

Test Site:  
FCC Test Site No.:  
IC OATS No.:

96997  
IC3475A-1



## ECL-EMC Test Report No.: 11-095

Equipment under test: **ION-M7P/85P/17P/19P 1700MHz Path**  
FCC ID: **XS5-ML7851719P**  
IC ID: **2237E-ML7851719P**  
Type of test: **FCC 47 CFR Part 27 Subpart C: 2011**  
**Miscellaneous Wireless Communication Services**  
**IC RSS-139:2009**  
**Advanced Wireless Services Equipment Operating in**  
**the Bands 1710-1755 MHz and 2110-2155 MHz**

**Measurement Procedures:** 47 CFR Parts 2 (*Frequency Allocations and Radio Treaty Matters; General Rules and Regulations*),  
Part 27:2011 (*Miscellaneous Wireless Communication Services*),  
ANSI/TIA-603-C (2004), *Land Mobile FM or PM Communications Equipment Measurement and Performance Standards*  
IC-GEN General Requirements and Information for the  
Certification of Radiocommunication Equipment

**Test result:** **Passed**

|                   |                    |          |                                     |            |
|-------------------|--------------------|----------|-------------------------------------|------------|
| Date of issue:    | 26.04.11           |          |                                     | Signature: |
| Issue-No.:        | 01                 | Author:  | <b>T. Zahlmann</b><br>Test engineer |            |
| Date of delivery: |                    | Checked: | <b>M. Lehmann</b><br>Head of ECL    |            |
| Test dates:       | 1.04 –<br>05.04.11 |          |                                     |            |
| Pages:            | 33                 |          |                                     |            |

Test Report No.: 11-094

FCC ID: XS5-ML7851719P

IC ID: 2237E-ML7851719P

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**General:**

The purpose of this report is to show compliance to the FCC regulations for devices operating under Part N 22,N°27 of the Code of Federal Regulations title 47.

This report informs about the results of the EMC tests, it only refers to the equipment under test. No part of this report may be reproduced in any form, without written permission.



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## 1 Test Results Summary

| Name of Test                            | FCC Para. No. | FCC Method           | FCC Spec.         | Result   |
|---|---------------|----------------------|-------------------|----------|
| RF Power Output                         | 27.50(d)      | 2.1046               | 1640 Watts/MHz    | Complies |
| Occupied Bandwidth                      | 2.1049        | 2.1049               | Input/Output      | Complies |
| Spurious Emissions at Antenna Terminals | 27.53(h)      | 2.1051               | -13dBm            | Complies |
| Field Strength of Spurious Emissions    | 27.53(m)      | 2.1053<br>TIA/EA-603 | -13dBm<br>E.I.R.P | Complies |
| Frequency Stability                     | 27.54         | 2.1055               | Must stay in band | NA       |

| Name of Test                            | IC Para. No. | IC Method               | Result   |
|---|--------------|-------------------------|----------|
| RF Power Output                         | RSS-139 6.4  | RSS-GEN 4.8             | Complies |
| Occupied Bandwidth                      | RSS-Gen 4.6  | RSS-GEN 4.6.1           | Complies |
| Spurious Emissions at Antenna Terminals | RSS-139 6.5  | RSS-GEN 4.9             | Complies |
| Field Strength of Spurious Emissions    | RSS-139 6.5  | RSS-GEN 4.9<br>SRSP-513 | Complies |
| Frequency Stability                     | RSS-139 6.3  | RSS-GEN 4.7             | NA       |

Frequency stability is not applicable because the device uses a common oscillator to up convert and down convert the RF signal. The EUT does not contain modulation circuitry, or frequency generation, therefore the test was not performed.



## 2 Equipment under test (E.U.T.)

### 2.1 Description

|                                   |                     |                                     |
|-----------------------------------|---------------------|-------------------------------------|
| Kind of equipment                 | ION-M7P/85P/17P/19P |                                     |
| Andrew Ident. Number              | Id.No. 7629728-0002 |                                     |
| Serial no.(SN)                    | 11                  |                                     |
| Revision                          | 00                  |                                     |
| Software version and ID           | n. a.               |                                     |
| Type of modulation and Designator | CDMA (F9W)          | <input checked="" type="checkbox"/> |
|                                   | W-CDMA (F9W)        | <input checked="" type="checkbox"/> |
|                                   | LTE (G7D)           | <input checked="" type="checkbox"/> |
| Frequency Translation             | F1-F1               | <input checked="" type="checkbox"/> |
|                                   | F1-F2               | <input type="checkbox"/>            |
|                                   | N/A                 | <input type="checkbox"/>            |
| Band Selection                    | Software            | <input type="checkbox"/>            |
|                                   | Duplexer            | <input checked="" type="checkbox"/> |
|                                   | Full band           | <input type="checkbox"/>            |

#### 2.1.1 Downlink

|   |                            |
|---|----------------------------|
| Pass band   | 2110 MHz – 2155 MHz        |
| Max. composite output power based on one carrier per path (rated) | 43,14 dBm = 20,61W         |
| Gain  | 10 dB @ Pout BTS of 33 dBm |

#### 2.1.2 Uplink

|           |                     |
|-----------|---------------------|
| Pass band | 1710 MHz – 1755 MHz |
| Gain      | n.a.                |

Note: The EUT does not transmit over the air in the uplink direction.

#### 2.1.3 Description of EUT

ION-M7P/85P/17P/19P is a multi-band, multi-operator remote unit configuration used in conjunction with a master unit in the ION optical distribution system.

This system transports up to four frequency bands simultaneously (700 MHz, 850 MHz, 1700/2100 MHz, 1900 MHz), providing a cost-effective solution for distributing capacity from one or more base stations.

The ION- M7P/85P/17P/19P Repeater consists of one 700 MHz path, one 850 MHz path, one 1700 MHz path and one 1900 MHz, with the intended use of simultaneous transmission. This Test Report describes only the approval of the 1700/2100 MHz path

## 2.1.4 Block diagram of measurement reference points

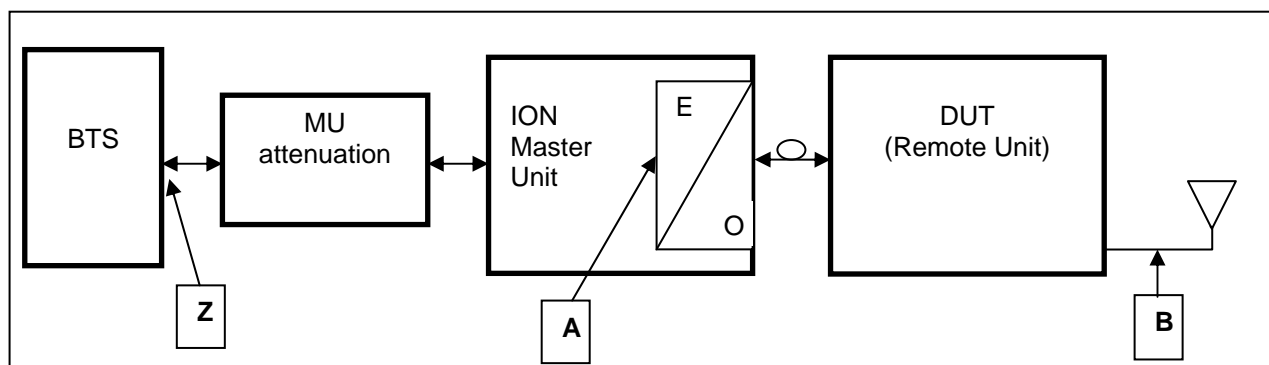


figure 2.1.4-#1 Block diagram of measurement reference points

Remote Unit is the DUT  
O/E Optcal/Electrical converter  
SRMU SubRack Master Unit

Reference point A, SRMU UL output, DL input  
Reference point B, Remote Unit DL output, UL input  
Reference point Z, BTS DL output, BTS UL input

Since a signal generator does not supply a good output signal with +33 or +43dBm, for the downlink measurement the MU Attenuation is not used. That means for downlink measurements the signal generator is connected to measurement point A at the master optical / electrical converter and the analyzer to the measurement point B at the RU.

## 3 Test site (Andrew Buchdorf)

### 3.1 Test environment

All tests were performed under the following environmental conditions:

| Condition           | Minimum value         | Maximum value |
|---------------------|-----------------------|---------------|
| Barometric pressure | 86 kPa                | 106 kPa       |
| Temperature         | 15°C                  | 30°C          |
| Relative Humidity   | 20 %                  | 75 %          |
| Power supply range  | ±5% of rated voltages |               |

### 3.2 Test equipment

| ANDREW Inv. No. | Test equipment    | Type     | Manufacturer | Serial No. | Calibration |
|-----------------|-------------------|----------|--------------|------------|-------------|
| 8372            | Network Analyzer  | 8753D    | HP           | 3410A08675 | 02/11       |
| 8961            | Spectrum Analyzer | FSP-13   | R&S          | 100147/013 | 10/11       |
| 8798            | Spectrum Analyzer | FSQ-26   | R&S          | 100340     | 03/2012     |
| 8849            | Signal Generator  | SMU200A  | R&S          | 101732     | 04/11       |
| 8856            | Signal Generator  | SMIQ 03B | R&S          | 100435     | 12/11       |
| 7192            | Power Attenuator  | 769-30   | Narda        | 07448      | CIU         |
| 7338            | Power Attenuator  | 769-10   | Narda        | 05773      | CIU         |

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|      |                  |           |                |            |     |
|------|------------------|-----------|----------------|------------|-----|
| 7191 | Power Attenuator | 765-20    | Narda          | 0012       | CIU |
| 7119 | Divider          | 2way      | Mikom          | 3512       | CIU |
| 7287 | RF-Cable         | 2,0m; N-N | Huber & Suhner | 28441/4PEA | CIU |
| 7288 | RF-Cable         | 2,0m; N-N | Huber & Suhner | 28442/4PEA | CIU |
| 7391 | RF-Cable         | 1,0m; SMA | Huber & Suhner | 40447/4P   | CIU |
| 7391 | RF-Cable         | 0,5m; SMA | Huber & Suhner | 40225/4P   | CIU |

CIU = Calibrate in use

### 3.3 Input and output losses

All recorded power levels should be referenced to the input and output connectors of the repeater, unless explicitly stated otherwise.

The test equipment used in this test has to be calibrated, so that the functionality is also checked.

All cables, attenuators, splitter, isolator, circulator and combiner etc. must be measured before testing and used for compensation during testing.

### 3.4 Measurement uncertainty

The extended measurement uncertainty corresponds to the measurement results from the standard measurement uncertainty multiplied by the coverage factor  $k=2$ . The true value is located in the corresponding interval with a probability of 95 %.



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## **4 Test site (TEMPTON Service Plus GmbH)**

FCC Test site:

IC OATS:

**See relevant dates under section 8.**

## 5 RF Power Out: §27.50, §2.1046; RSS-139, RSS-GEN

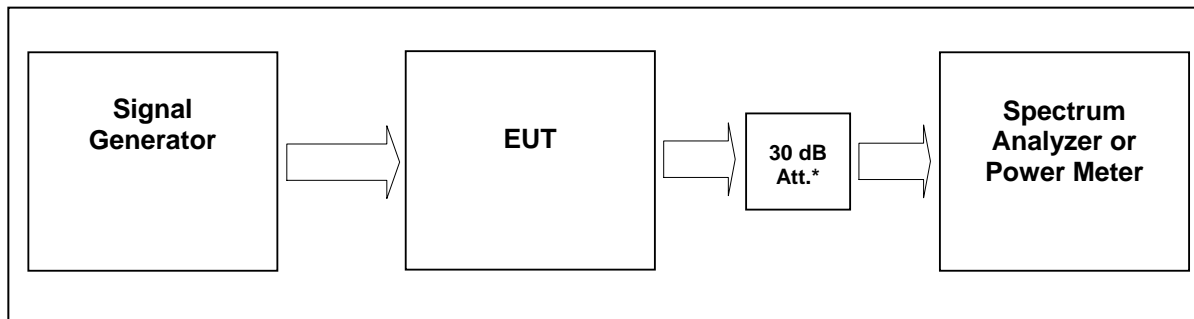


figure 3.4-#1 Test setup: RF Power Out: §27.50, §2.1046; RSS-139, RSS-GEN

|                         |                               |
|-------------------------|-------------------------------|
| Measurement uncertainty | ± 0,38 dB                     |
| Test equipment used     | 8890; 8667; 8668; 8848; 7355; |

### 5.1 Limit

Minimum standard:

Para. No.27.50(d)(2)(B)

(d) The following power and antenna height requirements apply to stations transmitting in the 1710–1755 MHz and 2110–2155 MHz bands:

(2) The power of each fixed or base station transmitting in the 2110–2155 MHz band and situated in any geographic location other than that described in paragraph (d)(1) is limited to:

(B) an EIRP of 1640 watts/MHz when transmitting with an emission bandwidth greater than 1 MHz.

### 5.2 Test method

§ 2.1046 Measurements required: RF power output.

(a) For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in § 2.1033(c)(8). The electrical characteristics of the radio frequency load attached to the output terminals when this test is made shall be stated.

(c) For measurements conducted pursuant to paragraphs (a) and (b) of this section, all calculations and methods used by the applicant for determining carrier power or peak envelope power, as appropriate, on the basis of measured power in the radio frequency load attached to the transmitter output terminals shall be shown. Under the test conditions specified, no components of the emission spectrum shall exceed the limits specified in the applicable rule parts as necessary for meeting occupied bandwidth or emission limitations

### 5.3 Test results

Detector RMS.

#### Test signal CDMA

Signal waveform according to table 6.2-1 of standard specification 3GPP2 C.p0051-0 v1.0 16.February 2006 pilot, sync, paging, 37 traffics, which is equal to the table 6.5.2.1 of 3GPP2 C.S0010-C v2.0 24.February 2006.

#### Test signal WCDMA

Signal waveform according to Test Model 1 of standard specification 3GPP TS25.141. Signal modulated with a combination of PCCPCH, SCCPCH and Dedicated Physical Channels specified as test model 1 64 DPCH.

#### Test signal LTE:

Signal waveform according to Test Model 1.1, E-TM1.1, clause 6.1.1.1-1, table 6.1.1.1-1 of standard specification 3GPP TS 36.141 V9.3.0 (2010-03).

#### 5.3.1 Downlink

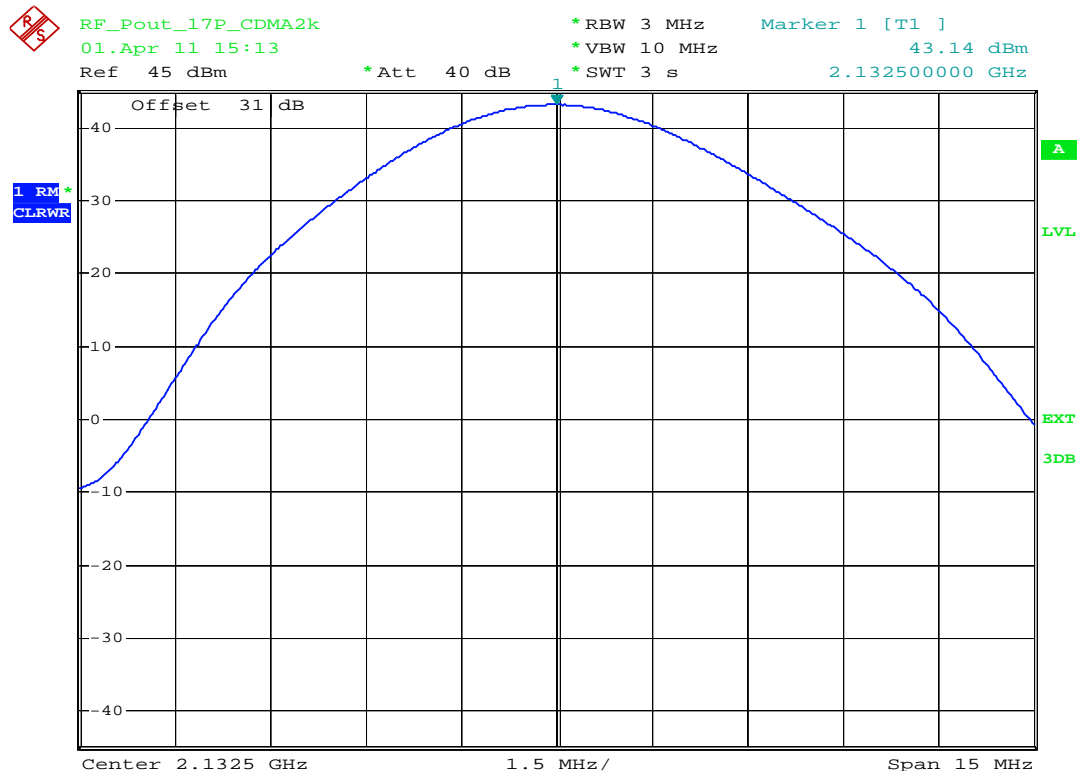
| Modulation                                      | Measured at | RBW<br>VBW<br>Span      | RF Power<br>(dBm) | RF Power<br>(W) | Plot -        |
|---|-------------|-------------------------|-------------------|-----------------|---------------|
| CDMA  | 2132,5 MHz  | 3MHz<br>10MHz<br>15MHz  | 43,14             | 20,61           | 5.3.1.1<br>#1 |
| WCDMA   | 2132,5 MHz  | 10MHz<br>10MHz<br>50MHz | 43,01             | 20,00           | 5.3.1.2<br>#1 |
| LTE   | 2132,5 MHz  | 3MHz<br>10MHz<br>50MHz  | 43,04             | 20,14           | 5.3.1.3<br>#1 |
| Maximum output power = 43,14 dBm -> 20,61W      |             |                         |                   |                 |               |
| Limit Maximum output power = 160 W -> 52,04 dBm |             |                         |                   |                 |               |

table 5.3.1-#1 RF Power Out: §27.50, §2.1046; RSS-139, RSS-GEN Test results Downlink

| Modulation | Pin / dBm<br>(Ref. point B) |
|------------|-----------------------------|
| CDMA       | 2,9                         |
| WCDMA      | 3,0                         |
| LTE        | 3,0                         |

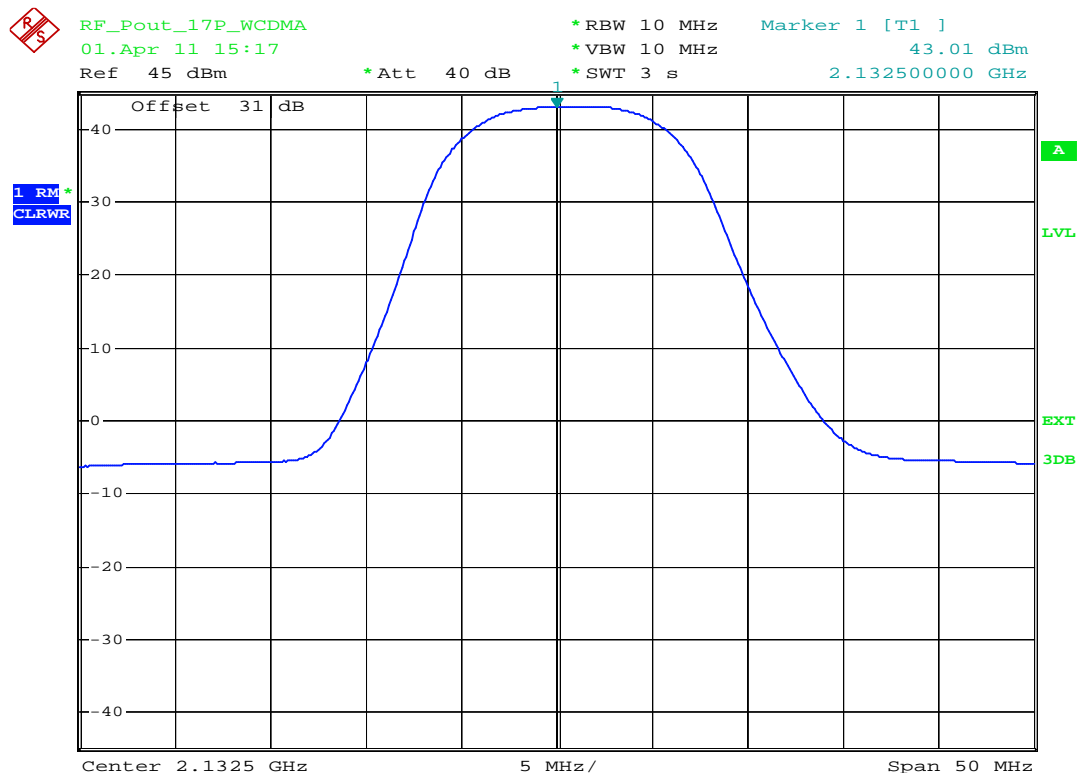
table 5.3.1-#2 RF Power Out: §27.50, §2.1046; RSS-139, RSS-GEN Test results Downlink Input power

## 5.3.1.1 CDMA



plot 5.3.1.1-#1 RF Power Out: §27.50, §2.1046; RSS-139, RSS-GEN; Test results; Downlink; CDMA  
Middle

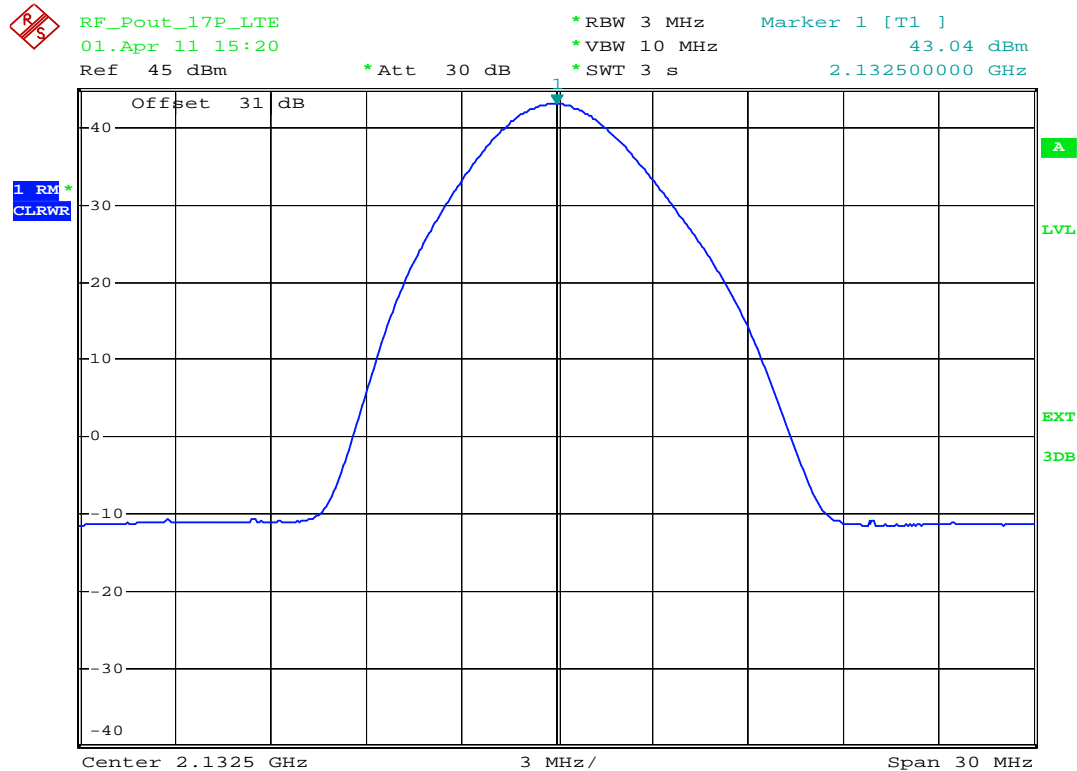
## 5.3.1.2 W-CDMA



plot 5.3.1.2-#1 RF Power Out: §27.50, §2.1046; RSS-139, RSS-GEN; Test results; Downlink; W-CDMA  
Middle



5.3.1.3 LTE



plot 5.3.1.3-#1 RF Power Out: §27.50, §2.1046; RSS-139, RSS-GEN; Test results; Downlink; LTE Middle

5.3.2 Uplink

n.a.  
Note: The EUT does not transmit over the air in the uplink direction.

5.4 Summary test result

|             |                                     |
|-------------|-------------------------------------|
| Test result | complies, according the plots above |
| Tested by:  | L.Oskerko                           |
| Date:       | 01.04.2011                          |

## 6 Occupied Bandwidth: §2.1049; RSS-GEN

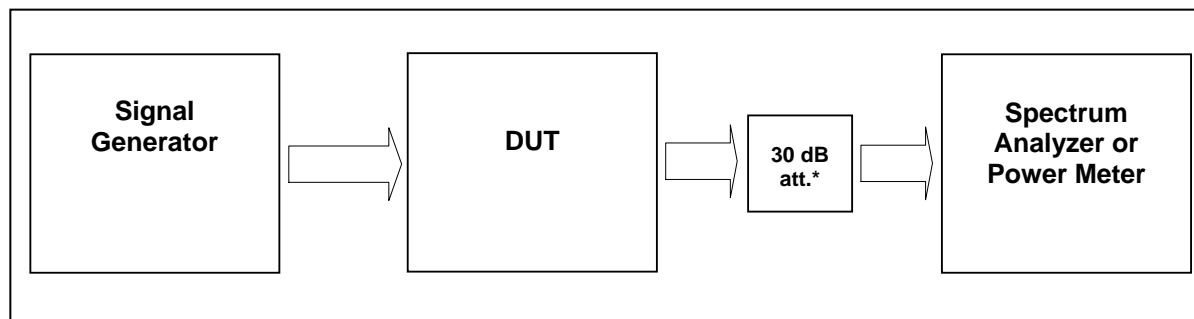


figure 5.4-#1 Test setup: Occupied Bandwidth: §2.1049; RSS-GEN

|                         |                               |
|-------------------------|-------------------------------|
| Measurement uncertainty | ± 0,38 dB                     |
| Test equipment used     | 8890; 8667; 8668; 8848; 7355; |

### 6.1 Limit

The spectral shape of the output should look similar to input for all modulations.

### 6.2 Test method

Para. No.2.1049

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the following conditions as applicable:

(h) Transmitters employing digital modulation techniques—when modulated by an input signal such that its amplitude and symbol rate represent the maximum rated conditions under which the equipment will be operated. The signal shall be applied through any filter networks, pseudo-random generators or other devices required in normal service. Additionally, the occupied bandwidth shall be shown for operation with any devices used for modifying the spectrum when such devices are optional at the discretion of the user.

### 6.3 Test results

#### 6.3.1 Downlink

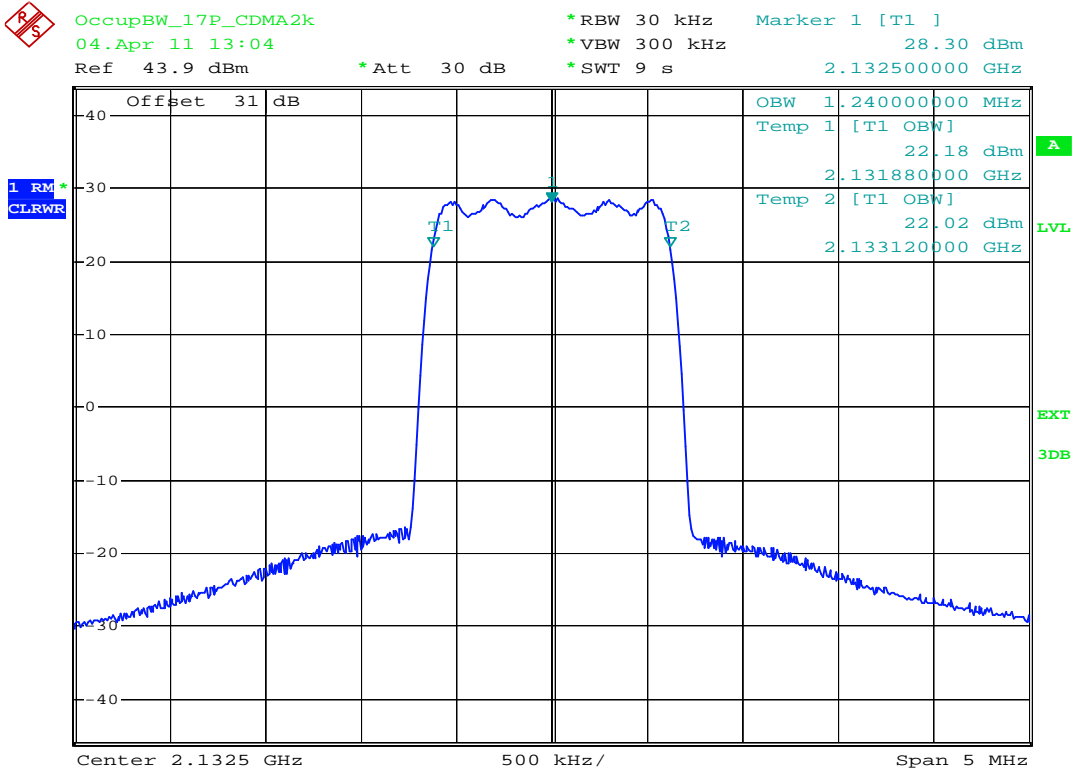
Detector RMS.

| Modulation | Measured at | Fcenter / MHz | RBW<br>VBW<br>Span         | Occupied<br>Bandwidth /<br>MHz | Plot #            |
|------------|-------------|---------------|----------------------------|--------------------------------|-------------------|
| CDMA       | Middle      | 2132,5        | 30kHz<br>300kHz<br>5MHz    | 1,24                           | 6.3.1.1<br>#1, #2 |
| WCDMA      | Middle      | 2132,5        | 100kHz<br>1MHz<br>10MHz    | 4,17                           | 6.3.1.2<br>#1, #2 |
| LTE        | Middle      | 2132,5        | 30 kHz<br>300 kHz<br>5 MHz | 1,10                           | 6.3.1.3<br>#1,#2  |

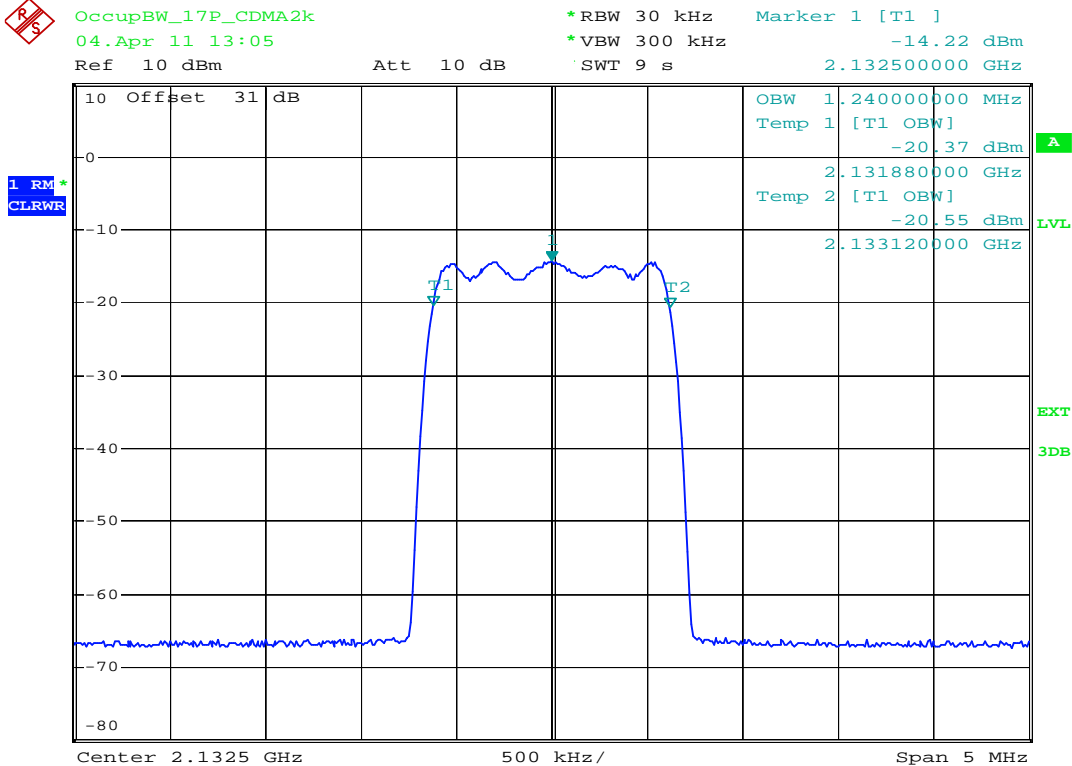
table 6.3-#1 Occupied Bandwidth: §2.1049; RSS-GEN Test results Downlink



6.3.1.1 CDMA

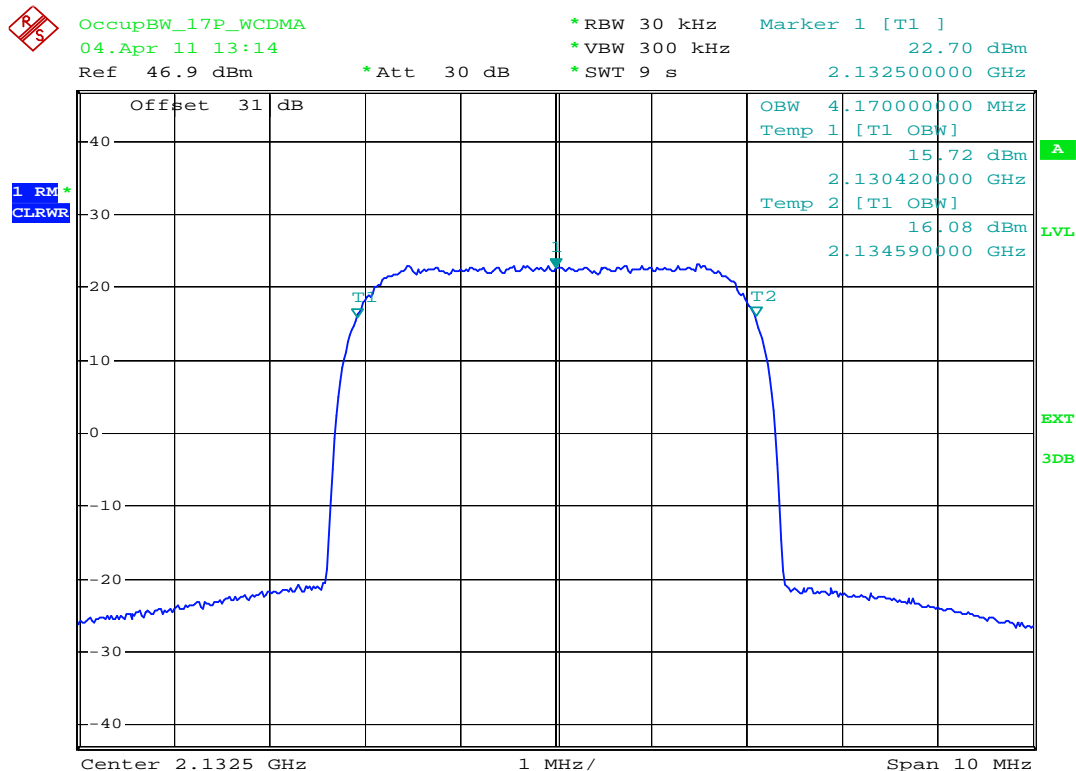


plot 6.3.1.1-#1 Occupied Bandwidth: §2.1049; RSS-GEN; Test results; Downlink; CDMA Output

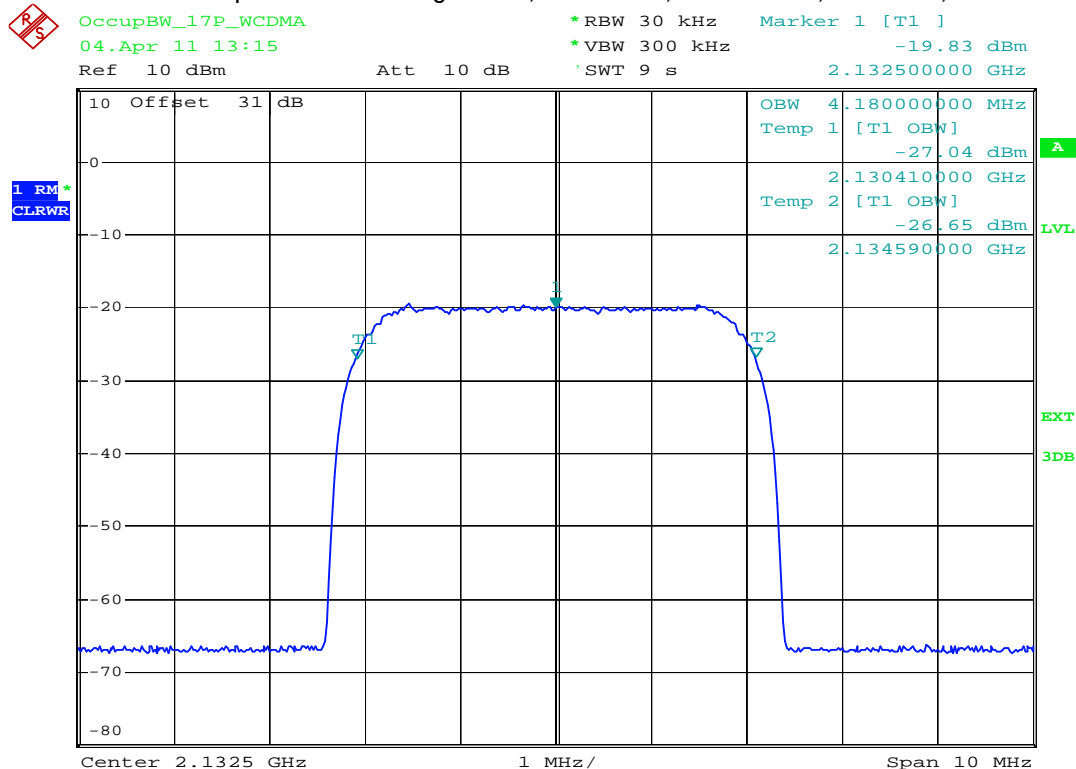


plot 6.3.1.1-#2 Occupied Bandwidth: §2.1049; RSS-GEN; Test results; Downlink; CDMA Input

## 6.3.1.2 W-CDMA



plot 6.3.1.2-#1 Occupied Bandwidth: §2.1049; RSS-GEN; Test results; Downlink; W-CDMA Output

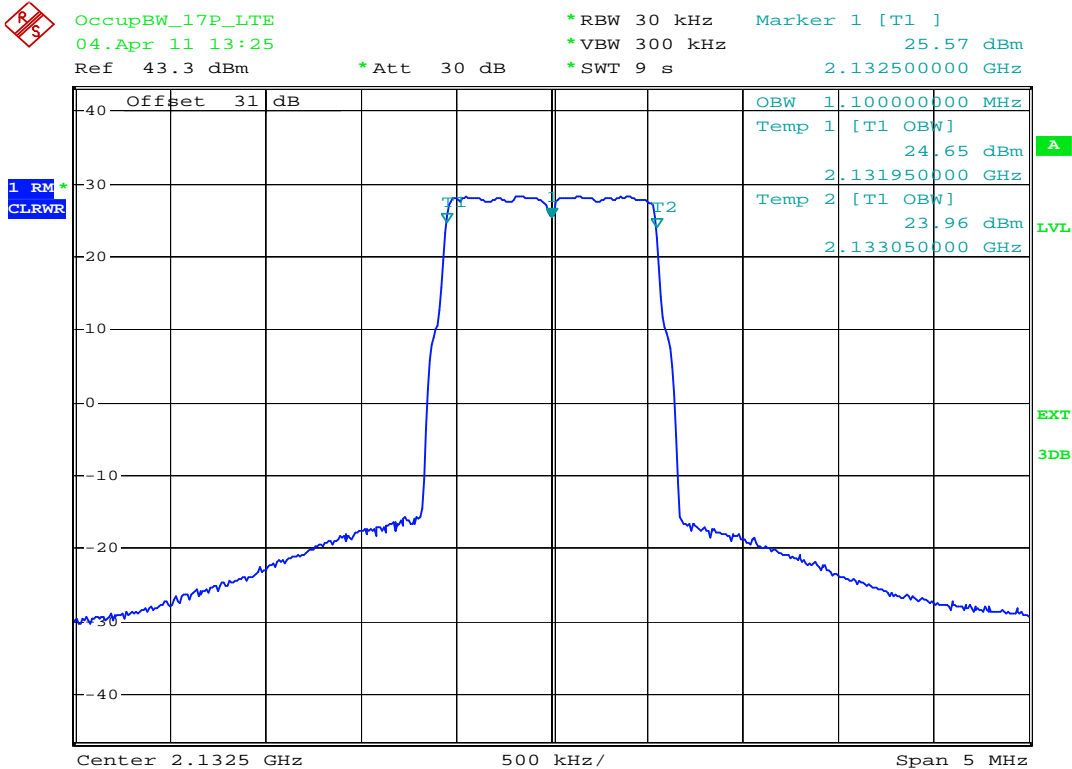


plot 6.3.1.2-#2 Occupied Bandwidth: §2.1049; RSS-GEN; Test results; Downlink; W-CDMA Input

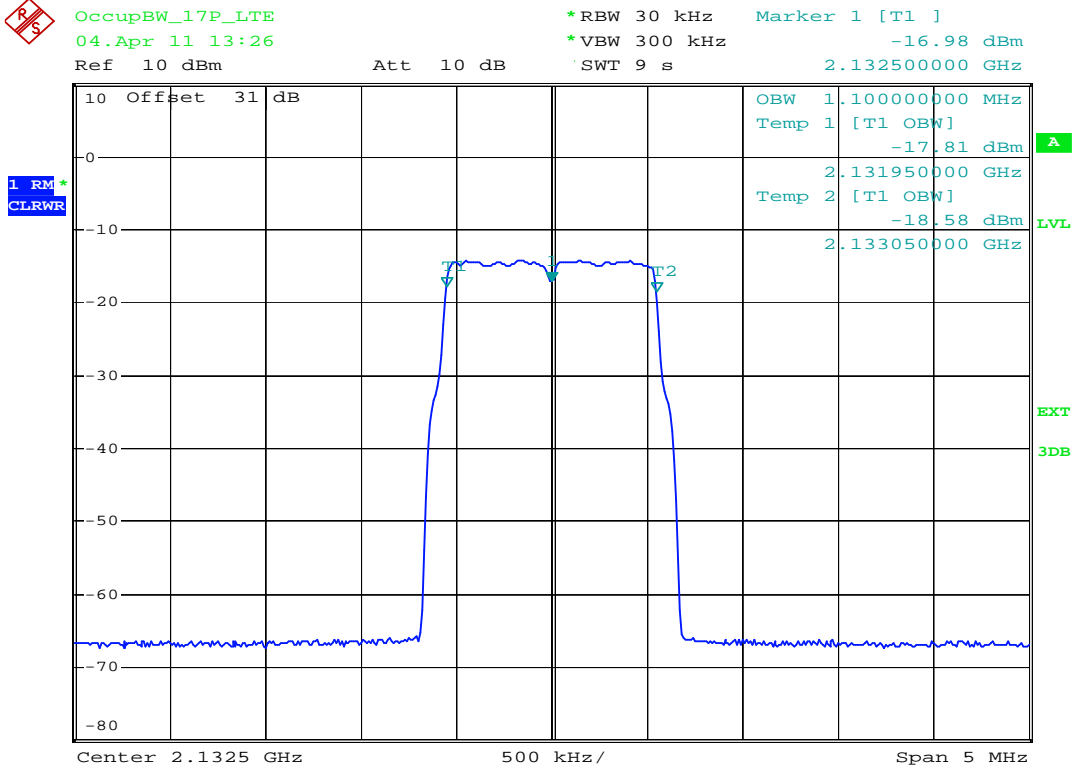




6.3.1.3 LTE



plot 6.3.1.3-#1 Occupied Bandwidth: §2.1049; RSS-GEN; Test results; Downlink; LTE Output



plot 6.3.1.3-#2 Occupied Bandwidth: §2.1049; RSS-GEN; Test results; Downlink; LTE Input

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IC ID: 2237E-ML7851719P



### 6.3.2 Uplink

n.a.

Note: The EUT does not transmit over the air in the uplink direction.

### 6.4 Summary test result

|             |                                     |
|-------------|-------------------------------------|
| Test result | complies, according the plots above |
| Tested by:  | L.Oskerko                           |
| Date:       | 04.04.2011                          |

## 7 Spurious Emissions at Antenna Terminals: §27.53, §2.1051; RSS-139, RSS-GEN

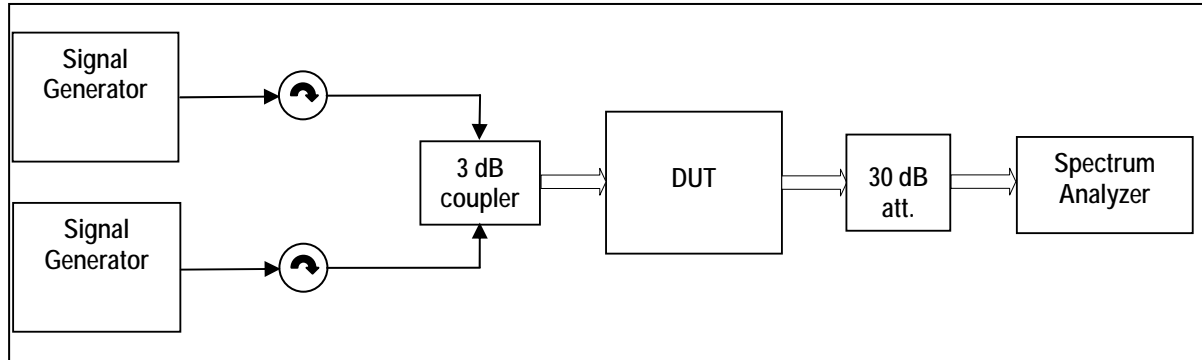


figure 7-#1 Test setup: Spurious Emissions at Antenna Terminals: §27.53, §2.1051; RSS-139, RSS-GEN

|                         |   |   |
|-------------------------|---|---|
| Measurement uncertainty | $\pm 0,54$ dB<br>$\pm 1,2$ dB<br>$\pm 1,5$ dB | 9 kHz to 3 GHz<br>3 GHz to 7 GHz<br>7 GHz to 26 GHz |
| Test equipment used     | 8890; 8667; 8668; 8848; 7355;                 |   |

### 7.1 Limit

Minimum standard:

Para. No.27.53(h)

(h) For operations in the 1710–1755 MHz and 2110–2155 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least  $43 + 10 \log_{10}(P)$  dB.

(1) Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

(2) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the licensee's frequency block edges, both upper and lower, as the design permits.

(3) The measurements of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power.

### 7.2 Test method

Para. No 2.1051 Measurements required: Spurious emissions at antenna terminals.

The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in § 2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

[39 FR 5919, Feb. 15, 1974. Redesignated and amended at 63 FR 36599, July 7, 1998]

### 7.3 Test results

#### 7.3.1 Downlink

##### <1MHz from Band Edge

Detector: RMS.

| Modulation | Measured at Band Edge    | Carriers   | RBW<br>VBW<br>Span      | Max. level (dBm) | Plot -              |
|------------|--------------------------|--|-------------------------|------------------|---------------------|
| WCDMA      | Lower Edge<br>Upper Edge | 2110,775 MHz<br>2112,025 MHz<br>2152,975 MHz<br>2154,225 MHz | 30kHz<br>300kHz<br>6MHz | -19,86           | 7.3.1.1<br>#1<br>#2 |
| CDMA       | Lower Edge<br>Upper Edge | 2112,6 MHz<br>2117,6 MHz<br>2147,4 MHz<br>2152,4 MHz         | 100kHz<br>1MHz<br>15MHz | -24,44           | 7.3.1.2<br>#1<br>#2 |
| LTE        | Lower Edge<br>Upper Edge | 2110,7 MHz<br>2112,1 MHz<br>2152,9 MHz<br>2154,3 MHz         | 30kHz<br>300kHz<br>6MHz | -18,47           | 7.3.1.3<br>#1<br>#2 |

table 7.3-#1 Spurious Emissions at Antenna Terminals: §27.53, §2.1051; RSS-139, RSS-GEN Test results Downlink <1MHz from Band Edge

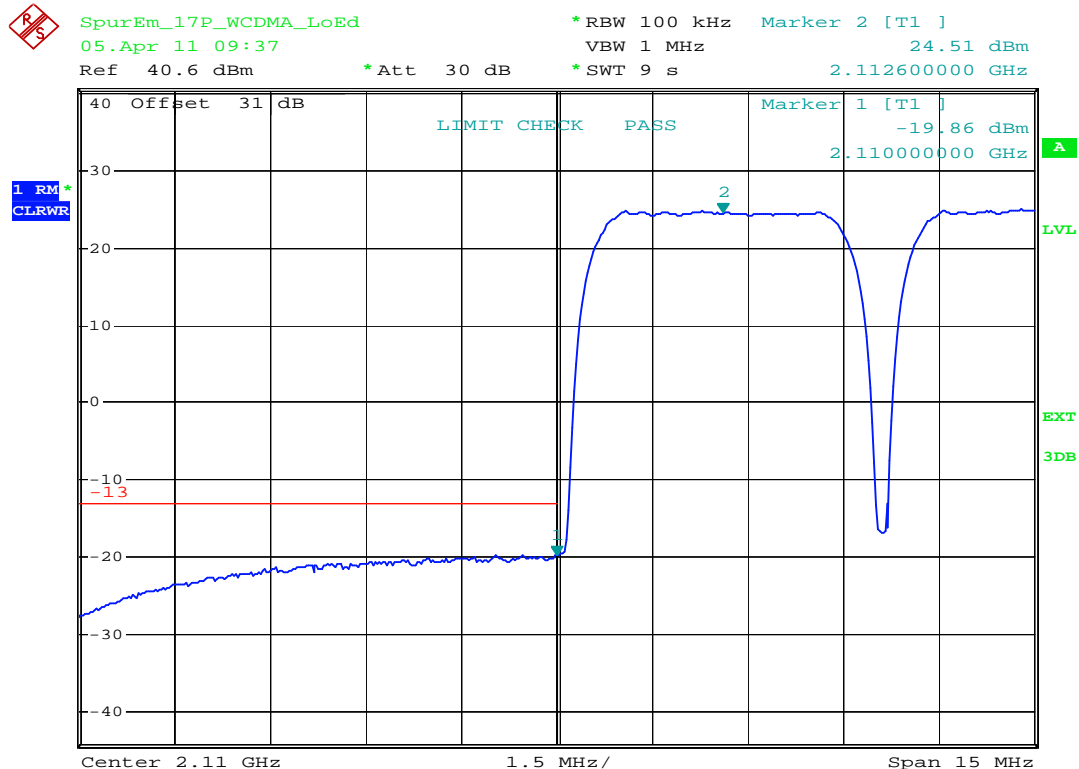
##### >1MHz from Band Edge

Detector: RMS.

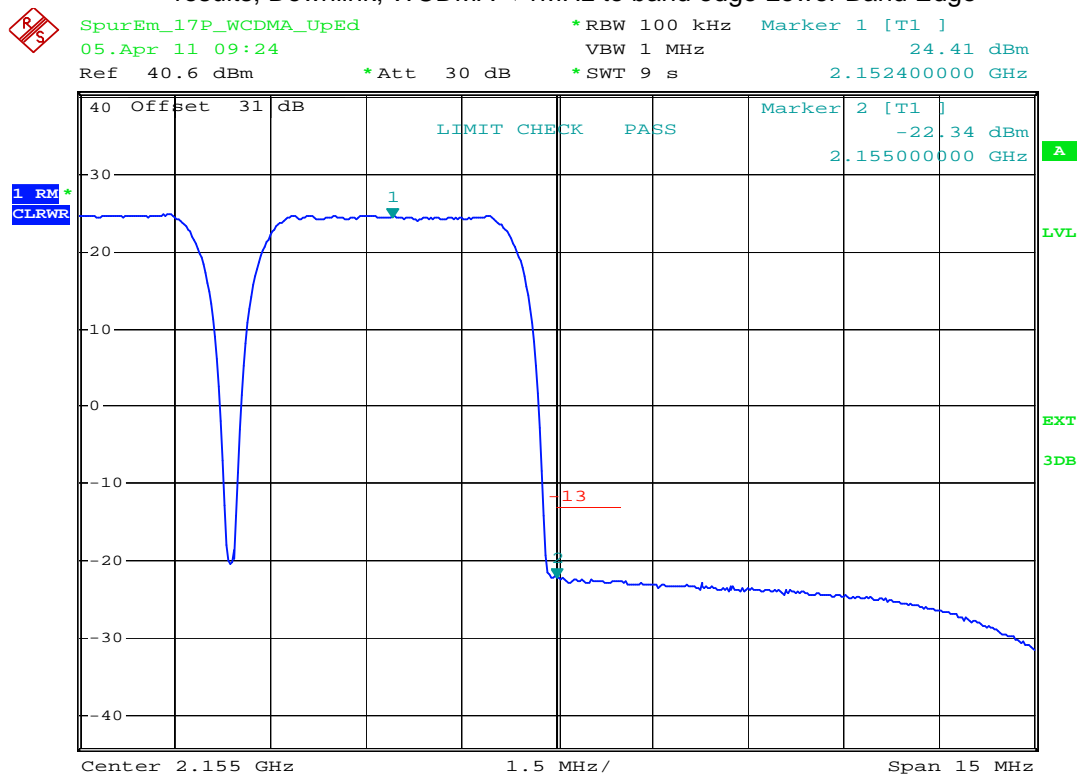
| Modulation | Carrier at | Carrier    | Max. level (dBm) | RBW<br>VBW<br>Frequency range | Plot -        |
|------------|------------|------------|------------------|-------------------------------|---------------|
| CDMA       | Middle     | 2132,5 MHz | < -30            | 1MHz<br>3MHz<br>30MHz – 22GHz | 7.3.1.4<br>#1 |
| WCDMA      | Middle     | 2132,5 MHz | < -30            | 1MHz<br>3MHz<br>30MHz – 22GHz | 7.3.1.5<br>#1 |
| LTE        | Middle     | 2132,5 MHz | < -30            | 1MHz<br>3MHz<br>30MHz – 22GHz | 7.3.1.6<br>#1 |

table 7.3-#2 Spurious Emissions at Antenna Terminals: §27.53, §2.1051; RSS-139, RSS-GEN Test results Downlink >1MHz from Band Edge

## 7.3.1.1 WCDMA &lt; 1MHz to band edge



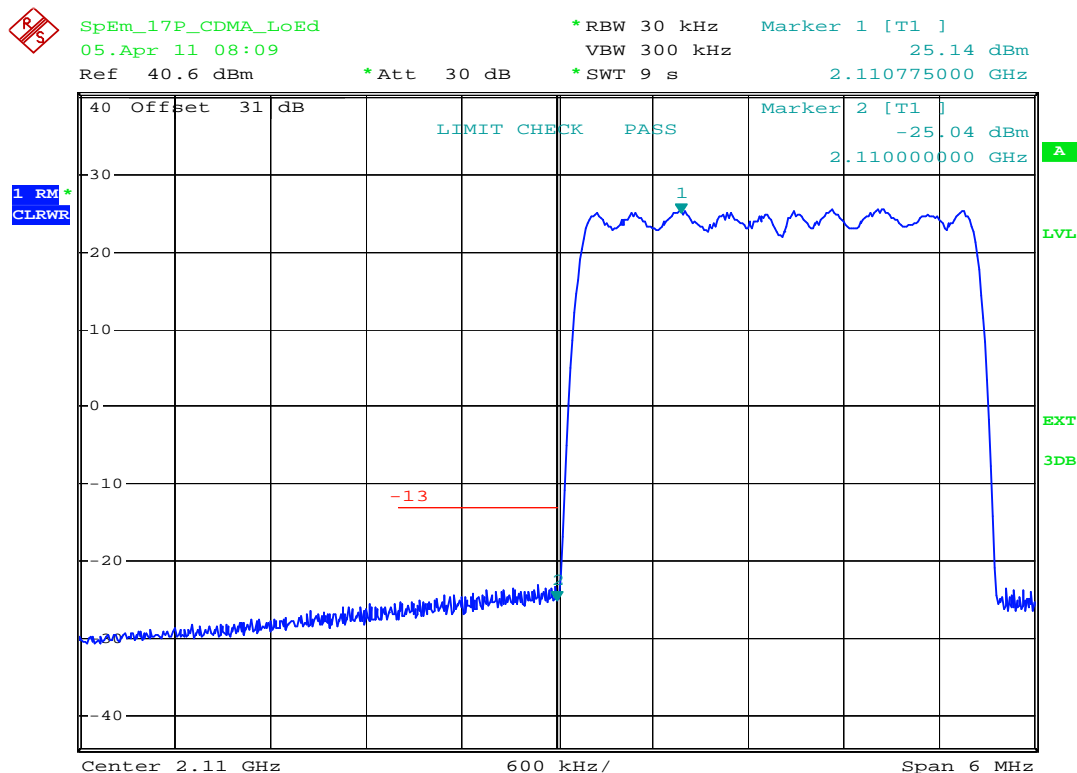
plot 7.3.1.1-#1 Spurious Emissions at Antenna Terminals: §27.53, §2.1051; RSS-139, RSS-GEN; Test results; Downlink; WCDMA &lt; 1MHz to band edge Lower Band Edge



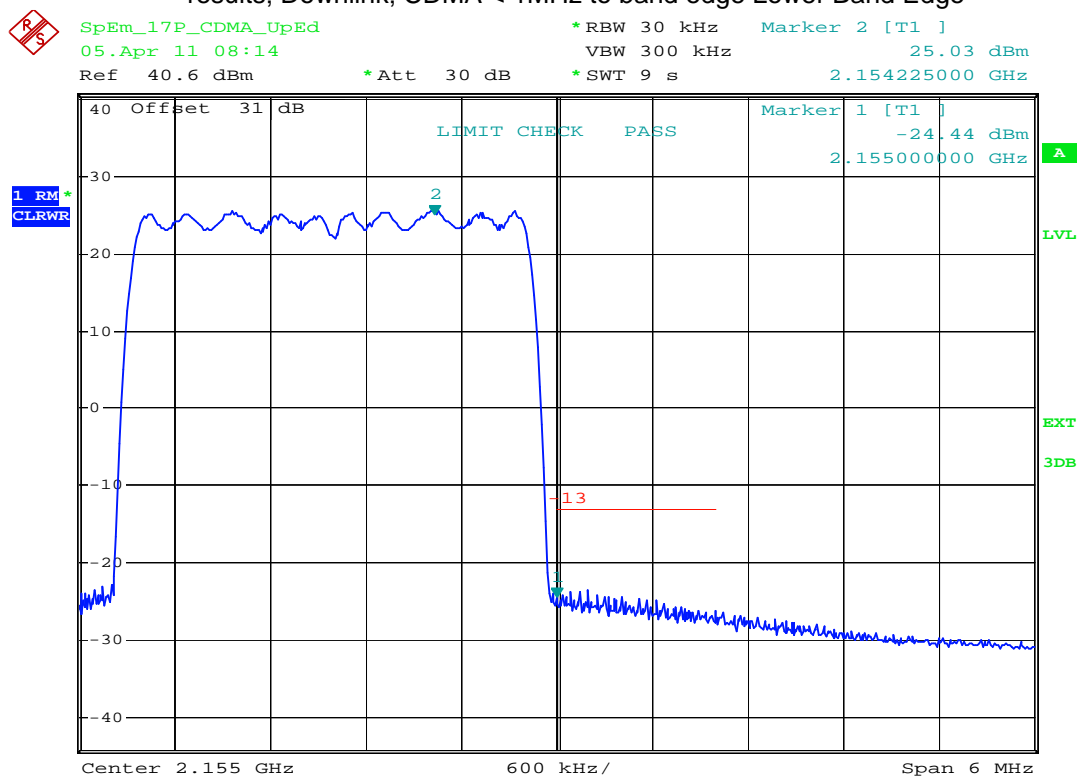
plot 7.3.1.1-#2 Spurious Emissions at Antenna Terminals: §27.53, §2.1051; RSS-139, RSS-GEN; Test results; Downlink; WCDMA &lt; 1MHz to band edge Upper Band Edge



## 7.3.1.2 CDMA &lt; 1MHz to band edge



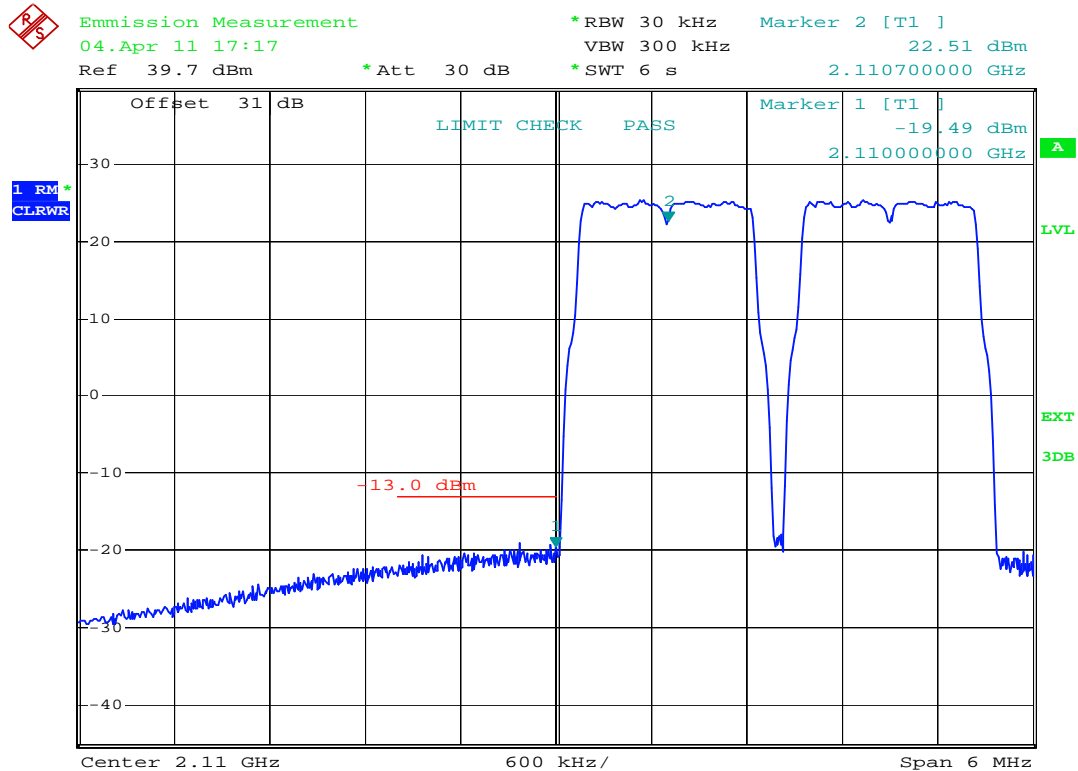
plot 7.3.1.2-#1 Spurious Emissions at Antenna Terminals: §27.53, §2.1051; RSS-139, RSS-GEN; Test results; Downlink; CDMA < 1MHz to band edge Lower Band Edge



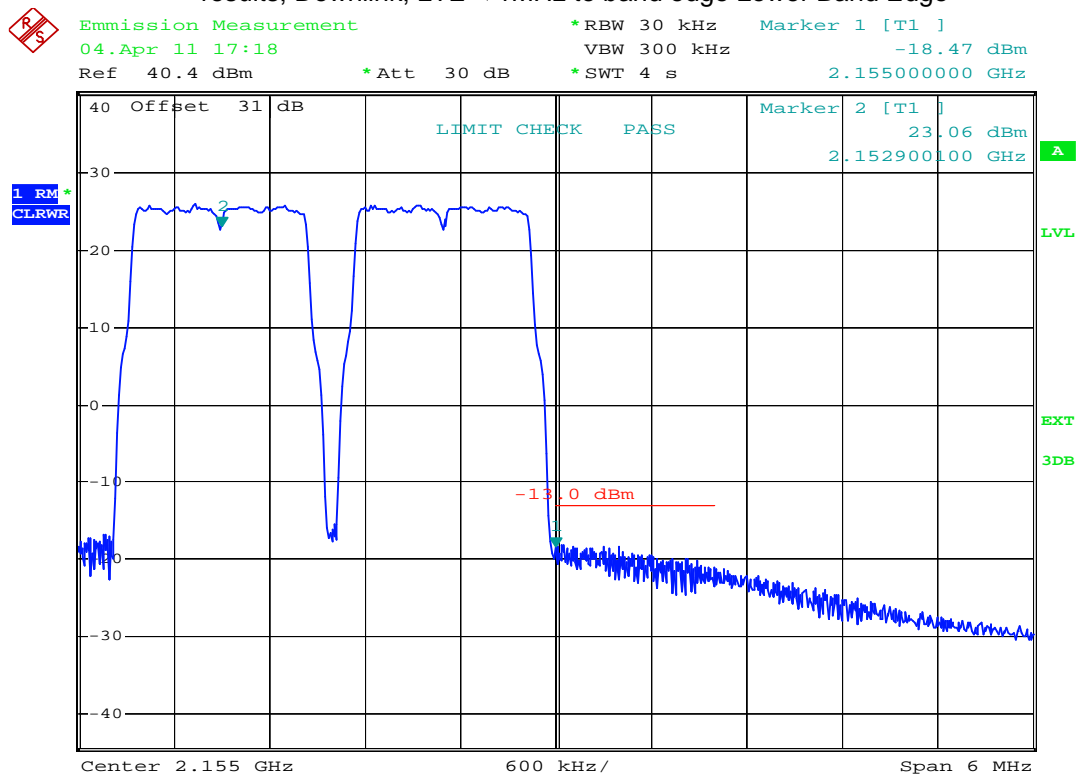
plot 7.3.1.2-#2 Spurious Emissions at Antenna Terminals: §27.53, §2.1051; RSS-139, RSS-GEN; Test results; Downlink; CDMA < 1MHz to band edge Upper Band Edge



## 7.3.1.3 LTE &lt; 1MHz to band edge

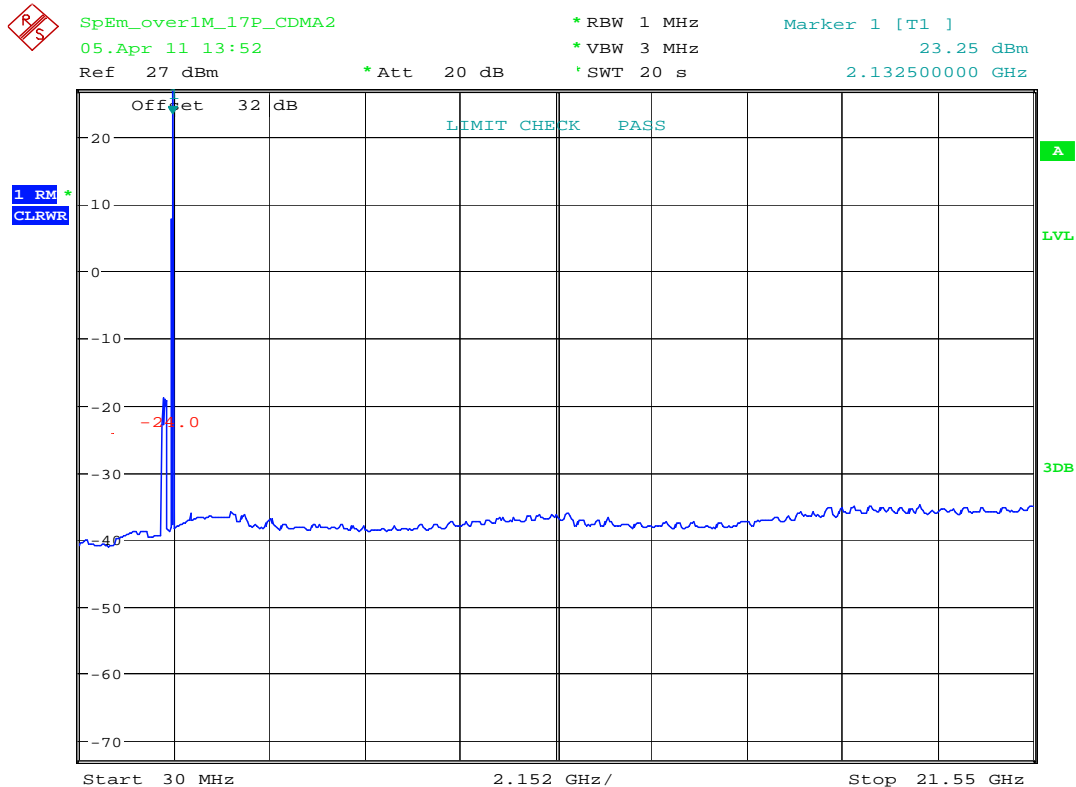


plot 7.3.1.3-#1 Spurious Emissions at Antenna Terminals: §27.53, §2.1051; RSS-139, RSS-GEN; Test results; Downlink; LTE &lt; 1MHz to band edge Lower Band Edge



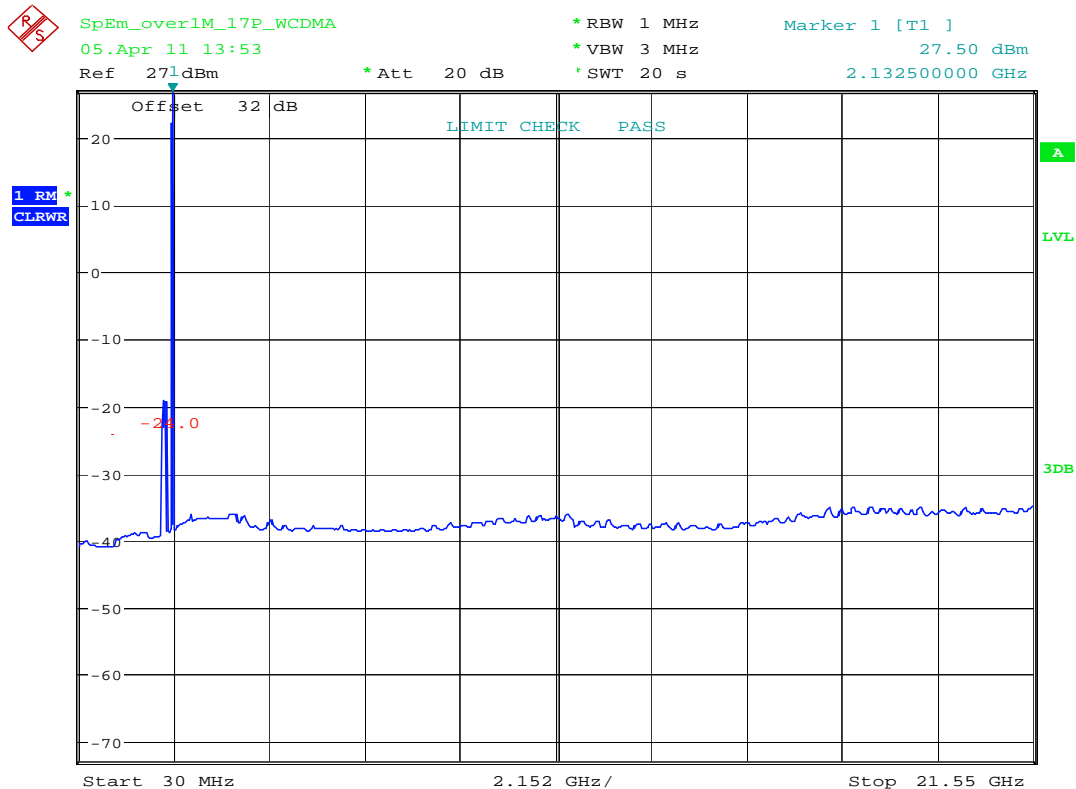
plot 7.3.1.3-#2 Spurious Emissions at Antenna Terminals: §27.53, §2.1051; RSS-139, RSS-GEN; Test results; Downlink; LTE &lt; 1MHz to band edge Upper Band Edge

### 7.3.1.4 CDMA > 1MHz to band edge



plot 7.3.1.4-#1 Spurious Emissions at Antenna Terminals: §27.53, §2.1051; RSS-139, RSS-GEN; Test results; Downlink; CDMA > 1MHz to band edge; carrier (2132,5MHz) notched

### 7.3.1.5 W-CDMA > 1MHz to band edge

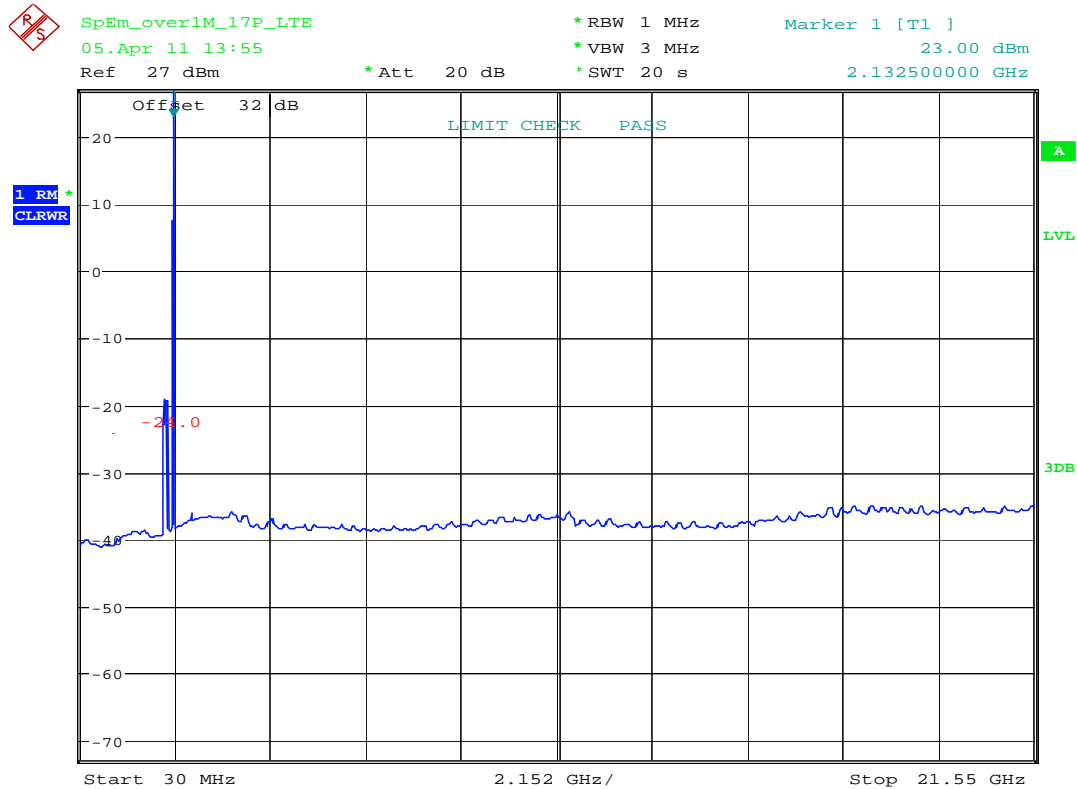


plot 7.3.1.5-#1 Spurious Emissions at Antenna Terminals: §27.53, §2.1051; RSS-139, RSS-GEN; Test results; Downlink; W-CDMA > 1MHz to band edge; carrier (2132,5MHz) notched





7.3.1.6 LTE > 1MHz to band edge



plot 7.3.1.6-#1 Spurious Emissions at Antenna Terminals: §27.53, §2.1051; RSS-139, RSS-GEN; Test results; Downlink; LTE > 1MHz to band edge; carrier (2132,5MHz) notched

7.3.2 Uplink

n.a.

Note: The EUT does not transmit over the air in the uplink direction.

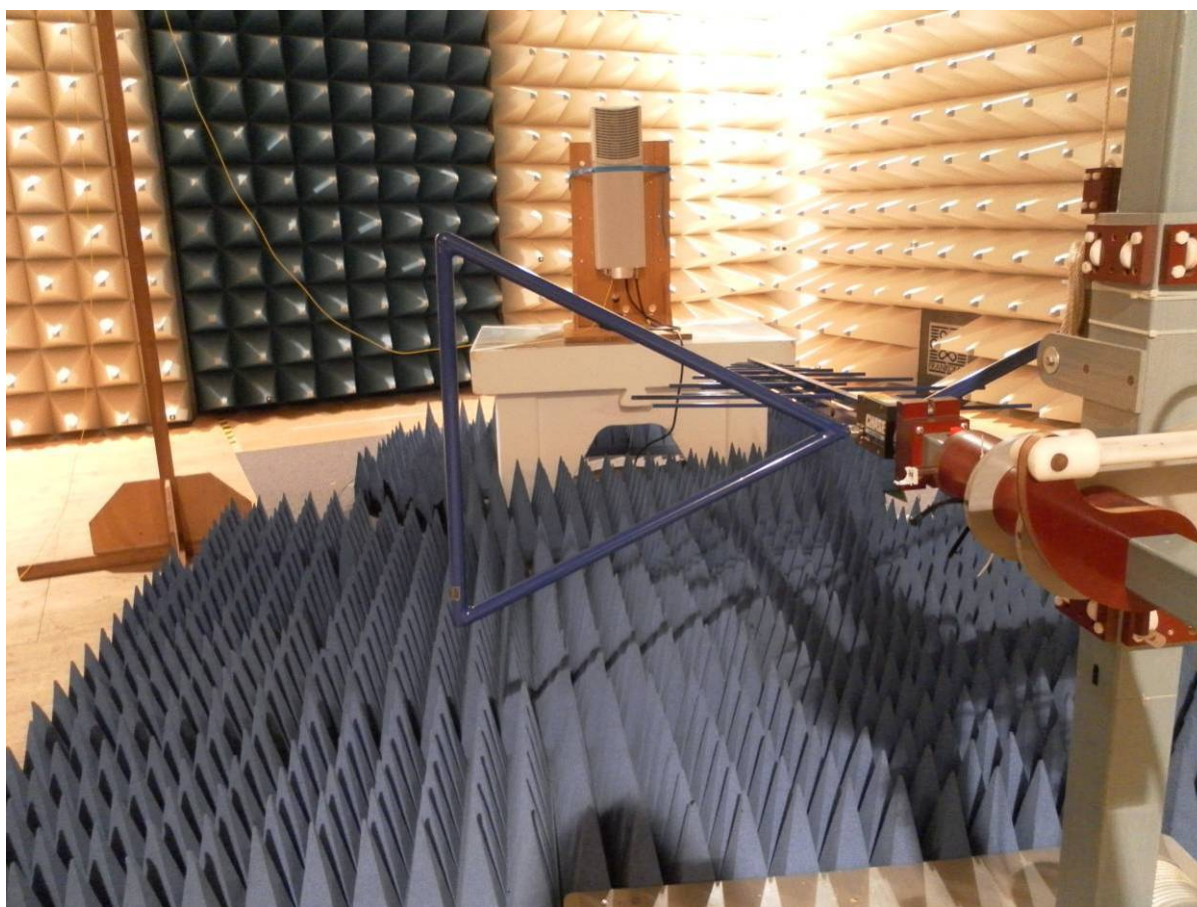
7.4 Summary test result

|             |                                     |
|-------------|-------------------------------------|
| Test result | complies, according the plots above |
| Tested by:  | L.Oskerko                           |
| Date:       | 05.04.2011                          |

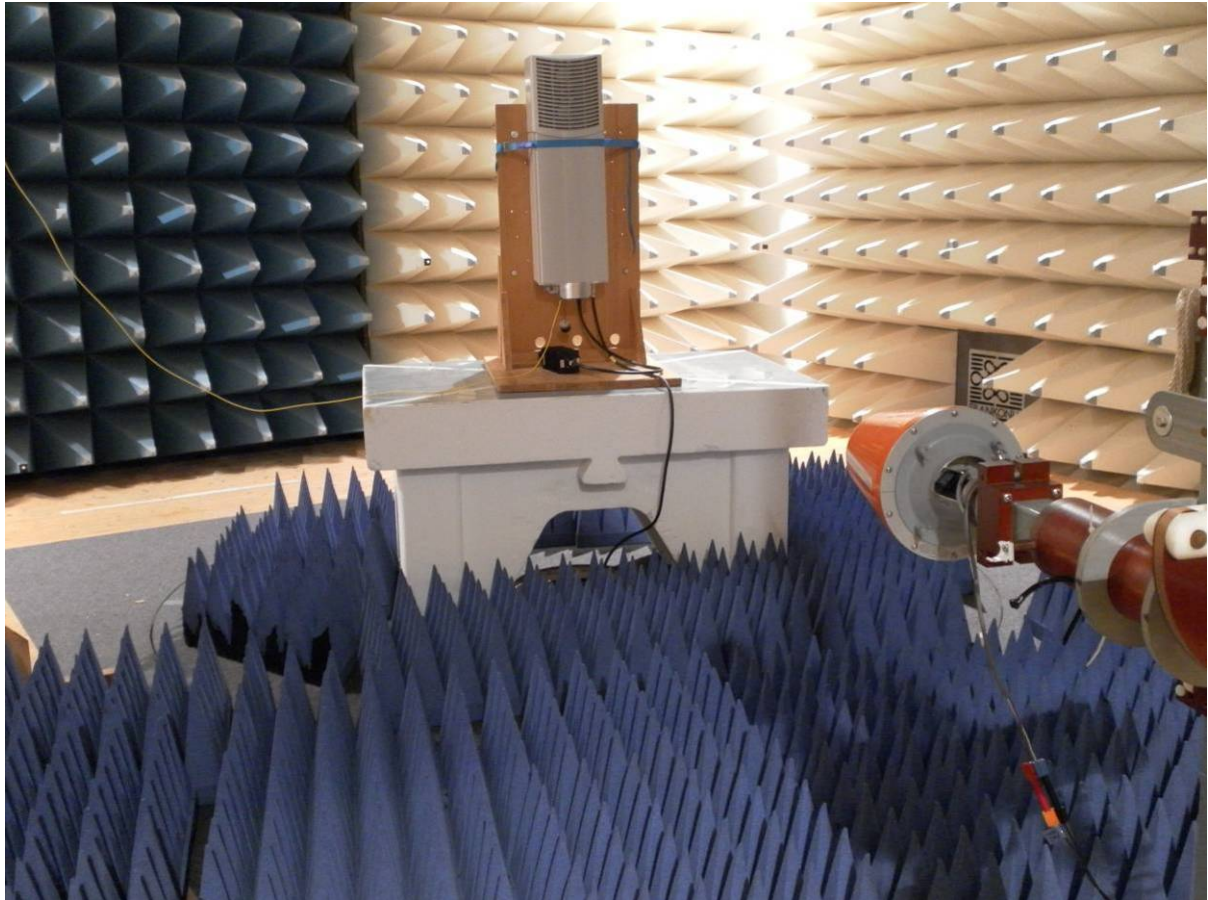
## 8 Field Strength of Spurious Emissions: §27.53, §2.1053, RSS-139



picture 8.1: label



picture 8.2: Test setup: Field Strength Emission <1 GHz @3m in the FAC



**picture 8.3:** Test setup: Field Strength Emission >1 GHz @3m in the FAC

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This clause specifies requirements for the measurement of radiated emission.

| Frequency range | Distance:<br>EUT <-> antenna /<br>location | Limit                 | Test method        |
|-----------------|--|-----------------------|--------------------|
| 30 MHz - 1 GHz  | 3 metres / FAC                             | FCC 47 CFR Part 27.53 | TIA/EIA-603-C:2004 |
|                 |  | IC RSS-139 sec. 6.4   |                    |
| 1 GHz – 22 GHz  |  | FCC 47 CFR Part 27.53 |                    |
|                 |  | IC RSS-139 sec. 6.4   |                    |

**Test equipment used:**

| Designation       | Type          | Manufacturer    | Invent.-no. | Cal.-date  | due Cal.-date | used |
|-------------------|---------------|-----------------|-------------|------------|---------------|------|
| EMI test receiver | ESI40         | Rohde & Schwarz | E1687       | 21.12.2010 | 21.12.2011    | X    |
| Antenna           | CBL 6111      | Chase           | K1149       | 24.09.2010 | 24.09.2011    | X    |
| RF Cable          |               | Frankonia       | K1121 SET   | 01.07.2010 | 01.07.2011    | X    |
| Pre amplifier     | AM1431        | Miteq           | K1721       | 02.07.2010 | 02.07.2011    | X    |
| Antenna           | HL 025        | R&S             | K809        | 28.09.2010 | 28.09.2011    | X    |
| Preamplifier      | AFS4-00102000 | Miteq           | K838        | 09.02.2011 | 09.02.2012    | X    |
| RF Cable          | Sucoflex 100  | Suhner          | K1742       | 05.04.2011 | 05.04.2012    | X    |

The REMI version 2.135 has been used for max search.

**Test set-up:**

Test location: FAC  
The Fully Anechoic Chamber (FAC) fulfils the requirements of ANSI C63.4 and CISPR 16-1-4 with regards to NSA and SVSWR.

Test Voltage: 115V / 60 Hz

Type of EUT: Wall mounted

**Measurement uncertainty:**

|  |   |
|--|---|
| Measurement uncertainty expanded<br>(95% or K=2) | ± 4,7 dB for ANSI C63.4 measurement<br>± 0,5 dB for TIA-603 measurement |
|--|---|



## 8.1 Method of Measurement

### Measurement procedure. TIA-603-C

The antenna substitution method is used to determine the equivalent radiated power at spurious frequencies. The spurious emissions are measured at a distance of 3 meters. The EUT is then replaced with a reference substitution antenna with a known gain referenced to a dipole. This antenna is fed with a signal at the spurious frequency. The level of the signal is adjusted to repeat the previously measured level. The resulting eirp is the signal level fed to the reference antenna corrected for gain referenced to an isotropic dipole (see Figure 7.2).

From KDB (AMPLIFIER, BOOSTER, AND REPEATER REMINDER SHEET):

Radiated spurs (enclosure) – Use of CW signal (low, mid. and high freq.) is acceptable rather than all modulations.

The maximum RFI field strength was determined during the measurement by rotating the turntable ( $\pm 180$  degrees) and varying the height of the receive antenna ( $h = 1 \dots 4$  m) as like defined in ANSI C63.4. A measurement receiver has been used with a RBW 120 kHz up to 1 GHz and 1 MHz above 1 GHz. Steps with during pre measurement was half the RBW.

Both, the Fully Anechoic Chamber (FAC) and the Semi Anechoic Chamber (SAC) fulfil the requirements of ANSI C63.4 and CISPR 16-1-4 with regards to NSA and SVSWR.

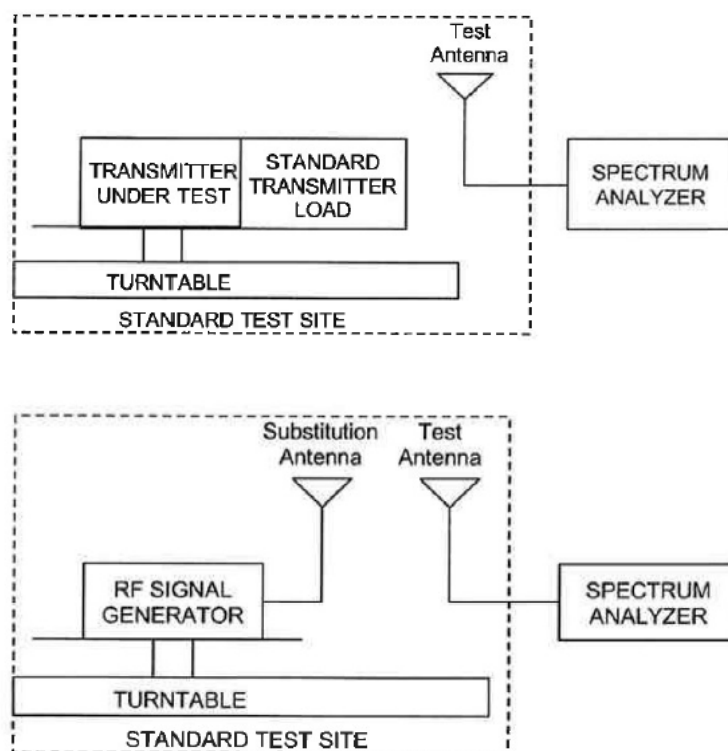


Figure #7.2 Substitution methods TIA/EIA-603-C

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## 8.2 Limit §27.53 (h)

The Emission limit is -13dBm.

## 8.3 Climatic values in the lab

|                    |          |
|--------------------|----------|
| Temperature:       | 21°      |
| Relative Humidity: | 45%      |
| Air-pressure:      | 1004 hPa |

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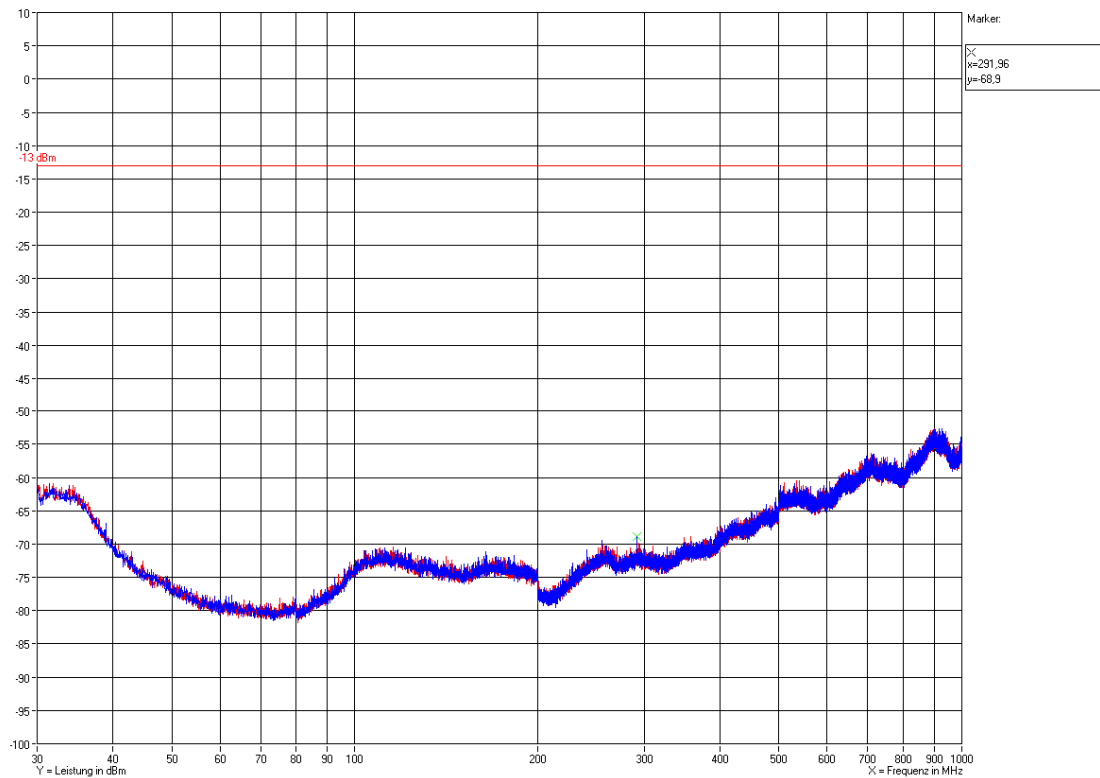


## 8.4 Test results

### 8.4.1 30 MHz to 1 GHz Downlink (Bottom – Middle – Top)

B/M/T: 2110 MHz / 2132,5 MHz / 2155 MHz (Operation with maximum composite power)

Horizontal / Vertical



Measurement with Peak detector, BW 120KHz,  
Step width 60 kHz, dwell time 50ms

Antenna height: 1.55m; all positions of the turn  
table measured with max. hold function

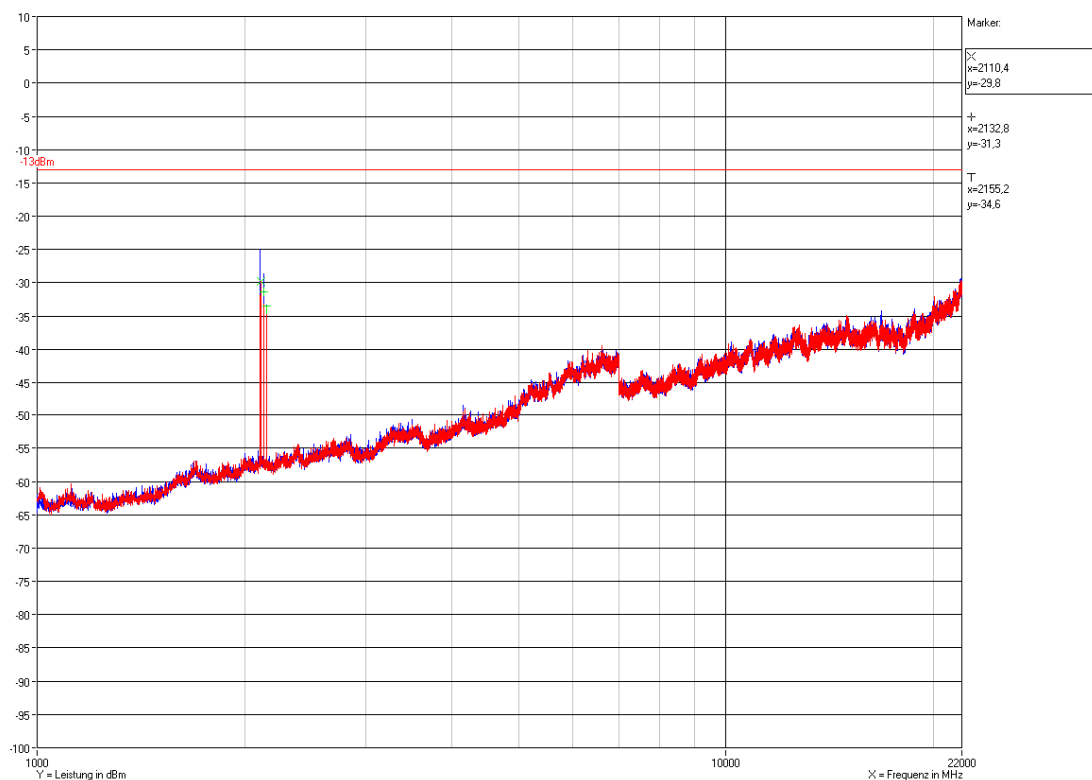
Polarization: Horizontal / Vertical

No peak detected 20dB above noise

## 8.4.2 1 GHz to 22 GHz Downlink (Bottom – Middle – Top)

B/M/T: 2110 MHz / 2132,5 MHz / 2155 MHz (Operation with maximum composite power)

Horizontal / Vertikal



| Frequenz MHz | Measurement dBuV | dBuV -> dBm | Peak dBm | Limt dBm | Marchin |
|--------------|------------------|-------------|----------|----------|---------|
| 2110,000     | -46,3            | 21,4        | -24,9    | -13,0    | 11,9    |
| 2132,400     | -49,9            | 21,3        | -28,6    | -13,0    | 15,6    |

The radiated spurious emission requirements have been met in all frequency bands.

## 9 History

| Revision | Modification        | Date       | Name        |
|----------|---------------------|------------|-------------|
| 01.00    | Initial Test report | 26.04.2011 | T. Zahlmann |



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**\*\*\*\*\* End of test report \*\*\*\*\***