

Test Site:  
FCC Test Site No.: 96997



BUREAU  
VERITAS

## ECL-EMC Test Report No.: 16-088

Equipment under test: **AF 1927**  
FCC ID: **BCR-AF1927**

Type of test: **FCC 47 CFR Part 24 Subpart E: 2016**  
Broadband PCS

Measurement Procedures: 47 CFR Parts 2: 2016(*Frequency Allocations and Radio Treaty Matters; General Rules and Regulations*),  
24 (Broadband PCS),  
ANSI/TIA-603-C (2004), *Land Mobile FM or PM Communications Equipment Measurement and Performance Standards*

Test result: **Passed**

|                   |                     |          |  |            |
|-------------------|---------------------|----------|--|------------|
| Date of issue:    | 28.04.16            |          |  | Signature: |
| Issue-No.:        | 01                  | Author:  |  |            |
| Date of delivery: | 18.04.16            | Checked: |  |            |
| Test dates:       | 07.04.16 – 19.04.16 |          |  |            |
| Pages:            | 51                  |          |  |            |



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**General:**

The purpose of this report is to show compliance to the FCC regulations for unlicensed devices operating under part 24 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                         | 24.232(a)                | 2.1046(a)                | 500 Watts                | Complies |
| Occupied Bandwidth                      | KDB 935210<br>D02 v03r02 | 2.1049(h)                | Input/Output             | Complies |
| Spurious Emissions at Antenna Terminals | 24.238(a)                | 2.1051                   | -13dBm                   | Complies |
| Field Strength of Spurious Emissions    | 24.238(a)                | 2.1053                   | -13dBm<br>E.I.R.P        | Complies |
| Intermodulation                         | KDB 935210<br>D02 v03r02 | KDB 935210<br>D02 v03r02 | KDB 935210<br>D02 v03r02 | Complies |
| *Frequency Stability                    | n.a.                     | 2.1055(a)(d)             | Must stay in band        | NA       |
| Out of Band Rejection                   | KDB 935210<br>D02 v03r02 | KDB 935210<br>D03 v04    | KDB 935210<br>D03 v04    | Complies |

### \*Footnotes (Frequency Stability):

(1) Modulation characteristics were not tested since the E.U.T processes but does not produce a modulated waveform.

(2) The equipment under test uses a common oscillator to down-convert the RF input to an intermediate frequency and to up-convert the IF to RF output. The RF input and output frequency are the same.



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

### 2.1 Description

|                                   |                                                                                                                                    |
|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| Kind of equipment                 | AF 1927                                                                                                                            |
| Andrew Ident. Number              | 7577552-01                                                                                                                         |
| Serial no.(SN)                    | ND1086                                                                                                                             |
| Revision                          | 00                                                                                                                                 |
| Software version and ID           | Noda AM Software V1.7.6, 7613506-07                                                                                                |
| Type of modulation and Designator | CDMA (F9W) <input type="checkbox"/><br>W-CDMA (F9W) <input type="checkbox"/><br>LTE (G7D) <input checked="" type="checkbox"/>      |
| Frequency Translation             | F1-F1 <input checked="" type="checkbox"/><br>F1-F2 <input type="checkbox"/><br>N/A <input type="checkbox"/>                        |
| Band Selection                    | Software <input checked="" type="checkbox"/><br>Duplexer <input checked="" type="checkbox"/><br>Full band <input type="checkbox"/> |

#### 2.1.1 Downlink

|                                                                      |                     |
|----------------------------------------------------------------------|---------------------|
| Pass band                                                            | 1930 MHz – 1995 MHz |
| Max. composite output power<br>based on one carrier per path (rated) | 27 dBm = 0.5 W      |
| Gain max.                                                            | 84 dB               |

#### 2.1.2 Uplink

|                            |                     |
|----------------------------|---------------------|
| Pass band                  | 1850 MHz – 1915 MHz |
| Maximum rated output power | 30 dBm = 1 W        |
| Gain max.                  | 84 dB               |

#### 2.1.3 Description of EUT

The Node A is an RF enhancer which is capable of filtering and amplifying a multitude of distinct sub-bands up to 120 MHz in total anywhere within multiple frequency bands. It is designed to be part of the primary infrastructure.

2.1.4 Block diagram of measurement reference points

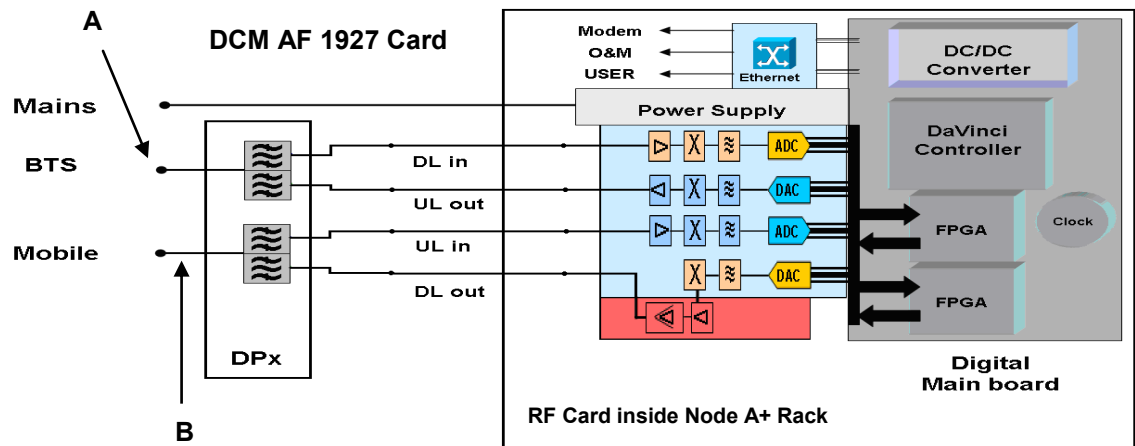


figure 2.1.4-#1 Block diagram of measurement reference points

DCM AF 1927 is the EUT

|                   |            |          |
|-------------------|------------|----------|
| Reference point A | UL output, | DL input |
| Reference point B | DL output, | UL input |



### 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<br>Inv. No. | Test equipment    | Type                  | Manufacturer | Serial No. | Calibration |
|--------------------|-------------------|-----------------------|--------------|------------|-------------|
| 9266               | Network Analyzer  | ZNB 20                | R&S          | 101490     | 9/2015      |
| 9126               | Spectrum Analyzer | FSV 30                | R&S          | 101237     | 11/2015     |
| 9069               | Generator         | SMBV100A              | R&S          | 256275     | 08/2015     |
| 9046               | Generator         | SMBV100A              | R&S          | 255090     | 07/2015     |
| 8542               | Power Meter       | E4418A                | Agilent      | GB38273230 | 01/2016     |
| 8544               | Power Sensor      | E8481H                | Agilent      | 3318A19208 | 01/2016     |
| 7583               | RF-Cable          | Testpro 4.2           | Radiall      | ---        | CIU         |
| 7584               | RF-Cable          | Testpro 4.2           | Radiall      | ---        | CIU         |
| 7585               | RF-Cable          | Testpro 4.2           | Radiall      | ---        | CIU         |
| 7586               | RF-Cable          | Testpro 4.2           | Radiall      | ---        | CIU         |
| 7537               | RF-Cable          | Testpro 4.2 + Projack | Radiall      | ---        | CIU         |
| 7542               | RF-Cable          | Testpro 4.2 + Projack | Radiall      | ---        | CIU         |
| 7475               | Notch Filter      | WRCT1850/1910         | Wainwright   | 1          | CIU         |
| 7459               | Notch Filter      | WRCT1930/1990         | Wainwright   | 1          | CIU         |
| 7406               | Matrix            |                       | COMMSCOPE    | ---        | weekly      |

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 %.

## 4 Test site (Bureau Veritas Consumer Products Services)

FCC Test site: 96997

See relevant dates under section 10 of this test report.

## 5 RF Power Out: §24.232, §2.1046

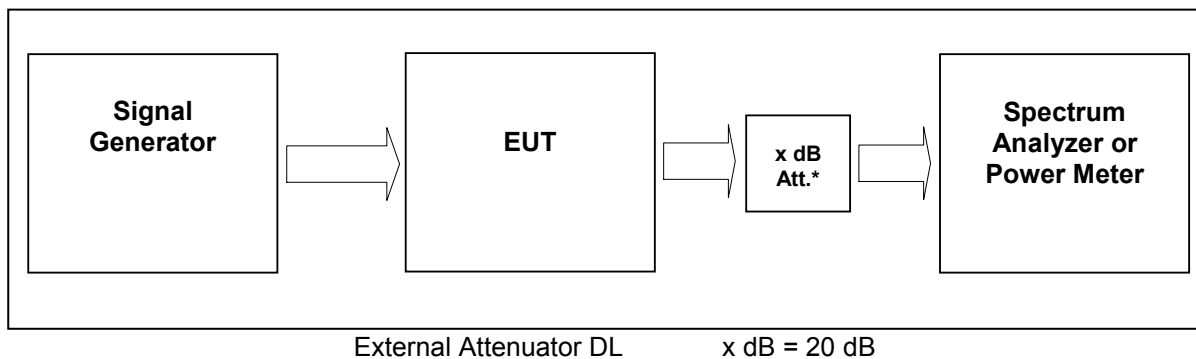


figure 5-#1 Test setup: RF Power Out: §24.232, §2.1046

|                         |                                                      |
|-------------------------|------------------------------------------------------|
| Measurement uncertainty | ± 0,38 dB                                            |
| Test equipment used     | 9046, 9126, 9784, 7537, 7584, 7542, 8542, 8544, 7370 |

### 5.1 Limit

Minimum standard:

Para. No.24.232

(a)(1) Base stations with an emission bandwidth of 1 MHz or less are limited to 1640 watts equivalent isotropically radiated power (EIRP) with an antenna height up to 300 meters HAAT, except as described in paragraph (b) below.

(2) Base stations with an emission bandwidth greater than 1 MHz are limited to 1640 watts/MHz equivalent isotropically radiated power (EIRP) with an antenna height up to 300 meters HAAT, except as described in paragraph (b) below.

Table 1—Reduced Power for Base Station Antenna Heights Over 300 Meters

| HAAT in meters | Maximum EIRP watts |
|----------------|--------------------|
| ≤ 300          | 1640               |
| ≤ 500          | 1070               |
| ≤ 1000         | 490                |
| ≤ 1500         | 270                |
| ≤ 2000         | 160                |

### 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 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 | Path       | RBW<br>VBW<br>Span     | RF Power<br>(dBm) | RF Power<br>(W) | Plot -        |
|-------------------------------------------|-------------|------------|------------------------|-------------------|-----------------|---------------|
| LTE                                       | Middle      | 1962.5 MHz | 3MHz<br>10MHz<br>15MHz | 27                | 0.5             | 5.3.2.1<br>#1 |
| Maximum output power = 27 dBm = 0.5 W     |             |            |                        |                   |                 |               |
| Limit Maximum output power (erp) = 1000 W |             |            |                        |                   |                 |               |

table 5.3.1-#1 RF Power Out: §24.232, §2.1046 Test results Downlink

The max RF Power out is 27 dBm, so the maximum antenna gain (x) can be calculated as follow:

**Limit = 1000W (erp) = 60 dBm**

Info: 1000W (erp) = 1640W (eirp)

$60 \text{ dBm} > 27 \text{ dBm} + x \rightarrow x = 60 \text{ dBm} - 27 \text{ dBm} = 33 \text{ dBd}$

$x \text{ dBi} = 33 \text{ dBd} + 2.15 = 35.15 \text{ dBi}$

=> The antenna that will be used for the complete system have to have a gain lower than 35.15 dBi, relative to a dipol.

#### 5.3.2 Uplink

| Modulation                                | Measured at | Path       | RBW<br>VBW<br>Span     | RF Power<br>(dBm) | RF Power<br>(W) | Plot -        |
|-------------------------------------------|-------------|------------|------------------------|-------------------|-----------------|---------------|
| LTE                                       | Middle      | 1882.5 MHz | 3MHz<br>10MHz<br>15MHz | 30                | 1               | 5.3.2.2<br>#1 |
| Maximum output power = 30 dBm = 1 W       |             |            |                        |                   |                 |               |
| Limit Maximum output power (erp) = 1000 W |             |            |                        |                   |                 |               |

table 5.3.2-#2 RF Power Out: §24.232, §2.1046 Test results Uplink

The max RF Power out is 30 dBm, so the maximum antenna gain (x) can be calculated as follow:

**Limit = 1000W (erp) = 60 dBm**

Info: 1000W (erp) = 1640W (eirp)

$60 \text{ dBm} > 30 \text{ dBm} + x \rightarrow x = 60 \text{ dBm} - 30 \text{ dBm} = 30 \text{ dBd}$

$x \text{ dBi} = 30 \text{ dBd} + 2.15 = 32.15 \text{ dBi}$

=> The antenna that will be used for the complete system have to have a gain lower than 32.15 dBi, relative to a dipol.

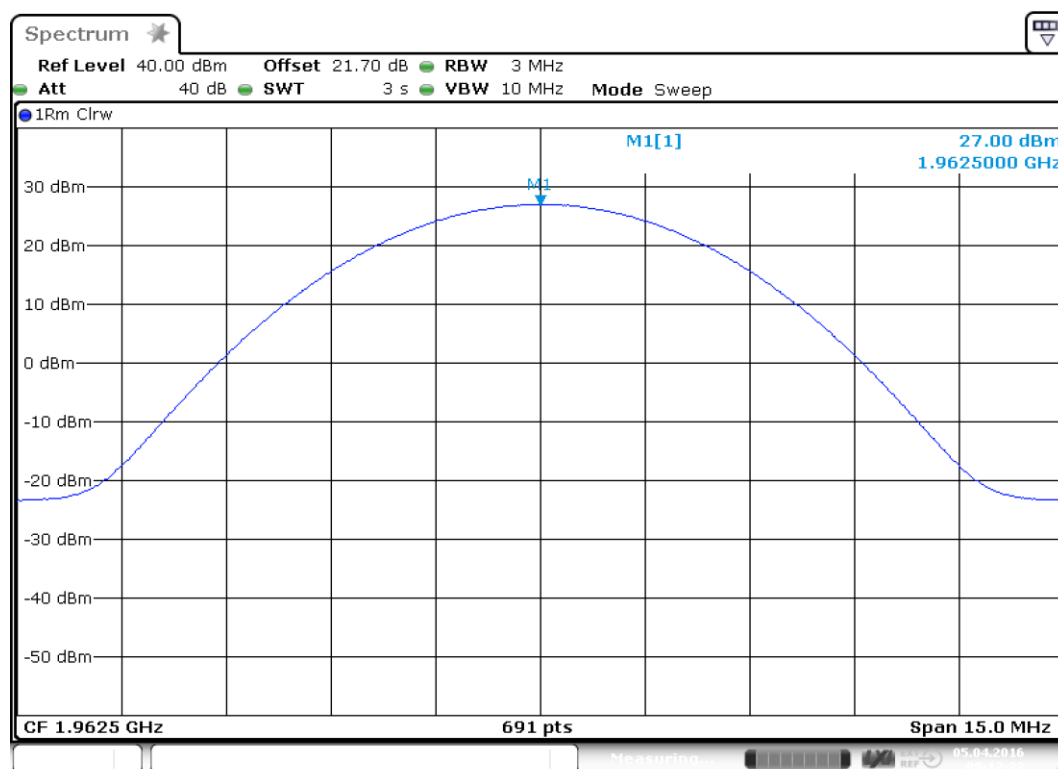


## 5.3.2.1 LTE Downlink

| Modulation | Pin / dBm*<br>(Ref. point A) |
|------------|------------------------------|
| LTE        | -27                          |

\*measured with 54dB gain

table 5.3.2-#3 RF Power Out: §24.232, §2.1046 Test results Uplink Input power



Date: 5.APR.2016 09:12:33

plot 5.3.2.1-#1 RF Power Out: §24.232, §2.1046; Test results; Uplink; LTE Downlink Middle

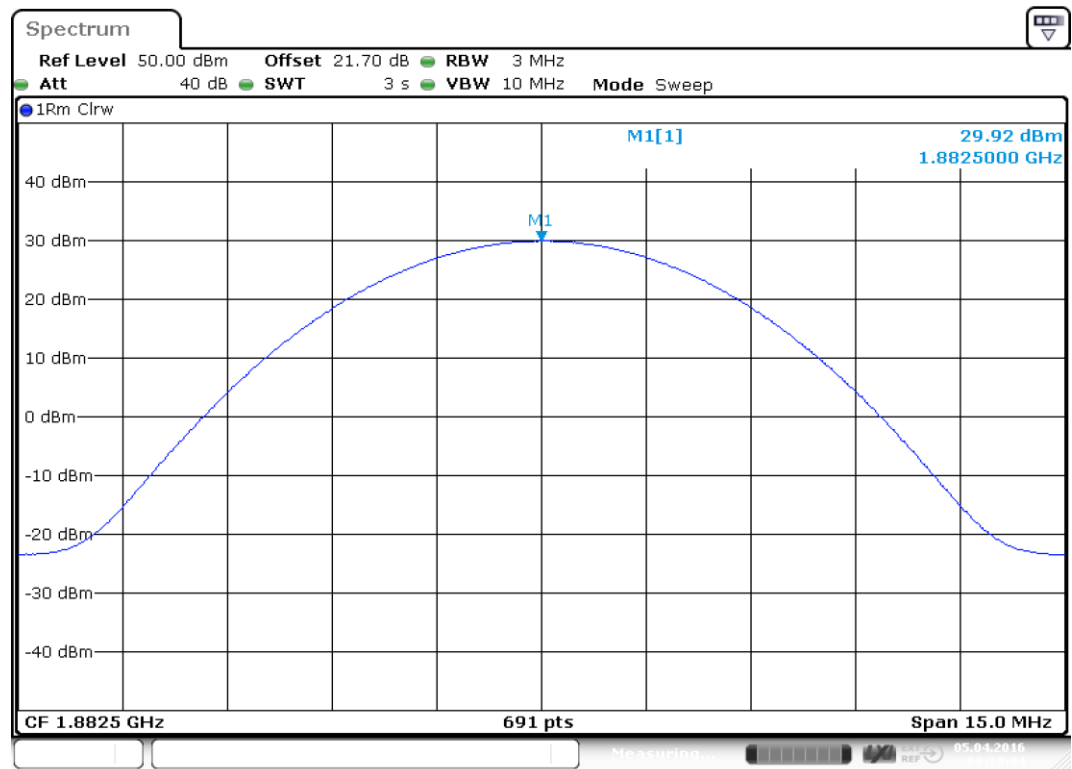


5.3.2.2 LTE Uplink

| Modulation | Pin / dBm*<br>(Ref. point B) |
|------------|------------------------------|
| LTE        | -24                          |

\*measured with 54dB gain

table 5.3.2-#4 RF Power Out: §24.232, §2.1046 Test results Uplink Input power



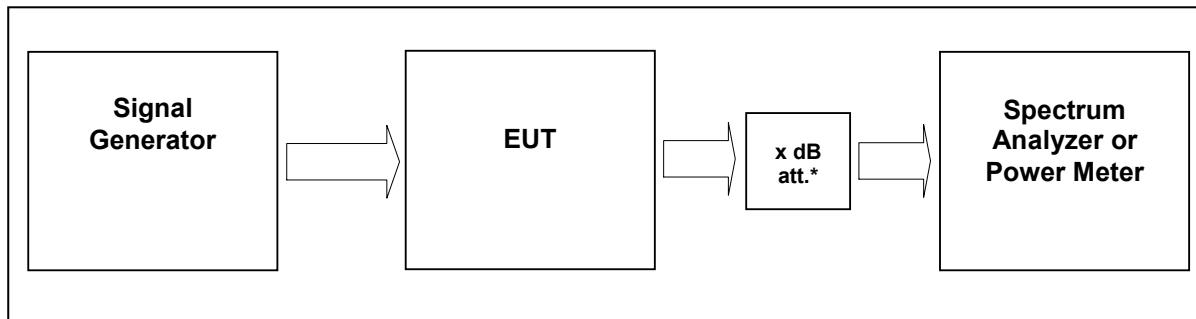
Date: 5.APR.2016 09:10:04

plot 5.3.2.2-#1 RF Power Out: §24.232, §2.1046; Test results; Uplink; LTE Uplink Middle

5.4 Summary test result

|             |                                     |
|-------------|-------------------------------------|
| Test result | complies, according the plots above |
| Tested by:  | F. Bengesser                        |
| Date:       | 05.04.2016                          |

## 6 Occupied Bandwidth: §2.1049



External Attenuator DL      x dB = 20 dB  
figure 6-#1 Test setup: Occupied Bandwidth: §2.1049

|                         |                                                      |
|-------------------------|------------------------------------------------------|
| Measurement uncertainty | ± 0,38 dB                                            |
| Test equipment used     | 9046, 9126, 9784, 7537, 7584, 7542, 8542, 8544, 7370 |

### 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:



## 6.3 Test results

### 6.3.1 Downlink

Detector PK.

| Modulation | Measured at | F center / MHz | RBW<br>VBW<br>Span         | Occupied<br>Bandwidth /<br>MHz | Plot #           |
|------------|-------------|----------------|----------------------------|--------------------------------|------------------|
| LTE        | Middle      | 1962.5         | 30 kHz<br>300 kHz<br>5 MHz | 1.1                            | 6.3.2.1<br>#1,#2 |

| Modulation | Measured at | F center / MHz | RBW<br>VBW<br>Span         | 26dB<br>Bandwidth /<br>MHz | Plot #           |
|------------|-------------|----------------|----------------------------|----------------------------|------------------|
| LTE        | Middle      | 1962.5         | 30 kHz<br>300 kHz<br>5 MHz | 1.3                        | 6.3.3.1<br>#1,#2 |

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

### 6.3.2 Uplink

Detector PK.

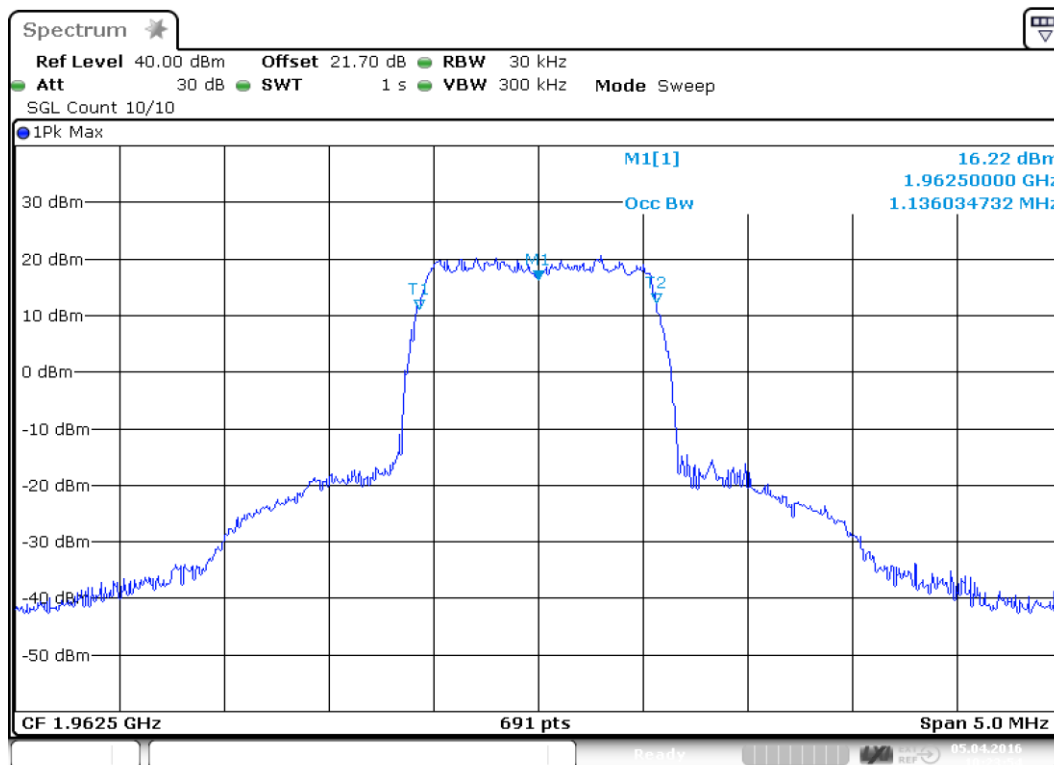
| Modulation | Measured at | F center / MHz | RBW<br>VBW<br>Span         | Occupied<br>Bandwidth /<br>MHz | Plot #           |
|------------|-------------|----------------|----------------------------|--------------------------------|------------------|
| LTE        | Middle      | 1882.5         | 30 kHz<br>300 kHz<br>5 MHz | 1.1                            | 6.3.2.2<br>#1,#2 |

| Modulation | Measured at | F center / MHz | RBW<br>VBW<br>Span         | 26dB<br>Bandwidth /<br>MHz | Plot #           |
|------------|-------------|----------------|----------------------------|----------------------------|------------------|
| LTE        | Middle      | 1882.5         | 30 kHz<br>300 kHz<br>5 MHz | 1.4                        | 6.3.3.2<br>#1,#2 |

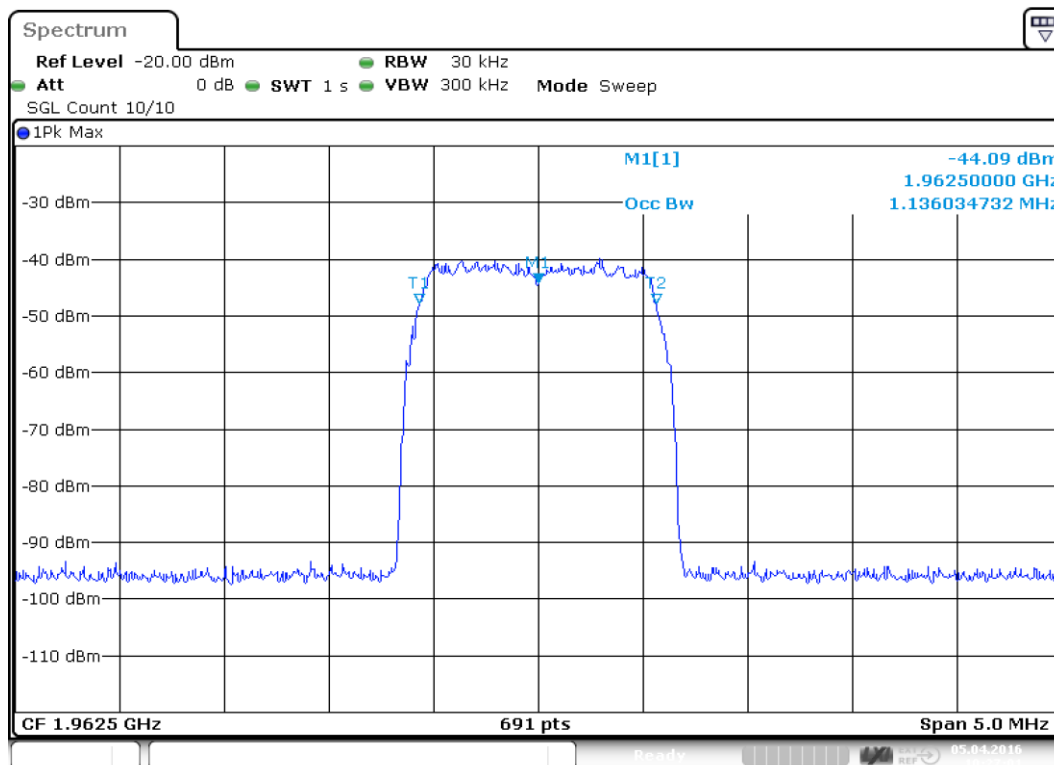
table 6.3-#2 Occupied Bandwidth: §2.1049 Test results Uplink



### 6.3.2.1 Downlink LTE



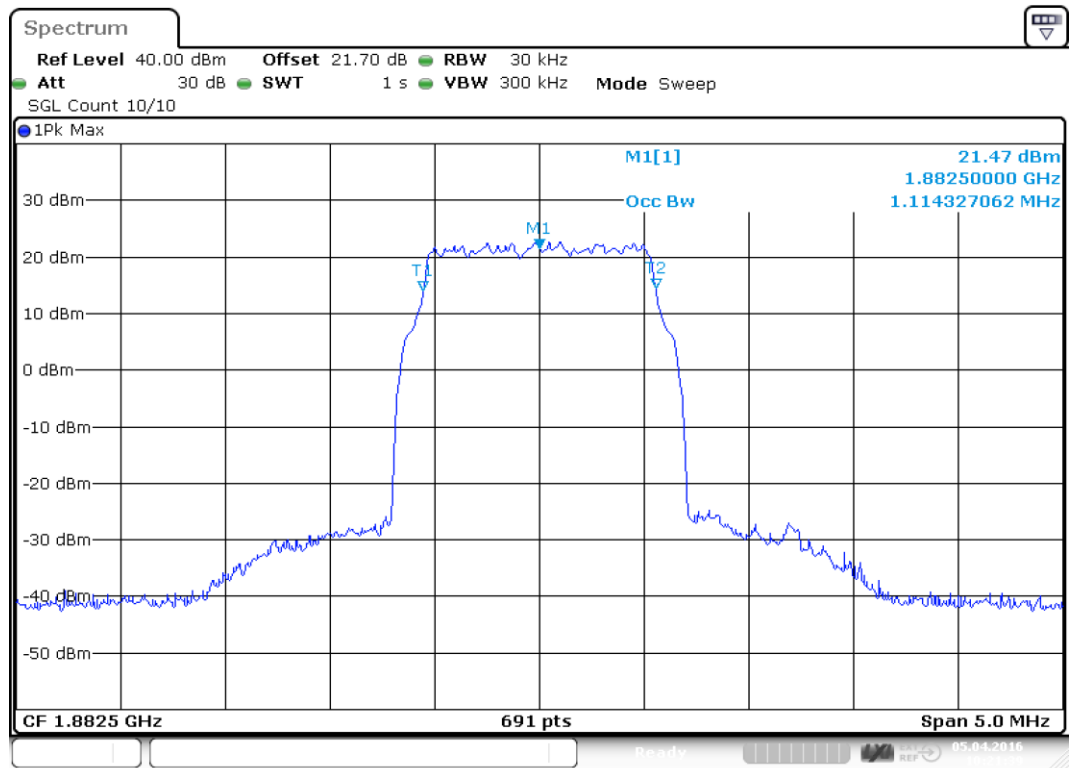
plot 6.3.2.1-#1 Occupied Bandwidth: \$2.1049; Test results; Uplink; Downlink LTE Output



plot 6.3.2.1-#2 Occupied Bandwidth: \$2.1049; Test results; Uplink; Downlink LTE Input

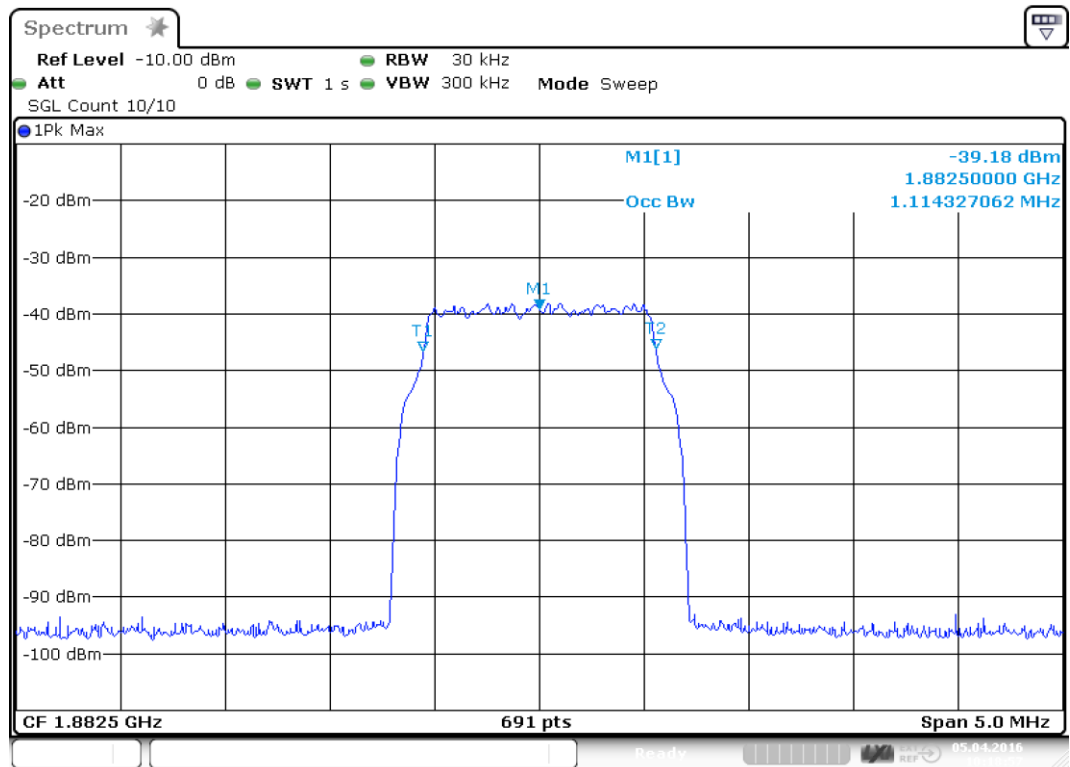


6.3.2.2 Uplink LTE



Date: 5.APR.2016 10:21:39

plot 6.3.2.2-#1 Occupied Bandwidth: \$2.1049; Test results; Uplink; Uplink LTE Output



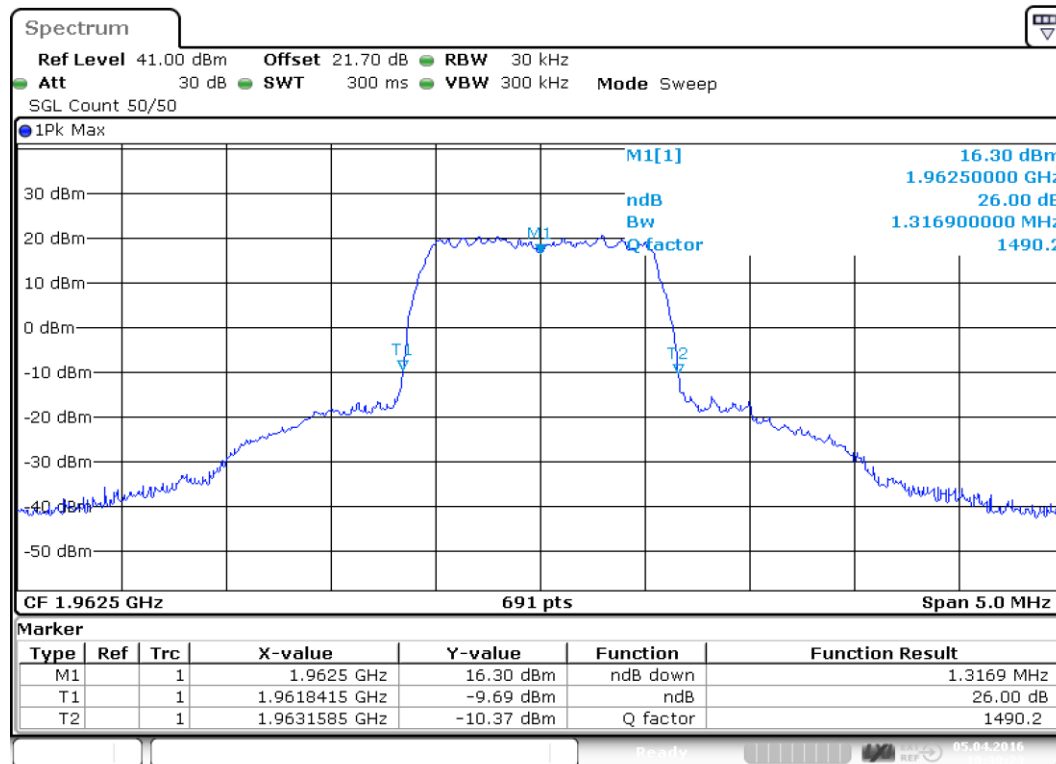
Date: 5.APR.2016 10:18:57

plot 6.3.2.2-#2 Occupied Bandwidth: \$2.1049; Test results; Uplink; Uplink LTE Input



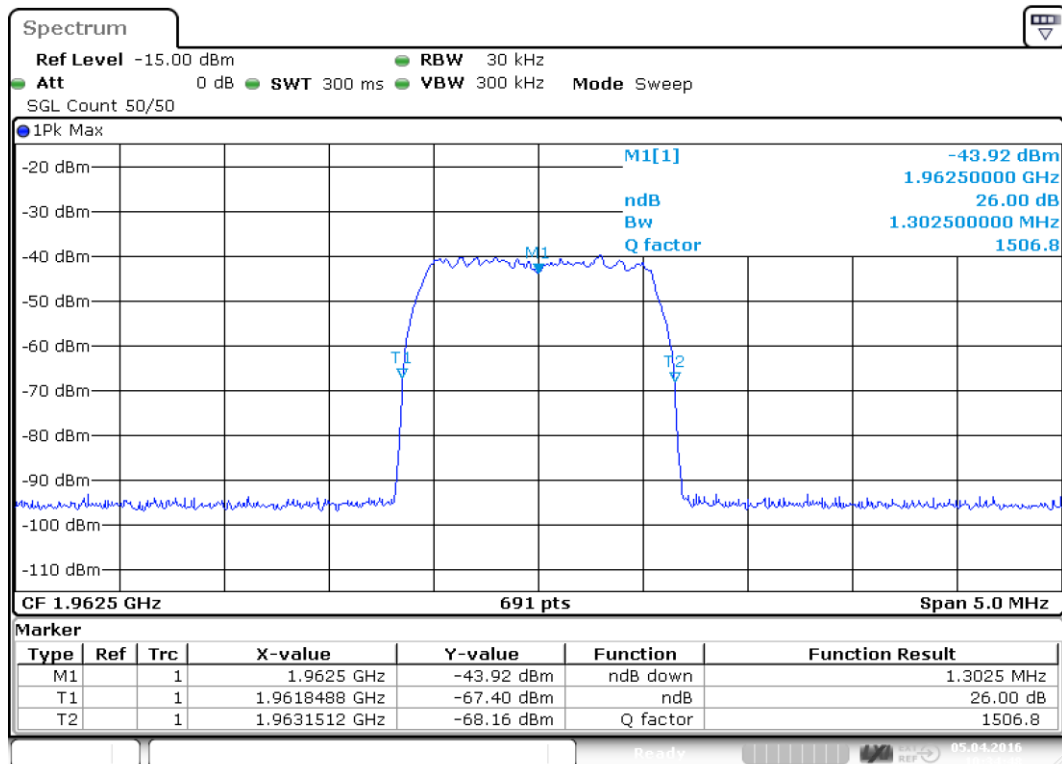
### 6.3.3 26dB Bandwidth

#### 6.3.3.1 Downlink LTE



Date: 5.APR.2016 10:38:23

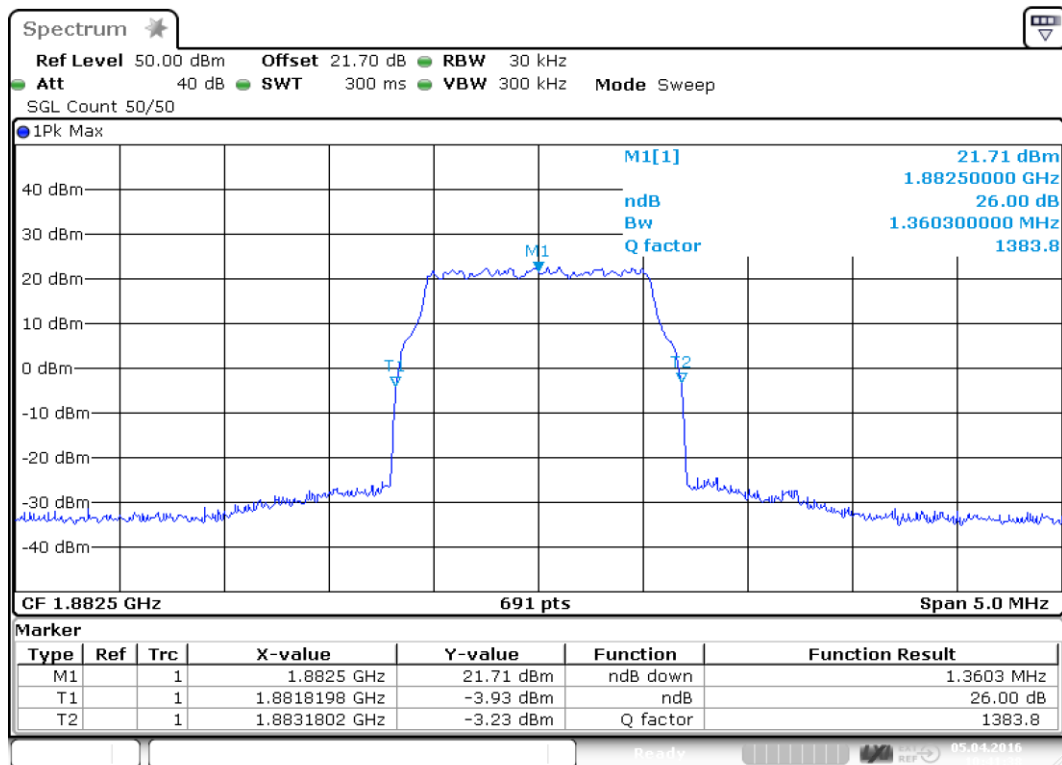
plot 6.3.3.1-#1 Occupied Bandwidth: \$2.1049; Test results; 26dB Bandwidth; Downlink LTE Output

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Date: 5.APR.2016 10:34:48

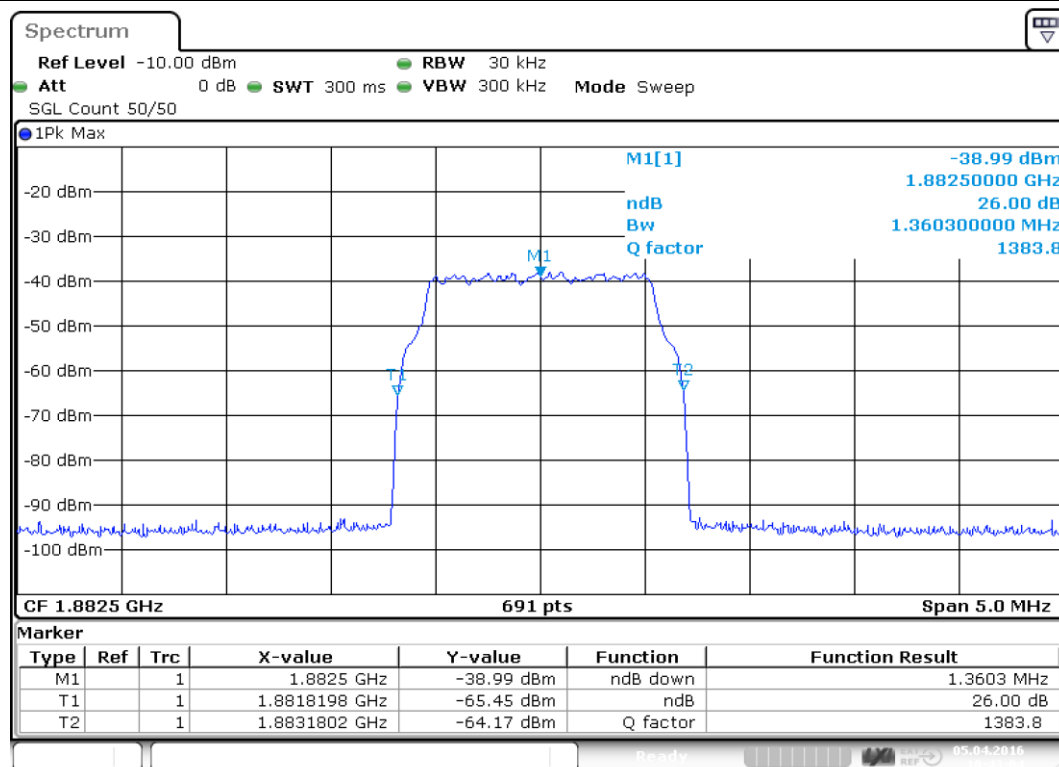
plot 6.3.3.1-#2 Occupied Bandwidth: \$2.1049; Test results; 26dB Bandwidth; Downlink LTE Input

### 6.3.3.2 Uplink LTE



Date: 5.APR.2016 10:41:38

plot 6.3.3.2-#1 Occupied Bandwidth: \$2.1049; Test results; 26dB Bandwidth; Uplink LTE Output

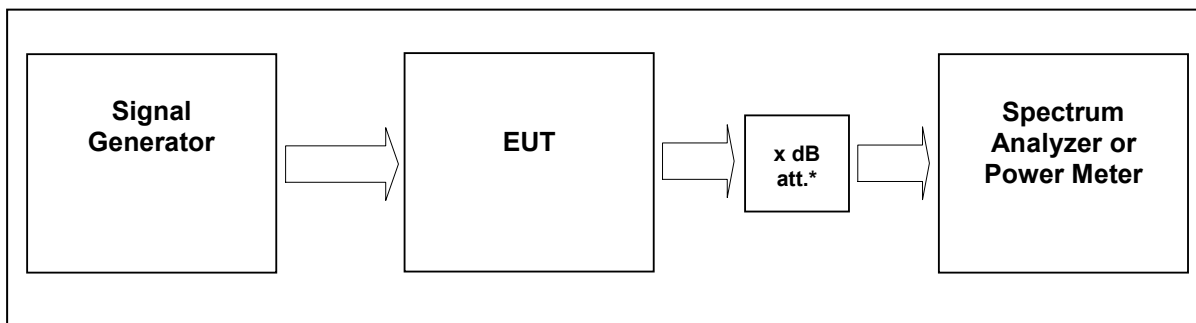
BUREAU  
VERITAS

plot 6.3.3.2-#2 Occupied Bandwidth: §2.1049; Test results; 26dB Bandwidth; Uplink LTE Input

### 6.3.4 Summary test result

|             |                                     |
|-------------|-------------------------------------|
| Test result | complies, according the plots above |
| Tested by:  | F. Bengesser                        |
| Date:       | 05.04.2016                          |

## 7 Spurious Emissions at Antenna Terminals: §24.238, §2.1051



External Attenuator DL                      x dB = 20 dB

figure 7-#1 Test setup: Spurious Emissions at Antenna Terminals: §24.238, §2.1051

|                         |                                                                  |                                                     |
|-------------------------|------------------------------------------------------------------|-----------------------------------------------------|
| 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     | 9046, 9126, 9784, 7537, 7584, 7542, 7475, 7459, 8542, 8544, 7370 |                                                     |

### 7.1 Limit

Minimum standard:

Para. No.24.238(a)

The rules in this section govern the spectral characteristics of emissions in the Broadband Personal Communications Service.

(a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

### 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

Detector: RMS.

| Modulation | Carrier    | RBW<br>VBW<br>Span            | Max.<br>level<br>(dBm) | Plot -        |
|------------|------------|-------------------------------|------------------------|---------------|
| LTE        | 1962.5 MHz | 1MHz<br>3MHz<br>30MHz – 23GHz | -41.1                  | 7.3.2.1<br>#1 |

table 7.3-#1 Spurious Emissions at Antenna Terminals: §24.238, §2.1051 Test results

### 7.3.2 Uplink

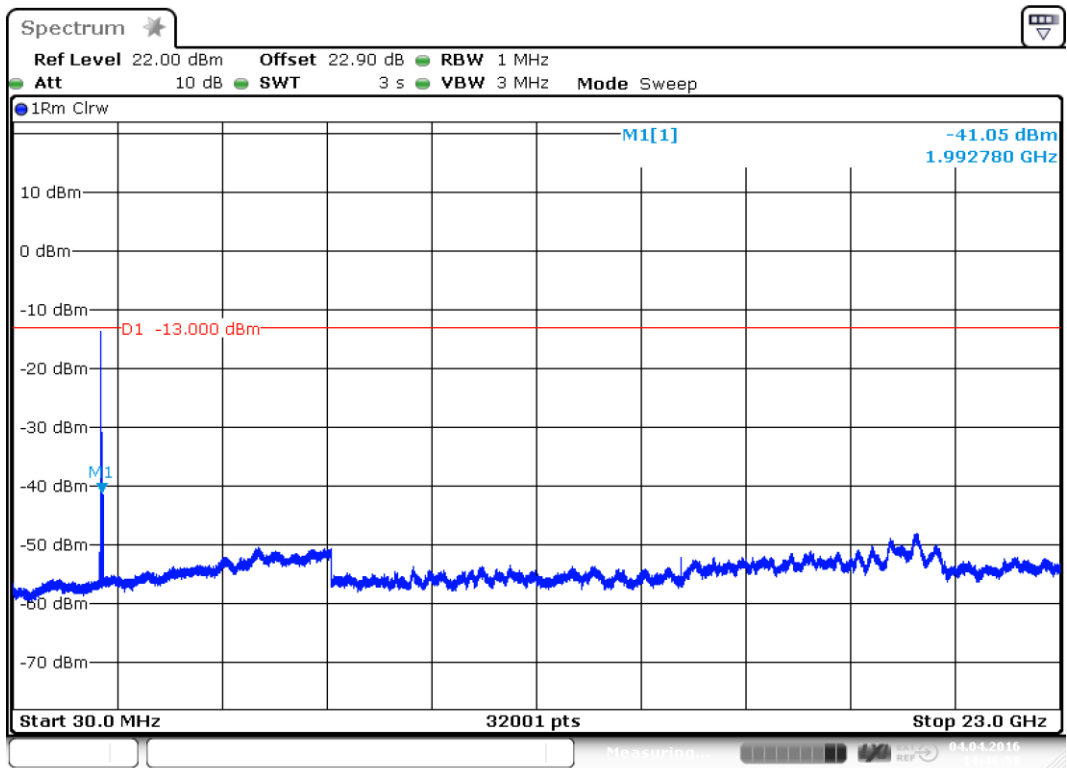
Detector: RMS.

| Modulation | Carrier    | RBW<br>VBW<br>Span            | Max.<br>level<br>(dBm) | Plot -        |
|------------|------------|-------------------------------|------------------------|---------------|
| LTE        | 1882.5 MHz | 1MHz<br>3MHz<br>30MHz – 23GHz | -40.0                  | 7.3.2.2<br>#1 |

table 7.3-#2 Spurious Emissions at Antenna Terminals: §24.238, §2.1051 Test results



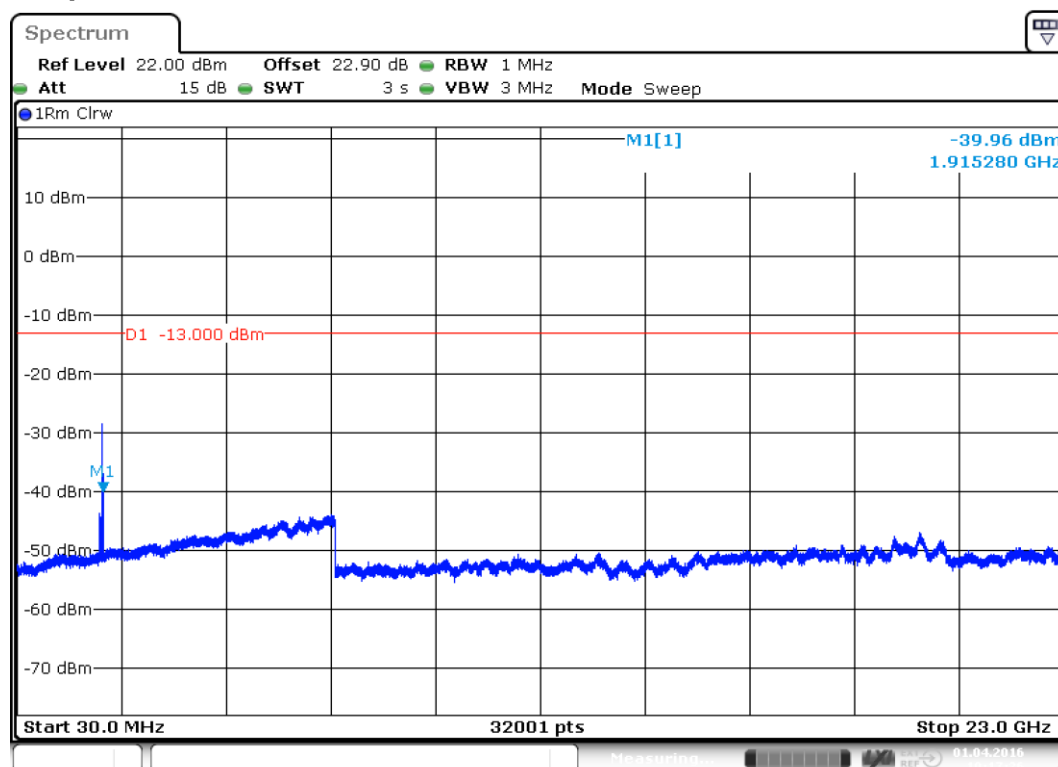
7.3.2.1 Downlink LTE



Date: 4.APR.2016 14:48:58

plot 7.3.2.1-#1 Spurious Emissions at Antenna Terminals: §24.238, §2.1051; Test results; Uplink; Downlink LTE; carrier (1962.5MHz) notched

## 7.3.2.2 Uplink LTE



Date: 1.APR.2016 10:17:26

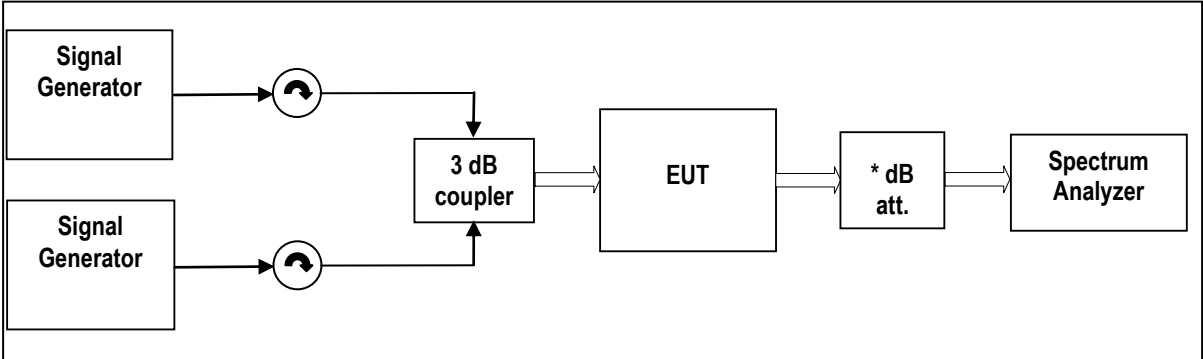
plot 7.3.2.2-#1 Spurious Emissions at Antenna Terminals: §24.238, §2.1051; Test results; Uplink; Uplink LTE; carrier (1882.5MHz) notched

## 7.4 Summary test result

|             |                                     |
|-------------|-------------------------------------|
| Test result | complies, according the plots above |
| Tested by:  | F. Bengesser                        |
| Date:       | 01.04.2016                          |



8 Intermodulation: §24.238, §2.1051



External Attenuator DL x dB = 20 dB  
figure 8-#1 Test setup: Intermodulation: §24.238, §2.1051

|                         |                                                                  |                                                     |
|-------------------------|------------------------------------------------------------------|-----------------------------------------------------|
| 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     | 9046, 9069, 9126, 9784, 7583, 7584, 7537, 7542, 8542, 8544, 7370 |                                                     |

8.1 Limit

Minimum standard:

Para. No.24.238(a)

The rules in this section govern the spectral characteristics of emissions in the Broadband Personal Communications Service.

(a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

8.2 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]



### 8.3 Test results

#### 8.3.1 Downlink

Detector: RMS.

| Modulation | Measured at Band Edge | Carriers                 | RBW<br>VBW<br>Span      | Max. level (dBm) | Plot -        |
|------------|-----------------------|--------------------------|-------------------------|------------------|---------------|
| LTE        | Lower Edge            | 1930.7 MHz<br>1932.1 MHz | 30kHz<br>300kHz<br>6MHz | -28.0            | 8.3.2.1<br>#1 |
|            | Upper Edge            | 1992.9 MHz<br>1994.3 MHz |                         |                  | #2            |

table 8.3-#1 Intermodulation: §24.238, §2.1051 Test results

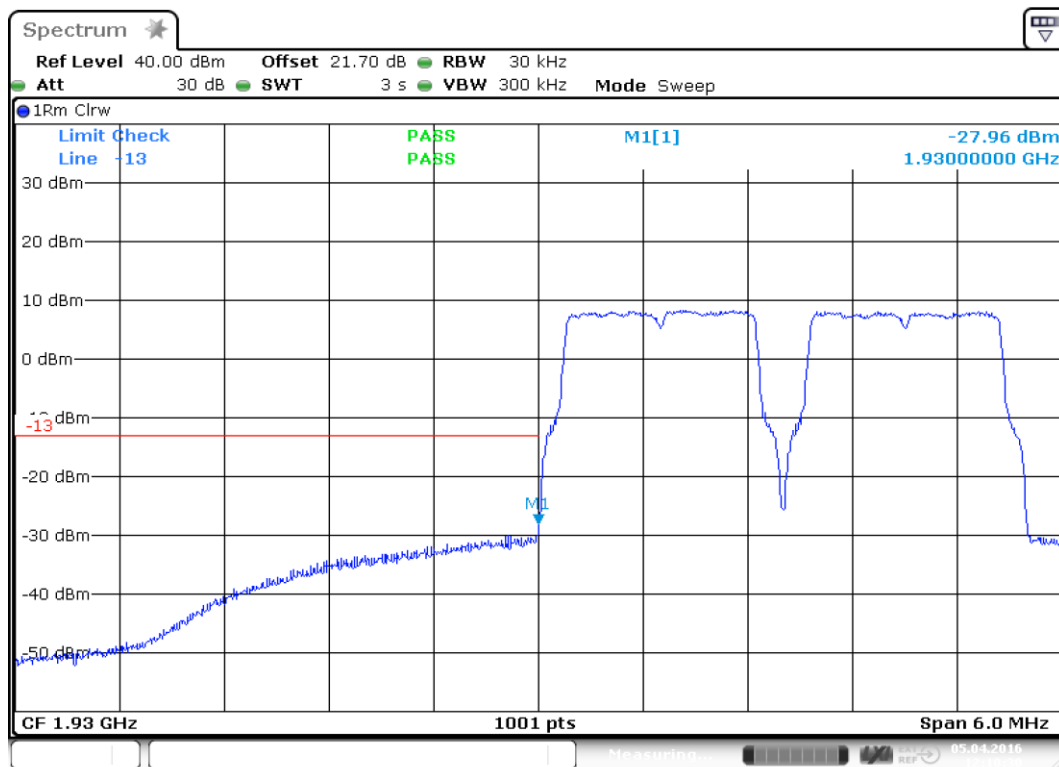
#### 8.3.2 Uplink

Detector: RMS.

