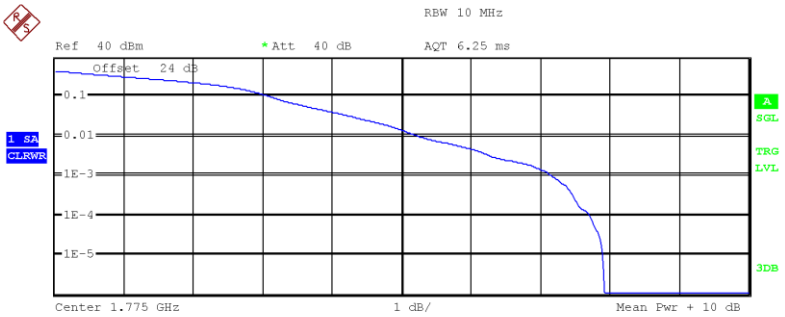
High Channel:



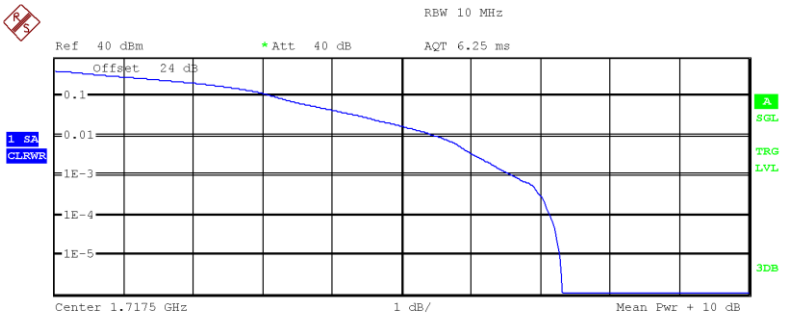
Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 11.2MHz

	Trace 1
Mean	21.30 dBm
Peak	29.21 dBm
Crest	7.91 dB
10 %	3.13 dB
1 %	5.26 dB
.1 %	7.16 dB
.01 %	7.71 dB

Date: 16.JAN.2023 13:26:05

LTE Band 66. Bandwidth = 15 MHz. Modulation 16QAM. RB Size: 1. RB Offset: 5.

Low Channel:

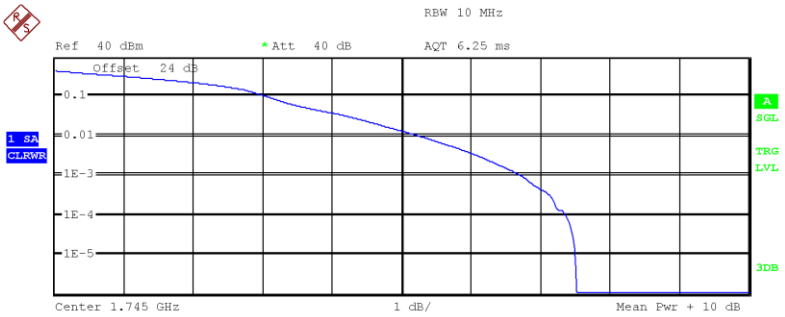


Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 11.2MHz

	Trace 1
Mean	21.44 dBm
Peak	28.75 dBm
Crest	7.31 dB
10 %	3.19 dB
1 %	5.51 dB
.1 %	6.60 dB
.01 %	7.15 dB

Date: 16.JAN.2023 13:24:13

Middle Channel:

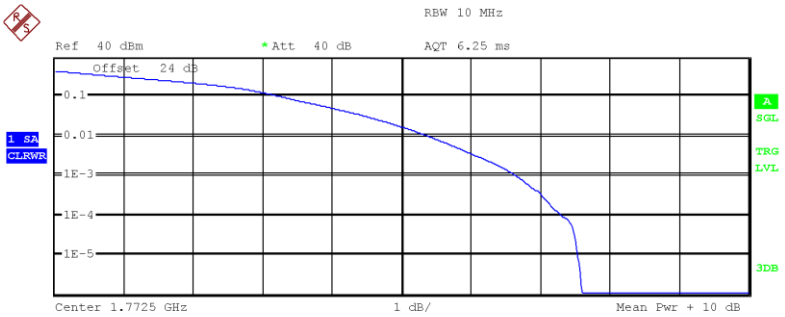


Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 11.2MHz

	Trace 1
Mean	21.74 dBm
Peak	29.25 dBm
Crest	7.51 dB
10 %	3.08 dB
1 %	5.27 dB
.1 %	6.71 dB
.01 %	7.37 dB

Date: 16.JAN.2023 12:42:33

High Channel:



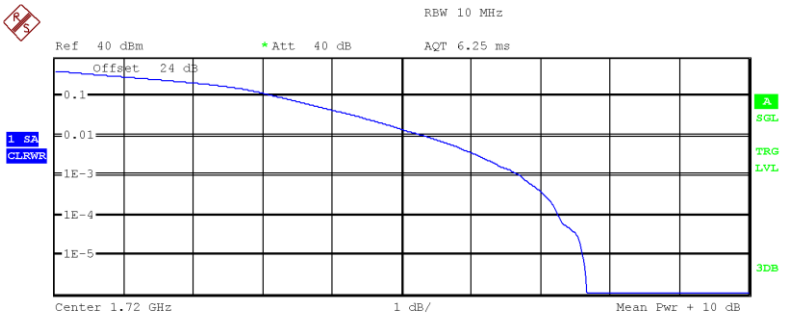
Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 11.2MHz

	Trace 1
Mean	21.89 dBm
Peak	29.49 dBm
Crest	7.60 dB
10 %	3.29 dB
1 %	5.40 dB
.1 %	6.65 dB
.01 %	7.31 dB

Date: 16.JAN.2023 13:20:55

LTE Band 66. Bandwidth = 20 MHz. Modulation 16QAM. RB Size: 5. RB Offset: 1.

Low Channel:

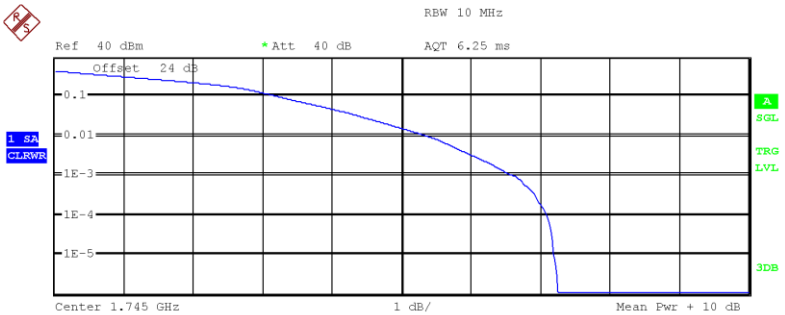


Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 11.2MHz

	Trace 1
Mean	21.94 dBm
Peak	29.60 dBm
Crest	7.67 dB
10 %	3.24 dB
1 %	5.37 dB
.1 %	6.71 dB
.01 %	7.26 dB

Date: 16.JAN.2023 13:15:11

Middle Channel:

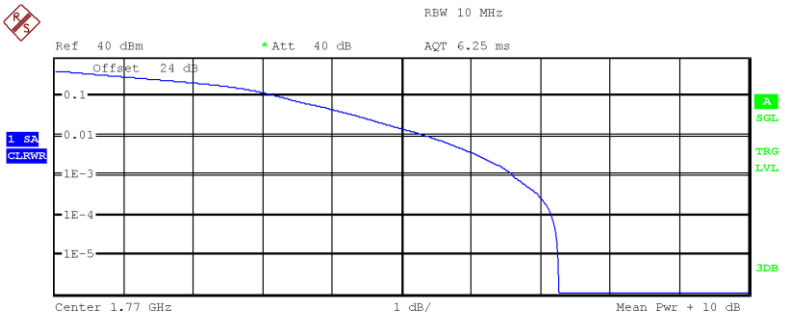


Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 11.2MHz

	Trace 1
Mean	22.07 dBm
Peak	29.32 dBm
Crest	7.25 dB
10 %	3.24 dB
1 %	5.38 dB
.1 %	6.62 dB
.01 %	7.10 dB

Date: 16.JAN.2023 12:47:26

High Channel:



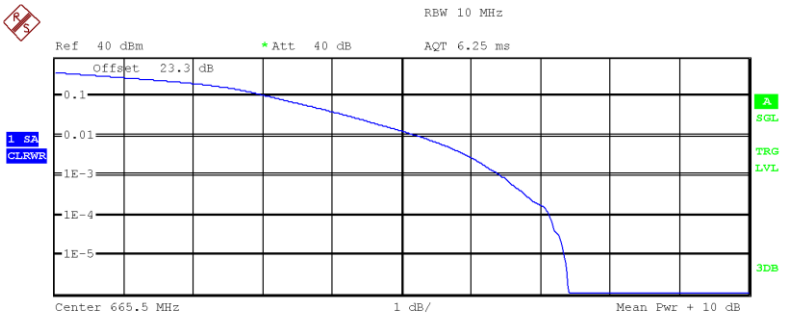
Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 11.2MHz

	Trace 1
Mean	21.87 dBm
Peak	29.13 dBm
Crest	7.26 dB
10 %	3.25 dB
1 %	5.38 dB
.1 %	6.62 dB
.01 %	7.16 dB

Date: 16.JAN.2023 13:13:24

LTE Band 71. Bandwidth = 5 MHz. Modulation 16QAM. RB Size: 1. RB Offset: 0.

Low Channel:

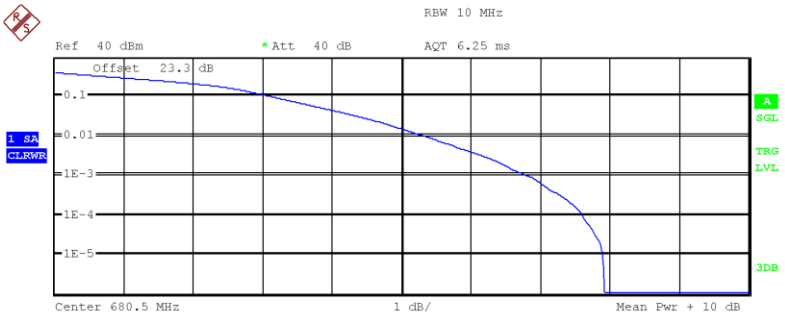


Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 11.2MHz

	Trace 1
Mean	22.85 dBm
Peak	30.26 dBm
Crest	7.40 dB
10 %	3.13 dB
1 %	5.26 dB
.1 %	6.43 dB
.01 %	7.13 dB

Date: 16.JAN.2023 11:36:57

Middle Channel:

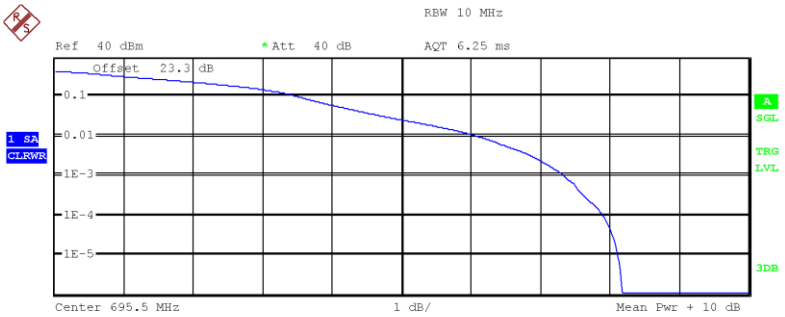


Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 11.2MHz

	Trace 1
Mean	22.72 dBm
Peak	30.64 dBm
Crest	7.92 dB
10 %	3.14 dB
1 %	5.34 dB
.1 %	6.79 dB
.01 %	7.61 dB

Date: 13.JAN.2023 20:08:42

High Channel:



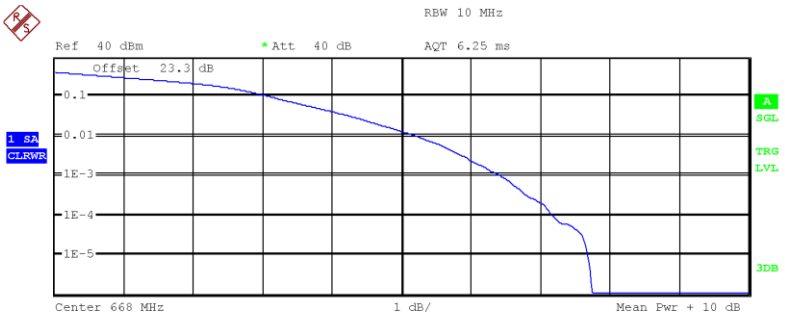
Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 11.2MHz

	Trace 1
Mean	21.58 dBm
Peak	29.75 dBm
Crest	8.17 dB
10 %	3.53 dB
1 %	6.11 dB
.1 %	7.34 dB
.01 %	7.90 dB

Date: 16.JAN.2023 11:42:21

LTE Band 71. Bandwidth = 10 MHz. Modulation 16QAM. RB Size: 5. RB Offset: 0.

Low Channel:

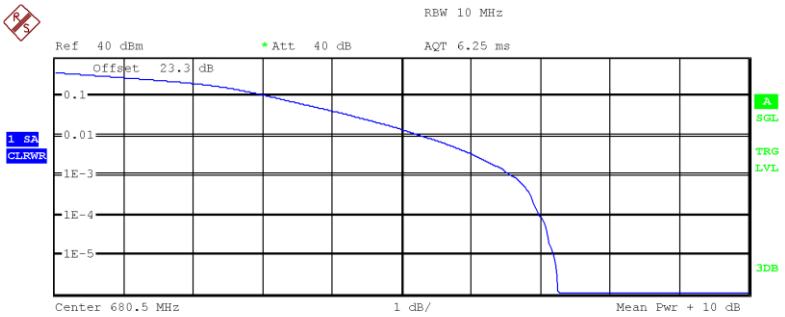


Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 11.2MHz

	Trace 1
Mean	22.59 dBm
Peak	30.33 dBm
Crest	7.74 dB
10 %	3.13 dB
1 %	5.22 dB
.1 %	6.43 dB
.01 %	7.16 dB

Date: 16.JAN.2023 11:31:22

Middle Channel:

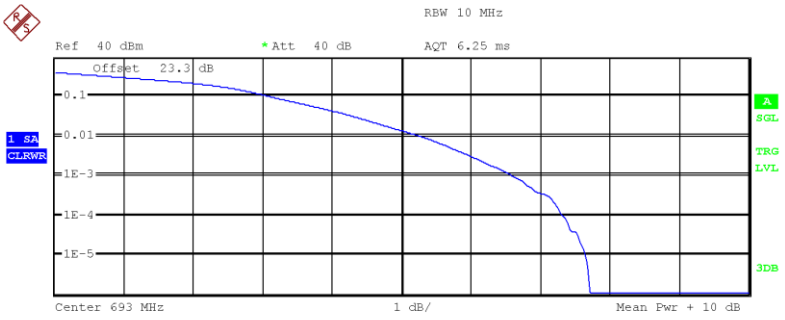


Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 11.2MHz

	Trace 1
Mean	22.70 dBm
Peak	29.96 dBm
Crest	7.26 dB
10 %	3.14 dB
1 %	5.32 dB
.1 %	6.60 dB
.01 %	6.99 dB

Date: 16.JAN.2023 07:05:51

High Channel:



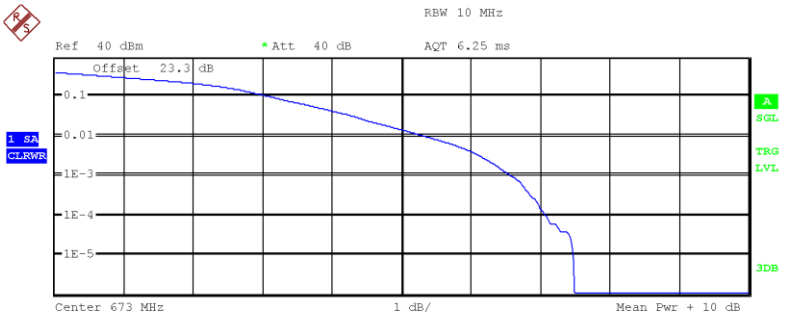
Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 11.2MHz

	Trace 1
Mean	22.75 dBm
Peak	30.46 dBm
Crest	7.71 dB
10 %	3.14 dB
1 %	5.27 dB
.1 %	6.59 dB
.01 %	7.32 dB

Date: 16.JAN.2023 11:50:18

LTE Band 71. Bandwidth = 15 MHz. Modulation 16QAM. RB Size: 5. RB Offset: 1.

Low Channel:

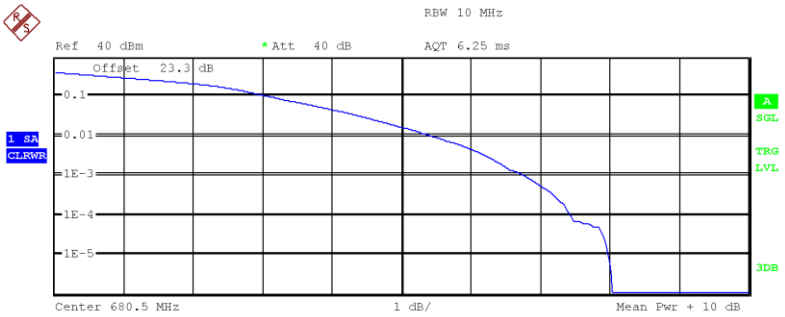


Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 11.2MHz

	Trace 1
Mean	22.90 dBm
Peak	30.39 dBm
Crest	7.49 dB
10 %	3.13 dB
1 %	5.35 dB
.1 %	6.59 dB
.01 %	7.08 dB

Date: 16.JAN.2023 11:12:59

Middle Channel:

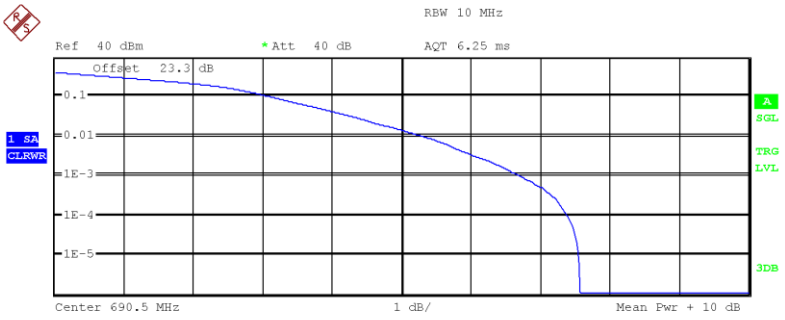


Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 11.2MHz

	Trace 1
Mean	22.91 dBm
Peak	30.95 dBm
Crest	8.04 dB
10 %	3.13 dB
1 %	5.45 dB
.1 %	6.76 dB
.01 %	7.44 dB

Date: 16.JAN.2023 10:33:05

High Channel:



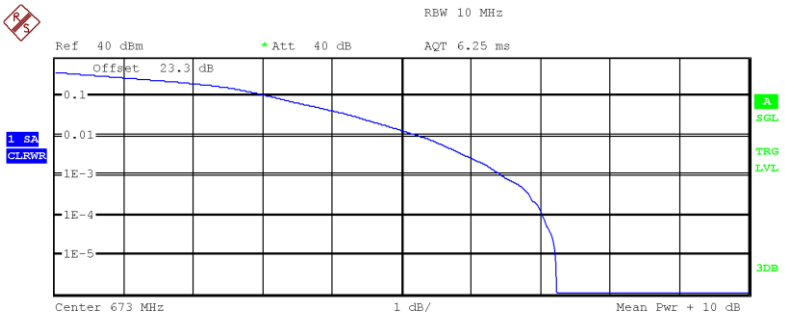
Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 11.2MHz

	Trace 1
Mean	22.97 dBm
Peak	30.53 dBm
Crest	7.57 dB
10 %	3.13 dB
1 %	5.30 dB
.1 %	6.70 dB
.01 %	7.39 dB

Date: 16.JAN.2023 11:26:12

LTE Band 71. Bandwidth = 20 MHz. Modulation 16QAM. RB Size: 5. RB Offset: 1.

Low Channel:

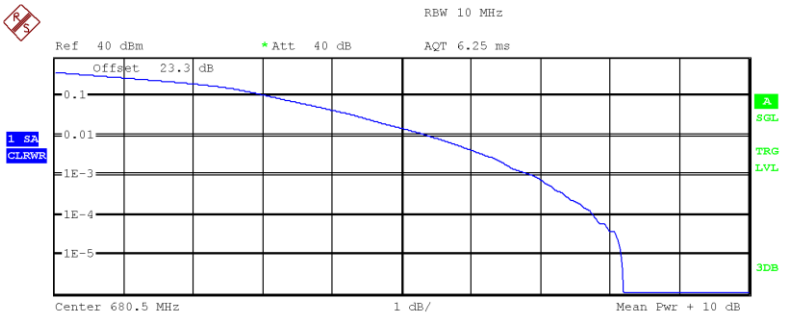


Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 11.2MHz

	Trace 1
Mean	22.81 dBm
Peak	30.04 dBm
Crest	7.23 dB
10 %	3.14 dB
1 %	5.27 dB
.1 %	6.46 dB
.01 %	7.04 dB

Date: 16.JAN.2023 11:03:19

Middle Channel:

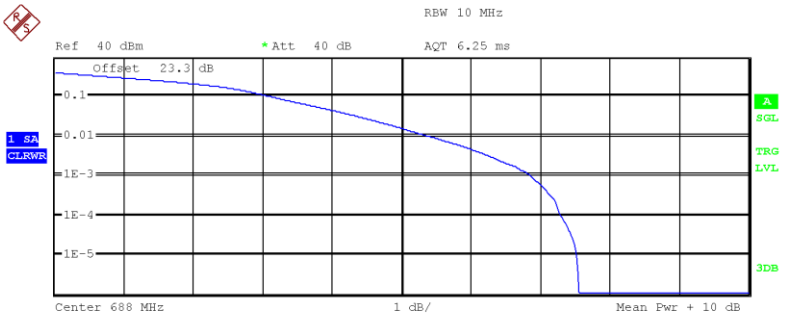


Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 11.2MHz

	Trace 1
Mean	22.75 dBm
Peak	30.95 dBm
Crest	8.19 dB
10 %	3.14 dB
1 %	5.40 dB
.1 %	6.89 dB
.01 %	7.76 dB

Date: 16.JAN.2023 10:42:47

High Channel:



Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 11.2MHz

	Trace 1
Mean	22.91 dBm
Peak	30.46 dBm
Crest	7.55 dB
10 %	3.14 dB
1 %	5.42 dB
.1 %	6.86 dB
.01 %	7.29 dB

Date: 16.JAN.2023 10:59:29

LTE Band 12:

Channel	Measured maximum average power at antenna port (dBm)	Maximum declared antenna gain (dBi)	Maximum equivalent isotropically radiated power E.I.R.P (dBm)	Maximum effective radiated power E.R.P (dBm)	PAPR (dB)
Low	22.64	2	24.64	22,49	6.76
Middle	22.42		24.42	22,27	7.42
High	22.51		24.51	22,36	6.67
Measurement uncertainty (dB)	<±0.94				

LTE Band 13:

Channel	Measured maximum average power at antenna port (dBm)	Maximum declared antenna gain (dBi)	Maximum equivalent isotropically radiated power E.I.R.P (dBm)	Maximum effective radiated power E.R.P (dBm)	PAPR (dB)
Low	22.20	2	24.20	22.05	6.83
Middle	22.22		24.24	22.09	6.7
High	22.32		24.32	22.17	6.78
Measurement uncertainty (dB)	<±0.94				

LTE Band 66:

Channel	Measured maximum average power at antenna port (dBm)	Maximum declared antenna gain (dBi)	Maximum equivalent isotropically radiated power E.I.R.P (dBm)	Maximum effective radiated power E.R.P (dBm)	PAPR (dB)
Low	22.07	4.5	26.570	24.420	7
Middle	22.17		26.670	24.520	6.96
High	21.99		26.490	24.340	7.16
Measurement uncertainty (dB)	<±0.94				

LTE Band 71:

Channel	Measured maximum average power at antenna port (dBm)	Maximum declared antenna gain (dBi)	Maximum equivalent isotropically radiated power E.I.R.P (dBm)	Maximum effective radiated power E.R.P (dBm)	PAPR (dB)
Low	22.54	2	24,54	22,39	6.59
Middle	22.96		24,96	22,81	6.89
High	22.59		24,59	22,44	7.34
Measurement uncertainty (dB)	<±0.94				

Frequency Stability

SPECIFICATION:

* 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 & RSS-139, Clause 6.4. 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.

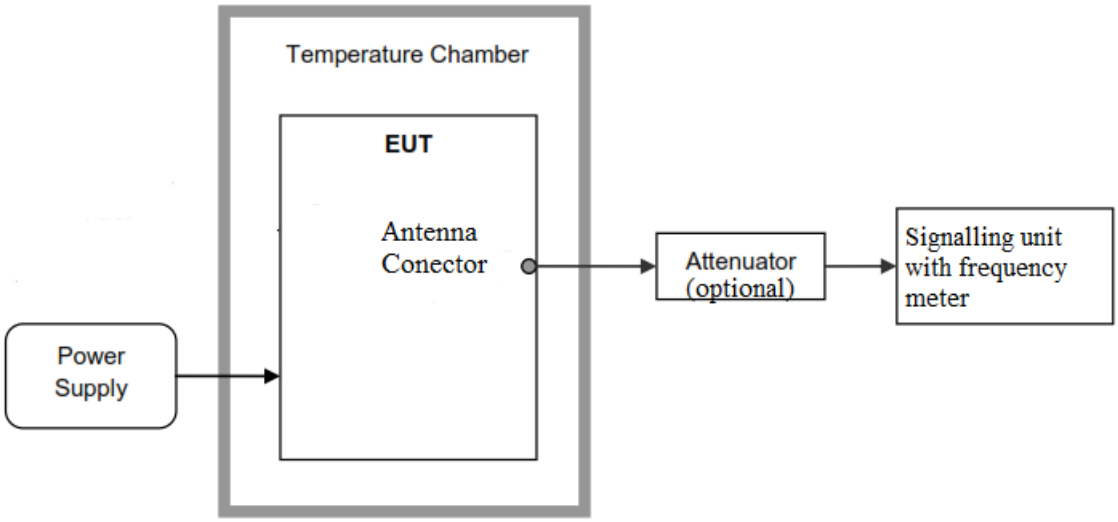
The EUT was set in “Radio Resource Control (RRC) mode” on the middle channel using the Universal Radio Communication tester R&S CMW500 and the maximum frequency error was measured using the built-in calibrated frequency meter.
The worst case LTE mode for conducted power was used for the test.

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.

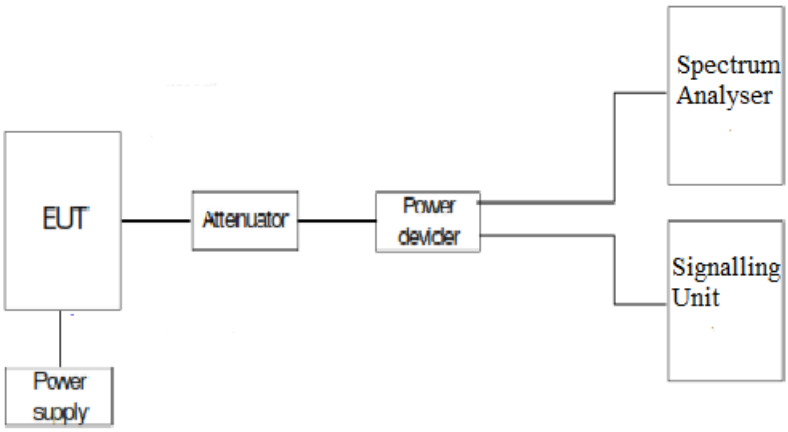
The reference point measurements were made at the RF output terminals of the EUT using an attenuator, power splitter and spectrum analyser. The EUT was controlled via the Universal Radio Communication tester R&S CMW500 selecting maximum transmission power of the EUT and different modes of modulation.

TEST SETUP:

Frequency tolerance:



Reference points *f*L and *f*H:



RESULTS:

1. FREQUENCY TOLERANCE:

- **Frequency stability over temperature variations:**

LTE Band 12:

Temperature (ºC)	Frequency Error (Hz)	Frequency Error (ppm)
+50	4.63	0.00654417
+40	7.84	0.011081272
+30	3.87	0.005469965
+20	5.54	0.007830389
+10	3.79	0.00535689
0	6.6	0.009328622
-10	8.34	0.011787986
-20	4.89	0.006911661
-30	7.4	0.010459364

LTE Band 13:

Temperature (ºC)	Frequency Error (Hz)	Frequency Error (ppm)
+50	5.91	0.007557545
+40	9.1	0.011636829
+30	8.67	0.011086957
+20	7.86	0.010051151
+10	7.46	0.009539642
0	10.78	0.013785166
-10	9.93	0.01269821
-20	8.88	0.011355499
-30	6	0.007672634

LTE Band 66:

Temperature (ºC)	Frequency Error (Hz)	Frequency Error (ppm)
+50	20.51	0.011753582
+40	20.83	0.011936963
+30	18.73	0.010733524
+20	18.29	0.010481375
+10	20.93	0.011994269
0	18.58	0.010647564
-10	19.66	0.011266476
-20	18.36	0.01052149
-30	19.2	0.011002865

LTE Band 71:

Temperature (ºC)	Frequency Error (Hz)	Frequency Error (ppm)
+50	1.03	0.001513593
+40	0.95	0.001396032
+30	2.52	0.003703159
+20	0.97	0.001425422
+10	0.83	0.001219691
0	1.43	0.002101396
-10	0.16	0.000235121
-20	1.19	0.001748714
-30	1.71	0.002512858

- **Frequency stability over voltage variations:**

LTE Band 12:

Supply voltage	Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)
Vmax	240	7.45	0.010530035
Vmin	110	5.05	0.007137809

LTE Band 13:

Supply voltage	Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)
Vmax	240	10.75	0.013746803
Vmin	110	10.52	0.013452685

LTE Band 66:

Supply voltage	Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)
Vmax	240	19.83	0.011363897
Vmin	110	19.75	0.011318052

LTE Band 71:

Supply voltage	Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)
Vmax	240	0.64	0.000940485
Vmin	110	0.25	0.000367377

2. REFERENCE FREQUENCY POINTS fL AND fH:

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

LTE Band 12: QPSK. Nominal bandwidth 5 MHz

*f*L (MHz)	699.0130
*f*H (MHz)	715.9970

LTE Band 13: QPSK. Nominal bandwidth 5 MHz

*f*L (MHz)	777.1050
*f*H (MHz)	786.8050

LTE Band 66: QPSK. Nominal bandwidth 5 MHz

*f*L (MHz)	1.710015
*f*H (MHz)	1.779995

LTE Band 71: QPSK. Nominal bandwidth 5 MHz

*f*L (MHz)	663.0980
*f*H (MHz)	697.9050

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

Measurement uncertainty (Hz): <±207.77

Verdict: PASS

Modulation Characteristics

SPECIFICATION:

FCC §2.1047.

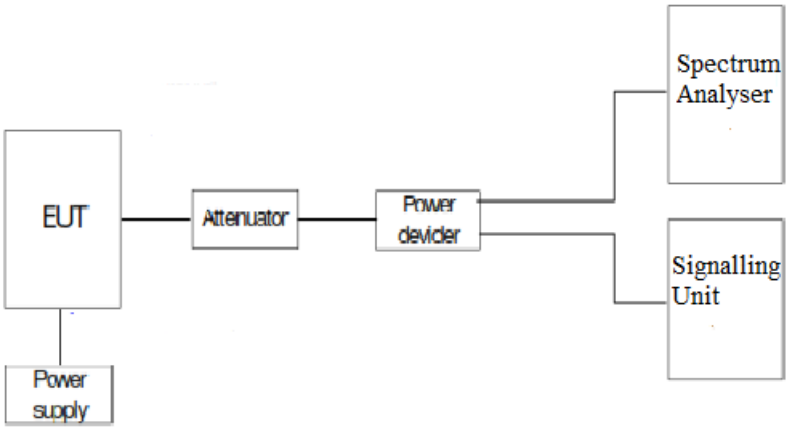
RSS-130, Clause 4.2: Equipment certified under this standard shall employ digital modulation.

RSS-139, Clause 6.2: The devices may employ any type of modulation techniques. The type of modulation used must be reported.

METHOD:

For LTE the EUT operates with QPSK and 16QAM modulation modes in which the information is digitised 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:

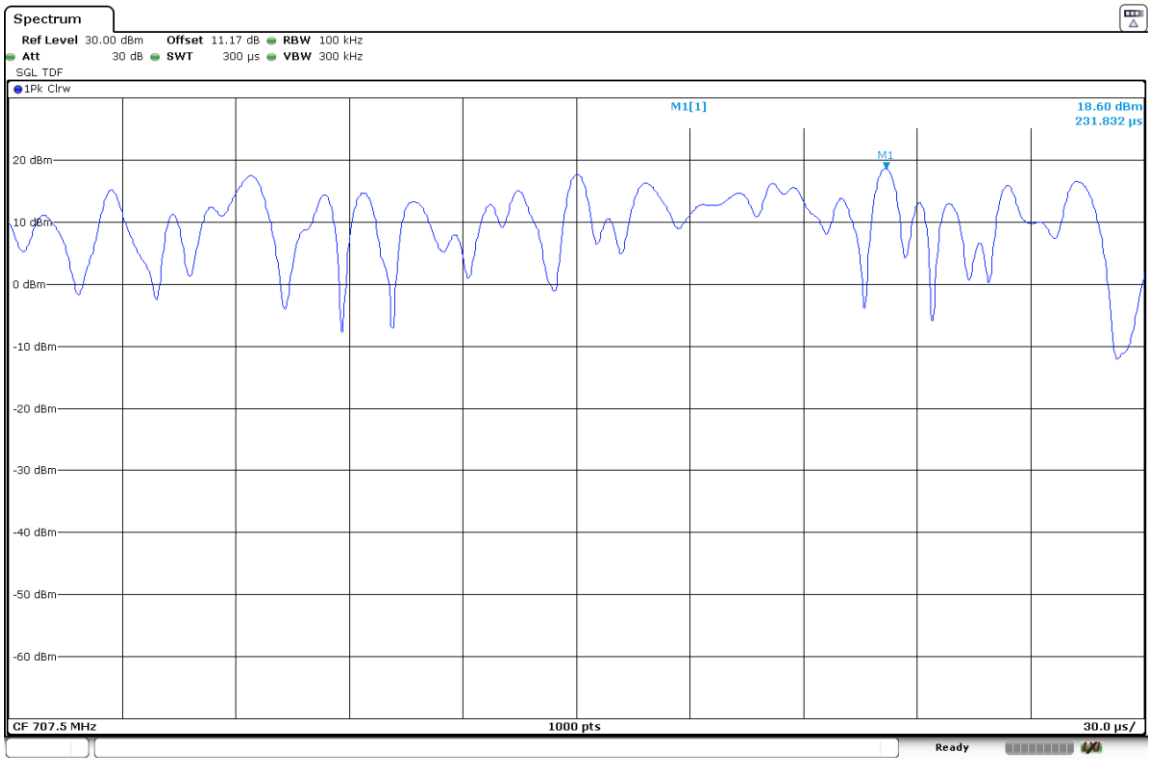


RESULTS:

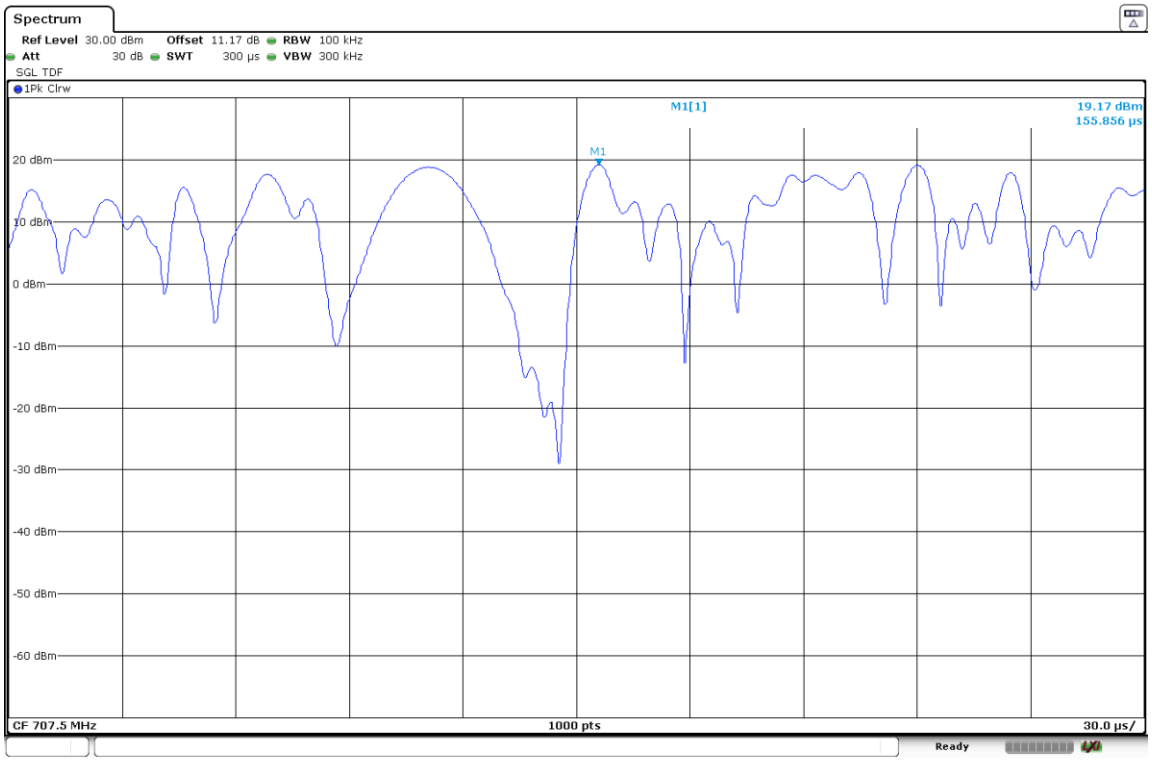
The following plots show the modulation schemes in the EUT.

LTE Band 12:

QPSK. Nominal Bandwidth 1.4 MHz.

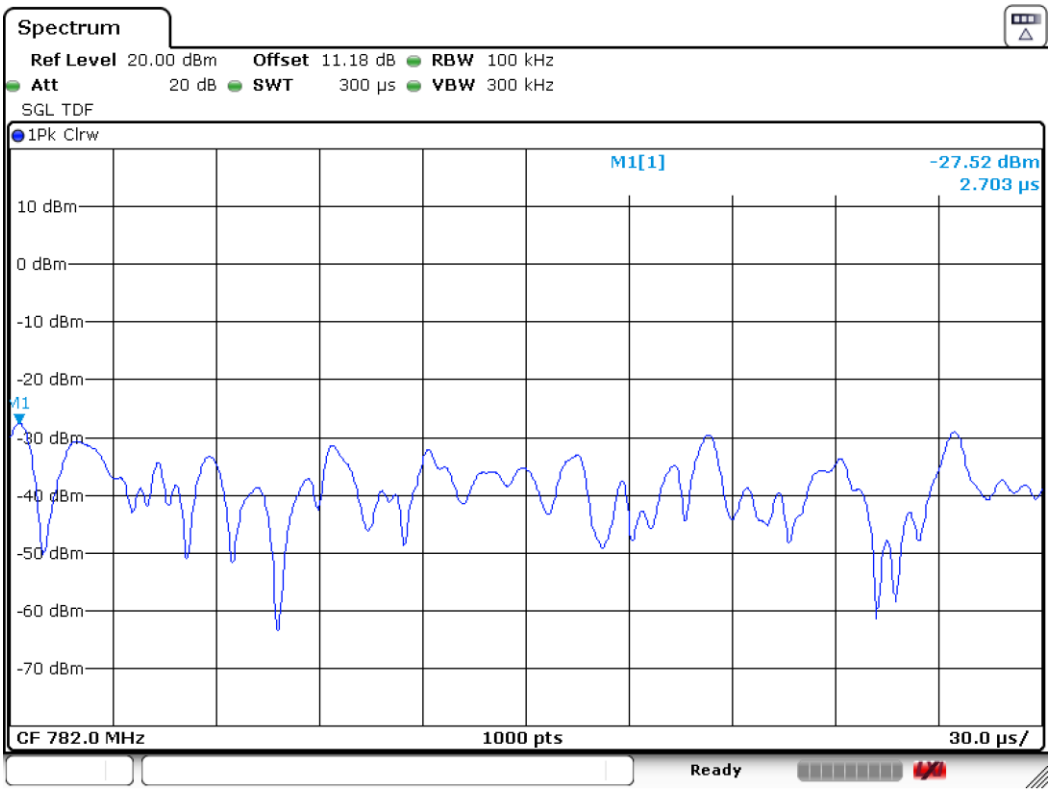


16QAM. Nominal Bandwidth 1.4 MHz.

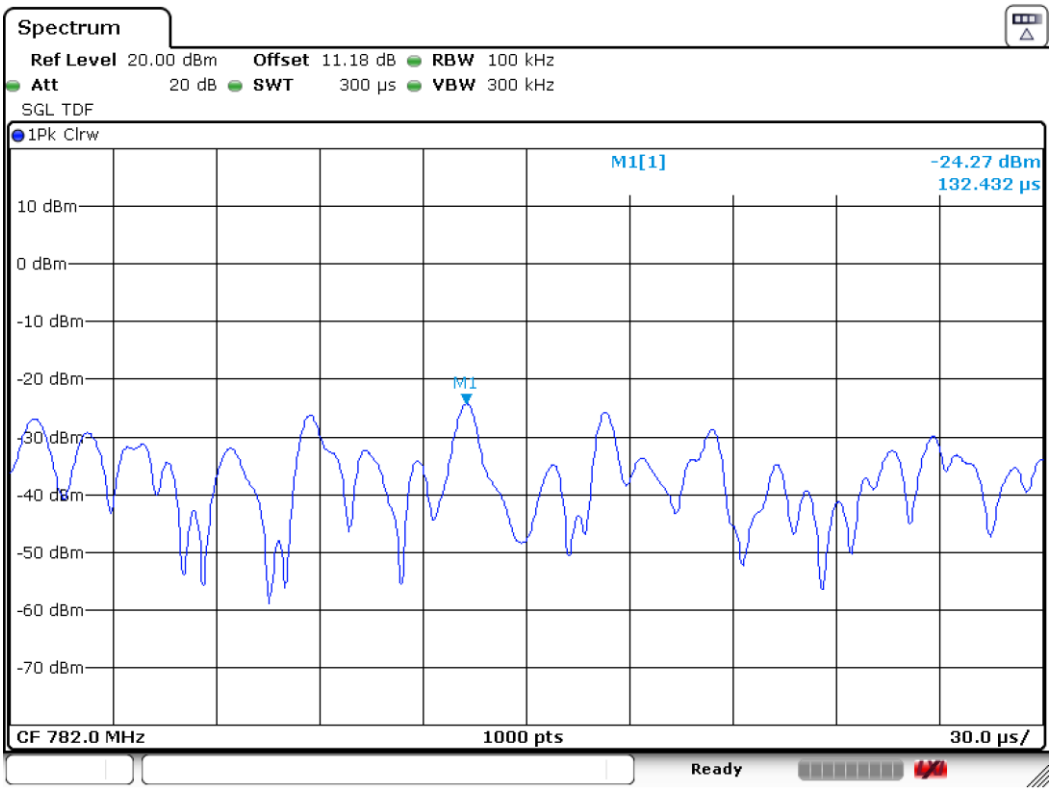


LTE Band 13:

QPSK. Nominal Bandwidth 5 MHz.

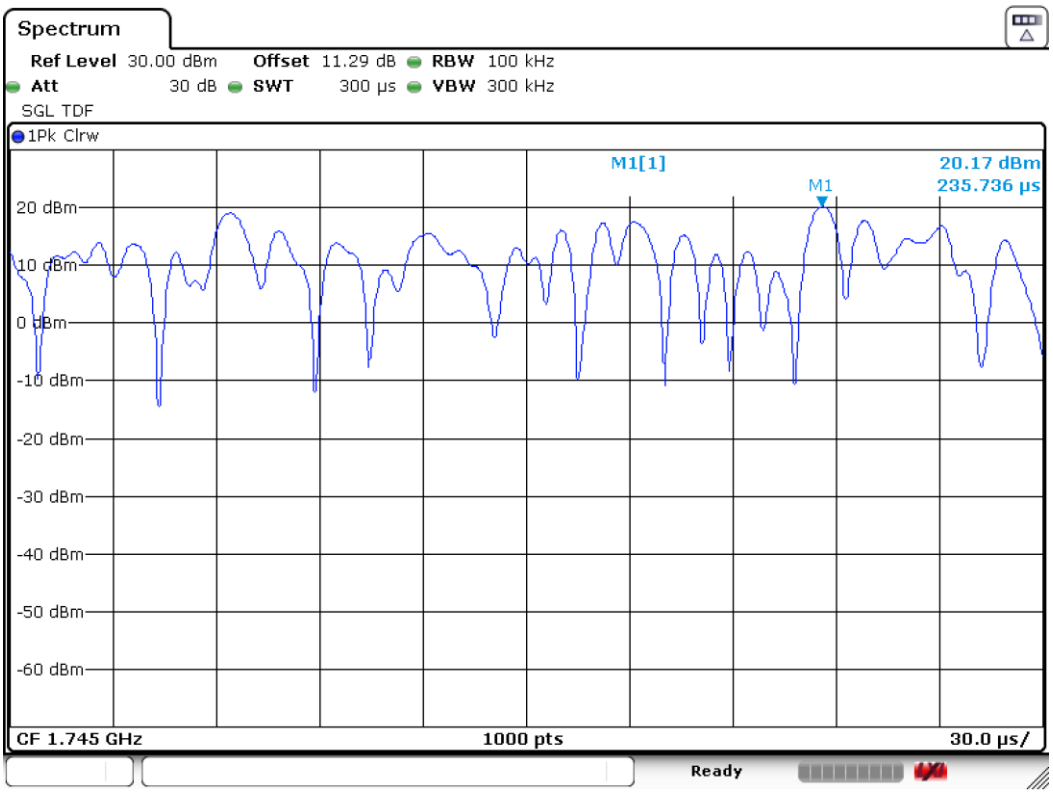


16QAM. Nominal Bandwidth 5 MHz.

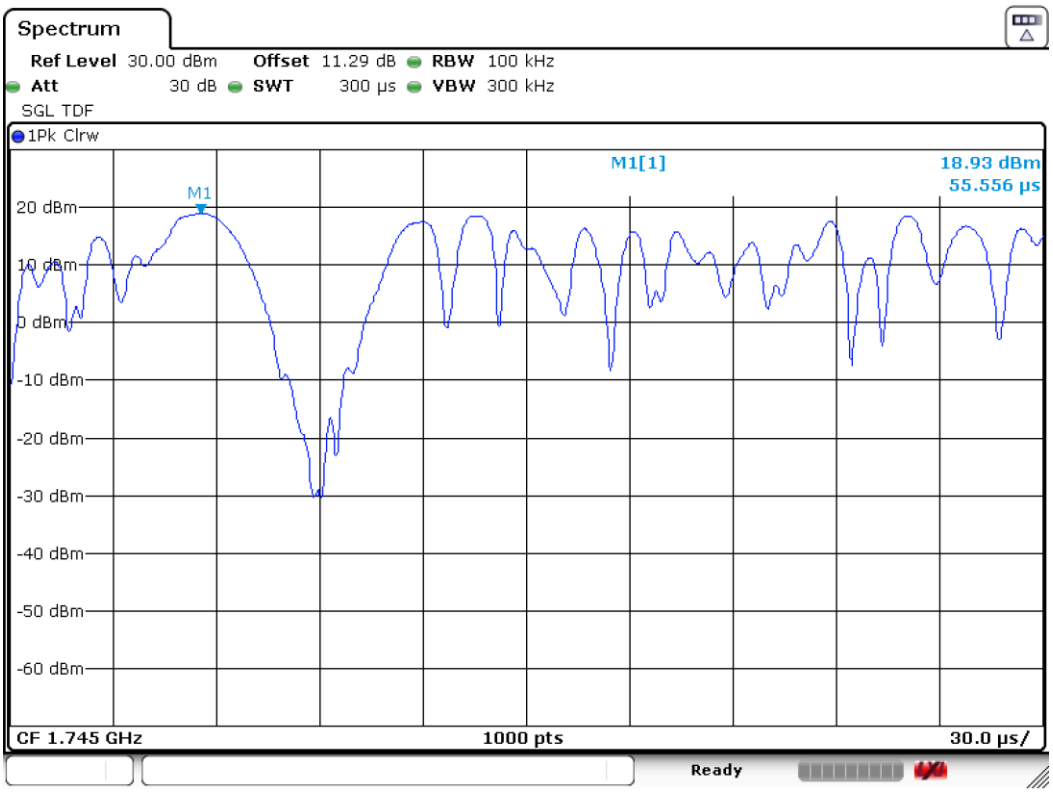


LTE Band 66:

QPSK. Nominal Bandwidth 1.4 MHz.

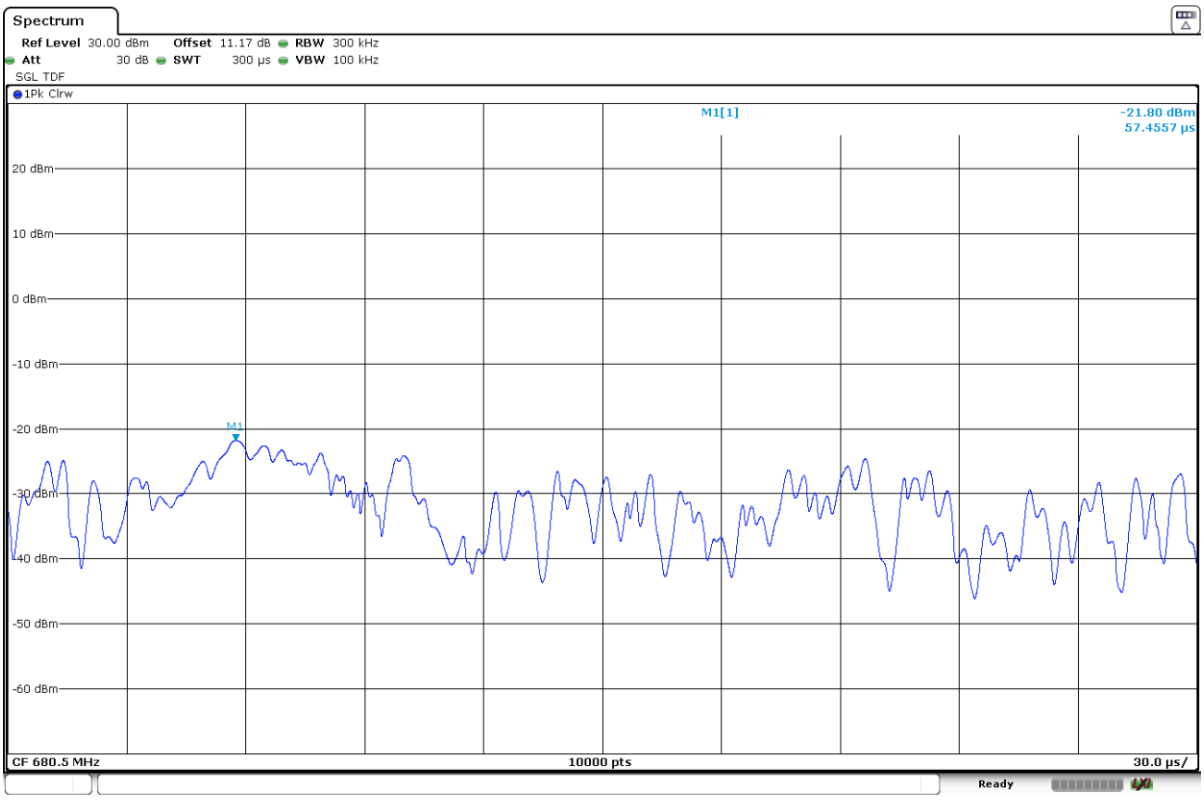


16QAM. Nominal Bandwidth 1.4 MHz.

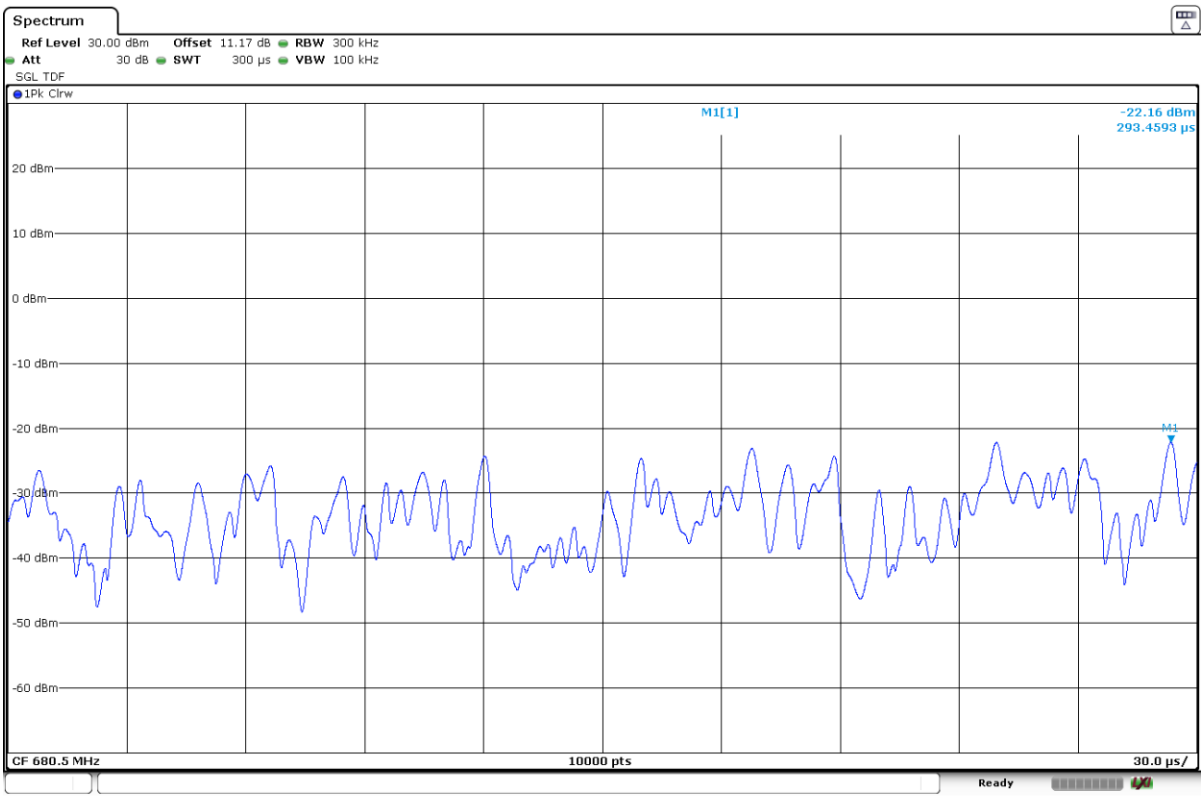


LTE Band 71:

QPSK. Nominal Bandwidth 5 MHz.



16QAM. Nominal Bandwidth 5 MHz.



Occupied Bandwidth

SPECIFICATION:

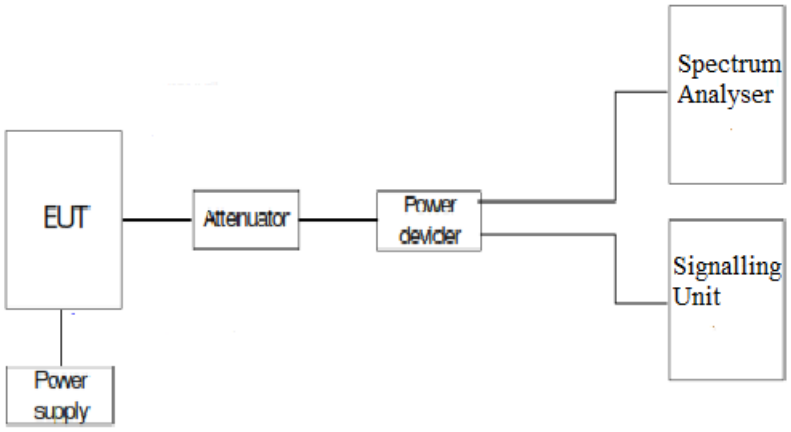
FCC §2.1049: Measurements required: Occupied bandwidth.

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 all Resource Blocks (RB) offset 0 regardless either the Narrowband position or the Nominal Bandwidth selected.

LTE Band 12:

QPSK. Nominal Bandwidth 1.4 MHz. RB Size 6. Offset 0.

Channel	Low	Middle	High
99% Occupied Bandwidth (MHz)	1.110500	1.112500	1.116000
-26 dBc Bandwidth (MHz)	1.437740	1.458300	1.521310
Measurement uncertainty (kHz)	<±3.75		

16QAM. Nominal Bandwidth 1.4 MHz. RB Size 5. Offset 0.

Channel	Low	Middle	High
99% Occupied Bandwidth (MHz)	0.950000	0.954500	0.956000
-26 dBc Bandwidth (MHz)	1.290740	1.444300	1.328330
Measurement uncertainty (kHz)	<±3.75		

LTE Band 13:

QPSK. Nominal Bandwidth 5 MHz. RB Size 6. Offset 0.

Channel	Low	Middle	High
99% Occupied Bandwidth (MHz)	1.118	1.110	1.113
-26 dBc Bandwidth (MHz)	1.409	1.416	1.424
Measurement uncertainty (kHz)	<±3.75		

16QAM. Nominal Bandwidth 5 MHz. RB Size 5. Offset 0.

Channel	Low	Middle	High
99% Occupied Bandwidth (MHz)	0.943500	0.943500	0.943500
-26 dBc Bandwidth (MHz)	1.287500	1.309	1.243
Measurement uncertainty (kHz)	<±3.75		

LTE Band 66:

QPSK. Nominal Bandwidth 1.4 MHz. RB Size 6. Offset 0.

Channel	Low	Middle	High
99% Occupied Bandwidth (MHz)	1.111500	1.107	1.107
-26 dBc Bandwidth (MHz)	1.431830	1.424	1.446
Measurement uncertainty (kHz)	<±3.75		

16QAM. Nominal Bandwidth 1.4 MHz. RB Size 5. Offset 0.

Channel	Low	Middle	High
99% Occupied Bandwidth (MHz)	0.950000	0.949500	0.950000
-26 dBc Bandwidth (MHz)	1.375830	1.300	1.308190
Measurement uncertainty (kHz)	<±3.75		

LTE Band 71:

QPSK. Nominal Bandwidth 5 MHz. RB Size 6. Offset 0.

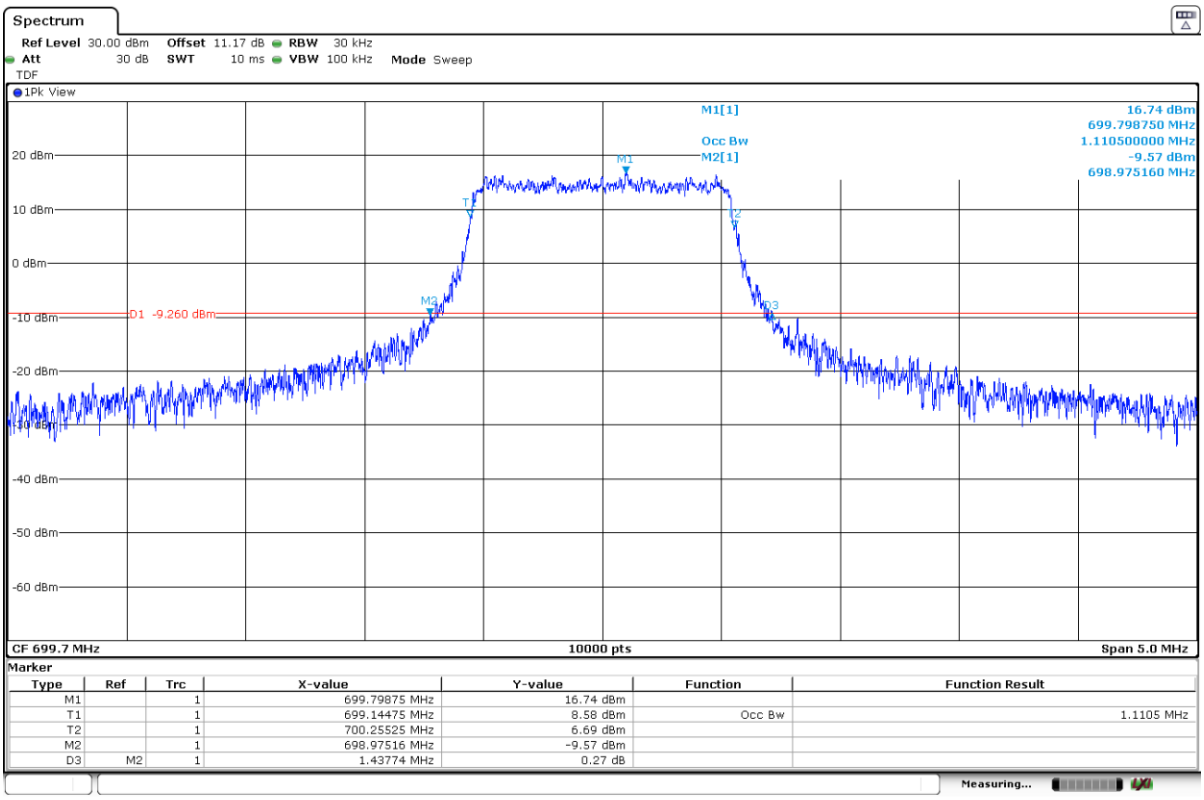
Channel	Low	Middle	High
99% Occupied Bandwidth (MHz)	1.115	1.112	1.112
-26 dBc Bandwidth (MHz)	1.427	1.499	1.436
Measurement uncertainty (kHz)	<±3.75		

16QAM. Nominal Bandwidth 5 MHz. RB Size 5. Offset 0.

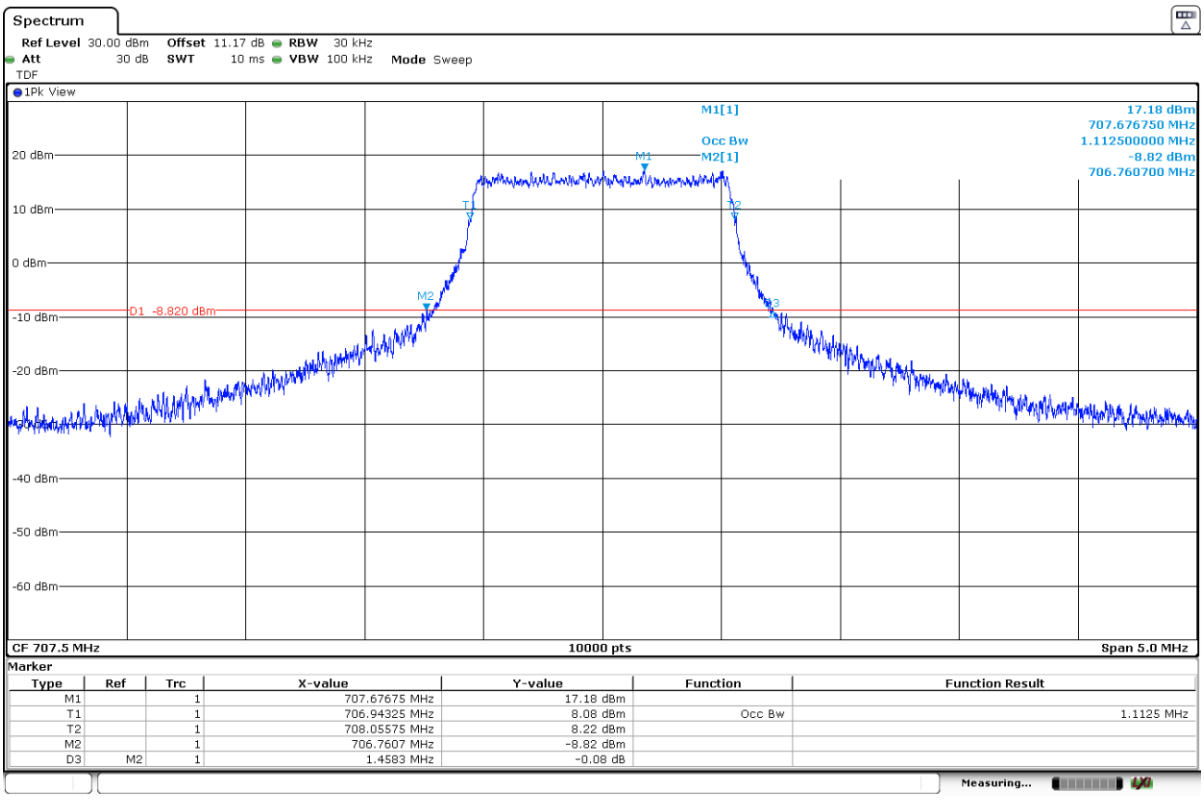
Channel	Low	Middle	High
99% Occupied Bandwidth (MHz)	0.958500	0.957000	0.948000
-26 dBc Bandwidth (MHz)	1.337	1.308	1.272
Measurement uncertainty (kHz)	<±3.75		

LTE Band 12. QPSK. Nominal Bandwidth 1.4 MHz. RB Size 6. Offset 0.

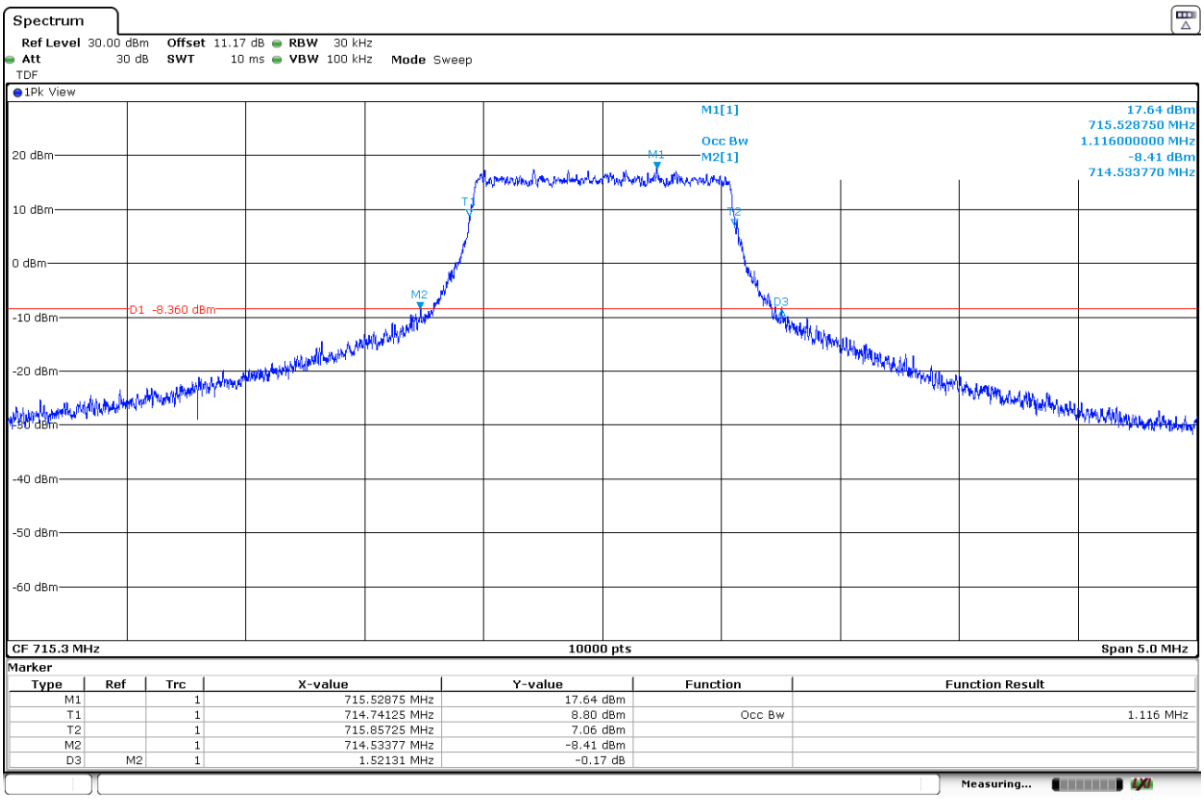
Low Channel:



Middle Channel:

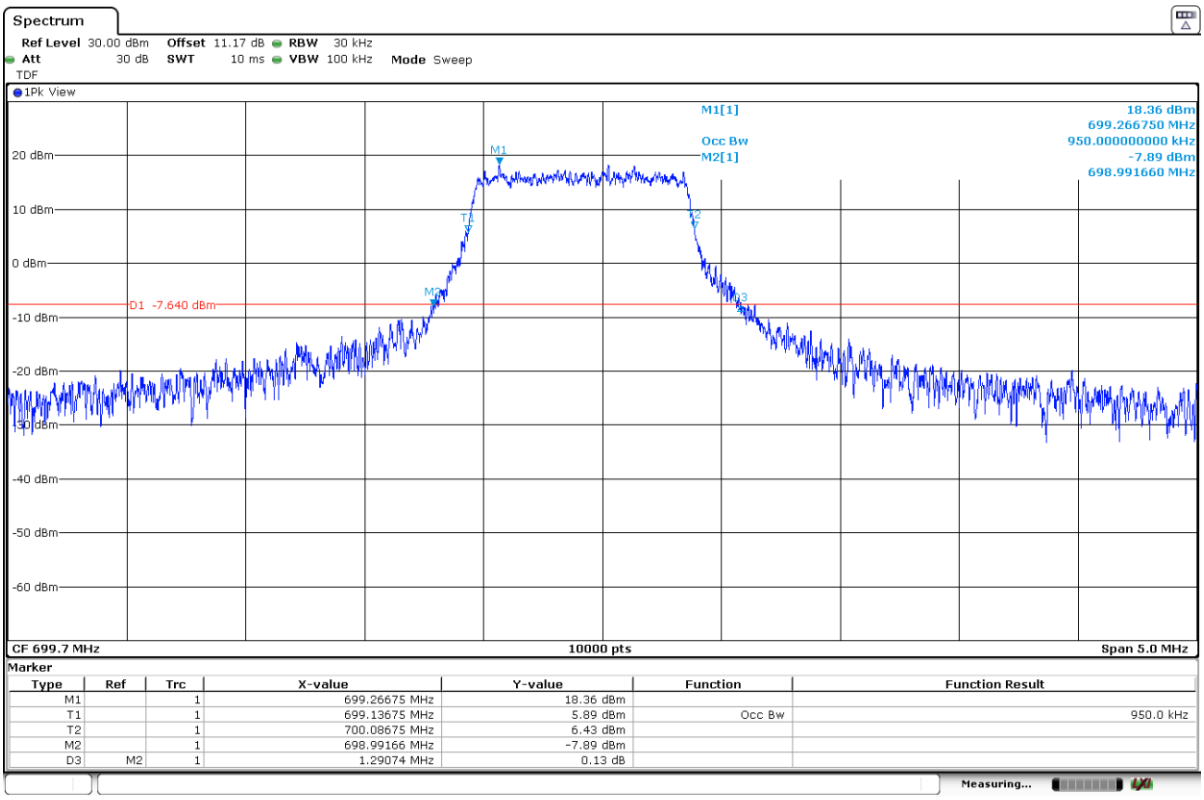


High Channel:

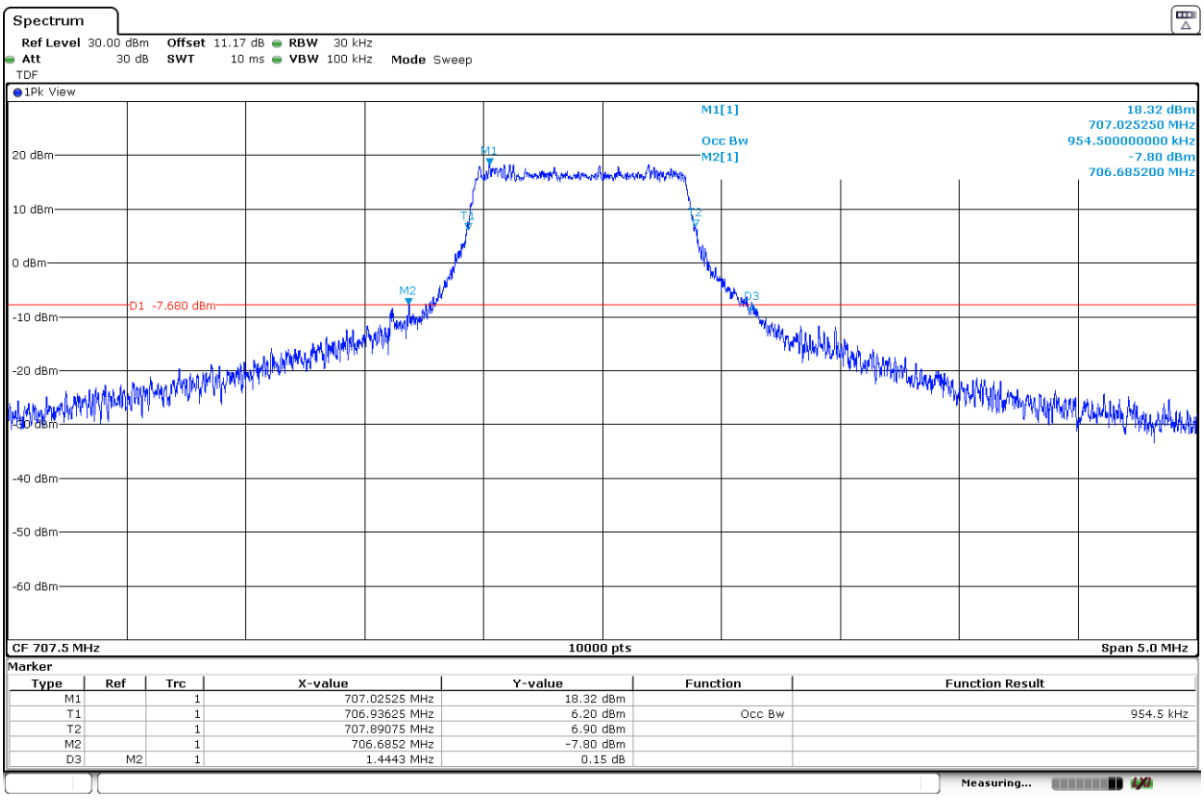


LTE Band 12. 16QAM. Nominal Bandwidth 1.4 MHz. RB Size 5. Offset 0.

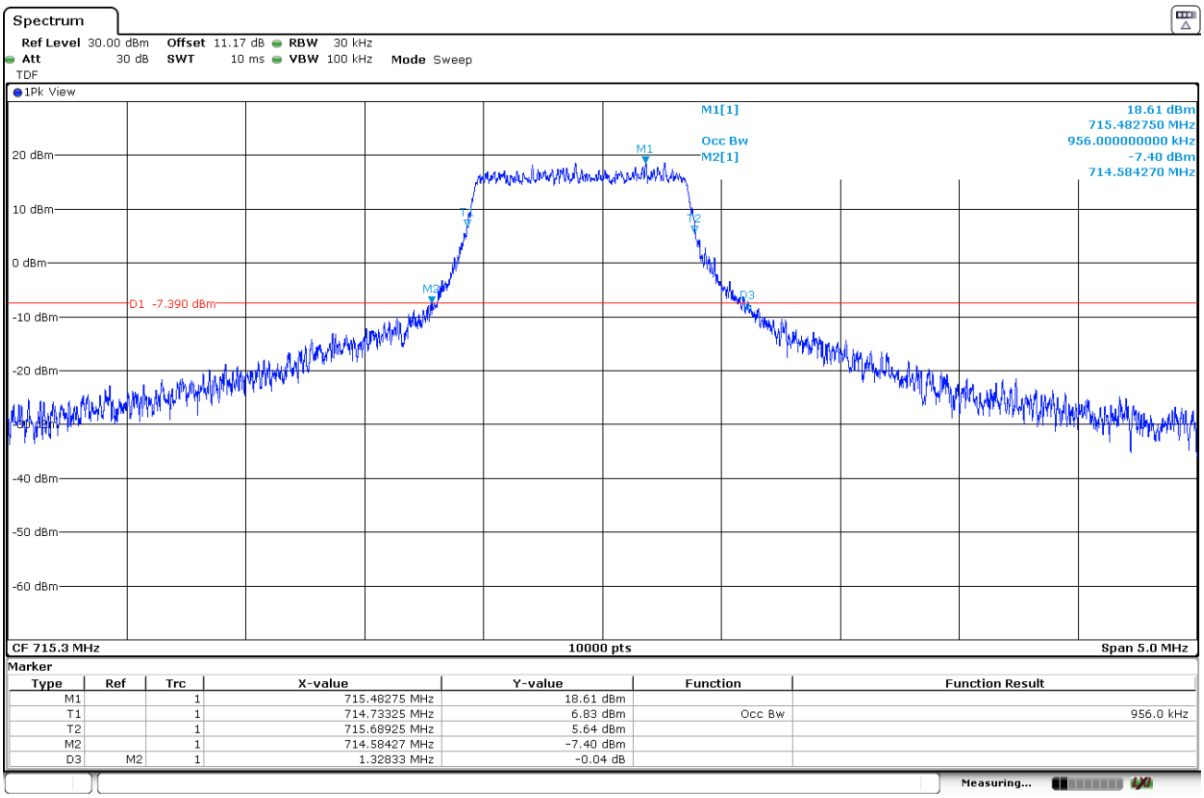
Low Channel:



Middle Channel:

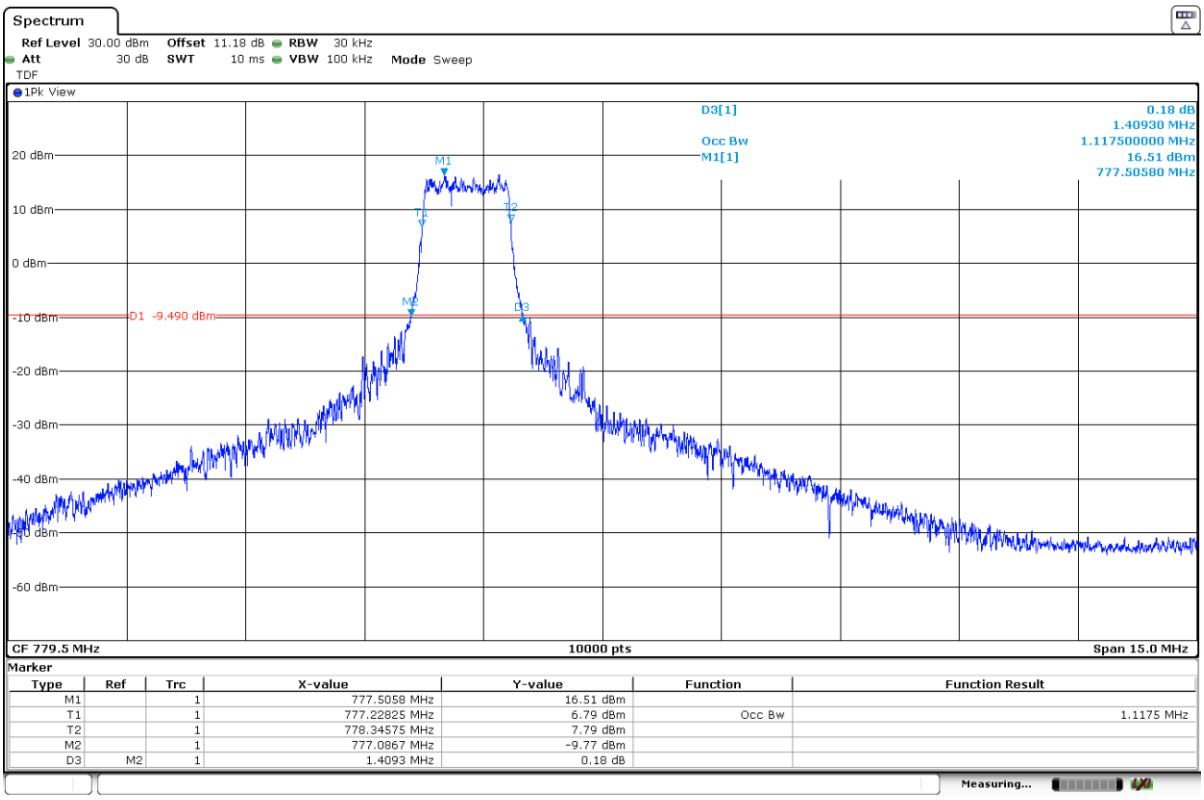


High Channel:

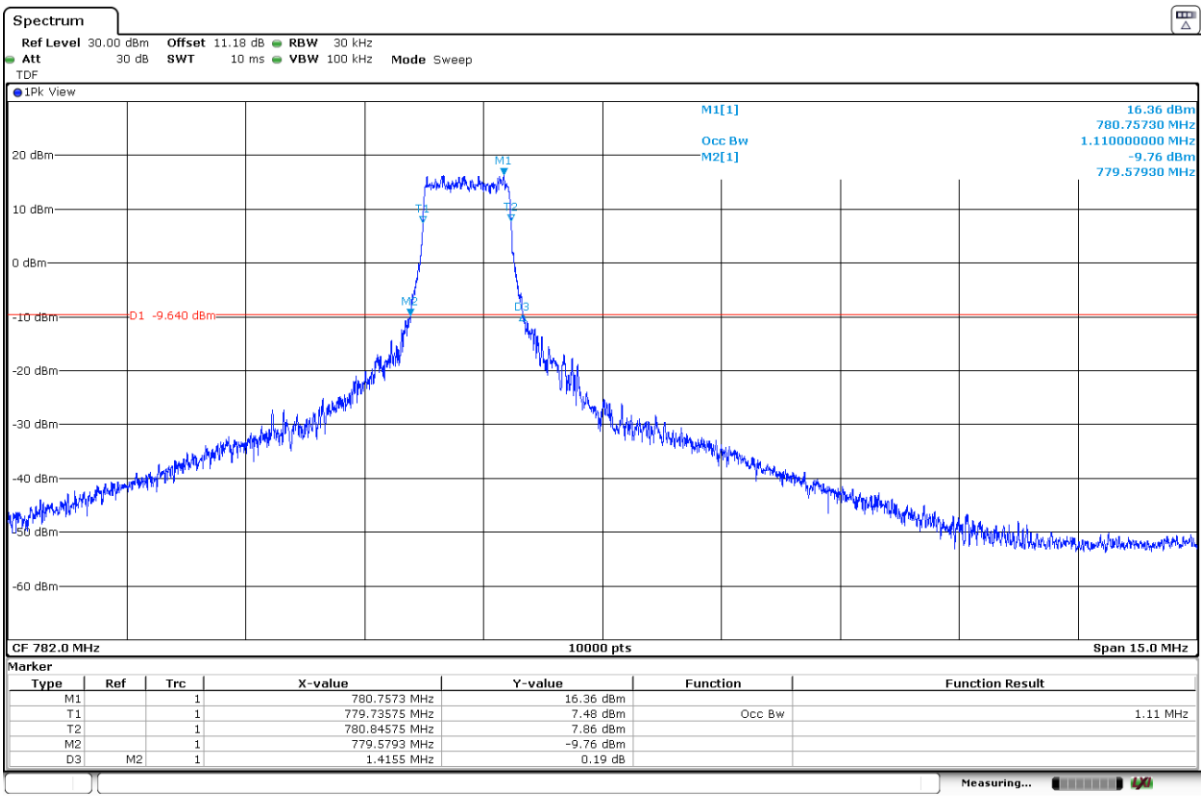


LTE Band 13. QPSK. Nominal Bandwidth 5 MHz. RB Size 6. Offset 0.

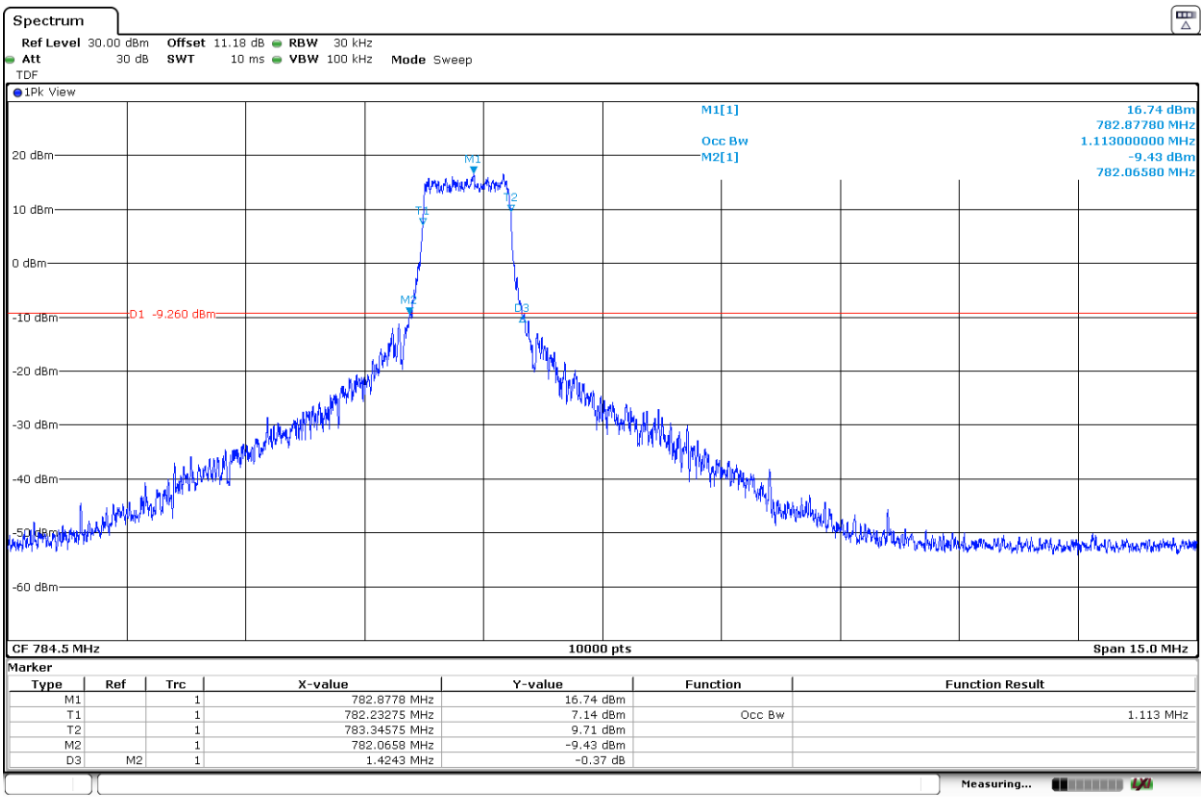
Low Channel:



Middle Channel:

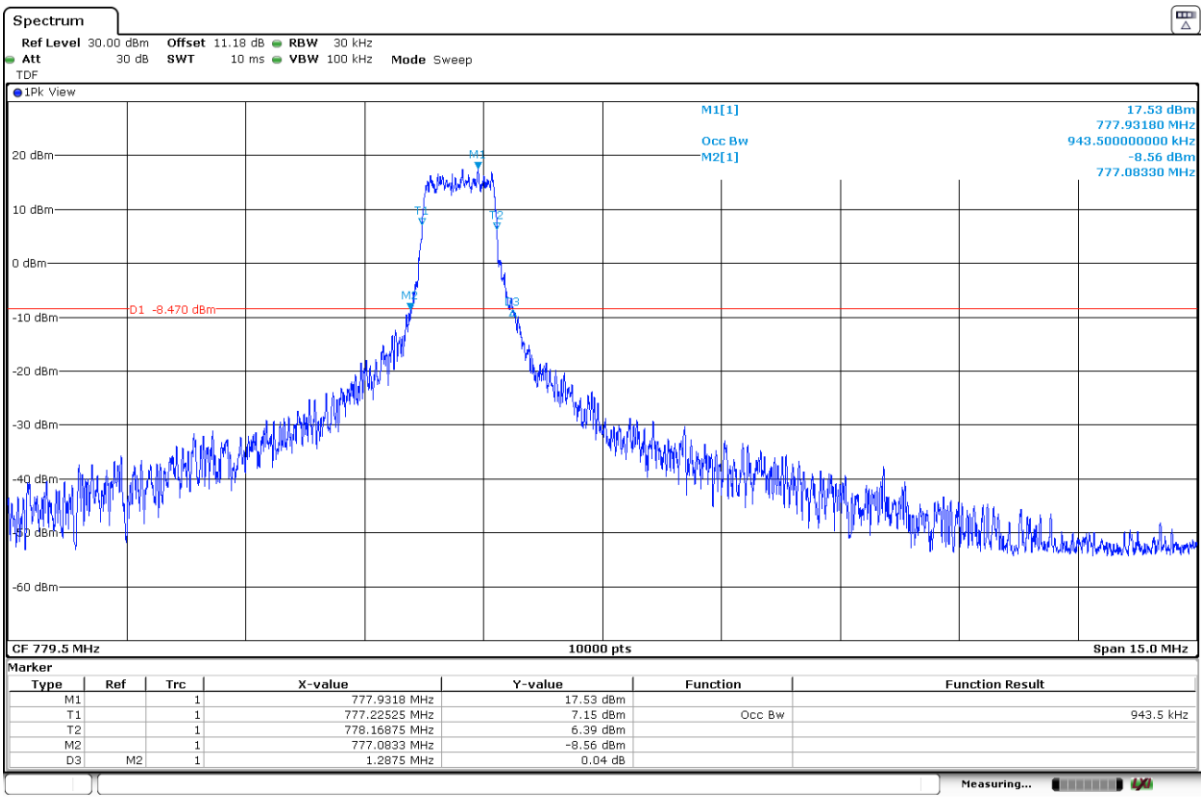


High Channel:

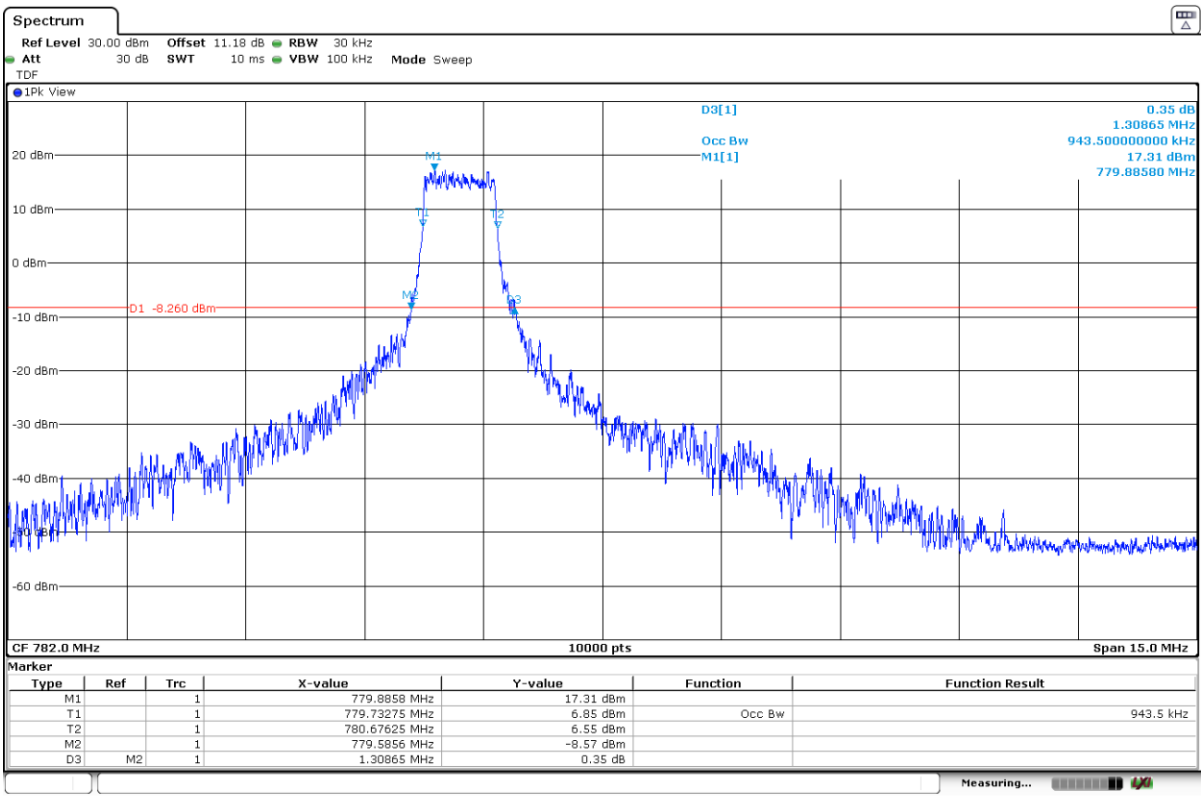


LTE Band 13. 16QAM. Nominal Bandwidth 5 MHz. RB Size 5. Offset 0.

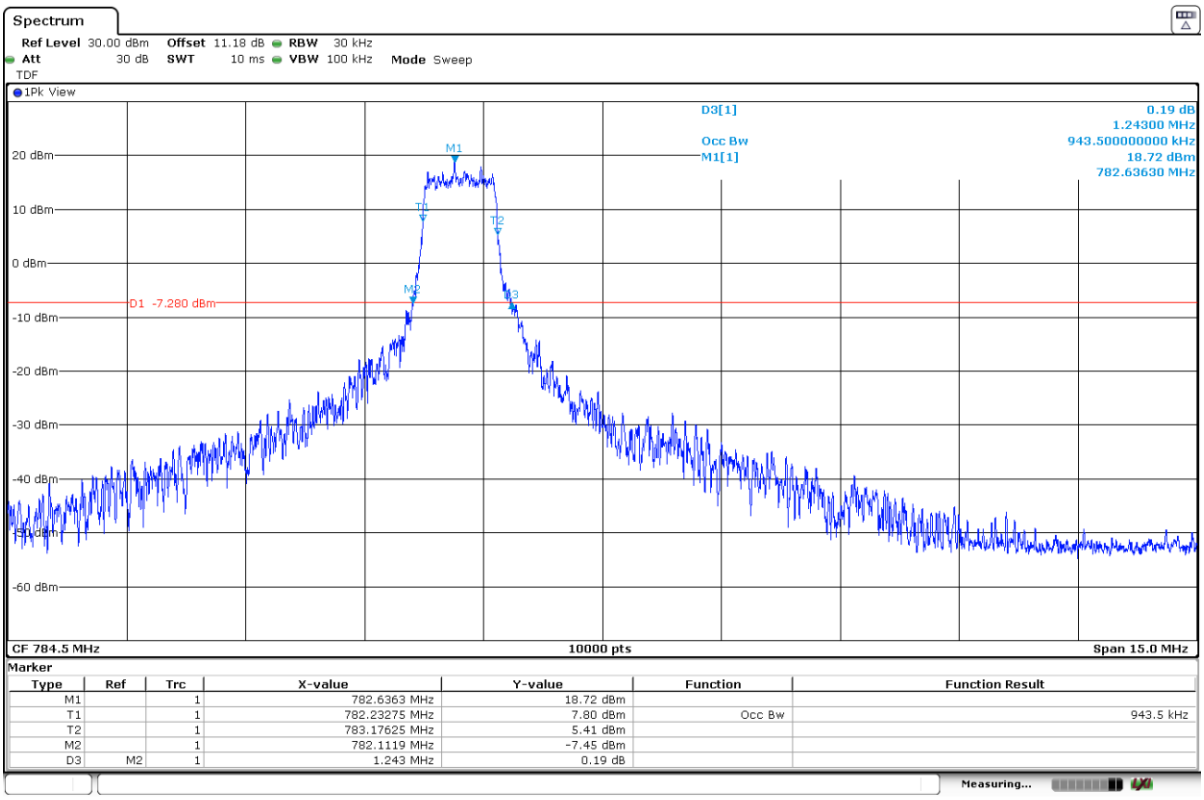
Low Channel:



Middle Channel:

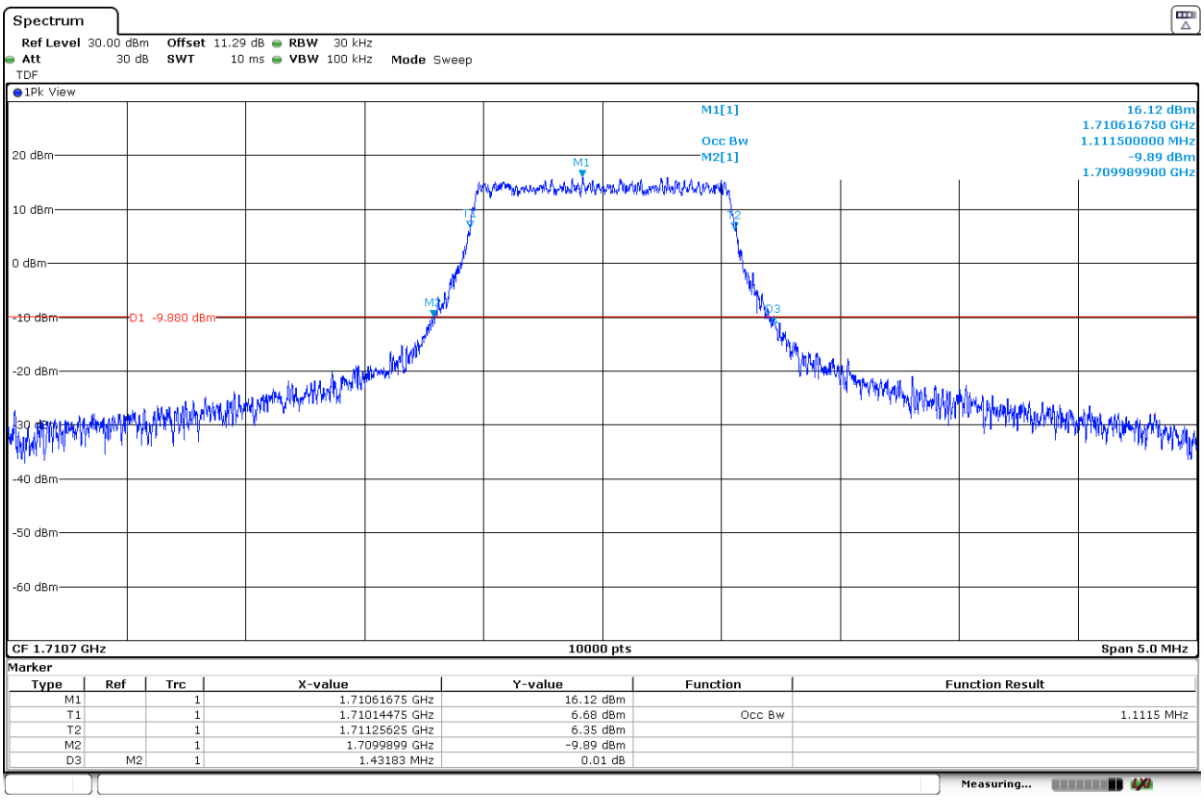


High Channel:

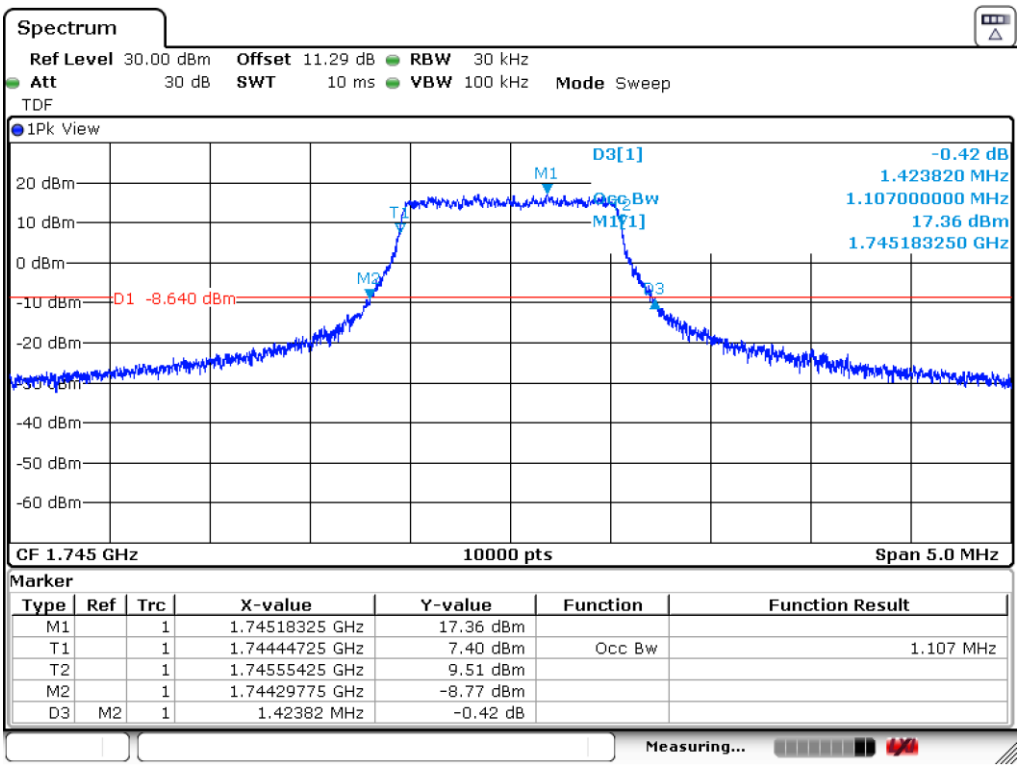


LTE Band 66. QPSK. Nominal Bandwidth 1.4 MHz. RB Size 6. Offset 0.

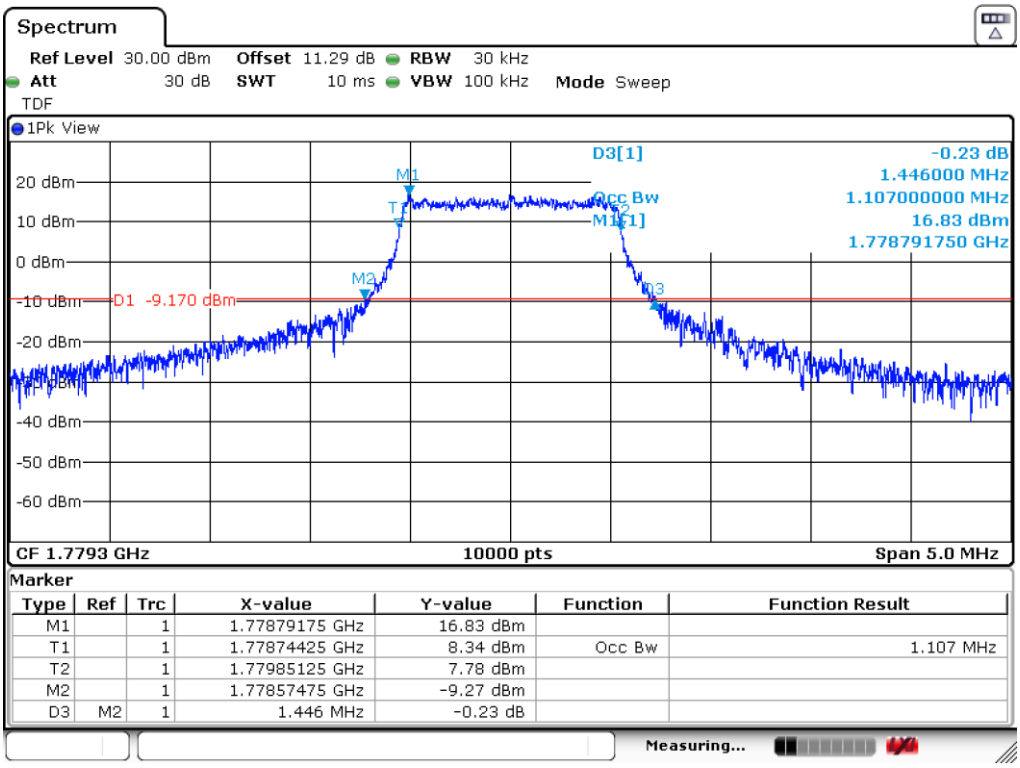
Low Channel:



Middle Channel:

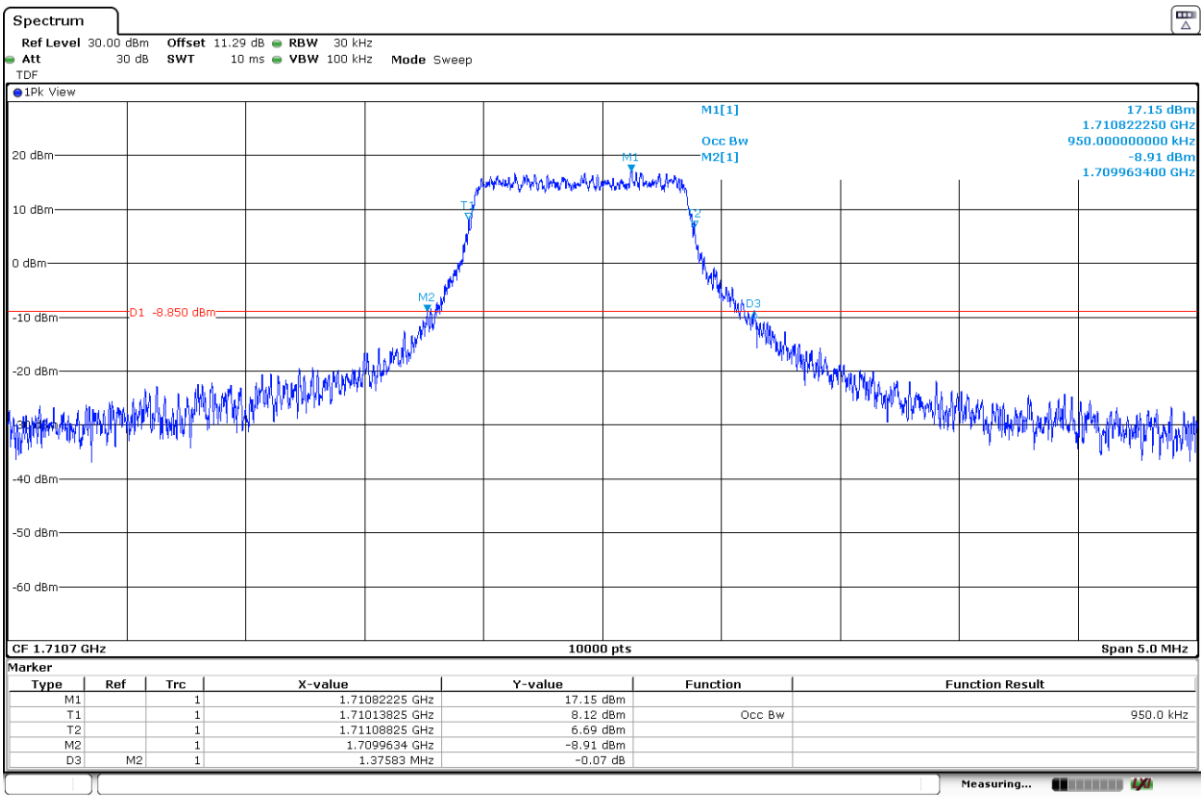


High Channel:

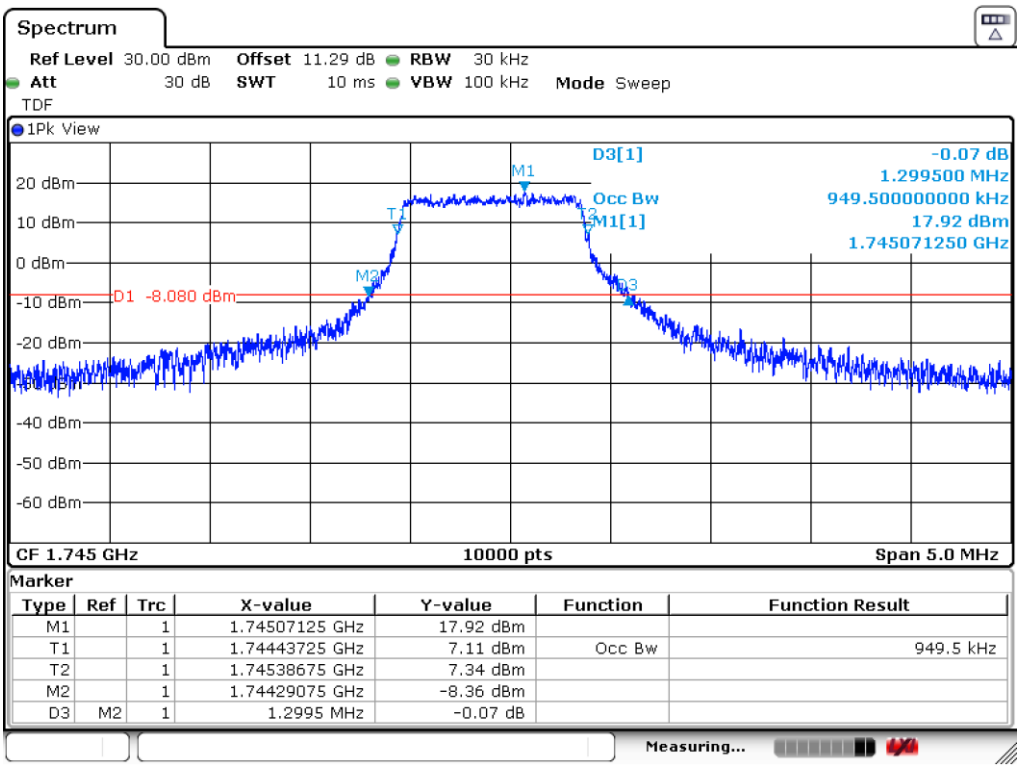


LTE Band 66. 16QAM. Nominal Bandwidth 1.4 MHz. RB Size 5. Offset 0.

Low Channel:



Middle Channel:



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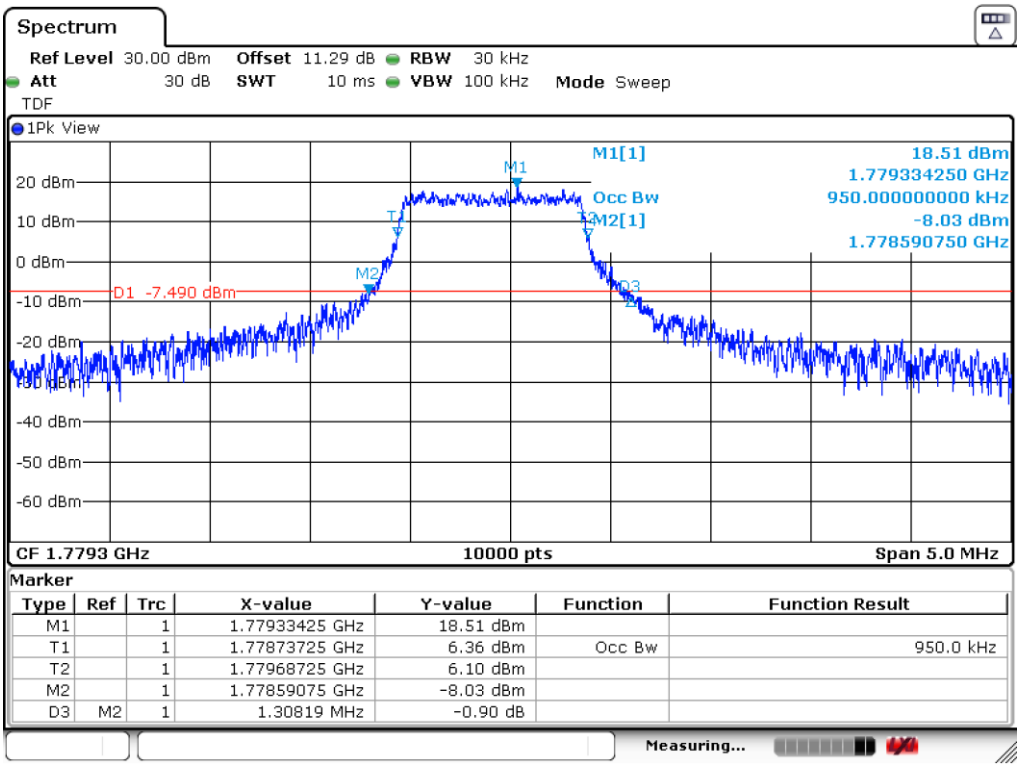
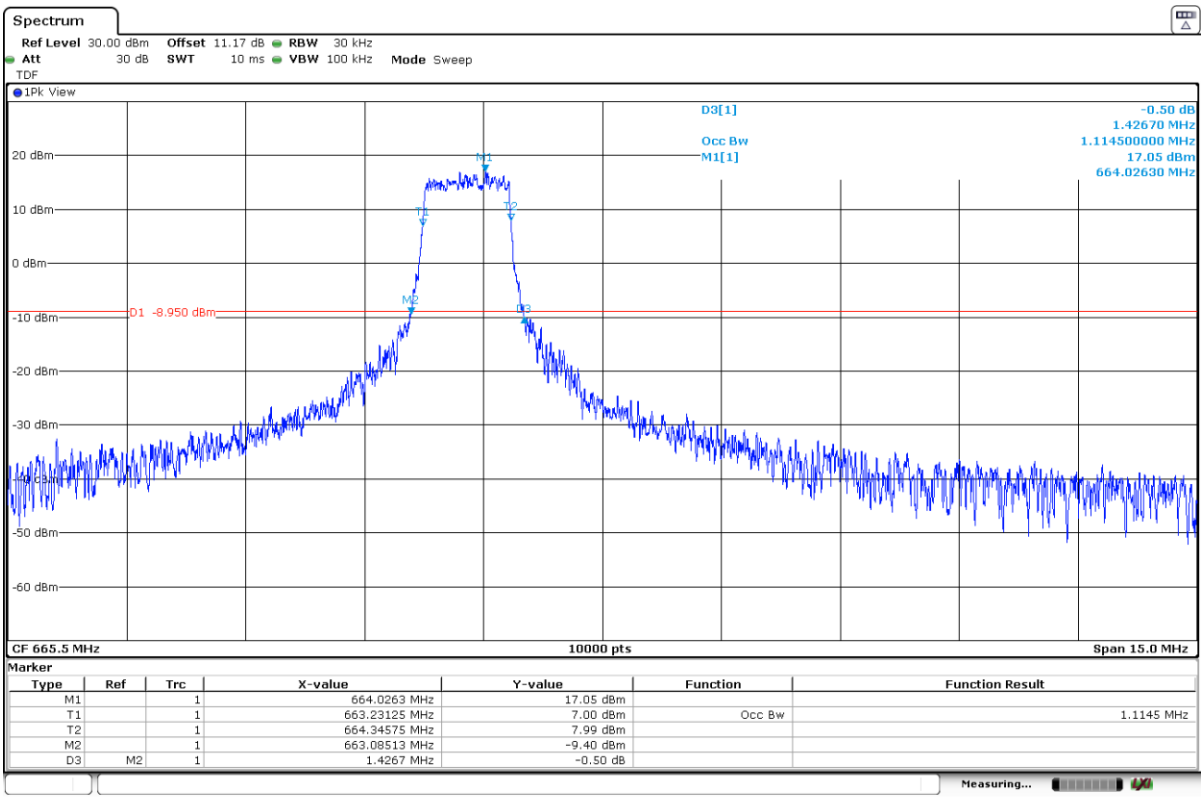
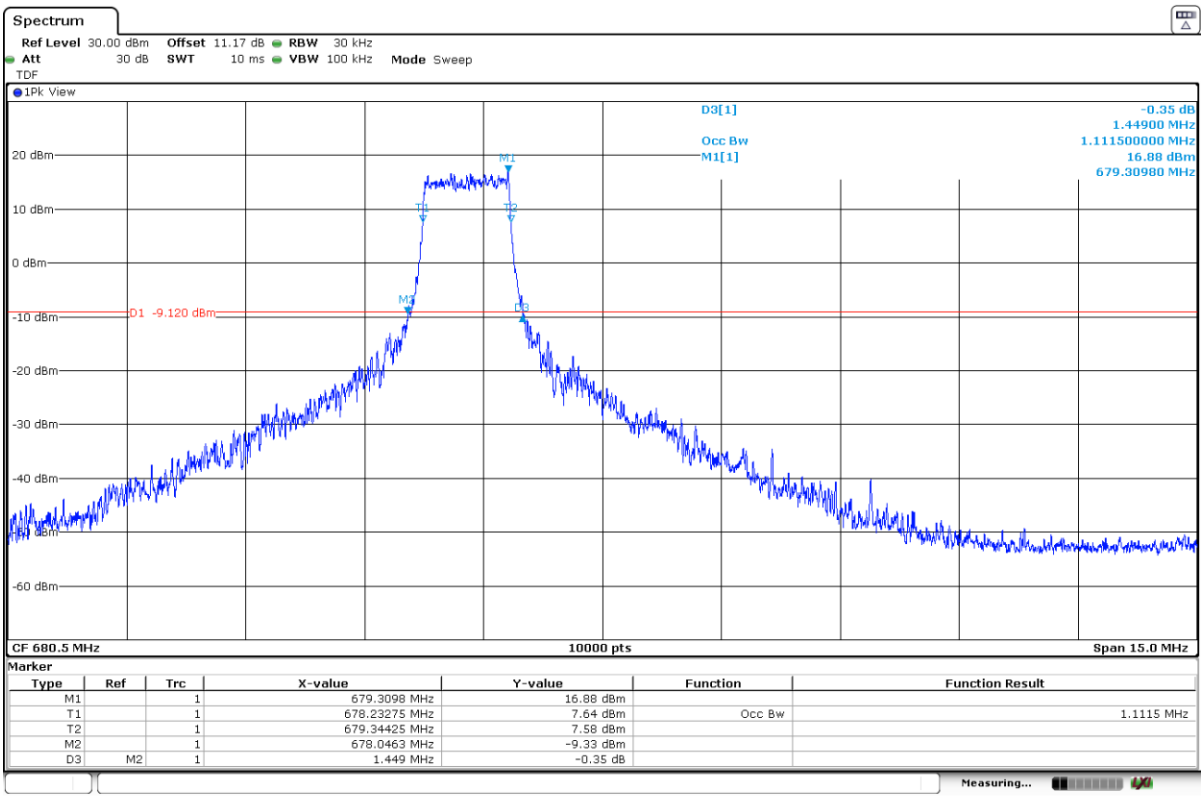


LTE Band 71. QPSK. Nominal Bandwidth 5 MHz. RB Size 6. Offset 0.

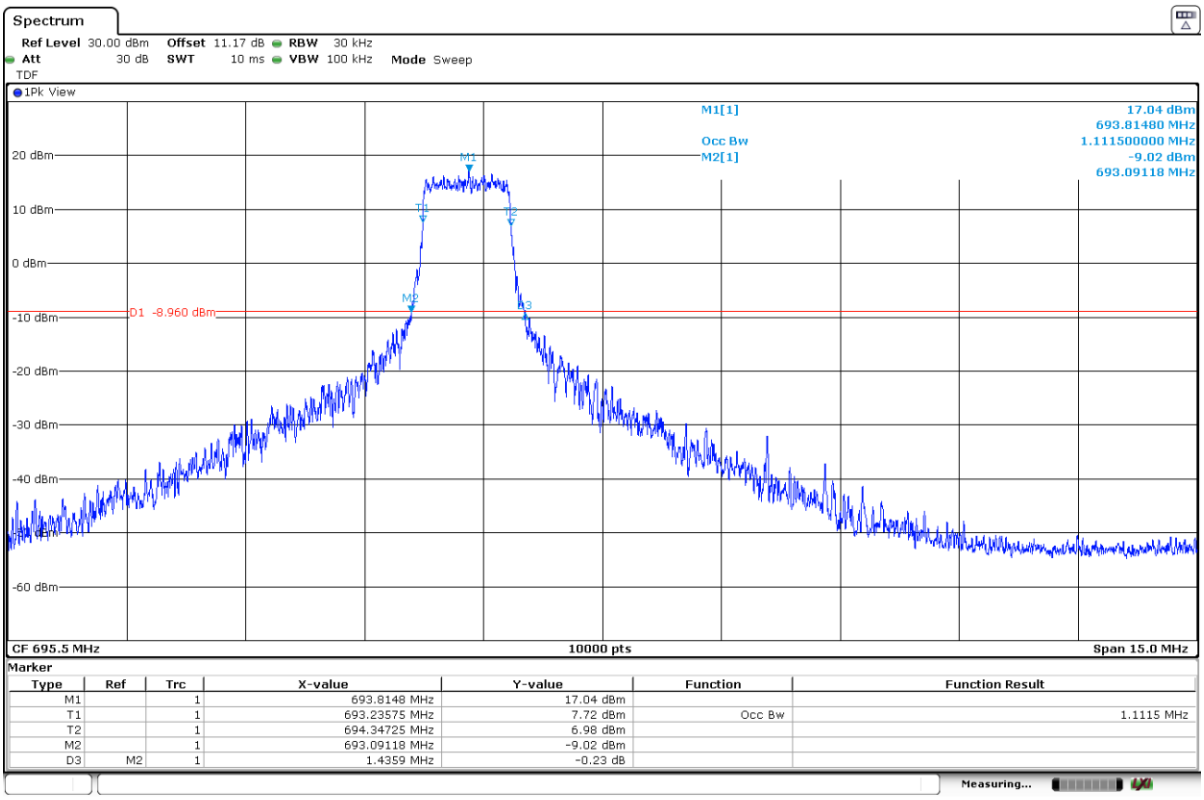
Low Channel:



Middle Channel:

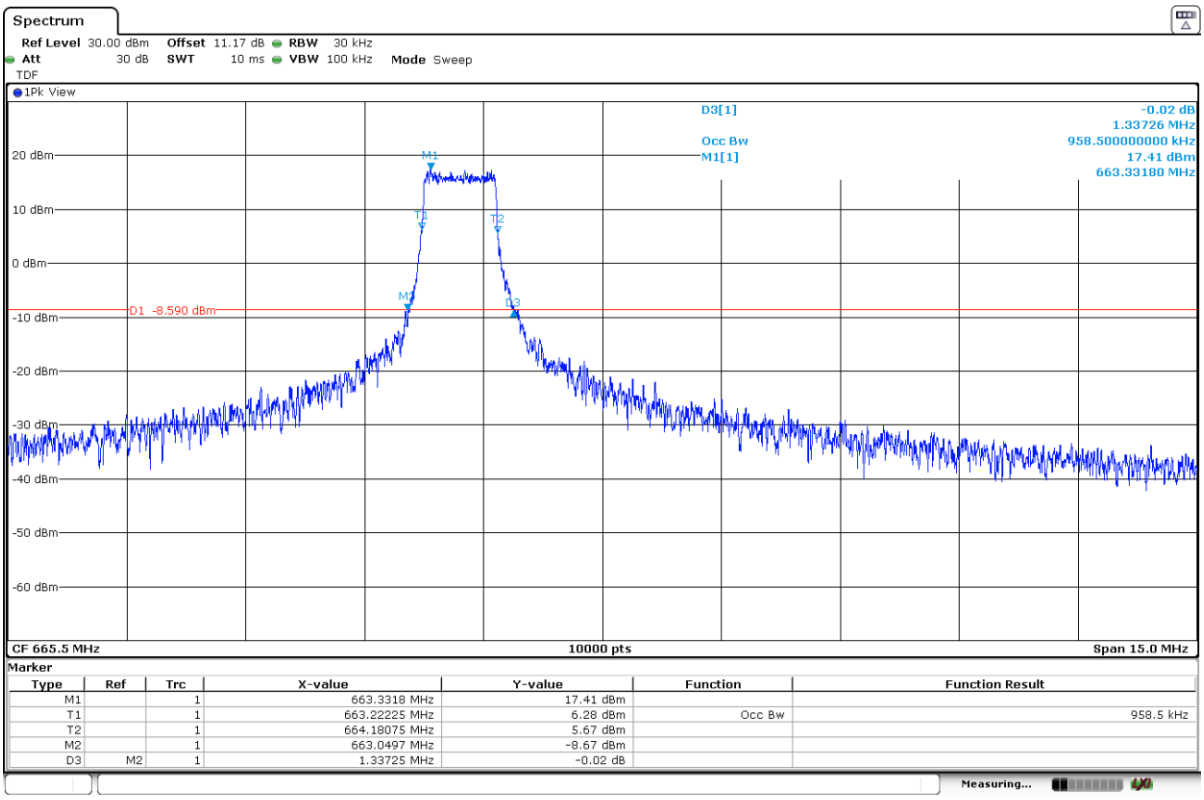


High Channel:

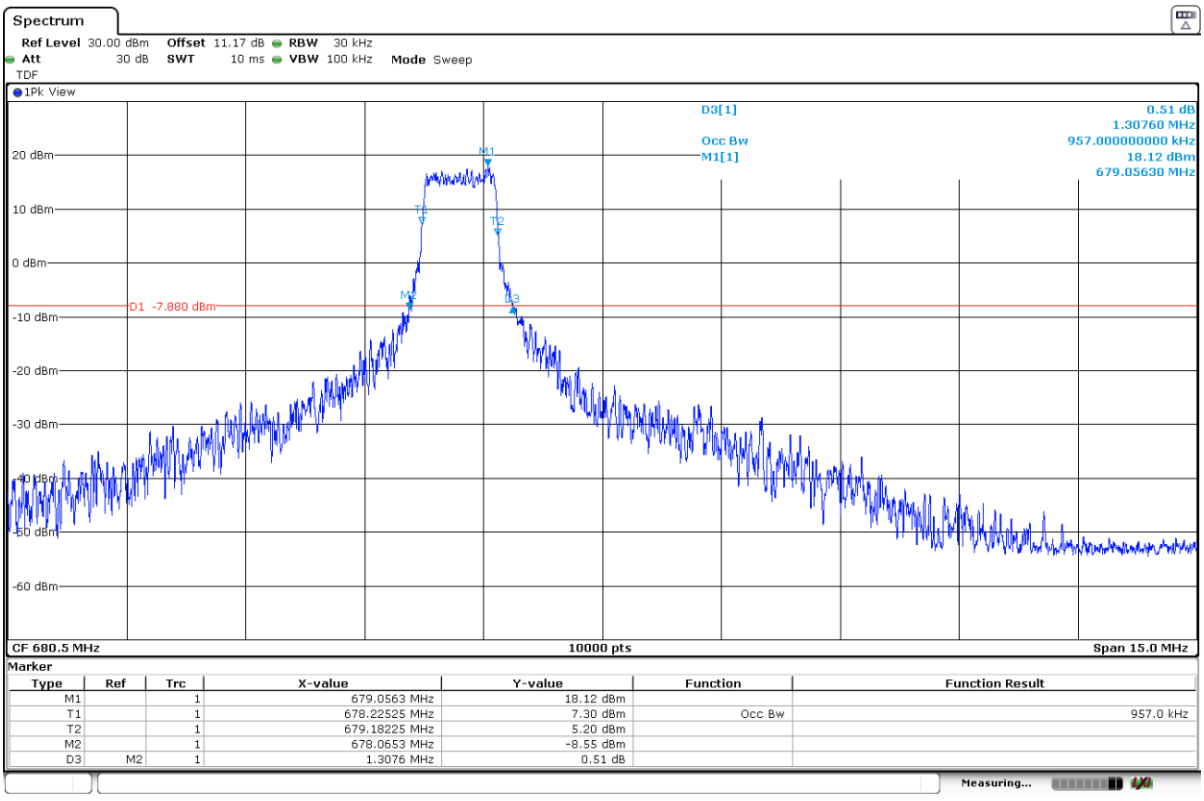


LTE Band 71. 16QAM. Nominal Bandwidth 5 MHz. RB Size 5. Offset 0.

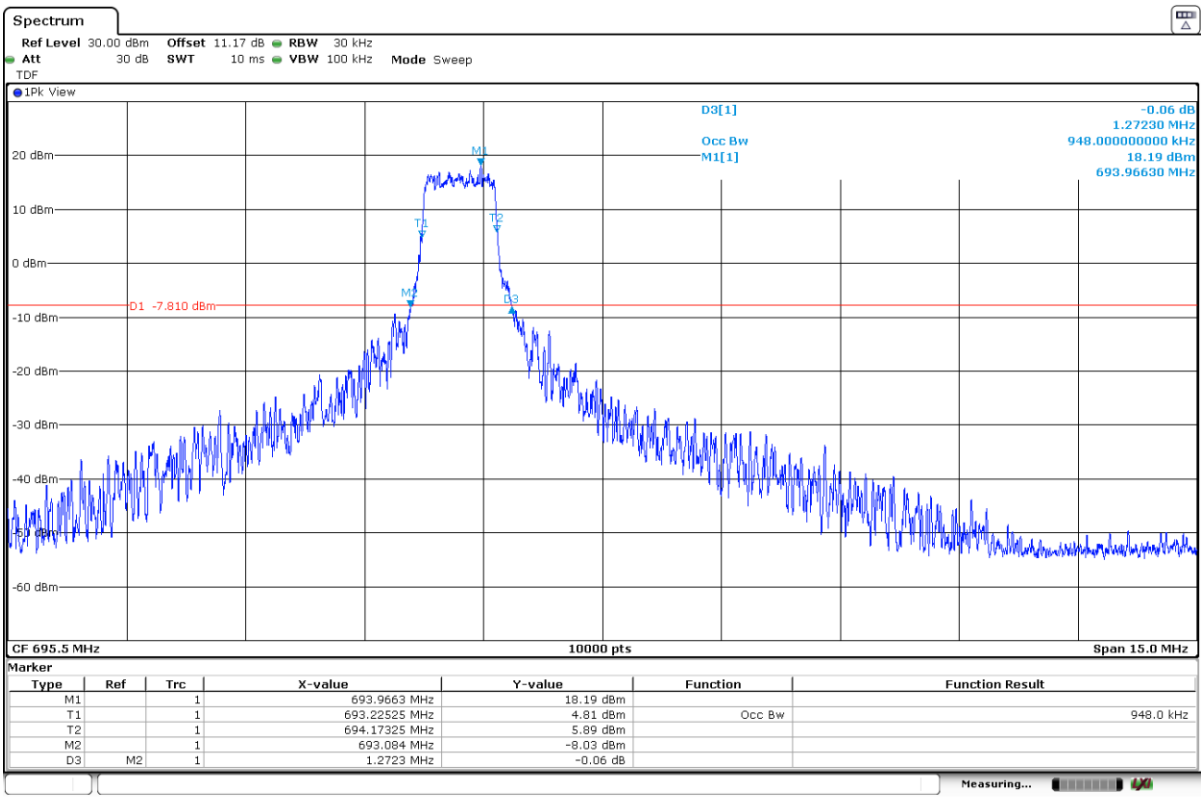
Low Channel:



Middle Channel:



High Channel:



Spurious Emissions at Antenna Terminals

SPECIFICATION:

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.

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.

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(watts), dB, for mobile and portable equipment.

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 log10 (P) dB.Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater.

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:

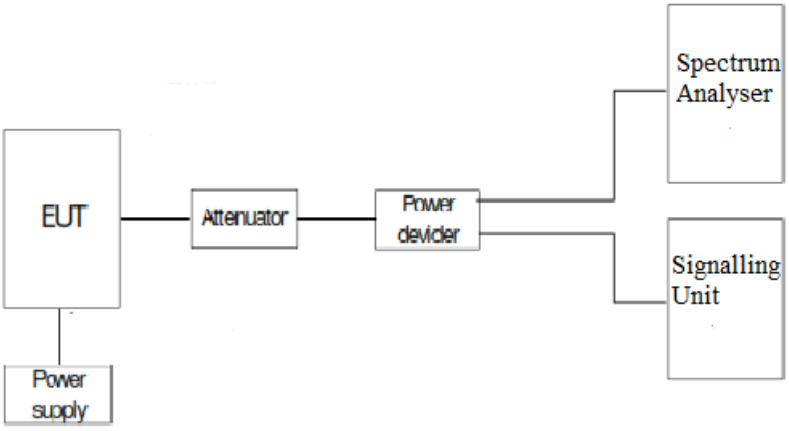
The EUT RF output connector was connected to a spectrum analyser and to the Universal Radio Communication tester R&S CMW500 (selecting maximum transmission power of the EUT and different modes of modulation) using a 50-Ohm attenuator and a power divider.

The spectrum was investigated from 9 kHz to 8 GHz for LTE Bands 12 & 13 and from 9 kHz to 18 GHz for LTE 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:



RESULTS:

LTE Band 12: 16QAM. Nominal Bandwidth 1.4 MHz. RB Size 5. RB Offset 0. Narrowband = 0. Position 1.

- 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

LTE Band 13: 16QAM. Nominal Bandwidth 5 MHz. RB Size 5. RB Offset 0. Narrowband = 0. Position 1.

- Low Channel: Spurious frequencies at less than 20 dB below the limit:

Spurious Frequency (MHz)	Emission Limitations Conducted (dBm)	Limit (dBm)
774.747	-42.94	-35

- 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

LTE Band 66: QPSK. Nominal Bandwidth 20 MHz. RB Size 1. RB Offset 0. Narrowband = 7. Position 1.

- Low Channel: Spurious frequencies at less than 20 dB below the limit:

Spurious Frequency (MHz)	Emission Limitations Conducted (dBm)
1706.599	-14.34

- Middle 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)	Emission Limitations Conducted (dBm)
2021.749	-31.88

LTE Band 71: QPSK. Nominal Bandwidth 20 MHz. RB Size 6, RB Offset 0. Narrowband = 0, Position 1.

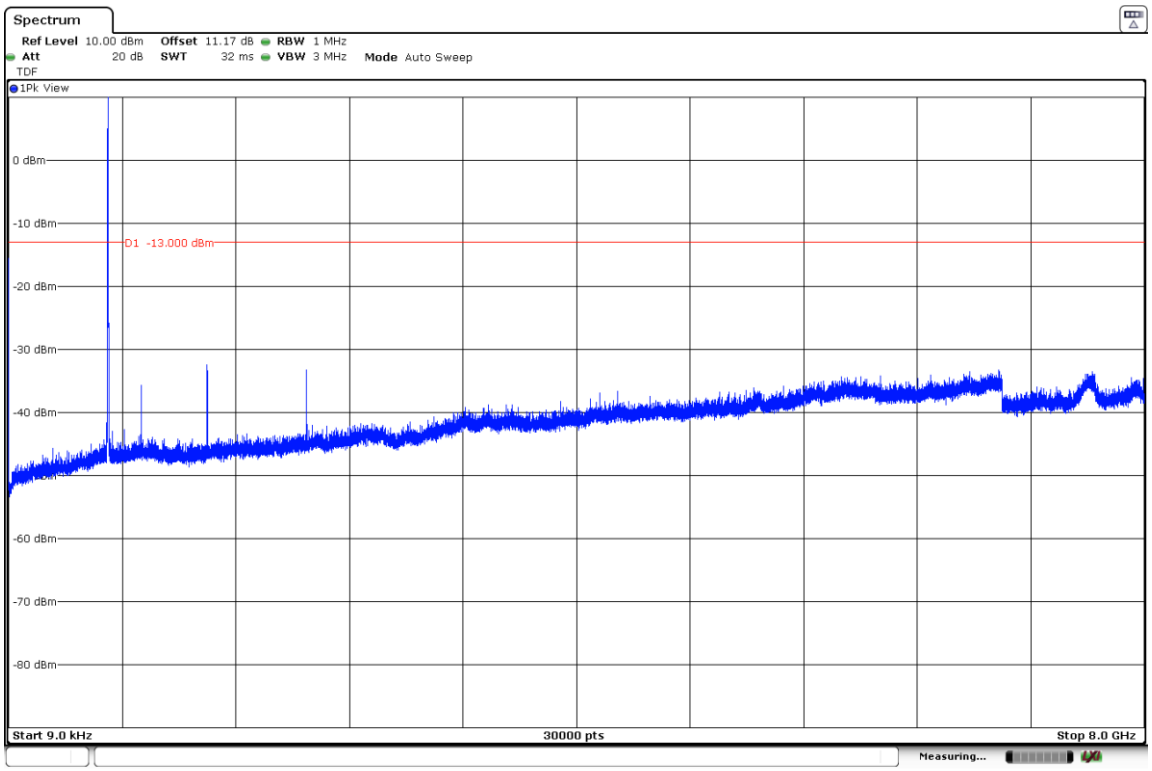
- Low Channel: No spurious frequencies at less than 20 dB below the limit.
- Middle Channel: No spurious frequencies at less than 20 dB below the limit.
- High Channel: No spurious frequencies at less than 20 dB below the limit

Measurement uncertainty (dB): <±2.76

Verdict: PASS

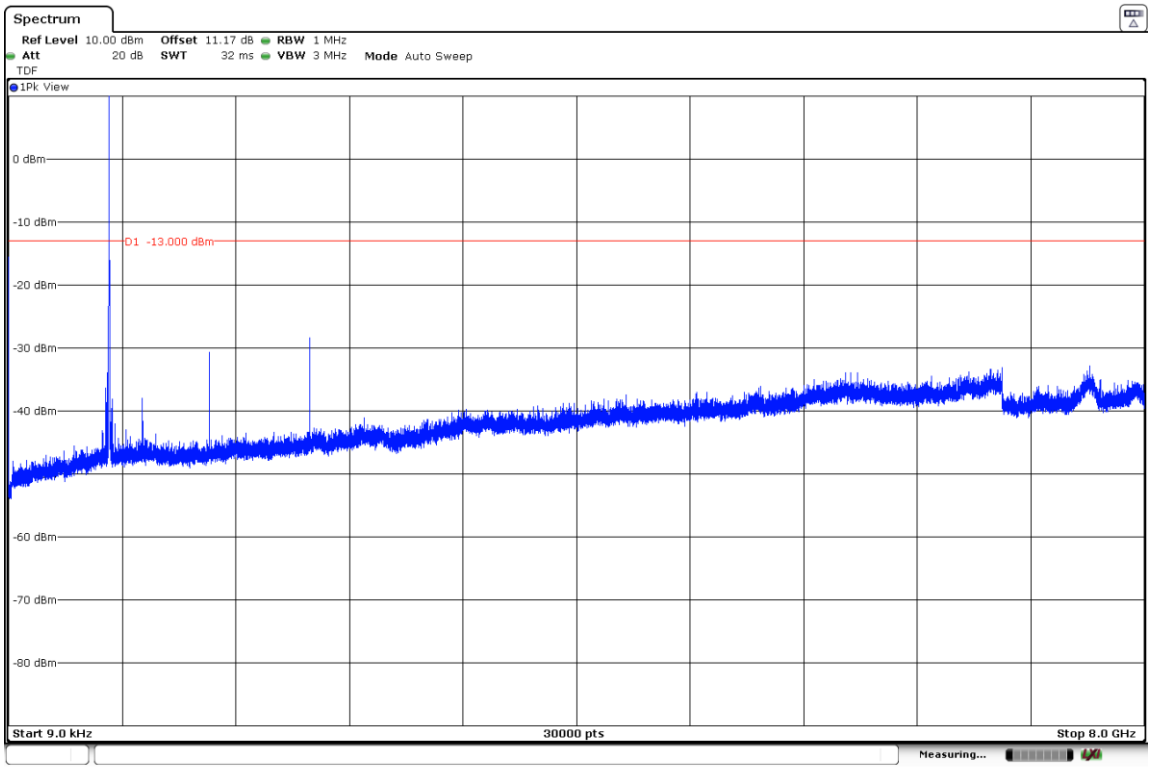
LTE Band 12. 16QAM. Nominal Bandwidth 1.4 MHz. RB Size 5. RB Offset 0. Narrowband = 0. Position 1.

Low Channel:



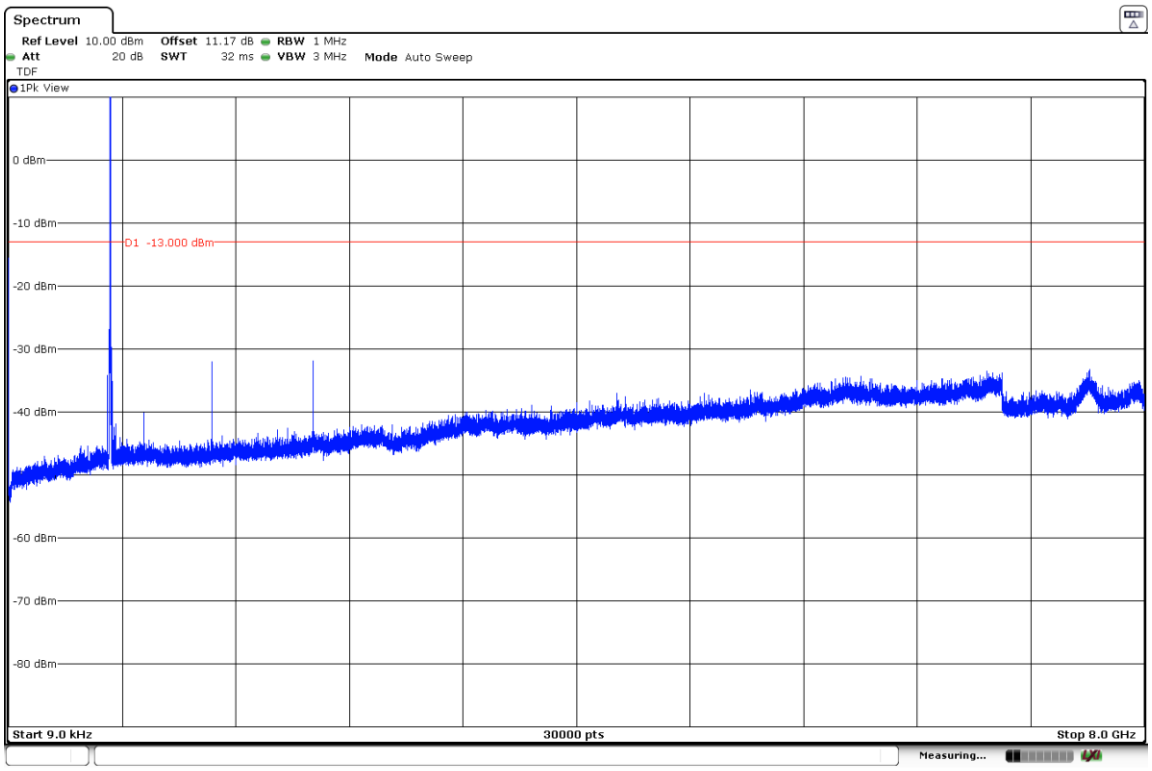
The peak above the limit is the carrier frequency.

Middle Channel:



The peak above the limit is the carrier frequency.

High Channel:



The peak above the limit is the carrier frequency.