3GPP TR 38.905 V15.3.0 (2019-06)

Technical Specification

3rd Generation Partnership Project;
Technical Specification Group Radio Access Network;
NR;
Derivation of test points for radio transmission and reception User Equipment (UE) conformance test cases
(Release 15)

Keywords
RAN, 5G, NR

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Contents

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;
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- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
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1 Scope

The present document specifies and contains the derivation of Test Points for NR RF test cases, thereby 3GPP TSG RAN WG5 will have a way of storing the input contributions provided. The test cases are described in TS38.521-1[2], TS38.521-2[3] and TS38.521-3[4],

The test cases which have been analysed to determine Test Points are included as .zip files.

The present document is applicable from Release 15 up to the release indicated on the front page of the present Terminal conformance specifications.

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 38.521-1: "NR; UE conformance specification; Radio transmission and reception; Part 1: NR range 1".

[3] 3GPP TS 38.521-2: "NR; UE conformance specification; Radio transmission and reception; Part 2: NR range 2".

[4] 3GPP TS 38.521-3: "NR; UE conformance specification; Radio transmission and reception; Part 3: NR interworking between NR range1 + NR range2 and between NR and LTE".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP 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 3GPP TR 21.905 [1].

Other definitions used in the present document are listed in 3GPP TS 38.521-1 [2], 3GPP TS 38.521-2 [3] or 3GPP TS 38.521-3 [4].

Editor’s note: intended to capture definitions

3.2 Symbols

Symbols used in the present document are listed in 3GPP TR 21.905 [1], 3GPP TS 38.521-1 [2], 3GPP TS 38.521-2 [3] or 3GPP TS 38.521-3 [4].

Editor’s note: intended to capture definitions

3.3 Abbreviations

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

Other abbreviations used in the present document are listed in 3GPP TS 38.521-1 [2], or 3GPP, 3GPP TS 38.521-1 [2], 3GPP TS 38.521-2 [3] or 3GPP TS 38.521-3 [4].

Editor's note: intended to capture definitions

4 Test coverage analysis

This clause contains information on test point analysis and test point selection for RX and TX test configuration tables in [2], [3] and [4]. The test point analysis should include selection of:

- Test environment
- Test frequencies
- Test channel bandwidth
- Test Subcarrier Spacing (SCS)
- Downlink configuration including modulation and RB allocation
- Uplink configuration including modulation and RB allocation
- Number of test points

4.1 Test point analysis for FR1

This clause contains information on test point analysis and test point selection for test cases in [2] clause 6 and 7 with information about transmitting test point selection for FR1 listed in table 4.1-1 and receiver test point selection in table 4.1-2.

Table 4.1-1: NR UE transmitter test point selection for FR1

Subclause	Number of test points	Justification in attachment	Comments
6.2.1 UE maximum output power	540	"38.521-1_TPanalysis_6.2.1_MaxOP_v2.zip"	RAN5#82
6.2.2 Maximum Power Reduction (MPR)	power class 3: 1040 power class 2: 920	"38.521-1_TPanalysis_6.2.2_MPR_v2.zip"	RAN5#82
6.2.3 UE A-MPR	Table 4.1.1.1-1	Table 4.1.1.1-1	See Table 4.1.1.1-1
6.2.4 Configured Transmitted Power	30	"38.521-1_TPanalysis_6.2.4_ConfigTP.zip"	RAN5#82
6.2A.1.1 UE maximum output power for CA (2UL CA)	240	"38.521-1_TP analysis_6.2A.1_MOP"	RAN5#83
6.2C.1 Configured UE transmitted Output Power	270	"38.521-1_TPanalysis_6.2C.1_ConfigOPSUL.zip"	RAN5#80
6.2D.1 UE maximum output power for UL-MIMO	FFS	"38.521-1_TPanalysis_6.2.1_MaxOP_v2.zip"	RAN5#82
6.2D.2 Maximum Power Reduction (MPR)	power class 3: 400 power class 2: 400	"38.521-1_TPanalysis_6.2.2_MPR_v2.zip"	RAN5#82
6.2D.3 UE additional maximum output power reduction for UL-MIMO	Table 4.1.1.1-1	Table 4.1.1.1-1	See Table 4.1.1.1-1
6.2D.4 Configured Transmitted Power for UL-MIMO	15	"38.521-1_TPanalysis_6.2D.4_ConfigTP.zip"	RAN5#82
6.3.1 Minimum output power	45	"38.521-1_TPanalysis_6.3.1_MinOP_v3.zip"	RAN5#5-5G-NR Adhoc
6.3.3.2 General ON/OFF time mask	TBD	"38.521-1_TPanalysis_6.3.3.2_OnOff_M_v2.zip"	RAN5#5-5G-NR Adhoc
6.3.3.6 SRS time mask	30	"38.521-1_TPanalysis_6.3.3.3_SRS.zip"	RAN5#82
6.3.4.2 Absolute power tolerance	6	"38.521-1_TPanalysis_6.3.4.2_AbsPtol_v2.zip"	RAN5#83
6.3.4.3 Relative power tolerance	TBD	"38.521-1_TPanalysis_6.3.4.3_RelPtol_v2.zip"	RAN5#83
6.3.4.4 Aggregate power tolerance	PUCCH: 6 PUSCH: 6	"38.521-1_TPanalysis_6.3.4.4_AggPtol_v2.zip"	RAN5#83
6.3A.1.1 Minimum output power for CA (2UL CA)	20	38.521-1_TPanalysis_6.3A.1.1_MinOP_CA.zip	RAN5#83
6.3A.3.1 Transmit ON/OFF time mask for CA (2UL CA)	40	"38.521-1_TPanalysis_6.3A.3.1_ OnOff_M _CA.zip"	RAN5#83
6.3D.1 Minimum output power for UL-MIMO	45	"38.521-1_TPanalysis_6.3.1_MinOP_v3.zip"	RAN5#5-5G-NR Adhoc
6.3D.3 Transmit ON/OFF time mask for UL-MIMO	TBD	"38.521-1_TPanalysis_6.3.3.2_OnOff_M_v2.zip"	RAN5#5-5G-NR Adhoc
6.3D.4.1 Absolute Power tolerance for UL-MIMO	6	"38.521-1_TPanalysis_6.3.4.2_AbsPtol_v2.zip"	RAN5#83
6.3D.4.2 Relative Power Tolerance for UL-MIMO	TBD	"38.521-1_TPanalysis_6.3.4.3_RelPtol_v2.zip"	RAN5#83
6.3D.4.3 Aggregate Power tolerance for UL-MIMO	PUCCH: 6 PUSCH: 6	"38.521-1_TPanalysis_6.3.4.4_AggPtol_v2.zip"	RAN5#83
6.4.1 Frequency error	5	"38.521-1_TPanalysis_6.4.1_FreqErr_v2.zip"	RAN5#2-5G-NR Adhoc RAN5#80
6.4.2.1 Error Vector	PUSCH: 252	"38.521-1_TPanalysis_6.4.2.1_EVM.zip"	RAN5#80

Magnitude	PUCCH: 36 PRACH: 36		
6.4.2.2 Carrier leakage	3	"38.521-1_TPanalysis_6.4.2.2_CarrLeak.zip"	RAN5#80
6.4.2.3 In-band emissions	36	"38.521-1_TPanalysis_6.4.2.3_IE.zip"	RAN5#80
6.4.2.4 EVM equalizer spectrum flatness	90	"38.521-1 TPanalysis_6.4.2.4_EVMequalizerSpectrumFlatness_v2.zip"	RAN5#3-5G-NR
6.4.2.5 EVM equalizer spectrum flatness for Pi/2 BPSK	45	"38.521-1 TPanalysis_6.4.2.5_EVMequalizerSpectrumFlatness_BPSK.zip"	RAN5#81
6.4A.1.1 Frequency error for CA (2UL CA)	5	"38.521-1_TPanalysis on 6.4A.1.1_FreqErr.zip"	RAN5#82
6.4A.2.1.1 Error Vector Magnitude for CA (2UL CA)	168	"38.521-1_TPanalysis on 6.4A.2.1.1_EVM.zip"	RAN5#82
6.4A.2.2.1 Carrier leakage for CA (2UL CA)	2	"38.521-1_TPanalysis on 6.4A.2.2.1_CarrLeak.zip"	RAN5#82
6.4A.2.3.1 In-band emissions for CA (2UL CA)		"38.521-1_TPanalysis on 6.4A.2.2.1_IBE.zip"	RAN5#82
6.4D.3 Time alignment error for UL-MIMO	6	"38.521-1_TPanalysis_6.4D.3_TAE_MIMO.zip"	RAN5#82
6.5.1 Occupied bandwidth	10	"38.521-1_TPanalysis_6.5.1_OccBW_v2.zip	RAN5#82
6.5.2.2 Spectrum Emission Mask	144 for Power Class 3 144 for Power Class 2	"38.521-1_TPanalysis_6.5.2.2_SEM_v2.zip"	RAN5#3-5G-NR-Adhoc
6.5D.2.3 Additional spectrum emission mask for UL-MIMO	Table 4.1.1.1-1	Table 4.1.1.1-1	See Table 4.1.1.1-1
6.5.2.4.1 NR Adjacent channel leakage ratio	920 for Power Class 3 920 for Power Class 2	"38.521-1_TPanalysis_6.5.2.4_ACLR_v3.zip"	RAN5#82
6.5.2.4.2 UTRA Adjacent channel leakage ratio	680	"38.521-1_TPanalysis_6.5.2.4.2_UTRA ACLR.zip"	RAN5#3-5G-NR Adhoc
6.5D.2.4.2 UTRA ACLR for UL-MIMO	96 for NS_3U	"38.521-1_TPanalysis_6.5D.2.4.2_UTRA ALCR_NS_3U.zip"	RAN5#5-5G-NR Adhoc
6.5.3.1 General spurious emissions	27	"38.521-1_TP analysis_6.5.3.1_TX_Spurious_Emission.zip"	RAN5#4-5G-NR Adhoc
6.5.3.2 Spurious emissions for UE co-existence	TBD	"38.521-1_TPanalysis_6.5.3.2_SEcoex.zip"	RAN5#2-5G-NR Adhoc
6.5.4 Transmit intermodulation	8	"38.521-1_TPanalysis_6.5.4_TxIm.zip"	RAN5#80
6.5A.2.2.1 Spectrum emission mask for CA (2UL CA)	112	"38.521-1_TPanalysis on 6.5A.2.2.1_SEM.zip"	RAN5#82
6.5A.2.4.1.1 NR ACLR for CA (2UL CA)	840	"38.521-1_TPanalysis on 6.5A.2.4.1.1_NR ACLR.zip"	RAN5#82
6.5A.2.4.2.1 UTRA ACLR for CA (2UL CA)	840	"38.521-1_TPanalysis on 6.5A.2.4.2.1 UTRA ACLR .zip"	RAN5#82
6.5A.3.1.1 General spurious emissions for CA (2UL CA)	24	"38.521-1_TPanalysis on 6.5A.3.1.1_Spurious.zip"	RAN5#82
6.5A.3.2.1 Spurious emissions for UE co-existence for CA (2UL CA)	3 for CA_n3A-n78A 4 for CA_n8A-n78A	"38.521-1_TPanalysis on 6.5A.3.2.1_SECoex.zip" "	RAN5#82
6.5A.4.1 Transmit intermodulation for CA (2UL CA)	840	"38.521-1_TPanalysis on 6.5A.4.1_TxIM.zip"	RAN5#82
6.5D.1 Occupied		38.521-1_TPanalysis_6.5.1_OBW_v2.zip	RAN5#82

bandwidth for UL-MIMO			
6.5D.2.4.1NR ACLR for UL-MIMO		"38.521-1_TPanalysis_6.5.2.4_ACLR_v3.zip"	RAN5#82
6.5D.3.1 General spurious emissions		"38.521-1_TPanalysis_6.5.3.2_SEcoex_v2.zip"	RAN5#82
6.5D.3.2 Spurious emissions for UE co-existence for UL-MIMO	TBD	"38.521-1_TPanalysis_6.5.3.2_SEcoex_v2.zip"	RAN5#82
6.5D.3.3 Additional spurious emissions for UL-MIMO	Table 4.1.1.1-1	Table 4.1.1.1-1	RAN5#5-5G-NR Adhoc
6.5D.4 Transmit intermodulation for UL-MIMO		"38.521-1_TPanalysis_6.5.4_TxIm_v2.zip"	RAN5#82

Table 4.1-2: NR UE receiver test point selection for FR1

Subclause	Number of test points	Justification in attachment	Comments
7.3 Reference sensitivity power level	45	"38.521-1_TPanalysis_7.3_RefSense_v3.zip"	RAN5#5-5G-NR Adhoc
7.3D.2 Reference sensitivity power level for UL-MIMO		"38.521-1_TPanalysis_7.3_RefSense_v2.zip"	RAN5#82
7.4 Maximum input level	6	"38.521-1_TPanalysis_7.4_Maximun input level_v2.zip"	RAN5#82
7.4D Maximum input level for UL-MIMO		"38.521-1_TPanalysis_7.4_Maximun input level_v2.zip"	RAN5#82
7.5 Adjacent Channel Selectivity	3	"38.521-1_TPanalysis_7.5_ACS_v2.zip"	RAN5#82
7.5A.1 Adjacent channel selectivity for 2DL CA		"38.521-1_TPanalysis_7.5A.1_ACS_2CA.zip"	RAN5#83
7.5D Adjacent Channel Selectivity for UL-MIMO		"38.521-1_TPanalysis_7.5_ACS_v2.zip"	RAN5#82
7.6.2 In Band Blocking	3	"38.521-1_TPanalysis_7.6.2_InB_Block_v2.zip"	RAN5#5-5G-NR Adhoc
7.6.3 Out-of-band blocking	3	"38.521-1_TPanalysis_7.6.3_OobBlocking_v2.zip"	RAN5#5-5G-NR Adhoc
7.6.4 Narrow band blocking	3	"38.521-1_TPanalysis_7.6.4_NarrowbBlocking_v2.zip"	RAN5#5-5G-NR Adhoc
7.6D.2 Inband blocking for UL-MIMO	3	"38.521-1_TPanalysis_7.6.2_InB_Block_v2.zip"	RAN5#5-5G-NR Adhoc
7.6D.3 Out-of-band blocking for UL-MIMO	3	"38.521-1_TPanalysis_7.6.3_OobBlocking_v2.zip"	RAN5#5-5G-NR Adhoc
7.6D.4 Narrow band blocking for UL-MIMO	3	"38.521-1_TPanalysis_7.6.4_NarrowbBlocking_v2.zip"	RAN5#5-5G-NR Adhoc
7.7 Spurious response	3	"38.521-1_TPanalysis_7.7_Spurious response.zip"	RAN5#4-5G-NR Adhoc
7.7D Spurious response for UL-MIMO	3	"38.521-1_TPanalysis_7.6.3_OobBlocking_v2.zip"	RAN5#83
7.8.2 Wide band Intermodulation	3	"38.521-1_TPanalysis_7.8.2_WidebandIntermod_v2.zip"	RAN5#5-5G-NR Adhoc
7.8D.2 Wide band Intermodulation for UL-MIMO	3	"38.521-1_TPanalysis_7.8.2_WidebandIntermod_v2.zip"	RAN5#5-5G-NR Adhoc
7.9 Spurious emissions	3	"38.521-1_TPanalysis_7.9_RxSpurious.zip"	RAN5#81

4.1.1 Test point selection for FR1 in A-MPR test cases

4.1.1.1 A-MPR test cases for single carrier

This section contains information on test point selection for test case 6.2.3 in [2], Additional Maximum Power Reduction (A-MPR).

Selection of test points should include some possible worst combinations based on the A-MPR characteristics specified for each NS value and these shall be selected so that they match with corresponding spectrum emission requirements test points. The number of test points should be realistic.

Table 4.1.1.1-1: NS value specific test points for A-MPR single carrier

NS label	Number of test points	Justification	Comments
NS_04	6.2.3: 220 6.2D.3: 112 6.5D.3.3:112	"38.521-1_TPanalysis_6.2.3_AMPR_NS_04_v2.zip"	RAN5#5-5G-NR Adhoc
NS_35	144 for singular transmission test 72 for UL-MOMO transmission test	"38.521-1_TPanalysis_6.2.3_AMPR_NS_35_v2.zip"	RAN5#5-5G-NR-Adhoc

4.2 Test point analysis for FR2

This clause contains information on test point analysis and test point selection for test cases in [3] clause 6 and 7 with information about transmitting test point selection for FR2 listed in table 4.2-1 and receiver test point selection in table 4.2-2.

Table 4.2-1: NR UE transmitter test point selection for FR2

Subclause	Number of test points	Justification in attachment	Comments
6.2.1 UE maximum output power	x	"38.521-2_TPanalysis_6.2.1_MOP_v2.zip"	RAN5#5-5G-NR Adhoc
6.2.2 UE maximum output power reduction	power class 1: 62 power class 2&4: 72 power class 3: 72	"38.521-2_TPanalysis_6.2.2_MPR"	RAN5#83
6.3.1 Minimum output power	9	"38.521-2_TP analysis_6.3.1_MinOP.zip"	RAN5#4-5G-NR Adhoc
6.3.2 Transmit OFF power	3	"38.521-2_TPanalysis_6.3.2_Tx_OFF_power"	RAN5#83
6.3.4.3 Relative power tolerance	FFS	"38.521-2_TPanalysis_6.3.4.3_RelPtol.zip"	RAN5#82
6.3.4.4 Aggregate power tolerance	PUCCH: 6 PUSCH: 6	"38.521-2_TPanalysis_6.3.4.4_AggPtol.zip"	RAN5#82
6.3A.1.1 Minimum output power for CA (2UL CA)	4	"38.521-2_TP analysis_6.3A.1.1_MinOP.zip"	RAN5#83
6.4.1 Frequency error	1	"38.521-2_TPanalysis_6.4.1_FreqErr.zip"	RAN5#80
6.4.2.1 Error Vector Magnitude	PUSCH: 168 PUCCH: 24 PRACH: 24	"38.521-2_TPanalysis_6.4.2.1_EVM.zip"	RAN5#3-5G-NR Adhoc
6.4.2.2 Carrier leakage	3	"38.521-2_TPanalysis_6.4.2.2_CarrLeak.zip"	RAN5#3-5G-NR Adhoc
6.4.2.3 In-band emissions	PUSCH: 36 PUCCH: 18	"38.521-1_TPanalysis_6.4.2.3_IE.zip"	RAN5#3-5G-NR Adhoc
6.4.2.4 EVM equalizer spectrum flatness	18	"38.521-2_TPanalysis_6.4.2.4_6.4.2.5_EVMequalizerSpectrumFlatness.zip"	RAN5#3-5G-NR Adhoc
6.4.2.5 EVM spectral flatness for pi/2 BPSK modulation with spectrum shaping	9	"38.521-2_TPanalysis_6.4.2.4_6.4.2.5_EVMequalizerSpectrumFlatness.zip"	RAN5#3-5G-NR Adhoc
6.5.1 Occupied Bandwidth	12	"38.521-2_TPanalysis_6.5.1_OccBW.zip"	RAN5#2-5G-NR Adhoc
6.5.2.1 Spectrum Emission Mask	90	"38.521-2_TPanalysis_6.5.2.1_SEM.zip"	RAN5#2-5G-NR Adhoc RAN5#79 RAN5#80
6.5.2.3 Adjacent Channel Leakage Ratio	TBD	"38.521-2_TPanalysis_6.5.2.3_ACLR.zip"	RAN5#2-5G-NR Adhoc
6.5.3.1 Spurious emissions	2	"38.521-2_TPanalysis_6.5.3_TxSpurious.zip"_v1	RAN5#4-5G-NR Adhoc
6.5.3.2 Spurious emissions UE band co-existence	2	"38.521-2_TPanalysis_6.5.3.2_TxSpurCoex.zip"	RAN5#5-5G-NR Adhoc

Table 4.2-2: NR UE receiver test point selection for FR2

Subclause	Number of test points	Justification in attachment	Comments
7.3 Reference sensitivity	9	"38.521-2_TPanalysis_7.3_RefSense.zip"	RAN5#80
7.4 Maximum input level	3	"38.521-2_TPanalysis_7.4_Maximun input level.zip"	RAN5#81
7.5 Adjacent channel selectivity	3	"38.521-2_TPanalysis_7.5 ACS_v1.zip"	RAN5#83
7.6.2 In Band Blocking	3	"38.521-2_TPanalysis_7.6.2 InB_Block_v1.zip"	RAN5#83

4.3 Test point analysis for NR CA and EN-DC

This clause contains information on test point analysis and test point selection for test cases in [4] clause 6 and 7 with information about transmitting test point selection for NR CA and EN-DC listed in table 4.3-1 and receiver test point selection in table 4.3-2.

Table 4.3-1: NR UE transmitter test point selection for NR CA and EN-DC

Subclause	Number of test points	Justification in attachment	Comments
6.2.1 UE maximum output power	TBD	TBD	TBD
6.2B.1.1 UE Maximum Output Power for Intra-Band Contiguous EN-DC	0	"38.521-3_TPanalysis_6.2B.1.1 _MOP_Intra_B_contig.zip"	RAN5#4-5G-NR Adhoc
6.2B.1.2 UE Maximum Output Power for Intra-Band Non-Contiguous EN-DC	630	"38.521-3_TPanalysis_6.2B.1.2 _MOP_Intra_B_non-contig.zip"	RAN5#4-5G-NR Adhoc
6.2B.1.3 UE Maximum Output Power for Inter-Band EN-DC	TBD	"38.521-3_TPanalysis_6.2B.1.3 _MOP_Inter_B_Config.zip"	RAN5#82
6.2.2 Maximum Power Reduction (MPR)	TBD	TBD	TBD
6.2B.2.1 UE Maximum Output Power reduction for Intra-Band Contiguous EN-DC	240 (Note 1)/ 1680 (Note 2)	"38.521-3_TP_analysis_6.2B.2.1_MPR_Intra_B_cont_v2.zip"	RAN5#5-5G-NR Adhoc
6.2B.2.3 UE Maximum Output Power reduction for Inter-Band EN-DC within FR1	Same as Table 4.1-1, test case 6.5.2	Same as Table 4.1-1, test case 6.5.2.	RAN5#3-5G-NR Adhoc
6.2B.2.4 UE Maximum Output Power reduction for Inter-Band EN-DC including FR2	Same as Table 4.2-1, test case 6.2.2	Same as Table 4.2-1, test case 6.2.2	RAN5#5-5G-NR-Adhoc
6.2B.3.1 UE Additional Maximum Output Power reduction for Intra-band contiguous EN-DC	340	"38.521-3_TPanalysis_6.2B.3.1_AMPR_NS_04_v3.zip"	RAN5#81
	8	"38.521-3_TPanalysis_6.2B.3.1_AMPR_NS_35.zip"	RAN5#3-5G-NR Adhoc
6.2B.4.1.1 Configured Output Power Level for Intra-Band Contiguous EN-DC	10	"38.521-3_TPanalysis_6.2B.4.1.1_ConfiguredTP_Intra_B_Contig.zip"	RAN5#82
6.2B.4.1.2 Configured Output Power for Intra-Band Non-Contiguous EN-DC	10	"38.521-3_TPanalysis_6.2B.4.1.2_ConfiguredTP_Intra_B_Non-contig.zip"	RAN5#82
6.2B.4.1.3 Configured Output Power for Inter-Band EN-DC within FR1	10	"38.521-3_TPanalysis_6.2B.4.1.3_ConfiguredTP_Inter_B_within_FR1.zip"	RAN5#82
6.4B.2.1.3 In-band emissions for intra-band contiguous EN-DC	36	"38.521-3_TPanalysis_6.4B.2.1.3_IBE_Intra_B_contig.zip"	RAN5#83
6.5B.1.1 Occupied bandwidth for Intra-Band Contiguous EN-DC	X= intraband ENDC channel BWs supported by UE	"38.521-3_TPanalysis_6.5B.1.1_OBW_Intra_B_contig.zip"	RAN5#3-5G-NR adhoc
6.5B.2.1.1 Spectrum emissions mask for intra-band contiguous EN-DC	304	"38.521-3_TPanalysis_6.5B.2.1.1_SEM_Intra_B_contig.zip"	RAN5#3-5G-NR adhoc
6.5B.3.1 Spurious Emissions for intra-band contiguous EN-DC	1	"38.521-3_TPanalysis_6.5B.3.1 TxSpurious_Intra_B_contig.zip"	RAN5#80
6.5B.3.2 Spurious emission for intra-band contiguous EN-DC	24	"38.521-3_TP_analysis_38.905_6.5B.3_TX_SpurEmission_EN-DC.zip	RAN5#82
6.5B.3.3 Spurious Emissions for Inter-band EN-DC within FR1	24	"38.521-3_TP_analysis_38.905_6.5B.3_TX_SpurEmission_EN-DC.zip"	RAN5#82
NOTE 1: Applicably for a UE not supporting dynamic power sharing. NOTE 2: Applicable for a UE supporting dynamic power sharing.			

Table 4.3-2: NR UE receiver test point selection for NR CA and EN-DC

Subclause	Number of test points	Justification in attachment	Comments
7.3B.2.1 Reference sensitivity for Intra-band Contiguous EN-DC	45	"38.521-3_TP analysis_7.3B.2.1_RxSense_Intra-band Contiguous EN-DC with FR1.zip"	RAN5#35G-NR Adhoc
7.3B.2.3 Reference sensitivity for Inter-band EN-DC within FR1	45	"38.521-3_TP analysis_7.3B.2.3_RxSense_ Inter-band EN-DC with FR1.zip"	RAN5#35G-NR Adhoc
7.4B.1 Maximum Input Level for Intra-Band Contiguous EN-DC	6	"38.521-3_TPanalysis_7.4B.1.1_MaxIL_Intra_B_contig.zip"	RAN5#82
7.4B.2 Maximum Input Level for Intra-Band Non-Contiguous EN-DC	6	"38.521-3_TPanalysis_7.4B.2_MaxIL_Intra_B_noncontig.zip"	RAN5#82
7.8B.2.3 Wideband Intermodulation for inter-band EN-DC within FR1	Same as Table 4.1-2, test case 7.8.2.	Same as Table 4.1-2, test case 7.8.2.	RAN5#81
7.9A.1 Spurious emission for 2DL CA	3	"38.521-1_TPanalysis_7.9A_Spurious Emission_DL CA.zip"	RAN5#82
7.9B.3 Spurious Emissions for inter-band EN-DC within FR1	Same as Table 4.1-2, test case 7.9.	Same as Table 4.1-2, test case 7.9.	RAN5#81

4.4 Test points selection and Frequency ranges to cover in Tx spurious emissions test cases for UL CA

In this case, it is sufficient to verify the minimum requirements in frequency ranges affected by 2nd and 3rd order intermodulation products. The frequency ranges and UL RB allocations used in the test are calculated here.

The analyses are performed per CA configuration and are stored as zip-files as defined in annex A.

Table 4.4-1: Frequency range analysis availability per CA configuration

CA config	Justification	Comments
CA_n3A-n78A	TpAnalysisSpur(n3A-n78A).zip	Added at RAN5#82
CA_n8A-n78A	TpAnalysisSpur(n8A-n78A).zip	Added at RAN5#82

4.5 Test points selection and Frequency ranges to cover in Tx spurious emissions test cases for EN-DC

In this case, it is sufficient to verify the minimum requirements in frequency ranges affected by 2nd and 3rd order intermodulation products. The frequency ranges and UL RB allocations used in the test are calculated here.

The analyses are performed per EN-DC configuration and are stored as zip-files as defined in annex A.

Table 4.5-1: Frequency range analysis availability per EN-DC configuration

EN-DC config	Justification	Comments
DC_3A-n79A	38.521-3_TpAnalysisSpur(DC_3A-n79A).zip	Added at RAN5#83

Annex A: Derivation documents

The documents and spreadsheets used to give the background for the selected test points for each test case are included in the present document as zip files.

The name of the zip shall:

- Include a prefix allowing easier grouping of fi“*38.521-1_TPanalysis*”, “*38.521-2_TPanalysis*” or “*38.521-3_TPanalysis*”.les in the same area, e.g. .
- Include Test Case Number(s) and an abbreviation Test Case Name, e.g. “*6.2.1_MOP*”, “*7.6.2.InB_Block*” or “*6.2.1_MOP+6.2.2_MPR*”.
- In cases where multiple analysis is needed per test cases, e.g. for different CA configurations, include the CA band combination applicable in the parentheses, e.g. add *“(1A-3A)*” for CA_1A-3A.

Concatenated example file name: “*38.521-1_TPanalysis_6.2.1_MOP.zip*”.

If there is an update of test points for a test case the old corresponding zip file shall be replaced with a new zip file with a version stepping in the file name. e.g. “nnn_v2.zip”. The aim is to provide a reference to completed test cases, so that test points for similar test cases can be selected on a common basis.

Annex B: Change history

Change history							
Date	**Meeting**	**TDoc**	**CR**	**Rev**	**Cat**	**Subject/Comment**	**New version**
2017-09	RAN5#76	R5-174704	-	-	-	Draft skeleton TR 38.905	0.0.1
2018-04	RAN5#2-5G-NR Adhoc	R5-181954	-	-	-	Agreed Text Proposal in RAN5#2-5G-NR Adhoc: **R5-181889**, " TP to update TR 38.905 with information on test point analysis " Agreed Test Point Analysis in RAN5#78: **R5-180885**, "Discussion on test point selection for NR Occupied Bandwidth in FR1" **R5-180886**, "Discussion on test point selection for NR SEM in FR1" **R5-180887**, "Discussion on test point selection for NR ACLR in FR1" **R5-181524**, "Discussion on test point selection for Absolute Power Tolerance in FR1" **R5-181525**, "Discussion on test point selection for Aggregate Power Tolerance in FR1" Agreed Test Point Analysis in RAN5#2-5G-NR Adhoc: **R5-182019**, "Discussion of NR FR1 Test Point for TX Spurious Emission test cases " **R5-182024**, "Discussion on test point selection for NR Frequency Error in FR1" **R5-181830**, "Discussion on test point selection for Maximum Output Power in FR1" **R5-181831**, "Discussion on test point selection for Minimum Output Power in FR1**R5-181832**, "Discussion on test point selection for General ON/OFF Time Mask in FR1" **R5-181879**, "Discussion on test point selection for NR In-Band in FR1" **R5-181880**, "Discussion on test point selection for NR ACS in FR1" **R5-182025**, "Discussion on test point selection for NR Frequency Error in FR1" **R5-181905**, "Discussion on test point selection for NR Occupied Bandwidth in FR2" **R5-182030**, "Discussion on test point selection for NR ACLR in FR2" **R5-182042**, "Discussion on test point selection for NR In-Band blocking in FR2" **R5-182044**, "Discussion on test point selection for NR ACS in FR2"	0.1.0
2018-05	RAN5#79	R5-183078	-	-	-	Document title corrected. Agreed Text Proposal in RAN WG5#79: **R5-183963**, "Test Point analysis for FR1 RefSens test case"	0.2.0
2018-08	RAN5#80	R5-185134	-	-	-	**R5-184923**, "Test Point analysis for FR2 RefSense test case" **R5-184961**, "TP for updating TR 38.905 with FR2 Frequency Error test point analysis" **R5-185307**, "TP for updating TR38.905 with FR1 AMPR test point analyses with NS_35" **R5-185309**, "Test Point analysis for FR1 Configured Output Power for SUL" **R5-185311**, "TP for updating TR 38.905 with FR1 Carrier Leakage test point analysis" **R5-185314**, "TP for updating TR 38.905 with FR1 EVM equalizer spectrum flatness test point analysis" **R5-185316**, "TP for updating TR 38.905 with FR1 Frequency Error test point analysis" **R5-185412**, "TP for updating TR 38.905 with EVM test point analysis" **R5-185491**, "Test Point analysis for FR2 TxSpurious test case" **R5-185215**, "TP for updating TR 38.905 with FR2 SEM test point analysis" **R5-185334**, "Discussion of LTE Test point selection for EN-DC with FR1 Tx Spurious emission Test" **R5-185301**, "Discussion on test point selection for NR Out-of-band in FR1" **R5-185423**, "Discussion on Uplink configuration for NR Transmit Intermodulation in FR1" **R5-185216**, "TP for updating TR38.905 with UE AMPR for NS_04 Intra-band contiguous EN-DC" **R5-185319**, "TP for updating TR 38.905 with FR1 In-band Emissions test point analysis"	1.0.0
2018-09	RAN#81	-	-	-	-	raised to v15.0.0 with editorial changes only	15.0.0

2018-12	RAN#82	R5-186454	0016	-	F	TP analysis for test case 6.5.2.4.2	15.1.0
2018-12	RAN#82	R5-186455	0017	-	F	TP analysis for EN-DC test case 6.2B.2.3	15.1.0
2018-12	RAN#82	R5-186609	0018	-	F	TP_analysis for TX spurious emission UE co-existence for intra-band contiguous EN-DC with FR1	15.1.0
2018-12	RAN#82	R5-186610	0019	-	F	TP analysis for Reference sensitivity for Intra-band Contiguous EN-DC with FR1	15.1.0
2018-12	RAN#82	R5-186611	0020	-	F	TP analysis for Reference sensitivity for Inter-band EN-DC with FR1	15.1.0
2018-12	RAN#82	R5-186674	0021	-	F	Test point analysis for AMPR Intra-band contiguous EN-DC in FR1 for NS_35	15.1.0
2018-12	RAN#82	R5-186710	0022	-	F	TP analysis for 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	R5-186791	0028	-	F	TP analysis OBW intraband contiguous EN-DC	15.1.0
2018-12	RAN#82	R5-186792	0029	-	F	TP analysis SEM intraband contiguous EN-DC	15.1.0
2018-12	RAN#82	R5-187035	0031	-	F	Update test points analysis for multiple FR1 test cases	15.1.0
2018-12	RAN#82	R5-187396	0037	-	F	Update of TR 38.905 with SA FR1 A-MPR test point analyses, NS_04	15.1.0
2018-12	RAN#82	R5-188240	0039	1	F	Update of TR 38.905 with EN-DC A-MPR test point analyses, NS_04	15.1.0
2018-12	RAN#82	R5-188227	0041	1	F	Test Point analysis for FR2 Maximum Output Power	15.1.0
2018-12	RAN#82	R5-187489	0042	-	F	TP analysis for FR1 test case 6.3.4.3, relative power tolerance	15.1.0
2018-12	RAN#82	R5-187582	0043	-	F	Discussion on test point selection for EVM in FR2	15.1.0
2018-12	RAN#82	R5-187583	0044	-	F	Discussion on test point selection for Carrier Leakage in FR2	15.1.0
2018-12	RAN#82	R5-187584	0045	-	F	Update of test point selection for EVM equalizer spectrum flatness in FR1	15.1.0
2018-12	RAN#82	R5-187587	0046	-	F	Discussion on test point selection for In-band Emissions in FR2	15.1.0
2018-12	RAN#82	R5-187589	0047	-	F	Discussion on test point selection for EVM equalizer spectrum flatness in FR2	15.1.0
2018-12	RAN#82	R5-187593	0048	-	F	Discussion on test point selection for EVM equalizer spectrum flatness for Pi/2 BPSK in FR1	15.1.0
2018-12	RAN#82	R5-187806	0023	1	F	Test Point analysis for FR1 7.4 Maximum input level	15.1.0
2018-12	RAN#82	R5-187808	0035	1	F	TP analysis for receiver spurious emission tests for FR1 SA	15.1.0
2018-12	RAN#82	R5-187809	0036	1	F	TP analysis for wideband intermodulation tests for FR1 SA	15.1.0
2018-12	RAN#82	R5-187817	0033	1	F	TP analysis for receiver spurious emission tests for FR1 inter-band EN-DC	15.1.0
2018-12	RAN#82	R5-187818	0034	1	F	TP analysis for wideband intermodulation tests for FR1 inter-band EN-DC	15.1.0
2018-12	RAN#82	R5-187836	0025	1	F	Test Point analysis for FR2 7.4 Maximum input level	15.1.0
2018-12	RAN#82	R5-187907	0024	1	F	Test Point analysis for FR1 MPR test case	15.1.0
2019-03	RAN#83	R5-191257	0077	-	F	Test Point analysis for TC 6.3.3.4 PRACH time mask in FR1	15.2.0
2019-03	RAN#83	R5-191260	0078	-	F	Test Point analysis for NR Narrow band in FR1	15.2.0
2019-03	RAN#83	R5-191261	0079	-	F	Test Point analysis for NR spurious response in FR1	15.2.0
2019-03	RAN#83	R5-191337	0081	-	F	Adding test case 6.2B.2.1 to 38.905	15.2.0
2019-03	RAN#83	R5-191678	0086	-	F	Addition of TP analysis of FR2 6.3.1 Minimum output power	15.2.0
2019-03	RAN#83	R5-191811	0087	-	F	Test Point analysis update for FR2 TxSpurious test case	15.2.0
2019-03	RAN#83	R5-191855	0091	-	F	TP_analysis_38.905_6.5.3.1_TX_SpurEmission	15.2.0
2019-03	RAN#83	R5-192002	0104	-	F	Adding test case 7.4B.1 to 38.905	15.2.0
2019-03	RAN#83	R5-192003	0105	-	F	Adding test case 7.4B.2 to 38.905	15.2.0
2019-03	RAN#83	R5-192007	0106	-	F	Adding test case 6.2B.1.1 to 38.905	15.2.0
2019-03	RAN#83	R5-192008	0107	-	F	Adding test case 6.2B.1.2 to 38.905	15.2.0
2019-03	RAN#83	R5-192009	0108	-	F	Adding test case 6.2B.1.3 to 38.905	15.2.0
2019-03	RAN#83	R5-192239	0116	-	F	TP analysis of FR1 time alignment error for UL MIMO	15.2.0
2019-03	RAN#83	R5-192401	0085	1	F	Addition of TP analysis of FR1 6.2.4 Configured transmitted power	15.2.0
2019-03	RAN#83	R5-192404	0099	1	F	TP analysis for FR1 6.5A.2.4.1.1 NR ACLR for CA (2UL CA)	15.2.0
2019-03	RAN#83	R5-192405	0100	1	F	TP analysis for FR1 6.5A.2.4.2.1 UTRA ACLR for CA (2UL CA)	15.2.0
2019-03	RAN#83	R5-192406	0103	1	F	TP analysis for FR1 6.5A.4.1 Transmit intermodulation for CA (2UL CA)	15.2.0
2019-03	RAN#83	R5-192410	0110	1	F	Update of TP analysis of FR1 6.3.1 Minimum Output Power	15.2.0
2019-03	RAN#83	R5-192444	0113	1	F	Addition of TP analysis for EN-DC 6.2B.4.1.3 Configured transmitted power inter-band within FR1	15.2.0
2019-03	RAN#83	R5-192449	0080	1	F	Adding FR2 test case 6.3.4.3 to 38.905	15.2.0
2019-03	RAN#83	R5-192546	0082	1	F	Test Point analysis for FR1 6.3.3.6 SRS time mask	15.2.0
2019-03	RAN#83	R5-192568	0095	1	F	TP analysis for FR1 6.4A.2.1.1 Error Vector Magnitude for CA (2UL CA)	15.2.0
2019-03	RAN#83	R5-192569	0094	1	F	TP analysis for FR1 6.4A.1.1 Frequency error for CA (2UL CA)	15.2.0
2019-03	RAN#83	R5-192571	0096	1	F	TP analysis for FR1 6.4A.2.2.1 Carrier leakage for CA (2UL CA)	15.2.0
2019-03	RAN#83	R5-192572	0097	1	F	TP analysis for FR1 6.4A.2.3.1 In-band emissions for CA (2UL CA)	15.2.0
2019-03	RAN#83	R5-192573	0098	1	F	TP analysis for FR1 6.5A.2.2.1 Spectrum emission mask for CA (2UL CA)	15.2.0
2019-03	RAN#83	R5-192574	0101	1	F	TP analysis for FR1 6.5A.3.1.1 General spurious emissions for CA (2UL CA)	15.2.0
2019-03	RAN#83	R5-192575	0102	1	F	TP analysis for FR1 6.5A.3.2.1 Spurious emissions for UE co-existence for CA (2UL CA)	15.2.0
2019-03	RAN#83	R5-192582	0109	1	F	Add Tp analysis statements for MIMO tests	15.2.0

2019-03	RAN#83	R5-192599	0084	1	F	Update of TP analysis of FR1 6.2.1 MOP	15.2.0
2019-03	RAN#83	R5-192624	0115	1	F	TP_analysis_38.905_6.5B.3_TX_SpurEmission	15.2.0
2019-03	RAN#83	R5-192647	0092	1	F	Addition of Test Point analysis of FR2 6.3.4.4 Aggregate power tolerance	15.2.0
2019-03	RAN#83	R5-192684	0073	1	F	TP analysis for FR1 Rx 7.9A.1 Spurious Emission for 2DL CA	15.2.0
2019-03	RAN#83	R5-192691	0111	1	F	Addition of TP analysis for EN-DC 6.2B.4.1.1 Configured transmitted power Intra-band contiguous	15.2.0
2019-03	RAN#83	R5-192692	0112	1	F	Addition of TP analysis for EN-DC 6.2B.4.1.2 Configured transmitted power Intra-band non-contiguous	15.2.0
2019-03	RAN#83	R5-192846	0114	2	F	Introduction of new section for Tp analysis of Tx spurious	15.2.0
2019-06	RAN#84	R5-193543	0137	-	F	Additional TT analysis for 38.521-3 MPR intra-band contiguous	15.3.0
2019-06	RAN#84	R5-193730	0146	-	F	Addition of test frequency selection of 6.5A.3.2 for Rel-16 CA_n41A-n79A	15.3.0
2019-06	RAN#84	R5-193808	0147	-	F	Addition of TP analysis for power control for UL-MIMO	15.3.0
2019-06	RAN#84	R5-193916	0148	-	F	Update of TP analysis of 6.2D.3 A-MPR for UL-MIMO	15.3.0
2019-06	RAN#84	R5-193919	0149	-	F	Add SA FR1 RF 6.5D.2.4.2 to 38.905	15.3.0
2019-06	RAN#84	R5-194010	0151	-	F	Test Point analysis update for FR2 TxSpurious UE coexistence test case	15.3.0
2019-06	RAN#84	R5-194168	0152	-	F	Updating Annex A; Derivation documents	15.3.0
2019-06	RAN#84	R5-194169	0153	-	F	Update of test points analysis for NS_35 A-MPR FR1 test case	15.3.0
2019-06	RAN#84	R5-194170	0154	-	F	Test point analysis for A-MPR Intra-band contiguous EN-DC; NS_04	15.3.0
2019-06	RAN#84	R5-194257	0155	-	F	TP analysis for Asymmetric CH BWs in Reference Sensitivity Requirements in FR1	15.3.0
2019-06	RAN#84	R5-194402	0158	-	F	Test Point analysis for EN-DC In-band emissions for intra-band contiguous	15.3.0
2019-06	RAN#84	R5-194459	0160	-	F	Update to TP analysis for FR2 Maximum Output Power	15.3.0
2019-06	RAN#84	R5-194904	0142	1	F	Addition of TP analysis for 38.521-1 7.6D.3	15.3.0
2019-06	RAN#84	R5-194907	0163	1	F	Addition of TP analysis for 38.521-1 6.3A.3	15.3.0
2019-06	RAN#84	R5-194909	0164	1	F	Addition of TP analysis for 38.521-1 6.3A.1 FR1	15.3.0
2019-06	RAN#84	R5-194913	0165	-	F	Addition of TP analysis for ACS for 2DL CA in FR1	15.3.0
2019-06	RAN#84	R5-194914	0166	-	F	Addition of TP analysis for FR1 MOP for CA	15.3.0
2019-06	RAN#84	R5-194927	0162	1	F	Addition of test frequency selection of spurious co-existence inter-band for DC 3-n79	15.3.0
2019-06	RAN#84	R5-194931	0141	1	F	Addition of TP analysis for 38.521-1 7.6D.2	15.3.0
2019-06	RAN#84	R5-194932	0143	1	F	Addition of TP analysis for 38.521-1 7.6D.4	15.3.0
2019-06	RAN#84	R5-194933	0144	1	F	Addition of TP analysis for 38.521-1 7.8D.2	15.3.0
2019-06	RAN#84	R5-194959	0167	-	F	Addition of TP analysis for UL-MIMO cases of 6.3D.1 and 6.3D.3	15.3.0
2019-06	RAN#84	R5-194961	0157	1	F	TP analysis for FR2 Tx 6.3A.1.1 Minimum output power for CA 2UL CA	15.3.0
2019-06	RAN#84	R5-194963	0161	1	F	Update SCS test points for FR2 ACS and Inband blocking test cases	15.3.0
2019-06	RAN#84	R5-195055	0150	1	F	Addition of test frequency selection of 6.5B.3.3.2 spurious co-existence inter-band for Rel-16 DC configurations	15.3.0
2019-06	RAN#84	R5-195146	0138	1	F	Addition of TP analysis for SA FR2 6.2.2	15.3.0
2019-06	RAN#84	R5-195148	0139	1	F	Addition of TP analysis for SA FR2 6.3.2	15.3.0
2019-06	RAN#84	R5-195190	0145	1	F	TPanalysis of 7.7D Spurious response for UL-MIMO	15.3.0