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Part 3: Range 1 and Range 2 Interworking operation
with other radios
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Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

- x the first digit:
 - 1 presented to TSG for information;
 - 2 presented to TSG for approval;
 - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

The present document is part 3 of a multi-part Technical Specification (TS) covering the New Radio (NR) User Equipment (UE) conformance specification, which is divided in the following parts:

- TS 38.521-1 [8]: "NR; User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: Range 1 Standalone" (the present document).
- TS 38.521-2 [9]: "NR; User Equipment (UE) conformance specification; Radio transmission and reception; Part 2: Range 2 Standalone".
- TS 38.521-3: "NR; User Equipment (UE) conformance specification; Radio transmission and reception; Part 3: Range 1 and Range 2 Interworking operation with other radios".
- TS 38.521-4 [22]: "NR; User Equipment (UE) conformance specification; Radio transmission and reception; Part 4: Performance".
- TS 38.522 [14]: "NR; User Equipment (UE) conformance specification; Applicability of RF and RRM test cases".
- TS 38.533 [23]: "NR; User Equipment (UE) conformance specification; Radio resource management (RRM)".

1 Scope

The present document specifies the measurement procedures for the conformance test of the user equipment (UE) that contain RF characteristics for carrier aggregation between Range 1 and Range 2 and additional requirements due to NR non-standalone (NSA) operation mode with E-UTRA.

The requirements are listed in different clauses only if the corresponding parameters deviate. More generally, tests are only applicable to those mobiles that are intended to support the appropriate functionality. To indicate the circumstances in which tests apply, this is noted in the "*definition and applicability*" part of the test.

For example only Release 15 and later UE declared to support 5G-NR shall be tested for this functionality. In the event that for some tests different conditions apply for different releases, this is indicated within the text of the test itself.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

- [1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications"
- [2] 3GPP TS 38.101-1: "NR; User Equipment (UE) radio transmission and reception; Part 1: Range 1 Standalone".
- [3] 3GPP TS 38.101-2: "NR; User Equipment (UE) radio transmission and reception; Part 2: Range 2 Standalone".
- [4] 3GPP TS 38.101-3: "NR; User Equipment (UE) radio transmission and reception; Part 3: Range 1 and Range 2 Interworking operation with other radios".
- [5] 3GPP TS 36.101: "Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception".
- [6] 3GPP TS 38.508-1: "5GS; User Equipment (UE) conformance specification; Part 1: Common test environment".
- [7] 3GPP TR 38.905: "NR; Derivation of test points for radio transmission and reception conformance test cases".
- [8] 3GPP TS 38.521-1: "User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: Range 1 Standalone".
- [9] 3GPP TS 38.521-2: "NR; User Equipment (UE) conformance specification; Radio transmission and reception; Part 2: Range 2 Standalone".
- [10] 3GPP TS 36.521-1: "Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: Conformance testing"
- [11] 3GPP TS 36.508: "Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Packet Core (EPC); Common test environments for User Equipment (UE) conformance testing".
- [12] 3GPP TS 36.133: "Evolved Universal Terrestrial Radio Access (E-UTRA); Requirements for support of radio resource management".

- [13] 3GPP TS 36.211: "E-UTRA; Physical channels and modulation".
- [14] 3GPP TS 38.522: "NR; User Equipment (UE) conformance specification; Applicability of radio transmission, radio reception and radio resource management test cases".
- [15] Void.
- [16] 3GPP TS 38.306: "NR: User Equipment (UE) radio access capabilities".
- [17] 3GPP TS 36.331: "Evolved Universal Terrestrial Radio Access (E-UTRA); Radio Resource Control (RRC); Protocol specification".
- [18] 3GPP TS 38.331: "NR; Radio Resource Control (RRC) protocol specification".
- [19] 3GPP TS 38.213: "NR; Physical layer procedures for control".
- [20] 3GPP TS 36.213: "E-UTRA Physical layer procedures".
- [21] Recommendation ITU-R M.1545: "Measurement uncertainty as it applies to test limits for the terrestrial component of International Mobile Telecommunications-2000".
- [22] 3GPP TS 38.521-4: "NR; User Equipment (UE) conformance specification; Radio transmission and reception; Part 4: Performance".
- [23] 3GPP TS 38.533: "NR; User Equipment (UE) conformance specification; Radio resource management (RRM)".
- [24] 3GPP TS 36.214: "E-UTRA; Physical layer; Measurements".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [1].

Con-current operation: The simultaneous transmission and reception of sidelink and Uu interfaces while operation is agnostic of the service used on each interface.

3.2 Symbols

For the purposes of the present document, the following symbols apply:

| | |
|----------------------------|---|
| $\Delta R_{IB,c}$ | Allowed reference sensitivity relaxation due to support for CA or DC operation, for serving cell c . |
| $\Delta T_{IB,c}$ | Allowed maximum configured output power relaxation due to support for CA or DC operation, for serving cell c |
| $BW_{E-UTRA_Channel}$ | Channel bandwidth of E-UTRA carrier |
| $BW_{E-UTRA_Channel_CA}$ | Channel bandwidth of E-UTRA sub-block which is composed of intra-band contiguous CA E-UTRA carriers |
| $BW_{NR_Channel}$ | Channel bandwidth of NR carrier |
| $BW_{NR_Channel_CA}$ | Channel bandwidth of NR sub-block which is composed of intra-band contiguous CA NR carriers |
| $Cell(x)$ | Rounding upwards; $ceil(x)$ is the smallest integer such that $ceil(x) \geq x$ |
| $EN-DC_{ACLR}$ | The ratio of the filtered mean power centred on the aggregated sub-block bandwidth ENBW to the filtered mean power centred on an adjacent bandwidth of the same size ENBW |
| $E-UTRA_{ACLR}$ | E-UTRA ACLR |
| F_C | <i>RF reference frequency</i> for the carrier centre on the channel raster |
| F_{DL_low} | The lowest frequency of the downlink <i>operating band</i> |
| F_{DL_high} | The highest frequency of the downlink <i>operating band</i> |
| F_{UL_low} | The lowest frequency of the uplink <i>operating band</i> |
| F_{UL_high} | The highest frequency of the uplink <i>operating band</i> |
| $FOOB$ | The boundary between the NR out of band emission and spurious emission domains |

| | |
|--------------|---|
| L_{CRB} | Transmission bandwidth which represents the length of a contiguous resource block allocation expressed in units of resources blocks |
| Max() | The largest of given numbers |
| Min() | The smallest of given numbers |
| NR ACLR | NR ACLR |
| N_{RB} | Transmission bandwidth configuration, expressed in units of resource blocks |
| P_{CMAX} | The configured maximum UE output power |
| RB_{start} | Indicates the lowest RB index of transmitted resource blocks |
| W_{gap} | The sub-block gap between the two sub-blocks |

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [1].

| | |
|---------|---|
| ACLR | Adjacent Channel Leakage Ratio |
| ACS | Adjacent Channel Selectivity |
| A-MPR | Additional Maximum Power Reduction |
| BCS | Bandwidth Combination Set |
| CA | Carrier Aggregation |
| CC | Component Carrier |
| DC | Dual Connectivity |
| EN-DC | E-UTRA/NR DC |
| EIRP | Equivalent Isotropically Radiated Power |
| EVM | Error Vector Magnitude |
| FR | Frequency Range |
| ENBW | The aggregated bandwidth of an E-UTRA sub-block and an adjacent NR sub-block |
| ITS | Intelligent Transportation System |
| ITU-R | Radio communication Sector of the International Telecommunication Union |
| MBW | Measurement bandwidth defined for the protected band |
| MPR | Allowed maximum power reduction |
| MSD | Maximum Sensitivity Degradation |
| MCG | Master Cell Group |
| NR | New Radio |
| NS | Network Signalling |
| NSA | Non-Standalone, a mode of operation where operation of another radio is assisted with another radio |
| OOB | Out-of-band |
| OOBE | Out-of-band emission |
| OTA | Over The Air |
| PRB | Physical Resource Block |
| PSCCH | Physical Sidelink Control CHannel |
| PSSCH | Physical Sidelink Shared CHannel |
| RE | Resource Element |
| REFSENS | Reference Sensitivity |
| RF | Radio Frequency |
| Rx | Receiver |
| SCG | Secondary Cell Group |
| SCS | Subcarrier spacing |
| SEM | Spectrum Emission Mask |
| SL | Sidelink |
| SUL | Supplementary uplink |
| TDM | Time Division Multiplex |
| Tx | Transmitter |
| UE | User Equipment |
| UL-MIMO | Up Link Multiple Antenna transmission |
| ULSUP | Uplink sharing from UE perspective |
| V2X | Vehicle to Everything |

4 General

4.1 Relationship between minimum requirements and test requirements

TS 38.101-3 [4] is interwork specification for NR UE, covering RF characteristics and minimum performance requirements. Conformance to TS 38.101-3 [4] is demonstrated by fulfilling the test requirements specified in the present document.

The Minimum Requirements given in this specification make no allowance for measurement uncertainty (MU). The present document defines test tolerances (TT). These test tolerances are individually calculated for each test. The test tolerances are used to relax the minimum requirements in TS 38.101-3 [4] to create test requirements. For some requirements, including regulatory requirements, the test tolerance is set to zero.

The measurement results returned by the test system are compared - without any modification - against the test requirements as defined by various levels of "Shared Risk" principle as described below. a) Core specification value is not relaxed by any relaxation value (TT=0). For each single measurement, the probability of a borderline good UE being judged as FAIL equals the probability of a borderline bad UE being judged as PASS.

- Test tolerances equal to 0 (TT=0) are considered in this specification.
- b) Core specification value is relaxed by a relaxation value (TT>0). For each single measurement, the probability of a borderline bad UE being judged as PASS is greater than the probability of a borderline good UE being judged as FAIL.
 - Test tolerances lower than measurement uncertainty and greater than 0 ($0 < TT < MU$) are considered in this specification.
 - Test tolerances high up to measurement uncertainty ($TT = MU$) are considered in this specification which is also known as "Never fail a good DUT" principle.
- c) Core specification value is tightened by a stringent value (TT<0). For each single measurement, the probability of a borderline good UE being judged as FAIL is greater than the probability of a borderline bad UE being judged as PASS.
 - Test tolerances lower than 0 (TT<0) are not considered in this specification.

The "Never fail a good DUT" and the "Shared Risk" principles are defined in Recommendation ITU-R M.1545 [21].

4.2 Applicability of minimum requirements

- a) In TS 38.101-3 [4] the Minimum Requirements are specified as general requirements and additional requirements. Where the Requirement is specified as a general requirement, the requirement is mandated to be met in all scenarios
- b) For specific scenarios for which an additional requirement is specified, in addition to meeting the general requirement, the UE is mandated to meet the additional requirements.
- c) The spurious emissions power requirements are for the long-term average of the power. For the purpose of reducing measurement uncertainty, it is acceptable to average the measured power over a period of time sufficient to reduce the uncertainty due to the statistical nature of the signal.
- d) Terminal that supports EN-DC configuration shall meet E-UTRA requirements as specified in TS 36.101 [5] and NR requirements as in TS 38.101-1 [2] and TS 38.101-2 [3] unless otherwise specified in TS 38.101-3 [4].
- e) All the requirements for intra-band contiguous and non-contiguous EN-DC apply under the assumption of the same uplink-downlink and special subframe configurations in the E-UTRA and slot format indicated by UL-DL-configurationCommon and UL-DL-configurationDedicated in the NR for the EN-DC.
- f) For EN-DC combinations with CA configurations for E-UTRA and/or NR, all the requirements for E-UTRA and/or NR all the requirements for E-UTRA and/or NR intra-band contiguous and non-contiguous CA apply

under the assumption of the same slot format indicated by UL-DL-configurationCommon and UL-DL-configurationDedicated in the PSCell and SCells for NR and the same uplink-downlink and special subframe configurations in PCell and SCells for E-UTRA.

A terminal which supports an EN-DC configuration shall support:

- If any subsets of the EN-DC configuration do not specify its own bandwidth combination sets in 5.3B, then the terminal shall support the same E-UTRA bandwidth combination sets it signals the support for in E-UTRA CA configuration part of E-UTRA – NR DC and shall support the same NR bandwidth combination sets it signals the support for in NR CA configuration part of E-UTRA – NR DC.
- Else if one of the subsets of the EN-DC configuration specify its own bandwidth combination sets in 5.3B, then the terminal shall support a product set of channel bandwidth for each band specified by E-UTRA bandwidth combination sets, NR bandwidth combination sets, and EN-DC bandwidth combination sets it signals the support.

A terminal which supports an inter-band EN-DC configuration with a certain UL configuration shall support the all lower order DL configurations of the lower order EN-DC combinations, which have this certain UL configuration and the fallbacks of this UL configuration.

A terminal which supports CA or DC configurations, which include FR2 intra-band CA combinations with multiple subblocks, where at least one of the subblocks consists of a contiguous CA combination, is not required to support all possible fallback combinations but can directly fall back to a single FR2 carrier. Deactivating carriers within the CA or DC combination is still possible.

Terminal that supports inter-band NR-DC between FR1 and FR2 configuration shall meet the requirements for corresponding CA configuration (suffix A), unless otherwise specified.

4.3 Specification suffix information

Unless stated otherwise the following suffixes are used for indicating at 2nd level clause, shown in Table 4.3-1.

Table 4.3-1: Definition of suffixes

| Clause suffix | Variant |
|---------------|--|
| None | Single Carrier |
| A | Carrier Aggregation (CA) between FR1 and FR2 |
| B | Dual-Connectivity (DC) with and without SUL including UL sharing from UE perspective, inter-band NR DC between FR1 and FR2 |
| D | UL MIMO |
| E | V2X |

4.4 Test points analysis

The information on test point analysis and test point selection including number of test points for each test case is shown in TR 38.905 [7] clause 4.3.

4.5 Applicability and test coverage rules

- (1) The applicability and test coverage rules for Non-Standalone (NSA) only capable devices shall include the following:
 - (a) For each NR band in a device; test all the EN-DC exception test requirements as per test procedures in TS 38.521-3.
 - (b) Test all the EN-DC FR2 non-exception test requirements in TS 38.521-3 with test procedures which refer appropriately back to TS 38.521-2 [9] for each NR band. Test only one EN-DC combination per FR2 band

for each EN-DC configuration as defined in clause 5.5B of TS 38.101-3 [4] using LTE anchor agnostic approach.

- (c) Test all the EN-DC FR1 non-exception test requirements in TS 38.521-3 with test procedures which refer appropriately back to TS 38.521-1 [8] for each NR band. Test only one EN-DC combination per FR1 band for each EN-DC configuration as defined in clause 5.5B of 38.101-3 [4] using LTE anchor agnostic approach.
- (2) The applicability and test coverage rules for Standalone (SA) and NSA capable devices shall include the following:
- (a) For each NR band in a device, test all the EN-DC exception test requirements as per test procedures in TS 38.521-3.
 - (b) Test all the Standalone FR2 test requirements as per test procedures in TS 38.521-2 [9] for each NR band. This also fulfils coverage for all non-exception EN-DC FR2 test requirements for that NR band and need not be retested. If Standalone FR2 cannot be tested (due to test case not being complete), then test in EN-DC mode following (1)(b) above.
 - (c) Test all the Standalone FR1 test requirements as per test procedures in TS 38.521-1 [8] for each NR band. This also fulfils coverage for all non-exception EN-DC FR1 test requirements for that NR band and need not be retested. If Standalone FR1 cannot be tested (due to test case not being complete), then test in EN-DC mode following (1)(c) above.

4.5.1 Test coverage across 5G NR architecture options

The test cases in this specification cover both Standalone (FR1+FR2 CA without DC) as well as Non-Standalone FR1 and FR2 (E-UTRA and 5G NR interworking) testing. Below shall be the understanding with respect to coverage across 5G NR architecture options:

- 1) Unless otherwise stated within the test case, it shall be understood that test requirements are agnostic of the NSA architecture option configured within the test. The test coverage across NSA options shall be considered fulfilled by execution of the NSA test case in one NSA option. Subsequently the test execution and test results can be leveraged to other NSA options.
- 2) Only one SA or NSA architecture option type is identified and utilized in the definition of each test case within this test specification. NSA test cases are configured using *Connectivity EN-DC* i.e. NSA Option 3 and Standalone (SA) test cases are configured using *Connectivity NR* i.e. SA Option 2 which shall be the default architecture options used for NSA and SA test execution respectively.
- 3) If a UE does not support NSA Option 3, any other supported NSA option can be configured to execute the test. This is accomplished by appropriately picking the generic procedure parameter from Table 4.5.1-2. The leverage rule detailed in (1) would apply.

Table 4.5.1-1: Generic procedure parameter summary for SA

| Generic Procedure Parameter to use in Initial Conditions | | Description | 5G NR SA Architecture Option supported by UE |
|---|--------|----------------------------|---|
| Connectivity | NR | NG-RAN NR Radio Access | SA Option 2 |
| | E-UTRA | NG-RAN E-UTRA Radio Access | SA Option 5 |

Editor's note: Any additional test config details needed for SA Option 5 is FFS.

Table 4.5.1-2: Generic procedure parameter summary for NSA

| Generic Procedure Parameter to use in Initial Conditions | | Description | 5G NR NSA Architecture Option supported by UE |
|--|---------|------------------------------------|---|
| Connectivity | NSA | | |
| | EN-DC | E-UTRA-NR Dual Connectivity | NSA Option 3 |
| | NE-DC | NR-E-UTRA Dual Connectivity | NSA Option 4 |
| | NGEN-DC | NG-RAN E-UTRA-NR Dual Connectivity | NSA Option 7 |

Editor's note: Any additional test config details needed for NSA Options 4 and 7 are FFS.

4.6 E-UTRA configuration for EN-DC FR1 tests applying the E-UTRA anchor-agnostic approach

This clause applies to EN-DC test cases where E-UTRA anchor needs to be configured as per the anchor-agnostic approach outlined in clauses 6.1 and 7.1 of TS 38.101-3 [4]. The LTE anchor-agnostic approach is defined as measurements on the NR carrier under conditions where the LTE anchor resources do not interfere with NR operation. The configuration defined in this clause ensures establishment of such conditions.

For baseline configuration, the E-UTRA carrier will be configured for each test case in clauses 6 and 7 as defined in the equivalent standalone E-UTRA test in TS 36.521-1 [10]. However, the below exceptions defined in Table 4.6-1, 4.6-2, 4.6-3, 4.6-4 and 4.6-5 are applied to ensure that the E-UTRA anchor resources do not interfere with NR operation.

For EN-DC within FR1 band combinations with multiple E-UTRA component carriers, it is sufficient to configure any one E-UTRA carrier from the carrier group whenever it is determined that anchor agnostic approach can be applied. Unless otherwise stated, the number of component carriers (CCs) listed in the test case titles of Clause 6 and clause 7 shall refer to the number of component carriers configured within the test case.

Table 4.6-1: E-UTRA configuration for EN-DC FR1 tests applying anchor agnostic approach

| Parameter | Value | Comments |
|--|---|---|
| Test Frequency during and after connection setup | Mid (See Table 4.6-2) | As defined in TS 36.508 for the LTE band under test |
| Bandwidth during and after connection setup | 5 MHz (See Table 4.6-2) | Supported by all LTE bands. |
| DL signal levels during connection setup | RS EPRE -85.0 dBm/15kHz | DL physical channels as defined in Annex C0, C.1, C.2 and Annex C.3 of TS 36.521-1 [10]. TS 36.521-1 [10] annex C.0 defines the default DL power level of RS EPRE to be -85dBm/15kHz. |
| UL Signal levels during connection setup | PUSCH Power | Attained by enabling open loop power control and setting up UL signal levels according to Annex H.0, H.2 and H.3 of TS 36.521-1 [10]. |
| DL/UL RMC after connection setup | 0 RB allocation on both DL and UL (see Table 4.6-2) | Once the LTE link is established, then LTE Tx can be restricted by configuring 0 RB allocation on DL and UL. <i>TimeAlignmentTimerDedicated</i> IE to be set to infinity to ensure UE doesn't look for TA adjustments (See Table 4.6-5) |
| CQI Reports and SRS after connection setup | Disabled (See Table 4.6-3 and 4.6-4) | Disable periodic and aperiodic CQI reports to ensure none of these transmissions occur on the LTE uplink. Since LTE transmissions could easily exceed spurious emissions limits, tests that are intended to measure RF parameters on the NR should simply avoid LTE transmit altogether. |

Table 4.6-2: E-UTRA Test Configuration Table

| E-UTRA Test Parameters | | | | | |
|--------------------------|-----------------------|------------|---------------|------------|---------------|
| E-UTRA Channel Bandwidth | E-UTRA Test Frequency | Downlink | | Uplink | |
| | | Modulation | RB allocation | Modulation | RB allocation |
| 5 MHz ² | MidRange ¹ | N/A | 0 | N/A | 0 |

NOTE 1: E-UTRA Test Frequency as specified in TS 36.508 [11] clause 4.3.1.
 NOTE 2: For EN-DC Intra-band tests that need to apply E-UTRA anchor agnostic approach, refer to and pick applicable E-UTRA channel bandwidth from clause 5.3B.1 and indicate within test case if it is different than 5 MHz.

Table 4.6-3: CQI-ReportConfig-DEFAULT: Additional E-UTRA Anchor Configuration

| Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-2 CQI-ReportConfig-DEFAULT | | | |
|---|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| CQI-ReportConfig-DEFAULT ::= SEQUENCE { | | | |
| cqi-ReportModeAperiodic | NOT PRESENT | | |
| cqi-ReportPeriodic | NOT PRESENT | | |
| } | | | |

Table 4.6-4: PhysicalConfigDedicated-DEFAULT: Additional E-UTRA Anchor Configuration

| Derivation Path: TS 36.508 [7] clause 4.8.2, Table 4.8.2.1.6-1 PhysicalConfigDedicated-DEFAULT | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| PhysicalConfigDedicated-DEFAULT ::= SEQUENCE { | | | |
| soundingRS-UL-ConfigDedicated | Not present | | RBC |
| } | | | |

Table 4.6-5: MAC-MainConfig-RBC: Additional E-UTRA Anchor Configuration

| Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1 MAC-MainConfig-RBC | | | |
|---|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| timeAlignmentTimerDedicated | Infinity | | |

4.7 E-UTRA configuration for EN-DC FR2 tests applying the E-UTRA anchor-agnostic approach

This clause applies to EN-DC test cases where E-UTRA anchor needs to be configured as per the anchor-agnostic approach outlined in clauses 6.1 and 7.1 of TS 38.101-3 [4]. The LTE anchor-agnostic approach is defined as measurements on the NR carrier under conditions where the LTE anchor resources do not interfere with NR operation. The configuration defined in this clause ensures establishment of such conditions.

For baseline configuration, the E-UTRA carrier will be configured for each test case in clauses 6 and 7 as defined in the equivalent standalone E-UTRA test in TS 36.521-1 [10]. However, the below exceptions defined in Table 4.7-1 to 4.7-7 are applied to ensure that the E-UTRA anchor resources do not interfere with NR operation.

Since the E-UTRA link is always a functional link when testing EN-DC including FR2 band combinations, it is sufficient to configure any one E-UTRA carrier from the carrier group, irrespective of the number of E-UTRA carriers in the EN-DC combination under test. Unless otherwise stated, the number of component carriers (CCs) listed in the test case titles of Clause 6 and clause 7 shall refer to the number of component carriers configured within the test case.

Table 4.7-1: E-UTRA configuration for EN-DC FR2 tests applying anchor agnostic approach

| Parameter | Value | Comments |
|--|---|--|
| Test Frequency during and after connection setup | Mid (See Table 4.7-2) | As defined in TS 36.508 for the LTE band under test |
| Bandwidth during and after connection setup | 5 MHz (See Table 4.7-2) | Supported by all LTE bands. |
| DL signal levels | See table 4.7-3 | DL physical channels as defined in Annex C0, C.1, C.2 and Annex C.3 of TS 36.521-1 [10]. |
| UL Signal levels for connection setup and UBF transmission | PUSCH Power | Attained by enabling open loop power control and setting up UL signal levels according to Annex H.0, H.2 and H.3 of TS 36.521-1 [10] with the exception for power control message exception defined in Table 4.7-5 |
| DL/UL RMC after connection setup except for UBF transmission | 0 RB allocation on both DL and UL (see Table 4.7-2) | Once the LTE link is established, then LTE Tx can be restricted by configuring 0 RB allocation on DL and UL. <i>TimeAlignmentTimerDedicated</i> IE to be set to infinity to ensure UE doesn't look for TA adjustments (See Table 4.7-7) |
| CQI Reports and SRS after connection setup | Disabled (See Table 4.7-4 and 4.7-6) | Disable periodic and aperiodic CQI reports to ensure none of these transmissions occur on the LTE uplink. Since LTE transmissions could easily exceed spurious emissions limits, tests that are intended to measure RF parametrics on the NR should simply avoid LTE transmit altogether. |

Table 4.7-2: E-UTRA Test Configuration Table

| E-UTRA Test Parameters | | | | | |
|--------------------------|-----------------------|------------|---------------|------------|---------------|
| E-UTRA Channel Bandwidth | E-UTRA Test Frequency | Downlink | | Uplink | |
| | | Modulation | RB allocation | Modulation | RB allocation |
| 5 MHz ² | MidRange ¹ | N/A | 0 | N/A | 0 |

NOTE 1: E-UTRA Test Frequency as specified in TS 36.508 [11] clause 4.3.1
 NOTE 2: For EN-DC Intra-band tests that need to apply E-UTRA anchor agnostic approach, refer to and pick applicable E-UTRA channel bandwidth from clause 5.3B.1 and indicate within test case if it is different than 5 MHz.

Table 4.7-3: Default Downlink power levels for E-UTRA anchor

| | Unit | Band Group | Channel Bandwidth | | | | | |
|---------|-----------|----------------|-------------------|-------|----------|-------|--------|--------|
| | | | 1.4 MHz | 3 MHz | 5MHz | 10MHz | 15 MHz | 20 MHz |
| RS EPRE | dBm/15kHz | FDD_A, TDD_A | N/A | N/A | ≥ -120.0 | N/A | N/A | N/A |
| | | FDD_B1, TDD_B1 | N/A | N/A | ≥ -119.5 | N/A | N/A | N/A |
| | | FDD_C, TDD_C | N/A | N/A | ≥ -119.0 | N/A | N/A | N/A |
| | | FDD_D, TDD_D | N/A | N/A | ≥ -118.5 | N/A | N/A | N/A |
| | | FDD_E, TDD_E | N/A | N/A | ≥ -118.0 | N/A | N/A | N/A |
| | | FDD_G, TDD_G | N/A | N/A | ≥ -117.0 | N/A | N/A | N/A |
| | | FDD_H, TDD_H | N/A | N/A | ≥ -116.5 | N/A | N/A | N/A |
| | | FDD_N, TDD_N | N/A | N/A | ≥ -113.5 | N/A | N/A | N/A |

NOTE 1: The power level is specified at RSRP reference point as defined in TS 36.214 [24]
 NOTE 2: E-UTRA Band groups are defined in TS 36.133 [12] clause 3.5.1.

Table 4.7-4: CQI-ReportConfig-DEFAULT: Additional E-UTRA Anchor Configuration

| Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-2 CQI-ReportConfig-DEFAULT | | | |
|---|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| CQI-ReportConfig-DEFAULT ::= SEQUENCE { | | | |
| cqi-ReportModeAperiodic | NOT PRESENT | | |
| cqi-ReportPeriodic | NOT PRESENT | | |
| } | | | |

Table 4.7-5: UplinkPowerControlCommon-DEFAULT : Additional E-UTRA Anchor Configuration

| Derivation Path: TS 36.508 [7] clause 4.6.3, UplinkPowerControlCommon-DEFAULT | | | |
|---|---------------|--------------------------------------|-----------|
| Information Element | Value/remark | Comment | Condition |
| UplinkPowerControlCommon-DEFAULT ::= SEQUENCE { | | | |
| p0-NominalPUSCH | -60 (-60 dBm) | To attain maximum power from the DUT | |
| } | | | |

Table 4.7-6: PhysicalConfigDedicated-DEFAULT: Additional E-UTRA Anchor Configuration

| Derivation Path: TS 36.508 [7] clause 4.8.2, Table 4.8.2.1.6-1 PhysicalConfigDedicated-DEFAULT | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| PhysicalConfigDedicated-DEFAULT ::= SEQUENCE { | | | |
| soundingRS-UL-ConfigDedicated | Not present | | RBC |
| } | | | |

Table 4.7-7: MAC-MainConfig-RBC: Additional E-UTRA Anchor Configuration

| Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1 MAC-MainConfig-RBC | | | |
|---|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| timeAlignmentTimerDedicated | Infinity | | |

5 Operating bands and channel arrangement

5.1 General

The channel arrangements presented in this clause are based on the operating bands and channel bandwidths defined in the present release of specifications.

NOTE: Other operating bands and channel bandwidths may be considered in future releases.

Requirements throughout the RF specifications are in many cases defined separately for different frequency ranges (FR). The frequency ranges in which NR can operate according to this version of the specifications are identified as described in Table 5.1-1.

Table 5.1-1: Definition of frequency ranges

| Frequency range designation | Corresponding frequency range |
|-----------------------------|-------------------------------|
| FR1 | 410 MHz – 7125 MHz |
| FR2 | 24250 MHz – 52600 MHz |

The present specification covers band combinations including

- at least one FR1 operating band and one FR2 operating band for carrier aggregation and dual connectivity operations;
- at least one E-UTRA operating band for dual connectivity operations.

5.2 Operating bands

NR is designed to operate in FR1 operating bands defined in TS 38.101-1 [2] and FR2 operating bands defined in TS 38.101-2 [3]. E-UTRA is designed to operate in operating bands defined in TS 36.101 [4].

5.2A Operating bands for CA

5.2A.1 Inter-band CA between FR1 and FR2

NR carrier aggregation is designed to operate in the operating bands defined in Table 5.2A.1-1. The band combinations include at least one FR1 operating band and one FR2 operating band.

Table 5.2A.1-1: Band combinations for inter-band NR CA between FR1 and FR2

| NR CA Band | NR Band |
|---|-----------|
| CA_n8-n258 | n8, n258 |
| CA_n71-n257 ¹ | n71, n257 |
| CA_n77-n257 ¹ | n77, n257 |
| CA_n78-n257 ¹ | n78, n257 |
| CA_n79-n257 ¹ | n79, n257 |
| NOTE 1: Applicable for UE supporting inter-band carrier aggregation with mandatory simultaneous Rx/Tx capability. | |

5.2B Operating bands for DC

5.2B.1 General

The operating bands are specified in clause 5.5B for operation with EN-DC, NGEN-DC, NE-DC or NR-DC configured.

5.2B.2 to 5.2B.7 Void

5.2E Operating bands for V2X

5.2E.1 Intra-band V2X bands

NR V2X operation is designed to operate concurrent with E-UTRA uplink/downlink or sidelink on the operating bands combinations listed in Table 5.2E.1-1.

Table 5.2E.1-1: Intra-band V2X operating bands

| V2X con-current operating band | E-UTRA or NR Band | Interface |
|--------------------------------|-------------------|-----------|
| V2X_47_n47 ¹ | 47 | PC5 |
| | n47 | PC5 |

NOTE 1: Only single switched SL is supported.

5.2E.2 Inter-band V2X bands

NR V2X operation is designed to operate concurrent with E-UTRA uplink/downlink on the operating bands combinations listed in Table 5.2E.2-1.

Table 5.2E.2-1: Inter-band con-current V2X operating bands

| E-UTRA-NR V2X Band Combination | E-UTRA or NR Band | Interface |
|--------------------------------|-------------------|-----------|
| V2X_20_n38 | 20 | Uu |
| | n38 | PC5 |
| V2X_n71_47 | 47 | PC5 |
| | n71 | Uu |
| V2X_n71_(n) 47 ¹ | 47 | PC5 |
| | n47 | PC5 |
| | n71 | Uu |

NOTE 1: Only single switched SL in ITS band is supported.

5.3 UE Channel bandwidth

5.3A UE Channel bandwidth for CA

5.3A.1 Inter-band CA between FR1 and FR2

For inter-band NR CA between FR1 and FR2, a carrier aggregation configuration is a combination of operating bands, each supporting a carrier aggregation bandwidth class as specified in clause 5.3A.5 of TS 38.101-1 [2] and clause 5.3A.4 of TS 38.101-2 [3] independently.

5.3B UE Channel bandwidth for EN-DC

For intra-band contiguous EN-DC, the aggregated channel bandwidth is sum of the individual NR and E-UTRA channel bandwidths assuming nominal EN-DC channel with 0 kHz offset spacing as specified in clause 5.4.

$$\text{ENBW} = \text{BW}_{\text{NR_Channel}} + \text{BW}_{\text{E-UTRA_Channel}}$$

In the case where the NR sub-block and/or the E-UTRA sub-block itself is composed of intra-band contiguous CA carriers, the EN-DC aggregated channel bandwidth is the sum of the aggregated channel bandwidths of the NR and E-UTRA sub-blocks assuming nominal EN-DC channel spacing between the NR sub-block and E-UTRA sub-block.

$$\text{ENBW} = \text{BW}_{\text{NR_Channel_CA}} + \text{BW}_{\text{E-UTRA_Channel_CA}}$$

For NR inter-band dual connectivity specified in 5.5B.7, the corresponding NR CA configurations in 5.5A.1, i.e., dual uplink inter-band carrier aggregation between FR1 and FR2 with uplink assigned to two NR bands, are applicable to Dual Connectivity.

NOTE: Requirements for the dual connectivity configurations are defined in the clause corresponding NR uplink CA between FR1 and FR2 configurations, unless otherwise specified.

Intra-band contiguous EN-DC configurations are defined using intra-band contiguous EN-DC bandwidth class notation DC_(n)Xyz where the first EN-DC bandwidth class letter indicates the number of contiguous E-UTRA carriers and the second EN-DC bandwidth class letter indicates the number of contiguous NR carriers for the EN-DC combination of E-UTRA Band X and NR Band nX. Applicable contiguous intraband EN-DC bandwidth classes are listed in Table 5.3B-1

Table 5.3B-1: Intra-band contiguous EN-DC bandwidth classes

| Intra-band contiguous EN-DC bandwidth class | Number of contiguous CC | |
|---|-------------------------|----|
| | E-UTRA | NR |
| AA | 1 | 1 |
| CA | 2 | 1 |
| DA | 3 | 1 |

5.3B.1 Intra-band EN-DC in FR1

5.3B.1.1 General

The requirements for intra-band EN-DC in this specification are defined for EN-DC configurations with associated bandwidth combination sets.

For each EN-DC configuration, requirements are specified for all bandwidth combinations contained in a *bandwidth combination set*, which is indicated per supported band combination in the UE radio access capability. A UE can indicate support of several bandwidth combination sets per band combination.

5.3B.1.2 BCS for Intra-band contiguous EN-DC

For intra-band contiguous EN-DC, an EN-DC configuration is a single operating band supporting an intra-band contiguous EN-DC bandwidth class.

Bandwidth combination sets for intra-band contiguous EN-DC are specified in Table 5.3B.1.2-1.

Table 5.3B.1.2-1: EN-DC configurations and bandwidth combination sets defined for intra-band contiguous EN-DC

| E-UTRA – NR configuration / Bandwidth combination set | | | | | | |
|---|-----------------------------|---|---|---|------------------------------------|---------------------------|
| Downlink EN-DC configuration | Uplink EN-DC configurations | Component carriers in order of increasing carrier frequency | | | Maximum aggregated bandwidth (MHz) | Bandwidth combination set |
| | | Channel bandwidths for E-UTRA carrier (MHz) | Channel bandwidths for NR carrier (MHz) | Channel bandwidths for E-UTRA carrier (MHz) | | |

| | | | | | | | | | |
|---|---|----------|------------------------|----------|-----|---|--|--|--|
| DC_(n)41AA | DC_(n)41AA | 20 | 40, 60, 80, 100 | | 120 | 0 | | | |
| | | | 40, 60, 80, 100 | 20 | | | | | |
| | | 20 | 40, 50, 60, 80, 100 | | 120 | 1 | | | |
| | | | 40, 50, 60, 80, 100 | 20 | | | | | |
| DC_(n)41CA | DC_(n)41AA ¹ , DC_41A_n41A ² | 20+20 | 40, 60, 80, 100 | | 140 | 0 | | | |
| | | | 40, 60, 80, 100 | 20+20 | | | | | |
| | | 20+20 | 40, 50, 60, 80, 100 | | 140 | 1 | | | |
| | | | 40, 50, 60, 80, 100 | 20+20 | | | | | |
| DC_(n)41DA | DC_(n)41AA ¹ , DC_41A_n41A ² | 20+20+20 | 40, 60, 80, 100 | | 160 | 0 | | | |
| | | | 40, 60, 80, 100 | 20+20+20 | | | | | |
| | | 20+20+20 | 40, 50, 60, 80, 100 | | 160 | 1 | | | |
| | | | 40, 50, 60, 80, 100 | 20+20+20 | | | | | |
| DC_(n)71AA | DC_(n)71AA | 15 | 5 | | 20 | 0 | | | |
| | | 10 | 5, 10 | | | | | | |
| | | 5 | 5, 10, 15 | | | | | | |
| | | | 5 | 15 | | | | | |
| | | | 5, 10 | 10 | | | | | |
| | | | 5, 10, 15 | 5 | | | | | |
| NOTE 1: Void | | | | | | | | | |
| NOTE 2: Void | | | | | | | | | |
| NOTE 3: Void | | | | | | | | | |
| NOTE 4: The channel bandwidths for E-UTRA or NR carrier should be at least supported in one of the BCS indicated in E-UTRA bandwidth combination sets or NR bandwidth combination sets if reported. | | | | | | | | | |

5.3B.1.3 BCS for Intra-band non-contiguous EN-DC

For intra-band non-contiguous EN-DC, an EN-DC configuration is a single operating band supporting E-UTRA and NR carriers, where E-UTRA configuration is indicated by using E-UTRA CA bandwidth class as defined in TS 36.101 [5] and NR configuration is indicated by using NR CA bandwidth class as defined in TS 38.101-1 [2].

Requirements for intra-band non-contiguous EN-DC are defined for the EN-DC configurations and bandwidth combination sets specified in Table 5.3B.1.3-1.

Table 5.3B.1.3-1: EN-DC configurations and bandwidth combination sets defined for intra-band non-contiguous EN-DC

| E-UTRA – NR configuration / Bandwidth combination set | | | | | | |
|---|--------------------------------|--|--|--|---|---------------------------------|
| Downlink EN-DC configuration | Uplink EN-DC configurations | Component carriers in order of increasing carrier frequency | | | Maximum aggregated bandwidth (MHz) | Bandwidth combination set |
| | | Channel bandwidths for E-UTRA carrier (MHz) | Channel bandwidths for NR carrier (MHz) | Channel bandwidths for E-UTRA carrier (MHz) | | |
| | | | | | | |

| | | | | | | |
|-------------|--------------------------|----------|--------------------------|---------------|-----|---|
| DC_3A_n3A | DC_3A_n3A ⁽¹⁾ | | 5, 10, 15, 20, 25, 30 | 5, 10, 15, 20 | 50 | 0 |
| DC_41A_n41A | DC_41A_n41A | 20 | 40, 60, 80,100 | | 120 | 0 |
| | | | 40, 60, 80,100 | 20 | | |
| | | 20 | 40, 50, 60, 80,100 | | 120 | 1 |
| | | | 40, 50, 60, 80,100 | 20 | | |
| DC_41C_n41A | DC_41A_n41A | 20+20 | 40, 60, 80,100 | | 140 | 0 |
| | | | 40, 60, 80,100 | 20+20 | | |
| | | 20+20 | 40, 50, 60, 80,100 | | 140 | 1 |
| | | | 40, 50, 60, 80,100 | 20+20 | | |
| DC_41D_n41A | DC_41A_n41A | 20+20+20 | 40, 60, 80,100 | | 160 | 0 |
| | | | 40, 60, 80,100 | 20+20+20 | | |
| | | 20+20+20 | 40, 50, 60, 80,100 | | 160 | 1 |
| | | | 40, 50, 60, 80,100 | 20+20+20 | | |

NOTE 1: Only single switched UL is supported in Rel-15.

5.3E UE Channel bandwidth for V2X

The requirements specified in clause 5.3B are applicable to NR V2X UE.

5.3E.1 Intra-band contiguous V2X in FR1

For intra-band contiguous E-UTRA NR V2X UE, an EN-DC bandwidth class in Table 5.3.B-1 are considered to specify the V2X transmission/reception configurations.

Bandwidth combination sets and V2X transmission/reception configurations for intra-band contiguous V2X UE are specified in Table 5.3E.1-1.

Table 5.3E.1-1: E-UTRA-NR V2X configurations and bandwidth combination sets for intra-band contiguous V2X UE

| V2X configuration | SL transmission band | Channel bandwidths for E-UTRA carrier (MHz) | Channel bandwidths for NR carrier (MHz) | Maximum aggregated bandwidth (MHz) | Bandwidth combination set |
|-------------------|-------------------------------|---|---|------------------------------------|---------------------------|
| V2X_(n)47AA | E-UTRA Band 47 or NR band n47 | 10 | 10,20,30,40 | 60 | 0 |
| | | 20 | 10,20,30,40 | | |

5.3E.2 Intra-band non-contiguous V2X in FR1

For intra-band non-contiguous E-UTRA NR V2X UE, an EN-DC bandwidth class in Table 5.3.B-1 are considered to specify the V2X transmission/reception configurations.

Bandwidth combination sets and SL transmission/reception configurations for intra-band non-contiguous V2X are specified in Table 5.3E.2-1.

Table 5.3E.2-1: E-UTRA-NR V2X configurations and bandwidth combination sets for intra-band non-contiguous V2X UE

| V2X configuration | SL transmission band | Channel bandwidths for E-UTRA carrier (MHz) | Channel bandwidths for NR carrier (MHz) | Maximum aggregated bandwidth (MHz) | Bandwidth combination set |
|-------------------|-------------------------------|---|---|------------------------------------|---------------------------|
| V2X_47A_n47A | E-UTRA Band 47 or NR band n47 | 10 | 10,20,30,40 | 60 | 0 |
| | | 20 | 10,20,30,40 | | |

5.3E.3 Inter-band V2X in FR1

For inter-band E-UTRA NR V2X UE, the each channel bandwidth for inter-band V2X operations in FR1 is specified in TS 36.101 [4] and TS 38.101-1 [2], respectively.

5.4 Void

5.4A Channel arrangement for CA

The channel arrangement for CA operations in FR1 and FR2 as specified in TS 38.101-1 [2] and TS 38.101-2 [3], respectively.

5.4B Channel arrangement for DC

The channel arrangement for intra-band EN-DC operations in FR1 is specified in TS 36.101 [5] and TS 38.101-1 [2], respectively.

5.4B.1 Channel spacing for intra-band EN-DC carriers

The spacing between carriers will depend on the deployment scenario, the size of the frequency block available and the channel bandwidths. The nominal channel spacing between an E-UTRA carrier and an adjacent NR carrier for intra-band contiguous EN-DC is defined as following:

- For NR operating bands with 100 kHz channel raster,

$$\text{Nominal Channel spacing} = (\text{BW}_{\text{E-UTRA_Channel}} + \text{BW}_{\text{NR_Channel}})/2$$

- For NR operating bands with 15 kHz channel raster,

$$\text{Nominal Channel spacing} = (\text{BW}_{\text{E-UTRA_Channel}} + \text{BW}_{\text{NR_Channel}})/2 + \{-5\text{kHz}, 0\text{kHz}, 5\text{kHz}\}$$

- For NR operating bands with 30 kHz channel raster,

$$\text{Nominal Channel spacing} = (\text{BW}_{\text{E-UTRA_Channel}} + \text{BW}_{\text{NR_Channel}})/2 + \{-10\text{kHz}, 0\text{kHz}, 10\text{kHz}\}$$

where $\text{BW}_{\text{E-UTRA_Channel}}$ and $\text{BW}_{\text{NR_Channel}}$ are the channel bandwidths of the E-UTRA and NR carriers. The channel spacing can be adjusted depending on the channel raster to optimize performance in a particular deployment scenario.

For intra-band non-contiguous EN-DC the channel spacing between E-UTRA and NR carriers shall be larger than the nominal channel spacing defined in this clause.

5.5 Configuration

5.5A Configuration for CA

5.5A.1 Inter-band CA configurations between FR1 and FR2

Table 5.5A.1-1: Inter-band CA configurations and bandwidth combinations sets between FR1 and FR2 (two bands)

| NR CA configuration | Uplink CA configuration | NR Band | SCS (kHz) | 5 MHz | 10 MHz | 15 MHz | 20 MHz | 40 MHz | 50 MHz | 60 MHz | 80 MHz | 100 MHz | 200 MHz | 400 MHz | Bandwidth combination set |
|---------------------|-------------------------|---------|-----------|-------|--------|--------|--------|--------|--------|--------|--------|---------|---------|---------|---------------------------|
| CA_n8A-n258A | CA_n8A-n258A | n8 | 15 | Yes | Yes | Yes | Yes | | | | | | | | 0 |
| | | | 30 | | Yes | Yes | Yes | | | | | | | | |
| | | | 60 | | | | | | | | | | | | |
| | | n258 | 60 | | | | | | Yes | | | Yes | Yes | | |
| | | | 120 | | | | | | Yes | | | Yes | Yes | Yes | |
| | | n71 | 15 | Yes | Yes | Yes | Yes | | | | | | | | 0 |
| | | | 30 | | Yes | Yes | Yes | | | | | | | | |
| | | | 60 | | | | | | | | | | | | |
| | | | 60 | | | | | | Yes | | | Yes | Yes | | |
| | | n257 | 120 | | | | | | Yes | | | Yes | Yes | Yes | |
| | | | 15 | | Yes | Yes | Yes | Yes | Yes | | | | | | 0 |
| | | | 30 | | Yes | | | |
| | | | 60 | | Yes | | | |
| | | n77 | 60 | | | | | | Yes | | | Yes | Yes | | 0 |
| | | | 120 | | | | | | Yes | | | Yes | Yes | Yes | |
| | | | 15 | | Yes | Yes | Yes | Yes | Yes | | | | | | |
| | | | 30 | | Yes | Yes | | |
| | | n257 | 60 | | Yes | Yes | | 0 |
| | | | 120 | | | | | | Yes | | | Yes | Yes | Yes | |
| | | | 15 | | | | | | Yes | | | | | | |
| | | | 30 | | | | | | Yes | | | | | | |
| | | n77 | 60 | | | | | | Yes | | | | | | 0 |
| | | | 120 | | | | | | Yes | | | | | | |
| | | | 15 | | | | | | Yes | | | | | | |
| | | | 30 | | | | | | Yes | | | | | | |
| | | n257 | 60 | | | | | | Yes | | | | | | 0 |
| | | | 120 | | | | | | Yes | | | | | | |
| | | | 15 | | | | | | Yes | | | | | | |
| | | | 30 | | | | | | Yes | | | | | | |
| | | n77 | 60 | | | | | | Yes | | | | | | 0 |
| | | | 120 | | | | | | Yes | | | | | | |
| | | | 15 | | | | | | Yes | | | | | | |
| | | | 30 | | | | | | Yes | | | | | | |
| | | n257 | 60 | | | | | | Yes | | | | | | 0 |
| | | | 120 | | | | | | Yes | | | | | | |
| | | | 15 | | | | | | Yes | | | | | | |
| | | | 30 | | | | | | Yes | | | | | | |
| | | n77 | 60 | | | | | | Yes | | | | | | 0 |
| | | | 120 | | | | | | Yes | | | | | | |
| | | | 15 | | | | | | Yes | | | | | | |
| | | | 30 | | | | | | Yes | | | | | | |
| | | n257 | 60 | | | | | | Yes | | | | | | 0 |
| | | | 120 | | | | | | Yes | | | | | | |
| | | | 15 | | | | | | Yes | | | | | | |
| | | | 30 | | | | | | Yes | | | | | | |
| | | n77 | 60 | | | | | | Yes | | | | | | 0 |
| | | | 120 | | | | | | Yes | | | | | | |
| | | | 15 | | | | | | Yes | | | | | | |
| | | | 30 | | | | | | Yes | | | | | | |
| | | n257 | 60 | | | | | | Yes | | | | | | 0 |
| | | | 120 | | | | | | Yes | | | | | | |
| | | | 15 | | | | | | Yes | | | | | | |
| | | | 30 | | | | | | Yes | | | | | | |
| | | n77 | 60 | | | | | | Yes | | | | | | 0 |
| | | | 120 | | | | | | Yes | | | | | | |
| | | | 15 | | | | | | Yes | | | | | | |
| | | | 30 | | | | | | Yes | | | | | | |
| | | n257 | 60 | | | | | | Yes | | | | | | 0 |
| | | | 120 | | | | | | Yes | | | | | | |
| | | | 15 | | | | | | Yes | | | | | | |
| | | | 30 | | | | | | Yes | | | | | | |
| | | n77 | 60 | | | | | | Yes | | | | | | 0 |
| | | | 120 | | | | | | Yes | | | | | | |
| | | | 15 | | | | | | Yes | | | | | | |
| | | | 30 | | | | | | Yes | | | | | | |
| | | n257 | 60 | | | | | | Yes | | | | | | 0 |
| | | | 120 | | | | | | Yes | | | | | | |
| | | | 15 | | | | | | Yes | | | | | | |
| | | | 30 | | | | | | Yes | | | | | | |
| | | n77 | 60 | | | | | | Yes | | | | | | 0 |
| | | | 120 | | | | | | Yes | | | | | | |
| | | | 15 | | | | | | Yes | | | | | | |
| | | | 30 | | | | | | Yes | | | | | | |
| | | n257 | 60 | | | | | | Yes | | | | | | 0 |
| | | | 120 | | | | | | Yes | | | | | | |
| | | | 15 | | | | | | Yes | | | | | | |
| | | | 30 | | | | | | Yes | | | | | | |
| | | n77 | 60 | | | | | | Yes | | | | | | 0 |
| | | | 120 | | | | | | Yes | | | | | | |
| | | | 15 | | | | | | Yes | | | | | | |
| | | | 30 | | | | | | Yes | | | | | | |
| | | n257 | 60 | | | | | | Yes | | | | | | 0 |
| | | | 120 | | | | | | Yes | | | | | | |
| | | | 15 | | | | | | Yes | | | | | | |
| | | | 30 | | | | | | Yes | | | | | | |
| | | n77 | 60 | | | | | | Yes | | | | | | 0 |
| | | | 120 | | | | | | Yes | | | | | | |
| | | | 15 | | | | | | Yes | | | | | | |
| | | | 30 | | | | | | Yes | | | | | | |
| | | n257 | 60 | | | | | | Yes | | | | | | 0 |
| | | | 120 | | | | | | Yes | | | | | | |
| | | | 15 | | | | | | Yes | | | | | | |
| | | | 30 | | | | | | Yes | | | | | | |
| | | n77 | 60 | | | | | | Yes | | | | | | 0 |
| | | | 120 | | | | | | Yes | | | | | | |
| | | | 15 | | | | | | Yes | | | | | | |
| | | | 30 | | | | | | Yes | | | | | | |
| | | n257 | 60 | | | | | | Yes | | | | | | 0 |
| | | | 120 | | | | | | Yes | | | | | | |
| | | | 15 | | | | | | Yes | | | | | | |
| | | | 30 | | | | | | Yes | | | | | | |
| | | n77 | 60 | | | | | | Yes | | | | | | 0 |
| | | | 120 | | | | | | Yes | | | | | | |
| | | | 15 | | | | | | Yes | | | | | | |
| | | | 30 | | | | | | Yes | | | | | | |
| | | n257 | 60 | | | | | | Yes | | | | | | 0 |
| | | | 120 | | | | | | Yes | | | | | | |
| | | | 15 | | | | | | Yes | | | | | | |
| | | | 30 | | | | | | | | | | | | |

| NR CA configuration | Uplink CA configuration | NR Band | SCS (kHz) | 5 MHz | 10 MHz | 15 MHz | 20 MHz | 40 MHz | 50 MHz | 60 MHz | 80 MHz | 100 MHz | 200 MHz | 400 MHz | Band width combination set |
|---------------------|-------------------------|---------|---|-------|--------|--------|--------|--------|--------|--------|--------|---------|---------|---------|----------------------------|
| CA_n78A-n257F | CA_n78A-n257A | n78 | 15 | | Yes | Yes | Yes | Yes | Yes | | | | | | 0 |
| | | | 30 | | Yes | | | |
| | | | 60 | | Yes | | | |
| | | n257 | See CA_n257F in Table 5.5A.1-2 in TS 38.101-2 | | | | | | | | | | | | |
| CA_n78C-n257A | CA_n78A-n257A | n78 | See CA_n78C in Table 5.5A.1-1 in TS 38.101-1 | | | | | | | | | | | | 0 |
| | | | 60 | | | | | | Yes | | | Yes | Yes | | |
| | | n257 | 120 | | | | | | Yes | | | Yes | Yes | Yes | |
| CA_n78C-n257D | CA_n78A-n257A | n78 | See CA_n78C in Table 5.5A.1-1 in TS 38.101-1 | | | | | | | | | | | | 0 |
| CA_n78C-n257E | CA_n78A-n257A | n78 | See CA_n78C in Table 5.5A.1-1 in TS 38.101-1 | | | | | | | | | | | | 0 |
| CA_n78C-n257F | CA_n78A-n257A | n78 | See CA_n78C in Table 5.5A.1-1 in TS 38.101-1 | | | | | | | | | | | | 0 |
| CA_n79A-n257A | CA_n79A-n257A | n79 | 15 | | | | | Yes | Yes | | | | | | 0 |
| | | | 30 | | | | | Yes | Yes | Yes | Yes | Yes | | | |
| | | | 60 | | | | | Yes | Yes | Yes | Yes | Yes | | | |
| | | n257 | 60 | | | | | | Yes | | | Yes | Yes | | 0 |
| | | | 120 | | | | | | Yes | | | Yes | Yes | Yes | |
| CA_n79A-n257D | CA_n79A-n257A | n79 | 15 | | | | | Yes | Yes | | | | | | 0 |
| CA_n79A-n257D | CA_n79A-n257A | n79 | 30 | | | | | Yes | Yes | Yes | Yes | Yes | | | |
| CA_n79A-n257D | CA_n79A-n257A | n79 | 60 | | | | | Yes | Yes | Yes | Yes | Yes | | | |
| CA_n79A-n257A | CA_n79A-n257A | n257 | See CA_n257D in Table 5.5A.1-2 in TS 38.101-2 | | | | | | | | | | | | 0 |
| | | n79 | 15 | | | | | Yes | Yes | | | | | | |
| | | | 30 | | | | | Yes | Yes | Yes | Yes | Yes | | | |
| | | | 60 | | | | | Yes | Yes | Yes | Yes | Yes | | | |
| CA_n79A-n257E | CA_n79A-n257A | n257 | See CA_n257E in Table 5.5A.1-2 in TS 38.101-2 | | | | | | | | | | | | 0 |
| | | n79 | 15 | | | | | Yes | Yes | | | | | | |
| | | | 30 | | | | | Yes | Yes | Yes | Yes | Yes | | | |
| | | | 60 | | | | | Yes | Yes | Yes | Yes | Yes | | | |
| CA_n79A-n257F | CA_n79A-n257A | n257 | See CA_n257F in Table 5.5A.1-2 in TS 38.101-2 | | | | | | | | | | | | 0 |
| | | n79 | 15 | | | | | Yes | Yes | | | | | | |
| | | | 30 | | | | | Yes | Yes | Yes | Yes | Yes | | | |
| | | | 60 | | | | | Yes | Yes | Yes | Yes | Yes | | | |
| CA_n79C-n257A | CA_n79A-n257A | n257 | See CA_n79C in Table 5.5A.1-1 in TS 38.101-1 | | | | | | | | | | | | 0 |
| | | n79 | 60 | | | | | | Yes | | | Yes | Yes | | |
| | | | 120 | | | | | | Yes | | | Yes | Yes | Yes | |
| | | | 15 | | | | | | | Yes | Yes | | | | |
| CA_n79C-n257D | CA_n79A-n257A | n257 | See CA_n79C in Table 5.5A.1-1 in TS 38.101-1 | | | | | | | | | | | | 0 |
| CA_n79C-n257E | CA_n79A-n257A | n257 | See CA_n79C in Table 5.5A.1-1 in TS 38.101-1 | | | | | | | | | | | | 0 |
| CA_n79C-n257F | CA_n79A-n257A | n257 | See CA_n79C in Table 5.5A.1-1 in TS 38.101-1 | | | | | | | | | | | | 0 |

5.5B Configuration for DC

5.5B.1 General

The operating bands and bandwidth classes are specified for operation with EN-DC, NGEN-DC, NE-DC or NR-DC configured. The EN-DC, NE-DC or NGEN-DC band combinations include at least one E-UTRA operating band.

For EN-DC or NE-DC configurations indicated by column "Single Uplink allowed" (e.g., problematic band combinations as defined in TS 38.306 [16]) in tables in this clause the UE may indicate capability of not supporting simultaneous dual and triple uplink operation due to possible intermodulation interference to its own primary downlink channel bandwidth of PCell or PSCell if the intermodulation order is 2 or if the intermodulation order is 3 for the combinations when both operating bands are between 450 MHz – 960 MHz or between 1427 MHz – 2690 MHz.

In the case for EN-DC or NE-DC configurations listed in tables in this clause for which the intermodulation products caused by the dual and triple uplink operation fall into the receive band but do not interfere with its own primary downlink channel bandwidth of PCell or PSCell as defined in Annex I the UE is mandated to operate in dual and triple

uplink mode. Single Uplink is also allowed for certain band combinations where intermodulation or reverse intermodulation products could create difficulty for meeting emission requirements.

For EN-DC combinations of order 3 or higher, "Single Uplink allowed" UL configurations captured in Table 5.5B.2-1, Table 5.5B.3-1, and Table 5.5B.4-1 apply.

Non-contiguous resource allocation and almost contiguous allocation are not applicable for E-UTRA or NR carrier part of intra-band EN-DC configuration.

If multiple UL DC configurations are listed for multiple DL DC configurations, valid uplink configurations are such that uplink does not have more carriers than downlink.

Non-contiguous resource allocation and almost contiguous allocation are not applicable for E-UTRA or NR carrier part of intra-band EN-DC configuration.

5.5B.2 Intra-band contiguous EN-DC

Supported channel bandwidths for E-UTRA operating bands are defined in TS 36.521-1 [10] and for NR operating bands in TS 38.521-1 [8].

Table 5.5B.2-1: Intra-band contiguous EN-DC configurations

| EN-DC Configuration | Uplink EN-DC configuration (NOTE 1) | Single UL allowed |
|---|-------------------------------------|-------------------|
| DC_(n)41AA ⁵ DC_(n)41CA ⁵ DC_(n)41DA ⁵ | DC_(n)41AA | Yes ³ |
| DC_(n)41CA ⁵ DC_(n)41DA ⁵ | DC_41A_n41A | Yes ³ |
| DC_(n)71AA ² | DC_(n)71AA | No ⁴ |

NOTE 1: Uplink EN-DC configurations are the configurations supported by the present release of specifications.
 NOTE 2: Requirements in this specification apply for NR SCS of 15 kHz only.
 NOTE 3: Single UL allowed due to potential emission issues, not self-interference.
 NOTE 4: For UE(s) supporting dynamic power sharing it is mandatory to do dual simultaneous UL. For UE(s) not supporting dynamic power sharing single UL is allowed.
 NOTE 5: The minimum requirements only apply for non-simultaneous Tx/Rx between all carriers.

5.5B.3 Intra-band non-contiguous EN-DC

Supported channel bandwidths for E-UTRA operating bands are defined in TS 36.521-1 [10] and for NR operating bands in TS 38.521-1 [8].

Table 5.5B.3-1: Intra-band non-contiguous EN-DC configurations

| EN-DC Configuration | Uplink EN-DC configuration (NOTE 1) | Single UL allowed |
|--|-------------------------------------|-------------------|
| DC_3A_n3A | DC_3A_n3A ² | Yes ² |
| DC_41A_n41A ³ DC_41C_n41A ³ DC_41D_n41A ³ | DC_41A_n41A | Yes ⁴ |
| DC_66A_n66A | DC_66A_n66A ⁵ | Yes ⁵ |

NOTE 1: Uplink EN-DC configurations are the configurations supported by the present release of specifications.
 NOTE 2: Only single switched UL is supported in Rel-15
 NOTE 3: The minimum requirements only apply for non-simultaneous Tx/Rx between all carriers.
 NOTE 4: Single UL allowed due to potential emission issues, not self-interference.
 NOTE 5: Only single switched UL is supported.

5.5B.4 Inter-band EN-DC within FR1

Supported channel bandwidths for E-UTRA operating bands and CA configurations are defined in TS 36.521-1 [10] and for NR operating bands and CA configurations in TS 38.521-1 [8] and present document.

5.5B.4.1 Inter-band EN-DC configurations within FR1 (two bands)

Table 5.5B.4.1-1: Inter-band EN-DC configurations within FR1 (two bands)

| EN-DC configuration | Uplink EN-DC configuration (NOTE 1) | Single UL allowed |
|---|-------------------------------------|-------------------|
| DC_1A_n3A | DC_1A_n3A | DC_1_n3 |
| DC_1A_n28A | DC_1A_n28A | No |
| DC_1A_n40A | DC_1A_n40A | No |
| DC_1A_n51A | DC_1A_n51A | No |
| DC_1A_n77A ⁷ DC_1A_n77C ⁷ | DC_1A_n77A | DC_1_n77 |
| DC_1A_n78A ⁷ DC_1A_n78C ⁷ | DC_1A_n78A | No |
| DC_1A_n79A ⁷ DC_1A_n79C ⁷ | DC_1A_n79A | No |
| DC_2A_n5A | DC_2A_n5A | No |
| DC_2A_n41A DC_2C_n41A | DC_2A_n41A DC_2C_n41A | No |
| DC_2A_n66A | DC_2A_n66A | DC_2_n66 |
| DC_2A_n71A | DC_2A_n71A | No |
| DC_2A_n78A | DC_2A_n78A | DC_2_n78 |
| DC_3A_n1A | DC_3A_n1A | DC_3_n1 |
| DC_3A_n7A | DC_3A_n7A | No |
| DC_3A_n28A | DC_3A_n28A | No |
| DC_3A_n40A | DC_3A_n40A | No |
| DC_3A_n41A DC_3C_n41A | DC_3A_n41A DC_3C_n41A | DC_3_n41 |
| DC_3A_n51A | DC_3A_n51A | No |
| DC_3A_n77A ⁷ DC_3A_n77C ⁷ | DC_3A_n77A | DC_3_n77 |
| DC_3A_n78A ⁷ DC_3A_n78C ⁷ DC_3C_n78A ⁷ | DC_3A_n78A | DC_3_n78 |
| DC_3A_n79A ⁷ DC_3A_n79C ⁷ | DC_3A_n79A | No |
| DC_5A_n2A | DC_5A_n2A | No |
| DC_5A_n40A | DC_5A_n40A | No |
| DC_5A_n66A | DC_5A_n66A | DC_5_n66 |
| DC_5A_n78A ⁷ | DC_5A_n78A | No |
| DC_7A_n1A | DC_7A_n1A | No |
| DC_7A_n3A | DC_7A_n3A | No |
| DC_7A_n28A | DC_7A_n28A | No |
| DC_7A_n51A | DC_7A_n51A | No |
| DC_7A_n66A DC_7C_n66A | DC_7A_n66A | No |
| DC_7A_n78A ⁷ | DC_7A_n78A | No |
| DC_7C_n78A ⁷ | DC_7A_n78A | No |
| DC_7A-7A_n78A ⁷ | DC_7A_n78A | No |
| DC_8A_n1A | DC_8A_n1A | No |
| DC_8A_n3A | DC_8A_n3A | No |
| DC_8A_n40A ⁷ | DC_8A_n40A | No |
| DC_8A_n41A DC_8A_n41C DC_8A_n41(2A) | DC_8A_n41A | No |
| DC_8A_n77A ⁷ | DC_8A_n77A | No |
| DC_8A_n78A ⁷ | DC_8A_n78A | No |
| DC_8A_n79A ⁷ | DC_8A_n79A | No |
| DC_11A_n77A ⁷ | DC_11A_n77A | No |
| DC_11A_n78A ⁷ | DC_11A_n78A | No |
| DC_11A_n79A ⁷ | DC_11A_n79A | No |
| DC_12A_n5A | DC_12A_n5A | No |

| EN-DC configuration | Uplink EN-DC configuration (NOTE 1) | Single UL allowed |
|-----------------------------|-------------------------------------|-------------------|
| DC_12A_n66A | DC_12A_n66A | No |
| DC_12A_n78A | DC_12A_n78A | DC_12_n78 |
| DC_13A_n2A | DC_13A_n2A | No |
| DC_13A_n66A | DC_13A_n66A | No |
| DC_14A_n2A | DC_14A_n2A | No |
| DC_14A_n66A | DC_14A_n66A | No |
| DC_18A_n77A ⁷ | DC_18A_n77A | No |
| DC_18A_n78A ⁷ | DC_18A_n78A | No |
| DC_18A_n79A ⁷ | DC_18A_n79A | No |
| DC_19A_n77A ⁷ | DC_19A_n77A | No |
| DC_19A_n77C ⁷ | | |
| DC_19A_n78A ⁷ | DC_19A_n78A | No |
| DC_19A_n79A ⁷ | DC_19A_n79A | No |
| DC_20A_n1A | DC_20A_n1A | No |
| DC_20A_n3A | DC_20A_n3A | No |
| DC_20A_n8A | DC_20A_n8A | DC_20_n8 |
| DC_20A_n28A ^{8,10} | DC_20A_n28A | No |
| DC_20A_n51A | DC_20A_n51A | No |
| DC_20A_n77A ⁷ | DC_20A_n77A | No |
| DC_20A_n78A ⁷ | DC_20A_n78A | No |
| DC_21A_n77A ⁷ | DC_21A_n77A | No |
| DC_21A_n77C ⁷ | | |
| DC_21A_n78A ⁷ | DC_21A_n78A | No |
| DC_21A_n79A ⁷ | DC_21A_n79A | No |
| DC_25A_n41A | DC_25A_n41A | No |
| DC_26A_n41A | DC_26A_n41A | No |
| DC_26A_n77A ⁷ | DC_26A_n77A | No |
| DC_26A_n78A ⁷ | DC_26A_n78A | No |
| DC_26A_n79A ⁷ | DC_26A_n79A | No |
| DC_28A_n3A | DC_28A_n3A | No |
| DC_28A_n51A | DC_28A_n51A | No |
| DC_28A_n77A ⁷ | DC_28A_n77A | No |
| DC_28A_n77C ⁷ | | |
| DC_28A_n78A ⁷ | DC_28A_n78A | No |
| DC_28A_n79A ⁷ | DC_28A_n79A | No |
| DC_30A_n5A | DC_30A_n5A | No |
| DC_30A_n66A | DC_30A_n66A | No |
| DC_38A_n78A ⁷ | N/A | No |
| DC_39A_n41A | DC_39A_n41A | No |
| DC_39C_n41A | DC_39C_n41A | |
| DC_39A_n78A ^{5,7} | DC_39A_n78A | No |
| DC_39A_n79A ⁷ | DC_39A_n79A | No |
| DC_40A_n1A | DC_40A_n1A | No |
| DC_40A_n41A | DC_40A_n41A | No |
| DC_40A_n77A | N/A | No |
| DC_40A_n78A | DC_40A_n78A | No |
| DC_40C_n78A | DC_40C_n78A | |
| DC_41A_n77A | DC_41A_n77A | No |
| DC_41C_n77A | | |
| DC_41A_n78A | DC_41A_n78A | No |
| DC_41C_n78A | | |
| DC_41A_n79A ^{6,7} | DC_41A_n79A | No |
| DC_41C_n79A ^{6,7} | | |
| DC_42A_n51A | DC_42A_n51A | No |

| EN-DC configuration | Uplink EN-DC configuration (NOTE 1) | Single UL allowed |
|--|-------------------------------------|-------------------|
| DC_42A_n77A ^{3,4,9} DC_42A_n77C ^{3,4,9} DC_42C_n77A ^{3,4,9} DC_42C_n77C ^{3,4,9} DC_42D_n77A ^{3,4,9} DC_42E_n77A ^{3,4,9} | N/A | N/A |
| DC_42A_n78A ^{3,4,9} DC_42A_n78C ^{3,4,9} DC_42C_n78A ^{3,4,9} DC_42C_n78C ^{3,4,9} DC_42D_n78A ^{3,4,9} DC_42E_n78A ^{3,4,9} | N/A | N/A |
| DC_42A_n79A ⁹ DC_42A_n79C ⁹ DC_42C_n79A ⁹ DC_42C_n79C ⁹ DC_42D_n79A ⁹ DC_42E_n79A ⁹ | N/A | N/A |
| DC_46A_n78A ² DC_46C_n78A ² DC_46D_n78A ² DC_46E_n78A ² | N/A | N/A |
| DC_48A_n5A | DC_48A_n5A | No |
| DC_48A_n66A | DC_48A_n66A | No |
| DC_66A_n2A | DC_66A_n2A | DC_66_n2 |
| DC_66A_n5A | DC_66A_n5A | DC_66_n5 |
| DC_66A_n41A | DC_66A_n41A | No |
| DC_66A_n71A | DC_66A_n71A | No |
| DC_66A_n78A | DC_66A_n78A | No |
| <p>NOTE 1: Uplink EN-DC configurations are the configurations supported by the present release of specifications.</p> <p>NOTE 2: Restricted to E-UTRA operation when inter-band carrier aggregation is configured. The downlink operating band for Band 46 is paired with the uplink operating band (external E-UTRA band) of the carrier aggregation configuration that is supporting the configured PCell.</p> <p>NOTE 3: The minimum requirements apply only when there is non-simultaneous Tx/Rx operation between E-UTRA and NR carriers. This restriction applies also for these carriers when applicable EN-DC configuration is part of a higher order EN-DC configuration.</p> <p>NOTE 4: The minimum requirements for intra-band contiguous or non-contiguous EN-DC apply. The intra-band requirements also apply for these carriers when applicable EN-DC configuration is a subset of a higher order EN-DC configuration.</p> <p>NOTE 5: The frequency range above 3600 MHz for Band n78 is not used in this combination.</p> <p>NOTE 6: The frequency range below 2506 MHz for Band 41 is not used in this combination.</p> <p>NOTE 7: Applicable for UE supporting inter-band EN-DC with mandatory simultaneous Rx/Tx capability.</p> <p>NOTE 8: The frequency range in band n28 is restricted for this band combination to 703-733 MHz for the UL and 758-788 MHz for the DL.</p> <p>NOTE 9: The combination is not used alone as fall back mode of other band combinations in which UL in Band 42 is not used.</p> <p>NOTE 10: The maximum power spectral density imbalance between downlink carriers is within [6] dB. The power spectral density imbalance condition also applies for these carriers when applicable EN-DC configuration is a subset of a higher order EN-DC configuration.</p> | | |

5.5B.4.2 Inter-band EN-DC configurations within FR1 (three bands)

Table 5.5B.4.2-1: Inter-band EN-DC configurations within FR1 (three bands)

| EN-DC configuration | Uplink EN-DC configuration (NOTE 1) |
|--|-------------------------------------|
| DC_1A-3A_n28A | DC_1A_n28A DC_3A_n28A |
| DC_1A-3A_n77A ⁵ DC_1A-3A_n77C ⁵ | DC_1A_n77A DC_3A_n77A |
| DC_1A-3A_n78A ⁵ DC_1A-3A_n78C ⁵ DC_1A-3C_n78A ⁵ | DC_1A_n78A DC_3A_n78A |
| DC_1A-3A_n79A ⁵ DC_1A-3A_n79C ⁵ | DC_1A_n79A DC_3A_n79A |
| DC_1A-5A_n78A ⁵ | DC_1A_n78A DC_5A_n78A |
| DC_1A-7A_n3A | DC_1A_n3A DC_7A_n3A |
| DC_1A-7A_n28A ⁵ | DC_1A_n28A DC_7A_n28A |
| DC_1A-7A_n78A ⁵ | DC_1A_n78A DC_7A_n78A |
| DC_1A-7A-7A_n78A ⁵ | DC_1A_n78A DC_7A_n78A |
| DC_1A-8A_n3A | DC_1A_n3A DC_8A_n3A |
| DC_1A-8A_n78A ⁵ | DC_1A_n78A DC_8A_n78A |
| DC_1A-18A_n77A ⁵ | DC_1A_n77A DC_18A_n77A |
| DC_1A-18A_n78A ⁵ | DC_1A_n78A DC_18A_n78A |
| DC_1A-18A_n79A | DC_1A_n79A DC_18A_n79A |
| DC_1A-19A_n77A ⁵ DC_1A-19A_n77C ⁵ | DC_1A_n77A DC_19A_n77A |
| DC_1A-19A_n78A ⁵ DC_1A-19A_n78C ⁵ | DC_1A_n78A DC_19A_n78A |
| DC_1A-19A_n79A ⁵ DC_1A-19A_n79C ⁵ | DC_1A_n79A DC_19A_n79A |
| DC_1A-20A_n3A | DC_1A_n3A DC_20A_n3A |
| DC_1A-20A_n28A ⁶ | DC_1A_n28A DC_20A_n28A |
| DC_1A-20A_n78A ⁵ | DC_1A_n78A DC_20A_n78A |
| DC_1A-21A_n77A ⁵ DC_1A-21A_n77C ⁵ | DC_1A_n77A DC_21A_n77A |
| DC_1A-21A_n78A ⁵ DC_1A-21A_n78C ⁵ | DC_1A_n78A DC_21A_n78A |
| DC_1A-21A_n79A ⁵ DC_1A-21A_n79C ⁵ | DC_1A_n79A DC_21A_n79A |
| DC_1A-28A_n77A ⁵ DC_1A-28A_n77C ⁵ | DC_1A_n77A DC_28A_n77A |
| DC_1A-28A_n78A ⁵ DC_1A-28A_n78C ⁵ | DC_1A_n78A DC_28A_n78A |
| DC_1A_n28A-n78A ⁵ | DC_1A_n28A, DC_1A_n78A |
| DC_1A-28A_n79A | DC_1A_n79A |

| EN-DC configuration | Uplink EN-DC configuration (NOTE 1) |
|--|--|
| DC_1A-28A_n79C | DC_28A_n79A |
| DC_1A-41A_n77A DC_1A-41C_n77A | DC_1A_n77A DC_41A_n77A |
| DC_1A-41A_n78A DC_1A-41C_n78A | DC_1A_n78A DC_41A_n78A |
| DC_1A-41C_n79A | DC_1A_n79A |
| DC_1A-42A_n77A DC_1A-42A_n77C DC_1A-42C_n77A DC_1A-42C_n77C DC_1A-42D_n77A DC_1A-42E_n77A | DC_1A_n77A |
| DC_1A-42A_n78A DC_1A-42A_n78C DC_1A-42C_n78A DC_1A-42C_n78C DC_1A-42D_n78A DC_1A-42E_n78A | DC_1A_n78A |
| DC_1A-42A_n79A DC_1A-42A_n79C DC_1A-42C_n79A DC_1A-42C_n79C DC_1A-42D_n79A DC_1A-42E_n79A | DC_1A_n79A |
| DC_1A_n77A-n79A | DC_1A_n77A DC_1A_n79A |
| DC_1A_n78A-n79A | DC_1A_n78A DC_1A_n79A |
| DC_1A_SUL_n78A-n84A ⁵ | DC_1A_n84A_ULSUP-TDM_n78A DC_1A_n84A_ULSUP-FDM_n78A |
| DC_2A-5A_n66A | DC_2A_n66A DC_5A_n66A |
| DC_2A-12A_n66A | DC_2A_n66A DC_12A_n66A |
| DC_2A-14A_n2A | DC_2A_n2A ² DC_14A_n2A |
| DC_2A-14A_n66A | DC_2A_n66A DC_14A_n66A |
| DC_2A-2A-14A_n66A | DC_2A_n66A DC_14A_n66A |
| DC_2A-30A_n66A | DC_2A_n66A DC_30A_n66A |
| DC_2A-66A_n5A | DC_2A_n5A DC_66A_n5A |
| DC_2A-66A_n41A | DC_2A_n41A DC_66A_n41A |
| DC_2A-66A_n71A | DC_2A_n71A DC_66A_n71A |
| DC_2A-(n)71AA | DC_2A_n71A DC_(n)71AA |
| DC_3A_n3A-n77A | DC_3A_n77A DC_3A_n3A ² |
| DC_3A_n3A-n78A | DC_3A_n78A DC_3A_n3A ² |
| DC_3A-5A_n78A ⁵ | DC_3A_n78A DC_5A_n78A |
| DC_3A-7A_n28A | DC_3A_n28A DC_7A_n28A |

| EN-DC configuration | Uplink EN-DC configuration (NOTE 1) |
|--|--|
| DC_3A-7A_n78A ⁵ DC_3C-7A_n78A ⁵ | DC_3A_n78A DC_7A_n78A |
| DC_3A-7C_n78A ⁵ DC_3C-7C_n78A ⁵ | DC_3A_n78A DC_7A_n78A |
| DC_3A-7A-7A_n78A ⁵ | DC_3A_n78A DC_7A_n78A |
| DC_3A-8A_n1A | DC_3A_n1A DC_8A_n1A |
| DC_3A-8A_n78A | DC_3A_n78A DC_8A_n78A |
| DC_3A-18A_n78A | DC_3A_n78A DC_18A_n78A |
| DC_3A-19A_n77A ⁵ DC_3A-19A_n77C ⁵ | DC_3A_n77A DC_19A_n77A |
| DC_3A-19A_n78A ⁵ DC_3A-19A_n78C ⁵ | DC_3A_n78A DC_19A_n78A |
| DC_3A-19A_n79A ⁵ DC_3A-19A_n79C ⁵ | DC_3A_n79A DC_19A_n79A |
| DC_3A-20A_n1A | DC_3A_n1A DC_20A_n1A |
| DC_3A-20A_n28A ^{5,6} | DC_3A_n28A DC_20A_n28A |
| DC_3A-20A_n78A ⁵ DC_3C-20A_n78A ⁵ | DC_3A_n78A DC_20A_n78A |
| DC_3A-21A_n77A ⁵ DC_3A-21A_n77C ⁵ | DC_3A_n77A DC_21A_n77A |
| DC_3A-21A_n78A ⁵ DC_3A-21A_n78C ⁵ | DC_3A_n78A DC_21A_n78A |
| DC_3A-21A_n79A ⁵ DC_3A-21A_n79C ⁵ | DC_3A_n79A DC_21A_n79A |
| DC_3A-28A_n77A DC_3A-28A_n77C | DC_3A_n77A DC_28A_n77A |
| DC_3A-28A_n78A ⁵ DC_3A-28A_n78C ⁵ | DC_3A_n78A DC_28A_n78A |
| DC_3A_n28A-n78A ⁵ | DC_3A_n28A, DC_3A_n78A |
| DC_3A-28A_n79A DC_3A-28A_n79C | DC_3A_n79A DC_28A_n79A |
| DC_3A-38A_n78A | DC_3A_n78A |
| DC_3A-40A_n1A | DC_3A_n1A DC_40A_n1A |
| DC_3A-41A_n78A | DC_3A_n78A DC_41A_n78A |
| DC_3A-42A_n77A DC_3A-42A_n77C DC_3A-42C_n77A DC_3A-42C_n77C DC_3A-42D_n77A DC_3A-42E_n77A | DC_3A_n77A |
| DC_3A-42A_n78A DC_3A-42A_n78C DC_3A-42C_n78A DC_3A-42C_n78C DC_3A-42D_n78A DC_3A-42E_n78A | DC_3A_n78A |
| DC_3A-42A_n79A DC_3A-42A_n79C DC_3A-42C_n79A DC_3A-42C_n79C | DC_3A_n79A |

| EN-DC configuration | Uplink EN-DC configuration (NOTE 1) |
|--|--|
| DC_3A-42D_n79A DC_3A-42E_n79A | |
| DC_3A_n77A-n79A | DC_3A_n77A DC_3A_n79A |
| DC_3A_n78A-n79A | DC_3A_n78A DC_3A_n79A |
| DC_3A_SUL_n78A-n80A ⁵ | DC_3A_n78A DC_3A_n80A_ULSUP-TDM_n78A DC_3A_n80A_ULSUP-FDM_n78A |
| DC_3A_SUL_n78A-n82A ⁵ | DC_3A_n78A DC_3A_n82A |
| DC_3A_SUL_n79A-n80A ⁵ | DC_3A_n79A DC_3A_n80A_ULSUP-TDM_n79A DC_3A_n80A_ULSUP-FDM_n79A |
| DC_5A-7A_n78A | DC_5A_n78A DC_7A_n78A |
| DC_5A-7A-7A_n78A | DC_5A_n78A DC_7A_n78A |
| DC_5A-30A_n66A | DC_5A_n66A DC_30A_n66A |
| DC_7A-8A_n1A | DC_7A_n1A DC_8A_n1A |
| DC_7A-20A_n1A | DC_7A_n1A DC_20A_n1A |
| DC_7A-20A_n3A | DC_7A_n3A DC_20A_n3A |
| DC_7A-20A_n28A ⁶ | DC_7A_n28A DC_20A_n28A |
| DC_7A-20A_n78A ⁵ | DC_7A_n78A DC_20A_n78A |
| DC_7A-28A_n78A ⁵ | DC_7A_n78A DC_28A_n78A |
| DC_7C-28A_n78A ⁵ | DC_7A_n78A DC_28A_n78A |
| DC_7A_n28A-n78A ⁵ | DC_7A_n28A, DC_7A_n78A |
| DC_7A-46A_n78A ³ DC_7A-46C_n78A ³ DC_7A-46D_n78A ³ DC_7A-46E_n78A ³ | DC_7A_n78A |
| DC_8A_SUL_n78A-n81A ⁵ | DC_8A_n78A DC_8A_n81A_ULSUP-TDM_n78A DC_8A_n81A_ULSUP-FDM_n78A |
| DC_8A_SUL_n79A-n81A ⁵ | DC_8A_n79A DC_8A_n81A_ULSUP-TDM_n79A DC_8A_n81A_ULSUP-FDM_n79A |
| DC_12A-30A_n66A | DC_12A_n66A DC_30A_n66A |
| DC_18A-28A_n77A ⁵ | DC_18A_n77A DC_28A_n77A |
| DC_18A-28A_n78A ⁵ | DC_18A_n78A DC_28A_n78A |
| DC_18A-28A_n79A ⁵ | DC_18A_n79A DC_28A_n79A |
| DC_19A-21A_n77A ⁵ DC_19A-21A_n77C ⁵ | DC_19A_n77A DC_21A_n77A |
| DC_19A-21A_n78A ⁵ DC_19A-21A_n78C ⁵ | DC_19A_n78A DC_21A_n78A |

| EN-DC configuration | Uplink EN-DC configuration (NOTE 1) |
|--|---|
| DC_19A-21A_n79A ⁵ DC_19A-21A_n79C ⁵ | DC_19A_n79A DC_21A_n79A |
| DC_19A-42A_n77A DC_19A-42A_n77C | DC_19A_n77A |
| DC_19A-42A_n78A DC_19A-42A_n78C | DC_19A_n78A |
| DC_19A-42A_n79A DC_19A-42A_n79C | DC_19A_n79A |
| DC_19A-42C_n77A DC_19A-42C_n77C | DC_19A_n77A |
| DC_19A-42C_n78A DC_19A-42C_n78C | DC_19A_n78A |
| DC_19A-42C_n79A DC_19A-42C_n79C | DC_19A_n79A |
| DC_19A_n77A-n79A | DC_19A_n77A DC_19A_n79A |
| DC_19A_n78A-n79A | DC_19A_n78A DC_19A_n79A |
| DC_20A_n8A-n75A ⁶ | DC_20A_n8A |
| DC_20A_n28A-n75A ⁶ | DC_20A_n28A |
| DC_20A_n28A-n78A ^{5,6} | DC_20A_n28A DC_20A_n78A |
| DC_20A_n75A-n78A ⁵ | DC_20A_n78A |
| DC_20A_n76A-n78A ⁵ | DC_20A_n78A |
| DC_20A_SUL_n78A-n82A ⁵ | DC_20A_n78A DC_20A_n82A_ULSUP-TDM_n78A DC_20A_n82A_ULSUP-FDM_n78A |
| DC_20A_SUL_n78A-n83A ⁵ | DC_20A_n78A DC_20A_n83A |
| DC_21A-28A_n77A DC_21A-28A_n77C | DC_21A_n77A DC_28A_n77A |
| DC_21A-28A_n78A DC_21A-28A_n78C | DC_21A_n78A DC_28A_n78A |
| DC_21A-28A_n79A DC_21A-28A_n79C | DC_21A_n79A DC_28A_n79A |
| DC_21A-42A_n77A DC_21A-42A_n77C DC_21A-42C_n77A DC_21A-42C_n77C | DC_21A_n77A |
| DC_21A-42A_n78A DC_21A-42A_n78C DC_21A-42C_n78A DC_21A-42C_n78C | DC_21A_n78A |
| DC_21A-42A_n79A DC_21A-42A_n79C DC_21A-42C_n79A DC_21A-42C_n79C | DC_21A_n79A |
| DC_21A_n77A-n79A | DC_21A_n77A DC_21A_n79A |
| DC_21A_n78A-n79A | DC_21A_n78A DC_21A_n79A |
| DC_28A-42A_n77A DC_28A-42A_n77C DC_28A-42C_n77A | DC_28A_n77A |
| DC_28A-42A_n78A DC_28A-42A_n78C DC_28A-42C_n78A | DC_28A_n78A |
| DC_28A-42A_n79A | DC_28A_n79A |

| EN-DC configuration | Uplink EN-DC configuration (NOTE 1) |
|--|---|
| DC_28A-42A_n79C DC_28A-42C_n79A | |
| DC_28A_SUL_n78A-n83A ⁵ | DC_28A_n78A DC_28A_n83A_ULSUP-TDM_n78A DC_28A_n83A_ULSUP-FDM_n78A |
| DC_41A-42A_n77A DC_41A-42C_n77A DC_41C-42A_n77A DC_41C-42C_n77A | DC_41A_n77A |
| DC_41A-42A_n78A DC_41A-42C_n78A DC_41C-42A_n78A DC_41C-42C_n78A | DC_41A_n78A |
| DC_41A-42A_n79A DC_41A-42C_n79A DC_41C-42A_n79A DC_41C-42C_n79A | DC_41A_n79A |
| DC_66A_(n)71AA | DC_66A_n71A DC_(n)71AA |
| DC_66A_SUL_n78A-n86A ⁵ | DC_66A_n78A DC_66A_n86A_ULSUP-TDM_n78A DC_66A_n86A_ULSUP-FDM_n78A |
| <p>NOTE 1: Uplink EN-DC configurations are the configurations supported by the present release of specifications.</p> <p>NOTE 2: Only single switched UL is supported.</p> <p>NOTE 3: Restricted to E-UTRA operation when inter-band carrier aggregation is configured. The downlink operating band for Band 46 is paired with the uplink operating band (external E-UTRA band) of the carrier aggregation configuration that is supporting the configured PCell.</p> <p>NOTE 4: If a UE is configured with both NR UL and NR SUL carriers in a cell, the switching time between NR UL carrier and NR SUL carrier can be up to 140us and placed in SUL resources.</p> <p>NOTE 5: Applicable for UE supporting inter-band EN-DC with mandatory simultaneous Rx/Tx capability</p> <p>NOTE 6: The frequency range in band n28 is restricted for this band combination to 703-733 MHz for the UL and 758-788 MHz for the DL.</p> | |

5.5B.4.3 Inter-band EN-DC configurations within FR1 (four bands)

Table 5.5B.4.3-1: Inter-band EN-DC configurations within FR1 (four bands)

| EN-DC configuration | Uplink EN-DC configuration (NOTE 1) |
|--|--|
| DC_1A-3A-5A_n78A ² | DC_1A_n78A DC_3A_n78A DC_5A_n78A |
| DC_1A-3A-7A_n28A | DC_1A_n28A DC_3A_n28A DC_7A_n28A |
| DC_1A-3A-7A_n78A ² DC_1A-3C-7A_n78A ² | DC_1A_n78A DC_3A_n78A DC_7A_n78A |
| DC_1A-3A-7A-7A_n78A ² | DC_1A_n78A DC_3A_n78A DC_7A_n78A |
| DC_1A-3A-8A_n78A ² | DC_1A_n78A DC_3A_n78A DC_8A_n78A |
| DC_1A-3A-19A_n77A ² DC_1A-3A-19A_n77C ² | DC_1A_n77A DC_3A_n77A DC_19A_n77A |
| DC_1A-3A-19A_n78A ² DC_1A-3A-19A_n78C ² | DC_1A_n78A DC_3A_n78A DC_19A_n78A |
| DC_1A-3A-19A_n79A ² DC_1A-3A-19A_n79C ² | DC_1A_n79A DC_3A_n79A DC_19A_n79A |
| DC_1A-3A-20A_n28A ³ | DC_1A_n28A DC_3A_n28A DC_20A_n28A |
| DC_1A-3A-20A_n78A ² | DC_1A_n78A DC_3A_n78A DC_20A_n78A |
| DC_1A-3A-21A_n77A ² DC_1A-3A-21A_n77C ² | DC_1A_n77A DC_3A_n77A DC_21A_n77A |
| DC_1A-3A-21A_n78A ² DC_1A-3A-21A_n78C ² | DC_1A_n78A DC_3A_n78A DC_21A_n78A |
| DC_1A-3A-21A_n79A ² DC_1A-3A-21A_n79C ² | DC_1A_n79A DC_3A_n79A DC_21A_n79A |
| DC_1A-3A-28A_n77A ² | DC_1A_n77A DC_3A_n77A DC_28A_n77A |
| DC_1A-3A-28A_n78A ² | DC_1A_n78A DC_3A_n78A DC_28A_n78A |
| DC_1A-3A-28A_n79A ² | DC_1A_n79A DC_3A_n79A DC_28A_n79A |
| DC_1A-3A_n28A-n78A ² | DC_1A_n28A DC_1A_n78A DC_3A_n28A DC_3A_n78A |
| DC_1A-3A-42A_n77A DC_1A-3A-42A_n77C DC_1A-3A-42C_n77A DC_1A-3A-42C_n77C | DC_1A_n77A DC_3A_n77A |

| EN-DC configuration | Uplink EN-DC configuration (NOTE 1) |
|---|--|
| DC_1A-3A-42A_n78A DC_1A-3A-42A_n78C DC_1A-3A-42C_n78A DC_1A-3A-42C_n78C DC_1A-3A-42D_n78A | DC_1A_n78A DC_3A_n78A |
| DC_1A-3A-42A_n79A DC_1A-3A-42A_n79C DC_1A-3A-42C_n79A DC_1A-3A-42C_n79C DC_1A-3A-42D_n79A | DC_1A_n79A DC_3A_n79A |
| DC_1A-5A-7A_n78A | DC_1A_n78A DC_5A_n78A DC_7A_n78A |
| DC_1A-5A-7A-7A_n78A | DC_1A_n78A DC_5A_n78A DC_7A_n78A |
| DC_1A-7A-20A_n28A ³ | DC_1A_n28A DC_7A_n28A DC_20A_n28A |
| DC_1A-7A-20A_n78A ² | DC_1A_n78A DC_7A_n78A DC_20A_n78A |
| DC_1A-7A_n28A-n78A ² | DC_1A_n28A DC_1A_n78A DC_7A_n28A DC_7A_n78A |
| DC_1A-18A-28A_n77A | DC_1A_n77A DC_18A_n77A DC_28A_n77A |
| DC_1A-18A-28A_n78A | DC_1A_n78A DC_18A_n78A DC_28A_n78A |
| DC_1A-18A-28A_n79A ² | DC_1A_n79A DC_18A_n79A DC_28A_n79A |
| DC_1A-19A-21A_n77A DC_1A-19A-21A_n77C | DC_1A_n77A DC_19A_n77A DC_21A_n77A |
| DC_1A-19A-21A_n78A DC_1A-19A-21A_n78C | DC_1A_n78A DC_19A_n78A DC_21A_n78A |
| DC_1A-19A-21A_n79A DC_1A-19A-21A_n79C | DC_1A_n79A DC_19A_n79A DC_21A_n79A |
| DC_1A-19A-42A_n77A DC_1A-19A-42A_n77C DC_1A-19A-42C_n77A DC_1A-19A-42C_n77C | DC_1A_n77A DC_19A_n77A |
| DC_1A-19A-42A_n78A DC_1A-19A-42A_n78C DC_1A-19A-42C_n78A DC_1A-19A-42C_n78C | DC_1A_n78A DC_19A_n78A |
| DC_1A-19A-42A_n79A DC_1A-19A-42A_n79C DC_1A-19A-42C_n79A DC_1A-19A-42C_n79C | DC_1A_n79A DC_19A_n79A |
| DC_1A-20A_n28A-n78A ^{2,3} | DC_1A_n28A DC_1A_n78A DC_20A_n28A DC_20A_n78A |
| DC_1A-21A-28A_n77A ² | DC_1A_n77A |

| EN-DC configuration | Uplink EN-DC configuration (NOTE 1) |
|--|--|
| | DC_21A_n77A DC_28A_n77A |
| DC_1A-21A-28A_n78A ² | DC_1A_n78A DC_21A_n78A DC_28A_n78A |
| DC_1A-21A-28A_n79A ² | DC_1A_n79A DC_21A_n79A DC_28A_n79A |
| DC_1A-21A-42A_n77A DC_1A-21A-42A_n77C DC_1A-21A-42C_n77A DC_1A-21A-42C_n77C | DC_1A_n77A DC_21A_n77A |
| DC_1A-21A-42A_n78A DC_1A-21A-42A_n78C DC_1A-21A-42C_n78A DC_1A-21A-42C_n78C | DC_1A_n78A DC_21A_n78A |
| DC_1A-21A-42A_n79A DC_1A-21A-42A_n79C DC_1A-21A-42C_n79A DC_1A-21A-42C_n79C | DC_1A_n79A DC_21A_n79A |
| DC_1A-28A-42A_n77A DC_1A-28A-42C_n77A | DC_1A_n77A DC_28A_n77A |
| DC_1A-28A-42A_n78A DC_1A-28A-42C_n78A | DC_1A_n78A DC_28A_n78A |
| DC_1A-28A-42A_n79A DC_1A-28A-42C_n79A | DC_1A_n79A DC_28A_n79A |
| DC_1A-41A-42A_n77A DC_1A-41A-42C_n77A DC_1A-41C-42A_n77A DC_1A-41C-42C_n77A | DC_1A_n77A DC_41A_n77A |
| DC_1A-41A-42A_n78A DC_1A-41A-42C_n78A DC_1A-41C-42A_n78A DC_1A-41C-42C_n78A | DC_1A_n78A DC_41A_n78A |
| DC_1A-41A-42A_n79A DC_1A-41A-42C_n79A DC_1A-41C-42A_n79A DC_1A-41C-42C_n79A | DC_1A_n79A DC_41A_n79A |
| DC_2A-7A-7A-13A_n66A DC_2A-7C-13A_n66A | DC_2A_n66A DC_7A_n66A DC_13A_n66A |
| DC_2A-7C-66A_n66A DC_2A-7A-7A-66A_n66A | DC_2A_n66A DC_7A_n66A DC_66A_n66A ⁴ |
| DC_2A-7A-7A-66A_n78A DC_2A-7C-66A_n78A | DC_2A_n78A DC_7A_n78A DC_66A_n78A |
| DC_2A-7A-13A_n66A | DC_2A_n66A DC_7A_n66A DC_13A_n66A |
| DC_2A-7A-66A_n66A | DC_2A_n66A DC_7A_n66A DC_66A_n66A ⁴ |
| DC_2A-14A-66A_n2A | DC_2A_n2A ⁴ DC_14A_n2A DC_66A_n2A |
| DC_2A-14A-66A-66A_n2A | DC_2A_n2A ⁴ DC_14A_n2A DC_66A_n2A |
| DC_2A-14A-66A_n66A | DC_2A_n66A DC_14A_n66A |

| EN-DC configuration | Uplink EN-DC configuration (NOTE 1) |
|--|--|
| | DC_66A_n66A ⁴ |
| DC_2A-2A-14A-66A_n66A | DC_2A_n66A DC_14A_n66A DC_66A_n66A ⁴ |
| DC_2A-66A-(n)71AA | DC_2A_n71A DC_66A_n71A DC_(n)71AA |
| DC_3A-5A-7A_n78A | DC_3A_n78A DC_5A_n78A DC_7A_n78A |
| DC_3A-5A-7A-7A_n78A | DC_3A_n78A DC_5A_n78A DC_7A_n78A |
| DC_3A-7A-20A_n28A ³ | DC_3A_n28A DC_7A_n28A DC_20A_n28A |
| DC_3A-7A-20A_n78A ² | DC_3A_n78A DC_7A_n78A DC_20A_n78A |
| DC_3A-7A-28A_n78A ² DC_3A-7C-28A_n78A ² | DC_3A_n78A DC_7A_n78A DC_28A_n78A |
| DC_3A-7A_n28A-n78A ² | DC_3A_n28A DC_3A_n78A DC_7A_n28A DC_7A_n78A |
| DC_3A-19A-21A_n77A ² DC_3A-19A-21A_n77C ² | DC_3A_n77A DC_19A_n77A DC_21A_n77A |
| DC_3A-19A-21A_n78A ² DC_3A-19A-21A_n78C ² | DC_3A_n78A DC_19A_n78A DC_21A_n78A |
| DC_3A-19A-21A_n79A ² DC_3A-19A-21A_n79C ² | DC_3A_n79A DC_19A_n79A DC_21A_n79A |
| DC_3A-19A-42A_n77A DC_3A-19A-42A_n77C DC_3A-19A-42C_n77A DC_3A-19A-42C_n77C | DC_3A_n77A DC_19A_n77A |
| DC_3A-19A-42A_n78A DC_3A-19A-42A_n78C DC_3A-19A-42C_n78A DC_3A-19A-42C_n78C | DC_3A_n78A DC_19A_n78A |
| DC_3A-19A-42A_n79A ² DC_3A-19A-42A_n79C ² DC_3A-19A-42C_n79A ² DC_3A-19A-42C_n79C ² | DC_3A_n79A DC_19A_n79A |
| DC_3A-20A_n28A-n78A ^{2,3} | DC_3A_n28A DC_3A_n78A DC_20A_n28A DC_20A_n78A |
| DC_3A-21A-42A_n77A DC_3A-21A-42A_n77C DC_3A-21A-42C_n77A DC_3A-21A-42C_n77C | DC_3A_n77A DC_21A_n77A |
| DC_3A-21A-42A_n78A DC_3A-21A-42A_n78C DC_3A-21A-42C_n78A DC_3A-21A-42C_n78C | DC_3A_n78A DC_21A_n78A |
| DC_3A-21A-42A_n79A DC_3A-21A-42A_n79C | DC_3A_n79A DC_21A_n79A |

| EN-DC configuration | Uplink EN-DC configuration (NOTE 1) |
|---|--|
| DC_3A-21A-42C_n79A DC_3A-21A-42C_n79C | |
| DC_3A-28A-42A_n77A DC_3A-28A-42C_n77A | DC_3A_n77A DC_28A_n77A |
| DC_3A-28A-42A_n78A DC_3A-28A-42C_n78A | DC_3A_n78A DC_28A_n78A |
| DC_3A-28A-42A_n79A DC_3A-28A-42C_n79A | DC_3A_n79A DC_28A_n79A |
| DC_7A-20A_n28A-n78A ^{2,3} | DC_7A_n28A DC_7A_n78A DC_20A_n28A DC_20A_n78A |
| DC_19A-21A-42A_n77A DC_19A-21A-42A_n77C DC_19A-21A-42C_n77A DC_19A-21A-42C_n77C | DC_19A_n77A DC_21A_n77A |
| DC_19A-21A-42A_n78A DC_19A-21A-42A_n78C DC_19A-21A-42C_n78A DC_19A-21A-42C_n78C | DC_19A_n78A DC_21A_n78A |
| DC_19A-21A-42A_n79A DC_19A-21A-42A_n79C DC_19A-21A-42C_n79A DC_19A-21A-42C_n79C | DC_19A_n79A DC_21A_n79A |
| DC_21A-28A-42A_n77A DC_21A-28A-42C_n77A | DC_21A_n77A DC_28A_n77A |
| DC_21A-28A-42A_n78A DC_21A-28A-42C_n78A | DC_21A_n78A DC_28A_n78A |
| DC_21A-28A-42A_n79A DC_21A-28A-42C_n79A | DC_21A_n79A DC_28A_n79A |
| <p>NOTE 1: Uplink EN-DC configurations are the configurations supported by the present release of specifications.</p> <p>NOTE 2: Applicable for UE supporting inter-band EN-DC with mandatory simultaneous Rx/Tx capability</p> <p>NOTE 3: The frequency range in band n28 is restricted for this band combination to 703-733 MHz for the UL and 758-788 MHz for the DL.</p> <p>NOTE 4: Only single switched UL is supported.</p> | |

5.5B.4.4 Inter-band EN-DC configurations within FR1 (five bands)

Table 5.5B.4.4-1: Inter-band EN-DC configurations within FR1 (five bands)

| EN-DC configuration | Uplink EN-DC configuration (NOTE 1) |
|--|--|
| DC_1A-3A-5A-7A_n78A | DC_1A_n78A DC_3A_n78A DC_5A_n78A DC_7A_n78A |
| DC_1A-3A-5A-7A-7A_n78A | DC_1A_n78A DC_3A_n78A DC_5A_n78A DC_7A_n78A |
| DC_1A-3A-5A-41A_n79A | DC_1A_n79A DC_3A_n79A DC_5A_n79A DC_41A_n79A |
| DC_1A-3A-7A-20A_n28A ³ | DC_1A_n28A DC_3A_n28A DC_7A_n28A DC_20A_n28A |
| DC_1A-3A-7A-20A_n78A ² | DC_1A_n78A DC_3A_n78A DC_7A_n78A DC_20A_n78A |
| DC_1A-3A-7A_n28A-n78A ² | DC_1A_n28A DC_1A_n78A DC_3A_n28A DC_3A_n78A DC_7A_n28A DC_7A_n78A |
| DC_1A-3A-19A-21A_n77A ² DC_1A-3A-19A-21A_n77C ² | DC_1A_n77A DC_3A_n77A DC_19A_n77A DC_21A_n77A |
| DC_1A-3A-19A-21A_n78A ² DC_1A-3A-19A-21A_n78C ² | DC_1A_n78A DC_3A_n78A DC_19A_n78A DC_21A_n78A |
| DC_1A-3A-19A-21A_n79A ² DC_1A-3A-19A-21A_n79C ² | DC_1A_n79A DC_3A_n79A DC_19A_n79A DC_21A_n79A |
| DC_1A-3A-19A-42A_n77A DC_1A-3A-19A-42A_n77C DC_1A-3A-19A-42C_n77A DC_1A-3A-19A-42C_n77C | DC_1A_n77A DC_3A_n77A DC_19A_n77A |
| DC_1A-3A-19A-42A_n78A DC_1A-3A-19A-42A_n78C DC_1A-3A-19A-42C_n78A DC_1A-3A-19A-42C_n78C | DC_1A_n78A DC_3A_n78A DC_19A_n78A |
| DC_1A-3A-19A-42A_n79A DC_1A-3A-19A-42A_n79C DC_1A-3A-19A-42C_n79A DC_1A-3A-19A-42C_n79C | DC_1A_n79A DC_3A_n79A DC_19A_n79A |
| DC_1A-3A-20A_n28A-n78A ^{2,3} | DC_1A_n28A DC_1A_n78A DC_3A_n28A DC_3A_n78A DC_20A_n28A DC_20A_n78A |
| DC_1A-3A-21A-42A_n77A DC_1A-3A-21A-42A_n77C | DC_1A_n77A DC_3A_n77A |

| EN-DC configuration | Uplink EN-DC configuration (NOTE 1) |
|--|--|
| DC_1A-3A-21A-42C_n77A DC_1A-3A-21A-42C_n77C | DC_21A_n77A |
| DC_1A-3A-21A-42A_n78A DC_1A-3A-21A-42A_n78C DC_1A-3A-21A-42C_n78A DC_1A-3A-21A-42C_n78C | DC_1A_n78A DC_3A_n78A DC_21A_n78A |
| DC_1A-3A-21A-42A_n79A DC_1A-3A-21A-42A_n79C DC_1A-3A-21A-42C_n79A DC_1A-3A-21A-42C_n79C | DC_1A_n79A DC_3A_n79A DC_21A_n79A |
| DC_1A-3A-28A-42A_n77A DC_1A-3A-28A-42C_n77A | DC_1A_n77A DC_3A_n77A DC_28A_n77A |
| DC_1A-3A-28A-42A_n78A DC_1A-3A-28A-42C_n78A | DC_1A_n78A DC_3A_n78A DC_28A_n78A |
| DC_1A-3A-28A-42A_n79A DC_1A-3A-28A-42C_n79A | DC_1A_n79A DC_3A_n79A DC_28A_n79A |
| DC_1A-7A-20A_n28A-n78A ^{2,3} | DC_1A_n28A DC_1A_n78A DC_7A_n28A DC_7A_n78A DC_20A_n28A DC_20A_n78A |
| DC_1A-19A-21A-42A_n77A DC_1A-19A-21A-42A_n77C DC_1A-19A-21A-42C_n77A DC_1A-19A-21A-42C_n77C | DC_1A_n77A DC_19A_n77A DC_21A_n77A |
| DC_1A-19A-21A-42A_n78A DC_1A-19A-21A-42A_n78C DC_1A-19A-21A-42C_n78A DC_1A-19A-21A-42C_n78C | DC_1A_n78A DC_19A_n78A DC_21A_n78A |
| DC_1A-19A-21A-42A_n79A DC_1A-19A-21A-42A_n79C DC_1A-19A-21A-42C_n79A DC_1A-19A-21A-42C_n79C | DC_1A_n79A DC_19A_n79A DC_21A_n79A |
| DC_1A-21A-28A-42A_n77A DC_1A-21A-28A-42C_n77A | DC_1A_n77A DC_21A_n77A DC_28A_n77A |
| DC_1A-21A-28A-42A_n78A DC_1A-21A-28A-42C_n78A | DC_1A_n78A DC_21A_n78A DC_28A_n78A |
| DC_1A-21A-28A-42A_n79A DC_1A-21A-28A-42C_n79A | DC_1A_n79A DC_21A_n79A DC_28A_n79A |
| DC_3A-7A-20A_n28A-n78A ^{2,3} | DC_3A_n28A DC_3A_n78A DC_7A_n28A DC_7A_n78A DC_20A_n28A DC_20A_n78A |
| DC_3A-19A-21A-42A_n78A DC_3A-19A-21A-42C_n78A | DC_3A_n78A DC_19A_n78A DC_21A_n78A |
| DC_3A-19A-21A-42A_n79A DC_3A-19A-21A-42C_n79A | DC_3A_n79A DC_19A_n79A DC_21A_n79A |
| NOTE 1: Uplink EN-DC configurations are the configurations supported by the present release of specifications. | |
| NOTE 2: Applicable for UE supporting inter-band EN-DC with mandatory simultaneous Rx/Tx capability | |

| EN-DC configuration | Uplink EN-DC configuration (NOTE 1) |
|--|-------------------------------------|
| NOTE 3: The frequency range in band n28 is restricted for this band combination to 703-733 MHz for the UL and 758-788 MHz for the DL | |

5.5B.4.5 Inter-band EN-DC configurations within FR1 (six bands)

Table 5.5B.4.5-1: Inter-band EN-DC configurations within FR1 (six bands)

| EN-DC configuration | Uplink EN-DC configuration (NOTE 1) |
|--|--|
| DC_1A-3A-7A-20A_n28A-n78A ^{2,3} | DC_1A_n28A DC_1A_n78A DC_3A_n28A DC_3A_n78A DC_7A_n28A DC_7A_n78A DC_20A_n28A DC_20A_n78A |
| NOTE 1: Uplink EN-DC configurations are the configurations supported by the present release of specifications. | |
| NOTE 2: Applicable for UE supporting inter-band EN-DC with mandatory simultaneous Rx/Tx capability | |
| NOTE 3: The frequency range in band n28 is restricted for this band combination to 703-733 MHz for the UL and 758-788 MHz for the DL | |

5.5B.4a Inter-band NE-DC within FR1

5.5B.4a.1 Inter-band NE-DC configurations within FR1 (two bands)

Table 5.5B.4a.1-1: Inter-band NE-DC configurations within FR1 (two bands)

| NE-DC configuration | Uplink NE-DC configuration (NOTE 1) | Single UL allowed |
|--|-------------------------------------|-------------------|
| DC_n1A_28A | DC_n1A_28A | No |
| NOTE 1: Uplink EN-DC configurations are the configurations supported by the present release of specifications. | | |

5.5B.5 Inter-band EN-DC including FR2

Supported channel bandwidths for E-UTRA operating bands and CA configurations are defined in TS 36.521-1 [10] and for NR operating bands and CA configurations in TS 38.521-1 [8], TS 38.521-2 [9] and present document.

5.5B.5.1 Inter-band EN-DC configurations including FR2 (two bands)

Table 5.5B.5.1-1: Inter-band EN-DC configurations including FR2 (two bands)

| EN-DC configuration | Uplink EN-DC configuration (NOTE 1) |
|--|---|
| DC_1A_n257A DC_1A_n257D DC_1A_n257E DC_1A_n257F DC_1A_n257G DC_1A_n257H DC_1A_n257I DC_1A_n257J DC_1A_n257K DC_1A_n257L DC_1A_n257M | DC_1A_n257A DC_1A_n257D DC_1A_n257G DC_1A_n257H DC_1A_n257I DC_1A_n257J DC_1A_n257K DC_1A_n257L DC_1A_n257M |
| DC_2A_n257A DC_2C_n257A | DC_2A_n257A |
| DC_2A_n257(2A) | DC_2A_n257A |
| DC_2A-2A_n257A | DC_2A_n257A |
| DC_2A_n260A DC_2A_n260G DC_2A_n260H DC_2A_n260I DC_2A_n260J DC_2A_n260K DC_2A_n260L DC_2A_n260M DC_2C_n260A | DC_2A_n260A |
| DC_2A_n260(2A) | DC_2A_n260A |
| DC_2A-2A_n260A DC_2A-2A_n260G DC_2A-2A_n260H DC_2A-2A_n260I DC_2A-2A_n260J DC_2A-2A_n260K DC_2A-2A_n260L DC_2A-2A_n260M | DC_2A_n260A |
| DC_3A_n257A DC_3A_n257D DC_3A_n257E DC_3A_n257F DC_3A_n257G DC_3A_n257H DC_3A_n257I | DC_3A_n257A DC_3A_n257B DC_3A_n257D DC_3A_n257G DC_3A_n257H DC_3A_n257I |
| DC_3A_n258A | DC_3A_n258A |
| DC_5A_n257A DC_5B_n257A | DC_5A_n257A DC_5B_n257A |
| DC_5A-5A_n257A | DC_5A_n257A |
| DC_5A_n260A DC_5A_n260B DC_5A_n260C DC_5A_n260D DC_5A_n260E DC_5A_n260F DC_5A_n260G DC_5A_n260H DC_5A_n260I DC_5A_n260J DC_5A_n260K DC_5A_n260L DC_5A_n260M DC_5A_n260O | DC_5A_n260A DC_5B_n260A |

| EN-DC configuration | Uplink EN-DC configuration (NOTE 1) |
|---|-------------------------------------|
| DC_5A_n260P DC_5A_n260Q DC_5B_n260A | |
| DC_5A_n260(2A) DC_5A_n260(3A) DC_5A_n260(4A) DC_5A_n260(A-I) DC_5A_n260(D-G) DC_5A_n260(D-H) DC_5A_n260(D-I) DC_5A_n260(D-O) DC_5A_n260(D-P) DC_5A_n260(D-Q) DC_5A_n260(E-O) DC_5A_n260(E-P) DC_5A_n260(E-Q) DC_5A_n260(G-I) | DC_5A_n260A |
| DC_5A-5A_n260A | DC_5A_n260A |
| DC_5A_n261A DC_5A_n261B DC_5A_n261C DC_5A_n261D DC_5A_n261E DC_5A_n261F DC_5A_n261G DC_5A_n261H DC_5A_n261I DC_5A_n261J DC_5A_n261K DC_5A_n261L DC_5A_n261M DC_5A_n261O DC_5A_n261P DC_5A_n261Q | DC_5A_n261A |
| DC_5A_n261(2A) DC_5A_n261(3A) DC_5A_n261(4A) DC_5A_n261(D-G) DC_5A_n261(D-H) DC_5A_n261(D-I) DC_5A_n261(D-O) DC_5A_n261(D-P) DC_5A_n261(D-Q) DC_5A_n261(E-O) DC_5A_n261(E-P) DC_5A_n261(E-Q) | DC_5A_n261A |
| DC_7A_n257A | DC_7A_n257A |
| DC_7A-7A_n257A | DC_7A_n257A |
| DC_7A_n258A | DC_7A_n258A |
| DC_8A_n257A | DC_8A_n257A |
| DC_8A_n258A | DC_8A_n258A |
| DC_11A_n257A | DC_11A_n257A |
| DC_12A_n260A DC_12A_n260G DC_12A_n260H DC_12A_n260I DC_12A_n260J DC_12A_n260K DC_12A_n260L DC_12A_n260M | DC_12A_n260A |
| DC_12A_n260(A-I) DC_12A_n260(G-I) | DC_12A_n260A |

| EN-DC configuration | Uplink EN-DC configuration (NOTE 1) |
|--|--|
| DC_13A_n257A | DC_13A_n257A |
| DC_13A_n260A | DC_13A_n260A |
| DC_18A_n257A | DC_18A_n257A |
| DC_19A_n257A DC_19A_n257D DC_19A_n257E DC_19A_n257F DC_19A_n257G DC_19A_n257H DC_19A_n257I | DC_19A_n257A DC_19A_n257G DC_19A_n257H DC_19A_n257I |
| DC_20A_n258A | DC_20A_n258A |
| DC_21A_n257A DC_21A_n257D DC_21A_n257E DC_21A_n257F DC_21A_n257G DC_21A_n257H DC_21A_n257I | DC_21A_n257A DC_21A_n257G DC_21A_n257H DC_21A_n257I |
| DC_26A_n257A | DC_26A_n257A |
| DC_28A_n257A DC_28A_n257D DC_28A_n257E DC_28A_n257F | DC_28A_n257A |
| DC_28A_n258A | DC_28A_n258A |
| DC_30A_n260A DC_30A_n260G DC_30A_n260H DC_30A_n260I DC_30A_n260J DC_30A_n260K DC_30A_n260L DC_30A_n260M | DC_30A_n260A |
| DC_30A_n260(A-I) DC_30A_n260(G-I) | DC_30A_n260A |
| DC_39A_n258A | DC_39A_n258A |
| DC_41A_n257A DC_41C_n257A | DC_41A_n257A DC_41C_n257A |
| DC_41A_n258A | DC_41A_n258A |
| DC_42A_n257A DC_42A_n257D DC_42A_n257E DC_42A_n257F DC_42C_n257A DC_42C_n257D DC_42C_n257E DC_42C_n257F DC_42D_n257A DC_42E_n257A | DC_42A_n257A DC_42C_n257A |
| DC_48A_n257A DC_48C_n257A | DC_48A_n257A DC_48C_n257A |
| DC_48A-48A_n257A | DC_48A_n257A |
| DC_48A_n260A DC_48C_n260A | DC_48A_n260A DC_48C_n260A |
| DC_48A-48A_n260A | DC_48A_n260A |
| DC_66A_n257A DC_66A_n257(2A) DC_66A_n257G DC_66A_n257H DC_66A_n257I DC_66A_n257J | DC_66A_n257A |

| EN-DC configuration | Uplink EN-DC configuration (NOTE 1) |
|---|-------------------------------------|
| DC_66A_n257K DC_66A_n257L DC_66A_n257M DC_66C_n257A | |
| DC_66A-66A_n257A | DC_66A_n257A |
| DC_66A_n260A DC_66A_n260D DC_66A_n260E DC_66A_n260F DC_66A_n260G DC_66A_n260H DC_66A_n260I DC_66A_n260J DC_66A_n260K DC_66A_n260L DC_66A_n260M DC_66A_n260O DC_66A_n260P DC_66A_n260Q | DC_66A_n260A |
| DC_66A_n260(2A) DC_66A_n260(3A) DC_66A_n260(4A) DC_66A_n260(A-I) DC_66A_n260(D-G) DC_66A_n260(D-H) DC_66A_n260(D-I) DC_66A_n260(D-O) DC_66A_n260(D-P) DC_66A_n260(D-Q) DC_66A_n260(E-O) DC_66A_n260(E-P) DC_66A_n260(E-Q) DC_66A_n260(G-I) | DC_66A_n260A |
| DC_66A-66A_n260A DC_66A-66A_n260G DC_66A-66A_n260H DC_66A-66A_n260I DC_66A-66A_n260J DC_66A-66A_n260K DC_66A-66A_n260L DC_66A-66A_n260M | DC_66A_n260A |
| DC_66A_n261A DC_66A_n261D DC_66A_n261E DC_66A_n261F DC_66A_n261G DC_66A_n261H DC_66A_n261I DC_66A_n261J DC_66A_n261K DC_66A_n261L DC_66A_n261M DC_66A_n261O DC_66A_n261P DC_66A_n261Q | DC_66A_n261A |
| DC_66A_n261(2A) DC_66A_n261(3A) DC_66A_n261(4A) DC_66A_n261(D-G) DC_66A_n261(D-H) DC_66A_n261(D-I) DC_66A_n261(D-O) DC_66A_n261(D-P) DC_66A_n261(D-Q) DC_66A_n261(E-O) | DC_66A_n261A |

| EN-DC configuration | Uplink EN-DC configuration (NOTE 1) |
|--------------------------------------|-------------------------------------|
| DC_66A_n261(E-P) DC_66A_n261(E-Q) | |

NOTE 1: Uplink EN-DC configurations are the configurations supported by the present release of specifications.

NOTE 2: Applicable for UE supporting inter-band EN-DC with mandatory simultaneous Rx/Tx capability for all of the above combinations

5.5B.5.2 Inter-band EN-DC configurations including FR2 (three bands)

Table 5.5B.5.2-1: Inter-band EN-DC configurations including FR2 (three bands)

| EN-DC configuration | Uplink EN-DC configuration (NOTE 1) |
|---|--|
| DC_1A-3A_n257A ² DC_1A-3A_n257D ² DC_1A-3A_n257E ² DC_1A-3A_n257F ² DC_1A-3A_n257G DC_1A-3A_n257H DC_1A-3A_n257I | DC_1A_n257A DC_1A_n257D DC_3A_n257A DC_3A_n257D DC_3A_n257G DC_3A_n257H DC_3A_n257I |
| DC_1A-5A_n257A ² | DC_1A_n257A DC_5A_n257A |
| DC_1A-7A_n257A ² | DC_1A_n257A DC_7A_n257A |
| DC_1A-7A-7A_n257A ² | DC_1A_n257A DC_7A_n257A |
| DC_1A-8A_n257A ² | DC_1A_n257A DC_8A_n257A |
| DC_1A-18A_n257A ² | DC_1A_n257A DC_18A_n257A |
| DC_1A-19A_n257A ² DC_1A-19A_n257D ² DC_1A-19A_n257E ² DC_1A-19A_n257F ² DC_1A-19A_n257G DC_1A-19A_n257H DC_1A-19A_n257I | DC_1A_n257A DC_1A_n257D DC_1A_n257G DC_1A_n257H DC_1A_n257I DC_19A_n257A DC_19A_n257D |
| DC_1A-21A_n257A ² DC_1A-21A_n257D ² DC_1A-21A_n257E ² DC_1A-21A_n257F ² DC_1A-21A_n257G DC_1A-21A_n257H DC_1A-21A_n257I | DC_1A_n257A DC_1A_n257G DC_1A_n257H DC_1A_n257I DC_21A_n257A DC_21A_n257G DC_21A_n257H DC_21A_n257I |
| DC_1A-28A_n257A ² DC_1A-28A_n257D ² DC_1A-28A_n257E ² DC_1A-28A_n257F ² | DC_1A_n257A DC_28A_n257A |
| DC_1A-41A_n257A DC_1A-41C_n257A | DC_1A_n257A DC_41A_n257A DC_41C_n257A |
| DC_1A-42A_n257A DC_1A-42A_n257D DC_1A-42A_n257E DC_1A-42A_n257F DC_1A-42A_n257G DC_1A-42A_n257H DC_1A-42A_n257I DC_1A-42C_n257A DC_1A-42C_n257D DC_1A-42C_n257E DC_1A-42C_n257F DC_1A-42D_n257A DC_1A-42D_n257G DC_1A-42D_n257H DC_1A-42D_n257I DC_1A-42E_n257A DC_1A-42E_n257G DC_1A-42E_n257H DC_1A-42E_n257I | DC_1A_n257A DC_1A_n257D DC_1A_n257G DC_1A_n257H DC_1A_n257I DC_42A_n257A DC_42A_n257D |
| DC_2A-5A_n257A ² | DC_2A_n257A |

| EN-DC configuration | Uplink EN-DC configuration (NOTE 1) |
|---|---|
| | DC_5A_n257A |
| DC_2A-5A_n260A DC_2A-5A_n260G DC_2A-5A_n260H DC_2A-5A_n260I DC_2A-5A_n260J DC_2A-5A_n260K DC_2A-5A_n260L DC_2A-5A_n260M | DC_2A_n260A DC_5A_n260A |
| DC_2A-12A_n260A DC_2A-12A_n260G DC_2A-12A_n260H DC_2A-12A_n260I DC_2A-12A_n260J DC_2A-12A_n260K DC_2A-12A_n260L DC_2A-12A_n260M | DC_2A_n260A DC_12A_n260A |
| DC_2A-13A_n257A ² | DC_2A_n257A DC_13A_n257A |
| DC_2A-13A_n260A ² | DC_2A_n260A DC_13A_n260A |
| DC_2A-30A_n260A DC_2A-30A_n260G DC_2A-30A_n260H DC_2A-30A_n260I DC_2A-30A_n260J DC_2A-30A_n260K DC_2A-30A_n260L DC_2A-30A_n260M | DC_2A_n260A DC_30A_n260A |
| DC_2A-66A_n257A ² | DC_2A_n257A DC_66A_n257A |
| DC_2A-66A_n260A DC_2A-66A_n260G DC_2A-66A_n260H DC_2A-66A_n260I DC_2A-66A_n260J DC_2A-66A_n260K DC_2A-66A_n260L DC_2A-66A_n260M | DC_2A_n260A DC_66A_n260A |
| DC_3A-5A_n257A ² | DC_3A_n257A DC_5A_n257A |
| DC_3A-7A_n257A ² | DC_3A_n257A DC_7A_n257A |
| DC_3A-7A-7A_n257A ² | DC_3A_n257A DC_7A_n257A |
| DC_3A-19A_n257A ² DC_3A-19A_n257D ² DC_3A-19A_n257E ² DC_3A-19A_n257F ² DC_3A-19A_n257G DC_3A-19A_n257H DC_3A-19A_n257I | DC_3A_n257A DC_3A_n257D DC_3A_n257G DC_3A_n257H DC_3A_n257I DC_19A_n257A DC_19A_n257D |
| DC_3A-21A_n257A ² DC_3A-21A_n257D ² DC_3A-21A_n257E ² DC_3A-21A_n257F ² DC_3A-21A_n257G DC_3A-21A_n257H DC_3A-21A_n257I | DC_3A_n257A DC_3A_n257D DC_3A_n257G DC_3A_n257H DC_3A_n257I DC_21A_n257A DC_21A_n257D |
| DC_3A-28A_n257A ² DC_3A-28A_n257D ² DC_3A-28A_n257E ² DC_3A-28A_n257F ² | DC_3A_n257A DC_28A_n257A |

| EN-DC configuration | Uplink EN-DC configuration (NOTE 1) |
|--|---|
| DC_3A-41A_n257A | DC_3A_n257A DC_41A_n257A |
| DC_3A-42A_n257A ² DC_3A-42A_n257D ² DC_3A-42A_n257E ² DC_3A-42A_n257F ² DC_3A-42A_n257G DC_3A-42A_n257H DC_3A-42A_n257I DC_3A-42C_n257A ² DC_3A-42C_n257D ² DC_3A-42C_n257E ² DC_3A-42C_n257F ² DC_3A-42C_n257G DC_3A-42C_n257H DC_3A-42C_n257I DC_3A-42D_n257A ² DC_3A-42D_n257G DC_3A-42D_n257H DC_3A-42D_n257I DC_3A-42E_n257A ² DC_3A-42E_n257G DC_3A-42E_n257H DC_3A-42E_n257I | DC_3A_n257A DC_3A_n257D DC_3A_n257G DC_3A_n257H DC_3A_n257I DC_42A_n257A DC_42A_n257D |
| DC_5A-7A_n257A ² | DC_5A_n257A DC_7A_n257A |
| DC_5A-7A-7A_n257A | DC_5A_n257A DC_7A_n257A |
| DC_5A-30A_n260A DC_5A-30A_n260G DC_5A-30A_n260H DC_5A-30A_n260I DC_5A-30A_n260J DC_5A-30A_n260K DC_5A-30A_n260L DC_5A-30A_n260M | DC_5A_n260A DC_30A_n260A |
| DC_5A-66A_n257A | DC_5A_n257A DC_66A_n257A |
| DC_5A-66A_n260A DC_5A-66A_n260G DC_5A-66A_n260H DC_5A-66A_n260I DC_5A-66A_n260J DC_5A-66A_n260K DC_5A-66A_n260L DC_5A-66A_n260M | DC_5A_n260A DC_66A_n260A |
| DC_12A-30A_n260A DC_12A-30A_n260G DC_12A-30A_n260H DC_12A-30A_n260I DC_12A-30A_n260J DC_12A-30A_n260K DC_12A-30A_n260L DC_12A-30A_n260M | DC_12A_n260A DC_30A_n260A |
| DC_12A-66A_n260A DC_12A-66A_n260G DC_12A-66A_n260H DC_12A-66A_n260I DC_12A-66A_n260J DC_12A-66A_n260K DC_12A-66A_n260L DC_12A-66A_n260M | DC_12A_n260A DC_66A_n260A |
| DC_13A-66A_n257A ² | DC_13A_n257A DC_66A_n257A |

| EN-DC configuration | Uplink EN-DC configuration (NOTE 1) |
|---|--|
| DC_13A-66A_n260A ² | DC_13A_n260A DC_66A_n260A |
| DC_18A-28A_n257A ² | DC_18A_n257A DC_28A_n257A |
| DC_19A-21A_n257A ² DC_19A-21A_n257D ² DC_19A-21A_n257E ² DC_19A-21A_n257F ² DC_19A-21A_n257G DC_19A-21A_n257H DC_19A-21A_n257I | DC_19A_n257A DC_19A_n257D DC_21A_n257A DC_21A_n257D DC_21A_n257G |
| DC_19A-42A_n257A ² DC_19A-42A_n257D ² DC_19A-42A_n257E ² DC_19A-42A_n257F ² DC_19A-42A_n257G ² DC_19A-42A_n257H ² DC_19A-42A_n257I ² DC_19A-42C_n257A ² DC_19A-42C_n257G ² DC_19A-42C_n257H ² DC_19A-42C_n257I ² | DC_19A_n257A DC_19A_n257D DC_19A_n257G DC_19A_n257H DC_19A_n257I DC_42A_n257A DC_42A_n257D DC_42A_n257G DC_42A_n257H DC_42A_n257I |
| DC_21A-28A_n257A ² DC_21A-28A_n257D ² DC_21A-28A_n257E ² DC_21A-28A_n257F ² | DC_21A_n257A DC_28A_n257A |
| DC_21A-42A_n257A ² DC_21A-42A_n257D ² DC_21A-42A_n257E ² DC_21A-42A_n257F ² DC_21A-42A_n257G DC_21A-42A_n257H DC_21A-42A_n257I DC_21A-42C_n257A ² DC_21A-42C_n257G DC_21A-42C_n257H DC_21A-42C_n257I | DC_21A_n257A DC_21A_n257D DC_21A_n257G DC_21A_n257H DC_21A_n257I DC_42A_n257A DC_42A_n257D |
| DC_28A-42C_n257A ² DC_28A-42A_n257A ² | DC_28A_n257A DC_42A_n257A |
| DC_30A-66A_n260A DC_30A-66A_n260G DC_30A-66A_n260H DC_30A-66A_n260I DC_30A-66A_n260J DC_30A-66A_n260K DC_30A-66A_n260L DC_30A-66A_n260M | DC_30A_n260A DC_66A_n260A |
| DC_41A-42A_n257A DC_41A-42C_n257A DC_41C-42A_n257A DC_41C-42C_n257A | DC_41A_n257A DC_42A_n257A |

NOTE 1: Uplink EN-DC configurations are the configurations supported by the present release of specifications.

NOTE 2: Applicable for UE supporting inter-band EN-DC with mandatory simultaneous Rx/Tx capability

5.5B.5.3 Inter-band EN-DC configurations including FR2 (four bands)

Table 5.5B.5.3-1: Inter-band EN-DC configurations including FR2 (four bands)

| EN-DC configuration | Uplink EN-DC configuration (NOTE 1) |
|--|--|
| DC_1A-3A-5A_n257A ² | DC_1A_n257A DC_3A_n257A DC_5A_n257A |
| DC_1A-3A-7A_n257A ² | DC_1A_n257A DC_3A_n257A DC_7A_n257A |
| DC_1A-3A-7A-7A_n257A | DC_1A_n257A DC_3A_n257A DC_7A_n257A |
| DC_1A-3A-19A_n257A ² DC_1A-3A-19A_n257G DC_1A-3A-19A_n257H DC_1A-3A-19A_n257I | DC_1A_n257A DC_3A_n257A DC_3A_n257G DC_3A_n257H DC_3A_n257I DC_19A_n257A |
| DC_1A-3A-21A_n257A ² DC_1A-3A-21A_n257G DC_1A-3A-21A_n257H DC_1A-3A-21A_n257I | DC_1A_n257A DC_3A_n257A DC_3A_n257G DC_3A_n257H DC_3A_n257I DC_21A_n257A |
| DC_1A-3A-28A_n257A ² | DC_1A_n257A DC_3A_n257A DC_28A_n257A |
| DC_1A-3A-42A_n257A DC_1A-3A-42A_n257G DC_1A-3A-42A_n257H DC_1A-3A-42A_n257I DC_1A-3A-42C_n257A DC_1A-3A-42C_n257D DC_1A-3A-42C_n257E DC_1A-3A-42C_n257F DC_1A-3A-42C_n257G DC_1A-3A-42C_n257H DC_1A-3A-42C_n257I DC_1A-3A-42D_n257G DC_1A-3A-42D_n257H DC_1A-3A-42D_n257I | DC_1A_n257A DC_1A_n257G DC_1A_n257H DC_1A_n257I DC_3A_n257ADC_3A_n257G DC_3A_n257H DC_3A_n257I |
| DC_1A-5A-7A_n257A ² | DC_1A_n257A DC_5A_n257A DC_7A_n257A |
| DC_1A-5A-7A-7A_n257A | DC_1A_n257A DC_5A_n257A DC_7A_n257A |
| DC_1A-18A-28A_n257A ² | DC_1A_n257A DC_18A_n257A DC_28A_n257A |
| DC_1A-19A-21A_n257A DC_1A-19A-21A_n257D DC_1A-19A-21A_n257E DC_1A-19A-21A_n257F DC_1A-19A-21A_n257G DC_1A-19A-21A_n257H DC_1A-19A-21A_n257I | DC_1A_n257A DC_1A_n257G DC_1A_n257H DC_1A_n257I DC_19A_n257A DC_21A_n257A DC_21A_n257G DC_21A_n257H DC_21A_n257I |
| DC_1A-19A-42A_n257A DC_1A-19A-42A_n257G DC_1A-19A-42A_n257H | DC_1A_n257A DC_1A_n257G DC_1A_n257H |

| EN-DC configuration | Uplink EN-DC configuration (NOTE 1) |
|---------------------|-------------------------------------|
| DC_1A-19A-42A_n257I | DC_1A_n257I |
| DC_1A-19A-42C_n257A | DC_19A_n257A |
| DC_1A-19A-42C_n257D | DC_42A_n257A |
| DC_1A-19A-42C_n257E | |
| DC_1A-19A-42C_n257F | |
| DC_1A-19A-42C_n257G | |
| DC_1A-19A-42C_n257H | |
| DC_1A-19A-42C_n257I | |

| EN-DC configuration | Uplink EN-DC configuration (NOTE 1) |
|---|---|
| DC_1A-21A-28A_n257A ² | DC_1A_n257A DC_21A_n257A DC_28A_n257A |
| DC_1A-21A-42A_n257A DC_1A-21A-42A_n257G DC_1A-21A-42A_n257H DC_1A-21A-42A_n257I DC_1A-21A-42C_n257A DC_1A-21A-42C_n257D DC_1A-21A-42C_n257E DC_1A-21A-42C_n257F DC_1A-21A-42C_n257G DC_1A-21A-42C_n257H DC_1A-21A-42C_n257I | DC_1A_n257A DC_1A_n257G DC_1A_n257H DC_1A_n257I DC_21A_n257A DC_21A_n257G DC_21A_n257H DC_21A_n257I DC_42A_n257A DC_42A_n257D |
| DC_1A-28A-42A_n257A DC_1A-28A-42C_n257A | DC_1A_n257A DC_28A_n257A DC_42A_n257A |
| DC_1A-41A-42A_n257A DC_1A-41A-42C_n257A DC_1A-41C-42A_n257A DC_1A-41C-42C_n257A | DC_1A_n257A DC_41A_n257A DC_42A_n257A |
| DC_3A-5A-7A_n257A ² | DC_3A_n257A DC_5A_n257A DC_7A_n257A |
| DC_3A-5A-7A-7A_n257A ² | DC_3A_n257A DC_5A_n257A DC_7A_n257A |
| DC_3A-19A-21A_n257A ² | DC_3A_n257A DC_19A_n257A DC_21A_n257A |
| DC_3A-19A-42A_n257A DC_3A-19A-42A_n257G DC_3A-19A-42A_n257H DC_3A-19A-42A_n257I DC_3A-19A-42C_n257A DC_3A-19A-42C_n257D DC_3A-19A-42C_n257E DC_3A-19A-42C_n257F DC_3A-19A-42C_n257G DC_3A-19A-42C_n257H DC_3A-19A-42C_n257I | DC_3A_n257A DC_3A_n257D DC_3A_n257G DC_3A_n257H DC_3A_n257I DC_19A_n257A DC_19A_n257D DC_19A_n257G DC_19A_n257H DC_19A_n257I DC_42A_n257A DC_42A_n257D DC_42A_n257G DC_42A_n257H DC_42A_n257I |
| DC_3A-21A-42A_n257A DC_3A-21A-42A_n257G DC_3A-21A-42A_n257H DC_3A-21A-42A_n257I DC_3A-21A-42C_n257A DC_3A-21A-42C_n257D DC_3A-21A-42C_n257E DC_3A-21A-42C_n257F DC_3A-21A-42C_n257G DC_3A-21A-42C_n257H DC_3A-21A-42C_n257I | DC_3A_n257A DC_3A_n257D DC_3A_n257G DC_3A_n257H DC_3A_n257I DC_21A_n257A DC_21A_n257D DC_21A_n257G DC_21A_n257H DC_21A_n257I DC_42A_n257A DC_42A_n257D DC_42A_n257G DC_42A_n257H DC_42A_n257I |
| DC_3A-28A-42A_n257A DC_3A-28A-42C_n257A | DC_3A_n257A DC_28A_n257A DC_42A_n257A |

| EN-DC configuration | Uplink EN-DC configuration (NOTE 1) |
|---|--|
| DC_19A-21A-42A_n257A ² DC_19A-21A-42A_n257G ² DC_19A-21A-42A_n257H ² DC_19A-21A-42A_n257I ² DC_19A-21A-42C_n257A ² DC_19A-21A-42C_n257D ² DC_19A-21A-42C_n257E ² DC_19A-21A-42C_n257F ² DC_19A-21A-42C_n257G ² DC_19A-21A-42C_n257H ² DC_19A-21A-42C_n257I ² | DC_19A_n257A DC_19A_n257D DC_19A_n257G DC_19A_n257H DC_19A_n257I DC_21A_n257A DC_21A_n257D DC_21A_n257G DC_21A_n257H DC_21A_n257I DC_42A_n257A DC_42A_n257D DC_42A_n257G DC_42A_n257H DC_42A_n257I |
| DC_21A-28A-42A_n257A ² DC_21A-28A-42C_n257A ² | DC_21A_n257A DC_28A_n257A DC_42A_n257A |
| <p>NOTE 1: Uplink EN-DC configurations are the configurations supported by the present release of specifications.</p> <p>NOTE 2: Applicable for UE supporting inter-band EN-DC with mandatory simultaneous Rx/Tx capability</p> | |

5.5B.5.4 Inter-band EN-DC configurations including FR2 (five bands)

Table 5.5B.5.4-1: Inter-band EN-DC configurations including FR2 (five bands)

| EN-DC configuration | Uplink EN-DC configuration (NOTE 1) |
|--|--|
| DC_1A-3A-5A-7A_n257A | DC_1A_n257A DC_3A_n257A DC_5A_n257A DC_7A_n257A |
| DC_1A-3A-5A-7A-7A_n257A | DC_1A_n257A DC_3A_n257A DC_5A_n257A DC_7A_n257A |
| DC_1A-3A-19A-21A_n257A DC_1A-3A-19A-21A_n257D DC_1A-3A-19A-21A_n257E DC_1A-3A-19A-21A_n257F | DC_1A_n257A DC_3A_n257A DC_19A_n257A DC_21A_n257A |
| DC_1A-3A-19A-42A_n257A DC_1A-3A-19A-42A_n257D DC_1A-3A-19A-42A_n257E DC_1A-3A-19A-42A_n257F DC_1A-3A-19A-42A_n257G DC_1A-3A-19A-42A_n257H DC_1A-3A-19A-42A_n257I DC_1A-3A-19A-42C_n257A DC_1A-3A-19A-42C_n257D DC_1A-3A-19A-42C_n257E DC_1A-3A-19A-42C_n257F DC_1A-3A-19A-42C_n257G DC_1A-3A-19A-42C_n257H DC_1A-3A-19A-42C_n257I | DC_1A_n257A DC_3A_n257A DC_3A_n257G DC_3A_n257H DC_3A_n257I DC_19A_n257A DC_42A_n257A |
| DC_1A-3A-21A-42A_n257A DC_1A-3A-21A-42C_n257A DC_1A-3A-21A-42C_n257D DC_1A-3A-21A-42C_n257E DC_1A-3A-21A-42C_n257F DC_1A-3A-21A-42C_n257G DC_1A-3A-21A-42C_n257H DC_1A-3A-21A-42C_n257I | DC_1A_n257A DC_3A_n257A DC_3A_n257G DC_3A_n257H DC_3A_n257I DC_3A_n257J DC_21A_n257A DC_42A_n257A |
| DC_1A-3A-28A-42A_n257A DC_1A-3A-28A-42C_n257A | DC_1A_n257A DC_3A_n257A DC_28A_n257A DC_42A_n257A |
| DC_1A-19A-21A-42A_n257A DC_1A-19A-21A-42A_n257D DC_1A-19A-21A-42A_n257E DC_1A-19A-21A-42A_n257F DC_1A-19A-21A-42A_n257G DC_1A-19A-21A-42A_n257H DC_1A-19A-21A-42A_n257I DC_1A-19A-21A-42C_n257A DC_1A-19A-21A-42C_n257D DC_1A-19A-21A-42C_n257E DC_1A-19A-21A-42C_n257F DC_1A-19A-21A-42C_n257G DC_1A-19A-21A-42C_n257H DC_1A-19A-21A-42C_n257I | DC_1A_n257A DC_1A_n257G DC_1A_n257H DC_1A_n257I DC_19A_n257A DC_21A_n257A DC_21A_n257G DC_21A_n257H DC_21A_n257I DC_42A_n257A |
| DC_1A-19A-28A-42C_n257A | DC_1A_n257A DC_19A_n257A DC_28A_n257A DC_42A_n257A |
| DC_1A-21A-28A-42A_n257A | DC_1A_n257A DC_21A_n257A DC_28A_n257A DC_42A_n257A |

| EN-DC configuration | Uplink EN-DC configuration (NOTE 1) |
|--|-------------------------------------|
| NOTE 1: Uplink EN-DC configurations are the configurations supported by the present release of specifications. | |

5.5B.5.5 Void

5.5B.6 Inter-band EN-DC including FR1 and FR2

Supported channel bandwidths for E-UTRA operating bands and CA configurations are defined in TS 36.521-1 [10] and for NR operating bands and CA configurations in TS 38.521-1 [8], TS 38.521-2 [9] and present document.

5.5B.6.1 Void

5.5B.6.2 Inter-band EN-DC configurations including FR1 and FR2 (three bands)

Table 5.5B.6.2-1: Inter-band EN-DC configurations including FR1 and FR2_(three bands)

| EN-DC configuration | Uplink EN-DC configuration (NOTE 1) |
|--|---|
| DC_1A_n77A-n257A DC_1A_n77A-n257D DC_1A_n77A-n257E DC_1A_n77A-n257F DC_1A_n77C-n257A DC_1A_n77C-n257D DC_1A_n77C-n257E DC_1A_n77C-n257F | DC_1A_n77A DC_1A_n257A DC_1A_n77A-n257A |
| DC_1A_n78A-n257A DC_1A_n78A-n257D DC_1A_n78A-n257E DC_1A_n78A-n257F DC_1A_n78C-n257A DC_1A_n78C-n257D DC_1A_n78C-n257E DC_1A_n78C-n257F | DC_1A_n78A DC_1A_n257A DC_1A_n78A-n257A |
| DC_1A_n79A-n257A DC_1A_n79A-n257D DC_1A_n79A-n257E DC_1A_n79A-n257F DC_1A_n79C-n257A DC_1A_n79C-n257D DC_1A_n79C-n257E DC_1A_n79C-n257F | DC_1A_n79A DC_1A_n257A DC_1A_n79A-n257A |
| DC_3A_n77A-n257A DC_3A_n77A-n257D DC_3A_n77A-n257E DC_3A_n77A-n257F DC_3A_n77C-n257A DC_3A_n77C-n257D DC_3A_n77C-n257E DC_3A_n77C-n257F | DC_3A_n77A DC_3A_n257A DC_3A_n77A-n257A |
| DC_3A_n78A-n257A DC_3A_n78A-n257D DC_3A_n78A-n257E DC_3A_n78A-n257F DC_3A_n78C-n257A DC_3A_n78C-n257D DC_3A_n78C-n257E DC_3A_n78C-n257F | DC_3A_n78A DC_3A_n257A DC_3A_n78A-n257A |
| DC_3A_n79A-n257A DC_3A_n79A-n257D DC_3A_n79A-n257E DC_3A_n79A-n257F DC_3A_n79C-n257A DC_3A_n79C-n257D DC_3A_n79C-n257E DC_3A_n79C-n257F | DC_3A_n79A DC_3A_n257A DC_3A_n79A-n257A |
| DC_5A_n78A-n257A ² | DC_5A_n78A DC_5A_n257A |
| DC_7A_n78A-n257A | DC_7A_n78A DC_7A_n257A |
| DC_7A-7A_n78A-n257A | DC_7A_n78A DC_7A_n257A DC_7A_n78A-n257A |
| DC_19A_n77A-n257A DC_19A_n77A-n257D | DC_19A_n77A DC_19A_n257A |

| EN-DC configuration | Uplink EN-DC configuration (NOTE 1) |
|--|--|
| DC_19A_n77A-n257E DC_19A_n77A-n257F DC_19A_n77C-n257A DC_19A_n77C-n257D DC_19A_n77C-n257E DC_19A_n77C-n257F | DC_19A_n77A-n257A |
| DC_19A_n78A-n257A DC_19A_n78A-n257D DC_19A_n78A-n257E DC_19A_n78A-n257F DC_19A_n78C-n257A DC_19A_n78C-n257D DC_19A_n78C-n257E DC_19A_n78C-n257F | DC_19A_n78A DC_19A_n257A DC_19A_n78A-n257A |
| DC_19A_n79A-n257A DC_19A_n79A-n257D DC_19A_n79A-n257E DC_19A_n79A-n257F DC_19A_n79C-n257A DC_19A_n79C-n257D DC_19A_n79C-n257E DC_19A_n79C-n257F | DC_19A_n79A DC_19A_n257A DC_19A_n79A-n257A |
| DC_21A_n77A-n257A | DC_21A_n77A DC_21A_n257A |
| DC_21A_n78A-n257A | DC_21A_n78A DC_21A_n257A |
| DC_21A_n79A-n257A | DC_21A_n79A DC_21A_n257A |

NOTE 1: Uplink EN-DC configurations are the configurations supported by the present release of specifications.

NOTE 2: Applicable for UE supporting inter-band EN-DC with mandatory simultaneous Rx/Tx capability

5.5B.6.3 Inter-band EN-DC configurations including FR1 and FR2 (four bands)

Table 5.5B.6.3-1: Inter-band EN-DC configurations including FR1 and FR2 (four bands)

| EN-DC configuration | Uplink EN-DC configuration (NOTE 1) |
|--|--|
| DC_1A-3A_n78A-n257A DC_1A-3A_n78A-n257G DC_1A-3A_n78A-n257H DC_1A-3A_n78A-n257I | DC_1A_n78A DC_1A_n257A DC_1A_n257D DC_1A_n257G DC_1A_n257H DC_1A_n257I DC_3A_n78A DC_3A_n257A DC_3A_n257D DC_3A_n257G DC_3A_n257H DC_3A_n257I |
| DC_1A-5A_n78A-n257A | DC_1A_n78A DC_1A_n257A DC_5A_n78A DC_5A_n257A |
| DC_1A-7A_n78A-n257A | DC_1A_n78A DC_1A_n257A DC_7A_n78A DC_7A_n257A |
| DC_1A-7A-7A_n78A-n257A | DC_1A_n78A DC_1A_n257A DC_7A_n78A DC_7A_n257A |
| DC_3A-5A_n78A-n257A | DC_3A_n78A DC_3A_n257A DC_5A_n78A DC_5A_n257A |
| DC_3A-7A_n78A-n257A | DC_3A_n78A DC_3A_n257A DC_7A_n78A DC_7A_n257A |
| DC_3A-7A-7A_n78A-n257A | DC_3A_n78A DC_3A_n257A DC_7A_n78A DC_7A_n257A |
| DC_5A-7A_n78A-n257A | DC_5A_n78A DC_5A_n257A DC_7A_n78A DC_7A_n257A |
| DC_5A-7A-7A_n78A-n257A | DC_5A_n78A DC_5A_n257A DC_7A_n78A DC_7A_n257A |
| NOTE 1: Uplink EN-DC configurations are the configurations supported by the present release of specifications. | |

5.5B.6.4 Inter-band EN-DC configurations including FR1 and FR2 (five bands)

Table 5.5B.6.4-1: Inter-band EN-DC configurations including FR1 and FR2 (five bands)

| EN-DC configuration | Uplink EN-DC configuration (NOTE 1) |
|--|---|
| DC_1A-3A-5A_n78A-n257A | DC_1A_n78A DC_1A_n257A DC_3A_n78A DC_3A_n257A DC_5A_n78A DC_5A_n257A |
| DC_1A-3A-7A_n78A-n257A | DC_1A_n78A DC_1A_n257A DC_3A_n78A DC_3A_n257A DC_7A_n78A DC_7A_n257A |
| DC_1A-3A-7A-7A_n78A-n257A | DC_1A_n78A DC_1A_n257A DC_3A_n78A DC_3A_n257A DC_7A_n78A DC_7A_n257A |
| DC_1A-5A-7A_n78A-n257A | DC_1A_n78A DC_1A_n257A DC_5A_n78A DC_5A_n257A DC_7A_n78A DC_7A_n257A |
| DC_1A-5A-7A-7A_n78A-n257A | DC_1A_n78A DC_1A_n257A DC_5A_n78A DC_5A_n257A DC_7A_n78A DC_7A_n257A |
| DC_3A-5A-7A_n78A-n257A | DC_3A_n78A DC_3A_n257A DC_5A_n78A DC_5A_n257A DC_7A_n78A DC_7A_n257A |
| DC_3A-5A-7A-7A_n78A-n257A | DC_3A_n78A DC_3A_n257A DC_5A_n78A DC_5A_n257A DC_7A_n78A DC_7A_n257A |
| NOTE 1: Uplink EN-DC configurations are the configurations supported by the present release of specifications. | |

5.5B.6.5 Inter-band EN-DC configurations including FR1 and FR2 (six bands)

Table 5.5B.6.5-1: Inter-band EN-DC configurations including FR1 and FR2 (six bands)

| EN-DC configuration | Uplink EN-DC configuration (NOTE 1) |
|---------------------------|--|
| DC_1A-3A-5A-7A_n78A-n257A | DC_1A_n78A DC_1A_n257A DC_3A_n78A DC_3A_n257A DC_5A_n78A DC_5A_n257A DC_7A_n78A DC_7A_n257A |

NOTE 1: Uplink EN-DC configurations are the configurations supported by the present release of specifications.

5.5B.7 Inter-band NR-DC between FR1 and FR2

Supported channel bandwidths for E-UTRA operating bands and CA configurations are defined in TS 36.521-1 [10] and for NR operating bands and CA configurations in TS 38.521-1 [8], TS 38.521-2 [9] and present document.

5.5B.7.1 Inter-band NR-DC configurations between FR1 and FR2 (two bands)

Table 5.5B.7-1: Inter-band NR-DC configurations between FR1 and FR2 (two bands)

| Downlink NR-DC configuration | Uplink NR-DC configuration |
|---|----------------------------|
| DC_n77A-n257A DC_n77A-n257D DC_n77A-n257E DC_n77A-n257F DC_n77A-n257G DC_n77A-n257H DC_n77A-n257I DC_n77A-n257J DC_n77A-n257K DC_n77A-n257L DC_n77A-n257M DC_n77C-n257A DC_n77C-n257D DC_n77C-n257E DC_n77C-n257F | DC_n77A-n257A |
| DC_n78A-n257A DC_n78A-n257D DC_n78A-n257E DC_n78A-n257F DC_n78A-n257G DC_n78A-n257H DC_n78A-n257I DC_n78A-n257J DC_n78A-n257K DC_n78A-n257L DC_n78A-n257M DC_n78C-n257A DC_n78C-n257D DC_n78C-n257E DC_n78C-n257F | DC_n78A-n257A |
| DC_n79A-n257A DC_n79A-n257D DC_n79A-n257E DC_n79A-n257F DC_n79A-n257G DC_n79A-n257H DC_n79A-n257I DC_n79A-n257J DC_n79A-n257K DC_n79A-n257L DC_n79A-n257M DC_n79C-n257A DC_n79C-n257D DC_n79C-n257E DC_n79C-n257F | DC_n79A-n257A |
| NOTE 1: NR configuration for FR1 and FR2 are defined in TS 38.521-1 [8] and TS 38.521-2 [9] respectively. | |

5.5E Configuration for V2X operation

5.5E.1 General

The operating bands and bandwidth classes are specified for V2X operation.

5.5E.2 Intra-band contiguous V2X operation in FR1

Table 5.5E.2-1: Intra-band contiguous V2X configurations

| V2X configuration | SL transmission |
|-------------------|-------------------------------|
| V2X_(n)47AA | E-UTRA Band 47 or NR band n47 |

NOTE 1: Only single switched SL is supported.

5.5E.3 Intra-band non-contiguous V2X operation in FR1

Table 5.5E.3-1: Intra-band non-contiguous V2X configurations

| V2X configuration | SL transmission |
|-------------------|-------------------------------|
| V2X_47A_n47A | E-UTRA Band 47 or NR band n47 |

NOTE 1: Only single switched SL is supported.

5.5E.4 Inter-band V2X operation in FR1

5.5E.4.1 Inter-band V2X configurations within FR1 (two bands)

Table 5.5E.4.1-1: Inter-band V2X configurations

| V2X configuration | V2X transmission configuration |
|-------------------|--------------------------------|
| V2X_20A_n38A | V2X_20A_n38A |
| V2X_n71A_47A | V2X_n71A_47A |

NOTE 1: V2X transmission configurations are the configurations supported by the present release of specifications.

6 Transmitter characteristics

6.1 General

Editor's note: Test configurations/environments that require new spherical scan shall be included in test procedure clause and identifying such scenarios is currently FFS and owned by RAN5.

Unless otherwise stated the transmitter characteristics are specified at the antenna connector(s) of the UE for the bands operating on frequency range 1 and over the air of the UE for the bands operating on frequency range 2. The requirements for frequency range 1 and frequency range 2 can be verified separately. For the carrier in frequency range 1, requirements can be verified with NR FR2 link disabled. For the carrier in frequency range 2, requirements can be verified in OTA mode with E-UTRA connecting to the network by OTA without calibration.

For NR FR2 Tx test cases the identified beam peak direction can be stored and reused for a device under test in various configurations/environments for the full duration of device testing as long as beam peak direction is the same.

Unless otherwise stated, requirements for NR transmitter written in TS 38.521-1 [8] and TS 38.521-2 [9] apply and are assumed anchor agnostic. Requirements are verified under conditions where anchor resources do not interfere NR operation. For Rel-15, unless otherwise stated, if UE indicates IE maxNumberSRS-Ports-PerResource = n2 in NR standalone operation mode, the said UE shall meet the NR requirements for either power class 2 or power class 3 in EN-DC within FR1 if UE indicates IE maxNumberSRS-Ports-PerResource = n1 for EN-DC on this NR band. For Rel-16 and forward, if UE indicates IE [powerClassNRPt] as defined in TS 38.331 [18] in EN-DC, UE shall meet NR requirements according to this power class.

Unless otherwise stated, Channel Bandwidth shall be prioritized in the selecting of test points. Subcarrier spacing shall be selected after Test Channel Bandwidth is selected.

For conformance testing involving FR2 test cases in this specification, the UE under test shall be pre-configured with UL Tx diversity schemes disabled to account for single polarization System Simulator (SS) in the test environment. The UE under test may transmit with dual polarization.

Uplink RB allocations for E-UTRA carrier given in Table 6.1-1 are used throughout this clause, unless otherwise stated by the test case.

Table 6.1-1: Common uplink configuration for E-UTRA carrier

| Channel Bandwidth | RB allocation | | | |
|---|------------------------|---------------------------|-----------------|------------------|
| | Full_Allocation | Partial_Allocation | 1RB_Left | 1RB_Right |
| 1.4MHz | 6@0 | 5@0 | 1@0 | 1@5 |
| 3MHz | 15@0 | 4@0 | 1@0 | 1@14 |
| 5MHz | 25@0 | 8@0 | 1@0 | 1@24 |
| 10MHz | 50@0 | 12@0 | 1@0 | 1@49 |
| 15MHz | 75@0 | 16@0 | 1@0 | 1@74 |
| 20MHz | 100@0 | 18@0 | 1@0 | 1@99 |
| NOTE: Partial_Allocation corresponds to the test points with 0dB MPR _{single,E-UTRA} for QPSK modulation type included in TS 36.521-1 Table 6.2.2.4.1-1. | | | | |

6.2 Transmitter power

6.2A Transmitter power for CA without EN-DC

6.2A.1 UE maximum output power for CA

6.2A.1.1 UE maximum output power for inter-band NR CA between FR 1 and FR 2 without EN-DC

6.2A.1.1.1 Test purpose

Same test purpose as in clause 6.2.1 in TS 38.521-1 [8] for NR FR1 carrier(s) and clause 6.2.1 in TS 38.521-2 [9] for NR FR2 carrier(s).

6.2A.1.1.2 Test applicability

The requirements in this test are not testable due to issues with combined testing of NR FR1 conducted mode with NR FR2 in radiated mode. Therefore, the conducted and radiated requirements are tested separately.

No test case details are specified. The SA requirements for maximum output power apply and are tested in TS 38.521-1 [8] clauses 6.2 and 6.2A and TS 38.521-2 [9] clauses 6.2 and 6.2A

6.2A.2 UE maximum output power reduction for CA

6.2A.2.1 UE maximum output power reduction for inter-band NR CA between FR 1 and FR 2 without EN-DC

6.2A.2.1.1 Test purpose

Same test purpose as in clause 6.2.2 in TS 38.521-1 [8] for NR FR1 carrier(s) and clause 6.2.2 in TS 38.521-2 [9] for NR FR2 carrier(s).

6.2A.2.1.2 Test applicability

The requirements in this test are not testable due to issues with combined testing of NR FR1 conducted mode with NR FR2 in radiated mode. Therefore, the conducted and radiated requirements are tested separately.

No test case details are specified. The SA requirements for additional spectrum emissions mask apply and are tested in TS 38.521-1 [8] clauses 6.2 and 6.2A and TS 38.521-2 [9] clauses 6.2 and 6.2A

6.2A.3 UE additional maximum output power reduction for CA

6.2A.3.1 UE additional maximum output power reduction for inter-band NR CA between FR 1 and FR 2 without EN-DC

6.2A.3.1.1 Test purpose

Same test purpose as in clause 6.2.3.1 in TS 38.521-1 [8] for NR FR1 carrier and clause 6.2.3.1 in TS 38.521-2 [9] for NR FR2 carrier.

6.2A.3.1.2 Test applicability

The requirements in this test are not testable due to issues with combined testing of NR FR1 and E-UTRA in conducted mode with NR FR2 in radiated mode. Therefore, the conducted and radiated requirements are tested separately.

No test case details are specified. The single carrier requirements for Additional Maximum Output Power apply and are tested as part of clause 6.2.3 in TS 38.521-1 [8] for NR FR1 carrier and clause 6.2.3 in TS 38.521-2 [9] for NR FR2 carrier.

6.2A.4 Configured output power level for CA

6.2A.4.1 Configured output power level for inter-band NR CA between FR 1 and FR 2 without EN-DC

6.2A.4.1.1 Test purpose

Same test purpose as in clause 6.2.4 in TS 38.521-1 [8] for NR FR1 carrier(s) and clause 6.2.4 in TS 38.521-2 [9] for NR FR2 carrier(s).

6.2A.4.1.2 Test applicability

The requirements in this test are not testable due to issues with combined testing of NR FR1 conducted mode with NR FR2 in radiated mode. Therefore, the conducted and radiated requirements are tested separately.

No test case details are specified. The SA requirements for configured output power level apply and are tested in TS 38.521-1 [8] clauses 6.2 and 6.2A and TS 38.521-2 [9] clauses 6.2 and 6.2A.

6.2A.4.2 $\Delta T_{IB,c}$ for CA

6.2A.4.2.1 $\Delta T_{IB,c}$ for inter-band CA between FR 1 and FR 2

For the UE which supports inter-band NR CA configuration, $\Delta T_{IB,c}$ in Table 6.2A.4.2.1-1 applies. Unless otherwise stated, $\Delta T_{IB,c}$ is set to zero.

Table 6.2A.4.2.1-1: Void

6.2B Transmitter power for DC

6.2B.1 UE Maximum Output Power for DC

6.2B.1.1 UE Maximum Output Power for Intra-Band Contiguous EN-DC

Editor's note:

- For overlapping transmission there is no test point satisfying 0dB MPR according to RAN4 specification.
- Test requirements for Power Class 2 of Rel-15 is FFS due to ongoing RAN4 discussion on minimum requirement

6.2B.1.1.1 Test purpose

To verify that the error of the UE maximum output power does not exceed the range prescribed by the specified nominal maximum output power and tolerance.

An excess maximum output power has the possibility to interfere to other channels or other systems. A small maximum output power decreases the coverage area.

6.2B.1.1.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting intra-band contiguous EN-DC operation on FR1.

6.2B.1.1.3 Minimum conformance requirements

The following UE Power Classes define the total maximum output power for any transmission bandwidth(s) of the CG(s) configured.

The maximum output power is measured as the total maximum output power across the UE antenna connector(s). The period of measurement shall be at least one sub frame.

Table 6.2B.1.1.3-1: Maximum output power for EN-DC (continuous sub-blocks)

| DC configuration | Power class 2 (dBm) | Tolerance (dB) | Power class 3 (dBm) | Tolerance (dB) |
|---|---------------------|--------------------|---------------------|--------------------|
| EN-DC_(n)71AA | | | 23 | +2/-3 |
| DC_(n)41AA | 26 | +2/-2 ¹ | 23 | +2/-2 ¹ |
| NOTE 1: If all transmitted resource blocks over all component carriers are confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or/and $F_{UL_high} - 4$ MHz and F_{UL_high} , the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB | | | | |
| NOTE 2: Power Class 3 is the default power class unless otherwise stated. | | | | |

If UE supports a different power class than the default UE power class for EN-DC band combination, and the supported power class enables higher maximum output power than that of the default power class:

- if the E-UTRA UL/DL configuration is 0 or 6; or

- if the E-UTRA UL/DL configuration is 1 and special subframe configuration is 0 or 5; or
- if the IE $p\text{-}maxUE\text{-}FR1\text{-}r15$ as defined in TS 36.331 [17] is provided and set to the maximum output power of the default power class or lower;
 - apply all requirements for the default power class, and set the configured transmitted power as specified in clause 6.2B.4;
- else
 - apply all requirements for the supported power class, and set the configured transmitted power class as specified in subclause 6.2B.4;

The normative reference for this requirement is TS 38.101-3 [4] clause 6.2B.1.

LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

6.2B.1.1.4 Test description

6.2B.1.1.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on EN-DC operating bands specified in clause 5.3B.1.2, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-1 [8] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2. All of these configurations shall be tested with applicable test parameters for each EN-DC configuration specified in clause 5.3B.1.2, and are shown in table 6.2B.1.1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in TS 36.521-1 [10] Annex A, clause A.2.3 for E-UTRA RMC for TDD, TS 36.521-1 [10] Annex A, clause A.2.2 for E-UTRA RMC for FDD, and TS 38.521-1 [8] Annex A, clause A.2 for NR RMC. Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521-1 [10] Annex C, clause C.2 and in TS 38.521-1 [8] Annex C, clause C.2 for E-UTRA CG and NR CG respectively.

Table 6.2B.1.1.4.1-1: Test configuration table for

| Initial Conditions | | | | | |
|---|------------------------------------|----------------------------|--------------------|--------------------|----------------|
| Test Environment as specified in TS 38.508-1 [5] clause 4.1 | Normal, TL/VL, TL/VH, TH/VL, TH/VH | | | | |
| NR/E-UTRA Test Parameters | | | | | |
| Test ID | Downlink Configuration | EN-DC Uplink Configuration | | | |
| | | E-UTRA Cell | | NR Cell | |
| 1 | N/A | QPSK | Partial_Allocation | N/A | N/A |
| 2 | N/A | QPSK | 1RB_Left | N/A | N/A |
| 3 | N/A | N/A | N/A | DFT-s-OFDM QPSK | Inner Full |
| 4 | N/A | N/A | N/A | DFT-s-OFDM QPSK | Inner_1RB_LEFT |

NOTE 1: The specific configuration of each RB allocation is defined in Table 6.1-1 in TS 38.521-1 [8].
 NOTE 2: The specific configuration of each RB allocation is defined in Table 6.1-1 in current specification.

Table 6.2B.1.1.4.1-2: Void

1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [6] clause A.3.1.1 for SS diagram and clause A.3.2.1 for UE diagram.
2. The parameter settings for the E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3, and the parameter settings for the NR cell are set up according to TS 38.508-1 [6] clause 4.4.3.
3. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C, clause C.0 and TS 38.521-1 [8] Annex C, clause C.0 for E-UTRA CG and NR CG respectively, and uplink signals according to TS 36.521-1 [10] Annex H and TS 38.521-1 [8] Annex G for E-UTRA CG and NR CG respectively.
4. The UL Reference Measurement channels are TS 36.521-1 [10] Annex A, clause A.2 and TS 38.521-1 [8] Annex A, clause A.2 for E-UTRA CG and NR CG respectively.
5. Propagation conditions are set according to TS 36.521-1 [10] Annex B.0 and TS 38.521-1 [8] Annex B, clause B.0 for E-UTRA CG and NR CG respectively.
6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 6.2B.1.1.4.3.
7. For the case of testing overlapping E-UTRA and NR UL transmission scenario when both bands are TDD, ensure E-UTRA UL transmission overlaps with NR UL transmission in time by giving SCG a delay of 3 E-UTRA subframes, or by giving MCG a delay of 2 subframes.

6.2B.1.1.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format 0_1 for C_RNTI to schedule the UL RMC according to table 6.2B.1.1.4.1-1 on E-UTRA CC and NR CC respectively. Since the UL has no payload and no loopback data to send, the UE sends uplink MAC padding bits on the UL RMC.

2. Send continuously uplink power control "up" commands to the UE for NR and E-UTRA carrier until the UE transmits at its P_{UMAX} level; allow at least 200 ms from the first TPC command for the UE to reach P_{UMAX} level.
3. Measure the mean transmitted power over all EN-DC component carriers in the EN-DC, which shall meet the requirements described in table 6.2B.1.1.5-1 and the period of the measurement shall be at least the continuous duration of one active sub-frame.
4. For UEs supporting Power Class 2, repeat steps 1~3 on the applicable bands with message exception defined in Table 6.2B.1.1.4.3-5.

6.2B.1.1.4.3 Message contents

Message contents are according to TS 36.508 [11] clause 4.6.1 and TS 38.508-1 [6] clause 4.6.1 with the following exceptions.

6.2B.1.1.4.3-1: PhysicalCellGroupConfig

| Derivation Path: TS 38.508-1 [6], Table 4.6.3-106 | | | |
|---|--------------|---------|------------------|
| Information Element | Value/remark | Comment | Condition |
| p-NR-FR1 | 23 | | Power Class 3 UE |
| | 26 | | Power Class 2 UE |

6.2B.1.1.4.3-2: RRConnectionReconfiguration: nr-Config-r15

| Derivation Path: TS 36.508 [11], Table 4.6.1-8 | | | |
|--|--------------|---------|------------------|
| Information Element | Value/remark | Comment | Condition |
| p-MaxEUTRA-r15 | 23 | | Power Class 3 UE |
| | 26 | | Power Class 2 UE |

6.2B.1.1.4.3-3: RRConnectionReconfiguration: tdm-PatternConfig if operating on FDD band

| Derivation Path: TS 36.508 [11], Table 4.6.1-8 | | | |
|--|--------------|--|-----------|
| Information Element | Value/remark | Comment | Condition |
| tdm-PatternConfig-r15 ::= CHOICE{ | | | |
| setup ::= SEQUENCE { | | Apply if operating on FDD band for a UE NOT indicating support of dynamicPowerSharing in the UE-MRDC-Capability IE according to TS 38.213 [x] clause 7.6.1 | |
| subframeAssignment-r15 | sa2 | | |
| harq-Offset-r15 | 0 | | |
| } | | | |
| } | | | |

6.2B.1.1.4.3-4: SystemInformationBlockType1: tdd-Config if operating on TDD band

| Derivation Path: TS 36.508 [11], Table 4.6.3-23 | | | |
|---|--------------|-----------------------|-----------|
| Information Element | Value/remark | Comment | Condition |
| TDD-Config-DEFAULT ::= SEQUENCE { | | Operating on TDD band | |
| subframeAssignment | sa2 | | |
| specialSubframePatterns | ssp7 | | |
| } | | | |

6.2B.1.1.4.3-5: RRConnectionReconfiguration: p-MaxUE-FR1-r15 (step 4 in 6.2B.1.1.4.2)

| Derivation Path: TS 36.508 [11], Table 4.6.1-8 | | | |
|--|--------------|---------------------------------------|------------------|
| Information Element | Value/remark | Comment | Condition |
| nonCriticalExtension SEQUENCE { | | RRConnectionReconfiguration-v1530-IEs | |
| p-MaxUE-FR1-r15 | 23 | | Power Class 2 UE |
| } | | | |

6.2B.1.1.5 Test requirements

The maximum output power for the DC configuration, derived in step 3 shall be within the range prescribed by the DC UE Power Class and tolerance in Table 6.2B.1.1.5-1 for power class 3 UE and Table 6.2B.1.1.5-2 for power class 2 UE. The corresponding requirements is specified in table 6.2.2.5-1, 6.2.2_1.5-1 in TS 36.521-1 [10] or table 6.2.1.5-1, 6.2.1.5-2 in TS 38.521-1 [8].

The maximum output power for the DC configuration, derived in step 4 shall be within the range prescribed in Table 6.2B.1.1.5-1.

Table 6.2B.1.1.5-1: Maximum output power for EN-DC (continuous sub-blocks) for power class 3

| DC configuration | Power class2 | Tolerance (dB) | Power class 3 (dBm) | Tolerance (dB) |
|---|--------------|----------------|---------------------|---------------------------|
| DC_(n)71AA | | | 23 | +2+TT/-2.5-TT |
| DC_(n)41AA | | | 23 | +2+TT/-2 ¹ +TT |
| NOTE 1: If all transmitted resource blocks over all component carriers are confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or/and $F_{UL_high} - 4$ MHz and F_{UL_high} , the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB | | | | |
| NOTE 2: TT for each frequency and channel bandwidth is specified in Table 6.2B.1.1.5-3. | | | | |

Table 6.2B.1.1.5-2: Maximum output power for EN-DC (continuous sub-blocks) for Power Class 2 for Rel-15

| DC configuration | Carrier | Power class2 | Tolerance (dB) | Condition | Comment | |
|---|----------------|--------------|---------------------------|---------------------------------|-------------------------------------|--|
| DC_(n)41AA | NR carrier | FFS | FFS | UE indicates PC2 on NR band | FFS | |
| | | FFS | FFS | UE indicates PC3 on NR band | FFS | |
| | E-UTRA carrier | 26 | +2+TT/-2 ¹ -TT | UE indicates PC2 ON E-UTRA band | UE meets power class 2 requirements | |
| | | 23 | +2+TT/-2 ¹ -TT | UE indicates PC3 on E-UTRA band | UE meets power class 3 requirements | |
| NOTE 1: If all transmitted resource blocks over all component carriers are confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or/and $F_{UL_high} - 4$ MHz and F_{UL_high} , the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB | | | | | | |
| NOTE 2: TT for each frequency and channel bandwidth is specified in Table 6.2B.1.1.5-3 | | | | | | |

Table 6.2B.1.1.5-2a: Maximum output power for EN-DC (continuous sub-blocks) for Power Class 2 for Rel-16 and forward

| DC configuration | Carrier | Power class2 | Tolerance (dB) | Condition | Comment | |
|--|----------------|--------------|---------------------------|---|-------------------------------------|--|
| DC_(n)41AA | NR carrier | 26 | +2+TT/-3 ¹ -TT | UE indicates PC2 for the NR part within the EN-DC combination | UE meets power class 2 requirements | |
| | | 23 | +2+TT/-2 ¹ -TT | UE indicates PC3 for the NR part within the EN-DC combination | UE meets power class 3 requirements | |
| | E-UTRA carrier | 26 | +2+TT/-2 ¹ -TT | UE indicates PC2 ON E-UTRA band | UE meets power class 2 requirements | |
| | | 23 | +2+TT/-2 ¹ -TT | UE indicates PC3 on E-UTRA band | UE meets power class 3 requirements | |
| NOTE 1: If all transmitted resource blocks over all component carriers are confined within FUL_low and FUL_low + 4 MHz or/and FUL_high – 4 MHz and FUL_high, the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB | | | | | | |
| NOTE 2: TT for each frequency and channel bandwidth is specified in Table 6.2B.1.1.5-3 | | | | | | |

Table 6.2B.1.1.5-3: Test Tolerance

| | f ≤ 3.0GHz | 3.0GHz < f ≤ 6GHz |
|---------------------|------------|-------------------|
| BW ≤ 40MHz | 0.7 dB | 1.0 dB |
| 40MHz < BW ≤ 100MHz | 1.0 dB | 1.0 dB |

6.2B.1.2 UE Maximum Output Power for Intra-Band Non-Contiguous EN-DC

Editor's note:

- For overlapping transmission there is no test point satisfying 0dB MPR according to RAN4 specification.
- Test requirements for Power Classes 2 of Rel-15 is FFS due to ongoing RAN4 discussion on minimum requirement

6.2B.1.2.1 Test purpose

To verify that the error of the UE maximum output power does not exceed the range prescribed by the specified nominal maximum output power and tolerance.

An excess maximum output power has the possibility to interfere to other channels or other systems. A small maximum output power decreases the coverage area.

6.2B.1.2.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting intra-band non-contiguous EN-DC operation on FR1.

6.2B.1.2.3 Minimum conformance requirements

The following UE Power Classes define the total maximum output power for any transmission bandwidth(s) of the CG(s) configured.

The maximum output power is measured as the total maximum output power across the UE antenna connector(s). The period of measurement shall be at least one sub frame.

Table 6.2B.1.2.3-1: Maximum output power for EN-DC (non-continuous sub-blocks)

| DC configuration | Power class 2 (dBm) | Tolerance (dB) | Power class 3 (dBm) | Tolerance (dB) |
|-----------------------------|------------------------|--------------------|------------------------|--------------------|
| DC_2A_n2A ⁴ | | | 23 | +2/-3 |
| EN-DC_3A_n3A ⁽²⁾ | | | 23 | +2/-3 |
| DC_41A_n41A | 26 | +2/-2 ¹ | 23 | +2/-2 ¹ |
| DC_66A_n66A ⁴ | | | 23 | +2/-3 |

NOTE 1: If all transmitted resource blocks over all component carriers are confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or/and $F_{UL_high} - 4$ MHz and F_{UL_high} , the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB

NOTE 2: Only single switched UL is supported in Rel.15

NOTE 3: Power Class 3 is the default power class unless otherwise stated.

NOTE 4: Only single switched UL is supported.

If UE supports a different power class than the default UE power class for EN-DC band combination, and the supported power class enables higher maximum output power than that of the default power class:

- if the E-UTRA UL/DL configuration is 0 or 6; or
- if the E-UTRA UL/DL configuration is 1 and special subframe configuration is 0 or 5; or
- if the IE $p\text{-maxUE-FRI-}r15$ as defined in TS 36.331 [17] is provided and set to the maximum output power of the default power class or lower:
 - apply all requirements for the default power class, and set the configured transmitted power as specified in subclause 6.2B.4;
- else
 - apply all requirements for the supported power class, and set the configured transmitted power class as specified in subclause 6.2B.4.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.2B.1.

LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

6.2B.1.2.4 Test description

6.2B.1.2.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on EN-DC operating bands specified in Table 5.3B.1.3-1, channel bandwidths and sub-carrier spacings for the NR cell are specified in TS 38.521-1 [8] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2. All of these configurations shall be tested with applicable test parameters for each EN-DC configuration specified in Table 5.3B.1.3-1, and are shown in table 6.2B.1.2.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in TS 36.521-1 [10] Annex A, clause A.2.3 for E-UTRA RMC for TDD, TS 36.521-1 [10] Annex A, clause A.2.2 for E-UTRA RMC for FDD, and TS 38.521-1 [8] Annex A, clause A.2 for NR RMC Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521-1 [10] Annex C, clause C.2 and in TS 38.521-1 [8] Annex C, clause C.2 for E-UTRA CG and NR CG respectively.

Table 6.2B.1.2.4.1-1: Test configuration table for intra-band non-contiguous EN-DC

| Initial Conditions | | | | | |
|---|------------------------------------|----------------------------|--------------------|------------------------|----------------|
| Test Environment as specified in TS 38.508-1 [5] clause 4.1 | Normal, TL/VL, TL/VH, TH/VL, TH/VH | | | | |
| NR Test Frequencies as specified in TS 38.508-1 [5] clause 4.3.1 E-UTRA Test Frequencies as specified in TS 36.508-1 [11] clause 4.3.1 | Minimum Wgap, Maximum Wgap | | | | |
| Test EN-DC bandwidth combination as specified in TS 38.508-1 [5] clause 4.3.1 | Highest N_{RB_agg} | | | | |
| NR Test SCS as specified in Table 5.3.5-1 in TS 38.521-1 [8] | Highest supported SCS | | | | |
| NR/E-UTRA Test Parameters | | | | | |
| Test ID | Downlink Configuration | EN-DC Uplink Configuration | | | |
| | | E-UTRA Cell | NR Cell | | |
| | Modulation | RB allocation (NOTE 2) | Modulation | RB allocation (NOTE 1) | |
| 1 | N/A | QPSK | Partial_Allocation | N/A | N/A |
| 2 | N/A | QPSK | 1RB_Left | N/A | N/A |
| 3 | N/A | N/A | N/A | DFT-s-OFDM QPSK | Inner Full |
| 4 | N/A | N/A | N/A | DFT-s-OFDM QPSK | Inner_1RB_LEFT |
| NOTE 1: The specific configuration of each RB allocation is defined in Table 6.1-1 in TS 38.521-1 [8]. | | | | | |
| NOTE 2: The specific configuration of each RB allocation is defined in Table 6.1-1 in current specification. | | | | | |

1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [6] A.3.1.1 for SS diagram and A.3.2.1 for UE diagram.
2. The parameter settings for the cell are set up according to TS 38.508-1 [6] clause 4.4.3.
3. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C.0 and TS 38.521-1 [8] Annex C.0 for E-UTRA CG and NR CG respectively, and uplink signals according to TS 36.521-1 [10] Annex H and TS 38.521-1 [8] Annex G for E-UTRA CG and NR CG respectively.
4. The UL Reference Measurement channels are TS 36.521-1 [10] Annex A.2 and TS 38.521-1 [8] Annex A.2 for E-UTRA CG and NR CG respectively.
5. Propagation conditions are set according to TS 36.521-1 [10] Annex B.0 and TS 38.521-1 [8] Annex B.0 for E-UTRA CG and NR CG respectively.
6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 6.2B.1.2.4.3.
7. For the case of testing overlapping E-UTRA and NR UL transmission scenario when both bands are TDD, ensure E-UTRA UL transmission overlaps with NR UL transmission in time by giving SCG a delay of 3 E-UTRA subframes, or by giving MCG a delay of 2 subframes.

6.2B.1.2.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format 0_1 for C_RNTI to schedule the UL RMC according to table 6.2B.1.2.4.1-1on E-UTRA CC and NR CC respectively. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
2. Send continuously uplink power control "up" commands to the UE for NR and E-UTRA carrier until the UE transmits at its P_{UMAX} level; allow at least 200 ms from the first TPC command for the UE to reach P_{UMAX} level for Power class 3.

3. Measure the mean transmitted power over all EN-DC component carriers in the EN-DC, which shall meet the requirements described in table 6.2B.1.2.5-1 and the period of the measurement shall be at least the continuous duration of one active sub-frame.
4. For UEs supporting Power Class 2, repeat steps 1~3 on the applicable bands with message exception defined in Table 6.2B.1.1.4.3-5.

6.2B.1.2.4.3 Message contents

Same message contents as specified in 6.2B.1.1.4.3.

6.2B.1.2.5 Test requirements

The maximum output power for the DC configuration, derived in step 3 shall be within the range prescribed by the DC UE Power Class and tolerance in Table 6.2B.1.2.5-1 for power class 3 UE and Table 6.2B.1.2.5-2 for power class 2 UE. The corresponding requirements is specified in table 6.2.2.5-1, 6.2.2.1.5-1 in TS 36.521-1 [10] or table 6.2.1.5-1, 6.2.1.5-2 in TS 38.521-1 [8].

The maximum output power for the DC configuration, derived in step 4 shall be within the range prescribed in Table 6.2B.1.2.5-1.

Table 6.2B.1.2.5-1: Maximum output power for EN-DC (non-continuous sub-blocks) for power class 3

| DC configuration | Power class 2 (dBm) | Tolerance (dB) | Power class 3 (dBm) | Tolerance (dB) |
|--------------------------|------------------------|-------------------|------------------------|---------------------------|
| DC_2A_n2A ⁴ | | | 23 | +2+TT/-2 ¹ -TT |
| DC_3A_n3A ⁽²⁾ | | | 23 | +2+TT/-2 ¹ -TT |
| DC_41A_n41A | | | 23 | +2+TT/-2 ¹ -TT |
| DC_66A_n66A ⁴ | | | 23 | +2+TT/-2 ¹ -TT |

NOTE 1: If all transmitted resource blocks over all component carriers are confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or/and $F_{UL_high} - 4$ MHz and F_{UL_high} , the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB

NOTE 2: Only single switched UL is supported in Rel.15

NOTE 3: TT for each frequency and channel bandwidth is specified in Table 6.2B.1.2.5-3

NOTE 4: Only single switched UL is supported.

Table 6.2B.1.2.5-2: Maximum output power for EN-DC (non-continuous sub-blocks) for power class 2 for Rel-15

| DC configuration | Carrier | Power class2 | Tolerance (dB) | Condition | Comment |
|------------------|----------------|--------------|---------------------------|---|-------------------------------------|
| DC_41A_n41A | NR carrier | FFS | FFS | UE indicates PC2 on NR band | FFS |
| | | FFS | FFS | UE indicates PC3 on NR band | FFS |
| | E-UTRA carrier | 26 | +2+TT/-3 ¹ -TT | UE indicates PC3 on E-UTRA carrier of this DC_Configutation | UE meets power class 2 requirements |
| | | 23 | +2+TT/-2 ¹ -TT | UE indicates PC3 on E-UTRA carrier of this DC_Configutation | UE meets power class 3 requirements |

NOTE 1: If all transmitted resource blocks over all component carriers are confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or/and $F_{UL_high} - 4$ MHz and F_{UL_high} , the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB

NOTE 2: TT for each frequency and channel bandwidth is specified in Table 6.2B.1.1.5-3

Table 6.2B.1.2.5-2a: Maximum output power for EN-DC (non-continuous sub-blocks) for power class 2 for Rel-16 and forward

| DC configuration | Carrier | Power class2 | Tolerance (dB) | Condition | Comment | |
|--|----------------|--------------|---------------------------|---|-------------------------------------|--|
| DC_41A_n41A | NR carrier | 26 | +2+TT/-3 ¹ -TT | UE indicates PC2 for the NR part within the EN-DC combination | UE meets power class 2 requirements | |
| | | 23 | +2+TT/-2 ¹ -TT | UE indicates PC3 for the NR part within the EN-DC combination | UE meets power class 3 requirements | |
| | E-UTRA carrier | 26 | +2+TT/-2 ¹ -TT | UE indicates PC2 ON E-UTRA carrier of this DC_Configutation | UE meets power class 2 requirements | |
| | | 23 | +2+TT/-2 ¹ -TT | UE indicates PC3 on E-UTRA carrier of this DC_Configutation | UE meets power class 3 requirements | |
| NOTE 1: If all transmitted resource blocks over all component carriers are confined within FUL_low and FUL_low + 4 MHz or/and FUL_high – 4 MHz and FUL_high, the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB | | | | | | |
| NOTE 2: TT for each frequency and channel bandwidth is specified in Table 6.2B.1.1.5-3 | | | | | | |

Table 6.2B.1.2.5-3: Test Tolerance

| | f ≤ 3.0GHz | 3.0GHz < f ≤ 6GHz |
|-------------------------------|------------|-------------------|
| BW ≤ 40MHz | 0.7 dB | 1.0 dB |
| 40MHz < BW ≤ 100MHz | 1.0 dB | 1.0 dB |

6.2B.1.3 UE Maximum Output Power for Inter-Band EN-DC within FR1

6.2B.1.3.1 Test purpose

To verify that the error of the UE maximum output power does not exceed the range prescribed by the specified nominal maximum output power and tolerance.

An excess maximum output power has the possibility to interfere to other channels or other systems. A small maximum output power decreases the coverage area.

6.2B.1.3.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC operating on FR1.

6.2B.1.3.3 Minimum conformance requirements

For inter-band EN-DC of E-UTRA and NR in FR1, the following UE Power Classes define the maximum output power for any transmission bandwidth within the aggregated channel bandwidth. The maximum output power is measured as the sum of the maximum output power at each UE antenna connector. The period of measurement shall be at least one sub frame (1ms). UE maximum output power shall be measured over all component carriers from different bands. If each band has separate antenna connectors, maximum output power is measured as the sum of maximum output power at each UE antenna connector.

Table 6.2B.1.3.3-1: Maximum output power for inter-band EN-DC (two bands)

| EN-DC configuration | Power class 2 (dBm) | Tolerance (dB) | Power class 3 (dBm) | Tolerance (dB) |
|---|--------------------------------|---------------------------|--------------------------------|---------------------------|
| DC_1A_n3A | | | 23 | +2/-3 |
| DC_1A_n28A | | | 23 | +2/-3 |
| DC_1A_n40A | | | 23 | +2/-3 |
| DC_1A_n51A | | | 23 | +2/-3 |
| DC_1A_n77A | | | 23 | +2/-3 |
| DC_1A_n78A DC_1A_n84A_ULSUP- TDM_n78A DC_1A_n84A_ULSUP- FDM_n78A | | | 23 | +2/-3 |
| DC_1A_n79A | | | 23 | +2/-3 |
| DC_2A_n5A | | | 23 | +2/-3 ¹ |
| DC_2A_n41A | | | 23 | +2/-3 |
| DC_2A_n66A | | | 23 | +2/-3 ¹ |
| DC_2A_n71A | | | 23 | +2/-3 |
| DC_2A_n78A | | | 23 | +2/-3 |
| DC_3A_n7A | | | 23 | +2/-3 ¹ |
| DC_3A_n28A | | | 23 | +2/-3 ¹ |
| DC_3A_n40A | | | 23 | +2/-3 ¹ |
| DC_3A_n41A, DC_3C_n41A | 26 ⁶ | +2/-3 | 23 | +2/-3 |
| DC_3A_n51A | | | 23 | +2/-3 ¹ |
| DC_3A_n77A | | | 23 | +2/-3 ¹ |
| DC_3A_n78A | 26 ⁶ | +2/-3 ¹ | 23 | +2/-3 ¹ |
| DC_3A_n79A DC_3A_n80A_ULSUP- TDM_n79A, DC_3A_n80A_ULSUP- FDM_n79A | | | 23 | +2/-3 ¹ |
| DC_3A_n82A | | | 23 | +2/-3 ¹ |
| DC_5A_n2A | | | 23 | +2/-3 |
| DC_5A_n40A | | | 23 | +2/-3 ¹ |
| DC_5A_n66A | | | 23 | +2/-3 ¹ |
| DC_5A_n78A | | | 23 | +2/-3 |
| DC_7A_n1A | | | 23 | +2/-3 |
| DC_7A_n3A | | | 23 | +2/-3 |
| DC_7A_n28A | | | 23 | +2/-3 ¹ |
| DC_7A_n51A | | | 23 | +2/-3 ¹ |
| DC_7A_n66A | | | 23 | +2/-3 ¹ |
| DC_7A_n78A DC_7C_n78A | | | 23 | +2/-3 |
| DC_8A_n1A | | | 23 | +2/-3 |
| DC_8A_n3A | | | 23 | +2/-3 |
| DC_8A_n40A | | | 23 | +2/-3 ¹ |
| DC_8A_n41A, DC_8A_n81A_ULSUP- TDM, DC_8A_n81A_ULSUP- FDM | | | 23 | +2/-3 |
| DC_8A_n77A | | | 23 | +2/-3 |

| EN-DC configuration | Power class 2 (dBm) | Tolerance (dB) | Power class 3 (dBm) | Tolerance (dB) |
|--|------------------------|-------------------|------------------------|-------------------|
| DC_8A_n78A | | | 23 | +2/-3 |
| DC_8A_n81A_ULSUP-TDM_n78A, DC_8A_n81A_ULSUP-FDM_n78A | | | 23 | +2/-3 |
| DC_8A_n79A | | | 23 | +2/-3 |
| DC_8A_n81A_ULSUP-TDM_n79A, DC_8A_n81A_ULSUP-FDM_n79A | | | 23 | +2/-3 |
| DC_11A_n77A | | | 23 | +2/-3 |
| DC_11A_n78A | | | 23 | +2/-3 |
| DC_11A_n79A | | | 23 | +2/-3 |
| DC_12A_n5A | | | 23 | +2/-3 |
| DC_12A_n66A | | | 23 | +2/-3 |
| DC_12A_n78A | | | 23 | +2/-3 |
| DC_13A_n2A | | | 23 | +2/-3 |
| DC_13A_n66A | | | 23 | +2/-3 |
| DC_14A_n2A | | | 23 | +2/-3 |
| DC_14A_n66A | | | 23 | +2/-3 |
| DC_18A_n77A | | | 23 | +2/-3 |
| DC_18A_n78A | | | 23 | +2/-3 |
| DC_18A_n79A | | | 23 | +2/-3 |
| DC_19A_n77A | | | 23 | +2/-3 |
| DC_19A_n78A | | | 23 | +2/-3 |
| DC_19A_n79A | | | 23 | +2/-3 |
| DC_20A_n1A | | | 23 | +2/-3 |
| DC_20A_n3A | | | 23 | +2/-3 |
| DC_20A_n8A | | | 23 | +2/-3 |
| DC_20A_n28A DC_20A_n83A | | | 23 | +2/-3 |
| DC_20A_n51A | | | 23 | +2/-3 |
| DC_20A_n77A | | | 23 | +2/-3 |
| DC_20A_n78A DC_20A_n82A_ULSUP-TDM_n78A, DC_20A_n82A_ULSUP-FDM_n78A | | | 23 | +2/-3 |
| DC_21A_n77A | | | 23 | +2/-3 |
| DC_21A_n78A | | | 23 | +2/-3 |
| DC_21A_n79A | | | 23 | +2/-3 |
| DC_25A_n41A | | | 23 | +2/-3 |
| DC_26A_n41A | | | 23 | +2/-3 |
| DC_26A_n77A | | | 23 | +2/-3 |
| DC_26A_n78A | | | 23 | +2/-3 |
| DC_26A_n79A | | | 23 | +2/-3 |
| DC_28A_n3A | | | 23 | +2/-3 |
| DC_28A_n51A | | | 23 | +2/-3 |
| DC_28A_n77A | | | 23 | +2/-3 |
| DC_28A_n78A DC_28A_n83A_ULSUP-TDM_n78A, | | | 23 | +2/-3 |

| EN-DC configuration | Power class 2 (dBm) | Tolerance (dB) | Power class 3 (dBm) | Tolerance (dB) |
|---|------------------------|--------------------|------------------------|--------------------|
| DC_28A_n83A_ULSUP -FDM_n78A | | | | |
| DC_28A_n79A | | | 23 | +2/-3 |
| DC_30A_n5A | | | 23 | +2/-3 |
| DC_30A_n66A | | | 23 | +2/-3 |
| DC_38A_n78A | | | N/A | N/A |
| DC_39A_n41A | 26 | +2/-3 ¹ | 23 | +2/-2 |
| DC_39A_n78A | | | 23 | +2/-3 ¹ |
| DC_39A_n79A | 26 | +2/-3 | 23 | +2/-3 ¹ |
| DC_40A_n1A | | | 23 | +2/-3 |
| DC_40A_n41A | | | 23 | +2/-3 |
| DC_40A_n77A | | | N/A | N/A |
| DC_40A_n78A | | | 23 | +2/-3 |
| DC_41A_n77A DC_41C_n77A | | | 23 | +2/-3 ¹ |
| DC_41A_n78A DC_41C_n78A | | | 23 | +2/-3 ¹ |
| DC_41A_n79A DC_41C_n79A | 26 | +2/-3 ¹ | 23 | +2/-3 ¹ |
| DC_42A_n51A | | | 23 | +2/-3 |
| DC_42A_n77A | | | N/A | N/A |
| DC_42A_n78A | | | N/A | N/A |
| DC_42A_n79A | | | N/A | N/A |
| DC_48A_n5A | | | 23 | +2/-3 |
| DC_48A_n66A | | | 23 | +2/-3 |
| DC_66A_n2A | | | 23 | +2/-3 |
| DC_66A_n5A | | | 23 | +2/-3 ¹ |
| DC_66A_n41A | | | 23 | +2/-3 |
| DC_66A_n71A | | | 23 | +2/-3 |
| DC_66A_n78A, DC_66A_n86A_ULSUP -TDM_n78A, DC_66A_n86A_ULSUP -FDM_n78A | | | 23 | +2/-3 |
| <p>NOTE 1: For the transmission bandwidths confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high}, the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB.</p> <p>NOTE 2: $P_{PowerClass, EN-DC}$ is the maximum UE power specified without taking into account the tolerance.</p> <p>NOTE 3: For inter-band EN-DC the maximum power requirement should apply to the total transmitted power over all component carriers (per UE).</p> <p>NOTE 4: Power Class 3 is the default power class unless otherwise stated.</p> <p>NOTE 5: The UE is not required to support PC2 within each individual cell group. Power class support within each individual cell group is signaled separately by the UE.</p> <p>NOTE 6: The UE supports PC3 within E-UTRA cell group, and supports either PC3 or PC2 within NR cell group. Power class support within each individual cell group is signaled separately by the UE.</p> | | | | |

If a UE supports a different power class than the default UE power class for an EN-DC band combination and the supported power class enables higher maximum output power than that of the default power class:

- if the field of UE capability *maxUplinkDutyCycle-EN-DC* is absent and the percentage of NR uplink symbols transmitted in a certain evaluation period is larger than 30% (The exact evaluation period is no less than one radio frame); or
- if the field of UE capability *maxUplinkDutyCycle-EN-DC* is not absent and the percentage of NR uplink symbols transmitted in a certain evaluation period is larger than *maxUplinkDutyCycle-EN-DC* as defined in TS38.331 (The exact evaluation period is no less than one radio frame); or

- if the IE *p-maxUE-FRI* as defined in TS 38.331 is provided and set to the maximum output power of the default power class or lower;
 - shall apply all requirements for the default power class to the supported power class and set the configured transmitted power as specified clause 6.2B.4;
- Else if the IE *p-maxUE-FRI* as defined in TS 38.331 is not provided or set to the higher value than the maximum output power of the default power class and the percentage of uplink symbols transmitted in a certain evaluation period is less than or equal to *maxUplinkDutyCycle-EN-DC* as defined in TS 38.331; or
- if the IE *p-maxUE-FRI* as defined in TS 38.331 is not provided or set to the higher value than the maximum output power of the default power class and the percentage of NR uplink symbols transmitted in a certain evaluation period is less than or equal to 30% when *maxUplinkDutyCycle-EN-DC* is absent. (The exact evaluation period is no less than one radio frame);
 - shall apply all requirements for the supported power class and set the configured transmitted power class as specified in clause 6.2B.4.

If a UE supports a different power class than the default UE power class for an E-UTRA FDD and NR TDD EN-DC band combination and the supported power class enables higher maximum output power than that of the default power class:

If UE indicating the two capabilities *maxUplinkDutyCycle-EN-DC_FDDTDD_1* and *maxUplinkDutyCycle-EN-DC_FDDTDD_2*:

- if the IE *p-maxUE-FRI* as defined in TS 38.331 is not provided or set to the higher value than the maximum output power of the default power class, and the percentage of EUTRA uplink symbols transmitted in a certain evaluation period is between 40% and 70%, and the percentage of NR uplink symbols transmitted in a certain evaluation period is less than or equal to *maxUplinkDutyCycle-EN-DC_FDDTDD_1* as defined in TS 38.331 (The exact evaluation period is no less than one radio frame); or
 - if the IE *p-maxUE-FRI* as defined in TS 38.331 is not provided or set to the higher value than the maximum output power of the default power class, and the percentage of EUTRA uplink symbols transmitted in a certain evaluation period is no larger than 40%, and the percentage of NR uplink symbols transmitted in a certain evaluation period is less than or equal to *maxUplinkDutyCycle-EN-DC_FDDTDD_2* as defined in TS 38.331 (The exact evaluation period is no less than one radio frame)
 - shall apply all requirements for the supported power class and set the configured transmitted power class as specified in sub-clause 6.2B.4.
 - else
 - shall apply all requirements for the default power class and set the configured transmitted power as specified sub-clause 6.2B.4;
- else
- shall apply all requirements for the supported power class and set the configured transmitted power as specified sub-clause 6.2B.4;

The normative reference for this requirement is TS 38.101-3 [4] clause 6.2B.1.

LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

6.2B.1.3.4 Test description

6.2B.1.3.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, DC configuration specified in clause 5.5B.4 and test channel bandwidths specified in TS 36.508 [11] clause 4.3.1 and TS 38.508-1 [6] clause 4.3.1, and sub-carrier spacing based on NR operating bands specified in TS 38.521-1 [8] clause 5.3. All of these

configurations shall be tested with applicable test parameters for each EN-DC configuration, and are shown in table 6.2B.1.3.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in TS 36.521-1 [10] Annex A, clause A.2.3 for E-UTRA RMC for TDD, TS 36.521-1 [10] Annex A, clause A.2.2 for E-UTRA RMC for FDD, and TS 38.521-1 [8] Annex A, clause A.2 for NR RMC. Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521-1 [10] Annex C, clause C.2 and in TS 38.521-1 [8] Annex C, clause C.2 for E-UTRA CG and NR CG respectively.

Table 6.2B.1.3.4.1-1: Test configuration table

| Default Conditions | | | | | | | | | |
|--|-----------|---------------|-----------------|------------------------|----------------------------|------------------------|----------------------|------------------------|--|
| | | | | | EN-DC Uplink Configuration | | | | |
| Test ID | Test Freq | E-UTRA BW | NR BW | Downlink Configuration | E-UTRA Cell | | NR Cell | | |
| | | | | | Modulation (NOTE 1) | RB allocation (NOTE 1) | Modulation (NOTE 3) | RB allocation (NOTE 2) | |
| 1 | High | Default | Default | N/A | QPSK | 1RB_Right | DFT-s-OFDM PI/2 BPSK | Inner_1RB_Right | |
| 2 | Low | Default | Default | | QPSK | 1RB_Left | DFT-s-OFDM PI/2 BPSK | Inner_1RB_Left | |
| 3 | Default | Default | Default | | QPSK | Partial_Allocation | DFT-s-OFDM PI/2 BPSK | Inner_Full | |
| 4 | High | Default | Default | | QPSK | 1RB_Right | DFT-s-OFDM QPSK | Inner_1RB_Right | |
| 5 | Low | Default | Default | | QPSK | 1RB_Left | DFT-s-OFDM QPSK | Inner_1RB_Left | |
| 6 | Default | Default | Default | | QPSK | Partial_Allocation | DFT-s-OFDM QPSK | Inner_Full | |
| 7 | High | 5MHz, Highest | Lowest | | QPSK | 1RB_Right | N/A | N/A | |
| 8 | Low | 5MHz, Highest | Lowest | | QPSK | 1RB_Left | N/A | N/A | |
| 9 | Default | 5MHz, Highest | Lowest | | QPSK | Partial_Allocation | N/A | N/A | |
| 10 | High | 5MHz | Lowest, Highest | | N/A | N/A | DFT-s-OFDM PI/2 BPSK | Inner_1RB_Right | |
| 11 | Low | 5MHz | Lowest, Highest | | N/A | N/A | DFT-s-OFDM PI/2 BPSK | Inner_1RB_Left | |
| 12 | Default | 5MHz | Lowest, Highest | | N/A | N/A | DFT-s-OFDM PI/2 BPSK | Inner_Full | |
| 13 | High | 5MHz | Lowest, Highest | | N/A | N/A | DFT-s-OFDM QPSK | Inner_1RB_Right | |
| 14 | Low | 5MHz | Lowest, Highest | | N/A | N/A | DFT-s-OFDM QPSK | Inner_1RB_Left | |
| 15 | Default | 5MHz | Lowest, Highest | | N/A | N/A | DFT-s-OFDM QPSK | Inner_Full | |
| NOTE 1: The specific configuration of each RB allocation is defined in Table 6.1-1 in current specification. | | | | | | | | | |
| NOTE 2: The specific configuration of each RB allocation is defined in Table 6.1-1 in TS 38.521-1 [8]. | | | | | | | | | |
| NOTE 3: DFT-s-OFDM Pi/2 BPSK test applies only for UEs which supports Pi/2 BPSK in NR FR1 | | | | | | | | | |

1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [6] clause A.3.1.1 for SS and clause A.3.2.1 for UE.
2. The parameter settings for the cell are set up according to TS 38.508-1 [6] clause 4.4.3.

3. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C.0 and TS 38.521-1 [8] Annex C.0 for E-UTRA CG and NR CG respectively, and uplink signals according to TS 36.521-1 [10] Annex H and TS 38.521-1 [8] Annex G for E-UTRA CG and NR CG respectively.
4. The UL Reference Measurement channels are TS 36.521-1 [10] Annex A.2 and TS 38.521-1 [8] Annex A.2 for E-UTRA CG and NR CG respectively.
5. Propagation conditions are set according to TS 36.521-1 [10] and TS 38.521-1 [8] Annex B.0 for E-UTRA CG and NR CG respectively.
6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 6.2B.1.3.4.3.
7. For the case of testing overlapping E-UTRA and NR UL transmission scenario when both bands are TDD, ensure E-UTRA UL transmission overlaps with NR UL transmission in time by giving SCG a delay of 3 E-UTRA subframes, or by giving MCG a delay of 2 subframes.

6.2B.1.3.3.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format 0_1 for *C_RNTI* to schedule the UL RMC according to table 6.2B.1.3.4.1-1 on E-UTRA CC and NR CC respectively. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. For an E-UTRA FDD and NR TDD EN-DC band combination, if UE supports PC2, the percentage of EUTRA uplink symbols transmitted in each radio frame shall be less than 40%.
2. Send continuously uplink power control "up" commands to the UE for NR and E-UTRA carrier according to table 6.2B.1.3.4.1-1 until the UE transmits at its P_{UMAX} level; allow at least 200 ms from the first TPC command for the UE to reach P_{UMAX} level.
3. For test ID 1~6 measure the sum of mean transmitted power over all EN-DC component carriers in the EN-DC, which shall meet the requirements described in table 6.2B.1.3.5-1 and the period of the measurement shall be at least the continuous duration of one active sub-frame.

For test ID 7~15 measure the mean transmitted power over E-UTRA carrier or NR carrier, which shall meet the requirements described in table 6.2.2.5-1 in TS 36.521-1 [10] or table 6.2.1.5-1 in TS 38.521-1 [8] respectively. The period of the measurement shall be at least the continuous duration of one active sub-frame.

6.2B.1.3.4.3 Message contents

Message contents are according to TS 36.508 [11] clause 4.6.1 and TS 38.508-1 [6] clause 4.6.1 with the following exceptions.

6.2B.1.3.4.3-1: PhysicalCellGroupConfig

| Derivation Path: TS 38.508-1 [6], Table 4.6.3-106 | | | |
|--|--------------|---|--------------------------------|
| Information Element | Value/remark | Comment | Condition |
| PhysicalCellGroupConfig ::= SEQUENCE { p-NR-FR1 | 20 | For simultaneous E-UTRA and NR transmission | Power Class 3 UE Test IDs 1-6 |
| | 23 | For Test IDs 7~9 NR carrier is configured but not measured. | Power Class 3 UE Test IDs 7-15 |
| | 23 | For simultaneous E-UTRA and NR transmission | Power Class 2 UE Test IDs 1-6 |
| | 26 | For Test IDs 7~9 NR carrier is configured but not measured. | Power Class 2 UE Test IDs 7-15 |
| } | | | |

6.2B.1.3.4.3-2: RRConnectionReconfiguration: nr-Config-r15

| Derivation Path: TS 36.508 [11], Table 4.6.1-8 | | | |
|--|--------------|---|--------------------------------|
| Information Element | Value/remark | Comment | Condition |
| p-MaxEUTRA-r15 | 20 | For simultaneous E-UTRA and NR transmission | Power Class 3 UE Test IDs 1-6 |
| | 23 | For Test IDs 10~15 E-UTRA carrier is configured but not measured. | Power Class 3 UE Test IDs 7-15 |
| | 23 | For simultaneous E-UTRA and NR transmission | Power Class 2 UE Test IDs 1-6 |
| | 26 | For Test IDs 10~15 E-UTRA carrier is configured but not measured. | Power Class 2 UE Test IDs 7-15 |

6.2B.1.3.4.3-3: RRConnectionReconfiguration: tdm-PatternConfig if E-UTRA on FDD band and UE does not support dynamic power sharing

| Derivation Path: TS 36.508 [11], Table 4.6.1-8 | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| tdm-PatternConfig-r15 CHOICE{ setup SEQUENCE { subframeAssignment-r15 harq-Offset-r15 }} | | | |
| | sa2 | | |
| | 0 | | |
| | | | |
| | | | |

6.2B.1.3.4.3-4: SystemInformationBlockType1: tdd-Config if E-UTRA on TDD band

| Derivation Path: TS 36.508 [11], Table 4.6.3-23 | | | |
|---|--------------|-----------------------|-----------|
| Information Element | Value/remark | Comment | Condition |
| TDD-Config-DEFAULT ::= SEQUENCE { | | Operating on TDD band | |
| subframeAssignment | Sa2 | | |
| specialSubframePatterns | Ssp7 | | |
| } | | | |

6.2B.1.3.5 Test requirements

For test ID 1~6 the maximum output power for the DC configuration, derived in step 3 shall be within the range prescribed by the UE Power Class and tolerance in Table 6.2B.1.3.5-1.

For test ID 7~15 the maximum output power for the DC configuration, derived in step 3 shall be within the range prescribed by the UE Power Class and tolerance in table 6.2.2.5-1 in TS 36.521-1 [10] or table 6.2.1.5-1 in TS 38.521-1 [8] for E-UTRA carier and NR carrier respectively for Power class 3, and in Table 6.2B.1.3.5-2a for Power class 2.

Table 6.2B.1.3.5-1: Maximum output power for inter-band EN-DC (two bands), for overlapping UL transmission

| EN-DC configuration | Power class 2 (dBm) | Tolerance (dB) | Power class 3 (dBm) | Tolerance (dB) |
|--|------------------------|--------------------------|------------------------|---------------------------|
| DC_1A_n3A | | | 23 | +2 +TT/-3-TT |
| DC_1A_n28A | | | 23 | +2 +TT/-3-TT |
| DC_1A_n40A | | | 23 | +2 +TT/-3-TT |
| DC_1A_n51A | | | 23 | +2 +TT/-3-TT |
| DC_1A_n77A | | | 23 | +2 +TT/-3-TT |
| DC_1A_n78A | | | | |
| DC_1A_n84A_ULSUP-TDM_n78A | | | 23 | +2 +TT/-3-TT |
| DC_1A_n84A_ULSUP-FDM_n78A | | | | |
| DC_1A_n79A | | | 23 | +2 +TT/-3-TT |
| DC_2A_n5A | | | 23 | +2 +TT/-3-TT ³ |
| DC_2A_n41A | | | 23 | +2 +TT/-3-TT |
| DC_2A_n66A | | | 23 | +2 +TT/-3-TT ³ |
| DC_2A_n71A | | | 23 | +2 +TT/-3-TT |
| DC_2A_n78A | | | 23 | +2 +TT/-3-TT |
| DC_3A_n7A | | | 23 | +2 +TT/-3-TT ³ |
| DC_3A_n28A | | | 23 | +2 +TT/-3-TT ³ |
| DC_3A_n40A | | | 23 | +2 +TT/-3-TT ³ |
| DC_3A_n41A, DC_3C_n41A | 26 ⁸ | +2+TT/-3-TT ³ | 23 | +2+TT/-3-TT ³ |
| DC_3A_n51A | | | 23 | +2 +TT/-3-TT ³ |
| DC_3A_n77A | | | 23 | +2 +TT/-3-TT ³ |
| DC_3A_n78A | 26 ⁸ | +2+TT/-3-TT ³ | 23 | +2 +TT/-3-TT ³ |
| DC_3A_n79A | | | | |
| DC_3A_n80A_ULSUP-TDM_n79A, DC_3A_n80A_ULSUP-FDM_n79A | | | 23 | +2 +TT/-3-TT ³ |
| DC_3A_n82A | | | 23 | +2 +TT/-3-TT ³ |
| DC_5A_n2A | | | 23 | +2 +TT/-3-TT |
| DC_5A_n40A | | | 23 | +2 +TT/-3-TT ³ |
| DC_5A_n66A | | | 23 | +2 +TT/-3-TT ³ |
| DC_5A_n78A | | | 23 | +2 +TT/-3-TT |
| DC_7A_n1A | | | 23 | +2 +TT/-3-TT |
| DC_7A_n3A | | | 23 | +2 +TT/-3-TT |
| DC_7A_n28A | | | 23 | +2 +TT/-3-TT ³ |
| DC_7A_n51A | | | 23 | +2 +TT/-3-TT ³ |
| DC_7A_n66A | | | 23 | +2 +TT/-3-TT ³ |
| DC_7A_n78A DC_7C_n78A | | | 23 | +2 +TT/-3-TT |
| DC_8A_n1A | | | | +2 +TT/-3-TT |
| DC_8A_n3A | | | | +2 +TT/-3-TT |
| DC_8A_n40A | | | 23 | +2 +TT/-3-TT ³ |
| DC_8A_n41A, DC_8A_n81A_ULSUP-TDM, DC_8A_n81A_ULSUP-FDM | | | 23 | +2 +TT/-3-TT |

| EN-DC configuration | Power class 2 (dBm) | Tolerance (dB) | Power class 3 (dBm) | Tolerance (dB) |
|--|------------------------|-------------------|------------------------|-------------------|
| DC_8A_n77A | | | 23 | +2 +TT/-3-TT |
| DC_8A_n78A DC_8A_n81A_ULSUP- TDM_n78A, DC_8A_n81A_ULSUP- FDM_n78A | | | 23 | +2 +TT/-3-TT |
| DC_8A_n79A DC_8A_n81A_ULSUP- TDM_n79A, DC_8A_n81A_ULSUP- FDM_n79A | | | 23 | +2 +TT/-3-TT |
| DC_11A_n77A | | | 23 | +2 +TT/-3-TT |
| DC_11A_n78A | | | 23 | +2 +TT/-3-TT |
| DC_11A_n79A | | | 23 | +2 +TT/-3-TT |
| DC_12A_n5A | | | 23 | +2 +TT/-3-TT |
| DC_12A_n66A | | | 23 | +2 +TT/-3-TT |
| DC_12A_n78A | | | 23 | +2 +TT/-3-TT |
| DC_13A_n2A | | | 23 | +2 +TT/-3-TT |
| DC_13A_n66A | | | 23 | +2 +TT/-3-TT |
| DC_14A_n2A | | | 23 | +2 +TT/-3-TT |
| DC_14A_n66A | | | 23 | +2 +TT/-3-TT |
| DC_18A_n77A | | | 23 | +2 +TT/-3-TT |
| DC_18A_n78A | | | 23 | +2 +TT/-3-TT |
| DC_18A_n79A | | | 23 | +2 +TT/-3-TT |
| DC_19A_n77A | | | 23 | +2 +TT/-3-TT |
| DC_19A_n78A | | | 23 | +2 +TT/-3-TT |
| DC_19A_n79A | | | 23 | +2 +TT/-3-TT |
| DC_20A_n1A | | | 23 | +2 +TT/-3-TT |
| DC_20A_n3A | | | 23 | +2 +TT/-3-TT |
| DC_20A_n8A | | | 23 | +2 +TT/-3-TT |
| DC_20A_n28A DC_20A_n83A | | | 23 | +2 +TT/-3-TT |
| DC_20A_n51A | | | 23 | +2 +TT/-3-TT |
| DC_20A_n77A | | | 23 | +2 +TT/-3-TT |
| DC_20A_n78A DC_20A_n82A_ULSUP- TDM_n78A, DC_20A_n82A_ULSUP- FDM_n78A | | | 23 | +2 +TT/-3-TT |
| DC_21A_n77A | | | 23 | +2 +TT/-3-TT |
| DC_21A_n78A | | | 23 | +2 +TT/-3-TT |
| DC_21A_n79A | | | 23 | +2 +TT/-3-TT |
| DC_25A_n41A | | | 23 | +2 +TT/-3-TT |
| DC_26A_n41A | | | 23 | +2 +TT/-3-TT |
| DC_26A_n77A | | | 23 | +2 +TT/-3-TT |
| DC_26A_n78A | | | 23 | +2 +TT/-3-TT |
| DC_26A_n79A | | | 23 | +2 +TT/-3-TT |
| DC_28A_n3A | | | 23 | +2 +TT/-3-TT |
| DC_28A_n51A | | | 23 | +2 +TT/-3-TT |
| DC_28A_n77A | | | 23 | +2 +TT/-3-TT |
| DC_28A_n78A DC_28A_n83A_ULSUP | | | 23 | +2 +TT/-3-TT |

| EN-DC configuration | Power class 2 (dBm) | Tolerance (dB) | Power class 3 (dBm) | Tolerance (dB) |
|---|------------------------|--------------------|------------------------|---------------------------|
| -TDM_n78A, DC_28A_n83A_ULSUP -FDM_n78A | | | | |
| DC_28A_n79A | | | 23 | +2 +TT/-3-TT |
| DC_30A_n5A | | | 23 | +2 +TT/-3-TT |
| DC_30A_n66A | | | 23 | +2 +TT/-3-TT |
| DC_38A_n78A | | | N/A | N/A |
| DC_39A_n41A | 26 | +2/-3 ¹ | 23 | +2 +TT/-3-TT ³ |
| DC_39A_n78A | | | 23 | +2 +TT/-3-TT ³ |
| DC_39A_n79A | 26 | +2/-3 | 23 | +2 +TT/-3-TT ³ |
| DC_40A_n1A | | | 23 | +2 +TT/-3-TT |
| DC_40A_n41A | | | 23 | +2 +TT/-3-TT |
| DC_40A_n77A | | | N/A | N/A |
| DC_40A_n78A | | | 23 | +2 +TT/-3-TT |
| DC_41A_n77A DC_41C_n77A | | | 23 | +2 +TT/-3-TT ³ |
| DC_41A_n78A DC_41C_n78A | | | 23 | +2 +TT/-3-TT ³ |
| DC_41A_n79A DC_41C_n79A | 26 | +2/-3 ¹ | 23 | +2 +TT/-3-TT ³ |
| DC_42A_n51A | | | 23 | +2 +TT/-3-TT |
| DC_42A_n77A | | | N/A | N/A |
| DC_42A_n78A | | | N/A | N/A |
| DC_42A_n79A | | | N/A | N/A |
| DC_48A_n5A | | | 23 | +2 +TT/-3-TT |
| DC_48A_n66A | | | 23 | +2 +TT/-3-TT |
| DC_66A_n2A | | | 23 | +2 +TT/-3-TT |
| DC_66A_n5A | | | 23 | +2 +TT/-3-TT ³ |
| DC_66A_n41A | | | 23 | +2 +TT/-3-TT |
| DC_66A_n71A | | | 23 | +2 +TT/-3-TT |
| DC_66A_n78A, DC_66A_n86A_ULSUP -TDM_n78A, DC_66A_n86A_ULSUP -FDM_n78A | | | 23 | +2 +TT/-3-TT |

NOTE 1: TT applies to output power in each UL carrier with E-UTRA UL transmission not overlapping with NR UL transmission in time, and its value is the same as TT of standalone E-UTRA or NR transmission. For detailed values refer to Table 6.2B.1.3.5-2.

NOTE 2: TT applies to overall output power with E-UTRA UL transmission overlapping with NR UL transmission in time, and its value is the maximum TT among all E-UTRA and NR UL carriers. For detailed values refer to Table 6.2B.1.3.5-3.

NOTE 3: For the transmission bandwidths confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} , the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB.

NOTE 4: $P_{PowerClass, EN-DC}$ is the maximum UE power specified without taking into account the tolerance.

NOTE 5: For inter-band EN-DC the maximum power requirement should apply to the total transmitted power over all component carriers (per UE).

NOTE 6: Power Class 3 is the default power class unless otherwise stated.

NOTE 7: The UE is not required to support PC2 within each individual cell group. Power class support within each individual cell group is signaled separately by the UE.

NOTE 8: The UE supports PC3 within E-UTRA cell group, and supports either PC3 or PC2 within NR cell group. Power class support within each individual cell group is signaled separately by the UE.

Table 6.2B.1.3.5-2: Void**Table 6.2B.1.3.5-2a: Maximum output power for inter-band EN-DC (two bands), for non-overlapping UL transmission for power class 2 (Rel-16 and forward)**

| EN-DC configuration | Carrier | Power class 2 (dBm) | Tolerance (dB) | Condition | Comment |
|--|----------------|----------------------------|---------------------------|---|-------------------------------------|
| DC_3A_n41A | NR carrier | 26 | +2+TT/-3 ² -TT | UE indicates PC2 for the NR part within the EN-DC combination | UE meets power class 2 requirements |
| | | 23 | +2+TT/-2 ² -TT | UE indicates PC3 for the NR part within the EN-DC combination | UE meets power class 3 requirements |
| | E-UTRA carrier | 23 | +2+TT/-2 ² -TT | UE indicates PC3 on E-UTRA band | UE meets power class 3 requirements |
| DC_3A_n78A | NR carrier | 26 | +2+TT/-3-TT | UE indicates PC2 for the NR part within the EN-DC combination | UE meets power class 2 requirements |
| | | 23 | +2+TT/-3-TT | UE indicates PC3 for the NR part within the EN-DC combination | UE meets power class 3 requirements |
| | E-UTRA carrier | 23 | +2+TT/-2 ² -TT | UE indicates PC3 on E-UTRA band | UE meets power class 3 requirements |
| DC_39A_n41A | NR carrier | 26 | +2+TT/-3 ² -TT | UE indicates PC2 for the NR part within the EN-DC combination | UE meets power class 2 requirements |
| | | 23 | +2+TT/-2 ² -TT | UE indicates PC3 for the NR part within the EN-DC combination | UE meets power class 3 requirements |
| | E-UTRA carrier | 23 | +2+TT/-2 ² -TT | UE indicates PC3 on E-UTRA band | UE meets power class 3 requirements |
| DC_39A_n79A | NR carrier | 26 | +2+TT/-3-TT | UE indicates PC2 for the NR part within the EN-DC combination | UE meets power class 2 requirements |
| | | 23 | +2+TT/-3-TT | UE indicates PC3 for the NR part within the EN-DC combination | UE meets power class 3 requirements |
| | E-UTRA carrier | 23 | +2+TT/-2 ² -TT | UE indicates PC3 on E-UTRA band | UE meets power class 3 requirements |
| DC_41A_n79A DC_41C_n79A | NR carrier | 26 | +2+TT/-3-TT | UE indicates PC2 for the NR part within the EN-DC combination | UE meets power class 2 requirements |
| | | 23 | +2+TT/-3-TT | UE indicates PC3 for the NR part within the EN-DC combination | UE meets power class 3 requirements |
| | E-UTRA carrier | 26 | +2+TT/-2 ² -TT | UE indicates PC2 on E-UTRA band | UE meets power class 2 requirements |
| | | 23 | +2+TT/-2 ² -TT | UE indicates PC3 on E-UTRA band | UE meets power class 3 requirements |
| NOTE 1: TT applies to output power in each UL carrier with E-UTRA UL transmission not overlapping with NR UL transmission in time, and its value is the same as TT of standalone E-UTRA or NR transmission. For detailed | | | | | |

values refer to Table 6.2B.1.3.5-3.

NOTE 2: For the transmission bandwidths confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} , the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB.

NOTE 3: $P_{PowerClass, EN-DC}$ is the maximum UE power specified without taking into account the tolerance.

Table 6.2B.1.3.5-3: Test Tolerance for UE maximum output power (Overlapping UL transmission)

| TT for overall output power | | | | | | | | | | | |
|-----------------------------|------------|-------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|--------|
| | | NR | | | | | | | | | |
| | | BW ≤ 20MHz | | | 20 MHz < BW ≤ 40MHz | | | 40MHz < BW ≤ 100MHz | | | |
| E-UTRA | BW ≤ 20MHz | f ≤ 3.0GHz | 3.0GHz < f ≤ 4.2GHz | 4.2GHz < f ≤ 6.0GHz | f ≤ 3.0GHz | 3.0GHz < f ≤ 4.2GHz | 4.2GHz < f ≤ 6.0GHz | f ≤ 3.0GHz | 3.0GHz < f ≤ 4.2GHz | 4.2GHz < f ≤ 6.0GHz | |
| | | f ≤ 3.0GHz | 0.7 dB | 1.0 dB | 1.0 dB | 0.7 dB | 1.0 dB |
| | | 3.0GHz < f ≤ 4.2GHz | 1.0 dB | 1.0 dB |

6.2B.1.4 UE Maximum Output Power for Inter-Band EN-DC including FR2

6.2B.1.4.1 UE Maximum Output Power for Inter-Band EN-DC including FR2 - EIRP and TR

Editor's note: The following aspects are either missing or not yet determined:

- The referred test case 6.2.1.1 in TS 38.521-2 is incomplete for power class 1, 2 and 4.
- The following aspects of the clause are for future consideration:
- Test Procedures for EIRP beam peak Extreme Conditions are FFS

6.2B.1.4.1.1 Test purpose

Same test purpose as in clause 6.2.1.1.1 in TS 38.521-2 [9] for the NR carrier.

6.2B.1.4.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 2CCs.

6.2B.1.4.1.3 Minimum conformance requirements

UE maximum output power requirement for E-UTRA single carrier and CA operation specified in subclauses 6.2.2 and 6.2.2A of TS 36.101 [10] and for NR single carrier and CA operation specified in subclause 6.2.1, 6.2A.1, and 6.2D.1 of TS 38.101-2 [9] apply.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.2B.1.4.

6.2B.1.4.1.4 Test description

Same test description as in clause 6.2.1.1.4 in TS 38.521-2 [9] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1.

For initial conditions as in clause 6.2.1.1.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

2.1 The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.

3.1 The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.2.1.1.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.2.1.1.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.2B.1.4.1.5 Test requirement

Same test requirement as in clause 6.2.1.1.5 in TS 38.521-2 [9] for the NR carrier.

6.2B.1.4.2 UE Maximum Output Power for Inter-Band EN-DC including FR2 - Spherical Coverage

Editor's note: The following aspects are either missing or not yet determined:

- Measurement Uncertainties and Test Tolerances are FFS for power class 1, 2 and 4.

6.2B.1.4.2.1 Test purpose

Same test purpose as in clause 6.2.1.2.1 in TS 38.521-2 [9] for the NR carrier.

6.2B.1.4.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 2 UL CCs.

6.2B.1.4.2.3 Minimum conformance requirements

UE maximum output power requirement for E-UTRA single carrier and CA operation specified in subclauses 6.2.2 and 6.2.2A of TS 36.101 [10] and for NR single carrier and CA operation specified in subclause 6.2.1, 6.2A.1, and 6.2D.1 of TS 38.101-2 [9] apply.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.2B.1.4.

6.2B.1.4.2.4 Test description

Same test description as in clause 6.2.1.2.4 in TS 38.521-2 [9] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1.

For initial conditions as in clause 6.2.1.2.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

2.1 The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.

3.1 The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of initial conditions as in clause 6.2.1.2.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.2.1.2.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

- 1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.2B.1.4.2.5 Test requirement

Same test requirement as in clause 6.2.1.2.5 in TS 38.521-2 [9] for the NR carrier.

6.2B.1.4_1 UE Maximum Output Power for Inter-Band EN-DC including FR2 (>2 CCs)

6.2B.1.4_1.1 UE Maximum Output Power for Inter-Band EN-DC including FR2 (3 CCs)

6.2B.1.4_1.1.1 UE Maximum Output Power for Inter-Band EN-DC including FR2 (3 CCs) - EIRP and TRP

Editor's note: The following aspects are either missing or not yet determined:

- The referred test case 6.2A.1.1.1 in TS 38.521-2 [9] is incomplete for aggregated BW > 400MHz.
- The referred test case 6.2A.1.1.1 in TS 38.521-2 [9] is incomplete for power class 1, 2 and 4.
- Test Procedures for EIRP beam peak Extreme Conditions are FFS.

6.2B.1.4_1.1.1.1 Test purpose

Same test purpose as in clause 6.2.1.1.1 in TS 38.521-2 [9] for the NR carrier.

6.2B.1.4_1.1.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 3 UL CCs (2NR UL CCs).

6.2B.1.4_1.1.1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.2B.1.4.1.3

6.2B.1.4_1.1.1.4 Test description

6.2B.1.4_1.1.1.4.1 Initial condition

Same test description as in clause 6.2A.1.1.1.4 in TS 38.521-2 [9] for the NR carriers with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1.

For Initial conditions as in clause 6.2A.1.1.1.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.2A.1.1.1.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.2A.1.1.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

- 1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.2B.1.4_1.1.1.5 Test Requirements

Same test requirement as in clause 6.2A.1.1.1.5 in TS 38.521-2 [9] for the NR carriers.

6.2B.1.4_1.1.2 UE Maximum Output Power for Inter-Band EN-DC including FR2 (3 CCs) - Spherical Coverage

Editor's note: The following aspects are either missing or not yet determined:

- The referred test case 6.2A.1.2.1 in TS 38.521-2 is incomplete for aggregated BW > 400MHz.
- The referred test case 6.2A.1.2.1 in TS 38.521-2 is incomplete for power class 1, 2 and 4.

6.2B.1.4_1.1.2.1 Test purpose

Same test purpose as in clause 6.2.1.2.1 in TS 38.521-2 [9] for the NR carrier.

6.2B.1.4_1.1.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 3 UL CCs (2NR UL CCs).

6.2B.1.4_1.1.2.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.2B.1.4.2.3.

6.2B.1.4_1.1.2.4 Test description

6.2B.1.4_1.1.2.4.1 Initial condition

Same test description as in clause 6.2A.1.2.1.4 in TS 38.521-2 [9] for the NR carriers with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1.

For Initial conditions as in clause 6.2A.1.2.1.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.2A.1.2.1.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.2A.1.2.1.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

- 1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.2B.1.4_1.1.2.5 Test Requirements

Same test requirement as in clause 6.2A.1.2.1.5 in TS 38.521-2 [9] for the *NR* carriers.

6.2B.1.4_1.2 UE Maximum Output Power for Inter-Band EN-DC including FR2 (4 CCs)

6.2B.1.4_1.2.1 UE Maximum Output Power for Inter-Band EN-DC including FR2 (4 CCs) - EIRP and TRP

Editor's note: The following aspects are either missing or not yet determined:

- - The referred test case 6.2A.1.1.2 in TS 38.521-2 is incomplete for aggregated BW > 400MHz.
- The referred test case 6.2A.1.1.2 in TS 38.521-2 is incomplete for power class 1, 2 and 4.

6.2B.1.4_1.2.1.1 Test purpose

Same test purpose as in clause 6.2.1.1.1 in TS 38.521-2 [9] for the *NR* carriers.

6.2B.1.4_1.2.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 4 UL CCs (3NR UL CCs).

6.2B.1.4_1.2.1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.2B.1.4.1.3.

6.2B.1.4_1.2.1.4 Test description

6.2B.1.4_1.2.1.4.1 Initial condition

Same test description as in clause 6.2A.1.1.2.4 in TS 38.521-2 [9] for the *NR* carriers with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1.

For Initial conditions as in clause 6.2A.1.1.2.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.2A.1.1.2.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.2A.1.1.2.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

- 1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.2B.1.4_1.2.1.5 Test Requirements

Same test requirement as in clause 6.2A.1.1.2.5 in TS 38.521-2 [9] for the *NR* carrier.

6.2B.1.4_1.2.2 UE Maximum Output Power for Inter-Band EN-DC including FR2 (4 CCs) - Spherical Coverage

Editor's note: The following aspects are either missing or not yet determined:

- The referred test case 6.2A.1.2.2 in TS 38.521-2 is incomplete for aggregated BW > 400MHz.
- The referred test case 6.2A.1.2.2 in TS 38.521-2 is incomplete for power class 1, 2 and 4.

6.2B.1.4_1.2.2.1 Test purpose

Same test purpose as in clause 6.2.1.2.1 in TS 38.521-2 [9] for the NR carriers.

6.2B.1.4_1.2.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 4 UL CCs (3NR UL CCs).

6.2B.1.4_1.2.2.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.2B.1.4.2.3.

6.2B.1.4_1.2.2.4 Test description

6.2B.1.4_1.2.2.4.1 Initial condition

Same test description as in clause 6.2A.1.2.2.4 in TS 38.521-2 [9] for the *NR* carriers with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1.

For Initial conditions as in clause 6.2A.1.2.2.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.2A.1.2.2.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.2A.1.2.2.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

- 1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set TimeAlignmentTimerDedicated IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.2B.1.4_1.2.2.5 Test Requirements

Same test requirement as in clause 6.2A.1.2.2.5 in TS 38.521-2 [9] for the *NR* carriers.

6.2B.1.4_1.3 UE Maximum Output Power for Inter-Band EN-DC including FR2 (5 CCs)

6.2B.1.4_1.3.1 UE Maximum Output Power for Inter-Band EN-DC including FR2 (5 CCs) - EIRP and TRP

Editor's note: The following aspects are either missing or not yet determined:

- The referred test case 6.2A.1.1.3 in TS 38.521-2 is incomplete for aggregated BW > 400MHz.

- The referred test case 6.2A.1.1.3 in TS 38.521-2 is incomplete for power class 1, 2 and 4.

6.2B.1.4_1.3.1.1 Test purpose

Same test purpose as in clause 6.2.1.1.1 in TS 38.521-2 [9] for the NR carriers.

6.2B.1.4_1.3.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 5 UL CCs (4NR UL CCs).

6.2B.1.4_1.3.1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.2B.1.4.1.3.

6.2B.1.4_1.3.1.4 Test description

6.2B.1.4_1.3.1.4.1 Initial condition

Same test description as in clause 6.2A.1.1.3.4 in TS 38.521-2 [9] for the *NR* carriers with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1.

For Initial conditions as in clause 6.2A.1.1.3.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.2A.1.1.3.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.2A.1.1.3.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

- 1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.2B.1.4_1.3.1.5 Test Requirements

Same test requirement as in clause 6.2A.1.1.3.5 in TS 38.521-2 [9] for the *NR* carriers.

6.2B.1.4_1.3.2 UE Maximum Output Power for Inter-Band EN-DC including FR2 (5 CCs) - Spherical Coverage

Editor's note: The following aspects are either missing or not yet determined:

- The referred test case 6.2A.1.2.3 in TS 38.521-2 is incomplete for aggregated BW > 400MHz.
- The referred test case 6.2A.1.2.3 in TS 38.521-2 is incomplete for power class 1, 2 and 4.

6.2B.1.4_1.3.2.1 Test purpose

Same test purpose as in clause 6.2.1.2.1 in TS 38.521-2 [9] for the NR carriers.

6.2B.1.4_1.3.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 5 UL CCs (4NR UL CCs).

6.2B.1.4_1.3.2.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.2B.1.4.2.3.

6.2B.1.4_1.3.2.4 Test description

6.2B.1.4_1.3.2.4.1 Initial condition

Same test description as in clause 6.2A.1.2.3.4 in TS 38.521-2 [9] for the *NR* carriers with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1.

For Initial conditions as in clause 6.2A.1.2.3.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.2A.1.2.3.4.1 in TS 38.521-2 [9] is replaced by:

- 6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.2A.1.2.3.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

- 1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set TimeAlignmentTimerDedicated IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.2B.1.4_1.3.2.5 Test Requirements

Same test requirement as in clause 6.2A.1.2.3.5 in TS 38.521-2 [9] for the *NR* carriers.

6.2B.1.4D UE Maximum Output Power for Inter-Band EN-DC including FR2 for UL-MIMO

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- The referred test case 6.2D.1 in TS 38.521-2 [9] is incomplete

6.2B.1.4D.1 Test purpose

Same test purpose as in clause 6.2D.1 in TS 38.521-2 [9] for the NR carrier.

6.2B.1.4D.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with UL-MIMO.

6.2B.1.4D.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.2D.1 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this measurement is TS 38.101-3 [4] clause 6.2B.1.4.

6.2B.1.4D.4 Test description

Same test description as in clause [6.2D.1] in TS 38.521-2 [9] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1. For Initial conditions as in clause [6.2D.1] in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

[Step 6] of Initial conditions as in clause 6.2D.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG according to TS 36.508 [6] clause 4.5.

6.2B.1.4D.5 Test Requirement

Same test requirement as in clause 6.2D.1 of TS 38.521-2 [9] for the NR carrier.

6.2B.1.5 UE Maximum Output Power for Inter-Band EN-DC including both FR1 and FR2

6.2B.1.5.1 Test purpose

Same test purpose as in clause 6.2.1.1 in TS 38.521-1 [8] for NR FR1 carrier and 6.2.1.1 in TS 38.521-2 [9] for NR FR2 carrier.

6.2B.1.5.2 Test applicability

The requirements in this test are not testable due to issues with combined testing of NR FR1 and E-UTRA in conducted mode with NR FR2 in radiated mode. Therefore, the conducted and radiated requirements are tested separately.

No test case details are specified. The NSA requirements for maximum output power apply and are tested as part of the EN-DC within FR1 and EN-DC including FR2 test cases in clause 6.2B.

6.2B.1.5D UE Maximum Output Power for Inter-Band EN-DC including both FR1 and FR2 for UL-MIMO

6.2B.1.5D.1 Test purpose

Same test purpose as in clause 6.2.1.1 in TS 38.521-1 [8] for NR FR1 carrier and 6.2.1.1 in TS 38.521-2 [9] for NR FR2 carrier.

6.2B.1.5D.2 Test applicability

The requirements in this test are not testable due to issues with combined testing of NR FR1 and E-UTRA in conducted mode with NR FR2 in radiated mode. Therefore, the conducted and radiated requirements are tested separately.

No test case details are specified. The NSA requirements for maximum output power apply and are tested as part of the EN-DC within FR1 as in clause 6.2.1 in TS 38.521-1 [8] and EN-DC within FR2 as in clause 6.2.1 in TS 38.521-2 [9].

6.2B.2 UE Maximum Output Power reduction for EN-DC

6.2B.2.0 General

The UE maximum output power reduction (MPR) specified in this clause is applicable for UEs configured with EN-DC when NS_01 is indicated in the MCG and the SCG. The MPR applies subject to indication in the field *modifiedMPRbehavior* for the SCG [2].

6.2B.2.1 UE Maximum Output Power reduction for Intra-Band Contiguous EN-DC

6.2B.2.1.1 Test purpose

Same test purpose as in clause 6.2.2.1 in TS 38.521-1 [8] for the NR carrier.

6.2B.2.1.2 Test applicability

This test case applies to all types of E-UTRA power class 3 and power class 2 UE release 15 and forward, supporting intra-band contiguous EN-DC.

6.2B.2.1.3 Minimum conformance requirements

When the UE is configured for intra-band contiguous EN-DC, the UE determines the total allowed maximum output power reduction as specified in this clause.

For UE supporting dynamic power sharing the following:

- for the MCG, MPR_c in accordance with TS 36.101 [5]
- for the SCG,

$$MPR'_c = MPR_{NR} = \text{MAX}(MPR_{\text{single},NR}, MPR_{\text{ENDC}})$$

- for the total configured transmission power,

$$MPR_{\text{tot}} = P_{\text{PowerClass,EN-DC}} - \min(P_{\text{PowerClass,EN-DC}}, 10 * \log_{10}(10^{((P_{\text{PowerClass,E-UTRA}} - MPR_{E-UTRA})/10)} + 10^{((P_{\text{PowerClass,NR}} - MPR_{NR})/10)})$$

where

$$MPR_{E-UTRA} = \text{MAX}(MPR_{\text{single},E-UTRA}, MPR_{\text{ENDC}})$$

with

- $MPR_{\text{single},E-UTRA}$ is the MPR defined for the E-UTRA transmission in TS 36.101 [5]
- $MPR_{\text{single},NR}$ is the MPR defined for the NR transmission in TS 38.101-1 [2]

For UEs not supporting dynamic power sharing the following

- for the MCG,

$$MPR_c = \text{MAX}(MPR_{\text{single},E-UTRA}, MPR_{\text{ENDC}})$$

- for the SCG,

$$MPR'_c = \text{MAX}(MPR_{\text{single},NR}, MPR_{\text{ENDC}})$$

where

- $MPR_{\text{single},NR}$ is the MPR defined for the NR transmission in TS 38.101-1 [2]
- $MPR_{\text{single},E-UTRA}$ is the MPR defined for the E-UTRA transmission in TS 36.101 [5]

MPR in this subclause is applicable for power class 3 and power class 2 UEs indicating IE *dualPA-Architecture* supported with ENDC power class being the same as the E-UTRA and NR power class, otherwise the UE can use as much MPR as needed to fulfil emissions requirements when scheduled with dual uplink transmission. For UEs scheduled with single uplink transmission, MPR in subclause 6.2.4 of TS 36.101 [5] and 6.2.2 of TS 38.101-1 [2] apply. For a UE supporting dynamic power sharing for DC_(n)71AA for which dual simultaneous uplink transmissions are mandatory and A-MPR defined in subclause 6.2B.3.1.1 is applied as MPR. The allowed maximum output power reduction for IM3 related emissions applied to transmission on the MCG and the SCG is defined as follows:

$$MPR_{\text{ENDC}} = M_A$$

Where M_A is defined as follows

| | |
|---------|------------------------|
| $M_A =$ | 15; $0 \leq B < 0.5$ |
| | 10; $0.5 \leq B < 1.0$ |
| | 8; $1.0 \leq B < 2.0$ |
| | 6; $2.0 < B$ |

Where:

For UEs supporting dynamic power sharing,

$$B = (L_{CRB_alloc, E-UTRA} * 12 * SCS_{E-UTRA} + L_{CRB_alloc, NR} * 12 * SCS_{NR})/1,000,000$$

For UEs not supporting dynamic power sharing,

For E-UTRA

$$B = (L_{CRB_alloc, E-UTRA} * 12 * SCS_{E-UTRA} + 12 * SCS_{NR})/1,000,000$$

Where $SCS_{NR} = 15$ kHz is assumed in calculation of B.

For NR

$$B = (12 * SCS_{E-UTRA} + L_{CRB_alloc, NR} * 12 * SCS_{NR})/1,000,000$$

Where $SCS_{E-UTRA} = 15$ kHz is assumed in calculation of B.

and M_A is reduced by 1 dB for $B < 2$.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.2B.2.1.

Exception requirements for both NR and E-UTRA are defined for this test when transmission on E-UTRA overlap in time with NR. LTE anchor agnostic approach is not applied for this case. E-UTRA test point analysis is included and E-UTRA measurements are performed.

Exception requirements for both NR and E-UTRA are defined for this test when transmission on E-UTRA doesn't overlap in time with NR, for a UE that doesn't support dynamic power sharing. LTE anchor agnostic approach is not applied for this case. E-UTRA test point analysis is included and E-UTRA measurements are performed.

No exception requirements for NR or E-UTRA are defined for this test when transmission on E-UTRA doesn't overlap in time with NR, for a UE that supports dynamic power sharing. LTE anchor agnostic approach is not applied for this case based on the test point analysis in TS 38.905 [7].

6.2B.2.1.4 Test description

6.2B.2.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and test channel bandwidths based on NR operating bands specified in clause 5.3B.1.2, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-1 [8] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2. All of these configurations shall be tested with applicable test parameters for each EN-DC combination of test channel bandwidth and sub-carrier spacing, and are shown in table 6.4B.2.1.3.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521.1 [10] Annex C.2 and in TS 38.521-1 [8] Annex C.2 for E-UTRA CG and NR CG respectively.

Table 6.2B.2.1.4.1-1: Test configuration table

| Initial Conditions | | | | | | | | |
|--------------------|---------------------------|------------|---------------------------|--------------------------|----------------------------|----------------------|----------------|---|
| | | | | | Test Parameters | | | |
| Test ID | Freq | ChBw | SCS | Downlink Configuration | EN-DC Uplink Configuration | | | |
| | | | | | E-UTRA Cell | NR Cell | Common | |
| Modulation | RB allocation (Note 5) | Modulation | RB allocation (NOTE 1) | Power config (NOTE 8) | | | | |
| 1 | Default | Default | N/A | 16QAM | Outer_Full | DFT-s-OFDM Pi/2 BPSK | Outer_Full | B |
| 2 (Note 3) | Default | | | 16QAM | Outer_1RB_Left | DFT-s-OFDM Pi/2 BPSK | Edge_1RB_Right | B |
| 3 (Note 3) | Low | | | 16QAM | Outer_1RB_Left | DFT-s-OFDM Pi/2 BPSK | N/A | A |
| 4 (Note 3) | High | | | 16QAM | N/A | DFT-s-OFDM Pi/2 BPSK | Edge_1RB_Right | A |
| 5 (Note 4) | Default | | | 16QAM | Outer_1RB_Right | DFT-s-OFDM Pi/2 BPSK | Edge_1RB_Left | B |
| 6 (Note 4) | Low | | | 16QAM | N/A | DFT-s-OFDM Pi/2 BPSK | Edge_1RB_Left | A |
| 7 (Note 4) | High | | | 16QAM | Outer_1RB_Right | DFT-s-OFDM Pi/2 BPSK | N/A | A |
| 8 | Default | | | 16QAM | Outer_Full | DFT-s-OFDM QPSK | Outer_Full | B |
| 9 (Note 3) | Default | | | 16QAM | Outer_1RB_Left | DFT-s-OFDM QPSK | Edge_1RB_Right | B |
| 10 (Note 3) | Low | | | 16QAM | Outer_1RB_Left | DFT-s-OFDM QPSK | N/A | A |
| 11 (Note 3) | High | | | 16QAM | N/A | DFT-s-OFDM QPSK | Edge_1RB_Right | A |
| 12 (Note 4) | Default | | | 16QAM | Outer_1RB_Right | DFT-s-OFDM QPSK | Edge_1RB_Left | B |
| 13 (Note 4) | Low | | | 16QAM | N/A | DFT-s-OFDM QPSK | Edge_1RB_Left | A |
| 14 (Note 4) | High | | | 16QAM | Outer_1RB_Right | DFT-s-OFDM QPSK | N/A | A |
| 15 | Default | | | 16QAM | Outer_Full | DFT-s-OFDM 16QAM | Outer_Full | B |
| 16 (Note 3) | Default | | | 16QAM | Outer_1RB_Left | DFT-s-OFDM 16QAM | Edge_1RB_Right | B |

| | | | | | | | | |
|-------------------|---------|--|--|-------|-----------------|----------------------|----------------|---|
| 17 (Note 3) | Low | | | 16QAM | Outer_1RB_Left | DFT-s-OFDM 16QAM | N/A | A |
| 18 (Note 3) | High | | | 16QAM | N/A | DFT-s-OFDM 16QAM | Edge_1RB_Right | A |
| 19 (Note 4) | Default | | | 16QAM | Outer_1RB_Right | DFT-s-OFDM 16QAM | Edge_1RB_Left | B |
| 20 (Note 4) | Low | | | 16QAM | N/A | DFT-s-OFDM 16QAM | Edge_1RB_Left | A |
| 21 (Note 4) | High | | | 16QAM | Outer_1RB_Right | DFT-s-OFDM 16QAM | N/A | A |
| 22 | Default | | | 16QAM | Outer_Full | DFT-s-OFDM 64QAM | Outer_Full | B |
| 23 (Note 3) | Low | | | 16QAM | Outer_1RB_Left | DFT-s-OFDM 64QAM | Edge_1RB_Right | B |
| 24 (Note 4) | High | | | 16QAM | Outer_1RB_Right | DFT-s-OFDM 64QAM | Edge_1RB_Left | B |
| 25 | Default | | | 16QAM | Outer_Full | DFT-s-OFDM 256QAM | Outer_Full | B |
| 26 (Note 3) | Low | | | 16QAM | Outer_1RB_Left | DFT-s-OFDM 256QAM | Edge_1RB_Right | B |
| 27 (Note 4) | High | | | 16QAM | Outer_1RB_Right | DFT-s-OFDM 256QAM | Edge_1RB_Left | B |
| 28 | Default | | | 16QAM | Outer_Full | CP-OFDM QPSK | Outer_Full | B |
| 29 (Note 3) | Default | | | 16QAM | Outer_1RB_Left | CP-OFDM QPSK | Edge_1RB_Right | B |
| 30 (Note 3) | Low | | | 16QAM | Outer_1RB_Left | CP-OFDM QPSK | N/A | A |
| 31 (Note 3) | High | | | 16QAM | N/A | CP-OFDM QPSK | Edge_1RB_Right | A |
| 32 (Note 4) | Default | | | 16QAM | Outer_1RB_Right | CP-OFDM QPSK | Edge_1RB_Left | B |
| 33 (Note 4) | Low | | | 16QAM | N/A | CP-OFDM QPSK | Edge_1RB_Left | A |
| 34 (Note 4) | High | | | 16QAM | Outer_1RB_Right | CP-OFDM QPSK | N/A | A |
| 35 | Default | | | 16QAM | Outer_Full | CP-OFDM 16QAM | Outer_Full | B |
| 36 (Note 3) | Default | | | 16QAM | Outer_1RB_Left | CP-OFDM 16QAM | Edge_1RB_Right | B |
| 37 (Note 3) | Low | | | 16QAM | Outer_1RB_Left | CP-OFDM 16QAM | N/A | A |
| 38 (Note 3) | High | | | 16QAM | N/A | CP-OFDM 16QAM | Edge_1RB_Right | A |
| 39 (Note 4) | Default | | | 16QAM | Outer_1RB_Right | CP-OFDM 16QAM | Edge_1RB_Left | B |

| | | | | | | | | |
|----------------|---------|--|--|-------|-----------------|-------------------|----------------|---|
| 40 (Note 4) | Low | | | 16QAM | N/A | CP-OFDM 16QAM | Edge_1RB_Left | A |
| 41 (Note 4) | High | | | 16QAM | Outer_1RB_Right | CP-OFDM 16QAM | N/A | A |
| 42 | Default | | | 16QAM | Outer_Full | CP-OFDM 64QAM | Outer_Full | B |
| 43 (Note 3) | Low | | | 16QAM | Outer_1RB_Left | CP-OFDM 64QAM | Edge_1RB_Right | B |
| 44 (Note 4) | High | | | 16QAM | Outer_1RB_Right | CP-OFDM 64QAM | Edge_1RB_Left | B |
| 45 | Default | | | 16QAM | Outer_Full | CP-OFDM 256QAM | Outer_Full | B |
| 46 (Note 3) | Low | | | 16QAM | Outer_1RB_Left | CP-OFDM 256QAM | Edge_1RB_Right | B |
| 47 (Note 4) | High | | | 16QAM | Outer_1RB_Right | CP-OFDM 256QAM | Edge_1RB_Left | B |
| 48 (Note 4) | Default | | | 16QAM | Edge_Full_Right | CP-OFDM 256QAM | Edge_Full_Left | B |

NOTE 1: The specific configuration of each RB allocation is defined in Table 6.1-1 in TS 38.521-1 [8].

NOTE 2: If the UE supports multiple CC combinations in the EN-DC configuration with the same N_{RB_agg} , select the combination to test as follows:

- Lowest ENBW: NR component with lowest N_{RB} is tested.
- Highest ENBW: NR component with highest N_{RB} is tested.

NOTE 3: Applicable when E-UTRA cell carrier frequency is lower than NR cell carrier.

NOTE 4: Applicable when NR cell carrier frequency is lower than E-UTRA cell carrier.

NOTE 5: Outer_Full defined as the transmission bandwidth configuration N_{RB} per channel bandwidth for the E-UTRA component as indicated in TS 36.521 [10] Table 5.4.2-1. Outer_1RB_Left defined as 1 RB allocated at the left edge of the E-UTRA component. Edge_Full_Right is defined as 2 RBs allocated at the right edge of the E-UTRA component. Outer_1RB_Right defined as 1 RB allocated at the right edge of the E-UTRA component.

NOTE 6: DFT-s-OFDM Pi/2 BPSK test applies only for UEs which supports Pi/2 BPSK in FR1

NOTE 7: Test IDs with simultaneous E-UTRA and NR UL transmission only apply for UEs indicating dualPA-Architecture.

NOTE 8: Power config as specified in Table 6.2B.2.1.4.3-4 (PC3) or Table 6.2B.2.1.4.3-5 (PC2).

NOTE 9: Test IDs with simultaneous E-UTRA and NR UL transmission don't apply to DC_(n)71AA for a UE supporting dynamic power sharing (A-MPR is applied as MPR and covered by 6.2B.3.1.1).

1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [6] Annex A, Figure A.3.1.1 for TE diagram and clause A.3.2.1 for UE diagram.
2. The parameter settings for the E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3, and the parameter settings for the NR cell are set up according to TS 38.508-1 [6] clause 4.4.3.
3. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C.0 and TS 38.521-1 [8] Annex C.0 for E-UTRA CG and NR CG respectively, and uplink signals according to TS 36.521-1 [10] Annex H and TS 38.521-1 [8] Annex G for E-UTRA CG and NR CG respectively.
4. NR downlink signals are initially set up according to Annex C.0, C.1, and C.2 and uplink signals according to Annex G.0, G.1, G.2, and G.3.0 of TS 38.521-1 [8].
5. The UL Reference Measurement channels are TS 36.521-1 [10] Annex A.2 and TS 38.521-1 [8] Annex A.2 for E-UTRA CG and NR CG respectively.
6. Propagation conditions are set according to TS 36.521-1 [10] Annex B.0 and TS 38.521-1 [8] Annex B.0 for E-UTRA CG and NR CG respectively.
7. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 6.2B.2.1.4.3.

8. For the case of testing overlapping E-UTRA and NR UL transmission scenario when both bands are TDD, ensure E-UTRA UL transmission overlaps with NR UL transmission in time by giving SCG a delay of 3 E-UTRA subframes, or by giving MCG a delay of 2 subframes.

6.2B.2.1.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 6.2B.2.1.4.1-1 on E-UTRA CC and NR CC respectively. Since the UL has no payload and no loopback data to send, the UE transmits uplink MAC padding bits on the UL RMC.
2. Send continuously uplink power control "up" commands to the UE for NR and E-UTRA carrier until the UE transmits at its P_{UMAX} level; allow at least 200 ms from the first TPC command starting in this step for the UE to reach P_{UMAX} level.
3. Measure the mean power over all component carriers for the EN-DC configuration, which shall meet the requirements described in clause 6.2B.2.1.5. The period of the measurement shall be at least the continuous duration of one active sub-frame (1ms). For TDD slots with transient periods are not under test.

NOTE 1: When switching to DFT-s-OFDM waveform, as specified in the test configuration table 6.2B.2.1.4.1-1, send an NR RRCCreconfiguration message according to TS 38.508-1 [6] clause 4.6.3 Table 4.6.3-118 PUSCH-Config with TRANSFORM_PRECODER_ENABLED condition.

6.2B.2.1.4.3 Message contents

Message contents are according to TS 38.508-1 [6] clause 4.6.1 with the following exceptions:

Table 6.2B.2.1.4.3-1: AdditionalSpectrumEmission for MCG

| Derivation Path: 36.508 [11] clause 4.6.3, Table 4.4.3.3-1 | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| AdditionalSpectrumEmission | 0 (NS_01) | | |

Table 6.2B.2.1.4.3-2: AdditionalSpectrumEmission for SCG

| Derivation Path: 38.508-1 [5] clause 4.6.3, Table 4.6.3-1 | | | |
|---|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| AdditionalSpectrumEmission | 0 (NS_01) | | |

Table 6.2B.2.1.4.3-3: PhysicalCellGroupConfig for PC3

| Derivation Path: TS 38.508-1 [6], Table 4.6.3-106 | | | |
|--|--------------|-------------------------|-----------|
| Information Element | Value/remark | Comment | Condition |
| p-NR-FR1 | 23 | Power config A (NOTE 1) | |
| | 20 | Power config B (NOTE 2) | |
| NOTE 1: Applies when E-UTRA UL transmission not overlapping with NR UL transmission in time. | | | |
| NOTE 2: Applies when E-UTRA UL transmission overlapping with NR UL transmission in time. | | | |

Table 6.2B.2.1.4.3-4: RRCConnectionReconfiguration: nr-Config-r15 for PC3

| Derivation Path: TS 36.508 [11], Table 4.6.1-8 | | | |
|---|--------------|-------------------------|-----------|
| Information Element | Value/remark | Comment | Condition |
| p-MaxEUTRA-r15 | 23 | Power config A (NOTE 1) | |
| | 20 | Power config B (NOTE 2) | |
| NOTE 1: Applies when E-UTRA UL transmission not overlapping with NR UL transmission in time.. | | | |
| NOTE 2: Applies when E-UTRA UL transmission overlapping with NR UL transmission in time | | | |

Table 6.2B.2.1.4.3-5: PhysicalCellGroupConfig for PC2

| Derivation Path: TS 38.508-1 [6], Table 4.6.3-106 | | | |
|--|--------------|-------------------------|-----------|
| Information Element | Value/remark | Comment | Condition |
| p-NR-FR1 | 26 | Power config A (NOTE 1) | |
| | 23 | Power config B (NOTE 2) | |
| NOTE 1: Applies when E-UTRA UL transmission not overlapping with NR UL transmission in time. | | | |
| NOTE 2: Applies when E-UTRA UL transmission overlapping with NR UL transmission in time. | | | |

Table 6.2B.2.1.4.3-6: RRCConnectionReconfiguration: nr-Config-r15 for PC2

| Derivation Path: TS 36.508 [11], Table 4.6.1-8 | | | |
|---|--------------|-------------------------|-----------|
| Information Element | Value/remark | Comment | Condition |
| p-MaxEUTRA-r15 | 26 | Power config A (NOTE 1) | |
| | 23 | Power config B (NOTE 2) | |
| NOTE 1: Applies when E-UTRA UL transmission not overlapping with NR UL transmission in time.. | | | |
| NOTE 2: Applies when E-UTRA UL transmission overlapping with NR UL transmission in time | | | |

6.2B.2.1.5 Test requirement

The maximum output power, derived in step 3 shall be within the range prescribed by the nominal maximum output power and tolerance in table 6.2B.2.1.5-1/table 6.2B.2.1.5-2/ table 6.2B.2.1.5-5/ table 6.2B.2.1.5-6 for UE supporting dynamic power sharing and table 6.2B.2.1.5-3/table 6.2B.2.1.5-4/ table 6.2B.2.1.5-7/ table 6.2B.2.1.5-8 for UE not supporting dynamic power sharing.

Table 6.2B.2.1.5-1: UE Power Class 3 test requirements, E-UTRA UL transmission overlapping with NR UL transmission

| Configuration ID | Test SCS (kHz) | MPR _{tot} (dB) | P _{EN-DC, tot_L} (dBm) | P _{EN-DC, tot_H} (dBm) | T _{LOW} (P _{CMAX_L}) (dB) | T _{HIGH} (P _{CMAX_H}) (dB) | Upper limit (dBm) | Lower limit (dBm) |
|---|----------------|-------------------------|---------------------------------|---------------------------------|--|---|-------------------|-------------------|
| 1, 8, 15, 22, 25, 28, 35, 42, 45 (NOTE 1) | 15, 30, 60 | 3.0 | 20.0 | 23.0 | 6.0 | 2.0 | 25.0 + TT | 14.0 - TT |
| 2, 5, 9, 12, 16, 19, 23, 24, 26, 27, 29, 32, 36, 39, 43, 44, 46, 47 (NOTE 2) | 15 | 11.0 | 12.0 | 23.0 | 6.0 | 2.0 | 25.0 + TT | 6.0 - TT |
| | 30, 60 | 6.0 | 17.0 | 23.0 | 5.0 | 2.0 | 25.0 + TT | 12.0 - TT |
| 48 (NOTE 3) | 15 | 7.0 | 16.0 | 23.0 | 5.0 | 2.0 | 25.0 + TT | 11.0 - TT |
| | 30, 60 | 5.0 | 18.0 | 23.0 | 5.0 | 2.0 | 25.0 + TT | 13.0 - TT |
| NOTE 1: Test configuration IDs with transmission overlap with full RB allocation, requirements in TS 38.101-3 [4] apply. | | | | | | | | |
| NOTE 2: Test configuration IDs with transmission overlap with 1RB allocation, requirements in TS 38.101-3 [4] apply. | | | | | | | | |
| NOTE 3: Test configuration IDs with transmission overlap with edge full RB allocation, requirements in TS 38.101-3 [4] apply. | | | | | | | | |

Table 6.2B.2.1.5-2: UE Power Class 3 test requirements, UE supporting dynamic power sharing, E-UTRA UL transmission not overlapping with NR UL transmission

| Configuration ID | Test SCS (kHz) | MPR (dB) | $P_{C\text{MAX}, L}$ (dBm) | $P_{C\text{MAX}, H}$ (dBm) | $T_{\text{LOW}} (P_{C\text{MAX}, L})$ (dB) | $T_{\text{HIGH}} (P_{C\text{MAX}, H})$ (dB) | Upper limit (dBm) | Lower limit (dBm) |
|---|----------------|----------|----------------------------|----------------------------|--|---|-------------------|-------------------|
| 3, 7, 10, 14, 17, 21, 30, 34, 37, 41 (NOTE 1) | 15, 30, 60 | 1.0 | 22.0 | 23.0 | 2.0 | 2.0 | 25.0 + TT | 20.0 - TT |
| 4, 6 (NOTE 2) | 15, 30, 60 | 3.5 | 19.5 | 23.0 | 2.0 | 2.0 | 25.0 + TT | 17.5 - TT |
| 11, 13 (NOTE 2) | 15, 30, 60 | 1 | 22.0 | 23.0 | 2.0 | 2.0 | 25.0 + TT | 20.0 - TT |
| 18, 20 (NOTE 2) | 15, 30, 60 | 2 | 21.0 | 23.0 | 2.0 | 2.0 | 25.0 + TT | 19.0 - TT |
| 31, 33, 38, 40 (NOTE 2) | 15, 30, 60 | 3 | 20.0 | 23.0 | 2.0 | 2.0 | 25.0 + TT | 18.0 - TT |

NOTE 1: Test configuration IDs without transmission overlap with E-UTRA allocation, MPR requirements in TS 36.101 [4] apply.

NOTE 2: Test configuration IDs without transmission overlap with NR allocation, MPR requirements in TS 38.101-1 [2] apply.

Table 6.2B.2.1.5-3: UE Power Class 3 test requirements, UE not supporting dynamic power sharing, E-UTRA UL transmission overlapping with NR UL transmission

| Configuration ID | Test SCS (kHz) | MPR _{tot} (dB) | $P_{\text{EN-DC, tot}, L}$ (dBm) | $P_{\text{EN-DC, tot}, H}$ (dBm) | $T_{\text{LOW}} (P_{C\text{MAX}, L})$ (dB) | $T_{\text{HIGH}} (P_{C\text{MAX}, H})$ (dB) | Upper limit (dBm) | Lower limit (dBm) |
|--|----------------|-------------------------|----------------------------------|----------------------------------|--|---|-------------------|-------------------|
| 1, 8, 15, 22, 25, 28, 35, 42, 45 (NOTE 1) | 15, 30, 60 | 6.0 | 17.0 | 23.0 | 5.0 | 2.0 | 25.0 + TT | 12.0 - TT |
| 2, 5, 9, 12, 16, 19, 23, 24, 26, 27, 29, 32, 36, 39, 43, 44, 46, 47 (NOTE 2) | 15 | 14.0 | 9.0 | 23.0 | 7.0 | 2.0 | 25.0 + TT | 2.0 - TT |
| | 30, 60 | 9.0 | 14.0 | 23.0 | 6.0 | 2.0 | 25.0 + TT | 8.0 - TT |
| 48 (NOTE 3) | 15, 30 | 9.0 | 14.0 | 23.0 | 6.0 | 2.0 | 25.0 + TT | 8.0 - TT |
| | 60 | 7.0 | 16.0 | 23.0 | 5.0 | 2.0 | 25.0 + TT | 11.0 - TT |

NOTE 1: Test configuration IDs with transmission overlap with full RB allocation, requirements in TS 38.101-3 [4] apply.

NOTE 2: Test configuration IDs with transmission overlap with 1RB allocation, requirements in TS 38.101-3 [4] apply.

NOTE 3: Test configuration IDs with transmission overlap with edge full RB allocation, requirements in TS 38.101-3 [4] apply.

Table 6.2B.2.1.5-4: UE Power Class 2 test requirements, UE supporting dynamic power sharing, E-UTRA UL transmission overlapping with NR UL transmission

| Configuration ID | Test SCS (kHz) | MPR _{tot} (dB) | P _{EN-DC, tot_L} (dBm) | P _{EN-DC, tot_H} (dBm) | T _{LOW} (P _{CMAX_L}) (dB) | T _{HIGH} (P _{CMAX_H}) (dB) | Upper limit (dBm) | Lower limit (dBm) |
|---|----------------|-------------------------|---------------------------------|---------------------------------|--|---|-------------------|-------------------|
| 1, 8, 15, 22, 25, 28, 35, 42, 45 (NOTE 1) | 15, 30, 60 | 3.0 | 23.0 | 26.0 | 3.0 | 2.0 | 28.0 + TT | 20.0 - TT |
| 2, 5, 9, 12, 16, 19, 23, 24, 26, 27, 29, 32, 36, 39, 43, 44, 46, 47 (NOTE 2) | 15 | 11.0 | 15.0 | 26.0 | 6.0 | 2.0 | 28.0 + TT | 9.0 - TT |
| | 30, 60 | 6.0 | 20.0 | 26.0 | 6.0 | 2.0 | 28.0 + TT | 14.0 - TT |
| 48 (NOTE 3) | 15 | 7.0 | 19.0 | 26.0 | 5.0 | 2.0 | 28.0 + TT | 14.0 - TT |
| | 30, 60 | 5.0 | 21.0 | 26.0 | 5.0 | 2.0 | 28.0 + TT | 16.0 - TT |
| | | | | | | | | |
| NOTE 1: Test configuration IDs with transmission overlap with full RB allocation, requirements in TS 38.101-3 [4] apply. | | | | | | | | |
| NOTE 2: Test configuration IDs with transmission overlap with 1RB allocation, requirements in TS 38.101-3 [4] apply. | | | | | | | | |
| NOTE 3: Test configuration IDs with transmission overlap with edge full RB allocation, requirements in TS 38.101-3 [4] apply. | | | | | | | | |

Table 6.2B.2.1.5-5: UE Power Class 2 test requirements, E-UTRA UL transmission not overlapping with NR UL transmission

| Configuration ID | Test SCS (kHz) | MPR (dB) | P _{CMAX_L} (dBm) | P _{CMAX_H} (dBm) | T _{LOW} (P _{CMAX_L}) (dB) | T _{HIGH} (P _{CMAX_H}) (dB) | Upper limit (dBm) | Lower limit (dBm) |
|--|----------------|----------|---------------------------|---------------------------|--|---|-------------------|-------------------|
| 3, 7, 10, 14, 17, 21, 30, 34, 37, 41 (NOTE 1) | 15, 30, 60 | 1.0 | 25.0 | 26.0 | 2.0 | 2.0 | 28.0 + TT | 23.0 - TT |
| 4, 6 (NOTE 2) | 15, 30, 60 | 3.5 | 22.5 | 26.0 | 2.0 | 2.0 | 28.0 + TT | 20.5 - TT |
| 11, 13 (NOTE 2) | 15, 30, 60 | 3.5 | 22.5 | 26.0 | 2.0 | 2.0 | 28.0 + TT | 20.5 - TT |
| 18, 20 (NOTE 2) | 15, 30, 60 | 3.5 | 22.5 | 26.0 | 2.0 | 2.0 | 28.0 + TT | 20.5 - TT |
| 31, 33, 38, 40 (NOTE 2) | 15, 30, 60 | 3.5 | 22.5 | 26.0 | 2.0 | 2.0 | 28.0 + TT | 20.5 - TT |
| NOTE 1: Test configuration IDs without transmission overlap with E-UTRA allocation, MPR requirements in TS 36.101 [4] apply. | | | | | | | | |
| NOTE 2: Test configuration IDs without transmission overlap with NR allocation, MPR requirements in TS 38.101-1 [2] apply. | | | | | | | | |

Table 6.2B.2.1.5-6: UE Power Class 2 test requirements, UE not supporting dynamic power sharing, E-UTRA UL transmission overlapping with NR UL transmission

| Configuration ID | Test SCS (kHz) | MPR _{tot} (dB) | P _{EN-DC, tot_L} (dBm) | P _{EN-DC, tot_H} (dBm) | T _{LOW} (P _{CMAX_L}) (dB) | T _{HIGH} (P _{CMAX_H}) (dB) | Upper limit (dBm) | Lower limit (dBm) |
|---|----------------|-------------------------|---------------------------------|---------------------------------|--|---|-------------------|-------------------|
| 1, 8, 15, 22, 25, 28, 35, 42, 45 (NOTE 1) | 15, 30, 60 | 6.0 | 20.0 | 26.0 | 6.0 | 2.0 | 28.0 + TT | 14.0 - TT |
| 2, 5, 9, 12, 16, 19, 23, 24, 26, 27, 29, 32, 36, 39, 43, 44, 46, 47 (NOTE 2) | 15 | 14.0 | 12.0 | 26.0 | 6.0 | 2.0 | 28.0 + TT | 6.0 - TT |
| | 30, 60 | 9.0 | 17.0 | 26.0 | 5.0 | 2.0 | 28.0 + TT | 12.0 - TT |
| 48 (NOTE 3) | 15, 30 | 9.0 | 17.0 | 26.0 | 5.0 | 2.0 | 28.0 + TT | 12.0 - TT |
| | 60 | 7.0 | 19.0 | 26.0 | 5.0 | 2.0 | 28.0 + TT | 14.0 - TT |
| | | | | | | | | |
| NOTE 1: Test configuration IDs with transmission overlap with full RB allocation, requirements in TS 38.101-3 [4] apply. | | | | | | | | |
| NOTE 2: Test configuration IDs with transmission overlap with 1RB allocation, requirements in TS 38.101-3 [4] apply. | | | | | | | | |
| NOTE 3: Test configuration IDs with transmission overlap with edge full RB allocation, requirements in TS 38.101-3 [4] apply. | | | | | | | | |

Table 6.2B.2.1.5-7: Test Tolerance

| | f ≤ 3.0GHz | 3.0GHz < f ≤ 6GHz |
|-------------------------------|------------|-------------------|
| BW ≤ 40MHz | 0.7 | 1.0 |
| 40MHz < BW ≤ 100MHz | 1.0 | 1.0 |

6.2B.2.2 UE Maximum Output Power reduction for Intra-Band Non-Contiguous EN-DC

6.2B.2.2.1 Test purpose

Same test purpose as in clause 6.2B.2.1.1.

6.2B.2.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band non-contiguous EN-DC.

6.2B.2.2.3 Minimum conformance requirements

When the UE is configured for intra-band non-contiguous EN-DC, the UE determines the total allowed maximum output power reduction as specified in this subclause.

For UE supporting dynamic power sharing the following:

- for the MCG, MPR_c in accordance with TS 36.101 [4]
- for the SCG,

$$\text{MPR}'_c = \text{MPR}_{\text{NR}} = \text{MAX}(\text{MPR}_{\text{single,NR}}, \text{MPR}_{\text{ENDC}})$$

- for the total configured transmission power,

$$\text{MPR}_{\text{tot}} = \text{P}_{\text{PowerClass,EN-DC}} - \min(\text{P}_{\text{PowerClass,EN-DC}}, 10^{\log_{10}(10^{(\text{P}_{\text{PowerClass,E-UTRA}} - \text{MPR}_{\text{E-UTRA}})/10}) + 10^{(\text{P}_{\text{PowerClass,NR}} - \text{MPR}_{\text{NR}})/10})})$$

where

$$\text{MPR}_{\text{E-UTRA}} = \text{MAX}(\text{MPR}_{\text{single,E-UTRA}}, \text{MPR}_{\text{ENDC}})$$

with

- $MPR_{single, E-UTRA}$ is the MPR defined for the E-UTRA transmission in TS 36.101 [4]
- $MPR_{single,NR}$ is the MPR defined for the NR transmission in TS 38.101-1 [2]

For UEs not supporting dynamic power sharing the following

- for the MCG,

$$MPR_c = \text{MAX}(MPR_{single,E-UTRA}, MPR_{ENDC})$$

- for the SCG,

$$MPR'_c = \text{MAX}(MPR_{single,NR}, MPR_{ENDC})$$

where

- $MPR_{single,NR}$ is the MPR defined for the NR transmission in TS 38.101-1 [2]
- $MPR_{single,E-UTRA}$ is the MPR defined for the E-UTRA transmission in TS 36.101 [4]

MPR in this subclause is applicable for power class 3 and power class 2 UEs indicating IE *dualPA-Architecture* supported with ENDC power class being the same as the E-UTRA and NR power class, otherwise the UE can use as much MPR as needed to fulfil emissions requirements when scheduled with dual uplink transmission. For UEs scheduled with single uplink transmission, MPR in subclause 6.2.4 of TS 36.101 [5] and 6.2.3 of TS 38.101-1 [2] apply. The allowed maximum output power reduction for IM3 related emissions applied to transmission on the MCG and the SCG is defined as follows:

$$MPR_{ENDC} = M_A$$

Where M_A is defined as follows

$$\begin{aligned} M_A &= 18 ; \quad 0 \leq B < 1.0 \\ &= 17 ; \quad 1.0 \leq B < 2.0 \\ &= 16 ; \quad 2.0 \leq B < 5.0 \\ &= 15 ; \quad 5.0 \leq B \end{aligned}$$

Where:

For UEs supporting dynamic power sharing,

$$B = (L_{CRB_alloc, E-UTRA} * 12 * SCS_{E-UTRA} + L_{CRB_alloc,NR} * 12 * SCS_{NR})/1,000.000$$

For UEs not supporting dynamic power sharing,

For E-UTRA

$$B = (L_{CRB_alloc, E-UTRA} * 12 * SCS_{E-UTRA} + 12 * SCS_{NR})/1,000.000$$

Where $SCS_{NR} = 15$ kHz is assumed in calculation of B.

For NR

$$B = (12 * SCS_{E-UTRA} + L_{CRB_alloc,NR} * 12 * SCS_{NR})/1,000.000$$

Where $SCS_{E-UTRA} = 15$ kHz is assumed in calculation of B.

and M_A is reduced by 1 dB for $B < 2$.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.2B.2.2.

Exception requirements for both NR and E-UTRA are defined for this test when transmission on E-UTRA overlap in time with NR. LTE anchor agnostic approach is not applied for this case. E-UTRA test point analysis is included and E-UTRA measurements are performed.

Exception requirements for both NR and E-UTRA are defined for this test when transmission on E-UTRA doesn't overlap in time with NR, for a UE that doesn't support dynamic power sharing. LTE anchor agnostic approach is not applied for this case. E-UTRA test point analysis is included and E-UTRA measurements are performed.

No exception requirements for NR or E-UTRA are defined for this test when transmission on E-UTRA doesn't overlap in time with NR, for a UE that supports dynamic power sharing. LTE anchor agnostic approach is not applied for this case based on the test point analysis in TS 38.905 [7].6.2B.2.2.4 Test description

6.2B.2.2.4.1 Initial conditions

Same initial conditions as described in clause 6.2B.2.1.4.1 for both E-UTRA and NR carriers with the following exception:

Table 6.2B.2.2.4.1-1: Test Configuration Table

| Initial Conditions | |
|--|------------------------------------|
| Test Frequencies as specified in TS 38.508 [7] clause 4.3.1 for different DC bandwidth classes | Low range, High range with MaxWGap |

6.2B.2.2.4.2 Test procedure

Same test procedure as described in clause 6.2B.2.1.4.2.6.2B.2.2.4.3 Message contents

Same message contents as in clause 6.2B.2.1.4.3. with the following exceptions:

- Instead of Table 6.2B.2.1.4.3-4 --> use Table 6.2B.2.2.4.3-1
- Instead of Table 6.2B.2.1.4.3-5 --> use Table 6.2B.2.2.4.3-2

6.2B.2.2.4.3-1: RRCCoNNECTIONReconfiguration: nr-Config-r15 for PC3

| Derivation Path: TS 36.508 [11], Table 4.6.1-8 | | | |
|--|--------------|-------------------------|------------------------------|
| Information Element | Value/remark | Comment | Condition |
| p-MaxEUTRA-r15 | 23 | Power config A (NOTE 1) | |
| | 20 | Power config B (NOTE 2) | |
| | 7 | Power config C (NOTE 3) | |
| | 4 | Power config D (NOTE 3) | |
| | 5 | Power config E (NOTE 3) | SCS_15KHz |
| | 6 | Power config E (NOTE 3) | SCS_30kHz OR SCS_60kHz |
| P-Max | 23 | Power config A (NOTE 1) | |
| | 20 | Power config B (NOTE 2) | |
| | 8 | Power config C (NOTE 3) | |
| | 5 | Power config D (NOTE 3) | |
| | 6 | Power config E (NOTE 3) | SCS_15KHz |
| | 7 | Power config E (NOTE 3) | SCS_30kHz OR SCS_60kHz |

NOTE 1: Applies when E-UTRA UL transmission not overlapping with NR UL transmission in time.
 NOTE 2: Applies when E-UTRA UL transmission overlapping with NR UL transmission in time and UE doesn't support dynamic power sharing.
 NOTE 3: Applies when E-UTRA UL transmission overlapping with NR UL transmission and UE supports dynamic power sharing.

6.2B.2.2.4.3-2: RRCConnectionReconfiguration: nr-Config-r15 for PC2

| Derivation Path: TS 36.508 [11], Table 4.6.1-8 | | | |
|---|--------------|-------------------------|------------------------------|
| Information Element | Value/remark | Comment | Condition |
| p-MaxEUTRA-r15 | 26 | Power config A (NOTE 1) | |
| | 23 | Power config B (NOTE 2) | |
| | 10 | Power config C (NOTE 3) | |
| | 7 | Power config D (NOTE 3) | |
| | 8 | Power config E (NOTE 3) | SCS_15kHz |
| | 9 | Power config E (NOTE 3) | SCS_30kHz OR SCS_60kHz |
| P-Max | 26 | Power config A (NOTE 1) | |
| | 23 | Power config B (NOTE 2) | |
| | 11 | Power config C (NOTE 3) | |
| | 8 | Power config D (NOTE 3) | |
| | 9 | Power config E (NOTE 3) | SCS_15kHz |
| | 10 | Power config E (NOTE 3) | SCS_30kHz OR SCS_60kHz |
| NOTE 1: Applies when E-UTRA UL transmission not overlapping with NR UL transmission in time. NOTE 2: Applies when E-UTRA UL transmission overlapping with NR UL transmission in time and UE doesn't support dynamic power sharing. NOTE 3: Applies when E-UTRA UL transmission overlapping with NR UL transmission and UE supports dynamic power sharing. | | | |

6.2B.2.2.5 Test requirement

The maximum output power, derived in step 3 shall be within the range prescribed by the nominal maximum output power and tolerance in table 6.2B.2.2.5-1/table 6.2B.2.2.5-2/table 6.2B.2.2.5-5/table 6.2B.2.2.5-6 for UE supporting dynamic power sharing and table 6.2B.2.2.5-3/table 6.2B.2.2.5-4/table 6.2B.2.2.5-7/table 6.2B.2.2.5-8 for UE not supporting dynamic power sharing.

Table 6.2B.2.2.5-1: UE Power Class 3 test requirements, UE supporting dynamic power sharing, E-UTRA UL transmission overlapping with NR UL transmission

| Configuration ID | Test SCS (kHz) | MPR _{tot} (dB) | P _{EN-DC, tot_L} (dBm) | P _{EN-DC, tot_H} (dBm) | T _{LOW} (P _{CMAX_L}) (dB) | T _{HIGH} (P _{CMAX_H}) (dB) | Upper limit (dBm) | Lower limit (dBm) |
|---|----------------|-------------------------|---------------------------------|---------------------------------|--|---|-------------------|-------------------|
| 1, 8, 15, 22, 25, 28, 35, 42, 45 (NOTE 1) | 15, 30, 60 | 12.0 | 11.0 | 23.0 | 6.0 | 4.0 | 27.0 + TT | 5.0 - TT |
| 2, 5, 9, 12, 16, 19, 23, 24, 26, 27, 29, 32, 36, 39, 43, 44, 46, 47 (NOTE 2) | 15, 30, 60 | 15.0 | 8.0 | 23.0 | 7.0 | 4.0 | 27.0 + TT | 1.0 - TT |
| 48 (NOTE 3) | 15 | 14.0 | 9.0 | 23.0 | 7.0 | 4.0 | 27.0 + TT | 2.0 - TT |
| | 30, 60 | 13.0 | 10.0 | 23.0 | 7.0 | 4.0 | 27.0 + TT | 3.0 - TT |
| NOTE 1: Test configuration IDs with transmission overlap with full RB allocation, requirements in TS 38.101-3 [4] apply. NOTE 2: Test configuration IDs with transmission overlap with 1RB allocation, requirements in TS 38.101-3 [4] apply. NOTE 3: Test configuration IDs with transmission overlap with edge full RB allocation, requirements in TS 38.101-3 [4] apply. | | | | | | | | |

Table 6.2B.2.2.5-2: UE Power Class 3 test requirements, UE supporting dynamic power sharing, E-UTRA UL transmission not overlapping with NR UL transmission

| Configuration ID | Test SCS (kHz) | MPR (dB) | $P_{C\text{MAX}, L}$ (dBm) | $P_{C\text{MAX}, H}$ (dBm) | $T_{\text{LOW}} (P_{C\text{MAX}, L})$ (dB) | $T_{\text{HIGH}} (P_{C\text{MAX}, H})$ (dB) | Upper limit (dBm) | Lower limit (dBm) |
|---|----------------|----------|----------------------------|----------------------------|--|---|-------------------|-------------------|
| 3, 7, 10, 14, 17, 21, 30, 34, 37, 41 (NOTE 1) | 15, 30, 60 | 1.0 | 22.0 | 23.0 | 2.0 | 2.0 | 25.0 + TT | 20.0 - TT |
| 4, 6 (NOTE 2) | 15, 30, 60 | 3.5 | 19.5 | 23.0 | 2.0 | 2.0 | 25.0 + TT | 17.5 - TT |
| 11, 13 (NOTE 2) | 15, 30, 60 | 1 | 22.0 | 23.0 | 2.0 | 2.0 | 25.0 + TT | 20.0 - TT |
| 18, 20 (NOTE 2) | 15, 30, 60 | 2 | 21.0 | 23.0 | 2.0 | 2.0 | 25.0 + TT | 19.0 - TT |
| 31, 33, 38, 40 (NOTE 2) | 15, 30, 60 | 3 | 20.0 | 23.0 | 2.0 | 2.0 | 25.0 + TT | 18.0 - TT |

NOTE 1: Test configuration IDs without transmission overlap with E-UTRA allocation, MPR requirements in TS 36.101 [4] apply.

NOTE 2: Test configuration IDs without transmission overlap with NR allocation, MPR requirements in TS 38.101-1 [2] apply.

Table 6.2B.2.2.5-3: UE Power Class 3 test requirements, UE not supporting dynamic power sharing, E-UTRA UL transmission overlapping with NR UL transmission

| Configuration ID | Test SCS (kHz) | MPR _{tot} (dB) | $P_{\text{EN-DC, tot}, L}$ (dBm) | $P_{\text{EN-DC, tot}, H}$ (dBm) | $T_{\text{LOW}} (P_{C\text{MAX}, L})$ (dB) | $T_{\text{HIGH}} (P_{C\text{MAX}, H})$ (dB) | Upper limit (dBm) | Lower limit (dBm) |
|--|----------------|-------------------------|----------------------------------|----------------------------------|--|---|-------------------|-------------------|
| 1, 8, 15, 22, 25, 28, 35, 42, 45 (NOTE 1) | 15, 30, 60 | 15.0 | 8.0 | 23.0 | 7.0 | 4.0 | 27.0 + TT | 1.0 - TT |
| 2, 5, 9, 12, 16, 19, 23, 24, 26, 27, 29, 32, 36, 39, 43, 44, 46, 47 (NOTE 2) | 15, 30, 60 | 17.0 | 6.0 | 23.0 | 7.0 | 4.0 | 27.0 + TT | -1.0 - TT |
| 48 (NOTE 3) | 15, 30 | 17.0 | 6.0 | 23.0 | 7.0 | 4.0 | 27.0 + TT | -1.0 - TT |
| | 60 | 16.5 | 6.5 | 23.0 | 7.0 | 4.0 | 27.0 + TT | -0.5 - TT |

NOTE 1: Test configuration IDs with transmission overlap with full RB allocation, requirements in TS 38.101-3 [4] apply.

NOTE 2: Test configuration IDs with transmission overlap with 1RB allocation, requirements in TS 38.101-3 [4] apply.

NOTE 3: Test configuration IDs with transmission overlap with edge full RB allocation, requirements in TS 38.101-3 [4] apply.

Table 6.2B.2.2.5-4: UE Power Class 3 test requirements, UE not supporting dynamic power sharing, E-UTRA UL transmission not overlapping with NR UL transmission

| Configuration ID | Test SCS (kHz) | MPR (dB) | $P_{C\text{MAX}, L}$ (dBm) | $P_{C\text{MAX}, H}$ (dBm) | $T_{\text{LOW}} (P_{C\text{MAX}, L})$ (dB) | $T_{\text{HIGH}} (P_{C\text{MAX}, H})$ (dB) | Upper limit (dBm) | Lower limit (dBm) |
|--|----------------|----------|----------------------------|----------------------------|--|---|-------------------|-------------------|
| 3, 4, 6, 7, 10, 11, 13, 14, 17, 18, 20, 21, 30, 31, 34, 37, 38, 40, 41 | 15, 30, 60 | 17.0 | 6.0 | 23.0 | 7.0 | 4.0 | 27.0 + TT | -1.0 - TT |

NOTE: Test configuration IDs without transmission overlap with 1RB allocation, requirements in TS 38.101-3 [4] apply.

Table 6.2B.2.2.5-5: UE Power Class 2 test requirements, UE supporting dynamic power sharing, E-UTRA UL transmission overlapping with NR UL transmission

| Configuration ID | Test SCS (kHz) | MPR _{tot} (dB) | P _{EN-DC, tot_L} (dBm) | P _{EN-DC, tot_H} (dBm) | T _{LOW} (P _{CMAX_L}) (dB) | T _{HIGH} (P _{CMAX_H}) (dB) | Upper limit (dBm) | Lower limit (dBm) |
|---|----------------|-------------------------|---------------------------------|---------------------------------|--|---|-------------------|-------------------|
| 1, 8, 15, 22, 25, 28, 35, 42, 45 (NOTE 1) | 15, 30, 60 | 12.0 | 14.0 | 26.0 | 6.0 | 4.0 | 30.0 + TT | 8.0 - TT |
| 2, 5, 9, 12, 16, 19, 23, 24, 26, 27, 29, 32, 36, 39, 43, 44, 46, 47 (NOTE 2) | 15, 30, 60 | 15.0 | 11.0 | 26.0 | 6.0 | 4.0 | 30.0 + TT | 5.0 - TT |
| 48 (NOTE 3) | 15 | 14.0 | 12.0 | 26.0 | 6.0 | 4.0 | 30.0 + TT | 6.0 - TT |
| | 30, 60 | 13.0 | 13.0 | 26.0 | 6.0 | 4.0 | 30.0 + TT | 7.0 - TT |
| NOTE 1: Test configuration IDs with transmission overlap with full RB allocation, requirements in TS 38.101-3 [4] apply. | | | | | | | | |
| NOTE 2: Test configuration IDs with transmission overlap with 1RB allocation, requirements in TS 38.101-3 [4] apply. | | | | | | | | |
| NOTE 3: Test configuration IDs with transmission overlap with edge full RB allocation, requirements in TS 38.101-3 [4] apply. | | | | | | | | |

Table 6.2B.2.2.5-6: UE Power Class 2 test requirements, UE supporting dynamic power sharing, E-UTRA UL transmission not overlapping with NR UL transmission

| Configuration ID | Test SCS (kHz) | MPR (dB) | P _{CMAX_L} (dBm) | P _{CMAX_H} (dBm) | T _{LOW} (P _{CMAX_L}) (dB) | T _{HIGH} (P _{CMAX_H}) (dB) | Upper limit (dBm) | Lower limit (dBm) |
|--|----------------|----------|---------------------------|---------------------------|--|---|-------------------|-------------------|
| 3, 7, 10, 14, 17, 21, 30, 34, 37, 41 (NOTE 1) | 15, 30, 60 | 1.0 | 25.0 | 26.0 | 2.0 | 2.0 | 28.0 + TT | 23.0 - TT |
| 4, 6 (NOTE 2) | 15, 30, 60 | 3.5 | 22.5 | 26.0 | 2.0 | 2.0 | 28.0 + TT | 20.5 - TT |
| 11, 13 (NOTE 2) | 15, 30, 60 | 3.5 | 22.5 | 26.0 | 2.0 | 2.0 | 28.0 + TT | 20.5 - TT |
| 18, 20 (NOTE 2) | 15, 30, 60 | 3.5 | 22.5 | 26.0 | 2.0 | 2.0 | 28.0 + TT | 20.5 - TT |
| 31, 33, 38, 40 (NOTE 2) | 15, 30, 60 | 3.5 | 22.5 | 26.0 | 2.0 | 2.0 | 28.0 + TT | 20.5 - TT |
| NOTE 1: Test configuration IDs without transmission overlap with E-UTRA allocation, MPR requirements in TS 36.101 [4] apply. | | | | | | | | |
| NOTE 2: Test configuration IDs without transmission overlap with NR allocation, MPR requirements in TS 38.101-1 [2] apply. | | | | | | | | |

Table 6.2B.2.2.5-7: UE Power Class 2 test requirements, UE not supporting dynamic power sharing, E-UTRA UL transmission overlapping with NR UL transmission

| Configuration ID | Test SCS (kHz) | MPR _{tot} (dB) | P _{EN-DC, tot_L} (dBm) | P _{EN-DC, tot_H} (dBm) | T _{LOW} (P _{CMAX_L}) (dB) | T _{HIGH} (P _{CMAX_H}) (dB) | Upper limit (dBm) | Lower limit (dBm) |
|---|----------------|-------------------------|---------------------------------|---------------------------------|--|---|-------------------|-------------------|
| 1, 8, 15, 22, 25, 28, 35, 42, 45 (NOTE 1) | 15, 30, 60 | 15.0 | 11.0 | 26.0 | 6.0 | 4.0 | 30.0 + TT | 5.0 - TT |
| 2, 5, 9, 12, 16, 19, 23, 24, 26, 27, 29, 32, 36, 39, 43, 44, 46, 47 (NOTE 2) | 15, 30, 60 | 17.0 | 9.0 | 26.0 | 7.0 | 4.0 | 30.0 + TT | 2.0 - TT |
| 48 (NOTE 3) | 15, 30 | 17.0 | 9.0 | 26.0 | 7.0 | 4.0 | 30.0 + TT | 2.0 - TT |
| | 60 | 16.0 | 10.0 | 26.0 | 7.0 | 4.0 | 30.0 + TT | 3.0 - TT |
| NOTE 1: Test configuration IDs with transmission overlap with full RB allocation, requirements in TS 38.101-3 [4] apply. | | | | | | | | |
| NOTE 2: Test configuration IDs with transmission overlap with 1RB allocation, requirements in TS 38.101-3 [4] apply. | | | | | | | | |
| NOTE 3: Test configuration IDs with transmission overlap with edge full RB allocation, requirements in TS 38.101-3 [4] apply. | | | | | | | | |

Table 6.2B.2.2.5-8: UE Power Class 2 test requirements, UE not supporting dynamic power sharing, E-UTRA UL transmission not overlapping with NR UL transmission

| Configuration ID | Test SCS (kHz) | MPR (dB) | $P_{C\text{MAX}, L}$ (dBm) | $P_{C\text{MAX}, H}$ (dBm) | $T_{\text{LOW}} (P_{C\text{MAX}, L})$ (dB) | $T_{\text{HIGH}} (P_{C\text{MAX}, H})$ (dB) | Upper limit (dBm) | Lower limit (dBm) |
|---|----------------|----------|----------------------------|----------------------------|--|---|-------------------|-------------------|
| 3, 4, 6, 7, 10, 11, 13, 14, 17, 18, 20, 21, 30, 31, 34, 37, 38, 40, 41 | 15, 30, 60 | 17.0 | 9.0 | 26.0 | 7.0 | 4.0 | 30.0 + TT | 2.0 - TT |
| NOTE: Test configuration IDs without transmission overlap with 1RB allocation, requirements in TS 38.101-3 [4] apply. | | | | | | | | |

Table 6.2B.2.2.5-9: Test Tolerance

| | $f \leq 3.0\text{GHz}$ | $3.0\text{GHz} < f \leq 6\text{GHz}$ |
|---|------------------------|--------------------------------------|
| $\text{BW} \leq 40\text{MHz}$ | 0.7 | 1.0 |
| $40\text{MHz} < \text{BW} \leq 100\text{MHz}$ | 1.0 | 1.0 |

6.2B.2.3 UE Maximum Output Power reduction for Inter-Band EN-DC within FR1

6.2B.2.3.1 Test purpose

Same test purpose as in clause 6.2.2.1 in TS 38.521-1 [8] for the NR carrier.

6.2B.2.3.2 Test applicability

The requirements of this test apply to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC within FR1.

6.2B.2.3.3 Minimum conformance requirements

For inter-band EN-DC between E-UTRA and FR1 NR, UE maximum output power reduction specified in TS 36.101 [5] and TS 38.101-1 [2] apply for E-UTRA and NR respectively.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.2B.2.3.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.2B.2.3.4 Test description

Same test description as in clause 6.2.2.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1.

For Initial conditions as in clause 6.2.2.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for the E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3 with E-UTRA channel bandwidth and test frequencies defined in Table 4.6-1.

3.1. Downlink E-UTRA signals are initially set up according to TS 36.521-1 [10] Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.

4.1. The E-UTRA UL Reference Measurement channels are set according to Table 4.6-1.

Step 6 of Initial conditions as in clause 6.2.2.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG according to TS 38.508 [6] clause 4.5.

Same test procedure as in clause 6.2.2.4.2 in TS 38.521-1 [8].

6.2B.2.3.5 Test requirement

Same test requirement as in clause 6.2.2.5 in TS 38.521-1 [8].

6.2B.2.4 UE Maximum Output Power reduction for Inter-Band EN-DC including FR2

Editor's note: Following aspects are missing or under discussion

- The referred test case 6.2.2 in TS 38.521-2 [9] is incomplete for PC1, PC2 and PC4.

6.2B.2.4.1 Test purpose

To verify that the error of the UE maximum output power does not exceed the range prescribed by the specified maximum output power with MPR and tolerance.

An excess maximum output power has the possibility to interfere to other channels or other systems. A small maximum output power decreases the coverage area.

6.2B.2.4.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2.

6.2B.2.4.3 Minimum conformance requirements

UE maximum output power reduction requirement for E-UTRA single carrier and CA operation specified in clauses 6.2.3 and 6.2.3A of TS 36.101[5] and for NR single carrier and CA operation specified in clauses 6.2.2, 6.2A.2, and 6.2D.2 of TS 38.101-2 [3] apply.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.2B.2.4.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.2B.2.4.4 Test description

6.2B.2.4.4.1 Initial conditions

Same test description as in clause 6.2.2.4 in TS 38.521-2 [9] for the NR carrier with the following exceptions:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1.

For Initial conditions as in clause 6.2.2.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for the E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3 with E-UTRA channel bandwidth and test frequencies defined in Table 4.6-1.
 - 3.1. Downlink E-UTRA signals are initially set up according to TS 36.521-1 [10] Annex C, clauses C.0, C.1 and C.3.0, and uplink signals according to Annex H, clauses H.1 and H.3.0.
 - 4.1. The E-UTRA UL Reference Measurement channels are set according to Table 4.6-1.

Step 6 of Initial conditions as in clause 6.2.2.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG according to TS 38.508 [6] clause 4.5.

Same test procedure as in clause 6.2.2.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.2B.2.4.5 Test requirement

Same test requirement as in clause 6.2.2.5 in TS 38.521-2 [9] for the NR carrier.

6.2B.2.5 UE Maximum Output power reduction for inter-band EN-DC including both FR1 and FR2

6.2B.2.5.1 Test purpose

Same test purpose as in clause 6.2B.2.3.1 in TS 38.521-1 [8] for NR FR1 carrier(s) and clause 6.2B.2.4.1 in TS 38.521-2 [9] for NR FR2 carrier(s).

6.2B.2.5.2 Test applicability

The requirements in this test are not testable due to issues with combined testing of NR FR1 and E-UTRA in conducted mode with NR FR2 in radiated mode. Therefore, the conducted and radiated requirements are tested separately.

No test case details are specified. The NSA requirements for maximum output power apply and are tested as part of the EN-DC within FR1 and EN-DC including FR2 test cases in clause 6.2B.

6.2B.3 UE additional maximum output power reduction for EN-DC

6.2B.3.1 UE Additional Maximum Output Power reduction for Intra-band contiguous EN-DC

6.2B.3.1.1 Test purpose

Additional emission requirements can be signalled by the network with network signalling value indicated by the field *additionalSpectrumEmission*. To meet these additional requirements, additional maximum power reduction (A-MPR) is allowed for the maximum output power as specified in Table 6.2B.1.1.3-1. Unless stated otherwise, an A-MPR of 0 dB shall be used.

6.2B.3.1.2 Test applicability

The requirements of this test apply in test case 6.5B.2.1.2 Additional spectrum emission mask for network signalled values NS_04 and NS_35 to all types of E-UTRA power class 3 and power class 2 UE release 15 and forward, supporting intra-band contiguous EN-DC.

6.2B.3.1.3 Minimum conformance requirements

For intra-band contiguous EN-DC band combinations with additional requirements the allowed A-MPR is specified in table 6.2B.3.1.3-1 for UEs configured with EN-DC and combinations of network signalling values indicated in the E-UTRA and NR cell groups.

Unless otherwise stated the A-MPR specified in subclause 6.2B.3.1 for intra-band contiguous EN-DC configurations is the total power reduction allowed including MPR.

Table 6.2B.3.1.3-1: Additional maximum power reduction for Intra-band contiguous EN-DC

| DC configuration | Requirement (subclause) | E-UTRA network signalling value | NR network signalling value | A-MPR (clause) |
|-------------------------|--------------------------------|--|------------------------------------|---------------------------|
| DC_(n)71AA | 6.5B.2.1.2.3.1 | NS_35 | NS_35 | 6.2B.3.1.3.1 ³ |
| DC_(n)41AA ¹ | 6.5B.2.1.2.3.2 | NS_01 or NS_04 | NS_04 | 6.2B.3.1.3.2 ⁴ |

NOTE 1: Only applies to UEs that support dual UL transmission for this EN-DC combination.
 NOTE 2: The additional emission requirement is indicated when the combination of network signalling values in the two CGs is set (only for UEs configured with EN-DC).
 NOTE 3: The A-MPR is applied as MPR if NS_35 is not signalled.
 NOTE 4: Void.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.2B.3.1.

Exception requirements for both NR and E-UTRA are defined for this test when transmission on E-UTRA overlap in time with NR.LTE anchor agnostic approach is not applied for this case. E-UTRA test point analysis is included and E-UTRA measurements are performed.

Exception requirements for both NR and E-UTRA are defined for this test when transmission on E-UTRA doesn't overlap in time with NR, for a UE that doesn't support dynamic power sharing. LTE anchor agnostic approach is not applied for this case. E-UTRA test point analysis is included and E-UTRA measurements are performed.

No exception requirements for NR or E-UTRA are defined for this test when transmission on E-UTRA doesn't overlap in time with NR, for a UE that supports dynamic power sharing. LTE anchor agnostic approach is not applied for this case.

6.2B.3.1.3.1 A-MPR for DC_(n)71AA

For UE supporting dynamic power sharing the following:

- for the MCG, A-MPR_c in accordance with TS 36.101 [5]
- for the SCG, A-MPR'_c = [A-MPR_{DC}]
- for the total configured transmission power, A-MPR_{tot} = A-MPR_{DC}

with A-MPR_{DC} as defined in this subclause.

For UEs not supporting dynamic power sharing the following

- for the MCG,
A-MPR_c = A-MPR_{E-UTRA}
- for the SCG,
A-MPR'_c = A-MPR_{NR}

with A-MPR_{E-UTRA} and A-MPR_{NR} as defined in this subclause.

For DC_(n)71AA with configured with network signaling values as per Table 6.2B.3.1.0-1 the allowed A-MPR is defined by

- for UE indicating support of dynamicPowerSharing in the *UE-MRDC-Capability* IE

$$A-MPR_{DC} = CEIL\{ M_{A,DC}(A), 0.5 \}$$

where A-MPR_{DC} is the total power reduction allowed (dB),

- for OFDM:

$$M_{A,DC} = 11.00 - 11.67 * A; \quad 0.00 < A \leq 0.30$$

$$8.10 - 2.00 * A; \quad 0.30 < A \leq 0.80$$

$$6.50; \quad 0.80 < A \leq 1.00$$

- for DFT-S-OFDM:

$$\begin{aligned} M_{A,DC} &= 11.00 - 13.33*A; & 0.00 < A \leq 0.30 \\ & 8.00 - 3.33*A; & 0.30 < A \leq 0.60 \\ & 6.00; & 0.60 < A \leq 1.00 \end{aligned}$$

where:

$$A = \frac{L_{CRB,E-UTRA} + L_{CRB,NR}}{N_{RB,E-UTRA} + N_{RB,NR}}$$

with $L_{CRB,E-UTRA}$ and $N_{RB,E-UTRA}$ the number of allocated PRB and transmission bandwidth for MCG, $L_{CRB,NR}$ and $N_{RB,NR}$ the number of allocated PRB and transmission bandwidth for SCG with SCS = 15 kHz.

- for UE not indicating support of dynamicPowerSharing

$$A\text{-MPR}_{E-UTRA} = \text{CEIL}\{M_{A,E-UTRA}, 0.5\}$$

$$A\text{-MPR}_{NR} = \text{CEIL}\{M_{A,NR}, 0.5\}$$

where A-MPR is the total power reduction allowed per CG with

$$M_{A,E-UTRA} = M_{A,DC}(A_{E-UTRA,wc}) - 1 - \Delta_{E-UTRA}$$

$$M_{A,NR} = M_{A,DC}(A_{NR,wc}) - 1 - \Delta_{NR}$$

$$A_{E-UTRA,wc} = \frac{L_{CRB,E-UTRA} + 1}{N_{RB,E-UTRA} + N_{RB,NR}}$$

$$A_{NR,wc} = \frac{1 + L_{CRB,NR}}{N_{RB,E-UTRA} + N_{RB,NR}}$$

$$\Delta_{E-UTRA} = 10 \log_{10} \frac{N_{RB,E-UTRA}}{N_{RB,E-UTRA} + N_{RB,NR}}$$

$$\Delta_{NR} = 10 \log_{10} \frac{N_{RB,NR}}{N_{RB,E-UTRA} + N_{RB,NR}}$$

Where $L_{CRB,NR}$ and $N_{RB,NR}$ the number of allocated PRB and transmission bandwidth for SCG with SCS = 15 kHz.

6.2B.3.1.3.2 A-MPR for NS_04

6.2B.3.1.3.2.0 General

When the UE is configured for B41/n41 intra-band contiguous EN-DC and it receives IE NS_04, the UE determines the total allowed maximum output power reduction as specified in this clause. The A-MPR for EN-DC defined in this clause is used instead of MPR defined in 6.2B.2.2, not additively, so EN-DC MPR = 0 when NS_04 is signaled. For UEs scheduled with single uplink transmission, AMPR in subclause 6.2.4 of [5] and 6.2.3 of [2] apply.

For UE supporting dynamic power sharing the following:

- for the MCG, A-MPR_c in accordance with 36.101 [5]
- for the SCG,

$$A\text{-MPR}'_c = A\text{-MPR}_{NR} = \text{MAX}(A\text{-MPR}_{single,NR}, A\text{-MPR}_{IM3})$$

- for the total configured transmission power,

$$A\text{-MPR}_{tot} = P_{PowerClass,EN-DC} - \min(P_{PowerClass,EN-DC}, 10 * \log_{10}(10^{((P_{PowerClass,E-UTRA} - A\text{-MPR}_{E-UTRA})/10)} + 10^{((P_{PowerClass,NR} - A\text{-MPR}_{NR})/10)})$$

where

$$A\text{-MPR}_{E\text{-UTRA}} = \text{MAX}(A\text{-MPR}_{\text{single},E\text{-UTRA}} + MPR_{\text{single},E\text{-UTRA}}, A\text{-MPR}_{IM3})$$

with

- $A\text{-MPR}_{\text{single}, E\text{-UTRA}}$ is the A-MPR defined for the E-UTRA transmission in TS 36.101 [5]
- $A\text{-MPR}_{\text{single}, NR}$ is the A-MPR defined for the NR transmission in TS 38.101-1 [2]
- $MPR_{\text{single},E\text{-UTRA}}$ is the MPR defined for the E-UTRA transmission in TS 36.101 [5]

For UEs not supporting dynamic power sharing the following

- for the MCG,

$$A\text{-MPR}_c = \text{MAX}(A\text{-MPR}_{\text{single},E\text{-UTRA}} + MPR_{\text{single},E\text{-UTRA}}, A\text{-MPR}_{IM3})$$

- for the SCG,

$$A\text{-MPR}'_c = \text{MAX}(A\text{-MPR}_{\text{single},NR}, A\text{-MPR}_{IM3})$$

where

- $A\text{-MPR}_{\text{single}, E\text{-UTRA}}$ is the A-MPR defined for the E-UTRA transmission in TS 36.101 [5]
- $A\text{-MPR}_{\text{single}, NR}$ is the A-MPR defined for the NR transmission in TS 38.101-1 [2]
- $MPR_{\text{single},E\text{-UTRA}}$ is the MPR defined for the E-UTRA transmission in TS 36.101 [5]

The UE determines the Channel Configuration Case and the value of $A\text{-MPR}_{IM3}$ as follows:

If $F_{IM3,\text{low_block,low}} < 2490.5$ MHz

Channel Configuration Case B. $A\text{-MPR}_{IM3}$ defined in clause 6.2B.3.1.3.2.2.

Else

Channel Configuration Case A. $A\text{-MPR}_{IM3}$ defined in clause 6.2B.3.1.3.2.1.

where

- $F_{IM3,\text{low_block,low}} = (2 * F_{\text{low_channel,low_edge}}) - F_{\text{high_channel,high_edge}}$
- $F_{\text{low_channel,low_edge}}$ is the lowermost frequency of lower transmission bandwidth configuration.
- $F_{\text{high_channel,high_edge}}$ is the uppermost frequency of upper transmission bandwidth configuration.

Where the transmission bandwidth configuration for NR is the maximum frequency span covering all the configured SCSSpecificCarrier for scenarios that carrier bandwidths with different SCS can be fully overlapped.

6.2B.3.1.3.2.1 $A\text{-MPR}_{IM3}$ for NS_04 to meet -13 dBm / 1MHz for 26dBm UE power

$A\text{-MPR}$ in this subclause is relative to 26 dBm for a power class 2 Cell Group. The same $A\text{-MPR}$ is used relative to 23 dBm for a power class 3 Cell Group. For the UE is configured with channel configurations Case A or Case C (defined in Clause 6.2B.3.2.3.1), the allowed maximum output power reduction for IM3s applied to transmission on the MCG and the SCG with non-contiguous resource allocation is defined as follows:

$$A\text{-MPR}_{IM3} = M_A$$

Where M_A is defined as follows

$$M_A = 15 ; 0 \leq B < 0.5$$

$$10 ; 0.5 \leq B < 1.0$$

$$8 ; 1.0 \leq B < 2.0$$

$$6 ; 2.0 \leq B$$

Where:

For UEs supporting dynamic power sharing,

$$B = (L_{CRB_alloc, E-UTRA} * 12 * SCS_{E-UTRA} + L_{CRB_alloc,NR} * 12 * SCS_{NR})/1,000,000$$

For UEs not supporting dynamic power sharing,

For E-UTRA

$$B = (L_{CRB_alloc, E-UTRA} * 12 * SCS_{E-UTRA} + 12 * SCS_{NR})/1,000,000$$

Where $SCS_{NR} = 15$ kHz is assumed in calculation of B.

For NR

$$B = (12 * SCS_{E-UTRA} + L_{CRB_alloc,NR} * 12 * SCS_{NR})/1,000,000$$

Where $SCS_{E-UTRA} = 15$ kHz is assumed in calculation of B

and M_A is reduced by 1 dB for $B < 2.0$.

6.2B.3.1.3.2.2 A-MPR for NS_04 to meet -25 dBm / 1MHz for 26 dBm UE power

A-MPR in this subclause is relative to 26 dBm for a power class 2 Cell Group. The same A-MPR is used relative to 23 dBm for a power class 3 Cell Group. For the UE is configured with channel configurations Case B or Case D (defined in clause 6.2B.3.2.1), the allowed maximum output power reduction for IM3s applied to transmission on the MCG and the SCG with non-contiguous resource allocation is defined as follows:

$$A-MPR_{IM3} = M_A$$

Where M_A is defined as follows

$$M_A = 15 ; 0 \leq B < 1.0$$

$$14 ; 1.0 \leq B < 2.0$$

$$13 ; 2.0 \leq B < 5.0$$

$$12 ; 5.0 \leq B$$

Where:

For UEs supporting dynamic power sharing,

$$B = (L_{CRB_alloc, E-UTRA} * 12 * SCS_{E-UTRA} + L_{CRB_alloc,NR} * 12 * SCS_{NR})/1,000,000$$

For UEs not supporting dynamic power sharing,

For E-UTRA

$$B = (L_{CRB_alloc,E-UTRA} * 12 * SCS_{E-UTRA} + 12 * SCS_{NR})/1,000,000$$

Where $SCS_{NR} = 15$ kHz is assumed in calculation of B.

For NR

$$B = (12 * SCS_{E-UTRA} + L_{CRB_alloc,NR} * 12 * SCS_{NR})/1,000,000$$

Where $SCS_{E-UTRA} = 15$ kHz is assumed in calculation of B

and M_A is reduced by 1 dB.

6.2B.3.1.4 Test description

6.2B.3.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on NR operating bands specified in clause 5.3B.1.2, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-1 [8] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2. All these configurations shall be tested with applicable test parameters for each EN-DC configuration specified in clause 5.3B.1.2 and are shown in table 6.2B.3.1.4.1-1 through 6.2B.3.1.4.1-2. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521-1 [10] Annex C.2 and in TS 38.521-1 [8] Annex C.2 for E-UTRA CG and NR CG respectively.

Table 6.2B.3.1.4.1-0: Void

Table 6.2B.3.1.4.1-1: Test configuration table (network signalled value "NS_35")

| Initial Conditions | | | | | | | |
|--|---------------------------|--|----------------------------|---------------------------|--------------------------|----------------|---|
| Test Environment as specified in TS 38.508-1 [6] clause 4.1 | | NC | | | | | |
| Test Frequencies as specified in TS 38.508-1 [6] clause 4.3.1 | | Low range, High range | | | | | |
| Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1 | | Lowest N _{RB_aggr} , Highest N _{RB_aggr} (Note 2) | | | | | |
| Test SCS for the NR cell as specified in TS 38.521-1 [8] Table 5.3.5-1 | | Lowest, Highest | | | | | |
| Test Parameters | | | | | | | |
| Test ID | Freq | Downlink Configuration | EN-DC Uplink Configuration | | | | |
| | | | E-UTRA Cell | NR Cell | | Common | |
| Modula | RB allocation (Note 5) | tion | Modulation | RB allocation (Note 1) | Power config (Note 8) | | |
| 1 | Default | N/A | 16QAM | Outer_Full | DFT-s-OFDM Pi/2 BPSK | Outer_Full | B |
| 2 (Note 3) | Default | | 16QAM | Outer_1RB_Left | DFT-s-OFDM Pi/2 BPSK | Edge_1RB_Right | B |
| 3 (Note 3) | Low | | 16QAM | Outer_1RB_Left | DFT-s-OFDM Pi/2 BPSK | N/A | A |
| 4 (Note 3) | High | | 16QAM | N/A | DFT-s-OFDM Pi/2 BPSK | Edge_1RB_Right | A |
| 5 (Note 4) | Default | | 16QAM | Outer_1RB_Right | DFT-s-OFDM Pi/2 BPSK | Edge_1RB_Left | B |
| 6 (Note 4) | Low | | 16QAM | N/A | DFT-s-OFDM Pi/2 BPSK | Edge_1RB_Left | A |
| 7 (Note 4) | High | | 16QAM | Outer_1RB_Right | DFT-s-OFDM Pi/2 BPSK | N/A | A |
| 8 | Default | | 16QAM | Outer_Full | DFT-s-OFDM QPSK | Outer_Full | B |
| 9 (Note 3) | Default | | 16QAM | Outer_1RB_Left | DFT-s-OFDM QPSK | Edge_1RB_Right | B |
| 10 (Note 3) | Low | | 16QAM | Outer_1RB_Left | DFT-s-OFDM QPSK | N/A | A |
| 11 (Note 3) | High | | 16QAM | N/A | DFT-s-OFDM QPSK | Edge_1RB_Right | A |
| 12 (Note 4) | Default | | 16QAM | Outer_1RB_Right | DFT-s-OFDM QPSK | Edge_1RB_Left | B |
| 13 (Note 4) | Low | | 16QAM | N/A | DFT-s-OFDM QPSK | Edge_1RB_Left | A |
| 14 (Note 4) | High | | 16QAM | Outer_1RB_Right | DFT-s-OFDM QPSK | N/A | A |
| 15 | Default | | 16QAM | Outer_Full | DFT-s-OFDM 16QAM | Outer_Full | B |
| 16 (Note 3) | Default | | 16QAM | Outer_1RB_Left | DFT-s-OFDM 16QAM | Edge_1RB_Right | B |
| 17 (Note 3) | Low | | 16QAM | Outer_1RB_Left | DFT-s-OFDM 16QAM | N/A | A |
| 18 (Note 3) | High | | 16QAM | N/A | DFT-s-OFDM 16QAM | Edge_1RB_Right | A |
| 19 (Note 4) | Default | | 16QAM | Outer_1RB_Right | DFT-s-OFDM 16QAM | Edge_1RB_Left | B |
| 20 (Note 4) | Low | | 16QAM | N/A | DFT-s-OFDM 16QAM | Edge_1RB_Left | A |
| 21 (Note 4) | High | | 16QAM | Outer_1RB_Right | DFT-s-OFDM 16QAM | N/A | A |
| 22 | Default | | 16QAM | Outer_Full | DFT-s-OFDM 64QAM | Outer_Full | B |
| 23 (Note 3) | Low | | 16QAM | Outer_1RB_Left | DFT-s-OFDM 64QAM | Edge_1RB_Right | B |
| 24 (Note 4) | High | | 16QAM | Outer_1RB_Right | DFT-s-OFDM 64QAM | Edge_1RB_Left | B |
| 25 | Default | | 16QAM | Outer_Full | DFT-s-OFDM 256QAM | Outer_Full | B |

| | | | | | | | |
|-------------|---------|--|-------|-----------------|----------------------|----------------|---|
| 26 (Note 3) | Low | | 16QAM | Outer_1RB_Left | DFT-s-OFDM 256QAM | Edge_1RB_Right | B |
| 27 (Note 4) | High | | 16QAM | Outer_1RB_Right | DFT-s-OFDM 256QAM | Edge_1RB_Left | B |
| 28 | Default | | 16QAM | Outer_Full | CP-OFDM QPSK | Outer_Full | B |
| 29 (Note 3) | Default | | 16QAM | Outer_1RB_Left | CP-OFDM QPSK | Edge_1RB_Right | B |
| 30 (Note 3) | Low | | 16QAM | Outer_1RB_Left | CP-OFDM QPSK | N/A | A |
| 31 (Note 3) | High | | 16QAM | N/A | CP-OFDM QPSK | Edge_1RB_Right | A |
| 32 (Note 4) | Default | | 16QAM | Outer_1RB_Right | CP-OFDM QPSK | Edge_1RB_Left | B |
| 33 (Note 4) | Low | | 16QAM | N/A | CP-OFDM QPSK | Edge_1RB_Left | A |
| 34 (Note 4) | High | | 16QAM | Outer_1RB_Right | CP-OFDM QPSK | N/A | A |
| 35 | Default | | 16QAM | Outer_Full | CP-OFDM 16QAM | Outer_Full | B |
| 36 (Note 3) | Default | | 16QAM | Outer_1RB_Left | CP-OFDM 16QAM | Edge_1RB_Right | B |
| 37 (Note 3) | Low | | 16QAM | Outer_1RB_Left | CP-OFDM 16QAM | N/A | A |
| 38 (Note 3) | High | | 16QAM | N/A | CP-OFDM 16QAM | Edge_1RB_Right | A |
| 39 (Note 4) | Default | | 16QAM | Outer_1RB_Right | CP-OFDM 16QAM | Edge_1RB_Left | B |
| 40 (Note 4) | Low | | 16QAM | N/A | CP-OFDM 16QAM | Edge_1RB_Left | A |
| 41 (Note 4) | High | | 16QAM | Outer_1RB_Right | CP-OFDM 16QAM | N/A | A |
| 42 | Default | | 16QAM | Outer_Full | CP-OFDM 64QAM | Outer_Full | B |
| 43 (Note 3) | Low | | 16QAM | Outer_1RB_Left | CP-OFDM 64QAM | Edge_1RB_Right | B |
| 44 (Note 4) | High | | 16QAM | Outer_1RB_Right | CP-OFDM 64QAM | Edge_1RB_Left | B |
| 45 | Default | | 16QAM | Outer_Full | CP-OFDM 256QAM | Outer_Full | B |
| 46 (Note 3) | Low | | 16QAM | Outer_1RB_Left | CP-OFDM 256QAM | Edge_1RB_Right | B |
| 47 (Note 4) | High | | 16QAM | Outer_1RB_Right | CP-OFDM 256QAM | Edge_1RB_Left | B |
| 48 (Note 4) | Default | | 16QAM | Edge_Full_Right | CP-OFDM 256QAM | Edge_Full_Left | B |

NOTE 1: The specific configuration of each RB allocation is defined in Table 6.1-1 in TS 38.521-1 [8].

NOTE 2: If the UE supports multiple CC combinations in the EN-DC configuration with the same N_{RB_agg} , select the combination to test as follows:

- Lowest ENBW: NR component with lowest N_{RB} is tested.
- Highest ENBW: NR component with highest N_{RB} is tested.

NOTE 3: Applicable when E-UTRA cell carrier frequency is lower than NR cell carrier.

NOTE 4: Applicable when NR cell carrier frequency is lower than E-UTRA cell carrier.

NOTE 5: Outer_Full defined as the transmission bandwidth configuration N_{RB} per channel bandwidth for the E-UTRA component as indicated in TS 36.521 [10] Table 5.4.2-1. Outer_1RB_Left defined as 1 RB allocated at the left edge of the E-UTRA component. Edge_Full_Right is defined as 2 RBs allocated at the right edge of the E-UTRA component. Outer_1RB_Right defined as 1 RB allocated at the right edge of the E-UTRA component.

NOTE 6: DFT-s-OFDM Pi/2 BPSK test applies only for UEs which supports Pi/2 BPSK in FR1.

NOTE 7: Test IDs with simultaneous E-UTRA and NR UL transmission only apply for UEs indicating dualPA-Architecture.

NOTE 8: Power config as specified in Table 6.2B.3.1.4.3-1-1 to 6.2B.3.1.4.3-2 (PC3) or Table 6.2B.3.1.4.3-3 to 6.2B.3.1.4.3-4 (PC2).

Table 6.2B.3.1.4.1-2: NR test configuration table for NS_04

| Initial Conditions | | | | | | | |
|--|------------------------|------------------------|---|-----------------------|----------------------|----------------|---|
| Test Environment as specified in TS 38.508-1 [6] clause 4.1 | | | NC | | | | |
| Test Frequencies as specified in TS 38.508-1 [6] clause 4.3.1 | | | Low range, High range (Note 7) | | | | |
| Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1 | | | Lowest N _{RB_aggr} , Highest N _{RB_aggr} (Note 2) | | | | |
| Test SCS for the NR cell as specified in TS 38.521-1 [8] Table 5.3.5-1 | | | Lowest, Highest | | | | |
| Test Parameters | | | | | | | |
| Test ID | Freq | Downlink Configuration | EN-DC Uplink Configuration | | | | |
| | | | E-UTRA Cell | NR Cell | | Common | |
| Modulation | RB allocation (Note 5) | Modulation | RB allocation (Note 1) | Power config (Note 8) | | | |
| 1 | Default | N/A | 16QAM | Outer_Full | DFT-s-OFDM Pi/2 BPSK | Outer_Full | B |
| 2 (Note 3) | Default | | 16QAM | Outer_1RB_Left | DFT-s-OFDM Pi/2 BPSK | Edge_1RB_Right | B |
| 3 (Note 3) | Low | | 16QAM | Outer_1RB_Left | DFT-s-OFDM Pi/2 BPSK | N/A | A |
| 4 (Note 3) | High | | 16QAM | N/A | DFT-s-OFDM Pi/2 BPSK | Edge_1RB_Right | A |
| 5 (Note 4) | Default | | 16QAM | Outer_1RB_Right | DFT-s-OFDM Pi/2 BPSK | Edge_1RB_Left | B |
| 6 (Note 4) | Low | | 16QAM | N/A | DFT-s-OFDM Pi/2 BPSK | Edge_1RB_Left | A |
| 7 (Note 4) | High | | 16QAM | Outer_1RB_Right | DFT-s-OFDM Pi/2 BPSK | N/A | A |
| 8 | Default | | 16QAM | Outer_Full | DFT-s-OFDM QPSK | Outer_Full | B |
| 9 (Note 3) | Default | | 16QAM | Outer_1RB_Left | DFT-s-OFDM QPSK | Edge_1RB_Right | B |
| 10 (Note 3) | Low | | 16QAM | Outer_1RB_Left | DFT-s-OFDM QPSK | N/A | A |
| 11 (Note 3) | High | | 16QAM | N/A | DFT-s-OFDM QPSK | Edge_1RB_Right | A |
| 12 (Note 4) | Default | | 16QAM | Outer_1RB_Right | DFT-s-OFDM QPSK | Edge_1RB_Left | B |
| 13 (Note 4) | Low | | 16QAM | N/A | DFT-s-OFDM QPSK | Edge_1RB_Left | A |
| 14 (Note 4) | High | | 16QAM | Outer_1RB_Right | DFT-s-OFDM QPSK | N/A | A |
| 15 | Default | | 16QAM | Outer_Full | DFT-s-OFDM 16QAM | Outer_Full | B |
| 16 (Note 3) | Default | | 16QAM | Outer_1RB_Left | DFT-s-OFDM 16QAM | Edge_1RB_Right | B |
| 17 (Note 3) | Low | | 16QAM | Outer_1RB_Left | DFT-s-OFDM 16QAM | N/A | A |
| 18 (Note 3) | High | | 16QAM | N/A | DFT-s-OFDM 16QAM | Edge_1RB_Right | A |
| 19 (Note 4) | Default | | 16QAM | Outer_1RB_Right | DFT-s-OFDM 16QAM | Edge_1RB_Left | B |
| 20 (Note 4) | Low | | 16QAM | N/A | DFT-s-OFDM 16QAM | Edge_1RB_Left | A |
| 21 (Note 4) | High | | 16QAM | Outer_1RB_Right | DFT-s-OFDM 16QAM | N/A | A |
| 22 | Default | | 16QAM | Outer_Full | DFT-s-OFDM 64QAM | Outer_Full | B |
| 23 (Note 3) | Low | | 16QAM | Outer_1RB_Left | DFT-s-OFDM 64QAM | Edge_1RB_Right | B |
| 24 (Note 4) | High | | 16QAM | Outer_1RB_Right | DFT-s-OFDM 64QAM | Edge_1RB_Left | B |
| 25 | Default | | 16QAM | Outer_Full | DFT-s-OFDM 256QAM | Outer_Full | B |

| | | | | | | | | |
|---|---------|--|-------|-----------------|----------------------|----------------|---|--|
| 26 (Note 3) | Low | | 16QAM | Outer_1RB_Left | DFT-s-OFDM 256QAM | Edge_1RB_Right | B | |
| 27 (Note 4) | High | | 16QAM | Outer_1RB_Right | DFT-s-OFDM 256QAM | Edge_1RB_Left | B | |
| 28 | Default | | 16QAM | Outer_Full | CP-OFDM QPSK | Outer_Full | B | |
| 29 (Note 3) | Default | | 16QAM | Outer_1RB_Left | CP-OFDM QPSK | Edge_1RB_Right | B | |
| 30 (Note 3) | Low | | 16QAM | Outer_1RB_Left | CP-OFDM QPSK | N/A | A | |
| 31 (Note 3) | High | | 16QAM | N/A | CP-OFDM QPSK | Edge_1RB_Right | A | |
| 32 (Note 4) | Default | | 16QAM | Outer_1RB_Right | CP-OFDM QPSK | Edge_1RB_Left | B | |
| 33 (Note 4) | Low | | 16QAM | N/A | CP-OFDM QPSK | Edge_1RB_Left | A | |
| 34 (Note 4) | High | | 16QAM | Outer_1RB_Right | CP-OFDM QPSK | N/A | A | |
| 35 | Default | | 16QAM | Outer_Full | CP-OFDM 16QAM | Outer_Full | B | |
| 36 (Note 3) | Default | | 16QAM | Outer_1RB_Left | CP-OFDM 16QAM | Edge_1RB_Right | B | |
| 37 (Note 3) | Low | | 16QAM | Outer_1RB_Left | CP-OFDM 16QAM | N/A | A | |
| 38 (Note 3) | High | | 16QAM | N/A | CP-OFDM 16QAM | Edge_1RB_Right | A | |
| 39 (Note 4) | Default | | 16QAM | Outer_1RB_Right | CP-OFDM 16QAM | Edge_1RB_Left | B | |
| 40 (Note 4) | Low | | 16QAM | N/A | CP-OFDM 16QAM | Edge_1RB_Left | A | |
| 41 (Note 4) | High | | 16QAM | Outer_1RB_Right | CP-OFDM 16QAM | N/A | A | |
| 42 | Default | | 16QAM | Outer_Full | CP-OFDM 64QAM | Outer_Full | B | |
| 43 (Note 3) | Low | | 16QAM | Outer_1RB_Left | CP-OFDM 64QAM | Edge_1RB_Right | B | |
| 44 (Note 4) | High | | 16QAM | Outer_1RB_Right | CP-OFDM 64QAM | Edge_1RB_Left | B | |
| 45 | Default | | 16QAM | Outer_Full | CP-OFDM 256QAM | Outer_Full | B | |
| 46 (Note 3) | Low | | 16QAM | Outer_1RB_Left | CP-OFDM 256QAM | Edge_1RB_Right | B | |
| 47 (Note 4) | High | | 16QAM | Outer_1RB_Right | CP-OFDM 256QAM | Edge_1RB_Left | B | |
| 48 (Note 4) | Default | | 16QAM | Edge_Full_Right | CP-OFDM 256QAM | Edge_Full_Left | B | |
| NOTE 1: The specific configuration of each RB allocation is defined in Table 6.1-1 in TS 38.521-1 [8]. | | | | | | | | |
| NOTE 2: If the UE supports multiple CC combinations in the EN-DC configuration with the same N_{RB_agg} , select the combination to test as follows: | | | | | | | | |
| - Lowest ENBW: NR component with lowest N_{RB} is tested. | | | | | | | | |
| - Highest ENBW: NR component with highest N_{RB} is tested. | | | | | | | | |
| NOTE 3: Applicable when E-UTRA cell carrier frequency is lower than NR cell carrier. | | | | | | | | |
| NOTE 4: Applicable when NR cell carrier frequency is lower than E-UTRA cell carrier. | | | | | | | | |
| NOTE 5: Outer_Full defined as the transmission bandwidth configuration N_{RB} per channel bandwidth for the E-UTRA component as indicated in TS 36.521 [10] Table 5.4.2-1. Outer_1RB_Left defined as 1 RB allocated at the left edge of the E-UTRA component. Edge_Full_Right is defined as 2 RBs allocated at the right edge of the E-UTRA component. Outer_1RB_Right defined as 1 RB allocated at the right edge of the E-UTRA component. | | | | | | | | |
| NOTE 6: DFT-s-OFDM Pi/2 BPSK test applies only for UEs which supports Pi/2 BPSK in FR1. | | | | | | | | |
| NOTE 7: Additional IM3 test frequencies may apply. | | | | | | | | |
| NOTE 8: Power config as specified in Table 6.2B.3.1.4.3-1 to 6.2B.3.1.4.3-2 (PC3) or Table 6.2B.3.1.4.3-3 to 6.2B.3.1.4.3-4 (PC2). | | | | | | | | |
| NOTE 9: Test IDs with simultaneous E-UTRA and NR UL transmission only apply for UEs indicating dualPA-Architecture. | | | | | | | | |

Table 6.2B.3.1.4.1-3: Additional IM3 Test Frequencies for NS_04 intra-band contiguous EN-DC

| Additional Initial Condition | |
|-------------------------------------|--|
| Additional IM3 Test Frequencies | <p>if SCS 15 kHz, 15 kHz NR raster, and NR ChBw 40 MHz or 50 MHz then IM3 test frequencies as specified in Table 6.2B.3.1.4.1-4.</p> <p>if SCS 30 kHz, 30 kHz NR raster, and NR ChBw 40 MHz, 50 MHz or 60 MHz then IM3 test frequencies as specified in Table 6.2B.3.1.4.1-5.</p> <p>if SCS 60 kHz, 15 kHz NR raster, and NR ChBw 40 MHz, 50 MHz or 60 MHz then IM3 test frequencies as specified in Table 6.2B.3.1.4.1-6.</p> |

Table 6.2B.3.1.4.1-4: EN-DC combination DC_(n)41AA, intra-band contiguous, SCS 15 kHz, 15 kHz NR raster, IM3 test frequencies

| EN-DC channel bandwidth combination | CC | Bandwidth [MHz] | carrier Bandwidth [PRBs] | Range | | Carrier centre [MHz] Note 2 | Carrier centre [ARFCN] | point A [MHz] | absolute FrequencyPoint A [ARFCN] | offset ToCarrier [Carrier PRBs] | SS block SCS [kHz] | GSCN | absoluteFrequencySSB [ARFCN] |
|-------------------------------------|------------|-----------------|--------------------------|-------------------|-----|-----------------------------|------------------------|---------------|-----------------------------------|----------------------------------|--------------------|------|------------------------------|
| E-UTRA: 20MHz + NR: 40MHz | E-UTRA CC1 | 20 | 100 | Downlink & Uplink | IM3 | 2600.400 | 40694 | - | - | - | - | - | - |
| | NR CC1 | 40 | 216 | Downlink & Uplink | IM3 | 2570.400 | 514080 | 2550.96 | 510192 | 0 | 15 | 6384 | 514080 |
| E-UTRA: 20MHz + NR: 50MHz | E-UTRA CC1 | 20 | 100 | Downlink & Uplink | IM3 | 2620.400 | 40894 | - | - | - | - | - | - |
| | NR CC1 | 50 | 270 | Downlink & Uplink | IM3 | 2585.400 | 517080 | 2561.1 | 512220 | 0 | 15 | 6408 | 517080 |

Table 6.2B.3.1.4.1-5: EN-DC combination DC_(n)41AA, intra-band contiguous, SCS 30 kHz, 30 kHz NR raster, IM3 test frequencies

| EN-DC channel bandwidth combination | CC | Bandwidth [MHz] | carrier Bandwidth [PRBs] | Range | | Carrier centre [MHz] Note 2 | Carrier centre [ARFCN] | point A [MHz] | absolute FrequencyPoint A [ARFCN] | offset ToCarrier [Carrier PRBs] | SS block SCS [kHz] | GSCN | absoluteFrequencySSB [ARFCN] |
|-------------------------------------|------------|-----------------|--------------------------|-------------------|-----|-----------------------------|------------------------|---------------|-----------------------------------|----------------------------------|--------------------|------|------------------------------|
| E-UTRA: 20MHz + NR: 40MHz | E-UTRA CC1 | 20 | 100 | Downlink & Uplink | IM3 | 2600.400 | 40694 | - | - | - | - | - | - |
| | NR CC1 | 40 | 216 | Downlink & Uplink | IM3 | 2570.400 | 514080 | 2550.96 | 510192 | 0 | 15 | 6384 | 514080 |
| E-UTRA: 20MHz + NR: 50MHz | E-UTRA CC1 | 20 | 100 | Downlink & Uplink | IM3 | 2620.400 | 40894 | - | - | - | - | - | - |
| | NR CC1 | 50 | 270 | Downlink & Uplink | IM3 | 2585.400 | 517080 | 2561.1 | 512220 | 0 | 15 | 6408 | 517080 |
| E-UTRA: 20MHz + NR: 60MHz | E-UTRA CC1 | 20 | 100 | Downlink & Uplink | IM3 | 2640.500 | 41095 | - | - | - | - | - | - |
| | NR CC1 | 60 | 162 | Downlink & Uplink | IM3 | 2600.500 | 520100 | 2571.34 | 514268 | 0 | 30 | 6438 | 520100 |

Table 6.2B.3.1.4.1-6: EN-DC combination DC_(n)41AA, intra-band contiguous, SCS 60 kHz, 15 kHz NR raster, IM3 test frequencies

| EN-DC channel bandwidth combination | CC | Bandwidth [MHz] | carrier Bandwidth [PRBs] | Range | Carrier centre [MHz] Note 2 | Carrier centre [ARFCN] | point A [MHz] | absolute FrequencyPointA [ARFCN] | offset ToCarrier [Carrier PRBs] | SS block SCS [kHz] | GSCN | absoluteFrequencySSB [ARFCN] |
|-------------------------------------|------------|-----------------|--------------------------|-------------------|-----------------------------|------------------------|---------------|----------------------------------|----------------------------------|--------------------|------|------------------------------|
| E-UTRA: 20MHz + NR: 40MHz | E-UTRA CC1 | 20 | 100 | Downlink & Uplink | IM3 | 2600.400 | 40694 | - | - | - | - | - |
| | NR CC1 | 40 | 51 | Downlink & Uplink | IM3 | 2570.400 | 514080 | 2552.04 | 510408 | 0 | 15 | 6387 514080 |
| E-UTRA: 20MHz + NR: 50MHz | E-UTRA CC1 | 20 | 100 | Downlink & Uplink | IM3 | 2620.400 | 40894 | - | - | - | - | - |
| | NR CC1 | 50 | 65 | Downlink & Uplink | IM3 | 2585.400 | 517080 | 2562 | 512400 | 0 | 15 | 6411 517080 |
| E-UTRA: 20MHz + NR: 60MHz | E-UTRA CC1 | 20 | 100 | Downlink & Uplink | IM3 | 2640.500 | 41095 | - | - | - | - | - |
| | NR CC1 | 60 | 79 | Downlink & Uplink | IM3 | 2600.500 | 520100 | 2572.06 | 514412 | 0 | 15 | 6435 520100 |

Editor's note: The following lines belong at the end of clause 6.2B.3.1.4.1. As new tables are added to this clause, these lines should always follow the tables.

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1.

1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [6] Annex A, Figure A.3.1.1 for TE diagram and clause A.3.2.1 for UE diagram.
2. The parameter settings for E-UTRA the cell are set up according to TS 36.508 [11] clause 4.4.3, and the parameter settings for the NR cell are set up according to TS 38.508-1 [6] clause 4.4.3.
3. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C.0 and TS 38.521-1 [8] Annex C.0 for E-UTRA CG and NR CG respectively, and uplink signals according to TS 36.521-1 [10] Annex H and TS 38.521-1 [8] Annex G for E-UTRA CG and NR CG respectively.
4. NR downlink signals are initially set up according to Annex C.0, C.1, and C.2 and uplink signals according to Annex G.0, G.1, G.2, and G.3.0 of TS 38.521-1 [8].
5. The UL Reference Measurement channels are set according to TS 36.521-1 [10] Annex A.2 and TS 38.521-1 [8] Annex A.2 for E-UTRA CG and NR CG link respectively.
6. Propagation conditions are set according to TS 36.521-1 [10] Annex B.0 and TS 38.521-1 [8] Annex B.0 for E-UTRA CG and NR CG respectively.
7. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 6.2B.3.1.4.3.
8. For the case of testing overlapping E-UTRA and NR UL transmission scenario when both bands are TDD, ensure E-UTRA UL transmission overlaps with NR UL transmission in time by giving SCG a delay of 3 E-UTRA subframes, or by giving MCG a delay of 2 subframes.

6.2B.3.1.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format 0_1 for C_RNTI to schedule the UL RMC according to table 6.2B.3.1.4.1-1 or 6.2B.3.1.4.1-2 on both EN-DC component carriers. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
2. Send continuously uplink power control "up" commands to the UE for NR and E-UTRA carrier until the UE transmits at its P_{UMAX} level; allow at least 200 ms starting from the first TPC command in this step for the UE to reach P_{UMAX} level.
3. Measure the mean power over all component carriers for the EN-DC configuration, which shall meet the requirements described in table 6.2B.3.1.5.1-1 through to 6.2B.3.1.5.2-6. The period of the measurement shall be at least the continuous duration of one active sub-frame (1ms). For TDD, only slots consisting of only UL symbols are under test.

NOTE 1: When switching to DFT-s-OFDM waveform, as specified in the test configuration table 6.2B.3.1.4.1-1 or 6.2B.3.1.4.1-2, send an NR RRCReconfiguration message according to TS 38.508-1 [6] clause 4.6.3 Table 4.6.3-118 PUSCH-Config with TRANSFORM_PRECODER_ENABLED condition.

6.2B.3.1.4.3 Message contents

Message contents are according to TS 38.508-1 [6] clause 4.6.1, with the following exceptions.

Table 6.2B.3.1.4.3-1: RRConnectionReconfiguration: nr-Config-r15 for PC3

| Derivation Path: TS 36.508 [11], Table 4.6.1-8 | | | |
|--|--------------|-------------------------|-----------|
| Information Element | Value/remark | Comment | Condition |
| p-MaxEUTRA-r15 | 23 | Power config A (NOTE 1) | |
| | 20 | Power config B (NOTE 2) | |
| NOTE 1: Applies when E-UTRA UL transmission not overlapping with NR UL transmission in time. | | | |
| NOTE 2: Applies when E-UTRA UL transmission overlapping with NR UL transmission in time. | | | |

Table 6.2B.3.1.4.3-2: PhysicalCellGroupConfig for PC3

| Derivation Path: TS 38.508-1 [6], Table 4.6.3-106 | | | |
|--|--------------|-------------------------|-----------|
| Information Element | Value/remark | Comment | Condition |
| p-NR-FR1 | 23 | Power config A (NOTE 1) | |
| | 20 | Power config B (NOTE 2) | |
| NOTE 1: Applies when E-UTRA UL transmission not overlapping with NR UL transmission in time. | | | |
| NOTE 2: Applies when E-UTRA UL transmission overlapping with NR UL transmission in time. | | | |

Table 6.2B.3.1.4.3-3: RRConnectionReconfiguration: nr-Config-r15 for PC2

| Derivation Path: TS 36.508 [11], Table 4.6.1-8 | | | |
|--|--------------|-------------------------|-----------|
| Information Element | Value/remark | Comment | Condition |
| p-MaxEUTRA-r15 | 26 | Power config A (NOTE 1) | |
| | 23 | Power config B (NOTE 2) | |
| NOTE 1: Applies when E-UTRA UL transmission not overlapping with NR UL transmission in time. | | | |
| NOTE 2: Applies when E-UTRA UL transmission overlapping with NR UL transmission in time. | | | |

Table 6.2B.3.1.4.3-4: PhysicalCellGroupConfig for PC2

| Derivation Path: TS 38.508-1 [6], Table 4.6.3-106 | | | |
|--|--------------|-------------------------|-----------|
| Information Element | Value/remark | Comment | Condition |
| p-NR-FR1 | 26 | Power config A (NOTE 1) | |
| | 23 | Power config B (NOTE 2) | |
| NOTE 1: Applies when E-UTRA UL transmission not overlapping with NR UL transmission in time. | | | |
| NOTE 2: Applies when E-UTRA UL transmission overlapping with NR UL transmission in time. | | | |

6.2B.3.1.4.3.1 Message contents exceptions (network signalled value "NS_04")

Message contents are according to TS 38.508-1 [6] clause 4.6.1 with the following exceptions for NS_04:

Table 6.2B.3.1.4.3.1-1: AdditionalSpectrumEmission for MCG and "NS_04"

| Derivation Path: 36.508 [11] clause 4.6.3, Table 4.4.3.3-1 | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| AdditionalSpectrumEmission | 1 (NS_04) | | |

Table 6.2B.3.1.4.3.1-2: AdditionalSpectrumEmission for SCG and "NS_04"

| Derivation Path: TS 38.508-1 [6] clause 4.6.3, Table 4.6.3-1 | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| AdditionalSpectrumEmission | 1 (NS_04) | | |

6.2B.3.1.4.3.2 Message contents exceptions (network signalled value "NS_35")

Message contents are according to TS 38.508-1 [6] clause 4.6.1 with the following exceptions for NS_35:

Table 6.2B.3.1.4.3.2-1: AdditionalSpectrumEmission for MCG and "NS_35"

| Derivation Path: 36.508 [11] clause 4.6.3, Table 4.4.3.3-1 | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| AdditionalSpectrumEmission | 1 (NS_35) | | |

Table 6.2B.3.1.4.3.2-2: AdditionalSpectrumEmission for SCG "NS_35"

| Derivation Path: TS 38.508-1 [5] clause 4.6.3, Table 4.6.3-1 | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| AdditionalSpectrumEmission | 1 (NS_35) | | |

6.2B.3.1.5 Test requirement

Table: 6.2B.3.1.5-1: Test Tolerance for UE maximum output power (LTE, NR TX separately)

| Uplink TX | | $f \leq 3.0\text{GHz}$ | $3.0\text{GHz} < f \leq 4.2\text{GHz}$ | $4.2\text{GHz} < f \leq 6\text{GHz}$ |
|-----------|---|------------------------|--|--------------------------------------|
| LTE | $\text{BW} \leq 20\text{MHz}$ | 0.7 | 1.0 | 1.3 |
| NR | $\text{BW} \leq 40\text{MHz}$ | 0.7 dB | 1.0 dB | 1.0 |
| | $40\text{MHz} < \text{BW} \leq 100\text{MHz}$ | 1.0 dB | 1.0 dB | 1.0 |

6.2B.3.1.5.1 Test requirement for network signalled value "NS_35"

The maximum output power, derived in step 3 shall be within the range prescribed by the nominal maximum output power and tolerance in table 6.2B.3.1.5.1-1. The allowed A-MPR values specified in table 6.2B.3.1.3-1 are in addition to the allowed MPR requirements specified in clause 6.2B.1.1.3. For the UE maximum output power modified by MPR and/or A-MPR, the power limits specified in table 6.2B.1.1.3-1 apply.

Table 6.2B.3.1.5.1-1: UE Power Class test requirements for network signalled value "NS_35"for UEs not supporting dynamic power sharing

| Test ID | Test freq. range | E-UTRA BW | NR BW | Modulation | P _{PowerClass} (dBm) | ΔP _{PowerClass} (dB) | A-MPR _c (dB) | ΔTC,c (dB) Note 7 | P _{CMAX,c} (dBm) | T(P _{CMAX,L,f,c}) (dB) | T _{L,c} (dB) | Upper limit | Lower limit |
|--|------------------|-----------|-------|------------|-------------------------------|-------------------------------|-------------------------|-------------------|---------------------------|----------------------------------|-----------------------|-------------|-------------|
| 1, 8, 15, 22, 25 | Low | 5 | 5 | E-UTRA/NR | 23 | 0 | 6.0 | 0 | 17.0 | 5 | +2/-3 | 25+TT | 12-TT |
| 1, 8, 15, 22, 25 | Low | 5 | 15 | E-UTRA/NR | 23 | 0 | 6.0 | 0 | 17.0 | 5 | +2/-3 | 25+TT | 12-TT |
| 1, 8, 15, 22, 25 | High | 5 | 5 | E-UTRA/NR | 23 | 0 | 6.0 | 0 | 17.0 | 5 | +2/-3 | 25+TT | 12-TT |
| 1, 8, 15, 22, 25 | High | 15 | 5 | E-UTRA/NR | 23 | 0 | 6.0 | 0 | 17.0 | 5 | +2/-3 | 25+TT | 12-TT |
| 2, 5, 9, 12, 16, 19, 23, 24, 2, 26, 27 | Low | 5 | 5 | E-UTRA/NR | 23 | 0 | 10.5 | 0 | 12.5 | 6 | +2/-3 | 25+TT | 6.5-TT |
| 2, 5, 9, 12, 16, 19, 23, 24, 2, 26, 27 | Low | 5 | 15 | E-UTRA/NR | 23 | 0 | 11.0 | 0 | 12.0 | 6 | +2/-3 | 25+TT | 6-TT |
| 2, 5, 9, 12, 16, 19, 23, 24, 2, 26, 27 | High | 5 | 5 | E-UTRA/NR | 23 | 0 | 10.5 | 0 | 12.5 | 6 | +2/-3 | 25+TT | 6.5-TT |
| 2, 5, 9, 12, 16, 19, 23, 24, 2, 26, 27 | High | 15 | 5 | E-UTRA/NR | 23 | 0 | 11.0 | 0 | 12.0 | 6 | +2/-3 | 25+TT | 6-TT |
| 3, 10, 17 | Low | 5 | 5 | E-UTRA/NR | 23 | 0 | 12.5 | 0 | 10.5 | 6 | +2/-3 | 25+TT | 4.5-TT |
| 3, 14, 17 | Low | 5 | 15 | E-UTRA/NR | 23 | 0 | 16.0 | 0 | 7.0 | 7 | +2/-3 | 25+TT | 0-TT |
| 4, 11, 18 | High | 5 | 5 | E-UTRA/NR | 23 | 0 | 12.5 | 0 | 10.5 | 12.5 | +2/-3 | 25+TT | 4.5-TT |
| 4, 11, 18 | High | 15 | 5 | E-UTRA/NR | 23 | 0 | 16.0 | 0 | 7.0 | 16.0 | +2/-3 | 25+TT | 0-TT |
| 6, 13, 20 | Low | 5 | 5 | E-UTRA/NR | 23 | 0 | 11.0 | 0 | 12.0 | 6 | +2/-3 | 25+TT | 6-TT |
| 6, 13, 20 | Low | 5 | 15 | E-UTRA/NR | 23 | 0 | 11.0 | 0 | 12.0 | 6 | +2/-3 | 25+TT | 6-TT |
| 7, 14, 21 | High | 5 | 5 | E-UTRA/NR | 23 | 0 | 11.0 | 0 | 12.0 | 6 | +2/-3 | 25+TT | 6-TT |
| 7, 14, 21 | High | 15 | 5 | E-UTRA/NR | 23 | 0 | 11.0 | 0 | 12.0 | 6 | +2/-3 | 25+TT | 6-TT |
| 28, 35, 42, 45 | Low | 5 | 5 | E-UTRA/NR | 23 | 0 | 6.5 | 0 | 16.5 | 5 | +2/-3 | 25+TT | 11.5-TT |
| 28, 35, 42, 45 | Low | 5 | 15 | E-UTRA/NR | 23 | 0 | 6.5 | 0 | 16.5 | 5 | +2/-3 | 25+TT | 11.5-TT |
| 28, 35, 42, 45 | High | 5 | 5 | E-UTRA/NR | 23 | 0 | 6.5 | 0 | 16.5 | 5 | +2/-3 | 25+TT | 11.5-TT |
| 28, 35, 42, 45 | High | 15 | 5 | E-UTRA/NR | 23 | 0 | 6.5 | 0 | 16.5 | 5 | +2/-3 | 25+TT | 11.5-TT |
| 29, 35, 42, 45 | Low | 5 | 5 | E-UTRA/NR | 23 | 0 | 11.0 | 0 | 12.0 | 6 | +2/-3 | 25+TT | 6.5-TT |
| 29, 35, 42, 45 | Low | 5 | 15 | E-UTRA/NR | 23 | 0 | 11.0 | 0 | 12.0 | 6 | +2/-3 | 25+TT | 6-TT |
| 29, 35, 42, 45 | High | 5 | 5 | E-UTRA/NR | 23 | 0 | 11.0 | 0 | 12.0 | 6 | +2/-3 | 25+TT | 6.5-TT |
| 29, 35, 42, 45 | High | 15 | 5 | E-UTRA/NR | 23 | 0 | 11.0 | 0 | 12.0 | 6 | +2/-3 | 25+TT | 6-TT |
| 30, 34, 37, 41 | Low | 5 | 5 | E-UTRA/NR | 23 | 0 | 11.0 | 0 | 12.0 | 6 | +2/-3 | 25+TT | 6-TT |
| 30, 34, 37, 41 | Low | 5 | 15 | E-UTRA/NR | 23 | 0 | 11.0 | 0 | 12.0 | 6 | +2/-3 | 25+TT | 6-TT |
| 31, 33, 38, 40 | High | 5 | 5 | E-UTRA/NR | 23 | 0 | 11.0 | 0 | 12.0 | 6 | +2/-3 | 25+TT | 6-TT |
| 31, 33, 38, 40 | High | 15 | 5 | E-UTRA/NR | 23 | 0 | 11.0 | 0 | 12.0 | 6 | +2/-3 | 25+TT | 6-TT |

Table 6.2B.3.1.5.1-1A: UE Power Class test requirements for network signalled value "NS_35" for UEs supporting dynamic power sharing

| Test ID | Test freq. range | E-UTRA BW | NR BW | Modulation | $P_{PowerClass}$ (dBm) | $\Delta P_{PowerClass}$ (dB) | $A\text{-}MPR}_c$ (dB) | $\Delta TC,c$ (dB) Note 7 | $P_{CMA}_{x,c}$ (dBm) | $T(P_{CMAX\text{-}L,f,c})$ (dB) | $T_{L,c}$ (dB) | Upper limit | Lower limit |
|---------|------------------|-----------|-------|------------|------------------------|------------------------------|------------------------|------------------------------|-----------------------|---------------------------------|----------------|-------------|-------------|
|---------|------------------|-----------|-------|------------|------------------------|------------------------------|------------------------|------------------------------|-----------------------|---------------------------------|----------------|-------------|-------------|

| | | | | | | | | | | | | | |
|---|------|----|----|---------|----|---|------|---|------|---|-------|-------|---------|
| 1, 8, 15, 22, 25 | Low | 5 | 5 | E-UTRA | 23 | 0 | 8.5 | 0 | 14.5 | 5 | +2/-3 | 25+TT | 9.5-TT |
| 1, 8, 15, 22, 25 | Low | 5 | 5 | NR | 23 | 0 | 8.5 | 0 | 14.5 | 5 | +2/-3 | 25+TT | 9.5-TT |
| 1, 8, 15, 22, 25 | Low | 5 | 15 | E-UTRA | 23 | 0 | 13.0 | 0 | 10.0 | 6 | +2/-3 | 25+TT | 4-TT |
| 1, 8, 15, 22, 25 | Low | 5 | 15 | NR | 23 | 0 | 6.5 | 0 | 16.5 | 5 | +2/-3 | 25+TT | 11.5-TT |
| 1, 8, 15, 22, 25 | High | 5 | 5 | E-UTRA | 23 | 0 | 8.5 | 0 | 14.5 | 5 | +2/-3 | 25+TT | 9.5-TT |
| 1, 8, 15, 22, 25 | High | 5 | 5 | NR | 23 | 0 | 8.5 | 0 | 14.5 | 5 | +2/-3 | 25+TT | 9.5-TT |
| 1, 8, 15, 22, 25 | High | 15 | 5 | E-UTRA | 23 | 0 | 6.5 | 0 | 16.5 | 5 | +2/-3 | 25+TT | 11.5-TT |
| 1, 8, 15, 22, 25 | High | 15 | 5 | NR | 23 | 0 | 13.0 | 0 | 10.0 | 6 | +2/-3 | 25+TT | 4-TT |
| 2, 5, 9, 12, 16, 19, 23, 24, 2, 26, 27 | Low | 5 | 5 | E-UTRA | 23 | 0 | 13.0 | 0 | 10.0 | 6 | +2/-3 | 25+TT | 4-TT |
| 2, 5, 9, 12, 16, 19, 23, 24, 2, 26, 27 | Low | 5 | 5 | NR | 23 | 0 | 13.0 | 0 | 10.0 | 6 | +2/-3 | 25+TT | 4-TT |
| 2, 5, 9, 12, 16, 19, 23, 24, 2, 26, 27 | Low | 5 | 15 | E-UTRA | 23 | 0 | 16.0 | 0 | 7.0 | 7 | +2/-3 | 25+TT | 0-TT |
| 2, 5, 9, 12, 16, 19, 23, 24, 2, 26, 27 | Low | 5 | 15 | NR | 23 | 0 | 11.0 | 0 | 12.0 | 6 | +2/-3 | 25+TT | 6-TT |
| 2, 5, 9, 12, 16, 19, 23, 24, 2, 26, 27 | High | 5 | 5 | E-UTRA | 23 | 0 | 13.0 | 0 | 10.0 | 6 | +2/-3 | 25+TT | 4-TT |
| 2, 5, 9, 12, 16, 19, 23, 24, 2, 26, 27 | High | 5 | 5 | NR | 23 | 0 | 13.0 | 0 | 10.0 | 6 | +2/-3 | 25+TT | 4-TT |
| 2, 5, 9, 12, 16, 19, 23, 24, 2, 26, 27 | High | 15 | 5 | E-UTRA | 23 | 0 | 11.5 | 0 | 11.5 | 6 | +2/-3 | 25+TT | 5.5-TT |
| 2, 5, 9, 12, 16, 19, 23, 24, 2, 26, 27 | High | 15 | 5 | NR | 23 | 0 | 16.0 | 0 | 7.0 | 7 | +2/-3 | 25+TT | 0-TT |
| 3, 10, 17 | Low | 5 | 5 | E-UTRA/ | 23 | 0 | 12.5 | 0 | 10.5 | 6 | +2/-3 | 25+TT | 4.5-TT |
| 3, 10, 17 | Low | 5 | 15 | E-UTRA | 23 | 0 | 16.0 | 0 | 7.0 | 7 | +2/-3 | 25+TT | 0-TT |
| 4, 11, 18 | High | 5 | 5 | NR | 23 | 0 | 13.0 | 0 | 10.0 | 6 | +2/-3 | 25+TT | 4-TT |
| 4, 11, 18 | High | 15 | 5 | NR | 23 | 0 | 16.0 | 0 | 7.0 | 7 | +2/-3 | 25+TT | 0-TT |
| 6, 17, 20 | Low | 5 | 5 | E-UTRA/ | 23 | 0 | 13.0 | 0 | 10.0 | 6 | +2/-3 | 25+TT | 4-TT |
| 6, 17, 20 | Low | 5 | 15 | E-UTRA | 23 | 0 | 16.5 | 0 | 6.5 | 7 | +2/-3 | 25+TT | -0.5-TT |
| 7, 14, 21 | High | 5 | 5 | NR | 23 | 0 | 13.0 | 0 | 10.0 | 6 | +2/-3 | 25+TT | 4-TT |
| 7, 14, 21 | High | 15 | 5 | NR | 23 | 0 | 16.0 | 0 | 7.0 | 7 | +2/-3 | 25+TT | 0-TT |
| 28, 35, 42, 45 | Low | 5 | 5 | E-UTRA | 23 | 0 | 9.5 | 0 | 13.5 | 5 | +2/-3 | 25+TT | 8.5-TT |
| 28, 35, 42, 45 | Low | 5 | 5 | NR | 23 | 0 | 9.5 | 0 | 13.5 | 5 | +2/-3 | 25+TT | 8.5-TT |
| 28, 35, 42, 45 | Low | 5 | 15 | E-UTRA | 23 | 0 | 13.5 | 0 | 9.5 | 6 | +2/-3 | 25+TT | 3.5-TT |
| 28, 35, 42, 45 | Low | 5 | 15 | NR | 23 | 0 | 7.0 | 0 | 16.0 | 5 | +2/-3 | 25+TT | 11-TT |
| 28, 35, 42, 45 | High | 5 | 5 | E-UTRA | 23 | 0 | 9.5 | 0 | 13.5 | 5 | +2/-3 | 25+TT | 8.5-TT |

| | | | | | | | | | | | | | |
|----------------|------|----|----|---------|----|---|------|---|------|---|-------|-------|---------|
| 28, 35, 42, 45 | High | 5 | 5 | NR | 23 | 0 | 9.5 | 0 | 13.5 | 5 | +2/-3 | 25+TT | 8.5-TT |
| 28, 35, 42, 45 | High | 15 | 5 | E-UTRA | 23 | 0 | 7.0 | 0 | 16.0 | 5 | +2/-3 | 25+TT | 11-TT |
| 28, 35, 42, 45 | High | 15 | 5 | NR | 23 | 0 | 13.0 | 0 | 10.0 | 6 | +2/-3 | 25+TT | 4-TT |
| 29, 36, 43, 46 | Low | 5 | 5 | E-UTRA | 23 | 0 | 13.0 | 0 | 10.0 | 6 | +2/-3 | 25+TT | 4-TT |
| 29, 36, 43, 46 | Low | 5 | 5 | NR | 23 | 0 | 13.0 | 0 | 10.0 | 6 | +2/-3 | 25+TT | 4-TT |
| 29, 36, 43, 46 | Low | 5 | 15 | E-UTRA | 23 | 0 | 16.0 | 0 | 7.0 | 7 | +2/-3 | 25+TT | 0-TT |
| 29, 36, 43, 46 | Low | 5 | 15 | NR | 23 | 0 | 11.0 | 0 | 12.0 | 6 | +2/-3 | 25+TT | 6-TT |
| 29, 36, 43, 46 | High | 5 | 5 | E-UTRA | 23 | 0 | 13.0 | 0 | 10.0 | 6 | +2/-3 | 25+TT | 4-TT |
| 29, 36, 43, 46 | High | 5 | 5 | NR | 23 | 0 | 13.0 | 0 | 10.0 | 6 | +2/-3 | 25+TT | 4-TT |
| 29, 36, 43, 46 | High | 15 | 5 | E-UTRA | 23 | 0 | 11.5 | 0 | 11.5 | 6 | +2/-3 | 25+TT | 0-TT |
| 29, 36, 43, 46 | High | 15 | 5 | NR | 23 | 0 | 16.0 | 0 | 7.0 | 7 | +2/-3 | 25+TT | 5.5-TT |
| 30, 37 | Low | 5 | 5 | E-UTRA/ | 23 | 0 | 13.0 | 0 | 10.0 | 6 | | 25+TT | 4-TT |
| 30, 37 | Low | 5 | 15 | E-UTRA | 23 | 0 | 16.0 | 0 | 7.0 | 7 | | 25+TT | 0-TT |
| 31, 38 | High | 5 | 5 | NR | 23 | 0 | 13.0 | 0 | 10.0 | 6 | | 25+TT | 4-TT |
| 31, 38 | High | 15 | 5 | NR | 23 | 0 | 16.0 | 0 | 7.0 | 7 | | 25+TT | 0-TT |
| 34, 41 | High | 5 | 5 | NR | 23 | 0 | 13.0 | 0 | 10.0 | 6 | | 25+TT | 4-TT |
| 34, 41 | High | 15 | 5 | NR | 23 | 0 | 16.0 | 0 | 7.0 | 7 | | 25+TT | 0-TT |
| 33, 40 | Low | 5 | 5 | E-UTRA/ | 23 | 0 | 13.0 | 0 | 10.0 | 6 | | 25+TT | 4-TT |
| 33, 40 | Low | 5 | 15 | E-UTRA | 23 | 0 | 16.5 | 0 | 6.5 | 7 | | 25+TT | -0.5-TT |

NOTE 8: TT for each frequency and channel bandwidth is specified in Table 6.2B.3.1.5-1.

6.2B.3.1.5.2 Test requirement for network signalled value "NS_04"

Table 6.2B.3.1.5.2-1: UE Power Class 3 test requirements for NS_04, supporting dynamic power sharing and E-UTRA UL transmission overlapping with NR UL transmission

| Test ID | Test SCS (kHz) | A-MPR _{tot} (dB) | P _{EN-DC, tot_L} (dBm) | P _{EN-DC, tot_H} (dBm) | T _{LOW} (P _{CMAX_L}) (dB) | T _{HIGH} (P _{CMAX_H}) (dB) | Upper limit (dBm) | Lower limit (dBm) |
|--|----------------|---------------------------|---------------------------------|---------------------------------|--|---|-------------------|-------------------|
| 1, 8, 15, 22, 25, 28, 35, 42, 45 (Note 1, 4) | 15, 30, 60 | 3 | 20 | 23 | 6 | 2 | 25+TT | 14+TT |
| 1, 8, 15, 22, 25, 28, 35, 42, 45 (Note 1, 5) | 15, 30, 60 | 9 | 14 | 23 | 6 | 2 | 25+TT | 8+TT |
| 2, 5, 9, 12, 16, 19, 23, 24, 26, 27, 29, 32, 36, 39, 43, 44, 46, 47 (Note 2, 4, 5) | 15 | 11 | 12 | 23 | 6 | 2 | 25+TT | 6+TT |
| 2, 5, 9, 12, 16, 19, 23, 24, 26, 27, 29, 32, 36, 39, 43, 44, 46, 47 (Note 2, 4) | 30, 60 | 6 | 17 | 23 | 5 | 2 | 25+TT | 12+TT |
| 2, 5, 9, 12, 16, 19, 23, 24, 26, 27, 29, 32, 36, 39, 43, 44, 46, 47 (Note 2, 5) | 30, 60 | 11 | 12 | 23 | 6 | 2 | 25+TT | 6+TT |
| 48 (Note 3, 4) | 15 | 7 | 16 | 23 | 5 | 2 | 25+TT | 11+TT |
| 48 (Note 3, 4) | 30, 60 | 12 | 11 | 23 | 6 | 2 | 25+TT | 5+TT |
| 48 (Note 3, 5) | 15, 30, 60 | 7 | 16 | 23 | 5 | 2 | 25+TT | 11+TT |

NOTE 1: Test configuration IDs with transmission overlap with full RB allocation, requirements in TS 38.101-3 [4] apply.

NOTE 2: Test configuration IDs with transmission overlap with 1RB allocation, requirements in TS 38.101-3 [4] apply.

NOTE 3: Test configuration IDs with transmission overlap with edge full RB allocation, requirements in TS 38.101-3 [4] apply.

NOTE 4: When F_{IM3,low_block,low} ≥ 2490.5 MHz (Case A)

NOTE 5: When F_{IM3,low_block,low} < 2490.5 MHz (Case B)

NOTE 6: TT for each frequency and channel bandwidth is specified in Table 6.2B.3.1.5-1.

Table 6.2B.3.1.5.2-2: UE Power Class 3 test requirements for NS_04, E-UTRA UL transmission not overlapping with NR UL transmission

| Test ID | Test SCS (kHz) | A-MPR (dB) | P_{EN-DC, tot_L} (dBm) | P_{EN-DC, tot_H} (dBm) | $T_{LOW} (P_{CMAX_L})$ (dB) | $T_{HIGH} (P_{CMAX_H})$ (dB) | Upper limit (dBm) | Lower limit (dBm) |
|---|----------------|------------|---------------------------|---------------------------|------------------------------|-------------------------------|-------------------|-------------------|
| 3, 7, 10, 14, 17, 21, 30, 34, 37, 41 (Note 1) | 15, 30, 60 | 3 | 20 | 23 | 4 | 2 | 25+TT | 16+TT |
| 4, 6 (Note 2) | 15, 30, 60 | 3.5 | 19.5 | 23 | 5 | 2 | 25+TT | 14.5+TT |
| 11, 13, 18, 20 (Note 2) | 15, 30, 60 | 4 | 19 | 23 | 5 | 2 | 25+TT | 14+TT |
| 31, 33, 38, 40 (Note 2) | 15, 30, 60 | 5.5 | 17.5 | 23 | 5 | 2 | 25+TT | 12.5+TT |

NOTE 1: Test configuration IDs with transmission overlap with full RB allocation, requirements in TS 38.101-3 [4] apply.

NOTE 2: Test configuration IDs with transmission overlap with 1RB allocation, requirements in TS 38.101-3 [4] apply.

NOTE 3: Test configuration IDs with transmission overlap with edge full RB allocation, requirements in TS 38.101-3 [4] apply.

NOTE 4: When $FIM3,low_block,low \geq 2490.5$ MHz (Case A)

NOTE 5: When $FIM3,low_block,low < 2490.5$ MHz (Case B)

NOTE 6: TT for each frequency and channel bandwidth is specified in Table 6.2B.3.1.5-1.

Table 6.2B.3.1.5.2-3: UE Power Class 3 test requirements for NS_04, not supporting dynamic power sharing and E-UTRA UL transmission overlapping with NR UL transmission

| Test ID | Test SCS (kHz) | $A-MPR_{tot}$ (dB) | P_{EN-DC, tot_L} (dBm) | P_{EN-DC, tot_H} (dBm) | $T_{LOW} (P_{CMAX_L})$ (dB) | $T_{HIGH} (P_{CMAX_H})$ (dB) | Upper limit (dBm) | Lower limit (dBm) |
|--|----------------|--------------------|---------------------------|---------------------------|------------------------------|-------------------------------|-------------------|-------------------|
| 1, 8, 15, 22, 25, 28, 35, 42, 45 (Note 1, 4) | 15, 30, 60 | 6 | 17 | 23 | 5 | 2 | 25+TT | 12+TT |
| 1, 8, 15, 22, 25, 28, 35, 42, 45 (Note 1, 5) | 15, 30, 60 | 12 | 11 | 23 | 6 | 2 | 25+TT | 5+TT |
| 2, 5, 9, 12, 16, 19, 23, 24, 26, 27, 29, 32, 36, 39, 43, 44, 46, 47 (Note 2, 4, 5) | 15 | 14 | 9 | 23 | 7 | 2 | 25+TT | 2+TT |
| 2, 5, 9, 12, 16, 19, 23, 24, 26, 27, 29, 32, 36, 39, 43, 44, 46, 47 (Note 2, 4) | 30, 60 | 9 | 14 | 23 | 6 | 2 | 25+TT | 8+TT |
| 2, 5, 9, 12, 16, 19, 23, 24, 26, 27, 29, 32, 36, 39, 43, 44, 46, 47 (Note 2, 5) | 30, 60 | 14 | 9 | 23 | 7 | 2 | 25+TT | 2+TT |
| 48 (Note 3, 4) | 15 | 10 | 13 | 23 | 6 | 2 | 25+TT | 7+TT |
| 48 (Note 3, 4) | 30, 60 | 15 | 8 | 23 | 7 | 2 | 25+TT | 1+TT |
| 48 (Note 3, 5) | 15, 30, 60 | 10 | 13 | 23 | 6 | 2 | 25+TT | 7+TT |

NOTE 1: Test configuration IDs with transmission overlap with full RB allocation, requirements in TS 38.101-3 [4] apply.

NOTE 2: Test configuration IDs with transmission overlap with 1RB allocation, requirements in TS 38.101-3 [4] apply.

NOTE 3: Test configuration IDs with transmission overlap with edge full RB allocation, requirements in TS 38.101-3 [4] apply.

NOTE 4: When $FIM3,low_block,low \geq 2490.5$ MHz (Case A)

NOTE 5: When $FIM3,low_block,low < 2490.5$ MHz (Case B)

NOTE 6: TT for each frequency and channel bandwidth is specified in Table 6.2B.3.1.5-1.

Table 6.2B.3.1.5.2-4: UE Power Class 2 test requirements for NS_04, supporting dynamic power sharing and E-UTRA UL transmission overlapping with NR UL transmission

| Test ID | Test SCS (kHz) | A-MPR _{tot} (dB) | P _{EN-DC, tot_L} (dBm) | P _{EN-DC, tot_H} (dBm) | T _{LOW} (P _{CMAX_L}) (dB) | T _{HIGH} (P _{CMAX_H}) (dB) | Upper limit (dBm) | Lower limit (dBm) |
|--|----------------|---------------------------|---------------------------------|---------------------------------|--|---|-------------------|-------------------|
| 1, 8, 15, 22, 25, 28, 35, 42, 45 (Note 1, 4) | 15, 30, 60 | 3 | 23 | 26 | 3 | 2 | 28+TT | 20+TT |
| 1, 8, 15, 22, 25, 28, 35, 42, 45 (Note 1, 5) | 15, 30, 60 | 9 | 17 | 26 | 5 | 2 | 28+TT | 12+TT |
| 2, 5, 9, 12, 16, 19, 23, 24, 26, 27, 29, 32, 36, 39, 43, 44, 46, 47 (Note 2, 4, 5) | 15 | 11 | 15 | 26 | 6 | 2 | 28+TT | 9+TT |
| 2, 5, 9, 12, 16, 19, 23, 24, 26, 27, 29, 32, 36, 39, 43, 44, 46, 47 (Note 2, 4) | 30, 60 | 6 | 20 | 26 | 6 | 2 | 28+TT | 14+TT |
| 2, 5, 9, 12, 16, 19, 23, 24, 26, 27, 29, 32, 36, 39, 43, 44, 46, 47 (Note 2, 5) | 30, 60 | 11 | 15 | 26 | 6 | 2 | 28+TT | 9+TT |
| 48 (Note 3, 4) | 15 | 7 | 19 | 26 | 5 | 2 | 28+TT | 14+TT |
| 48 (Note 3, 4) | 30, 60 | 12 | 14 | 26 | 6 | 2 | 28+TT | 8+TT |
| 48 (Note 3, 5) | 15, 30, 60 | 7 | 19 | 26 | 5 | 2 | 28+TT | 14+TT |

NOTE 1: Test configuration IDs with transmission overlap with full RB allocation, requirements in TS 38.101-3 [4] apply.
 NOTE 2: Test configuration IDs with transmission overlap with 1RB allocation, requirements in TS 38.101-3 [4] apply.
 NOTE 3: Test configuration IDs with transmission overlap with edge full RB allocation, requirements in TS 38.101-3 [4] apply.
 NOTE 4: When FIM3,low_block,low \geq 2490.5 MHz (Case A)
 NOTE 5: When FIM3,low_block,low < 2490.5 MHz (Case B)
 NOTE 6: TT for each frequency and channel bandwidth is specified in Table 6.2B.3.1.5-1.

Table 6.2B.3.1.5.2-5: UE Power Class 2 test requirements for NS_04, E-UTRA UL transmission not overlapping with NR UL transmission

| Test ID | Test SCS (kHz) | A-MPR (dB) | P _{EN-DC, tot_L} (dBm) | P _{EN-DC, tot_H} (dBm) | T _{LOW} (P _{CMAX_L}) (dB) | T _{HIGH} (P _{CMAX_H}) (dB) | Upper limit (dBm) | Lower limit (dBm) |
|---|----------------|------------|---------------------------------|---------------------------------|--|---|-------------------|-------------------|
| 3, 7, 10, 14, 17, 21, 30, 34, 37, 41 (Note 1) | 15, 30, 60 | 3 | 23 | 26 | 2 | 2 | 28+TT | 21+TT |
| 4, 6 (Note 2) | 15, 30, 60 | 3.5 | 22.5 | 26 | 2 | 2 | 28+TT | 20.5+TT |
| 11, 13, 18, 20 (Note 2) | 15, 30, 60 | 4.5 | 21.5 | 26 | 3 | 2 | 28+TT | 18.5+TT |
| 31, 33, 38, 40 (Note 2) | 15, 30, 60 | 6.5 | 19.5 | 26 | 5 | 2 | 28+TT | 14.5+TT |

NOTE 1: Test configuration IDs with transmission overlap with full RB allocation, requirements in TS 38.101-3 [4] apply.
 NOTE 2: Test configuration IDs with transmission overlap with 1RB allocation, requirements in TS 38.101-3 [4] apply.
 NOTE 3: Test configuration IDs with transmission overlap with edge full RB allocation, requirements in TS 38.101-3 [4] apply.
 NOTE 4: When FIM3,low_block,low \geq 2490.5 MHz (Case A)
 NOTE 5: When FIM3,low_block,low < 2490.5 MHz (Case B)
 NOTE 6: TT for each frequency and channel bandwidth is specified in Table 6.2B.3.1.5-1.

Table 6.2B.3.1.5.2-6: UE Power Class 2 test requirements for NS_04, not supporting dynamic power sharing and E-UTRA UL transmission overlapping with NR UL transmission

| Test ID | Test SCS (kHz) | A-MPR _{tot} (dB) | P _{EN-DC, tot_L} (dBm) | P _{EN-DC, tot_H} (dBm) | T _{LOW} (P _{CMAX_L}) (dB) | T _{HIGH} (P _{CMAX_H}) (dB) | Upper limit (dBm) | Lower limit (dBm) |
|--|----------------|---------------------------|---------------------------------|---------------------------------|--|---|-------------------|-------------------|
| 1, 8, 15, 22, 25, 28, 35, 42, 45 (Note 1, 4) | 15, 30, 60 | 6 | 20 | 26 | 6 | 2 | 28+TT | 14+TT |
| 1, 8, 15, 22, 25, 28, 35, 42, 45 (Note 1, 5) | 15, 30, 60 | 12 | 14 | 26 | 6 | 2 | 28+TT | 8+TT |
| 2, 5, 9, 12, 16, 19, 23, 24, 26, 27, 29, 32, 36, 39, 43, 44, 46, 47 (Note 2, 4, 5) | 15 | 14 | 12 | 26 | 6 | 2 | 28+TT | 6+TT |
| 2, 5, 9, 12, 16, 19, 23, 24, 26, 27, 29, 32, 36, 39, 43, 44, 46, 47 (Note 2, 4) | 30, 60 | 9 | 17 | 26 | 5 | 2 | 28+TT | 12+TT |
| 2, 5, 9, 12, 16, 19, 23, 24, 26, 27, 29, 32, 36, 39, 43, 44, 46, 47 (Note 2, 5) | 30, 60 | 14 | 12 | 26 | 6 | 2 | 28+TT | 6+TT |
| 48 (Note 3, 4) | 15 | 10 | 16 | 26 | 5 | 2 | 28+TT | 11+TT |
| 48 (Note 3, 4) | 30, 60 | 15 | 11 | 26 | 6 | 2 | 28+TT | 5+TT |
| 48 (Note 3, 5) | 15, 30, 60 | 10 | 16 | 26 | 5 | 2 | 28+TT | 11+TT |

NOTE 1: Test configuration IDs with transmission overlap with full RB allocation, requirements in TS 38.101-3 [4] apply.
 NOTE 2: Test configuration IDs with transmission overlap with 1RB allocation, requirements in TS 38.101-3 [4] apply.
 NOTE 3: Test configuration IDs with transmission overlap with edge full RB allocation, requirements in TS 38.101-3 [4] apply.
 NOTE 4: When FIM3,low_block,low ≥ 2490.5 MHz (Case A)
 NOTE 5: When FIM3,low_block,low < 2490.5 MHz (Case B)
 NOTE 6: TT for each frequency and channel bandwidth is specified in Table 6.2B.3.1.5-1.

6.2B.3.2 UE Additional Maximum Output Power reduction for Intra-Band Non-Contiguous EN-DC

Editor's note: This test case is incomplete. The following aspects are either missing or not yet determined:

- Test frequencies for the Minimum W_{GAP}

6.2B.3.2.1 Test purpose

Additional emission requirements can be signalled by the network with network signalling value indicated by the field *additionalSpectrumEmission*. To meet these additional requirements, additional maximum power reduction (A-MPR) is allowed for the maximum output power as specified in Table 6.2B.1.1.3-1. Unless stated otherwise, an A-MPR of 0 dB shall be used.

6.2B.3.2.2 Test applicability

The requirements of this test apply in test case 6.5B.2.2.2 Additional spectrum emission mask for network signalled values NS_04 to all types of E-UTRA UE release 15 and forward, supporting intra-band non-contiguous EN-DC.

6.2B.3.2.3 Minimum conformance requirements

For intra-band non-contiguous EN-DC band combinations with additional requirements the A-MPR allowed are specified in table 6.2B.3.2.3-1 for UEs configured with EN-DC and combinations of network signalling values indicated in the E-UTRA and NR cell group(s). Unless otherwise stated the A-MPR specified in subclause 6.2B.3.2 for intra-band non-contiguous EN-DC configurations is the total power reduction allowed including MPR. For UEs scheduled with single uplink transmission, AMPR in subclause 6.2.4 of [4] and 6.2.3 of [2] apply.

Table 6.2B.3.2.3-1: Allowed power reduction for intra-band non-contiguous EN-DC

| DC configuration | Requirement (clause) | E-UTRA network signalling value | NR network signalling value | A-MPR (clause) |
|--------------------------|---|---------------------------------|-----------------------------|----------------|
| DC_41A_n41A ¹ | 6.6.3.3.19 and 6.6.2.2.2 of TS 36.101 [5] and 6.5.2.3.2 and 6.5.3.3.1 of TS 38.101-1 [2] | NS_01 or NS_04 | NS_04 | 6.2B.3.2.3.1 |

NOTE 1: Only applies to UEs that support dual UL transmission for this EN-DC combination.
 NOTE 2: The requirement applies when the combination of network signalling values in the two CGs is set (only for UEs configured with EN-DC).

The normative reference for this requirement is TS 38.101-3 [4] clause 6.2B.3.2.

Exception requirements for both NR and E-UTRA are defined for this test when transmission on E-UTRA overlap in time with NR.LTE anchor agnostic approach is not applied for this case and referred to as sub-test 1. E-UTRA test point analysis is included and E-UTRA measurements are performed.

Exception requirements for both NR and E-UTRA are defined for this test when transmission on E-UTRA doesn't overlap in time with NR, for a UE that doesn't support dynamic power sharing. LTE anchor agnostic approach is not applied for this case. E-UTRA test point analysis is included and E-UTRA measurements are performed.

No exception requirements for NR or E-UTRA are defined for this test when transmission on E-UTRA doesn't overlap in time with NR, for a UE that supports dynamic power sharing. LTE anchor agnostic approach is not applied for this case.

6.2B.3.2.3.1 A-MPR for NS_04

When the UE is configured for B41/n41 intra-band non-contiguous EN-DC and it receives IE NS_04, the UE determines the total allowed maximum output power reduction as specified in this clause. The A-MPR for EN-DC defined in this clause is used instead of MPR defined in 6.2B.2.2, not additively, so EN-DC MPR=0 when NS_04 is signalled.

For UE supporting dynamic power sharing the following:

- for the MCG, A-MPR_c in accordance with TS 36.101 [5]
- for the SCG,

$$A-MPR'_c = A-MPR_{NR} = \text{MAX}(A-MPR_{\text{single},NR}, A-MPR_{EN-DC})$$

- for the total configured transmission power,

$$A-MPR_{\text{tot}} = P_{\text{PowerClass,EN-DC}} - \min(P_{\text{PowerClass,EN-DC}}, 10 * \log_{10}(10^{(P_{\text{PowerClass,E-UTRA}} - A-MPR_{E-UTRA})/10}) + 10^{((P_{\text{PowerClass,NR}} - A-MPR_{NR})/10)})$$

where

$$A-MPR_{E-UTRA} = \text{MAX}(A-MPR_{\text{single},E-UTRA} + MPR_{\text{single},E-UTRA}, A-MPR_{EN-DC})$$

$$A-MPR_{EN-DC} = \text{MAX}(A-MPR_{IM3}, A-MPR_{ACLoverlap})$$

with

- A-MPR_{single, E-UTRA} is the A-MPR defined for the E-UTRA transmission in TS 38.101-3 [4]
- A-MPR_{single,NR} is the A-MPR defined for the NR transmission in TS 38.101-1 [2]
- MPR_{single,E-UTRA} is the MPR defined for the E-UTRA transmission in TS 38.101-3 [4]

For UEs not supporting dynamic power sharing the following

- for the MCG,

$$A\text{-MPR}_c = \text{MAX}(A\text{-MPR}_{\text{single}, E\text{-UTRA}} + MPR_{\text{single}, E\text{-UTRA}}, A\text{-MPR}_{IM3}, A\text{-MPR}_{ACLRoverlap})$$

- for the SCG,

$$A\text{-MPR}'_c = \text{MAX}(A\text{-MPR}_{\text{single}, NR}, A\text{-MPR}_{IM3}, A\text{-MPR}_{ACLRoverlap})$$

where

- $A\text{-MPR}_{\text{single}, E\text{-UTRA}}$ is the A-MPR defined for the E-UTRA transmission in TS 36.101 [5]
- $A\text{-MPR}_{\text{single}, NR}$ is the A-MPR defined for the NR transmission in TS 38.101-1 [2]
- $MPR_{\text{single}, E\text{-UTRA}}$ is the MPR defined for the E-UTRA transmission in TS 36.101 [5]

The UE determines the Channel Configuration Case and the value of $A\text{-MPR}_{IM3}$ as follows:

If $\text{AND}(F_{IM3,low_block,high} < F_{\text{filter},low}, \text{MAX}(SEM_{-13,high}, F_{IM3,high_block,low}) > F_{\text{filter},high})$

Channel Configuration Case C. $A\text{-MPR}_{IM3}$ defined in Clause 6.2B.3.1.3.2.1

Else

Channel Configuration Case D. $A\text{-MPR}_{IM3}$ defined in Clause 6.2B.3.1.3.2.2

where

- $F_{IM3,low_block,high} = (2 * F_{\text{low_channel},high_edge}) - F_{\text{high_channel},low_edge}$
- $F_{IM3,high_block,low} = (2 * F_{\text{high_channel},low_edge}) - F_{\text{low_channel},high_edge}$
- $F_{\text{low_channel},low_edge}$ is the lowermost frequency of lower transmission bandwidth configuration.
- $F_{\text{low_channel},high_edge}$ is the uppermost frequency of lower transmission bandwidth configuration.
- $F_{\text{high_channel},low_edge}$ is the lowermost frequency of upper transmission bandwidth configuration.
- $F_{\text{high_channel},high_edge}$ is the uppermost frequency of upper transmission bandwidth configuration.
- $F_{\text{filter},low} = 2480$ MHz
- $F_{\text{filter},high} = 2745$ MHz
- $SEM_{-13,high}$ = Threshold frequency where upper spectral emission mask for upper channel drops from -13 dBm / 1MHz to -25 dBm / 1MHz, as specified in Clause 6.6.2.2.2 in [5] and Subclause 6.5.2.3.2 in [2] respectively.

Where the transmission bandwidth configuration for NR is the maximum frequency span covering all the configured SCSSpecificCarrier for scenarios that carrier bandwidths with different SCS can be fully overlapped.

The UE determines the value of $A\text{-MPR}_{ACLRoverlap}$ as specified in Table 6.2B.3.2.3.1-1:

Table 6.2B.3.2.3.1-1: A-MPR_{ACLRoverlap}

| W_{gap} | A-MPR_{ACLRoverlap} |
|---|------------------------------------|
| < $BW_{\text{channel},E\text{-UTRA}} + BW_{\text{channel},NR}$ | 4 dB |
| $\geq BW_{\text{channel},E\text{-UTRA}} + BW_{\text{channel},NR}$ | 0 dB |
| NOTE 1: $W_{gap} = F_{\text{high_channel},low_edge} - F_{\text{low_channel},high_edge}$ | |

6.2B.3.2.4 Test description

6.2B.3.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and sub-carrier spacing based on NR operating bands specified in table 5.2B.3.1-1. All of these configurations shall be tested

with applicable test parameters for each combination of test channel bandwidth and sub-carrier spacing, and are shown in test configuration table 6.2B.3.1.4.1-1 through 6.2B.3.1.4.1-2 with additional IM3 test frequencies for NS_04 in 6.2B.3.2.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A2. Configurations of PDSCH and PDCCCH before measurement are specified in Annex TS 36.521-1 [10] Annex C and in Annex C2 for LTE link and NR link respectively.

Table 6.2B.3.2.4.1-0: E-UTRA test configuration table

| E-UTRA Test Parameters | | | | |
|--------------------------|-----------------------------------|-----------------------|------------|---------------|
| E-UTRA Channel Bandwidth | E-UTRA Test Frequency (Note 1) | Downlink | Uplink | |
| | | N/A for A-MPR testing | Modulation | RB allocation |
| 20 MHz | Low range and High range (Note 2) | | QPSK | 100 |

NOTE 1: E-UTRA Test Frequency as specified in TS 36.508 [6] clause 4.3.1
 NOTE 2: NR carrier shall be the outermost carrier during test.

Table 6.2B.3.2.4.1-1: Additional IM3 Test Frequencies for NS_04 intra-band non-contiguous EN-DC

| Additional Initial Condition | |
|---------------------------------|---|
| Additional IM3 Test Frequencies | if maximum $W_{GAP} > 88.4$ MHz, and SCS 15 kHz, 15 kHz NR raster then IM3 test frequencies as specified in Table 6.2B.3.2.4.1-2. if maximum $W_{GAP} > 88.4$ MHz, and SCS 15 kHz, 30 kHz NR raster then IM3 test frequencies as specified in Table 6.2B.3.2.4.1-3. if maximum $W_{GAP} > 88.4$ MHz, and SCS 15 kHz, 60 kHz NR raster then IM3 test frequencies as specified in Table 6.2B.3.2.4.1-4. |

Table 6.2B.3.2.4.1-2: EN-DC combination DC_41A_n41A, intra-band non-contiguous, SCS 15 kHz, 15 kHz NR raster, IM3 test frequencies

| EN-DC channel bandwidth combination | CC | Bandwidth [MHz] | carrierBandwidth [PRBs] | Range | Carrier centre [MHz] Note 2 | Carrier centre [ARFCN] | point A [MHz] | absolute FrequencyPoint A [ARFCN] | offsetTo Carrier [Carrier PRBs] | SS block SCS [kHz] | GSC N | absoluteFrequency SSB [ARFCN] |
|-------------------------------------|------------|-----------------|-------------------------|-------------------|--------------------------------|------------------------|---------------|-----------------------------------|---------------------------------|--------------------|-------|-------------------------------|
| E-UTRA: 20MHz + NR: 40MHz | E-UTRA CC1 | 20 | 100 | Downlink & Uplink | IM3 | 2666.700 | 41357 | - | - | - | - | - |
| | NR CC1 | 40 | 216 | Downlink & Uplink | IM3 | 2548.300 | 509660 | 2528.86 | 505772 | 0 | 15 | 6327 |
| NR: 40MHz + E-UTRA: 20MHz | E-UTRA CC1 | 20 | 100 | Downlink & Uplink | IM3 | 2558.300 | 40273 | - | - | - | - | - |
| | NR CC1 | 40 | 216 | Downlink & Uplink | IM3 | 2676.700 | 535340 | 2657.26 | 531452 | 0 | 15 | 6648 |
| E-UTRA: 20MHz + NR: 50MHz | E-UTRA CC1 | 20 | 100 | Downlink & Uplink | IM3 | 2524.900 | 39939 | - | - | - | - | - |
| | NR CC1 | 50 | 270 | Downlink & Uplink | IM3 | 2665.000 | 533000 | 2640.7 | 528140 | 0 | 15 | 6606 |
| NR: 50MHz + E-UTRA: 20MHz | E-UTRA CC1 | 20 | 100 | Downlink & Uplink | IM3 | 2666.700 | 41357 | - | - | - | - | - |
| | NR CC1 | 50 | 270 | Downlink & Uplink | IM3 | 2543.300 | 508660 | 2519 | 503800 | 0 | 15 | 6303 |

Table 6.2B.3.2.4.1-3: EN-DC combination DC_41A_n41A, intra-band non-contiguous, SCS 30 kHz, 30 kHz NR raster, IM3 test frequencies

| EN-DC channel bandwidth combination | CC | Bandwidth [MHz] | carrierBandwidth [PRBs] | Range | Carrier centre [MHz] Note 2 | Carrier centre [ARFCN] | point A [MHz] | absolute FrequencyPointA [ARFCN] | offsetTo Carrier [Carrier PRBs] | SS block SCS [kHz] | GSC N | absoluteFrequency SSB [ARFCN] |
|-------------------------------------|----|-----------------|-------------------------|-------|--------------------------------|------------------------|---------------|----------------------------------|---------------------------------|--------------------|-------|-------------------------------|
|-------------------------------------|----|-----------------|-------------------------|-------|--------------------------------|------------------------|---------------|----------------------------------|---------------------------------|--------------------|-------|-------------------------------|

| | | | | | | | | | | | | | |
|---------------------------------|------------|----|-----|-------------------|-----|----------|--------|---------|--------|---|----|------|--------|
| E-UTRA: 20MHz + NR: 40MHz | E-UTRA CC1 | 20 | 100 | Downlink & Uplink | IM3 | 2666.700 | 41357 | - | - | - | - | - | - |
| | NR CC1 | 40 | 106 | Downlink & Uplink | IM3 | 2548.300 | 509660 | 2529.22 | 505844 | 0 | 30 | 6333 | 509660 |
| NR: 40MHz + E-UTRA: 20MHz | E-UTRA CC1 | 20 | 100 | Downlink & Uplink | IM3 | 2558.300 | 40273 | - | - | - | - | - | - |
| | NR CC1 | 40 | 106 | Downlink & Uplink | IM3 | 2676.700 | 535340 | 2657.62 | 531524 | 0 | 30 | 6654 | 535340 |
| E-UTRA: 20MHz + NR: 50MHz | E-UTRA CC1 | 20 | 100 | Downlink & Uplink | IM3 | 2524.900 | 39939 | - | - | - | - | - | - |
| | NR CC1 | 50 | 133 | Downlink & Uplink | IM3 | 2665.000 | 533000 | 2641.06 | 528212 | 0 | 30 | 6612 | 533000 |
| NR: 50MHz + E-UTRA: 20MHz | E-UTRA CC1 | 20 | 100 | Downlink & Uplink | IM3 | 2666.700 | 41357 | - | - | - | - | - | - |
| | NR CC1 | 50 | 133 | Downlink & Uplink | IM3 | 2543.300 | 508660 | 2519.36 | 503872 | 0 | 30 | 6309 | 508660 |

Table 6.2B.3.2.4.1-4: EN-DC combination DC_41A_n41A, intra-band non-contiguous, SCS 60 kHz, 15 kHz NR raster, IM3 test frequencies

| EN-DC channel bandwidth combination | CC | Bandwidth [MHz] | carrierBandwidth [PRBs] | Range | Carrier centre [MHz] Note 2 | Carrier centre [ARFCN] | point A [MHz] | absolute Frequen cyPoint A [ARFCN] | offsetTo Carrier [Carrier PRBs] | SS block SCS [kHz] | GSC N | absoluteF requency SSB [ARFCN] |
|--|------------|--------------------|----------------------------|-------------------|--------------------------------------|------------------------------|------------------|--|--|-----------------------------|----------|---|
| E-UTRA: 20MHz + NR: 40MHz | E-UTRA CC1 | 20 | 100 | Downlink & Uplink | IM3 | 2666.700 | 41357 | - | - | - | - | - |
| | NR CC1 | 40 | 51 | Downlink & Uplink | IM3 | 2548.300 | 509660 | 2529.94 | 505988 | 0 | 15 | 6330 |
| NR: 40MHz + E-UTRA: 20MHz | E-UTRA CC1 | 20 | 100 | Downlink & Uplink | IM3 | 2558.300 | 40273 | - | - | - | - | - |
| | NR CC1 | 40 | 51 | Downlink & Uplink | IM3 | 2676.700 | 535340 | 2658.34 | 531668 | 0 | 15 | 6651 |
| E-UTRA: 20MHz + NR: 50MHz | E-UTRA CC1 | 20 | 100 | Downlink & Uplink | IM3 | 2524.900 | 39939 | - | - | - | - | - |
| | NR CC1 | 50 | 65 | Downlink & Uplink | IM3 | 2665.000 | 535340 | 2653.3 | 530660 | 0 | 15 | 6639 |
| NR: 50MHz + E-UTRA: 20MHz | E-UTRA CC1 | 20 | 100 | Downlink & Uplink | IM3 | 2666.700 | 41357 | - | - | - | - | - |
| | NR CC1 | 50 | 65 | Downlink & Uplink | IM3 | 2543.300 | 508660 | 2519.9 | 503980 | 0 | 15 | 6306 |

Editor's note: The following lines belong at the end of clause 6.2B.3.2.4.1. As new tables are added to this clause, these lines should always follow the tables.

1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [6] Annex A, Figure A.3.1.1.1 for TE diagram and clause A.3.2.1 for UE diagram.
2. The parameter settings for the cell are set up according to TS 38.508-1 [6] clause 4.4.3.
3. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C.0 and TS 38.521-1 [8] Annex C.0 for E-UTRA CG and NR CG respectively, and uplink signals according to TS 36.521-1 [10] Annex H and TS 38.521-1 [8] Annex G for E-UTRA CG and NR CG respectively.
4. NR downlink signals are initially set up according to Annex C.0, C.1, and C.2 and uplink signals according to Annex G.0, G.1, G.2, and G.3.0 of TS 38.521-1 [8].
5. The UL Reference Measurement channels are set according to TS 36.521-1 [10] Annex A.2 and Annex A for LTE link and NR link respectively.
6. Propagation conditions are set according to TS 36.521-1 [10] Annex B.0 and TS 38.521-1 [8] Annex B.0 for E-UTRA CG and NR CG respectively.
7. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 6.2B.3.2.4.3.
8. For the case of testing overlapping E-UTRA and NR UL transmission scenario when both bands are TDD, ensure E-UTRA UL transmission overlaps with NR UL transmission in time by giving SCG a delay of 3 E-UTRA subframes, or by giving MCG a delay of 2 subframes.

6.2B.3.2.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format [0_1] for C_RNTI to schedule the UL RMC according to table 6.2B.3.2.4.1-1 on both EN-DC component carriers. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
2. Send continuously uplink power control "up" commands to the UE for NR and E-UTRA carrier until the UE transmits at its P_{UMAX} level; allow at least 200 ms starting from the first TPC command in this step for the UE to reach P_{UMAX} level.
3. Measure the mean power over all component carriers for the EN-DC configuration, which shall meet the requirements described in table 6.2B.3.2.5-1. The period of the measurement shall be at least the continuous duration of one sub-frame (1ms).

NOTE 1: When switching to DFT-s-OFDM waveform, as specified in the test configuration table 6.2B.3.1.4.1-2, send an NR RRCCReconfiguration message according to TS 38.508-1 [6] clause 4.6.3 Table 4.6.3-118 PUSCH-Config with TRANSFORM_PRECODER_ENABLED condition.

6.2B.3.2.4.3 Message contents

Message contents are according to TS 38.508-1 [6] clause 4.6.1, with the following exceptions.

Table 6.2B.3.2.4.3-1: RRCConnectionReconfiguration: nr-Config-r15

| Derivation Path: TS 36.508 [11], Table 4.6.1-8 | | | |
|--|--------------|--|-----------|
| Information Element | Value/remark | Comment | Condition |
| p-MaxEUTRA-r15 | 23 | Apply if run test points with E-UTRA UL transmission not overlapping with NR UL transmission in time for PC3 UE | |
| | 20 | Apply if run test points with E-UTRA UL transmission overlapping with NR UL transmission in time for PC3 UE, and UE doesn't support dynamic power sharing. | |
| P-Max | 23 | Apply if run test points with E-UTRA UL transmission not overlapping with NR UL transmission in time for PC3 UE | |
| | 20 | Apply if run test points with E-UTRA UL transmission overlapping with NR UL transmission in time for PC3 UE, and UE doesn't support dynamic power sharing. | |

6.2B.3.2.4.3.1 Message contents exceptions (network signalled value "NS_04")

For "NS_04" see A-MPR test case in table 6.2B.3.1.4.3.1-1 and table 6.2B.3.1.4.3.1-2.

6.2B.3.2.5 Test requirement

The maximum output power, derived in step 3 shall be within the range prescribed by the nominal maximum output power and tolerance in table 6.2B.3.2.5-1. The allowed A-MPR values specified in table 6.2B.3.2.3-1 are in addition to the allowed MPR requirements specified in clause 6.2B.1.1.3. For the UE maximum output power modified by MPR and/or A-MPR, the power limits specified in table 6.2B.1.1.3-1 apply.

Table 6.2B.3.2.5-0: Test Tolerance for UE maximum output power (LTE, NR TX separately)

| Uplink TX | | $f \leq 3.0\text{GHz}$ | $3.0\text{GHz} < f \leq 4.2\text{GHz}$ | $4.2\text{GHz} < f \leq 6\text{GHz}$ |
|-----------|---|------------------------|--|--------------------------------------|
| LTE | $\text{BW} \leq 20\text{MHz}$ | 0.7 | 1.0 | 1.3 |
| NR | $\text{BW} \leq 40\text{MHz}$ | 0.7 dB | 1.0 dB | 1.0 |
| | $40\text{MHz} < \text{BW} \leq 100\text{MHz}$ | 1.0 dB | 1.0 dB | 1.0 |

Table 6.2B.3.2.5-1: UE Power Class 3 test requirements for network signalled value "NS_04"

| Test ID | Modulation | $\Delta P_{PowerClass}$ (dB) | MPR (dB) | A-MPR (dB) | $A-MPR_{EN-DC}$ (dB) | $A-MPR_c$ (dB) | $\Delta T_{C,c}$ (dB) Note 7 | $P_{CMAX,c}$ (dBm) | $T(P_{CMAX_L,f,c})$ (dB) | $T_{L,c}$ (dB) | Upper limit | Lower limit |
|---|------------------|------------------------------|----------|------------|----------------------|----------------|------------------------------|--------------------|---------------------------|----------------|-------------|-----------------|
| 1, 8, 15, 22, 25, 28, 35, 42 and 45 | E-UTRA Note 1 | 0 | 2 | 0 | 6 | 6 | 0 (1.5) | 17 (15.5) | 5 (5) | 2 (3.5) | 25+TT | 12-TT (10.5-TT) |
| 1, 8, 15, 22, 25, 28, 35, 42 and 45 | E-UTRA Note 2 | 0 | 2 | 0 | 11 | 11 | 0 (1.5) | 12 (10.5) | 6 (6) | 2 (3.5) | 25+TT | 6+TT (4.5-TT) |
| 1, 8, 15, 22, 25, 28, 35, 42 and 45 | NR, Note 1 | 0 | - | Note 5 | 6 | 6 | 0 (1.5) | 17 (15.5) | 5 (5) | 2 (3.5) | 25+TT | 12-TT (10.5-TT) |
| 1, 8, 15, 22, 25, 28, 35, 42 and 45 | NR, Note 2 | 0 | - | Note 5 | 11 | 11 | 0 (1.5) | 12 (10.5) | 6 (6) | 2 (3.5) | 25+TT | 6+TT (4.5-TT) |
| 2, 5, 9, 16, 19, 23, 24, 26, 27, 29, 32, 36, 39, 43, 44, 46, and 47 | E-UTRA Note 1, 3 | 0 | 1 | Note 6 | 14 | 14 | 0 (1.5) | 9 (7.5) | 6 (7) | 2 (3.5) | 25+TT | 3-TT (0.5-TT) |
| 2, 5, 9, 16, 19, 23, 24, 26, 27, 29, 32, 36, 39, 43, 44, 46, and 47 | E-UTRA Note 1, 4 | 0 | 1 | Note 6 | 9 | 9 | 0 (1.5) | 14 (12.5) | 5 (6) | 2 (3.5) | 25+TT | 9-TT (6.5-TT) |
| 2, 5, 9, 16, 19, 23, 24, 26, 27, 29, 32, 36, 39, 43, 44, 46, and 47 | E-UTRA Note 2 | 0 | 1 | Note 6 | 14 | 14 | 0 (1.5) | 9 (7.5) | 6 | 2 (3.5) | 25+TT | 3-TT (0.5-TT) |
| 2, 5, 9, 16, 19, 23, 24, 26, 27, 29, 32, 36, 39, 43, 44, 46, and 47 | NR Note 1, 3 | 0 | - | Note 5 | 14 | 14 | 0 (1.5) | 9 (7.5) | 6 (7) | 2 (3.5) | 25+TT | 3-TT (0.5-TT) |
| 2, 5, 9, 16, 19, 23, 24, 26, 27, 29, 32, 36, 39, 43, 44, 46, and 47 | NR Note 1, 4 | 0 | - | Note 5 | 9 | 9 | 0 (1.5) | 14 (12.5) | 5 (6) | 2 (3.5) | 25+TT | 9-TT (6.5-TT) |

| | | | | | | | | | | | |
|---|---------------|---|---|--------|----|----|---------|-----------|-------|---------|---------------------|
| 46, and 47 | | | | | | | | | | | |
| 2, 5, 9, 16, 19, 23, 24, 26, 27, 29, 32, 36, 39, 43, 44, 46, and 47 | NR Note 2 | 0 | - | Note 5 | 11 | 11 | 0 (1.5) | 9 (7.5) | 6 (6) | 2 (3.5) | 25+TT 3-TT (0.5-TT) |
| 3, 7, 10, 14, 17, 21, 30, 34, 37, 41 | E-UTRA Note 1 | 0 | 1 | Note 6 | 14 | 14 | 0 (1.5) | 9 (7.5) | 6 (7) | 2 (3.5) | 25+TT 3-TT (0.5-TT) |
| 3, 7, 10, 14, 17, 21, 30, 34, 37 and 41 | E-UTRA Note 2 | 0 | 1 | Note 6 | 14 | 14 | 0 (1.5) | 9 (7.5) | 6 (7) | 2 (3.5) | 25+TT 3-TT (0.5-TT) |
| 4, 6, 11, 13, 18, 20, 31, 33, 38 and 40 | NR Note 1, 3 | 0 | - | Note 5 | 14 | 14 | 0 (1.5) | 9 (7.5) | 6 (7) | 2 (3.5) | 25+TT 3-TT (0.5-TT) |
| 4, 6, 11, 13, 18, 20, 31, 33, 38 and 40 | NR Note 1,4 | 0 | - | Note 5 | 9 | 9 | 0 (1.5) | 14 (12.5) | 5 (6) | 2 (3.5) | 25+TT 9-TT (6.5-TT) |
| 4, 6, 11, 13, 18, 20, 31, 33, 38 and 40 | NR Note 2 | 0 | - | Note 5 | 14 | 14 | 0 (1.5) | 9 (7.5) | 6 (6) | 2 (3.5) | 25+TT 3-TT (0.5-TT) |

NOTE 1: When $F_{IM3,low_block,low} \geq 2490.5$ MHz (Case A)

NOTE 2: When $F_{IM3,low_block,low} < 2490.5$ MHz (Case B)

NOTE 3: When NR SCS = 15kHz.

NOTE 4: When NR SCS = 30 kHz or 60 kHz.

NOTE 5: NR A-MPR values for NS_04 are defined in Table 6.2.3.3.2-1.

NOTE 6: E-UTRA A-MPR= 3 dB for 1 RB and $f_c < 2517.5$ MHz, otherwise 0 dB.

NOTE 7: $\Delta T_{C,c} = 1.5$ dB for transmission bandwidths confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} , otherwise 0 dB.

NOTE 8: TT for each frequency and channel bandwidth is specified in Table 6.2B.3.2.5-0.

Table 6.2B.3.2.5-2: UE Power Class 2 test requirements for network signalled value "NS_04"

| Test ID | Modulation | $\Delta P_{\text{PowerClass}}$ (dB) | MPR (dB) | A-MPR (dB) | $A\text{-}MPR}_{\text{EN-DC}}$ (dB) | $A\text{-}MPR_c$ (dB) | $\Delta T_{C,c}$ (dB) Note 7 | $P_{\text{CMAX},c}$ (dBm) | $T(P_{\text{CMAX,L,f,c}})$ (dB) | $T_{L,c}$ (dB) | Upper limit | Lower limit |
|---|-------------------|-------------------------------------|-----------------|-------------------|-------------------------------------|-----------------------|---------------------------------|---------------------------|---------------------------------|----------------|-------------|-----------------|
| 1, 8, 15, 22, 25, 28, 35, 42 and 45 | E-UTRA Note 1 | 3 | 2 | 0 | 6 | 6 | 0 (1.5) | 17 (15.5) | 5 (5) | 2 (3.5) | 28+TT | 12-TT (10.5-TT) |
| 1, 8, 15, 22, 25, 28, 35, 42 and 45 | E-UTRA Note 2 | 3 | 2 | 0 | 11 | 11 | 0 (1.5) | 12 (10.5) | 6 (6) | 2 (3.5) | 28+TT | 6+TT (4.5-TT) |
| 1, 8, 15, 22, 25, 28, 35, 42 and 45 | NR, Note 1 | 3 | - | Note 5 | 6 | 6 | 0 (1.5) | 17 (15.5) | 5 (5) | 2 (3.5) | 28+TT | 12-TT (10.5-TT) |
| 1, 8, 15, 22, 25, 28, 35, 42 and 45 | NR, Note 2 | 3 | - | Note 5 | 11 | 11 | 0 (1.5) | 12 (10.5) | 6 (6) | 2 (3.5) | 28+TT | 6+TT (4.5-TT) |
| 2, 5, 9, 16, 19, 23, 24, 26, 27, 29, 32, 36, 39, 43, 44, 46, and 47 | E-UTRA Note 1, 3 | 3 | 1 | Note 6 | 14 | 14 | 0 (1.5) | 9 (7.5) | 6 (7) | 2 (3.5) | 28+TT | 3-TT (0.5-TT) |
| 2, 5, 9, 16, 19, 23, 24, 26, 27, 29, 32, 36, 39, 43, 44, 46, and 47 | E-UTRA Note 1, 4 | 3 | 1 | Note 6 | 9 | 9 | 0 (1.5) | 14 (12.5) | 5 (6) | 2 (3.5) | 28+TT | 9-TT (6.5-TT) |
| 2, 5, 9, 16, 19, 23, 24, 26, 27, 29, 32, 36, 39, 43, 44, 46, and 47 | E-UTRA Note 2 | 3 | 1 | Note 6 | 14 | 14 | 0 (1.5) | 9 (7.5) | 6 | 2 (3.5) | 28+TT | 3-TT (0.5-TT) |
| 2, 5, 9, 16, 19, 23, 24, 26, 27, 29, 32, 36, 39, 43, 44, 46, and 47 | NR Note 1, 3 | 3 | - | Note 5 | 14 | 14 | 0 (1.5) | 9 (7.5) | 6 (7) | 2 (3.5) | 28+TT | 3-TT (0.5-TT) |
| 2, 5, 9, 16, 19, 23, 24, 26, 27, 29, 32, 36, 39, 43, 44, 46, and 47 | NR Note 1, 4 | 3 | - | Note 5 | 9 | 9 | 0 (1.5) | 14 (12.5) | 5 (6) | 2 (3.5) | 28+TT | 9-TT (6.5-TT) |

| | | | | | | | | | | | |
|---|---------------|---|---|--------|----|----|---------|-----------|-------|---------|---------------------|
| 46, and 47 | | | | | | | | | | | |
| 2, 5, 9, 16, 19, 23, 24, 26, 27, 29, 32, 36, 39, 43, 44, 46, and 47 | NR Note 2 | 3 | - | Note 5 | 11 | 11 | 0 (1.5) | 9 (7.5) | 6 (6) | 2 (3.5) | 28+TT 3-TT (0.5-TT) |
| 3, 7, 10, 14, 17, 21, 30, 34, 37, 41 | E-UTRA Note 1 | 3 | 1 | Note 6 | 14 | 14 | 0 (1.5) | 9 (7.5) | 6 (7) | 2 (3.5) | 28+TT 3-TT (0.5-TT) |
| 3, 7, 10, 14, 17, 21, 30, 34, 37 and 41 | E-UTRA Note 2 | 3 | 1 | Note 6 | 14 | 14 | 0 (1.5) | 9 (7.5) | 6 (7) | 2 (3.5) | 28+TT 3-TT (0.5-TT) |
| 4, 6, 11, 13, 18, 20, 31, 33, 38 and 40 | NR Note 1, 3 | 3 | - | Note 5 | 14 | 14 | 0 (1.5) | 9 (7.5) | 6 (7) | 2 (3.5) | 28+TT 3-TT (0.5-TT) |
| 4, 6, 11, 13, 18, 20, 31, 33, 38 and 40 | NR Note 1,4 | 3 | - | Note 5 | 9 | 9 | 0 (1.5) | 14 (12.5) | 5 (6) | 2 (3.5) | 28+TT 9-TT (6.5-TT) |
| 4, 6, 11, 13, 18, 20, 31, 33, 38 and 40 | NR Note 2 | 3 | - | Note 5 | 14 | 14 | 0 (1.5) | 9 (7.5) | 6 (6) | 2 (3.5) | 28+TT 3-TT (0.5-TT) |
| NOTE 1: When $F_{IM3,low_block,low} \geq 2490.5$ MHz (Case A). NOTE 2: When $F_{IM3,low_block,low} < 2490.5$ MHz (Case B). NOTE 3: When NR SCS = 15kHz. NOTE 4: When NR SCS = 30 kHz or 60 kHz. NOTE 5: NR A-MPR values for NS_04 are defined in Table 6.2.3.3.2-1. NOTE 6: E-UTRA A-MPR= 3 dB for 1 RB and $f_c < 2517.5$ MHz, otherwise 0 dB. NOTE 7: $\Delta T_{C,c} = 1.5$ dB for transmission bandwidths confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} , otherwise 0 dB. NOTE 8: TT for each frequency and channel bandwidth is specified in Table 6.2B.3.2.5-0. | | | | | | | | | | | |

6.2B.3.3 UE Additional Maximum Output Power reduction for Inter-Band EN-DC within FR1

6.2B.3.3.1 Test purpose

Same test purpose as in clause 6.2.3.1 in TS 38.521-1 [8] for the NR carrier.

6.2B.3.3.2 Test applicability

The requirements of this test apply to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC.

6.2B.3.3.3 Minimum conformance requirements

For inter-band EN-DC between E-UTRA and FR1 NR, UE additional maximum output power reduction specified in TS 36.101 [5] and TS 38.101-1 [2] apply for E-UTRA and NR respectively.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.2B.3.3.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied

6.2B.3.3.4 Test description

Same test description as in clause 6.2.3.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1.

For Initial conditions as in clause 6.2.3.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for the E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3 with E-UTRA channel bandwidth and test frequencies defined in Table 6.2B.3.3.4-1.

3.1. Downlink E-UTRA signals are initially set up according to TS 36.521-1 [10] Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.

4.1. The E-UTRA UL Reference Measurement channels are set according to Table 6.2B.3.3.4-1.

Step 6 of Initial conditions as in clause 6.2.3.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG according to TS 38.508 [6] clause 4.5.

Same test procedure as in clause 6.2.3.4.2 in TS 38.521-1 [8].

6.2B.3.3.5 Test requirement

Same test requirement as in clause 6.2.2.5 in TS 38.521-1 [8].

6.2B.3.4 UE Additional Maximum Output Power reduction for Inter-Band EN-DC including FR2

Editor's note: This test case is incomplete. Following aspects are missing or under discussion:

- Test requirements in referenced TS 38.521-2 [9] test case is incomplete due to missing Test Tolerance

6.2B.3.4.1 Test purpose

Same test purpose as in clause 6.2.3.1 in TS 38.521-2 [9] for the NR carrier.

6.2B.3.4.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2.

6.2B.3.4.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.2.2.3 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.2B.3.4.4 Test description

6.2B.3.4.4.1 Initial conditions

Same test description as in clause 6.2.3.4 in TS 38.521-2 [9] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1. For Initial conditions as in clause 6.2.3.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.2.3.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

6.2B.3.4.4.2 Test procedure

Same test procedure as in clause 6.2.3.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

- 1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.2B.3.4.4.3 Message contents

Message contents are according to TS 38.508-1 [5] clause 4.6 with the following exceptions for each network signalled value.

1. Information element AdditionalSpectrumEmission for NR can be set in *nr-SecondaryCellGroupConfig* according to TS 38.331 [15]. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2B.3.4.4.3-1: AdditionalSpectrumEmission: Additional spurious emissions test requirement

| Derivation Path: TS 38.508-1 [5] clause 4.6.3, Table 4.6.3-1 | | | |
|--|--------------|---------------|-----------|
| Information Element | Value/remark | Comment | Condition |
| AdditionalSpectrumEmission | 1 (NS_201) | for band n258 | |

6.2B.3.4.5 Test requirement

Same test requirement as in clause 6.2.2.5 in TS 38.521-2 [9] for the NR carrier.

6.2B.3.5 UE Additional Maximum Output power reduction for inter-band EN-DC including both FR1 and FR2

6.2B.3.5.1 Test purpose

Same test purpose as in clause 6.2.3.1 in TS 38.521-1 [8] for NR FR1 carrier and clause 6.2.3.1 in TS 38.521-2 [9] for NR FR2 carrier.

6.2B.3.5.2 Test applicability

The requirements in this test are not testable due to issues with combined testing of NR FR1 and E-UTRA in conducted mode with NR FR2 in radiated mode. Therefore, the conducted and radiated requirements are tested separately.

No test case details are specified. The NSA requirements for Additional Maximum Output Power apply and are tested as part of the EN-DC within FR1 and EN-DC including FR2 test cases in clause 6.2B.3.

6.2B.4 Configured Output Power for EN-DC

6.2B.4.1 Configured Output Power Level for EN-DC

6.2B.4.1.0 Minimum Conformance Requirements

6.2B.4.1.0.1 Configured output power level

6.2B.4.1.0.1.1 Intra-band contiguous EN-DC

The following requirements apply for one component carrier per CG configured for synchronous DC.

For intra-band dual connectivity with one uplink serving cell per CG on E-UTRA and NR respectively, the UE is allowed to set its configured maximum output power $P_{CMAX,c(i),i}$ for serving cell $c(i)$ of CG i , $i = 1, 2$, and its total configured maximum transmission power for EN-DC operation $\hat{P}_{Total}^{EN-DC} = 10\log_{10}(\hat{P}_{total}^{EN-DC})$ with \hat{P}_{total}^{EN-DC} as specified in clause 7.6 of TS 38.213 [19].

The configured maximum output power $P_{CMAX_E-UTRA,c}(p)$ in sub-frame p for the configured E-UTRA uplink carrier shall be set within the bounds:

$$P_{CMAX_L_E-UTRA,c}(p) \leq P_{CMAX_E-UTRA,c}(p) \leq P_{CMAX_H_E-UTRA,c}(p)$$

where $P_{CMAX_L_E-UTRA,c}$ and $P_{CMAX_H_E-UTRA,c}$ are the limits for a serving cell c as specified in TS 36.101 [5] clause 6.2.5 modified by P_{LTE} as follows:

$$P_{CMAX_L_E-UTRA,c} = \text{MIN} \{ \text{MIN}(P_{EMAX,c}, P_{EMAX,EN-DC}, P_{LTE}) - \Delta t_{C_E-UTRA,c}, (P_{PowerClass,EN-DC} - \Delta P_{PowerClass,EN-DC}), (P_{PowerClass} - \Delta P_{PowerClass}) - \text{MAX}(MPR_c + A-MPR_c + \Delta T_{IB,c} + \Delta T_{C_E-UTRA,c} + \Delta T_{ProSe}, P-MPR_c) \}$$

$$P_{CMAX_H_E-UTRA,c} = \text{MIN} \{ P_{EMAX,c}, P_{EMAX,EN-DC}, P_{LTE}, P_{PowerClass,EN-DC}, P_{PowerClass} - \Delta P_{PowerClass} \}$$

where

- $P_{EMAX,EN-DC}$ is the value given by the field $p\text{-maxUE-FRI}$ of the *RRConnectionReconfiguration-v1530* IE as defined in TS 36.331 [17];
- P_{LTE} is the value given by the field $p\text{-maxEUTRA-r15}$ of the *RRConnectionReconfiguration-v1510* IE as defined in TS 36.331 [17] which is the same as P_{LTE} in TS 38.213 [19];
- $\Delta t_{C_EUTRA,c} = 1.5$ dB when NOTE 2 in Table 6.2.2-1 of TS 36.101 [5] applies; $\Delta t_{C_EUTRA,c} = 0$ dB otherwise;

and whenever NS_01 is not indicated within CG 1:

- for a UE indicating support of dynamicPowerSharing, the MPR_c and the A-MPR_c are determined in accordance with the DCI of serving cell c of the CG 1 and the specification in clause 6.2.4 of TS 36.101 [5];
- for a UE not indicating support of dynamicPowerSharing, the A-MPR_c is determined in accordance with clause 6.2B.3.1 with parameters applicable for UEs not indicating support of dynamicPowerSharing and MPR_c = 0 dB;

and whenever NS_01 is indicated in CG 1:

- for a UE indicating support of dynamicPowerSharing, the MPR_c is determined in accordance with the DCI of serving cell c of the CG 1 and the specification in clause 6.2.4 of TS 36.101 [5];
- for a UE not indicating support of dynamicPowerSharing, the MPR_c is determined in accordance with clause 6.2B.2.1 with parameters applicable for UEs not indicating support of dynamicPowerSharing and A-MPR_c = 0 dB;

The configured maximum output power $P_{CMAX_NR,c}(q)$ in physical channel q for the configured NR carrier shall be set within the bounds:

$$P_{CMAX_L,f,c,,NR}(q) \leq P_{CMAX,f,c,NR}(q) \leq P_{CMAX_H,f,c,NR}(q)$$

where $P_{C\text{MAX},L,\text{NR},c}$ and $P_{C\text{MAX},H,\text{NR},c}$ are the limits for a serving cell c as specified in clause 6.2.4 of TS 38.101-1 [2] modified as follows:

$$P_{C\text{MAX},L,f,c,NR} = \min \{ \min(P_{\text{EMAX},c}, P_{\text{EMAX},\text{EN-DC}}, P_{\text{NR}}) - \Delta T_{C,\text{NR},c}, (P_{\text{PowerClass},\text{EN-DC}} - \Delta P_{\text{PowerClass},\text{EN-DC}}), (P_{\text{PowerClass}} - \Delta P_{\text{PowerClass}}) - \max(\max(MPR_c, A-MPR_c) + \Delta T_{IB,c} + \Delta T_{C,\text{NR},c} + \Delta T_{RxSRS}, P-MPR_c) \}$$

$$P_{C\text{MAX},H,f,c,NR} = \min \{ P_{\text{EMAX},c}, P_{\text{EMAX},\text{EN-DC}}, P_{\text{NR}}, P_{\text{PowerClass},\text{EN-DC}}, P_{\text{PowerClass}} - \Delta P_{\text{PowerClass}} \}$$

where

- $P_{\text{EMAX},\text{EN-DC}}$ is the value given by the field *p-maxUE-FRI* of the *RRConnectionReconfiguration-v1530* IE as defined in TS 36.331 [17];

- P_{LTE} signalled by RRC as *p-MaxEUTRA-r15* in TS 36.331 [17]

- P_{NR} is the value given by the field *p-NR-FRI* of the *PhysicalCellGroupConfig* IE as defined in [18] and signalled by RRC;

- $\Delta T_{C,E-\text{UTRA},c} = 1.5\text{dB}$ when NOTE 2 in Table 6.2.2-1 in TS 36.101 [4] applies for a serving cell c , otherwise $\Delta T_{C,E-\text{UTRA},c} = 0\text{dB}$;

- $\Delta T_{C,\text{NR},c} = 1.5\text{dB}$ when NOTE 3 in Table 6.2.1-1 in TS 38.101-1 [2] applies for a serving cell c , otherwise $\Delta T_{C,\text{NR},c} = 0\text{dB}$;

$P_{\text{PowerClass},\text{EN-DC}}$ is defined in clause 6.2B.1.1 for intra-band contiguous EN-DC;

- $\Delta P_{\text{PowerClass},\text{EN-DC}}$ is 3 dB for a power class 2 capable EN-DC UE when LTE UL/DL configuration is 0 or 6; or LTE UL/DL configuration is 1 and special subframe configuration is 0 or 5; $\Delta P_{\text{PowerClass},\text{EN-DC}} = 3\text{ dB}$ when the IE *p-maxUE-FRI* as defined in TS 36.331 [17] is provided and set to the maximum output power of the default power class or lower; otherwise $\Delta P_{\text{PowerClass},\text{EN-DC}} = 0\text{ dB}$;

- $P_{\text{PowerClass},\text{NR}}$ is the nominal UE power of the power class that the UE supports for the NR band of the EN-DC combination as defined in clause 6.2.1 of 38.101-1 [2]; in case IE [*powerClassNRPart*] as defined in TS 38.331 [18] is indicated, $P_{\text{PowerClass},\text{NR}}$ should use that value instead.

- $P_{\text{PowerClass},\text{E-UTRA}}$ is the nominal UE power of the power class that the UE supports for the E-UTRA band of the EN-DC combination as defined in clause 6.2.2 of 36.101 [5];-

$\Delta P_{\text{PowerClass},\text{EN-DC}}$ is 3 dB for a power class 2 capable EN-DC UE when LTE UL/DL configuration is 0 or 6; or LTE UL/DL configuration is 1 and special subframe configuration is 0 or 5; $\Delta P_{\text{PowerClass},\text{EN-DC}} = 3\text{ dB}$ when the IE *p-maxUE-FRI* as defined in TS 36.331 [17] is provided and set to the maximum output power of the default power class or lower; $\Delta P_{\text{PowerClass},\text{EN-DC}}$ is 6 dB for a power class 1.5 capable EN-DC UE when the LTE UL duty cycle is greater than $\max(50\%, \text{maxUplinkDutyCycle})$; $\Delta P_{\text{PowerClass},\text{EN-DC}}$ is 3 dB for a power class 1.5 capable EN-DC UE when the LTE UL duty cycle is between $\max(50\%, \text{maxUplinkDutyCycle})$ and $\max(25\%, \text{maxUplinkDutyCycle}/2)$; otherwise $\Delta P_{\text{PowerClass},\text{EN-DC}} = 0\text{ dB}$;

and whenever NS_01 is not indicated within CG 2:

- for a UE indicating support of dynamicPowerSharing, $A-MPR_c = A-MPR'_c$ with $A-MPR'_c$ determined in accordance with clause 6.2B.3.1 and $MPR_c = 0\text{ dB}$ if transmission(s) in subframe p on CG 1 overlap in time with physical channel q on CG 2;
- for a UE indicating support of dynamicPowerSharing, $A-MPR_c$ is determined in accordance with TS 38.101-1 [2] if transmission(s) in subframe p on CG 1 does not overlap in time with physical channel q on CG 2;
- for a UE not indicating support of dynamicPowerSharing, the $A-MPR_c$ is determined in accordance with clause 6.2B.3.1 with parameters applicable for UEs not indicating support of dynamicPowerSharing and $MPR_c = 0\text{ dB}$;

and whenever NS_01 is indicated in CG 2.

- for a UE indicating support of dynamicPowerSharing, $MPR_c = MPR'_c$ with MPR'_c determined in accordance with clause 6.2B.2.1 and $A-MPR_c = 0\text{ dB}$ if transmission(s) in subframe p on CG 1 overlap in time with physical channel q on CG 2;
- for a UE indicating support of dynamicPowerSharing, MPR_c is determined in accordance with TS 38.101-1 [2] if transmission(s) in subframe p on CG 1 does not overlap in time with physical channel q on CG 2;

- for a UE not indicating support of dynamicPowerSharing, the MPRc is determined in accordance with clause 6.2B.2.1 with parameters applicable for UEs not indicating support of dynamicPowerSharing and A-MPRc = 0 dB;

If the transmissions from NR and E-UTRA do not overlap, then the complete clauses for configured transmitted power for E-UTRA and NR respectively from their own specifications apply with the modifications specified above. The lower value between $P_{\text{PowerClass, EN-DC}}$ or $P_{\text{EMAX, EN-DC}}$ shall not be exceeded at any time by UE.

If the EN-DC UE is not supporting dynamic power sharing, then the complete clauses for configured transmitted power for E-UTRA and NR respectively from their own specifications TS 36.101 [5] and TS 38.101-1 [2] respectively apply with the modifications specified above.

If the UE does not support dynamic power sharing,

$$P_{\text{Total}}^{\text{EN-DC}} = \text{MIN} \{ P_{\text{EMAX, EN-DC}}, P_{\text{PowerClass, EN-DC}} - \Delta P_{\text{PowerClass, EN-DC}} \} + 0.3 \text{ dB}$$

For UEs indicating support of dynamicPowerSharing in the *UE-MRDC-Capability* IE the UE can configure the total maximum transmission power $P_{\text{Total}}^{\text{EN-DC}}$ within the range

$$P_{\text{EN-DC,tot,L}} \leq P_{\text{Total}}^{\text{EN-DC}} \leq P_{\text{EN-DC,tot,H}}$$

where

$$P_{\text{EN-DC,tot,L}}(p, q) = \text{MIN} \{ P_{\text{PowerClass, EN-DC}} - \Delta P_{\text{PowerClass, EN-DC}} - \text{MAX} \{ \text{MPR}_{\text{tot}}, \text{A-MPR}_{\text{tot}} \}, P_{\text{EMAX, EN-DC}} \}$$

$$P_{\text{EN-DC,tot,H}}(p, q) = \text{MIN} \{ P_{\text{PowerClass, EN-DC}}, P_{\text{EMAX, EN-DC}} \}$$

for sub-frame p on CG 1 overlapping with physical channel q on CG 2 and with MPR_{tot} and $\text{A-MPR}_{\text{tot}}$ in accordance with 6.2B.2.1 and clause 6.2B.3.1, respectively.

The measured total maximum output power P_{UMAX} over both CGs/RATs, measured over the transmission reference time duration is

$$P_{\text{UMAX}} = 10 \log_{10} [p_{\text{UMAX,c,E-UTRA}} + p_{\text{UMAX,f,c,NR}}],$$

where $p_{\text{UMAX,c,E-UTRA}}$ and $p_{\text{UMAX,f,c,NR}}$ denotes the measured output power of serving cell c for *E-UTRA and NR* respectively, expressed in linear scale.

For UEs indicating support of dynamicPowerSharing, the measured total configured maximum output power P_{UMAX} shall be within the following bounds:

$$P_{\text{CMAX,L}} - T_{\text{LOW}}(P_{\text{CMAX,L}}) \leq P_{\text{UMAX}} \leq P_{\text{CMAX,H}} + T_{\text{HIGH}}(P_{\text{CMAX,H}})$$

with the tolerances $T_{\text{LOW}}(P_{\text{CMAX,L}})$ and $T_{\text{HIGH}}(P_{\text{CMAX,H}})$ for applicable values of $P_{\text{CMAX,L}}$ and $P_{\text{CMAX,H}}$ specified in Table 6.2B.4.1.0.1.1-2.

When an UL subframe transmission p from E-UTRA overlap with a physical channel q from the NR, then for P_{UMAX} evaluation, the E-UTRA subframe p is taken as reference period T_{REF} and always considered as the reference measurement duration and the following rules are applicable.

T_{REF} and T_{eval} are specified in Table 6.2B.4.1.0.1.1-1 when same or different subframes and physical channel durations are used in aggregated carriers. $P_{\text{PowerClass, EN-DC}}$ shall not be exceeded by the UE during any evaluation period of time.

Table 6.2B.4.1.0.1.1-1: P_{CMAX} evaluation window

| transmission duration | T_{REF} | T_{eval} |
|---|------------------|---|
| Different transmission duration in different RAT carriers | E-UTRA Subframe | Min($T_{\text{no_hopping}}$, Physical Channel Length) |

For each T_{REF} , the $P_{\text{CMAX,H}}$ is evaluated per T_{eval} and given by the maximum value over the transmission(s) within the T_{eval} as follows:

$$P_{\text{CMAX,H}} = \text{MAX} \{ P_{\text{CMAX,EN-DC,H}}(p, q), P_{\text{CMAX,EN-DC,H}}(p, q+I), \dots, P_{\text{CMAX,EN-DC,H}}(p, q+n) \}$$

where $P_{CMAX_EN-DC_H}$ are the applicable upper limits for each overlapping scheduling unit pairs $(p,q), (p, q+1), \dots, (p, q+n)$ for each applicable T_{eval} duration, where $q+n$ is the last NR UL physical channel overlapping with LTE subframe p .

While P_{CMAX_L} is computed as follows:

$$P_{CMAX_L} = \text{MIN} \{ P_{CMAX_EN-DC_L}(p,q), P_{CMAX_EN-DC_L}(p,q+1), \dots, P_{CMAX_EN-DC_L}(p,q+n) \}$$

where $P_{CMAX_EN-DC_L}$ are the applicable lower limits for each overlapping scheduling unit pairs $(p,q), (p, q+1), \dots, (p, q+n)$ for each applicable T_{eval} duration, where $q+n$ is the last NR UL physical channel overlapping with E-UTRA subframe p ,

With

$$P_{CMAX_EN-DC_H}(p,q) = \text{MIN} \{ 10 \log_{10} [p_{CMAX_H_E-UTRA,c}(p) + p_{CMAX_H,f,c,NR_c}(q)], P_{EMAX, EN-DC}, P_{PowerClass, EN-DC} \}$$

And:

$$a = 10 \log_{10} [p_{CMAX_E-UTRA,c}(p) + p_{CMAX,f,c,NR}(q)] > P_{EN-DC,tot_L}$$

$$b = 10 \log_{10} [p_{CMAX_E-UTRA,c}(p) + p_{CMAX,f,c,NR}(q) / X_scale] > P_{EN-DC,tot_L}$$

If $a = \text{FALSE}$ and the configured transmission power spectral density between the MCG and SCG differs by less than [6] dB

$$P_{CMAX_EN-DC_L}(p,q) = \text{MIN} \{ 10 \log_{10} [p_{CMAX_L_E-UTRA,c}(p) + p_{CMAX_L,f,c,NR_c}(q)], P_{EMAX, EN-DC}, P_{PowerClass, EN-DC} - \Delta P_{PowerClass, EN-DC} \}$$

ELSE If ($a=\text{TRUE}$) AND ($b=\text{FALSE}$) and the configured transmission power spectral density between the MCG and SCG differs by less than [6] dB

$$P_{CMAX_EN-DC_L}(p,q) = \text{MIN} \{ 10 \log_{10} [p_{CMAX_L_E-UTRA,c}(p) + p_{CMAX_L,f,c,NR_c}(q) / X_scale], P_{EMAX, EN-DC}, P_{PowerClass, EN-DC} - \Delta P_{PowerClass, EN-DC} \}$$

ELSE If $b = \text{TRUE}$ or the transmission power after power scaling spectral density between the MCG and SCG differs by more than [6] dB

$$P_{CMAX_EN-DC_L}(p,q) = \text{MIN} \{ 10 \log_{10} [p_{CMAX_L_E-UTRA,c}(p)], P_{EMAX, EN-DC}, P_{PowerClass, EN-DC} - \Delta P_{PowerClass, EN-DC} \}$$

where

- $p_{CMAX_H_E-UTRA,c}(p)$ is the E-UTRA higher limit of the maximum configured power expressed in linear scale;
- $p_{CMAX_H_NR,c}(q)$ is the NR higher limit of the maximum configured power expressed in linear scale;
- $p_{CMAX_L_E-UTRA,c}(p)$ is the E-UTRA lower limit of the maximum configured power expressed in linear scale;
- $p_{CMAX_L_NR,c}(q)$ is the NR lower limit of the maximum configured power expressed in linear scale;
- $P_{PowerClass, EN-DC}$ is defined in clause 6.2B.1.1.3-1 for intra-band EN-DC;
- X_scale is the linear value of X dB which is configured by RRC and can only take values [0, 6] dB
- $p_{CMAX_E-UTRA,c}(p)$ is the linear value of $P_{CMAX_E-UTRA,c}(p)$, the real configured max power for E-UTRA
- $p_{CMAX,f,c,NR}(q)$ is the linear value of $P_{CMAX,f,c,NR}(q)$, the real configured max power of NR

Table 6.2B.4.1.0.1.1-2: P_{CMAX} tolerance for Dual Connectivity E-UTRANR

| P_{CMAX} (dBm) | Tolerance $T_{LOW}(P_{CMAX_L})$ (dB) | Tolerance $T_{HIGH}(P_{CMAX_H})$ (dB) |
|------------------|--|---|
|------------------|--|---|

| | | |
|----------------------------|-------|-------|
| $23 \leq P_{CMAX} \leq 33$ | [3.0] | [2.0] |
| $22 \leq P_{CMAX} < 23$ | [5.0] | [2.0] |
| $21 \leq P_{CMAX} < 22$ | [5.0] | [3.0] |
| $20 \leq P_{CMAX} < 21$ | [6.0] | [4.0] |
| $16 \leq P_{CMAX} < 20$ | | [5.0] |
| $11 \leq P_{CMAX} < 16$ | | [6.0] |
| $-40 \leq P_{CMAX} < 11$ | | [7.0] |

If the UE supports dynamic power sharing, and when LTE and NR transmissions overlap and the condition (If (a=TRUE) AND (b=FALSE)) is met, SCG shall be transmitted and the following supplementary minimum requirement apply for the measured SCG power, $P_{UMAX,f,c,NR}(q)$, under nominal conditions and unless otherwise stated.

$$10\log(p_{CMAX_L,f,c,NR}(q)/X_scale) - T_{LOW}(10\log(p_{CMAX_L,f,c,NR}(q)/X_scale)) \leq P_{UMAX,f,c,NR}(q) \leq 10\log(p_{CMAX_H,f,c,NR}(q)) + T_{HIGH}(10\log(p_{CMAX_H,f,c,NR}(q))).$$

with the tolerances T_{LOW} and T_{HIGH} for applicable values of P_{CMAX} specified in Table 6.2B.4.1.0.1.1-2.

If the UE supports dynamic power sharing, the measured maximum output power in subframe p on CG 1, $P_{UMAX,c,E-UTRA}$, shall meet the requirements in clause 6.2.5 in TS 36.101 [5] with the limits $P_{CMAX_L,c}$ and $P_{CMAX_H,c}$ replaced by $P_{CMAX_L_E-UTRA,c}$ and $P_{CMAX_H_E-UTRA,c}$ as specified above, respectively.

If the configured transmission power spectral density between the MCG and SCG differs by more than [6] dB, then

$$P_{UMAX,f,c,NR}(q) \leq 10\log(p_{CMAX_H,f,c,NR}(q)) + T_{HIGH}(10\log(p_{CMAX_H,f,c,NR}(q))).$$

6.2B.4.1.0.1.2 Intra-band non-contiguous EN-DC

The following requirements apply for one component carrier per CG configured for synchronous DC. The CG(s) are indexed by $j = 1$ for MCG and $j = 2$ for SCG.

The configured maximum output power $P_{CMAX_E-UTRA,c}(p)$ in sub-frame p for the configured E-UTRA uplink carrier shall be set in accordance with clause 6.2B.4.1.0.1.1 but where

- for a UE not indicating support of dynamicPowerSharing, the A-MPR_c determined in accordance with clause 6.2B.3.2 with parameters applicable for UEs not indicating support of dynamicPowerSharing and MPR_c = 0 dB;

whenever NS_01 is not indicated within CG 1 while

- for a UE not indicating support of dynamicPowerSharing, the MPR_c determined in accordance with clause 6.2B.2.2 with parameters applicable for UEs not indicating support of dynamicPowerSharing and A-MPR_c = 0 dB;

whenever NS_01 is indicated in CG 1.

The configured maximum output power $P_{CMAX_NR,c}(q)$ in physical channel q for the configured NR carrier shall be set in accordance with clause 6.2B.4.1.0.1.1 but where

- for a UE indicating support of dynamicPowerSharing, A-MPR_c = A-MPR'_c with A-MPR'_c determined in accordance with clause 6.2B.3.2 and MPR_c = 0 dB if transmission(s) in subframe p on CG 1 overlap in time with physical channel q on CG 2;
- for a UE indicating support of dynamicPowerSharing, A-MPR_c is determined in accordance with [2] if transmission(s) in subframe p on CG 1 does not overlap in time with physical channel q on CG 2;
- for a UE not indicating support of dynamicPowerSharing, the A-MPR_c is determined in accordance with clause 6.2B.3.2 with parameters applicable for UEs not indicating support of dynamicPowerSharing and MPR_c = 0 dB;

For UEs indicating support of dynamicPowerSharing in the *UE-MRDC-Capability IE*, the UE can configure the total transmission power in accordance with clause 6.2B.4.1.0.1.1 but with $P_{powerclass,EN-DC}$ the EN-DC power class of the intra-band non-contiguous band combination configured and A-MPR determined in accordance with clause 6.2B.3.2.

whenever NS_01 is not indicated in CG 2 while

- for a UE indicating support of dynamicPowerSharing, $MPR_c = MPR'_c$ with MPR'_c determined in accordance with clause 6.2B.2.2 and $A-MPR_c = 0$ dB if transmission(s) in subframe p on CG 1 overlap in time with physical channel q on CG 2;
- for a UE indicating support of dynamicPowerSharing, MPR_c is determined in accordance with TS 38.101-1 [2] if transmission(s) in subframe p on CG 1 does not overlap in time with physical channel q on CG 2;
- for a UE not indicating support of dynamicPowerSharing, the MPR_c is determined in accordance with clause 6.2B.2.2 with parameters applicable for UEs not indicating support of dynamicPowerSharing and $A-MPR_c = 0$ dB;

whenever NS_01 is indicated in CG 2.

For UEs indicating support of dynamicPowerSharing in the *UE-MRDC-Capability IE*, the UE can configure the total transmission power in accordance with clause 6.2B.4.1.1 but with $P_{\text{powerclass}, \text{EN-DC}}$ the EN-DC power class of the intra-band non-contiguous band combination configured and $A-MPR$ determined in accordance with clause 6.2B.3.2.

The total maximum output power P_{UMAX} over both CGs is measured in accordance with clause 6.2B.4.1.0.1.1 and shall be within the limits specified in clause 6.2B.4.1.0.1.1 but with parameters applicable for the non-contiguous band combination configured.

The maximum output power levels $p_{\text{UMAX}, c, E-\text{UTRA}}$ and $p_{\text{UMAX}, f, c, NR}$ for the CGs are measured in accordance with clause 6.2B.4.1.0.1.1 and shall be within the limits specified in clause 6.2B.4.1.0.1.1 but with parameters applicable for the non-contiguous band combination configured.

6.2B.4.1.0.1.3 Inter-band EN-DC within FR1

For inter-band dual connectivity with one uplink serving cell per CG on E-UTRA and NR respectively, the UE is allowed to set its configured maximum output power $P_{\text{CMAX}, c(i), i}$ for serving cell $c(i)$ of CG i , $i = 1, 2$, and its total configured maximum transmission power for EN-DC operation, $P_{\text{Total}}^{\text{EN-DC}} = 10\log_{10}(\hat{P}_{\text{total}}^{\text{EN-DC}})$ with $\hat{P}_{\text{total}}^{\text{EN-DC}}$ as specified in clause 7.6 of TS 38.213 [19].

The configured maximum output power $P_{\text{CMAX}_E-\text{UTRA}, c}(p)$ in sub-frame p for the configured E-UTRA uplink carrier shall be set within the bounds:

$$P_{\text{CMAX}_L-E-\text{UTRA}, c}(p) \leq P_{\text{CMAX}_E-\text{UTRA}, c}(p) \leq P_{\text{CMAX}_H-E-\text{UTRA}, c}(p)$$

where $P_{\text{CMAX}_L-E-\text{UTRA}, c}$ and $P_{\text{CMAX}_H-E-\text{UTRA}, c}$ are the limits for a serving cell c as specified in TS 36.101 [5] clause 6.2.5 modified by P_{LTE} as follows:

$$P_{\text{CMAX}_L-E-\text{UTRA}, c} = \min \{ P_{\text{EMAX}, \text{EN-DC}}, (P_{\text{PowerClass}, \text{EN-DC}} - \Delta P_{\text{PowerClass}}), \min(P_{\text{EMAX}, c}, P_{\text{LTE}}) - \Delta t_{C-E-\text{UTRA}, c}, (P_{\text{PowerClass}} - \Delta P_{\text{PowerClass}}) - \max(MPR_c + A-MPR_c + \Delta T_{IB, c} + \Delta T_{C-E-\text{UTRA}, c} + \Delta T_{\text{ProSe}}, P-MPR_c) \}$$

$$P_{\text{CMAX}_H-E-\text{UTRA}, c} = \min \{ P_{\text{EMAX}, c}, P_{\text{EMAX}, \text{EN-DC}}, (P_{\text{PowerClass}, \text{EN-DC}} - \Delta P_{\text{PowerClass}}), P_{\text{LTE}}, P_{\text{PowerClass}} - \Delta P_{\text{PowerClass}} \}$$

The configured maximum output power $P_{\text{CMAX}_N, c}(q)$ in physical-channel q for the configured NR carrier shall be set within the bounds:

$$P_{\text{CMAX}_L, f, c, NR}(q) \leq P_{\text{CMAX}_f, c, NR}(q) \leq P_{\text{CMAX}_H, f, c, NR}(q)$$

where $P_{\text{CMAX}_L-N, c}$ and $P_{\text{CMAX}_H-N, c}$ are the limits for a serving cell c as specified in clause 6.2.4 of TS 38.101-1 [2] modified as follows:

$$P_{\text{CMAX}_L, f, c, NR} = \min \{ P_{\text{EMAX}, \text{EN-DC}}, (P_{\text{PowerClass}, \text{EN-DC}} - \Delta P_{\text{PowerClass}}), \min(P_{\text{EMAX}, c}, P_{\text{NR}}) - \Delta t_{C-NR, c}, (P_{\text{PowerClass}} - \Delta P_{\text{PowerClass}}) - \max(MPR_c + A-MPR_c + \Delta T_{IB, c} + \Delta T_{C-NR, c} + \Delta T_{\text{RxSRS}}, P-MPR_c) \}$$

$$P_{\text{CMAX}_H, f, c, NR} = \min \{ P_{\text{EMAX}, c}, P_{\text{EMAX}, \text{EN-DC}}, (P_{\text{PowerClass}, \text{EN-DC}} - \Delta P_{\text{PowerClass}}), P_{\text{NR}}, P_{\text{PowerClass}} - \Delta P_{\text{PowerClass}} \}$$

where

- $P_{\text{EMAX}, \text{EN-DC}}$ is the value given by the field *p-maxUE-FR1* of the *RRCCConnectionReconfiguration-v1530* IE as defined in TS 36.331 [17];
- P_{LTE} is the value given by the field *p-maxEUTRA-r15* of the *RRCCConnectionReconfiguration-v1510* IE as defined in TS 36.331 [17];

- P_{NR} is the value given by the field $p-NR-FRI$ of the *PhysicalCellGroupConfig* IE as defined TS 38.331 [18];
- $\Delta T_{c_E-UTRA,c} = 1.5$ dB when NOTE 2 in Table 6.2.2-1 in TS 36.101 [5] applies for a serving cell c , otherwise $\Delta T_{c_E-UTRA,c} = 0$ dB;
- $\Delta T_{C_NR,c} = 1.5$ dB when NOTE 3 in Table 6.2.1-1 in TS 38.101-1 [2] applies for a serving cell c , otherwise $\Delta T_{C_NR,c} = 0$ dB;
- $P_{PowerClass, EN-DC}$ is defined in clause 6.2B.1.3 for inter-band EN-DC;
- $P_{PowerClass,NR}$ is the nominal UE power of the power class that the UE supports for the NR band of the EN-DC combination as defined in clause 6.2.1 of 38.101-1 [2]; in case IE [*powerClassNRPart*] as defined in TS 38.331 [18] is indicated, $P_{PowerClass,NR}$ should use that value instead.
- $P_{PowerClass,E-UTRA}$ is the nominal UE power of the power class that the UE supports for the E-UTRA band of the EN-DC combination as defined in clause 6.2.2 of 36.101 [5];
- $\Delta T_{IB,c}$ specified in clause 6.2B.4.2.3 for EN-DC, the individual Power Class defined in table 6.2B.1.3 and any other additional power reductions parameters specified in clauses 6.2B.2 and 6.2B.3 for EN-DC are applicable to $P_{CMAX_E-UTRA,c}$ and $P_{CMAX_NR,c}$ evaluations.
- $\Delta P_{PowerClass,EN-DC} = 3$ dB for a power class 2 capable EN-DC UE when requirements of default power class had been applied as specified in sub-clause 6.2B.1; otherwise $\Delta P_{PowerClass,EN-DC} = 0$ dB;

If the transmissions from NR and E-UTRA do not overlap, then the complete clauses for configured transmitted power for E-UTRA and NR respectively from their own specifications apply with the modifications specified above. The lower value between $P_{PowerClass, EN-DC}$ or $P_{EMAX, EN-DC}$ shall not be exceeded at any time by UE.

$P_{Total}^{EN-DC} = 10\log_{10}(\hat{P}_{total}^{EN-DC})$ with P_{Total}^{EN-DC} the configured maximum transmission power for EN-DC operation as specified in clause 7.6 of TS 38.213 [19].

The total configured maximum transmission power for both synchronous and non-synchronous operation is

$$P_{Total}^{EN-DC} = \text{MIN} \{ P_{EMAX, EN-DC}, P_{PowerClass, EN-DC} - \Delta P_{PowerClass} \}$$

If the UE does not support dynamic power sharing,

$$P_{Total}^{EN-DC} = \text{MIN} \{ P_{EMAX, EN-DC}, P_{PowerClass, EN-DC} - \Delta P_{PowerClass, EN-DC} \} + 0.3 \text{ dB}$$

If the EN-DC UE does not support dynamic power sharing, then the complete clauses for configured transmitted power for E-UTRA and NR respectively from their own specifications TS 36.101 [5] and TS 38.101-1 [2] respectively apply with the modifications specified above and P_{Total}^{EN-DC} applies.

When a UE supporting dynamic sharing is configured for overlapping E-UTRA uplink and NR uplink transmissions, the UE can set its configured maximum output power $P_{CMAX_E-UTRA,c}$ and $P_{CMAX_NR,c}$ for the configured E-UTRA and NR uplink carriers, respectively, and its configured maximum transmission power for EN-DC operation, \hat{P}_{Total}^{EN-DC} , as specified above.

The measured total maximum output power P_{UMAX} over both CGs/RATs, measured over the transmission reference time duration is

$$P_{UMAX} = 10 \log_{10} [p_{UMAX,c,E-UTRA} + p_{UMAX,c,NR}],$$

where $p_{UMAX,c,E-UTRA}$ and $p_{UMAX,c,NR}$ denotes the measured output power of serving cell c for E-UTRA and NR respectively, expressed in linear scale.

The measured total configured maximum output power P_{UMAX} shall be within the following bounds:

$$P_{CMAX_L} \cdot T_{LOW}(P_{CMAX_L}) \leq P_{UMAX} \leq P_{CMAX_H} + T_{HIGH}(P_{CMAX_H})$$

with the tolerances $T_{LOW}(P_{CMAX_H})$ and $T_{HIGH}(P_{CMAX_H})$ for applicable values of P_{CMAX} specified in Table 6.2B.4.1.0.1.3-2.

When an UL subframe transmission p from E-UTRA overlap with a physical-channel q from the NR, then for P_{UMAX} evaluation, the E-UTRA subframe p is taken as reference period T_{REF} and always considered as the reference measurement duration and the following rules are applicable.

T_{REF} and T_{eval} are specified in Table 6.2B.4.1.0.1.3-1 when same or different subframe and physical-channel durations are used in aggregated carriers. $P_{PowerClass,EN-DC}$ shall not be exceeded by the UE during any evaluation period of time.

Table 6.2B.4.1.0.1.3-1: P_{CMAX} evaluation window

| transmission duration | T_{REF} | T_{eval} |
|---|-----------------|---|
| Different transmission duration in different RAT carriers | E-UTRA Subframe | $\text{Min}(T_{no_hopping}, \text{Physical Channel Length})$ |

For each T_{REF} , the P_{CMAX_H} is evaluated per T_{eval} and given by the maximum value over the transmission(s) within the T_{eval} as follows:

$$P_{CMAX_H} = \text{MAX} \{ P_{CMAX_EN-DC_H}(p, q), P_{CMAX_EN-DC_H}(p, q+I), \dots, P_{CMAX_EN-DC_H}(p, q+n) \}$$

where $P_{CMAX_EN-DC_H}$ are the applicable upper limits for each overlapping scheduling unit pairs (p, q) , $(p, q+I)$, up to $(p, q+n)$ for each applicable T_{eval} duration, where $q+n$ is the last NR UL physical-channel overlapping with E-UTRA subframe p.

