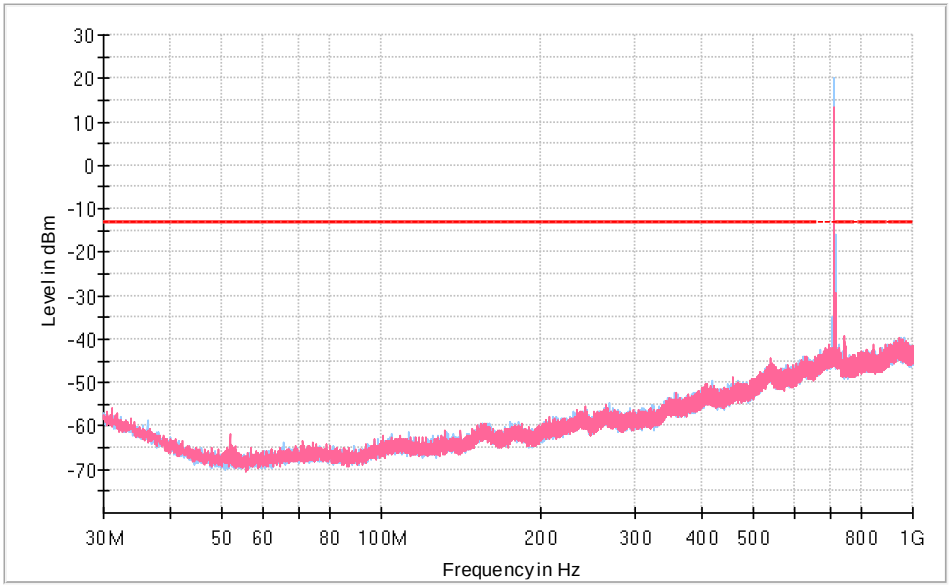
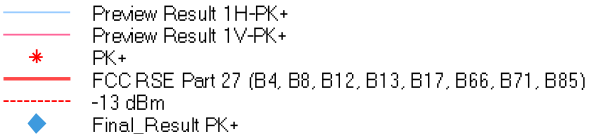
- HIGH CHANNEL:

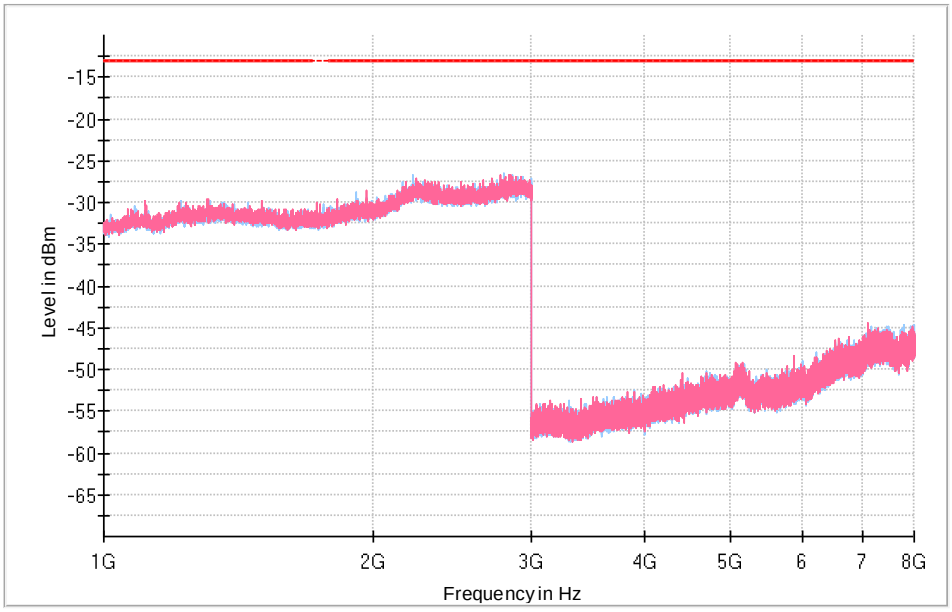


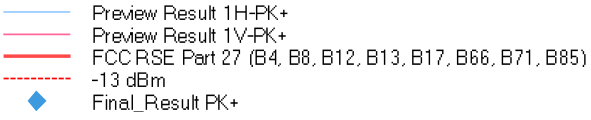




The peak above the limit is the LTE Cat-M1 Band 85 carrier frequency.

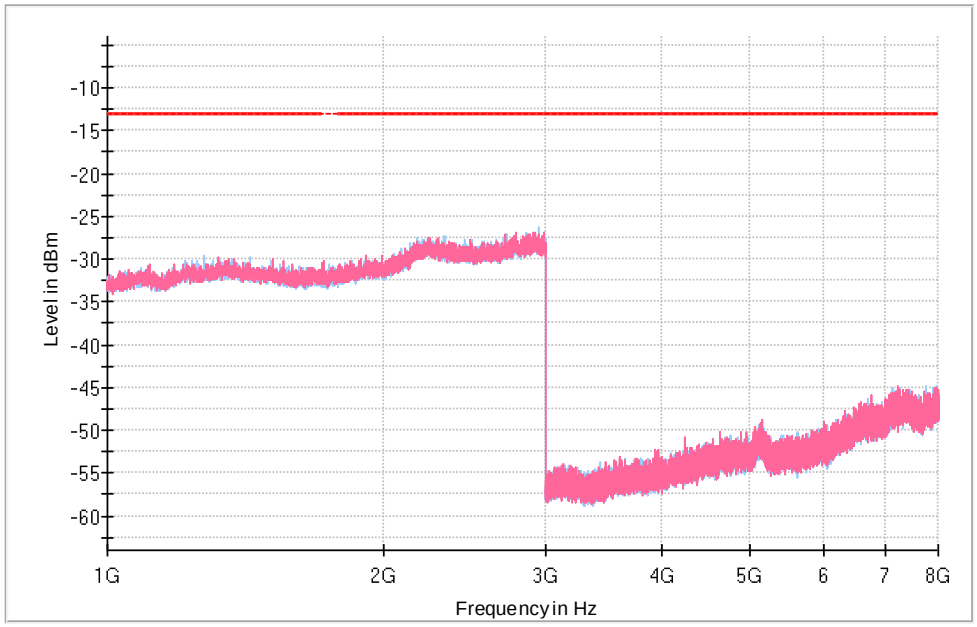
**FREQUENCY RANGE 1 GHz - 8 GHz**

- LOW CHANNEL:



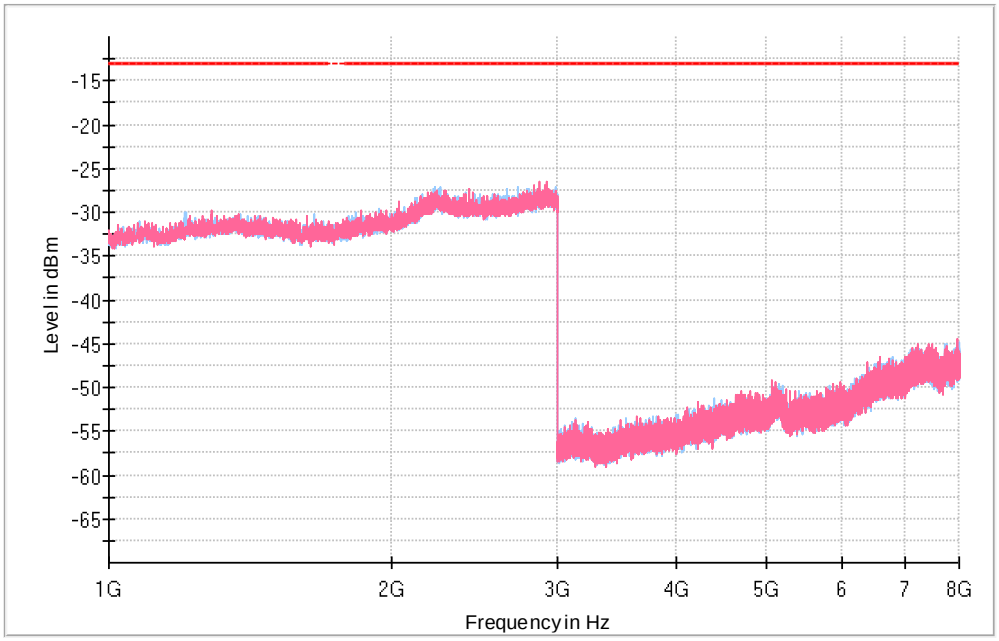



- MIDDLE CHANNEL:




Preview Result 1H-PK+
Preview Result 1V-PK+
FCC RSE Part 27 (B4, B8, B12, B13, B17, B66, B71, B85)
-13 dBm
Final_Result PK+

- HIGH CHANNEL:




Preview Result 1H-PK+
Preview Result 1V-PK+
FCC RSE Part 27 (B4, B8, B12, B13, B17, B66, B71, B85)
-13 dBm
Final_Result PK+

# **Appendix B:** Test results for FCC 27 / RSS-130: LTE Cat NB1 Bands 85

# INDEX

# TEST CONDITIONS

(*): Declared by the Applicant.

POWER SUPPLY (*):

Vnormal: 5 Vdc.
Vmin 2.2 Vdc
Vmax 5.5 Vdc
Type of Power Supply: External DC.

ANTENNA (*):

| Band | Gain (dBi) | Type of Antenna |
|---|---|---|
| 85 | 0.17 | External (OmniLOG_90200) |
| | 1.1 | Internal (FR01-S4-210) |

Pre-scan determines that internal antenna is worst case.

TEST FREQUENCIES:

LTE Cat NB1 Band 85. Pi/2-BPSK, Pi/4-QPSK, QPSK modulations:

| Channel (Frequency, MHz) | | |
|---|---|---|
| Low | Middle | High |
| 134004 (698.2)* | 134092 (707) | 134181 (715.8)* |
| *The outermost channel which is in compliance with Block edge testing. | | |

# RF Output Power

***Limits***

**LTE Cat NB1 Band 85.** FCC §27.50 (c) (10) / RSS-130 Clause 4.6.

FCC §27.50 (c) (10):

> Portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP.

RSS-130 Clause 4.6:

> 4.6.1 General
>
> The transmitter output power shall be measured in terms of average power. In addition, the peak-to-average power ratio (PAPR) of the transmitter shall not exceed 13 dB for more than 0.1% of the time and shall use a signal corresponding to the High PAPR during periods of continuous transmission.
>
> 4.6.3 Frequency bands 698-756 MHz and 777-787 MHz
>
> The e.r.p. shall not exceed 30 watts for mobile equipment and outdoor fixed subscriber equipment. The e.r.p. shall not exceed 3 watts for portable equipment and indoor fixed subscriber equipment.

***Method***

The conducted RF output power measurements were made at the RF output terminals of the EUT using the power meter of the Universal Radio Communication tester CMW500, selecting maximum transmission power of the EUT and different modes of modulation.

The peak-to-average power ratio (PAPR) is measured using an attenuator, power splitter and spectrum analyser with a Complementary Cumulative Distribution Function implemented.

The maximum equivalent isotropically radiated power (e.i.r.p.) is calculated by adding the declared maximum antenna gain (dBi).

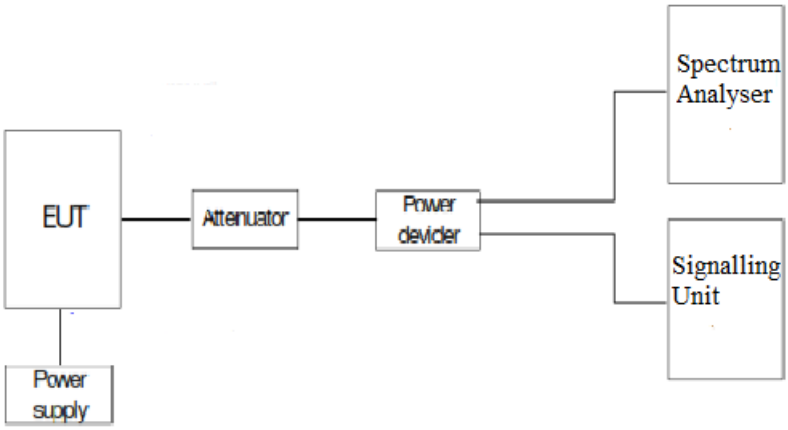
The maximum effective radiated power e.r.p. is calculated from the maximum equivalent isotropically radiated power (e.i.r.p.) by subtracting 2.15 dB:

E.R.P. = E.I.R.P. - 2.15 dB

***Test Setup***

3. CONDUCTED AVERAGE POWER:


4. PEAK-TO-AVERAGE POWER RATIO (PAPR) and Conducted Average power:



***Results***

## 1. CONDUCTED AVERAGE POWER

LTE Cat NB1 Band 85:

Worst-case of RF Power is Low Channel, QPSK, BW=15 kHz, Tone Number=3, Tone Offset=6, MSC/TBS=5.

| CHANNEL | FREQUENCY (MHz) | MODULATION | BW | Tone Number | Tone Offset (Start SubCarrier) | MSC / TBS | AVERAGE POWER (dBm) |
|---|---|---|---|---|---|---|---|
| Low 134004 | 698,2 MHz | pi/2 - BPSK | 3,75 kHz | 1 | 0 | 0 | 22,81 |
| | | | | 1 | 47 | 0 | 22,83 |
| | | | 15 kHz | 1 | 0 | 0 | 23,02 |
| | | | | 1 | 11 | 0 | 23 |
| | | pi/4 - QPSK | 3,75 kHz | 1 | 0 | 3 | 22,82 |
| | | | | 1 | 47 | 3 | 22,83 |
| | | | 15 kHz | 1 | 0 | 3 | 23,01 |
| | | | | 1 | 11 | 3 | 23,01 |
| | | QPSK | 15 kHz | 3 | 0 | 5 | 23,09 |
| | | | | 3 | 6 | 5 | **23,3** |
| | | | | 6 | 0 | 5 | 23,07 |
| | | | | 6 | 6 | 5 | 23,1 |
| | | | | 12 | 0 | 5 | 22,97 |
| Middle 134092 | 707 MHz | pi/2 - BPSK | 3,75 kHz | 1 | 0 | 0 | 22,69 |
| | | | | 1 | 47 | 0 | 22,82 |
| | | | 15 kHz | 1 | 0 | 0 | 22,93 |
| | | | | 1 | 11 | 0 | 22,94 |
| | | pi/4 - QPSK | 3,75 kHz | 1 | 0 | 3 | 22,83 |
| | | | | 1 | 47 | 3 | 22,81 |
| | | | 15 kHz | 1 | 0 | 3 | 22,94 |
| | | | | 1 | 11 | 3 | 22,92 |
| | | QPSK | 15 kHz | 3 | 0 | 5 | 23,04 |
| | | | | 3 | 9 | 5 | 23,06 |
| | | | | 6 | 0 | 5 | 23,04 |
| | | | | 6 | 6 | 5 | 23,04 |
| | | | | 12 | 0 | 5 | 22,9 |
| High 134180 | 715,8 MHz | pi/2 - BPSK | 3,75 kHz | 1 | 0 | 0 | 22,78 |
| | | | | 1 | 47 | 0 | 22,81 |
| | | | 15 kHz | 1 | 0 | 0 | 22,92 |
| | | | | 1 | 11 | 0 | 22,99 |
| | | pi/4 - QPSK | 3,75 kHz | 1 | 0 | 3 | 22,79 |
| | | | | 1 | 47 | 3 | 22,79 |
| | | | 15 kHz | 1 | 0 | 3 | 22,95 |
| | | | | 1 | 11 | 3 | 22,95 |
| | | QPSK | 15 kHz | 3 | 0 | 5 | 23,01 |
| | | | | 3 | 6 | 5 | 23,24 |
| | | | | 6 | 0 | 5 | 23,04 |
| | | | | 6 | 6 | 5 | 23,05 |
| | | | | 12 | 0 | 5 | 22,37 |

| MAX POWER | COND. POWER AVG (dBm) | ANTENNA GAIN (dBi) | RAD. POWER AVG ERP (dBm) |
|---|---|---|---|
| LOW | 23.3 | 1.1 | 24.4 |
| MIDDLE | 23.06 | 1.1 | 24.16 |

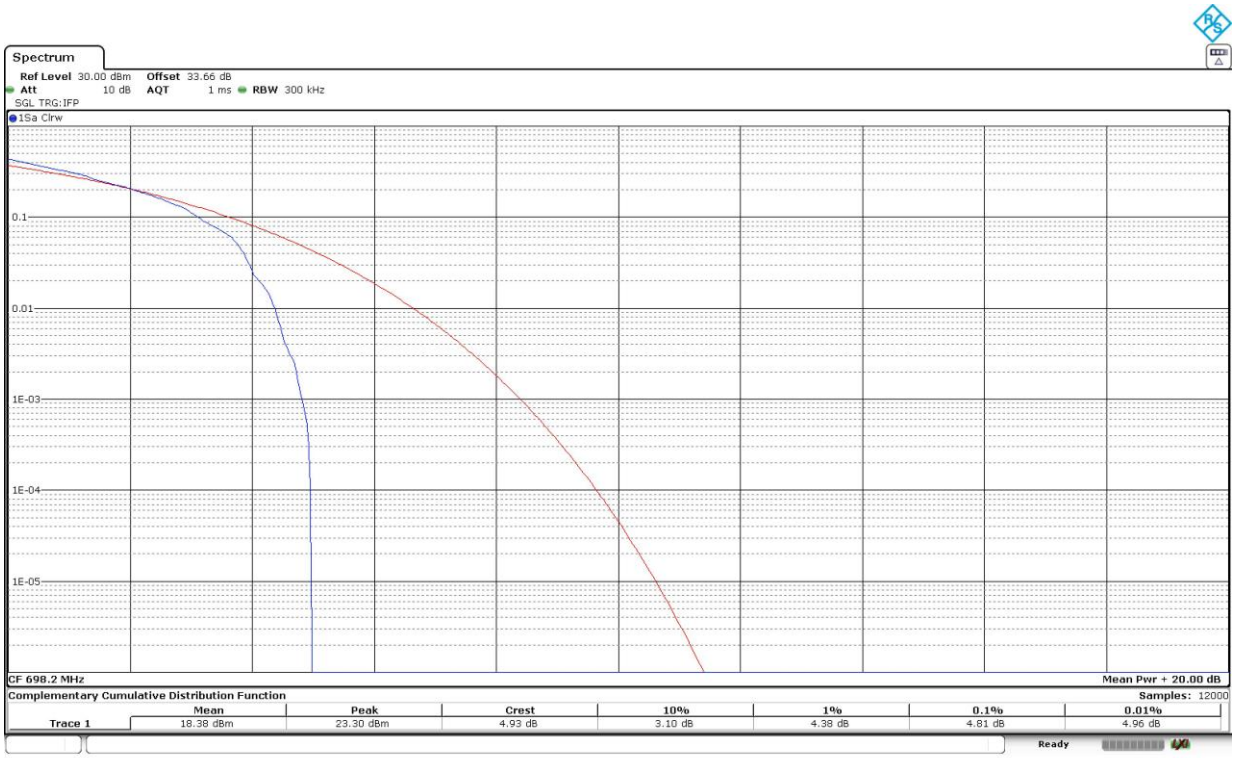
| | | | |
|---|---|---|---|
| HIGH | 23,24 | 1.1 | 24.34 |
| MAX: | 23.3 | | 24.34 |

## 2. PEAK-TO-AVERAGE POWER RATIO (PAPR)

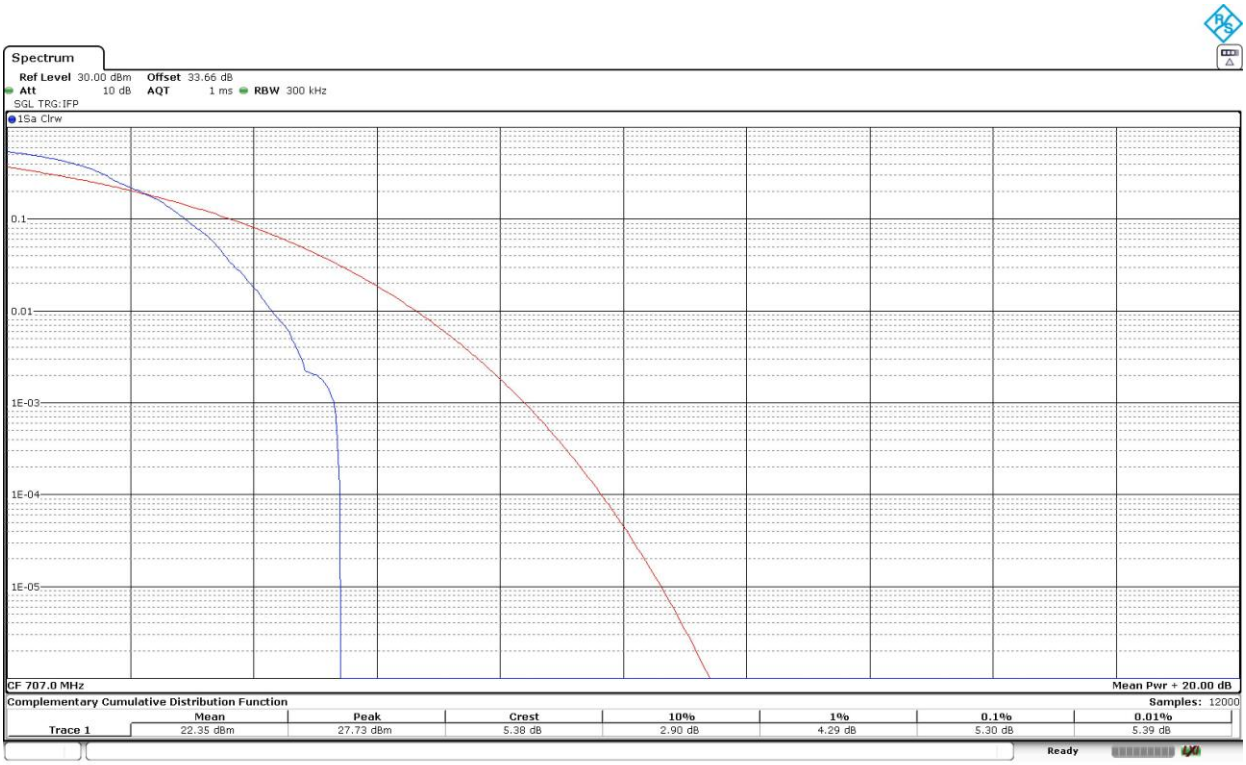
LTE Cat NB1 Band 85:

Worst-case of PAPR is High Channel, QPSK, BW=15 kHz, Tone Number=12, Tone Offset=0, MSC/TBS=5.

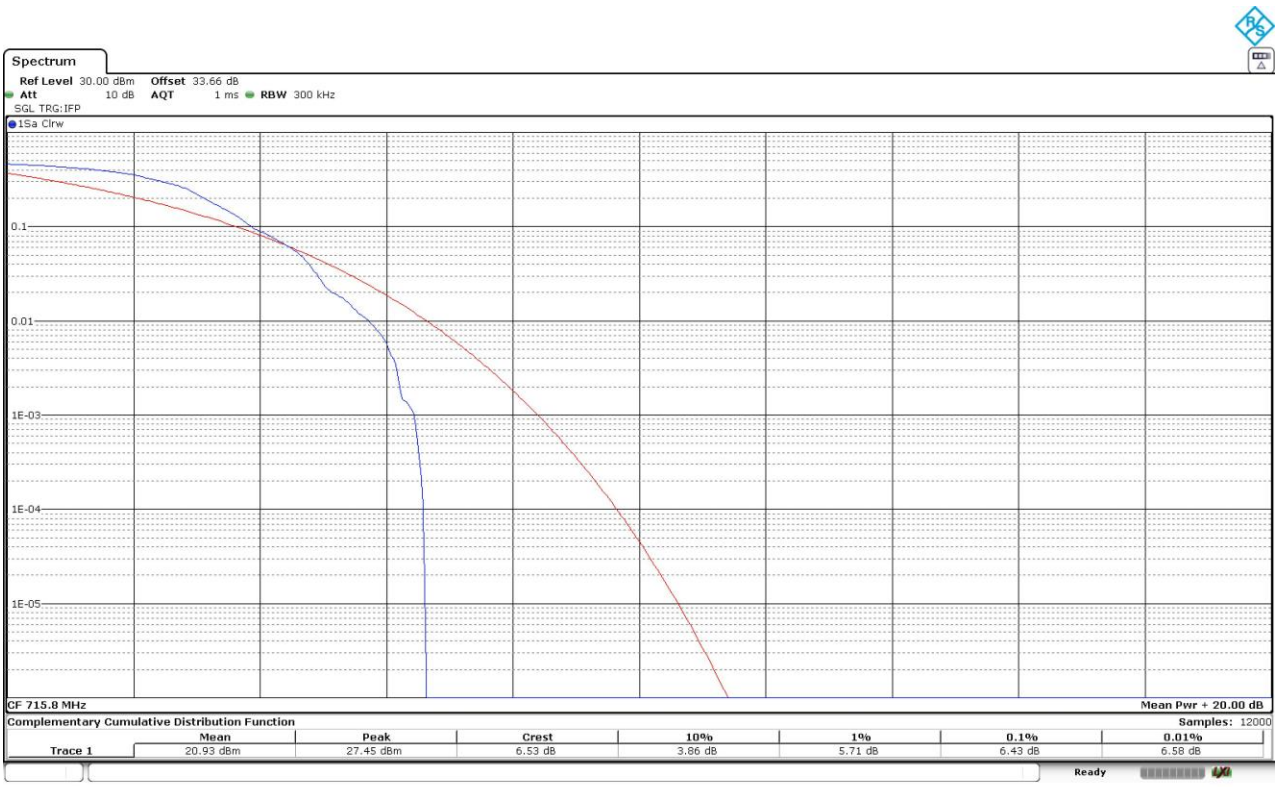
Low Channel:




Middle Channel:



High Channel:




| QPSK | Low | Middle | High |
|---|---|---|---|
| PAPR (dB) | 4.81 | 5.3 | 6.43 |

***Verdict***

Pass

# Frequency Stability

***Limits***

* FCC §27.54 & §2.1055. The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

* 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.

***Method***

The frequency tolerance measurements over temperature variations were made over the temperature range of –30ºC to +50ºC. The EUT was placed inside a climatic chamber and the temperature was raised hourly in 10ºC steps from –30ºC up to +50ºC.
The supply voltage was varied between 85% and 115% of nominal voltage.

Temperature and voltage range of testing has been extended to the maximum and minimum values declared by customer.

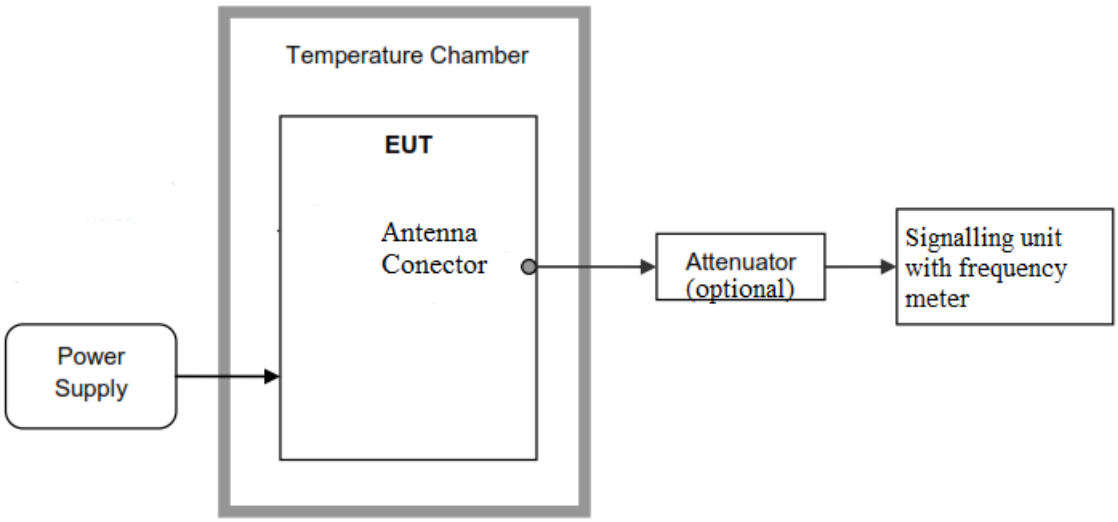
The EUT was set in “Radio Resource Control (RRC) mode” on the middle channel using the Universal Radio Communication tester R&S CMW500 and the maximum frequency error was measured using the built-in calibrated frequency meter.
The worst case LTE mode for conducted power was used for the test.

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.

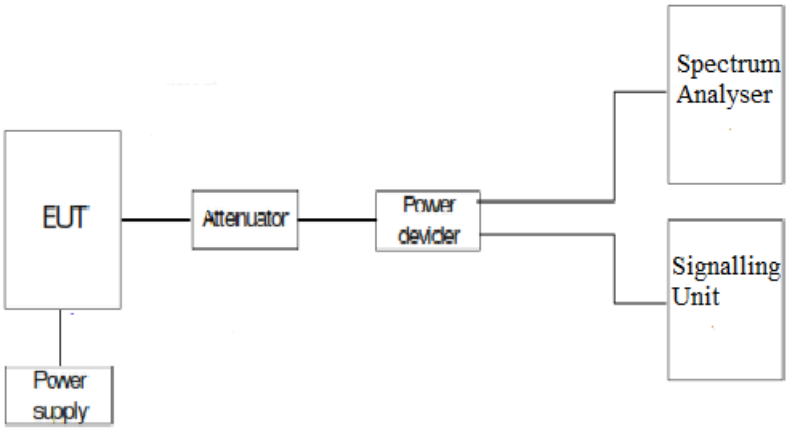
The reference point measurements were made at the RF output terminals of the EUT using an attenuator, power splitter and spectrum analyser. The EUT was controlled via the Universal Radio Communication tester R&S CMW500 selecting maximum transmission power of the EUT and different modes of modulation.

***Test Setup***

Frequency tolerance.




Reference points *f*L and *fH.*



***Results***

## 3. FREQUENCY TOLERANCE:

- **Frequency stability over temperature variations:**

**LTE Cat NB1 Band 85:**

The worst case modulation in terms of Frequency Stability is QPSK, BW=15 kHz, Tone Number=3, Tone Offset=6, MSC/TBS=5.

| Temperature (ºC) | Frequency Error (Hz) | Frequency Error (ppm) |
|---|---|---|
| +85 [#] | -0,89 | -0,00125884 |
| +80 [#] | -7,9 | -0,011173975 |
| +70 [#] | -14,68 | -0,020763791 |
| +60 [#] | -3,14 | -0,004441301 |
| +50 | -1 | -0,001414427 |
| +40 | 2,82 | 0,003988685 |
| +30 | -1,09 | -0,001541726 |
| +20 | -2,8 | -0,003960396 |
| +10 | -1,37 | -0,001937765 |
| 0 | -2,47 | -0,003493635 |
| -10 | -5,2 | -0,007355021 |
| -20 | -3,54 | -0,005007072 |
| -30 | -4,87 | -0,00688826 |
| -40 [#] | -4,36 | -0,006166902 |

Test conditions marked with "#" are out of the scope of ENAC accreditation

- **Frequency stability over voltage variations:**

**LTE Cat NB1 Band 85:**

The worst case modulation in terms of Frequency Stability is QPSK, BW=15 kHz, Tone Number=3, Tone Offset=6, MSC/TBS=5.

| Supply voltage | Voltage (V) | Frequency Error (Hz) | Frequency Error (ppm) |
|---|---|---|---|
| Vmax | 5,75 | 0,09 | 0,000127298 |
| Vmin | 2,2 | 0,68 | 0,00096181 |

## 4. REFERENCE FREQUENCY POINTS fL AND fH:

The worst-case frequency offsets added or subtracted per band and bandwidth:

**LTE Cat NB1 Band 85:**

The worst case modulation in terms of Frequency Stability is QPSK, BW=15 kHz, Tone Number=3, Tone Offset=6, MSC/TBS=5.

| | |
|---|---|
| *f*L (MHz) | 698.0217 |

| | |
|---|---|
| *f*H (MHz) | 715.9959 |

The reference frequency points fL and fH stay within the authorized blocks for the band above.

Measurement uncertainty (Hz): <±211.77

***Verdict***

PASS

# Modulation Characteristics

***Limits***

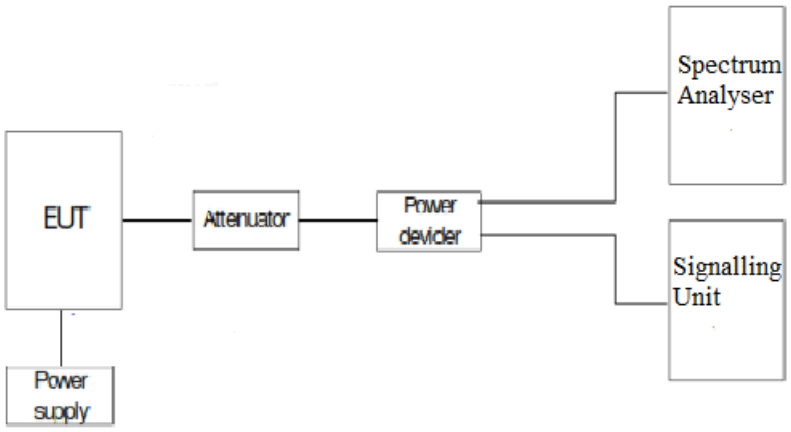
FCC §2.1047.

RSS-130, Clause 4.2: Equipment certified under this standard shall employ digital modulation.

***Method***

For LTE NB1 the EUT operates with Pi/2-BPSK, Pi/4-QPSK and QPSK modulations in which the information is digitized and coded into a bit stream. The RF transmission is multiplexed using *Orthogonal Frequency Division Multiplexing (OFDM)* using different possible arrangement of subcarriers (Resource Blocks RB).

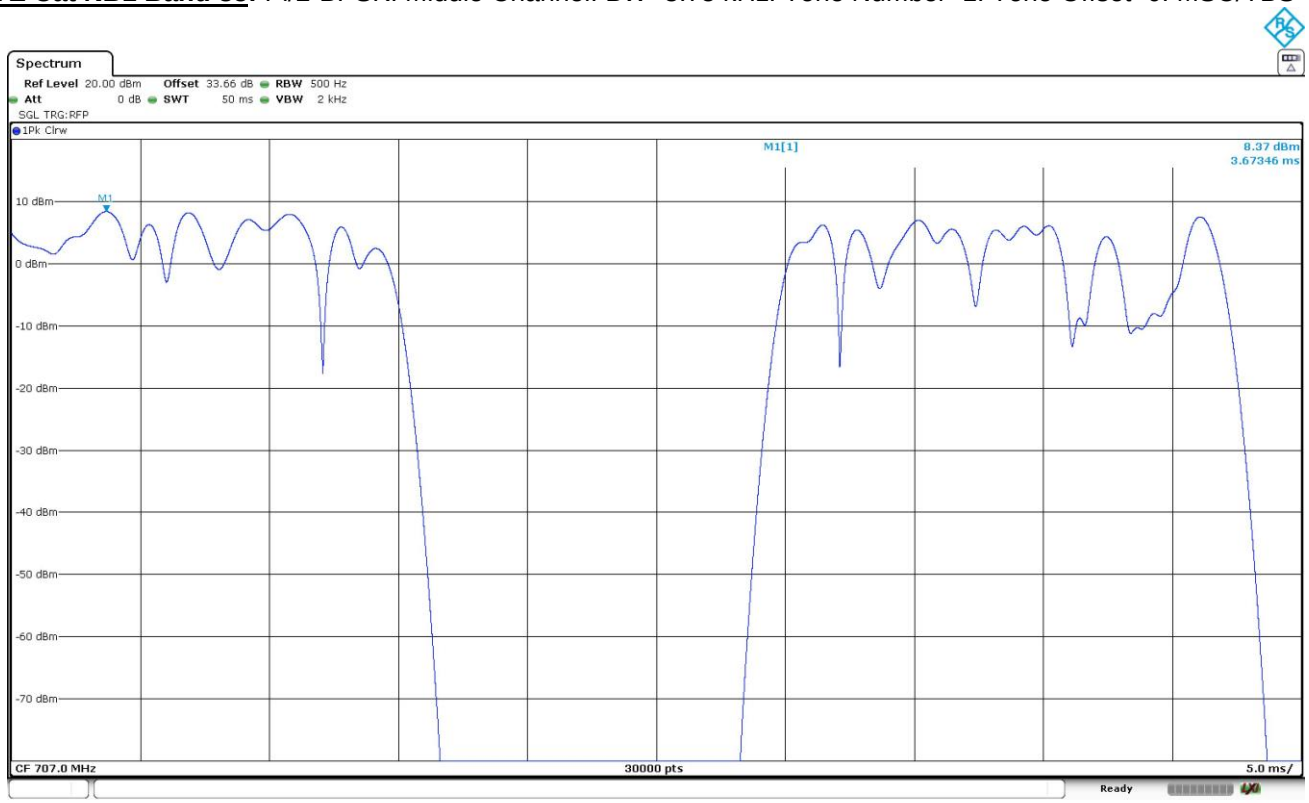
***Test Setup***



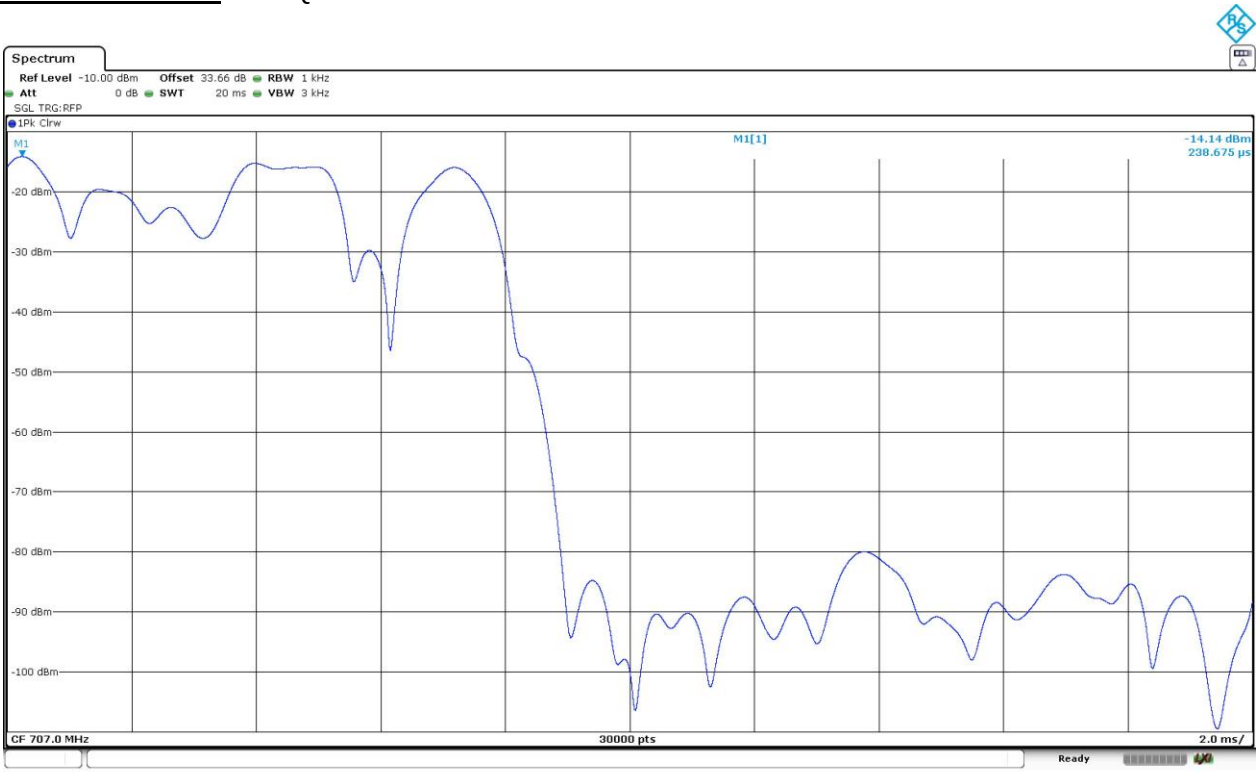
### *Results*

The following plot shows the modulation schemes in the EUT.

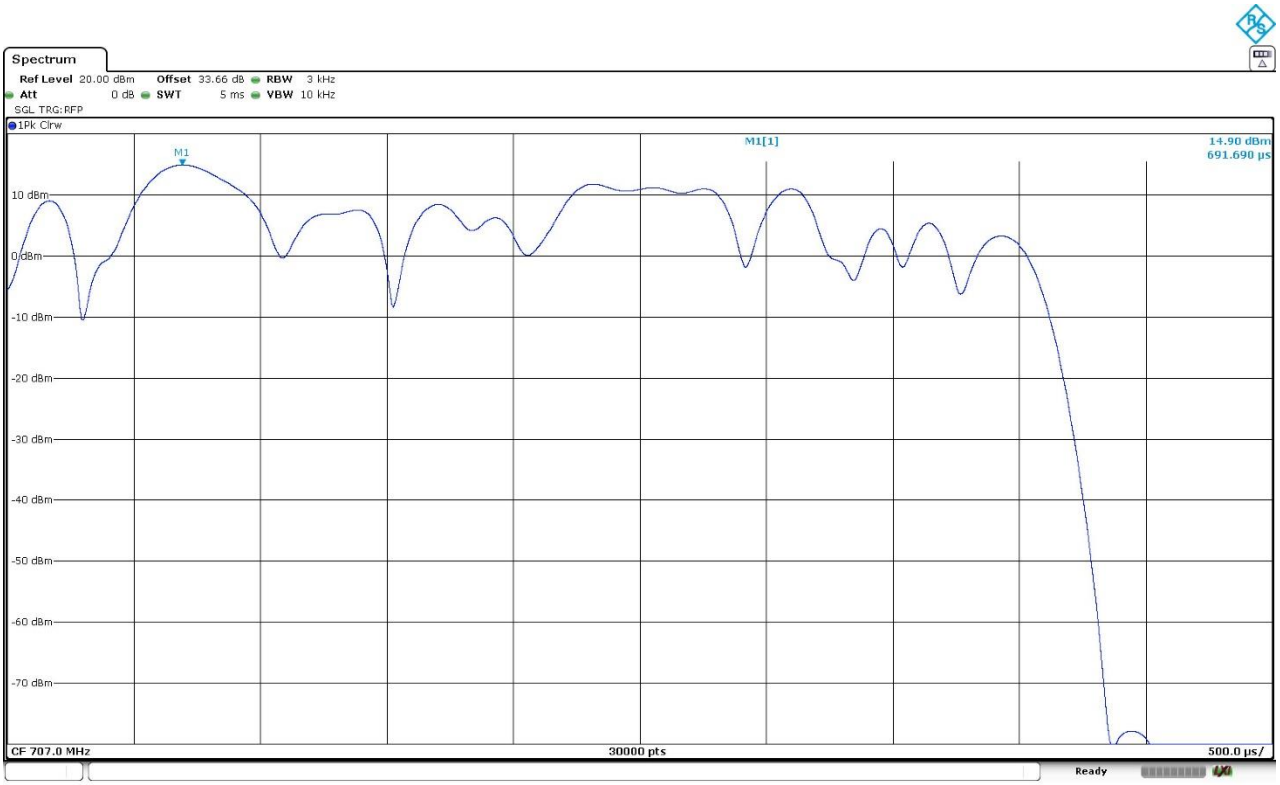
**LTE Cat NB1 Band 85:** Pi/2-BPSK. Middle Channel. BW=3.75 kHz. Tone Number=1. Tone Offset=0. MSC/TBS=0.




**LTE Cat NB1 Band 85:** Pi/4-QPSK. Middle Channel. BW=3.75 kHz. Tone Number=1. Tone Offset=0. MSC/TBS=3.



**LTE Cat NB1 Band 85:** QPSK. Middle Channel. BW=3.75 kHz. Tone Number=1. Tone Offset=0. MSC/TBS=3.



# Occupied Bandwidth

***Limits***

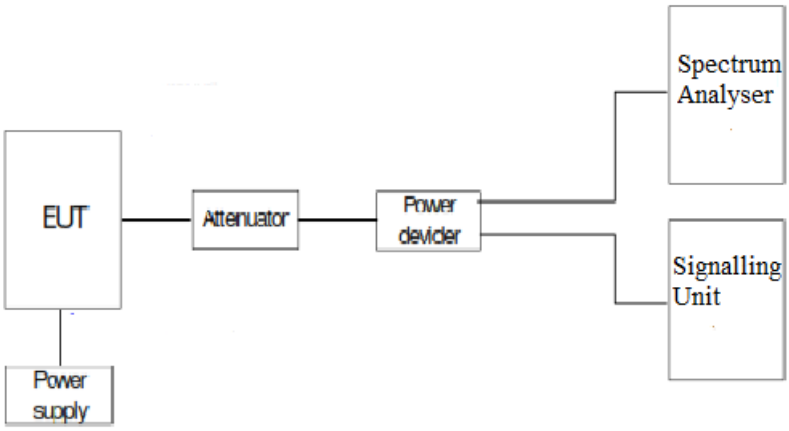
FCC §2.1049. Measurements required: Occupied bandwidth.

RSS-Gen, Clause 6.7.

***Method***

The occupied bandwidth measurement was performed at the 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. The 99% occupied bandwidth and the -26 dBc bandwidth were measured directly using the built-in bandwidth measuring option of spectrum analyser.

***Test Setup***




***Results***

The worst case of occupied bandwidth corresponds to the following ones.

**LTE Cat NB1 Band 85:**

LTE Cat NB1 Band 85. Pi/2-BPSK. BW=3.75 kHz. Tone Number=1. Tone Offset=23. MSC/TBS=0.

| | Low Channel | Middle Channel | High Channel |
|---|---|---|---|
| 99% Occupied Bandwidth (kHz) | 56,08000 | 56,12000 | 56,46000 |
| -26 dBc Bandwidth (kHz) | 34,95960 | 34,93500 | 34,99070 |
| Measurement uncertainty (kHz) | <±0.35 | | |

LTE Cat NB1 Band 85. Pi/4-QPSK. BW=3.75 kHz. Tone Number=1. Tone Offset=23. MSC/TBS=3.

| | Low Channel | Middle Channel | High Channel |
|---|---|---|---|
| 99% Occupied Bandwidth (kHz) | 58,02000 | 56,20000 | 55,78000 |
| -26 dBc Bandwidth (kHz) | 41,36740 | 41,20700 | 41,13180 |
| Measurement uncertainty (kHz) | <±0.35 | | |

LTE Cat NB1 Band 85. Pi/2-BPSK. BW=15 kHz. Tone Number=1. Tone Offset=5. MSC/TBS=0.

| | Low Channel | Middle Channel | High Channel |
|---|---|---|---|
| 99% Occupied Bandwidth (kHz) | 129,45000 | 129,36000 | 129,78000 |
| -26 dBc Bandwidth (kHz) | 133,59700 | 130,24640 | 130,41320 |
| Measurement uncertainty (kHz) | <±0.35 | | |

LTE Cat NB1 Band 85. Pi/4-QPSK. BW=15 kHz. Tone Number=1. Tone Offset=5. MSC/TBS=3.

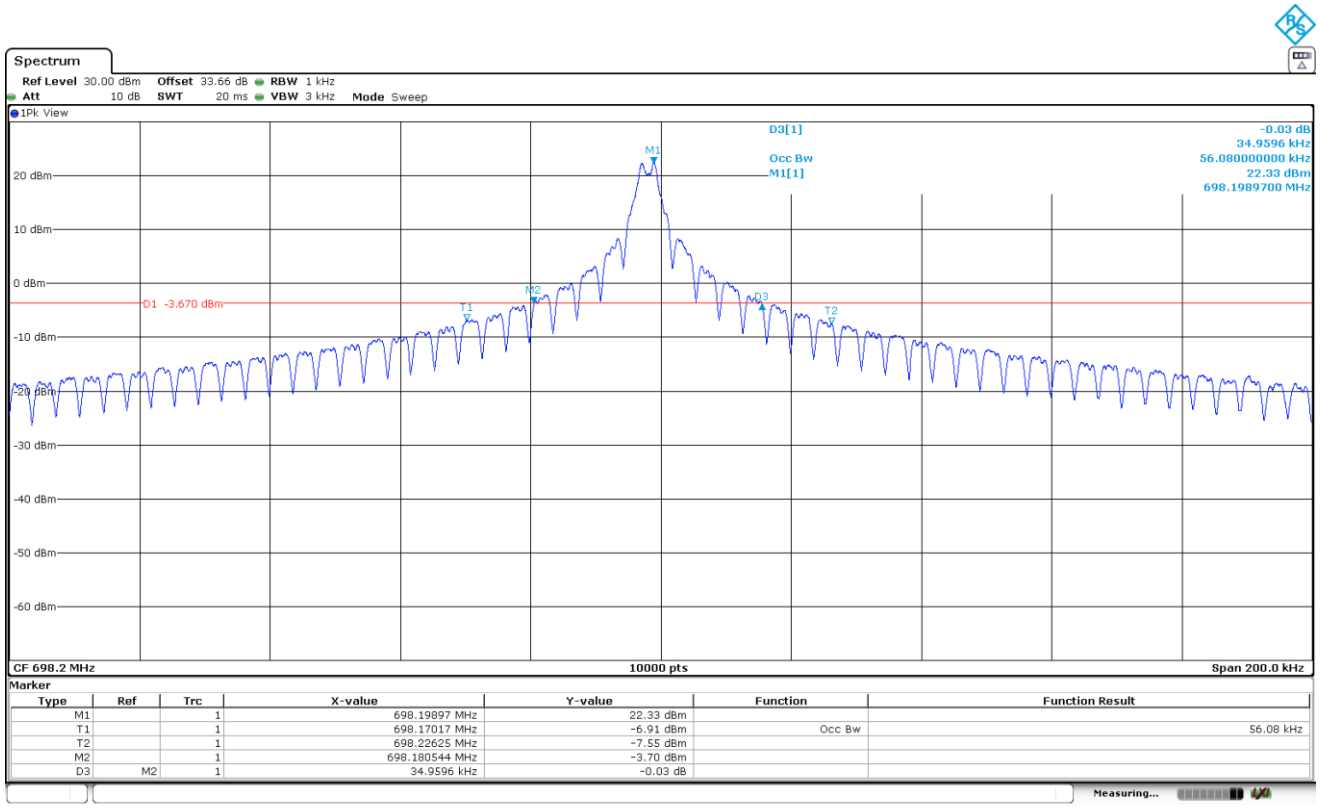
| | Low Channel | Middle Channel | High Channel |
|---|---|---|---|
| 99% Occupied Bandwidth (kHz) | 126,39000 | 126,54000 | 125,91000 |
| -26 dBc Bandwidth (kHz) | 132,26700 | 132,19020 | 131,93340 |
| Measurement uncertainty (kHz) | <±0.35 | | |

LTE Cat NB1 Band 85. QPSK. BW=15 kHz. Tone Number=12. Tone Offset=0. MSC/TBS=5.

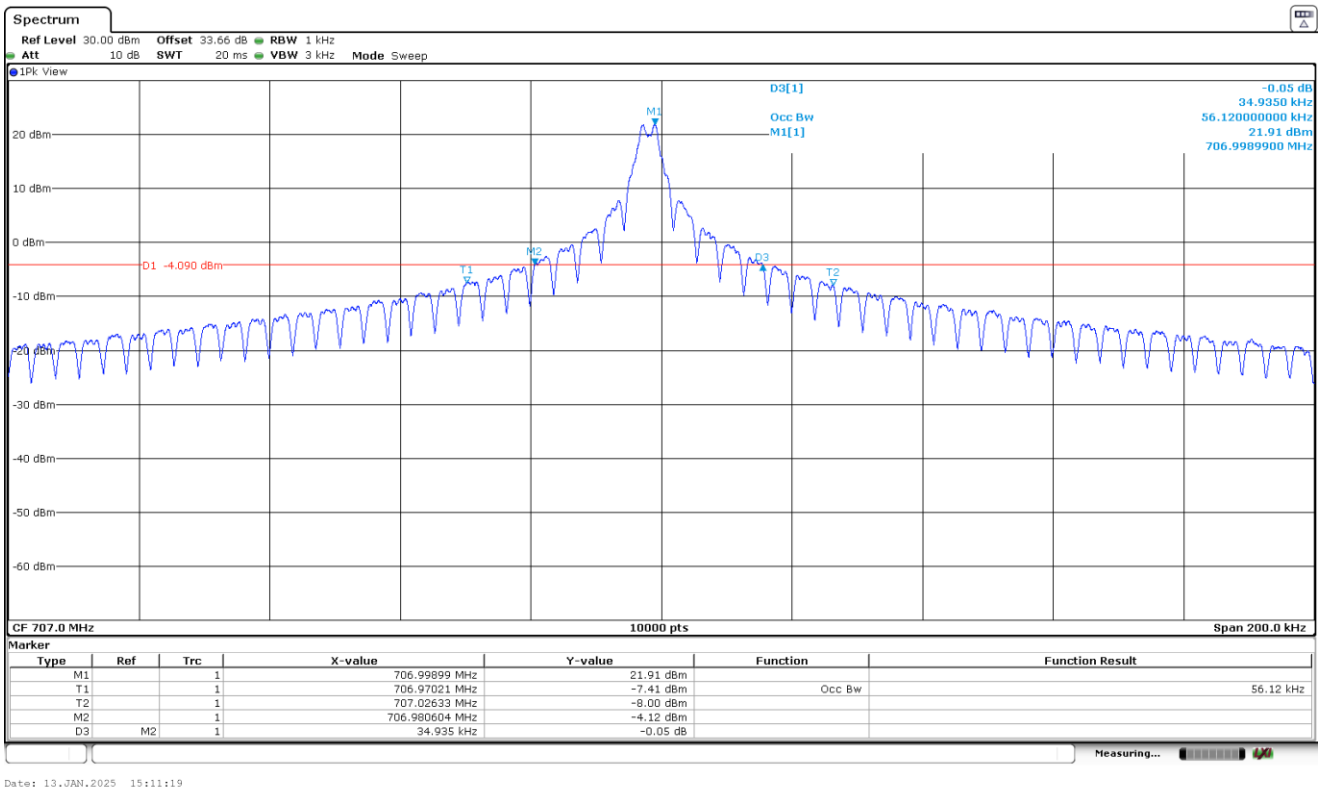
| | Low Channel | Middle Channel | High Channel |
|---|---|---|---|
| 99% Occupied Bandwidth (kHz) | 193,10000 | 195,00000 | 193,65000 |
| -26 dBc Bandwidth (kHz) | 273,62090 | 296,49740 | 277,72150 |
| Measurement uncertainty (kHz) | <±0.35 | | |

LTE Cat NB1 Band 85. Pi/2-BPSK. BW=3.75 kHz. Tone Number=1. Tone Offset=23. MSC/TBS=0.

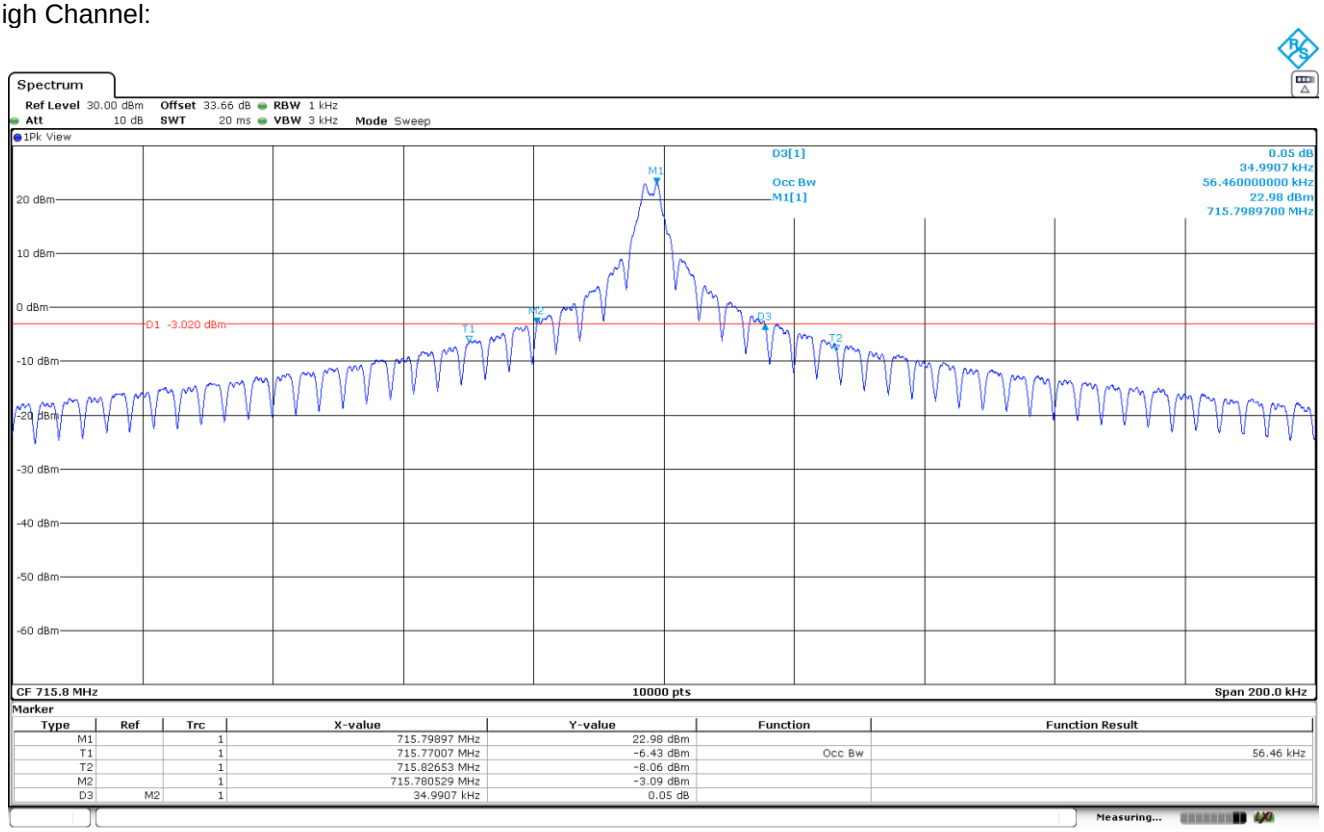
Low Channel:




Middle Channel:

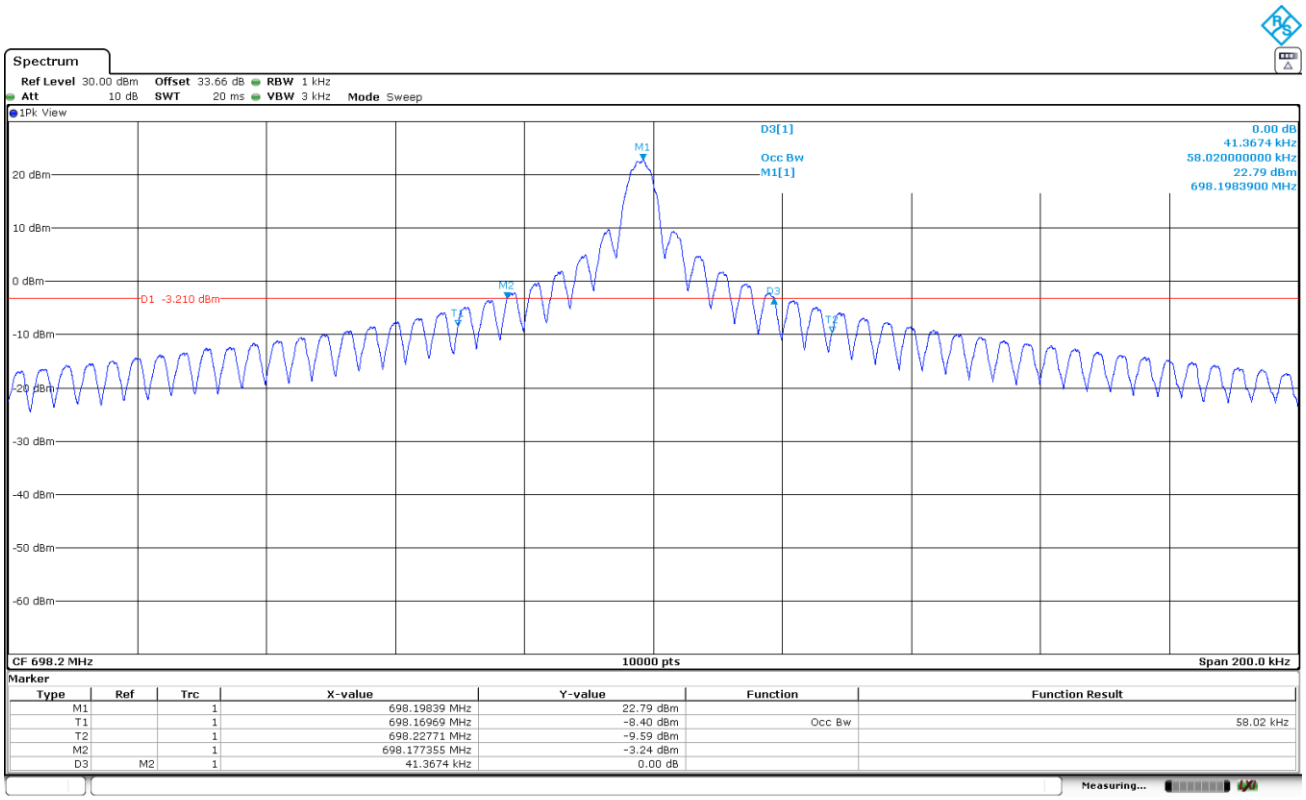


High Channel:

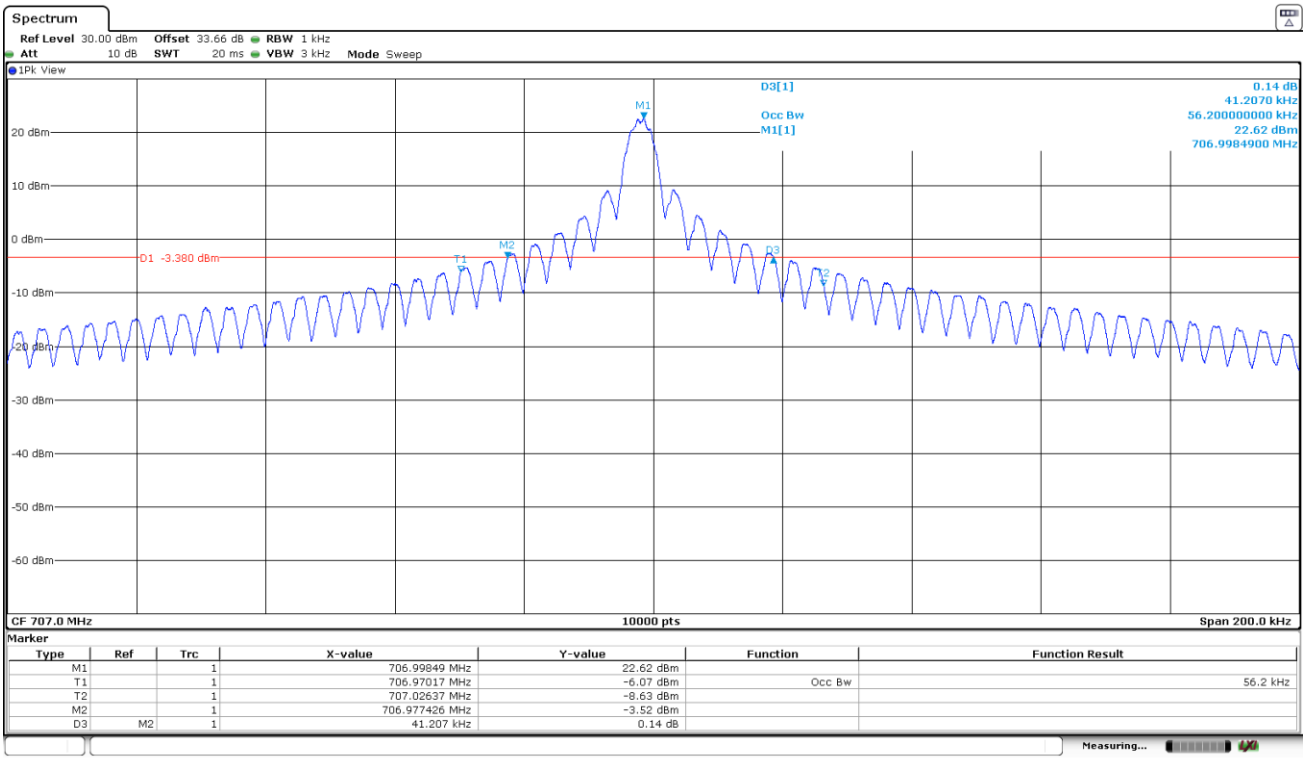


LTE Cat NB1 Band 85. Pi/4-QPSK. BW=3.75 kHz. Tone Number=1. Tone Offset=23. MSC/TBS=3.

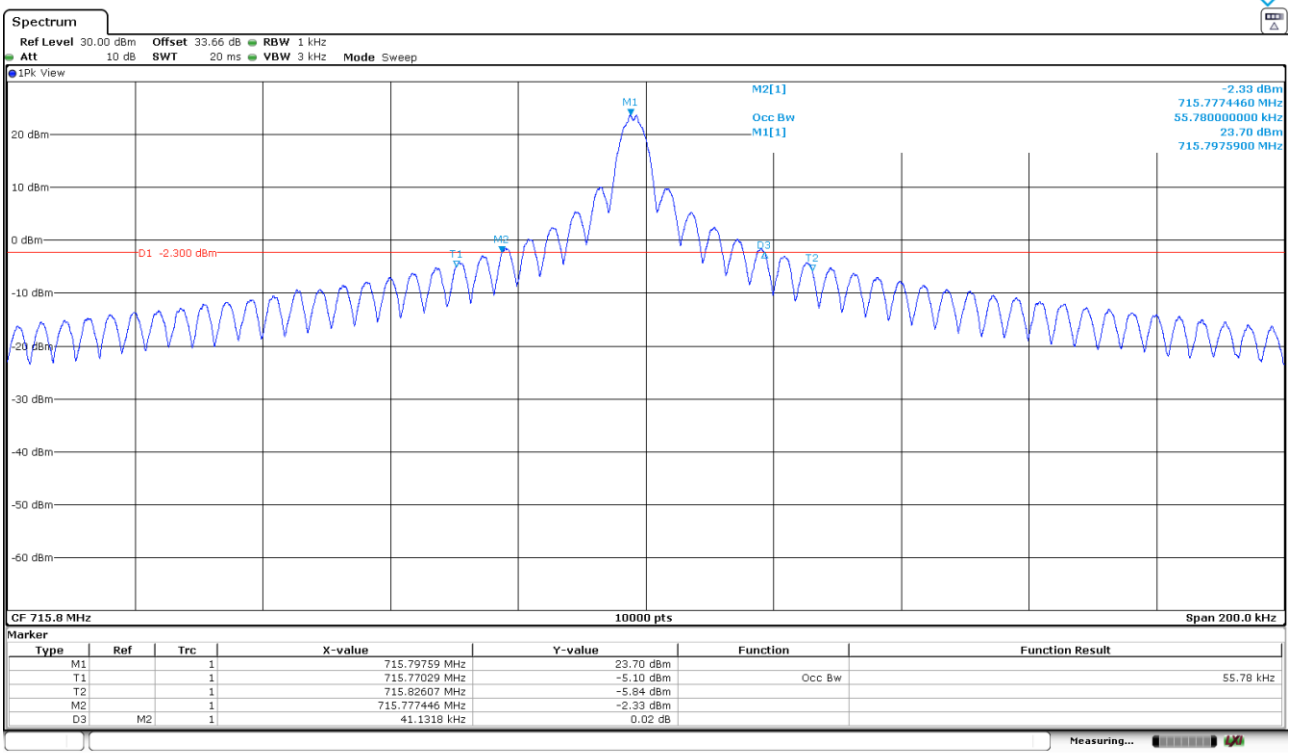
Low Channel:




Middle Channel:

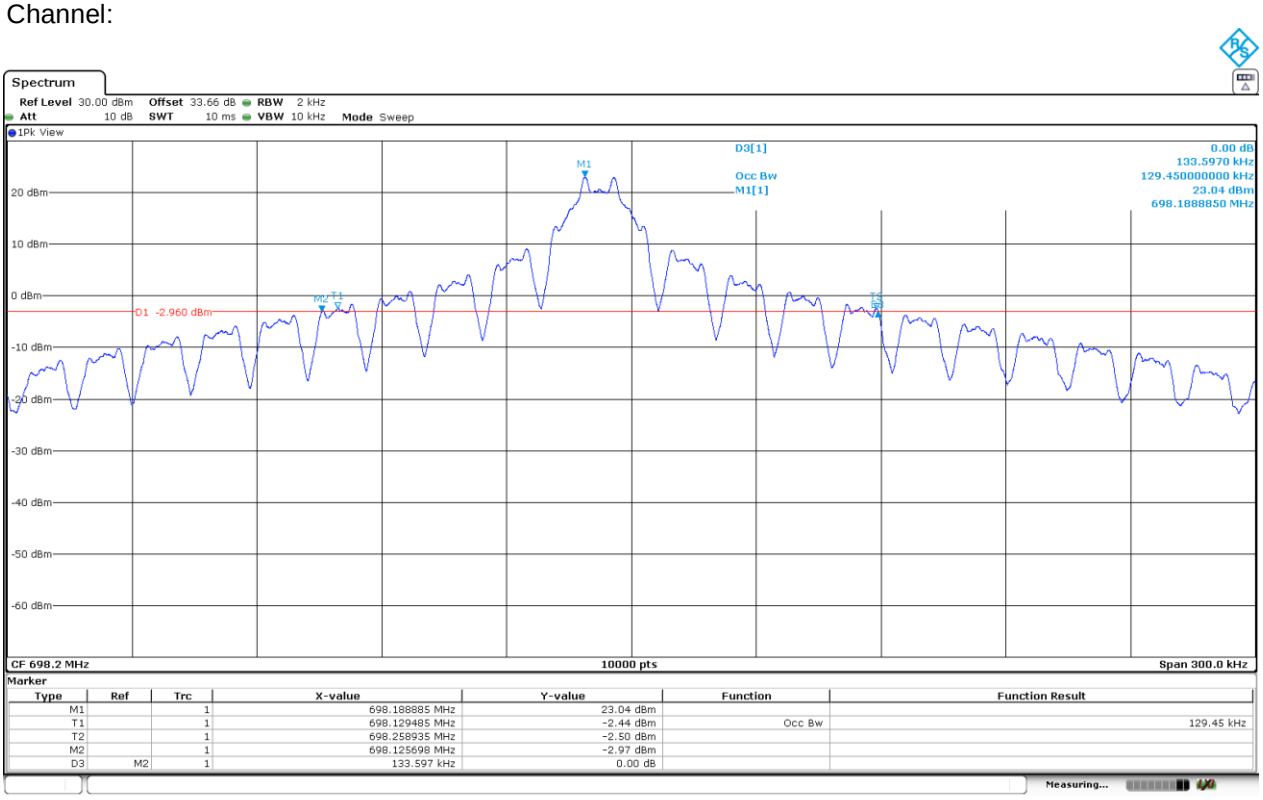


High Channel:

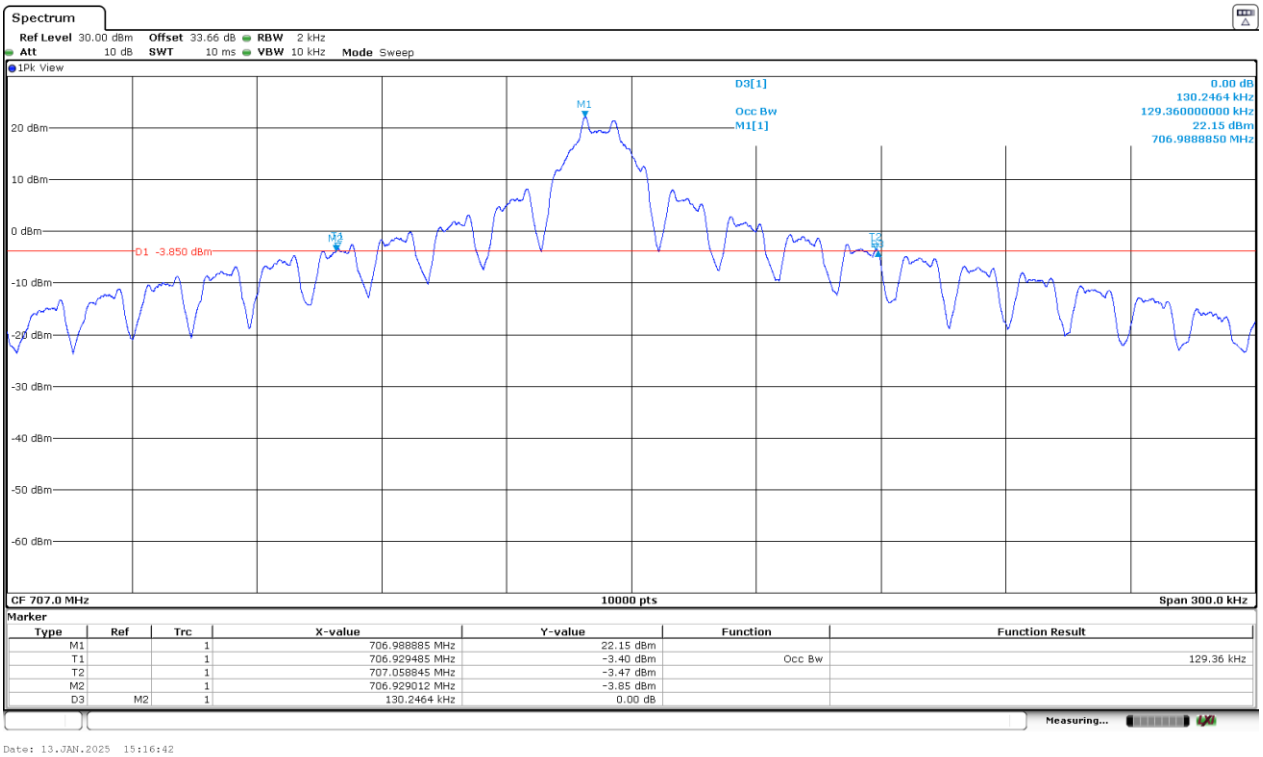


LTE Cat NB1 Band 85. Pi/2-BPSK. BW=15 kHz. Tone Number=1. Tone Offset=5. MSC/TBS=0.

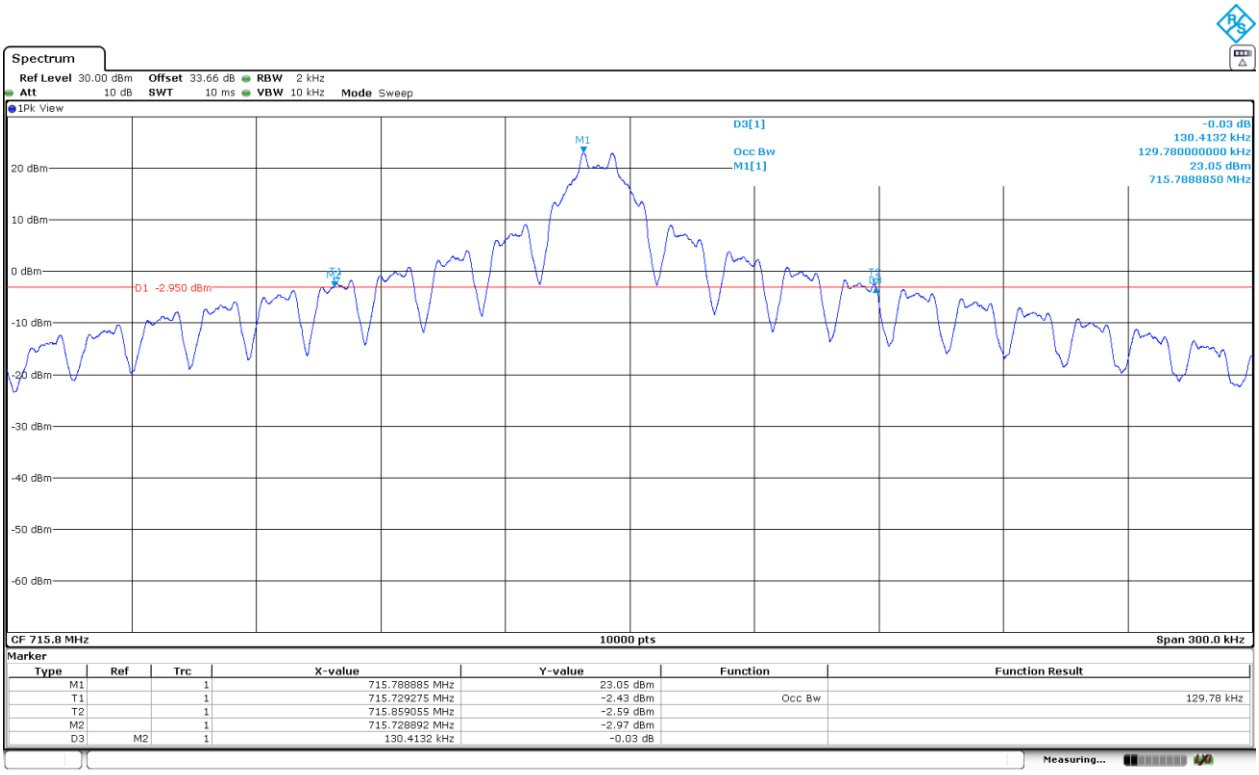
Low Channel:




Middle Channel:

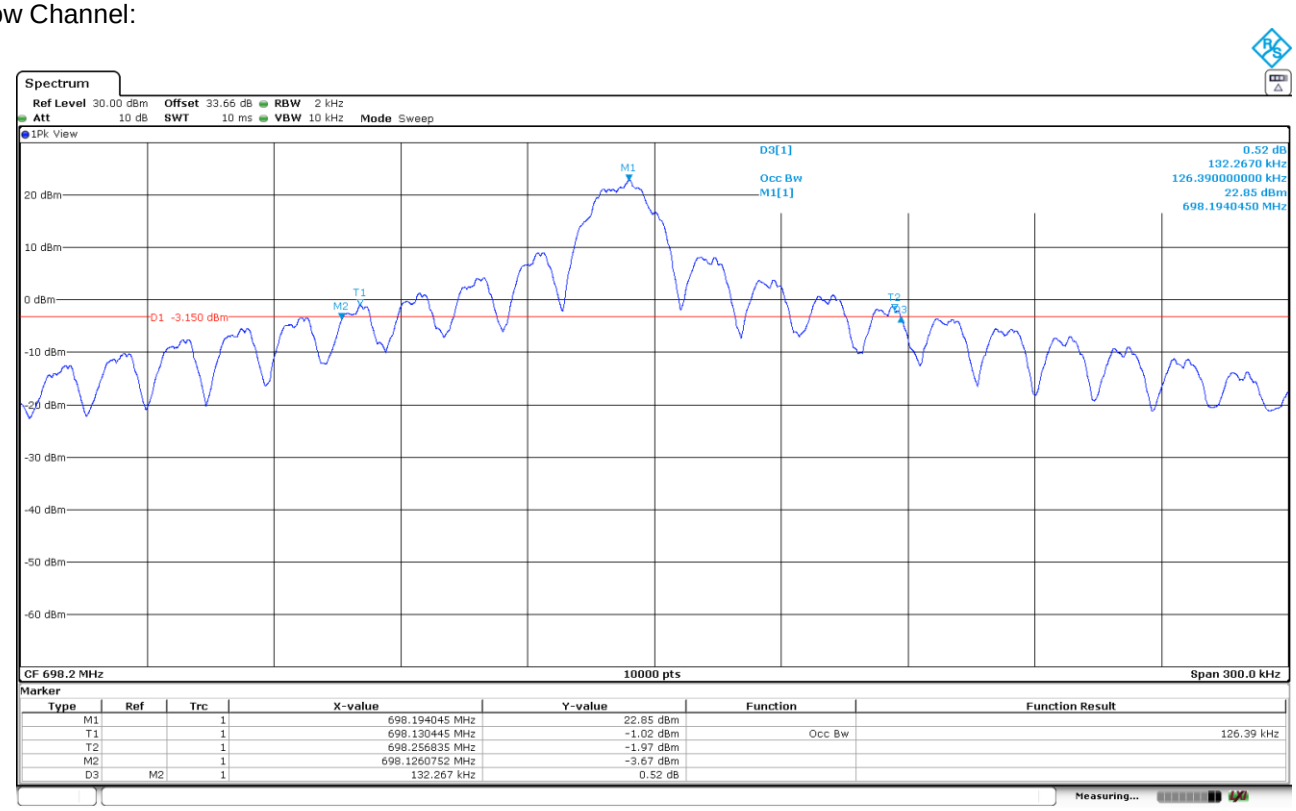


High Channel:

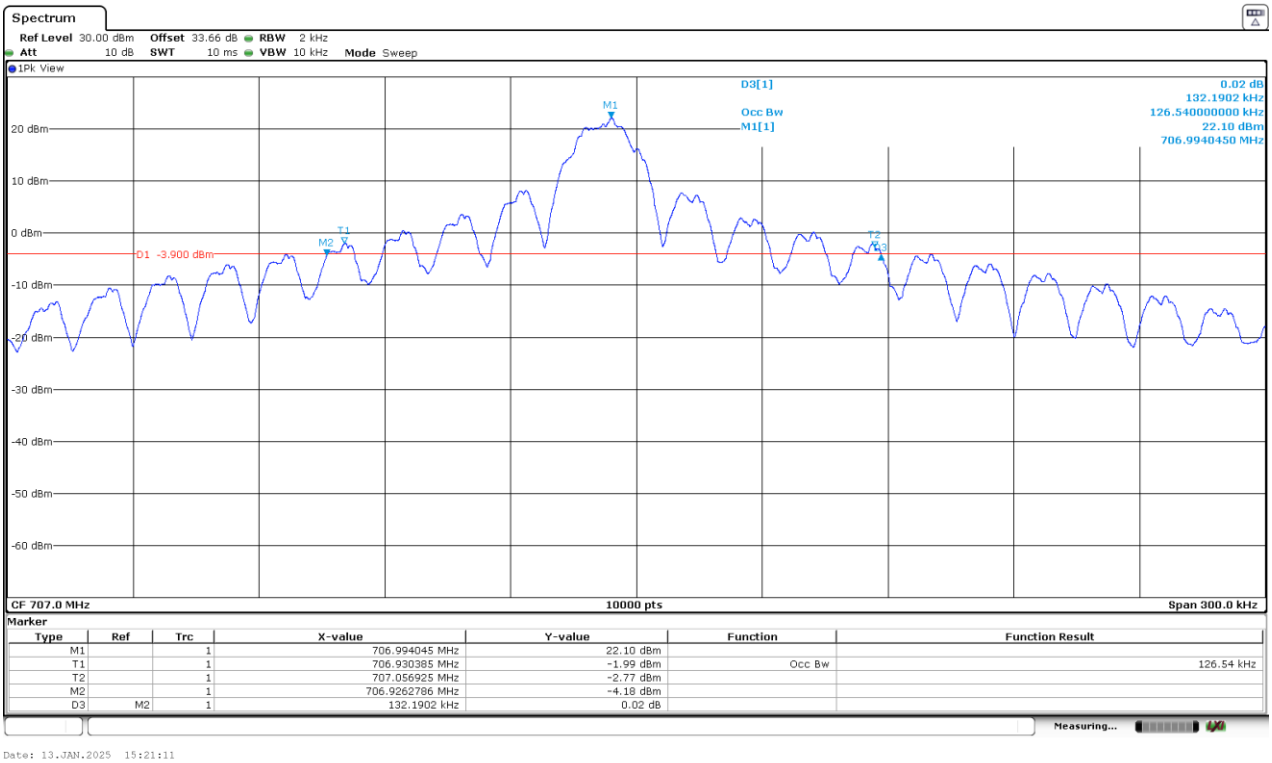


LTE Cat NB1 Band 85. Pi/4-QPSK. BW=15 kHz. Tone Number=1. Tone Offset=5. MSC/TBS=3.

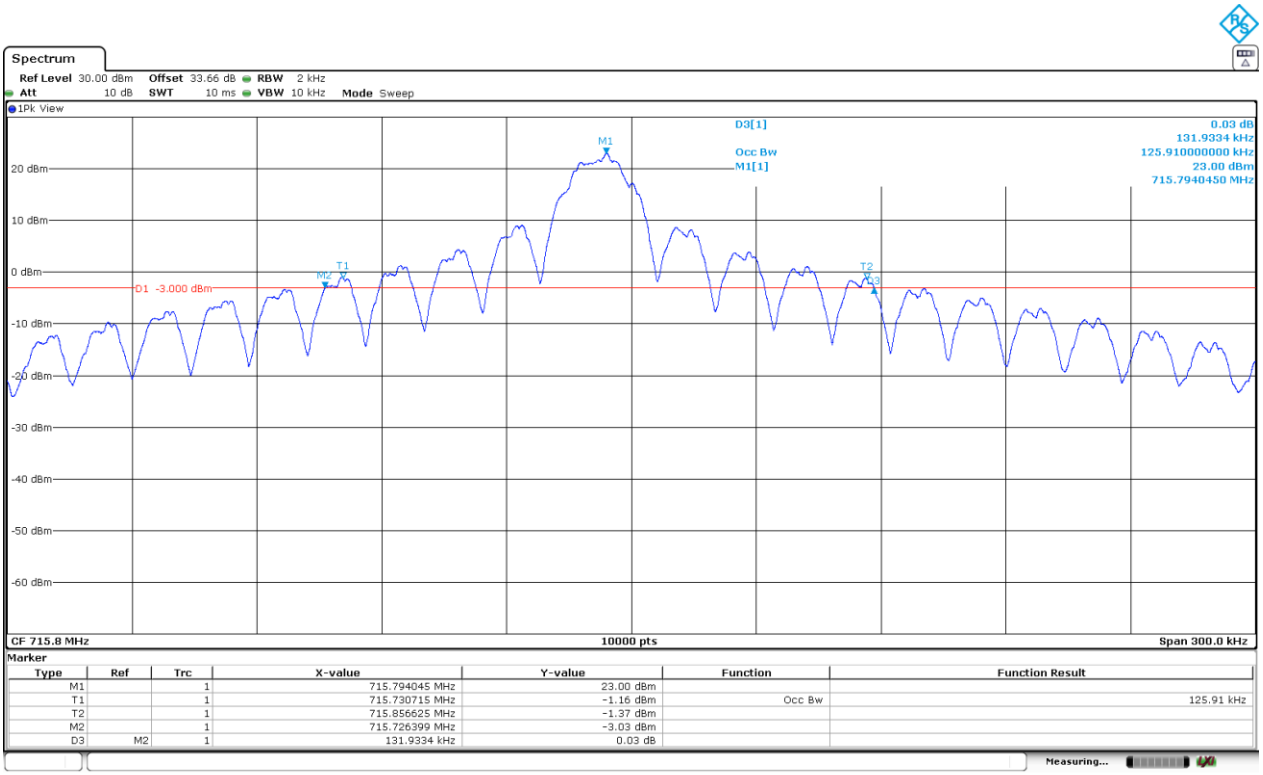
Low Channel:




Middle Channel:

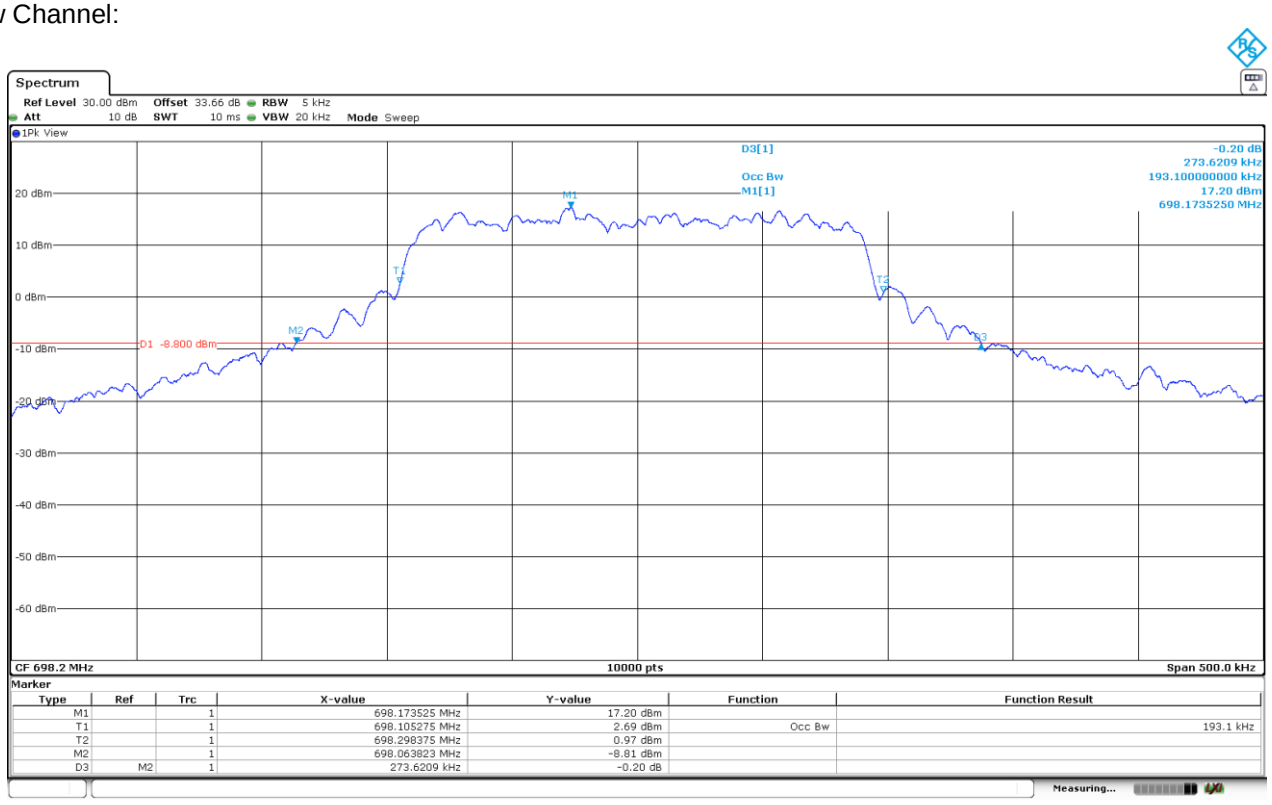


High Channel:

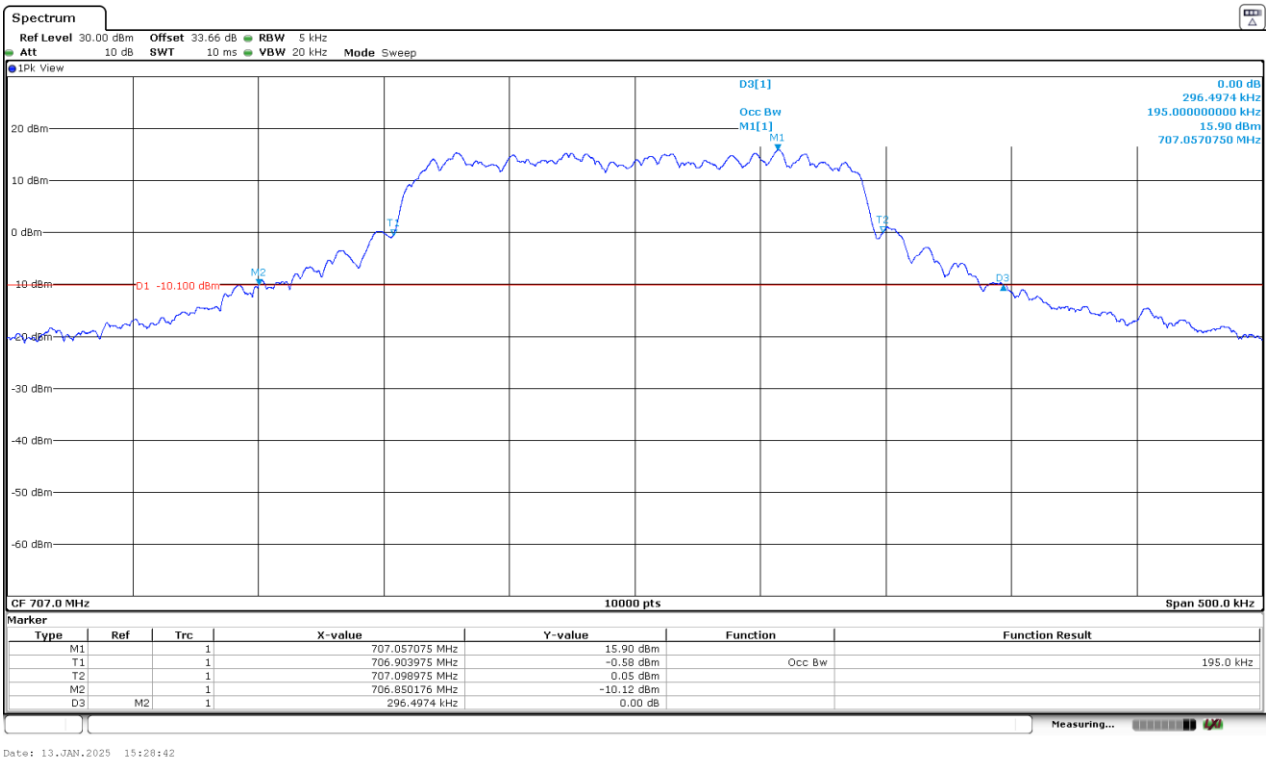


LTE Cat NB1 Band 85. QPSK. BW=15 kHz. Tone Number=12. Tone Offset=0. MSC/TBS=5.

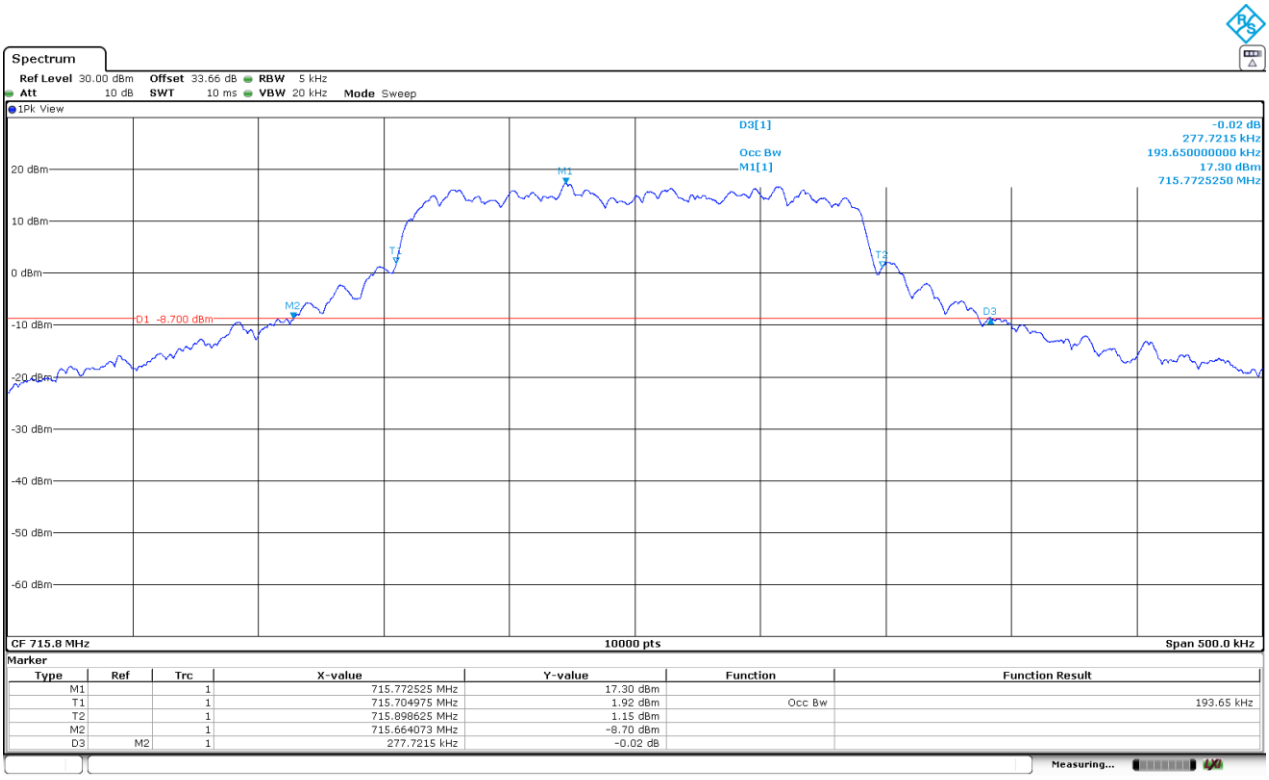
Low Channel:




Middle Channel:



High Channel:



# Spurious emissions at antenna terminals

***Limits***

**LTE Cat NB1 Band 85.**

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.

RSS-130, Clause 4.7.1:

> 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.

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

Po (dBm) – [43 + 10 log (Po in mW) - 30] = -13 dBm

At Po transmitting power, the specified minimum attenuation becomes 65+10 log (Po), and the level in dBm relative to Po becomes:

Po (dBm) – [65 + 10 log (Po in mW) - 30] = -35 dBm

***Method***

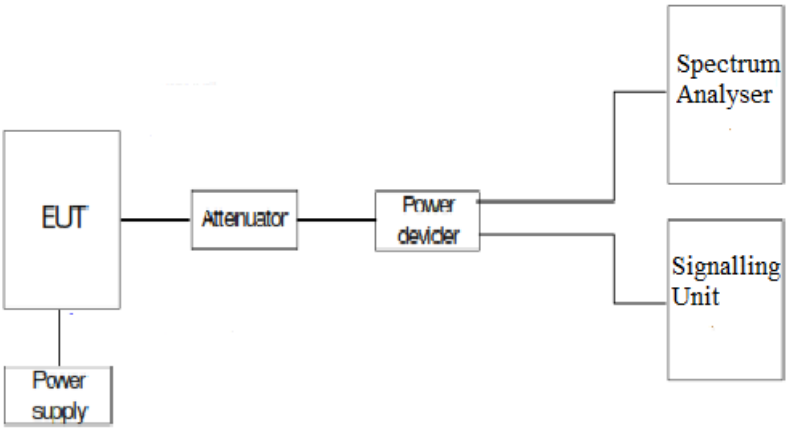
The EUT RF output connector was connected to a spectrum analyser and to the Universal Radio Communication tester R&S CMW500 (selecting maximum transmission power of the EUT and different modes of modulation) using a 50-Ohm attenuator and a power divider.

The spectrum was investigated from 9 kHz to 10 GHz for LTE Cat NB1 Band 85 and from 9 kHz to 20 GHz for LTE Cat NB1 Band 66.

The reading of the spectrum analyser is corrected with the attenuation loss of connection between output terminal of EUT and input of the spectrum analyser.

The configuration of Resource Blocks and modulation which is the worst case for conducted power was used.

### *Test Setup*


Spectrum Analyser
EUT
Attenuator
Power devicler
Signalling Unit
Power supply

***Results***

The next results are for the worst-case configuration for each LTE Cat NB1 Band.

**LTE Cat NB1 Band 85:**

A preliminary scan determined the worst-case:

Pi/2-BPSK. BW=15 kHz. Tone Number=3. Tone Offset=6. MSC/TBS=0.

**Frequency range 9 KHz - 10 GHz:**

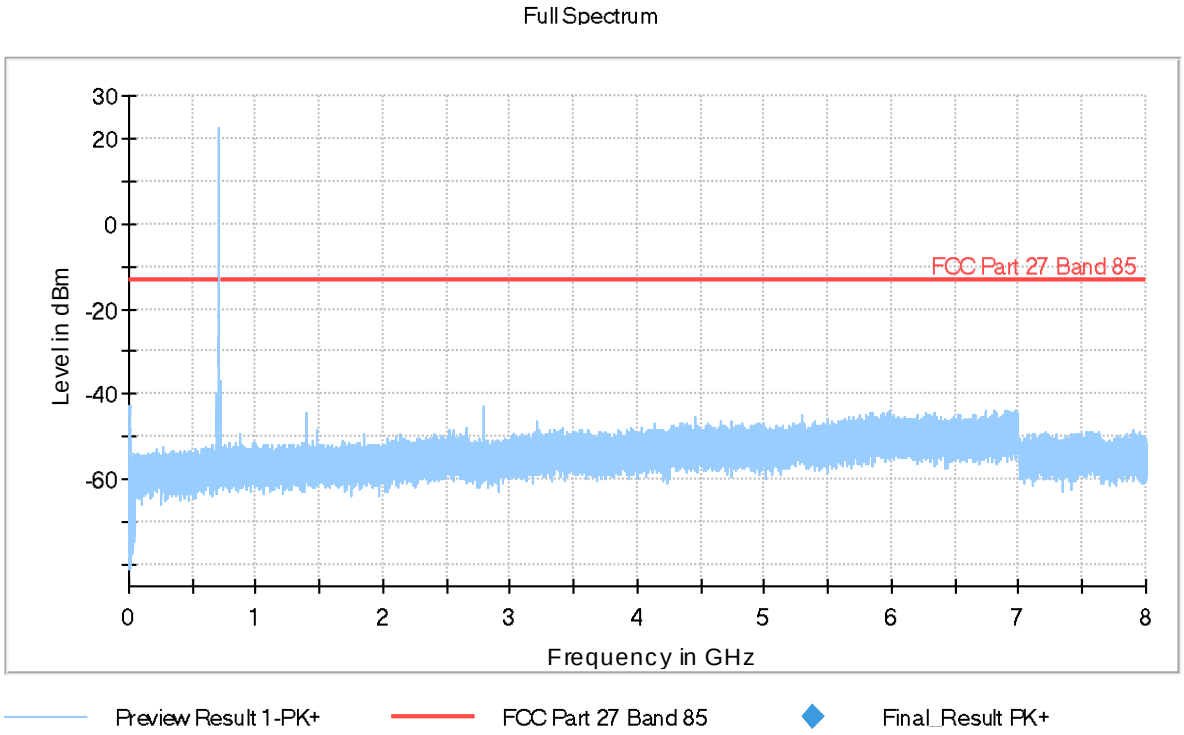
- Low Channel: No spurious frequencies at less than 20 dB below the limit.
- Middle Channel: No spurious frequencies at less than 20 dB below the limit.
- High Channel: No spurious frequencies at less than 20 dB below the limit.

Measurement uncertainty (dB): <±2.76

Verdict: PASS

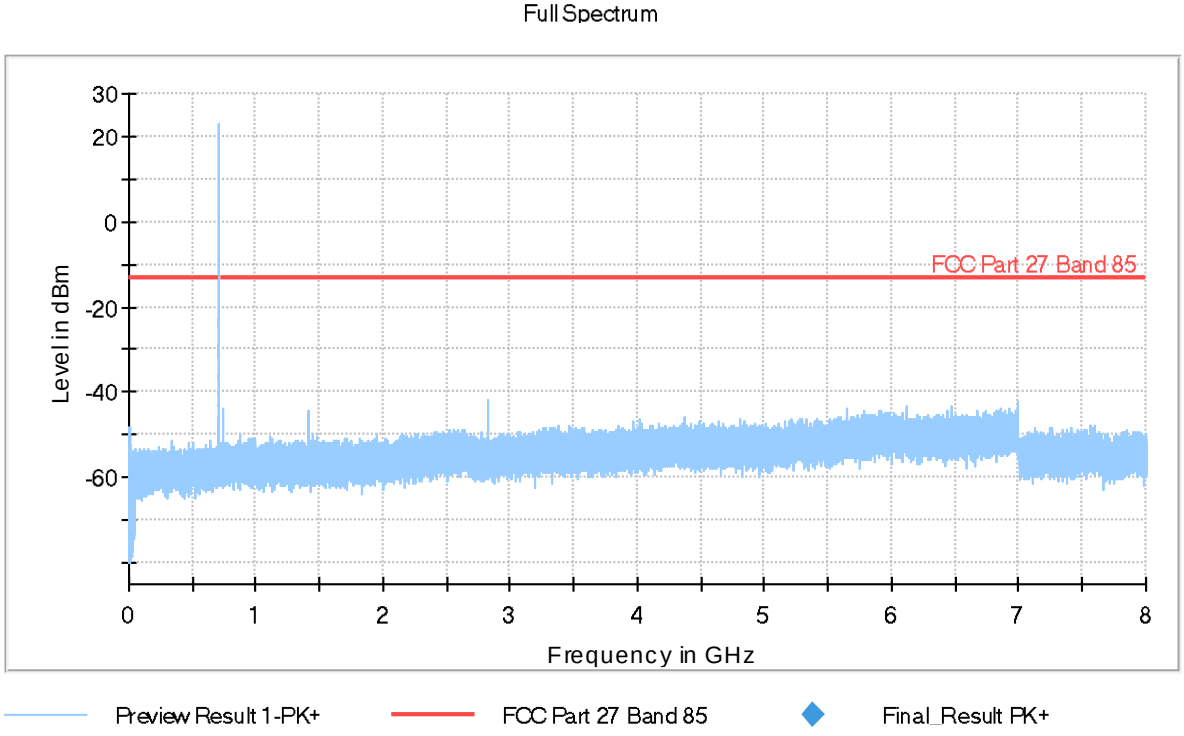
**LTE Cat-NB1 Band 85:** Pi/2-BPSK. BW=15 kHz. Tone Number=3. Tone Offset=6. MSC/TBS=0.

Low Channel:



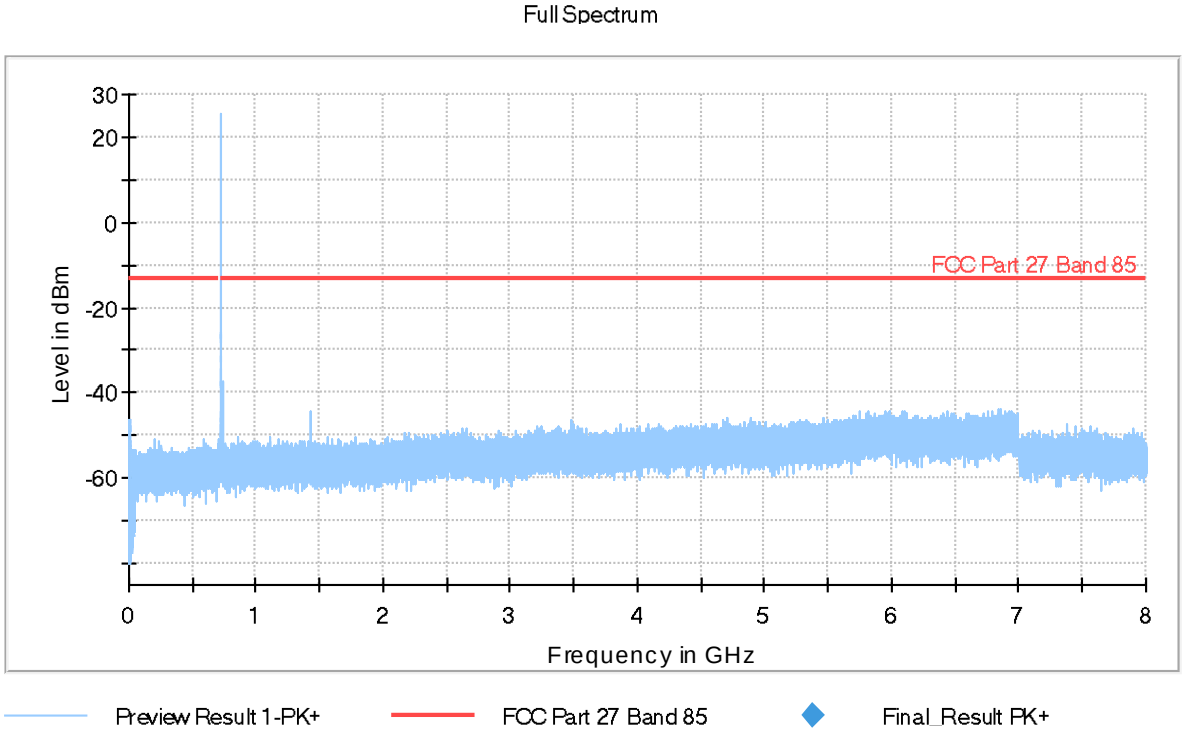

The peak above the limit is the carrier frequency.

Middle Channel:




The peak above the limit is the carrier frequency.

High Channel:




The peak above the limit is the carrier frequency.

# Spurious emissions at antenna terminals at Block Edges

***Limits***

**LTE Cat NB1 Band 85.**

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.

RSS-130, Clause 4.7.1:

> 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.

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

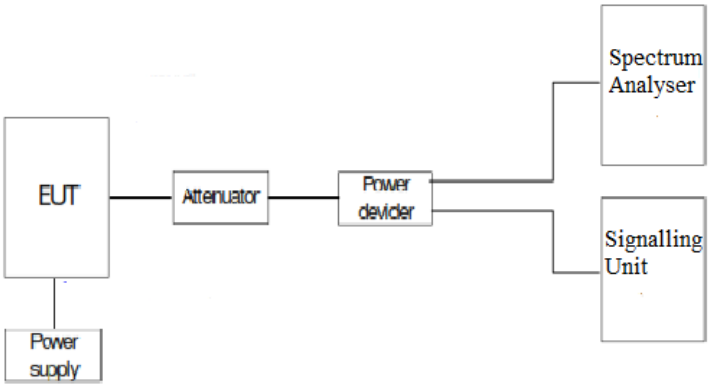
Po (dBm) – [43 + 10 log (Po in mW) - 30] = -13 dBm

***Method***

The EUT RF output connector was connected to a spectrum analyser and to the Universal Radio Communication tester R&S CMW500 (selecting maximum transmission power of the EUT and different modes of modulation) using a 50-Ohm attenuator and a power splitter.

The reading of the spectrum analyser is corrected with the attenuation loss of connection between output terminal of EUT and input of the spectrum analyser.

***Test Setup***



***Results***

**LTE Cat NB1 Band 85:**

Preliminary measurements determined the worst-case. Results attached are for this worst-case configuration.

| LTE Cat NB1 Band 85 | Pi/2-BPSK<br>BW=3.75 kHz<br>Tone Number=1<br>Tone Offset=0<br>MSC/TBS=0 | Pi/2-BPSK<br>BW=15 kHz<br>Tone Number=1<br>Tone Offset=0<br>MSC/TBS=3 | QPSK<br>BW=15 kHz<br>Tone Number=12<br>Tone Offset=0<br>MSC/TBS=5 |
|---|---|---|---|
| Maximum measured level at Low Block Edge at antenna port (dBm) | -22,66 | -20,83 | -21,99 |

| LTE Cat NB1 Band 85 | Pi/2-BPSK<br>BW=3.75 kHz<br>Tone Number=1<br>Tone Offset=47<br>MSC/TBS=0 | Pi/2-BPSK<br>BW=15 kHz<br>Tone Number=1<br>Tone Offset=11<br>MSC/TBS=3 | QPSK<br>BW=15 kHz<br>Tone Number=12<br>Tone Offset=0<br>MSC/TBS=5 |
|---|---|---|---|
| Maximum measured level at High Block Edge at antenna port (dBm) | -24,32 | -16,33 | -13,98 |

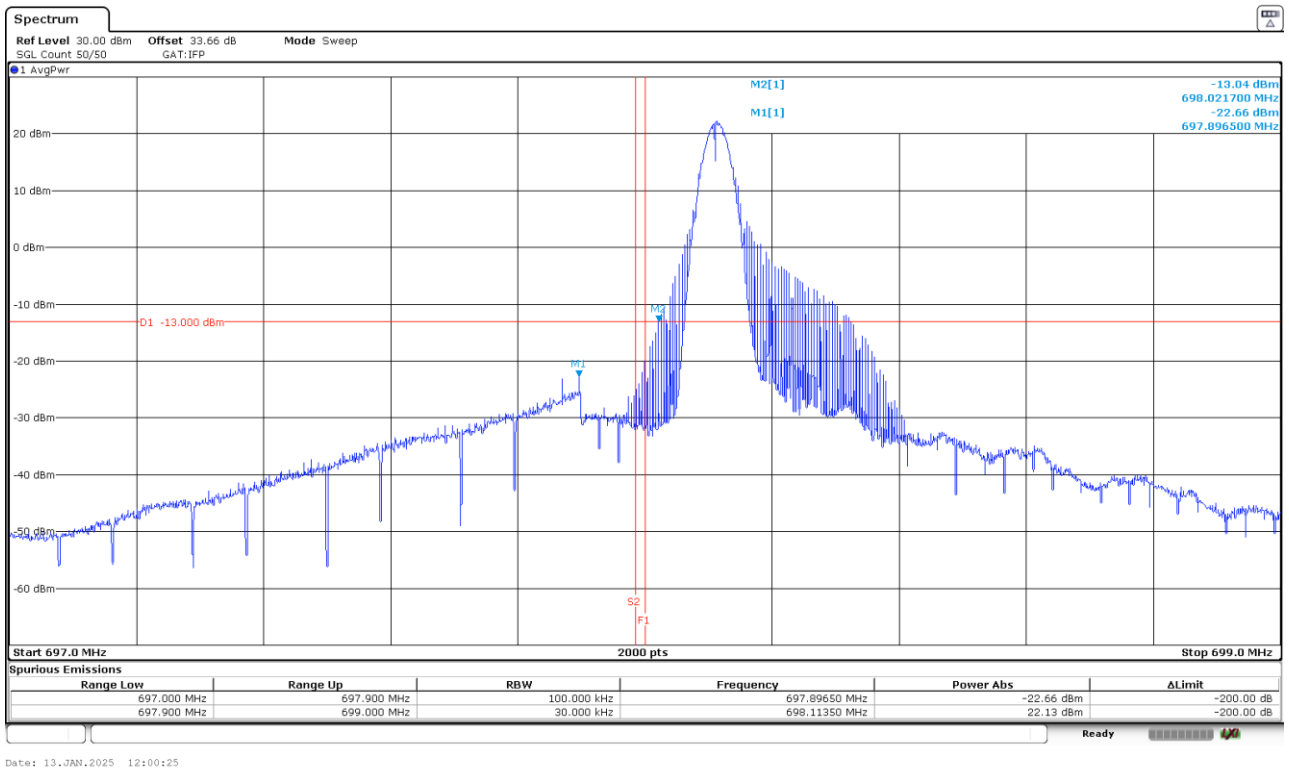
Measurement uncertainty (dB): <±2.76

***Verdict***

Pass

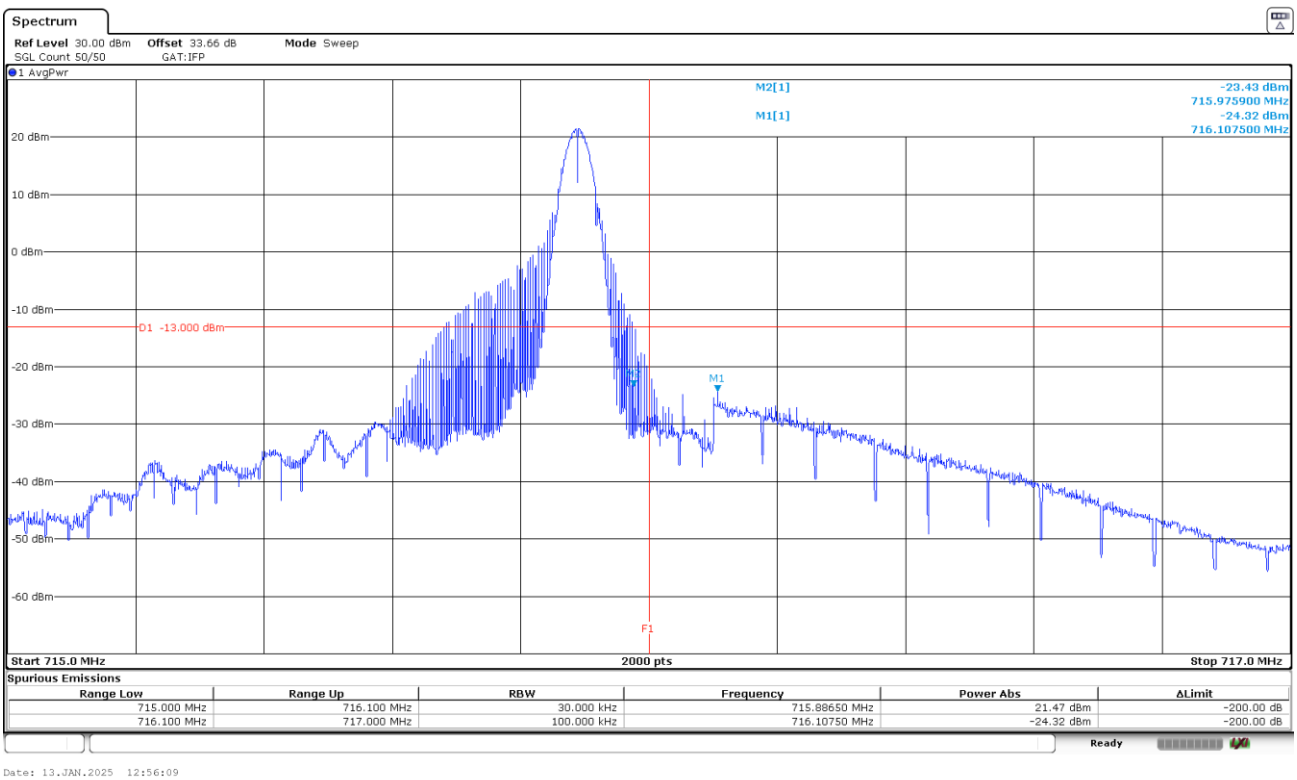
## LTE Cat NB1 Band 85:

LTE Cat NB1 Band 85. Pi/2-BPSK. BW=3.75 kHz. Tone Number=1. Tone Offset=0. MSC/TBS=0. Low Channel:



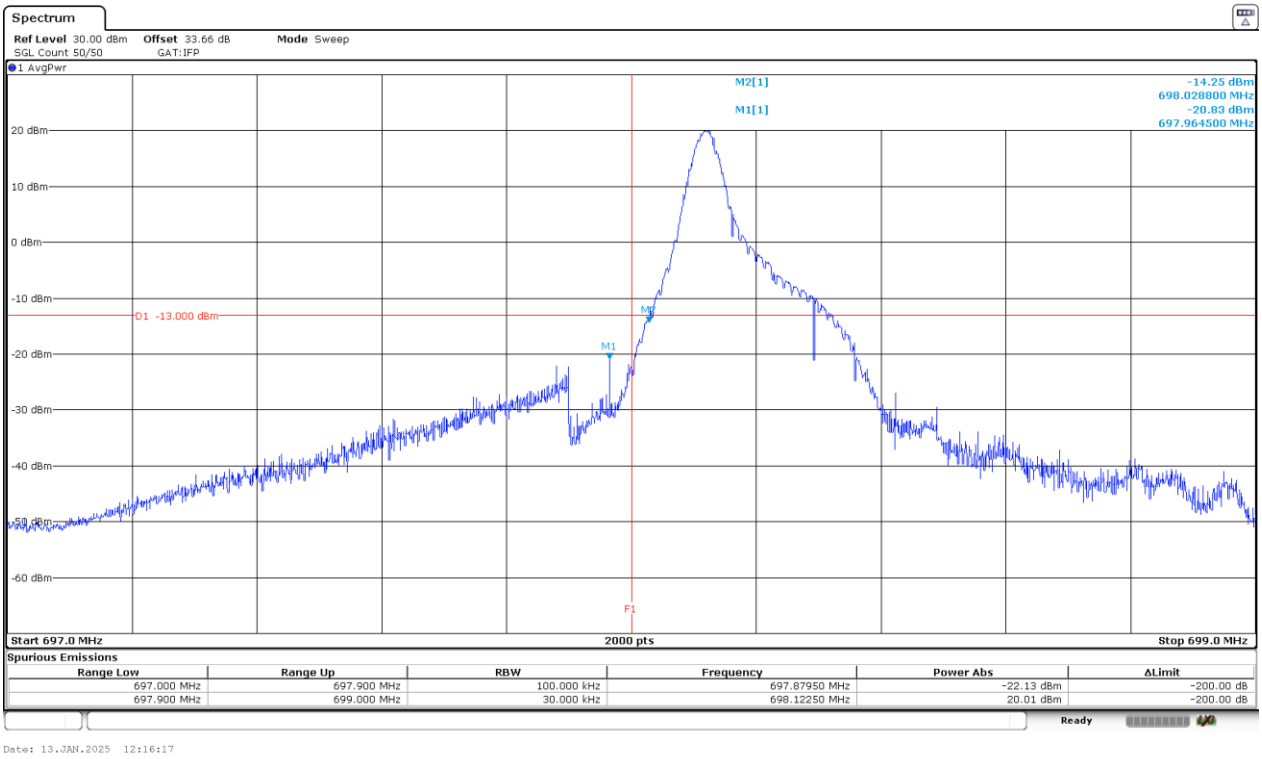

The equipment transmits at the maximum output power

LTE Cat NB1 Band 85. Pi/2-BPSK. BW=3.75 kHz. Tone Number=1. Tone Offset=47. MSC/TBS=0. High Channel:



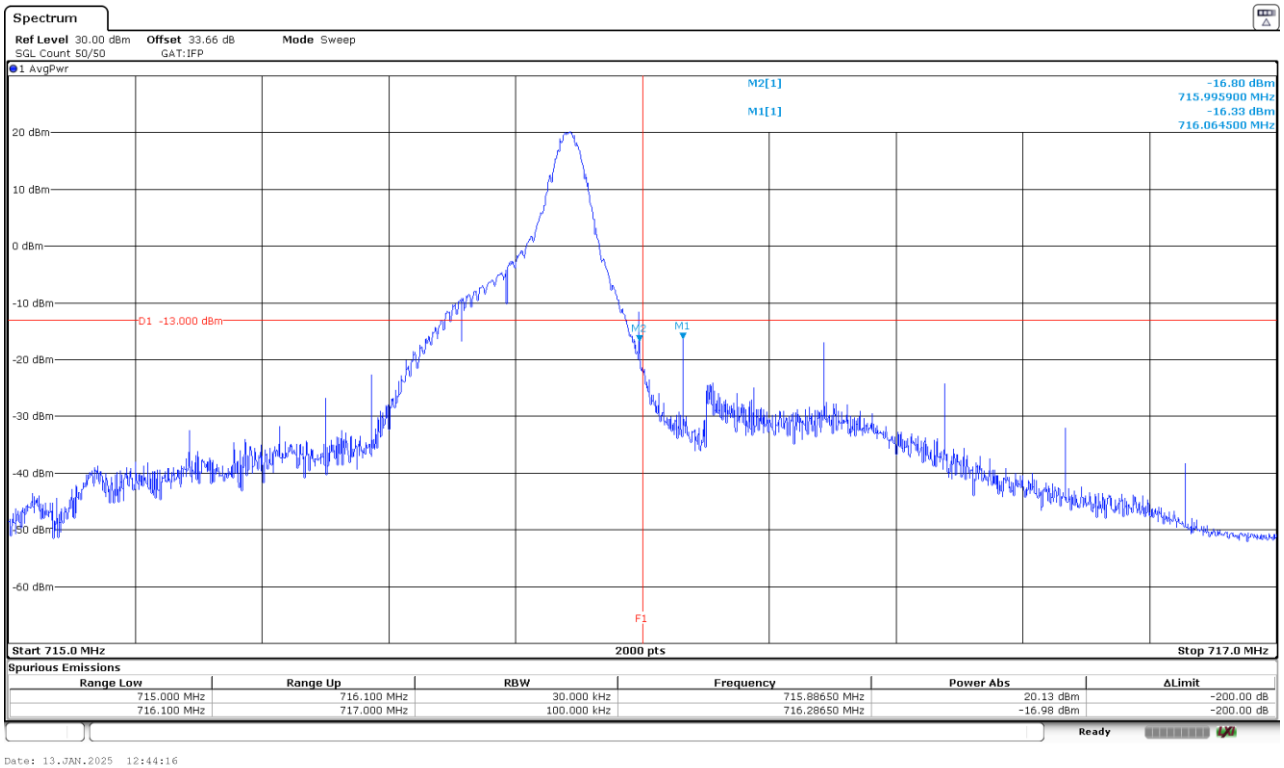

The equipment transmits at the maximum output power

LTE Cat NB1 Band 85. Pi/2-BPSK. BW=15 kHz. Tone Number=1. Tone Offset=0. MSC/TBS=0. Low Channel:



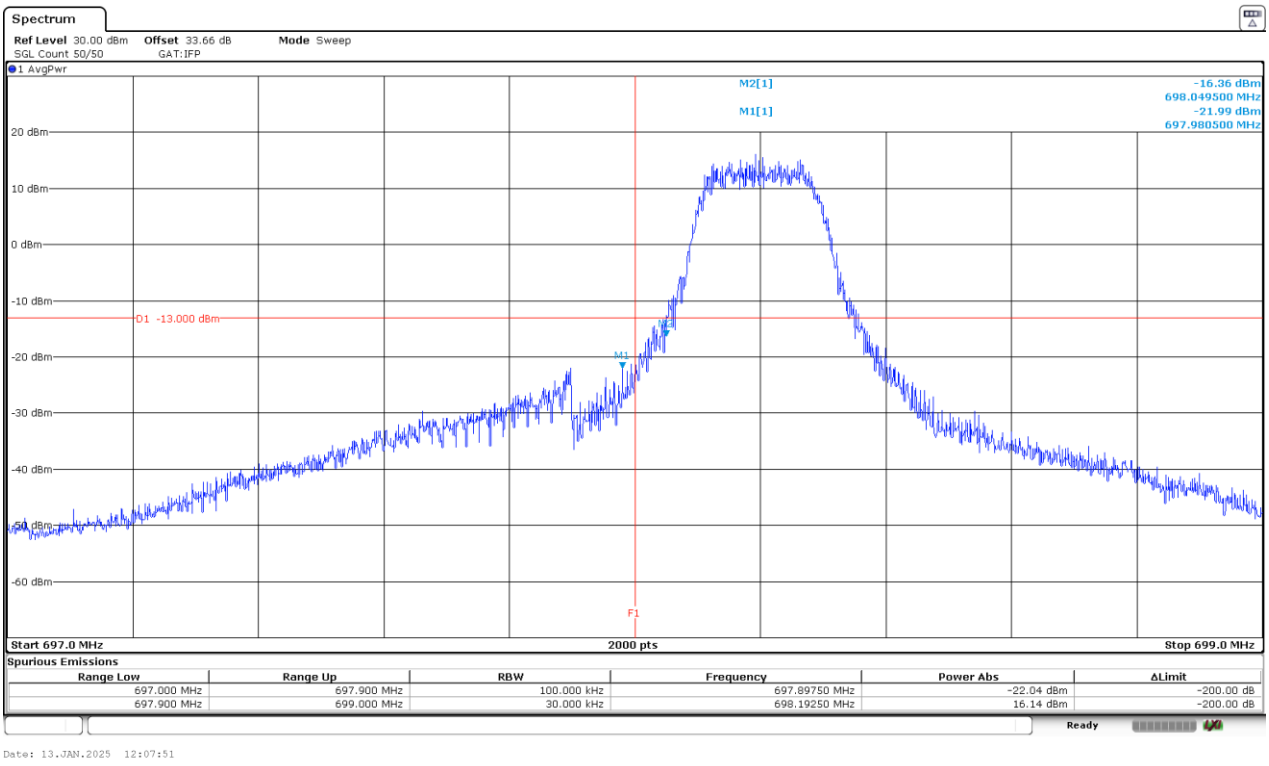

The equipment transmits at the maximum output power

LTE Cat NB1 Band 85. Pi/2-BPSK. BW=15 kHz. Tone Number=1. Tone Offset=11. MSC/TBS=0. High Channel:



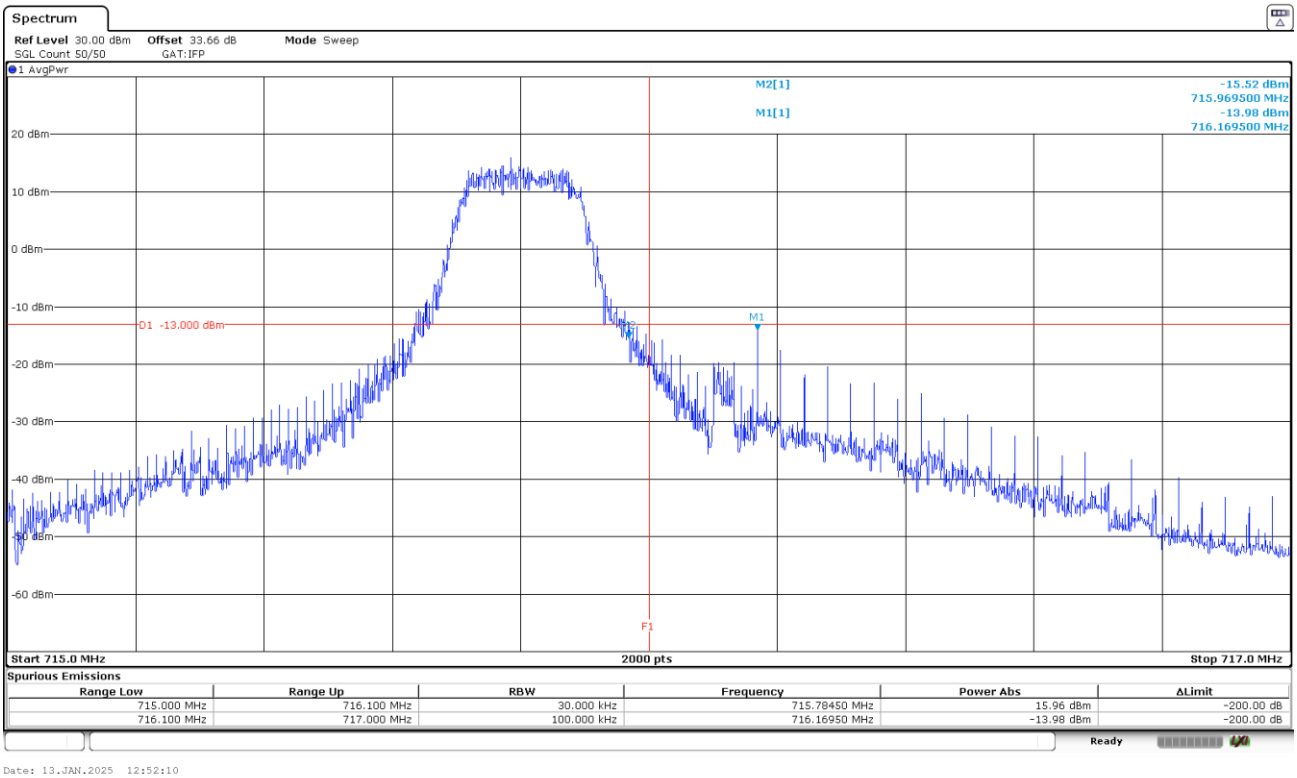

The equipment transmits at the maximum output power

LTE Cat NB1 Band 85. QPSK. BW=15 kHz. Tone Number=12. Tone Offset=0. MSC/TBS=5. Low Channel:




The equipment transmits at the maximum output power

LTE Cat NB1 Band 85. QPSK. BW=15 kHz. Tone Number=12. Tone Offset=0. MSC/TBS=5. High Channel:




The equipment transmits at the maximum output power

# Radiated emissions

***Limits***

**LTE Cat NB1 Band 85.** FCC §2.1053 & §27.53 (g) / RSS-130 Issue 2 Clause 4.7.

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:

> 4.7.1. 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 log10 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.

***Method***

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

The EUT was placed on a non-conductive stand at 3-meter distance from the measuring antenna for the frequency range 30 MHz to 18 GHz.

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

Measurement Limits:

At Po transmitting power, the specified minimum attenuation 43 + 10 log10 p (watts) becomes:

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

At Po transmitting power, the specified minimum attenuation 65 + 10 log10 p (watts) becomes:

$$Po\ (dBm) - [65 + 10 \log (Po\ in\ mwatts) - 30] = -35\ dBm$$

For operation in band 13, the e.i.r.p. in the band 1559-1610 MHz shall not exceed -70 dBW (-40 dBm) per MHz for wideband signals, and -80 dBW (-50 dBm) for discrete emissions of less than 700 Hz bandwidth.