

ISED CABid: ES1909

Test report No:  
NIE: 68561RRF.001

## Partial Test Report

### Reference Standard:

USA FCC Part 22, Part 24, Part 27  
CANADA IC RSS-130 RSS-132, RSS-133, RSS-139,  
RSS-Gen

|                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (*) Identification of item tested         | 3G/LTE Wireless Module                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| (*) Trademark                             | Telit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| (*) Model and /or type reference          | LE910-NA V2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| (*) Derived model not tested              | LE910-NA1, LE910B4-NA, LE910B1-NA                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Other identification of the product       | FCC ID: R17LE910NAV2<br>IC: 5131A-LE910NAV2<br>HW version: 1.0<br>SW version: 20.00.508                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| (*) Features                              | WCDMA/HSPA/LTE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Applicant                                 | Telit Communications S.p.A.<br>Via Stazione di Prosecco 5/B<br>34010 Sgonico - Trieste, Italy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Test method requested, standard           | USA FCC Part 22 (10-1-20 Edition): Public Mobile Services.<br>USA FCC Part 24 (10-1-20 Edition): Personal Communications Services.<br>USA FCC Part 27 (10-1-20 Edition): Miscellaneous Wireless Communications Services.<br>CANADA IC RSS-130 Issue 2, Feb 2019.<br>CANADA IC RSS-132 Issue 3, Jan. 2013.<br>CANADA IC RSS-133 Issue 6 Amendment 1, Jan. 2018.<br>CANADA IC RSS-139 Issue 3, Jul. 2015.<br>CANADA IC RSS-Gen Issue 5 (Amendment 1 (March 2019), Amendment 2 (February 2021)).<br>ANSI C63.26-2015: American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services.<br>KDB 971168 D01 Power Meas License Digital Systems v03r01, April. 2018 |
| Approved by (name / position & signature) | Jose Carlos Luque<br>RF Lab. Supervisor<br><br>Firmado digitalmente por 74841983Y JOSE CARLOS LUQUE (C:A29507456) Fecha: 2021.12.23 14:29:45 +01'00'                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Date of issue                             | 2021-12-23                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Report template No                        | FDT08_23<br>(*) "Data provided by the client"                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

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## Competences and guarantees

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## General conditions

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2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
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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 consists of a solder down radio module to provide connectivity to host devices through WCDMA/HSPA/LTE networks
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.

The software version of the derived model are:

|            |           |
|------------|-----------|
| LE910-NA1  | 20.00.528 |
| LE910B4-NA | 20.00.538 |
| LE910B1-NA | 20.00.548 |

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 |
|------------|-------------|------------|-----------------|-------------------|
| 68561/001  | Module      | LE910NA-V2 | 358148069917487 | 2021/06/29        |

Auxiliary elements used with the Sample S/01:

| Control N° | Description | Model | Serial N°    | Date of reception |
|------------|-------------|-------|--------------|-------------------|
| 68561/002  | Antenna LTE | --    | --           | 2021/06/29        |
| 68561/005  | Antenna LTE | --    | --           | 2021/06/29        |
| 53445B/017 | Test board  | --    | 113990005439 | 2017/06/28        |

Sample S/01 has undergone the following test(s): The Radiated tests indicated in the Appendixes A, B & C.

Sample S/02 is composed of the following elements:

| Control N° | Description                        | Model      | Serial N°       | Date of reception |
|------------|------------------------------------|------------|-----------------|-------------------|
| 68561/004  | Module (20.00.507 –<br>02/08/2021) | LE910NA-V2 | 358148069917479 | 2021/06/29        |

Auxiliary elements used with the Sample S/02:

| Control N° | Description | Model | Serial N°    | Date of reception |
|------------|-------------|-------|--------------|-------------------|
| 53445B/017 | Test board  | --    | 113990005439 | 2017/06/28        |

Sample S/02 has undergone the following test(s): The Conducted tests indicated in the Appendixes A, B & C.

## Test sample description

|                                               |                                          |                          |                          |                          |                                   |                          |
|-----------------------------------------------|------------------------------------------|--------------------------|--------------------------|--------------------------|-----------------------------------|--------------------------|
| Ports..... :                                  | Port name and description                | Cable                    |                          |                          |                                   |                          |
|                                               |                                          | Specified max length [m] | Attached during test     | Shielded                 | Coupled to patient <sup>(3)</sup> |                          |
|                                               |                                          |                          | <input 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                        |
|                                               | <input type="checkbox"/>                 |                          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>          | <input type="checkbox"/> |
| Rated Power .....                             | 3.4 VDC to 4.2 VDC (Nominal: 3.8 VDC)    |                          |                          |                          |                                   |                          |
| Clock frequencies..... :                      | 32kHz XTAL, 26MHz VTCXO                  |                          |                          |                          |                                   |                          |
| Other parameters .....                        | PCB Flammability V-1, 105°C, UL94, UL796 |                          |                          |                          |                                   |                          |
| Software version .....                        | 20.00.xx8                                |                          |                          |                          |                                   |                          |
| Hardware version .....                        | 1.0                                      |                          |                          |                          |                                   |                          |
| Dimensions in cm (W x H x D) .....            | 28.2 x 28.2 x 2.2 mm                     |                          |                          |                          |                                   |                          |
| Mounting position .....                       | <input checked="" type="checkbox"/>      | Other: solder down       |                          |                          |                                   |                          |
| Modules/parts..... :                          | Module/parts of test item                |                          | Type                     |                          | Manufacturer                      |                          |
|                                               |                                          |                          |                          |                          |                                   |                          |
| Accessories (not part of the test item) ..... | Description                              |                          | Type                     |                          | Manufacturer                      |                          |
|                                               | Evaluation Board Kit                     |                          |                          |                          | Telit                             |                          |
|                                               | Antenna                                  |                          | T-AT305, L/4             |                          | ATEL-CAB                          |                          |
| Documents as provided by the applicant .....  | Description                              |                          | File name                |                          | Issue date                        |                          |
|                                               |                                          |                          |                          |                          |                                   |                          |

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

## Identification of the client

Telit Communications S.p.A.

Via Stazione di Prosecco 5/B  
34010 Sgonico - Trieste, Italy

## Testing period and place

|               |                                        |
|---------------|----------------------------------------|
| Test Location | DEKRA Testing and Certification S.A.U. |
| Date (start)  | 2021-08-13                             |
| Date (finish) | 2021-10-28                             |

## Document history

| Report number | Date       | Description   |
|---------------|------------|---------------|
| 68561RRF.001  | 2021-12-23 | 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 %   |

In the chamber for conducted measurements, 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: Cristina Calle, José Manuel Jiménez and Javier Miguel Nadales.

Used instrumentation:

### Conducted Measurements:

|                                                                    | Last Calibration | Due Calibration |
|--------------------------------------------------------------------|------------------|-----------------|
| 1. Shielded Room ETS LINDGREN S101                                 | N/A              | N/A             |
| 2. Wideband radio communication tester<br>ROHDE AND SCHWARZ CMW500 | 2021/07          | 2022/07         |
| 3. Climatic chamber BINDER MK 56                                   | 2021/03          | 2022/03         |
| 4. DC Power supply 30V/5A KEYSIGHT<br>TECHNOLOGIES U8002A          | N/A              | N/A             |
| 5. Digital Multimeter FLUKE 175                                    | 2020/11          | 2021/11         |

### Radiated Measurements:

|                                                                        | Last Calibration | Due Calibration |
|------------------------------------------------------------------------|------------------|-----------------|
| 1. Semianechoic Absorber Lined Chamber ETS<br>LINDGREN FACT 3 200 STP  | N/A              | N/A             |
| 2. Shielded Room ETS LINDGREN S101                                     | N/A              | N/A             |
| 3. Wideband radio communication tester<br>ROHDE AND SCHWARZ CMW500     | 2021/07          | 2022/07         |
| 4. Hybrid Bilog Antenna 30 MHz - 6 GHz ETS<br>LINDGREN 3142E           | 2020/10          | 2023/10         |
| 5. RF Pre-amplifier G>40dB 10MHz-6GHz<br>BONN ELEKTRONIK BLNA 0160-01N | 2021/03          | 2022/03         |
| 6. EMI Test Receiver 7 GHz ROHDE AND<br>SCHWARZ ESR7                   | 2019/10          | 2021/10         |
| 7. Horn antenna 1-18 GHz SCHWARZBECK<br>BBHA 9120 D                    | 2020/08          | 2023/08         |
| 8. RF Pre-amplifier, G>30 dB 1-18 GHz BONN<br>ELEKTRONIK BLMA 0118-3A  | 2020/10          | 2021/10         |
| 9. Signal and spectrum analyzer 10Hz-40GHz<br>Rhode and Schwarz FSV40  | 2019/10          | 2021/10         |
| 10. Horn antenna 18 - 40 GHz SCHWARZBECK<br>BBHA 9170                  | 2020/05          | 2023/05         |
| 11. RF Pre-amplifier G>30dB 18-40 GHz BONN<br>ELEKTRONIK BLMA 1840-3G  | 2019/11          | 2021/11         |
| 12. DC Power supply 30V/5A KEYSIGHT<br>TECHNOLOGIES U8002A             | N/A              | N/A             |
| 13. Digital Multimeter FLUKE 175                                       | 2020/11          | 2021/11         |

## Testing verdicts

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

## Summary

| FCC PART 22 / IC 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                     | P       |        |
| 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) Test not requested.                                                   |         |        |

| FCC PART 24 / IC RSS-133 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                     | P       |        |
| 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) Test not requested.                                                   |         |        |

| FCC PART 27 / IC RSS-130, IC RSS-139 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                     | P       |        |
| 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) Test not requested.                                                   |         |        |

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

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## TEST CONDITIONS

Vnominal = 3.8 Vdc

Type of power supply = DC Voltage from external power supply

Type of antenna = External antenna.

Declared Gain for antenna = +2.14 dBi.

### TEST FREQUENCIES:

3G - WCDMA and HSUPA modulations. (Band V)

| Channel (Frequency MHz) |                 |                 |
|-------------------------|-----------------|-----------------|
| Lowest                  | Middle          | Highest         |
| 4132<br>(826.4)         | 4182<br>(836.4) | 4233<br>(846.6) |

LTE Band 5 (824-849 MHz). QPSK and 16QAM modulations:

|        | Channel (Frequency)   |                       |                       |                               |
|--------|-----------------------|-----------------------|-----------------------|-------------------------------|
|        | BW = 1.4 MHz          | BW = 3 MHz            | BW=5 MHz              | <b>BW=10 MHz</b>              |
| Low    | 20407<br>(824.70 MHz) | 20415<br>(825.50 MHz) | 20425<br>(826.50 MHz) | 20450<br>(829.00 MHz)         |
| Middle | 20525<br>(836.50 MHz) | 20525<br>(836.50 MHz) | 20525<br>(836.50 MHz) | <b>20525<br/>(836.50 MHz)</b> |
| High   | 20643<br>(848.30 MHz) | 20635<br>(847.50 MHz) | 20625<br>(846.50 MHz) | 20600<br>(844.00 MHz)         |

## Frequency Stability

### SPECIFICATION:

FCC §2.1055 and §22.355.  $\pm 2.5$  ppm for mobile stations operating in the range 821 to 896 MHz.

RSS-132. Clause 5.3. The carrier frequency shall not depart from the reference frequency in excess of  $\pm 2.5$  ppm for mobile stations.

### METHOD:

The frequency tolerance measurements over temperature variations were made over the temperature range of  $-30^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$ . The EUT was placed inside a climatic chamber and the temperature was raised hourly in  $10^{\circ}\text{C}$  steps from  $-30^{\circ}\text{C}$  up to  $+50^{\circ}\text{C}$ .

The supply voltage was varied between 85% and 115% of nominal voltage.

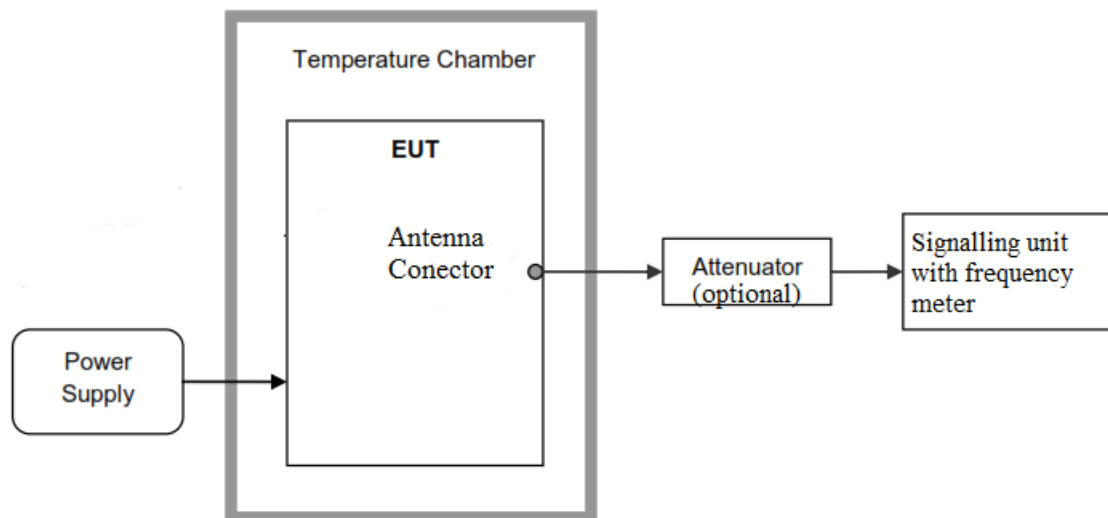
The EUT was set in "Radio Resource Control (RRC) mode" in the Middle channel using the Universal Radio Communication tester R&S CMW500 and the maximum frequency error was measured using the built-in calibrated frequency meter.

In order to check that the frequency stability is sufficient such that the fundamental emissions stay within the authorized bands of operation, a reference point is established at the applicable unwanted emissions limit using a RBW equal to the RBW required by the unwanted emissions specification of the applicable regulatory standard. These reference points measured using the lowest and highest channel of operation are identified as fL and fH respectively. The worst-case frequency offset determined in the above methods is added or subtracted from the values of fL and fH to check that the resulting frequencies remain within the band.

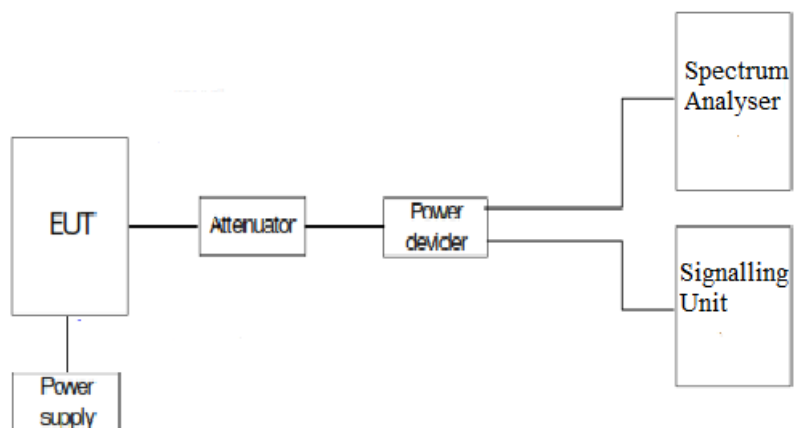
The reference point measurements were made at the RF output terminals of the EUT using an attenuator, power splitter and spectrum analyser. The EUT was controlled via the Universal Radio Communication tester R&S CMW500 selecting maximum transmission power of the EUT and different modes of modulation.

## TEST SETUP:

### 1. Frequency Tolerance:



### 2. Reference Frequency Points $f_L$ and $f_H$ :



## RESULTS:

### Frequency stability over temperature variations.

3G - 850 MHz (Band V). WCDMA and HSUPA MODULATIONS. (WCDMA)

Nominal Frequency: 836.6 MHz

| Temperature (°C) | Frequency Error (Hz) | Frequency Error (ppm) |
|------------------|----------------------|-----------------------|
| +50              | -2.08                | -0.0025               |
| +40              | -2.17                | -0.0026               |
| +30              | 2.10                 | 0.0025                |
| +20              | -2.01                | -0.0024               |
| +10              | 0.11                 | 0.0001                |
| 0                | -2.75                | -0.0033               |
| -10              | 1.11                 | 0.0013                |
| -20              | 1.09                 | 0.0013                |
| -30              | -3.74                | -0.0045               |

### Frequency stability over voltage variations.

3G - 850 MHz (Band V). WCDMA and HSUPA MODULATIONS. (WCDMA)

| Battery Supply voltage | Voltage (V) | Frequency Error (Hz) | Frequency Error (ppm) |
|------------------------|-------------|----------------------|-----------------------|
| Vmax                   | 4.2         | -3.90                | -0.0047               |
| Vmin                   | 3.2         | -2.10                | -0.0025               |

|                              |       |
|------------------------------|-------|
| Measurement uncertainty (Hz) | <±102 |
|------------------------------|-------|

Verdict: PASS

LTE – Band 5. QPSK and 16QAM MODULATIONS. (QPSK BW=10MHz)

Nominal Frequency: 836.5 MHz

| Temperature (°C) | Frequency Error (Hz) | Frequency Error (ppm) |
|------------------|----------------------|-----------------------|
| +50              | -0.79                | -0.000944411          |
| +40              | 1.62                 | 0.001936641           |
| +30              | -2.07                | -0.002474597          |
| +20              | -1.82                | -0.002175732          |
| +10              | -2.55                | -0.003048416          |
| 0                | 0.66                 | 0.000789002           |
| -10              | -2.02                | -0.002414824          |
| -20              | 4.36                 | 0.005212194           |
| -30              | 2.86                 | 0.003419008           |

Frequency stability over voltage variations.

LTE – Band 5. QPSK and 16QAM MODULATIONS. (QPSK BW=10MHz)

| Battery Supply voltage | Voltage (V) | Frequency Error (Hz) | Frequency Error (ppm) |
|------------------------|-------------|----------------------|-----------------------|
| Vmax                   | 4.2         | -4.48                | -0.005355649          |
| Vmin                   | 3.2         | -1.59                | -0.001900777          |

|                              |       |
|------------------------------|-------|
| Measurement uncertainty (Hz) | <±102 |
|------------------------------|-------|

Verdict: PASS

## Radiated emissions

### SPECIFICATION

FCC § 22.917

RSS-132. Clause 5.5.

FCC §2.1051.

### 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 1 meter high 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 field strength (dBμV/m) is measured and 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:

$EIRP (dBm) = E (dB\mu V/m) + 20\log(D) - 104.8$ ; where D is the measurement distance (in the far field region) in m. D = 3 m

Measurement Limit:

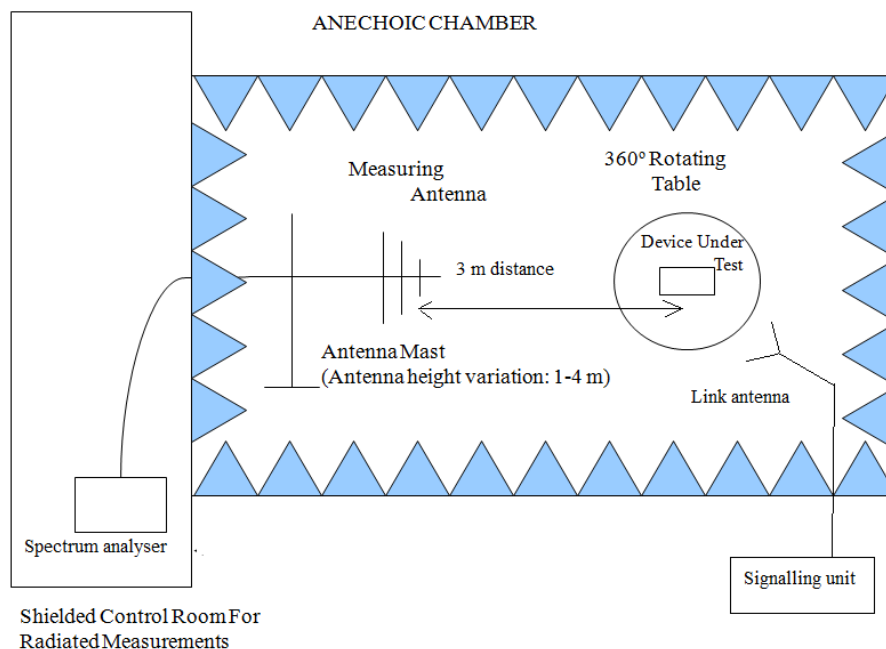
According to specification. the power of emissions shall be attenuated below the transmitter power (P) by a factor of at least  $43 + 10 \log (P)$  dB. P in watts.

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

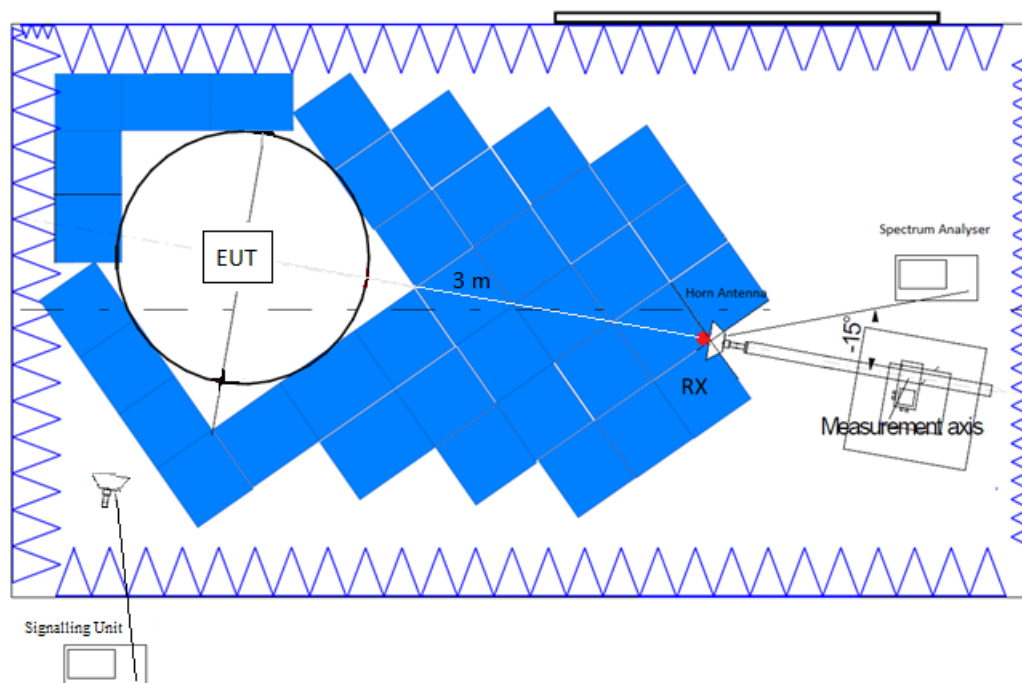
$Po (dBm) - [43 + 10 \log (Po \text{ in mwatts}) - 30] = - 13 \text{ dBm}$

## TEST SETUP

Radiated measurements below 1 GHz.