While P_{CMAX_L} is computed as follows:

$$P_{CMAX_L} = \text{MIN} \{ P_{CMAX_EN-DC_L}(p, q), P_{CMAX_EN-DC_L}(p, q+I), \dots, P_{CMAX_EN-DC_L}(p, q+n) \}$$

where $P_{CMAX_EN-DC_L}$ are the applicable lower limits for each overlapping scheduling unit pairs (p, q) , $(p, q+I)$, up to $(p, q+n)$ for each applicable T_{eval} duration, where $q+n$ is the last NR UL physical-channel overlapping with E-UTRA subframe p,

With

$$P_{CMAX_EN-DC_H}(p, q) = \text{MIN} \{ 10 \log_{10} [p_{CMAX_H_E-UTRA,c}(p) + p_{CMAX_H,f,c,NR,c}(q)], P_{EMAX,EN-DC}, P_{PowerClass,EN-DC} \}$$

And:

$$a = 10 \log_{10} [p_{CMAX_E-UTRA,c}(p) + p_{CMAX,f,c,NR}(q)] > P_{Total}^{EN-DC}$$

$$b = 10 \log_{10} [p_{CMAX_E-UTRA,c}(p) + p_{CMAX,f,c,NR}(q) / X_scale] > P_{Total}^{EN-DC}$$

If $a = \text{FALSE}$

$$P_{CMAX_EN-DC_L}(p, q) = \text{MIN} \{ 10 \log_{10} [p_{CMAX_L_E-UTRA,c}(p) + p_{CMAX_L,f,c,NR,c}(q)], P_{EMAX,EN-DC}, P_{PowerClass,EN-DC} \}$$

ELSE If ($a=\text{TRUE}$) AND ($b=\text{FALSE}$)

$$P_{CMAX_EN-DC_L}(p, q) = \text{MIN} \{ 10 \log_{10} [p_{CMAX_L_E-UTRA,c}(p) + p_{CMAX_L,f,c,NR,c}(q) / X_scale], P_{EMAX,EN-DC}, P_{PowerClass,EN-DC} \}$$

ELSE If $b = \text{TRUE}$

$$P_{CMAX_EN-DC_L}(p, q) = \text{MIN} \{ 10 \log_{10} [p_{CMAX_L_E-UTRA,c}(p)], P_{EMAX,EN-DC}, P_{PowerClass,EN-DC} \}$$

where

- $p_{CMAX_H_E-UTRA,c}(p)$ is the E-UTRA higher limit of the maximum configured power expressed in linear scale;
- $p_{CMAX_H_NR,c}(q)$ is the NR higher limit of the maximum configured power expressed in linear scale;
- $p_{CMAX_L_E-UTRA,c}(p)$ is the E-UTRA lower limit of the maximum configured power expressed in linear scale;
- $p_{CMAX_L_NR,c}(q)$ is the NR lower limit of the maximum configured power expressed in linear scale;
- $P_{PowerClass,EN-DC}$ is defined in clause 6.2B.1.3-1 for inter-band EN-DC;
- X_scale is the linear value of X dB which is configured by RRC and can only take values [0, 6]
- $p_{CMAX_E-UTRA,c}(p)$ is the linear value of $P_{CMAX_E-UTRA,c}(p)$, the real configured max power for LTE
- $p_{CMAX,f,c,NR}(q)$ is the linear value of $P_{CMAX,f,c,NR}(q)$, the real configured max power of NR

Table 6.2B.4.1.0.1.3-2: $P_{C\text{MAX}}$ tolerance for Dual Connectivity E-UTRANR

| $P_{C\text{MAX}}(\text{dBm})$ | Tolerance $T_{\text{LOW}}(P_{C\text{MAX},\text{L}})$ (dB) | Tolerance $T_{\text{HIGH}}(P_{C\text{MAX},\text{H}})$ (dB) |
|--|--|---|
| $23 \leq P_{C\text{MAX}} \leq 33$ | [3.0] | [2.0] |
| $22 \leq P_{C\text{MAX}} < 23$ | [5.0] | [2.0] |
| $21 \leq P_{C\text{MAX}} < 22$ | [5.0] | [3.0] |
| $20 \leq P_{C\text{MAX}} < 21$ | [6.0] | [4.0] |
| $16 \leq P_{C\text{MAX}} < 20$ | | [5.0] |
| $11 \leq P_{C\text{MAX}} < 16$ | | [6.0] |
| $-40 \leq P_{C\text{MAX}} < 11$ | | [7.0] |
| NOTE 1: For UEs not indicating support of dynamic power sharing, the upper tolerance T_{high} shall be reduced by 0.3 dB for $P \geq 20$ dBm. | | |

When E-UTRA and NR transmissions overlap and the condition (If (a=TRUE) AND (b=FALSE)) is met, SCG shall be transmitted and the following supplementary minimum requirement apply for the measured SCG power, $P_{U\text{MAX},f,c,NR}(q)$, under nominal conditions.

$$10\log(p_{C\text{MAX},L,f,c,NR,c}(q)/X_{\text{scale}}) - T_{\text{LOW}}(10\log(p_{C\text{MAX},L,f,c,NR,c}(q)/X_{\text{scale}})) \leq P_{U\text{MAX},f,c,NR}(q) \leq 10\log(p_{C\text{MAX},H,f,c,NR,c}(q)) + T_{\text{HIGH}}(10\log(p_{C\text{MAX},H,f,c,NR,c}(q))).$$

with the tolerances T_{LOW} and T_{HIGH} for applicable values of $P_{C\text{MAX}}$ specified in Table 6.2B.4.1.0.1.3-2.

6.2B.4.1.0.1.4 Inter-band EN-DC including FR2

For inter-band dual connectivity with one uplink serving cell per CG on E-UTRA and NR respectively, with NR configured in FR2, the UE is allowed to set its configured maximum output power $P_{C\text{MAX},c(i),i}$ for serving cell c(i) of CG i, $i = 1,2$.

The UE maximum configured power $P_{C\text{MAX},c(i)}$, on E-UTRA for the subframe i shall be set according to clause 6.2.5 from TS 36.101 [5]. Applicable inter-band $\Delta T_{IB,c}$ parameters shall be used according to the clauses 6.2B.4.2.4 or 6.2B.4.2.5.

The UE maximum configured power $P_{C\text{MAX},c(j)}$, on NR for the slot j shall be set according to clause 6.2.4 from TS 38.101-2 [3].

For the configured power measurements TS 36.101 [5] clause 6.2.5 and TS 38.101-2 [3] clause 6.2.4 are applicable.

6.2B.4.1.0.1.5 Inter-band EN-DC including both FR1 and FR2

For inter-band dual connectivity with one uplink serving cell per CG on E-UTRA and NR respectively, with both CGs configured in FR1, the requirements specified in clause 6.2B.4.1.0.1.3 apply.

For inter-band dual connectivity with one uplink serving cell per CG on E-UTRA and NR respectively, with NR configured in FR2, the requirements specified in clause 6.2B.4.1.0.1.4 apply.

For inter-band dual connectivity with one uplink serving cell in first CG on E-UTRA and two uplink serving cells in second CG on NR FR1 and NR FR2 respectively, the UE is allowed to set its configured maximum output power $P_{C\text{MAX},c(i),i}$ for serving cell c(i), $i = 1,2,3$ with $i=1$ for E-UTRA, $i=2$ for NR FR1 and $i=3$ for NR FR2.

- For serving cell on FR2, the requirements specified in clause 6.2.4 in TS 38.101-2 [3] apply to the UE maximum configured power $P_{C\text{MAX},c(3),3}$ and the measured maximum configured power.
- For remaining inter-band dual connectivity involving CG1 and CG2, the requirements specified in clause 6.2B.4.1.3 apply.

6.2B.4.1.1 Configured Output Power Level for Intra-Band Contiguous EN-DC

Editor's note: The following aspects are either missing or not yet determined:

- Minimum requirements are pending RAN4.

6.2B.4.1.1.1 Test purpose

To verify the UE does not exceed the power bounds defined by PCMAX_L and PCMAX_H.

6.2B.4.1.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band contiguous EN-DC.

6.2B.4.1.1.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.2B.4.1.0.1.1.

Exception requirements for both NR and E-UTRA are defined for this test and therefore LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

6.2B.4.1.1.4 Test description

6.2B.4.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on EN-DC operating bands specified in clause 5.3B.1.2, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-1 [8] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2. All of these configurations shall be tested with applicable test parameters for each EN-DC configuration specified in clause 5.3B.1.2 and are shown in table 6.2B.4.1.1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521-1 [10] Annex C.2 and in TS 38.521-1 [8] Annex C.2 for E-UTRA CG and NR CG respectively.

Table 6.2B.4.1.1.4.1-1: Test configurations table for intra-band contiguous EN-DC

| Initial Conditions | | | | | | | |
|--|--|----------------------------|--------------------|---------------------------|-----------------|------------|---------------------------|
| Test Environment as specified in TS 38.508-1 [5] clause 4.1 | Normal, TL/VL, TL/VH, TH/VL, TH/VH | | | | | | |
| NR and E-UTRA Test Frequencies as specified in TS 38.508-1 [5] clause 4.3.1 | Mid range | | | | | | |
| Test EN-DC bandwidth combination as specified in TS 38.508-1 [5] clause 4.3.1 | Lowest N_{RB_agg} , Highest N_{RB_agg} | | | | | | |
| NR Test SCS as specified in Table 5.3.5-1 in TS 38.521-1 [8] | Highest supported SCS | | | | | | |
| NR/E-UTRA Test Parameters for UE supporting DPS | | | | | | | |
| Test ID (NOTE 3) | Downlink Configuration | EN-DC Uplink Configuration | | | | | |
| | | E-UTRA Cell | Modulation | RB allocation (NOTE 2) | P_{LTE} | Modulation | RB allocation (NOTE 1) |
| 1a-1f | N/A | QPSK | Full_Allocation | {-13, 7, 12, 15, 19, 23} | CP-OFDM QPSK | Outer_Full | {-13, 7, 12, 15, 18, 23} |
| 2a-2c | | QPSK | Partial_Allocation | {-10, 10, 15} | N/A | N/A | {-10, 10, 15} |
| 3a-3c | | N/A | N/A | {-10, 10, 15} | DFT-s-OFDM QPSK | Inner Full | {-10, 10, 15} |
| NR/E-UTRA Test Parameters for UE not supporting DPS | | | | | | | |
| Test ID (NOTE 3) | Downlink Configuration | EN-DC Uplink Configuration | | | | | |
| | | E-UTRA Cell | Modulation | RB allocation (NOTE 2) | P_{LTE} | Modulation | RB allocation (NOTE 1) |
| 1a-1d | N/A | QPSK | Full_Allocation | {-10, 10, 15, 23} | CP-OFDM QPSK | Outer_Full | {-10, 10, 15, 23} |
| 2a-2c | | QPSK | Partial_Allocation | {-10, 10, 15} | N/A | N/A | {-10, 10, 15} |
| 3a-3c | | N/A | N/A | {-10, 10, 15} | DFT-s-OFDM QPSK | Inner Full | {-10, 10, 15} |
| NOTE 1: The specific configuration of each RB allocation is defined in Table 6.1-1 in TS 38.521-1 [8]. | | | | | | | |
| NOTE 2: The specific configuration of each RB allocation is defined in Table 6.1-1 in current specification. | | | | | | | |
| NOTE 3: The suffix in Test ID identifies the configured power level being tested from the P_{LTE} and P_{NR} lists | | | | | | | |

Table 6.2B.4.1.1.4.1-2: Void

1. Connect the SS to the UE antenna connectors as shown in [6] TS 38.508-1 A.3.1.2.1 for SS diagram and A.3.2.1 for UE diagram.
2. The parameter settings for the E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3, and the parameter settings for the NR cell are set up according to TS 38.508-1 [6] clause 4.4.3.
3. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C.0 and TS 38.521-1 [8] Annex C.0 for E-UTRA CG and NR CG respectively, and uplink signals according to TS 36.521-1 [10] Annex H and TS 38.521-1 [8] Annex G for E-UTRA CG and NR CG respectively.
4. The UL Reference Measurement channels are TS 36.521-1 [10] Annex A.2 and TS 38.521-1 [8] Annex A.2 for E-UTRA CG and NR CG respectively.
5. Propagation conditions are set according to TS 36.521-1 [10] Annex B.0 and TS 38.521-1 [8] Annex B.0 for E-UTRA CG and NR CG respectively.
6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 6.2B.4.1.1.4.3.

7. For the case of testing overlapping E-UTRA and NR UL transmission scenario when both bands are TDD, ensure E-UTRA UL transmission overlaps with NR UL transmission in time by giving SCG a delay of 3 E-UTRA subframes, or by giving MCG a delay of 2 subframes.

6.2B.4.1.1.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format 0_1 for C_RNTI to schedule the UL RMC according table 6.2B.4.1.1.4.1-1 on E-UTRA CC and NR CC respectively. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
2. Send continuously uplink power control "up" commands to the UE for NR and E-UTRA carrier until the UE transmits at its P_{UMAX} level; allow at least 200 ms from the first TPC command for the UE to reach P_{UMAX} level.
3. Measure the mean transmitted power over E-UTRA component carrier and NR component carrier respectively, or/and measure the sum of mean transmitted power over E-UTRA and NR component carriers according to Table 6.2B.4.1.1.5-1 and Table 6.2B.4.1.1.5-2. The period of the measurement shall be at least the continuous duration of one active sub-frame. For TDD, only slots consisting of only UL symbols are under test.

6.2B.4.1.1.4.3 Message contents

Message contents are according to TS 36.508 [11] clause 4.6.1 and TS 38.508-1 [6] clause 4.6.1 with the following exceptions.

Table 6.2B.4.1.1.4.3-1: RRCConnectionReconfiguration: tdm-PatternConfig if E-UTRA on FDD band and UE doesn't support dynamic power sharing

| Derivation Path: TS 36.508 [11], Table 4.6.1-8 | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| tdm-PatternConfig-r15 CHOICE{ | | | |
| setup SEQUENCE { | | | |
| subframeAssignment-r15 | sa2 | | |
| harq-Offset-r15 | 0 | | |
| } | | | |
| } | | | |

Table 6.2B.4.1.1.4.3-2: SystemInformationBlockType1: tdd-Config if E-UTRA on TDD band

| Derivation Path: TS 36.508 [11], Table 4.6.3-23 | | | |
|---|--------------|-----------------------|-----------|
| Information Element | Value/remark | Comment | Condition |
| TDD-Config-DEFAULT ::= SEQUENCE { | | Operating on TDD band | |
| subframeAssignment | sa2 | | |
| specialSubframePatterns | ssp7 | | |
| } | | | |

Table 6.2B.4.1.1.4.3-3: RRCConnectionReconfiguration: nr-Config-r15

| Derivation Path: TS 36.508 [11], Table 4.6.1-8 | | | |
|--|--|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| p-MaxEUTRA-r15 | Defined as P_{LTE} in Table 6.2B.4.1.1.4.1-1 | | |

Table 6.2B.4.1.1.4.3-4: PhysicalCellGroupConfig

| Derivation Path: TS 38.508-1 [6], Table 4.6.3-106 | | | |
|---|--|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| PhysicalCellGroupConfig ::= SEQUENCE { | | | |
| p-NR-FR1 | Defined as P _{NR} in Table 6.2B.4.1.1.4.1-1 | | |
| } | | | |

Table 6.2B.4.1.1.4.3-5: RRCConnectionReconfiguration: p-MaxUE-FR1-r15

| Derivation Path: TS 36.508 [11], Table 4.6.1-8 | | | |
|--|--------------|--|-----------|
| Information Element | Value/remark | Comment | Condition |
| nonCriticalExtension | | | |
| SEQUENCE { | | RRCConnectionReconfiguration-v1530-IEs | |
| p-MaxUE-FR1-r15 | 23 | | |
| } | | | |

6.2B.4.1.1.5 Test requirement

For UE supporting DPS, the output power measured shall not exceed the values specified in Table 6.2B.4.1.1.5-1.

Table 6.2B.4.1.1.5-1: P_{CMAX} configured UE output power for UE supporting DPS

| | E-UTRA component carrier | NR component carrier | Total power measured over E-UTRA and NR component carriers |
|------------|---|----------------------|---|
| Test ID 1a | Not measured | Not measured | -10dBm ± (7+TT) |
| Test ID 1b | Not measured | Not measured | 10dBm ± (7+TT) |
| Test ID 1c | Not measured | Not measured | 15 ± (6+TT) |
| Test ID 1d | Not measured | Not measured | 18 ± (5+TT) |
| Test ID 1e | Not measured | 12 ± (6+TT) | 19.79 ± (5+TT) |
| Test ID 1f | Maximum output power with reduction as defined in Table 6.2.3.5-1 of TS 36.521-1 [10] | N/A | Maximum output power with reduction as defined in Table 6.2.3.1 of TS 36.521-1 [10] |
| Test ID 2a | -10dBm ± (7+TT) | N/A- | Not measured |
| Test ID 2b | 10dBm ± (6+TT) | N/A- | Not measured |
| Test ID 2c | 15dBm ± (5+TT) | N/A- | Not measured |
| Test ID 3a | N/A | -10dBm ± (7+TT) | Not measured |
| Test ID 3b | N/A | 10dBm ± (6+TT) | Not measured |
| Test ID 3c | N/A | 15dBm ± (5+TT) | Not measured |

NOTE 1: In addition NOTE 2 in Table 6.2.2-1 in TS 36.101 [5] and/or NOTE 3 in Table 6.2.1-1 in TS 38.101-1 [2] shall apply to the tolerances.

NOTE 2: TT for each frequency and channel bandwidth is specified in Table 6.2B.4.1.1.5-3

For UE not supporting DPS, the output power measured shall not exceed the values specified in Table 6.2B.4.1.1.5-2.

Table 6.2B.4.1.1.5-2: P_{CMAX} configured UE output power for UE not supporting DPS

| | E-UTRA component carrier | NR component carrier | Total power measured over E-UTRA and NR component carriers |
|--|--------------------------|----------------------|--|
| | | | |

| | | | |
|---|---|----------------------|--------------|
| Test ID 1a | -10 dBm \pm (7+TT) | -10 dBm \pm (7+TT) | Not measured |
| Test ID 1b | 10 dBm \pm (6+TT) | 10 dBm \pm (6+TT) | Not measured |
| Test ID 1c | 15 dBm \pm (5+TT) | 15 dBm \pm (5+TT) | Not measured |
| Test ID 1d | Maximum output power with reduction as defined in Table 6.2.3.5-1 of TS 36.521-1 [10] | N/A | Not measured |
| Test ID 2a | -10dBm \pm (7+TT) | N/A | Not measured |
| Test ID 2b | 10dBm \pm (6+TT) | N/A | Not measured |
| Test ID 2c | 15dBm \pm (5+TT) | N/A | Not measured |
| Test ID 3a | N/A | -10dBm \pm (7+TT) | Not measured |
| Test ID 3b | N/A | 10dBm \pm (6+TT) | Not measured |
| Test ID 3c | N/A | 15dBm \pm (5+TT) | Not measured |
| NOTE 1: In addition NOTE 2 in Table 6.2.2.1 in TS 36.101 [5] and/or NOTE 3 in Table 6.2.1-1 in TS 38.101-1 [2] shall apply to the tolerances. | | | |
| NOTE 2: TT for each frequency and channel bandwidth is specified in Table 6.2B.4.1.1.5-3 | | | |

Table 6.2B.4.1.1.5-3: Test Tolerance (UE configured UE output power)

| | $f \leq 3.0\text{GHz}$ | $3.0\text{GHz} < f \leq 4.2\text{GHz}$ | $4.2\text{GHz} < f \leq 6.0\text{GHz}$ |
|---|------------------------|--|--|
| BW $\leq 40\text{MHz}$ | 0.7 dB | 1.0 dB | 1.0 dB |
| $40\text{MHz} < BW \leq 100\text{MHz}$ | 1.0 dB | 1.0 dB | 1.0 dB |

6.2B.4.1.2 Configured Output Power for Intra-Band Non-Contiguous EN-DC

Editor's note: The following aspects are either missing or not yet determined:

- Minimum requirements are pending RAN4.

6.2B.4.1.2.1 Test purpose

To verify the UE does not exceed the power bounds defined by P_{CMAX_L} and P_{CMAX_H} .

6.2B.4.1.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band non-contiguous EN-DC.

6.2B.4.1.2.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.2B.4.1.0.1.2.

Exception requirements for both NR and E-UTRA are defined for this test and therefore LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

6.2B.4.1.2.4 Test description

6.2B.4.1.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on EN-DC operating bands specified in clause 5.3B.1.2, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-1 [8] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2. All of these configurations shall be tested with applicable test parameters for each EN-DC configuration specified in clause 5.3B.1.2 and are shown in table 6.2B.4.1.2.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521-1 [10] Annex C.2 and in TS 38.521-1 [8] Annex C.2 for E-UTRA CG and NR CG respectively.

Table 6.2B.4.1.2.4.1-1: Test configurations table for intra-band non-contiguous EN-DC

| Initial Conditions | | | | | | | |
|--|--|----------------------------|--------------------|---------------------------|-----------------|------------|------------------|
| Test Environment as specified in TS 38.508-1 [5] clause 4.1 | Normal, TL/VL, TL/VH, TH/VL, TH/VH | | | | | | |
| NR and E-UTRA Test Frequencies as specified in TS 38.508-1 [5] clause 4.3.1 | Maximum Wgap | | | | | | |
| Test EN-DC bandwidth combination as specified in TS 38.508-1 [5] clause 4.3.1 | Lowest N_{RB_agg} , Highest N_{RB_agg} | | | | | | |
| NR Test SCS as specified in Table 5.3.5-1 in TS 38.521-1 [8] | Highest supported SCS | | | | | | |
| NR/E-UTRA Test Parameters for UE supporting DPS | | | | | | | |
| Test ID (NOTE 3) | Downlink Configuration | EN-DC Uplink Configuration | | | | | |
| | | E-UTRA Cell | | | NR Cell | | |
| Modulation | RB allocation (NOTE 2) | P_{LTE} | Modulation | RB allocation (NOTE 1) | P_{NR} | | |
| 1a-1d | N/A | QPSK | Full_Allocation | {-13, 7, 10, 23} | CP-OFDM QPSK | Outer_Full | {-13, 7, 10, 23} |
| 2a-2c | | QPSK | Partial_Allocation | {-10, 10, 15} | N/A | N/A | {-10, 10, 15} |
| 3a-3c | | N/A | N/A | {-10, 10, 15} | DFT-s-OFDM QPSK | Inner Full | {-10, 10, 15} |
| NR/E-UTRA Test Parameters for UE not supporting DPS | | | | | | | |
| Test ID (NOTE 3) | Downlink Configuration | EN-DC Uplink Configuration | | | | | |
| | | E-UTRA Cell | | | NR Cell | | |
| Modulation | RB allocation (NOTE 2) | P_{LTE} | Modulation | RB allocation (NOTE 1) | P_{NR} | | |
| 1a-1b | N/A | QPSK | Full_Allocation | {-10, 23} | CP-OFDM QPSK | Outer_Full | {-10, 23} |
| 2a-2c | | QPSK | Partial_Allocation | {-10, 10, 15} | N/A | N/A | {-10, 10, 15} |
| 3a-3c | | N/A | N/A | {-10, 10, 15} | DFT-s-OFDM QPSK | Inner Full | {-10, 10, 15} |
| NOTE 1: The specific configuration of each RB allocation is defined in Table 6.1-1 in TS 38.521-1 [8]. | | | | | | | |
| NOTE 2: The specific configuration of each RB allocation is defined in Table 6.1-1 in current specification. | | | | | | | |
| NOTE 3: The suffix in Test ID identifies the configured power level being tested from the P_{LTE} and P_{NR} lists | | | | | | | |

Table 6.2B.4.1.2.4.1-2: Void

1. Connect the SS to the UE antenna connectors as shown in [6] TS 38.508-1 A.3.1.2.1 for SS diagram and A.3.2.1 for UE diagram.
2. The parameter settings for the E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3, and the parameter settings for the NR cell are set up according to TS 38.508-1 [6] clause 4.4.3.
3. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C.0 and TS 38.521-1 [8] Annex C.0 for E-UTRA CG and NR CG respectively, and uplink signals according to TS 36.521-1 [10] Annex H and TS 38.521-1 [8] Annex G for E-UTRA CG and NR CG respectively.
4. The UL Reference Measurement channels are TS 36.521-1 [10] Annex A.2 and TS 38.521-1 [8] Annex A.2 for E-UTRA CG and NR CG respectively.
5. Propagation conditions are set according to TS 36.521-1 [10] Annex B.0 and TS 38.521-1 [8] Annex B.0 for E-UTRA CG and NR CG respectively.
6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 6.2B.4.1.2.4.3.

7. For the case of testing overlapping E-UTRA and NR UL transmission scenario when both bands are TDD, ensure E-UTRA UL transmission overlaps with NR UL transmission in time by giving SCG a delay of 3 E-UTRA subframes, or by giving MCG a delay of 2 subframes.

6.2B.4.1.2.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format 0_1 for C_RNTI to schedule the UL RMC according table 6.2B.4.1.2.4.1-1 on E-UTRA CC and NR CC respectively. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
2. Send continuously uplink power control "up" commands to the UE for NR and E-UTRA carrier until the UE transmits at its P_{UMAX} level; allow at least 200 ms from the first TPC command for the UE to reach P_{UMAX} level.
3. Measure the mean transmitted power over E-UTRA component carrier and NR component carrier respectively, or/and measure the sum of mean transmitted power over E-UTRA and NR component carriers according to Table 6.2B.4.1.2.5-1 and Table 6.2B.4.1.2.5-2. The period of the measurement shall be at least the continuous duration of one active sub-frame. For TDD, only slots consisting of only UL symbols are under test.

6.2B.4.1.2.4.3 Message contents

Message contents are according to TS 36.508 [11] clause 4.6.1 and TS 38.508-1 [6] clause 4.6.1 with the following exceptions.

Table 6.2B.4.1.2.4.3-1: RRCConnectionReconfiguration: tdm-PatternConfig if E-UTRA on FDD band and UE doesn't support dynamic power sharing

| Derivation Path: TS 36.508 [11], Table 4.6.1-8 | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| tdm-PatternConfig-r15 CHOICE{ | | | |
| setup SEQUENCE { | | | |
| subframeAssignment-r15 | sa2 | | |
| harq-Offset-r15 | 0 | | |
| } | | | |
| } | | | |

Table 6.2B.4.1.2.4.3-2: SystemInformationBlockType1: tdd-Config if E-UTRA on TDD band

| Derivation Path: TS 36.508 [11], Table 4.6.3-23 | | | |
|---|--------------|-----------------------|-----------|
| Information Element | Value/remark | Comment | Condition |
| TDD-Config-DEFAULT ::= SEQUENCE { | | Operating on TDD band | |
| subframeAssignment | sa2 | | |
| specialSubframePatterns | ssp7 | | |
| } | | | |

Table 6.2B.4.1.2.4.3-3: RRCConnectionReconfiguration: nr-Config-r15

| Derivation Path: TS 36.508 [11], Table 4.6.1-8 | | | |
|--|--|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| p-MaxEUTRA-r15 | Defined as P_{LTE} in Table 6.2B.4.1.2.4.1-1 | | |

Table 6.2B.4.1.2.4.3-4: PhysicalCellGroupConfig

| Derivation Path: TS 38.508-1 [6], Table 4.6.3-106 | | | |
|---|--|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| PhysicalCellGroupConfig ::= SEQUENCE { | | | |
| p-NR-FR1 | Defined as P _{NR} in Table 6.2B.4.1.2.4.1-1 | | |
| } | | | |

Table 6.2B.4.1.2.4.3-5: RRConnectionReconfiguration: p-MaxUE-FR1-r15

| Derivation Path: TS 36.508 [11], Table 4.6.1-8 | | | |
|--|--------------|---------------------------------------|-----------|
| Information Element | Value/remark | Comment | Condition |
| nonCriticalExtension ::= SEQUENCE { | | RRConnectionReconfiguration-v1530-IEs | |
| p-MaxUE-FR1-r15 | 23 | | |
| } | | | |

6.2B.4.1.2.5 Test requirement

For UE supporting DPS, the output power measured shall not exceed the values specified in Table 6.2B.4.1.2.5-1.

Table 6.2B.4.1.2.5-1: P_{CMAX} configured UE output power for UE supporting DPS

| | E-UTRA component carrier | NR component carrier | Total power measured over E-UTRA and NR component carriers |
|---|---|----------------------|---|
| Test ID 1a | Not measured | Not measured | -10dBm ± (7+TT) |
| Test ID 1b | Not measured | Not measured | 10dBm ± (7+TT) |
| Test ID 1c | Not measured | 6 ± (7+TT) | 10,97 ± (7+TT) |
| Test ID 1d | Maximum output power with reduction as defined in Table 6.2.3.5-1 of TS 36.521-1 [10] | N/A | Maximum output power with reduction as defined in Table 6.2.3-1 of TS 36.521-1 [10] |
| Test ID 2a | -10dBm ± (7+TT) | N/A | Not measured |
| Test ID 2b | 10dBm ± (6+TT) | N/A | Not measured |
| Test ID 2c | 15dBm ± (5+TT) | N/A | Not measured |
| Test ID 3a | N/A | -10dBm ± (7+TT) | Not measured |
| Test ID 3b | N/A | 10dBm ± (6+TT) | Not measured |
| Test ID 3c | N/A | 15dBm ± (5+TT) | Not measured |
| NOTE 1: In addition NOTE 2 in Table 6.2.2-1 in TS 36.101 [5] and/or NOTE 3 in Table 6.2.1-1 in TS 38.101-1 [2] shall apply to the tolerances. | | | |
| NOTE 2: TT for each frequency and channel bandwidth is specified in Table 6.2B.4.1.1.5-3 | | | |

For UE not supporting DPS, the output power measured shall not exceed the values specified in Table 6.2B.4.1.1.5-2.

Table 6.2B.4.1.2.5-2: P_{CMAX} configured UE output power for UE not supporting DPS

| | E-UTRA component carrier | NR component carrier | Total power measured over E-UTRA and NR component carriers |
|--|--------------------------|----------------------|--|
| | | | |

| | | | |
|------------|---|----------------------|--------------|
| Test ID 1a | -10 dBm \pm (7+TT) | -10 dBm \pm (7+TT) | Not measured |
| Test ID 1b | Maximum output power with reduction as defined in Table 6.2.3.5-1 of TS 36.521-1 [10] | N/A | Not measured |
| Test ID 2a | -10dBm \pm (7+TT) | N/A | Not measured |
| Test ID 2b | 10dBm \pm (6+TT) | N/A | Not measured |
| Test ID 2c | 15dBm \pm (5+TT) | N/A | Not measured |
| Test ID 3a | N/A | -10dBm \pm (7+TT) | Not measured |
| Test ID 3b | N/A | 10dBm \pm (6+TT) | Not measured |
| Test ID 3c | N/A | 15dBm \pm (5+TT) | Not measured |

NOTE 1: In addition NOTE 2 in Table 6.2.2.1 in TS 36.101 [5] and/or NOTE 3 in Table 6.2.1-1 in TS 38.101-1 [2] shall apply to the tolerances.

NOTE 2: TT for each frequency and channel bandwidth is specified in Table 6.2B.4.1.1.5-3

Table 6.2B.4.1.2.5-3: Test Tolerance for UE configured UE output power (Separate measurements over E-UTRA and NR CCs)

| Uplink TX | | f \leq 3.0GHz | 3.0GHz < f \leq 4.2GHz | 4.2GHz < f \leq 6GHz |
|-----------|--------------------------|-----------------|--------------------------|------------------------|
| E-UTRA | BW \leq 20MHz | 0.7 dB | 1.0 dB | 1.3 dB |
| NR | BW \leq 40MHz | 0.7 dB | 1.0 dB | 1.0 dB |
| | 40MHz < BW \leq 100MHz | 1.0 dB | 1.0 dB | 1.0 dB |

Table 6.2B.4.1.2.5-4: Test Tolerance for UE configured UE output power (Combined measurements of E-UTRA and NR CCs)

| TT for overall output power | | | | | | | | | | | |
|-----------------------------|-----------------|--------------------------|-----------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | | | NR | | | | | | | | |
| | | | BW \leq 20MHz | | | 20 MHz < BW \leq 40MHz | | | 40MHz < BW \leq 100MHz | | |
| | | | f \leq 3.0GHz | 3.0GHz < f \leq 4.2GHz | 4.2GHz < f \leq 6.0GHz | f \leq 3.0GHz | 3.0GHz < f \leq 4.2GHz | 4.2GHz < f \leq 6.0GHz | f \leq 3.0GHz | 3.0GHz < f \leq 4.2GHz | 4.2GHz < f \leq 6.0GHz |
| E-UTRA | BW \leq 20MHz | f \leq 3.0GHz | 0.7 dB | 1.0 dB | 1.0 dB | 0.7 dB | 1.0 dB |
| | | 3.0GHz < f \leq 4.2GHz | 1.0 dB | 1.0 dB | 1.0 dB | 1.0 dB | 1.0 dB | 1.0 dB | 1.0 dB | 1.0 dB | 1.0 dB |

6.2B.4.1.3 Configured Output Power for Inter-Band EN-DC within FR1

Editor's note: The following aspects are either missing or not yet determined:

- Minimum requirements are pending RAN4.

6.2B.4.1.3.1 Test purpose

To verify the UE does not exceed the power bounds defined by P_{CMAX} and P_{CMAX_H}.

6.2B.4.1.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC within FR1.

6.2B.4.1.3.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.2B.4.1.0.1.3.

Exception requirements for both NR and E-UTRA are defined for this test and therefore LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

6.2B.4.1.3.4 Test description

6.2B.4.1.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on EN-DC operating bands specified in clause 5.3B.1.2, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-1 [8] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2. All of these configurations shall be tested with applicable test parameters for each EN-DC configuration specified in clause 5.3B.1.2 and are shown in table 6.2B.4.1.3.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521-1 [10] Annex C.2 and in TS 38.521-1 [8] Annex C.2 for E-UTRA CG and NR CG respectively.

Table 6.2B.4.1.3.4.1-1: Test configurations table for inter-band contiguous EN-DC

| Initial Conditions | | | | | | | |
|---|--|----------------------------|--------------------|-----------------------------------|------------------|------------|-----------------------------------|
| Test Environment as specified in TS 38.508-1 [5] clause 4.1 | Normal, TL/VL, TL/VH, TH/VL, TH/VH | | | | | | |
| NR Test Frequencies as specified in TS 38.508-1 [5] clause 4.3.1 E-UTRA Test Frequencies as specified in TS 36.508-1 [11] clause 4.3.1 | Mid range | | | | | | |
| Test EN-DC bandwidth combination as specified in TS 38.508-1 [5] clause 4.3.1 | 5MHz for E-UTRA CC1 and Lowest for NR CC1, Highest for E-UTRA CC1 and Highest for NR CC1 | | | | | | |
| NR Test SCS as specified in Table 5.3.5-1 in TS 38.521-1 [8] | Highest supported SCS | | | | | | |
| NR/E-UTRA Test Parameters for UE supporting DPS | | | | | | | |
| Test ID (NOTE 3) | Downlink Configuration | EN-DC Uplink Configuration | | | | | |
| | | E-UTRA Cell | Modulation | RB allocation (NOTE 2) | P _{LTE} | NR Cell | P _{NR} |
| 1a-1h | N/A | QPSK | Full_Allocation | {-13, 12, 14, 17, 18, 19, 20, 23} | CP-OFDM QPSK | Outer_Full | {-13, 12, 14, 17, 18, 19, 23, 23} |
| 2a-2c | | QPSK | Partial_Allocation | {-10, 10, 15} | N/A | N/A | {-10, 10, 15} |
| 3a-3c | | N/A | N/A | {-10, 10, 15} | DFT-s-OFDM QPSK | Inner Full | {-10, 10, 15} |
| NR/E-UTRA Test Parameters for UE not supporting DPS | | | | | | | |
| Test ID (NOTE 3) | Downlink Configuration | EN-DC Uplink Configuration | | | | | |
| | | E-UTRA Cell | Modulation | RB allocation (NOTE 2) | P _{LTE} | NR Cell | P _{NR} |
| 1-1d | N/A | QPSK | Full_Allocation | {-10, 10, 15, 23} | CP-OFDM QPSK | Outer_Full | {-10, 10, 15, 23} |
| 2a-2c | | QPSK | Partial_Allocation | {-10, 10, 15} | N/A | N/A | {-10, 10, 15} |
| 3a-3c | | N/A | N/A | {-10, 10, 15} | DFT-s-OFDM QPSK | Inner Full | {-10, 10, 15} |

NOTE 1: The specific configuration of each RB allocation is defined in Table 6.1-1 in TS 38.521-1 [8].

NOTE 2: The specific configuration of each RB allocation is defined in Table 6.1-1 in current specification.

NOTE 3: The suffix in Test ID identifies the configured power level being tested from the P_{LTE} and P_{NR} lists

Table 6.2B.4.1.3.4.1-2: Void

1. Connect the SS to the UE antenna connectors as shown in [6] TS 38.508-1 A.3.1.2.1 for SS diagram and A.3.2.1 for UE diagram.

2. The parameter settings for the E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3, and the parameter settings for the NR cell are set up according to TS 38.508-1 [6] clause 4.4.3.
3. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C.0 and TS 38.521-1 [8] Annex C.0 for E-UTRA CG and NR CG respectively, and uplink signals according to TS 36.521-1 [10] Annex H and TS 38.521-1 [8] Annex G for E-UTRA CG and NR CG respectively.
4. The UL Reference Measurement channels are TS 36.521-1 [10] Annex A.2 and TS 38.521-1 [8] Annex A.2 for E-UTRA CG and NR CG respectively.
5. Propagation conditions are set according to TS 36.521-1 [10] Annex B.0 and TS 38.521-1 [8] Annex B.0 for E-UTRA CG and NR CG respectively.
6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 6.2B.4.1.3.4.3.
7. For the case of testing overlapping E-UTRA and NR UL transmission scenario when both bands are TDD, ensure E-UTRA UL transmission overlaps with NR UL transmission in time by giving SCG a delay of 3 E-UTRA subframes, or by giving MCG a delay of 2 subframes.

6.2B.4.1.3.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format 0_1 for C_RNTI to schedule the UL RMC according table 6.2B.4.1.2.4.1-1 on E-UTRA CC and NR CC respectively. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
2. Send continuously uplink power control "up" commands to the UE for NR and E-UTRA carrier until the UE transmits at its P_{UMAX} level; allow at least 200 ms from the first TPC command for the UE to reach P_{UMAX} level.
3. Measure the mean transmitted power over E-UTRA component carrier and NR component carrier respectively, or/and measure the sum of mean transmitted power over E-UTRA and NR component carriers according to Table 6.2B.4.1.2.5-1 and Table 6.2B.4.1.2.5-2. The period of the measurement shall be at least the continuous duration of one active sub-frame. For TDD, only slots consisting of only UL symbols are under test.

6.2B.4.1.3.4.3 Message contents

Message contents are according to TS 36.508 [11] clause 4.6.1 and TS 38.508-1 [6] clause 4.6.1 with the following exceptions.

Table 6.2B.4.1.3.4.3-1: RRConnectionReconfiguration: tdm-PatternConfig if E-UTRA on FDD band and UE doesn't support dynamic power sharing

| Derivation Path: TS 36.508 [11], Table 4.6.1-8 | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| tdm-PatternConfig-r15 CHOICE{ | | | |
| setup SEQUENCE { | | | |
| subframeAssignment-r15 | sa2 | | |
| harq-Offset-r15 | 0 | | |
| } | | | |
| } | | | |

Table 6.2B.4.1.3.4.3-2: SystemInformationBlockType1: tdd-Config if E-UTRA on TDD band

| Derivation Path: TS 36.508 [11], Table 4.6.3-23 | | | |
|---|--------------|-----------------------|-----------|
| Information Element | Value/remark | Comment | Condition |
| TDD-Config-DEFAULT ::= SEQUENCE { | | Operating on TDD band | |
| subframeAssignment | sa2 | | |
| specialSubframePatterns | ssp7 | | |
| } | | | |

Table 6.2B.4.1.3.4.3-3: RRConnectionReconfiguration: nr-Config-r15

| Derivation Path: TS 36.508 [11], Table 4.6.1-8 | | | |
|--|---|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| p-MaxEUTRA-r15 | Defined as P _{LTE} in Table 6.2B.4.1.2.4.1-1 | | |

Table 6.2B.4.1.3.4.3-4: PhysicalCellGroupConfig

| Derivation Path: TS 38.508-1 [6], Table 4.6.3-106 | | | |
|---|--|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| PhysicalCellGroupConfig ::= SEQUENCE { | | | |
| p-NR-FR1 | Defined as P _{NR} in Table 6.2B.4.1.2.4.1-1 | | |
| } | | | |

Table 6.2B.4.1.3.4.3-5: RRConnectionReconfiguration: p-MaxUE-FR1-r15

| Derivation Path: TS 36.508 [11], Table 4.6.1-8 | | | |
|--|--------------|--|-----------|
| Information Element | Value/remark | Comment | Condition |
| nonCriticalExtension | | RRCConnectionReconfiguration-v1530-IEs | |
| SEQUENCE { | | | |
| p-MaxUE-FR1-r15 | 23 | | |
| } | | | |

6.2B.4.1.3.5 Test requirement

For UE supporting DPS, the output power measured shall not exceed the values specified in Table 6.2B.4.1.2.5-1.

Table 6.2B.4.1.3.5-1: P_{CMAX} configured UE output power for UE supporting DPS

| | E-UTRA component carrier | NR component carrier | Total power measured over E-UTRA and NR component carriers |
|------------|---|----------------------------|---|
| Test ID 1a | Not measured | Not measured | -10dBm ± ([7]+TT) |
| Test ID 1b | Not measured | Not measured | 15dBm ± ([6]+TT) |
| Test ID 1c | Not measured | Not measured | 17 ± ([5]+TT) |
| Test ID 1d | Not measured | Not measured | 20 + ([4]+TT) / - ([6]+TT) |
| Test ID 1e | Not measured | Not measured | 21 + ([3]+TT) / - ([5]+TT) |
| Test ID 1f | Not measured | Not measured | 22+ ([2]+TT) / - ([5]+TT) |
| Test ID 1g | Not measured | 17 ± ([3]+TT) / - ([5]+TT) | 21.7 + ([3]+TT) / - ([5]+TT) |
| Test ID 1h | Maximum output power with reduction as defined in Table 6.2.3.5-1 of TS 36.521-1 [10] | N/A | Maximum output power with reduction as defined in Table 6.2.3-1 of TS 36.521-1 [10] |
| Test ID 2a | -10dBm ± (7+TT) | N/A | Not measured |
| Test ID 2b | 10dBm ± (6+TT) | N/A | Not measured |
| Test ID 2c | 15dBm ± (5+TT) | N/A | Not measured |
| Test ID 3a | N/A | -10dBm ± (7+TT) | Not measured |
| Test ID 3b | N/A | 10dBm ± (6+TT) | Not measured |
| Test ID 3c | N/A | 15dBm ± (5+TT) | Not measured |

NOTE 1: In addition NOTE 2 in Table 6.2.2-1 in TS 36.101 [5] and/or NOTE 3 in Table 6.2.1-1 in TS 38.101-1 [2] shall apply to the tolerances.

NOTE 2: TT for each frequency and channel bandwidth is specified in Table 6.2B.4.1.1.5-3 and Table 6.2B.4.1.1.5-4.

For UE not supporting DPS, the output power measured shall not exceed the values specified in Table 6.2B.4.1.1.5-2.

Table 6.2B.4.1.3.5-2: P_{CMAX} configured UE output power for UE not supporting DPS

| | E-UTRA component carrier | NR component carrier | Total power measured over E-UTRA and NR component carriers |
|---|---|----------------------|--|
| Test ID 1a | -10 dBm \pm (7+TT) | -10 dBm \pm (7+TT) | Not measured |
| Test ID 1b | 10 dBm \pm (6+TT) | 10 dBm \pm (6+TT) | |
| Test ID 1c | 15 dBm \pm (5+TT) | 15 dBm \pm (5+TT) | |
| Test ID 1d | Maximum output power with reduction as defined in Table 6.2.3.5-1 of TS 36.521-1 [10] | N/A | Not measured |
| Test ID 2a | -10dBm \pm (7+TT) | N/A | Not measured |
| Test ID 2b | 10dBm \pm (6+TT) | N/A | Not measured |
| Test ID 2c | 15dBm \pm (5+TT) | N/A | Not measured |
| Test ID 3a | N/A | -10dBm \pm (7+TT) | Not measured |
| Test ID 3b | N/A | 10dBm \pm (6+TT) | Not measured |
| Test ID 3c | N/A | 15dBm \pm (5+TT) | Not measured |
| NOTE 1: In addition NOTE 2 in Table 6.2.2-1 in TS 36.101 [5] and/or NOTE 3 in Table 6.2.1-1 in TS 38.101-1 [2] shall apply to the tolerances. | | | |
| NOTE 2: TT for each frequency and channel bandwidth is specified in Table 6.2B.4.1.1.5-3. | | | |

Table 6.2B.4.1.3.5-3: Test Tolerance for UE maximum output power (Separate measurements over E-UTRA and NR CCs)

| Uplink TX | | $f \leq 3.0\text{GHz}$ | $3.0\text{GHz} < f \leq 4.2\text{GHz}$ | $4.2\text{GHz} < f \leq 6\text{GHz}$ |
|-----------|--|------------------------|--|--------------------------------------|
| E-UTRA | $BW \leq 20\text{MHz}$ | 0.7 dB | 1.0 dB | 1.3 dB |
| NR | $BW \leq 40\text{MHz}$ | 0.7 dB | 1.0 dB | 1.0 dB |
| | $40\text{MHz} < BW \leq 100\text{MHz}$ | 1.0 dB | 1.0 dB | 1.0 dB |

Table 6.2B.4.1.3.5-4: Test Tolerance for UE maximum output power (Combined measurements of E-UTRA and NR CCs)

| TT for overall output power | | | | | | | | | | | |
|-----------------------------|--|------------------------|--|--|------------------------|--|--|------------------------|--|--|--------|
| | | NR | | | | | | | | | |
| | | BW $\leq 20\text{MHz}$ | | | | 20 MHz $< BW \leq 40\text{MHz}$ | | | 40MHz $< BW \leq 100\text{MHz}$ | | |
| E-UTRA | $BW \leq 20\text{MHz}$ | $f \leq 3.0\text{GHz}$ | $3.0\text{GHz} < f \leq 4.2\text{GHz}$ | $4.2\text{GHz} < f \leq 6.0\text{GHz}$ | $f \leq 3.0\text{GHz}$ | $3.0\text{GHz} < f \leq 4.2\text{GHz}$ | $4.2\text{GHz} < f \leq 6.0\text{GHz}$ | $f \leq 3.0\text{GHz}$ | $3.0\text{GHz} < f \leq 4.2\text{GHz}$ | $4.2\text{GHz} < f \leq 6.0\text{GHz}$ | |
| | | $f \leq 3.0\text{GHz}$ | 0.7 dB | 1.0 dB | 1.0 dB | 0.7 dB | 1.0 dB | 1.0 dB | 1.0 dB | 1.0 dB | 1.0 dB |
| | $3.0\text{GHz} < f \leq 4.2\text{GHz}$ | 1.0 dB | 1.0 dB | 1.0 dB | 1.0 dB | 1.0 dB | 1.0 dB | 1.0 dB | 1.0 dB | 1.0 dB | 1.0 dB |

For the UE which supports inter-band EN-DC configuration, $\Delta T_{IB,c}$ in 6.2B.4.2 applies where unless otherwise stated, the same $\Delta T_{IB,c}$ is applicable to NR band(s) part for DC configurations which have the same NR operating band combination. Unless otherwise stated, $\Delta T_{IB,c}$ is set to zero.

6.2B.4.1.4 Configured Output Power for Inter-Band EN-DC including FR2

6.2B.4.1.4.1 Test purpose

Same test purpose as in clause 6.2.4.1 in TS 38.521-2 [9] for the NR carrier.

6.2B.4.1.4.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 2CCs.

The requirements of this test for NR carrier are covered in test cases 6.2B.1.1 Maximum output power for Inter-Band EN-DC including FR2, 6.2B.2.1 Maximum output power reduction for Inter-Band EN-DC including FR2 and 6.2B.3.1 UE maximum output power with additional requirements for Inter-Band EN-DC including FR2 to all types of NR UE release 15 and forward.

6.2B.4.1.4.3 Minimum conformance requirements

UE configured output power requirement for E-UTRA single carrier and CA operation specified in subclauses 6.2.5 and 6.2.5A of [10] and for NR single carrier and CA operation specified in subclause 6.2.4, 6.2A.4 and 6.2D.4 of [9] apply.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.2B.4.1.4.

6.2B.4.1.4.4 Test description

This test is covered by clause 6.2B.1.1 Maximum output power for Inter-Band EN-DC including FR2, 6.2B.2.1 Maximum output power reduction for Inter-Band EN-DC including FR2 and 6.2B.3.1 UE maximum output power with additional requirements for Inter-Band EN-DC including FR2.

6.2B.4.1.4.5 Test requirement

This test is covered by clause 6.2B.1.1 Maximum output power for Inter-Band EN-DC including FR2, 6.2B.2.1 Maximum output power reduction for Inter-Band EN-DC including FR2 and 6.2B.3.1 UE maximum output power with additional requirements for Inter-Band EN-DC including FR2.

6.2B.4.1.5 Configured Output Power for Inter-Band EN-DC including both FR1 and FR2

6.2B.4.1.5.1 Test purpose

Same test purpose as in clause 6.2.4.1 in TS 38.521-1 [8] for NR FR1 carrier and 6.2.4.1 in TS 38.521-2 [9] for NR FR2 carrier.

6.2B.4.1.5.2 Test applicability

The requirements in this test are not testable due to issues with combined testing of NR FR1 and E-UTRA in conducted mode with NR FR2 in radiated mode. Therefore, the conducted and radiated requirements are tested separately.

No test case details are specified. The NSA requirements for maximum output power apply and are tested as part of the EN-DC within FR1 and EN-DC including FR2 test cases in clause 6.2B.

6.2B.4.2 $\Delta T_{IB,c}$ for EN-DC

For the UE which supports inter-band EN-DC configuration, $\Delta T_{IB,c}$ in Tables below applies where unless otherwise stated, the same $\Delta T_{IB,c}$ is applicable to NR band(s) part for DC configurations which have the same NR operating band combination. Unless otherwise stated, $\Delta T_{IB,c}$ is set to zero.

Unless $\Delta T_{IB,c}$ is specified for the NE-DC configuration, the specified $\Delta T_{IB,c}$ for the EN-DC configuration including same bands as the corresponding NE-DC configuration is applicable for the NE-DC configuration.

6.2B.4.2.1 Intra-Band Contiguous EN-DC

$\Delta T_{IB,c}$ is not applicable for intra-band contiguous EN-DC.

6.2B.4.2.2 Intra-Band non-Contiguous EN-DC

$\Delta T_{IB,c}$ is not applicable for intra-band non-contiguous EN-DC.

6.2B.4.2.3 Inter-Band EN-DC within FR1

6.2B.4.2.3.1 $\Delta T_{IB,c}$ for EN-DC two bands**Table 6.2B.4.2.3.1-1: $\Delta T_{IB,c}$ due to EN-DC(two bands)**

| Inter-band EN-DC configuration | E-UTRA or NR Band | $\Delta T_{IB,c}$ (dB) |
|--------------------------------|-------------------|---|
| DC_1_n3 | 1 n3 | 0.3 0.3 |
| DC_1_n28 | 1 n28 | 0.3 0.6 |
| DC_1_n40 | 1 n40 | 0.5 0.5 |
| DC_1_n51 | 1 n51 | 0.6 0.6 |
| DC_1_n77 | 1 n77 | 0.6 0.8 |
| DC_1_n78 | 1 n78 | 0.3 0.8 |
| DC_2_n5 | 2 n5 | 0.3 0.3 |
| DC_2_n41 | 2 n41 | 0.5 0.4 ¹ 0.9 ² |
| DC_2_n66 | 2 n66 | 0.5 0.5 |
| DC_2_n71 | 2 n71 | 0.3 0.3 |
| DC_2_n78 | 2 n78 | 0.6 0.8 |
| DC_3_n1 | 3 n1 | 0.3 0.3 |
| DC_3_n7 | 3 n7 | 0.5 0.5 |
| DC_3_n28 | 3 n28 | 0.3 0.3 |
| DC_3_n40 | 3 n40 | 0.5 0.5 |
| DC_3_n41 | 3 n41 | 0.3 ³ 0.8 ⁴ |
| DC_3_n51 | 3 n51 | 0.3 0.3 |
| DC_3_n77 | 3 n77 | 0.6 0.8 |
| DC_3_n78 | 3 n78 | 0.6 0.8 |
| DC_5_n2, DC_5-5_n2 | 5 n2 | 0.3 0.3 |
| DC_5_n40 | 5 n40 | 0.3 0.3 |
| DC_5_n66 | 5 n66 | 0.3 0.3 |
| DC_5_n78 | 5 n78 | 0.6 0.8 |
| DC_7_n1 | 7 n1 | 0.6 0.5 |
| DC_7_n3 | 7 n3 | 0.5 0.5 |
| DC_7_n28 | 7 n28 | 0.3 0.3 |
| DC_7_n51 | 7 n51 | 0.3 0.3 |
| DC_7_n66, | 7 | 0.5 |

| Inter-band EN-DC configuration | E-UTRA or NR Band | $\Delta T_{IB,c}$ (dB) |
|--------------------------------|-------------------|------------------------|
| DC_1_n3 | 1 | 0.3 |
| | n3 | 0.3 |
| DC_7-7_n66 | n66 | 0.5 |
| | 7 | 0.5 |
| DC_7-n78, DC_7-7_n78 | n78 | 0.8 |
| | 8 | 0.3 |
| DC_8_n1 | n1 | 0.3 |
| | 8 | 0.3 |
| DC_8_n3 | n3 | 0.3 |
| | 8 | 0.3 |
| DC_8_n40 | n40 | 0.3 |
| | 8 | 0.3 |
| DC_8_n41 | n41 | 0.3 |
| | 8 | 0.3 |
| DC_8_n77 | n77 | 0.6 |
| | 8 | 0.8 |
| DC_8_n78 | n78 | 0.6 |
| | 11 | 0.8 |
| DC_11_n77 | n77 | 0.4 |
| | 11 | 0.8 |
| DC_11_n78 | n78 | 0.4 |
| | 11 | 0.8 |
| DC_12_n5 | n5 | 0.4 |
| | 12 | 0.8 |
| DC_12_n66 | n66 | 0.3 |
| | 12 | 0.8 |
| DC_12_n78 | n78 | 0.5 |
| | 12 | 0.8 |
| DC_13_n2 | n2 | 0.3 |
| | 13 | 0.3 |
| DC_13_n66 | n66 | 0.3 |
| | 13 | 0.3 |
| DC_14_n2 | n2 | 0.3 |
| | 14 | 0.3 |
| DC_14_n66 | n66 | 0.3 |
| | 14 | 0.3 |
| DC_18_n77 | n77 | 0.3 |
| | 18 | 0.8 |
| DC_18_n78 | n78 | 0.3 |
| | 18 | 0.8 |
| DC_19_n77 | n77 | 0.3 |
| | 19 | 0.8 |
| DC_19_n78 | n78 | 0.3 |
| | 19 | 0.8 |
| DC_20_n1 | n1 | 0.3 |
| | 20 | 0.3 |
| DC_20_n3 | n3 | 0.3 |
| | 20 | 0.3 |
| DC_20_n8 | n8 | 0.4 |
| | 20 | 0.4 |
| DC_20_n28 | n28 | 0.5 |
| | 20 | 0.5 |
| DC_20_n51 | n51 | 0.5 |
| | 20 | 0.5 |
| DC_20_n77 | n77 | 0.6 |
| | 20 | 0.8 |
| DC_20_n78 | n78 | 0.6 |
| | 20 | 0.8 |
| DC_21_n77 | n77 | 0.4 |
| | 21 | 0.8 |
| DC_21_n78 | n78 | 0.4 |
| | 21 | 0.8 |
| DC_25_n41 | n41 | 0.5 |
| | 25 | 0.4 ¹ |

| Inter-band EN-DC configuration | E-UTRA or NR Band | $\Delta T_{IB,c}$ (dB) |
|--------------------------------|-------------------|--------------------------------------|
| DC_1_n3 | 1 | 0.3 |
| | n3 | 0.3 |
| | | 0.9 ² |
| DC_26_n41 | 26 | 0.3 |
| | n41 | 0.3 |
| DC_26_n77 | 26 | 0.3 |
| | n77 | 0.8 |
| DC_26_n78 | 26 | 0.3 |
| | n78 | 0.8 |
| DC_28_n51 | 28 | 0.5 |
| | n51 | 0.5 |
| DC_28_n77 | 28 | 0.5 |
| | n77 | 0.8 |
| DC_28_n78 | 28 | 0.5 |
| | n78 | 0.8 |
| DC_30_n5 | 30 | 0.3 |
| | n5 | 0.3 |
| DC_30_n66 | 30 | 0.5 |
| | n66 | 0.8 |
| DC_38_n78 | n78 | 0.5 |
| DC_39_n41 | 39 | 0.5 |
| | n41 | 0.5 |
| DC_39_n78 | 39 | 0.3 |
| | n78 | 0.8 |
| DC_39_n79 | 39 | 0.3 |
| | n79 | 0.8 |
| DC_40_n1 | n1 | 0.5 |
| | 40 | 0.5 |
| DC_40_n41 ⁵ | 40 | 0.5 |
| | n41 | 0.5 |
| DC_40_n77 | n77 | 0.5 |
| DC_40_n78 | n78 | 0.5 ⁶ |
| DC_41_n77 | 41 | 0.3 |
| | n77 | 0.8 |
| DC_41_n78 | 41 | 0.3 |
| | n78 | 0.8 |
| DC_41_n79 | 41 | 0.3 |
| | n79 | 0.8 |
| DC_42_n51 | 42 | 0.6 |
| | n51 | 0.8 |
| DC_48_n5 | 48 | 0.3 |
| | n5 | 0.3 |
| DC_48_n66 | 48 | 0.8 |
| | n66 | 0.6 |
| DC_66_n2 | 66 | 0.5 |
| | n2 | 0.5 |
| DC_66_n5 | 66 | 0.3 |
| | n5 | 0.3 |
| DC_66_n41 | 66 | 0.5 |
| | n41 | 0.8 ¹ 1.3 ² |
| DC_66_n71 | 66 | 0.3 |
| | n71 | 0.3 |
| DC_66_n78 | 66 | 0.6 |
| | n78 | 0.8 |

NOTE 1: The requirement is applied for UE transmitting on the frequency range of 2545-2690 MHz.
 NOTE 2: The requirement is applied for UE transmitting on the frequency range of 2496-2545 MHz.
 NOTE 3: Applicable for the frequency range of 2515 - 2690 MHz.
 NOTE 4: Applicable for the frequency range of 2496 - 2515 MHz.
 NOTE 5: Applicable for UE supporting inter-band EN-DC without simultaneous Rx/Tx.
 NOTE 6: Only applicable for UE supporting inter-band carrier aggregation with uplink in one E-UTRA band and without simultaneous Rx/Tx.

6.2B.4.2.3.2

 $\Delta T_{IB,c}$ for EN-DC three bandsTable 6.2B.4.2.3.2-1: $\Delta T_{IB,c}$ due to EN-DC (three bands)

| Inter-band EN-DC configuration | E-UTRA or NR Band | $\Delta T_{IB,c}$ (dB) |
|--------------------------------|-------------------|------------------------|
| DC_1-3_n28 | 1 | 0.3 |
| | 3 | 0.3 |
| | n28 | 0.6 |
| DC_1-3_n77 | 1 | 0.6 |
| | 3 | 0.6 |
| | n77 | 0.8 |
| DC_1-3_n78 | 1 | 0.6 |
| | 3 | 0.6 |
| | n78 | 0.8 |
| DC_1-3_n79 | 1 | 0.3 |
| | 3 | 0.3 |
| DC_1-5_n78 | 1 | 0.3 |
| | 5 | 0.6 |
| | n78 | 0.8 |
| DC_1-7_n3 | 1 | 0.6 |
| | 7 | 0.6 |
| | n3 | 0.6 |
| DC_1-7_n28 | 1 | 0.5 |
| | 7 | 0.6 |
| | n28 | 0.6 |
| DC_1-7_n78 DC_1-7-7_n78 | 1 | 0.6 |
| | 7 | 0.6 |
| | n78 | 0.8 |
| DC_1-8_n3 | 1 | 0.3 |
| | 8 | 0.3 |
| | n3 | 0.3 |
| DC_1-8_n78 | 1 | 0.3 |
| | 8 | 0.6 |
| | n78 | 0.8 |
| DC_1-18_n77 | 1 | 0.3 |
| | 18 | 0.3 |
| | n77 | 0.8 |
| DC_1-18_n78 | 1 | 0.3 |
| | 18 | 0.3 |
| | n78 | 0.8 |
| DC_1-19_n77 | 1 | 0.3 |
| | 19 | 0.3 |
| | n77 | 0.8 |
| DC_1-19_n78 | 1 | 0.3 |
| | 19 | 0.3 |
| | n78 | 0.8 |
| DC_1-19_n79 | 1 | 0.3 |
| | 19 | 0.3 |
| | n79 | 0.3 |
| DC_1-20_n3 | 1 | 0.3 |
| | 20 | 0.3 |
| | n3 | 0.3 |
| DC_1-20_n28 | 1 | 0.3 |
| | 20 | 0.6 |
| | n28 | 0.6 |
| DC_1-20_n78 | 1 | 0.3 |
| | 20 | 0.3 |
| | n78 | 0.8 |
| DC_1-21_n77 | 1 | 0.3 |
| | 21 | 0.3 |
| | n77 | 0.8 |
| DC_1-21_n78 | 1 | 0.6 |
| | 21 | 0.4 |
| | n78 | 0.8 |
| DC_1-21_n79 | 1 | 0.3 |

| Inter-band EN-DC configuration | E-UTRA or NR Band | $\Delta T_{IB,c}$ (dB) |
|--------------------------------|-------------------|------------------------|
| DC_1-28_n77 | 21 | 0.3 |
| | 1 | 0.3 |
| | 28 | 0.6 |
| | n77 | 0.8 |
| DC_1-28_n78 DC_1_n28-n78 | 1 | 0.3 |
| | 28 or n28 | 0.6 |
| | n78 | 0.8 |
| DC_1_n28-n79 | 1 | 0.3 |
| | n28 | 0.3 |
| DC_1-41_n77 | 1 | 0.5 |
| | 41 | 0.5 |
| | n77 | 0.8 |
| DC_1-41_n78 | 1 | 0.5 |
| | 41 | 0.5 |
| | n78 | 0.8 |
| DC_1-41_n79 | 1 | 0.5 |
| | 41 | 0.5 |
| DC_1-42_n77 | 1 | 0.6 |
| | 42 | 0.8 |
| | n77 | 0.8 |
| DC_1-42_n78 | 1 | 0.3 |
| | 42 | 0.8 |
| | n78 | 0.8 |
| DC_1-42_n79 | 1 | 0.3 |
| | 42 | 0.8 |
| DC_1_n77-n79 | 1 | 0.6 |
| | n77 | 0.8 |
| DC_1_SUL_n78-n84 | 1 | 0.3 |
| | n78 | 0.8 |
| | n84 | 0.3 |
| DC_1_n78-n79 | 1 | 0.3 |
| | n78 | 0.8 |
| | n79 | 0.5 |
| DC_2-5_n66 | 2 | 0.5 |
| | 5 | 0.3 |
| | n66 | 0.5 |
| DC_2-14_n2 | 2 | 0.3 |
| | 14 | 0.3 |
| | n2 | 0.3 |
| DC_2-14_n66 DC_2-2-14_n66 | 2 | 0.5 |
| | 14 | 0.3 |
| | n66 | 0.5 |
| DC_2-30_n66 | 2 | 0.5 |
| | 30 | 0.3 |
| | n66 | 0.5 |
| DC_2-66_n5 | 2 | 0.5 |
| | 66 | 0.5 |
| | n5 | 0.3 |
| DC_2-66_n41 | 2 | 0.5 |
| | 66 | 0.5 |
| | n41 | 0.8 ¹ |
| | | 1.3 ² |
| DC_2-66_n71 | 2 | 0.5 |
| | 66 | 0.5 |
| | n71 | 0.3 |
| DC_2-(n)71 | 2 | 0.3 |
| | 71 | 0.3 |
| | n71 | |
| DC_3_n3-n77 | 3 | 0.6 |
| | n3 | 0.6 |
| | n77 | 0.8 |
| DC_3_n3-n78 | 3 | 0.6 |
| | n3 | 0.6 |

| Inter-band EN-DC configuration | E-UTRA or NR Band | $\Delta T_{IB,c}$ (dB) |
|--------------------------------|-------------------|------------------------|
| DC_3-5_n78 | n78 | 0.8 |
| | 3 | 0.6 |
| | 5 | 0.6 |
| | n78 | 0.8 |
| DC_3-7_n28 | 3 | 0.5 |
| | 7 | 0.5 |
| | n28 | 0.3 |
| DC_3-7_n78, DC_3-7-7_n78 | 3 | 0.6 |
| | 7 | 0.6 |
| | n78 | 0.8 |
| DC_3-8_n78 | 3 | 0.6 |
| | 8 | 0.6 |
| | n78 | 0.8 |
| DC_3-19_n77 | 3 | 0.6 |
| | 19 | 0.3 |
| | n77 | 0.8 |
| DC_3-19_n78 | 3 | 0.6 |
| | 19 | 0.3 |
| | n78 | 0.8 |
| DC_3-19_n79 | 3 | 0.3 |
| | 19 | 0.3 |
| DC_3-20_n1 | 3 | 0.3 |
| | 20 | 0.3 |
| | n1 | 0.3 |
| DC_3-20_n28 | 3 | 0.3 |
| | 20 | 0.5 |
| | n28 | 0.5 |
| DC_3-20_n78 | 3 | 0.5 |
| | 20 | 0.3 |
| | n78 | 0.8 |
| DC_3-21_n77 | 3 | 0.8 |
| | 21 | 0.9 |
| | n77 | 0.8 |
| DC_3-21_n78 | 3 | 0.8 |
| | 21 | 0.9 |
| | n78 | 0.8 |
| DC_3-21_n79 | 3 | 0.8 |
| | 21 | 0.9 |
| DC_3-28_n78 | 3 | 0.5 |
| | 28 | 0.3 |
| | n78 | 0.8 |
| DC_3_n28-n78 | 3 | 0.5 |
| | n28 | 0.3 |
| | n78 | 0.8 |
| DC_3-38_n78 | 3 | 0.6 |
| | n78 | 0.8 |
| DC_3-40_n1 | 3 | 0.5 |
| | 40 | 0.5 |
| | n1 | 0.5 |
| DC_3-41_n78 | 3 | 0.6 |
| | 41 | 0.3 ¹ |
| | | 0.8 ² |
| | n78 | 0.8 |
| DC_3-42_n77 | 3 | 0.6 |
| | 42 | 0.8 |
| | n77 | 0.8 |
| DC_3-42_n78 | 3 | 0.6 |
| | 42 | 0.8 |
| | n78 | 0.8 |
| DC_3-42_n79 | 3 | 0.6 |
| | 42 | 0.8 |
| DC_3_n77-n79 | 3 | 0.6 |
| | n77 | 0.8 |

| Inter-band EN-DC configuration | E-UTRA or NR Band | $\Delta T_{IB,c}$ (dB) |
|--------------------------------|-------------------|------------------------|
| DC_3_n78-n79 | 3 | 0.6 |
| | n78 | 0.8 |
| | n79 | 0.5 |
| DC_3_SUL_n78-n80 | 3 | 0.6 |
| | n78 | 0.8 |
| | n80 | 0.6 |
| DC_3_SUL_n78-n82 | 3 | 0.5 |
| | n78 | 0.8 |
| | n82 | 0.3 |
| DC_5-7_n78, DC_5-7-7_n78 | 5 | 0.6 |
| | 7 | 0.6 |
| | n78 | 0.8 |
| DC_5-30_n66 | 5 | 0.3 |
| | 30 | 0.3 |
| | n66 | 0.5 |
| DC_7-20_n28 | 7 | 0.3 |
| | 20 | 0.6 |
| | n28 | 0.6 |
| DC_7-20_n3 | 7 | 0.5 |
| | 20 | 0.3 |
| | n3 | 0.5 |
| DC_7-20_n78 | 7 | 0.3 |
| | 20 | 0.3 |
| | n78 | 0.8 |
| DC_7-28_n78 | 7 | 0.3 |
| | 28 | 0.3 |
| | n78 | 0.8 |
| DC_7_n28-n78 | 7 | 0.3 |
| | n28 | 0.3 |
| | n78 | 0.8 |
| DC_7-46_n78 | 7 | 0.5 |
| | n78 | 0.8 |
| DC_8_SUL_n78- n81 | 8 | 0.6 |
| | n78 | 0.8 |
| | n81 | 0.6 |
| DC_14-66_n2 DC_14-66-66_n2 | 14 | 0.3 |
| | 66 | 0.5 |
| | n2 | 0.5 |
| DC_14-66_n66 | 14 | 0.3 |
| | 66 | 0.3 |
| | n66 | 0.3 |
| DC_18-28_n77 | 18 | 0.5 |
| | 28 | 0.5 |
| | n77 | 0.8 |
| DC_18-28_n78 | 18 | 0.5 |
| | 28 | 0.5 |
| | n78 | 0.8 |
| DC_18-28_n79 | 18 | 0.5 |
| | 28 | 0.5 |
| DC_19-21_n77 | 19 | 0.3 |
| | 21 | 0.4 |
| | n77 | 0.8 |
| DC_19-21_n78 | 19 | 0.3 |
| | 21 | 0.4 |
| | n78 | 0.8 |
| DC_19-21_n79 | 19 | 0.3 |
| | 21 | 0.4 |
| DC_19-42_n77 | 19 | 0.3 |
| | 42 | 0.8 |
| | n77 | 0.8 |
| DC_19-42_n78 | 19 | 0.3 |
| | 42 | 0.8 |
| | n78 | 0.8 |

| Inter-band EN-DC configuration | E-UTRA or NR Band | $\Delta T_{IB,c}$ (dB) |
|--------------------------------|-------------------|------------------------|
| DC_19-42_n79 | 19 | 0.3 |
| | 42 | 0.8 |
| DC_19_n77-n79 | 19 | 0.3 |
| | n77 | 0.8 |
| DC_19_n78-n79 | 19 | 0.3 |
| | n78 | 0.8 |
| | n79 | 0.5 |
| DC_20_n8-n75 | 20 | 0.4 |
| | n8 | 0.4 |
| DC_20_n28-n75 | 20 | 0.5 |
| | n28 | 0.7 |
| DC_20_n28-n78 | 20 | 0.6 |
| | n28 | 0.6 |
| | n78 | 0.8 |
| DC_20_n75-n78 | 20 | 0.5 |
| | n78 | 0.8 |
| DC_20_n76-n78 | 20 | 0.5 |
| | n78 | 0.8 |
| DC_20_SUL_n78-n82 | 20 | 0.6 |
| | n78 | 0.8 |
| | n82 | 0.6 |
| DC_20_SUL_n78-n83 | 20 | 0.8 |
| | n78 | 0.8 |
| | n83 | 0.8 |
| DC_21-42_n77 | 21 | 0.4 |
| | 42 | 0.8 |
| | n77 | 0.8 |
| DC_21-42_n78 | 21 | 0.4 |
| | 42 | 0.8 |
| | n78 | 0.8 |
| DC_21-42_n79 | 21 | 0.4 |
| | 42 | 0.8 |
| DC_21_n77-n79 | 21 | 0.4 |
| | n77 | 0.8 |
| DC_21_n78-n79 | 21 | 0.4 |
| | n78 | 0.8 |
| | n79 | 0.5 |
| DC_28-42_n77 | 28 | 0.5 |
| | 42 | 0.8 |
| | n77 | 0.8 |
| DC_28-42_n78 | 28 | 0.5 |
| | 42 | 0.8 |
| | n78 | 0.8 |
| DC_28-42_n79 | 28 | 0.5 |
| | 42 | 0.8 |
| DC_28_SUL_n78-n83 | 28 | 0.5 |
| | n78 | 0.8 |
| | n83 | 0.5 |
| DC_41-42_n77 | 41 | 0.5 |
| | 42 | 0.8 |
| | n77 | 0.8 |
| DC_41-42_n78 | 41 | 0.5 |
| | 42 | 0.8 |
| | n78 | 0.8 |
| DC_41-42_n79 | 41 | 0.3 |
| | 42 | 0.8 |
| DC_66_(n)71 | 66 | 0.3 |
| | 71 | 0.3 |
| | n71 | |
| DC_66_SUL_n78-n86 | 66 | 0.6 |
| | n78 | 0.8 |
| | n86 | 0.6 |

NOTE 1: The requirement is applied for UE transmitting on the frequency range of 2545-2690

| Inter-band EN-DC configuration | E-UTRA or NR Band | $\Delta T_{IB,c}$ (dB) |
|---|-------------------|------------------------|
| MHz. NOTE 2: The requirement is applied for UE transmitting on the frequency range of 2496-2545 MHz. | | |

6.2B.4.2.3.3 $\Delta T_{IB,c}$ for EN-DC four bands**Table 6.2B.4.2.3.3-1: $\Delta T_{IB,c}$ due to EN-DC(four bands)**

| Inter-band EN-DC configuration | E-UTRA or NR Band | $\Delta T_{IB,c}$ (dB) |
|---------------------------------|-------------------|------------------------|
| DC_1-3-5_n78 | 1 | 0.6 |
| | 3 | 0.6 |
| | 5 | 0.3 |
| | n78 | 0.8 |
| DC_1-3-7_n28 | 1 | 0.6 |
| | 3 | 0.6 |
| | 7 | 0.6 |
| | n28 | 0.6 |
| DC_1-3-7_n78 DC_1-3-7-7_n78 | 1 | 0.7 |
| | 3 | 0.7 |
| | 7 | 0.7 |
| | n78 | 0.8 |
| DC_1-3-8_n78 | 1 | 0.6 |
| | 3 | 0.6 |
| | 8 | 0.6 |
| | n78 | 0.8 |
| DC_1-3-19_n78 | 1 | 0.6 |
| | 3 | 0.6 |
| | 19 | 0.3 |
| | n78 | 0.8 |
| DC_1-3-19_n79 | 1 | 0.3 |
| | 3 | 0.3 |
| | 19 | 0.3 |
| | n28 | 0.6 |
| DC_1-3-20_n28 | 1 | 0.3 |
| | 3 | 0.3 |
| | 20 | 0.6 |
| | n28 | 0.6 |
| DC_1-3-20_n78 | 1 | 0.6 |
| | 3 | 0.6 |
| | 20 | 0.3 |
| | n78 | 0.8 |
| DC_1-3-21_n77 | 1 | 0.6 |
| | 3 | 0.8 |
| | 21 | 0.9 |
| | n77 | 0.8 |
| DC_1-3-21_n78 | 1 | 0.6 |
| | 3 | 0.8 |
| | 21 | 0.9 |
| | n78 | 0.8 |
| DC_1-3-21_n79 | 1 | 0.3 |
| | 3 | 0.8 |
| | 21 | 0.9 |
| | n79 | 0.8 |
| DC_1-3-28_n77 | 1 | 0.6 |
| | 3 | 0.6 |
| | 28 | 0.6 |
| | n77 | 0.8 |
| DC_1-3-28_n78 DC_1-3_n28-n78 | 1 | 0.6 |
| | 3 | 0.6 |
| | 28 or n28 | 0.6 |
| | n78 | 0.8 |
| DC_1-3-28_n79 | 1 | 0.6 |
| | 3 | 0.6 |
| | 28 | 0.6 |
| | n79 | 0.8 |
| DC_1-3-42_n77 | 1 | 0.6 |
| | 3 | 0.6 |
| | 42 | 0.8 |
| | n77 | 0.8 |
| DC_1-3-42_n78 | 1 | 0.6 |
| | 3 | 0.6 |

| Inter-band EN-DC configuration | E-UTRA or NR Band | $\Delta T_{IB,c}$ (dB) |
|--------------------------------|-------------------|------------------------|
| DC_1-3-42_n79 | 42 | 0.8 |
| | n78 | 0.8 |
| | 1 | 0.6 |
| | 3 | 0.6 |
| | 42 | 0.8 |
| | 1 | 0.6 |
| DC_1-5-7_n78 | 5 | 0.6 |
| | 7 | 0.6 |
| | n78 | 0.8 |
| | 1 | 0.6 |
| DC_1-7-20_n28 | 7 | 0.6 |
| | 20 | 0.6 |
| | n28 | 0.6 |
| | 1 | 0.5 |
| DC_1-7-20_n78 | 7 | 0.6 |
| | 20 | 0.4 |
| | n78 | 0.8 |
| | 1 | 0.6 |
| DC_1-7_n28-n78 | 7 | 0.7 |
| | 20 | 0.4 |
| | n78 | 0.8 |
| | 1 | 0.6 |
| DC_1-18-28_n77 | 7 | 0.6 |
| | n28 | 0.6 |
| | n78 | 0.8 |
| | 1 | 0.3 |
| DC_1-18-28_n78 | 18 | 0.5 |
| | 28 | 0.5 |
| | n77 | 0.8 |
| | 1 | 0.3 |
| DC_1-18-28_n79 | 18 | 0.5 |
| | 28 | 0.5 |
| | n78 | 0.8 |
| | 1 | 0.3 |
| DC_1-19-42_n77 | 18 | 0.5 |
| | 28 | 0.5 |
| | n77 | 0.8 |
| | 1 | 0.6 |
| DC_1-19-42_n78 | 19 | 0.3 |
| | 42 | 0.8 |
| | n77 | 0.8 |
| | 1 | 0.3 |
| DC_1-19-42_n79 | 19 | 0.3 |
| | 42 | 0.8 |
| | n78 | 0.8 |
| | 1 | 0.3 |
| DC_1-20_n28-n78 | 19 | 0.3 |
| | 42 | 0.8 |
| | n77 | 0.8 |
| | 1 | 0.3 |
| DC_1-21-28_n77 | 20 | 0.6 |
| | n28 | 0.6 |
| | n78 | 0.8 |
| | 1 | 0.6 |
| DC_1-21-28_n78 | 21 | 0.4 |
| | 28 | 0.6 |
| | n77 | 0.8 |
| | 1 | 0.3 |
| DC_1-21-28_n79 | 21 | 0.4 |
| | 28 | 0.6 |
| | n78 | 0.8 |
| | 1 | 0.3 |
| DC_1-21-28_n77 | 21 | 0.4 |
| | 42 | 0.8 |
| | n77 | 0.8 |
| | 1 | 0.6 |
| DC_1-21-42_n78 | 21 | 0.4 |
| | 42 | 0.8 |
| | n77 | 0.8 |
| | 1 | 0.3 |

| Inter-band EN-DC configuration | E-UTRA or NR Band | $\Delta T_{IB,c}$ (dB) |
|--------------------------------|-------------------|------------------------|
| | 21 | 0.4 |
| | 42 | 0.8 |
| | n78 | 0.8 |
| | 1 | 0.3 |
| DC_1-21-42_n79 | 21 | 0.4 |
| | 42 | 0.8 |
| | 1 | 0.6 |
| DC_1-28-42_n77 | 28 | 0.6 |
| | 42 | 0.8 |
| | n77 | 0.8 |
| | 1 | 0.3 |
| DC_1-28-42_n78 | 28 | 0.6 |
| | 42 | 0.8 |
| | n78 | 0.8 |
| DC_1-28-42_n79 | 1 | 0.3 |
| | 28 | 0.6 |
| | 42 | 0.8 |
| | 1 | 0.5 |
| DC_1-41-42_n77 | 41 | 0.5 |
| | 42 | 0.8 |
| | n77 | 0.8 |
| | 1 | 0.5 |
| DC_1-41-42_n78 | 41 | 0.5 |
| | 42 | 0.8 |
| | n78 | 0.8 |
| DC_1-41-42_n79 | 1 | 0.5 |
| | 41 | 0.5 |
| | 42 | 0.8 |
| | 2 | 0.5 |
| DC_2-7-13_n66 | 7 | 0.5 |
| DC_2-7-7-13_n66 | 13 | 0.3 |
| | n66 | 0.5 |
| | 2 | 0.5 |
| DC_2-7-66_n66 | 7 | 0.5 |
| DC_2-7-7-66_n66 | 66 | 0.5 |
| | n66 | |
| | 2 | 0.6 |
| DC_2-7-66_n78 | 7 | 0.5 |
| | 66 | 0.6 |
| | n78 | 0.8 |
| | 2 | 0.5 |
| DC_2-14-66_n2 | 14 | 0.3 |
| DC_2-14-66-66_n2 | 66 | 0.5 |
| | n2 | 0.5 |
| | 2 | 0.5 |
| DC_2-14-66_n66 | 14 | 0.3 |
| DC_2-2-14-66_n66 | 66 | 0.5 |
| | n66 | 0.5 |
| | 2 | 0.5 |
| DC_2-66-(n)71 | 66 | 0.5 |
| | 71 | 0.3 |
| | n71 | |
| | 3 | 0.6 |
| DC_3-5-7_n78 | 5 | 0.6 |
| DC_3-5-7-7_n78 | 7 | 0.6 |
| | n78 | 0.8 |
| | 3 | 0.5 |
| DC_3-7-20_n28 | 7 | 0.5 |
| | 20 | 0.6 |
| | n28 | 0.5 |
| | 3 | 0.6 |
| DC_3-7-20_n78 | 7 | 0.6 |
| | 20 | 0.3 |

| Inter-band EN-DC configuration | E-UTRA or NR Band | $\Delta T_{IB,c}$ (dB) |
|--------------------------------|-------------------|------------------------|
| DC_3-7-28_n78 | n78 | 0.8 |
| | 3 | 0.6 |
| | 7 | 0.6 |
| | 28 | 0.6 |
| | n78 | 0.8 |
| DC_3-7_n28-n78 | 3 | 0.6 |
| | 7 | 0.6 |
| | n28 | 0.6 |
| | n78 | 0.8 |
| DC_3-19-21_n77 | 3 | 0.8 |
| | 19 | 0.3 |
| | 21 | 0.9 |
| | n77 | 0.8 |
| DC_3-19-21_n78 | 3 | 0.8 |
| | 19 | 0.3 |
| | 21 | 0.9 |
| | n78 | 0.8 |
| DC_3-19-21_n79 | 3 | 0.8 |
| | 19 | 0.3 |
| | 21 | 0.9 |
| DC_3-19-42_n77 | 3 | 0.6 |
| | 19 | 0.3 |
| | 42 | 0.8 |
| | n77 | 0.8 |
| DC_3-19-42_n78 | 3 | 0.6 |
| | 19 | 0.3 |
| | 42 | 0.8 |
| | n78 | 0.8 |
| DC_3-19-42_n79 | 3 | 0.6 |
| | 19 | 0.3 |
| | 42 | 0.8 |
| | n78 | 0.8 |
| DC_3-20_n28-n78 | 3 | 0.6 |
| | 20 | 0.6 |
| | n28 | 0.6 |
| | n78 | 0.8 |
| DC_3-21-42_n77 | 3 | 0.8 |
| | 21 | 0.9 |
| | 42 | 0.8 |
| | n77 | 0.8 |
| DC_3-21-42_n78 | 3 | 0.8 |
| | 21 | 0.9 |
| | 42 | 0.8 |
| | n78 | 0.8 |
| DC_3-21-42_n79 | 3 | 0.8 |
| | 21 | 0.9 |
| | 42 | 0.8 |
| | n78 | 0.8 |
| DC_3-28-42_n77 | 3 | 0.6 |
| | 28 | 0.5 |
| | 42 | 0.8 |
| | n77 | 0.8 |
| DC_3-28-42_n78 | 3 | 0.6 |
| | 28 | 0.5 |
| | 42 | 0.8 |
| | n78 | 0.8 |
| DC_3-28-42_n79 | 3 | 0.6 |
| | 28 | 0.5 |
| | 42 | 0.8 |
| | n78 | 0.8 |
| DC_7-20_n28-n78 | 7 | 0.3 |
| | 20 | 0.6 |
| | n28 | 0.6 |
| | n78 | 0.8 |
| DC_19-21-42_n77 | 19 | 0.3 |
| | 21 | 0.4 |

| Inter-band EN-DC configuration | E-UTRA or NR Band | $\Delta T_{IB,c}$ (dB) |
|--------------------------------|-------------------|------------------------|
| DC_19-21-42_n78 | 42 | 0.8 |
| | n77 | 0.8 |
| | 19 | 0.3 |
| | 21 | 0.4 |
| | 42 | 0.8 |
| | n78 | 0.8 |
| DC_19-21-42_n79 | 19 | 0.3 |
| | 21 | 0.4 |
| | 42 | 0.8 |
| DC_21-28-42_n77 | 21 | 0.4 |
| | 28 | 0.5 |
| | 42 | 0.8 |
| | n77 | 0.8 |
| DC_21-28-42_n78 | 21 | 0.4 |
| | 28 | 0.5 |
| | 42 | 0.8 |
| | n78 | 0.8 |
| DC_21-28-42_n79 | 21 | 0.4 |
| | 28 | 0.5 |
| | 42 | 0.8 |

6.2B.4.2.3.4

 $\Delta T_{IB,c}$ for EN-DC five bands**Table 6.2B.4.2.3.4-1: $\Delta T_{IB,c}$ due to EN-DC (five bands)**

| Inter-band EN-DC configuration | E-UTRA or NR Band | $\Delta T_{IB,c}$ (dB) |
|-------------------------------------|-------------------|------------------------|
| DC_1-3-5-7_n78, DC_1-3-5-7-7_n78 | 1 | 0.6 |
| | 3 | 0.6 |
| | 5 | 0.6 |
| | 7 | 0.6 |
| | n78 | 0.8 |
| DC_1-3-7-20_n28 | 1 | 0.6 |
| | 3 | 0.6 |
| | 7 | 0.6 |
| | 20 | 0.6 |
| | n28 | 0.6 |
| DC_1-3-7-20_n78 | 1 | 0.6 |
| | 3 | 0.6 |
| | 7 | 0.6 |
| | 20 | 0.6 |
| | n78 | 0.6 |
| DC_1-3-7_n28-n78 | 1 | 0.7 |
| | 3 | 0.7 |
| | 7 | 0.7 |
| | n28 | 0.6 |
| | n78 | 0.8 |
| DC_1-3-19-21_n77 | 1 | 0.6 |
| | 3 | 0.8 |
| | 19 | 0.3 |
| | 21 | 0.9 |
| | n77 | 0.8 |
| DC_1-3-19-21_n78 | 1 | 0.6 |
| | 3 | 0.8 |
| | 19 | 0.3 |
| | 21 | 0.9 |
| | n78 | 0.8 |
| DC_1-3-19-21_n79 | 1 | 0.3 |
| | 3 | 0.8 |
| | 19 | 0.3 |
| | 21 | 0.9 |
| DC_1-3-19-42_n77 | 1 | 0.6 |
| | 3 | 0.6 |
| | 19 | 0.3 |
| | 42 | 0.8 |
| | n77 | 0.8 |
| DC_1-3-19-42_n78 | 1 | 0.6 |
| | 3 | 0.6 |
| | 19 | 0.3 |
| | 42 | 0.8 |
| | n78 | 0.8 |
| DC_1-3-19-42_n79 | 1 | 0.6 |
| | 3 | 0.6 |
| | 19 | 0.3 |
| | 42 | 0.8 |
| DC_1-3-20_n28-n78 | 1 | 0.6 |
| | 3 | 0.6 |
| | 20 | 0.6 |
| | n28 | 0.6 |
| | n78 | 0.8 |
| DC_1-3-21-42_n77 | 1 | 0.6 |

| Inter-band EN-DC configuration | E-UTRA or NR Band | $\Delta T_{IB,c}$ (dB) |
|--------------------------------|-------------------|------------------------|
| DC_1-3-21-42_n78 | 3 | 0.8 |
| | 21 | 0.9 |
| | 42 | 0.8 |
| | n77 | 0.6 |
| | 1 | 0.6 |
| DC_1-3-21-42_n79 | 3 | 0.8 |
| | 21 | 0.9 |
| | 42 | 0.8 |
| | n78 | 0.6 |
| | 1 | 0.6 |
| DC_1-3-28-42_n77 | 3 | 0.8 |
| | 21 | 0.9 |
| | 42 | 0.8 |
| | n77 | 0.6 |
| | 1 | 0.6 |
| DC_1-3-28-42_n78 | 3 | 0.6 |
| | 28 | 0.6 |
| | 42 | 0.8 |
| | n78 | 0.8 |
| | 1 | 0.6 |
| DC_1-3-28-42_n79 | 3 | 0.6 |
| | 28 | 0.6 |
| | 42 | 0.8 |
| | 1 | 0.6 |
| | 7 | 0.7 |
| DC_1-7-20_n28-n78 | 20 | 0.6 |
| | n28 | 0.6 |
| | n78 | 0.8 |
| | 1 | 0.6 |
| | 19 | 0.3 |
| DC_1-19-21-42_n77 | 21 | 0.4 |
| | 42 | 0.8 |
| | n77 | 0.8 |
| | 1 | 0.3 |
| | 19 | 0.3 |
| DC_1-19-21-42_n78 | 21 | 0.4 |
| | 42 | 0.8 |
| | n78 | 0.8 |
| | 1 | 0.3 |
| | 19 | 0.3 |
| DC_1-19-21-42_n79 | 21 | 0.4 |
| | 42 | 0.8 |
| | 1 | 0.3 |
| | 19 | 0.3 |
| | 21 | 0.4 |
| DC_1-21-28-42_n77 | 28 | 0.6 |
| | 42 | 0.8 |
| | n77 | 0.8 |
| | 1 | 0.6 |
| | 21 | 0.4 |
| DC_1-21-28-42_n78 | 28 | 0.6 |
| | 42 | 0.8 |
| | n78 | 0.8 |
| | 1 | 0.3 |
| | 21 | 0.4 |
| DC_1-21-28-42_n79 | 28 | 0.6 |
| | 42 | 0.8 |
| | n78 | 0.8 |
| | 1 | 0.3 |
| | 21 | 0.4 |

| Inter-band EN-DC configuration | E-UTRA or NR Band | $\Delta T_{IB,c}$ (dB) |
|--------------------------------|-------------------|------------------------|
| | 28 | 0.6 |
| | 42 | 0.8 |
| DC_3-7-20_n28-n78 | 3 | 0.6 |
| | 7 | 0.6 |
| | 20 | 0.6 |
| | n28 | 0.6 |
| | n78 | 0.8 |

6.2B.4.2.3.5 $\Delta T_{IB,c}$ for EN-DC six bands

Table 6.2B.4.2.3.5-1: $\Delta T_{IB,c}$ due to EN-DC (six bands)

| Inter-band EN-DC configuration | E-UTRA or NR Band | $\Delta T_{IB,c}$ (dB) |
|--------------------------------|-------------------|------------------------|
| DC_1-3-7-20_n28-n78 | 1 | 0.7 |
| | 3 | 0.7 |
| | 7 | 0.7 |
| | 20 | 0.6 |
| | n28 | 0.6 |
| | n78 | 0.8 |

6.2B.4.2.4 Inter-band EN-DC including FR2

6.2B.4.2.4.1 $\Delta T_{IB,c}$ for EN-DC two bands

Unless otherwise stated, $\Delta T_{IB,c}$ for E-UTRA and FR2 NR bands of inter-band EN-DC combinations defined in table 5.2B.5.1-1 is set to zero.

Table 6.2B.4.2.4.1-1: Void

6.2B.4.2.4.2 $\Delta T_{IB,c}$ for EN-DC three bands

Unless otherwise stated, $\Delta T_{IB,c}$ for FR2 NR bands is set to zero, and $\Delta T_{IB,c}$ for constituent E-UTRA bands for inter-band EN-DC defined in table 5.2B.5.2-1 is the same as those for the corresponding E-UTRA CA configuration specified in TS 36.101 [4], without the FR2 NR bands.

Table 6.2B.4.2.4.2-1: Void

6.2B.4.2.4.3 $\Delta T_{IB,c}$ for EN-DC four bands

Unless otherwise stated, $\Delta T_{IB,c}$ for FR2 NR bands is set to zero, and $\Delta T_{IB,c}$ for constituent E-UTRA bands for inter-band EN-DC defined in table 5.2B.5.3-1 is the same as those for the corresponding E-UTRA CA configuration specified in TS 36.101 [4], without the FR2 NR bands.

Table 6.2B.4.2.4.3-1: Void

6.2B.4.2.4.4 $\Delta T_{IB,c}$ for EN-DC five bands

Unless otherwise stated, $\Delta T_{IB,c}$ for FR2 NR bands is set to zero, and $\Delta T_{IB,c}$ for constituent E-UTRA bands for inter-band EN-DC defined in table 5.2B.5.4-1 is the same as those for the corresponding E-UTRA CA configuration specified in TS 36.101 [4], without the FR2 NR bands.

Table 6.2B.4.2.4.4-1: Void

| | |
|--------------|---|
| 6.2B.4.2.4.5 | Void |
| 6.2B.4.2.5 | Inter-band EN-DC including both FR1 and FR2 |
| 6.2B.4.2.5.1 | $\Delta T_{IB,c}$ for EN-DC three bands |

Unless otherwise stated, for inter-band EN-DC configurations defined in table 5.2B.6.2-1, $\Delta T_{IB,c}$ for constituent FR2 NR bands is set to zero, and $\Delta T_{IB,c}$ for constituent E-UTRA and FR1 NR bands is the same as those for the corresponding inter band EN-DC configuration without the FR2 bands specified in 6.2B.4.2.3.

Table 6.2B.4.2.5.1-1: Void

| | |
|--------------|--|
| 6.2B.4.2.5.2 | $\Delta T_{IB,c}$ for EN-DC four bands |
|--------------|--|

Unless otherwise stated, for inter-band EN-DC configurations defined in table 5.2B.6.3-1, $\Delta T_{IB,c}$ for constituent FR2 NR bands is set to zero, and $\Delta T_{IB,c}$ for constituent E-UTRA and FR1 NR bands is the same as those for the corresponding inter band EN-DC configuration without the FR2 bands specified in 6.2B.4.2.3.

| | |
|--------------|--|
| 6.2B.4.2.5.3 | $\Delta T_{IB,c}$ for EN-DC five bands |
|--------------|--|

Unless otherwise stated, for inter-band EN-DC configurations defined in table 5.2B.6.4-1, $\Delta T_{IB,c}$ for constituent FR2 NR bands is set to zero, and $\Delta T_{IB,c}$ for constituent E-UTRA and FR1 NR bands is the same as those for the corresponding inter band EN-DC configuration without the FR2 bands specified in 6.2B.4.2.3.

| | |
|--------------|---------------------------------------|
| 6.2B.4.2.5.4 | $\Delta T_{IB,c}$ for EN-DC six bands |
|--------------|---------------------------------------|

Unless otherwise stated, for inter-band EN-DC configurations defined in table 5.2B.6.5-1, $\Delta T_{IB,c}$ for constituent FR2 NR bands is set to zero, and $\Delta T_{IB,c}$ for constituent E-UTRA and FR1 NR bands is the same as those for the corresponding inter band EN-DC configuration without the FR2 bands specified in 6.2B.4.2.3.

6.2B.5 Configured Output Power for NR-DC

| | |
|----------|-------------------------------|
| 6.2B.5.1 | Configured Output power Level |
|----------|-------------------------------|

| | |
|------------|--|
| 6.2B.5.1.1 | Configured Output Power Level for Inter-band NR-DC between FR1 and FR2 |
|------------|--|

| | |
|--------------|--------------|
| 6.2B.5.1.1.1 | Test purpose |
|--------------|--------------|

Same test purpose as in clause 6.2.4.1 in TS 38.521-1 [8] for NR FR1 carrier and 6.2.4.1 in TS 38.521-2 [9] for NR FR2 carrier.

| | |
|--------------|--------------------|
| 6.2B.5.1.1.2 | Test applicability |
|--------------|--------------------|

The requirements in this test are not testable due to issues with combined testing of NR FR1 in conducted mode with NR FR2 in radiated mode. Therefore, the conducted and radiated requirements are tested separately.

No test case details are specified. The SA requirements for configured output power apply and are tested as part of the standalone NR within FR1 in clause 6.2.4 in TS 38.521-1 [8] and standalone NR within FR2 in clause 6.2.4 in TS 38.521-2 [9].

6.3 Output power dynamics

6.3A Output Power Dynamics for CA without EN-DC

6.3A.1 UE Output Power Dynamics for CA

6.3A.1.1 UE Output Power Dynamics for NR CA between FR 1 and FR 2 without EN-DC

6.3A.1.1.1 Test purpose

Same test purpose as in clause 6.3 in TS 38.521-1 [8] for NR FR1 carrier(s) and clause 6.3 in TS 38.521-2 [9] for NR FR2 carrier(s).

6.3A.1.1.2 Test applicability

The requirements in this test are not testable due to issues with combined testing of NR FR1 conducted mode with NR FR2 in radiated mode. Therefore, the conducted and radiated requirements are tested separately.

No test case details are specified. The SA requirements for maximum output power apply and are tested in TS 38.521-1 [8] clauses 6.3 and 6.2A and TS 38.521-2 [9] clauses 6.3 and 6.3A

6.3B Output power dynamics for DC

6.3B.1 Minimum Output Power for EN-DC

6.3B.1.1 Minimum Output Power for intra-band contiguous EN-DC

6.3B.1.1.1 Test purpose

Same test purpose as in clause 6.3.1.1 in TS 38.521-1 [8] for the NR carrier.

6.3B.1.1.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting intra-band contiguous EN-DC.

6.3B.1.1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.3.1.3 in TS 38.521-1 [8] for the NR carrier.

Exception requirements for both NR and E-UTRA are defined for this test and therefore LTE anchor agnostic approach is not applied.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.3.

6.3B.1.1.4 Test description

Same test descriptions as in clause 6.3.1.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

Table 6.3B.1.1.4-1: Test configuration table

| E-UTRA Test Parameters | | | | |
|--|-----------------------|-------------------------------|------------|---------------|
| E-UTRA Channel Bandwidth | E-UTRA Test Frequency | Downlink | Uplink | |
| | | N/A for min output power test | Modulation | RB allocation |
| 5 MHz | MidRange | | QPSK | 25 |
| NOTE 1: E-UTRA Test Frequency as specified in TS 36.508 [11] clause 4.3.1. | | | | |

For Initial conditions as in clause 6.3.1.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for the E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3 with E-UTRA channel bandwidth and test frequencies defined in Table 6.3B.1.1.4-1.
- 3.1. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C.0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
- 4.1. The UL Reference Measurement channels are set according to Table 6.3B.1.1.4-1.

Step 6 of Initial conditions as in clause 6.3.1.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.3.1.4.2 in TS 38.521-1 [8] with the following steps added for E-UTRA component:

- 1.1. For E-UTRA component, SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to table 6.3B.1.1.4-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
- 2.1. For E-UTRA component, send continuously uplink power control "down" commands in every uplink scheduling information to the UE.

6.3B.1.1.5 Test requirements

Same test requirement as in clause 6.3.1.5 in TS 38.521-1 [8] for the NR carrier.

6.3B.1.2 Minimum output power for intra-band non-contiguous EN-DC

6.3B.1.2.1 Test purpose

Same test purpose as in clause 6.3.1.1 in TS 38.521-1 [8] for the NR carrier.

6.3B.1.2.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting intra-band non-contiguous EN-DC.

6.3B.1.2.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.3.1.3 in TS 38.521-1 [8] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this requirement is TS 38.101-1 [2] clause 6.3.

6.3B.1.2.4 Test description

Same test descriptions as in clause 6.3.1.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

Table 6.3B.1.2.4-1: Test Configuration Table

| Initial Conditions | |
|--|--|
| Test Frequencies as specified in TS 38.508-1 [6] clause 4.3.1 for different EN-DC bandwidth classes | Low with maxWGap, High with maxWGap |
| Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1 across bandwidth combination sets supported by the UE | Lowest N _{RB_agg} , Highest N _{RB_agg} (NOTE1) |
| NOTE 1: If the UE supports multiple CC Combinations in the EN-DC Configuration with the same NRB_agg, only the combination with the lowest NRB_SCG and highest NRB_SCG are tested for Lowest N _{RB_agg} , and Highest N _{RB_agg} , respectively. | |

The initial test configurations for E-UTRA as specified in Table 4.6-1 except for the parameters specified in Table 6.3B.1.2.4-1.

For Initial conditions as in clause 6.3.1.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for the E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3 with E-UTRA channel bandwidth and test frequencies defined in Table 6.3B.1.2.4-1.

3.1. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C, clauses C.0, C.1 and C.3.0, and uplink signals according to Annex H, clauses H.1 and H.3.0.

4.1. The UL Reference Measurement channels are set according to Table 6.3B.1.2.4-1.

Step 6 of Initial conditions as in clause 6.3.1.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

6.3B.1.2.5 Test requirements

Same test requirement as in clause 6.3.1.5 in TS 38.521-1 [8] for the NR carrier.

6.3B.1.3 Minimum output power for inter-band EN-DC within FR1

6.3B.1.3.1 Test purpose

Same test purpose as in clause 6.3.1.1 in TS 38.521-1 [8] for the NR carrier.

6.3B.1.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC.

6.3B.1.3.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.3.1.3 in TS 38.521-1 [8] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.3.

6.3B.1.3.4 Test description

Same test descriptions as in clause 6.3.1.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1. For Initial conditions as in clause 6.3.1.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.3.1.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

6.3B.1.3.5 Test requirements

Same test requirement as in clause 6.3.1.5 in TS 38.521-1 [8] for the NR carrier.

6.3B.1.4 Minimum Output Power for EN-DC Interband including FR2

Editor's note: The following aspects of the clause are for future consideration:

- Testing of extreme conditions for FR2 is FFS.

6.3B.1.4.1 Test purpose

Same test purpose as in clause 6.3.1.1 in TS 38.521-2 [9] for the NR carrier.

6.3B.1.4.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2.

6.3B.1.4.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.3.1.3 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.3B.1.

6.3B.1.4.4 Test description

Same test description as in clause 6.3.1.4 in TS 38.521-2 [9] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1.

For initial conditions as in clause 6.3.1.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of initial conditions as in clause 6.3.1.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.3.1.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

- 1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.3B.1.4.5 Test requirements

Same test requirement as in clause 6.3.1.5 in TS 38.521-2 [9] for the NR carrier.

6.3B.1.4_1 Minimum output power for inter-band EN-DC including FR2 (>2 CCs)

6.3B.1.4_1.1 Minimum output power for inter-band EN-DC including FR2 (3 CCs)

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- The referred test case 6.3A.1.1 in TS 38.521-2 [9] is incomplete.

6.3B.1.4_1.1.1 Test purpose

Same test purpose as in clause 6.3.1.1 in TS 38.521-2 [9] for the NR carrier.

6.3B.1.4_1.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 3 UL CCs (2NR UL CCs).

6.3B.1.4_1.1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.3.1.3 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.3B.

6.3B.1.4_1.1.4 Test description

6.3B.1.4_1.1.4.1 Initial condition

Same test description as in clause 6.3A.1.1.4 in TS 38.521-2 [9] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1.

For Initial conditions as in clause 6.3A.1.1.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.3A.1.1.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.3A.1.1.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

- 1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.3B.1.4_1.1.5 Test Requirements

Same test requirement as in clause 6.3A.1.1.5 in TS 38.521-2 [9] for the NR carrier.

6.3B.1.4_1.2 Minimum output power for inter-band EN-DC including FR2 (4 CCs)

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- The referred test case 6.3A.1.2 in TS 38.521-2 [9] is incomplete.

6.3B.1.4_1.2.1 Test purpose

Same test purpose as in clause 6.3.1.1 in TS 38.521-2 [9] for the NR carrier.

6.3B.1.4_1.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 4 UL CCs (3NR UL CCs).

6.3B.1.4_1.2.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.3.1.3 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.3B.

6.3B.1.4_1.2.4 Test description

6.3B.1.4_1.2.4.1 Initial condition

Same test description as in clause 6.3A.1.2.4 in TS 38.521-2 [9] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1.

For Initial conditions as in clause 6.3A.1.2.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.3A.1.2.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.3A.1.2.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

- 1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.3B.1.4_1.2.5 Test Requirements

Same test requirement as in clause 6.3A.1.2.5 in TS 38.521-2 [9] for the NR carrier.

6.3B.1.4_1.3 Minimum output power for inter-band EN-DC including FR2 (5 CCs)

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- The referred test case 6.3A.1.3 in TS 38.521-2 [9] is incomplete.

6.3B.1.4_1.3.1 Test purpose

Same test purpose as in clause 6.3.1.1 in TS 38.521-2 [9] for the NR carrier.

6.3B.1.4_1.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 5 UL CCs (4NR UL CCs).

6.3B.1.4_1.3.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.3.1.3 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.3B.

6.3B.1.4_1.3.4 Test description

6.3B.1.4_1.3.4.1 Initial condition

Same test description as in clause 6.3A.1.3.4 in TS 38.521-2 [9] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1.

For Initial conditions as in clause 6.3A.1.3.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.3A.1.3.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.3A.1.3.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.3B.1.4_1.3.5 Test Requirements

Same test requirement as in clause 6.3A.1.3.5 in TS 38.521-2 [9] for the NR carrier.

6.3B.1.4D Minimum output power for inter-band EN-DC including FR2 for UL-MIMO

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- The referred test case 6.3D.1 in TS 38.521-2 [9] is incomplete

6.3B.1.4D.1 Test purpose

Same test purpose as in clause 6.3D.1.1 in TS 38.521-2 [9] for the NR carrier.

6.3B.1.4D.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC FR2.

6.3B.1.4D.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.3D.1.3 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this measurement is TS 38.101-3 [4] clause 6.3B.

6.3B.1.4D.4 Test Description

Same test description as in clause 6.3D.1.4 in TS 38.521-2 [9] for the NR carrier with the following exceptions:

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.7-1.

For Initial conditions as in clause 6.3D.1.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for the cell are set up according to TS 36.508 [11] subclause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.3D.1.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [6] clause 4.5.

Same Test procedure as in clause 6.3D.1.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

1.1. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set TimeAlignmentTimerDedicated IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.3B.1.4D.5 Test Requirement

Same test requirement as specified in TS 38.521-2 [9] clause 6.3D.1.5 for the NR carrier(s).

6.3B.2 Transmit OFF Power for EN-DC

6.3B.2.1 Transmit OFF Power for intra-band contiguous EN-DC

6.3B.2.1.1 Test purpose

Same test purpose as in clause 6.3.2.1 in TS 38.521-1 [8] for the NR carrier.

6.3B.2.1.2 Test applicability

The requirements of this test apply in Clause 6.3B.3 Tx ON/OFF time mask/PUCCH time mask to all types of E-UTRA UE release 15 and forward, supporting intra-band contiguous EN-DC.

6.3B.2.1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.3.2.3 in TS 38.521-1 [8] for the NR carrier.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.3.

6.3B.2.1.4 Test description

This test is covered by Clause 6.3B.3 Tx ON/OFF time mask/PUCCH time mask for EN-DC.

6.3B.2.1.5 Test requirements

Same test requirement as in clause 6.3.2.5 in TS 38.521-1 [8] for the NR carrier.

6.3B.2.2 Transmit OFF Power for intra-band non-contiguous EN-DC

6.3B.2.2.1 Test purpose

Same test purpose as in clause 6.3.2.1 in TS 38.521-1 [8] for the NR carrier.

6.3B.2.2.2 Test applicability

The requirements of this test apply in clause 6.3B.3 Tx ON/OFF time mask/PUCCH time mask to all types of E-UTRA UE Release 15 and forward, supporting intra-band non-contiguous EN-DC.

6.3B.2.2.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.3.2.3 in TS 38.521-1 [8] for the NR carrier.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.3.

6.3B.2.2.4 Test description

This test is covered by Clause 6.3B.3 Tx ON/OFF time mask/PUCCH time mask for EN-DC.

6.3B.2.2.5 Test requirements

Same test requirement as in clause 6.3.2.5 in TS 38.521-1 [8] for the NR carrier.

6.3B.2.3 Transmit OFF Power for inter-band EN-DC within FR1

6.3B.2.3.1 Test purpose

Same test purpose as in clause 6.3.2.1 in TS 38.521-1 [8] for the NR carrier.

6.3B.2.3.2 Test applicability

The requirements of this test apply in Clause 6.3B.3 Tx ON/OFF time mask/PUCCH time mask to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC.

6.3B.2.3.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.3.2.3 in TS 38.521-1 [8] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.3.

6.3B.2.3.4 Test description

This test is covered by Clause 6.3B.3 Tx ON/OFF time mask/PUCCH time mask for EN-DC.

6.3B.2.3.5 Test requirements

Same test requirement as in clause 6.3.2.5 in TS 38.521-1 [8] for the NR carrier.

6.3B.2.4 Transmit OFF Power for inter-band EN-DC including FR2

Editor's note: This test case is complete for Band n257. Following aspects are either missing or not yet determined:

- The referred test case 6.3.2 in TS 38.521-2 [9] is incomplete for other than band n257.

6.3B.2.4.1 Test purpose

Same test purpose as in clause 6.3.2.1 in TS 38.521-2 [9] for the NR carrier.

6.3B.2.4.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 2CCs.

6.3B.2.4.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.3.2.3 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.3.

6.3B.2.4.4 Test description

Same test description as in clause 6.3.2.4 in TS 38.521-2 [9] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1.

For Initial conditions as in clause 6.3.2.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.3.2.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.3.2.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.3B.2.4.5 Test requirements

Same test requirement as in clause 6.3.2.5 in TS 38.521-2 [8] for the NR carrier.

6.3B.2.4_1 Transmit OFF Power for Inter-band EN-DC including FR2 (>2 CCs)

6.3B.2.4_1.1 Transmit OFF Power for Inter-band EN-DC including FR2 (3 CCs)

Editor's note: The following aspects are either missing or not yet determined in the referred test case 6.3A.2.1 in TS 38.521-2 [9]:

- For PC3, The testability of this test case is pending further analysis on relaxation of the requirement for other than Band n257.
- For PC3, Measurement Uncertainties and Test Tolerances for intra-band contiguous CA supporting aggregated BW > 400MHz is TBD.
- Measurement Uncertainties, Test Tolerances and testability limit analysis is TBD for PC1/2/4.
- Test applicability, Test Description requires updates to clarify number of E-UTRA carriers that will be configured during the test that will be limited to only 1 E-UTRA CC

6.3B.2.4_1.1.1 Test purpose

Same test purpose as in clause 6.3.2.1 in TS 38.521-2 [9] for the NR carrier.

6.3B.2.4_1.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 3 UL CCs (2NR UL CCs).

6.3B.2.4_1.1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.3.2.3 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.3.

6.3B.2.4_1.1.4 Test description

6.3B.2.4_1.1.4.1 Initial condition

Same test description as in clause 6.3A.2.1.4 in TS 38.521-2 [9] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1.

For Initial conditions as in clause 6.3A.2.1.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.3A.2.1.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.3A.2.1.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.3B.2.4_1.1.5 Test Requirements

Same test requirement as in clause 6.3A.2.1.5 in TS 38.521-2 [9] for the NR carrier.

6.3B.2.4_1.2 Transmit OFF Power for Inter-band EN-DC including FR2 (4 CCs)

Editor's note: The following aspects are either missing or not yet determined in the referred test case 6.3A.2.1 in TS 38.521-2 [9]:

- For PC3, The testability of this test case is pending further analysis on relaxation of the requirement for other than Band n257.
- For PC3, Measurement Uncertainties and Test Tolerances for intra-band contiguous CA supporting aggregated BW > 400MHz is TBD.
- Measurement Uncertainties, Test Tolerances and testability limit analysis is TBD for PC1/2/4.

6.3B.2.4_1.2.1 Test purpose

Same test purpose as in clause 6.3.2.1 in TS 38.521-2 [9] for the NR carrier.

6.3B.2.4_1.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 4 UL CCs (3NR UL CCs).

6.3B.2.4_1.2.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.3.2.3 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.3.

6.3B.2.4_1.2.4 Test description

6.3B.2.4_1.2.4.1 Initial condition

Same test description as in clause 6.3A.2.2.4 in TS 38.521-2 [9] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1.

For Initial conditions as in clause 6.3A.2.2.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.3A.2.2.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.3A.2.2.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

- 1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.3B.2.4_1.2.5 Test Requirements

Same test requirement as in clause 6.3A.2.2.5 in TS 38.521-2 [9] for the NR carrier.

6.3B.2.4_1.3 Transmit OFF Power for Inter-band EN-DC including FR2 (5 CCs)

Editor's note: The following aspects are either missing or not yet determined in the referred test case 6.3A.2.1 in TS 38.521-2 [9]

- For PC3, The testability of this test case is pending further analysis on relaxation of the requirement for other than Band n257.
- For PC3, Measurement Uncertainties and Test Tolerances for intra-band contiguous CA supporting aggregated BW > 400MHz is TBD.
- Measurement Uncertainties, Test Tolerances and testability limit analysis is TBD for PC1/2/4.

6.3B.2.4_1.3.1 Test purpose

Same test purpose as in clause 6.3.2.1 in TS 38.521-2 [9] for the NR carrier.

6.3B.2.4_1.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 5 UL CCs (4NR UL CCs).

6.3B.2.4_1.3.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.3.2.3 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.3.

6.3B.2.4_1.3.4 Test description

6.3B.2.4_1.3.4.1 Initial condition

Same test description as in clause 6.3A.2.3.4 in TS 38.521-2 [9] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1.

For Initial conditions as in clause 6.3A.2.3.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.3A.2.3.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.3A.2.3.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.3B.2.4_1.3.5 Test Requirements

Same test requirement as in clause 6.3A.2.3.5 in TS 38.521-2 [9] for the NR carrier.

6.3B.3 Tx ON/OFF time mask/PUCCH time mask for EN-DC

6.3B.3.1 Tx ON/OFF time mask for intra-band contiguous EN-DC

6.3B.3.1.1 Test purpose

Same test purpose as in clause 6.3.3.2.1 in TS 38.521-1 [8] for the NR carrier.

6.3B.3.1.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting intra-band contiguous EN-DC.

6.3B.3.1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.3.3.2.3 in TS 38.521-1 [8] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.3.

6.3B.3.1.4 Test description

Same test descriptions as in clause 6.3.3.2.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1.

For Initial conditions as in clause 6.3.3.2.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for the E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA Downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.3.3.2.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, *Connected without release On* according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.3.3.2.4.2 in TS 38.521-1 [8] with the following steps added for E-UTRA component:

- 1.1. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

6.3B.3.1.5 Test requirements

Same test requirement as in clause 6.3.3.2.5 in TS 38.521-1 [8] for the NR carrier.

6.3B.3.2 Tx ON/OFF time mask for intra-band non-contiguous EN-DC

6.3B.3.2.1 Test purpose

Same test purpose as in clause 6.3.3.2.1 in TS 38.521-1 [8] for the NR carrier.

6.3B.3.2.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting intra-band non-contiguous EN-DC.

6.3B.3.2.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.3.3.2.3 in TS 38.521-1 [8] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.3.

6.3B.3.2.4 Test description

Same test descriptions as in clause 6.3.3.2.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1.

For Initial conditions as in clause 6.3.3.2.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for the E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.

- 3.1. The E-UTRA Downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.3.3.2.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, *Connected without release On* according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.3.3.2.4.2 in TS 38.521-1 [8] with the following steps added for E-UTRA component:

- 1.1. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

6.3B.3.2.5 Test requirements

Same test requirement as in clause 6.3.3.2.5 in TS 38.521-1 [8] for the NR carrier.

6.3B.3.3 Tx ON/OFF time mask for inter-band EN-DC within FR1

6.3B.3.3.1 Test purpose

Same test purpose as in clause 6.3.3.2.1 in TS 38.521-1 [8] for the NR carrier.

6.3B.3.3.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC.

6.3B.3.3.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.3.3.2.3 in TS 38.521-1 [8] for the NR carrier.

No exception requirements applicable to NR or LTE.LTE anchor agnostic approach is applied.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.3.

6.3B.3.3.4 Test description

Same test descriptions as in clause 6.3.3.2.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1.

For Initial conditions as in clause 6.3.3.2.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for the E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA Downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.3.3.2.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, *Connected without release On* according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.3.3.2.4.2 in TS 38.521-1 [8] with the following steps added for E-UTRA component:

- 1.1. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

6.3B.3.3.5 Test requirements

Same test requirement as in clause 6.3.3.2.5 in TS 38.521-1 [8] for the NR carrier.

6.3B.3.4 Transmit ON/OFF time mask for inter-band EN-DC including FR2

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- The referred test case 6.3.3.2 in TS 38.521-2 [9] is incomplete

6.3B.3.4.1 Test purpose

Same test purpose as in clause 6.3.3.2.1 in TS 38.521-2 [9] for the NR carrier.

6.3B.3.4.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC FR2.

6.3B.3.4.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.3.3.2.3 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this measurement is TS 38.101-3 [4] clause 6.3B.

6.3B.3.4.4 Test Description

Same test description as in clause 6.3.3.2.4 in TS 38.521-2 [9] for the NR carrier with the following exceptions:

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.7-1.

For Initial conditions as in clause 6.3.3.2.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for the cell are set up according to TS 36.508 [11] subclause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.3.3.2.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [6] clause 4.5.

Same Test procedure as in clause 6.3.3.2.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

- 1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.3B.3.4.5 Test Requirement

Same test requirement as specified in TS 38.521-2 [9] clause 6.3.3.2.5 for the NR carrier(s).

6.3B.4 PRACH time mask for EN-DC

6.3B.4.1 PRACH time mask for intra-band contiguous EN-DC

6.3B.4.1.1 Test purpose

Same test purpose as in clause 6.3.3.4.1 in TS 38.521-1 [8] for the NR carrier.

6.3B.4.1.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting intra-band contiguous EN-DC.

6.3B.4.1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.3.3.4.3 in TS 38.521-1 [8] for the NR carrier.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.3.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.3B.4.1.4 Test description

Same test description as in clause 6.3.3.4.4 in TS 38.521-1 [8] with the following exception:

Table 6.3B.4.1.4-1: Test Configuration Table

| Initial Conditions | |
|--|--------------------------|
| Test Frequencies as specified in TS 38.508-1 [6] clause 4.3.1 for different DC bandwidth classes. | Mid range |
| Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1 across bandwidth combination sets supported by the UE | Highest NRB_agg (NOTE 1) |
| NOTE 1: If the UE supports multiple CC Combinations in the EN-DC Configuration with the same NRB_agg , only the combination with the highest NRB_SCG is tested | |

The initial test configurations for E-UTRA as specified in Table 4.6-1 except for the parameters specified in Table 6.3B.4.1.4-1.

For Initial conditions as in clause 6.3.3.4.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 5 of Initial conditions as in clause 6.3.3.4.4.1 in TS 38.521-1 [8] is replaced by:

- 5. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

For Message contents as in clause 6.3.3.4.4.3 in TS 38.521-1 [8], the following exception:

Table 6.3B.4.1.4-2: RACH-ConfigGeneric: PRACH measurement

| Derivation Path: TS 38.508-1[5], Table 4.6.3-130 | | | |
|--|--------------|-------------------|-----------------|
| Information Element | Value/remark | Comment | Condition |
| RACH-ConfigGeneric ::= SEQUENCE { | | | |
| prach-ConfigurationIndex | 14 | Unpaired Spectrum | PRACH Format 0 |
| | 128 | Unpaired Spectrum | PRACH Format A3 |

6.3B.4.1.5 Test requirements

Same test requirement as in clause 6.3.3.4.5 in TS 38.521-1 [8].

6.3B.4.2 PRACH Time Mask for intra-band non-contiguous EN-DC

6.3B.4.2.1 Test purpose

Same test purpose as in clause 6.3.3.4.1 in TS 38.521-1 [8] for the NR carrier.

6.3B.4.2.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting intra-band non-contiguous EN-DC.

6.3B.4.2.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.3.3.4.3 in TS 38.521-1 [8] for the NR carrier.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.3.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.3B.4.2.4 Test description

Same test description as in clause 6.3.3.4.4 in TS 38.521-1 [8] with the following exception:

Table 6.3B.4.2.4-1: Test Configuration Table

| Initial Conditions | |
|--|-------------------------|
| Test Frequencies as specified in TS 36TS 38.508-1 [76] clause 4.3.1 for different EN-DC bandwidth classes | [MaxWGap] |
| Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1 across bandwidth combination sets supported by the UE | Highest NRB_agg (NOTE1) |
| NOTE 1: If the UE supports multiple CC Combinations in the EN-DC Configuration with the same NRB_agg , only the combination with the highest NRB_SCG is tested | |

The initial test configurations for E-UTRA as specified in Table 4.6-1 except for the parameters specified in Table 6.3B.4.2.4-1.

For Initial conditions as in clause 6.3.3.4.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 5 of Initial conditions as in clause 6.3.3.4.4.1 in TS 38.521-1 [8] is replaced by:

- 5. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

For Message contents as in clause 6.3.3.4.4.3 in TS 38.521-1 [8], the following exception:

Table 6.3B.4.2.4-2: RACH-ConfigGeneric: PRACH measurement

| Derivation Path: TS 38.508-1[5], Table 4.6.3-130 | | | |
|---|--------------|-------------------|-----------------|
| Information Element | Value/remark | Comment | Condition |
| RACH-ConfigGeneric ::= SEQUENCE { prach-ConfigurationIndex | 14 | Unpaired Spectrum | PRACH Format 0 |
| | 128 | Unpaired Spectrum | PRACH Format A3 |

6.3B.4.2.5 Test requirements

Same test requirement as in clause 6.3.3.4.5 in TS 38.521-1 [8].

6.3B.4.3 PRACH Time Mask for inter-band EN-DC within FR1**6.3B.4.3.1 Test purpose**

Same test purpose as in clause 6.3.3.4.1 in TS 38.521-1 [8] for the NR carrier.

6.3B.4.3.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC.

6.3B.4.3.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.3.3.4.3 in TS 38.521-1 [8] for the NR carrier.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.3.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.3B.4.3.4 Test description

Same test description as in clause 6.3.3.4.4 in TS 38.521-1 [8] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1. For Initial conditions as in clause 6.3.3.4.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 5 of Initial conditions as in clause 6.3.3.4.4.1 in TS 38.521-1 [8] is replaced by:

- 5. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

6.3B.4.3.5 Test requirements

Same test requirement as in clause 6.3.3.4.5 in TS 38.521-1 [8].

6.3B.5 Output power dynamics for EN-DC with UL sharing from UE perspective

6.3B.5.1 E-UTRA and NR switching time mask for TDM based UL sharing from UE perspective

No test case details are specified. Current test procedures for time masks are based on power measurement in relatively long period compared with transient period. For time masks between 2 active time slots with different power level, the test procedure can't provide enough resolution to identify non-conformant UEs. Therefore the minimum requirement is not testable.

6.3B.6 Output power dynamics for intra-band EN-DC without dual PA capability

No test case details are specified. Current test procedures for time masks are based on power measurement in relatively long period compared with transient period. For time masks between 2 active time slots with different power level, the test procedure can't provide enough resolution to identify non-conformant UEs. Therefore the minimum requirement is not testable.

6.3B.7 Output power dynamics for intra-band EN-DC with dual PA capability

No test case details are specified. Current test procedures for time masks are based on power measurement in relatively long period compared with transient period. For time masks between 2 active time slots with different power level, the test procedure can't provide enough resolution to identify non-conformant UEs. Therefore the minimum requirement is not testable.

6.3B.8 Power control for EN-DC

6.3B.8.1 Absolute power tolerance for EN-DC

6.3B.8.1.1 Absolute power tolerance for intra-band contiguous EN-DC

6.3B.8.1.1.1 Test purpose

Same test purpose as in clause 6.3.4 in TS 38.521-1 [8] for the NR FR1 carrier(s),

6.3B.8.1.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band contiguous EN-DC.

6.3B.8.1.1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.3.4 in TS 38.521-1 [8] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.3B.8.1.1.4 Test description

Same test description as in clause 6.3.4.2.4 in TS 38.521-1 [8] for the NR carrier with the following exception:

Notes defined in Table 6.3.4.2.4.1-1 will be updated as below.

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1. For Initial conditions as in clause 6.3.4.2.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B, clause B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.3.4.2.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG according to TS 38.508 [6] clause 4.5.

6.3B.8.1.1.5 Test Requirement

Same test requirement as in clause 6.3.4.2.5 in TS 38.521-1 [8] for the NR carrier.

6.3B.8.1.2 Absolute power tolerance for intra-band non-contiguous EN-DC

6.3B.8.1.2.1 Test purpose

Same test purpose as in clause 6.3.4 in TS 38.521-1 [8] for the NR FR1 carrier(s).

6.3B.8.1.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band non-contiguous EN-DC.

6.3B.8.1.2.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.3.4 in TS 38.521-1 [8] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.3B.8.1.2.4 Test description

Same test description as in clause 6.3.4.2.4 in TS 38.521-1 [8] for the NR carrier with the following exception:

Notes defined in Table 6.3.4.2.4.1-1 will be updated as below.

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1. For Initial conditions as in clause 6.3.4.2.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B, clause B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.3.4.2.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG according to TS 38.508 [6] clause 4.5.

6.3B.8.1.2.5 Test Requirement

Same test requirement as in clause 6.3.4.2.5 in TS 38.521-1 [8] for the NR carrier.

6.3B.8.1.3 Absolute power tolerance for inter-band EN-DC within FR1

6.3B.8.1.3.1 Test purpose

Same test purpose as in clause 6.3.4 in TS 38.521-1 [8] for the NR FR1 carrier(s).

6.3B.8.1.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC within FR1.

6.3B.8.1.3.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.3.4 in TS 38.521-1 [8] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.3B.8.1.3.4 Test description

Same test description as in clause 6.3.4.2.4 in TS 38.521-1 [8] for the NR carrier with the following exception:

Notes defined in Table 6.3.4.2.4.1-1 will be updated as below.

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1. For Initial conditions as in clause 6.3.4.2.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B, clause B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.3.4.2.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG according to TS 36.508 [6] clause 4.5.

6.3B.8.1.3.5 Test Requirement

Same test requirement as in clause 6.3.4.2.5 in TS 38.521-1 [8] for the NR carrier.

6.3B.8.1.4 Absolute power tolerance for inter-band EN-DC including FR2

6.3B.8.1.4.1 Test purpose

Same test purpose as in clause 6.3.4 in TS 38.521-2 [9] for NR FR2 carrier(s).

6.3B.8.1.4.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2.

6.3B.8.1.4.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.3.4 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.3B.8.1.4.4 Test description

Same test description as in clause 6.3.4.2.4 in TS 38.521-2 [9] for the NR carrier with the following exception:

Notes defined in Table 6.3.4.2.4.1-1 will be updated as below.

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1. For Initial conditions as in clause 6.3.4.2.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B, clause B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.3.4.2.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG according to TS 38.508 [6] clause 4.5.

6.3B.8.1.4.5 Test Requirement

Same test requirement as in clause 6.3.4.2.5 in TS 38.521-2 [9] for the NR carrier.

6.3B.8.2 Relative power tolerance for EN-DC

6.3B.8.2.1 Relative power tolerance for intra-band contiguous EN-DC

6.3B.8.2.1.1 Test purpose

Same test purpose as in clause 6.3.4 in TS 38.521-1 [8] for the NR FR1 carrier(s).

6.3B.8.2.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band contiguous EN-DC.

6.3B.8.2.1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.3.4 in TS 38.521-1 [8] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.3B.8.2.1.4 Test description

Same test description as in clause 6.3.4.3.4 in TS 38.521-1 [8] for the NR carrier with the following exception:

Notes defined in Table 6.3.4.3.4.1-1 will be updated as below.

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1. For Initial conditions as in clause 6.3.4.3.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B, clause B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.3.4.3.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG according to TS 38.508 [6] clause 4.5.

6.3B.8.2.1.5 Test Requirement

Same test requirement as in clause 6.3.4.3.5 in TS 38.521-1 [8] for the NR carrier.

6.3B.8.2.2 Relative power tolerance for intra-band non-contiguous EN-DC

6.3B.8.2.2.1 Test purpose

Same test purpose as in clause 6.3.4 in TS 38.521-1 [8] for the NR FR1 carrier(s).

6.3B.8.2.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band non-contiguous EN-DC.

6.3B.8.2.2.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.3.4 in TS 38.521-1 [8] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.3B.8.2.2.4 Test description

Same test description as in clause 6.3.4.3.4 in TS 38.521-1 [8] for the NR carrier with the following exception:

Notes defined in Table 6.3.4.3.4.1-1 will be updated as below.

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1. For Initial conditions as in clause 6.3.4.3.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B, clause B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.3.4.3.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG according to TS 36.508 [6] clause 4.5.

6.3B.8.1.2.5 Test Requirement

Same test requirement as in clause 6.3.4.3.5 in TS 38.521-1 [8] for the NR carrier.

6.3B.8.2.3 Relative power tolerance for inter-band EN-DC within FR1

6.3B.8.2.3.1 Test purpose

Same test purpose as in clause 6.3.4 in TS 38.521-1 [8] for the NR FR1 carrier(s).

6.3B.8.2.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC within FR1.

6.3B.8.2.3.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.3.4 in TS 38.521-1 [8] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.3B.8.2.3.4 Test description

Same test description as in clause 6.3.4.3.4 in TS 38.521-1 [8] for the NR carrier with the following exception:

Notes defined in Table 6.3.4.3.4.1-1 will be updated as below.

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1. For Initial conditions as in clause 6.3.4.3.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B, clause B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.3.4.3.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG according to TS 38.508 [6] clause 4.5.

6.3B.8.2.3.5 Test Requirement

Same test requirement as in clause 6.3.4.3.5 in TS 38.521-1 [8] for the NR carrier.

6.3B.8.2.4 Relative power tolerance for inter-band EN-DC including FR2

6.3B.8.2.4.1 Test purpose

Same test purpose as in clause 6.3.4 in TS 38.521-2 [9] for NR FR2 carrier(s).

6.3B.8.2.4.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2.

6.3B.8.2.4.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.3.4 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.3B.8.2.4.4 Test description

Same test description as in clause 6.3.4.3.4 in TS 38.521-2 [9] for the NR carrier with the following exception:

Notes defined in Table 6.3.4.3.4.1-1 will be updated as below.

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1. For Initial conditions as in clause 6.3.4.3.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B, clause B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.3.4.3.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG according to TS 38.508 [6] clause 4.5.

6.3B.8.2.4.5 Test Requirement

Same test requirement as in clause 6.3.4.3.5 in TS 38.521-2 [9] for the NR carrier.

6.3B.8.3 Aggregate power tolerance for EN-DC

6.3B.8.3.1 Aggregate power tolerance for intra-band contiguous EN-DC

6.3B.8.3.1.1 Test purpose

Same test purpose as in clause 6.3.4 in TS 38.521-1 [8] for the NR FR1 carrier(s).

6.3B.8.3.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band contiguous EN-DC.

6.3B.8.3.1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.3.4 in TS 38.521-1 [8] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.3B.8.3.1.4 Test description

Same test description as in clause 6.3.4.4.4 in TS 38.521-1 [8] for the NR carrier with the following exception:

Notes defined in Table 6.3.4.4.4.1-1 will be updated as below.

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1. For Initial conditions as in clause 6.3.4.4.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B, clause B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.3.4.3.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG according to TS 38.508 [6] clause 4.5.

6.3B.8.3.1.5 Test Requirement

Same test requirement as in clause 6.3.4.4.5 in TS 38.521-1 [8] for the NR carrier.

6.3B.8.3.2 Aggregate power tolerance for intra-band non-contiguous EN-DC

6.3B.8.3.2.1 Test purpose

Same test purpose as in clause 6.3.4 in TS 38.521-1 [8] for the NR FR1 carrier(s).

6.3B.8.3.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band non-contiguous EN-DC.

6.3B.8.3.2.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.3.4 in TS 38.521-1 [8] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.3B.8.3.2.4 Test description

Same test description as in clause 6.3.4.4.4 in TS 38.521-1 [8] for the NR carrier with the following exception:

Notes defined in Table 6.3.4.4.4.1-1 will be updated as below.

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1. For Initial conditions as in clause 6.3.4.4.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B, clause B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.3.4.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG according to TS 38.508 [6] clause 4.5.

6.3B.8.3.2.5 Test Requirement

Same test requirement as in clause 6.3.4.4.5 in TS 38.521-1 [8] for the NR carrier.

6.3B.8.3.3 Aggregate power tolerance for inter-band EN-DC within FR1

6.3B.8.3.3.1 Test purpose

Same test purpose as in clause 6.3.4 in TS 38.521-1 [8] for the NR FR1 carrier(s).

6.3B.8.3.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC within FR1.

6.3B.8.3.3.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.3.4 in TS 38.521-1 [8] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.3B.8.3.3.4 Test description

Same test description as in clause 6.3.4.4.4 in TS 38.521-1 [8] for the NR carrier with the following exception:

Notes defined in Table 6.3.4.4.1-1 will be updated as below.

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1. For Initial conditions as in clause 6.3.4.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B, clause B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.3.4.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG according to TS 38.508 [6] clause 4.5.

6.3B.8.3.3.5 Test Requirement

Same test requirement as in clause 6.3.4.4.5 in TS 38.521-1 [8] for the NR carrier.

6.3B.8.3.4 Aggregate power tolerance for inter-band EN-DC including FR2

6.3B.8.3.4.1 Test purpose

Same test purpose as in clause 6.3.4 in TS 38.521-2 [9] for NR FR2 carrier(s).

6.3B.8.3.4.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2.

6.3B.8.3.4.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.3.4 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.3B.8.3.4.4 Test description

Same test description as in clause 6.3.4.4.4 in TS 38.521-2 [9] for the NR carrier with the following exception:

Notes defined in Table 6.3.4.4.4.1-1 will be updated as below.

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1. For Initial conditions as in clause 6.3.4.4.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B, clause B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.3.4.4.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG according to TS 36.508 [6] clause 4.5.

6.3B.8.3.4.5 Test Requirement

Same test requirement as in clause 6.3.4.4.5 in TS 38.521-2 [9] for the NR carrier.

6.4 Transmit signal quality

6.4A Transmit Signal Quality for inter-band NR CA between FR and FR2 without EN-DC

6.4A.1 Frequency error for inter-band NR CA between FR 1 and FR 2 without EN-DC

6.4A.1.1 Test purpose

Same test purpose as in clause 6.4.1 in TS 38.521-1 [8] for NR FR1 carrier(s) and clause 6.4.1 in TS 38.521-2 [9] for NR FR2 carrier(s).

6.4A.1.2 Test applicability

The requirements in this test are not testable due to issues with combined testing of NR FR1 conducted mode with NR FR2 in radiated mode. Therefore, the conducted and radiated requirements are tested separately.

No test case details are specified. The SA requirements for frequency error apply and are tested in TS 38.521-1 [8] clauses 6.4 and 6.4A and TS 38.521-2 [9] clauses 6.4 and 6.4A

6.4A.2 Transmit Modulation Quality for inter-band NR CA without EN-DC**6.4A.2.1 Error Vector Magnitude for inter-band NR CA between FR 1 and FR 2 without EN-DC****6.4A.2.1.1 Test purpose**

Same test purpose as in clause 6.4.2.1 in TS 38.521-1 [8] for NR FR1 carrier(s) and clause 6.4.2.1 in TS 38.521-2 [9] for NR FR2 carrier(s).

6.4A.2.1.2 Test applicability

The requirements in this test are not testable due to issues with combined testing of NR FR1 conducted mode with NR FR2 in radiated mode. Therefore, the conducted and radiated requirements are tested separately.

No test case details are specified. The SA requirements for error vector magnitude apply and are tested in TS 38.521-1 [8] clauses 6.4 and 6.4A and TS 38.521-2 [9] clauses 6.4 and 6.4A

6.4A.2.2 Carrier Leakage for inter-band NR CA between FR 1 and FR 2 without EN-DC**6.4A.2.2.1 Test purpose**

Same test purpose as in clause 6.4.2.2 in TS 38.521-1 [8] for NR FR1 carrier(s) and clause 6.4.2.2 in TS 38.521-2 [9] for NR FR2 carrier(s).

6.4A.2.2.2 Test applicability

The requirements in this test are not testable due to issues with combined testing of NR FR1 conducted mode with NR FR2 in radiated mode. Therefore, the conducted and radiated requirements are tested separately.

No test case details are specified. The SA requirements for carrier leakage apply and are tested in TS 38.521-1 [8] clauses 6.4 and 6.4A and TS 38.521-2 [9] clauses 6.4 and 6.4A

6.4A.2.3 In-band Emissions for inter-band NR CA between FR 1 and FR 2 without EN-DC**6.4A.2.3.1 Test purpose**

Same test purpose as in clause 6.4.2.3 in TS 38.521-1 [8] for NR FR1 carrier(s) and clause 6.4.2.3 in TS 38.521-2 [9] for NR FR2 carrier(s).

6.4A.2.3.2 Test applicability

The requirements in this test are not testable due to issues with combined testing of NR FR1 conducted mode with NR FR2 in radiated mode. Therefore, the conducted and radiated requirements are tested separately.

No test case details are specified. The SA requirements for in-band emissions apply and are tested in TS 38.521-1 [8] clauses 6.4 and 6.4A and TS 38.521-2 [9] clauses 6.4 and 6.4A

6.4A.2.4 EVM Equalizer Spectral Flatness for inter-band NR CA between FR 1 and FR 2 without EN-DC**6.4A.2.4.1 Test purpose**

Same test purpose as in clause 6.4.2.4 in TS 38.521-1 [8] for NR FR1 carrier(s) and clause 6.4.2.4 in TS 38.521-2 [9] for NR FR2 carrier(s).

6.4A.2.4.1 Test applicability

The requirements in this test are not testable due to issues with combined testing of NR FR1 conducted mode with NR FR2 in radiated mode. Therefore, the conducted and radiated requirements are tested separately.

No test case details are specified. The SA requirements for EVM equalizer spectral flatness apply and are tested in TS 38.521-1 [8] clauses 6.4 and 6.4A and TS 38.521-2 [9] clauses 6.4 and 6.4A

6.4B Transmit Signal Quality for DC

6.4B.1 Frequency error

6.4B.1.1 Frequency error for Intra-band contiguous EN-DC

6.4B.1.1.1 Test purpose

Same test purpose as in clause 6.4.1 in TS 38.521-1 [8] for the NR carrier.

6.4B.1.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band contiguous EN-DC.

6.4B.1.1.3 Minimum conformance requirements

For intra-band contiguous EN-DC, the requirement shall apply on each component carrier as defined in clause 6.5.1 in TS 38.101-3 [4] and in clause 6.4.1 in TS 38.101-1 [2], respectively.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this measurement is TS 38.101-3 [4] clause 6.4B.1.1.

6.4B.1.1.4 Test description

Same test description as in clause 6.4.1.4 in TS 38.521-1 [8] for the NR carrier with the following exception:

Notes defined in Table 6.4.1.4.1-1 will be updated as below.

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1. For Initial conditions as in clause 6.4.1.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B, clause B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.4.1.4.1 in TS 38.521-1 [8] is replaced by:

- 6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG according to TS 38.508 [6] clause 4.5.

6.4B.1.1.5 Test Requirement

The 10 frequency error Δf results must fulfil the test requirement defined in clause 6.4.1.5 TS 38.521-1 [8].

6.4B.1.2 Frequency error for Intra-band non-contiguous EN-DC

6.4B.1.2.1 Test purpose

Same test purpose as in clause 6.4.1 in TS 38.521-1 [8] for the NR carrier.

6.4B.1.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band non-contiguous EN-DC.

6.4B.1.2.3 Minimum conformance requirements

For intra-band non-contiguous EN-DC, the requirement shall apply on each component carrier as defined in clause 6.5.1 in TS 38.101-3 [4] and in clause 6.4.1 in TS 38.101-1 [2], respectively.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this measurement is TS 38.101-3 [4] clause 6.4B.1.2.

6.4B.1.2.4 Test description

Same test description as in clause 6.4.1.4 in TS 38.521-1 [8] for the NR carrier with the following exception:

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on EN-DC operating bands specified in clause 5.2B.3, all of these configurations shall be tested with applicable test parameters for each intra-band non-contiguous EN-DC configuration specified in clause 5.3B.1.3, and are shown in table 6.4B.1.2.4-1.

Table 6.4B.1.2.4-1: Test Configuration Table

| Initial Conditions | | | | |
|---|------------------------------------|------------------|-----------------------------|------------------|
| Test Environment as specified in TS 38.508-1 [5] clause 4.1 | Normal, TL/VL, TL/VH, TH/VL, TH/VH | | | |
| Test Frequencies as specified in TS 38.508-1 [6] clause 4.3.1 for different EN-DC bandwidth classes | minWgap , MaxWgap | | | |
| Test Frequencies as specified in TS 38.508-1 [5] clause 4.3.1 | Mid range | | | |
| Test Channel Bandwidths as specified in TS 38.508-1 [5] clause 4.3.1 | Highest | | | |
| Test SCS as specified in Table 5.3.5-1 | Lowest | | | |
| Test Parameters | | | | |
| | Downlink Configuration | | Uplink Configuration | |
| Test ID | Modulation | RB allocation | Modulation | RB allocation |
| 1 | CP-OFDM QPSK | Full RB (NOTE 1) | DFT-s-OFDM QPSK | REFSENS (NOTE 2) |
| NOTE 1: Full RB allocation shall be used per each SCS and channel BW as specified in Table 7.3.2.4.1-2. | | | | |
| NOTE 2: REFSENS refers to Table 7.3.2.4.1-3 which defines uplink RB configuration and start RB location for each SCS, channel BW and NR band. | | | | |

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1 with the exception that E-UTRA test frequency are specified in Table 7.4B.2.4.1-1 based on intra-band non-contiguous EN-DC configuration specified in clause 5.3B.1.3.

For Initial conditions as in clause 6.4.1.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B, clause B.0 of TS 36.521-1 [10].

Steps 4 and 6 of Initial conditions as in clause 6.4.1.4.1 in TS 38.521-1 [8] is replaced by:

4. The DL and UL Reference Measurement frequencies are set according to Table 6.4B.1.2.4-1.

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG according to TS 38.508 [6] clause 4.5.

6.4B.1.2.5 Test Requirement

The 10 frequency error Δf results must fulfil the test requirement defined in TS 38.521-1 [8], clause 6.4.1.5.

6.4B.1.3 Frequency error for Inter-band EN-DC within FR1

6.4B.1.3.1 Test purpose

Same test purpose as in clause 6.4.1 in TS 38.521-1 [8] for the NR carrier.

6.4B.1.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC.

6.4B.1.3.3 Minimum conformance requirements

For inter-band EN-DC with uplink assigned to one E-UTRA band and one NR band, the requirements shall apply on each component carrier as defined in clause 6.5.1 in TS 36.101 [5] and in clause 6.4.1 in TS 38.101-1 [2], respectively, with all component carriers active. If multiple component carriers are assigned to one E-UTRA band, the requirements in clauses 6.5.1A in TS 36.101 [5] apply for those component carriers, and if multiple component carriers are assigned to one NR band, the requirements in clauses 6.4A.1 in TS 38.101-1 [2] apply for those component carriers.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this measurement is TS 38.101-3 [4] clause 6.4B.1.3.

6.4B.1.3.4 Test description

Same test description as in clause 6.4.1.4 in TS 38.521-1 [8] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1. For Initial conditions as in clause 6.4.1.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.4.1.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG according to TS 38.508 [6] clause 4.5.

6.4B.1.3.5 Test Requirement

The 10 frequency error Δf results must fulfil the test requirement defined in 6.4.1.5 TS 38.521-1 [8].

6.4B.1.4 Frequency Error for inter-band EN-DC including FR2

Editor's note:

- The following aspects of the clause are for future consideration:
- Testing of extreme conditions for FR2 is FFS.

6.4B.1.4.1 Test purpose

Same test purpose as in clause 6.4.1.1 in TS 38.521-2 [9] for the NR carrier.

6.4B.1.4.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting intra-band EN-DC including FR2.

6.4B.1.4.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.4.1.3 in TS 38.521-2 [9] for the *NR* carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.4B.

6.4B.1.4.4 Test description

Same test description as in clause 6.4.1.4 in TS 38.521-2 [9] for the *NR* carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1.

For initial conditions as in clause 6.4.1.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.4.1.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.4.1.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

- 1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.4B.1.4.5 Test requirements

Same test requirement as in clause 6.4.1.5 in TS 38.521-2 [9] for the *NR* carrier.

6.4B.1.4_1 Frequency Error for Inter-band EN-DC including FR2 (>2 CCs)

Editor's note: Test applicability, Test Description in below sub-clauses requires updates to clarify number of E-UTRA carriers that will be configured during the test that will be limited to only 1 E-UTRA CC

6.4B.1.4_1.1 Frequency Error for Inter-band EN-DC including FR2 (3 CCs)

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- The referred test case 6.4A.1.1 in TS 38.521-2 [9] is incomplete.

6.4B.1.4_1.1.1 Test purpose

Same test purpose as in clause 6.4.1.1 in TS 38.521-2 [9] for the *NR* carrier.

6.4B.1.4_1.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 3 UL CCs (2NR UL CCs).

6.4B.1.4_1.1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.4.1.3 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.4B.1.4.

6.4B.1.4_1.1.4 Test description

6.4B.1.4_1.1.4.1 Initial condition

Same test description as in clause 6.4A.1.1.4 in TS 38.521-2 [9] for the *NR* carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1.

For Initial conditions as in clause 6.4A.1.1.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.4A.1.1.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.4A.1.1.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.4B.1.4_1.1.5 Test Requirements

Same test requirement as in clause 6.4A.1.1.5 in TS 38.521-2 [9] for the *NR* carrier.

6.4B.1.4_1.2 Frequency Error for Inter-band EN-DC including FR2 (4 CCs)

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- The referred test case 6.4A.1.2 in TS 38.521-2 [9] is incomplete.

6.4B.1.4_1.2.1 Test purpose

Same test purpose as in clause 6.4.1.1 in TS 38.521-2 [9] for the NR carrier.

6.4B.1.4_1.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 4 UL CCs (3NR UL CCs).

6.4B.1.4_1.2.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.4.1.3 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.4B.1.4.

6.4B.1.4_1.2.4 Test description

6.4B.1.5.4_1.2.1 Initial condition

Same test description as in clause 6.4A.1.2.4 in TS 38.521-2 [9] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1.

For Initial conditions as in clause 6.4A.1.2.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.4A.1.2.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.4A.1.2.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.4B.1.4_1.2.5 Test Requirements

Same test requirement as in clause 6.4A.1.2.5 in TS 38.521-2 [9] for the NR carrier.

6.4B.1.4_1.3 Frequency Error for Inter-band EN-DC including FR2 (5 CCs)

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- The referred test case 6.4A.1.3 in TS 38.521-2 [9] is incomplete.

6.4B.1.4_1.3.1 Test purpose

Same test purpose as in clause 6.4.1.1 in TS 38.521-2 [9] for the NR carrier.

6.4B.1.4_1.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 5 UL CCs (4NR UL CCs).

6.4B.1.4_1.3.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.4.1.3 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.4B.1.4.

6.4B.1.4_1.3.4 Test description

6.4B.1.4_1.3.4.1 Initial condition

Same test description as in clause 6.4A.1.3.4 in TS 38.521-2 [9] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1.

For Initial conditions as in clause 6.4A.1.3.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.4A.1.3.4.1 in TS 38.521-2 [9] is replaced by:

- 6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.4A.1.3.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

- 1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.4B.1.4_1.3.5 Test Requirements

Same test requirement as in clause 6.4A.1.3.5 in TS 38.521-2 [9] for the NR carrier.

6.4B.2 Transmit Modulation Quality for DC

6.4B.2.1 Transmit Modulation Quality for intra-band contiguous EN-DC

6.4B.2.1.1 Error Vector Magnitude for intra-band contiguous EN-DC

6.4B.2.1.1.1 Test purpose

The Error Vector Magnitude is a measure of the difference between the reference waveform and the measured waveform. This difference is called the error vector. Before calculating the EVM the measured waveform is corrected by the sample timing offset and RF frequency offset. Then the carrier leakage shall be removed from the measured waveform before calculating the EVM.

The measured waveform is further equalised using the channel estimates subjected to the EVM equaliser spectrum flatness requirement specified in clause 6.4B.2.1.4.3. For DFT-s-OFDM waveforms, the EVM result is defined after the front-end FFT and IDFT as the square root of the ratio of the mean error vector power to the mean reference power expressed as a %. For CP-OFDM waveforms, the EVM result is defined after the front-end FFT as the square root of the ratio of the mean error vector power to the mean reference power expressed as a %.

The basic EVM measurement interval in the time domain is one preamble sequence for the PRACH and the duration of PUCCH/PUSCH channel, or one hop, if frequency hopping is enabled for PUCCH and PUSCH in the time domain. The EVM measurement interval is reduced by any symbols that contains an allowable power transient as defined in clause 6.3.3.3 of TS 38.521-1 [8].

6.4B.2.1.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band EN-DC.

6.4B.2.1.1.3 Minimum conformance requirements

For the intra-band contiguous EN-DC with one component carrier per CG the EVM requirement applies with PRB allocation in one of the CG and the other CG unallocated.

The EVM requirements for each CG are according to clause 6.5.2 of TS 36.101 [5] for the MCG and clause 6.4.2 of TS 38.101-1 [2] for the SCG with EN-DC configured.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.4B.2.1.1.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.4B.2.1.1.4 Test description

Same test description as in clause 6.4.2.1.4 in TS 38.521-1 [8] for the NR carrier with the following exception:

Table 6.4B.2.1.1.4-1: Test Configuration Table

| Initial Conditions | |
|---|--------------------------|
| Test Frequencies as specified in TS 38.508-1 [6] clause 4.3.1 | Mid range |
| Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1 | Highest NRB_agg (NOTE 1) |
| NOTE 1: If the UE supports multiple CC Combinations in the EN-DC Configuration with the same NRB_agg , only the combination with the highest NRB_SCG is tested. | |

The initial test configurations for E-UTRA as specified in Table 4.6-1 except for the parameters specified in Table 6.4B.2.1.1.4-1.

For Initial conditions as in clause 6.4.2.1.4.1 in TS 38.521-1 [8], the following steps are added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.4.2.1.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

Same test procedure as in clause 6.4.2.1.4.2 in TS 38.521-1 [8].

For Message contents as in clause 6.4.2.1.4.3 in TS 38.521-1 [8], the following exception:

Table 6.4B.2.1.1.4-2: RACH-ConfigGeneric: PRACH measurement

| Derivation Path: TS 38.508-1[5], Table 4.6.3-130 | | | |
|---|--------------|-------------------|----------------|
| Information Element | Value/remark | Comment | Condition |
| RACH-ConfigGeneric ::= SEQUENCE { prach-ConfigurationIndex | 14 | Unpaired Spectrum | PRACH Format 0 |

6.4B.2.1.1.5 Test requirements

Same test requirement as in clause 6.4.2.1.5 in TS 38.521-1 [8] for the NR carrier.

6.4B.2.1.2 Carrier Leakage for intra-band contiguous EN-DC

6.4B.2.1.2.1 Test purpose

Carrier leakage expresses itself as unmodulated sine wave with the carrier frequency or centre frequency of aggregated transmission bandwidth configuration. It is an interference of approximately constant amplitude and independent of the amplitude of the wanted signal. Carrier leakage interferes with the centre sub carriers of the UE under test (if allocated), especially, when their amplitude is small. The measurement interval is defined over one slot in the time domain.

The purpose of this test is to exercise the UE transmitter to verify its modulation quality in terms of carrier leakage.

6.4B.2.1.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band EN-DC.

6.4B.2.1.2.3 Minimum conformance requirements

The carrier leakage requirements for each CG are according to clause 6.5.2 of TS 36.101 [5] for the MCG and clause 6.4.2 of TS 38.101-1 [2] for the SCG with EN-DC configured.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.4B.2.1.2.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.4B.2.1.2.4 Test description

Same test description as in clause 6.4.2.2.4 in TS 38.521-1 [8] for the NR carrier with the following exception:

Table 6.4B.2.1.2.4-1: Test Configuration

| Initial Conditions | |
|---|--------------------------|
| | |
| Test Frequencies as specified in TS 38.508-1 [6] clause 4.3.1 | Mid range |
| Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1 | Highest NRB_agg (NOTE 1) |
| NOTE 1: If the UE supports multiple CC Combinations in the EN-DC Configuration with the same NRB_agg , only the combination with the highest NRB_SCG is tested. | |

The initial test configurations for E-UTRA as specified in Table 4.6-1 except for the parameters specified in Table 6.4B.2.1.2.4-1For Initial conditions as in clause 6.4.2.2.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.4.2.2.4.1 in TS 38.521-1 [8] is replaced by:

- 6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

6.4B.2.1.2.5 Test requirements

Same test requirement as in clause 6.4.2.2.5 in TS 38.521-1 [8] for the NR carrier.

6.4B.2.1.3 In-band Emissions for intra-band contiguous EN-DC

6.4B.2.1.3.1 Test purpose

The in-band emissions are a measure of the interference falling into the non-allocated resources blocks.

The in-band emission is defined as the average emission across 12 sub-carriers and as a function of the RB offset from the edge of the allocated UL transmission bandwidth. The in-band emission is measured as the ratio of the UE output power in a non-allocated RB to the UE output power in an allocated RB.

The basic in-band emissions measurement interval is defined over one slot in the time domain, however, the minimum requirement applies when the in-band emission measurement is averaged over 10 sub-frames. When the PUSCH or PUCCH transmission slot is shortened due to multiplexing with SRS, the in-band emissions measurement interval is reduced by one or more symbols, accordingly.

The purpose of this test is to exercise the UE transmitter to verify its modulation quality in terms of in-band emissions.

6.4B.2.1.3.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting intra-band contiguous EN-DC.

6.4B.2.1.3.3 Minimum conformance requirements

For the MCG the in-band emission requirements in Table 6.5.2A.3.1-1 and Table 6.5.2A.3.1-2 in TS 36.101 [5] apply within the aggregated transmission bandwidth configuration of the EN-DC bandwidth with the carriers of both CGs active and one single contiguous PRB allocation of bandwidth L_{CRB} within the MCG at the edge of the said aggregated transmission bandwidth configuration.

For the SCG the in-band emission requirements in Table 6.5.2A.3.1-1 and Table 6.5.2A.3.1-2 in TS 36.101 [5] apply within the aggregated transmission bandwidth configuration of the EN-DC bandwidth with the carriers of both CGs active and one single contiguous PRB allocation of bandwidth L_{CRB} within the SCG at the edge of the aggregated transmission bandwidth configuration.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.4B.2.1.3

Exception requirements for both NR and E-UTRA are defined for this test and therefore LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

6.4B.2.1.3.4 Test description

6.4B.2.1.3.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and test channel bandwidths based on NR operating bands specified in clause 5.3B.1.2, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-1 [8] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2. All of these configurations shall be tested with applicable test parameters for each EN-DC combination of test channel bandwidth and sub-carrier spacing, and are shown in table 6.4B.2.1.3.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521.1 [10] Annex C.2 and in TS 38.521-1 [8] Annex C.2 for E-UTRA CG and NR CG respectively.

Table 6.4B.2.1.3.4.1-1: Test configuration table

| Initial Conditions | | | | | |
|---|----------------------------------|--|---------------------------|-----------------|---------------------------|
| Test Environment as specified in TS 38.508-1 [6] clause 4.1 | | NC | | | |
| Test Frequencies as specified in TS 38.508-1 [6] clause 4.3.1 | | Low range, Mid range, High range | | | |
| Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1 | | Lowest NRB_agg, Highest NRB_agg (Note 2) | | | |
| Test SCS for the NR cell as specified in TS 38.521-1 [8] Table 5.3.5-1 | | Smallest supported SCS per Channel Bandwidth | | | |
| Test Parameters | | | | | |
| Test ID | Downlink Configuration | EN-DC Uplink Configuration | | | |
| | | E-UTRA Cell | | NR Cell | |
| Modulation | RB allocation | Modulation | RB allocation (Note 1) | Modulation | RB allocation (Note 1) |
| 1 (Note3) | N/A for In-band emission test | QPSK | 0 | DFT-s-OFDM QPSK | Inner_1RB_Left |
| 2 (Note 4) | | QPSK | 0 | DFT-s-OFDM QPSK | Inner_1RB_Right |
| 3 (Note3) | | QPSK | 0 | CP-OFDM QPSK | Inner_1RB_Left |
| 4 (Note 4) | | QPSK | 0 | CP-OFDM QPSK | Inner_1RB_Right |
| 5 (Note3) | | QPSK | Outer_1RB_Right | DFT-s-OFDM QPSK | 0 |
| 6 (Note 4) | | QPSK | Outer_1RB_Left | DFT-s-OFDM QPSK | 0 |

NOTE 1: The specific configuration of each RB allocation is defined in Table 6.1-1 in TS 38.521-1 [8].
 NOTE 2: If the UE supports multiple CC combinations in the EN-DC configuration with the same NRB_agg, select the combination to test as follows:
 - Lowest ENBW: NR component with lowest N_{RB} is tested.
 - Highest ENBW: NR component with highest N_{RB} is tested.
 NOTE 3: Applicable when E-UTRA cell carrier frequency is lower than NR cell carrier.
 NOTE 4: Applicable when NR cell carrier frequency is lower than E-UTRA cell carrier.
 NOTE 5: Outer_1RB_Left defined as 1 RB allocated at the left edge of the E-UTRA component. Outer_1RB_Right defined as 1 RB allocated at the right edge of the E-UTRA component.

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operation band and test channel bandwidth as specified in Table 4.6-1.

1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [6] Annex A, Figure A.3.1.1 for TE diagram and clause A.3.2.1 for UE diagram.
2. The parameter settings for the E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3, and the parameter settings for the NR cell are set up according to TS 38.508-1 [6] clause 4.4.3.
3. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C.0 and TS 38.521-1 [8] Annex C.0 for E-UTRA CG and NR CG respectively, and uplink signals according to TS 36.521-1 [10] Annex H and TS 38.521-1 [8] Annex G for E-UTRA CG and NR CG respectively.
4. NR downlink signals are initially set up according to Annex C.0, C.1, and C.2 and uplink signals according to Annex G.0, G.1, G.2, and G.3.0 of TS 38.521-1 [8].
5. The UL Reference Measurement channels are TS 36.521-1 [10] Annex A.2 and TS 38.521-1 [8] Annex A.2 for E-UTRA CG and NR CG respectively.
6. Propagation conditions are set according to TS 36.521-1 [10] Annex B.0 and TS 38.521-1 [8] Annex B.0 for E-UTRA CG and NR CG respectively.
7. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 6.4B.2.1.3.4.3.

8. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

6.4B.2.1.3.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 6.4B.2.1.3.4.1-1 on E-UTRA CC and NR CC respectively. Since the UL has no payload and no loopback data to send, the UE transmits uplink MAC padding bits on the UL RMC.
2. For NR CC, send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as +MU to +(MU + Uplink power control window size) dB of the target power level 0dBm, where:
 - MU is the test system uplink power measurement uncertainty and is specified in Table F.1.2-1 for the carrier frequency f and the channel bandwidth BW.
 - Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified in Table F.1.2-1.
3. Measure In-band emission on NR CC using Global In-Channel Tx-Test (Annex E). Measure power spectral density on E-UTRA CC. For TDD slots with transient periods are not under test.
4. For NR CC, send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as +MU to +(MU + Uplink power control window size) dB of the target power level -30dBm, where MU and Uplink power control window size are defined above.
5. Measure In-band emission on NR CC using Global In-Channel Tx-Test (Annex E). Measure power spectral density on E-UTRA CC. For TDD slots with transient periods are not under test
6. For NR CC, send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as +MU to +(MU + Uplink power control window size) dB of the target power level -40dBm, where MU and Uplink power control window size are defined above.
7. Measure In-band emission on NR CC using Global In-Channel Tx-Test (Annex E). Measure power spectral density on E-UTRA CC. For TDD slots with transient periods are not under test.
8. For E-UTRA CC, send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as +MU to +(MU + Uplink power control window size) dB of the target power level 0dBm, where:
 - MU is the test system uplink power measurement uncertainty and is specified in Table F.1.2-1 for the carrier frequency f and the channel bandwidth BW.
 - Uplink power control window size = 1dB (UE power step size) + 1.0dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 36.101 [5], Table 6.3.5.2.1-1 and is 1.0dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified in Table F.1.2-1.
9. Measure In-band emission on E-UTRA CC using Global In-Channel Tx-Test (Annex E). Measure power spectral density on NR CC. For TDD slots with transient periods are not under test.
10. For E-UTRA CC, send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as +MU to +(MU + Uplink power control window size) dB of the target power level -30dBm, where MU and Uplink power control window size are defined above.
11. Measure In-band emission on E-UTRA CC using Global In-Channel Tx-Test (Annex E). Measure power spectral density on NR CC. For TDD slots with transient periods are not under test

12. For E-UTRA CC, send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as $+\text{MU}$ to $+(\text{MU} + \text{Uplink power control window size})$ dB of the target power level -40dBm, where MU and Uplink power control window size are defined above.

13. Measure In-band emission on E-UTRA CC using Global In-Channel Tx-Test (Annex E). Measure power spectral density on NR CC. For TDD slots with transient periods are not under test.

NOTE 1: When switching to DFT-s-OFDM waveform, as specified in the test configuration table 6.4B.2.1.3.4.1-1, send an NR RRCReconfiguration message according to TS 38.508-1 [6] clause 4.6.3 Table 4.6.3-118 PUSCH-Config with TRANSFORM_PRECODER_ENABLED condition.

NOTE 2: The purpose of the Uplink power control window is to ensure that the actual UE output power is no less than the target power level, and as close as possible to the target power level. The relationship between the Uplink power control window, the target power level and the corresponding possible actual UE Uplink power window is illustrated in Annex F, clause F.4.

Table 6.4B.2.1.3.4.2-1: Void

Table 6.4B.2.1.3.4.2-2: Void

6.4B.2.1.3.4.3 Message contents

Message contents are according to TS 38.508-1 [6] clause 4.6.1.

6.4B.2.1.3.5 Test requirements

Each of the [20] In-band emissions results, derived in Annex E.4.3 shall not exceed the corresponding values in Table 6.4B.2.1.3.5-1.

Table 6.4B.2.1.3.5-1: Test requirements for in-band emissions (allocated component carrier)

| Parameter | Unit | Limit | | Applicable Frequencies |
|---|------|--|----------------------------------|--|
| General | dB | $\max \{ -25 - 10 \cdot \log_{10} (N_{RB} / L_{CRB}),$ $20 \cdot \log_{10} EVM - 3 - 5 \cdot (\Delta_{RB} - 1) / L_{CRB},$ $-57 \text{ dBm} / 180 \text{ kHz} - P_{RB} \}$ + TT | | Any non-allocated (NOTE 2) |
| IQ Image | dB | -25 | | Exception for IQ image (NOTE 3) |
| Carrier leakage | dBc | 25 + TT | Output power > 0 dBm | Exception for Carrier frequency (NOTE 4) |
| | | 20 + TT | -30 dBm ≤ Output power ≤ 0 dBm | |
| | | 10 + TT | -40 dBm ≤ Output power < -30 dBm | |
| <p>NOTE 1: An in-band emissions combined limit is evaluated in each non-allocated RB. For each such RB, the minimum requirement is calculated as the higher of $P_{RB} - 30$ dB and the power sum of all limit values (General, IQ Image or Carrier leakage) that apply. P_{RB} is defined in NOTE 9. The limit is evaluated in each non-allocated RB.</p> <p>NOTE 2: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured average power per allocated RB, where the averaging is done across all allocated RBs.</p> <p>NOTE 3: Exceptions to the general limit are allowed for up to $L_{CRBs} + 1$ RBs within a contiguous width of $L_{CRBs} + 1$ non-allocated RBs. The measurement bandwidth is 1 RB.</p> <p>NOTE 4: Exceptions to the general limit are allowed for up to two contiguous non-allocated RBs. The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in the non-allocated RB to the measured total power in all allocated RBs.</p> <p>NOTE 5: L_{CRB} is the Transmission Bandwidth (see Figure 5.6-1) not exceeding $\lfloor N_{RB} / 2 - 1 \rfloor$</p> <p>NOTE 6: N_{RB} is the Transmission Bandwidth Configuration (see Figure 5.6-1) of the component carrier with RBs allocated.</p> <p>NOTE 7: EVM is the limit specified in Table 6.5.2.1.1-1 for the modulation format used in the allocated RBs.</p> <p>NOTE 8: Δ_{RB} is the starting frequency offset between the allocated RB and the measured non-allocated RB (e.g. $\Delta_{RB} = 1$ or $\Delta_{RB} = -1$ for the first adjacent RB outside of the allocated bandwidth).</p> <p>NOTE 9: P_{RB} is the transmitted power per 180 kHz in allocated RBs, measured in dBm.</p> <p>NOTE 10: Test tolerance TT = 0.8 dB.</p> | | | | |

The in-band emissions results, measured with the spectral test shall not exceed the corresponding values in Table 6.4B.2.1.3.5-2.

Table 6.4B.2.1.3.5-2: Test requirements for in-band emissions (not allocated component carrier)

| Parameter | Unit | Meas BW NOTE 1 | Limit | remark | Applicable Frequencies |
|--|------|------------------------------------|--|--|---|
| General | dB | BW of 1 RB (180KHz rectangular) | $\max \{ -25 - 10 \cdot \log_{10}(N_{RB} / L_{CRB}), 20 \cdot \log_{10} EVM - 3 - 5 \cdot (\Delta_{RB} - 1) / L_{CRB}, -57 dBm / 180kHz - P_{RB} \}$ | The reference value is the average power per allocated RB in the allocated component carrier | Any RB in the non-allocated component carrier. The frequency raster of the RBs is derived when this component carrier is allocated with RBs |
| IQ Image | dB | BW of 1 RB (180KHz rectangular) | -25 + TT NOTE 2 | The reference value is the average power per allocated RB in the allocated component carrier | The frequencies of the L_{CRB} contiguous non-allocated RBs are unknown. The frequency raster of the RBs is derived when this component carrier is allocated with RBs |
| Carrier leakage | dBc | BW of 1 RB (180KHz rectangular) | NOTE 3 | The reference value is the total power of the allocated RBs in the allocated component carrier | The frequencies of the up to 2 non-allocated RBs are unknown. The frequency raster of the RBs is derived when this component carrier is allocated with RBs |
| | | | -25 + TT | | |
| | | | Output power > 0 dBm | | |
| | | | -20 + TT | | |
| | | | -30 dBm ≤ Output power ≤ 0 dBm | | |
| | | | -10 + TT | | |
| | | | -40 dBm ≤ Output power < -30 dBm | | |
| <p>NOTE 1: Resolution BWs smaller than the measurement BW may be integrated to achieve the measurement bandwidth.</p> <p>NOTE 2: Exceptions to the general limit are allowed for up to $L_{CRB} + 1$ RBs within a contiguous width of $L_{CRB} + 1$ non-allocated RBs.</p> <p>NOTE 3: Two Exceptions to the general limit are allowed for up to two contiguous non-allocated RBs</p> <p>NOTE 4: NOTES 1, 5, 6, 7, 8, 9 from Table 6.5.2A.3.1-1 apply for Table 6.5.2A.3.1-2 as well.</p> <p>NOTE 5: Δ_{RB} for measured non-allocated RB in the non-allocated component carrier may take non-integer values when the carrier spacing between the CCs is not a multiple of RB.</p> <p>NOTE 6: Test tolerance TT = 0.8 dB.</p> | | | | | |

6.4B.2.1.4 EVM Equalizer Flatness for intra-band contiguous EN-DC**6.4B.2.1.4.1 Test purpose**

Same test purpose as in clause 6.4.2.4 in TS 38.521-1 [8] for the NR carrier.

6.4B.2.1.4.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band contiguous EN-DC.

6.4B.2.1.4.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.4.2.4.3 in TS 38.521-1 [8] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.4B.2.1.4.4 Test description

Same test description as in clause 6.4.2.4.4 in TS 38.521-1 [8] for the NR carrier with the following exception:

Table 6.4B.2.1.4.4-1: Test Configuration Table

| Initial Conditions | |
|--|--------------------------|
| Test Frequencies as specified in TS 38.508-1 [6] clause 4.3.1 | Mid range |
| Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1 | Highest NRB_agg (NOTE 1) |
| NOTE 1: If the UE supports multiple CC Combinations in the EN-DC Configuration with the same NRB_agg, only the combination with the highest NRB_SCG is tested. | |

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1.

For Initial conditions as in clause 6.4.2.4.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.4.2.4.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.4.2.4.4.2 in TS 38.521-1 [8] with the following steps added for E-UTRA component:

1.1. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

6.4B.2.1.4.5 Test requirement

Same test requirement as in clause 6.4.2.4.5 in TS 38.521-1 [8] for the NR carrier.

6.4B.2.2 Transmit Modulation Quality for intra-band non-contiguous EN-DC

6.4B.2.2.1 Error Vector Magnitude for intra-band non-contiguous EN-DC

6.4B.2.2.1.1 Test purpose

Same test purpose as in clause 6.4.2.1.1 in TS 38.521-1 [8] for the NR carrier.

6.4B.2.2.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band non-contiguous EN-DC.

6.4B.2.2.1.3 Minimum conformance requirements

For the intra-band non-contiguous EN-DC with one component carrier per CG the EVM requirement applies with PRB allocation in one of the CG and the other CG unallocated.

The EVM requirements for each CG are according to clause 6.5.2.1 of TS 36.101 [5] for the MCG and clause 6.4.2.1.3 of TS 38.521-1 [8] for the SCG with EN-DC configured.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.4B.2.2.1.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.4B.2.2.1.4 Test description

Same test description as in clause 6.4.2.1.4 in TS 38.521-1 [8] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1. For Initial conditions as in clause 6.4.2.1.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.4.2.1.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

Same test procedure as in clause 6.4.2.1.4.2 in TS 38.521-1 [8].

For Message contents as in clause 6.4.2.1.4.3 in TS 38.521-1 [8], the following exception:

Table 6.4B.2.2.1.4-1: RACH-ConfigGeneric: PRACH measurement

| Derivation Path: TS 38.508-1[5], Table 4.6.3-130 | | | |
|--|--------------|-------------------|----------------|
| Information Element | Value/remark | Comment | Condition |
| RACH-ConfigGeneric ::= SEQUENCE { | | | |
| prach-ConfigurationIndex | 14 | Unpaired Spectrum | PRACH Format 0 |

6.4B.2.2.1.5 Test requirement

Same test requirement as in clause 6.4.2.1.5 in TS 38.521-1 [8] for the NR carrier.

6.4B.2.2.2 Carrier Leakage for intra-band non-contiguous EN-DC

6.4B.2.2.2.1 Test purpose

Same test purpose as in clause 6.4.2.2.1 in TS 38.521-1 [8] for the NR carrier.

6.4B.2.2.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band non-contiguous EN-DC.

6.4B.2.2.2.3 Minimum conformance requirements

The carrier leakage requirements for each CG are according to clause 6.5.2.2 of TS 36.101 [5] for the MCG and clause 6.4.2.2.3 of TS 38.521-1 [8] for the SCG with EN-DC configured and PRB allocation only in the CG being measured.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.4B.2.2.2.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.4B.2.2.4 Test description

Same test description as in clause 6.4.2.2.4 in TS 38.521-1 [8] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1.

For Initial conditions as in clause 6.4.2.2.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.4.2.2.4.1 in TS 38.521-1 [8] is replaced by the following two steps:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.
7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

6.4B.2.2.5 Test requirement

Same test requirement as in clause 6.4.2.2.5 in TS 38.521-1 [8] for the NR carrier.

6.4B.2.2.3 In-band Emissions for intra-band non-contiguous EN-DC

6.4B.2.2.3.1 Test purpose

Same test purpose as in clause 6.4.2.3.1 in TS 38.521-1 [8] for the NR carrier.

6.4B.2.2.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band non-contiguous EN-DC.

6.4B.2.2.3.3 Minimum conformance requirements

For the MCG the in-band emission requirements in Table 6.5.2A.3.1-1 and Table 6.5.2A.3.1-2 in TS 36.101 [5] apply within the transmission bandwidth configuration of the MCG with the carriers of both CGs active and one single contiguous PRB allocation of bandwidth L_{CRB} within the MCG at the edge of the transmission bandwidth configuration.

For the SCG the in-band emission requirements in Table 6.5.2A.3.1-1 and Table 6.5.2A.3.1-2 in TS 36.101 [5] apply within the transmission bandwidth configuration of the SCG with the carriers of both CGs active and one single contiguous PRB allocation of bandwidth L_{CRB} within the SCG at the edge of the transmission bandwidth configuration.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.4B.2.2.3.

No exception requirements applicable to NR or LTE.

6.4B.2.2.3.4 Test description

6.4B.2.2.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and test channel bandwidths based on NR operating bands specified in clause 5.3B.1.2, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-1 [8] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2. All of these configurations shall be tested with applicable test parameters for each EN-DC combination of test channel bandwidth and sub-carrier spacing, and are shown in table 6.4B.2.2.3.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521.1 [10] Annex C.2 and in TS 38.521-1 [8] Annex C.2 for E-UTRA CG and NR CG respectively.

Table 6.4B.2.2.3.4-1: Test Configuration Table

| Initial Conditions | | | | | |
|--|--|-----------------------------------|-----------------|-------------------|---------------------------------|
| Test Environment as specified in TS 38.508-1 [6] clause 4.1 | NC | | | | |
| Test Frequencies as specified in TS 38.508-1 [6] clause 4.3.1 | MaxWGap | | | | |
| Test EN-DC bandwidth combination as specified in Table 5.3B.1.3-1 | Lowest N _{RB_agg} , Highest N _{RB_agg} | | | | |
| Test SCS for the NR cell as specified in TS 38.521-1 [8] Table 5.3.5-1 | Smallest supported SCS per Channel Bandwidth | | | | |
| Test Parameters | | | | | |
| Test ID | Downlink Configuration | EN-DC Uplink Configuration | | | |
| | | E-UTRA Cell | NR Cell | Modulation | RB allocation (NOTE 1,2) |
| 1 | N/A for carrier leakage testing | QPSK | 0 | DFT-s-OFDM QPSK | Inner_1RB_Left |
| 2 | | QPSK | 0 | DFT-s-OFDM QPSK | Inner_1RB_Right |
| 3 | | QPSK | 0 | CP-OFDM QPSK | Inner_1RB_Left |
| 4 | | QPSK | 0 | CP-OFDM QPSK | Inner_1RB_Right |
| 5 | | QPSK | Outer_1RB_Left | DFT-s-OFDM QPSK | 0 |
| 6 | | QPSK | Outer_1RB_Right | DFT-s-OFDM QPSK | 0 |
| NOTE 1: The specific configuration of each RB allocation is defined in Table 6.1-1 in TS 38.521-1 [8]. | | | | | |
| NOTE 2: When the signalled DC carrier position is at Inner_1RB_Left, use Inner_1RB_Right for UL RB allocation. | | | | | |
| NOTE 3: Outer_1RB_Left defined as 1 RB allocated at the left edge of the E-UTRA component. Outer_1RB_Right defined as 1 RB allocated at the right edge of the E-UTRA component. | | | | | |

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1.

1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [6] Annex A, in Figure A.3.1.1.1 for TE diagram and clause A.3.2.1 for UE diagram.
2. The parameter settings for NR cell are set up according to TS 38.508-1 [6] clause 4.4.3.
3. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].
4. NR downlink signals are initially set up according to Annex C.0, C.1, and C.2 and uplink signals according to Annex G.0, G.1, G.2, and G.3.0 of TS 38.521-1 [8].
5. E-UTRA downlink signals are initially set up according to Annex C.0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0 of TS 36.521-1 [10].
6. The UL Reference Measurement channels are TS 36.521-1 [10] Annex A.2 and TS 38.521-1 [8] Annex A.2 for E-UTRA CG and NR CG respectively.

7. Propagation conditions are set according to TS 36.521-1 [10] Annex B.0 and TS 38.521-1 [8] Annex B.0 for E-UTRA CG and NR CG respectively.
8. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 6.4B.2.2.3.4.3.
9. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

6.4B.2.2.3.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 6.4B.2.2.3.4.1-1 on E-UTRA CC and NR CC respectively. Since the UL has no payload and no loopback data to send, the UE transmits uplink MAC padding bits on the UL RMC.
2. For NR CC, send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as +MU to +(MU + Uplink power control window size) dB of the target power level 0dBm, where:
 - MU is the test system uplink power measurement uncertainty and is specified in Table F.1.2-1 for the carrier frequency f and the channel bandwidth BW.
 - Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty)+ (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified in Table F.1.2-1.
3. Measure In-band emission on NR CC using Global In-Channel Tx-Test (Annex E). Measure power spectral density on E-UTRA CC. For TDD slots with transient periods are not under test.
4. For NR CC, send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as +MU to +(MU + Uplink power control window size) dB of the target power level -30dBm, where MU and Uplink power control window size are defined above.
5. Measure In-band emission on NR CC using Global In-Channel Tx-Test (Annex E). Measure power spectral density on E-UTRA CC. For TDD slots with transient periods are not under test
6. For NR CC, send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as +MU to +(MU + Uplink power control window size) dB of the target power level -40dBm, where MU and Uplink power control window size are defined above.
7. Measure In-band emission on NR CC using Global In-Channel Tx-Test (Annex E). Measure power spectral density on E-UTRA CC. For TDD slots with transient periods are not under test.
8. For E-UTRA CC, send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as +MU to +(MU + Uplink power control window size) dB of the target power level 0dBm, where:
 - MU is the test system uplink power measurement uncertainty and is specified in Table F.1.2-1 for the carrier frequency f and the channel bandwidth BW.
 - Uplink power control window size = 1dB (UE power step size) + 1.0dB (UE power step tolerance) , where, the UE power step tolerance is specified in TS 36.101 [5], Table 6.3.5.2.1-1 and is 1.0dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified in Table F.1.2-1.
9. Measure In-band emission on E-UTRA CC using Global In-Channel Tx-Test (Annex E). Measure power spectral density on NR CC. For TDD slots with transient periods are not under test.
10. For E-UTRA CC, send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as +MU to

$+(MU + \text{Uplink power control window size}) \text{ dB}$ of the target power level -30dBm , where MU and Uplink power control window size are defined above.

11. Measure In-band emission on E-UTRA CC using Global In-Channel Tx-Test (Annex E). Measure power spectral density on NR CC. For TDD slots with transient periods are not under test
12. For E-UTRA CC, send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as $+MU$ to $+(MU + \text{Uplink power control window size}) \text{ dB}$ of the target power level -40dBm , where MU and Uplink power control window size are defined above.
13. Measure In-band emission on E-UTRA CC using Global In-Channel Tx-Test (Annex E). Measure power spectral density on NR CC. For TDD slots with transient periods are not under test.

NOTE 1: When switching to DFT-s-OFDM waveform, as specified in the test configuration table 6.4B.2.2.3.4.1-1, send an NR RRCReconfiguration message according to TS 38.508-1 [6] clause 4.6.3 Table 4.6.3-118 PUSCH-Config with TRANSFORM_PRECODER_ENABLED condition.

NOTE 2: The purpose of the Uplink power control window is to ensure that the actual UE output power is no less than the target power level, and as close as possible to the target power level. The relationship between the Uplink power control window, the target power level and the corresponding possible actual UE Uplink power window is illustrated in Annex F, clause F.4.

Table 6.4B.2.2.3.4.2-1: Void

Table 6.4B.2.2.3.4.2-2: Void

6.4B.2.2.3.4.3 Message contents

Message contents are according to TS 38.508-1 [5] clause 4.6.

6.4B.2.2.3.5 Test requirement

Each of the [20] In-band emissions results, derived in Annex E.4.3 shall not exceed the corresponding values in Tables 6.4B.2.2.3.5-1.

Table 6.4B.2.2.3.5-1: Minimum requirements for in-band emissions (allocated component carrier)

| Parameter | Unit | Limit | | Applicable Frequencies | | |
|---|------|---|----------------------------------|--|--|--|
| General | dB | $\max \left\{ -25 - 10 \cdot \log_{10} (N_{RB} / L_{CRB}), 20 \cdot \log_{10} EVM - 3 - 5 \cdot (\Delta_{RB} - 1) / L_{CRB}, -57 \text{ dBm} / 180 \text{ kHz} - P_{RB} \right\}$ | | Any non-allocated (NOTE 2) | | |
| IQ Image | dB | -25 | | Exception for IQ image (NOTE 3) | | |
| Carrier leakage | dBc | -25 | Output power > 0 dBm | Exception for Carrier frequency (NOTE 4) | | |
| | | -20 | -30 dBm ≤ Output power ≤ 0 dBm | | | |
| | | -10 | -40 dBm ≤ Output power < -30 dBm | | | |
| NOTE 1: An in-band emissions combined limit is evaluated in each non-allocated RB. For each such RB, the minimum requirement is calculated as the higher of P_{RB} - 30 dB and the power sum of all limit values (General, IQ Image or Carrier leakage) that apply. P_{RB} is defined in NOTE 9. The limit is evaluated in each non-allocated RB. | | | | | | |
| NOTE 2: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured average power per allocated RB, where the averaging is done across all allocated RBs. | | | | | | |
| NOTE 3: Exceptions to the general limit are allowed for up to $L_{CRBs} + 1$ RBs within a contiguous width of $L_{CRBs} + 1$ non-allocated RBs. The measurement bandwidth is 1 RB. | | | | | | |
| NOTE 4: Exceptions to the general limit are allowed for up to two contiguous non-allocated RBs. The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in the non-allocated RB to the measured total power in all allocated RBs. | | | | | | |
| NOTE 5: L_{CRB} is the Transmission Bandwidth (see Figure [5.6-1]) not exceeding $\lfloor N_{RB} / 2 - 1 \rfloor$ | | | | | | |
| NOTE 6: N_{RB} is the Transmission Bandwidth Configuration (see Figure [5.6-1]) of the component carrier with RBs allocated. | | | | | | |
| NOTE 7: EVM is the limit specified in Table 6.4.2.1.3-1 for the modulation format used in the allocated RBs. | | | | | | |
| NOTE 8: Δ_{RB} is the starting frequency offset between the allocated RB and the measured non-allocated RB (e.g. $\Delta_{RB} = 1$ or $\Delta_{RB} = -1$ for the first adjacent RB outside of the allocated bandwidth). | | | | | | |
| NOTE 9: P_{RB} is the transmitted power per 180 kHz in allocated RBs, measured in dBm. | | | | | | |

Table 6.4B.2.2.3.5-2: Minimum requirements for in-band emissions (not allocated component carrier)

| Para-meter | Unit | Meas BW NOTE 1 | Limit | remark | Applicable Frequencies |
|--|---|------------------------------------|--|--|--|
| General | dB | BW of 1 RB (180KHz rectangular) | $\max \{ -25 - 10 \cdot \log_{10}(N_{RB} / L_{CRB}), 20 \cdot \log_{10} EVM - 3 - 5 \cdot (\Delta_{RB} - 1) / L_{CRB}, -57 dBm / 180kHz - P_{RB} \}$ | The reference value is the average power per allocated RB in the allocated component carrier | Any RB in the non-allocated component carrier. The frequency raster of the RBs is derived when this component carrier is allocated with RBs |
| IQ Image | dB | BW of 1 RB (180KHz rectangular) | -25 NOTE 2 | The reference value is the average power per allocated RB in the allocated component carrier | The frequencies of the L_{CRB} contiguous non-allocated RBs are unknown. The frequency raster of the RBs is derived when this component carrier is allocated with RBs |
| Carrier leakage | dBc | BW of 1 RB (180KHz rectangular) | NOTE 3 | | The frequencies of the up to 2 non-allocated RBs are unknown. The frequency raster of the RBs is derived when this component carrier is allocated with RBs |
| -25 | Output power > 0 dBm | | | | |
| -20 | $-30 \text{ dBm} \leq \text{Output power} \leq 0 \text{ dBm}$ | | | | |
| -10 | $-40 \text{ dBm} \leq \text{Output power} < -30 \text{ dBm}$ | | | | |
| <p>NOTE1: Resolution BWs smaller than the measurement BW may be integrated to achieve the measurement bandwidth.</p> <p>NOTE 2: Exceptions to the general limit are allowed for up to $L_{CRB} + 1$ RBs within a contiguous width of $L_{CRB} + 1$ non-allocated RBs.</p> <p>NOTE 3: Two Exceptions to the general limit are allowed for up to two contiguous non-allocated RBs</p> <p>NOTE 4: NOTES 1, 5, 6, 7, 8, 9 from Table 6.4B.2.2.3.5-1 apply for Table 6.4B.2.2.3.5-2 as well.</p> <p>NOTE 5: Δ_{RB} for measured non-allocated RB in the non-allocated component carrier may take non-integer values when the carrier spacing between the CCs is not a multiple of RB.</p> | | | | | |

6.4B.2.2.4 EVM Equalizer Flatness for intra-band non-contiguous EN-DC

6.4B.2.2.4.1 Test purpose

Same test purpose as in clause 6.4.2.4 in TS 38.521-1 [8] for the NR carrier.

6.4B.2.2.4.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band non-contiguous EN-DC.

6.4B.2.2.4.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.4.2.4.3 in TS 38.521-1 [8] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.4B.2.2.4.4 Test description

Same test description as in clause 6.4.2.4.4 in TS 38.521-1 [8] for the NR carrier with the following exception:

Table 6.4B.2.2.4.4-1: Test Configuration Table

| Initial Conditions | | | | |
|---|--|-----------------------------|---------------------------|--|
| Test Environment as specified in TS 38.508-1 [6] clause 4.1 | Normal, TL/VL, TL/VH, TH/VL, TH/VH | | | |
| Test Frequencies as specified in TS 38.508-1 [6] clause 4.3.1 | MaxWGap | | | |
| Test Channel Bandwidths as specified in TS 38.508-1 [6] clause 4.3.1 | Highest N _{RB_agg} (NOTE1, 2) | | | |
| Test SCS as specified in Table 5.3.5-1 | Lowest | | | |
| Test parameters | | | | |
| | Downlink Configuration | Uplink Configuration | | |
| Test ID | N/A for EVM equalizer flatness testing | Modulation | NR RB allocation (NOTE 3) | |
| 1 | | DFT-s-OFDM QPSK | Outer Full | |
| 2 | | CP-OFDM QPSK | Outer Full | |
| NOTE 1: Test Channel Bandwidths are checked separately for each NR band, which applicable channel bandwidths are specified in Table 5.3.5-1 of 38.521-1 [8]. | | | | |
| NOTE 2: Lowest and highest allowed NR channel BW as specified in Table 5.3B.1.3-1. If the UE supports multiple CC Combinations in the EN-DC Configuration with the same NRB_agg, only the combination with the highest NRB_SCG is tested. | | | | |
| NOTE 3: The specific configuration of each RB allocation is defined in Table 6.1-1 of 38.521-1 [8]. | | | | |

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1.

For Initial conditions as in clause 6.4.2.4.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.4.2.4.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.4.2.4.4.2 in TS 38.521-1 [8] with the following steps added for E-UTRA component:

1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

6.4B.2.2.4.5 Test requirement

Same test requirement as in clause 6.4.2.4.5 in TS 38.521-1 [8] for the NR carrier.

6.4B.2.3 Transmit Modulation Quality for inter-band EN-DC within FR1

6.4B.2.3.1 Error Vector Magnitude for inter-band EN-DC within FR1

6.4B.2.3.1.1 Test purpose

Same test purpose as in clause 6.4.2.1.1 in TS 38.521-1 [8] for the NR carrier.

6.4B.2.3.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC.

6.4B.2.3.1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.4.2.1.3 in TS 38.521-1 [8] for the NR carrier.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.4B.2.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.4B.2.3.1.4 Test description

Same test description as in clause 6.4.2.1.4 in TS 38.521-1 [8] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1. For Initial conditions as in clause 6.4.2.1.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.4.2.1.4.1 in TS 38.521-1 [8] is replaced by the following two steps:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.
7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

Same test procedure as in clause 6.4.2.1.4.2 in TS 38.521-1 [8].

6.4B.2.3.1.5 Test requirement

Same test requirement as in clause 6.4.2.1.5 in TS 38.521-1 [8] for the NR carrier.

6.4B.2.3.2 Carrier Leakage for inter-band EN-DC within FR1

6.4B.2.3.2.1 Test purpose

Same test purpose as in clause 6.4.2.2.1 in TS 38.521-1 [8] for the NR carrier.

6.4B.2.3.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC.

6.4B.2.3.2.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.4.2.2.3 in TS 38.521-1 [8] for the NR carrier.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.4B.2.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.4B.2.3.2.4 Test description

Same test description as in clause 6.4.2.2.4 in TS 38.521-1 [8] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1.

For Initial conditions as in clause 6.4.2.2.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.5.2.2.4.1 in TS 38.521-1 [8] is replaced by the following two steps:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.
7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

6.4B.2.3.2.5 Test requirement

Same test requirement as in clause 6.4.2.2.5 in TS 38.521-1 [8] for the NR carrier.

6.4B.2.3.3 In-band Emissions for inter-band EN-DC within FR1

6.4B.2.3.3.1 Test purpose

Same test purpose as in clause 6.4.2.3.1 in TS 38.521-1 [8] for the NR carrier.

6.4B.2.3.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC.

6.4B.2.3.3.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.4.2.3.3 in TS 38.521-1 [8] for the NR carrier.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.4B.2.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.4B.2.3.3.4 Test description

Same test description as in clause 6.4.2.3.4 in TS 38.521-1 [8] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1. For Initial conditions as in clause 6.4.2.3.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.4.2.3.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508 [6] clause 4.5.
7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

Same test procedure as in clause 6.4.2.3.4.2 in TS 38.521-1 [8].

6.4B.2.3.3.5 Test requirement

Same test requirement as in clause 6.4.2.3.5 in TS 38.521-1 [8] for the NR carrier.

6.4B.2.3.4 EVM Equalizer Flatness for inter-band EN-DC within FR1

6.4B.2.3.4.1 Test purpose

Same test purpose as in clause 6.4.2.4 in TS 38.521-1 [8] for the NR carrier.

6.4B.2.3.4.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC.

6.4B.2.3.4.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.4.2.4.3 in TS 38.521-1 [8] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.4B.2.3.4.4 Test description

6.4B.2.3.4.4.1 Initial conditions

Same test description as in clause 6.4.2.4.4 in TS 38.521-1 [8] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1.

For Initial conditions as in clause 6.4.2.4.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.4.2.4.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.4.2.4.4.2 in TS 38.521-1 [8] with the following steps added for E-UTRA component:

- 1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

6.4B.2.3.4.5 Test requirement

Same test requirement as in clause 6.4.2.4.5 in TS 38.521-1 [8] for the NR carrier.

6.4B.2.4 Transmit Modulation Quality for inter-band EN-DC including FR2

6.4B.2.4.1 Error Vector Magnitude for inter-band EN-DC including FR2

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- The referred test case 6.4.2.1 in TS 38.521-2 [9] is incomplete.
- Measurement Uncertainty and Test Tolerance are FFS.
- TS 38.101-2 [3] clause 6.3.4.3: Relative power tolerances are in square brackets.

6.4B.2.4.1.1 Test purpose

Same test purpose as in clause 6.4.2.1 in TS 38.521-2 [9] for the NR carrier.

6.4B.2.4.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 2 UL CCs.

6.4B.2.4.1.3 Minimum conformance requirements

For inter-band EN-DC including FR2 or both FR1 and FR2, transmit modulation quality for EN-DC operations in FR1 and FR2 as specified in TS 36.101 [5], 38.101-1 [2] and 38.101-2 [3] apply for E-UTRA, NR FR1 and NR FR2 respectively.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.4B.2.4.

Same minimum conformance requirements as in clause 6.4.2.1.3 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.4B.2.4.1.4 Test description

6.4B.2.4.1.4.1 Initial conditions

Same test description as in clause 6.4.2.1.4 in TS 38.521-2 [9] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1. For Initial conditions as in clause 6.4.2.1.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.4.2.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.4.2.1.4.1 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

- 1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.4B.2.4.1.5 Test requirement

Same test requirement as in clause 6.4.2.1.5 in TS 38.521-2 [9] for the NR carrier.

6.4B.2.4.1_1 Error Vector Magnitude for inter-band EN-DC including FR2 (>2 CCs)

6.4B.2.4.1_1.1 Error Vector Magnitude for inter-band EN-DC including FR2 (3 CCs)

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- The referred test case 6.4A.2.1.1 in TS 38.521-2 [9] is incomplete.
- Test configuration table is FFS.

6.4B.2.4.1_1.1.1 Test purpose

Same test purpose as in clause 6.4.2.1.1 in TS 38.521-2 [9] for the NR carrier.

6.4B.2.4.1_1.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 3 UL CCs (2NR UL CCs).

6.4B.2.4.1_1.1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.4.2.1.3 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.4B.2.4.

6.4B.2.4.1_1.1.4 Test description

6.4B.2.4.1_1.1.4.1 Initial condition

Same test description as in clause 6.4A.2.1.1.4 in TS 38.521-2 [9] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1.

For Initial conditions as in clause 6.4A.2.1.1.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.4A.2.1.1.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.4A.2.1.1.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

- 1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.4B.2.4.1_1.1.5 Test Requirements

Same test requirement as in clause 6.4A.2.1.1.5 in TS 38.521-2 [9] for the NR carrier.

6.4B.2.4.1_1.2 Error Vector Magnitude for inter-band EN-DC including FR2 (4 CCs)

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- The referred test case 6.4A.2.1.2 in TS 38.521-2 [9] is incomplete.
- Test configuration table is FFS.

6.4B.2.4.1_1.2.1 Test purpose

Same test purpose as in clause 6.4.2.1.1 in TS 38.521-2 [9] for the NR carrier.

6.4B.2.4.1_1.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 4 UL CCs (3NR UL CCs).

6.4B.2.4.1_1.2.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.4.2.1.3 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.4B.2.4.

6.4B.2.4.1_1.2.4 Test description

6.4B.2.4.1_1.2.4.1 Initial condition

Same test description as in clause 6.4A.2.1.2.4 in TS 38.521-2 [9] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1.

For Initial conditions as in clause 6.4A.2.1.2.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.4A.2.1.2.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.4A.2.1.2.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

- 1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.4B.2.4.1_1.2.5 Test Requirements

Same test requirement as in clause 6.4A.2.1.2.5 in TS 38.521-2 [9] for the NR carrier.

6.4B.2.4.1_1.3 Error Vector Magnitude for inter-band EN-DC including FR2 (5 CCs)

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- The referred test case 6.4A.2.1.3 in TS 38.521-2 [9] is incomplete.
- Test configuration table is FFS.

6.4B.2.4.1_1.3.1 Test purpose

Same test purpose as in clause 6.4.2.1.1 in TS 38.521-2 [9] for the NR carrier.

6.4B.2.4.1_1.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 5 UL CCs (4NR UL CCs).

6.4B.2.4.1_1.3.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.4.2.1.3 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.4B.2.4.

6.4B.2.4.1_1.3.4 Test description

6.4B.2.4.1_1.3.4.1 Initial condition

Same test description as in clause 6.4A.2.1.3.4 in TS 38.521-2 [9] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1.

For Initial conditions as in clause 6.4A.2.1.3.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.4A.2.1.3.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.4A.2.1.3.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

- 1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.4B.2.4.1_1.3.5 Test Requirements

Same test requirement as in clause 6.4A.2.1.3.5 in TS 38.521-2 [9] for the NR carrier.

6.4B.2.4.1D Error Vector Magnitude for inter-band EN-DC including FR2 for UL-MIMO

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- The referred test case 6.4D.2.1 in TS 38.521-2 [9] is incomplete.
- Measurement Uncertainty and Test Tolerance are FFS and Annex F needs to be updated.

6.4B.2.4.1D.1 Test purpose

Same test purpose as in clause 6.4D.2.1.1 in TS 38.521-2 [9] for the NR carrier.

6.4B.2.4.1D.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 and UL-MIMO.

6.4B.2.4.1D.3 Minimum conformance requirements

For inter-band EN-DC including FR2 or both FR1 and FR2, transmit modulation quality for EN-DC operations in FR1 and FR2 as specified in TS 36.101 [5], 38.101-1 [2] and 38.101-2 [3] apply for E-UTRA, NR FR1 and NR FR2 respectively.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.4B.2.4.

Same minimum conformance requirements as in clause 6.4D.2.1.3 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.4B.2.4.1D.4 Test description

6.4B.2.4.1D.4.1 Initial conditions

Same test description as in clause 6.4D.2.1.4 in TS 38.521-2 [9] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1. For Initial conditions as in clause 6.4D.2.1.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.4D.2.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.4D.2.1.4.1 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

- 1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.4B.2.4.1D.5 Test requirement

Same test requirement as in clause 6.4D.2.1.5 in TS 38.521-2 [9] for the NR carrier.

6.4B.2.4.2_1 Carrier Leakage for inter-band EN-DC including FR2 (>2 CCs)

6.4B.2.4.2_1.1 Carrier Leakage for inter-band EN-DC including FR2 (3 CCs)

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- The referred test case 6.4A.2.2.1 in TS 38.521-2 [9] is incomplete.
- Measurement Uncertainty and Test Tolerance are FFS.
- Test applicability, Test Description requires updates to clarify number of E-UTRA carriers that will be configured during the test that will be limited to only 1 E-UTRA CC

6.4B.2.4.2_1.1.1 Test purpose

Same test purpose as in clause 6.4.2.2 in TS 38.521-2 [9] for the NR carrier.

6.4B.2.4.2_1.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 3 CCs(2NR CCs).

6.4B.2.4.2_1.1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.4B.2.4.2.3.

6.4B.2.4.2_1.1.4 Test Description

6.4B.2.4.2_1.1.4.1 Initial conditions

Same test description as in clause 6.4A.2.2.1.4 in TS 38.521-2 [9] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1.

For Initial conditions as in clause 6.4A.2.2.1.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.4A.2.2.1.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.4A.2.2.1.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.4B.2.4.2_1.1.5 Test Requirement

Same test requirement as in clause 6.4A.2.2.1.5 in TS 38.521-2 [9] for the NR carrier.

6.4B.2.4.2_1.2 Carrier Leakage for inter-band EN-DC including FR2 (4 CCs)

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- The referred test case 6.4A.2.2.2 in TS 38.521-2 [9] is incomplete.
- Measurement Uncertainty and Test Tolerance are FFS.

6.4B.2.4.2_1.2.1 Test purpose

Same test purpose as in clause 6.4.2.2 in TS 38.521-2 [9] for the NR carrier.

6.4B.2.4.2_1.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 4 CCs(3NR CCs).

6.4B.2.4.2_1.2.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.4B.2.4.2.3.

6.4B.2.4.2_1.2.4 Test Description

6.4B.2.4.2_1.2.4.1 Initial conditions

Same test description as in clause 6.4A.2.2.2.4 in TS 38.521-2 [9] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1.

For Initial conditions as in clause 6.4A.2.2.2.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.4A.2.2.2.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.4A.2.2.2.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.4B.2.4.2_1.2.5 Test Requirement

Same test requirement as in clause 6.4A.2.2.2.5 in TS 38.521-2 [9] for the NR carrier.

6.4B.2.4.2_1.3 Carrier Leakage for inter-band EN-DC including FR2 (5 CCs)

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- The referred test case 6.4A.2.2.3 in TS 38.521-2 [9] is incomplete.
- Measurement Uncertainty and Test Tolerance are FFS.

6.4B.2.4.2_1.3.1 Test purpose

Same test purpose as in clause 6.4.2.2 in TS 38.521-2 [9] for the NR carrier.

6.4B.2.4.2_1.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 5 CCs(4NR CCs).

6.4B.2.4.2_1.3.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.4B.2.4.2.3.

6.4B.2.4.2_1.3.4 Test Description

6.4B.2.4.2_1.3.4.1 Initial conditions

Same test description as in clause 6.4A.2.2.3.4 in TS 38.521-2 [9] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1.

For Initial conditions as in clause 6.4A.2.2.3.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.4A.2.2.3.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.4A.2.2.3.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

- 1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.4B.2.4.2_1.3.5 Test Requirement

Same test requirement as in clause 6.4A.2.2.3.5 in TS 38.521-2 [9] for the NR carrier.

6.4B.2.4.2D Carrier Leakage for inter-band EN-DC including FR2 for UL-MIMO

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- The referred test case 6.4D.2.2 in TS 38.521-2 [9] is incomplete.
- Measurement Uncertainty and Test Tolerance are FFS and Annex F needs to be updated.

6.4B.2.4.2D.1 Test purpose

Same test purpose as in clause 6.4D.2.2.1 in TS 38.521-2 [9] for the NR carrier.

6.4B.2.4.2D.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 and UL-MIMO.

6.4B.2.4.2D.3 Minimum conformance requirements

For inter-band EN-DC including FR2 or both FR1 and FR2, transmit modulation quality for EN-DC operations in FR1 and FR2 as specified in TS 36.101 [5], 38.101-1 [2] and 38.101-2 [3] apply for E-UTRA, NR FR1 and NR FR2 respectively.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.4B.2.4.

Same minimum conformance requirements as in clause 6.4D.2.2.3 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied

6.4B.2.4.2D.4 Test description

6.4B.2.4.2D.4.1 Initial conditions

Same test description as in clause 6.4D.2.2.4 in TS 38.521-2 [9] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1. For Initial conditions as in clause 6.4D.2.2.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.4D.2.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.4D.2.2.4.1 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.4B.2.4.2D.5 Test requirement

Same test requirement as in clause 6.4D.2.2.5 in TS 38.521-2 [9] for the NR carrier.

6.4B.2.4.3D In-band Emissions for inter-band EN-DC including FR2 for UL-MIMO

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- The referred test case 6.4D.2.3 in TS 38.521-2 [9] is incomplete.
- Measurement Uncertainty and Test Tolerance are FFS and Annex F needs to be updated.

6.4B.2.4.3D.1 Test purpose

Same test purpose as in clause 6.4D.2.3.1 in TS 38.521-2 [9] for the NR carrier.

6.4B.2.4.3D.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 and UL-MIMO.

6.4B.2.4.3D.3 Minimum conformance requirements

For inter-band EN-DC including FR2 or both FR1 and FR2, transmit modulation quality for EN-DC operations in FR1 and FR2 as specified in TS 36.101 [5], TS 38.101-1 [2] and TS 38.101-2 [3] apply for E-UTRA, NR FR1 and NR FR2 respectively.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.4B.2.4.

Same minimum conformance requirements as in clause 6.4D.2.3.3 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.4B.2.4.3D.4 Test description

6.4B.2.4.3D.4.1 Initial conditions

Same test description as in clause 6.4D.2.3.4 in TS 38.521-2 [9] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1. For Initial conditions as in clause 6.4D.2.3.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.4D.2.3.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.4D.2.3.4.1 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

- 1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.4B.2.4.3D.5 Test requirement

Same test requirement as in clause 6.4D.2.3.5 in TS 38.521-2 [9] for the NR carrier.

6.4B.2.4.4D EVM Equalizer Flatness for inter-band EN-DC including FR2 for UL-MIMO

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- The referred test case 6.4D.2.4 in TS 38.521-2 [9] is incomplete.
- Measurement Uncertainty and Test Tolerance are FFS and Annex F needs to be updated.

6.4B.2.4.4D.1 Test purpose

Same test purpose as in clause 6.4D.2.4.1 in TS 38.521-2 [9] for the NR carrier.

6.4B.2.4.4D.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 and UL-MIMO.

6.4B.2.4.4D.3 Minimum conformance requirements

For inter-band EN-DC including FR2 or both FR1 and FR2, transmit modulation quality for EN-DC operations in FR1 and FR2 as specified in TS 36.101 [5], TS 38.101-1 [2] and TS 38.101-2 [3] apply for E-UTRA, NR FR1 and NR FR2 respectively.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.4B.2.4.

Same minimum conformance requirements as in clause 6.4D.2.4.3 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.4B.2.4.4D.4 Test description

6.4B.2.4.4D.4.1 Initial conditions

Same test description as in clause 6.4D.2.4.4 in TS 38.521-2 [9] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1. For Initial conditions as in clause 6.4D.2.4.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.4D.2.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.4D.2.4.4.1 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

- 1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.4B.2.4.4.D.5 Test requirement

Same test requirement as in clause 6.4D.2.4.5 in TS 38.521-2 [9] for the NR carrier.

6.4B.2.4.2 Carrier Leakage for inter-band EN-DC including FR2

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- The referred test case 6.4.2.2 in TS 38.521-2 [9] is incomplete.
- Measurement Uncertainty and Test Tolerance are FFS.
- TS 38.101-2 [3] clause 6.3.4.3: Relative power tolerances are in square brackets.

6.4B.2.4.2.1 Test purpose

Same test purpose as in clause 6.4.2.2 in TS 38.521-2 [9] for the NR carrier.

6.4B.2.4.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 2 UL CCs.

6.4B.2.4.2.3 Minimum conformance requirements

For inter-band EN-DC including FR2 or both FR1 and FR2, transmit modulation quality for EN-DC operations in FR1 and FR2 as specified in TS 36.101 [5], 38.101-1 [2] and 38.101-2 [3] apply for E-UTRA, NR FR1 and NR FR2 respectively.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.4B.2.4.

Same minimum conformance requirements as in clause 6.4.2.2.3 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied

6.4B.2.4.2.4 Test description

6.4B.2.4.2.4.1 Initial conditions

Same test description as in clause 6.4.2.2.4 in TS 38.521-2 [9] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1. For Initial conditions as in clause 6.4.2.2.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.4.2.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.4.2.2.4.1 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.4B.2.4.2.5 Test requirement

Same test requirement as in clause 6.4.2.2.5 in TS 38.521-2 [9] for the NR carrier.

6.4B.2.4.3 In-band Emissions for inter-band EN-DC including FR2

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- The referred test case 6.4.2.3 in TS 38.521-2 [9] is incomplete.
- Measurement Uncertainty and Test Tolerance are FFS.
- 38.101-2 [3] clause 6.3.4.3: Relative power tolerances are in square brackets.

6.4B.2.4.3.1 Test purpose

Same test purpose as in clause 6.4.2.3 in TS 38.521-2 [9] for the NR carrier.

6.4B.2.4.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 2 UL CCs.

6.4B.2.4.3.3 Minimum conformance requirements

For inter-band EN-DC including FR2 or both FR1 and FR2, transmit modulation quality for EN-DC operations in FR1 and FR2 as specified in TS 36.101 [5], TS 38.101-1 [2] and TS 38.101-2 [3] apply for E-UTRA, NR FR1 and NR FR2 respectively.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.4B.2.4.

Same minimum conformance requirements as in clause 6.4.2.3.3 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.4B.2.4.3.4 Test description

6.4B.2.4.3.4.1 Initial conditions

Same test description as in clause 6.4.2.3.4 in TS 38.521-2 [9] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1. For Initial conditions as in clause 6.4.2.3.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.4.2.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.4.2.3.4.1 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

- 1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.4B.2.4.3.5 Test requirement

Same test requirement as in clause 6.4.2.3.5 in TS 38.521-2 [9] for the NR carrier.

6.4B.2.4.4 EVM Equalizer Flatness for inter-band EN-DC including FR2

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- The referred test case 6.4.2.4 in TS 38.521-2 [9] is incomplete.
- Measurement Uncertainty and Test Tolerance are FFS.
- 38.101-2 [3] clause 6.3.4.3: Relative power tolerances are in square brackets.

6.4B.2.4.4.1 Test purpose

Same test purpose as in clause 6.4.2.4 in TS 38.521-2 [9] for the NR carrier.

6.4B.2.4.4.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 2 UL CCs.

6.4B.2.4.4.3 Minimum conformance requirements

For inter-band EN-DC including FR2 or both FR1 and FR2, transmit modulation quality for EN-DC operations in FR1 and FR2 as specified in TS 36.101 [5], TS 38.101-1 [2] and TS 38.101-2 [3] apply for E-UTRA, NR FR1 and NR FR2 respectively.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.4B.2.4.

Same minimum conformance requirements as in clause 6.4.2.4.3 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.4B.2.4.4.4 Test description

6.4B.2.4.4.4.1 Initial conditions

Same test description as in clause 6.4.2.4.4 in TS 38.521-2 [9] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1. For Initial conditions as in clause 6.4.2.4.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.4.2.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.4.2.4.4.1 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

- 1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.4B.2.4.4.5 Test requirement

Same test requirement as in clause 6.4.2.4.5 in TS 38.521-2 [9] for the NR carrier.

6.5 Output RF spectrum emissions

6.5A Output RF spectrum emissions for CA

6.5A.1 Occupied bandwidth for CA without EN-DC

6.5A.1.1 Test purpose

Same test purpose as in clause 6.5.1 in TS 38.521-1 [8] for NR FR1 carrier(s) and clause 6.5.1 in TS 38.521-2 [9] for NR FR2 carrier(s).

6.5A.1.2 Test applicability

The requirements in this test are not testable due to issues with combined testing of NR FR1 conducted mode with NR FR2 in radiated mode. Therefore, the conducted and radiated requirements are tested separately.

No test case details are specified. The SA requirements for occupied bandwidth apply and are tested in TS 38.521-1 [8] clauses 6.5 and 6.5A and TS 38.521-2 [9] clauses 6.5 and 6.5A.

6.5A.2 Out-of-band emissions for CA without EN-DC

6.5A.2.1 Spectrum emissions mask for CA without EN-DC

6.5A.2.1.1 Test purpose

Same test purpose as in clause 6.5.2.2 in TS 38.521-1 [8] for NR FR1 carrier(s) and clause 6.5.2.1 in TS 38.521-2 [9] for NR FR2 carrier(s).

6.5A.2.1.2 Test applicability

The requirements in this test are not testable due to issues with combined testing of NR FR1 conducted mode with NR FR2 in radiated mode. Therefore, the conducted and radiated requirements are tested separately.

No test case details are specified. The SA requirements for additional spectrum emissions mask apply and are tested in TS 38.521-1 [8] clauses 6.5 and 6.5A and TS 38.521-2 [9] clauses 6.5 and 6.5A.

6.5A.2.2 Additional Spectrum emissions mask for CA without EN-DC

6.5A.2.2.1 Test purpose

Same test purpose as in clause 6.5.2.3 in TS 38.521-1 [8] for NR FR1 carrier(s) and clause 6.5.2.2 in TS 38.521-2 [9] for NR FR2 carrier(s).

6.5A.2.2.2 Test applicability

The requirements in this test are not testable due to issues with combined testing of NR FR1 conducted mode with NR FR2 in radiated mode. Therefore, the conducted and radiated requirements are tested separately.

No test case details are specified. The SA requirements for additional spectrum emissions mask apply and are tested in TS 38.521-1 [8] clauses 6.5 and 6.5A and TS 38.521-2 [9] clauses 6.5 and 6.5A.

6.5A.2.3 Adjacent channel leakage ratio for CA without EN-DC

No test case details specified as there are no exception requirements applicable to NR FR1 or NR FR2 as per TS 38.101-3 [4], clause 6.5A.2. The SA requirement for ACLR applies and is tested in TS 38.521-1 [8] and TS 38.521-2 [9] for FR1 and FR2 respectively.

6.5A.3 Spurious emissions for CA without EN-DC

6.5A.3.1 Inter-band CA between FR1 and FR2

6.5A.3.1.1 Test purpose

Same test purpose as in clause 6.5.3 in TS 38.521-1 [8] for NR FR1 carrier(s) and clause 6.5.3 in TS 38.521-2 [9] for NR FR2 carrier(s).

6.5A.3.1.2 Test applicability

The requirements in this test are not testable due to issues with combined testing of NR FR1 conducted mode with NR FR2 in radiated mode. Therefore, the conducted and radiated requirements are tested separately.

No test case details are specified. The SA requirements for spurious emission for inter-band CA between FR1 and FR2 and UE co-existence requirements apply for each component carrier and are tested in TS 38.521-1 [8] clauses 6.5 and 6.5A and TS 38.521-2 [9] clauses 6.5 and 6.5A.

6.5B Output RF spectrum emissions for DC

6.5B.1 Occupied bandwidth for EN-DC

6.5B.1.1 Occupied bandwidth for Intra-Band Contiguous EN-DC

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- measurement uncertainty for ENBW > 100 MHz is FFS.

6.5B.1.1.1 Test purpose

To verify that the UE occupied bandwidth for intra-band contiguous EN-DC for all transmission bandwidth configurations supported by the UE are less than their specific limits.

6.5B.1.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band contiguous EN-DC.

6.5B.1.1.3 Minimum conformance requirements

For intra-band contiguous EN-DC, the occupied bandwidth is a measure of the bandwidth containing the 99% of the total integrated power of the transmitted spectrum. The OBW shall be less than the aggregated channel bandwidth for EN-DC, denoted as EN-BW in clause 5.3B.

The normative reference for this measurement is TS 38.101-3 [4] clause 6.5B.1.

Exception requirements for both NR and E-UTRA are defined for this test and therefore LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

6.5B.1.1.4 Test description

6.5B.1.1.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on EN-DC operating bands specified in clause 5.3B.1.2, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-1 [8] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2. All of these configurations shall be tested with applicable test parameters for each EN-DC configuration

specified in clause 5.3B.1.2 and are shown in table 6.5B.1.1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521-1 [10] Annex C.2 and in TS 38.521-1 [8] Annex C.2 for E-UTRA CG and NR CG respectively.

Table 6.5B.1.1.4.1-1: Test configuration table

| Initial Conditions | | | | | |
|--|-------------------------------|-----------------------------------|----------------|-------------------|-------------------------------|
| Test Environment as specified in TS 38.508-1 [6] clause 4.1 | NC | | | | |
| Test Parameters | | | | | |
| Test ID | Downlink Configuration | EN-DC Uplink Configuration | | | |
| | | E-UTRA Cell | NR Cell | Modulation | RB allocation (NOTE 2) |
| 1 | N/A for OBW testing. | QPSK | Outer_Full | CP-OFDM QPSK | Outer_Full |

NOTE 1: The specific configuration of each RB allocation is defined in Table 6.1-1 in TS 38.521-1 [8].
 NOTE 2: Outer_Full defined as the transmission bandwidth configuration N_{RB} per channel bandwidth for the E-UTRA component as indicated in TS 36.521-1 [10] Table 5.4.2-1.

1. Connect the SS to the UE antenna connectors as shown in [6] TS 38.508-1 A.3.1.2.1 for SS diagram and A.3.2.1 for UE diagram.
2. The parameter settings for the E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3, and the parameter settings for the NR cell are set up according to TS 38.508-1 [6] clause 4.4.3.
3. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C.0 and TS 38.521-1 [8] Annex C.0 for E-UTRA CG and NR CG respectively, and uplink signals according to TS 36.521-1 [10] Annex H and TS 38.521-1 [8] Annex G for E-UTRA CG and NR CG respectively.
4. The UL Reference Measurement channels are TS 36.521-1 [10] Annex A.2 and TS 38.521-1 [8] Annex A.2 for E-UTRA CG and NR CG respectively.
5. Propagation conditions are set according to TS 36.521-1 [10] Annex B.0 and TS 38.521-1 [8] Annex B.0 for E-UTRA CG and NR CG respectively.
6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 6.2B.1.1.4.3.

6.5B.1.1.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format 0_1 for C_RNTI to schedule the UL RMC according to table 6.5B.1.1.4.1-1 on E-UTRA CC and NR CC respectively. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
2. Send continuously uplink power control "up" commands to the UE for NR and E-UTRA carrier until the UE transmits at its P_{UMAX} level; allow at least 200 ms from the first TPC command for the UE to reach P_{UMAX} level.
3. Measure the power spectrum distribution over all EN-DC component carriers in the EN-DC within two times or more range over the requirement for Occupied Bandwidth specification for intra-band contiguous EN-DC centring on the current carrier frequency in the EN-DC configuration. The characteristics of the filter shall be approximately Gaussian (typical spectrum analyser filter). Other methods to measure the power spectrum distribution are allowed. The measuring duration is at least 1ms over consecutive active uplink slots.

4. Calculate the total power within the range of all frequencies measured in step 3 and save this value as "Total power".
5. Sum up the power upward from the lower boundary of the measured frequency range in step 3 and seek the limit frequency point by which this sum becomes 0.5% of "Total power" and save this point as "Lower Frequency".
6. Sum up the power downward from the upper boundary of the measured frequency range in step 3 and seek the limit frequency point by which this sum becomes 0.5% of "Total power" and save this point as "Upper Frequency".
7. Calculate the difference "Upper Frequency" – "Lower Frequency" = "Occupied Bandwidth" between the two limit frequencies obtained in step 5 and step 6.

6.5B.1.1.4.3 Message contents

Message contents are according to TS 38.508-1 [6] clause 4.6.1.

6.5B.1.1.5 Test requirements

The measured Occupied Bandwidth shall not exceed values of aggregated channel bandwidth as defined in clause 5.3B.1.2 for intra-band contiguous EN-DC.

6.5B.1.2 Occupied bandwidth for Intra-Band Non-Contiguous EN-DC

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- Wgap for intra-band non-contiguous EN-DC is FFS in TS 38.508-1 due to dependencies with RAN4.

6.5B.1.2.1 Test purpose

Same test purpose as in clause 6.5.1.1 in TS 38.521-1 [8] for the NR carrier.

6.5B.1.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band non-contiguous EN-DC.

6.5B.1.2.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.5.1.3 in TS 38.521-1 [8] for the NR carrier.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.5B.1.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.5B.1.2.4 Test description

Same test description as in clause 6.5.1.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1.

For Initial conditions as in clause 6.5.1.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.5.1.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.
7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

Same test procedure as in clause 6.5.1.4.2 in TS 38.521-1 [8].

6.5B.1.2.5 Test requirement

Same test requirement as in clause 6.5.1.5 in TS 38.521-1 [8] for the NR carrier.

6.5B.1.3 Occupied bandwidth for Inter-Band EN-DC within FR1

6.5B.1.3.1 Test purpose

Same test purpose as in clause 6.5.1.1 in TS 38.521-1 [8] for the NR carrier.

6.5B.1.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC.

6.5B.1.3.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.5.1.3 in TS 38.521-1 [8] for the NR carrier.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.5B.1.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.5B.1.3.4 Test description

Same test description as in clause 6.5.1.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1.

For Initial conditions as in clause 6.5.1.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for the cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.5.1.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.
7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

6.5B.1.3.5 Test requirement

Same test requirement as in clause 6.5.1.5 in TS 38.521-1 [8] for the NR carrier.

6.5B.1.4 Occupied bandwidth for Inter-Band EN-DC including FR2 (2 CCs)

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- The referred test case 6.5.1 in TS 38.521-2 [9] is incomplete
- Measurement Uncertainty FFS.

6.5B.1.4.1 Test purpose

Same test purpose as in clause 6.5.1.1 in TS 38.521-2 [9] for the NR carrier.

6.5B.1.4.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 2 UL CCs.

6.5B.1.4.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.5.1.3 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.5B.1.4.4 Test description

6.5B.1.4.4.1 Initial conditions

Same test description as in clause 6.5.1.4 in TS 38.521-2 [9] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1. For Initial conditions as in clause 6.5.1.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.5.1.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.5.1.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

- 1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.5B.1.4.5 Test requirement

Same test requirement as in clause 6.5.1.5 in TS 38.521-2 [9] for the NR carrier.

6.5B.1.4_1 Occupied bandwidth for Inter-band EN-DC including FR2 (>2 CCs)

Editor's note: Test applicability, Test Description in below sub-clauses requires updates to clarify number of E-UTRA carriers that will be configured during the test that will be limited to only 1 E-UTRA CC

6.5B.1.4_1.1 Occupied bandwidth for Inter-band EN-DC including FR2 (3 CCs)

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- Test configuration table and Connection diagram in TS 38.521-2 [9] are TBD
- The referred test case 6.5A.1.1 in TS 38.521-2 [9] is incomplete.

6.5B.1.4_1.1.1 Test purpose

Same test purpose as in clause 6.5.1.1 in TS 38.521-2 [9] for the NR carrier.

6.5B.1.4_1.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 3 UL CCs (2NR UL CCs).

6.5B.1.4_1.1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.5.1.3 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.5B.1.

6.5B.1.4_1.1.4 Test description

6.5B.1.4_1.1.4.1 Initial condition

Same test description as in clause 6.5A.1.1.4 in TS 38.521-2 [9] for the *NR* carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1.

For Initial conditions as in clause 6.5A.1.1.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.5A.1.1.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.5A.1.1.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

- 1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.5B.1.4_1.1.5 Test Requirements

Same test requirement as in clause 6.5A.1.1.5 in TS 38.521-2 [9] for the *NR* carrier.

6.5B.1.4_1.2 Occupied bandwidth for Inter-band EN-DC including FR2 (4 CCs)

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- Connection diagram in TS 38.521-2 [9] are TBD
- The referred test case 6.5A.1.2 in TS 38.521-2 [9] is incomplete.

6.5B.1.4_1.2.1 Test purpose

Same test purpose as in clause 6.5.1.1 in TS 38.521-2 [9] for the NR carrier.

6.5B.1.4_1.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 4 UL CCs (3NR UL CCs).

6.5B.1.4_1.2.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.5.1.3 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.5B.1.

6.5B.1.4_1.2.4 Test description

6.5B.1.4_1.2.4.1 Initial condition

Same test description as in clause 6.5A.1.2.4 in TS 38.521-2 [9] for the *NR* carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1.

For Initial conditions as in clause 6.5A.1.2.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.5A.1.2.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.5A.1.2.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

- 1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.5B.1.4_1.2.5 Test Requirements

Same test requirement as in clause 6.5A.1.2.5 in TS 38.521-2 [9] for the *NR* carrier.

6.5B.1.4_1.3 Occupied bandwidth for Inter-band EN-DC including FR2 (5 CCs)

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- Test configuration table and Connection diagram in TS 38.521-2 [9] are TBD
- The referred test case 6.5A.1.1 in TS 38.521-2 [9] is incomplete.

6.5B.1.4_1.3.1 Test purpose

Same test purpose as in clause 6.5.1.1 in TS 38.521-2 [9] for the NR carrier.

6.5B.1.4_1.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 5 UL CCs (4NR UL CCs).

6.5B.1.4_1.3.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.5.1.3 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.5B.1.

6.5B.1.4_1.3.4 Test description

6.5B.1.4_1.3.4.1 Initial condition

Same test description as in clause 6.5A.1.3.4 in TS 38.521-2 [9] for the *NR* carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1.

For Initial conditions as in clause 6.5A.1.3.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.5A.1.3.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.5A.1.3.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.5B.1.4_1.3.5 Test Requirements

Same test requirement as in clause 6.5A.1.3.5 in TS 38.521-2 [9] for the *NR* carrier.

6.5B.2 Out-of-band emissions for EN-DC

6.5B.2.1 Out-of-band emissions for Intra-band contiguous EN-DC

6.5B.2.1.1 Spectrum emissions mask for intra-band contiguous EN-DC

6.5B.2.1.1.1 Test purpose

To verify that the power of any UE emissions shall not exceed specified level for the specified aggregated bandwidth for the EN-DC intra-band contiguous.

6.5B.2.1.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band contiguous EN-DC.

6.5B.2.1.1.3 Minimum conformance requirements

The general spectrum emission for intra-band contiguous EN-DC is specified in Table 6.5B.2.1.1.3-1.

Table 6.5B.2.1.1.3-1: General spectrum emission mask for intra-band contiguous EN-DC

| Δf_{OOB} (MHz) | Spectrum emission limit (dBm) | Measurement bandwidth |
|---|------------------------------------|-----------------------|
| $\pm 0 - 1$ | Max(Round(10*log(0.15/ENBW)), -24) | 30 kHz |
| $\pm 1 - 5$ | -10 | 1 MHz |
| $\pm 5 - \text{ENBW}$ | -13 | 1 MHz |
| $\pm \text{ENBW} - (\text{ENBW}+5)$ | -25 | 1 MHz |
| NOTE: ENBW refers to the aggregated channel bandwidth in MHz as defined in clause 5.3B. | | |

The normative reference for this measurement is TS 38.101-3 [4] clause 6.5B.2.1.1.

Exception requirements for both NR and E-UTRA are defined for this test and therefore LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

6.5B.2.1.1.4 Test description

6.5B.2.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on EN-DC operating bands specified in clause 5.3B.1.2, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-1 [8] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2. All of these configurations shall be tested with applicable test parameters for each EN-DC configuration specified in clause 5.3B.1.2 and are shown in table 6.5B.2.1.1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521-1 [10] Annex C.2 and in TS 38.521-1 [8] Annex C.2 for E-UTRA CG and NR CG respectively.

Table 6.5B.2.1.1.4.1-1: Test configuration table

| Initial Conditions | | | | | | | | |
|--------------------|---------|---------|---------|------------------------|----------------------------|------------------------|----------------------|------------------------|
| | | | | | Test Parameters | | | |
| Test ID | Freq | ChBw | SCS | Downlink Configuration | EN-DC Uplink Configuration | | | |
| | | | | | E-UTRA Cell | | NR Cell | |
| | | | | | Modulation | RB allocation (Note 5) | Modulation | RB allocation (NOTE 1) |
| 1 | Default | Default | Default | N/A | 16QAM | Outer_Full | DFT-s-OFDM Pi/2 BPSK | Outer_Full |
| 2 (Note 3) | Default | | | | 16QAM | Outer_1RB_Left | DFT-s-OFDM Pi/2 BPSK | Edge_1RB_Right |
| 3 (Note 3) | Low | | | | 16QAM | Outer_1RB_Left | DFT-s-OFDM Pi/2 BPSK | N/A |
| 4 (Note 3) | High | | | | 16QAM | N/A | DFT-s-OFDM Pi/2 BPSK | Edge_1RB_Right |
| 5 (Note 4) | Default | | | | 16QAM | Outer_1RB_Right | DFT-s-OFDM Pi/2 BPSK | Edge_1RB_Left |
| 6 (Note 4) | Low | | | | 16QAM | N/A | DFT-s-OFDM Pi/2 BPSK | Edge_1RB_Left |
| 7 (Note 4) | High | | | | 16QAM | Outer_1RB_Right | DFT-s-OFDM Pi/2 BPSK | N/A |
| 8 | Default | | | | 16QAM | Outer_Full | DFT-s-OFDM QPSK | Outer_Full |
| 9 (Note 3) | Default | | | | 16QAM | Outer_1RB_Left | DFT-s-OFDM QPSK | Edge_1RB_Right |
| 10 (Note 3) | Low | | | | 16QAM | Outer_1RB_Left | DFT-s-OFDM QPSK | N/A |
| 11 (Note 3) | High | | | | 16QAM | N/A | DFT-s-OFDM QPSK | Edge_1RB_Right |
| 12 (Note 4) | Default | | | | 16QAM | Outer_1RB_Right | DFT-s-OFDM QPSK | Edge_1RB_Left |
| 13 (Note 4) | Low | | | | 16QAM | N/A | DFT-s-OFDM QPSK | Edge_1RB_Left |
| 14 (Note 4) | High | | | | 16QAM | Outer_1RB_Right | DFT-s-OFDM QPSK | N/A |
| 15 | Default | | | | 16QAM | Outer_Full | DFT-s-OFDM 16QAM | Outer_Full |
| 16 (Note 3) | Default | | | | 16QAM | Outer_1RB_Left | DFT-s-OFDM 16QAM | Edge_1RB_Right |
| 17 (Note) | Low | | | | 16QAM | Outer_1RB_Left | DFT-s-OFDM | N/A |

| | | | | | | | | |
|-------------------|---------|--|--|-------|-----------------|----------------------|----------------|---|
| 3) | | | | 16QAM | | | | |
| 18 (Note 3) | High | | | 16QAM | N/A | DFT-s-OFDM 16QAM | Edge_1RB_Right | A |
| 19 (Note 4) | Default | | | 16QAM | Outer_1RB_Right | DFT-s-OFDM 16QAM | Edge_1RB_Left | B |
| 20 (Note 4) | Low | | | 16QAM | N/A | DFT-s-OFDM 16QAM | Edge_1RB_Left | A |
| 21 (Note 4) | High | | | 16QAM | Outer_1RB_Right | DFT-s-OFDM 16QAM | N/A | A |
| 22 | Default | | | 16QAM | Outer_Full | DFT-s-OFDM 64QAM | Outer_Full | B |
| 23 (Note 3) | Low | | | 16QAM | Outer_1RB_Left | DFT-s-OFDM 64QAM | Edge_1RB_Right | B |
| 24 (Note 4) | High | | | 16QAM | Outer_1RB_Right | DFT-s-OFDM 64QAM | Edge_1RB_Left | B |
| 25 | Default | | | 16QAM | Outer_Full | DFT-s-OFDM 256QAM | Outer_Full | B |
| 26 (Note 3) | Low | | | 16QAM | Outer_1RB_Left | DFT-s-OFDM 256QAM | Edge_1RB_Right | B |
| 27 (Note 4) | High | | | 16QAM | Outer_1RB_Right | DFT-s-OFDM 256QAM | Edge_1RB_Left | B |
| 28 | Default | | | 16QAM | Outer_Full | CP-OFDM QPSK | Outer_Full | B |
| 29 (Note 3) | Default | | | 16QAM | Outer_1RB_Left | CP-OFDM QPSK | Edge_1RB_Right | B |
| 30 (Note 3) | Low | | | 16QAM | Outer_1RB_Left | CP-OFDM QPSK | N/A | A |
| 31 (Note 3) | High | | | 16QAM | N/A | CP-OFDM QPSK | Edge_1RB_Right | A |
| 32 (Note 4) | Default | | | 16QAM | Outer_1RB_Right | CP-OFDM QPSK | Edge_1RB_Left | B |
| 33 (Note 4) | Low | | | 16QAM | N/A | CP-OFDM QPSK | Edge_1RB_Left | A |
| 34 (Note 4) | High | | | 16QAM | Outer_1RB_Right | CP-OFDM QPSK | N/A | A |
| 35 | Default | | | 16QAM | Outer_Full | CP-OFDM 16QAM | Outer_Full | B |
| 36 (Note 3) | Default | | | 16QAM | Outer_1RB_Left | CP-OFDM 16QAM | Edge_1RB_Right | B |
| 37 (Note 3) | Low | | | 16QAM | Outer_1RB_Left | CP-OFDM 16QAM | N/A | A |
| 38 (Note 3) | High | | | 16QAM | N/A | CP-OFDM 16QAM | Edge_1RB_Right | A |
| 39 (Note 4) | Default | | | 16QAM | Outer_1RB_Right | CP-OFDM 16QAM | Edge_1RB_Left | B |
| 40 (Note | Low | | | 16QAM | N/A | CP-OFDM 16QAM | Edge_1RB_Left | A |

| | | | | | | | | |
|----------------|---------|--|--|-------|-----------------|----------------|----------------|---|
| 4) | | | | | | | | |
| 41 (Note 4) | High | | | 16QAM | Outer_1RB_Right | CP-OFDM 16QAM | N/A | A |
| 42 | Default | | | 16QAM | Outer_Full | CP-OFDM 64QAM | Outer_Full | B |
| 43 (Note 3) | Low | | | 16QAM | Outer_1RB_Left | CP-OFDM 64QAM | Edge_1RB_Right | B |
| 44 (Note 4) | High | | | 16QAM | Outer_1RB_Right | CP-OFDM 64QAM | Edge_1RB_Left | B |
| 45 | Default | | | 16QAM | Outer_Full | CP-OFDM 256QAM | Outer_Full | B |
| 46 (Note 3) | Low | | | 16QAM | Outer_1RB_Left | CP-OFDM 256QAM | Edge_1RB_Right | B |
| 47 (Note 4) | High | | | 16QAM | Outer_1RB_Right | CP-OFDM 256QAM | Edge_1RB_Left | B |
| 48 (Note 4) | Default | | | 16QAM | Edge_Full_Right | CP-OFDM 256QAM | Edge_Full_Left | B |

NOTE 1: The specific configuration of each RB allocation is defined in Table 6.1-1 in TS 38.521-1 [8].

NOTE 2: If the UE supports multiple CC combinations in the EN-DC configuration with the same N_{RB_agg} , select the combination to test as follows:

- Lowest ENBW: NR component with lowest N_{RB} is tested.
- Highest ENBW: NR component with highest N_{RB} is tested.

NOTE 3: Applicable when E-UTRA cell carrier frequency is lower than NR cell carrier.

NOTE 4: Applicable when NR cell carrier frequency is lower than E-UTRA cell carrier.

NOTE 5: Outer_Full defined as the transmission bandwidth configuration N_{RB} per channel bandwidth for the E-UTRA component as indicated in TS 36.521 [10] Table 5.4.2-1. Outer_1RB_Left defined as 1 RB allocated at the left edge of the E-UTRA component. Outer_1RB_Right defined as 1 RB allocated at the right edge of the E-UTRA component. Edge_Full_Right is defined as 2 RBs allocated at the right edge of the E-UTRA component.

NOTE 6: DFT-s-OFDM Pi/2 BPSK test applies only for UEs which supports Pi/2 BPSK in FR1

NOTE 7: Power config as specified in Table 6.5B.2.1.2.4.3-3 (PC3) or 6.5B.2.1.2.4.3-4 (PC2).

NOTE 8: All test points in this table must also exist in table 6.2B.2.1.4.1-1 (MPR).

1. Connect the SS to the UE antenna connectors as shown in [6] TS 38.508-1 A.3.1.2.1 for SS diagram and A.3.2.1 for UE diagram.
2. The parameter settings for the E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3, and the parameter settings for the NR cell are set up according to TS 38.508-1 [6] clause 4.4.3.
3. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C.0 and TS 38.521-1 [8] Annex C.0 for E-UTRA CG and NR CG respectively, and uplink signals according to TS 36.521-1 [10] Annex H and TS 38.521-1 [8] Annex G for E-UTRA CG and NR CG respectively.
4. The UL Reference Measurement channels are TS 36.521-1 [10] Annex A.2 and TS 38.521-1 [8] Annex A.2 for E-UTRA CG and NR CG respectively.
5. Propagation conditions are set according to TS 36.521-1 [10] Annex B.0 and TS 38.521-1 [8] Annex B.0 for E-UTRA CG and NR CG respectively.
6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 6.2B.1.1.4.3.

6.5B.2.1.1.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format 0_1 for C_RNTI to schedule the UL RMC according to table 6.5B.1.1.4.1-1 on E-UTRA CC and NR CC respectively. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

2. Send continuously uplink power control "up" commands to the UE for NR and E-UTRA carrier until the UE transmits at its P_{UMAX} level; allow at least 200 ms from the first TPC command for the UE to reach P_{UMAX} level.
3. Measure the mean power over all component carriers for the EN-DC configuration. The period of measurement shall be at least the continuous duration of 1ms over consecutive active uplink slots For TDD, only slots consisting of only UL symbols are under test.
4. Measure the power of the transmitted signal with a measurement filter of bandwidths according to table 6.5B.2.1.1.5-1. The centre frequency of the filter shall be stepped in continuous steps according to the same table. The measured power shall be recorded for each step. The measurement period shall capture the active TSs.

NOTE 1: When switching to DFT-s-OFDM waveform, as specified in the test configuration table 6.5B.2.1.1.4.1-1, send an NR RRCReconfiguration message according to TS 38.508-1 [6] clause 4.6.3 Table 4.6.3-118 PUSCH-Config with TRANSFORM_PRECODER_ENABLED condition.

6.5B.2.1.2.4.3 Message contents

Message contents are according to TS 38.508-1 [6] clause 4.6.1 with the following exceptions:

Table 6.5B.2.1.2.4.3-1: AdditionalSpectrumEmission for MCG

| Derivation Path: 36.508 [11] clause 4.6.3, Table 4.4.3.3-1 | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| AdditionalSpectrumEmission | 0 (NS_01) | | |

Table 6.5B.2.1.2.4.3 -2: AdditionalSpectrumEmission for SCG

| Derivation Path: 38.508-1 [5] clause 4.6.3, Table 4.6.3-1 | | | |
|---|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| AdditionalSpectrumEmission | 0 (NS_01) | | |

Table 6.5B.2.1.2.4.3-3: PhysicalCellGroupConfig for PC3

| Derivation Path: TS 38.508-1 [6], Table 4.6.3-106 | | | |
|--|--------------|-------------------------|-----------|
| Information Element | Value/remark | Comment | Condition |
| p-NR-FR1 | 23 | Power config A (NOTE 1) | |
| | 20 | Power config B (NOTE 2) | |
| NOTE 1: Applies when E-UTRA UL transmission not overlapping with NR UL transmission in time. | | | |
| NOTE 2: Applies when E-UTRA UL transmission overlapping with NR UL transmission in time. | | | |

Table 6.5B.2.1.2.4.3-4: RRConnectionReconfiguration: nr-Config-r15 for PC3

| Derivation Path: TS 36.508 [11], Table 4.6.1-8 | | | |
|--|--------------|-------------------------|-----------|
| Information Element | Value/remark | Comment | Condition |
| p-MaxEUTRA-r15 | 23 | Power config A (NOTE 1) | |
| | 20 | Power config B (NOTE 2) | |
| NOTE 1: Applies when E-UTRA UL transmission not overlapping with NR UL transmission in time. | | | |
| NOTE 2: Applies when E-UTRA UL transmission overlapping with NR UL transmission in time. | | | |

Table 6.5B.2.1.2.4.3-5: PhysicalCellGroupConfig for PC2

| Derivation Path: TS 38.508-1 [6], Table 4.6.3-106 | | | |
|--|--------------|-------------------------|-----------|
| Information Element | Value/remark | Comment | Condition |
| p-NR-FR1 | 26 | Power config A (NOTE 1) | |
| | 23 | Power config B (NOTE 2) | |
| NOTE 1: Applies when E-UTRA UL transmission not overlapping with NR UL transmission in time. | | | |
| NOTE 2: Applies when E-UTRA UL transmission overlapping with NR UL transmission in time. | | | |

Table 6.5B.2.1.2.4.3-6: RRConnectionReconfiguration: nr-Config-r15 for PC2

| Derivation Path: TS 36.508 [11], Table 4.6.1-8 | | | |
|--|--------------|-------------------------|-----------|
| Information Element | Value/remark | Comment | Condition |
| p-MaxEUTRA-r15 | 26 | Power config A (NOTE 1) | |
| | 23 | Power config B (NOTE 2) | |
| NOTE 1: Applies when E-UTRA UL transmission not overlapping with NR UL transmission in time. | | | |
| NOTE 2: Applies when E-UTRA UL transmission overlapping with NR UL transmission in time. | | | |

6.5B.2.1.2.5 Test requirements

The power of any UE emissions shall fulfil requirements in Table 6.5B.2.1.2.5-1.

Table 6.5B.2.1.1.5-1: General spectrum emission mask for intra-band contiguous EN-DC

| Δf_{OOB} (MHz) | Spectrum emission limit (dBm) | Measurement bandwidth |
|---|------------------------------------|-----------------------|
| $\pm 0 - 1$ | Max(Round(10*log(0.15/ENBW)), -24) | 30 kHz |
| $\pm 1 - 5$ | -10 + TT | 1 MHz |
| $\pm 5 - \text{ENBW}$ | -13 + TT | 1 MHz |
| $\pm \text{ENBW} - (\text{ENBW}+5)$ | -25 + TT | 1 MHz |
| NOTE: ENBW refers to the aggregated channel bandwidth in MHz as defined in clause 5.3B. | | |

Table 6.5B.2.1.1.5-2: Test Tolerance (Spectrum Emission Mask)

| $f \leq 3.0\text{GHz}$ | $3.0\text{GHz} < f \leq 4.2\text{GHz}$ | $4.2\text{GHz} < f \leq 6.0\text{GHz}$ |
|------------------------|--|--|
| 1.5 dB | 1.8 dB | 1.8 dB |

6.5B.2.1.2 Additional spectrum emissions mask for intra-band contiguous EN-DC

6.5B.2.1.2.1 Test purpose

To verify that UE transmitter does not cause unacceptable interference to other channels or other systems in terms of transmitter spurious emissions under the deployment scenarios where additional requirements are specified.

6.5B.2.1.2.2 Test applicability

This test case applies to all types of E-UTRA power class 3 and power class 2 UE release 15 and forward, supporting intra-band contiguous EN-DC.

6.5B.2.1.2.3 Minimum conformance requirements

6.5B.2.1.2.3.1 Minimum requirement for network signalled value "NS_35"

For contiguous intra-band EN-DC configuration of DC_(n)71AA when NS_35 is indicated for the UE the requirements in table 6.5B.2.1.2.3-1 apply in the frequency ranges immediately adjacent and outside the aggregation of the said sub-blocks

When NS_35 is indicated in the MCG and NS_35 is indicated in the SCG the requirements in table 6.5B.2.1.2.3.1-1 apply in the frequency ranges immediately adjacent and outside the aggregated sub-blocks of the EN-DC configuration for DC_(n)71AA.

Table 6.5B.2.1.2.3.1-1: Additional requirements

| | Frequency offset of measurement filter centre frequency, f_offset | Minimum requirement (dBm) | Measurement bandwidth |
|--------------------------|--|----------------------------------|------------------------------|
| 0 MHz ≤ Δf < 0.1 MHz | 0.015 MHz ≤ f_offset < 0.085 MHz | -13 | 30 kHz |
| 0.1 MHz ≤ Δf < ENBW | 0.15 MHz ≤ f_offset < ENBW - 0.05 MHz | -13 | 100 kHz |
| ENBW ≤ Δf < ENBW + 5 MHz | ENBW + 0.5 MHz ≤ f_offset < ENBW + 4.5 MHz | -25 | 1 MHz |
| NOTE: | ENBW is the aggregated bandwidth of an E-UTRA sub-block and an adjacent NR sub-block; there is no frequency separation between the said sub-blocks. The sub-block bandwidths include any internal guard bands. | | |

The normative reference for this requirement is TS 38.101-3 [4] clause 6.5B.2.1.2.1.

Exception requirements for both NR and E-UTRA are defined for this test when transmission on E-UTRA overlap in time with NR.LTE and therefore LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

Exception requirements for both NR and E-UTRA are defined for this test when transmission on E-UTRA doesn't overlap in time with NR, for a UE that doesn't support dynamic power sharing. LTE anchor agnostic approach is not applied for this case. E-UTRA test point analysis is included and E-UTRA measurements are performed.

No exception requirements for NR or E-UTRA are defined for this test when transmission on E-UTRA doesn't overlap in time with NR, for a UE that supports dynamic power sharing. LTE anchor agnostic approach is not applied for this case.

6.5B.2.1.2.3.2 Minimum requirement for network signalled value "NS_04"

Additional spectrum emission requirements are signalled by the network to indicate that the UE shall meet an additional requirement for a specific deployment scenario as part of the cell handover/broadcast message.

The Band 41/n41 SEM transition point from -13 dBm/MHz to -25 dBm/MHz is based on the emission bandwidth. The emission bandwidth is defined as the width of the signal between two points, one below the carrier centre frequency and one above the carrier centre frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power. Since the 26 dB emission bandwidth is implementation dependent, the transmission bandwidths occupied by RBs is used for the SEM. The emission bandwidth for LTE carriers is document in TS 36.101 [5], and the emission bandwidth for NR carriers is documented in TS 38.101-1 [2]. The total emission bandwidth for contiguous intra-band EN-DC is the sum of the emission bandwidth for each CC plus the guard band between contiguous CCs.

When "NS_04" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5B.2.1.2.3.2-1.

Table 6.5B.2.1.2.3.2-1: n41 SEM with NS_04

| ΔfOOB MHz | Spectrum emission limit (dBm)/ measurement bandwidth for each channel bandwidth | | | | | | |
|---------------------------|--|---------------|---------------|---------------|---------------|--------------------|------------------------------|
| | 10 MHz | 15 MHz | 20 MHz | 40 MHz | 50 MHz | > 50 MHz | Measurement bandwidth |
| ± 0 - 1 | -18 | -20 | -21 | -24 | -25 | | 30 kHz |
| ± 1 - 5 | | | -10 | | | | |
| ± 5 - X | | | -13 | | | | 1 MHz |
| ± X - (BWChannel + 5 MHz) | | | -25 | | | | |

NOTE 1: X is defined as the sum of the emission bandwidth of the component carriers plus the guard band between contiguous CCs.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.5B.2.1.2.2.

Exception requirements for both NR and E-UTRA are defined for this test and therefore LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

6.5B.2.1.2.4 Test description

6.5B.2.1.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on EN-DC operating bands specified in clause 5.3B.1.2, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-1 [8] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2. All these configurations shall be tested with applicable test parameters for each EN-DC configuration specified in clause 5.3B.1.2 and are shown in test configuration table 6.2B.3.1.4.1-1 through 6.2B.3.1.4.1-26. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521-1 [10] Annex C.2 and in TS 38.521-1 [8] Annex C.2 for E-UTRA CG and NR CG respectively.

Table 6.5B.2.1.2.4.1-0: E-UTRA test configuration table

| E-UTRA Test Parameters | | | | |
|--------------------------|-----------------------------------|------------------------|------------|---------------|
| E-UTRA Channel Bandwidth | E-UTRA Test Frequency (Note 1) | Downlink | Uplink | |
| | | N/A for A-MPR testing. | Modulation | RB allocation |
| 20 MHz | Low range and High range (Note 2) | | QPSK | 100 |

NOTE 1: E-UTRA Test Frequency as specified in TS 36.508 [6] clause 4.3.1
 NOTE 2: NR carrier shall be the outermost carrier during test.

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1.

1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [6] Annex A, Figure A.3.1.2.1 for SS diagram and clause A.3.2.1 for UE diagram.
2. The parameter settings for the E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3, and the parameter settings for the NR cell are set up according to TS 38.508-1 [6] clause 4.4.3.
3. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C.0 and TS 38.521-1 [8] Annex C.0 for E-UTRA CG and NR CG respectively, and uplink signals according to TS 36.521-1 [10] Annex H and TS 38.521-1 [8] Annex G for E-UTRA CG and NR CG respectively.
4. NR downlink signals are initially set up according to Annex C.0, C.1, and C.2 and uplink signals according to Annex G.0, G.1, G.2, and G.3.0 of TS 38.521-1 [8].
5. The UL Reference Measurement channels are set according to TS 36.521-1 [10] Annex A.2 and TS 38.521-1 [8] Annex A.2 for E-UTRA CG link and NR CG link respectively.
6. Propagation conditions are set according to TS 36.521-1 [10] Annex B.0 and TS 38.521-1 [8] Annex B.0 for E-UTRA CG link and NR CG link respectively.
7. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 6.5B.2.1.2.4.3.
8. For the case of testing overlapping E-UTRA and NR UL transmission scenario when both bands are TDD, ensure E-UTRA UL transmission overlaps with NR UL transmission in time by giving SCG a delay of 3 E-UTRA subframes, or by giving MCG a delay of 2 subframes.

6.5B.2.1.2.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format [0_1] for C_RNTI to schedule the UL RMC according to table 6.2B.3.1.4.1-1 on both EN-DC component carriers. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

2. Send continuously uplink power control "up" commands to the UE for NR and E-UTRA carrier until the UE transmits at its P_{UMAX} level; allow at least 200 ms from the first TPC command starting from the first TPC command in this step for the UE to reach P_{UMAX} level.
3. Measure the mean power over all component carriers for the EN-DC configuration, which shall meet the requirements described in table 6.5B.2.1.2.5.1-1 through to 6.5B.2.1.2.5.2-1. The period of the measurement shall be at least the continuous duration of one active sub-frame (1ms).
4. Measure the power of the transmitted signal with a measurement filter of bandwidths according to table 6.5B.2.1.2.5.1 through to 6.5B.2.1.2.5.2-1. The centre frequency of the filter shall be stepped in contiguous steps according to the same table. The measured power shall be recorded for each step. The measurement period shall capture the active time slots.

NOTE 1: When switching to DFT-s-OFDM waveform, as specified in the test configuration table 6.2B.3.1.4.1-2, send an NR RRCReconfiguration message according to TS 38.508-1 [6] clause 4.6.3 Table 4.6.3-118 PUSCH-Config with TRANSFORM_PRECODER_ENABLED condition.

6.5B.2.1.2.4.3 Message contents

Message contents are according to TS 38.508-1 [6] clause 4.6.1, with the following exceptions.

Table 6.5B.2.1.2.4.3-1: RRCConnectionReconfiguration: nr-Config-r15

| Derivation Path: TS 36.508 [11], Table 4.6.1-8 | | | |
|--|--------------|--|-----------|
| Information Element | Value/remark | Comment | Condition |
| p-MaxEUTRA-r15 | 23 | Apply if run test points with E-UTRA UL transmission not overlapping with NR UL transmission in time for PC3 UE | |
| | 20 | Apply if run test points with E-UTRA UL transmission overlapping with NR UL transmission in time for PC3 UE, and UE doesn't support dynamic power sharing. | |
| P-Max | 23 | Apply if run test points with E-UTRA UL transmission not overlapping with NR UL transmission in time for PC3 UE | |
| | 20 | Apply if run test points with E-UTRA UL transmission overlapping with NR UL transmission in time for PC3 UE, and UE doesn't support dynamic power sharing. | |

6.5B.2.1.2.4.3.1 Message contents exceptions for network signalled value "NS_35"

For "NS_35" see A-MPR test case in table 6.2B.3.1.4.3.2-1 and table 6.2B.3.1.4.3.2-2.

6.5B.2.1.2.4.3.2 Message contents exceptions for network signalled value "NS_04"

For "NS_04" see A-MPR test case in table 6.2B.3.1.4.3.1-1 and table 6.2B.3.1.4.3.1-2.

6.5B.2.1.2.5 Test requirement

6.5B.2.1.2.5-1: Test Tolerance (Additional Spectrum Emission Mask)

| $f \leq 3.0\text{GHz}$ | $3.0\text{GHz} < f \leq 4.2\text{GHz}$ | $4.2\text{GHz} < f \leq 6.0\text{GHz}$ |
|------------------------|--|--|
| 1.5 dB | 1.8 dB | 1.8 dB |

6.5B.2.1.2.5.1 Test requirement for network signalled value "NS_35"

When "NS_35" is indicated in the cell measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in table 6.2B.3.1.5.1-1, and the power of any UE shall not exceed the described values in table 6.5B.2.1.2.5.1-1. The requirements in the table apply in the frequency ranges immediately adjacent and outside the aggregation of the sub-blocks.

Table 6.5B.2.1.2.5.1-1: Additional requirements for "NS_35"

| Δf_{OOB} | Frequency offset of measurement filter centre frequency, f_{offset} | Minimum requirement [dBm] | Measurement bandwidth |
|--|--|---------------------------|-----------------------|
| 0 MHz $\leq \Delta f < 0.1$ MHz | 0.015 MHz $\leq f_{\text{offset}} < 0.085$ MHz | -13+TT | 30 kHz |
| 0.1 MHz $\leq \Delta f <$ ENBW | 0.15 MHz $\leq f_{\text{offset}} <$ ENBW - 0.05 MHz | -13+TT | 100 kHz |
| ENBW $\leq \Delta f <$ ENBW + 5 MHz | ENBW + 0.5 MHz $\leq f_{\text{offset}} <$ ENBW + 4.5 MHz | -25+TT | 1 MHz |
| NOTE: ENBW is the aggregated bandwidth of an E-UTRA sub-block and an adjacent NR sub-block; there is no frequency separation between the said sub-blocks. The sub-block bandwidths include any internal guard bands. | | | |

6.5B.2.1.2.5.2 Test requirement for network signalled value "NS_04"

When "NS_04" is indicated in the cell measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in tables 6.2B.3.1.5.2-1, and the power of any UE shall not exceed the described values in table 6.5B.2.1.2.5.2-1. The requirements in the table apply in the frequency ranges immediately adjacent and outside the aggregation of the sub-blocks.

Table 6.5B.2.1.2.5.2-1: Additional requirements for n41 SEM with NS_04

| Δf_{OOB} MHz | Spectrum emission limit (dBm)/ measurement bandwidth for each channel bandwidth | | | | | | |
|--------------------------------------|--|-----------|-----------|-----------|-----------|-------------|--------------------------|
| | 10 MHz | 15 MHz | 20 MHz | 40 MHz | 50 MHz | > 50 MHz | Measurement bandwidth |
| $\pm 0 - 1$ | -18+TT | -20+TT | -21+TT | -24+TT | -25+TT | | 30 kHz |
| $\pm 1 - 5$ | | | -10+TT | | | | |
| $\pm 5 - X$ | | | -13+TT | | | | 1 MHz |
| $\pm X - (\text{BWChannel} + 5$ MHz) | | | -25+TT | | | | |

NOTE 1: X is defined as the sum of the emission bandwidth of the component carriers plus the guard band between contiguous CCs.

6.5B.2.1.3 Adjacent channel leakage ratio for intra-band contiguous EN-DC**6.5B.2.1.3.1 Test purpose**

To verify that UE transmitter does not cause unacceptable interference to adjacent channels in terms of Adjacent Channel Leakage Power Ratio (ACLR).

6.5B.2.1.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band EN-DC.

6.5B.2.1.3.3 Minimum conformance requirements

For EN-DC operation with an E-UTRA sub-block immediately adjacent to an NR sub-block, the ACLR is defined as the ratio of the filtered mean power centred on the aggregated sub-block bandwidth ENBW to the filtered mean power centred on an adjacent bandwidth of the same size ENBW at nominal channel spacing. The UE shall meet the ACLR minimum requirement EN-DC_{ACLR} specified in Table 6.5B.2.1.3-1 with ENBW the sum of the sub-block bandwidths.

The assigned channel power and adjacent channel power are measured with rectangular filters with measurement bandwidths specified in 6.5B.2.1.3-1.

Table 6.5B.2.1.3-1: ACLR for intra-band EN-DC (contiguous sub-blocks)

| Parameter | Unit | Value |
|---|---|--------------------|
| EN-DC _{ACLR} | dBc | 30 |
| Measurement bandwidth of EN-DC channel | | 1.00*ENBW |
| Measurement bandwidth of adjacent channel | | 0.95*ENBW |
| Frequency offset of adjacent channel | | ENBW / -ENBW |
| NOTE 1: | ENBW is the aggregated bandwidth in MHz as defined in clause 5.3B. | |
| NOTE 2: | The frequency offset is that in between the centre frequencies of the measurement filters | |

The normative reference for this requirement is TS 38.101-3 [4] clause 6.5B.2.1.3.

Exception requirements for both NR and E-UTRA are defined for this test and therefore LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

6.5B.2.1.3.4 Test description

6.5B.2.1.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on EN-DC operating bands specified in clause 5.3B.1.2, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-1 [8] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2. All of these configurations shall be tested with applicable test parameters for each EN-DC configuration specified in clause 5.3B.1.2 and are shown in table 6.5B.2.1.1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521-1 [10] Annex C.2 and in TS 38.521-1 [8] Annex C.2 for E-UTRA CG and NR CG respectively.

Table 6.5B.2.1.3.4.1-1: Test Configuration Table

| Initial Conditions | | | | | | | | | |
|--|---------|---|-----|------------------------|----------------------------|------------------------|----------------------|------------------------|-----------------------|
| Test Environment as specified in TS 38.508-1 [6] clause 4.1 | | NC, TL/VL, TL/VH, TH/VL, TH/VH | | | | | | | |
| Test Frequencies as specified in TS 38.508-1 [6] clause 4.3.1 | | Low range, High range | | | | | | | |
| Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1 | | Lowest N _{RB_aggr} , Highest N _{RB_aggr} (Note 2) | | | | | | | |
| Test SCS for the NR cell as specified in TS 38.521-1 [8] Table 5.3.5-1 | | Lowest, Highest | | | | | | | |
| Test Parameters | | | | | | | | | |
| Test ID | Freq | ChBw | SCS | Downlink Configuration | EN-DC Uplink Configuration | | | | |
| | | | | | E-UTRA Cell | | NR Cell | Common | |
| | | | | | Modulation | RB allocation (Note 5) | Modulation | RB allocation (NOTE 1) | Power config (NOTE 8) |
| 1 | Default | Default | N/A | Default | 16QAM | Outer_Full | DFT-s-OFDM Pi/2 BPSK | Outer_Full | B |
| 2 (Note 3) | Default | | | | 16QAM | Outer_1RB_Left | DFT-s-OFDM Pi/2 BPSK | Edge_1RB_Right | B |
| 3 (Note 3) | Low | | | | 16QAM | Outer_1RB_Left | DFT-s-OFDM Pi/2 BPSK | N/A | A |
| 4 (Note 3) | High | | | | 16QAM | N/A | DFT-s-OFDM Pi/2 BPSK | Edge_1RB_Right | A |
| 5 (Note 4) | Default | | | | 16QAM | Outer_1RB_Right | DFT-s-OFDM Pi/2 BPSK | Edge_1RB_Left | B |
| 6 (Note 4) | Low | | | | 16QAM | N/A | DFT-s-OFDM Pi/2 BPSK | Edge_1RB_Left | A |
| 7 (Note 4) | High | | | | 16QAM | Outer_1RB_Right | DFT-s-OFDM Pi/2 BPSK | N/A | A |
| 8 | Default | | | | 16QAM | Outer_Full | DFT-s-OFDM QPSK | Outer_Full | B |
| 9 (Note 3) | Default | | | | 16QAM | Outer_1RB_Left | DFT-s-OFDM QPSK | Edge_1RB_Right | B |
| 10 (Note 3) | Low | | | | 16QAM | Outer_1RB_Left | DFT-s-OFDM QPSK | N/A | A |
| 11 (Note 3) | High | | | | 16QAM | N/A | DFT-s-OFDM QPSK | Edge_1RB_Right | A |
| 12 (Note 4) | Default | | | | 16QAM | Outer_1RB_Right | DFT-s-OFDM QPSK | Edge_1RB_Left | B |
| 13 (Note 4) | Low | | | | 16QAM | N/A | DFT-s-OFDM QPSK | Edge_1RB_Left | A |
| 14 (Note 4) | High | | | | 16QAM | Outer_1RB_Right | DFT-s-OFDM QPSK | N/A | A |
| 15 | Default | | | | 16QAM | Outer_Full | DFT-s-OFDM 16QAM | Outer_Full | B |
| 16 (Note 3) | Default | | | | 16QAM | Outer_1RB_Left | DFT-s-OFDM 16QAM | Edge_1RB_Right | B |
| 17 (Note) | Low | | | | 16QAM | Outer_1RB_Left | DFT-s-OFDM | N/A | A |

| | | | | | | | | |
|-------------------|---------|--|--|-------|-----------------|----------------------|----------------|---|
| 3) | | | | 16QAM | | 16QAM | | |
| 18 (Note 3) | High | | | 16QAM | N/A | DFT-s-OFDM 16QAM | Edge_1RB_Right | A |
| 19 (Note 4) | Default | | | 16QAM | Outer_1RB_Right | DFT-s-OFDM 16QAM | Edge_1RB_Left | B |
| 20 (Note 4) | Low | | | 16QAM | N/A | DFT-s-OFDM 16QAM | Edge_1RB_Left | A |
| 21 (Note 4) | High | | | 16QAM | Outer_1RB_Right | DFT-s-OFDM 16QAM | N/A | A |
| 22 | Default | | | 16QAM | Outer_Full | DFT-s-OFDM 64QAM | Outer_Full | B |
| 23 (Note 3) | Low | | | 16QAM | Outer_1RB_Left | DFT-s-OFDM 64QAM | Edge_1RB_Right | B |
| 24 (Note 4) | High | | | 16QAM | Outer_1RB_Right | DFT-s-OFDM 64QAM | Edge_1RB_Left | B |
| 25 | Default | | | 16QAM | Outer_Full | DFT-s-OFDM 256QAM | Outer_Full | B |
| 26 (Note 3) | Low | | | 16QAM | Outer_1RB_Left | DFT-s-OFDM 256QAM | Edge_1RB_Right | B |
| 27 (Note 4) | High | | | 16QAM | Outer_1RB_Right | DFT-s-OFDM 256QAM | Edge_1RB_Left | B |
| 28 | Default | | | 16QAM | Outer_Full | CP-OFDM QPSK | Outer_Full | B |
| 29 (Note 3) | Default | | | 16QAM | Outer_1RB_Left | CP-OFDM QPSK | Edge_1RB_Right | B |
| 30 (Note 3) | Low | | | 16QAM | Outer_1RB_Left | CP-OFDM QPSK | N/A | A |
| 31 (Note 3) | High | | | 16QAM | N/A | CP-OFDM QPSK | Edge_1RB_Right | A |
| 32 (Note 4) | Default | | | 16QAM | Outer_1RB_Right | CP-OFDM QPSK | Edge_1RB_Left | B |
| 33 (Note 4) | Low | | | 16QAM | N/A | CP-OFDM QPSK | Edge_1RB_Left | A |
| 34 (Note 4) | High | | | 16QAM | Outer_1RB_Right | CP-OFDM QPSK | N/A | A |
| 35 | Default | | | 16QAM | Outer_Full | CP-OFDM 16QAM | Outer_Full | B |
| 36 (Note 3) | Default | | | 16QAM | Outer_1RB_Left | CP-OFDM 16QAM | Edge_1RB_Right | B |
| 37 (Note 3) | Low | | | 16QAM | Outer_1RB_Left | CP-OFDM 16QAM | N/A | A |
| 38 (Note 3) | High | | | 16QAM | N/A | CP-OFDM 16QAM | Edge_1RB_Right | A |
| 39 (Note 4) | Default | | | 16QAM | Outer_1RB_Right | CP-OFDM 16QAM | Edge_1RB_Left | B |
| 40 (Note | Low | | | 16QAM | N/A | CP-OFDM 16QAM | Edge_1RB_Left | A |

| | | | | | | | | |
|----------------|---------|--|--|-------|-----------------|----------------|----------------|---|
| 4) | | | | | | | | |
| 41 (Note 4) | High | | | 16QAM | Outer_1RB_Right | CP-OFDM 16QAM | N/A | A |
| 42 | Default | | | 16QAM | Outer_Full | CP-OFDM 64QAM | Outer_Full | B |
| 43 (Note 3) | Low | | | 16QAM | Outer_1RB_Left | CP-OFDM 64QAM | Edge_1RB_Right | B |
| 44 (Note 4) | High | | | 16QAM | Outer_1RB_Right | CP-OFDM 64QAM | Edge_1RB_Left | B |
| 45 | Default | | | 16QAM | Outer_Full | CP-OFDM 256QAM | Outer_Full | B |
| 46 (Note 3) | Low | | | 16QAM | Outer_1RB_Left | CP-OFDM 256QAM | Edge_1RB_Right | B |
| 47 (Note 4) | High | | | 16QAM | Outer_1RB_Right | CP-OFDM 256QAM | Edge_1RB_Left | B |
| 48 (Note 4) | Default | | | 16QAM | Edge_Full_Right | CP-OFDM 256QAM | Edge_Full_Left | B |

NOTE 1: The specific configuration of each RB allocation is defined in Table 6.1-1 in TS 38.521-1 [8].

NOTE 2: If the UE supports multiple CC combinations in the EN-DC configuration with the same N_{RB_agg} , select the combination to test as follows:

- Lowest ENBW: NR component with lowest N_{RB} is tested.
- Highest ENBW: NR component with highest N_{RB} is tested.

NOTE 3: Applicable when E-UTRA cell carrier frequency is lower than NR cell carrier.

NOTE 4: Applicable when NR cell carrier frequency is lower than E-UTRA cell carrier.

NOTE 5: Outer_Full defined as the transmission bandwidth configuration N_{RB} per channel bandwidth for the E-UTRA component as indicated in TS 36.521 [10] Table 5.4.2-1. Outer_1RB_Left defined as 1 RB allocated at the left edge of the E-UTRA component. Edge_Full_Right is defined as 2 RBs allocated at the right edge of the E-UTRA component. Outer_1RB_Right defined as 1 RB allocated at the right edge of the E-UTRA component.

NOTE 6: DFT-s-OFDM Pi/2 BPSK test applies only for UEs which supports Pi/2 BPSK in FR1

NOTE 7: Power config as specified in Table 6.5B.2.1.3.4.3-3 (PC3) or Table 6.5B.2.1.3.4.3-4 (PC2).

NOTE 9: All test points in this table must also exist in table 6.2B.2.1.4.1-1 (MPR).

1. Connect the SS to the UE antenna connectors as shown in [6] TS 38.508-1 A.3.1.2.1 for SS diagram and A.3.2.1 for UE diagram.
2. The parameter settings for the E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3, and the parameter settings for the NR cell are set up according to TS 38.508-1 [6] clause 4.4.3.
3. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C.0 and TS 38.521-1 [8] Annex C.0 for E-UTRA CG and NR CG respectively, and uplink signals according to TS 36.521-1 [10] Annex H and TS 38.521-1 [8] Annex G for E-UTRA CG and NR CG respectively.
4. The UL Reference Measurement channels are TS 36.521-1 [10] Annex A.2 and TS 38.521-1 [8] Annex A.2 for E-UTRA CG and NR CG respectively.
5. Propagation conditions are set according to TS 36.521-1 [10] Annex B.0 and TS 38.521-1 [8] Annex B.0 for E-UTRA CG and NR CG respectively.
6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 6.2B.1.1.4.3.

6.5B.2.1.3.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format [0_1] for C_RNTI to schedule the UL RMC according to Table 6.5B.2.1.3.4.1-1 on both EN-DC component carriers. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

2. Send continuously uplink power control "up" commands to the UE for NR and E-UTRA carrier until the UE transmits at its P_{UMAX} level; allow at least 200ms for the UE to reach P_{UMAX} level.
3. Measure the filtered mean power of the transmitted signal centred on the aggregated sub-block ENBW with a measurement filter of bandwidth according to Table 6.5B.2.1.3-1. The period of the measurement shall be at least the continuous duration of 1ms over consecutive active uplink slots. For TDD, only slots consisting of only UL symbols are under test.
4. Measure the filtered mean power of the first adjacent channel on both lower and upper side of the assigned NR + E-UTRA channel, respectively with a frequency offset and measurement filter of bandwidth according to Table 6.5B.2.1.3-1.
5. Calculate the ratios of the power between the values measured in step 3 over step 4 for lower and upper side respectively.

NOTE 1: When switching to DFT-s-OFDM waveform, as specified in the test configuration table 6.5B.2.1.4.1-1, send an NR RRCCreconfiguration message according to TS 38.508-1 [6] clause 4.6.3 Table 4.6.3-118 PUSCH-Config with TRANSFORM_PRECODER_ENABLED condition.

6.5B.2.1.3.4.3 Message contents

Message contents are according to TS 38.508-1 [5] clause 4.6.1 with the following exceptions:

Table 6.5B.2.1.3.4.3-1: AdditionalSpectrumEmission for MCG

| Derivation Path: 36.508 [11] clause 4.6.3, Table 4.4.3.3-1 | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| AdditionalSpectrumEmission | 0 (NS_01) | | |

Table 6.5B.2.1.3.4.3-2: AdditionalSpectrumEmission for SCG

| Derivation Path: 38.508-1 [5] clause 4.6.3, Table 4.6.3-1 | | | |
|---|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| AdditionalSpectrumEmission | 0 (NS_01) | | |

Table 6.5B.2.1.3.4.3-3: PhysicalCellGroupConfig for PC3

| Derivation Path: TS 38.508-1 [6], Table 4.6.3-106 | | | |
|--|--------------|-------------------------|-----------|
| Information Element | Value/remark | Comment | Condition |
| p-NR-FR1 | 23 | Power config A (NOTE 1) | |
| | 20 | Power config B (NOTE 2) | |
| NOTE 1: Applies when E-UTRA UL transmission not overlapping with NR UL transmission in time. | | | |
| NOTE 2: Applies when E-UTRA UL transmission overlapping with NR UL transmission in time. | | | |

Table 6.5B.2.1.3.4.3-4: RRCConnectionReconfiguration: nr-Config-r15 for PC3

| Derivation Path: TS 36.508 [11], Table 4.6.1-8 | | | |
|--|--------------|-------------------------|-----------|
| Information Element | Value/remark | Comment | Condition |
| p-MaxEUTRA-r15 | 23 | Power config A (NOTE 1) | |
| | 20 | Power config B (NOTE 2) | |
| NOTE 1: Applies when E-UTRA UL transmission not overlapping with NR UL transmission in time. | | | |
| NOTE 2: Applies when E-UTRA UL transmission overlapping with NR UL transmission in time | | | |

6.5B.2.1.3.5 Test requirement

The measured adjacent channel power ratio, derived in step 5, shall be less than or equal to $30 + TT$ dBc , where

- $TT = 0.8$ dB for $f \leq 4.0$ GHz, $TT = 1.0$ dB for $4.0\text{GHz} < f \leq 6.0$ GHz,

6.5B.2.2 Out-of-band emissions for Intra-band non-contiguous EN-DC

6.5B.2.2.1 Spectrum emissions mask for intra-band non-contiguous EN-DC

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- For $W_{gap} < NR \Delta f_{OOB} + E\text{-UTRA} \Delta f_{OOB}$, test description and test requirements are FFS.

6.5B.2.2.1.1 Test purpose

Same test purpose as in clause 6.5.2.2 in TS 38.521-1 [8] for the NR carrier.

6.5B.2.2.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band non-contiguous EN-DC.

6.5B.2.2.1.3 Minimum conformance requirements

The spectral emission mask for intra-band non-contiguous EN-DC is a composite of the emission mask for each CC with the level set to the maximum value from each mask for each frequency outside of the transmission bandwidth of either carrier. A composite spectrum emission mask is a combination of individual CC spectrum emissions masks. Where two masks overlap the most relaxed limit is used. Composite spectrum emission mask applies to frequencies up to $\pm \Delta f_{OOB}$ starting from the edges of the sub-blocks. If for some frequency an individual CC spectrum emission mask overlaps with the bandwidth of another CC then the emission mask does not apply for that frequency.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.5B.2.2.1.

No exception requirements applicable to NR or LTE when $W_{gap} > NR \Delta f_{OOB} + E\text{-UTRA} \Delta f_{OOB}$. LTE anchor agnostic approach is applied when $W_{gap} > NR \Delta f_{OOB} + E\text{-UTRA} \Delta f_{OOB}$.

Exception requirements for both NR and E-UTRA are defined for this test when $W_{gap} < NR \Delta f_{OOB} + E\text{-UTRA} \Delta f_{OOB}$ and therefore LTE anchor agnostic approach is not applied when $W_{gap} < NR \Delta f_{OOB} + E\text{-UTRA} \Delta f_{OOB}$.

6.5B.2.2.1.4 Test description

For $W_{gap} > NR \Delta f_{OOB} + E\text{-UTRA} \Delta f_{OOB}$:

Same test description as in clause 6.5.2.2.4 in TS 38.521-1 [8] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1. For Initial conditions as in clause 6.5.2.2.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.5.2.2.4.1 in TS 38.521-1 [8] is replaced by the following two steps:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG according to TS 38.508 [6] clause 4.5.
7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

Same test procedure as in clause 6.5.2.2.4.2 in TS 38.521-1 [8] with the following steps exception:

3. Measure the mean power of the UE in the channel bandwidth of the radio access mode according to the test configuration. The period of the measurement shall be at least the continuous duration of 1ms over consecutive active uplink slots. For TDD, only slots consisting of only UL symbols are under test.

For $W_{gap} < NR \Delta f_{OOB} + E\text{-UTRA } \Delta f_{OOB}$:

FFS.

6.5B.2.2.1.5 Test requirement

For $W_{gap} > NR \Delta f_{OOB} + E\text{-UTRA } \Delta f_{OOB}$:

Power of any UE emission shall fulfil requirements in Table 6.5.2.2.5-1 defined in TS 38.521-1 [8] for the NR carrier.

For $W_{gap} < NR \Delta f_{OOB} + E\text{-UTRA } \Delta f_{OOB}$:

FFS.

6.5B.2.2.2 Spectrum emissions mask for intra-band non-contiguous EN-DC

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- For $W_{gap} < NR \Delta f_{OOB} + E\text{-UTRA } \Delta f_{OOB}$, test description and test requirements are FFS.

6.5B.2.2.2.1 Test purpose

Same test purpose as in clause 6.5.2.3 in TS 38.521-1 [8] for the NR carrier.

6.5B.2.2.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band non-contiguous EN-DC.

6.5B.2.2.2.3 Minimum conformance requirements

The spectral emission mask for intra-band non-contiguous EN-DC is a composite of the emission mask for each CC with the level set to the maximum value from each mask for each frequency outside of the transmission bandwidth of either carrier. A composite spectrum emission mask is a combination of individual CC spectrum emissions masks. Where two masks overlap the most relaxed limit is used. Composite spectrum emission mask applies to frequencies up to $\pm \Delta f_{OOB}$ starting from the edges of the sub-blocks. If for some frequency an individual CC spectrum emission mask overlaps with the bandwidth of another CC then the emission mask does not apply for that frequency.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.5B.2.2.2.

No exception requirements applicable to NR or LTE when $W_{gap} > NR \Delta f_{OOB} + E\text{-UTRA } \Delta f_{OOB}$. LTE anchor agnostic approach is applied when $W_{gap} > NR \Delta f_{OOB} + E\text{-UTRA } \Delta f_{OOB}$.

Exception requirements for both NR and E-UTRA are defined for this test when $W_{gap} < NR \Delta f_{OOB} + E\text{-UTRA } \Delta f_{OOB}$ and therefore LTE anchor agnostic approach is not applied when $W_{gap} < NR \Delta f_{OOB} + E\text{-UTRA } \Delta f_{OOB}$.

6.5B.2.2.2.4 Test description

For $W_{gap} > NR \Delta f_{OOB} + E\text{-UTRA } \Delta f_{OOB}$:

Same test description as in clause 6.5.2.3.4 in TS 38.521-1 [8] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1. For Initial conditions as in clause 6.5.2.3.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.5.2.2.4.1 in TS 38.521-1 [8] is replaced by the following two steps:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG according to TS 38.508 [6] clause 4.5.

7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

Same test procedure as in clause 6.5.2.3.4.2 in TS 38.521-1 [8] with the following steps exception:

3. Measure the mean power of the UE in the channel bandwidth of the radio access mode according to the test configuration. The period of the measurement shall be at least the continuous duration of 1ms over consecutive active uplink slots. For TDD, only slots consisting of only UL symbols are under test.

For $W_{gap} < NR \Delta f_{OOB} + E\text{-UTRA} \Delta f_{OOB}$:

FFS.

6.5B.2.2.2.5 Test requirement

For $W_{gap} > NR \Delta f_{OOB} + E\text{-UTRA} \Delta f_{OOB}$:

Power of any UE emission shall fulfil requirements in Table 6.5.2.3.5-1 defined in TS 38.521-1 [8] for the NR carrier.

For $W_{gap} < NR \Delta f_{OOB} + E\text{-UTRA} \Delta f_{OOB}$:

FFS.

6.5B.2.2.3 Adjacent channel leakage ratio for intra-band non-contiguous EN-DC

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- For $W_{gap} < NR$ adjacent channel + E-UTRA adjacent channel, test description and test requirements are FFS.

6.5B.2.2.3.1 Test purpose

Same test purpose as in clause 6.5.2.4.1.1 in TS 38.521-1 [8] for the NR carrier.

6.5B.2.2.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band non-contiguous EN-DC.

6.5B.2.2.3.3 Minimum conformance requirements

For intra-band non-contiguous EN-DC, the EN-DC Adjacent Channel Leakage power Ratio (EN-DC_{ACLR}) is the ratio of the sum of the filtered mean powers centred on the assigned E-UTRA and NR sub-block frequencies to the filtered mean power centred on an adjacent channel frequency at nominal channel spacing. In case the sub-block gap bandwidth W_{gap} is smaller than a E-UTRA or NR sub-block bandwidth, no EN-DC_{ACLR} requirement is set for the corresponding sub-block for the gap. The assigned EN-DC sub-block power and adjacent channel power are measured with rectangular filters with measurement bandwidths specified in TS 38.101-3 [4] for the E-UTRA sub-block, and [2],[3] for the NR sub-block. If the measured adjacent channel power is greater than -50dBm then the EN-DC_{ACLR} shall be higher than the value specified in for E-UTRA_{ACLR} and NR_{ACLR}.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.5B.2.2.3.

No exception requirements applicable to NR or LTE when $W_{gap} > NR$ adjacent channel + E-UTRA adjacent channel. LTE anchor agnostic approach is applied when $W_{gap} > NR$ adjacent channel + E-UTRA adjacent channel.

Exception requirements for both NR and E-UTRA are defined for this test when $W_{gap} < NR$ adjacent channel + E-UTRA adjacent channel and therefore LTE anchor agnostic approach is not applied when $W_{gap} < NR$ adjacent channel + E-UTRA adjacent channel.

6.5B.2.2.3.4 Test description

For $W_{gap} > NR$ adjacent channel + E-UTRA adjacent channel:

Same test description as in clause 6.5.2.4.1.4 in TS 38.521-1 [8] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1. For Initial conditions as in clause 6.5.2.4.1.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.5.2.4.1.4.1 in TS 38.521-1 [8] is replaced by the following two steps:

- 6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG according to TS 38.508 [6] clause 4.5.
- 7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

Same test procedure as in clause 6.5.2.4.1.4.2 in TS 38.521-1 [8] with the following steps exception:

- 3. Measure the mean power of the UE in the channel bandwidth of the radio access mode according to the test configuration. The period of the measurement shall be at least the continuous duration of 1ms over consecutive active uplink slots. For TDD, only slots consisting of only UL symbols are under test.

For $W_{gap} < \text{NR adjacent channel} + \text{E-UTRA adjacent channel}$:

FFS.

6.5B.2.2.3.5 Test requirement

For $W_{gap} > \text{NR adjacent channel} + \text{E-UTRA adjacent channel}$:

If the measured adjacent channel power is greater than -50 dBm then the measured NR ACLR shall be higher than the limits in table 6.5.2.4.1.5-2 defined in clause 6.5.2.4.1.5 in TS 38.521-1 [8] for the NR carrier.

For $W_{gap} < \text{NR adjacent channel} + \text{E-UTRA adjacent channel}$:

FFS.

6.5B.2.3 Out-of-band emissions for Inter-band EN-DC within FR1

6.5B.2.3.1 Spectrum emissions mask for Inter-band EN-DC within FR1

6.5B.2.3.1.1 Test purpose

Same test purpose as in clause 6.5.2.2 in TS 38.521-1 [8] for the NR carrier.

6.5B.2.3.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC.

6.5B.2.3.1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.5.2.2.3 in TS 38.521-1 [8] for the NR carrier.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.5B.2.3.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.5B.2.3.1.4 Test description

Same test description as in clause 6.5.2.2.4 in TS 38.521-1 [8] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1. For Initial conditions as in clause 6.5.2.2.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.5.2.2.4.1 in TS 38.521-1 [8] is replaced by the following two steps:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG according to TS 38.508 [6] clause 4.5.
7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

Same test procedure as in clause 6.5.2.2.4.2 in TS 38.521-1 [8] with the following steps exception:

3. Measure the mean power of the UE in the channel bandwidth of the radio access mode according to the test configuration. The period of the measurement shall be at least the continuous duration of one active sub-frame (1ms) and in the uplink symbols. For TDD slots with transient periods are not under test.

6.5B.2.3.1.5 Test requirement

Power of any UE emission shall fulfil requirements in Table 6.5.2.2.5-1 defined in TS 38.521-1 [8] for the NR carrier.

6.5B.2.3.2 Additional Spectrum emissions mask for Inter-band EN-DC within FR1

6.5B.2.3.2.1 Test purpose

Same test purpose as in clause 6.5.2.3.1 in TS 38.521-1 [8] for the NR carrier.

6.5B.2.3.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC.

6.5B.2.3.2.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.5.2.3.3 in TS 38.521-1 [8] for the NR carrier.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.5B.2.3.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.5B.2.3.2.4 Test description

Same test description as in clause 6.5.2.3.4 in TS 38.521-1 [8] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1. For Initial conditions as in clause 6.5.2.3.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.5.2.3.4.1 in TS 38.521-1 [8] is replaced by the following two steps:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG according to TS 38.508 [6] clause 4.5.

7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

Same test procedure as in clause 6.5.2.3.4.2 in TS 38.521-1 [8] with the following steps exception:

3. Measure the mean power of the UE in the channel bandwidth of the radio access mode according to the test configuration. The period of the measurement shall be at least the continuous duration of one active sub-frame (1ms) and in the uplink symbols. For TDD slots with transient periods are not under test.

6.5B.2.3.2.5 Test requirement

Power of any UE emission shall fulfil requirements in applicable table from Table 6.5.2.3.5-1 to Table 6.5.2.3.5.2-1 defined in TS 38.521-1 [8] for the NR carrier.

6.5B.2.3.3 Adjacent channel leakage ratio for inter-band EN-DC within FR1

6.5B.2.3.3.1 Test purpose

Same test purpose as in clause 6.5.2.4.1.1 in TS 38.521-1 [8].

6.5B.2.3.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC.

6.5B.2.3.3.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.5.2.4.1.3 in TS 38.521-1 [8] for the NR carrier.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.5B.2.3.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied

6.5B.2.3.3.4 Test description

Same test description as in clause 6.5.2.4.1.4 in TS 38.521-1 [8] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1.

For Initial conditions as in clause 6.5.2.4.1.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.5.2.4.1.4.1 in TS 38.521-1 [8] is replaced by the following two steps:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.
7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

Same test procedure as in clause 6.5.2.4.1.4.2 in TS 38.521-1 [8] with the following steps exception:

3. Measure the mean power of the UE in the channel bandwidth of the radio access mode according to the test configuration. The period of the measurement shall be at least the continuous duration of one active sub-frame (1ms) and in the uplink symbols. For TDD slots with transient periods are not under test.

6.5B.2.3.3.5 Test requirement

If the measured adjacent channel power is greater than -50 dBm then the measured NR ACLR shall be higher than the limits in table 6.5.2.4.1.5-2 defined in clause 6.5.2.4.1.5 in TS 38.521-1 [8] for the NR carrier.

6.5B.2.4 Out-of-band emissions for Inter-band EN-DC including FR2

6.5B.2.4.1 Spectrum emissions mask for Inter-band EN-DC including FR2 (2 CCs)

6.5B.2.4.1.1 Test purpose

Same test purpose as in clause 6.5.2.1.1 in TS 38.521-2 [9] for the NR carrier.

6.5B.2.4.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 2 UL CCs.

6.5B.2.4.1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.5.2.1.3 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.5B.2.4.1.4 Test description

6.5B.2.4.1.4.1 Initial conditions

Same test description as in clause 6.5.2.1.4 in TS 38.521-2 [9] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1. For Initial conditions as in clause 6.5.2.1.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.5.2.1.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.5.2.1.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

- 1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.5B.2.4.1.5 Test requirement

Same test requirement as in clause 6.5.2.1.5 in TS 38.521-2 [9] for the NR carrier.

6.5B.2.4.1_1 Spectrum emissions mask for Inter-band EN-DC including FR2 (>2 CCs)

Editor's note: Test applicability, Test Description in below sub-clauses requires updates to clarify number of E-UTRA carriers that will be configured during the test

6.5B.2.4.1_1.1 Spectrum emissions mask for Inter-band EN-DC including FR2 (3 CCs)

Editor's note: The following aspects are either missing or not yet determined:

- The referred test case 6.5A.2.1.1 in TS 38.521-2 [9] is incomplete for intra-band contiguous CA supporting aggregated BW > 400MHz are TBD.

6.5B.2.4.1_1.1.1 Test purpose

Same test purpose as in clause 6.5.2.1.1 in TS 38.521-2 [9] for the NR carrier.

6.5B.2.4.1_1.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 3 UL CCs (2NR UL CCs).

6.5B.2.4.1_1.1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.5.2.1.3 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.4B.1.4.

6.5B.2.4.1_1.1.4 Test description

6.5B.2.4.1_1.1.4.1 Initial condition

Same test description as in clause 6.5A.2.1.1.4 in TS 38.521-2 [9] for the *NR* carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1.

For Initial conditions as in clause 6.5A.2.1.1.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.5A.2.1.1.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.5A.2.1.1.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

- 1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.5B.2.4.1_1.1.5 Test Requirements

Same test requirement as in clause 6.5A.2.1.1.5 in TS 38.521-2 [9] for the *NR* carrier.

6.5B.2.4.1_1.2 Spectrum emissions mask for Inter-band EN-DC including FR2 (4 CCs)

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- The referred test case 6.5A.2.1.2 in TS 38.521-2 [9] is incomplete for intra-band contiguous CA supporting aggregated BW > 400MHz are TBD.

6.5B.2.4.1_1.2.1 Test purpose

Same test purpose as in clause 6.5.2.1.1 in TS 38.521-2 [9] for the NR carrier.

6.5B.2.4.1_1.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 4 UL CCs (3NR UL CCs).

6.5B.2.4.1_1.2.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.5.2.1.3 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.4B.1.4.

6.5B.2.4.1_1.2.4 Test description

6.5B.2.4.1_1.2.4.1 Initial condition

Same test description as in clause 6.5A.2.1.2.4 in TS 38.521-2 [9] for the *NR* carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1.

For Initial conditions as in clause 6.5A.2.1.2.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.5A.2.1.2.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.5A.2.1.2.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.5B.2.4.1_1.2.5 Test Requirements

Same test requirement as in clause 6.5A.2.1.2.5 in TS 38.521-2 [9] for the *NR* carrier.

6.5B.2.4.1_1.3 Spectrum emissions mask for Inter-band EN-DC including FR2 (5 CCs)

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- The referred test case 6.5A.2.1.3 in TS 38.521-2 [9] is incomplete for intra-band contiguous CA supporting aggregated BW > 400MHz are TBD.

6.5B.2.4.1_1.3.1 Test purpose

Same test purpose as in clause 6.5.2.1.1 in TS 38.521-2 [9] for the NR carrier.

6.5B.2.4.1_1.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 5 UL CCs (4NR UL CCs).

6.5B.2.4.1_1.3.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.5.2.1.3 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.4B.1.4.

6.5B.2.4.1_1.3.4 Test description

6.5B.2.4.1_1.3.4.1 Initial condition

Same test description as in clause 6.5A.2.1.3.4 in TS 38.521-2 [9] for the *NR* carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1.

For Initial conditions as in clause 6.5A.2.1.3.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.5A.2.1.3.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.5A.2.1.3.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

- 1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.5B.2.4.1_1.3.5 Test Requirements

Same test requirement as in clause 6.5A.2.1.3.5 in TS 38.521-2 [9] for the *NR* carrier.

6.5B.2.4.1D Spectrum emissions mask for inter-band EN-DC including FR2 for UL-MIMO

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- The referred test case 6.5D.2.1 in TS 38.521-2 [9] is incomplete

6.5B.2.4.1D.1 Test purpose

Same test purpose as in clause 6.5D.2.1 in TS 38.521-2 [9] for the NR carrier.

6.5B.2.4.1D.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC FR2.

6.5B.2.4.1D.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.5D.2.1 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this measurement is TS 38.101-3 [4] clause 6.2B.2.4.

6.5B.2.4.1D.4 Test description

Same test description as in clause [6.5D.2.1] in TS 38.521-2 [9] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1. For Initial conditions as in clause [6.5D.2.1] in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

[Step 6] of Initial conditions as in clause [6.5D.2.1] in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG according to TS 36.508 [6] clause 4.5.

6.5B.2.4.1D.5 Test Requirement

Same test requirement as in clause 6.5D.2.1 of TS 38.521-2 [9] for the NR carrier.

6.5B.2.4.3 Adjacent channel leakage ratio for Inter-band EN-DC including FR2 (2 CCs)

Editor's note: The following aspects are either missing or not yet determined:

- The referred test case 6.5.2.3 in TS 38.521-2 [9] is incomplete for PC1, 2 and 4.
- The referred test case 6.5.2.3 in TS 38.521-2 [9] is incomplete for aggregated BW > 400MHz.

6.5B.2.4.3.1 Test purpose

Same test purpose as in clause 6.5.2.3.1 in TS 38.521-2 [9] for the NR carrier.

6.5B.2.4.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 2 UL CCs.

6.5B.2.4.3.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.5.2.3.3 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.5B.2.4.3.4 Test description

6.5B.2.4.3.4.1 Initial conditions

Same test description as in clause 6.5.2.3.4 in TS 38.521-2 [9] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1. For Initial conditions as in clause 6.5.2.3.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.5.2.3.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.5.2.3.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

- 1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.5B.2.4.3.5 Test requirement

Same test requirement as in clause 6.5.2.3.5 in TS 38.521-2 [9] for the NR carrier.

6.5B.2.4.3_1 Adjacent channel leakage ratio for Inter-band EN-DC including FR2 (>2 CCs)

Editor's note: Test applicability, Test Description in below sub-clauses requires updates to clarify number of E-UTRA carriers that will be configured during the test

6.5B.2.4.3_1.1 Adjacent channel leakage ratio for Inter-band EN-DC including FR2 (3 CCs)

Editor's note: The following aspects are either missing or not yet determined:

- The referred test case 6.5A.2.2.1 in TS 38.521-2 [9] is incomplete for intra-band contiguous CA supporting aggregated BW > 400MHz are TBD.

6.5B.2.4.3_1.1.1 Test purpose

Same test purpose as in clause 6.5.2.3.1 in TS 38.521-2 [9] for the NR carrier.

6.5B.2.4.3_1.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 3 UL CCs (2NR UL CCs).

6.5B.2.4.3_1.1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.5.2.3.3 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.4B.2.4.

6.5B.2.4.3_1.1.4 Test description

6.5B.2.4.3_1.1.4.1 Initial condition

Same test description as in clause 6.5A.2.2.1.4 in TS 38.521-2 [9] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1.

For Initial conditions as in clause 6.5A.2.2.1.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.5A.2.2.1.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.5A.2.2.1.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.5B.2.4.3_1.1.5 Test Requirements

Same test requirement as in clause 6.5A.2.2.1.5 in TS 38.521-2 [9] for the NR carrier.

6.5B.2.4.3_1.2 Adjacent channel leakage ratio for Inter-band EN-DC including FR2 (4 CCs)

Editor's note: The following aspects are either missing or not yet determined:

- The referred test case 6.5A.2.2.2 in TS 38.521-2 [9] is incomplete for intra-band contiguous CA supporting aggregated BW > 400MHz are TBD.

6.5B.2.4.3_1.2.1 Test purpose

Same test purpose as in clause 6.5.2.3.1 in TS 38.521-2 [9] for the NR carrier.

6.5B.2.4.3_1.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 4 UL CCs (3NR UL CCs).

6.5B.2.4.3_1.2.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.5.2.3.3 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.4B.2.4.

6.5B.2.4.3_1.2.4 Test description

6.5B.2.4.3_1.2.4.1 Initial condition

Same test description as in clause 6.5A.2.2.2.4 in TS 38.521-2 [9] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1.

For Initial conditions as in clause 6.5A.2.2.2.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.5A.2.2.2.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.5A.2.2.2.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

- 1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.5B.2.4.3_1.2.5 Test Requirements

Same test requirement as in clause 6.5A.2.2.2.5 in TS 38.521-2 [9] for the NR carrier.

6.5B.2.4.3_1.3 Adjacent channel leakage ratio for Inter-band EN-DC including FR2 (5 CCs)

Editor's note: The following aspects are either missing or not yet determined:

- The referred test case 6.5A.2.2.3 in TS 38.521-2 [9] is incomplete for intra-band contiguous CA supporting aggregated BW > 400MHz are TBD.

6.5B.2.4.3_1.3.1 Test purpose

Same test purpose as in clause 6.5.2.3.1 in TS 38.521-2 [9] for the NR carrier.

6.5B.2.4.3_1.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 5 UL CCs (4NR UL CCs).

6.5B.2.4.3_1.3.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.5.2.3.3 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.4B.2.4.

6.5B.2.4.3_1.3.4 Test description

6.5B.2.4.3_1.3.4.1 Initial condition

Same test description as in clause 6.5A.2.2.3.4 in TS 38.521-2 [9] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1.

For Initial conditions as in clause 6.5A.2.2.3.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.5A.2.2.3.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.5A.2.2.3.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

- 1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.5B.2.4.3_1.3.5 Test Requirements

Same test requirement as in clause 6.5A.2.2.3.5 in TS 38.521-2 [9] for the NR carrier.

6.5B.2.4D.3 Adjacent channel leakage ratio for inter-band EN-DC including FR2 for UL-MIMO

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- The referred test case 6.5D.2.2 in TS 38.521-2 [9] is incomplete

6.5B.2.4D.3.1 Test purpose

Same test purpose as in clause 6.5D.2.2 in TS 38.521-2 [9] for the NR carrier.

6.5B.2.4D.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC FR2.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.5B.2.4D.3.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.5D.2.2 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this measurement is TS 38.101-3 [4] clause 6.2B.2.4.

6.5B.2.4D.3.4 Test description

Same test description as in clause 6.5D.2.2 in TS 38.521-2 [9] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1. For Initial conditions as in clause 6.5D.2.2 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

[Step 6] of Initial conditions as in clause 6.5D.2.2 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG according to TS 38.508 [6] clause 4.5.

Same test procedure as in clause 6.5D.2.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

- 1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set TimeAlignmentTimerDedicated IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.5B.2.4D.3.5 Test Requirement

Same test requirement as in clause 6.5D.2.2 of TS 38.521-2 [9] for the NR carrier.

6.5B.3 Spurious emissions for EN-DC

Spurious emissions are emissions which are caused by unwanted transmitter effects such as harmonics emission, parasitic emissions, intermodulation products and frequency conversion products, but exclude out of band emissions. The spurious emission limits are specified in terms of general requirements in line with SM.329 [3] and NR operating band requirement to address UE co-existence.

To improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

6.5B.3.1 Spurious Emissions for intra-band contiguous EN-DC

6.5B.3.1.1 General spurious emissions for intra-band contiguous EN-DC

6.5B.3.1.1.1 Test purpose

To verify that UE transmitter does not cause unacceptable interference to other channels or other systems in terms of transmitter spurious emissions.

6.5B.3.1.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band EN-DC.

6.5B.3.1.1.3 Minimum conformance requirements

The general spurious emissions requirements specified in clause 6.6.3.1 of TS 36.521-1 [10] and clause 6.5.3.1 of TS 38.521-1 [8] apply beyond any frequencies for which the out-of-band emissions requirements in clause 6.5B.2.1 of TS 38.101-3 [4] apply.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.5B.3.1.1.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.5B.3.1.1.4 Test description

Same test description as in clause 6.5.3.1.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

Table 6.5B.3.1.1.4-1: Test Configuration Table

| Initial Conditions | |
|---|--|
| Test Frequencies as specified in TS 38.508-1 [6] clause 4.3.1 for different EN-DC bandwidth classes | Low range, Mid range, High range |
| Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1 across bandwidth combination sets supported by the UE | Lowest N _{RB_agg} , Highest N _{RB_agg} (NOTE1) |
| NOTE 1: If the UE supports multiple CC Combinations in the EN-DC Configuration with the same NRB _{agg} , only the combination with the lowest NRB _{SCG} , mid NRB _{SCG} and highest NRB _{SCG} are tested for Lowest N _{RB_agg} , Mid N _{RB_agg} and Highest N _{RB_agg} , respectively. | |

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths are specified in Table 4.6-1 except for the parameters specified in Table 6.5B.3.1.1.4-1.

For Initial conditions as in clause 6.5.3.1.4 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

- 2.1 The parameter settings for the E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3 with E-UTRA channel bandwidth and test frequencies defined in Table 6.5B.3.1.1.4-1.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].
- 4.1. The UL Reference Measurement channels are set according to Table 6.5B.3.1.1.4-1.

Step 6 of Initial conditions as in clause 6.5.3.1.4 in TS 38.521-1 [8] is replaced by:

- 6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG according to TS 38.508 [6] clause 4.5.

Same test procedure as in clause 6.5.3.1.4 in TS 38.521-1 [8].

6.5B.3.1.1.5 Test Requirement

The measured average power of spurious emission, derived in step 5, shall not exceed the described value in Table 6.5B.3.1.1.5-1.

Unless otherwise stated, the spurious emission limits apply for the frequency ranges that are more than Δ_{FOOB} (MHz) from the edge of the channel bandwidth shown in Table 6.5.3.1.5-1 of TS 38.521-1 [8] for NR carrier, and Table 6.6.3.1.3-1 of TS 36.521-1[10] for E-UTRA carrier.

NOTE: For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the measurement bandwidth defined for the protected band.

Table 6.5B.3.1.1.5-1: General spurious emissions test requirements

| Frequency Range | Maximum Level | Measurement bandwidth | NOTE |
|---|---------------|-----------------------|------|
| 9 kHz $\leq f < 150$ kHz | -36 dBm | 1 kHz | |
| 150 kHz $\leq f < 30$ MHz | -36 dBm | 10 kHz | |
| 30 MHz $\leq f < 1000$ MHz | -36 dBm | 100 kHz | |
| 1 GHz $\leq f < 12.75$ GHz | -30 dBm | 1 MHz | 4 |
| | -25 dBm | 1 MHz | 3 |
| 12.75 GHz $\leq f <$ 5th harmonic of the upper frequency edge of the UL operating band in GHz | -30 dBm | 1 MHz | 1 |
| 12.75 GHz $< f < 26$ GHz | -30 dBm | 1 MHz | 2 |
| NOTE 1: Applies for Band that the upper frequency edge of the UL Band more than 2.69 GHz. NOTE 2: Applies for Band that the upper frequency edge of the UL Band more than 5.2 GHz. NOTE 3: Applies for Band n41, CA configurations including Band n41, and EN-DC configurations that include n41 specified in clause 5.2B of TS 36.101 [4] when NS_04 is signalled. NOTE 4: Does not apply for Band n41, CA configurations including Band n41, and EN-DC configurations that include n41 specified in subclause 5.2B of TS 38.101-3 [4] when NS_04 is signalled. | | | |

6.5B.3.1.2 Spurious emission band UE co-existence for intra-band contiguous EN-DC

6.5B.3.1.2.1 Test purpose

To verify that UE transmitter does not cause unacceptable interference to other channels or other systems in terms of transmitter spurious emissions for band UE co-existence for intra-band contiguous EN-DC.

6.5B.3.1.2.2 Test applicability

This test case applies to all types of NR UE release 15 and forward supporting intra-band contiguous EN-DC.

6.5B.3.1.2.3 Minimum conformance requirements

This clause specifies the requirements for the specified EN-DC configurations for coexistence with protected bands.

The requirements in Table 6.5B.3.1.2.3-1 apply on each component carrier with all component carriers are active.

Table 6.5B.3.1.2.3-1: Requirements for intra band contiguous EN-DC

| EN-DC Configuration | Spurious emission | | | | | |
|--|--|-----------------------|---|---------------------|-----------|------|
| | Protected band | Frequency range (MHz) | | Maximum Level (dBm) | MBW (MHz) | NOTE |
| DC_(n)71 | E-UTRA Band 4, 5, 12, 13, 14, 17, 24, 26, 30, 48, 66 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | E-UTRA Band 2, 25, 41, 70 NR Band n77 ⁵ | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | E-UTRA Band 29 | F_{DL_low} | - | F_{DL_high} | -38 | 1 |
| | E-UTRA Band 71 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| DC_(n)41 | E-UTRA Band 1, 2, 3, 4, 5, 8, 10, 11, 12, 13, 14, 17, 18, 19, 21, 24, 25, 26, 27, 28, 29, 30, 34, 39, 42, 44, 45, 48, 50, 51, 66, 70, 71, 73, 74 NR Band n77, n78 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 |
| | NR Band n79 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| NOTE 1: F_{DL_low} and F_{DL_high} refer to each E-UTRA frequency band specified in Table 5.2-1 of TS 36.121-1 [10]. | | | | | | |
| NOTE 2: As exceptions, measurements with a level up to the applicable requirements defined in Table 6.5B.3.1.1.5-1 are permitted for each assigned E-UTRA carrier used in the measurement due to 2 nd , 3 rd , 4 th or 5 th harmonic spurious emissions. Due to spreading of the harmonic emission the exception is also allowed for the first 1 MHz frequency range immediately outside the harmonic emission on both sides of the harmonic emission. This results in an overall exception interval centred at the harmonic emission of (2MHz + N x L _{CRB} x 180kHz), where N is 2, 3, 4, 5 for the 2 nd , 3 rd , 4 th or 5 th harmonic respectively. The exception is allowed if the measurement bandwidth (MBW) totally or partially overlaps the overall exception interval. | | | | | | |
| NOTE 3: These requirements also apply for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.5.3.1-1 and Table 6.5A.3.1-1 of TS 38.101-1 [2] from the edge of the channel bandwidth. | | | | | | |
| NOTE 4: Applicable when co-existence with PHS system operating in 1884.5 - 1915.7 MHz. | | | | | | |
| NOTE 5: Only applies to NR UE release 16 and forward supporting intra-band contiguous EN-DC | | | | | | |

NOTE: To simplify the above Table, E-UTRA band numbers are listed for bands which are specified only for E-UTRA operation or both E-UTRA and NR operation. NR band numbers are listed for bands which are specified only for NR operation.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.5B.3.1.2.

Exception requirements for both NR and E-UTRA are defined for this test and therefore LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

6.5B.3.1.2.4 Test description

6.5B.3.1.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on EN-DC operating bands specified in clause 5.2B.2.1, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-1 [8] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2. All of these configurations shall be tested with applicable test parameters for each EN-DC configuration specified in clause 5.3B.1.2 and are shown in table 6.5B.3.1.2.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521-1 [10] Annex C.2 and in TS 38.521-1 [8] Annex C.2 for E-UTRA CG and NR CG respectively.

Table 6.5B.3.1.2.4.1-1: Test configuration table

| Initial Conditions | | | | |
|---|--|----------------------------|------------------------|------------------------------|
| Test Environment as specified in TS 38.508-1 [6] clause 4.1 | NC | | | |
| Test Parameters | | | | |
| Test ID | Downlink Configuration | EN-DC Uplink Configuration | | |
| | | E-UTRA Cell | NR Cell | |
| Modulation | RB allocation (NOTE 2) | Modulation | RB allocation (NOTE 1) | |
| 1 | N/A for Spurious emission. | QPSK | Outer_Full | CP-OFDM QPSK Edge_1RB_Left |
| 2 | | QPSK | Outer_Full | CP-OFDM QPSK Edge_1RB_Rig ht |
| 3 | | QPSK | Outer_Full | CP-OFDM QPSK Outer Full |
| Note 1: | The specific configuration of each RB allocation is defined in Table 6.1-1 in TS 38.521-1 [8]. | | | |
| Note 2: | Outer_Full defined as the transmission bandwidth configuration N_{RB} per channel bandwidth for the E-UTRA component as indicated in TS 36.521-1 [10] Table 5.4.2-1. | | | |
| Note 3: | If the UE supports multiple CC Combinations in the EN-DC Configuration with the same aggregated channel BW, only the combination with the highest NR BW is tested. | | | |

1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, Figure A.3.1.1.1 for TE diagram and clause A.3.2.1 for UE diagram.
2. The parameter settings for the E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3, and the parameter settings for the NR cell are set up according to TS 38.508-1 [6] clause 4.4.3.
3. E-UTRA downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0 of TS 36.521-1 [10].
4. NR downlink signals are initially set up according to Annex C.0, C.1 and C.2, and uplink signals according to Annex G.0, G.1, G.2, G.3.0 of TS 38.521-1 [8].
5. The UL Reference Measurement channels are set up according to TS 36.521-1 [10] Annex A.2 and TS 38.521-1 [8] Annex A.2 for E-UTRA CG and NR CG respectively.
6. Propagation conditions are set according to TS 36.521-1 [10] Annex B.0 and TS 38.521-1 [8] Annex B.0 for E-UTRA CG and NR CG, respectively.
7. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 6.5B.3.1.2.4.3.

6.5B.3.1.2.4.2 Test Procedure

1. E-UTRA SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.5B.3.1.2.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.
2. NR SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 6.5B.3.1.2.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.
3. Both NR and E-UTRA SS send continuously uplink power control "up" commands in the uplink scheduling information to the UE until the UE transmits at P_{UMAX} level.

4. Measure the power of the transmitted signal with a measurement filter of bandwidths according to Table 6.5B.3.1.2.3-1. The centre frequency of the filter shall be stepped in contiguous steps according to table 6.5B.3.1.2.3-1. The measured power shall be verified for each step. The measurement period shall capture the active time slots.

6.5B.3.2.1.4.3 Message Contents

Message contents are according to TS 38.508-1 [5] clause 4.6 and TS 38.508-1 [6] clause 4.6.1 with the following exceptions.

Table 6.5B.3.2.1.4.3-1: RRCCConnectionReconfiguration: nr-Config-r15

| Derivation Path: TS 36.508 [11], Table 4.6.1-8 | | | |
|--|--------------|---------|--|
| Information Element | Value/remark | Comment | Condition |
| p-MaxEUTRA-r15 | 23 | | Power Class 2 UE AND simultaneous E-UTRA and NR transmission |
| | 20 | | Power Class 3 UE AND simultaneous E-UTRA and NR transmission |

Table 6.5B.3.2.1.4.3-2: PhysicalCellGroupConfig

| Derivation Path: TS 38.508-1 [6] Table 4.6.3-106 | | | |
|--|--------------|---------|--|
| Information Element | Value/remark | Comment | Condition |
| p-NR-FR1 | 23 | | Power Class 2 UE AND simultaneous E-UTRA and NR transmission |
| | 20 | | Power Class 3 UE AND simultaneous E-UTRA and NR transmission |

6.5B.3.1.2.5 Test Requirement

Test requirements for Spurious Emissions UE Co-existence for intra-band contiguous EN-DC are the same as described in minimum requirements and are not repeated in this clause.

6.5B.3.2 Spurious Emissions for intra-band non-contiguous EN-DC

6.5B.3.2.1 General spurious emissions for Intra-band non-contiguous EN-DC

6.5B.3.2.1.1 Test purpose

To verify that UE transmitter does not cause unacceptable interference to other channels or other systems in terms of transmitter spurious emissions.

6.5B.3.2.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward supporting intra-band non-contiguous EN-DC.

6.5B.3.2.1.3 Minimum conformance requirements

The general spurious emissions requirements specified in clause 6.6.3.1 of TS 36.521-1 [10] and clause 6.5.3.1 of TS 38.521-1 [8] apply beyond any frequencies for which the out-of-band emissions requirements in clause 6.5B.2.2 of TS 38.101-3 [4] apply.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.5B.3.2.1.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.5B.3.2.1.4 Test description

Same test description as in clause 6.5.3.1.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

Table 6.5B.3.2.1.4-1: Test Configuration Table

| Initial Conditions | |
|---|--|
| Test Frequencies as specified in TS 38.508-1 [6] clause 4.3.1 for different EN-DC bandwidth classes | MaxWGap (Low range, High range) |
| Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1 across bandwidth combination sets supported by the UE | Lowest N _{RB_agg} , Highest N _{RB_agg} (NOTE1) |
| NOTE 1: If the UE supports multiple CC Combinations in the EN-DC Configuration with the same NRB_agg, only the combination with the lowest NRB_SCG, mid NRB_SCG and highest NRB_SCG are tested for Lowest N _{RB_agg} , Mid N _{RB_agg} and Highest N _{RB_agg} , respectively. | |

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths are specified in Table 4.6-1 except for the parameters specified in Table 6.5B.3.2.1.4-1.

For Initial conditions as in clause 6.5.3.1.4 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for the E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3 with E-UTRA channel bandwidth and test frequencies defined in Table 6.5B.3.1.1.4-1.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.2.2.4.1 in TS 38.521-1 [8] is replaced by:

- 6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG according to TS 38.508 [6] clause 4.5.

Same test procedure as in clause 6.5.3.1.4 in TS 38.521-1 [8].

6.5B.3.2.1.5 Test Requirement

Same test requirement as in clause 6.5B.3.1.1.5.

6.5B.3.2.2 Spurious emission band UE co-existence for intra-band non-contiguous EN-DC

6.5B.3.2.2.1 Test purpose

To verify that UE transmitter does not cause unacceptable interference to other channels or other systems in terms of transmitter spurious emissions for band UE co-existence for intra-band non-contiguous EN-DC.

6.5B.3.2.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward supporting intra-band non-contiguous EN-DC.

6.5B.3.2.2.3 Minimum conformance requirements

This clause specifies the requirements for the specified EN-DC configurations for co-existence with protected bands.

The requirements in Table 6.5B.3.2.2.3-1 apply with all component carriers are active.

Table 6.5B.3.2.2.3-1: Requirements for intra-band non-contiguous EN-DC

| EN-DC Configuration | Spurious emission | | | | | |
|--|--|-----------------------|---|---------------------|-----------|------|
| | Protected band | Frequency range (MHz) | | Maximum Level (dBm) | MBW (MHz) | NOTE |
| ... | | | | | | |
| DC_41A_n41A | E-UTRA Band 1, 2, 3, 4, 5, 8, 10, 11, 12, 13, 14, 17, 18, 19, 21, 24, 25, 26, 27, 28, 29, 34, 39, 42, 44, 45, 48, 50, 51, 66, 70, 71, 73, 74 NR Band n77, n78 and n79 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 |
| | E-UTRA Band 30, 40 | F_{DL_low} | - | F_{DL_high} | [-40] | 1 |
| | ... | | | | | |
| <p>NOTE 1: F_{DL_low} and F_{DL_high} refer to each E-UTRA frequency band specified in Table 5.2-1 of TS 36.121-1 [10].</p> <p>NOTE 2: As exceptions, measurements with a level up to the applicable requirements defined in Table 6.5.3.1.3-2 of TS 38.521-1 [8] are permitted for each assigned E-UTRA carrier used in the measurement due to 2nd, 3rd, 4th or 5th harmonic spurious emissions. Due to spreading of the harmonic emission the exception is also allowed for the first 1 MHz frequency range immediately outside the harmonic emission on both sides of the harmonic emission. This results in an overall exception interval centred at the harmonic emission of (2MHz + N x L_{CRB} x 180kHz), where N is 2, 3, 4, 5 for the 2nd, 3rd, 4th or 5th harmonic respectively. The exception is allowed if the measurement bandwidth (MBW) totally or partially overlaps the overall exception interval.</p> <p>NOTE 3: Applicable when co-existence with PHS system operating in 1884.5 - 1915.7 MHz.</p> | | | | | | |

The normative reference for this requirement is TS 38.101-3 [4] clause 6.5B.3.2.2.

Exception requirements are applicable for NR but not for E-UTRA within this test. LTE anchor agnostic approach is not applied. E-UTRA configuration is included but E-UTRA measurements are not performed.

6.5B.3.2.2.4 Test description

6.5B.3.2.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and sub-carrier spacing based on NR operating bands specified in table 5.2B.2.1-1. All of these configurations shall be tested with applicable test parameters for each combination of test channel bandwidth and sub-carrier spacing are shown in Table 6.5B.3.2.2.4.1-1 for E-UTRA and Table 6.5B.3.2.2.4.1-2 for NR. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex TS 36.521-1 [10] Annex C and in TS 38.521-1 [8] Annex C2 for LTE link and NR link respectively.

Table 6.5B.3.2.2.4.1-1: Test configuration table

| Initial Conditions | | | | | | |
|--|-------------------------------|--|---------------------------|-----------------|--------------------|--|
| Test Environment as specified in TS 38.508-1 [6] clause 4.1 | | NC | | | | |
| Test Frequencies as specified in TS 38.508-1 [6] clause 4.3.1 | | MaxWgap (Low range, High range) | | | | |
| Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1 | | Lowest and Highest N_{RB_agg} (Note 3) | | | | |
| Test Parameters | | | | | | |
| Test ID | Downlink Configuration | EN-DC Uplink Configuration | | | | |
| | | E-UTRA Cell | | NR Cell | | |
| Modulation | RB allocation (NOTE 2) | Modulation | RB allocation (NOTE 1) | | | |
| 1 | N/A for Spurious emission. | QPSK | Outer_Full | CP-OFDM QPSK | Edge_1RB_Left | |
| 2 | | QPSK | Outer_Full | CP-OFDM QPSK | Edge_1RB_Rig ht | |
| 3 | | QPSK | Outer_Full | CP-OFDM QPSK | Outer Full | |
| NOTE 1: The specific configuration of each RB allocation is defined in Table 6.1-1 in TS 38.521-1 [8]. | | | | | | |
| NOTE 2: Outer_Full defined as the transmission bandwidth configuration N_{RB} per channel bandwidth for the E-UTRA component as indicated in TS 36.521-1 [10] Table 5.4.2-1. | | | | | | |
| NOTE 3: If the UE supports multiple CC Combinations in the EN-DC Configuration with the same aggregated channel BW, only the combination with the highest NR BW is tested. | | | | | | |

1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [6] Annex A, Figure A.3.1.1.1 for SS diagram and clause A.3.2.1 for UE diagram.
2. The parameter settings for the cell are set up according to TS 38.508-1 [6] clause 4.4.3.
3. E-UTRA downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0 of TS 36.521-1 [10].
4. NR downlink signals are initially set up according to Annex C.0, C.1 and C.2, and uplink signals according to Annex G.0, G.1, G.2, G.3.0 of TS 38.521-1 [8].
5. The UL Reference Measurement channels are set according to TS 36.521-1 [10] Annex A.2 and TS 38.521-1 [8] Annex A.2 for E-UTRA CG and NR CG respectively.
6. For each EN-DC combination specified in Table 5.3B.1.3-1, channel spacing between NR and E-UTRA is specified according to clause 5.4B.1.
7. Propagation conditions are set according to TS 36.521-1 [10] Annex B and TS 38.521-1 [8] Annex B for E-UTRA link and NR link respectively.
8. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 6.5B.3.2.2.4.3.

6.5B.3.2.2.4.2 Test Procedure

1. E-UTRA SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.5B.3.2.2.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.
2. NR SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format [0_1] for C_RNTI to schedule the UL RMC according to Table 6.5B.3.2.2.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

3. Send continuously uplink power control "up" commands to the UE for both NR and E-UTRA carriers until the UE transmits at its P_{UMAX} level; allow at least 200 ms starting from the first TPC command in this step for the UE to reach P_{UMAX} level.
4. Measure the power of the transmitted signal with a measurement filter of bandwidths according to table 6.5B.3.2.2.3-1. The centre frequency of the filter shall be stepped in contiguous steps according to the same table. The measured power shall be recorded for each step. The measurement period shall capture the active time slots.

6.5B.3.2.2.4.3 Message Contents

Message contents are according to TS 38.508-1 [5] clause 4.6 and TS 38.508-1 [6] clause 4.6.1 with the following exceptions.

Table 6.5B.3.2.2.4.3-1: RRCCConnectionReconfiguration: nr-Config-r15.

| Derivation Path: TS 36.508 [11], Table 4.6.1-8 | | | |
|--|--------------|---------|--|
| Information Element | Value/remark | Comment | Condition |
| p-MaxEUTRA-r15 | 23 | | Power Class 2 UE AND simultaneous E-UTRA and NR transmission |
| | 20 | | Power Class 3 UE AND simultaneous E-UTRA and NR transmission |

Table 6.5B.3.2.2.4.3-2: PhysicalCellGroupConfig

| Derivation Path: TS 38.508-1 [6] Table 4.6.3-106 | | | |
|--|--------------|---------|--|
| Information Element | Value/remark | Comment | Condition |
| p-NR-FR1 | 23 | | Power Class 2 UE AND simultaneous E-UTRA and NR transmission |
| | 20 | | Power Class 3 UE AND simultaneous E-UTRA and NR transmission |

6.5B.3.2.2.5 Test Requirement

Test requirements for Spurious Emissions UE Co-existence for intra-band non-contiguous EN-DC are the same as the minimum requirements described in clause 6.5B.3.2.2.3 and are not repeated in this clause.

6.5B.3.3 Spurious Emissions for Inter-band EN-DC within FR1

6.5B.3.3.1 General spurious emissions for Inter-band EN-DC within FR1

6.5B.3.3.1.1 Test purpose

Same test purpose as in clause 6.5B.3.1.1.1.

6.5B.3.3.1.2 Test applicability

This test case applies to all types of NR UE release 15 and forward supporting inter-band EN-DC.

6.5B.3.3.1.3 Minimum conformance requirements

The general spurious emissions requirements specified in subclause 6.6.3.1 of TS 36.101 [5], subclause 6.5.3.1 of TS 38.101-1 [2] and TS 38.101-2 [3] apply for each component carrier. For the case of inter-band EN-DC with a single carrier per cell group, the general spurious emissions requirements also apply with both downlink carrier and both uplink carriers active. Limits on configured maximum output power for the uplink according to subclause 6.2B.4 apply.

NOTE: The general spurious emission requirements with both uplink carriers active are allowed to be verified for only a single inter-band EN-DC configuration per NR band. Furthermore, the requirements are allowed to be verified by measuring spurious emissions at the specific frequencies where second and third order intermodulation products generated by the two transmitted carriers can occur.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.5B.3.3.1. Exception requirements applicable for both NR or LTE, therefore LTE anchor agnostic approach is not applied

6.5B.3.3.1.4 Test description

6.5B.3.3.1.4.1 Initial condition

Same initial conditions as in clause 6.5B.3.1.2.4.1 with the following exceptions:

Table 6.5B.3.3.1.4.1-1: Test configuration table

| Initial Conditions | |
|--|--|
| Test EN-DC channel bandwidth as specified in TS 36.508 [6] clause 4.3.1 and TS 38.508-1 clause 4.3.1 | 5MHz for E-UTRA CC1 and Lowest for NR CC1, Highest for E-UTRA CC1 and Highest for NR CC1 |

and additional step 8 when both bands are TDD:

8. For both E-UTRA and NR UL uplink carriers active when both bands are TDD, ensure E-UTRA UL transmission overlaps with NR UL transmission in time by giving SCG a delay of 3 subframes, or by giving MCG a delay of 2 subframes.

6.5B.3.3.1.4.2 Test procedure

Same test procedure as in clause 6.5B.3.1.2.4.2 with the following exceptions in step 4:

- Instead of Table 6.5B.3.1.2.3.-1 -> use Table 6.5B.3.1.1.5-1.

Note: Measured spurious emissions at the specific frequencies of second and third order intermodulation products generated by the two transmitted carriers.

6.5B.3.3.1.4.3 Message Contents

Message contents are according to TS 36.508 [11] clause 4.6.1 and TS 38.508-1 [6] clause 4.6.1 with the following exceptions.

Table 6.5B.3.3.1.4.3-1: SystemInformationBlockType1: tdd-Config if E-UTRA on TDD band

| Derivation Path: TS 36.508 [11], Table 4.6.3-23 | | | |
|---|--------------|-----------------------|-----------|
| Information Element | Value/remark | Comment | Condition |
| TDD-Config-DEFAULT ::= SEQUENCE { | | Operating on TDD band | |
| subframeAssignment | Sa2 | | |
| specialSubframePatterns | Ssp7 | | |
| } | | | |

Table 6.5B.3.3.1.4.3-1a: RRCCConnectionReconfiguration: tdm-PatternConfig if E-UTRA on FDD band and UE does not support dynamic power sharing

| Derivation Path: TS 36.508 [11], Table 4.6.1-8 | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| tdm-PatternConfig-r15 CHOICE{ | | | |
| setup SEQUENCE { | | | |
| subframeAssignment-r15 | sa2 | | |
| harq-Offset-r15 | 0 | | |
| } | | | |
| } | | | |

Table 6.5B.3.3.1.4.3-2: RRCConnectionReconfiguration: nr-Config-r15

| Derivation Path: TS 36.508 [11], Table 4.6.1-8 | | | |
|--|--------------|---------|--|
| Information Element | Value/remark | Comment | Condition |
| p-MaxEUTRA-r15 | 23 | | Power Class 2 UE AND simultaneous E-UTRA and NR transmission |
| | 20 | | Power Class 3 UE AND simultaneous E-UTRA and NR transmission |

Table 6.5B.3.3.1.4.3-3: PhysicalCellGroupConfig

| Derivation Path: TS 38.508-1 [6] Table 4.6.3-106 | | | |
|--|--------------|---------|--|
| Information Element | Value/remark | Comment | Condition |
| p-NR-FR1 | 23 | | Power Class 2 UE AND simultaneous E-UTRA and NR transmission |
| | 20 | | Power Class 3 UE AND simultaneous E-UTRA and NR transmission |

6.5B.3.3.1.5 Test Requirement

Same test requirement as in clause 6.5B.3.1.1.5.

6.5B.3.3.2 Spurious emission band UE co-existence for Inter-band within FR1

Editor's note: The default and additional test configuration is analysed based on the assumption that only intermodulation products need to be tested.

6.5B.3.3.2.1 Test purpose

To verify that UE transmitter does not cause unacceptable interference to other channels or other systems in terms of transmitter spurious emissions for band UE co-existence for inter-band EN-DC.

6.5B.3.3.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward supporting inter-band EN-DC.

6.5B.3.3.2.3 Minimum conformance requirements

This clause specifies the requirements for the specified EN-DC, for coexistence with protected bands. The requirements in Table 6.5B.3.3.2-1 apply on each component carrier with all component carriers are active.

NOTE: For inter-band EN_DC with the uplink assigned to one LTE band and one NR band, the requirements in Table 6.5B.3.3.2.3-1 could be verified by measuring spurious emissions at the specific frequencies where second and third order intermodulation products generated by the two transmitted carriers can occur.

Table 6.5B.3.3.2.3-1: Spurious emission band UE co-existence limits Rel-15

| EN-DC Configuration | Spurious emission | | | | | |
|--|---|-----------------------|---|----------------------|-----------|------|
| | Protected band | Frequency range (MHz) | | Maximum Level (dBm) | MBW (MHz) | NOTE |
| DC_1_n28 | E-UTRA Band 5, 7, 8, 18, 19, 20, 26, 27, 31, 38, 40, 41, 72, 73 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | E-UTRA Band 1, 22, 32, 42, 43, 50, 51, 52, 65, 74, 75, 76 NR band n77, n78 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | E-UTRA band n3, n34 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | E-UTRA Band 11, 21 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | E-UTRA Band 1, 65 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | Frequency range | 470 | - | 694 | -42 | 8 |
| | Frequency range | 470 | - | 710 | -26.2 | 6 |
| | Frequency range | 758 | - | 773 | -32 | 1 |
| | Frequency range | 773 | - | 803 | -50 | 1 |
| | Frequency range | 662 | - | 694 | -26.2 | 6 |
| | Frequency range | 1880 | - | 1895 | -40 | 1 |
| | Frequency range | 1895 | - | 1915 | -15.5 | 5 |
| | Frequency range | 1915 | - | 1920 | +1.6 | 5 |
| | Frequency range | 1839.9 | - | 1879.9 | -50 | 1 |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 |
| DC_1_n40 | Band 1, 5, 7, 8, 20, 22, 26, 27, 28, 31, 32, 38, 41, 42, 43, 44, 45, 50, 51, 52, 65, 67, 68, 69, 72, 73, 74, 75, 76 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | Band 3, 34 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | Frequency range | 1880 | - | 1895 | -40 | 1 |
| | Frequency range | 1895 | - | 1915 | -15.5 | 5 |
| | Frequency range | 1915 | - | 1920 | +1.6 | 5 |
| DC_1_n51 | E-UTRA Band 7, 12, 13, 17, 20, 22, 27, 28, 29, 31, 38, 44, 48, 67, 68, 69, 72, 73 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | E-UTRA Band 3, 34 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | Frequency range | 1880 | - | 1895 | -40 | 1 |
| | Frequency range | 1895 | - | 1915 | -15.5 | 5 |
| | Frequency range | 1915 | - | 1920 | +1.6 | 5 |
| | E-UTRA Band 5, 6, 8, 26, 30, 40, 41, 42, 43, 46 NR Band n77, n78, n79, | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| DC_1_n77 | E-UTRA Band 1, 3, 5, 7, 8, 11, 18, 19, 20, 21, 26, 28, 34, 40, 41, 65, 74 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | Frequency range | 1880 | - | 1895 | -40 | 1 |
| | Frequency range | 1895 | - | 1915 | -15.5 | 5 |
| | Frequency range | 1915 | - | 1920 | +1.6 | 5 |
| | E-UTRA Band 1, 3, 5, 7, 8, 11, 18, 19, 20, 21, 26, 28, 34, 40, 41, 65, 74 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| DC_1_n78 DC_1_n84_uls UP-TDM_n78 | Frequency range | 1880 | - | 1895 | -40 | 1 |
| | Frequency range | 1895 | - | 1915 | -15.5 | 5 |
| | Frequency range | 1915 | - | 1920 | +1.6 | 5 |
| | E-UTRA Band 1, 3, 5, 7, 8, 11, 18, 19, 21, 26, 28, 34, 40, 41, 42, 65, 74 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | Frequency range | 1880 | - | 1895 | -40 | 1 |
| DC_1_n79 | Frequency range | 1895 | - | 1915 | -15.5 | 5 |
| | Frequency range | 1915 | - | 1920 | +1.6 | 5 |
| | E-UTRA Band 1, 3, 5, 7, 8, 11, 18, 19, 21, 26, 28, 34, 40, 41, 42, 65, 74 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | Frequency range | 1880 | - | 1895 | -40 | 1 |
| | Frequency range | 1895 | - | 1915 | -15.5 | 5 |
| DC_2_n5 | Frequency range | 1915 | - | 1920 | +1.6 | 5 |
| | E-UTRA Bands 4, 5, 12, 13, 14, 17, 24, 26, 28, 29, 30, 42, 48, 50, 51, 53, 66, 70, 71, n71, 74, 85 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | E-UTRA Bands 2, 25 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | E-UTRA Band 41, 43 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |

| | | | | | | | |
|---|--|---------------|---|----------------|-------|-----|---------|
| DC_2_n66 | E-UTRA Bands 4, 5, 10, 12, 13, 14, 17, 24, 26, 27, 28, 29, 30, 41, 50, 51, 66, 70, 71, n71, 74, 85 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | E-UTRA Bands 2, 25 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 5 |
| | E-UTRA Bands 42, 48 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |
| DC_2_n71 | E-UTRA Band 4, 5, 12, 13, 14, 17, 24, 26, 29, 30, 48, 66 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | E-UTRA Band 2, 25, 41, 70 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |
| | E-UTRA Band n71 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 5 |
| DC_2_n78 | E-UTRA Band 4, 5, 10, 12, 13, 14, 17, 24, 26, 27, 28, 29, 30, 41, 50, 51, 66, 70, 71, 74, 85 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | E-UTRA Band 2, 25 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |
| DC_3_n7 | E-UTRA Band 1, 5, 7, 8, 20, 26, 27, 28, 31, 32, 33, 34, 40, 43, 44, 50, 51, 65, 67, 72, 74, 75, 76 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | E-UTRA band 3 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 5 |
| | E-UTRA band 22, 42 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |
| | Frequency range | 2570 | - | 2575 | +1.6 | 5 | 5, 6, 7 |
| | Frequency range | 2575 | - | 2595 | -15.5 | 5 | 5, 6, 7 |
| DC_3_n28 | Frequency range | 2595 | - | 2620 | -40 | 1 | 5, 6 |
| | E-UTRA Band 1, 42, 43, 50, 51, 65, 74, 75, 76 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |
| | NR band n77, n78, n79 | | | | | | |
| | E-UTRA band 1 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 9, 11 |
| | E-UTRA band 3 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 5 |
| | E-UTRA Band 5, 7, 8, 18, 19, 20, 26, 27, 31, 34, 38, 40, 41, 72 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | E-UTRA Band 11, 21 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 9, 10 |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 13 |
| | Frequency range | 470 | - | 710 | -26.2 | 6 | 14 |
| | Frequency range | 758 | - | 773 | -32 | 1 | 5 |
| DC_3_n40 | Frequency range | 773 | - | 803 | -50 | 1 | |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 3, 9 |
| | E-UTRA Band 1, 5, 7, 8, 20, 26, 27, 28, 31, 32, 33, 34, 38, 39, 41, 43, 44, 45, 50, 51, 65, 67, 68, 69, 72, 73, 75, 76 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | E-UTRA Band 3 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 5 |
| DC_3_n51 | E-UTRA Band 22, 42, 52 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 3 |
| | E-UTRA Band 7, 8, 12, 13, 17, 20, 27, 28, 31, 33, 38, 48, 67, 68, 69, 72, 73 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| DC_3_n77 | E-UTRA Band 3 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 5 |
| | E-UTRA Band 1, 5, 6, 22, 26, 30, 34, 36, 40, 41, 42, 43, 44, 46, 65, 71 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 3 |
| DC_3_n78 DC_3_n80_ULS UP-TDM_n78 | E-UTRA Band 1, 3, 5, 7, 8, 11, 18, 19, 20, 21, 26, 28, 34, 39, 40, 41, 65, 74 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 3 |
| | E-UTRA Band 42 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |
| DC_3_n79 DC_3_n80_ULS UP-TDM_n79 | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 3 |
| | E-UTRA Band 1, 3, 5, 8, 11, 18, 19, 21, 28, 34, 39, 40, 41, 65, 74 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | E-UTRA Band 42 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |
| DC_3_n82 | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 3 |
| | E-UTRA Band 1, 3, 7, 8, 20, 22, 31, 32, 33, 34, 38, 40, 43, 50, 51, 65, 67, 68, 69, 72, 74, 75, 76 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | E-UTRA Band 42 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |
| DC_5_n40 | E-UTRA Band 1, 3, 5, 7, 8, 28, | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |

| | | | | | | |
|---|---|---------------------|---|----------------------|-------|-------|
| | 31, 34, 38, 42, 43, 45, 65, 73 | | | | | |
| | E-UTRA Band 26 | 859 | - | 869 | -27 | 1 |
| | E-UTRA Band 41, 52 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| DC_5_n66 | E-UTRA Band 1, 2, 3, 4, 5, 6, 7, 8, 10, 12, 13, 14, 17, 24, 25, 28, 29, 30, 34, 38, 40, 43, 45, 50, 51, 65, 66, 70, 71, 85 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | E-UTRA Band 26 | 859 | - | 869 | -27 | 1 |
| | E-UTRA Band 41, 42, 48, 52 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| DC_5_n78 | E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 10, 12, 13, 14, 17, 24, 25, 28, 29, 30, 31, 34, 38, 40, 45, 65, 66, 70 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | E-UTRA Band 26 | 859 | - | 869 | -27 | 1 |
| | E-UTRA Band 41 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| DC_7_n28 | E-UTRA Band 2, 3, 5, 7, 8, 20, 26, 27, 31, 34, 40, 72 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | E-UTRA Band 1, 4, 10, 42, 43, 50, 51, 65, 66, 74, 75, 76 NR band n78 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | E-UTRA band 1 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | Frequency range | 758 | - | 773 | -32 | 1 |
| | Frequency range | 773 | - | 803 | -50 | 1 |
| | Frequency range | 2570 | - | 2575 | +1.6 | 5 |
| | Frequency range | 2575 | - | 2595 | -15.5 | 5 |
| DC_7_n51 | E-UTRA Band 2, 3, 5, 8, 26, 30, 31, 32, 33, 34, 40, 48, 72 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | Frequency range | 2570 | - | 2575 | +1.6 | 5 |
| | Frequency range | 2575 | - | 2595 | -15.5 | 5 |
| | Frequency range | 2595 | - | 2620 | -40 | 1 |
| | E-UTRA Band 1, 4, 10, 12, 13, 14, 17, 20, 22, 23, 27, 28, 29, 42, 43, 44, 46, 65, 66, 67, 68 NR Band n77, n78, n79, | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | Frequency range | 2595 | - | 2620 | -40 | 2 |
| | Frequency range | 2595 | - | 2620 | -40 | 1 |
| DC_7_n78 | E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 10, 11, 18, 19, 20, 21, 26, 27, 28, 31, 32, 33, 34, 38, 39, 40, 50, 51, 65, 66, 67, 68, 72, 74, 75, 76 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | Frequency range | 2570 | - | 2575 | +1.6 | 5 |
| | Frequency range | 2575 | - | 2595 | -15.5 | 5 |
| | Frequency range | 2595 | - | 2620 | -40 | 1 |
| | Frequency range | 2595 | - | 2620 | -40 | 5, 6 |
| DC_8_n40 | E-UTRA Band 1, 20, 28, 31, 32, 33, 34, 38, 39, 40, 45, 50, 51, 65, 67, 68, 69, 72, 73, 74, 75, 76 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | E-UTRA Band 3, 7, 22, 41, 42, 43, 52 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | E-UTRA Band 8 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| DC_8_n77 | E-UTRA Band 1, 20, 28, 31, 32, 33, 34, 38, 39, 40, 44, 45, 50, 51, 65, 67, 68, 69, 72, 73, 74, 75, 76 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | E-UTRA band 3, 7, 41 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | E-UTRA Band 8 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | E-UTRA Band 11, 21 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | Frequency range | 860 | - | 890 | -40 | 1 |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 3, 12 |
| DC_8_n78 DC_8_n81_ULS UP-TDM_n78 | E-UTRA Band 1, 20, 28, 34, 39, 40, 65 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | E-UTRA Band 3, 7, 41 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | E-UTRA Band 8 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | E-UTRA Band 11, 21 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | Frequency range | 860 | - | 890 | -40 | 1 |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 5, 12 |
| DC_8_n79 | E-UTRA Band 1, 8, 28, 34, 39, 40, 65, 74 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| DC_8_n81_ULS | | | | | | |

| | | | | | | | |
|------------|---|---------------|---|----------------|-----|-----|-------|
| UP-TDM_n79 | E-UTRA Band 3,41,42 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |
| | E-UTRA Band 11, 21 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 12 |
| | Frequency range | 860 | - | 890 | -40 | 1 | 5, 12 |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 3 |
| DC_11_n77 | E-UTRA Band 1, 3, 18, 19, 28, 34, 65 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | Frequency range | 945 | - | 960 | -50 | 1 | |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 3 |
| | Frequency range | 2545 | - | 2575 | -50 | 1 | |
| | Frequency range | 2595 | - | 2645 | -50 | 1 | |
| DC_11_n78 | E-UTRA Band 1, 3, 18, 19, 28, 34, 65 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | Frequency range | 945 | - | 960 | -50 | 1 | |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 3 |
| | Frequency range | 2545 | - | 2575 | -50 | 1 | |
| | Frequency range | 2595 | - | 2645 | -50 | 1 | |
| DC_11_n79 | E-UTRA Band 1, 3, 18, 19, 28, 34, 42, 65 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | Frequency range | 945 | - | 960 | -50 | 1 | |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 3 |
| | Frequency range | 2545 | - | 2575 | -50 | 1 | |
| | Frequency range | 2595 | - | 2645 | -50 | 1 | |
| DC_12_n5 | E-UTRA Band 2, 5, 12, 13, 14, 17, 24, 25, 26, 30, 42, 43 50, 51, 71, 74 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | E-UTRA Band 4, 10, 41, 48, 66, 70 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |
| | E-UTRA Band 12, 85 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| DC_12_n66 | E-UTRA Band 2, 5, 13, 14, 17, 25, 26, 27, 30, 41, 71, 74 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | E-UTRA Bands 4, 10, 48, 50, 51, 66, 70 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |
| | E-UTRA Band 12, 85 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 5 |
| | | | | | | | |
| DC_18_n77 | E-UTRA Band 1, 3, 11, 21, 28, 34, 65, 74 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | Frequency range | 945 | - | 960 | -50 | 1 | |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 3 |
| | Frequency range | 2545 | - | 2575 | -50 | 1 | |
| | Frequency range | 2595 | - | 2645 | -50 | 1 | |
| DC_18_n78 | E-UTRA Band 1, 3, 11, 21, 28, 34, 65, 74 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | Frequency range | 945 | - | 960 | -50 | 1 | |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 3 |
| | Frequency range | 2545 | - | 2575 | -50 | 1 | |
| | Frequency range | 2595 | - | 2645 | -50 | 1 | |
| DC_18_n79 | E-UTRA Band 1, 3, 11, 21, 28, 34, 42, 65, 74 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | Frequency range | 945 | - | 960 | -50 | 1 | |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 3 |
| | Frequency range | 2545 | - | 2575 | -50 | 1 | |
| | Frequency range | 2595 | - | 2645 | -50 | 1 | |
| DC_19_n77 | E-UTRA Band 1, 3, 11, 21, 28, 34, 65, 74 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | Frequency range | 945 | - | 960 | -50 | 1 | |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 3 |
| | Frequency range | 2545 | - | 2575 | -50 | 1 | |
| | Frequency range | 2595 | - | 2645 | -50 | 1 | |
| DC_19_n78 | E-UTRA Band 1, 3, 11, 21, 28, 34, 65, 74 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | Frequency range | 945 | - | 960 | -50 | 1 | |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 3 |
| | Frequency range | 2545 | - | 2575 | -50 | 1 | |
| | Frequency range | 2595 | - | 2645 | -50 | 1 | |
| DC_19_n79 | E-UTRA Band 1, 3, 11, 21, 28, 34, 42, 65, 74 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |

| | | | | | | | |
|---------------------|--|---------------|---|----------------|-----|-----|---|
| | Frequency range | 945 | - | 960 | -50 | 1 | |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 3 |
| | Frequency range | 2545 | - | 2575 | -50 | 1 | |
| | Frequency range | 2595 | - | 2645 | -50 | 1 | |
| DC_20_n8 | E-UTRA Band 1, 3, 7, 22, 28, 31, 32, 34, 38, 42, 43, 65, 75, 76, NR band n78 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| DC_20_n28 | E-UTRA Band 1, 3, 7, 8, 22, 31, 32, 34, 38, 42, 43, 65, 75, 76 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| DC_20_n83 | E-UTRA Band 1, 3, 4, 8, 17, 22, 28, 29, 31, 40, 43, 48, 65, 66, 68, 72 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| DC_20_n51 | E-UTRA Band 20 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 5 |
| | Frequency range | 758 | - | 788 | -50 | 1 | |
| | E-UTRA Band 2, 7, 25, 32, 33, 34, 35, 36, 37, 38, 39, 41, 42, 46, 69, 70 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |
| | NR Band n77, n78, n79, | | | | | | |
| DC_20_n77 | E-UTRA Band 1, 3, 7, 8, 31, 32, 33, 34, 40, 50, 51, 65, 67, 68, 72, 74, 75, 76 | | | | | | |
| | E-UTRA Band 20 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 5 |
| | E-UTRA Band 38, 69 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |
| DC_20_n78 | E-UTRA Band 1, 3, 7, 8, 31, 32, 33, 34, 40, 50, 51, 65, 67, 68, 72, 74, 75, 76 | | | | | | |
| DC_20_n82_UL | E-UTRA Band 20 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 5 |
| SUP-TDM_n78 | E-UTRA Band 38, 69 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |
| DC_21_n77 | E-UTRA Band 1, 3, 18, 19, 21, 28, 34, 65 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | Frequency range | 945 | - | 960 | -50 | 1 | |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 3 |
| | Frequency range | 2545 | - | 2575 | -50 | 1 | |
| | Frequency range | 2595 | - | 2645 | -50 | 1 | |
| DC_21_n78 | E-UTRA Band 1, 3, 18, 19, 21, 28, 34, 65 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | Frequency range | 945 | - | 960 | -50 | 1 | |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 3 |
| | Frequency range | 2545 | - | 2575 | -50 | 1 | |
| | Frequency range | 2595 | - | 2645 | -50 | 1 | |
| DC_21_n79 | E-UTRA Band 1, 3, 18, 19, 21, 28, 34, 42, 65 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | Frequency range | 945 | - | 960 | -50 | 1 | |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 3 |
| | Frequency range | 2545 | - | 2575 | -50 | 1 | |
| | Frequency range | 2595 | - | 2645 | -50 | 1 | |
| DC_25_n41 | E-UTRA band 4, 5, 10, 12, 13, 14, 17, 24, 26, 27, 28, 29, 30, 42, 45, 48, 66, 70, 71 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | E-UTRA/NR Band 2, 25 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 5 |
| DC_26_n41 | E-UTRA/NR Band 1, 2, 3, 4, 5, 10, 11, 12, 13, 14, 17, 18, 19, 21, 24, 25, 26, 29, 30, 31, 34, 39, 42, 43, 48, 50, 51, 65, 66, 70, 71, 74 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 3 |
| | Frequency range | 703 | - | 799 | -50 | 1 | |
| | Frequency range | 799 | - | 803 | -40 | 1 | 5 |
| | Frequency range | 945 | - | 960 | -50 | 1 | |
| DC_26_n77 | E-UTRA Band 1, 3, 5, 11, 18, 19, 21, 26, 34, 39, 40, 41, 65, 74 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | Frequency range | 703 | - | 799 | -50 | 1 | |
| | Frequency range | 799 | - | 803 | -40 | 1 | 5 |
| | Frequency range | 945 | - | 960 | -50 | 1 | |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 3 |
| | Frequency range | 2545 | - | 2575 | -50 | 1 | |

| | | | | | | | |
|--|---|---------------------|---|----------------------|-------|-----|----------|
| | Frequency range | 2595 | - | 2645 | -50 | 1 | |
| DC_26_n78 | E-UTRA Band 1, 3, 5, 11, 18, 19, 21, 26, 34, 39, 40, 41, 65, 74 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | |
| | Frequency range | 703 | - | 799 | -50 | 1 | |
| | Frequency range | 799 | - | 803 | -40 | 1 | 5 |
| | Frequency range | 945 | - | 960 | -50 | 1 | |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 3 |
| | Frequency range | 2545 | - | 2575 | -50 | 1 | |
| | Frequency range | 2595 | - | 2645 | -50 | 1 | |
| DC_26_n79 | E-UTRA Band 1, 3, 5, 11, 18, 19, 21, 26, 34, 39, 40, 41, 42, 65, 79 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | |
| | Frequency range | 703 | - | 799 | -50 | 1 | |
| | Frequency range | 799 | - | 803 | -40 | 1 | 5 |
| | Frequency range | 945 | - | 960 | -50 | 1 | |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 3 |
| | Frequency range | 2545 | - | 2575 | -50 | 1 | |
| | Frequency range | 2595 | - | 2645 | -50 | 1 | |
| DC_28_n51 | E-UTRA Band 2, 3, 5, 7, 8, 25, 26, 31, 34, 38, 40, 41, 66, 72 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | |
| | E-UTRA Band 4, 10, 20, 22, 24, 32, 42, 43, 45, 46, 65, 66, 71, 73 NR band n78, n79 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | 2 |
| | E-UTRA Band 1 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | 2, 9, 10 |
| | Frequency range | 470 | - | 694 | -42 | 8 | 5, 17 |
| | Frequency range | 470 | - | 710 | -26.2 | 6 | 14 |
| | Frequency range | 662 | - | 694 | -26.2 | 6 | 5 |
| | Frequency range | 758 | - | 773 | -32 | 1 | 5 |
| | Frequency range | 773 | - | 803 | -50 | 1 | |
| DC_28_n77 | E-UTRA Band 3, 5, 7, 8, 18, 19, 20, 26, 34, 39, 40, 41, 74 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | |
| | E-UTRA Band 1, 65 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | 2 |
| | E-UTRA Band 1 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | 9, 10 |
| | E-UTRA Band 11, 21 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | 9, 11 |
| | Frequency range | 758 | - | 773 | -32 | 1 | |
| | Frequency range | 773 | - | 803 | -50 | 1 | |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 3 |
| DC_28_n78 DC_28_n83_UL SUP-TDM_n78 | E-UTRA Band 3, 5, 7, 8, 18, 19, 20, 26, 34, 39, 40, 41 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | |
| | E-UTRA Band 1, 65 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | 2 |
| | E-UTRA Band 1 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | 9, 11 |
| | E-UTRA Band 11, 21 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | 9, 10 |
| | Frequency range | 758 | - | 773 | -32 | 1 | |
| | Frequency range | 773 | - | 803 | -50 | 1 | |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 3, 9 |
| DC_28_n79 | E-UTRA Band 3, 5, 8, 18, 19, 34, 39, 40, 41, 42 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | |
| | E-UTRA Band 1, 65, 74 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | 2 |
| | E-UTRA Band 1 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | 9, 11 |
| | E-UTRA Band 11, 21 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | 9, 10 |
| | Frequency range | 758 | - | 773 | -32 | 1 | |
| | Frequency range | 773 | - | 803 | -50 | 1 | |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 3, 9 |
| DC_30_n5 | E-UTRA Band 2, 4, 5, 7, 12, 13, 14, 17, 24, 25, 26, 29, 30, 38, 48, 66, 70, 71, 85 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | |
| | E-UTRA Band 41 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | 2 |
| DC_30_n66 | E-UTRA Band 2, 4, 5, 10, 12, 13, 14, 17, 24, 25, 26, 27, 29, 30, 38, 41, 66, 70, 71 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | |
| | Band 48 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | 2 |
| DC_38_n78 | | | | N/A | | | |
| DC_39_n78 | E-UTRA Band 1, 8, 34, 40, 41, 44, 45 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | |
| | Frequency range | 1805 | - | 1855 | -40 | 1 | 18 |
| | Frequency range | 1855 | - | 1880 | -15.5 | 5 | 18 |
| DC_39_n79 | E-UTRA Band 1, 8, 34, 40, 41, | F _{DL_low} | - | F _{DL_high} | -50 | 1 | |

| | | | | | | | |
|--|--|---------------|---|----------------|-------|-----|----|
| | 44, 45 | | | | | | |
| | Frequency range | 1805 | - | 1855 | -40 | 1 | 18 |
| | Frequency range | 1855 | - | 1880 | -15.5 | 5 | 18 |
| DC_40_n77 | N/A | | | | | | |
| DC_41_n77 | E-UTRA Band 1, 3, 5, 8, 11, 18, 19, 21, 26, 28, 33, 34, 39, 40, 44, 45, 73, 74 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | Frequency range | 1884.5 | | 1915.7 | -41 | 0.3 | 3 |
| DC_41_n78 | E-UTRA Band 1, 3, 5, 8, 11, 18, 19, 21, 26, 28, 34, 39, 40, 44, 45, 74 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | Frequency range | 1884.5 | | 1915.7 | -41 | 0.3 | 3 |
| DC_41_n79 | E-UTRA Band 1, 3, 5, 8, 11, 18, 19, 21, 26, 28, 34, 39, 40, 42, 44, 45, 65, 74 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 3 |
| DC_42_n51 | E-UTRA Band 3, 8, 20, 25, 30, 31, 34, 39, 41, 73 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | E-UTRA Band 1, 2, 4, 5, 6, 7, 10, 12, 13, 14, 17, 23, 24, 26, 27, 28, 29, 32, 38, 40, 44, 46, 65, 66, 67, 68, 70, 71 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |
| DC_42_n77 | N/A | | | | | | |
| DC_42_n78 | N/A | | | | | | |
| DC_42_n79 | N/A | | | | | | |
| DC_66_n5 | E-UTRA Band 1, 2, 3, 4, 5, 6, 7, 8, 10, 12, 13, 14, 17, 24, 25, 26, 28, 29, 30, 34, 38, 40, 43, 45, 50, 51, 65, 66, 70, 71, 85 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | E-UTRA Band 41, 42, 48, 52 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| DC_66_n71 | E-UTRA Band 4, 5, 7, 10, 13, 14, 17, 22, 24, 26, 27, 29, 30, 43, 50, 51, 66, 74 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | E-UTRA Band 2, 25, 41, 42, 48, 70 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |
| | E-UTRA Band 71 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 5 |
| DC_66_n78, DC_66_n86_UL SUP-TDM_n78 | E-UTRA Band 1, 3, 5, 7, 8, 20, 26, 28, 34, 39, 40, 41, 65 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

- NOTE 1: FDL_low and FDL_high refer to each E-UTRA frequency band specified in Table 5.2-1 of TS 36.121-1 [10].
- NOTE 2: As exceptions, measurements with a level up to the applicable requirements defined in Table 6.5B.3.1.1-5-1 are permitted for each assigned E-UTRA carrier used in the measurement due to 2nd, 3rd, 4th or 5th harmonic spurious emissions. Due to spreading of the harmonic emission the exception is also allowed for the first 1 MHz frequency range immediately outside the harmonic emission on both sides of the harmonic emission. This results in an overall exception interval centred at the harmonic emission of $(2\text{MHz} + N \times L_{\text{CRB}} \times 180\text{kHz})$, where N is 2, 3, 4, 5 for the 2nd, 3rd, 4th or 5th harmonic respectively. The exception is allowed if the measurement bandwidth (MBW) totally or partially overlaps the overall exception interval.
- NOTE 3: Applicable when co-existence with PHS system operating in 1884.5 -1915.7MHz.
- NOTE 4: Void.
- NOTE 5: These requirements also apply for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.5.3.1-1 and Table 6.5A.3.1-1 of TS 38.101-1 [2] from the edge of the channel bandwidth.
- NOTE 6: This requirement is applicable for any channel bandwidths within the range 2500 - 2570 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 2560.5 - 2562.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 2552 - 2560 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB.
- NOTE 7: For these adjacent bands, the emission limit could imply risk of harmful interference to UE(s) operating in the protected operating band.
- NOTE 8: This requirement is applicable for any channel bandwidths within the range 1920 - 1980 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 1927.5 - 1929.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 1930 - 1938 MHz the requirement is applicable only for an uplink
- NOTE 9: Applicable when the assigned E-UTRA carrier is confined within 718 MHz and 748 MHz and when the channel bandwidth used is 5 or 10 MHz.
- NOTE 10: As exceptions, measurements with a level up to the applicable requirement of -36 dBm/MHz is permitted for each assigned E-UTRA carrier used in the measurement due to 2nd harmonic spurious emissions. An exception is allowed if there is at least one individual RB within the transmission bandwidth (see Figure 5.6-1) for which the 2nd harmonic totally or partially overlaps the measurement bandwidth (MBW).
- NOTE 11: As exceptions, measurements with a level up to the applicable requirement of -38 dBm/MHz is permitted for each assigned E-UTRA carrier used in the measurement due to 3rd harmonic spurious emissions. An exception is allowed if there is at least one individual RB within the transmission bandwidth (see Figure 5.6-1) for which the 3rd harmonic totally or partially overlaps the measurement bandwidth (MBW).
- NOTE 12: This requirement is applicable only for the following cases: - for carriers of 5 MHz channel bandwidth when carrier centre frequency (F_c) is within the range $902.5 \text{ MHz} \leq F_c < 907.5 \text{ MHz}$ with an uplink transmission bandwidth less than or equal to 20 RB - for carriers of 5 MHz channel bandwidth when carrier centre frequency (F_c) is within the range $907.5 \text{ MHz} \leq F_c \leq 912.5 \text{ MHz}$ without any restriction on uplink transmission bandwidth. - for carriers of 10 MHz channel bandwidth when carrier centre frequency (F_c) is $F_c = 910 \text{ MHz}$ with an uplink transmission bandwidth less than or equal to 32 RB with $\text{RBstart} > 3$.
- NOTE 13: Void.
- NOTE 14: This requirement is applicable for 5 and 10 MHz E-UTRA channel bandwidth allocated within 718-728MHz. For carriers of 10 MHz bandwidth, this requirement applies for an uplink transmission bandwidth less than or equal to 30 RB with $\text{RBstart} > 1$ and $\text{RBstart}<48$.
- NOTE 15: Void.
- NOTE 16: This requirement is applicable for any channel bandwidths within the range 1920 - 1980 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 1927.5 - 1929.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 1930 - 1938 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB.
- NOTE 17: This requirement is applicable in the case of a 10 MHz E-UTRA carrier confined within 703 MHz and 733 MHz, otherwise the requirement of -25 dBm with a measurement bandwidth of 8 MHz applies.
- NOTE 18: This requirement is only applicable for E-UTRA carriers with bandwidth confined within 1885-1920 MHz (requirement for carriers with at least 1RB confined within 1880 - 1885 MHz is not specified). This requirement applies for an uplink transmission bandwidth less than or equal to 54 RB for E-UTRA carriers of 15 MHz bandwidth when carrier centre frequency is within the range 1892.5 - 1894.5 MHz and for E-UTRA carriers of 20 MHz bandwidth when carrier centre frequency is within the range 1895 - 1903 MHz.
- NOTE 19: Void.

Table 6.5B.3.3.2.3-2: Spurious emission band UE co-existence limits Rel-16

| EN-DC Configuration | Spurious emission | | | | | |
|---------------------|---|-----------------------|---|---------------------|-----------|------|
| | Protected band | Frequency range (MHz) | | Maximum Level (dBm) | MBW (MHz) | NOTE |
| DC_1_n3 | E-UTRA Band 1, 5, 7, 8, 11, 18, 19, 20, 21, 26, 27, 28, 31, 32, 38, 40, 41, 43, 44, 50, 51, 65, 67, 72, 73, 74, 75, 76 NR Band n79 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | E-UTRA band 3, 34 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | E-UTRA band 22, 42, 52 NR Band n77, n78 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 |
| | Frequency range | 1880 | | 1895 | -40 | 1 |
| | Frequency range | 1895 | | 1915 | -15.5 | 5 |
| | Frequency range | 1915 | | 1920 | +1.6 | 5 |
| DC_1_n5 | E-UTRA Band 1, 5, 7, 8, 11, 18, 19, 21, 22, 28, 31, 38, 40, 42, 43, 50, 51, 65, 73, 74 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | E-UTRA band 3,34 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | E-UTRA band 41, 52 NR Band n77, n78, n79 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| DC_1_n7 | E-UTRA Band 1, 5, 7, 8, 20, 22, 26, 27, 28, 31,32, 40, 42, 43, 50, 51, 52, 65, 67, 72, 74, 75, 76 NR Band n78, n79 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | band n77 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | band 3, 34 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | Frequency range | 1880 | - | 1895 | -40 | 1 |
| | Frequency range | 1895 | - | 1915 | -15.5 | 5 |
| | Frequency range | 1915 | - | 1920 | +1.6 | 5 |
| | Frequency range | 2570 | - | 2575 | +1.6 | 5 |
| | Frequency range | 2575 | - | 2595 | -15.5 | 5 |
| | Frequency range | 2595 | - | 2620 | -40 | 1 |
| DC_1_n28 | E-UTRA Band 5, 7, 8, 18, 19, 20, 26, 27, 31, 38, 40, 41, 72, 73 NR band n79 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | E-UTRA Band 1, 22, 32, 42, 43, 50, 51, 52, 65, 74, 75, 76 NR band n77, n78 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | E-UTRA band 3, 34 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | E-UTRA Band 11, 21 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | E-UTRA Band 1, 65 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | Frequency range | 470 | - | 694 | -42 | 8 |
| | Frequency range | 470 | - | 710 | -26.2 | 6 |
| | Frequency range | 758 | - | 773 | -32 | 1 |
| | Frequency range | 773 | - | 803 | -50 | 1 |
| | Frequency range | 662 | - | 694 | -26.2 | 6 |
| | Frequency range | 1880 | - | 1895 | -40 | 1 |
| | Frequency range | 1895 | - | 1915 | -15.5 | 5 |
| DC_1_n38 | E-UTRA Band 1, 3, 5, 8, 20, 22, 27, 28, 31, 32, 34, 40, 42, 43, 50, 51, 65, 67, 68, 72, 74, 75, 76 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | E-UTRA Band 1, 5, 7, 8, 20, 22, 26, 27, 28, 31, 32, 38, 40, 41, 42, 43, 44, 45, 50, 51, 52, 65, 67, 68, 69, 72, 73, 74, 75, 76 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| DC_1_n40 | Band 3, 34 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | Frequency range | 1880 | | 1895 | -40 | 1 |
| | Frequency range | 1895 | | 1915 | -15.5 | 5 |
| | Frequency range | 1915 | | 1920 | +1.6 | 5 |
| DC_1_n51 | E-UTRA Band 7, 12, 13, 17, 20, 22, 27, 28, 29, 31, 38, 44, 48, 67, 68, 69, 72, 73 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |

| | | | | | | | |
|--|---|---------------|---|----------------|-------|---|----------|
| | E-UTRA Band 3, 34 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 5, 2 |
| | Frequency range | 1880 | - | 1895 | -40 | 1 | 5, 16 |
| | Frequency range | 1895 | - | 1915 | -15.5 | 5 | 5, 7, 16 |
| | Frequency range | 1915 | - | 1920 | +1.6 | 5 | 5, 7, 16 |
| | E-UTRA Band 5, 6, 8, 26, 30, 40, 41, 42, 43, 46 NR Band n77, n78, n79, | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |
| DC_1_n77 DC_1_n84_ULS UP-TDM_n77 | E-UTRA Band 1, 3, 5, 7, 8, 11, 18, 19, 20, 21, 26, 28, 34, 40, 41, 65, 74 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | Frequency range | 1880 | - | 1895 | -40 | 1 | 5, 8 |
| | Frequency range | 1895 | - | 1915 | -15.5 | 5 | 5, 7, 8 |
| | Frequency range | 1915 | - | 1920 | +1.6 | 5 | 5, 7, 8 |
| DC_1_n78 DC_1_n84_ULS UP-TDM_n78 | E-UTRA Band 1, 3, 5, 7, 8, 11, 18, 19, 20, 21, 26, 28, 34, 40, 41, 65, 74 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | Frequency range | 1880 | - | 1895 | -40 | 1 | 5, 8 |
| | Frequency range | 1895 | - | 1915 | -15.5 | 5 | 5, 7, 8 |
| | Frequency range | 1915 | - | 1920 | +1.6 | 5 | 5, 7, 8 |
| DC_1_n79 DC_1_n84_ULS UP-TDM_n79 | E-UTRA Band 1, 3, 5, 7, 8, 11, 18, 19, 21, 26, 28, 34, 40, 41, 42, 65, 74 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | Frequency range | 1880 | - | 1895 | -40 | 1 | 5, 8 |
| | Frequency range | 1895 | - | 1915 | -15.5 | 5 | 5, 7, 8 |
| | Frequency range | 1915 | - | 1920 | +1.6 | 5 | 5, 7, 8 |
| DC_1_n80 | E-UTRA Band 1, 5, 7, 8, 11, 18, 19, 20, 21, 26, 27, 28, 31, 32, 38, 40, 41, 43, 44, 45, 50, 51, 65, 67, 68, 69, 72, 73, 74, 75, 76, NR Band n79 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | E-UTRA Band 3, 34 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 5 |
| | E-UTRA Band 22, 42, NR Band n77, n78 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |
| | | | | | | | |
| DC_2_n5 | E-UTRA Bands 4, 5, 12, 13, 14, 17, 24, 26, 28, 29, 30, 42, 48, 50, 51, 53, 66, 70, 71, n71, 74, 85 NR Band n77 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | NR Band n77 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2, 5 |
| | E-UTRA Bands 2, 25 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 5 |
| | E-UTRA Band 41, 43 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |
| DC_2_n41 | E-UTRA Band 4, 5, 10, 12, 13, 14, 17, 24, 26, 27, 28, 29, 30, 42, 48, 50, 51, 66, 70, 71, 74, 85 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | E-UTRA Bands 2, 25 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 5 |
| | E-UTRA Band 43 NR Band n77 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |
| DC_2_n66 | E-UTRA Bands 4, 5, 10, 12, 13, 14, 17, 24, 26, 27, 28, 29, 30, 41, 50, 51, 66, 70, 71, n71, 74, 85 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | E-UTRA Bands 2, 25 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 5 |
| | E-UTRA Bands 42, 48 NR Band n77 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |
| DC_2_n71 | E-UTRA Band 4, 5, 12, 13, 14, 17, 24, 26, 29, 30, 48, 66 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | E-UTRA Band 2, 25, 41, 70 NR Band n77 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |
| | E-UTRA Band n71 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 5 |
| DC_2_n78 | E-UTRA Band 4, 5, 10, 12, 13, 14, 17, 24, 26, 27, 28, 29, 30, 41, 50, 51, 66, 70, 71, 74, 85 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | E-UTRA Band 2, 25 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |
| DC_3_n1 | E-UTRA Band 1, 5, 7, 8, 11, 18, 19, 20, 21, 26, 27, 28, 31, 32, 38, 40, 41, 43, 44, 50, 51, 65, 67, 72, 73, 74, 75, 76 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |

| | | | | | | | |
|---|--|---------------------|---|----------------------|-------|-----|----------|
| | NR Band n79 | | | | | | |
| | E-UTRA band 3, 34 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | 5 |
| | E-UTRA band 22, 42, 52 NR Band n77, n78 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | 2 |
| | Frequency range | 1880 | | 1895 | -40 | 1 | 5, 17 |
| | Frequency range | 1895 | | 1915 | -15.5 | 5 | 5, 7, 17 |
| | Frequency range | 1915 | | 1920 | +1.6 | 5 | 5, 7, 17 |
| DC_3_n5 | E-UTRA Band 1, 5, 7, 8, 11, 18, 19, 21, 22, 28, 31, 38, 40, 42, 43, 50, 51, 65, 73, 74 NR Band n79 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | |
| | E-UTRA band 3,34 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | 5 |
| | E-UTRA Band 52 Band n77, n78 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | 2 |
| | Frequency range | 1884.5 | | 1915.7 | -41 | 0.3 | 3 |
| DC_3_n7 | E-UTRA Band 1, 5, 7, 8, 20, 26, 27, 28, 31, 32, 33, 34, 40, 43, 44, 50, 51, 65, 67, 72, 74, 75, 76 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | |
| | E-UTRA band 3 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | 5 |
| | E-UTRA band 22, 42 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | 2 |
| | Frequency range | 2570 | - | 2575 | +1.6 | 5 | 5, 6, 7 |
| | Frequency range | 2575 | - | 2595 | -15.5 | 5 | 5, 6, 7 |
| | Frequency range | 2595 | - | 2620 | -40 | 1 | 5, 6 |
| DC_3_n28 | E-UTRA Band 1, 42, 43, 50, 51, 65, 74, 75, 76 NR band n77, n78, n79 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | 2 |
| | E-UTRA band 1 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | 9, 11 |
| | E-UTRA band 3 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | 5 |
| | E-UTRA Band 5, 7, 8, 18, 19, 20, 26, 27, 31, 34, 38, 40, 41, 72 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | |
| | E-UTRA Band 11, 21 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | 9, 10 |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 13 |
| | Frequency range | 470 | - | 710 | -26.2 | 6 | 14 |
| | Frequency range | 758 | - | 773 | -32 | 1 | 5 |
| | Frequency range | 773 | - | 803 | -50 | 1 | |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 3, 9 |
| DC_3_n38 | E-UTRA Band 1, 5, 8, 20, 27, 28, 31, 32, 33, 34, 40, 42, 43, 50, 51, 65, 67, 68, 72, 74, 75, 76 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | |
| | E-UTRA Band 22, 42 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | 2 |
| DC_3_n40 | E-UTRA Band 1, 5, 7, 8, 20, 26, 27, 28, 31, 32, 33, 34, 38, 39, 41, 43, 44, 45, 50, 51, 65, 67, 68, 69, 72, 73, 75, 76 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | |
| | E-UTRA Band 3 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | 5 |
| | E-UTRA Band 22, 42, 52 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | 2 |
| DC_3_n41, DC_3_n80_ULS UP-TDM_n41 | E-UTRA Band 1, 5, 8, 11, 18, 19, 21, 26, 27, 28, 34, 39, 40, 44, 45, 50, 51, 65, 73, 74 E-UTRA Band 42, 52 NR Band n77, n78, n79 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 3 |
| DC_3_n51 | E-UTRA Band 7, 8, 12, 13, 17, 20, 27, 28, 31, 33, 38, 48, 67, 68, 69, 72, 73 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | |
| | E-UTRA Band 3 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | 5 |
| | E-UTRA Band 1, 5, 6, 22, 26, 30, 34, 36, 40, 41, 42, 43, 44, 46, 65, 71 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | 2 |
| DC_3_n77 DC_3_n80_ULS UP-TDM_n77 | E-UTRA Band 1, 3, 5, 7, 8, 11, 18, 19, 20, 21, 26, 28, 34, 39, 40, 41, 65, 74 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 3 |
| DC_3_n78 DC_3_n80_ULS UP-TDM_n78 | E-UTRA Band 1, 3, 5, 7, 8, 11, 18, 19, 20, 21, 26, 28, 34, 39, 40, 41, 65, 74 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 3 |

| | | | | | | | |
|--------------|---|---------------|---|----------------|-------|-----|----------|
| DC_3_n79 | E-UTRA Band 1, 3, 5, 8, 11, 18, 19, 21, 28, 34, 39, 40, 41, 65, 74 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| DC_3_n80_ULS | E-UTRA Band 42 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |
| UP-TDM_n79 | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 3 |
| DC_3_n82 | E-UTRA Band 1, 3 7, 8, 20, 22, 31, 32, 33, 34, 38, 40, 43, 50, 51, 65, 67, 68, 69, 72, 74, 75, 76 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | E-UTRA Band 42 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |
| DC_3_n84 | E-UTRA Band 1, 5, 7, 8, 11, 18, 19, 20, 21, 26, 27, 28, 31, 32, 38, 40, 41, 43, 44, 45, 50, 51, 65, 67, 68, 69, 72, 73, 74, 75, 76 NR Band n79 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | E-UTRA Band 3 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 5 |
| | NR Band n77, n78 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |
| DC_5_n2 | E-UTRA Band 4, 5, 10, 12, 13, 14, 17, 24, 28, 29, 30, 42, 50, 51, 53, 66, 70, 71, 74, 85 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | E-UTRA Band 25 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 5 |
| | NR Band n2 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 5 |
| | E-UTRA Band 26 | 859 | - | 869 | -27 | 1 | |
| | E-UTRA Band 41, 43 NR Band n77 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |
| DC_5_n40 | E-UTRA Band 1, 3, 5, 7, 8, 28, 31, 34, 38, 42, 43, 45, 65, 73 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | E-UTRA Band 26 | 859 | - | 869 | -27 | 1 | |
| | E-UTRA Band 41, 52 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| DC_5_n66 | E-UTRA Band 1, 2, 3, 4, 5, 6, 7, 8, 10, 12, 13, 14, 17, 24, 25, 28, 29, 30, 34, 38, 40, 43, 45, 50, 51, 65, 66, 70, 71, 85 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | E-UTRA Band 26 | 859 | - | 869 | -27 | 1 | |
| | E-UTRA Band 41, 42, 48, 52 NR Band n77 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |
| DC_5_n71 | E-UTRA Band 4, 5, 12, 13, 14, 17, 24, 26, 30, 48, 66, 85 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | E-UTRA Band 2, 25, 41, 70 NR Band n77 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |
| | E-UTRA Band 29 | F_{DL_low} | - | F_{DL_high} | -38 | 1 | 5 |
| | E-UTRA Band 71 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 5 |
| DC_5_n78 | E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 10, 12, 13, 14, 17, 24, 25, 28, 29, 30, 31, 34, 38, 40, 45, 65, 66, 70 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | E-UTRA Band 26 | 859 | - | 869 | -27 | 1 | |
| | E-UTRA Band 41 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 7 |
| DC_5_n79 | Bands 1, 2, 3, 4, 5, 7, 8, 10, 12, 13, 14, 17, 24, 25, 28, 29, 30, 31, 34, 38, 40, 42, 43, 45, 48, 50, 51, 65, 66, 70, 71, 73, 74, 85 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | E-UTRA Band 26 | 859 | - | 869 | -27 | 1 | |
| | Bands 41, 52 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |
| DC_7_n1 | Band 1, 5, 7, 8, 20, 22, 26, 27, 28, 31, 32, 40, 42, 43, 50, 51, 52, 65, 67, 72, 74, 75, 76, n78, n79 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | band n77 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |
| | band 3, 34 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 5 |
| | Frequency range | 1880 | | 1895 | -40 | 1 | 5, 16 |
| | Frequency range | 1895 | | 1915 | -15.5 | 5 | 5, 7, 16 |
| | Frequency range | 1915 | | 1920 | +1.6 | 5 | 5, 7, 16 |
| | Frequency range | 2570 | - | 2575 | +1.6 | 5 | 5, 6, 7 |
| | Frequency range | 2575 | - | 2595 | -15.5 | 5 | 5, 6, 7 |
| | Frequency range | 2595 | - | 2620 | -40 | 1 | 5, 6 |
| DC_7_n3 | E-UTRA Band 1, 5, 7, 8, 20, 26, 27, 28, 31, 32, 33, 34, 40, 43, 50, 51, 65, 67, 68, 72, 74, 75, 76 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | E-UTRA band 3 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 5 |

| | | | | | | | |
|----------|---|---------------|---|----------------|-------|---|----------|
| | E-UTRA band 22, 42, 52 NR band n78, n77 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |
| | Frequency range | 2570 | - | 2575 | +1.6 | 5 | 5, 6, 7 |
| | Frequency range | 2575 | - | 2595 | -15.5 | 5 | 5, 6, 7 |
| | Frequency range | 2595 | - | 2620 | -40 | 1 | 5, 6 |
| DC_7_n5 | E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 10, 12, 13, 14, 17, 22, 28, 29, 30, 31, 40, 42, 43, 50, 51, 65, 66, 74, 85 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | E-UTRA Band 52 NR Band n77, n78 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |
| | Frequency range | 2570 | - | 2575 | +1.6 | 5 | 5, 7, 6 |
| | Frequency range | 2575 | - | 2595 | -15.5 | 5 | 5, 7, 6 |
| | Frequency range | 2595 | - | 2620 | -40 | 1 | 5, 14 |
| DC_7_n28 | E-UTRA Band 2, 3, 5, 7, 8, 20, 26, 27, 31, 34, 40, 72 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | E-UTRA Band 1, 4, 10, 42, 43, 50, 51, 65, 66, 74, 75, 76 NR band n78 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |
| | E-UTRA band 1 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 9, 10 |
| | Frequency range | 758 | - | 773 | -32 | 1 | 5 |
| | Frequency range | 773 | - | 803 | -50 | 1 | |
| | Frequency range | 2570 | - | 2575 | +1.6 | 5 | 5, 6, 7 |
| | Frequency range | 2575 | - | 2595 | -15.5 | 5 | 5, 6, 7 |
| | Frequency range | 2595 | - | 2620 | -40 | 1 | 5, 6 |
| DC_7_n51 | E-UTRA Band 2, 3, 5, 8, 26, 30, 31, 32, 33, 34, 40, 48, 72 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | Frequency range | 2570 | - | 2575 | +1.6 | 5 | 5, 7, 16 |
| | Frequency range | 2575 | - | 2595 | -15.5 | 5 | 5, 7, 16 |
| | Frequency range | 2595 | - | 2620 | -40 | 1 | 5, 21 |
| | E-UTRA Band 1, 4, 10, 12, 13, 14, 17, 20, 22, 23, 27, 28, 29, 42, 43, 44, 46, 65, 66, 67, 68 NR Band n77, n78, n79, | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |
| DC_7_n66 | E-UTRA Band 2, 4, 5, 7, 10, 12, 13, 14, 17, 26, 27, 28, 29, 30, 43, 50, 51, 66, 74, 85 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | E-UTRA Band 42 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |
| | Frequency range | 2570 | - | 2575 | +1.6 | 5 | 5, 6, 7 |
| | Frequency range | 2575 | - | 2595 | -15.5 | 5 | 5, 6, 7 |
| | Frequency range | 2595 | - | 2620 | -40 | 1 | 5, 6 |
| DC_7_n71 | E-UTRA Band 4, 5, 12, 13, 14, 17, 26, 30, 66, 85 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | E-UTRA Band 2, 70 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |
| | E-UTRA Band 29 | F_{DL_low} | - | F_{DL_high} | -38 | 1 | 5 |
| | Frequency range | 2570 | - | 2575 | 1.6 | 5 | 5, 6, 7 |
| | Frequency range | 2575 | - | 2595 | -15.5 | 5 | 5, 6, 7 |
| | Frequency range | 2595 | - | 2620 | -40 | 1 | 5, 6 |
| DC_7_n77 | E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 10, 11, 18, 19, 20, 21, 26, 27, 28, 31, 32, 33, 34, 40, 50, 51, 65, 66, 67, 68, 72, 74, 75, 76 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | Frequency range | 2570 | - | 2575 | +1.6 | 5 | 5, 6, 7 |
| | Frequency range | 2575 | - | 2595 | -15.5 | 5 | 5, 6, 7 |
| | Frequency range | 2595 | - | 2620 | -40 | 1 | 5, 6 |
| DC_7_n78 | E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 10, 11, 18, 19, 20, 21, 26, 27, 28, 31, 32, 33, 34, 40, 50, 51, 65, 66, 67, 68, 72, 74, 75, 76 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | Frequency range | 2570 | - | 2575 | +1.6 | 5 | 5, 6, 7 |
| | Frequency range | 2575 | - | 2595 | -15.5 | 5 | 5, 6, 7 |
| | Frequency range | 2595 | - | 2620 | -40 | 1 | 5, 6 |
| DC_8_n1 | E-UTRA Band 20, 28, 31, 32, 38, 40, 50, 51, 65, 67, 72, 73, 74, 75, 76 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | E-UTRA band 3, 7, 22, 41, 42, | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |

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|---|--|---------------------|---|----------------------|-------|-----|
| | 43, 52 NR Band n77, n78, n79 | | | | | |
| | E-UTRA Band 1, 8, 34 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | E-UTRA band 11, 21 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | Frequency range | 860 | - | 890 | -40 | 1 |
| | Frequency range | 1880 | | 1895 | -40 | 1 |
| | Frequency range | 1895 | | 1915 | -15.5 | 5 |
| | Frequency range | 1915 | | 1920 | +1.6 | 5 |
| DC_8_n3 | E-UTRA Band 1, 20, 28, 31, 32, 33, 34, 38, 39, 40, 44, 50, 51, 65, 67, 72, 73, 74, 75, 76 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | E-UTRA band 3, 8 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | E-UTRA band 11, 21 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | E-UTRA band 7, 22, 41, 42, 43, 52 | | | | -50 | 1 |
| | NR Band n77, n78, n79 | F _{DL_low} | - | F _{DL_high} | | 2 |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 |
| | Frequency range | 860 | - | 890 | -40 | 1 |
| DC_7_n80 | E-UTRA Band 1, 5, 7, 8, 20, 26, 27, 28, 31, 32, 33, 34, 40, 42, 43, 50, 51, 65, 67, 68, 72, 74, 75, 76. NR Band n79 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | E-UTRA Band 3, 34 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | E-UTRA Band 22, 42, NR Band n77, n78 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | Frequency range | 2570 | - | 2575 | +1.6 | 5 |
| | Frequency range | 2575 | - | 2595 | -15.5 | 5 |
| | Frequency range | 2595 | - | 2620 | -40 | 1 |
| DC_8_n40 | E-UTRA Band 1, 20, 28, 31, 32, 33, 34, 38, 39, 40, 45, 50, 51, 65, 67, 68, 69, 72, 73, 74, 75, 76 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | E-UTRA Band 3, 7, 22, 41, 42, 43, 52 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | E-UTRA Band 8 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| DC_8_n41, DC_8_n81_ULS UP-TDM_n41 | E-UTRA Band 1, 11, 21, 28, 34, 39, 40, 45, 50, 51, 65, 73, 74 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | E-UTRA band 3, 42, 52 NR Band n77, n78, n79 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | E-UTRA Band 8 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | Frequency range | 860 | - | 890 | -40 | 1 |
| | Frequency range | 1884.5 | | 1915.7 | -41 | 0.3 |
| DC_8_n77 | E-UTRA Band 1, 20, 28, 31, 32, 33, 34, 38, 39, 40, 44, 45, 50, 51, 65, 67, 68, 69, 72, 73, 74, 75, 76 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | E-UTRA band 3, 7, 41 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | E-UTRA Band 8 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | E-UTRA Band 11, 21 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | Frequency range | 860 | - | 890 | -40 | 1 |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 |
| DC_8_n78 DC_8_n81_ULS UP-TDM_n78, DC_8_n81_ULS UP-FDM_n78 | E-UTRA Band 1, 20, 28, 34, 39, 40, 65, 74 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | E-UTRA Band 3, 7,41 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | E-UTRA Band 8 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | E-UTRA Band 11, 21 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | Frequency range | 860 | - | 890 | -40 | 1 |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 |
| DC_8_n79 DC_8_n81_ULS UP-TDM_n79 | E-UTRA Band 1, 8, 28, 34, 39, 40, 65 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | E-UTRA Band 3,41,42 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | E-UTRA Band 11, 21 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | Frequency range | 860 | - | 890 | -40 | 1 |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 |
| DC_8_n80 | E-UTRA Band 1, 20, 28, 31, 32, 33, 34, 38, 39, 40, 45, 50, 51, | F _{DL_low} | - | F _{DL_high} | -50 | 1 |

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|-----------|---|---------------------|---|----------------------|-----|-------------|
| | 65, 67, 68, 69, 72, 73, 74, 75, 76 NR Band n79 | | | | | |
| | E-UTRA Band 3, 8 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | E-UTRA Band 3, 7, 22, 41, 42, 43, 52 NR Band n77, n78 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | E-UTRA Band 11, 21 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 |
| DC_11_n77 | E-UTRA Band 1, 3, 18, 19, 28, 34, 65 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | Frequency range | 945 | - | 960 | -50 | 1 |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 |
| | Frequency range | 2545 | - | 2575 | -50 | 1 |
| | Frequency range | 2595 | - | 2645 | -50 | 1 |
| DC_11_n78 | E-UTRA Band 1, 3, 18, 19, 28, 34, 65 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | Frequency range | 945 | - | 960 | -50 | 1 |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 |
| | Frequency range | 2545 | - | 2575 | -50 | 1 |
| | Frequency range | 2595 | - | 2645 | -50 | 1 |
| DC_11_n79 | E-UTRA Band 1, 3, 18, 19, 28, 34, 42, 65 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | Frequency range | 945 | - | 960 | -50 | 1 |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 |
| | Frequency range | 2545 | - | 2575 | -50 | 1 |
| | Frequency range | 2595 | - | 2645 | -50 | 1 |
| DC_12_n2 | E-UTRA Band 5, 13, 14, 17, 24, 26, 27, 30, 41, 50, 53, 71, 74 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | E-UTRA Band 12, 25, 85 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | E-UTRANR Band n2 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | E-UTRA Band 4, 10, 51, 66, 70, NR Band n77 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| DC_12_n5 | E-UTRA Band 2, 5, 12, 13, 14, 17, 24, 25, 26, 30, 42, 43 50, 51, 71, 74 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | E-UTRA Band 4, 10, 41, 48, 66, 70, NR Band n77 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | E-UTRA Band 12, 85 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| DC_12_n66 | E-UTRA Band 2, 5, 13, 14, 17, 25, 26, 27, 30, 41, 53, 71, 74 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | E-UTRA Bands 4, 10, 48, 50, 51, 66, 70, NR Band n77 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | E-UTRA Band 12, 85 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| DC_12_n71 | E-UTRA Band 5, 13, 14, 17, 24, 26, 27, 30, 48, 50, 51, 74 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | E-UTRA Band 2, 4, 25, 41, 66, 70 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | E-UTRA Band 12, 71, 85 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| DC_12_n78 | E-UTRA Band 2, 5, 7, 13, 17, 25, 26, 41, 71 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | E-UTRA Band 4, 66 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | E-UTRA band 12 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 |
| DC_13_n2 | E-UTRA Band 4, 5,12,13,17, 26, 29, 41, 48, 66, 70, 71 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | E-UTRA Band 2,14, 25 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | E-UTRA Band 30 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | Frequency range | 769 | - | 775 | -35 | 0.006 25 |
| | Frequency range | 799 | - | 805 | -35 | 0.006 25 |
| DC_13_n66 | E-UTRA Band 2, 4, 5, 12, 13, 17, 25, 26, 27, 29, 41, 50, 51, 53, 66, 70, 71, 74, 85 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |

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|------------------------|--|---------------|---|----------------|-----|-------------|---|
| | E-UTRA Band 14 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 5 |
| | E-UTRA Band 30, 48, NR Band n77 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |
| | Frequency range | 769 | - | 775 | -35 | 0.006 25 | 5 |
| | Frequency range | 799 | - | 803 | -35 | 0.006 25 | 5 |
| DC_18_n77 | E-UTRA Band 1, 3, 11, 21, 28, 34, 65, 74 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | Frequency range | 945 | - | 960 | -50 | 1 | |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 3 |
| | Frequency range | 2545 | - | 2575 | -50 | 1 | |
| | Frequency range | 2595 | - | 2645 | -50 | 1 | |
| DC_18_n78 | E-UTRA Band 1, 3, 11, 21, 28, 34, 65, 74 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | Frequency range | 945 | - | 960 | -50 | 1 | |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 3 |
| | Frequency range | 2545 | - | 2575 | -50 | 1 | |
| | Frequency range | 2595 | - | 2645 | -50 | 1 | |
| DC_18_n79 | E-UTRA Band 1, 3, 11, 21, 28, 34, 42, 65, 74 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | Frequency range | 945 | - | 960 | -50 | 1 | |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 3 |
| | Frequency range | 2545 | - | 2575 | -50 | 1 | |
| | Frequency range | 2595 | - | 2645 | -50 | 1 | |
| DC_19_n77 | E-UTRA Band 1, 3, 11, 21, 28, 34, 65, 74 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | Frequency range | 945 | - | 960 | -50 | 1 | |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 3 |
| | Frequency range | 2545 | - | 2575 | -50 | 1 | |
| | Frequency range | 2595 | - | 2645 | -50 | 1 | |
| DC_19_n78 | E-UTRA Band 1, 3, 11, 21, 28, 34, 65, 74 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | Frequency range | 945 | - | 960 | -50 | 1 | |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 3 |
| | Frequency range | 2545 | - | 2575 | -50 | 1 | |
| | Frequency range | 2595 | - | 2645 | -50 | 1 | |
| DC_19_n79 | E-UTRA Band 1, 3, 11, 21, 28, 34, 42, 65, 74 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | Frequency range | 945 | - | 960 | -50 | 1 | |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 3 |
| | Frequency range | 2545 | - | 2575 | -50 | 1 | |
| | Frequency range | 2595 | - | 2645 | -50 | 1 | |
| DC_20_n1 | E-UTRA Band 1, 3, 7, 8, 20, 22, 31, 32, 40, 42, 43, 50, 51, 65, 67, 68, 72, 75, 76 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | E-UTRANR Band 1 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 5 |
| | E-UTRA Band 38, 69 NR Band n77, n78 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |
| | Frequency range | 758 | - | 788 | -50 | 1 | |
| DC_20_n3 | E-UTRA Band 1, 7, 8, 31, 32, 33, 34, 40, 43, 50, 51, 65, 67, 72, 74, 75, 76 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | E-UTRA Band 20 E-UTRANR Band 3 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 5 |
| | E-UTRA Band 22, 38, 42, 52 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |
| | Frequency range | 758 | - | 788 | -50 | 1 | |
| DC_20_n8 | E-UTRA Band 1, 3, 7, 22, 28, 31, 32, 34, 38, 42, 43, 65, 75, 76, NR band n78 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| DC_20_n28 DC_20_n83 | E-UTRA Band 1, 3, 7, 8, 22, 31, 32, 34, 38, 42, 43, 65, 75, 76 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| DC_20_n51 | E-UTRA Band 1, 3, 4, 8, 17, 22, 28, 29, 31, 40, 43, 48, 65, 66, 68, 72 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | E-UTRA Band 20 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 5 |

| | | | | | | | |
|--|--|---------------|---|----------------|-----|-----|-------|
| | Frequency range | 758 | - | 788 | -50 | 1 | |
| | E-UTRA Band 2, 7, 25, 32, 33, 34, 35, 36, 37, 38, 39, 41, 42, 46, 69, 70 NR Band n77, n78, n79, | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |
| DC_20_n77 | E-UTRA Band 1, 3, 7, 8, 31, 32, 33, 34, 40, 50, 51, 65, 67, 68, 72, 74, 75, 76 | | | | | | |
| | E-UTRA Band 20 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 5 |
| | E-UTRA Band 38, 69 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |
| DC_20_n78 DC_20_n82_ULS UP-TDM_n78 | E-UTRA Band 1, 3, 7, 8, 31, 32, 33, 34, 40, 50, 51, 65, 67, 68, 72, 74, 75, 76 | | | | | | |
| | E-UTRA Band 20 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 5 |
| | E-UTRA Band 38, 69 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |
| DC_20_n80 | E-UTRA Band 1, 7, 8, 27, 28, 31, 32, 33, 34, 40, 43, 50, 51, 65, 67, 68, 72, 74, 75, 76. NR Band n79 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | E-UTRA Band 3, 20 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 5 |
| | E-UTRA Band 22, 42, NR Band n77, n78 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |
| DC_21_n77 | E-UTRA Band 1, 3, 18, 19, 21, 28, 34, 65 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | Frequency range | 945 | - | 960 | -50 | 1 | |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 3 |
| | Frequency range | 2545 | - | 2575 | -50 | 1 | |
| | Frequency range | 2595 | - | 2645 | -50 | 1 | |
| DC_21_n78 | E-UTRA Band 1, 3, 18, 19, 21, 28, 34, 65 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | Frequency range | 945 | - | 960 | -50 | 1 | |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 3 |
| | Frequency range | 2545 | - | 2575 | -50 | 1 | |
| | Frequency range | 2595 | - | 2645 | -50 | 1 | |
| DC_21_n79 | E-UTRA Band 1, 3, 18, 19, 21, 28, 34, 42, 65 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | Frequency range | 945 | - | 960 | -50 | 1 | |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 3 |
| | Frequency range | 2545 | - | 2575 | -50 | 1 | |
| | Frequency range | 2595 | - | 2645 | -50 | 1 | |
| DC_25_n41 | E-UTRA band 4, 5, 10, 12, 13, 14, 17, 24, 26, 27, 28, 29, 30, 42, 45, 48, 66, 70, 71 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | E-UTRA Band 2, 25, NR Band n77 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 5 |
| DC_26_n41 | E-UTRA/NR Band 1, 2, 3, 4, 5, 10, 12, 13, 14, 17, 24, 25, 26, 28, 29, 30, 31, 34, 39, 42, 43, 48, 50, 51, 65, 66, 70, 71, 74 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | Frequency range | 1884.5 | | 1915.7 | -41 | 0.3 | 3, 19 |
| | Frequency range | 703 | - | 799 | -50 | 1 | |
| | Frequency range | 799 | - | 803 | -40 | 1 | 5 |
| | Frequency range | 945 | - | 960 | -50 | 1 | |
| | E-UTRA Band 1, 3, 5, 11, 18, 19, 21, 26, 34, 39, 40, 41, 65, 74 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | Frequency range | 703 | - | 799 | -50 | 1 | |
| DC_26_n77 | Frequency range | 799 | - | 803 | -40 | 1 | 5 |
| | Frequency range | 945 | - | 960 | -50 | 1 | |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 3 |
| | Frequency range | 2545 | - | 2575 | -50 | 1 | |
| | Frequency range | 2595 | - | 2645 | -50 | 1 | |
| | E-UTRA Band 1, 3, 5, 11, 18, 19, 21, 26, 34, 39, 40, 41, 65, 74 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | Frequency range | 703 | - | 799 | -50 | 1 | |
| DC_26_n78 | Frequency range | 799 | - | 803 | -40 | 1 | 5 |
| | E-UTRA Band 1, 3, 5, 11, 18, 19, 21, 26, 34, 39, 40, 41, 65, 74 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | Frequency range | 703 | - | 799 | -50 | 1 | |
| | Frequency range | 799 | - | 803 | -40 | 1 | 5 |

| | | | | | | | |
|-----------|---|---------------|---|----------------|-------|-----|-------|
| | Frequency range | 945 | - | 960 | -50 | 1 | |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 3 |
| | Frequency range | 2545 | - | 2575 | -50 | 1 | |
| | Frequency range | 2595 | - | 2645 | -50 | 1 | |
| DC_26_n79 | E-UTRA Band 1, 3, 5, 11, 18, 19, 21, 26, 34, 39, 40, 41, 65, 74 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | Frequency range | 703 | - | 799 | -50 | 1 | |
| | Frequency range | 799 | - | 803 | -40 | 1 | 5 |
| | Frequency range | 945 | - | 960 | -50 | 1 | |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 3 |
| | Frequency range | 2545 | - | 2575 | -50 | 1 | |
| | Frequency range | 2595 | - | 2645 | -50 | 1 | |
| DC_28_n3 | E-UTRA Band 1, 22, 42, 43, 50, 51, 65, 74, 75, 76, NR Band n77, n78 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |
| | E-UTRA Band 1 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 9, 11 |
| | E-UTRA Band 3, 5, 7, 8, 18, 19, 20, 26, 27, 31, 34, 38, 40, 41, 72, 73 NR Band n79 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | E-UTRA Band 11, 21 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 9, 10 |
| | Frequency range | 470 | - | 710 | -26.2 | 6 | 14 |
| | Frequency range | 758 | - | 773 | -32 | 1 | 5 |
| | Frequency range | 773 | - | 803 | -50 | 1 | |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 3, 9 |
| | E-UTRA Band 2, 3, 5, 7, 8, 14, 18, 19, 24, 25, 26, 28, 30, 31, 34, 38, 40, 45, 48, 70, 71 | FDL_low | - | FDL_high | -50 | | |
| | E-UTRA Band 1, 4, 10, 22, 32, 41, 42, 43, 50, 51, 52, 65, 66, 73, 74, 75, 76 NR Band n77, n78, n79 | FDL_low | - | FDL_high | -50 | 1 | 2 |
| DC_28_n5 | E-UTRA Band 1 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 9, 11 |
| | E-UTRA Band 11, 21 | FDL_low | - | FDL_high | -50 | 1 | 9, 10 |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 3, 9 |
| | Frequency range | 470 | - | 694 | -42 | 8 | 5, 17 |
| | Frequency range | 470 | - | 710 | -26.2 | 6 | 14 |
| | Frequency range | 662 | - | 694 | -26.2 | 6 | 5 |
| | Frequency range | 758 | - | 773 | -32 | 1 | 5 |
| | Frequency range | 773 | - | 803 | -50 | 1 | |
| | Frequency range | 773 | - | 803 | -50 | 1 | |
| | E-UTRA Band 20, 31, 34, 38, 40, 72 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| DC_28_n8 | E-UTRA band 3, 7, 22, 41, 42, 43, 50, 51, 52, 65, 73, 74, 75, 76 NR Band n77, n78, n79 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |
| | E-UTRA Band 8 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 5 |
| | E-UTRA Band 11, 21 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 9, 10 |
| | E-UTRA Band 1 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 9, 11 |
| | Frequency range | 470 | - | 694 | -42 | 8 | 5, 17 |
| | Frequency range | 470 | - | 710 | -26.2 | 6 | 14 |
| | Frequency range | 662 | - | 694 | -26.2 | 6 | 5 |
| | Frequency range | 758 | - | 773 | -32 | 1 | 5 |
| | Frequency range | 773 | - | 803 | -50 | 1 | |
| | Frequency range | 860 | - | 890 | -40 | 1 | 5, 12 |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 3, 9 |
| DC_28_n41 | E-UTRA Band 4, 10, 14, 18, 19, 20, 26, 27, 39, 42, 43, 50, 51, 52, 65, 66, 71, 73 NR Band n77, n78, n79 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |
| | E-UTRA Band 1 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 9, 11 |
| | E-UTRA Band 2, 3, 5, 8, 24, 25, 30, 31, 34, 40, 48, 70, 72 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | E-UTRA Band 11, 21, 74, 75, 76 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 9, 10 |
| | Frequency range | 470 | - | 694 | -42 | 8 | 5, 17 |

| | | | | | | | |
|-----------|--|--|---------------------|----------------------|----------------------|-----|----------|
| | Frequency range | 470 | - | 710 | -26.2 | 6 | 14 |
| | Frequency range | 662 | - | 694 | -26.2 | 6 | 5 |
| | Frequency range | 758 | - | 773 | -32 | 1 | 5 |
| | Frequency range | 773 | - | 803 | -50 | 1 | |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 3, 9 |
| DC_28_n50 | E-UTRA Band 4, 10, 40, 42, 43, 52, 65, 66, 73 NR Band n77, n78, n79 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | 2 |
| | E-UTRA Band 1 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | 9, 10 |
| | E-UTRA Band 2, 3, 5, 7, 8, 18, 19, 25, 26, 27, 31, 34, 38, 39, 41, 48, 52, 72 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | |
| | Frequency range | 470 | - | 694 | -42 | 8 | 5, 17 |
| | Frequency range | 470 | - | 710 | -26.2 | 6 | 14 |
| | Frequency range | 662 | - | 694 | -26.2 | 6 | 5 |
| | Frequency range | 758 | - | 773 | -32 | 1 | 5 |
| | Frequency range | 773 | - | 803 | -50 | 1 | |
| | | | | | | | |
| | | | | | | | |
| DC_28_n51 | E-UTRA Band 2, 3, 5, 7, 8, 25, 26, 31, 34, 38, 40, 41, 66, 72 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | |
| | E-UTRA Band 4, 10, 20, 22, 24, 32, 42, 43, 45, 46, 65, 66, 71, 73 NR band n78, n79 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | 2 |
| | E-UTRA Band 1 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | 2, 9, 10 |
| | Frequency range | 470 | - | 694 | -42 | 8 | 5, 17 |
| | Frequency range | 470 | - | 710 | -26.2 | 6 | 14 |
| | Frequency range | 662 | - | 694 | -26.2 | 6 | 5 |
| | Frequency range | 758 | - | 773 | -32 | 1 | 5 |
| | Frequency range | 773 | - | 803 | -50 | 1 | |
| | | | | | | | |
| | | | | | | | |
| DC_28_n77 | E-UTRA Band 3, 5, 7, 8, 18, 19, 20, 26, 34, 39, 40, 41 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | |
| | E-UTRA Band 1, 65, 74 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | 2 |
| | E-UTRA Band 1 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | 9, 11 |
| | E-UTRA Band 11, 21 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | 9, 10 |
| | Frequency range | 758 | - | 773 | -32 | 1 | |
| | Frequency range | 773 | - | 803 | -50 | 1 | |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 3, 9 |
| | DC_28_n78 | E-UTRA Band 3, 5, 7, 8, 18, 19, 20, 26, 34, 39, 40, 41 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | DC_28_n83_ULS | E-UTRA Band 1, 65, 74 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| | UP-TDM_n78 | E-UTRA Band 1 | F _{DL_low} | - | F _{DL_high} | -50 | 1 |
| DC_28_n79 | E-UTRA Band 1 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | 9, 11 |
| | E-UTRA Band 11, 21 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | 9, 10 |
| | Frequency range | 758 | - | 773 | -32 | 1 | |
| | Frequency range | 773 | - | 803 | -50 | 1 | |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 3 |
| | E-UTRA Band 3, 5, 8, 18, 19, 34, 39, 40, 41, 42 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | |
| | E-UTRA Band 1, 65, 74 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | 2 |
| | E-UTRA Band 1 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | 9, 11 |
| | E-UTRA Band 11, 21 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | 9, 10 |
| | Frequency range | 758 | - | 773 | -32 | 1 | |
| DC_30_n5 | Frequency range | 773 | - | 803 | -50 | 1 | |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 3, 9 |
| DC_30_n6 | E-UTRA Band 2, 4, 5, 7, 12, 13, 14, 17, 24, 25, 26, 29, 30, 38, 48, 53, 66, 70, 71, 85 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | |
| | E-UTRA Band 41, NR Band n77 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | 2 |
| DC_30_n66 | E-UTRA Band 2, 4, 5, 10, 12, 13, 14, 17, 24, 25, 26, 27, 29, 30, 38, 41, 66, 70, 71 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | |
| | E-UTRA Band 48, NR Band n77 | F _{DL_low} | - | F _{DL_high} | -50 | 1 | 2 |
| DC_38_n78 | | | | N/A | | | |
| DC_39_n41 | E-UTRA Band 1, 8, 26, 28, 34, | F _{DL_low} | - | F _{DL_high} | -50 | 1 | |

| | | | | | | |
|-----------|--|---------------|-----|----------------|-------|---|
| | 40, 42, 44, 45, 50, 51, 74 | | | | | |
| | NR Band n77, n78, n79 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | Frequency range | 1805 | - | 1855 | -40 | 1 |
| | Frequency range | 1855 | - | 1880 | -15.5 | 5 |
| DC_39_n78 | E-UTRA Band 1, 8, 28, 34, 40, 41, 44, 45 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | Frequency range | 1805 | - | 1855 | -40 | 1 |
| | Frequency range | 1855 | - | 1880 | -15.5 | 5 |
| DC_39_n79 | E-UTRA Band 1, 8, 28, 34, 40, 41, 44, 45 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | Frequency range | 1805 | - | 1855 | -40 | 1 |
| | Frequency range | 1855 | - | 1880 | -15.5 | 5 |
| DC_40_n1 | E-UTRA Band 1, 3, 5, 7, 8, 20, 22, 26, 27, 28, 31, 32, 38, 41, 42, 43, 44, 45, 50, 51, 52, 65, 67, 68, 69, 72, 73, 74, 75, 76 NR Band n78 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | E-UTRA Band 34 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | NR Band n77, n79 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| DC_40_n41 | Bands 1, 3, 5, 8, 26, 27, 28, 34, 39, 42, 44, 45, 50, 51, 65, 73, 74, NR Band n77, n78 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | NR Band n79 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | | | N/A | | | |
| DC_40_n77 | E-UTRA Band 1, 3, 5, 7, 8, 20, 26, 27, 28, 31, 32, 33, 34, 38, 39, 41, 44, 45, 50, 51, 65, 67, 68, 69, 72, 73, 74, 75, 76 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | NR Band n79 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| DC_40_n78 | | | | | | |

| | | | | | | | |
|-----------------|--|---------------|---|----------------|-----|-----|---|
| DC_41_n77 | E-UTRA Band 1, 3, 5, 8, 11, 18, 19, 21, 26, 28, 33, 34, 39, 40, 44, 45, 73, 74 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | | | | | | | |
| Frequency range | | 1884.5 | | 1915.7 | -41 | 0.3 | 3 |
| DC_41_n78 | E-UTRA Band 1, 3, 5, 8, 11, 18, 19, 21, 26, 28, 34, 39, 40, 44, 45, 74 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | Frequency range | 1884.5 | | 1915.7 | -41 | 0.3 | 3 |
| DC_41_n79 | E-UTRA Band 1, 3, 5, 8, 11, 18, 19, 21, 26, 28, 34, 40, 42, 44, 45, 65, 74 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 3 |
| DC_42_n51 | E-UTRA Band 3, 8, 20, 25, 30, 31, 34, 39, 41, 73 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | E-UTRA Band 1, 2, 4, 5, 6, 7, 10, 12, 13, 14, 17, 23, 24, 26, 27, 28, 29, 32, 38, 40, 44, 46, 65, 66, 67, 68, 70, 71 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |
| DC_42_n77 | N/A | | | | | | |
| DC_42_n78 | N/A | | | | | | |
| DC_42_n79 | N/A | | | | | | |
| DC_48_n5 | E-UTRA Band 2, 4, 5, 12, 13, 14, 17, 24, 25, 26, 29, 30, 41, 50, 51, 66, 70, 71, 74, 85 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 3 |
| DC_48_n66 | E-UTRA Band 2, 4, 5, 12, 13, 14, 17, 24, 25, 26, 29, 30, 41, 50, 51, 66, 70, 71, 74, 85 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| DC_66_n2 | E-UTRA Band 4, 5, 10, 12, 13, 14, 17, 22, 24, 26, 27, 28, 29, 30, 41, 50, 51, 53, 66, 70, 71, 74, 85 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | E-UTRA Band 25 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 5 |
| | E-UTRANR Band n2 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 5 |
| | E-UTRA Band 42, 43, NR Band n77 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |
| DC_66_n5 | E-UTRA Band 1, 2, 3, 4, 5, 6, 7, 8, 10, 12, 13, 14, 17, 24, 25, 26, 28, 29, 30, 34, 38, 40, 43, 45, 50, 51, 65, 66, 70, 71, 85 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | E-UTRA Band 41, 42, 48, 52, NR Band n77 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |

bandwidth less than or equal to 20 RB; B: for carriers of 5 MHz channel bandwidth when carrier centre frequency (F_c) is within the range $907.5 \text{ MHz} \leq F_c \leq 912.5 \text{ MHz}$ without any restriction on uplink transmission bandwidth; C: for carriers of 10 MHz channel bandwidth when carrier centre frequency (F_c) is $F_c = 910 \text{ MHz}$ with an uplink transmission bandwidth less than or equal to 32 RB with $\text{RB}_{\text{start}} > 3$.

NOTE 13: Void.

NOTE 14: This requirement is applicable for 5 and 10 MHz E-UTRA channel bandwidth allocated within 718-728MHz. For carriers of 10 MHz bandwidth, this requirement applies for an uplink transmission bandwidth less than or equal to 30 RB with $\text{RB}_{\text{start}} > 1$ and $\text{RB}_{\text{start}} < 48$.

NOTE 15: Void.

NOTE 16: This requirement is applicable for any channel bandwidths within the range 1920 - 1980 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 1927.5 - 1929.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 1930 - 1938 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB.

NOTE 17: This requirement is applicable in the case of a 10 MHz E-UTRA carrier confined within 703 MHz and 733 MHz, otherwise the requirement of -25 dBm with a measurement bandwidth of 8 MHz applies.

NOTE 18: This requirement is only applicable for E-UTRA carriers with bandwidth confined within 1885 - 1920 MHz (requirement for carriers with at least 1RB confined within 1880 - 1885 MHz is not specified). This requirement applies for an uplink transmission bandwidth less than or equal to 54 RB for E-UTRA carriers of 15 MHz bandwidth when carrier centre frequency is within the range 1892.5 - 1894.5 MHz and for E-UTRA carriers of 20 MHz bandwidth when carrier centre frequency is within the range 1895 - 1903 MHz.

NOTE 19: Void.

NOTE 20: Void.

NOTE 21: Void.

NOTE 22: This requirement is applicable for power class 3 UE for any channel bandwidths within the range 2570 - 2615 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 2605.5 - 2607.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 2597 - 2605 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB.

NOTE: To simplify the above Table, E-UTRA band numbers are listed for bands which are specified only for E-UTRA operation or both E-UTRA and NR operation. NR band numbers are listed for bands which are specified only for NR operation.

The normative reference for this requirement is TS 38.101-3 [1] clause 6.5B.3.3.2, Table 6.5B.3.3.2-1.

Exception requirements for both NR and E-UTRA are defined for this test and therefore LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

6.5B.3.3.2.4 Test description

6.5B.3.3.2.4.1 Initial conditions

Same initial conditions as described in clause 6.5B.3.1.2.4.1 with the following exceptions:

- Instead of Table 6.5B.3.1.2.4.1-1 --> use Table 6.5B.3.3.2.4.1-1.

Table 6.5B.3.3.2.4.1-1: Test Configuration Table

| Initial Conditions | | | | | | | | | | | |
|---|---|-------|------|--------|--|--|-------------------|---------------------------|--------------------------|---|---------------------|
| Test Environment as specified in TS 38.508-1 [6] clause 4.1 | | | | | | NC | | | | | |
| Test Frequencies as specified in TS 38.508-1 [6] clause 4.3.1 | | | | | | For test frequencies refer to "Range" columns. | | | | | |
| Test EN-DC channel bandwidth as specified in TS 36.508 [6] clause 4.3.1 and TS 38.508-1 clause 4.3.1 | | | | | | Refer to "NR N _{RB} " and "E-UTRA N _{RB} " columns | | | | | |
| Test SCS for the NR cell as specified in TS 38.521-1 [8] Table 5.3.5-1 | | | | | | Lowest SCS per Channel Bandwidth | | | | | |
| Test Parameters for DC Configurations | | | | | | | | | | | |
| ID | DC Configuration / N _{RB} _agg | | | | | | DL Allocation | | UL Allocation (Note 1,2) | | |
| | DC Configuration | | | | E-UTRA Ch | NR Ch | CC MOD | E-UTRA & NR RB allocation | CC MOD | E-UTRA & NR allocations (L _{CRB} @ RB _{start}) | |
| | E-UTRA | | NR | | Band | Range | Band | Range | Band | Range | |
| | Band | Range | Band | Range | | | | | | | |
| Default Test Settings for a DC_XA_nYA Configuration | | | | | | | | | | | |
| 1 | X | Low | Y | Low | Highest Ch BW /Highest N _{RB} | Highest Ch BW /Highest N _{RB} | QPSK/CP-OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | 1@0 |
| 2 | X | High | Y | High | Highest Ch BW /Highest N _{RB} | Highest Ch BW /Highest N _{RB} | QPSK/CP-OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@RB _{max} | 1@RB _{max} |
| Test Setting for DC_1A_n3A Configuration | | | | | | | | | | | |
| 1 | 1 | Low | 3 | Low | 10/50 | 30/160 | QPSK/CP-OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | 1@0 |
| 2 | 1 | High | 3 | Mid | 10/50 | 30/160 | QPSK/CP-OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@49 | 1@0 |
| Test Setting for DC_1A_n78A Configuration | | | | | | | | | | | |
| 1 | 1 | Low | 78 | Low | 20/100 | 100/273 | QPSK/CP-OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | <u>1@272</u> |
| 2 | 1 | Low | 78 | High | 20/100 | 100/273 | QPSK/CP-OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | <u>1@272</u> |
| 3 | 1 | Low | 78 | Note 8 | 20/100 | 100/273 | QPSK/CP-OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | 1@0 |
| Test Setting for DC_2A_n66A Configuration | | | | | | | | | | | |
| 1 | 2 | Low | 66 | Low | 20/100 | 40/216 | QPSK/CP-OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | 1@0 |
| 2 | 2 | High | 66 | High | 20/100 | 40/216 | QPSK/CP-OFDM QPSK | NA | QPSK / CP-OFDM QPSK | <u>1@99</u> | <u>1@215</u> |
| 3 | 2 | High | 66 | Low | 20/100 | 40/216 | QPSK/CP-OFDM QPSK | NA | QPSK / CP-OFDM QPSK | <u>1@99</u> | 1@0 |
| 4 | 2 | High | 66 | Low | 20/100 | 40/216 | QPSK/CP-OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | 1@0 |
| 5 | 2 | High | 66 | High | 20/100 | 40/216 | QPSK/CP-OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | <u>1@215</u> |
| Test Setting for DC_2A_n78A Configuration | | | | | | | | | | | |
| 1 | 2 | Low | 78 | Low | 20/100 | 100/273 | QPSK/CP-OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | <u>1@272</u> |

| | | | | | | | | | | | |
|---|---|------|----|------|--------|---------|--------------------------|----|---------------------------|-------------|--------------|
| | | | | | | | QPSK | | QPSK | | |
| 2 | 2 | Low | 78 | Low | 20/100 | 100/273 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | <u>1@99</u> | 1@0 |
| 3 | 2 | High | 78 | Low | 20/100 | 100/273 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | <u>1@99</u> | <u>1@272</u> |
| 4 | 2 | Low | 78 | High | 20/100 | 100/273 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | <u>1@272</u> |

Test Settings for DC_3A_n1A Configuration

| | | | | | | | | | | | |
|---|---|-----|---|------|--------|--------|--------------------------|----|---------------------------|-------------|--------------|
| 1 | 3 | Low | 1 | Low | 20/100 | 20/106 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | 1@0 |
| 2 | 3 | Low | 1 | High | 20/100 | 20/106 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | <u>1@99</u> | <u>1@105</u> |

Test Setting for DC_3A_n7A Configuration

| | | | | | | | | | | | |
|---|---|-----|---|------|--------|-------|--------------------------|----|---------------------------|-------------|-------------|
| 1 | 3 | Low | 7 | High | 20/100 | 10/52 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | <u>1@47</u> | <u>1@51</u> |
| 2 | 3 | Mid | 7 | High | 20/100 | 10/52 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | <u>1@99</u> | <u>1@51</u> |
| 3 | 3 | Low | 7 | Low | 20/100 | 10/52 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | <u>1@51</u> |
| 4 | 3 | Mid | 7 | Low | 20/100 | 10/52 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | <u>1@99</u> | 1@0 |
| 5 | 3 | Low | 7 | High | 20/100 | 10/52 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | <u>1@51</u> |

Test Settings for DC_3A_n41A Configuration

| | | | | | | | | | | | |
|---|---|--------|----|------|--------|---------|--------------------------|----|---------------------------|-------------|--------------|
| 1 | 3 | Low | 41 | Low | 20/100 | 100/273 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | 1@0 |
| 2 | 3 | High | 41 | High | 20/100 | 100/273 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | <u>1@99</u> | <u>1@272</u> |
| 3 | 3 | Mid | 41 | High | 20/100 | 100/273 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | <u>1@272</u> |
| 4 | 3 | Note 4 | 41 | High | 10/50 | 100/273 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@49 | <u>1@272</u> |

Test Setting for DC_3A_n78A Configuration

| | | | | | | | | | | | |
|---|---|------|----|------|--------|---------|--------------------------|----|---------------------------|-------------|--------------|
| 1 | 3 | High | 78 | High | 20/100 | 100/273 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | <u>1@99</u> | <u>1@272</u> |
| 2 | 3 | High | 78 | Mid | 20/100 | 100/273 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | <u>1@99</u> | <u>1@272</u> |
| 3 | 3 | Low | 78 | Mid | 20/100 | 100/273 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | <u>1@272</u> |

Test Settings for DC_3A_n79A Configuration

| | | | | | | | | | | | |
|---|---|------|----|--------|--------|---------|--------------------------|----|---------------------------|---------------------|-------|
| 1 | 3 | Low | 79 | Low | 20/100 | 100/273 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | 1@0 |
| 2 | 3 | High | 79 | Note 3 | 20/100 | 100/273 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@75 | 1@0 |
| 3 | 3 | High | 79 | Low | 20/100 | 100/273 | QPSK/CP -OFDM | NA | QPSK / CP-OFDM | 1@RB _{max} | 1@136 |

| | | | | | | | | | | | |
|---|---|------|----|--------|--------|---------|--------------------------|----|---------------------------|---------------------|---------------------|
| | | | | | | | QPSK | | QPSK | | |
| 4 | 3 | High | 79 | Low | 20/100 | 100/273 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@75 | 1@RB _{max} |
| 5 | 3 | Low | 79 | Low | 20/100 | 100/273 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@RB _{max} | 1@136 |
| 6 | 3 | Low | 79 | Note 3 | 20/100 | 100/273 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@RB _{max} | 1@RB _{max} |

Test Settings for DC_5A_n66A Configuration

| | | | | | | | | | | | |
|---|---|------|----|------|-------|--------|--------------------------|----|---------------------------|-------------|--------------|
| 1 | 5 | Low | 66 | Low | 10/50 | 40/216 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | 1@0 |
| 2 | 5 | High | 66 | High | 10/50 | 40/216 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | <u>1@49</u> | <u>1@215</u> |
| 3 | 5 | Low | 66 | Low | 10/50 | 40/216 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@49 | 1@0 |
| 4 | 5 | High | 66 | Low | 10/50 | 40/216 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@49 | <u>1@0</u> |

Test Setting for DC_5A_n78A Configuration

| | | | | | | | | | | | |
|---|---|------|----|--------|-------|---------|--------------------------|----|---------------------------|-------------|--------------|
| 1 | 5 | Low | 78 | High | 10/50 | 100/273 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | 1@272 |
| 2 | 5 | Low | 78 | Note 7 | 10/50 | 100/273 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | 1@0 |
| 3 | 5 | High | 78 | Low | 10/50 | 100/273 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | <u>1@49</u> | <u>1@272</u> |
| 4 | 5 | High | 78 | High | 10/50 | 100/273 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@27 | <u>1@0</u> |
| 5 | 5 | Low | 78 | Mid | 10/50 | 100/273 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | <u>1@272</u> |
| 6 | 5 | Low | 78 | Mid | 10/50 | 100/273 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | <u>1@0</u> |
| 7 | 5 | High | 78 | Mid | 10/50 | 100/273 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@49 | <u>1@272</u> |

Test Setting for DC_7A_n1A Configuration

| | | | | | | | | | | | |
|---|---|-----|---|------|--------|--------|--------------------------|----|---------------------------|-------------|--------------|
| 1 | 7 | Low | 1 | Low | 20/100 | 20/106 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | 1@0 |
| 2 | 7 | Low | 1 | High | 20/100 | 20/106 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | <u>1@105</u> |
| 3 | 7 | Mid | 1 | High | 20/100 | 20/106 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | <u>1@22</u> | <u>1@105</u> |

Test Setting for DC_7A_n66A Configuration

| | | | | | | | | | | | |
|---|---|-----|----|------|--------|--------|--------------------------|----|---------------------------|-------------|--------------|
| 1 | 7 | Low | 66 | High | 20/100 | 40/216 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | <u>1@99</u> | <u>1@215</u> |
| 2 | 7 | Low | 66 | High | 20/100 | 40/216 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | 1@0 |
| 3 | 7 | Mid | 66 | High | 20/100 | 40/216 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | <u>1@50</u> | <u>1@215</u> |

| | | | | | | | | | | | |
|---|---|------|----|------|--------|--------|-------------------|----|---------------------|-------------|--------------|
| 4 | 7 | Low | 66 | High | 20/100 | 40/216 | QPSK/CP-OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | <u>1@215</u> |
| 5 | 7 | Mid | 66 | Low | 20/100 | 40/216 | QPSK/CP-OFDM QPSK | NA | QPSK / CP-OFDM QPSK | <u>1@99</u> | 1@0 |
| 6 | 7 | High | 66 | Low | 20/100 | 40/216 | QPSK/CP-OFDM QPSK | NA | QPSK / CP-OFDM QPSK | <u>1@99</u> | 1@0 |

Test Setting for DC_7A_n78A Configuration

| | | | | | | | | | | | |
|---|---|------|----|------|--------|---------|-------------------|----|---------------------|-------------|--------------|
| 1 | 7 | Low | 78 | Low | 20/100 | 100/273 | QPSK/CP-OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | 1@0 |
| 2 | 7 | Mid | 78 | Low | 20/100 | 100/273 | QPSK/CP-OFDM QPSK | NA | QPSK / CP-OFDM QPSK | <u>1@99</u> | 1@0 |
| 3 | 7 | Mid | 78 | Low | 20/100 | 100/273 | QPSK/CP-OFDM QPSK | NA | QPSK / CP-OFDM QPSK | <u>1@27</u> | <u>1@272</u> |
| 4 | 7 | Low | 78 | Low | 20/100 | 100/273 | QPSK/CP-OFDM QPSK | NA | QPSK / CP-OFDM QPSK | <u>1@99</u> | <u>1@272</u> |
| 5 | 7 | High | 78 | High | 20/100 | 100/273 | QPSK/CP-OFDM QPSK | NA | QPSK / CP-OFDM QPSK | <u>1@77</u> | 1@0 |
| 6 | 7 | Mid | 78 | Mid | 20/100 | 100/273 | QPSK/CP-OFDM QPSK | NA | QPSK / CP-OFDM QPSK | <u>1@99</u> | <u>1@272</u> |
| 7 | 7 | High | 78 | Mid | 20/100 | 100/273 | QPSK/CP-OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | <u>1@272</u> |
| 8 | 7 | High | 78 | Low | 20/100 | 100/273 | QPSK/CP-OFDM QPSK | NA | QPSK / CP-OFDM QPSK | <u>1@99</u> | 1@0 |
| 9 | 7 | High | 78 | Mid | 20/100 | 100/273 | QPSK/CP-OFDM QPSK | NA | QPSK / CP-OFDM QPSK | <u>1@99</u> | 1@0 |

Test Settings for DC_8A_n1A Configuration

| | | | | | | | | | | | |
|---|---|-----|---|-----|-------|--------|-------------------|----|---------------------|-----|-----|
| 1 | 8 | Low | 1 | Low | 10/50 | 20/106 | QPSK/CP-OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | 1@0 |
|---|---|-----|---|-----|-------|--------|-------------------|----|---------------------|-----|-----|

Test Settings for DC_8A_n41A Configuration

| | | | | | | | | | | | |
|---|---|------|----|------|-------|---------|-------------------|----|---------------------|-------------|--------------|
| 1 | 8 | Low | 41 | Low | 10/50 | 100/273 | QPSK/CP-OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | 1@0 |
| 2 | 8 | High | 41 | High | 10/50 | 100/273 | QPSK/CP-OFDM QPSK | NA | QPSK / CP-OFDM QPSK | <u>1@49</u> | <u>1@272</u> |
| 3 | 8 | Mid | 41 | Mid | 10/50 | 100/273 | QPSK/CP-OFDM QPSK | NA | QPSK / CP-OFDM QPSK | <u>1@49</u> | <u>1@136</u> |
| 4 | 8 | Low | 41 | High | 10/50 | 100/273 | QPSK/CP-OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | <u>1@272</u> |

Test Settings for DC_8A_n78A Configuration

| | | | | | | | | | | | |
|---|---|------|----|------|-------|---------|-------------------|----|---------------------|-------------|--------------|
| 1 | 8 | High | 78 | Mid | 10/50 | 100/273 | QPSK/CP-OFDM QPSK | NA | QPSK / CP-OFDM QPSK | <u>1@49</u> | <u>1@272</u> |
| 2 | 8 | High | 78 | Low | 10/50 | 100/273 | QPSK/CP-OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | 1@0 |
| 3 | 8 | Low | 78 | High | 10/50 | 100/273 | QPSK/CP-OFDM QPSK | NA | QPSK / CP-OFDM QPSK | <u>1@49</u> | <u>1@272</u> |
| 4 | 8 | High | 78 | High | 10/50 | 100/273 | QPSK/CP-OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | 1@0 |

| | | | | | | | | | | | |
|---|---|------|----|------|-------|---------|--------------------------|----|---------------------------|-------------|-----|
| | | | | | | | QPSK | | QPSK | | |
| 5 | 8 | High | 78 | High | 10/50 | 100/273 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | <u>1@49</u> | 1@0 |
| 6 | 8 | Mid | 78 | Low | 10/50 | 100/273 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | <u>1@25</u> | 1@0 |

Test Setting for DC_12A_n66A Configuration

| | | | | | | | | | | | |
|---|----|------|----|------|-------|--------|--------------------------|----|---------------------------|-------------|-------|
| 1 | 12 | Low | 66 | Low | 10/50 | 40/216 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | 1@0 |
| 2 | 12 | High | 66 | High | 10/50 | 40/216 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | <u>1@49</u> | 1@215 |
| 3 | 12 | Low | 66 | High | 10/50 | 40/216 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | <u>1@49</u> | 1@215 |

Test Setting for DC_12A_n78A Configuration

| | | | | | | | | | | | |
|---|----|------|----|-----|-------|---------|--------------------------|----|---------------------------|-------------|--------------|
| 1 | 12 | Low | 78 | Low | 10/50 | 100/273 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | 1@0 |
| 2 | 12 | High | 78 | Low | 10/50 | 100/273 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | <u>1@49</u> | <u>1@272</u> |
| 3 | 12 | Low | 78 | Mid | 10/50 | 100/273 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | <u>1@136</u> |

Test Setting for DC_20A_n3A Configuration

| | | | | | | | | | | | |
|---|----|------|---|------|--------|--------|--------------------------|----|---------------------------|------|-------|
| 1 | 20 | Low | 3 | Low | 20/100 | 30/160 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | 1@0 |
| 2 | 20 | High | 3 | High | 20/100 | 30/160 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@99 | 1@159 |
| 3 | 20 | Low | 3 | High | 20/100 | 30/160 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | 1@159 |

Test Setting for DC_28A_n3A Configuration

| | | | | | | | | | | | |
|---|----|------|---|------|--------|--------|--------------------------|----|---------------------------|-------------|--------------|
| 1 | 28 | Low | 3 | Low | 20/100 | 30/160 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | 1@0 |
| 2 | 28 | High | 3 | High | 20/100 | 30/160 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | <u>1@99</u> | <u>1@159</u> |
| 3 | 28 | High | 3 | Low | 20/100 | 30/160 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | <u>1@99</u> | 1@0 |

Test Setting for DC_30A_n5A Configuration

| | | | | | | | | | | | |
|---|----|------|---|------|-------|--------|--------------------------|----|---------------------------|------|-------|
| 1 | 30 | High | 5 | High | 10/50 | 20/106 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@49 | 1@105 |
|---|----|------|---|------|-------|--------|--------------------------|----|---------------------------|------|-------|

Test Settings for DC_39A_n41A Configuration

| | | | | | | | | | | | |
|---|----|------|----|------|--------|---------|--------------------------|----|---------------------------|------|-------|
| 1 | 39 | High | 41 | High | 20/100 | 100/273 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@99 | 1@272 |
|---|----|------|----|------|--------|---------|--------------------------|----|---------------------------|------|-------|

Test Settings for DC_39A_n79A Configuration

| | | | | | | | | | | | |
|---|----|------|----|------|--------|---------|--------------------------|----|---------------------------|------|--------------|
| 1 | 39 | Low | 79 | Low | 20/100 | 100/273 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | 1@0 |
| 2 | 39 | High | 79 | High | 20/100 | 100/273 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@99 | 1@272 |
| 3 | 39 | Mid | 79 | High | 20/100 | 100/273 | QPSK/CP -OFDM | NA | QPSK / CP-OFDM | 1@0 | <u>1@136</u> |

| | | | | | | | | | | | |
|---|----|-----|----|--------|--------|---------|--------------------------|----|---------------------------|------|-----|
| | | | | | | | QPSK | | QPSK | | |
| 4 | 39 | Low | 79 | Note 5 | 20/100 | 100/273 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@99 | 1@0 |

Test Settings for DC_40A_n1A Configuration

| | | | | | | | | | | | |
|---|----|------|---|-----|--------|--------|--------------------------|----|---------------------------|------|------|
| 1 | 40 | Low | 1 | LOW | 20/100 | 20/106 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | 1@0 |
| 2 | 40 | High | 1 | LOW | 20/100 | 20/106 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | 1@0 |
| 3 | 40 | High | 1 | LOW | 20/100 | 20/106 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@99 | 1@81 |
| 4 | 40 | Mid | 1 | LOW | 20/100 | 20/106 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | 1@0 |

Test Settings for DC_40A_n41A Configuration

| | | | | | | | | | | | |
|---|----|------|----|------|--------|---------|--------------------------|----|---------------------------|------|-------|
| 1 | 40 | Low | 41 | Low | 20/100 | 100/273 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | 1@0 |
| 2 | 40 | High | 41 | High | 20/100 | 100/273 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@99 | 1@272 |
| 3 | 40 | Mid | 41 | High | 20/100 | 100/273 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@50 | 1@272 |
| 4 | 40 | Low | 41 | High | 20/100 | 100/273 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | 1@272 |

Test Settings for DC_40A_n78A Configuration

| | | | | | | | | | | | |
|---|----|------|----|------|--------|---------|--------------------------|----|---------------------------|------|-------|
| 1 | 40 | Low | 78 | HIGH | 20/100 | 100/273 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | 1@53 |
| 2 | 40 | Low | 78 | HIGH | 20/100 | 100/273 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@99 | 1@0 |
| 3 | 40 | Low | 78 | HIGH | 20/100 | 50/270 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | 1@269 |
| 4 | 40 | Low | 78 | HIGH | 20/100 | 100/273 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | 1@110 |
| 5 | 40 | High | 78 | LOW | 20/100 | 100/273 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | 1@0 |
| 6 | 40 | High | 78 | LOW | 20/100 | 100/273 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | 1@86 |
| 7 | 40 | High | 78 | LOW | 20/100 | 100/273 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@99 | 1@0 |
| 8 | 40 | Low | 78 | LOW | 20/100 | 100/273 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | 1@272 |

Test Settings for DC_41A_n79A Configuration

| | | | | | | | | | | | |
|---|----|------|----|--------|--------|---------|--------------------------|----|---------------------------|------|-------|
| 1 | 41 | Low | 79 | Low | 20/100 | 100/273 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | 1@0 |
| 2 | 41 | High | 79 | High | 20/100 | 100/273 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@99 | 1@272 |
| 3 | 41 | High | 79 | Note 6 | 20/100 | 100/273 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | 1@0 |

| | | | | | | | | | | | |
|---|----|--------|----|--------|--------|---------|--------------------------|----|---------------------------|------|-------|
| 4 | 41 | Mid | 79 | Low | 20/100 | 100/273 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | 1@136 |
| 5 | 41 | High | 79 | Low | 20/100 | 100/273 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@75 | 1@272 |
| 6 | 41 | High | 79 | Low | 20/100 | 100/273 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@99 | 1@136 |
| 7 | 41 | High | 79 | Low | 20/100 | 100/273 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@99 | 1@272 |
| 8 | 41 | Note 6 | 79 | Low | 20/100 | 100/273 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | 1@0 |
| 9 | 41 | High | 79 | Note 6 | 20/100 | 100/273 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@99 | 1@0 |

Test Settings for DC_66A_n2A Configuration

| | | | | | | | | | | | |
|---|----|------|---|------|--------|--------|--------------------------|----|---------------------------|------|-------|
| 1 | 66 | Low | 2 | Low | 20/100 | 20/106 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | 1@0 |
| 2 | 66 | High | 2 | High | 20/100 | 20/106 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@99 | 1@105 |
| 3 | 66 | Low | 2 | High | 20/100 | 20/106 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | 1@105 |
| 4 | 66 | Low | 2 | Low | 20/100 | 20/106 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | 1@105 |
| 5 | 66 | Low | 2 | Low | 20/100 | 20/106 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | 1@46 |

Test Settings for DC_66A_n78A Configuration

| | | | | | | | | | | | |
|---|----|------|----|------|--------|---------|--------------------------|----|---------------------------|------|-------|
| 1 | 66 | High | 78 | High | 20/100 | 100/273 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@99 | 1@272 |
| 2 | 66 | Low | 78 | Mid | 20/100 | 100/273 | QPSK/CP -OFDM QPSK | NA | QPSK / CP-OFDM QPSK | 1@0 | 1@247 |

Note 1: Use DC Configuration – specific test points if present in the table, otherwise use test points from matching Group Test Settings, if present in the table. Otherwise use the Default Test Settings test points.

Note 2: X, Y correspond to the different bands in the DC Configuration. E.g. for DC_1A_n3A, X=1, Y=3.

Note 3: Test Point ID 2 for DC_3A_n79A have the centre carrier frequency of 4480.5 MHz in Band 79 (NR ARFCN=698700). Test Point ID 6 for DC_3A_n79A have the centre carrier frequency of 4909.5 MHz in Band 79 (NR ARFCN=727300).

Note 4: Test Point ID 4 for DC_3A_n41A have the centre carrier frequency of 1773 MHz in Band 3 (EARFCN=19830).

Note 5: Test Point ID 4 for DC_39A_n79A have the centre carrier frequency of 4649.96 MHz in Band 79 (NR ARFCN=709998).

Note 6: Test Point ID 3 for DC_41A_n79A have the centre carrier frequency of 4869.5 MHz in Band 79 (NR ARFCN=724634). Test Point ID 8 for DC_41A_n79A have the centre carrier frequency of 2600 MHz in Band 41 (EARFCN=40690). Test Point ID 9 for DC_41A_n79A have the centre carrier frequency of 4760 MHz in Band 79 (NR ARFCN=717334).

Note 7: Test Point ID 2 for DC_5A_n78A have the centre carrier frequency of 3494 MHz in Band 78 (NR ARFCN=632932).

Note 8: Test Point ID 3 for DC_1A_n78A have the centre carrier frequency of 3470 MHz in Band 78 (NR ARFCN=631332).

Additional step 8 when both bands are TDD:

8. For both E-UTRA and NR UL uplink carriers active when both bands are TDD, ensure E-UTRA UL transmission overlaps with NR UL transmission in time by giving SCG a delay of 3 E-UTRA subframes, or by giving MCG a delay of 2 subframes.

6.5B.3.3.2.4.2 Test Procedure

Same test procedure as described in clause 6.5B.3.1.2.4.2 with the following exceptions:

Instead of Table 6.5B.3.1.2.3-1 --> use Table 6.5B.3.3.2.5-1 and 6.5B.3.3.2.5-2.

In addition to test configurations above, NSA only capable UEs needs to be tested according to LTE anchor agnostic approach below.

Same test description as in clause 6.5.3.2.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1.

For Initial conditions as in clause 6.5.3.2.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for the cell are set up according to TS 36.508 [11] clause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.5.3.2.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 36.508 [6] clause 4.5.
7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

6.5B.3.3.2.4.3 Message Contents

Message contents are according to TS 36.508 [11] clause 4.6.1 and TS 38.508-1 [6] clause 4.6.1 with the following exceptions.

Table 6.5B.3.3.2.4.3-1: SystemInformationBlockType1: tdd-Config if E-UTRA on TDD band

| Derivation Path: TS 36.508 [11], Table 4.6.3-23 | | | |
|---|--------------|-----------------------|-----------|
| Information Element | Value/remark | Comment | Condition |
| TDD-Config-DEFAULT ::= SEQUENCE { | | Operating on TDD band | |
| subframeAssignment | Sa2 | | |
| specialSubframePatterns | Ssp7 | | |
| } | | | |

Table 6.5B.3.3.2.4.3-1a: RRCConnectionReconfiguration: tdm-PatternConfig if E-UTRA on FDD band and UE does not support dynamic power sharing

| Derivation Path: TS 36.508 [11], Table 4.6.1-8 | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| tdm-PatternConfig-r15 CHOICE{ | | | |
| setup SEQUENCE { | | | |
| subframeAssignment-r15 | sa2 | | |
| harq-Offset-r15 | 0 | | |
| } | | | |
| } | | | |

Table 6.5B.3.3.2.4.3-2: RRCConnectionReconfiguration: nr-Config-r15

| Derivation Path: TS 36.508 [11], Table 4.6.1-8 | | | |
|--|--------------|---------|--|
| Information Element | Value/remark | Comment | Condition |
| p-MaxEUTRA-r15 | 23 | | Power Class 2 UE AND simultaneous E-UTRA and NR transmission |
| | 20 | | Power Class 3 UE AND simultaneous E-UTRA and NR transmission |

Table 6.5B.3.3.2.4.3-3: PhysicalCellGroupConfig

| Derivation Path: TS 38.508-1 [6] Table 4.6.3-106 | | | |
|--|--------------|---------|--|
| Information Element | Value/remark | Comment | Condition |
| p-NR-FR1 | 23 | | Power Class 2 UE AND simultaneous E-UTRA and NR transmission |
| | 20 | | Power Class 3 UE AND simultaneous E-UTRA and NR transmission |

6.5B.3.3.2.5 Test Requirement

The test requirements are in Table 6.5B.3.3.2.5-1 and Table 6.5B.3.3.2.5-2. For EN-DC only capable devices, in addition to Table 6.5B.3.3.2.5-1 and Table 6.5B.3.3.2.5-2, the test requirements as in clause 6.5.3.2.5 in TS 38.521-1 [8] are also needed.

Table 6.5B.3.3.2.5-1: Requirements for inter-band within FR1 for Rel-15

| EN-DC Configuration | Spurious emission | | | | | |
|---------------------|--|-----------------------|---|---------------------|-----------|------|
| | Protected band | Frequency range (MHz) | | Maximum Level (dBm) | MBW (MHz) | NOTE |
| DC_1_n78 | E-UTRA Band 3, 11, 21 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | Frequency range | 1880 | - | 1895 | -40 | 1 |
| DC_2_n5 | E-UTRA Band 42, 48 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | E-UTRA Band 41, 43 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| DC_2_n66 | E-UTRA Band 4, 10, 24, 50, 66, 70, 74 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | E-UTRA Band 2, 25 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | E-UTRA Band 42, 48 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| DC_2_n78 | E-UTRA Band 24, 50, 51, 74 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | E-UTRA Band 2, 25 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| DC_3_n7 | E-UTRA Band 5, 8, 20, 26, 27, 28, 44, 67 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | E-UTRA Band 42 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| DC_3_n41 | E-UTRA Band 5, 8, 20, 26, 27, 28, 44 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | E-UTRA Band 18, 19 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | E-UTRA Band 42, NR Band n77, n78, n79 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| DC_3_n78 | E-UTRA Band 3, 34, 39 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 |
| DC_3_n79 | E-UTRA Band 5, 8, 11, 18, 19, 21, 41 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| DC_5_n66 | E-UTRA Band 5, 6, 7, 8, 38 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | E-UTRA Band 26 | 859 | - | 869 | -27 | 1 |
| | E-UTRA Band 41, 42, 52 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | E-UTRA Band 18, 19 | F_{DL_low} | - | F_{DL_high} | -40 | 1 |
| DC_5_n78 | E-UTRA Band 1, 2, 3, 4, 7, 10, 25, 34, 38, 65, 66, 70 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | Frequency range | 1884.5 | | 1915.7 | -41 | 0.3 |
| | Frequency range | 2545 | | 2575 | -50 | 1 |
| | Frequency range | 2595 | | 2645 | -50 | 1 |
| | E-UTRA Band 41 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| DC_7_n78 | E-UTRA Band 3, 5, 8, 11, 18, 19, 20, 21, 26, 27, 28, 32, 50, 51, 67, 68, 74, 75, 76 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| DC_8_n41 | E-UTRA Band 28, n77, 78, 79 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | E-UTRA band 3, 42, 52 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| DC_8_n78 | E-UTRA band 34, 39, 40, 74 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | E-UTRA Band 3, 7, 41 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | E-UTRA Band 11, 21 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 |
| | E-UTRA Band 41 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| DC_12_n66 | E-UTRA Band 41 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| DC_30_n5 | E-UTRA Band 71 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| DC_39_n41 | E-UTRA Band 42, 44 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | NR Band n77, n78, n79 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| DC_39_n79 | E-UTRA Band 8, 41, 44 or NR Band n8, n41 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| DC_40_n41 | Bands 1, 34, 39, 65 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | NR Band n79 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 |
| DC_41_n79 | E-UTRA Band 1, 3, 5, 8, 9, 18, 19, 28, 34, 40, 44, 65 or NR Band n1, n3, n8, n28, n34, n40 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 |
| DC_66_n2 | E-UTRA Band 2, 22, 25, 42, 43 Band n7 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | E-UTRA Band 4, 10, 66 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | E-UTRA Band 50, 75 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | E-UTRA Band 24 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | E-UTRA Band 70 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |

| | | | | | | | |
|------------------|------------------------|---------------|---|----------------|-----|---|---|
| DC_66_n5 | E-UTRA Band 43 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |
| | E-UTRA Band 42, 48, 52 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | 2 |
| DC_66_n78 | E-UTRA Band 3, 34, 39 | F_{DL_low} | - | F_{DL_high} | -50 | 1 | |

NOTE 1: F_{DL_low} and F_{DL_high} refer to each E-UTRA frequency band specified in Table 5.5.1-1 of TS 36.101 [5].

NOTE 2: As exceptions, measurements with a level up to the applicable requirements defined in Table 6.6.3.1-2 of TS 38.101-3 [1] are permitted for each assigned E-UTRA carrier used in the measurement due to 2nd, 3rd, 4th or 5th harmonic spurious emissions. Due to spreading of the harmonic emission the exception is also allowed for the first 1 MHz frequency range immediately outside the harmonic emission on both sides of the harmonic emission. This results in an overall exception interval centred at the harmonic emission of $(2\text{MHz} + N \times L_{CRB} \times 180\text{kHz})$, where N is 2, 3, 4, 5 for the 2nd, 3rd, 4th or 5th harmonic respectively. The exception is allowed if the measurement bandwidth (MBW) totally or partially overlaps the overall exception interval.

NOTE 3: Applicable when co-existence with PHS system operating in 1884.5 -1915.7MHz

NOTE 4: Void.

NOTE 5: These requirements also apply for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.5.3.1-1 and Table 6.5A.3.1-1 of TS 38.101-1 [2] from the edge of the channel bandwidth.

NOTE 6: This requirement is applicable for any channel bandwidths within the range 2500 - 2570 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 2560.5 - 2562.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 2552 - 2560 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB.

NOTE 7: For these adjacent bands, the emission limit could imply risk of harmful interference to UE(s) operating in the protected operating band.

NOTE 8: This requirement is applicable for any channel bandwidths within the range 1920 - 1980 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 1927.5 – 1929.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 1930 - 1938 MHz the requirement is applicable only for an uplink.

NOTE 9: Applicable when the assigned E-UTRA carrier is confined within 718 MHz and 748 MHz and when the channel bandwidth used is 5 or 10 MHz.

NOTE 10: As exceptions, measurements with a level up to the applicable requirement of -36 dBm/MHz is permitted for each assigned E-UTRA carrier used in the measurement due to 2nd harmonic spurious emissions. An exception is allowed if there is at least one individual RB within the transmission bandwidth (see Figure 5.6-1) for which the 2nd harmonic totally or partially overlaps the measurement bandwidth (MBW).

NOTE 11: As exceptions, measurements with a level up to the applicable requirement of -38 dBm/MHz is permitted for each assigned E-UTRA carrier used in the measurement due to 3rd harmonic spurious emissions. An exception is allowed if there is at least one individual RB within the transmission bandwidth (see Figure 5.6-1) for which the 3rd harmonic totally or partially overlaps the measurement bandwidth (MBW).

NOTE 12: This requirement is applicable only for the following cases: - for carriers of 5 MHz channel bandwidth when carrier centre frequency (F_c) is within the range $902.5\text{ MHz} \leq F_c < 907.5\text{ MHz}$ with an uplink transmission bandwidth less than or equal to 20 RB - for carriers of 5 MHz channel bandwidth when carrier centre frequency (F_c) is within the range $907.5\text{ MHz} \leq F_c \leq 912.5\text{ MHz}$ without any restriction on uplink transmission bandwidth. - for carriers of 10 MHz channel bandwidth when carrier centre frequency (F_c) is $F_c = 910\text{ MHz}$ with an uplink transmission bandwidth less than or equal to 32 RB with $RBstart > 3$.

NOTE 13: Void.

NOTE 14: This requirement is applicable for 5 and 10 MHz E-UTRA channel bandwidth allocated within 718-728MHz. For carriers of 10 MHz bandwidth, this requirement applies for an uplink transmission bandwidth less than or equal to 30 RB with $RBstart > 1$ and $RBstart < 48$.

NOTE 15: Void.

NOTE 16: This requirement is applicable for any channel bandwidths within the range 1920 - 1980 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 1927.5 - 1929.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 1930 - 1938 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB.

NOTE 17: This requirement is applicable in the case of a 10 MHz E-UTRA carrier confined within 703 MHz and 733 MHz, otherwise the requirement of -25 dBm with a measurement bandwidth of 8 MHz applies.

NOTE 18: This requirement is only applicable for E-UTRA carriers with bandwidth confined within 1885-1920 MHz (requirement for carriers with at least 1RB confined within 1880 - 1885 MHz is not specified). This requirement applies for an uplink transmission bandwidth less than or equal to 54 RB for E-UTRA carriers of 15 MHz bandwidth when carrier centre frequency is within the range 1892.5 - 1894.5 MHz and for E-UTRA carriers of 20 MHz bandwidth when carrier centre frequency is within the range 1895 - 1903 MHz.

NOTE 19: Void.

Table 6.5B.3.3.2.5-2: Requirements for inter-band within FR1 for Rel-16

| EN-DC Configuration | Spurious emission | | | | | |
|---------------------|--|-----------------------|---|---------------------|-----------|------|
| | Protected band | Frequency range (MHz) | | Maximum Level (dBm) | MBW (MHz) | NOTE |
| DC_1_n3 | E-UTRA Band 1, 11, 21, 32, 43, 50, 65, 74, 75 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | NR Band 77, 78 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| DC_2_n5 | E-UTRA Band 42, 48 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | NR band n77 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| DC_3_n1 | E-UTRA Band 41, 43 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| DC_7_n1 | E-UTRA Band 1, 11, 21, 32, 50, 65, 74, 75 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| DC_7_n1 | E-UTRA Band 32, 50, 51, 75, 76 or NR Band n79 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| DC_8_n1 | E-UTRA Band 43 or NR Band n77, n78, n79 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| DC_7_n66 | E-UTRA Band 5, 12, 13, 14, 17, 26, 27, 28, 29, 85 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | E-UTRA band 42 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| DC_12_n66 | E-UTRA Band 41, 53 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | NR band n77 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| DC_12_n78 | E-UTRA Band 2, 7, 25, 41 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | E-UTRA Band 4, 66 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 |
| DC_13_n66 | E-UTRA Band 41, 53 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | NR Band n77 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| DC_20_n3 | E-UTRA Band 7, 8 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | E-UTRA Band 38, 42, 52 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| DC_28_n3 | NR Band n77 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | E-UTRA Band 7, 41 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| DC_30_n5 | E-UTRA Band 71 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | NR band n77 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| DC_40_n1 | E-UTRA Band 7, 31, 32, 41, 45, 50, 72, 73, 74, 75 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| DC_40_n78 | E-UTRA Band 5, 8, 20, 26, 27, 28, 32, 44, 45, 50, 51, 74, 75, 76 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |
| | NR Band n79 | F_{DL_low} | - | F_{DL_high} | -50 | 1 |

NOTE 1: F_{DL_low} and F_{DL_high} refer to each E-UTRA frequency band specified in Table 5.5-1 in TS 36.101 [5].

NOTE 2: As exceptions, measurements with a level up to the applicable requirements defined in Table 6.6.3.1-2 are permitted for each assigned E-UTRA carrier used in the measurement due to 2nd, 3rd, 4th or 5th harmonic spurious emissions. Due to spreading of the harmonic emission the exception is also allowed for the first 1 MHz frequency range immediately outside the harmonic emission on both sides of the harmonic emission. This results in an overall exception interval centred at the harmonic emission of $(2 \text{ MHz} + N \times L_{CRB} \times 180 \text{ kHz})$, where N is 2, 3, 4, 5 for the 2nd, 3rd, 4th or 5th harmonic respectively. The exception is allowed if the measurement bandwidth (MBW) totally or partially overlaps the overall exception interval.

NOTE 3: Applicable when co-existence with PHS system operating in 1884.5 - 1915.7 MHz

NOTE 4: Void.

NOTE 5: These requirements also apply for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.5.3.1-1 and Table 6.5A.3.1-1 of TS 38.101-1 [2] from the edge of the channel bandwidth.

NOTE 6: This requirement is applicable for any channel bandwidths within the range 2500 - 2570 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 2560.5 - 2562.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 2552 - 2560 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB.

NOTE 7: For these adjacent bands, the emission limit could imply risk of harmful interference to UE(s) operating in the protected operating band.

NOTE 8: This requirement is applicable for any channel bandwidths within the range 1920 - 1980 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 1927.5 - 1929.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 1930 - 1938 MHz the requirement is applicable only for an uplink

NOTE 9: Applicable when the assigned E-UTRA carrier is confined within 718 MHz and 748 MHz and when the channel bandwidth used is 5 or 10 MHz.

NOTE 10: As exceptions, measurements with a level up to the applicable requirement of -38 dBm/MHz is permitted for each assigned E-UTRA carrier used in the measurement due to 2nd harmonic spurious emissions. An exception is allowed if there is at least one individual RB within the transmission bandwidth (see Figure 5.6-1)

for which the 2nd harmonic totally or partially overlaps the measurement bandwidth (MBW).

NOTE 11: As exceptions, measurements with a level up to the applicable requirement of -36 dBm/MHz is permitted for each assigned E-UTRA carrier used in the measurement due to 3rd harmonic spurious emissions. An exception is allowed if there is at least one individual RB within the transmission bandwidth (see Figure 5.6-1) for which the 3rd harmonic totally or partially overlaps the measurement bandwidth (MBW).

NOTE 12: This requirement is applicable only for the following cases: A: for carriers of 5 MHz channel bandwidth when carrier centre frequency (F_c) is within the range $902.5 \text{ MHz} \leq F_c < 907.5 \text{ MHz}$ with an uplink transmission bandwidth less than or equal to 20 RB; B: for carriers of 5 MHz channel bandwidth when carrier centre frequency (F_c) is within the range $907.5 \text{ MHz} \leq F_c \leq 912.5 \text{ MHz}$ without any restriction on uplink transmission bandwidth; C: for carriers of 10 MHz channel bandwidth when carrier centre frequency (F_c) is $F_c = 910 \text{ MHz}$ with an uplink transmission bandwidth less than or equal to 32 RB with $RB_{start} > 3$.

NOTE 13: Void.

NOTE 14: This requirement is applicable for 5 and 10 MHz E-UTRA channel bandwidth allocated within 718-728MHz. For carriers of 10 MHz bandwidth, this requirement applies for an uplink transmission bandwidth less than or equal to 30 RB with $RB_{start} > 1$ and $RB_{start} < 48$.

NOTE 15: Void.

NOTE 16: This requirement is applicable for any channel bandwidths within the range 1920 - 1980 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 1927.5 - 1929.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 1930 - 1938 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB.

NOTE 17: This requirement is applicable in the case of a 10 MHz E-UTRA carrier confined within 703 MHz and 733 MHz, otherwise the requirement of -25 dBm with a measurement bandwidth of 8 MHz applies.

NOTE 18: This requirement is only applicable for E-UTRA carriers with bandwidth confined within 1885 - 1920 MHz (requirement for carriers with at least 1RB confined within 1880 - 1885 MHz is not specified). This requirement applies for an uplink transmission bandwidth less than or equal to 54 RB for E-UTRA carriers of 15 MHz bandwidth when carrier centre frequency is within the range 1892.5 - 1894.5 MHz and for E-UTRA carriers of 20 MHz bandwidth when carrier centre frequency is within the range 1895 - 1903 MHz.

NOTE 19: Void.

NOTE 20: Void.

NOTE 21: Void.

6.5B.3.4 Spurious Emissions for Inter-band including FR2

Editor's note: This clause is complete for Band n257, n258 and n261. The following aspects are either missing or not yet determined:

- The referred test case 6.5.3 in TS 38.521-2 [9] is incomplete for frequency above 66GHz.

6.5B.3.4.1 General Spurious Emissions for Inter-band including FR2 (2 CCs)

6.5B.3.4.1.1 Test purpose

Same test purpose as in clause 6.5.3.1.1 in TS 38.521-2 [9] for the NR carrier.

6.5B.3.4.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 2 UL CCs.

6.5B.3.4.1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.5.3.1.3 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.5B.3.4.

6.5B.3.4.1.4 Test description

6.4B.3.4.1.4.1 Initial conditions

Same test description as in clause 6.5.3.1.4 in TS 38.521-2 [9] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1. For Initial conditions as in clause 6.5.3.1.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

2.1 The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.

3.1 The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.5.3.1.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.5.3.1.4.1 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.5B.3.4.1.5 Test requirement

Same test requirement as in clause 6.5.3.1.5 in TS 38.521-2 [9] for the NR carrier.

6.5B.3.4.1_1 Transmitter Spurious emissions for Inter-band EN-DC including FR2 (>2 CCs)

Editor's note: Test applicability, Test Description in below sub-clauses requires updates to clarify number of E-UTRA carriers that will be configured during the test that will be limited to only 1 E-UTRA CC

6.5B.3.4.1_1.1 Transmitter Spurious emissions for Inter-band EN-DC including FR2 (3 CCs)

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- Test configuration table and Connection diagram in TS 38.521-2 [9] are TBD
- The referred test case 6.5A.3.1.1 in TS 38.521-2 [9] is incomplete.

6.5B.3.4.1_1.1.1 Test purpose

Same test purpose as in clause 6.5.3.1 in TS 38.521-2 [9] for the NR carrier.

6.5B.3.4.1_1.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 3 UL CCs (2NR UL CCs).

6.5B.3.4.1_1.1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.5.3.3 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.4B.3.4.

6.5B.3.4.1_1.1.4 Test description

6.5B.3.4.1_1.1.4.1 Initial condition

Same test description as in clause 6.5A.3.1.1.4 in TS 38.521-2 [9] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1.

For Initial conditions as in clause 6.5A.3.1.1.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.5A.3.1.1.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.5A.3.1.1.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

- 1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.5B.3.4.1_1.1.5 Test Requirements

Same test requirement as in clause 6.5A.3.1.1.5 in TS 38.521-2 [9] for the NR carrier.

6.5B.3.4.1_1.2 Transmitter Spurious emissions for Inter-band EN-DC including FR2 (4 CCs)

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- Test configuration table and Connection diagram in TS 38.521-2 [9] are TBD
- The referred test case 6.5A.3.1.2 in TS 38.521-2 [9] is incomplete.

6.5B.3.4.1_1.2.1 Test purpose

Same test purpose as in clause 6.5.3.1 in TS 38.521-2 [9] for the NR carrier.

6.5B.3.4.1_1.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 4 UL CCs (3NR UL CCs).

6.5B.3.4.1_1.2.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.5.3.3 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.4B.3.4.

6.5B.3.4.1_1.2.4 Test description

6.5B.3.4.1_1.2.4.1 Initial condition

Same test description as in clause 6.5A.3.1.2.4 in TS 38.521-2 [9] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1.

For Initial conditions as in clause 6.5A.3.1.2.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.5A.3.1.2.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.5A.3.1.2.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.5B.3.4.1_1.2.5 Test Requirements

Same test requirement as in clause 6.5A.3.1.2.5 in TS 38.521-2 [9] for the NR carrier.

6.5B.3.4.1_1.3 Transmitter Spurious emissions for Inter-band EN-DC including FR2 (5 CCs)

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- Test configuration table and Connection diagram in TS 38.521-2 [9] are TBD
- The referred test case 6.5A.3.1.3 in TS 38.521-2 [9] is incomplete.

6.5B.3.4.1_1.3.1 Test purpose

Same test purpose as in clause 6.5.3.1 in TS 38.521-2 [9] for the NR carrier.

6.5B.3.4.1_1.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 5 UL CCs (4NR UL CCs).

6.5B.3.4.1_1.3.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.5.3.3 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.4B.3.4.

6.5B.3.4.1_1.3.4 Test description

6.5B.3.4.1_1.3.4.1 Initial condition

Same test description as in clause 6.5A.3.1.3.4 in TS 38.521-2 [9] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1.

For Initial conditions as in clause 6.5A.3.1.3.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.5A.3.1.3.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.5A.3.1.3.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

- 1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.5B.3.4.1_1.3.5 Test Requirements

Same test requirement as in clause 6.5A.3.1.3.5 in TS 38.521-2 [9] for the NR carrier.

6.5B.3.4.1D Spurious Emissions for inter-band EN-DC including FR2 for UL-MIMO

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- The referred test case 6.5D.3 in TS 38.521-2 [9] is incomplete

6.5B.3.4.1D.1 Test purpose

Same test purpose as in clause 6.5D.3.1 in TS 38.521-2 [9] for the NR carrier.

6.5B.3.4.1D.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC FR2.

6.5B.3.4.1D.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.5D.3.1 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this measurement is TS 38.101-3 [4] clause 6.5B.3.4.

6.5B.3.4.1D.4 Test Description

Same test description as in clause 6.5D.3.1 in TS 38.521-2 [9] for the NR carrier with the following exceptions:

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1.

For Initial conditions as in clause 6.5D.3.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for the cell are set up according to TS 36.508 [11] subclause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.5D.3.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.
7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

6.5B.3.4.1D.5 Test Requirement

Same test requirement as specified in TS 38.521-2 [9] clause 6.5D.3.1 for the NR carrier(s).

6.5B.3.4.2 Spurious emission band UE co-existence for Inter-band including FR2

Editor's note: The following aspects are either missing or not yet determined:

- The referred test case 6.5.3.2 in TS 38.521-2 [9] is incomplete for PC1, PC2 and PC4.

6.5B.3.4.2.1 Test purpose

Same test purpose as in clause 6.5.3.2.1 in TS 38.521-2 [9] for the *NR* carrier.

6.5B.3.4.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2.

6.5B.3.4.2.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.5.3.2.3 in TS 38.521-2 [9] for the *NR* carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.5B.3.4.1.

6.5B.3.4.2.4 Test description

Same Test description as in clause 6.5.3.2.4 in TS 38.521-2 [9] for the *NR* carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1.

For initial conditions as in clause 6.5.3.2.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

2.1 The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.

3.1 The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.5.3.2.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.5.3.2.4.1 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.5B.3.4.2.5 Test requirement

Same Test requirement as in clause 6.5.3.2.5 in TS 38.521-2 [9] for the *NR* carrier.

6.5B.3.5 Spurious emissions for Inter-band including FR1 and FR2

6.5B.3.5.1 General Spurious Emissions for Inter-band including FR1 and FR2

6.5B.3.5.1.1 Test purpose

Same test purpose as in clause 6.5.3 in TS 38.521-1 [8] for NR FR1 carrier(s) and clause 6.5.3 in TS 38.521-2 [9] for NR FR2 carrier(s).

6.5B.3.5.1.2 Test applicability

The requirements in this test are not testable due to issues with combined testing of NR FR1 and E-UTRA in conducted mode with NR FR2 in radiated mode. Therefore, the conducted and radiated requirements are tested separately.

No test case details are specified. The NSA requirements for spurious emissions apply and are tested as part of the EN-DC within FR1 and EN-DC including FR2 test cases in clause 6.5B.3.

6.5B.3.5.2 Spurious emission band UE co-existence for Inter-band including FR1 and FR2

6.5B.3.5.2.1 Test purpose

Same test purpose as in clause 6.5.3 in TS 38.521-1 [8] for NR FR1 carrier(s) and clause 6.5.3 in TS 38.521-2 [9] for NR FR2 carrier(s).

6.5B.3.5.2.2 Test applicability

The requirements in this test are not testable due to issues with combined testing of NR FR1 and E-UTRA in conducted mode with NR FR2 in radiated mode. Therefore, the conducted and radiated requirements are tested separately.

No test case details are specified. The NSA requirements for spurious emissions apply and are tested as part of the EN-DC within FR1 and EN-DC including FR2 test cases in clause 6.5B.3.

6.5B.4 Additional Spurious Emissions for EN-DC

6.5B.4.1 Additional Spurious Emissions for Intra-band contiguous EN-DC

6.5B.4.1.1 Test purpose

To verify that UE transmitter does not cause unacceptable interference to other channels or other systems in terms of transmitter spurious emissions under the deployment scenarios where additional requirements are specified.

6.5B.4.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward supporting intra-band contiguous EN-DC.

6.5B.4.1.3 Minimum conformance requirements

These requirements are specified in terms of an additional spectrum emission requirement. Additional spurious emission requirements are signalled by the network to indicate that the UE shall meet an additional requirement for a specific deployment scenario as part of the cell handover/broadcast message.

NOTE: For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the measurement bandwidth defined for the protected band.

6.5B.4.1.3.1 Minimum requirement (network signalled value "NS_04")

When "NS 04" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5B.4.1.3.1-1. This requirement also applies for the frequency ranges that are less than F_{00B} (MHz) in Table 6.6.3.1-1 of TS 38.521-1 [8] from the edge of the channel bandwidth.

Table 6.5B.4.1.3.1-1: Additional requirements

| Frequency band (MHz) | Channel bandwidth / Spectrum emission limit (dBm) | Measurement bandwidth |
|-----------------------------|--|--|
| 2495 ≤ f < 2496 | -13 | 1% of Channel BW for contiguous BW up to 100 MHz, 1 MHz for contiguous BW > 100 MHz |
| 2490.5 ≤ f < 2495 | -13 | 1 MHz |
| 0 < f < 2490.5 | -25 | 1 MHz |

The normative reference for this requirement is TS 38.101-3 [4] clause 6.5B.4.1.1.

Exception requirements for both NR and E-UTRA are defined for this test. LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

6.5B.4.1.4 Test description

6.5B.4.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and sub-carrier spacing based on NR operating bands specified in table 5.2B.2.1-1. All of these configurations shall be tested with applicable test parameters for each combination of test channel bandwidth and sub-carrier spacing are shown in Table 6.5B.4.1.4.1-1 for E-UTRA and Table 6.5B.4.1.4.1-2 for NR. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex TS 36.521-1 [10] Annex C and in TS 38.521-1 [8] Annex C2 for LTE link and NR link respectively.

Table 6.5B.4.1.4.1-1: EN-DC test configuration table for NS_04

| Initial Conditions | | | | | | | |
|--|---|------------------------|----------------------------|------------------------|-----------------------|----------------|--------|
| Test Environment as specified in TS 38.508-1 [6] clause 4.1 | NC | | | | | | |
| Test Frequencies as specified in TS 38.508-1 [6] clause 4.3.1 | Low range, High range | | | | | | |
| Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1 | Lowest N_{RB_agg} , Highest N_{RB_agg} (Note 2) | | | | | | |
| Test SCS for the NR cell as specified in TS 38.521-1 [8] Table 5.3.5-1 | Lowest SCS per Channel Bandwidth | | | | | | |
| Test Parameters | | | | | | | |
| Test ID | Freq | Downlink Configuration | EN-DC Uplink Configuration | | | | |
| | | | E-UTRA Cell | NR Cell | | Common | |
| Modulation | RB allocation (Note 5) | | Modulation | RB allocation (Note 1) | Power config (Note 6) | | |
| 1 | Default | | 16QAM | Outer_Full | DFT-s-OFDM QPSK | Outer_Full | B or C |
| 2 (Note 3) | Default | | 16QAM | Outer_1RB_Left | DFT-s-OFDM QPSK | Edge_1RB_Right | B or D |
| 3 (Note 3) | Low | | 16QAM | Outer_1RB_Left | DFT-s-OFDM QPSK | N/A | A |
| 4 (Note 3) | High | | 16QAM | N/A | DFT-s-OFDM QPSK | Edge_1RB_Right | A |
| 5 (Note 4) | Default | | 16QAM | Outer_1RB_Right | DFT-s-OFDM QPSK | Edge_1RB_Left | B or D |
| 6 (Note 4) | Low | | 16QAM | N/A | DFT-s-OFDM QPSK | Edge_1RB_Left | A |
| 7 (Note 4) | High | | 16QAM | Outer_1RB_Right | DFT-s-OFDM QPSK | N/A | A |
| 8 | Default | | 16QAM | Outer_Full | CP-OFDM 256QAM | Outer_Full | B or C |
| 9 (Note 3) | Low | | 16QAM | Outer_1RB_Left | CP-OFDM 256QAM | Edge_1RB_Right | B or D |
| 10 (Note 4) | High | 16QAM | Outer_1RB_Right | CP-OFDM 256QAM | Edge_1RB_Left | B or D | |
| 11 (Note 4) | Default | 16QAM | Edge_Full_Right | CP-OFDM 256QAM | Edge_Full_Left | B or E | |
| NOTE 1: The specific configuration of each RB allocation is defined in Table 6.1-1 in TS 38.521-1 [8]. | | | | | | | |
| NOTE 2: If the UE supports multiple CC combinations in the EN-DC configuration with the same N_{RB_agg} , select the combination to test as follows: | | | | | | | |
| - Lowest ENBW: NR component with lowest N_{RB} is tested. | | | | | | | |
| - Highest ENBW: NR component with highest N_{RB} is tested. | | | | | | | |
| NOTE 3: Applicable when E-UTRA cell carrier frequency is lower than NR cell carrier. | | | | | | | |
| NOTE 4: Applicable when NR cell carrier frequency is lower than E-UTRA cell carrier. | | | | | | | |
| NOTE 5: Outer_Full defined as the transmission bandwidth configuration N_{RB} per channel bandwidth for the E-UTRA component as indicated in TS 36.521 [10] Table 5.4.2-1. Outer_1RB_Left defined as 1 RB allocated at the left edge of the E-UTRA component. Outer_1RB_Right defined as 1 RB allocated at the right edge of the E-UTRA component. | | | | | | | |
| NOTE 6: Power config as specified in Table 6.2B.3.1.4.3-2. | | | | | | | |
| NOTE 7: Test IDs with simultaneous E-UTRA and NR UL transmission only apply for UEs indicating dualPA-Architecture. | | | | | | | |

1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [6] Annex A, Figure A.3.1.1.1 for SS diagram and clause A.3.2.1 for UE diagram.
2. The parameter settings for NR cell are set up according to TS 38.508-1 [6] clause 4.4.3.
3. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
4. E-UTRA downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0 of TS 36.521-1 [10].
5. NR downlink signals are initially set up according to Annex C.0, C.1 and C.2, and uplink signals according to Annex G.0, G.1, G.2, G.3.0 of TS 38.521-1 [8].
6. The UL Reference Measurement channels are set according to Table 6.5B.4.1.4.1-1.

7. NR propagation conditions are set according to B.0 of TS 38.521-1 [8]. E-UTRA propagation conditions are set according to B.0 of TS 36.521-1 [10].
8. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 6.5B.4.1.4.3.

6.5B.4.1.4.2 Test Procedure

1. E-UTRA SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.5B.4.1.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.
2. NR SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format [0_1] for C_RNTI to schedule the UL RMC according to Table 6.5B.4.1.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.
3. Send continuously uplink power control "up" commands to the UE for both NR and E-UTRA carriers until the UE transmits at its P_{UMAX} level; allow at least 200 ms starting from the first TPC command in this step for the UE to reach P_{UMAX} level.
4. Measure the mean power of each component carriers for the EN-DC configuration, which shall meet the requirements described in 6.2B.3.1.5.2 depending NS-values. The period of the measurement shall be at least the continuous duration of one sub-frame.
5. Measure the power of the transmitted signal with a measurement filter of bandwidths according to table 6.5B.4.1.3.1 -1. The centre frequency of the filter shall be stepped in contiguous steps according to the same table. The measured power shall be recorded for each step. The measurement period shall capture the active time slots.

6.5B.4.1.4.3 Message Contents

Message contents are according to TS 38.508-1 [5] clause 4.6 with the following exceptions for each network signalled value.

6.5B.4.1.4.3.1 Message contents exceptions for network signalled value "NS_04"

1. Information element additionalSpectrumEmission is set to NS_04. This can be set in *SIB1* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.5B.4.1.4.3.1-1: AdditionalSpectrumEmission: Additional spurious emissions test requirement for "NS_04"

| Derivation Path: TS 38.508-1 [5] clause 4.6.3, Table 4.6.3-1 | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| additionalSpectrumEmission | 1 (NS_04) | | |

Table 6.5B.4.1.4.3.1-2: RRCConnectionReconfiguration: nr-Config-r15

| Derivation Path: TS 36.508 [11], Table 4.6.1-8 | | | |
|--|--------------|---------|--|
| Information Element | Value/remark | Comment | Condition |
| p-MaxEUTRA-r15 | 23 | | Power Class 2 UE AND simultaneous E-UTRA and NR transmission |
| | 20 | | Power Class 3 UE AND simultaneous E-UTRA and NR transmission |

Table 6.5B.4.1.4.3.1-3: PhysicalCellGroupConfig

| Derivation Path: TS 38.508-1 [6] Table 4.6.3-106 | | | |
|--|--------------|---------|--|
| Information Element | Value/remark | Comment | Condition |
| p-NR-FR1 | 23 | | Power Class 2 UE AND simultaneous E-UTRA and NR transmission |
| | 20 | | Power Class 3 UE AND simultaneous E-UTRA and NR transmission |

6.5B.4.1.5 Test Requirement

Test requirements for additional spurious emissions for intra-band contiguous EN-DC are the same as the minimum requirements described in clause 6.5B.4.1.3 and are not repeated in this clause.

6.5B.4.2 Additional Spurious Emissions for Intra-band non-contiguous EN-DC

Editor's note: Wgap for intra-band non-contiguous EN-DC is FFS in TS 38.508-1

6.5B.4.2.1 Test purpose

Same minimum conformance requirements as in clause 6.5B.4.1.1.

6.5B.4.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band non-contiguous EN-DC.

6.5B.4.2.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.5B.4.1.3.

6.5B.4.2.4 Test description

6.5B.4.2.4.1 Initial conditions

Same initial conditions as described in clause 6.5B.4.1.4.1 for both E-UTRA and NR carriers with the following exception:

1. For each EN-DC combination specified in Table 5.3B.1.3-1, channel spacing between NR and E-UTRA is specified according to clause 5.4B.1.
2. Set up the NR and E-UTRA test frequencies so that NR carrier is located at the lower frequency side as specified in Table 5.3B.1.3-1. Repeat each testing with E-UTRA carrier frequency is located at the lower side as specified in Table 5.3B.1.3-1.

6.5B.4.2.4.2 Test Procedure

Same test procedure as described in clause 6.5B.4.1.4.2.

6.5B.4.2.4.3 Message Contents

Message contents are according to TS 38.508-1 [5] clause 4.6 with the following exceptions for each network signalled value.

6.5B.4.2.4.3.1 Message contents exceptions for network signalled value "NS_04"

1. Information element additionalSpectrumEmission is set to NS_04. This can be set in *SIB1* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.5B.4.2.4.3.1-1: AdditionalSpectrumEmission: Additional spurious emissions test requirement for "NS_04"

| Derivation Path: TS 38.508-1 [5] clause 4.6.3, Table 4.6.3-1 | | | |
|--|--------------|---------|-----------|
| Information Element | Value/remark | Comment | Condition |
| additionalSpectrumEmission | 1 (NS_04) | | |

6.5B.4.2.5 Test Requirement

Test requirements for Spurious Emissions for intra-band non-contiguous EN-DC are the same as the minimum requirements described in 6.5B.4.2.3 and are not repeated in this clause.

6.5B.4.3 Additional Spurious Emissions for Inter-band EN-DC within FR1**6.5B.4.3.1 Test purpose**

Same test purpose as in clause 6.5.3.3.1 in TS 38.521-1 [8] for the NR carrier.

6.5B.4.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward supporting inter-band EN-DC

6.5B.4.3.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.5.3.3.3 in TS 38.521-1 [8] for the NR carrier.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.5B.4.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.5B.4.3.4 Test description

Same test description as in clause 6.5.3.3.4 in TS 38.521-1 [8] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1. For Initial conditions as in clause 6.5.3.3.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.5.3.3.4.1 in TS 38.521-1 [8] is replaced by the following two steps:

- 6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.
- 7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

Same test procedure as in clause 6.5.3.3.4.2 in TS 38.521-1 [8].

6.5B.4.3.5 Test Requirement

Same test requirement as in clause 6.5.3.3.5 in TS 38.521-1 [8] for the NR carrier.

6.5B.5 Transmit intermodulation

6.5B.5.1 Intra-band contiguous EN-DC

6.5B.5.2 Intra-band non-contiguous EN-DC

6.5B.5.3 Inter-band EN-DC within FR1

6.5B.5.3.1 Test purpose

Same test purpose as in clause 6.5.4 in TS 38.521-1 [8] for the NR carrier.

6.5B.5.3.2 Test applicability

Editor's note: wrong clause starts here!

6.5B.5.3.3 Minimum conformance requirements

The transmit intermodulation requirement specified in clauses 6.7.1 and 6.7.1A of TS 36.101 [5] and clauses 6.5.4 and 6.5A.4 of TS 38.101-1 [2] apply for each component carrier in E-UTRA bands and NR bands, respectively.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this measurement is TS 38.101-3 [4] clause 6.5B.5.3.

6.5B.5.3.4 Test description

Same test description as in clause 6.5.4.4 in TS 38.521-1 [8] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1. For Initial conditions as in clause 6.5.4.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.5.4.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG according to TS 38.508 [6] clause 4.5.

Same test procedure as in clause 6.5.4.4.2 in TS 38.521-1 [8].

6.5B.5.3.5 Test Requirement

The ratio derived in step 6 and 8, shall not exceed the described value in Table 6.5.4.5-1 defined in TS 38.521-1 [8].

6.5B.5.4 Inter-band EN-DC including FR2

6.5B.5.5 Inter-band EN-DC including both FR1 and FR2

7 Receiver characteristics

7.1 General

Editor's note: Test configurations/environments that require new spherical scan shall be included in test procedure clause and identifying such scenarios is currently FFS and owned by RAN5.

Unless otherwise stated the receiver characteristics are specified at the antenna connector(s) of the UE for the bands operating on frequency range 1 and over the air of the UE for the bands operating on frequency range 2. The requirements for frequency range 1 and frequency range 2 can be verified separately. For the carrier in frequency range 1, requirements can be verified with NR FR2 link disabled. For the carrier in frequency range 2, requirements can be verified in OTA mode with E-UTRA connecting to the network by OTA without calibration.

For NR FR2 Rx test cases the identified beam peak direction can be stored and reused for a device under test in various configurations/environments for the full duration of device testing as long as beam peak direction is the same.

The requirements defined in this clause are the extra requirements compared with the single carrier requirements defined in TS 38.521-1 [8] and TS 38.521-2 [9].

Unless otherwise stated, the UL and DL reference measurement channels are the same with the configurations specified in TS 38.521-1 [8] and TS 38.521-2 [9].

Unless otherwise stated, requirements for NR receiver written in TS 38.521-1 [8] and TS 38.521-2 [9] apply and are assumed anchor agnostic. Requirements are verified under conditions where anchor resources do not interfere NR operation.

For intra-band non-contiguous EN-DC, the output power is configured as follows:

- One E-UTRA uplink carrier with the output power set to 29dB below $P_{CMAX,L,c}$ and the NR band whose downlink is being tested has its uplink carrier output power set to 4dB below $P_{CMAX,L,f,c}$.
- One NR uplink carrier with the output power set to 29dB below $P_{CMAX,L,f,c}$ and the E-UTRA band whose downlink is being tested has its uplink carrier output power set to 4 dB below $P_{CMAX,L,c}$.

For the additional requirements for intra-band non-contiguous EN-DC of two sub-blocks, an in-gap test refers to the case when the interfering signal is located at a negative offset with respect to the assigned lowest channel frequency of the highest sub-block and located at a positive offset with respect to the assigned highest channel frequency of the lowest sub-block.

For the additional requirements for intra-band non-contiguous EN-DC of two sub-blocks, an out-of-gap test refers to the case when the interfering signal(s) is (are) located at a positive offset with respect to the assigned channel frequency of the highest carrier frequency or located at a negative offset with respect to the assigned channel frequency of the lowest carrier frequency.

For the additional requirements for intra-band non-contiguous EN-DC of two sub-blocks with channel bandwidth larger than or equal to 5 MHz, the existing adjacent channel selectivity requirements, in-band blocking requirements (for each case), and narrow band blocking requirements apply for in-gap tests only if the corresponding interferer frequency offsets with respect to the two measured carriers satisfy the following condition in relation to the sub-block gap size W_{gap} for at least one of the E-UTRA or NR sub-blocks, so that the interferer frequency position does not change the nature of the core requirement tested:

$$W_{gap} \geq 2 \cdot |F_{Interferer}(\text{offset})| - BW_{Channel}$$

For the E-UTRA sub-block, the $F_{Interferer}(\text{offset})$, for a sub-block with a single component carrier is the interferer frequency offset with respect to carrier as specified in clause 7.5.1, clause 7.6.1 and clause 7.6.3 for the respective requirement in TS 36.521 [10] and $BW_{Channel}$. $F_{Interferer}(\text{offset})$ for the E-UTRA sub-block with two or more contiguous component carriers

is the interference frequency offset with respect to the carrier adjacent to the gap is specified in clause 7.5.1A, 7.6.1A and 7.6.3A in TS 36.521 [10].

For the NR sub-block, the $F_{\text{Interferer (offset)}}$, for a sub-block with a single component carrier is the interferer frequency offset with respect to carrier as specified in clause 7.5, clause 7.6.2 and clause 7.6.4 for the respective requirement in TS 38.521-1 [8] and BW_{Channel} .

The interferer frequency offsets for adjacent channel selectivity, each in-band blocking case and narrow- band blocking shall be tested separately with a single in-gap interferer at a time.

Unless otherwise stated, Channel Bandwidth shall be prioritized in the selecting of test points. Subcarrier spacing shall be selected after Test Channel Bandwidth is selected.

For conformance testing involving FR2 test cases in this specification, the UE under test shall be pre-configured with UL Tx diversity schemes disabled to account for single polarization System Simulator (SS) in the test environment. The UE under test may transmit with dual polarization.

7.2 Void

7.3 Void

7.3A Reference sensitivity for CA without EN-DC

7.3A.1 General

For NR CA operation NR single carrier REFSENS requirements defined in TS 38.101-1 [2] and TS 38.101-2 [3] apply to all downlink bands part of NR CA configurations listed in Table 5.2A.1-1 unless sensitivity degradation is allowed as defined in clause 7.3A in TS 38.101-3 [4].

7.3A.2 Reference sensitivity power level for CA without EN-DC

7.3A.2.1 Test purpose

Same test purpose as in clause 7.3.2 in TS 38.521-1 [8] for NR FR1 carrier(s) and clause 7.3.2 in TS 38.521-2 [9] for NR FR2 carrier(s).

7.3A.2.2 Test applicability

The requirements in this test are not testable due to issues with combined testing of NR FR1 conducted mode with NR FR2 in radiated mode. Therefore, the conducted and radiated requirements are tested separately.

No test case details are specified. The SA requirements for receiver sensitivity power level apply and are tested in TS 38.521-1 [8] clauses 7.3 and 7.3A and TS 38.521-2 [9] clauses 7.3 and 7.3A.

7.3A.3 $\Delta R_{IB,c}$ for CA without EN-DC

For the UE which supports inter-band NR CA configuration, the minimum requirement for reference sensitivity in clause 7.3.2 in TS 38.101-1 [2] and clause 7.3.2, 7.3A.2 in TS 38.101-2 [3] shall be increased by the amount given in $\Delta R_{IB,c}$ in Tables below. Unless otherwise stated, $\Delta R_{IB,c}$ is set to zero.

In case the UE supports more than one of band combinations for CA, SUL or DC, and an operating band belongs to more than one band combinations then

- When the operating band frequency range is $\leq 1\text{GHz}$, the applicable additional $\Delta R_{IB,c}$ shall be the average value for all band combinations defined in clause 7.3A, 7.3B, 7.3C in this specification and 7.3A, 7.3B in TS 38.101-3 [4], truncated to one decimal place that apply for that operating band among the supported band combinations. In case there is a harmonic relation between low band UL and high band DL, then the maximum $\Delta R_{IB,c}$ among the different supported band combinations involving such band shall be applied

- When the operating band frequency range is > 1 GHz, the applicable additional $\Delta R_{IB,c}$ shall be the maximum value for all band combinations defined in clause 7.3A, 7.3B, 7.3C in this specification and 7.3A, 7.3B in TS 38.101-3 [4] for the applicable operating bands.

7.3A.3.1 $\Delta R_{IB,c}$ for Inter-band CA between FR1 and FR2 without EN-DC

Unless otherwise stated, $\Delta R_{IB,c}$ for NR FR1 band and FR2 band of inter-band CA defined in table 5.5A.1-1 is set to zero.

7.3A.4 Void

7.3B Reference sensitivity level for DC

7.3B.1 General

For EN-DC, E-UTRA and NR single carrier, CA, and MIMO operation of REFSENS requirements defined in TS 38.101-1 [2], TS 38.101-2 [3] and TS 36.101 [5] apply to all downlink bands of EN-DC configurations listed in clause 5.5B, unless sensitivity degradation exception is allowed in this clause of this specification, clause 7.3 in TS 38.101-1 [2], clause 7.3 in TS 38.101-2 [3] or clause 7.3 in TS 36.101 [5]. Allowed exceptions specified in this clause also apply to any higher order EN-DC configuration combination containing one of the band combinations that exception is allowed for. Reference sensitivity exceptions are specified by applying maximum sensitivity degradation (MSD) into applicable REFSENS requirement. EN-DC REFSENS requirements shall be met for NR uplink transmissions using QPSK DFT-s-OFDM waveforms as defined in clause 7.3.2 in TS 38.101-1 [2]. Unless otherwise specified UL allocation uses the lowest SCS allowable for a given channel BW. Limits on configured maximum output power for the uplink according to subclause 6.2B.4 shall apply.

In case of interband EN-DC the receiver REFSENS requirements in this clause do not apply for 1.4 and 3 MHz E-UTRA carriers. For the case of inter-band EN-DC with a single carrier per cell group and multi-carrier per cell group, in addition to the E-UTRA and NR single carrier, CA, and MIMO operation of REFSENS requirements defined in TS 38.101-1 [2], TS 38.101-2 [3], and TS 36.101 [5], the REFSENS requirements specified therein also apply with both downlink carriers and both uplink carriers active unless sensitivity exceptions are allowed in this clause of this specification, clause 7.3 in TS 38.101-1 [2] or clause 7.3 in TS 36.101 [5].

NOTE: For inter-band EN-DC, the reference sensitivity requirement with both uplink carriers active is allowed to be verified for only a single inter-band EN-DC configuration per NR band.

7.3B.2 Reference sensitivity for EN-DC

7.3B.2.0 Minimum Conformance Requirements of Reference sensitivity for EN-DC

7.3B.2.0.1 Intra-band contiguous EN-DC

For intra-band contiguous EN-DC configurations, the reference sensitivity power level REFSENS is the minimum mean power applied to each one of the UE antenna ports at which the throughput for the carrier(s) of the E-UTRA and NR CGs shall meet or exceed the requirements for the specified E-UTRA and NR reference measurement channels. The reference sensitivity requirements apply with all uplink carriers and all downlink carriers active for EN-DC configuration and Uplink EN-DC configuration listed in Table 5.5B.2-1 and Table 5.5B.3-1, as supported by the UE. For EN-DC configurations where uplink is not available in either the MCG or the SCG or for EN-DC configurations where the UE only supports single uplink operation, reference sensitivity requirements apply with single uplink transmission. The downlink carrier(s) from the cell group with uplink shall be configured closer to the uplink operating band than any of the downlink carriers from the cell group without uplink.

Sensitivity degradation is allowed for Intra-band contiguous EN-DC configurations listed in Table 7.3B.2.0.1-1, the reference sensitivity is defined only for the specific uplink and downlink test points which are specified in Table 7.3B.2.0.1-1 and E-UTRA and NR single carrier requirements do not apply.

Table 7.3B.2.0.1-1: Reference sensitivity (MSD) for intra-band contiguous EN-DC

| EN-DC configuration/channel allocations/MSD | | | | | | | |
|---|----------------|---------------------------|-------------------------|-----------------------------------|---------------------------|----------|-------------|
| EN-DC configuration | E-UTRA/NR band | F _c (UL) (MHz) | Channel bandwidth (MHz) | UL allocation (L _{CRB}) | F _c (DL) (MHz) | MSD (dB) | Duplex mode |
| DC_(n)71AA | 71 | 665.5 | 5 | 5 (RB _{end} = 24) | 619.5 | 0 | FDD |
| | n71 | 675.5 | 15 | 15 (RB _{start} = 0) | 629.5 | 1.8 | |
| DC_(n)71AA | 71 | 670.5 | 15 | 15 (RB _{end} = 74) | 624.5 | 0 | |
| | n71 | 680.5 | 5 | 5 (RB _{start} = 0) | 634.5 | 1.6 | |
| DC_(n)71AA | 71 | 668 | 10 | 10 (RB _{end} = 49) | 622 | 0 | FDD |
| | n71 | 678 | 10 | 10 (RB _{start} = 0) | 632 | 1.7 | |
| DC_(n)71AA | 71 | 668 | 10 | 10 (RB _{start} = 0) | 622 | 17.2 | |
| | n71 | 678 | 10 | 10 (RB _{end} = 51) | 632 | 29.4 | |
| DC_(n)71AA | 71 | 665.5 | 5 | 5 (RB _{end} = 24) | 619.5 | 0 | FDD |
| | n71 | 675.5 | 151 | 15 (RB _{start} = 0) | 6321 | 2.5 | |
| DC_(n)71AA | 71 | 670.5 | 15 | 15 (RB _{end} = 74) | 624.5 | 0 | |
| | n71 | 680.5 | 51 | 5 (RB _{start} = 0) | 6371 | 2.2 | |
| DC_(n)71AA | 71 | 668 | 10 | 10 (RB _{end} = 49) | 622 | 0 | FDD |
| | n71 | 678 | 101 | 10 (RB _{start} = 0) | 634.51 | 2.5 | |
| DC_(n)71AA | 71 | 668 | 10 | 10 (RB _{start} = 0) | 622 | 17.2 | |
| | n71 | 678 | 101 | 10 (RB _{end} = 51) | 634.51 | 29.1 | |

NOTE 1: In accordance to BCS1, the NR uplink bandwidth is specified as in this table, but the corresponding NR downlink bandwidth is 5 MHz larger.

NOTE 2: The transmitters powers shall be set to P_{UMAX}, as defined in TS 38.101-1 [2], TS 38.101-2 [3], and TS 36.101 [5], with additional limits on configured maximum output power for the uplink according to subclause 6.2B.4.

7.3B.2.0.2 Intra-band non-contiguous EN-DC

For intra-band non-contiguous EN-DC configurations, the reference sensitivity power level REFSENS is the minimum mean power applied to each one of the UE antenna ports at which the throughput for the carrier(s) of the E-UTRA and NR CGs shall meet or exceed the requirements for the specified E-UTRA and NR reference measurement channels.

For DC_3A_n3A intra-band non-contiguous EN-DC combination, only single switched UL is supported in rel.15, therefore, no MSD is specified and E-UTRA and NR single carrier requirements apply.

7.3B.2.0.3 Inter-band EN-DC within FR1

Reference sensitivity exceptions are specified for the condition when there is uplink transmission only in the aggressor band.

7.3B.2.0.3.1 Reference sensitivity exceptions due to UL harmonic interference for EN-DC in NR FR1

Sensitivity degradation is allowed for a band if it is impacted by UL harmonic interference from another band part of the same EN-DC configuration. Reference sensitivity exceptions for the victim band (high) are specified in Table 7.3B.2.0.3.1-1 with uplink configuration of the aggressor band (low) specified in Table 7.3B.2.0.3.1-2.

Table 7.3B.2.0.3.1-1: Reference sensitivity exceptions (MSD) due to UL harmonic for EN-DC in NR FR1

| E-UTRA or NR Band / Channel bandwidth of the affected DL band / MSD | | | | | | | | | | | | | |
|---|--|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------|
| UL band | DL band | 5 MHz (dB) | 10 MHz (dB) | 15 MHz (dB) | 20 MHz (dB) | 25 MHz (dB) | 30 MHz (dB) | 40 MHz (dB) | 50 MHz (dB) | 60 MHz (dB) | 80 MHz (dB) | 90 MHz (dB) | 100 MHz (dB) |
| 1, 3 | n77 ^{2, 13} | | 23.9 | 22.1 | 20.9 | | | 17.9 | 16.8 | 16.0 | 14.8 | 14.3 | 13.8 |
| | n77 ³ | | 1.1 | 0.8 | 0.3 | | | | | | | | |
| 2 | n78 ^{2, 13} | | 23.9 | 22.1 | 20.9 | | | 17.9 | 16.8 | 16.0 | 14.8 | 14.3 | 13.8 |
| | n78 ³ | | 1.1 | 0.8 | 0.3 | | | | | | | | |
| 3 | n78 ^{2, 13} | | 23.9 | 22.1 | 20.9 | | | 17.9 | 16.8 | 16.0 | 14.8 | 14.3 | 13.8 |
| | n78 ³ | | 1.1 | 0.8 | 0.3 | | | | | | | | |
| 5 | n78 ^{6, 7} | | 10.5 | 8.9 | 7.8 | | | 5.4 | 4.2 | 3.5 | 2.3 | 2.1 | 1.4 |
| 8 | n41 ^{8, 9} | | 13 | 11.3 | 10.1 | | | 7.0 | 6.1 | 5.5 | 4.3 | 3.9 | 3.5 |
| 8 | n77 ^{6, 7} n78 ^{6, 7} | | 10.8 | 9.1 | 8 | | | 5.1 | 4.2 | 3.5 | 2.3 | 2.1 | 1.4 |
| 8 | n79 ^{4, 5} | | | | | | | 6.8 | 6.2 | 5.6 | 4.9 | | 4.4 |
| 12 | n66 ^{8, 9, 10} | 10 | 7.5 | 6.2 | 5.5 | | | 2.4 | | | | | |
| 12 | n78 ^{4, 5} | | 10.4 | 8.9 | 7.8 | | | 4.7 | 3.7 | 3 | 1.7 | 1.2 | 0.7 |
| 18, 19 | n77 ^{4, 5} n78 ^{4, 5} | | 10.4 | 8.9 | 7.8 | | | 4.7 | 3.7 | 3 | 1.7 | 1.2 | 0.7 |
| 28 | n51 ^{2, 13} | 27.8 | | | | | | | | | | | |
| | n51 ³ | 1.9 | | | | | | | | | | | |
| 28 | n77 ^{4, 5} n78 ^{4, 5} | | 10.4 | 8.9 | 7.8 | | | 4.7 | 3.7 | 3 | 1.7 | 1.2 | 0.7 |
| 20 | n77 ^{6, 7} n78 ^{6, 7} | | 10.8 | 9.1 | 8 | | | 6 | 4.0 | 3.2 | 2.0 | 1.5 | 1.0 |
| 26 | n41 ^{8, 9} | | 10.3 | 8.4 | 7.4 | | | 5 | 4.3 | 3.9 | 3.1 | 2.7 | |
| 26 | n77 ^{6, 7} n78 ^{6, 7} | | 10.8 | 9.1 | 8 | | | 6 | 4.0 | 3.2 | 2.0 | 1.5 | 1.0 |
| n28 | 1 ^{8, 9, 10} | 10.2 | 7.6 | 6.2 | 5.3 | | | | | | | | |
| n71 | 2 ¹¹ | 4.6 | 1.0 | 0.7 | 0.6 | | | | | | | | |
| | 2 ¹² | 1.7 | 1.0 | 0.7 | 0.6 | | | | | | | | |
| n71 | 7 ^{6, 7} | 14.6 | 11.7 | 10.1 | 9 | | | | | | | | |
| 66 | n78 ^{2, 13} | | 23.9 | 22.1 | 20.9 | | | 17.9 | 16.8 | 16.0 | 14.8 | 14.3 | 13.8 |
| | n78 ³ | | 1.1 | 0.8 | 0.3 | | | | | | | | |
| n66 | 48 ^{2, 13} | 27.3 | 24.4 | 22.4 | 21.2 | | | | | | | | |
| | 48 ³ | 1.9 | 1.4 | 0.9 | 0.4 | | | | | | | | |

NOTE 1: Void.

NOTE 2: The requirements should be verified for UL EARFCN or NR ARFCN of the aggressor (lower) band (superscript LB) such that $f_{UL}^{LB} = \lfloor f_{DL}^{HB} / 0.2 \rfloor + 0.1$ in MHz and $F_{UL_low}^{LB} + BW_{Channel}^{LB} / 2 \leq f_{UL}^{LB} \leq F_{UL_high}^{LB} - BW_{Channel}^{LB} / 2$ with carrier frequency in the victim (higher) band in MHz and the channel bandwidth configured in the lower band.

NOTE 3: The requirements are only applicable to channel bandwidths no larger than 20 MHz and with a carrier frequency at $\pm (20 + BW_{Channel}^{HB} / 2)$ MHz offset from $2f_{UL}^{LB}$ in the victim (higher band) with $F_{UL_low}^{LB} + BW_{Channel}^{LB} / 2 \leq f_{UL}^{LB} \leq F_{UL_high}^{LB} - BW_{Channel}^{LB} / 2$, where $BW_{Channel}^{LB}$ and $BW_{Channel}^{HB}$ are the channel bandwidths configured in the aggressor (lower) and victim (higher) bands in MHz, respectively.

NOTE 4: These requirements apply when there is at least one individual RE within the uplink transmission bandwidth of the aggressor (lower) band for which the 5th transmitter harmonic is within the downlink transmission bandwidth of a victim (higher) band.

NOTE 5: The requirements should be verified for UL EARFCN of the aggressor (lower) band (superscript LB) such that $f_{UL}^{LB} = \lfloor f_{DL}^{HB} / 0.5 \rfloor + 0.1$ in MHz and $F_{UL_low}^{LB} + BW_{Channel}^{LB} / 2 \leq f_{UL}^{LB} \leq F_{UL_high}^{LB} - BW_{Channel}^{LB} / 2$ with carrier frequency in the victim (higher) band in MHz and the channel bandwidth configured in the lower band.

NOTE 6: These requirements apply when there is at least one individual RE within the uplink transmission bandwidth of the aggressor (lower) band for which the 4th transmitter harmonic is within the downlink transmission bandwidth of a victim (higher) band.

- NOTE 7: The requirements should be verified for UL EARFCN of the aggressor (lower) band (superscript LB) such that $f_{UL}^{LB} = \lfloor f_{DL}^{HB} / 0.4 \rfloor + 0.1$ in MHz and $F_{UL_low}^{LB} + BW_{Channel}^{LB} / 2 \leq f_{UL}^{LB} \leq F_{UL_high}^{LB} - BW_{Channel}^{LB} / 2$ with carrier frequency in the victim (higher) band in MHz and the channel bandwidth configured in the lower band.
- NOTE 8: These requirements apply when there is at least one individual RE within the uplink transmission bandwidth of a low band for which the 3rd transmitter harmonic is within the downlink transmission bandwidth of a high band.
- NOTE 9: The requirements should be verified for UL EARFCN of the aggressor (lower) band (superscript LB) such that in MHz and $F_{UL_low}^{LB} + BW_{Channel}^{LB} / 2 \leq f_{UL}^{LB} \leq F_{UL_high}^{LB} - BW_{Channel}^{LB} / 2$ with the carrier frequency in the victim (higher) band in MHz and the channel bandwidth configured in the low band.
- NOTE 10: Applicable for the operations with 2 or 4 antenna ports supported in the band with carrier aggregation configured.
- NOTE 11: These requirements apply when the lower edge frequency of the 5 MHz uplink channel in Band 71 is located at or below 668 MHz and the downlink channel in Band 2 is located with its upper edge at 1990 MHz.
- NOTE 12: These requirements apply when the lower edge frequency of the 10 MHz, 15 MHz, or 20 MHz uplink channel in Band 71 is located at or below 668 MHz and the downlink channel in Band 2 is located with its upper edge at 1990 MHz.
- NOTE 13: These requirements apply when there is at least one individual RE within the uplink transmission bandwidth of the aggressor (lower) band for which the 2nd transmitter harmonic is within the downlink transmission bandwidth of a victim (higher) band and a range ΔF_{HD} above and below the edge of this downlink transmission bandwidth. The value ΔF_{HD} depends on the EN-DC band combination: $\Delta F_{HD} = 10$ MHz for DC_1_n77, DC_2_n77, DC_66_n77, DC_3_n77, DC_3_n78, DC_28_n51, DC_66_n78.
- NOTE 14: MSD test point can be chosen according to supported BW and lowest SCS supported by the UE

Table 7.3B.2.0.3.1-2: Uplink configuration for reference sensitivity exceptions due to UL harmonic interference for EN-DC in NR FR1

| E-UTRA or NR Band / Channel bandwidth of the affected DL band / UL RB allocation of the aggressor band | | | | | | | | | | | | | | |
|--|-------------|----------------------|-----------------------------------|-----------------------------------|-----------------------------------|--------------------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|-----------------------------|
| UL band | DL band | SCS of UL band (kHz) | 5 MHz (L _{CRB}) | 10 MHz (L _{CRB}) | 15 MHz (L _{CRB}) | 20 MHz (L _{CRB}) | 25 MHz (L _{CRB}) | 30 MHz (L _{CRB}) | 40 MHz (L _{CRB}) | 50 MHz (L _{CRB}) | 60 MHz (L _{CRB}) | 80 MHz (L _{CRB}) | 90 MHz (L _{CRB}) | 100 MHz (L _{CRB}) |
| 1 | n77 | 15 | | 25 | 36 | 50 | | | 100 | 100 | 100 | 100 | 100 | 100 |
| 2 | n78 | 15 | | 25 | 36 | 50 | | | 50 | 50 | 50 | 50 | 50 | 50 |
| 3 | n77 | 15 | | 25 | 36 | 50 | | | 50 | 50 | 50 | 50 | 50 | 50 |
| 3 | n78 | 15 | | 25 | 36 | 50 | | | 50 | 50 | 50 | 50 | 50 | 50 |
| 5 | n78 | 15 | 8 | 16 | 25 | 25 | | | 25 | | | | | |
| 8 | n41 | 15 | | 16 | 25 | 25 | | | 25 | 25 | 25 | 25 | 25 | 25 |
| 8 | n77 n78 | 15 | | 16 | 25 | 25 | | | 25 | 25 | 25 | 25 | 25 | 25 |
| 8 | n79 | 15 | | | | | | | 25 | 25 | 25 | 25 | 25 | 25 |
| 12 | n66 | 15 | 8 | 16 | 20 | 20 | | | 20 | | | | | |
| 12 | n78 | 15 | | 10 | 15 | 20 | | | 25 | 25 | 25 | 25 | 25 | 25 |
| 18 | n77, n78 | 15 | | 16 | 25 | 25 | | | 25 | 25 | 25 | 25 | 25 | 25 |
| 19 | n77, n78 | 15 | | 16 | 25 | 25 | | | 25 | 25 | 25 | 25 | | 25 |
| 20 | n77 n78 | 15 | | 16 | 25 | 25 ¹ , 25 ² | | | 25 | 25 | 25 | 25 | 25 | 25 |
| 26 | n41 | 15 | | 16 | 25 | 25 | | | 25 | 25 | | | | |
| 26 | n77 n78 | 15 | | 16 | 25 | 25 | | | 25 | 25 | 25 | 25 | 25 | 25 |
| n28 | 1 | 15 | 8 | 16 | 25 | 25 | | | | | | | | |
| 28 | n51 | 15 | 12 | | | | | | | | | | | |
| 28 | n77 n78 | 15 | | 10 | -15 | 20 | | | 25 | 25 | 25 | 25 | 25 | 25 |
| 66 | n78 | 15 | | 25 | 36 | 50 | | | 100 | 100 | 100 | 100 | 100 | 100 |
| n66 | 48 | 15 | 12 | 25 | 36 | 50 | | | | | | | | |
| n71 | 2 | 15 | 25 ⁴ 8 ⁵ | 25 ⁴ 8 ⁵ | 20 ⁴ 8 ⁵ | 20 ⁴ 8 ⁵ | | | | | | | | |
| n71 | 7 | 15 | 8 | 16 | 25 | 25 | | | | | | | | |

NOTE 1: The UL configuration applies regardless of the channel bandwidth of the UL band unless the UL resource blocks exceed that specified in Table 7.3.1-2 in TS 36.101 [5] or Table 7.3.2-3 in TS 38.101-1 [2] for the uplink bandwidth in which case the allocation according to Table 7.3.1-2 in TS 36.101 [5] or Table 7.3.2-3 in TS 38.101-1 [2] applies.

NOTE 2: Void.

NOTE 3: Unless stated otherwise, UL resource blocks shall be centred within the transmission bandwidth configuration for the channel bandwidth.

NOTE 4: These requirements apply when the lower edge frequency of the 5 MHz uplink channel in Band 71 is located at or below 668 MHz and the downlink channel in Band 2 is located with its upper edge at 1990 MHz.

NOTE 5: These requirements apply when the lower edge frequency of the 10 MHz, 15 MHz, or 20 MHz uplink channel in Band 71 is located at or below 668 MHz and the downlink channel in Band 2 is located with its upper edge at 1990 MHz.

NOTE 6: If the aggressor band is NR band, the test SCS and UL RB can be adjusted according to supported BW and lowest SCS supported by the UE

7.3B.2.0.3.2

Reference sensitivity exceptions due to receiver harmonic mixing for EN-DC in NR FR1

Sensitivity degradation is allowed for a band if it is impacted by receiver harmonic mixing due to another band part of the same EN-DC configuration. Reference sensitivity exceptions for the victim band (low) are specified in Table 7.3B.2.0.3.2-1 with uplink configuration of the aggressor band (high) specified in Table 7.3B.2.0.3.2-2.

Table 7.3B.2.0.3.2-1: Reference sensitivity exceptions (MSD) due to receiver harmonic mixing for EN-DC in NR FR1

| E-UTRA or NR Band / Channel bandwidth of the affected DL band / MSD | | | | | | | | | | | | |
|---|------------------|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------|
| UL band | DL band | 5 MHz (dB) | 10 MHz (dB) | 15 MHz (dB) | 20 MHz (dB) | 25 MHz (dB) | 40 MHz (dB) | 50 MHz (dB) | 60 MHz (dB) | 80 MHz (dB) | 90 MHz (dB) | 100 MHz (dB) |
| 2 | n71 ⁴ | 26.8 | 23.6 | 21.2 | 15.6 | | | | | | | |
| n41 | 26 ⁴ | 24.3 | 24.3 | 22.5 | N/A | | | | | | | |
| n77 | 3 | 5.7 | 4.0 | 3.0 | 2.7 | | | | | | | |
| n78 | 3 | 5.7 | 4.0 | 3.0 | 2.7 | | | | | | | |
| n77 | 41 ⁸ | 10.4 | 10.4 | 10.4 | 10.4 | | | | | | | |
| n77 | 28 ² | 28 | 25 | 23.2 | 22 | | | | | | | |
| n78 | 41 ⁸ | 10.4 | 10.4 | 10.4 | 10.4 | | | | | | | |
| n79 | 11 ⁴ | 39.3 | 36.3 | 34.5 | | | | | | | | |
| n79 | 19 ² | 29.5 | 26.5 | 24.7 | | | | | | | | |
| n79 | 21 ⁴ | 39.3 | 36.3 | 34.5 | | | | | | | | |
| n79 | 26 ² | 27 | 24 | 22.2 | | | | | | | | |

NOTE 1: These requirements apply when there is at least one individual RE within the uplink transmission bandwidth of the aggressor (higher) band for which the mixing product due to harmonic of victim (lower) band LO with leakage of aggressor (higher) band is within the downlink transmission bandwidth of a victim (lower) band.

NOTE 2: The requirements should be verified for DL EARFCN of the victim (lower) band (superscript LB) such that $f_{DL}^{LB} = \lfloor f_{UL}^{HB} / 0.5 \rfloor 0.1$ with f_{DL}^{LB} the DL carrier frequency in the lowerband and f_{UL}^{HB} the UL carrier frequency in the higher band, both in MHz.

NOTE 3: Void.

NOTE 4: The requirements should be verified for DL EARFCN or NR-ARFCN of the victim (lower) band (superscript LB) such that $f_{DL}^{LB} = \lfloor f_{UL}^{HB} / 0.3 \rfloor 0.1$ with f_{DL}^{LB} the DL carrier frequency in the lower band and in MHz and f_{UL}^{HB} the UL carrier frequency in the higher band, both in MHz.

NOTE 5: Void.

NOTE 6: Void.

NOTE 7: Void.

NOTE 8: The requirements should be verified for DL EARFCN of the victim (lower) band (superscript LB) such that $f_{DL}^{LB} = \lfloor f_{UL}^{HB} / 0.15 \rfloor 0.1$ with f_{DL}^{LB} the DL carrier frequency in the lower band and f_{UL}^{HB} the UL carrier frequency in the higher band, both in MHz.

NOTE 9: MSD test point can be chosen according to supported BW and lowest SCS supported by the UE.

Table 7.3B.2.0.3.2-2: Uplink configuration for reference sensitivity exceptions due to receiver harmonic mixing for EN-DC in NR FR1

| E-UTRA or NR Band / SCS / Channel bandwidth of the affected DL band / UL RB allocation of the aggressor band | | | | | | | | | | | | | | |
|---|----------------|-----------------------------|---------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|-----------------------|--|
| UL band | DL band | SCS of UL band (kHz) | 5 MHz (LCRB) | 10 MHz (LCRB) | 15 MHz (LCRB) | 20 MHz (LCRB) | 25 MHz (LCRB) | 40 MHz (LCRB) | 50 MHz (LCRB) | 60 MHz (LCRB) | 80 MHz (LCRB) | 90 MHz (LCRB) | 100 MHz (LCRB) | |
| 2 | n71 | 15 | 25 | 50 | 50 | 50 | | | | | | | | |
| n41 | 26 | 15 | 25 | 50 | 75 | | | | | | | | | |
| n77 | 3 | 15 | 25 | 50 | 75 | 100 | | | | | | | | |
| n78 | 3 | 15 | 25 | 50 | 75 | 100 | | | | | | | | |
| n77 | 28 | 15 | 25 | 50 | 75 | 100 | | | | | | | | |
| n77 | 41 | 15 | 12 | 25 | 36 | 50 | | | | | | | | |
| n78 | 41 | 15 | 12 | 25 | 36 | 50 | | | | | | | | |
| n79 | 11 | 15 | 25 | 50 | 75 | | | | | | | | | |
| n79 | 19 | 15 | 25 | 50 | 75 | | | | | | | | | |
| n79 | 21 | 15 | 25 | 50 | 75 | | | | | | | | | |
| n79 | 26 | 15 | 25 | 50 | 75 | | | | | | | | | |

NOTE 1: Void.
 NOTE 2: Void.
 NOTE 3: The UL configuration applies regardless of the channel bandwidth of the UL band. UL resource blocks allocation in the table shall be further limited to that specified in Table 7.3.1-2 in TS 36.101 [5] or Table 7.3.2-3 in TS 38.101-1[2].
 NOTE 4: Unless otherwise stated, the UL resource blocks allocation is applied at the center of the channel bandwidth. The note applies to the entire table.
 NOTE 5: If the aggressor band is NR band, the test SCS and UL RB can be adjusted according to supported BW and lowest SCS supported by the UE.

7.3B.2.0.3.3 Void

7.3B.2.0.3.4 Reference sensitivity exceptions due to cross band isolation for EN-DC in NR FR1

Sensitivity degradation is allowed for a band if it is impacted by UL of another band part of the same EN-DC configuration due to cross band isolation issues. Reference sensitivity exceptions for the victim band are specified in Table 7.3B.2.0.3.4-1, Table 7.3B.2.0.3.4-1a with uplink configuration of the aggressor band specified in Table 7.3B.2.0.3.4-2.

Table 7.3B.2.0.3.4-1: Reference sensitivity exceptions (MSD) due to cross band isolation for PC3 EN-DC in NR FR1

| E-UTRA or NR Band / Channel bandwidth of the affected DL band /MSD | | | | | | | | | | | | | |
|--|-----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------|
| UL band | DL band | 5 MHz (dBm) | 10 MHz (dB) | 15 MHz (dB) | 20 MHz (dB) | 25 MHz (dB) | 30 MHz (dB) | 40 MHz (dB) | 50 MHz (dB) | 60 MHz (dB) | 80 MHz (dB) | 90 MHz (dB) | 100 MHz (dB) |
| n1 ³ | 3 | [3] | 2.3 | 2 | 1.8 | | | | | | | | |
| 1 | n40 | 6.6 | 6.6 | 6.6 | 6.6 | 6.6 | 6.6 | 6.6 | 6.6 | 6.6 | 6.6 | | |
| n40 | 1 | 8.3 | 8.3 | 8.3 | 8.3 | | | | | | | | |
| n41 | 2 | 0.6 | 0.6 | 0.6 | 0.6 | | | | | | | | |
| n41 | 25 | 0.6 | 0.6 | 0.6 | 0.6 | | | | | | | | |
| n77 | 41 ¹ | 4.5 | 4.5 | 4.5 | 4.5 | | | | | | | | |
| n41 | 66 ¹ | 3.5 | 3.5 | 3.5 | 3.5 | | | | | | | | |
| 41 | n77 | | 8.3 | 8.3 | 8.3 | | | 6.3 | 5.3 | 4.5 | 4.0 | 3.9 | 3.8 |
| 3 | n51 | 6.4 | | | | | | | | | | | |
| 30 | n66 | 8.3 | 8.3 | 8.3 | 8.3 | | | 8.3 | | | | | |
| n78 | 7 ¹ | 4.5 | 4.5 | 4.5 | 4.5 | | | | | | | | |
| n78 | 38 | 3.3 | 3.3 | 3.3 | 3.3 | | | | | | | | |
| n78 | 41 ¹ | 4.5 | 4.5 | 4.5 | 4.5 | | | | | | | | |
| n78 | 46 | | | | 7 | | | | | | | | |
| 41 | n78 | | 8.3 | 8.3 | 8.3 | | | 6.3 | 5.3 | 4.5 | 4.0 | 3.9 | 3.8 |

Table 7.3B.2.0.3.4-1a: Reference sensitivity exceptions (MSD) due to cross band isolation for PC2 EN-DC in NR FR1

Table 7.3B.2.0.3.4-2: Uplink configuration for reference sensitivity exceptions due to cross band isolation for PC3 EN-DC in NR FR1

| E-UTRA or NR Band / SCS / Channel bandwidth of the affected DL band / UL RB allocation of the aggressor band | | | | | | | | | | | | | | |
|--|---------|----------------------|--------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|----------------|
| UL band | DL band | SCS of UL band (kHz) | 5 MHz (LCRB) | 10 MHz (LCRB) | 15 MHz (LCRB) | 20 MHz (LCRB) | 25 MHz (LCRB) | 30 MHz (LCRB) | 40 MHz (LCRB) | 50 MHz (LCRB) | 60 MHz (LCRB) | 80 MHz (LCRB) | 90 MHz (LCRB) | 100 MHz (LCRB) |
| n1 | 3 | 15 | 25 | 25 | 25 | 25 | | | | | | | | |
| 1 | n40 | 15 | 25 | 50 | 75 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | | |
| n40 | 1 | 15 | 25 | 50 | 75 | 100 | | | | | | | | |
| n41 | 2 | 30 | 160 | 160 | 160 | 160 | | | | | | | | |
| n41 | 25 | 30 | 160 | 160 | 160 | 160 | | | | | | | | |
| n77 | 41 | 30 | 270 | 270 | 270 | 270 | | | | | | | | |
| n41 | 66 | 30 | 128 | 128 | 128 | 128 | | | | | | | | |
| 41 | n77 | 15 | | 100 | 100 | 100 | | | 100 | 100 | 100 | 100 | 100 | 100 |
| 3 | n51 | 15 | 25 | | | | | | | | | | | |
| 30 | n66 | 15 | 25 | 25 | 25 | 25 | | 25 | | | | | | |
| n78 | 7 | 30 | 270 | 270 | 270 | 270 | | | | | | | | |
| n78 | 38 | 30 | 270 | 270 | 270 | 270 | | | | | | | | |
| n78 | 41 | 30 | 270 | 270 | 270 | 270 | | | | | | | | |
| n78 | 46 | 30 | | | | 270 | | | | | | | | |
| 41 | n78 | 15 | | 100 | 100 | 100 | | | 100 | 100 | 100 | 100 | 100 | 100 |

NOTE 1: The UL configuration applies regardless of the channel bandwidth of the UL band. UL resource blocks allocation in the table shall be further limited to that specified in Table 7.3.1-2 in TS 36.101 [5] or Table 7.3.2-3 in TS 38.101-1 [2].

NOTE 2: When the maximum UL RB allocation "LCRB" value is less than the maximum transmission bandwidth configuration "N_{RB}" defined in Table 5.3.2-1 in 38.101-1 [2] for the specified UL band SCS, the UL band should be configured using the lowest CBW that is compatible with the maximum specified L_{CRB} value.

NOTE 3: If the aggressor band is NR band, the test SCS and UL RB can be adjusted according to supported BW and lowest SCS supported by the UE.

7.3B.2.0.3.5 MSD for intermodulation interference due to dual uplink operation for EN-DC in NR FR1

For EN-DC configurations in NR FR1 the UE may indicate capability of not supporting simultaneous dual uplink operation due to possible intermodulation interference overlapping in frequency to its own primary downlink channel bandwidth if

- the intermodulation order is 2;
- the intermodulation order is 3 when both operating bands are between 450 MHz – 960 MHz or between 1427 MHz – 2690 MHz

In the case for EN-DC configurations in NR FR1 for which the intermodulation products caused by dual uplink operation do not interfere with its own primary downlink channel bandwidth as defined in Annex M the UE is mandated to operate in dual and triple uplink mode.

For EN-DC configurations in NR FR1 with uplink and downlink assigned to E-UTRA and NR FR1 bands given in Table 7.3B.2.0.3.5.1-1, Table 7.3B.2.0.3.5.1-1a, Table 7.3B.2.0.3.5.2-0 and Table 7.3B.2.0.3.5.2-1 the reference sensitivity is defined only for the specific uplink and downlink test points specified in Table 7.3B.2.0.3.5.1-1, Table 7.3B.2.0.3.5.1-1a, Table 7.3B.2.0.3.5.2-0 and Table 7.3B.2.0.3.5.2-1. For these test points the reference sensitivity levels specified in clause 7.3.1 in TS 36.101 [5] and 7.3.2 of TS 38.101-1 [2] for the corresponding channel bandwidths or in clause 7.3.1 of TS 36.101 [5] are relaxed by the amount of the parameter MSD given in Table 7.3B.2.0.3.5.1-1, Table 7.3B.2.0.3.5.1-1a, Table 7.3B.2.0.3.5.2-0 and Table 7.3B.2.0.3.5.2-1.

The throughput on each of the CGs shall be $\geq 95\%$ of the maximum throughput of the respective reference measurement channels as specified in Annex A of TS 38.101-1 [2] and Annex A of TS 36.101 [5], with parameters

specified in Table 7.3B.2.0.3.5.1-1, Table 7.3B.2.0.3.5.1-1a, Table 7.3B.2.0.3.5.2-0 and Table 7.3B.2.0.3.5.2-1 with dual UL transmissions overlapping in time unless otherwise stated.

7.3B.2.0.3.5.1 MSD test points for intermodulation interference due to dual uplink operation for EN-DC in NR FR1 involving two bands

Table 7.3B.2.0.3.5.1-1: MSD test points for PCell due to dual uplink operation for EN-DC in NR FR1 (two bands)

| NR or E-UTRA Band / Channel bandwidth / N _{RB} / MSD | | | | | | | |
|---|------------------|-------------------------|----------------|---------------------|-------------------------|-------------------|-------------------|
| EN-DC Configuration | EUTRA or NR band | UL F _c (MHz) | UL/DL BW (MHz) | UL L _{CRB} | DL F _c (MHz) | MSD (dB) | IMD order |
| DC_1_n3 | 1 | 1950 | 5 | 25 | 2140 | [23] | IMD3 |
| | n3 | 1760 | 5 | 25 | 1855 | N/A | N/A |
| DC_1A_n5A | 1 | 1965 | 5 | 25 | 2155 | 6 | IMD4 |
| | n5 | 836.5 | 5 | 25 | 876.5 | N/A | N/A |
| DC_1A_n77A DC_1A_SUL_n77A-n84A | 1 | 1950 | 5 | 25 | 2140 | 29.8 | IMD2 ³ |
| | n77, n78 | 4090 | 10 | 50 | 4090 | 32.5 ⁴ | |
| DC_1A_n77A DC_1A-SUL_n77A-n84A | 1 | 1950 | 5 | 25 | 2140 | 8.0 | IMD4 ³ |
| | n77, n78 | 3710 | 10 | 50 | 3710 | 10.7 ⁴ | |
| DC_1A_n78A, DC_1A_SUL_n78A-n84A | 1 | 1950 | 5 | 25 | 2140 | 8.0 | IMD4 ³ |
| | n78 | 3710 | 10 | 25 | 3710 | 10.7 ⁴ | |
| DC_2A_n66A | 2 | 1855 | 5 | 25 | 1935 | 20 | IMD3 |
| | n66 | 1775 | 5 | 25 | 2175 | N/A | N/A |
| DC_2A_n66A | 2 | 1883.3 | 5 | 25 | 1963.3 | N/A | N/A |
| | n66 | 1750 | 5 | 25 | 2150 | 4 | IMD5 |
| DC_2A_n78A | 2 | 1855 | 5 | 25 | 1935 | 26 | IMD2 ³ |
| | n78 | 3790 | 10 | 50 | 3790 | 28.7 ⁴ | |
| DC_2A_n78A | 2 | 1885 | 5 | 25 | 1965 | 8.0 | IMD4 ³ |
| | n78 | 3690 | 10 | 50 | 3700 | 10.7 ⁴ | |
| DC_3_n1 | 3 | 1760 | 5 | 25 | 1855 | N/A | N/A |
| | n1 | 1950 | 5 | 25 | 2140 | 23 | IMD3 |
| DC_3_n5 | 3 | 1771 | 10 | 50 | 1866 | 4 | IMD4 |
| | n5 | 838 | 5 | 25 | 883 | N/A | N/A |
| | 3 | 1721 | 10 | 50 | 1816 | N/A | N/A |
| | n5 | 838 | 5 | 25 | 883 | 24 | IMD2 ³ |
| DC_3A_n7A DC_3C_n7A | 3 | 1730 | 5 | 25 | 1825 | N/A | N/A |
| | n7 | 2535 | 10 | 50 | 2655 | 10.2 ⁵ | IMD4 |
| DC_3A_n20A | 3 | 1775 | 5 | 25 | 1870 | 4 | IMD4 |
| | n20 | 840 | 5 | 25 | 799 | N/A | N/A |
| | 3 | 1735 | 5 | 25 | 1830 | N/A | N/A |
| | n20 | 847 | 5 | 25 | 806 | 9 | IMD4 |
| DC_3A_n41A DC_3C_n41A | 3 | 1740 | 5 | 25 | 1835 | 8.2 | IMD4 |
| | n41 | 2657.5 | 10 | 50 | 2657.5 | N/A | IMD4 |
| DC_3A_SUL_n41A-n80A, DC_3C_SUL_n41A-n80A | 3 | 1740 | 5 | 25 | 1835 | 8.2 | IMD4 |
| | n41 | 2657.5 | 10 | 52 | 2657.5 | N/A | N/A |
| DC_3A_n77A DC_3A_SUL_n77A-n80A DC_3A_n78A DC_3A-SUL_n78A-n80A, DC_3C_n78A | 3 | 1740 | 5 | 25 | 1835 | 26 | IMD2 ³ |
| | n77, n78 | 3575 | 10 | 50 | 3575 | 28.7 ⁴ | |
| DC_3A_n77A DC_3A_SUL_n77A-n80A, DC_3A_n78A | 3 | 1765 | 5 | 25 | 1860 | 8.0 | IMD4 ³ |
| | | | | | | 10.7 ⁴ | |

| | | | | | | | |
|--|----------|--------|-----|-----|--------|------|---------------------|
| DC_3A-SUL_n78A-n80A, DC_3C_n78A | n77, n78 | 3435 | 10 | 50 | 3435 | N/A | N/A |
| DC_5A_n66A | 5 | 838 | 5 | 25 | 883 | 30 | IMD2 ³ |
| | n66 | 1721 | 5 | 25 | 2121 | N/A | N/A |
| DC_5A_n78A | 5 | 844 | 5 | 25 | 889 | 8.3 | IMD4 |
| | n78 | 3421 | 10 | 50 | 3421 | N/A | N/A |
| DC_7_n3 | 7 | 2535 | 10 | 50 | 2655 | 13 | IMD4 |
| | n3 | 1730 | 5 | 25 | 1825 | N/A | N/A |
| DC_7_n5 | 7 | 2547 | 10 | 50 | 2667 | N/A | N/A |
| | n5 | 834 | 5 | 25 | 879 | 12 | IMD3 ³ |
| DC_7A_n77A | 7 | 2540 | 5 | 25 | 2660 | 7.1 | IMD4 |
| | n77 | 3870 | 10 | 50 | 3870 | N/A | N/A |
| DC_7A_n66A | 7 | 2535 | 10 | 50 | 2655 | 15 | 4 th IMD |
| DC_7A-7A_n66A DC_7C_n66A | n66 | 1730 | 5 | 25 | 2130 | N/A | N/A |
| DC_8A_n1A | 8 | 887.5 | 5 | 25 | 932.5 | N/A | N/A |
| | n1 | 1965 | 5 | 25 | 2155 | 6 | IMD4 |
| DC_8A_n3A | 8 | 900 | 5 | 25 | 945 | 8 | IMD4 ³ |
| | n3 | 1755 | 10 | 50 | 1850 | N/A | N/A |
| | 8 | 897.5 | 5 | 25 | 942.5 | N/A | N/A |
| | n3 | 1747.5 | 10 | 50 | 1842.5 | 6.4 | IMD5 |
| DC_8A_n41A | 8 | 882.5 | 5 | 25 | 927.5 | 12.1 | IMD3 ³ |
| | n41 | 2685 | 10 | 50 | 2685 | N/A | N/A |
| DC_8A_SUL_n41A-n81A | 8 | 882.5 | 5 | 25 | 927.5 | 12.1 | IMD3 ³ |
| | n41 | 2685 | 10 | 52 | 2685 | N/A | N/A |
| DC_8A_n77A DC_8A_n78A DC_8A-n79C, DC_8A-SUL_n78A-n81A | 8 | 897.5 | 5 | 25 | 942.5 | 8.3 | IMD4 |
| | n77, n78 | 3635 | 10 | 50 | 3635 | N/A | H4 |
| DC_12_n78 | 12 | 710 | 5 | 25 | 740 | 5.5 | IMD5 |
| | n78 | 3580 | 10 | 50 | 3580 | N/A | N/A |
| DC_20A_n3A | 20 | 840 | 5 | 25 | 799 | N/A | N/A |
| | n3 | 1775 | 5 | 25 | 1870 | 4 | IMD4 |
| | 20 | 847 | 5 | 25 | 806 | 9 | IMD4 |
| | n3 | 1735 | 5 | 25 | 1830 | N/A | N/A |
| DC_8A_n79A DC_8A-SUL_n79A-n81A | 8 | 897.5 | 5 | 25 | 942.5 | 4.8 | IMD5 |
| | n79 | 4532.5 | 40 | 216 | 4532.5 | N/A | N/A |
| DC_18A_n77A DC_18A_n78A | 18 | N/A | N/A | N/A | N/A | N/A | IMD4 |
| | n77, n78 | N/A | N/A | N/A | N/A | N/A | N/A |
| DC_19A_n78A | 19 | N/A | N/A | N/A | N/A | N/A | IMD4 |
| | n78 | N/A | N/A | N/A | N/A | N/A | N/A |
| DC_20A_n8A | 20 | 849.5 | 5 | 25 | 808.5 | 21 | IMD3 |
| | n8 | 892.5 | 5 | 25 | 937.5 | 21 | IMD3 |
| DC_20A_n77A DC_20A_n78A, DC_20A-SUL_n78A-n82A | 20 | 850 | 5 | 25 | 809 | 11 | IMD4 |
| | n77, n78 | 3359 | 10 | 50 | 3359 | N/A | N/A |
| DC_20A_n77A | 20 | 840 | 5 | 25 | 799 | 6.5 | IMD5 ⁴ |
| | n77 | 4159 | 10 | 50 | 4159 | N/A | N/A |
| DC_21A_n79A | 21 | 1457.5 | 5 | 25 | 1505.5 | 18.4 | IMD3 |
| | n79 | 4420.5 | 40 | 216 | 4420.5 | N/A | N/A |
| DC_26A_n41A | 26 | 839 | 5 | 25 | 884 | 15.6 | IMD3 |
| | n41 | 2562 | 10 | 50 | 2562 | N/A | N/A |
| DC_28A_n41A | 28 | 723 | 105 | 25 | 768 | 12.7 | IMD3 |
| | n41 | 2225 | 105 | 25 | 2225 | N/A | N/A |
| DC_28_n50 | 28 | 730 | 10 | 50 | 775 | 15.3 | IMD 2 |
| | n50 | 1500 | 10 | 50 | 1500 | N/A | N/A |
| | 28 | 740 | 10 | 50 | 785 | 6 | IMD 4 |
| | n50 | 1500 | 10 | 50 | 1500 | N/A | N/A |
| | 28 | 740 | 10 | 50 | 785 | 0.5 | IMD 5 |
| | n50 | 1500 | 10 | 50 | 1500 | N/A | N/A |

| | | | | | | | |
|---|----------|--------|----|-----|--------|------|-------------------|
| DC_28A_n51A | 28 | 742.3 | 5 | 25 | 797.3 | 5 | IMD 4 |
| | n51 | 1429.5 | 5 | 25 | 1429.5 | N/A | N/A |
| DC_26A_n77A, DC_26A_n78A | 26 | 836.5 | 5 | 25 | 881.5 | 11.1 | IMD4 |
| | n77, n78 | 3391 | 10 | 50 | 3391 | N/A | N/A |
| DC_28A_n77A, DC_28A_n78A, DC_28A-SUL_n78A-n83A | 28 | 705.5 | 5 | 25 | 760.5 | 5.5 | IMD5 |
| | n77, n78 | 3582.5 | 10 | 50 | 3582.5 | N/A | N/A |
| DC_48A_n66A | 48 | 3630 | 20 | 100 | 3630 | N/A | N/A |
| | n66 | 1715 | 5 | 25 | 2115 | 4 | IMD5 |
| DC_66A_n2A | 66 | 1775 | 5 | 25 | 2175 | N/A | N/A |
| | n2 | 1855 | 5 | 25 | 1935 | 20 | IMD3 |
| | 66 | 1750 | 5 | 25 | 2150 | 4 | IMD5 |
| | n2 | 1883.3 | 5 | 25 | 1963.3 | N/A | N/A |
| DC_66A_n5A | n5 | 838 | 5 | 25 | 883 | 30 | IMD2 ³ |
| | 66 | 1721 | 5 | 25 | 2121 | N/A | N/A |
| DC_66A_n25A | 66 | 1775 | 5 | 25 | 2175 | N/A | N/A |
| | n25 | 1855 | 5 | 25 | 1935 | 20 | IMD3 |
| | 66 | 1712.5 | 5 | 25 | 2112.5 | 23 | IMD3 |
| | n25 | 1912.5 | 5 | 25 | 1992.5 | N/A | N/A |
| | 66 | 1750 | 5 | 25 | 2150 | 4 | IMD5 |
| DC_66A_n71A | n25 | 1883.3 | 5 | 25 | 1963.3 | N/A | N/A |
| | 66 | 1750 | 5 | 25 | 2150 | 5 | IMD4 |
| | n71 | 675 | 5 | 25 | 629 | N/A | N/A |
| DC_66A_n78A | 66 | 1730 | 5 | 25 | 2130 | 5.0 | IMD5 |
| | n78 | 3660 | 5 | 50 | 3660 | N/A | N/A |
| NOTE 1: Both of the transmitters shall be set min(+20 dBm, P _{CMAX_L,c}) as defined in clause 6.2.5A. | | | | | | | |
| NOTE 2: RB _{START} = 0 | | | | | | | |
| NOTE 3: This band is subject to IMD5 also which MSD is not specified. | | | | | | | |
| NOTE 4: Applicable only if operation with 4 antenna ports is supported in the band with EN-DC configured. | | | | | | | |
| NOTE 5: Void. | | | | | | | |
| NOTE 6: For NR band, UL/DL BW and UL L _{CRB} can be adjusted according to the supported BW and lowest SCS supported by the UE. | | | | | | | |

Table 7.3B.2.0.3.5.1-1a: MSD test points for PCell due to dual uplink operation for PC2 EN-DC in NR FR1 (two bands)

| NR or E-UTRA Band / Channel bandwidth / N _{RB} / MSD | | | | | | | |
|---|------------------|-------------------------|----------------|---------------------|-------------------------|----------|-----------|
| EN-DC Configuration | EUTRA or NR band | UL F _c (MHz) | UL/DL BW (MHz) | UL L _{CRB} | DL F _c (MHz) | MSD (dB) | IMD order |
| DC_3A_n41A | 3 | 1740 | 5 | 25 | 1835 | 18.4 | IMD4 |
| | n41 | 2657.5 | 10 | 50 | 2657.5 | N/A | N/A |
| DC_3A_n78A | 3 | 1740 | 5 | 25 | 1835 | 31.9 | IMD2 |
| | n78 | 3575 | 10 | 50 | 3575 | N/A | N/A |
| DC_3A_n78A | 3 | 1765 | 5 | 25 | 1860 | 18.5 | IMD4 |
| | n78 | 3435 | 10 | 50 | 3435 | N/A | N/A |

Table 7.3B.2.0.3.5.1-1a: MSD test points for PCell due to dual uplink operation for PC2 EN-DC in NR FR1 (two bands)

| NR or E-UTRA Band / Channel bandwidth / N _{RB} / MSD | | | | | | | |
|---|------------------|-------------------------|----------------|---------------------|-------------------------|----------|-----------|
| EN-DC Configuration | EUTRA or NR band | UL F _c (MHz) | UL/DL BW (MHz) | UL L _{CRB} | DL F _c (MHz) | MSD (dB) | IMD order |
| DC_3A_n78A | 3 | 1740 | 5 | 25 | 1835 | 31.9 | IMD2 |
| | n78 | 3575 | 10 | 50 | 3575 | N/A | N/A |
| DC_3A_n78A | 3 | 1765 | 5 | 25 | 1860 | 18.5 | IMD4 |
| | n78 | 3435 | 10 | 50 | 3435 | N/A | N/A |

7.3B.2.0.3.5.2 MSD test points for intermodulation interference due to dual uplink operation for EN-DC in NR FR1 involving three bands

Table 7.3B.2.0.3.5.2-0: MSD test points for PCell due to dual uplink operation for EN-DC in NR FR1 (three bands)

| NR or E-UTRA Band / Channel bandwidth / N _{RB} / MSD | | | | | | | | |
|---|---------------|-------------------------|----------------|--------------------------------|-------------------------|----------|--|-----------|
| EN-DC Configuration | EUTRA/NR band | UL F _c (MHz) | UL/DL BW (MHz) | UL L _{CRB} | DL F _c (MHz) | MSD (dB) | | IMD order |
| DC_66A_(n)71AA | 66 | 1750 | 5 | 25 | 2150 | 5 | | IMD4 |
| | n71 | 678 | 10 | 10 (RB _{start} =0) | 632 | N/A | | N/A |

NOTE 1: For NR band, UL/DL BW and UL LCRB can be adjusted according to the supported BW and lowest SCS supported by the UE.

Table 7.3B.2.0.3.5.2-1: MSD test points for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

| NR or E-UTRA Band / Channel bandwidth / NRB / MSD | | | | | | | |
|---|---------------|-------------|----------------|---------------------|-------------|----------|-----------|
| EN-DC Configuration | EUTRA/NR band | UL Fc (MHz) | UL/DL BW (MHz) | UL L _{CRB} | DL Fc (MHz) | MSD (dB) | IMD order |
| DC_1A-3A_n28A DC_1A-3C_n28A | 1 | 1975 | 5 | 25 | 2165 | N/A | N/A |
| | n28 | 710.5 | 5 | 25 | 765.5 | N/A | N/A |
| | 3 | 1723.5 | 5 | 25 | 1818.5 | 4.0 | IMD5 |
| DC_1A-3A_n28A DC_1A-3C_n28A | 3 | 1780 | 5 | 25 | 1875 | N/A | N/A |
| | n28 | 710.5 | 5 | 25 | 765.5 | N/A | N/A |
| | 1 | 1949 | 5 | 25 | 2139 | 11.0 | IMD4 |
| DC_1A-7A_n28A DC_1A-7C_n28A | 1 | 1935 | 5 | 25 | 2125 | N/A | N/A |
| | n28 | 718 | 5 | 25 | 773 | N/A | N/A |
| | 7 | 2533 | 10 | 50 | 2653 | 30.0 | IMD2 |
| DC_1A-3A_n77A | 1 | 1950 | 5 | 25 | 2140 | N/A | N/A |
| | 3 | 1712.5 | 5 | 25 | 1807.5 | 31.5 | IMD2 |
| | n77 | 3757.5 | 10 | 50 | 3757.5 | N/A | N/A |
| | 1 | 1950 | 5 | 25 | 2140 | N/A | N/A |
| | 3 | 1775 | 5 | 25 | 1870 | 8.5 | IMD4 |
| | n77 | 3980 | 10 | 50 | 3980 | N/A | N/A |
| | 1 | 1950 | 5 | 25 | 2140 | 31.0 | IMD2 |
| | 3 | 1775 | 5 | 25 | 1870 | N/A | N/A |
| | n77 | 3915 | 10 | 50 | 3915 | N/A | N/A |
| | 1 | 1950 | 5 | 25 | 2140 | N/A | N/A |
| DC_1A-3A_n78A DC_1A-3C_n78A | 3 | 1712.5 | 5 | 25 | 1807.5 | 31.2 | IMD2 |
| | n78 | 3757.5 | 10 | 50 | 3757.5 | N/A | N/A |
| | 1 | 1935 | 5 | 25 | 2125 | 2.8 | IMD5 |
| | 3 | 1775 | 5 | 25 | 1870 | N/A | N/A |
| | n78 | 3725 | 10 | 50 | 3725 | N/A | N/A |
| DC_1A-5A_n78A | 1 | 1932 | 5 | 25 | 2122 | 18.1 | IMD3 |
| | 5 | 829 | 5 | 25 | 874 | N/A | N/A |
| | n78 | 3780 | 10 | 50 | 3780 | N/A | N/A |
| | 1 | 1975 | 5 | 25 | 2165 | N/A | N/A |
| | 5 | 840 | 5 | 25 | 885 | 3.1 | IMD5 |
| | n78 | 3405 | 10 | 50 | 3405 | N/A | N/A |
| DC_1A-7A_n78A DC_1A-7C_n78A | 1 | 1977.5 | 5 | 25 | 2167.5 | N/A | N/A |
| | 7 | 2507.5 | 5 | 25 | 2627.5 | 9.1 | IMD4 |
| | n78 | 3305 | 10 | 50 | 3305 | N/A | N/A |
| | 1 | 1950 | 5 | 25 | 2140 | 8.7 | IMD4 |
| | 7 | 2510 | 10 | 50 | 2630 | N/A | N/A |
| | n78 | 3580 | 10 | 50 | 3580 | N/A | N/A |
| DC_1A_n7A-n78A | 1 | 1977.5 | 5 | 25 | 2167.5 | N/A | N/A |
| | n7 | 2507.5 | 5 | 25 | 2627.5 | 9.1 | IMD4 |
| | n78 | 3305 | 10 | 50 | 3305 | N/A | N/A |
| | 1 | 1970 | 5 | 25 | 2160 | N/A | N/A |
| | n7 | 2520 | 5 | 25 | 2640 | N/A | N/A |
| | n78 | 3390 | 10 | 52 | 3390 | 10.1 | IMD4 |
| DC_1A-3A_n79A | 1 | 1950 | 5 | 25 | 2140 | 3.6 | IMD5 |
| | 3 | 1750 | 5 | 25 | 1845 | N/A | N/A |
| | n79 | 4860 | 40 | 216 | 4860 | N/A | N/A |
| DC_1A-8A_n78A | 1 | 1945 | 5 | 25 | 2135 | N/A | N/A |
| | 8 | 900 | 5 | 25 | 945 | N/A | N/A |
| | n78 | 3745 | 10 | 52 | 3745 | 14.9 | IMD3 |
| | 1 | 1940 | 5 | 25 | 2130 | N/A | N/A |
| | 8 | 895 | 5 | 25 | 940 | 3.3 | IMD5 |
| | n78 | 3380 | 10 | 52 | 3330 | N/A | N/A |
| DC_1A-18A_n77A | 1 | N/A | N/A | N/A | N/A | N/A | N/A |
| | 18 | N/A | N/A | N/A | N/A | N/A | IMD5 |
| | n77 | N/A | N/A | N/A | N/A | N/A | N/A |
| | 1 | 1930 | 5 | 25 | 2120 | 16.4 | IMD3 |
| | 18 | 825 | 5 | 25 | 870 | N/A | N/A |
| | n77 | 3770 | 10 | 50 | 3770 | N/A | N/A |
| DC_1A-18A_n78A | 1 | N/A | N/A | N/A | N/A | N/A | N/A |

| NR or E-UTRA Band / Channel bandwidth / NRB / MSD | | | | | | | |
|---|---------------|-------------|----------------|---------------------|-------------|----------|-----------|
| EN-DC Configuration | EUTRA/NR band | UL Fc (MHz) | UL/DL BW (MHz) | UL L _{CRB} | DL Fc (MHz) | MSD (dB) | IMD order |
| DC_1A-18A_n79A | 18 | N/A | N/A | N/A | N/A | N/A | IMD5 |
| | n78 | N/A | N/A | N/A | N/A | N/A | N/A |
| | 1 | 1930 | 5 | 25 | 2120 | 16.4 | IMD3 |
| | 18 | 819 | 5 | 25 | 864 | N/A | N/A |
| | n78 | 3758 | 10 | 50 | 3758 | N/A | N/A |
| | 1 | 1935 | 5 | 25 | 2125 | N/A | N/A |
| | 18 | 822.5 | 5 | 25 | 867.5 | 18.3 | IMD3 |
| | n79 | 4737.5 | 40 | 216 | 4737.5 | N/A | N/A |
| | 1 | 1930 | 5 | 25 | 2120 | N/A | N/A |
| | 18 | 820 | 5 | 25 | 865 | 8.9 | IMD4 |
| DC_1A-19A_n77A DC_1A-19A_n78A | n79 | 4925 | 40 | 216 | 4925 | N/A | N/A |
| | 1 | 1935 | 5 | 25 | 2125 | 8.1 | IMD4 |
| | 18 | 822.5 | 5 | 25 | 867.5 | N/A | N/A |
| | n79 | 4592.5 | 40 | 216 | 4592.5 | N/A | N/A |
| | 1 | 1940 | 5 | 25 | 2130 | 17.8 | IMD3 |
| DC_1A-19A_n79A | 19 | 832.5 | 5 | 25 | 877.5 | N/A | N/A |
| | n77, n78 | 3795 | 10 | 50 | 3795 | N/A | N/A |
| | 1 | N/A | N/A | N/A | N/A | N/A | N/A |
| | 19 | N/A | N/A | N/A | N/A | N/A | IMD5 |
| | n78 | N/A | N/A | N/A | N/A | N/A | N/A |
| | 1 | 1950 | 5 | 25 | 2140 | N/A | N/A |
| DC_1A-20A_n78A | 19 | 837.5 | 5 | 25 | 882.5 | 18.3 | IMD3 |
| | n79 | 4782.5 | 40 | 216 | 4782.5 | N/A | N/A |
| | 1 | 1950 | 5 | 25 | 2140 | 8.1 | IMD4 |
| DC_1A-20A_n78A | 19 | 837.5 | 5 | 25 | 882.5 | N/A | N/A |
| | n79 | 4652.5 | 40 | 216 | 4652.5 | N/A | N/A |
| | 1 | 1930 | 5 | 25 | 2120 | 20.3 | IMD3 |
| DC_1A-21A_n77A DC_1A-21A_n78A | 20 | 835 | 5 | 25 | 794 | N/A | N/A |
| | n78 | 3790 | 10 | 50 | 3790 | N/A | N/A |
| | 1 | 1950 | 5 | 25 | 2140 | N/A | N/A |
| DC_1A-21A_n79A | 20 | 851 | 5 | 25 | 810 | 3.0 | IMD5 |
| | n78 | 3330 | 10 | 50 | 3330 | N/A | N/A |
| | 1 | N/A | N/A | N/A | N/A | N/A | N/A |
| DC_1A-21A_n77A DC_1A-21A_n78A | 21 | 1450.4 | 5 | 25 | 1498.4 | N/A | N/A |
| | n77, n78 | 3605 | 10 | 50 | 3605 | N/A | N/A |
| | 1 | N/A | N/A | N/A | N/A | N/A | N/A |
| | 21 | N/A | N/A | N/A | N/A | N/A | IMD2 |
| | n78 | N/A | N/A | N/A | N/A | N/A | N/A |
| DC_1A-21A_n79A | 1 | 1950 | 5 | 25 | 2140 | N/A | N/A |
| | 21 | 1452 | 5 | 25 | 1500 | 2.9 | IMD5 |
| | n77, n78 | 3675 | 10 | 50 | 3675 | N/A | N/A |
| | 1 | N/A | N/A | N/A | N/A | N/A | N/A |
| | 21 | N/A | N/A | N/A | N/A | N/A | IMD4 |
| DC_1A-28A_n77A | n79 | N/A | N/A | N/A | N/A | N/A | N/A |
| | 1 | 1960 | 5 | 25 | 2150 | 15.8 | IMD3 |
| | 28 | 740 | 5 | 25 | 795 | N/A | N/A |
| DC_1A-28A_n77A | n77 | 3630 | 10 | 50 | 3630 | N/A | N/A |
| | 1 | 1960 | 5 | 25 | 2150 | N/A | N/A |
| | 28 | 725 | 5 | 25 | 780 | 4.3 | IMD5 |
| DC_1A-28A_n78A | n77 | 3330 | 10 | 50 | 3330 | N/A | N/A |
| | 1 | 1960 | 5 | 25 | 2150 | 15.7 | IMD3 |
| | 28 | 740 | 5 | 25 | 795 | N/A | N/A |
| DC_1A-28A_n78A | n78 | 3630 | 10 | 50 | 3630 | N/A | N/A |
| | 1 | 1970 | 5 | 25 | 2160 | N/A | N/A |
| | 28 | 739 | 5 | 25 | 794 | 4.2 | IMD5 |
| DC_1A-28A_n78A | n78 | 3352 | 10 | 50 | 3352 | N/A | N/A |
| | 1 | 1950 | 5 | 25 | 2140 | N/A | N/A |
| | n28 | 733 | 5 | 25 | 788 | N/A | N/A |
| | n78 | 3416 | 10 | 50 | 3416 | 15.7 | IMD3 |
| | 1 | 1950 | 5 | 25 | 2140 | N/A | N/A |
| DC_1A_n28A-n78A | n78 | 3320 | 10 | 50 | 3320 | N/A | N/A |

| NR or E-UTRA Band / Channel bandwidth / NRB / MSD | | | | | | | |
|---|---------------|-------------|----------------|---------------------|-------------|----------|-------------------------|
| EN-DC Configuration | EUTRA/NR band | UL Fc (MHz) | UL/DL BW (MHz) | UL L _{CRB} | DL Fc (MHz) | MSD (dB) | IMD order |
| DC_1A-28A_n79A | n28 | 735 | 5 | 25 | 790 | 3.3 | IMD5 |
| | 1 | 1930 | 5 | 25 | 2120 | N/A | N/A |
| | 28 | 733 | 5 | 25 | 788 | 15.2 | IMD3 |
| | n79 | 4648 | 40 | 216 | 4648 | N/A | N/A |
| | 1 | 1925 | 5 | 25 | 2115 | N/A | N/A |
| | 28 | 740 | 5 | 25 | 795 | 10.0 | IMD4 |
| | n79 | 4980 | 40 | 216 | 4980 | N/A | N/A |
| | 1 | 1977.5 | 5 | 25 | 2167.5 | 1.2 | IMD4 |
| | 28 | 745.5 | 5 | 25 | 800.5 | N/A | N/A |
| | n79 | 4420 | 40 | 216 | 4420 | N/A | N/A |
| | 1 | 1935 | 5 | 25 | 2125 | 4.5 | IMD5 |
| | 28 | 718 | 5 | 25 | 773 | N/A | N/A |
| | n79 | 4807 | 40 | 216 | 4807 | N/A | N/A |
| | 1 | 1930 | 5 | 25 | 2120 | N/A | N/A |
| | n40 | 2340 | 5 | 25 | 2340 | N/A | N/A |
| DC_1A_n40A-n78A | n78 | 3450 | 10 | 50 | 3450 | 9.8 | IMD4 3*f1- fn40 |
| | 1 | 1960 | 5 | 25 | 2150 | N/A | N/A |
| | n40 | 2360 | 5 | 25 | 2360 | 10.6 | IMD4 3*f1 - fn78 |
| | n78 | 3520 | 10 | 50 | 3520 | N/A | N/A |
| | 1 | 1970 | 5 | 25 | 2160 | N/A | N/A |
| DC_1A-41A_n77A | n77 | 3400 | 10 | 50 | 3400 | N/A | |
| | 41 | 2510 | 5 | 25 | 2510 | 11.0 | IMD4 |
| | 1 | N/A | N/A | N/A | N/A | N/A | IMD4 |
| | n77 | N/A | N/A | N/A | N/A | N/A | N/A |
| | 41 | N/A | N/A | N/A | N/A | N/A | N/A |
| | 1 | 1930 | 5 | 25 | 2120 | N/A | N/A |
| | n77 | 4150 | 10 | 50 | 4150 | N/A | |
| | 41 | 2510 | 5 | 25 | 2510 | 3.6 | IMD5 |
| DC_1A-41A_n78A | 1 | N/A | N/A | N/A | N/A | N/A | IMD4 |
| | 41 | N/A | N/A | N/A | N/A | N/A | N/A |
| | n78 | N/A | N/A | N/A | N/A | N/A | N/A |
| | 1 | 1975 | 5 | 25 | 2165 | N/A | N/A |
| | 41 | | 5 | 25 | 2515 | 12 | IMD4 |
| | n78 | 3410 | 10 | 50 | 3410 | N/A | N/A |
| DC_1A-41A_n78A | 1 | 1955 | 5 | 25 | 2145 | 8.7 | IMD4 |
| | 41 | 2507.5 | 10 | 50 | 2507.5 | N/A | N/A |
| | n78 | 3580 | 10 | 50 | 3580 | N/A | N/A |
| DC_1A-41A_n79A | 1 | 1970 | 5 | 25 | 2160 | N/A | N/A |
| | n79 | 4500 | 40 | 216 | 4500 | N/A | |
| | 41 | 2530 | 5 | 25 | 2530 | 29.4 | IMD2 |
| DC_1A-42A_n79A | 1 | 1977.5 | 5 | 25 | 2167.5 | N/A | N/A |
| | n79 | 4420 | 40 | 216 | 4420 | N/A | N/A |
| | 42 | 3490 | 5 | 25 | 3490 | 4.8 | IMD5 |
| | 42 | 3402.5 | 5 | 25 | 3402.5 | N/A | N/A |
| | n79 | 4640 | 40 | 216 | 4640 | N/A | N/A |
| | 1 | 1975 | 5 | 25 | 2165 | 15.5 | IMD3 |
| | 42 | 3450 | 5 | 25 | 3450 | N/A | N/A |
| | n79 | 4520 | 40 | 216 | 4520 | N/A | N/A |
| | 1 | 1950 | 5 | 25 | 2140 | 9.3 | IMD4 |
| DC_1A-SUL_n77A-n80A | 1 | 1950 | 5 | 25 | 2140 | 23 | IMD3 |
| | n80 | 1760 | 5 | 25 | | N/A | N/A |
| DC_1A-SUL_n77A-n80A | 1 | 1922.5 | 5 | 25 | 2112.5 | N/A | N/A |
| | n80 | 1782.5 | 5 | 25 | | N/A | N/A |
| | n78 | 3425 | 10 | 50 | 3425 | 13.0 | IMD4 |
| DC_1A_n78A-n79A | 1 | 1950 | 5 | 25 | 2140 | N/A | N/A |
| | n78 | 3410 | 10 | 50 | 3410 | N/A | N/A |
| | n79 | 4870 | 40 | 216 | 4870 | 15.9 | IMD3 |

| NR or E-UTRA Band / Channel bandwidth / NRB / MSD | | | | | | | |
|---|---------------|-------------|----------------|---------------------|-------------|----------|-----------|
| EN-DC Configuration | EUTRA/NR band | UL Fc (MHz) | UL/DL BW (MHz) | UL L _{CRB} | DL Fc (MHz) | MSD (dB) | IMD order |
| | 1 | 1950 | 5 | 25 | 2140 | N/A | N/A |
| | n79 | 4670 | 40 | 216 | 4670 | N/A | N/A |
| | n78 | 3490 | 10 | 50 | 3490 | 4.6 | IMD5 |
| DC_2A-12A_n66A | 2 | N/A | N/A | N/A | N/A | N/A | IMD4 |
| | 12 | N/A | N/A | N/A | N/A | N/A | N/A |
| | n66 | N/A | N/A | N/A | N/A | N/A | N/A |
| DC_2A-14A_n66A | 2 | 1874 | 5 | 25 | 1954 | 7.2 | IMD4 |
| | 14 | 793 | 5 | 25 | 763 | N/A | N/A |
| | 66 | 1770 | 5 | 25 | 2170 | N/A | N/A |
| DC_3A-5A_n78A | 3 | N/A | N/A | N/A | N/A | N/A | IMD3 |
| | 5 | N/A | N/A | N/A | N/A | N/A | N/A |
| | n78 | N/A | N/A | N/A | N/A | N/A | N/A |
| DC_3A-7A_n28A | 3 | 1712.5 | 5 | 25 | 1807.5 | N/A | N/A |
| | n28 | 743 | 5 | 25 | 798 | N/A | N/A |
| | 7 | 2562 | 10 | 50 | 2682 | 16.9 | IMD3 |
| | 7 | 2543 | 10 | 50 | 2663 | N/A | N/A |
| | n28 | 710.5 | 5 | 25 | 765.5 | N/A | N/A |
| DC_3C-7A_n28A | 3 | 1737.5 | 5 | 25 | 1832.5 | 26.0 | IMD2 |
| | 3 | 1725 | 5 | 25 | 1820 | 17.6 | IMD3 |
| | 7 | 2565 | 5 | 25 | 2685 | N/A | N/A |
| | n78 | 3310 | 10 | 50 | 3310 | N/A | N/A |
| | 3 | 1725 | 5 | 25 | 1820 | 8.6 | IMD4 |
| DC_3A-3A-7A-7A_n78A DC_3A-3A-7A-7A_n78A DC_3A-SUL_n78A-n80A DC_3C-7A_SUL_n78A-n80A | 7 | 2565 | 5 | 25 | 2685 | N/A | N/A |
| | n78 | 3475 | 10 | 50 | 3475 | N/A | N/A |
| DC_3A-8A_n77A | 3 | 1715 | 5 | 25 | 1810 | N/A | N/A |
| | n77 | 4190 | 10 | 50 | 4190 | N/A | N/A |
| | 8 | 910 | 5 | 25 | 955 | 9.7 | IMD4 |
| DC_3A-8A_n77A | 8 | 910 | 5 | 25 | 955 | N/A | N/A |
| | n77 | 3640 | 10 | 50 | 3640 | N/A | N/A |
| | 3 | 1725 | 5 | 25 | 1820 | 16.5 | IMD3 |
| DC_3A-8A_n78A | 8 | 910 | 5 | 25 | 955 | N/A | N/A |
| | n78 | 3640 | 10 | 50 | 3640 | N/A | N/A |
| | 3 | 1725 | 5 | 25 | 1820 | 16.5 | IMD3 |
| DC_3A-8A_n79A | 3 | 1755 | 5 | 25 | 1850 | N/A | N/A |
| | n79 | 4465 | 40 | 216 | 4465 | N/A | N/A |
| | 8 | 910 | 5 | 25 | 955 | 15.3 | IMD3 |
| DC_3A-8A_n79A | 8 | 910 | 5 | 25 | 955 | N/A | N/A |
| | n79 | 4580 | 40 | 216 | 4580 | N/A | N/A |
| | 3 | 1755 | 5 | 25 | 1850 | 8.8 | IMD4 |
| DC_3A_n7A-n78A DC_3C_n7A-n78A | 3 | 1730 | 5 | 25 | 1825 | N/A | N/A |
| | n7 | 2560 | 5 | 25 | 2680 | N/A | N/A |
| | n78 | 3390 | 10 | 52 | 3390 | 16.1 | 2*fn7-fB3 |
| DC_3A-8A_n78A | 8 | 910 | 5 | 25 | 955 | N/A | N/A |
| | n78 | 3640 | 10 | 50 | 3640 | N/A | N/A |
| | 3 | 1725 | 5 | 25 | 1820 | 16.5 | IMD3 |
| DC_3A-19A_n78A | 3 | N/A | N/A | N/A | N/A | N/A | IMD3 |
| | 19 | N/A | N/A | N/A | N/A | N/A | N/A |
| | n78 | N/A | N/A | N/A | N/A | N/A | N/A |
| DC_3A-19A_n79A | 3 | 1775 | 5 | 25 | 1870 | N/A | N/A |
| | 19 | 840 | 5 | 25 | 885 | [18.5] | IMD3 |
| | n79 | 4435 | 40 | 216 | 4435 | N/A | N/A |
| | 3 | 1782.5 | 5 | 25 | 1877.5 | 0.2 | IMD4 |
| | 19 | 842.5 | 5 | 25 | 887.5 | N/A | N/A |
| | n79 | 4420 | 40 | 216 | 4420 | N/A | N/A |
| DC_3A-20A_n28A | 20 | 852 | 5 | 25 | 811 | N/A | N/A |
| DC_3C-20A_n28A | n28 | 738 | 5 | 25 | 793 | N/A | N/A |

| NR or E-UTRA Band / Channel bandwidth / NRB / MSD | | | | | | | |
|---|---------------|-------------|----------------|---------------------|-------------|----------|-----------|
| EN-DC Configuration | EUTRA/NR band | UL Fc (MHz) | UL/DL BW (MHz) | UL L _{CRB} | DL Fc (MHz) | MSD (dB) | IMD order |
| DC_3A_n20A-n78A | 3 | 1723 | 5 | 25 | 1818 | 9.4 | IMD4 |
| | 3 | 1730 | 5 | 25 | 1825 | N/A | N/A |
| | n20 | 845 | 5 | 25 | 804 | N/A | N/A |
| | n78 | 3420 | 10 | 52 | 3420 | 16.1 | IMD3 |
| DC_3A-20A_n78A DC_3C-20A_n78A | 3 | 1725 | 5 | 25 | 1820 | 17.3 | IMD3 |
| | 20 | 845 | 5 | 25 | 804 | N/A | N/A |
| | n78 | 3510 | 10 | 50 | 3510 | N/A | N/A |
| DC_3A-21A_n77A DC_3A-21A_n78A | 3 | 1767.5 | 5 | 25 | 1862.5 | N/A | N/A |
| | 21 | 1459.5 | 5 | 25 | 1507.5 | 8.8 | IMD4 |
| | n77, n78 | 3795 | 10 | 50 | 3795 | N/A | N/A |
| | 3 | N/A | N/A | N/A | N/A | N/A | IMD2 |
| | 21 | N/A | N/A | N/A | N/A | N/A | N/A |
| | n78 | N/A | N/A | N/A | N/A | N/A | N/A |
| DC_3A-21A_n77A | 3 | 1771.6 | 5 | 25 | 1866.6 | 3.4 | IMD5 |
| | 21 | 1450.4 | 5 | 25 | 1498.4 | N/A | N/A |
| | n77 | 3935 | 10 | 50 | 3935 | N/A | N/A |
| DC_3A-21A_n79A | 3 | N/A | N/A | N/A | N/A | N/A | N/A |
| | 21 | N/A | N/A | N/A | N/A | N/A | IMD3 |
| | n79 | N/A | N/A | N/A | N/A | N/A | N/A |
| | 3 | 1774.2 | 5 | 25 | 1869.2 | 17.8 | IMD3 |
| | 21 | 1450.4 | 5 | 25 | 1498.4 | N/A | N/A |
| | n79 | 4770 | 40 | 216 | 4770 | N/A | N/A |
| DC_3A-28A_n77A | 3 | 1712.5 | 5 | 25 | 1807.5 | N/A | N/A |
| | 28 | 715 | 5 | 25 | 770 | 15.3 | IMD3 |
| | n77 | 4195 | 10 | 50 | 4195 | N/A | N/A |
| | 3 | 1755 | 5 | 25 | 1850 | 17.0 | IMD3 |
| | 28 | 735 | 5 | 25 | 790 | N/A | N/A |
| DC_3A-28A_n78A | n77 | 3320 | 10 | 50 | 3320 | N/A | N/A |
| | 3 | 1775 | 5 | 25 | 1870 | 17.3 | IMD3 |
| | 28 | 740 | 5 | 25 | 760 | N/A | N/A |
| DC_3A-28A_n79A | n78 | 3350 | 10 | 25 | 3350 | N/A | N/A |
| | 3 | 1770 | 5 | 25 | 1865 | N/A | N/A |
| | 28 | 725 | 5 | 25 | 780 | 10.3 | IMD4 |
| | n79 | 4530 | 40 | 216 | 4530 | N/A | N/A |
| | 3 | 1775 | 5 | 25 | 1870 | 5.7 | IMD5 |
| | 28 | 725 | 5 | 25 | 780 | N/A | N/A |
| DC_3A_n28A-n78A DC_3C_n28A-n78A | n79 | 4770 | 40 | 216 | 4770 | N/A | N/A |
| | 3 | 1750 | 5 | 25 | 1845 | N/A | N/A |
| | n28 | 743 | 5 | 25 | 798 | N/A | N/A |
| DC_3A-41A_n78A | n78 | 3764 | 10 | 50 | 3764 | 4.5 | IMD5 |
| | 41 | 2620 | 5 | 25 | 2620 | N/A | N/A |
| | n78 | 3400 | 10 | 52 | 3400 | N/A | N/A |
| DC_3A_n78A-n79A | 3 | 1745 | 5 | 25 | 1840 | 16.4 | IMD3 |
| | 3 | 1770 | 5 | 25 | 1865 | N/A | N/A |
| | n78 | 3340 | 10 | 50 | 3340 | N/A | N/A |
| | n79 | 4910 | 40 | 216 | 4910 | 16.3 | IMD3 |
| | 3 | 1770 | 5 | 25 | 1865 | N/A | N/A |
| | n79 | 4510 | 40 | 216 | 4510 | N/A | N/A |
| DC_3A-SUL_n78A-n82A | n78 | 3710 | 10 | 50 | 3710 | 4.2 | IMD5 |
| | 3 | 1775 | 5 | 25 | 1870 | 4 | IMD4 |
| DC_3A-21A_n79A | n82 | 840 | 5 | 25 | | N/A | N/A |
| | 3 | 1774.2 | 5 | 25 | 1869.2 | 17.8 | IMD3 |
| | 21 | 1450.4 | 5 | 25 | 1498.4 | N/A | N/A |
| DC_5A-7A_n78A | n79 | 4770 | 40 | 216 | 4770 | N/A | N/A |
| | 5 | 844 | 5 | 25 | 889 | N/A | N/A |
| | 7 | 2525 | 5 | 25 | 2645 | 30.1 | IMD2 |
| | n78 | 3489 | 10 | 50 | 3489 | N/A | N/A |
| | 5 | 834 | 5 | 25 | 879 | 30.2 | IMD2 |
| | 7 | 2550 | 5 | 25 | 2670 | N/A | N/A |
| | n78 | 3429 | 10 | 50 | 3429 | N/A | N/A |
| | 5 | 830 | 5 | 25 | 875 | 3.3 | IMD5 |

| NR or E-UTRA Band / Channel bandwidth / NRB / MSD | | | | | | | |
|---|---------------|-------------|----------------|---------------------|-------------|----------|-------------------|
| EN-DC Configuration | EUTRA/NR band | UL Fc (MHz) | UL/DL BW (MHz) | UL L _{CRB} | DL Fc (MHz) | MSD (dB) | IMD order |
| | 7 | 2525 | 5 | 25 | 2645 | N/A | N/A |
| | n78 | 3350 | 10 | 50 | 3350 | N/A | N/A |
| DC_5A_41A_n78A | 5 | 860 | 5 | 25 | 885 | 30.2 | IMD2 |
| | 41 | 2615 | 5 | 25 | 2615 | N/A | N/A |
| | n78 | 3500 | 10 | 50 | 3500 | N/A | N/A |
| | 5 | 856.5 | 5 | 25 | 881.5 | 3.1 | IMD5 |
| | 41 | 2620.5 | 5 | 25 | 2620.5 | N/A | N/A |
| | n78 | 3490 | 10 | 50 | 3490 | N/A | N/A |
| DC_5A-41A_n79A | 5 | 835 | 5 | 25 | 880 | 23.9 | IMD3 |
| | 41 | 2665 | 5 | 25 | 2665 | N/A | N/A |
| | n79 | 4450 | 40 | 216 | 4450 | N/A | N/A |
| | 5 | 826.5 | 5 | 25 | 871.5 | N/A | N/A |
| | 41 | 2517.5 | 5 | 25 | 2517.5 | 1.8 | IMD4 |
| | n79 | 4980 | 40 | 216 | 4980 | N/A | N/A |
| DC_7A-20A_n3A | 7 | 2543 | 10 | 50 | 2663 | N/A | N/A |
| | 20 | 847 | 10 | 20 | 806 | 10.5 | IMD2 |
| | n3 | 1737 | 5 | 25 | 1832 | N/A | N/A |
| | 7 | 2510 | 10 | 50 | 2630 | 26.0 | IMD2 ¹ |
| | 20 | 855 | 5 | 25 | 896 | N/A | N/A |
| | n3 | 1775 | 10 | 50 | 1870 | N/A | N/A |
| DC_7A-20A_n28A | 20 | 852 | 5 | 25 | 811 | N/A | N/A |
| | n28 | 738 | 5 | 25 | 793 | N/A | N/A |
| | 7 | 2550 | 10 | 50 | 2670 | 5.9 | IMD5 |
| DC_7A-20A_n78A | 7 | 2560 | 5 | 25 | 2680 | N/A | N/A |
| | 20 | 851 | 5 | 25 | 810 | 30.5 | IMD2 |
| | n78 | 3370 | 10 | 50 | 3370 | N/A | N/A |
| DC_7A-20A_n78A | 7 | 2560 | 5 | 25 | 2680 | N/A | N/A |
| | 20 | 851 | 5 | 25 | 810 | 3.0 | IMD5 |
| | n78 | 3435 | 10 | 50 | 3435 | N/A | N/A |
| DC_7A-20A_n78A | 7 | 2555 | 5 | 25 | 2675 | 30.8 | IMD2 |
| | 20 | 845 | 5 | 25 | 804 | N/A | N/A |
| | n78 | 3520 | 10 | 50 | 3520 | N/A | N/A |
| DC_7A-28A_n5A DC_7C-28A_n5A | 7 | 2540 | 5 | 25 | 2725 | N/A | N/A |
| | 28 | 721 | 5 | 25 | 776 | 4.4 | IMD5 |
| | n5 | 829 | 5 | 25 | 854 | N/A | N/A |
| | 7 | 2510 | 5 | 25 | 2630 | 5.9 | IMD5 |
| | 28 | 730 | 5 | 25 | 785 | N/A | N/A |
| | n5 | 840 | 5 | 25 | 874 | N/A | N/A |
| DC_7A-28A_n78A | 7 | 2570 | 5 | 25 | 2670 | N/A | N/A |
| | 28 | 720 | 5 | 25 | 780 | 8.3 | IMD2 |
| | n78 | 3350 | 10 | 50 | 3421 | N/A | N/A |
| | 7 | 2570 | 5 | 25 | 2670 | N/A | N/A |
| | 28 | 720 | 5 | 25 | 790 | 3.0 | IMD5 |
| | n78 | 3460 | 10 | 50 | 3421 | N/A | N/A |
| | 7 | 2570 | 5 | 25 | 2650 | 30.5 | IMD2 |
| | 28 | 740 | 5 | 25 | 768 | N/A | N/A |
| DC_7A_n28A-n78A DC_7C_n28A-n78A | n78 | 3390 | 10 | 50 | 3421 | N/A | N/A |
| | 7 | 2565 | 5 | 25 | 2685 | N/A | N/A |
| | n28 | 745 | 5 | 25 | 800 | N/A | N/A |
| | n78 | 3310 | 10 | 50 | 3310 | 29.7 | IMD2 |
| | 7 | 2565 | 5 | 25 | 2685 | N/A | N/A |
| | n78 | 3365 | 10 | 50 | 3365 | N/A | N/A |
| DC_7A-46A_n78A ⁶ | n28 | 745 | 5 | 25 | 800 | 28.8 | IMD2 |
| | 7 | N/A | N/A | N/A | N/A | N/A | N/A |
| | 46 | N/A | N/A | N/A | N/A | N/A | IMD2, IMD5 |
| DC_14A-66A_n2A DC_14A-66A- 66A_n2A | n78 | N/A | N/A | N/A | N/A | N/A | N/A |
| | 14 | 793 | 5 | 25 | 763 | N/A | N/A |
| | 66 | 1762 | 5 | 25 | 2162 | 7.6 | IMD4 |
| DC_18A-28A_n77A | n2 | 1874 | 5 | 25 | 1954 | N/A | N/A |
| | 18 | 820 | 5 | 25 | 865 | N/A | N/A |

| NR or E-UTRA Band / Channel bandwidth / NRB / MSD | | | | | | | |
|---|---------------|-------------|----------------|---------------------|-------------|----------|-----------|
| EN-DC Configuration | EUTRA/NR band | UL Fc (MHz) | UL/DL BW (MHz) | UL L _{CRB} | DL Fc (MHz) | MSD (dB) | IMD order |
| | 28 | 723 | 5 | 25 | 778 | 4.4 | IMD5 |
| | n77 | 4058 | 10 | 50 | 4058 | N/A | N/A |
| DC_18A-28A_n77A | 18 | 820 | 5 | 25 | 865 | 3.9 | IMD5 |
| | 28 | 723 | 5 | 25 | 778 | N/A | N/A |
| | n77 | 3757 | 10 | 50 | 3757 | N/A | N/A |
| DC_18A-28A_n78A | 18 | 819 | 5 | 25 | 864 | 3.8 | IMD5 |
| | 28 | 723 | 5 | 25 | 778 | N/A | N/A |
| | n78 | 3756 | 10 | 50 | 3756 | N/A | N/A |
| DC_19A-21A_n77A DC_19A-21A_n78A | 19 | 837.5 | 5 | 25 | 882.5 | 18.7 | IMD3 |
| | 21 | 1450.4 | 5 | 25 | 1498.4 | N/A | N/A |
| | n77, n78 | 3783.3 | 10 | 50 | 3783.3 | N/A | N/A |
| DC_19A-21A_n77A | 19 | 837.5 | 5 | 25 | 882.5 | N/A | N/A |
| | 21 | 1454.5 | 5 | 25 | 1502.5 | 9.0 | IMD4 |
| | n77 | 4015 | 10 | 50 | 4015 | N/A | N/A |
| DC_19A-21A_n79A | 19 | N/A | N/A | N/A | N/A | N/A | IMD5 |
| | 21 | N/A | N/A | N/A | N/A | N/A | N/A |
| | n79 | N/A | N/A | N/A | N/A | N/A | N/A |
| | 19 | 837.5 | 5 | 25 | 882.2 | N/A | N/A |
| | 21 | 1452 | 5 | 25 | 1500 | 3.8 | IMD5 |
| | n79 | 4850 | 40 | 216 | 4850 | N/A | N/A |
| DC_20A_n1A-n78A | 20 | 845 | 5 | 25 | 804 | N/A | N/A |
| | n1 | 1940 | 5 | 25 | 2130 | N/A | N/A |
| | n78 | 3630 | 10 | 52 | 3630 | 16.0 | IMD3 |
| | 20 | 835 | 5 | 25 | 794 | N/A | N/A |
| | n1 | 1930 | 5 | 25 | 2120 | 15.3 | IMD3 |
| | n78 | 3790 | 10 | 52 | 3790 | N/A | N/A |
| DC_20A_n3A-n78A | 20 | 845 | 5 | 25 | 804 | N/A | N/A |
| | n3 | 1730 | 5 | 25 | 1825 | N/A | N/A |
| | n78 | 3420 | 10 | 52 | 3420 | 16.1 | IMD3 |
| | 20 | 845 | 5 | 25 | 804 | N/A | N/A |
| | n3 | 1765 | 5 | 25 | 1860 | 15.7 | IMD3 |
| | n78 | 3550 | 10 | 52 | 3550 | N/A | N/A |
| DC_20A_SUL_n78A-n80A | 20 | 847 | 5 | 25 | 806 | 9 | IMD4 |
| | n80 | 1735 | 5 | 25 | | N/A | N/A |
| DC_21A-28A_n77A | 21 | 1452 | 5 | 25 | 1500 | N/A | N/A |
| | 28 | 730.5 | 5 | 25 | 785.5 | 16.9 | IMD3 |
| | n77 | 3689.5 | 10 | 50 | 3689.5 | N/A | N/A |
| | 21 | 1450.5 | 5 | 25 | 1498.5 | 9.9 | IMD4 |
| | 28 | 730.5 | 5 | 25 | 785.5 | N/A | N/A |
| | n77 | 3690 | 10 | 50 | 3690 | N/A | N/A |
| DC_21A-28A_n79A | 21 | 1450 | 5 | 25 | 1498 | 5.2 | IMD5 |
| | 28 | 730.5 | 5 | 25 | 785.5 | N/A | N/A |
| | n79 | 4420 | 40 | 216 | 4420 | N/A | N/A |
| DC_28A-42A_79A | 28 | 730 | 5 | 25 | 785 | N/A | N/A |
| | 42 | 3420 | 5 | 25 | 3420 | 15.3 | IMD3 |
| | n79 | 4880 | 40 | 216 | 4880 | N/A | N/A |
| | 28 | 745 | 5 | 25 | 800 | 16.2 | IMD2 |
| | 42 | 3597.5 | 5 | 25 | 3597.5 | N/A | N/A |
| | n79 | 4420 | 40 | 216 | 4420 | N/A | N/A |
| DC_19A_n78A-n79A | 19 | 835 | 5 | 25 | 880 | N/A | N/A |
| | n78 | 3680 | 10 | 50 | 3680 | N/A | N/A |
| | n79 | 4515 | 40 | 216 | 4515 | 29.3 | IMD2 |
| | 19 | 835 | 5 | 25 | 880 | N/A | N/A |
| | n79 | 4550 | 40 | 216 | 4550 | N/A | N/A |
| | n78 | 3715 | 10 | 50 | 3715 | 28.8 | IMD2 |
| DC_20A_n28A-n78A DC_20A_SUL_n78A-n83A | 20 | 857 | 5 | 25 | 816 | N/A | N/A |
| | n28, n83 | 743 | 5 | 25 | 798 | N/A | N/A |
| | n78 | 3314 | 10 | 50 | 3314 | 8.7 | IMD4 |
| | 20 | 837 | 5 | 25 | 796 | N/A | N/A |
| | n78 | 3310 | 10 | 50 | 3310 | N/A | N/A |
| | n28 | 744 | 5 | 25 | 799 | 9.4 | IMD4 |

| NR or E-UTRA Band / Channel bandwidth / NRB / MSD | | | | | | | |
|---|---------------|-------------|----------------|---------------------|-------------|----------|-----------|
| EN-DC Configuration | EUTRA/NR band | UL Fc (MHz) | UL/DL BW (MHz) | UL L _{CRB} | DL Fc (MHz) | MSD (dB) | IMD order |
| DC_21A_n78A-n79A | 21 | 1453 | 5 | 25 | 1501 | N/A | N/A |
| | n78 | 3420 | 10 | 50 | 3420 | N/A | N/A |
| | n79 | 4873 | 40 | 216 | 4873 | 30.1 | IMD2 |
| | 21 | 1453 | 5 | 25 | 1501 | N/A | N/A |
| | n79 | 4940 | 40 | 216 | 4940 | N/A | N/A |
| | n78 | 3487 | 10 | 50 | 3487 | 29.8 | IMD2 |
| NOTE 1: For NR band, UL/DL BW and UL L _{CRB} can be adjusted according to the supported BW and lowest SCS supported by the UE. | | | | | | | |
| DC_3A-40A_n1A | n1 | 1950 | 5 | 25 | 2140 | N/A | N/A |
| | 3 | 1735 | 5 | 25 | 1830 | N/A | N/A |
| | 40 | 2380 | 5 | 25 | 2380 | 8.0 | IMD5 |

7.3B.2.0.3.5.3 Void

7.3B.2.0.3a Inter-band NE-DC within FR1

Reference sensitivity exceptions are specified for the condition when there is uplink transmission only in the aggressor band. This subclause addresses directly only NE-DC configurations that don't have a corresponding specified EN-DC configuration or specific NE-DC exceptions.

7.3B.0.2.3a.1 Reference sensitivity exceptions due to UL harmonic interference for NE-DC in NR FR1

Sensitivity degradation is allowed for a band if it is impacted by UL harmonic interference from another band part of the same NE-DC configuration. For the NE-DC configurations that have an EN-DC defined configuration, the reference sensitivity exceptions for the victim band (high) are specified in Table 7.3B.2.3.1-1 with uplink configuration of the aggressor band (low) specified in Table 7.3B.2.3.1-2 are applicable.

7.3B.2.0.4 Inter-band EN-DC including FR2

7.3B.2.0.4.1 Void

7.3B.2.0.5 Inter-band EN-DC including both FR1 and FR2

7.3B.2.0.5.1 Reference sensitivity exceptions due to UL harmonic interference for EN-DC including both FR1 and FR2

For inter-band EN-DC of E-UTRA and NR in both FR1 and FR2, the UE is allowed to apply each sensitivity degradation for EN-DC in FR1 specified in clause 7.3B.2.3 TS 38.101-3 and for EN-DC including FR2 specified in clause 7.3B.2.3 of TS 38.101-3 independently.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.3B.2.

7.3B.2.1 Reference sensitivity for Intra-band Contiguous EN-DC (2 CCs)

Editor's note: MSD test point selection is based on core spec requirement and shall be added to TP analysis to TS 38.905 [7].

7.3B.2.1.1 Test purpose

To verify the ability of UE that support intra-band contiguous EN-DC configurations to receive data with a given average throughput for a specified reference measurement channel, under conditions of low signal level, ideal propagation and no added noise. A UE unable to meet the throughput requirement under these conditions will decrease the effective coverage area.

7.3B.2.1.2 Test applicability

This test applies to all types of NR UE release 15 and forward supporting intra-band EN-DC.

7.3B.2.1.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.3B.2.0.

Exception requirements for both NR and E-UTRA are defined for this test and therefore LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

7.3B.2.1.4 Test description

7.3B.2.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations for NR consist of environmental conditions test frequencies, test channel bandwidths and sub-carrier spacing based on NR operating bands specified in Table 5.3.5-1 of TS 38.521-1 [8]. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in Table 7.3.2.4.1-1, Table 7.3.2.4.1-2, and Table 7.3.2.4.1-3 of TS 38.521-1 [8]. The details of the uplink reference measurement channels (RMCs) are specified in Annexe A2.2 of TS 38.521-1 [8]. Configurations of PDSCH and PDCCCH before measurement are specified in Annex C.2 of TS 38.521-1 [8].

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 5.4.2.1-1 of TS 36.521-1 [10]. All of these configurations shall be tested with applicable test parameters for each channel bandwidth are shown in tables 7.3.4.1-1 and 7.3.4.1-2 of TS 36.521-1 [10]. The details of the downlink and uplink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3 of TS 36.521-1 [10]. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and PDCCCH before measurement are specified in Annex C.2 of TS 36.521-1 [10].

The channel bandwidths for E-UTRA and NR component carriers shall follow the values specified in Table 5.3B.1.2-1 for a given EN-DC combination.

Table 7.3B.2.1.4.1-1: Test configurations table for EN-DC configurations affected by Reference sensitivity exceptions

| Initial Conditions | | | | | | | |
|---|------------------|--|----------------------|------------------------------------|--|-------------------|-----------------------------------|
| Test Environment as specified in TS 38.508-1 [5] clause 4.1 | | | | Normal, TL/VL, TL/VH, TH/VL, TH/VH | | | |
| NR Test Frequencies as specified in TS 38.508-1 [5] clause 4.3.1 E-UTRA Test Frequencies as specified in TS 36.508-1 [11] clause 4.3.1 | | | | Low, mid and high range | | | |
| E-UTRA Test Channel Bandwidths as specified in TS 36.508 [11] clause 4.3.1 | | | | Specified below | | | |
| NR Test Channel Bandwidths as specified in TS 38.508-1 [5] clause 4.3.1 | | | | Specified below | | | |
| NR Test SCS as specified in Table 5.3.5-1 in TS 38.521-1 [8] | | | | Lowest supported SCS | | | |
| NR/E-UTRA Test Parameters | | | | | | | |
| Downlink Configuration | | | | Uplink Configuration | | | |
| NR Modulation | NR RB allocation | E-UTRA Modulation | E-UTRA RB allocation | NR Modulation | NR RB allocation | E-UTRA Modulation | E-UTRA RB allocation |
| CP-OFDM QPSK | Full RB (NOTE 1) | QPSK | Full RB | DFT-s-OFDM QPSK | Specified in Table 7.3B.2.1.4.1-2 | QPSK | Specified in Table 7.3B.2.1.4.1-2 |
| Test Point configurations | | | | | | | |
| Test Settings for DC_(n)71AA dual UL UE | | | | | | | |
| Test ID | E-UTRA/NR band | F _c (UL) (MHz) N _{UL} | UL Channel BW (MHz) | UL allocation (L _{CRB}) | F _c (DL) (MHz) N _{DL} | Duplex mode | |
| 1 | 71 | 665.5MHz, E _{UL} = 133147 | 5 | 5@19 | 619.5 MHz E _{DL} = 68611 | FDD | |
| | n71 | 675.5 N _{UL} = 135100 | 15 | 15@0 | 629.5 N _{DL} = 125900 | | |
| 2 | 71 | 670.5 E _{UL} = 133197 | 15 | 15@59 | 624.5 E _{DL} = 68661 | | |
| | n71 | 680.5 N _{UL} = 136100 | 5 | 5@0 | 634.5 N _{DL} = 126900 | | |
| 3 | 71 | 668 E _{UL} = 133172 | 10 | 10@39 | 622 E _{DL} = 68636 | | |
| | n71 | 678 N _{UL} = 135600 | 10 | 10@0 | 632 N _{DL} = 126400 | | |
| 4 | 71 | 668 E _{UL} = 133172 | 10 | 10@0 | 622 E _{DL} = 68636 | | |
| | n71 | 678 N _{UL} = 135600 | 10 | 10@41 | 632 N _{DL} = 126400 | | |
| 5 | 71 | 665.5 E _{UL} = 133147 | 5 | 5@19 | 619.5 E _{DL} = 68611 | FDD | |
| | n71 | 675.5 N _{UL} = 135100 | 15 ³ | 15@0 | 632 ³ N _{UL} = 126400 | | |
| 6 | 71 | 670.5 E _{UL} = 133197 | 15 | 15@59 | 624.5 E _{DL} = 68661 | | |
| | n71 | 680.5 N _{UL} = 136100 | 5 ³ | 5@0 | 637 ³ N _{UL} = 127400 | | |
| 7 | 71 | 668 E _{UL} = 133172 | 10 | 10@39 | 622 E _{DL} = 68636 | | |
| | n71 | 678 N _{UL} = 135600 | 10 ³ | 10@0 | 634.5 ³ N _{UL} = 126900 | | |
| 8 | 71 | 668 E _{UL} = 133172 | 10 | 10@0 | 622 E _{DL} = 68636 | | |
| | n71 | 678 N _{UL} = 135600 | 10 ³ | 10@41 | 634.5 ³ N _{UL} = 126900 | | |

| Test Settings for DC_(n)71AA for single UL UE | | | | | | | |
|---|-----|---------|---------|------------|---------|-----|--|
| 1 | 71 | default | Highest | 0 | default | FDD | |
| | n71 | default | Highest | REFSENS_NR | default | | |
| NOTE 1: Full RB allocation shall be used per each SCS and channel BW as specified in Table 7.3.2.4.1-2 of TS 38.521-1 [8]. | | | | | | | |
| NOTE 2: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.3B.1.2-1. | | | | | | | |
| NOTE 3: In accordance to BCS1, the NR uplink bandwidth is specified as in this table, but the corresponding NR downlink bandwidth is 5 MHz larger. | | | | | | | |
| NOTE 4: In a FR1 band where UE supports 4Rx, the test shall be performed only with 4Rx antennas ports connected. | | | | | | | |

Table 7.3B.2.1.4.1-2: Test configurations table for EN-DC configurations not affected by Reference sensitivity exceptions, EN-DC configuration other than DC_(n)71AA

| Initial Conditions | | | | | | | |
|---|---|---------|-------------------------|--|-----------------|-----------------------|--|
| | Test Environment as specified in TS 38.508-1 [6] clause 4.1 | | | NC, TL/VL, TL/VH, TH/VL, TH/VH | | | |
| | NR Test Frequencies as specified in TS 38.508-1 [6] clause 4.3.1, E-UTRA Test Frequencies as specified in TS 36.508 [11] clause 4.3.1 | | | Low range, High range | | | |
| | Test DC Combination setting (NRB_agg) as specified in clause [TBD] for the DC Configuration across bandwidth combination sets supported by the UE. | | | Refer to "NR NRB" and "E-UTRA NRB" columns | | | |
| | Network signalling value | | | NS_01 by default, exceptions listed in Table 7.3.3-3, dependent on PCC Band | | | |
| Test Parameters for DC Configurations | | | | | | | |
| ID | PCC – E-UTRA | | | SCG -NR | | | |
| | Band | Range | NRB | Band | Range | NRB | |
| | UL MOD | DL MOD | CH BW | DLalloc / UL alloc | UL MOD | DL MOD | UL/DL Ch BW DLalloc / UL alloc |
| Test Settings for a DC_(n)XAA Configuration (Intra-band contiguous EN-DC) – Note 2 | | | | | | | |
| 1 (Note 4) | X | default | | | nX | default | |
| | QPSK | QPSK | Highest N _{RB} | All RBs / REFSENS_LTE | CP-OFDM QPSK | QPSK /CP-OFDM QPSK | Highest N _{RB} All RBs / REFSENS_NR |
| 2 (Note 5) | X | default | | | nX | default | |
| | N/A | QPSK | Highest N _{RB} | All RBs / 0 | CP-OFDM QPSK | QPSK /CP-OFDM QPSK | Highest N _{RB} All RBs / REFSENS_NR |
| Note 1: REFSENS_LTE refers to the single carrier Uplink RB allocation for reference sensitivity according to table 7.3.3-2 of TS 36.521-1 [10]. REFSENS_NR refers to the single carrier Uplink RB allocation for reference sensitivity according to table 7.3.2.4.1-3 of TS 38.521-1 [8]. REFSENS_ENDC_1 refers to the Uplink RB allocation for reference sensitivity exceptions due to UL harmonic interference according to table 7.3B.2.0.3.1-2. REFSENS_ENDC_2 refers to the Uplink RB allocation for reference sensitivity exceptions due to receiver harmonic mixing according to table 7.3B.2.0.3.2-2. REFSENS_ENDC_3 refers to the Uplink RB allocation for reference sensitivity exceptions due to cross band isolation according to table 7.3B.2.0.3.4-2. | | | | | | | |
| Note 2: Not LTE anchor agnostic configuration due to exception requirement for intra-band contiguous CA in clause 7.4B, 7.5B, 7.6B.2, 7.6B.3, 7.6B.4, 7.7B, 7.8B, 7.9B test cases | | | | | | | |
| Note 3: In a FR1 band where UE supports 4Rx, the test shall be performed only with 4Rx antennas ports connected. | | | | | | | |

1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, Figure A.3.1.1.1 for TE diagram and clause A.3.2.1 for UE diagram.

2. The parameter settings for NR cell are set up according to TS 38.508-1 [5] clause 4.4.3.
3. The parameter settings for E-URA cell are set up according to TS 36.508 [11] clause 4.4.3.
4. NR downlink signals are initially set up according to Annex C.0, C.1, C.2, C.3.1, and uplink signals according to Annex G.0, G.1, G.2, and G.3.1 of TS 38.521-1 [8].
5. E-UTRA downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0 of TS 36.521-1 [10].
6. The UL Reference Measurement channels for NR are set according to Table 7.3.2.4.1-1, Table 7.3.2.4.1-2, and Table 7.3.2.4.1-3 of TS 38.521-1 [8].
7. The UL Reference Measurement channels for E-UTRA are set according to Tables 7.3.4.1-1 and 7.3.4.1-2 of TS 36.521-1 [10].
8. NR propagation conditions are set according to Annex B.0 of TS 38.521-1 [8].
9. E-UTRA propagation conditions are set according to B.0 of TS 36.521-1 [10].
10. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters *Connectivity* EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 7.3B.2.1.4.3.
11. The UL Reference Measurement channels configurations for exceptional cases are set according to Table 7.3B.2.1.4.1-1.

7.3B.2.1.4.2 Test procedure

1. NR SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format [0_1] for C_RNTI to schedule the UL RMC according to Table 7.3B.2.3.4.1-1 on both EN-DC component carriers. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
2. E-UTRA SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.6.3.1.4.1-1 of TS 36.521-1 [10]. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.
3. Set the Downlink signal level to the appropriate REFSENS value defined in TS 38.521-1 [8], Table 7.3.3-1 for NR band and TS 36.521-1 [10] Table 7.3.3-1 for E-UTRA band. Send continuously uplink power control "up" commands in the uplink scheduling information to both carriers to ensure the UE transmits PUMAX level for at least the duration of the Throughput measurement.
4. Measure the average throughput of both NR and E-UTRA for a duration sufficient to achieve statistical significance according to Annex H.2 of TS 38.521-1 [8] for NR band, and Annex G.2 of TS 36.521-1 [10] for EUTRA band.

7.3B.2.1.4.3 Message contents

Message contents are according to TS 38.508-1 [5] clause 4.6 for NR band. Message contents are according to TS 36.508 [7] clause 4.6 for EUTRA band.

7.3B.2.1.5 Test requirement

For intra-band contiguous EN-DC configurations, The throughput of each CG shall be $\geq 95\%$ of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with reference receive power level specified in Tables 7.3.2.5-1 and parameters specified Tables 7.3.2.4.1-1, Tables 7.3.2.4.1-2 and Tables 7.3.2.4.1-3 of TS 38.521-1 [8] for NR band , and reference measurement channels as specified in Annex A.3.2 of TS 36.521-1 [10] with parameters specified in Tables 7.3.5-1 and Table 7.3.5-2 of TS 36.521-1 [10] for E-UTRA band.

The maximum allowed degradation MSD of the reference sensitivity level, as specified for the applicable carrier bandwidths in accordance with [5] for the E-UTRA CG and [2] for the NR CG, is specified in Table 7.3B.2.1.5-1.

Reference sensitivity test requirements for EN-DC configurations other than DC_(n)71AA with dual UL UE, are specified in Table 7.3.5-1 in TS 36.521-1 [10] for the LTE CC, and Table 7.3.2.5-1 in TS 38.521-1 [8] for the NR CC.

Table 7.3B.2.1.5-1: Reference sensitivity for intra-band DC_(n)71AA

| EN-DC | E-UTRA/ NR band | SCS (kHz) | Channel BW (MHz) | Ref sensitivity (dBm) | Note | Duplex mode |
|--|--------------------|--------------|------------------------|-----------------------------|--------|----------------|
| DC_(n)71AA | 71 | N/A | 5 | -97.2 | | FDD |
| | n71 | 15 | 5 | -97.2 +TT | | |
| | 71 | N/A | 5 | -97.2 | | |
| | n71 | 15 | 10 | -94.0 +TT | | |
| | B1 | N/A | 5 | -97.2 | | |
| | n71 | 15 | 15 | -91.6 +TT | | |
| | 71 | N/A | 5 | -97.2 | | |
| | n71 | 15 | 20 | -86.0 +TT | | |
| | 71 | N/A | 5 | -96.5 | | |
| | n71 | 15 | 15 | -89.8 +TT | Note 1 | |
| | 71 | N/A | 15 | -91.3 | | |
| | n71 | 15 | 5 | -95.6 +TT | Note 2 | |
| | 71 | N/A | 10 | -93.5 | | |
| | n71 | 15 | 10 | -92.3 +TT | Note 3 | |
| | 71 | N/A | 10 | -76.3 | | |
| | n71 | 15 | 10 | -64.6 +TT | Note 4 | |
| | 71 | N/A | 5 | -96.5 | | |
| | n71 | 15 | 15 ⁹ | -89.1 +TT | Note 5 | |
| | 71 | N/A | 15 | -91.3 | | |
| | n71 | 15 | 5 ⁹ | -95.0 +TT | Note 6 | |
| | 71 | N/A | 10 | -93.5 | | |
| | n71 | 15 | 10 ⁹ | -91.5 +TT | Note 7 | |
| | 71 | N/A | 10 | -76.3 | | |
| | n71 | 15 | 10 ⁹ | -64.9 +TT | Note 8 | |
| NOTE 1: For test configuration specified by Table 7.3B.2.1.4.1-2 Test ID 1. NOTE 2: For test configuration specified by Table 7.3B.2.1.4.1-2 Test ID 2. NOTE 3: For test configuration specified by Table 7.3B.2.1.4.1-2 Test ID 3. NOTE 4: For test configuration specified by Table 7.3B.2.1.4.1-2 Test ID 4. NOTE 5: For test configuration specified by Table 7.3B.2.1.4.1-1 Test ID 5. NOTE 6: For test configuration specified by Table 7.3B.2.1.4.1-1 Test ID 6. NOTE 7: For test configuration specified by Table 7.3B.2.1.4.1-1 Test ID 7. NOTE 8: For test configuration specified by Table 7.3B.2.1.4.1-1 Test ID 8. NOTE 9: In accordance to BCS1, the NR uplink bandwidth is specified as in this table, but the corresponding NR downlink bandwidth is 5 MHz larger. | | | | | | |

Table 7.3B.2.1.5-2: Test Tolerance (TT) for NR RX sensitivity level

| $f \leq 3.0\text{GHz}$ | $3.0\text{GHz} < f \leq 6.0\text{ GHz}$ |
|------------------------|---|
| 0.7 dB | 1.0 dB |

7.3B.2.2 Reference sensitivity for Intra-band non-contiguous EN-DC (2 CCs)

7.3B.2.2.1 Test purpose

Same as in clause 7.3B.2.1.1.

7.3B.2.2.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting intra-band non-contiguous EN-DC.

7.3B.2.2.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.3B.2.0.

Exception requirements for both NR and E-UTRA are defined for this test and therefore LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

7.3B.2.2.4 Test Description

7.3B.2.2.4.1 Initial Condition

Initial conditions are a set of **test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.**

The initial test configurations for E-UTRA consist of the test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1, with the exception that the E-UTRA channel bandwidth is the lowest supported value in Table 5.3B.1.3-1 for the EN-DC non-contiguous configuration under test.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and sub-carrier spacing based on NR operating bands specified in table 5.2B.2.1-1. All of these configurations shall be tested with applicable test parameters for each combination of test channel bandwidth and sub-carrier spacing are shown in Table 7.3B.2.2.4.1-1 for NR band. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in TS 38.521-1 [8] Annex C2.

Table 7.3B.2.2.4.1-1: Test Configuration Table for EN-DC configurations affected by Reference sensitivity exceptions

Table 7.3B.2.1.4.1-2: Test configurations table for EN-DC configurations not affected by Reference sensitivity exceptions, EN-DC configuration other than DC_3A_n3A

| Initial Conditions | | | | | | | | |
|--|--|---------|-------|--------------------|---|--------------------|-------------------------|----------------------|
| ID | Test Environment as specified in TS 38.508-1 [6] clause 4.1 | | | | NC, TL/VL, TL/VH, TH/VL, TH/VH | | | |
| | NR Test Frequencies as specified in TS 38.508-1 [6] clause 4.3.1, E-UTRA Test Frequencies as specified in TS 36.508 [11] clause 4.3.1 | | | | TBD | | | |
| | Test DC Combination setting (NRB_agg) as specified in clause [TBD] for the DC Configuration across bandwidth combination sets supported by the UE. | | | | Refer to "NR NRB" and "E-UTRA NRB" columns | | | |
| | Network signalling value | | | | NS_01 by default, exceptions listed in Table 7.3.3-3, dependent on PCC Band | | | |
| Test Parameters for DC Configurations | | | | | | | | |
| ID | PCC – E-UTRA | | | | SCG -NR | | | |
| | Band | Range | NRB | | Band | Range | NRB | |
| | UL MOD | DL MOD | CH BW | DLalloc / UL alloc | UL MOD | DL MOD | UL/DL Ch BW | DLalloc / UL alloc |
| Test Settings for a DC_XA_nXA Configuration (Intra-band non-contiguous EN-DC) – Note 2 | | | | | | | | |
| 1 | X | default | | | nX | default | | |
| | N/A | N/A | 5 MHz | N/A | CP-OFDM QPSK | QPSK /CP-OFDM QPSK | Highest N _{RB} | All RBs / REFSENS_NR |
| Note 1: REFSENS_LTE refers to the single carrier Uplink RB allocation for reference sensitivity according to table 7.3.3-2 of TS 36.521-1 [10]. REFSENS_NR refers to the single carrier Uplink RB allocation for reference sensitivity according to table 7.3.2.4.1-3 of TS 38.521-1 [8]. REFSENS_ENDC_1 refers to the Uplink RB allocation for reference sensitivity exceptions due to UL harmonic interference according to table 7.3B.2.0.3.1-2. REFSENS_ENDC_2 refers to the Uplink RB allocation for reference sensitivity exceptions due to receiver harmonic mixing according to table 7.3B.2.0.3.2-2. REFSENS_ENDC_3 refers to the Uplink RB allocation for reference sensitivity exceptions due to cross band isolation according to table 7.3B.2.0.3.4-2. Note 2: LTE anchor agnostic configuration Note 3: In a FR1 band where UE supports 4Rx, the test shall be performed only with 4Rx antennas ports connected. | | | | | | | | |

1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, Figure A.3.1.1.1 for TE diagram and clause A.3.2 for UE diagram.
2. The parameter settings for NR cell are set up according to TS 38.508-1 [6] clause 4.4.3.
3. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3. E-UTRA downlink signal level, and uplink signal level are set according to Table 4.6-1.
4. NR downlink signals are initially set up according to Annex C.0, C.1, and C.2 and uplink signals according to Annex G.0, G.1, G.2, and G.3.0 of TS 38.521-1 [8].
5. The NR UL Reference Measurement channels for NR are set according to Table 7.3B.2.2.4.1-1.
6. Set up the NR and E-UTRA test frequencies so that NR carrier is located at the lower frequency side as specified in Table 5.3B.1.3-1. Repeat each testing with E-UTRA carrier frequency is located at the lower side as specified in Table 5.3B.1.3-1.7.
7. NR propagation conditions are set according to Annex B.0 of TS 38.521-1 [8]. E-UTRA propagation conditions are set according to B.0 of TS 36.521-1 [10].
8. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 7.3B.2.2.4.3.

9. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

7.3B.2.2.4.2 Test Procedure

1. NR SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format [0_1] for C_RNTI to schedule the UL RMC according to Table 7.3B.22..4.1-1 Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
2. Set the Downlink signal level to the appropriate REFSENS value defined in TS 38.521-1 [8], Table 7.3.3-1 for NR band and TS 36.521-1 [10] Table 7.3.3-1 for E-UTRA band. Send continuously uplink power control "up" commands in the uplink scheduling information to both carriers to ensure the UE transmits PUMAX level for at least the duration of the Throughput measurement.
3. Measure the average throughput on the NR carrier for a duration sufficient to achieve statistical significance according to Annex H.2 of TS 38.521-1 [8] for NR band.

7.3B.2.2.4.3 Message Contents

Message contents are according to TS 38.508-1 [6] clause 4.6.1.

7.3B.2.2.5 Test Requirement

For intra-band non-contiguous EN-DC configuration DC_3A_n3A, the measured throughput on the NR carrier shall be $\geq 95\%$ of the maximum throughput of the reference measurement channels as specified in Annex A with reference receive power level specified in Table 7.3B.2.2.5-1, and parameters specified Tables 7.3.2.4.1-1, Tables 7.3.2.4.1-2 and Tables 7.3.2.4.1-3 of TS 38.521-1 [8] for NR band.

Reference sensitivity test requirements for EN-DC configurations other than DC_3A_n3A, are specified in Table 7.3.2.5-1 in TS 38.521-1 [8] for the NR CC.

Table 7.3B.2.2.5-1: Reference sensitivity for intra-band Non-contiguous EN-DC

| EN-DC | Test ID | E-UTRA/ NR band | SCS (kHz) | Channel BW (MHz) | Ref sensitivity (dBm) | Duplex mode |
|-----------|---------|--------------------|--------------|------------------------|-----------------------------|----------------|
| DC_3A_n3A | 1 | 3 | N/A | 5 | TBD | FDD |
| | | n3 | 15 | 5 | | |
| | 2 | 3 | N/A | 5 | | |
| | | n3 | 15 | 10 | | |
| | 3 | 3 | N/A | 5 | | |
| | | n3 | 15 | 15 | | |
| | 4 | 3 | N/A | 5 | | |
| | | n3 | 15 | 20 | | |

Note: NR band Test tolerance (TT) is specified in Table 7.3B.2.2.5-2

Table 7.3B.2.2.5-2: Test Tolerance (TT) for NR RX sensitivity level

| $f \leq 3.0\text{GHz}$ | $3.0\text{GHz} < f \leq 6.0\text{ GHz}$ |
|------------------------|---|
| 0.7 dB | 1.0 dB |

7.3B.2.3 Reference sensitivity for Inter-band EN-DC within FR1 (2 CCs)

7.3B.2.3.1 Test purpose

Same as in clause 7.3B.2.1.1.

7.3B.2.3.2 Test applicability

This test applies to all types of NR UE release 15 and forward supporting inter-band EN-DC.

7.3B.2.3.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.3B.2.0.

LTE anchor agnostic approach is not applied.

7.3B.2.3.4 Test description

7.3B.2.3.4.1 Void

7.3B.2.3.4.2 Test description

7.3B.2.3.4.2.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations for E-UTRA consist of the test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1, with the exception that the E-UTRA channel bandwidth is the lowest supported value in Table 5.3B.1.3-1 for the EN-DC non-contiguous configuration under test.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and sub-carrier spacing based on NR operating bands specified in table 5.2B.2.1-1. All of these configurations shall be tested with applicable test parameters for each combination of test channel bandwidth and sub-carrier spacing are shown in Tables 7.3B.2.3.4.2.1-0 in anchor agnostic mode and Tables 7.3B.2.3.4.2.1-0 to 7.3B.2.3.4.2.1-5 for exceptional test cases in anchor specific mode. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in TS 38.521-1 [8] Annex C2.

In a FR1 band where UE supports 4Rx, the test shall be performed only with 4Rx antennas ports connected.

Table 7.3B.2.3.4.2.1-0: Test configurations table for EN-DC configuration without any reference sensitivity exception

Table 7.3B.2.3.4.2.1-1: Initial test conditions for reference sensitivity exceptions due to UL harmonic interference for EN-DC in NR FR1

Table 7.3B.2.3.4.2.1-2_1: Test configurations table for exceptions due to UL harmonic interference for EN-DC 1_n77

| E-UTRA Band 1 | | | | NR Band n77 | | |
|---------------|------------------|---|-----------------------------------|--|--------------|-----------------------------------|
| Test ID | Channel BW (MHz) | F _c (UL) (MHz) / N _{UL} | UL allocation (L _{CRB}) | NR F _c (DL) (MHz) N _{DL} | NR CBW (MHz) | UL allocation (L _{CRB}) |
| 1 | 10 | 1925 MHz/ 18050 | 25@12 | 3850.02 MHz/ 656668 | Lowest | REFSENS (NOTE 2) |
| 2 | | 1925 MHz/ 18050 | 50@0 | 3850.02 MHz/ 656668 | Mid Highest | REFSENS (NOTE 2) |
| 3 | | 1950 MHz/ 18300 | 25@12 | 3900 MHz/ 660000 | Lowest | REFSENS (NOTE 2) |
| 4 | | 1950 MHz/ 18300 | 50@0 | 3900 MHz/ 660000 | Mid Highest | REFSENS (NOTE 2) |
| 5 | | 1975 MHz/ 18550 | 25@12 | 3950.01 MHz/ 663334 | Lowest | REFSENS (NOTE 2) |
| 6 | | 1975 MHz/ 18550 | 50@0 | 3950.01 MHz/ 663334 | Mid Highest | REFSENS (NOTE 2) |

NOTE 1: Test frequencies are selected to fulfil Note 2 and 13 in Table 7.3B.2.0.3.1-1.
 NOTE 2: REFSENS refers to Table 7.3.2.4.1-3 in TS 38.521-1 [8] which defines uplink RB configuration and start RB location for each SCS, channel BW and NR band.

Table 7.3B.2.3.4.2.1-2_2: Test configurations table for exceptions due to UL harmonic interference for EN-DC 1_n77 (For Note 3 in Table 7.3B.2.0.3.1-1)

| E-UTRA Band 1 | | | | NR Band n77 | | | |
|---------------|------------------|---|-----------------------------------|------------------------------|--|--------------|-----------------------------------|
| Test ID | Channel BW (MHz) | F _c (UL) (MHz) / N _{UL} | UL allocation (L _{CRB}) | NR F _c (DL) (MHz) | NR F _c (DL) N _{UL} | NR CBW (MHz) | UL allocation (L _{CRB}) |
| 1 | 10 | 1925MHz / 18050 | 25@12 | 3825.000 | 655000 | 10 | REFSENS (NOTE 2) |
| | | | 36@7 | 3822.495 | 654833 | 15 | |
| | | | 50@0 | 3820.005 | 654667 | 20 | |
| 2 | 10 | 1950 MHz / 18300 | 25@12 | 3874.995 | 658333 | 10 | REFSENS (NOTE 2) |
| | | | 36@7 | 3872.505 | 658167 | 15 | |
| | | | 50@0 | 3870.000 | 658000 | 20 | |
| 3 | 10 | 1975 MHz / 18550 | 25@12 | 3975.000 | 665000 | 10 | REFSENS (NOTE 2) |
| | | | 36@7 | 3977.505 | 665167 | 15 | |
| | | | 50@0 | 3979.995 | 665333 | 20 | |

NOTE 1: Test frequencies are selected to fulfil Note 3 in Table 7.3B.2.0.3.1-1.
 NOTE 2: REFSENS refers to Table 7.3.2.4.1-3 which defines uplink RB configuration and start RB location for each SCS, channel BW and NR band.
 NOTE 3: Only NR channel bandwidths supported by the UE are tested.

Table 7.3B.2.3.4.2.1-2_3: Test configurations table for exceptions due to UL harmonic interference for EN-DC 3_n77

| E-UTRA Band 3 | | | | NR Band n77 | | |
|---------------|------------------|---|-----------------------------------|--|--------------|-----------------------------------|
| Test ID | Channel BW (MHz) | F _c (UL) (MHz) / N _{UL} | UL allocation (L _{CRB}) | NR F _c (DL) (MHz) N _{DL} | NR CBW (MHz) | UL allocation (L _{CRB}) |
| 1 | 10 | 1715 MHz/ 19250 | 25@12 | 3430.02 MHz/ 628668 | Lowest | REFSENS (NOTE 2) |
| 2 | | 1715 MHz/ 19250 | 50@0 | 3430.02 MHz/ 628668 | Mid Highest | REFSENS (NOTE 2) |
| 3 | | 1747.5 MHz/ 19575 | 25@12 | 3495 MHz/ 633000 | Lowest | REFSENS (NOTE 2) |
| 4 | | 1747.5 MHz/ 19575 | 50@12 | 3495 MHz/ 633000 | Mid Highest | REFSENS (NOTE 2) |
| 5 | | 1780 MHz/ 19900 | 25@12 | 3560.01 MHz/ 637334 | Lowest | REFSENS (NOTE 2) |
| 6 | | 1780 MHz/ 19900 | 50@12 | 3560.01 MHz/ 637334 | Mid Highest | REFSENS (NOTE 2) |

NOTE 1: Test frequencies are selected to fulfil 13 in Table 7.3B.2.0.3.1-1.

NOTE 2: REFSENS refers to Table 7.3.2.4.1-3 in TS 38.521-1 [8] which defines uplink RB configuration and start RB location for each SCS, channel BW and NR band.

Table 7.3B.2.3.4.2.1-2_4: Test configurations table for exceptions due to UL harmonic interference for EN-DC 3_n77 (For Note 3 in Table 7.3B.2.0.3.1-1)

| E-UTRA Band 3 | | | | NR Band n77 | | | |
|---------------|------------------|---|-----------------------------------|------------------------------|--|--------------|-----------------------------------|
| Test ID | Channel BW (MHz) | F _c (UL) (MHz) / N _{UL} | UL allocation (L _{CRB}) | NR F _c (DL) (MHz) | NR F _c (DL) N _{DL} | NR CBW (MHz) | UL allocation (L _{CRB}) |
| 1 | 10 | 1715 MHz / 19250 | 25@12 | 3405.000 | 627000 | 10 | REFSENS (NOTE 2) |
| | | | 36@7 | 3402.495 | 626833 | 15 | |
| | | | 50@0 | 3400.005 | 626667 | 20 | |
| 2 | 10 | 1747.5 MHz / 19575 | 25@12 | 3469.995 | 631333 | 10 | REFSENS (NOTE 2) |
| | | | 36@7 | 3467.505 | 631167 | 15 | |
| | | | 50@0 | 3465.000 | 631000 | 20 | |
| 3 | 10 | 1780 MHz / 19900 | 25@12 | 3585.000 | 639000 | 10 | REFSENS (NOTE 2) |
| | | | 36@7 | 3587.505 | 639167 | 15 | |
| | | | 50@0 | 3589.995 | 639333 | 20 | |

NOTE 1: Test frequencies are selected to fulfil Note 3 in Table 7.3B.2.0.3.1-1.

NOTE 2: REFSENS refers to Table 7.3.2.4.1-3 which defines uplink RB configuration and start RB location for each SCS, channel BW and NR band.

NOTE 3: Only NR channel bandwidths supported by the UE are tested.

Table 7.3B.2.3.4.2.1-2_5: Test configurations table for exceptions due to UL harmonic interference for EN-DC 2_n78

| E-UTRA Band 2 | | | | NR Band n78 | | |
|---------------|------------------|--|-----------------------------------|--|----------------|-----------------------------------|
| Test ID | Channel BW (MHz) | F _c (UL) (MHz) N _{UL} | UL allocation (L _{CRB}) | NR F _c (DL) (MHz) N _{DL} | NR CBW (MHz) | UL allocation (L _{CRB}) |
| 1 | 10 | 1855 MHz/ 18650 | 25@12 | 3710.01 MHz/ 647334 | Lowest | REFSENS (NOTE 2) |
| 2 | | 1855 MHz/ 18650 | 50@0 | 3710.01 MHz/ 647334 | Mid Highest | REFSENS (NOTE 2) |
| 3 | | 1865 MHz/ 18750 | 25@12 | 3730.02 MHz/ 648668 | Lowest | REFSENS (NOTE 2) |
| 4 | | 1865 MHz/ 18750 | 50@0 | 3730.02 MHz/ 648668 | Mid Highest | REFSENS (NOTE 2) |
| 5 | | 1875MHz/ 18850 | 25@12 | 3750 MHz/ 650000 | Lowest | REFSENS (NOTE 2) |
| 6 | | 1875 MHz/ 18850 | 50@0 | 3750 MHz/ 650000 | Mid Highest | REFSENS (NOTE 2) |

NOTE 1: Test frequencies are selected to fulfil Note 2 and 13 in Table 7.3B.2.0.3.1-1.

NOTE 2: REFSENS refers to Table 7.3.2.4.1-3 in TS 38.521-1 [8] which defines uplink RB configuration and start RB location for each SCS, channel BW and NR band.

Table 7.3B.2.3.4.2.1-2_6: Test configurations table for exceptions due to UL harmonic interference for EN-DC 2_n78 (for Note 3 in Table 7.3B.2.0.3.1-1)

| E-UTRA Band 2 | | | | NR Band n78 | | | | |
|---------------|------------------|--|-----------------------------------|---|---|--------------|-----------------------------------|------------------|
| Test ID | Channel BW (MHz) | F _c (UL) (MHz) N _{UL} | UL allocation (L _{CRB}) | NR F _c (DL) (MHz) N _{DL} | NR F _c (DL) (MHz) N _{DL} | NR CBW (MHz) | UL allocation (L _{CRB}) | |
| 1 | 10 | 1855 | 18650 | 25@12 | 3685.005 | 645667 | 10 | REFSENS (NOTE 2) |
| | | | 36@7 | 3682.500 | 645500 | 15 | | |
| | | | 50@0 | 3679.995 | 645333 | 20 | | |
| 2 | 10 | 1867. 5 | 18775 | 25@12 | 3709.995 | 647333 | 10 | REFSENS (NOTE 2) |
| | | | | 36@7 | 3707.505 | 647167 | 15 | |
| | | | | 50@0 | 3705.000 | 647000 | 20 | |
| 3 | 10 | 1885 | 18950 | 25@12 | 3795.000 | 653000 | 10 | REFSENS (NOTE 2) |
| | | 1882. 5 | 18925 | 36@7 | 3792.495 | 652833 | 15 | |
| | | 1879. 9 | 18899 | 50@0 | 3789.795 | 652653 | 20 | |

NOTE 1: Test frequencies are selected to fulfil Note 3 in Table 7.3B.2.0.3.1-1.

NOTE 2: REFSENS refers to Table 7.3.2.4.1-3 which defines uplink RB configuration and start RB location for each SCS, channel BW and NR band.

NOTE 3: Only NR channel bandwidths supported by the UE are tested.

Table 7.3B.2.3.4.2.1-2_7: Test configurations table for exceptions due to UL harmonic interference for EN-DC 3_n78 (Test frequencies are selected to fulfil Requirement for Note 1 and 2 in Table 7.3B.2.0.3.1-1)

| E-UTRA Band 3 | | | | NR Band n78 | | |
|---------------|------------------|--|-----------------------------------|--|--------------|-----------------------------------|
| Test ID | Channel BW (MHz) | F _c (UL) (MHz) N _{UL} | UL allocation (L _{CRB}) | NR F _c (DL) (MHz) N _{DL} | NR CBW (MHz) | UL allocation (L _{CRB}) |
| 1 | 10 | 1715 MHz/ 19250 | 25@12 | 3430.02 MHz/ 628668 | Lowest | REFSENS (NOTE 2) |
| 2 | | 1715 MHz/ 19250 | 50@0 | 3430.02 MHz/ 628668 | Mid Highest | REFSENS (NOTE 2) |
| 3 | | 1747.5 MHz/ 19575 | 25@12 | 3495 MHz/ 633000 | Lowest | REFSENS (NOTE 2) |
| 4 | | 1747.5 MHz/ 19575 | 50@0 | 3495 MHz/ 633000 | Mid Highest | REFSENS (NOTE 2) |
| 5 | | 1780 MHz/ 19900 | 25@12 | 3560.01 MHz/ 637334 | Lowest | REFSENS (NOTE 2) |
| 6 | | 1780 MHz/ 19900 | 50@0 | 3560.01 MHz/ 637334 | Mid Highest | REFSENS (NOTE 2) |

NOTE 1: Test frequencies are selected to fulfil Note 2 and 13 in Table 7.3B.2.0.3.1-1.
 NOTE 2: REFSENS refers to Table 7.3.2.4.1-3 in TS 38.521-1 [8] which defines uplink RB configuration and start RB location for each SCS, channel BW and NR band.

Table 7.3B.2.3.4.2.1-2_8: Test configurations table for exceptions due to UL harmonic interference for EN-DC 3_n78 (Test frequencies are selected to fulfil Requirement for Note 3 in Table 7.3B.2.0.3.1-1)

| E-UTRA Band 3 | | | | NR Band n78 | | | |
|---------------|------------------|---|-----------------------------------|------------------------------|--|--------------|-----------------------------------|
| Test ID | Channel BW (MHz) | F _c (UL) (MHz) / N _{UL} | UL allocation (L _{CRB}) | NR F _c (DL) (MHz) | NR F _c (DL) N _{UL} | NR CBW (MHz) | UL allocation (L _{CRB}) |
| 1 | 10 | 1715 MHz / 19250 | 25@12 | 3405.000 | 627000 | 10 | REFSENS (NOTE 2) |
| | | | 36@7 | 3402.495 | 626833 | 15 | |
| | | | 50@0 | 3400.005 | 626667 | 20 | |
| 2 | 10 | 1747.5 MHz / 19575 | 25@12 | 3469.995 | 631333 | 10 | REFSENS (NOTE 2) |
| | | | 36@7 | 3467.505 | 631167 | 15 | |
| | | | 50@0 | 3465.000 | 631000 | 20 | |
| 3 | 10 | 1780 MHz / 19900 | 25@12 | 3585.000 | 639000 | 10 | REFSENS (NOTE 2) |
| | | | 36@7 | 3587.505 | 639167 | 15 | |
| | | | 50@0 | 3589.995 | 639333 | 20 | |

NOTE 1: Test frequencies are selected to fulfil Note 3 in Table 7.3B.2.0.3.1-1.
 NOTE 2: REFSENS refers to Table 7.3.2.4.1-3 which defines uplink RB configuration and start RB location for each SCS, channel BW and NR band.
 NOTE 3: Only NR channel bandwidths supported by the UE are tested.

Table 7.3B.2.3.4.2.1-2_9: Test configurations table for exceptions due to UL harmonic interference for EN-DC 5_n78 (Test frequencies are selected to fulfil Requirement of Note 6 and 7 in Table 7.3B.2.0.3.1-1)

| E-UTRA Band 5 | | | | NR Band n78 | | |
|---------------|------------------|---|-----------------------------------|--|--------------|-----------------------------------|
| Test ID | Channel BW (MHz) | F _c (UL) (MHz) N _{UL} | UL allocation (L _{CRB}) | NR F _c (DL) (MHz) N _{DL} | NR CBW (MHz) | UL allocation (L _{CRB}) |
| 1 | 10 | 837.5 MHz/ 20535 | 16@17 | 3350.01 MHz/ 623334 | Lowest | REFSENS (NOTE 2) |
| 2 | | 837.5 MHz/ 20535 | 25@12 | 3350.01 MHz/ 623334 | 40 | REFSENS (NOTE 2) |
| 3 | | 840.7 MHz/ 20567 | 16@17 | 3362.82 MHz/ 624188 | Lowest | REFSENS (NOTE 2) |
| 4 | | 840.7 MHz/ 20567 | 25@12 | 3362.82 MHz/ 624188 | 40 | REFSENS (NOTE 2) |
| 5 | | 844 MHz/ 20600 | 16@17 | 3376.02 MHz/ 625068 | Lowest | REFSENS (NOTE 2) |
| 6 | | 844 MHz/ 20600 | 25@12 | 3376.02 MHz/ 625068 | 40 | REFSENS (NOTE 2) |

NOTE 1: Test frequencies are selected to fulfil Note 6 and 7 in Table 7.3B.2.0.3.1-1.

NOTE 2: REFSENS refers to Table 7.3.2.4.1-3 in TS 38.521-1 [8] which defines uplink RB configuration and start RB location for each SCS, channel BW and NR band.

NOTE 3: For UEs with limited UE NR channel bandwidth capability, if the channel BW is not supported by the UE, skip the test point. This shall apply only for Rel 15 UEs.

Table 7.3B.2.3.4.2.1-2_10: Test configurations table for exceptions due to UL harmonic interference for EN-DC 8_n41 (Test frequencies are selected to fulfil Requirement of Note 8 and 9 in Table 7.3B.2.0.3.1-1)

| E-UTRA Band 8 | | | | NR Band n41 | | |
|---------------|------------------|---|-----------------------------------|--|--------------|-----------------------------------|
| Test ID | Channel BW (MHz) | F _c (UL) (MHz) N _{UL} | UL allocation (L _{CRB}) | NR F _c (DL) (MHz) N _{DL} | NR CBW (MHz) | UL allocation (L _{CRB}) |
| 1 | 10 | 885 MHz/ 21500 | 16@17 | 2655 MHz/ 531000 | Lowest | REFSENS (NOTE 2) |
| 2 | | 885 MHz/ 21500 | 25@12 | 2655 MHz/ 531000 | Mid | REFSENS (NOTE 2) |
| 3 | | 890 MHz/ 21550 | 16@17 | 2670 MHz/ 534000 | Lowest | REFSENS (NOTE 2) |

NOTE 1: Test frequencies are selected to fulfil Note 8 and 9 in Table 7.3B.2.0.3.1-1.

NOTE 2: REFSENS refers to Table 7.3.2.4.1-3 in TS 38.521-1 [8] which defines uplink RB configuration and start RB location for each SCS, channel BW and NR band.

Table 7.3B.2.3.4.2.1-2_11: Test configurations table for exceptions due to UL harmonic interference for EN-DC 8_n77 and 8_n78 (Test frequencies are selected to fulfil Requirement of Note 6 and 7 in Table 7.3B.2.0.3.1-1)

| E-UTRA Band 8 | | | | NR Band n77/n78 | | |
|---------------|------------------|---|-----------------------------------|--|--------------|-----------------------------------|
| Test ID | Channel BW (MHz) | F _c (UL) (MHz) N _{UL} | UL allocation (L _{CRB}) | NR F _c (DL) (MHz) N _{DL} | NR CBW (MHz) | UL allocation (L _{CRB}) |
| 1 | 10 | 885 MHz/ 21500 | 16@17 | 3540 MHz/ 636000 | Lowest | REFSENS (NOTE 2) |
| 2 | | 885 MHz/ 21500 | 25@12 | 3540 MHz/ 636000 | Mid Highest | REFSENS (NOTE 2) |
| 3 | | 897.5 MHz/ 21625 | 16@17 | 3590.01 MHz/ 639334 | Lowest | REFSENS (NOTE 2) |
| 4 | | 897.5 MHz/ 21625 | 25@12 | 3590.01 MHz/ 639334 | Mid Highest | REFSENS (NOTE 2) |
| 5 | | 910 MHz/ 21750 | 16@17 | 3640.02 MHz/ 642668 | Lowest | REFSENS (NOTE 2) |
| 6 | | 910 MHz/ 21750 | 25@12 | 3640.02 MHz/ 642668 | Mid Highest | REFSENS (NOTE 2) |

NOTE 1: Test frequencies are selected to fulfil Note 6 and 7 in Table 7.3B.2.0.3.1-1.

NOTE 2: REFSENS refers to Table 7.3.2.4.1-3 in TS 38.521-1 [8] which defines uplink RB configuration and start RB location for each SCS, channel BW and NR band.

Table 7.3B.2.3.4.2.1-2_12: Test configurations table for exceptions due to UL harmonic interference for EN-DC 8_n79 (Requirement of Note 4 and 5)

| E-UTRA Band 8 | | | | NR Band n79 | | |
|---------------|------------------|---|-----------------------------------|--|--------------------|-----------------------------------|
| Test ID | Channel BW (MHz) | F _c (UL) (MHz) N _{UL} | UL allocation (L _{CRB}) | NR F _c (DL) (MHz) N _{DL} | NR CBW (MHz) | UL allocation (L _{CRB}) |
| 1 | 10 | 890 MHz/ 21550 | 25@12 | 4450.02 MHz/ 696668 | Lowest Mid Highest | REFSENS (NOTE 2) |
| 2 | | 897.5 MHz/ 21625 | 25@12 | 4487.52 MHz/ 699168 | Lowest Mid Highest | REFSENS (NOTE 2) |
| 3 | | 910 MHz/ 21750 | 25@12 | 4550.01 MHz/ 703334 | Lowest Mid Highest | REFSENS (NOTE 2) |

NOTE 1: Test frequencies are selected to fulfil Note 4 and 5 in Table 7.3B.2.0.3.1-1.

NOTE 2: REFSENS refers to Table 7.3.2.4.1-3 in TS 38.521-1 [8] which defines uplink RB configuration and start RB location for each SCS, channel BW and NR band.

Table 7.3B.2.3.4.2.1-2_13: Test configurations table for exceptions due to UL harmonic interference for EN-DC 12_n66 (Requirement of Note 8 and 9)

| E-UTRA Band 12 | | | | NR Band n66 | | |
|----------------|------------------|--|-----------------------------------|---|----------------|-----------------------------------|
| Test ID | Channel BW (MHz) | F _c (UL) (MHz) N _{UL} | UL allocation (L _{CRB}) | NR F _c (DL) (MHz) N _{DL} | NR CBW (MHz) | UL allocation (L _{CRB}) |
| 1 | 10 | 704.1 MHz/ 23061 | 8@21 | 2112.5 MHz/ 422500 | Lowest | REFSENS (NOTE 2) |
| 2 | | 707.5 MHz/ 23095 | 8@21 | 2122.5 MHz/ 424500 | Lowest | REFSENS (NOTE 2) |
| | | 707.5 MHz/ 23095 | 20@15 | 2122.5 MHz/ 424500 | Mid | REFSENS (NOTE 2) |
| 3 | | 711 MHz/ 23130 | 8@21 | 2133 MHz/ 426600 | Lowest | REFSENS (NOTE 2) |
| | | 711 MHz/ 23130 | 20@15 | 2133 MHz/ 426600 | Mid Highest | REFSENS (NOTE 2) |

NOTE 1: Test frequencies are selected to fulfil Note 8 and 9 in Table 7.3B.2.0.3.1-1.

NOTE 2: REFSENS refers to Table 7.3.2.4.1-3 in TS 38.521-1 [8] which defines uplink RB configuration and start RB location for each SCS, channel BW and NR band.

Table 7.3B.2.3.4.2.1-2_14: Test configurations table for exceptions due to UL harmonic interference for EN-DC 18_n77 (Requirement of Note 4 and 5)

| E-UTRA Band 18 | | | | NR Band n77 | | |
|----------------|------------------|--|-----------------------------------|---|----------------|-----------------------------------|
| Test ID | Channel BW (MHz) | F _c (UL) (MHz) N _{UL} | UL allocation (L _{CRB}) | NR F _c (DL) (MHz) N _{DL} | NR CBW (MHz) | UL allocation (L _{CRB}) |
| 1 | 10 | 820 MHz/ 23900 | 16@17 | 4100.01 MHz/ 673334 | Lowest | REFSENS (NOTE 2) |
| 2 | | 820 MHz/ 23900 | 25@12 | 4100.01 MHz/ 673334 | Mid Highest | REFSENS (NOTE 2) |
| 3 | | 822.5 MHz/ 23925 | 16@17 | 4112.52 MHz/ 674168 | Lowest | REFSENS (NOTE 2) |
| 4 | | 822.5 MHz/ 23925 | 25@12 | 4112.52 MHz/ 674168 | Mid Highest | REFSENS (NOTE 2) |
| 5 | | 825 MHz/ 23950 | 16@17 | 4125 MHz/ 675000 | Lowest | REFSENS (NOTE 2) |
| 6 | | 825 MHz/ 23950 | 25@12 | 4125 MHz/ 675000 | Mid Highest | REFSENS (NOTE 2) |

NOTE 1: Test frequencies are selected to fulfil Note 4 and 5 in Table 7.3B.2.0.3.1-1.

NOTE 2: REFSENS refers to Table 7.3.2.4.1-3 in TS 38.521-1 [8] which defines uplink RB configuration and start RB location for each SCS, channel BW and NR band.

Table 7.3B.2.3.4.2.1-2_15: Test configurations table for exceptions due to UL harmonic interference for EN-DC 19_n77 (Requirement of Note 4 and 5)

| E-UTRA Band 19 | | | | NR Band n77 | | |
|----------------|------------------|---|-----------------------------------|--|--------------|-----------------------------------|
| Test ID | Channel BW (MHz) | F _c (UL) (MHz) N _{UL} | UL allocation (L _{CRB}) | NR F _c (DL) (MHz) N _{DL} | NR CBW (MHz) | UL allocation (L _{CRB}) |
| 1 | 10 | 835 MHz/ 24050 | 16@17 | 4175.01 MHz/ 678334 | Lowest | REFSENS (NOTE 2) |
| 2 | | 835 MHz/ 24050 | 25@12 | 4175.01 MHz/ 678334 | 40 | REFSENS (NOTE 2) |
| 3 | | 838.9 MHz/ 24089 | 16@17 | 4194.99 MHz/ 679666 | Lowest | REFSENS (NOTE 2) |

NOTE 1: Test frequencies are selected to fulfil Note 4 and 5 in Table 7.3B.2.0.3.1-1.

NOTE 2: REFSENS refers to Table 7.3.2.4.1-3 in TS 38.521-1 [8] which defines uplink RB configuration and start RB location for each SCS, channel BW and NR band.

NOTE 3: For UEs with limited UE NR channel bandwidth capability, if the channel BW is not supported by the UE, skip the test point. This shall apply only for Rel 15 UEs.

Table 7.3B.2.3.4.2.1-2_16: Test configurations table for exceptions due to UL harmonic interference for EN-DC 28_n77/n78 (Requirement of Note 4 and 5)

| E-UTRA Band 28 | | | | NR Band n77/n78 | | |
|----------------|------------------|---|-----------------------------------|--|--------------|-----------------------------------|
| Test ID | Channel BW (MHz) | F _c (UL) (MHz) N _{UL} | UL allocation (L _{CRB}) | NR F _c (DL) (MHz) N _{DL} | NR CBW (MHz) | UL allocation (L _{CRB}) |
| 1 | 10 | 708 MHz/ 27260 | 10@20 | 3540 MHz/ 636000 | Lowest | REFSENS (NOTE 2) |
| 2 | | 708 MHz/ 27260 | 25@12 | 3540 MHz/ 636000 | Mid Highest | REFSENS (NOTE 2) |
| 3 | | 723 MHz/ 27410 | 10@20 | 3615 MHz/ 641000 | Lowest | REFSENS (NOTE 2) |
| 4 | | 723 MHz/ 27410 | 25@12 | 3615 MHz/ 641000 | Mid Highest | REFSENS (NOTE 2) |
| 5 | | 743 MHz/ 27610 | 10@20 | 3715.02 MHz/ 647668 | Lowest | REFSENS (NOTE 2) |
| 6 | | 743 MHz/ 27610 | 25@12 | 3715.02 MHz/ 647668 | Mid Highest | REFSENS (NOTE 2) |

NOTE 1: Test frequencies are selected to fulfil Note 4 and 5 in Table 7.3B.2.0.3.1-1.

NOTE 2: REFSENS refers to Table 7.3.2.4.1-3 in TS 38.521-1 [8] which defines uplink RB configuration and start RB location for each SCS, channel BW and NR band.

Table 7.3B.2.3.4.2.1-2_17: Void

Table 7.3B.2.3.4.2.1-2_18: Test configurations table for exceptions due to UL harmonic interference for EN-DC 26_n41 (Requirement of Note 8 and 9)

| E-UTRA Band 26 | | | | NR Band n41 | | |
|----------------|------------------|--|-----------------------------------|---|--------------|-----------------------------------|
| Test ID | Channel BW (MHz) | F _c (UL) (MHz) N _{UL} | UL allocation (L _{CRB}) | NR F _c (DL) (MHz) N _{DL} | NR CBW (MHz) | UL allocation (L _{CRB}) |
| 1 | | 833.7 MHz/ 26887 | 16@17 | 2501.1 MHz/ 500220 | Lowest | REFSENS (NOTE 2) |
| 3 | | 844 MHz/ 26990 | 16@17 | 2532 MHz/ 506400 | Lowest | REFSENS (NOTE 2) |
| | | 844 MHz/ 26990 | 25@12 | 2532 MHz/ 506400 | 50 | REFSENS (NOTE 2) |

NOTE 1: Test frequencies are selected to fulfil Note 8 and 9 in Table 7.3B.2.0.3.1-1.

NOTE 2: REFSENS refers to Table 7.3.2.4.1-3 in TS 38.521-1 [8] which defines uplink RB configuration and start RB location for each SCS, channel BW and NR band.

NOTE 3: For UEs with limited UE NR channel bandwidth capability, if the channel BW is not supported by the UE, skip the test point. This shall apply only for Rel 15 UEs.

Table 7.3B.2.3.4.2.1-2_19: Test configurations table for exceptions due to UL harmonic interference for EN-DC 26_n77/78 (Requirement of Note 6 and 7)

| E-UTRA Band 26 | | | | NR Band n77/n78 | | |
|----------------|------------------|--|-----------------------------------|---|--------------------------|-----------------------------------|
| Test ID | Channel BW (MHz) | F _c (UL) (MHz) N _{UL} | UL allocation (L _{CRB}) | NR F _c (DL) (MHz) N _{DL} | NR CBW (MHz) | UL allocation (L _{CRB}) |
| 1 | 10 | 825 MHz/ 26800 | 16@17 | 3300 MHz/ 620000 | Lowest Mid Highest | REFSENS (NOTE 2) |
| 2 | | 831.5 MHz/ 26865 | 16@17 | 3326 MHz/ 621733 | Lowest Mid Highest | REFSENS (NOTE 2) |
| 3 | | 844 MHz/ 226990 | 16@17 | 3376 MHz/ 625066 | Lowest Mid Highest | REFSENS (NOTE 2) |

NOTE 1: Test frequencies are selected to fulfil Note 6 and 7 in Table 7.3B.2.0.3.1-1.

NOTE 2: REFSENS refers to Table 7.3.2.4.1-3 in TS 38.521-1 [8] which defines uplink RB configuration and start RB location for each SCS, channel BW and NR band.

Table 7.3B.2.3.4.2.1-2_20: Test configurations table for exceptions due to UL harmonic interference for EN-DC 66_n77/78 (Requirement of Note 2 and 13)

| E-UTRA Band 66 | | | | NR Band n77/n78 | | |
|----------------|------------------|--|-----------------------------------|---|--------------------------|-----------------------------------|
| Test ID | Channel BW (MHz) | F _c (UL) (MHz) N _{UL} | UL allocation (L _{CRB}) | NR F _c (DL) (MHz) N _{DL} | NR CBW (MHz) | UL allocation (L _{CRB}) |
| 1 | 10 | 1715 MHz/ 132022 | 25@12 | 3430 MHz/ 628666 | Lowest Mid Highest | REFSENS (NOTE 2) |
| 2 | | 1755 MHz/ 132422 | 25@12 | 3510 MHz/ 634000 | Lowest Mid Highest | REFSENS (NOTE 2) |
| 3 | | 1775 MHz/ 132622 | 25@12 | 3550 MHz/ 636666 | Lowest Mid Highest | REFSENS (NOTE 2) |

NOTE 1: Test frequencies are selected to fulfil Note 2 and 13 in Table 7.3B.2.0.3.1-1.

NOTE 2: REFSENS refers to Table 7.3.2.4.1-3 in TS 38.521-1 [8] which defines uplink RB configuration and start RB location for each SCS, channel BW and NR band.

Table 7.3B.2.3.4.2.1-2_21: Test configurations table for exceptions due to UL harmonic interference for EN-DC 66_n78 (Requirement of Note 3)

| E-UTRA Band 66 | | | | NR Band n78 | | | | | | |
|----------------|------------------|---|-----------------------------------|------------------------------|--|--------------|-----------------------------------|--|--|--|
| Test ID | Channel BW (MHz) | F _c (UL) (MHz) / N _{UL} | UL allocation (L _{CRB}) | NR F _c (DL) (MHz) | NR F _c (DL) N _{UL} | NR CBW (MHz) | UL allocation (L _{CRB}) | | | |
| 1 | 10 | 1715 MHz / 132022 | 25@12 | 3405.000 | 627000 | 10 | REFSENS (NOTE 2) | | | |
| | | | | 3402.495 | 626833 | 15 | | | | |
| | | | | 3400.005 | 626667 | 20 | | | | |
| | | | | 3454.995 | 630333 | 10 | | | | |
| | | | | 3457.500 | 630500 | 15 | | | | |
| | | 1755 MHz / 132422 | | 3460.005 | 630667 | 20 | REFSENS (NOTE 2) | | | |
| | | | | 3484.995 | 632333 | 10 | | | | |
| | | | | 3482.505 | 632167 | 15 | | | | |
| | | | | 3480.000 | 632000 | 20 | | | | |
| | | | | 3535.005 | 635667 | 10 | | | | |
| 2 | 10 | 1775 MHz / 132622 | | 3537.495 | 635833 | 15 | REFSENS (NOTE 2) | | | |
| | | | | 3540.000 | 636000 | 20 | | | | |
| | | | | 3574.995 | 638333 | 10 | | | | |
| | | | | 3577.500 | 638500 | 15 | | | | |
| | | | | 3580.005 | 638667 | 20 | | | | |
| | | | | 3574.995 | 638333 | 10 | | | | |
| 3 | 10 | | | 3577.500 | 638500 | 15 | REFSENS (NOTE 2) | | | |
| | | | | 3580.005 | 638667 | 20 | | | | |
| | | | | 3574.995 | 638333 | 10 | | | | |
| | | | | 3577.500 | 638500 | 15 | | | | |
| 4 | 10 | | | 3580.005 | 638667 | 20 | REFSENS (NOTE 2) | | | |
| | | | | 3574.995 | 638333 | 10 | | | | |
| | | | | 3577.500 | 638500 | 15 | | | | |
| | | | | 3580.005 | 638667 | 20 | | | | |
| 5 | 10 | | | 3574.995 | 638333 | 10 | REFSENS (NOTE 2) | | | |
| | | | | 3577.500 | 638500 | 15 | | | | |
| | | | | 3580.005 | 638667 | 20 | | | | |
| | | | | 3574.995 | 638333 | 10 | | | | |
| 6 | 10 | | | 3577.500 | 638500 | 15 | REFSENS (NOTE 2) | | | |
| | | | | 3580.005 | 638667 | 20 | | | | |
| | | | | 3574.995 | 638333 | 10 | | | | |
| | | | | 3577.500 | 638500 | 15 | | | | |

Table 7.3B.2.3.4.2.1-2_22: Test configurations table for exceptions due to UL harmonic interference for EN-DC 1_n28

| NR Band n28 | | | | E-UTRA Band 1 | | |
|-------------|------------------|--|-----------------------------------|---|------------------|-----------------------------------|
| Test ID | Channel BW (MHz) | F _c (UL) (MHz) N _{UL} | UL allocation (L _{CRB}) | E-UTRA F _c (DL) (MHz) N _{DL} | E-UTRA CBW (MHz) | UL allocation (L _{CRB}) |
| 1 | 10 | 715 MHz/ 143000 | 8@21 | 2145 MHz/ 350 | 5 | REFSENS (NOTE 2) |
| 2 | 10 | 715 MHz/ 143000 | 16@17 | 2145 MHz/ 350 | 10 | REFSENS (NOTE 2) |
| 3 | 10 | 715 MHz/ 143000 | 25@12 | 2145 MHz/ 350 | 15, 20 | REFSENS (NOTE 2) |

NOTE 1: Test frequencies are selected to fulfil Note 8, 9 and 10 in Table 7.3B.2.0.3.1-1.

NOTE 2: REFSENS refers to Table 7.3.4.1-1 in TS 36.521-1 [10] which defines uplink RB configuration and start RB location for each channel BW.

Table 7.3B.2.3.4.2.1-2_23: Test configurations table for exceptions due to UL harmonic interference for EN-DC 7 n71 (Requirement of Note 6 and 7)

| NR Band n71 | | | | E-UTRA Band 7 | | |
|-------------|------------------|--|-----------------------------------|--|-----------|-----------------------------------|
| Test ID | Channel BW (MHz) | F _c (UL) (MHz) N _{UL} | UL allocation (L _{CRB}) | F _c (DL) (MHz) N _{DL} | CBW (MHz) | UL allocation (L _{CRB}) |
| 1 | 10 | 668 MHz/ 133600 | 16@17 | 2672 MHz/ 3270 | 10 | REFSENS (NOTE 2) |
| 2 | | | 25@17 | | 15 | REFSENS (NOTE 2) |
| 3 | | | 25@17 | | 20 | REFSENS (NOTE 2) |

NOTE 1: Test frequencies are selected to fulfil Note 6 and 7 in Table 7.3B.2.0.3.1-1.

NOTE 2: REFSENS refers to Table 7.3.4.1-1 in TS 36.521-1 [10] which defines uplink RB configuration and start RB location for each channel BW and E-UTRA band.

Table 7.3B.2.3.4.2.1-2_24: Test configurations table for exceptions due to UL harmonic interference for EN-DC 2_n71 (Requirement of Note 11 and 12)

| NR Band n71 | | | | E-UTRA Band 2 | | |
|-------------|------------------|--|-----------------------------------|--|-----------|-----------------------------------|
| Test ID | Channel BW (MHz) | F _c (UL) (MHz) N _{UL} | UL allocation (L _{CRB}) | F _c (DL) (MHz) N _{DL} | CBW (MHz) | UL allocation (L _{CRB}) |
| 1 | 5 | 665.5 MHz/ 133100 | 25@12 | 1985 MHz/ 1150 | 10 | REFSENS (NOTE 2) |
| | | | 20@15 | 1982.5 MHz/ 1125 | 15 | REFSENS (NOTE 2) |
| | | | 20@15 | 1980 MHz/ 1100 | 20 | REFSENS (NOTE 2) |
| 2 | 10 | 668 MHz/ 133600 | 8@21 | 1985 MHz/ 1150 | 10 | REFSENS (NOTE 2) |
| | | | | 1982.5 MHz/ 1125 | 15 | REFSENS (NOTE 2) |
| | | | | 1980 MHz/ 1100 | 20 | REFSENS (NOTE 2) |

NOTE 1: Test frequencies are selected to fulfil Note 11 and 12 in Table 7.3B.2.0.3.1-1.

NOTE 2: REFSENS refers to Table 7.3.4.1-1 in TS 36.521-1 [10] which defines uplink RB configuration and start RB location for each channel BW and E-UTRA band.

Table 7.3B.2.3.4.2.1-2_25: Test configurations table for exceptions due to UL harmonic interference for EN-DC 12_n78 (Test frequencies are selected to fulfil Requirement of Note 4 and 5 in Table 7.3B.2.0.3.1-1)

| E-UTRA Band 12 | | | | NR Band 78 | | |
|----------------|------------------|---|-----------------------------------|--|--------------|-----------------------------------|
| Test ID | Channel BW (MHz) | F _c (UL) (MHz) / N _{UL} | UL allocation (L _{CRB}) | NR F _c (DL) (MHz) / N _{DL} | NR CBW (MHz) | UL allocation (L _{CRB}) |
| 1 | 10 | 711 MHz / 23130 | 10@10 | Mid | 10 | REFSENS (NOTE 2) |
| | | | 15@22 | | 15 | |
| | | | 20@15 | | 20 | |
| | | | 25@12 | | >=40 | |

NOTE 1: Test frequencies are selected to fulfil Note 4 and 5 in Table 7.3B.2.0.3.1-1.

NOTE 2: REFSENS refers to Table 7.3.4.1-3 which defines uplink RB configuration and start RB location for each SCS, channel BW and NR band.

NOTE 3: Only Highest NR channel bandwidths supported by the UE are tested.

Table 7.3B.2.3.4.2.1-2_26: Test configurations table for exceptions due to UL harmonic interference for EN-DC 48_n66 (Victim LTE B48) (Requirement of Note 2 and 13)

| NR Band n66 | | | | E-UTRA Band 48 | | |
|-------------|------------------|--|-----------------------------------|--|-----------|-----------------------------------|
| Test ID | Channel BW (MHz) | F _c (UL) (MHz) N _{UL} | UL allocation (L _{CRB}) | F _c (DL) (MHz) N _{DL} | CBW (MHz) | UL allocation (L _{CRB}) |
| 1 | 5 | 1777.5 MHz/ 355500 | 12@6 | 3555.0 MHz/ 55290 | 5 | REFSENS (NOTE 2) |
| | | | | 3555.0 MHz/ 55290 | 10 | REFSENS (NOTE 2) |
| | | | | 3555.0 MHz/ 55290 | 15 | REFSENS (NOTE 2) |

NOTE 1: Test frequencies are selected to fulfil Note 2 and 13 in Table 7.3B.2.0.3.1-1.

NOTE 2: REFSENS refers to Table 7.3.4.1-1 in TS 36.521-1 [10] which defines uplink RB configuration and start RB location for each channel BW and E-UTRA band.

Table 7.3B.2.3.4.2.1-2_27: Test configurations table for exceptions due to UL harmonic interference for EN-DC 48_n66 (Victim LTE B48) (Requirement of Note 3)

| NR Band n66 | | | | E-UTRA Band 48 | | |
|-------------|------------------|--|-----------------------------------|--|-----------|-----------------------------------|
| Test ID | Channel BW (MHz) | F _c (UL) (MHz) N _{UL} | UL allocation (L _{CRB}) | F _c (DL) (MHz) N _{DL} | CBW (MHz) | UL allocation (L _{CRB}) |
| 1 | 5 | 1777.5 MHz/ 355500 | 12@6 | 3577.5 MHz/ 55515 | 5 | REFSENS (NOTE 2) |
| | | | | 3580.0 MHz/ 55540 | 10 | REFSENS (NOTE 2) |
| | | | | 3585.0 MHz/ 55590 | 20 | REFSENS (NOTE 2) |

NOTE 1: Test frequencies are selected to fulfil Note 3 in Table 7.3B.2.0.3.1-1.
 NOTE 2: REFSENS refers to Table 7.3.4.1-1 in TS 36.521-1 [10] which defines uplink RB configuration and start RB location for each channel BW and E-UTRA band.

Table 7.3B.2.3.4.2.1-2_28: Test configurations table for exceptions due to UL harmonic interference for EN-DC 28_n51 (Victim n51) (Requirement of Note 2, 13)

| E-UTRA Band B28 | | | | NR Band n51 | | |
|-----------------|------------------|--|-----------------------------------|--|-----------|-----------------------------------|
| Test ID | Channel BW (MHz) | F _c (UL) (MHz) N _{UL} | UL allocation (L _{CRB}) | F _c (DL) (MHz) N _{DL} | CBW (MHz) | UL allocation (L _{CRB}) |
| 1 | 5 | 710 MHz/ 27280 | 12@6 | 1420 MHz/ 284000 | 5 | REFSENS (NOTE 2) |

NOTE 1: Test frequencies are selected to fulfil Note 2 and 13 in Table 7.3B.2.0.3.1-1.
 NOTE 2: REFSENS refers to Table 7.3.2.4.1-3 which defines uplink RB configuration and start RB location for each SCS, channel BW and NR band.

The initial test configurations for E-UTRA band and NR band consist of environmental conditions, test frequencies, and channel bandwidths and RB allocations for exceptional test scenarios due to receiver harmonic mixing for EN-DC in NR FRI are specified in Table 7.3B.2.3.4.2.1-3, to Table 7.3B.2.3.4.2.1-3j.

Table 7.3B.2.3.4.2.1-3: Default test conditions for reference sensitivity exceptions due to receiver harmonic mixing for EN-DC in NR FR1

Table 7.3B.2.3.4.2.1-3a: Test configurations table for exceptions due to receiver harmonic mixing for EN-DC 2_n71

| | NR Band n71 | | | E-UTRA Band 2 | | |
|---------|---------------|------------|-----------------------------|------------------|--------------------------|-----------------------------|
| Test ID | NR Channel BW | NR Fc (UL) | UL allocation (L_{CRB}) | Channel BW (MHz) | Fc (UL) (MHz) / N_{UL} | UL allocation (L_{CRB}) |
| 1 | 5 | Low | REFSENS (NOTE 2) | 5 | 1858.50 / 18685 | 25@0 |
| 2 | 5 | Low | REFSENS (NOTE 2) | 10 | 1858.50 / 18685 | 50@0 |
| 3 | 5 | Mid | REFSENS (NOTE 2) | 5 | 1903.50 / 19135 | 25@0 |
| 4 | 5 | Mid | REFSENS (NOTE 2) | 10 | 1903.50 / 19135 | 50@0 |
| 5 | 20 | Low | REFSENS (NOTE 2) | 5 | 1881.00 / 18910 | 25@0 |
| 6 | 20 | Low | REFSENS (NOTE 2) | 10 | 1881.00 / 18910 | 50@0 |
| 7 | 20 | Low | REFSENS (NOTE 2) | 15 | 1881.00 / 18910 | 50@13 |
| 8 | 20 | Low | REFSENS (NOTE 2) | 20 | 1881.00 / 18910 | 50@25 |
| 9 | 20 | Mid | REFSENS (NOTE 2) | 5 | 1903.50 / 19135 | 25@0 |
| 10 | 20 | Mid | REFSENS (NOTE 2) | 10 | 1903.50 / 19135 | 50@0 |

NOTE 1: Test frequencies are selected to fulfil Note 4 in Table 7.3B.2.0.3.2-1.

NOTE 2: REFSENS refers to Table 7.3.2.4.1-3 in TS 38.521-1 [8] which defines uplink RB configuration and start RB location for each SCS, channel BW and NR band.

NOTE 3: For UEs with limited UE NR channel bandwidth capability, if the channel BW is not supported by the UE, skip the test point. This shall apply only for Rel 15 UEs.

Table 7.3B.2.3.4.2.1-3aa: Test configurations table for exceptions due to receiver harmonic mixing for EN-DC 3 n78

| | NR Band n78 | | | E-UTRA Band 3 | | |
|---------|---------------|------------|-----------------------------|------------------|---------------------|-----------------------------|
| Test ID | NR Channel BW | NR Fc (UL) | UL allocation (L_{CRB}) | Channel BW (MHz) | Fc (UL) (MHz) / NUL | UL allocation (L_{CRB}) |
| 1 | 50 | Mid | 100@85 | 20 | Mid | REFSENS (NOTE 3) |

NOTE 1: Test frequencies are selected to fulfil Note 4 in Table 7.3B.2.0.3.2-1.

NOTE 2: For UEs with limited UE NR channel bandwidth capability, if the channel BW is not supported by the UE, skip the test point. This shall apply only for Rel 15 UEs.

NOTE 3: REFSENS refers to Table 7.3.4.1-1 in TS 36.521-1 [10] which defines uplink RB configuration and start RB location for each channel BW.

Table 7.3B.2.3.4.2.1-3b: Test configurations table for exceptions due to receiver harmonic mixing for EN-DC 26_n41 (Victim band LTE)

| NR Band n41 | | | | E-UTRA Band 26 | | |
|-------------|------------------|--|-----------------------------------|--|---------------|-----------------------------------|
| Test ID | Channel BW (MHz) | F _c (UL) (MHz) N _{UL} | UL allocation (L _{CRB}) | F _c (DL) (MHz) N _{DL} | CBW (MHz) | UL allocation (L _{CRB}) |
| 1 | 10 | 2593 MHz/ 518601 | 50@0 | 864.3 MHz/ 8743 | 5, 10, 15, 20 | REFSENS (NOTE 2) |
| 2 | | 2660 MHz/ 532000 | 50@0 | 886.6 MHz/ 8966 | 5, 10, 15, 20 | REFSENS (NOTE 2) |

NOTE 1: Test frequencies are selected to fulfil Note 4 in Table 7.3B.2.0.3.2-1.

NOTE 2: REFSENS refers to Table 7.3.4.1-1 in TS 36.521-1 [10] which defines uplink RB configuration and start RB location for each channel BW.

Table 7.3B.2.3.4.2.1-3c: Void**Table 7.3B.2.3.4.2.1-3d: Test configurations table for exceptions due to receiver harmonic mixing for EN-DC 41_n77 (Victim band LTE)**

| NR Band n77 | | | | E-UTRA Band 41 | | |
|-------------|------------------|--|-----------------------------------|---|---------------|-----------------------------------|
| Test ID | Channel BW (MHz) | F _c (UL) (MHz) N _{UL} | UL allocation (L _{CRB}) | E-UTRA F _c (DL) (MHz) N _{DL} | CBW (MHz) | UL allocation (L _{CRB}) |
| 1 | 20 | 3765 MHz/ 651000 | 50@28 | 2510 MHz/ 39790 | 5, 10, 15, 20 | REFSENS (NOTE 2) |
| 2 | | 4005 MHz/ 667000 | 50@28 | 2670 MHz/ 41390 | 5, 10, 15, 20 | REFSENS (NOTE 2) |

NOTE 1: Test frequencies are selected to fulfil Note 8 in Table 7.3B.2.0.3.2-1.

NOTE 2: REFSENS refers to Table 7.3.4.1-1 in TS 36.521-1 [10] which defines uplink RB configuration and start RB location for each channel BW.

Table 7.3B.2.3.4.2.1-3e: Test configurations table for exceptions due to receiver harmonic mixing for EN-DC 41_n78 (Victim band LTE)

| NR Band n78 | | | | E-UTRA Band 41 | | |
|-------------|------------------|--|-----------------------------------|---|---------------|-----------------------------------|
| Test ID | Channel BW (MHz) | F _c (UL) (MHz) N _{UL} | UL allocation (L _{CRB}) | E-UTRA F _c (DL) (MHz) N _{DL} | CBW (MHz) | UL allocation (L _{CRB}) |
| 1 | 20 | 3789.7 MHz/ 652644 | 50@28 | 2526.4MHz/ 39954 | 5, 10, 15, 20 | REFSENS (NOTE 2) |

NOTE 1: Test frequencies are selected to fulfil Note 8 in Table 7.3B.2.0.3.2-1.

NOTE 2: REFSENS refers to Table 7.3.4.1-1 in TS 36.521-1 [10] which defines uplink RB configuration and start RB location for each channel BW.

Table 7.3B.2.3.4.2.1-3f: Test configurations table for exceptions due to receiver harmonic mixing for EN-DC 28_n77 (Victim band LTE)

| NR Band n77 | | | | E-UTRA Band 41 | | |
|-------------|------------------|--|-----------------------------------|---|---------------|-----------------------------------|
| Test ID | Channel BW (MHz) | F _c (UL) (MHz) N _{UL} | UL allocation (L _{CRB}) | E-UTRA F _c (DL) (MHz) N _{DL} | CBW (MHz) | UL allocation (L _{CRB}) |
| 1 | 20 | 3850 MHz/ 656666 | 100@3 | 770 MHz/ 9330 | 5, 10, 15, 20 | REFSENS (NOTE 2) |
| 2 | | 3950 MHz/ 663333 | 100@3 | 790 MHz/ 9530 | 5, 10, 15, 20 | REFSENS (NOTE 2) |

NOTE 1: Test frequencies are selected to fulfil Note 2 in Table 7.3B.2.0.3.2-1.

NOTE 2: REFSENS refers to Table 7.3.4.1-1 in TS 36.521-1 [10] which defines uplink RB configuration and start RB location for each channel BW.

Table 7.3B.2.3.4.2.1-3g: Void**Table 7.3B.2.3.4.2.1-3h: Test configurations table for exceptions due to receiver harmonic mixing for EN-DC 19_n79**

| Test ID | E-UTRA Band 19 | | | NR Band n79 | |
|---------|----------------|---|-----------------------------------|---------------------|------------------------|
| | Channel BW | F _c (UL) (MHz) / N _{UL} | UL allocation (L _{CRB}) | NR Channel BW (MHz) | NR F _c (UL) |
| 1 | 5 | 840.40 / 24104 | REFSENS (NOTE 2) | 40 | Low |
| 2 | 10 | 840.40 / 24104 | REFSENS (NOTE 2) | 40 | Low |
| 3 | 15 | 840.40 / 24104 | REFSENS (NOTE 2) | 40 | Low |

NOTE 1: Test frequencies are selected to fulfil Note 2 in Table 7.3B.2.0.3.2-1.
 NOTE 2: REFSENS refers to Table 7.3.4.1-1 in TS 36.521-1 [10] which defines uplink RB configuration and start RB location for each channel BW and E-UTRA band.
 NOTE 3: For UEs with limited UE NR channel bandwidth capability, if the channel BW is not supported by the UE, skip the test point. This shall apply only for Rel 15 UEs.

Table 7.3B.2.3.4.2.1-3i: Test configurations table for exceptions due to receiver harmonic mixing for EN-DC 21_n79

| Test ID | E-UTRA Band 21 | | | NR Band n79 | |
|---------|----------------|---------------------|-----------------------------------|---------------------|--|
| | Channel BW | F _c (UL) | UL allocation (L _{CRB}) | NR Channel BW (MHz) | NR F _c (UL) (MHz) / N _{UL} |
| 1 | 5 | Mid | REFSENS (NOTE 2) | 40 | 4510.20 / 700680 |
| 2 | 10 | Mid | REFSENS (NOTE 2) | 40 | 4510.20 / 700680 |
| 3 | 15 | Mid | REFSENS (NOTE 2) | 40 | 4510.20 / 700680 |

NOTE 1: Test frequencies are selected to fulfil Note 3 in Table 7.3B.2.0.3.2-1.
 NOTE 2: Test point NR f_{UL/DL} = 4510.2 MHz (N_{DL} = 700680).
 NOTE 3: REFSENS refers to Table 7.3.4.1-1 in TS 36.521-1 [10] which defines uplink RB configuration and start RB location for each channel BW and E-UTRA band.
 NOTE 4: For UEs with limited UE NR channel bandwidth capability, if the channel BW is not supported by the UE, skip the test point. This shall apply only for Rel 15 UEs.

Table 7.3B.2.3.4.2.1-3j: Test configurations table for exceptions due to receiver harmonic mixing for EN-DC 26_n79 (Victim band LTE)

| Test ID | NR Band n79 | | | E-UTRA Band 26 | | |
|---------|------------------|---|-----------------------------------|--|-----------|-----------------------------------|
| | Channel BW (MHz) | F _c (UL) (MHz) N _{UL} | UL allocation (L _{CRB}) | E-UTRA F _c (DL) (MHz) N _{DL} | CBW (MHz) | UL allocation (L _{CRB}) |
| 1 | 40 | 4427.4 MHz/ 695160 | 216@0 | 885.4 MHz/ 8954 | 5, 10, 15 | REFSENS (NOTE 2) |

NOTE 1: Test frequencies are selected to fulfil Note 2 in Table 7.3B.2.0.3.2-1.
 NOTE 2: REFSENS refers to Table 7.3.4.1-1 in TS 36.521-1 [10] which defines uplink RB configuration and start RB location for each channel BW.

Table 7.3B.2.3.4.2.1-3k: Void

The initial test configurations for E-UTRA band and NR band consist of environmental conditions, test frequencies, and channel bandwidths and RB allocations for exceptional test scenarios due to cross band isolation for EN-DC in NR FR1 are specified in Table 7.3B.2.3.4.2.1-4, to Table 7.3B.2.3.4.2.1-4n.

Table 7.3B.2.3.4.2.1-4: Test configurations table for exceptions due to cross band isolation for EN-DC FR1

| Initial Conditions | | | | | | | |
|---|---------------------|-------------------|----------------------|--|---|-------------------|-------------------------------------|
| Test Environment as specified in TS 38.508-1 [6] clause 4.1 | | | | Normal, TL/VL, TL/VH, TH/VL, TH/VH | | | |
| NR Test Frequencies as specified in TS 38.508-1 [6] clause 4.3.1 E-UTRA Test Frequencies as specified in TS 36.508 [11] clause 4.3.1 | | | | Specified in Table 7.3B.2.3.4.2.1-4a to Table 7.3B.2.3.4.2.1-4n. | | | |
| NR Test Channel Bandwidths as specified in TS 38.508-1 [6] clause 4.3.1 E-UTRA Test Channel Bandwidths as specified in TS 36.508 [11] clause 4.3.1 | | | | Specified in Table 7.3B.2.3.4.2.1-4a to Table 7.3B.2.3.4.2.1-4n. | | | |
| NR Test SCS as specified in Table 5.3.5-1 | | | | 30 KHz | | | |
| NR Test Parameters | | | | | | | |
| Downlink Configuration | | | | Uplink Configuration | | | |
| NR Modulation | NR RB allocation | E-UTRA Modulation | E-UTRA RB allocation | NR Modulation | NR RB allocation | E-UTRA Modulation | E-UTRA RB allocation |
| CP-OFDM QPSK | Full RB (NOTE 1) | QPSK | Full RB | DFT-s-OFDM QPSK | Specified in Table 7.3B.2.3.4.2.1-4a to Table 7.3B.2.3.4.2.1-4n | QPSK | Table 7.3.4.1-1 in TS 36.521-1 [10] |
| NOTE 1: Full RB allocation shall be used per each SCS and channel BW as specified in Table 7.3.2.4.1-2 of TS 38.521-1 [8]. | | | | | | | |

Table 7.3B.2.3.4.2.1-4a: Test configurations for exceptions due to cross band isolation for EN-DC 2_n41 (Victim band LTE)

| Aggressor UL CBW/RB allocation | | | E-UTRA B2 Ch BW/Frequency range | | |
|-----------------------------------|------------------|-----------|------------------------------------|------------------|----------------|
| | | | 10MHz | 15 MHz | 20MHz |
| | | | High range | High range | High range |
| NR n41 | 100 MHz 160@0 | low range | X ¹ - | X ¹ - | X ¹ |
| | 100 MHz 160@0 | mid range | - | - | X ¹ |

NOTE 1: The UL resource blocks shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth.
 NOTE 2: NR UL RB configuration shall set per Table 7.3.2.4.1-3 in TS 38.521-1 [8].

Table 7.3B.2.3.4.2.1-4b: Test configurations for exceptions due to cross band isolation for EN-DC 25_n41 (Victim band LTE)

| Aggressor UL CBW/RB allocation | | | E-UTRA B25 Ch BW/Frequency range | | |
|-----------------------------------|------------------|-----------|-------------------------------------|------------------|----------------|
| | | | 10MHz | 15 MHz | 20MHz |
| | | | High range | High range | High range |
| NR n41 | 100 MHz 160@0 | low range | X ¹ - | X ¹ - | X ¹ |
| | 100 MHz 160@0 | mid range | - | - | X ¹ |

NOTE 1: The UL resource blocks shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth.

NOTE 2: NR UL RB configuration shall set per Table 7.3.2.4.1-3 in TS 38.521-1 [8].

Table 7.3B.2.3.4.2.1-4c: Test configurations for exceptions due to cross band isolation for EN-DC 7_n78 (Victim band LTE)

| Aggressor UL CBW/RB allocation | | | E-UTRA B7 DL CBM/RB allocation | | |
|-----------------------------------|------------------|------------|-----------------------------------|---------------------|---------------------|
| | | | 10MHz | 15 MHz | 20MHz |
| | | | Low, Mid High range | Low, Mid High range | Low, Mid High range |
| NR Band n78 | 100 MHz 270@0 | Low range | X | X | X |
| | 100 MHz 270@0 | High range | - | - | X |

NOTE 1: The UL resource blocks shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth.

NOTE 2: NR UL RB configuration shall be further limited to that specified per Table 7.3.2.4.1-3 in TS 38.521-1 [8].

Table 7.3B.2.3.4.2.1-4d: Test configurations for exceptions due to cross band isolation for EN-DC 38_n78 (Victim band LTE)

| Aggressor UL CBW/RB allocation | | | E-UTRA B38 DL CBM/RB allocation | | |
|-----------------------------------|------------------|------------|------------------------------------|---------------------|---------------------|
| | | | 10MHz | 15 MHz | 20MHz |
| | | | Low, Mid High range | Low, Mid High range | Low, Mid High range |
| NR Band n78 | 100 MHz 270@0 | Low range | X | X | X |
| | 100 MHz 270@0 | High range | - | - | X |

NOTE 1: The UL resource blocks shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth.

NOTE 2: NR UL RB configuration shall be further limited to that specified per Table 7.3.2.4.1-3 in TS 38.521-1 [8].

Table 7.3B.2.3.4.2.1-4e: Test configurations table for exceptions due to cross band isolation for EN-DC 41_n77 (Victim band LTE)

| Aggressor UL CBW/RB allocation | | | E-UTRA B41 Ch BW/Frequency range | | |
|-----------------------------------|------------------|-----------|-------------------------------------|----------------|----------------|
| | | | 10MHz | 15 MHz | 20MHz |
| | | | High range | High range | High range |
| NR n77 | 100 MHz 270@0 | Low range | X ¹ | X ¹ | X ¹ |
| | 100 MHz 270@0 | Mid range | - | - | X ¹ |

NOTE 1: The UL resource blocks shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth.

NOTE 2: NR UL RB configuration shall be further limited to that specified per Table 7.3.2.4.1-3 in TS 38.521-1 [8].

NOTE 3: Applicable only when harmonic mixing MSD for this combination is not applied.

Table 7.3B.2.3.4.2.1-4f: Test configurations table for exceptions due to cross band isolation for EN-DC 41_n77 (Victim band NR)

| Aggressor UL CBW/RB allocation | | | n77 Ch BW/Frequency range | | |
|-----------------------------------|-----------------|------------|------------------------------|----------------|----------------|
| | | | 20MHz | 50 MHz | 100MHz |
| | | | Low range | Mid range | High range |
| E-UTRA | 20 MHz 100@0 | High range | X ¹ | X ¹ | X ¹ |
| | 20 MHz 100@0 | Mid range | X ¹ | - | - |

NOTE 1: The UL resource blocks shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth.

NOTE 2: NR UL RB configuration shall be further limited to that specified per Table 7.3.2.4.1-3 in TS 38.521-1 [8].

NOTE 3: Applicable only when harmonic mixing MSD for this combination is not applied.

Table 7.3B.2.3.4.2.1-4g: Test configurations table for exceptions due to cross band isolation for EN-DC 41_n78(Victim band LTE)

| Aggressor UL CBW/RB allocation | | | E-UTRA B41 Ch BW/Frequency range | | |
|-----------------------------------|------------------|-----------|-------------------------------------|----------------|----------------|
| | | | 10MHz | 15 MHz | 20MHz |
| | | | High range | High range | High range |
| NR | 100 MHz 270@0 | low range | X ¹ | X ¹ | X ¹ |
| | 100 MHz 270@0 | mid range | - | - | X ¹ |

NOTE 1: The UL resource blocks shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth.

NOTE 2: NR UL RB configuration shall be further limited to that specified per Table 7.3.2.4.1-3 in TS 38.521-1 [8].

NOTE 3: Applicable only when harmonic mixing MSD for this combination is not applied.

Table 7.3B.2.3.4.2.1-4h: Test configurations table for exceptions due to cross band isolation for EN-DC 41_n78 (Victim band NR)

| Aggressor UL CBW/RB allocation | | | n78 Ch BW/Frequency range | | |
|-----------------------------------|-----------------|------------|------------------------------|----------------|----------------|
| | | | 20MHz | 50 MHz | 100MHz |
| | | | Low range | Mid range | High range |
| E-UTRA | 20 MHz 100@0 | High range | X ¹ | X ¹ | X ¹ |
| | 20 MHz 100@0 | Mid range | X ¹ | - | - |

NOTE 1: The UL resource blocks shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth.

NOTE 2: NR UL RB configuration shall be further limited to that specified per Table 7.3.2.4.1-3 in TS 38.521-1 [8].

NOTE 3: Applicable only when harmonic mixing MSD for this combination is not applied.

Table 7.3B.2.3.4.2.1-4i: Test configurations table for exceptions due to cross band isolation for EN-DC 66_n41(Victim band LTE)

| Aggressor UL CBW/RB allocation | | | E-UTRA B66 Ch BW/Frequency range | | |
|-----------------------------------|------------------|-----------|-------------------------------------|----------------|----------------|
| | | | 10MHz | 15 MHz | 20MHz |
| | | | High range | High range | High range |
| NR n41 | 100 MHz 128@0 | low range | X ¹ | X ¹ | X ¹ |
| | 100 MHz 128@0 | mid range | - | - | X ¹ |

NOTE 1: The UL resource blocks shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth.

NOTE 2: NR UL RB configuration shall be further limited to that specified per Table 7.3.2.4.1-3 in TS 38.521-1 [8].

NOTE 3: Applicable only when harmonic mixing MSD for this combination is not applied.

Table 7.3B.2.3.4.2.1-4j: Test configurations table for exceptions due to cross band isolation for EN-DC 1_n40 (Victim band NR)

| Aggressor UL CBW/RB allocation | | | NR n40 Ch BW/Frequency range | | |
|-----------------------------------|-----------------|------------|---------------------------------|----------------|----------------|
| | | | 10MHz | 30 MHz | 80 MHz |
| | | | Low range | Low range | Low range |
| E-UTRA B1 | 20 MHz 100@0 | Mid range | X ¹ | X ¹ | X ¹ |
| | 20 MHz 100@0 | High range | - | - | X ¹ |

NOTE 1: The UL resource blocks shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth.

NOTE 2: NR UL RB configuration shall be further limited to that specified per Table 7.3.2.4.1-3 in TS 38.521-1 [8].

Table 7.3B.2.3.4.2.1-4k: Test configurations table for exceptions due to cross band isolation for EN-DC 1_n40 (Victim band LTE)

| Aggressor UL CBW/RB allocation | | | E-UTRA B1 Ch BW/Frequency range | | |
|-----------------------------------|-----------------|-----------|------------------------------------|----------------|----------------|
| | | | 10MHz | 15 MHz | 20MHz |
| | | | Low range | Mid range | High range |
| NR n40 | 20 MHz 100@0 | low range | X ¹ | X ¹ | X ¹ |
| | 20 MHz 100@0 | mid range | - | - | X ¹ |

NOTE 1: The UL resource blocks shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth.

NOTE 2: NR UL RB configuration shall be further limited to that specified per Table 7.3.2.4.1-3 in TS 38.521-1 [8].

Table 7.3B.2.3.4.2.1-4l: Test configurations table for exceptions due to cross band isolation for EN-DC 3_n51 (Victim band NR)

| Aggressor UL CBW/RB allocation | | | NR n51 Ch BW/Frequency range | | |
|-----------------------------------|---------------|-----------|---------------------------------|-----------|------------|
| | | | 5 MHz | 5 MHz | 5 MHz |
| | | | Low range | Mid range | High range |
| E-UTRA B3 | 5 MHz 25@0 | low range | X ¹ | - | - |
| | 5 MHz 25@0 | Mid range | X ¹ | - | - |

NOTE 1: The UL resource blocks shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth.

NOTE 2: NR UL RB configuration shall be further limited to that specified per Table 7.3.2.4.1-3 in TS 38.521-1 [8].

Table 7.3B.2.3.4.2.1-4m: Test configurations table for exceptions due to cross band isolation for EN-DC 30_n66 (Victim band NR)

| Aggressor UL CBW/RB allocation | | | NR n66 Ch BW/Frequency range | | |
|-----------------------------------|---------------|-----------|---------------------------------|----------------|----------------|
| | | | 20 MHz | 20 MHz | 20 MHz |
| | | | Low range | Mid range | High range |
| E-UTRA | 5 MHz 25@0 | low range | X ¹ | X ¹ | X ¹ |
| | 5 MHz 25@0 | Mid range | - | - | X ¹ |

NOTE 1: The UL resource blocks shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth.

NOTE 2: NR UL RB configuration shall be further limited to that specified per Table 7.3.2.4.1-3 in TS 38.521-1 [8].

Table 7.3B.2.3.4.2.1-4n: Test configurations table for exceptions due to cross band isolation for EN-DC 46_n78 (Victim band LTE)

| Aggressor UL CBW/RB allocation | | | E-UTRA B46 Ch BW/Frequency range | | |
|-----------------------------------|-----------------|------------|-------------------------------------|----------------|----------------|
| | | | 20 MHz | 20 MHz | 20 MHz |
| | | | Low range | Mid range | High range |
| NR | 50 MHz 270@0 | mid range | X ¹ | X ¹ | X ¹ |
| | 50 MHz 270@0 | high range | X ¹ | - | - |

NOTE 1: The UL resource blocks shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth.

NOTE 2: NR UL RB configuration shall be further limited to that specified per Table 7.3.2.4.1-3 in TS 38.521-1 [8].

The initial test configurations for E-UTRA band and NR band consist of environmental conditions, test frequencies, and channel bandwidths and RB allocations for exceptional test scenarios due to dual uplink operation for EN-DC in NR FR1 (two bands) are specified in Table 7.3B.2.3.4.2.1-5.

Table 7.3B.2.3.4.2.1-5: Test Configuration Table Reference sensitivity exceptions due to dual uplink operation for EN-DC in NR FR1 (two bands)

| Initial Conditions | | | | | | | | | | | | | | | | |
|--|----------------------------------|--------|-------|--------|--------------|----------|--|---------------------------|-----------------------|--------------------------|---|--|--|--|--|--|
| Test Environment as specified in TS 38.508-1 [6] clause 4.1 | | | | | | | NC, TL/VL, TL/VH, TH/VL, TH/VH | | | | | | | | | |
| NR Test Frequencies as specified in TS 38.508-1 [6] clause 4.3.1, E-UTRA Test Frequencies as specified in TS 36.508 [11] clause 4.3.1 | | | | | | | For test frequencies refer to "Range" columns. | | | | | | | | | |
| Test DC Combination setting (N_{RB_agg}) as specified in clause [TBD] for the DC Configuration across bandwidth combination sets supported by the UE. | | | | | | | Refer to "NR N_{RB} " and "E-UTRA N_{RB} " columns | | | | | | | | | |
| Network signalling value | | | | | | | NS_01 Unless given by Table 7.3.3-3 in TS 36.521-1 [10] for the E-UTRA band and Table 7.3.2.3-4 in TS 38.521-1 [8] for the NR band. | | | | | | | | | |
| Test Parameters for DC Configurations | | | | | | | | | | | | | | | | |
| ID | DC Configuration / N_{RB_agg} | | | | | | | DL Allocation | | UL Allocation (Note 2,3) | | | | | | |
| | DC Configuration | | | | E-UTRA Ch BW | NR Ch BW | CC MOD E-UTRA/NR | E-UTRA & NR RB allocation | | CC MOD E-UTRA/NR | E-UTRA & NR allocations (LCRB @ RB _{start}) | | | | | |
| | E-UTRA | | NR | | | | | PCC | SCC | | | | | | | |
| | Band | Range | Band | Range | | | | | | | | | | | | |
| Default Test Settings for a DC_XA-nYA Configuration | | | | | | | | | | | | | | | | |
| 1 | X | Mid | Y | Mid | 5 | Mid | QPSK /CP-OFDM QPSK | All RBs | QPSK/ DFT-s-OFDM QPSK | REFSENS | REFSENS | | | | | |
| Test Settings for DC_1A-n3A Configuration | | | | | | | | | | | | | | | | |
| 1 | 1 | Note 5 | 3 | Note 5 | 5 | 5 | Note 7 | All RBs | Note 7 | 25@0 | 25@0 | | | | | |
| Test Settings for DC_1A-n5A Configuration | | | | | | | | | | | | | | | | |
| 1 | 1 | Note 5 | 5 | Note 5 | 5 | 5 | Note 7 | All RBs | Note 7 | 25@0 | 25@0 | | | | | |
| Test Settings for DC_1A-n77A Configuration | | | | | | | | | | | | | | | | |
| 1 | 1 | Note 5 | 77 | Note 5 | 5 | 10 | Note 7 | All RBs | Note 7 | 25@0 | 25@0 | | | | | |
| Test Settings for DC_2A-n66A Configuration | | | | | | | | | | | | | | | | |
| 1 | 2 | Note 5 | 66 | Note 5 | 5 | 5 | Note 7 | All RBs | Note 7 | 25@0 | 25@0 | | | | | |
| Test Settings for DC_2A-n78A Configuration | | | | | | | | | | | | | | | | |
| 1 | 2 | Note 5 | 78 | Note 5 | 5 | 10 | Note 7 | All RBs | Note 7 | 25@0 | 50@0 | | | | | |
| Test Settings for DC_3A-n5A Configuration | | | | | | | | | | | | | | | | |
| 1 | 3 | Note 5 | 5 | Note 5 | 10 | 5 | Note 7 | All RBs | Note 7 | 50@0 | 25@0 | | | | | |
| Test Settings for DC_3A-n7A Configuration | | | | | | | | | | | | | | | | |
| 1 | 3 | Note 5 | 7 | Note 5 | 5 | 10 | Note 7 | All RBs | Note 7 | 25@0 | 50@0 | | | | | |
| Test Settings for DC_3A-n20A Configuration | | | | | | | | | | | | | | | | |
| 1 | 3 | Note 5 | 20 | Note 5 | 5 | 5 | Note 7 | All RBs | Note 7 | 25@0 | 25@0 | | | | | |
| Test Settings for DC_3A-n77A Configuration | | | | | | | | | | | | | | | | |
| 1 | 3 | Note 5 | 77/78 | Note 5 | 5 | 10 | Note 7 | All RBs | Note 7 | 25@0 | 50@0 | | | | | |
| Test Settings for DC_5A-n66A Configuration | | | | | | | | | | | | | | | | |
| 1 | 5 | Note 5 | 66 | Note 5 | 5 | 5 | Note 7 | All RBs | Note 7 | 25@0 | 25@0 | | | | | |
| Test Settings for DC_5A-n78A Configuration | | | | | | | | | | | | | | | | |
| 1 | 5 | Note 5 | 78 | Note 5 | 5 | 10 | Note 7 | All RBs | Note 7 | 25@0 | 52@0 | | | | | |

Table 7.3B.2.3.4.2.1-6: Test Configuration Table for EN-DC configurations affected by Reference sensitivity exceptions (two bands)

| Initial Conditions | | | | | | | | |
|--|--------------|---------|--------|-----------------------------|---|-----------------|-------------|------------------------------|
| Test Environment as specified in TS 38.508-1 [6] clause 4.1 | | | | | NC, TL/VL, TL/VH, TH/VL, TH/VH | | | |
| NR Test Frequencies as specified in TS 38.508-1 [6] clause 4.3.1, E-UTRA Test Frequencies as specified in TS 36.508 [11] clause 4.3.1 | | | | | For test frequencies refer to "Range" columns. | | | |
| Test DC Combination setting (NRB_agg) as specified in clause [TBD] for the DC Configuration across bandwidth combination sets supported by the UE. | | | | | Refer to "NR NRB" and "E-UTRA NRB" columns | | | |
| Network signalling value | | | | | NS_01 by default, exceptions listed in Table 7.3.3-3, dependent on PCC Band | | | |
| Test Parameters for DC Configurations | | | | | | | | |
| ID | PCC – E-UTRA | | | | SCG -NR | | | |
| | Band | Range | NRB | | Band | Range | NRB | |
| | UL MOD | DL MOD | CH BW | DLalloc / UL alloc | UL MOD | DL MOD | UL/DL Ch BW | DLalloc / UL alloc |
| Test Settings for a DC_1A_n78 Configuration | | | | | | | | |
| 1 ² | | | | | FFS | | | |
| | 1 | DL 2140 | | | n78 | 3710 | | |
| 2 ⁴ | QPSK | QPSK | 5 MHz | All RBs / REFSENS_ENDC_4 | CP-OFDM QPSK | CP-OFDM QPSK | 10 MHz | All RBs / REFSENS_END C_4 |
| Test Settings for a DC_3_n1 Configuration | | | | | | | | |
| 1 ⁷ | 3 | Mid | | | n1 | Mid | | |
| | N/A | QPSK | 20 MHz | All RBs / 0 | N/A | QPSK | 100 MHz | All RBs / REFSENS_NR |
| 2 ⁶ | 3 | Mid | | | n1 | Mid | | |
| | QPSK | QPSK | 20 MHz | All RBs / REFSENS_ENDC_3 | N/A | CP-OFDM QPSK | 20 MHz | All RBs / 0 |
| 3 ⁴ | 3 | DL 1855 | | | n1 | 2140 | | |
| | QPSK | QPSK | 5 MHz | All RBs / REFSENS_ENDC_4 | CP-OFDM QPSK | CP-OFDM QPSK | 5 MHz | All RBs / REFSENS_END C_4 |
| Test Settings for a DC_3A_n41 Configuration | | | | | | | | |
| 1 ⁶ | 3 | Low | | | n41 | Low | | |
| | QPSK | QPSK | 20 MHz | All RBs / REFSENS_ENDC_3 | N/A | QPSK | 20 MHz | All RBs / 0 |
| 2 ⁶ | 3 | Mid | | | n41 | Low | | |
| | QPSK | QPSK | 20 MHz | All RBs / REFSENS_ENDC_3 | N/A | QPSK | 20 MHz | All RBs / 0 |
| 3 ⁶ | 3 | High | | | n41 | Low | | |
| | N/A | QPSK | 20 MHz | All RBs / 0 | QPSK | QPSK | 100 MHz | All RBs / REFSENS_END C_3 |
| 4 ⁶ | 3 | High | | | n41 | Mid | | |
| | N/A | QPSK | 20 MHz | All RBs / 0 | QPSK | QPSK | 100 MHz | All RBs / REFSENS_END C_3 |
| 5 ⁴ | 3 | DL 1835 | | | n41 | 2657.5 | | |
| | QPSK | QPSK | 5 MHz | All RBs / REFSENS_ENDC_4 | QP | QPSK | 10 MHz | All RBs / REFSENS_END C_4 |
| Test Settings for a DC_3A_n78 Configuration | | | | | | | | |
| 1 ³ | 3 | Mid | | | n78 | 3495 | | |
| | QPSK | QPSK | 20 MHz | All RBs / REFSENS_ENDC_1 | N/A | QPSK | 100 MHz | All RBs / 0 |
| 2 ³ | 3 | Mid | | | n78 | 3525 | | |

7.3B.2.3.4.2.2 Test procedure

1. NR SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format [0_1] for C_RNTI to schedule the UL RMC according to Table 7.3B.22..4.1-1 Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
2. Set the Downlink signal level to the appropriate REFSENS value defined in TS 38.521-1 [8], Table 7.3.3-1 for NR band and TS 36.521-1 [10] Table 7.3.3-1 for E-UTRA band. Send continuously uplink power control "up" commands in the uplink scheduling information to both carriers to ensure the UE transmits P_{UMAX} level for at least the duration of the Throughput measurement.
3. Measure the average throughput on the NR carrier for a duration sufficient to achieve statistical significance according to Annex H.2 of TS 38.521-1 [8] for NR band.

7.3B.2.3.4.2.3 Message contents

Message contents are according to TS 38.508-1 [5] clause 4.6.

7.3B.2.3.5 Test requirement

For inter-band EN-DC configurations, the throughput of each CG shall be $\geq 95\%$ of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with reference receive power level specified in Tables Table 7.3.2.5-1 in TS 38.521-1 [8] and parameters specified Tables 7.3.2.4.1-1, Tables 7.3.2.4.1-2 and Tables 7.3.2.4.1-3 in TS 38.521-1 [8] for NR band.

Reference sensitivity test requirements for EN-DC configurations without any reference sensitivity exception are specified in Table 7.3.2.5-1 in TS 38.521-1 [8] for the NR CC with uplink configuration specified in Table 7.3B.2.3.4.2.1-0.

Test procedure for exceptional test requirements for reference sensitivity for inter-band EN-DC within FR1 are defined in clause 7.3B.2.3.4.2.2. The test requirement is defined in Table 7.3B.2.3.5-1, Table 7.3B.2.3.5-2, Table 7.3B.2.3.5-3, Table 7.3B.2.3.5-4 and Table 7.3B.2.3.5-5 for MSDs due to uplink harmonic, harmonic mixing, cross band isolation, dual uplinks for PC3 ENDC and dual uplink operation for PC2 EN-DC, respectively. For a given EN-DC combo, if more than one category of MSD applies, UE shall pass all requirement.

For the UE which supports inter-band EN-DC, the minimum requirement for reference sensitivity in Table 7.3.2.5-1 of TS 38.521-1 [8] for NR band and Table 7.3.5-1 of TS 36.521-1 [10] for EUTRA band, shall be increased by the amount given in $\Delta R_{IB,c}$ defined in clause 7.3B.3.3 for the applicable for two, three, four and five bands operation.

Reference sensitivity exceptions due to UL harmonic interference for EN-DC in NR FR1, are specified in Table 7.3B.2.3.5-1 with uplink configuration specified in Table 7.3B.2.3.4.2.1-2 to Table 7.3B.2.3.4.2.1-2_27 for each specific EN-DC combination scenario.

Table 7.3B.2.3.5-1: Reference sensitivity due to UL harmonic for EN-DC in NR FR1

| UL band | DL band | SCS (kHz) | 5 MHz (dBm) | 10 MHz (dBm) | 15 MHz (dBm) | 20 MHz (dBm) | 25 MHz (dBm) | 30 MHz (dBm) | 40 MHz (dBm) | 50 MHz (dBm) | 60 MHz (dBm) | 80 MHz (dBm) | 90 MHz (dBm) | 100 MHz (dBm) |
|---------|--|-----------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|---------------|
| 1, 3 | n77 ^{1,2} | 15 | | -71.4 +TT | -71.4 +TT | -71.3 +TT | | | -71.2 +TT | -71.3 +TT | | | | |
| | | 30 | | -71.7 +TT | -71.5 +TT | -71.5 +TT | | | -71.3 +TT | -71.4 +TT | -71.4 +TT | -71.3 +TT | -71.3 +TT | |
| | | 60 | | -72.1 +TT | -71.8 +TT | -71.7 +TT | | | -71.5 +TT | -71.5 +TT | -71.5 +TT | -71.4 +TT | -71.4 +TT | |
| | n77 ³ | 15 | | -94.2 +TT | -92.7 +TT | -91.9 +TT | | | | | | | | |
| | | 30 | | -94.5 +TT | -92.8 +TT | -92.1 +TT | | | | | | | | |
| | | 60 | | -94.9 +TT | -93.1 +TT | -92.3 +TT | | | | | | | | |
| | n78 ^{1,2} | 15 | | -71.4 +TT | -71.4 +TT | -71.3 +TT | | | -71.2 +TT | | | | | |
| | | 30 | | -71.7 +TT | -71.5 +TT | -71.5 +TT | | | -71.3 +TT | | | | | |
| | | 60 | | -72.1 +TT | -71.8 +TT | -71.7 +TT | | | -71.5 +TT | | | | | |
| 2 | n78 ³ | 15 | | -94.2 +TT | -92.7 +TT | -91.9 +TT | | | | | | | | |
| | | 30 | | -94.5 +TT | -92.8 +TT | -92.1 +TT | | | | | | | | |
| | | 60 | | -94.9 +TT | -93.1 +TT | -92.3 +TT | | | | | | | | |
| | n78 ^{1,2} | 15 | | -71.9 +TT | -71.9 +TT | -71.8 +TT | | | -71.7 +TT | -71.8 +TT | | | | |
| | | 30 | | -72.2 +TT | -72.0 +TT | -72.0 +TT | | | -71.8 +TT | -71.9 +TT | -71.9 +TT | -71.8 +TT | -71.8 +TT | |
| | | 60 | | -72.6 +TT | -72.3 +TT | -72.2 +TT | | | -72.0 +TT | -72.0 +TT | -72.0 +TT | -71.9 +TT | -71.9 +TT | |
| 3 | n78 ³ | 15 | | -94.7 +TT | -93.2 +TT | -92.4 +TT | | | | | | | | |
| | | 30 | | -95.0 +TT | -93.3 +TT | -92.6 +TT | | | | | | | | |
| | | 60 | | -95.4 +TT | -93.6 +TT | -92.8 +TT | | | | | | | | |
| | n78 | 15 | | -84.2 +TT | -84.4 +TT | | | | -84.2 +TT | -84.4 +TT | | | | |
| | | 30 | | -84.3 +TT | -84.5 +TT | -84.4 +TT | | | -84.3 +TT | -84.5 +TT | -84.4 +TT | -84.3 +TT | -84.0 +TT | |
| | | 60 | | -84.5 +TT | -84.6 +TT | -84.5 +TT | | | -84.5 +TT | -84.6 +TT | -84.5 +TT | -84.4 +TT | -84.1 +TT | |
| 8 | n77 ^{6,7} n78 ^{6,7} | 15 | | -84.5 +TT | -84.4 +TT | -84.2 +TT | | | -84.0 +TT | -83.9 +TT | | | | |
| | | 30 | | -84.8 +TT | -84.5 +TT | -84.4 +TT | | | -84.1 +TT | -84.0 +TT | -83.9 +TT | -83.8 +TT | -83.5 +TT | |
| | | 60 | | -85.2 +TT | -84.8 +TT | -84.6 +TT | | | -84.3 +TT | -84.1 +TT | -84.0 +TT | -83.9 +TT | -83.6 +TT | |
| | n41 | 15 | | -81.8 +TT | -81.7 +TT | -81.7 +TT | | | -81.6 +TT | -81.5 +TT | | | | |
| | | 30 | | -82.1 +TT | -81.8 +TT | -81.9 +TT | | | -81.7 +TT | -81.6 +TT | -81.4 +TT | -81.3 +TT | -81.2 +TT | |
| | | 60 | | -82.5 +TT | -82.1 +TT | -81.1 +TT | | | -81.9 +TT | -81.7 +TT | -81.6 +TT | -81.3 +TT | -81.2 +TT | |
| 8 | n79 ^{4,5} | 15 | | | | | | | -82.8 +TT | -82.4 +TT | | | | |
| | | 30 | | | | | | | -82.9 +TT | -82.5 +TT | -82.3 +TT | -81.7 +TT | | |
| | | 60 | | | | | | | -83.1 +TT | -82.6 +TT | -82.4 +TT | -81.8 +TT | | |
| | n66 | 15 | -89.5 +TT | -88.8 +TT | -88.3 +TT | -87.8 +TT | | | -87.7 +TT | | | | | |
| | | 30 | | -89.1 | -88.4 | -88.0 | | | -87.8 | | | | | |

| | | | | | | | | | | | | |
|------------|--|---------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--|
| | | | +TT | +TT | +TT | | +TT | | | | | |
| | | 60 | -89.5 +TT | -88.7 +TT | -88.2 +TT | | -87.9 +TT | | | | | |
| 12 | n78 | 15 | -85.4 +TT | -85.1 +TT | -84.9 +TT | | -84.9 +TT | -84.9 +TT | | | | |
| | | 30 | -85.7 +TT | -85.2 +TT | -85.1 +TT | | -85.0 +TT | -85.0 +TT | -84.9 +TT | -84.9 +TT | -84.9 +TT | |
| | | 60 | -86.1 +TT | -85.5 +TT | -85.3 +TT | | -85.2 +TT | -85.1 +TT | -85.0 +TT | -85.0 +TT | -85.0 +TT | |
| 18 , 19 | n77 ^{4,5} | 15 | -84.9 +TT | -84.6 +TT | -84.4 +TT | | -84.4 +TT | -84.4 +TT | | | | |
| | | 30 | -85.2 +TT | -84.7 +TT | -84.6 +TT | | -84.5 +TT | -84.5 +TT | -84.4 +TT | -84.4 +TT | | |
| | | 60 | -85.6 +TT | -85.0 +TT | -84.8 +TT | | -84.7 +TT | -84.6 +TT | -84.5 +TT | -84.5 +TT | | |
| 28 | n51 | 15 | -72.2 +TT | | | | | | | | | |
| | | 30 | | | | | | | | | | |
| | | 60 | | | | | | | | | | |
| 28 | n77 ^{4,5} n78 ^{4,5} | 15 | -84.9 +TT | -84.6 +TT | -84.4 +TT | | -84.4 +TT | -84.4 +TT | | | | |
| | | 30 | -85.2 +TT | -84.7 +TT | -84.6 +TT | | -84.5 +TT | -84.5 +TT | -84.4 +TT | -84.4 +TT | | |
| | | 60 | -85.6 +TT | -85.0 +TT | -84.8 +TT | | -84.7 +TT | -84.6 +TT | -84.5 +TT | -84.5 +TT | | |
| 20 | n77 ^{6,7} n78 ^{6,7} | 15 | -84.5 +TT | -84.4 +TT | -84.2 +TT | | -83.1 +TT | | | | | |
| | | 30 | -84.8 +TT | -84.5 +TT | -84.4 +TT | | -83.2 +TT | | | | | |
| | | 60 | -85.2 +TT | -84.8 +TT | -84.6 +TT | | -83.4 +TT | | | | | |
| 26 | n41 | | -84.5 +TT | -84.6 +TT | -84.4 +TT | | -83.6 +TT | -83.3 +TT | 3.9 +TT | 3.1 +TT | 2.7 +TT | |
| | | 30 | -84.8 +TT | -84.7 +TT | -84.6 +TT | | -83.7 +TT | -83.4 +TT | -83.0 +TT | -82.5 +TT | -82.4 +TT | |
| | | 60 | -85.2 +TT | -85.0 +TT | -84.8 +TT | | -83.9 +TT | -83.5 +TT | -83.2 +TT | -82.5 +TT | -82.4 +TT | |
| 26 | n77 ^{6,7} n78 ^{6,7} | 15 | -84.5 +TT | -84.4 +TT | -84.2 +TT | | -83.1 +TT | | | | | |
| | | 30 | -84.8 +TT | -84.5 +TT | -84.4 +TT | | -83.2 +TT | | | | | |
| | | 60 | -85.2 +TT | -84.8 +TT | -84.6 +TT | | -83.4 +TT | | | | | |
| 26 | n77 ^{4,5} | 15 | -84.9 +TT | -84.6 +TT | -84.4 +TT | | -84.4 +TT | -84.4 +TT | | | | |
| | | 30 | -85.2 +TT | -84.7 +TT | -84.6 +TT | | -84.5 +TT | -84.5 +TT | -84.4 +TT | -84.4 +TT | -85.6 +TT | |
| | | 60 | -85.6 +TT | -85.0 +TT | -84.8 +TT | | -84.7 +TT | -84.6 +TT | -84.5 +TT | -84.5 +TT | -85.7 +TT | |
| n28 | n75 ^{1,2} | 18,9,10 | 15 | -89.1 +TT | -88.7 +TT | -88.3 +TT | -88.0 +TT | | | | | |
| | | | 15 | TBD | TBD | TBD | TBD | | | | | |
| | | | 30 | TBD | TBD | TBD | TBD | | | | | |
| | | | 60 | TBD | TBD | TBD | TBD | | | | | |
| n71 | 2 ¹¹ | 15 | -92.7 +TT | -93.3 +TT | -91.8 +TT | -90.7 +TT | | | | | | |
| n71 | 2 ¹² | 15 | -95.6 +TT | -93.3 +TT | -91.8 +TT | -90.7 +TT | | | | | | |
| n71 | 7 | N/A | -82.7 | -82.6 | -82.4 | -82.3 | | | | | | |
| 66 | n78 ^{1,2} | | 15 | | -71.4 +TT | -71.4 +TT | -71.3 +TT | | -71.2 +TT | | | |
| | | | 30 | | -71.7 +TT | -71.5 +TT | -71.5 +TT | | -71.3 +TT | | | |
| | | | 60 | | -72.1 | -71.8 | -71.7 | | -71.5 | | | |

| | | | +TT | +TT | +TT | | | +TT | | | | |
|---|---------------------|----|--------------|--------------|--------------|-------|--|-----|--|--|--|--|
| n78 ³ | 15 | | -94.2 +TT | -92.7 +TT | -91.9 +TT | | | | | | | |
| | 30 | | -94.5 +TT | -92.8 +TT | -92.1 +TT | | | | | | | |
| | 60 | | -94.9 +TT | -93.1 +TT | -92.3 +TT | | | | | | | |
| n66 | 48 ^{2, 13} | 15 | -70.7 | -70.6 | -70.8 | -70.8 | | | | | | |
| n66 | 48 ³ | 15 | -96.1 | -93.6 | -92.3 | -91.6 | | | | | | |
| NOTE 1: Void. | | | | | | | | | | | | |
| NOTE 2: The requirements should be verified for UL EARFCN or NR ARFCN of the aggressor (lower) band (superscript LB) such that $f_{UL}^{LB} = \lfloor f_{DL}^{HB} / 0.2 \rfloor 0.1$ in MHz and $F_{UL_low}^{LB} + BW_{Channel}^{LB} / 2 \leq f_{UL}^{LB} \leq F_{UL_high}^{LB} - BW_{Channel}^{LB} / 2$ with carrier frequency in the victim (higher) band in MHz and the channel bandwidth configured in the lower band. | | | | | | | | | | | | |
| NOTE 3: The requirements are only applicable to channel bandwidths no larger than 20 MHz and with a carrier frequency at $\pm (20 + BW_{Channel}^{HB} / 2)$ MHz offset from $2f_{UL}^{LB}$ in the victim (higher band) with $F_{UL_low}^{LB} + BW_{Channel}^{LB} / 2 \leq f_{UL}^{LB} \leq F_{UL_high}^{LB} - BW_{Channel}^{LB} / 2$ where $BW_{Channel}^{LB}$ and $BW_{Channel}^{HB}$ are the channel bandwidths configured in the aggressor (lower) and victim (higher) bands in MHz respectively. | | | | | | | | | | | | |
| NOTE 4: These requirements apply when there is at least one individual RE within the uplink transmission bandwidth of the aggressor (lower) band for which the 5 th transmitter harmonic is within the downlink transmission bandwidth of a victim (higher) band. | | | | | | | | | | | | |
| NOTE 5: The requirements should be verified for UL EARFCN of the aggressor (lower) band (superscript LB) such that $f_{UL}^{LB} = \lfloor f_{DL}^{HB} / 0.5 \rfloor 0.1$ in MHz and $F_{UL_low}^{LB} + BW_{Channel}^{LB} / 2 \leq f_{UL}^{LB} \leq F_{UL_high}^{LB} - BW_{Channel}^{LB} / 2$ with carrier frequency in the victim (higher) band in MHz and the channel bandwidth configured in the lower band. | | | | | | | | | | | | |
| NOTE 6: These requirements apply when there is at least one individual RE within the uplink transmission bandwidth of the aggressor (lower) band for which the 4 th transmitter harmonic is within the downlink transmission bandwidth of a victim (higher) band. | | | | | | | | | | | | |
| NOTE 7: The requirements should be verified for UL EARFCN of the aggressor (lower) band (superscript LB) such that $f_{UL}^{LB} = \lfloor f_{DL}^{HB} / 0.4 \rfloor 0.1$ in MHz and $F_{UL_low}^{LB} + BW_{Channel}^{LB} / 2 \leq f_{UL}^{LB} \leq F_{UL_high}^{LB} - BW_{Channel}^{LB} / 2$ with carrier frequency in the victim (higher) band in MHz and the channel bandwidth configured in the lower band. | | | | | | | | | | | | |
| NOTE 8: These requirements apply when there is at least one individual RE within the uplink transmission bandwidth of a low band for the 3rd transmitter harmonic is within the downlink transmission bandwidth of a high band. | | | | | | | | | | | | |
| NOTE 9: The requirements should be verified for UL EARFCN of a low band (superscript LB) such that in MHz and $F_{UL_low}^{LB} + BW_{Channel}^{LB} / 2 \leq f_{UL}^{LB} \leq F_{UL_high}^{LB} - BW_{Channel}^{LB} / 2$ with the carrier frequency of a high band in MHz and the channel bandwidth configured in the low band. | | | | | | | | | | | | |
| NOTE 10: Applicable for the operations with 2 or 4 antenna ports supported in the band with carrier aggregation configured. | | | | | | | | | | | | |
| NOTE 11: These requirements apply when the lower edge frequency of the 5 MHz uplink channel in Band 71 is located at or below 668 MHz and the downlink channel in Band 2 is located with its upper edge at 1990 MHz. | | | | | | | | | | | | |
| NOTE 12: These requirements apply when the lower edge frequency of the 10 MHz, 15 MHz, or 20 MHz uplink channel in Band 71 is located at or below 668 MHz and the downlink channel in Band 2 is located with its upper edge at 1990 MHz. | | | | | | | | | | | | |
| NOTE 13: These requirements apply when there is at least one individual RE within the uplink transmission bandwidth of the aggressor (lower) band for which the 2nd transmitter harmonic is within the downlink transmission bandwidth of a victim (higher) band a range ΔF_{HD} above and below the edge of this downlink transmission bandwidth. The value ΔF_{HD} depends on the EN-DC bar combination: $\Delta F_{HD} = 10$ MHz for DC_1_n77, DC_2_n77, DC_66_n77, DC_3_n77 and DC_3_n78. | | | | | | | | | | | | |
| NOTE 14: TT is the same as defined in Table 7.3B.2.3.5-1a. | | | | | | | | | | | | |

Table 7.3B.2.3.5-1a: Test Tolerance (TT) for RX sensitivity level

| $f \leq 3.0\text{GHz}$ | $3.0\text{GHz} < f \leq 6.0\text{ GHz}$ |
|------------------------|---|
| 0.7 dB | 1.0 dB |

Reference sensitivity exceptions due to receiver harmonic mixing for EN-DC in NR FR1, are specified in Table 7.3B.2.3.5-2 with uplink configuration specified in Table 7.3B.2.3.4.2.1-3a to Table 7.3B.2.3.4.2.1-3k for each specific EN-DC combination scenario.

Table 7.3B.2.3.5-2: Reference sensitivity due to receiver harmonic mixing for EN-DC in NR FR1

| UL band | DL band | SCS (kHz) | 5 MHz (dBm) | 10 MHz (dBm) | 15 MHz (dBm) | 20 MHz (dBm) | 25 MHz (dBm) | 40 MHz (dBm) | 50 MHz (dBm) | 60 MHz (dBm) | 80 MHz (dBm) | 90 MHz (dBm) | 100 MHz (dBm) |
|---------|------------------|-----------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|---------------|
| 2 | n71 ⁴ | 15 | -70.4 +TT | -70.4 +TT | -70.4 +TT | -70.4 +TT | | | | | | | |
| | | 30 | | -70.7 +TT | -70.7 +TT | -71.8 +TT | | | | | | | |
| | | 60 | | -72.4 +TT | -72.7 +TT | -77.0 +TT | | | | | | | |
| n41 | 26 ⁴ | | -72.5 +TT | -69.5 +TT | -69.5 +TT | N/A | | | | | | | |
| n77 | 41 ⁸ | | -86.9 +TT | -83.9 +TT | -82.1 +TT | -80.9 +TT | N/A |
| n77 | 28 ² | | -69.8 +TT | -69.8 +TT | -69.8 +TT | -68.3 +TT | | | | | | | |
| n78 | 3 | 15 | -91.3+ TT | -89.8+ TT | -89.0+ TT | -88.1+ TT | | | | | | | |
| n78 | 40 | | -86.9 | -83.9 | -82.1 | -80.9 | | | | | | | |
| n78 | 41 ⁸ | | -86.9 +TT | -83.9 +TT | -82.1 +TT | -80.9 +TT | N/A |
| n79 | 19 ² | | -69.8 +TT | -69.8 +TT | -69.8 +TT | | | | | | | | |
| n79 | 26 ² | | -69.8 +TT | -69.8 +TT | -69.8 +TT | N/A |

NOTE 1: These requirements apply when there is at least one individual RE within the uplink transmission bandwidth of the aggressor (higher) band for which the mixing product due to harmonic of victim (lower) band LO with leakage of aggressor (higher) band is within the downlink transmission bandwidth of a victim (lower) band.

NOTE 2: The requirements should be verified for DL EARFCN of the victim (lower) band (superscript LB) such that $f_{DL}^{LB} = \lfloor f_{UL}^{HB} / 0.5 \rfloor 0.1$ with f_{DL}^{LB} the DL carrier frequency in the lower band and f_{UL}^{HB} the UL carrier frequency in the higher band, both in MHz.

NOTE 3: Void.

NOTE 4: The requirements should be verified for DL EARFCN or NR-ARFCN of the victim (lower) band (superscript LB) such that $f_{DL}^{LB} = \lfloor f_{UL}^{HB} / 0.3 \rfloor 0.1$ with f_{DL}^{LB} the DL carrier frequency in the lower band and f_{UL}^{HB} the UL carrier frequency in the higher band, both in MHz.

NOTE 5: Void.

NOTE 6: Void.

NOTE 7: The requirements should be verified for DL EARFCN of the victim (higher) band (superscript HB) such that $f_{DL}^{HB} = \lfloor 50 \times f_{UL}^{LB} \rfloor 0.03$ with f_{DL}^{HB} the DL carrier frequency in the higher band and f_{UL}^{LB} the UL carrier frequency in the lower band, both in MHz.

NOTE 8: The requirements should be verified for DL EARFCN of the victim (lower) band (superscript LB) such that $f_{DL}^{LB} = \lfloor f_{UL}^{HB} / 0.15 \rfloor 0.1$ with f_{DL}^{LB} the DL carrier frequency in the lower band and f_{UL}^{HB} the UL carrier frequency in the higher band, both in MHz.

NOTE 9: TT is the same as defined in Table 7.3B.2.3.5-1a.

Reference sensitivity exceptions due to cross band isolation for EN-DC in NR FR1, are specified in Table 7.3B.2.3.5-3 with uplink configuration specified in Table 7.3B.2.3.4.2.1-4a to Table 7.3B.2.3.4.2.1-4n.

Table 7.3B.2.3.5-3: Reference sensitivity exceptions due to cross band isolation for PC3 EN-DC in NR FR1

| E-UTRA or NR Band / Channel bandwidth of the affected DL band | | | | | | | | | | | | | |
|---|-----------------|-----------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|---------------|
| UL band | DL band | SCS (kHz) | 5 MHz (dBm) | 10 MHz (dBm) | 15 MHz (dBm) | 20 MHz (dBm) | 25 MHz (dBm) | 40 MHz (dBm) | 50 MHz (dBm) | 60 MHz (dBm) | 80 MHz (dBm) | 90 MHz (dBm) | 100 MHz (dBm) |
| 1 | n40 | 15 | -93.4 +TT | -90.2 +TT | -88.4 +TT | -87.2 +TT | -86.1 +TT | -85.3 +TT | -84.0 +TT | | | | |
| n40 | 1 | NA | -91.0 | -88.0 | -86.2 | -85.0 | | | | | | | |
| n41 | 2 | N/A | -96.7 | -93.7 | -91.9 | -90.7 | | | | | | | |
| n41 | 25 | N/A | -95.2 | -92.2 | -90.4 | -89.2 | | | | | | | |
| n77 | 41 | N/A | -92.8 | -89.8 | -88.0 | -86.8 | | | | | | | |
| n41 | 66 | N/A | -95.3 | -92.3 | -90.5 | -89.3 | | | | | | | |
| 41 | n77 | 30 | | -87.3 +TT | -85.3 +TT | -84.1 +TT | | -82.9 +TT | -82.9 +TT | -82.9 +TT | -82.1 +TT | -81.7 +TT | -81.3 +TT |
| 3 | n51 | 15 | -93.6 +TT | | | | | | | | | | |
| 30 | n66 | 15 | -91.2 +TT | -88.0 +TT | -86.2 +TT | -85.0 +TT | | | -81.8 +TT | | | | |
| n78 | 7 ¹ | N/A | -93.5 | -90.5 | -88.7 | -87.5 | | | | | | | |
| n78 | 38 | N/A | -96.7 | -93.7 | -91.9 | -90.7 | | | | | | | |
| n78 | 41 ¹ | N/A | -93.5 | -90.5 | -88.7 | -87.5 | | | | | | | |
| 41 | n78 | 30 | | -87.8 +TT | -85.8 +TT | -84.6 +TT | | -83.4 +TT | -83.4 +TT | -83.4 +TT | -82.6 +TT | -82.2 +TT | -81.8 +TT |
| NOTE 1: Applicable only when harmonic mixing MSD for this combination is not applied. | | | | | | | | | | | | | |
| NOTE 2: TT is the same as defined in Table 7.3B.2.3.5-1a. | | | | | | | | | | | | | |

Table 7.3B.2.3.5-3a: Reference sensitivity exceptions due to cross band isolation for PC2 EN-DC in NR FR1

| E-UTRA or NR Band / Channel bandwidth of the affected DL band | | | | | | | | | | | | | | |
|---|---------|-----------|-------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|---------------|
| UL band | DL band | SCS (kHz) | 5 MHz (dBm) | 10 MHz (dBm) | 15 MHz (dBm) | 20 MHz (dBm) | 25 MHz (dBm) | 30MHz (dBm) | 40 MHz (dBm) | 50 MHz (dBm) | 60 MHz (dBm) | 80 MHz (dBm) | 90 MHz (dBm) | 100 MHz (dBm) |
| 3 | n41 | 30 | | -94.4 +TT | -92.4 +TT | -91.3 +TT | | -90.0 +TT | -88.0 +TT | -87.0 +TT | -86.2 +TT | -84.9 +TT | -84.4 +TT | -84.0 +TT |
| n41 | 3 | N/A | -94.0 | -91.0 | -89.2 | -88.0 | | | | | | | | |

NOTE 1: Applicable only when harmonic mixing MSD for this combination is not applied.

NOTE 2: TT is the same as defined in Table 7.3B.2.3.5-1a.

Reference sensitivity exceptions due to dual uplink operation for EN-DC in NR FR1, are specified in Table 7.3B.2.3.5-4 with uplink configuration specified in Table 7.3B.2.3.4.2.1-6.

Table 7.3B.2.3.5-4: Reference sensitivity exceptions due to dual uplink operation for PC3 EN-DC in NR FR1 (two bands)

| NR or E-UTRA Band / Channel bandwidth | | | | | | | | | |
|--|------------------|-----------|-------------|------------------------|--------------|--------------|--------------|-------------------|-------------|
| EN-DC Configuration | EUTRA or NR band | SCS (kHz) | 5 MHz (dBm) | 10 MHz (dBm) | 15 MHz (dBm) | 20 MHz (dBm) | 40 MHz (dBm) | IMD order | Duplex mode |
| DC_1_n3 | 1 | N/A | [-76.3] | - | - | - | - | IMD3 | FDD |
| | n3 | 15 | REFSENS | | - | - | - | N/A | TDD |
| CA_1A-n5A | 1 | N/A | -93.3 | - | - | - | - | IMD4 | FDD |
| | n5 | 15 | REFSENS | | - | - | - | N/A | FDD |
| DC_1A_n77A | 1 | N/A | -69.5 | - | - | - | - | IMD2 ³ | FDD |
| | n77 | 15 | - | REFSENS | - | - | - | N/A | TDD |
| DC_1A_n77A | 1 | N/A | -91.3 | - | - | - | - | IMD4- | FDD |
| | n77 | 15 | - | REFSENS | - | - | - | N/A | TDD |
| DC_1A_n78A | 1 | N/A | -91.3 | - | - | - | - | IMD4 | FDD |
| | n78 | 15 | - | REFSENS | - | - | - | N/A | TDD |
| DC_2A_n66A | 2 | N/A | -77.3 | - | - | - | - | IMD3 | |
| | n66 | 15 | REFSENS | - | - | - | - | N/A | |
| DC_2A_n66A | 2 | N/A | REFSENS | - | - | - | - | N/A | |
| | n66 | 15 | -95.5 +TT | - | - | - | - | IMD5 | |
| DC_2A_n78A | 2 | N/A | -71.3 | - | - | - | - | IMD2 ³ | FDD |
| | n78 | 15 | - | REFSENS | - | - | - | - | TDD |
| DC_2A_n78A | 2 | N/A | -89.3 | - | - | - | - | N/A | |
| | n78 | 15 | - | REFSENS | - | - | - | IMD4 ³ | TDD |
| DC_3_n1 | 3 | N/A | REFSENS | - | - | - | - | N/A | FDD |
| | n1 | 15 | -74.0+TT | - | - | - | - | IMD3 | FDD |
| DC_3_n5 | 3 | N/A | | -89.3 | - | - | - | IMD4 | FDD |
| | n5 | 15 | REFSENS | - | - | - | - | N/A | FDD |
| | 3 | N/A | | REFSENS | - | - | - | N/A | FDD |
| | n5 | 15 | -74.0+TT | - | - | - | - | IMD23 | FDD |
| DC_3A_n7A | 3 | N/A | REFSENS | - | - | - | - | - | |
| | n7 | 15 | - | -84.6 +TT ⁵ | - | - | - | - | |
| CA_3A-n20A | 3 | N/A | -92.3 | - | - | - | - | IMD4 | FDD |
| | n20 | 15 | REFSENS | - | - | - | - | N/A | FDD |
| | 3 | N/A | REFSENS | - | - | - | - | N/A | FDD |
| | n20 | 15 | -88.0+TT | - | - | - | - | IMD4 | FDD |
| DC_3A_n41A | 3 | N/A | -88.1 | - | - | - | - | IMD4 | FDD |
| | n41 | 15 | - | REFSENS | - | - | - | IMD4 | TDD |
| DC_3A_n77A, DC_3A_n78A, DC_3A- SUL_n78A-n80A, DC_3C_n78A | 3 | N/A | -70.3 | - | - | - | - | IMD2 ³ | |
| | n77, n78 | 15 | - | REFSENS | - | - | - | - | TDD |
| DC_3A_n77A, DC_3A_n78A, DC_3A- SUL_n78A-n80A, DC_3C_n78A | 3 | N/A | -88.3 | - | - | - | - | IMD4 ³ | |
| | n77, n78 | 15 | - | REFSENS | - | - | - | N/A | TDD |
| DC_5A_n78A | 5 | N/A | -89.0 | - | - | - | - | IMD4 | FDD |
| | n78 | 15 | - | REFSENS | - | - | - | N/A | TDD |
| DC_7_n5 | 7 | N/A | | REFSENS | - | - | - | N/A | FDD |
| | n5 | 15 | -86.0+TT | - | - | - | - | IMD33 | FDD |
| DC_7A_n66A | 7 | N/A | - | -79.3 | - | - | - | IMD4 | FDD |
| | n66 | 15 | REFSENS | - | - | - | - | N/A | TDD |
| DC_7A_n77A | 7 | N/A | -90.2 | - | - | - | - | IMD4 | FDD |

| | | | | | | | | | |
|--|----------|-----|------------|-----------|---|----|---------|-------------------|-----|
| | n77 | 15 | - | REFSENS | - | - | - | N/A | TDD |
| DC_8A_n1A | 8 | N/A | REFSENS | - | - | - | - | N/A | FDD |
| | n1 | 15 | -94.0 + TT | - | - | -- | - | IMD4 | FDD |
| DC_8A_n3A | 8 | N/A | -88.3 | - | - | - | - | IMD43 | FDD |
| | n3 | 15 | - | REFSENS | - | - | - | N/A | FDD |
| | 8 | N/A | REFSENS | - | - | - | - | N/A | FDD |
| DC_8A_n41A | n3 | 15 | - | -87.4+ TT | - | - | - | IMD5 | FDD |
| | 8 | N/A | -84.2 | - | - | - | - | IMD3 ³ | FDD |
| | n41 | 15 | - | REFSENS | - | - | - | N/A | TDD |
| DC_8A_n77A DC_8A_n78A DC_8A-SUL_n78A-n81A | 8 | N/A | -88.0 | - | - | - | - | IMD4 | FDD |
| | n77, n78 | 15 | - | REFSENS | - | - | - | H4 | TDD |
| DC_8A_n79A DC_8A-SUL_n79A-n81A | 8 | N/A | -91.5 | - | - | - | - | IMD5 | FDD |
| | n79 | 15 | - | - | - | - | REFSENS | N/A | TDD |
| DC_12_n78 | 12 | N/A | -90.8 | - | - | - | - | IMD5 | FDD |
| | n78 | 15 | - | REFSENS | - | - | - | N/A | TDD |
| DC_20A_n3A | 20 | N/A | REFSENS | - | - | - | - | N/A | FDD |
| | n3 | 15 | -93.0 +TT | - | - | - | - | IMD4 | FDD |
| | 20 | N/A | -87.3 | - | - | - | - | IMD4 | FDD |
| | n3 | 15 | REFSENS | - | - | - | - | N/A | FDD |
| DC_20A_n77A | 20 | N/A | -85.3 | - | - | - | - | IMD4 | FDD |
| | n77 | 15 | - | REFSENS | - | - | - | N/A | TDD |
| | 20 | N/A | -89.8 | - | - | - | - | IMD5 | FDD |
| | n77 | 15 | - | REFSENS | - | - | - | N/A | TDD |
| DC_20A_n78A, DC_20A-SUL_n78A-n82A | 20 | N/A | -74.6 | - | - | - | - | IMD4 ⁴ | FDD |
| | n78 | 15 | - | REFSENS | - | - | - | N/A | TDD |
| DC_21A_n79A | 21 | N/A | -80.9 | - | - | - | - | IMD3 | FDD |
| | n79 | 15 | - | - | - | - | REFSENS | N/A | TDD |
| DC_28A_n41A | 28 | N/A | - | -82.1 | - | - | - | IMD3 | FDD |
| | n41 | 15 | - | REFSENS | - | - | - | N/A | TDD |
| DC_28_n50 | 28 | N/A | - | -79.5 | - | - | - | IMD 2 | FDD |
| | n50 | 15 | - | REFSENS | - | - | - | N/A | TDD |
| | 28 | N/A | - | -88.8 | - | - | - | IMD 4 | FDD |
| | n50 | 15 | - | REFSENS | - | - | - | N/A | TDD |
| | 28 | N/A | - | -94.3 | - | - | - | IMD 5 | FDD |
| | n50 | 15 | - | REFSENS | - | - | - | N/A | TDD |
| CA_28A_n77A, CA_28A_n78A, DC_28A-SUL_n78A-n83A | 28 | N/A | -92.3 | - | - | - | - | IMD5 | FDD |
| | n77, n78 | 15 | - | REFSENS | - | - | - | N/A | TDD |
| DC_48A_n66A | 48 | N/A | - | REFSENS | - | - | - | N/A | TDD |
| | n66 | 15 | -95.5 +TT | - | - | - | - | IMD5 | FDD |
| DC_66A_n2A | 66 | N/A | REFSENS | - | - | - | - | N/A | FDD |
| | n2 | 15 | -78.0+TT | - | - | - | - | IMD3 | FDD |
| | 66 | N/A | -94.8 | - | - | - | - | IMD5 | FDD |
| | n2 | 15 | REFSENS | - | - | - | - | N/A | FDD |
| DC_66A_n5A | 66 | N/A | -68.8 | - | - | - | - | IMD2 ³ | FDD |
| | n5 | 15 | REFSENS | - | - | - | - | N/A | FDD |
| DC_66A_n25A | 66 | N/A | REFSENS | - | - | - | - | N/A | FDD |
| | n25 | 15 | -76.5+TT | - | - | - | - | IMD3 | FDD |
| | 66 | N/A | -75.8 | - | - | - | - | IMD3 | FDD |
| | n25 | 15 | REFSENS | - | - | - | - | N/A | FDD |
| | 66 | N/A | -94.8 | - | - | - | - | IMD5 | FDD |
| | n25 | 15 | REFSENS | - | - | - | - | N/A | FDD |
| DC_66A_n71A | 66 | N/A | -93.8 | - | - | - | - | IMD4 | FDD |
| | n71 | 15 | REFSENS | - | - | - | - | N/A | FDD |
| DC_66A_n78A | 66 | N/A | -93.8 | - | - | - | - | IMD5 | FDD |
| | n78 | 15 | - | REFSENS | - | - | - | N/A | TDD |

NOTE 1: Both of the transmitters shall be set min(+20 dBm, $P_{CMAX_L,c}$) as defined in clause 6.2.5A. In case Single UL is allowed and the UE only indicates support of "Single UL" the output power of the active UL shall be set at $P_{CMAX_L,c}$ or set to the maximum output power according to the UE power scaling capability.

NOTE 2: $RB_{START} = 0$

- NOTE 3: This band is subject to IMD5 also which MSD is not specified.
- NOTE 4: The symbol "REFSENS" in this table refers to the reference sensitivity values for single carrier specified in Table 7.3.5-2 of TS 36.521-1 [10] for 2 antenna port E-UTRA band, Table 7.3_1.5-1 of TS 36.521-1 [10] for 4 antenna port E-UTRA band, Table 7.3.2.5-1 for 2 antenna port NR band and Table 7.3.2_1.5-1 for 4 antenna port NR band.
- NOTE 5: For UEs only indicating support of Single UL, this requirement is verified with non-simultaneous uplink transmissions on the E-UTRA and NR CGs.
- NOTE 6: TT is the same as defined in Table 7.3B.2.3.5-1a.

Table 7.3B.2.3.5-5: Reference sensitivity exceptions due to dual uplink operation for PC2 EN-DC in NR FR1 (two bands)

| NR or E-UTRA Band / Channel bandwidth | | | | | | | | | |
|---------------------------------------|------------------|-----------|-------------|--------------|--------------|--------------|--------------|-------------------|-------------|
| EN-DC Configuration | EUTRA or NR band | SCS (kHz) | 5 MHz (dBm) | 10 MHz (dBm) | 15 MHz (dBm) | 20 MHz (dBm) | 40 MHz (dBm) | IMD order) | Duplex mode |
| DC_3A_n41A | 3 | N/A | -77.9 | - | - | - | - | IMD4 ³ | |
| | n41 | 15 | - | REFSENS | - | - | - | N/A | TDD |
| DC_3A_n78A | 3 | N/A | -64.4+TT | - | - | - | - | IMD2 ³ | |
| | n78 | 15 | - | REFSENS | - | - | - | - | TDD |
| DC_3A_n78A | 3 | N/A | -77.8+TT | - | - | - | - | IMD4 ³ | |
| | n78 | 15 | - | REFSENS | - | - | - | N/A | TDD |

NOTE 1: Both of the transmitters shall be set min(+20 dBm, $P_{CMAX_L,c}$) as defined in clause 6.2.5A. In case Single UL is allowed and the UE only indicates support of "Single UL" the output power of the active UL shall be set at $P_{CMAX_L,c}$ or set to the maximum output power according to the UE power scaling capability.

NOTE 2: $RB_{START} = 0$

NOTE 3: This band is subject to IMD5 also which MSD is not specified.

NOTE 4: The symbol "REFSENS" in this table refers to the reference sensitivity values for single carrier specified in Table 7.3.5-2 of TS 36.521-1 [10] for 2 antenna port E-UTRA band, Table 7.3_1.5-1 of TS 36.521-1 [10] for 4 antenna port E-UTRA band, Table 7.3.2.5-1 for 2 antenna port NR band and Table 7.3.2_1.5-1 for 4 antenna port NR band.

NOTE 5: For UEs only indicating support of Single UL, this requirement is verified with non-simultaneous uplink transmissions on the E-UTRA and NR CGs.

NOTE 6: TT is the same as defined in Table 7.3B.2.3.5-1a.

7.3B.2.3_1 Reference sensitivity for EN-DC within FR1 (>2 CCs)

7.3B.2.3_1.1 Reference sensitivity for EN-DC within FR1 (3 CCs)

Editor's note: The test requirements section of this test case contains some EN-DC configurations that have no test points defined meaning these cannot be tested.

7.3B.2.3_1.1.1 Test purpose

To verify the ability of UE that support intra-band contiguous EN-DC configurations to receive data with a given average throughput for a specified reference measurement channel, under conditions of low signal level, ideal propagation and no added noise when no CA exceptions are allowed and single carrier requirements apply whenever possible. A UE unable to meet the throughput requirement under these conditions will decrease the effective coverage area.

7.3B.2.3_1.1.2 Test applicability

This test applies to all types of NR UE release 15 and forward supporting 3CC EN-DC.

7.3B.2.3_1.1.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.3B.2.0

Exception requirements for both NR and E-UTRA are defined for this test and therefore LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

7.3B.2.3_1.1.4 Test description

7.3B.2.3_1.1.4.1 Initial conditions

Same initial conditions as in clause 7.3B.2.3.4.1 with following exceptions:

The initial test configurations for E-UTRA band and NR band consist of environmental conditions, test frequencies, and channel bandwidths and RB allocations for exceptional test scenarios are specified in Table 7.3B.2.3_1.1.4.1-1 and 7.3B.2.3_1.1.4.1-2.

Table 7.3B.2.3_1.1.4.1-0: Test Configuration Table for EN-DC configurations not affected by Reference sensitivity exceptions

| Initial Conditions | | | | | | | | | | | | |
|--|---|---------|---------|--|-----------------|---------|---|-----------------|--------------|---------|-------------|-------------------|
| Test Environment as specified in TS 38.508-1 [6] clause 4.1 | | | | NC, TL/VL, TL/VH, TH/VL, TH/VH | | | | | | | | |
| NR Test Frequencies as specified in TS 38.508-1 [6] clause 4.3.1, E-UTRA Test Frequencies as specified in TS 36.508 [11] clause 4.3.1 | | | | DC_XA_nYA_nZA and DC_XA-YA_nZA: Mid range for MCG and SCG DC_XA_nYC: Mid range for XA Low range, High Range for nXC DC_(n)XCA: Low range, High Range for nYC For non-contiguous carriers: TBD | | | | | | | | |
| Test DC Combination setting (NRB_agg) as specified in clause [TBD] for the DC Configuration across bandwidth combination sets supported by the UE. | | | | Refer to "NR NRB" and "E-UTRA NRB" columns | | | | | | | | |
| Network signalling value | | | | NS_01 by default, exceptions listed in Table 7.3.3-3, dependent on PCC Band | | | | | | | | |
| Test SCS for the NR cell as specified in TS 38.521-1 [8] Table 5.3.5-1 | | | | Lowest SCS per Channel Bandwidth | | | | | | | | |
| Test Parameters for DC Configurations | | | | | | | | | | | | |
| ID | PCC – E-UTRA | | | | SCC1 – EUTRA/NR | | | | CG -NR | | | |
| | Band | Range | NRB | | Band | Range | NRB | | Band | Range | NRB | |
| ID | UL MOD | DL MOD | CH BW | DLalloc/UL alloc | UL MOD | DL MOD | UL/DL Ch BW | DLalloc/ULalloc | UL MOD | DL MOD | UL/DL Ch BW | DLalloc/UL alloc |
| | Test Settings for a DC_(n)XCA Configuration (Intra-band contiguous EN-DC with LTE CA)– Note 2 | | | | | | | | | | | |
| 1 | X | default | Highest | All RBs / REFSENS | X | default | Highest | All RBs / 0 | nX | default | Highest | All RBs / REFSENS |
| | QPSK | REFSENS | | | N/A | QPSK | | | CP-OFDM QPSK | QPSK | | |
| Test Settings for a DC_XC_nXA Configuration (Intra-band non-contiguous EN-DC with LTE CA)– Note 3 | | | | | | | | | | | | |
| | | | | | | | No test required, LTE 1CC fallback is tested in 7.3B.2.2) | | | | | |
| Test Settings for a DC_XA-XA_nXA Configuration (Intra-band non-contiguous EN-DC with LTE CA)– Note 3 | | | | | | | | | | | | |
| | | | | | | | No test | | | | | |

| | | | | | | | | | | | | |
|--|-----|---------|-------|-----|-----------------|------------------------------|--|--------------------------|---------------------|---------|---------|----------------------|
| | | | | | | | required, LTE 1CC fallback is tested in 7.3B.2.2) | | | | | |
| Test Settings for a DC_XA_nYC Configuration (Inter-band EN-DC with NR CA, 2 bands) – Note 1 | | | | | | | | | | | | |
| 1 | X | default | 5 MHz | 0/0 | nY | default | Highest | All RBs / 0 | nY | default | Highest | All RBs / REFSENS |
| | N/A | N/A | | | N/A | QPSK /CP- OFDM QPSK | | | CP- OFDM QPSK | QPSK | | |
| Test Settings for a DC_XA_nY(2A) Configuration (Inter-band EN-DC with NR CA, 2 bands) – Note 3 | | | | | | | | | | | | |
| | | | | | | | No test required, LTE 1CC fallback is tested in 7.3B.2.3) | | | | | |
| Test Settings for a DC_XC_nYA, DC_XA-XA_nYA Configuration (Inter-band EN-DC with LTE CA, 2 bands) – Note 3 | | | | | | | | | | | | |
| | | | | | | | No test required, LTE 1CC fallback is tested in 7.3B.2.3) | | | | | |
| Default Test Settings for a DC_XA-YA_nZA Configuration (Inter-band EN-DC with LTE CA, 3 bands) – Note 3 | | | | | | | | | | | | |
| | | | | | | | No test required, LTE 1CC fallback is tested in 7.3B.2.3) | | | | | |
| Default Test Settings for a DC_XA_nYA_nZA Configuration (Inter-band EN-DC with NR CA, 3 bands) – Note 1 | | | | | | | | | | | | |
| 1 | X | Mid | 5 MHz | 0/0 | nY | default | Highest | All RBs / 0 | nZ | default | Highest | All RBs / REFSENS |
| | N/A | N/A | | | N/A | QPSK /CP- OFDM QPSK | | | CP- OFDM QPSK | QPSK | | |
| 2 | X | Mid | 5 MHz | 0/0 | nY | default | Highest | All RBs / REFSEN S | nZ | default | Highest | All RBs / 0 |
| | N/A | N/A | | | CP-OFDM QPSK | QPSK /CP- OFDM | | | N/A | QPSK | | |

| | | | | | | |
|---------|---|--|------|--|--|--|
| | | | QPSK | | | |
| Note 1: | LTE anchor agnostic configuration | | | | | |
| Note 2: | Not LTE anchor agnostic configuration due to exception requirement for intra-band contiguous CA in clause 7.4B, 7.5B, 7.6B.2, 7.6B.3, 7.6B.4, 7.7B, 7.8B, 7.9B test cases | | | | | |
| Note 3: | LTE anchor agnostic configuration with LTE CA where LTE CA fallback to 1CC is sufficient to test | | | | | |
| Note 4: | In a FR1 band where UE supports 4Rx, the test shall be performed only with 4Rx antennas ports connected. | | | | | |

Table 7.3B.2.3_1.1.4.1-1: Test Configuration Table for EN-DC configurations affected by Reference sensitivity exceptions

| | | | | | | | | | | | |
|---|------|-------------|-------|-------------------|--------------|---|-------------------|--------------------|--------------|--------------|--------------------|
| | | | | | | No test required, LTE 1CC fallback is tested in 7.3B.2.3) | | | | | |
| Default Test Settings for a DC_XA-YA_nZA Configuration (Inter-band EN-DC with LTE CA, 3 bands) – Note 4 | | | | | | | | | | | |
| | | | | | | No test required, LTE 1CC fallback is tested in 7.3B.2.3) | | | | | |
| Default Test Settings for a DC_XA_nYA_nZA Configuration (Inter-band EN-DC with NR CA, 3 bands) – Note 2 | | | | | | | | | | | |
| 1 | X | Mid | 5 MHz | 0/0 | nY | default | Highest | All RBs / 0 | nZ | default | All RBs / REFSSENS |
| | N/A | N/A | | | N/A | CP-OFDM QPSK | | | CP-OFDM QPSK | CP-OFDM QPSK | |
| 2 | X | Mid | 5 MHz | 0/0 | nY | default | Highest | All RBs / REFSSENS | nZ | default | All RBs / 0 |
| | N/A | N/A | | | CP-OFDM QPSK | CP-OFDM QPSK | | | N/A | CP-OFDM QPSK | |
| Test Settings for DC_1A-3A_n78A Configuration – Note 3 | | | | | | | | | | | |
| 1 | 1 | DL 2140 MHz | 5 MHz | All RBs / All RBs | 3 | DL 1807.5 MHz | All RBs / 0 | CP-OFDM QPSK | n78 | 3757.5 MHz | All RBs / All RBs |
| | QPSK | QPSK | | | N/A | QPSK | | | CP-OFDM QPSK | 10 MHz | |
| 2 | 1 | DL 2125 MHz | 5 MHz | All RBs / 0 | 3 | DL 1870 MHz | All RBs / All RBs | CP-OFDM QPSK | n78 | 3725.5 MHz | All RBs / All RBs |
| | N/A | QPSK | | | QPSK | QPSK | | | CP-OFDM QPSK | 10 MHz | |
| Test Settings for DC_1A-5A_n78A Configuration – Note 3 | | | | | | | | | | | |
| 1 | 1 | DL 2122 MHz | 5 MHz | All RBs / 0 | 5 | DL 874 MHz | All RBs / All RBs | CP-OFDM QPSK | n78 | 3780 MHz | All RBs / All RBs |
| | N/A | QPSK | | | QPSK | QPSK | | | CP-OFDM QPSK | 10 MHz | |
| 2 | 1 | DL 2165 MHz | 5 MHz | All RBs / All RBs | 5 | DL 885 MHz | All RBs / 0 | CP-OFDM QPSK | n78 | 3405 MHz | All RBs / All RBs |
| | QPSK | QPSK | | | N/A | QPSK | | | CP-OFDM QPSK | 10 MHz | |

| Test Settings for DC_1A-7A_n78A Configuration – Note 3 | | | | | | | | | | | |
|---|------|---------------|-------|-------------------|------|---------------|-------|-------------------|--------------|--------------|--------|
| 1 | 1 | DL 2167.5 MHz | | | 7 | DL 2627.5 MHz | | | n78 | 3305 MHz | |
| | QPSK | QPSK | 5 MHz | All RBs / All RBs | N/A | QPSK | 5 MHz | All RBs / 0 | CP-OFDM QPSK | CP-OFDM QPSK | 10 MHz |
| 2 | 1 | DL 2140 MHz | | | 7 | DL 2630 MHz | | | n78 | 3580 MHz | |
| | N/A | QPSK | 5 MHz | All RBs / 0 | QPSK | QPSK | 5 MHz | All RBs / All RBs | CP-OFDM QPSK | CP-OFDM QPSK | 10 MHz |
| Test Settings for DC_1A-20A_n78A Configuration – Note 3 | | | | | | | | | | | |
| 1 | 1 | DL 2120 MHz | | | 20 | DL 794 MHz | | | n78 | 3790 MHz | |
| | N/A | QPSK | 5 MHz | All RBs / 0 | QPSK | QPSK | 5 MHz | All RBs / All RBs | CP-OFDM QPSK | CP-OFDM QPSK | 10 MHz |
| 2 | 1 | DL 2140 MHz | | | 20 | DL 810 MHz | | | n78 | 3330 MHz | |
| | QPSK | QPSK | 5 MHz | All RBs / All RBs | N/A | QPSK | 5 MHz | All RBs / 0 | CP-OFDM QPSK | CP-OFDM QPSK | 10 MHz |
| Test Settings for DC_3A-7A_n78A Configuration – Note 3 | | | | | | | | | | | |
| 1 | 3 | DL 1820 MHz | | | 7 | DL 2685 MHz | | | n78 | 3310 MHz | |
| | N/A | QPSK | 5 MHz | All RBs / 0 | QPSK | QPSK | 5 MHz | All RBs / All RBs | CP-OFDM QPSK | CP-OFDM QPSK | 10 MHz |
| 2 | 3 | DL 1820 MHz | | | 7 | DL 2685 MHz | | | n78 | 3475 MHz | |
| | QPSK | QPSK | 5 MHz | All RBs / All RBs | N/A | QPSK | 5 MHz | All RBs / 0 | CP-OFDM QPSK | CP-OFDM QPSK | 10 MHz |
| Test Settings for DC_3A-20A_n78A Configuration – Note 3 | | | | | | | | | | | |
| 1 | 3 | DL 1820 MHz | | | 20 | DL 804 MHz | | | n78 | 3510 MHz | |
| | N/A | QPSK | 5 MHz | All RBs / 0 | QPSK | QPSK | 5 MHz | All RBs / All RBs | CP-OFDM QPSK | CP-OFDM QPSK | 10 MHz |
| Test Settings for DC_3A-40A_n1A Configuration – Note 3, 6 | | | | | | | | | | | |
| 1 | 3 | DL 1830 MHz | | | 40 | DL 2380 MHz | | | n1A | 2140 MHz | |

| | QPSK | QPSK | 5 MHz | All RBs / All RBs | N/A | QPSK | 5 MHz | All RBs / 0 | CP-OFDM QPSK | CP-OFDM QPSK | 5 MHz | All RBs / All RBs |
|---|------|---------------|-------|-------------------|------|--------------|-------|-------------------|--------------|--------------|--------|-------------------|
| Test Settings for DC_5A-7A_n78A Configuration – Note 3 | | | | | | | | | | | | |
| 1 | 5 | DL 889 MHz | | | 7 | DL 2645 MHz | | | n78 | 3489 MHz | | |
| | QPSK | QPSK | 5 MHz | All RBs / All RBs | N/A | QPSK | 5 MHz | All RBs / 0 | CP-OFDM QPSK | CP-OFDM QPSK | 10 MHz | All RBs / All RBs |
| 2 | 5 | DL 879 MHz | | | 7 | DL 2670 MHz | | | n78 | 3429 MHz | | |
| | N/A | QPSK | 5 MHz | All RBs / 0 | QPSK | QPSK | 5 MHz | All RBs / All RBs | CP-OFDM QPSK | CP-OFDM QPSK | 10 MHz | All RBs / All RBs |
| 3 | 5 | DL 875 MHz | | | 7 | DL 2645 MHz | | | n78 | 3350 MHz | | |
| | N/A | QPSK | 5 MHz | All RBs / 0 | QPSK | QPSK | 5 MHz | All RBs / All RBs | CP-OFDM QPSK | CP-OFDM QPSK | 10 MHz | All RBs / All RBs |
| Test Settings for DC_7A-20A_n78A Configuration – Note 3 | | | | | | | | | | | | |
| 1 | 7 | DL 2680 MHz | | | 20 | DL 810 MHz | | | n78 | 3370 MHz | | |
| | QPSK | QPSK | 5 MHz | All RBs / All RBs | N/A | QPSK | 5 MHz | All RBs / 0 | CP-OFDM QPSK | CP-OFDM QPSK | 10 MHz | All RBs / All RBs |
| 2 | 7 | DL 2680 MHz | | | 20 | DL 810 MHz | | | n78 | 3435 MHz | | |
| | QPSK | QPSK | 5 MHz | All RBs / All RBs | N/A | QPSK | 5 MHz | All RBs / 0 | CP-OFDM QPSK | CP-OFDM QPSK | 10 MHz | All RBs / All RBs |
| 3 | 7 | DL 2675 MHz | | | 20 | DL 804 MHz | | | n78 | 3520 MHz | | |
| | N/A | QPSK | 5 MHz | All RBs / 0 | QPSK | QPSK | 5 MHz | All RBs / All RBs | CP-OFDM QPSK | CP-OFDM QPSK | 10 MHz | All RBs / All RBs |
| Test Settings for DC_7A-28A_n78A Configuration – Note 3 | | | | | | | | | | | | |
| 1 | 7 | DL 2687.5 MHz | | | 20 | DL 782.5 MHz | | | n78 | 3350 MHz | | |
| | QPSK | QPSK | 5 MHz | All RBs / All RBs | N/A | QPSK | 5 MHz | All RBs / 0 | CP-OFDM QPSK | CP-OFDM QPSK | 10 MHz | All RBs / All RBs |
| 2 | 7 | DL 2687.5 | | | 20 | DL 782.5 | | | n78 | 3460 MHz | | |

| | | | | | | | | | | | | |
|---|------|-------------|-------|-------------------|------|-------------|-------|-------------------|--------------|--------------|--------|-------------------|
| | MHz | | | | MHz | | | | | | | |
| | QPSK | QPSK | 5 MHz | All RBs / All RBs | N/A | QPSK | 5 MHz | All RBs / 0 | CP-OFDM QPSK | CP-OFDM QPSK | 10 MHz | All RBs / All RBs |
| 3 | 7 | DL 2650 MHz | | | 20 | DL 795 MHz | | | n78 | 3390 MHz | | |
| | N/A | QPSK | 5 MHz | All RBs / 0 | QPSK | QPSK | 5 MHz | All RBs / All RBs | CP-OFDM QPSK | CP-OFDM QPSK | 10 MHz | All RBs / All RBs |
| Test Settings for DC_2A-14A_n66A Configuration – Note 3 | | | | | | | | | | | | |
| 1 | 2 | DL 1954 MHz | | | 14 | DL 763 MHz | | | n66 | DL 2170 MHz | | |
| | N/A | QPSK | 5 MHz | All RBs / 0 | QPSK | QPSK | 5 MHz | All RBs / All RBs | CP-OFDM QPSK | CP-OFDM QPSK | 5 MHz | All RBs / All RBs |
| Test Settings for DC_14A-66A_n2A Configuration – Note 3 | | | | | | | | | | | | |
| 1 | 14 | DL 763 MHz | | | 66 | DL 2162 MHz | | | n2 | DL 1954 MHz | | |
| | QPSK | QPSK | 5 MHz | All RBs / All RBs | N/A | QPSK | 5 MHz | All RBs / 0 | CP-OFDM QPSK | CP-OFDM QPSK | 5 MHz | All RBs / All RBs |

7.3B.2.3_1.1.4.2 Test procedure

Same as in clause 7.3B.2.3.4.2.

7.3B.2.3_1.1.4.3 Message contents

Message contents are according to TS 38.508-1 [5] clause 4.6.

7.3B.2.3_1.1.5 Test requirement

Reference sensitivity test requirements for EN-DC configurations affected by 2UL intermodulation interference in NR FR1, are specified in Table 7.3B.2.3_1.1.5-1 and Table 7.3B.2.3_1.1.5-2 with uplink configuration specified in Table 7.3B.2.3_1.1.4.1-1 and 7.3B.2.3_1.1.4.1-2.

Reference sensitivity test requirements for EN-DC configurations not affected by 2UL intermodulation interference in NR FR1, are specified in Table 7.3.5-1 in TS 36.521-1 [10] for the LTE CC, and Table 7.3.2.5-1 in TS 38.521-1 [8] for the NR CC.

Table 7.3B.2.3_1.1.5-1: Reference sensitivity exceptions for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

| EN-DC Configuration | Test ID | EUTRA/NR band | SCS (kHz) | 5 MHz (dBm) | 10 MHz (dBm) | 20 MHz (dBm) | 40 MHz (dBm) | Duplex mode | IMD order | Sing. UL allow |
|--------------------------------|---------|---------------|-----------|-------------|--------------|--------------|--------------|-------------|-----------|----------------|
| DC_1A-3A_n77A | n77 | 1 | N/A | REFSENS | - | - | - | FDD | N/A | |
| | | 3 | N/A | -64.8 | - | - | - | | IMD2 | |
| | | n77 | 15 | - | REFSENS | - | - | TDD | N/A | |
| | n77 | 1 | N/A | REFSENS | - | - | - | FDD | N/A | |
| | | 3 | N/A | -87.8 | - | - | - | | IMD4 | |
| | | n77 | 15 | - | REFSENS | - | - | TDD | N/A | |
| | n77 | 1 | N/A | -68.3 | - | - | - | FDD | IMD2 | |
| | | 3 | N/A | REFSENS | - | - | - | | N/A | |
| | | n77 | 15 | - | REFSENS | - | - | TDD | N/A | |
| DC_1A-3A_n78A DC_1A-3C_n78A | n78 | 1 | N/A | -91.0 | - | - | - | FDD | IMD4 | |
| | | 3 | N/A | REFSENS | - | - | - | FDD | N/A | |
| | | n78 | 15 | - | REFSENS | - | - | TDD | N/A | |
| | n78 | 1 | N/A | REFSENS | - | - | - | FDD | N/A | |
| | | 3 | N/A | -65.1 | - | - | - | | IMD2 | |
| | | n78 | 15 | - | REFSENS | - | - | TDD | N/A | |
| | n78 | 1 | N/A | -96.5 | - | - | - | FDD | IMD5 | |
| | | 3 | N/A | REFSENS | - | - | - | | N/A | |
| | | n78 | 15 | - | REFSENS | - | - | TDD | N/A | |
| DC_1A-5A_n78A | n78 | 1 | N/A | -91.0 | - | - | - | FDD | IMD4 | |
| | | 5 | N/A | REFSENS | - | - | - | FDD | N/A | |
| | | n78 | 15 | - | REFSENS | - | - | TDD | N/A | |
| | n78 | 1 | N/A | REFSENS | - | - | - | FDD | N/A | |
| | | 5 | N/A | -89.0 | - | - | - | FDD | IMD4 | |
| | | n78 | 15 | - | REFSENS | - | - | TDD | N/A | |
| | n78 | 1 | N/A | -81.2 | - | - | - | FDD | IMD3 | |
| | | 5 | N/A | REFSENS | - | - | - | FDD | N/A | |
| | | n78 | 15 | - | REFSENS | - | - | TDD | N/A | |
| | n78 | 1 | N/A | REFSENS | - | - | - | FDD | N/A | |
| | | 5 | N/A | -94.2 | - | - | - | FDD | IMD5 | |
| | | n78 | 15 | - | REFSENS | - | - | TDD | N/A | |
| DC_1A-7A_n78A | n78 | 1 | 1 | -91.0 | - | - | - | FDD | IMD4 | |
| | | 7 | N/A | REFSENS | - | - | - | FDD | N/A | |
| | | n78 | 15 | - | REFSENS | - | - | TDD | N/A | |
| | n78 | 1 | N/A | REFSENS | - | - | - | FDD | N/A | |
| | | 7 | N/A | -90.4 | - | - | - | FDD | IMD4 | |
| | | n78 | 15 | - | REFSENS | - | - | TDD | N/A | |
| | n78 | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| DC_1A-20A_n78A | n78 | 1 | N/A | -79.0 | - | - | - | FDD | IMD3 | |
| | | 20 | N/A | REFSENS | - | - | - | FDD | N/A | |
| | | n78 | 15 | - | REFSENS | - | - | TDD | N/A | |
| DC_1A-20A_n78A | n78 | 1 | N/A | REFSENS | - | - | - | FDD | N/A | |
| | | 20 | N/A | -93.3 | - | - | - | FDD | IMD5 | |
| | | n78 | 15 | - | REFSENS | - | - | TDD | N/A | |
| DC_2A-14A_n66A | n66 | 2 | N/A | -90.1 | - | - | - | FDD | IMD4 | |
| | | 14 | N/A | REFSENS | - | - | - | FDD | N/A | |
| | | n66 | 15 | REFSENS | - | - | - | FDD | N/A | |
| DC_3A-5A_n78A | n78 | 3 | N/A | REFSENS | - | - | - | FDD | N/A | |
| | | 5 | N/A | -89.0 | - | - | - | FDD | IMD4 | |
| | | n78 | 15 | - | REFSENS | - | - | TDD | N/A | |
| DC_3A-5A_n78A | n78 | 3 | N/A | -70.3 | - | - | - | FDD | IMD2 | |
| | | 5 | N/A | REFSENS | - | - | - | FDD | N/A | |
| | | n78 | 15 | - | REFSENS | - | - | TDD | N/A | |

| EN-DC Configuration | Test ID | EUTRA/NR band | SCS (kHz) | 5 MHz (dBm) | 10 MHz (dBm) | 20 MHz (dBm) | 40 MHz (dBm) | Duplex mode | IMD order | Sing. UL allow |
|----------------------------------|---------|---------------|-----------|-------------|--------------|--------------|-------------------|-------------|-----------|----------------|
| | | n78 | 15 | - | REFSENS | - | - | TDD | N/A | |
| | | 3 | N/A | -88.3 | - | - | - | FDD | IMD4 | |
| | | | [TBD] | | | | 10.7 ⁵ | | | |
| DC_3C-7C_n78A | | 3 | N/A | -78.7 | - | - | - | FDD | IMD3 | |
| | | 7 | N/A | REFSENS | - | - | - | FDD | N/A | |
| | | n78 | 15 | - | REFSENS | - | - | TDD | N/A | |
| | | 3 | N/A | -87.7 | - | - | - | FDD | IMD4 | |
| | | 7 | N/A | REFSENS | - | - | - | FDD | N/A | |
| | | n78 | 15 | - | REFSENS | - | - | TDD | N/A | |
| DC_3A-7A_n78A DC_3C-7A_n78A | | 3 | N/A | -78.7 | - | - | - | FDD | IMD3 | |
| | | 7 | N/A | REFSENS | - | - | - | FDD | N/A | |
| | | n78 | 15 | - | REFSENS | - | - | TDD | N/A | |
| DC_3A-7A_n78A DC_3C-7A_n78A | | 3 | N/A | -87.7 | - | - | - | FDD | IMD4 | |
| | | 7 | N/A | REFSENS | - | - | - | FDD | N/A | |
| | | n78 | 15 | - | REFSENS | - | - | TDD | N/A | |
| DC_3A-20A_n78A DC_3C-20A_n78A | 1 | 3 | N/A | -79.0 | - | - | - | FDD | IMD3 | |
| | | 20 | N/A | REFSENS | - | - | - | FDD | N/A | |
| | | n78 | 15 | - | REFSENS | - | - | TDD | N/A | |
| DC_3A-40A_n1A | 1 | n1 | N/A | REFSENS | - | - | - | FDD | N/A | |
| | | 3 | N/A | REFSENS | - | - | - | FDD | N/A | |
| | | 40 | 15 | -91.3 | - | - | - | TDD | IMD5 | |
| DC_5A-7A_n78A | | 5 | N/A | -89.0 | - | - | - | FDD | IMD4 | |
| | | 7 | N/A | REFSENS | - | - | - | FDD | N/A | |
| | | n78 | 15 | - | REFSENS | - | - | TDD | N/A | |
| | | 5 | N/A | REFSENS | - | - | - | FDD | N/A | |
| | | 7 | N/A | -67.2 | - | - | - | FDD | N/A | |
| | | n78 | 15 | - | REFSENS | - | - | TDD | N/A | |
| | | 5 | N/A | -67.1 | - | - | - | FDD | IMD2 | |
| | | 7 | N/A | REFSENS | - | - | - | FDD | N/A | |
| | | n78 | 15 | - | REFSENS | - | - | TDD | N/A | |
| | | 5 | N/A | -94.0 | - | - | - | FDD | IMD5 | |
| | | 7 | N/A | REFSENS | - | - | - | FDD | N/A | |
| | | n78 | 15 | - | REFSENS | - | - | TDD | N/A | |
| DC_7A-20A_n78A | 1 | 7 | N/A | REFSENS | - | - | - | FDD | N/A | |
| | | 20 | N/A | -65.8 | - | - | - | FDD | IMD2 | |
| | | n78 | 3370 | - | REFSENS | - | - | TDD | N/A | |
| DC_7A-20A_n78A | 2 | 7 | N/A | REFSENS | - | - | - | FDD | N/A | |
| | | 20 | N/A | -93.3 | - | - | - | FDD | IMD5 | |
| | | n78 | 15 | - | REFSENS | - | - | TDD | N/A | |
| DC_7A-20A_n78A | 3 | 7 | N/A | -66.5 | - | - | - | FDD | IMD2 | |
| | | 20 | N/A | REFSENS | - | - | - | FDD | N/A | |
| | | n78 | 15 | - | REFSENS | - | - | TDD | N/A | |
| DC_7A-28A_n78A | | 7 | N/A | REFSENS | - | - | - | FDD | N/A | |
| | | 28 | N/A | -89.5 | - | - | - | | IMD2 | |
| | | n78 | 15 | - | REFSENS | - | - | TDD | N/A | |
| | | 7 | N/A | REFSENS | - | - | - | FDD | N/A | |
| | | 28 | N/A | -94.8 | - | - | - | | IMD5 | |
| | | n78 | 15 | - | REFSENS | - | - | TDD | N/A | |
| | | 7 | N/A | -66.8 | - | - | - | FDD | IMD2 | |
| | | 28 | N/A | REFSENS | - | - | - | | N/A | |
| | | n78 | 15 | - | REFSENS | - | - | TDD | N/A | |
| DC_14A-66A_n2A | | 14 | N/A | REFSENS | - | - | - | FDD | N/A | |
| | | 66 | N/A | -91.2 | - | - | - | FDD | IMD4 | |
| | | n2 | 15 | REFSENS | - | - | - | FDD | N/A | |

NOTE 1: Both of the transmitters shall be set min (+20 dBm, $P_{CMAX_L,c}$) as defined in clause 6.2.5A. In case Single UL is allowed and the UE only indicates support of "Single UL" the output power of the active UL shall be set at $P_{CMAX_L,c}$ or set to the maximum output power according to the UE power scaling capability.

NOTE 2: $RB_{START} = 0$

NOTE 3: For UEs only indicating support of Single UL, this requirement is verified with non-simultaneous uplink transmissions on the E

| EN-DC Configuration | Test ID | EUTRA/NR band | SCS (kHz) | 5 MHz (dBm) | 10 MHz (dBm) | 20 MHz (dBm) | 40 MHz (dBm) | Duplex mode | IMD order | Single UL allowed |
|--|---------|---------------|-----------|-------------|--------------|--------------|--------------|-------------|-----------|-------------------|
| UTRA and NR CGs. | | | | | | | | | | |
| NOTE 4: This band is subject to IMD5 also which MSD is not specified. | | | | | | | | | | |
| NOTE 5: The symbol "REFSENS" in this table refers to the reference sensitivity values for single carrier specified in Table 7.3.5-1 of TS 36.521-1 [10] for 2 antenna port E-UTRA band, Table 7.3.1.5-1 of TS 36.521-1 [10] for 4 antenna port E-UTRA band, Table 7.3.2.5-1 for 2 antenna port NR band and Table 7.3.2.5-2 for 4 antenna port NR band. | | | | | | | | | | |
| NOTE 6: No requirements apply when there is at least one individual RE within the intermodulation generated by the dual uplink is within the downlink transmission bandwidth of the Band 46. The reference sensitivity should only be verified when this is not the case (the requirements for Band 46 specified in the CA_7A-46A in clause 7.3.1 of TS 36.101 [5] apply). | | | | | | | | | | |

Table 7.3B.2.3_1.1.5-2: Reference sensitivity exceptions for Scell due to dual uplink operation for EN-DC in NR FR1 (two bands)

| EN-DC Configuration | EUTRA/NR band | SCS (kHz) | 5 MHz (dBm) | 10 MHz (dBm) | 20 MHz (dBm) | 40 MHz (dBm) | Duplex mode | IMD order | Single UL allowed | |
|---|---------------|-----------|----------------------|--------------|--------------|--------------|-------------|-----------|-------------------|--|
| DC_1A_n78C | 1 | N/A | -92.0+T _T | - | - | - | FDD | IMD4 | | |
| | n78 | 15 | - | REFSE NS | - | - | TDD | N/A | | |
| | n78 | 15 | - | REFSE NS | - | - | | N/A | | |
| NOTE 1: Both of the transmitters shall be set min (+20 dBm, P _{CMAX_L,C}) as defined in clause 6.2.5A. In case Single UL is allowed and the UE only indicates support of "Single UL" the output power of the active UL shall be set at P _{CMAX_L,C} or set to the maximum output power according to the UE power scaling capability. | | | | | | | | | | |
| NOTE 2: RB _{START} = 0 | | | | | | | | | | |

Test tolerance is the same as given in Table 7.3B.2.3.5-2.

7.3B.2.3_1.2 Reference sensitivity for EN-DC within FR1 (4 CCs)

7.3B.2.3_1.2.1 Test purpose

Same as in clause 7.3B.2.3.1.

7.3B.2.3_1.2.2 Test applicability

This test applies to all types of NR UE release 15 and forward supporting 4 CCs EN-DC.

7.3B.2.3_1.2.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.3B.2.0.

For EN-DC combinations with no exception requirements applicable to NR or LTE, LTE anchor agnostic approach is applied.

For EN-DC combinations with exceptional requirements, LTE anchor agnostic approach is not applied.

7.3B.2.3_1.2.4 Test description

7.3B.2.3_1.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations for E-UTRA consist of the test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1, with the exception that the E-UTRA channel bandwidth is the lowest supported value in Table 5.3B.1.3-1 for the EN-DC non-contiguous configuration under test.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and sub-carrier spacing based on NR operating bands specified in table 5.2B.2.1-1. The 4CC EN-DC configurations listed in table 7.3B.2.3_1.2.4.1-0 shall not be tested according to TR 38.905 test point analysis. The other 4CC configurations shall be tested with applicable test parameters for each combination of test channel bandwidth and sub-carrier spacing are shown in Tables 7.3B.2.3.4.2.1-0 to 7.3B.2.3.4.2.1-1 for NR band. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in TS 38.521-1 [8] Annex C2.

In a FR1 band where UE supports 4Rx, the test shall be performed only with 4Rx antennas ports connected. **Table 7.3B.2.3_1.2.4.1-0: 4CC EN-DC configurations that shall not be tested**

| EN-DC type | E-UTRA CA | NR CA | Notation |
|---|----------------|----------------|--|
| Intra-band contiguous EN-DC (1 band) | Yes | No | DC_(n)XDA |
| Intra-band non-contiguous EN-DC (1 band) | Yes (cont) | No | DC_XD_nXA |
| | Yes (non-cont) | No | DC_XA-XC_nXA |
| | No | Yes (non-cont) | DC_XA-nY(2A)-nZA |
| | No | Yes (inter) | DC_XA-nYA-nZC |
| Yes (all types) | No | | DC_XD-nYA, DC_XA-YC_nZA, DC_XA-XA-YA-nZA, DC_XA-YA-ZA_nRA |
| Yes (all types) | Yes (cont) | | DC_XC_nYC, DC_XA-XA_nYC, DC_XA-YA_nYC |
| | Yes (cont) | | DC_XC_nY(2A), DC_XC_nY(2A), DC_XA-YA_nY(2A) |
| | Yes (inter) | | DC_XC-nYA-nZA, DC_XA-XA_nYA-nZA, DC_XA-YA_nZA-nRA |
| Intra-band contiguous EN-DC (2-3 band) | Yes | No | DC_XA-YA_(n)ZAA, DC_XC_(n)YAA |
| | Yes | Yes | DC_(n)XCA-nYA |
| Intra-band non contiguous EN-DC (2-3 band) | Yes | No | DC_XA-YA-ZA_nZA |
| | Yes | Yes | DC_XA-YA_nYA-nZA |
| NOTE 1: X, Y and Z in this table correspond to different bands i.e. X != Y != Z. | | | |
| NOTE 2: The table apply to all band numbers, i.e. all values of X, Y and Z defined in TS38.101-3 | | | |
| NOTE 3: The band combinations with difference appearance order of bands/sub-blocks in the band combination string are not distinguished. E.g. DC_YA-(n)XAA represents the set of DC_YA-(n)XAA and DC_(n)XAA-YA. | | | |

Table 7.3B.2.3_1.2.4.1-1: Test Configuration Table for EN-DC configurations not affected by Reference sensitivity exceptions

| Initial Conditions | | | | | | | | | |
|---|------------|------|-----|-------------------------|---|-----------------|--------------|----------|----------|
| Test Environment as specified in TS 38.508-1 [6] clause 4.1 | | | | | NC, TL/VL, TL/VH, TH/VL, TH/VH | | | | |
| Test Frequencies as specified in TS 38.508-1 [6] clause 4.3.1 for different EN-DC bandwidth classes | | | | | For test frequencies refer to "Range" columns. For mapping within Band refer to "CC" columns | | | | |
| Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1 across bandwidth combination sets supported by the UE | | | | | DC_(n)XDA: Low range, High Range DC_XA-nYA-nZC: Mid range for X Low range, High Range for nY and nZ DC_XA-nY(2A)-nZA: Mid range for X TBD for nY Mid range for nZ | | | | |
| NR Test SCS as specified in Table 5.3.5-1 in TS 38.521-1 [8] | | | | | Lowest SCS per Channel Bandwidth | | | | |
| Network signalling value | | | | | NS_01 by default, exceptions listed in Table 7.3.3-3, dependent on PCC Band | | | | |
| Test Parameters for EN-DC Configurations | | | | | | | | | |
| ID | CC (NOTE1) | Band | SCS | NRB | Range/ Wgap | UL MOD | DL MOD | UL Alloc | DL Alloc |
| Default Test Settings for a DC_(n)XDA Configuration – Note 5 | | | | | | | | | |
| 1 (Note 6) | PCC(M) | X | | Highest N _{RB} | default | QPSK | QPSK | REFSENS | All RBs |
| | SCC1(M) | X | | Highest N _{RB} | Default | N/A | QPSK | N/A | All RBs |
| | SCC2(M) | X | | Highest N _{RB} | Default | N/A | QPSK | N/A | All RBs |
| | PCC(S) | X | | Highest N _{RB} | default | DFT-s-OFDM QPSK | CP-OFDM QPSK | REFSENS | All RBs |
| 2 (Note 7) | PCC(M) | X | | Highest N _{RB} | default | N/A | QPSK | 0 | All RBs |
| | SCC1(M) | X | | Highest N _{RB} | Default | N/A | QPSK | N/A | All RBs |
| | SCC2(M) | X | | Highest N _{RB} | Default | N/A | QPSK | N/A | All RBs |
| | PCC(S) | X | | Highest N _{RB} | default | DFT-s-OFDM QPSK | CP-OFDM QPSK | REFSENS | All RBs |
| Default Test Settings for a DC_XA-nY(2A)-nZA Configuration – Note 4 | | | | | | | | | |
| 1 | PCC(M) | X | | 5 MHz | default | N/A | QPSK | 0 | All RBs |
| | SCC1(S) | Y | | Highest N _{RB} | default | N/A | QPSK | N/A | All RBs |
| | SCC2(S) | Z | | Highest N _{RB} | default | N/A | QPSK | N/A | All RBs |
| | PCC(S) | Y | | Highest N _{RB} | default | DFT-s-OFDM QPSK | CP-OFDM QPSK | REFSENS | All RBs |
| 2 | PCC(M) | X | | 5 MHz | default | N/A | QPSK | 0 | All RBs |
| | SCC1(S) | Y | | Highest N _{RB} | default | N/A | QPSK | N/A | All RBs |
| | SCC2(S) | Y | | Highest N _{RB} | default | N/A | QPSK | N/A | All RBs |
| | PCC(S) | Z | | Highest N _{RB} | default | DFT-s-OFDM QPSK | CP-OFDM QPSK | REFSENS | All RBs |
| Default Test Settings for a DC_XA-nYA-nZC Configuration – Note 4 | | | | | | | | | |
| 1 | PCC(M) | X | | 5 MHz | default | N/A | QPSK | 0 | All RBs |
| | SCC1(S) | Z | | Highest N _{RB} | default | N/A | QPSK | N/A | All RBs |
| | SCC2(S) | Z | | Highest N _{RB} | default | N/A | QPSK | N/A | All RBs |
| | PCC(S) | Y | | Highest N _{RB} | default | DFT-s-OFDM QPSK | CP-OFDM QPSK | REFSENS | All RBs |
| 2 | PCC(M) | X | | 5 MHz | default | N/A | QPSK | 0 | All RBs |
| | SCC1(S) | Z | | Highest | default | N/A | QPSK | N/A | All |

| | | | N_{RB} | | | | | RBs |
|---------|---|--|------------------|---------|-----------------|--------------|---------|---------|
| SCC2(S) | Y | | Highest N_{RB} | default | N/A | QPSK | N/A | All RBs |
| PCC(S) | Z | | Highest N_{RB} | default | DFT-s-OFDM QPSK | CP-OFDM QPSK | REFSENS | All RBs |

NOTE 1: (M) and (S) indicate MCG and SCG respectively.
 NOTE 2: X, Y and Z in this table correspond to different bands i.e. X != Y != Z.
 NOTE 3: The band combinations with difference appearance order of bands/sub-blocks in the band combination string are not distinguished. E.g. DC_YA-(n)XAA represents the set of DC_YA-(n)XAA and DC_(n)XAA-YA.
 Note 4: LTE anchor agnostic configuration
 Note 5: Not LTE anchor agnostic configuration due to exception requirement for intra-band contiguous CA in clause 7.4B, 7.5B, 7.6B.2, 7.6B.3, 7.6B.4, 7.7B, 7.8B, 7.9B test cases
 Note 6: Test point for UE supporting dual UL
 Note 7: Test point for UE supporting single UL

Table 7.3B.2.3_1.2.4.1-2: Test Configuration Table for EN-DC configurations affected by Reference sensitivity exceptions

| Initial Conditions | | | | | | | | | |
|--|------------|------|-----|-------------------------|--|-----------------|--------------|----------|----------|
| Test Environment as specified in TS 38.508-1 [6] clause 4.1 | | | | | NC, TL/VL, TL/VH, TH/VL, TH/VH | | | | |
| Test Frequencies as specified in TS 38.508-1 [6] clause 4.3.1 for different EN-DC bandwidth classes | | | | | For test frequencies refer to "Range" columns. For mapping within Band refer to "CC" columns | | | | |
| Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1 across bandwidth combination sets supported by the UE | | | | | DC_XA-nYA-nZC: Mid range for X Mid Range for nY and nZ DC_XA-nY(2A)-nZA: Mid range for X TBD for nY Mid range for nZ | | | | |
| NR Test SCS as specified in Table 5.3.5-1 in TS 38.521-1 [8] | | | | | Lowest SCS per Channel Bandwidth | | | | |
| Network signalling value | | | | | NS_01 by default, exceptions listed in Table 7.3.3-3, dependent on PCC Band | | | | |
| Test Parameters for EN-DC Configurations | | | | | | | | | |
| ID | CC (NOTE1) | Band | SCS | NRB | Range/Wgap | UL MOD | DL MOD | UL Alloc | DL Alloc |
| Default Test Settings for a DC_(n)XA Configuration – Note 4 | | | | | | | | | |
| | | | | | N/A | | | | |
| Default Test Settings for a DC_XA-nY(2A)-nZA Configuration – Note 5 | | | | | | | | | |
| 1 | PCC(M) | X | | Highest N _{RB} | default | QPSK | QPSK | REFSENS | All RBs |
| | SCC1(S) | Y | | Highest N _{RB} | default | N/A | QPSK | N/A | All RBs |
| | SCC2(S) | Z | | Highest N _{RB} | default | N/A | QPSK | N/A | All RBs |
| | PCC(S) | Y | | Highest N _{RB} | default | DFT-s-OFDM QPSK | CP-OFDM QPSK | REFSENS | All RBs |
| 2 | PCC(M) | X | | Highest N _{RB} | default | QPSK | QPSK | REFSENS | All RBs |
| | SCC1(S) | Y | | Highest N _{RB} | default | N/A | QPSK | N/A | All RBs |
| | SCC2(S) | Y | | Highest N _{RB} | default | N/A | QPSK | N/A | All RBs |
| | PCC(S) | Z | | Highest N _{RB} | default | DFT-s-OFDM QPSK | CP-OFDM QPSK | REFSENS | All RBs |
| Default Test Settings for a DC_XA-nYA-nZC Configuration – Note 5 | | | | | | | | | |
| 1 | PCC(M) | X | | Highest N _{RB} | default | QPSK | QPSK | REFSENS | All RBs |
| | SCC1(S) | Z | | Highest N _{RB} | default | N/A | QPSK | N/A | All RBs |
| | SCC2(S) | Z | | Highest N _{RB} | default | N/A | QPSK | N/A | All RBs |
| | PCC(S) | Y | | Highest N _{RB} | default | DFT-s-OFDM QPSK | CP-OFDM QPSK | REFSENS | All RBs |
| 2 | PCC(M) | X | | Highest N _{RB} | default | QPSK | QPSK | REFSENS | All RBs |
| | SCC1(S) | Z | | Highest N _{RB} | default | N/A | QPSK | N/A | All RBs |
| | SCC2(S) | Y | | Highest N _{RB} | default | N/A | QPSK | N/A | All RBs |
| | PCC(S) | Z | | Highest N _{RB} | default | DFT-s-OFDM QPSK | CP-OFDM QPSK | REFSENS | All RBs |
| NOTE 1: (M) and (S) indicate MCG and SCG respectively. NOTE 2: X, Y and Z in this table correspond to different bands i.e. X != Y != Z. NOTE 3: The band combinations with difference appearance order of bands/sub-blocks in the band combination string are not distinguished. E.g. DC_YA-(n)XAA represents the set of DC_YA-(n)XAA and DC_(n)XAA-YA. NOTE 4: No refsens exceptions with this EN-DC configuration exist in TS38.101-3 NOTE 5: This test setting is valid for EN-DC configurations affected by UL harmonics, harmonic mixing or cross band isolation exceptions when the exception is avoided by selecting specific test frequency. Test only one of the test points. UL to be active on the cell that form the aggressor of the exception NOTE 6: EN-DC configuration affected by 2UL intermodulation exception. The exceptions always apply for a certain UL | | | | | | | | | |

configuration.
 NOTE 7: LTE CA fallback to 1CC is sufficient to test, unless both LTE cells are part of the exception requirement in which case the configuration need to be tested (using configuration specific test settings and not default).

Table 7.3B.2.3_1.2.4.1-3: Void**7.3B.2.3_1.2.4.2 Test procedure**

Same as in clause 7.3B.2.3.4.2

7.3B.2.3_1.2.4.3 Message contents

Message contents are according to TS 38.508-1 [5] clause 4.6.

7.3B.2.3_1.2.5 Test Requirement

Reference sensitivity test requirements for EN-DC configurations affected by 2UL intermodulation interference in NR FR1, are specified in Table 7.3B.2.3_1.2.5-1 and Table 7.3B.2.3_1.2.5-1 with uplink configuration specified in Table 7.3B.2.3_1.1.4.1-2.

Reference sensitivity test requirements for EN-DC configurations not affected by 2UL intermodulation interference in NR FR1, are specified in Table 7.3.5-1 in TS 36.521-1 [10] for the LTE CC, and Table 7.3.2.5-1 in TS 38.521-1 [8] for the NR CC.

Table 7.3B.2.3_1.2.5-1: Reference sensitivity exceptions for Scell due to dual uplink operation for EN-DC in NR FR1 (two bands)**FFS****Table 7.3B.2.3_1.2.5-2: Reference sensitivity exceptions for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)****FFS**

Test tolerance is the same as given in Table 7.3B.2.3.5-2.

7.3B.2.3_1.3 Reference sensitivity for EN-DC within FR1 (5 CCs)**7.3B.2.3_1.3.1 Test purpose**

Same as in clause 7.3B.2.3.1.

7.3B.2.3_1.3.2 Test applicability

This test applies to all types of NR UE release 15 and forward supporting 5 CCs inter-band EN-DC.

7.3B.2.3_1.3.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.3B.2.0

Exception requirements for both NR and E-UTRA are defined for this test and therefore LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

7.3B.2.3_1.3.4 Test description 7.3B.2.3_1.3.4.1 Initial conditions

Same initial conditions as in clause 7.3B.2.3.4.1 with following exceptions:

The initial test configurations for E-UTRA band and NR band consist of environmental conditions, test frequencies, and channel bandwidths and RB allocations for exceptional test scenarios are specified in Table 7.3B.2.3_1.3.4.1-1 and Table 7.3B.2.3_1.3.4.1-2

Table 7.3B.2.3_1.3.4.1-1: Test Configuration Table Reference sensitivity exceptions due to dual uplink operation for EN-DC in NR FR1 (four bands)

| Initial Conditions | | | | | | | | | |
|--|------------|------|--------|-------------------------|--|-----------------|--------------|----------|----------|
| Test Environment as specified in TS 38.508-1 [6] clause 4.1 | | | | | NC, TL/VL, TL/VH, TH/VL, TH/VH | | | | |
| Test Frequencies as specified in TS 38.508-1 [6] clause 4.3.1 for different EN-DC bandwidth classes | | | | | For test frequencies refer to "Range" columns. For mapping within Band refer to "CC" columns | | | | |
| Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1 across bandwidth combination sets supported by the UE | | | | | Refer to "NRB" column | | | | |
| NR Test SCS as specified in Table 5.3.5-1 in TS 38.521-1 [8] | | | | | Refer to "SCS" column | | | | |
| Network signalling value | | | | | NS_01 by default, exceptions listed in Table 7.3.3-3, dependent on PCC Band | | | | |
| Test Parameters for EN-DC Configurations | | | | | | | | | |
| ID | CC (NOTE1) | Band | SCS | NRB | Range/ Wgap | UL MOD | DL MOD | UL Alloc | DL Alloc |
| Default Test Settings for a DC_XA-YA_ZC_nRA Configuration | | | | | | | | | |
| 1 | PCC(M) | X | N/A | Highest N _{RB} | Mid | QPSK | QPSK | REFSENS | All RBs |
| | SCC1(M) | Y | N/A | Highest N _{RB} | Mid | N/A | QPSK | N/A | All RBs |
| | SCC2(M) | Z | N/A | Highest N _{RB} | Mid | N/A | QPSK | N/A | All RBs |
| | SCC3(M) | Z | N/A | Highest N _{RB} | Mid | N/A | QPSK | N/A | All RBs |
| | PCC(S) | R | 15 kHz | Highest N _{RB} | Mid | DFT-s-OFDM QPSK | CP-OFDM QPSK | REFSENS | All RBs |
| NOTE 1: (M) and (S) indicate MCG and SCG respectively. | | | | | | | | | |
| NOTE 2: X, Y and Z in this table correspond to different bands i.e. X != Y != Z | | | | | | | | | |
| NOTE 3: The band combinations with difference appearance order of bands/sub-blocks in the band combination string are not distinguished. E.g. DC_YA-(n)XAA represents the set of DC_YA-(n)XAA and DC_(n)XAA-YA | | | | | | | | | |

Table 7.3B.2.3_1.3.4.1-2: Test Configuration Table Reference sensitivity exceptions due to dual uplink operation for EN-DC in NR FR1 (five bands)

| Initial Conditions | | | | | | | | | |
|--|------------|------|--------|-------------------------|--|-----------------|--------------|----------|----------|
| Test Environment as specified in TS 38.508-1 [6] clause 4.1 | | | | | NC, TL/VL, TL/VH, TH/VL, TH/VH | | | | |
| Test Frequencies as specified in TS 38.508-1 [6] clause 4.3.1 for different EN-DC bandwidth classes | | | | | For test frequencies refer to "Range" columns. For mapping within Band refer to "CC" columns | | | | |
| Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1 across bandwidth combination sets supported by the UE | | | | | Refer to "NRB" column | | | | |
| NR Test SCS as specified in Table 5.3.5-1 in TS 38.521-1 [8] | | | | | Refer to "SCS" column | | | | |
| Network signalling value | | | | | NS_01 by default, exceptions listed in Table 7.3.3-3, dependent on PCC Band | | | | |
| Test Parameters for EN-DC Configurations | | | | | | | | | |
| ID | CC (NOTE1) | Band | SCS | NRB | Range/Wgap | UL MOD | DL MOD | UL Alloc | DL Alloc |
| Default Test Settings for a DC_XA-YA-ZA-SA_nRA Configuration | | | | | | | | | |
| 1 | PCC(M) | X | N/A | Highest N _{RB} | Mid | QPSK | QPSK | REFSENS | All RBs |
| | SCC1(M) | Y | N/A | Highest N _{RB} | Mid | N/A | QPSK | N/A | All RBs |
| | SCC2(M) | Z | N/A | Highest N _{RB} | Mid | N/A | QPSK | N/A | All RBs |
| | SCC3(M) | S | N/A | Highest N _{RB} | Mid | N/A | QPSK | N/A | All RBs |
| | PCC(S) | R | 15 kHz | Highest N _{RB} | Mid | DFT-s-OFDM QPSK | CP-OFDM QPSK | REFSENS | All RBs |
| NOTE 1: (M) and (S) indicate MCG and SCG respectively. | | | | | | | | | |
| NOTE 2: X, Y and Z in this table correspond to different E-UTRA bands i.e. X != Y != Z, R corresponds to NR band. | | | | | | | | | |
| NOTE 3: For inter-band EN-DC 4CCs configuration with four bands, if there is no additional exceptional test point is defined besides the requirement for default uplink EN-DC configurations defined in Table 5.5B.4.3-1, testing for 4CC with four band can be skipped. | | | | | | | | | |

7.3B.2.3_1.3.4.2 Test procedure

Same as in clause 7.3B.2.3.4.2.

7.3B.2.3_1.3.4.3 Message contents

Message contents are according to TS 38.508-1 [5] clause 4.6.

7.3B.2.3_1.3.5 Test requirement

For inter-band EN-DC configurations, the throughput of each CG shall be $\geq 95\%$ of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with reference receive power level specified in Tables Table 7.3.2.5-1 in TS 38.521-1 [8] and parameters specified Tables 7.3.2.4.1-1, Tables 7.3.2.4.1-2 and Tables 7.3.2.4.1-3 in TS 38.521-1 [8] for NR band.

Each EN-DC combination defined in Table 5.5B.4.3-1 shall be tested in anchor-agnostic anchor-agnostic mode as described in this clause. If a test point is overlapped with uplink EN-DC combo MSD test points, the requirement with MSD shall apply.

For the UE which supports inter-band EN-DC, the minimum requirement for reference sensitivity in Table 7.3.2.5-1 of TS 38.521-1 [8] for NR band and Table 7.3.5-1 of TS 36.521-1 [10] for EUTRA band, shall be increased by the amount given in $\Delta R_{IB,c}$ defined in clause 7.3B.3.3 for the applicable for two, three, four and five bands operation.

Reference sensitivity exceptions for intermodulation interference due to dual uplink operation for EN-DC in NR FR1, are specified in Table 7.3B.2.3_1.3.5-1 for four bands and Table 7.3B.2.3_1.3.5-2 for five bands with uplink configuration specified in Table 7.3B.2.3_1.3.4.1-1 for four bands and 7.3B.2.3_1.3.4.1-2 for five bands, respectively.

For a given inter-band EN-DC 5CCs configuration defined in Table 5.5B.4.3-1 and Table 5.5B.4.4-1, if there is no additional exceptional test point is defined besides the requirement for default uplink EN-DC configurations defined in

Table 5.5B.4.3-1 and Table 5.5B.4.4-1, the test requirement for default fallback uplink EN-DC configurations defined in Table 5.5B.4.3-1 applies.

Table 7.3B.2.3_1.3.5-1 Reference sensitivity exceptions for Scell due to dual uplink operation for EN-DC in NR FR1 (four bands)

TBD

Table 7.3B.2.3_1.3.5-2 Reference sensitivity exceptions for Scell due to dual uplink operation for EN-DC in NR FR1 (five bands)

TBD

7.3B.2.3_1.4 Reference sensitivity for EN-DC within FR1 (6 CCs)

TBD

7.3B.2.4 Reference sensitivity for Inter-band EN-DC including FR2

7.3B.2.4.1 Test purpose

Same test purpose as in clause 7.3.2.1 in TS 38.521-2 [9] for the NR carrier.

7.3B.2.4.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 2 DL CCs.

7.3B.2.4.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 7.3B.2.0.4 TS 3.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.3B.2.4.

7.3B.2.4.4 Test description

7.3B.2.4.4.1 Initial conditions

Same test description as in clause 7.3.2.4 in TS 38.521-2 [9] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1. For Initial conditions as in clause 7.3.2.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 7.3.2.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 7.3.2.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

7.3B.2.4.5 Test requirement

Same test requirement as in clause 7.3.2.5 in TS 38.521-2 [9] for the NR carrier.

7.3B.2.4_1 Reference sensitivity for Inter-band EN-DC including FR2 (>2 CCs)

7.3B.2.4_1.1 Reference sensitivity for Inter-band EN-DC including FR2 (3 CCs)

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- **Test applicability,** Test Description requires updates to clarify number of E-UTRA carriers that will be configured during the test that will be limited to only 1 E-UTRA CC

7.3B.2.4_1.1.1 Test purpose

Same test purpose as in clause 7.3B.2.4.1.

7.3B.2.4_1.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 3 DL CCs (2NR DL CCs).

7.3B.2.4_1.1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 7.3B.2.0.4.

7.3B.2.4_1.1.4 Test description

The FR2 reference sensitivity test description for all 3CC EN-DC CA combinations (1LTE+2FR2, 2LTE+1FR2), is the same as in corresponding clause of clause 7.5A or clause 7.5 (if only 1 FR2 carrier) in TS 38.521-2 [9] with the exceptions described below.

7.3B.2.4_1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on EN-DC operating bands specified in clause 5.2B.1, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-2 [9] clause 5.3 or clause 5.3A and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2 or clause 5.4.2A. All valid configurations shall be tested with applicable test parameters for inter-band EN-DC including FR2 configuration specified in clause 5.5B.5, and the configuration for NR carrier are shown in TS 38.521-2 [9] Table 7.3.2.4.1-1 or Table 7.3A.2.1.4.1-1.

For Initial conditions as in clause 7.3.2.4.1 or clause 7.3A.2.1.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are configured as per clause 4.7 with parameters set according to Table 4.7-1 and propagation conditions set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 7.3.2.4.1 or clause 7.3A.2.1.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

7.3B.2.4_1.1.4.2 Test Procedure

Same test procedure as in clause 7.3.2.4.2 or clause 7.3A.2.1.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

7.3B.2.4_1.1.4.3 Message contents

Message contents are according to TS 38.508-1 [6] clause 4.6.1.

7.3B.2.4_1.1.5 Test requirement

For each NR component carrier, the test requirement is the same as in clause 7.3.2.5 or clause 7.3A.2.1.5 in TS 38.521-2 [9].

7.3B.2.4_1.2 Reference sensitivity for Inter-band EN-DC including FR2 (4 CCs)

7.3B.2.4_1.2.1 Test purpose

Same test purpose as in clause 7.3B.2.4_1.1.1.

7.3B.2.4_1.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 4 DL CCs (3NR DL CCs).

7.3B.2.4_1.2.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 7.3B.2.4_1.1.3.

7.3B.2.4_1.2.4 Test description

The FR2 reference sensitivity test description for all 4CC EN-DC CA combinations (1LTE+3FR2, 2LTE+2FR2, 3LTE+1FR2), is the same as in corresponding clause of clause 7.5A or clause 7.5 (if only 1 FR2 carrier) in TS 38.521-2 [9], with the exceptions described in clause 7.3B.2.4_1.1.4.1 and clause 7.3B.2.4_1.1.4.2.

7.3B.2.4_1.2.5 Test requirement

For each NR component carrier, the test requirement is the same as in clause 7.3.2.5 or clause 7.3A.2.1.5 in TS 38.521-2 [9].

7.3B.2.4_1.3 Reference sensitivity for Inter-band EN-DC including FR2 (5 CCs)

7.3B.2.4_1.3.1 Test purpose

Same test purpose as in clause 7.3B.2.4_1.1.1.

7.3B.2.4_1.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 5 DL CCs (4NR DL CCs).

7.3B.2.4_1.3.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 7.3B.2.4_1.1.3.

7.3B.2.4_1.3.4 Test description

The FR2 reference sensitivity test description for all 5CC EN-DC CA combinations (1LTE+4FR2, 2LTE+3FR2, 3LTE+2FR2, 4LTE+1FR2), is the same as in corresponding clause of clause 7.5A or clause 7.5 (if only 1 FR2 carrier) in TS 38.521-2 [9], with the exceptions described in clause 7.3B.2.4_1.1.4.1 and clause 7.3B.2.4_1.1.4.2.

7.3B.2.4_1.3.5 Test requirement

For each NR component carrier, the test requirement is the same as in clause 7.3.2.5 or clause 7.3A.2.1.5 in TS 38.521-2 [9].

7.3B.2.4_1.4 Reference sensitivity for Inter-band EN-DC including FR2 (6 CCs)

7.3B.2.4_1.4.1 Test purpose

Same test purpose as in clause 7.3B.2.4_1.1.1.

7.3B.2.4_1.4.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 6 DL CCs (5NR DL CCs).

7.3B.2.4_1.4.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 7.3B.2.4_1.1.3.

7.3B.2.4_1.4.4 Test description

The FR2 reference sensitivity test description for all 6CC EN-DC CA combinations (1LTE+5FR2, 2LTE+4FR2, 3LTE+3FR2, 4LTE+2FR2, 5LTE+1FR2), is the same as in corresponding clause of clause 7.5A or clause 7.5 (if only 1 FR2 carrier) in TS 38.521-2 [9], with the exceptions described in clause 7.3B.2.4_1.1.4.1 and clause 7.3B.2.4_1.1.4.2.

7.3B.2.4_1.4.5 Test requirement

For each NR component carrier, the test requirement is the same as in clause 7.3.2.5 or clause 7.3A.2.1.5 in TS 38.521-2 [9].

7.3B.2.4D Reference sensitivity for inter-band EN-DC including FR2 for UL-MIMO

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- The referred test case 7.3D in TS 38.521-2 [9] is incomplete

7.3B.2.4D.1 Test purpose

Same test purpose as in clause 7.3D.1 in TS 38.521-2 [9] for the NR carrier.

7.3B.2.4D.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC FR2.

7.3B.2.4D.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 7.3D.1 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this measurement is TS 38.101-3 [4] clause 7.3B.

7.3B.2.4D.4 Test Description

Same test description as in clause 7.3D.1 in TS 38.521-2 [9] for the NR carrier with the following exceptions:

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1.

For Initial conditions as in clause 7.3D.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for the cell are set up according to TS 36.508 [11] subclause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 7.3D.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.
7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set TimeAlignmentTimerDedicated IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

7.3B.2.4D.5 Test Requirement

Same test requirement as specified in TS 38.521-2 [9] clause 7.3D.1 for the NR carrier(s).

7.3B.2.5 Reference sensitivity for Inter-band EN-DC including FR1 and FR2 (3 CCs)

7.3B.2.5.1 Test purpose

Same test purpose as in 7.3B.2 in TS 38.521-1 [8] for NR FR1 carrier(s) and 7.3.2 in TS 38.521-2 [9] for NR FR2 carrier(s).

7.3B.2.5.2 Test applicability

The requirements in this test are not testable due to issues with combined testing of NR FR1 and E-UTRA in conducted mode with NR FR2 in radiated mode. Therefore, the conducted and radiated requirements are tested separately.

No test case details are specified. The NSA requirements for reference sensitivity apply and are tested as part of the EN-DC within FR1 and EN-DC including FR2 test cases in clause 7.3B.

7.3B.2.5D Reference sensitivity for inter-band EN-DC including FR1 and FR2 for UL-MIMO

7.3B.2.5D.1 Test purpose

Same test purpose as in clause 7.3D in TS 38.521-1 [8] for NR FR1 carrier and 7.3D in TS 38.521-2 [9] for NR FR2 carrier.

7.3B.2.5D.2 Test applicability

The requirements in this test are not testable due to issues with combined testing of NR FR1 and E-UTRA in conducted mode with NR FR2 in radiated mode. Therefore, the conducted and radiated requirements are tested separately.

No test case details are specified. The NSA requirements for reference sensitivity apply and are tested as part of the EN-DC within FR1 as in clause 7.3 in TS 38.521-1 [8] and EN-DC within FR2 as in clause 7.3 in TS 38.521-2 [9].

7.3B.2.6 Void

7.3B.3 $\Delta R_{IB,c}$ ΔR_{IBNC} for EN-DC

7.3B.3.0 General

For the UE which supports inter-band EN-DC or NE-DC configuration, the minimum requirement for reference sensitivity in Table 7.3.1-1 and Table 7.3.1-1a in TS.36101 [5], clause 7.3.2, 7.3A.2, 7.3C.2 in TS 38.101-1 [2] and

clause 7.3.2, 7.3A.2 in TS 38.101-2 [3] shall be increased by the amount given in $\Delta R_{IB,c}$ ΔR_{IBNC} in Tables below where unless otherwise stated, the same $\Delta R_{IB,c}$, ΔR_{IBNC} are applicable to NR band(s) part for DC configurations which have the same NR operating band combination. Unless otherwise stated, $\Delta R_{IB,c}$ or ΔR_{IBNC} is set to zero.

In case the UE supports more than one of band combinations for CA, SUL or DC, and an operating band belongs to more than one band combinations then

- When the operating band frequency range is ≤ 1 GHz, the applicable additional $\Delta R_{IB,c}$ shall be the average value for all band combinations defined in clause 7.3A, 7.3B, 7.3C in this specification and 7.3A, 7.3B in TS 38.101-3 [4], truncated to one decimal place that apply for that operating band among the supported band combinations. In case there is a harmonic relation between low band UL and high band DL, then the maximum $\Delta R_{IB,c}$ among the different supported band combinations involving such band shall be applied.
- When the operating band frequency range is > 1 GHz, the applicable additional $\Delta R_{IB,c}$ shall be the maximum value for all band combinations defined in clause 7.3A, 7.3B, 7.3C in this specification and 7.3A, 7.3B in TS 38.101-3 [4] for the applicable operating bands.

Unless $\Delta R_{IB,c}$ is specified for the NE-DC configuration, the specified $\Delta R_{IB,c}$ for the EN-DC configuration including same bands as the corresponding NE-DC configuration is applicable for the NE-DC configuration.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.3B.3.

7.3B.3.1 Reference sensitivity $\Delta R_{IB,c}$ for Intra-band Contiguous EN-DC

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7.3B.3.2 Reference sensitivity $\Delta R_{IB,C}$ for Intra-band non-contiguous EN-DC

Table 7.3B.3.2-1: Intra-band non-contiguous EN-DC with one uplink configuration on E-UTRA for reference sensitivity

| DC configuration | Aggregated channel bandwidth (LTE+NR) | | $W_{gap} / (\text{MHz})$ | UL E-UTRA allocation | ΔR_{IBNC} (dB) | Duplex mode |
|------------------|---------------------------------------|-------|--------------------------|----------------------|------------------------|-------------|
| | E-UTRA | NR | | | | |
| DC_3A_n3A | 5MHz | 5MHz | 45.0 < W_{gap} ≤ 65.0 | 12 ¹ | 4.7 | FDD |
| | | | 0.0 < W_{gap} ≤ 45.0 | 25 ¹ | 0 | |
| | 5MHz | 10MHz | 40.0 < W_{gap} ≤ 60.0 | 12 ¹ | 3.8 | |
| | | | 0.0 < W_{gap} ≤ 40.0 | 25 ¹ | 0 | |
| | 5MHz | 15MHz | 35.0 < W_{gap} ≤ 55.0 | 12 ¹ | 3.6 | |
| | | | 0.0 < W_{gap} ≤ 35.0 | 25 ¹ | 0 | |
| | 5MHz | 20MHz | 30.0 < W_{gap} ≤ 50.0 | 12 ¹ | 3.4 | |
| | | | 0.0 < W_{gap} ≤ 30.0 | 25 ¹ | 0 | |
| | 5MHz | 25MHz | 25.0 < W_{gap} ≤ 45.0 | 12 ¹ | 3.2 | |
| | | | 0.0 < W_{gap} ≤ 25.0 | 25 ¹ | 0 | |
| | 5MHz | 30MHz | 20.0 < W_{gap} ≤ 40.0 | 12 ¹ | 3.0 | |
| | | | 0.0 < W_{gap} ≤ 20.0 | 25 ¹ | 0 | |
| | 10MHz | 5MHz | 30.0 < W_{gap} ≤ 60.0 | 12 ⁵ | 5.1 | |
| | | | 0.0 < W_{gap} ≤ 30.0 | 32 ¹ | 0 | |
| | 10MHz | 10MHz | 25.0 < W_{gap} ≤ 55.0 | 12 ⁵ | 4.3 | |
| | | | 0.0 < W_{gap} ≤ 25.0 | 32 ¹ | 0 | |
| | 10MHz | 15MHz | 20.0 < W_{gap} ≤ 50.0 | 12 ⁵ | 3.8 | |
| | | | 0.0 < W_{gap} ≤ 20.0 | 32 ¹ | 0 | |
| | 10MHz | 20MHz | 15.0 < W_{gap} ≤ 45.0 | 12 ⁵ | 3.5 | |
| | | | 0.0 < W_{gap} ≤ 15.0 | 32 ¹ | 0 | |
| | 10MHz | 25MHz | 10.0 < W_{gap} ≤ 40.0 | 12 ⁵ | 3.2 | |
| | | | 0.0 < W_{gap} ≤ 10.0 | 32 ¹ | 0 | |
| | 10MHz | 30MHz | 5.0 < W_{gap} ≤ 35.0 | 12 ⁵ | 2.8 | |
| | | | 0.0 < W_{gap} ≤ 5.0 | 32 ¹ | 0 | |
| | 15MHz | 5MHz | 25.0 < W_{gap} ≤ 55.0 | 12 ⁶ | 6.0 | |
| | | | 0.0 < W_{gap} ≤ 25.0 | 32 ¹ | 0 | |
| | 15MHz | 10MHz | 20.0 < W_{gap} ≤ 50.0 | 12 ⁶ | 4.7 | |
| | | | 0.0 < W_{gap} ≤ 20.0 | 32 ¹ | 0 | |
| | 15MHz | 15MHz | 15.0 < W_{gap} ≤ 45.0 | 12 ⁶ | 4.2 | |
| | | | 0.0 < W_{gap} ≤ 15.0 | 32 ¹ | 0 | |
| | 15MHz | 20MHz | 10.0 < W_{gap} ≤ 40.0 | 12 ⁶ | 3.8 | |
| | | | 0.0 < W_{gap} ≤ 10.0 | 32 ¹ | 0 | |
| | 15MHz | 25MHz | 5.0 < W_{gap} ≤ 35.0 | 12 ⁶ | 3.5 | |
| | | | 0.0 < W_{gap} ≤ 5.0 | 32 ¹ | 0 | |
| | 15MHz | 30MHz | 0.0 < W_{gap} ≤ 30.0 | 12 ⁶ | 3.3 | |
| | | | 15.0 < W_{gap} ≤ 50.0 | 16 ⁷ | 6.5 | |
| | 20MHz | 5MHz | 0.0 < W_{gap} ≤ 15.0 | 32 ¹ | 0 | |
| | | | 10.0 < W_{gap} ≤ 45.0 | 16 ⁷ | 5.1 | |
| | 20MHz | 10MHz | 0.0 < W_{gap} ≤ 10.0 | 32 ¹ | 0 | |
| | | | 5.0 < W_{gap} ≤ 40.0 | 16 ⁷ | 4.5 | |
| | 20MHz | 15MHz | 0.0 < W_{gap} ≤ 5.0 | 32 ¹ | 0 | |
| | | | 0.0 < W_{gap} ≤ 35.0 | 16 ⁷ | 4.1 | |
| | 20MHz | 20MHz | 0.0 < W_{gap} ≤ 30.0 | 16 ⁷ | 3.8 | |
| | | | 0.0 < W_{gap} ≤ 25.0 | 16 ⁷ | 3.6 | |

NOTE 1: UL resource blocks shall be located as close as possible to the downlink operating band but confined within the transmission.

NOTE 2: W_{gap} is the sub-block gap between the two sub-blocks.

NOTE 3: The table only applies when the centre frequency of E-UTRA carrier is higher than the NR carrier, and the ΔR_{IBNC} applies to the NR DL carrier only.

NOTE 4: All combinations of channel bandwidths defined in Table 5.3B.1.3-1.

NOTE 5: UL resource blocks shall be located at $RB_{start}=25$.

NOTE 6: UL resource blocks shall be located at $RB_{start}=35$.

NOTE 7: UL resource blocks shall be located at $RB_{start}=50$.

7.3B.3.3 $\Delta R_{IB,c}$ for Inter-band EN-DC within FR1

7.3B.3.3.1 $\Delta R_{IB,c}$ for EN-DC in two bands

Table 7.3B.3.3.1-1: $\Delta R_{IB,c}$ due to EN-DC(two bands)

| Inter-band EN-DC configuration | E-UTRA or NR Band | $\Delta R_{IB,c}$ (dB) |
|--------------------------------|-------------------|------------------------------------|
| DC_1_n28 | n28 | 0.2 |
| DC_1_n51 | n51 | 0.1 |
| | 1 | 0.2 |
| DC_1_n77 | n77 | 0.5 |
| DC_1_n78 | n78 | 0.5 |
| | 2 | 0.3 |
| DC_2_n66 | n66 | 0.3 |
| | 2 | 0.2 |
| DC_2_n78 | n78 | 0.5 |
| DC_3_n41 | n41 | 0 ³ 0.5 ⁴ |
| | 3 | 0.2 |
| DC_3_n51 | n51 | 0.2 |
| | 3 | 0.2 |
| DC_3_n77, DC_3-3_n77 | n77 | 0.5 |
| | 3 | 0.2 |
| DC_3_n78, DC_3-3_n78 | n78 | 0.5 |
| DC_5_n78 | n78 | 0.2 0.5 |
| DC_7_n51 | n51 | 0.2 |
| DC_7_n71 | n71 | 0.2 |
| DC_7_n77, DC_7-7_n77 | n77 | 0.5 |
| DC_7_n78, DC_7-7_n78 | n78 | 0.5 |
| DC_8_n77 | n77 | 0.2 0.5 |
| DC_8_n78 | n78 | 0.2 0.5 |
| DC_11_n77 | n77 | 0.5 |
| DC_11_n78 | n78 | 0.5 |
| DC_12_n5 | n5 | 0.3 0.5 |
| DC_12_n66 | n66 | 0.5 |
| DC_12_n78 | n78 | 0.2 0.5 |
| DC_18_n77 | n77 | 0.5 |
| DC_19_n77 | n77 | 0.5 |
| DC_19_n78 | n78 | 0.5 |
| DC_20_n51 | n51 | 0.2 |
| DC_20_n77 | n77 | 0.5 |
| DC_20_n78 | n78 | 0.5 |
| DC_21_n77 | n77 | 0.5 |
| DC_21_n78 | n78 | 0.5 |
| DC_25_n41, DC_25-25_n41 | n41 | 0 ¹ 0.5 ² |
| DC_26_n77 | n77 | 0.5 |
| DC_26_n78 | n78 | 0.5 |
| DC_28_n8 | n8 | 0.1 0.2 |
| DC_28_n51 | n51 | 0.2 |
| DC_28_n77 | n77 | 0.2 0.5 |
| DC_28_n78 | n78 | 0.2 0.5 |
| DC_30_n66 | n66 | 0.5 0.4 |
| DC_38_n78 | n78 | 0.4 0.5 |

| | | |
|-----------|-----------|--------------------------------------|
| DC_39-n41 | 39 n41 | 0.2 0.2 |
| DC_39_n78 | n78 | 0.5 |
| DC_39_n79 | n79 | 0.5 |
| DC_40_n77 | 40 n77 | 0.4 0.5 |
| DC_40_n78 | 40 n78 | 0.4 ⁵ 0.5 ⁵ |
| DC_40_n79 | n79 | 0.5 |
| DC_41_n77 | n77 | 0.5 |
| DC_41_n78 | n78 | 0.5 |
| DC_41_n79 | n79 | 0.5 |
| DC_42_n51 | n51 | 0.2 |
| DC_66_n2 | 66 n2 | 0.3 0.3 |
| DC_66_n25 | 66 n25 | 0.3 0.3 |
| DC_66_n41 | 66 n41 | 0.5 0.5 ¹ |
| | | 1 ² |
| DC_66_n78 | 66 n78 | 0.2 0.5 |

NOTE 1: The requirement is applied for UE transmitting on the frequency range of 2545-2690MHz.
 NOTE 2: The requirement is applied for UE transmitting on the frequency range of 2496-2545MHz.
 NOTE 3: Applicable for the frequency range of 2515-2690 MHz.
 NOTE 4: Applicable for the frequency range of 2496-2515 MHz.
 NOTE 5: Only applicable for UE supporting inter-band carrier aggregation with uplink in one E-UTRA band and without simultaneous Rx/Tx.

7.3B.3.3.2 $\Delta R_{IB,c}$ for EN-DC in three bands**Table 7.3B.3.3.2-1: $\Delta R_{IB,c}$ due to EN-DC (three bands)**

| Inter-band EN-DC configuration | E-UTRA or NR Band | $\Delta R_{IB,c}$ (dB) |
|--------------------------------|-------------------|------------------------|
| DC_1-3_n28 | n28 | 0.2 |
| DC_1-3_n77 | 1 | 0.2 |
| | 3 | 0.2 |
| | n77 | 0.5 |
| | 1 | 0.2 |
| DC_1-3_n78 | 3 | 0.2 |
| | n78 | 0.5 |
| | 1 | 0.2 |
| DC_1_n3-n78 | n3 | 0.2 |
| | n78 | 0.5 |
| | 1 | 0.2 |
| DC_1-5_n78 | 5 | 0.2 |
| | n78 | 0.5 |
| | 1 | 0.2 |
| DC_1-7_n28 | n28 | 0.2 |
| DC_1-7_n78 | 1 | 0.2 |
| | 7 or n7 | 0.2 |
| | n78 | 0.5 |
| | 8 | 0.2 |
| DC_1-7-7_n78 | n77 | 0.5 |
| | 8 | 0.2 |
| | n78 | 0.5 |
| | 1 | 0.2 |
| DC_1-8_n78 | n78 | 0.5 |
| DC_1-11_n77 | 1 | 0.2 |
| | n77 | 0.5 |
| | n78 | 0.5 |
| DC_1-18_n77 | n77 | 0.5 |
| DC_1-18_n78 | n78 | 0.5 |
| DC_1-19_n77 | n77 | 0.5 |
| DC_1-19_n78 | n78 | 0.5 |
| DC_1-19_n79 | 1 | 0.3 |
| | 19 | 0.3 |
| DC_1-20_n28 | 20 | 0.2 |
| | n28 | 0.2 |
| DC_1-20_n78 | n78 | 0.5 |
| DC_1-21_n77 | n77 | 0.5 |
| DC_1-21_n78 | 1 | 0.2 |
| | n78 | 0.5 |
| DC_1-28_n77 | 28 | 0.2 |
| | n77 | 0.5 |
| DC_1-28_n78 | 28 or n28 | 0.2 |
| | n78 | 0.5 |
| DC_1_n28-n79 | 1 | 0.3 |
| | 28 | 0.3 |
| DC_1_n40-n78 | n78 | 0.5 |
| DC_1-41_n77 | n77 | 0.5 |
| DC_1-41_n78 | n78 | 0.5 |
| DC_1-42_n77 | 1 | 0.2 |
| | 42 | 0.5 |
| | n77 | 0.5 |
| DC_1-42_n78 | 1 | 0.2 |
| | 42 | 0.5 |
| | n78 | 0.5 |
| DC_1-42_n79 | 42 | 0.5 |
| DC_1_n77-n79 | 1 | 0.2 |
| | n77 | 0.5 |
| DC_1_SUL_n77-n80 | 1 | 0.2 |
| | n77 | 0.5 |
| DC_1_SUL_n77-n84 | 1 | 0.2 |
| | n77 | 0.5 |
| DC_1_n78-n79 | n78 | 0.5 |

| | | |
|---|---------------------|--|
| DC_1_SUL_n78-n80 | 1 n78 | 0.2 0.5 |
| DC_1-SUL_n78-n84 | n78 | 0.5 |
| DC_2-5_n66 | 2 n66 n71 | 0.3 0.3 0.2 |
| DC_2-13_n66 | 2 | 0.3 |
| DC_2-2-13_n66 | n66 | 0.3 |
| DC_2-29_n260 | 2 | 0 |
| DC_2-14_n66 | 2 | 0.3 |
| DC_2-2-14_n66 | n66 | 0.3 |
| DC_2-30_n5, DC_2-2-30_n5 | 2 30 | 0.4 0.5 |
| DC_2-30_n66 | 2 30 n66 | 0.4 0.5 0.4 |
| DC_2-66_n5 DC_2A-2A-66A_n5A DC_2-66-66_n5 DC_2A-2A-66A-66A_n5A DC_2-66-66-66_n5 | 2 66 | 0.3 0.3 |
| DC_2-66_n41 | 2 66 n41 | 0.3 0.5 0.5 ¹ 1 ² |
| DC_2-66_n71B | 2 66 | 0.3 0.3 |
| DC_2-66_n78 DC_2-66-66_n78 | 2 66 n78 | 0.3 0.3 0.5 |
| DC_3_n1-n77 | 3 n1 n77 | 0.2 0.2 0.5 |
| DC_3_n1-n78 | 3 n1 n78 | 0.2 0.2 0.5 |
| DC_3_n3-n77 | 3 n3 n77 | 0.2 0.2 0.5 |
| DC_3_n3-n78 | 3 n3 n78 | 0.2 0.2 0.5 |
| DC_3-5_n78 | 3 5 n78 | 0.2 0.2 0.5 |
| DC_3-7_n78 DC_3-7-7_n78 DC_3-3-7_n78 DC_3-3-7-7_n78 DC_3_n7-n78 | 3 7 or n7 n78 | 0.2 0.2 0.5 |
| DC_3-8_n77 | 3 8 n77 | 0.2 0.2 0.5 |
| DC_3-8_n78 | 3 8 n78 | 0.2 0.2 0.5 |
| DC_3-18-n77 | 3 n77 | 0.2 0.5 |
| DC_3-18-n78 | 3 n78 | 0.2 0.5 |
| DC_3-19_n77 | 3 n77 | 0.2 0.5 |
| DC_3-19_n78 | 3 n78 | 0.2 0.5 |
| DC_3-20_n28 | 20 | 0.1 |

| | | |
|------------------|-----|----------------------------------|
| | n28 | 0.1 |
| DC_3-20_n78 | 3 | 0.2 |
| | n78 | 0.5 |
| | 3 | 0.2 |
| DC_3_n20-n78 | n78 | 0.5 |
| | 3 | 0.3 |
| | 21 | 0.5 |
| DC_3-21_n77 | n77 | 0.5 |
| | 3 | 0.3 |
| | 21 | 0.5 |
| DC_3-21_n78 | n78 | 0.5 |
| | 3 | 0.3 |
| | 21 | 0.5 |
| DC_3-21_n79 | 28 | 0.1 |
| | n5 | 0.1 |
| | n41 | 0 ¹ /0.5 ² |
| | 3 | 0.2 |
| | n78 | 0.5 |
| DC_3-38_n78 | 3 | 0.2 |
| | 38 | 0.4 |
| | n78 | 0.5 |
| DC_3-41-n77 | 3 | 0.2 |
| | 41 | 0 ¹ |
| | n77 | 0.5 ² |
| DC_3-41_n78 | 3 | 0.2 |
| | 41 | 0 ¹ |
| | n78 | 0.5 ² |
| DC_3-41-n79 | 3 | 0.2 |
| | 41 | 0 ¹ |
| | n77 | 0.5 ² |
| DC_3_SUL_n41-n80 | n41 | 0.5 ³ |
| DC_3-42_n77 | 3 | 0.2 |
| | 42 | 0.5 |
| | n77 | 0.5 |
| DC_3-42_n78 | 3 | 0.2 |
| | 42 | 0.5 |
| | n78 | 0.5 |
| DC_3-42_n79 | 3 | 0.2 |
| | 42 | 0.5 |
| DC_3_n77-n79 | 3 | 0.2 |
| | n77 | 0.5 |
| DC_3_SUL_n77-n80 | 3 | 0.2 |
| | n77 | 0.5 |
| DC_3_SUL_n77-n84 | 3 | 0.2 |
| | n77 | 0.5 |
| DC_3_n78-n79 | 3 | 0.2 |
| | n78 | 0.5 |
| DC_3-SUL_n78-n80 | 3 | 0.2 |
| | n78 | 0.5 |
| DC_3-SUL_n78-n82 | 3 | 0.2 |
| | n78 | 0.5 |
| DC_3_SUL_n78-n84 | 3 | 0.2 |
| | n78 | 0.5 |
| | n71 | 0.2 |
| DC_5-7_n78 | 5 | 0.2 |
| | 7 | 0.2 |
| | n78 | 0.5 ² |
| DC_5_30_n66 | 30 | 0.5 |
| | n66 | 0.4 |
| DC_7_n1-n78 | 7 | 0.2 |
| | n1 | 0.2 |
| | n78 | 0.5 |
| DC_7-8_n77 | 7 | 0 |

| | | |
|-------------------|-----|-----|
| | 8 | 0.2 |
| | n77 | 0.5 |
| | 7 | 0 |
| DC_7-8_n78 | 8 | 0.2 |
| | n78 | 0.5 |
| DC_7-20_n28 | 20 | 0.2 |
| | n28 | 0.2 |
| DC_7-20_n78 | n78 | 0.5 |
| DC_7-28_n78 | n78 | 0.5 |
| DC_7_n28-n78 | n78 | 0.5 |
| DC_7-46_n78 | n78 | 0.5 |
| DC_7_SUL_n78-n80 | 7 | 0.2 |
| | n78 | 0.5 |
| DC_8-11_n77 | 8 | 0.2 |
| | n77 | 0.5 |
| DC_8-11_n78 | 8 | 0.2 |
| | n78 | 0.2 |
| DC_8-20_n78 | 8 | 0.2 |
| | n78 | 0.5 |
| DC_8_SUL_n78-n80 | 8 | 0.2 |
| | n78 | 0.5 |
| DC_8-SUL_n78-n81 | 8 | 0.2 |
| | n78 | 0.2 |
| DC_14-66_n2 | 66 | 0.3 |
| DC_14-66-66_n2 | n2 | 0.3 |
| DC_18-28_n77 | n77 | 0.5 |
| DC_18-28_n78 | n78 | 0.5 |
| | 42 | 0.5 |
| | n77 | 0.5 |
| | 42 | 0.5 |
| | n78 | 0.5 |
| | 42 | 0.5 |
| DC_19-21_n77 | n77 | 0.5 |
| DC_19-21_n78 | n78 | 0.5 |
| DC_19-42_n77 | 42 | 0.5 |
| | n77 | 0.5 |
| DC_19-42_n78 | 42 | 0.5 |
| | n78 | 0.5 |
| DC_19-42_n79 | 42 | 0.5 |
| DC_19_n77-n79 | n77 | 0.5 |
| DC_19_n78-n79 | n78 | 0.5 |
| DC_20_n1-n78 | n78 | 0.5 |
| DC_20_n3-n78 | n3 | 0.2 |
| | n78 | 0.5 |
| DC_20_n28-n75 | n28 | 0.2 |
| DC_20_n28-n78 | 20 | 0.2 |
| | n28 | 0.2 |
| | n78 | 0.5 |
| DC_20-38_n78 | 38 | 0.4 |
| | n78 | 0.5 |
| DC_20_n75-n78 | n78 | 0.5 |
| DC_20_n76-n78 | n78 | 0.5 |
| DC_20_SUL_n78-n80 | n78 | 0.5 |
| DC_20-SUL_n78-n82 | n78 | 0.5 |
| DC_20-SUL_n78-n83 | 20 | 0.2 |
| | n78 | 0.5 |
| DC_21-42_n77 | 42 | 0.5 |
| | n77 | 0.5 |
| DC_21-42_n78 | 42 | 0.5 |
| | n78 | 0.5 |
| DC_21-42_n79 | 42 | 0.5 |
| DC_21_n77-n79 | n77 | 0.5 |
| DC_21_n78-n79 | n78 | 0.5 |
| DC_28-SUL_n78-n83 | 28 | 0.2 |
| | n78 | 0.5 |

| | | |
|---|-----|-----|
| | n83 | 0.2 |
| DC_28_n8-n258 | 28 | 0.1 |
| | n8 | 0.2 |
| DC_28-41_n77 | 28 | 0.2 |
| | n77 | 0.5 |
| DC_28-41_n78 | 28 | 0.2 |
| | n78 | 0.5 |
| | n79 | 0.5 |
| DC_28-42_n77 | 28 | 0.2 |
| | 42 | 0.5 |
| | n77 | 0.5 |
| DC_28-42_n78 | 28 | 0.2 |
| | 42 | 0.5 |
| | n78 | 0.5 |
| DC_28-42_n79 | 28 | 0.2 |
| | 42 | 0.5 |
| | 66 | 0.4 |
| | n5 | 0.5 |
| DC_41-42_n77 | 42 | 0.5 |
| | n77 | 0.5 |
| DC_41-42_n78 | 42 | 0.5 |
| | n78 | 0.5 |
| DC_41-42_n79 | 42 | 0.5 |
| DC_66-SUL_n78-n86 | 66 | 0.2 |
| | n78 | 0.5 |
| NOTE 1: The requirement is applied for UE transmitting on the frequency range of 2545–2690MHz. | | |
| NOTE 2: The requirement is applied for UE transmitting on the frequency range of 2496–2545MHz. | | |
| NOTE 3: The requirement is applied for UE transmitting on the frequency range of 2515 – 2690 MHz. | | |
| NOTE 4: The requirement is applied for UE transmitting on the frequency range of 2496 – 2515 MHz. | | |
| NOTE 5: Only applicable for UE supporting inter-band carrier aggregation with uplink in one NR band and without simultaneous Rx/Tx. | | |

7.3B.3.3.3 $\Delta R_{IB,c}$ for EN-DC in four bands**Table 7.3B.3.3.3-1: $\Delta R_{IB,c}$ due to EN-DC (four bands)**

| Inter-band EN-DC configuration | E-UTRA or NR Band | $\Delta R_{IB,c}$ (dB) |
|---|-------------------|------------------------|
| DC_1-3-5_n78 | 1 | 0.2 |
| | 3 | 0.2 |
| | n78 | 0.5 |
| DC_1-3-7_n28 | n28 | 0.2 |
| DC_1-3-7_n78 DC_1-3-7-7_n78 DC_1-3_n7-n78 | 1 | 0.3 |
| | 3 | 0.3 |
| | 7 or n7 | 0.3 |
| | n78 | 0.5 |
| DC_1-3-8_n77 | 1 | 0.2 |
| | 3 | 0.2 |
| | 8 | 0.2 |
| | n77 | 0.5 |
| DC_1-3-8_n78 | 1 | 0.2 |
| | 3 | 0.2 |
| | 8 | 0.2 |
| | n78 | 0.5 |
| DC_1-3-28_n5 | 28 | 0.2 |
| | n5 | 0.2 |
| DC_1-3-18_n77 | 1 | 0.2 |
| | 3 | 0.2 |
| | n77 | 0.5 |
| DC_1-3-18_n78 | 1 | 0.2 |
| | 3 | 0.2 |
| | n78 | 0.5 |
| DC_1-3-19_n78 | 1 | 0.2 |
| | 3 | 0.2 |
| | n78 | 0.5 |
| DC_1-3-20_n28 | 20 | 0.2 |
| | n28 | 0.2 |
| DC_1-3-20_n78 | 1 | 0.2 |
| | 3 | 0.2 |
| | n78 | 0.5 |
| DC_1-3-21_n77 | 1 | 0.2 |
| | 3 | 0.3 |
| | 21 | 0.5 |
| | n77 | 0.5 |
| DC_1-3-21_n78 | 1 | 0.2 |
| | 3 | 0.3 |
| | 21 | 0.5 |
| | n78 | 0.5 |
| DC_1-3-21_n79 | 3 | 0.3 |
| | 21 | 0.5 |
| DC_1-3-28_n77 | 1 | 0.2 |
| | 3 | 0.2 |
| | 28 | 0.2 |
| | n77 | 0.5 |
| DC_1-3-28_n78 DC_1-3_n28-n78 | 1 | 0.2 |
| | 3 | 0.2 |
| | 28 or n28 | 0.2 |
| | n78 | 0.5 |
| DC_1-3-28_n79 | 1 | 0.2 |
| | 3 | 0.2 |
| | 28 | 0.2 |

| | | |
|--------------------------------|-----|----------------------------------|
| DC_1-3-41_n77 | 1 | 0.2 |
| | 3 | 0.2 |
| | n77 | 0.5 |
| DC_1-3-41_n78 | 1 | 0.2 |
| | 3 | 0.2 |
| | n78 | 0.5 |
| DC_1-3-41_n79 | 41 | 0 ³ /0.5 ⁴ |
| DC_1-3-42_n77 | 1 | 0.2 |
| | 3 | 0.2 |
| | 42 | 0.5 |
| | n77 | 0.5 |
| DC_1-3-42_n78 | 1 | 0.2 |
| | 3 | 0.2 |
| | 42 | 0.5 |
| | n78 | 0.5 |
| DC_1-3-42_n79 | 1 | 0.2 |
| | 3 | 0.2 |
| | 42 | 0.5 |
| DC_1-3_n77-n79 | 1 | 0.2 |
| | 3 | 0.2 |
| | n77 | 0.5 |
| DC_1-3_n78-n79 | 1 | 0.2 |
| | 3 | 0.2 |
| | n78 | 0.5 |
| DC_1-3_SUL_n78-n80 | 1 | 0.2 |
| | 3 | 0.2 |
| | n78 | 0.5 |
| DC_1-5-7_n78 DC_1-5-7-7_n78 | 1 | 0.2 |
| | 5 | 0.2 |
| | 7 | 0.2 |
| | n78 | 0.5 |
| DC_1-7-20_n28 | 20 | 0.2 |
| | n28 | 0.2 |
| DC_1-7-20_n78 | 1 | 0.2 |
| | 7 | 0.2 |
| | 20 | 0.2 |
| | n78 | 0.5 |
| DC_1-7-28_n5 | 28 | 0.2 |
| | n5 | 0.2 |
| DC_1-7-28_n78 | 1 | 0.2 |
| | 7 | 0.2 |
| | 28 | 0.2 |
| | n78 | 0.5 |
| DC_1-7_n28-n78 | 1 | 0.2 |
| | 7 | 0.2 |
| | n28 | 0.2 |
| | n78 | 0.5 |
| DC_1-8-11_n77 | 1 | 0.2 |
| | 8 | 0.2 |
| | n77 | 0.5 |
| DC_1-8-11_n78 | 8 | 0.2 |
| | n78 | 0.5 |
| DC_1-8-20_n78A | 8 | 0.2 |
| | n78 | 0.5 |
| DC_1-18-28_n77 | n77 | 0.5 |
| DC_1-18-28_n78 | n78 | 0.5 |
| DC_1-18-42_n77 | 42 | 0.5 |
| | n77 | 0.5 |
| DC_1-18-42_n78 | 42 | 0.5 |
| | n78 | 0.5 |
| DC_1-18-42_n79 | 42 | 0.5 |
| DC_1-19-42_n77 | 1 | 0.2 |
| | 42 | 0.5 |
| | n77 | 0.5 |
| DC_1-19-42_n78 | 42 | 0.5 |

| | | |
|------------------------------|-----|----------------------------------|
| | n78 | 0.5 |
| DC_1-19-42_n79 | 42 | 0.5 |
| | 1 | 0.3 |
| DC_1-19_n77-n79 | 19 | 0.3 |
| | n77 | 0.5 |
| DC_1-19_n78-n79 | 1 | 0.3 |
| | 19 | 0.3 |
| | n78 | 0.5 |
| DC_1-20_n28-n78 | 20 | 0.2 |
| | n28 | 0.2 |
| | n78 | 0.5 |
| DC_1-21-42_n77 | 1 | 0.2 |
| | 42 | 0.5 |
| | n77 | 0.5 |
| DC_1-21-42_n78 | 42 | 0.5 |
| DC_1-21-42_n79 | n78 | 0.5 |
| DC_1-21_n77-n79 | 42 | 0.5 |
| DC_1-21_n78-n79 | n77 | 0.5 |
| | n78 | 0.5 |
| DC_1-28-42_n77 | 1 | 0.2 |
| | 28 | 0.2 |
| | 42 | 0.5 |
| | n77 | 0.5 |
| DC_1-28-42_n78 | 28 | 0.2 |
| | 42 | 0.5 |
| DC_1-28-42_n79 | n78 | 0.5 |
| DC_1-41-42_n78 | 28 | 0.2 |
| | 42 | 0.5 |
| DC_1-41-42_n79 | 42 | 0.5 |
| DC_1-41-42_n79 | n78 | 0.5 |
| DC_1-42_n77-n79 | 1 | 0.2 |
| | 42 | 0.5 |
| | n77 | 0.5 |
| DC_1-42_n78-n79 | 1 | 0.2 |
| | 42 | 0.5 |
| | n78 | 0.5 |
| DC_2-7-13_n66 | 2 | 0.3 |
| | 7 | 0.5 |
| | n66 | 0.5 |
| DC_2-7-66_n66, DC_2-7-66_n66 | 2 | 0.3 |
| | 7 | 0.5 |
| | 66 | 0.5 |
| | n66 | |
| DC_2-7-66_n78 | 2 | 0.6 |
| | 7 | 0.5 |
| | 66 | 0.6 |
| | n78 | 0.8 |
| DC_2-14-66_n2 | 2 | 0.3 |
| DC_2-14-66-66_n2 | 66 | 0.3 |
| | n2 | 0.3 |
| DC_2-14-66_n66 | 2 | 0.3 |
| DC_2-2-14-66_n66 | 66 | 0.3 |
| | n66 | 0.3 |
| DC_2-30-66_n5 | 2 | 0.4 |
| | 30 | 0.5 |
| | 66 | 0.4 |
| DC_2-66-(n)71 | 2 | 0.3 |
| | 66 | 0.3 |
| DC_3-5-7_n78 | 3 | 0.2 |
| DC_3-5-7-7_n78 | 5 | 0.2 |
| | 7 | 0.2 |
| | n78 | 0.5 |
| DC_3-5-41_n79 | 41 | 0 ¹ /0.5 ² |

| | | |
|---------------------------------|-----------|-----|
| DC_3-7_n1-n78 | 3 | 0.3 |
| | 7 | 0.3 |
| | n1 | 0.3 |
| | n78 | 0.5 |
| DC_3-7-7_n78 | 3 | 0.2 |
| | 7 | 0.2 |
| | n78 | 0.5 |
| DC_3-7-8_n78 | 3 | 0.2 |
| | 7 | 0.2 |
| | 8 | 0.2 |
| | n78 | 0.5 |
| DC_3-7-20_n28 | 20 | 0.2 |
| | n28 | 0.1 |
| DC_3-7-20_n78 | 3 | 0.2 |
| | 7 | 0.2 |
| | n78 | 0.5 |
| DC_3-7-28_n78 DC_3-7_n28-n78 | 3 | 0.2 |
| | 7 | 0.2 |
| | 28 or n28 | 0.2 |
| | n78 | 0.5 |
| DC_3-7_SUL_n78-n80 | 7 | 0.2 |
| | 3 | 0.2 |
| | n78 | 0.5 |
| DC_3-8-20_n78A | 3 | 0.2 |
| | 8 | 0.2 |
| | n78 | 0.5 |
| DC_3-8_SUL_n78-n80 | 3 | 0.2 |
| | 8 | 0.2 |
| | n78 | 0.5 |
| DC_3-18-42_n77 | 42 | 0.5 |
| | n77 | 0.5 |
| DC_3-18-42_n78 | 42 | 0.5 |
| | n78 | 0.5 |
| DC_3-18-42_n79 | 3 | 0.2 |
| | 42 | 0.5 |
| DC_3-19-21_n77 | 3 | 0.3 |
| | 21 | 0.5 |
| | n77 | 0.5 |
| DC_3-19-21_n78 | 3 | 0.3 |
| | 21 | 0.5 |
| | n78 | 0.5 |
| DC_3-19-21_n79 | 3 | 0.3 |
| | 21 | 0.5 |
| DC_3-19-42_n77 | 3 | 0.2 |
| | 42 | 0.5 |
| | n77 | 0.5 |
| DC_3-19-42_n78 | 3 | 0.2 |
| | 42 | 0.5 |
| | n78 | 0.5 |
| DC_3-19-42_n79 | 3 | 0.2 |
| | 42 | 0.5 |
| DC_3-19_n77-n79 | 3 | 0.2 |
| | n77 | 0.5 |
| DC_3-19_n78-n79 | 3 | 0.2 |
| | n78 | 0.5 |
| DC_3-20_n28-n78 | 3 | 0.2 |
| | 20 | 0.2 |
| | n28 | 0.2 |
| | n78 | 0.5 |
| DC_3_20_SUL_n78-n80 | 3 | 0.2 |
| | n78 | 0.5 |
| DC_3-21-42_n77 | 3 | 0.3 |
| | 21 | 0.5 |
| | 42 | 0.5 |
| | n77 | 0.5 |

| | | |
|------------------|-----|----------------------------------|
| DC_3-21-42_n78 | 3 | 0.3 |
| | 21 | 0.5 |
| | 42 | 0.5 |
| | n78 | 0.5 |
| DC_3-21-42_n79 | 3 | 0.3 |
| | 21 | 0.5 |
| | 42 | 0.5 |
| | 3 | 0.3 |
| DC_3-21_n77-n79 | 21 | 0.5 |
| | n77 | 0.5 |
| | 3 | 0.3 |
| | 21 | 0.5 |
| DC_3-21_n78-n79 | n78 | 0.5 |
| | 3 | 0.3 |
| | 28 | 0.2 |
| | 42 | 0.5 |
| DC_3-28-42_n77 | n77 | 0.5 |
| | 3 | 0.2 |
| | 28 | 0.2 |
| | 42 | 0.5 |
| DC_3-28-42_n78 | n78 | 0.5 |
| | 3 | 0.2 |
| | 28 | 0.2 |
| | 42 | 0.5 |
| DC_3-28-42_n79 | 3 | 0.2 |
| | 28 | 0.2 |
| | 42 | 0.5 |
| | 3 | 0.5 |
| DC_3-41-42_n77 | 41 | 0 ¹ /0.5 ² |
| | 42 | 0.5 |
| | n77 | 0.5 |
| | 3 | 0.5 |
| DC_3-41-42_n78 | 41 | 0 ¹ /0.5 ² |
| | 42 | 0.5 |
| | n78 | 0.5 |
| | 3 | 0.5 |
| DC_3-41-42_n79 | 41 | 0 ¹ /0.5 ² |
| | 42 | 0.5 |
| | 3 | 0.5 |
| | 28 | 0.2 |
| DC_3-42_n77-n79 | n77 | 0.5 |
| | 3 | 0.5 |
| | 42 | 0.5 |
| | n77 | 0.5 |
| DC_3-42_n78-n79 | 3 | 0.2 |
| | 42 | 0.5 |
| | n78 | 0.5 |
| | 5 | 0.2 |
| DC_5-7-7_n78 | 7 | 0.2 |
| | n78 | 0.5 |
| | 20 | 0.2 |
| DC_7-20_n28-n78 | n28 | 0.2 |
| | n78 | 0.5 |
| | 12 | 0.5 |
| DC_12-30-66_n260 | 30 | 0.5 |
| | 66 | 0.4 |
| | 42 | 0.5 |
| DC_19-21-42_n77 | n77 | 0.5 |
| | 42 | 0.5 |
| DC_19-21-42_n78 | n78 | 0.5 |
| | 42 | 0.5 |
| DC_19-21-42_n79 | 42 | 0.5 |
| DC_19-21_n77-n79 | n77 | 0.5 |
| DC_19-21_n78-n79 | n78 | 0.5 |
| DC_19-42_n77-n79 | 42 | 0.5 |
| DC_19-42_n77-n79 | n77 | 0.5 |
| DC_19-42_n78-n79 | 42 | 0.5 |
| DC_19-42_n78-n79 | n78 | 0.5 |
| DC_21-28-42_n77 | 28 | 0.2 |
| | 42 | 0.5 |
| | n77 | 0.5 |
| DC_21-28-42_n78 | 28 | 0.2 |

| | | |
|---|-----|-----|
| | 42 | 0.5 |
| | n78 | 0.5 |
| DC_21-28-42_n79 | 28 | 0.2 |
| | 42 | 0.5 |
| DC_21-42_n77-n79 | 42 | 0.5 |
| | n77 | 0.5 |
| DC_21-42_n78-n79 | 42 | 0.5 |
| | n78 | 0.5 |
| NOTE 1: The requirement is applied for UE transmitting on the frequency range of 2545 - 2690 MHz. | | |
| NOTE 2: The requirement is applied for UE transmitting on the frequency range of 2496 - 2545 MHz. | | |
| NOTE 3: The requirement is applied for UE transmitting on the frequency range of 2515 - 2690 MHz. | | |
| NOTE 4: The requirement is applied for UE transmitting on the frequency range of 2496 - 2515 MHz. | | |

7.3B.3.3.4 $\Delta R_{IB,c}$ for EN-DC in five bandsTable 7.3B.3.3.4-1: $\Delta R_{IB,c}$ due to EN-DC (five bands)

| Inter-band EN-DC configuration | E-UTRA or NR Band | $\Delta R_{IB,c}$ (dB) |
|-------------------------------------|-------------------|------------------------|
| DC_1-3-5-7_n78, DC_1-3-5-7-7_n78 | 1 | 0.2 |
| | 3 | 0.2 |
| | 5 | 0.2 |
| | 7 | 0.2 |
| | n78 | 0.5 |
| DC_1-3-5-41_n79 | 41 | 0 ¹ |
| | | 0.5 ² |
| DC_1-3-7-20_n28 | 20 | 0.2 |
| | n28 | 0.2 |
| DC_1-3-7-20_n78 | 1 | 0.2 |
| | 3 | 0.2 |
| | 7 | 0.2 |
| | n78 | 0.5 |
| | 1 | 0.2 |
| DC_1-3-7-28_n78 | 3 | 0.2 |
| | 7 | 0.2 |
| | 28 | 0.2 |
| | n78 | 0.5 |
| | 1 | 0.2 |
| DC_1-3-7_n28-n78 | 3 | 0.2 |
| | 7 | 0.2 |
| | n28 | 0.2 |
| | n78 | 0.5 |
| | 1 | 0.2 |
| DC_1-3-18-42_n77 | 3 | 0.2 |
| | 42 | 0.5 |
| | n77 | 0.5 |
| | 1 | 0.2 |
| DC_1-3-18-42_n78 | 3 | 0.2 |
| | 42 | 0.5 |
| | n78 | 0.5 |
| | 1 | 0.2 |
| DC_1-3-18-42_n79 | 3 | 0.2 |
| | 42 | 0.5 |
| | 1 | 0.2 |
| | 3 | 0.3 |
| DC_1-3-19-21-n77 | 21 | 0.5 |
| | n77 | 0.5 |
| | 1 | 0.2 |
| | 3 | 0.3 |
| | 21 | 0.5 |
| DC_1-3-19-21_n78 | n78 | 0.5 |
| | 3 | 0.3 |
| | 21 | 0.5 |
| | 1 | 0.2 |
| | 3 | 0.3 |
| DC_1-3-19-21_n79 | 21 | 0.5 |
| | 1 | 0.2 |
| | 3 | 0.2 |
| | 42 | 0.5 |
| DC_1-3-19-42_n77 | 42 | 0.5 |
| | n77 | 0.5 |
| | 1 | 0.2 |
| | 3 | 0.2 |
| DC_1-3-19-42_n79 | 42 | 0.5 |
| | 1 | 0.2 |
| | 3 | 0.2 |
| | 42 | 0.5 |
| DC_1-3-20_n28-n78 | 1 | 0.2 |
| | 3 | 0.2 |
| | 20 | 0.2 |
| | n28 | 0.2 |
| | n78 | 0.5 |
| DC_1-3-21-42_n77 | 1 | 0.2 |
| | 3 | 0.3 |
| | 21 | 0.5 |
| | 42 | 0.5 |

| | | |
|--------------------|-----|-----|
| | n77 | 0.2 |
| | 1 | 0.2 |
| | 3 | 0.3 |
| DC_1-3-21-42_n78 | 21 | 0.5 |
| | 42 | 0.5 |
| | n78 | 0.2 |
| | 1 | 0.2 |
| | 3 | 0.3 |
| DC_1-3-21-42_n79 | 21 | 0.5 |
| | 42 | 0.5 |
| | n79 | 0.0 |
| | 1 | 0.2 |
| DC_1-3-21_n77-n79 | 3 | 0.3 |
| | 21 | 0.5 |
| | n77 | 0.5 |
| | 1 | 0.2 |
| DC_1-3-21_n78-n79 | 3 | 0.3 |
| | 21 | 0.5 |
| | n78 | 0.5 |
| | 1 | 0.2 |
| | 3 | 0.2 |
| DC_1-3-28-42_n77 | 28 | 0.2 |
| | 42 | 0.5 |
| | n77 | 0.5 |
| | 1 | 0.2 |
| DC_1-3-28-42_n78 | 3 | 0.2 |
| | 28 | 0.2 |
| | 42 | 0.5 |
| | n78 | 0.5 |
| | 1 | 0.2 |
| DC_1-3-28-42_n79 | 3 | 0.2 |
| | 28 | 0.2 |
| | 42 | 0.5 |
| | 1 | 0.2 |
| DC_1-3-41-42_n77 | 3 | 0.2 |
| | 42 | 0.5 |
| | n77 | 0.5 |
| | 1 | 0.2 |
| DC_1-3-41-42_n78 | 3 | 0.2 |
| | 42 | 0.5 |
| | n78 | 0.5 |
| | 1 | 0.2 |
| DC_1-3-41-42_n79 | 3 | 0.2 |
| | 42 | 0.5 |
| | 1 | 0.2 |
| DC_1-7-20_n28-n78 | 7 | 0.2 |
| | 20 | 0.2 |
| | n28 | 0.2 |
| | n78 | 0.5 |
| | 1 | 0.2 |
| DC_1-19-21-42_n77 | 42 | 0.5 |
| | n77 | 0.5 |
| | 42 | 0.5 |
| DC_1-19-21-42_n78 | n78 | 0.5 |
| DC_1-19-21-42_n79 | 42 | 0.5 |
| | 1 | 0.2 |
| DC_1-19-42_n77-n79 | 42 | 0.5 |
| | n77 | 0.5 |
| | 42 | 0.5 |
| DC_1-19-42_n78-n79 | n78 | 0.5 |
| | 1 | 0.2 |
| DC_1-21-28-42_n77 | 28 | 0.2 |
| | 42 | 0.5 |
| | n77 | 0.5 |
| DC_1-21-28-42_n78 | 28 | 0.2 |

| | | |
|---------------------|-----|-----|
| | 42 | 0.5 |
| | n78 | 0.5 |
| DC_1-21-28-42_n79 | 28 | 0.2 |
| | 42 | 0.5 |
| | 1 | 0.2 |
| DC_1-21-42_n77-n79 | 21 | 0.2 |
| | 42 | 0.5 |
| | n77 | 0.5 |
| DC_1-21-42_n78-n79 | 21 | 0.2 |
| | 42 | 0.5 |
| | n78 | 0.5 |
| DC_3-7-20_n28-n78 | 3 | 0.2 |
| | 7 | 0.2 |
| | 20 | 0.2 |
| | n28 | 0.2 |
| DC_3-19-21-42_n77 | 3 | 0.3 |
| | 21 | 0.5 |
| | 42 | 0.5 |
| | n77 | 0.5 |
| DC_3-19-21-42_n78 | 3 | 0.3 |
| | 21 | 0.5 |
| | 42 | 0.5 |
| | n78 | 0.5 |
| DC_3-19-21-42_n79 | 3 | 0.3 |
| | 21 | 0.5 |
| | 42 | 0.5 |
| DC_19-21-42_n77-n79 | 42 | 0.5 |
| | n77 | 0.5 |
| DC_19-21-42_n78-n79 | 42 | 0.5 |
| | n78 | 0.5 |

NOTE 1: The requirement is applied for UE transmitting on the frequency range of 2545 – 2690 MHz.

NOTE 2: The requirement is applied for UE transmitting on the frequency range of 2496 – 2545 MHz.

7.3B.3.3.5 $\Delta R_{IB,c}$ for EN-DC six bands

Table 7.3B.3.3.5-1: $\Delta R_{IB,c}$ due to EN-DC (six bands)

| Inter-band EN-DC configuration | E-UTRA or NR Band | $\Delta R_{IB,c}$ (dB) |
|--------------------------------|-------------------|------------------------|
| DC_1-3-7-20_n28-n78 | 1 | 0.2 |
| | 3 | 0.2 |
| | 7 | 0.2 |
| | 20 | 0.2 |
| | n28 | 0.2 |
| | n78 | 0.5 |

7.3B.3.4 Reference sensitivity for $\Delta R_{IB,c}$ Inter-band EN-DC including FR2

The $\Delta R_{IB,c}$ for NR FR2 band of inter-band CA defined in tables 5.5B.5.1-1 to 5.5B.5.5-1 is set to zero.

7.4 Void

7.4A Maximum Input Level for CA

7.4A.1 Test purpose

Same test purpose as in clause 7.4 in TS 38.521-1 [8] for NR FR1 carrier(s) and clause 7.4 in TS 38.521-2 [9] for NR FR2 carrier(s).

7.4A.2 Test applicability

The requirements in this test are not testable due to issues with combined testing of NR FR1 conducted mode with NR FR2 in radiated mode. Therefore, the conducted and radiated requirements are tested separately.

No test case details are specified. The SA requirements for maximum input level apply and are tested in TS 38.521-1 [8] clause 7.4 and 7.4A and TS 38.521-2 [9] clauses 7.4 and 7.4A.

7.4B Maximum Input Level for DC

7.4B.0 Minimum conformance requirement

7.4B.0.1 Intra-band contiguous EN-DC in FR1

Intra-band contiguous EN-DC maximum input level requirement and parameters are defined in Table 7.4B.0.1-1.

Table 7.4B.0.1-1: Maximum Input

| | |
|--|---|
| Power in Largest CC, E-UTRA or NR, dBm | X^1 |
| Power in each other CC, dBm | $X^1 - 10 * \log_{10}(N_x SCS_x / N_y SCS_y)$ |
| NOTE 1: Power in Largest E-UTRA or NR bandwidth CC, listed in Table 7.4-1 [2] | |
| NOTE 2: N_x , SCS_x is the number of RB's and Sub carrier spacing in the largest carrier bandwidth and could be LTE or NR carrier | |
| NOTE 3: N_y , SCS_y is the number of RB's in any other carrier. | |
| NOTE 4: For NR carrier, the transmitter shall be set to 4dB below P_{CMAX_L} at the minimum uplink configuration specified in Table 7.3.2-3 [2] with P_{CMAX_L} as defined in clause 6.2B.4. | |
| NOTE 5: For E-UTRA carrier, the transmitter shall be set to 4dB below P_{CMAX_L} at the minimum uplink configuration specified in Table 7.3.1-2 [5] with P_{CMAX_L} as defined in clause 6.2B.4. | |

7.4B.0.2 Intra-band non-contiguous EN-DC in FR1

For the E-UTRA sub-block containing one or multiple CC's, the requirement is defined in clause 7.4.1 for single carrier operation and in clause 7.4.1A for CA in TS 36.101 [5].

For the NR sub-block, the requirement is defined in clause 7.4 in TS 38.101-1 [2].

7.4B.0.3 Inter-band EN-DC within FR1

Maximum input level requirement for E-UTRA single carrier and CA operation specified in clauses 7.4.1 and 7.4.1A of TS 36.101 [5] and for NR single carrier and CA operation specified in clauses 7.4 and 7.4A of TS 38.101-1 [2] apply.

7.4B.0.4 Inter-band EN-DC including FR2

Maximum input level requirement for E-UTRA single carrier and CA operation specified in clauses 7.4.1 and 7.4.1A of TS 36.101 [5] and for NR single carrier and CA operation specified in clauses 7.4 and 7.4A of TS 38.101-2 [3] apply.

7.4B.0.5 Inter-band EN-DC including both FR1 and FR2

Maximum input level requirement for E-UTRA single carrier and CA operation specified in clauses 7.4.1 and 7.4.1A of TS 36.101 [5] and for NR single carrier and CA operation specified in clauses 7.4 and 7.4A of TS 38.101-1 [2] and TS 38.101-2 [3] apply.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.4B.

7.4B.1 Maximum Input Level for Intra-Band Contiguous EN-DC (2 CCs)

7.4B.1.1 Test purpose

Maximum input level for intra-band contiguous EN-DC tests the UE's ability to receive data with a given average throughput for a specified reference measurement channel, under conditions of high signal level, ideal propagation and no added noise.

A UE unable to meet the throughput requirement under these conditions will decrease the coverage area near to an e-NodeB or a gNB.

7.4B.1.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting intra-band contiguous EN-DC operating in FR1.

7.4B.1.3 Minimum conformance requirements

Refer to Clause 7.4B.0.1 for the intra-band contiguous EN-DC maximum input level requirement.

Exception requirements are defined for this test, therefore LTE agnostic approach is not applied, E-UTRA test point analysis is included and E-UTRA measurements are performed.

The normative reference for this requirement is TS 38.101-3 [4] Clause 7.4B.1.

7.4B.1.4 Test Description

7.4B.1.4.1 Initial Condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on EN-DC operating bands specified in clause 5.2B.2, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-1 [8] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2. All of these configurations shall be tested with applicable test parameters for each intra-band contiguous EN-DC configuration specified in clause 5.3B.1.2, and are shown in table 7.4B.3.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2 for E-UTRA RMC for TDD, TS 36.521-1 [10] Annex A.2 for E-UTRA RMC for FDD , and TS 38.521-1 [8] Annex A.2 for NR RMC Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521-1 [10] Annex C.2 and in TS 38.521-1 [8] Annex C.2 for E-UTRA CG and NR CG respectively.

Table 7.4B.1.4.1-1: Test configuration table

| Initial Conditions | | | | | | | | | |
|--|-------------------|---------------------|-------------------|----------------------|--|------------------|-------------------|----------------------|--|
| Test Environment as specified in TS 38.508-1 [6] clause 4.1 | | | | | Normal | | | | |
| Test Frequencies as specified in TS 38.508-1 [6] clause 4.3.1 | | | | | Mid range | | | | |
| Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1 across bandwidth combination sets supported by the UE | | | | | Lowest N _{RB_aggr} , Highest N _{RB_aggr} | | | | |
| Test SCS for the NR cell as specified in TS 38.521-1 [8] Table 5.3.5-1 | | | | | Lowest | | | | |
| Test Parameters for Intra-band Contiguous EN-DC Configuration | | | | | | | | | |
| Downlink Configuration | | | | | Uplink Configuration | | | | |
| Test ID | NR Modulation | NR RB allocation | E-UTRA Modulation | E-UTRA RB allocation | NR Modulation | NR RB allocation | E-UTRA Modulation | E-UTRA RB allocation | |
| 1 | CP-OFDM 64QAM | Full RB (NOTE 1) | CP-OFDM 64QAM | Full RB | DFT-s-OFDM QPSK | NOTE 2 | QPSK | NOTE 3 | |
| 2 | CP-OFDM 256QAM | Full RB (NOTE 1) | CP-OFDM 256QAM | Full RB | DFT-s-OFDM QPSK | NOTE 2 | QPSK | NOTE 3 | |
| NOTE 1: Full RB allocation shall be used per each SCS and channel BW as specified in Table 7.3.2.4.1-2 of TS 38.521-1 [8]. NOTE 2: Same RB allocation shall be used per each SCS and channel BW as specified in Table 7.3.2.4.1-2 of TS 38.521-1 [8]. NOTE 3: Same RB allocation shall be used per the E-UTRA band and channel BW as specified in Table 7.3.3-2 of TS 36.521 [10]. NOTE 4: In a FR1 band where UE supports 4Rx, the test shall be performed only with 4Rx antennas ports connected. | | | | | | | | | |

1. Connect the SS to the UE antenna connectors as shown in [6] TS 38.508-1 A.3.1.1 for SS diagram and A.3.2 for UE diagram.
2. The parameter settings for the E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3, and the parameter settings for the NR cell are set up according to TS 38.508-1 [6] clause 4.4.3.
3. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C.0, C.1,C.2,C3.1 and TS 38.521-1 [8] Annex C.0,C.1,C.2,C3.1for E-UTRA CG and NR CG respectively, and uplink signals according to TS 36.521-1 [10] Annex H.0,H.1,H.2,H.3.1 and TS 38.521-1 [8] Annex G.0,G.1,G.2,G.3.1 for E-UTRA CG and NR CG respectively.
4. The UL Reference Measurement channels are TS 36.521-1 [10] Annex A.2 and TS 38.521-1 [8] Annex A.2 for E-UTRA CG and NR CG respectively.
5. Propagation conditions are set according to TS 36.521-1 [10] Annex B.0 and TS 38.521-1 [8] Annex B.0 for E-UTRA CG and NR CG respectively.
6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 7.4B.1.4.3.

7.4B.1.4.2 Test Procedure

1. SS transmits PDSCH via PDCCH DCI format 1A and PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Tables 7.4B.1.4.1 on the E-UTRA CC and NR CC, The SS sends downlink MAC padding bits on the DL RMC.
2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and PDCCH DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 7.4B.1.4.1-1on the E-UTRA CC and NR CC. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

3. SS sets the Downlink signal level for the E-UTRA CC and NR CC to the value defined in Table 7.4B.1.5-1. For NR CC and E-UTRA CC, send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as - MU to -(MU + Uplink power control window size) dB of the target power level in Table 7.4B.1.5-1 for at least the duration of the Throughput measurement, where:

- MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW
- For NR CC, Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified in Table F.1.2-1.
- For E-UTRA CC, Uplink power control window size = 1dB (UE power step size) + 1.0dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 36.101 [5], Table 6.3.5.2.1-1 and is 1.0dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified in Table F.1.2-1 of TS 36.521-1 [10].

4. Measure the average throughput for each component carrier for duration sufficient to achieve statistical significance according to Annex H in TS 38.521-1 [8].

NOTE: The purpose of the Uplink power control window is to ensure that the actual UE output power is no greater than the target power level, and as close as possible to the target power level. The relationship between the Uplink power control window, the target power level and the corresponding possible actual UE Uplink power window is illustrated in Annex F, clause F.4.

Table 7.4B.1.4.2-1: Void

7.4B.1.4.3 Message Contents

Message contents are according to TS 36.508-1 [11] clause 4.6.1 and TS 38.508-1 [6] clause 4.6.1.

7.4B.1.5 Test Requirement

For the NR CC, the throughput measurement of the carrier derived in test procedure shall be $\geq 95\%$ of the maximum throughput of the reference measurement channels with parameters specified in Table 7.4B.1.5-1

Table 7.4B.1.5-1: Maximum input level requirement for each CC

| Channel bandwidth of Largest BW CC | Rx Parameter | | | |
|------------------------------------|-------------------------|---|-------------------------|---|
| | Power in the Largest CC | Power in the other CC | Power in the Largest CC | Power in the other CC |
| 5 MHz | -25 ² -TT | -25 ² -10*log10(N _x SCS _x /N _y SCS _y) -TT | -27 ³ -TT | -27 ³ -10*log10(N _x SCS _x /N _y SCS _y) -TT |
| 10 MHz | -25 ² -TT | -25 ² -10*log10(N _x SCS _x /N _y SCS _y) -TT | -27 ³ -TT | -27 ³ -10*log10(N _x SCS _x /N _y SCS _y) -TT |
| 15 MHz | -25 ² -TT | -25 ² -10*log10(N _x SCS _x /N _y SCS _y) -TT | -27 ³ -TT | -27 ³ -10*log10(N _x SCS _x /N _y SCS _y) -TT |
| 20 MHz | -25 ² -TT | -25 ² -10*log10(N _x SCS _x /N _y SCS _y) -TT | -27 ³ -TT | -27 ³ -10*log10(N _x SCS _x /N _y SCS _y) -TT |
| 25 MHz | -24 ² -TT | -24 ² -10*log10(N _x SCS _x /N _y SCS _y) -TT | -26 ³ -TT | -26 ³ -10*log10(N _x SCS _x /N _y SCS _y) -TT |
| 30 MHz | -23 ² -TT | -23 ² -10*log10(N _x SCS _x /N _y SCS _y) -TT | -25 ³ -TT | -25 ³ -10*log10(N _x SCS _x /N _y SCS _y) -TT |
| 40 MHz | -22 ² -TT | -22 ² -10*log10(N _x SCS _x /N _y SCS _y) -TT | -24 ³ -TT | -24 ³ -10*log10(N _x SCS _x /N _y SCS _y) -TT |
| 50 MHz | -21 ² -TT | -21 ² -10*log10(N _x SCS _x /N _y SCS _y) -TT | -23 ³ -TT | -23 ³ -10*log10(N _x SCS _x /N _y SCS _y) -TT |
| 60 MHz | -20 ² -TT | -20 ² -10*log10(N _x SCS _x /N _y SCS _y) -TT | -22 ³ -TT | -22 ³ -10*log10(N _x SCS _x /N _y SCS _y) -TT |
| 80 MHz | -20 ² -TT | -20 ² -10*log10(N _x SCS _x /N _y SCS _y) -TT | -22 ³ -TT | -22 ³ -10*log10(N _x SCS _x /N _y SCS _y) -TT |
| 90 MHz | -20 ² -TT | -20 ² -10*log10(N _x SCS _x /N _y SCS _y) -TT | -22 ³ -TT | -22 ³ -10*log10(N _x SCS _x /N _y SCS _y) -TT |
| 100 MHz | -20 ² -TT | -20 ² -10*log10(N _x SCS _x /N _y SCS _y) -TT | -22 ³ -TT | -22 ³ -10*log10(N _x SCS _x /N _y SCS _y) -TT |

NOTE 1: N_x, SCS_x is the number of RB's and Sub carrier spacing in the largest carrier bandwidth and could be LTE or NR carrier.

NOTE 2: Reference measurement channel refers to Clauses A.3.2.3 or A.3.3.3 in TS 38.521-1 [8] for 64-QAM NR Carrier, and to Tables A.3.2-3, A.3.2-4 for 64QAM in TS 36.521-1 [10] for E-UTRA Carrier.

NOTE 3: Reference measurement channel refers to Clauses A.3.2.4 or A.3.3.4 in TS 38.521-1 [8] for 256QAM NR Carrier, and Tables A.3.2-5, A.3.2-6 in TS 36.521-1 [10] for 256QAM E-UTRA Carrier.

NOTE 4: N_y, SCS_y is the number of RB's in any other carrier

NOTE 5: For NR carrier, the transmitter shall be set to 4dB below PCMAX_L at the minimum uplink configuration specified in Table 7.3.2-3 in TS 38.101-1 [2] with PCMAX_L as defined in clause 6.2B.4.

NOTE 6: For E-UTRA carrier, the transmitter shall be set to 4dB below P_{CMAX_L} at the minimum uplink configuration specified in Table 7.3.1-2 in TS 38.101-3 [4] with P_{CMAX_L} as defined in clause 6.2B.4 for single carrier.

NOTE 7: TT for each frequency is specified in Table 7.4B.1.5-2

Table 7.4B.1.5-2: Test Tolerance (Maximum input level)

| f ≤ 3.0GHz | 3.0GHz < f ≤ 6.0GHz |
|------------|---------------------|
| 0.7 dB | 1.0 dB |

7.4B.2 Maximum Input Level for Intra-Band Non-Contiguous EN-DC (2 CCs)

7.4B.2.1 Test purpose

Maximum input level for intra-band non-contiguous EN-DC tests the UE's ability to receive data with a given average throughput for a specified reference measurement channel, under conditions of high signal level, ideal propagation and no added noise.

A UE unable to meet the throughput requirement under these conditions will decrease the coverage area near to an e-NodeB or a gNB.

7.4B.2.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting intra-band non-contiguous EN-DC.

7.4B.2.3 Minimum conformance requirements

Refer to Clause 7.4B.0.2 for the intra-band non-contiguous EN-DC maximum input level requirement.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.4B.2, and TS 38.101-1 [2] clause 7.4, and TS 38.101-2 [3] clauses 7.4 and 7.4A

No exception requirements for E-UTRA CG and NR CG, LTE agnostic approach applies.

7.4B.2.4 Test Description

Same test description as in clause 7.4.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions in the initial test configuration.

- The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on EN-DC operating bands specified in clause 5.2B.3, all of these configurations shall be tested with applicable test parameters for each intra-band non-contiguous EN-DC configuration specified in clause 5.3B.1.3, and are shown in table 7.4B.2.4.1-1.

Table 7.4B.2.4.1-1: Test configuration table

| Initial Conditions | | | | | | | | |
|---|----------------|------------------|-------------------|----------------------|--|------------------|-------------------|----------------------|
| Test Environment as specified in TS 38.508-1 [6] clause 4.1 | | | | | Normal | | | |
| Test Frequencies as specified in TS 38.508-1 [6] clause 4.3.1 | | | | | MaxWGap for intra-band non-contiguous EN-DC | | | |
| Test EN-DC bandwidth combination as specified in Table 5.3B.1.3-1 across bandwidth combination sets supported by the UE | | | | | Lowest, Mid, Highest of Channel BW for NR CC | | | |
| Test SCS for the NR cell as specified in TS 38.521-1 [8] Table 5.3.5-1 | | | | | Lowest | | | |
| Test Parameters for EN-DC Configuration | | | | | | | | |
| Downlink Configuration | | | | | Uplink Configuration | | | |
| Test ID | NR Modulation | NR RB allocation | E-UTRA Modulation | E-UTRA RB allocation | NR Modulation | NR RB allocation | E-UTRA Modulation | E-UTRA RB allocation |
| 1 | CP-OFDM 64QAM | NOTE 1 | NOTE 2 | NOTE 2 | DFT-s-OFDM QPSK | NOTE 1 | NOTE 2 | NOTE 2 |
| 2 | CP-OFDM 256QAM | NOTE 1 | NOTE 2 | NOTE 2 | DFT-s-OFDM QPSK | NOTE 1 | NOTE 2 | NOTE 2 |
| NOTE 1: Same RB allocation shall be used per modulation as specified in Table 7.4.4.1-1 of TS 38.521-1 [8]. | | | | | | | | |
| NOTE 2: Modulation and RB allocation for E-UTRA CC refers to the Table 4.6-2. | | | | | | | | |
| NOTE 3: In a FR1 band where UE supports 4Rx, the test shall be performed only with 4Rx antennas ports connected. | | | | | | | | |

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1 with the exception that

- E-UTRA test frequency are specified in Table 7.4B.2.4.1-1 based on intra-band non-contiguous EN-DC configuration specified in clause 5.3B.1.3.

For Initial conditions as in clause 7.4.4.1 in TS 38.521-1 [8] with the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.

- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.4.1.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG according to TS 38.508 [6] clause 4.5.
7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

7.4B.2.5 Test Requirement

Same test requirement as in clause 7.4.5 in TS 38.521-1 [8] for NR carrier.

7.4B.3 Maximum Input Level for Inter-band EN-DC within FR1

7.4B.3.1 Test purpose

Same test purpose as in clause 7.4.1 in TS 38.521-1 [8] for the NR carrier.

7.4B.3.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC.

7.4B.3.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 7.4.3 in TS 38.521-1 [8] for the NR carrier.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.4B.3.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

7.4B.3.4 Test Description

Same test description as in clause 7.4.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1.

For Initial conditions as in clause 7.4.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for the cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B, clause B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 7.4.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508 [6] clause 4.5.
7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

7.4B.3.5 Test Requirement

Same test requirement as in clause 7.4.5 in TS 38.521-1 [8] for the NR carrier.

7.4B.3_1 Maximum Input Level for EN-DC within FR1 (>2 CCs)

Editor's note: The test cases in this clause are incomplete, the following aspects are either missing or not yet determined:

- Only inter-band EN-DC within FR1 is considered. Testing of intra-band contiguous/non-contiguous EN-DC are FFS.
- The referred test cases 7.4A.2, 7.4A.3 and 7.4A.4 in TS 38.521-1 [8] are incomplete.
- Test applicability, test configuration and test procedure details need further discussion and refinement to accurately to test the applicable set of EN-DC combinations in this test.

7.4B.3_1.1 Maximum Input Level for EN-DC within FR1 (3 CCs)

7.4B.3_1.1.1 Test purpose

Same test purpose as in clause 7.4B.3.1.

7.4B.3_1.1.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting EN-DC within FR1 with 3CCs.

7.4B.3_1.1.3 Minimum conformance requirements

Refer to Clause 7.4B.0.3 for the inter-band EN-DC within FR1 maximum input level requirement.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

7.4B.3_1.1.4 Test Description

Same test description as in clause 7.4.4 or 7.4A.1.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1.

For Initial conditions as in clause 7.4.4.1 or 7.4A.1.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for the cell are set up according to TS 36.508 [11] subclause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 7.4.4.1 or 7.4A.1.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set TimeAlignmentTimerDedicated IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

7.4B.3_1.1.5 Test Requirement

Same test requirement as specified in TS 38.521-1 [8] clause 7.4.5 or 7.4A.1.5 for the NR carrier(s).

7.4B.3_1.2 Maximum Input Level for EN-DC within FR1 (4 CCs)

7.4B.3_1.2.1 Test purpose

Same test purpose as in clause 7.4B.3.1.

7.4B.3_1.2.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting EN-DC within FR1 with 4CCs.

7.4B.3_1.2.3 Minimum conformance requirements

Refer to Clause 7.4B.0.3 for the inter-band EN-DC within FR1 maximum input level requirement.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

7.4B.3_1.2.4 Test Description

Same test description as in clause 7.4.4, 7.4A.1.4 or 7.4A.2.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1.

For Initial conditions as in clause 7.4.4.1, 7.4A.1.4.1 or 7.4A.2.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for the cell are set up according to TS 36.508 [11] subclause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 7.4.4.1, 7.4A.1.4.1 or 7.4A.2.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set TimeAlignmentTimerDedicated IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

7.4B.3_1.2.5 Test Requirement

Same test requirement as specified in TS 38.521-1 [8] clause 7.4.5, 7.4A.1.5 or 7.4A.2.5 for the NR carrier(s).

7.4B.3_1.3 Maximum Input Level for EN-DC within FR1 (5 CCs)

7.4B.3_1.3.1 Test purpose

Same test purpose as in clause 7.4B.3.1.

7.4B.3_1.3.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting EN-DC within FR1 with 5CCs.

7.4B.3_1.3.3 Minimum conformance requirements

Refer to Clause 7.4B.0.3 for the inter-band EN-DC within FR1 maximum input level requirement.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

7.4B.3_1.3.4 Test Description

Same test description as in clause 7.4.4, 7.4A.1.4, 7.4A.2.4 or 7.4A.3.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1.

For Initial conditions as in clause 7.4.4.1, 7.4A.1.4.1, 7.4A.2.4.1 or 7.4A.3.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for the cell are set up according to TS 36.508 [11] subclause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 7.4.4.1, 7.4A.1.4.1, 7.4A.2.4.1 or 7.4A.3.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set TimeAlignmentTimerDedicated IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

7.4B.3_1.3.5 Test Requirement

Same test requirement as specified in TS 38.521-1 [8] clause 7.4.5, 7.4A.1.5, 7.4A.2.5 or 7.4A.3.5 for the NR carrier(s).

7.4B.3_1.4 Maximum Input Level for EN-DC within FR1 (6 CCs)

7.4B.3_1.4.1 Test purpose

Same test purpose as in clause 7.4B.3.1.

7.4B.3_1.4.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting EN-DC within FR1 with 6CCs.

7.4B.3_1.4.3 Minimum conformance requirements

Refer to Clause 7.4B.0.3 for the inter-band EN-DC within FR1 maximum input level requirement.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

7.4B.3_1.4.4 Test Description

Same test description as in clause 7.4.4, 7.4A.1.4, 7.4A.2.4, 7.4A.3.4 or 7.4A.4.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1.

For Initial conditions as in clause 7.4.4.1, 7.4A.1.4.1, 7.4A.2.4.1, 7.4A.3.4.1 or 7.4A.4.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for the cell are set up according to TS 36.508 [11] subclause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 7.4.4.1, 7.4A.1.4.1, 7.4A.2.4.1, 7.4A.3.4.1 or 7.4A.4.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set TimeAlignmentTimerDedicated IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

7.4B.3_1.4.5 Test Requirement

Same test requirement as specified in TS 38.521-1 [8] clause 7.4.5, 7.4A.1.5, 7.4A.2.5, 7.4A.3.5 or 7.4A.4.5 for the NR carrier(s).

7.4B.4 Maximum Input Level for inter-band EN-DC including FR2 (2CCs)

Editor's note: The following aspects are either missing or not yet determined:

- The referred test case 7.4 in TS 38.521-2 is incomplete.

7.4B.4.1 Test purpose

Same test purpose as in clause 7.4 in TS 38.521-2 [9] for the *NR* carrier.

7.4B.4.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 2CCs.

The minimum conformance requirements of NR FR2 carrier in this test case are not testable due to maximum input level unachievable in IFF OTA test setup. Other test setups have not been analysed. Thus the test case will not be tested as part of UE conformance testing.

NOTE: As a result TC 7.4B.4 has not been included in the test case applicability table 4.1.3-1, TS 38.522. This does not preclude the test from being used for R&D or other purposes if deemed useful to all types of NR UE release 15 and forward.

7.4B.4.3 Minimum conformance requirements

Refer to Clause 7.4B.0.4 for the inter-band EN-DC including FR2 maximum input level requirement.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

7.4B.4.4 Test description

Same test description as in clause 7.4.4 in TS 38.521-2 [9] for the *NR* carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1.

For initial conditions as in clause 7.4.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

2.1 The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3.

3.1 The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS36.521-1 [10].

Step 6 of Initial conditions as in clause 7.4.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 7.4.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set TimeAlignmentTimerDedicated IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

7.4B.4.5 Test requirement

Same test requirement as in clause 7.4.5 in TS 38.521-2 [9] for the *NR* carrier.

7.4B.4_1 Maximum Input Level for Inter-Band EN-DC including FR2 (>2 CCs)

7.4B.4_1.1 Maximum Input Level for Inter-Band EN-DC including FR2 (3 CCs)

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- The referred test case 7.4A.1 in TS 38.521-2 is incomplete.

7.4B.4_1.1.1 Test purpose

Same test purpose as in clause 7.4 in TS 38.521-2 [9] for the NR carrier.

7.4B.4_1.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 3 DL CCs (2NR DL CCs).

The minimum conformance requirements of NR FR2 carrier in this test case are not testable due to maximum input level unachievable in IFF OTA test setup. Other test setups have not been analysed. Thus the test case will not be tested as part of UE conformance testing.

NOTE: As a result TC 7.4B.4_1.1 has not been included in the test case applicability table 4.1.3-1, TS 38.522. This does not preclude the test from being used for R&D or other purposes if deemed useful to all types of NR UE release 15 and forward.

7.4B.4_1.1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 7.4B.4.3.

7.4B.4_1.1.4 Test description

Same test description as in clause 7.4.4 or 7.4A.1.4 in TS 38.521-2 [9] for the *NR* carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1.

For initial conditions as in clause 7.4.4.1 or 7.4A.1.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

2.1 The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3.

3.1 The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 7.4.4.1 or 7.4A.1.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 36.508-1 [6] clause 4.5.

Same test procedure as in clause 7.4.4.2 or 7.4A.1.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set TimeAlignmentTimerDedicated IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

7.4B.4_1.1.5 Test Requirements

Same test requirement as in clause 7.4.5 or 7.4A.1.5 in TS 38.521-2 [9] for the *NR* carrier(s).

7.4B.4_1.2 Maximum Input Level for Inter-Band EN-DC including FR2 (4 CCs)

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- The referred test case 7.4A.1 and 7.4A.2 in TS 38.521-2 is incomplete.

7.4B.4_1.2.1 Test purpose

Same test purpose as in clause 7.4 in TS 38.521-2 [9] for the NR carrier.

7.4B.4_1.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 4 DL CCs (3NR DL CCs).

The minimum conformance requirements of NR FR2 carrier in this test case are not testable due to maximum input level unachievable in IFF OTA test setup. Other test setups have not been analysed. Thus the test case will not be tested as part of UE conformance testing.

NOTE: As a result TC 7.4B.4_1.2 has not been included in the test case applicability table 4.1.3-1, TS 38.522. This does not preclude the test from being used for R&D or other purposes if deemed useful to all types of NR UE release 15 and forward.

7.4B.4_1.2.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 7.4B.4.3.

7.4B.4_1.2.4 Test description

Same test description as in clause 7.4.4, 7.4A.1.4 or 7.4A.2.4 in TS 38.521-2 [9] for the *NR* carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1.

For initial conditions as in clause 7.4.4.1, 7.4A.1.4.1 or 7.4A.2.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

2.1 The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3.

3.1 The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS36.521-1 [10].

Step 6 of Initial conditions as in clause 7.4.4.1, 7.4A.1.4.1 or 7.4A.2.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 7.4.4.2, 7.4A.1.4.2 or 7.4A.2.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set TimeAlignmentTimerDedicated IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

7.4B.4_1.2.5 Test Requirements

Same test requirement as in clause 7.4.5, 7.4A.1.5 or 7.4A.2.5 in TS 38.521-2 [9] for the *NR* carrier(s).

7.4B.4_1.3 Maximum Input Level for Inter-Band EN-DC including FR2 (5 CCs)

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- The referred test case 7.4A.1, 7.4A.2 and 7.4A.3 in TS 38.521-2 is incomplete.

7.4B.4_1.3.1 Test purpose

Same test purpose as in clause 7.4 in TS 38.521-2 [9] for the NR carrier.

7.4B.4_1.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 5 DL CCs (4NR DL CCs).

The minimum conformance requirements of NR FR2 carrier in this test case are not testable due to maximum input level unachievable in IFF OTA test setup. Other test setups have not been analysed. Thus the test case will not be tested as part of UE conformance testing.

NOTE: As a result TC 7.4B.4_1.3 has not been included in the test case applicability table 4.1.3-1, TS 38.522. This does not preclude the test from being used for R&D or other purposes if deemed useful to all types of NR UE release 15 and forward.

7.4B.4_1.3.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 7.4B.4.3.

7.4B.4_1.3.4 Test description

Same test description as in clause 7.4.4, 7.4A.1.4, 7.4A.2.4 or 7.4A.3.4 in TS 38.521-2 [9] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1.

For initial conditions as in clause 7.4.4.1, 7.4A.1.4.1, 7.4A.2.4.1 or 7.4A.3.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

2.1 The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3.

3.1 The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS36.521-1 [10].

Step 6 of Initial conditions as in clause 7.4.4.1, 7.4A.1.4.1, 7.4A.2.4.1 or 7.4A.3.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 7.4.4.2, 7.4A.1.4.2, 7.4A.2.4.2 or 7.4A.3.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set TimeAlignmentTimerDedicated IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

7.4B.4_1.2.5 Test Requirements

Same test requirement as in clause 7.4.5, 7.4A.1.5, 7.4A.2.5 or 7.4A.3.5 in TS 38.521-2 [9] for the NR carrier(s).

7.4B.4_1.4 Maximum Input Level for Inter-Band EN-DC including FR2 (6 CCs)

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- The referred test case 7.4A.1, 7.4A.2, 7.4A.3 and 7.4A.4 in TS 38.521-2 is incomplete.

7.4B.4_1.4.1 Test purpose

Same test purpose as in clause 7.4 in TS 38.521-2 [9] for the NR carrier.

7.4B.4_1.4.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 6 DL CCs (5NR DL CCs).

The minimum conformance requirements of NR FR2 carrier in this test case are not testable due to maximum input level unachievable in IFF OTA test setup. Other test setups have not been analysed. Thus the test case will not be tested as part of UE conformance testing.

NOTE: As a result TC 7.4B.4_1.4 has not been included in the test case applicability table 4.1.3-1, TS 38.522. This does not preclude the test from being used for R&D or other purposes if deemed useful to all types of NR UE release 15 and forward.

7.4B.4_1.4.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 7.4B.4.3.

7.4B.4_1.4.4 Test description

Same test description as in clause 7.4.4, 7.4A.1.4, 7.4A.2.4, 7.4A.3.4 or 7.4A.4.4 in TS 38.521-2 [9] for the *NR* carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1.

For initial conditions as in clause 7.4.4.1, 7.4A.1.4.1, 7.4A.2.4.1, 7.4A.3.4.1 or 7.4A.4.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

2.1 The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3.

3.1 The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS36.521-1 [10].

Step 6 of Initial conditions as in clause 7.4.4.1, 7.4A.1.4.1, 7.4A.2.4.1, 7.4A.3.4.1 or 7.4A.4.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 7.4.4.2, 7.4A.1.4.2, 7.4A.2.4.2, 7.4A.3.4.2 or 7.4A.4.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set TimeAlignmentTimerDedicated IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

7.4B.4_1.4.5 Test Requirements

Same test requirement as in clause 7.4.5, 7.4A.1.5, 7.4A.2.5, 7.4A.3.5 or 7.4A.4.5 in TS 38.521-2 [9] for the *NR* carrier(s).

7.4B.4D Maximum Input Level for inter-band EN-DC including FR2 for UL-MIMO

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- The referred test case 7.4D in TS 38.521-2 [9] is incomplete

7.4B.4D.1.1 Test purpose

Same test purpose as in clause 7.4D in TS 38.521-2 [9] for the *NR* carrier..

7.4B.4D.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with UL-MIMO.

7.4B.4D.1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 7.4D in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this measurement is TS 38.101-3 [4] clause 7.4B.4.

7.4B.4D.1.4 Test Description

Same test description as in clause 7.4D in TS 38.521-2 [9] for the NR carrier with the following exceptions:

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1.

For Initial conditions as in clause [7.4D.1] in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for the cell are set up according to TS 36.508 [11] subclause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

[Step 6] of Initial conditions as in clause [7.4D.1] in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set TimeAlignmentTimerDedicated IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

7.4B.4D.1.5 Test Requirement

Same test requirement as specified in TS 38.521-2 [9] clause [7.4D.5] for the NR carrier(s).

7.4B.5 Maximum Input Level for inter-band EN-DC including both FR1 and FR2

7.4B.5.1 Test purpose

Same test purpose as in clause 7.4.1 in TS 38.521-1 [8] for NR FR1 carrier and 7.4.1 in TS 38.521-2 [9] for NR FR2 carrier.

7.4B.5.2 Test applicability

The requirements in this test are not testable due to issues with combined testing of NR FR1 and E-UTRA in conducted mode with NR FR2 in radiated mode. Therefore, the conducted and radiated requirements are tested separately.

No test case details are specified. The NSA requirements for maximum input level apply and are tested as part of the EN-DC within FR1 and EN-DC including FR2 test cases in clause 7.4B.

7.4B.5D Maximum Input Level for inter-band EN-DC including FR1 and FR2 for UL-MIMO

7.4B.5D.1 Test purpose

Same test purpose as in clause 7.4D.1 in TS 38.521-1 [8] for NR FR1 carrier and 7.4D.1 in TS 38.521-2 [9] for NR FR2 carrier.

7.4B.5D.2 Test applicability

The requirements in this test are not testable due to issues with combined testing of NR FR1 and E-UTRA in conducted mode with NR FR2 in radiated mode. Therefore, the conducted and radiated requirements are tested separately.

No test case details are specified. The NSA requirements for maximum input level apply and are tested as part of the EN-DC within FR1 and EN-DC including FR2 test cases in clause 7.4B.

7.5 Void

7.5A Adjacent Channel Selectivity for CA

7.5A.0 Test purpose

Same test purpose as in clauses 7.5 and 7.5A in TS 38.521-1 [8] for NR FR1 carrier(s) and clauses 7.5 and 7.5A in TS 38.521-2 [9] for NR FR2 carrier(s).

7.5A.1 Test applicability

The requirements in this test are not testable due to issues with combined testing of NR FR1 conducted mode with NR FR2 in radiated mode. Therefore, the conducted and radiated requirements are tested separately.

No test case details are specified. The SA requirements for adjacent channel selectivity apply and are tested in clauses 7.5 and 7.5A in TS 38.521-1 [8] and clauses 7.5 and 7.5A in TS 38.521-2 [9].

7.5B Adjacent channel selectivity for DC

7.5B.0 Minimum Conformance Requirements

7.5B.0.1 Intra-band contiguous EN-DC in FR1

Intra-band contiguous EN-DC ACS requirement and parameters are defined for test case 1 in Table 7.5B.0.1-1 and for test case 2 in Table 7.5B.0.1-2.

Table 7.5B.0.1-1: ACS test case 1

| EN-DC Aggregated Bandwidth, MHz | ≤ 100 | $>100, \leq 120$ | $>120, \leq 140$ | $>140, \leq 160$ |
|--|------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| ACS, dB | X ¹ | 19.2 | 18.5 | 17.9 |
| P _{interferer} , dBm | P _I ² | Aggregated power + 17.7 dB | Aggregated power + 17 dB | Aggregate d power + 16.4dB |
| Pw in Transmission BW configuration, per CC, dBm | REFSENS +14dB | | | |
| NOTE 1: X is ACS level at the specified EN-DC aggregated Bandwidth from Table 7.5.1A-1 in TS 36.101 [5] NOTE 2: P _I is from Table 7.5.1A-2 in TS 36.101 [5] NOTE 3: Jammer BW and offset is from Table 7.5.1A-2 in TS 36.101 [5] and is applied from the lowest edge of the lowest carrier and the highest edge of the highest carrier NOTE 4: For NR carrier, the transmitter shall be set to 4dB below P _{CMAX_L,f,c,NR} at the minimum uplink configuration specified in Table 7.3.2-3 in TS 38.101-1 [2] with P _{CMAX_L,f,c,NR} as defined in clause 6.2B.4 from TS 38.101-3 [4]. NOTE 5: For E-UTRA carrier, the transmitter shall be set to 4dB below P _{CMAX_L_E-UTRA,c} at the minimum uplink configuration specified in Table 7.3.1-2 in TS 36.101 [5] with P _{CMAX_L_E-UTRA,c} as defined in clause 6.2B.4 from TS 38.101-3 [4] for single carrier. | | | | |

Table 7.5B.0.1-2: ACS test case 2

| EN-DC Aggregated Bandwidth, ENBW, MHz | ≤ 100 | $>100, \leq 120$ | $>120, \leq 140$ | $>140, \leq 160$ |
|---|------------------------------|---|---|---|
| Pw in Transmission Bandwidth Configuration, perCC, dBm | P _w ¹ | -42.7 +10log ₁₀ (N _{RB,c} / N _{RB_agg}) | -42 +10log ₁₀ (N _{RB,c} / N _{RB_agg}) | -41.4 +10log ₁₀ (N _{RB,c} / N _{RB_agg}) |
| P _{interferer} , dBm | -25 | | | |
| NOTE 1: P _w is wanted signal power level at the specified EN-DC aggregated Bandwidth from Table 7.5.1A-3 in TS 36.101 [5] NOTE 2: Jammer BW and offset is from Table 7.5.1A-3 in TS 36.101 [5] and is applied from the lowest edge of the lowest carrier and the highest edge of the highest carrier NOTE 3: For NR carrier, the transmitter shall be set to 4dB below P _{CMAX_L,f,c,NR} at the minimum uplink configuration specified in Table 7.3.2-3 in TS 38.101-1 [2] with P _{CMAX_L,f,c,NR} as defined in clause 6.2B.4 from TS 38.101-3 [4]. NOTE 4: For E-UTRA carrier, the transmitter shall be set to 4dB below P _{CMAX_L_E-UTRA,c} at the minimum uplink configuration specified in Table 7.3.1-2 in TS 36.101 [5] with P _{CMAX_L_E-UTRA,c} as defined in clause 6.2B.4 from TS 38.101-3 [4] for single carrier. | | | | |

7.5B.0.2 Intra-band non-contiguous EN-DC in FR1

For the E-UTRA sub-block containing one or multiple CC's, the requirement is defined in clause 7.5.1 for single carrier operation and in clause 7.5.1A for CA in TS 36.101 [5].

For the NR sub-block, the requirement is defined in clause 7.5 in TS 38.101-1 [2].

The blocker configuration is defined in the general clause 7.1 in TS 38.101-3 [4].

7.5B.0.3 Inter-band EN-DC within FR1

Adjacent channel selectivity requirement for E-UTRA single carrier and CA operation specified in clauses 7.5.1 and 7.5.1A of TS 36.101 [5] and for NR single carrier and CA operation specified in clauses 7.5 and 7.5A of TS 38.101-1 [2] apply.

7.5B.0.3a Inter-band NE-DC within FR1

Adjacent channel selectivity requirement for E-UTRA single carrier and CA operation specified in subclauses 7.5.1 and 7.5.1A of TS 36.101 [5] and for NR single carrier and CA operation specified in subclauses 7.5 and 7.5A of TS 38.101-1 [2] apply.

7.5B.0.4 Inter-band EN-DC including FR2

Adjacent channel selectivity requirement for E-UTRA single carrier and CA operation specified in clauses 7.5.1 and 7.5.1A of TS 36.101 [5] and for NR single carrier and CA operation specified in clauses 7.5 and 7.5A of TS 38.101-2 [3] apply.

7.5B.0.5 Inter-band EN-DC including both FR1 and FR2

Adjacent channel selectivity requirement for E-UTRA single carrier and CA operation specified in clauses 7.5.1 and 7.5.1A of TS 36.101 [5] and for NR single carrier and CA operation specified in clauses 7.5 and 7.5A of TS 38.101-1 [2] and TS 38.101-2 [3] apply.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.5B.1, 7.5B.2, 7.5B.3, 7.5B.4 and 7.5B.5.

7.5B.1 Adjacent Channel Selectivity for intra-band contiguous EN-DC (2 CCs)

Editor's note: this clause is incomplete. The following aspects are either missing or not yet determined:

- Maximum Test System Uncertainty analysis is incomplete

7.5B.1.1 Test purpose

Adjacent channel selectivity (ACS) is a measure of a receiver's ability to receive an NR and E-UTRA signal at its assigned channel frequency in the presence of an adjacent channel signal at a given frequency offset from the centre frequency of the assigned channel. ACS is the ratio of the receive filter attenuation on the assigned channel frequency to the receive filter attenuation on the adjacent channel(s).

7.5B.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band contiguous EN-DC operating in FR1.

7.5B.1.3 Minimum conformance requirements

Refer to Clause 7.5B.0.1 for the intra-band contiguous EN-DC in FR1.

Exception requirements are applicable for NR but not for E-UTRA within this test. LTE anchor agnostic approach is not applied. E-UTRA test points are defined and measurements performed over the aggregated EN-DC bandwidth.

7.5B.1.4 Test description

7.5B.1.4.1 Initial Condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on EN-DC operating bands specified in clause 5.2B.2, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-1 [8] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2. All of these configurations shall be tested with applicable test parameters for each intra-band contiguous EN-DC configuration specified in clause 5.5B.2, and are shown in table 7.3B.2.1.4.1-1 for intra-band DC_(n)71AA.

In a FR1 band where UE supports 4Rx, the test shall be performed only with 4Rx antennas ports connected and 4Rx REFSENS requirement (TS 38.521-1 [8] Table 7.3.2.5-2) is used in the test requirements.

The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2 for E-UTRA RMC for TDD, TS 36.521-1 [10] Annex A.2 for E-UTRA RMC for FDD , TS 38.521-1 [8] Annex A.2 for NR UL RMC and TS 38.521-1 [8] Annex A.3 for NR DL RMC. Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521-1 [10] Annex C.2 and in TS 38.521-1 [8] Annex C.2 for E-UTRA CG and NR CG respectively.

1. Connect the SS to the UE antenna connectors as shown in A.3.1.1 for SS diagram and A.3.2 for UE diagram in TS 38.508-1 [6].
2. The parameter settings for the E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3, and parameter settings for the NR cell are set up according to TS 38.508-1 [6] clause 4.4.3.
3. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C.0 and TS 38.521-1 [8] Annex C.0 for E-UTRA CG and NR CG respectively, and uplink signals according to TS 36.521-1 [10] Annex H and TS 38.521-1 [8] Annex G for E-UTRA CG and NR CG respectively.
4. The UL Reference Measurement channels are TS 36.521-1 [10] Annex A.2 and TS 38.521-1 [8] Annex A.2 for E-UTRA CG and NR CG respectively.
5. Propagation conditions are set according to TS 36.521-1 [10] Annex B.0 and TS 38.521-1 [8] Annex B.0 for E-UTRA CG and NR CG respectively.
6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 7.5B.1.4.3.

7.5B.1.4.2 Test Procedure

1. SS transmits PDSCH via PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC on the NR CC according to Table 7.5B.1.4.1-1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC on the E-UTRA CC according to Table 7.5.4.1-1 in TS 36.521-1 [10]. The SS sends downlink MAC padding bits on the DL RMC.
2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0_1 for C_RNTI to schedule the UL RMC on the NR CC according to Table 7.5B.1.4.1-1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC on the E-UTRA CC according to Table 7.5.4.1-1 in TS 36.21-1 [10]. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.
3. Set the Downlink signal level on the NR CC to the value as defined in Table 7.5.5-2 or Table 7.5.5-5 as appropriate in TS 38.521-1 [8] (Case 1). For NR CC and E-UTRA CC, send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as -MU to -(MU + Uplink power control window size) dB of the target power level in Table 7.5B.0.1-1 for at least the duration of the Throughput measurement, where:
 - MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW.
 - For NR CC, Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified in Table F.1.2-1.
 - For E-UTRA CC, Uplink power control window size = 1dB (UE power step size) + 1.0dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 36.101 [5], Table 6.3.5.2.1-1 and is 1.0dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified in Table F.1.2-1 of TS 36.521-1 [10].
4. Set the Interferer signal level to the value as defined in Table 7.5B.0.1-1 (Case 1) and frequency below the wanted signal on the NR CC and E-UTRA CC, using a modulated interferer bandwidth as defined in Annex D.
5. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex H.
6. Repeat steps from 3 to 5, using an interfering signal above the wanted signal in Case 1 at step 4.

7. Set the Downlink signal level on the NR CC to the value as defined in Table 7.5.5-3 or Table 7.5.5-6 as appropriate in TS 38.521-1 [8] (Case 2). Set the Downlink signal level on the E-UTRA CC to the value as defined in Table 7.5.5-3 in TS 36.521-1 [10] (Case 2). For NR CC and E-UTRA CC, send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as $-\text{MU}$ to $-(\text{MU} + \text{Uplink power control window size})$ dB of the target power level in Table 7.5B.0.1-2 for at least the duration of the Throughput measurement, where MU and Uplink power control window size are defined above.
8. Set the Interferer signal level to the value as defined in Table 7.5B.0.1-2 (Case 2) and frequency below the wanted signal on the NR CC and E-UTRA CC, using a modulated interferer bandwidth as defined in AnnexD.
9. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex H
10. Repeat steps from 7 to 9, using an interfering signal above the wanted signal in Case 2 at step 8.
11. Repeat for applicable channel bandwidths and operating band combinations in both Case 1 and Case 2.

NOTE: The purpose of the Uplink power control window is to ensure that the actual UE output power is no greater than the target power level, and as close as possible to the target power level. The relationship between the Uplink power control window, the target power level and the corresponding possible actual UE Uplink power window is illustrated in Annex F, clause F.4.

7.5B.1.4.3 Message Contents

Message contents are according to TS 38.508-1 [6] clause 4.6.1.

7.5B.1.5 Test requirement

For the NR CC, the throughput measurement of the carrier derived in test procedure shall be $\geq 95\%$ of the maximum throughput of the reference measurement channels as specified in Annex A.3 under the conditions specified in Table 7.5B.0.1-1, and also under the conditions specified in Table 7.5B.0.1-2.

7.5B.2 Adjacent Channel Selectivity for intra-band non-contiguous EN-DC (2 CCs)

Editor's note: this clause is incomplete. The following aspects are either missing or not yet determined:

- The test point selection analysis is incomplete
- Maximum Test System Uncertainty analysis is incomplete

7.5B.2.1 Test purpose

Same test purpose as clause 7.5B.1.1

7.5B.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band non-contiguous EN-DC.

7.5B.2.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.5B.0.2.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

7.5B.2.4 Test description

Same test description as in subclause 7.5.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions:Table 7.5B.2.4.1-1: Test Configuration Table

| Initial Conditions | |
|---|--------------------------------------|
| Test Frequencies as specified in TS 38.508-1 [6] clause 4.3.1 for different DC bandwidth classes | Low with maxWgap, High with maxWgap |
| Test EN-DC bandwidth combination as specified in Table 5.3B.1.3-1 across bandwidth combination sets supported by the UE | Highest N _{RB_agg} (NOTE 1) |
| NOTE 1: If the UE supports multiple CC Combinations in the EN-DC Configuration with the same NRB _{agg} , only the combination with the highest NRB _{SCG} is tested. | |

The initial test configurations for E-UTRA as specified in Table 4.6-1 except for the parameters specified in Table 7.5B.2.4.1-1.

For initial conditions as in clause 7.5.4.1 in TS 38.521-1 [8], the following steps are added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].
- 7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

Step 6 of Initial conditions as in clause 7.5.4.1 in TS 38.521-1 [8] is replaced by:

- 6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [6] clause 4.5.

Same test procedure as specified in clause 7.5.4.2 in TS 38.521-1 [8].

7.5B.2.5 Test requirement

Same test requirement as specified in TS 38.521-1 [8] Clause 7.5.5.

7.5B.3 Adjacent Channel Selectivity for inter-band EN-DC within FR1 (2 CCs)

7.5B.3.1 Test purpose

Same test purpose as in clause 7.5B.1.1.

7.5B.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC within FR1.

7.5B.3.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.5B.0.3.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

7.5B.3.4 Test description

Same test description as in clause 7.5.4.2 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1.

For Initial conditions as in clause 7.5.4.1 in TS 38.521-1 [8], add step 2.1 and step 3.1 as follows:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 7.5.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

Add step 7 to Initial conditions in clause 7.5.4.1 in TS 38.521-1 [8] as follows:

7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

7.5B.3.5 Test requirement

Same test requirement as specified in TS 38.521-1 [8] Clause 7.5.5.

7.5B.3_1 Adjacent Channel Selectivity for EN-DC within FR1 (>2 CCs)

7.5B.3_1.1 Adjacent Channel Selectivity for EN-DC within FR1 (3 CCs)

7.5B.3_1.1.1 Test purpose

Same test purpose as in clause 7.5B.1.1.

7.5B.3_1.1.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting EN-DC within FR1 with 3CCs.

7.5B.3_1.1.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.5B.0.3.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

7.5B.3_1.1.4 Test description

Same test description as in clause 7.5.4.2 or 7.5A.1.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1.

For Initial conditions as in clause 7.5.4.1 or 7.5A.1.4.1 in TS 38.521-1 [8], add step 2.1 and step 3.1 as follows:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 7.5.4.1 or 7.5A.1.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

Add step 7 to Initial conditions in clause 7.5.4.1 or 7.5A.1.4.1 in TS 38.521-1 [8] as follows:

7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

7.5B.3_1.1.5 Test requirement

Same test requirement as specified in TS 38.521-1 [8] Clause 7.5.5 or 7.5A.1.5 for the NR carrier(s).

7.5B.3_1.2 Adjacent Channel Selectivity for EN-DC within FR1 (4 CCs)

Editor's note: The ACS for EN-DC within FR1 (4 CCs) test cases below cover only inter-band EN-DC.

7.5B.3_1.2.1 Test purpose

Same test purpose as in clause 7.5B.1.1.

7.5B.3_1.2.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting EN-DC within FR1 with 4CCs.

7.5B.3_1.2.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.5B.0.3.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

7.5B.3_1.2.4 Test description

Same test description as in clause 7.5.4.2 or 7.5A.1.4 or 7.5A.2.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1.

For Initial conditions as in clause 7.5.4.1 or 7.5A.1.4.1 or 7.5A.2.4.1 in TS 38.521-1 [8], add step 2.1 and step 3.1 as follows:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 7.5.4.1 or 7.5A.1.4.1 or 7.5A.2.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

Add step 7 to Initial conditions in clause 7.5.4.1 or 7.5A.1.4.1 or 7.5A.2.4.1 in TS 38.521-1 [8] as follows:

7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

7.5B.3_1.2.5 Test requirement

Same test requirement as specified in TS 38.521-1 [8] Clause 7.5.5 or 7.5A.1.5 or 7.5A.2.5 for the NR carrier(s).

7.5B.4 Adjacent Channel Selectivity for inter-band EN-DC including FR2 (2CCs)

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- MU is FFS in referred test case 7.5 in TS 38.521-2 [9].
- Testability issue due to high PSD interferer has been identified.

7.5B.4.1 Test purpose

Same test purpose as in clause 7.5B.1.1.

7.5B.4.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 2 DL CCs.

7.5B.4.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.5B.0.4.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

7.5B.4.4 Test description

7.5B.4.4.1 Initial Condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on EN-DC operating bands specified in clause 5.2B.5.1, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-2 [9] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2. All of these configurations shall be tested with applicable test parameters for each inter-band EN-DC including FR2 configuration specified in clause 5.5B.5.1, and the configuration for NR carrier are shown in TS 38.521-2 [9] Table 7.5.4.1-1.

For initial conditions as in clause 7.5.4.1 in TS 38.521-2 [9], the following steps are added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].
7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

Step 6 of initial conditions as in clause 7.5.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

7.5B.4.4.2 Test Procedure

Same test procedure as specified in clause 7.5.4.2 in TS 38.521-2 [9] with the following exceptions for E-UTRA anchor

On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

7.5B.4.4.3 Message contents

Message contents are according to TS 38.508-1 [6] clause 4.6.1.

7.5B.4.5 Test requirement

Same test requirement as specified in TS 38.521-2 [9] Clause 7.5.5.

7.5B.4_1 Adjacent Channel Selectivity for inter-band EN-DC including FR2 (>2 CCs)

7.5B.4_1.1 Adjacent Channel Selectivity for inter-band EN-DC including FR2 (3 CCs)

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- Working assumption: to avoid LTE CA testing in inter-band EN-DC including FR2 and only PCC band is configured.
- MU and TT are FFS.
- [Table 7.5A.4.1-1] in TS 38.521-2 [9] where the configuration for NR CA carriers are shown is FFS.
- [clause 7.5A.4.1] in TS 38.521-2 [9] where the initial conditions for NR CA is FFS.
- [clause 7.5A.4.2] in TS 38.521-2 [9] where the test procedure for NR CA is FFS.
- [Clause 7.5A.5] in TS 38.521-2 [9] where the test requirements for NR CA is FFS.
- [Clause 7.5A] in TS 38.521-2 [9] where the test description for NR CA is FFS.
- How to choose the LTE anchor when LTE CA is implemented is FFS.

7.5B.4_1.1.1 Test purpose

Same test purpose as in clause 7.5B.1.1.

7.5B.4_1.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 3 DL CCs (2NR DL CCs).

7.5B.4_1.1.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.5B.0.4.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

7.5B.4_1.1.4 Test description

- For inter-band of "single carrier LTE + 2DL FR2 CA", the test description of 2DL FR2 CA for adjacent channel selectivity is the same as in corresponding clause 7.5A in TS 38.521-2 [9] for FR2 with the exceptions described below.
- For inter-band of "2DL LTE CA + single carrier FR2", the test description of single carrier FR2 for adjacent channel selectivity is the same as in corresponding clause 7.5 in TS 38.521-2 [9] for FR2 with the exceptions described below.

7.5B.4_1.1.4.1 Initial Condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on EN-DC operating bands specified in clause 5.2B.5.2, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-2 [9] clause 5.3 or clause 5.3A and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2 or clause 5.4.2A. All of these configurations shall be tested with applicable test parameters for each inter-band EN-DC including FR2 configuration specified in clause 5.5B.5.2, and the configuration for NR carrier are shown in TS 38.521-2 [9] Table 7.5.4.1-1 or [Table 7.5A.4.1-1].

For initial conditions as in clause 7.5.4.1 or [clause 7.5A.4.1] in TS 38.521-2 [9], the following steps are added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].
7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

Step 6 of initial conditions as in clause 7.5.4.1 or [clause 7.5A.4.1] in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

7.5B.4_1.1.4.2 Test Procedure

Same test procedure as specified in clause 7.5.4.2 or [clause 7.5A.4.2] in TS 38.521-2 [9] with the following exceptions for E-UTRA anchor

On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

7.5B.4_1.1.4.3 Message contents

Message contents are according to TS 38.508-1 [6] clause 4.6.1.

7.5B.4_1.1.5 Test requirement

Same test requirement as specified in TS 38.521-2 [9] Clause 7.5.5 or [Clause 7.5A.5].

7.5B.4_1.2 Adjacent Channel Selectivity for inter-band EN-DC including FR2 (4 CCs)

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- Working assumption: to avoid LTE CA testing in inter-band EN-DC including FR2 and only PCC band is configured.
- MU and TT are FFS.
- [Table 7.5A.4.1-1] in TS 38.521-2 [9] where the configuration for NR CA carriers are shown in FFS.
- [clause 7.5A.4.1] in TS 38.521-2 [9] where the initial conditions for NR CA in FFS.
- [clause 7.5A.4.2] in TS 38.521-2 [9] where the test procedure for NR CA in FFS.
- [Clause 7.5A.5] in TS 38.521-2 [9] where the test requirements for NR CA in FFS.
- [Clause 7.5A] in TS 38.521-2 [9] where the test description for NR CA is FFS.
- How to choose the LTE anchor when LTE CA is implemented is FFS.

7.5B.4_1.2.1 Test purpose

Same test purpose as in clause 7.5B.1.1.

7.5B.4_1.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 4 DL CCs (3NR DL CCs).

7.5B.4_1.2.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.5B.0.4.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

7.5B.4_1.2.4 Test description

- For inter-band of "single carrier LTE + 3DL FR2 CA", the test description of 3DL FR2 CA for adjacent channel selectivity is the same as in corresponding part of clause 7.5A in TS 38.521-2 [9] for FR2 with the exceptions described below.
- For inter-band of "2DL LTE CA + 2DL FR2 CA", the test description of 2DL FR2 CA for adjacent channel selectivity is the same as in corresponding part of clause 7.5A in TS 38.521-2 [9] for FR2 with the exceptions described below.
- For inter-band of "3DL LTE CA + single carrier FR2", the test description of single carrier FR2 for adjacent channel selectivity is the same as in corresponding part of clause 7.5 in TS 38.521-2 [9] for FR2 with the exceptions described below.

7.5B.4_1.2.4.1 Initial Condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on EN-DC operating bands specified in clause 5.2B.5.3, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-2 [9] clause 5.3 or clause 5.3A and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2 or clause 5.4.2A. All of these configurations shall be tested with applicable test parameters for each inter-band EN-DC including FR2 configuration specified in clause 5.5B.5.3, and the configuration for NR carrier are shown in TS 38.521-2 [9] Table 7.5.4.1-1 or [Table 7.5A.4.1-1].

For initial conditions as in clause 7.5.4.1 or [clause 7.5A.4.1] in TS 38.521-2 [9], the following steps are added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].
7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

Step 6 of initial conditions as in clause 7.5.4.1 or [clause 7.5A.4.1] in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

7.5B.4_1.2.4.2 Test Procedure

Same test procedure as specified in clause 7.5B.4.2.4.2.

7.5B.4_1.2.4.3 Message contents

Same message contents as specified in clause 7.5B.4.2.4.3.

7.5B.4_1.2.5 Test requirement

Same test requirement as specified in clause 7.5B.4.2.5.

7.5B.4_1.3 Adjacent Channel Selectivity for inter-band EN-DC including FR2 (5 CCs)

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- Working assumption: to avoid LTE CA testing in inter-band EN-DC including FR2 and only PCC band is configured.
- MU and TT are FFS.
- [Table 7.5A.4.1-1] in TS 38.521-2 [9] where the configuration for NR CA carriers are shown is FFS.

- [clause 7.5A.4.1] in TS 38.521-2 [9] where the initial conditions for NR CA is FFS.
- [clause 7.5A.4.2] in TS 38.521-2 [9] where the test procedure for NR CA is FFS.
- [Clause 7.5A.5] in TS 38.521-2 [9] where the test requirements for NR CA is FFS.
- [Clause 7.5A] in TS 38.521-2 [9] where the test description for NR CA is FFS.
- How to choose the LTE anchor when LTE CA is implemented is FFS.

7.5B.4_1.3.1 Test purpose

Same test purpose as in clause 7.5B.1.1.

7.5B.4_1.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 5 DL CCs (4NR DL CCs).

7.5B.4_1.3.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.5B.0.4.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

7.5B.4_1.3.4 Test description

- For inter-band of "single carrier LTE + 4DL FR2 CA", the test description of 4DL FR2 CA for adjacent channel selectivity is the same as in corresponding part of clause 7.5A in TS 38.521-2 [9] for FR2 with the exceptions described below.
- For inter-band of "2DL LTE CA + 3DL FR2 CA", the test description of 3DL FR2 CA for adjacent channel selectivity is the same as in corresponding part of clause 7.5A in TS 38.521-2 [9] for FR2 with the exceptions described below.
- For inter-band of "3DL LTE CA + 2DL FR2 CA", the test description of 2DL FR2 CA for adjacent channel selectivity is the same as in corresponding part of clause 7.5A in TS 38.521-2 [9] for FR2 with the exceptions described below.
- For inter-band of "4DL LTE CA + single carrier FR2", the test description of single carrier FR2 for adjacent channel selectivity is the same as in corresponding part of clause 7.5 in TS 38.521-2 [9] for FR2 with the exceptions described below.

7.5B.4_1.3.4.1 Initial Condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on EN-DC operating bands specified in clause 5.2B.5.4, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-2 [9] clause 5.3 or clause 5.3A and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2 or clause 5.4.2A. All of these configurations shall be tested with applicable test parameters for each inter-band EN-DC including FR2 configuration specified in clause 5.5B.5.4, and the configuration for NR carrier are shown in TS 38.521-2 [9] Table 7.5.4.1-1 or [Table 7.5A.4.1-1].

For initial conditions as in clause 7.5.4.1 or [clause 7.5A.4.1] in TS 38.521-2 [9], the following steps are added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

Step 6 of initial conditions as in clause 7.5.4.1 or [clause 7.5A.4.1] in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

7.5B.4_1.3.4.2 Test Procedure

Same test procedure as specified in clause 7.5B.4.2.4.2.

7.5B.4_1.3.4.3 Message contents

Same message contents as specified in clause 7.5B.4.2.4.3.

7.5B.4_1.3.5 Test requirement

Same test requirement as specified in clause 7.5B.4.2.5.

7.5B.4_1.4 Adjacent Channel Selectivity for inter-band EN-DC including FR2 (6 CCs)

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- Working assumption: to avoid LTE CA testing in inter-band EN-DC including FR2 and only PCC band is configured.
- MU and TT are FFS.
- [Table 7.5A.4.1-1] in TS 38.521-2 [9] where the configuration for NR CA carriers are shown is FFS.
- [clause 7.5A.4.1] in TS 38.521-2 [9] where the initial conditions for NR CA is FFS.
- [clause 7.5A.4.2] in TS 38.521-2 [9] where the test procedure for NR CA is FFS.
- [Clause 7.5A.5] in TS 38.521-2 [9] where the test requirements for NR CA is FFS.
- [clause 5.2B.5.5] where EN-DC operating bands have been specified is FFS.
- [Clause 7.5A] in TS 38.521-2 [9] where the test description for NR CA is FFS.
- How to choose the LTE anchor when LTE CA is implemented is FFS.

7.5B.4_1.4.1 Test purpose

Same test purpose as in clause 7.5B.1.1.

7.5B.4_1.4.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 6 DL CCs (5NR DL CCs).

7.5B.4_1.4.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.5B.0.4.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

7.5B.4_1.4.4 Test description

- For inter-band of "single carrier LTE + 5DL FR2 CA", the test description of 5DL FR2 CA for adjacent channel selectivity is the same as in corresponding part of clause 7.5A in TS 38.521-2 [9] for FR2 with the exceptions described below.
- For inter-band of "2DL LTE CA + 4DL FR2 CA", the test description of 4DL FR2 CA for adjacent channel selectivity is the same as in corresponding part of clause 7.5A in TS 38.521-2 [9] for FR2 with the exceptions described below.
- For inter-band of "3DL LTE CA + 3DL FR2 CA", the test description of 3DL FR2 CA for adjacent channel selectivity is the same as in corresponding part of clause 7.5A in TS 38.521-2 [9] for FR2 with the exceptions described below.
- For inter-band of "4DL LTE CA + 2DL FR2 CA", the test description of 2DL FR2 CA for adjacent channel selectivity is the same as in corresponding part of clause 7.5A in TS 38.521-2 [9] for FR2 with the exceptions described below.
- For inter-band of "5DL LTE CA + single carrier FR2", the test description of single carrier FR2 for adjacent channel selectivity is the same as in corresponding part of clause 7.5 in TS 38.521-2 [9] for FR2 with the exceptions described below.

7.5B.4_1.4.4.1 Initial Condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on EN-DC operating bands specified in [clause 5.2B.5.5], channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-2 [9] clause 5.3 or clause 5.3A and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2 or clause 5.4.2A. All of these configurations shall be tested with applicable test parameters for each inter-band EN-DC including FR2 configuration specified in clause 5.5B.5.5, and the configuration for NR carrier are shown in TS 38.521-2 [9] Table 7.5.4.1-1 or [Table 7.5A.4.1-1].

For initial conditions as in clause 7.5.4.1 or [clause 7.5A.4.1] in TS 38.521-2 [9], the following steps are added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].
7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

Step 6 of initial conditions as in clause 7.5.4.1 or [clause 7.5A.4.1] in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

7.5B.4_1.4.4.2 Test Procedure

Same test procedure as specified in clause 7.5B.4.2.4.2.

7.5B.4_1.4.4.3 Message contents

Same message contents as specified in clause 7.5B.4.2.4.3.

7.5B.4_1.4.5 Test requirement

Same test requirement as specified in clause 7.5B.4.2.5.

7.5B.4D Adjacent Channel Selectivity for inter-band EN-DC including FR2 for UL-MIMO

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- The referred test case 7.5D in TS 38.521-2 [9] is incomplete

7.5B.4D.1.1 Test purpose

Same test purpose as in clause 7.5D.1 in TS 38.521-2 [9] for the NR carrier.

7.5B.4D.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with UL-MIMO.

7.5B.4D.1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 7.5D.3 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this measurement is TS 38.101-3 [4] clause 7.5B.4.

7.5B.4D.1.4 Test Description

Same test description as in clause 7.5D.4 in TS 38.521-2 [9] for the NR carrier with the following exceptions:

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1.

For Initial conditions as in clause [7.5D.4.1] in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for the cell are set up according to TS 36.508 [11] subclause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

[Step 6] of Test procedure as in clause [7.5D.4.2] in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set TimeAlignmentTimerDedicated IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

7.5B.4D.1.5 Test Requirement

Same test requirement as specified in TS 38.521-2 [9] clause [7.5D.5] for the NR carrier(s).

7.5B.5 Adjacent Channel Selectivity for inter-band EN-DC including both FR1 and FR2

7.5B.5.1 Test purpose

Same test purpose as in 7.5.1 in TS 38.521-1 [8] for NR FR1 carrier and 7.5.1 in TS 38.521-2 [9] for NR FR2 carrier.

7.5B.5.2 Test applicability

The requirements in this test are not testable due to issues with combined testing of NR FR1 and E-UTRA in conducted mode with NR FR2 in radiated mode. Therefore, the conducted and radiated requirements are tested separately.

No test case details are specified. The NSA requirements for adjacent channel selectivity apply and are tested as part of the EN-DC within FR1 and EN-DC including FR2 test cases in clause 7.5B.

7.5B.5D Adjacent Channel Selectivity for inter-band EN-DC including FR1 and FR2 for UL-MIMO

Editor's note: This clause is incomplete. Following aspects are either missing or not yet determined:

- clause [7.5D] in TS 38.521-2 [9] is FFS.

7.5B.5D.1 Test purpose

Same test purpose as in 7.5D in TS 38.521-1 [8] for NR FR1 carrier and [7.5D] in TS 38.521-2 [9] for NR FR2 carrier.

7.5B.5D.2 Test applicability

The requirements in this test are not testable due to issues with combined testing of NR FR1 and E-UTRA in conducted mode with NR FR2 in radiated mode. Therefore, the conducted and radiated requirements are tested separately.

No test case details are specified. The NSA requirements for adjacent channel selectivity apply and are tested as part of the EN-DC within FR1 and EN-DC including FR2 test cases in clause 7.5B.

7.6 Void

7.6A Blocking characteristics for CA

7.6A.1 Test purpose

Same test purpose as in clause 7.6 in TS 38.521-1 [8] for NR FR1 carrier(s) and clause 7.6 in TS 38.521-2 [9] for NR FR2 carrier(s).

7.6A.2 Test applicability

The requirements in this test are not testable due to issues with combined testing of NR FR1 conducted mode with NR FR2 in radiated mode. Therefore, the conducted and radiated requirements are tested separately.

No test case details are specified. The SA requirements for blocking characteristics apply and are tested in TS 38.521-1 [8] clause 7.6 and 7.6A and TS 38.521-2 [9] clauses 7.6 and 7.6A.

7.6B Blocking characteristics for DC

7.6B.1 General

The blocking characteristic for EN-DC in FR1 is a measure of the receiver's ability of an UE that support EN-DC in FR1 to receive a wanted signal at its assigned channel frequency in the presence of an unwanted interferer on frequencies other than those of the spurious response or the adjacent channels, without this unwanted input signal causing a degradation of the performance of the receiver beyond a specified limit. The blocking performance shall apply at all frequencies except those at which a spurious response occur.

7.6B.2 Inband blocking for DC

7.6B.2.0 Minimum Conformance Requirements

7.6B.2.0.1 Intra-band contiguous EN-DC in FR1

Intra-band contiguous EN-DC in-band blocking requirement and parameters are defined in Table 7.6B.2.0.1-1.

Table 7.6B.2.0.1-1: In-band blocking for intra-band contiguous EN-DC

| EN-DC Aggregated Bandwidth, MHz | ≤ 100 | $> 100, \leq 120$ | $> 120, \leq 140$ | $> 140, \leq 160$ |
|--|--|-------------------|-------------------|-------------------|
| Pw in Transmission Bandwidth Configuration, perCC, dBm | REFSENS + Aggregated BW specific value below | | | |
| | Pw ¹ | 16.8 | 17.5 | 18 |

NOTE 1: Pw is wanted signal power level at the specified EN-DC aggregated Bandwidth from Table 7.6.1.1A-1 in TS 36.101 [5].
 NOTE 2: Interferer values are specified from Table 7.6.1.1A-2 in TS 36.101 [5].
 NOTE 3: Jammer BW and offset is from Table 7.6.1.1A-1 in TS 36.101 [5] and is applied from the lowest edge of the lowest carrier and the highest edge of the highest carrier.
 NOTE 4: For NR carrier, the transmitter shall be set to 4dB below P_{CMAX_L,f,c,NR} at the minimum uplink configuration specified in Table 7.3.2-3 [2] with P_{CMAX_L,f,c,NR} as defined in clause 6.2B.4.
 NOTE 5: For E-UTRA carrier, the transmitter shall be set to 4dB below P_{CMAX_L_E-UTRA,c} at the minimum uplink configuration specified in Table 7.3.1-2 in TS 36.101 [5] with P_{CMAX_L_E-UTRA,c} as defined in clause 6.2B.4 for single carrier.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.6B.2.1.

7.6B.2.0.2 Intra-band non-contiguous EN-DC in FR1

For the E-UTRA sub-block containing one or multiple CC's, the requirement is defined in clause 7.6.1.1 for single carrier operation and in clause 7.6.1.1A for CA in TS 36.101 [5].

For the NR sub-block, the requirement is defined in clause 7.6.2 in TS 38.101-1 [2].

The blocker configuration is defined in the general clause 7.1.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.6B.2.2.

7.6B.2.0.3 Inter-band EN-DC within FR1

Inband blocking requirement for E-UTRA single carrier and CA operation specified in clauses 7.6.1.1 and 7.6.1.1A of TS 36.101 [5] and for NR single carrier and CA operation specified in clauses 7.6.2 and 7.6A.2 of TS 38.101-1 [2] apply.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.6B.2.3.

7.6B.2.0.3A Inter-band NE-DC within FR1

Inband blocking requirement for E-UTRA single carrier and CA operation specified in clauses 7.6.1.1 and 7.6.1.1A of TS 36.101 [5] and for NR single carrier and CA operation specified in clauses 7.6.2 and 7.6A.2 of TS 38.101-1 [2] apply.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.6B.2.3a.

7.6B.2.0.4 Inter-band EN-DC including FR2

Inband blocking requirement for E-UTRA single carrier and CA operation specified in clauses 7.6.1.1 and 7.6.1.1A of TS 36.101 [5] and for NR single carrier and CA operation specified in clauses 7.6.2 and 7.6A.2 of TS 38.101-2 [3] apply.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.6B.2.4.

7.6B.2.0.5 Inter-band EN-DC including both FR1 and FR2

Inband blocking requirement for E-UTRA single carrier and CA operation specified in clauses 7.6.1.1 and 7.6.1.1A of TS 36.101 [5] and for NR single carrier and CA operation specified in clauses 7.6.2 and 7.6A.2 of TS 38.101-1 [2] and TS 38.101-2 [3] apply.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.6B.2.5.

7.6B.2.1 Inband blocking for intra-band contiguous EN-DC in FR1 (2 CCs)

7.6B.2.1.1 Test Purpose

In-band blocking is defined for an unwanted interfering signal falling into the range from 15MHz below to 15MHz above the UE receive band, at which the relative throughput shall meet or exceed the requirement for the specified measurement channels. The lack of in-band blocking ability will decrease the coverage area when other NodeB transmitters exist (except in the adjacent channels and spurious response).

7.6B.2.1.2 Test Applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band contiguous EN-DC in FR1 with 2CCs.

7.6B.2.1.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.6 B.2.0.1.

Exception requirements for both NR and E-UTRA are defined for this test and therefore LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

7.6B.2.1.4 Test Description

7.6 B.2.1.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on EN-DC operating bands specified in clause 5.3B.1.2, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-1 [8] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2. All of these configurations shall be tested with applicable test parameters for each EN-DC configuration specified in clause 5.3B.1.2 and are shown in Table 7.6B.2.1.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annex A.2 and A.3 respectively. The details of the OCNG patterns used are specified in TS 36.521-1 [10] Annex A.5 and in TS 38.521-1 [8] Annex A.5 for E-UTRA CG and NR CG respectively. Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521-1 [10] Annex C.2 and in TS 38.521-1 [8] Annex C.2 for E-UTRA CG and NR CG respectively.

Table 7.6B.2.1.4.1-1: Test configuration table

| Initial Conditions | | | | | | | |
|---|---|-------------------|----------------------|----------------------|------------------|-------------------|----------------------|
| Test Environment as specified in TS 38.508-1 [6] clause 4.1 | Normal | | | | | | |
| Test Frequencies as specified in TS 38.508-1 [6] clause 4.3.1 for different EN-DC bandwidth classes | Mid range | | | | | | |
| Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1 across bandwidth combination sets supported by the UE | Lowest N _{RB_agg} , Highest N _{RB_agg} (NOTE 3) | | | | | | |
| NR Test SCS as specified in Table 5.3.5-1 in TS 38.521-1 [8] | Lowest | | | | | | |
| NR/E-UTRA Test Parameters | | | | | | | |
| Downlink Configuration | | | | Uplink Configuration | | | |
| NR Modulation | NR RB allocation | E-UTRA Modulation | E-UTRA RB allocation | NR Modulation | NR RB allocation | E-UTRA Modulation | E-UTRA RB allocation |
| CP-OFDM QPSK | Full RB (NOTE 1) | QPSK | Full RB | DFT-s-OFDM QPSK | REFSENS | QPSK | REFSENS |
| NOTE 1: Full RB allocation shall be used per each SCS and channel BW as specified in Table 7.3.2.4.1-2 of TS 38.521-1 [8]. NOTE 2: Test Channel Bandwidths are checked separately for each EN-DC band, which applicable channel bandwidths are specified in Table 5.3B.1.2-1. NOTE 3: If the UE supports multiple CC Combinations in the EN-DC Configuration with the same N _{RB_agg} , only the combination with the highest N _{RB_SCG} is tested. NOTE 4: REFSENS refers to Uplink configuration in Table 7.3.2.3-3 in [8] and Table 7.3.3-2 in [10] for NR and E-UTRA CC respectively. NOTE 5: In a FR1 band where UE supports 4Rx, the test shall be performed only with 4Rx antennas ports connected and 4Rx REFSENS requirement (TS 38.521-1 [8] Table 7.3.2.5-2) is used in the test requirements. | | | | | | | |

1. Connect the SS to the UE antenna connectors as shown in [6] TS 38.508-1 Annex A, in Figure A.3.1.4.1 for SS diagram and clause A.3.2 for UE diagram.
2. The parameter settings for the E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3, and the parameter settings for the NR cell are set up according to TS 38.508-1 [6] clause 4.4.3.
3. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C and TS 38.521-1 [8] Annex C for E-UTRA CG and NR CG respectively, and uplink signals according to TS 36.521-1 [10] Annex H and TS 38.521-1 [8] Annex G for E-UTRA CG and NR CG respectively.
4. The UL and DL Reference Measurement channels are TS 36.521-1 [10] Annex A.2, A.3 and TS 38.521-1 [8] Annex A.2 , A.3 for E-UTRA CG and NR CG respectively.
5. Propagation conditions are set according to TS 36.521-1 [10] Annex B.0 and TS 38.521-1 [8] Annex B.0 for E-UTRA CG and NR CG respectively.
6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 7.6B.2.1.4.3.

7.6B.2.1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A and PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Table 7.6B.2.1.4.1-1 on E-UTRA CC and NR CC respectively. The SS sends downlink MAC padding bits on the DL RMC.
2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 7.6B.2.1.4.1-1 on E-UTRA CC and NR CC respectively. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

3. Set the Downlink signal level to the value as defined in Table 7.6B.2.1.5-1. For NR CC and E-UTRA CC, send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as $-\text{MU}$ to $(-\text{MU} + \text{Uplink power control window size})$ dB of the target power level in Table 7.6B.2.1.5-1 + ($[10\log(S_{LCRB}/N_{RB_alloc})]$ for NR CC, $[10\log(P_{LCRB}/N_{RB_alloc})]$ for E-UTRA CC) for at least the duration of the Throughput measurement, where:
 - MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW
 - For NR CC, Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified in Table F.1.2-1.
 - For E-UTRA CC, Uplink power control window size = 1dB (UE power step size) + 1.0dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 36.101 [5], Table 6.3.5.2.1-1 and is 1.0dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified in Table F.1.2-1 of TS 36.521-1 [10].
4. Set the parameters of the signal generator for an interfering signal below the aggregated component carriers in Case 1 according to Table 7.6B.2.1.5-1.
5. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex H.2.
6. Repeat steps from 4 to 5, using an interfering signal above the aggregated component carriers in Case 1 at step 4.
7. Repeat steps from 4 to 6, using interfering signals in Case 2 at steps 4 and 6.

NOTE: The purpose of the Uplink power control window is to ensure that the actual UE output power is no greater than the target power level, and as close as possible to the target power level. The relationship between the Uplink power control window, the target power level and the corresponding possible actual UE Uplink power window is illustrated in Annex F, clause F.4.

7.6B.2.1.4.3 Message contents

Message contents are according to TS 38.508-1 [6] clause 4.6 Table 4.6.3-118 with condition TRANSFORM_PRECODER_ENABLED.

7.6B.2.1.5 Test Requirement

The throughput shall be $\geq 95\%$ of the maximum throughput of the reference measurement channels as specified in TS 36.521-1 [10] Annex A.3 and TS 38.521-1 [8] Annex A.3 for E-UTRA CG and NR CG respectively with parameters specified in Table 7.6B.2.1.5-1 for the specified wanted signal mean power in the presence of interfering signals.

Table 7.6B.2.1.5-1: In-band blocking for intra-band contiguous EN-DC

| EN-DC Aggregated Bandwidth, MHz | ≤ 100 | $> 100, \leq 120$ | $> 120, \leq 140$ | $> 140, \leq 160$ |
|--|--|-------------------|-------------------|-------------------|
| Pw in Transmission Bandwidth Configuration, perCC, dBm | REFSENS + Aggregated BW specific value below | | | |
| | Pw ¹ | 16.8 | 17.5 | 18 |

NOTE 1: Pw is wanted signal power level at the specified EN-DC aggregated Bandwidth from Table 7.6.1.1A-1 in TS 36.101 [5].

NOTE 2: Interferer values are specified from Table 7.6.1.1A-2 in TS 36.101 [5].

NOTE 3: Jammer BW and offset is from Table 7.6.1.1A-1 in TS 36.101 [5] and is applied from the lowest edge of the lowest carrier and the highest edge of the highest carrier.

NOTE 4: For NR carrier, the transmitter shall be set to 4dB below P_{CMAX_L,f,c,NR} at the minimum uplink configuration specified in TS 38.101-1 [2], Table 7.3.2-3 with P_{CMAX_L,f,c,NR} as defined in clause 6.2B.4.

NOTE 5: For E-UTRA carrier, the transmitter shall be set to 4dB below P_{CMAX_L_E-UTRA,c} at the minimum uplink configuration specified in TS 36.101 [5], Table 7.3.1-2 with P_{CMAX_L_E-UTRA,c} as defined in clause 6.2B.4 for single carrier.

Table 7.6B.2.1.5-2: Void**Table 7.6B.2.1.5-3: Void**

7.6B.2.2 Inband blocking for intra-band non-contiguous EN-DC in FR1 (2 CCs)

7.6B.2.2.1 Test Purpose

Same test purpose as in clause 7.6.2.1 in TS 38.521-1 [8] for the NR carrier.

7.6B.2.2.2 Test Applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band non-contiguous EN-DC in FR1 with 2CCs.

7.6B.2.2.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.6B.2.0.2.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

7.6B.2.2.4 Test Description

Same test description as in clause 7.6.2.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

Table 7.6B.2.2.4-1: Test Configuration Table

| Initial Conditions | |
|---|-------------------------------------|
| Test Frequencies as specified in TS 38.508-1 [6] clause 4.3.1 for different EN-DC bandwidth classes | High with maxWGap |
| Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1 across bandwidth combination sets supported by the UE | Highest N _{RB_agg} (NOTE1) |
| NOTE 1: If the UE supports multiple CC Combinations in the EN-DC Configuration with the same NRB _{agg} , only the combination with the highest NRB _{SCG} is tested. | |

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1 except for the parameters specified in Table 7.6B.2.2.4-1.

For Initial conditions as in clause 7.6.2.4.1 in TS 38.521-1 [8], add step 2.1 and step 3.1 as follows:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 7.6.2.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

Add step 7 to Initial conditions in clause 7.6.2.4.1 in TS 38.521-1 [8] as follows:

7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

Step 3 of Test procedure as in clause 7.6.2.4.2 in TS 38.521-1 [8] shall treat the in-gap tests as below: For intra-band non-contiguous EN-DC of two sub-blocks with channel bandwidth larger than or equal to 5 MHz, the existing requirements apply for in-gap tests only if the corresponding interferer frequency offsets satisfy the following condition in relation to the sub-block gap size W_{gap} , so that the interferer frequency position does not change the nature of the core requirement tested:

$$W_{gap} \geq 2 \cdot |F_{Interferer}(\text{offset})| - BW_{\text{Channel}}$$

Step 4 of Test procedure as in clause 7.6.2.4.2 in TS 38.521-1 [8] is replaced by:

4. Set the downlink signal level for NR CC according to the Table 7.6.2.5-1 or 7.6.2.5-3 in TS 38.521-1 [8] as appropriate. For NR CC and E-UTRA CC, send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as $-MU$ to $(-MU + \text{Uplink power control window size})$ dB of $(P_{CMAX,L,c} - 29\text{dB})$ for E-UTRA CC, and of 4dB below $P_{CMAX,L,f,c}$ for NR CC for at least the duration of the Throughput measurement, where:

- MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW
- For NR CC, Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified in Table F.1.2-1.
- For E-UTRA CC, Uplink power control window size = 1dB (UE power step size) + 1.0dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 36.101 [5], Table 6.3.5.2.1-1 and is 1.0dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified in Table F.1.2-1 of TS 36.521-1 [10].

7.6B.2.2.5 Test Requirement

Same test requirement as in clause 7.6.2.5 in TS 38.521-1 [8].

7.6B.2.3 Inband blocking for inter-band EN-DC within FR1 (2 CCs)

7.6B.2.3.1 Test Purpose

Same test purpose as in clause 7.6.2.1 in TS 38.521-1 [8] for the NR carrier.

7.6B.2.3.2 Test Applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC within FR1 with 2CCs.

7.6B.2.3.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.6B.2.0.3.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

7.6B.2.3.4 Test Description

Same test description as in clause 7.6.2.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1.

For Initial conditions as in clause 7.6.2.4.1 in TS 38.521-1 [8], add step 2.1 and step 3.1 as follows:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 7.6.2.4.1 in TS 38.521-1 [8] is replaced by:

- 6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

Add step 7 to Initial conditions in clause 7.6.2.4.1 in TS 38.521-1 [8] as follows:

- 7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

7.6B.2.3.5 Test Requirement

Same test requirement as in clause 7.6.2.5 in TS 38.521-1 [8].

7.6B.2.3_1 Inband blocking for EN-DC within FR1 (>2 CCs)

7.6B.2.3_1.1 Inband blocking for EN-DC within FR1 (3 CCs)

7.6B.2.3_1.1.1 Test Purpose

For intra-band contiguous EN-DC within FR1 with 3 DL CCs: In-band blocking is defined for an unwanted interfering signal falling into the range from 15MHz below to 15MHz above the UE receive band, at which the relative throughput shall meet or exceed the requirement for the specified measurement channels. The lack of in-band blocking ability will decrease the coverage area when other NodeB transmitters exist (except in the adjacent channels and spurious response).

For inter-band EN-DC within FR1 with 3 DL CCs (2NR DL CCs): Same test purpose as in clause 7.6A.2.1.1 in TS 38.521-1 [8].

7.6B.2.3_1.1.2 Test Applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band contiguous EN-DC within FR1 with 3 DL CCs or inter-band EN-DC within FR1 with 3 DL CCs (2NR DL CCs).

7.6B.2.3_1.1.3 Minimum Conformance Requirements

For intra-band contiguous EN-DC within FR1 with 3 DL CCs: The minimum conformance requirements are defined in clause 7.6 B.2.0.1. Exception requirements for both NR and E-UTRA are defined and therefore LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

For inter-band EN-DC within FR1 with 3 DL CCs (2NR DL CCs): The minimum conformance requirements are defined in clause 7.6B.2.0.3.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

7.6B.2.3_1.1.4 Test Description

7.6B.2.3_1.1.4.1 Intra-band contiguous EN-DC within FR1 with 3 DL CCs

7.6B.2.3_1.1.4.1.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on EN-DC operating bands specified in clause 5.3B.1.2, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-1 [8] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2. All of these configurations shall be tested with applicable test parameters for each EN-DC configuration specified in clause 5.3B.1.2 and are shown in Table 7.6B.2.3_1.1.4.1.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annex A.2 and A.3 respectively. The details of the OCNG patterns used are specified in TS 36.521-1 [10] Annex A.5 and in TS 38.521-1 [8] Annex A.5 for E-UTRA CG and NR CG respectively. Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521-1 [10] Annex C.2 and in TS 38.521-1 [8] Annex C.2 for E-UTRA CG and NR CG respectively.

Table 7.6B.2.3_1.1.4.1.1-1: Test configuration table

| Initial Conditions | | | | | |
|---|--|-------------------------|-------------------------|------------------------------------|-----------------------------|
| Test Environment as specified in TS 38.508-1 [6] clause 4.1 | Normal | | | | |
| Test Frequencies as specified in TS 38.508-1 [6] clause 4.3.1 for different EN-DC bandwidth classes | Mid range | | | | |
| Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1 across bandwidth combination sets supported by the UE | Lowest N_{RB_agg} , Highest N_{RB_agg} (NOTE 3) | | | | |
| NR Test SCS as specified in Table 5.3.5-1 in TS 38.521-1 [8] | Lowest | | | | |
| NR/E-UTRA Test Parameters | | | | | |
| PCC – E-UTRA | | SCC – EUTRA | | NR | |
| UL/DL Modulation | UL/DL allocation | UL/DL Modulation | UL/DL allocation | UL/DL Modulation | UL/DL allocation |
| QPSK/QPSK | REFSENS/Full RB | NA/QPSK | NA/Full RB | DFT-s-OFDM QPSK/CP-OFDM QPSK | REFSENS/Full RB (NOTE 1) |
| NOTE 1: Full RB allocation shall be used per each SCS and channel BW as specified in Table 7.3.2.4.1-2 of TS 38.521-1 [8]. | | | | | |
| NOTE 2: Test Channel Bandwidths are checked separately for each EN-DC band, which applicable channel bandwidths are specified in Table 5.3B.1.2-1. | | | | | |
| NOTE 3: If the UE supports multiple CC Combinations in the EN-DC Configuration with the same N_{RB_agg} , only the combination with the highest N_{RB_SCG} is tested. | | | | | |
| NOTE 4: REFSENS refers to Uplink configuration in Table 7.3.2.3-3 in [8] and Table 7.3.3-2 in [10] for NR and E-UTRA CC respectively. | | | | | |
| NOTE 5: In a FR1 band where UE supports 4Rx, the test shall be performed only with 4Rx antennas ports connected and 4Rx REFSENS requirement (TS 38.521-1 [8] Table 7.3.2.5-2) is used in the test requirements. | | | | | |

1. Connect the SS to the UE antenna connectors as shown in [6] TS 38.508-1 Annex A, in Figure A.3.1.4.1 for SS diagram and clause A.3.2 for UE diagram.
2. The parameter settings for the E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3, and the parameter settings for the NR cell are set up according to TS 38.508-1 [6] clause 4.4.3.
3. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C and TS 38.521-1 [8] Annex C for E-UTRA CG and NR CG respectively, and uplink signals according to TS 36.521-1 [10] Annex H and TS 38.521-1 [8] Annex G for E-UTRA CG and NR CG respectively.
4. The UL and DL Reference Measurement channels are TS 36.521-1 [10] Annex A.2, A.3 and TS 38.521-1 [8] Annex A.2 , A.3 for E-UTRA CG and NR CG respectively.

5. Propagation conditions are set according to TS 36.521-1 [10] Annex B.0 and TS 38.521-1 [8] Annex B.0 for E-UTRA CG and NR CG respectively.
6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 7.6B.2.3_1.1.4.1.3.

7.6B.2.3_1.1.4.1.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A and PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Table 7.6B.2.3_1.1.4.1.1-1 on E-UTRA CC and NR CC respectively. The SS sends downlink MAC padding bits on the DL RMC.
2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 7.6B.2.3_1.1.4.1.1-1 on E-UTRA CC and NR CC respectively. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
3. Set the Downlink signal level to the value as defined in Table 7.6B.2.1.5-1. For NR CC and E-UTRA CC, send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as -(MU to -(MU + Uplink power control window size) dB of the target power level in Table 7.6B.2.1.5-1 + ([10log(S_LCRB/N_{RB_alloc}) for NR CC, [10log(P_LCRB/N_{RB_alloc}) for E-UTRA CC) for at least the duration of the Throughput measurement, where:
 - MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW
 - For NR CC, Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified in Table F.1.2-1.
 - For E-UTRA CC, Uplink power control window size = 1dB (UE power step size) + 1.0dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 36.101 [5], Table 6.3.5.2.1-1 and is 1.0dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified in Table F.1.2-1 of TS 36.521-1 [10].
4. Set the parameters of the signal generator for an interfering signal below the aggregated component carriers in Case 1 according to Table 7.6B.2.1.5-1.
5. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex H.2.
6. Repeat steps from 4 to 5, using an interfering signal above the aggregated component carriers in Case 1 at step 4.
7. Repeat steps from 4 to 6, using interfering signals in Case 2 at steps 4 and 6.

NOTE: The purpose of the Uplink power control window is to ensure that the actual UE output power is no greater than the target power level, and as close as possible to the target power level. The relationship between the Uplink power control window, the target power level and the corresponding possible actual UE Uplink power window is illustrated in Annex F, clause F.4.

7.6B.2.3_1.1.4.1.3 Message contents

Message contents are according to TS 38.508-1 [6] clause 4.6 Table 4.6.3-118 with condition TRANSFORM_PRECODER_ENABLED.

7.6B.2.3_1.1.4.2 Inter-band EN-DC within FR1 with 3 DL CCs (2NR DL CCs)

Same test description as in clause 7.6A.2.1.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1.

For Initial conditions as in clause 7.6A.2.1.4.1 in TS 38.521-1 [8], add step 2.1 and step 3.1 as follows:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 7.6A.2.1.4.1 in TS 38.521-1 [8] is replaced by:

- 6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

Add step 7 to Initial conditions in clause 7.6A.2.1.4.1 in TS 38.521-1 [8] as follows:

- 7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

7.6B.2.3_1.1.5 Test Requirement

For intra-band contiguous EN-DC within FR1 with 3 DL CCs: Same test requirement as in clause 7.6B.2.1.5.

For inter-band EN-DC within FR1 with 3 DL CCs (2NR DL CCs): Same test requirement as in clause 7.6A.2.1.5 in TS 38.521-1 [8].

7.6B.2.3_1.2 Inband blocking for EN-DC within FR1 (4 CCs)

7.6B.2.3_1.2.1 Test Purpose

For intra-band contiguous EN-DC within FR1 with 4 DL CCs: In-band blocking is defined for an unwanted interfering signal falling into the range from 15MHz below to 15MHz above the UE receive band, at which the relative throughput shall meet or exceed the requirement for the specified measurement channels. The lack of in-band blocking ability will decrease the coverage area when other NodeB transmitters exist (except in the adjacent channels and spurious response).

For inter-band EN-DC within FR1 with 4 DL CCs (3NR DL CCs): Same test purpose as in clause 7.6A.2.2.1 in TS 38.521-1 [8].

7.6B.2.3_1.2.2 Test Applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band contiguous EN-DC within FR1 with 4 DL CCs or inter-band EN-DC within FR1 with 4 DL CCs (3NR DL CCs).

7.6B.2.3_1.2.3 Minimum Conformance Requirements

For intra-band contiguous EN-DC within FR1 with 4 DL CCs: The minimum conformance requirements are defined in clause 7.6 B.2.0.1. Exception requirements for both NR and E-UTRA are defined and therefore LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

For inter-band EN-DC within FR1 with 4 DL CCs (3NR DL CCs): The minimum conformance requirements are defined in clause 7.6B.2.0.3.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

7.6B.2.3_1.2.4 Test Description

7.6B.2.3_1.2.4.1 Intra-band contiguous EN-DC within FR1 with 4 DL CCs

7.6B.2.3_1.2.4.1.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on EN-DC operating bands specified in clause 5.3B.1.2, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-1 [8] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2. All of these configurations shall be tested with applicable test parameters for each EN-DC configuration specified in clause 5.3B.1.2 and are shown in Table 7.6B.2.3_1.2.4.1.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annex A.2 and A.3 respectively. The details of the OCNG patterns used are specified in TS 36.521-1 [10] Annex A.5 and in TS 38.521-1 [8] Annex A.5 for E-UTRA CG and NR CG respectively. Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521-1 [10] Annex C.2 and in TS 38.521-1 [8] Annex C.2 for E-UTRA CG and NR CG respectively.

Table 7.6B.2.3_1.2.4.1.1-1: Test configuration table

| Initial Conditions | | | | | |
|---|---|------------------|------------------|------------------------------|--------------------------|
| Test Environment as specified in TS 38.508-1 [6] clause 4.1 | Normal | | | | |
| Test Frequencies as specified in TS 38.508-1 [6] clause 4.3.1 for different EN-DC bandwidth classes | Mid range | | | | |
| Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1 across bandwidth combination sets supported by the UE | Lowest N_{RB_agg} , Highest N_{RB_agg} (NOTE 3) | | | | |
| NR Test SCS as specified in Table 5.3.5-1 in TS 38.521-1 [8] | Lowest | | | | |
| NR/E-UTRA Test Parameters | | | | | |
| PCC – E-UTRA | SCC1 – EUTRA and SCC2 – EUTRA | NR | | | |
| UL/DL Modulation | UL/DL allocation | UL/DL Modulation | UL/DL allocation | UL/DL Modulation | UL/DL allocation |
| QPSK/QPSK | REFSENS/Full RB | NA/QPSK | NA/Full RB | DFT-s-OFDM QPSK/CP-OFDM QPSK | REFSENS/Full RB (NOTE 1) |
| NOTE 1: Full RB allocation shall be used per each SCS and channel BW as specified in Table 7.3.2.4.1-2 of TS 38.521-1 [8]. NOTE 2: Test Channel Bandwidths are checked separately for each EN-DC band, which applicable channel bandwidths are specified in Table 5.3B.1.2-1. NOTE 3: If the UE supports multiple CC Combinations in the EN-DC Configuration with the same N_{RB_agg} , only the combination with the highest N_{RB_SCG} is tested. NOTE 4: REFSENS refers to Uplink configuration in Table 7.3.2.3-3 in [8] and Table 7.3.3-2 in [10] for NR and E-UTRA CC respectively. NOTE 5: In a FR1 band where UE supports 4Rx, the test shall be performed only with 4Rx antennas ports connected and 4Rx REFSENS requirement (TS 38.521-1 [8] Table 7.3.2.5-2) is used in the test requirements. | | | | | |

1. Connect the SS to the UE antenna connectors as shown in [6] TS 38.508-1 Annex A, in Figure A.3.1.4.1 for SS diagram and clause A.3.2 for UE diagram.
2. The parameter settings for the E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3, and the parameter settings for the NR cell are set up according to TS 38.508-1 [6] clause 4.4.3.
3. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C and TS 38.521-1 [8] Annex C for E-UTRA CG and NR CG respectively, and uplink signals according to TS 36.521-1 [10] Annex H and TS 38.521-1 [8] Annex G for E-UTRA CG and NR CG respectively.
4. The UL and DL Reference Measurement channels are TS 36.521-1 [10] Annex A.2, A.3 and TS 38.521-1 [8] Annex A.2 , A.3 for E-UTRA CG and NR CG respectively.
5. Propagation conditions are set according to TS 36.521-1 [10] Annex B.0 and TS 38.521-1 [8] Annex B.0 for E-UTRA CG and NR CG respectively.
6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 7.6B.2.3_1.2.4.1.3.

7.6B.2.3_1.2.4.1.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A and PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Table 7.6B.2.3_1.2.4.1.1-1 on E-UTRA CC and NR CC respectively. The SS sends downlink MAC padding bits on the DL RMC.
2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 7.6B.2.3_1.2.4.1.1-1 on E-UTRA CC and NR CC respectively. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
3. Set the Downlink signal level to the value as defined in Table 7.6B.2.1.5-1. For NR CC and E-UTRA CC, send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as $-\text{MU} \leq \text{UE power} \leq -(\text{MU} + \text{Uplink power control window size})$ dB of the target power level in Table 7.6B.2.1.5-1 + ($[10\log(S_{\text{LCRB}}/N_{\text{RB_alloc}})]$ for NR CC, $[10\log(P_{\text{LCRB}}/N_{\text{RB_alloc}})]$ for E-UTRA CC) for at least the duration of the Throughput measurement, where:
 - MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW
 - For NR CC, Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified in Table F.1.2-1.
 - For E-UTRA CC, Uplink power control window size = 1dB (UE power step size) + 1.0dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 36.101 [5], Table 6.3.5.2.1-1 and is 1.0dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified in Table F.1.2-1 of TS 36.521-1 [10].
4. Set the parameters of the signal generator for an interfering signal below the aggregated component carriers in Case 1 according to Table 7.6B.2.1.5-1.
5. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex H.2.
6. Repeat steps from 4 to 5, using an interfering signal above the aggregated component carriers in Case 1 at step 4.
7. Repeat steps from 4 to 6, using interfering signals in Case 2 at steps 4 and 6.

NOTE: The purpose of the Uplink power control window is to ensure that the actual UE output power is no greater than the target power level, and as close as possible to the target power level. The relationship between the Uplink power control window, the target power level and the corresponding possible actual UE Uplink power window is illustrated in Annex F, clause F.4.

7.6B.2.3_1.2.4.1.3 Message contents

Message contents are according to TS 38.508-1 [6] clause 4.6 Table 4.6.3-118 with condition TRANSFORM_PRECODER_ENABLED.

7.6B.2.3_1.2.4.2 Inter-band EN-DC within FR1 with 4 DL CCs (3NR DL CCs)

Same test description as in clause 7.6A.2.2.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1.

For Initial conditions as in clause 7.6A.2.2.4.1 in TS 38.521-1 [8], add step 2.1 and step 3.1 as follows:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 7.6A.2.2.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

Add step 7 to Initial conditions in clause 7.6A.2.2.4.1 in TS 38.521-1 [8] as follows:

7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

7.6B.2.3_1.2.5 Test Requirement

For intra-band contiguous EN-DC within FR1 with 4 DL CCs: Same test requirement as in clause 7.6B.2.1.5.

For inter-band EN-DC within FR1 with 4 DL CCs (3NR DL CCs): Same test requirement as in clause 7.6A.2.2.5 in TS 38.521-1 [8].

7.6B.2.3_1.3 Inband blocking for EN-DC within FR1 (5 CCs)

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- The referred test case 7.6A.2.3 in TS 38.521-1 is incomplete.

7.6B.2.3_1.3.1 Test Purpose

Same test purpose as in clause 7.6B.2.3.1.

7.6B.2.3_1.3.2 Test Applicability

This test case applies to all types of E-UTRA UE release 16 and forward, supporting inter-band EN-DC within FR1 with 5 DL CCs (4 NR DL CCs).

7.6B.2.3_1.3.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.6B.2.0.3.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

7.6B.2.3_1.3.4 Test Description

Same test description as in clause 7.6A.2.3.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1.

For Initial conditions as in clause 7.6A.2.3.4.1 in TS 38.521-1 [8], add step 2.1 and step 3.1 as follows:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 7.6A.2.3.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

Add step 7 to Initial conditions in clause 7.6A.2.3.4.1 in TS 38.521-1 [8] as follows:

7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

7.6B.2.3_1.3.5 Test Requirement

Same test requirement as in clause 7.6A.2.3.5 in TS 38.521-1 [8].

7.6B.2.3_1.4 Void

7.6B.2.4 Inband blocking for inter-band EN-DC including FR2 (2 CCs)

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- MU is FFS in referred test case 7.6.2 in TS 38.521-2 [9].

7.6B.2.4.1 Test Purpose

Same test purpose as in clause 7.6.2.1 in TS 38.521-2 [9] for the NR carrier.

7.6B.2.4.2 Test Applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 2 DL CCs.

7.6B.2.4.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.6B.2.0.4.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

7.6B.2.4.4 Test Description

Same test description as in clause 7.6.2.4 in TS 38.521-2 [9] for the NR carrier with the following exceptions:

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1.

For Initial conditions as in clause 7.6.2.4.1 in TS 38.521-2 [9], add step 2.1 and step 3.1 as follows:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 7.6.2.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

Add step 7 to Initial conditions in clause 7.6.2.4.1 in TS 38.521-2 [9] as follows:

7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

7.6B.2.4.5 Test Requirement

Same test requirement as in clause 7.6.2.5 in TS 38.521-2 [9].

7.6B.2.4_1 Inband blocking for inter-band EN-DC including FR2 (>2 CCs)

7.6B.2.4_1.1 Inband blocking for inter-band EN-DC including FR2 (3 CCs)

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- The referred test case 7.6A.2.1 in TS 38.521-2 is incomplete.

7.6B.2.4_1.1.1 Test Purpose

Same test purpose as in clause 7.6B.2.4.1.

7.6B.2.4_1.1.2 Test Applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 3CCs (2NR CCs).

7.6B.2.4_1.1.3 Minimum Conformance Requirements

Same minimum conformance requirements as in clause 7.4B.2.4.3

7.6B.2.4_1.1.4 Test Description

Same test description as in clause 7.6A.2.1.4 in TS 38.521-2 [9] for the NR carrier with the following exceptions:

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1.

For Initial conditions as in clause 7.6A.2.1.4.1 in TS 38.521-2 [9], add step 2.1 and step 3.1 as follows:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 7.6A.2.1.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 36.508 [6] clause 4.5.

Add step 7 to Initial conditions in clause 7.6A.2.1.4.1 in TS 38.521-2 [9] as follows:

7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

7.6B.2.4_1.1.5 Test Requirement

Same test requirement as in clause 7.6A.2.1.5 in TS 38.521-2 [9].

7.6B.2.4_1.2 Inband blocking for inter-band EN-DC including FR2 (4 CCs)

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- The referred test case 7.6A.2.2 in TS 38.521-2 is incomplete.

7.6B.2.4_1.2.1 Test Purpose

Same test purpose as in clause 7.6B.2.4.1.

7.6B.2.4_1.2.2 Test Applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 4CCs (3NR CCs).

7.6B.2.4_1.2.3 Minimum Conformance Requirements

Same minimum conformance requirements as in clause 7.4B.2.4.3

7.6B.2.4_1.2.4 Test Description

Same test description as in clause 7.6A.2.2.4 in TS 38.521-2 [9] for the NR carrier with the following exceptions:

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1.

For Initial conditions as in clause 7.6A.2.2.4.1 in TS 38.521-2 [9], add step 2.1 and step 3.1 as follows:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 7.6A.2.2.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

Add step 7 to Initial conditions in clause 7.6A.2.2.4.1 in TS 38.521-2 [9] as follows:

7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

7.6B.2.4_1.2.5 Test Requirement

Same test requirement as in clause 7.6A.2.2.5 in TS 38.521-2 [9].

7.6B.2.4_1.3 Inband blocking for inter-band EN-DC including FR2 (5 CCs)

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- The referred test case 7.6A.2.3 in TS 38.521-2 is incomplete.

7.6B.2.4_1.3.1 Test Purpose

Same test purpose as in clause 7.6B.2.4.1.

7.6B.2.4_1.3.2 Test Applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 5CCs (4NR CCs).

7.6B.2.4_1.3.3 Minimum Conformance Requirements

Same minimum conformance requirements as in clause 7.4B.2.4.3

7.6B.2.4_1.3.4 Test Description

Same test description as in clause 7.6A.2.3.4 in TS 38.521-2 [9] for the NR carrier with the following exceptions:

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1.

For Initial conditions as in clause 7.6A.2.3.4.1 in TS 38.521-2 [9], add step 2.1 and step 3.1 as follows:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 7.6A.2.3.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

Add step 7 to Initial conditions in clause 7.6A.2.3.4.1 in TS 38.521-2 [9] as follows:

7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

7.6B.2.4_1.3.5 Test Requirement

Same test requirement as in clause 7.6A.2.3.5 in TS 38.521-2 [9].

7.6B.2.4_1.4 Inband blocking for inter-band EN-DC including FR2 (6 CCs)

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- The referred test case 7.6A.2.4 in TS 38.521-2 is incomplete.

7.6B.2.4_1.4.1 Test Purpose

Same test purpose as in clause 7.6B.2.4.1.

7.6B.2.4_1.4.2 Test Applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 6CCs (5NR CCs).

7.6B.2.4_1.4.3 Minimum Conformance Requirements

Same minimum conformance requirements as in clause 7.4B.2.4.3

7.6B.2.4_1.4.4 Test Description

Same test description as in clause 7.6A.2.4.4 in TS 38.521-2 [9] for the NR carrier with the following exceptions:

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1.

For Initial conditions as in clause 7.6A.2.4.4.1 in TS 38.521-2 [9], add step 2.1 and step 3.1 as follows:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 7.6A.2.4.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

Add step 7 to Initial conditions in clause 7.6A.2.4.4.1 in TS 38.521-2 [9] as follows:

7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

7.6B.2.4_1.4.5 Test Requirement

Same test requirement as in clause 7.6A.2.4.5 in TS 38.521-2 [9].

7.6B.2.4D Inband blocking for inter-band EN-DC including FR2 for UL-MIMO

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- The referred test case 7.6D.2 in TS 38.521-2 [9] is incomplete

7.6B.2.4D.1 Test purpose

Same test purpose as in clause 7.6D.2.1 in TS 38.521-2 [9] for the NR carrier.

7.6B.2.4D.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with UL-MIMO.

7.6B.2.4D.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 7.6D.2.3 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this measurement is TS 38.101-3 [4] clause 7.6B.2.4.

7.6B.2.4D.4 Test Description

Same test description as in clause 7.6D.2.4 in TS 38.521-2 [9] for the NR carrier with the following exceptions:

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1.

For Initial conditions as in clause [7.6D.2.4.1] in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for the cell are set up according to TS 36.508 [11] subclause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

[Step 6] of Test procedure as in clause [7.6D.2.4.2] in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set TimeAlignmentTimerDedicated IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

7.6B.2.4D.5 Test Requirement

Same test requirement as specified in TS 38.521-2 [9] clause [7.6D.2.5] for the NR carrier(s).

7.6B.2.5 Inband blocking for inter-band EN-DC including both FR1 and FR2

7.6B.2.5.1 Test purpose

Same test purpose as in clause 7.6.2.1 in TS 38.521-1 [8] for NR FR1 carrier and clause 7.6.2.1 in TS 38.521-2 [9] for NR FR2 carrier.

7.6B.2.5.2 Test applicability

The requirements in this test are not testable due to issues with combined testing of NR FR1 and E-UTRA in conducted mode with NR FR2 in radiated mode. Therefore, the conducted and radiated requirements are tested separately.

No test case details are specified. The NSA requirements for Inband blocking apply and are tested as part of the EN-DC within FR1 and EN-DC including FR2 test cases in clause 7.6B.2.

7.6B.2.5D Inband blocking for inter-band EN-DC including FR1 and FR2 for UL-MIMO

Editor's note: This clause is incomplete. Following aspects are either missing or not yet determined:

- clause [7.6D.X] in TS 38.521-2 [9] is FFS.

7.6B.2.5D.1 Test purpose

Same test purpose as in clause 7.6D.2 in TS 38.521-1 [8] for NR FR1 carrier and clause [7.6D.X] in TS 38.521-2 [9] for NR FR2 carrier.

7.6B.2.5D.2 Test applicability

The requirements in this test are not testable due to issues with combined testing of NR FR1 and E-UTRA in conducted mode with NR FR2 in radiated mode. Therefore, the conducted and radiated requirements are tested separately.

No test case details are specified. The NSA requirements for Inband blocking apply and are tested as part of the EN-DC within FR1 and EN-DC including FR2 test cases in clause 7.6B.2.

7.6B.3 Out-of-band blocking for DC

7.6B.3.0 Minimum Conformance Requirements

7.6B.3.0.1 Intra-band contiguous EN-DC in FR1

Intra-band contiguous EN-DC out-of-band requirement and parameters are defined in Table 7.6B.3.0.1-1.

Table 7.6B.3.0.1-1: Out-of-band blocking for intra-band contiguous EN-DC

| EN-DC Aggregated Bandwidth, MHz | ≤ 100 | $>100, \leq 120$ | $>120, \leq 140$ | $>140, \leq 160$ |
|--|---|------------------|------------------|------------------|
| Pw in Transmission Bandwidth Configuration, perCC, dBm | REFSENS + Aggregated BW specific value below | | | |
| | 9 | | | |
| NOTE 1: | Interferer values and offsets are specified from Table 7.6.2.1A-2 in TS 36.101 [5]. For inter-band combinations where the intra-band requirements are applicable, in which the E-UTRA band is a subset of an NR-only band, the NR band interferer values and offsets specified from Table 7.6A.3-2 in TS 38.101-1 [2] apply to both E-UTRA and NR carriers. | | | |
| NOTE 2: | For NR carrier, the transmitter shall be set to 4dB below $P_{CMAX_L,f,c,NR}$ at the minimum uplink configuration specified in Table 7.3.2-3 [2] with $P_{CMAX_L,f,c,NR}$ as defined in clause 6.2B.4. | | | |
| NOTE 3: | For E-UTRA carrier, the transmitter shall be set to 4dB below $P_{CMAX_L_E-UTRA,c}$ at the minimum uplink configuration specified in Table 7.3.1-2 [5] with $P_{CMAX_L_E-UTRA,c}$ as defined in clause 6.2B.4 for single carrier. | | | |

The normative reference for this requirement is TS 38.101-3 [4] clause 7.6B.3.1.

7.6B.3.0.2 Intra-band non-contiguous EN-DC in FR1

For the E-UTRA sub-block containing one or multiple CC's, the requirement is defined in clause 7.6.2.1 for single carrier operation and in clause 7.6.2.1A for CA in TS 36.101 [5].

For the NR sub-block, the requirement is defined in clause 7.6.3 in TS 38.101-1 [2].

The normative reference for this requirement is TS 38.101-3 [4] clause 7.6B.3.2.

7.6B.3.0.3 Inter-band EN-DC within FR1

Out-of-band blocking requirements for E-UTRA single carrier and CA operation specified in clauses 7.6.2.1 and 7.6.2.1A of TS 36.101 [5] and for NR single carrier and CA operation specified in clauses 7.6.3 and 7.6A.3 of TS 38.101-1 [2] apply for lowest level EN-DC fallbacks (two bands) in clause 5.5B.4.1 with following conditions:

- one E-UTRA uplink carrier with the output power set to 4dB below $P_{CMAX,L,c}$ and the NR band whose downlink is being tested has its uplink carrier output power set to 29 dB below $P_{CMAX,L,f,c}$.
- one NR uplink carrier with the output power set to 4dB below $P_{CMAX,L,f,c}$ on the NR band with both E-UTRA and NR downlinks being tested with E-UTRA output power set to 29 dB below $P_{CMAX,L,c}$.

If CW interferer falls in a gap between F_{DL_high} of the E-UTRA or NR band and F_{DL_low} of the NR or EUTRA band, where the corresponding OOB ranges 1 and 2 overlap, then the lower level interferer limit of the overlapping OOB ranges applies.

If F_{DL_high} of the lower E-UTRA or NR band is greater than or equal to the F_{DL_low} of the upper NR or E-UTRA band as in overlapping RX frequency ranges, then the OOB range shall start from the F_{DL_low} of the lower E-UTRA or NR band, and from the F_{DL_high} of the upper NR or E-UTRA band.

For EN-DC combination listed in Table 7.6B.3.0.3-1 under the first test condition above, exceptions to the requirement specified in Table 7.6B.3.0.3-2 are allowed when the second order intermodulation product of the lower frequency band UL carrier and the CW interfering signal fully or partially overlaps with the higher frequency band DL carrier.

Table 7.6B.3.0.3-1: EN-DC combination with exceptions allowed

| EN-DC combination |
|-------------------|
| DC_5_n78 |
| DC_8_n77 |
| DC_8_n78 |
| DC_8_n79 |
| DC_11_n77 |
| DC_18_n77 |
| DC_18_n78 |
| DC_18_n79 |
| DC_19_n77 |
| DC_19_n78 |
| DC_19_n79 |
| DC_20_n77 |
| DC_20_n78 |
| DC_21_n77 |
| DC_26_n77 |
| DC_26_n78 |
| DC_26_n79 |
| DC_28_n77 |
| DC_28_n78 |
| DC_28_n79 |

Table 7.6B.3.0.3-2: Exceptions allowed

| Parameter | Unit | Level |
|--|------|------------------|
| P _{Interferer} (CW) | dBm | -44 ¹ |
| NOTE 1: The requirement applies when $ f_{\text{interferer}} \pm f_{UL}^{LB} - f_{DL}^{HB} \leq (BW_{UL}^{LB} + BW_{DL}^{HB})/2$, where f_{UL}^{LB} and f_{DL}^{HB} are the carrier frequencies for lower frequency band UL and higher frequency band DL, respectively. BW_{UL}^{LB} and BW_{DL}^{HB} are the channel bandwidths configured for lower frequency band UL carrier and higher frequency band DL carrier in MHz, respectively. | | |

For each of the two test cases in clauses 7.6.2.1 and 7.6.2.1A of [5] and for NR single carrier and CA operation specified in clauses 7.6.3 and 7.6A.3 of TS 38.101-1 [2] for all interferer frequency ranges a maximum of

$$\lfloor \max \{24,6 \cdot \lceil n \cdot N_{RB} / 6 \rceil\} / \min \{\lfloor n \cdot N_{RB} / 10 \rfloor, 5\} \rfloor$$

exceptions are allowed for spurious response frequencies in each assigned frequency channel when measured using a step size of $\min(\lfloor CBW / 2 \rfloor, 5)$ MHz with N_{RB} the number of resource blocks in the downlink transmission bandwidth configuration, CBW the bandwidth of the frequency channel in MHz and $n = 1, 2, 3$ for SCS = 15, 30, 60 kHz, respectively. For these exceptions, the requirements in clause 7.7 apply.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.6B.3.3.

7.6B.3.0.3A Inter-band NE-DC within FR1

Out-of-band blocking requirements for E-UTRA single carrier and CA operation specified in clauses 7.6.2.1 and 7.6.2.1A of TS 36.101 [5] and for NR single carrier and CA operation specified in clauses 7.6.3 and 7.6A.3 of TS 38.101-1 [2] apply for lowest level NE-DC fallbacks (two bands) in clause 5.5B.4a.1 with following conditions:

- one E-UTRA uplink carrier with the output power set to 4 dB below P_{CMAX_L,c} and the NR band whose downlink is being tested has its uplink carrier output power set to 29 dB below P_{CMAX_L,f,c}.
- one NR uplink carrier with the output power set to 4 dB below P_{CMAX_L,f,c} on the NR band with both E-UTRA and NR downlinks being tested with E-UTRA output power set to 29 dB below P_{CMAX_L,c}.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.6B.3.3a.

7.6B.3.0.4 Inter-band EN-DC including FR2

Out-of-band blocking requirements specified for E-UTRA single carrier and CA operation specified in clauses 7.6.2.1 and 7.6.2.1A of TS 36.101 [5] apply for lowest level EN-DC fallbacks (two bands) in clause 5.5B.5.1 with only E-UTRA UL with output power as in TS 36.101 [5] (4dB below P_{CMAX_L}).

The normative reference for this requirement is TS 38.101-3 [4] clause 7.6B.3.4.

7.6B.3.0.5 Inter-band EN-DC including both FR1 and FR2

Out-of-band blocking requirements specified for E-UTRA single carrier and CA operation specified in clauses 7.6.2.1 and 7.6.2.1A of TS 36.101 [5] and for NR single carrier and CA operation specified in clauses 7.6.3 and 7.6A.3 of TS 38.101-1 [2] apply for lowest level EN-DC fallbacks (three bands) in clause 5.5B.6.2 with only E-UTRA UL with output power as in TS 36.101 [5] (4dB below P_{CMAX_L}).

The normative reference for this requirement is TS 38.101-3 [4] clause 7.6B.3.5.

7.6B.3.1 Out-of-band blocking for intra-band contiguous EN-DC in FR1 (2 CCs)

7.6B.3.1.1 Test Purpose

Out-of-band band blocking is defined for an unwanted CW interfering signal falling more than 15 MHz below or above the UE receive band, at which a given average throughput shall meet or exceed the requirement for the specified measurement channels.

For the first 15 MHz below or above the UE receive band the appropriate in-band blocking or adjacent channel selectivity in clause 7.6B.2.1 and clause 7.5B.1 shall be applied.

The lack of out-of-band blocking ability will decrease the coverage area when other NodeB transmitters exist (except in the adjacent channels and spurious response).

7.6B.3.1.2 Test Applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band contiguous EN-DC in FR1 with 2CCs.

7.6B.3.1.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.6B.3.0.1.

Exception requirements for both NR and E-UTRA are defined for this test and therefore LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

7.6B.3.1.4 Test Description

7.6B.3.1.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on EN-DC operating bands specified in clause 5.3B.1.2, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-1 [8] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2. All of these configurations shall be tested with applicable test parameters for each EN-DC configuration specified in clause 5.3B.1.2 and are shown in Table 7.6B.3.1.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annex A.2 and A.3 respectively. The details of the OCNG patterns used are specified in TS 36.521-1 [10] Annex A.5 and in TS 38.521-1 [8] Annex A.5 for E-UTRA CG and NR CG respectively. Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521-1 [10] Annex C.2 and in TS 38.521-1 [8] Annex C.2 for E-UTRA CG and NR CG respectively.

Table 7.6B.3.1.4.1-1: Test configuration table

| Initial Conditions | | | | | | | |
|---|--------------------------------|-------------------|----------------------|----------------------|------------------|-------------------|----------------------|
| Test Environment as specified in TS 38.508-1 [6] clause 4.1 | Normal | | | | | | |
| Test Frequencies as specified in TS 38.508-1 [6] clause 4.3.1 for different EN-DC bandwidth classes | Mid range | | | | | | |
| Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1 across bandwidth combination sets supported by the UE | Highest N_{RB_agg} (NOTE 3) | | | | | | |
| NR Test SCS as specified in Table 5.3.5-1 in TS 38.521-1 [8] | Lowest | | | | | | |
| NR/E-UTRA Test Parameters | | | | | | | |
| Downlink Configuration | | | | Uplink Configuration | | | |
| NR Modulation | NR RB allocation | E-UTRA Modulation | E-UTRA RB allocation | NR Modulation | NR RB allocation | E-UTRA Modulation | E-UTRA RB allocation |
| CP-OFDM QPSK | Full RB (NOTE 1) | QPSK | Full RB | DFT-s-OFDM QPSK | REFSENS | QPSK | REFSENS |
| NOTE 1: Full RB allocation shall be used per each SCS and channel BW as specified in Table 7.3.2.4.1-2 of TS 38.521-1 [8]. NOTE 2: Test Channel Bandwidths are checked separately for each EN-DC band, which applicable channel bandwidths are specified in Table 5.3B.1.2-1. NOTE 3: If the UE supports multiple CC Combinations in the EN-DC Configuration with the same N_{RB_agg} , only the combination with the highest NRB_SCG is tested. NOTE 4: REFSENS refers to Uplink configuration in Table 7.3.2.3-3 in [8] and Table 7.3.3-2 in [10] for NR and E-UTRA CC respectively. NOTE 5: In a FR1 band where UE supports 4Rx, the test shall be performed only with 4Rx antennas ports connected and 4Rx REFSENS requirement (TS 38.521-1 [8] Table 7.3.2.5-2) is used in the test requirements. | | | | | | | |

1. Connect the SS to the UE antenna connectors as shown in [6] TS 38.508-1 Annex A, in Figure A.3.1.4.2 for SS diagram and clause A.3.2 for UE diagram.
2. The parameter settings for the cell are set up according to TS 38.508-1 [6] clause 4.4.3.
3. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C and TS 38.521-1 [8] Annex C for E-UTRA CG and NR CG respectively, and uplink signals according to TS 36.521-1 [10] Annex H and TS 38.521-1 [8] Annex G for E-UTRA CG and NR CG respectively.
4. The UL and DL Reference Measurement channels are TS 36.521-1 [10] Annex A.2, A.3 and TS 38.521-1 [8] Annex A.2 , A.3 for E-UTRA CG and NR CG respectively.
5. Propagation conditions are set according to TS 36.521-1 [10] Annex B.0 and TS 38.521-1 [8] Annex B.0 for E-UTRA CG and NR CG respectively.
6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 7.6B.3.1.4.3.

7.6B.3.1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A and PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Table 7.6B.3.1.4.1-1 on E-UTRA CC and NR CC respectively. The SS sends downlink MAC padding bits on the DL RMC.
2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 7.6B.3.1.4.1-1 on E-UTRA CC and NR CC respectively. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
3. Set the Downlink signal level to the value as defined in Table 7.6B.3.1.5-1. For NR CC and E-UTRA CC, send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power

measured by the test system is within the Uplink power control window, defined as $-\text{MU}$ to $-(\text{MU} + \text{Uplink power control window size})$ dB of the target power level in Table 7.6B.3.1.5-1 + ([$10\log(S_{LCRB}/N_{RB_alloc})$] for NR CC, [$10\log(P_{LCRB}/N_{RB_alloc})$] for E-UTRA CC) for at least the duration of the Throughput measurement, where:

- MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW
 - For NR CC, Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified in Table F.1.2-1.
 - For E-UTRA CC, Uplink power control window size = 1dB (UE power step size) + 1.0dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 36.101 [5], Table 6.3.5.2.1-1 and is 1.0dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified in Table F.1.2-1 of TS 36.521-1 [10].
4. Set the parameters of the CW signal generator for an interfering signal below the aggregated component carriers according to Table 7.6B.3.1.5-1. The frequency step size is 1MHz.
 5. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex H.2.
 6. Repeat steps from 4 to 5, using an interfering signal above the aggregated component carriers at step 4.

NOTE: The purpose of the Uplink power control window is to ensure that the actual UE output power is no greater than the target power level, and as close as possible to the target power level. The relationship between the Uplink power control window, the target power level and the corresponding possible actual UE Uplink power window is illustrated in Annex F, clause F.4.

7.6B.3.1.4.3 Message contents

Message contents are according to TS 38.508-1 [6] clause 4.6 Table 4.6.3-118 with condition TRANSFORM_PRECODER_ENABLED.

7.6B.3.1.5 Test Requirement

The throughput shall be $\geq 95\%$ of the maximum throughput of the reference measurement channels as specified in TS 36.521-1 [10] Annex A.3 and TS 38.521-1 [8] Annex A.3 for E-UTRA CG and NR CG respectively with parameters specified in Table 7.6B.3.1.5-1 for the specified wanted signal mean power in the presence of interfering signals.

Table 7.6B.3.1.5-1: Out-of-band blocking for intra-band contiguous EN-DC

| EN-DC Aggregated Bandwidth, MHz | ≤ 100 | $> 100, \leq 120$ | $> 120, \leq 140$ | $> 140, \leq 160$ |
|--|--|-------------------|-------------------|-------------------|
| Pw in Transmission Bandwidth Configuration, perCC, dBm | REFSENS + Aggregated BW specific value below | | | |
| | 9 | | | |

NOTE 1: Interferer values and offsets are specified from Table 7.6.2.1A-2 in TS 36.101 [5]. For inter-band combinations where the intra-band requirements are applicable, in which the E-UTRA band is a subset of an NR-only band, the NR band interferer values and offsets specified from Table 7.6A.3-2 in TS 38.101-1 [2] apply to both E-UTRA and NR carriers.

NOTE 2: For NR carrier, the transmitter shall be set to 4dB below $P_{CMAX_L,f,c,NR}$ at the minimum uplink configuration specified in Table 7.3.2-3 in TS 8.101-1 [2] with $P_{CMAX_L,f,c,NR}$ as defined in clause 6.2B.4.

NOTE 3: For E-UTRA carrier, the transmitter shall be set to 4dB below $P_{CMAX_L_E-UTRA,c}$ at the minimum uplink configuration specified in Table 7.3.1-2 in TS 36.101 [5] with $P_{CMAX_L_E-UTRA,c}$ as defined in clause 6.2B.4 for single carrier.

Table 7.6B.3.1.5-2: Void**Table 7.6B.3.1.5-3: Void**

7.6B.3.2 Out-of-band blocking for intra-band non-contiguous EN-DC in FR1 (2 CCs)

7.6B.3.2.1 Test Purpose

Same test purpose as in clause 7.6.3.1 in TS 38.521-1 [8] for the NR carrier.

7.6B.3.2.2 Test Applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band non-contiguous EN-DC in FR1 with 2CCs.

7.6B.3.2.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.6B.3.0.2.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

7.6B.3.2.4 Test Description

Same test description as in clause 7.6.3.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

Table 7.6B.3.2.4-1: Test Configuration Table

| Initial Conditions | |
|---|-------------------------------------|
| Test Frequencies as specified in TS 38.508-1 [6] clause 4.3.1 for different EN-DC bandwidth classes | High with maxWGap |
| Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1 across bandwidth combination sets supported by the UE | Highest N _{RB_agg} (NOTE1) |
| NOTE 1: If the UE supports multiple CC Combinations in the EN-DC Configuration with the same NRB _{agg} , only the combination with the highest NRB _{SCG} is tested. | |

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1 except for the parameters specified in Table 7.6B.3.2.4-1.

For Initial conditions as in clause 7.6.3.4.1 in TS 38.521-1 [8], add step 2.1 and step 3.1 as follows:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 7.6.3.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

Add step 7 to Initial conditions in clause 7.6.3.4.1 in TS 38.521-1 [8] as follows:

7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

Step 4 of Test procedure as in clause 7.6.3.4.2 in TS 38.521-1 [8] is replaced by:

4. Set the downlink signal level for NR CC according to the Table 7.6.3.5-1 or 7.6.3.5-3 in TS 38.521-1 [8] as appropriate. For NR CC and E-UTRA CC, send uplink power control commands to the UE using 1dB power

step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as -MU to -(MU + Uplink power control window size) dB of ($P_{CMAX,L,c}$ - 29dB) for E-UTRA CC, and of 4dB below $P_{CMAX,L,f,c}$ for NR CC for at least the duration of the Throughput measurement, where:

- MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW
- For NR CC, Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified in Table F.1.2-1.
- For E-UTRA CC, Uplink power control window size = 1dB (UE power step size) + 1.0dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 36.101 [5], Table 6.3.5.2.1-1 and is 1.0dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified in Table F.1.2-1 of TS 36.521-1 [10].

7.6B.3.2.5 Test Requirement

Same test requirement as in clause 7.6.3.5 in TS 38.521-1 [8].

7.6B.3.3 Out-of-band blocking for inter-band EN-DC within FR1 (2 CCs)

7.6B.3.3.1 Test Purpose

Out-of-band band blocking is defined for an unwanted CW interfering signal falling more than 15 MHz or 3*CBW below or above the UE receive band, at which a given average throughput shall meet or exceed the requirement for the specified measurement channels.

For the first 15 MHz or 3*CBW below or above the UE receive band the appropriate in-band blocking or adjacent channel selectivity in clause 7.6B.2.3 and clause 7.5B.3 shall be applied.

The lack of out-of-band blocking ability will decrease the coverage area when other NodeB transmitters exist (except in the adjacent channels and spurious response).

7.6B.3.3.2 Test Applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC within FR1 with 2CCs.

7.6B.3.3.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.6B.3.0.3.

Exception requirements for both NR and E-UTRA are defined for this test and therefore LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

7.6B.3.3.4 Test Description

7.6B.3.3.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, DC configuration specified in clause 5.5B.4 and test channel bandwidths specified in TS 36.508 [11] clause 4.3.1 and TS 38.508-1 [6] clause 4.3.1, and sub-carrier spacing based on NR operating bands specified in TS 38.521-1 [8] clause 5.3. All of these configurations shall be tested with applicable test parameters for each EN-DC configuration, and are shown in Table 7.6B.3.3.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) and OCNG patterns are specified in TS 36.521-1 [10] Annex A for E-UTRA, and TS 38.521-1 [8] Annex A for NR. Configurations of

PDSCH and PDCCH before measurement are specified in TS 36.521-1 [10] Annex C and in TS 38.521-1 [8] Annex C for E-UTRA CG and NR CG respectively.

Table 7.6B.3.3.4.1-1: Test configuration table

| Initial Conditions | | | | | | | |
|---|---|--------------|---------------|-----------------------------|---------------|-----------------|---------------|
| Test Environment as specified in TS 38.508-1 [6] clause 4.1 | Normal | | | | | | |
| NR Test Frequencies as specified in TS 38.508-1 [6] clause 4.3.1 E-UTRA Test Frequencies as specified in TS 36.508-1 [11] clause 4.3.1 | Mid range for E-UTRA and Mid range for NR | | | | | | |
| NR Test Channel Bandwidths as specified in TS 38.508-1 [6] clause 4.3.1 E-UTRA Test Channel Bandwidths as specified in TS 36.508-1 [11] clause 4.3.1 | Highest for E-UTRA and Highest for NR | | | | | | |
| NR Test SCS as specified in TS 38.508-1 [6] Table 5.3.5-1 | Lowest | | | | | | |
| Test Parameters | | | | | | | |
| Downlink Configuration | | | | Uplink Configuration | | | |
| E-UTRA Cell | NR Cell | E-UTRA Cell | NR Cell | E-UTRA Cell | NR Cell | E-UTRA Cell | NR Cell |
| Modulation | RB allocation | Modulation | RB allocation | Modulation | RB allocation | Modulation | RB allocation |
| QPSK | NOTE 1 | CP-OFDM QPSK | NOTE 1 | QPSK | NOTE 1 | DFT-s-OFDM QPSK | NOTE 1 |
| NOTE 1: The specific configuration of uplink and downlink are defined in Table 7.3B.2.3.4.2.1-1. NOTE 2: In a FR1 band where UE supports 4Rx, the test shall be performed only with 4Rx antennas ports connected and 4Rx REFSENS requirement (TS 38.521-1 [8] Table 7.3.2.5-2) is used in the test requirements. | | | | | | | |

1. Connect the SS to the UE antenna connectors as shown in [6] TS 38.508-1 Annex A, in Figure A.3.1.4.2 for SS diagram and clause A.3.2 for UE diagram.
2. The parameter settings for the cell are set up according to TS 38.508-1 [6] clause 4.4.3.
3. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C and TS 38.521-1 [8] Annex C for E-UTRA CG and NR CG respectively, and uplink signals according to TS 36.521-1 [10] Annex H and TS 38.521-1 [8] Annex G for E-UTRA CG and NR CG respectively.
4. The UL and DL Reference Measurement channels are TS 36.521-1 [10] Annex A.2, A.3 and TS 38.521-1 [8] Annex A.2, A.3 for E-UTRA CG and NR CG respectively.
5. Propagation conditions are set according to TS 36.521-1 [10] Annex B.0 and TS 38.521-1 [8] Annex B.0 for E-UTRA CG and NR CG respectively.
6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 7.6B.3.3.4.3.

7.6B.3.3.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A and PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Table 7.6B.3.3.4.1-1 on E-UTRA CC and NR CC respectively. The SS sends downlink MAC padding bits on the DL RMC.
2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 7.6B.3.3.4.1-1 on E-UTRA CC and NR CC respectively. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
3. Set the Downlink signal level to the value as defined in Table 7.6B.3.3.5-1, Table 7.6B.3.3.5-3, or Table 7.6B.3.3.5-5 for E-UTRA CC and NR CC respectively. For NR CC and E-UTRA CC, send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system

is within the Uplink power control window, defined as $-\text{MU}$ to $-(\text{MU} + \text{Uplink power control window size})$ dB of $(P_{CMAX,L,c} - 4\text{dB})$ for E-UTRA CC, and of 29 dB below $P_{CMAX,L,f,c}$ for NR CC for at least the duration of the Throughput measurement, where:

- MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW
 - For NR CC, Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified in Table F.1.2-1.
 - For E-UTRA CC, Uplink power control window size = 1dB (UE power step size) + 1.0dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 36.101 [5], Table 6.3.5.2.1-1 and is 1.0dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified in Table F.1.2-1 of TS 36.521-1 [10].
4. Set the parameters of the CW signal generator for an interfering signal below the aggregated component carriers according to Table 7.6B.3.3.5-4 or Table 7.6B.3.3.5-6. The frequency step size is $\min(\lfloor CBW / 2 \rfloor, 5)$ MHz.

If CW interferer falls in a gap between F_{DL_high} of the E-UTRA or NR band and F_{DL_low} of the NR or EUTRA band, where the corresponding OOB ranges 1 and 2 in Table 7.6B.3.3.5-2 and Table 7.6B.3.3.5-4 or Table 7.6B.3.3.5-6 overlap, then the lower level interferer limit of the overlapping OOB ranges applies. CW interferer is eliminated from $F_{DL_low} - 15\text{MHz}$ to $F_{DL_high} + 15\text{MHz}$ of E-UTRA carrier.

If F_{DL_high} of the lower E-UTRA or NR band is greater than or equal to the F_{DL_low} of the upper NR or E-UTRA band as in overlapping RX frequency ranges, then the OOB range shall start from the F_{DL_low} of the lower E-UTRA or NR band, and from the F_{DL_high} of the upper NR or E-UTRA band.

For EN-DC combination listed in Table 7.6B.3.3.5-7, exceptions to the requirement specified in Table 7.6B.3.3.5-8 are allowed when the second order intermodulation product of the lower frequency band UL carrier and the CW interfering signal fully or partially overlaps with the higher frequency band DL carrier.

5. Measure the average throughput of NR CC for a duration sufficient to achieve statistical significance according to Annex H.2. Record the frequencies for which the throughput doesn't meet the requirements.
6. Repeat steps from 4 to 5, using an interfering signal above the aggregated component carriers at step 4.
7. Set the Downlink signal level to the value as defined in Table 7.6B.3.3.5-1, Table 7.6B.3.3.5-3, or Table 7.6B.3.3.5-5 for E-UTRA CC and NR CC respectively. For NR CC and E-UTRA CC, send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as $-\text{MU}$ to $-(\text{MU} + \text{Uplink power control window size})$ dB of $(P_{CMAX,L,f,c} - 4\text{dB})$ for NR CC, and of 29 dB below $P_{CMAX,L,c}$ for E-UTRA CC for at least the duration of the Throughput measurement, where:
 - MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW
 - For NR CC, Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified in Table F.1.2-1.
 - For E-UTRA CC, Uplink power control window size = 1dB (UE power step size) + 1.0dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 36.101 [5], Table 6.3.5.2.1-1 and is 1.0dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified in Table F.1.2-1 of TS 36.521-1 [10].
8. Set the parameters of the CW signal generator for an interfering signal below the aggregated component carriers according to Table 7.6B.3.3.5-2, Table 7.6B.3.3.5-4 or Table 7.6B.3.3.5-6 for E-UTRA CC and NR CC testing respectively. The frequency step size is $\min(\lfloor CBW / 2 \rfloor, 5)$ MHz.

If CW interferer falls in a gap between F_{DL_high} of the E-UTRA or NR band and F_{DL_low} of the NR or EUTRA band, where the corresponding OOB ranges 1 and 2 in Table 7.6B.3.3.5-2 and Table 7.6B.3.3.5-4 or Table

7.6B.3.3.5-6 overlap, then the lower level interferer limit of the overlapping OOB ranges applies. CW interferer is eliminated from $F_{DL_low} - 15\text{MHz}$ to $F_{DL_high} + 15\text{MHz}$ of E-UTRA and NR carriers.

If F_{DL_high} of the lower E-UTRA or NR band is greater than or equal to the F_{DL_low} of the upper NR or E-UTRA band as in overlapping RX frequency ranges, then the OOB range shall start from the F_{DL_low} of the lower E-UTRA or NR band, and from the F_{DL_high} of the upper NR or E-UTRA band.

9. Measure the average throughput of E-UTRA CC and NR CC respectively for a duration sufficient to achieve statistical significance according to Annex H.2. Record the frequencies for which the throughput doesn't meet the requirements.

10. Repeat steps from 8 to 9, using an interfering signal above the aggregated component carriers at step 8.

NOTE: The purpose of the Uplink power control window is to ensure that the actual UE output power is no greater than the target power level, and as close as possible to the target power level. The relationship between the Uplink power control window, the target power level and the corresponding possible actual UE Uplink power window is illustrated in Annex F, clause F.4.

7.6B.3.3.4.3 Message contents

Message contents are according to TS 38.508-1 [6] clause 4.6.

7.6B.3.3.5 Test Requirement

For E-UTRA bands, except for the spurious response frequencies recorded in test procedure, the throughput measurement derived in test procedure shall be $\geq 95\%$ of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 of TS 36.521-1 [10] with parameters specified in Tables 7.6B.3.3.5-1 and 7.6B.3.3.5-2.

For NR bands with $F_{DL_high} < 2700\text{ MHz}$ and $F_{UL_high} < 2700\text{ MHz}$, except for the spurious response frequencies recorded in test procedure, the throughput measurement derived in test procedure shall be $\geq 95\%$ of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 and A.3.3 of TS 38.521-1 [8] with parameters specified in Tables 7.6B.3.3.5-3 and 7.6B.3.3.5-4.

For NR bands with $F_{DL_low} \geq 3300\text{ MHz}$ and $F_{UL_low} \geq 3300\text{ MHz}$, except for the spurious response frequencies recorded in test procedure, the throughput measurement derived in test procedure shall be $\geq 95\%$ of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 and A.3.3 of TS 38.521-1 [8] with parameters specified in Tables 7.6B.3.3.5-5 and 7.6B.3.3.5-6.

If CW interferer falls in a gap between F_{DL_high} of the E-UTRA or NR band and F_{DL_low} of the NR or EUTRA band, where the corresponding OOB ranges 1 and 2 in Table 7.6B.3.3.5-2 and Table 7.6B.3.3.5-4 or Table 7.6B.3.3.5-6 overlap, then the lower level interferer limit of the overlapping OOB ranges applies.

If F_{DL_high} of the lower E-UTRA or NR band is greater than or equal to the F_{DL_low} of the upper NR or E-UTRA band as in overlapping RX frequency ranges, then the OOB range shall start from the F_{DL_low} of the lower E-UTRA or NR band, and from the F_{DL_high} of the upper NR or E-UTRA band.

For EN-DC combination listed in Table 7.6B.3.3.5-7 under the first test condition above, exceptions to the requirement specified in Table 7.6B.3.3.5-8 are allowed when the second order intermodulation product of the lower frequency band UL carrier and the CW interfering signal fully or partially overlaps with the higher frequency band DL carrier.

For all interferer frequency ranges a maximum of

$$\lfloor \max \{24, 6 \cdot \lceil n \cdot N_{RB} / 6 \rceil\} / \min \{\lfloor n \cdot N_{RB} / 10 \rfloor, 5\} \rfloor$$

exceptions are allowed for spurious response frequencies in each assigned frequency channel when measured using a step size of $\min(\lfloor CBW / 2 \rfloor, 5)$ MHz with N_{RB} the number of resource blocks in the downlink transmission bandwidth configuration, CBW the bandwidth of the frequency channel in MHz and $n = 1, 2, 3$ for SCS = 15, 30, 60 kHz, respectively. For these exceptions, the requirements in clause 7.7B.3 apply.

Table 7.6B.3.3.5-1: Out-of-band blocking parameters for E-UTRA bands

| Rx Parameter | Units | Channel bandwidth | | | | | |
|--------------|-------|-------------------|-------|-------|----|----|----|
| | | 1.4 | 3 MHz | 5 MHz | 10 | 15 | 20 |

| | | MHz | | MHz | MHz | MHz |
|---|-----|-----|---|-----|-----|-----|
| Power in Transmission Bandwidth Configuration | dBm | 6 | 6 | 6 | 6 | 7 |
| REFSENS + channel bandwidth specific value below | | | | | | 9 |
| Note 1: The reference measurement channel is specified in Annex A.3.2 of TS 36.521-1 [10] with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 of TS 36.521-1 [10]. | | | | | | |
| Note 2: The REFSENS power level is specified in Table 7.3.3-1 of TS 36.521-1 [10] for two and four antenna ports, respectively. | | | | | | |

Table 7.6B.3.3.5-2: Out of band blocking for E-UTRA bands

| E-UTRA band | Parameter | Units | Frequency | | | |
|--|---------------------------------|-------|--|---|--|--|
| | | | range 1 | | range 2 | |
| | | | -44 | -30 | -15 | -15 |
| 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 30, 31, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42 (Note 3), 43 (Note 3), 44, 45, 53, 65, 66, 68, 70, 71, 72, 73, 74 | $F_{\text{Interferer}}$ (CW) | MHz | $F_{\text{DL_low}}$ -15 to $F_{\text{DL_low}}$ -60 | $F_{\text{DL_low}}$ -60 to $F_{\text{DL_low}}$ -85 | $F_{\text{DL_low}}$ -85 to 1 MHz | - |
| | | | $F_{\text{DL_high}}$ +15 to $F_{\text{DL_high}}$ + 60 | $F_{\text{DL_high}}$ +60 to $F_{\text{DL_high}}$ +85 | $F_{\text{DL_high}}$ +85 to +12750 MHz | - |
| 2, 5, 12, 17 | $F_{\text{Interferer}}$ | MHz | - | - | - | $F_{\text{UL_low}} - F_{\text{UL_high}}$ |
| Note 1: Range 3 shall be tested only with the highest channel bandwidth. | | | | | | |
| Note 2: For the UE which supports both Band 11 and Band 21 the out of blocking is FFS. | | | | | | |
| Note 3: The power level of the interferer ($P_{\text{Interferer}}$) for Range 3 shall be modified to -20 dBm for $F_{\text{Interferer}} > 2800$ MHz and $F_{\text{Interferer}} < 4400$ MHz. | | | | | | |
| Note 4: For the UE that supports both Band 4 and Band 66, the out-of-blocking frequency range for Band 4 is defined relative to $F_{\text{DL_low}}$ and $F_{\text{DL_high}}$ of Band 66. | | | | | | |

Table 7.6B.3.3.5-3: Out-of-band blocking parameters for NR bands with $F_{\text{DL_high}} < 2700$ MHz and $F_{\text{UL_high}} < 2700$ MHz

| RX parameter | Units | Channel bandwidth | | | | |
|---|-------|-------------------|---------|--------|--------|--------|
| | | 5 MHz | 10 MHz | 15 MHz | 20 MHz | 25 MHz |
| REFSENS + channel bandwidth specific value below | | | | | | |
| Power in transmission bandwidth configuration | dBm | 6 | 6 | 7 | 9 | 10 |
| RX parameter | Units | Channel bandwidth | | | | |
| | | 30 MHz | 40 MHz | 50 MHz | 60 MHz | 80 MHz |
| REFSENS + channel bandwidth specific value below | | | | | | |
| Power in transmission bandwidth configuration | dBm | 11 | 12 | 13 | 14 | 15 |
| RX parameter | Units | Channel bandwidth | | | | |
| | | 90 MHz | 100 MHz | | | |
| REFSENS + channel bandwidth specific value below | | | | | | |
| Power in transmission bandwidth configuration | dBm | 15.5 | 16 | | | |
| NOTE: The transmitter shall be at the minimum UL configuration specified in Table 7.3.2.3-3 of TS 38.521-1 [8]. | | | | | | |

Table 7.6B.3.3.5-4: Out of-band blocking for NR bands with $F_{DL_high} < 2700$ MHz and $F_{UL_high} < 2700$ MHz

| NR band | Parameter | Unit | Range 1 | Range 2 | Range 3 |
|--|-----------------------|------|---|---|---|
| n1, n2, n3, n5, n7, n8, n12, n20, n25, n28, n34, n38, n39, n40, n41, n50, n51, n65, n66, n70, n71, n74, n75, n76 | $P_{interferer}$ | dBm | -44 | -30 | -15 |
| | $F_{interferer}$ (CW) | MHz | $-60 < f - F_{DL_low} < -15$ or $15 < f - F_{DL_high} < 60$ | $-85 < f - F_{DL_low} \leq -60$ or $60 \leq f - F_{DL_high} < 85$ | $1 \leq f \leq F_{DL_low} - 85$ or $F_{DL_high} + 85 \leq f \leq 12750$ |

NOTE 1: The power level of the interferer ($P_{interferer}$) for Range 3 shall be modified to -20 dBm for $F_{interferer} > 6000$ MHz.

NOTE 2: For band 51 the F_{DL_high} of band 50 is applied as F_{DL_high} for band 51. For band 50, the F_{DL_low} of band 51 is applied as F_{DL_low} for band 50.

NOTE 3: For band 76 the F_{DL_high} of band 75 is applied as F_{DL_high} for band 76. For band 75, the F_{DL_low} of band 76 is applied as F_{DL_low} for band 75.

NOTE 4: For UEs supporting both bands 38 and 41, the F_{DL_high} and F_{DL_low} of band 41 is applied as F_{DL_high} and F_{DL_low} for band 38.

Table 7.6B.3.3.5-5: Out-of-band blocking parameters for NR bands with $F_{DL_low} \geq 3300$ MHz and $F_{UL_low} \geq 3300$ MHz

| RX parameter | Units | Channel bandwidth | | | | |
|---|-------|--|--------|--------|---------|--------|
| | | 10 MHz | 15 MHz | 20 MHz | 40 MHz | 50 MHz |
| Power in transmission bandwidth configuration | dBm | REFSENS + channel bandwidth specific value below | | | | |
| | dB | 6 | 7 | 9 | 9 | 9 |
| RX parameter | Units | Channel bandwidth | | | | |
| | | 60 MHz | 80 MHz | 90 MHz | 100 MHz | |
| Power in transmission bandwidth configuration | dBm | REFSENS + channel bandwidth specific value below | | | | |
| | dB | 9 | 9 | 9 | 9 | |

NOTE: The transmitter shall be at the minimum UL configuration specified in Table 7.3.2.3-3 of TS 38.521-1 [8].

Table 7.6B.3.3.5-6: Out of-band blocking for NR bands with $F_{DL_low} \geq 3300$ MHz and $F_{UL_low} \geq 3300$ MHz

| NR band | Parameter | Unit | Range1 | Range 2 | Range 3 |
|----------------------|-----------------------|-------------|---|---|---|
| n77, n78 (NOTE 3) | $P_{interferer}$ | dBm | -44 | -30 | -15 |
| | $F_{interferer}$ (CW) | MHz | $-60 < f - F_{DL_low} \leq -3CBW$ or $3CBW \leq f - F_{DL_high} < 60$ | $-200 < f - F_{DL_low} \leq -\text{MAX}(60, 3CBW)$ or $\text{MAX}(60, 3CBW) \leq f - F_{DL_high} < 200$ | $1 \leq f \leq F_{DL_low} - \text{MAX}(200, 3CBW)$ or $F_{DL_high} + \text{MAX}(200, 3CBW) \leq f \leq 12750$ |
| n79 (NOTE 4) | $F_{interferer}$ (CW) | MHz | N/A | $-150 < f - F_{DL_low} \leq -\text{MAX}(60, 3CBW)$ or $\text{MAX}(60, 3CBW) \leq f - F_{DL_high} < 150$ | $1 \leq f \leq F_{DL_low} - \text{MAX}(150, 3CBW)$ or $F_{DL_high} + \text{MAX}(150, 3CBW) \leq f \leq 12750$ |

NOTE 1: The power level of the interferer ($P_{interferer}$) for Range 3 shall be modified to -20 dBm for $F_{interferer} > 6000$ MHz.

NOTE 2: CBW denotes the channel bandwidth of the wanted signal

NOTE 3: The power level of the interferer ($P_{interferer}$) for Range 3 shall be modified to -20 dBm, for $F_{interferer} > 2700$ MHz and $F_{interferer} < 4800$ MHz. For CBW > 15 MHz, the requirement for Range 1 is not applicable and Range 2 applies from the frequency offset of 3CBW from the band edge. For CBW larger than 60 MHz, the requirement for Range 2 is not applicable and Range 3 applies from the frequency offset of 3CBW from the band edge.

NOTE 4: The power level of the interferer ($P_{interferer}$) for Range 3 shall be modified to -20 dBm, for $F_{interferer} > 3650$ MHz and $F_{interferer} < 5750$ MHz. For CBW ≥ 40 MHz, the requirement for Range 2 is not applicable and Range 3 applies from the frequency offset of 3CBW from the band edge.

Table 7.6B.3.3.5-7: EN-DC combination with exceptions allowed

| EN-DC combination |
|--------------------------|
| DC_5_n78 |
| DC_8_n77 |
| DC_8_n78 |
| DC_8_n79 |
| DC_11_n77 |
| DC_18_n77 |
| DC_18_n78 |
| DC_18_n79 |
| DC_19_n77 |
| DC_19_n78 |
| DC_19_n79 |
| DC_20_n77 |
| DC_20_n78 |
| DC_21_n77 |
| DC_26_n77 |
| DC_26_n78 |
| DC_26_n79 |
| DC_28_n77 |
| DC_28_n78 |
| DC_28_n79 |

Table 7.6B.3.3.5-8: Exceptions allowed

| Parameter | Unit | Level |
|--|------|------------------|
| P _{Interferer} (CW) | dBm | -44 ¹ |
| NOTE 1: The requirement applies when $ f_{\text{interferer}} \pm f_{UL}^{LB} - f_{DL}^{HB} \leq (BW_{UL}^{LB} + BW_{DL}^{HB})/2$, where f_{UL}^{LB} and f_{DL}^{HB} are the carrier frequencies for lower frequency band UL and higher frequency band DL, respectively. BW_{UL}^{LB} and BW_{DL}^{HB} are the channel bandwidths configured for lower frequency band UL carrier and higher frequency band DL carrier in MHz, respectively. | | |

7.6B.3.3_1 Out-of-band blocking for EN-DC within FR1 (>2 CCs)

7.6B.3.3_1.1 Out-of-band blocking for EN-DC within FR1 (3 CCs)

7.6B.3.3_1.1.1 Test Purpose

Out-of-band band blocking is defined for an unwanted CW interfering signal falling more than 15 MHz below or above the UE receive band, at which a given average throughput shall meet or exceed the requirement for the specified measurement channels.

For the first 15 MHz below or above the UE receive band the appropriate in-band blocking or adjacent channel selectivity in clause 7.6B.2.1 and clause 7.5B.1 shall be applied.

The lack of out-of-band blocking ability will decrease the coverage area when other NodeB transmitters exist (except in the adjacent channels and spurious response).

7.6B.3.3_1.1.2 Test Applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band contiguous EN-DC in FR1 with 3 DL CCs.

7.6B.3.3_1.1.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.6B.3.0.1.

Exception requirements for both NR and E-UTRA are defined for this test and therefore LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

7.6B.3.3_1.1.4 Test Description

7.6B.3.3_1.1.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on EN-DC operating bands specified in clause 5.3B.1.2, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-1 [8] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2. All of these configurations shall be tested with applicable test parameters for each EN-DC configuration specified in clause 5.3B.1.2 and are shown in Table 7.6B.3.3_1.1.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annex A.2 and A.3 respectively. The details of the OCNG patterns used are specified in TS 36.521-1 [10] Annex A.5 and in TS 38.521-1 [8] Annex A.5 for E-UTRA CG and NR CG respectively. Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521-1 [10] Annex C.2 and in TS 38.521-1 [8] Annex C.2 for E-UTRA CG and NR CG respectively.

Table 7.6B.3.3_1.1.4.1-1: Test configuration table

| Initial Conditions | | | | | |
|---|------------------|--------------------------------|------------------|------------------------------|--------------------------|
| Test Environment as specified in TS 38.508-1 [6] clause 4.1 | | Normal | | | |
| Test Frequencies as specified in TS 38.508-1 [6] clause 4.3.1 for different EN-DC bandwidth classes | | Mid range | | | |
| Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1 across bandwidth combination sets supported by the UE | | Highest N_{RB_agg} (NOTE 3) | | | |
| NR Test SCS as specified in Table 5.3.5-1 in TS 38.521-1 [8] | | Lowest | | | |
| NR/E-UTRA Test Parameters | | | | | |
| PCC – E-UTRA | | SCC – EUTRA | | NR | |
| UL/DL Modulation | UL/DL allocation | UL/DL Modulation | UL/DL allocation | UL/DL Modulation | UL/DL allocation |
| QPSK/QPSK | REFSENS/Full RB | NA/QPSK | NA/Full RB | DFT-s-OFDM QPSK/CP-OFDM QPSK | REFSENS/Full RB (NOTE 1) |
| NOTE 1: Full RB allocation shall be used per each SCS and channel BW as specified in Table 7.3.2.4.1-2 of TS 38.521-1 [8]. NOTE 2: Test Channel Bandwidths are checked separately for each EN-DC band, which applicable channel bandwidths are specified in Table 5.3B.1.2-1. NOTE 3: If the UE supports multiple CC Combinations in the EN-DC Configuration with the same N_{RB_agg} , only the combination with the highest N_{RB_SCG} is tested. NOTE 4: REFSENS refers to Uplink configuration in Table 7.3.2.3-3 in [8] and Table 7.3.3-2 in [10] for NR and E-UTRA CC respectively. NOTE 5: In a FR1 band where UE supports 4Rx, the test shall be performed only with 4Rx antennas ports connected and 4Rx REFSENS requirement (TS 38.521-1 [8] Table 7.3.2.5-2) is used in the test requirements. | | | | | |

1. Connect the SS to the UE antenna connectors as shown in [6] TS 38.508-1 Annex A, in Figure A.3.1.4.2 for SS diagram and clause A.3.2 for UE diagram.
2. The parameter settings for the cell are set up according to TS 38.508-1 [6] clause 4.4.3.
3. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C and TS 38.521-1 [8] Annex C for E-UTRA CG and NR CG respectively, and uplink signals according to TS 36.521-1 [10] Annex H and TS 38.521-1 [8] Annex G for E-UTRA CG and NR CG respectively.
4. The UL and DL Reference Measurement channels are TS 36.521-1 [10] Annex A.2, A.3 and TS 38.521-1 [8] Annex A.2 , A.3 for E-UTRA CG and NR CG respectively.
5. Propagation conditions are set according to TS 36.521-1 [10] Annex B.0 and TS 38.521-1 [8] Annex B.0 for E-UTRA CG and NR CG respectively.
6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 7.6B.3.3_1.1.4.3.

7.6B.3.3_1.1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A and PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Table 7.6B.3.3_1.1.4.1-1 on E-UTRA CC and NR CC respectively. The SS sends downlink MAC padding bits on the DL RMC.
2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 7.6B.3.3_1.1.4.1-1 on E-UTRA CC and NR CC respectively. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
3. Set the Downlink signal level to the value as defined in Table 7.6B.3.3_1.1.5-1. For NR CC and E-UTRA CC, send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power

measured by the test system is within the Uplink power control window, defined as $-\text{MU}$ to $-(\text{MU} + \text{Uplink power control window size})$ dB of the target power level in Table 7.6B.3.3_1.1.5-1 + $[10\log(S_{\text{L}} \text{CRB}/N_{\text{RB_alloc}})]$ for NR CC, $[10\log(P_{\text{L}} \text{CRB}/N_{\text{RB_alloc}})]$ for E-UTRA CC) for at least the duration of the Throughput measurement, where:

- MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW
 - For NR CC, Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified in Table F.1.2-1.
 - For E-UTRA CC, Uplink power control window size = 1dB (UE power step size) + 1.0dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 36.101 [5], Table 6.3.5.2.1-1 and is 1.0dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified in Table F.1.2-1 of TS 36.521-1 [10].
4. Set the parameters of the CW signal generator for an interfering signal below the aggregated component carriers according to Table 7.6B.3.3_1.1.5-1. The frequency step size is 1MHz.
 5. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex H.2.
 6. Repeat steps from 4 to 5, using an interfering signal above the aggregated component carriers at step 4.

NOTE: The purpose of the Uplink power control window is to ensure that the actual UE output power is no greater than the target power level, and as close as possible to the target power level. The relationship between the Uplink power control window, the target power level and the corresponding possible actual UE Uplink power window is illustrated in Annex F, clause F.4.

7.6B.3.3_1.1.4.3 Message contents

Message contents are according to TS 38.508-1 [6] clause 4.6 Table 4.6.3-118 with condition TRANSFORM_PRECODER_ENABLED.

7.6B.3.3_1.1.5 Test Requirement

The throughput shall be $\geq 95\%$ of the maximum throughput of the reference measurement channels as specified in TS 36.521-1 [10] Annex A.3 and TS 38.521-1 [8] Annex A.3 for E-UTRA CG and NR CG respectively with parameters specified in Table 7.6B.3.3_1.1.5-1 for the specified wanted signal mean power in the presence of interfering signals.

Table 7.6B.3.3_1.1.5-1: Out-of-band blocking for intra-band contiguous EN-DC

| EN-DC Aggregated Bandwidth, MHz | ≤ 100 | $> 100, \leq 120$ | $> 120, \leq 140$ | $> 140, \leq 160$ |
|--|--|-------------------|-------------------|-------------------|
| Pw in Transmission Bandwidth Configuration, perCC, dBm | REFSENS + Aggregated BW specific value below | | | |
| | 9 | | | |

NOTE 1: Interferer values and offsets are specified from Table 7.6.2.1A-2 in TS 36.101 [5]. For inter-band combinations where the intra-band requirements are applicable, in which the E-UTRA band is a subset of an NR-only band, the NR band interferer values and offsets specified from Table 7.6A.3-2 in TS 38.101-1 [2] apply to both E-UTRA and NR carriers.

NOTE 2: For NR carrier, the transmitter shall be set to 4dB below $P_{\text{CMAX,L,f,c,NR}}$ at the minimum uplink configuration specified in Table 7.3.2-3 in TS 8.101-1 [2] with $P_{\text{CMAX,L,f,c,NR}}$ as defined in clause 6.2B.4.

NOTE 3: For E-UTRA carrier, the transmitter shall be set to 4dB below $P_{\text{CMAX,L,E-UTRA,c}}$ at the minimum uplink configuration specified in Table 7.3.1-2 in TS 36.101 [5] with $P_{\text{CMAX,L,E-UTRA,c}}$ as defined in clause 6.2B.4 for single carrier.

7.6B.3.3_1.2 Out-of-band blocking for EN-DC within FR1 (4 CCs)

7.6B.3.3_1.2.1 Test Purpose

Out-of-band band blocking is defined for an unwanted CW interfering signal falling more than 15 MHz below or above the UE receive band, at which a given average throughput shall meet or exceed the requirement for the specified measurement channels.

For the first 15 MHz below or above the UE receive band the appropriate in-band blocking or adjacent channel selectivity in clause 7.6B.2.1 and clause 7.5B.1 shall be applied.

The lack of out-of-band blocking ability will decrease the coverage area when other NodeB transmitters exist (except in the adjacent channels and spurious response).

7.6B.3.3_1.2.2 Test Applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band contiguous EN-DC in FR1 with 4 DL CCs.

7.6B.3.3_1.2.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.6B.3.0.1.

Exception requirements for both NR and E-UTRA are defined for this test and therefore LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

7.6B.3.3_1.2.4 Test Description

7.6B.3.3_1.2.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on EN-DC operating bands specified in clause 5.3B.1.2, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-1 [8] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2. All of these configurations shall be tested with applicable test parameters for each EN-DC configuration specified in clause 5.3B.1.2 and are shown in Table 7.6B.3.3_1.2.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annex A.2 and A.3 respectively. The details of the OCNG patterns used are specified in TS 36.521-1 [10] Annex A.5 and in TS 38.521-1 [8] Annex A.5 for E-UTRA CG and NR CG respectively. Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521-1 [10] Annex C.2 and in TS 38.521-1 [8] Annex C.2 for E-UTRA CG and NR CG respectively.

Table 7.6B.3.3_1.2.4.1-1: Test configuration table

| Initial Conditions | | | | | |
|---|--------------------------------|------------------|------------------|------------------------------|--------------------------|
| Test Environment as specified in TS 38.508-1 [6] clause 4.1 | Normal | | | | |
| Test Frequencies as specified in TS 38.508-1 [6] clause 4.3.1 for different EN-DC bandwidth classes | Mid range | | | | |
| Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1 across bandwidth combination sets supported by the UE | Highest N_{RB_agg} (NOTE 3) | | | | |
| NR Test SCS as specified in Table 5.3.5-1 in TS 38.521-1 [8] | Lowest | | | | |
| NR/E-UTRA Test Parameters | | | | | |
| PCC – E-UTRA | SCC1 – EUTRA and SCC2 – EUTRA | | NR | | |
| UL/DL Modulation | UL/DL allocation | UL/DL Modulation | UL/DL allocation | UL/DL Modulation | UL/DL allocation |
| QPSK/QPSK | REFSENS/Full RB | NA/QPSK | NA/Full RB | DFT-s-OFDM QPSK/CP-OFDM QPSK | REFSENS/Full RB (NOTE 1) |
| NOTE 1: Full RB allocation shall be used per each SCS and channel BW as specified in Table 7.3.2.4.1-2 of TS 38.521-1 [8]. | | | | | |
| NOTE 2: Test Channel Bandwidths are checked separately for each EN-DC band, which applicable channel bandwidths are specified in Table 5.3B.1.2-1. | | | | | |
| NOTE 3: If the UE supports multiple CC Combinations in the EN-DC Configuration with the same N_{RB_agg} , only the combination with the highest N_{RB_SCG} is tested. | | | | | |
| NOTE 4: REFSENS refers to Uplink configuration in Table 7.3.2.3-3 in [8] and Table 7.3.3-2 in [10] for NR and E-UTRA CC respectively. | | | | | |
| NOTE 5: In a FR1 band where UE supports 4Rx, the test shall be performed only with 4Rx antennas ports connected and 4Rx REFSENS requirement (TS 38.521-1 [8] Table 7.3.2.5-2) is used in the test requirements. | | | | | |

1. Connect the SS to the UE antenna connectors as shown in [6] TS 38.508-1 Annex A, in Figure A.3.1.4.2 for SS diagram and clause A.3.2 for UE diagram.
2. The parameter settings for the cell are set up according to TS 38.508-1 [6] clause 4.4.3.
3. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C and TS 38.521-1 [8] Annex C for E-UTRA CG and NR CG respectively, and uplink signals according to TS 36.521-1 [10] Annex H and TS 38.521-1 [8] Annex G for E-UTRA CG and NR CG respectively.
4. The UL and DL Reference Measurement channels are TS 36.521-1 [10] Annex A.2, A.3 and TS 38.521-1 [8] Annex A.2 , A.3 for E-UTRA CG and NR CG respectively.
5. Propagation conditions are set according to TS 36.521-1 [10] Annex B.0 and TS 38.521-1 [8] Annex B.0 for E-UTRA CG and NR CG respectively.
6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 7.6B.3.3_1.2.4.3.

7.6B.3.3_1.2.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A and PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Table 7.6B.3.3_1.2.4.1-1 on E-UTRA CC and NR CC respectively. The SS sends downlink MAC padding bits on the DL RMC.
2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 7.6B.3.3_1.2.4.1-1 on E-UTRA CC and NR CC respectively. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
3. Set the Downlink signal level to the value as defined in Table 7.6B.3.3_1.2.5-1. For NR CC and E-UTRA CC, send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as -MU to -(MU + Uplink

power control window size) dB of the target power level in Table 7.6B.3.3_1.2.5-1 + ([10log(S_L_{CRB}/N_{RB_alloc})] for NR CC, [10log(P_L_{CRB}/N_{RB_alloc})] for E-UTRA CC) for at least the duration of the Throughput measurement, where:

- MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW
 - For NR CC, Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified in Table F.1.2-1.
 - For E-UTRA CC, Uplink power control window size = 1dB (UE power step size) + 1.0dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 36.101 [5], Table 6.3.5.2.1-1 and is 1.0dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified in Table F.1.2-1 of TS 36.521-1 [10].
4. Set the parameters of the CW signal generator for an interfering signal below the aggregated component carriers according to Table 7.6B.3.3_1.2.5-1. The frequency step size is 1MHz.
 5. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex H.2.
 6. Repeat steps from 4 to 5, using an interfering signal above the aggregated component carriers at step 4.

NOTE: The purpose of the Uplink power control window is to ensure that the actual UE output power is no greater than the target power level, and as close as possible to the target power level. The relationship between the Uplink power control window, the target power level and the corresponding possible actual UE Uplink power window is illustrated in Annex F, clause F.4.

7.6B.3.3_1.2.4.3 Message contents

Message contents are according to TS 38.508-1 [6] clause 4.6 Table 4.6.3-118 with condition TRANSFORM_PRECODER_ENABLED.

7.6B.3.3_1.2.5 Test Requirement

The throughput shall be $\geq 95\%$ of the maximum throughput of the reference measurement channels as specified in TS 36.521-1 [10] Annex A.3 and TS 38.521-1 [8] Annex A.3 for E-UTRA CG and NR CG respectively with parameters specified in Table 7.6B.3.3_1.2.5-1 for the specified wanted signal mean power in the presence of interfering signals.

Table 7.6B.3.3_1.2.5-1: Out-of-band blocking for intra-band contiguous EN-DC

| EN-DC Aggregated Bandwidth, MHz | ≤ 100 | $> 100, \leq 120$ | $> 120, \leq 140$ | $> 140, \leq 160$ |
|--|--|-------------------|-------------------|-------------------|
| Pw in Transmission Bandwidth Configuration, perCC, dBm | REFSENS + Aggregated BW specific value below | | | |
| | 9 | | | |

NOTE 1: Interferer values and offsets are specified from Table 7.6.2.1A-2 in TS 36.101 [5]. For inter-band combinations where the intra-band requirements are applicable, in which the E-UTRA band is a subset of an NR-only band, the NR band interferer values and offsets specified from Table 7.6A.3-2 in TS 38.101-1 [2] apply to both E-UTRA and NR carriers.

NOTE 2: For NR carrier, the transmitter shall be set to 4dB below P_{CMAX_L,f,c,NR} at the minimum uplink configuration specified in Table 7.3.2-3 in TS 8.101-1 [2] with P_{CMAX_L,f,c,NR} as defined in clause 6.2B.4.

NOTE 3: For E-UTRA carrier, the transmitter shall be set to 4dB below P_{CMAX_L_E-UTRA,c} at the minimum uplink configuration specified in Table 7.3.1-2 in TS 36.101 [5] with P_{CMAX_L_E-UTRA,c} as defined in clause 6.2B.4 for single carrier.

7.6B.4 Narrow band blocking for DC

7.6B.4.0 Minimum Conformance Requirements

7.6B.4.0.1 Intra-band contiguous EN-DC in FR1

Intra-band contiguous EN-DC narrow band blocking requirement and parameters are defined in Table 7.6B.4.0.1-1.

Table 7.6B.4.0.1-1: Narrow band blocking parameters for intra-band contiguous EN-DC

| EN-DC Aggregated Bandwidth, MHz | ≤ 100 | $> 100, \leq 120$ | $> 120, \leq 140$ | $> 140, \leq 160$ |
|--|--|-------------------|-------------------|-------------------|
| Pw in Transmission Bandwidth Configuration, perCC, dBm | REFSENS + Aggregated BW specific value below | | | |
| | 16 | | | |
| Puw, dBm (CW) | | -55 | | |

NOTE 1: Jammer offset is from Table 7.6.3.1A-1 in TS 36.101 [5] and is applied from the lowest edge of the lowest carrier and the highest edge of the highest carrier.

NOTE 2: For NR carrier, the transmitter shall be set to 4dB below $P_{CMAX,L,f,c,NR}$ at the minimum uplink configuration specified in Table 7.3.2-3 [2] with $P_{CMAX,L,f,c,NR}$ as defined in clause 6.2B.4.

NOTE 3: For E-UTRA carrier, the transmitter shall be set to 4dB below $P_{CMAX,L,E-UTRA,c}$ at the minimum uplink configuration specified in Table 7.3.1-2 [5] with $P_{CMAX,L,E-UTRA,c}$ as defined in clause 6.2B.4 for single carrier.

NOTE 4: If NR carrier BW > 40 MHz, no narrow band blocking requirements apply when blocker is applied at the edge of the NR carrier.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.6B.4.1.

7.6B.4.0.2 Intra-band non-contiguous EN-DC in FR1

For the E-TRA sub-block containing one or multiple CC's, the requirement is defined in clause 7.6.3.1 for single carrier operation and in clause 7.6.3.1A for CA in TS 36.101 [5].

For the NR sub-block, the requirement is defined in clause 7.6.4 in TS 38.101-1 [2].

The blocker configuration is defined in the general clause 7.1.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.6B.4.2.

7.6B.4.0.3 Inter-band EN-DC within FR1

Narrow band blocking requirement for E-UTRA single carrier and CA operation specified in clauses 7.6.3.1 and 7.6.3.1A of TS 36.101 [5] and for NR single carrier and CA operation specified in clauses 7.6.4 and 7.6A.4 of TS 38.101-1 [2] apply.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.6B.4.3.

7.6B.4.0.3A Inter-band NE-DC within FR1

Narrow band blocking requirement for E-UTRA single carrier and CA operation specified in clauses 7.6.3.1 and 7.6.3.1A of TS 36.101 [5] and for NR single carrier and CA operation specified in clauses 7.6.4 and 7.6A.4 of TS 38.101-1 [2] apply.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.6B.4.3a.

7.6B.4.0.4 Inter-band EN-DC including FR2

Narrow band blocking requirement for E-UTRA single carrier and CA operation specified in clauses 7.6.3.1 and 7.6.3.1A of TS 36.101 [5] apply.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.6B.4.4.

7.6B.4.0.5 Inter-band EN-DC including both FR1 and FR2

Narrow band blocking requirement for E-UTRA single carrier and CA operation specified in clauses 7.6.3.1 and 7.6.3.1A of TS 36.101 [5] and for NR single carrier and CA operation specified in clauses 7.6.4 and 7.6A.4 of TS 38.101-1 [2] apply.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.6B.4.5.

7.6B.4.1 Narrow band blocking for intra-band contiguous EN-DC in FR1 (2 CCs)

7.6B.4.1.1 Test Purpose

Verifies a receiver's ability to receive EN-DC signals at its assigned channel frequencies in the presence of an unwanted narrow band CW interferer at a frequency, which is less than the nominal channel spacing.

The lack of narrow-band blocking ability will decrease the coverage area when other NodeB transmitters exist (except in the adjacent channels and spurious response).

7.6B.4.1.2 Test Applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band contiguous EN-DC in FR1 with 2CCs.

7.6B.4.1.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.6B.4.0.1.

Exception requirements for both NR and E-UTRA are defined for this test and therefore LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

7.6B.4.1.4 Test Description

7.6B.4.1.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on EN-DC operating bands specified in clause 5.3B.1.2, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-1 [8] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2. All of these configurations shall be tested with applicable test parameters for each EN-DC configuration specified in clause 5.3B.1.2 and are shown in Table 7.6B.4.1.4.1-1. The details of the uplink and downlink reference measurement channels (RMICs) are specified in Annex A.2 and A.3 respectively. The details of the OCNG patterns used are specified in TS 36.521-1 [10] Annex A.5 and in TS 38.521-1 [8] Annex A.5 for E-UTRA CG and NR CG respectively. Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521-1 [10] Annex C.2 and in TS 38.521-1 [8] Annex C.2 for E-UTRA CG and NR CG respectively.

Table 7.6B.4.1.4.1-1: Test configuration table

| Initial Conditions | | | | | | | |
|---|---|-------------------|----------------------|----------------------|------------------|-------------------|----------------------|
| Test Environment as specified in TS 38.508-1 [6] clause 4.1 | Normal | | | | | | |
| Test Frequencies as specified in TS 38.508-1 [6] clause 4.3.1 for different EN-DC bandwidth classes | Mid range | | | | | | |
| Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1 across bandwidth combination sets supported by the UE | Lowest N _{RB_agg} , Highest N _{RB_agg} (NOTE 3) | | | | | | |
| NR Test SCS as specified in Table 5.3.5-1 in TS 38.521-1 [8] | Lowest | | | | | | |
| NR/E-UTRA Test Parameters | | | | | | | |
| Downlink Configuration | | | | Uplink Configuration | | | |
| NR Modulation | NR RB allocation | E-UTRA Modulation | E-UTRA RB allocation | NR Modulation | NR RB allocation | E-UTRA Modulation | E-UTRA RB allocation |
| CP-OFDM QPSK | Full RB (NOTE 1) | QPSK | Full RB | DFT-s-OFDM QPSK | REFSENS | QPSK | REFSENS |
| NOTE 1: Full RB allocation shall be used per each SCS and channel BW as specified in Table 7.3.2.4.1-2 of TS 38.521-1 [8]. NOTE 2: Test Channel Bandwidths are checked separately for each EN-DC band, which applicable channel bandwidths are specified in Table 5.3B.1.2-1. NOTE 3: If the UE supports multiple CC Combinations in the EN-DC Configuration with the same N _{RB_agg} , only the combination with the highest N _{RB_SCG} is tested. NOTE 4: REFSENS refers to Uplink configuration in Table 7.3.2.3-3 in [8] and Table 7.3.3-2 in [10] for NR and E-UTRA CC respectively. NOTE 5: In a FR1 band where UE supports 4Rx, the test shall be performed only with 4Rx antennas ports connected and 4Rx REFSENS requirement (TS 38.521-1 [8] Table 7.3.2.5-2) is used in the test requirements. | | | | | | | |

1. Connect the SS to the UE antenna connectors as shown in [6] TS 38.508-1 Annex A, in Figure A.3.1.4.2 for SS diagram and clause A.3.2 for UE diagram.
2. The parameter settings for the E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3, and the parameter settings for the NR cell are set up according to TS 38.508-1 [6] clause 4.4.3.
3. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C and TS 38.521-1 [8] Annex C for E-UTRA CG and NR CG respectively, and uplink signals according to TS 36.521-1 [10] Annex H and TS 38.521-1 [8] Annex G for E-UTRA CG and NR CG respectively.
4. The UL and DL Reference Measurement channels are TS 36.521-1 [10] Annex A.2, A.3 and TS 38.521-1 [8] Annex A.2 , A.3 for E-UTRA CG and NR CG respectively.
5. Propagation conditions are set according to TS 36.521-1 [10] Annex B.0 and TS 38.521-1 [8] Annex B.0 for E-UTRA CG and NR CG respectively.
6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 7.6B.4.1.4.3.

7.6B.4.1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A and PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Table 7.6B.4.1.4.1-1 on E-UTRA CC and NR CC respectively. The SS sends downlink MAC padding bits on the DL RMC.
2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 7.6B.4.1.4.1-1 on E-UTRA CC and NR CC respectively. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

3. Set the Downlink signal level to the value as defined in Table 7.6B.4.1.5-1. For NR CC and E-UTRA CC, send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as $-\text{MU}$ to $(-\text{MU} + \text{Uplink power control window size})$ dB of the target power level in Table 7.6B.4.1.5-1 + ([10log(S_LCRB/N_{RB_alloc}) for NR CC, [10log(P_LCRB/N_{RB_alloc}) for E-UTRA CC]) for at least the duration of the Throughput measurement, where:
 - MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW
 - For NR CC, Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) = 1.7dB, where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size.
 - For E-UTRA CC, Uplink power control window size = 1dB (UE power step size) + 1.0dB (UE power step tolerance) = 2.0dB, where, the UE power step tolerance is specified in TS 36.101 [5], Table 6.3.5.2.1-1 and is 1.0dB for 1dB power step size.
4. Set the parameters of the CW signal generator for an interfering signal below the aggregated component carriers according to Table 7.6B.4.1.5-1.
5. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex H.2.
6. Repeat steps from 4 to 5, using an interfering signal above the aggregated component carriers at step 4.

NOTE: The purpose of the Uplink power control window is to ensure that the actual UE output power is no greater than the target power level, and as close as possible to the target power level. The relationship between the Uplink power control window, the target power level and the corresponding possible actual UE Uplink power window is illustrated in Annex F, clause F.4.

7.6B.4.1.4.3 Message contents

Message contents are according to TS 38.508-1 [6] clause 4.6 Table 4.6.3-118 with condition TRANSFORM_PRECODER_ENABLED.

7.6B.4.1.5 Test Requirement

The throughput shall be $\geq 95\%$ of the maximum throughput of the reference measurement channels as specified in TS 36.521-1 [10] Annex A.3 and TS 38.521-1 [8] Annex A.3 for E-UTRA CG and NR CG respectively with parameters specified in Table 7.6B.4.1.5-1 for the specified wanted signal mean power in the presence of interfering signals.

Table 7.6B.4.1.5-1: Narrow band blocking for intra-band contiguous EN-DC

| EN-DC Aggregated Bandwidth, MHz | ≤ 100 | $> 100, \leq 120$ | $> 120, \leq 140$ | $> 140, \leq 160$ |
|--|--|-------------------|-------------------|-------------------|
| Pw in Transmission Bandwidth Configuration, perCC, dBm | REFSENS + Aggregated BW specific value below | | | |
| | 16 | | | |
| P _{uw} , dBm (CW) | -55 | | | |

NOTE 1: Jammer offset is from Table 7.6.3.1A-1 in TS 36.101 [5] and is applied from the lowest edge of the lowest carrier and the highest edge of the highest carrier.

NOTE 2: For NR carrier, the transmitter shall be set to 4dB below P_{CMAX,L,f,c,NR} at the minimum uplink configuration specified in Table 7.3.2-3 in TS 38.101-1 [2] with P_{CMAX,L,f,c,NR} as defined in clause 6.2B.

NOTE 3: For E-UTRA carrier, the transmitter shall be set to 4dB below P_{CMAX,L,E-UTRA,c} at the minimum uplink configuration specified in Table 7.3.1-2 in TS 36.101 [5] with P_{CMAX,L,E-UTRA,c} as defined in clause 6.2B.4 for single carrier.

NOTE 4: If NR carrier BW > 40 MHz, no narrow band blocking requirements apply when blocker is applied at the edge of the NR carrier.

Table 7.6B.4.1.5-2: Void**Table 7.6B.4.1.5-3: Void**

7.6B.4.2 Narrow band blocking for intra-band non-contiguous EN-DC in FR1 (2 CCs)

7.6B.4.2.1 Test Purpose

Same test purpose as in clause 7.6.4.1 in TS 38.521-1 [8] for the NR carrier.

7.6B.4.2.2 Test Applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band non-contiguous EN-DC in FR1 with 2CCs.

7.6B.4.2.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.6B.4.0.2.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

7.6B.4.2.4 Test Description

Same test description as in clause 7.6.4.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

Table 7.6B.4.2.4-1: Test Configuration Table

| Initial Conditions | |
|---|-------------------------------------|
| Test Frequencies as specified in TS 38.508-1 [6] clause 4.3.1 for different EN-DC bandwidth classes | High with maxWGap |
| Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1 across bandwidth combination sets supported by the UE | Highest N _{RB_agg} (NOTE1) |
| NOTE 1: If the UE supports multiple CC Combinations in the EN-DC Configuration with the same NRB _{agg} , only the combination with the highest NRB _{SCG} is tested. | |

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1 except for the parameters specified in Table 7.6B.4.2.4-1.

For Initial conditions as in clause 7.6.4.4.1 in TS 38.521-1 [8], add step 2.1 and step 3.1 as follows:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 7.6.4.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

Add step 7 to Initial conditions in clause 7.6.4.4.1 in TS 38.521-1 [8] as follows:

7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

Step 3 of Test procedure as in clause 7.6.4.4.2 in TS 38.521-1 [8] shall treat the in-gap tests as below: For intra-band non-contiguous EN-DC of two sub-blocks with channel bandwidth larger than or equal to 5 MHz, the existing requirements apply for in-gap tests only if the corresponding interferer frequency offsets satisfy the following condition

in relation to the sub-block gap size W_{gap} , so that the interferer frequency position does not change the nature of the core requirement tested:

$$W_{gap} \geq 2 \cdot |F_{\text{Interferer}}(\text{offset})| - \text{BW}_{\text{Channel}}$$

Step 4 of Test procedure as in clause 7.6.4.4.2 in TS 38.521-1 [8] is replaced by:

4. Set the downlink signal level for NR CC according to the Table 7.6.4.5-1 in TS 38.521-1 [8] as appropriate. For NR CC and E-UTRA CC, send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as - MU to -(MU + Uplink power control window size) dB of ($P_{CMAX,L,c}$ - 29dB) for E-UTRA CC, and of 4dB below $P_{CMAX,L,f,c}$ for NR CC for at least the duration of the Throughput measurement, where:
 - MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW
 - For NR CC, Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified in Table F.1.2-1.
 - For E-UTRA CC, Uplink power control window size = 1dB (UE power step size) + 1.0dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 36.101 [5], Table 6.3.5.2.1-1 and is 1.0dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified in Table F.1.2-1 of TS 36.521-1 [10].

7.6B.4.2.5 Test Requirement

Same test requirement as in clause 7.6.4.5 in TS 38.521-1 [8].

7.6B.4.3 Narrow band blocking for inter-band EN-DC within FR1 (2 CCs)

7.6B.4.3.1 Test Purpose

Same test purpose as in clause 7.6.4.1 in TS 38.521-1 [8] for the NR carrier.

7.6B.4.3.2 Test Applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC within FR1 with 2CCs.

7.6B.4.3.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.6B.4.0.3.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

7.6B.4.3.4 Test Description

Same test description as in clause 7.6.4.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1.

For Initial conditions as in clause 7.6.4.4.1 in TS 38.521-1 [8], add step 2.1 and step 3.1 as follows:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 7.6.4.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

Add step 7 to Initial conditions in clause 7.6.4.4.1 in TS 38.521-1 [8] as follows:

7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

7.6B.4.3.5 Test Requirement

Same test requirement as in clause 7.6.4.5 in TS 38.521-1 [8].

7.6B.4.3_1 Narrow band blocking for EN-DC within FR1 (>2 CCs)

7.6B.4.3_1.1 Narrow band blocking for EN-DC within FR1 (3 CCs)

7.6B.4.3_1.1.1 Test Purpose

Verifies a receiver's ability to receive EN-DC signals at its assigned channel frequencies in the presence of an unwanted narrow band CW interferer at a frequency, which is less than the nominal channel spacing.

The lack of narrow-band blocking ability will decrease the coverage area when other NodeB transmitters exist (except in the adjacent channels and spurious response).

7.6B.4.3_1.1.2 Test Applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band contiguous EN-DC within FR1 with 3 DL CCs or inter-band EN-DC within FR1 with 3 DL CCs (2NR DL CCs).

7.6B.4.3_1.1.3 Minimum Conformance Requirements

For intra-band contiguous EN-DC within FR1 with 3 DL CCs: The minimum conformance requirements are defined in clause 7.6B.4.0.1. Exception requirements for both NR and E-UTRA are defined for this test and therefore LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

The minimum conformance requirements are defined in clause 7.6B.4.0.3.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

7.6B.4.3_1.1.4 Test Description

7.6B.4.3_1.1.4.1 Intra-band contiguous EN-DC within FR1 with 3 DL CCs

7.6B.4.3_1.1.4.1.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on EN-DC operating bands specified in clause 5.3B.1.2, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-1 [8] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2. All of these configurations shall be tested with applicable test parameters for each EN-DC configuration specified in clause 5.3B.1.2 and are shown in Table 7.6B.4.3_1.1.4.1.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annex A.2 and A.3 respectively. The details of the OCNG patterns used are specified in TS 36.521-1 [10] Annex A.5 and in TS 38.521-1 [8] Annex A.5 for E-UTRA CG and NR CG respectively. Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521-1 [10] Annex C.2 and in TS 38.521-1 [8] Annex C.2 for E-UTRA CG and NR CG respectively.

Table 7.6B.4.3_1.1.4.1.1-1: Test configuration table

| Initial Conditions | | | | | |
|---|------------------|---|------------------|------------------------------|--------------------------|
| Test Environment as specified in TS 38.508-1 [6] clause 4.1 | | Normal | | | |
| Test Frequencies as specified in TS 38.508-1 [6] clause 4.3.1 for different EN-DC bandwidth classes | | Mid range | | | |
| Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1 across bandwidth combination sets supported by the UE | | Lowest N _{RB_agg} , Highest N _{RB_agg} (NOTE 3) | | | |
| NR Test SCS as specified in Table 5.3.5-1 in TS 38.521-1 [8] | | Lowest | | | |
| NR/E-UTRA Test Parameters | | | | | |
| PCC – E-UTRA | | SCC – EUTRA | | NR | |
| UL/DL Modulation | UL/DL allocation | UL/DL Modulation | UL/DL allocation | UL/DL Modulation | UL/DL allocation |
| QPSK/QPSK | REFSENS/Full RB | NA/QPSK | NA/Full RB | DFT-s-OFDM QPSK/CP-OFDM QPSK | REFSENS/Full RB (NOTE 1) |

NOTE 1: Full RB allocation shall be used per each SCS and channel BW as specified in Table 7.3.2.4.1-2 of TS 38.521-1 [8].

NOTE 2: Test Channel Bandwidths are checked separately for each EN-DC band, which applicable channel bandwidths are specified in Table 5.3B.1.2-1.

NOTE 3: If the UE supports multiple CC Combinations in the EN-DC Configuration with the same N_{RB_agg}, only the combination with the highest N_{RB_SCG} is tested.

NOTE 4: REFSENS refers to Uplink configuration in Table 7.3.2.3-3 in [8] and Table 7.3.3-2 in [10] for NR and E-UTRA CC respectively.

NOTE 5: In a FR1 band where UE supports 4Rx, the test shall be performed only with 4Rx antennas ports connected and 4Rx REFSENS requirement (TS 38.521-1 [8] Table 7.3.2.5-2) is used in the test requirements.

1. Connect the SS to the UE antenna connectors as shown in [6] TS 38.508-1 Annex A, in Figure A.3.1.4.2 for SS diagram and clause A.3.2 for UE diagram.
2. The parameter settings for the E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3, and the parameter settings for the NR cell are set up according to TS 38.508-1 [6] clause 4.4.3.
3. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C and TS 38.521-1 [8] Annex C for E-UTRA CG and NR CG respectively, and uplink signals according to TS 36.521-1 [10] Annex H and TS 38.521-1 [8] Annex G for E-UTRA CG and NR CG respectively.
4. The UL and DL Reference Measurement channels are TS 36.521-1 [10] Annex A.2, A.3 and TS 38.521-1 [8] Annex A.2 , A.3 for E-UTRA CG and NR CG respectively.
5. Propagation conditions are set according to TS 36.521-1 [10] Annex B.0 and TS 38.521-1 [8] Annex B.0 for E-UTRA CG and NR CG respectively.
6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 7.6B.4.3_1.1.4.1.3.

7.6B.4.3_1.1.4.1.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A and PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Table 7.6B.4.3_1.1.4.1.1-1 on E-UTRA CC and NR CC respectively. The SS sends downlink MAC padding bits on the DL RMC.
2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 7.6B.4.3_1.1.4.1.1-1 on E-UTRA CC and NR CC respectively. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
3. Set the Downlink signal level to the value as defined in Table 7.6B.4.1.5-1. For NR CC and E-UTRA CC, send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power

measured by the test system is within the Uplink power control window, defined as $-\text{MU}$ to $-(\text{MU} + \text{Uplink power control window size})$ dB of the target power level in Table 7.6B.4.1.5-1 + ([$10\log(S_{LCRB}/N_{RB_alloc})$] for NR CC, [$10\log(P_{LCRB}/N_{RB_alloc})$] for E-UTRA CC) for at least the duration of the Throughput measurement, where:

- MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW
 - For NR CC, Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified in Table F.1.2-1.
 - For E-UTRA CC, Uplink power control window size = 1dB (UE power step size) + 1.0dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 36.101 [5], Table 6.3.5.2.1-1 and is 1.0dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified in Table F.1.2-1 of TS 36.521-1 [10].
4. Set the parameters of the CW signal generator for an interfering signal below the aggregated component carriers according to Table 7.6B.4.1.5-1.
 5. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex H.2.
 6. Repeat steps from 4 to 5, using an interfering signal above the aggregated component carriers at step 4.

NOTE: The purpose of the Uplink power control window is to ensure that the actual UE output power is no greater than the target power level, and as close as possible to the target power level. The relationship between the Uplink power control window, the target power level and the corresponding possible actual UE Uplink power window is illustrated in Annex F, clause F.4.

7.6B.4.3_1.1.4.1.3 Message contents

Message contents are according to TS 38.508-1 [6] clause 4.6 Table 4.6.3-118 with condition TRANSFORM_PRECODER_ENABLED.

7.6B.4.3_1.1.4.2 Inter-band EN-DC within FR1 with 3 DL CCs (2NR DL CCs)

Same test description as in clause 7.6.4.4 or 7.6A.4.1.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1.

For Initial conditions as in clause 7.6A.4.1.4.1 in TS 38.521-1 [8], add step 2.1 and step 3.1 as follows:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 7.6A.4.1.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508 [6] clause 4.5.

Add step 7 to Initial conditions in clause 7.6A.4.1.4.1 in TS 38.521-1 [8] as follows:

7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

7.6B.4.3_1.1.5 Test Requirement

For intra-band contiguous EN-DC within FR1 with 3 DL CCs: Same test requirement as in clause 7.6B.4.1.5.

For inter-band EN-DC within FR1 with 3 DL CCs (2NR DL CCs): Same test requirement as in clause 7.6A.4.1.5 in TS 38.521-1 [8].

7.6B.4.3_1.2 Narrow band blocking for EN-DC within FR1 (4 CCs)

7.6B.4.3_1.2.1 Test Purpose

Verifies a receiver's ability to receive EN-DC signals at its assigned channel frequencies in the presence of an unwanted narrow band CW interferer at a frequency, which is less than the nominal channel spacing.

The lack of narrow-band blocking ability will decrease the coverage area when other NodeB transmitters exist (except in the adjacent channels and spurious response).

7.6B.4.3_1.2.2 Test Applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band contiguous EN-DC within FR1 with 4 DL CCs or inter-band EN-DC within FR1 with 4 DL CCs (3NR DL CCs).

7.6B.4.3_1.2.3 Minimum Conformance Requirements

For intra-band contiguous EN-DC within FR1 with 4 DL CCs: The minimum conformance requirements are defined in clause 7.6B.4.0.1. Exception requirements for both NR and E-UTRA are defined for this test and therefore LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

For inter-band EN-DC within FR1 with 4 DL CCs (3NR DL CCs): The minimum conformance requirements are defined in clause 7.6B.4.0.3.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

7.6B.4.3_1.2.4 Test Description

7.6B.4.3_1.2.4.1 Intra-band contiguous EN-DC within FR1 with 4 DL CCs

7.6B.4.3_1.2.4.1.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on EN-DC operating bands specified in clause 5.3B.1.2, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-1 [8] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2. All of these configurations shall be tested with applicable test parameters for each EN-DC configuration specified in clause 5.3B.1.2 and are shown in Table 7.6B.4.3_1.2.4.1.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annex A.2 and A.3 respectively. The details of the OCNG patterns used are specified in TS 36.521-1 [10] Annex A.5 and in TS 38.521-1 [8] Annex A.5 for E-UTRA CG and NR CG respectively. Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521-1 [10] Annex C.2 and in TS 38.521-1 [8] Annex C.2 for E-UTRA CG and NR CG respectively.

Table 7.6B.4.3_1.2.4.1.1-1: Test configuration table

| Initial Conditions | | | | | |
|---|---|------------------|------------------|------------------------------|--------------------------|
| Test Environment as specified in TS 38.508-1 [6] clause 4.1 | Normal | | | | |
| Test Frequencies as specified in TS 38.508-1 [6] clause 4.3.1 for different EN-DC bandwidth classes | Mid range | | | | |
| Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1 across bandwidth combination sets supported by the UE | Lowest N _{RB_agg} , Highest N _{RB_agg} (NOTE 3) | | | | |
| NR Test SCS as specified in Table 5.3.5-1 in TS 38.521-1 [8] | Lowest | | | | |
| NR/E-UTRA Test Parameters | | | | | |
| PCC – E-UTRA | SCC1 – EUTRA and SCC2 – EUTRA | NR | | | |
| UL/DL Modulation | UL/DL allocation | UL/DL Modulation | UL/DL allocation | UL/DL Modulation | UL/DL allocation |
| QPSK/QPSK | REFSENS/Full RB | NA/QPSK | NA/Full RB | DFT-s-OFDM QPSK/CP-OFDM QPSK | REFSENS/Full RB (NOTE 1) |
| NOTE 1: Full RB allocation shall be used per each SCS and channel BW as specified in Table 7.3.2.4.1-2 of TS 38.521-1 [8]. NOTE 2: Test Channel Bandwidths are checked separately for each EN-DC band, which applicable channel bandwidths are specified in Table 5.3B.1.2-1. NOTE 3: If the UE supports multiple CC Combinations in the EN-DC Configuration with the same N _{RB_agg} , only the combination with the highest N _{RB_SCG} is tested. NOTE 4: REFSENS refers to Uplink configuration in Table 7.3.2.3-3 in [8] and Table 7.3.3-2 in [10] for NR and E-UTRA CC respectively. NOTE 5: In a FR1 band where UE supports 4Rx, the test shall be performed only with 4Rx antennas ports connected and 4Rx REFSENS requirement (TS 38.521-1 [8] Table 7.3.2.5-2) is used in the test requirements. | | | | | |

1. Connect the SS to the UE antenna connectors as shown in [6] TS 38.508-1 Annex A, in Figure A.3.1.4.2 for SS diagram and clause A.3.2 for UE diagram.
2. The parameter settings for the E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3, and the parameter settings for the NR cell are set up according to TS 38.508-1 [6] clause 4.4.3.
3. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C and TS 38.521-1 [8] Annex C for E-UTRA CG and NR CG respectively, and uplink signals according to TS 36.521-1 [10] Annex H and TS 38.521-1 [8] Annex G for E-UTRA CG and NR CG respectively.
4. The UL and DL Reference Measurement channels are TS 36.521-1 [10] Annex A.2, A.3 and TS 38.521-1 [8] Annex A.2 , A.3 for E-UTRA CG and NR CG respectively.
5. Propagation conditions are set according to TS 36.521-1 [10] Annex B.0 and TS 38.521-1 [8] Annex B.0 for E-UTRA CG and NR CG respectively.
6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 7.6B.4.3_1.2.4.1.3.

7.6B.4.3_1.2.4.1.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A and PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Table 7.6B.4.3_1.2.4.1.1-1 on E-UTRA CC and NR CC respectively. The SS sends downlink MAC padding bits on the DL RMC.
2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 7.6B.4.3_1.2.4.1.1-1 on E-UTRA CC and NR CC respectively. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

3. Set the Downlink signal level to the value as defined in Table 7.6B.4.1.5-1. For NR CC and E-UTRA CC, send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as $-\text{MU}$ to $(-\text{MU} + \text{Uplink power control window size})$ dB of the target power level in Table 7.6B.4.1.5-1 + ([10log(S_LCRB/N_{RB_alloc})]) for NR CC, [10log(P_LCRB/N_{RB_alloc})]) for E-UTRA CC) for at least the duration of the Throughput measurement, where:
 - MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW
 - For NR CC, Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified in Table F.1.2-1.
 - For E-UTRA CC, Uplink power control window size = 1dB (UE power step size) + 1.0dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 36.101 [5], Table 6.3.5.2.1-1 and is 1.0dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified in Table F.1.2-1 of TS 36.521-1 [10].
4. Set the parameters of the CW signal generator for an interfering signal below the aggregated component carriers according to Table 7.6B.4.1.5-1.
5. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex H.2.
6. Repeat steps from 4 to 5, using an interfering signal above the aggregated component carriers at step 4.

NOTE: The purpose of the Uplink power control window is to ensure that the actual UE output power is no greater than the target power level, and as close as possible to the target power level. The relationship between the Uplink power control window, the target power level and the corresponding possible actual UE Uplink power window is illustrated in Annex F, clause F.4.

7.6B.4.3_1.2.4.1.3 Message contents

Message contents are according to TS 38.508-1 [6] clause 4.6 Table 4.6.3-118 with condition TRANSFORM_PRECODER_ENABLED.

7.6B.4.3_1.2.4.2 Inter-band EN-DC within FR1 with 4 DL CCs (3NR DL CCs)

Same test description as in clause 7.6A.4.2.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1.

For Initial conditions as in clause 7.6A.4.2.4.1 in TS 38.521-1 [8], add step 2.1 and step 3.1 as follows:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 7.6A.4.2.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508 [6] clause 4.5.

Add step 7 to Initial conditions in clause 7.6A.4.2.4.1 in TS 38.521-1 [8] as follows:

7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

7.6B.4.3_1.2.5 Test Requirement

For intra-band contiguous EN-DC within FR1 with 4 DL CCs: Same test requirement as in clause 7.6B.4.1.5.

For inter-band EN-DC within FR1 with 4 DL CCs (3NR DL CCs): Same test requirement as in clause 7.6A.4.2.5 in TS 38.521-1 [8].

7.6B.4.3_1.3 Narrow band blocking for EN-DC within FR1 (5 CCs)

7.6B.4.3_1.3.1 Test Purpose

Same test purpose as in clause 7.6B.4.3.1.

7.6B.4.3_1.3.2 Test Applicability

This test case applies to all types of E-UTRA UE release 16 and forward, supporting inter-band EN-DC within FR1 with 5 DL CCs (4 NR DL CCs).

7.6B.4.3_1.3.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.6B.4.0.3.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

7.6B.4.3_1.3.4 Test Description

Same test description as in clause 7.6A.4.3.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1.

For Initial conditions as in clause 7.6A.4.3.4.1 in TS 38.521-1 [8], add step 2.1 and step 3.1 as follows:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 7.6A.4.3.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

Add step 7 to Initial conditions in clause 7.6A.4.3.4.1 in TS 38.521-1 [8] as follows:

7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

7.6B.4.3_1.3.5 Test Requirement

Same test requirement as in clause 7.6A.4.3.5 in TS 38.521-1 [8].

7.6B.4.3_1.4 Void

7.7 Void

7.7A Spurious response for CA

7.7A.1 Test purpose

Same test purpose as in clause 7.7 in TS 38.521-1 [8] for NR FR1 carrier(s).

7.7A.2 Test applicability

The requirements are only for FR1. Therefore, only the conducted requirements are tested.

No test case details are specified. The SA requirements for Spurious response apply and are tested in TS 38.521-1 [8] clause 7.7 and 7.7A.

7.7B Spurious response for DC

7.7B.0 Minimum Conformance Requirements

7.7B.0.1 Intra-band contiguous EN-DC in FR1

Intra-band contiguous EN-DC spurious response requirement and parameters are defined in Table 7.7B.0.1-1.

Table 7.7B.0.1-1: Spurious Response Parameters for intra-band contiguous EN-DC

| EN-DC Aggregated Bandwidth, MHz | ≤100 | >100, ≤120 | >120, ≤140 | >140, ≤160 |
|---|--|------------|------------|------------|
| Pw in Transmission Bandwidth Configuration, perCC, dBm | REFSENS + Aggregated BW specific value below | | | |
| | 9 | | | |
| Pinterferer, dBm (CW) | -44 | | | |
| NOTE 1: For NR carrier, the transmitter shall be set to 4dB below $P_{CMAX_L,f,c,NR}$ at the minimum uplink configuration specified in Table 7.3.2-3 in TS 38.101-1 [2] with $P_{CMAX_L,f,c,NR}$ as defined in clause 6.2B.4. NOTE 2: For E-UTRA carrier, the transmitter shall be set to 4dB below $P_{CMAX_L_E-UTRA,c}$ at the minimum uplink configuration specified in Table 7.3.1-2 in TS 36.101 [5] with $P_{CMAX_L_E-UTRA,c}$ as defined in clause 6.2B.4 for single carrier. | | | | |

The normative reference for this requirement is TS 38.101-3 [4] clause 7.7B.1.

7.7B.0.2 Intra-band non-contiguous EN-DC in FR1

For the E-UTRA sub-block containing one or multiple CC's, the requirement is defined in clause 7.7.1 for single carrier operation and in clause 7.7.1A for CA in TS 36.101 [5].

For the NR sub-block, the requirement is defined in clause 7.7 in TS 38.101-1 [2].

The normative reference for this requirement is TS 38.101-3 [4] clause 7.7B.2.

7.7B.0.3 Inter-band EN-DC within FR1

Spurious response requirement for E-UTRA single carrier and CA operation specified in clauses 7.7.1 and 7.7.1A of TS 36.101 [5] and for NR single carrier and CA operation specified in clauses 7.7 and 7.7A of TS 38.101-1 [2] apply for lowest level EN-DC fallbacks (two bands) in clause 5.5B.4.1 with following conditions:

- one E-UTRA uplink carrier with the output power set to 4 dB below $P_{CMAX_L,c}$ and the NR band whose downlink is being tested has its uplink carrier output power set to 29 dB below $P_{CMAX_L,f,c}$.
- one NR uplink carrier with the output power set to 4 dB below $P_{CMAX_L,f,c}$ on the NR band with both E-UTRA and NR downlinks being tested with E-UTRA output power set to 29 dB below $P_{CMAX_L,c}$.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.7B.3.

7.7B.0.3A Inter-band NE-DC within FR1

Spurious response requirement for E-UTRA single carrier and CA operation specified in clauses 7.7.1 and 7.7.1A of TS 36.101 [5] and for NR single carrier and CA operation specified in clauses 7.7 and 7.7A of TS 38.101-1 [2] apply for lowest level NE-DC fallbacks (two bands) in clause 5.5B.4a.1 with following conditions:

- one E-UTRA uplink carrier with the output power set to 4 dB below $P_{CMAX_L,c}$ and the NR band whose downlink is being tested has its uplink carrier output power set to 29 dB below $P_{CMAX_L,f,c}$.
- one NR uplink carrier with the output power set to 4 dB below $P_{CMAX_L,f,c}$ on the NR band with both E-UTRA and NR downlinks being tested with E-UTRA output power set to 29 dB below $P_{CMAX_L,c}$.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.7B.3a.

7.7B.0.4 Inter-band EN-DC including FR2

Spurious response requirement for E-UTRA single carrier and CA operation specified in clauses 7.7.1 and 7.7.1A of TS 36.101 [5] apply for lowest level EN-DC fallbacks (two bands) in clause 5.5B.5.1 with only E-UTRA UL with output power as in TS 36.101 [5] (4 dB below P_{CMAX_L}).

The normative reference for this requirement is TS 38.101-3 [4] clause 7.7B.4.

7.7B.0.5 Inter-band EN-DC including both FR1 and FR2

Spurious response requirement for E-UTRA single carrier and CA operation specified in clauses 7.7.1 and 7.7.1A of TS 36.101 [5] and for NR single carrier and CA operation specified in clauses 7.7 and 7.7A of TS 38.101-1 [2] apply for lowest level EN-DC fallbacks (three bands) in clause 5.5B.6.2 with only E-UTRA UL with output power as in TS 36.101 [5] (4 dB below P_{CMAX_L}).

The normative reference for this requirement is TS 38.101-3 [4] clause 7.7B.5.

7.7B.1 Spurious Response for intra-band contiguous EN-DC in FR1 (2 CCs)

7.7B.1.1 Test Purpose

Spurious response for EN-DC verifies the receiver's ability to receive a wanted aggregated signal on its assigned channel frequency without exceeding a given degradation due to the presence of an unwanted CW interfering signal at any other frequency at which a response is obtained i.e. for which the out of band blocking limit as specified in clause 7.6B.3.1 is not met.

The lack of the spurious response ability decreases the coverage area when other unwanted interfering signal exists at any other frequency.

7.7B.1.2 Test Applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band contiguous EN-DC in FR1 with 2CCs.

7.7B.1.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.7B.0.1.

Exception requirements for both NR and E-UTRA are defined for this test and therefore LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

7.7B.1.4 Test Description

7.7B.1.4.1 Initial condition

The initial conditions shall be the same as in clause 7.6B.3.1.4.1 in order to test spurious responses obtained in clause 7.6B.3.1 under the same conditions.

7.7B.1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A and PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Table 7.6B.3.1.4.1-1 on E-UTRA CC and NR CC respectively. The SS sends downlink MAC padding bits on the DL RMC.
2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 7.6B.3.1.4.1-1 on E-UTRA CC and NR CC respectively. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
3. Set the Downlink signal level to the value as defined in Table 7.7B.1.5-1. For NR CC and E-UTRA CC, send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as -(MU to -(MU + Uplink power control window size) dB of the target power level in Table 7.7B.1.5-1 +([10log(S_LCRB/N_{RB_alloc}) for NR CC, [10log(P_LCRB/N_{RB_alloc}) for E-UTRA CC] for at least the duration of the Throughput measurement, where:
 - MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW.
 - For NR CC, Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified in Table F.1.2-1.
 - For E-UTRA CC, Uplink power control window size = 1dB (UE power step size) + 1.0dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 36.101 [5], Table 6.3.5.2.1-1 and is 1.0dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified in Table F.1.2-1 of TS 36.521-1 [10].
4. Set the parameters of the CW signal generator for an interfering signal according to Table 7.7B.1.5-1. The spurious frequencies are taken from records in the final step of test procedures in clause 7.6B.3.1.4.2.
5. For each spurious frequency, Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex H.2.

NOTE: The purpose of the Uplink power control window is to ensure that the actual UE output power is no greater than the target power level, and as close as possible to the target power level. The relationship between the Uplink power control window, the target power level and the corresponding possible actual UE Uplink power window is illustrated in Annex F, clause F.4.

7.7B.1.4.3 Message contents

Message contents are according to TS 38.508-1 [6] clause 4.6 Table 4.6.3-118 with condition TRANSFORM_PRECODER_ENABLED.

7.7B.1.5 Test Requirement

The throughput shall be $\geq 95\%$ of the maximum throughput of the reference measurement channels as specified in TS 36.521-1 [10] Annex A.3 and TS 38.521-1 [8] Annex A.3 for E-UTRA CG and NR CG respectively with parameters specified in Table 7.7B.1.5-1 for the specified wanted signal mean power in the presence of interfering signals.

Table 7.7B.1.5-1: Spurious Response for intra-band contiguous EN-DC

| EN-DC Aggregated Bandwidth, MHz | ≤ 100 | $>100, \leq 120$ | $>120, \leq 140$ | $>140, \leq 160$ |
|--|--|------------------|------------------|------------------|
| Pw in Transmission Bandwidth Configuration, perCC, dBm | REFSENS + Aggregated BW specific value below | | | |
| | 9 | | | |
| P _{interferer} , dBm (CW) | -44 | | | |

NOTE 1: For NR carrier, the transmitter shall be set to 4dB below P_{CMAX_L,f,c,NR} at the minimum uplink configuration specified in Table 7.3.2-3 in TS 38.101-1 [2] with P_{CMAX_L,f,c,NR} as defined in clause 6.2B.4.

NOTE 2: For E-UTRA carrier, the transmitter shall be set to 4dB below P_{CMAX_L_E-UTRA,c} at the minimum uplink configuration specified in Table 7.3.1-2 in TS 36.101 [5] with P_{CMAX_L_E-UTRA,c} as defined in clause 6.2B.4 for single carrier.

Table 7.7B.1.5-2: Void**Table 7.7B.1.5-3: Void**

7.7B.2 Spurious Response for intra-band non-contiguous EN-DC in FR1 (2 CCs)

7.7B.2.1 Test Purpose

Same test purpose as in clause 7.7.1 in TS 38.521-1 [8] for the NR carrier.

7.7B.2.2 Test Applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band non-contiguous EN-DC in FR1 with 2CCs.

7.7B.2.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.7B.0.2.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

7.7B.2.4 Test Description

Same test description as in clause 7.7.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

The initial conditions shall be the same as the initial conditions in clause 7.6B.3.2.4 in order to test spurious responses obtained in clause 7.6B.3.2 under the same conditions.

Step 4 of Test procedure as in clause 7.7.4.2 in TS 38.521-1 [8] is replaced by:

4. Set the downlink signal level for NR CC according to the Table 7.7.5-1 or 7.7.5-1a in TS 38.521-1 [8] as appropriate. For NR CC and E-UTRA CC, send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as -MU to -(MU + Uplink power control window size) dB of (P_{CMAX_L,c} - 29dB) for E-UTRA CC, and of 4dB below P_{CMAX_L,f,c} for NR CC for at least the duration of the Throughput measurement, where:
 - MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW
 - For NR CC, Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified in Table F.1.2-1.

- For E-UTRA CC, Uplink power control window size = 1dB (UE power step size) + 1.0dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 36.101 [5], Table 6.3.5.2.1-1 and is 1.0dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified in Table F.1.2-1 of TS 36.521-1 [10].

7.7B.2.5 Test Requirement

Same test requirement as in clause 7.7.5 in TS 38.521-1 [8].

7.7B.3 Spurious Response for inter-band EN-DC within FR1 (2 CCs)

7.7B.3.1 Test Purpose

Spurious response is a measure of the ability of the receiver to receive a wanted signal on its assigned channel frequency without exceeding a given degradation due to the presence of an unwanted CW interfering signal at any other frequency for which a response is obtained, i.e. for which the out-of-band blocking limit as specified in subclause 7.6B.3.3 is not met.

The lack of the spurious response ability decreases the coverage area when other unwanted interfering signal exists at any other frequency.

7.7B.3.2 Test Applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC within FR1 with 2CCs.

7.7B.3.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.7B.0.3.

Exception requirements for both NR and E-UTRA are defined for this test and therefore LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

7.7B.3.4 Test Description

7.7B.3.4.1 Initial Conditions

The initial conditions shall be the same as in clause 7.6B.3.3.4.1 in order to test spurious responses obtained in clause 7.6B.3.3 under the same conditions.

7.7B.3.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A and PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Table 7.6B.3.3.4.1-1 on E-UTRA CC and NR CC respectively. The SS sends downlink MAC padding bits on the DL RMC.
2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 7.6B.3.3.4.1-1 on E-UTRA CC and NR CC respectively. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
3. Set the Downlink signal level to the value as defined in Table 7.7B.3.5-1, Table 7.7B.3.5-3, or Table 7.7B.3.5-4 for E-UTRA CC and NR CC respectively. For NR CC and E-UTRA CC, send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as -MU to -(MU + Uplink power control window size) dB of $(P_{CMAX,L,c} - 4dB)$ for E-UTRA CC, and of 29 dB below $P_{CMAX,L,f,c}$ for NR CC for at least the duration of the Throughput measurement, where:
 - MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW

- For NR CC, Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified in Table F.1.2-1.
 - For E-UTRA CC, Uplink power control window size = 1dB (UE power step size) + 1.0dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 36.101 [5], Table 6.3.5.2.1-1 and is 1.0dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified in Table F.1.2-1 of TS 36.521-1 [10].
4. Set the parameters of the CW signal generator for an interfering signal according to Table 7.7B.3.5-2. The spurious frequencies are taken from records in test procedures in clause 7.6B.3.3.4.2.
 5. For the spurious frequency, measure the average throughput of NR CC for a duration sufficient to achieve statistical significance according to Annex H.2.
 6. Set the Downlink signal level to the value as defined in Table 7.7B.3.5-1, Table 7.7B.3.5-3, or Table 7.7B.3.5-4 for E-UTRA CC and NR CC respectively. For NR CC and E-UTRA CC, send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as $-\text{MU}$ to $(-\text{MU} + \text{Uplink power control window size})$ dB of $(P_{\text{CMAX},L,f,c} - 4\text{dB})$ for NR CC, and of 29 dB below $P_{\text{CMAX},L,c}$ for E-UTRA CC for at least the duration of the Throughput measurement, where:
 - MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW
 - For NR CC, Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified in Table F.1.2-1.
 - For E-UTRA CC, Uplink power control window size = 1dB (UE power step size) + 1.0dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 36.101 [5], Table 6.3.5.2.1-1 and is 1.0dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified in Table F.1.2-1 of TS 36.521-1 [10].
 7. Set the parameters of the CW signal generator for an interfering signal according to Table 7.7B.3.5-2. The spurious frequencies are taken from records in test procedures in clause 7.6B.3.3.4.2 for E-UTRA CC and NR CC testing respectively..
 8. For the spurious frequency, measure the average throughput of E-UTRA CC and NR CC respectively for a duration sufficient to achieve statistical significance according to Annex H.2.

NOTE: The purpose of the Uplink power control window is to ensure that the actual UE output power is no greater than the target power level, and as close as possible to the target power level. The relationship between the Uplink power control window, the target power level and the corresponding possible actual UE Uplink power window is illustrated in Annex F, clause F.4.

7.7B.3.4.3 Message contents

Message contents are according to TS 38.508-1 [6] clause 4.6.

7.7B.3.5 Test Requirement

For E-UTRA bands, the throughput measurement derived in test procedure shall be $\geq 95\%$ of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 of TS 36.521-1 [10] with parameters specified in Tables 7.7B.3.5-1 and 7.7B.3.5-2.

For NR bands with $F_{\text{DL},\text{high}} < 2700$ MHz and $F_{\text{UL},\text{high}} < 2700$ MHz, the throughput measurement derived in test procedure shall be $\geq 95\%$ of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 and A.3.3 of TS 38.521-1 [8] with parameters specified in Tables 7.7B.3.5-3 and 7.7B.3.5-2.

For NR bands with $F_{DL_low} \geq 3300$ MHz and $F_{UL_low} \geq 3300$ MHz, the throughput measurement derived in test procedure shall be $\geq 95\%$ of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 and A.3.3 of TS 38.521-1 [8] with parameters specified in Tables 7.7B.3.5-4 and 7.7B.3.5-2.

Table 7.7B.3.5-1: Spurious response parameters for E-UTRA bands

| Rx Parameter | Units | Channel bandwidth | | | | | |
|---|-------|--|-------|-------|--------|--------|--------|
| | | 1.4 MHz | 3 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz |
| Power in Transmission Bandwidth Configuration | dBm | REFSENS + channel bandwidth specific value below | | | | | |
| | | 6 | 6 | 6 | 6 | 7 | 9 |
| Note 1: The reference measurement channel is specified in Annex A.3.2 of TS 36.521-1 [10] with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 of TS 36.521-1 [10]. | | | | | | | |
| Note 2: The REFSENS power level is specified in Table 7.3.3-1 of TS 36.521-1 [10] for two and four antenna ports, respectively. | | | | | | | |

Table 7.7B.3.5-2: Spurious Response for E-UTRA bands and NR bands

| Parameter | Unit | Level |
|-----------------------|------|-------------------------------|
| $P_{Interferer}$ (CW) | dBm | -44 |
| $F_{Interferer}$ | MHz | Spurious response frequencies |

Table 7.7B.3.5-3: Spurious response parameters for NR bands with $F_{DL_high} < 2700$ MHz and $F_{UL_high} < 2700$ MHz

| RX parameter | Units | Channel bandwidth | | | | | |
|---|-------|--|---------|--------|--------|--------|--|
| | | 5 MHz | 10 MHz | 15 MHz | 20 MHz | 25 MHz | |
| Power in transmission bandwidth configuration | | REFSENS + channel bandwidth specific value below | | | | | |
| | dB | 6 | 6 | 7 | 9 | 10 | |
| RX parameter | Units | Channel bandwidth | | | | | |
| | | 30 MHz | 40 MHz | 50 MHz | 60 MHz | 80 MHz | |
| Power in transmission bandwidth configuration | | REFSENS + channel bandwidth specific value below | | | | | |
| | dB | 11 | 12 | 13 | 14 | 15 | |
| RX parameter | Units | Channel bandwidth | | | | | |
| | | 90 MHz | 100 MHz | | | | |
| Power in transmission bandwidth configuration | | REFSENS + channel bandwidth specific value below | | | | | |
| | dB | 15.5 | 16 | | | | |
| NOTE: The transmitter shall be at the minimum UL configuration specified in Table 7.3.2.3-3 of TS 38.521-1 [8]. | | | | | | | |

Table 7.7B.3.5-4: Spurious response parameters for NR bands with $F_{DL_low} \geq 3300$ MHz and $F_{UL_low} \geq 3300$ MHz

| RX parameter | Units | Channel bandwidth | | | | |
|---|-------|--|--------|--------|---------|--------|
| | | 10 MHz | 15 MHz | 20 MHz | 40 MHz | 50 MHz |
| Power in transmission bandwidth configuration | dBm | REFSENS + channel bandwidth specific value below | | | | |
| | dB | 6 | 7 | 9 | 9 | 9 |
| RX parameter | Units | Channel bandwidth | | | | |
| | | 60 MHz | 80 MHz | 90 MHz | 100 MHz | |
| Power in transmission bandwidth configuration | dBm | REFSENS + channel bandwidth specific value below | | | | |
| | dB | 9 | 9 | 9 | 9 | |
| NOTE: The transmitter shall be at the minimum UL configuration specified in Table 7.3.2.3-3 of TS 38.521-1 [8]. | | | | | | |

7.7B.3_1 Spurious Response for EN-DC within FR1 (>2 CCs)

7.7B.3_1.1 Spurious Response for EN-DC within FR1 (3 CCs)

7.7B.3_1.1.1 Test Purpose

Spurious response for EN-DC verifies the receiver's ability to receive a wanted aggregated signal on its assigned channel frequency without exceeding a given degradation due to the presence of an unwanted CW interfering signal at any other frequency at which a response is obtained i.e. for which the out of band blocking limit as specified in clause 7.6B.3.3_1.1 is not met.

The lack of the spurious response ability decreases the coverage area when other unwanted interfering signal exists at any other frequency.

7.7B.3_1.1.2 Test Applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band contiguous EN-DC in FR1 with 3 DL CCs.

7.7B.3_1.1.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.7B.0.1.

Exception requirements for both NR and E-UTRA are defined for this test and therefore LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

7.7B.3_1.1.4 Test Description

7.7B.3_1.1.4.1 Initial condition

The initial conditions shall be the same as in clause 7.6B.3.3_1.1.4.1 in order to test spurious responses obtained in clause 7.6B.3.3_1.1 under the same conditions.

7.7B.3_1.1.4.2 Test procedure

- SS transmits PDSCH via PDCCH DCI format 1A and PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Table 7.6B.3.3_1.1.4.1-1 on E-UTRA CC and NR CC respectively. The SS sends downlink MAC padding bits on the DL RMC.
- SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 7.6B.3.3_1.1.4.1-1 on E-UTRA CC and NR CC respectively. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

3. Set the Downlink signal level to the value as defined in Table 7.7B.3_1.1.5-1. For NR CC and E-UTRA CC, send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as -(MU) to -(MU + Uplink power control window size) dB of the target power level in Table 7.7B.3_1.1.5-1 + ([10log(S_L_{CRB}/N_{RB_alloc}) for NR CC, [10log(P_L_{CRB}/N_{RB_alloc}) for E-UTRA CC]) for at least the duration of the Throughput measurement, where:
 - MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW.
 - For NR CC, Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified in Table F.1.2-1.
 - For E-UTRA CC, Uplink power control window size = 1dB (UE power step size) + 1.0dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 36.101 [5], Table 6.3.5.2.1-1 and is 1.0dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified in Table F.1.2-1 of TS 36.521-1 [10].
4. Set the parameters of the CW signal generator for an interfering signal according to Table 7.7B.3_1.1.5-1. The spurious frequencies are taken from records in the final step of test procedures in clause 7.6B.3.3_1.1.4.2.
5. For each spurious frequency, Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex H.2.

NOTE: The purpose of the Uplink power control window is to ensure that the actual UE output power is no greater than the target power level, and as close as possible to the target power level. The relationship between the Uplink power control window, the target power level and the corresponding possible actual UE Uplink power window is illustrated in Annex F, clause F.4.

7.7B.3_1.1.4.3 Message contents

Message contents are according to TS 38.508-1 [6] clause 4.6 Table 4.6.3-118 with condition TRANSFORM_PRECODER_ENABLED.

7.7B.3_1.1.5 Test Requirement

The throughput shall be $\geq 95\%$ of the maximum throughput of the reference measurement channels as specified in TS 36.521-1 [10] Annex A.3 and TS 38.521-1 [8] Annex A.3 for E-UTRA CG and NR CG respectively with parameters specified in Table 7.7B.3_1.1.5-1 for the specified wanted signal mean power in the presence of interfering signals.

Table 7.7B.3_1.1.5-1: Spurious Response for intra-band contiguous EN-DC

| EN-DC Aggregated Bandwidth, MHz | ≤ 100 | $> 100, \leq 120$ | $> 120, \leq 140$ | $> 140, \leq 160$ |
|--|--|-------------------|-------------------|-------------------|
| Pw in Transmission Bandwidth Configuration, perCC, dBm | REFSENS + Aggregated BW specific value below | | | |
| | 9 | | | |
| P _{interferer} , dBm (CW) | -44 | | | |
| NOTE 1: For NR carrier, the transmitter shall be set to 4dB below P _{CMAX_L,f,c,NR} at the minimum uplink configuration specified in Table 7.3.2-3 in TS 38.101-1 [2] with P _{CMAX_L,f,c,NR} as defined in clause 6.2B.4. | | | | |
| NOTE 2: For E-UTRA carrier, the transmitter shall be set to 4dB below P _{CMAX_L_E-UTRA,c} at the minimum uplink configuration specified in Table 7.3.1-2 in TS 36.101 [5] with P _{CMAX_L_E-UTRA,c} as defined in clause 6.2B.4 for single carrier. | | | | |

7.7B.3_1.2 Spurious Response for EN-DC within FR1 (4 CCs)

7.7B.3_1.2.1 Test Purpose

Spurious response for EN-DC verifies the receiver's ability to receive a wanted aggregated signal on its assigned channel frequency without exceeding a given degradation due to the presence of an unwanted CW interfering signal at any other frequency at which a response is obtained i.e. for which the out of band blocking limit as specified in clause 7.6B.3.3_1.2 is not met.

The lack of the spurious response ability decreases the coverage area when other unwanted interfering signal exists at any other frequency.

7.7B.3_1.2.2 Test Applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band contiguous EN-DC in FR1 with 4 DL CCs.

7.7B.3_1.2.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.7B.0.1.

Exception requirements for both NR and E-UTRA are defined for this test and therefore LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

7.7B.3_1.2.4 Test Description

7.7B.3_1.2.4.1 Initial condition

The initial conditions shall be the same as in clause 7.6B.3.3_1.2.4.1 in order to test spurious responses obtained in clause 7.6B.3.3_1.2 under the same conditions.

7.7B.3_1.2.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A and PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Table 7.6B.3.3_1.2.4.1-1 on E-UTRA CC and NR CC respectively. The SS sends downlink MAC padding bits on the DL RMC.
2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 7.6B.3.3_1.2.4.1-1 on E-UTRA CC and NR CC respectively. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
3. Set the Downlink signal level to the value as defined in Table 7.7B.3_1.2.5-1. For NR CC and E-UTRA CC, send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as -MU to -(MU + Uplink power control window size) dB of the target power level in Table 7.7B.3_1.2.5-1 + ([10log(S_LCRB/NRB_alloc)] for NR CC, [10log(P_LCRB/NRB_alloc)] for E-UTRA CC) for at least the duration of the Throughput measurement, where:
 - MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW.
 - For NR CC, Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified in Table F.1.2-1.
 - For E-UTRA CC, Uplink power control window size = 1dB (UE power step size) + 1.0dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 36.101 [5], Table 6.3.5.2.1-1 and is 1.0dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified in Table F.1.2-1 of TS 36.521-1 [10].

4. Set the parameters of the CW signal generator for an interfering signal according to Table 7.7B.3_1.2.5-1. The spurious frequencies are taken from records in the final step of test procedures in clause 7.6B.3.3_1.2.4.2.
5. For each spurious frequency, Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex H.2.

NOTE: The purpose of the Uplink power control window is to ensure that the actual UE output power is no greater than the target power level, and as close as possible to the target power level. The relationship between the Uplink power control window, the target power level and the corresponding possible actual UE Uplink power window is illustrated in Annex F, clause F.4.

7.7B.3_1.2.4.3 Message contents

Message contents are according to TS 38.508-1 [6] clause 4.6 Table 4.6.3-118 with condition TRANSFORM_PRECODER_ENABLED.

7.7B.3_1.2.5 Test Requirement

The throughput shall be $\geq 95\%$ of the maximum throughput of the reference measurement channels as specified in TS 36.521-1 [10] Annex A.3 and TS 38.521-1 [8] Annex A.3 for E-UTRA CG and NR CG respectively with parameters specified in Table 7.7B.3_1.2.5-1 for the specified wanted signal mean power in the presence of interfering signals.

Table 7.7B.3_1.2.5-1: Spurious Response for intra-band contiguous EN-DC

| EN-DC Aggregated Bandwidth, MHz | ≤ 100 | $> 100, \leq 120$ | $> 120, \leq 140$ | $> 140, \leq 160$ |
|--|--|-------------------|-------------------|-------------------|
| Pw in Transmission Bandwidth Configuration, perCC, dBm | REFSENS + Aggregated BW specific value below | | | |
| | 9 | | | |
| P _{interferer} , dBm (CW) | -44 | | | |
| NOTE 1: For NR carrier, the transmitter shall be set to 4dB below P _{CMAX_L,f,c,NR} at the minimum uplink configuration specified in Table 7.3.2-3 in TS 38.101-1 [2] with P _{CMAX_L,f,c,NR} as defined in clause 6.2B.4. | | | | |
| NOTE 2: For E-UTRA carrier, the transmitter shall be set to 4dB below P _{CMAX_L_E-UTRA,c} at the minimum uplink configuration specified in Table 7.3.1-2 in TS 36.101 [5] with P _{CMAX_L_E-UTRA,c} as defined in clause 6.2B.4 for single carrier. | | | | |

7.8 Void

7.8B Intermodulation characteristics for DC in FR1

7.8B.1 General

7.8B.2 Wide band Intermodulation

7.8B.2.0 Minimum Conformance Requirements

7.8B.2.0.1 Intra-band contiguous EN-DC in FR1

Intra-band contiguous EN-DC wide band intermodulation requirement and parameters are defined in Table 7.8B.2.0.1-1.

Table 7.8B.2.0.1-1: Wide band intermodulation

| EN-DC Aggregated Bandwidth, MHz | ≤ 100 | $>100, \leq 120$ | $>120, \leq 140$ | $>140, \leq 160$ |
|--|-----------------------------|------------------|------------------|------------------|
| P_w in Transmission Bandwidth Configuration, perCC, dBm | P _w ¹ | 16.8 | 17.5 | 18.0 |
| P_{interferer 1, dBm (CW)}² | | -46 | | |
| P_{interferer 2, dBm (Modulated)}² | | -46 | | |

NOTE 1: P_w is wanted signal power level from Table 7.8.1A-1 in TS 36.101 [5]
 NOTE 2: Jammer BW and offsets is from Table 7.8.1A-1 [5] and is applied from the lowest edge of the lowest carrier and the highest edge of the highest carrier
 NOTE 3: For NR carrier, the transmitter shall be set to 4dB below P_{CMAX_L,f,c} at the minimum uplink configuration specified in Table 7.3-3 with P_{CMAX_L,f,c} as defined in clause 6.2B.4.
 NOTE 4: For E-UTRA carrier, the transmitter shall be set to 4dB below P_{CMAX_L,c} at the minimum uplink configuration specified in Table 7.3-1-2 with P_{CMAX_L,c} as defined in clause 6.2B.4 for single carrier.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.8B.2.1.

7.8B.2.0.2 Intra-band non-contiguous EN-DC in FR1

For the E-UTRA sub-block containing one or multiple CC's, the requirement is defined in clause 7.8.1 for single carrier operation and in clause 7.8.1A for CA in TS 36.101 [5].

For the NR sub-block, the requirement is defined in clause 7.8.2 in TS 38.101-1 [2].

The blocker configuration is defined in the general clause 7.1 and the requirement only apply for out of gap interferers.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.8B.2.2.

7.8B.2.0.3 Inter-band EN-DC within FR1

Wide band Intermodulation requirement for E-UTRA single carrier and CA operation specified in clauses 7.8.1 and 7.8.1A of TS 36.101 [5] and for NR single carrier and CA operation specified in clauses 7.8.2 and 7.8A.2 of TS 38.101-1 [2] apply.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.8B.2.3.

7.8B.2.0.4 Inter-band EN-DC including FR2

Wide band Intermodulation requirement for E-UTRA single carrier and CA operation specified in clauses 7.8.1 and 7.8.1A of TS 36.101 [5] apply.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.8B.2.4.

7.8B.2.0.5 Inter-band EN-DC including both FR1 and FR2

Wide band Intermodulation requirement for E-UTRA single carrier and CA operation specified in clauses 7.8.1 and 7.8.1A of TS 36.101 [5] and for NR single carrier and CA operation specified in clauses 7.8.2 and 7.8A.2 of TS 38.101-1 [2] apply.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.8B.2.5.

7.8B.2.1 Wideband Intermodulation for intra-band contiguous EN-DC in FR1

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- UL Power configuration is TBD

7.8B.2.1.1 Test Purpose

Intermodulation response tests the UE's ability to receive data with a given average throughput for a specified reference measurement channel, in the presence of two or more interfering signals which have a specific frequency relationship to the wanted signal, under conditions of ideal propagation and no added noise.

A UE unable to meet the throughput requirement under these conditions will decrease the coverage area when two or more interfering signals exist which have a specific frequency relationship to the wanted signal.

7.8B.2.1.2 Test Applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band contiguous EN-DC within FR1.

7.8B.2.1.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.8B.2.0.

Exception requirements for both NR and E-UTRA are defined for this test and therefore LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

7.8B.2.1.4 Test Description

7.8B.2.1.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on EN-DC operating bands specified in clause 5.3B.1.2, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-1 [8] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2. All of these configurations shall be tested with applicable test parameters for each EN-DC configuration specified in clause 5.3B.1.2 and are shown in table 7.8B.2.1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521-1 [10] Annex C.2 and in TS 38.521-1 [8] Annex C.2 for E-UTRA CG and NR CG respectively.

Table 7.8B.2.1.4.1-1: Test configuration table

| Initial Conditions | | | | | | | |
|---|--|-------------------|----------------------|----------------------|------------------|-------------------|----------------------|
| Test Environment as specified in TS 38.508-1 [6] clause 4.1 | Normal | | | | | | |
| Test Frequencies as specified in TS 38.508-1 [6] clause 4.3.1 for different EN-DC bandwidth classes | Mid range | | | | | | |
| Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1 across bandwidth combination sets supported by the UE | Lowest NRB_agg, Highest NRB_agg (NOTE 3) | | | | | | |
| NR Test SCS as specified in Table 5.3.5-1 in TS 38.521-1 [8] | Highest | | | | | | |
| NR/E-UTRA Test Parameters | | | | | | | |
| Downlink Configuration | | | | Uplink Configuration | | | |
| NR Modulation | NR RB allocation | E-UTRA Modulation | E-UTRA RB allocation | NR Modulation | NR RB allocation | E-UTRA Modulation | E-UTRA RB allocation |
| CP-OFDM QPSK | Full RB (NOTE 1) | QPSK | Full RB | DFT-s-OFDM QPSK | REFSENS | QPSK | REFSENS |
| NOTE 1: Full RB allocation shall be used per each SCS and channel BW as specified in Table 7.3.2.4.1-2 of TS 38.521-1 [8]. NOTE 2: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.3B.1.2-1. NOTE 3: If the UE supports multiple CC Combinations in the EN-DC Configuration with the same NRB_agg, only the combination with the highest NRB_SCG is tested. NOTE 4: REFSENS refers to Uplink configuration in Table 7.3.2-3 in [8] and Table 7.3.3-2 in [10] for NR and E-UTRA CC respectively. NOTE 5: In a FR1 band where UE supports 4Rx, the test shall be performed only with 4Rx antennas ports connected and 4Rx REFSENS requirement (TS 38.521-1 [8] Table 7.3.2.5-2) is used in the test requirements. | | | | | | | |

1. Connect the SS to the UE antenna connectors as shown in [6] TS 38.508-1 A.3.1.2.1 for SS diagram and A.3.2 for UE diagram.
2. The parameter settings for the E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3, and the parameter settings for the NR cell are set up according to TS 38.508-1 [6] clause 4.4.3.
3. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C.0 and TS 38.521-1 [8] Annex C.0 for E-UTRA CG and NR CG respectively, and uplink signals according to TS 36.521-1 [10] Annex H and TS 38.521-1 [8] Annex G for E-UTRA CG and NR CG respectively.
4. The UL Reference Measurement channels are TS 36.521-1 [10] Annex A.2 and TS 38.521-1 [8] Annex A.2 for E-UTRA CG and NR CG respectively.
5. Propagation conditions are set according to TS 36.521-1 [10] Annex B.0 and TS 38.521-1 [8] Annex B.0 for E-UTRA CG and NR CG respectively.
6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 6.2B.1.1.4.3.

7.8B.2.1.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format 0_1 for C_RNTI to schedule the UL RMC according to table 7.8B.2.1.4.1-1 on E-UTRA CC and NR CC respectively. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
2. Set the Downlink signal level to the value as defined in Table 7.8B.2.1.5-1. For NR CC and E-UTRA CC, send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as -MU to -(MU + Uplink power control window size) dB of the target power level in Table 7.8B.2.1.5-1 + ([10log(S_LCRB/N_{RB_alloc})] for

NR CC, $[10\log(P_{L_{CRB}}/N_{RB_alloc})]$ for E-UTRA CC) for at least the duration of the Throughput measurement, where:

- MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW.
 - For NR CC, Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size. and the Test system relative power measurement uncertainty is specified in Table F.1.2-1.
 - For E-UTRA CC, Uplink power control window size = 1dB (UE power step size) + 1.0dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 36.101 [5], Table 6.3.5.2.1-1 and is 1.0dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified in Table F.1.2-1 of TS 36.521-1 [10].
3. Set the Interfering signal levels to the values as defined in Table 7.8B.2.1.5-1 and frequency below the wanted signal
 4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G.2.
 5. Repeat steps from 2 to 4, using an interfering signal above the wanted signal at step 3.

NOTE: The purpose of the Uplink power control window is to ensure that the actual UE output power is no greater than the target power level, and as close as possible to the target power level. The relationship between the Uplink power control window, the target power level and the corresponding possible actual UE Uplink power window is illustrated in Annex F, clause F.4.

7.8B.2.1.4.3 Message contents

Message contents are according to TS 38.508-1 [5] clause 4.6 with DFT-s-OFDM condition in Table 4.6.3-118 PUSCH-Config.

7.8B.2.1.5 Test Requirement

The throughput shall be $\geq 95\%$ of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table 7.8B.2.1.5-1 for the specified wanted signal mean power in the presence of two interfering signals.

Table 7.8B.2.1.5-1: Wide band intermodulation

| EN-DC Aggregated Bandwidth, MHz | ≤ 100 | $>100, \leq 120$ | $>120, \leq 140$ | $>140, \leq 160$ |
|--|------------|------------------|------------------|------------------|
| Pw in Transmission Bandwidth Configuration, perCC, dBm | P_w^1 | 16.8 | 17.5 | 18.0 |
| $P_{interferer 1}$, dBm (CW) ² | | -46 | | |
| $P_{interferer 2}$, dBm (Modulated) ² | | -46 | | |

NOTE 1: P_w is wanted signal power level from Table 7.8.1A-1 in TS 36.101 [5]

NOTE 2: Jammer BW and offsets is from Table 7.8.1A-1 in TS 36.101 [5] and is applied from the lowest edge of the lowest carrier and the highest edge of the highest carrier

NOTE 3: For NR carrier, the transmitter shall be set to 4dB below $P_{CMAX,L,f,c}$ at the minimum uplink configuration specified in Table 7.3-3 with $P_{CMAX,L,f,c}$ as defined in clause 6.2.4 from [2].

NOTE 4: For E-UTRA carrier, the transmitter shall be set to 4dB below $P_{CMAX,L,c}$ at the minimum uplink configuration specified in Table 7.3-1-2 with $P_{CMAX,L,c}$ as defined in clause 6.2.5 for single carrier and in Table 7.3-1A-1 with $P_{CMAX,L}$ as defined in clause 6.2.5A for LTE-CA from TS 36.101 [5].

Table 7.8B.2.1.5-2: Void

7.8B.2.2 Wideband Intermodulation for intra-band non-contiguous EN-DC in FR1

7.8B.2.2.1 Test Purpose

Same test purpose as in clause 7.8.2.1 in TS 38.521-1 [8] for the NR carrier.

7.8B.2.2.2 Test Applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band non-contiguous EN-DC within FR1.

7.8B.2.2.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.8B.2.0.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

7.8B.2.2.4 Test Description

Same test description as in clause 7.8.2.4 in TS 38.521-1 [8] with the following exceptions:

Table 7.8B.2.2.4-1: Test Configuration Table

| Initial Conditions | |
|---|-------------------------------------|
| Test Frequencies as specified in TS 38.508-1 [6] clause 4.3.1 for different EN-DC bandwidth classes | High with maxWGap |
| Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1 across bandwidth combination sets supported by the UE | Highest N _{RB_agg} (NOTE1) |
| NOTE 1: If the UE supports multiple CC Combinations in the EN-DC Configuration with the same NRB _{agg} , only the combination with the highest NRB _{SCG} is tested. | |

The initial test configurations for E-UTRA as specified in Table 4.6-1 except for the parameters specified in Table 7.9B.2.4-1.

For Initial conditions as in clause 7.8.2.4.1 in TS 38.521-1 [8], the following steps are added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

Step 6 of Initial conditions as in clause 7.8.2.4.2 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

Step 4 of Test procedure is replaced by:

4. Set the Interfering signal levels to the values as defined in Table 7.8.2.5-1 and frequency at the out-of-gap of the sub-blocks.

Step 6 of Test procedure is removed.

7.8B.2.2.5 Test Requirement

Same test requirement as in clause 7.8.2.5 in TS 38.521-1 [8].

7.8B.2.3 Wideband Intermodulation for inter-band EN-DC in FR1 (2 CCs)

7.8B.2.3.1 Test Purpose

Same test purpose as in clause 7.8.2.1 in TS 38.521-1 [8] for the NR carrier.

7.8B.2.3.2 Test Applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC within FR1.

7.8B.2.3.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.8B.2.0. No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

7.8B.2.3.4 Test Description

Same test description as in clause 7.8.2.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1.

For Initial conditions as in clause 7.8.2.4.1 in TS 38.521-1 [8], the following steps are added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].
7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

Step 6 of Initial conditions as in clause 7.8.2.4.2 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

7.8B.2.3.5 Test Requirement

Same test requirement as in clause 7.8.2.5 in TS 38.521-1 [8].

7.8B.2.4 Wideband Intermodulation for EN-DC including FR2 (2 CCs)

TBD

7.8B.2.5 Wideband Intermodulation for inter-band EN-DC including both FR1 and FR2 (3 CCs)

TBD

7.8B.2.6 Wideband Intermodulation for EN-DC within FR1 (3 CCs)

7.8B.2.6.1 Test Purpose

Intermodulation response tests the UE's ability to receive data with a given average throughput for a specified reference measurement channel, in the presence of two or more interfering signals which have a specific frequency relationship to the wanted signal, under conditions of ideal propagation and no added noise.

A UE unable to meet the throughput requirement under these conditions will decrease the coverage area when two or more interfering signals exist which have a specific frequency relationship to the wanted signal.

7.8B.2.6.2 Test Applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting EN-DC within FR1 (3 CCs).

7.8B.2.6.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.8B.2.0.

7.8B.2.6.4 Test Description

7.8B.2.6.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on EN-DC operating bands specified in clause 5.3B.1.2, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-1 [8] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2. All of these configurations shall be tested with applicable test parameters for each EN-DC configuration specified in clause 5.3B.1.2 and are shown in table 7.8B.2.6.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521-1 [10] Annex C.2 and in TS 38.521-1 [8] Annex C.2 for E-UTRA CG and NR CG respectively.

Table 7.8B.2.6.4.1-1: Test configuration table

| Initial Conditions | | | | | | | | | | |
|---|---------------|----------------|---------|-----------------------------|--|---|--------------|----------|----------|--|
| Test Environment as specified in TS 38.508-1 [6] clause 4.1 | | | | | NC | | | | | |
| Test Frequencies as specified in TS 38.508-1 [6] clause 4.3.1 for different EN-DC bandwidth classes | | | | | For test frequencies refer to "Range" columns. For mapping within Band refer to "CC" columns | | | | | |
| Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1 across bandwidth combination sets supported by the UE | | | | | Refer to "NRB" column | | | | | |
| NR Test SCS as specified in Table 5.3.5.1 in TS 38.521-1 [8] | | | | | Refer to "SCS" column | | | | | |
| Network signalling value | | | | | NS_01 by default | | | | | |
| Test Parameters for EN-DC Configurations | | | | | | | | | | |
| ID | CC (NOTE1) | Band | SCS | NRB | Range/ Wgap | UL MOD | DL MOD | UL Alloc | DL Alloc | |
| Default Test Settings for a DC_XA-nYA-nZA Configuration | | | | | | | | | | |
| 1 | PCC(M) | X ² | N/A | NOTE2 | NOTE2 | NOTE2 | NOTE2 | NOTE2 | NOTE2 | |
| | PCC(S) | | | | | As per CA_nYA-nZA in 7.8A.2.1 of 38.521-1 [1] | | | | |
| | SCC1(S) | | | | | As per CA_nYC in 7.8A.2.1 of 38.521-1 [1] | | | | |
| Default Test Settings for a DC_XA-nYC Configuration | | | | | | | | | | |
| 1 | PCC(M) | X ² | N/A | NOTE2 | NOTE2 | NOTE2 | NOTE2 | NOTE2 | NOTE2 | |
| | PCC(S) | | | | | As per CA_nYC in 7.8A.2.1 of 38.521-1 [1] | | | | |
| | SCC1(S) | | | | | As per CA_nYC in 7.8A.2.1 of 38.521-1 [1] | | | | |
| Default Test Settings for a DC_XA-XA-nYA Configuration | | | | | | | | | | |
| 1 | PCC(M) | X ² | N/A | NOTE2 | NOTE2 | NOTE2 | NOTE2 | NOTE2 | NOTE2 | |
| | SCC1(M) | X ³ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | |
| | PCC(S) | | | | | As per 7.8.2.1 of 38.521-1 [1] | | | | |
| Default Test Settings for a DC_XC-nYA Configuration | | | | | | | | | | |
| 1 | PCC(M) | X ² | N/A | NOTE2 | NOTE2 | NOTE2 | NOTE2 | NOTE2 | NOTE2 | |
| | SCC1(M) | X ³ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | |
| | PCC(S) | | | | | As per 7.8.2.1 of 38.521-1 [1] | | | | |
| Default Test Settings for a DC_XA-YA-nZA Configuration | | | | | | | | | | |
| 1 | PCC(M) | X ² | N/A | NOTE2 | NOTE2 | NOTE2 | NOTE2 | NOTE2 | NOTE2 | |
| | SCC1(M) | Y ³ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | |
| | PCC(S) | | | | | As per 7.8.2.1 of 38.521-1 [1] | | | | |
| Default Test Settings for a DC_XC-nXA Configuration | | | | | | | | | | |
| 1 | PCC(M) | X ² | N/A | Highest N _{RB_agg} | TBD | NOTE2 | NOTE2 | NOTE2 | NOTE2 | |
| | SCC1(M) | X ² | N/A | | TBD | NOTE2 | NOTE2 | NOTE2 | NOTE2 | |
| | PCC(S) | nX | Highest | | TBD | As per 7.8.2.1 of 38.521-1 [1] | | | | |
| Default Test Settings for a DC_(n)XCA Configuration | | | | | | | | | | |
| 1 | PCC(M) | X | N/A | Lowest N _{RB_agg} | Mid/CC1 | QPSK | QPSK | REFSENS | All | |
| | SCC1(M) | X | N/A | | Mid/CC2 | QPSK | QPSK | N/A | All | |
| | PCC(S) | nX | Highest | | Mid/CC1 | DFT-s-OFDM QPSK | CP-OFDM QPSK | REFSENS | All | |
| 2 | PCC(M) | X | N/A | Highest N _{RB_agg} | Mid/CC1 | QPSK | QPSK | REFSENS | All | |
| | SCC1(M) | X | N/A | | Mid/CC2 | QPSK | QPSK | N/A | All | |
| | PCC(S) | nX | Highest | | Mid/CC1 | DFT-s-OFDM QPSK | CP-OFDM QPSK | REFSENS | All | |
| Default Test Settings for a DC_XA-nXA-nYA Configuration | | | | | | | | | | |
| 1 | PCC(M) | X ² | N/A | Highest N _{RB_agg} | High with maxWGap | NOTE2 | NOTE2 | NOTE2 | NOTE2 | |
| | PCC(S) | nX | Highest | | High with maxWGap | As per CA_nXA-nYA in 7.8A.2.1 of 38.521-1 [1] | | | | |
| | SCC1(S) | nY | Highest | | Mid | As per CA_nXA-nYA in 7.8A.2.1 of 38.521-1 [1] | | | | |
| 2 | PCC(M) | X ² | N/A | Highest N _{RB_agg} | High with maxWGap | NOTE2 | NOTE2 | NOTE2 | NOTE2 | |
| | SCC1(S) | nX | Highest | | High with maxWGap | As per CA_nXA-nYA in 7.8A.2.1 of 38.521-1 [1] | | | | |
| | PCC(S) | nY | Highest | | Mid | As per CA_nXA-nYA in 7.8A.2.1 of 38.521-1 [1] | | | | |
| Default Test Settings for a DC_YA-(n)XAA Configuration | | | | | | | | | | |
| 1 | PCC(M) | X | N/A | Lowest N _{RB_agg} | Mid/CC1 | QPSK | QPSK | REFSENS | All | |
| | PCC(S) | nX | Highest | | Mid/CC1 | QPSK | QPSK | REFSENS | All | |
| | SCC1(M) | Y ³ | N/A | | N/A | N/A | N/A | N/A | All | |
| 2 | PCC(M) | X | N/A | Highest N _{RB_agg} | Mid/CC1 | QPSK | QPSK | REFSENS | All | |
| | PCC(S) | nX | Highest | | Mid/CC1 | QPSK | QPSK | REFSENS | All | |
| | SCC1(M) | Y ³ | N/A | | N/A | N/A | N/A | N/A | All | |

NOTE 1: (M) and (S) indicate MCG and SCG respectively.

NOTE 2: Anchor agnostic approach applies. Configurations as per clause 4.6.

NOTE 3: Not configured

NOTE 4: X, Y and Z in this table correspond to different bands i.e. $X \neq Y \neq Z$

NOTE 5: The band combinations with difference appearance order of bands/sub-blocks in the band combination string are not distinguished. E.g. DC_YA-(n)XAA represents the set of DC_YA-(n)XAA and DC_(n)XAA-YA

NOTE 6: In a FR1 band where UE supports 4Rx, the test shall be performed only with 4Rx antennas ports connected and 4Rx REFSE requirement (TS 38.521-1 [8] Table 7.3.2.5-2) is used in the test requirements.

1. Connect the SS to the UE antenna connectors as shown in [6] TS 38.508-1 A.3.1.2.1 for SS diagram and A.3.2 for UE diagram.
2. The parameter settings for the E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3, and the parameter settings for the NR cell are set up according to TS 38.508-1 [6] clause 4.4.3.
3. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C.0 and TS 38.521-1 [8] Annex C.0 for E-UTRA CG and NR CG respectively, and uplink signals according to TS 36.521-1 [10] Annex H and TS 38.521-1 [8] Annex G for E-UTRA CG and NR CG respectively.
4. The UL Reference Measurement channels are TS 36.521-1 [10] Annex A.2 and TS 38.521-1 [8] Annex A.2 for E-UTRA CG and NR CG respectively.
5. Propagation conditions are set according to TS 36.521-1 [10] Annex B.0 and TS 38.521-1 [8] Annex B.0 for E-UTRA CG and NR CG respectively.
6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 6.2B.1.1.4.3.
7. For the E-UTRA CC(s) where anchor agnostic apply according to NOTE 2 in Table 7.8B.2.6.4.1-1, downlink signal level and uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B, clause B.0 of TS 36.521-1 [10]. Disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

7.8B.2.6.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format 0_1 for C_RNTI to schedule the UL RMC according to table 7.8B.2.6.4.2-1 on E-UTRA CC and NR CC respectively. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
2. Set the Downlink signal level to the value as defined in Table 7.8B.2.6.4.2-1. For E-UTRA CC and NR CC where uplink is allocated according to Table 7.8B.2.6.4.1-1, send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as -MU to -(MU + Uplink power control window size) dB of the 4dB below PCMAX_L with PCMAX_L as defined in clause 6.2B.4 for at least the duration of the Throughput measurement.
 - MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW.
 - For NR CC, Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified in Table F.1.2-1.
 - For E-UTRA CC, Uplink power control window size = 1dB (UE power step size) + 1.0dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 36.101 [5], Table 6.3.5.2.1-1 and is 1.0dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified in Table F.1.2-1 of TS 36.521-1 [10].

NOTE: The purpose of the Uplink power control window is to ensure that the actual UE output power is no greater than, or no less than the target power level, and as close as possible to the target power level. The relationship between the Uplink power control window, the target power level and the corresponding possible actual UE Uplink power window is illustrated in Annex F, clause F.4.

3. Set the Interfering signal levels to the values as defined in Table 7.8B.2.6.4.2-1 and frequency below the wanted signal.
4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G, clause G.2.
5. Repeat steps from 2 to 4, using an interfering signal above the wanted signal at step 3.
6. Repeat steps 2 to 5 for component carriers listed in Table 7.8B.2.6.4.2-1.

Table 7.8B.2.6.4.2-1: Test repetition and measurement configuration

| DC configuration | ID (Note 1) | Throughput measured on (Note 3) | Table with test parameters to select (Note 2) |
|------------------|----------------|------------------------------------|--|
| DC_XA-nYA-nZA | 1 | TBD | TBD |
| DC_XA-nYC | 1 | TBD | TBD |
| DC_XA-XA-nYA | 1 | PCC(S) | 7.8.2.5-1 and 7.8.2.5-2 of 38.521-1[1] |
| DC_XC-nYA | 1 | PCC(S) | 7.8.2.5-1 and 7.8.2.5-2 of 38.521-1[1] |
| DC_XA-YA-nZA | 1 | PCC(S) | 7.8.2.5-1 and 7.8.2.5-2 of 38.521-1[1] |
| DC_XC-nXA | 1 | PCC(S) | 7.8.2.5-1 and 7.8.2.5-2 of 38.521-1[1] |
| DC_(n)XCA | 1 | PCC(M), SCC1(M), PCC(S) | 7.8B.2.1.5-1 |
| | 2 | PCC(M), SCC1(M), PCC(S) | 7.8B.2.1.5-1 |
| DC_XA-nXA-nYA | 1 | TBD | TBD |
| | 2 | TBD | TBD |
| DC_YA-(n)XAA | 1 | PCC(M), PCC(S) | 7.8B.2.1.5-1 |
| | 2 | PCC(M), PCC(S) | 7.8B.2.1.5-1 |

NOTE 1: Test point ID for the particular DC configuration as defined in clause 7.8B.2.6.4.1.
 NOTE 2: The reference for the placement of the interferer signals is the centre frequency of the carrier closest to the interferer among the carriers throughput is measured on.
 NOTE 3: Where there are multiple rows for a single Test point ID, the test is repeated for each row.

7.8B.2.6.4.3 Message contents

Message contents are according to TS 38.508-1 [5] clause 4.6 with DFT-s-OFDM condition in Table 4.6.3-118 PUSCH-Config.

7.8B.2.6.5 Test Requirement

The throughput shall be $\geq 95\%$ of the maximum throughput of the reference measurement channels as specified in Annex A, clause A.3.2 with parameters specified in Table 7.8B.2.6.4.2-1 for the specified wanted signal mean power in the presence of two interfering signals.

7.8B.2.7 Wideband Intermodulation for EN-DC including FR1 (4 CCs)

TBD

7.8B.2.8 Wideband Intermodulation for EN-DC including FR1 (5 CCs)

TBD

7.8B.2.9 Wideband Intermodulation for EN-DC including FR1 (6 CCs)

TBD

7.9 Void**7.9B Spurious emissions for DC in FR1****7.9B.0 Minimum Conformance Requirements****7.9B.0.1 Intra-band contiguous EN-DC in FR1**

The requirement is defined in clause 7.9A.1 in TS 38.101-1 [2].

The normative reference for this requirement is TS 38.101-3 [4] clause 7.9B.1.

7.9B.0.2 Intra-band non-contiguous EN-DC in FR1

Spurious emissions requirement for E-UTRA single carrier and CA operation specified in clauses 7.9.1 and 7.9.1A of TS 36.101 [5] and for NR single carrier and CA operation specified in clauses 7.9 and 7.9A of TS 38.101-1 [2] apply.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.9B.2.

7.9B.0.3 Inter-band EN-DC within FR1

E-UTRA requirements from TS 36.101 [5] and NR requirements from TS 38.101-1 [2] apply.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.9B.3.

7.9B.0.4 Inter-band EN-DC including FR2

Spurious emissions requirement for E-UTRA single carrier and CA operation specified in clauses 7.9.1 and 7.9.1A of TS 36.101 [5] and for NR single carrier and CA operation specified in clause 7.9 of TS 38.101-2 [3] apply.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.9B.4.

7.9B.0.5 Inter-band EN-DC including both FR1 and FR2

Spurious emissions requirement for E-UTRA single carrier and CA operation specified in clauses 7.9.1 and 7.9.1A of TS 36.101 [5] and for NR single carrier and CA operation specified in clauses 7.9 and 7.9A of TS 38.101-1 [2] and TS 38.101-2 [3] apply.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.9B.5.

7.9B.1 Spurious Emissions for intra-band contiguous EN-DC in FR1(2 CCs)**7.9B.1.1 Test purpose**

Same test purpose as in clause 7.9.1 in TS 38.521-1 [8] for the NR carrier.

7.9B.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band contiguous EN-DC within FR1.

7.9B.1.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.9B.0.3.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

7.9B.1.4 Test description

Same test description as in clause 7.9.4 in TS 38.521-1 [8] with the following exceptions:

Table 7.9B.1.4-1: Test Configuration Table

| Initial Conditions | |
|---|--------------------------------------|
| Test Frequencies as specified in TS 38.508-1 [6] clause 4.3.1 for different DC bandwidth classes. | Mid range |
| Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1 across bandwidth combination sets supported by the UE | Highest N _{RB_agg} (NOTE 1) |
| NOTE 1: If the UE supports multiple CC Combinations in the EN-DC Configuration with the same NRB_agg , only the combination with the highest NRB_SCG is tested. | |

The initial test configurations for E-UTRA as specified in Table 4.6-1 except for the parameters specified in Table 7.9B.1.4-1.

For Initial conditions as in clause 7.9.4.1 in TS 38.521-1 [8], the following steps are added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].
7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

Step 6 of Initial conditions as in clause 7.9.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

7.9B.1.5 Test requirement

Same test requirement as in clause 7.9.5 in TS 38.521-1 [8].

7.9B.2 Spurious Emissions for intra-band non-contiguous EN-DC in FR1(2 CCs)

7.9B.2.1 Test purpose

Same test purpose as in clause 7.9.1 in TS 38.521-1 [8] for the NR carrier.

7.9B.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC within FR1.

7.9B.2.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.9B.0.3.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

7.9B.2.4 Test description

Same test description as in clause 7.9.4 in TS 38.521-1 [8] with the following exceptions:

Table 7.9B.2.4-1: Test Configuration Table

| Initial Conditions | |
|---|--------------------------------------|
| Test Frequencies as specified in TS 38.508-1 [6] clause 4.3.1 for different DC bandwidth classes | [MaxWGap] |
| Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1 across bandwidth combination sets supported by the UE | Highest N _{RB_agg} (NOTE 1) |
| NOTE 1: If the UE supports multiple CC Combinations in the EN-DC Configuration with the same NRB_agg , only the combination with the highest NRB_SCG is tested. | |

The initial test configurations for E-UTRA as specified in Table 4.6-1 except for the parameters specified in Table 7.9B.2.4-1.

For Initial conditions as in clause 7.9.4.1 in TS 38.521-1 [8], the following steps are added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].
- 7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

Step 6 of Initial conditions as in clause 7.9.4.1 in TS 38.521-1 [8] is replaced by:

- 6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

7.9B.2.5 Test requirement

Same test requirement as in clause 7.9.5 in TS 38.521-1 [8].

7.9B.3 Spurious Emissions for inter-band EN-DC within FR1(2 CCs)

7.9B.3.1 Test purpose

Same test purpose as in clause 7.9.1 in TS 38.521-1 [8] for the NR carrier.

7.9B.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC within FR1.

7.9B.3.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.9B.0.3.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

7.9B.3.4 Test description

Same test description as in clause 7.9.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1.

For Initial conditions as in clause 7.9.4.1 in TS 38.521-1 [8], the following steps are added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].
7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

Step 6 of Initial conditions as in clause 7.9.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

7.9B.3.5 Test requirement

Same test requirement as in clause 7.9.5 in TS 38.521-1 [8].

7.9B.4 Spurious Emissions for inter-band EN-DC including FR2 (2 CCs)

Editor's note: The following aspects are either missing or not yet determined:

- The testability of this test case is pending further analysis on relaxation of the requirement for band other than n257.
- Measurement Uncertainties and Test Tolerances are FFS for power class 1, 2, and 4.

7.9B.4.1 Test purpose

Same test purpose as in clause 7.9.1 in TS 38.521-2 [9] for the NR carrier.

7.9B.4.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2 with 2 DL CCs.

7.9B.4.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 7.9.3 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.9B.4.

7.9B.4.4 Test description

Same test description as in clause 7.9.4 in TS 38.521-2 [9] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1.

For initial conditions as in clause 7.9.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3.
- 3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 7.9.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 7.9.4.1 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

- 1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

7.9B.4.5 Test requirements

Same test requirement as in clause 7.9.5 in TS 38.521-2 [9] for the NR carrier.

7.9B.4_1 Spurious Emissions for inter-band EN-DC including FR2 (>2 CCs)

7.9B.4_1.1 Spurious Emissions for inter-band EN-DC including FR2 (3 CCs)

TBD

7.9B.4_1.2 Spurious Emissions for inter-band EN-DC including FR2 (4 CCs)

TBD

7.9B.4_1.3 Spurious Emissions for inter-band EN-DC including FR2 (5 CCs)

TBD

7.9B.4_1.4 Spurious Emissions for inter-band EN-DC including FR2 (5 CCs)

TBD

7.9B.5 Spurious Emissions for inter-band EN-DC including both FR1 and FR2 (3 CCs)

TBD

7.9B.3_1 Spurious Emissions for EN-DC within FR1 (>2 CCs)

7.9B.3_1.1 Spurious Emissions for EN-DC within FR1 (3 CCs)

7.9B.3_1.1.1 Test purpose

Same test purpose as in clause 7.9B.1.

7.9B.3_1.1.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting EN-DC within FR1 with 3CCs.

7.9B.3_1.1.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.9B.0.3.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

7.9B.3_1.1.4 Test description

Same test description as in clause 7.9.4 or 7.9.A.1.4 in TS 38.521-1 [8] with the following exceptions:

Table 7.9B.1.4-1: Test Configuration Table

| Initial Conditions | |
|---|--------------------------------------|
| Test Frequencies as specified in TS 38.508-1 [6] clause 4.3.1 for different DC bandwidth classes. | Mid range |
| Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1 across bandwidth combination sets supported by the UE | Highest N _{RB_agg} (NOTE 1) |
| NOTE 1: If the UE supports multiple CC Combinations in the EN-DC Configuration with the same NRB_agg , only the combination with the highest NRB_SCG is tested. | |

The initial test configurations for E-UTRA as specified in Table 4.6-1 except for the parameters specified in Table 7.9B.1.4-1.

For Initial conditions as in clause 7.9.4.1 or 7.9A.1.4.1 in TS 38.521-1 [8], the following steps are added to configure E-UTRA component:

- 2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] clause 4.4.3. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].
- 7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

Step 6 of Initial conditions as in clause 7.9.4.1 or 7.9A.1.4.1 in TS 38.521-1 [8] is replaced by:

- 6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

7.9B.3_1.1.5 Test requirement

Same test requirement as in clause 7.9.5 in TS 38.521-1 [8].

Annex A (normative): Measurement Channels

Please refer to Annex A in TS 38.521-1 [8] and 38.521-2 [9] for appropriate details as needed for test cases in this test specification. EN-DC exceptions will be added.

A.1 General

The throughput values defined in the measurement channels specified in Annex A, are calculated and are valid per datastream (codeword). For multi-stream (more than one codeword) transmissions, the throughput referenced in the minimum requirements is the sum of throughputs of all datastreams (codewords).

The UE category entry in the definition of the reference measurement channel in Annex A is only informative and reveals the UE categories, which can support the corresponding measurement channel. Whether the measurement channel is used for testing a certain UE category or not is specified in the individual minimum requirements.

A.2 UL reference measurement channels for E-UTRA TDD Config 2

A.2.1 General

The measurement channels in the following clauses are defined to derive the requirements in clause 6 (Transmitter Characteristics) and clause 7 (Receiver Characteristics). The measurement channels represent example configurations of physical channels for different data rates.

A.2.2 Reference measurement channels for E-UTRA

A.2.2.1 Full RB allocation

A.2.2.1.1 QPSK

Table A.2.2.1.1-1: Reference Channels for QPSK with full RB allocation

| Parameter | Unit | Value | | | | | |
|--|--|----------|----------|----------|----------|----------|----------|
| Channel bandwidth | MHz | 1.4 | 3 | 5 | 10 | 15 | 20 |
| Allocated resource blocks | | 6 | 15 | 25 | 50 | 75 | 100 |
| Uplink-Downlink Configuration (Note 2) | | 2 | 2 | 2 | 2 | 2 | 2 |
| Special subframe configuration (Note 3) | | 7 | 7 | 7 | 7 | 7 | 7 |
| DFT-OFDM Symbols per Sub-Frame | | 12 | 12 | 12 | 12 | 12 | 12 |
| Modulation | QPSK | QPSK | QPSK | QPSK | QPSK | QPSK | QPSK |
| Target Coding rate | 1/3 | 1/3 | 1/3 | 1/3 | 1/5 | 1/6 | |
| Payload size | | | | | | | |
| For Sub-Frame 2,7 | Bits | 600 | 1544 | 2216 | 5160 | 4392 | 4584 |
| Transport block CRC | Bits | 24 | 24 | 24 | 24 | 24 | 24 |
| Number of code blocks per Sub-Frame (Note 1) | | | | | | | |
| For Sub-Frame 2,7 | | 1 | 1 | 1 | 1 | 1 | 1 |
| Total number of bits per Sub-Frame | | | | | | | |
| For Sub-Frame 2,7 | Bits | 1728 | 4320 | 7200 | 14400 | 21600 | 28800 |
| Total symbols per Sub-Frame | | | | | | | |
| For Sub-Frame 2,7 | | 864 | 2160 | 3600 | 7200 | 10800 | 14400 |
| UE Category | | ≥ 1 |
| Note 1: | If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit) | | | | | | |
| Note 2: | As per Table 4.2-2 in TS 36.211 [13] | | | | | | |
| Note 3: | As per Table 4.2-1 in TS 36.211 [13] | | | | | | |

A.2.2.1.2 16-QAM

Table A.2.2.1.2-1: Reference Channels for 16-QAM with full RB allocation

| Parameter | Unit | Value | | | | | |
|--|--|----------|----------|----------|----------|----------|----------|
| Channel bandwidth | MHz | 1.4 | 3 | 5 | 10 | 15 | 20 |
| Allocated resource blocks | | 6 | 15 | 25 | 50 | 75 | 100 |
| Uplink-Downlink Configuration (Note 2) | | 2 | 2 | 2 | 2 | 2 | 2 |
| Special subframe configuration (Note 3) | | 7 | 7 | 7 | 7 | 7 | 7 |
| DFT-OFDM Symbols per Sub-Frame | | 12 | 12 | 12 | 12 | 12 | 12 |
| Modulation | 16QAM | 16QAM | 16QAM | 16QAM | 16QAM | 16QAM | 16QAM |
| Target Coding rate | 3/4 | 1/2 | 1/3 | 3/4 | 1/2 | 1/3 | |
| Payload size | | | | | | | |
| For Sub-Frame 2,7 | Bits | 2600 | 4264 | 4968 | 21384 | 21384 | 19848 |
| Transport block CRC | Bits | 24 | 24 | 24 | 24 | 24 | 24 |
| Number of code blocks per Sub-Frame (Note 1) | | | | | | | |
| For Sub-Frame 2,7 | | 1 | 1 | 1 | 4 | 4 | 4 |
| Total number of bits per Sub-Frame | | | | | | | |
| For Sub-Frame 2,7 | Bits | 3456 | 8640 | 14400 | 28800 | 43200 | 57600 |
| Total symbols per Sub-Frame | | | | | | | |
| For Sub-Frame 2,7 | | 864 | 2160 | 3600 | 7200 | 10800 | 14400 |
| UE Category | | ≥ 1 | ≥ 1 | ≥ 1 | ≥ 2 | ≥ 2 | ≥ 2 |
| Note 1: | If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit) | | | | | | |
| Note 2: | As per Table 4.2-2 in TS 36.211 [13] | | | | | | |
| Note 3: | As per Table 4.2-1 in TS 36.211 [13] | | | | | | |

A.2.2.1.3 64-QAM

Table A.2.2.1.3-1: Reference Channels for 64-QAM with full RB allocation

| Parameter | Unit | Value | | | | | |
|--|------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Channel bandwidth | MHz | 1.4 | 3 | 5 | 10 | 15 | 20 |
| Allocated resource blocks | | 6 | 15 | 25 | 50 | 75 | 100 |
| Uplink-Downlink Configuration (Note 2) | | 2 | 2 | 2 | 2 | 2 | 2 |
| Special subframe configuration (Note 3) | | 7 | 7 | 7 | 7 | 7 | 7 |
| DFT-OFDM Symbols per Sub-Frame | | 12 | 12 | 12 | 12 | 12 | 12 |
| Modulation | | 64QAM | 64QAM | 64QAM | 64QAM | 64QAM | 64QAM |
| Target Coding rate | | 3/4 | 3/4 | 3/4 | 3/4 | 3/4 | 3/4 |
| Payload size | | | | | | | |
| For Sub-Frame 2,7 | Bits | 3752 | 9528 | 15840 | 31704 | 46888 | 63776 |
| Transport block CRC | Bits | 24 | 24 | 24 | 24 | 24 | 24 |
| Number of code blocks per Sub-Frame (Note 1) | | | | | | | |
| For Sub-Frame 2,7 | | 1 | 2 | 3 | 6 | 8 | 11 |
| Total number of bits per Sub-Frame | | | | | | | |
| For Sub-Frame 2,7 | Bits | 5184 | 12960 | 21600 | 43200 | 64800 | 86400 |
| Total symbols per Sub-Frame | | | | | | | |
| For Sub-Frame 2,7 | | 864 | 2160 | 3600 | 7200 | 10800 | 14400 |
| UE Category (Note 4) | | 5, 8 | 5, 8 | 5, 8 | 5, 8 | 5, 8 | 5, 8 |
| UE UL Category (Note 4) | | 5, 8, 13, 14 |
| Note 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit) | | | | | | | |
| Note 2: As per Table 4.2-2 in TS 36.211 [13] | | | | | | | |
| Note 3: As per Table 4.2-1 in TS 36.211 [13] | | | | | | | |
| Note 4: If UE does not report UE UL category, then the applicability of reference channel is determined by UE category. If UE reports UE UL category, then the applicability of reference channel is determined by UE UL category. | | | | | | | |

A.2.2.1.4 256 QAM

Table A.2.2.1.4-1: Reference Channels for 256 QAM with full RB allocation

| Parameter | Unit | Value | | | | | |
|--|------|--------|--------|--------|--------|--------|--------|
| Channel bandwidth | MHz | 1.4 | 3 | 5 | 10 | 15 | 20 |
| Allocated resource blocks | | 6 | 15 | 25 | 50 | 75 | 100 |
| Uplink-Downlink Configuration (Note 2) | | 2 | 2 | 2 | 2 | 2 | 2 |
| Special subframe configuration (Note 3) | | 7 | 7 | 7 | 7 | 7 | 7 |
| DFT-OFDM Symbols per Sub-Frame | | 12 | 12 | 12 | 12 | 12 | 12 |
| Modulation | | 256QAM | 256QAM | 256QAM | 256QAM | 256QAM | 256QAM |
| Target Coding rate | | 3/4 | 3/4 | 3/4 | 3/4 | 3/4 | 3/4 |
| Payload size | | | | | | | |
| For Sub-Frame 2,7 | Bits | 5160 | 12960 | 21384 | 42368 | 63776 | 84760 |
| Transport block CRC | Bits | 24 | 24 | 24 | 24 | 24 | 24 |
| Number of code blocks per Sub-Frame (Note 1) | | | | | | | |
| For Sub-Frame 2,7 | | 1 | 3 | 4 | 8 | 11 | 15 |
| Total number of bits per Sub-Frame | | | | | | | |
| For Sub-Frame 2,7 | Bits | 6912 | 17280 | 28800 | 57600 | 86400 | 115200 |
| Total symbols per Sub-Frame | | | | | | | |
| For Sub-Frame 2,7 | | 864 | 2160 | 3600 | 7200 | 10800 | 14400 |
| UE UL Category | | ≥ 15 | ≥ 15 | ≥ 15 | ≥ 15 | ≥ 15 | ≥ 15 |
| Note 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit) | | | | | | | |
| Note 2: As per Table 4.2-2 in TS 36.211 [13] | | | | | | | |
| Note 3: As per Table 4.2-1 in TS 36.211 [13] | | | | | | | |

A.2.2.2 Partial RB allocation

A.2.2.2.1 QPSK

Table A.2.2.2.1-1: Reference Channels for QPSK with partial RB allocation

| Parameter | Ch BW | Allocated RBs | UL-DL Configuration (Note 2) | Speci al subframe configuration (Note 3) | DFT-OFDM Symbols per Sub-Fram e | Mod'n | Targe t Codin g rate | Paylo ad size for Sub-Fram e 2, 7 | Trans port block CRC | Number of code blocks per Sub-Fram e (Note 1) | Total number of bits per Sub-Fram e for Sub-Fram e 2, 7 | Total symb ols per Sub-Fram e for Sub-Fram e 2, 7 | UE Categ ory |
|-----------|----------|---------------|------------------------------|--|---------------------------------|-------|----------------------|-----------------------------------|----------------------|---|---|---|--------------|
| Unit | MHz | | | | | | | Bits | Bits | | Bits | | |
| | 1.4 - 20 | 1 | 2 | 7 | 12 | QPSK | 1/3 | 72 | 24 | 1 | 288 | 144 | ≥ 1 |
| | 1.4 - 20 | 2 | 2 | 7 | 12 | QPSK | 1/3 | 176 | 24 | 1 | 576 | 288 | ≥ 1 |
| | 1.4 - 20 | 3 | 2 | 7 | 12 | QPSK | 1/3 | 256 | 24 | 1 | 864 | 432 | ≥ 1 |
| | 1.4 - 20 | 4 | 2 | 7 | 12 | QPSK | 1/3 | 392 | 24 | 1 | 1152 | 576 | ≥ 1 |
| | 1.4 - 20 | 5 | 2 | 7 | 12 | QPSK | 1/3 | 424 | 24 | 1 | 1440 | 720 | ≥ 1 |
| | 3-20 | 6 | 2 | 7 | 12 | QPSK | 1/3 | 600 | 24 | 1 | 1728 | 864 | ≥ 1 |
| | 3-20 | 8 | 2 | 7 | 12 | QPSK | 1/3 | 808 | 24 | 1 | 2304 | 1152 | ≥ 1 |
| | 3-20 | 9 | 2 | 7 | 12 | QPSK | 1/3 | 776 | 24 | 1 | 2592 | 1296 | ≥ 1 |
| | 3-20 | 10 | 2 | 7 | 12 | QPSK | 1/3 | 872 | 24 | 1 | 2880 | 1440 | ≥ 1 |
| | 3-20 | 12 | 2 | 7 | 12 | QPSK | 1/3 | 1224 | 24 | 1 | 3456 | 1728 | ≥ 1 |
| | 5-20 | 15 | 2 | 7 | 12 | QPSK | 1/3 | 1320 | 24 | 1 | 4320 | 2160 | ≥ 1 |
| | 5-20 | 16 | 2 | 7 | 12 | QPSK | 1/3 | 1384 | 24 | 1 | 4608 | 2304 | ≥ 1 |
| | 5-20 | 18 | 2 | 7 | 12 | QPSK | 1/3 | 1864 | 24 | 1 | 5184 | 2592 | ≥ 1 |
| | 5-20 | 20 | 2 | 7 | 12 | QPSK | 1/3 | 1736 | 24 | 1 | 5760 | 2880 | ≥ 1 |
| | 5-20 | 24 | 2 | 7 | 12 | QPSK | 1/3 | 2472 | 24 | 1 | 6912 | 3456 | ≥ 1 |
| | 10-20 | 25 | 2 | 7 | 12 | QPSK | 1/3 | 2216 | 24 | 1 | 7200 | 3600 | ≥ 1 |
| | 10-20 | 27 | 2 | 7 | 12 | QPSK | 1/3 | 2792 | 24 | 1 | 7776 | 3888 | ≥ 1 |
| | 10-20 | 30 | 2 | 7 | 12 | QPSK | 1/3 | 2664 | 24 | 1 | 8640 | 4320 | ≥ 1 |
| | 10-20 | 32 | 2 | 7 | 12 | QPSK | 1/3 | 2792 | 24 | 1 | 9216 | 4608 | ≥ 1 |
| | 10-20 | 36 | 2 | 7 | 12 | QPSK | 1/3 | 3752 | 24 | 1 | 10368 | 5184 | ≥ 1 |
| | 10-20 | 40 | 2 | 7 | 12 | QPSK | 1/3 | 4136 | 24 | 1 | 11520 | 5760 | ≥ 1 |
| | 10-20 | 45 | 2 | 7 | 12 | QPSK | 1/3 | 4008 | 24 | 1 | 12960 | 6480 | ≥ 1 |
| | 10-20 | 48 | 2 | 7 | 12 | QPSK | 1/3 | 4264 | 24 | 1 | 13824 | 6912 | ≥ 1 |
| | 15 - 20 | 50 | 2 | 7 | 12 | QPSK | 1/3 | 5160 | 24 | 1 | 14400 | 7200 | ≥ 1 |
| | 15 - 20 | 54 | 2 | 7 | 12 | QPSK | 1/3 | 4776 | 24 | 1 | 15552 | 7776 | ≥ 1 |
| | 15 - 20 | 60 | 2 | 7 | 12 | QPSK | 1/4 | 4264 | 24 | 1 | 17280 | 8640 | ≥ 1 |
| | 15 - 20 | 64 | 2 | 7 | 12 | QPSK | 1/4 | 4584 | 24 | 1 | 18432 | 9216 | ≥ 1 |
| | 15 - 20 | 72 | 2 | 7 | 12 | QPSK | 1/4 | 5160 | 24 | 1 | 20736 | 10368 | ≥ 1 |
| | 20 | 75 | 2 | 7 | 12 | QPSK | 1/5 | 4392 | 24 | 1 | 21600 | 10800 | ≥ 1 |
| | 20 | 80 | 2 | 7 | 12 | QPSK | 1/5 | 4776 | 24 | 1 | 23040 | 11520 | ≥ 1 |
| | 20 | 81 | 2 | 7 | 12 | QPSK | 1/5 | 4776 | 24 | 1 | 23328 | 11664 | ≥ 1 |
| | 20 | 90 | 2 | 7 | 12 | QPSK | 1/6 | 4008 | 24 | 1 | 25920 | 12960 | ≥ 1 |
| | 20 | 96 | 2 | 7 | 12 | QPSK | 1/6 | 4264 | 24 | 1 | 27648 | 13824 | ≥ 1 |

Note 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)

Note 2: As per Table 4.2-2 in TS 36.211 [13]

Note 3: As per Table 4.2-1 in TS 36.211 [13]

A.2.2.2.2 16-QAM

Table A.2.2.2.2-1: Reference Channels for 16QAM with partial RB allocation

| Parameter | Ch BW | Allocated RBs | UL-DL Configuration (Note 2) | Speci al subframe configuration (Note 3) | DFT-OFDM Symbols per Sub-Fram e | Mod'n | Targe t Codin g rate | Paylo ad size for Sub-Fram e 2, 7 | Trans port block CRC | Numb er of code block s per Sub-Fram e (Note 1) | Total number of bits per Sub-Fram e for Sub-Fram e 2, 7 | Total symb ols per Sub-Fram e for Sub-Fram e 2, 7 | UE Categ ory |
|-----------|----------|---------------|------------------------------|--|---------------------------------|-------|----------------------|-----------------------------------|----------------------|---|---|---|--------------|
| Unit | MHz | | | | | | | Bits | Bits | | Bits | | |
| | 1.4 - 20 | 1 | 2 | 7 | 12 | 16QAM | 3/4 | 408 | 24 | 1 | 576 | 144 | ≥ 1 |
| | 1.4 - 20 | 2 | 2 | 7 | 12 | 16QAM | 3/4 | 840 | 24 | 1 | 1152 | 288 | ≥ 1 |
| | 1.4 - 20 | 3 | 2 | 7 | 12 | 16QAM | 3/4 | 1288 | 24 | 1 | 1728 | 432 | ≥ 1 |
| | 1.4 - 20 | 4 | 2 | 7 | 12 | 16QAM | 3/4 | 1736 | 24 | 1 | 2304 | 576 | ≥ 1 |
| | 1.4 - 20 | 5 | 2 | 7 | 12 | 16QAM | 3/4 | 2152 | 24 | 1 | 2880 | 720 | ≥ 1 |
| | 3-20 | 6 | 2 | 7 | 12 | 16QAM | 3/4 | 2600 | 24 | 1 | 3456 | 864 | ≥ 1 |
| | 3-20 | 8 | 2 | 7 | 12 | 16QAM | 3/4 | 3496 | 24 | 1 | 4608 | 1152 | ≥ 1 |
| | 3-20 | 9 | 2 | 7 | 12 | 16QAM | 3/4 | 3880 | 24 | 1 | 5184 | 1296 | ≥ 1 |
| | 3-20 | 10 | 2 | 7 | 12 | 16QAM | 3/4 | 4264 | 24 | 1 | 5760 | 1440 | ≥ 1 |
| | 3-20 | 12 | 2 | 7 | 12 | 16QAM | 3/4 | 5160 | 24 | 1 | 6912 | 1728 | ≥ 1 |
| | 5-20 | 15 | 2 | 7 | 12 | 16QAM | 1/2 | 4264 | 24 | 1 | 8640 | 2160 | ≥ 1 |
| | 5-20 | 16 | 2 | 7 | 12 | 16QAM | 1/2 | 4584 | 24 | 1 | 9216 | 2304 | ≥ 1 |
| | 5-20 | 18 | 2 | 7 | 12 | 16QAM | 1/2 | 5160 | 24 | 1 | 10368 | 2592 | ≥ 1 |
| | 5-20 | 20 | 2 | 7 | 12 | 16QAM | 1/3 | 4008 | 24 | 1 | 11520 | 2880 | ≥ 1 |
| | 5-20 | 24 | 2 | 7 | 12 | 16QAM | 1/3 | 4776 | 24 | 1 | 13824 | 3456 | ≥ 1 |
| | 10-20 | 25 | 2 | 7 | 12 | 16QAM | 1/3 | 4968 | 24 | 1 | 14400 | 3600 | ≥ 1 |
| | 10-20 | 27 | 2 | 7 | 12 | 16QAM | 1/3 | 4776 | 24 | 1 | 15552 | 3888 | ≥ 1 |
| | 10-20 | 30 | 2 | 7 | 12 | 16QAM | 3/4 | 12960 | 24 | 3 | 17280 | 4320 | ≥ 2 |
| | 10-20 | 32 | 2 | 7 | 12 | 16QAM | 3/4 | 13536 | 24 | 3 | 18432 | 4608 | ≥ 2 |
| | 10-20 | 36 | 2 | 7 | 12 | 16QAM | 3/4 | 15264 | 24 | 3 | 20736 | 5184 | ≥ 2 |
| | 10-20 | 40 | 2 | 7 | 12 | 16QAM | 3/4 | 16992 | 24 | 3 | 23040 | 5760 | ≥ 2 |
| | 10-20 | 45 | 2 | 7 | 12 | 16QAM | 3/4 | 19080 | 24 | 4 | 25920 | 6480 | ≥ 2 |
| | 10-20 | 48 | 2 | 7 | 12 | 16QAM | 3/4 | 20616 | 24 | 4 | 27648 | 6912 | ≥ 2 |
| | 15 - 20 | 50 | 2 | 7 | 12 | 16QAM | 3/4 | 21384 | 24 | 4 | 28800 | 7200 | ≥ 2 |
| | 15 - 20 | 54 | 2 | 7 | 12 | 16QAM | 3/4 | 22920 | 24 | 4 | 31104 | 7776 | ≥ 2 |
| | 15 - | 60 | 2 | 7 | 12 | 16QAM | 2/3 | 23688 | 24 | 4 | 34560 | 8640 | ≥ 2 |

| | | | | | | | | | | | | |
|---------|----|---|---|----|--------|-----|-------|----|---|-------|-------|-----|
| | 20 | | | | M | | | | | | | |
| 15 - 20 | 64 | 2 | 7 | 12 | 16QA M | 2/3 | 25456 | 24 | 4 | 36864 | 9216 | ≥ 2 |
| 15 - 20 | 72 | 2 | 7 | 12 | 16QA M | 1/2 | 20616 | 24 | 4 | 41472 | 10368 | ≥ 2 |
| 20 | 75 | 2 | 7 | 12 | 16QA M | 1/2 | 21384 | 24 | 4 | 43200 | 10800 | ≥ 2 |
| 20 | 80 | 2 | 7 | 12 | 16QA M | 1/2 | 22920 | 24 | 4 | 46080 | 11520 | ≥ 2 |
| 20 | 81 | 2 | 7 | 12 | 16QA M | 1/2 | 22920 | 24 | 4 | 46656 | 11664 | ≥ 2 |
| 20 | 90 | 2 | 7 | 12 | 16QA M | 2/5 | 20616 | 24 | 4 | 51840 | 12960 | ≥ 2 |
| 20 | 96 | 2 | 7 | 12 | 16QA M | 2/5 | 22152 | 24 | 4 | 55296 | 13824 | ≥ 2 |

Note 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)
 Note 2: As per Table 4.2-2 in TS 36.211 [13]
 Note 3: As per Table 4.2-1 in TS 36.211 [13]

A.2.2.2.3 64-QAM

Table A.2.2.2.3-1: Reference Channels for 64-QAM with partial RB allocation

| Parameter | Ch BW | Allocated RBs | UL-DL Configuration (Note 2) | Special subframe configuration (Note 3) | DFT-OFDM Symbols per Sub-Frame | Mod'n | Target Coding rate | Payload size for Sub-Frame 2, 7 | Transport block CRC | Number of code blocks per Sub-Frame (Note 1) |
|-----------|----------|---------------|------------------------------|---|--------------------------------|-------|--------------------|---------------------------------|---------------------|--|
| Unit | MHz | | | | | | | Bits | Bits | |
| | 1.4 - 20 | 1 | 2 | 7 | 12 | 64QAM | 3/4 | 616 | 24 | 1 |
| | 1.4 - 20 | 2 | 2 | 7 | 12 | 64QAM | 3/4 | 1256 | 24 | 1 |
| | 1.4 - 20 | 3 | 2 | 7 | 12 | 64QAM | 3/4 | 1864 | 24 | 1 |
| | 1.4 - 20 | 4 | 2 | 7 | 12 | 64QAM | 3/4 | 2536 | 24 | 1 |
| | 1.4 - 20 | 5 | 2 | 7 | 12 | 64QAM | 3/4 | 3112 | 24 | 1 |
| | 3-20 | 6 | 2 | 7 | 12 | 64QAM | 3/4 | 3752 | 24 | 1 |
| | 3-20 | 8 | 2 | 7 | 12 | 64QAM | 3/4 | 5160 | 24 | 1 |
| | 3-20 | 9 | 2 | 7 | 12 | 64QAM | 3/4 | 5736 | 24 | 1 |
| | 3-20 | 10 | 2 | 7 | 12 | 64QAM | 3/4 | 6200 | 24 | 2 |
| | 3-20 | 12 | 2 | 7 | 12 | 64QAM | 3/4 | 7480 | 24 | 2 |
| | 5-20 | 15 | 2 | 7 | 12 | 64QAM | 3/4 | 9528 | 24 | 2 |
| | 5-20 | 16 | 2 | 7 | 12 | 64QAM | 3/4 | 10296 | 24 | 2 |
| | 5-20 | 18 | 2 | 7 | 12 | 64QAM | 3/4 | 11448 | 24 | 2 |
| | 5-20 | 20 | 2 | 7 | 12 | 64QAM | 3/4 | 12576 | 24 | 3 |
| | 5-20 | 24 | 2 | 7 | 12 | 64QAM | 3/4 | 15264 | 24 | 3 |
| | 10-20 | 25 | 2 | 7 | 12 | 64QAM | 3/4 | 15840 | 24 | 3 |
| | 10-20 | 27 | 2 | 7 | 12 | 64QAM | 3/4 | 16992 | 24 | 3 |
| | 10-20 | 30 | 2 | 7 | 12 | 64QAM | 3/4 | 19080 | 24 | 4 |
| | 10-20 | 32 | 2 | 7 | 12 | 64QAM | 3/4 | 20616 | 24 | 4 |
| | 10-20 | 36 | 2 | 7 | 12 | 64QAM | 3/4 | 22920 | 24 | 4 |
| | 10-20 | 40 | 2 | 7 | 12 | 64QAM | 3/4 | 25456 | 24 | 5 |
| | 10-20 | 45 | 2 | 7 | 12 | 64QAM | 3/4 | 28336 | 24 | 5 |
| | 10-20 | 48 | 2 | 7 | 12 | 64QAM | 3/4 | 30576 | 24 | 5 |
| | 15-20 | 50 | 2 | 7 | 12 | 64QAM | 3/4 | 31704 | 24 | 6 |
| | 15-20 | 54 | 2 | 7 | 12 | 64QAM | 3/4 | 34008 | 24 | 6 |
| | 15-20 | 60 | 2 | 7 | 12 | 64QAM | 3/4 | 37888 | 24 | 7 |

| | | | | | | | | | | | |
|--|---------|----|---|---|----|-------|-----|-------|----|----|--|
| | 15 - 20 | 64 | 2 | 7 | 12 | 64QAM | 3/4 | 40576 | 24 | 7 | |
| | 15 - 20 | 72 | 2 | 7 | 12 | 64QAM | 3/4 | 45352 | 24 | 8 | |
| | 20 | 75 | 2 | 7 | 12 | 64QAM | 3/4 | 46888 | 24 | 8 | |
| | 20 | 80 | 2 | 7 | 12 | 64QAM | 3/4 | 51024 | 24 | 9 | |
| | 20 | 81 | 2 | 7 | 12 | 64QAM | 3/4 | 51024 | 24 | 9 | |
| | 20 | 90 | 2 | 7 | 12 | 64QAM | 3/4 | 51024 | 24 | 9 | |
| | 20 | 96 | 2 | 7 | 12 | 64QAM | 3/4 | 61664 | 24 | 11 | |

Note 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise)

Note 2: As per Table 4.2-2 in TS 36.211 [13]

Note 3: As per Table 4.2-1 in TS 36.211 [13]

Note 4: If UE does not report UE UL category, then the applicability of reference channel is determined by UE category. If UE reports reference channel is determined by UE UL category

A.2.2.2.4 256 QAM

Table A.2.2.2.4-1: Reference Channels for 256 QAM with partial RB allocation

| Parameter | Ch BW | Allocated RBs | UL-DL Configuration (Note 2) | Speci al Slot Configuration (Note 3) | DFT-OFDM Symbols per Sub-Fram e | Mod'n | Targe t Codi ng rate | Paylo ad size for Sub-Frame 2, 7 | Trans -port block CRC | Numbe r of code blocks per Sub-Frame (Note 1) | Total number of bits per Sub-Frame for Sub-Frame 2, 7 | Total symbols per Sub-Frame for Sub-Frame 2, 7 | UE UL Category |
|-----------|----------|---------------|------------------------------|--------------------------------------|---------------------------------|--------|----------------------|----------------------------------|-----------------------|---|---|--|----------------|
| Unit | MHz | | | | | | | Bits | Bits | | Bits | | |
| | 1.4 - 20 | 1 | 2 | 7 | 12 | 256QAM | 3/4 | 840 | 24 | 1 | 1152 | 144 | ≥ 15 |
| | 1.4 - 20 | 2 | 2 | 7 | 12 | 256QAM | 3/4 | 1672 | 24 | 1 | 2304 | 288 | ≥ 15 |
| | 1.4 - 20 | 3 | 2 | 7 | 12 | 256QAM | 3/4 | 2536 | 24 | 1 | 3456 | 432 | ≥ 15 |
| | 1.4 - 20 | 4 | 2 | 7 | 12 | 256QAM | 3/4 | 3368 | 24 | 1 | 4608 | 576 | ≥ 15 |
| | 1.4 - 20 | 5 | 2 | 7 | 12 | 256QAM | 3/4 | 4264 | 24 | 1 | 5760 | 720 | ≥ 15 |
| | 3-20 | 6 | 2 | 7 | 12 | 256QAM | 3/4 | 5160 | 24 | 1 | 6912 | 864 | ≥ 15 |
| | 3-20 | 8 | 2 | 7 | 12 | 256QAM | 3/4 | 6712 | 24 | 2 | 9216 | 1152 | ≥ 15 |
| | 3-20 | 9 | 2 | 7 | 12 | 256QAM | 3/4 | 7736 | 24 | 2 | 10368 | 1296 | ≥ 15 |
| | 3-20 | 10 | 2 | 7 | 12 | 256QAM | 3/4 | 8504 | 24 | 2 | 11520 | 1440 | ≥ 15 |
| | 3-20 | 12 | 2 | 7 | 12 | 256QAM | 3/4 | 10296 | 24 | 2 | 13824 | 1728 | ≥ 15 |
| | 5-20 | 15 | 2 | 7 | 12 | 256QAM | 3/4 | 12960 | 24 | 3 | 17280 | 2160 | ≥ 15 |
| | 5-20 | 16 | 2 | 7 | 12 | 256QAM | 3/4 | 13536 | 24 | 3 | 18432 | 2304 | ≥ 15 |
| | 5-20 | 18 | 2 | 7 | 12 | 256QAM | 3/4 | 15264 | 24 | 3 | 20736 | 2592 | ≥ 15 |
| | 5-20 | 20 | 2 | 7 | 12 | 256QAM | 3/4 | 16992 | 24 | 3 | 23040 | 2880 | ≥ 15 |
| | 5-20 | 24 | 2 | 7 | 12 | 256QAM | 3/4 | 20616 | 24 | 4 | 27648 | 3456 | ≥ 15 |
| | 10-20 | 25 | 2 | 7 | 12 | 256QAM | 3/4 | 21384 | 24 | 4 | 28800 | 3600 | ≥ 15 |
| | 10-20 | 27 | 2 | 7 | 12 | 256QAM | 3/4 | 22920 | 24 | 4 | 31104 | 3888 | ≥ 15 |
| | 10-20 | 30 | 2 | 7 | 12 | 256QAM | 3/4 | 25456 | 24 | 5 | 34560 | 4320 | ≥ 15 |
| | 10-20 | 32 | 2 | 7 | 12 | 256QAM | 3/4 | 27376 | 24 | 5 | 36864 | 4608 | ≥ 15 |
| | 10-20 | 36 | 2 | 7 | 12 | 256QAM | 3/4 | 30576 | 24 | 6 | 41472 | 5184 | ≥ 15 |
| | 10-20 | 40 | 2 | 7 | 12 | 256QAM | 3/4 | 34008 | 24 | 6 | 46080 | 5760 | ≥ 15 |
| | 10-20 | 45 | 2 | 7 | 12 | 256QAM | 3/4 | 37888 | 24 | 7 | 51840 | 6480 | ≥ 15 |
| | 10-20 | 48 | 2 | 7 | 12 | 256QAM | 3/4 | 40576 | 24 | 8 | 55296 | 6912 | ≥ 15 |
| | 15 - 20 | 50 | 2 | 7 | 12 | 256QAM | 3/4 | 42368 | 24 | 8 | 57600 | 7200 | ≥ 15 |
| | 15 - 20 | 54 | 2 | 7 | 12 | 256QAM | 3/4 | 46888 | 24 | 8 | 62208 | 7776 | ≥ 15 |
| | 15 - 20 | 60 | 2 | 7 | 12 | 256QAM | 3/4 | 51024 | 24 | 9 | 69120 | 8640 | ≥ 15 |
| | 15 - 20 | 64 | 2 | 7 | 12 | 256QAM | 3/4 | 55056 | 24 | 9 | 73728 | 9216 | ≥ 15 |
| | 15 - 20 | 72 | 2 | 7 | 12 | 256QAM | 3/4 | 61664 | 24 | 11 | 82944 | 10368 | ≥ 15 |
| | 20 | 75 | 2 | 7 | 12 | 256QAM | 3/4 | 63776 | 24 | 11 | 86400 | 10800 | ≥ 15 |
| | 20 | 80 | 2 | 7 | 12 | 256QAM | 3/4 | 68808 | 24 | 12 | 92160 | 11520 | ≥ 15 |
| | 20 | 81 | 2 | 7 | 12 | 256QAM | 3/4 | 68808 | 24 | 12 | 93312 | 11664 | ≥ 15 |
| | 20 | 90 | 2 | 7 | 12 | 256QAM | 3/4 | 76208 | 24 | 13 | 103680 | 12960 | ≥ 15 |
| | 20 | 96 | 2 | 7 | 12 | 256QAM | 3/4 | 81176 | 24 | 14 | 110592 | 13824 | ≥ 15 |

Note 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)

Note 2: As per Table 4.2-2 in TS 36.211 [13]

Note 3: As per Table 4.2-1 in TS 36.211 [13]

A.3 DL reference measurement channels for E-UTRA

A.3.1 General

The number of available channel bits varies across the sub-frames due to PBCH and PSS/SSS overhead. The payload size per sub-frame is varied in order to keep the code rate constant throughout a frame.

Unless otherwise stated, no user data is scheduled on subframes #5 in order to facilitate the transmission of system information blocks (SIB).

The algorithm for determining the payload size A is as follows; given a desired coding rate R and radio block allocation N_{RB}

1. Calculate the number of channel bits N_{ch} that can be transmitted during the first transmission of a given sub-frame.
2. Find A such that the resulting coding rate is as close to R as possible, that is,

$$\min |R - (A + 24 * (N_{\text{CB}} + 1)) / N_{\text{ch}}|, \text{ where } N_{\text{CB}} = \begin{cases} 0, & \text{if } C = 1 \\ C, & \text{if } C > 1 \end{cases},$$

subject to

- a) A is a valid TB size according to clause 7.1.7 of TS 36.213 [6] assuming an allocation of N_{RB} resource blocks.
- b) C is the number of Code Blocks calculated according to clause 5.1.2 of TS 36.212 [5].
3. If there is more than one A that minimizes the equation above, then the larger value is chosen per default and the chosen code rate should not exceed 0.93.
4. For TDD, the measurement channel is based on DL/UL configuration ratio of 3DL+DwPTS (10 OFDM symbol SSF7): 1UL.

A.3.1.1 QPSK

Table A.3.1.1-1: Fixed Reference Channel for Receiver Requirements (TDD)

| Parameter | Unit | Value | | | | | |
|--|---|----------|----------|----------|------------|------------|------------|
| Channel Bandwidth | MHz | 1.4 | 3 | 5 | 10 | 15 | 20 |
| Allocated resource blocks | | 6 | 15 | 25 | 50 | 75 | 100 |
| Uplink-Downlink Configuration (NOTE 5) | | 2 | 2 | 2 | 2 | 2 | 2 |
| Special subframe configuration (NOTE 6) | | 7 | 7 | 7 | 7 | 7 | 7 |
| Allocated subframes per Radio Frame (D+S) | | 3 | 3+2 | 3+2 | 3+2 | 3+2 | 3+2 |
| Number of HARQ Processes | Processes | 7 | 7 | 7 | 7 | 7 | 7 |
| Maximum number of HARQ transmission | | 1 | 1 | 1 | 1 | 1 | 1 |
| Modulation | | QPSK | QPSK | QPSK | QPSK | QPSK | QPSK |
| Target coding rate | | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 |
| Information Bit Payload per Sub-Frame | Bits | | | | | | |
| For Sub-Frame 3, 4, 8, 9 | | 408 | 1320 | 2216 | 4392 | 6712 | 8760 |
| For Sub-Frame 1, 6 | | N/A | 776 | 1288 | 2664 | 4008 | 5352 |
| For Sub-Frame 5 | | N/A | N/A | N/A | N/A | N/A | N/A |
| For Sub-Frame 0 | | 208 | 1064 | 1800 | 4392 | 6712 | 8760 |
| Transport block CRC | Bits | 24 | 24 | 24 | 24 | 24 | 24 |
| Number of Code Blocks per Sub-Frame (NOTE 4) | | | | | | | |
| For Sub-Frame 3, 4, 8, 9 | | 1 | 1 | 1 | 1 | 2 | 2 |
| For Sub-Frame 1, 6 | | N/A | 1 | 1 | 1 | 1 | 1 |
| For Sub-Frame 5 | | N/A | N/A | N/A | N/A | N/A | N/A |
| For Sub-Frame 0 | | 1 | 1 | 1 | 1 | 2 | 2 |
| Binary Channel Bits Per Sub-Frame | Bits | | | | | | |
| For Sub-Frame 3, 4, 8, 9 | | 1368 | 3780 | 6300 | 13800 | 20700 | 27600 |
| For Sub-Frame 1, 6 | | N/A | 2616 | 4456 | 9056 | 13656 | 18256 |
| For Sub-Frame 5 | | N/A | N/A | N/A | N/A | N/A | N/A |
| For Sub-Frame 0 | | 672 | 3084 | 5604 | 13104 | 20004 | 26904 |
| Max. Throughput averaged over 1 frame | kbps | 102.4 | 564 | 932 | 1965. 6 | 3007. 2 | 3970. 4 |
| UE Category | | ≥ 1 | ≥ 1 | ≥ 1 | ≥ 1 | ≥ 1 | ≥ 1 |
| NOTE 1: | For normal subframes(0,3,4,5,8,9), 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz and 3 MHz; 4 symbols allocated to PDCCH for 1.4 MHz. For special subframe (1&6), only 2 OFDM symbols are allocated to PDCCH for all BWs. | | | | | | |
| NOTE 2: | For 1.4MHz, no data shall be scheduled on special subframes(1&6) to avoid problems with insufficient PDCCH performance | | | | | | |
| NOTE 3: | Reference signal, Synchronization signals and PBCH allocated as per TS 36.211 [7] | | | | | | |
| NOTE 4: | If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit). | | | | | | |
| NOTE 5: | As per Table 4.2-2 in TS 36.211 [7] | | | | | | |
| NOTE 6: | As per Table 4.2-1 in TS 36.211 [7] | | | | | | |

A.3.1.2 64-QAM

Table A.3.1.2-1: Fixed Reference Channel for Maximum input level for UE Categories ≥ 3 (TDD)

| Parameter | Unit | Value | | | | | |
|--|---|---------------|---------------|---------------|---------------|---------------|---------------|
| Channel bandwidth | MHz | 1.4 | 3 | 5 | 10 | 15 | 20 |
| Allocated resource blocks | | 6 | 15 | 25 | 50 | 75 | 100 |
| Subcarriers per resource block | | 12 | 12 | 12 | 12 | 12 | 12 |
| Uplink-Downlink Configuration (NOTE 5) | | 2 | 2 | 2 | 2 | 2 | 2 |
| Special subframe configuration (NOTE 6) | | 7 | 7 | 7 | 7 | 7 | 7 |
| Allocated subframes per Radio Frame | | 2 | 3+2 | 3+2 | 3+2 | 3+2 | 3+2 |
| Modulation | 64QAM | 64QAM | 64QAM | 64QAM | 64QAM | 64QAM | 64QAM |
| Target Coding Rate | | $\frac{3}{4}$ | $\frac{3}{4}$ | $\frac{3}{4}$ | $\frac{3}{4}$ | $\frac{3}{4}$ | $\frac{3}{4}$ |
| Number of HARQ Processes | Processes | 7 | 7 | 7 | 7 | 7 | 7 |
| Maximum number of HARQ transmissions | | 1 | 1 | 1 | 1 | 1 | 1 |
| Information Bit Payload per Sub-Frame | | | | | | | |
| For Sub-Frames 3, 4, 8, 9 | Bits | 2984 | 8504 | 14112 | 30576 | 46888 | 61664 |
| For Sub-Frames 1,6 | Bits | N/A | 5544 | 9528 | 19848 | 30576 | 40576 |
| For Sub-Frame 5 | Bits | N/A | N/A | N/A | N/A | N/A | N/A |
| For Sub-Frame 0 | Bits | N/A | 6968 | 12576 | 30576 | 45352 | 61664 |
| Transport block CRC | Bits | 24 | 24 | 24 | 24 | 24 | 24 |
| Number of Code Blocks per Sub-Frame (NOTE 4) | | | | | | | |
| For Sub-Frames 3, 4, 8, 9 | | 1 | 2 | 3 | 5 | 8 | 11 |
| For Sub-Frames 1,6 | | N/A | 2 | 2 | 4 | 6 | 8 |
| For Sub-Frame 5 | | N/A | N/A | N/A | N/A | N/A | N/A |
| For Sub-Frame 0 | | N/A | 2 | 3 | 5 | 8 | 11 |
| Binary Channel Bits per Sub-Frame | | | | | | | |
| For Sub-Frames 3, 4, 8, 9 | Bits | 4104 | 11340 | 18900 | 41400 | 62100 | 82800 |
| For Sub-Frames 1,6 | | N/A | 7848 | 13368 | 27168 | 40968 | 54768 |
| For Sub-Frame 5 | Bits | N/A | N/A | N/A | N/A | N/A | N/A |
| For Sub-Frame 0 | Bits | N/A | 9252 | 16812 | 39312 | 60012 | 80712 |
| Max. Throughput averaged over 1 frame | kbps | 596.8 | 3791.2 | 6369.6 | 13910 | 20945 | 27877 |
| NOTE 1: | For normal subframes(0,3,4,5,8,9), 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz and 3 MHz; 4 symbols allocated to PDCCH for 1.4 MHz. For special subframe (1&6), only 2 OFDM symbols are allocated to PDCCH for all BWs. | | | | | | |
| NOTE 2: | For 1.4MHz, no data shall be scheduled on special subframes(1&6) to avoid problems with insufficient PDCCH performance. | | | | | | |
| NOTE 3: | Reference signal, Synchronization signals and PBCH allocated as per TS 36.211 [7]. | | | | | | |
| NOTE 4: | If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit). | | | | | | |
| NOTE 5: | As per Table 4.2-2 in TS 36.211 [7]. | | | | | | |
| NOTE 6: | As per Table 4.2-1 in TS 36.211 [7] | | | | | | |

A.3.1.3 256-QAM

Table A.3.1.3-1: Fixed Reference Channel for Maximum input level for UE Categories 11/12 and UE DL categories ≥ 11 (TDD)

| Parameter | Unit | Value | | | | | |
|--|---|--------|--------|--------|---------|--------|---------|
| Channel bandwidth | MHz | 1.4 | 3 | 5 | 10 | 15 | 20 |
| Allocated resource blocks | | 6 | 15 | 25 | 50 | 75 | 100 |
| Subcarriers per resource block | | 12 | 12 | 12 | 12 | 12 | 12 |
| Uplink-Downlink Configuration (NOTE 5) | | 2 | 2 | 2 | 2 | 2 | 2 |
| Special subframe configuration (NOTE 6) | | 7 | 7 | 7 | 7 | 7 | 7 |
| Allocated subframes per Radio Frame | | 2 | 3+2 | 3+2 | 3+2 | 3+2 | 3+2 |
| Modulation | 256QAM | 256QAM | 256QAM | 256QAM | 256QAM | 256QAM | 256QAM |
| Target Coding Rate | | 4/5 | 4/5 | 4/5 | 4/5 | 4/5 | 4/5 |
| Number of HARQ Processes | Processes | 7 | 7 | 7 | 7 | 7 | 7 |
| Maximum number of HARQ transmissions | | 1 | 1 | 1 | 1 | 1 | 1 |
| Information Bit Payload per Sub-Frame | | | | | | | |
| For Sub-Frames 3,4,8,9 | Bits | 4392 | 12216 | 19848 | 42368 | 63776 | 84760 |
| For Sub-Frames 1,6 | Bits | N/A | 10464 | 17824 | 36224 | 54624 | 73024 |
| For Sub-Frame 5 | Bits | N/A | N/A | N/A | N/A | N/A | N/A |
| For Sub-Frame 0 | Bits | N/A | 9912 | 17568 | 42368 | 63776 | 84760 |
| Transport block CRC | Bits | 24 | 24 | 24 | 24 | 24 | 24 |
| Number of Code Blocks per Sub-Frame (NOTE 4) | | | | | | | |
| For Sub-Frames 3,4,8,9 | | 1 | 2 | 4 | 7 | 11 | 14 |
| For Sub-Frames 1,6 | | N/A | 2 | 3 | 6 | 9 | 13 |
| For Sub-Frame 5 | | N/A | N/A | N/A | N/A | N/A | N/A |
| For Sub-Frame 0 | | N/A | 2 | 3 | 7 | 11 | 14 |
| Binary Channel Bits per Sub-Frame | | | | | | | |
| For Sub-Frames 3,4,8,9 | Bits | 5472 | 15120 | 25200 | 55200 | 82800 | 110400 |
| For Sub-Frames 1,6 | | N/A | 8248 | 13536 | 27376 | 40576 | 55056 |
| For Sub-Frame 5 | Bits | N/A | N/A | N/A | N/A | N/A | N/A |
| For Sub-Frame 0 | Bits | N/A | 12336 | 22416 | 52416 | 80016 | 107616 |
| Max. Throughput averaged over 1 frame | kbps | 878.4 | 5570.4 | 9240 | 20049.6 | 30144 | 40503.2 |
| NOTE 1: | For normal subframes(0,3,4,5,8,9), 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz and 3 MHz; 4 symbols allocated to PDCCH for 1.4 MHz. For special subframe (1&6), only 2 OFDM symbols are allocated to PDCCH for all BWs. | | | | | | |
| NOTE 2: | For 1.4MHz, no data shall be scheduled on special subframes(1&6) to avoid problems with insufficient PDCCH performance. | | | | | | |
| NOTE 3: | Reference signal, Synchronization signals and PBCH allocated as per TS 36.211 [7]. | | | | | | |
| NOTE 4: | If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit). | | | | | | |
| NOTE 5: | As per Table 4.2-2 in TS 36.211 [7]. | | | | | | |
| NOTE 6: | As per Table 4.2-1 in TS 36.211 [7] | | | | | | |

Annex B (normative): Propagation Conditions

Please refer to Annex B in TS 38.521-1 [8] and 38.521-2 [9] for appropriate details as needed for test cases in this test specification. EN-DC exceptions will be added,

Annex C (normative): Downlink Physical Channels

Please refer to Annex C in TS 38.521-1 [8] and 38.521-2 [9] for appropriate details as needed for test cases in this test specification. EN-DC exceptions will be added,

Annex D (normative): Characteristics of the Interfering Signal

Please refer to Annex D in TS 38.521-1 [8] and 38.521-2 [9] for appropriate details as needed for test cases in this test specification. EN-DC exceptions will be added,

Annex E (normative): Global In-Channel Tx Test

Please refer to Annex E in TS 38.521-1 [8] and 38.521-2 [9] for appropriate details as needed for test cases in this test specification. EN-DC exceptions will be added,

Annex F (informative): Measurement uncertainties and Test Tolerances

F.1 Acceptable uncertainty of Test System (normative)

TBD

F.1.1 Measurement of test environments

TBD

F.1.2 Measurement of transmitter

Table F.1.2-1: Maximum Test System Uncertainty for transmitter tests

| Clause | Maximum Test System Uncertainty | Derivation of Test System Uncertainty |
|--|--|---|
| 6.2B.1.1 UE Maximum Output Power for Intra-Band Contiguous EN-DC | $f \leq 3.0\text{GHz}$ $\pm 0.7 \text{ dB}, \text{BW} \leq 40\text{MHz}$ $\pm 1.4 \text{ dB}, 40\text{MHz} < \text{BW} \leq 100\text{MHz}$ $3.0\text{GHz} < f \leq 4.2\text{GHz}$ $\pm 1.0 \text{ dB}, \text{BW} \leq 40\text{MHz}$ $\pm 1.6 \text{ dB}, 40\text{MHz} < \text{BW} \leq 100\text{MHz}$ $4.2\text{GHz} < f \leq 6.0\text{GHz}$ $\pm 1.3 \text{ dB}, \text{BW} \leq 20\text{MHz}$ $\pm 1.5 \text{ dB}, 20\text{MHz} < \text{BW} \leq 40\text{MHz}$ $\pm 1.6 \text{ dB}, 40\text{MHz} < \text{BW} \leq 100\text{MHz}$ | |
| 6.2B.1.2 UE Maximum Output Power for Intra-Band Non-Contiguous EN-DC | $\text{MAX}(\text{MU}_{\text{LTE}}, \text{MU}_{\text{SA}})$ MU_{LTE} $\pm 0.7 \text{ dB}, f \leq 3.0\text{GHz}$ $\pm 1.0 \text{ dB}, 3.0\text{GHz} < f \leq 4.2\text{GHz}$ MU_{SA} $f \leq 3.0\text{GHz}$ $\pm 0.7 \text{ dB}, \text{BW} \leq 40\text{MHz}$ $\pm 1.4 \text{ dB}, 40\text{MHz} < \text{BW} \leq 100\text{MHz}$ $3.0\text{GHz} < f \leq 4.2\text{GHz}$ $\pm 1.0 \text{ dB}, \text{BW} \leq 40\text{MHz}$ $\pm 1.6 \text{ dB}, 40\text{MHz} < \text{BW} \leq 100\text{MHz}$ $4.2\text{GHz} < f \leq 6.0\text{GHz}$ $\pm 1.3 \text{ dB}, \text{BW} \leq 20\text{MHz}$ $\pm 1.5 \text{ dB}, 20\text{MHz} < \text{BW} \leq 40\text{MHz}$ $\pm 1.6 \text{ dB}, 40\text{MHz} < \text{BW} \leq 100\text{MHz}$ | MU_{LTE} is MU of LTE specified in clause 6.2.2 in TS 36.521-1 [10]. MU_{SA} is MU of FR1 SA specified in clause 6.2.1 in TS 38.521-1 [8]. |
| 6.2B.1.3 UE Maximum Output Power for Inter-Band EN-DC within FR1 | $\text{MAX}(\text{MU}_{\text{LTE}}, \text{MU}_{\text{SA}})$ MU_{LTE} $\pm 0.7 \text{ dB}, f \leq 3.0\text{GHz}$ $\pm 1.0 \text{ dB}, 3.0\text{GHz} < f \leq 4.2\text{GHz}$ MU_{SA} $f \leq 3.0\text{GHz}$ $\pm 0.7 \text{ dB}, \text{BW} \leq 40\text{MHz}$ $\pm 1.4 \text{ dB}, 40\text{MHz} < \text{BW} \leq 100\text{MHz}$ $3.0\text{GHz} < f \leq 4.2\text{GHz}$ $\pm 1.0 \text{ dB}, \text{BW} \leq 40\text{MHz}$ $\pm 1.6 \text{ dB}, 40\text{MHz} < \text{BW} \leq 100\text{MHz}$ $4.2\text{GHz} < f \leq 6.0\text{GHz}$ $\pm 1.3 \text{ dB}, \text{BW} \leq 20\text{MHz}$ $\pm 1.5 \text{ dB}, 20\text{MHz} < \text{BW} \leq 40\text{MHz}$ $\pm 1.6 \text{ dB}, 40\text{MHz} < \text{BW} \leq 100\text{MHz}$ | MU_{LTE} is MU of LTE specified in clause 6.2.2 in TS 36.521-1 [10]. MU_{SA} is MU of FR1 SA specified in clause 6.2.1 in TS 38.521-1 [8]. |
| 6.2B.1.4.1 UE Maximum Output Power for Inter-Band EN-DC including FR2 (2 CCs) - EIRP and TRP | Same as clause 6.2.1.1 in TS 38.521-2 | |
| 6.2B.1.4.2 UE Maximum Output Power for Inter-Band EN-DC including FR2 (2 CCs) - Spherical Coverage | Same as clause 6.2.1.2 in TS 38.521-2 | |

| | | |
|---|---|--|
| 6.2B.2.1 UE Maximum Output Power reduction for Intra-Band Contiguous EN-DC | Same as clause 6.2B.1.1 | |
| 6.2B.2.2 UE Maximum Output Power reduction for Intra-Band Non-Contiguous EN-DC | Same as clause 6.2B.1.2 | |
| 6.2B.2.3 UE Maximum Output Power reduction for Inter-Band EN-DC within FR1 | Same as clause 6.2B.1.3 | |
| 6.2B.2.4 UE Maximum Output Power reduction for Inter-Band EN-DC including FR2 | Same as clause 6.2.2 in TS 38.521-2 [9] | |
| 6.2B.3.1 UE Additional Maximum Output Power reduction for Intra-band contiguous EN-DC | Same as clause 6.2B.1.1 | |
| 6.2B.3.2 UE Additional Maximum Output Power reduction for Intra-Band Non-Contiguous EN-DC | Same as clause 6.2B.1.2 | |
| 6.2B.3.3 UE Additional Maximum Output Power reduction for Inter-Band EN-DC within FR1 | Same as clause 6.2B.1.3 | |
| 6.2B.4.1.1 Configured Output Power Level for Intra-Band Contiguous EN-DC | Same as clause 6.2B.1.1 | |
| 6.2B.4.1.2 Configured Output Power for Intra-Band Non-Contiguous EN-DC | Same as clause 6.2B.1.2 | |
| 6.2B.4.1.3 Configured Output Power for Inter-Band EN-DC within FR1 | Same as clause 6.2B.1.3 | |
| 6.3B.1.1 Minimum Output Power for intra-band contiguous EN-DC | Same as clause 6.3.1 in TS 38.521-1 [8] | |
| 6.3B.1.2 Minimum output power for intra-band non-contiguous EN-DC | Same as clause 6.3.1 in TS 38.521-1 [8] | |
| 6.3B.1.3 Minimum output power for inter-band EN-DC within FR1 | Same as clause 6.3.1 in TS 38.521-1 [8] | |
| 6.3B.1.4 Minimum Output Power for EN-DC Interband including FR2 | Same as clause 6.3.1 in TS 38.521-1 [8] | |
| 6.3B.2.1 Transmit OFF Power for intra-band contiguous EN-DC | Same as clause 6.3.2 in TS 38.521-1 [8] | |
| 6.3B.2.2 Transmit OFF Power for intra-band non-contiguous EN-DC | Same as clause 6.3.2 in TS 38.521-1 [8] | |
| 6.3B.2.3 Transmit OFF Power for inter-band EN-DC within FR1 | Same as clause 6.3.2 in TS 38.521-1 [8] | |
| 6.3B.2.4 Transmit OFF Power for inter-band EN-DC including FR2 | Same as clause 6.3.2 in TS 38.521-2 [9] | |
| 6.3B.3.1 Tx ON/OFF time mask for intra-band contiguous EN-DC | Same as clause 6.3.3.2 in TS 38.521-1 [8] | |
| 6.3B.3.2 Tx ON/OFF time mask for intra-band non-contiguous EN-DC | Same as clause 6.3.3.2 in TS 38.521-1 [8] | |

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| 6.3B.3.3 Tx ON/OFF time mask for inter-band EN-DC within FR1 | Same as clause 6.3.3.2 in TS 38.521-1 [8] | |
| 6.3B.4.3 PRACH Time Mask for inter-band EN-DC within FR1 | Same as clause 6.3.3.4 in TS 38.521-1 [8] | |
| 6.3B.8.1.1 Absolute power tolerance for intra-band contiguous EN-DC | Same as clause 6.3.4.2 in TS 38.521-1 [8] | |
| 6.3B.8.1.2 Absolute power tolerance for intra-band non-contiguous EN-DC | Same as clause 6.3.4.2 in TS 38.521-1 [8] | |
| 6.3B.8.1.3 Absolute power tolerance for inter-band EN-DC within FR1 | Same as clause 6.3.4.2 in TS 38.521-1 [8] | |
| 6.3B.8.1.4 Absolute power tolerance for inter-band EN-DC including FR2 | Same as clause 6.3.4.2 in TS 38.521-2 [9] | |
| 6.3B.8.2.1 Relative power tolerance for intra-band contiguous EN-DC | Same as clause 6.3.4.3 in TS 38.521-1 [8] | |
| 6.3B.8.2.2 Relative power tolerance for intra-band non-contiguous EN-DC | Same as clause 6.3.4.3 in TS 38.521-1 [8] | |
| 6.3B.8.2.3 Relative power tolerance for inter-band EN-DC within FR1 | Same as clause 6.3.4.3 in TS 38.521-1 [8] | |
| 6.3B.8.2.4 Relative power tolerance for inter-band EN-DC including FR2 | Same as clause 6.3.4.3 in TS 38.521-2 [9] | |
| 6.3B.8.3.1 Aggregate power tolerance for intra-band contiguous EN-DC | Same as clause 6.3.4.4 in TS 38.521-1 [8] | |
| 6.3B.8.3.2 Aggregate power tolerance for intra-band non-contiguous EN-DC | Same as clause 6.3.4.4 in TS 38.521-1 [8] | |
| 6.3B.8.3.3 Aggregate power tolerance for inter-band EN-DC within FR1 | Same as clause 6.3.4.4 in TS 38.521-1 [8] | |
| 6.3B.8.3.4 Aggregate power tolerance for inter-band EN-DC including FR2 | Same as clause 6.3.4.4 in TS 38.521-2 [9] | |
| 6.4B.1.1 Frequency Error for intra-band contiguous EN-DC | TBD | |
| 6.4B.1.2 Frequency Error for intra-band non-contiguous EN-DC | TBD | |
| 6.4B.1.3 Frequency Error for inter-band EN-DC within FR1 | Same as clause 6.4.1 in TS 38.521-1 [8] | |
| 6.4B.1.5 Frequency Error for inter-band EN-DC including FR2 | Same as clause 6.4.1 in TS 38.521-2 [9] | |
| 6.4B.2.1.1 Error Vector Magnitude for intra-band contiguous EN-DC | Same as clause 6.4.2.1 in TS 38.521-1 [8] Uplink power measurement same as 6.3B.1.1. | |
| 6.4B.2.1.2 Carrier Leakage for intra-band contiguous EN-DC | Same as clause 6.4.2.2 in TS 38.521-1 [8] | |
| 6.4B.2.1.3 In-band Emissions for intra-band contiguous EN-DC | TBD Uplink power measurement for steps 2 and 8 same as 6.2B.1.1. Uplink power measurement for steps 4, 6, 10, and 12 same as 6.3B.1.1. | |

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| 6.4B.2.1.4 EVM Equalizer Flatness for intra-band contiguous EN-DC | TBD | |
| 6.4B.2.2.1 Error Vector Magnitude for intra-band non-contiguous EN-DC | Same as clause 6.4.2.1 in TS 38.521-1 [8] Uplink power measurement same as 6.3B.1.2. | |
| 6.4B.2.2.2 Carrier Leakage for intra-band non-contiguous EN-DC | Same as clause 6.4.2.2 in TS 38.521-1 [8] Uplink power measurement for step 2 and step 4 same as 6.2B.1.2. Uplink power measurement for step 6 and step 8 same as 6.3B.1.2. | |
| 6.4B.2.2.3 In-band Emissions for intra-band non-contiguous EN-DC | Same as clause 6.4.2.3 in TS 38.521-1 [8] Uplink power measurement for steps 2 and 8 same as 6.2B.1.2. Uplink power measurement for steps 4, 6, 10, and 12 same as 6.3B.1.2. | |
| 6.4B.2.2.4 EVM Equalizer Flatness for intra-band non-contiguous EN-DC | Same as clause 6.4.2.4 in TS 38.521-1 [8] | |
| 6.4B.2.3.1 Error Vector Magnitude for inter-band EN-DC within FR1 | Same as clause 6.4.2.1 in TS 38.521-1 [8] Uplink power measurement same as 6.3B.1.3. | |
| 6.4B.2.3.2 Carrier Leakage for inter-band EN-DC within FR1 | Same as clause 6.4.2.2 in TS 38.521-1 [8] Uplink power measurement for step 2 and step 4 same as 6.2B.1.3. Uplink power measurement for step 6 and step 8 same as 6.3B.1.3. | |
| 6.4B.2.3.3 In-band Emissions for inter-band EN-DC within FR1 | Same as clause 6.4.2.3 in TS 38.521-1 [8] Uplink power measurement for steps 1.2, 1.4, 2.2, and 2.4 same as 6.2B.1.3. Uplink power measurement for steps 1.6, 1.8, 2.6, and 2.8 same as 6.3B.1.3. | |
| 6.4B.2.3.4 EVM Equalizer Flatness for inter-band EN-DC within FR1 | Same as clause 6.4.2.4 in TS 38.521-1 [8] | |
| 6.4B.2.4.1 Error Vector Magnitude for inter-band EN-DC including FR2 | Same as clause 6.4.2.1 in TS 38.521-2 [9] | |
| 6.4B.2.4.2 Carrier Leakage for inter-band EN-DC including FR2 | Same as clause 6.4.2.2 in TS 38.521-2 [9] | |
| 6.4B.2.4.3 In-band Emissions for inter-band EN-DC including FR2 | Same as clause 6.4.2.3 in TS 38.521-2 [9] | |
| 6.4B.2.4.4 EVM Equalizer Flatness for inter-band EN-DC including FR2 | Same as clause 6.4.2.4 in TS 38.521-2 [9] | |
| 6.5B.1.1 Occupied bandwidth for Intra-Band Contiguous EN-DC | 1.5% of aggregated channel bandwidth | |
| 6.5B.1.2 Occupied bandwidth for Intra-Band Non-Contiguous EN-DC | Same as clause 6.5.1 in TS 38.521-1 [8] | |
| 6.5B.1.3 Occupied bandwidth for Inter-Band EN-DC within FR1 | Same as clause 6.5.1 in TS 38.521-1 [8] | |
| 6.5B.1.4 Occupied bandwidth for Inter-Band EN-DC including FR2 | Same as clause 6.5.1 in TS 38.521-2 [9] | |
| 6.5B.2.1.1 Spectrum emissions mask for intra-band contiguous EN-DC | Same as clause 6.5.2.2 in TS 38.521-1 [8] | |
| 6.5B.2.1.2 Additional spectrum emissions mask for intra-band contiguous EN-DC | Same as clause 6.5.2.3 in TS 38.521-1 [8] | |

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| 6.5B.2.1.3 Adjacent channel leakage ratio for intra-band contiguous EN-DC | Same as clause 6.5.2.4.1 in TS 38.521-1 [8] | |
| 6.5B.2.2.1 Spectrum emissions mask for intra-band non-contiguous EN-DC | Same as clause 6.5.2.2 in TS 38.521-1 [8] | |
| 6.5B.2.2.2 Additional Spectrum emissions mask for intra-band non-contiguous EN-DC | Same as clause 6.5.2.3 in TS 38.521-1 [8] | |
| 6.5B.2.2.3 Adjacent channel leakage ratio for intra-band non-contiguous EN-DC | TBD | |
| 6.5B.2.3.1 Spectrum emissions mask for Inter-band EN-DC within FR1 | Same as clause 6.5.2.2 in TS 38.521-1 [8] | |
| 6.5B.2.3.2 Additional Spectrum emissions mask for Inter-band EN-DC within FR1 | Same as clause 6.5.2.3 in TS 38.521-1 [8] | |
| 6.5B.2.3.3 Adjacent channel leakage ratio for inter-band EN-DC within FR1 | Same as clause 6.5.2.4.1 in TS 38.521-1 [8] | |
| 6.5B.2.4.1 Spectrum emissions mask for Inter-band EN-DC including FR2 | Same as clause 6.5.2.1 in TS 38.521-2 [9] | |
| 6.5B.2.4.3 Adjacent channel leakage ratio for Inter-band EN-DC including FR2 | Same as clause 6.5.2.3 in TS 38.521-2 [9] | |
| 6.5B.2.4.3_1.1 Adjacent channel leakage ratio for Inter-band EN-DC including FR2 (3 CCs) | Same as clause 6.5A.2.2.1 in TS 38.521-2 [9] | |
| 6.5B.2.4.3_1.2 Adjacent channel leakage ratio for Inter-band EN-DC including FR2 (4 CCs) | Same as clause 6.5A.2.2.2 in TS 38.521-2 [9] | |
| 6.5B.2.4.3_1.3 Adjacent channel leakage ratio for Inter-band EN-DC including FR2 (5 CCs) | Same as clause 6.5A.2.2.3 in TS 38.521-2 [9] | |
| 6.5B.3.1.1 General spurious emissions for intra-band contiguous EN-DC | Same as clause 6.5.3.1 in TS 38.521-1 [8] | |
| 6.5B.3.1.2 Spurious emission band UE co-existence for intra-band contiguous EN-DC | Same as clause 6.5.3.1 in TS 38.521-1 [8] | |
| 6.5B.3.2.1 General spurious emissions for Intra-band non-contiguous EN-DC | Same as clause 6.5.3.1 in TS 38.521-1 [8] | |
| 6.5B.3.2.2 Spurious Emission band UE co-existence for intra-band non-contiguous EN-DC | Same as clause 6.5.3.1 in TS 38.521-1 [8] | |
| 6.5B.3.3.1 General spurious emissions for Inter-band EN-DC within FR1 | Same as clause 6.5.3.1 in TS 38.521-1 [8] | |
| 6.5B.3.3.2 Spurious emission band UE co-existence for Inter-band within FR1 | Same as clause 6.5.3.1 in TS 38.521-1 [8] | |
| 6.5B.3.4.1 General Spurious Emissions for Inter-band including FR2 (2 CCs) | Same as clause 6.5.3.1 in TS 38.521-2 [9] | |

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| 6.5B.3.4.2 Spurious emission band UE co-existence for Inter-band including FR2 | Same as clause 6.5.3.2 in TS 38.521-2 [9] | |
| 6.5B.4.3 Additional Spurious Emissions for Inter-band EN-DC within FR1 | Same as clause 6.5.3.3 in TS 38.521-1 [8] | |
| 6.5B.5.3 Transmit intermodulation for Inter-band EN-DC within FR1 | Same as clause 6.5.4.3 in TS 38.521-1 [8] | |

F.1.3 Measurement of receiver

Table F.1.3-1: Maximum Test System Uncertainty for receiver tests

| Clause | Maximum Test System Uncertainty | Derivation of Test System Uncertainty |
|--|--|---|
| 7.3B.2.1 Reference sensitivity for Intra-band Contiguous EN-DC (2 CCs) | Same as clause 7.3.2 in TS 38.521-1 [8] | |
| 7.3B.2.2 Reference sensitivity for Intra-band non-contiguous EN-DC (2 CCs) | Same as clause 7.3.2 in TS 38.521-1 [8] | |
| 7.3B.2.3 Reference sensitivity for Inter-band EN-DC within FR1 (2 CCs) | Same as clause 7.3.2 in TS 38.521-1 [8] | |
| 7.3B.2.3_1.1 Reference sensitivity for Inter-band EN-DC within FR1 (3 CCs) | Same as clause 7.3A.1 in TS 38.521-1 [8] | |
| 7.3B.2.4 Reference sensitivity for Inter-band EN-DC including FR2 | Same as clause 7.3.2 in TS 38.521-2 [9] | |
| 7.4B.1 Maximum Input Level for Intra-Band Contiguous EN-DC (2 CCs) | MU for NR CC downlink power same as clause 7.4 in TS 38.521-1 [8]. Uplink power measurement same as 6.2B.1.1. | |
| 7.4B.2 Maximum Input Level for Intra-Band Non-Contiguous EN-DC (2 CCs) | Same as clause 7.4 in TS 38.521-1 [8] Uplink power measurement same as 6.2B.1.2. | |
| 7.4B.3 Maximum Input Level for Inter-band EN-DC within FR1 (2 CCs) | Same as clause 7.4 in TS 38.521-1 [8] Uplink power measurement same as 6.2B.1.3. | |
| 7.4B.3_1.1 Maximum Input Level for Inter-band EN-DC within FR1 (3 CCs) | Same as clause 7.4A.1 in TS 38.521-1 [8] Uplink power measurement same as 6.2B.1.3. | |
| 7.5B.1 Adjacent Channel Selectivity for intra-band contiguous EN-DC (2 CCs) | TBD Uplink power measurement same as 6.2B.1.1. | |
| 7.5B.2 Adjacent Channel Selectivity for intra-band non-contiguous EN-DC (2 CCs) | TBD Uplink power measurement same as 6.2B.1.2. | |
| 7.5B.3 Adjacent Channel Selectivity for inter-band EN-DC within FR1 (2 CCs) | Same as clause 7.5 in TS 38.521-1 [8] Uplink power measurement same as 6.2B.1.3. | |
| 7.5B.3_1.1 Adjacent Channel Selectivity for EN-DC within FR1 (3 CCs) | Same as clause 7.5 in TS 38.521-1 [8] Uplink power measurement same as 6.2B.1.3. | |
| 7.5B.3_1.2 Adjacent Channel Selectivity for EN-DC within FR1 (4 CCs) | Same as clause 7.5 in TS 38.521-1 [8] Uplink power measurement same as 6.2B.1.3. | The wanted signal level uncertainty applies for each CC |
| 7.5B.4 Adjacent Channel Selectivity for inter-band EN-DC including FR2 (2CCs) | Same as clause 7.5 in TS 38.521-2 [9] | |
| 7.5B.4_1.1 Adjacent Channel Selectivity for inter-band EN-DC including FR2 (3 CCs) | Same as clause 7.5A in TS 38.521-2 [9] | |
| 7.5B.4_1.2 Adjacent Channel Selectivity for inter-band EN-DC including FR2 (4 CCs) | Same as clause 7.5A in TS 38.521-2 [9] | |
| 7.5B.4_1.3 Adjacent Channel Selectivity for inter-band EN-DC including FR2 (5 CCs) | Same as clause 7.5A in TS 38.521-2 [9] | |

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| 7.5B.4_1.4 Adjacent Channel Selectivity for inter-band EN-DC including FR2 (6 CCs) | Same as clause 7.5A in TS 38.521-2 [9] | |
| 7.6B.2.1 Inband blocking for intra-band contiguous EN-DC in FR1 (2 CCs) | MU for NR CC downlink power same as clause 7.6.2 in TS 38.521-1 [8]. Uplink power measurement same as 6.2B.1.1. | |
| 7.6B.2.2 Inband blocking for intra-band non-contiguous EN-DC in FR1 (2 CCs) | Same as clause 7.6.2 in TS 38.521-1 [8] Uplink power measurement same as 6.2B.1.2. | |
| 7.6B.2.3 Inband blocking for inter-band EN-DC within FR1 (2 CCs) | Same as clause 7.6.2 in TS 38.521-1 [8] Uplink power measurement same as 6.2B.1.3. | |
| 7.6B.2.3_1.1 Inband blocking for EN-DC within FR1 (3 CCs) | Same as clause 7.6A.2.1 in TS 38.521-1 [8] Uplink power measurement same as 6.2B.1.3. | |
| 7.6B.2.3_1.2 Inband blocking for EN-DC within FR1 (4 CCs) | Same as clause 7.6.2 in TS 38.521-1 [8] for each component carrier. Uplink power measurement same as 6.2B.1.3. | |
| 7.6B.2.3_1.3 Inband blocking for EN-DC within FR1 (5 CCs) | Same as clause 7.6.2 in TS 38.521-1 [8] for each component carrier. Uplink power measurement same as 6.2B.1.3. | |
| 7.6B.2.4 Inband blocking for inter-band EN-DC including FR2 (2 CCs) | Same as 7.6.2 in TS 38.521-2 [9] | |
| 7.6B.2.4_1.1 Inband blocking for inter-band EN-DC including FR2 (3 CCs) | TBD | |
| 7.6B.2.4_1.2 Inband blocking for inter-band EN-DC including FR2 (4 CCs) | TBD | |
| 7.6B.2.4_1.3 Inband blocking for inter-band EN-DC including FR2 (5 CCs) | TBD | |
| 7.6B.2.4_1.4 Inband blocking for inter-band EN-DC including FR2 (6 CCs) | TBD | |
| 7.6B.3.1 Out-of-band blocking for intra-band contiguous EN-DC in FR1 (2 CCs) | MU for NR CC downlink power same as clause 7.6.3 in TS 38.521-1 [8]. Uplink power measurement same as 6.2B.1.1. | |
| 7.6B.3.2 Out-of-band blocking for intra-band non-contiguous EN-DC in FR1 (2 CCs) | Same as clause 7.6.3 in TS 38.521-1 [8] Uplink power measurement same as 6.2B.1.2. | |
| 7.6B.3.3 Out-of-band blocking for inter-band EN-DC within FR1 (2 CCs) | Same as clause 7.6.3 in TS 38.521-1 [8]. Uplink power measurement same as 6.2B.1.3. | |
| 7.6B.4.1 Narrow band blocking for intra-band contiguous EN-DC in FR1 (2 CCs) | MU for NR CC downlink power same as clause 7.6.4 in TS 38.521-1 [8]. Uplink power measurement same as 6.2B.1.1. | |
| 7.6B.4.2 Narrow band blocking for intra-band non-contiguous EN-DC in FR1 (2 CCs) | Same as clause 7.6.4 in TS 38.521-1 [8] Uplink power measurement same as 6.2B.1.2. | |
| 7.6B.4.3 Narrow band blocking for inter-band EN-DC within FR1 (2 CCs) | Same as clause 7.6.4 in TS 38.521-1 [8] Uplink power measurement same as 6.2B.1.3. | |
| 7.6B.4.3_1.1 Narrow band blocking for EN-DC within FR1 (3 CCs) | Same as clause 7.6A.4.1 in TS 38.521-1 [8] Uplink power measurement same as 6.2B.1.3. | |
| 7.6B.4.3_1.2 Narrow band blocking for EN-DC within FR1 (4 CCs) | Same as clause 7.6.4 in TS 38.521-1 [8] for each component carrier. Uplink power measurement same as 6.2B.1.3. | |

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| 7.6B.4.3_1.3 Narrow band blocking for EN-DC within FR1 (5 CCs) | Same as clause 7.6.4 in TS 38.521-1 [8] for each component carrier. Uplink power measurement same as 6.2B.1.3. | |
| 7.7B.1 Spurious Response for intra-band contiguous EN-DC in FR1 (2 CCs) | MU for NR CC downlink power same as clause 7.7 in TS 38.521-1 [8]. Uplink power measurement same as 6.2B.1.1. | |
| 7.7B.2 Spurious Response for intra-band non-contiguous EN-DC in FR1 (2 CCs) | Same as clause 7.7 in TS 38.521-1 [8] Uplink power measurement same as 6.2B.1.2. | |
| 7.7B.3 Spurious Response for inter-band EN-DC within FR1 (2 CCs) | Same as clause 7.7 in TS 38.521-1 [8]. Uplink power measurement same as 6.2B.1.3. | |
| 7.7B.3_1.1 Spurious Response for EN-DC within FR1 (3 CCs) | Same as clause 7.7 in TS 38.521-1 [8] for each component carrier. Uplink power measurement same as 6.2B.1.2. | |
| 7.7B.3_1.2 Spurious Response for EN-DC within FR1 (4 CCs) | Same as clause 7.7 in TS 38.521-1 [8] for each component carrier. Uplink power measurement same as 6.2B.1.2. | |
| 7.8B.2.1 Wideband Intermodulation for intra-band contiguous EN-DC in FR1 (2 CCs) | MU for NR CC downlink power same as clause 7.8.2 in TS 38.521-1 [8]. Uplink power measurement same as 6.2B.1.1. | |
| 7.8B.2.2 Wideband Intermodulation for intra-band non-contiguous EN-DC in FR1 (2 CCs) | Same as clause 7.8.2 in TS 38.521-1 [8] Uplink power measurement for same as 6.2B.1.2. | |
| 7.8B.2.3 Wideband Intermodulation for inter-band EN-DC within FR1 (2 CCs) | Same as clause 7.8.2 in TS 38.521-1 [8] Uplink power measurement for same as 6.2B.1.3. | |
| 7.8B.2.6 Wideband Intermodulation for EN-DC within FR1 (3 CCs) (2 CCs) | Same as clause 7.8A.2.1 in TS 38.521-1 [8] Uplink power measurement for same as 6.2B.1.3. | |
| 7.9B.1 Spurious Emissions for intra-band contiguous EN-DC within FR1 (2 CCs) | Same as clause 7.9 in TS 38.521-1 [8] | |
| 7.9B.2 Spurious Emissions for intra-band non-contiguous EN-DC within FR1 (2 CCs) | Same as clause 7.9 in TS 38.521-1 [8] | |
| 7.9B.3 Spurious Emissions for inter-band EN-DC within FR1 (2 CCs) | Same as clause 7.9 in TS 38.521-1 [8] | |
| 7.9B.4 Spurious Emissions for inter-band EN-DC including FR2 (2 CCs) | Same as clause 7.9 in TS 38.521-2 [9] | |

F.2 Interpretation of measurement results (normative)

TBD

F.3 Test Tolerance and Derivation of Test Requirements (informative)

TBD

F.3.1 Measurement of test environments

TBD

F.3.2 Measurement of transmitter

Table F.3.2-1: Derivation of Test Requirements (Transmitter tests)

| Sub clause | Test Tolerance (TT) | Formula for test requirement |
|--|--|---|
| 6.2B.1.1 UE Maximum Output Power for Intra-Band Contiguous EN-DC | Same as 6.2.1 in TS 38.521-1 [8] | |
| 6.2B.1.2 UE Maximum Output Power for Intra-Band Non-Contiguous EN-DC | $\text{MAX}(\text{TT}_{\text{LTE}}, \text{TT}_{\text{SA}})$ TT_{LTE} 0.7 dB, $f \leq 3.0\text{GHz}$ 1.0 dB, $3.0\text{GHz} < f \leq 4.2\text{GHz}$ TT_{SA} $f \leq 3.0\text{GHz}$ 0.7 dB, $\text{BW} \leq 40\text{MHz}$ 1.0 dB, $40\text{MHz} < \text{BW} \leq 100\text{MHz}$ $3.0\text{GHz} < f \leq 6.0\text{GHz}$ 1.0 dB, $\text{BW} \leq 100\text{MHz}$ | TT_{LTE} is TT of LTE specified in 6.2.2 in TS 36.521-1 [10]. TT_{SA} is TT of FR1 SA specified in 6.2.1 in TS 38.521-1 [8]. |
| 6.2B.1.3 UE Maximum Output Power for Inter-Band EN-DC within FR1 | $\text{MAX}(\text{TT}_{\text{LTE}}, \text{TT}_{\text{SA}})$ TT_{LTE} 0.7 dB, $f \leq 3.0\text{GHz}$ 1.0 dB, $3.0\text{GHz} < f \leq 4.2\text{GHz}$ TT_{SA} $f \leq 3.0\text{GHz}$ 0.7 dB, $\text{BW} \leq 40\text{MHz}$ 1.0 dB, $40\text{MHz} < \text{BW} \leq 100\text{MHz}$ $3.0\text{GHz} < f \leq 6.0\text{GHz}$ 1.0 dB, $\text{BW} \leq 100\text{MHz}$ | TT_{LTE} is TT of LTE specified in 6.2.3 in TS 36.521-1 [10]. TT_{SA} is TT of FR1 SA specified in 6.2.2 in TS 38.521-1 [8]. |
| 6.2B.1.4 UE Maximum Output Power for Inter-Band EN-DC including FR2 | Same as 6.2.1 in TS 38.521-2 [9] | |
| 6.2B.1.4.1 UE Maximum Output Power for Inter-Band EN-DC including FR2 (2 CCs) - EIRP and TR | Same as 6.2.1.1 in TS 38.521-2 | |
| 6.2B.1.4.2 UE Maximum Output Power for Inter-Band EN-DC including FR2 (2 CCs) - Spherical Coverage | Same as 6.2.1.2 in TS 38.521-2 | |
| 6.2B.2.2 UE Maximum Output Power reduction for Intra-Band Non-Contiguous EN-DC | Same as 6.2B.1.2 | |
| 6.2B.2.3 UE Maximum Output Power reduction for Inter-Band EN-DC within FR1 | Same as 6.2B.1.3 | |
| 6.2B.2.4 UE Maximum Output Power reduction for Inter-Band EN-DC including FR2 | Same as clause 6.2.2 and 6.2A.2.1 in TS 38.521-2 [9] | |
| 6.2B.3.1 UE Additional Maximum Output Power reduction for Intra-band contiguous EN-DC | Same as 6.2.3 in TS 38.521-1 [8] | |
| 6.2B.3.2 UE Additional Maximum Output Power reduction for Intra-Band Non-Contiguous EN-DC | Same as 6.2B.1.2 | |
| 6.2B.3.3 UE Additional Maximum Output Power reduction for Inter-Band EN-DC within FR1 | Same as 6.2B.1.3 | |
| 6.2B.4.1.1 Configured Output | Same as 6.2.4 in TS 38.521-1 [8] | |

| | | |
|---|------------------------------------|--|
| Power Level for Intra-Band Contiguous EN-DC | | |
| 6.2B.4.1.2 Configured Output Power for Intra-Band Non-Contiguous EN-DC | Same as 6.2B.1.2 | |
| 6.2B.4.1.3 Configured Output Power for Inter-Band EN-DC within FR1 | Same as 6.2B.1.3 | |
| 6.3B.1.1 Minimum Output Power for intra-band contiguous EN-DC | Same as 6.3.1 in TS 38.521-1 [8] | |
| 6.3B.1.2 Minimum output power for intra-band non-contiguous EN-DC | Same as 6.3.1 in TS 38.521-1 [8] | |
| 6.3B.1.3 Minimum output power for inter-band EN-DC within FR1 | Same as 6.3.1 in TS 38.521-1 [8] | |
| 6.3B.1.4 Minimum Output Power for EN-DC Interband including FR2 | Same as 6.3.1 in TS 38.521-2 [9] | |
| 6.3B.2.1 Transmit OFF Power for intra-band contiguous EN-DC | Same as 6.3.2 in TS 38.521-1 [8] | |
| 6.3B.2.2 Transmit OFF Power for intra-band non-contiguous EN-DC | Same as 6.3.2 in TS 38.521-1 [8] | |
| 6.3B.2.3 Transmit OFF Power for inter-band EN-DC within FR1 | Same as 6.3.2 in TS 38.521-1 [8] | |
| 6.3B.2.4 Transmit OFF Power for inter-band EN-DC including FR2 | Same as 6.3.2 in TS 38.521-2 [9] | |
| 6.3B.3.1 Tx ON/OFF time mask for intra-band contiguous EN-DC | Same as 6.3.3.2 in TS 38.521-1 [8] | |
| 6.3B.3.2 Tx ON/OFF time mask for intra-band non-contiguous EN-DC | Same as 6.3.3.2 in TS 38.521-1 [8] | |
| 6.3B.3.3 Tx ON/OFF time mask for inter-band EN-DC within FR1 | Same as 6.3.3.2 in TS 38.521-1 [8] | |
| 6.3B.4.3 PRACH Time Mask for inter-band EN-DC within FR1 | Same as 6.3.3.4 in TS 38.521-1 [8] | |
| 6.3B.8.1.1 Absolute power tolerance for intra-band contiguous EN-DC | Same as 6.3.4.2 in TS 38.521-1 [8] | |
| 6.3B.8.1.2 Absolute power tolerance for intra-band non-contiguous EN-DC | Same as 6.3.4.2 in TS 38.521-1 [8] | |
| 6.3B.8.1.3 Absolute power tolerance for inter-band EN-DC within FR1 | Same as 6.3.4.2 in TS 38.521-1 [8] | |
| 6.3B.8.1.4 Absolute power tolerance for inter-band EN-DC including FR2 | Same as 6.3.4.2 in TS 38.521-2 [9] | |
| 6.3B.8.2.1 Relative power tolerance for intra-band contiguous EN-DC | Same as 6.3.4.3 in TS 38.521-1 [8] | |
| 6.3B.8.2.2 Relative power tolerance for intra-band non-contiguous EN-DC | Same as 6.3.4.3 in TS 38.521-1 [8] | |
| 6.3B.8.2.3 Relative power tolerance for inter-band EN-DC within FR1 | Same as 6.3.4.3 in TS 38.521-1 [8] | |
| 6.3B.8.2.4 Relative power tolerance for inter-band EN- | Same as 6.3.4.3 in TS 38.521-2 [9] | |

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| DC including FR2 | | |
| 6.3B.8.3.1 Aggregate power tolerance for intra-band contiguous EN-DC | Same as 6.3.4.4 in TS 38.521-1 [8] | |
| 6.3B.8.3.2 Aggregate power tolerance for intra-band non-contiguous EN-DC | Same as 6.3.4.4 in TS 38.521-1 [8] | |
| 6.3B.8.3.3 Aggregate power tolerance for inter-band EN-DC within FR1 | Same as 6.3.4.4 in TS 38.521-1 [8] | |
| 6.3B.8.3.4 Aggregate power tolerance for inter-band EN-DC including FR2 | Same as 6.3.4.4 in TS 38.521-2 [9] | |
| 6.4B.1.1 Frequency Error for intra-band contiguous EN-DC | Same as 6.4.1 in TS 38.521-1 [8] | |
| 6.4B.1.2 Frequency Error for intra-band non-contiguous EN-DC | Same as 6.4.1 in TS 38.521-1 [8] | |
| 6.4B.1.3 Frequency Error for inter-band EN-DC within FR1 | Same as 6.4.1 in TS 38.521-1 [8] | |
| 6.4B.1.5 Frequency Error for inter-band EN-DC including FR2 | Same as 6.4.1 in TS 38.521-2 [9] | |
| 6.4B.2.1.1 Error Vector Magnitude for intra-band contiguous EN-DC | Same as 6.4.2.1 in TS 38.521-1 [8] | |
| 6.4B.2.1.2 Carrier Leakage for intra-band contiguous EN-DC | Same as 6.4.2.2 in TS 38.521-1 [8] | |
| 6.4B.2.1.3 In-band Emissions for intra-band contiguous EN-DC | Same as 6.4.2.3 in TS 38.521-1 [8] | |
| 6.4B.2.1.4 EVM Equalizer Flatness for intra-band contiguous EN-DC | Same as 6.4.2.4 in TS 38.521-1 [8] | |
| 6.4B.2.2.1 Error Vector Magnitude for intra-band non-contiguous EN-DC | Same as 6.4.2.1 in TS 38.521-1 [8] | |
| 6.4B.2.2.2 Carrier Leakage for intra-band non-contiguous EN-DC | Same as 6.4.2.2 in TS 38.521-1 [8] | |
| 6.4B.2.2.3 In-band Emissions for intra-band non-contiguous EN-DC | Same as 6.4.2.3 in TS 38.521-1 [8] | |
| 6.4B.2.2.4 EVM Equalizer Flatness for intra-band non-contiguous EN-DC | Same as 6.4.2.4 in TS 38.521-1 [8] | |
| 6.4B.2.3.1 Error Vector Magnitude for inter-band EN-DC within FR1 | Same as 6.4.2.1 in TS 38.521-1 [8] | |
| 6.4B.2.3.2 Carrier Leakage for inter-band EN-DC within FR1 | Same as 6.4.2.2 in TS 38.521-1 [8] | |
| 6.4B.2.3.3 In-band Emissions for inter-band EN-DC within FR1 | Same as 6.4.2.3 in TS 38.521-1 [8] | |
| 6.4B.2.3.4 EVM Equalizer Flatness for inter-band EN-DC within FR1 | Same as 6.4.2.4 in TS 38.521-1 [8] | |
| 6.4B.2.4.1 Error Vector Magnitude for inter-band EN-DC including FR2 | Same as 6.4.2.1 in TS 38.521-2 [9] | |
| 6.4B.2.4.2 Carrier Leakage for inter-band EN-DC including FR2 | Same as 6.4.2.2 in TS 38.521-2 [9] | |
| 6.4B.2.4.3 In-band Emissions for inter-band EN-DC | Same as 6.4.2.3 in TS 38.521-2 [9] | |

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| including FR2 | | |
| 6.4B.2.4.4 EVM Equalizer Flatness for inter-band EN-DC including FR2 | Same as 6.4.2.4 in TS 38.521-2 [9] | |
| 6.5B.1.1 Occupied bandwidth for Intra-Band Contiguous EN-DC | Same as 6.5.1 in TS 38.521-1 [8] | |
| 6.5B.1.2 Occupied bandwidth for Intra-Band Non-Contiguous EN-DC | Same as 6.5.1 in TS 38.521-1 [8] | |
| 6.5B.1.3 Occupied bandwidth for Inter-Band EN-DC within FR1 | Same as 6.5.1 in TS 38.521-1 [8] | |
| 6.5B.1.4 Occupied bandwidth for Inter-Band EN-DC including FR2 | Same as 6.5.1 in TS 38.521-2 [9] | |
| 6.5B.2.1.1 Spectrum emissions mask for intra-band contiguous EN-DC | Same as 6.5.2.2 in TS 38.521-1 [8] | |
| 6.5B.2.1.2 Additional spectrum emissions mask for intra-band contiguous EN-DC | Same as 6.5.2.3 in TS 38.521-1 [8] | |
| 6.5B.2.1.3 Adjacent channel leakage ratio for intra-band contiguous EN-DC | Same as 6.5.2.4.1 in TS 38.521-1 [8] | |
| 6.5B.2.2.1 Spectrum emissions mask for intra-band non-contiguous EN-DC | Same as 6.5.2.2 in TS 38.521-1 [8] | |
| 6.5B.2.2.2 Additional Spectrum emissions mask for intra-band non-contiguous EN-DC | Same as 6.5.2.3 in TS 38.521-1 [8] | |
| 6.5B.2.2.3 Adjacent channel leakage ratio for intra-band non-contiguous EN-DC | Same as 6.5.2.4.1 in TS 38.521-1 [8] | |
| 6.5B.2.3.1 Spectrum emissions mask for Inter-band EN-DC within FR1 | Same as 6.5.2.2 in TS 38.521-1 [8] | |
| 6.5B.2.3.2 Additional Spectrum emissions mask for Inter-band EN-DC within FR1 | Same as 6.5.2.3 in TS 38.521-1 [8] | |
| 6.5B.2.3.3 Adjacent channel leakage ratio for inter-band EN-DC within FR1 | Same as 6.5.2.4.1 in TS 38.521-1 [8] | |
| 6.5B.2.4.1 Spectrum emissions mask for Inter-band EN-DC including FR2 | Same as 6.5.2.1 in TS 38.521-2 [9] | |
| 6.5B.2.4.3 Adjacent channel leakage ratio for Inter-band EN-DC including FR2 | Same as 6.5.2.3 in TS 38.521-2 [9] | |
| 6.5B.2.4.3_1.1 Adjacent channel leakage ratio for Inter-band EN-DC including FR2 (3 CCs) | Same as clause 6.5A.2.2.1 in TS 38.521-2 [9] | |
| 6.5B.2.4.3_1.2 Adjacent channel leakage ratio for Inter-band EN-DC including FR2 (4 CCs) | Same as clause 6.5A.2.2.2 in TS 38.521-2 [9] | |
| 6.5B.2.4.3_1.3 Adjacent channel leakage ratio for Inter-band EN-DC including FR2 (5 CCs) | Same as clause 6.5A.2.2.3 in TS 38.521-2 [9] | |
| 6.5B.3.1.1 General spurious emissions for intra-band contiguous EN-DC | Same as 6.5.3.1 in TS 38.521-1 [8] | |
| 6.5B.3.1.2 Spurious emission band UE co-existence for | Same as 6.5.3.2 in TS 38.521-1 [8] | |

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| intra-band contiguous EN-DC | | |
| 6.5B.3.2.1 General spurious emissions for Intra-band non-contiguous EN-DC | Same as 6.5.3.1 in TS 38.521-1 [8] | |
| 6.5B.3.2.2 Spurious Emission band UE co-existence for intra-band non-contiguous EN-DC | Same as 6.5.3.2 in TS 38.521-1 [8] | |
| 6.5B.3.3.1 General spurious emissions for Inter-band EN-DC within FR1 | Same as 6.5.3.1 in TS 38.521-1 [8] | |
| 6.5B.3.3.2 Spurious emission band UE co-existence for Inter-band within FR1 | Same as 6.5.3.2 in TS 38.521-1 [8] | |
| 6.5B.3.4.1 General Spurious Emissions for Inter-band including FR2 (2 CCs) | Same as 6.5.3.1 in TS 38.521-2 [9] | |
| 6.5B.3.4.2 Spurious emission band UE co-existence for Inter-band including FR2 | Same as 6.5.3.2 in TS 38.521-2 [9] | |
| 6.5B.4.3 Additional Spurious Emissions for Inter-band EN-DC within FR1 | Same as clause 6.5.3.3 in TS 38.521-1 [8] | |
| 6.5B.5.3 Transmit intermodulation for Inter-band EN-DC within FR1 | Same as 6.5.4 in TS 38.521-1 [8] | |

F.3.3 Measurement of receiver

Table F.3.3-1: Derivation of Test Requirements (Receiver tests)

| Sub clause | Test Tolerance (TT) | Formula for test requirement |
|---|---------------------------------------|--|
| 7.3B.2.1 Reference sensitivity for Intra-band Contiguous EN-DC (2 CCs) | Same as 7.3.2 in TS 38.521-1 [8] | |
| 7.3B.2.2 Reference sensitivity for Intra-band non-contiguous EN-DC (2 CCs) | Same as 7.3.2 in TS 38.521-1 [8] | |
| 7.3B.2.3 Reference sensitivity for Inter-band EN-DC within FR1 (2 CCs) | Same as 7.3.2 in TS 38.521-1 [8] | |
| 7.3B.2.3_1.1 Reference sensitivity for Inter-band EN-DC within FR1 (3 CCs) | Same as 7.3A.1 in TS 38.521-1 [8] | |
| 7.3B.2.4 Reference sensitivity for Inter-band EN-DC including FR2 | Same as 7.3.2 in TS 38.521-2 [9] | |
| 7.4B.1 Maximum Input Level for Intra-Band Contiguous EN-DC (2 CCs) | Same as 7.4 in TS 38.521-1 [8] | |
| 7.4B.2 Maximum Input Level for Intra-Band Non-Contiguous EN-DC (2 CCs) | Same as 7.4 in TS 38.521-1 [8] | |
| 7.4B.3 Maximum Input Level for Inter-band EN-DC within FR1 (2 CCs) | Same as 7.4 in TS 38.521-1 [8] | |
| 7.4B.3_1.1 Maximum Input Level for Inter-band EN-DC within FR1 (3 CCs) | Same as 7.4A.1 in TS 38.521-1 [8] | |
| 7.5B.1 Adjacent Channel Selectivity for intra-band contiguous EN-DC (2 CCs) | Same as 7.5 in TS 38.521-1 [8] | |
| 7.5B.2 Adjacent Channel Selectivity for intra-band non-contiguous EN-DC (2 CCs) | Same as 7.5 in TS 38.521-1 [8] | |
| 7.5B.3 Adjacent Channel Selectivity for inter-band EN-DC within FR1 (2 CCs) | Same as 7.5 in TS 38.521-1 [8] | |
| 7.5B.3_1.1 Adjacent Channel Selectivity for EN-DC within FR1 (3 CCs) | Same as 7.5A.1 in TS 38.521-1 [8] | |
| 7.5B.3_1.2 Adjacent Channel Selectivity for EN-DC within FR1 (4 CCs) | Same as 7.5 in TS 38.521-1 [8] | |
| 7.5B.4 Adjacent Channel Selectivity for inter-band EN-DC including FR2 (2CCs) | Same as clause 7.5 in TS 38.521-2 [9] | |
| 7.6B.2.1 Inband blocking for intra-band contiguous EN-DC in FR1 (2 CCs) | Same as 7.6.2 in TS 38.521-1 [8] | |
| 7.6B.2.2 Inband blocking for intra-band non-contiguous EN-DC in FR1 (2 CCs) | Same as 7.6.2 in TS 38.521-1 [8] | |
| 7.6B.2.3 Inband blocking for inter-band EN-DC within FR1 (2 CCs) | Same as 7.6.2 in TS 38.521-1 [8] | |
| 7.6B.2.3_1.1 Inband blocking for EN-DC within FR1 (3 CCs) | 0 dB | Wanted signal power + TT Interferer signal power unchanged T-put limit unchanged |
| 7.6B.2.3_1.2 Inband blocking for EN-DC within FR1 (4 CCs) | 0 dB | Wanted signal power + TT Interferer signal power unchanged T-put limit unchanged |
| 7.6B.2.3_1.3 Inband blocking for EN-DC within FR1 (5 | 0 dB | Wanted signal power + TT Interferer signal power unchanged |

| | | |
|--|----------------------------------|--|
| CCs) | | T-put limit unchanged |
| 7.6B.2.4 Inband blocking for inter-band EN-DC including FR2 (2 CCs) | Same as 7.6.2 in TS 38.521-2 [9] | |
| 7.6B.2.4_1.1 Inband blocking for inter-band EN-DC including FR2 (3 CCs) | <u>0 dB</u> | Wanted signal power + TT T-put limit unchanged |
| 7.6B.2.4_1.2 Inband blocking for inter-band EN-DC including FR2 (4 CCs) | <u>0 dB</u> | Wanted signal power + TT T-put limit unchanged |
| 7.6B.2.4_1.3 Inband blocking for inter-band EN-DC including FR2 (5 CCs) | <u>0 dB</u> | Wanted signal power + TT T-put limit unchanged |
| 7.6B.2.4_1.4 Inband blocking for inter-band EN-DC including FR2 (6 CCs) | <u>0 dB</u> | Wanted signal power + TT T-put limit unchanged |
| 7.6B.3.1 Out-of-band blocking for intra-band contiguous EN-DC in FR1 (2 CCs) | Same as 7.6.3 in TS 38.521-1 [8] | |
| 7.6B.3.2 Out-of-band blocking for intra-band non-contiguous EN-DC in FR1 (2 CCs) | Same as 7.6.3 in TS 38.521-1 [8] | |
| 7.6B.3.3 Out-of-band blocking for inter-band EN-DC within FR1 (2 CCs) | Same as 7.6.3 in TS 38.521-1 [8] | |
| 7.6B.3.3_1.1 Out-of-band blocking for EN-DC within FR1 (3 CCs) | 0 dB | Wanted signal power + TT Interferer signal power unchanged T-put limit unchanged |
| 7.6B.3.3_1.2 Out-of-band blocking for EN-DC within FR1 (4 CCs) | 0 dB | Wanted signal power + TT Interferer signal power unchanged T-put limit unchanged |
| 7.6B.4.1 Narrow band blocking for intra-band contiguous EN-DC in FR1 (2 CCs) | Same as 7.6.4 in TS 38.521-1 [8] | |
| 7.6B.4.2 Narrow band blocking for intra-band non-contiguous EN-DC in FR1 (2 CCs) | Same as 7.6.4 in TS 38.521-1 [8] | |
| 7.6B.4.3 Narrow band blocking for inter-band EN-DC within FR1 (2 CCs) | Same as 7.6.4 in TS 38.521-1 [8] | |
| 7.6B.4.3_1.1 Narrow band blocking for EN-DC within FR1 (3 CCs) | <u>0 dB</u> | Wanted signal power + TT Interferer signal power unchanged T-put limit unchanged |
| 7.6B.4.3_1.2 Narrow band blocking for EN-DC within FR1 (4 CCs) | <u>0 dB</u> | Wanted signal power + TT Interferer signal power unchanged T-put limit unchanged |
| 7.6B.4.3_1.3 Narrow band blocking for EN-DC within FR1 (5 CCs) | <u>0 dB</u> | Wanted signal power + TT Interferer signal power unchanged T-put limit unchanged |
| 7.7B.1 Spurious Response for intra-band contiguous EN-DC in FR1 (2 CCs) | Same as 7.7 in TS 38.521-1 [8] | |
| 7.7B.2 Spurious Response for intra-band non-contiguous EN-DC in FR1 (2 CCs) | Same as 7.7 in TS 38.521-1 [8] | |
| 7.7B.3 Spurious Response for inter-band EN-DC within FR1 (2 CCs) | Same as 7.7 in TS 38.521-1 [8] | |
| 7.6B.3.3_1.1 Out-of-band blocking for EN-DC within FR1 (3 CCs) | 0 dB | Wanted signal power + TT Interferer signal power unchanged T-put limit unchanged |
| 7.6B.3.3_1.2 Out-of-band blocking for EN-DC within | 0 dB | Wanted signal power + TT Interferer signal power unchanged |

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| FR1 (4 CCs) | | T-put limit unchanged |
| 7.8B.2.1 Wideband Intermodulation for intra-band contiguous EN-DC in FR1 (2 CCs) | Same as 7.8.2 in TS 38.521-1 [8] | |
| 7.8B.2.2 Wideband Intermodulation for intra-band non-contiguous EN-DC in FR1 (2 CCs) | Same as 7.8.2 in TS 38.521-1 [8] | |
| 7.8B.2.3 Wideband Intermodulation for inter-band EN-DC within FR1 (2 CCs) | Same as 7.8.2 in TS 38.521-1 [8] | |
| 7.8B.2.6 Wideband Intermodulation for EN-DC within FR1 (3 CCs) (2 CCs) | Same as 7.8A.2.1 in TS 38.521-1 [8] | |
| 7.9B.1 Spurious Emissions for intra-band contiguous EN-DC within FR1 (2 CCs) | Same as 7.9 in TS 38.521-1 [8] | |
| 7.9B.2 Spurious Emissions for intra-band non-contiguous EN-DC within FR1 (2 CCs) | Same as 7.9 in TS 38.521-1 [8] | |
| 7.9B.3 Spurious Emissions for inter-band EN-DC within FR1 (2 CCs) | Same as 7.9 in TS 38.521-1 [8] | |
| 7.9B.4 Spurious Emissions for inter-band EN-DC including FR2 (2 CCs) | Same as 7.9 in TS 38.521-2 [9] | |

F.4 Uplink power window

F.4.1 Introduction

A number of Tx and Rx Test cases set the UE uplink power to be within a defined window to ensure the test is carried out in the intended conditions. This clause gives the method for calculating the uplink power window used in Tx test cases and Rx Test cases.

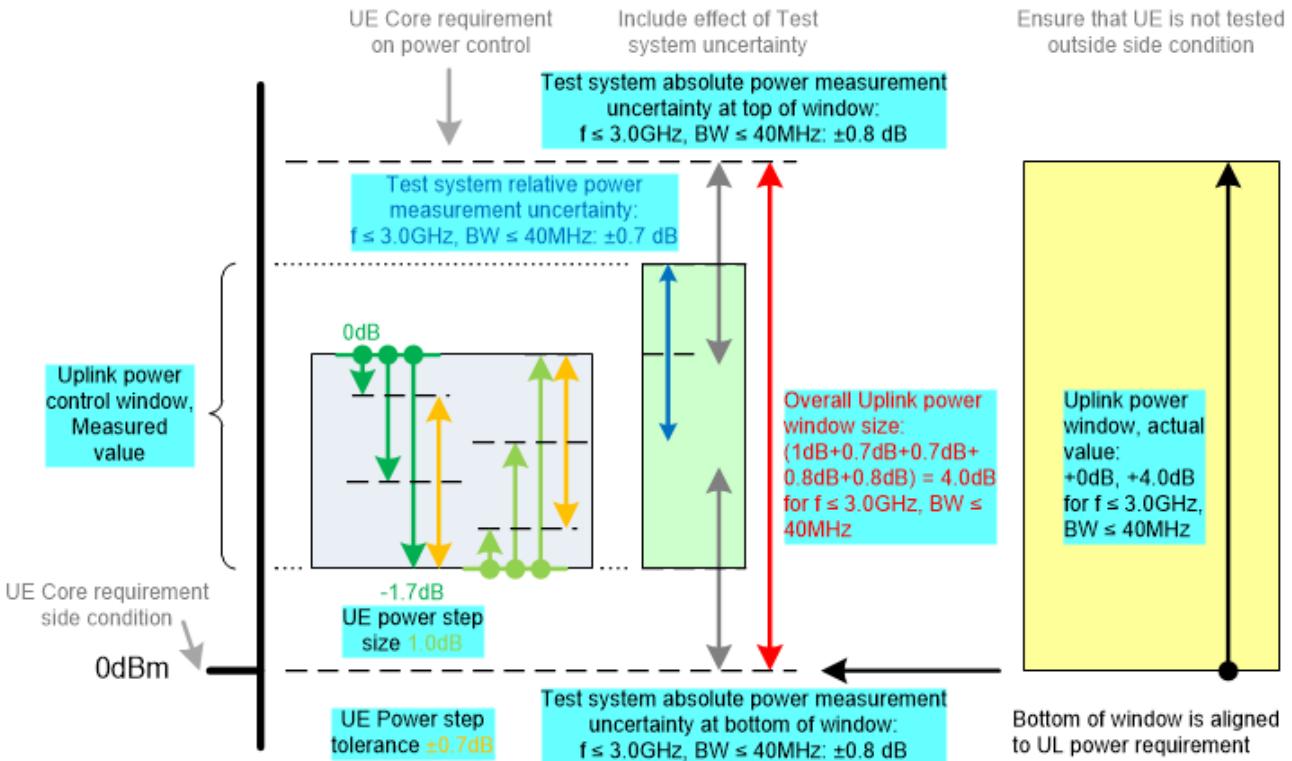
F.4.2 Setting the power window above a requirement

F.4.2.1 NR FR1

Information from the core requirements in TS 38.101-1 [2], TS 38.213 [19] and the uncertainties in Annex F applicable to the Test case are used to derive the uplink power window. There are 4 stages:

- Find the uplink power target value.
- Determine how closely the uplink power can be set to the target value.
- Include the effect of test system uncertainty.
- Position the Uplink power window to ensure UE is not tested outside Core requirements.

This process is shown in the diagram below, using values for $f \leq 3\text{GHz}$ and $\text{BW} \leq 40\text{MHz}$ and taking an example where the target value is 0dBm (lower end of a UE Core requirement side condition range of $0 \text{ dBm} \leq \text{Output power} \leq 10 \text{ dBm}$):



UE Uplink power

Figure F.4.2.1-1: Example NR FR1 uplink power setting to be above a requirement

The smallest UE Power step size is defined in TS 38.213 [9] Table 7.1.1-1, for absolute $\delta_{\text{PUSCH},b,f,c}$.

The UE Power step size tolerance is defined in TS 38.101-1 [2] Table 6.3.4.3-1, for PUSCH to PUSCH transitions with the allocated resource blocks fixed in frequency and no transmission gaps other than those generated by downlink subframes, DwPTS fields or Guard Periods, and for a power step $\Delta P \leq 1 \text{ dB}$.

The Test system uncertainties are defined in Annex F of the present document.

To ensure that the actual UE uplink power is within the Uplink power window, UE uplink power measured by the test system should remain within the smaller Uplink power control window shown in Figure F.4.2.1-1.

F.4.2.2 NR FR2

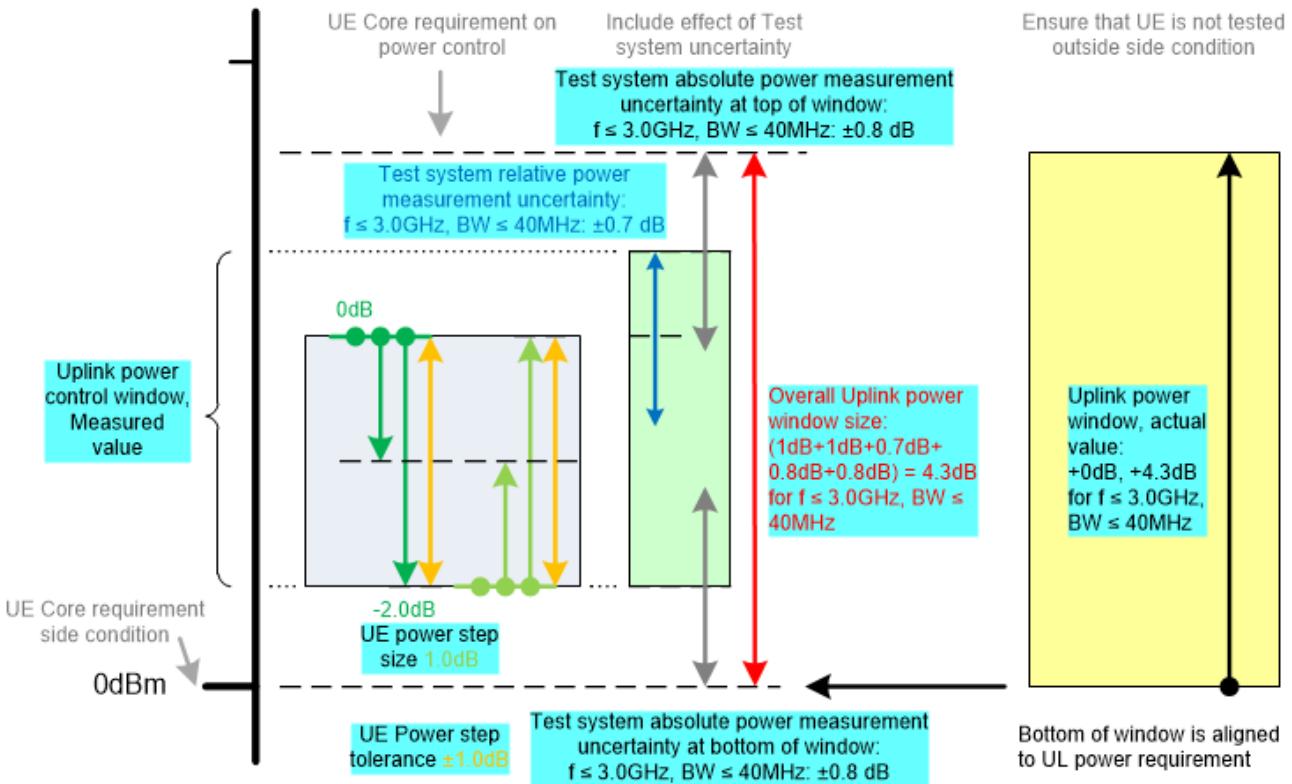
[FFS]

F.4.2.3 E-UTRA

Information from the core requirements in TS 36.101 [5], TS 36.213 [20] and the uncertainties in Annex F applicable to the Test case are used to derive the uplink power window. There are 4 stages:

- Find the uplink power target value.
- Determine how closely the uplink power can be set to the target value.
- Include the effect of test system uncertainty.
- Position the Uplink power window to ensure UE is not tested outside Core requirements.

This process is shown in the diagram below, using values for $f \leq 3\text{GHz}$ and $\text{BW} \leq 40\text{MHz}$ and taking an example where the target value is 0dBm (lower end of a UE Core requirement side condition range of $0\text{ dBm} \leq \text{Output power} \leq 10\text{ dBm}$):



UE Uplink power

Figure F.4.2.3-1: Example E-UTRA uplink power setting to be above a requirement

The smallest UE Power step size is defined in TS 36.213 [20] Table 5.1.1.1-2, for absolute δ_{PUSCH} .

The UE Power step size tolerance is defined in TS 36.101 [5] Table 6.3.5.2.1-1, for PUSCH to PUSCH transitions with the allocated resource blocks fixed in frequency and no transmission gaps other than those generated by downlink subframes, DwPTS fields or Guard Periods, and for a power step $\Delta P \leq 1\text{ dB}$.

The Test system uncertainties are defined in Annex F of the present document.

To ensure that the actual UE uplink power is within the Uplink power window, UE uplink power measured by the test system should remain within the smaller Uplink power control window shown in Figure F.4.2.3-1.

F.4.3 Setting the power window below a requirement

F.4.3.1 NR FR1

Information from the core requirements in TS 38.101-1 [2], TS 38.213 [19] and the uncertainties in Annex F applicable to the Test case are used to derive the uplink power window. There are 4 stages:

- Find the uplink power target value.
- Determine how closely the uplink power can be set to the target value.

- Include the effect of test system uncertainty.
- Position the Uplink power window to ensure UE is not tested outside Core requirements.

This process is shown in the diagram below, using values for $f \leq 3\text{GHz}$ and $\text{BW} \leq 40\text{MHz}$ and taking an example where the target value is 4dB below $P_{\text{CMAX_L}}$ (UE Core requirement side condition):

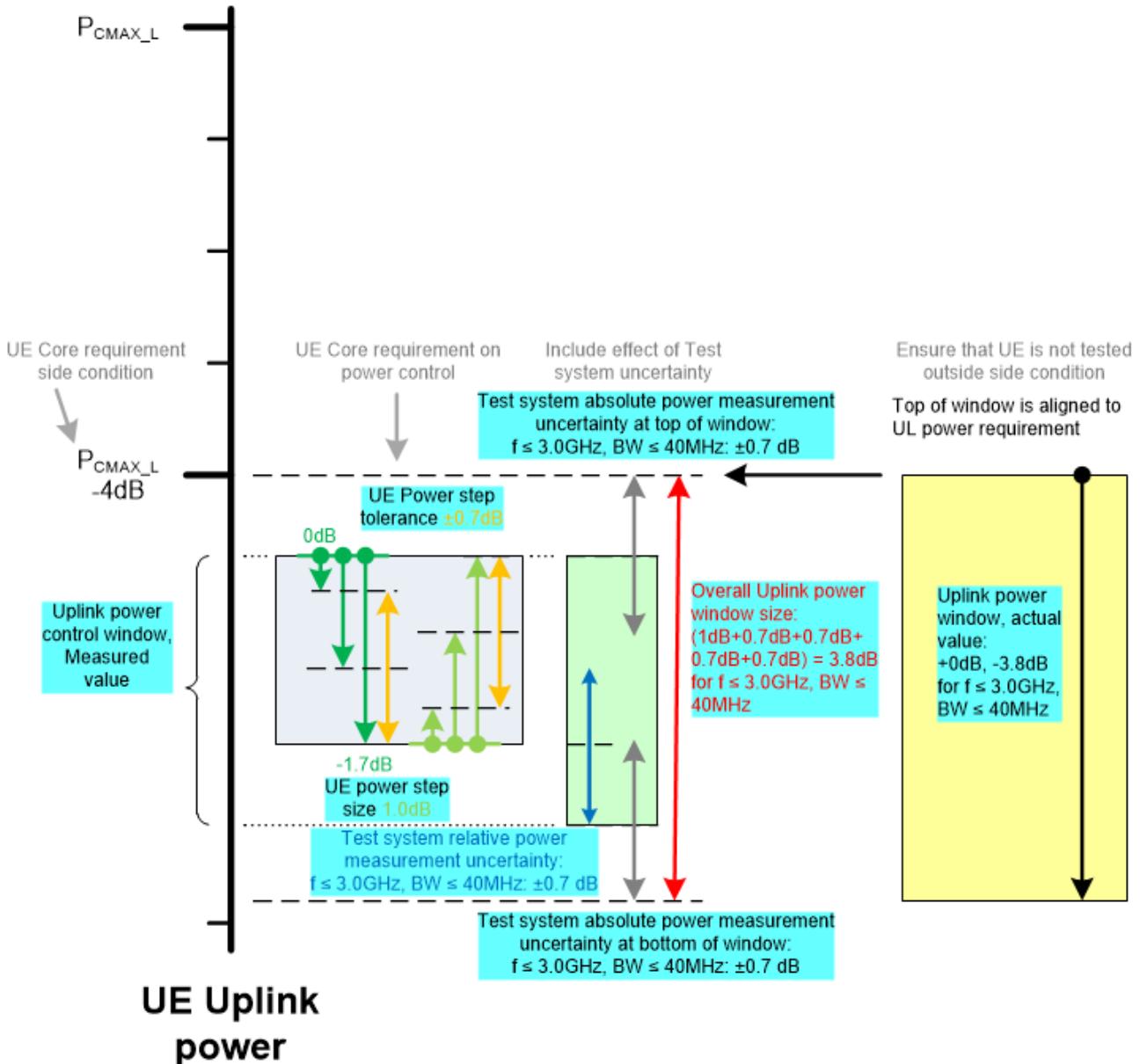


Figure F.4.3.1-1: Example NR FR1 uplink power setting to be below a requirement

The smallest UE Power step size is defined in TS 38.213 [19] Table 7.1.1-1, for absolute $\delta_{\text{PUSCH},b,f,c}$.

The UE Power step size tolerance is defined in TS 38.101-1 [5] Table 6.3.4.3-1, for PUSCH to PUSCH transitions with the allocated resource blocks fixed in frequency and no transmission gaps other than those generated by downlink subframes, DwPTS fields or Guard Periods, and for a power step $\Delta P \leq 1 \text{ dB}$.

The Test system uncertainties are defined in Annex F of the present document.

To ensure that the actual UE uplink power is within the Uplink power window, UE uplink power measured by the test system should remain within the smaller Uplink power control window shown in Figure F.4.3.1-1.

F.4.3.2 NR FR2

[FFS]

F.4.3.3 E-UTRA

Information from the core requirements in TS 36.101 [5], TS 36.213 [20] and the uncertainties in Annex F applicable to the Test case are used to derive the uplink power window. There are 4 stages:

- Find the uplink power target value.
- Determine how closely the uplink power can be set to the target value.
- Include the effect of test system uncertainty.
- Position the Uplink power window to ensure UE is not tested outside Core requirements.

This process is shown in the diagram below, using values for $f \leq 3\text{GHz}$ and $\text{BW} \leq 40\text{MHz}$ and taking an example where the target value is 4dB below $P_{\text{CMAX,L}}$ (UE Core requirement side condition):

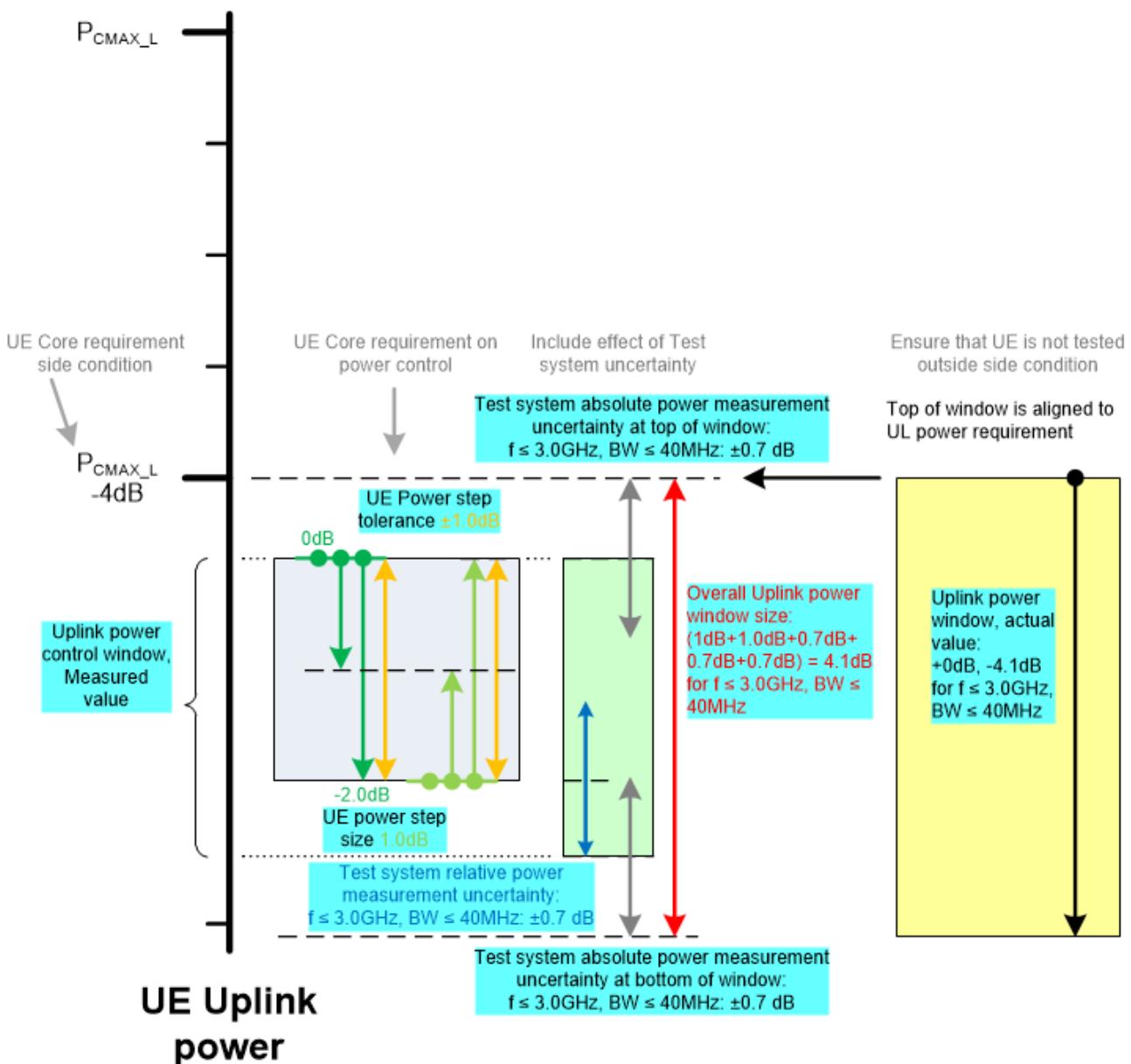


Figure F.4.3.3-1: Example E-UTRA uplink power setting to be below a requirement

The smallest UE Power step size is defined in TS 36.213 [20] Table 5.1.1.1-2, for absolute δ_{PUSCH} .

The UE Power step size tolerance is defined in TS 36.101 [5] Table 6.3.5.2.1-1, for PUSCH to PUSCH transitions with the allocated resource blocks fixed in frequency and no transmission gaps other than those generated by downlink subframes, DwPTS fields or Guard Periods, and for a power step $\Delta P \leq 1$ dB.

The Test system uncertainties are defined in Annex F of the present document.

To ensure that the actual UE uplink power is within the Uplink power window, UE uplink power measured by the test system should remain within the smaller Uplink power control window shown in Figure F.4.3.3-1.

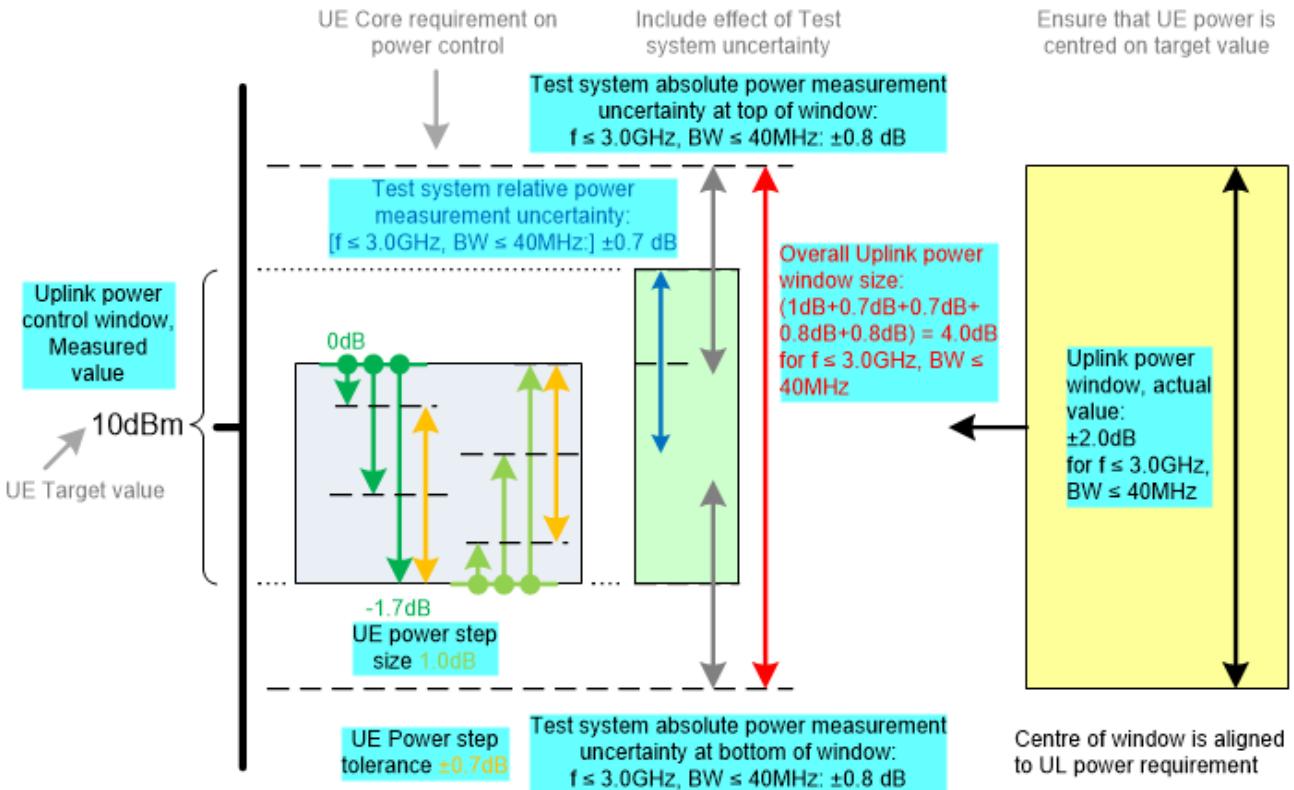
F.4.4 Setting the power window centred on a target value

F.4.4.1 NR FR1

Information from the core requirements in TS 38.101-1 [2], TS 38.213 [19] and the uncertainties in Annex F applicable to the Test case are used to derive the uplink power window. There are 4 stages:

- Find the uplink power target value.
- Determine how closely the uplink power can be set to the target value.
- Include the effect of test system uncertainty.
- Position the Uplink power window centred on the target value.

This process is shown in the diagram below, using values for $f \leq 3\text{GHz}$ and $BW \leq 40\text{MHz}$ and taking an example where the target value is +10dBm:



UE Uplink power

Figure F.4.4.1-1: Example NR FR1 uplink power setting centred on a target value

The smallest UE Power step size is defined in TS 38.213 [9] Table 7.1.1-1, for absolute $\delta_{\text{PUSCH},b,f,c}$.

The UE Power step size tolerance is defined in TS 38.101-1 [2] Table 6.3.4.3-1, for PUSCH to PUSCH transitions with the allocated resource blocks fixed in frequency and no transmission gaps other than those generated by downlink subframes, DwPTS fields or Guard Periods, and for a power step $\Delta P \leq 1 \text{ dB}$.

The Test system uncertainties are defined in Annex F of the present document.

To ensure that the actual UE uplink power is centred on the target value, UE uplink power measured by the test system should remain within the smaller Uplink power control window shown in Figure F.4.4.1-1.

F.4.4.2 NR FR2

[FFS]

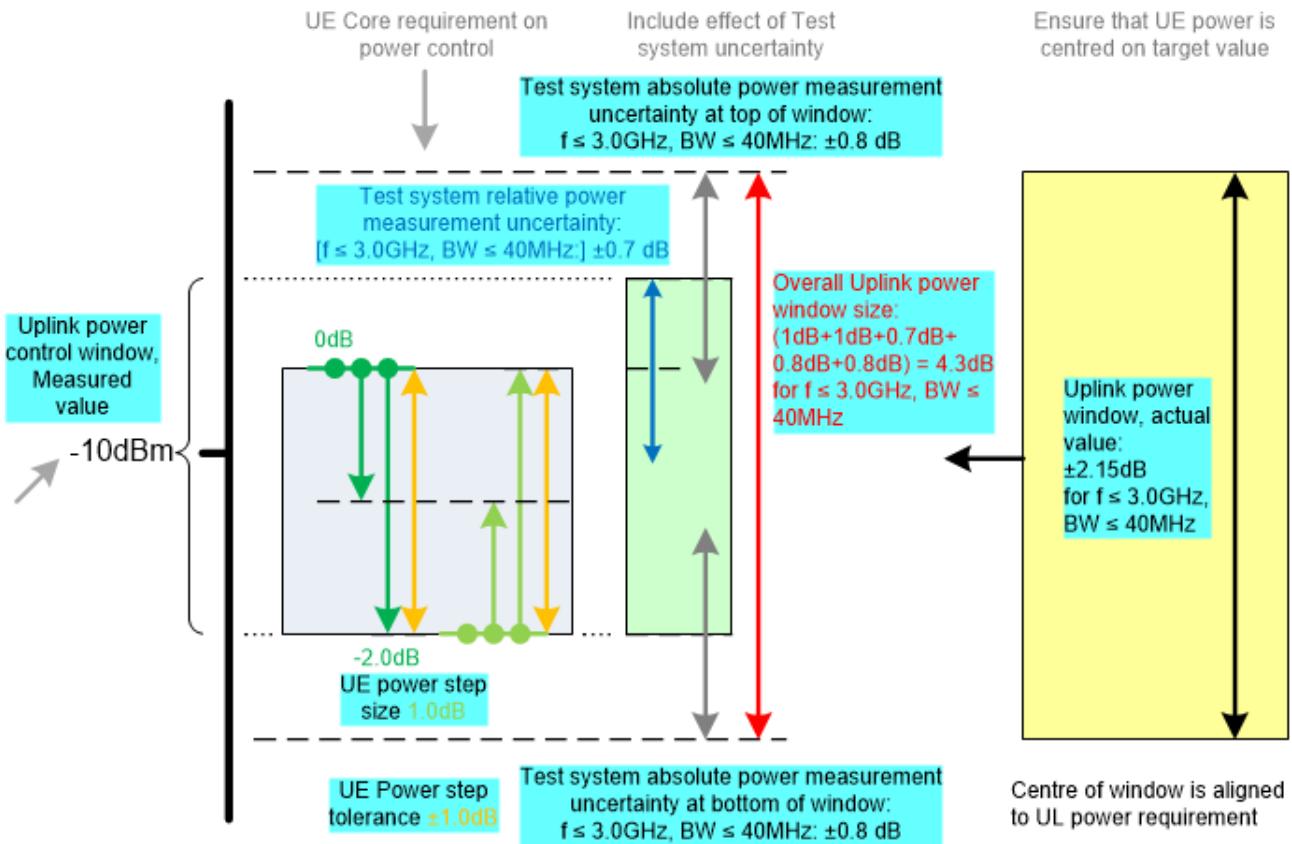
F.4.4.3 E-UTRA

Information from the core requirements in TS 36.101 [5], TS 36.213 [20] and the uncertainties in Annex F applicable to the Test case are used to derive the uplink power window. There are 4 stages:

- Find the uplink power target value.
- Determine how closely the uplink power can be set to the target value.
- Include the effect of test system uncertainty.

- Position the Uplink power window centred on the target value.

This process is shown in the diagram below, using values for $f \leq 3\text{GHz}$ and $\text{BW} \leq 40\text{MHz}$ and taking an example where the target value is -10dBm :



UE Uplink power

Figure F.4.4.3-1: Example E-UTRA uplink power setting centred on a target value

The smallest UE Power step size is defined in TS 36.213 [20] Table 5.1.1.1-2, for absolute δ_{PUSCH} .

The UE Power step size tolerance is defined in TS 36.101 [5] Table 6.3.5.2.1-1, for PUSCH to PUSCH transitions with the allocated resource blocks fixed in frequency and no transmission gaps other than those generated by downlink subframes, DwPTS fields or Guard Periods, and for a power step $\Delta P \leq 1 \text{ dB}$.

The Test system uncertainties are defined in Annex F of the present document.

To ensure that the actual UE uplink power is centred on the target value, UE uplink power measured by the test system should remain within the smaller Uplink power control window shown in Figure F.4.4.3-1.

Annex G (normative): Uplink Physical Channels

Please refer to Annex G in TS 38.521-1 [8] and TS 38.521-2 [9] for appropriate details as needed for test cases in this test specification. EN-DC exceptions will be added,

Annex H (normative): Statistical Testing

Editor's Note:

- Further investigate the technical details behind this statistical method to ensure that this is applicable for FR2 radiated test cases.

H.1 General

This annex specifies mapping throughput to error ratio, pass fail limits and pass fail decision rules that are needed for measuring average throughput for a duration sufficient to achieve statistical significance for testing receiver characteristics.

H.2 Statistical testing of receiver characteristics

H.2.1 General

The test of receiver characteristics is twofold.

1. A signal or a combination of signals is offered to the RX port(s) of the receiver.
2. The ability of the receiver to demodulate /decode this signal is verified by measuring the throughput.

In (2) is the statistical aspect of the test and is treated here.

The minimum requirement for all receiver tests is >95% of the maximum throughput.

All receiver tests are performed in static propagation conditions. No fading conditions are applied.

H.2.2 Mapping throughput to error ratio

- a) The measured information bit throughput R is defined as the sum (in kilobits) of the information bit payloads successfully received during the test interval, divided by the duration of the test interval (in seconds).
- b) In measurement practice the UE indicates successfully received information bit payload by signalling an ACK to the SS.
If payload is received, but damaged and cannot be decoded, the UE signals a NACK.
- c) Only the ACK and NACK signals, not the data bits received, are accessible to the SS.
The number of bits is known in the SS from knowledge of what payload was sent.
- d) For the reference measurement channel, applied for testing, the number of bits is different in different subframes, however in a radio frame it is fixed during one test.
- e) The time in the measurement interval is composed of successfully received subframes (ACK), unsuccessfully received subframes (NACK) and no reception at all (DTX-subframes).
- f) DTX-subframes may occur regularly according the applicable reference measurement channel (regDTX).
In real live networks this is the time when other UEs are served. In TDD these are the UL and special subframes. regDTX vary from test to test but are fixed within the test.
- g) Additional DTX-subframes occur statistically when the UE is not responding ACK or NACK where it should.
(statDTX)
This may happen when the UE was not expecting data or decided that the data were not intended for it.

The pass / fail decision is done by observing the:

- number of NACKs

- number of ACKs and
- number of statDTXs (regDTX is implicitly known to the SS)

The ratio $(\text{NACK} + \text{statDTX}) / (\text{NACK} + \text{statDTX} + \text{ACK})$ is the Error Ratio (ER). Taking into account the time consumed by the ACK, NACK, and DTX-TTIs (regular and statistical), ER can be mapped unambiguously to throughput for any single reference measurement channel test.

H.2.3 Design of the test

The test is defined by the following design principles (see clause H.x, Theory....):

1. The early decision concept is applied.
2. A second limit is introduced: Bad DUT factor $M > 1$
3. To decide the test pass:
 - Supplier risk is applied based on the Bad DUT quality
 - To decide the test fail
 - Customer Risk is applied based on the specified DUT quality

The test is defined by the following parameters:

1. Limit ER = 0.05 (Throughput limit = 95%)
2. Bad DUT factor $M = 1.5$ (selectivity)
3. Confidence level CL = 95% (for specified DUT and Bad DUT-quality)

H.2.4 Numerical definition of the pass fail limits

Table H.2.4-1: pass fail limits

| ne | ns _p | ns _f | ne | ns _p | ns _f | ne | ns _p | ns _f | ne | ns _p | ns _f |
|----|-----------------|-----------------|----|-----------------|-----------------|-----|-----------------|-----------------|-------|-----------------|--------------------|
| 0 | 67 | NA | 39 | 763 | 500 | 78 | 1366 | 1148 | 117 | 1951 | 1828 |
| 1 | 95 | NA | 40 | 778 | 516 | 79 | 1381 | 1166 | 118 | 1965 | 1845 |
| 2 | 119 | NA | 41 | 794 | 532 | 80 | 1396 | 1183 | 119 | 1980 | 1863 |
| 3 | 141 | NA | 42 | 810 | 548 | 81 | 1412 | 1200 | 120 | 1995 | 1881 |
| 4 | 162 | NA | 43 | 826 | 564 | 82 | 1427 | 1217 | 121 | 2010 | 1899 |
| 5 | 183 | NA | 44 | 842 | 580 | 83 | 1442 | 1234 | 122 | 2025 | 1916 |
| 6 | 202 | NA | 45 | 858 | 596 | 84 | 1457 | 1252 | 123 | 2039 | 1934 |
| 7 | 222 | NA | 46 | 873 | 612 | 85 | 1472 | 1269 | 124 | 2054 | 1952 |
| 8 | 241 | NA | 47 | 889 | 629 | 86 | 1487 | 1286 | 125 | 2069 | 1969 |
| 9 | 259 | NA | 48 | 905 | 645 | 87 | 1502 | 1303 | 126 | 2084 | 1987 |
| 10 | 278 | 76 | 49 | 920 | 661 | 88 | 1517 | 1321 | 127 | 2099 | 2005 |
| 11 | 296 | 88 | 50 | 936 | 678 | 89 | 1532 | 1338 | 128 | 2113 | 2023 |
| 12 | 314 | 100 | 51 | 952 | 694 | 90 | 1547 | 1355 | 129 | 2128 | 2040 |
| 13 | 332 | 113 | 52 | 967 | 711 | 91 | 1562 | 1373 | 130 | 2143 | 2058 |
| 14 | 349 | 126 | 53 | 983 | 727 | 92 | 1577 | 1390 | 131 | 2158 | 2076 |
| 15 | 367 | 140 | 54 | 998 | 744 | 93 | 1592 | 1407 | 132 | 2172 | 2094 |
| 16 | 384 | 153 | 55 | 1014 | 760 | 94 | 1607 | 1425 | 133 | 2187 | 2111 |
| 17 | 401 | 167 | 56 | 1029 | 777 | 95 | 1623 | 1442 | 134 | 2202 | 2129 |
| 18 | 418 | 181 | 57 | 1045 | 793 | 96 | 1637 | 1459 | 135 | 2217 | 2147 |
| 19 | 435 | 195 | 58 | 1060 | 810 | 97 | 1652 | 1477 | 136 | 2231 | 2165 |
| 20 | 452 | 209 | 59 | 1076 | 827 | 98 | 1667 | 1494 | 137 | 2246 | 2183 |
| 21 | 469 | 224 | 60 | 1091 | 844 | 99 | 1682 | 1512 | 138 | 2261 | 2201 |
| 22 | 486 | 238 | 61 | 1106 | 860 | 100 | 1697 | 1529 | 139 | 2275 | 2218 |
| 23 | 503 | 253 | 62 | 1122 | 877 | 101 | 1712 | 1547 | 140 | 2290 | 2236 |
| 24 | 519 | 268 | 63 | 1137 | 894 | 102 | 1727 | 1564 | 141 | 2305 | 2254 |
| 25 | 536 | 283 | 64 | 1153 | 911 | 103 | 1742 | 1582 | 142 | 2320 | 2272 |
| 26 | 552 | 298 | 65 | 1168 | 928 | 104 | 1757 | 1599 | 143 | 2334 | 2290 |
| 27 | 569 | 313 | 66 | 1183 | 944 | 105 | 1772 | 1617 | 144 | 2349 | 2308 |
| 28 | 585 | 328 | 67 | 1199 | 961 | 106 | 1787 | 1634 | 145 | 2364 | 2326 |
| 29 | 602 | 343 | 68 | 1214 | 978 | 107 | 1802 | 1652 | 146 | 2378 | 2344 |
| 30 | 618 | 359 | 69 | 1229 | 995 | 108 | 1817 | 1669 | 147 | 2393 | 2361 |
| 31 | 634 | 374 | 70 | 1244 | 1012 | 109 | 1832 | 1687 | 148 | 2408 | 2379 |
| 32 | 650 | 389 | 71 | 1260 | 1029 | 110 | 1847 | 1704 | 149 | 2422 | 2397 |
| 33 | 667 | 405 | 72 | 1275 | 1046 | 111 | 1861 | 1722 | 150 | 2437 | 2415 |
| 34 | 683 | 421 | 73 | 1290 | 1063 | 112 | 1876 | 1740 | 151 | 2452 | 2433 |
| 35 | 699 | 436 | 74 | 1305 | 1080 | 113 | 1891 | 1757 | 152 | 2466 | 2451 |
| 36 | 715 | 452 | 75 | 1321 | 1097 | 114 | 1906 | 1775 | 153*) | NA | 2469 |
| 37 | 731 | 468 | 76 | 1336 | 1114 | 115 | 1921 | 1793 | | | |
| 38 | 747 | 484 | 77 | 1351 | 1131 | 116 | 1936 | 1810 | | | *) note 2 in H.2.5 |

NOTE 1: The first column is the number of errors (ne = number of NACK + statDTX)

NOTE 2: The second column is the number of samples for the pass limit (ns_p, ns=Number of Samples= number of NACK + statDTX + ACK)

NOTE 3: The third column is the number of samples for the fail limit (ns_f)

H.2.5 Pass fail decision rules

The pass fail decision rules apply for a single test, comprising one component in the test vector. The over all Pass /Fail conditions are defined in clause H.2.6and H.2A.6

Having observed 0 errors, pass the test at 67+ samples, otherwise continue

Having observed 1 error, pass the test at 95+ otherwise continue

Having observed 2 errors, pass the test at 119+ samples, fail the test at 2- samples, otherwise continue
Etc. etc.

Having observed 151 errors, pass the test at 2452+ samples, fail the test at 2433- samples, otherwise continue

Having observed 152 errors, pass the test at 2466+ samples, fail the test at 2451- samples.

Where x+ means: x or more, x- means x or less

NOTE 1: an ideal DUT passes after 67 samples. The maximum test time is 2466 samples.

NOTE 2: It is allowed to deviate from the early decision concept by postponing the decision (pass/fail or continue). Postponing the decision to or beyond the end of Table H.2.4-1 requires a pass fail decision against the test limit: pass the DUT for ER<0.0618, otherwise fail.

Annex I (normative):
Void

Annex J (normative): Test applicability per permitted test method

Please refer to Annex J in TS 38.521-1 [8] and 38.521-2 [9] for appropriate details as needed for test cases in this test specification. Exceptions for EN-DC may be added as needed.

Annex K (normative): EIRP, TRP, and EIS measurement procedures

Please refer to Annex K in 38.521-2 [9] for appropriate details as needed for test cases in this test specification.
Exceptions for EN-DC may be added as needed.

Annex L (normative):
Void

Annex M (normative): Dual uplink interferer

UE is mandated to support operation in dual and triple uplink mode for EN-DC configuration in NR FR1 listed in Table 5.5B.2-1, Table 5.5B.3-1, and Table 5.5B.4.1-1 and indicated by column single uplink allowed, Table 7.3B.2.0.3.5.1-1, Table 7.3B.2.0.3.5.2-0, Table 7.3B.2.0.3.5.2-1 or NE-DC configuration in NR FR1 listed in Table 5.5B.4a.1-1 and indicated by column single uplink allowed if the intermodulation products caused by the dual uplink operation do not interfere with its own primary downlink transmission channel bandwidth. For intermodulation products falling into LTE secondary downlink channel bandwidth, UE single UL capability is not considered.

Formula for determining if the EN-DC in NR FR1 configuration with dual uplink operation interferes with its own downlink reception.

Interference bandwidth: $IBW = |a| * CBW1 + |b| * CBW2$

- $|a| + |b| = 2$ (or 3)
- CBW1 and CBW2 are the transmission bandwidth configurations of the UL channels

Center frequency of IBW: $fIBW = |a * f1 + b * f2|$

- $f1$ and $f2$ are center frequency of the transmission bandwidth configurations of each UL channel

The range of IMD 2 (or 3): $[fIBW - IBW/2, fIBW + IBW/2]$

NOTE 1: UE shall be able to apply operations which are configured by RRC reconfiguration and corresponding HARQ timing on the transmission bandwidth.

NOTE 2: For identified difficult band combination, during two adjacent RRC reconfiguration, the changing of transmission bandwidth should not introduce IM2 and IM3, which will result in UE changing from 2Tx to 1Tx. Otherwise, UE behavior is not specified.

For DC_3A_n3A intra-band non-contiguous EN-DC combination, only single switched UL is supported in Rel-15.

For DC_2A_n2A, DC_66A_n66A intra-band non-contiguous EN-DC combination, only single switched UL is supported.

Annex N (normative): Modified MPR behaviour

Editor's note: The *modifiedMPRbehavior* is given in the Annex H.1 of TS 38.101-3.

N.1 Indication of modified MPR behaviour

This annex contains the definitions of the bits in the field *modifiedMPRbehavior* indicated in the IE RF-Parameters [13] by a UE supporting an MPR or A-MPR modified in a later release of this specification. *modifiedMPRbehavior* is indicated in TS 36.211 [13] by an 8-bit bitmap per NR band.

Table N.1-1: Definitions of the bits in the field *modifiedMPRbehavior*

| NR Band | Index of field (bit number) | Definition (description of the supported functionality if indicator set to one) | Notes |
|---------|--------------------------------|--|---|
| n41 | 0 (leftmost bit) | - EN-DC contiguous intraband MPR as defined in clause 6.2B.2.1 of 38.101-3 v15.5.0 | - This bit may be set to 1 by a UE supporting DC_(n)41AA UE EN-DC |
| | 1 | - EN-DC non-contiguous intraband MPR as defined in clause 6.2B.2.2 of 38.101-3 v15.5.0 | - This bit may be set to 1 by a UE supporting DC_41A_n41A EN-DC |
| n71 | 0 (leftmost bit) | - EN-DC contiguous intraband MPR as defined in clause 6.2B.2.1 of 38.101-3 v15.5.0 | - This bit may be set to 1 by a UE supporting DC_(n)71AA UE EN-DC |

Annex O (informative): Change history

| Change history | | | | | | | |
|----------------|--------------------|-----------|----|-----|-----|---|-------------|
| Date | Meeting | TDoc | CR | Rev | Cat | Subject/Comment | New version |
| 2017-08 | RAN5#76 | R5-174710 | - | - | - | Draft skeleton | 0.0.1 |
| 2018-01 | RAN5#1-5G-NR Adhoc | R5-180086 | - | - | - | TP to add clause 6.2B.3.3 UE A-MPR intra-band EN-DC to 38.521-3 | 0.1.0 |
| 2018-01 | RAN5#1-5G-NR Adhoc | R5-180087 | - | - | - | TP to add clause 6.5B.2.1.2 Additional Spectrum emissions mask (contiguous sub-blocks) for intra-band EN-DC to 38.521-3 | 0.1.0 |
| 2018-02 | RAN5#78 | R5-181509 | - | - | - | Updated 38.521-3 for new Annex A Dual uplink interferer information | 0.2.0 |
| 2018-02 | RAN5#78 | R5-181690 | - | - | - | Updated 38.521-3 for channel bandwidth information | 0.2.0 |
| 2018-03 | RAN5#2-5G-NR Adhoc | R5-181760 | - | - | - | Draft TS 38.521-3 0.3.0 | 0.3.0 |
| 2018-04 | RAN5#2-5G-NR Adhoc | R5-182035 | - | - | - | 5G-NR Text Proposal to add spurious emissions test case to 38.521-3 | 0.4.0 |
| 2018-04 | RAN5#2-5G-NR Adhoc | R5-182016 | - | - | - | TP for new test case: 6.5B.2.1.3, Adjacent channel leakage ratio for intra-band contiguous EN-DC | 0.4.0 |
| 2018-04 | RAN5#2-5G-NR Adhoc | R5-182017 | - | - | - | TP to update clause 6.2B.3.1 UE A-MPR intra-band EN-DC to 38.521-3 | 0.4.0 |
| 2018-04 | RAN5#2-5G-NR Adhoc | R5-182018 | - | - | - | TP to update clause 6.5B.2.1.2 Additional spectrum emission mask to 38.521-3 | 0.4.0 |
| 2018-04 | RAN5#2-5G-NR Adhoc | R5-181807 | - | - | - | Update to Operating bands of 38.521-3 | 0.4.0 |
| 2018-04 | RAN5#2-5G-NR Adhoc | R5-181808 | - | - | - | Update to clause 3 and clause 4 of 38.521-3 | 0.4.0 |
| 2018-04 | RAN5#2-5G-NR Adhoc | R5-181828 | - | - | - | Updated 38.521-3 for channel bandwidth information with new structure | 0.4.0 |
| 2018-07 | RAN5#79 | R5-183961 | - | - | - | 5G_FR1_EN_DC_RF_sensitivity_for_DC | 0.5.0 |
| 2018-07 | RAN5#79 | R5-183962 | - | - | - | Introduction of TC 6.2B.1.3 for EN-DC | 0.5.0 |
| 2018-07 | RAN5#79 | R5-183949 | - | - | - | Statistical Testing Annex for 38.521-3 | 0.5.0 |
| 2018-07 | RAN5#79 | R5-182995 | - | - | - | Corrections annex for EIRP and TRP metric definition in TS 38.521-3 | 0.5.0 |
| 2018-07 | RAN5#79 | R5-183707 | - | - | - | TP for updating test case 6.2B.2.1, UE Maximum Output Power reduction for Intra-Band Contiguous EN-DC | 0.5.0 |
| 2018-07 | RAN5#79 | R5-183708 | - | - | - | Updated clause 5.5B Configuration for DC to 38.521-3 | 0.5.0 |
| 2018-07 | RAN5#79 | R5-183709 | - | - | - | TP to add Occupied BW EN-DC test case | 0.5.0 |
| 2018-07 | RAN5#79 | R5-183710 | - | - | - | TP to add SEM EN-DC test case | 0.5.0 |
| 2018-07 | RAN5#79 | R5-183711 | - | - | - | TP to add ACLR EN-DC test case | 0.5.0 |
| 2018-09 | RAN5#80 | R5-185563 | - | - | - | FR2_StoreTxRxBeamPeakCoordinates_38.521-3 | 1.0.0 |
| 2018-09 | RAN5#80 | R5-185520 | - | - | - | Addition of TRx MU and TT in TS 38.521-3 Annex | 1.0.0 |
| 2018-09 | RAN5#80 | R5-185503 | - | - | - | Add Clause 7.5B.1 into TS 38.521-3 | 1.0.0 |
| 2018-09 | RAN5#80 | R5-185504 | - | - | - | Add Clause 7.5B.2 into TS 38.521-3 | 1.0.0 |
| 2018-09 | RAN5#80 | R5-185505 | - | - | - | Add Clause 7.5B.3 into TS 38.521-3 | 1.0.0 |
| 2018-09 | RAN5#80 | R5-184579 | - | - | - | Updated EN-DC configuration information in clause 5 | 1.0.0 |
| 2018-09 | RAN5#80 | R5-184580 | - | - | - | TIB value add for EN-DC band in 38.521-3 | 1.0.0 |
| 2018-09 | RAN5#80 | R5-184671 | - | - | - | Update of References in clause 2 of 38.521-3 spec | 1.0.0 |
| 2018-09 | RAN5#80 | R5-184672 | - | - | - | Updates to Operating Bands in clause 5.2 | 1.0.0 |
| 2018-09 | RAN5#80 | R5-184737 | - | - | - | Dual uplink interferer updated to 38.521-3 | 1.0.0 |
| 2018-09 | RAN5#80 | R5-184737 | - | - | - | Dual uplink interferer updated to 38.521-3 | 1.0.0 |
| 2018-09 | RAN5#80 | R5-185332 | - | - | - | Addition of 6.2B.4.1.1 Configured OP for Intra-Band Contiguous EN-DC | 1.0.0 |
| 2018-09 | RAN5#80 | R5-185333 | - | - | - | Addition of 6.2B.4.1.2 Configured OP for Intra-Band Non-Contiguous EN-DC | 1.0.0 |
| 2018-09 | RAN5#80 | R5-185507 | - | - | - | Addition of 6.2B.4.1.3 Configured OP for Inter-Band within FR1 | 1.0.0 |
| 2018-09 | RAN5#80 | R5-185198 | - | - | - | Addition of 6.2B.4.1.4 Configured OP for Inter-Band EN-DC including FR2 | 1.0.0 |
| 2018-09 | RAN5#80 | R5-185199 | - | - | - | Addition of 6.2B.4.1.5 Configured OP for Inter-Band EN-DC | 1.0.0 |

| | | | | | | |
|---------|---------|-----------|------|----|--|--------|
| | | | | | including both FR1 and FR2 | |
| 2018-09 | RAN5#80 | R5-185469 | - | - | TP for updating test case 6.2B.3.1 UE AMPR for Intra-band contiguous EN-DC | 1.0.0 |
| 2018-09 | RAN5#80 | R5-185470 | - | - | TP for updating test case 6.2B.3.2 UE AMPR for Intra-band non-contiguous EN-DC | 1.0.0 |
| 2018-09 | RAN5#80 | R5-185200 | - | - | TP for updating test case 6.5B.2.1.2 Additional spectrum emission mask for intra-band contiguous EN-DC | 1.0.0 |
| 2018-09 | RAN5#80 | R5-185556 | - | - | FR2_UE_BeamlockInvoke_38.521-3 | 1.0.0 |
| 2018-09 | RAN5#80 | R5-185472 | - | - | Update of TC 6.2B.1.1 | 1.0.0 |
| 2018-09 | RAN5#80 | R5-185473 | - | - | Introduction of TC 6.2B.1.2 | 1.0.0 |
| 2018-09 | RAN5#80 | R5-185474 | - | - | Update of 6.2B.1.3 | 1.0.0 |
| 2018-09 | RAN5#80 | R5-185201 | - | - | Introduction of TC 7.4B.1 | 1.0.0 |
| 2018-09 | RAN5#80 | R5-185202 | - | - | Introduction of 7.4B.2 | 1.0.0 |
| 2018-09 | RAN5#80 | R5-185203 | - | - | Introduction of 7.4B.3 | 1.0.0 |
| 2018-09 | RAN5#80 | R5-185479 | - | - | Update Occupied Bandwidth for interband EN-DC within FR1 | 1.0.0 |
| 2018-09 | RAN5#80 | R5-185480 | - | - | Update SEM interband EN-DC within FR1 | 1.0.0 |
| 2018-09 | RAN5#80 | R5-185481 | - | - | Update ACLR for interband EN-DC within FR1 | 1.0.0 |
| 2018-09 | RAN5#80 | R5-185204 | - | - | 5G NR_EN_DC with FR1_Text update for RX sensitivity | 1.0.0 |
| 2018-09 | RAN5#80 | R5-185205 | - | - | 5G NR_EN_DC with FR1_Text_proposal_for_TX_Spurious_emission | 1.0.0 |
| 2018-09 | RAN5#80 | R5-185422 | - | - | Alignment of Annex numbering with core spec | 1.0.0 |
| 2018-09 | RAN5#80 | R5-184897 | - | - | Updates to Channel Arrangement clause in 38.521-3 | 1.0.0 |
| 2018-09 | RAN5#80 | R5-185206 | - | - | Addition of TC6.3B.1.1 Minimum Output power for intra-band contiguous EN-DC | 1.0.0 |
| 2018-09 | RAN5#80 | R5-185207 | - | - | Addition of TC6.3B.1.2 Minimum output power for intra-band non-contiguous EN-DC | 1.0.0 |
| 2018-09 | RAN5#80 | R5-185208 | - | - | Addition of TC6.3B.1.3 Minimum output power for inter-band EN-DC within FR1 | 1.0.0 |
| 2018-09 | RAN5#80 | R5-185351 | - | - | Update across EN-DC RF test cases in TS 38.521-3 | 1.0.0 |
| 2018-09 | RAN#81 | - | - | - | raised to v15.0.0 with editorial changes only | 15.0.0 |
| 2018-12 | RAN#82 | R5-186503 | 0033 | -F | FR2 Spurious Emission test case updates | 15.1.0 |
| 2018-12 | RAN#82 | R5-186506 | 0034 | -F | Update Text on Store Beam Peak Coordinate | 15.1.0 |
| 2018-12 | RAN#82 | R5-186507 | 0035 | -F | 38.521-3 Applicability Rules | 15.1.0 |
| 2018-12 | RAN#82 | R5-186601 | 0039 | -F | 5G NR_EN_DC with FR1_Text update for Intra-Band Contiguous RX sensitivity | 15.1.0 |
| 2018-12 | RAN#82 | R5-186602 | 0040 | -F | 5G NR_Text update for TX spurious emission intra-band contiguous EN-DC | 15.1.0 |
| 2018-12 | RAN#82 | R5-186608 | 0042 | -F | Spurious emission band UE co-existence for Inter-band EN-DC within FR1 | 15.1.0 |
| 2018-12 | RAN#82 | R5-186672 | 0044 | -F | Updating test case 6.2B.3.1 Additional Maximum Output Power reduction for Intra-band contiguous EN-DC | 15.1.0 |
| 2018-12 | RAN#82 | R5-186673 | 0045 | -F | Updating test case 6.5B.2.1.2 Additional spectrum emissions mask for intra-band contiguous EN-DC | 15.1.0 |
| 2018-12 | RAN#82 | R5-186681 | 0046 | -F | Updates to EN-DC test case 6.2B.2.1, UE Maximum Output Power reduction for Intra-Band Contiguous EN-DC | 15.1.0 |
| 2018-12 | RAN#82 | R5-186684 | 0047 | -F | Updates to test case 6.2B.2.3, UE Maximum Output Power reduction for Inter-Band EN-DC within FR1 | 15.1.0 |
| 2018-12 | RAN#82 | R5-186788 | 0049 | -F | Minor update OBW, SEM and ACLR inter-band FR1 test cases | 15.1.0 |
| 2018-12 | RAN#82 | R5-187153 | 0061 | -F | Updated EN-DC configuration information in clause 5 | 15.1.0 |
| 2018-12 | RAN#82 | R5-187371 | 0076 | -F | Addition of TC6.3B.2.1 Transmit OFF Power for intra-band contiguous EN-DC | 15.1.0 |
| 2018-12 | RAN#82 | R5-187372 | 0077 | -F | Addition of TC6.3B.2.3 Transmit OFF Power for inter-band EN-DC within FR1 | 15.1.0 |
| 2018-12 | RAN#82 | R5-187373 | 0078 | -F | Addition of TC6.3B.2.2 Transmit OFF Power for intra-band non-contiguous EN-DC | 15.1.0 |
| 2018-12 | RAN#82 | R5-187552 | 0083 | -F | Updates to TS 38.521-3 common sections 1-4 to align with core spec | 15.1.0 |
| 2018-12 | RAN#82 | R5-187559 | 0084 | -F | Updates to TS 38.521-3 clause 5 to align with core spec | 15.1.0 |
| 2018-12 | RAN#82 | R5-187562 | 0085 | -F | Update to TC6.5B.3.2.1 - General Spurious Emissions for intra-band non-contiguous EN-DC | 15.1.0 |
| 2018-12 | RAN#82 | R5-187563 | 0086 | -F | Update to 7.3B.2.2 - REFSENS for Intra-band Non-Contiguous EN-DC | 15.1.0 |
| 2018-12 | RAN#82 | R5-187565 | 0087 | -F | Updates to TS 38.521-3 clause 4 with LTE anchor details | 15.1.0 |
| 2018-12 | RAN#82 | R5-187614 | 0094 | -F | Updates to EN-DC test case 6.2B.2.2, UE Maximum Output Power reduction for Intra-Band Non-Contiguous EN-DC | 15.1.0 |
| 2018-12 | RAN#82 | R5-187816 | 0048 | 1F | Adding test case 6.2B.2.4, UE Maximum Output Power reduction for Inter-Band EN-DC including FR2 | 15.1.0 |
| 2018-12 | RAN#82 | R5-187819 | 0053 | 1F | Update general parameter Connection without release in initial conditions in TS 38.521-3 | 15.1.0 |
| 2018-12 | RAN#82 | R5-187820 | 0043 | 1F | Updates to test case 6.5B.2.1.3, Adjacent channel leakage ratio for intra-band contiguous EN-DC | 15.1.0 |
| 2018-12 | RAN#82 | R5-187821 | 0052 | 1F | Addition OBW intraband non contiguous EN-DC | 15.1.0 |
| 2018-12 | RAN#82 | R5-187822 | 0055 | 1F | Introduction of New test case 6.4B.2.2.1 Error Vector Magnitude for intra-band non-contiguous EN-DC | 15.1.0 |

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| 2018-12 | RAN#82 | R5-187823 | 0056 | 1 | F | Introduction of New test case 6.4B.2.2.2 Carrier Leakage for intra-band non-contiguous EN-DC | 15.1.0 |
| 2018-12 | RAN#82 | R5-187825 | 0058 | 1 | F | Introduction of New test case 6.4B.2.3.1 Error Vector Magnitude for inter-band EN-DC within FR1 | 15.1.0 |
| 2018-12 | RAN#82 | R5-187826 | 0059 | 1 | F | Introduction of New test case 6.4B.2.3.2 Carrier Leakage for inter-band EN-DC within FR1 | 15.1.0 |
| 2018-12 | RAN#82 | R5-187827 | 0060 | 1 | F | Introduction of New test case 6.4B.2.3.3 In-band Emissions for inter-band EN-DC within FR1 | 15.1.0 |
| 2018-12 | RAN#82 | R5-187828 | 0070 | 1 | F | Introduction of Error Vector Magnitude for intra-band contiguous EN-DC | 15.1.0 |
| 2018-12 | RAN#82 | R5-187829 | 0071 | 1 | F | Introduction of Carrier Leakage for intra-band contiguous EN-DC | 15.1.0 |
| 2018-12 | RAN#82 | R5-187831 | 0088 | 1 | F | FR2 General Spurious Emission test case update | 15.1.0 |
| 2018-12 | RAN#82 | R5-187832 | 0089 | 1 | F | FR2 Reference Sensitivity test case update | 15.1.0 |
| 2018-12 | RAN#82 | R5-187833 | 0092 | 1 | F | Updates to clause 7.3B.3.4 in TS 38.521-3 | 15.1.0 |
| 2018-12 | RAN#82 | R5-187834 | 0090 | 1 | F | Updates to sections 1-4 in TS 38.521-3 to align with core spec | 15.1.0 |
| 2018-12 | RAN#82 | R5-187835 | 0091 | 1 | F | Updates to Clause 5 in TS 38.521-3 | 15.1.0 |
| 2018-12 | RAN#82 | R5-187913 | 0067 | 1 | F | Addition of notes to clarify test point selection into general clause of TS 38.521-3 | 15.1.0 |
| 2018-12 | RAN#82 | R5-188012 | 0057 | 1 | F | Introduction of New test case 6.4B.2.2.3 In-band Emissions for intra-band non-contiguous EN-DC | 15.1.0 |
| 2018-12 | RAN#82 | R5-188013 | 0050 | 1 | F | Addition OBW intra-band contiguous EN-DC | 15.1.0 |
| 2018-12 | RAN#82 | R5-188014 | 0051 | 1 | F | Addition SEM intra-band contiguous EN-DC | 15.1.0 |
| 2018-12 | RAN#82 | R5-188015 | 0064 | 1 | F | Additional Spurious Emissions for Intra-band contiguous EN-DC | 15.1.0 |
| 2018-12 | RAN#82 | R5-188016 | 0065 | 1 | F | Additional Spurious Emissions for Intra-band non-contiguous EN-DC | 15.1.0 |
| 2018-12 | RAN#82 | R5-188017 | 0066 | 1 | F | Additional Spurious emission for inter-band EN-DC | 15.1.0 |
| 2018-12 | RAN#82 | R5-188018 | 0068 | 1 | F | Spurious emission band UE co-existence for intra-band non-contiguous EN-DC | 15.1.0 |
| 2018-12 | RAN#82 | R5-188019 | 0072 | 1 | F | Introduction of In-band Emissions for intra-band contiguous EN-DC | 15.1.0 |
| 2018-12 | RAN#82 | R5-188020 | 0073 | 1 | F | Addition of TC6.3B.3.1 Tx ON/OFF time mask for intra-band contiguous EN-DC | 15.1.0 |
| 2018-12 | RAN#82 | R5-188021 | 0074 | 1 | F | Addition of TC6.3B.3.2 Tx ON/OFF time mask for intra-band non-contiguous EN-DC | 15.1.0 |
| 2018-12 | RAN#82 | R5-188022 | 0075 | 1 | F | Addition of TC6.3B.3.3 Tx ON/OFF time mask for inter-band EN-DC within FR1 | 15.1.0 |
| 2018-12 | RAN#82 | R5-188023 | 0080 | 1 | F | Update of test case 6.5B.2.1.2 Additional spectrum emission mask for intra-band contiguous EN-DC for NS_04 | 15.1.0 |
| 2018-12 | RAN#82 | R5-188024 | 0081 | 1 | F | Update of test case 6.2B.3.1 UE A-MPR for Intra-band contiguous EN-DC for NS_04 | 15.1.0 |
| 2018-12 | RAN#82 | R5-188025 | 0038 | 1 | F | Update Clause 7.5B.3 in TS 38.521-3 | 15.1.0 |
| 2018-12 | RAN#82 | R5-188026 | 0041 | 1 | F | 5G NR_EN_DC with FR1_Text update for Inter-Band RX sensitivity | 15.1.0 |
| 2018-12 | RAN#82 | R5-188027 | 0082 | 1 | F | Update TC 7.4B.3 | 15.1.0 |
| 2018-12 | RAN#82 | R5-188028 | 0036 | 1 | F | Updates of MU in TS 38.521-3 Annex F during RAN5#81 | 15.1.0 |
| 2018-12 | RAN#82 | R5-188029 | 0037 | 1 | F | Updates of TT in TS 38.521-3 Annex F during RAN5#81 | 15.1.0 |
| 2018-12 | RAN#82 | R5-188039 | 0093 | 1 | F | LTE Anchor Link configuration for FR2 | 15.1.0 |
| 2018-12 | RAN#82 | R5-188219 | 0062 | 1 | F | Introduction of receiver spurious emission tests for FR1 inter-band EN-DC | 15.1.0 |
| 2018-12 | RAN#82 | R5-188220 | 0063 | 1 | F | Introduction of wideband intermodulation tests for FR1 inter-band EN-DC | 15.1.0 |
| 2018-12 | RAN#82 | R5-188221 | 0054 | 1 | F | LTE TDD configuration for UE Tx test in EN-DC | 15.1.0 |
| 2018-12 | RAN#82 | R5-188222 | 0069 | 1 | F | Core alignment CR to capture TS 38.101-3 updates during RAN4#89 | 15.1.0 |
| 2019-03 | RAN#83 | R5-191057 | 0165 | - | F | Introduction of TC 7.5B.0 | 15.2.0 |
| 2019-03 | RAN#83 | R5-191157 | 0174 | - | F | Updated EN-DC configuration information in clause 5 | 15.2.0 |
| 2019-03 | RAN#83 | R5-191231 | 0175 | - | F | Adding missing reference to 38.521-3 | 15.2.0 |
| 2019-03 | RAN#83 | R5-191336 | 0176 | - | F | Updates to EN-DC test case 6.2B.2.1, UE Maximum Output Power reduction for Intra-Band Contiguous EN-DC | 15.2.0 |
| 2019-03 | RAN#83 | R5-191339 | 0177 | - | F | Updates to EN-DC test case 6.2B.2.2, UE Maximum Output Power reduction for Intra-Band Non-Contiguous EN-DC | 15.2.0 |
| 2019-03 | RAN#83 | R5-191340 | 0178 | - | F | Adding test case 6.5A.2.3, Adjacent channel leakage ratio for CA without EN-DC | 15.2.0 |
| 2019-03 | RAN#83 | R5-191510 | 0183 | - | F | Shared Risk clarification in TS 38.521-3 | 15.2.0 |
| 2019-03 | RAN#83 | R5-191637 | 0193 | - | F | Updates of TT in TS 38.521-3 Annex F during RAN5#NR4 | 15.2.0 |
| 2019-03 | RAN#83 | R5-191845 | 0200 | - | F | Text update for 7.3B.3 deltaRIB,c deltaRIBNC for EN-DC | 15.2.0 |
| 2019-03 | RAN#83 | R5-191867 | 0205 | - | F | Addition of 7.3B.2.0 Reference sensitivity Minimum Conformance Requirements for EN-DC | 15.2.0 |
| 2019-03 | RAN#83 | R5-192004 | 0215 | - | F | Update of TC 6.2B.1.1 | 15.2.0 |
| 2019-03 | RAN#83 | R5-192005 | 0216 | - | F | Update of TC 6.2B.1.2 | 15.2.0 |
| 2019-03 | RAN#83 | R5-192006 | 0217 | - | F | Update of TC 6.2B.1.3 | 15.2.0 |
| 2019-03 | RAN#83 | R5-192176 | 0224 | - | F | TIB,c updated for CA and EN-DC cases | 15.2.0 |
| 2019-03 | RAN#83 | R5-192177 | 0225 | - | F | Updated to Annex M Dual uplink interferer | 15.2.0 |
| 2019-03 | RAN#83 | R5-192206 | 0228 | - | F | 38.521-3 Common clause updates to clarify leverage across architecture options | 15.2.0 |
| 2019-03 | RAN#83 | R5-192207 | 0229 | - | F | Formatting updates and index correction in TS 38.521-3 | 15.2.0 |

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| 2019-03 | RAN#83 | R5-192208 | 0230 | - | F | 38.521-1 Common clause updates to clarify leverage across architecture options | 15.2.0 |
| 2019-03 | RAN#83 | R5-192209 | 0231 | - | F | 38.521-2 Common clause updates to clarify leverage across architecture options | 15.2.0 |
| 2019-03 | RAN#83 | R5-192242 | 0237 | - | F | Update of test case 6.2B.3.1 UE A-MPR for Intra-band contiguous EN-DC | 15.2.0 |
| 2019-03 | RAN#83 | R5-192243 | 0238 | - | F | Update of test case 6.2B.3.4 UE A-MPR for Inter-Band EN-DC including FR2 | 15.2.0 |
| 2019-03 | RAN#83 | R5-192244 | 0239 | - | F | Update of test case 6.5B.2.1.2 UE Additional spectrum emissions mask for intra-band contiguous EN-DC | 15.2.0 |
| 2019-03 | RAN#83 | R5-192423 | 0157 | 1 | F | Update of TC 7.5B.1 | 15.2.0 |
| 2019-03 | RAN#83 | R5-192424 | 0159 | 1 | F | Introduction of TC 7.5B.4 | 15.2.0 |
| 2019-03 | RAN#83 | R5-192425 | 0166 | 1 | F | Update of TC 7.5B.3 | 15.2.0 |
| 2019-03 | RAN#83 | R5-192427 | 0180 | 1 | F | Introduction of NSA FR1 7.6B.2.1 Inband blocking for intra-band contiguous EN-DC in FR1 | 15.2.0 |
| 2019-03 | RAN#83 | R5-192428 | 0182 | 1 | F | Introduction of NSA FR1 7.6B.2.3 Inband blocking for inter-band EN-DC within FR1 | 15.2.0 |
| 2019-03 | RAN#83 | R5-192429 | 0184 | 1 | F | Introduction of NSA FR1 7.6B.3.1 Out-of-band blocking for intra-band contiguous EN-DC in FR1 | 15.2.0 |
| 2019-03 | RAN#83 | R5-192430 | 0185 | 1 | F | Introduction of NSA FR1 7.6B.3.2 Out-of-band blocking for intra-band non-contiguous EN-DC in FR1 | 15.2.0 |
| 2019-03 | RAN#83 | R5-192431 | 0186 | 1 | F | Introduction of NSA FR1 7.6B.3.3 Out-of-band blocking for inter-band EN-DC within FR1 | 15.2.0 |
| 2019-03 | RAN#83 | R5-192432 | 0187 | 1 | F | Introduction of NSA FR1 7.6B.4.1 Narrow band blocking for intra-band contiguous EN-DC in FR1 | 15.2.0 |
| 2019-03 | RAN#83 | R5-192433 | 0188 | 1 | F | Introduction of NSA FR1 7.6B.4.2 Narrow band blocking for intra-band non-contiguous EN-DC in FR1 | 15.2.0 |
| 2019-03 | RAN#83 | R5-192434 | 0189 | 1 | F | Introduction of NSA FR1 7.6B.4.3 Narrow band blocking for inter-band EN-DC within FR1 | 15.2.0 |
| 2019-03 | RAN#83 | R5-192435 | 0190 | 1 | F | Introduction of NSA FR1 7.7B.1 Spurious Response for intra-band contiguous EN-DC in FR1 | 15.2.0 |
| 2019-03 | RAN#83 | R5-192436 | 0191 | 1 | F | Introduction of NSA FR1 7.7B.2 Spurious Response for intra-band non-contiguous EN-DC in FR1 | 15.2.0 |
| 2019-03 | RAN#83 | R5-192437 | 0192 | 1 | F | Introduction of NSA FR1 7.7B.3 Spurious Response for inter-band EN-DC within FR1 | 15.2.0 |
| 2019-03 | RAN#83 | R5-192438 | 0207 | 1 | F | Text Update for 7.3B.2.2 Reference sensitivity for Intra-band non-contiguous EN-DC | 15.2.0 |
| 2019-03 | RAN#83 | R5-192439 | 0234 | 1 | F | TS 38.521-3 corrections and clean-up to TC categories within Clause 7 | 15.2.0 |
| 2019-03 | RAN#83 | R5-192440 | 0179 | 1 | F | Editorial: Band combinations for Inter-band CA between FR1 and FR2 | 15.2.0 |
| 2019-03 | RAN#83 | R5-192441 | 0232 | 1 | F | TS 38.521-3 clause 5 updates to align with core specification | 15.2.0 |
| 2019-03 | RAN#83 | R5-192442 | 0195 | 1 | F | Addition of TC6.3B.4.3 PRACH Time Mask for inter-band EN-DC within FR1 | 15.2.0 |
| 2019-03 | RAN#83 | R5-192443 | 0220 | 1 | F | Update of EN-DC 6.2B.4.1.3 Configured transmitted power inter-band within FR1 | 15.2.0 |
| 2019-03 | RAN#83 | R5-192445 | 0233 | 1 | F | TS 38.521-3 corrections and clean-up to TC categories within Clause 6 | 15.2.0 |
| 2019-03 | RAN#83 | R5-192453 | 0198 | 1 | F | FR2 NSA Spurious Emission Coexistence test case | 15.2.0 |
| 2019-03 | RAN#83 | R5-192454 | 0199 | 1 | F | FR2 NSA Frequency Error test case | 15.2.0 |
| 2019-03 | RAN#83 | R5-192455 | 0221 | 1 | F | Addition of transmit modulation quality test cases for inter-band EN-DC including FR2 | 15.2.0 |
| 2019-03 | RAN#83 | R5-192456 | 0222 | 1 | F | Introduction 6.5B.1.4 OBW interband EN-DC including FR2 | 15.2.0 |
| 2019-03 | RAN#83 | R5-192457 | 0223 | 1 | F | Introduction 6.5B.2.4.1 SEM interband EN-DC including FR2 | 15.2.0 |
| 2019-03 | RAN#83 | R5-192458 | 0226 | 1 | F | Introduction 6.5B.2.4.3 ACLR interband EN-DC including FR2 | 15.2.0 |
| 2019-03 | RAN#83 | R5-192459 | 0236 | 1 | F | Addition of TC6.3B.1.4 - Minimum Output Power for EN-DC Interband including FR2 | 15.2.0 |
| 2019-03 | RAN#83 | R5-192535 | 0194 | 1 | F | Clean up of occupied bandwidth for EN-DC within FR1 | 15.2.0 |
| 2019-03 | RAN#83 | R5-192600 | 0196 | 1 | F | Addition of TC6.3B.4.1 PRACH Time Mask for intra-band contiguous EN-DC | 15.2.0 |
| 2019-03 | RAN#83 | R5-192601 | 0197 | 1 | F | Addition of TC6.3B.4.2 PRACH Time Mask for intra-band non-contiguous EN-DC | 15.2.0 |
| 2019-03 | RAN#83 | R5-192603 | 0201 | 1 | F | Text Update for 6.5B.3.2 Spurious Emissions for intra-band non-contiguous EN-DC | 15.2.0 |
| 2019-03 | RAN#83 | R5-192604 | 0202 | 1 | F | Text Update for 6.5B.3.1 Spurious Emissions for intra-band contiguous EN-DC | 15.2.0 |
| 2019-03 | RAN#83 | R5-192605 | 0203 | 1 | F | Text Update for 6.5B.3.3 Spurious Emissions for Inter-band EN-DC within FR1 | 15.2.0 |
| 2019-03 | RAN#83 | R5-192606 | 0204 | 1 | F | Text Update for 6.5B.4 Additional Spurious Emissions for EN-DC | 15.2.0 |
| 2019-03 | RAN#83 | R5-192607 | 0209 | 1 | F | Update to Carrier Leakage for intra-band contiguous EN-DC | 15.2.0 |
| 2019-03 | RAN#83 | R5-192608 | 0210 | 1 | F | Introduction of Error Vector Magnitude for intra-band contiguous EN-DC | 15.2.0 |
| 2019-03 | RAN#83 | R5-192609 | 0211 | 1 | F | Update to In-band Emissions for intra-band contiguous EN-DC | 15.2.0 |

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| 2019-03 | RAN#83 | R5-192610 | 0227 | 1 | F | Clarification on UL slots in OBW, SEM and ACLR in TS 38.521-3 | 15.2.0 |
| 2019-03 | RAN#83 | R5-192611 | 0158 | 1 | F | Update of TC 7.5B.2 | 15.2.0 |
| 2019-03 | RAN#83 | R5-192617 | 0167 | 1 | F | Introducing Wideband Intermodulation for intra-band EN-DC in FR1 | 15.2.0 |
| 2019-03 | RAN#83 | R5-192618 | 0168 | 1 | F | Introducing receiver spurious emission for intra-band EN-DC in FR1 | 15.2.0 |
| 2019-03 | RAN#83 | R5-192619 | 0181 | 1 | F | Introduction of NSA FR1 7.6B.2.2 Inband blocking for intra-band non-contiguous EN-DC in FR1 | 15.2.0 |
| 2019-03 | RAN#83 | R5-192620 | 0206 | 1 | F | Text Update for 7.3B.2.1 Reference sensitivity for Intra-band Contiguous EN-DC | 15.2.0 |
| 2019-03 | RAN#83 | R5-192622 | 0170 | 1 | F | Updates of MU in TS 38.521-3 Annex F during RAN5#82 | 15.2.0 |
| 2019-03 | RAN#83 | R5-192623 | 0171 | 1 | F | Updates of TT in TS 38.521-3 Annex F during RAN5#82 | 15.2.0 |
| 2019-03 | RAN#83 | R5-192626 | 0214 | 1 | F | Update of TC 7.4B.2 | 15.2.0 |
| 2019-03 | RAN#83 | R5-192681 | 0235 | 1 | F | Addition of TC6.2B.1.4 - Max Output Power for EN-DC Interband including FR2 | 15.2.0 |
| 2019-03 | RAN#83 | R5-192689 | 0218 | 1 | F | Update of 6.2B.4.1.1 Configured output power Intra-band contiguous EN-DC | 15.2.0 |
| 2019-03 | RAN#83 | R5-192690 | 0219 | 1 | F | Update of EN-DC 6.2B.4.1.2 Configured transmitted power Intra-band non-contiguous | 15.2.0 |
| 2019-03 | RAN#83 | R5-192844 | 0213 | 2 | F | Update of TC 7.4B.1 | 15.2.0 |
| 2019-03 | RAN#83 | R5-192847 | 0212 | 1 | F | Addition of 7.4B.0 | 15.2.0 |
| 2019-03 | RAN#83 | R5-192863 | 0172 | 1 | F | Introduction of TxIM (inter-band EN-DC within FR1) | 15.2.0 |
| 2019-03 | RAN#83 | - | - | - | - | Editorial correction of references to TS 38.508-1 clause 4.6 tables | 15.2.0 |
| 2019-06 | RAN#84 | R5-193539 | 0294 | - | F | Adding missing reference in 38.521-3 | 15.3.0 |
| 2019-06 | RAN#84 | R5-193546 | 0295 | - | F | Updates to 6.2B.2.3, UE Maximum Output power reduction for inter-band EN-DC within FR1 | 15.3.0 |
| 2019-06 | RAN#84 | R5-193547 | 0296 | - | F | Adding test case 6.2B.2.5, UE Maximum Output power reduction for inter-band EN-DC including both FR1 and FR2 | 15.3.0 |
| 2019-06 | RAN#84 | R5-193548 | 0297 | - | F | Update of test case 6.2B.2.1, UE Maximum Output Power reduction for Intra-Band Contiguous EN-DC | 15.3.0 |
| 2019-06 | RAN#84 | R5-193714 | 0309 | - | F | Update of Clause 5.5B Configuration for DC | 15.3.0 |
| 2019-06 | RAN#84 | R5-193719 | 0311 | - | F | Update of TC 7.5B.2 ACS for intra-band non-contiguous 2CC | 15.3.0 |
| 2019-06 | RAN#84 | R5-193720 | 0312 | - | F | Update of TC 7.5B.3 ACS for inter-band FR1 2CC | 15.3.0 |
| 2019-06 | RAN#84 | R5-193722 | 0314 | - | F | Update of TC 7.5B.4.1 ACS for inter-band FR2 2CC | 15.3.0 |
| 2019-06 | RAN#84 | R5-193724 | 0316 | - | F | Introduction of TC 7.5B.4.3 ACS for inter-band FR2 4CC | 15.3.0 |
| 2019-06 | RAN#84 | R5-193725 | 0317 | - | F | Introduction of TC 7.5B.4.4 ACS for inter-band FR2 5CC | 15.3.0 |
| 2019-06 | RAN#84 | R5-193726 | 0318 | - | F | Introduction of TC 7.5B.4.5 ACS for inter-band FR2 6CC | 15.3.0 |
| 2019-06 | RAN#84 | R5-193727 | 0319 | - | F | Introduction of TC 7.5B.5 inter-band FR1 FR2 3CC | 15.3.0 |
| 2019-06 | RAN#84 | R5-193886 | 0320 | - | F | Introduction of NSA FR2 7.6B.2.4.1 | 15.3.0 |
| 2019-06 | RAN#84 | R5-193888 | 0322 | - | F | Update of NSA FR1 7.6B.2.0 | 15.3.0 |
| 2019-06 | RAN#84 | R5-193896 | 0324 | - | F | Update of NSA FR1 7.6B.2.2 | 15.3.0 |
| 2019-06 | RAN#84 | R5-193899 | 0326 | - | F | Update of NSA FR1 7.6B.3.1 | 15.3.0 |
| 2019-06 | RAN#84 | R5-193900 | 0327 | - | F | Update of NSA FR1 7.6B.3.2 | 15.3.0 |
| 2019-06 | RAN#84 | R5-193901 | 0328 | - | F | Update of NSA FR1 7.6B.4.0 | 15.3.0 |
| 2019-06 | RAN#84 | R5-193902 | 0329 | - | F | Update of NSA FR1 7.6B.4.1 | 15.3.0 |
| 2019-06 | RAN#84 | R5-193903 | 0330 | - | F | Update of NSA FR1 7.6B.4.2 | 15.3.0 |
| 2019-06 | RAN#84 | R5-193904 | 0331 | - | F | Update of NSA FR1 7.7B.0 | 15.3.0 |
| 2019-06 | RAN#84 | R5-193905 | 0332 | - | F | Update of NSA FR1 7.7B.1 | 15.3.0 |
| 2019-06 | RAN#84 | R5-193906 | 0333 | - | F | Update of NSA FR1 7.7B.2 | 15.3.0 |
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| 2019-06 | RAN#84 | R5-193947 | 0343 | - | F | Removing invalid test IDs from test case 6.5B.2.1.3 | 15.3.0 |
| 2019-06 | RAN#84 | R5-194016 | 0344 | - | F | 38.521-3 Annex re-alignment | 15.3.0 |
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| 2019-06 | RAN#84 | R5-194128 | 0347 | - | F | Addition SEM intraband non-contiguous EN-DC in TS 38.521-3 | 15.3.0 |
| 2019-06 | RAN#84 | R5-194129 | 0348 | - | F | Addition ACLR intraband non-contiguous EN-DC in TS 38.521-3 | 15.3.0 |
| 2019-06 | RAN#84 | R5-194164 | 0351 | - | F | Update of test case 6.2B.3.1 UE A-MPR for Intra-band contiguous EN-DC | 15.3.0 |
| 2019-06 | RAN#84 | R5-194166 | 0353 | - | F | Update of test case 6.2B.3.3 UE A-MPR for Inter-Band EN-DC within FR1 | 15.3.0 |
| 2019-06 | RAN#84 | R5-194317 | 0359 | - | F | Text Update for 7.3B.2.3 Reference sensitivity for Inter-band EN-DC within FR1 | 15.3.0 |
| 2019-06 | RAN#84 | R5-194318 | 0360 | - | F | Text Update for 7.3B.2.1 Ref sensitivity for Intra-band Contiguous EN-DC | 15.3.0 |
| 2019-06 | RAN#84 | R5-194319 | 0361 | - | F | Text Update for 6.5B.4 Additional Spurious Emissions for EN-DC | 15.3.0 |
| 2019-06 | RAN#84 | R5-194320 | 0362 | - | F | Text Update for 7.3B.3 | 15.3.0 |
| 2019-06 | RAN#84 | R5-194374 | 0366 | - | F | Text Update for 6.5B.3.3.2 Spurious emission band UE co-existence for Inter-band EN-DC within FR1 | 15.3.0 |
| 2019-06 | RAN#84 | R5-194375 | 0367 | - | F | Text Update for 7.3B.2.2 Ref sensitivity for Intra-band Non-Contiguous EN-DC | 15.3.0 |
| 2019-06 | RAN#84 | R5-194376 | 0368 | - | F | Text Update for 7.3B.2.0 Min Requirements of Ref sensitivity for EN-DC | 15.3.0 |
| 2019-06 | RAN#84 | R5-194400 | 0372 | - | F | Update to Carrier Leakage and In-band Emissions for intra-band contiguous EN-DC | 15.3.0 |

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| 2019-06 | RAN#84 | R5-194463 | 0378 | - | F | Update to 6.2.3 A-MPR FR2 NSA | 15.3.0 |
| 2019-06 | RAN#84 | R5-194484 | 0380 | - | F | Update EN-DC Transmit modulation quality test cases | 15.3.0 |
| 2019-06 | RAN#84 | R5-194621 | 0381 | - | F | Update of transmit modulation quality test cases for inter-band EN-DC including FR2 | 15.3.0 |
| 2019-06 | RAN#84 | R5-194706 | 0382 | - | F | TS 38.521-3 clause 5 updates to align with core specification | 15.3.0 |
| 2019-06 | RAN#84 | R5-194707 | 0383 | - | F | TS 38.521-3 updates across clause 6 test cases | 15.3.0 |
| 2019-06 | RAN#84 | R5-194708 | 0384 | - | F | TS 38.521-3 updates across clause 7 test cases | 15.3.0 |
| 2019-06 | RAN#84 | R5-194725 | 0388 | - | F | Update to clarify number of LTE CCs config for anchor agnostic EN-DC RF tests | 15.3.0 |
| 2019-06 | RAN#84 | R5-194934 | 0334 | 1 | F | Update of NSA FR1 RF 6.2B.1.1 MOP | 15.3.0 |
| 2019-06 | RAN#84 | R5-194935 | 0335 | 1 | F | Update of NSA FR1 RF 6.2B.1.2 MOP | 15.3.0 |
| 2019-06 | RAN#84 | R5-194936 | 0337 | 1 | F | Update of NSA FR1 RF 7.4B.1 | 15.3.0 |
| 2019-06 | RAN#84 | R5-194937 | 0338 | 1 | F | Update of NSA FR1 RF 7.4B.2 | 15.3.0 |
| 2019-06 | RAN#84 | R5-194938 | 0298 | 1 | F | Adding test case 6.5A.2.2, Additional Spectrum emissions mask for CA without EN-DC | 15.3.0 |
| 2019-06 | RAN#84 | R5-194941 | 0350 | 1 | F | Introduction of New test case 6.4B.2.3.4 EVM Equalizer Flatness for inter-band EN-DC within FR1 | 15.3.0 |
| 2019-06 | RAN#84 | R5-194942 | 0373 | 1 | F | Update of test case 6.2A.2.1, UE maximum output power reduction for inter-band NR CA between FR1 and FR2 without EN-DC | 15.3.0 |
| 2019-06 | RAN#84 | R5-194943 | 0374 | 1 | F | Update of 6.2B.3.1 A-MPR Intra-band contiguous for NS_35 | 15.3.0 |
| 2019-06 | RAN#84 | R5-194944 | 0375 | 1 | F | Update of 6.2B.3.2 A-MPR for Intra-band non-contiguous with additional test frequencies | 15.3.0 |
| 2019-06 | RAN#84 | R5-194945 | 0376 | 1 | F | Correction of editorial note in 6.5B.2.1.2 | 15.3.0 |
| 2019-06 | RAN#84 | R5-194946 | 0377 | 1 | F | Update to 6.2.3 A-MPR FR1 and FR2 | 15.3.0 |
| 2019-06 | RAN#84 | R5-194947 | 0389 | 1 | F | Updates to E-UTRA, FR1,FR2 IW tests in line with agreed way forward | 15.3.0 |
| 2019-06 | RAN#84 | R5-194948 | 0369 | 1 | F | Addition of msg content in TC 6.3B.4.1 | 15.3.0 |
| 2019-06 | RAN#84 | R5-194949 | 0370 | 1 | F | Addition of msg content in TC 6.3B.4.2 | 15.3.0 |
| 2019-06 | RAN#84 | R5-194950 | 0371 | 1 | F | Addition of msg content in TC 6.3B.4.3 | 15.3.0 |
| 2019-06 | RAN#84 | R5-194951 | 0310 | 1 | F | Update of TC 7.5B.0 ACS for EN-DC | 15.3.0 |
| 2019-06 | RAN#84 | R5-194952 | 0321 | 1 | F | Introduction of NSA FR2 7.6B.2.5 | 15.3.0 |
| 2019-06 | RAN#84 | R5-194953 | 0323 | 1 | F | Update of NSA FR1 7.6B.2.1 | 15.3.0 |
| 2019-06 | RAN#84 | R5-194954 | 0363 | 1 | F | Updated to EN-DC band and TIB information | 15.3.0 |
| 2019-06 | RAN#84 | R5-194955 | 0385 | 1 | F | TS 38.521-3 clause 5 updates to align with core specification | 15.3.0 |
| 2019-06 | RAN#84 | R5-194975 | 0315 | 1 | F | Introduction of TC 7.5B.4.2 ACS for inter-band FR2 3CC | 15.3.0 |
| 2019-06 | RAN#84 | R5-195046 | 0356 | 1 | F | Update to Wideband Intermodulation for EN-DC in FR1- 2CCs | 15.3.0 |
| 2019-06 | RAN#84 | R5-195047 | 0379 | 1 | F | Update to 6.2.3 A-MPR FR1 and FR2 NSA | 15.3.0 |
| 2019-06 | RAN#84 | R5-195049 | 0357 | 1 | F | Correction to 6.5B.3.3.2 Spurious emission band UE co-existence for Inter-band within FR1 | 15.3.0 |
| 2019-06 | RAN#84 | R5-195050 | 0358 | 1 | F | Introducing Wideband Intermodulation for EN-DC including FR1 - 3 CCs | 15.3.0 |
| 2019-06 | RAN#84 | R5-195051 | 0391 | - | F | Update of 6.5B.3.3.2 spurious co-existence inter-band EN-DC FR1 | 15.3.0 |
| 2019-06 | RAN#84 | R5-195091 | 0392 | 1 | F | Update of EN-DC ON_ON time mask test cases | 15.3.0 |
| 2019-06 | RAN#84 | R5-195162 | 0349 | 1 | F | Introduction of New test case 6.4B.2.2.4 EVM Equalizer Flatness for intra-band non-contiguous EN-DC | 15.3.0 |
| 2019-06 | RAN#84 | R5-195163 | 0364 | 1 | F | Clean up FR2 Inter-band EN-DC test cases | 15.3.0 |
| 2019-06 | RAN#84 | R5-195164 | 0390 | 1 | F | Update to UE Maximum Output Power for Inter-Band EN-DC within FR1 | 15.3.0 |
| 2019-06 | RAN#84 | R5-195165 | 0325 | 1 | F | Update of NSA FR1 7.6B.3.0 | 15.3.0 |
| 2019-06 | RAN#84 | R5-195411 | 0386 | 1 | F | TS 38.521-3 updates across clause 6 test cases | 15.3.0 |
| 2019-06 | RAN#84 | R5-195412 | 0387 | 1 | F | TS 38.521-3 updates across clause 7 test cases | 15.3.0 |
| 2019-06 | RAN#84 | R5-195419 | 0393 | 1 | F | EN-DC implementation of FR2 UL demod OTA tests using single pol Rx TE | 15.3.0 |
| 2019-06 | RAN#84 | R5-195436 | 0336 | 1 | F | Update of NSA FR1 RF 6.2B.1.3 MOP | 15.3.0 |
| 2019-06 | RAN#84 | R5-195437 | 0299 | 1 | F | Updates of MU and TT in TS 38.521-3 | 15.3.0 |
| 2019-06 | RAN#84 | R5-195446 | 0394 | 1 | F | Introduction of Tx test cases for FR2 NSA UL CA | 15.3.0 |
| 2019-06 | RAN#84 | R5-193922 | 0340 | - | F | Update of 6.2B.1.3 MOP inter-band adding Rel-16 EN-DC configurations | 16.0.0 |
| 2019-06 | RAN#84 | R5-193923 | 0341 | - | F | Update of 7.3B.2.3 REFSENS inter-band adding Rel-16 EN-DC configurations | 16.0.0 |
| 2019-06 | RAN#84 | R5-194059 | 0345 | - | F | Update of general sections adding Rel-16 EN-DC configurations, Editorial | 16.0.0 |
| 2019-06 | RAN#84 | R5-195054 | 0342 | 1 | F | Update of 6.5B.3.3.2 spurious co-existence inter-band adding Rel-16 EN-DC configurations | 16.0.0 |
| 2019-09 | RAN#85 | R5-197441 | 0397 | 1 | F | Correction of test case numbering for UL CA | 16.1.0 |
| 2019-09 | RAN#85 | R5-197346 | 0398 | 1 | F | Update of UE A_MPR intra band contiguous EN DC test case in 6.2B.3.1 | 16.1.0 |
| 2019-09 | RAN#85 | R5-197347 | 0399 | 1 | F | Update of UE A_MPR intra band non contiguous EN DC test case in 6.2B.3.2 | 16.1.0 |
| 2019-09 | RAN#85 | R5-197348 | 0401 | 1 | F | Addition of test case 6.5B.2.1.2 Additional Spectrum emissions mask for intra band contiguous EN DC | 16.1.0 |
| 2019-09 | RAN#85 | R5-197349 | 0402 | 1 | F | Addition of test case 6.5B.2.2.2 Additional Spectrum emissions mask | 16.1.0 |

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| | | | | | | for intra band non contiguous EN DC | |
| 2019-09 | RAN#85 | R5-197350 | 0403 | 1 | F | Addition of test case 6.5B.2.3.2 Additional Spectrum emissions mask for Inter band EN DC within FR1 | 16.1.0 |
| 2019-09 | RAN#85 | R5-197561 | 0404 | 1 | F | Refsens test case updates | 16.1.0 |
| 2019-09 | RAN#85 | R5-197351 | 0405 | 1 | F | Spurious test case updates | 16.1.0 |
| 2019-09 | RAN#85 | R5-197331 | 0406 | 1 | F | Correction to ACLR inter-band EN-DC FR1 test case | 16.1.0 |
| 2019-09 | RAN#85 | R5-196160 | 0407 | - | F | Clean up test cases 6.4B.2.2 Transmit Modulation Quality | 16.1.0 |
| 2019-09 | RAN#85 | R5-196161 | 0408 | - | F | Update to Annex F for Tx modulation quality test cases | 16.1.0 |
| 2019-09 | RAN#85 | R5-196200 | 0409 | - | F | Correction of uplink power setting for NSA transmitter test cases | 16.1.0 |
| 2019-09 | RAN#85 | R5-197516 | 0410 | 1 | F | Correction of uplink power setting for NSA receiver test cases | 16.1.0 |
| 2019-09 | RAN#85 | R5-196241 | 0411 | - | F | Correction to FR1 Transmit OFF Power | 16.1.0 |
| 2019-09 | RAN#85 | R5-197646 | 0412 | 1 | F | Correction to NR power control in FR1 Out-of-band blocking | 16.1.0 |
| 2019-09 | RAN#85 | R5-197352 | 0414 | 1 | F | Correction to FR1 PRACH time mask for EN-DC | 16.1.0 |
| 2019-09 | RAN#85 | R5-197353 | 0415 | 1 | F | Correction of NR uplink RB allocation for FR1 Inter-Band EN-DC MOP | 16.1.0 |
| 2019-09 | RAN#85 | R5-196290 | 0416 | - | F | Add Annex F.4 Uplink Power window explanation for interworking test cases | 16.1.0 |
| 2019-09 | RAN#85 | R5-196296 | 0417 | - | F | Addition of Clause 7.5A in TS 38.521-3 | 16.1.0 |
| 2019-09 | RAN#85 | R5-197549 | 0418 | 1 | F | Update of 6.2B.1.1 MOP for Intra-band contiguous EN-DC | 16.1.0 |
| 2019-09 | RAN#85 | R5-197550 | 0419 | 1 | F | Update of 6.2B.1.2 MOP for Intra-band non-contiguous EN-DC | 16.1.0 |
| 2019-09 | RAN#85 | R5-196446 | 0421 | - | F | Editorial update of general sections adding Rel-16 EN-DC configurations | 16.1.0 |
| 2019-09 | RAN#85 | R5-196449 | 0422 | - | F | Correction to description of Table 4.5.1-2 | 16.1.0 |
| 2019-09 | RAN#85 | R5-197354 | 0423 | 1 | F | Update for 6.5B.3.1.2 Spurious emission band UE co-existence for intra-band contiguous EN-DC | 16.1.0 |
| 2019-09 | RAN#85 | R5-197553 | 0424 | 1 | F | Update for 6.5B.3.3.2 Spurious emission band UE co-existence for Inter-band within FR1 | 16.1.0 |
| 2019-09 | RAN#85 | R5-197333 | 0425 | 1 | F | Update for 7.3B.2.0 Minimum Conformance Requirements of Reference sensitivity for EN-DC | 16.1.0 |
| 2019-09 | RAN#85 | R5-197636 | 0426 | 2 | F | Update for 7.3B.2.3 Ref sensitivity for Inter-band EN-DC within FR1 | 16.1.0 |
| 2019-09 | RAN#85 | R5-197359 | 0427 | 1 | F | Update for 7.3B.2.1 Reference sensitivity for Intra-band Contiguous EN-DC | 16.1.0 |
| 2019-09 | RAN#85 | R5-197334 | 0428 | 1 | F | Update for 7.3B.3.2 | 16.1.0 |
| 2019-09 | RAN#85 | R5-197335 | 0429 | 1 | F | Update for 7.3B.3 | 16.1.0 |
| 2019-09 | RAN#85 | R5-197337 | 0430 | 1 | F | Update for 7.3B.3.3 | 16.1.0 |
| 2019-09 | RAN#85 | R5-197338 | 0431 | 1 | F | Updated to EN-DC band information | 16.1.0 |
| 2019-09 | RAN#85 | R5-197336 | 0433 | 1 | F | Update of TCs in 7.6B and 7.7B | 16.1.0 |
| 2019-09 | RAN#85 | R5-197554 | 0434 | 1 | F | Updates to 6.2B.2.1, UE Maximum Output Power reduction for Intra-Band Contiguous EN-DC | 16.1.0 |
| 2019-09 | RAN#85 | R5-197555 | 0435 | 1 | F | Update of TC 6.3B.1.1 Minimum Output Power for intra-band contiguous EN-DC | 16.1.0 |
| 2019-09 | RAN#85 | R5-197556 | 0436 | 1 | F | Update of TC 6.3B.1.2 Minimum output power for intra-band non-contiguous EN-DC | 16.1.0 |
| 2019-09 | RAN#85 | R5-197340 | 0437 | 1 | F | Update of TC 6.3B.2.1 Transmit OFF Power for intra-band contiguous EN-DC | 16.1.0 |
| 2019-09 | RAN#85 | R5-197341 | 0438 | 1 | F | Update of TC 6.3B.2.2 Transmit OFF Power for intra-band non-contiguous EN-DC | 16.1.0 |
| 2019-09 | RAN#85 | R5-197342 | 0440 | 1 | F | Update of TC 6.4B.1.1 Frequency error for Intra-band contiguous EN-DC | 16.1.0 |
| 2019-09 | RAN#85 | R5-197557 | 0441 | 1 | F | Update of TC 6.4B.1.2 Frequency error for Intra-band non-contiguous EN-DC | 16.1.0 |
| 2019-09 | RAN#85 | R5-197343 | 0442 | 1 | F | Update of TC 6.4B.1.3 Frequency error for Inter-band EN-DC within FR1 | 16.1.0 |
| 2019-09 | RAN#85 | R5-197647 | 0443 | 1 | F | Correction to 7.8B.2.6 Wideband Intermodulation for EN-DC including FR1 - 3 CCs | 16.1.0 |
| 2019-09 | RAN#85 | R5-197562 | 0448 | 1 | F | Corrections to Reference sensitivity for EN-DC | 16.1.0 |
| 2019-09 | RAN#85 | R5-196842 | 0449 | - | F | Editorial corrections to Additional Spurious Emission test case | 16.1.0 |
| 2019-09 | RAN#85 | R5-197360 | 0450 | 1 | F | Correction to test case 7.4B.3 | 16.1.0 |
| 2019-09 | RAN#85 | R5-197558 | 0452 | 1 | F | Correction to EN-DC Spurious Emissions | 16.1.0 |
| 2019-09 | RAN#85 | R5-197345 | 0456 | 1 | F | Update OBW EN-DC FR2 test case | 16.1.0 |
| 2019-09 | RAN#85 | R5-197339 | 0457 | 1 | F | TS 38.521-3 Section 5 updates to align with core specification (Covered by CR0431R1) | 16.1.0 |
| 2019-09 | RAN#85 | R5-197542 | 0458 | 1 | F | TS 38.521-3 updates across section 6 test cases | 16.1.0 |
| 2019-09 | RAN#85 | R5-197563 | 0459 | 1 | F | TS 38.521-3 updates across section 7 test cases | 16.1.0 |
| 2019-09 | RAN#85 | R5-197559 | 0460 | 1 | F | Updates to 6.2B.2.4, UE Maximum Output Power reduction for Inter-Band EN-DC including FR2 | 16.1.0 |
| 2019-09 | RAN#85 | R5-196946 | 0461 | - | F | Corrections on UE maximum output power for DC in 38.521-3 | 16.1.0 |
| 2019-09 | RAN#85 | R5-197332 | 0462 | 1 | F | Corrections on Minimum conformance requirements of A-MPR in 38.521-3 | 16.1.0 |
| 2019-09 | RAN#85 | R5-196948 | 0463 | - | F | Corrections on clause 5 in 38.521-3 | 16.1.0 |
| 2019-09 | RAN#85 | R5-196949 | 0464 | - | F | Corrections on clause 2-4 in 38.521-3 | 16.1.0 |
| 2019-09 | RAN#85 | R5-197633 | 0465 | - | F | Removing test points for CP-OFDM PI/2 BPSK in test case 6.5B.2.1.1 | 16.1.0 |

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| 2019-12 | RAN#86 | R5-197940 | 0472 | - | F | Addition of 6.2B.1.5 MOP for Inter-Band EN-DC including FR1 and FR2 | 16.2.0 |
| 2019-12 | RAN#86 | R5-197944 | 0475 | - | F | Update of 6.2B.4.1.4 configured transmitted power for Inter-Band EN-DC including FR2 | 16.2.0 |
| 2019-12 | RAN#86 | R5-197945 | 0476 | - | F | Update of 6.2B.4.1.5 configured transmitted power for Inter-Band EN-DC including FR1 and FR2 | 16.2.0 |
| 2019-12 | RAN#86 | R5-197946 | 0477 | - | F | Addition of 7.4A Maximum Input Level for FR1-FR2 CA | 16.2.0 |
| 2019-12 | RAN#86 | R5-197949 | 0480 | - | F | Addition of 7.4B.5 Maximum Input Level for inter-band EN-DC including FR1 and FR2 | 16.2.0 |
| 2019-12 | RAN#86 | R5-198045 | 0485 | - | F | Update of TC 7.5B.0 ACS for EN-DC | 16.2.0 |
| 2019-12 | RAN#86 | R5-198046 | 0486 | - | F | Update of TC 7.5B.1 ACS for intra-band contiguous EN-DC 2CCs | 16.2.0 |
| 2019-12 | RAN#86 | R5-198172 | 0488 | - | F | Updating incorrect note in test procedure | 16.2.0 |
| 2019-12 | RAN#86 | R5-198280 | 0490 | - | F | Introduction of New TC 6.4B.2.1.4 EVM Equalizer Flatness for intra-band contiguous EN-DC | 16.2.0 |
| 2019-12 | RAN#86 | R5-198403 | 0501 | - | F | Correction to TC 6.4B.1.3 test description | 16.2.0 |
| 2019-12 | RAN#86 | R5-198404 | 0502 | - | F | Correction to Additional Spurious Emissions for Inter-band EN-DC within FR1 | 16.2.0 |
| 2019-12 | RAN#86 | R5-198406 | 0504 | - | F | Correction to Spurious emission band UE co-existence for Inter-band within FR1 | 16.2.0 |
| 2019-12 | RAN#86 | R5-198537 | 0509 | - | F | Updates to 6.2B.3.1, UE A-MPR for Intra-band Contig EN-DC | 16.2.0 |
| 2019-12 | RAN#86 | R5-198538 | 0510 | - | F | Updates to 6.2B.3.2, UE A-MPR for Intra-band Non-Contig EN-DC | 16.2.0 |
| 2019-12 | RAN#86 | R5-198539 | 0511 | - | F | Updates to 6.5B.2.1.2, Additional spectrum emission mask for intra-band Contig EN-DC | 16.2.0 |
| 2019-12 | RAN#86 | R5-198559 | 0512 | - | F | Updated to EN-DC band information Rel-16 | 16.2.0 |
| 2019-12 | RAN#86 | R5-198637 | 0513 | - | F | Updated to EN-DC General clause and band information Rel-15 | 16.2.0 |
| 2019-12 | RAN#86 | R5-198685 | 0515 | - | F | Update single allowed info and MPR test description to EN-DC configuration in 38.521-3 | 16.2.0 |
| 2019-12 | RAN#86 | R5-198686 | 0516 | - | F | Corrections on delta TIB for EN-DC configurations in 38.521-3 | 16.2.0 |
| 2019-12 | RAN#86 | R5-198722 | 0519 | - | F | Update for 7.3B.1 General | 16.2.0 |
| 2019-12 | RAN#86 | R5-198734 | 0523 | - | F | Update for 6.5B.3.3.1 General spurious emissions for Inter-band EN-DC within FR1 | 16.2.0 |
| 2019-12 | RAN#86 | R5-198735 | 0524 | - | F | Update for 6.5B.3.3.2 Spurious emission band UE co-existence for Inter-band within FR1 | 16.2.0 |
| 2019-12 | RAN#86 | R5-199088 | 0466 | 1 | F | Updates of MU and TT in TS 38.521-3 | 16.2.0 |
| 2019-12 | RAN#86 | R5-199342 | 0483 | 1 | F | Updates to test case 6.2B.2.1, UE Maximum Output Power reduction for Intra-Band Contiguous EN-DC | 16.2.0 |
| 2019-12 | RAN#86 | R5-199343 | 0487 | 1 | F | Editorial correction of test description in TC 6.4B.2.3.3 | 16.2.0 |
| 2019-12 | RAN#86 | R5-199344 | 0478 | 1 | F | Addition of 7.4B.3 Maximum Input Level for inter-band EN-DC within FR1 | 16.2.0 |
| 2019-12 | RAN#86 | R5-199345 | 0491 | 1 | F | Update of minimum conformance requirements of 7.6B.3 and editorial correction in 7.6B and 7.7B | 16.2.0 |
| 2019-12 | RAN#86 | R5-199346 | 0492 | 1 | F | Addition of 7.6A Blocking Characteristics for CA | 16.2.0 |
| 2019-12 | RAN#86 | R5-199347 | 0493 | 1 | F | Addition of 7.6B.2.3_1 Inband blocking for EN-DC within FR1 (>2 CCs) | 16.2.0 |
| 2019-12 | RAN#86 | R5-199348 | 0495 | 1 | F | Addition of 7.6B.4.3_1 Narrow band blocking for EN-DC within FR1 | 16.2.0 |

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| 2019-12 | RAN#86 | R5-199349 | 0468 | 1 | F | Add Uplink Power window explanation when centred on a target | 16.2.0 |
| 2019-12 | RAN#86 | R5-199350 | 0489 | 1 | F | Correction and addition of uplink power measurement MUs for NSA FR1 TCs | 16.2.0 |
| 2019-12 | RAN#86 | R5-199351 | 0508 | 1 | F | Addition of MU and TT for NSA 7.6B.2.3_1, 7.6B.2.4, 7.6B.2.4_1 and 7.6B.4.3_1 TCs in F.1.3 and F.3.3 | 16.2.0 |
| 2019-12 | RAN#86 | R5-199352 | 0529 | 1 | F | TS 38.521-3 Section 1-5 and Annex updates to align with core specification | 16.2.0 |
| 2019-12 | RAN#86 | R5-199377 | 0471 | 1 | F | Update of 6.2B.1.4 MOP for Inter-Band EN-DC including FR2 | 16.2.0 |
| 2019-12 | RAN#86 | R5-199378 | 0479 | 1 | F | Addition of 7.4B.4 Maximum Input Level for inter-band EN-DC including FR2 | 16.2.0 |
| 2019-12 | RAN#86 | R5-199413 | 0482 | 1 | F | Addition of 2A-7A-7A-66A_n66A | 16.2.0 |
| 2019-12 | RAN#86 | R5-199498 | 0500 | 1 | F | Correction to minimum output power for intra-band EN-DC | 16.2.0 |
| 2019-12 | RAN#86 | R5-199506 | 0496 | 1 | F | Removal of 7.7A Spurious Response for CA | 16.2.0 |
| 2019-12 | RAN#86 | R5-199508 | 0484 | 1 | F | Updates to test case 6.2B.2.2, UE Maximum Output Power reduction for Intra-Band Non-Contiguous EN-DC | 16.2.0 |
| 2019-12 | RAN#86 | R5-199514 | 0469 | 1 | F | Update of 6.2B.1.1 MOP for Intra-Band contiguous EN-DC | 16.2.0 |
| 2019-12 | RAN#86 | R5-199518 | 0467 | 1 | F | Updates of test procedure for MOP and co-existence tests | 16.2.0 |
| 2019-12 | RAN#86 | R5-199519 | 0517 | 1 | F | Update for 6.5B.3.1.1 General spurious emissions for intra-band contiguous EN-DC | 16.2.0 |
| 2019-12 | RAN#86 | R5-199520 | 0518 | 1 | F | Update for 6.5B.3.2.1 General spurious emissions for Intra-band non-contiguous EN-DC | 16.2.0 |
| 2019-12 | RAN#86 | R5-199521 | 0527 | 1 | F | Update for Additional Spurious Emissions for Intra-band contiguous EN-DC | 16.2.0 |
| 2019-12 | RAN#86 | R5-199522 | 0530 | 1 | F | TS 38.521-3 updates across section 6 test cases | 16.2.0 |
| 2019-12 | RAN#86 | R5-199523 | 0526 | 1 | F | Update for 7.3B.2.0 Minimum Conformance Requirements of Reference sensitivity for EN-DC | 16.2.0 |
| 2019-12 | RAN#86 | R5-199524 | 0531 | 1 | F | TS 38.521-3 updates across section 7 test cases | 16.2.0 |
| 2019-12 | RAN#86 | R5-199543 | 0520 | 1 | F | Correction of E-UTRA Mid channel bandwidth | 16.2.0 |
| 2019-12 | RAN#86 | R5-199546 | 0498 | 1 | F | Corrections to DC Config and dual UL interferer | 16.2.0 |
| 2019-12 | RAN#86 | R5-199547 | 0499 | 1 | F | Corrections to EN-DC and NE-DC Configurations | 16.2.0 |
| 2019-12 | RAN#86 | R5-199566 | 0494 | 1 | F | Addition of 7.6B.2.4_1 Inband blocking for inter-band EN-DC including FR2 (>2 CCs) | 16.2.0 |
| 2019-12 | RAN#86 | R5-199567 | 0522 | 1 | F | Update to test case 7.3B.2.3 | 16.2.0 |
| 2019-12 | RAN#86 | R5-199568 | 0525 | 1 | F | Update for 7.3B.2.3 Reference sensitivity for Inter-band EN-DC within FR1 | 16.2.0 |
| 2019-12 | RAN#86 | R5-199569 | 0528 | 1 | F | Update 4.5 Applicability and test coverage rules | 16.2.0 |
| 2020-03 | RAN#87 | R5-200351 | 0538 | - | F | Updated to EN-DC band information Rel-16 | 16.3.0 |
| 2020-03 | RAN#87 | R5-200446 | 0549 | - | F | Correction to FR1 EN-DC Spurious Test Case | 16.3.0 |
| 2020-03 | RAN#87 | R5-200448 | 0551 | - | F | Correction to LTE specialSubframePatterns in Maximum Output Power Test Case | 16.3.0 |
| 2020-03 | RAN#87 | R5-200449 | 0552 | - | F | Correction to tdm-PatternConfig in FR1 EN-DC Maximum Output Power Test Case | 16.3.0 |
| 2020-03 | RAN#87 | R5-200599 | 0553 | - | F | Update of 6.2B.1.3 on inter-band EN-DC MOP in 38.521-3 | 16.3.0 |
| 2020-03 | RAN#87 | R5-200651 | 0558 | - | F | Updates to 6.2B.2.1, UE Maximum Output Power reduction for Intra- | 16.3.0 |

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| 2020-03 | RAN#87 | R5-200653 | 0559 | - | F | Updates to 6.2B.2.2, UE Maximum Output Power reduction for Intra-Band Non-Contiguous EN-DC | 16.3.0 |
| 2020-03 | RAN#87 | R5-200657 | 0560 | - | F | Updates to 6.2B.2.3 and 6.2B.3.3 | 16.3.0 |
| 2020-03 | RAN#87 | R5-200668 | 0561 | - | F | Correction of reference clause for 7.3B.2.3 Reference Sensitivity Test Procedure | 16.3.0 |
| 2020-03 | RAN#87 | R5-200670 | 0563 | - | F | Update reference in Test Requirement section of 6.5B.4.3.5 | 16.3.0 |
| 2020-03 | RAN#87 | R5-200728 | 0568 | - | F | Correction of test cases in 7.6B.2 Inband blocking for DC | 16.3.0 |
| 2020-03 | RAN#87 | R5-200730 | 0569 | - | F | Correction to reference table number for TC 6.2B.2.3 and TC 6.2B.2.4 | 16.3.0 |
| 2020-03 | RAN#87 | R5-200731 | 0570 | - | F | Correction of test cases in 7.6B.3 Out-of-band blocking for DC | 16.3.0 |
| 2020-03 | RAN#87 | R5-200732 | 0571 | - | F | Correction of test cases in 7.6B.4 Narrow band blocking for DC | 16.3.0 |
| 2020-03 | RAN#87 | R5-200733 | 0572 | - | F | Correction of test cases in 7.7B Spurious response for DC | 16.3.0 |
| 2020-03 | RAN#87 | R5-200776 | 0576 | - | F | TS 38.521-3 Section 1-5 and Annex updates to align with core specification | 16.3.0 |
| 2020-03 | RAN#87 | R5-200801 | 0577 | - | F | Update of Non-Standalone FR2 A-MPR test case | 16.3.0 |
| 2020-03 | RAN#87 | R5-200814 | 0579 | - | F | Correction to Test Case 6.5B.3.3.2 | 16.3.0 |
| 2020-03 | RAN#87 | R5-200913 | 0534 | 1 | F | Update of Clause 4 in TS 38.521-3 | 16.3.0 |
| 2020-03 | RAN#87 | R5-200925 | 0541 | 1 | F | Adding common uplink configuration of E-UTRA carrier for EN-DC testing | 16.3.0 |
| 2020-03 | RAN#87 | R5-200926 | 0543 | 1 | F | Updating configured output power for inter-band EN-DC | 16.3.0 |
| 2020-03 | RAN#87 | R5-200927 | 0545 | 1 | F | Updating configured output power for intra-band contiguous EN-DC | 16.3.0 |
| 2020-03 | RAN#87 | R5-200928 | 0547 | 1 | F | Updating configured output power for intra-band non-contiguous EN-DC | 16.3.0 |
| 2020-03 | RAN#87 | R5-200929 | 0567 | 1 | F | Core spec alignment of EN-DC MOP and configured output power | 16.3.0 |
| 2020-03 | RAN#87 | R5-200963 | 0536 | 1 | F | Update of TC 7.5B.2 ACS for intra-band non-contiguous EN-DC 2CCs | 16.3.0 |
| 2020-03 | RAN#87 | R5-200964 | 0535 | 1 | F | Update of TC 7.5B.1 ACS for intra-band contiguous EN-DC 2CCs | 16.3.0 |
| 2020-03 | RAN#87 | R5-200982 | 0557 | 1 | F | Updates to 6.5B.2.1.3, Adjacent channel leakage ratio for intra-band contiguous EN-DC | 16.3.0 |
| 2020-03 | RAN#87 | R5-200983 | 0575 | 1 | F | Corrections to 6.2B.3.1, UE A_MPR for Intra-band Contig EN_DC | 16.3.0 |
| 2020-03 | RAN#87 | R5-200984 | 0533 | 1 | F | Addition of Clause 7.5B.0.3a | 16.3.0 |
| 2020-03 | RAN#87 | R5-200995 | 0578 | 1 | F | Correction of Reference Sensitivity Test Case 7.3B.2.3 | 16.3.0 |
| 2020-03 | RAN#87 | R5-201019 | 0555 | 1 | F | Update of general sections on EN-DC configurations in 38.521-3 | 16.3.0 |
| 2020-03 | RAN#87 | R5-201055 | 0542 | 1 | F | Updating MOP for inter-band EN-DC | 16.3.0 |
| 2020-03 | RAN#87 | R5-201066 | 0564 | 1 | F | Add TX test for Rel16_DC_2_n41 and 66_n41 | 16.3.0 |
| 2020-03 | RAN#87 | R5-201067 | 0565 | 1 | F | Add RX test for Rel16_DC_2_n41 and 66_n41 | 16.3.0 |
| 2020-03 | RAN#87 | R5-201165 | 0574 | 1 | F | Correction of REFSENS for inter-band EN-DC | 16.3.0 |
| 2020-03 | RAN#87 | R5-201187 | 0548 | 1 | F | Addition of a few R16 EN-DC configurations | 16.3.0 |
| 2020-03 | RAN#87 | R5-201193 | 0532 | 1 | F | Updates of MU and TT in TS 38.521-3 | 16.3.0 |
| 2020-03 | RAN#87 | R5-201198 | 0556 | 1 | F | Correcting usage of modifiedMPR-Behaviour | 16.3.0 |
| 2020-06 | RAN#88 | R5-201721 | 0587 | - | F | Update Annex F.4 Uplink Power window explanation | 16.4.0 |

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| 2020-06 | RAN#88 | R5-201855 | 0594 | - | F | Update of 6.2B.1.3 MOP for inter-band EN-DC | 16.4.0 |
| 2020-06 | RAN#88 | R5-201859 | 0596 | - | F | Updating A-SE to align test points with A-MPR | 16.4.0 |
| 2020-06 | RAN#88 | R5-201870 | 0598 | - | F | Update of test configuration in 6.5B.3.3.2 for UE co-existence | 16.4.0 |
| 2020-06 | RAN#88 | R5-201942 | 0605 | - | F | Updated to EN-DC Rel-16 band information in clause 5 | 16.4.0 |
| 2020-06 | RAN#88 | R5-202032 | 0611 | - | F | Correction of Initial condition for OOB intra-band contiguous EN-DC 2 CCs in FR1 in TC 7.6B.3.1 R15 | 16.4.0 |
| 2020-06 | RAN#88 | R5-202293 | 0626 | - | F | Correction to 7.3B.2.3 test configuration for EN-DC 26_n79 | 16.4.0 |
| 2020-06 | RAN#88 | R5-202294 | 0627 | - | F | Correction to Frequency error for Intra-band contiguous EN-DC | 16.4.0 |
| 2020-06 | RAN#88 | R5-202295 | 0628 | - | F | Correction to PRACH configuration for intra-band EN-DC tests | 16.4.0 |
| 2020-06 | RAN#88 | R5-202393 | 0630 | - | F | Addition of Intra-band non-contiguous EN-DC combination | 16.4.0 |
| 2020-06 | RAN#88 | R5-202421 | 0633 | - | F | Update Uplink power control window size for NSA TX TCs | 16.4.0 |
| 2020-06 | RAN#88 | R5-202429 | 0637 | - | F | Update for 7.3A.3 for CA without EN-DC | 16.4.0 |
| 2020-06 | RAN#88 | R5-202475 | 0638 | - | F | TS 38.521-3 Section 1-5 and Annex updates to align with core specification | 16.4.0 |
| 2020-06 | RAN#88 | R5-202725 | 0585 | 1 | F | Correction on the channel bandwidth to use in section 6.5B.3.3 | 16.4.0 |
| 2020-06 | RAN#88 | R5-202726 | 0586 | 1 | F | Setting p-MaxEUTRA to avoid limiting NR power in section 6.5B | 16.4.0 |
| 2020-06 | RAN#88 | R5-202727 | 0590 | 1 | F | Correction to TC 6.2B.4.1.3 | 16.4.0 |
| 2020-06 | RAN#88 | R5-202728 | 0595 | 1 | F | Updating 6.2B.4.x configured output power test cases for FR1 EN-DC | 16.4.0 |
| 2020-06 | RAN#88 | R5-202729 | 0614 | 1 | F | correction 6.3B.1.3 to include anchor agnostic approach applies | 16.4.0 |
| 2020-06 | RAN#88 | R5-202730 | 0616 | 1 | F | Clarification of disabling Tx diversity for FR2 UE for NSA FR2 testing | 16.4.0 |
| 2020-06 | RAN#88 | R5-202731 | 0618 | 1 | F | Updation of 6.5B.3.3.1 | 16.4.0 |
| 2020-06 | RAN#88 | R5-202732 | 0639 | 1 | F | Addition of UL-MIMO EN-DC tests in Clause 6 | 16.4.0 |
| 2020-06 | RAN#88 | R5-202733 | 0641 | 1 | F | Common updates across tests in Clause 6 | 16.4.0 |
| 2020-06 | RAN#88 | R5-202734 | 0640 | 1 | F | Addition of UL-MIMO EN-DC tests in Clause 7 | 16.4.0 |
| 2020-06 | RAN#88 | R5-202735 | 0642 | 1 | F | Common updates across tests in Clause 7 | 16.4.0 |
| 2020-06 | RAN#88 | R5-202782 | 0635 | 1 | F | Update Rx TC for 5 Rel_16_DC_combos | 16.4.0 |
| 2020-06 | RAN#88 | R5-202809 | 0632 | 1 | F | Receiver characteristics testing update to 38.521-3 | 16.4.0 |
| 2020-06 | RAN#88 | R5-202829 | 0601 | 1 | F | Addition of 6.2B.1.5D UE Maximum Output Power for Inter-Band EN-DC including both FR1 and FR2 for UL-MIMO | 16.4.0 |
| 2020-06 | RAN#88 | R5-202830 | 0602 | 1 | F | Addition of 6.2B.5.1.1 Configured Output Power Level for Inter-band NR-DC between FR1 and FR2 | 16.4.0 |
| 2020-06 | RAN#88 | R5-202901 | 0631 | 1 | F | Power control for EN-DC | 16.4.0 |
| 2020-06 | RAN#88 | R5-202902 | 0588 | 1 | F | Updated structure for RefSens for EN-DC within FR1 more than 2CCs | 16.4.0 |
| 2020-06 | RAN#88 | R5-202903 | 0597 | 1 | F | Updating REFSENS for 1A_n78A and 3A_n78A | 16.4.0 |
| 2020-06 | RAN#88 | R5-202904 | 0613 | 1 | F | Introduction of Rx test cases for EN-DC within FR1 3CCs | 16.4.0 |
| 2020-06 | RAN#88 | R5-202905 | 0629 | 1 | F | Update to NSA FR2 Receiver Spurious Emission Test Case | 16.4.0 |
| 2020-06 | RAN#88 | R5-202906 | 0636 | 1 | F | Add 7.3B.2.3_1.2 Reference sensitivity for EN-DC within FR1v - 4 CCs | 16.4.0 |
| 2020-06 | RAN#88 | R5-202907 | 0624 | 1 | F | Updates of FR2 MU and TT in TS 38.521-3 | 16.4.0 |

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| 2020-06 | RAN#88 | R5-202925 | 0634 | 1 | F | Update Tx TC for 5 Rel_16_DC_combos | 16.4.0 |
| 2020-06 | RAN#88 | R5-202934 | 0604 | 1 | F | Addition of TDD-TDD PC2 inter-band EN-DC | 16.4.0 |
| 2020-06 | RAN#88 | R5-202945 | 0592 | 1 | F | Updating 6.2B.1.1 MOP for intra-band contiguous EN-DC | 16.4.0 |
| 2020-06 | RAN#88 | R5-202946 | 0593 | 1 | F | Updating 6.2B.1.2 MOP for intra-band non-contiguous EN-DC | 16.4.0 |
| 2020-06 | RAN#88 | R5-202947 | 0606 | 1 | F | Updates to 6.2B.2.1, UE Maximum Output Power reduction for Intra-Band Contiguous EN-DC | 16.4.0 |
| 2020-06 | RAN#88 | R5-202948 | 0607 | 1 | F | Updates to 6.5B.2.1.1, Spectrum emissions mask for intra-band contiguous EN-DC | 16.4.0 |
| 2020-06 | RAN#88 | R5-202949 | 0608 | 1 | F | Updates to 6.5B.2.1.3, Adjacent channel leakage ratio for intra-band contiguous EN-DC | 16.4.0 |
| 2020-06 | RAN#88 | R5-202959 | 0620 | 1 | F | Updates of Tx test cases for EN-DC including FR2 | 16.4.0 |
| 2020-06 | RAN#88 | R5-202964 | 0622 | 1 | F | Update to configured output power relaxation due to inter-band EN-DC in 38.521-3 | 16.4.0 |
| 2020-06 | RAN#88 | R5-202965 | 0623 | 1 | F | Update to REFSENS relaxation due to inter-band EN-DC in 38.521-3 | 16.4.0 |
| 2020-06 | RAN#88 | R5-202991 | 0609 | 1 | F | Completion of TC 7.6B.3.3 OOB Inter-band EN-DC 2CCs within FR1 R15 | 16.4.0 |
| 2020-06 | RAN#88 | R5-202992 | 0610 | 1 | F | Completion of TC 7.7B.3 Spurious Response Inter-band EN-DC 2CCs within FR1 R15 | 16.4.0 |
| 2020-06 | RAN#88 | R5-202993 | 0612 | 1 | F | Alignment of requirements in 7.6B and 7.7B with core spec for Intra-band contiguous EN-DC in FR1 R15 | 16.4.0 |
| 2020-09 | RAN#89 | R5-203227 | 0644 | - | F | Adding receiver requirements for Rel-16 inter-band EN-DC FR1 band combinations | 16.5.0 |
| 2020-09 | RAN#89 | R5-203294 | 0645 | - | F | Correction of MU definition for test case 6.5B.2.1.3 | 16.5.0 |
| 2020-09 | RAN#89 | R5-203295 | 0646 | - | F | definition of MU and TT for test case 6.3B.4.3 | 16.5.0 |
| 2020-09 | RAN#89 | R5-203296 | 0647 | - | F | definition of MU and TT for test case 6.5B.4.3 | 16.5.0 |
| 2020-09 | RAN#89 | R5-203297 | 0648 | - | F | Definition of MU and TT for test case 7.3B.2.4 | 16.5.0 |
| 2020-09 | RAN#89 | R5-203492 | 0650 | - | F | In-band Blocking FR2 MU updates in 38.521-3 | 16.5.0 |
| 2020-09 | RAN#89 | R5-203515 | 0651 | - | F | Editorial correction of test case 6.5B.3.3.1 | 16.5.0 |
| 2020-09 | RAN#89 | R5-203637 | 0655 | - | F | Introduction of additional Rel-16 EN-DC inter-band configurations to EN-DC MOP test case 6.2B.1.3 | 16.5.0 |
| 2020-09 | RAN#89 | R5-203753 | 0660 | - | F | Update test procedure to 6.5B.3.3.1 | 16.5.0 |
| 2020-09 | RAN#89 | R5-203763 | 0661 | - | F | Editorial correction of referenced clause (6.2.3) in test case 6.2B.2.1.2 | 16.5.0 |
| 2020-09 | RAN#89 | R5-203872 | 0668 | - | F | Adding RRConnectionReconfiguration Table for E-UTRA on FDD band and UE does not support dynamic power sharing in 6.5B.3.3.1 and 6.5B.3.3.2 | 16.5.0 |
| 2020-09 | RAN#89 | R5-203907 | 0669 | - | F | Corrections on delta RIB due to Rel-16 EN-DC configurations | 16.5.0 |
| 2020-09 | RAN#89 | R5-203941 | 0674 | - | F | Addition of the test description to apply LTE agnostic approach in 7.4B.2 MIL | 16.5.0 |
| 2020-09 | RAN#89 | R5-203960 | 0680 | - | F | Correction to additional test points for spurious emission UE co-existence for a few Rel-15 inter-band EN-DC | 16.5.0 |
| 2020-09 | RAN#89 | R5-203973 | 0684 | - | F | Cleaning up of delta_TIB | 16.5.0 |
| 2020-09 | RAN#89 | R5-204154 | 0693 | - | F | Updated to Annex M for EN-DC Rel-16 configuration requirement | 16.5.0 |
| 2020-09 | RAN#89 | R5-204170 | 0697 | - | F | Update for TC 7.5B.0 Minimum Conformance Requirements of ACS | 16.5.0 |

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| 2020-09 | RAN#89 | R5-204176 | 0703 | - | F | Update for TC 7.5B.4 ACS for inter-band EN-DC including FR2 2CCs | 16.5.0 |
| 2020-09 | RAN#89 | R5-204177 | 0704 | - | F | Update for TC 7.5B.4_1.1 ACS for inter-band EN-DC including FR2 3CCs | 16.5.0 |
| 2020-09 | RAN#89 | R5-204178 | 0705 | - | F | Update for TC 7.5B.4_1.2 ACS for inter-band EN-DC including FR2 4CCs | 16.5.0 |
| 2020-09 | RAN#89 | R5-204179 | 0706 | - | F | Update for TC 7.5B.4_1.3 ACS for inter-band EN-DC including FR2 5CCs | 16.5.0 |
| 2020-09 | RAN#89 | R5-204180 | 0707 | - | F | Update for TC 7.5B.4_1.4 ACS for inter-band EN-DC including FR2 6CCs | 16.5.0 |
| 2020-09 | RAN#89 | R5-204198 | 0713 | - | F | Update for 7.3B.2.0 | 16.5.0 |
| 2020-09 | RAN#89 | R5-204199 | 0714 | - | F | Update for Spurious Emissions for intra-band EN-DC | 16.5.0 |
| 2020-09 | RAN#89 | R5-204209 | 0717 | - | F | Update Uplink power control window size for NSA RX TCs | 16.5.0 |
| 2020-09 | RAN#89 | R5-204210 | 0718 | - | F | Update Tx TC for Rel-16 DC combos | 16.5.0 |
| 2020-09 | RAN#89 | R5-204250 | 0721 | - | F | FR2 Minimum output power measurement period definition | 16.5.0 |
| 2020-09 | RAN#89 | R5-204296 | 0726 | - | F | Addition of test case 6.4B.2.4.1D | 16.5.0 |
| 2020-09 | RAN#89 | R5-204297 | 0727 | - | F | Addition of test case 6.4B.2.4.2D | 16.5.0 |
| 2020-09 | RAN#89 | R5-204298 | 0728 | - | F | Addition of test case 6.4B.2.4.3D | 16.5.0 |
| 2020-09 | RAN#89 | R5-204299 | 0729 | - | F | Addition of test case 6.4B.2.4.4D | 16.5.0 |
| 2020-09 | RAN#89 | R5-204310 | 0730 | - | F | Update of test case 6.2B.3.1 UE Additional Maximum Output Power reduction for Intra-band contiguous EN-DC | 16.5.0 |
| 2020-09 | RAN#89 | R5-204313 | 0733 | - | F | TS 38.521-3 Section 1-5 and Annex updates to align with core specification | 16.5.0 |
| 2020-09 | RAN#89 | R5-204322 | 0736 | - | F | Update for TC 7.5B.5 ACS for inter-band EN-DC including both FR1 and FR2 | 16.5.0 |
| 2020-09 | RAN#89 | R5-204349 | 0738 | - | F | Editorial correction of Rx spurious emissions for FR1 EN-DC | 16.5.0 |
| 2020-09 | RAN#89 | R5-204705 | 0739 | - | F | Addition of test configuration for 71AA in 6.2B.1.1 MOP | 16.5.0 |
| 2020-09 | RAN#89 | R5-204707 | 0740 | - | F | Addition of MOP testing for DC_28A_n3A in 6.2B.1.3 | 16.5.0 |
| 2020-09 | RAN#89 | R5-204719 | 0715 | 1 | F | Update for 7.3B.2.3_1.3 Reference sensitivity for EN-DC within FR1 5CCs | 16.5.0 |
| 2020-09 | RAN#89 | R5-204724 | 0662 | 1 | F | Updated to clause 6 for EN-DC Rel-16 band requirement | 16.5.0 |
| 2020-09 | RAN#89 | R5-204766 | 0665 | 1 | F | Spurious inter-band EN-DC FR2 UL MIMO test cases | 16.5.0 |
| 2020-09 | RAN#89 | R5-204767 | 0673 | 1 | F | Addition of test requirement of dropped NR carrier for non-DPS UE in 6.2B.4.x | 16.5.0 |
| 2020-09 | RAN#89 | R5-204768 | 0678 | 1 | F | Addition of additional test points for spurious emission UE co-existence for a few Rel-15 inter-band EN-DC | 16.5.0 |
| 2020-09 | RAN#89 | R5-204769 | 0723 | 1 | F | Editorial correction to EN-DC co-existence requirements | 16.5.0 |
| 2020-09 | RAN#89 | R5-204770 | 0664 | 1 | F | FR2 RefSens inter-band EN-DC UL MIMO test cases | 16.5.0 |
| 2020-09 | RAN#89 | R5-204771 | 0670 | 1 | F | Update of 7.3B.3.3 for REFSENS relaxation due to inter-band EN-DC within FR1 | 16.5.0 |
| 2020-09 | RAN#89 | R5-204772 | 0676 | 1 | F | Addition of new test case 7.4B.5D MIL for inter-band EN-DC including FR1 and FR2 for UL-MIMO | 16.5.0 |
| 2020-09 | RAN#89 | R5-204773 | 0709 | 1 | F | Addition of TC 7.5B.5D ACS for inter-band EN-DC including FR1 and FR2 for UL-MIMO | 16.5.0 |

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| 2020-09 | RAN#89 | R5-204809 | 0643 | 1 | F | Adding transmitter requirements for Rel-16 inter-band EN-DC FR1 band combinations | 16.5.0 |
| 2020-09 | RAN#89 | R5-204810 | 0654 | 1 | F | Editorial correction to spurious emission test case 6.5B.3.3.2 | 16.5.0 |
| 2020-09 | RAN#89 | R5-204811 | 0656 | 1 | F | Introduction of dTIBc for additional Rel-16 EN-DC inter-band configurations | 16.5.0 |
| 2020-09 | RAN#89 | R5-204812 | 0657 | 1 | F | Introduction of Rel-16 EN-DC configuration DC_40A_n1A to spurious emission test case 6.5B.3.3.2 | 16.5.0 |
| 2020-09 | RAN#89 | R5-204813 | 0658 | 1 | F | Introduction of Rel-16 EN-DC configuration DC_40A_n78A to spurious emission test case 6.5B.3.3.2 | 16.5.0 |
| 2020-09 | RAN#89 | R5-204814 | 0679 | 1 | F | Addition of additional test points for spurious emission UE co-existence for a few Rel-16 inter-band EN-DC | 16.5.0 |
| 2020-09 | RAN#89 | R5-204815 | 0694 | 1 | F | Updated to clause 6 for EN-DC Rel-16 configuration test requirement | 16.5.0 |
| 2020-09 | RAN#89 | R5-204816 | 0692 | 1 | F | Updated to EN-DC Rel-16 Configuration information in clause 5 | 16.5.0 |
| 2020-09 | RAN#89 | R5-204840 | 0696 | 1 | F | Updated to EN-DC general clauses for NRSL eV2X | 16.5.0 |
| 2020-09 | RAN#89 | R5-204866 | 0689 | 1 | F | CR to update MU and TT in 38.521-3 | 16.5.0 |
| 2020-09 | RAN#89 | R5-204867 | 0716 | 1 | F | Update for 6.5B.3.3.2 Spurious emission band UE co-existence | 16.5.0 |
| 2020-09 | RAN#89 | R5-204869 | 0649 | 1 | F | Adjacent Channel Selectivity FR2 MU and TT updates in 38.521-3 | 16.5.0 |
| 2020-09 | RAN#89 | R5-204924 | 0666 | 1 | F | Update of Test applicability for some Inter-Band EN-DC including FR2 TCs | 16.5.0 |
| 2020-09 | RAN#89 | R5-204925 | 0687 | 1 | F | Clean up complete status for EN-DC test cases | 16.5.0 |
| 2020-09 | RAN#89 | R5-204926 | 0731 | 1 | F | Addition of pending UL-MIMO tests (FR2) in Clause 6 | 16.5.0 |
| 2020-09 | RAN#89 | R5-204928 | 0681 | 1 | F | Update of NSA Rx test cases for 4Rx UEs | 16.5.0 |
| 2020-09 | RAN#89 | R5-204929 | 0700 | 1 | F | Addition of TC 7.5B.3_1.2 ACS for EN-DC within FR1 4CC | 16.5.0 |
| 2020-09 | RAN#89 | R5-204930 | 0711 | 1 | F | Addition of TC 7.6B.2.5D Inband blocking for inter-band EN-DC including FR1 and FR2 for UL-MIMO | 16.5.0 |
| 2020-09 | RAN#89 | R5-204931 | 0712 | 1 | F | Update for 7.3B.2.3 Ref sense for Inter-band EN-DC within FR1-2 CCs | 16.5.0 |
| 2020-09 | RAN#89 | R5-204932 | 0719 | 1 | F | Re-organization of EN-DC refsens test cases | 16.5.0 |
| 2020-09 | RAN#89 | R5-204957 | 0695 | 1 | F | Updated to clause 7 for EN-DC Rel-16 configuration test requirement | 16.5.0 |
| 2020-09 | RAN#89 | R5-204958 | 0737 | 1 | F | Add Rx TC for 2Rel 16 DC combos | 16.5.0 |
| 2020-09 | RAN#89 | R5-205005 | 0741 | - | F | Update of OOBB and Spurious Response of Inter-band EN-DC within FR1 | 16.5.0 |
| 2020-09 | RAN#89 | R5-205006 | 0690 | 1 | F | Update Refsense exceptions for EN-DC including n78 | 16.5.0 |
| 2020-12 | RAN#90 | R5-205489 | 0749 | - | F | Correction to Reference Sensitivity for Inter-band EN-DC | 16.6.0 |
| 2020-12 | RAN#90 | R5-205500 | 0750 | - | F | Minor correction of section 6.1 | 16.6.0 |
| 2020-12 | RAN#90 | R5-205501 | 0751 | - | F | Correction of spec style in section 7.6B and 7.7B and correction of table number in 7.6B.3.3.4.1 | 16.6.0 |
| 2020-12 | RAN#90 | R5-205502 | 0752 | - | F | Addition of intra-band contiguous EN-DC testing and update of inter-band EN-DC testing for 7.6B.2.3_1.1 Inband blocking for EN-DC within FR1 3 CCs | 16.6.0 |
| 2020-12 | RAN#90 | R5-205503 | 0753 | - | F | Addition of intra-band contiguous EN-DC testing and update of inter-band EN-DC testing for 7.6B.2.3_1.2 Inband blocking for EN-DC within FR1 4 CCs | 16.6.0 |

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| 2020-12 | RAN#90 | R5-205505 | 0755 | - | F | Addition of new test case 7.6B.3.3_1.1 Out-of-band blocking for EN-DC within FR1 3 CCs | 16.6.0 |
| 2020-12 | RAN#90 | R5-205506 | 0756 | - | F | Addition of new test case 7.6B.3.3_1.2 Out-of-band blocking for EN-DC within FR1 4 CCs | 16.6.0 |
| 2020-12 | RAN#90 | R5-205507 | 0757 | - | F | Addition of intra-band contiguous EN-DC testing and update of inter-band EN-DC testing for 7.6B.4.3_1.1 Narrow band blocking for EN-DC within FR1 3 CCs | 16.6.0 |
| 2020-12 | RAN#90 | R5-205508 | 0758 | - | F | Addition of intra-band contiguous EN-DC testing and update of inter-band EN-DC testing for 7.6B.4.3_1.2 Narrow band blocking for EN-DC within FR1 4 CCs | 16.6.0 |
| 2020-12 | RAN#90 | R5-205510 | 0760 | - | F | Addition of new test case 7.7B.3_1.1 Spurious Response for EN-DC within FR1 3 CCs | 16.6.0 |
| 2020-12 | RAN#90 | R5-205511 | 0761 | - | F | Addition of new test case 7.7B.3_1.2 Spurious Response for EN-DC within FR1 4 CCs | 16.6.0 |
| 2020-12 | RAN#90 | R5-205515 | 0763 | - | F | Correction of section 7.1 and update of 7.6B.3.0.3A and 7.7B.0.3A as per RAN4 spec | 16.6.0 |
| 2020-12 | RAN#90 | R5-205516 | 0764 | - | F | Correction of uplink power and in gap test requirement for 7.6B.2.2, 7.6B.3.2, 7.6B.4.2 and 7.7B.2 | 16.6.0 |
| 2020-12 | RAN#90 | R5-205534 | 0768 | - | F | Editorial, removing duplication of text in test case | 16.6.0 |
| 2020-12 | RAN#90 | R5-205568 | 0776 | - | F | Introduction of DC_3A-40A_n1A to reference sensitivity test | 16.6.0 |
| 2020-12 | RAN#90 | R5-205678 | 0778 | - | F | Addition of Clause 7.5B.4D ACS for inter-band EN-DC including FR2 for UL-MIMO | 16.6.0 |
| 2020-12 | RAN#90 | R5-205679 | 0779 | - | F | Addition of Clause 7.6B.2.4D Inband blocking for inter-band EN-DC including FR2 for UL-MIMO | 16.6.0 |
| 2020-12 | RAN#90 | R5-205696 | 0782 | - | F | Editorial correction to EN-DC test cases 6.5B.2.3 | 16.6.0 |
| 2020-12 | RAN#90 | R5-205775 | 0785 | - | F | Adding delta TIB for a few Rel-16 inter-band EN-DC configurations within FR1 | 16.6.0 |
| 2020-12 | RAN#90 | R5-205776 | 0786 | - | F | Adding refsens exceptions for DC_3_n78 due to receiver harmonic mixing | 16.6.0 |
| 2020-12 | RAN#90 | R5-205778 | 0788 | - | F | Adding delta RIB for DC_2-7-66_n78 | 16.6.0 |
| 2020-12 | RAN#90 | R5-205784 | 0790 | - | F | Update of UE co-existence spurious emissions for Rel-16 inter-band EN-DC DC_13_n66 | 16.6.0 |
| 2020-12 | RAN#90 | R5-205788 | 0792 | - | F | Correction to UE co-existence spurious emissions for inter-band EN-DC within FR1 | 16.6.0 |
| 2020-12 | RAN#90 | R5-205803 | 0793 | - | F | Introduction of New TC 6.4B.2.4.2_1.1 Carrier Leakage for inter-band EN-DC including FR2 with 3 CCs | 16.6.0 |
| 2020-12 | RAN#90 | R5-205804 | 0794 | - | F | Introduction of New TC 6.4B.2.4.2_1.2 Carrier Leakage for inter-band EN-DC including FR2 with 4 CCs | 16.6.0 |
| 2020-12 | RAN#90 | R5-205806 | 0795 | - | F | Introduction of New TC 6.4B.2.4.2_1.3 Carrier Leakage for inter-band EN-DC including FR2 with 5 CCs | 16.6.0 |
| 2020-12 | RAN#90 | R5-205855 | 0798 | - | F | Correction of channel bandwidth for EN-DC MOP TC 6.2B.1.3 | 16.6.0 |
| 2020-12 | RAN#90 | R5-205911 | 0803 | - | F | Introduction of DC_3A-20A_n78A to reference sensitivity test | 16.6.0 |
| 2020-12 | RAN#90 | R5-205934 | 0805 | - | F | Update of DC_1A-7A_n78A to reference sensitivity test | 16.6.0 |
| 2020-12 | RAN#90 | R5-205935 | 0806 | - | F | Update DC_7A-20A_n78A to reference sensitivity test | 16.6.0 |
| 2020-12 | RAN#90 | R5-205994 | 0808 | - | F | Updates to Reference sensitivity for EN-DC within FR1 3CC | 16.6.0 |
| 2020-12 | RAN#90 | R5-206018 | 0811 | - | F | Correction of 7.3B.3.3 for delta RIB with inter-band EN-DC configurations | 16.6.0 |

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| 2020-12 | RAN#90 | R5-206029 | 0813 | - | F | Update spurious emission band UE co-existence for DC_2_n41 and DC_66_n41 | 16.6.0 |
| 2020-12 | RAN#90 | R5-206236 | 0832 | - | F | Correction to Rel-16 EN-DC configuration DC_40A_n1A and DC_40A_n78 in spurious emission test case 6.5B.3.3.2 | 16.6.0 |
| 2020-12 | RAN#90 | R5-206237 | 0833 | - | F | Introduction of Rel-16 EN-DC configuration DC_1A_n3A to spurious emission test case 6.5B.3.3.2 | 16.6.0 |
| 2020-12 | RAN#90 | R5-206238 | 0834 | - | F | Introduction of Rel-16 EN-DC configuration DC_20A_n3A to spurious emission test case 6.5B.3.3.2 | 16.6.0 |
| 2020-12 | RAN#90 | R5-206255 | 0835 | - | F | Update for 6.5B.3.2.2 Spurious emission band UE co-existence for intra-band non-contiguous EN-DC | 16.6.0 |
| 2020-12 | RAN#90 | R5-206648 | 0766 | 1 | F | Addition of TC6.3B.1.4D Minimum output power for inter-band EN-DC including FR2 for UL-MIMO | 16.6.0 |
| 2020-12 | RAN#90 | R5-206649 | 0767 | 1 | F | Addition of TC6.3B.3.4 Transmit ON/OFF time mask for inter-band EN-DC including FR2 | 16.6.0 |
| 2020-12 | RAN#90 | R5-206650 | 0777 | 1 | F | Update on Transmit OFF power for EN-DC including FR2 | 16.6.0 |
| 2020-12 | RAN#90 | R5-206651 | 0789 | 1 | F | Update of UE co-existence spurious emissions for a few Rel-15 inter-band EN-DC configurations | 16.6.0 |
| 2020-12 | RAN#90 | R5-206652 | 0796 | 1 | F | Addition of 6.5B.2.4D.3 Adjacent channel leakage ratio for inter-band EN-DC including FR2 for UL-MIMO | 16.6.0 |
| 2020-12 | RAN#90 | R5-206653 | 0799 | 1 | F | Update of 6.2B.1.4_1 MOP for Inter-Band EN-DC including FR2 | 16.6.0 |
| 2020-12 | RAN#90 | R5-206654 | 0821 | 1 | F | Update for 6.5B.3.1.2 Spurious emission band UE co-existence for intra-band contiguous EN-DC | 16.6.0 |
| 2020-12 | RAN#90 | R5-206655 | 0822 | 1 | F | Update for 6.5B.3.3.2 Spurious emission band UE co-existence for Inter-band within FR1 | 16.6.0 |
| 2020-12 | RAN#90 | R5-206656 | 0780 | 1 | F | Update for Clause F.1.3 Measurement of receiver | 16.6.0 |
| 2020-12 | RAN#90 | R5-206657 | 0810 | 1 | F | Correction of 7.3B.3.3 for allowed reference sensitivity relaxation | 16.6.0 |
| 2020-12 | RAN#90 | R5-206658 | 0819 | 1 | F | Update the interferer range for OOBB and Spurious Response of Inter-band EN-DC within FR1 | 16.6.0 |
| 2020-12 | RAN#90 | R5-206659 | 0823 | 1 | F | Update for 7.3B.2.0 Minimum Conformance Requirements of Reference sensitivity for EN-DC | 16.6.0 |
| 2020-12 | RAN#90 | R5-206660 | 0826 | 1 | F | Editor's notes updates for FR1 inter-band 3CC DL CA | 16.6.0 |
| 2020-12 | RAN#90 | R5-206661 | 0762 | 1 | F | Addition of measurement uncertainties and test tolerance for blocking test cases for EN-DC within FR1 with 3CCs, 4CCs and 5CCs and correction of some spec styles | 16.6.0 |
| 2020-12 | RAN#90 | R5-206662 | 0817 | 1 | F | 6.4B.2.1.1 Error Vector Magnitude for intra-band contiguous EN DC Measurement Uncertainty update | 16.6.0 |
| 2020-12 | RAN#90 | R5-206663 | 0818 | 1 | F | 6.4B.2.1.2 Carrier Leakage for intra-band contiguous EN-DC Measurement Uncertainty update | 16.6.0 |
| 2020-12 | RAN#90 | R5-206664 | 0820 | 1 | F | FR1 Intra-band CA General Tx ON OFF time mask measurement uncertainties and test tolerances corrections | 16.6.0 |
| 2020-12 | RAN#90 | R5-206665 | 0836 | 1 | F | TS 38.521-3 Section 1-5 and Annex updates to align with core specification | 16.6.0 |
| 2020-12 | RAN#90 | R5-206720 | 0742 | 1 | F | Introduction of New test case 6.3B.1.4_1.1 Minimum output power for inter-band EN-DC including FR2 - 3 CCs | 16.6.0 |
| 2020-12 | RAN#90 | R5-206721 | 0743 | 1 | F | Introduction of New test case 6.3B.1.4_1.2 Minimum output power for inter-band EN-DC including FR2 - 4 CCs | 16.6.0 |
| 2020-12 | RAN#90 | R5-206722 | 0744 | 1 | F | Introduction of New test case 6.3B.1.4_1.3 Minimum output power for inter-band EN-DC including FR2 - 5 CCs | 16.6.0 |

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| 2020-12 | RAN#90 | R5-206723 | 0745 | 1 | F | Introduction of New test case 6.4B.2.4.1_1.1 Error Vector Magnitude for inter-band EN-DC including FR2 - 3 CCs | 16.6.0 |
| 2020-12 | RAN#90 | R5-206724 | 0746 | 1 | F | Introduction of New test case 6.4B.2.4.1_1.2 Error Vector Magnitude for inter-band EN-DC including FR2 - 4 CCs | 16.6.0 |
| 2020-12 | RAN#90 | R5-206725 | 0747 | 1 | F | Introduction of New test case 6.4B.2.4.1_1.3 Error Vector Magnitude for inter-band EN-DC including FR2 - 5 CCs | 16.6.0 |
| 2020-12 | RAN#90 | R5-206727 | 0787 | 1 | F | Adding refsens exceptions for DC_3_n1 due to cross band isolation | 16.6.0 |
| 2020-12 | RAN#90 | R5-206728 | 0783 | 1 | F | Update to EN-DC R16 Configuration information in clause 5 | 16.6.0 |
| 2020-12 | RAN#90 | R5-206772 | 0781 | 1 | F | Addition of PC2 Tx requirements for DC_3A_n41A | 16.6.0 |
| 2020-12 | RAN#90 | R5-206773 | 0801 | 1 | F | Addition of PC2 Tx requirements for DC_3A_n78A | 16.6.0 |
| 2020-12 | RAN#90 | R5-206784 | 0802 | 1 | F | Updating Rel-16 EN-DC PC2 MOP to add UE power class capability for NR part | 16.6.0 |
| 2020-12 | RAN#90 | R5-206827 | 0829 | 1 | F | Minimum output power editor's notes | 16.6.0 |
| 2020-12 | RAN#90 | R5-206828 | 0828 | 1 | F | Update FR2 TRx MU and TT in 38.521-3 | 16.6.0 |
| 2020-12 | RAN#90 | R5-206869 | 0809 | 1 | F | Updates to Reference sensitivity for EN-DC within FR1 4CC re-structuring test configuration tables | 16.6.0 |
| 2020-12 | RAN#90 | R5-206870 | 0825 | 1 | F | Measurement uncertainties and test tolerances updates for FR1 inter-band 3CC DL CA | 16.6.0 |
| 2020-12 | RAN#90 | R5-206883 | 0772 | 1 | F | Introduction of DC_3A_n1A to reference sensitivity test | 16.6.0 |
| 2020-12 | RAN#90 | R5-206884 | 0773 | 1 | F | Introduction of DC_1A_n3A to reference sensitivity test | 16.6.0 |
| 2020-12 | RAN#90 | R5-206885 | 0774 | 1 | F | Introduction of DC_20A_n3A to reference sensitivity test | 16.6.0 |
| 2020-12 | RAN#90 | R5-206886 | 0775 | 1 | F | Introduction of DC_40A_n78A to reference sensitivity test | 16.6.0 |
| 2020-12 | RAN#90 | R5-206902 | 0769 | 1 | F | Moving test configurations table for EN-DC 20_n78 to a general test configuration table for 2CC reference sensitivity exceptions | 16.6.0 |
| 2020-12 | RAN#90 | R5-206903 | 0770 | 1 | F | Introduction of DC_1A_n78A to reference sensitivity test | 16.6.0 |
| 2020-12 | RAN#90 | R5-206904 | 0771 | 1 | F | Introduction of DC_3A_n78A to reference sensitivity test | 16.6.0 |
| 2020-12 | RAN#90 | R5-206913 | 0754 | 1 | F | Update of 7.6B.2.3_1.3 Inband blocking for EN-DC within FR1 5 CCs and removal of 7.6B.2.3_1.4 Inband blocking for EN-DC within FR1 6 CCs | 16.6.0 |
| 2020-12 | RAN#90 | R5-206914 | 0759 | 1 | F | Update of 7.6B.4.3_1.3 Narrow band blocking for EN-DC within FR1 5 CCs and removal of 7.6B.4.3_1.4 Narrow band blocking for EN-DC within FR1 6 CCs | 16.6.0 |
| 2020-12 | RAN#90 | R5-206915 | 0807 | 1 | F | Updates to Reference sensitivity for EN-DC within FR1 2CC for UE supporting single UL | 16.6.0 |
| 2020-12 | RAN#90 | R5-206916 | 0827 | 1 | F | Update for 7.3B.3.2 | 16.6.0 |
| 2020-12 | RAN#90 | R5-206918 | 0804 | 1 | F | Addition of PC2 Rx requirements for DC_3A_n41A | 16.6.0 |
| 2020-12 | RAN#90 | R5-206919 | 0814 | 1 | F | Addition of PC2 ENDC DC_3A-n78A into TC7.3B.2.3 | 16.6.0 |