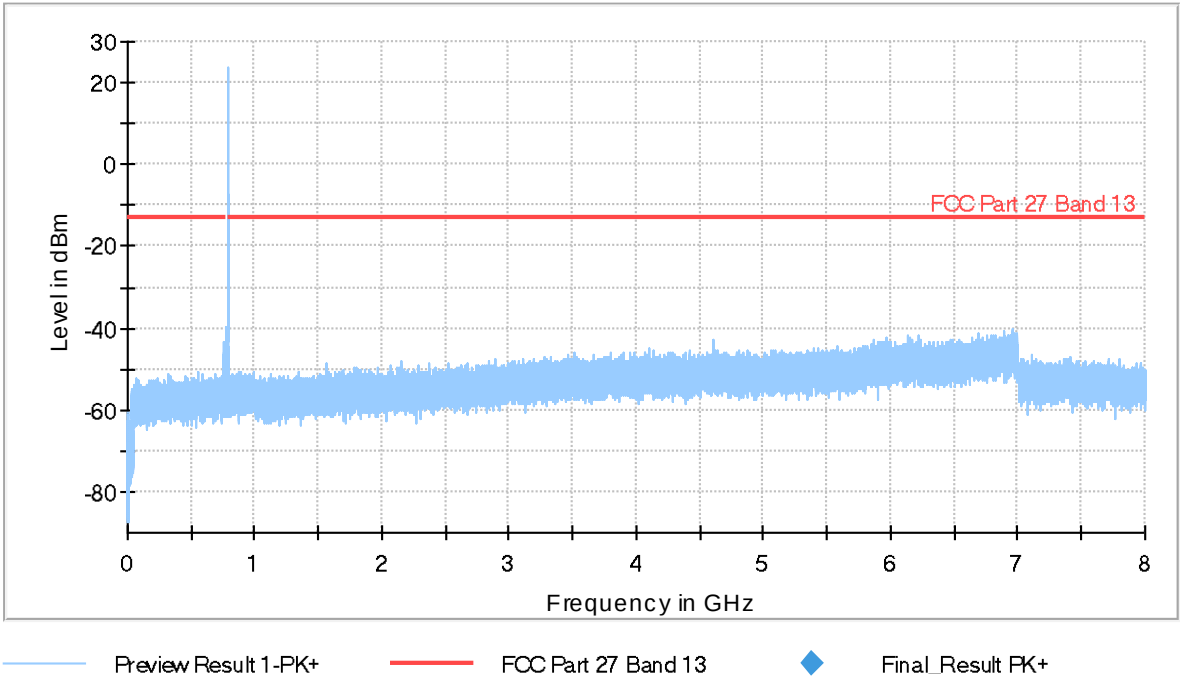


High Channel:

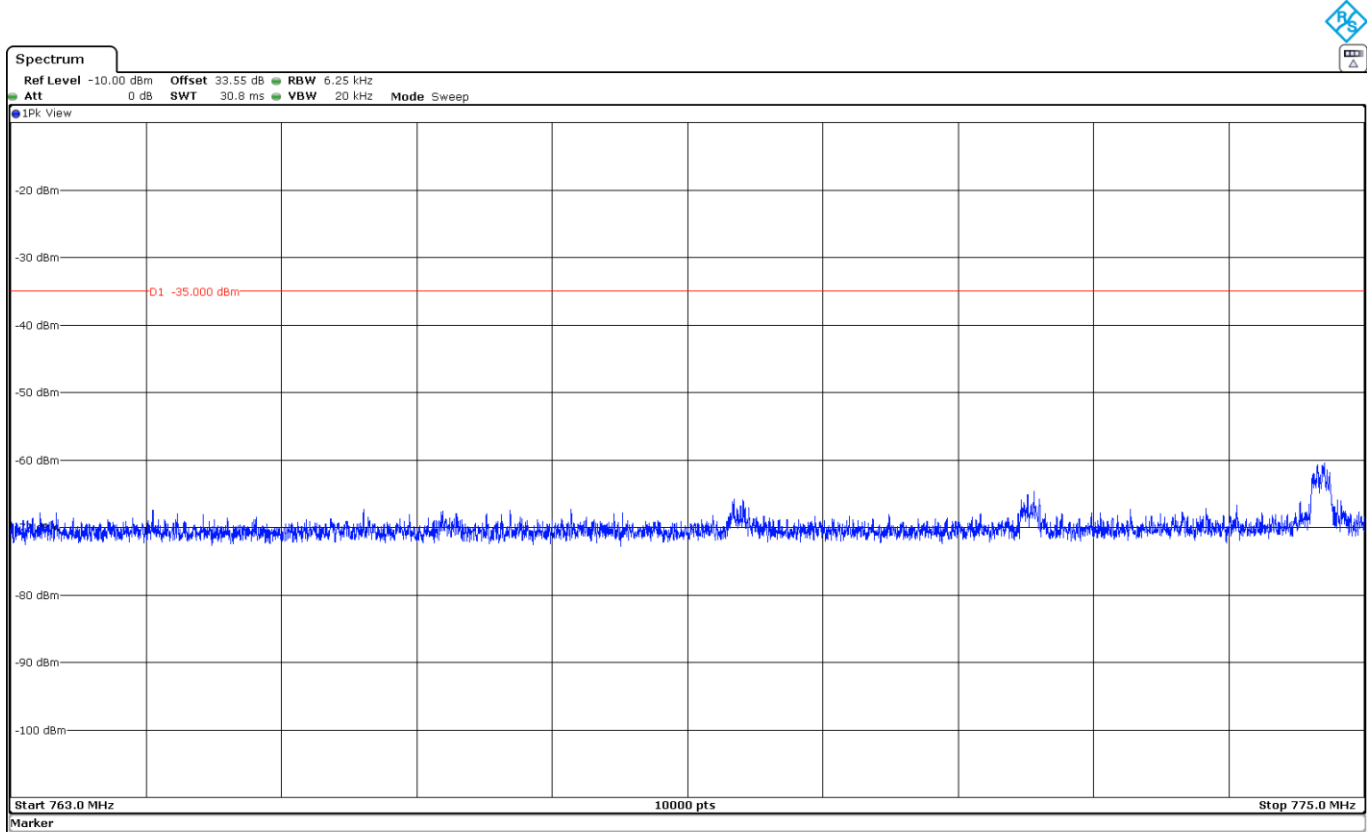
- Frequency range 9 kHz – 8 GHz:

Full Spectrum

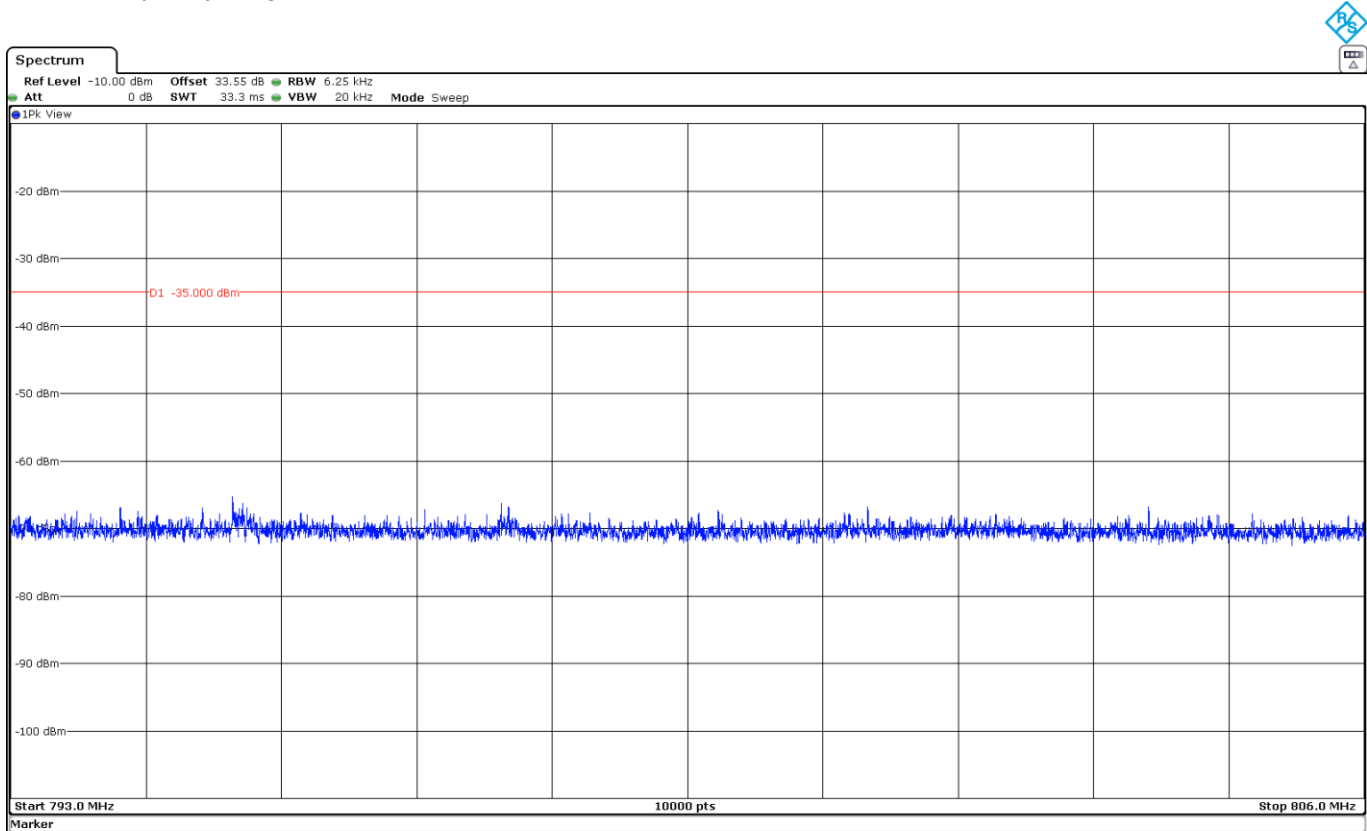


The peak above the limit is the carrier frequency.
The highest peak next to the carrier is the Downlink frequency.

- Frequency range 763 MHz – 775 MHz:



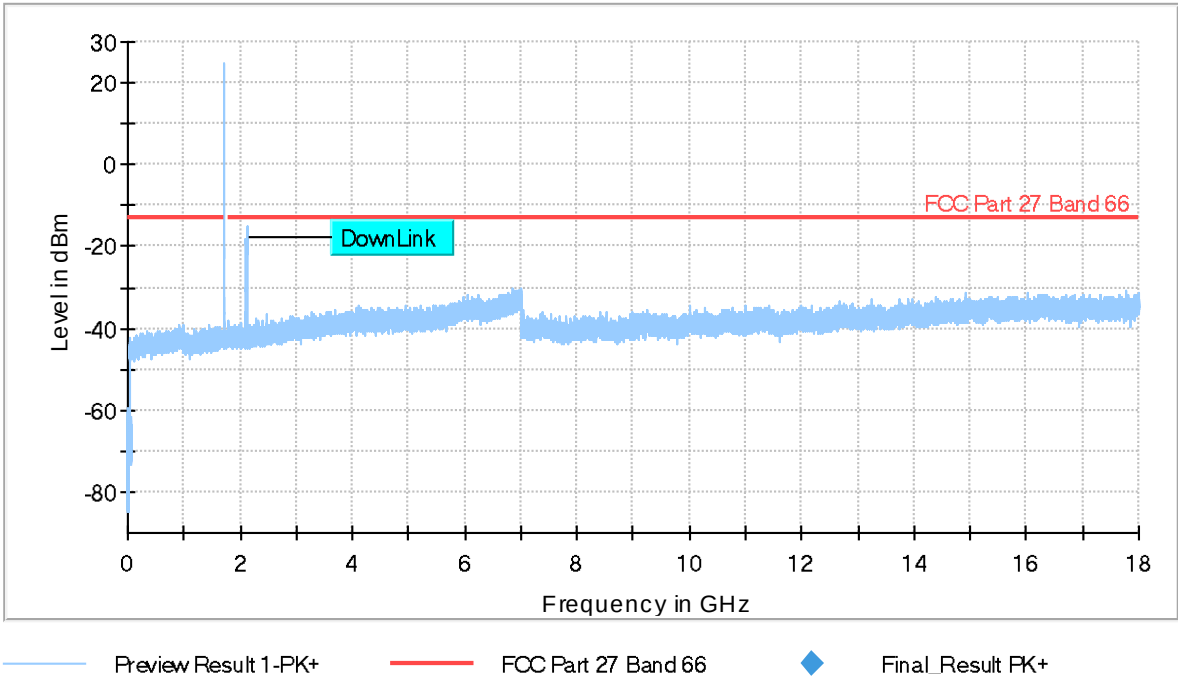
- Frequency range 793 MHz – 806 MHz:



LTE Cat-M1 Band 66. BW=15 MHz. QPSK. RB Size 6. RB Offset 0. Narrowband 0.

Low Channel:

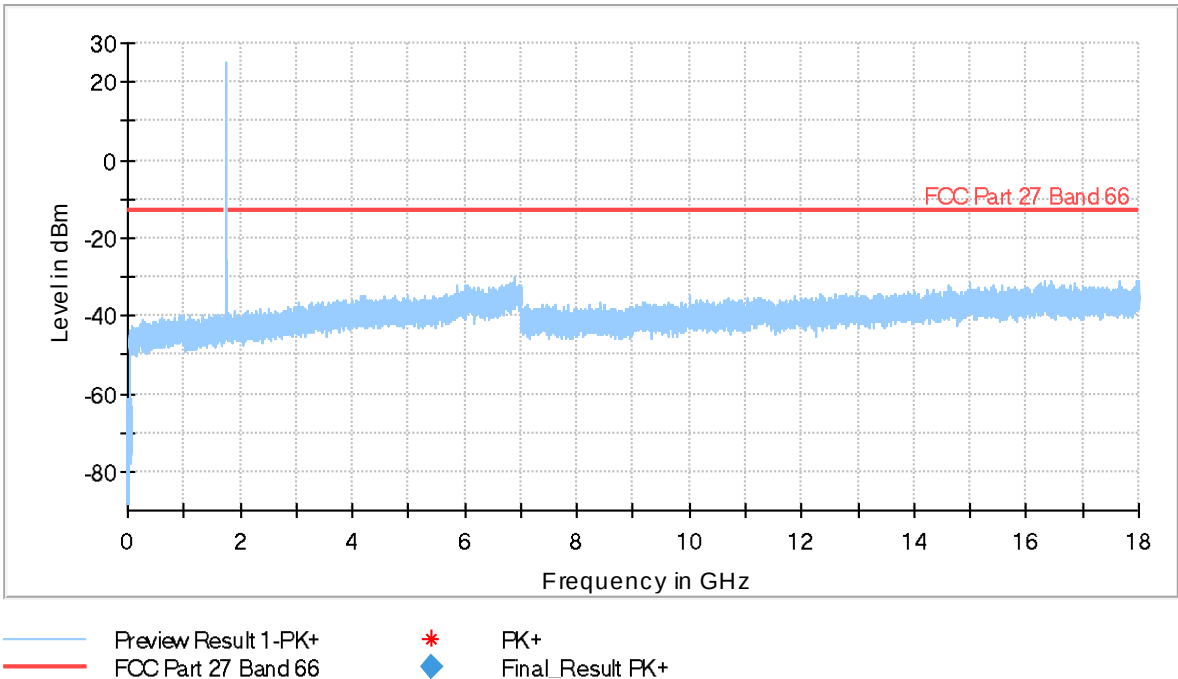
Full Spectrum



The peak above the limit is the carrier frequency.
The highest peak next to the carrier is the Downlink frequency.

Middle Channel:

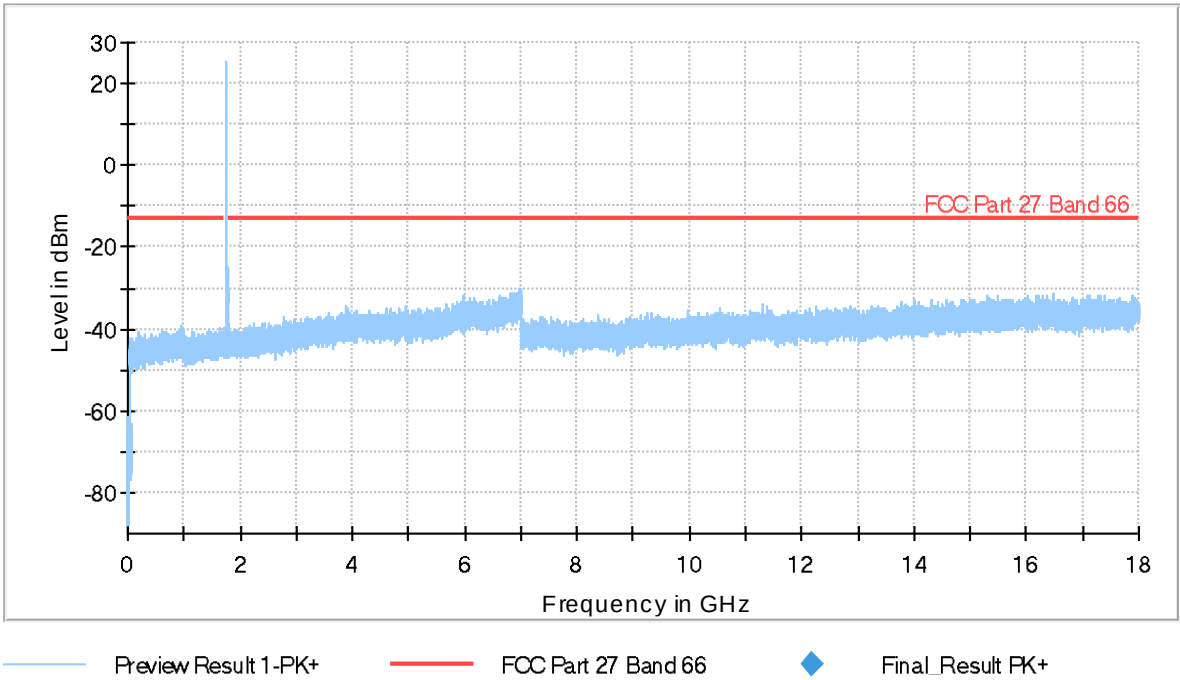
Full Spectrum



The peak above the limit is the carrier frequency.
The highest peak next to the carrier is the Downlink frequency.

High Channel:

Full Spectrum

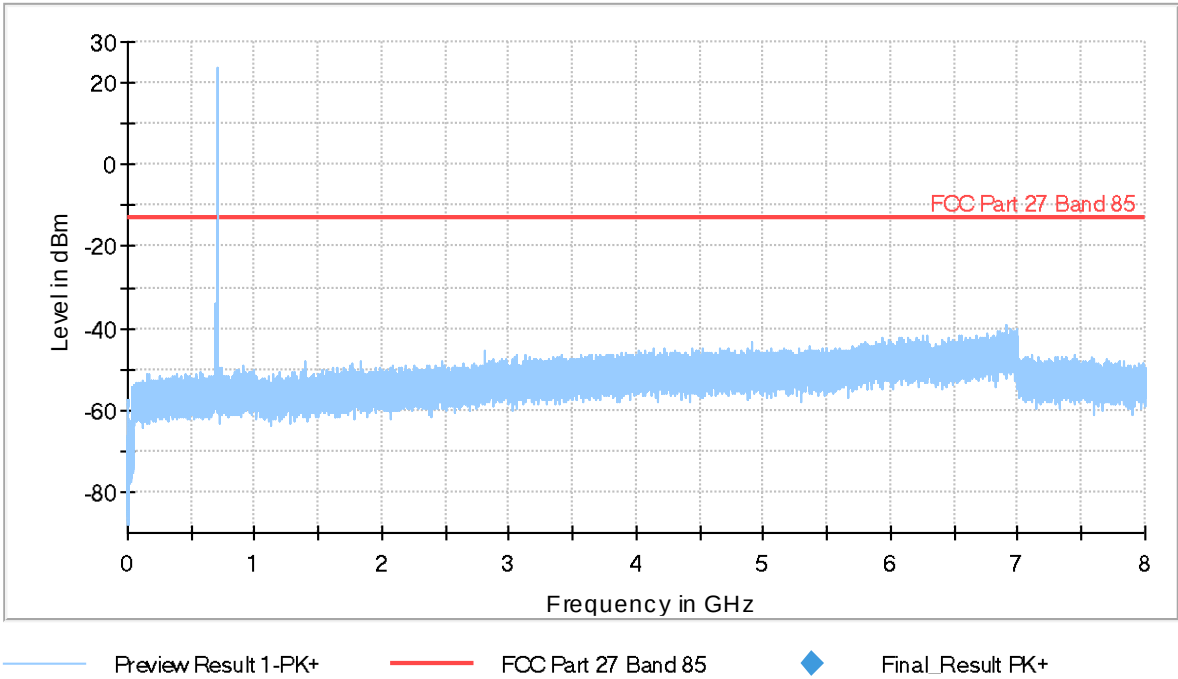


The peak above the limit is the carrier frequency.
The highest peak next to the carrier is the Downlink frequency.

LTE Cat-M1 Band 85. BW=5 MHz. QPSK. RB Size 1. RB Offset 2. Narrowband 1.

Low Channel:

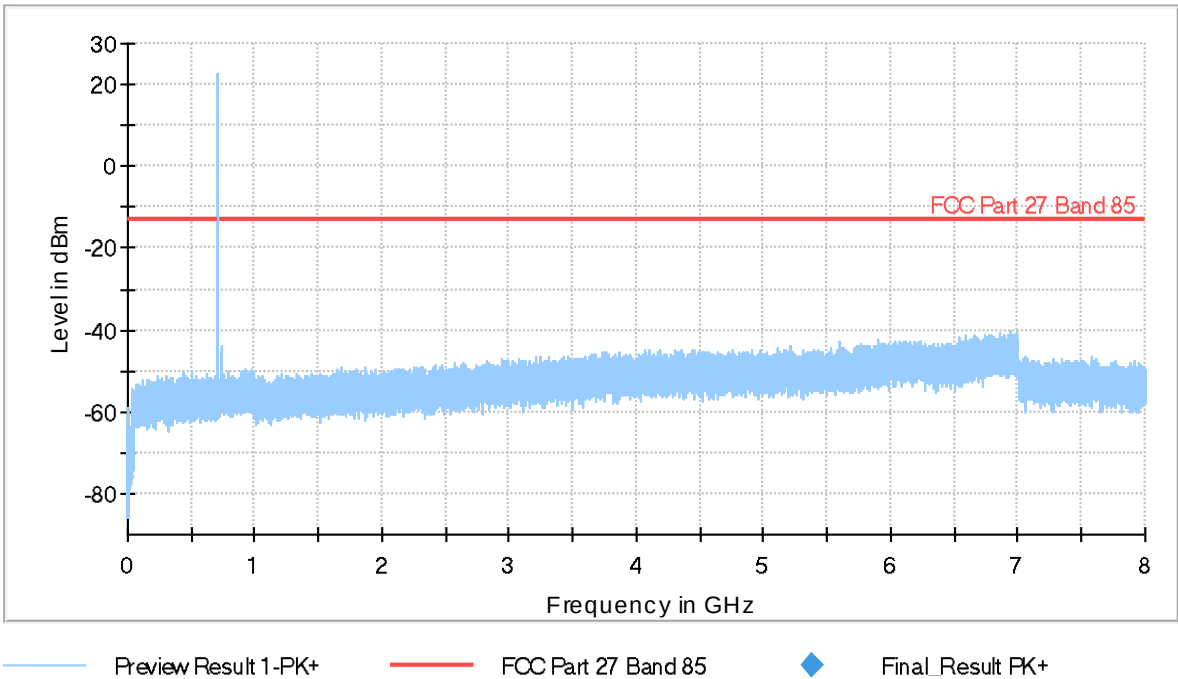
Full Spectrum



The peak above the limit is the carrier frequency.
The highest peak next to the carrier is the Downlink frequency.

Middle Channel:

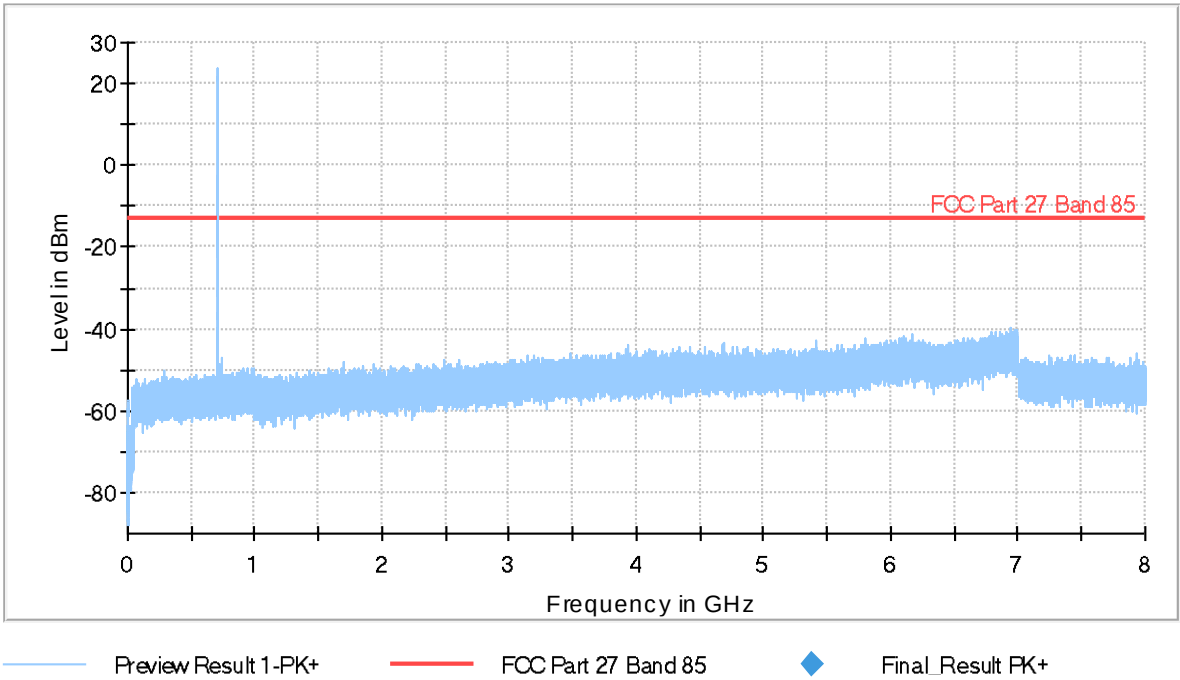
Full Spectrum



The peak above the limit is the carrier frequency.
The highest peak next to the carrier is the Downlink frequency.

High Channel:

Full Spectrum



The peak above the limit is the carrier frequency.
The highest peak next to the carrier is the Downlink frequency.

Spurious Emissions at Antenna Terminals at Block Edges

Limits

1. LTE Cat-M1 Band 8. FCC §27.1509 (a).

FCC §27.1509 (a):

The power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) in watts by at least the following amounts:

- (a) For 900 MHz broadband operations in 897.5–900.5 MHz band by at least $43 + 10 \log (P)$ dB.

2. LTE Cat-M1 Band 13.

FCC §27.53 (c):

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. Compliance is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater.

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. Compliance is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment.

RSS-130 4.7.1 and 4.7.2:

4.7.1 General unwanted emissions limits:

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.

4.7.2 Additional unwanted emissions limits:

In addition to the limit outlined in section 4.7.1 above, equipment operating in the frequency bands 746-756 MHz and 777-787 MHz shall also comply with the following restrictions:

a. 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:

- i. $76 + 10 \log_{10} p$ (watts), dB, for base and fixed equipment and
- ii. $65 + 10 \log_{10} p$ (watts), dB, for mobile and portable equipment

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

3. LTE Cat-M1 Band 66.

FCC §27.53 (h). RSS-139. Clause 6.6:

According to specification, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10} (P)$ dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater.

4. LTE Cat-M1 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 P_o transmitting power. the specified minimum attenuation becomes $43 + 10 \log (P_o)$. and the level in dBm relative to P_o becomes:

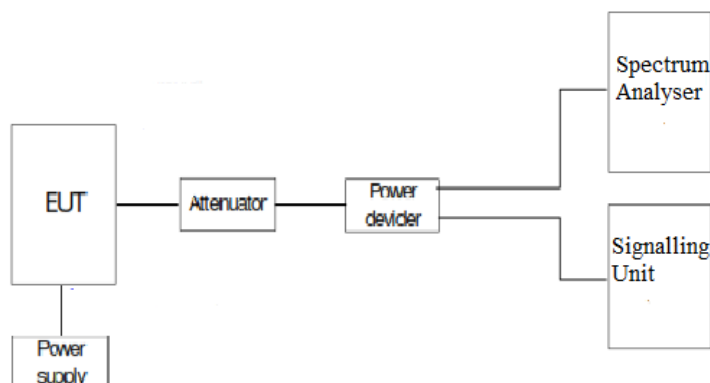
$$P_o \text{ (dBm)} - [43 + 10 \log (P_o \text{ in mW}) - 30] = -13 \text{ dBm}$$

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-M1 Band 4:

Preliminary measurements determined QPSK. BW=1.4 MHz as the worst-case modulation in terms of band edge results. The next results are for this worst-case configuration.

Low Block Edge. Narrowband= 0.

Note: Low Block Edge for LTE Cat-M1 Band 4 is the same as for LTE Cat-M1 Band 66.

High Block Edge. Narrowband= Max.

LTE Cat-M1 Band 4. QPSK:	RB=1. Offset=Max. BW = 1.4 MHz	RB=1. Offset=Max. BW = 3 MHz	RB=1. Offset=Max. BW = 5 MHz	RB=1. Offset=Max. BW = 10 MHz	RB=1. Offset=Max. BW = 15 MHz	RB=1. Offset=Max. BW = 20 MHz
Maximum measured level at <u>High Block Edge</u> at antenna port (dBm)	-19.15	-33.57	-29.99	-43.16	-45.4	-46.63

LTE Cat-M1 Band 4. QPSK:	RB=ALL. Offset=0. BW = 1.4 MHz	RB=All. Offset=0. BW = 3 MHz	RB = All. Offset = 0. BW = 5 MHz	RB = All. Offset = 0. BW = 10 MHz	RB = All. Offset = 0. BW = 15 MHz	RB = All. Offset = 0. BW = 20 MHz
Maximum measured level at <u>High Block Edge</u> at antenna port (dBm)	-28.22	-34.32	-29.28	-33.41	-31.06	-42

Measurement uncertainty: <±2.76 dB

Verdict

PASS

LTE Cat-M1 Band 8:

Preliminary measurements determined QPSK. BW=1.4 MHz as the worst-case modulation in terms of band edge results. The next results are for this worst-case configuration.

Low Block Edge. Narrowband= 0.

LTE Cat-M1 Band 8. QPSK:	RB=1. Offset=0. BW = 1.4 MHz	RB=1. Offset=0. BW = 3 MHz
Maximum measured level at <u>Low Block Edge</u> at antenna port (dBm)	-23.22	-29.62

LTE Cat-M1 Band 8. QPSK:	RB = All. Offset = 0. BW = 1.4 MHz	RB = All. Offset = 0. BW = 3 MHz
Maximum measured level at <u>Low Block Edge</u> at antenna port (dBm)	-29.25	-29.91

High Block Edge. Narrowband= Max.

LTE Cat-M1 Band 8. QPSK:	RB=1. Offset=Max. BW = 1.4 MHz	RB=1. Offset=Max. BW = 3 MHz
Maximum measured level at <u>High Block Edge</u> at antenna port (dBm)	-23.54	-33.26

LTE Cat-M1 Band 8. QPSK:	RB = All. Offset = 0. BW = 1.4 MHz	RB = All. Offset = 0. BW = 3 MHz
Maximum measured level at <u>High Block Edge</u> at antenna port (dBm)	-26.99	-30.44

Measurement uncertainty: <±2.76 dB

Verdict

PASS

LTE Cat-M1 Band 12:

Preliminary measurements determined QPSK. BW=5 MHz as the worst-case modulation in terms of band edge results. The next results are for this worst-case configuration.

Low Block Edge. Narrowband= 0.

LTE Cat-M1 Band 12. QPSK:	RB=1. Offset = 0. BW = 1.4 MHz	RB=1. Offset = 0. BW = 3 MHz	RB=1. Offset = 0. BW = 5 MHz	RB=1. Offset = 0. BW = 10 MHz
Maximum measured level at <u>Low Block Edge</u> at antenna port (dBm)	-42	-41.64	-41.69	-42.26

LTE Cat-M1 Band 12. QPSK:	RB = All. Offset = 0. BW = 1.4 MHz	RB = All. Offset = 0. BW = 3 MHz	RB = All. Offset = 0. BW = 5 MHz	RB = All. Offset = 0. BW = 10 MHz
Maximum measured level at <u>Low Block Edge</u> at antenna port (dBm)	-46.16	-47.78	-43.52	-45.52

High Block Edge. Narrowband= Max.

LTE Cat-M1 Band 12. QPSK:	RB=1. Offset=Max. BW = 1.4 MHz	RB=1. Offset=Max. BW = 3 MHz	RB=1. Offset=Max. BW = 5 MHz	RB=1. Offset=Max. BW = 10 MHz
Maximum measured level at <u>High Block Edge</u> at antenna port (dBm)	-19.26	-32.33	-26.56	-37.19

LTE Cat-M1 Band 12. QPSK:	RB = All. Offset = 0. BW = 1.4 MHz	RB = All. Offset = 0. BW = 3 MHz	RB = All. Offset = 0. BW = 5 MHz	RB = All. Offset = 0. BW = 10 MHz
Maximum measured level at <u>High Block Edge</u> at antenna port (dBm)	-24.04	-25.65	-21.08	-26.56

Measurement uncertainty: <±2.76 dB

Verdict

PASS

LTE Cat-M1 Band 13:

Preliminary measurements determined QPSK. BW=5 MHz as the worst-case modulation in terms of band edge results. The next results are for this worst-case configuration.

Low Block Edge. Narrowband= 0.

LTE Cat-M1 Band 13. QPSK:	RB=1. Offset = 0. BW = 5 MHz	RB=1. Offset = 0. BW = 10 MHz
Maximum measured level at <u>Low Block Edge</u> at antenna port (dBm)	-29.65	-36.66

LTE Cat-M1 Band 13. QPSK:	RB = All. Offset = 0. BW = 5 MHz	RB = All. Offset = 0. BW = 10 MHz
Maximum measured level at <u>Low Block Edge</u> at antenna port (dBm)	-20.66	-25.73

High Block Edge. Narrowband= Max.

LTE Cat-M1 Band 13. QPSK:	RB=1. Offset=Max. BW = 5 MHz	RB=1. Offset=Max. BW = 10 MHz
Maximum measured level at <u>High Block Edge</u> at antenna port (dBm)	-28.93	-36.4

LTE Cat-M1 Band 13. QPSK:	RB = All. Offset = 0. BW = 5 MHz	RB = All. Offset = 0. BW = 10 MHz
Maximum measured level at <u>High Block Edge</u> at antenna port (dBm)	-20.65	-26.88

Measurement uncertainty: <±2.76 dB

Verdict

PASS

LTE Cat-M1 Band 66:

Preliminary measurements determined QPSK. BW=1.4 MHz as the worst-case modulation in terms of band edge results. The next results are for this worst-case configuration.

Low Block Edge. Narrowband= 0.

LTE Cat-M1 Band 66. QPSK:	RB=1. Offset = 0. BW = 1.4 MHz	RB=1. Offset = 0. BW = 3 MHz	RB=1. Offset = 0. BW = 5 MHz	RB=1. Offset = 0. BW = 10 MHz	RB=1. Offset = 0. BW = 15 MHz	RB=1. Offset = 0. BW = 20 MHz
Maximum measured level at <u>Low Block Edge</u> at antenna port (dBm)	-17.56	-31.09	-29.01	-42.45	-44.91	-45.14

LTE Cat-M1 Band 66. QPSK:	RB = 6. Offset = 0. BW = 1.4 MHz	RB = 6. Offset = 0. BW = 3 MHz	RB = 6. Offset = 0. BW = 5 MHz	RB = 6. Offset = 0. BW = 10 MHz	RB = 6. Offset = 0. BW = 15 MHz	RB = 6. Offset = 0. BW = 20 MHz
Maximum measured level at <u>Low Block Edge</u> at antenna port (dBm)	-27.38	-32.28	-26.43	-30.67	-31.18	-41.4

High Block Edge. Narrowband= Max.

LTE Cat-M1 Band 66. QPSK:	RB=1. Offset=Max. BW = 1.4 MHz	RB=1. Offset=Max. BW = 3 MHz	RB=1. Offset=Max. BW = 5 MHz	RB=1. Offset=Max. BW = 10 MHz	RB=1. Offset=Max. BW = 15 MHz	RB=1. Offset=Max. BW = 20 MHz
Maximum measured level at <u>High Block Edge</u> at antenna port (dBm)	-18.55	-32.19	-29.21	-41.97	-44.28	-44.43

LTE Cat-M1 Band 66. QPSK:	RB = 6. Offset =0. BW = 1.4 MHz	RB = 6. Offset =0. BW = 3 MHz	RB = 6. Offset =0. BW = 5 MHz	RB = 6. Offset =0. BW = 10 MHz	RB = 6. Offset =0. BW = 15 MHz	RB = 6. Offset =0. BW = 20 MHz
Maximum measured level at <u>High Block Edge</u> at antenna port (dBm)	-26.11	-33.48	-29.1	-33.18	-29.52	-40.33

Measurement uncertainty: <±2.76 dB

Verdict

PASS

LTE Cat-M1 Band 85:

Preliminary measurements determined QPSK. BW=5 MHz as the worst-case modulation in terms of band edge results. The next results are for this worst-case configuration.

Low Block Edge. Narrowband=0.

LTE Cat-M1 Band 85. QPSK:	RB=1. Offset = 0. BW = 5 MHz	RB=1. Offset = 0. BW = 10 MHz
Maximum measured level at <u>Low Block Edge</u> at antenna port (dBm)	-27.74	-37.56

LTE Cat-M1 Band 85. QPSK:	RB = 6. Offset = 0. BW = 5 MHz	RB = 6. Offset = 0. BW = 10 MHz
Maximum measured level at <u>Low Block Edge</u> at antenna port (dBm)	-20.64	-27.08

High Block Edge. Narrowband=Max.

Note: High Block Edge for LTE Cat-M1 Band 85 is the same as for LTE Cat-M1 Band 12 for BW 5 MHz and 10 MHz.

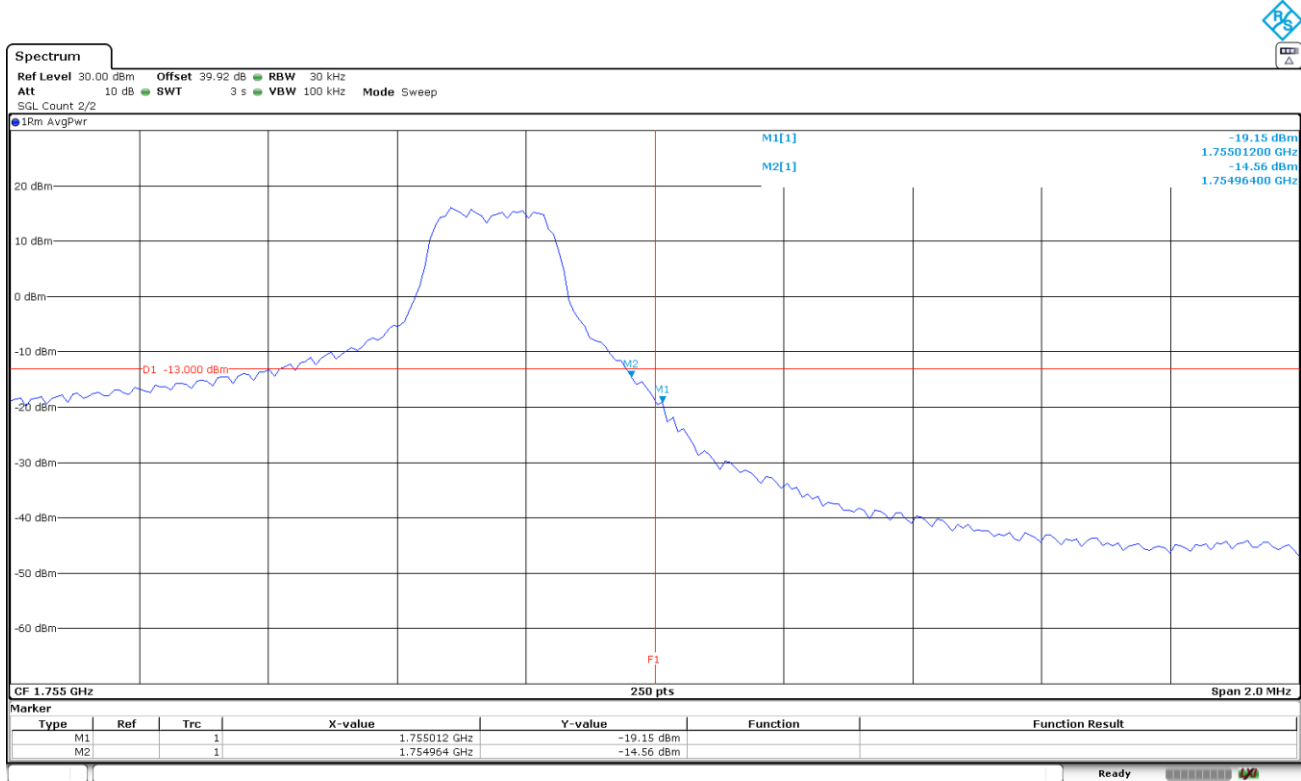
Measurement uncertainty: <±2.76 dB

Verdict

PASS

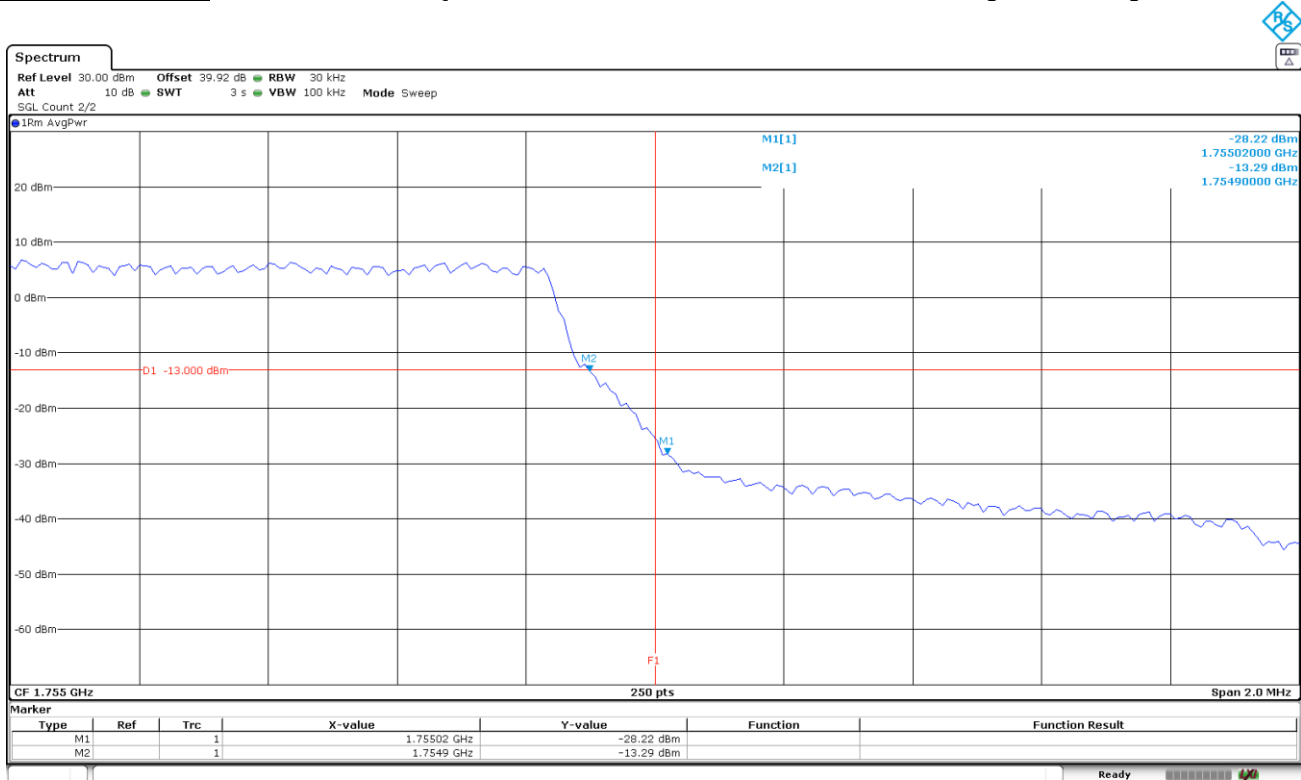
LTE Cat-M1 Band 4:

LTE Cat-M1 Band 4. BW=1.4 MHz. QPSK. RB=1. Offset=Max. Narrowband=Max. High Block Edge:



The equipment transmits at the maximum output power

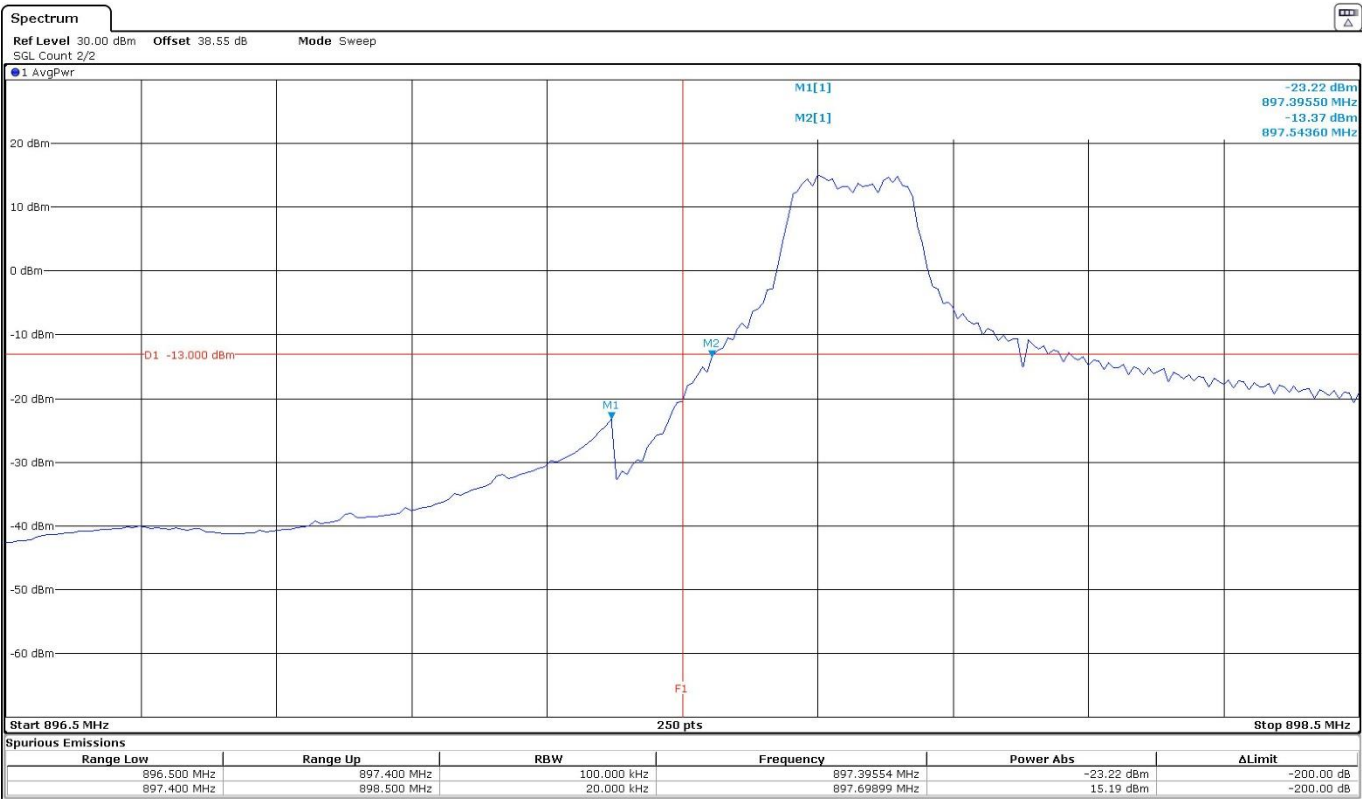
LTE Cat-M1 Band 4. BW=1.4 MHz. QPSK. RB=All. Offset=0. Narrowband=Max. High Block Edge:



The equipment transmits at the maximum output power

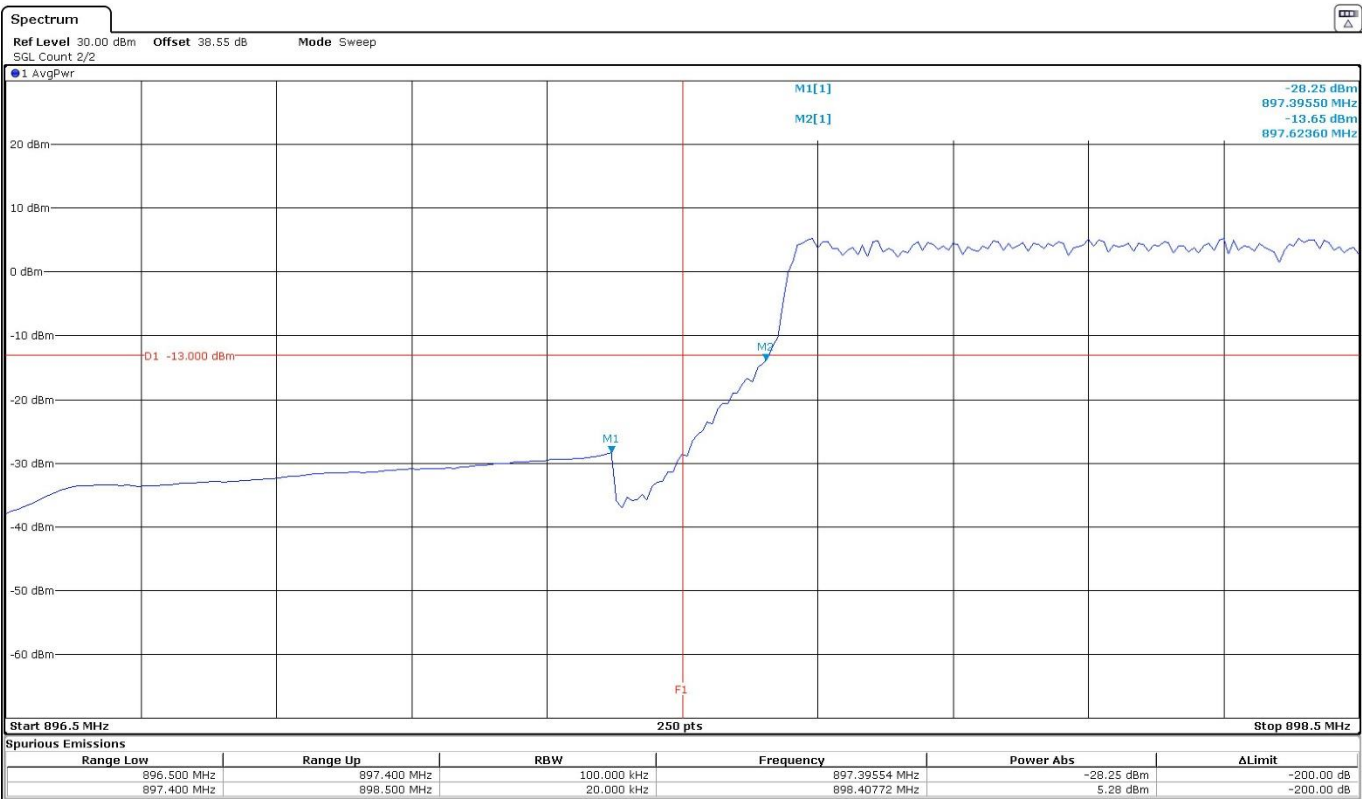
LTE Cat-M1 Band 8:

LTE Cat-M1 Band 8. BW=1.4 MHz. QPSK. RB=1. Offset=0. Narrowband=0. Low Block Edge:



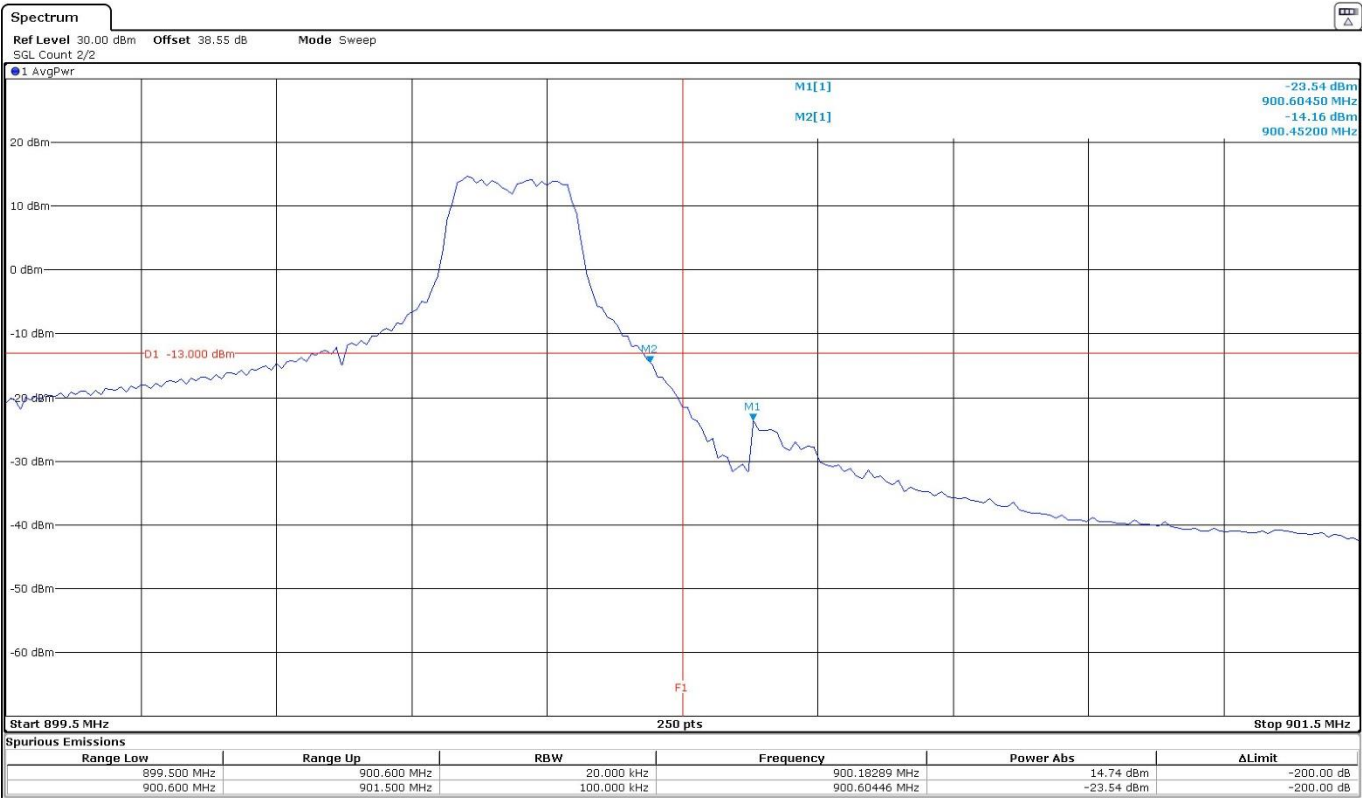
The equipment transmits at the maximum output power

LTE Cat-M1 Band 8. BW=1.4 MHz. QPSK. RB=All. Offset=0. Narrowband=0. Low Block Edge:



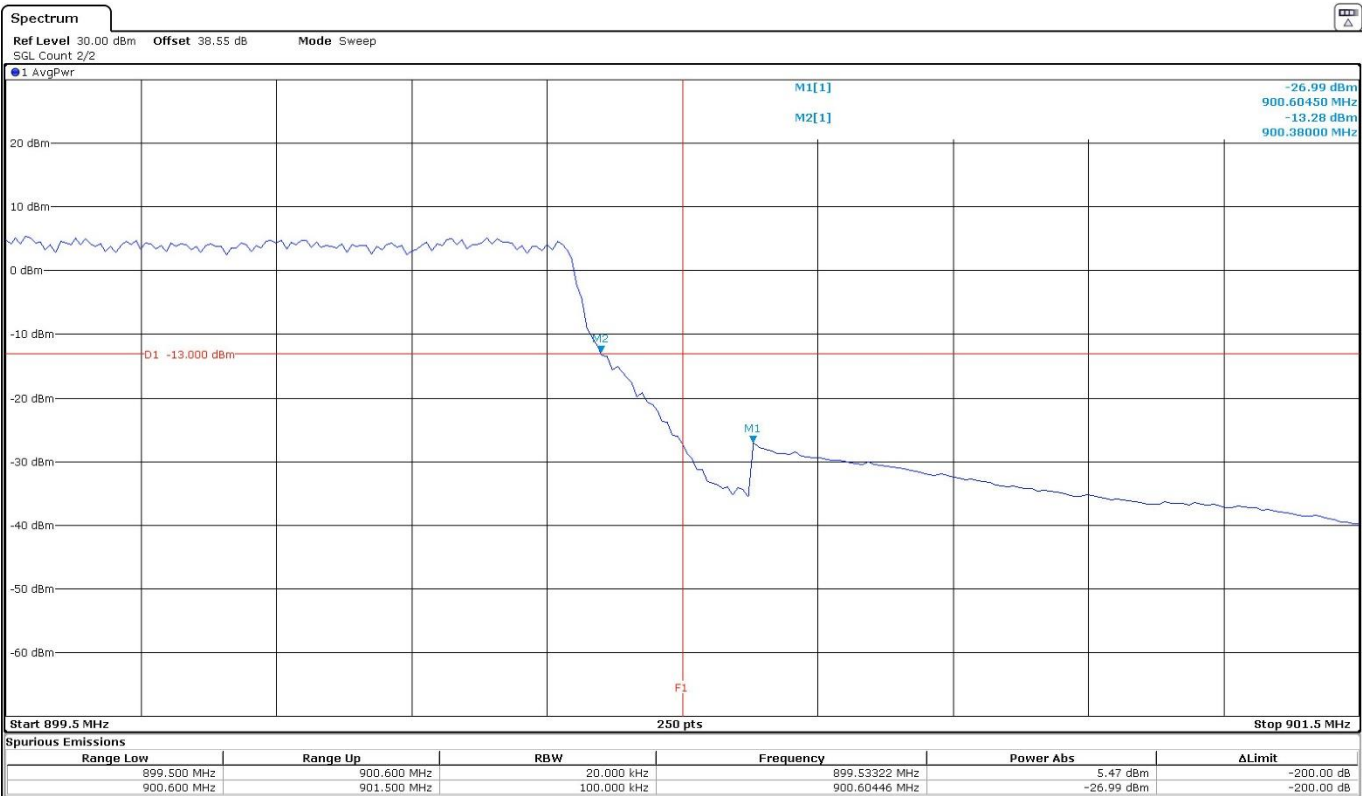
The equipment transmits at the maximum output power

LTE Cat-M1 Band 8. BW=1.4 MHz. QPSK. RB=1. Offset=Max. Narrowband=Max. High Block Edge:



The equipment transmits at the maximum output power

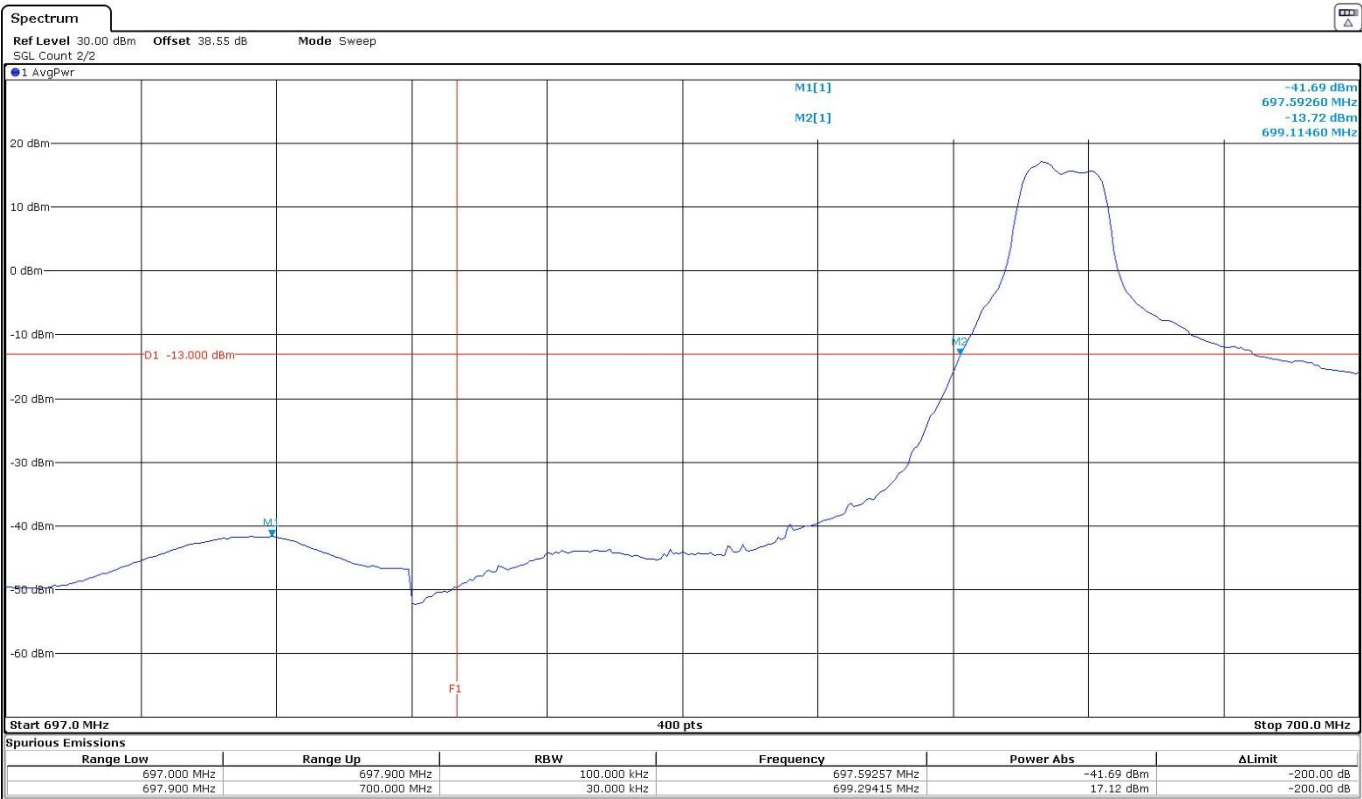
LTE Cat-M1 Band 8. BW=1.4 MHz. QPSK. RB=All. Offset=0. Narrowband=Max. High Block Edge:



The equipment transmits at the maximum output power

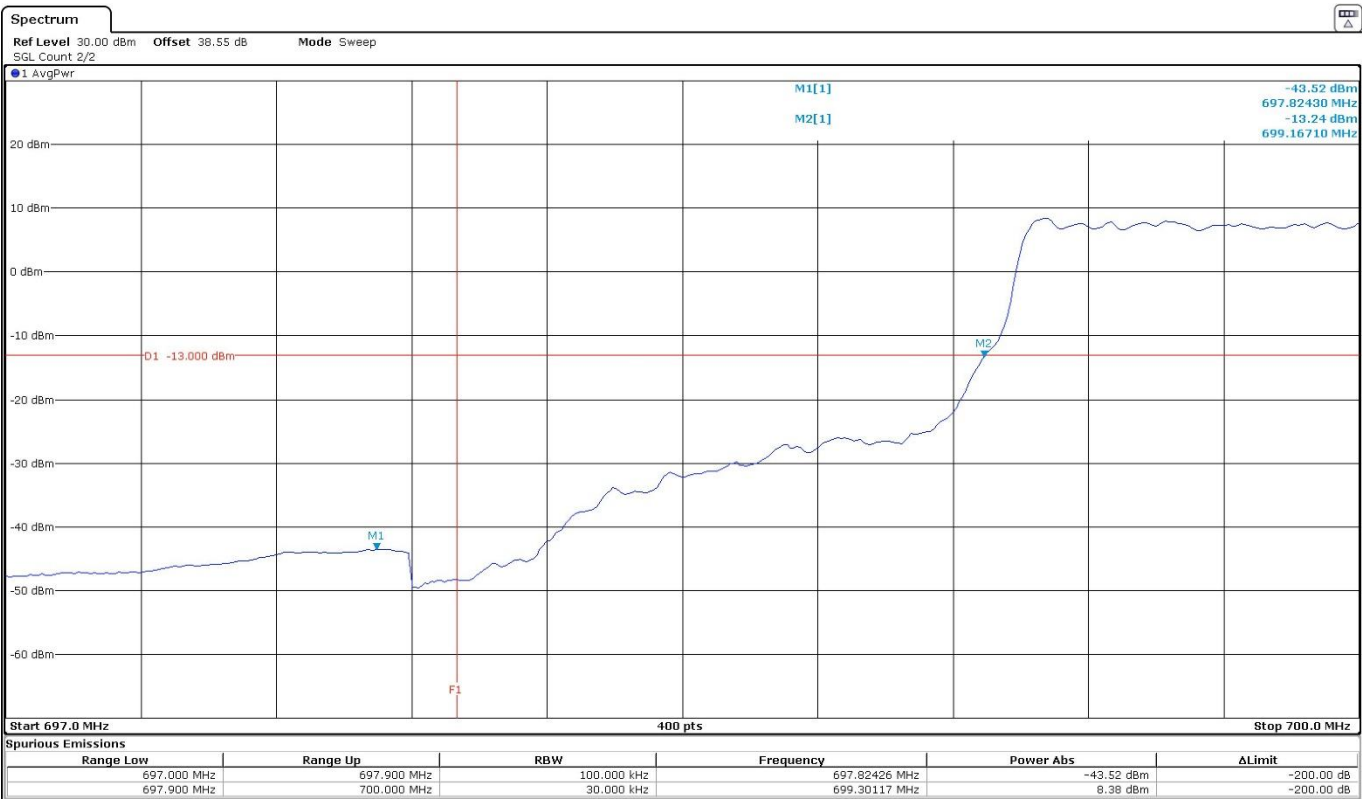
LTE Cat-M1 Band 12:

LTE Cat-M1 Band 12. BW=5 MHz. QPSK. RB=1. Offset=0. Narrowband=0. Low Block Edge:



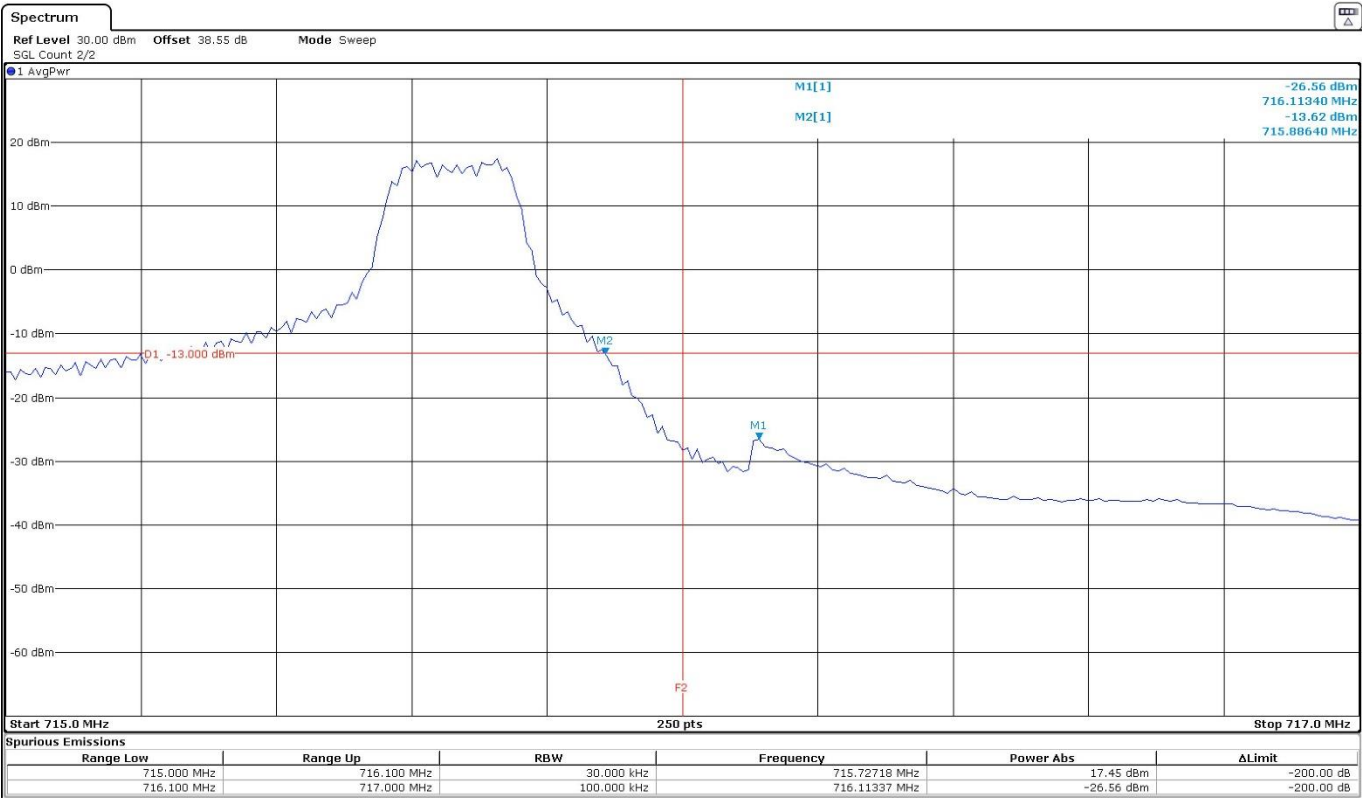
The equipment transmits at the maximum output power

LTE Cat-M1 Band 12. BW=5 MHz. QPSK. RB=All. Offset=0. Narrowband=Max. Low Block Edge:



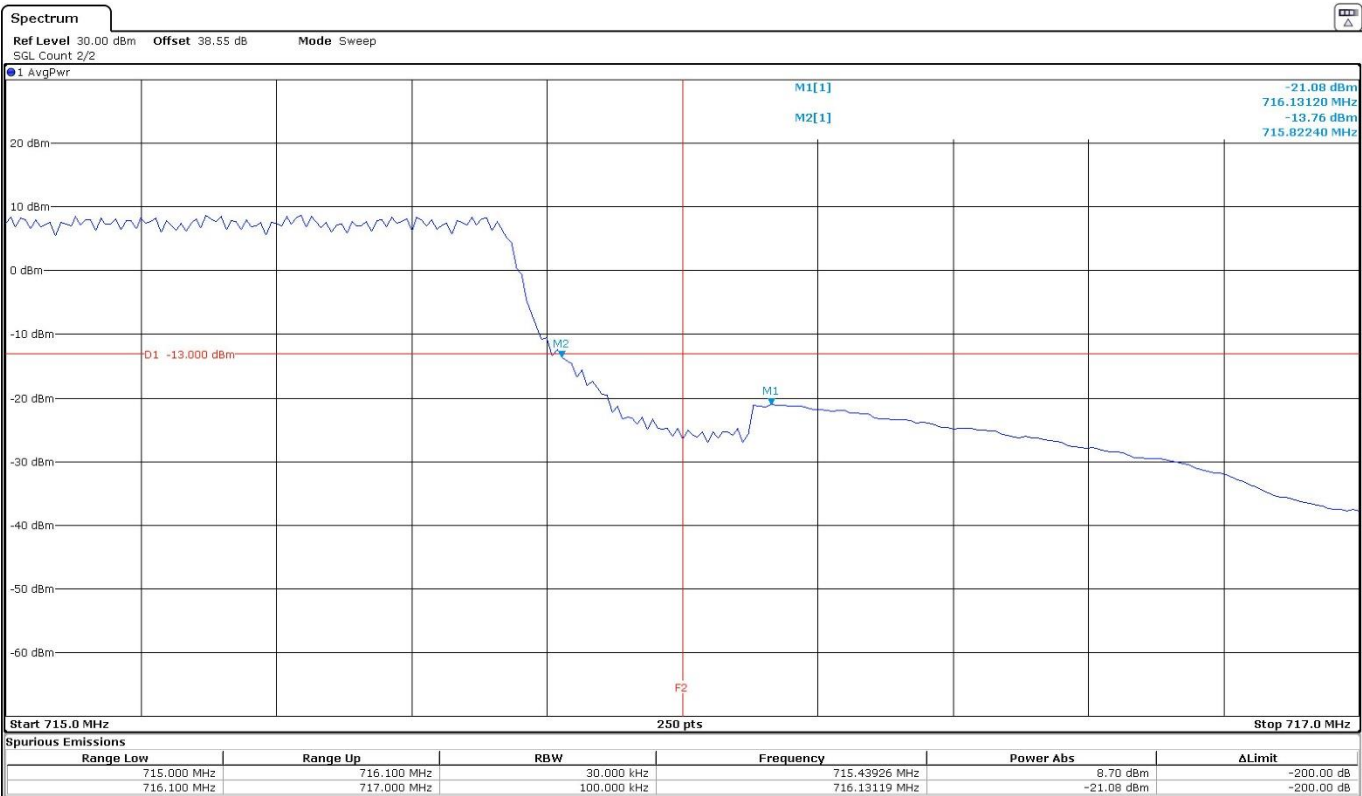
The equipment transmits at the maximum output power

LTE Cat-M1 Band 12. BW=5 MHz. QPSK. RB=1. Offset=Max. Narrowband=Max. High Block Edge:



The equipment transmits at the maximum output power

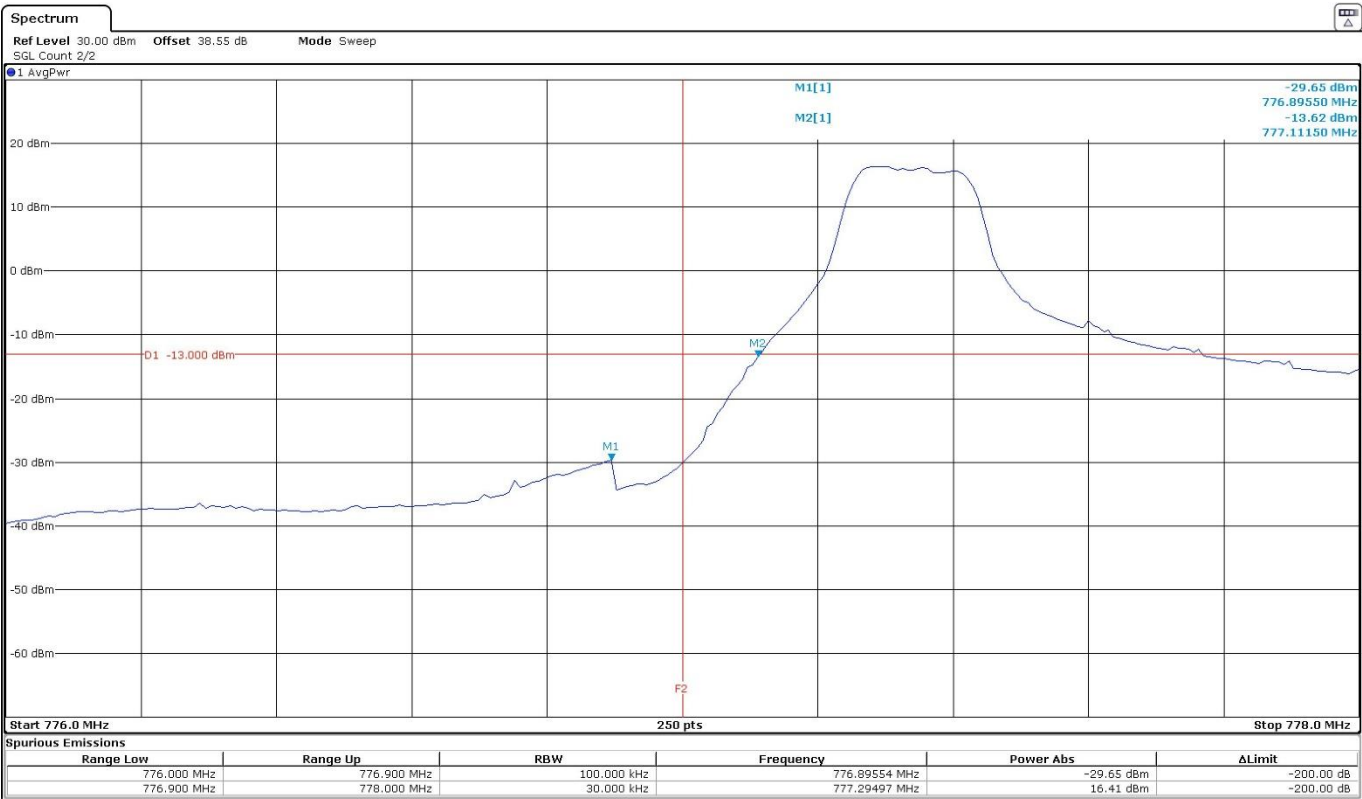
LTE Cat-M1 Band 12. BW=5 MHz. QPSK. RB=All. Offset=0. Narrowband=Max. High Block Edge:



The equipment transmits at the maximum output power

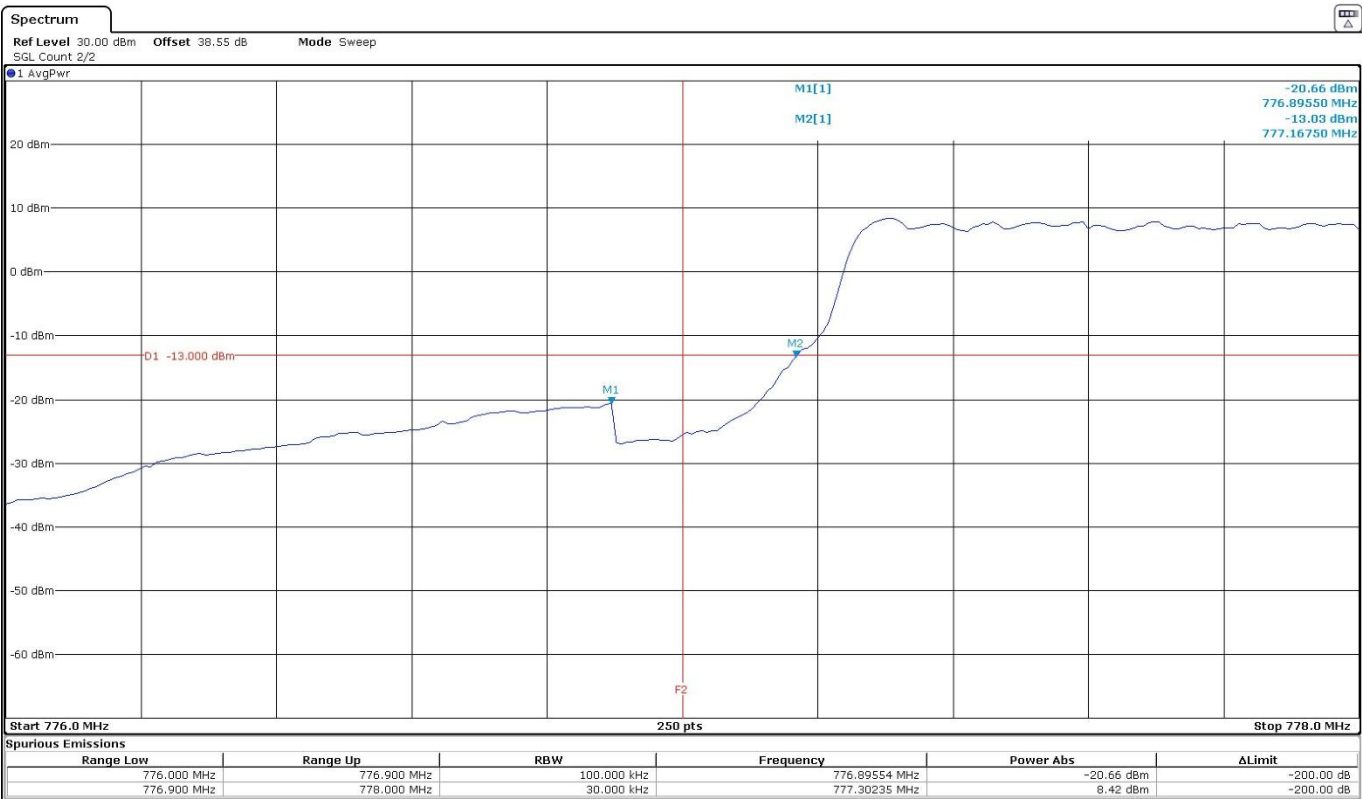
LTE Cat-M1 Band 13:

LTE Cat-M1 Band 13. BW=5 MHz. QPSK. RB=1. Offset=0. Narrowband=0. Low Block Edge:



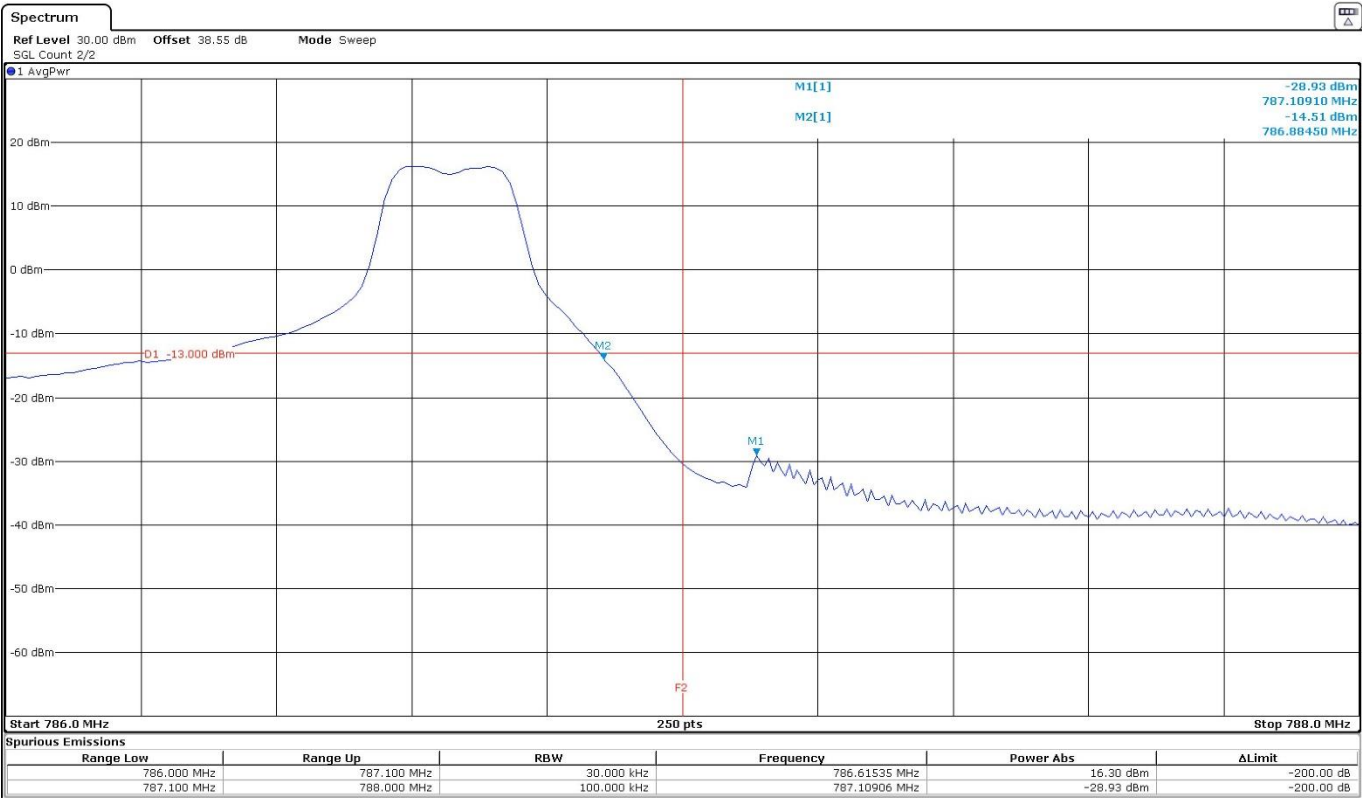
The equipment transmits at the maximum output power

LTE Cat-M1 Band 13. BW=5 MHz. QPSK. RB=All. Offset=0. Narrowband=0. Low Block Edge:



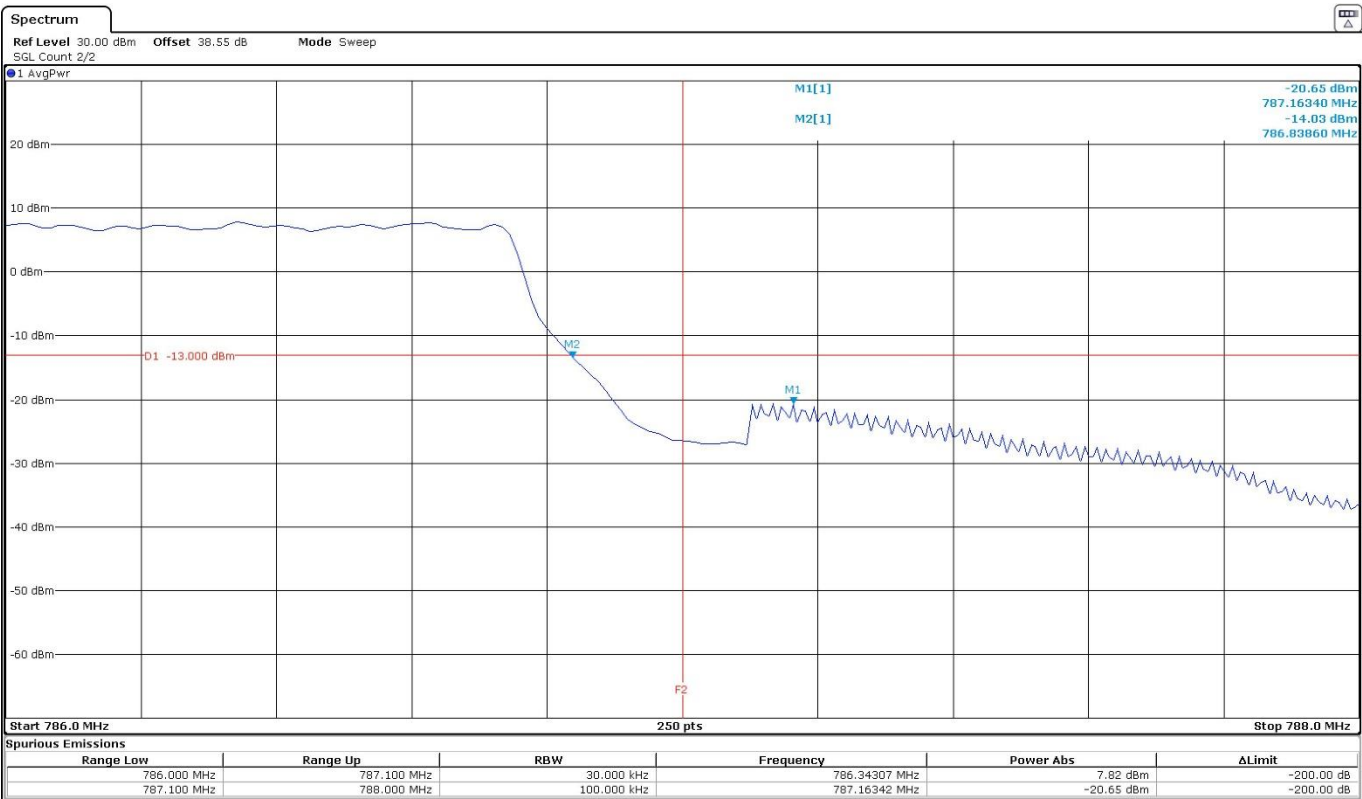
The equipment transmits at the maximum output power

LTE Cat-M1 Band 13. BW=5 MHz. QPSK. RB=1. Offset=Max. Narrowband=Max. High Block Edge:



The equipment transmits at the maximum output power

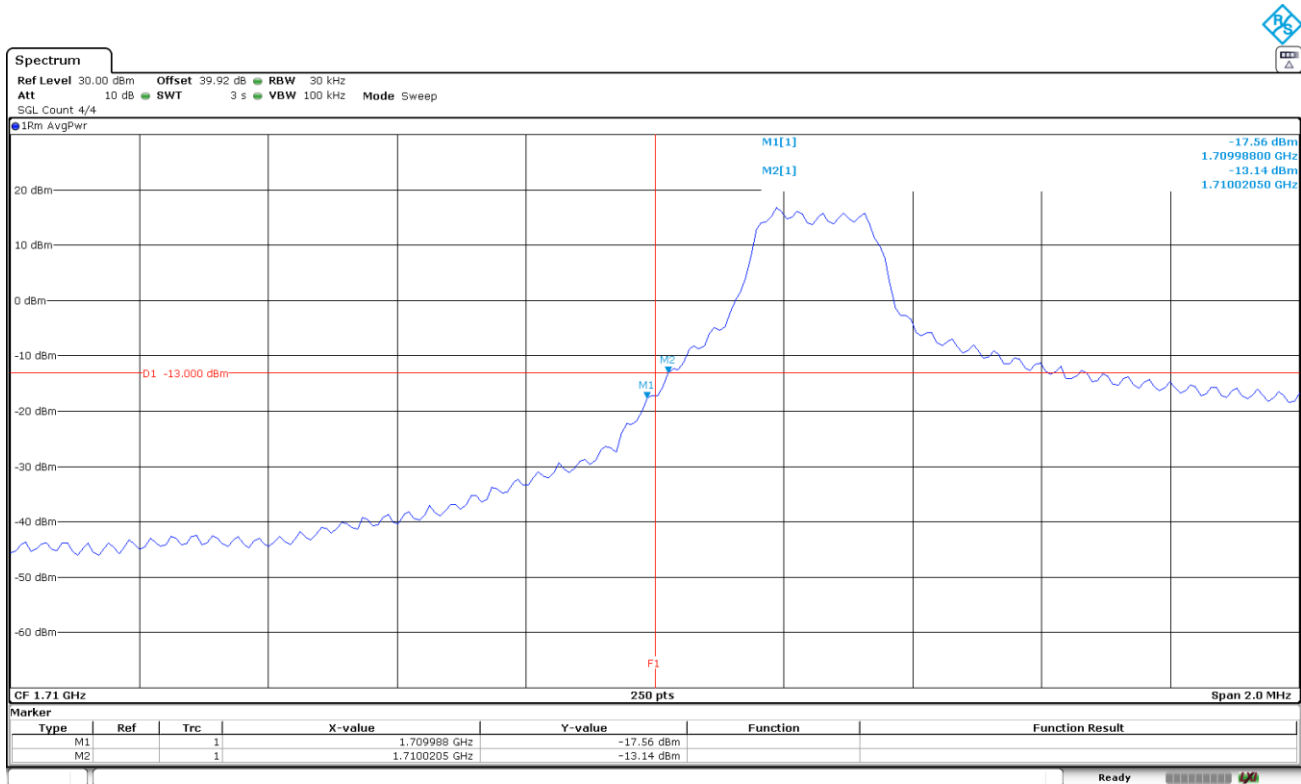
LTE Cat-M1 Band 13. BW=5 MHz. QPSK. RB=All. Offset=0. Narrowband=Max. High Block Edge:



The equipment transmits at the maximum output power

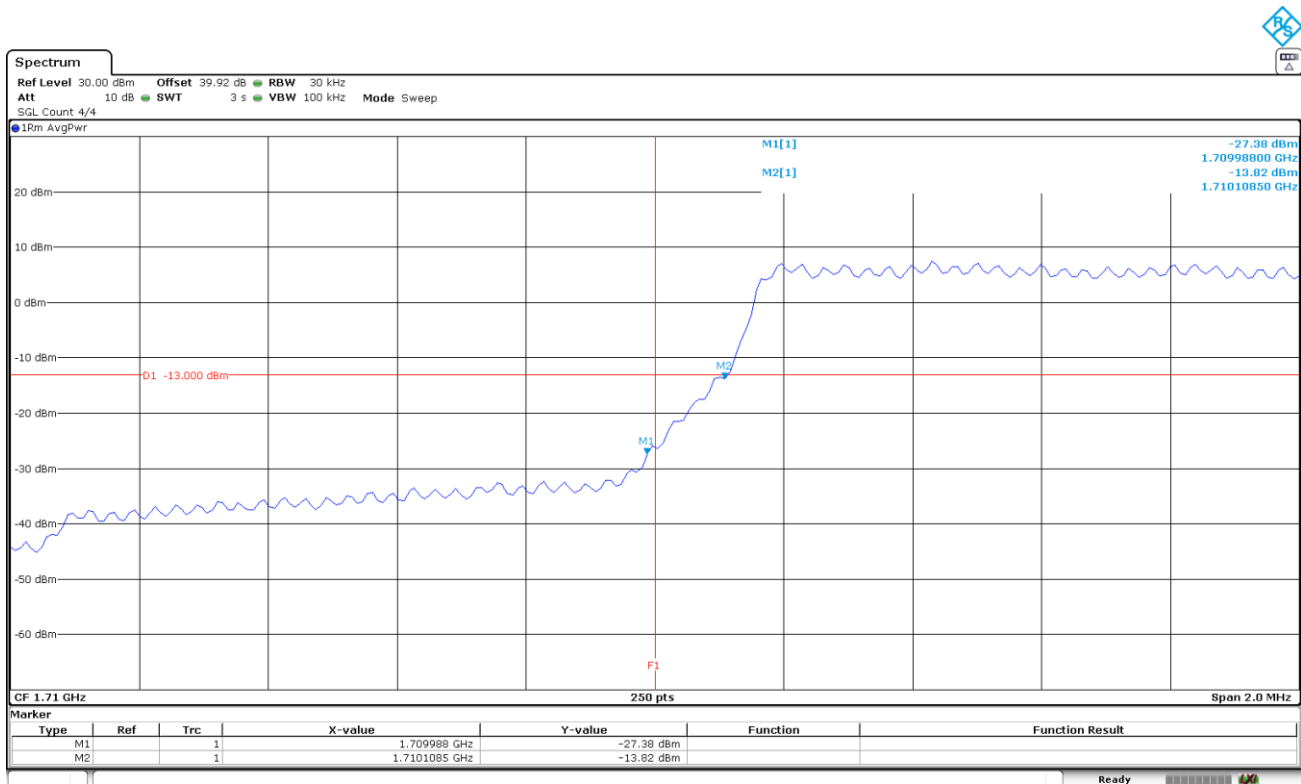
LTE Cat-M1 Band 66:

LTE Cat-M1 Band 66. BW=1.4 MHz. QPSK. RB=1. Offset=0. Narrowband=0. Low Block Edge:



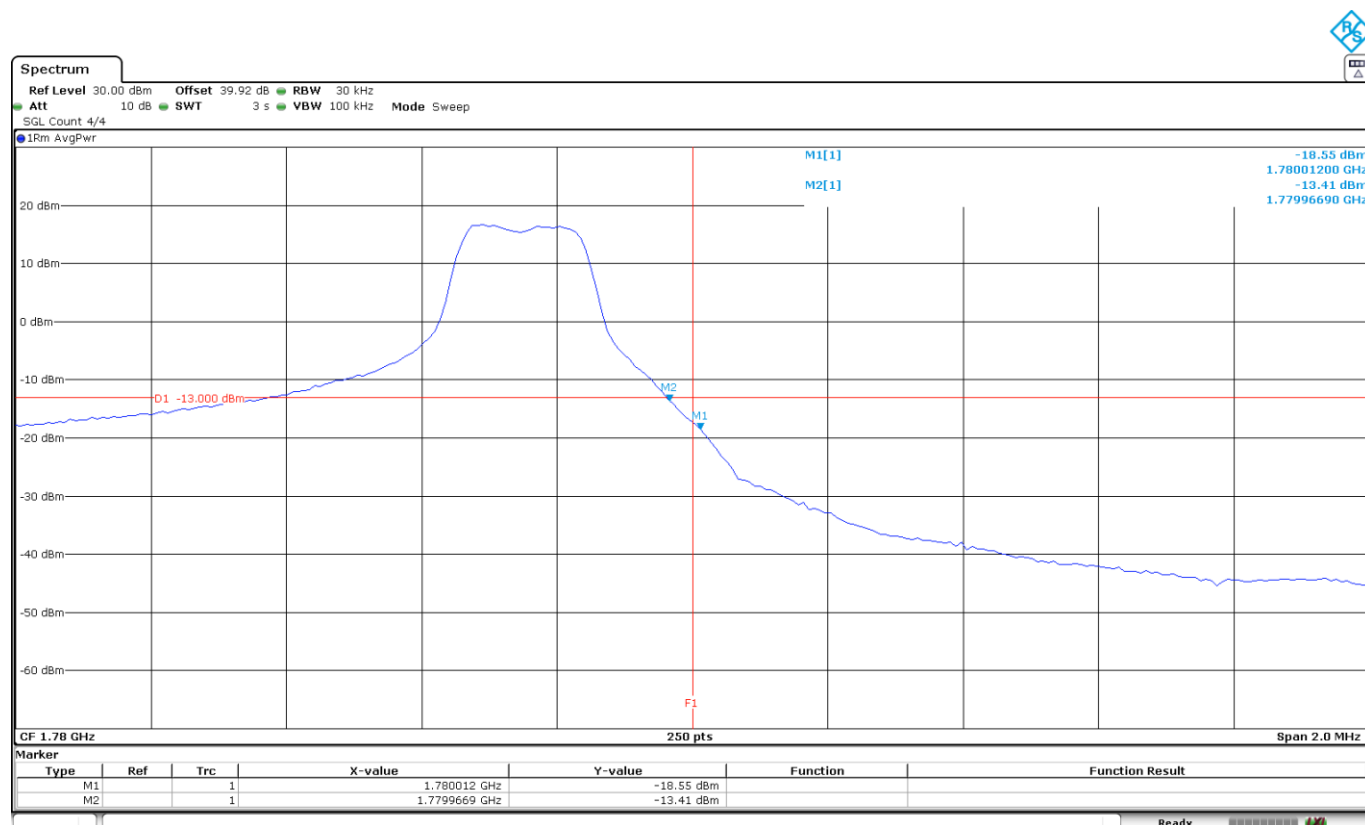
The equipment transmits at the maximum output power

LTE Cat-M1 Band 66. BW=1.4 MHz. QPSK. RB=All. Offset=1. Narrowband=0. Low Block Edge:



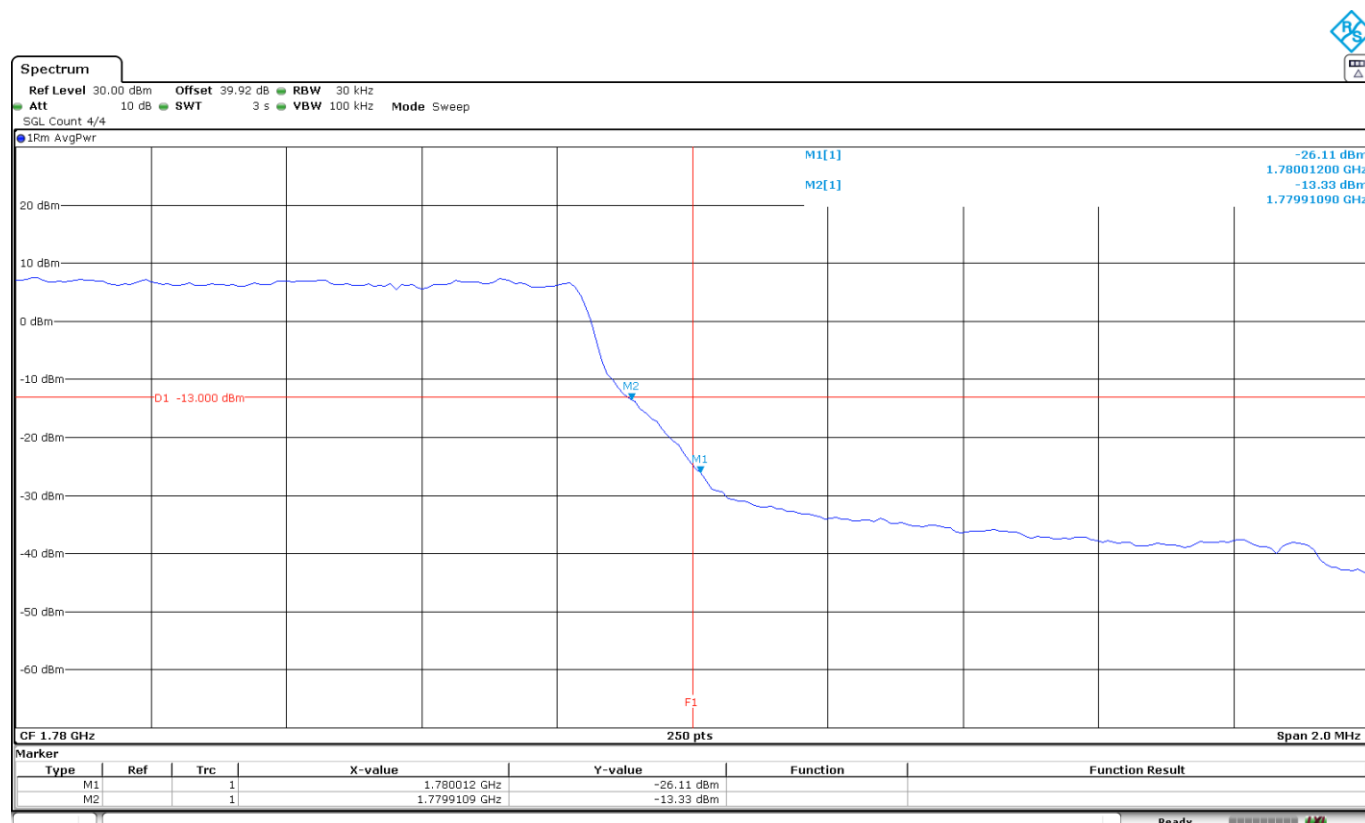
The equipment transmits at the maximum output power

LTE Cat-M1 Band 66. BW=1.4 MHz. QPSK. RB=1. Offset=Max. Narrowband=Max. High Block Edge:



The equipment transmits at the maximum output power

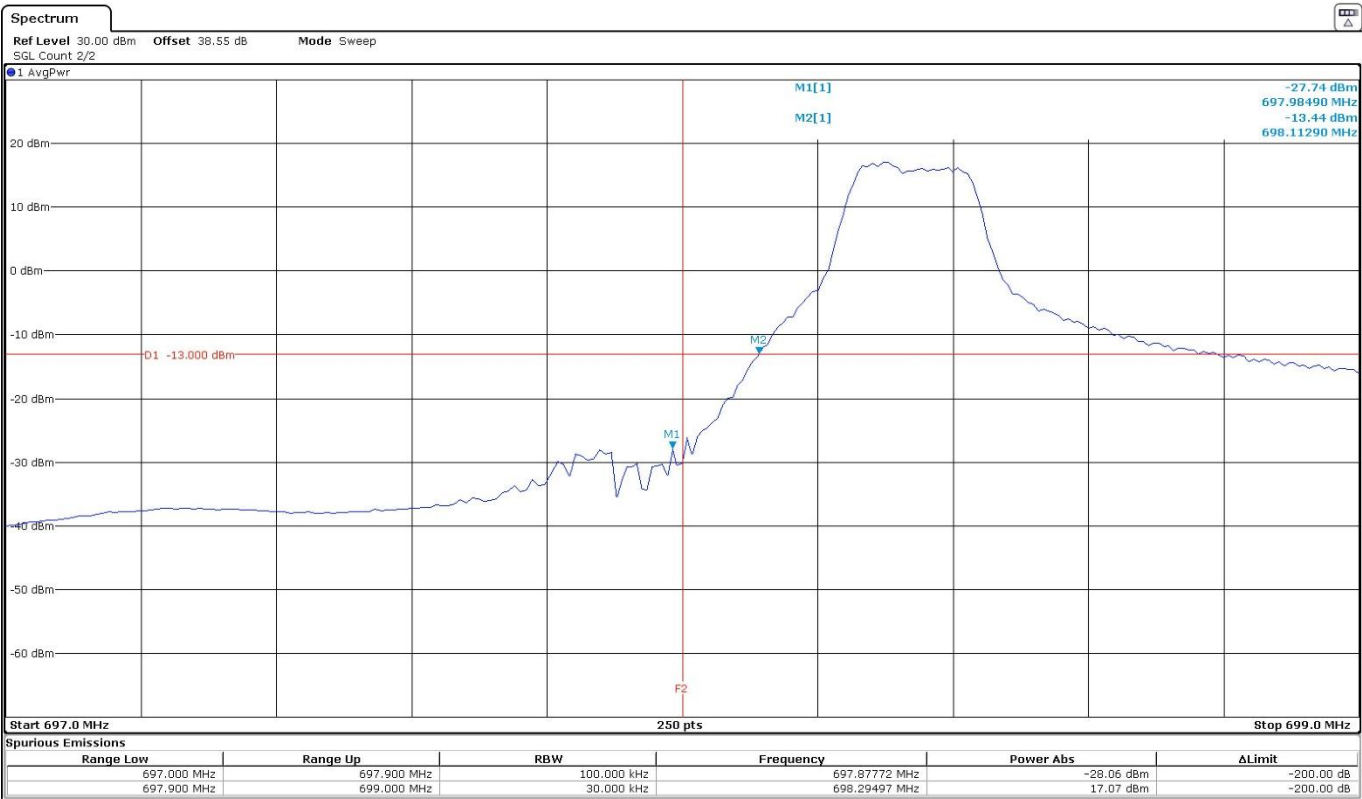
LTE Cat-M1 Band 66. BW=1.4 MHz. QPSK. RB=All. Offset=0. Narrowband=Max. High Block Edge:



The equipment transmits at the maximum output power

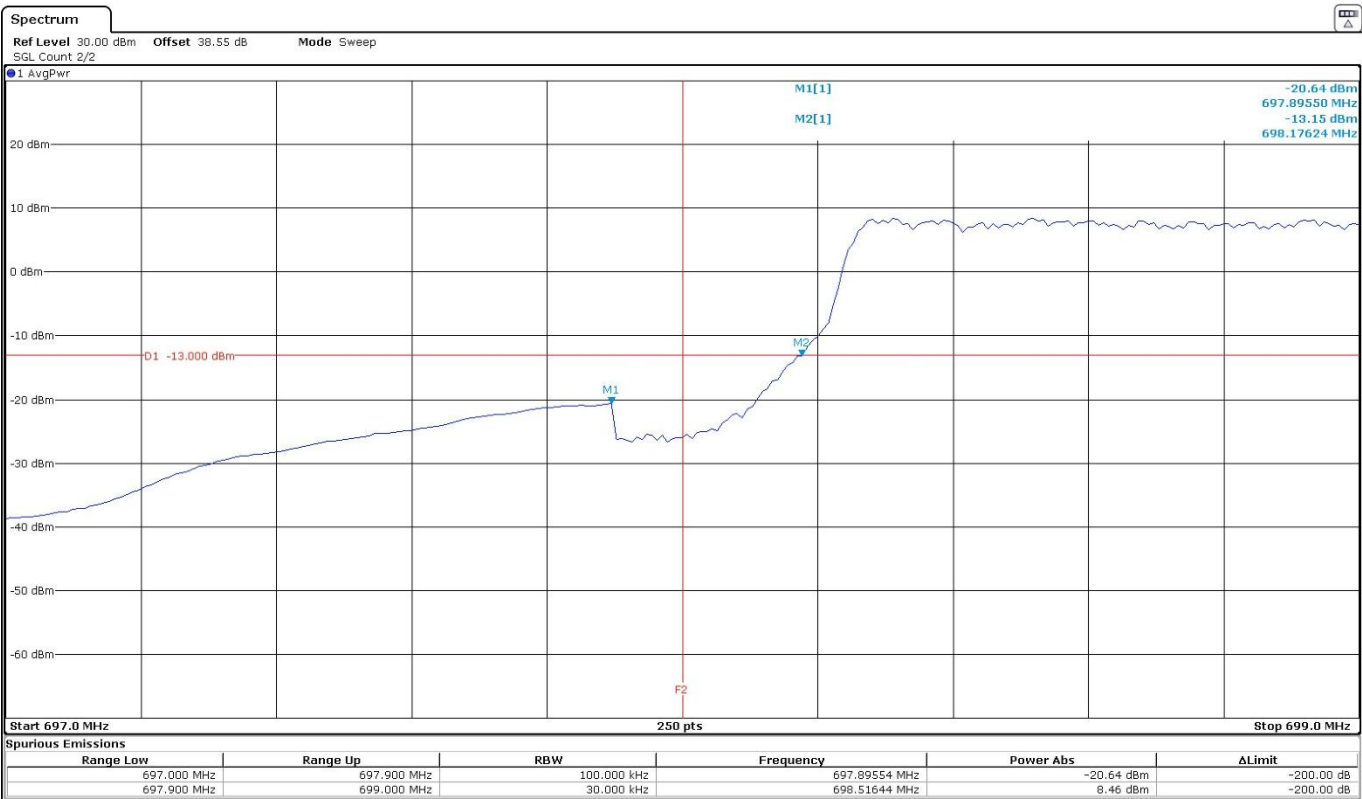
LTE Cat-M1 Band 85:

LTE Cat-M1 Band 85. BW=5 MHz. QPSK. RB=1. Offset=0. Narrowband=0. Low Block Edge:



The equipment transmits at the maximum output power

LTE Cat-M1 Band 85. BW=5 MHz. QPSK. RB=All. Offset=0. Narrowband=0. Low Block Edge:



The equipment transmits at the maximum output power

Radiated Emissions

Limits

1. LTE Cat-M1 Band 8. FCC §27.1509 (a).

FCC §27.1509:

The power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) in watts by at least the following amounts:

- (a) For 900 MHz broadband operations in 897.5–900.5 MHz band by at least $43 + 10 \log (P)$ dB.

2. LTE Cat-M1 Band 13. FCC §2.1053 & §27.53 (c) (2) (4) & (f) / RSS-130 Issue 2 Clause 4.7.1. & 4.7.2.

FCC §27.53 (c) (2) (4) & (f):

(c) (2) 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.

(c) (4) 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.

(f) 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. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

RSS-130 Issue 2 Clause 4.7.1 and 4.7.2:

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

4.7.2. In addition to the limit outlined in section 4.7.1 above, equipment operating in the frequency bands 746-756 MHz and 777-787 MHz shall also comply with the following restrictions:

a. 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:

- i. $76 + 10 \log_{10} p$ (watts), dB, for base and fixed equipment and
- ii. $65 + 10 \log_{10} p$ (watts), dB, for mobile and portable equipment

b. 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.

3. LTE Cat-M1 66. FCC §2.1053 & §27.53 (h) / RSS-139 Issue 4 Clause 5.6.

FCC §27.53 (h):

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

RSS-139 Issue 4 Clause 5.6:

Unwanted emissions shall be measured in terms of average value.

Equipment shall have the TRP or conducted power (all antenna connectors), of unwanted emissions outside the frequency block or frequency block group not exceeding the limits shown in the next table:

Offset from the edge of the frequency block or frequency block group	Unwanted emission limits
≤1 MHz	-13 dBm/(1% of OB)
>1 MHz	-13 dBm/MHz

Where OB is the occupied bandwidth.

4. LTE Cat-M1 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 $43 + 10 \log_{10} p$ (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.

Method

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

The EUT was placed on a non-conductive stand at 3-meter distance from the measuring antenna for measurements up to 17 GHz. Measurements above 17 GHz require the distance to be reduced to 1.5 meters.

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 P_o transmitting power, the specified minimum attenuation $43 + 10 \log_{10} p$ (watts) becomes:

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

At P_o transmitting power, the specified minimum attenuation $65 + 10 \log_{10} p$ (watts) becomes:

$$P_o \text{ (dBm)} - [65 + 10 \log(P_o \text{ in mwatts}) - 30] = -35 \text{ dBm}$$

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.

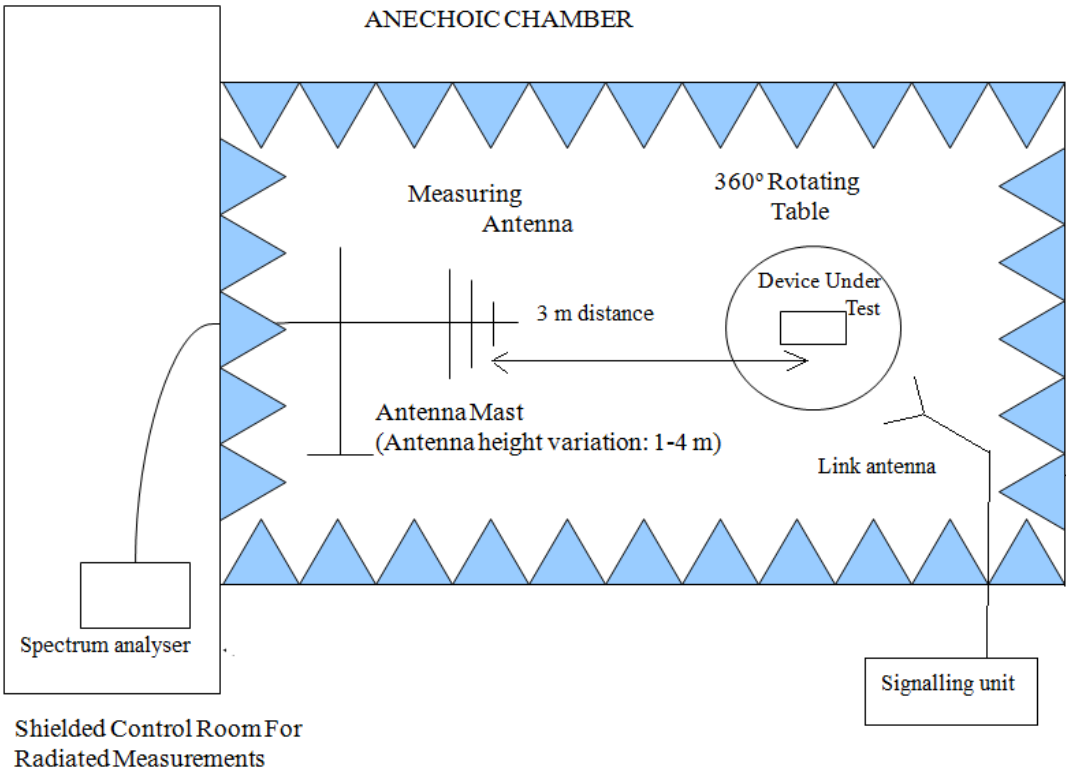
The maximum field strength (dBμV/m) of each detected emission at less than 20 dB respect to the limit is converted to an equivalent EIRP level (dBm) according to ANSI C63.26 with the formula:

$$\text{EIRP (dBm)} = E \text{ (dBμV/m)} + 20 \log(D) - 104.8;$$

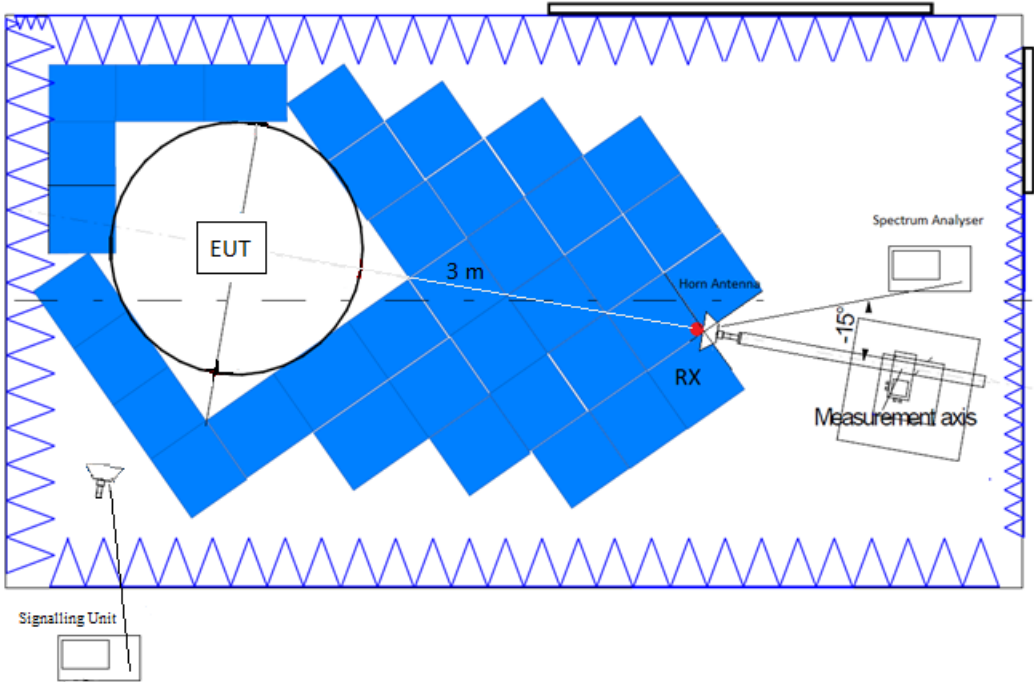
where D is the measurement distance (in the far field region) in m. $D = 3\text{m}$.

Test Setup

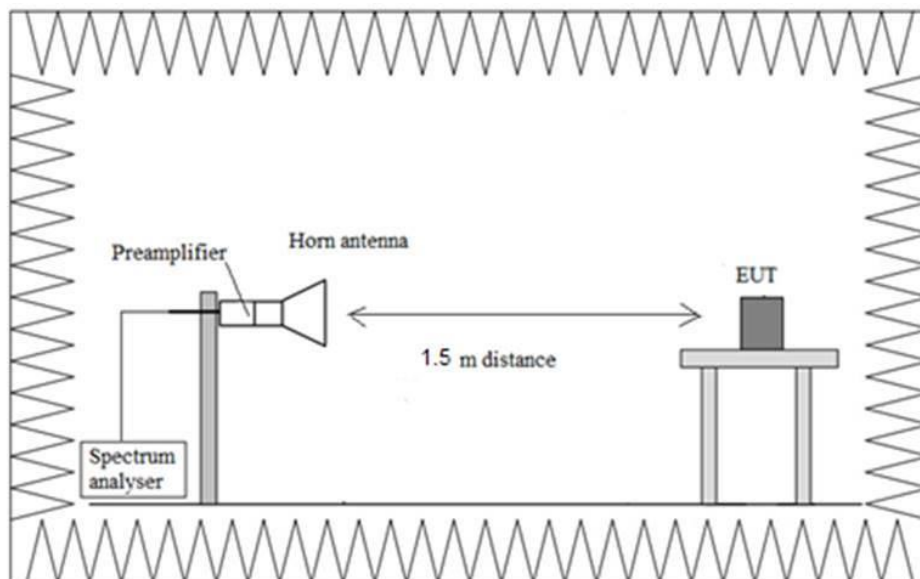
Radiated measurements setup from 30 MHz to 1 GHz:



Radiated measurements setup from 1 GHz to 17 GHz:



Radiated measurements above 17 GHz:



Results

Test was performed on worst-case channel in terms of radiated spurious emissions. determined by a preliminary scan for each band.

LTE Cat-M1 Band 8:

A preliminary scan determined the QPSK. BW=1.4 MHz. RB Size=1. RB Offset=2. Narrowband=0 as the worst case. The next results are for this worst-case configuration.

Frequency range 30 MHz - 1 GHz:

- LOW 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.

Frequency range 1 - 10 GHz:

- LOW 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) $< \pm 5.35$ for $f < 1$ GHz
 $< \pm 4.32$ for $f \geq 1$ GHz up to 8 GHz

Verdict

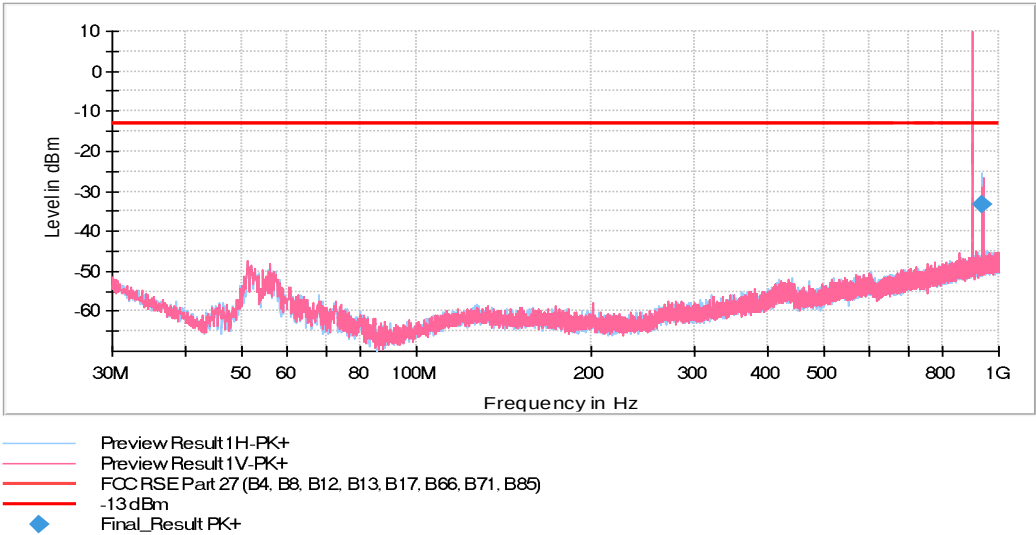
Pass

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
30 MHz - 1 GHz	30.312 kHz	PK+	100 kHz	Coupled	0 dB
1 GHz - 10 GHz	281.25 kHz	PK+	100 kHz	1 s	0 dB

LTE Cat-M1 Band 8:

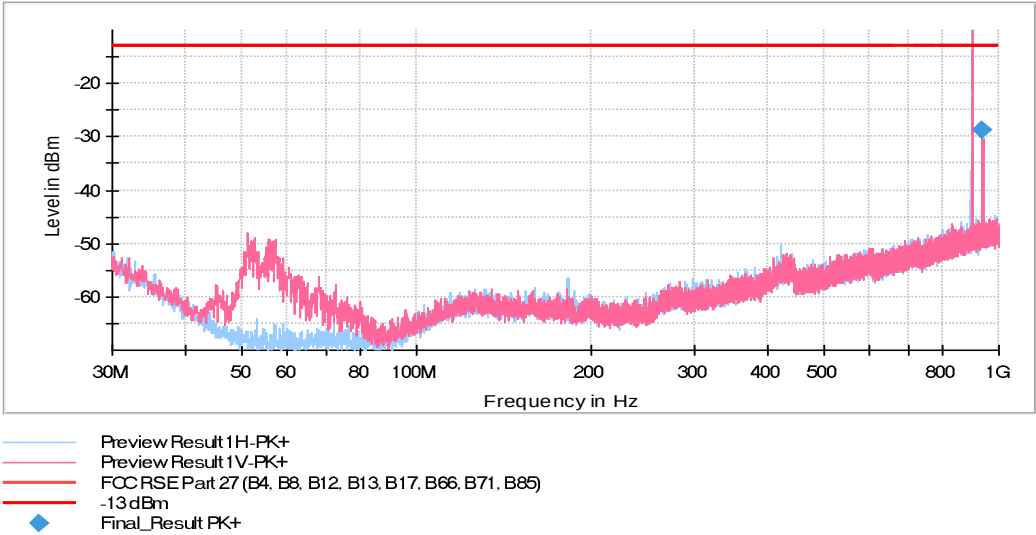
FREQUENCY RANGE 30 MHz - 1 GHz:

- LOW CHANNEL:



The peak above the limit is the LTE Cat-M1 Band 8 carrier frequency.

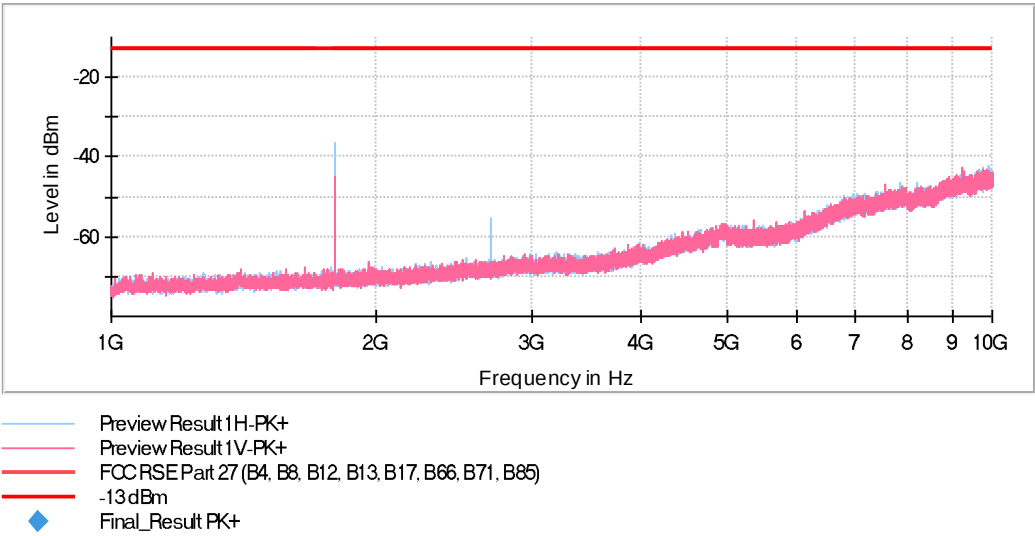
- HIGH CHANNEL:



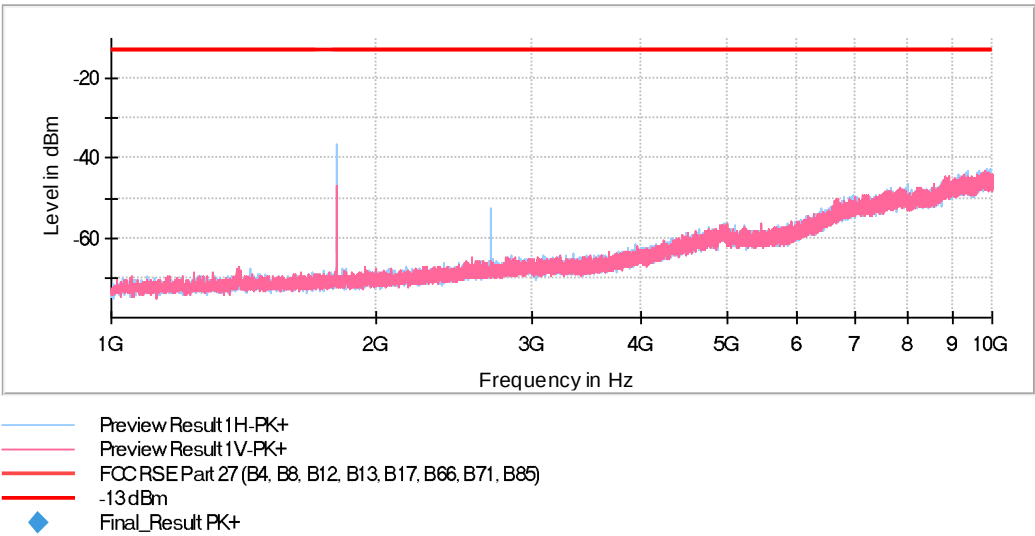
The peak above the limit is the LTE Cat-M1 Band 8 carrier frequency.

FREQUENCY RANGE 1 GHz - 10 GHz

- LOW CHANNEL:



- HIGH CHANNEL:



LTE Cat-M1 Band 13:

A preliminary scan determined the QPSK. BW=5 MHz. RB Size=1. RB Offset=0. Narrowband=0 as the worst case. The next results are for this worst-case configuration.

Frequency range 30 MHz - 1 GHz:

- LOW 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.

Frequency range 1 - 8 GHz:

- LOW CHANNEL:

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

- HIGH CHANNEL:

Spurious frequencies at less than 20 dB below the limit:

Spurious frequency (MHz)	E.I.R.P (dBm)	Polarization	Detector
1564.627531	-46.97	H	Peak
1565.838781	-49.95	H	Peak
1565.908906	-50.75	H	Peak
1566.147969	-51.35	H	Peak
1566.189406	-52.98	H	Peak

Measurement uncertainty (dB) < ±5.35 for f < 1 GHz
< ±4.32 for f ≥ 1 GHz up to 8 GHz

Verdict

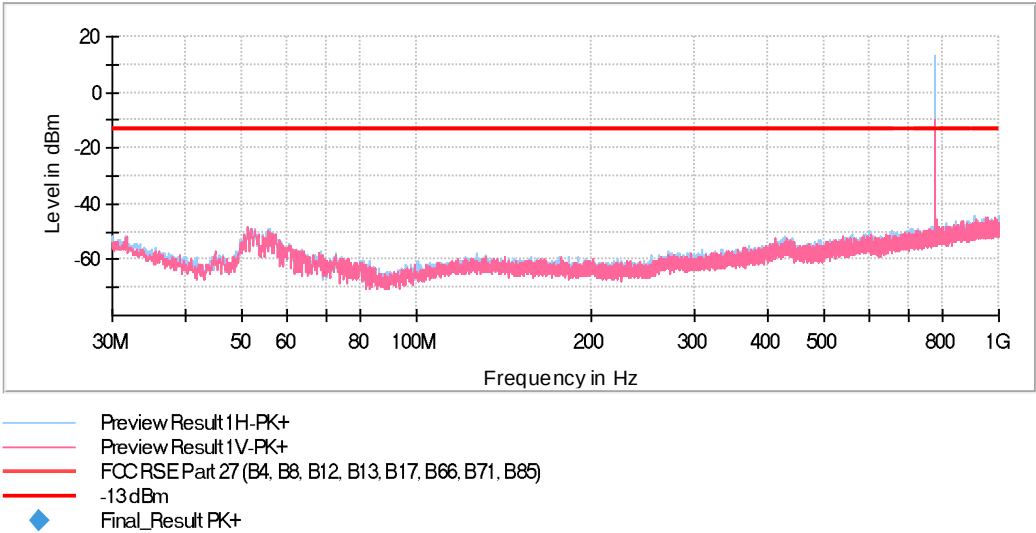
Pass

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
30 MHz - 1 GHz	30.312 kHz	PK+	1 MHz	Coupled	0 dB
763 MHz - 806 MHz	1.344 kHz	PK+	6.25 kHz	Coupled	0 dB
1 GHz - 8 GHz	218.75 kHz	PK+	100 kHz	1 s	0 dB
1.559 GHz - 1.61 GHz	1.594 kHz	PK+	1 MHz	1 s	0 dB

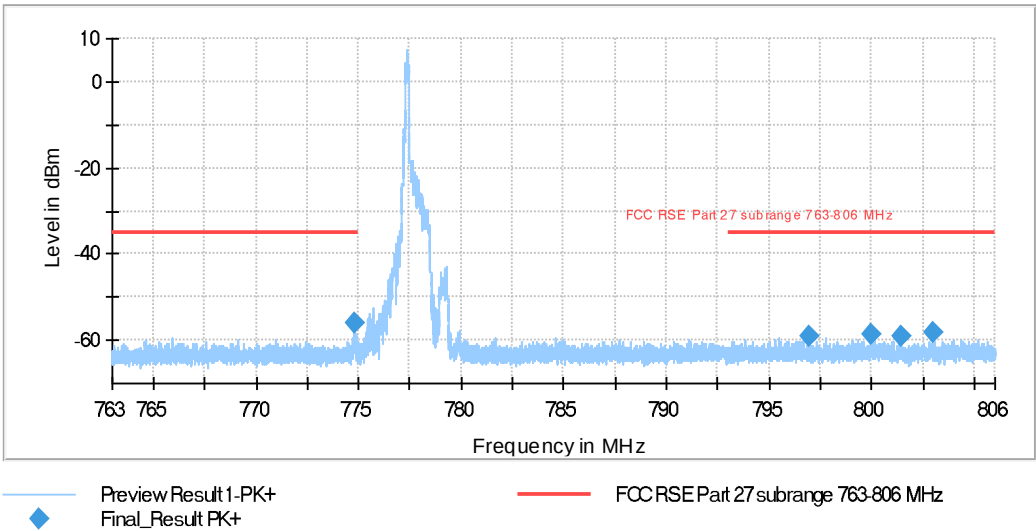
LTE Cat-M1 Band 13:

FREQUENCY RANGE 30 MHz - 1 GHz:

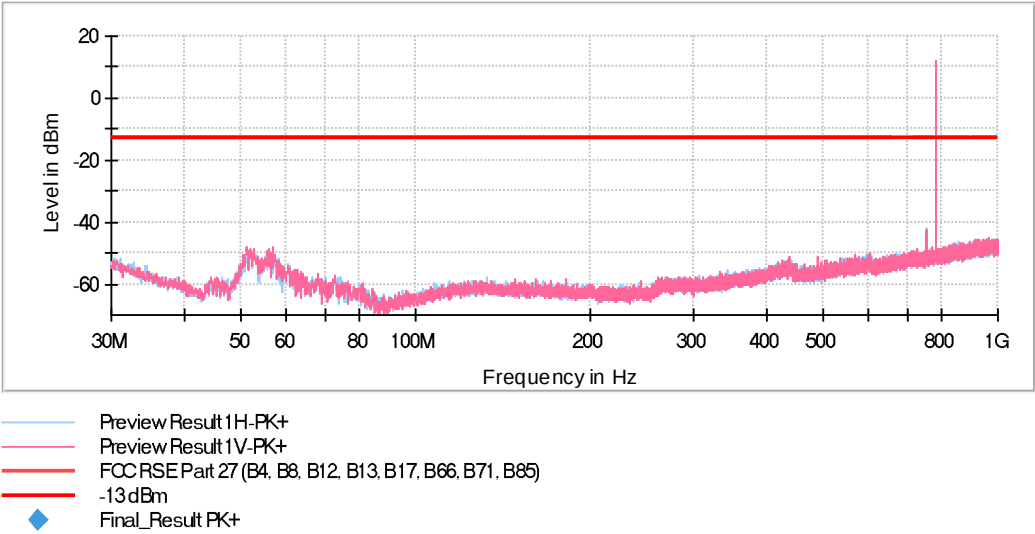
- LOW CHANNEL:



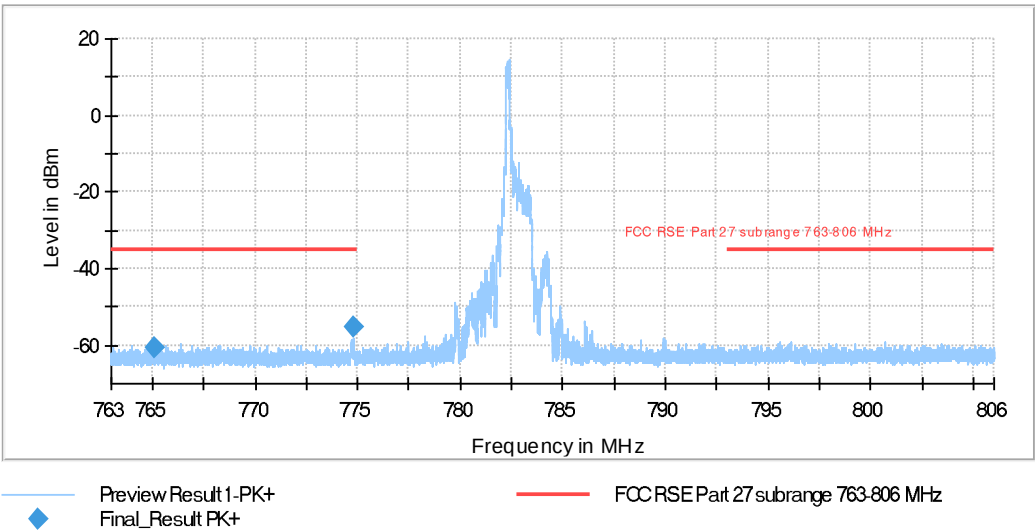
The peak above the limit is the carrier frequency.



- HIGH CHANNEL:

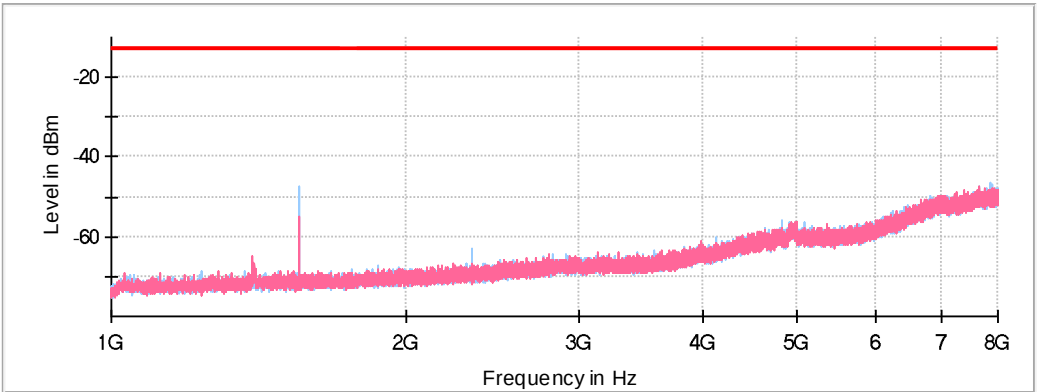


The peak above the limit is the carrier frequency.

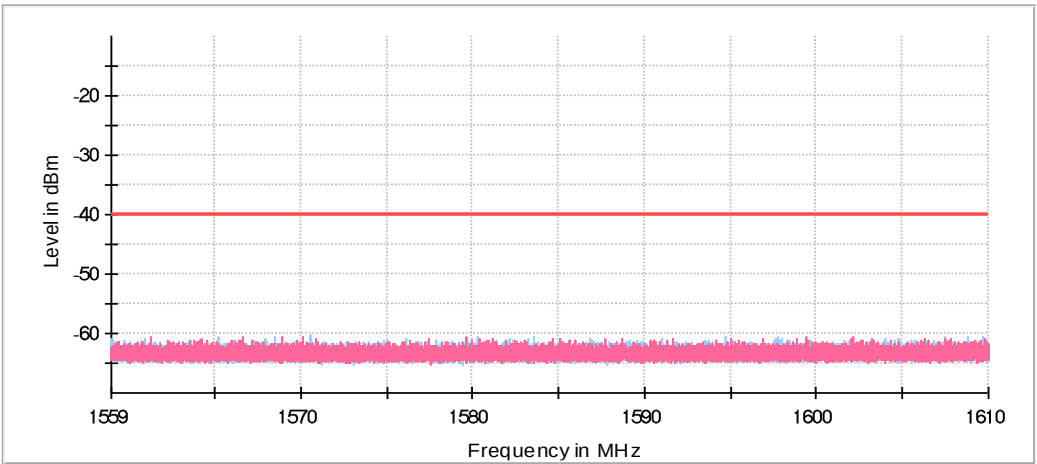


FREQUENCY RANGE 1 - 8 GHz:

- LOW CHANNEL:

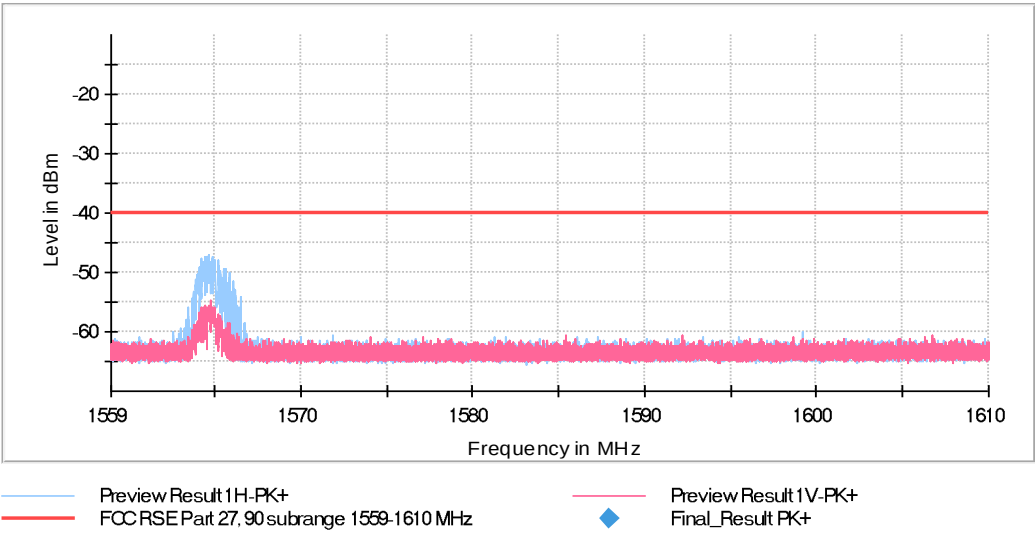
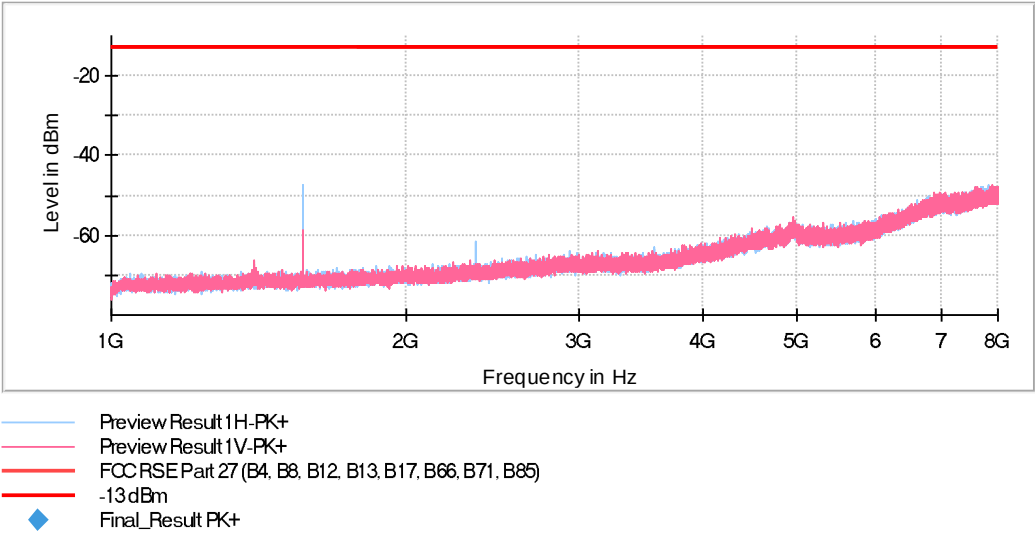


- Preview Result 1H-PK+
- Preview Result 1V-PK+
- FCC RSE Part 27 (B4, B8, B12, B13, B17, B66, B71, B85)
- 13dBm
- Final_Result PK+



- Preview Result 1H-PK+
- Preview Result 1V-PK+
- FCC RSE Part 27, 90 subrange 1559-1610 MHz
- Final_Result PK+

- HIGH CHANNEL:



LTE Cat-M1 Band 66:

A preliminary scan determined the QPSK. BW=15 MHz. RB=6. RB Offset=0. Narrowband=0 as the worst-case. The next results are for this worst-case configuration.

Frequency range 30 MHz - 1 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.

Frequency range 1 - 18 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) $< \pm 5.35$ for $f < 1$ GHz
 $< \pm 4.32$ for $f \geq 1$ GHz up to 18 GHz

Verdict

Pass