| Modulation | Measured at Band Edge | Carriers                 | RBW<br>VBW<br>Span      | Max. level (dBm) | Plot -        |
|------------|-----------------------|--------------------------|-------------------------|------------------|---------------|
| LTE        | Lower Edge            | 1850.7 MHz<br>1852.1 MHz | 30kHz<br>300kHz<br>6MHz | -29.7            | 8.3.2.2<br>#1 |
|            | Upper Edge            | 1912.9 MHz<br>1914.3 MHz |                         |                  | #2            |

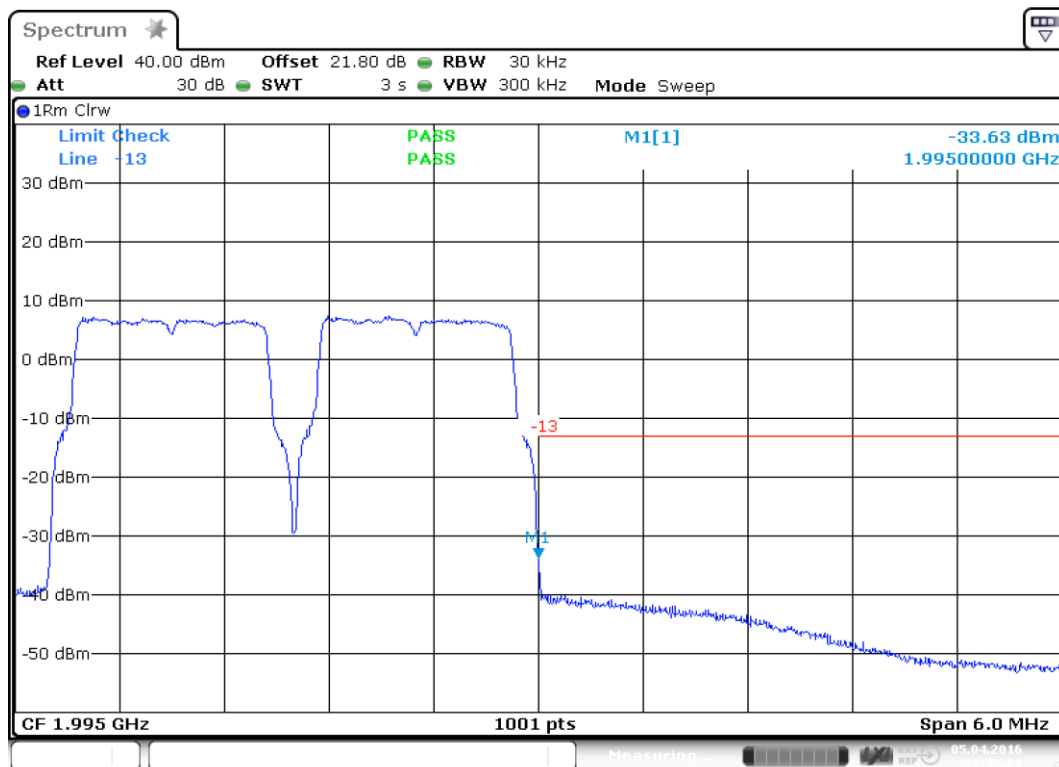
table 8.3-#2 Intermodulation: §24.238, §2.1051 Test results

### 8.3.2.1 Downlink LTE



Date: 5.APR.2016 12:10:30

plot 8.3.2.1-#1 Intermodulation: §24.238, §2.1051; Test results; Uplink; Downlink LTE Lower Band Edge

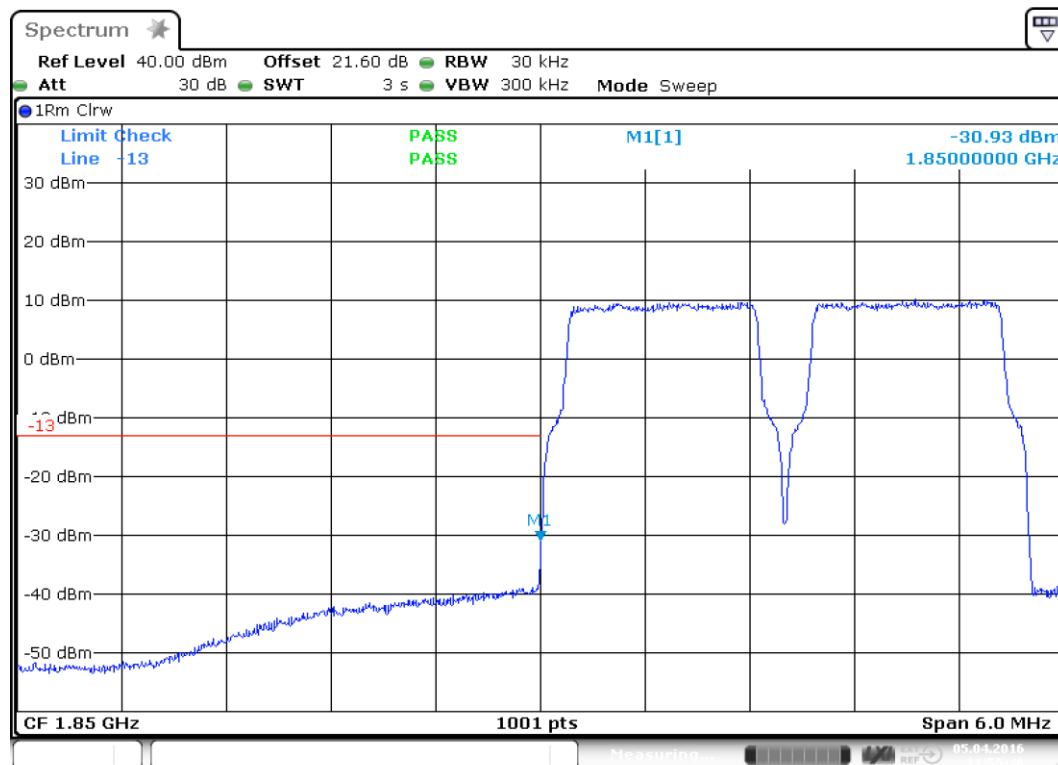


Date: 5.APR.2016 12:08:21

plot 8.3.2.1-#2 Intermodulation: §24.238, §2.1051; Test results; Uplink; Downlink LTE Upper Band Edge

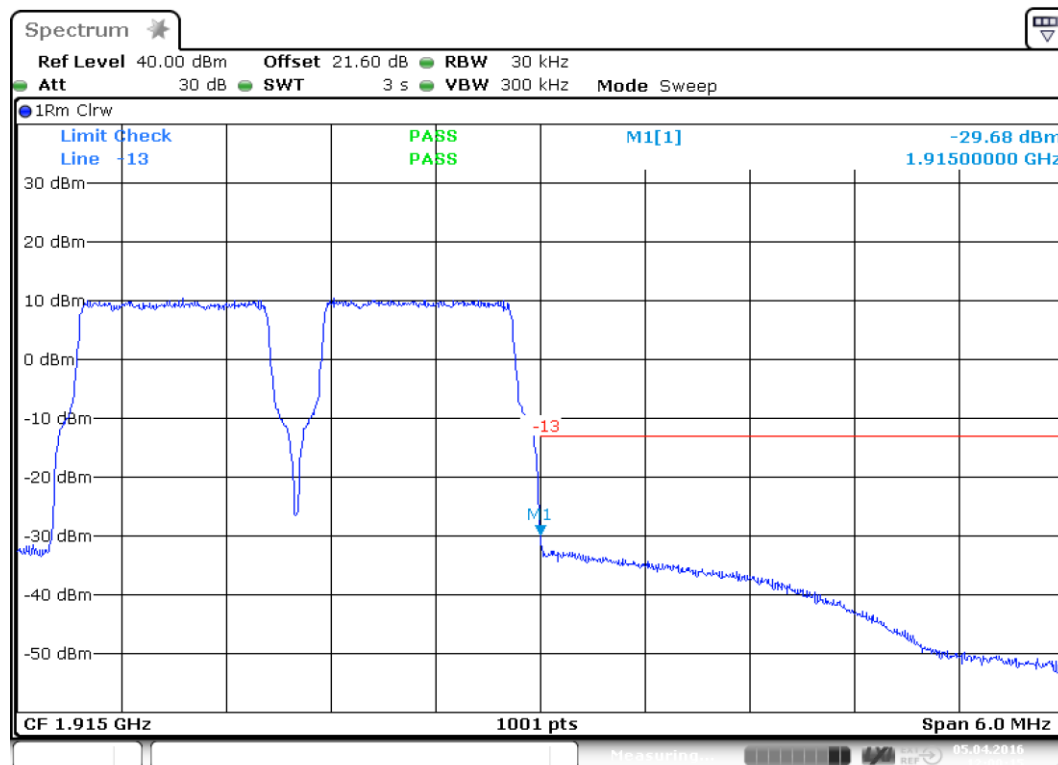


## 8.3.2.2 Uplink LTE



Date: 5.APR.2016 11:56:46

plot 8.3.2.2-#1 Intermodulation: §24.238, §2.1051; Test results; Uplink; Uplink LTE Lower Band Edge



Date: 5.APR.2016 12:00:15

plot 8.3.2.2-#2 Intermodulation: §24.238, §2.1051; Test results; Uplink; Uplink LTE Upper Band Edge

Test Report No.: 16-088

FCC ID: BCR-AF1927

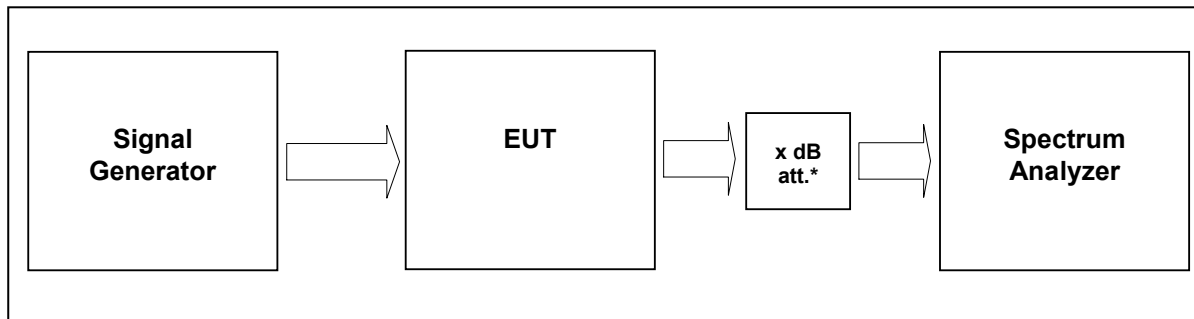


BUREAU  
VERITAS

#### 8.4 Summary test result

|             |                                     |
|-------------|-------------------------------------|
| Test result | complies, according the plots above |
| Tested by:  | F. Bengesser                        |
| Date:       | 05.04.2016                          |

## 9 Out of Band Rejection



External Attenuator DL      x dB = 20 dB  
figure 9-#1 Test setup: Out of Band Rejection

|                         |                                                      |
|-------------------------|------------------------------------------------------|
| Measurement uncertainty | ± 0,38 dB                                            |
| Test equipment used     | 9046, 9126, 9784, 7537, 7584, 7542, 8542, 8544, 7370 |

### 9.1 Limit

KDB 935210 D02 v03

Test for rejection of out of band signals. Filter frequency response plots are acceptable.

### 9.2 Test method

935210 D03 v03

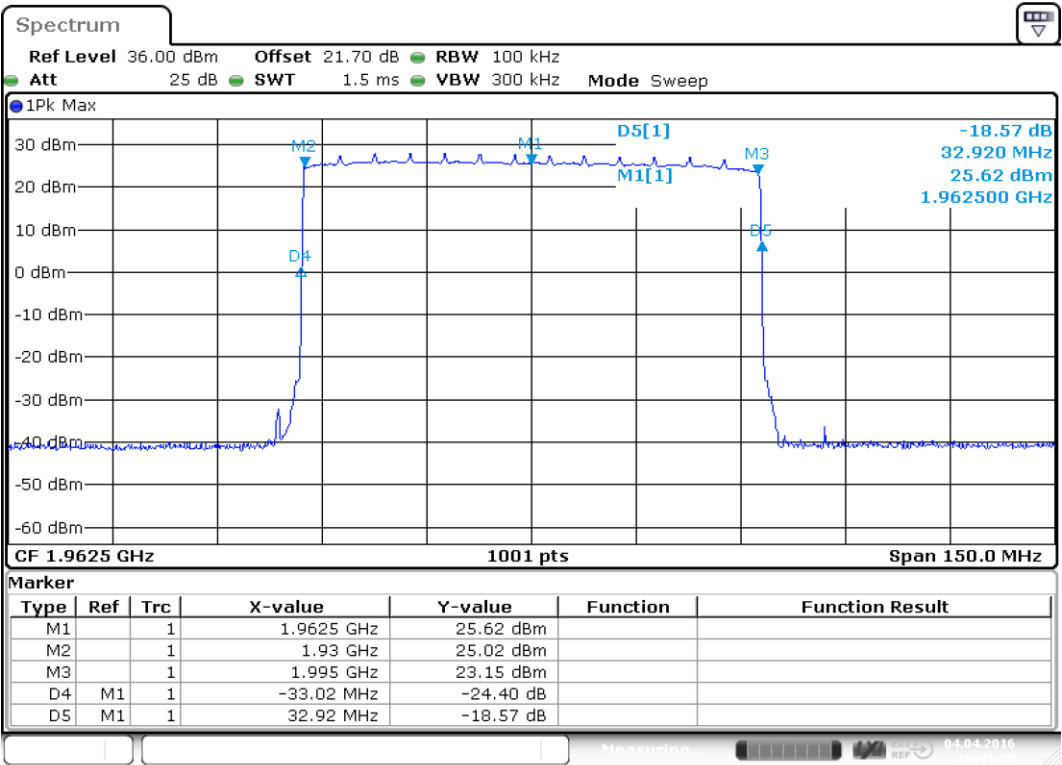
7.1 Authorized frequency band verification test

### 9.3 Test results

Detector Peak max hold



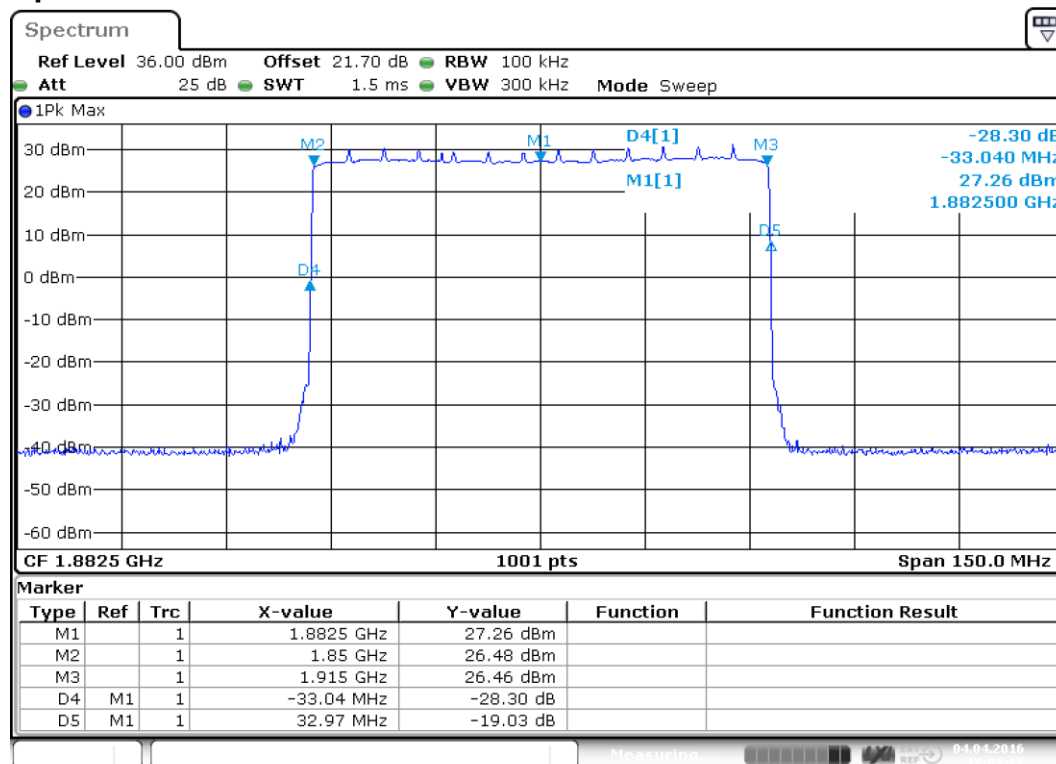
9.3.1 Downlink



Date: 4.APR.2016 16:41:50

plot 9.3.1-#1 Out of Band Rejection; Test results; Downlink;

## 9.3.2 Uplink



Date: 4.APR.2016 17:01:23

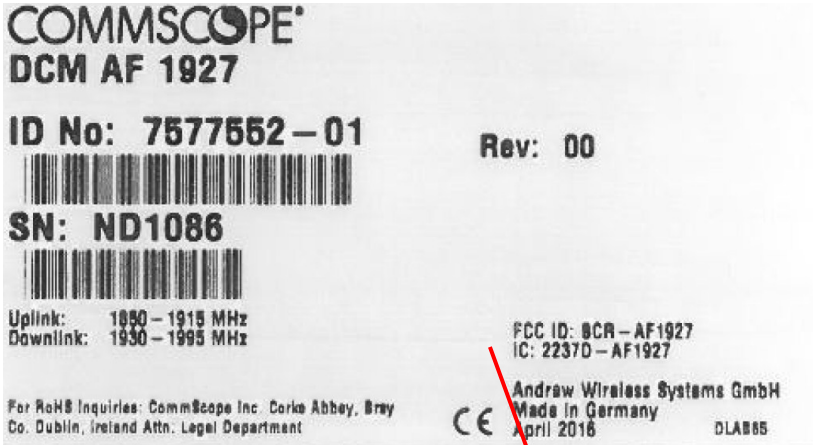
plot 9.3.2-#1 Out of Band Rejection; Test results; Uplink;

## 9.4 Summary test result

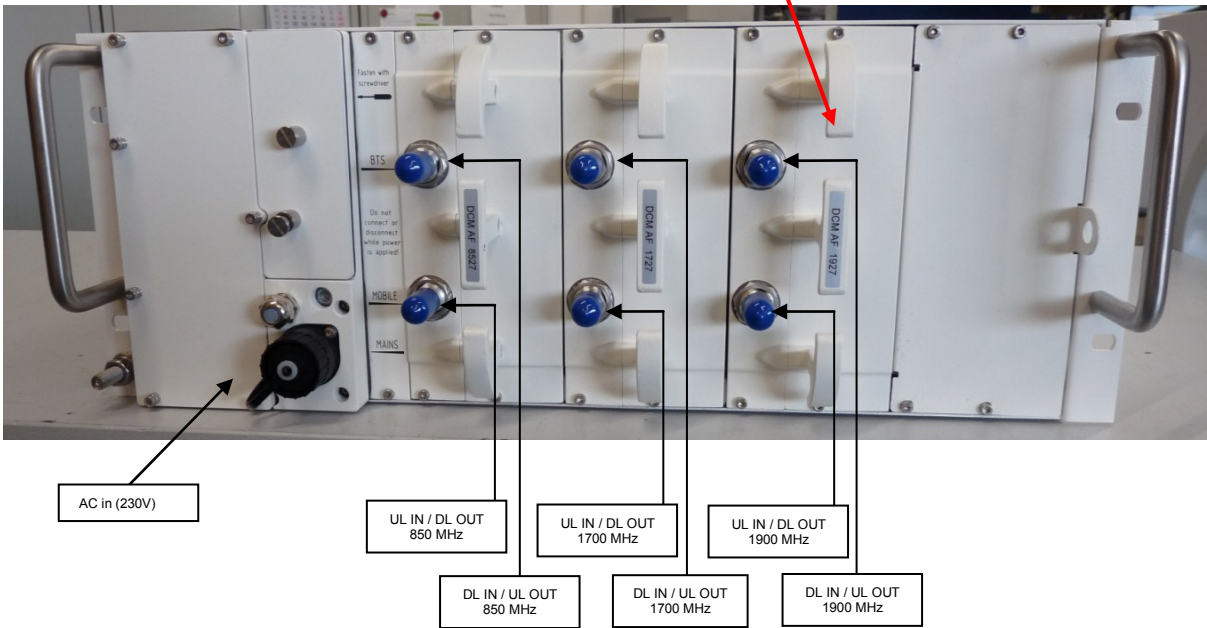
|             |                                     |
|-------------|-------------------------------------|
| Test result | complies, according the plots above |
| Tested by:  | F. Bengesser                        |
| Date:       | 04.04.2016                          |



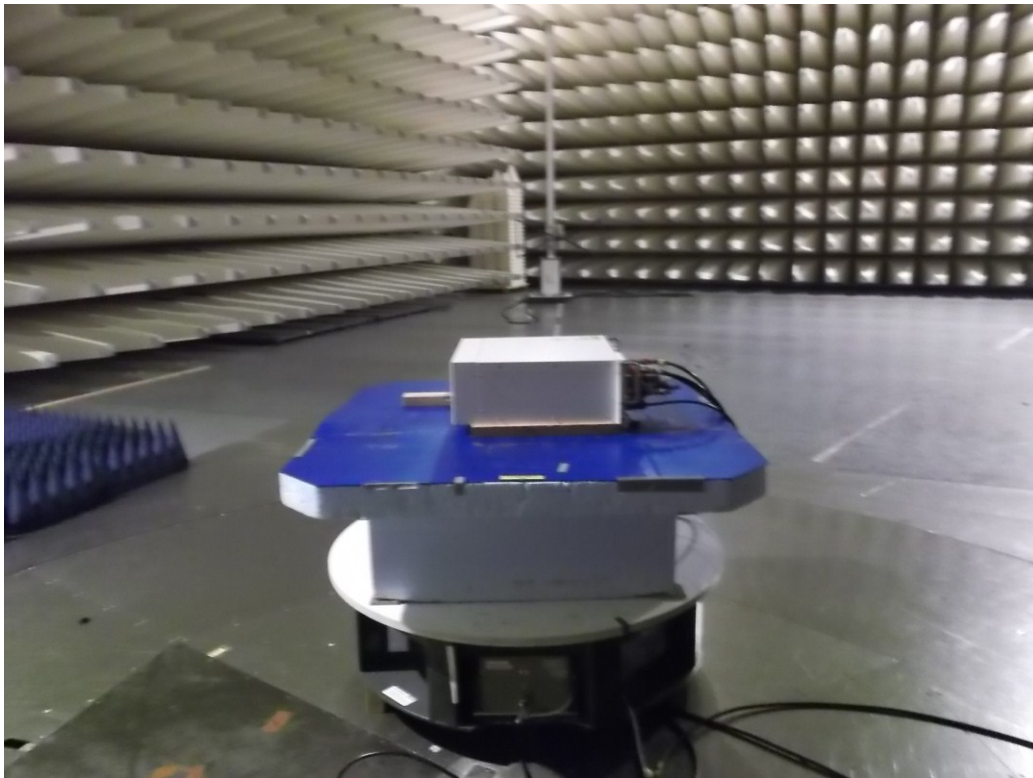
10 Field Strength of Spurious Emissions: §24.238, §2.1053



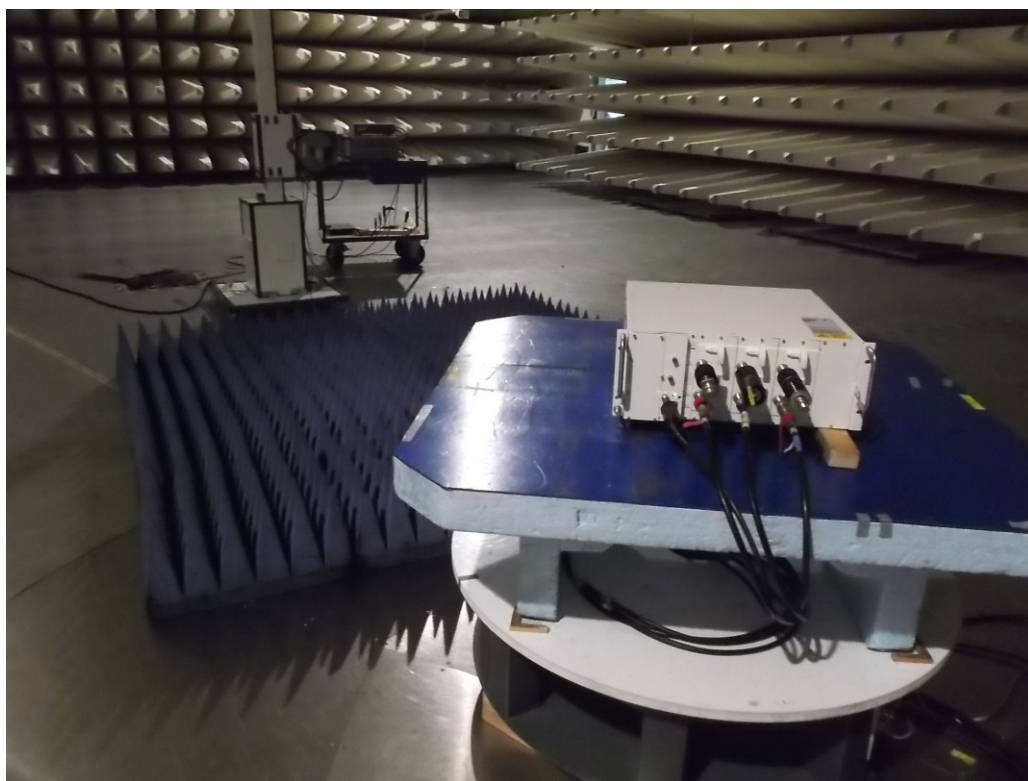
picture 8.1: label



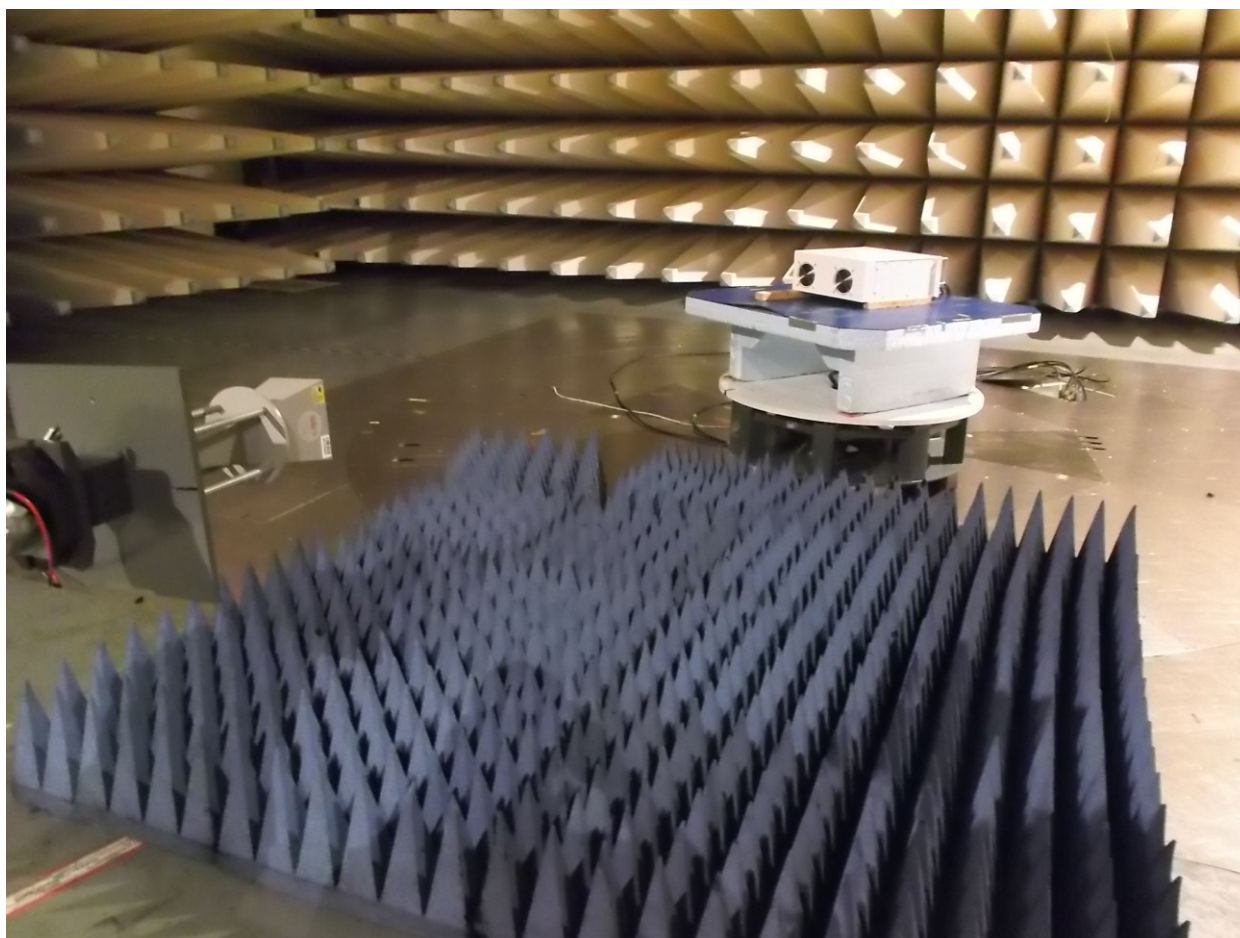
picture 8.2: (EUT)



**picture 8.3:** Test setup: Field Strength Emission <1 GHz @10m in the SAC



**picture 8.4:** Test setup: Field Strength Emission 1 - 18 GHz @3m in the SAC



**picture 8.5:** Test setup: Field Strength Emission 18 – 26.5 GHz @3m in the SAC



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    | 10 metres / SAC                            | FCC 47 CFR Part 27.53 | TIA/EIA-603-C:2004 |
| 1 GHz – 18 GHz    | 3 metres / SAC                             |                       |                    |
| 18 GHz – 26.5 GHz | 3 metres / SAC                             |                       |                    |

#### Test equipment used:

| Designation       | Type                  | Manufacturer    | Invent.-no. | Cal.-date  | due Cal.-<br>date | used |
|-------------------|-----------------------|-----------------|-------------|------------|-------------------|------|
| EMI test receiver | ESU40                 | Rohde & Schwarz | E2025       | 25.02.2016 | 25.02.2017        | X    |
| Antenna           | CBL 6111              | Chase           | K1026       | 12.02.2016 | 12.02.2017        | X    |
| RF Cable          | RG214                 | Frankonia       | K1121       | 16.04.2015 | 16.04.2017        | X    |
| Antenna           | HL 025                | R&S             | K1114       | 09.02.2016 | 09.02.2017        | X    |
| Preamplifier      | AFS4-00102000         | Miteq           | K838        | 17.06.2015 | 17.06.2016        | X    |
| RF Cable          | Sucoflex 100          | Suhner          | K1760       | 04.08.2015 | 04.08.2016        | X    |
| Antenna           | JXTXLB-42-25-<br>C-KF | A-Info          | K1175       | 09.03.2015 | 09.03.2017        | X    |

The REMI version 2.135 has been used to maximize radiated emission from the EUT with regards to ANSI C63.4:2009.

#### Test set-up:

Test location: SAC  
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.

Test Voltage: 110V / 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 |
|--------------------------------------------------|-------------------------------------------------------------------------|

## 10.1 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.

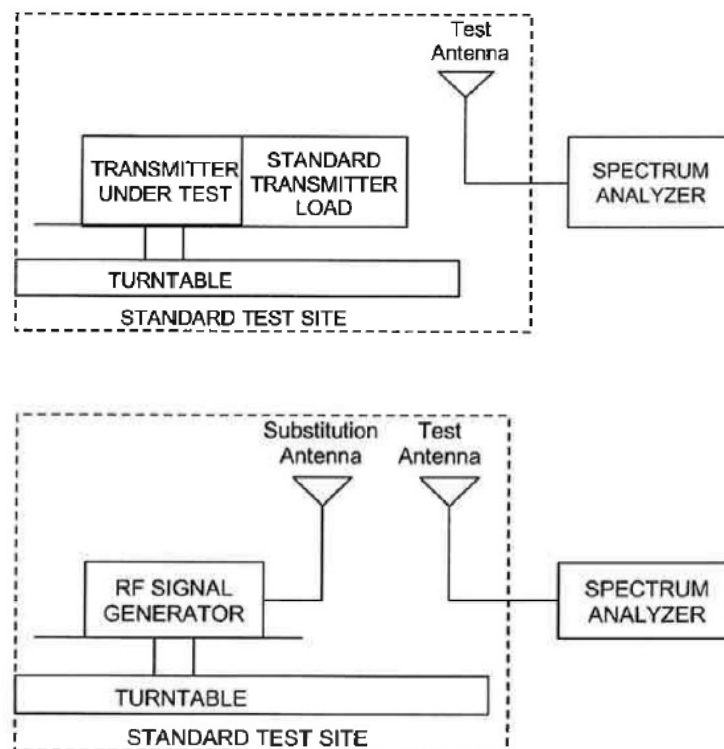


Figure #7.2 Substitution methods TIA/EIA-603-C



## 10.2 Limit

Minimum standard:

Para. No.24.238(a)

The rules in this section govern the spectral characteristics of emissions in the Broadband Personal Communications Service.

(a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

The Emission limit is -13dBm.

## 10.3 Climatic values in the lab

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

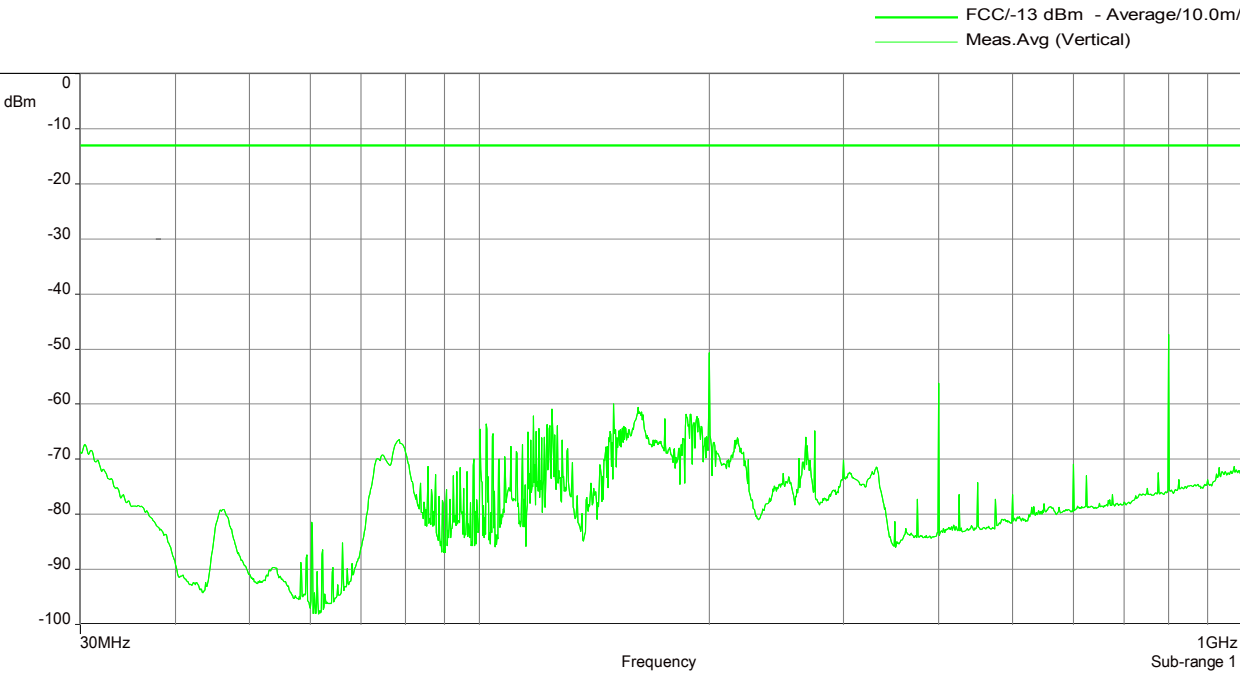


10.4 Test results

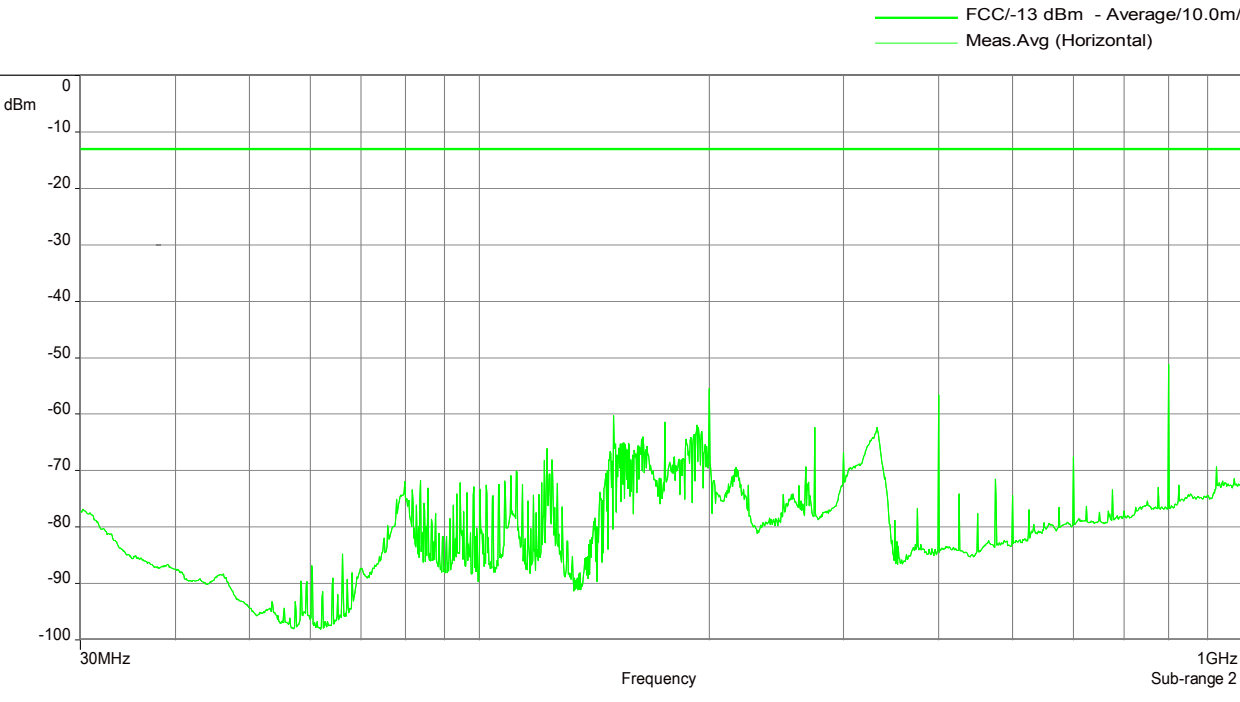
10.4.1 30 MHz to 1 GHz Uplink (Bottom – Middle – Top)

B/M/T: 1850 MHz / 1882.5 MHz / 1915 MHz (Operation with maximum composite power)

Vertikal



Horizontal



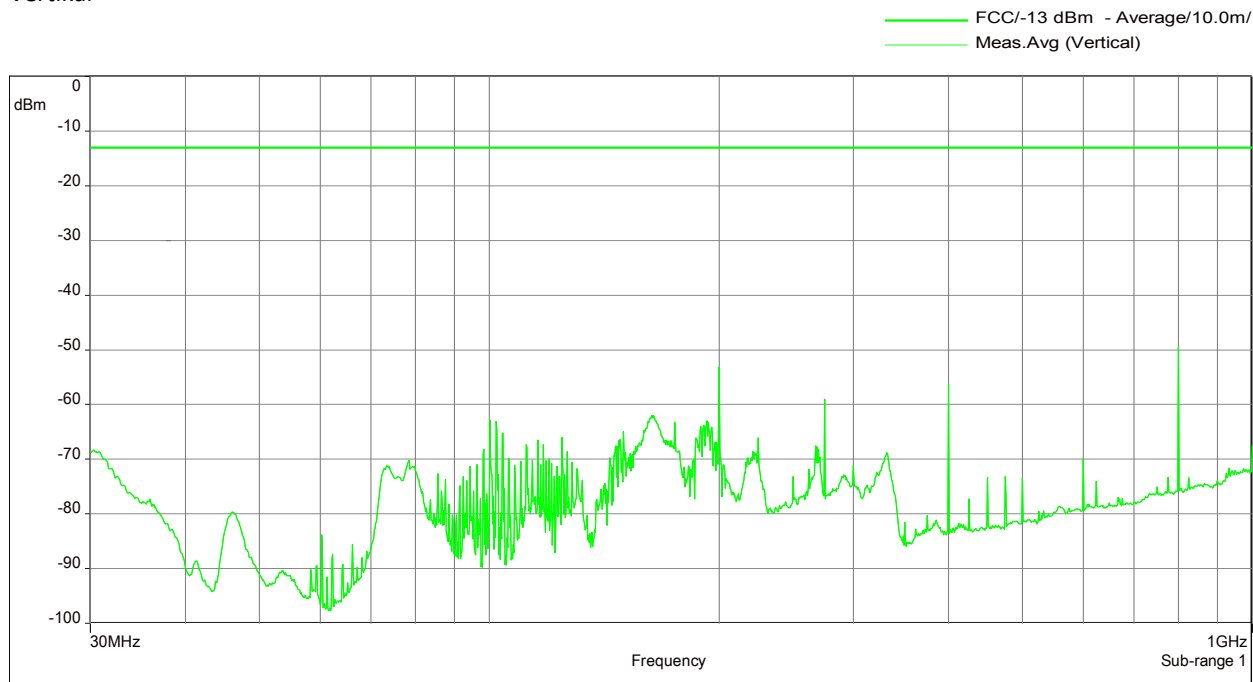
The RF output power is terminated.



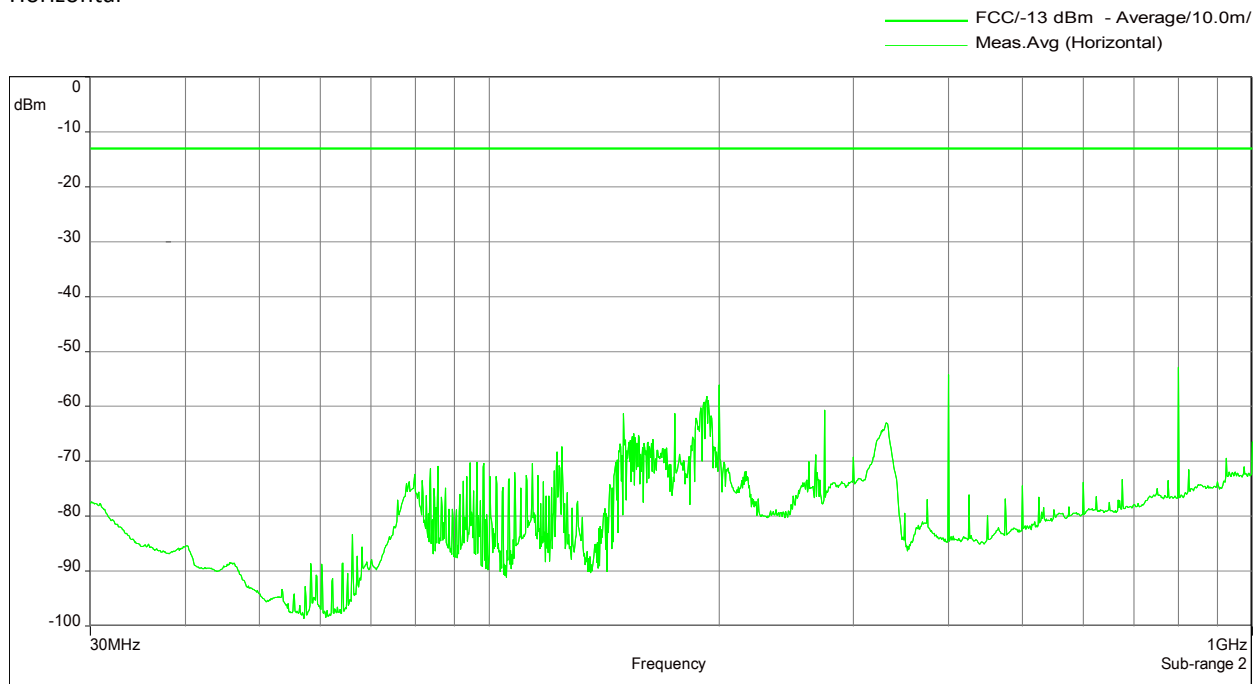
#### 10.4.2 30 MHz to 1 GHz Downlink (Bottom – Middle – Top)

B/M/T: 1930 MHz / 1962,5 MHz / 1995 MHz (Operation with maximum composite power)

Vertikal



Horizontal



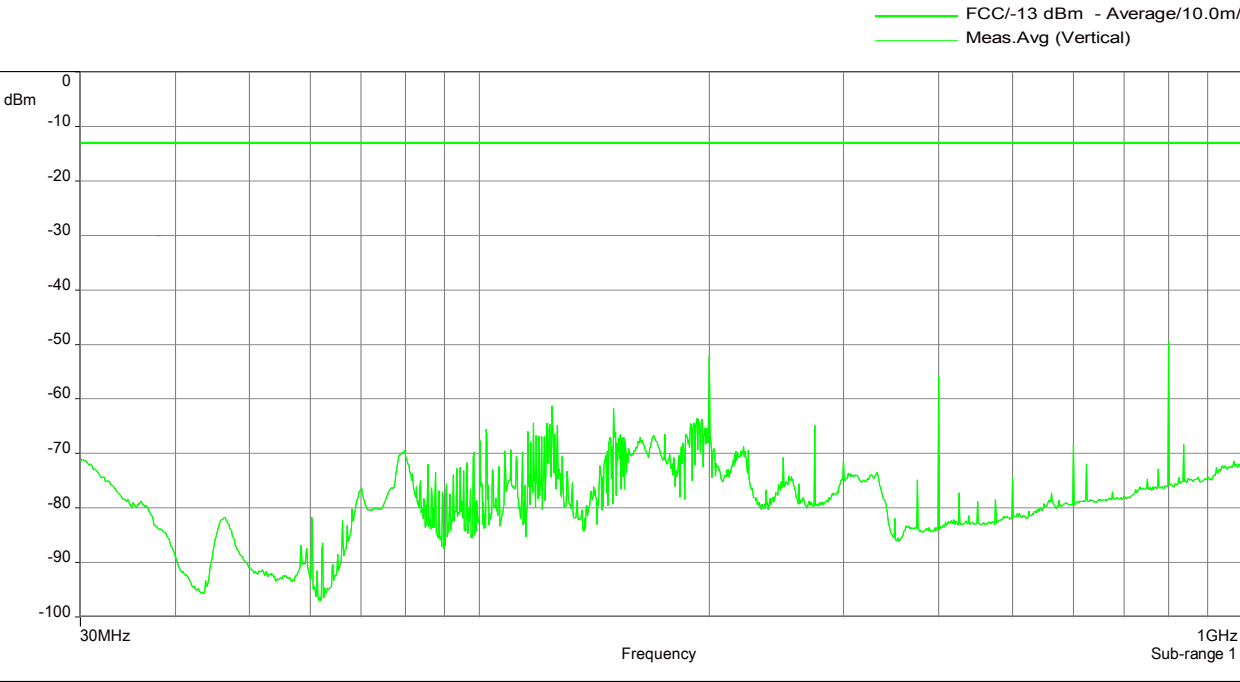
The RF output power is terminated.



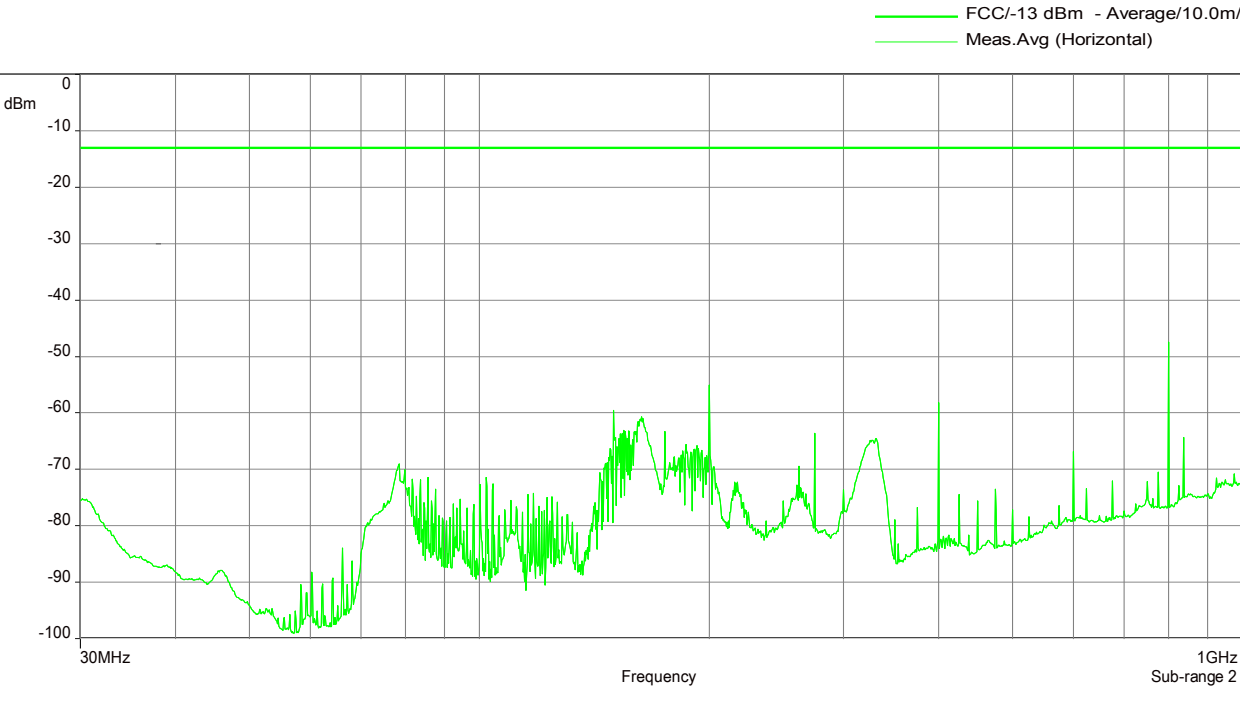
10.4.3 30 MHz to 1 GHz Uplink (Middle of both paths)

F1: 836,5 MHz; F2: 1732,5 MHz; F3: 1882,5 MHz

Vertikal



Horizontal



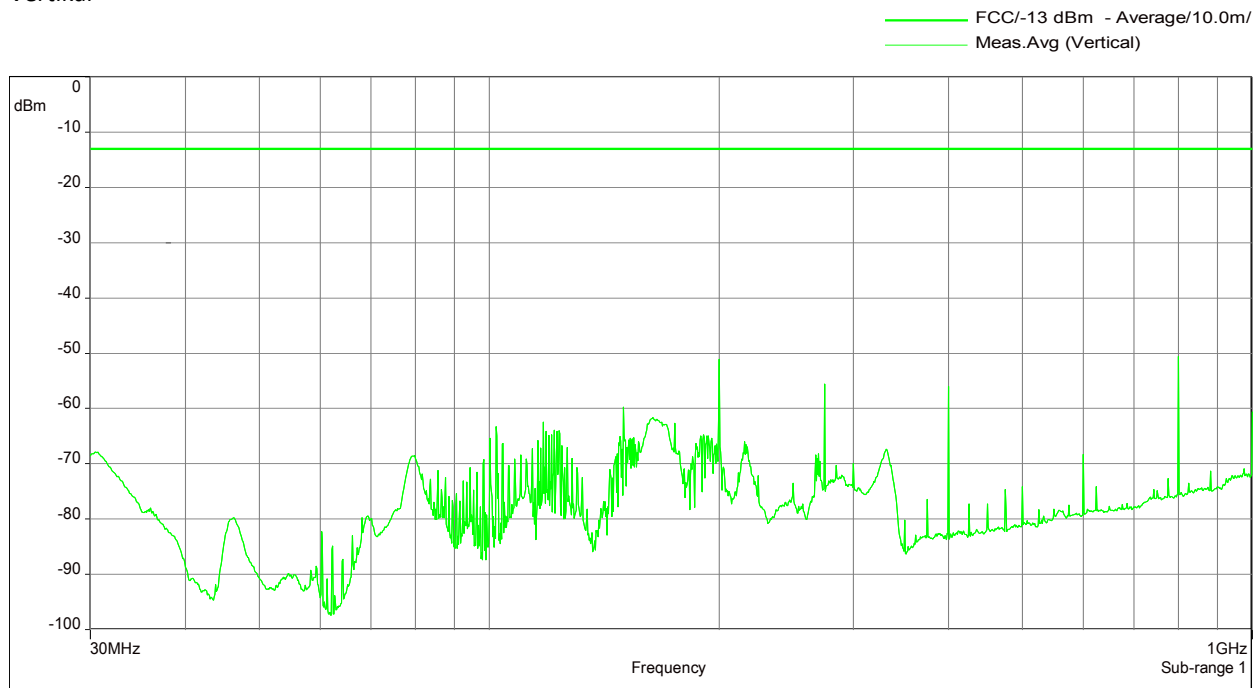
The RF output power is terminated.



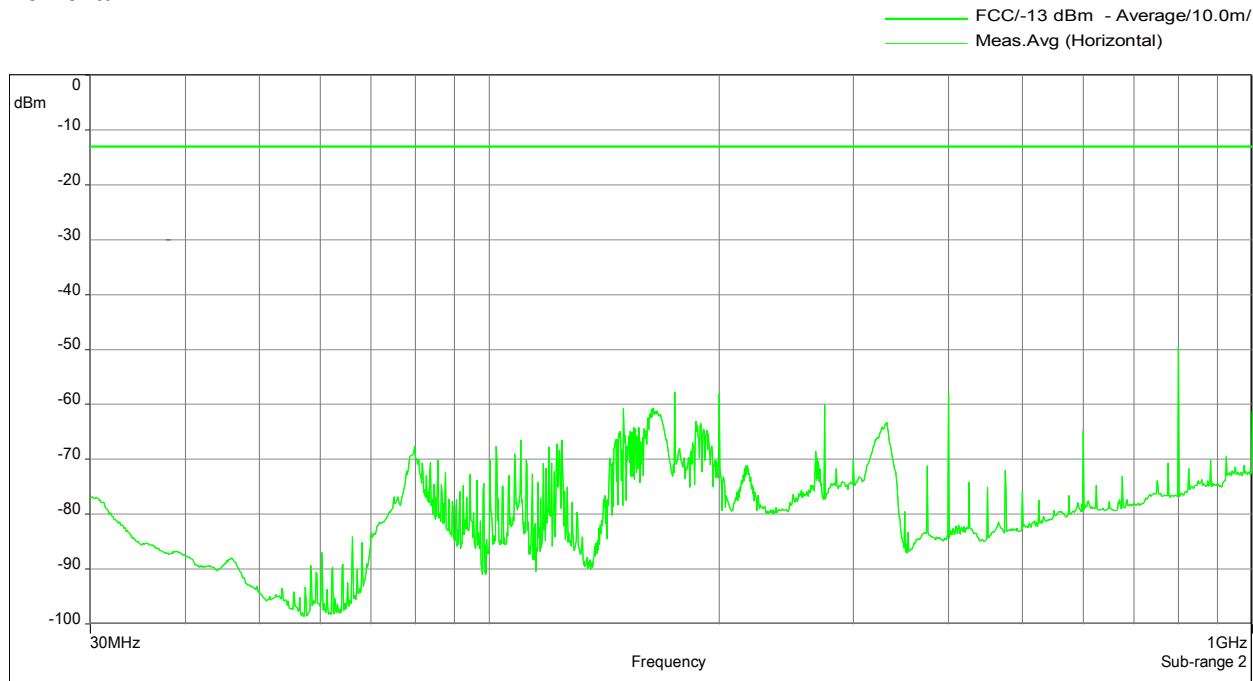
#### 10.4.4 30 MHz to 1 GHz Downlink (Middle of both paths)

F1: 881.5 MHz; F2: 2132.5 MHz; F3: 1962.5 MHz

Vertical



Horizontal



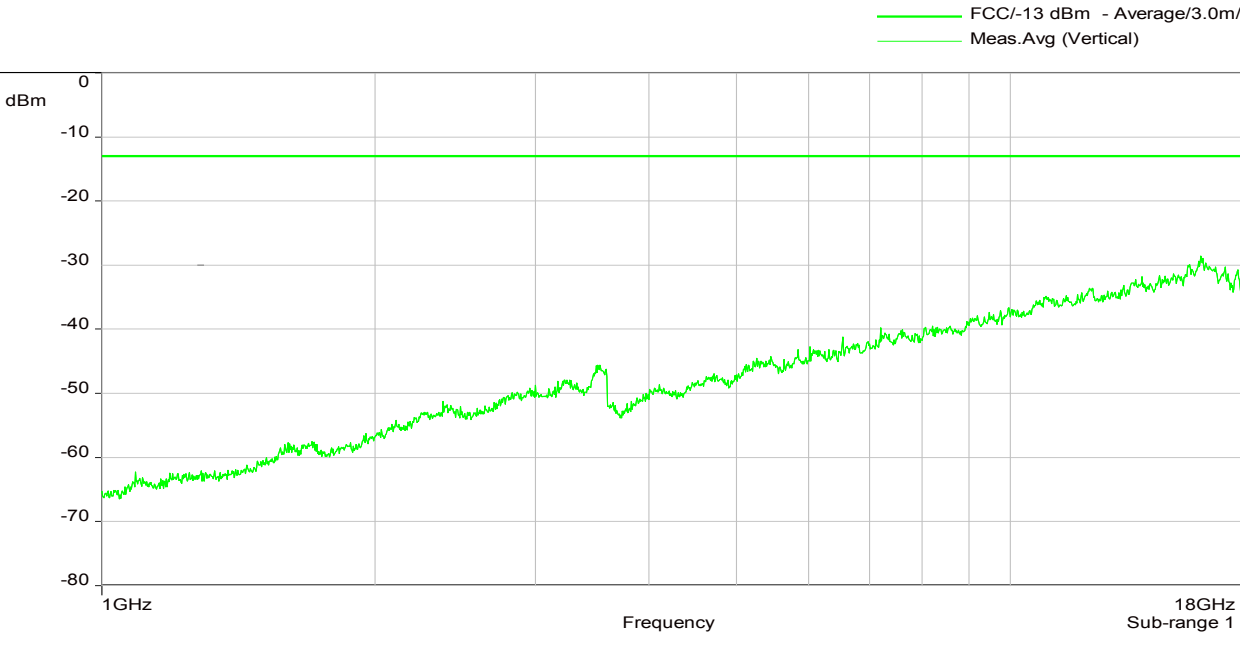
The RF output power is terminated.



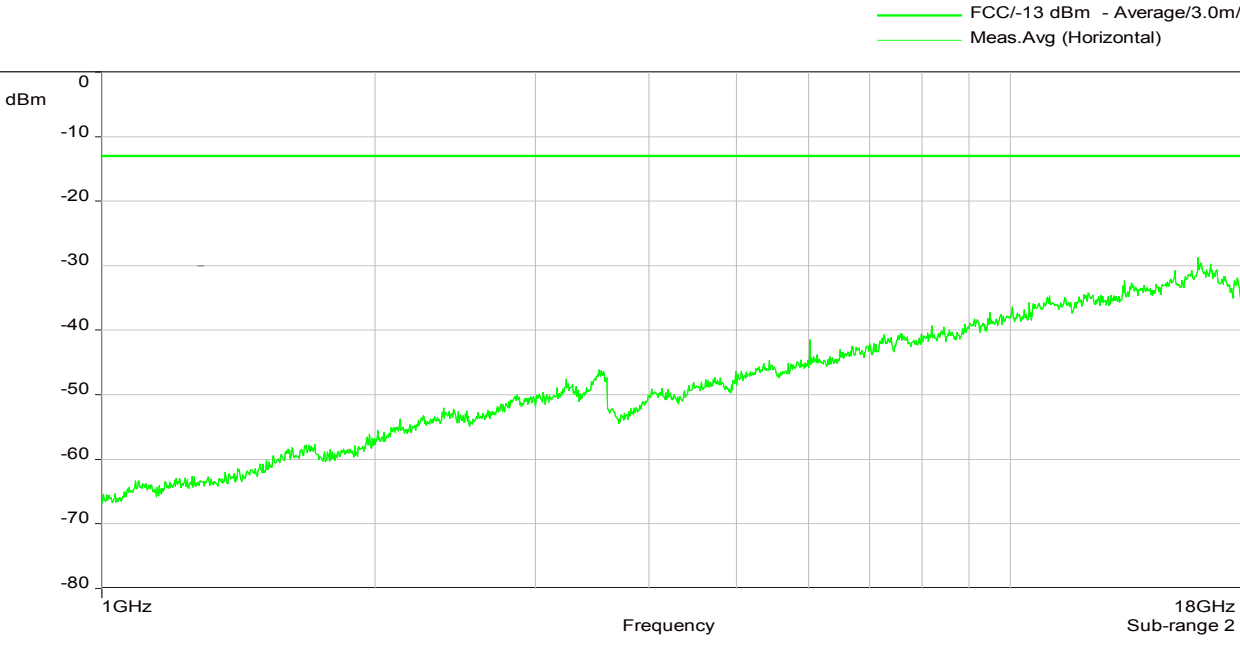
10.4.5 1 to 18 GHz Uplink (Bottom – Middle – Top)

B/M/T: 1850 MHz / 1882.5 MHz / 1915 MHz (Operation with maximum composite power)

Vertikal



Horizontal



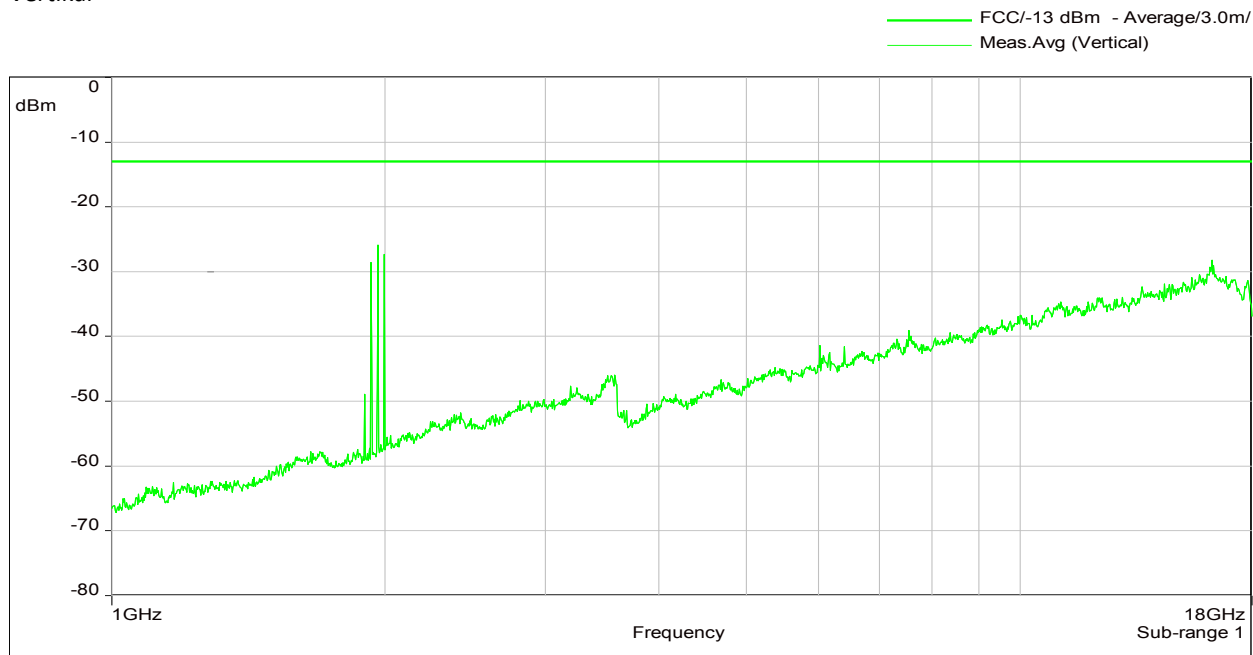
The RF output power is terminated.



#### 10.4.6 1 to 18 GHz Downlink (Bottom – Middle – Top)

B/M/T: 1930 MHz / 1962,5 MHz / 1995 MHz (Operation with maximum composite power)

Vertikal



Horizontal

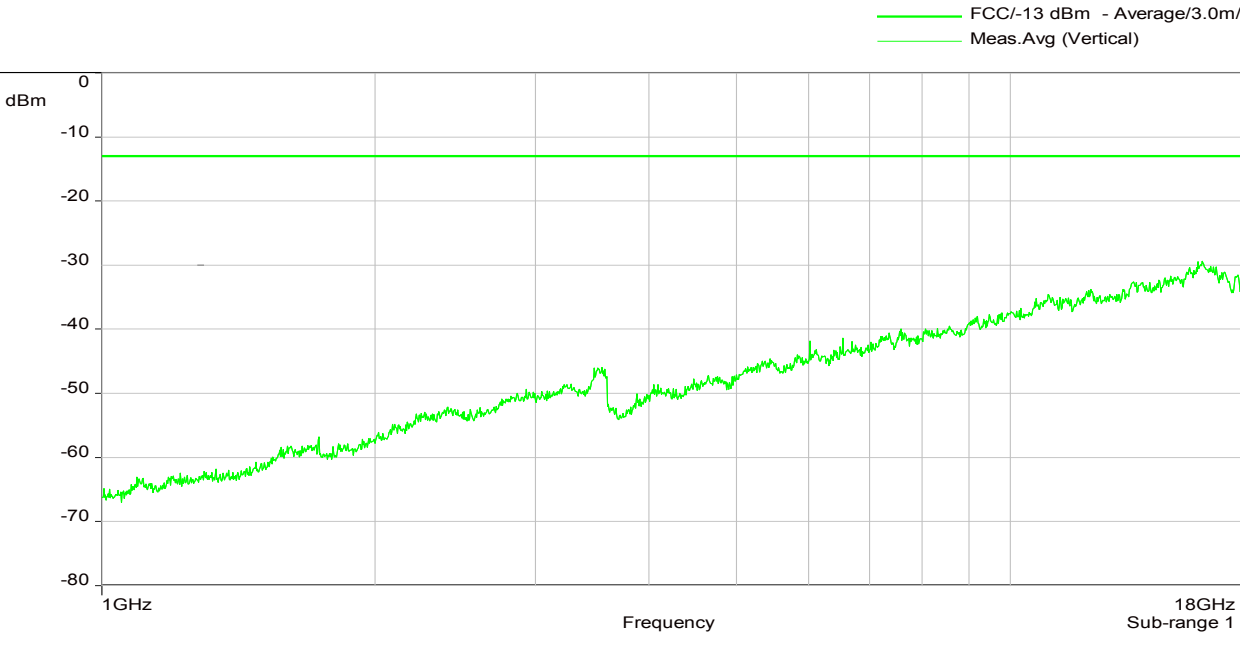
The RF output power is terminated.



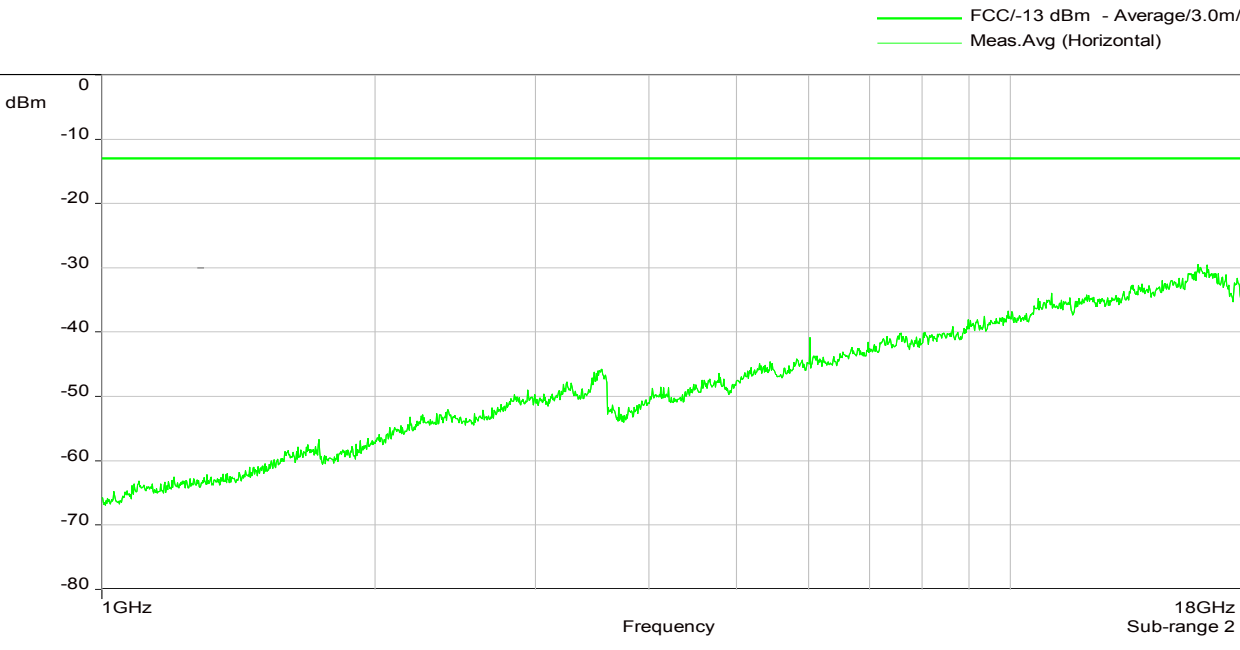
10.4.7 1 to 18 GHz Uplink (Middle of both paths)

F1: 836,5 MHz; F2: 1732,5 MHz; F3: 1882,5 MHz

Vertikal



Horizontal



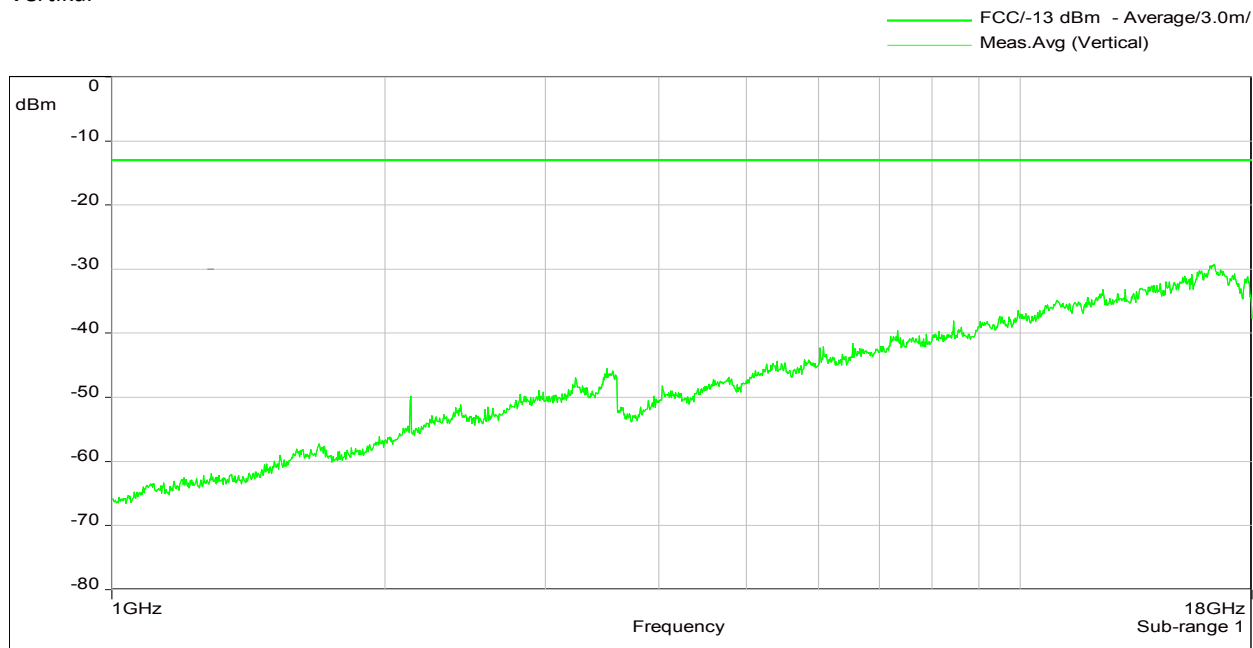
The RF output power is terminated.



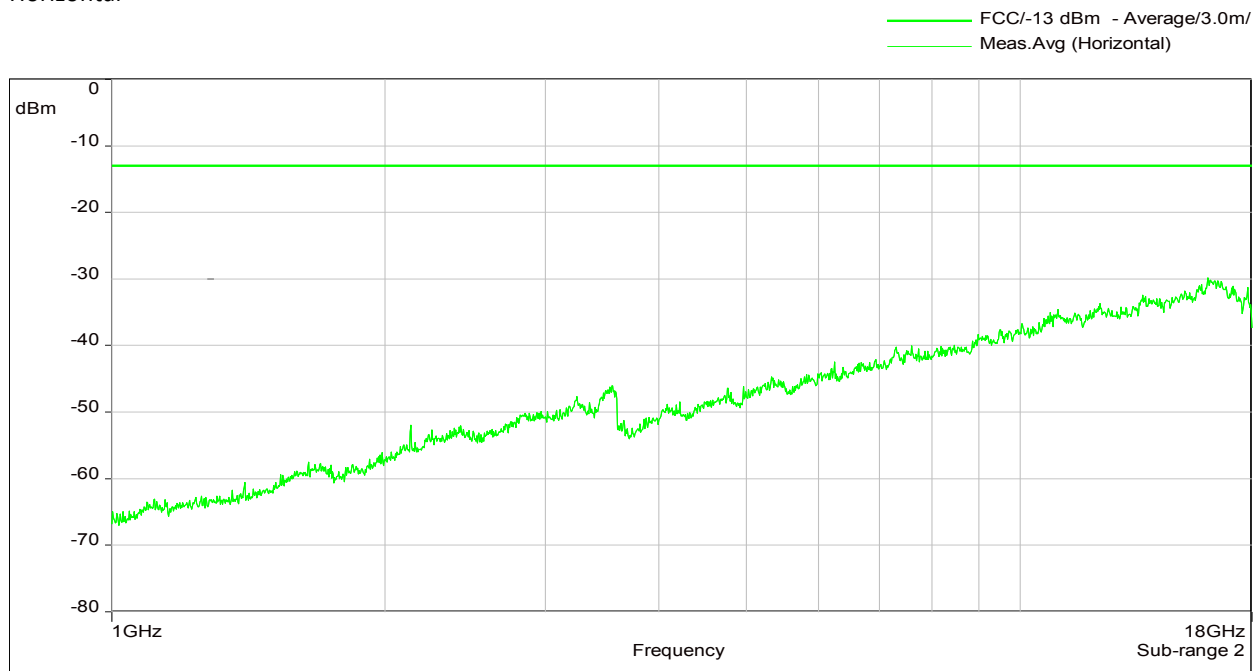
#### 10.4.8 1 to 18 GHz Downlink (Middle of both paths)

F1: 881.5 MHz; F2: 2132.5 MHz; F3: 1962.5 MHz

Vertikal



Horizontal



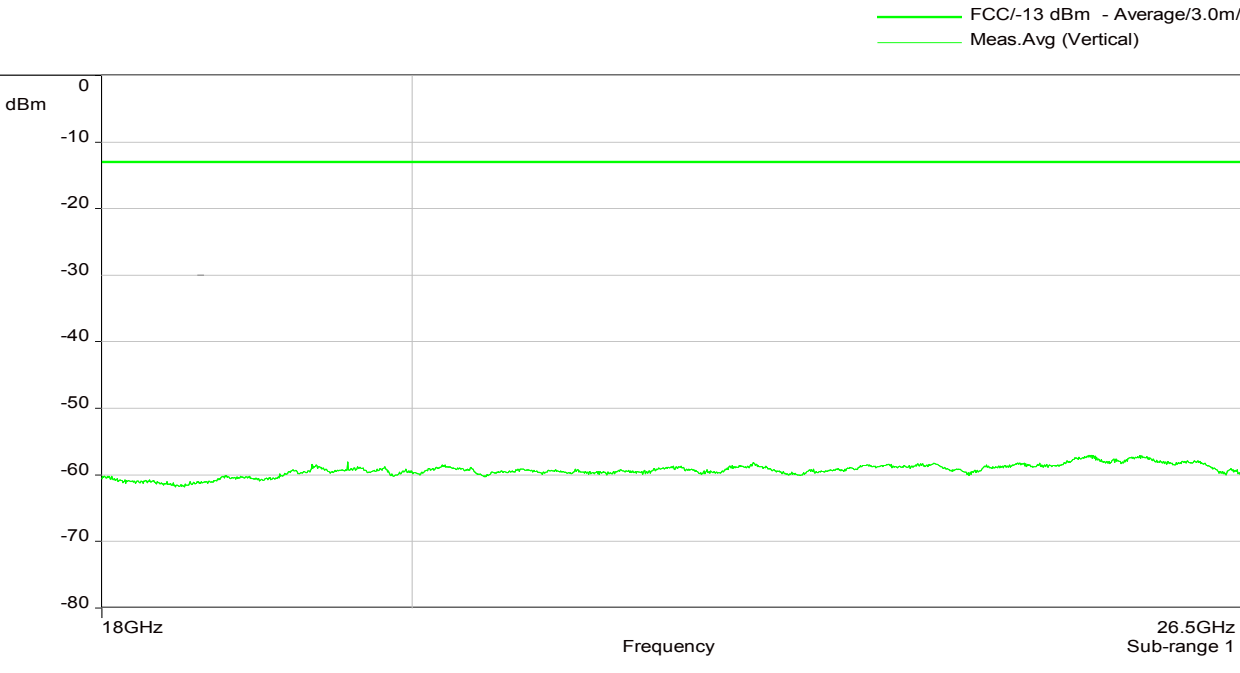
The RF output power is terminated.



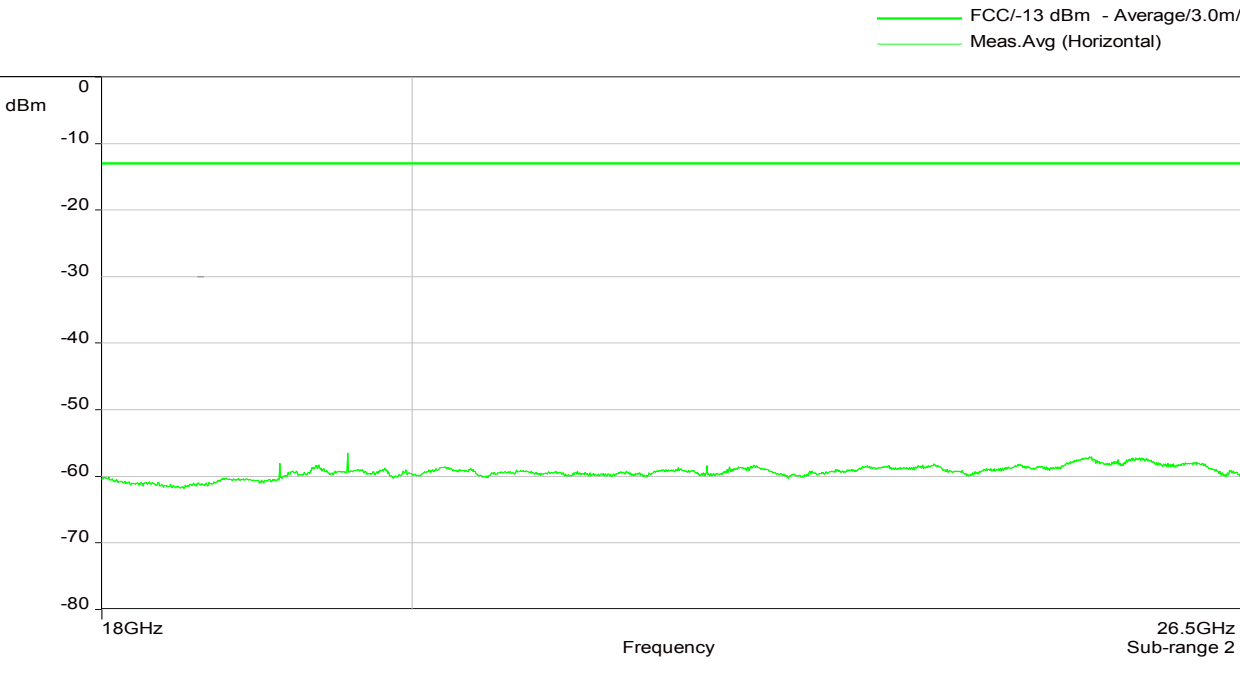
10.4.9 18 to 26.5 GHz Uplink (Bottom – Middle – Top)

B/M/T: 1850 MHz / 1882.5 MHz / 1915 MHz (Operation with maximum composite power)

Vertikal



Horizontal



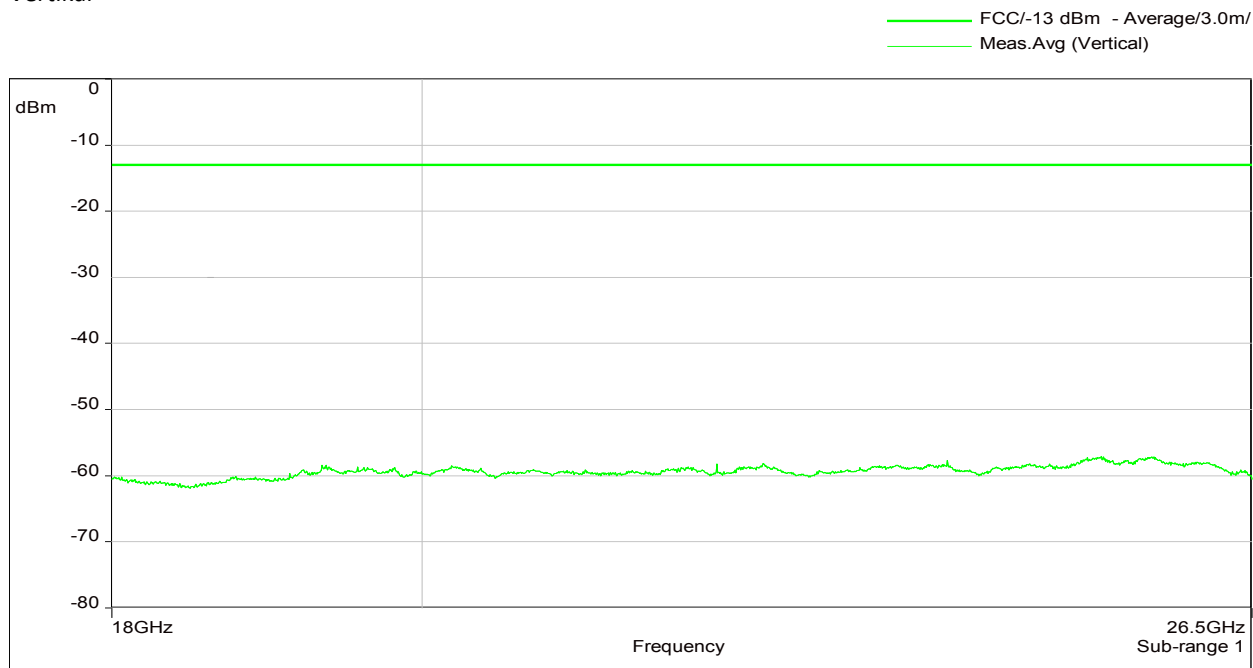
The RF output power is terminated.



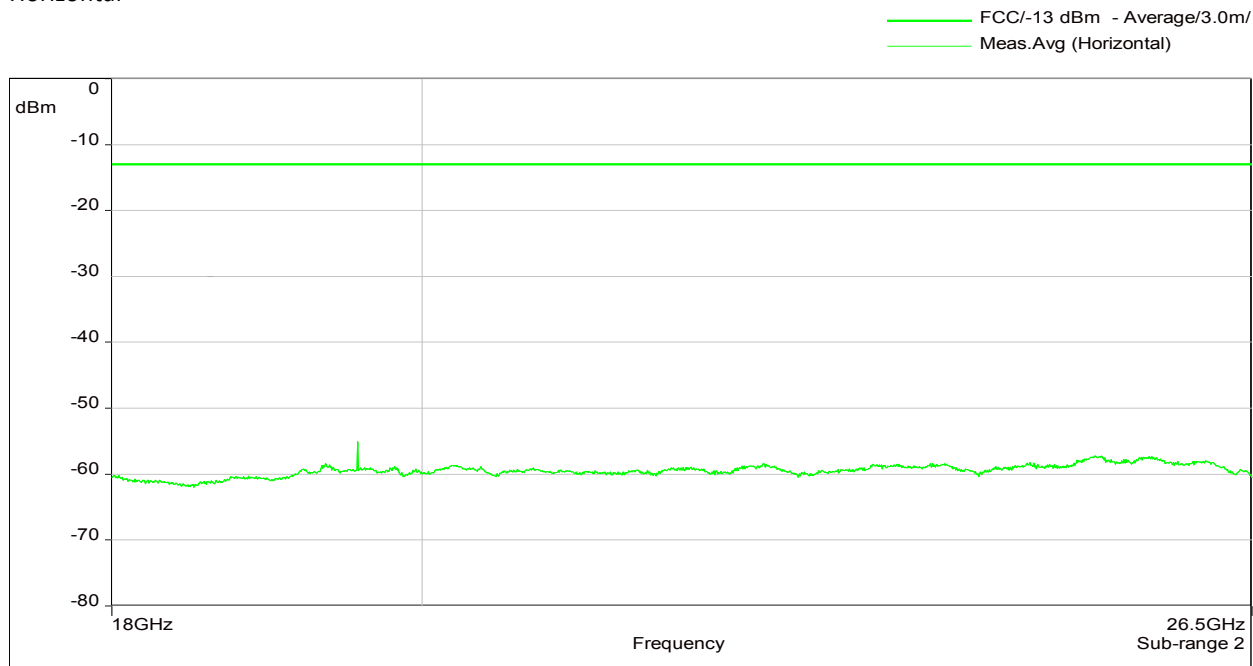
#### 10.4.10 18 to 26.5 GHz Downlink (Bottom – Middle – Top)

B/M/T: 1930 MHz / 1962.5 MHz / 1995 MHz (Operation with maximum composite power)

Vertikal



Horizontal



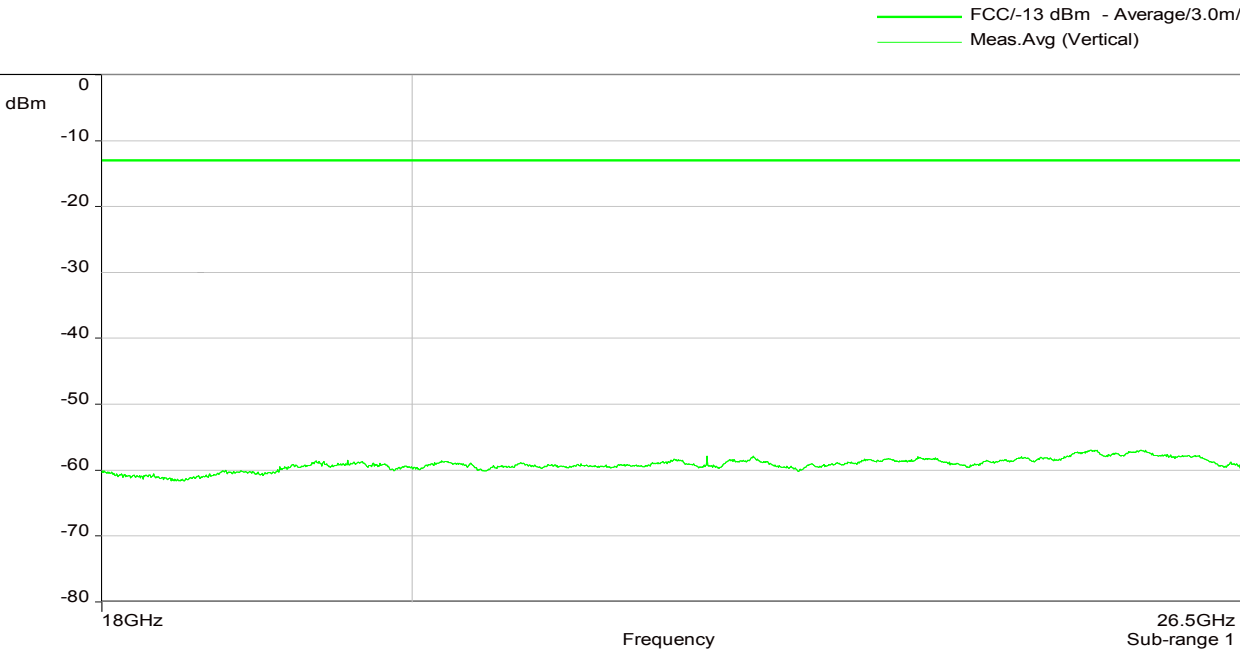
The RF output power is terminated.



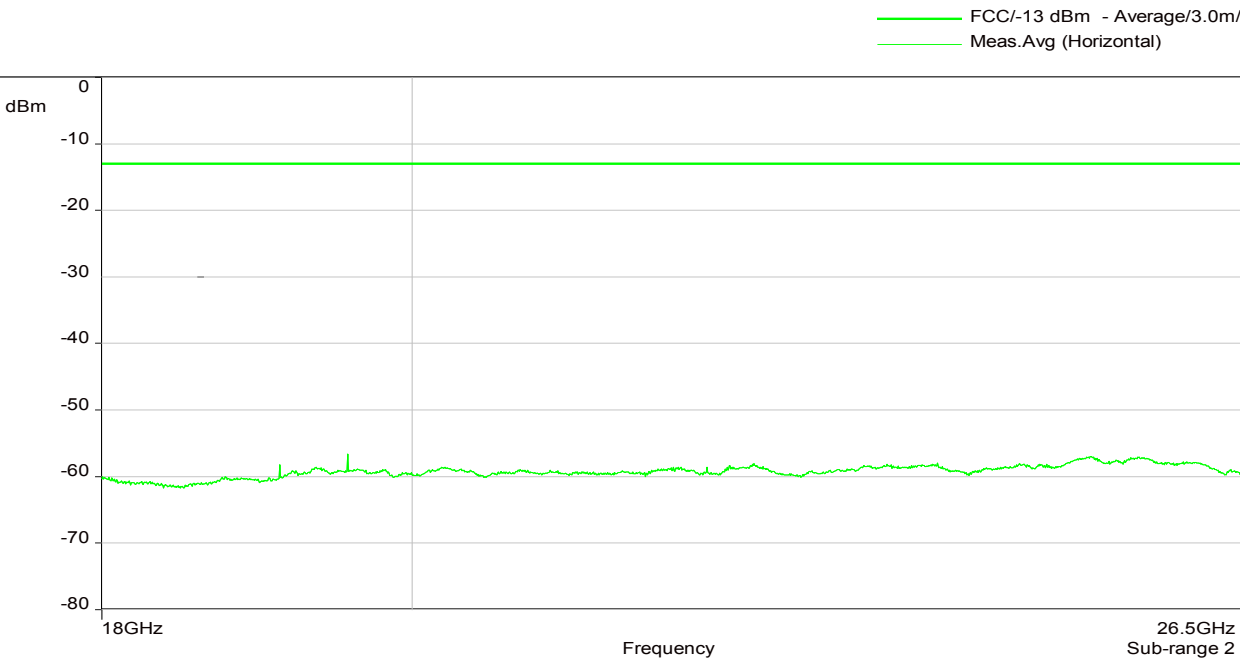
10.4.11 18 to 26.5 GHz Uplink (Middle of both paths)

F1: 836,5 MHz; F2: 1732,5 MHz; F3: 1882,5 MHz

Vertikal



Horizontal

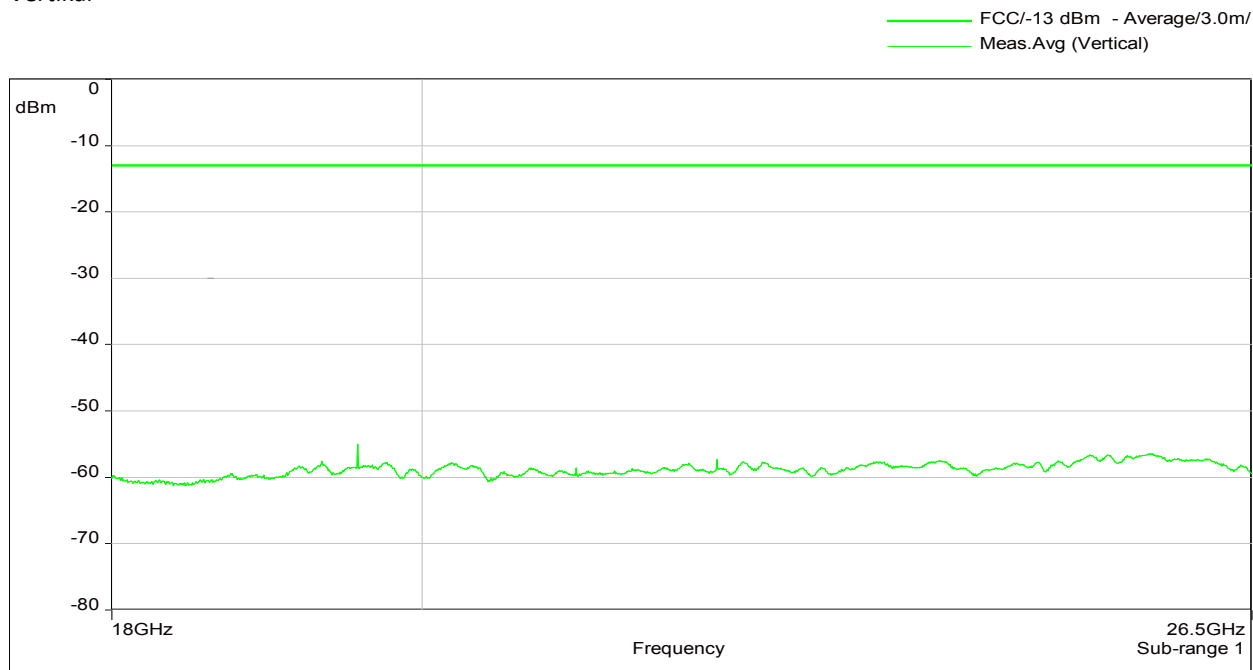


The RF output power is terminated.

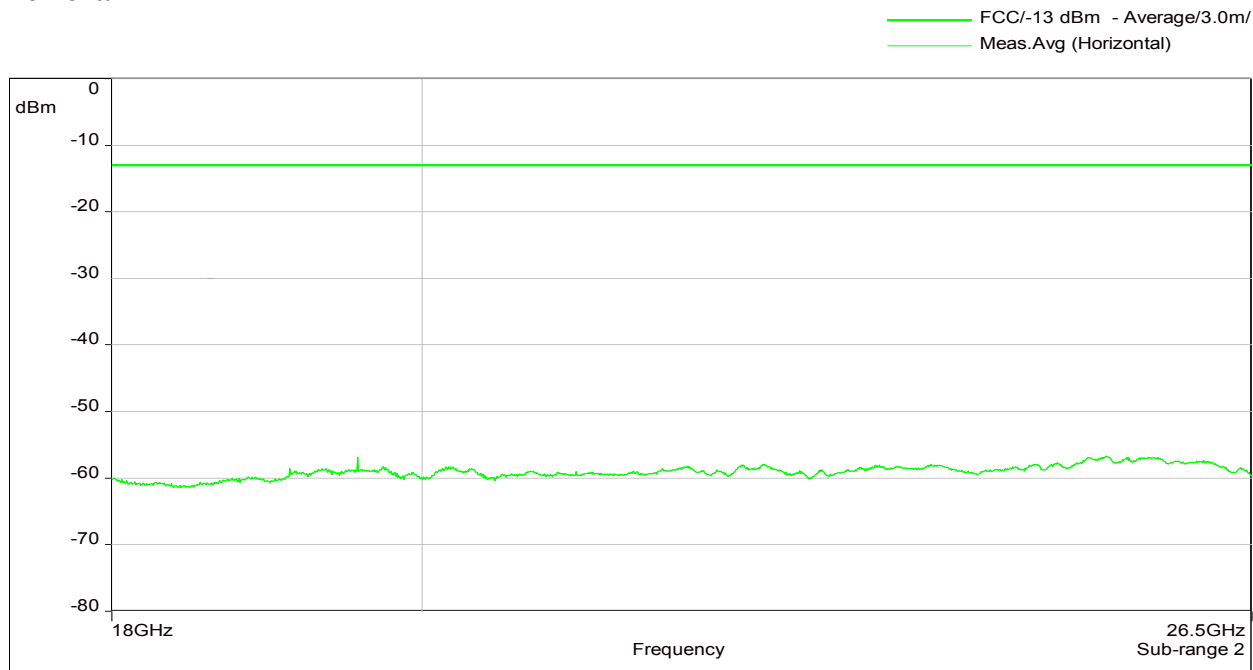
#### 10.4.12 18 to 26.5 GHz Downlink (Middle of both paths)

F1: 881.5 MHz; F2: 2132.5 MHz; F3: 1962.5 MHz

Vertikal



Horizontal



The RF output power is terminated.

Za/Ws / 15.04.2016

**The radiated spurious emission measurements have been passed!**



## 11 History

| Revision | Modification        | Date       | Name         |
|----------|---------------------|------------|--------------|
| 01.00    | Initial Test report | 28.04.2016 | Tom Zahlmann |

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