Radiated measurements above 1 GHz.



## RESULTS

A preliminary study determined the 3G band as the worst case between 3G - Band V and LTE Band 5.

### **3G - WCDMA - 850 MHz (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 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 – 8.5 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 – 8.5 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 – 8.5 GHz**

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

Measurement uncertainty (dB):  $<\pm 4.89$  for  $f \geq 30$  MHz up to 1 GHz  
 $<\pm 5.13$  for  $f \geq 1$  GHz up to 8.5 GHz

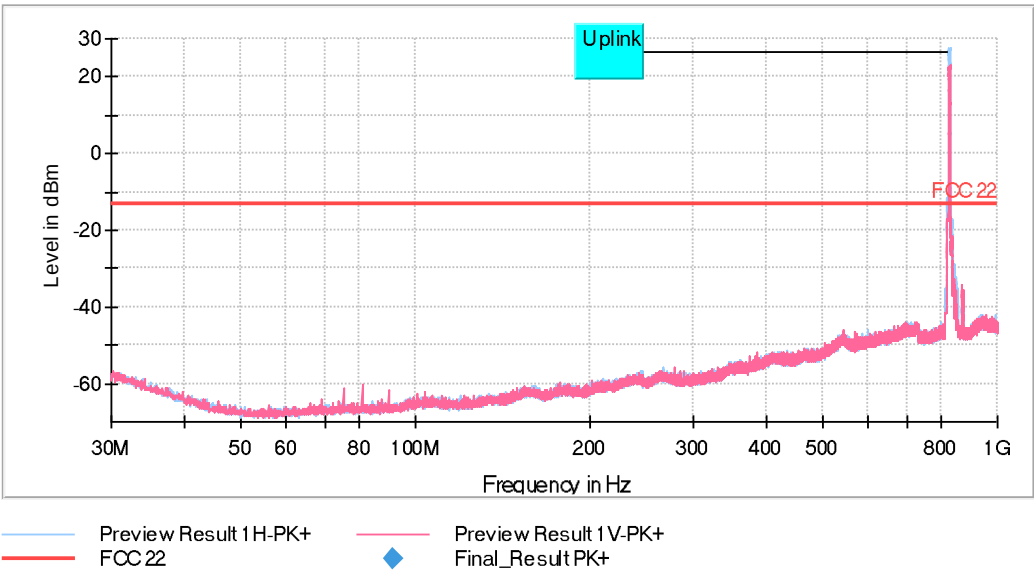
Verdict: PASS

3G - WCDMA - 850 MHz (Band V):

FREQUENCY RANGE 30 MHz - 1 GHz

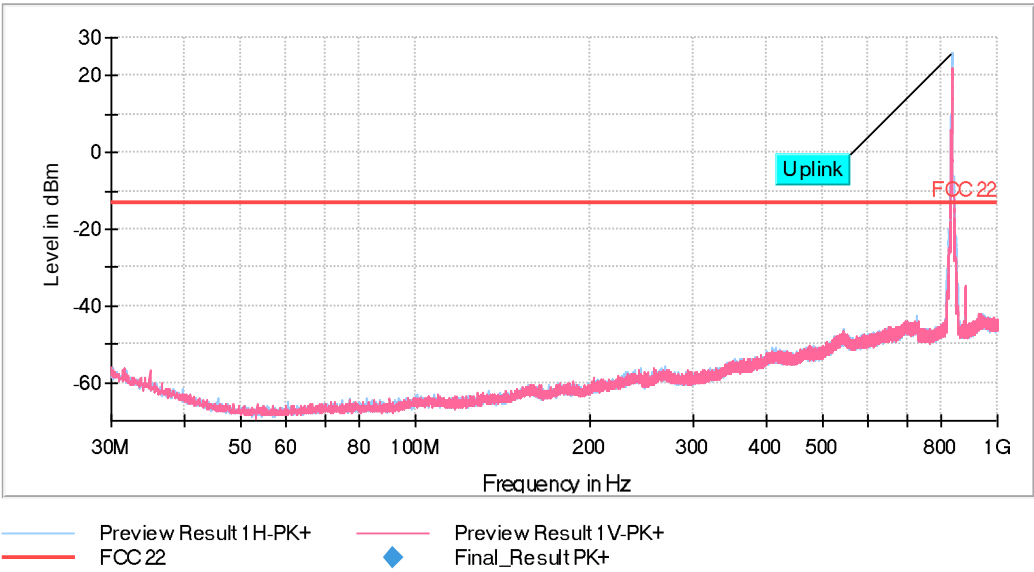
WCDMA MODULATION.

- Lowest Channel:



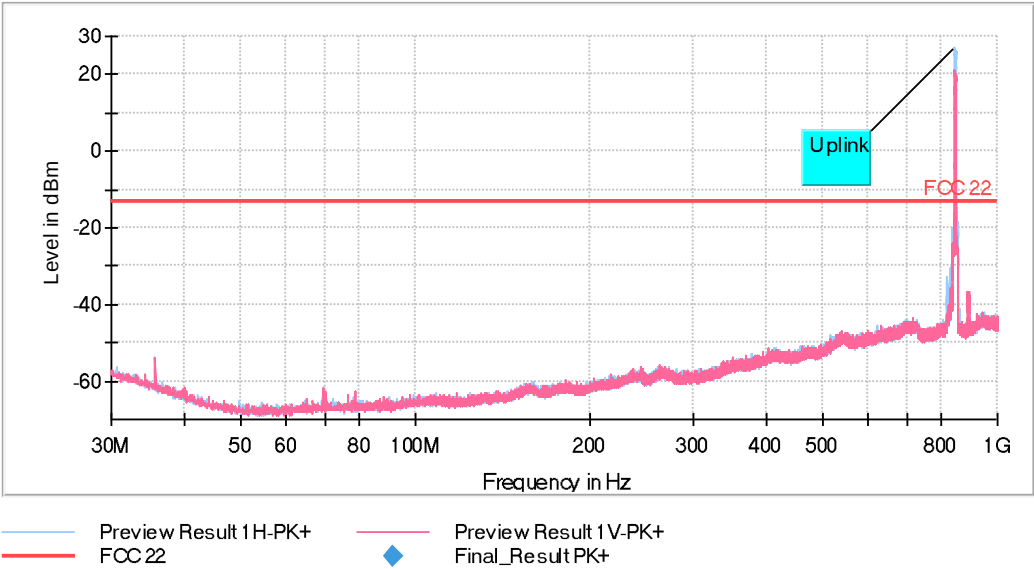
The peak above the limit is the carrier frequency.

- Middle Channel:



The peak above the limit is the carrier frequency.

- Highest Channel:

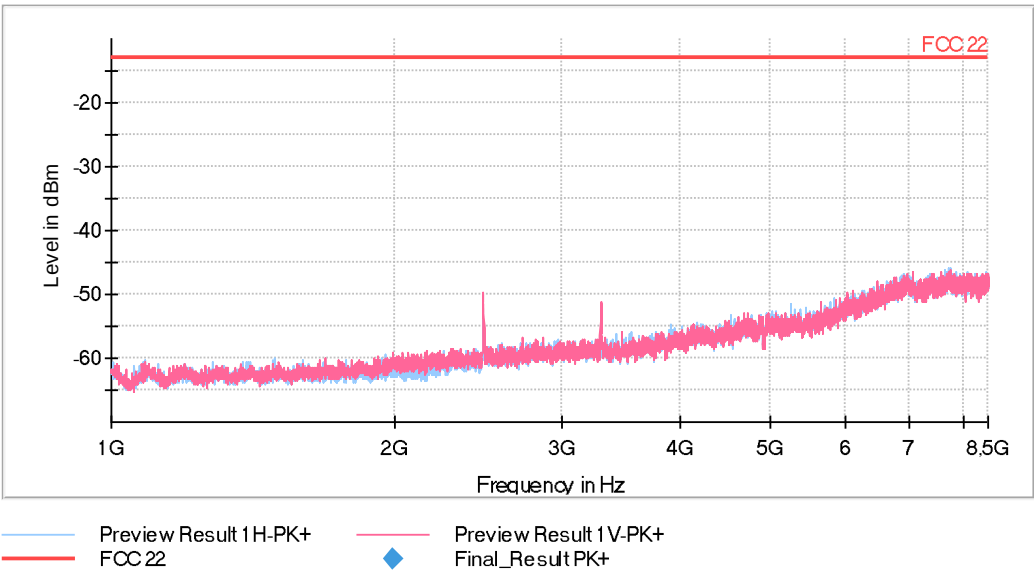


The peak above the limit is the carrier frequency.

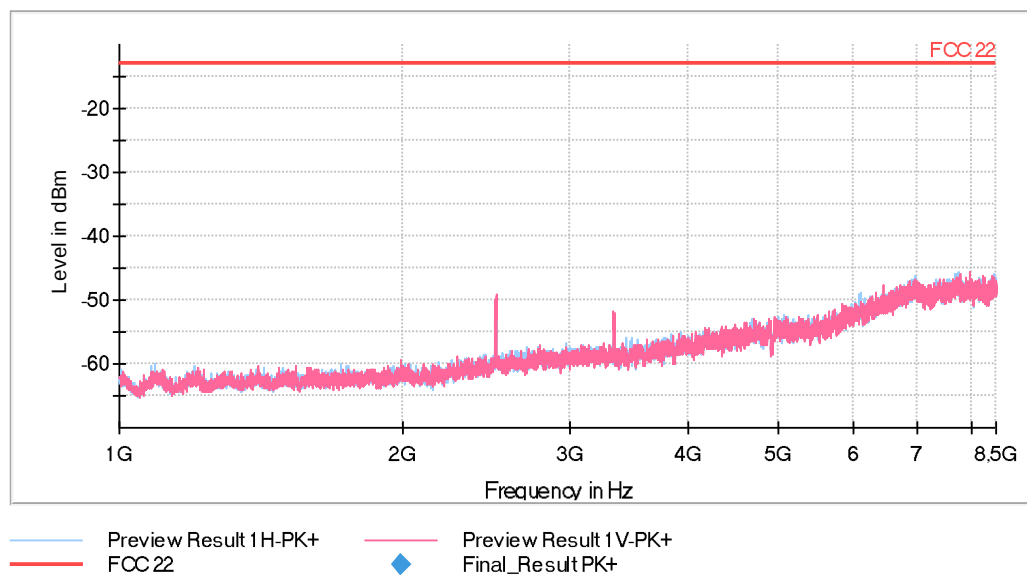
**FREQUENCY RANGE 1 – 8.5 GHz**

WCDMA MODULATION.

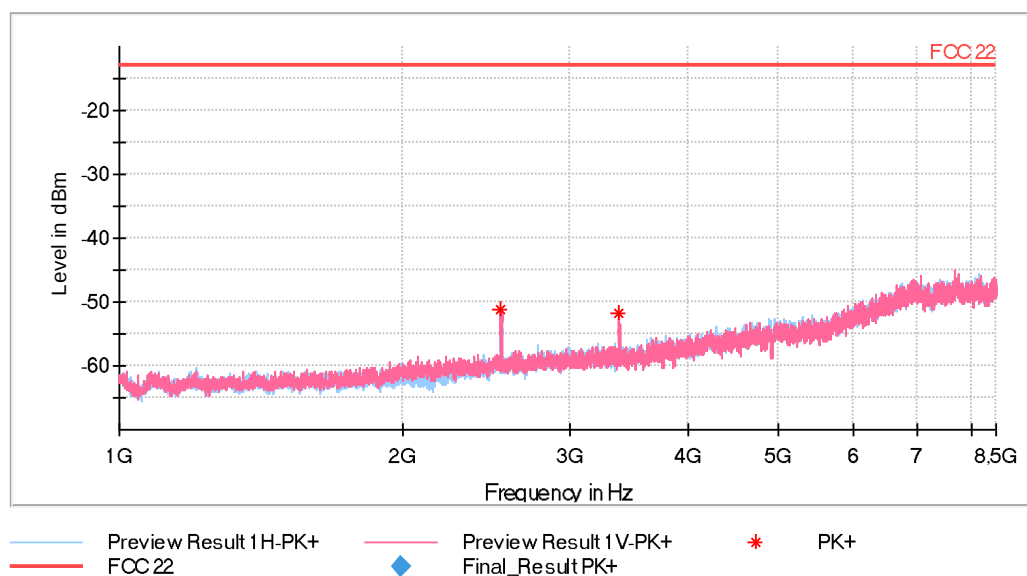
- Lowest Channel:



- Middle Channel:



- Highest Channel:



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

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## TEST CONDITIONS

Vnominal = 3.8 Vdc

Type of power supply = DC Voltage from external power supply

Type of antenna = External antenna.

Declared Gain for antenna = +2.14 dBi.

### TEST FREQUENCIES:

3G Band II. WCDMA and HSUPA modulations.

| Channel (Frequency MHz) |                |                  |
|-------------------------|----------------|------------------|
| Lowest                  | Middle         | Highest          |
| 9262<br>(1852.4)        | 9400<br>(1880) | 9538<br>(1907.6) |

LTE Band 2. QPSK and 16QAM modulations:

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

## Frequency Stability

### SPECIFICATION:

FCC §2.1055 and §24.235. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

RSS-133. Clause 6.3. The carrier frequency shall not depart from the reference frequency in excess of  $\pm 2.5$  ppm for mobile stations.

### METHOD:

The frequency tolerance measurements over temperature variations were made over the temperature range of  $-30^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$ . The EUT was placed inside a climatic chamber and the temperature was raised hourly in  $10^{\circ}\text{C}$  steps from  $-30^{\circ}\text{C}$  up to  $+50^{\circ}\text{C}$ .

The supply voltage was varied between 85% and 115% of nominal voltage.

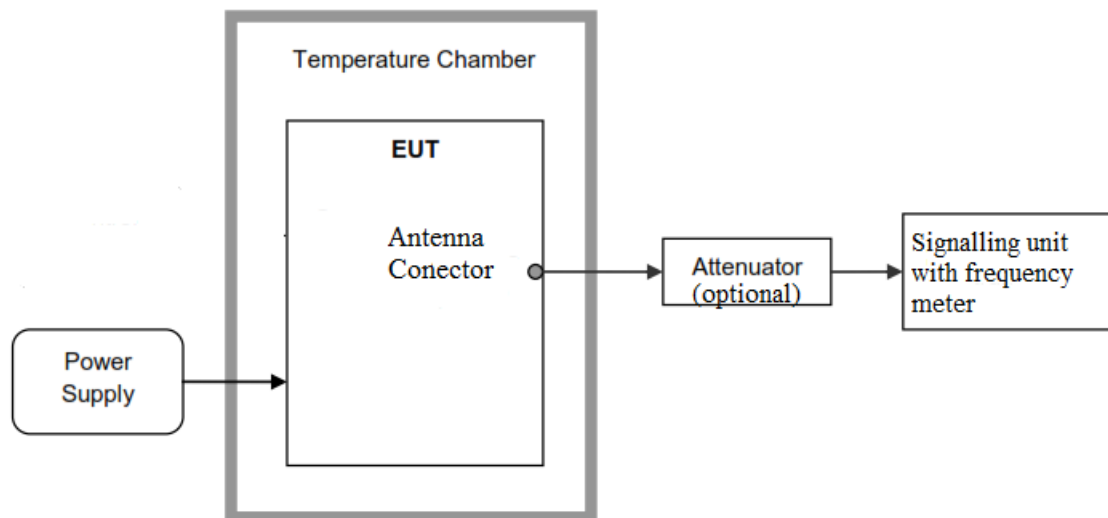
The EUT was set in "Radio Resource Control (RRC) mode" in the Middle channel using the Universal Radio Communication tester R&S CMW500 and the maximum frequency error was measured using the built-in calibrated frequency meter.

In order to check that the frequency stability is sufficient such that the fundamental emissions stay within the authorized bands of operation, a reference point is established at the applicable unwanted emissions limit using a RBW equal to the RBW required by the unwanted emissions specification of the applicable regulatory standard. These reference points measured using the lowest and highest channel of operation are identified as fL and fH respectively. The worst-case frequency offset determined in the above methods is added or subtracted from the values of fL and fH to check that the resulting frequencies remain within the band.

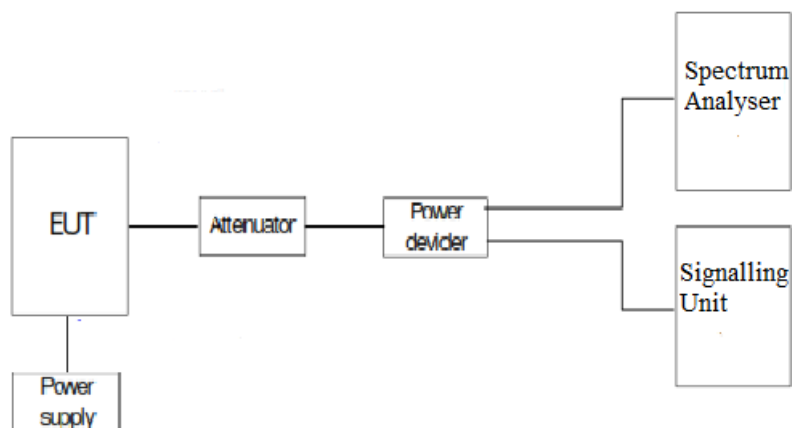
The reference point measurements were made at the RF output terminals of the EUT using an attenuator, power splitter and spectrum analyser. The EUT was controlled via the Universal Radio Communication tester R&S CMW500 selecting maximum transmission power of the EUT and different modes of modulation.

## TEST SETUP:

### 1. Frequency Tolerance:



### 3. Reference Frequency Points $f_L$ and $f_H$ :



## RESULTS:

### Frequency stability over temperature variations.

3G - 1900 MHz (Band II). WCDMA and HSUPA MODULATIONS. (WCDMA)

Nominal Frequency: 1880 MHz

| Temperature (°C) | Frequency Error (Hz) | Frequency Error (ppm) |
|------------------|----------------------|-----------------------|
| +50              | -2.90                | -0.0015               |
| +40              | 3.11                 | 0.0017                |
| +30              | 3.75                 | 0.0020                |
| +20              | 0.92                 | 0.0005                |
| +10              | -1.34                | -0.0007               |
| 0                | -1.72                | -0.0009               |
| -10              | -3.28                | -0.0018               |
| -20              | -2.98                | -0.0016               |
| -30              | -1.40                | -0.0007               |

### Frequency stability over voltage variations.

3G - 1900 MHz (Band II). WCDMA and HSUPA MODULATIONS. (WCDMA)

| Battery Supply voltage | Voltage (V) | Frequency Error (Hz) | Frequency Error (ppm) |
|------------------------|-------------|----------------------|-----------------------|
| Vmax                   | 4.2         | -4.31                | -0.0023               |
| Vmin                   | 3.2         | -0.16                | -0.0001               |

|                             |       |
|-----------------------------|-------|
| Measurement uncertainty(Hz) | <±222 |
|-----------------------------|-------|

Verdict: PASS

LTE - Band 2. QPSK and 16QAM MODULATIONS. (QPSK BW=20MHz)

Nominal Frequency: 1880 MHz

| Temperature (°C) | Frequency Error (Hz) | Frequency Error (ppm) |
|------------------|----------------------|-----------------------|
| +50              | 1                    | 0.000531915           |
| +40              | 1.03                 | 0.000547872           |
| +30              | 1.19                 | 0.000632979           |
| +20              | -4.78                | -0.002542553          |
| +10              | -3.03                | -0.001611702          |
| 0                | 1.7                  | 0.000904255           |
| -10              | -1.85                | -0.000984043          |
| -20              | 3.5                  | 0.001861702           |
| -30              | -1.17                | -0.00062234           |

Frequency stability over voltage variations.

LTE - Band 2. QPSK and 16QAM MODULATIONS. (QPSK BW=20MHz)

| Battery Supply voltage | Voltage (V) | Frequency Error (Hz) | Frequency Error (ppm) |
|------------------------|-------------|----------------------|-----------------------|
| Vmax                   | 4.2         | 1.87                 | 0.000994681           |
| Vmin                   | 3.2         | -3.36                | -0.001787234          |

|                             |       |
|-----------------------------|-------|
| Measurement uncertainty(Hz) | <±222 |
|-----------------------------|-------|

Verdict: PASS

## 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 highest frequency generated within the equipment.

The EUT was placed on a 1 meter high 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 field strength (dBμV/m) is measured and 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:

$EIRP (dBm) = E (dB\mu V/m) + 20\log(D) - 104.8$ ; where D is the measurement distance (in the far field region) in m. D = 3 m

Measurement Limit:

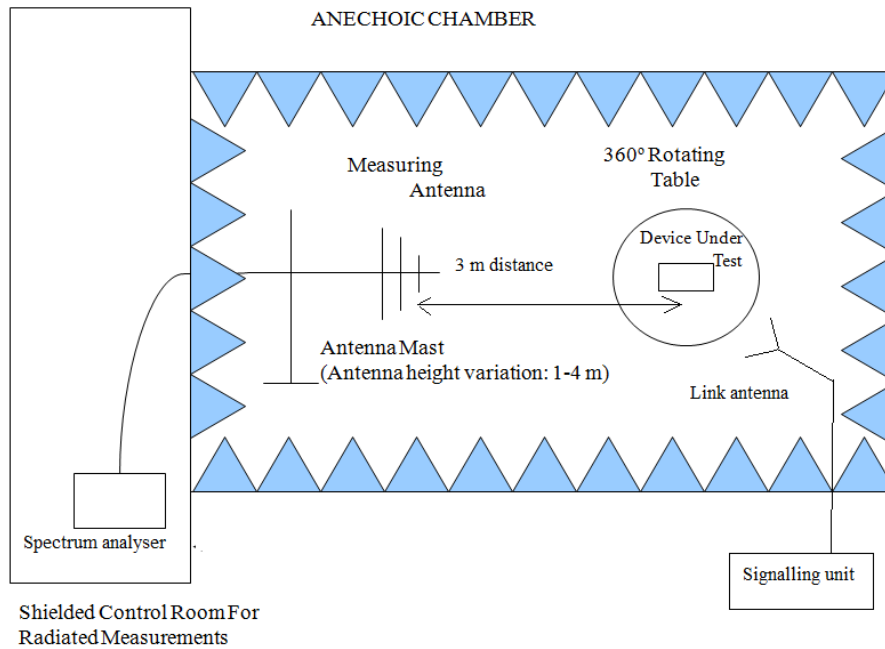
According to specification. the power of emissions shall be attenuated below the transmitter power (P) by a factor of at least  $43 + 10 \log (P)$  dB. P in watts.

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

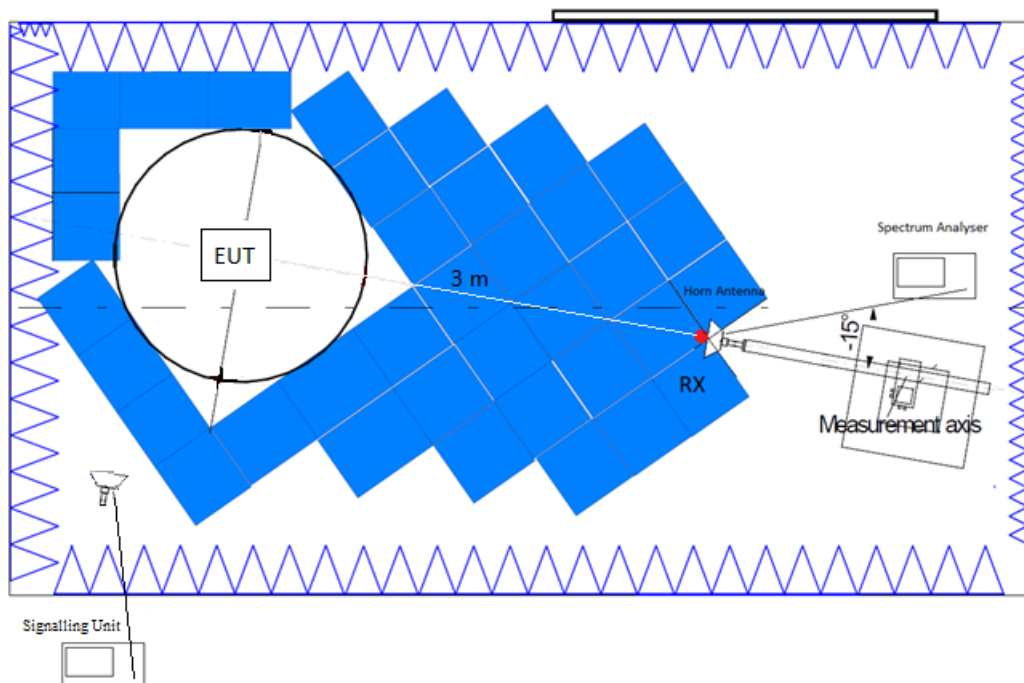
$P_o (dBm) - [43 + 10 \log (P_o \text{ in mwatts}) - 30] = - 13 \text{ dBm}$

## TEST SETUP

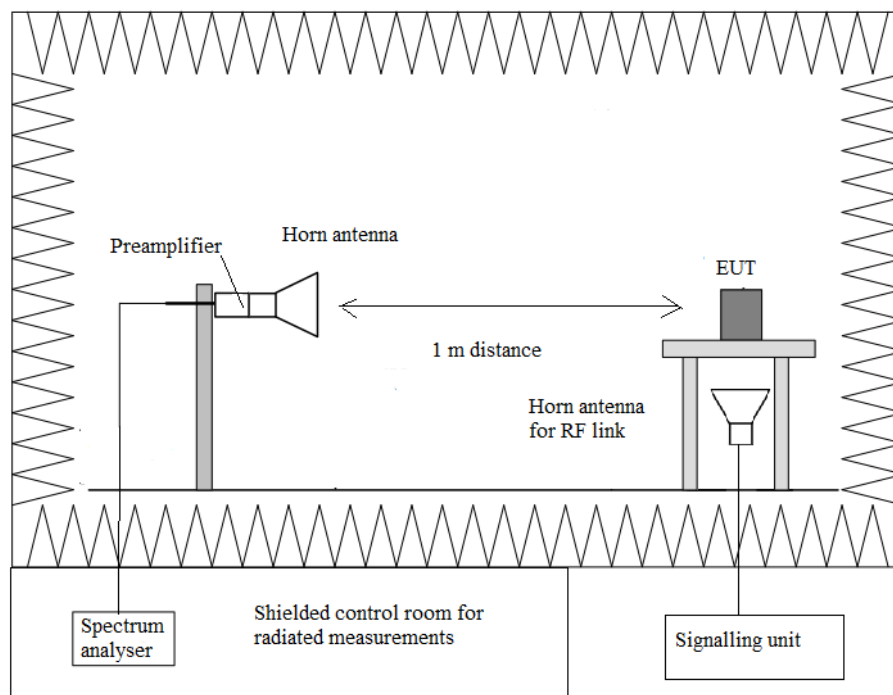
Radiated measurements below 1 GHz.



Radiated measurements above 1 GHz.



## Radiated measurements above 18 GHz.



## RESULTS

A preliminary study determined the 3G band as the worst case between 3G - Band II and LTE Band 2.

### **3G - WCDMA - 1900 MHz (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 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 – 18 GHz**

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

##### **Frequency range 18 – 20 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 – 18 GHz**

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

##### **Frequency range 18 – 20 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 – 18 GHz**

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

##### **Frequency range 18 – 20 GHz**

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

Measurement uncertainty (dB):  $<\pm 5.17$  for  $f \geq 30$  MHz up to 1 GHz  
 $<\pm 4.11$  for  $f \geq 1$  GHz up to 3 GHz  
 $<\pm 5.13$  for  $f \geq 3$  GHz up to 18 GHz  
 $<\pm 4.81$  for  $f \geq 18$  GHz up to 20 GHz

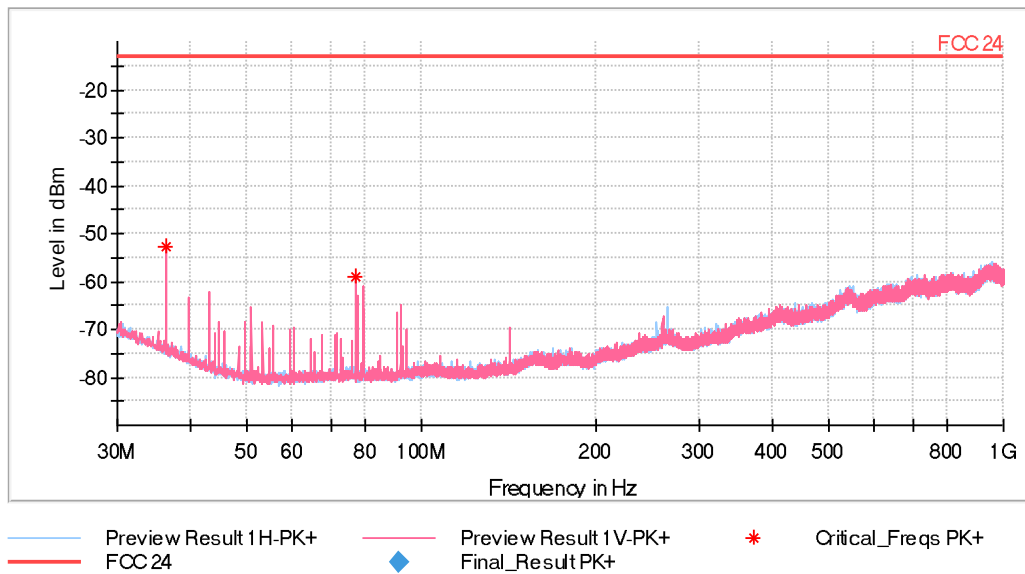
Verdict: PASS

### 3G - WCDMA - 1900 MHz (Band II):

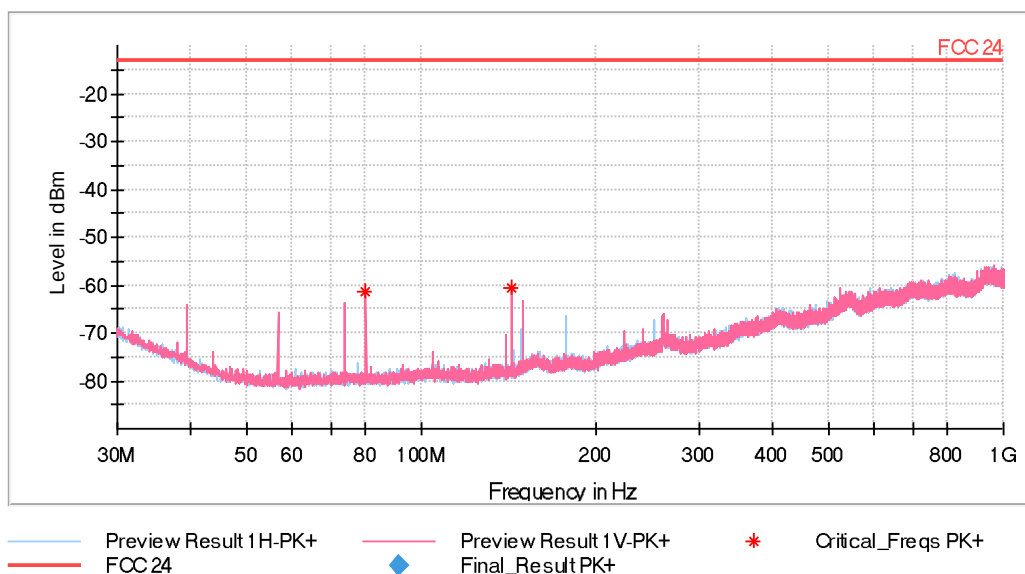
#### **FREQUENCY RANGE 30 MHz - 1 GHz**

WCDMA MODULATION.

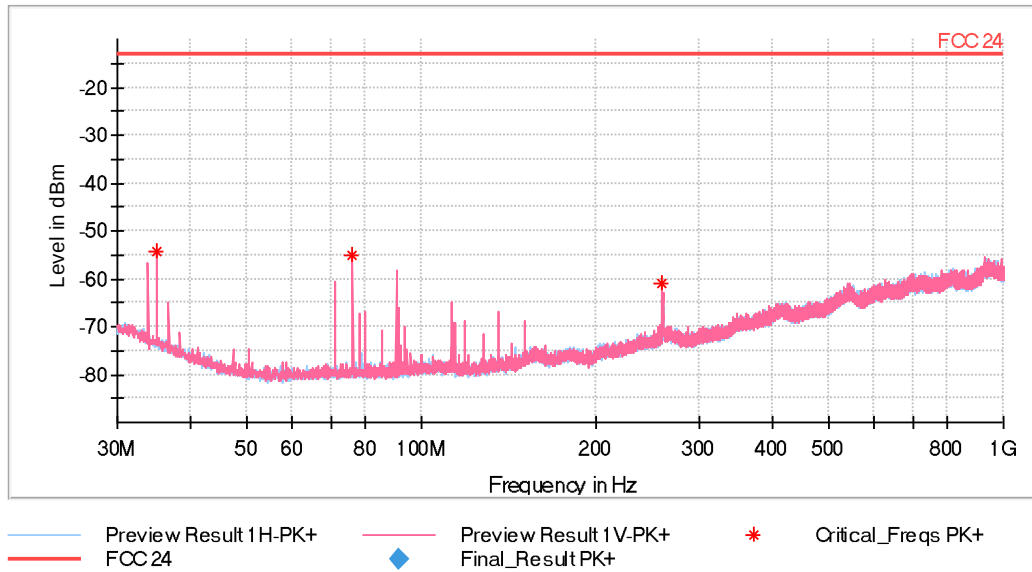
- Lowest Channel:



- Middle Channel:



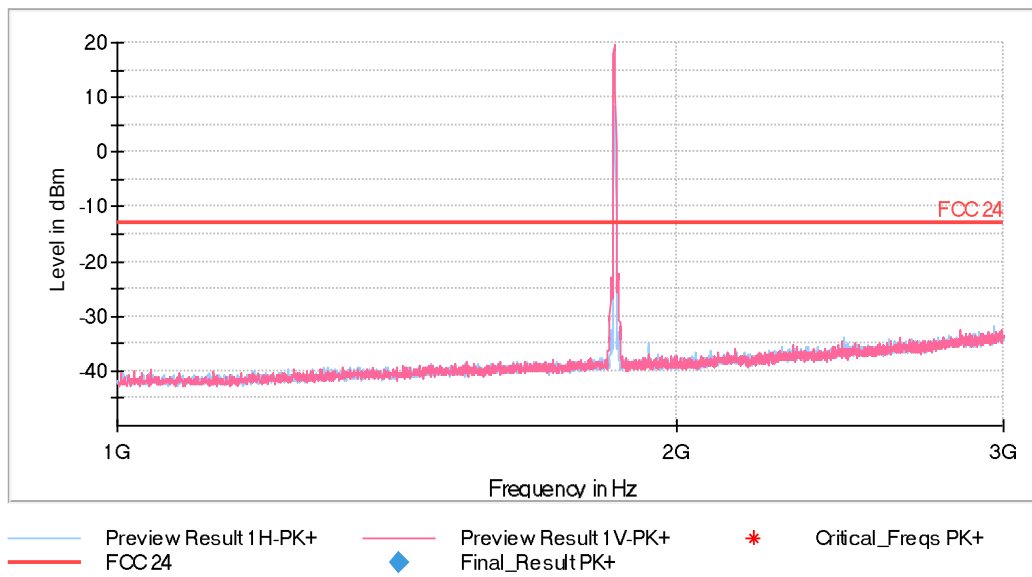
- Highest Channel:



## FREQUENCY RANGE 1 – 3 GHz

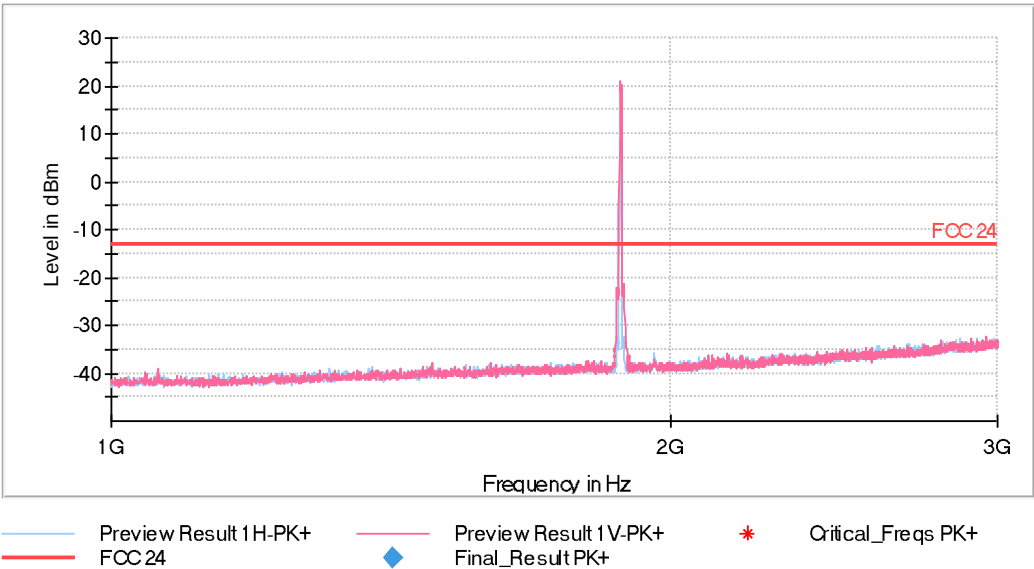
WCDMA MODULATION.

- Lowest Channel:

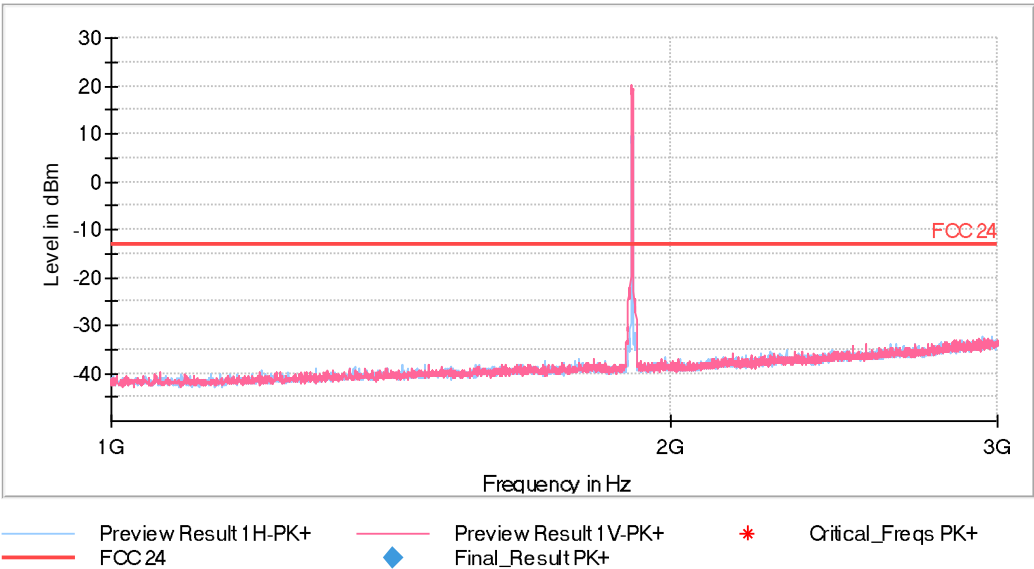


The peak above the limit is the carrier frequency.

- Middle Channel:



- Highest Channel:

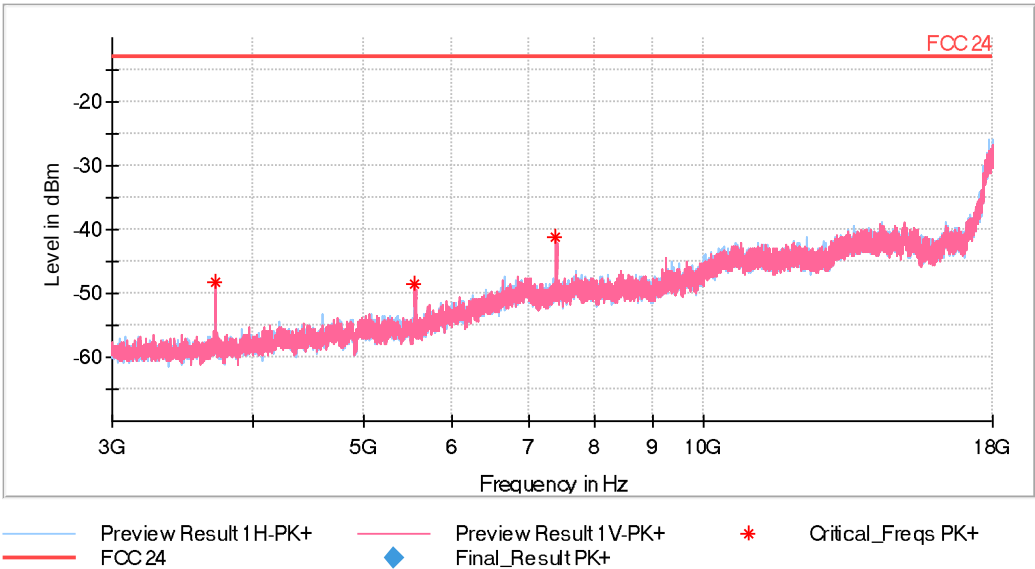


The peak above the limit is the carrier frequency.

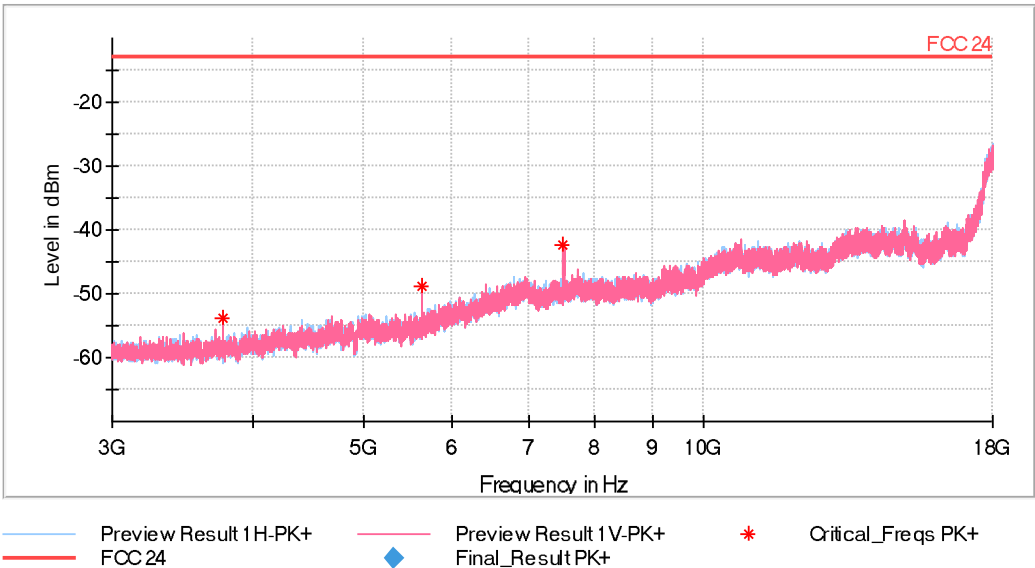
FREQUENCY RANGE 3 – 18 GHz

WCDMA MODULATION.

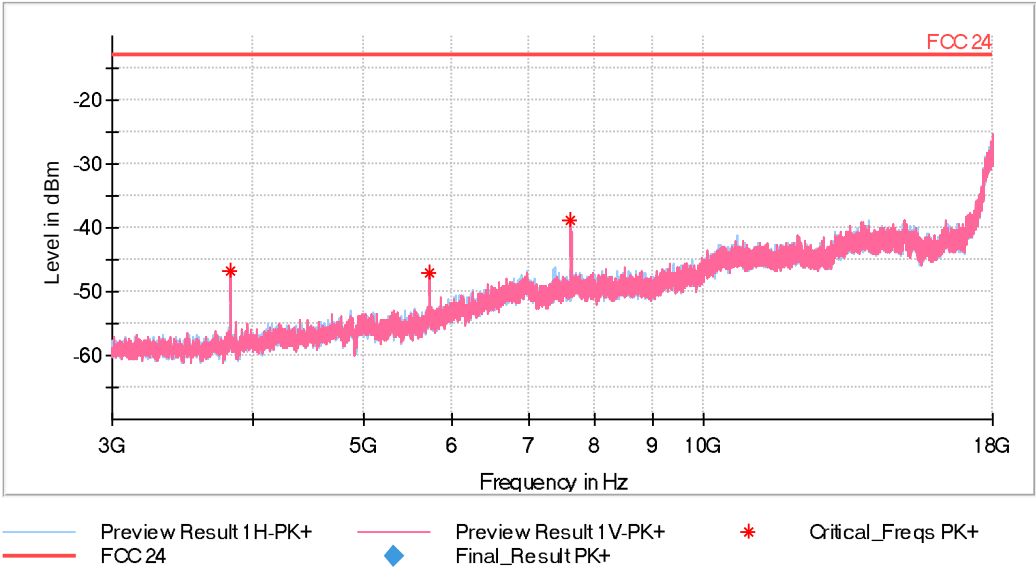
- Lowest Channel:



- Middle Channel:



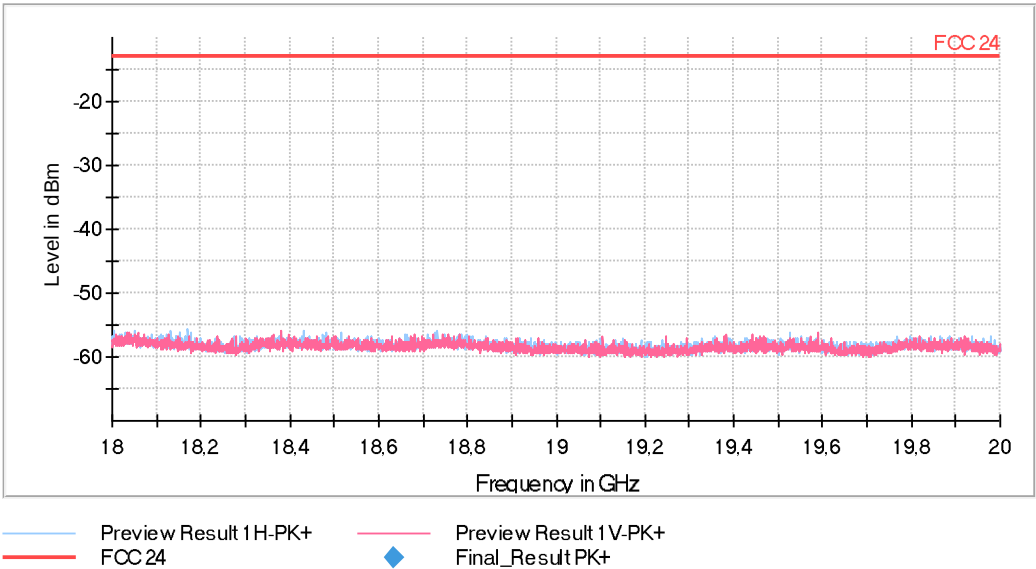
- Highest Channel:



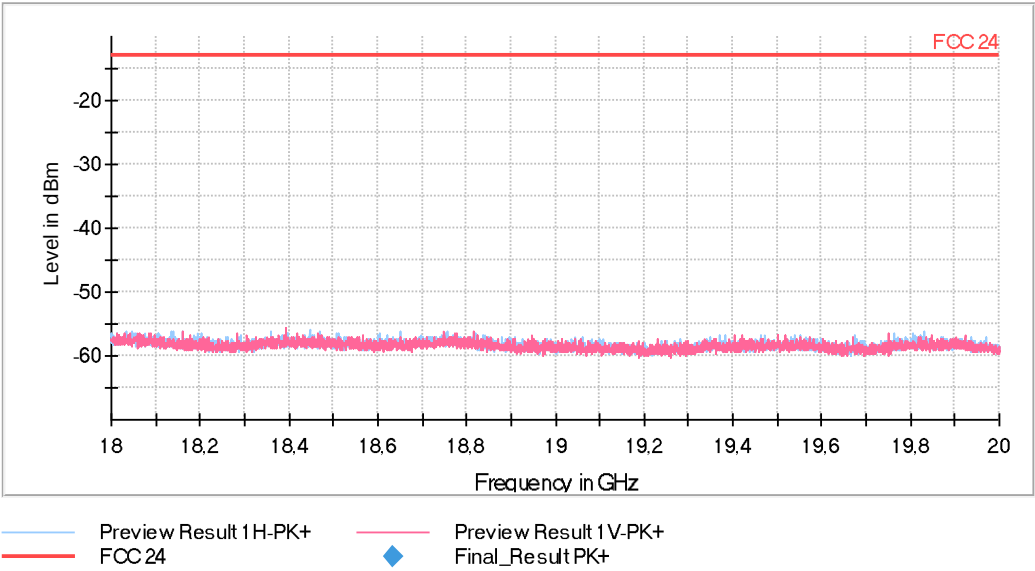
FREQUENCY RANGE 18 – 20 GHz

WCDMA MODULATION.

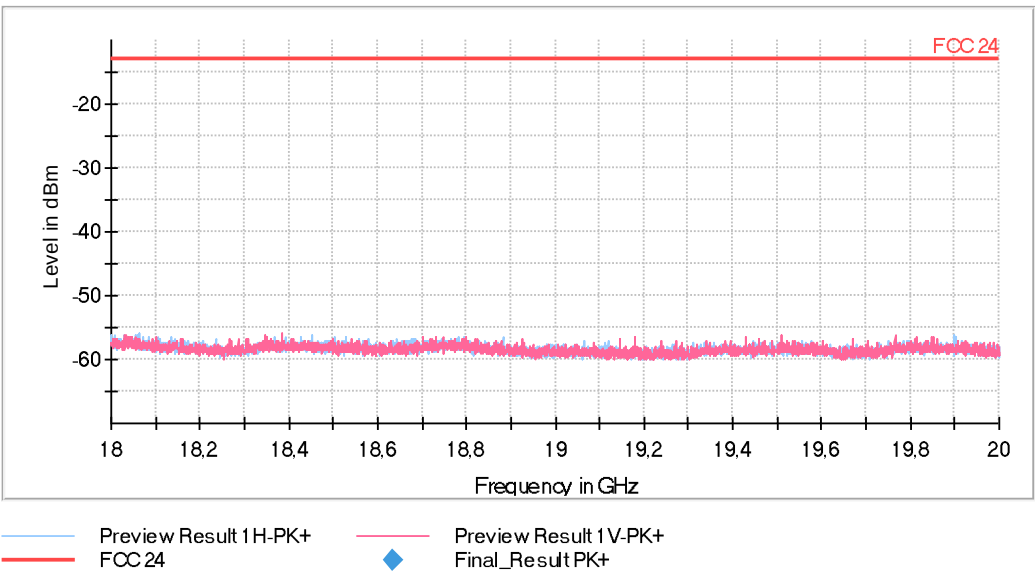
- Lowest Channel:



- Middle Channel:



- Highest Channel:



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

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## TEST CONDITIONS

Vnominal = 3.8 Vdc

Type of power supply = DC Voltage from external power supply

Type of antenna = External antenna.

Declared Gain for antenna = +2.14 dBi.

### TEST FREQUENCIES:

LTE Band 4. QPSK AND 16QAM MODULATION:

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

Note: RB=1 - Offset =0 - BW= 1.4 MHz

LTE Band 12. QPSK AND 16QAM MODULATION:

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

Note: RB=1 - Offset =0 - BW=1.4 MHz

LTE Band 13. QPSK AND 16QAM MODULATION:

|         | Channel (Frequency, MHz) |               |
|---------|--------------------------|---------------|
|         | <b>BW = 5 MHz</b>        | BW = 10 MHz   |
| Lowest  | <b>23205 (779.5)</b>     | N/A           |
| Middle  | <b>23230 (782.0)</b>     | 23230 (782.0) |
| Highest | <b>23255 (784.5)</b>     | N/A           |

NOTE: RB=1 - Offset =0 - BW=5 MHz

## Frequency Stability

### SPECIFICATION:

FCC §2.1055 and §27.54.

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

RSS-130. Clause 4.5.

The frequency stability shall be sufficient to ensure that the occupied bandwidth remains within each frequency block range when tested at the temperature and supply voltage variations specified in RSS-Gen.

RSS-139 Clause 6.4.

The frequency stability shall be sufficient to ensure that the occupied bandwidth stays within the operating frequency block when tested to the temperature and supply voltage variations specified in RSS-Gen.

### METHOD:

The frequency tolerance measurements over temperature variations were made over the temperature range of  $-30^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$ . The EUT was placed inside a climatic chamber and the temperature was raised hourly in  $10^{\circ}\text{C}$  steps from  $-30^{\circ}\text{C}$  up to  $+50^{\circ}\text{C}$ .

The supply voltage was varied between 85% and 115% of nominal voltage.

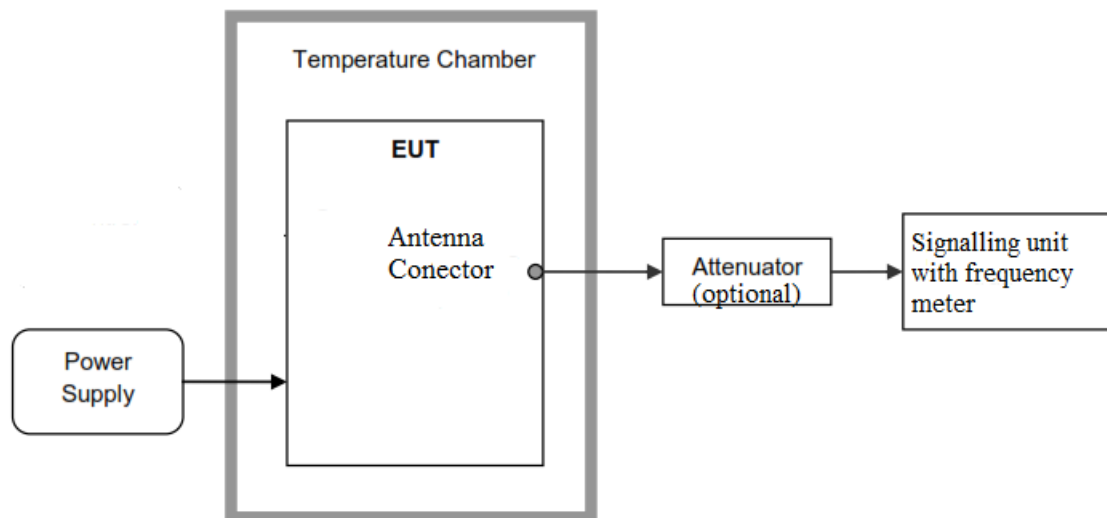
The EUT was set in "Radio Resource Control (RRC) mode" in the Middle channel using the Universal Radio Communication tester R&S CMW500 and the maximum frequency error was measured using the built-in calibrated frequency meter.

In order to check that the frequency stability is sufficient such that the fundamental emissions stay within the authorized bands of operation, a reference point is established at the applicable unwanted emissions limit using a RBW equal to the RBW required by the unwanted emissions specification of the applicable regulatory standard. These reference points measured using the lowest and highest channel of operation are identified as fL and fH respectively. The worst-case frequency offset determined in the above methods is added or subtracted from the values of fL and fH to check that the resulting frequencies remain within the band.

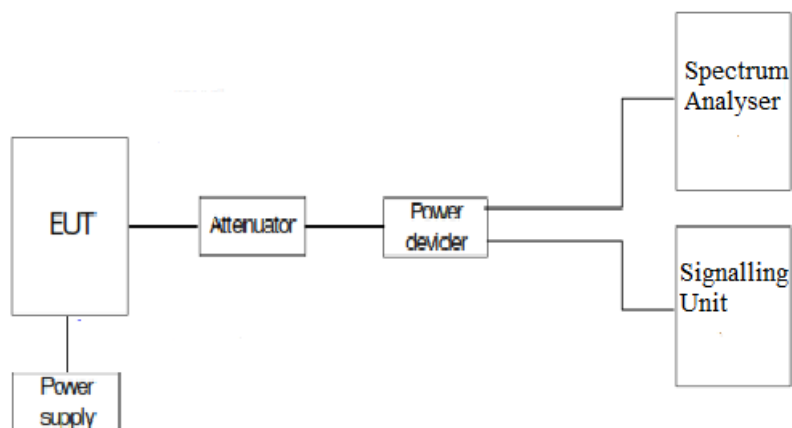
The reference point measurements were made at the RF output terminals of the EUT using an attenuator, power splitter and spectrum analyser. The EUT was controlled via the Universal Radio Communication tester R&S CMW500 selecting maximum transmission power of the EUT and different modes of modulation.

## TEST SETUP:

### 1. Frequency Tolerance:



### 4. Reference Frequency Points $f_L$ and $f_H$ :



## RESULTS:

### Frequency stability over temperature variations.

LTE – Band 4. QPSK and 16QAM MODULATIONS. (QPSK) - BW= 20 MHz

Nominal Frequency: 1732.5 MHz

| Temperature (°C) | Frequency Error (Hz) | Frequency Error (ppm) |
|------------------|----------------------|-----------------------|
| +50              | 2.73                 | 0.0016                |
| +40              | -2.06                | -0.0012               |
| +30              | -6.97                | -0.0040               |
| +20              | -3.23                | -0.0019               |
| +10              | 0.90                 | 0.0006                |
| 0                | -0.30                | -0.0002               |
| -10              | 2.53                 | 0.0015                |
| -20              | -3.25                | -0.0019               |
| -30              | -5.32                | -0.0031               |

|                              |       |
|------------------------------|-------|
| Measurement uncertainty (Hz) | <±206 |
|------------------------------|-------|

LTE- Band 12. QPSK and 16QAM MODULATIONS. (QPSK) - BW=10 MHz

Nominal Frequency: 707.5 MHz

| Temperature (°C) | Frequency Error (Hz) | Frequency Error (ppm) |
|------------------|----------------------|-----------------------|
| +50              | -1.42                | -0.0008               |
| +40              | 3.69                 | 0.0021                |
| +30              | -0.82                | -0.0005               |
| +20              | -2.02                | -0.0012               |
| +10              | 0.94                 | 0.0005                |
| 0                | -1.80                | -0.0010               |
| -10              | -3.89                | -0.0022               |
| -20              | 1.16                 | 0.0007                |
| -30              | 2.37                 | 0.0014                |

|                              |      |
|------------------------------|------|
| Measurement uncertainty (Hz) | <±87 |
|------------------------------|------|

LTE – Band 13. QPSK and 16QAM MODULATIONS. (QPSK) - BW=10 MHz

Nominal Frequency: 782.0 MHz

| Temperature (°C) | Frequency Error (Hz) | Frequency Error (ppm) |
|------------------|----------------------|-----------------------|
| +50              | -0.69                | -0.0004               |
| +40              | -2.49                | -0.0014               |
| +30              | -3.09                | -0.0018               |
| +20              | -1.59                | -0.0009               |
| +10              | -1.83                | -0.0011               |
| 0                | 0.26                 | 0.0002                |
| -10              | 2.69                 | 0.0016                |
| -20              | -0.24                | -0.0001               |
| -30              | 1.43                 | 0.0008                |

|                              |      |
|------------------------------|------|
| Measurement uncertainty (Hz) | <±96 |
|------------------------------|------|

Frequency stability over voltage variations.

LTE – Band 4. QPSK and 16QAM MODULATIONS. (QPSK) - BW= 20 MHz

| Battery Supply voltage | Voltage (V) | Frequency Error (Hz) | Frequency Error (ppm) |
|------------------------|-------------|----------------------|-----------------------|
| Vmax                   | 4.2         | -5.74                | -0.0033               |
| Vmin                   | 3.2         | -1.52                | -0.0009               |

|                              |       |
|------------------------------|-------|
| Measurement uncertainty (Hz) | <±206 |
|------------------------------|-------|

LTE – Band 12. QPSK and 16QAM MODULATIONS. (QPSK) - BW=10 MHz

| Battery Supply voltage | Voltage (V) | Frequency Error (Hz) | Frequency Error (ppm) |
|------------------------|-------------|----------------------|-----------------------|
| Vmax                   | 4.2         | 1.30                 | 0.0008                |
| Vmin                   | 3.2         | -4.13                | -0.0024               |

|                              |      |
|------------------------------|------|
| Measurement uncertainty (Hz) | <±87 |
|------------------------------|------|

LTE – Band 13. QPSK and 16QAM MODULATIONS. (QPSK) - BW=10 MHz

| Battery Supply voltage | Voltage (V) | Frequency Error (Hz) | Frequency Error (ppm) |
|------------------------|-------------|----------------------|-----------------------|
| Vmax                   | 4.2         | -0.90                | -0.0005               |
| Vmin                   | 3.2         | -0.47                | -0.0003               |

|                              |      |
|------------------------------|------|
| Measurement uncertainty (Hz) | <±96 |
|------------------------------|------|

Verdict: PASS

## Radiated emissions

### SPECIFICATION

FCC §27.53 (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

FCC §27.53 (c) & (f).

On any frequency outside the 776-788 MHz band. the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least  $43 + 10 \log (P)$  dB.

On all frequencies between 763-775 MHz and 793-805 MHz. by a factor not less than  $65 + 10 \log (P)$  dB in a 6.25 kHz band segment. for mobile and portable stations.

For operations in the 746-758 MHz. 775-788 MHz. and 805-806 MHz bands. emissions in the band 1559-1610 MHz shall be limited to -70 dBW (-40 dBm)/MHz equivalent isotropically radiated power (EIRP) for wideband signals. and -80 dBW (-50 dBm) EIRP for discrete emissions of less than 700 Hz bandwidth.

RSS-130 Clause 4.7.

The unwanted emissions in any 100 kHz bandwidth on any frequency outside the low frequency edge and the high frequency edge of each frequency block range(s), 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 of the equipment's frequency block range, a resolution bandwidth of 30 kHz may be employed.

The power of any unwanted emissions in any 6.25 kHz bandwidth for all frequencies between 763-775 MHz and 793-806 MHz shall be attenuated below the transmitter power. P (dBW). by at least  $65 + 10 \log_{10} p$  (watts). dB. for mobile and portable equipment.

The e.i.r.p. in the band 1559-1610 MHz shall not exceed -70 dBW (-40 dBm) /MHz for wideband signal and -80 dBW (-50 dBm) for discrete emission with bandwidth less than 700 Hz.

FCC §27.53 (h). RSS-139 Clause 6.6.

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:

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

## 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 1 meter high 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 field strength (dBμV/m) is measured and 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:

$EIRP (dBm) = E (dB\mu V/m) + 20\log(D) - 104.8$ ; where D is the measurement distance (in the far field region) in m. D = 3 m

Measurement Limit:

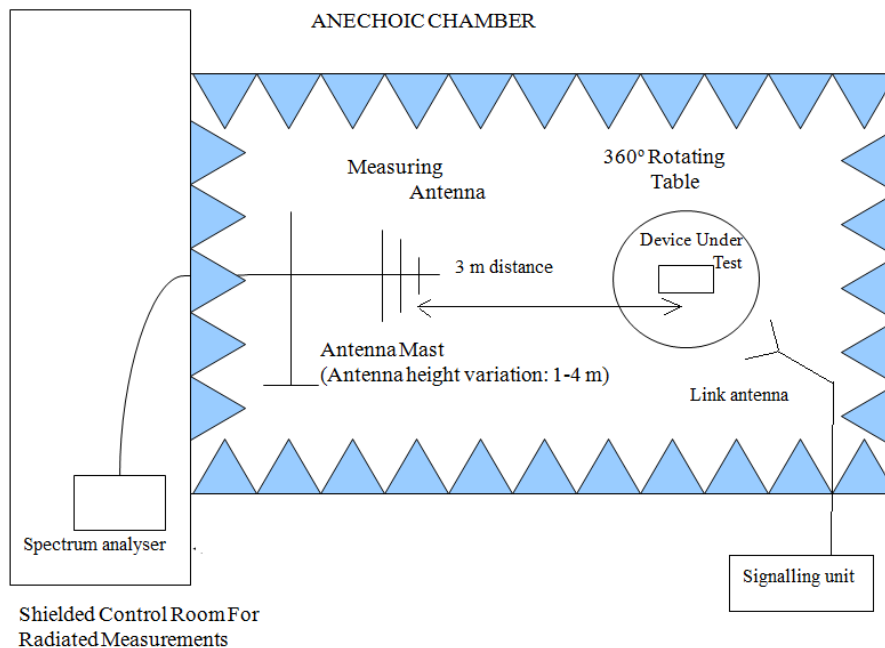
According to specification, the power of emissions shall be attenuated below the transmitter power (P) by a factor of at least  $43 + 10 \log (P)$  dB. P in watts.

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

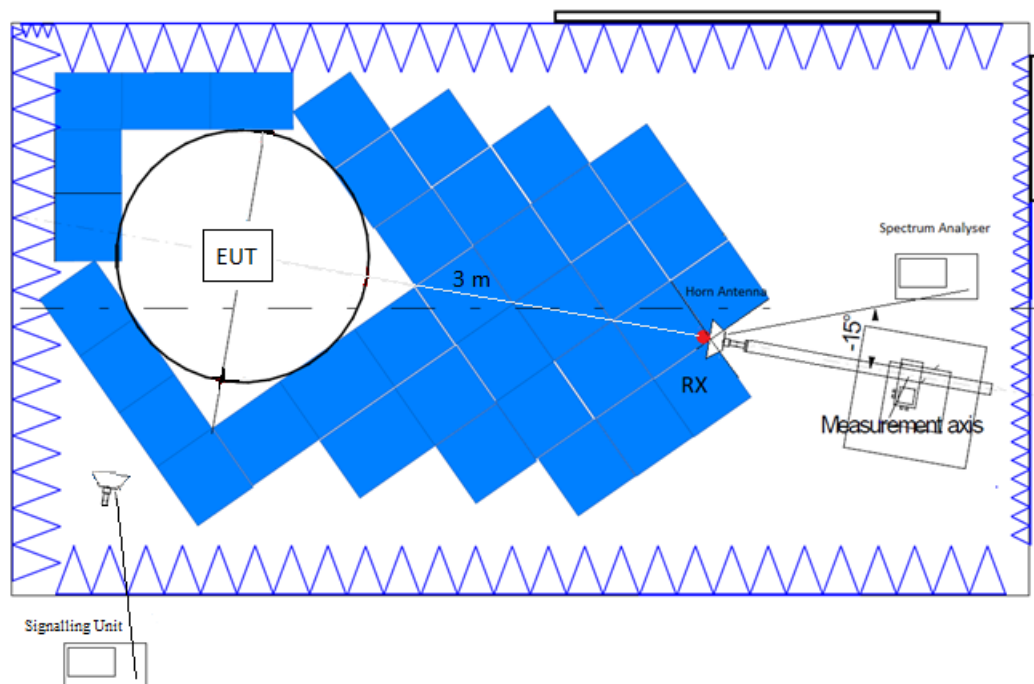
$P_o (dBm) - [43 + 10 \log (P_o \text{ in mwatts}) - 30] = -13 \text{ dBm}$

## TEST SETUP

Radiated measurements below 1 GHz.



## Radiated measurements above 1 GHz.



## RESULTS

### **LTE Band 4:**

QPSK and 16-QAM Modulations:

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

#### **- LOW CHANNEL:**

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

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

##### **Frequency range 1 – 3 GHz**

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

##### **Frequency range 3 – 18 GHz**

Spurious frequencies detected closest to the limit:

| Spurious frequency (GHz) | Detector | E.I.R.P. (dBm) | Polarization |
|--------------------------|----------|----------------|--------------|
| 6.8411                   | Peak     | -28.71         | V            |

#### **- MIDDLE CHANNEL:**

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

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

##### **Frequency range 1 – 3 GHz**

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

##### **Frequency range 3 – 18 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 – 3 GHz**

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

**Frequency range 3 – 18 GHz**

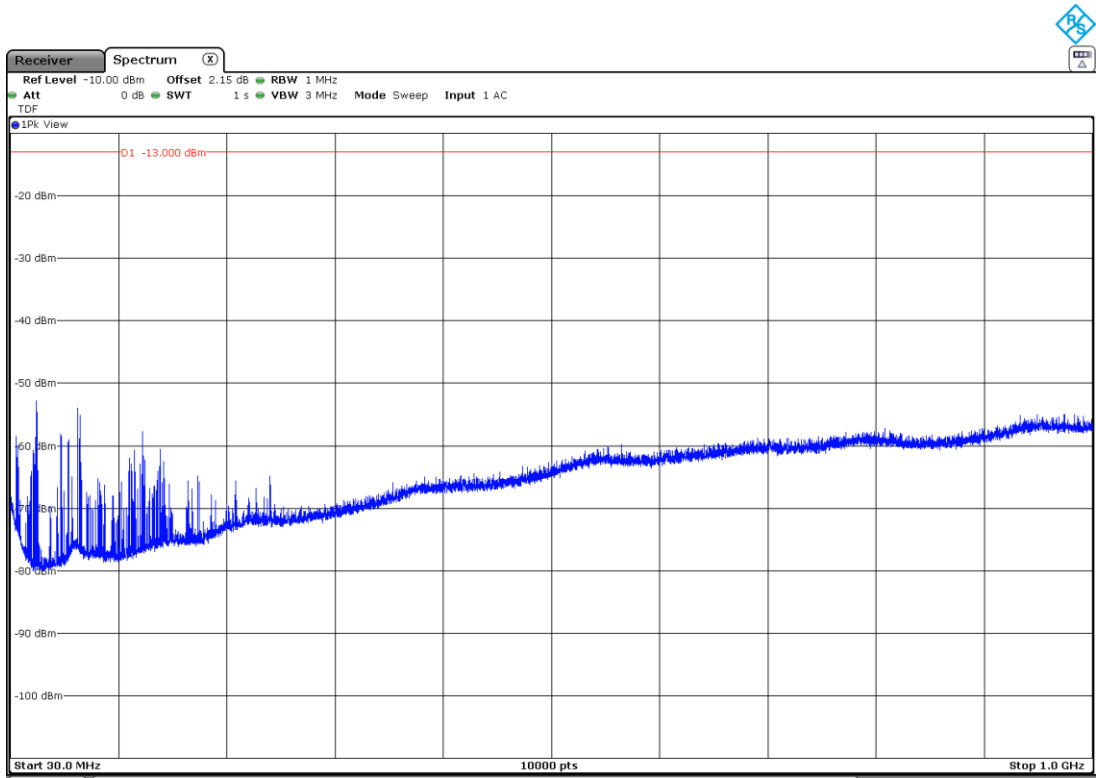
No spurious frequencies at less than 20 dB below the limit.

Measurement uncertainty (dB)  $<\pm 5.08$  for  $f < 1\text{GHz}$   
 $<\pm 4.11$  for  $f \geq 1\text{GHz}$  up to  $3\text{GHz}$   
 $<\pm 5.13$  for  $f \geq 3\text{GHz}$  up to  $18\text{GHz}$

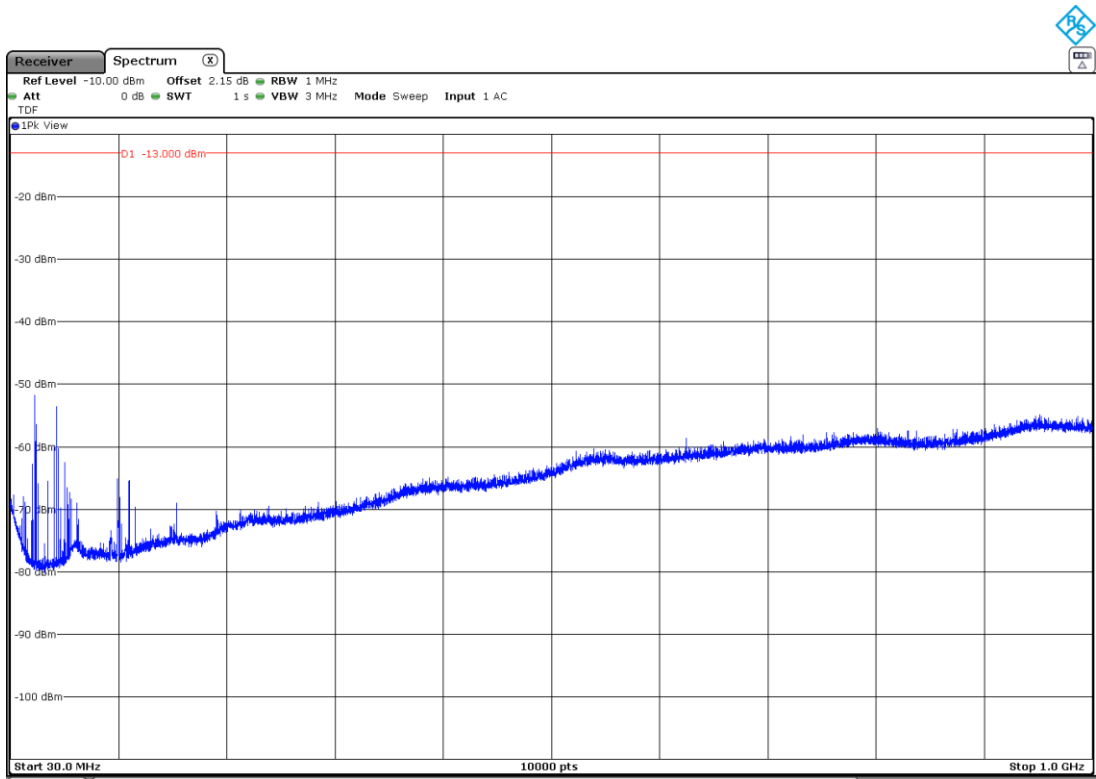
Verdict: PASS

**FREQUENCY RANGE 30 MHz - 1 GHz (worst case):**

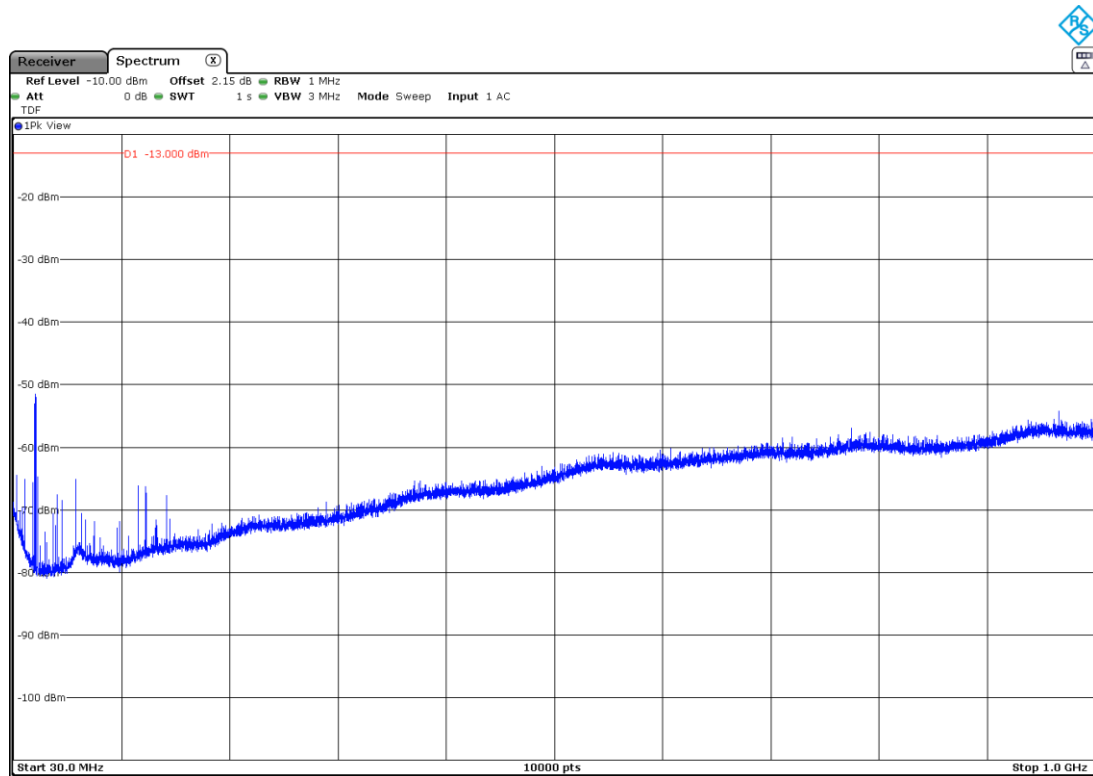
- Low Channel:



- Middle Channel:

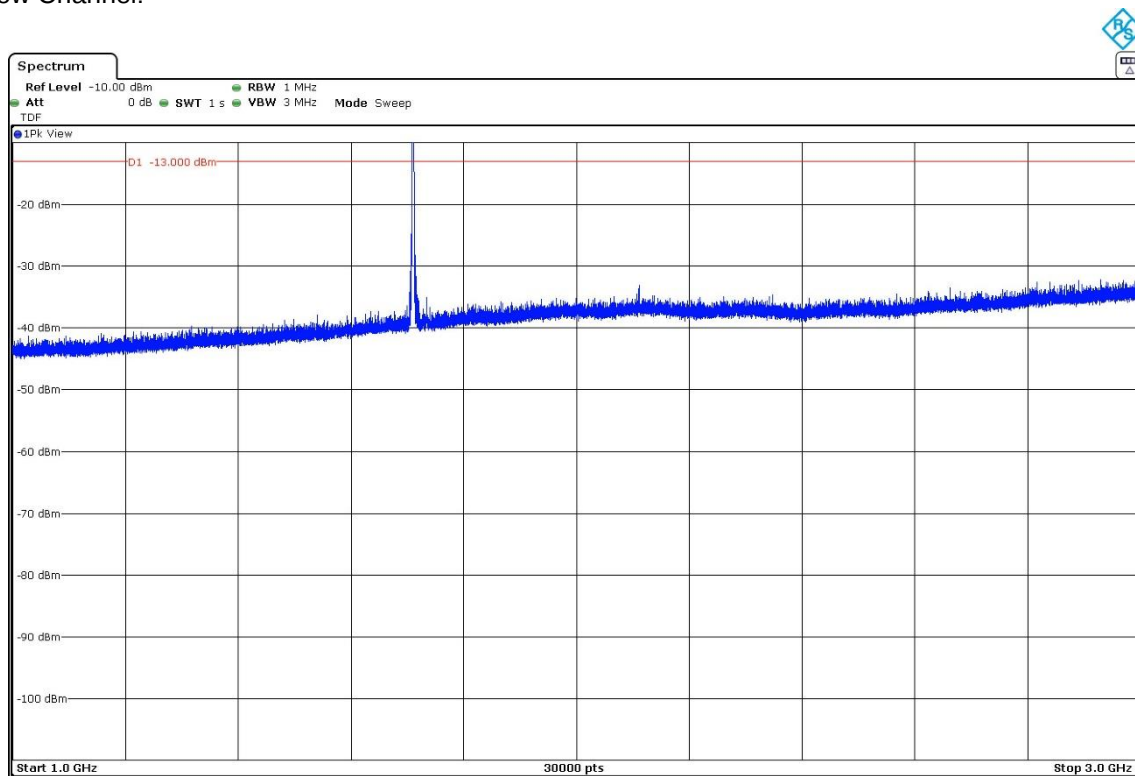


- High Channel:



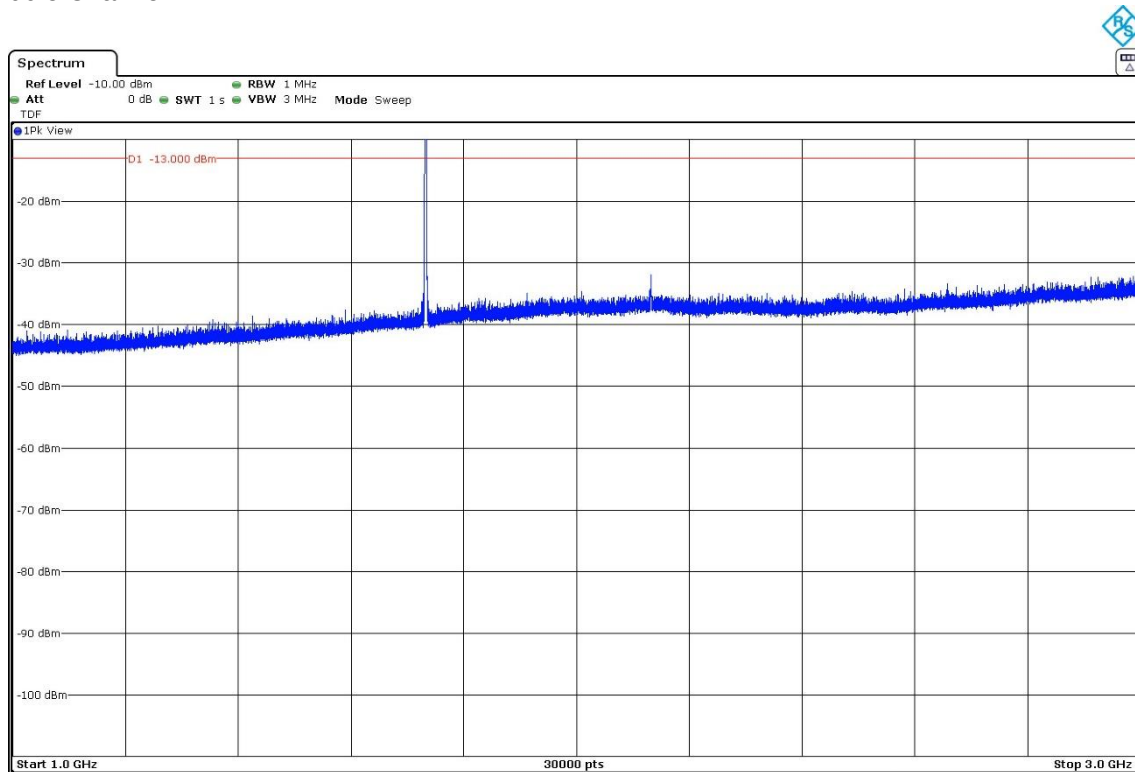
#### FREQUENCY RANGE 1 GHz - 3 GHz (worst case):

- Low Channel:



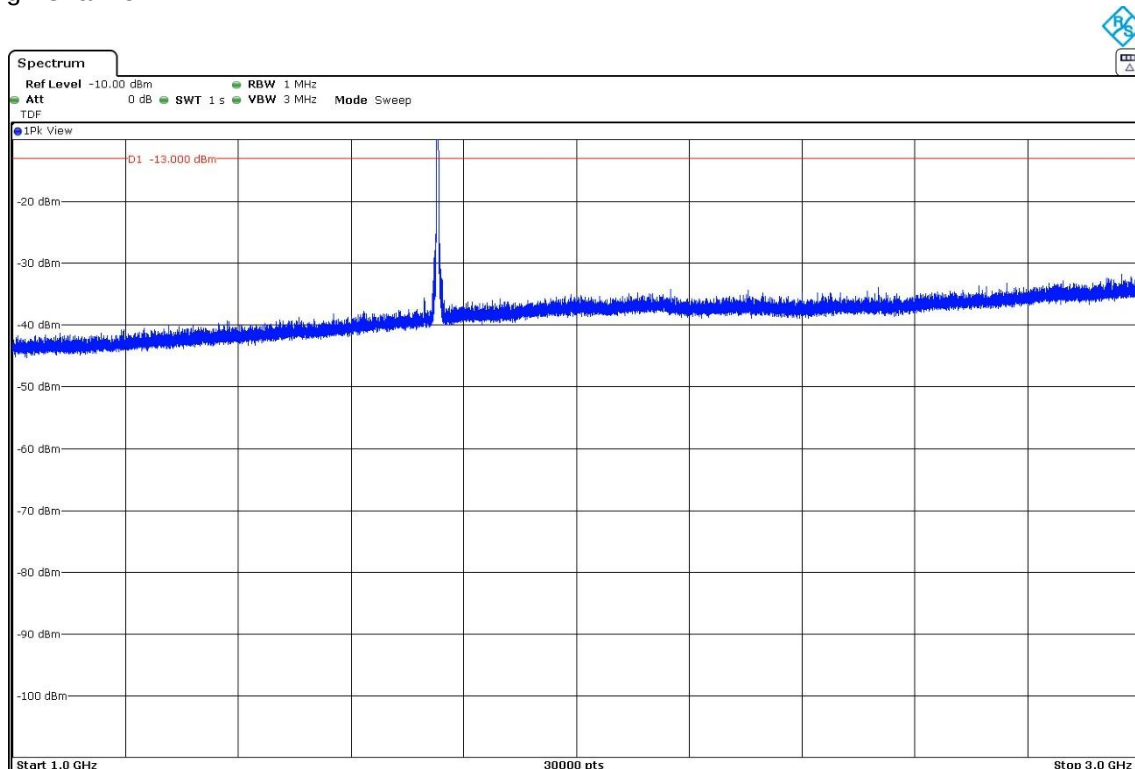
The peak above the limit is the carrier frequency.

- Middle Channel:



The peak above the limit is the carrier frequency.

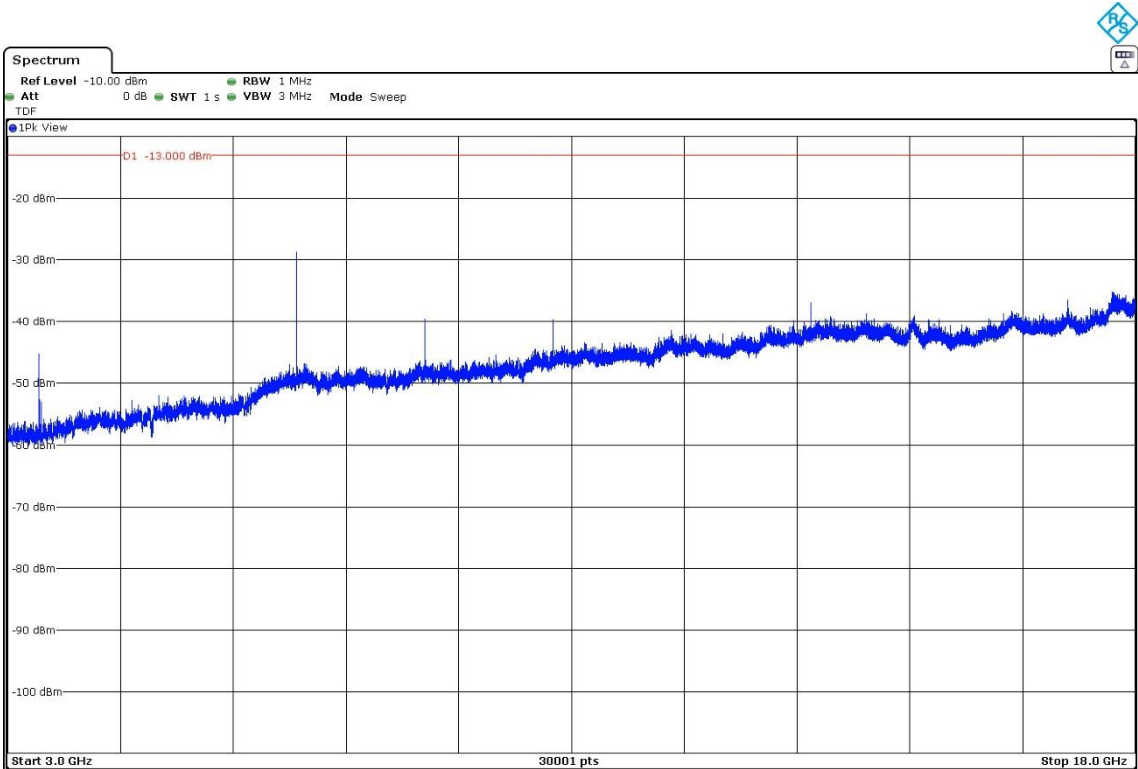
- High Channel:



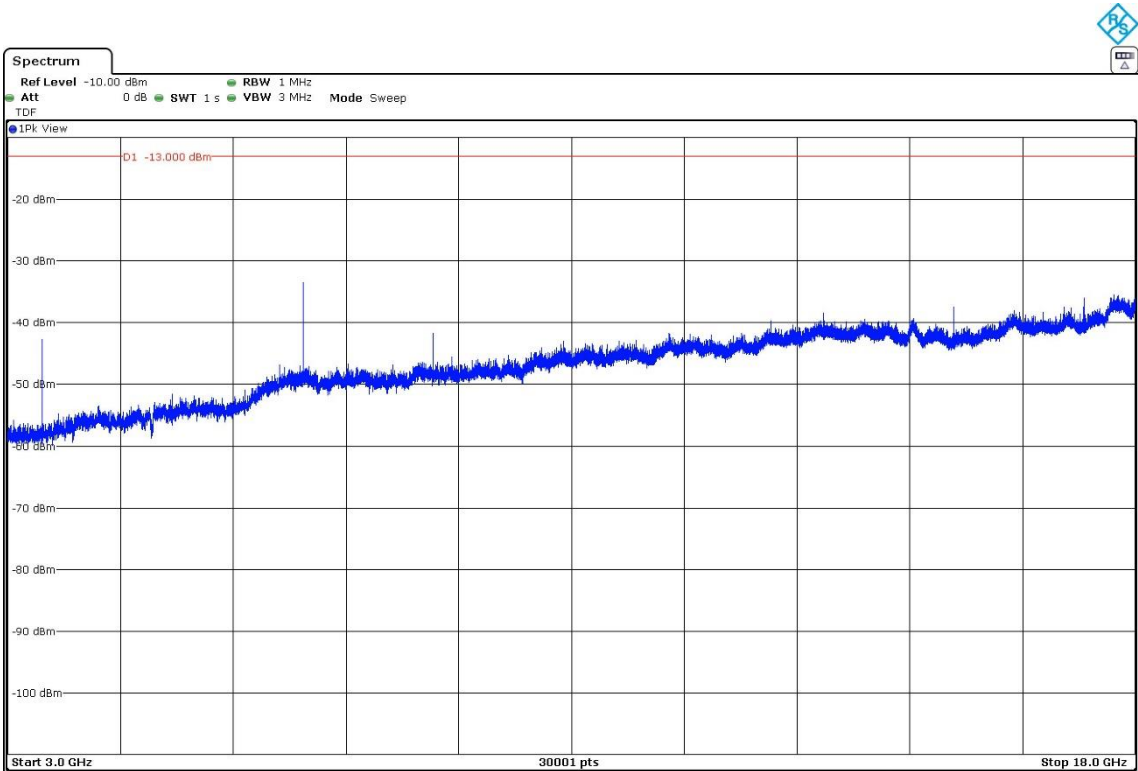
The peak above the limit is the carrier frequency.

FREQUENCY RANGE 3 GHz - 18 GHz (worst case):

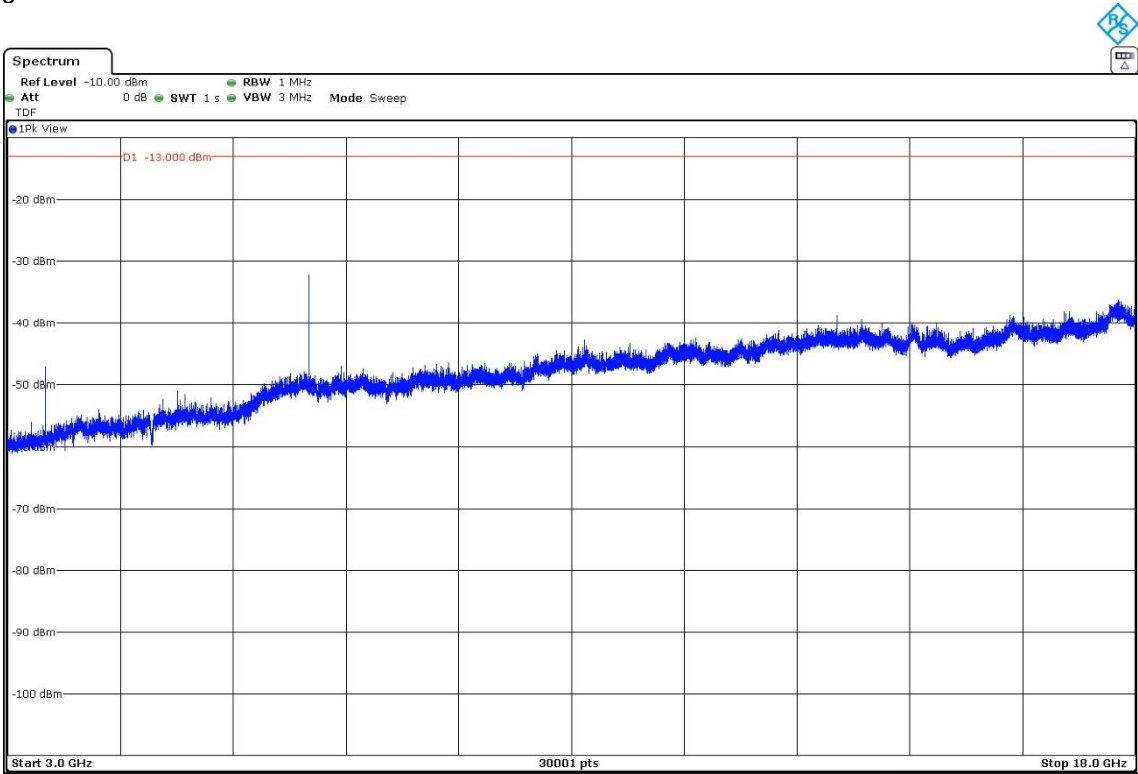
- Low Channel:



- Middle Channel:



- High Channel:



## **LTE Band 12:**

QPSK and 16-QAM Modulations:

A preliminary scan determined the QPSK modulation, BW = 3 MHz, RB Size = 1, RB Offset = 0, Narrowband = 0 as the worst case. The following tables and plots show the results for this worst-case configuration.

### **- 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**

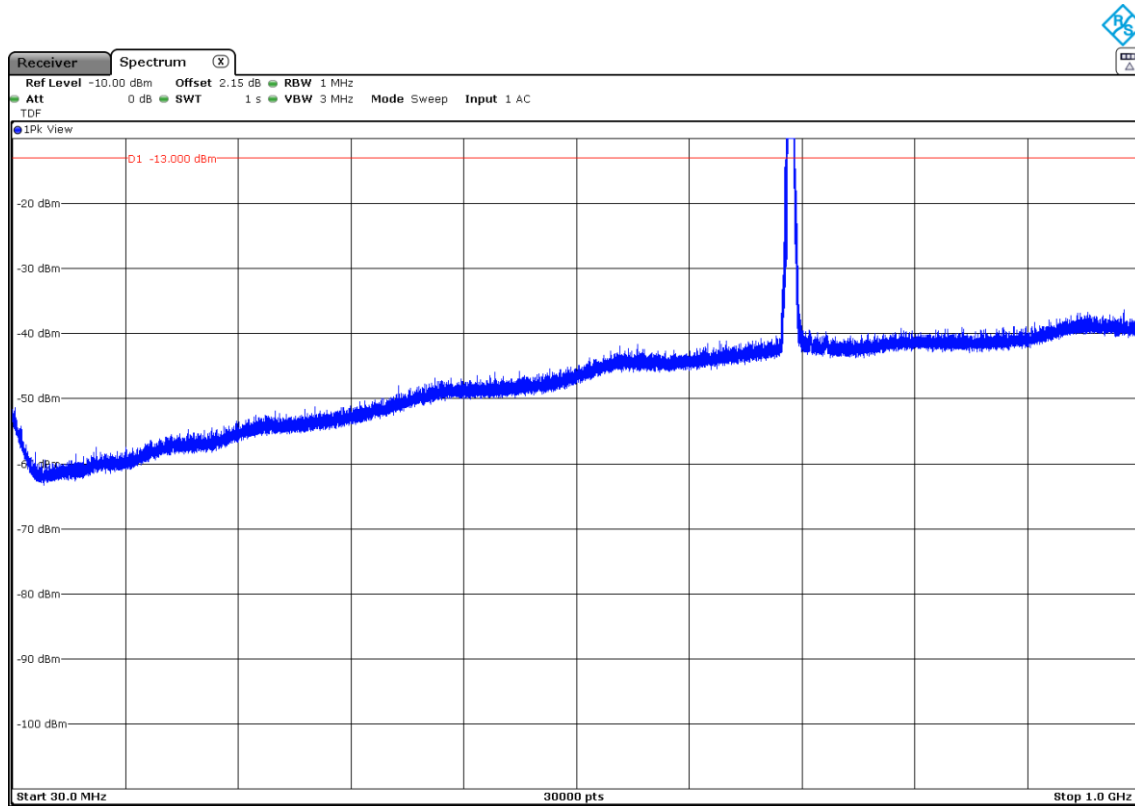
No spurious frequencies at less than 20 dB below the limit.

Measurement uncertainty (dB)  $< \pm 4.86$  for  $f < 1\text{ GHz}$   
 $< \pm 5.13$  for  $f \geq 1\text{ GHz}$  up to 8 GHz

Verdict: PASS

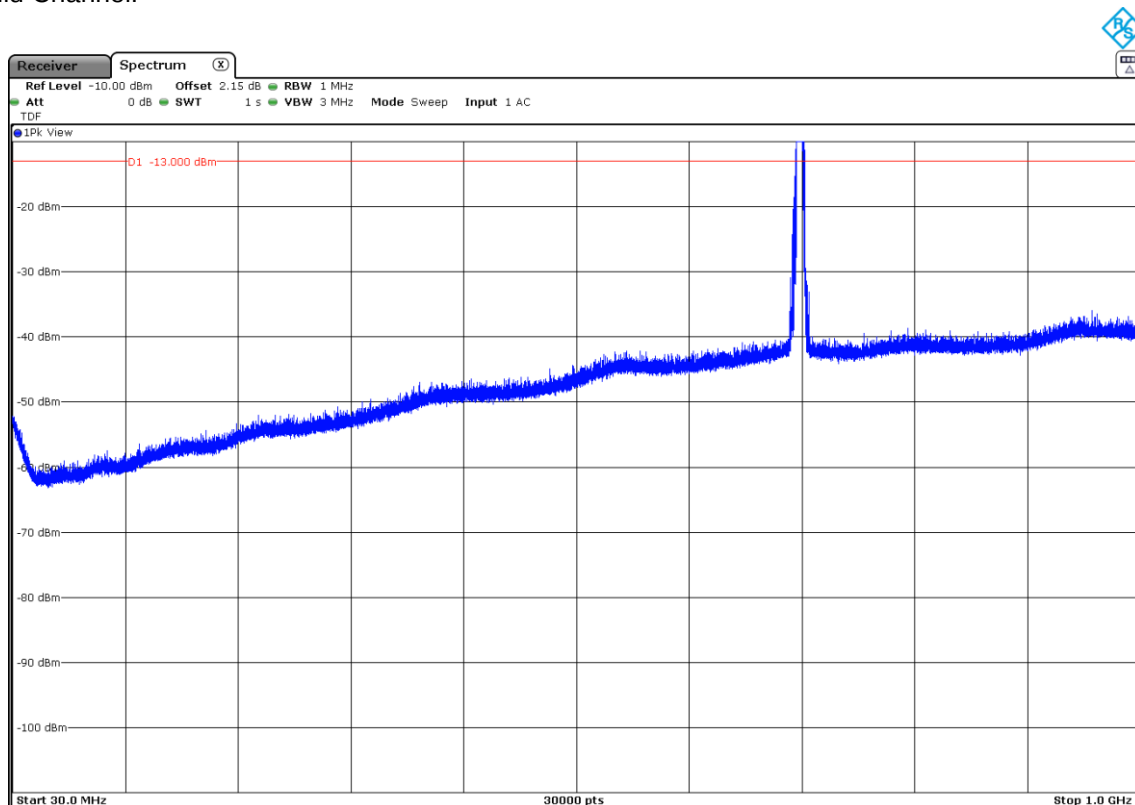
## FREQUENCY RANGE 30 MHz - 1 GHz (worst case):

- Low Channel:



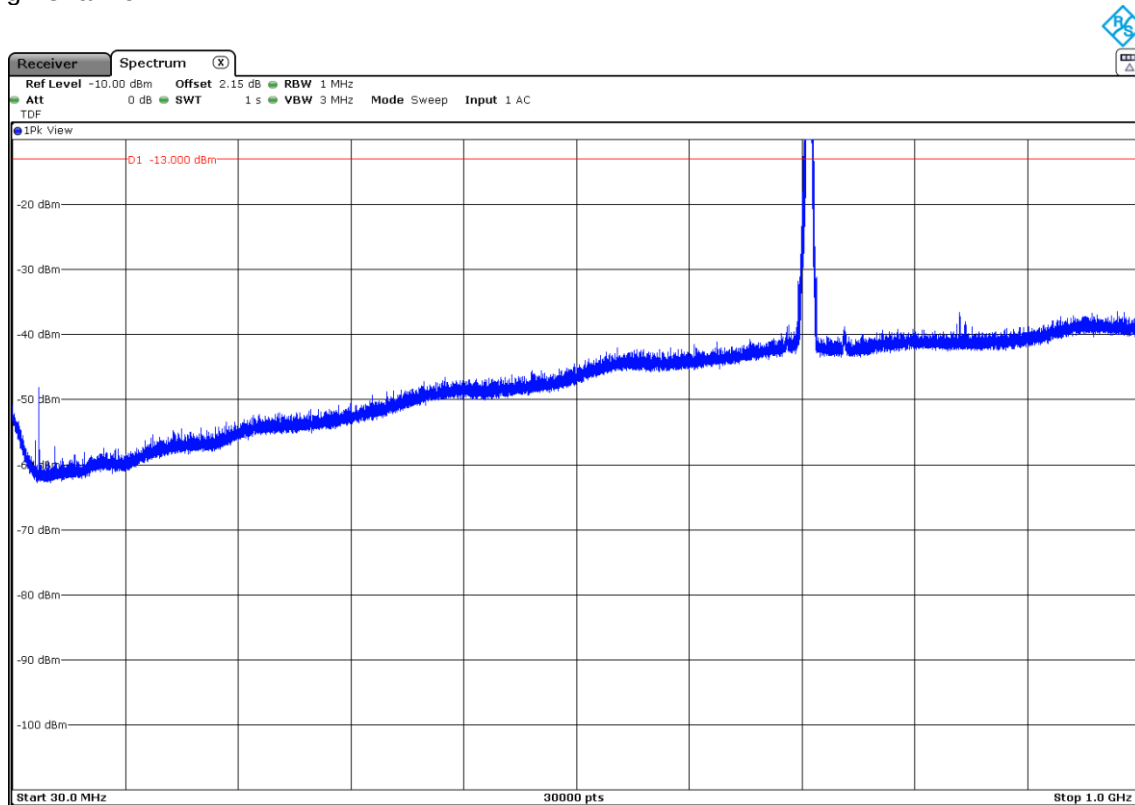
The peak above the limit is the carrier frequency.

- Mid Channel:



The peak above the limit is the carrier frequency.

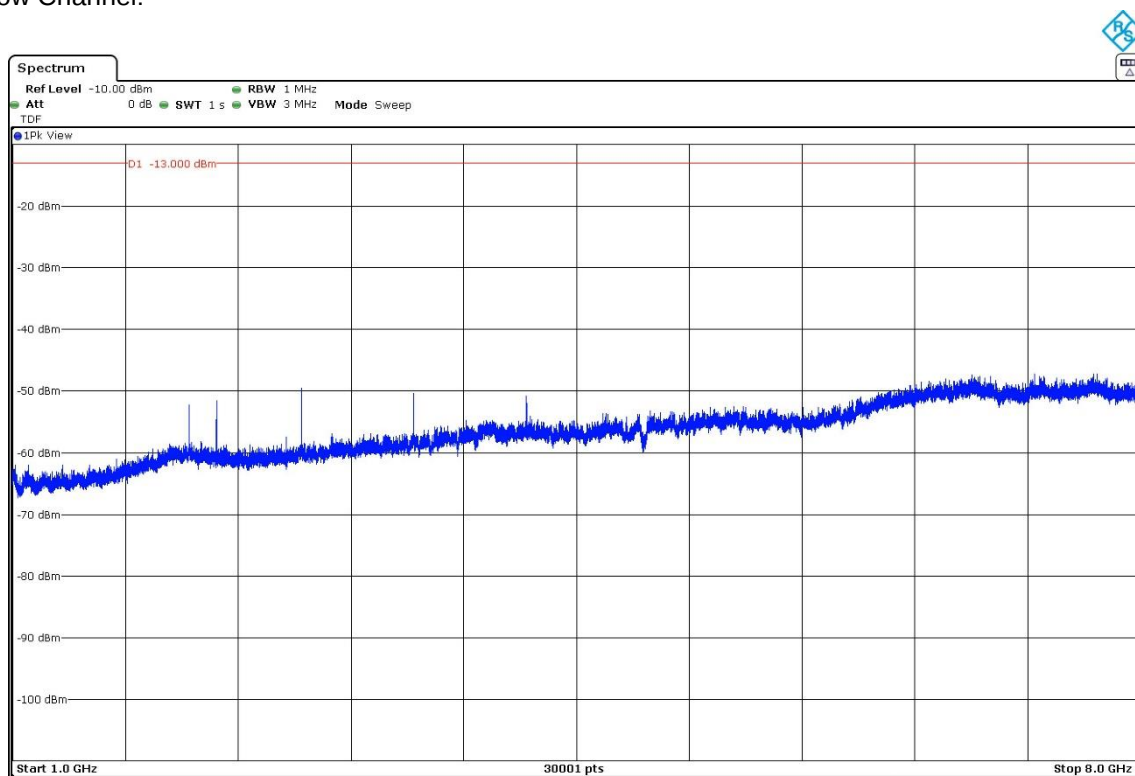
- High Channel:



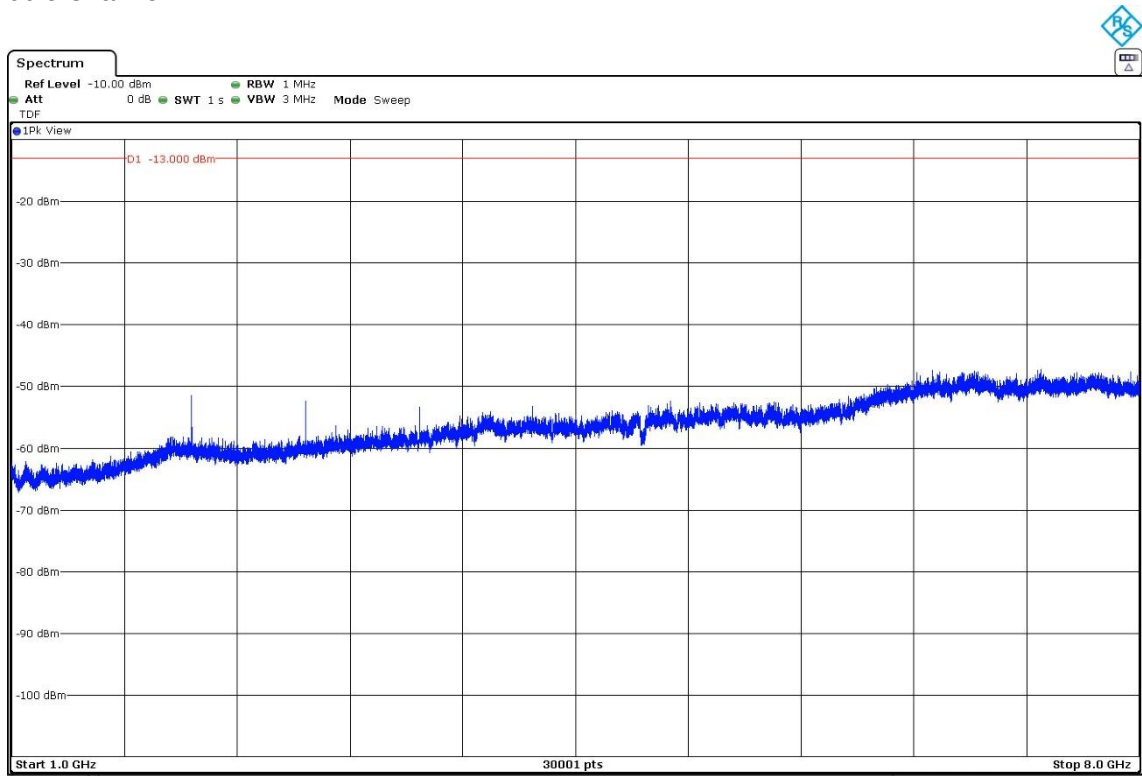
The peak above the limit is the carrier frequency.

## FREQUENCY RANGE 1 GHz - 8 GHz (worst case):

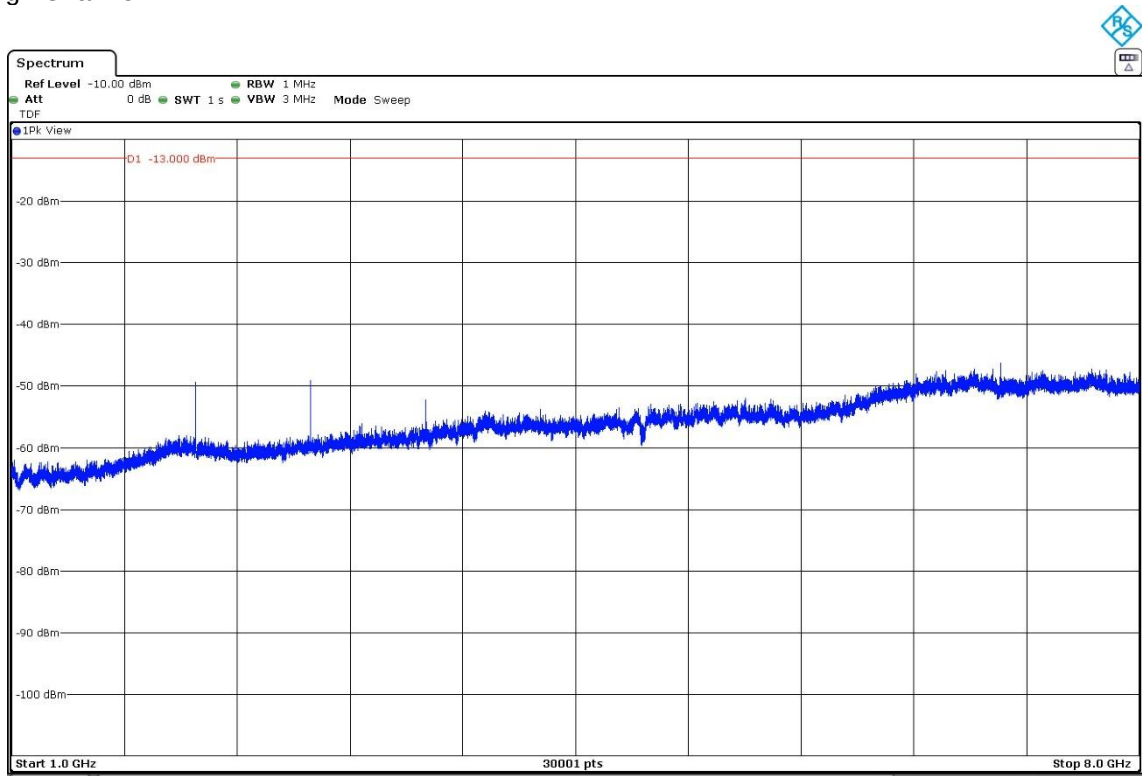
- Low Channel:



- Middle Channel:



- High Channel:



### **LTE Band 13:**

QPSK and 16-QAM Modulations:

A preliminary scan determined the QPSK modulation, BW = 5 MHz, RB Size = 1, RB Offset = 0, Narrowband = 0 as the worst case. The following tables and plots show the results for this worst-case configuration.

#### **- LOW CHANNEL:**

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

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

##### **Frequency range 763 MHz – 775 MHz:**

Spurious frequencies closest to the limit:

| Spurious frequency (MHz) | Detector | E.I.R.P. (dBm) | Polarization |
|--------------------------|----------|----------------|--------------|
| 771.4402                 | Peak     | -57.35         | V            |
| 773.0782                 | Peak     | -46.02         | V            |

##### **Frequency range 793 MHz – 806 MHz:**

Spurious frequencies closest to the limit:

| Spurious frequency (MHz) | Detector | E.I.R.P. (dBm) | Polarization |
|--------------------------|----------|----------------|--------------|
| 795.2232                 | Peak     | -56.71         | V            |

##### **Frequency range 1 – 8 GHz**

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

##### **Frequency range 1559 MHz – 1610 MHz:**

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 763 MHz – 775 MHz:**

Spurious frequencies closest to the limit:

| Spurious frequency (MHz) | Detector | E.I.R.P. (dBm) | Polarization |
|--------------------------|----------|----------------|--------------|
| 773.9050                 | Peak     | -46.32         | V            |

##### **Frequency range 793 MHz – 806 MHz:**

Spurious frequencies closest to the limit:

| Spurious frequency (MHz) | Detector | E.I.R.P. (dBm) | Polarization |
|--------------------------|----------|----------------|--------------|
| 797.7357                 | Peak     | -56.84         | H            |

### Frequency range 1 – 8 GHz

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

### Frequency range 1559 MHz – 1610 MHz:

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 763 MHz – 775 MHz:

Spurious frequencies closest to the limit:

| Spurious frequency (MHz) | Detector | E.I.R.P. (dBm) | Polarization |
|--------------------------|----------|----------------|--------------|
| 773.6465                 | Peak     | -53.80         | H            |

### Frequency range 793 MHz – 806 MHz:

Spurious frequencies closest to the limit:

| Spurious frequency (MHz) | Detector | E.I.R.P. (dBm) | Polarization |
|--------------------------|----------|----------------|--------------|
| 793.1073                 | Peak     | -55.02         | V            |
| 800.1875                 | Peak     | -60.11         | V            |

### Frequency range 1 – 8 GHz

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

### Frequency range 1559 MHz – 1610 MHz:

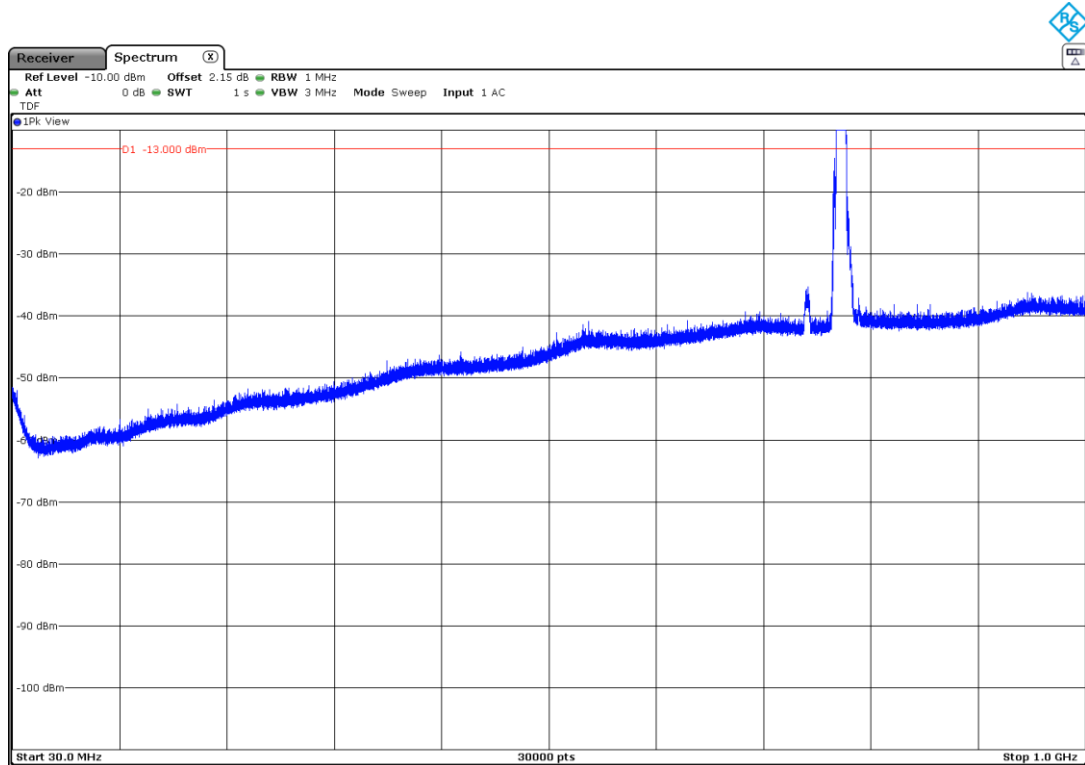
No spurious frequencies at less than 20 dB below the limit.

Measurement uncertainty (dB)  $< \pm 5.08$  for  $f < 1\text{GHz}$   
 $< \pm 5.13$  for  $f \geq 1\text{GHz}$  up to 8 GHz

Verdict: PASS

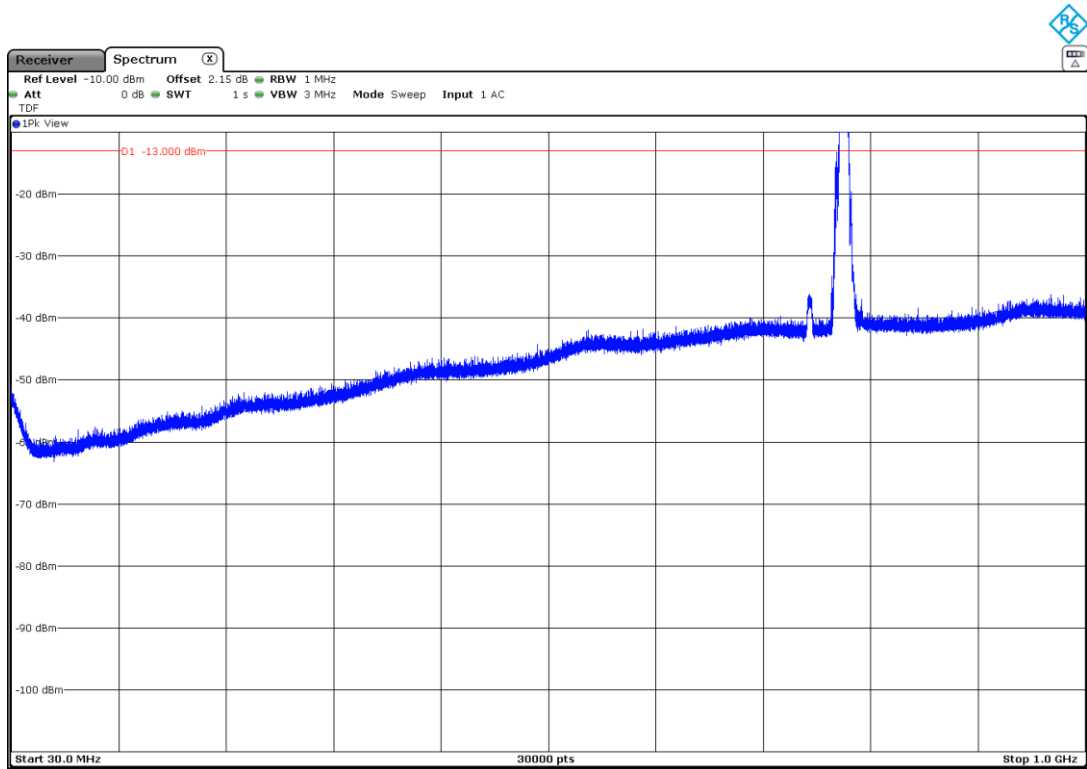
## FREQUENCY RANGE 30 MHz - 1 GHz (worst case):

- Low Channel:



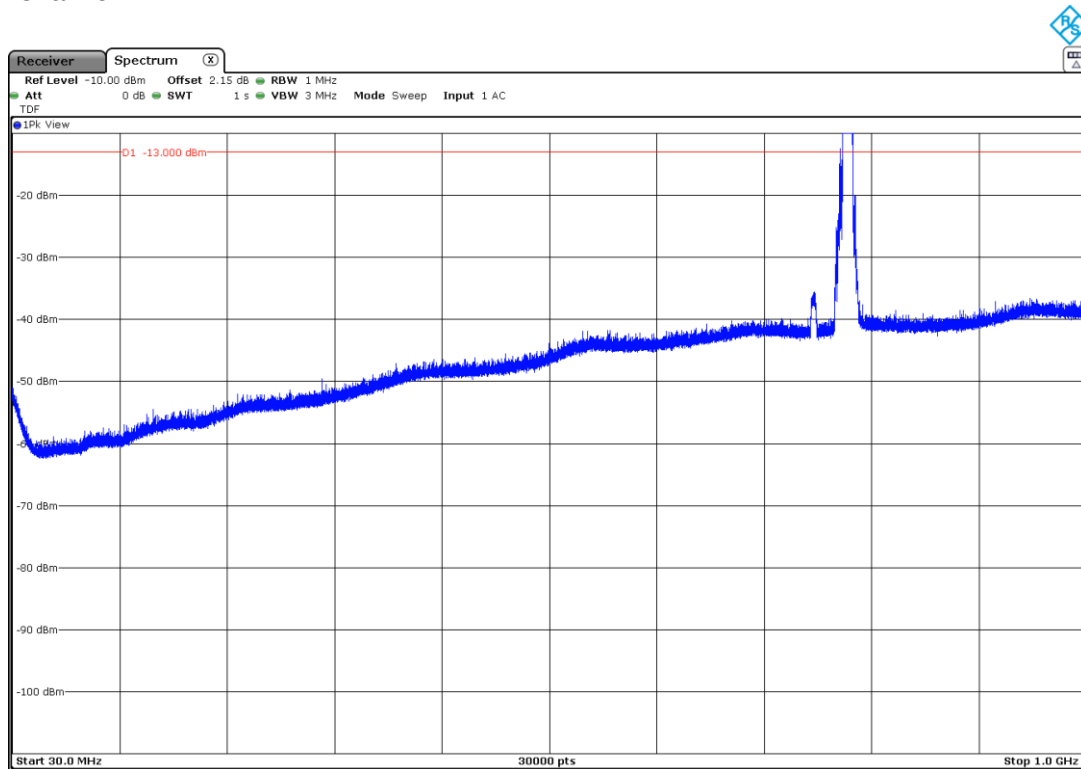
The peak above the limit is the carrier frequency. The other peak is the downlink signal.

- Middle Channel:



The peak above the limit is the carrier frequency. The other peak is the downlink signal.

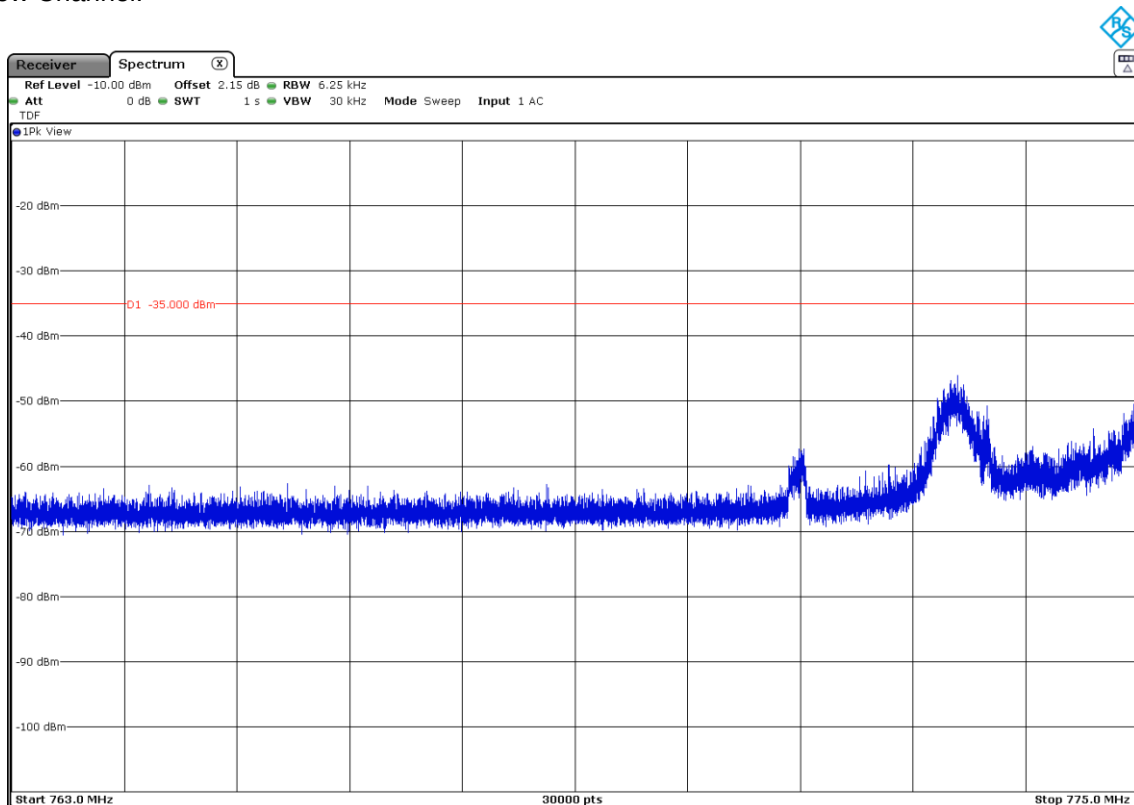
- High Channel:



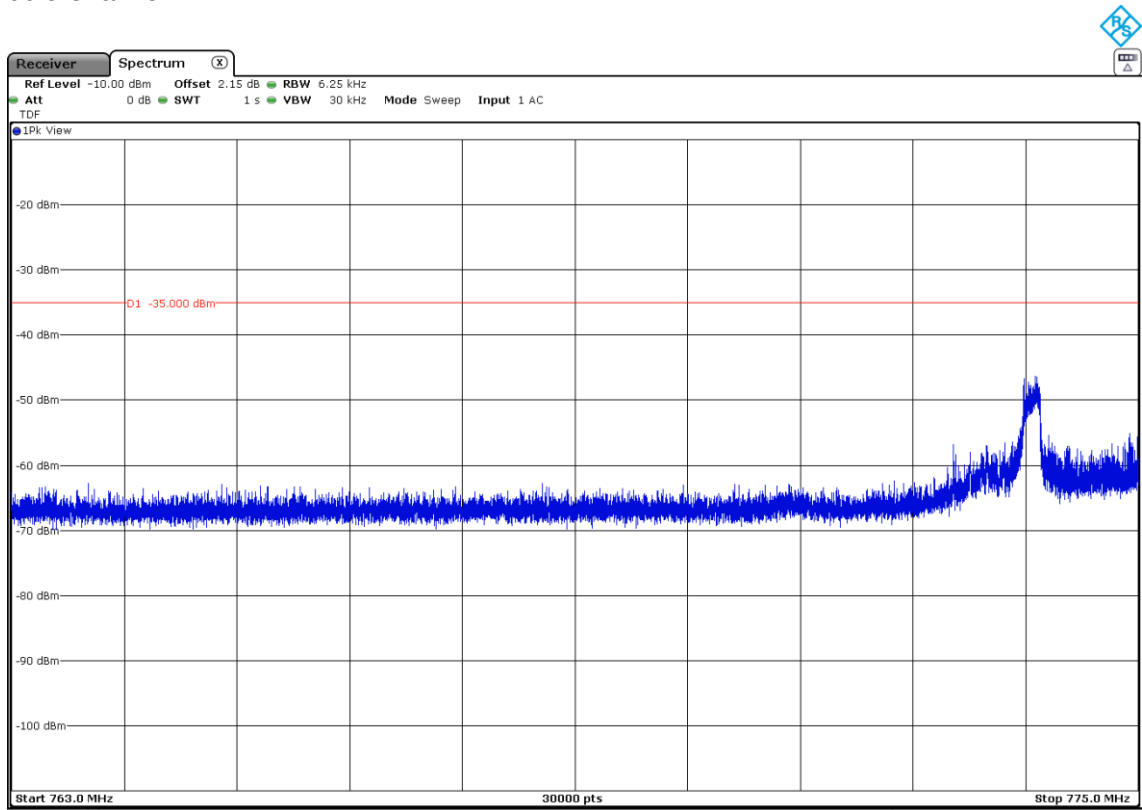
The peak above the limit is the carrier frequency. The other peak is the downlink signal.

#### FREQUENCY RANGE 763 MHz - 775 MHz (worst case):

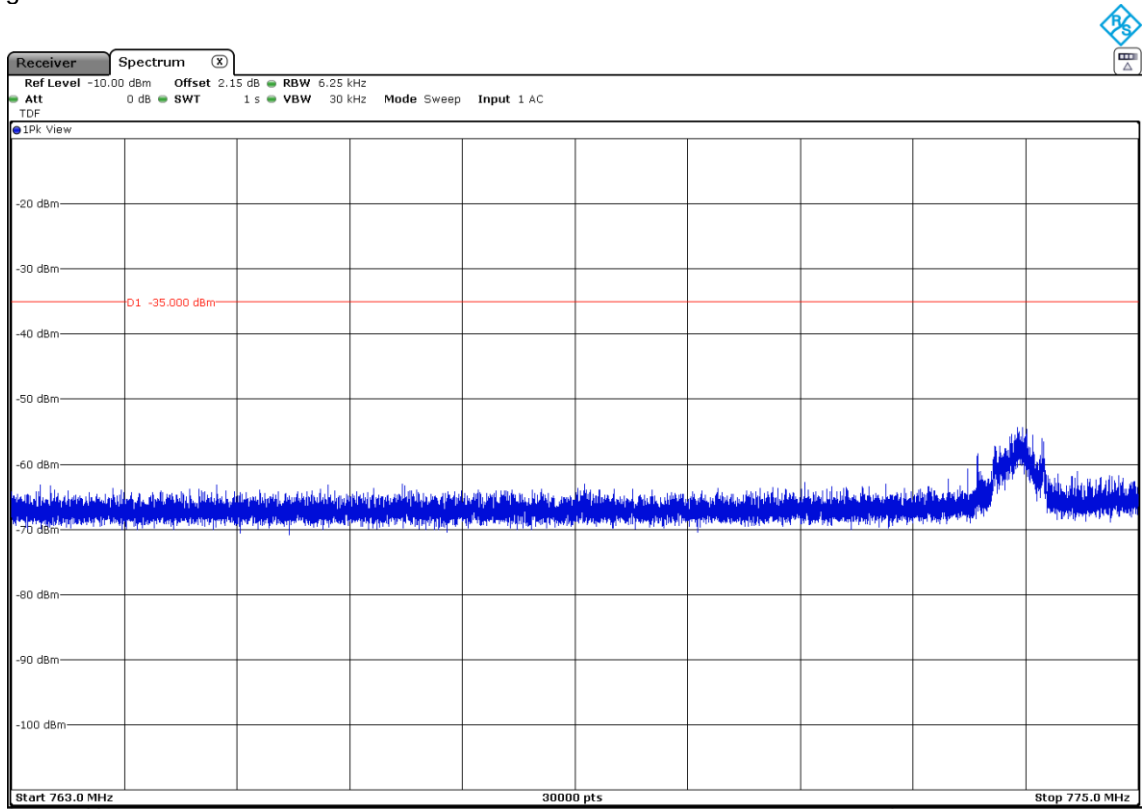
- Low Channel:



- Middle Channel:

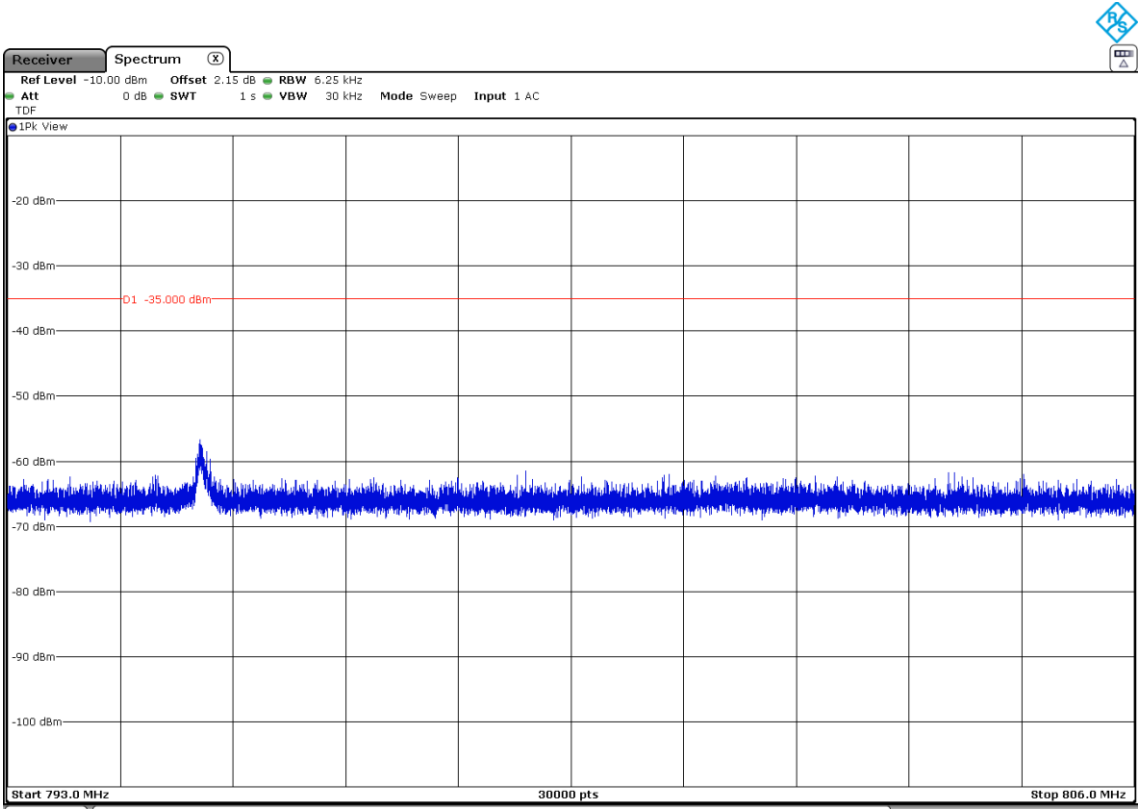


- High Channel:

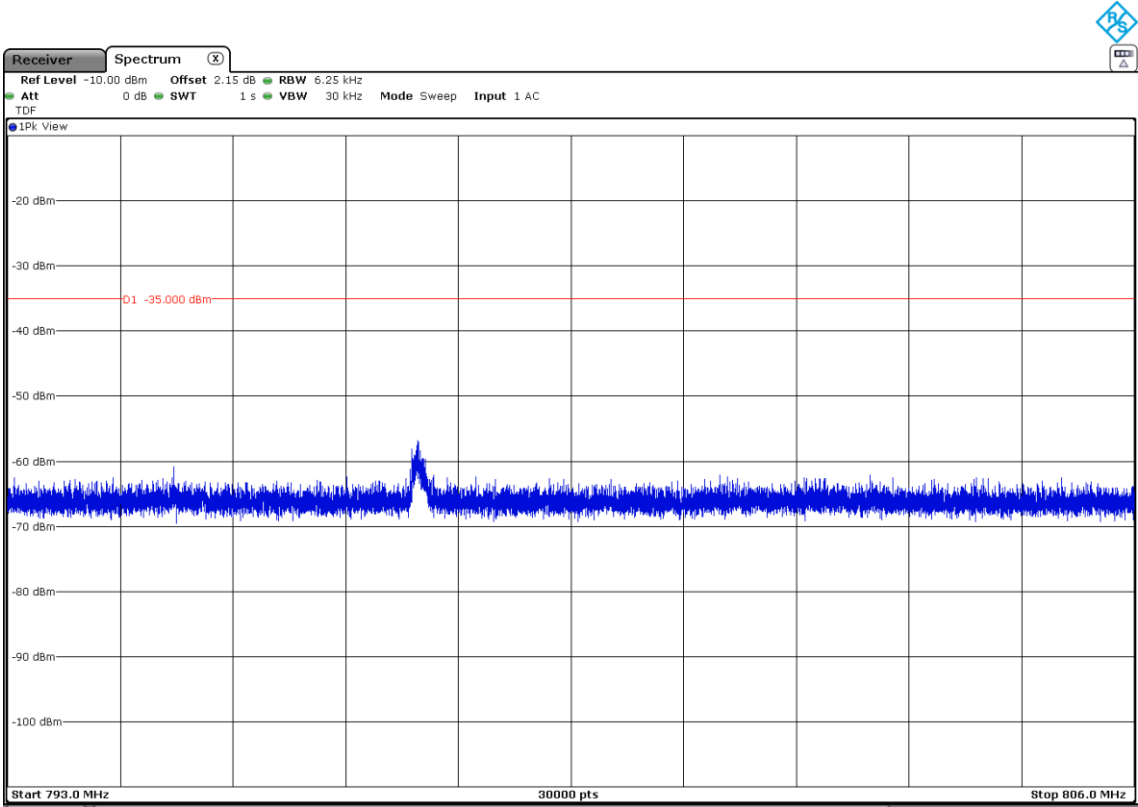


FREQUENCY RANGE 793 MHz - 806 MHz (worst case):

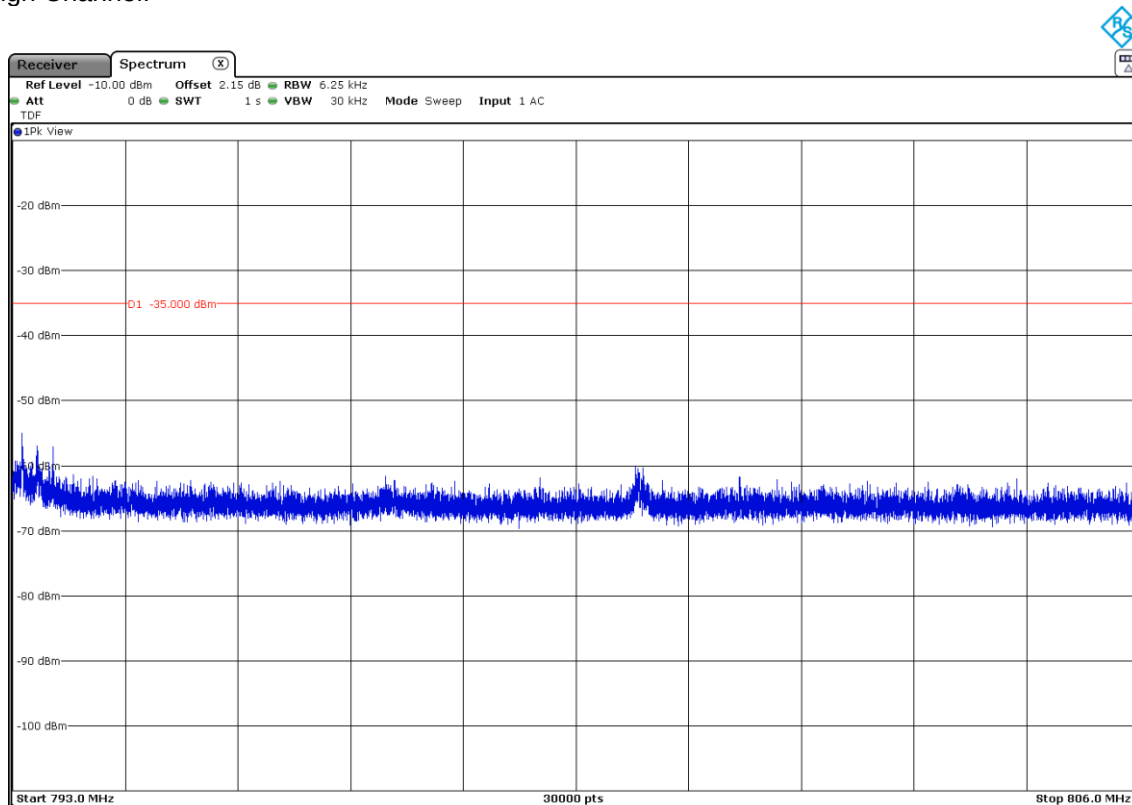
- Low Channel:



- Middle Channel:

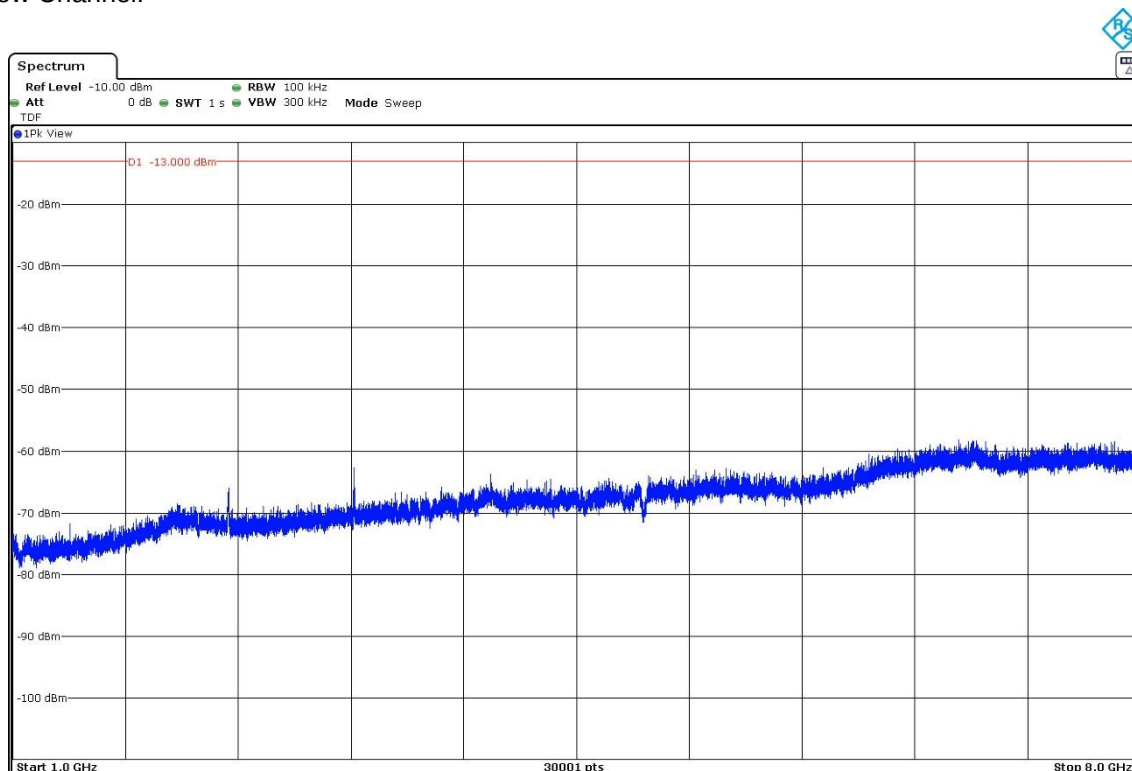


- High Channel:

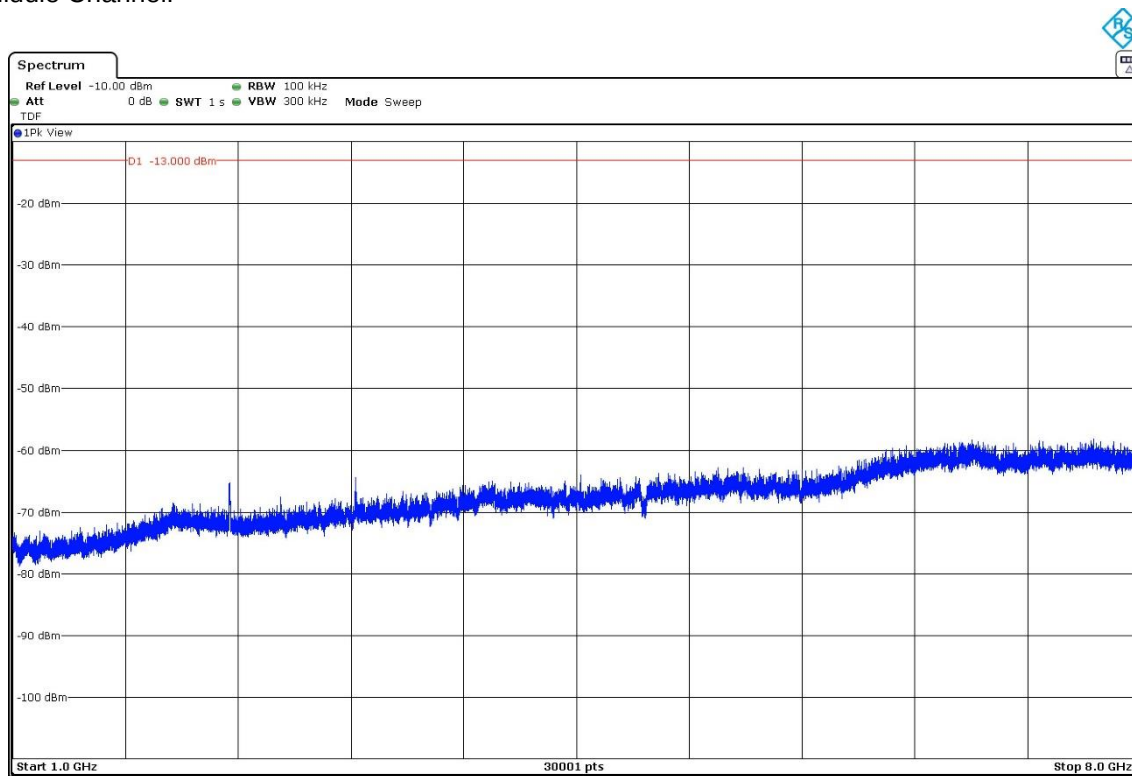


#### FREQUENCY RANGE 1 GHz - 8 GHz (worst case):

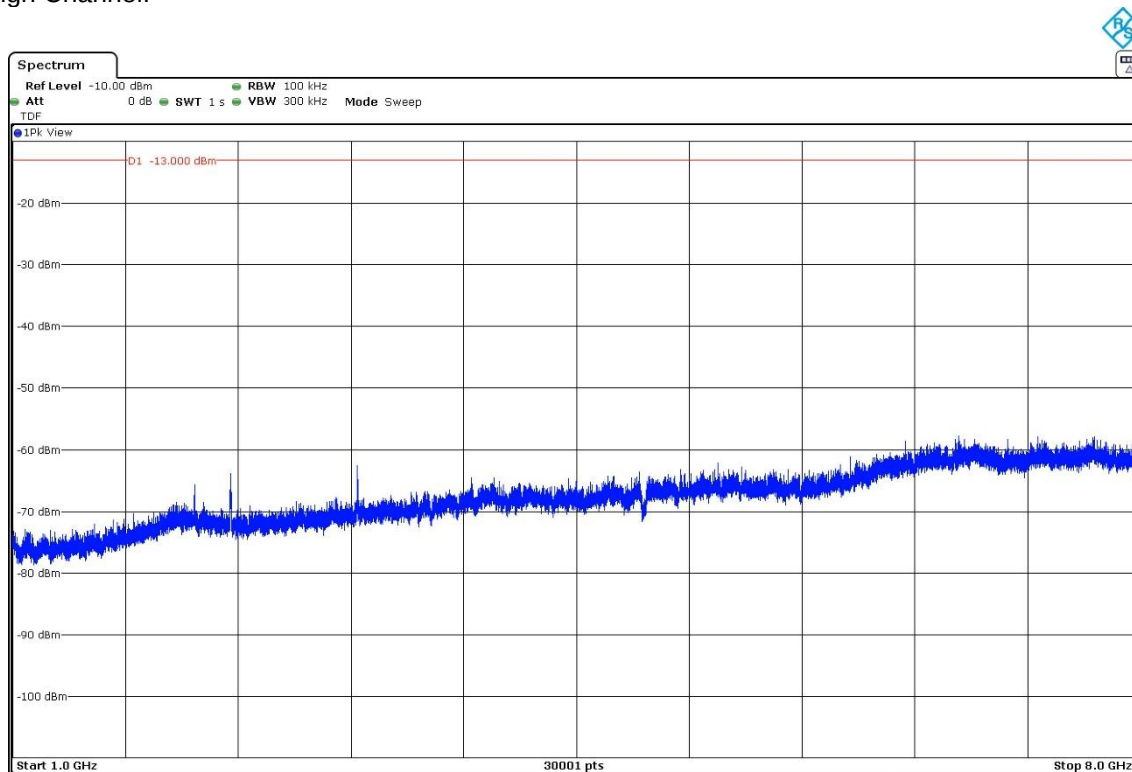
- Low Channel:



- Middle Channel:

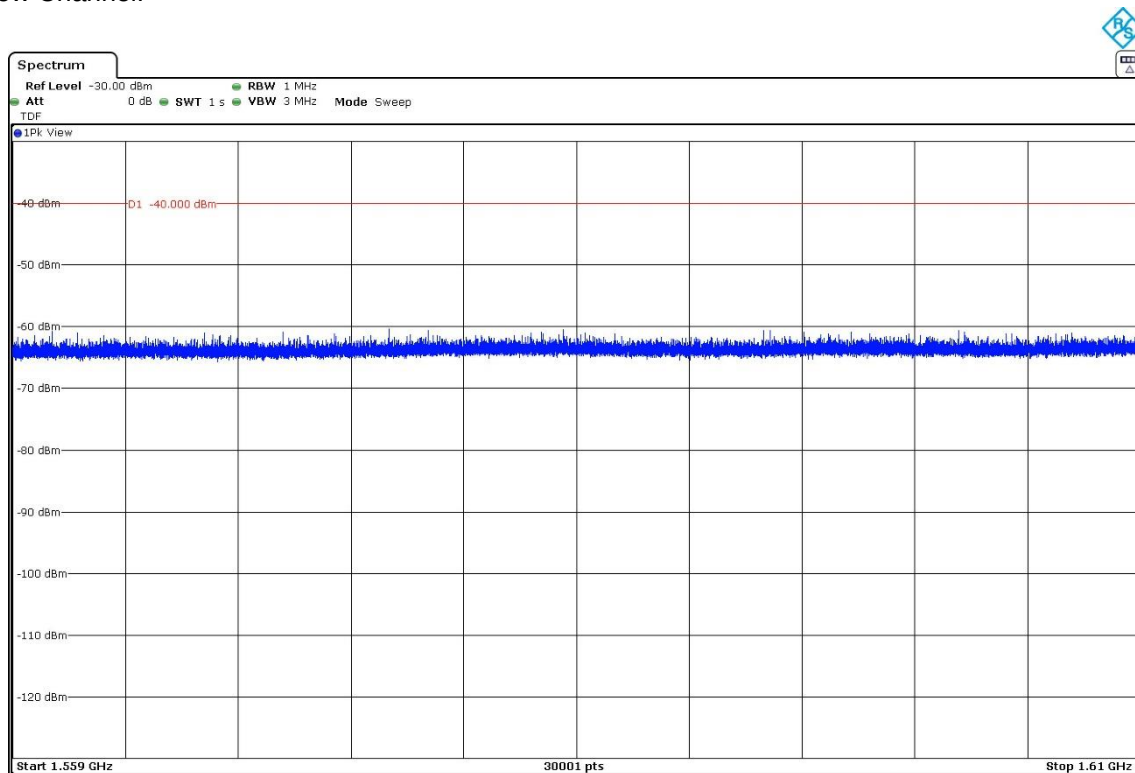


- High Channel:

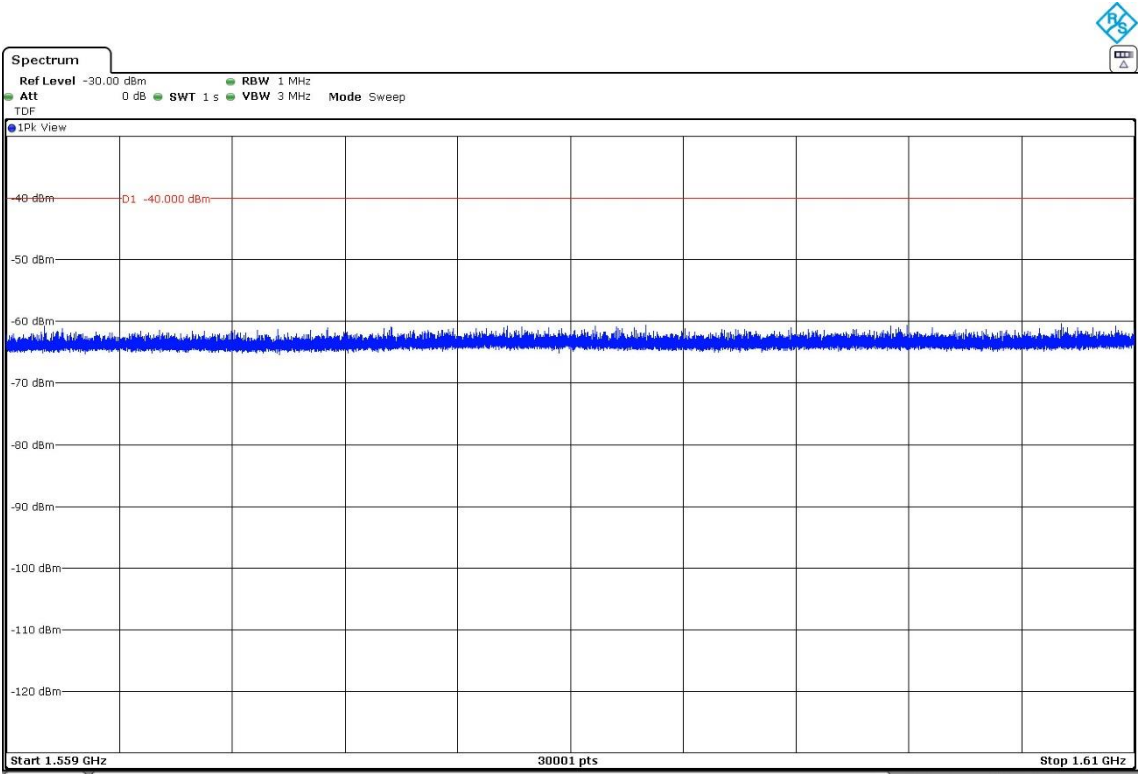


## FREQUENCY RANGE 1559 MHz - 1610 MHz (worst case):

- Low Channel:



- Middle Channel:



- High Channel:

