

Test report No:  
NIE: 63467RRF.003

## Partial Test report

### REFERENCE STANDARD: USA FCC Part 22, Part 24 & Part 27 CANADA RSS-130, RSS-132, RSS-133 & RSS-139

|                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (*) Identification of item tested         | Continuous Positive Airway Pressure (CPAP) Device                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| (*) Trademark                             | ResMed                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| (*) Model and /or type reference          | 39000 AirSense 11                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| (*) Derived model not tested              | 39420 AirSense 11 AutoSet, 39421 AirSense 11 CPAP, 39422 AirSense 11 Elite, 39423 AirSense 11 AutoSet, 39424 AirSense 11 CPAP, 39425 AirSense 11 Elite.                                                                                                                                                                                                                                                                                                                                     |
| Other identification of the product       | HW Version: 1.0<br>SW Version: SW04600<br>FCC ID: 2ACHL-AIR114G<br>IC: 9103A-AIR114G                                                                                                                                                                                                                                                                                                                                                                                                        |
| (*) Features                              | 4G LTE Cat 1, 3G, BLE                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Applicant                                 | RESMED Pty Ltd<br>1 Elizabeth Macarthur Drive, BELLA VISTA, NSW, 2153, AUSTRALIA                                                                                                                                                                                                                                                                                                                                                                                                            |
| Test method requested, standard           | USA FCC Part 22 (10-1-19 Edition). Public Mobile Services.<br>USA FCC Part 24 (10-1-19 Edition). Personal Communications Services.<br>USA FCC Part 27 (10-1-19 Edition). Miscellaneous Wireless Communications Services.<br>CANADA RSS-130 Issue 2, Feb. 2019.<br>CANADA RSS-132 Issue 3, Jan. 2013.<br>CANADA RSS-133 Issue 6 Amendment 1, Jan. 2018.<br>CANADA RSS-139 Issue 3, Jul. 2015.<br>ANSI C63.26-2015.<br>KDB 971168 D01 Power Meas License Digital Systems v03r01, April. 2018. |
| Approved by (name / position & signature) | Rafael López Martín<br>EMC Consumer & RF Lab. Manager                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Date of issue                             | 2021-02-03                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Report template No                        | FDT08_23<br>(*) "Data provided by the client"                                                                                                                                                                                                                                                                                                                                                                                                                                               |

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## Competences and guarantees

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DEKRA Testing and Certification is a FCC-recognized accredited testing laboratory with appropriate scope of accreditation that include testing performed in this test report.

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In order to assure the traceability to other national and international laboratories, DEKRA Testing and Certification S.A.U. has a calibration and maintenance program for its measurement equipment.

DEKRA Testing and Certification S.A.U. guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and, it is based on the knowledge and technical facilities available at DEKRA Testing and Certification S.A.U. at the time of performance of the test.

DEKRA Testing and Certification S.A.U. is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

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## General conditions

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1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of DEKRA Testing and Certification S.A.U.
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## Uncertainty

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Uncertainty (factor  $k=2$ ) was calculated according to the DEKRA Testing and Certification S.A.U. internal document PODT000.

## Data provided by the client

---

The following data has been provided by the client:

1. Information relating to the description of the sample ("Identification of the item tested", "Trademark", "Model and/or type reference tested").
2. The sample of the model AirSense 11 is a CPAP device with integrated cellular and Bluetooth connectivity.
3. Derived model not tested. These models have been declared by the supplier of the sample as being the same as the model under test.



Date: 20 December 2020

### DECLARATION OF EQUIVALENCE

This document declares that the following designated products (model/name) are equivalent to the unit under test 39000.

For the USA:

39420 AirSense 11 AutoSet  
39421 AirSense 11 CPAP  
39422 AirSense 11 Elite

For Canada:

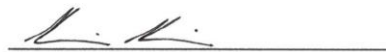
39423 AirSense 11 AutoSet  
39424 AirSense 11 CPAP  
39425 AirSense 11 Elite

All the above stated products have the same hardware and the same cellular firmware and Bluetooth firmware.

#### Applicant

Company name: ResMed Pty Ltd. ACN 003 765 142  
Address: 1 Elizabeth Macarthur Drive  
Bella Vista  
NSW 2153  
Australia  
Telephone No: +61 2 8884 1000

By:



Christopher Jenkins

Title:

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T +61 2 8884 1000 E Christopher.jenkins@ResMed.com.au

ResMed.com

DEKRA Testing and Certification S.A.U. declines any responsibility with respect to the information provided by the client and that may affect the validity of results.

## Usage of samples

Samples undergoing test have been selected by: The client.

- Sample S/01 is composed of the following elements:

| Control N° | Description                                       | Model             | Serial N°   | Date of reception |
|------------|---------------------------------------------------|-------------------|-------------|-------------------|
| 63467/002  | Continuous Positive Airway Pressure (CPAP) Device | 39000 AirSense 11 | 22201142040 | 2020/10/01        |
| 63467/013  | AC/DC adapter                                     | --                | 0000C100    | 2020/10/01        |
| 63467/015  | ClimateLine                                       | AIR11             | --          | 2020/10/14        |

Sample S/01 has undergone the following test(s): All radiated tests indicated in Appendixes A, B and C.

## Test sample description

|                                               |                                                            |                          |                                     |                          |                                   |                          |  |  |  |  |  |
|-----------------------------------------------|------------------------------------------------------------|--------------------------|-------------------------------------|--------------------------|-----------------------------------|--------------------------|--|--|--|--|--|
| Ports..... :                                  | Port name and description                                  | Cable                    |                                     |                          |                                   |                          |  |  |  |  |  |
|                                               |                                                            | Specified max length [m] | Attached during test                | Shielded                 | Coupled to patient <sup>(3)</sup> |                          |  |  |  |  |  |
|                                               | Power                                                      |                          | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>          |                          |  |  |  |  |  |
| Supplementary information to the ports..... : | --                                                         |                          |                                     |                          |                                   |                          |  |  |  |  |  |
| Rated power supply .....                      | Voltage and Frequency                                      |                          | Reference poles                     |                          |                                   |                          |  |  |  |  |  |
|                                               |                                                            |                          | L1                                  | L2                       | L3                                | N PE                     |  |  |  |  |  |
|                                               | <input checked="" type="checkbox"/> AC: 100-240V~, 50-60Hz |                          | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/>          | <input type="checkbox"/> |  |  |  |  |  |
|                                               | <input type="checkbox"/> DC:                               |                          |                                     |                          |                                   |                          |  |  |  |  |  |
| Rated Power .....                             | 24Vdc, 2.71A                                               |                          |                                     |                          |                                   |                          |  |  |  |  |  |
| Clock frequencies..... :                      | --                                                         |                          |                                     |                          |                                   |                          |  |  |  |  |  |
| Other parameters .....                        | --                                                         |                          |                                     |                          |                                   |                          |  |  |  |  |  |
| Software version .....                        | SW04600                                                    |                          |                                     |                          |                                   |                          |  |  |  |  |  |
| Hardware version .....                        | 1.0                                                        |                          |                                     |                          |                                   |                          |  |  |  |  |  |
| Dimensions in cm (W x H x D) .....            | --                                                         |                          |                                     |                          |                                   |                          |  |  |  |  |  |
| Mounting position .....                       | <input checked="" type="checkbox"/>                        | Table top equipment      |                                     |                          |                                   |                          |  |  |  |  |  |
| Modules/parts..... :                          | Module/parts of test item                                  |                          | Type                                |                          | Manufacturer                      |                          |  |  |  |  |  |
|                                               | ELS61-US                                                   |                          | Cellular                            |                          | Thales                            |                          |  |  |  |  |  |
|                                               | EFR32BG1                                                   |                          | Bluetooth LE                        |                          | SiLabs                            |                          |  |  |  |  |  |
| Accessories (not part of the test item) ..... | Description                                                |                          | Type                                |                          | Manufacturer                      |                          |  |  |  |  |  |
|                                               | --                                                         |                          |                                     |                          |                                   |                          |  |  |  |  |  |
| Documents as provided by the applicant..... : | Description                                                |                          | File name                           |                          | Issue date                        |                          |  |  |  |  |  |
|                                               | --                                                         |                          |                                     |                          |                                   |                          |  |  |  |  |  |

<sup>(3)</sup> Only for Medical Equipment

## Identification of the client

RESMED PTY LTD  
1 Elizabeth Macarthur Drive, Bella Vista, NSW, 2153, Australia

## Testing period and place

|               |                                        |
|---------------|----------------------------------------|
| Test Location | DEKRA Testing and Certification S.A.U. |
| Date (start)  | 2020-10-13                             |
| Date (finish) | 2020-10-14                             |

## Document history

| Report number | Date       | Description   |
|---------------|------------|---------------|
| 63467RRF.003  | 2021-02-03 | First release |

## Environmental conditions

In the control chamber, the following limits were not exceeded during the test:

|                   |                              |
|-------------------|------------------------------|
| Temperature       | Min. = 15 °C<br>Max. = 35 °C |
| Relative humidity | Min. = 20 %<br>Max. = 75 %   |

In the semianechoic chamber, the following limits were not exceeded during the test.

|                   |                              |
|-------------------|------------------------------|
| Temperature       | Min. = 15 °C<br>Max. = 35 °C |
| Relative humidity | Min. = 20 %<br>Max. = 75 %   |

## Remarks and comments

The tests have been performed by the technical personnel: Nicolás Salguero, Cristina Calle and Miguel Manuel López.

Used instrumentation:

### Radiated Measurements

|     |                                                                         | Last Calibration | Due Calibration |
|-----|-------------------------------------------------------------------------|------------------|-----------------|
| 1.  | Semianechoic Absorber Lined Chamber ETS LINDGREN FACT 3 200 STP         | N.A.             | N.A.            |
| 2.  | Shielded Room ETS LINDGREN S101                                         | N.A.             | N.A.            |
| 3.  | Biconical/Log Antenna 30 MHz - 6 GHz ETS LINDGREN 3142E                 | 2020/04          | 2023/04         |
| 4.  | EMI Test Receiver 7 GHz ROHDE AND SCHWARZ ESR7                          | 2019/10          | 2021/10         |
| 5.  | RF Pre-amplifier, 40 dB ,10MHz-6 GHz BONN ELEKTRONIK BLMA 0160-01N      | 2020/02          | 2021/02         |
| 6.  | Broadband Horn antenna 1-18 GHz SCHWARZBECK MESS-ELEKTRONIK BBHA 9120 D | 2019/11          | 2022/11         |
| 7.  | RF Pre-amplifier 1-18 GHz BONN ELEKTRONIK BLMA 0118-1M                  | 2020/05          | 2021/05         |
| 8.  | Signal and Spectrum Analyzer ROHDE AND SCHWARZ FSW 50                   | 2020/07          | 2022/07         |
| 9.  | Broadband Horn antenna 1-18 Horn antenna SCHWARZBECK BBHA 9170          | 2020/05          | 2023/05         |
| 10. | RF Pre-amplifier 18-40 GHz BONN ELEKTRONIK BLMA 1840-1M                 | 2019/02          | 2021/02         |

## Testing verdicts

|                 |     |
|-----------------|-----|
| Not applicable: | N/A |
| Pass:           | P   |
| Fail:           | F   |
| Not measured:   | N/M |

## Summary

### 1. 3G Band V, LTE Band FDD 5

| FCC PART 22 / RSS-132 PARAGRAPH                                             |         |        |
|-----------------------------------------------------------------------------|---------|--------|
| Requirement – Test case                                                     | Verdict | Remark |
| Clause 22.913 / RSS-132 Clause 5.4: RF output power                         | N/M     | (1)    |
| Clause 2.1047 / RSS-132 Clause 5.2: Modulation characteristics              | N/M     | (1)    |
| Clause 22.355 / RSS-132 Clause 5.3: Frequency stability                     | N/M     | (1)    |
| Clause 2.1049: Occupied Bandwidth                                           | N/M     | (1)    |
| Clause 22.917 / RSS-132 Clause 5.5: Spurious emissions at antenna terminals | N/M     | (1)    |
| Clause 22.917 / RSS-132 Clause 5.5: Radiated emissions                      | P       |        |
| <u>Supplementary information and remarks:</u>                               |         |        |
| 1. Radiated Spurious Emissions test only requested.                         |         |        |

### 2. 3G Band II, LTE Cat M1 Band FDD 2

| FCC PART 24 / RSS-133 PARAGRAPH                                             |         |        |
|-----------------------------------------------------------------------------|---------|--------|
| Requirement – Test case                                                     | Verdict | Remark |
| Clause 24.232 / RSS-133 Clause 6.4: RF output power                         | N/M     | (1)    |
| Clause 2.1047 / RSS-133 Clause 6.2: Modulation characteristics              | N/M     | (1)    |
| Clause 24.235 / RSS-133 Clause 6.3: Frequency stability                     | N/M     | (1)    |
| Clause 2.1049: Occupied Bandwidth                                           | N/M     | (1)    |
| Clause 24.238 / RSS-133 Clause 6.5: Spurious emissions at antenna terminals | N/M     | (1)    |
| Clause 24.238 / RSS-133 Clause 6.5: Radiated emissions                      | P       |        |
| <u>Supplementary information and remarks:</u>                               |         |        |
| 1. Radiated Spurious Emissions test only requested.                         |         |        |

### 3. 3G Band IV, LTE Band FDD 4, Band FDD 12

| FCC PART 27 / IC RSS-130 / RSS-139 PARAGRAPH                                                         |         |        |
|------------------------------------------------------------------------------------------------------|---------|--------|
| Requirement – Test case                                                                              | Verdict | Remark |
| Clause 27.50 / RSS-139 Clause 6.5. / RSS-130 Clause 4.6: RF output power                             | N/M     | (1)    |
| Clause 2.1047 / RSS-139 Clause 6.2. / RSS-130 Clause 4.2: Modulation characteristics                 | N/M     | (1)    |
| Clause 27.54 / RSS-139 Clause 6.4. / RSS-130 Clause 4.5: Frequency stability                         | N/M     | (1)    |
| Clause 2.1049: Occupied Bandwidth                                                                    | N/M     | (1)    |
| Clause 27.53 / RSS-139 Clause 6.6. / RSS-130 Clause 4.7: Spurious emissions at antenna terminals     | N/M     | (1)    |
| Clause 27.53 / RSS-139 Clause 6.6. / RSS-130 Clause 4.7: Radiated emissions                          | P       |        |
| <u>Supplementary information and remarks:</u><br>1. Radiated Spurious Emissions test only requested. |         |        |

## Appendix A: Test results FCC Part 22 / RSS-132

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## TEST CONDITIONS

### POWER SUPPLY (V):

Vnominal: 230 Vac  
 Type of Power Supply: AC voltage.

### ANTENNA:

Type of Antennas: Internal.  
 Maximum Declared Gain for 3G Band V: +2.2 dBi  
 Maximum Declared Gain for LTE Band 5: +2.2 dBi

### TEST FREQUENCIES:

#### 3G Band V:

##### WCDMA and HSUPA MODULATIONS:

Low Channel (4132): 826.4 MHz  
 Middle Channel (4182): 836.4 MHz  
 High Channel (4233): 846.6 MHz

#### LTE Band 5. QPSK AND 16QAM MODULATIONS:

|        | Channel (Frequency)  |                      |                      |                      |
|--------|----------------------|----------------------|----------------------|----------------------|
|        | BW = 1.4 MHz         | BW = 3 MHz           | BW = 5 MHz           | BW = 10 MHz          |
| Low    | 20407<br>(824.7 MHz) | 20415<br>(825.5 MHz) | 20425<br>(826.5 MHz) | 20450<br>(829 MHz)   |
| Middle | 20525<br>(836.5 MHz) | 20525<br>(836.5 MHz) | 20525<br>(836.5 MHz) | 20525<br>(836.5 MHz) |
| High   | 20643<br>(848.3 MHz) | 20635<br>(847.5 MHz) | 20625<br>(846.5 MHz) | 20600<br>(844 MHz)   |

## Radiated emissions

### SPECIFICATION:

FCC §22.917:

RSS-132. Clause 5.5:

The power of emissions shall be attenuated below the transmitter power (P) by a factor of at least  $43 + 10 \log (P)$  dB. P in watts.

### METHOD:

The measurement was performed with the EUT inside an anechoic chamber. The spectrum was scanned from 30 MHz to at least the 10th harmonic of the highest frequency generated within the equipment.

The EUT was placed on a non-conductive stand at a 3 meter distance from the measuring antenna.

Detected emissions were maximized at each frequency by rotating the EUT and adjusting the measuring antenna height and polarization. The maximum meter reading was recorded.

The maximum field strength (dBμV/m) of each detected emission at less than 20 dB respect to the limit is converted to an equivalent EIRP level (dBm) according to ANSI C63.26 with the formula:

$$\text{EIRP (dBm)} = E (\text{dB}\mu\text{V/m}) + 20\log(D) - 104.8$$

Where D is the measurement distance (in the far field region) in m.  $D = 3 \text{ m}$

### Measurement Limit:

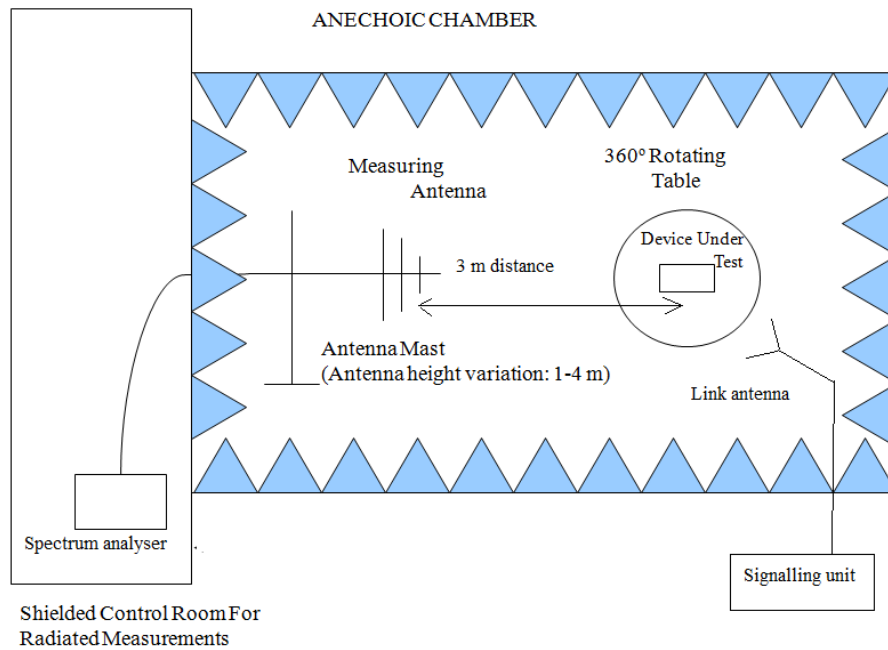
According to specification, the power of emissions shall be attenuated below the transmitter power (P) by a factor of at least  $43 + 10 \log (P)$  dB. P in watts.

At  $P_o$  transmitting power, the specified minimum attenuation becomes  $43+10\log (P_o)$ , and the level in dBm relative  $P_o$  becomes:

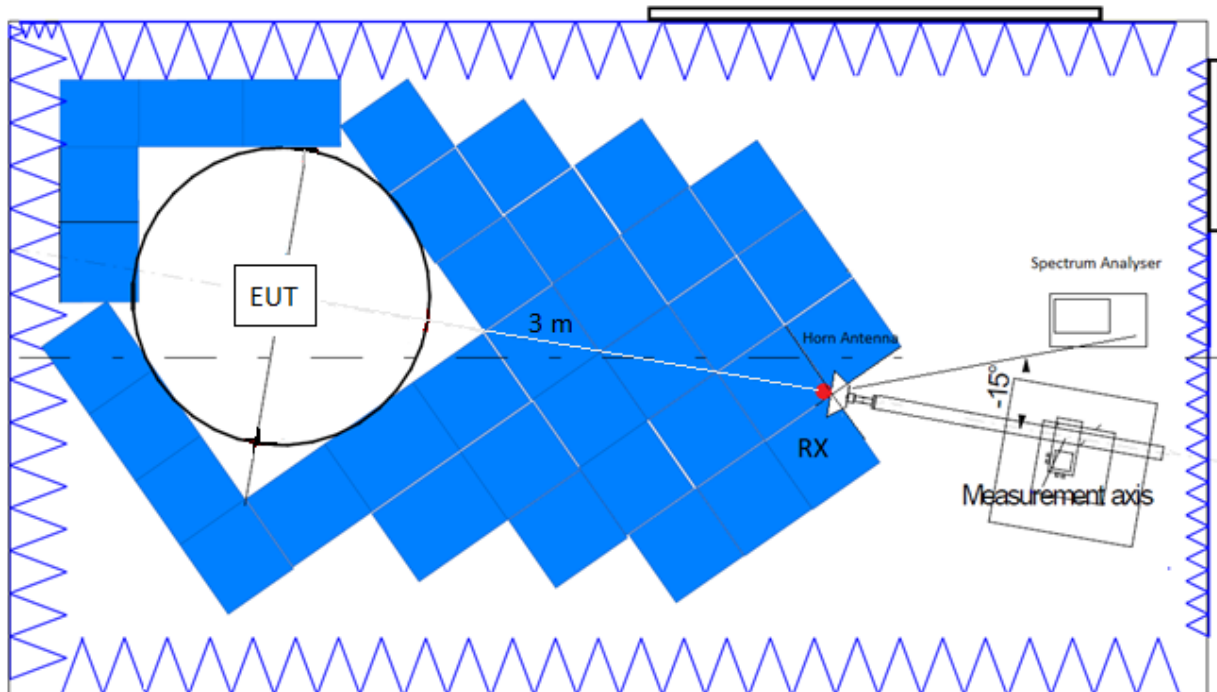
$$P_o (\text{dBm}) - [43 + 10 \log (P_o \text{ in mwatts}) - 30] = - 13 \text{ dBm}$$

## TEST SETUP:

Radiated measurements below 1 GHz:



Radiated measurements above 1 GHz:



## RESULTS:

### 3G Band V:

WCDMA and HSUPA Modulations:

A preliminary scan determined the WCDMA modulation as the worst case. The following tables and plots show the results for WCDMA modulation.

#### **- Low Channel:**

##### **Frequency range 30 MHz - 1 GHz**

Spurious frequencies detected at less than 20 dB below the limit:

| Spurious frequency (MHz) | E.I.R.P (dBm) | Polarization | Detector |
|--------------------------|---------------|--------------|----------|
| 34.737                   | -26.38        | V            | Peak     |
| 39.846                   | -32.29        | V            | Peak     |
| 821.139                  | -29.31        | H            | Peak     |
| 822.950                  | -24.60        | H            | Peak     |

##### **Frequency range 1 - 10 GHz**

No spurious frequencies detected at less than 20 dB below the limit.

#### **- Middle Channel:**

##### **Frequency range 30 MHz - 1 GHz**

Spurious frequencies detected at less than 20 dB below the limit:

| Spurious frequency (MHz) | E.I.R.P (dBm) | Polarization | Detector |
|--------------------------|---------------|--------------|----------|
| 39.619                   | -27.53        | V            | Peak     |

##### **Frequency range 1 - 10 GHz**

No spurious frequencies detected at less than 20 dB below the limit.

#### **- High Channel:**

##### **Frequency range 30 MHz - 1 GHz**

Spurious frequencies detected at less than 20 dB below the limit:

| Spurious frequency (MHz) | E.I.R.P (dBm) | Polarization | Detector |
|--------------------------|---------------|--------------|----------|
| 850.050                  | -27.31        | H            | Peak     |
| 851.182                  | -29.62        | H            | Peak     |

##### **Frequency range 1 - 10 GHz**

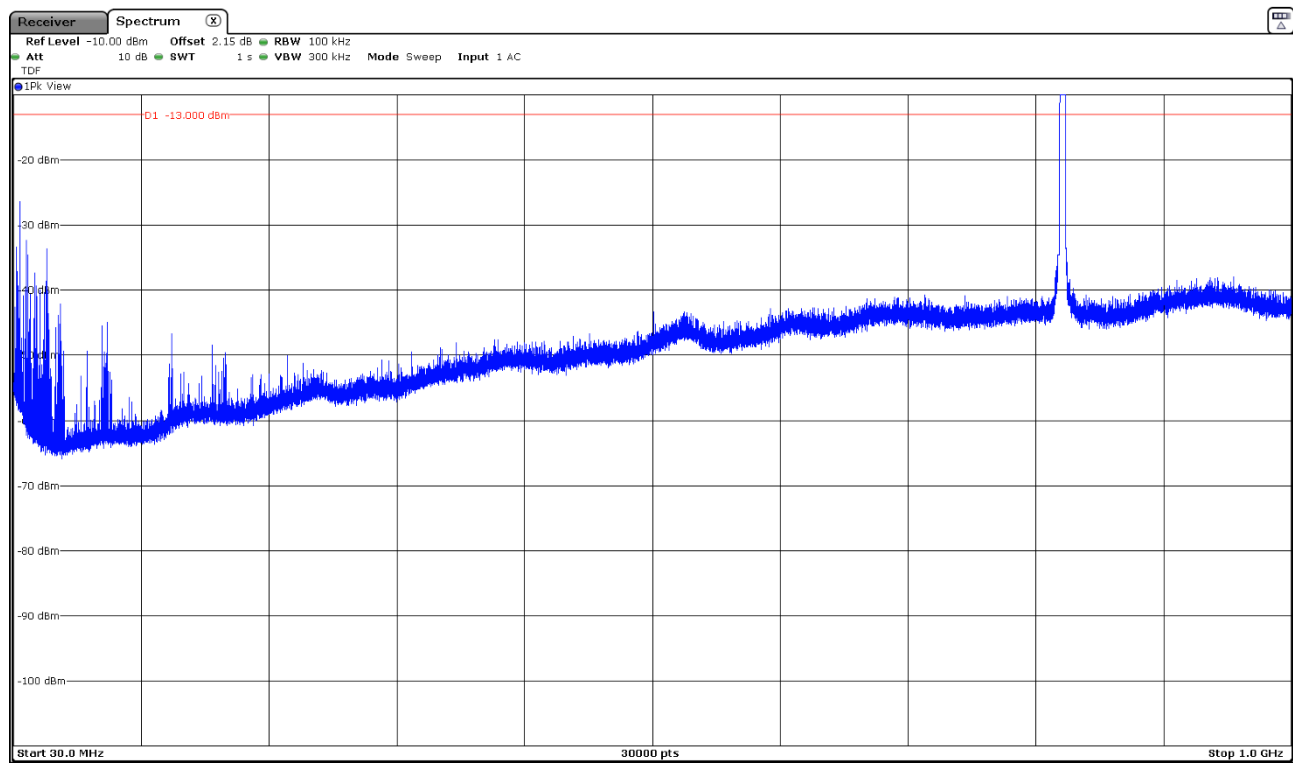
No spurious frequencies detected at less than 20 dB below the limit.

Measurement uncertainty (dB)  $< \pm 4.68$  for  $f < 1$  GHz  
 $< \pm 4.99$  for  $f \geq 1$  GHz up to 10 GHz

Verdict: PASS

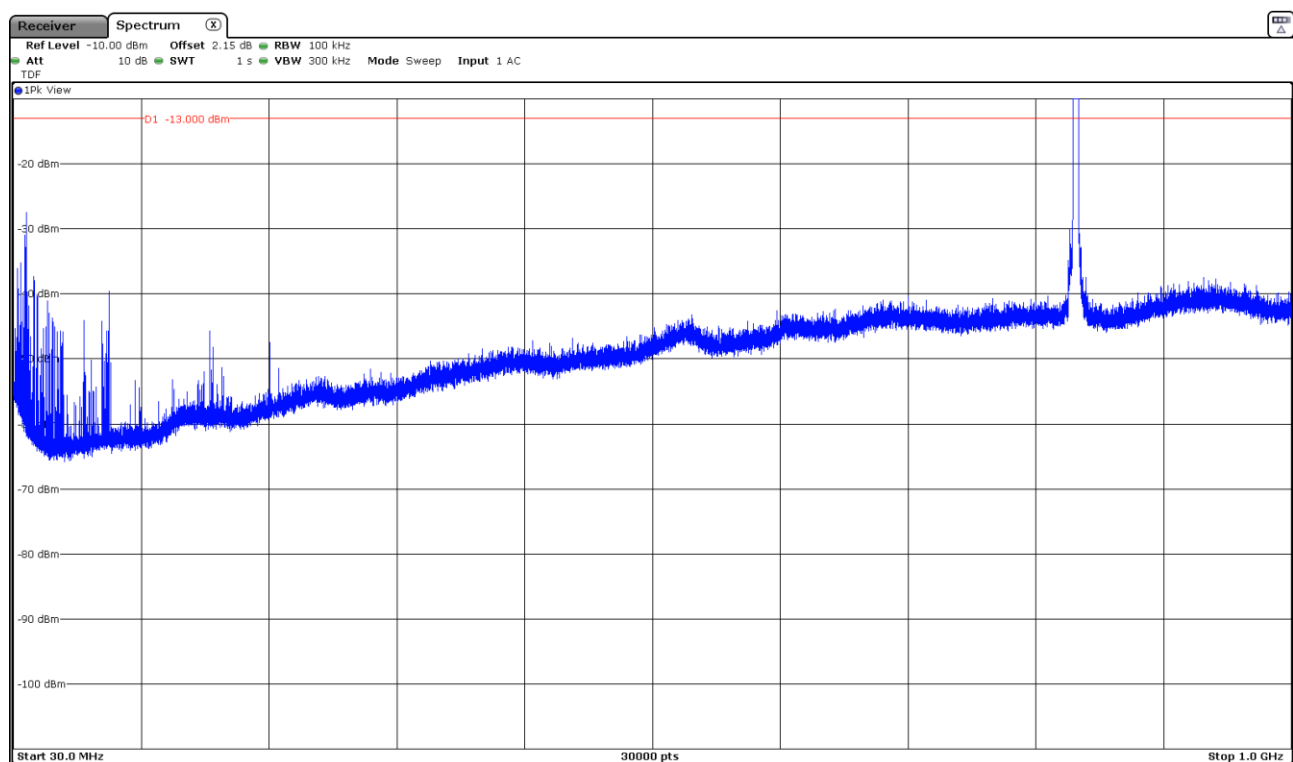
FREQUENCY RANGE 30 MHz - 1 GHz

- Low Channel:



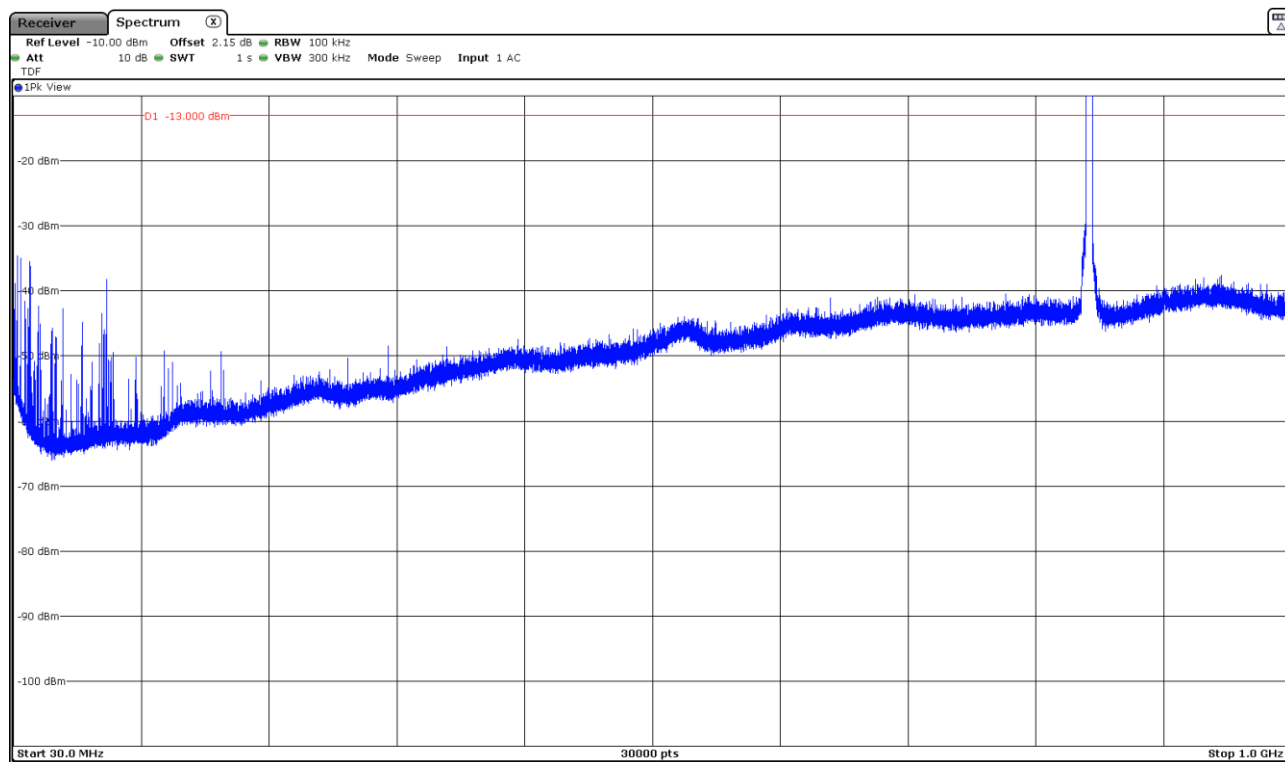
The peak above the limit is the carrier frequency.

- Middle Channel:



The peak above the limit is the carrier frequency.

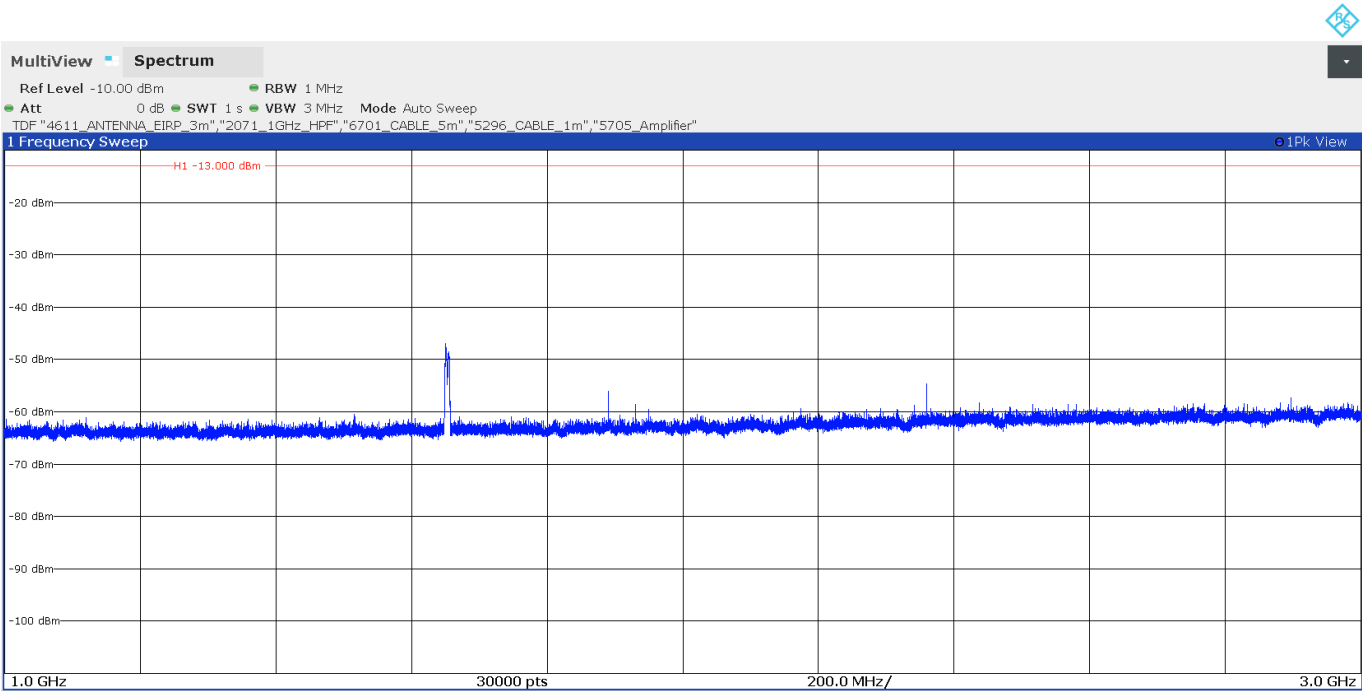
- High Channel:



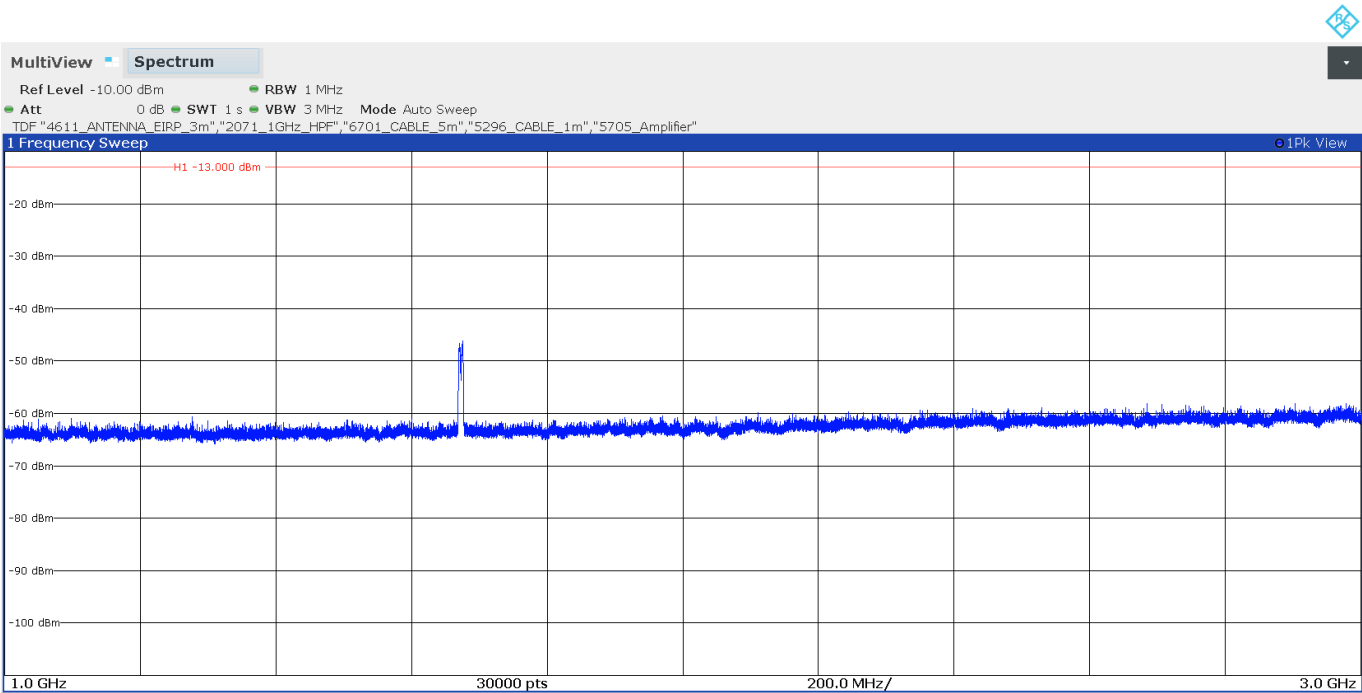
The peak above the limit is the carrier frequency.

FREQUENCY RANGE 1 - 3 GHz

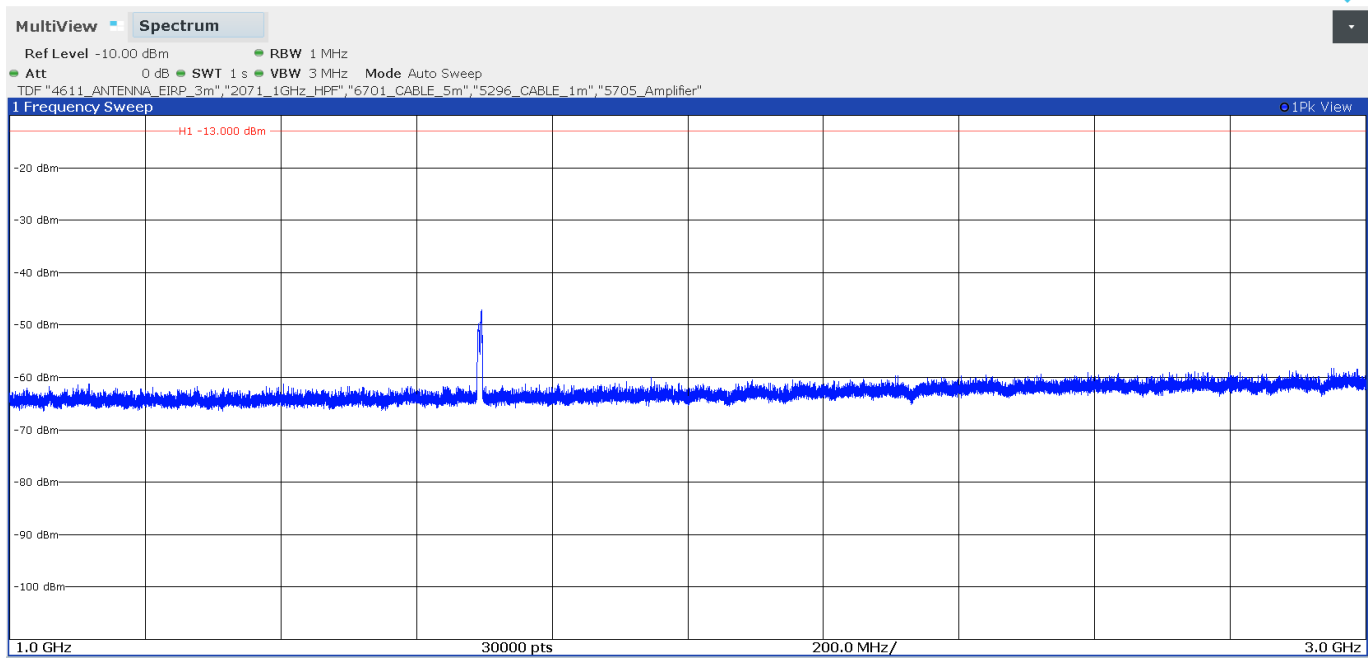
- Low Channel:



- Middle Channel:

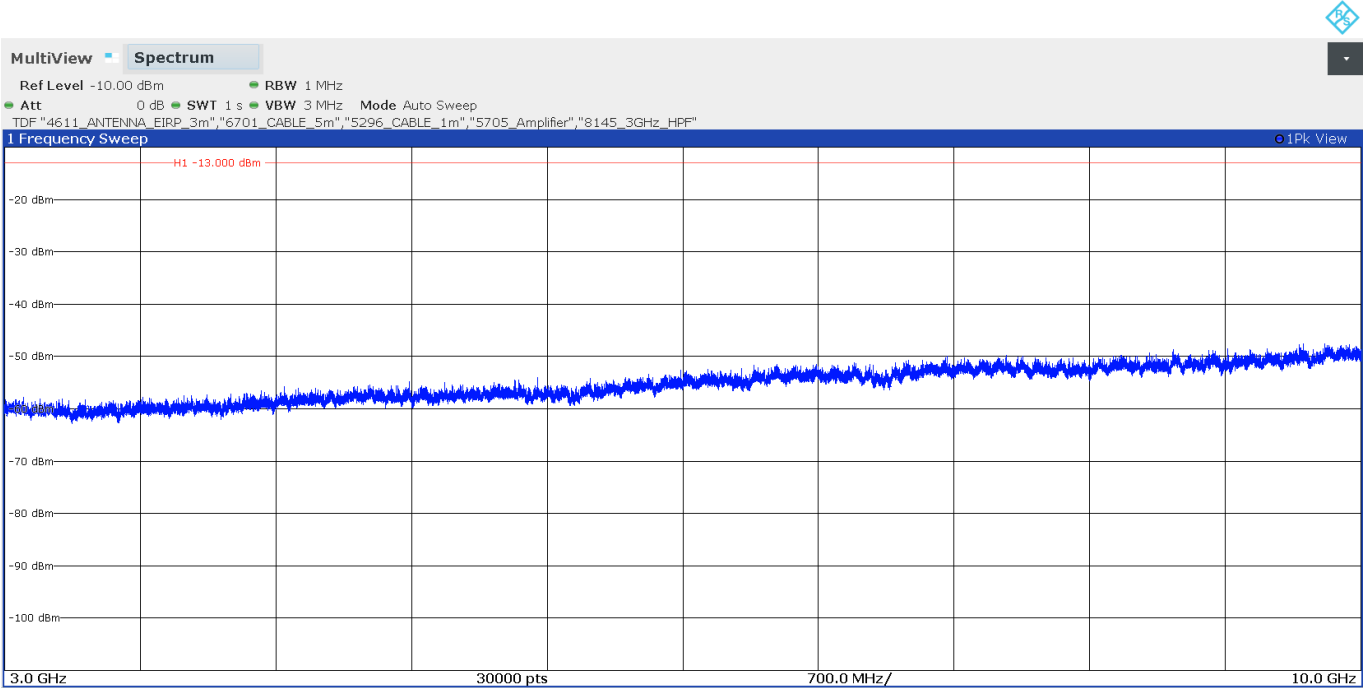


- High Channel:

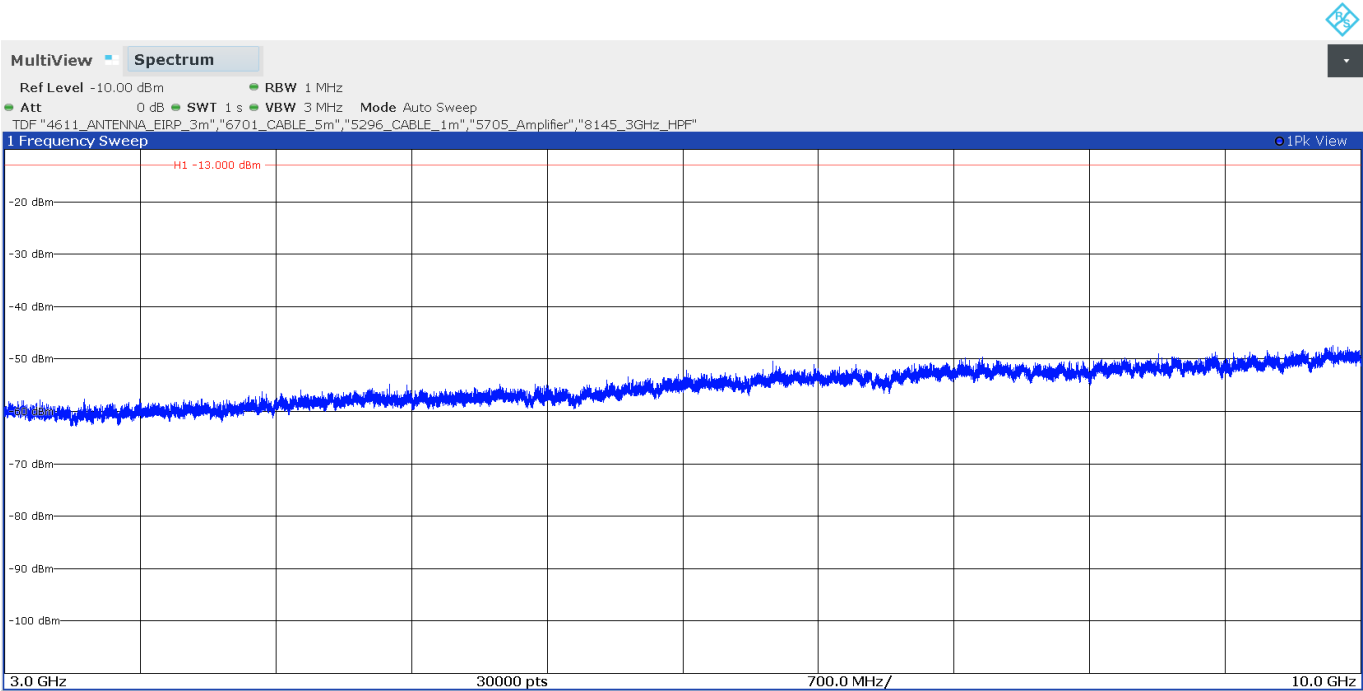


FREQUENCY RANGE 3 - 10 GHz

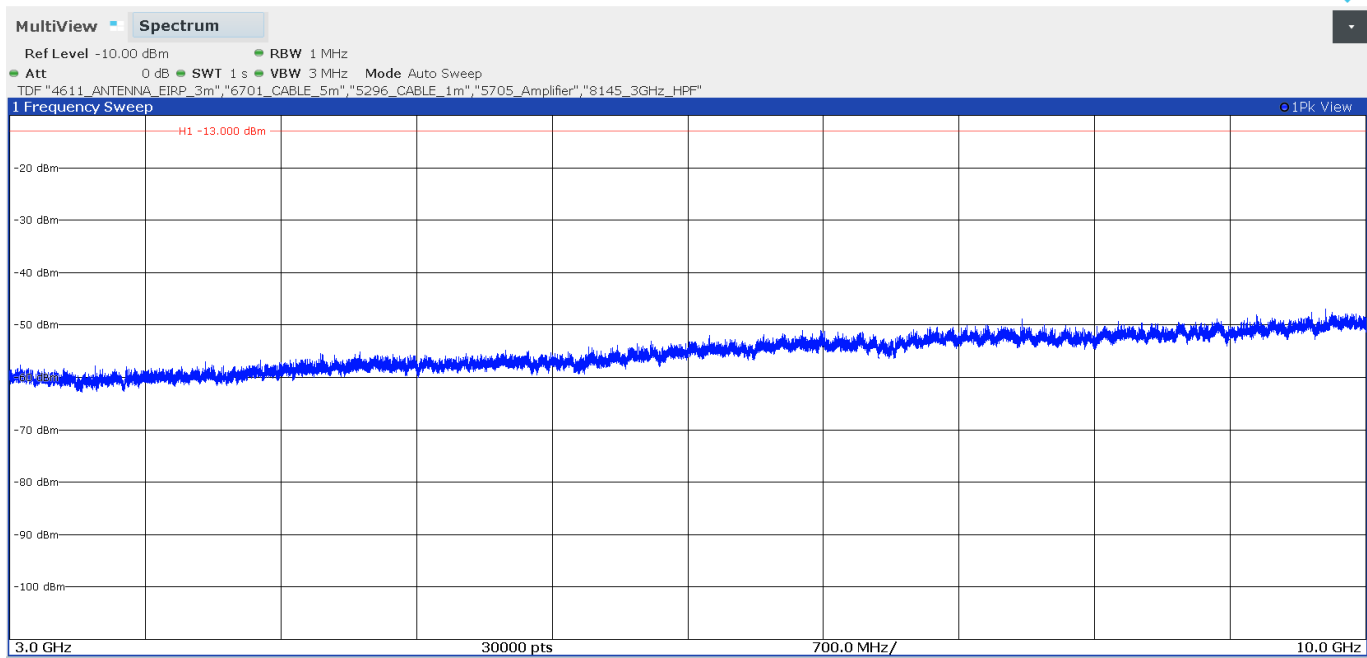
- Low Channel:



- Middle Channel:



- High Channel:



## **LTE Band 5:**

QPSK and 16QAM Modulations:

A preliminary scan determined the QPSK modulation, BW=1.4 MHz, RB=1, Offset=0 as the worst case. The following tables and plots show the results for the worst case modulation.

### **- Low Channel:**

#### **Frequency range 30 MHz - 1 GHz**

No spurious frequencies at less than 20 dB below the limit.

#### **Frequency range 1 - 10 GHz**

No spurious frequencies at less than 20 dB below the limit.

### **- Middle Channel:**

#### **Frequency range 30 MHz - 1 GHz**

No spurious frequencies at less than 20 dB below the limit.

#### **Frequency range 1 - 10 GHz**

No spurious frequencies at less than 20 dB below the limit.

### **- High Channel:**

#### **Frequency range 30 MHz - 1 GHz**

No spurious frequencies at less than 20 dB below the limit.

#### **Frequency range 1 - 10 GHz**

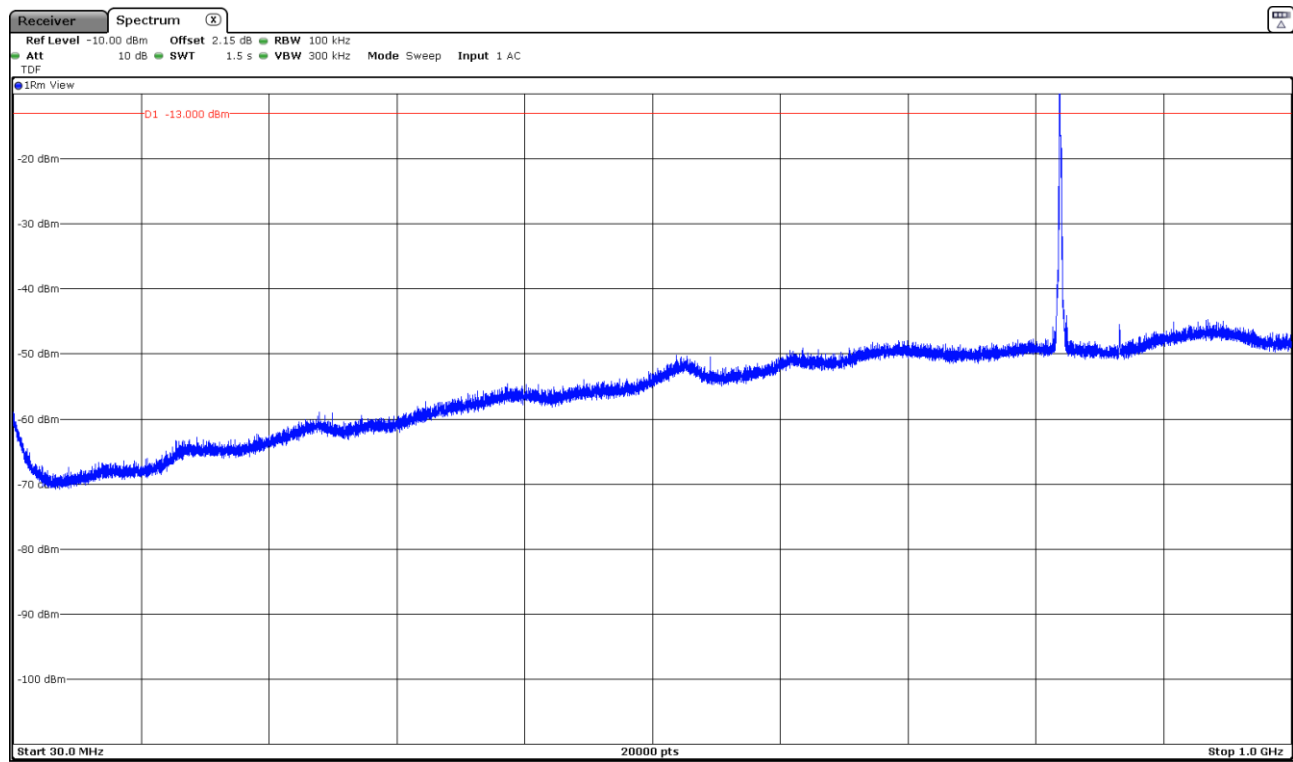
No spurious frequencies at less than 20 dB below the limit.

Measurement uncertainty (dB)     $< \pm 4.68$  for  $f < 1$  GHz  
                                                          $< \pm 4.99$  for  $f \geq 1$  GHz up to 10 GHz

Verdict: PASS

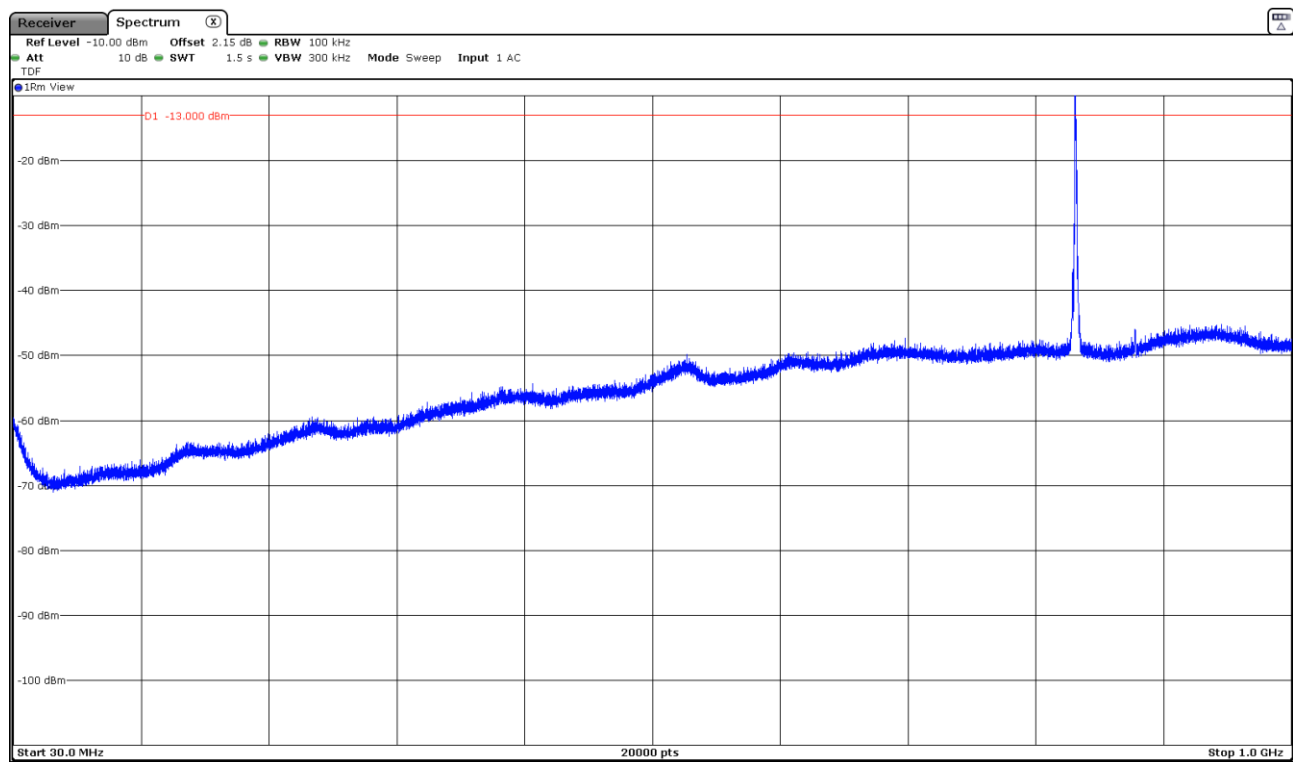
FREQUENCY RANGE 30 MHz - 1 GHz

- Low Channel:



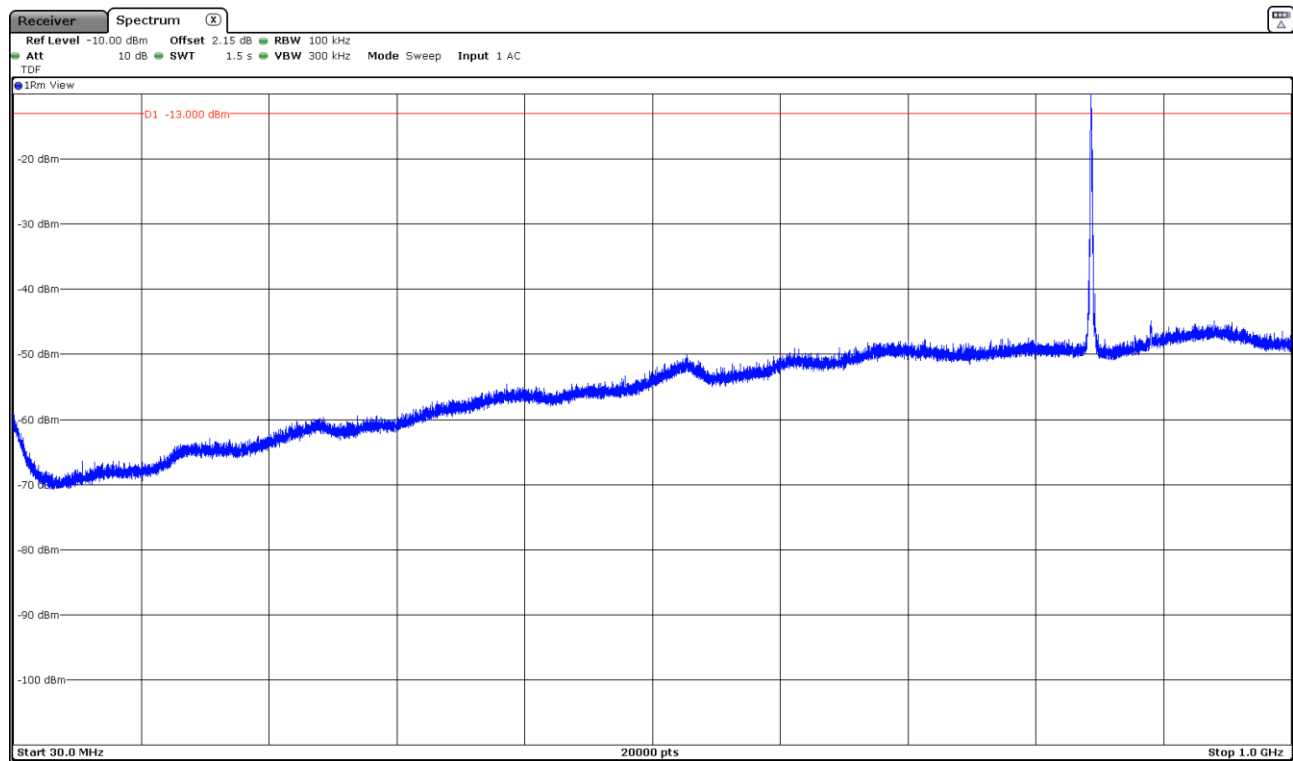
The peak above the limit is the carrier frequency.

- Middle Channel:



The peak above the limit is the carrier frequency.

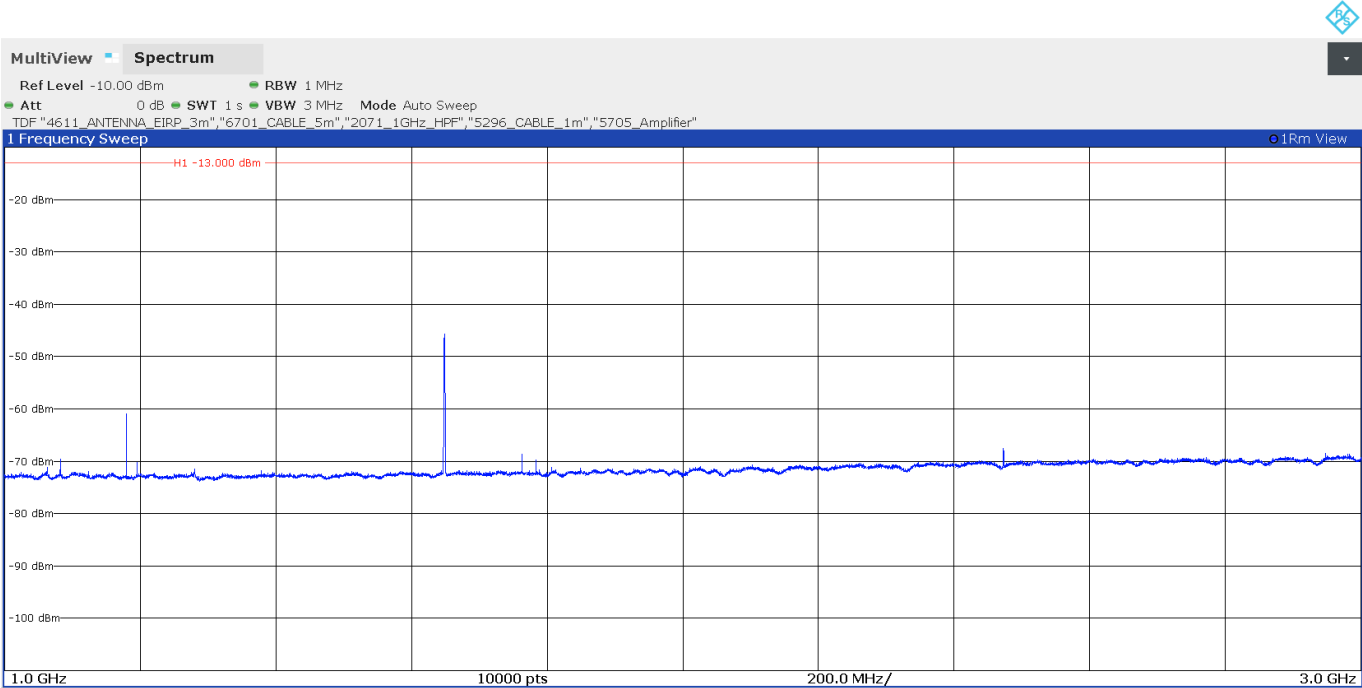
- High Channel:



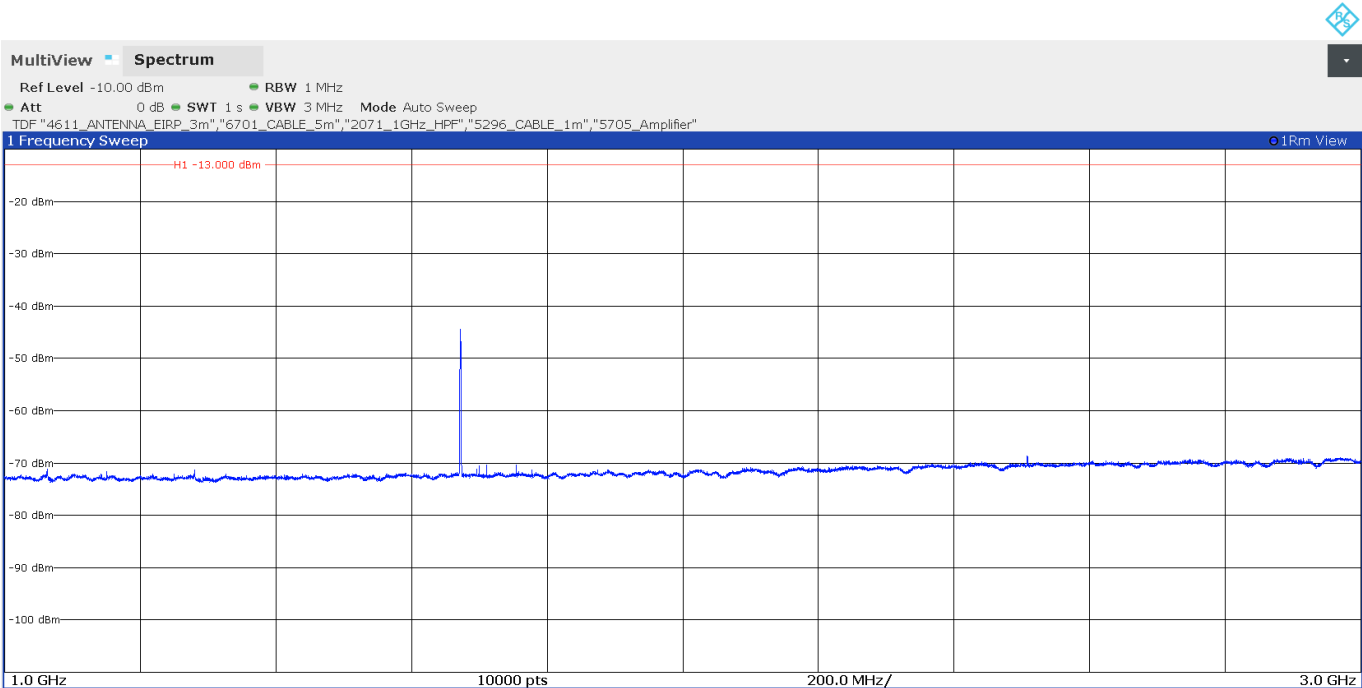
The peak above the limit is the carrier frequency.

FREQUENCY RANGE 1 - 3 GHz

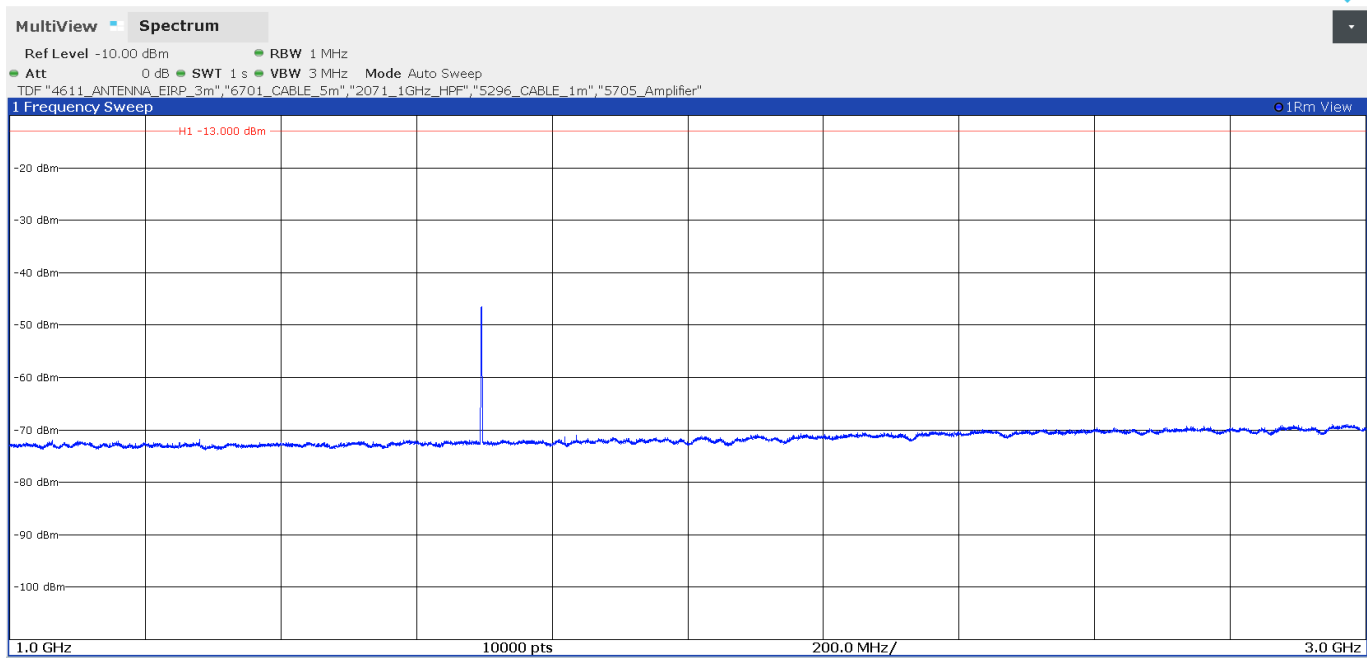
- Low Channel:



- Middle Channel:

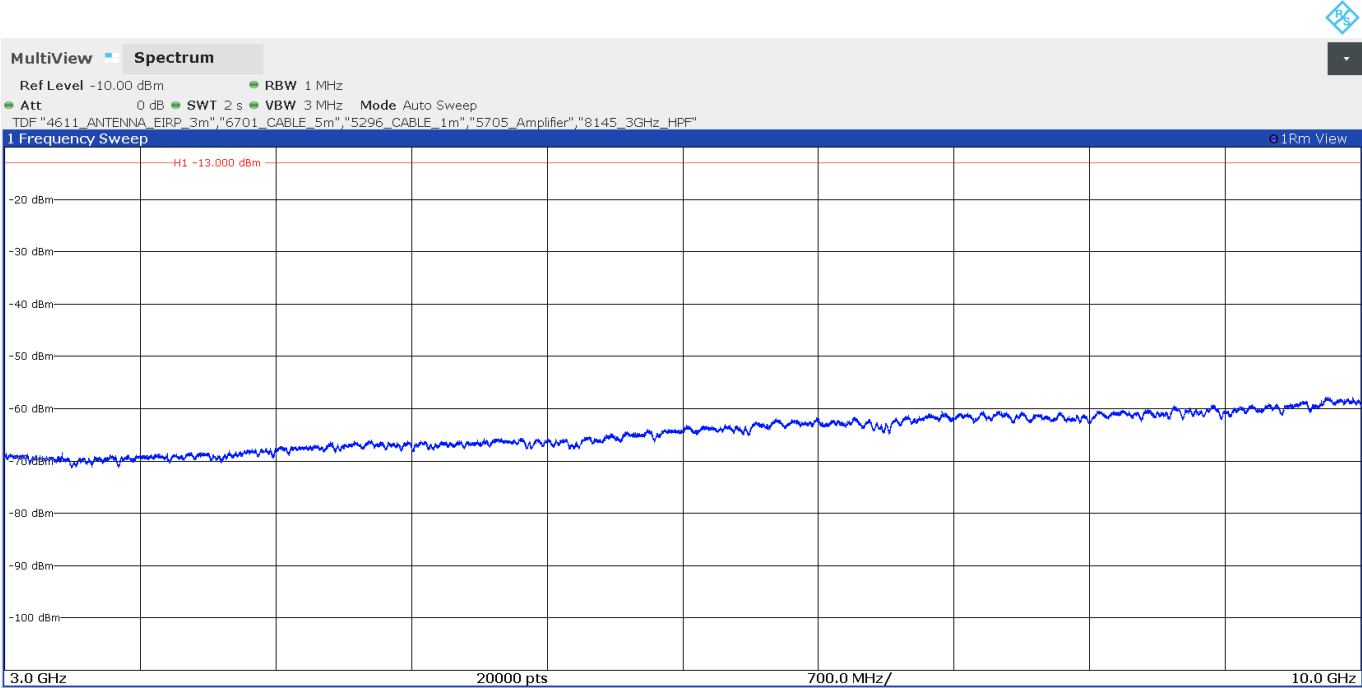


- High Channel:

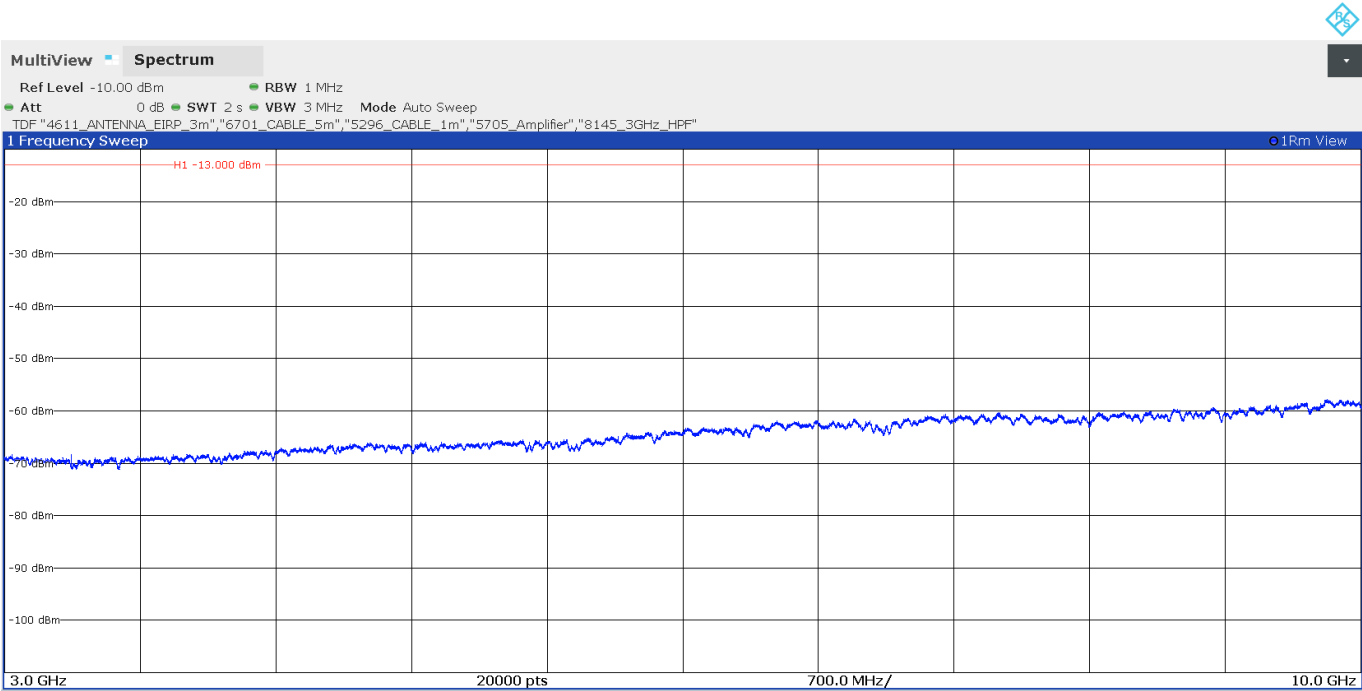


FREQUENCY RANGE 3 - 10 GHz

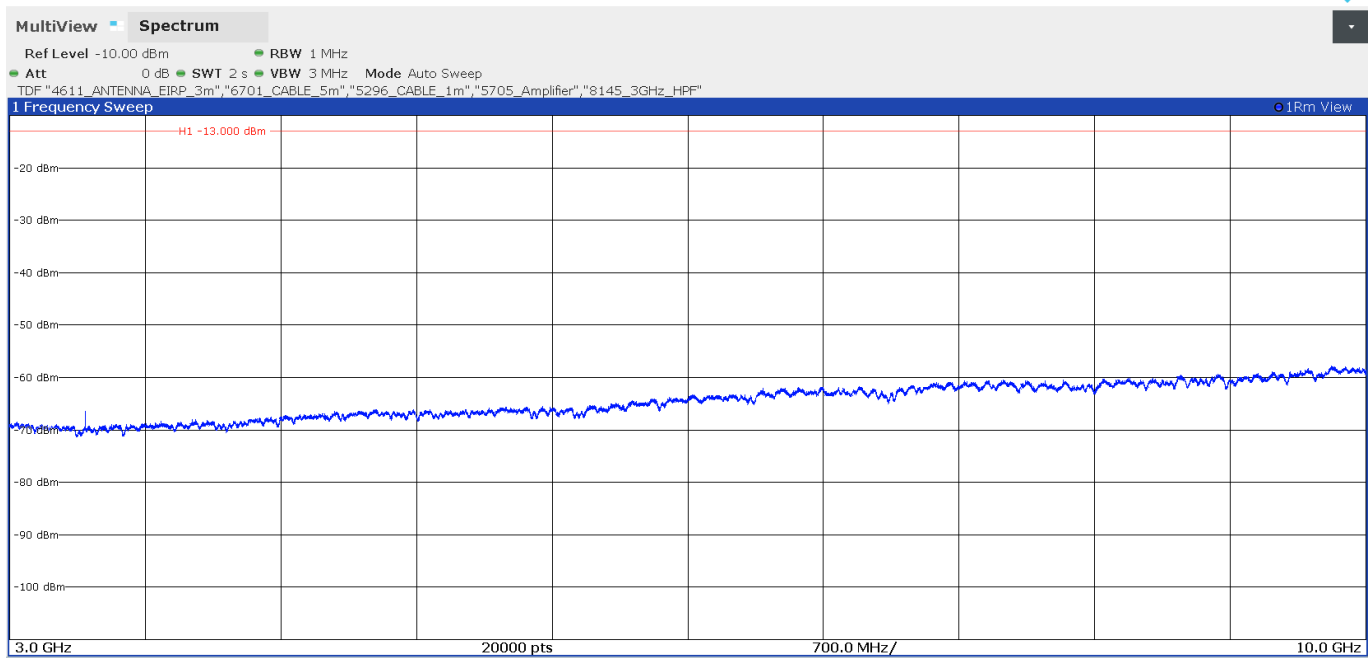
- Low Channel:



- Middle Channel:



- High Channel:



## Appendix B: Test results FCC Part 24 / RSS-133

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## TEST CONDITIONS

### POWER SUPPLY (V):

Vnominal: 230 Vac  
 Type of Power Supply: AC voltage

### ANTENNA:

Type of Antennas: Internal.  
 Maximum Declared Gain for 3G Band II: +2.5 dBi  
 Maximum Declared Gain for LTE Band 2: +2.5 dBi

### TEST FREQUENCIES:

#### 3G Band II:

##### WCDMA and HSUPA MODULATIONS:

Low Channel (9262): 1852.4 MHz  
 Middle Channel (9400): 1880.0 MHz  
 High Channel (9538): 1907.6 MHz

#### LTE Band 2. QPSK AND 16QAM MODULATIONS:

|        | Channel (Frequency in MHz) |                |                |              |                |              |
|--------|----------------------------|----------------|----------------|--------------|----------------|--------------|
|        | BW = 1.4 MHz               | BW = 3 MHz     | BW = 5 MHz     | BW = 10 MHz  | BW = 15 MHz    | BW = 20 MHz  |
| Low    | 18607 (1850.7)             | 18615 (1851.5) | 18625 (1852.5) | 18650 (1855) | 18675 (1857.5) | 18700 (1860) |
| Middle | 18900 (1880)               | 18900 (1880)   | 18900 (1880)   | 18900 (1880) | 18900 (1880)   | 18900 (1880) |
| High   | 19193 (1909.3)             | 19185 (1908.5) | 19175 (1907.5) | 19150 (1905) | 19125 (1902.5) | 19100 (1900) |

## Radiated emissions

### SPECIFICATION:

FCC § 24.238. RSS-133 Clause 6.5.

The power of emissions shall be attenuated below the transmitter power (P) by a factor of at least  $43 + 10 \log (P)$  dB. P in watts.

### METHOD:

The measurement was performed with the EUT inside an anechoic chamber. The spectrum was scanned from 30 MHz to at least the 10th harmonic of the High frequency generated within the equipment.

The EUT was placed on a non-conductive stand at a 3 meter distance from the measuring antenna for measurements below 18 GHz and at 1 m distance for measurements above 18 GHz.

Detected emissions were maximized at each frequency by rotating the EUT and adjusting the measuring antenna height and polarization. The maximum meter reading was recorded.

The maximum field strength (dB $\mu$ V/m) of each detected emission at less than 20 dB respect to the limit is converted to an equivalent EIRP level (dBm) according to ANSI C63.26 with the formula:

$$\text{EIRP (dBm)} = E(\text{dB}\mu\text{V/m}) + 20 \log (D) - 104.8$$

Where D is the measurement distance (in the far field region) in m.  $D = 3$  m.

### Measurement Limit:

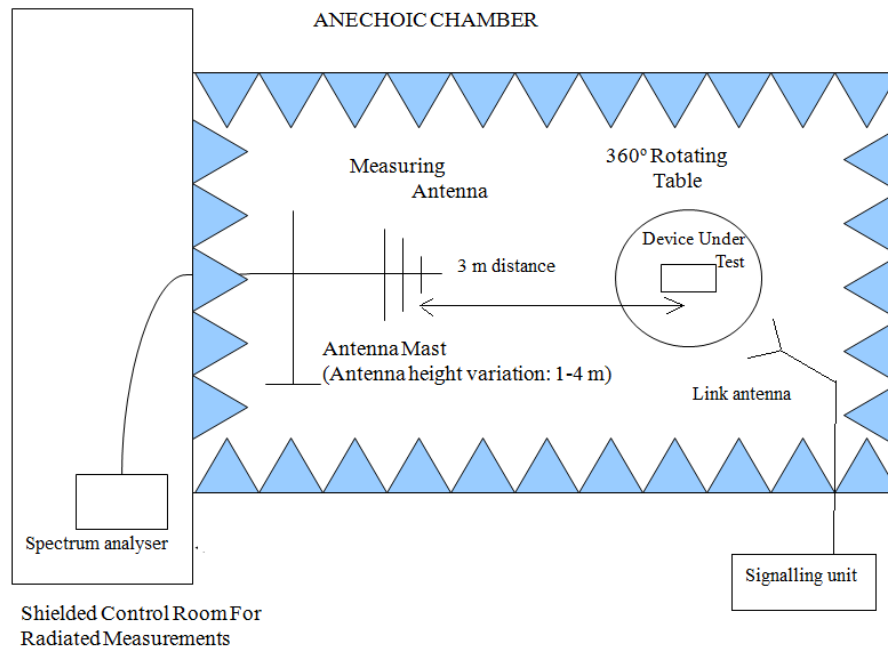
According to specification, the power of emissions shall be attenuated below the transmitter power (P) by a factor of at least  $43 + 10 \log (P)$  dB. P in watts.

At  $P_o$  transmitting power, the specified minimum attenuation becomes  $43 + 10 \log (P_o)$  and the level in dBm relative  $P_o$  becomes:

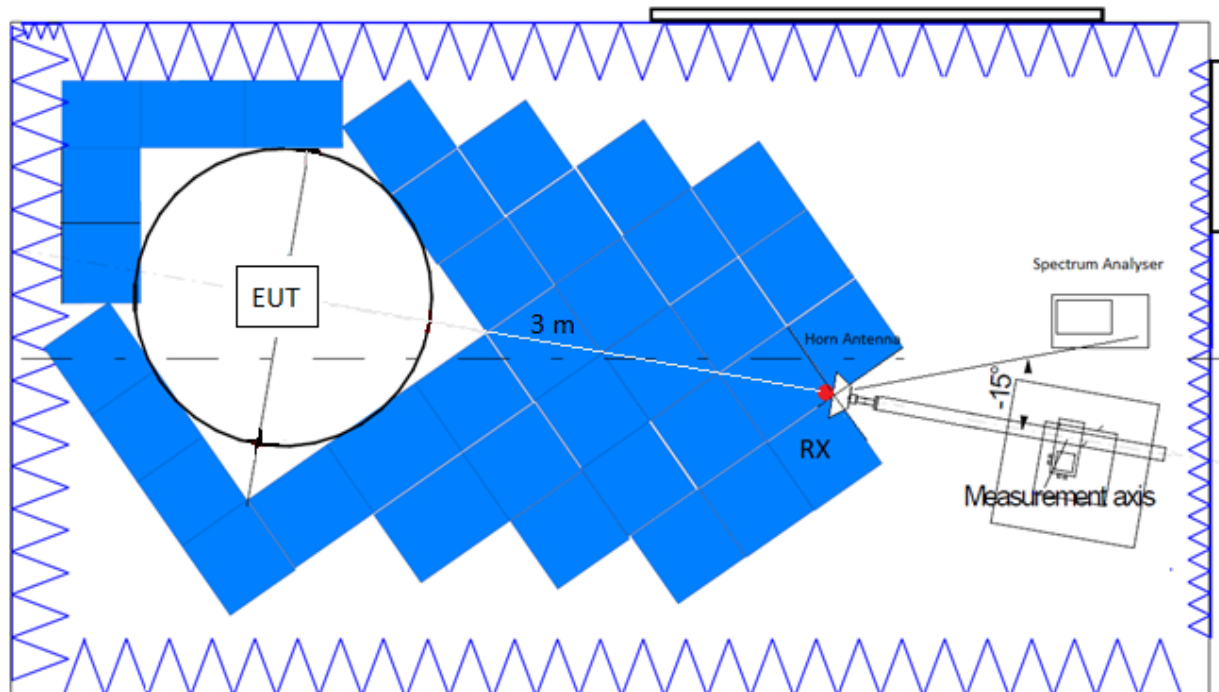
$$P_o \text{ (dBm)} - [43 + 10 \log (P_o \text{ in mwatts}) - 30] = -13 \text{ dBm}$$

## TEST SETUP:

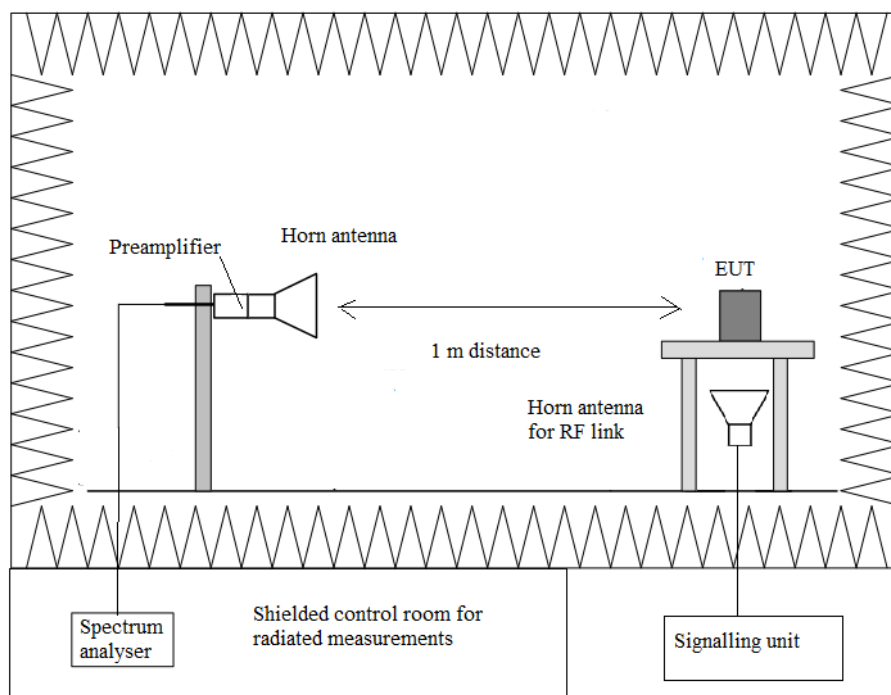
Radiated measurements below 1 GHz:



Radiated measurements setup from 1GHz to 18 GHz:



## Radiated measurements above 18 GHz:



## RESULTS:

### 3G Band II:

WCDMA and HSUPA Modulations:

A preliminary scan determined the WCDMA modulation as the worst case. The following tables and plots show the results for WCDMA modulation.

#### **- Low Channel:**

##### **Frequency range 30 MHz - 1 GHz**

Spurious frequencies detected at less than 20 dB below the limit:

| Spurious frequency (MHz) | E.I.R.P (dBm) | Polarization | Detector |
|--------------------------|---------------|--------------|----------|
| 39.555                   | -26.39        | V            | Peak     |
| 46.862                   | -25.42        | V            | Peak     |
| 62.770                   | -26.79        | V            | Peak     |
| 96.073                   | -28.95        | V            | Peak     |

##### **Frequency range 1 - 20 GHz**

Spurious frequencies detected at less than 20 dB below the limit:

| Spurious frequency (GHz) | E.I.R.P (dBm) | Polarization | Detector |
|--------------------------|---------------|--------------|----------|
| 1.8447                   | -17.30        | H            | Peak     |
| 1.8485                   | -14.34        | H            | Peak     |

#### **- Middle Channel:**

##### **Frequency range 30 MHz - 1 GHz**

Spurious frequencies detected at less than 20 dB below the limit:

| Spurious frequency (MHz) | E.I.R.P (dBm) | Polarization | Detector |
|--------------------------|---------------|--------------|----------|
| 34.026                   | -26.34        | V            | Peak     |
| 43.047                   | -28.28        | V            | Peak     |
| 48.317                   | -26.89        | V            | Peak     |
| 57.532                   | -30.94        | V            | Peak     |
| 76.835                   | -32.62        | V            | Peak     |

##### **Frequency range 1 - 20 GHz**

No spurious frequencies detected at less than 20 dB below the limit.

**- High Channel:**

**Frequency range 30 MHz - 1 GHz**

No spurious frequencies detected at less than 20 dB below the limit.

**Frequency range 1 - 20 GHz**

Spurious frequencies detected at less than 20 dB below the limit:

| Spurious frequency (GHz) | E.I.R.P (dBm) | Polarization | Detector |
|--------------------------|---------------|--------------|----------|
| 1.9115                   | -14.15        | H            | Peak     |
| 1.9134                   | -19.26        | H            | Peak     |
| 1.9166                   | -23.95        | H            | Peak     |

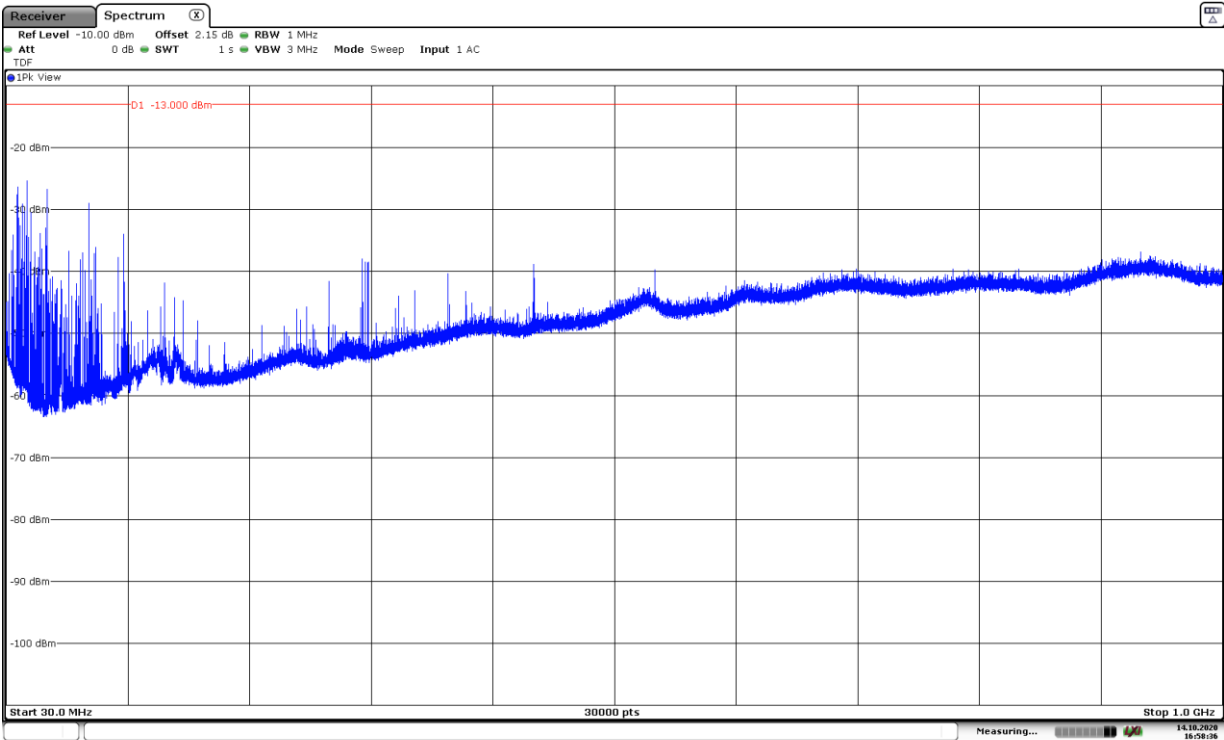
Measurement uncertainty (dB)

|                                    |
|------------------------------------|
| < ±4.68 for f < 1 GHz              |
| < ±4.00 for f ≥ 1 GHz up to 3 GHz  |
| < ±4.99 for f ≥ 3 GHz up to 18 GHz |
| < ±5.08 for f ≥ 18 GHz             |

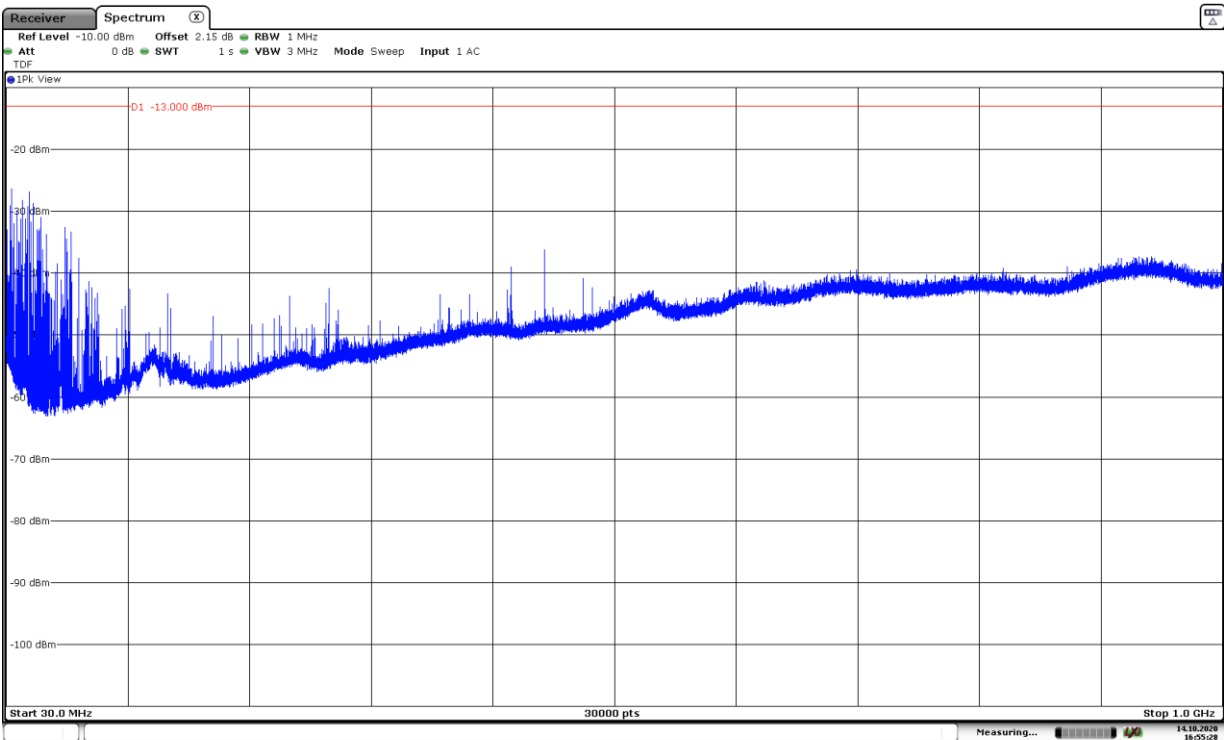
Verdict: PASS

FREQUENCY RANGE 30 MHz - 1 GHz

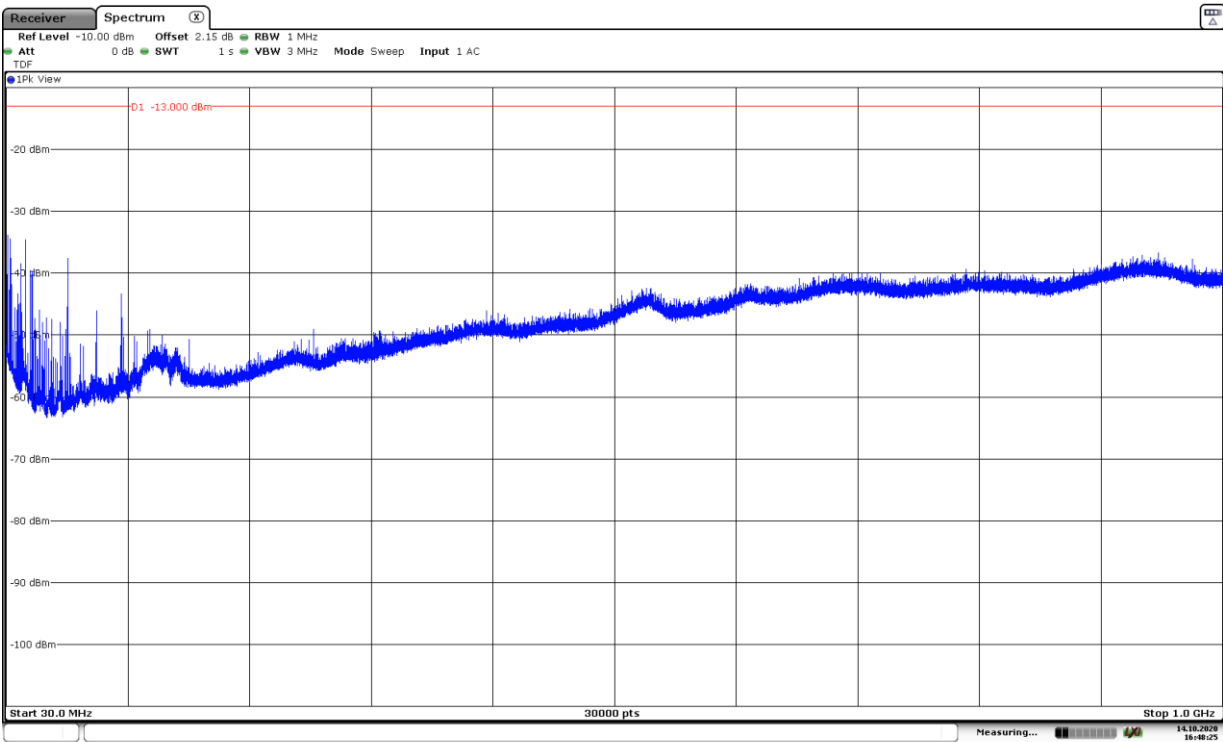
- Low Channel:



- Middle Channel:

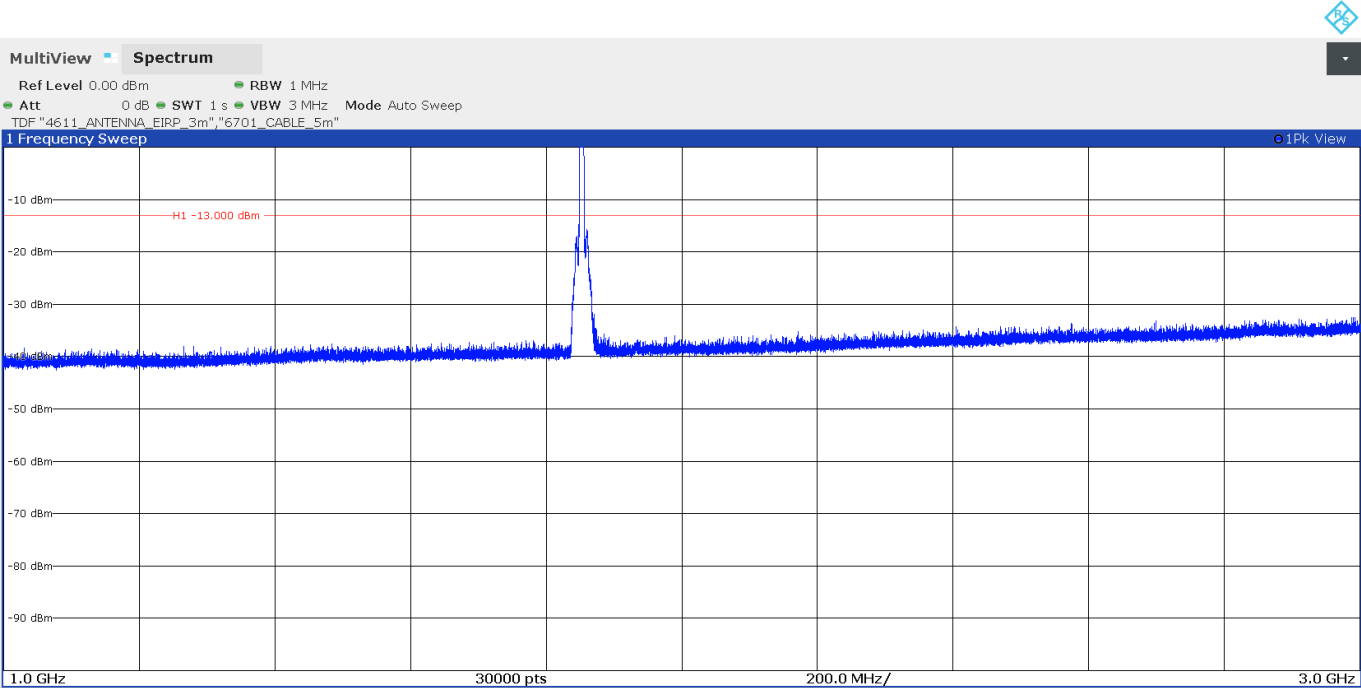


- High Channel:



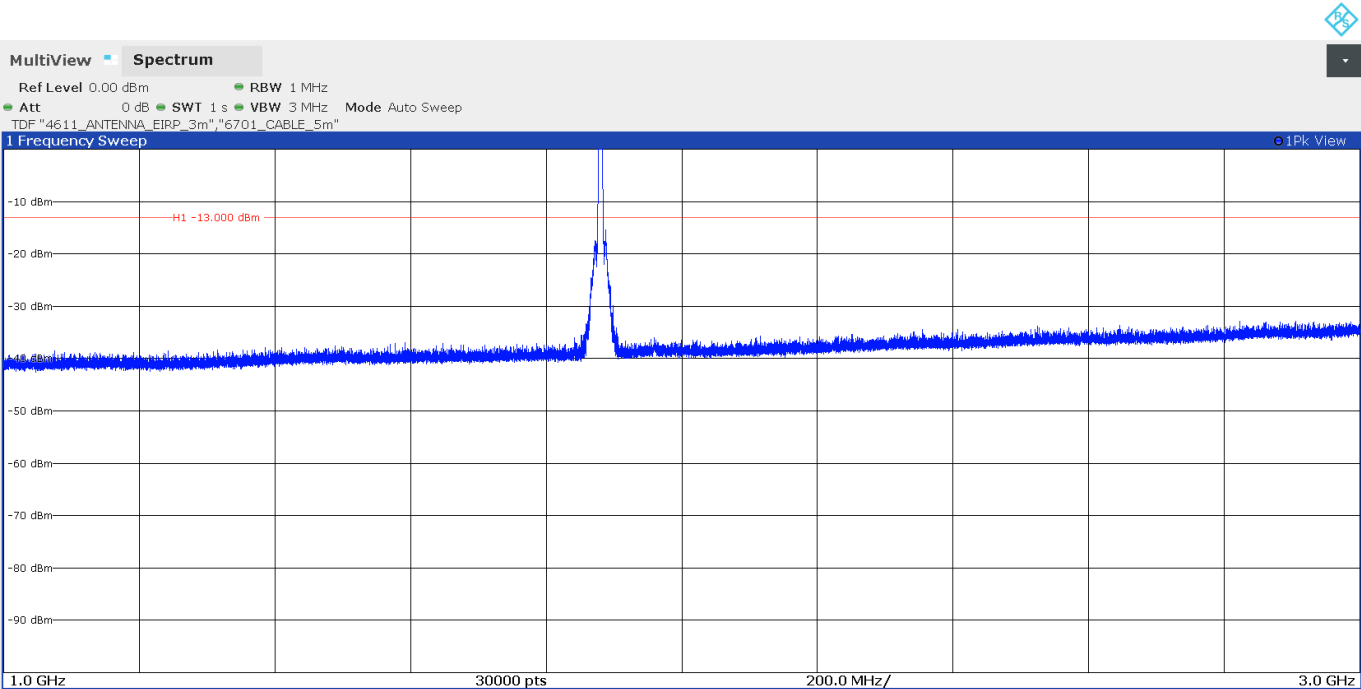
FREQUENCY RANGE 1 - 3 GHz

- Low Channel:



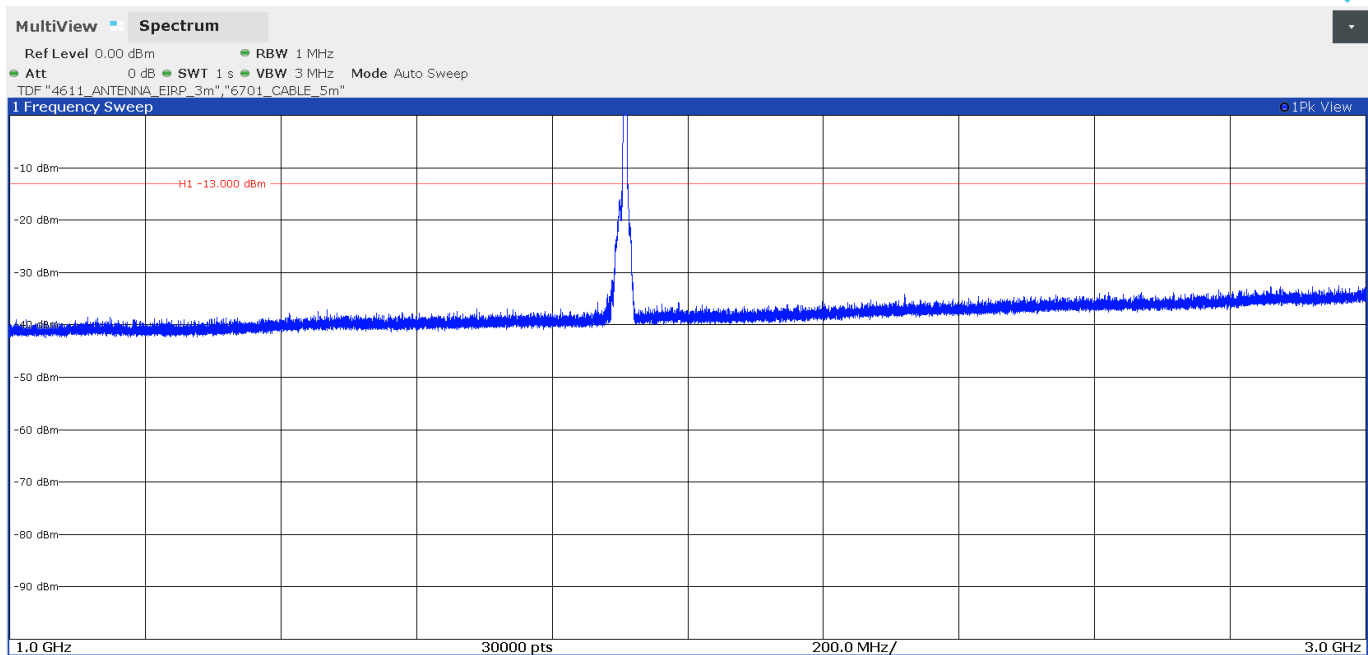
The peak above the limit is the carrier frequency.

- Middle Channel:



The peak above the limit is the carrier frequency.

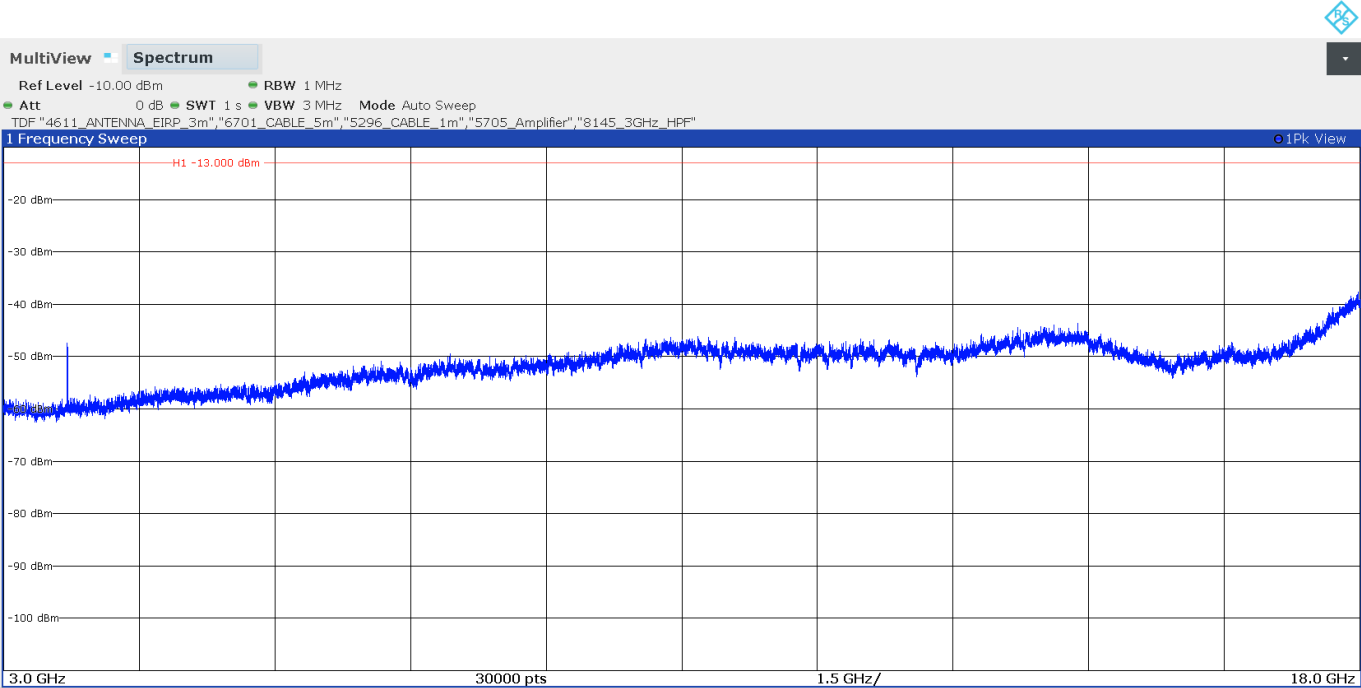
- High Channel:



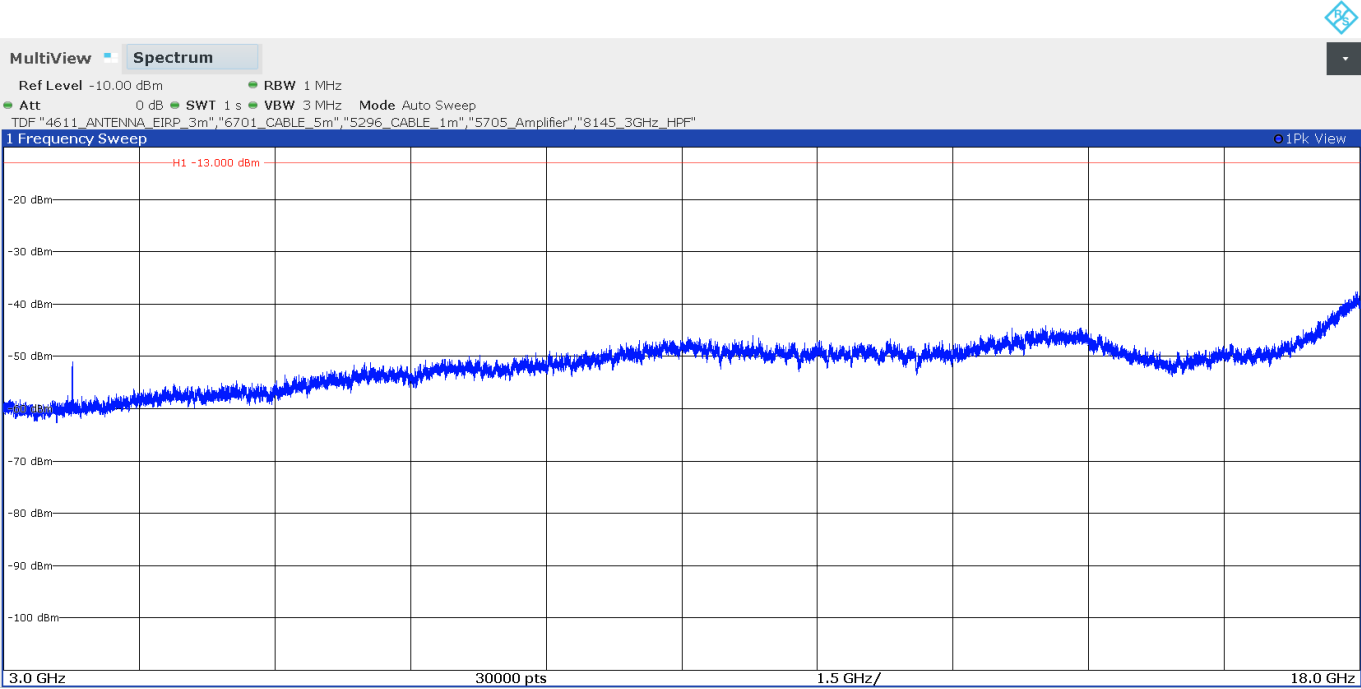
The peak above the limit is the carrier frequency.

FREQUENCY RANGE 3 - 18 GHz

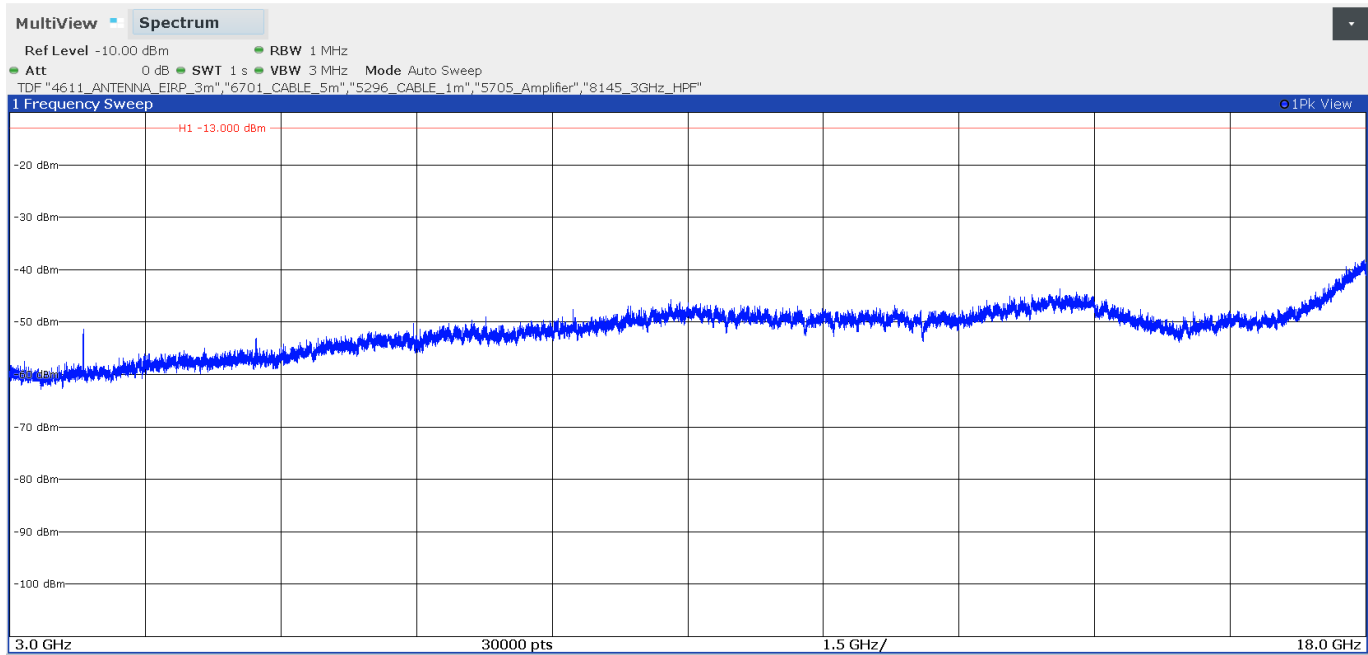
- Low Channel:



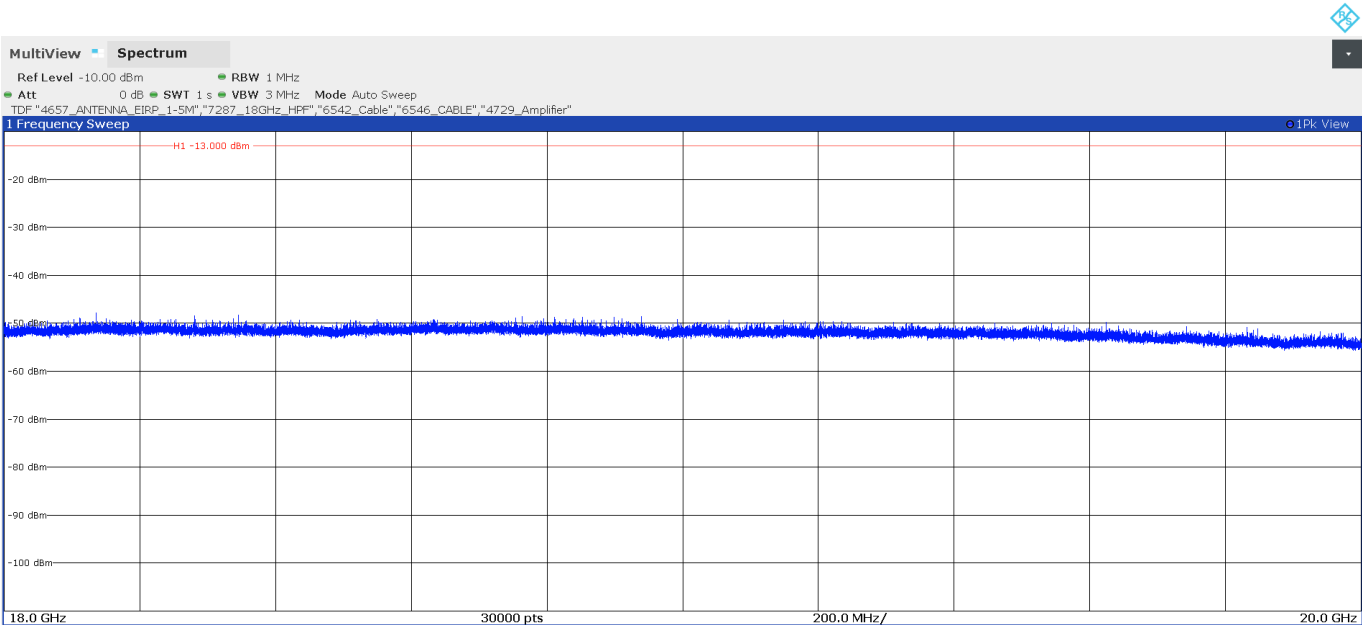
- Middle Channel:



- High Channel:



FREQUENCY RANGE 18 - 20 GHz



This plot is valid for the Low, Middle and High Channels.

## **LTE Band 2:**

QPSK and 16QAM Modulations:

A preliminary scan determined the QPSK modulation, BW=20 MHz, RB=1, Offset=0 as the worst case. The following tables and plots show the results for this combination.

### **- Low Channel:**

#### **Frequency range 30 MHz - 1 GHz**

No spurious frequencies detected at less than 20 dB below the limit.

#### **Frequency range 1 - 20 GHz**

Spurious frequencies detected at less than 20 dB below the limit:

| Spurious frequency (GHz) | E.I.R.P (dBm) | Polarization | Detector |
|--------------------------|---------------|--------------|----------|
| 1.8487                   | -24.68        | V            | RMS      |

### **- Middle Channel:**

#### **Frequency range 30 MHz - 1 GHz**

No spurious frequencies detected at less than 20 dB below the limit.

#### **Frequency range 1 GHz - 20 GHz**

No spurious frequencies detected at less than 20 dB below the limit.

### **- High Channel:**

#### **Frequency range 30 MHz - 1 GHz**

No spurious frequencies detected at less than 20 dB below the limit.

#### **Frequency range 1 GHz - 20 GHz.**

No spurious frequencies detected at less than 20 dB below the limit.

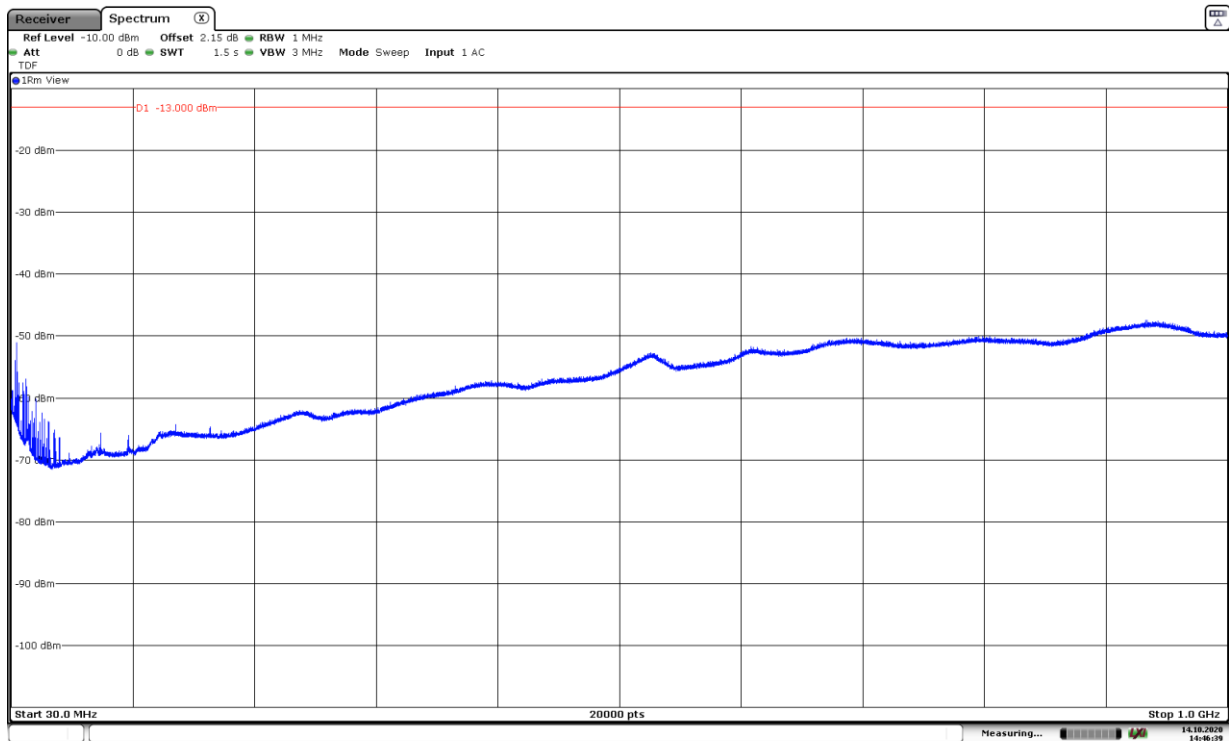
Measurement uncertainty (dB)

|                                    |
|------------------------------------|
| < ±4.68 for f < 1 GHz              |
| < ±4.00 for f ≥ 1 GHz up to 3 GHz  |
| < ±4.99 for f ≥ 3 GHz up to 18 GHz |
| < ±5.08 for f ≥ 18 GHz             |

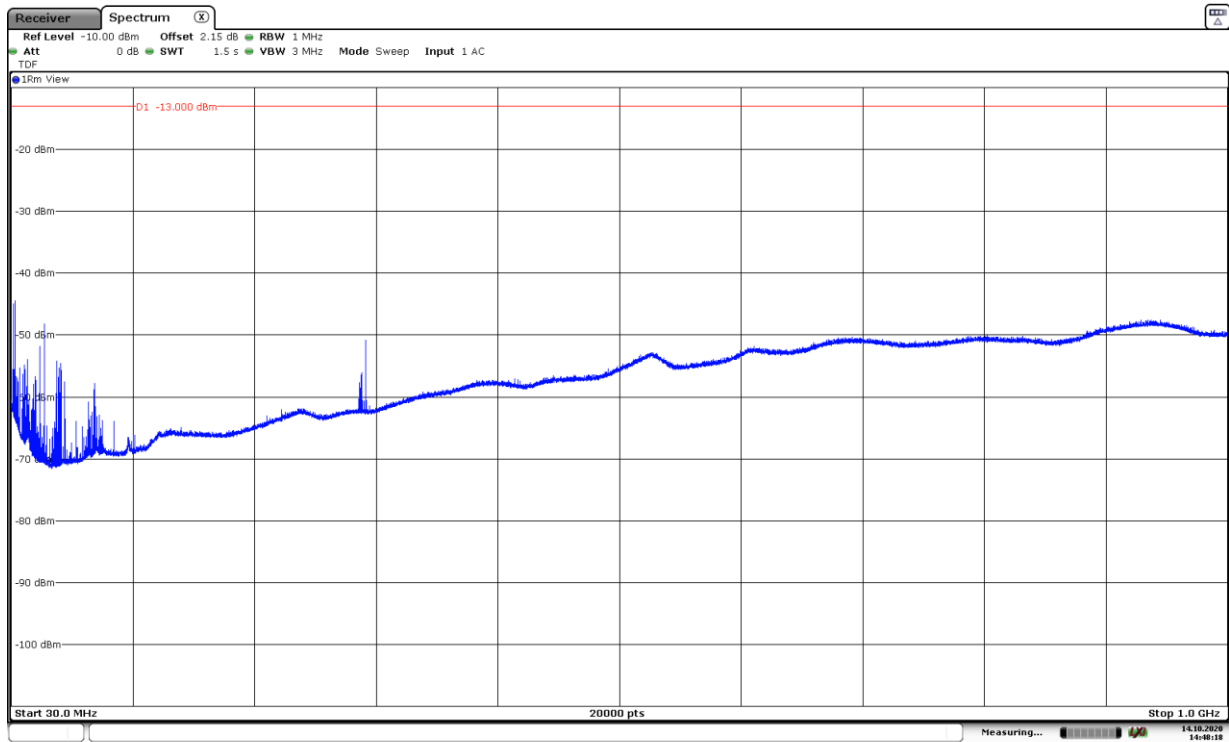
Verdict: PASS

FREQUENCY RANGE 30 MHz - 1 GHz

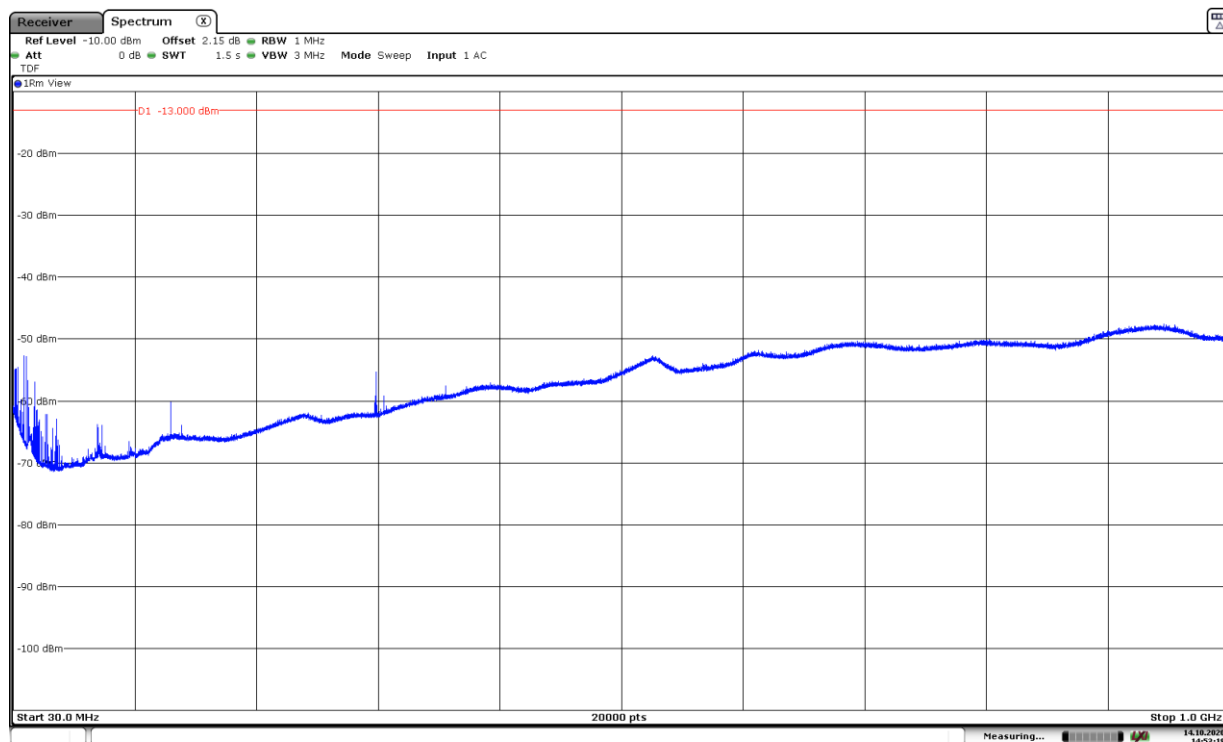
- Low Channel:



- Middle Channel:

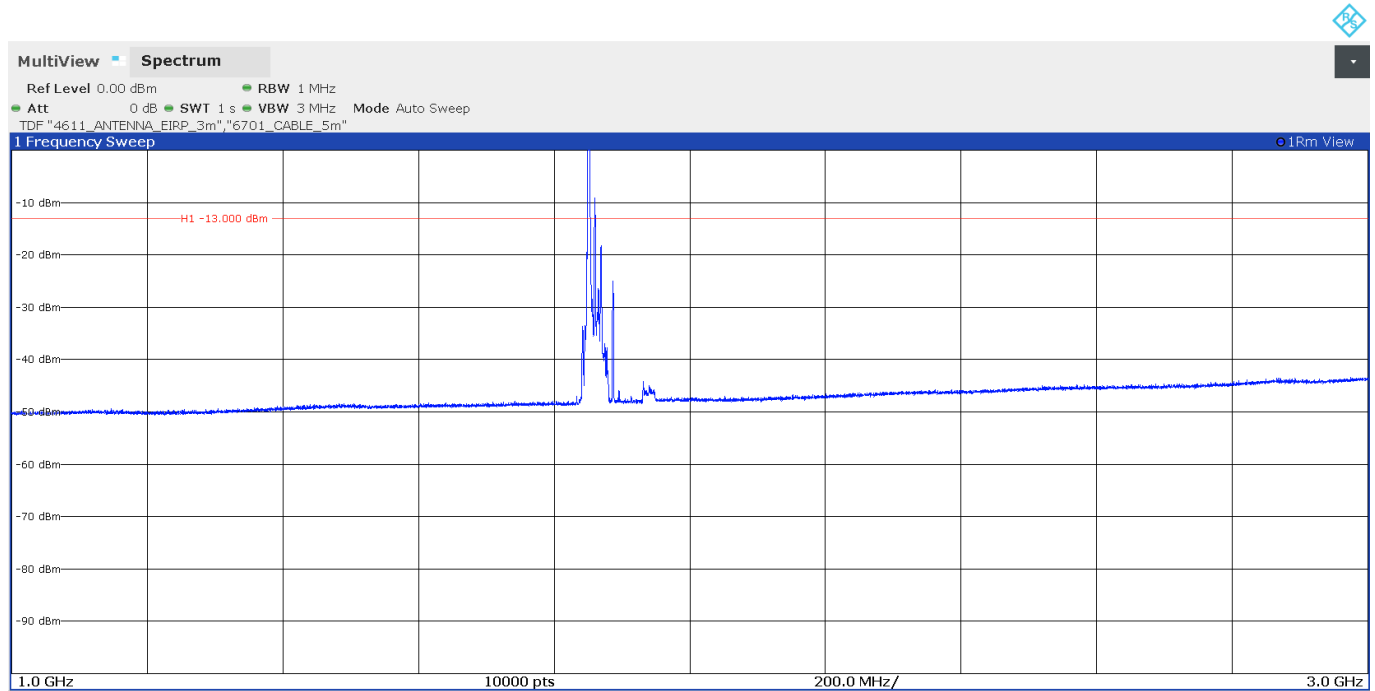


- High Channel:



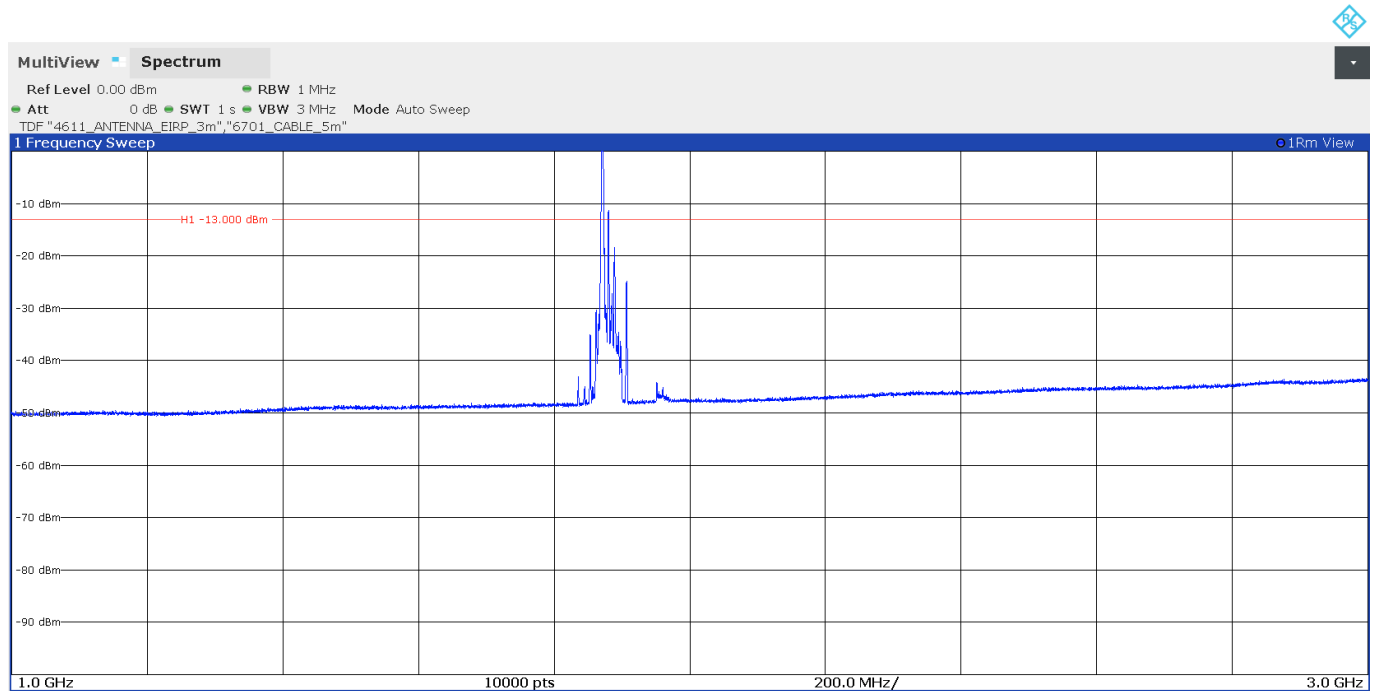
## FREQUENCY RANGE 1 - 3 GHz

- Low Channel:



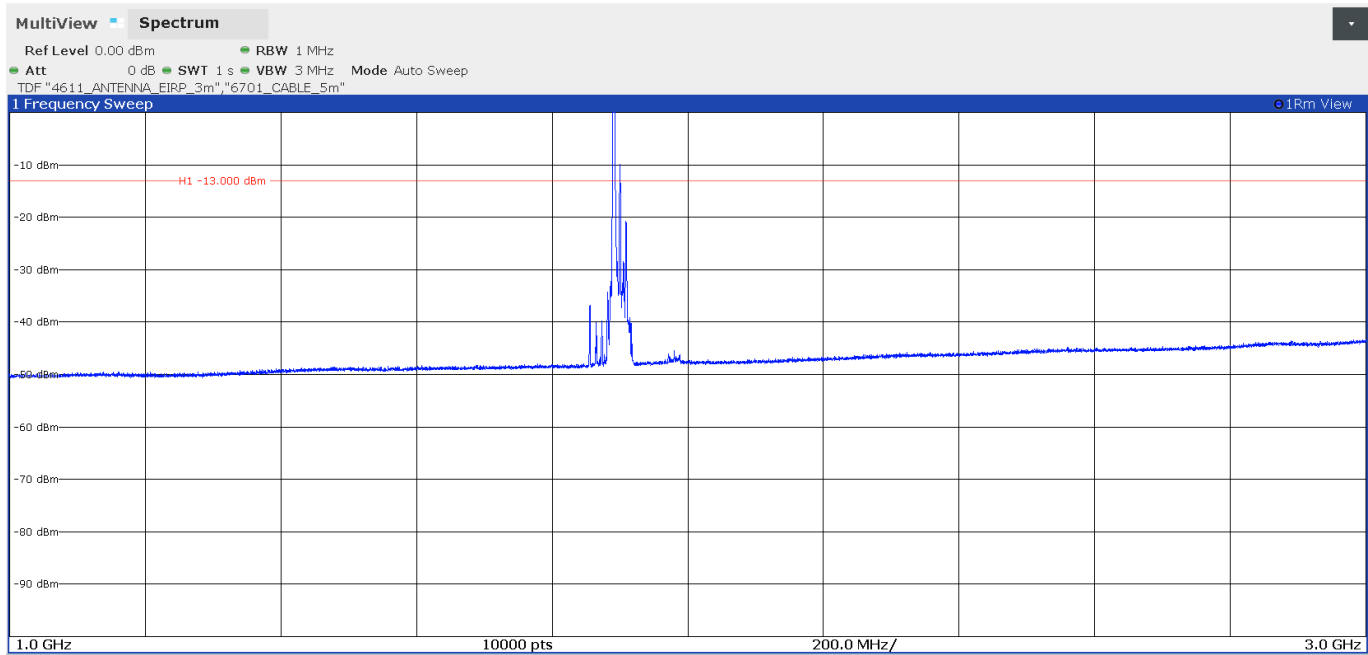
The peak above the limit is the carrier frequency.

- Middle Channel:



The peak above the limit is the carrier frequency.

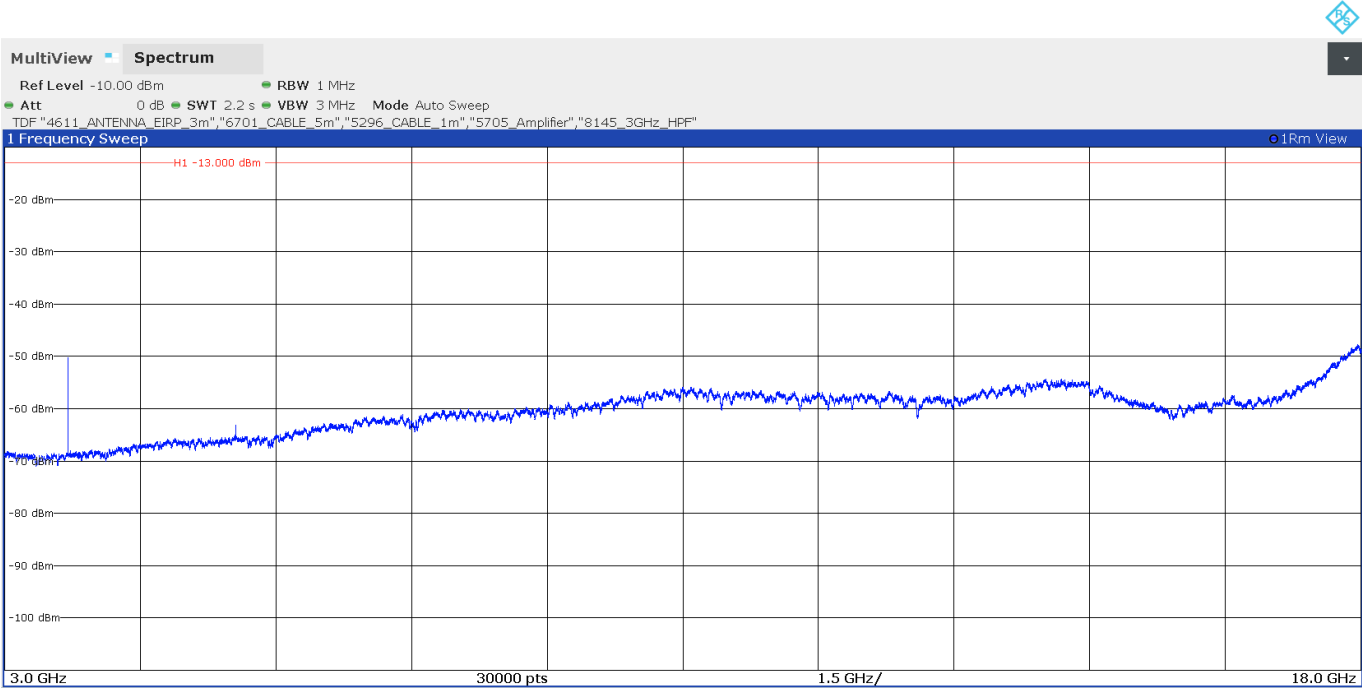
- High Channel:



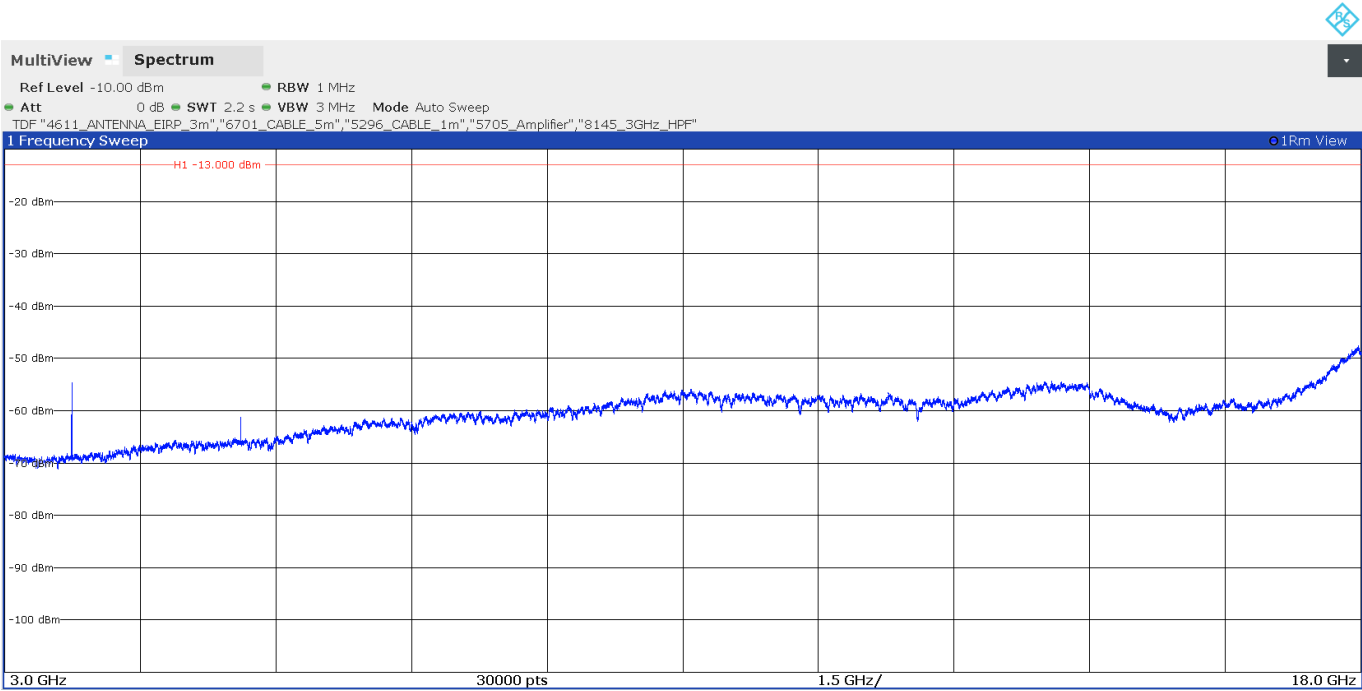
The peak above the limit is the carrier frequency.

FREQUENCY RANGE 3 - 18 GHz

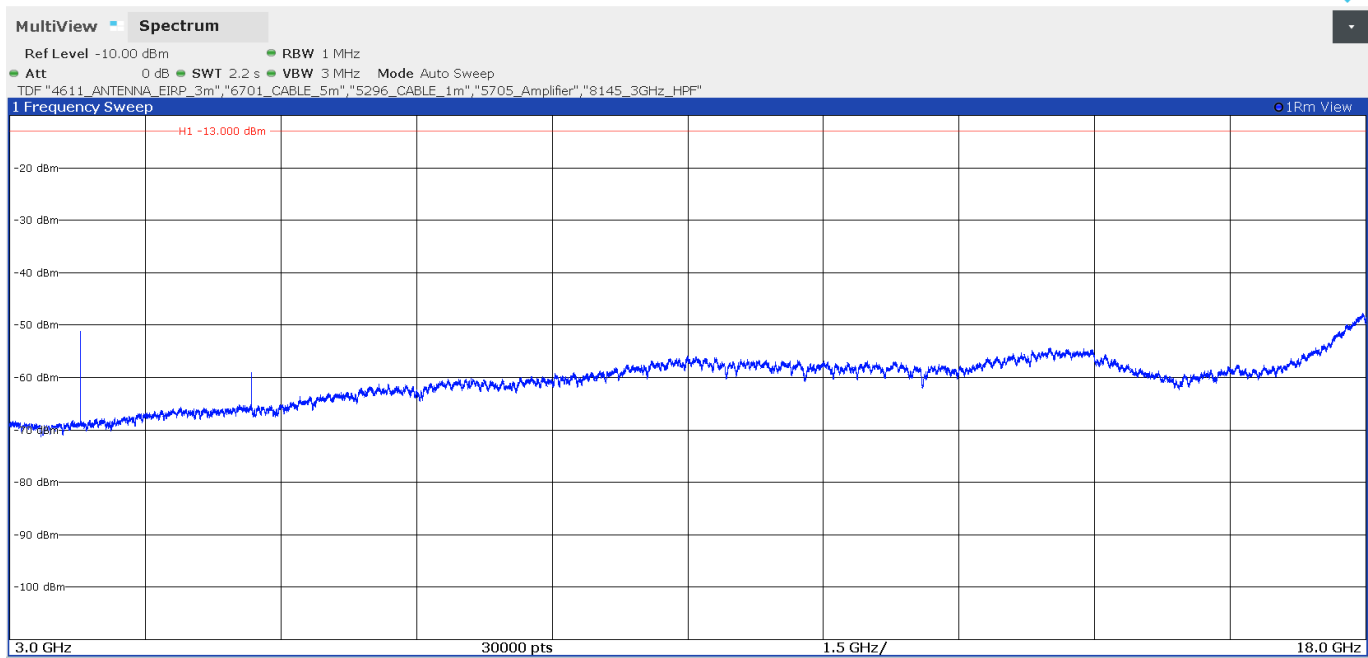
- Low Channel:



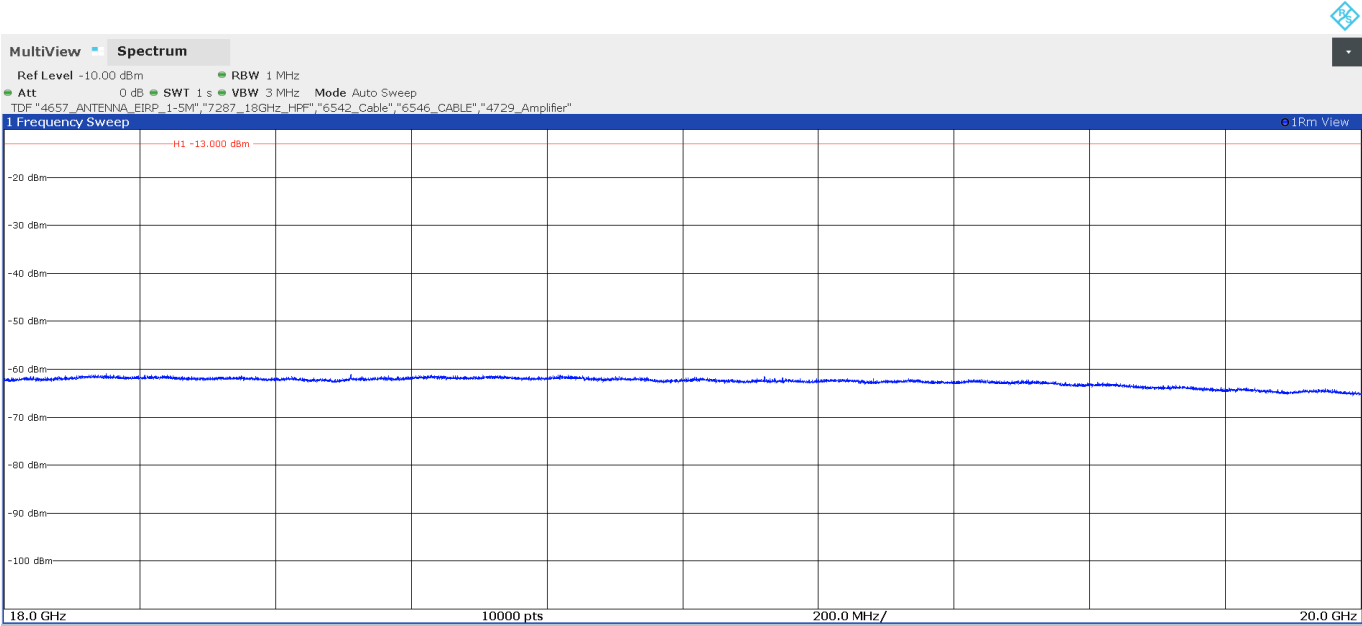
- Middle Channel:



- High Channel:



FREQUENCY RANGE 18 - 20 GHz



This plot is valid for the Low, Middle and High Channels.

## Appendix C: Test results FCC Part 27 / RSS-130, RSS-139

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## TEST CONDITIONS

### POWER SUPPLY (V):

Vnominal: 230 Vac  
Type of Power Supply: AC voltage

### ANTENNA:

Type of Antennas: Internal.  
Maximum Declared Gain for 3G Band IV: +4.5 dBi  
Maximum Declared Gain for LTE Band 4: +4.5 dBi  
Maximum Declared Gain for LTE Band 12: +2.0 dBi

### TEST FREQUENCIES:

#### 3G Band IV:

##### WCDMA and HSUPA MODULATIONS:

Low Channel (1312): 1712.4 MHz  
Middle Channel (1762): 1732.5 MHz  
High Channel (1513): 1752.6 MHz

#### LTE Band 4. QPSK AND 16QAM MODULATION:

|        | Channel (Frequency in MHz) |                   |                   |                   |                   |                   |
|--------|----------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
|        | BW = 1.4 MHz               | BW = 3 MHz        | BW = 5 MHz        | BW = 10 MHz       | BW = 15 MHz       | BW = 20 MHz       |
| Low    | 19957<br>(1710.7)          | 19965<br>(1711.5) | 19975<br>(1712.5) | 20000<br>(1715.0) | 20025<br>(1717.5) | 20050<br>(1720.0) |
| Middle | 20175<br>(1732.5)          | 20175<br>(1732.5) | 20175<br>(1732.5) | 20175<br>(1732.5) | 20175<br>(1732.5) | 20175<br>(1732.5) |
| High   | 20393<br>(1754.3)          | 20385<br>(1753.5) | 20375<br>(1752.5) | 20350<br>(1750.0) | 20325<br>(1747.5) | 20300<br>(1745.0) |

#### LTE Band 12. QPSK AND 16QAM MODULATION:

|        | Channel (Frequency in MHz) |                  |                  |                  |
|--------|----------------------------|------------------|------------------|------------------|
|        | BW = 1.4 MHz               | BW = 3 MHz       | BW = 5 MHz       | BW = 10 MHz      |
| Low    | 23017<br>(699.7)           | 23025<br>(700.5) | 23035<br>(701.5) | 23060<br>(704.0) |
| Middle | 23095<br>(707.5)           | 23095<br>(707.5) | 23095<br>(707.5) | 23095<br>(707.5) |
| High   | 23173<br>(715.3)           | 23165<br>(714.5) | 23155<br>(713.5) | 23130<br>(711.0) |

## Radiated emissions

### SPECIFICATION:

#### **1. 3G Band IV and LTE Band 4.** FCC §2.1053 & §27.53 (h) / RSS-139 Issue 3 Clause 6.6.

FCC §27.53 (h):

(h) Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least  $43 + 10 \log_{10} (P)$  dB.

RSS-139 Clause 6.6:

i. In the first 1.0 MHz bands immediately outside and adjacent to the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least  $43 + 10 \log_{10} p$  (watts) dB.

ii. After the first 1.0 MHz outside the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power in any 1 MHz bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least  $43 + 10 \log_{10} P$  (watts) dB.

3G Band IV and LTE Band 4 MEASUREMENT LIMIT:

At  $P_o$  transmitting power, the specified minimum attenuation becomes  $43 + 10 \log (P_o)$ , and the level in dBm relative  $P_o$  becomes:

$$P_o \text{ (dBm)} - [43 + 10 \log (P_o \text{ in mwatts}) - 30] = -13 \text{ dBm}$$

#### **2. LTE Band 12.** FCC §2.1053 & §27.53 (g) / RSS-130 Issue 2 Clause 4.7.1.

FCC §27.53 (g):

(g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least  $43 + 10 \log (P)$  dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

RSS-130 Issue 2 Clause 4.7.1:

4.7.1. The power of any unwanted emissions in any 100 kHz bandwidth on any frequency outside the frequency range(s) within which the equipment is designed to operate shall be attenuated below the transmitter power, P (dBW), by at least  $43 + 10 \log_{10} p$  (watts), dB. However, in the 100 kHz band immediately outside the equipment's operating frequency range, a resolution bandwidth of 30 kHz may be employed.

LTE Band 12 MEASUREMENT LIMIT:

At  $P_o$  transmitting power, the specified minimum attenuation becomes  $43 + 10 \log (P_o)$ , and the level in dBm relative  $P_o$  becomes:

$$P_o \text{ (dBm)} - [43 + 10 \log (P_o \text{ in mwatts}) - 30] = -13 \text{ dBm}$$

#### METHOD:

The measurement was performed with the EUT inside an anechoic chamber. The spectrum was scanned from 30 MHz to at least the 10th harmonic of the High frequency generated within the equipment.

The EUT was placed on a non-conductive stand at a 3 meter distance from the measuring antenna.

Detected emissions were maximized at each frequency by rotating the EUT and adjusting the measuring antenna height and polarization. The maximum meter reading was recorded.

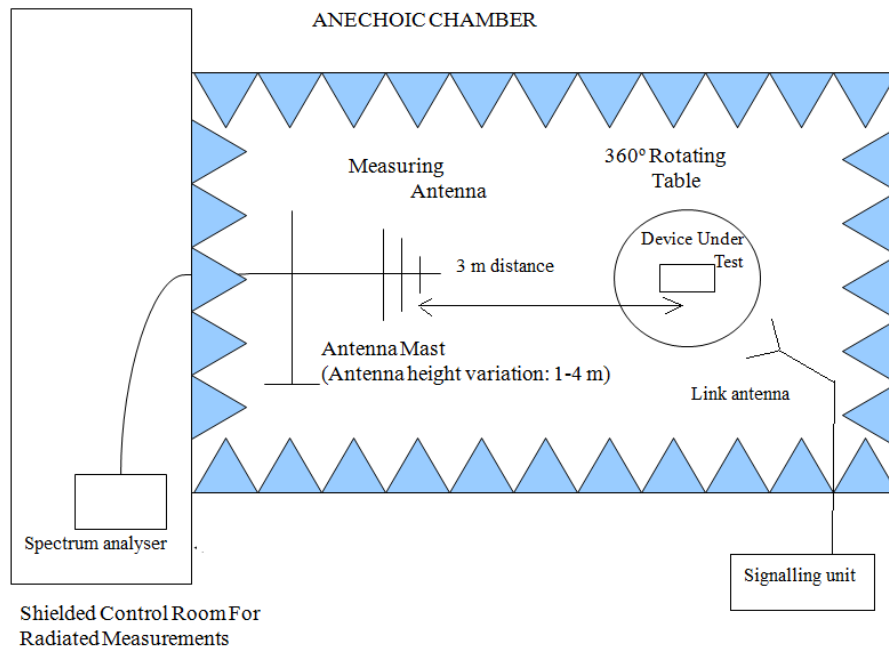
The maximum field strength (dBμV/m) of each detected emission at less than 20 dB respect to the limit is converted to an equivalent EIRP level (dBm) according to ANSI C63.26 with the formula:

$$\text{EIRP (dBm)} = E \text{ (dB}\mu\text{V/m)} + 20\log(D) - 104.8$$

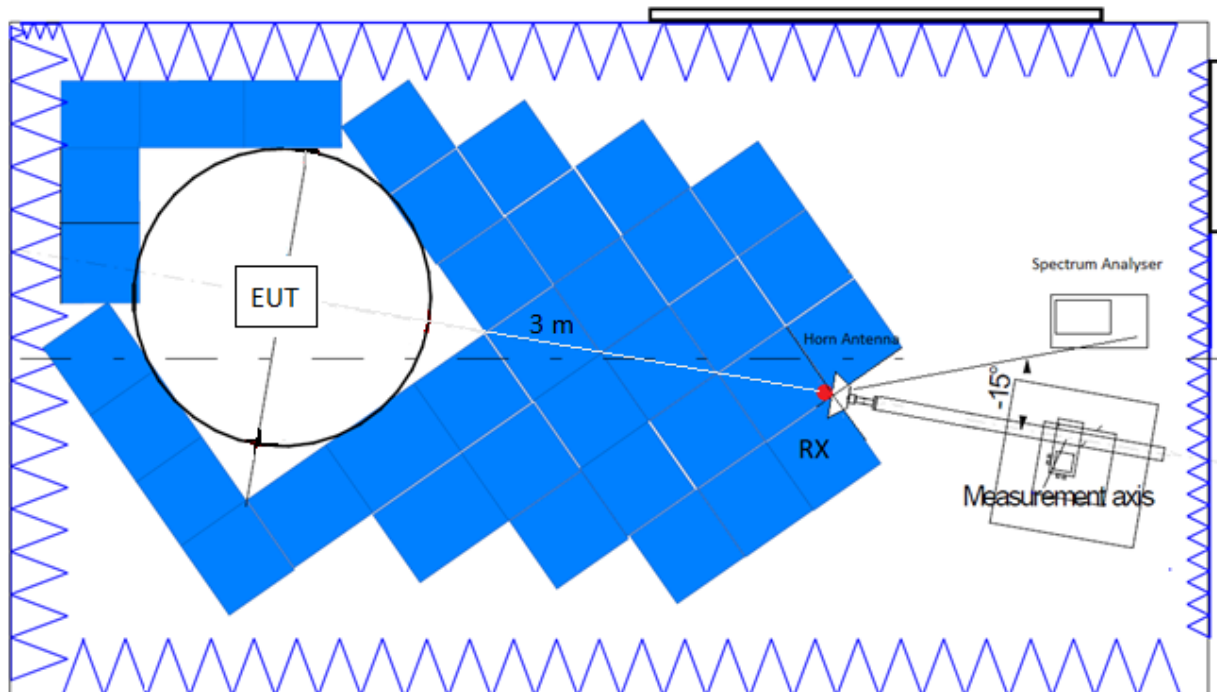
Where D is the measurement distance (in the far field region) in m. D = 3 m

## TEST SETUP:

Radiated measurements below 1 GHz:



Radiated measurements above 1 GHz:



## RESULTS:

### 3G Band IV:

WCDMA and HSUPA Modulations:

A preliminary scan determined the WCDMA modulation as the worst case. The following tables and plots show the results for WCDMA modulation.

#### - Low Channel:

##### Frequency range 30 MHz - 1 GHz

Spurious frequencies detected at less than 20 dB below the limit:

| Spurious frequency (MHz) | E.I.R.P (dBm) | Polarization | Detector |
|--------------------------|---------------|--------------|----------|
| 32.441                   | -25.99        | V            | Peak     |
| 40.686                   | -31.22        | V            | Peak     |
| 45.924                   | -24.89        | V            | Peak     |
| 56.885                   | -29.75        | V            | Peak     |
| 156.892                  | -32.84        | V            | Peak     |
| 556.694                  | -27.85        | V            | Peak     |

##### Frequency range 1 - 18 GHz

Spurious frequencies detected at less than 20 dB below the limit:

| Spurious frequency (GHz) | E.I.R.P (dBm) | Polarization | Detector |
|--------------------------|---------------|--------------|----------|
| 1.6984                   | -29.65        | H            | Peak     |
| 1.7028                   | -22.42        | H            | Peak     |
| 1.7042                   | -18.57        | H            | Peak     |
| 1.7085                   | -13.50        | H            | Peak     |

#### - Middle Channel:

##### Frequency range 30 MHz - 1 GHz

Spurious frequencies detected at less than 20 dB below the limit:

| Spurious frequency (MHz) | E.I.R.P (dBm) | Polarization | Detector |
|--------------------------|---------------|--------------|----------|
| 34.963                   | -32.00        | V            | Peak     |
| 38.931                   | -28.20        | H            | Peak     |
| 40.137                   | -26.47        | V            | Peak     |
| 47.735                   | -30.31        | V            | Peak     |
| 58.049                   | -32.09        | V            | Peak     |
| 401.785                  | -32.42        | V            | Peak     |

##### Frequency range 1 - 18 GHz

No spurious frequencies detected at less than 20 dB below the limit.

## - High Channel:

### Frequency range 30 MHz - 1 GHz

Spurious frequencies detected at less than 20 dB below the limit:

| Spurious frequency (MHz) | E.I.R.P (dBm) | Polarization | Detector |
|--------------------------|---------------|--------------|----------|
| 33.451                   | -28.27        | V            | Peak     |
| 46.539                   | -29.74        | V            | Peak     |
| 80.877                   | -32.36        | V            | Peak     |

### Frequency range 1 - 18 GHz

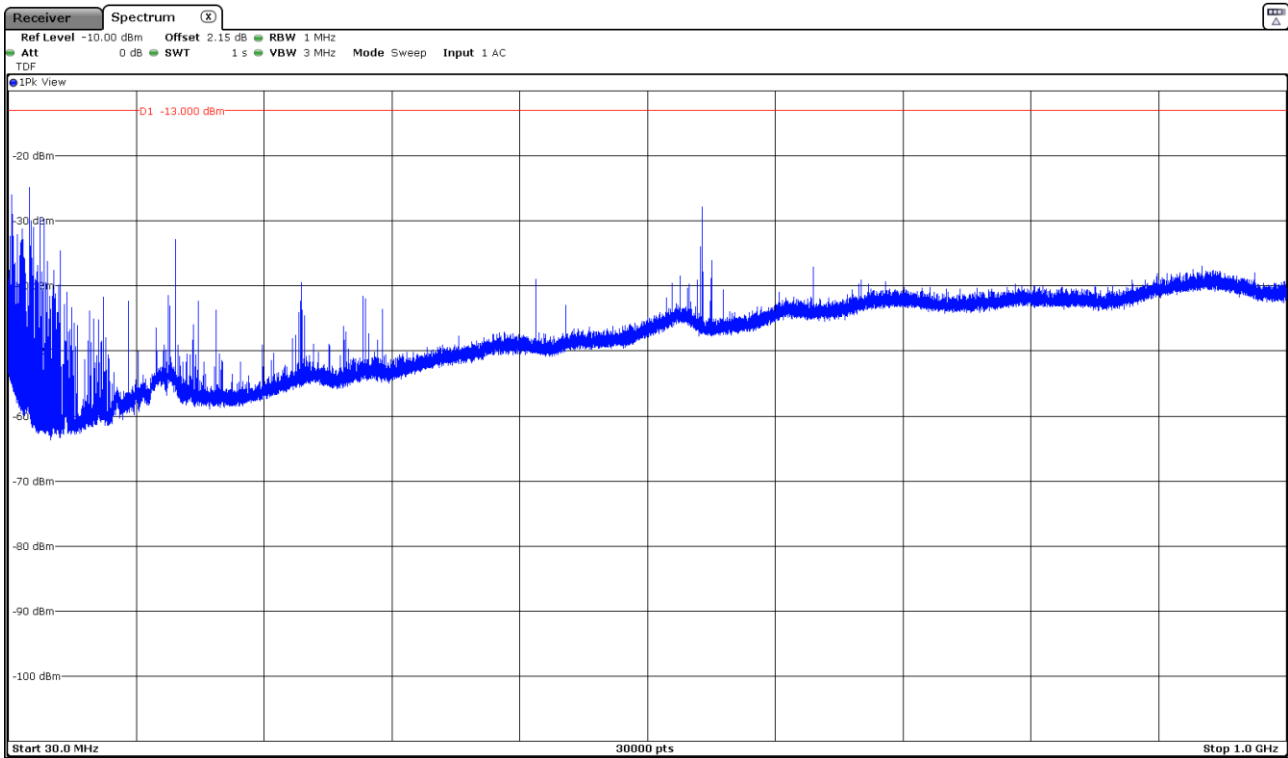
Spurious frequencies detected at less than 20 dB below the limit:

| Spurious frequency (GHz) | E.I.R.P (dBm) | Polarization | Detector |
|--------------------------|---------------|--------------|----------|
| 1.7565                   | -13.30        | H            | Peak     |
| 1.7572                   | -16.36        | H            | Peak     |
| 1.7602                   | -18.40        | H            | Peak     |
| 1.7618                   | -22.18        | H            | Peak     |

Measurement uncertainty (dB)  $< \pm 5.07$  for  $f < 1$  GHz  
 $< \pm 4.00$  for  $f \geq 1$  GHz up to 3 GHz  
 $< \pm 4.99$  for  $f \geq 3$  GHz

Verdict: PASS

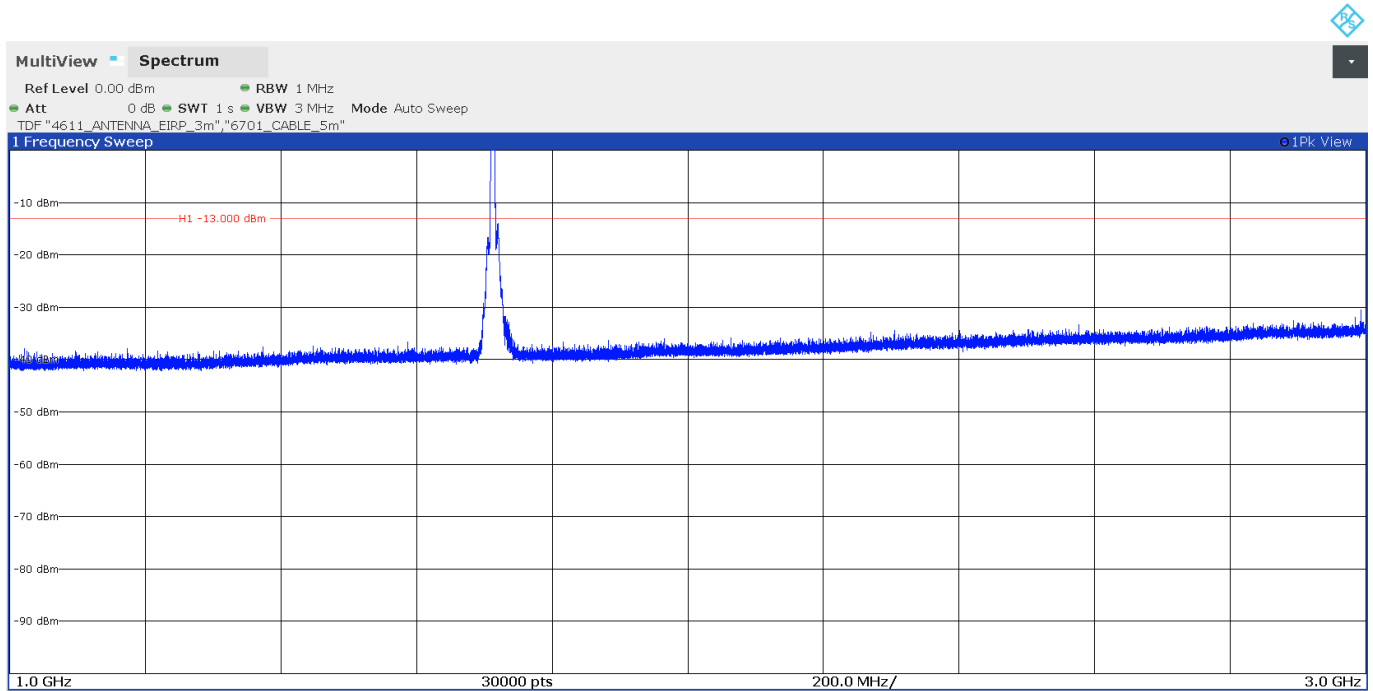
FREQUENCY RANGE 30 MHz - 1 GHz



This plot is valid for the Low, Middle and High Channels.

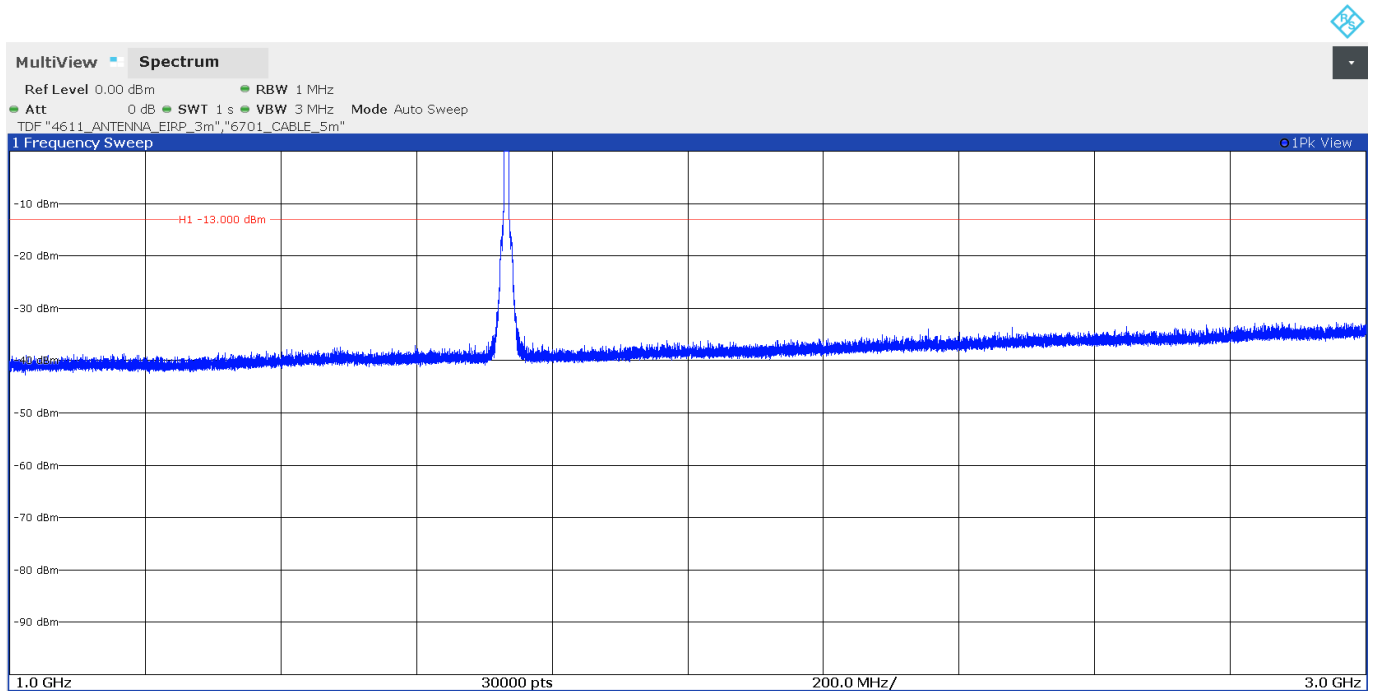
## FREQUENCY RANGE 1 - 3 GHz

- Low Channel:



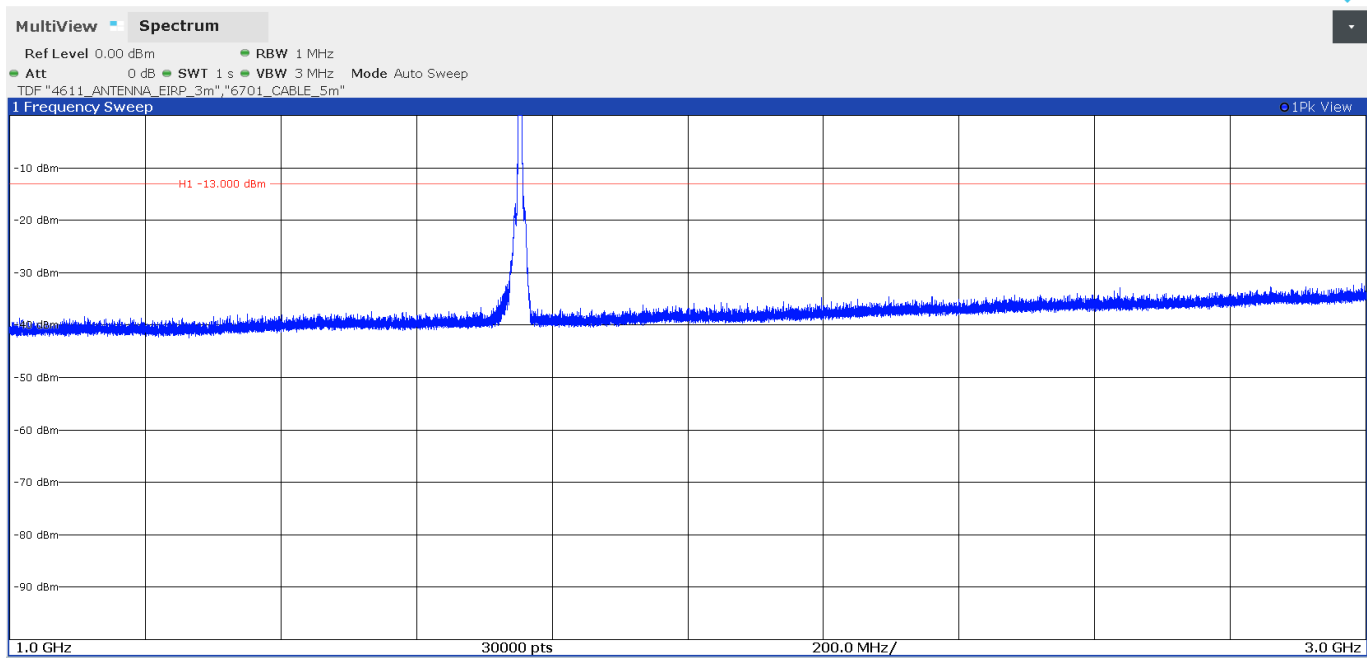
The peak above the limit is the carrier frequency.

- Middle Channel:



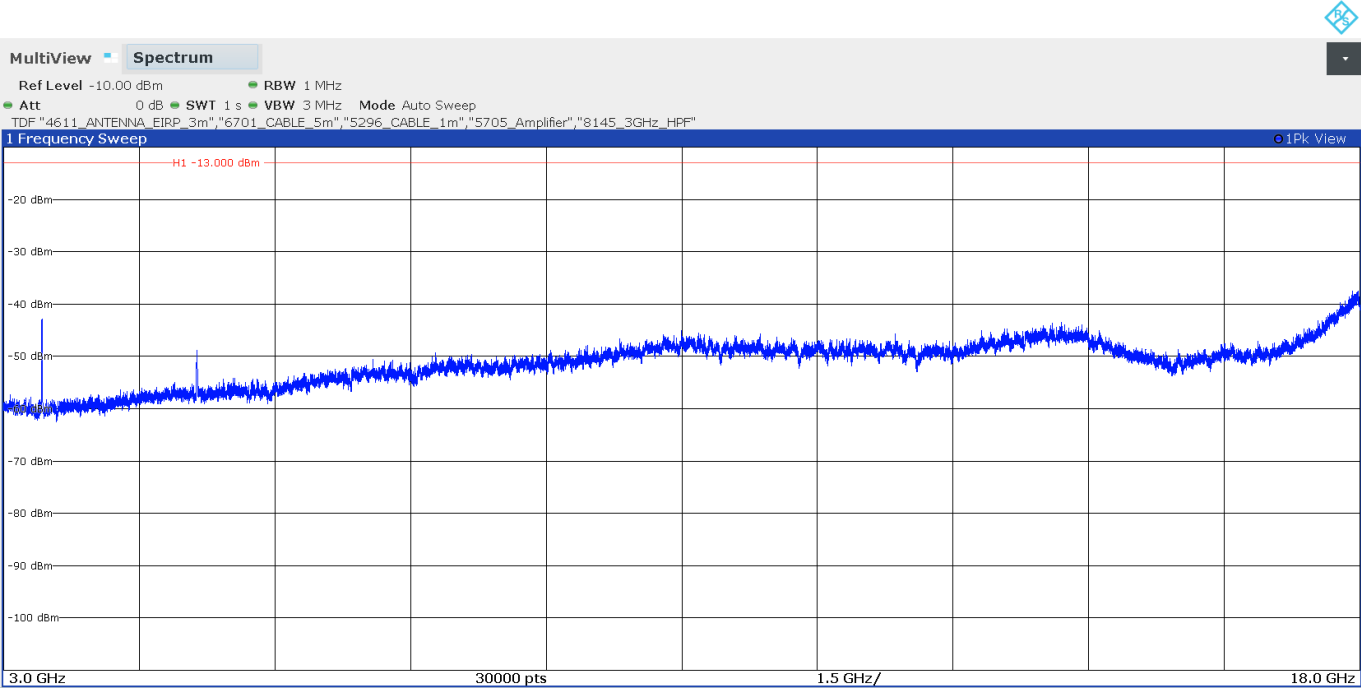
The peak above the limit is the carrier frequency.

- High Channel:

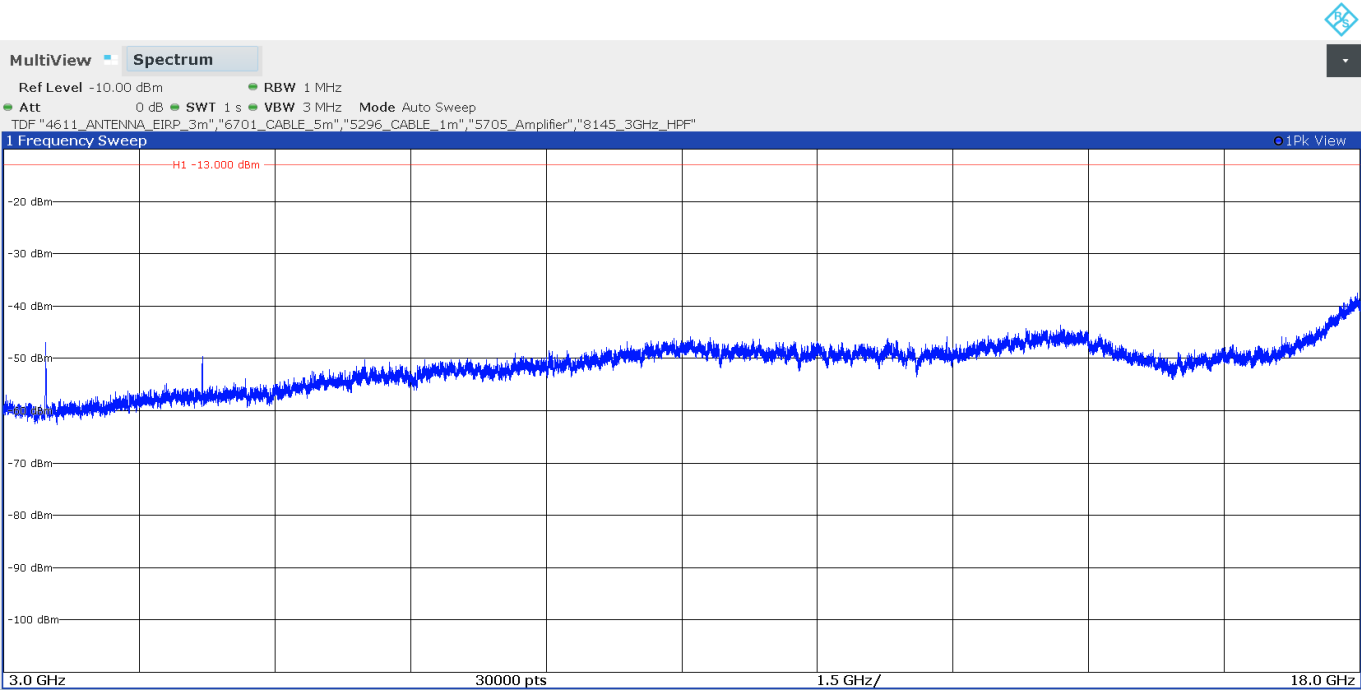


FREQUENCY RANGE 3 - 18 GHz

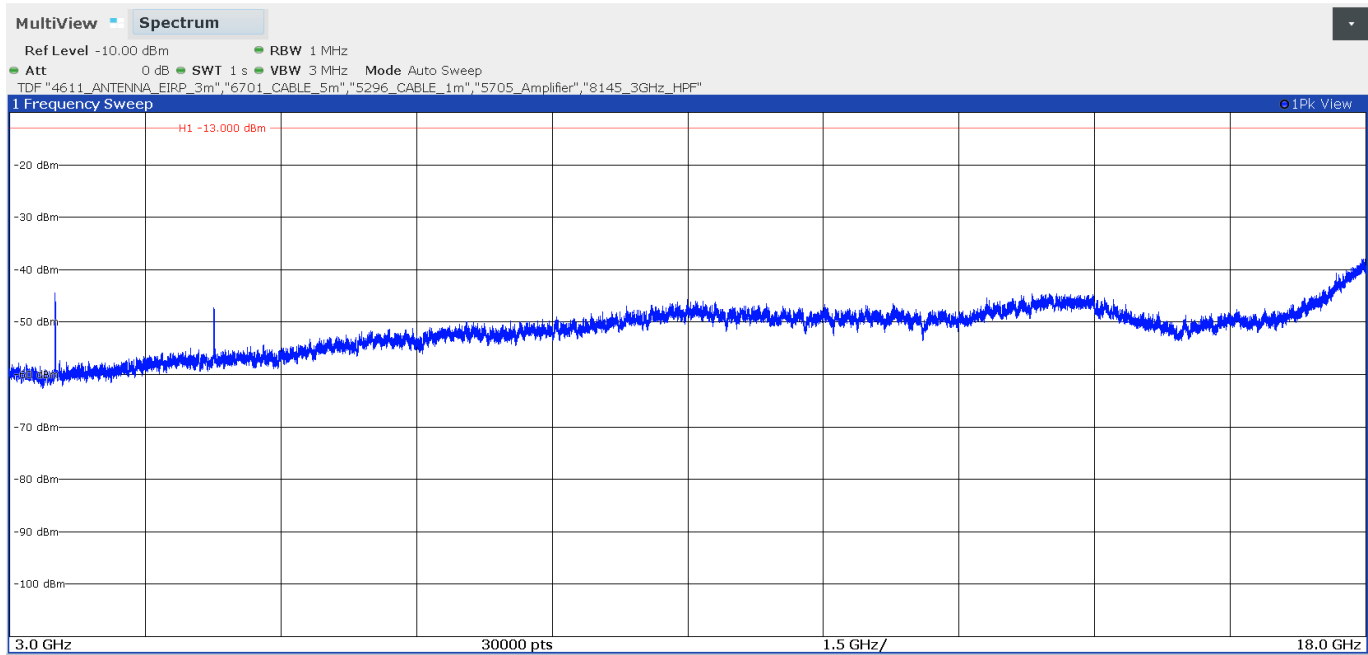
- Low Channel:



- Middle Channel:



- High Channel:



#### **LTE Band 4:**

QPSK and 16QAM Modulations:

A preliminary scan determined the QPSK modulation, BW=15 MHz, RB=1, Offset=0 as the worst case. The following tables and plots show the results for this combination.

##### **- Low Channel:**

###### **Frequency range 30 MHz - 1 GHz**

No spurious frequencies detected at less than 20 dB below the limit.

###### **Frequency range 1 - 18 GHz**

Spurious frequencies detected at less than 20 dB below the limit:

| Spurious frequency (GHz) | E.I.R.P (dBm) | Polarization | Detector |
|--------------------------|---------------|--------------|----------|
| 1.7085                   | -13.56        | H            | RMS      |

##### **- Middle Channel:**

###### **Frequency range 30 MHz - 1 GHz**

No spurious frequencies detected at less than 20 dB below the limit.

###### **Frequency range 1 - 18 GHz**

No spurious frequencies detected at less than 20 dB below the limit.

##### **- High Channel:**

###### **Frequency range 30 MHz - 1 GHz**

No spurious frequencies detected at less than 20 dB below the limit.

###### **Frequency range 1 - 18 GHz**

Spurious frequencies detected at less than 20 dB below the limit:

| Spurious frequency (GHz) | E.I.R.P (dBm) | Polarization | Detector |
|--------------------------|---------------|--------------|----------|
| 1.7673                   | -31.53        | H            | RMS      |

Measurement uncertainty (dB)  $< \pm 4.68$  for  $f < 1\text{GHz}$   
 $< \pm 4.00$  for  $f \geq 1\text{GHz}$  up to  $3\text{GHz}$   
 $< \pm 4.99$  for  $f \geq 3\text{GHz}$

Verdict: PASS

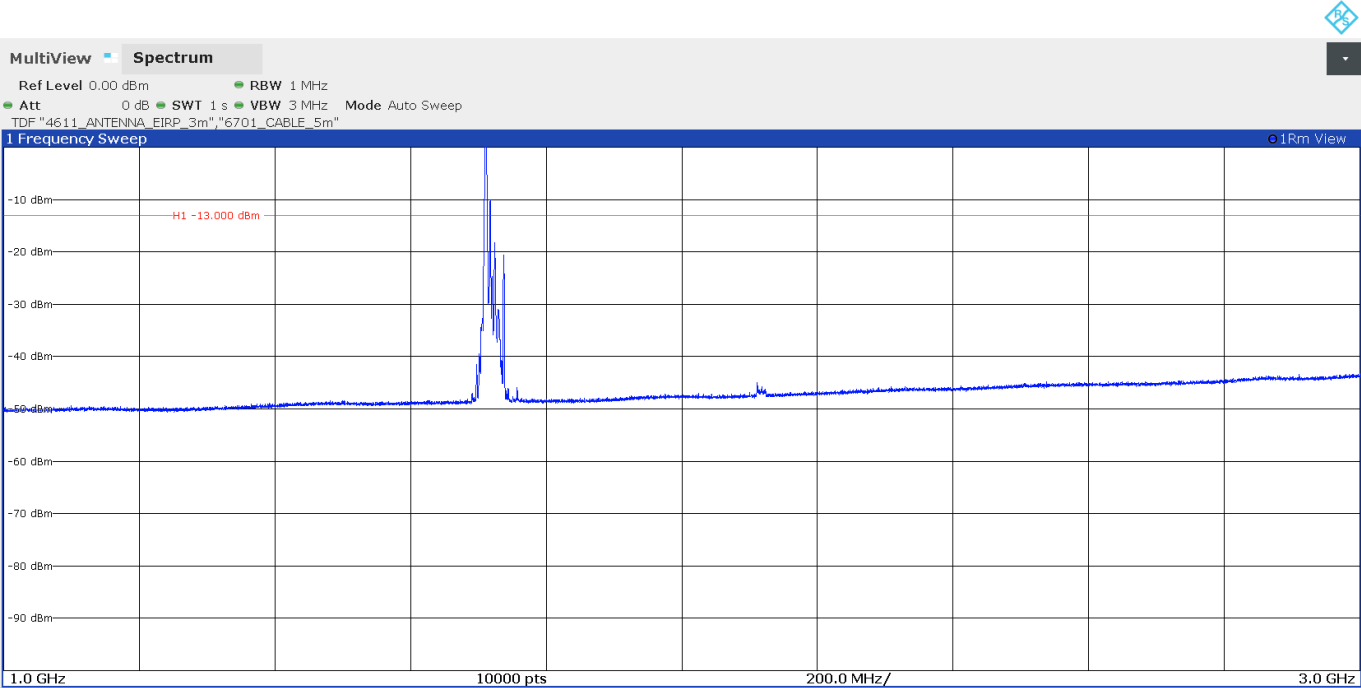
FREQUENCY RANGE 30 MHz - 1 GHz



This plot is valid for the Low, Middle and High Channels.

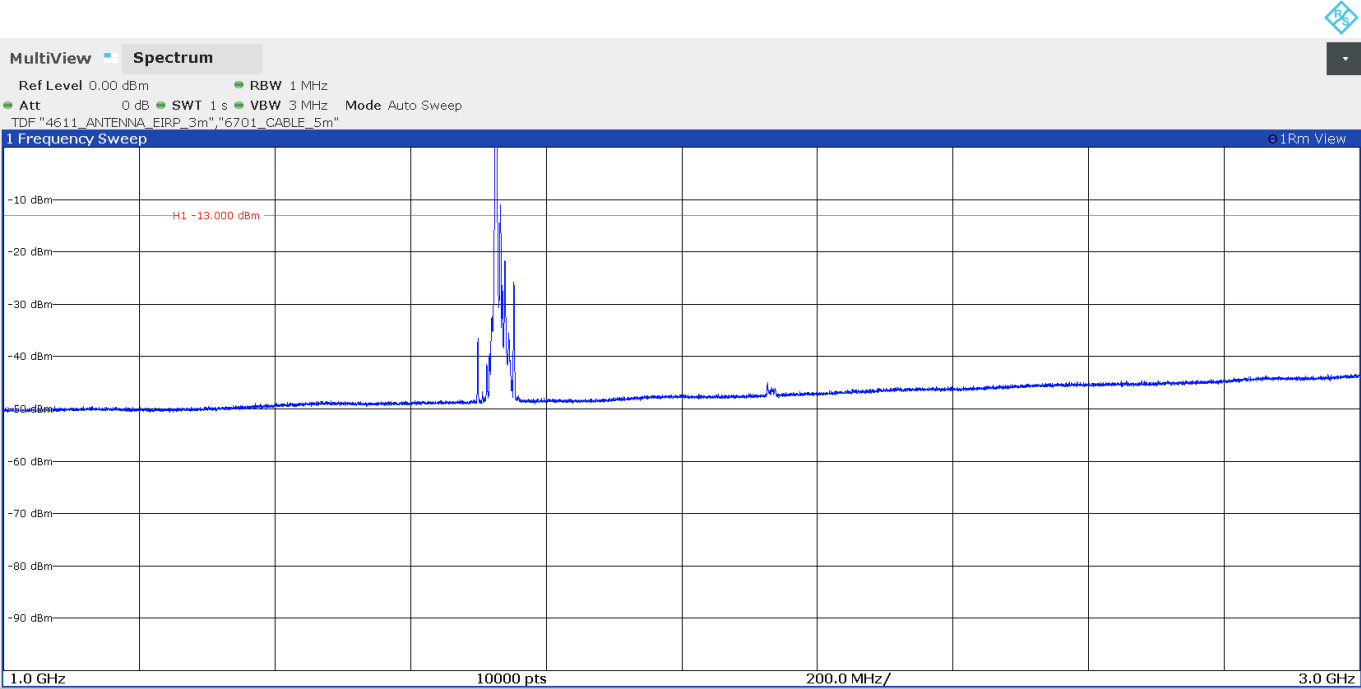
FREQUENCY RANGE 1 - 3 GHz

- Low Channel:



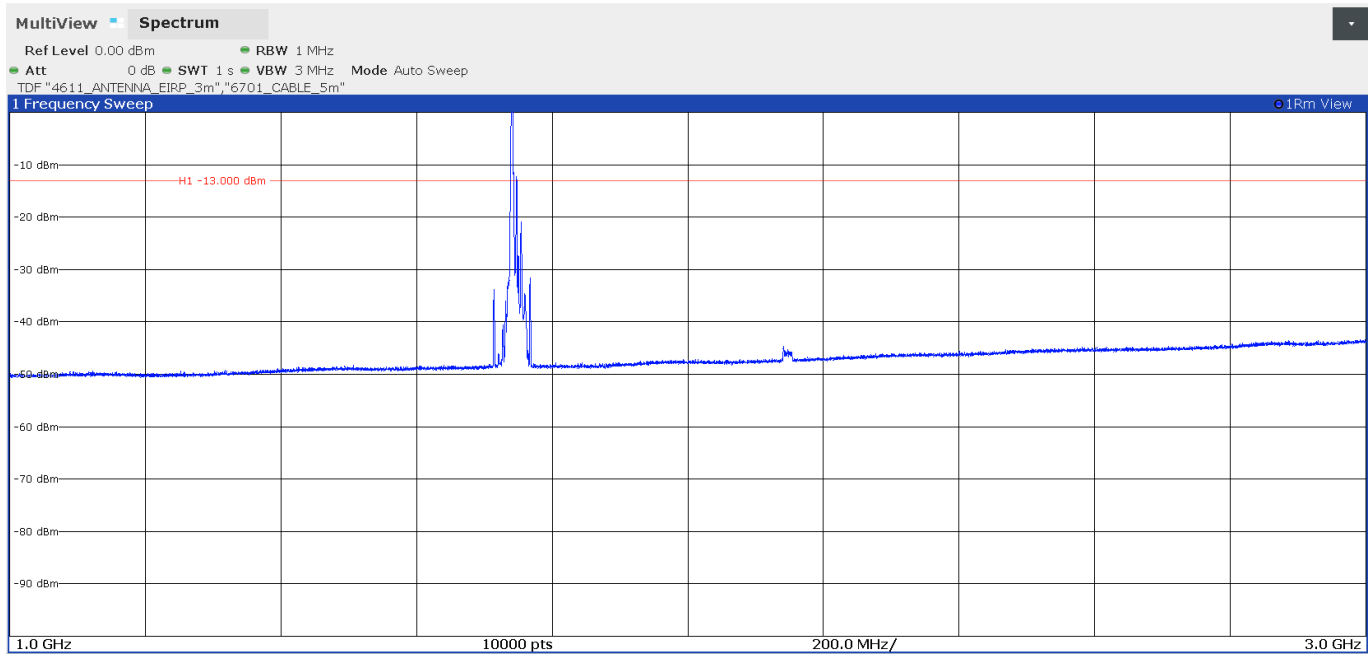
The peak above the limit is the carrier frequency.

- Middle Channel:



The peak above the limit is the carrier frequency.

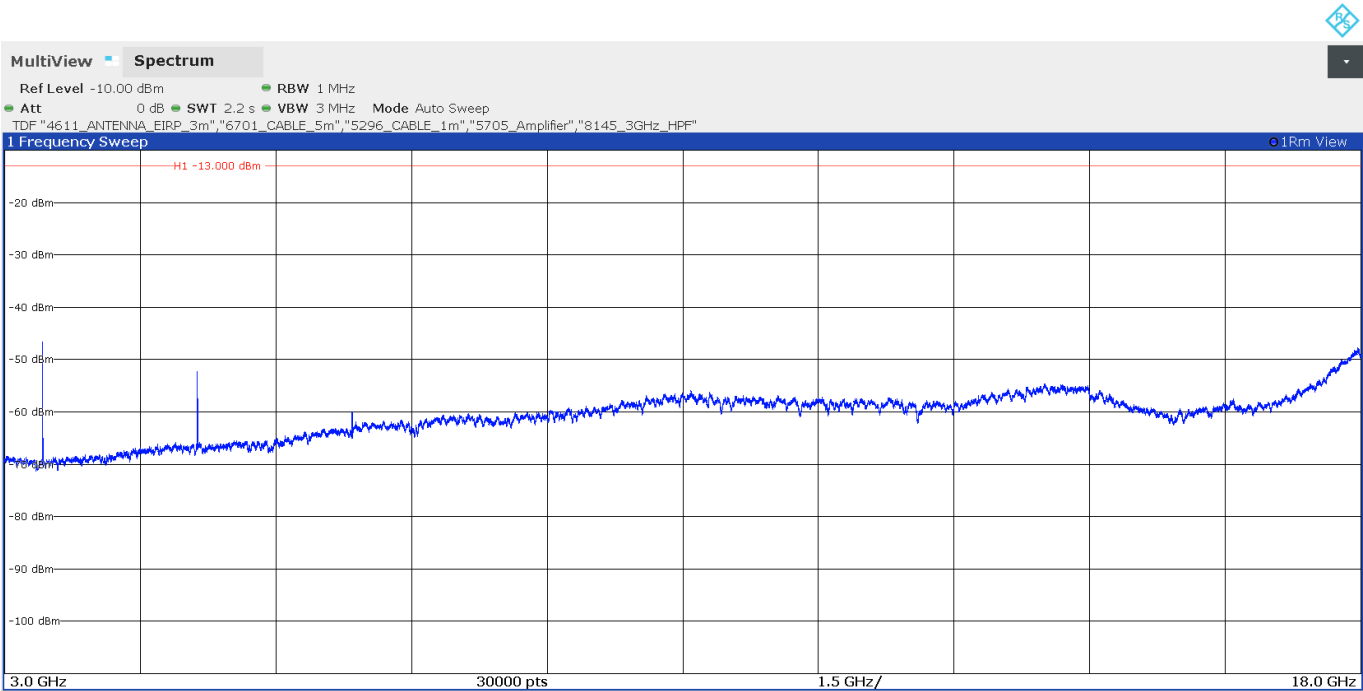
- High Channel:



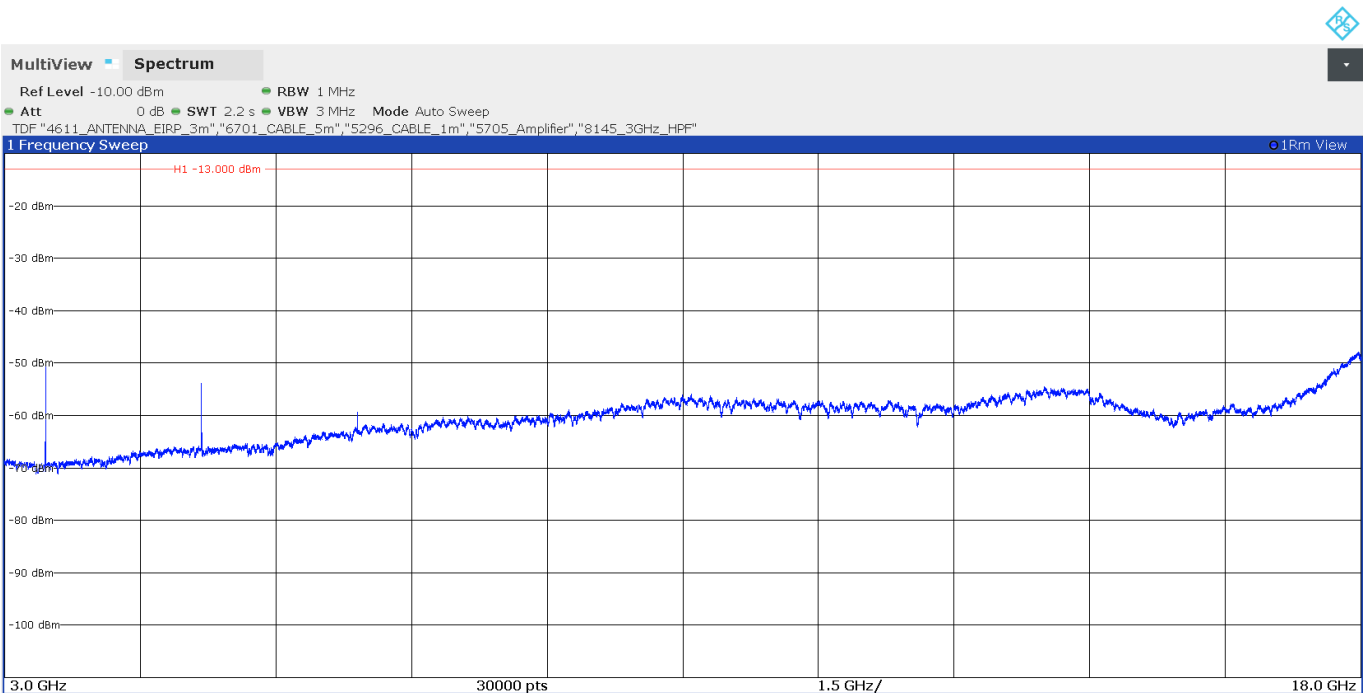
The peak above the limit is the carrier frequency.

FREQUENCY RANGE 3 – 18 GHz

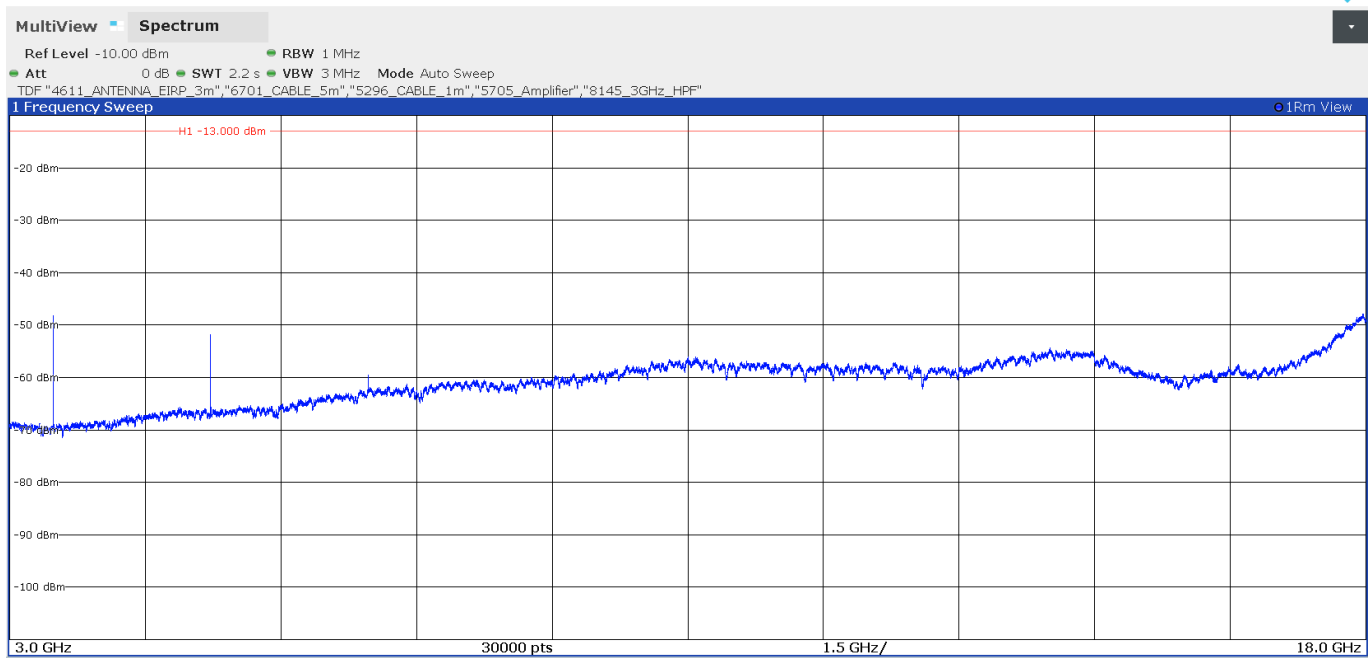
- Low Channel:



- Middle Channel:



- High Channel:



## **LTE Band 12:**

QPSK and 16QAM Modulations:

A preliminary scan determined the QPSK modulation, BW=1.4 MHz, RB=1, Offset=0 as the worst case. The following tables and plots show the results for this combination.

### **- Low Channel:**

#### **Frequency range 30 MHz - 1 GHz**

No spurious frequencies at less than 20 dB below the limit.

#### **Frequency range 1 - 8 GHz**

No spurious frequencies at less than 20 dB below the limit.

### **- Middle Channel:**

#### **Frequency range 30 MHz - 1 GHz**

No spurious frequencies at less than 20 dB below the limit.

#### **Frequency range 1 - 8 GHz**

No spurious frequencies at less than 20 dB below the limit.

### **- High Channel:**

#### **Frequency range 30 MHz - 1 GHz**

No spurious frequencies at less than 20 dB below the limit.

#### **Frequency range 1 - 8 GHz**

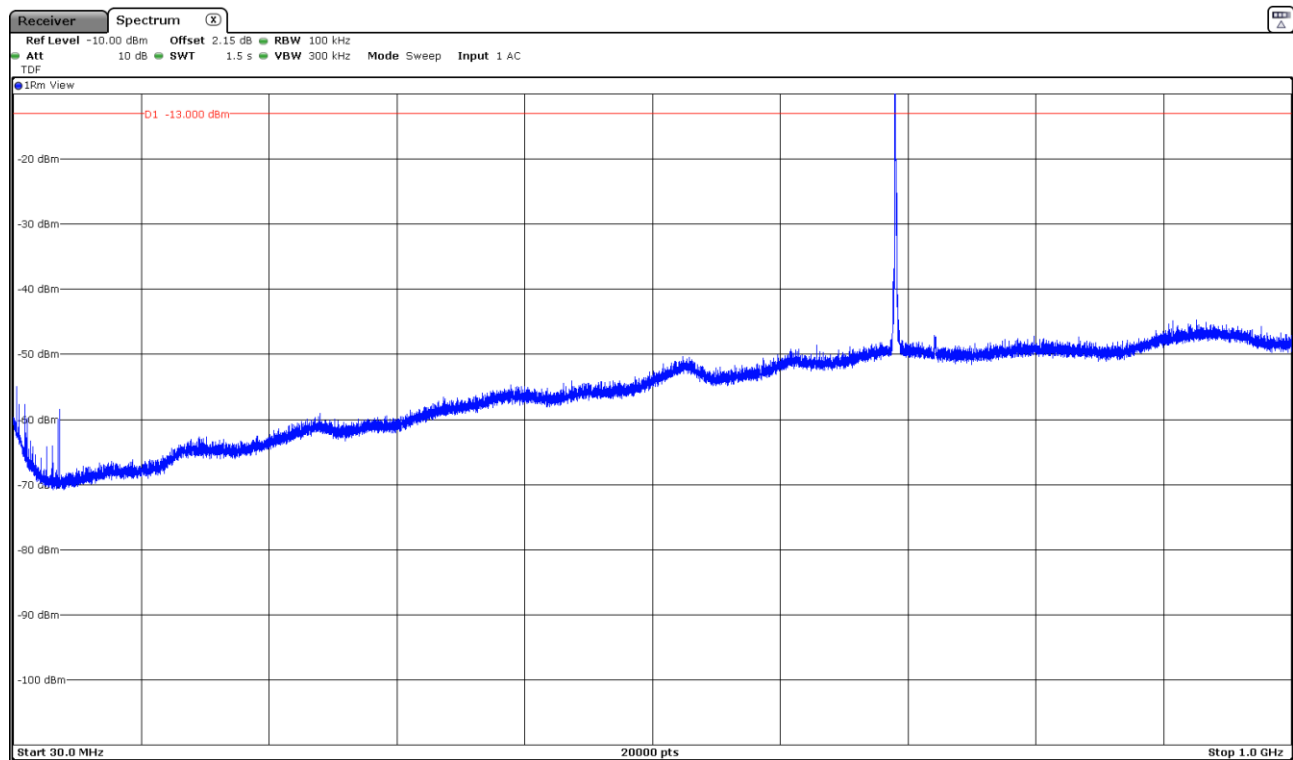
No spurious frequencies at less than 20 dB below the limit.

Measurement uncertainty (dB)  $\leq \pm 4.68$  for  $f < 1\text{GHz}$   
 $\leq \pm 4.99$  for  $f \geq 1\text{GHz}$  up to 8 GHz

Verdict: PASS

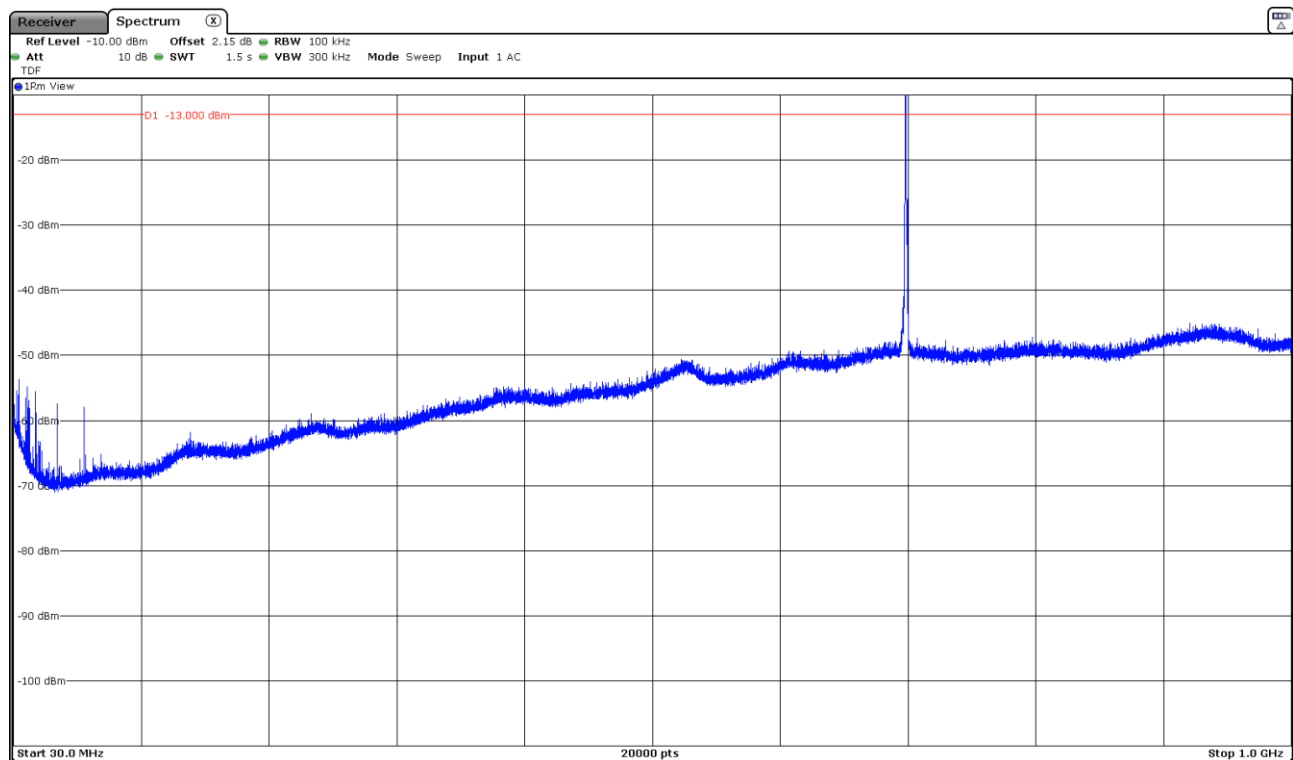
FREQUENCY RANGE 30 MHz - 1 GHz

- Low Channel:



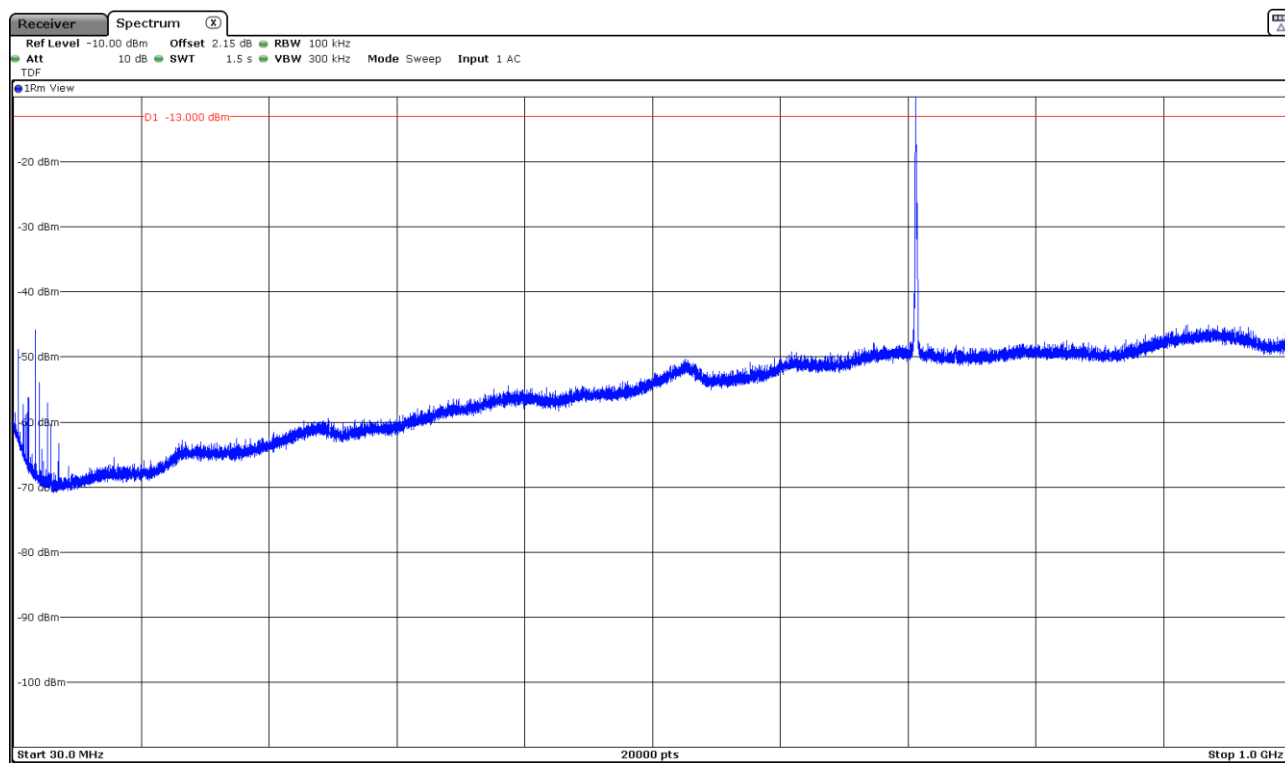
The peak above the limit is the carrier frequency.

- Middle Channel:



The peak above the limit is the carrier frequency.

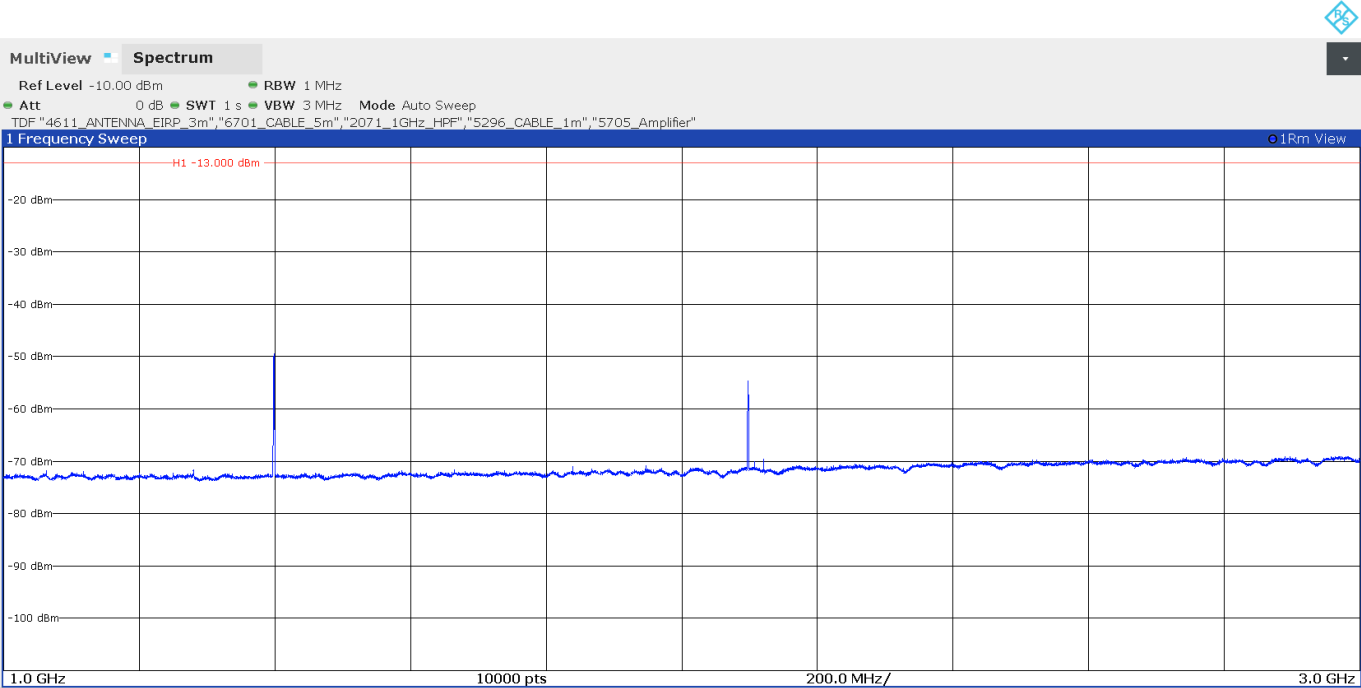
- High Channel:



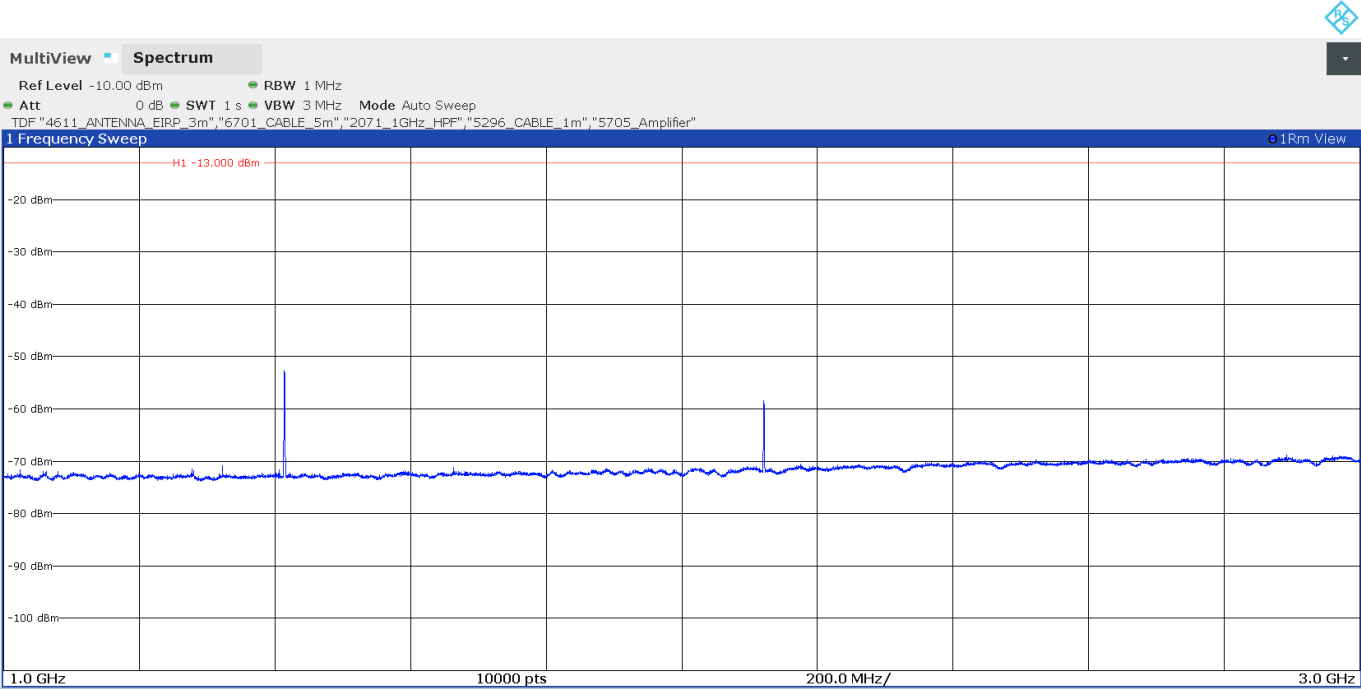
The peak above the limit is the carrier frequency.

FREQUENCY RANGE 1 - 3 GHz

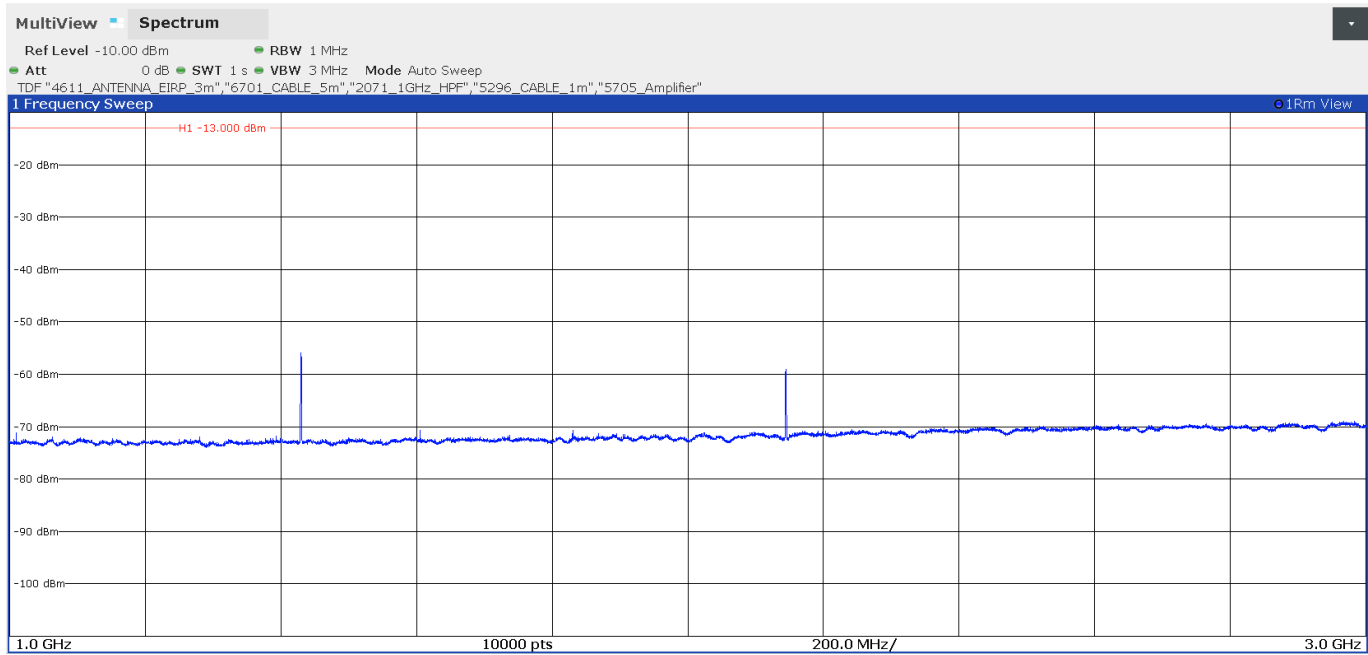
- Low Channel:



- Middle Channel:

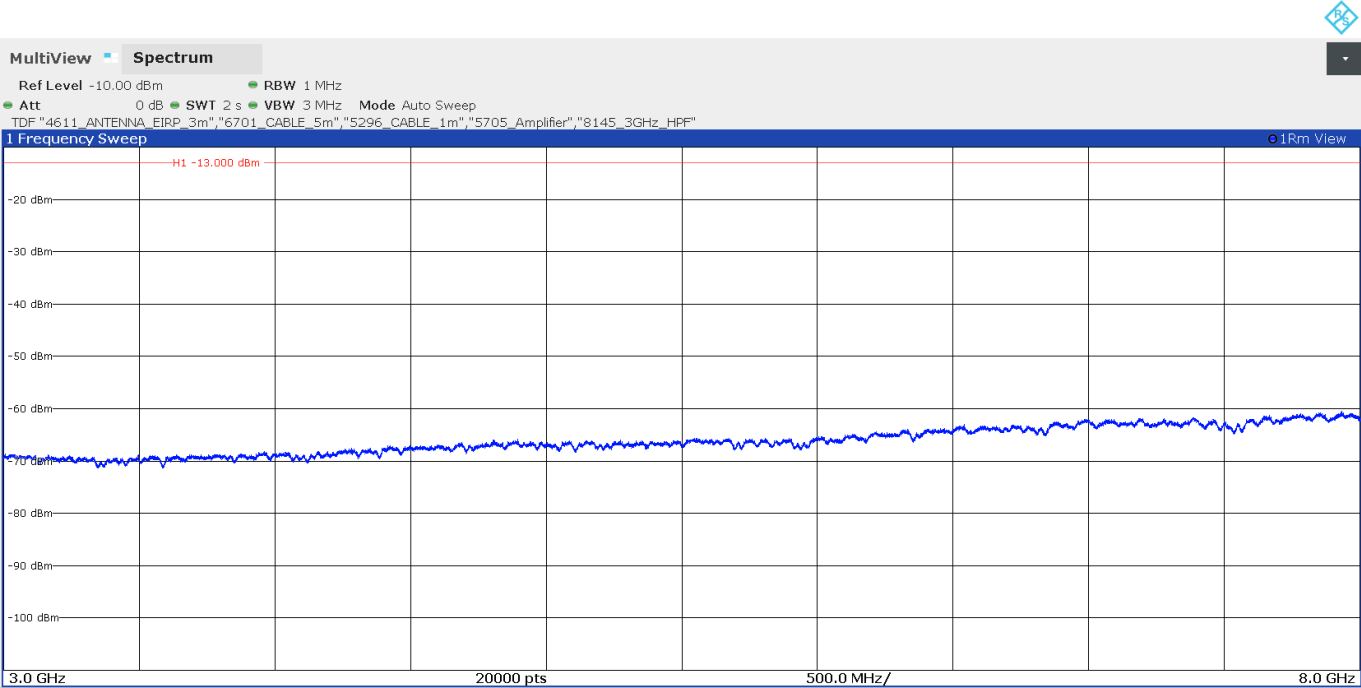


- High Channel:

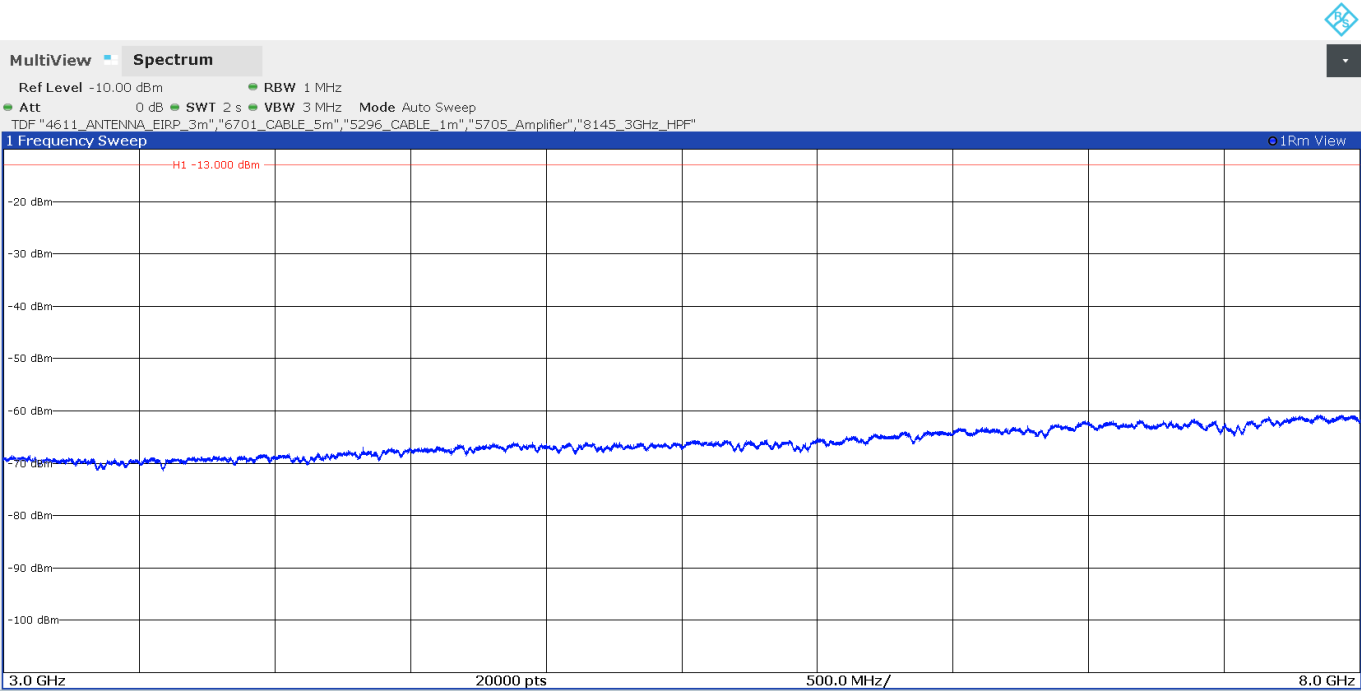


FREQUENCY RANGE 3 - 8 GHz

- Low Channel:



- Middle Channel:



- High Channel:

