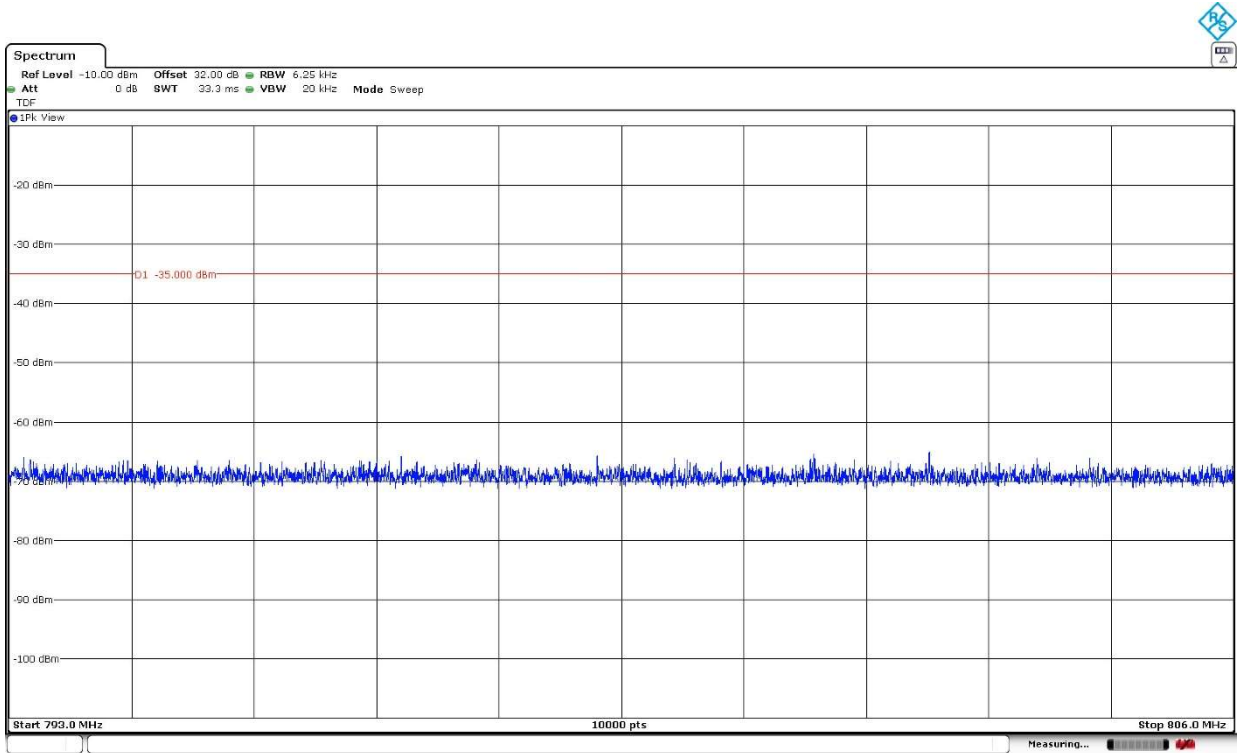
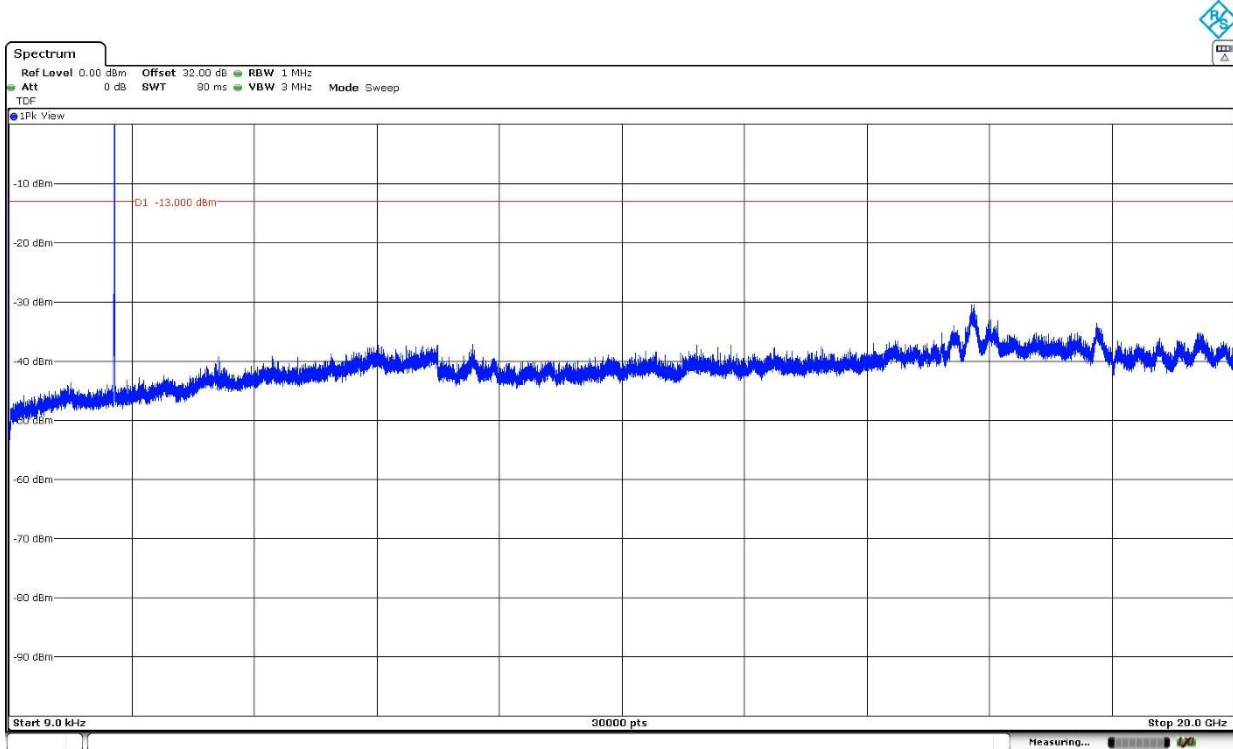


- Frequency range 793 MHz – 806 MHz:



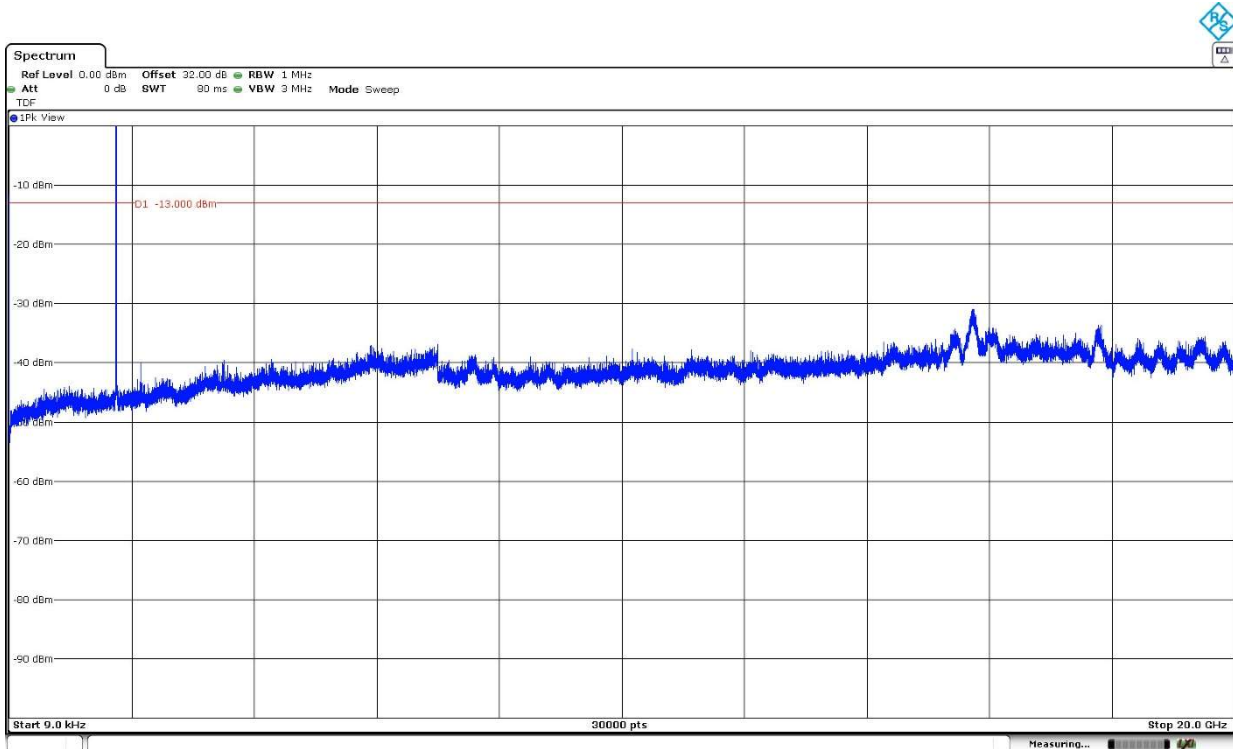
LTE Cat-M1 Band 66. BW=10 MHz. 16QAM. RB Size 1. RB Offset 2.

Low Channel:



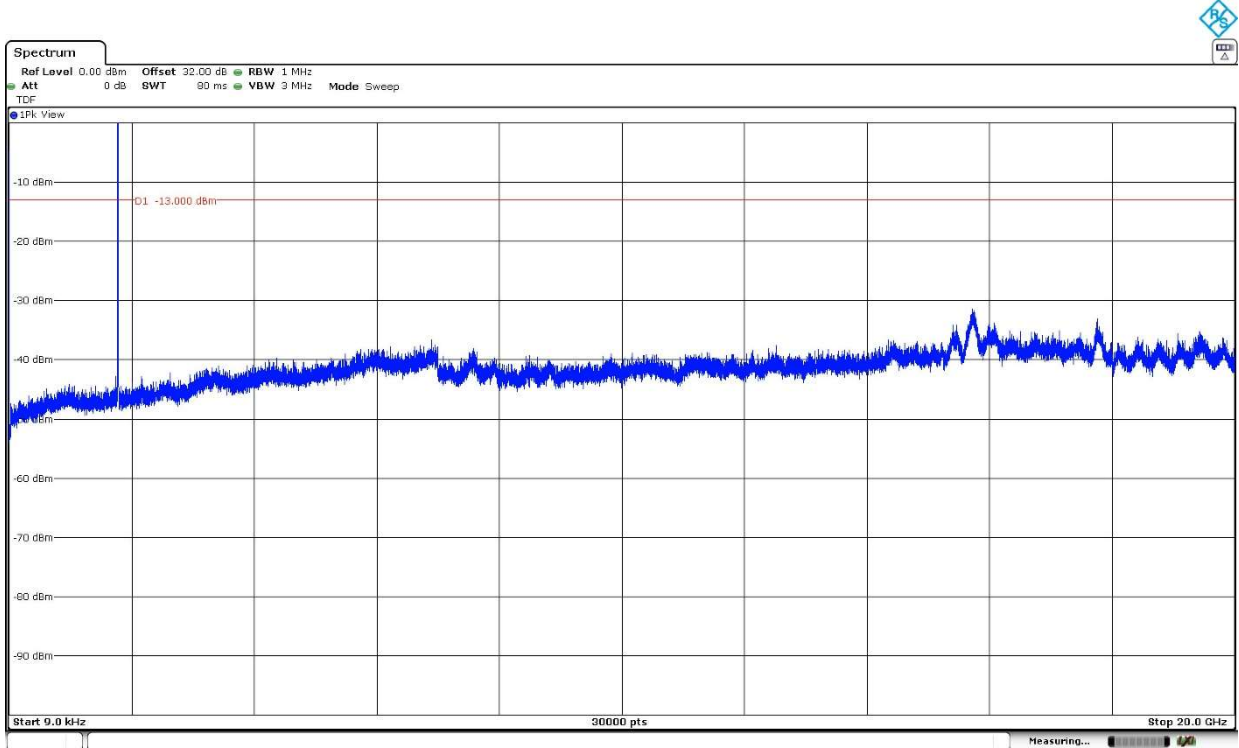
The peak above the limit is the carrier frequency.
The highest peak next to the carrier is the Downlink frequency.

Middle Channel:



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

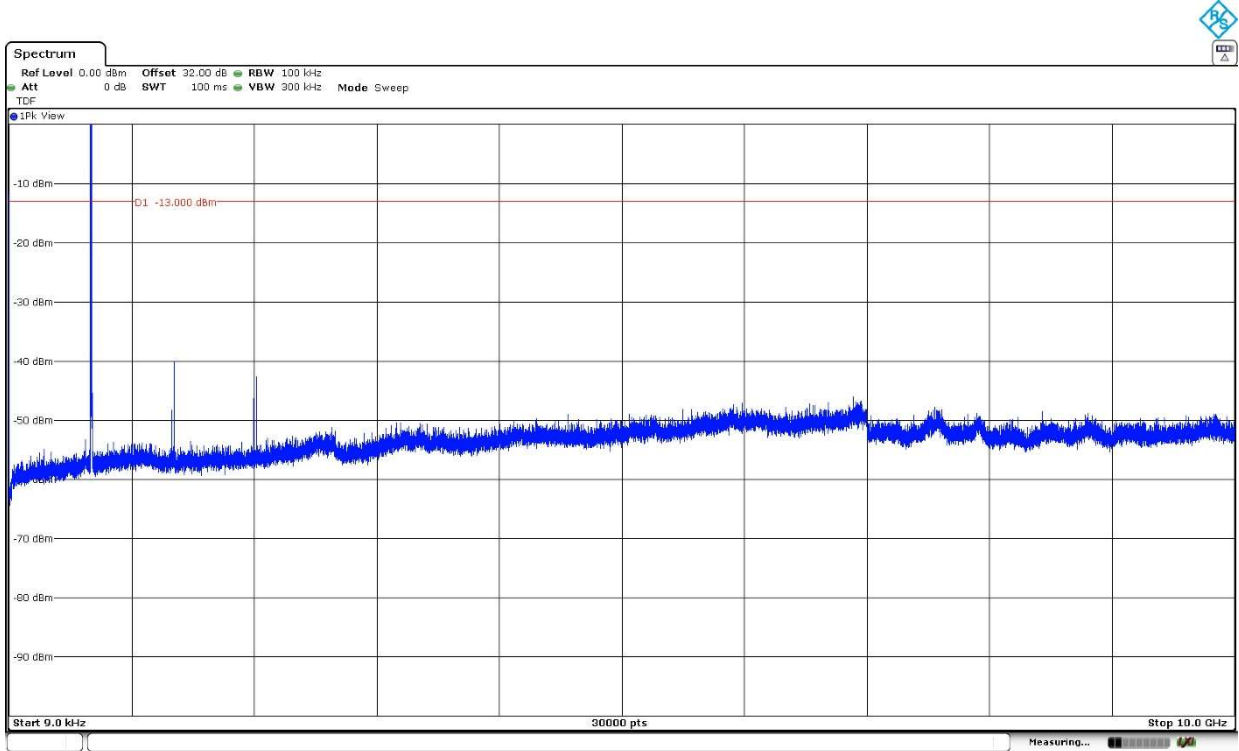
High Channel:



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

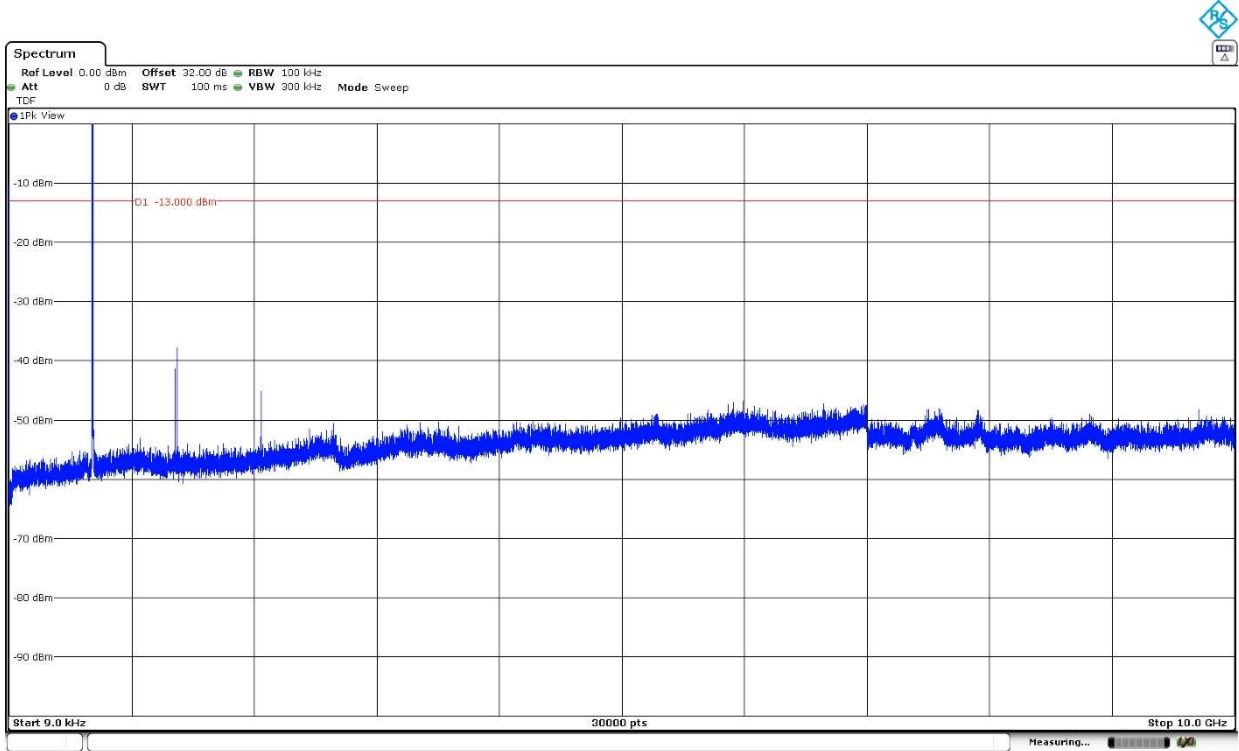
LTE Cat-M1 Band 71. BW=10 MHz. 16QAM. RB Size 1. RB Offset 2.

Low Channel:



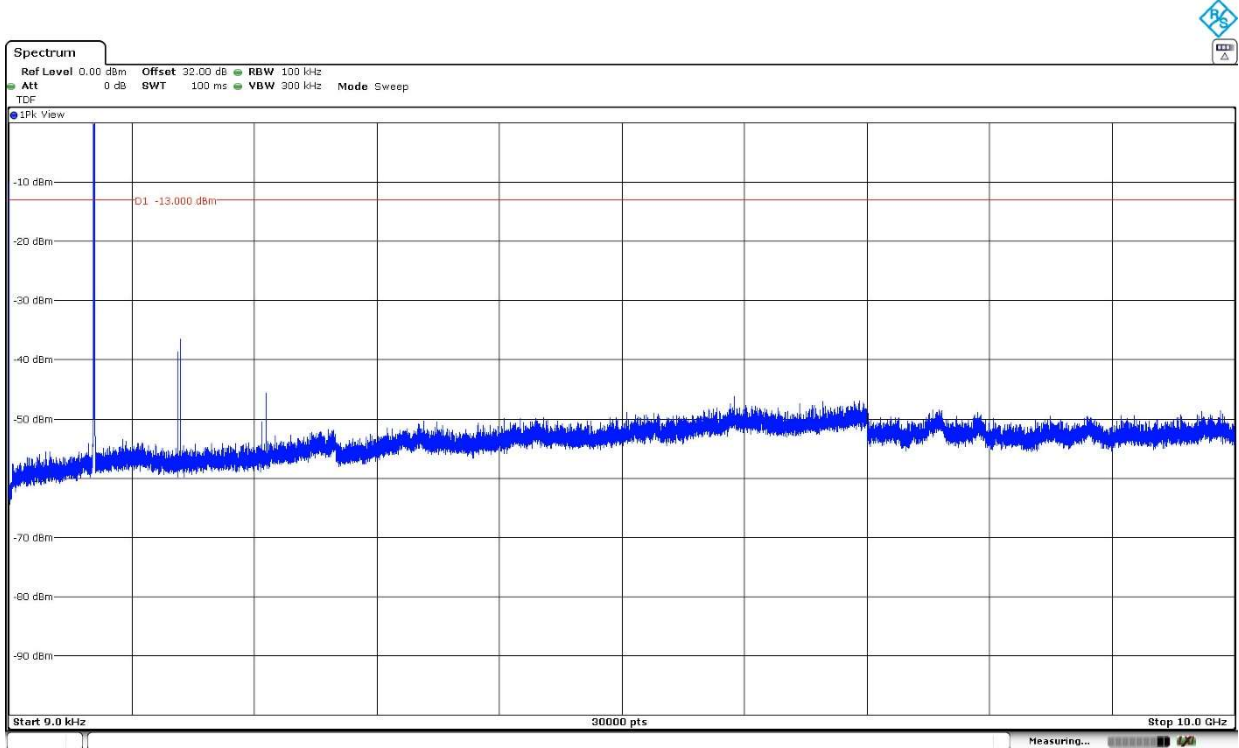
The peak above the limit is the carrier frequency.
The highest peak next to the carrier is the Downlink frequency.

Middle Channel:



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

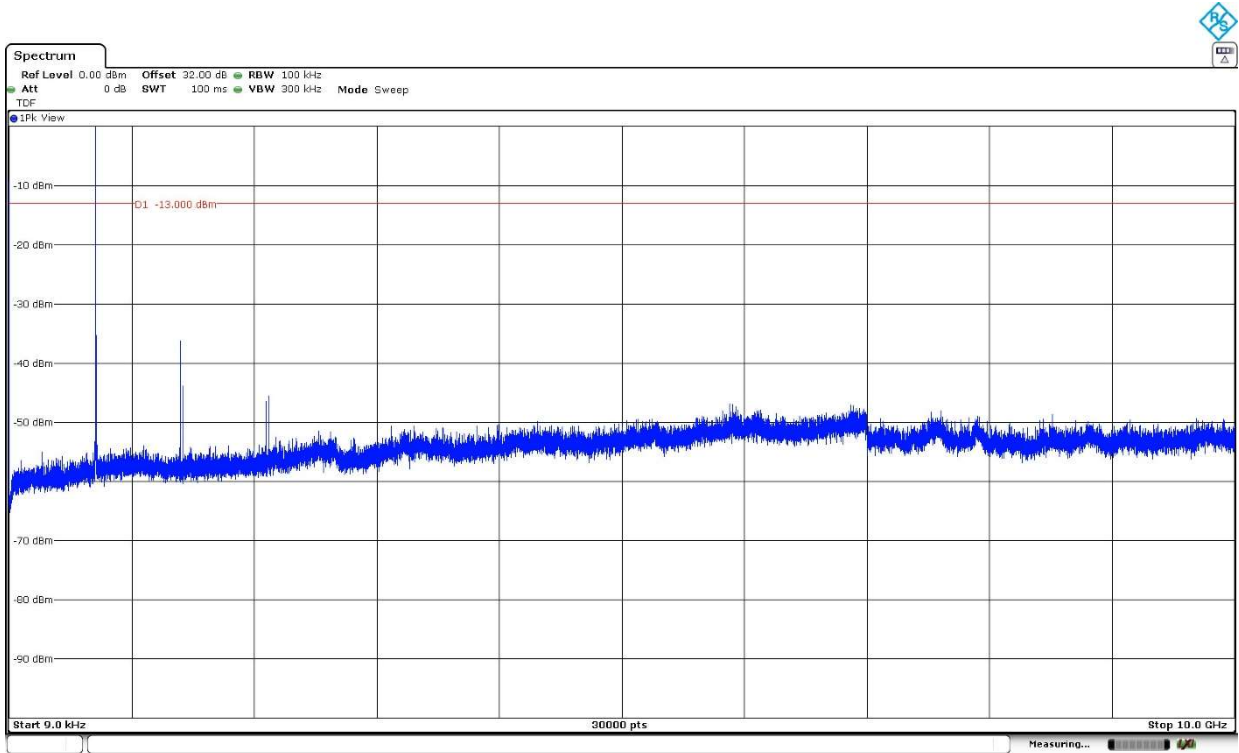
High Channel:



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

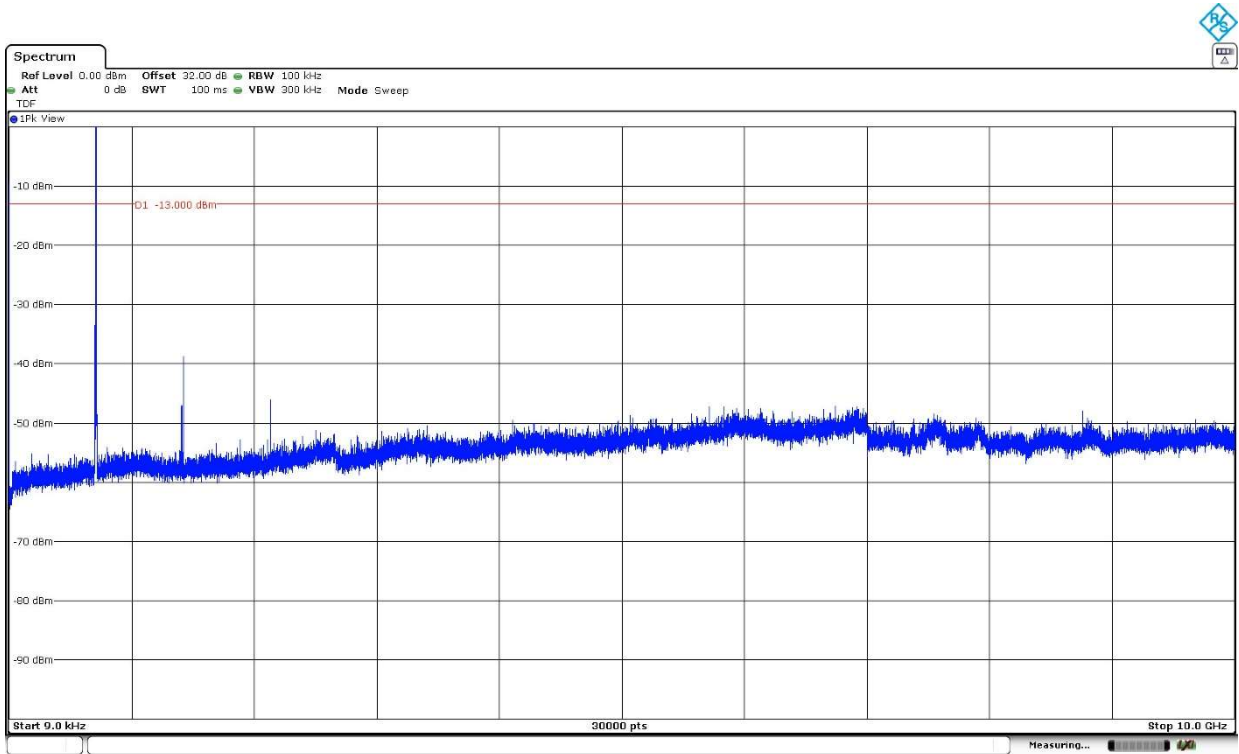
LTE Cat-M1 Band 85. BW=10 MHz. 16QAM. RB Size 1. RB Offset 2.

Low Channel:



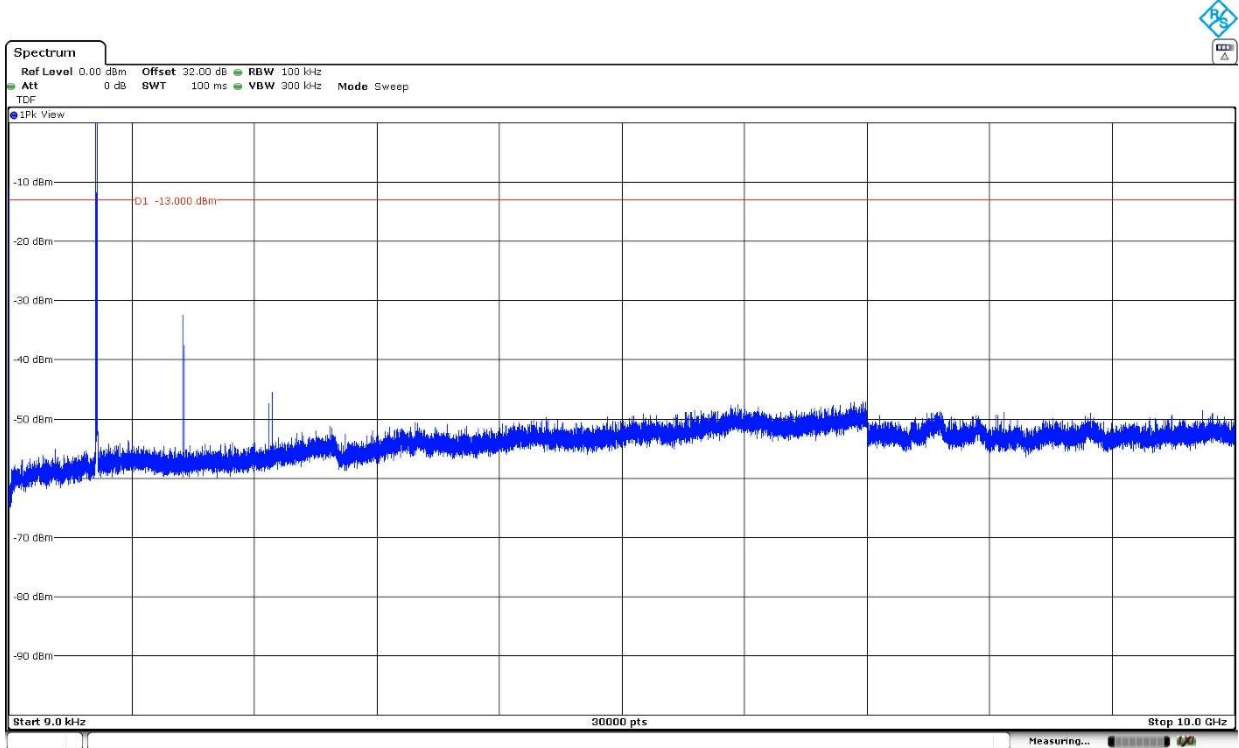
The peak above the limit is the carrier frequency.
The highest peak next to the carrier is the Downlink frequency.

Middle Channel:



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

High Channel:



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, Clause 4.7.2:

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 $65 + 10 \log_{10} p(\text{watts})$, dB, for mobile and portable equipment.

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 71 & 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 $43 + 10 \log_{10} p(\text{watts})$, 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:

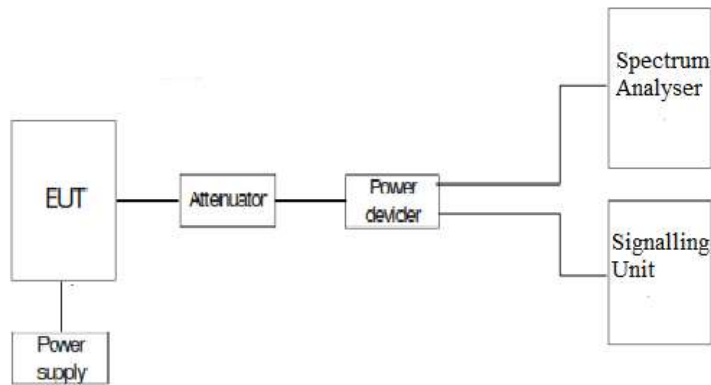
$$P_o \text{ (dBm)} - [43 + 10 \log (P_o \text{ in mW}) - 30] = -13 \text{ dBm}$$

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 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. Narrow Band= 0.

LTE 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)	-19.646	-25.11

LTE 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)	-14.97	-27.22

High Block Edge. Narrow Band= Max.

LTE 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)	-19.1	-24.59

LTE 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)	-21.92	-25.5

Measurement uncertainty: $\pm 2.76\text{ dB}$

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. Narrow Band= 0.

LTE 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)	-31.99	-47.32

LTE 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)	-35.32	-33.53

High Block Edge. Narrow Band= Max.

LTE 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)	-34.78	-47.53

LTE 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)	-33.3	-33.65

Measurement uncertainty: $\pm 2.76\text{ dB}$

Verdict

PASS

LTE Cat-M1 Band 66:

Preliminary measurements determined 16QAM, 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. Narrow Band= 0.

LTE 16QAM MODULATION:	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)	-20.84	-39.76	-35.45	-48.67	-48.69	-52.11

LTE 16QAM MODULATION:	RB = 5. Offset = 0. BW = 1.4 MHz	RB = 5. Offset = 0. BW = 3 MHz	RB = 5. Offset = 0. BW = 5 MHz	RB = 5. Offset = 0. BW = 10 MHz	RB = 5. Offset = 0. BW = 15 MHz	RB = 5. Offset = 0. BW = 20 MHz
Maximum measured level at <u>Low Block Edge</u> at antenna port (dBm)	-25.67	-37.15	-34.7	-37.71	-39.32	-41.26

High Block Edge. Narrow Band= Max.

LTE 16QAM MODULATION:	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)	-23.63	-42.51	-35.18	-49.55	-50.67	-52.51

LTE 16QAM MODULATION:	RB = 5. Offset =0. BW = 1.4 MHz	RB = 5. Offset =0. BW = 3 MHz	RB = 5. Offset =0. BW = 5 MHz	RB = 5. Offset =0. BW = 10 MHz	RB = 5. Offset =0. BW = 15 MHz	RB = 5. Offset =0. BW = 20 MHz
Maximum measured level at <u>High Block Edge</u> at antenna port (dBm)	-28.08	-37.06	-35.84	-38.74	-38.99	-40.83

Measurement uncertainty: $\pm 2.76\text{ dB}$

Verdict

PASS

LTE Cat-M1 Band 71:

Preliminary measurements determined 16QAM, 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. Narrow Band= 0.

LTE 16QAM MODULATION:	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)	-24.47	-35.23	-36.77	-40.67

LTE 16QAM MODULATION:	RB = 5. Offset = 0. BW = 5 MHz	RB = 5. Offset = 0. BW = 10 MHz	RB = 5. Offset = 0. BW = 15 MHz	RB = 5. Offset = 0. BW = 20 MHz
Maximum measured level at <u>Low Block Edge</u> at antenna port (dBm)	-26.11	-28.89	-32.1	-34.89

High Block Edge. Narrow Band= Max.

LTE 16QAM MODULATION:	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)	-24.44	-35.81	-40.48	-42.13

LTE 16QAM MODULATION:	RB = 5. Offset = 0. BW = 5 MHz	RB = 5. Offset = 0. BW = 10 MHz	RB = 5. Offset = 0. BW = 15 MHz	RB = 5. Offset = 0. BW = 20 MHz
Maximum measured level at <u>High Block Edge</u> at antenna port (dBm)	-28.09	-32.99	-31.78	-36.17

Measurement uncertainty: $\pm 2.76\text{ dB}$

Verdict

PASS

LTE Cat-M1 Band 85:

Preliminary measurements determined 16QAM, 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. Narrow Band= 0.

LTE 16QAM MODULATION:	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)	-16.65	-29.12

LTE 16QAM MODULATION:	RB = 5. Offset = 0. BW = 5 MHz	RB = 5. Offset = 0. BW = 10 MHz
Maximum measured level at <u>Low Block Edge</u> at antenna port (dBm)	-32.2	-34.59

High Block Edge. Narrow Band= Max.

LTE 16QAM MODULATION:	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)	-32.34	-44.85

LTE 16QAM MODULATION:	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)	-30.35	-34.56

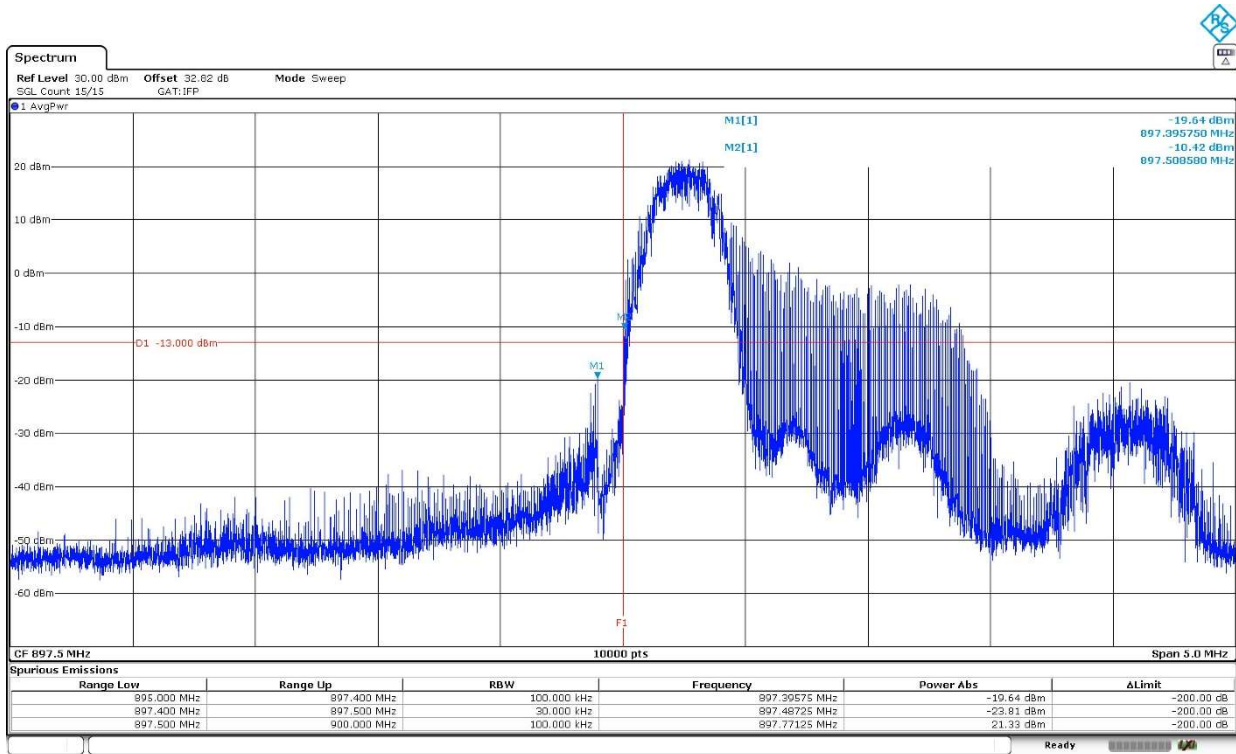
Measurement uncertainty: $\pm 2.76\text{ dB}$

Verdict

PASS

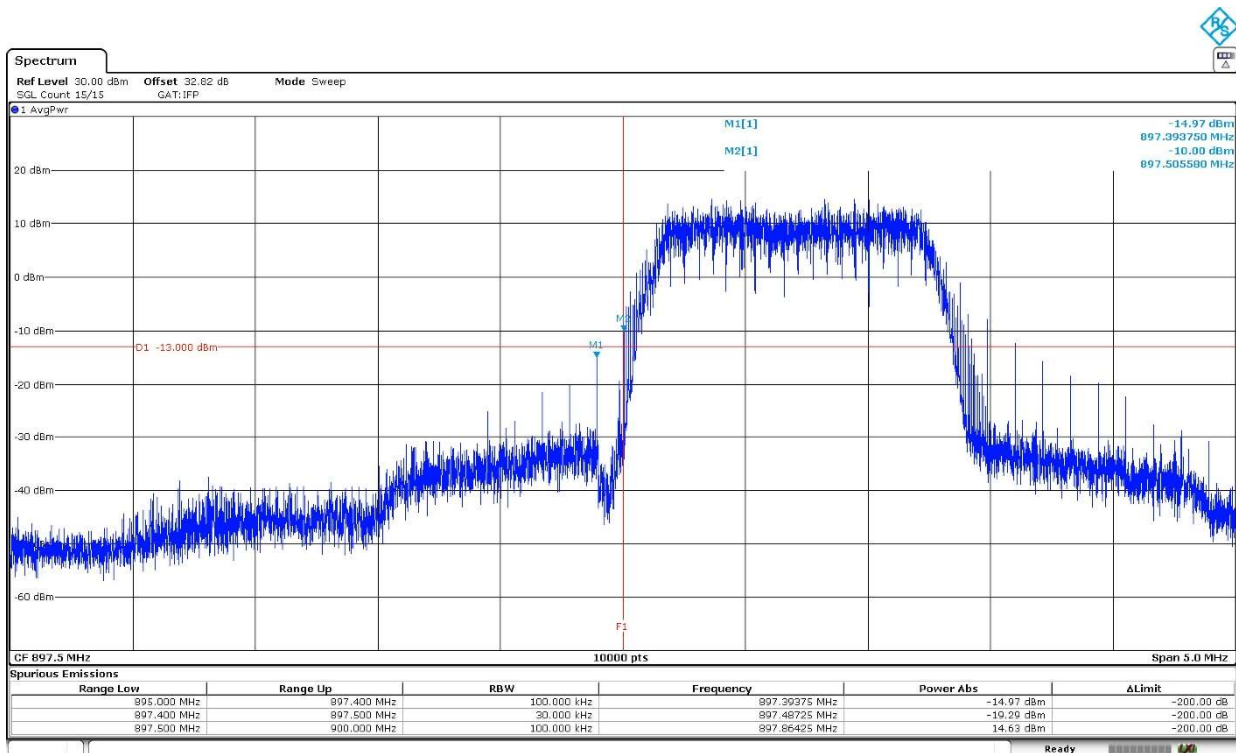
LTE Cat-M1 Band 8:

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



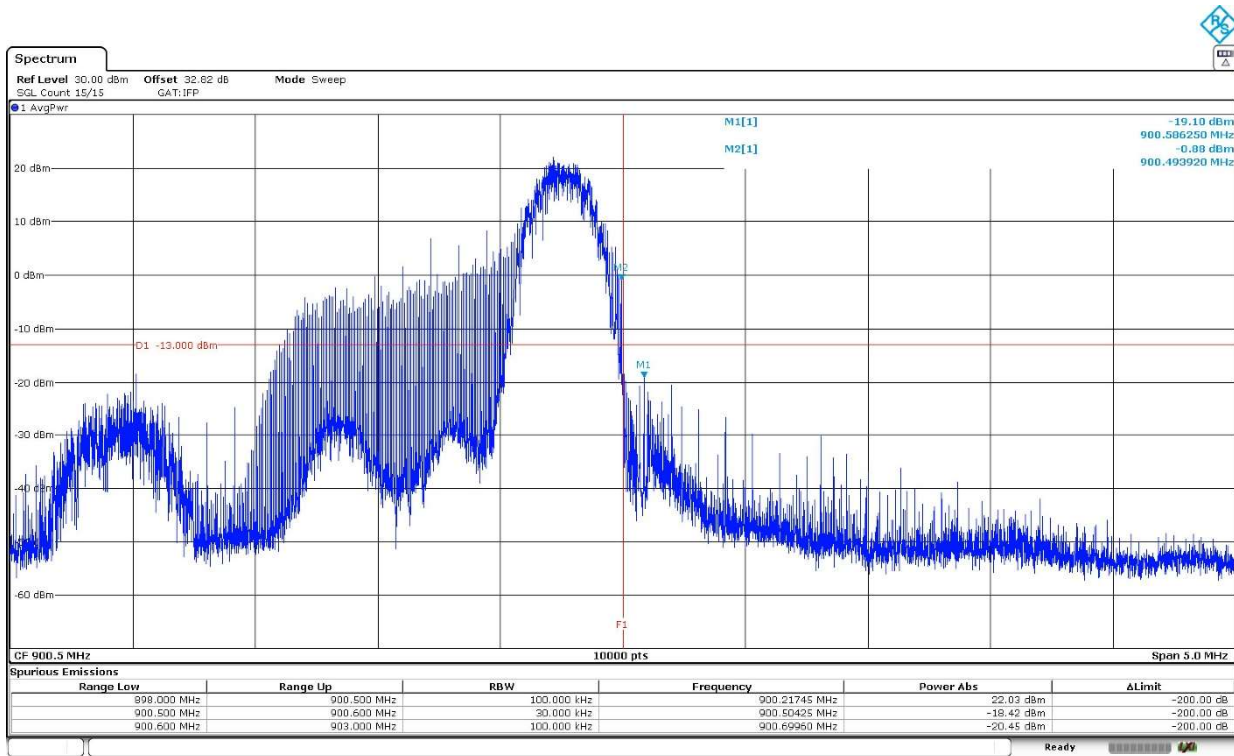
The equipment transmits at the maximum output power

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



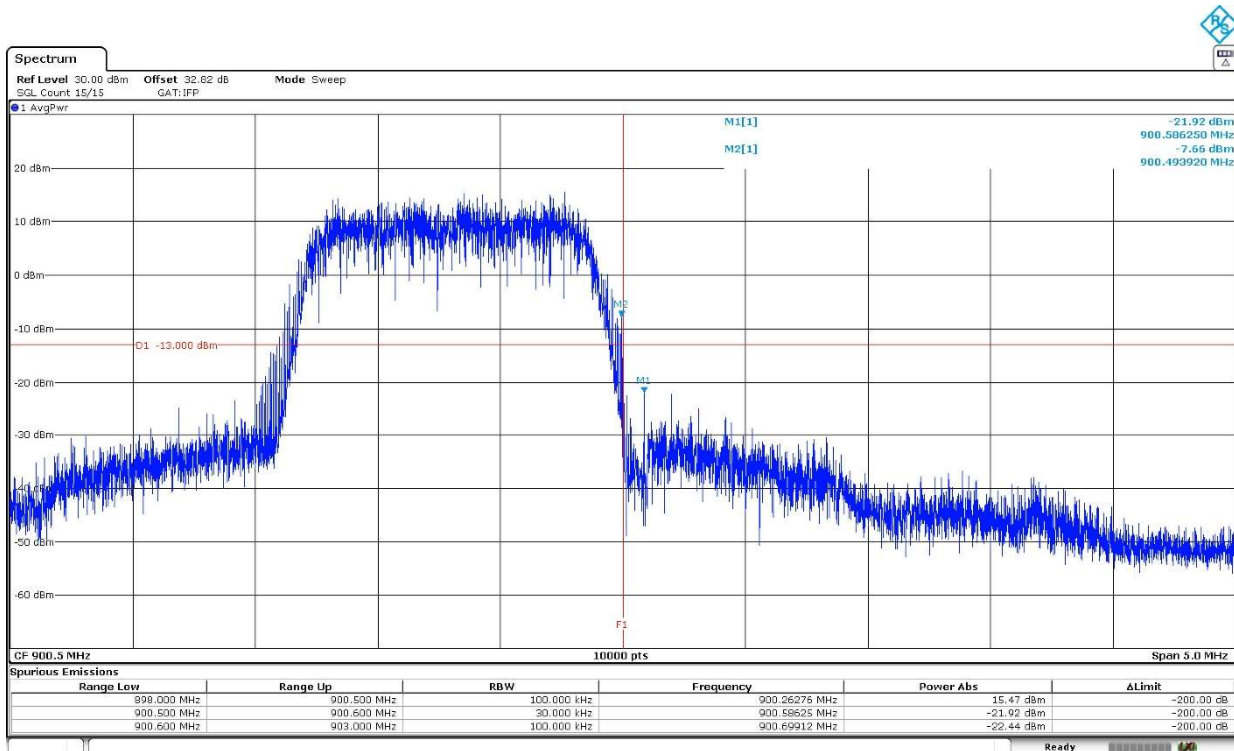
The equipment transmits at the maximum output power

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



The equipment transmits at the maximum output power

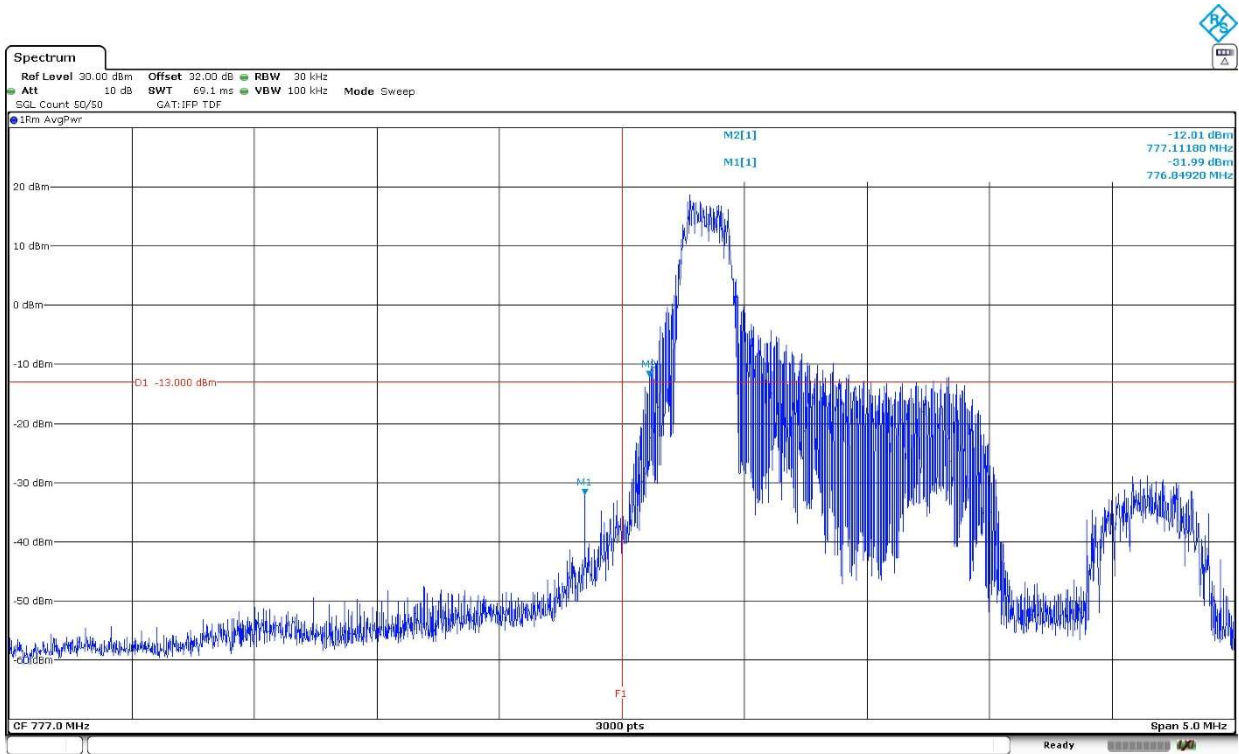
LTE Cat-M1 Band 8. BW=1.4 MHz. QPSK. RB=All. Offset=0. High Block Edge:



The equipment transmits at the maximum output power

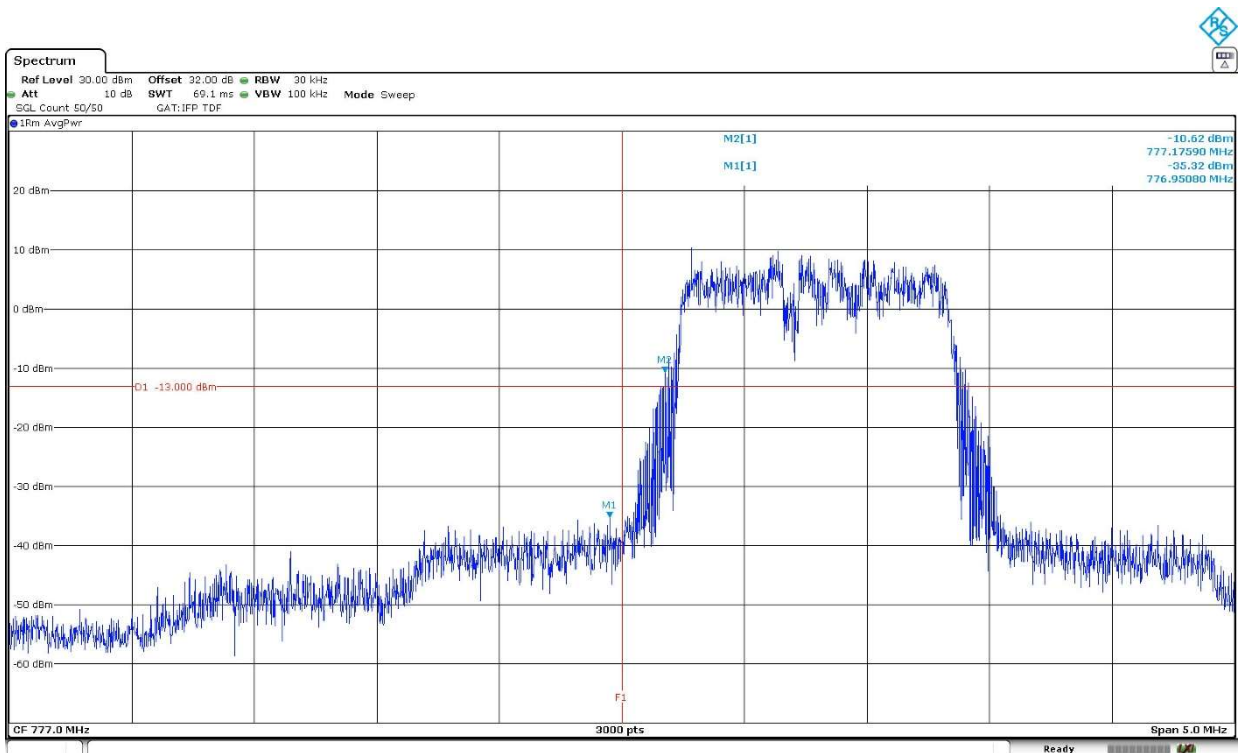
LTE Cat-M1 Band 13:

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



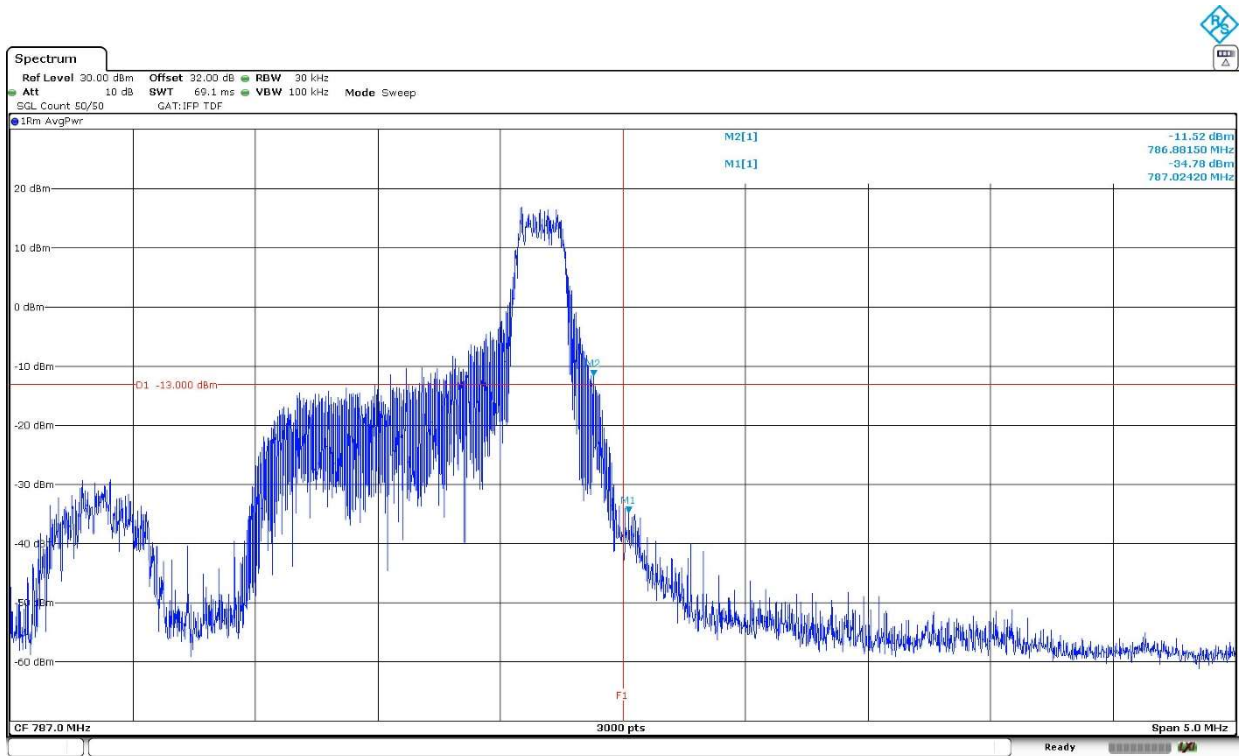
The equipment transmits at the maximum output power

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



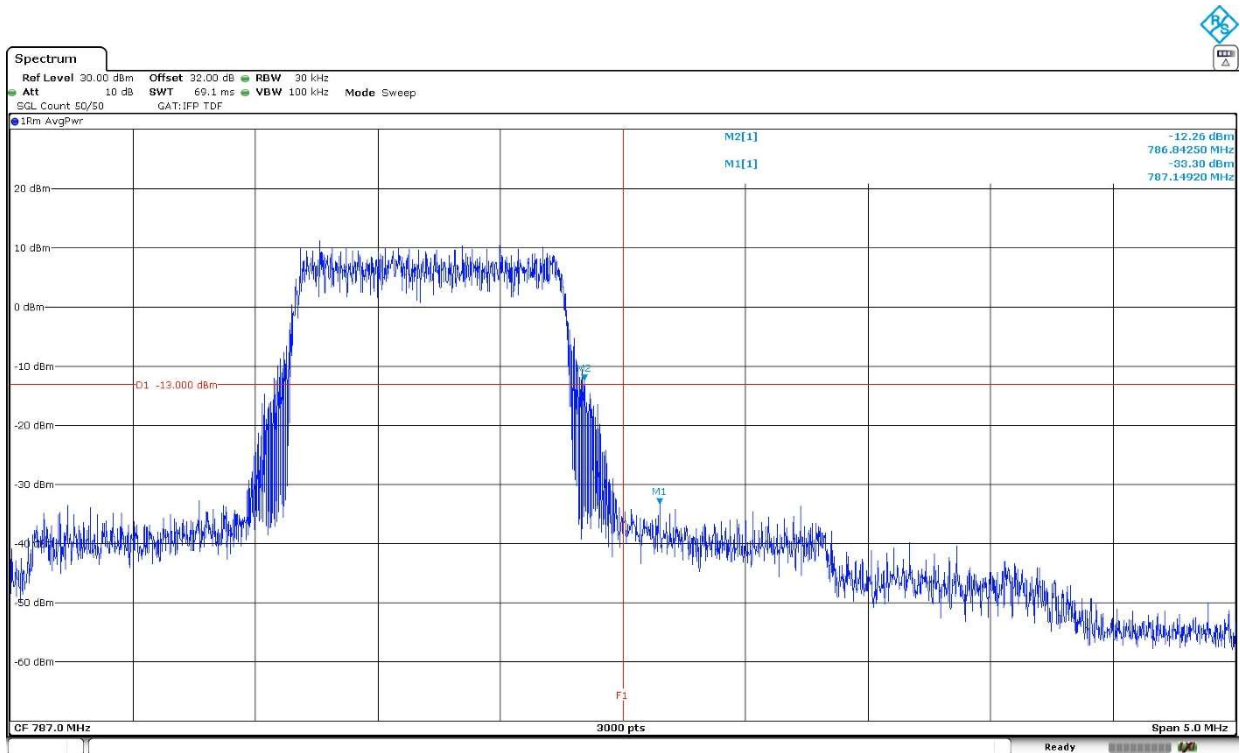
The equipment transmits at the maximum output power

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



The equipment transmits at the maximum output power

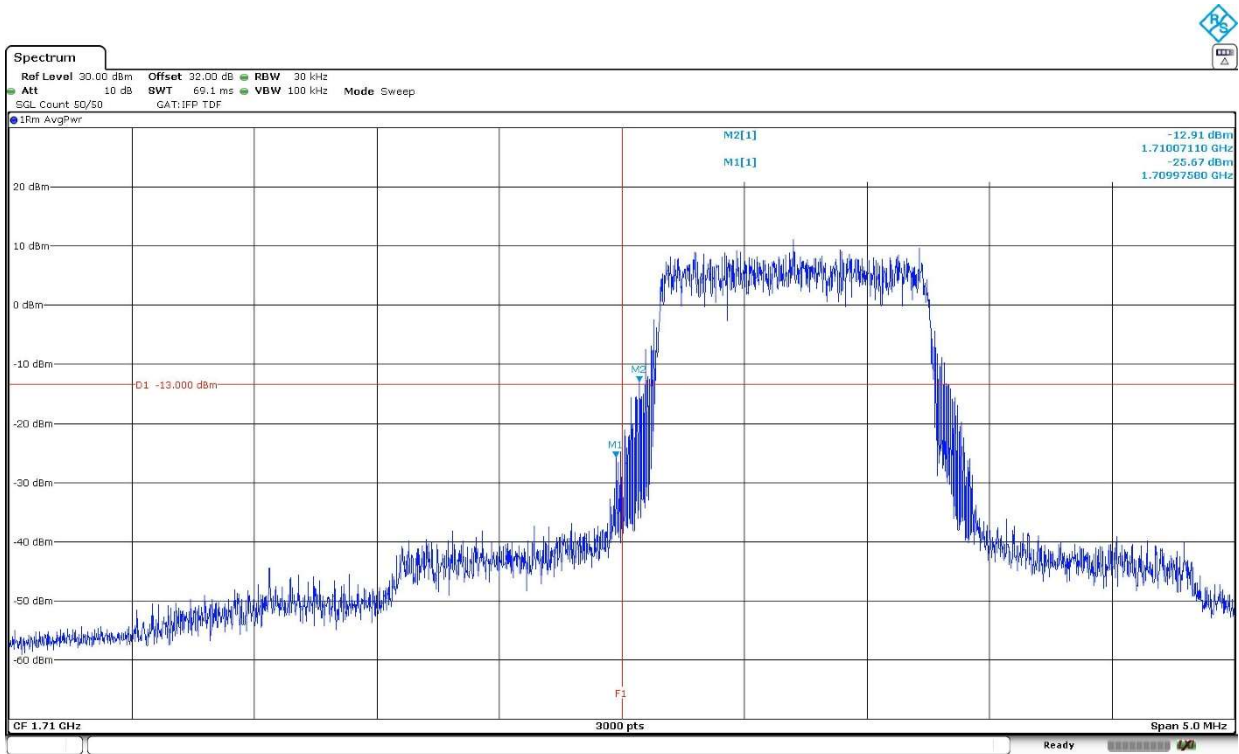
LTE Cat-M1 Band 13. BW=5 MHz. QPSK. RB=All. Offset=0. High Block Edge:



The equipment transmits at the maximum output power

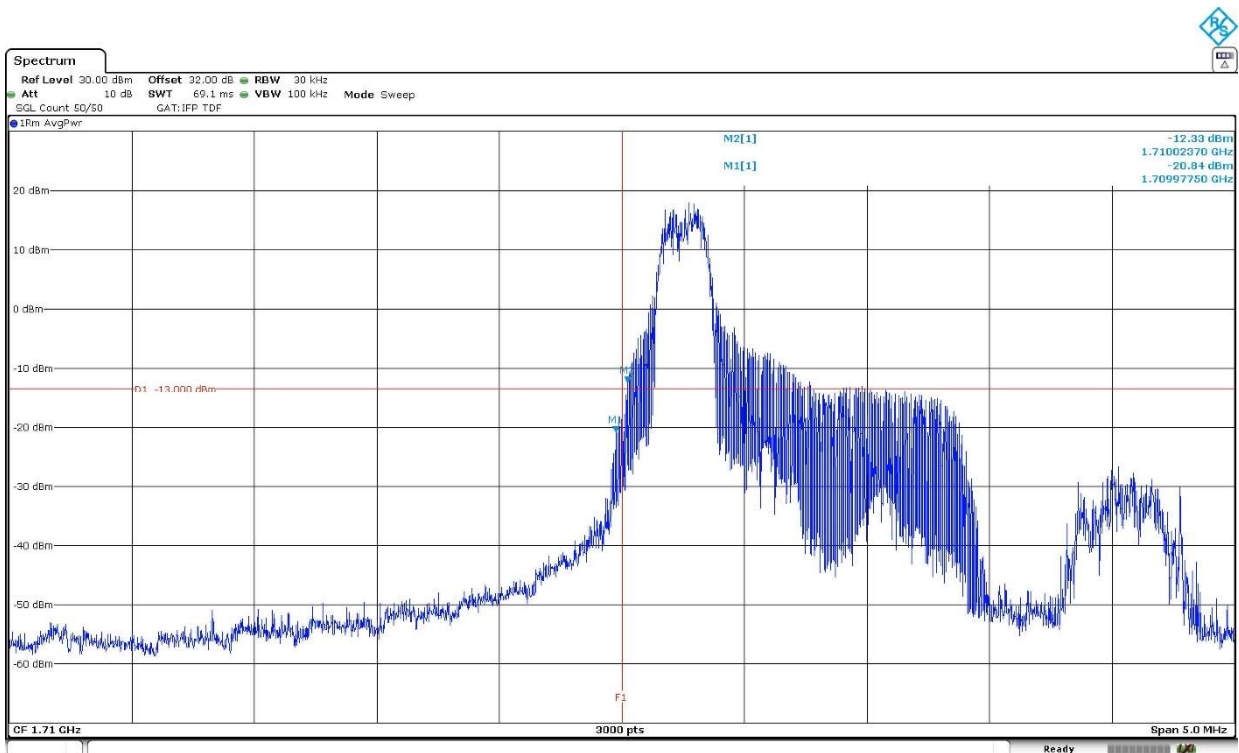
LTE Cat-M1 Band 66:

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



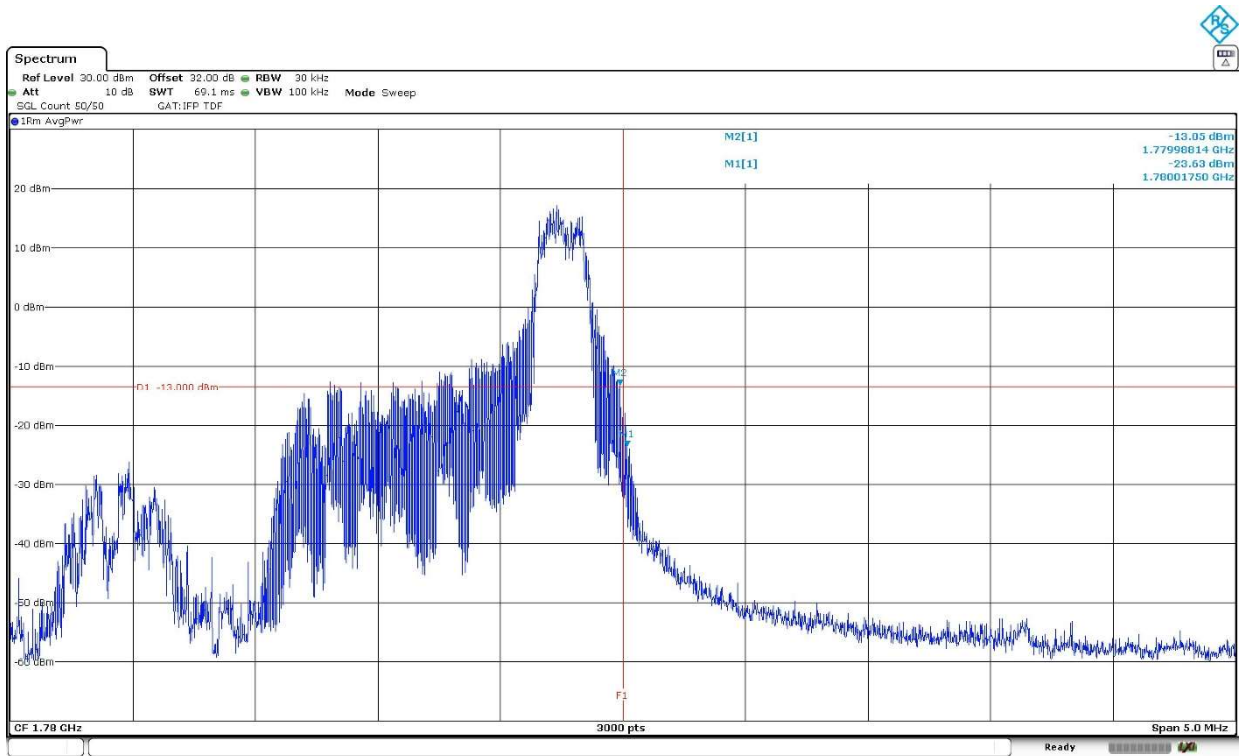
The equipment transmits at the maximum output power

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



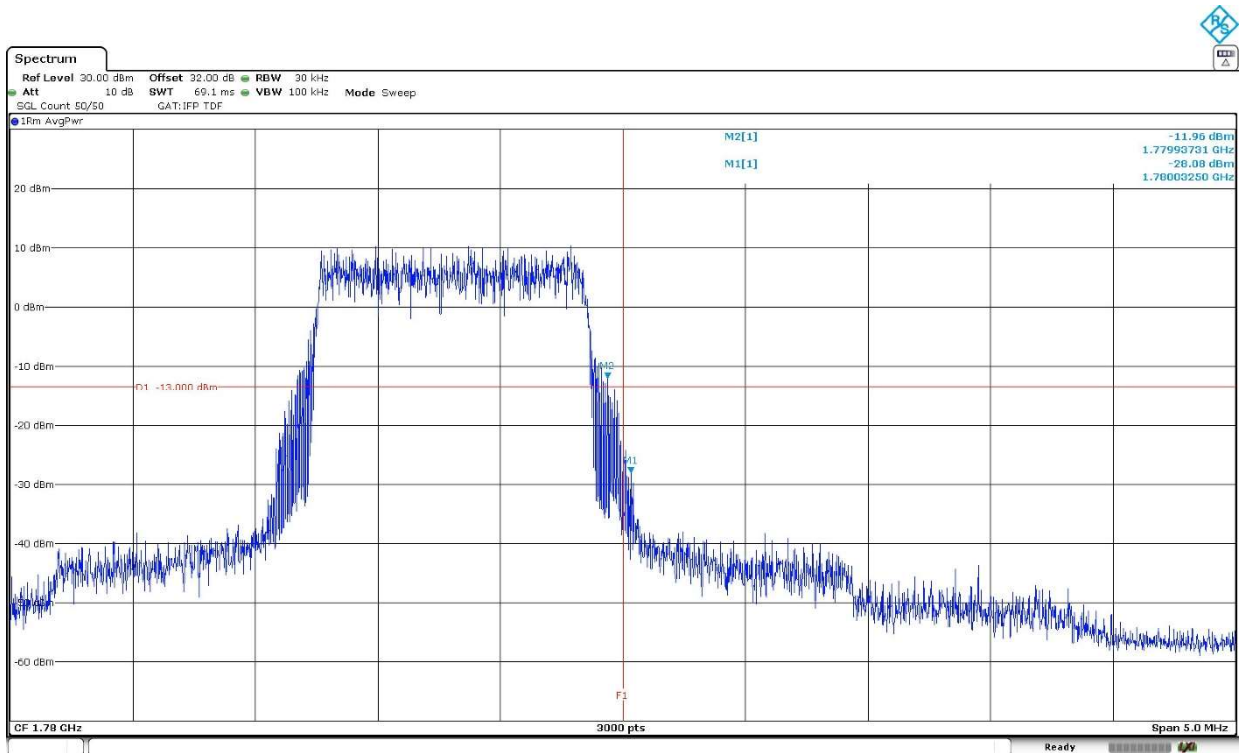
The equipment transmits at the maximum output power

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



The equipment transmits at the maximum output power

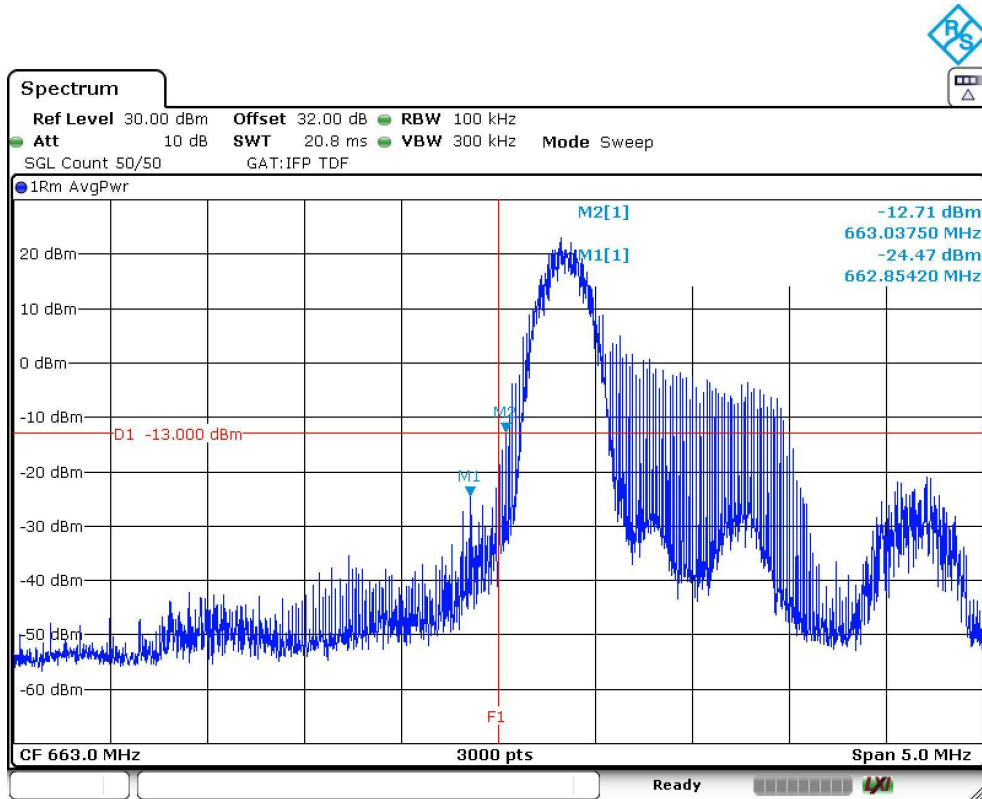
LTE Cat-M1 Band 66. BW=1.4 MHz. QPSK. RB=All. Offset=0. High Block Edge:



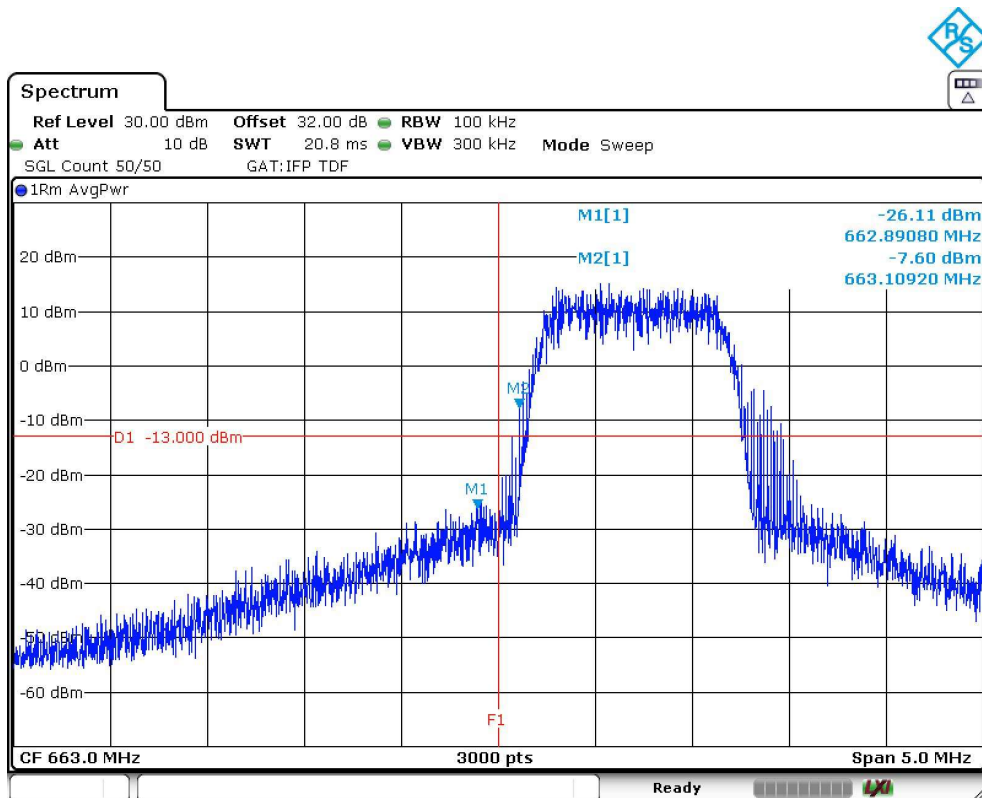
The equipment transmits at the maximum output power

LTE Cat-M1 Band 71:

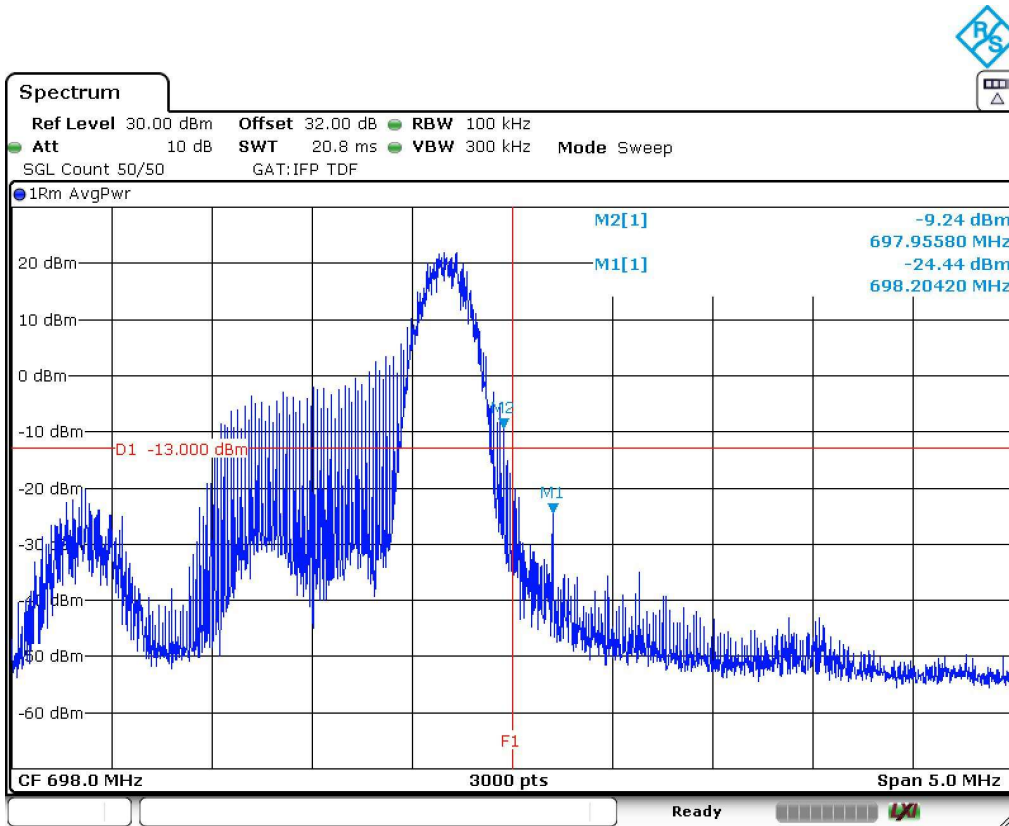
LTE Cat-M1 Band 71. BW=5 MHz. QPSK. RB=1. Offset=0. Low Block Edge:



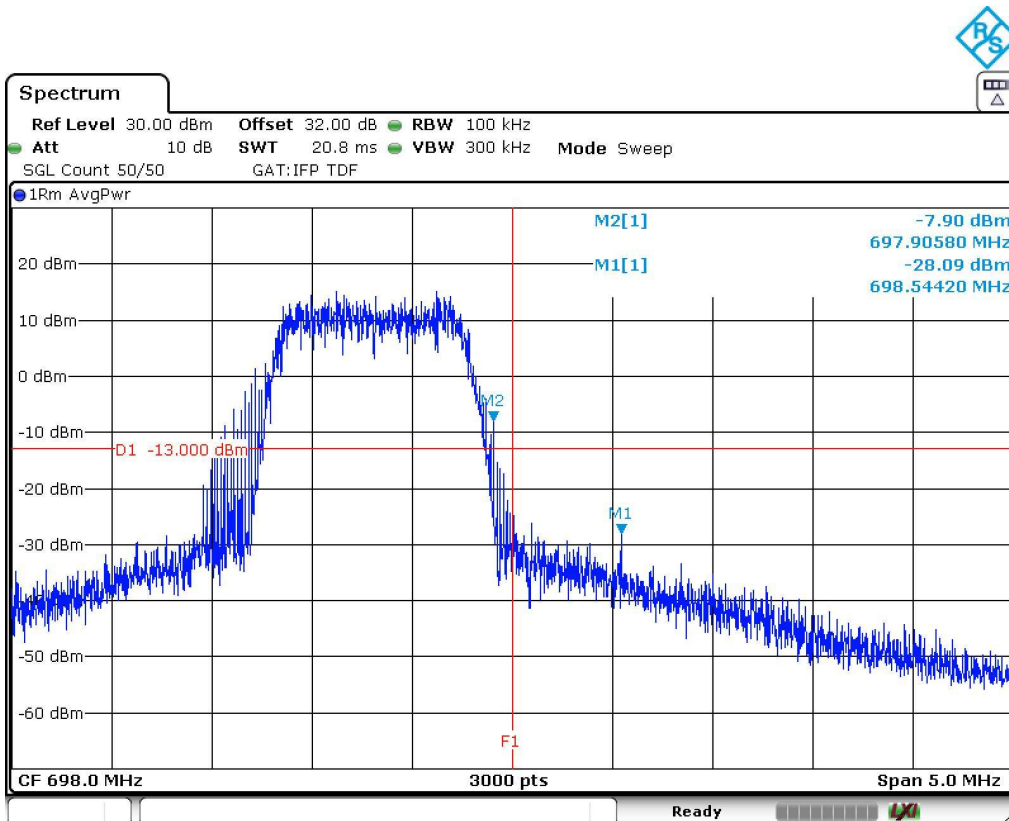
LTE Cat-M1 Band 71. BW=5 MHz. QPSK. RB=All. Offset=0. Low Block Edge:



LTE Cat-M1 Band 71. BW=5 MHz. QPSK. RB=1. Offset 5. High Block Edge:

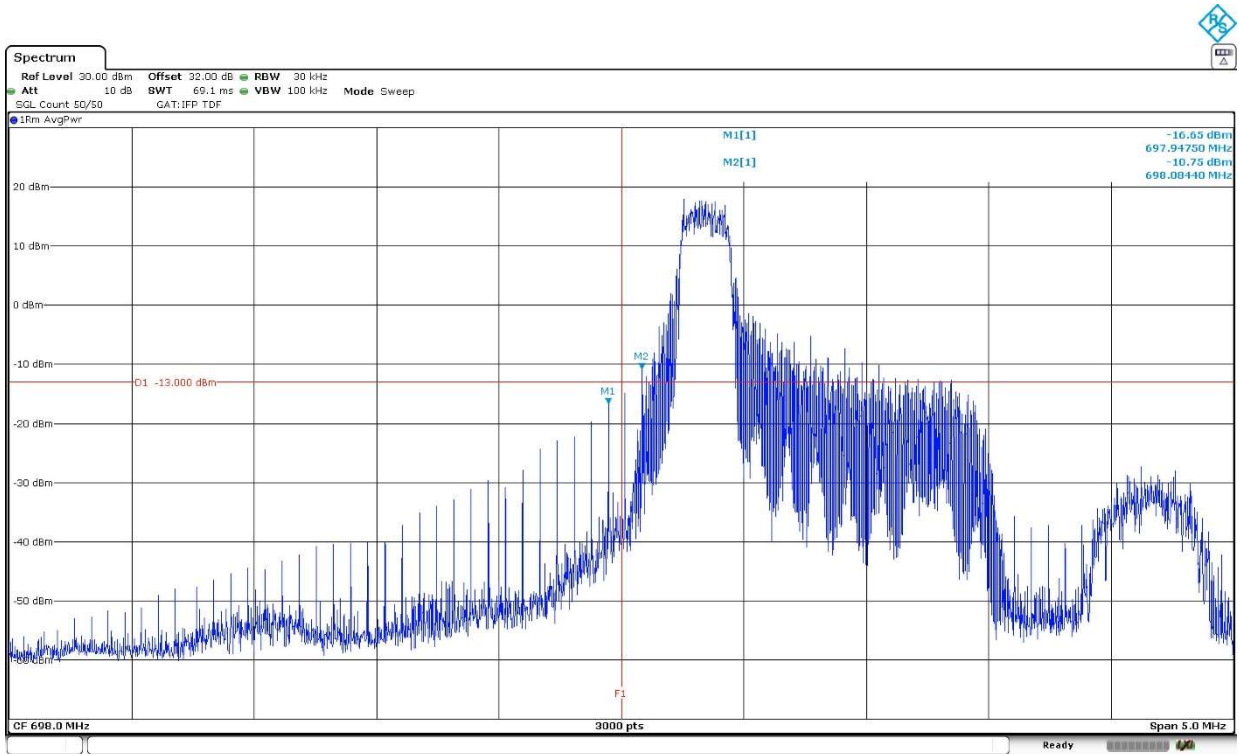


LTE Cat-M1 Band 71. BW=5 MHz. QPSK. RB=All. Offset 0. High Block Edge:

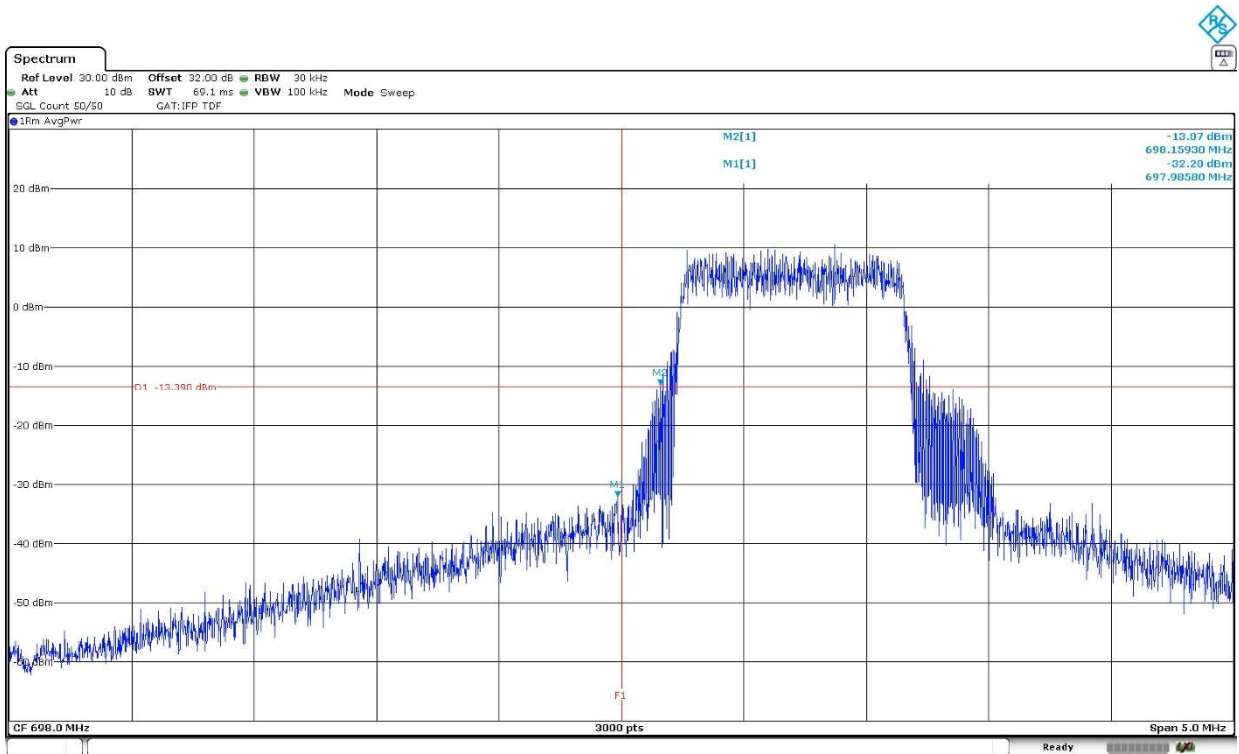


LTE Cat-M1 Band 85:

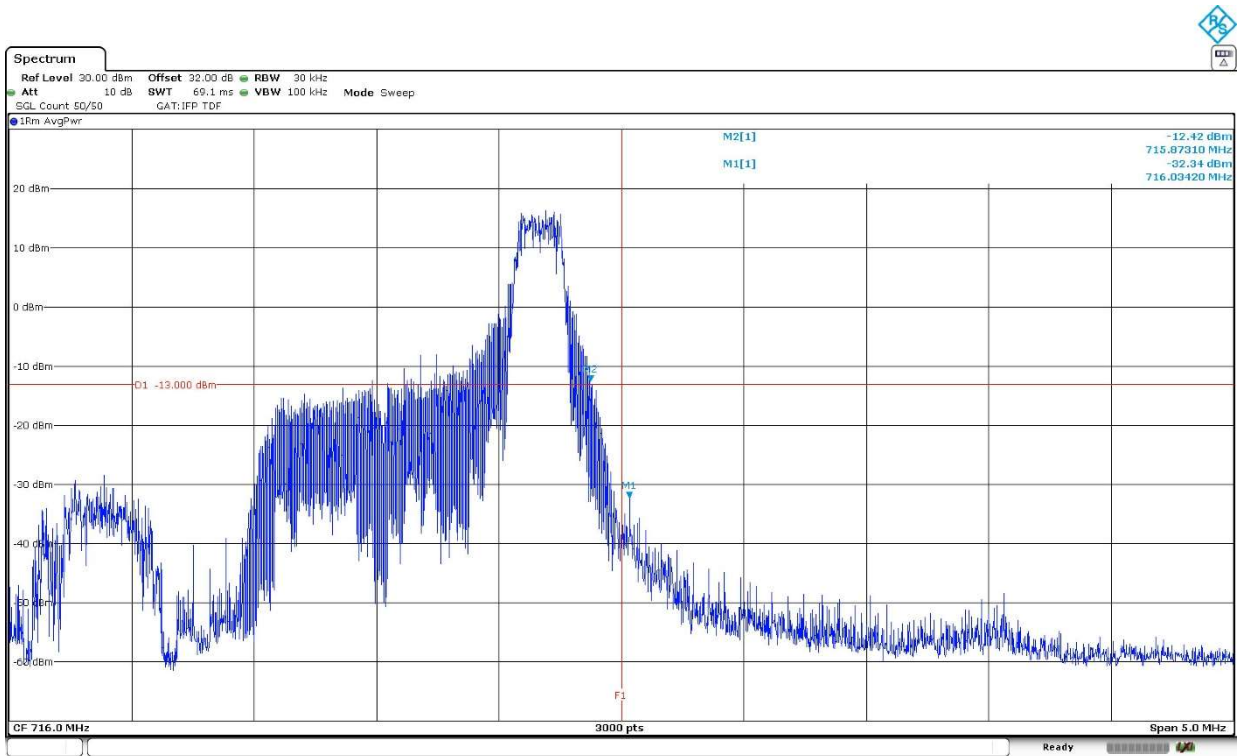
LTE Cat-M1 Band 85. BW=5 MHz. QPSK. RB=1. Offset=0. Low Block Edge:



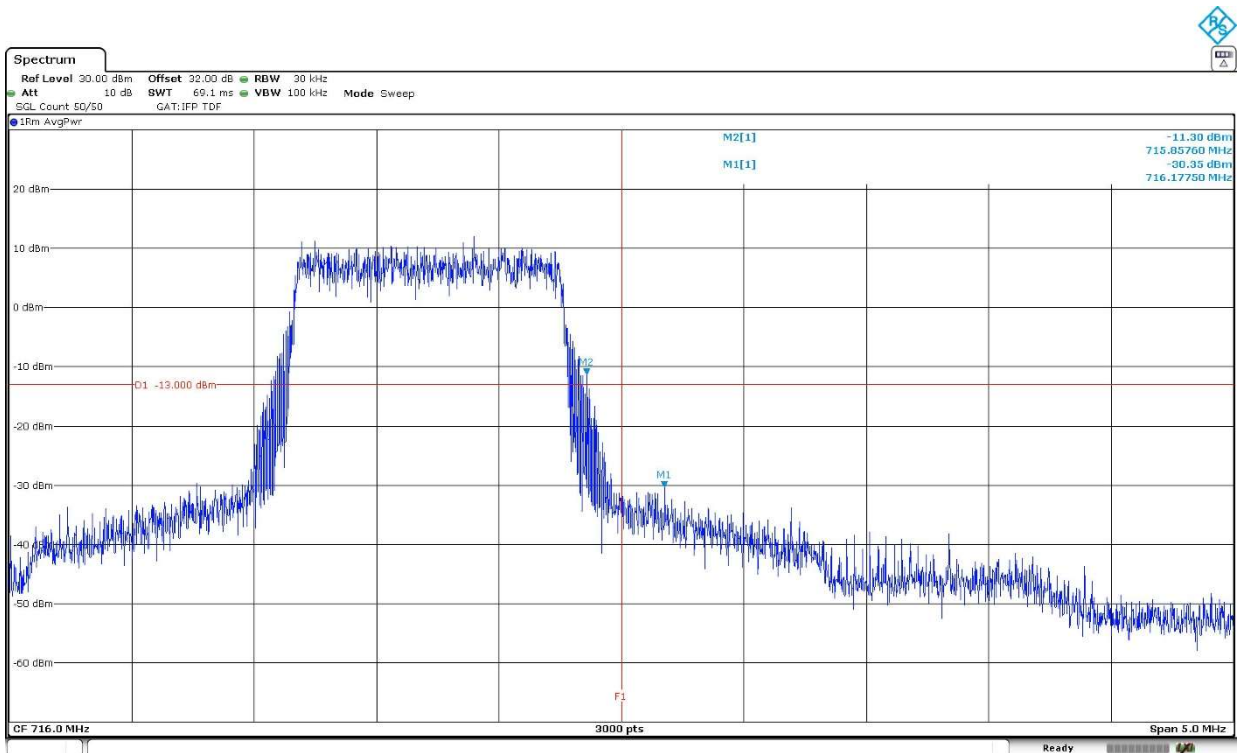
LTE Cat-M1 Band 85. BW=5 MHz. QPSK. RB=All. Offset=0. Low Block Edge:



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



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



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: