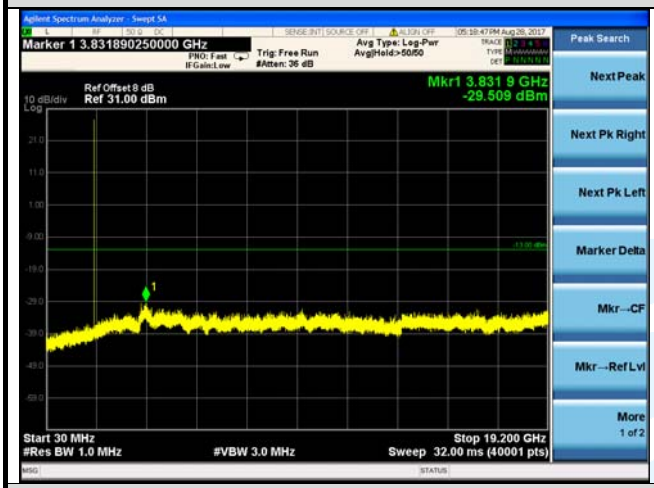
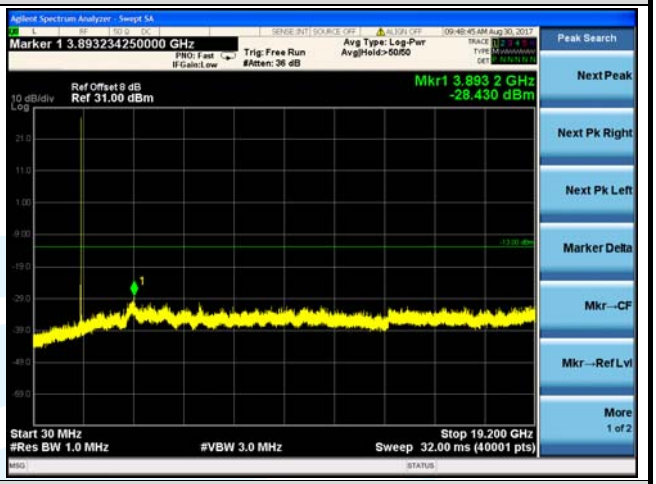
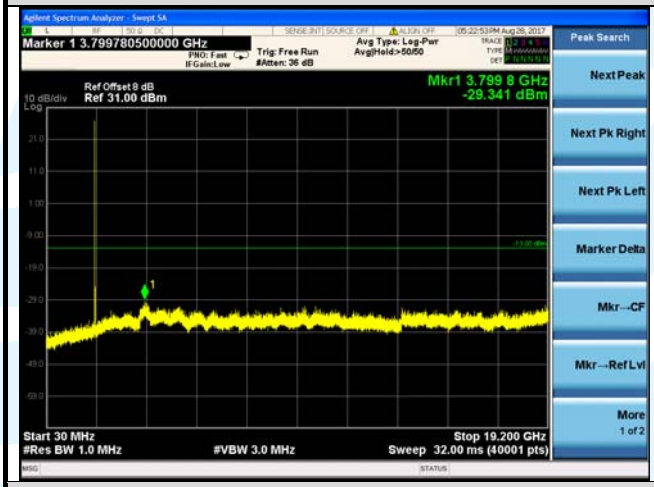
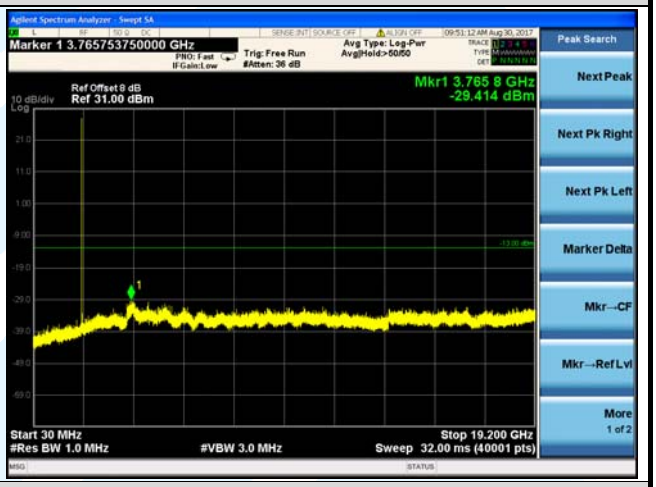
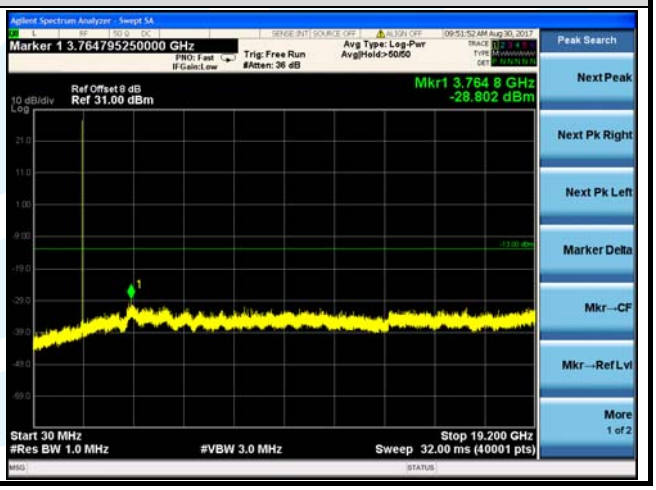
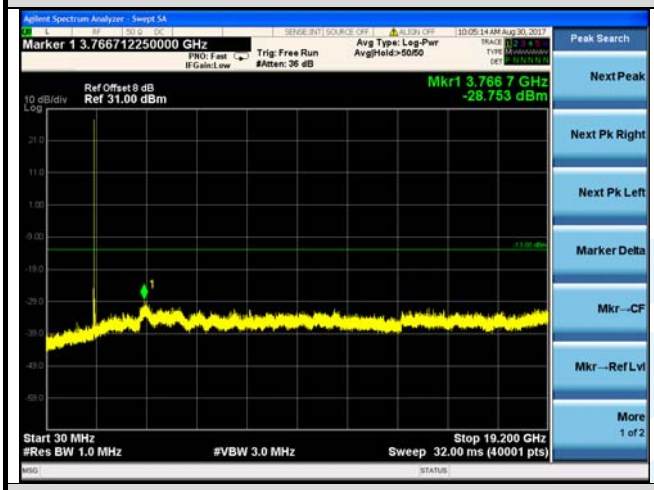
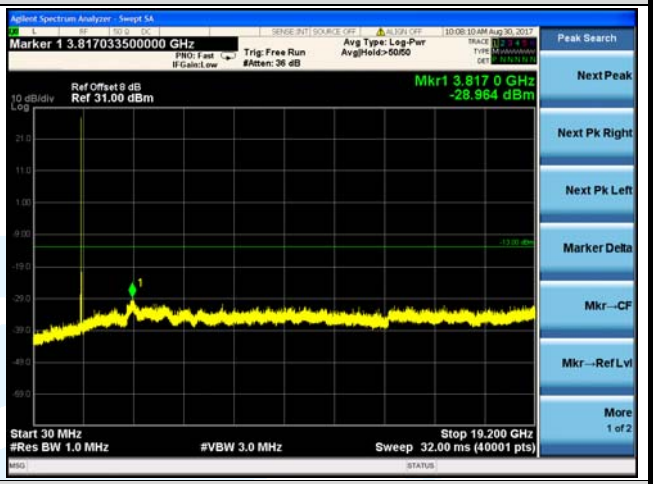
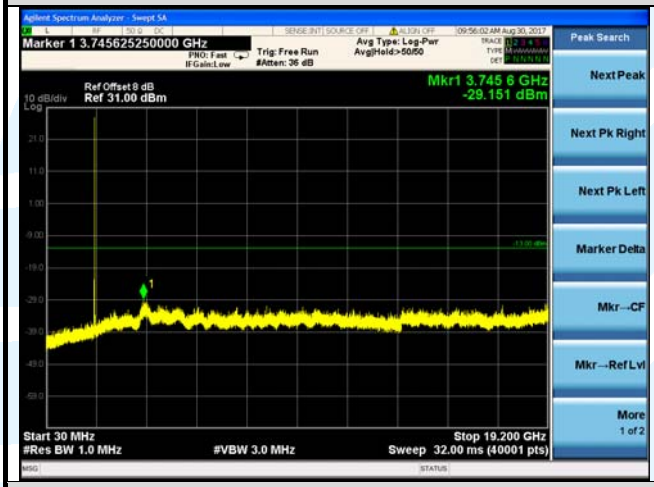
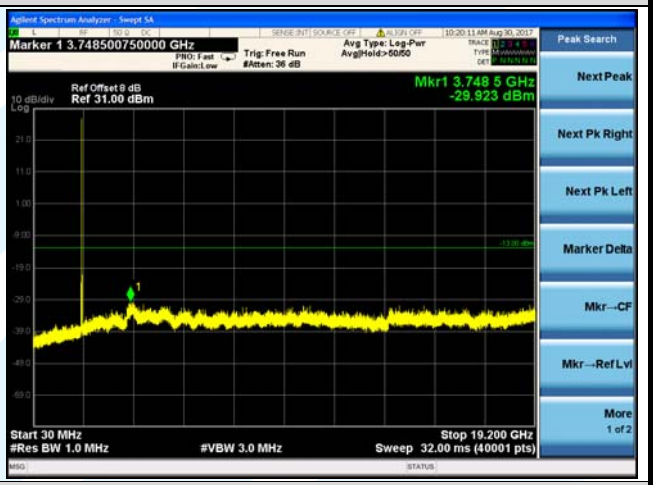
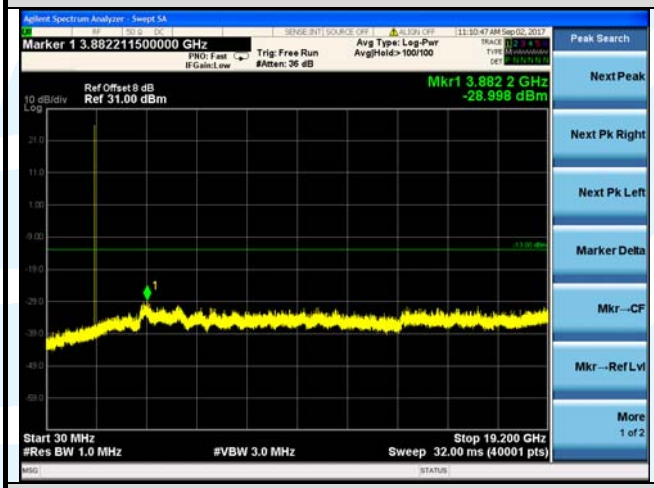
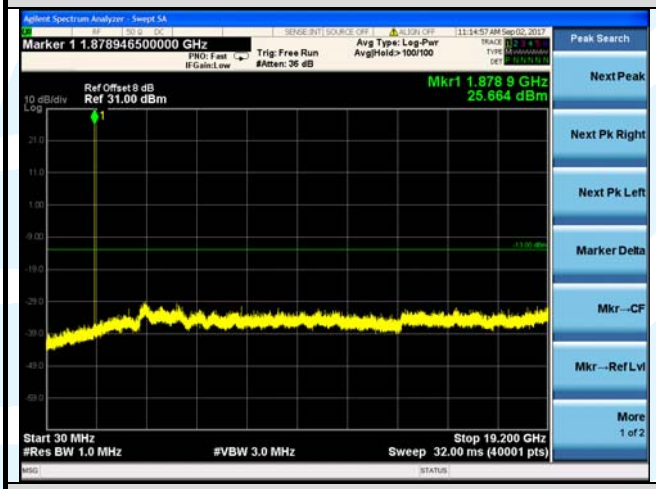
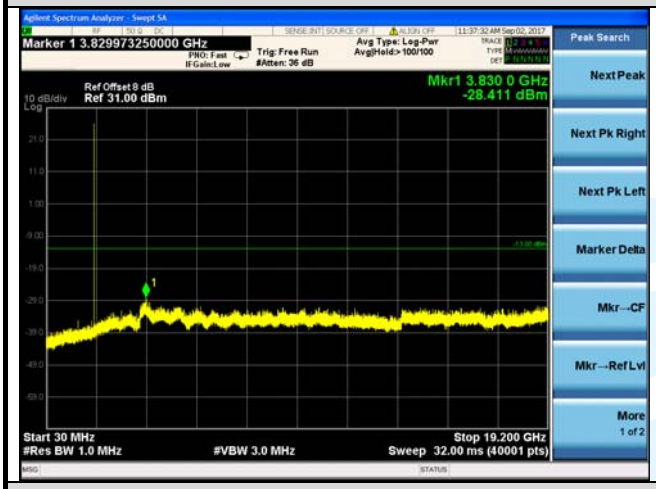
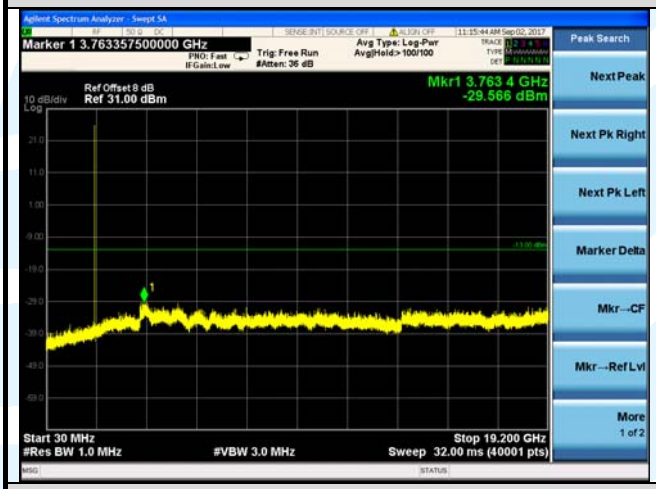
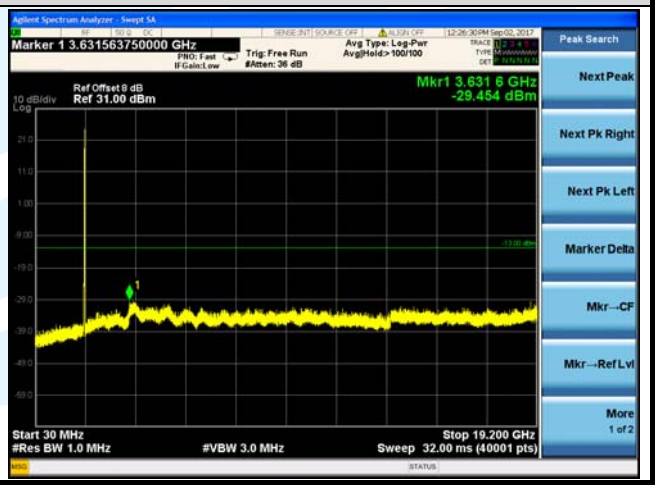
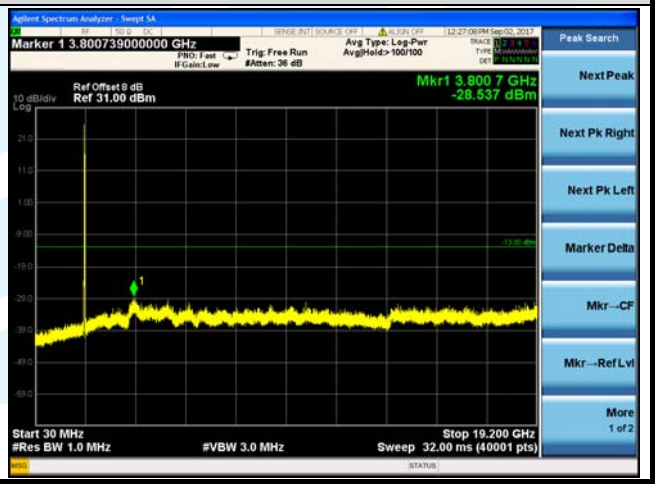
LTE Band 2 / 5MHz / 64QAM	LTE Band 2 / 10MHz / 64QAM
Lowest Channel	
	
Middle Channel	
	
Highest Channel	
	

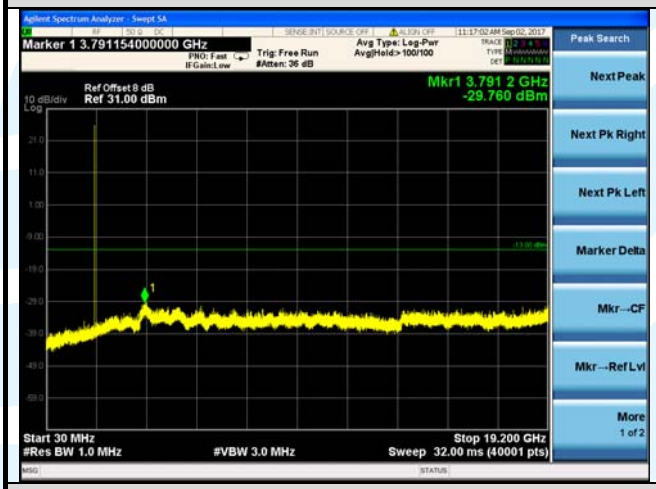
LTE Band 2 / 15MHz / 64QAM	LTE Band 2 / 20MHz / 64QAM
Lowest Channel	
	
Middle Channel	
	
Highest Channel	

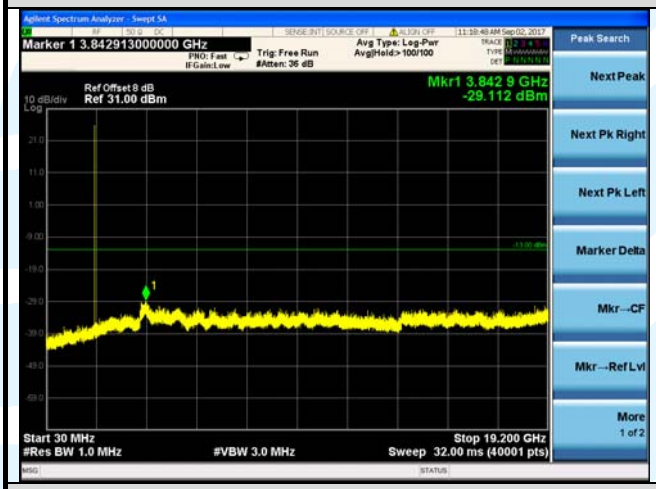
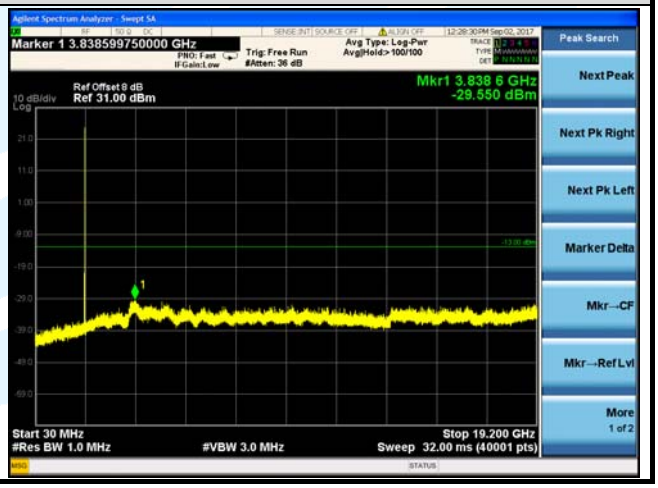
LTE Band 25_ Channel Bandwidth: 1.4 MHz	
QPSK	16QAM
Lowest Channel	
Middle Channel	
	
Highest Channel	

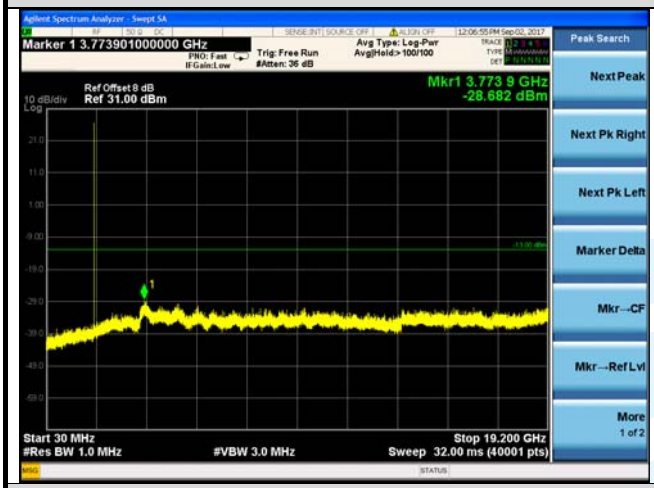
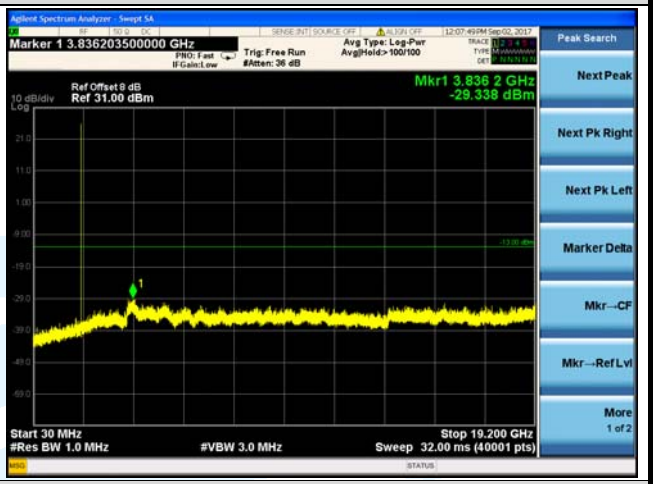
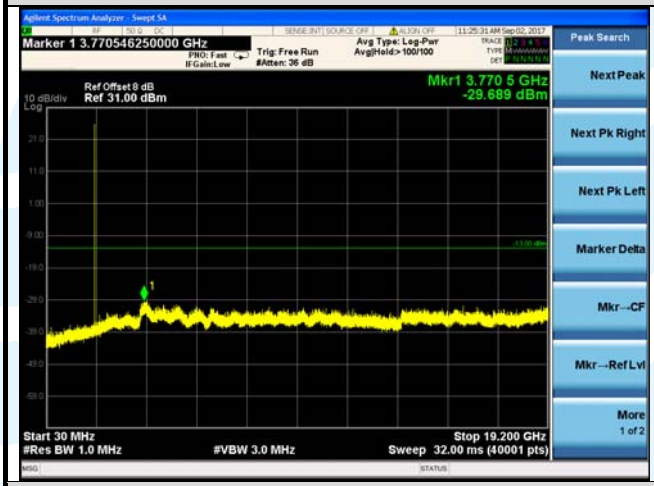
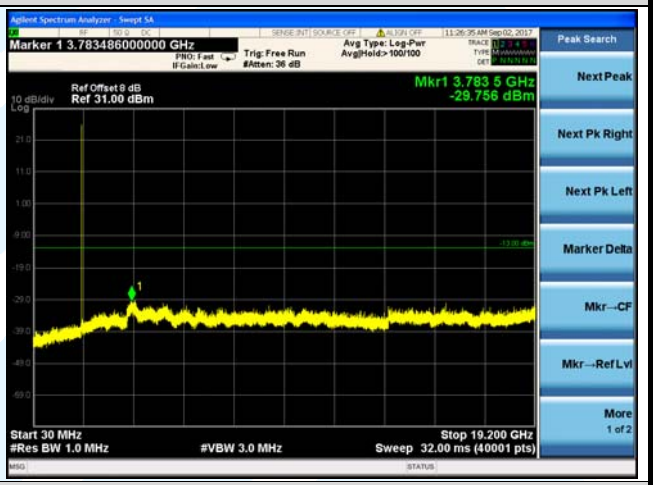
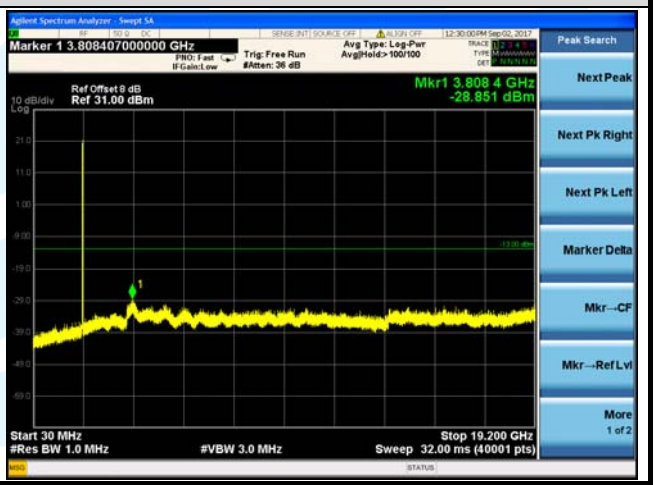
LTE Band 25_ Channel Bandwidth: 3 MHz	
QPSK	16QAM
Lowest Channel	
Middle Channel	
	
Highest Channel	

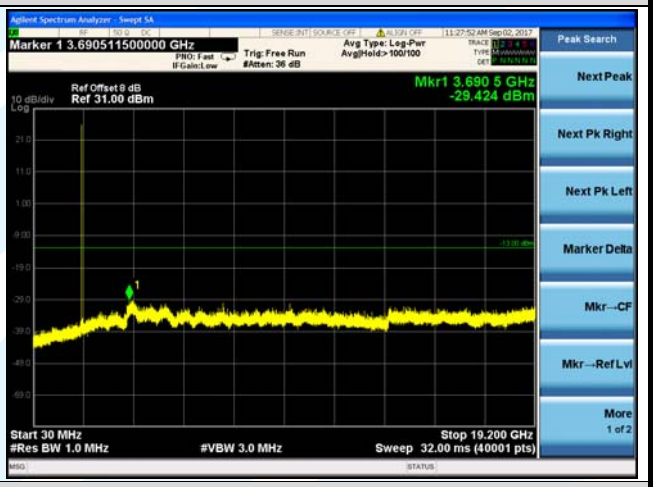
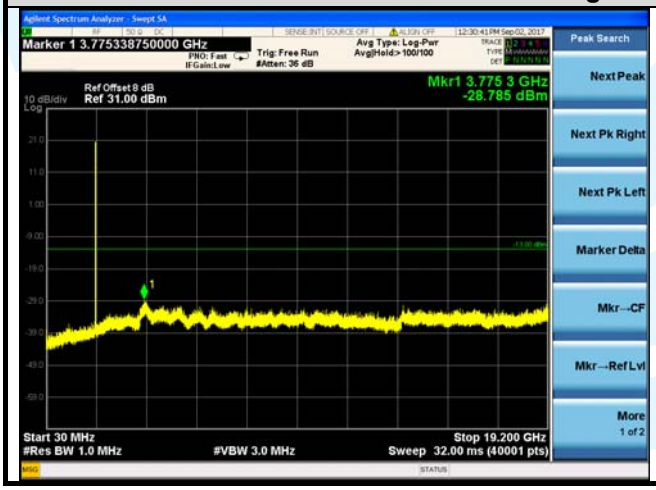
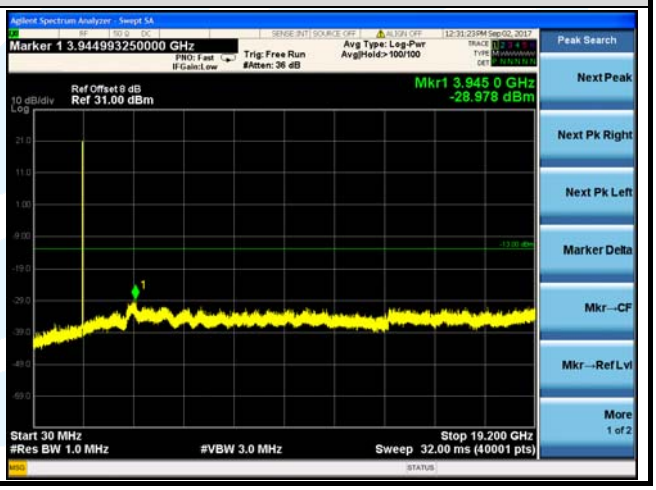
LTE Band 25_ Channel Bandwidth: 5 MHz	
QPSK	16QAM
Lowest Channel	
	
Middle Channel	
	
Highest Channel	
	

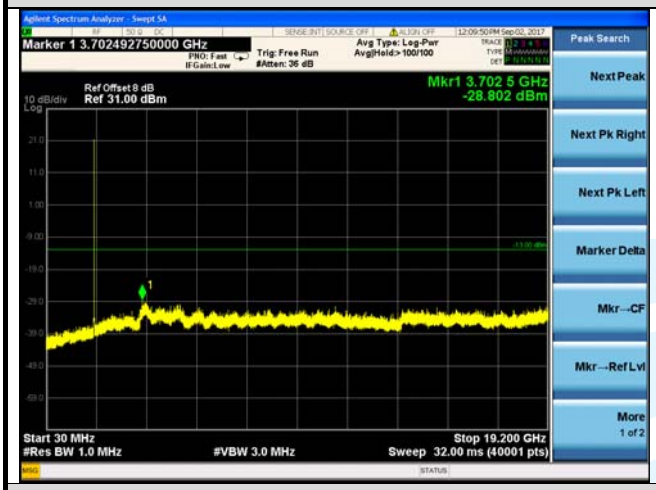
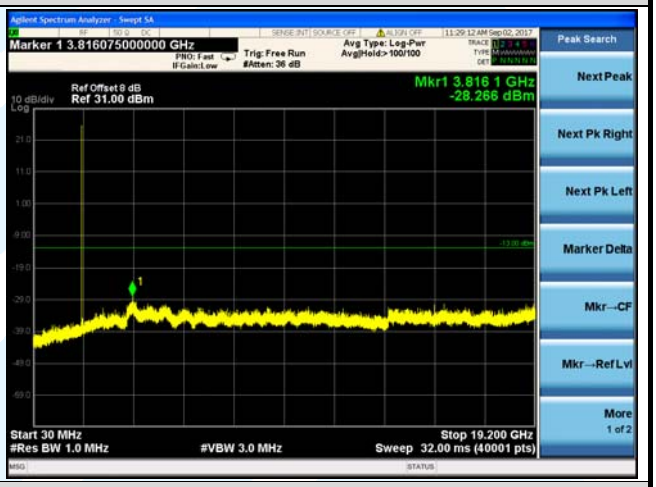
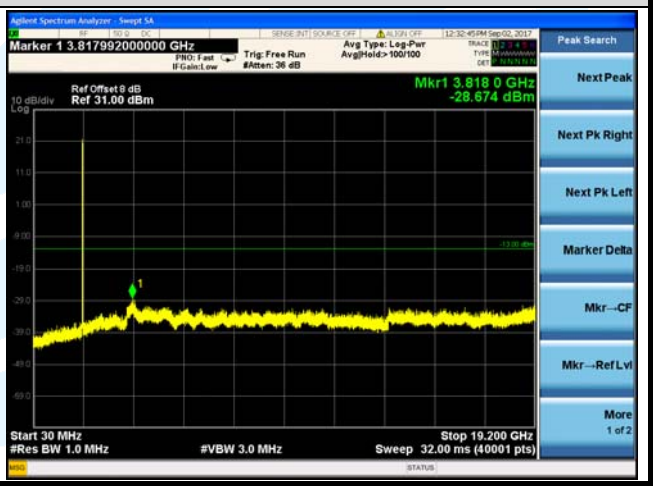
LTE Band 25_ Channel Bandwidth: 10 MHz	
QPSK	16QAM
Lowest Channel	
Middle Channel	
Highest Channel	
	

LTE Band 25_ Channel Bandwidth: 15 MHz	
QPSK	16QAM
Lowest Channel	
Middle Channel	
	
Highest Channel	

LTE Band 25_ Channel Bandwidth: 20 MHz	
QPSK	16QAM
Lowest Channel	
Middle Channel	
	
Highest Channel	
	

LTE Band 25 / 1.4MHz / 64QAM	LTE Band 25 / 3MHz / 64QAM
Lowest Channel	
	
Middle Channel	
	
Highest Channel	
	

LTE Band 25 / 5MHz / 64QAM	LTE Band 25 / 10MHz / 64QAM
Lowest Channel	
Middle Channel	
	
Highest Channel	
	

LTE Band 25 / 15MHz / 64QAM	LTE Band 25 / 20MHz / 64QAM
Lowest Channel	
	
Middle Channel	
	
Highest Channel	
	

5.8 FIELD STRENGTH OF SPURIOUS RADIATION

Test Requirement: FCC 47 CFR Part 2.1053 & FCC 47 CFR Part 24.238(a)(b)

Test Method: ANSI/TIA/EIA-603-D 2010 & KDB 971168 D01v02r02

Receiver Setup:

Frequency	Detector	RBW	VBW	Remark
0.009 MHz-30 MHz	Peak	10 kHz	30 KHz	Peak
30 MHz-1 GHz	Quasi-peak	100 kHz	300 KHz	Peak
Above 1 GHz	Peak	1 MHz	3 MHz	Peak

Limits:

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. The emission limit equal to -13 dBm

Test Setup: Refer to section 4.2.1 for details.

Test Procedures:

1. Scan up to 10th harmonic, find the maximum radiation frequency to measure.
2. The technique used to find the Spurious Emissions of the transmitter was the antenna substitution method. Substitution method was performed to determine the actual ERP/EIRP emission levels of the EUT.

Test procedure as below:

1) The EUT was powered ON and placed on a 0.8/1.5m high table at a 3 meter semi/fully Anechoic Chamber. The antenna of the transmitter was extended to its maximum length. Modulation mode and the measuring receiver shall be tuned to the frequency of the transmitter under test.
2) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3) The disturbance of the transmitter was maximized on the test receiver display by raising and lowering from 1m to 4m the receive antenna and by rotating through 360° the turntable. After the fundamental emission was maximized, a field strength measurement was made.
4) Steps 1) to 3) were performed with the EUT and the receive antenna in both vertical and horizontal polarization.
5) The transmitter was then removed and replaced with another antenna. The center of the antenna was approximately at the same location as the center of the transmitter.
6) A signal at the disturbance was fed to the substitution antenna by means of a non-radiating cable. With both the substitution and the receive antennas horizontally polarized, the receive antenna was raised and lowered to obtain a maximum reading at the test receiver. The level of the signal generator was adjusted until the measured field strength level in step 3) is obtained for this set of conditions.
7) The output power into the substitution antenna was then measured.
8) Steps 6) and 7) were repeated with both antennas polarized.
9) Calculate power in dBm by the following formula:

ERP(dBm) = Pg(dBm) – cable loss (dB) + antenna gain (dBd)

EIRP(dBm) = Pg(dBm) – cable loss (dB) + antenna gain (dBi)

EIRP=ERP+2.15dB

where:

Pg is the generator output power into the substitution antenna.

10) Test the EUT in the lowest channel, the middle channel the Highest channel
11) The radiation measurements are performed in X, Y, Z axis positioning for EUT operation mode, and found the Y axis positioning which it is worse case.
12) Repeat above procedures until all frequencies measured was complete.

Equipment Used: Refer to section 3 for details.

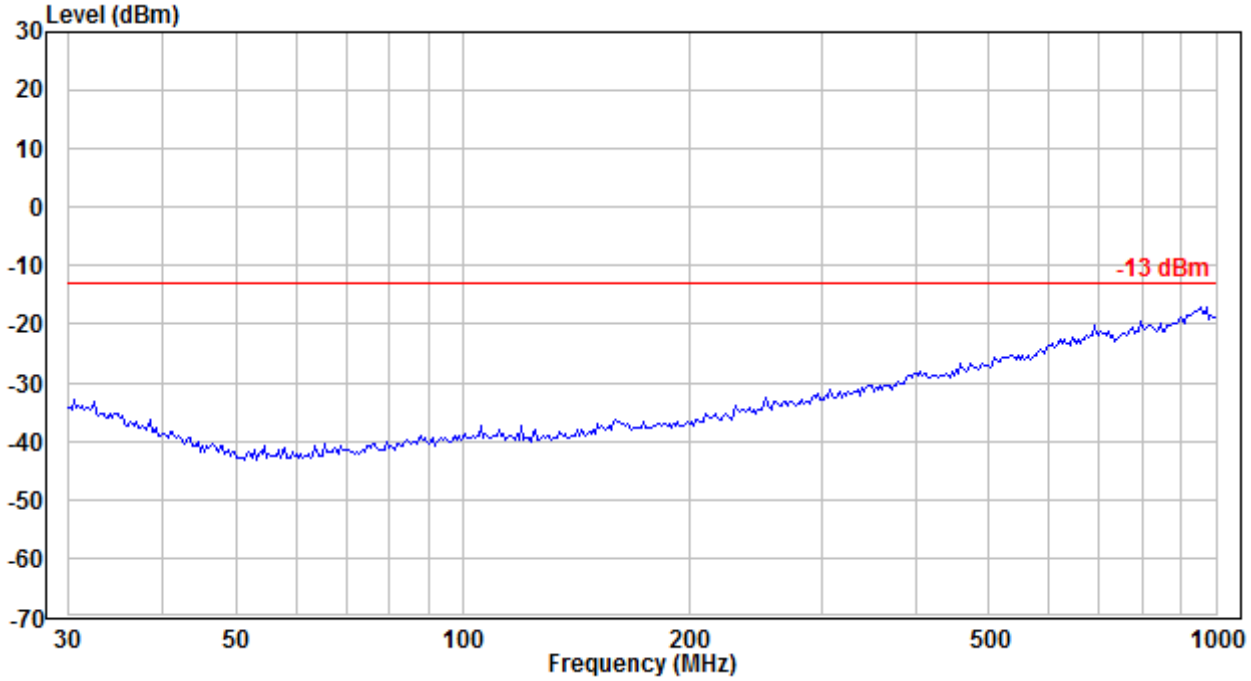
Test Result: Pass

The measurement data as follows:

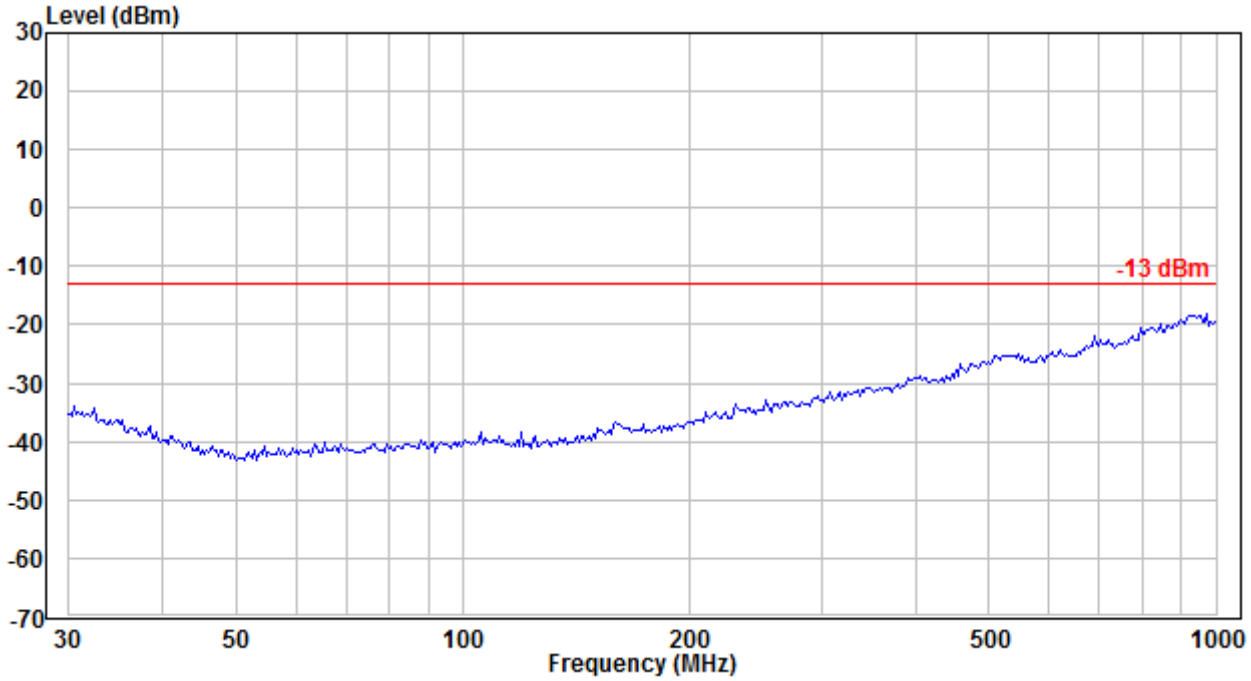
5.8.1 Radiated Emission Test Data (30 MHz to 1 GHz)

GSM 1Tx-slot_Middle Channel

Horizontal

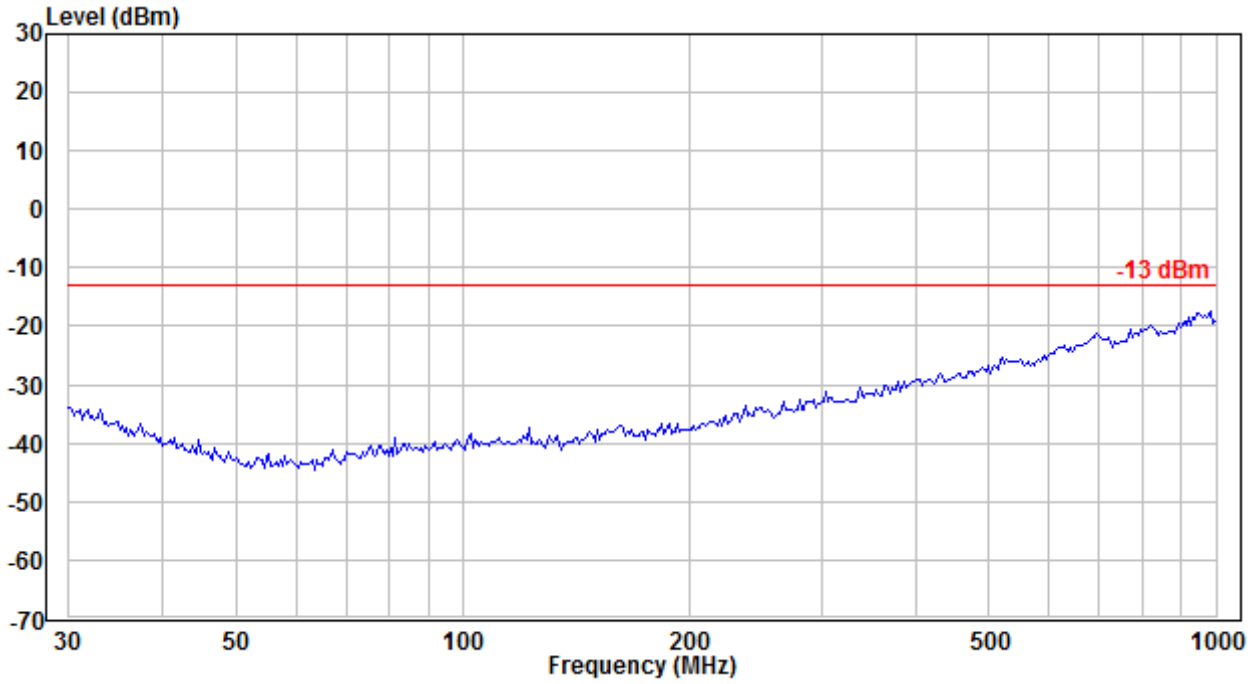


Vertical

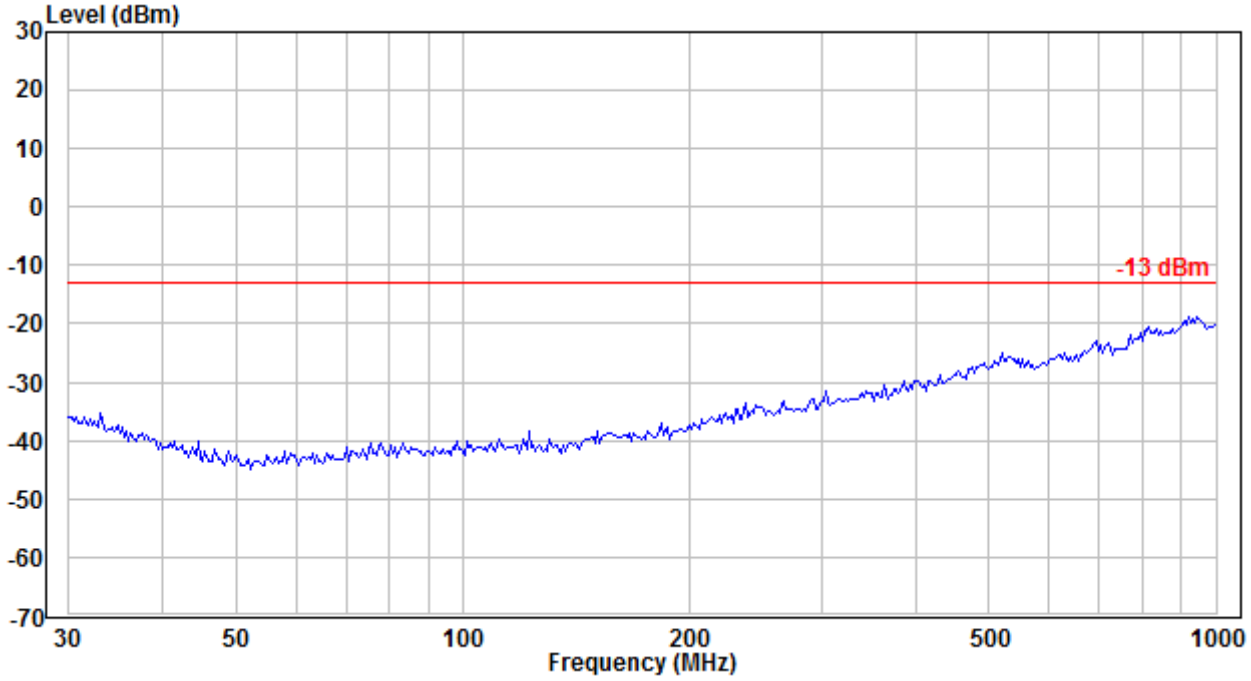


WCDMA RMC 12.2Kbps_Middle Channel

Horizontal

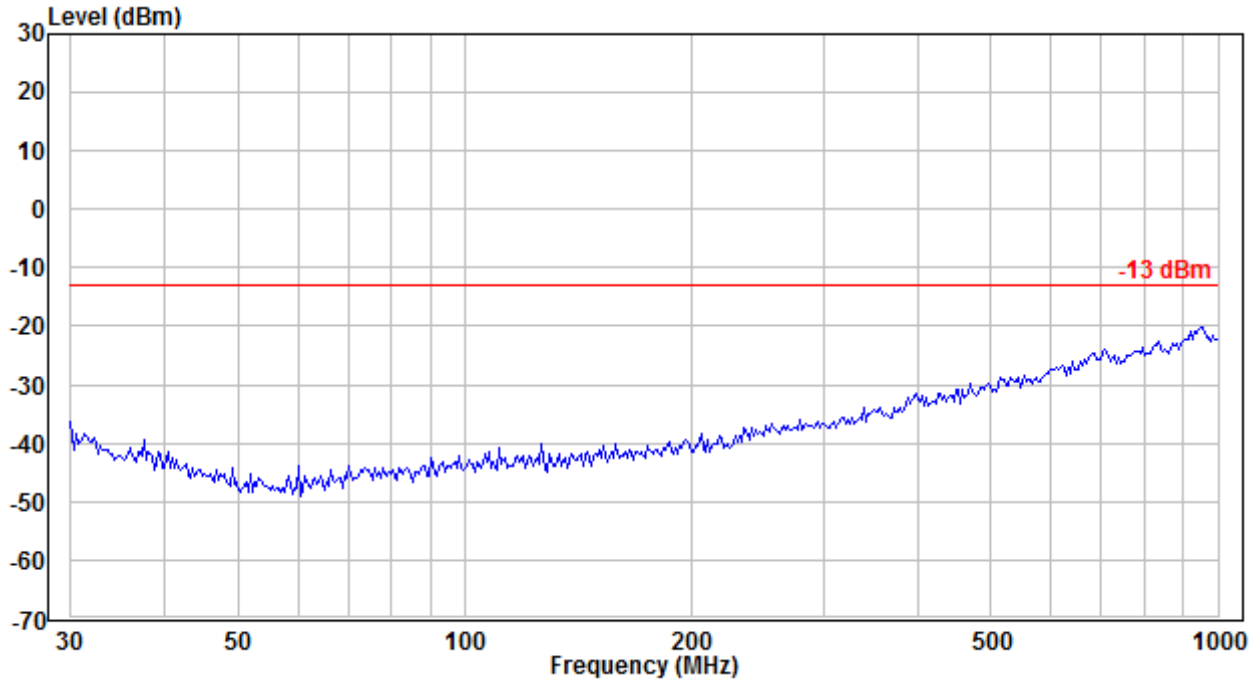


Vertical

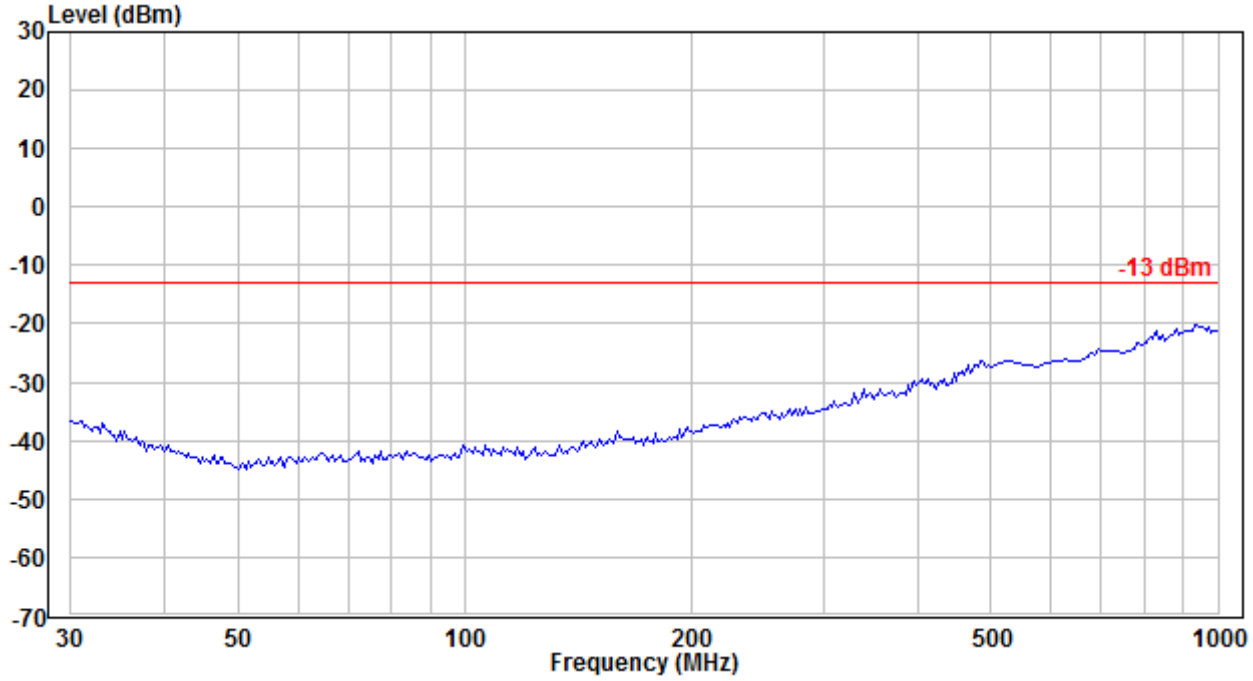


CDMA2000 BC1 1xRTT_Middle Channel

Horizontal

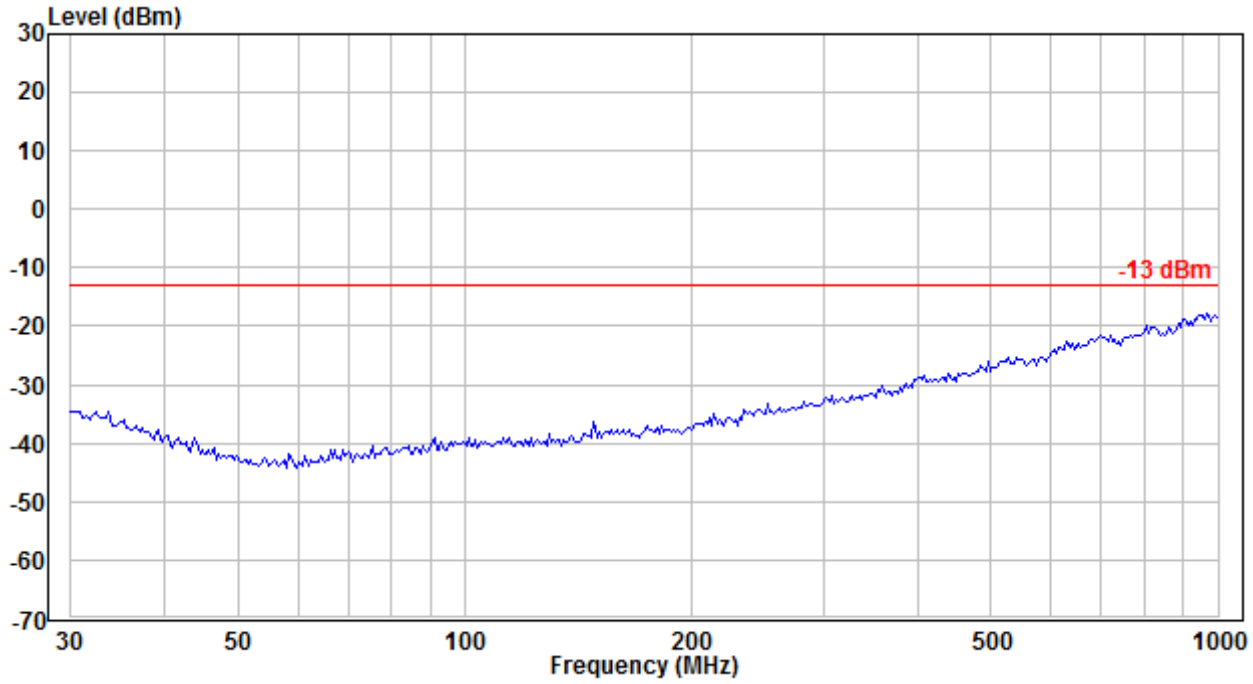


Vertical

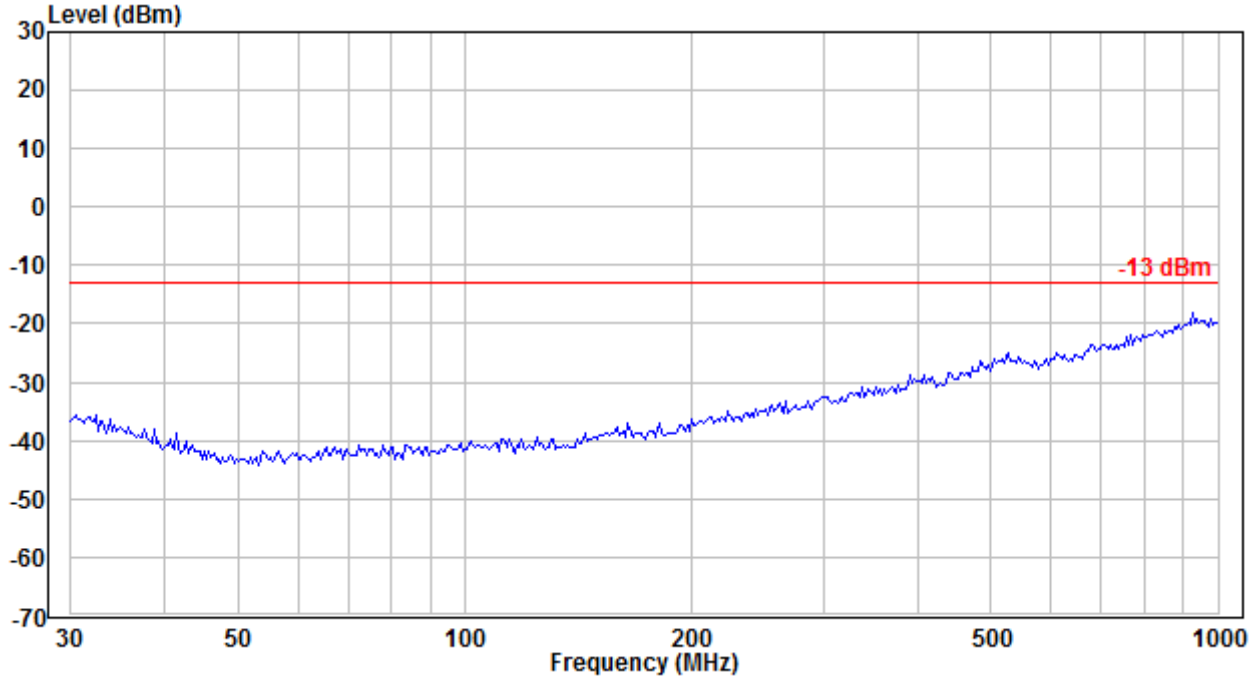


LTE Band 2 / 1.4 MHz / QPSK_ Middle Channel

Horizontal

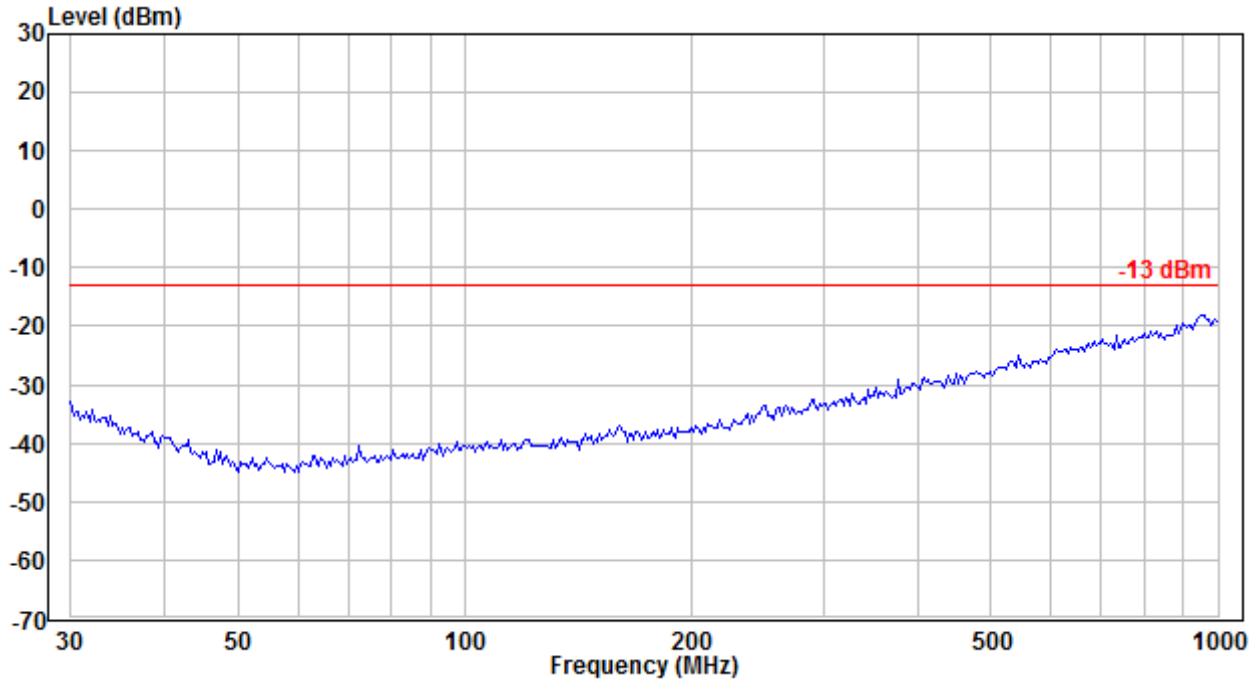


Vertical

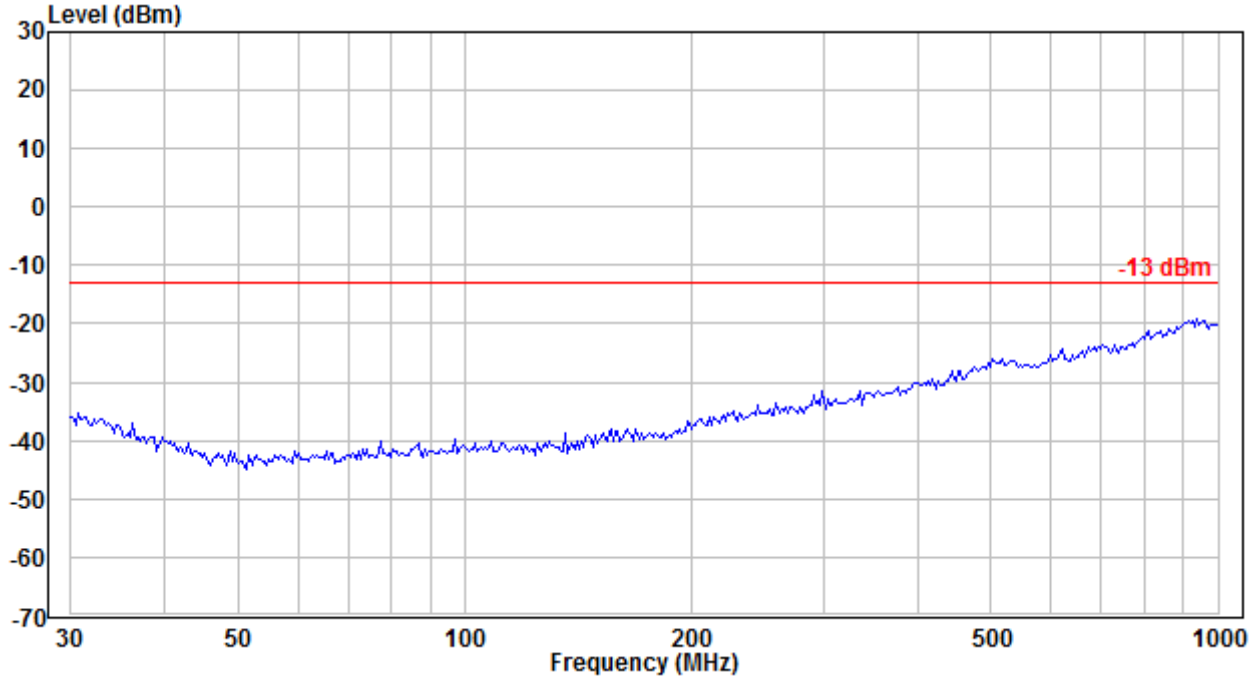


LTE Band 2 / 3 MHz / QPSK_ Middle Channel

Horizontal

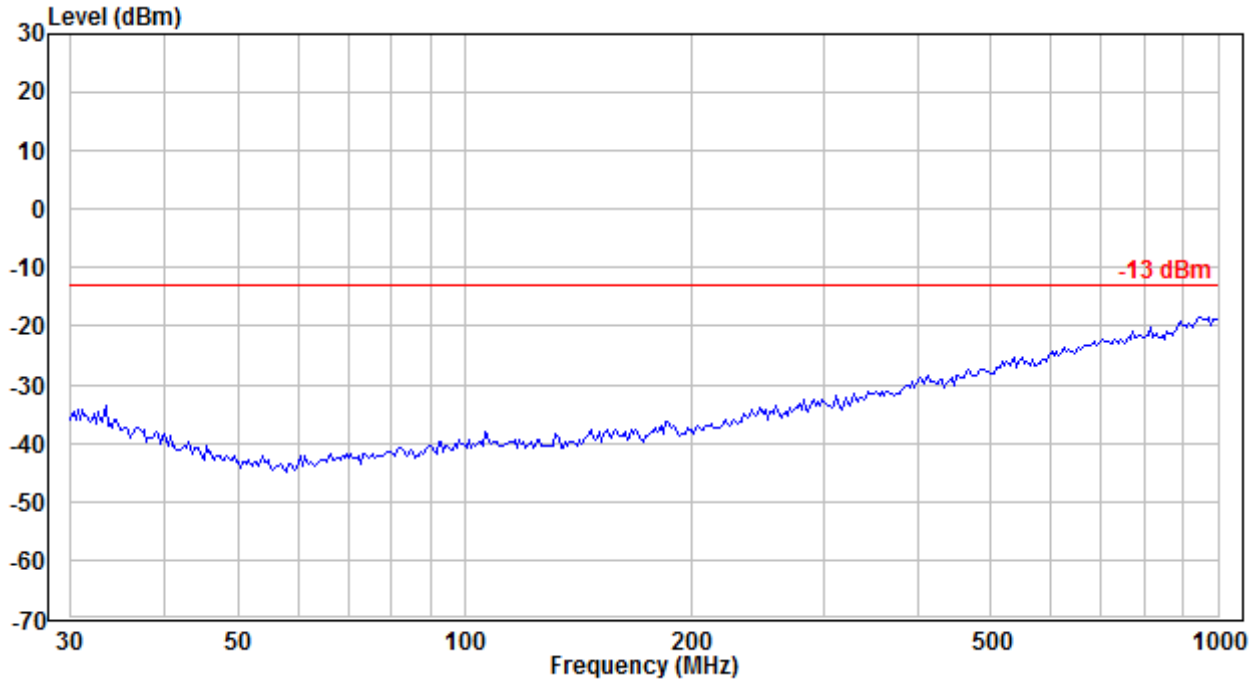


Vertical

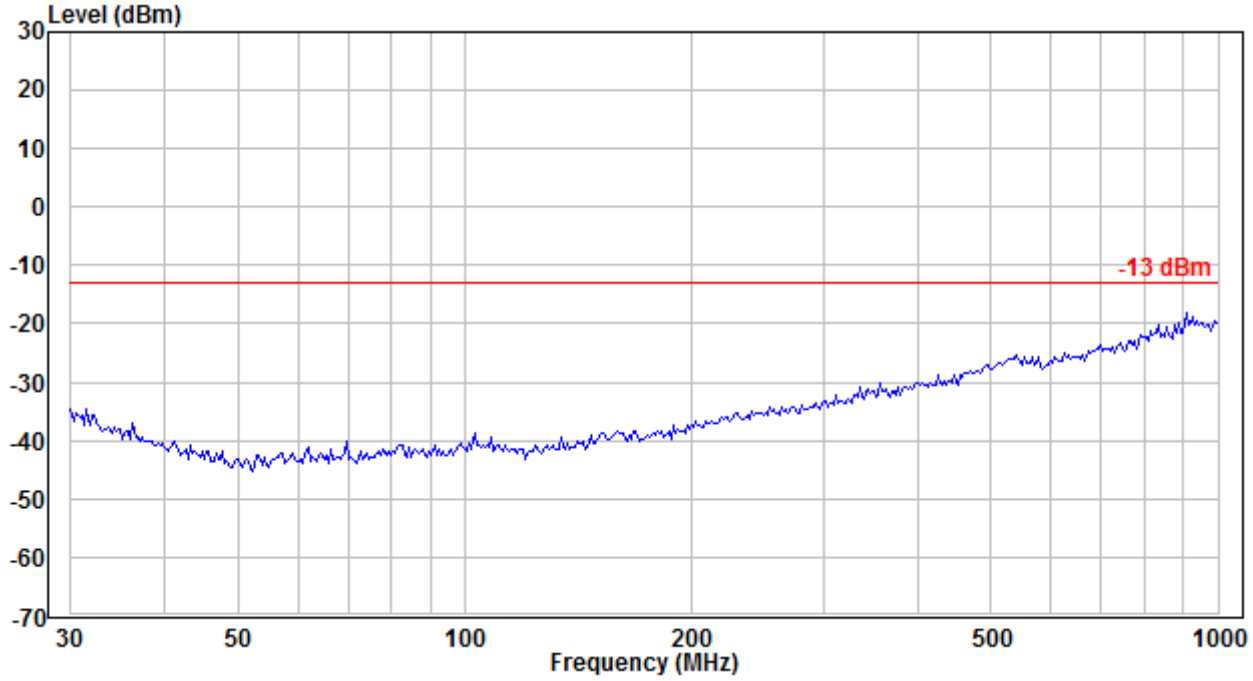


LTE Band 2 / 5 MHz / QPSK_ Middle Channel

Horizontal

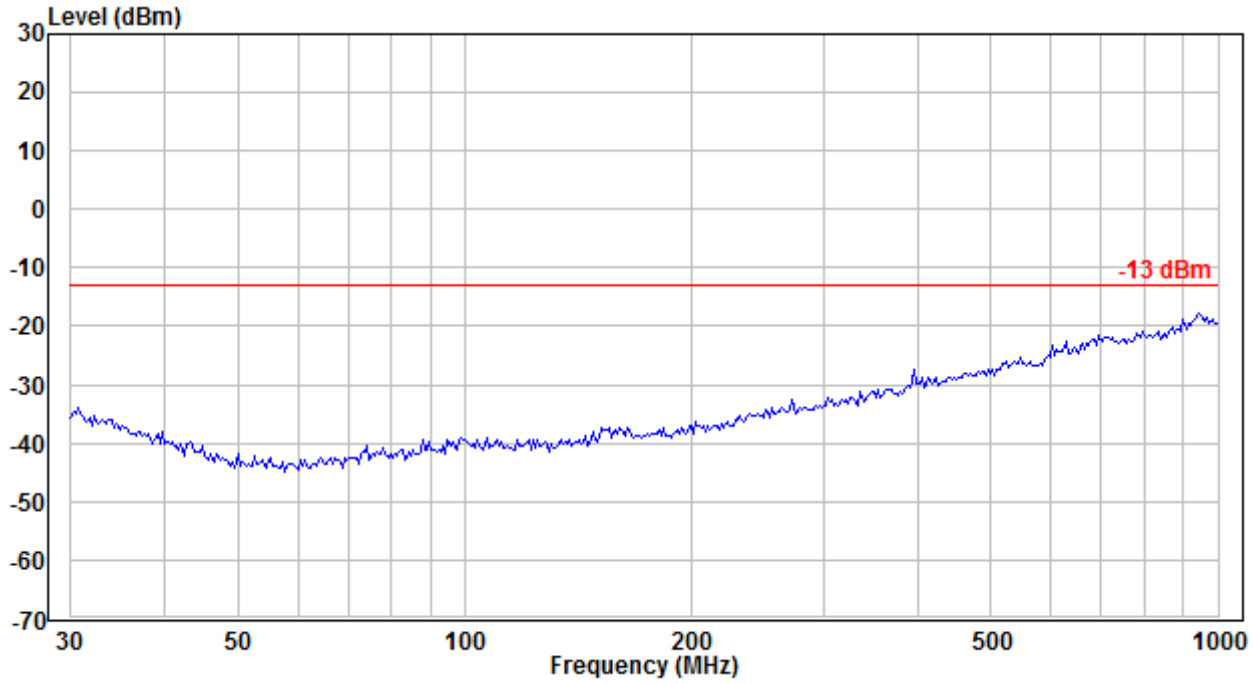


Vertical

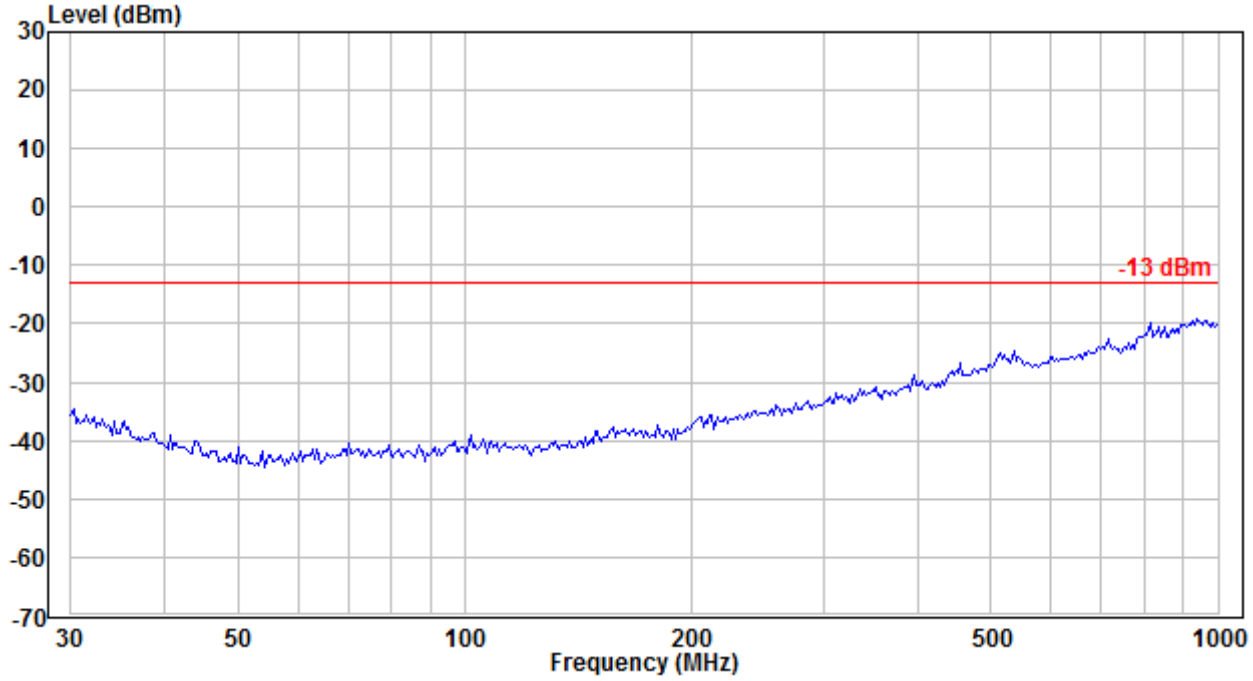


LTE Band 2 / 10 MHz / QPSK_ Middle Channel

Horizontal

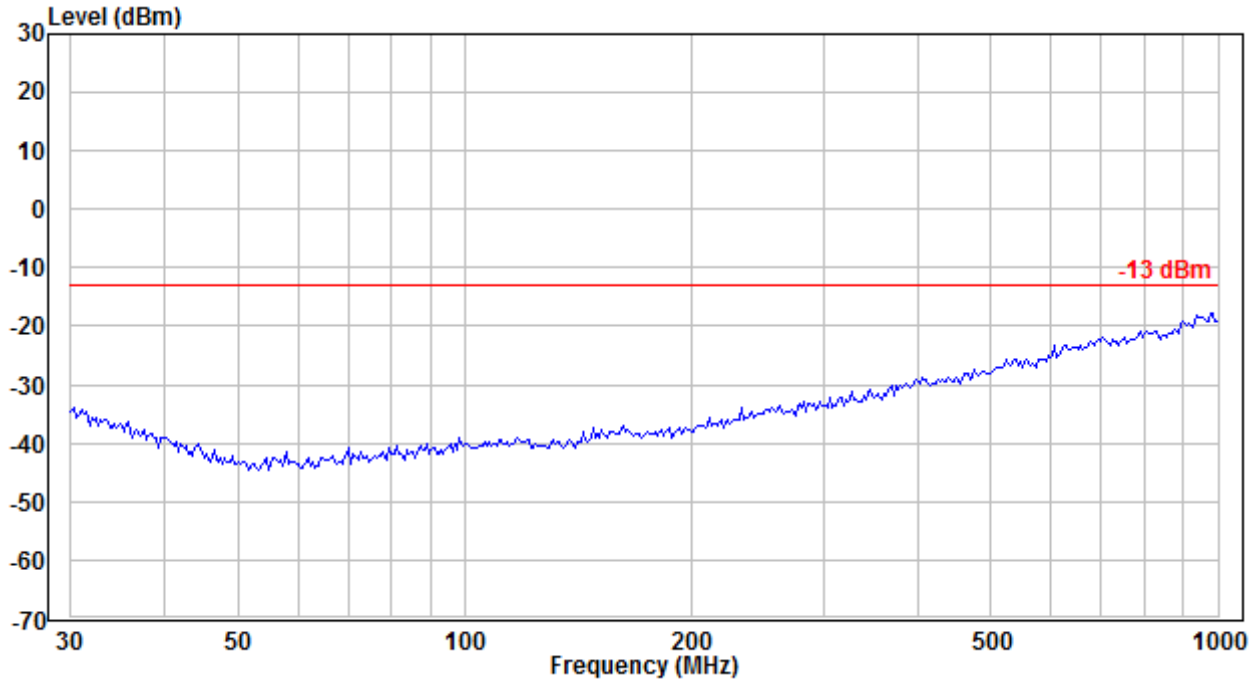


Vertical

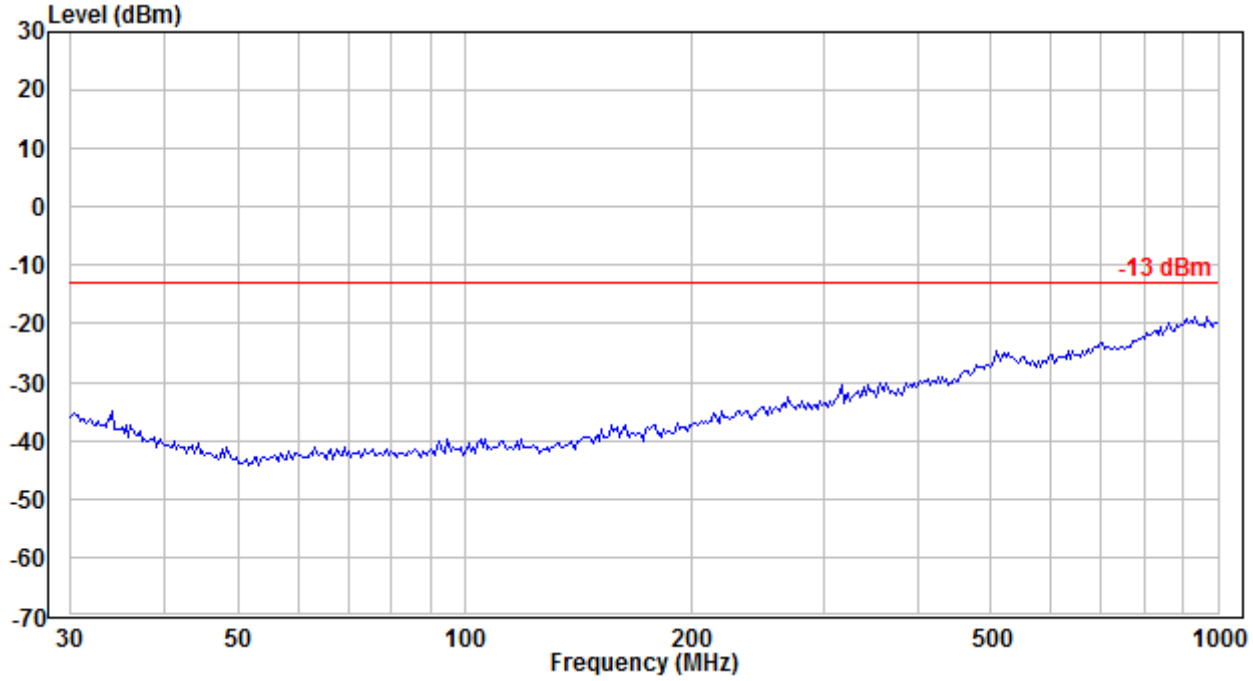


LTE Band 2 / 15 MHz / QPSK_ Middle Channel

Horizontal

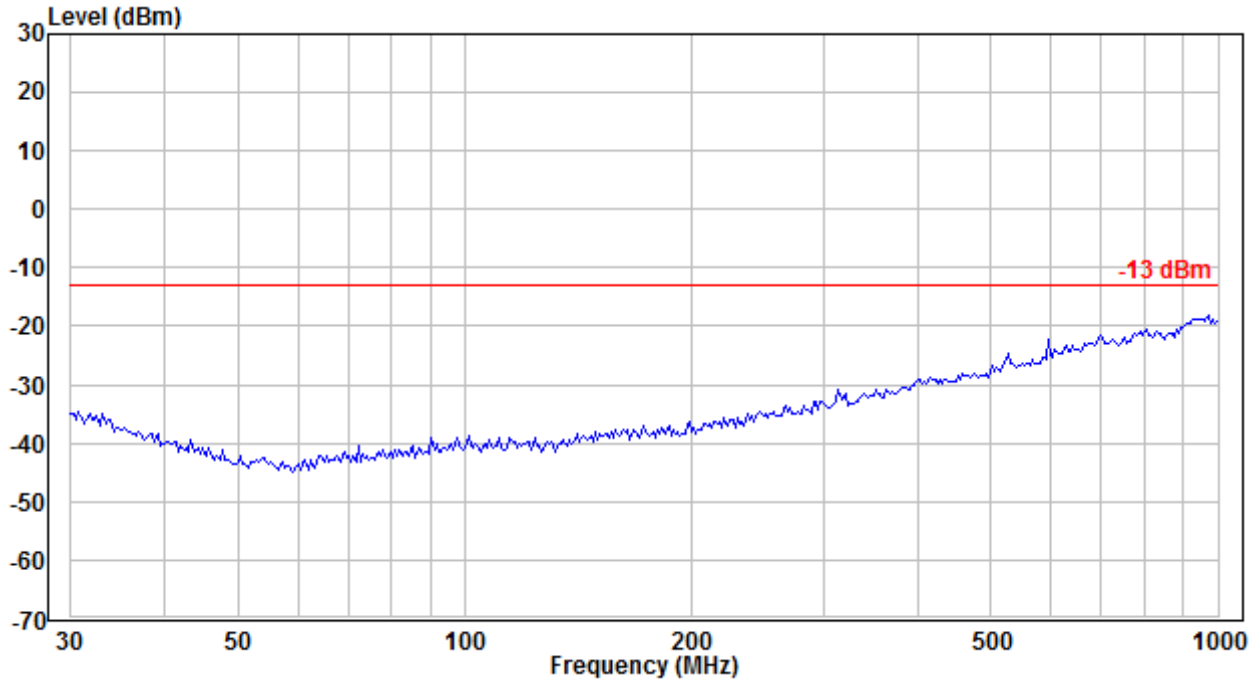


Vertical

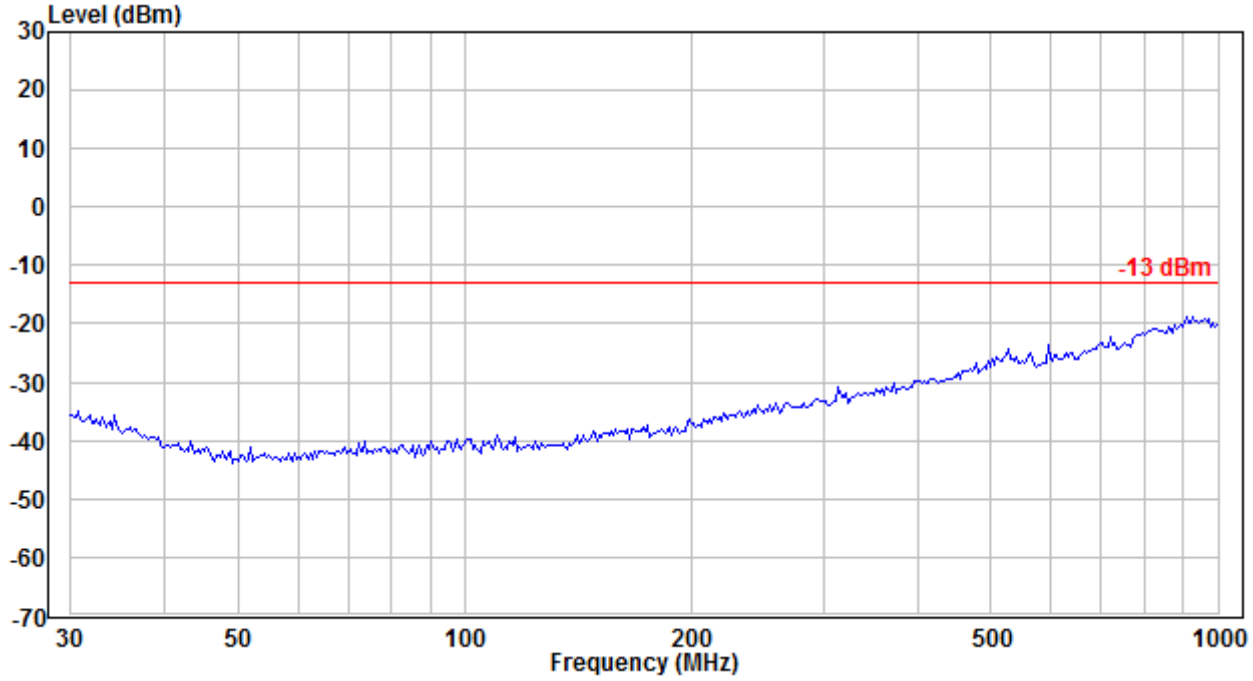


LTE Band 2 / 20 MHz / QPSK_ Middle Channel

Horizontal

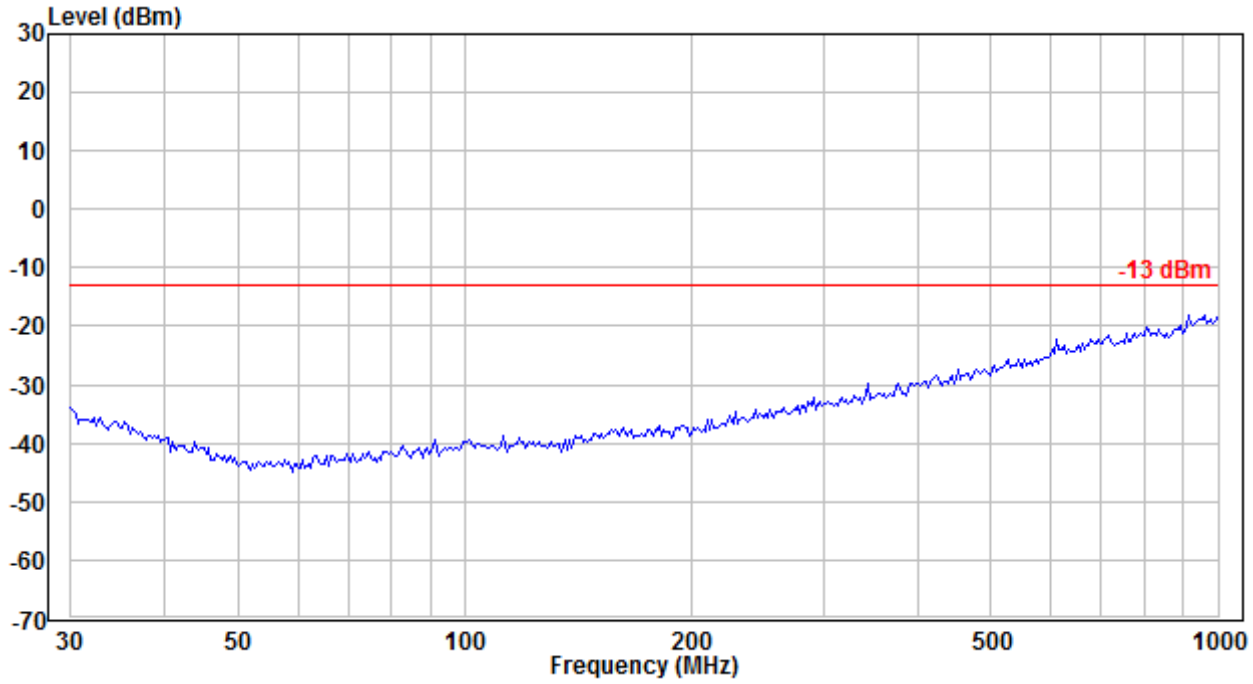


Vertical

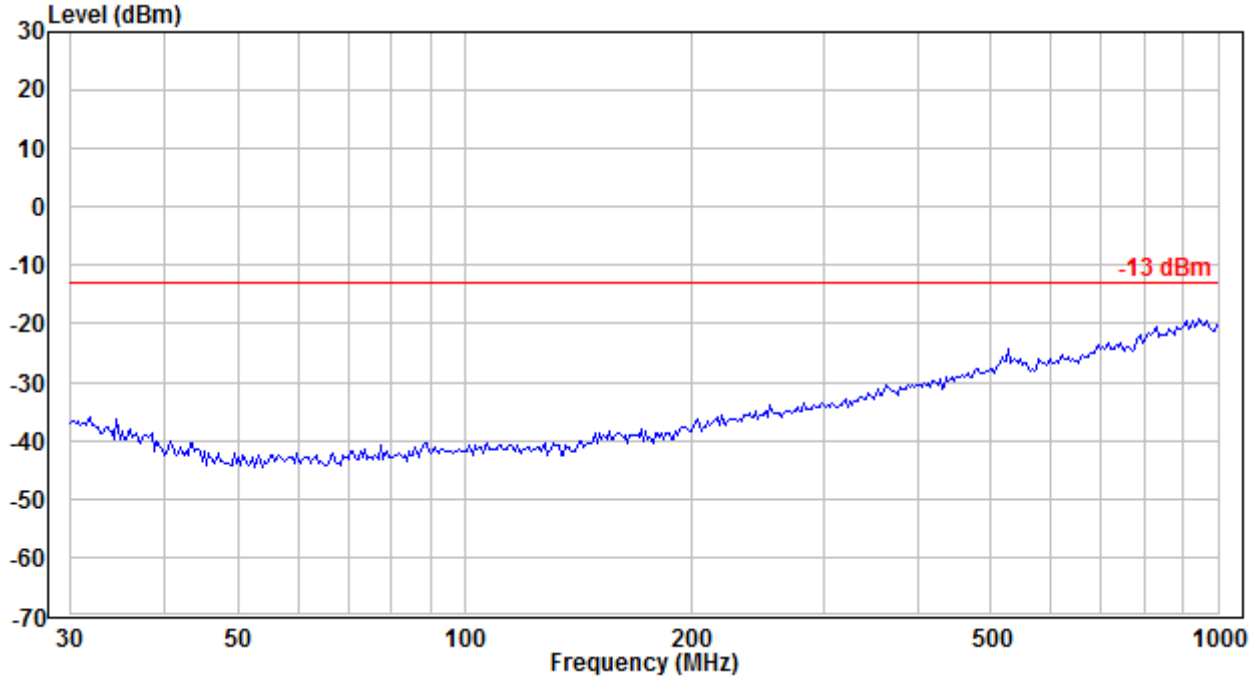


LTE Band 25 / 1.4 MHz / QPSK_ Middle Channel

Horizontal

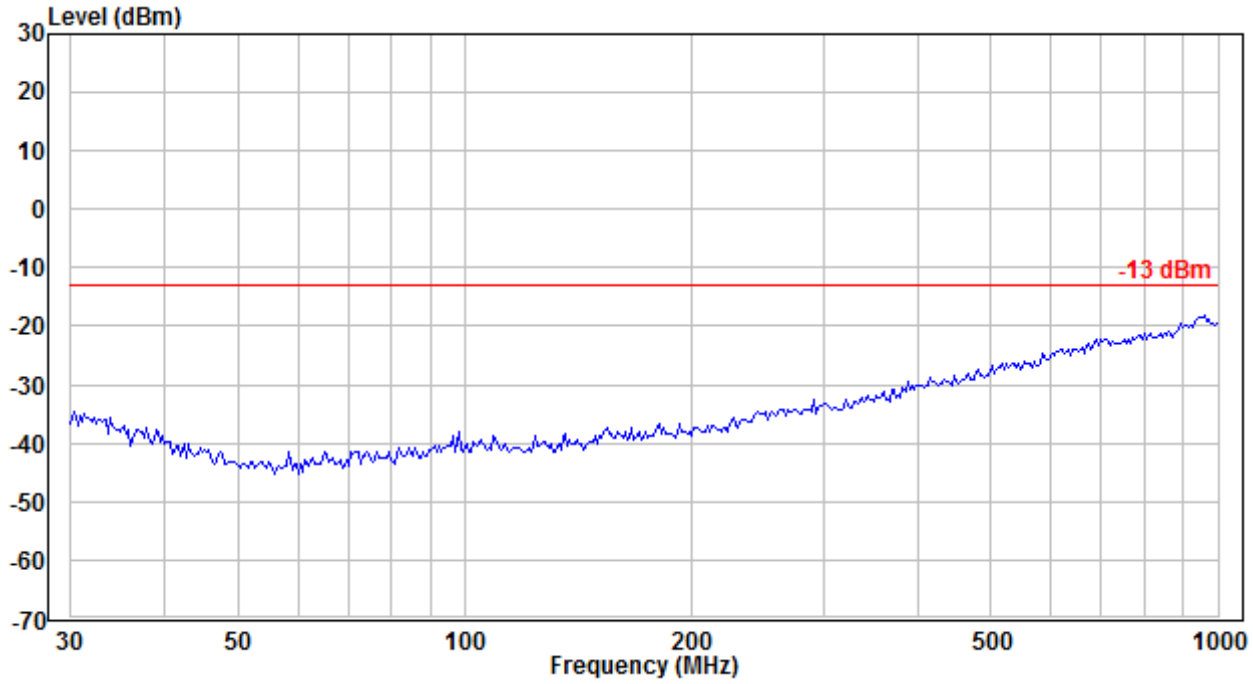


Vertical

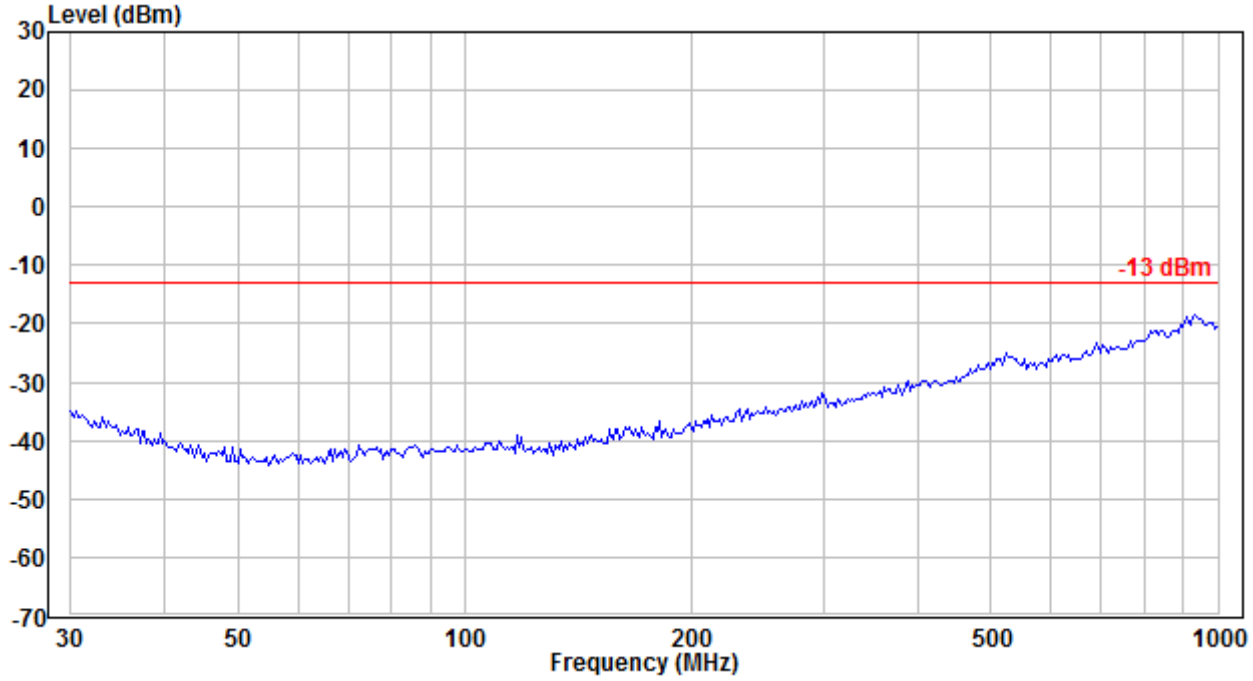


LTE Band 25 / 3 MHz / QPSK_ Middle Channel

Horizontal

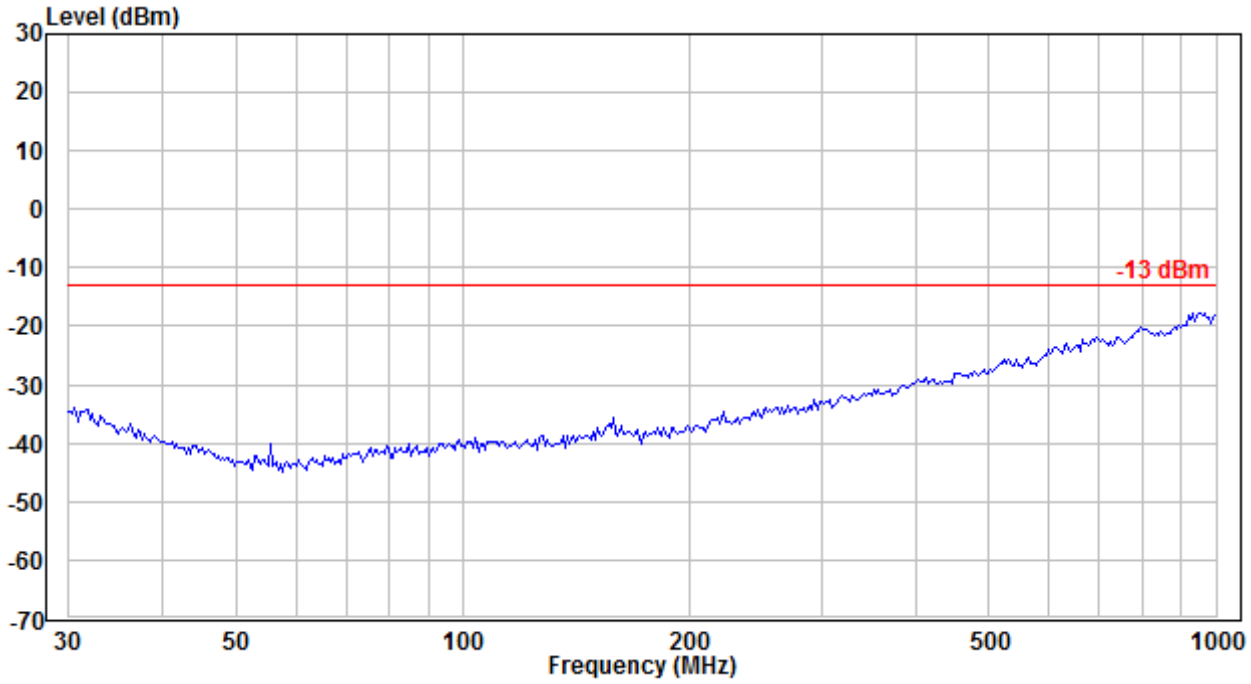


Vertical

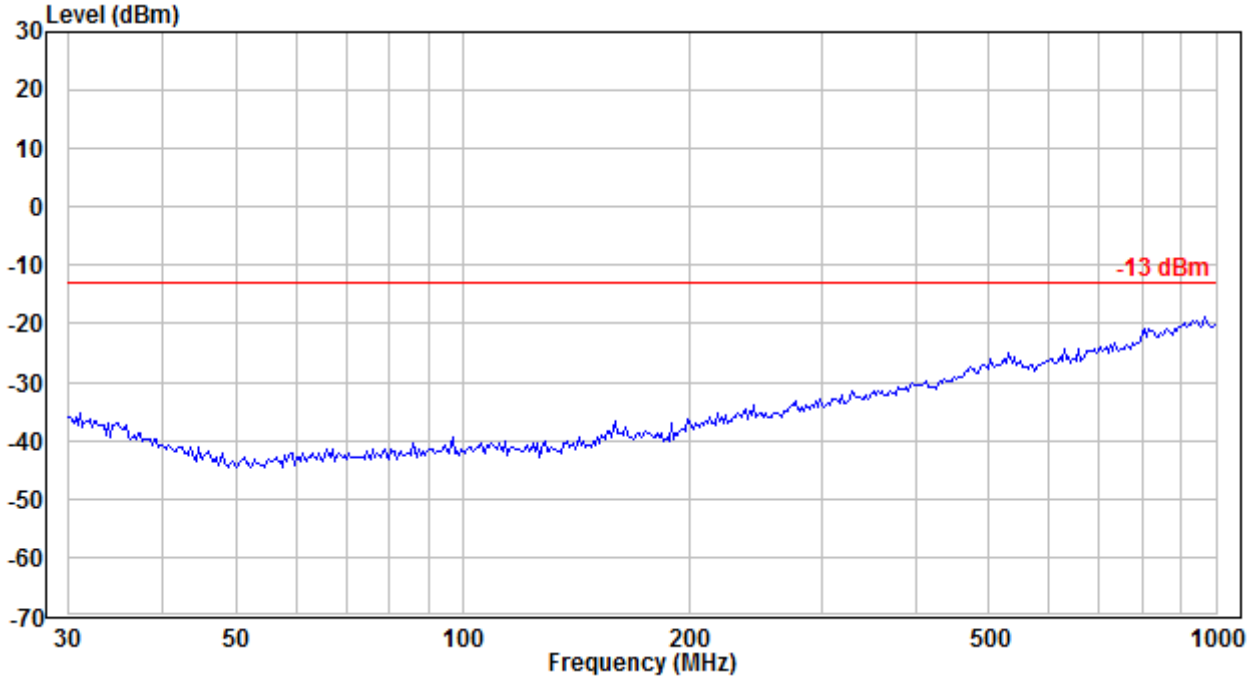


LTE Band 25 / 5 MHz / QPSK_ Middle Channel

Horizontal

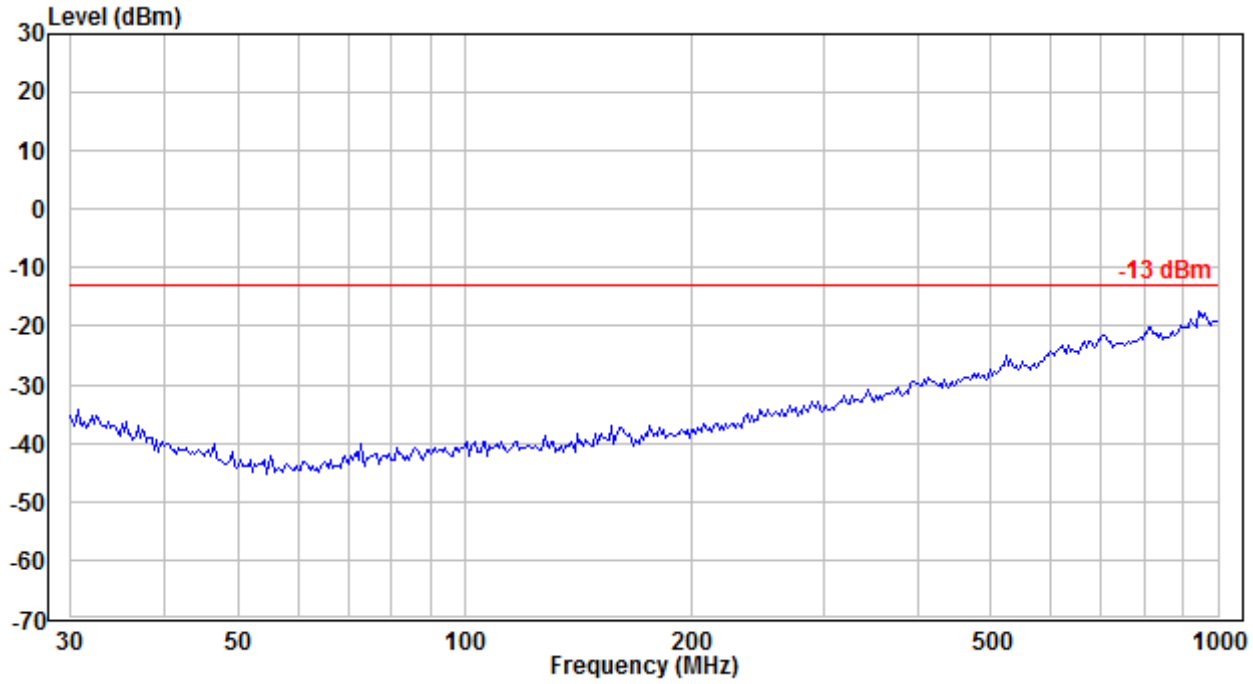


Vertical

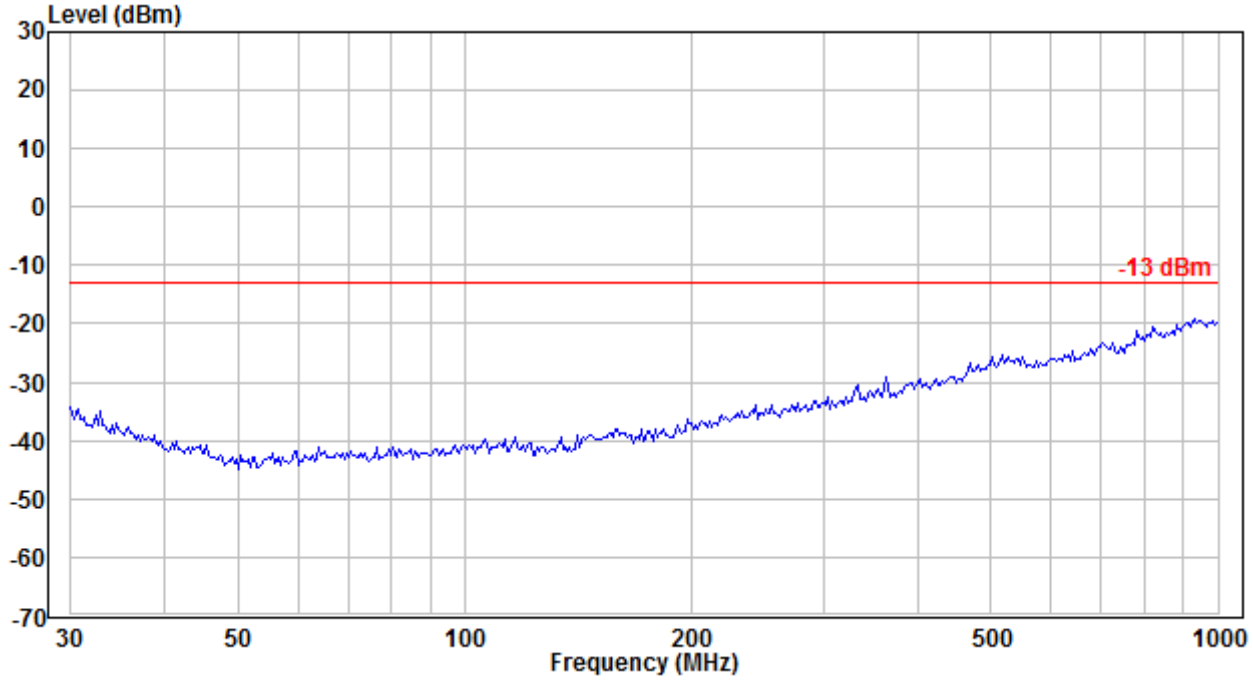


LTE Band 25 / 10 MHz / QPSK_ Middle Channel

Horizontal

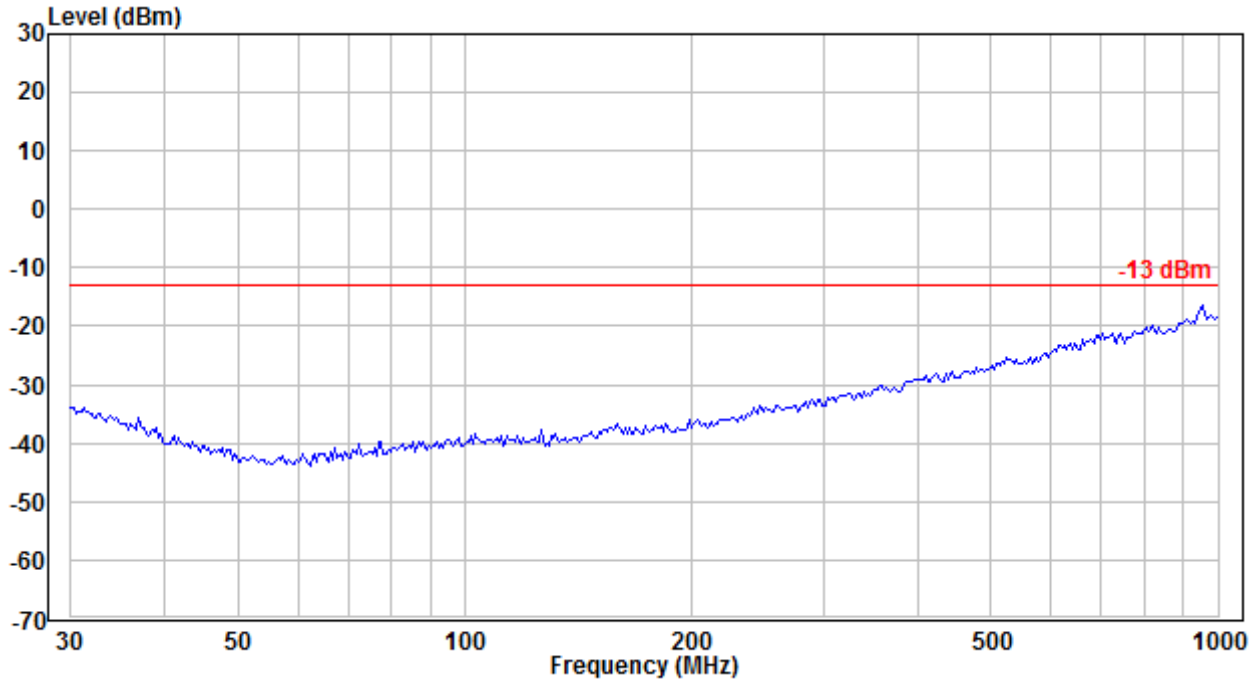


Vertical

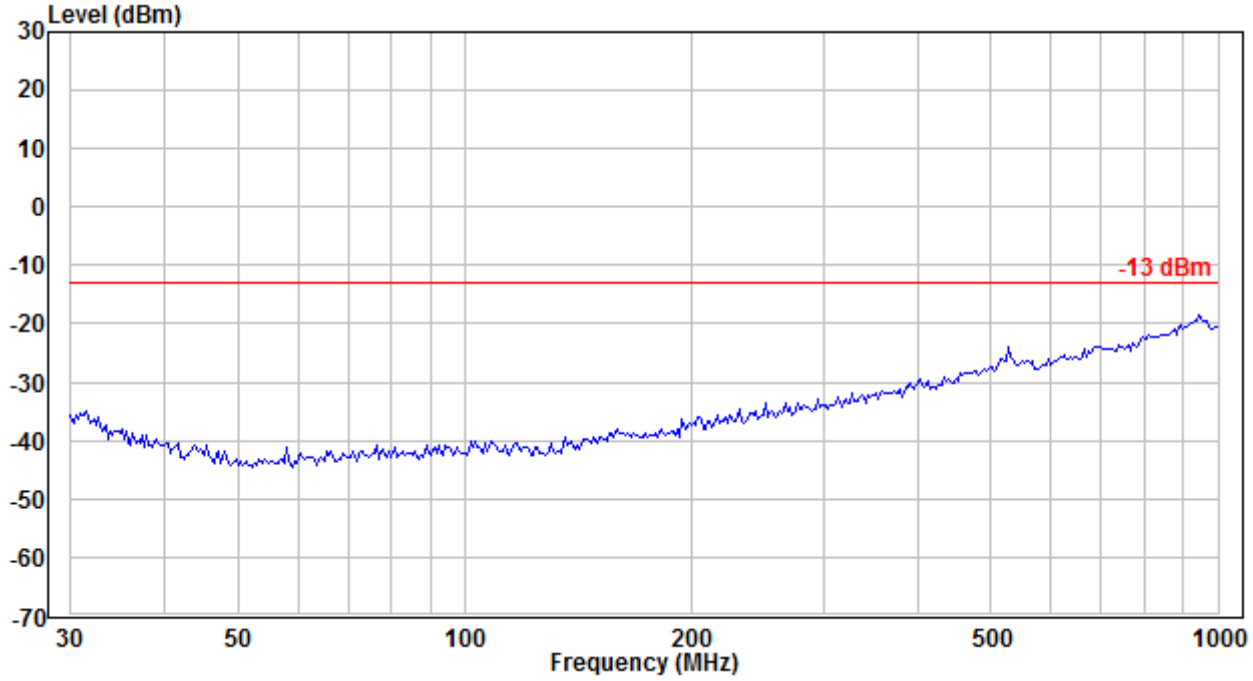


LTE Band 25 / 15 MHz / QPSK_ Middle Channel

Horizontal

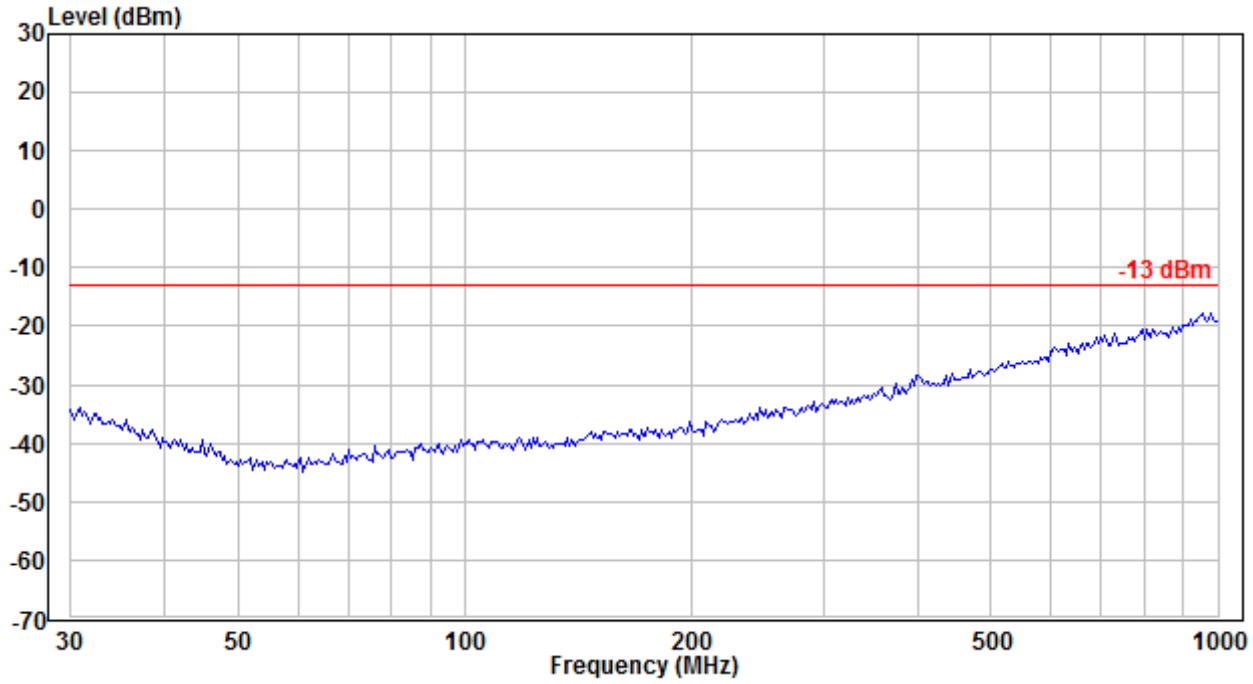


Vertical

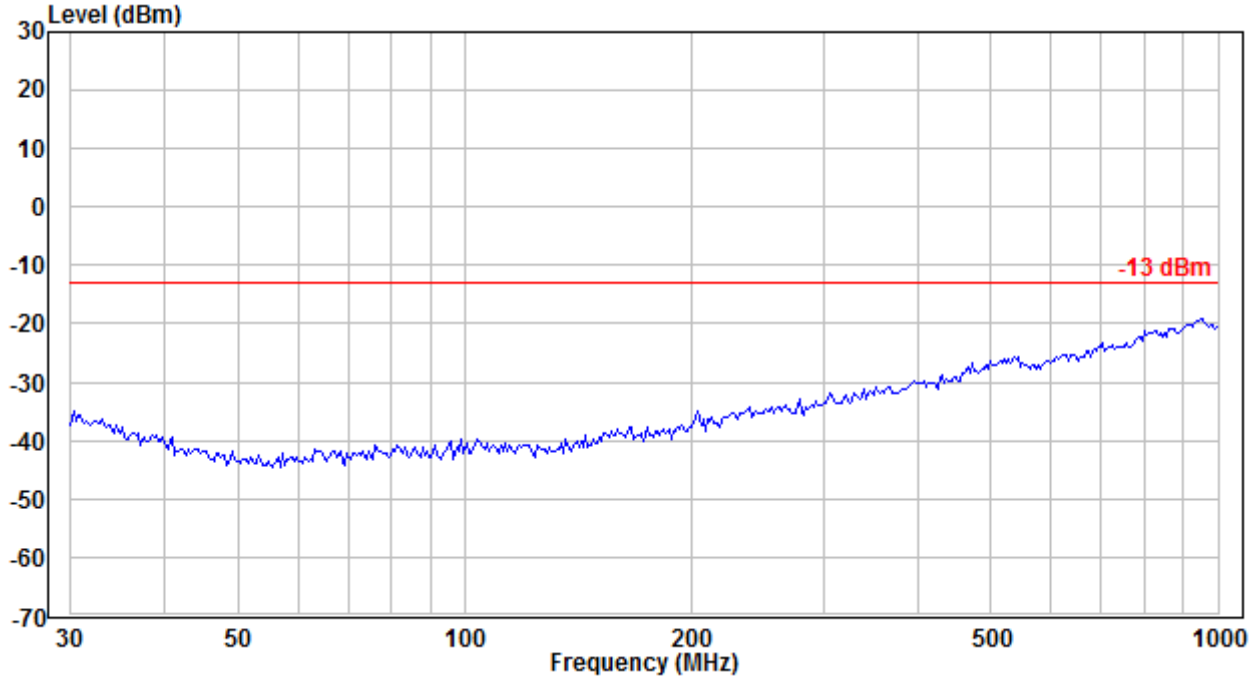


LTE Band 25 / 20 MHz / QPSK_ Middle Channel

Horizontal



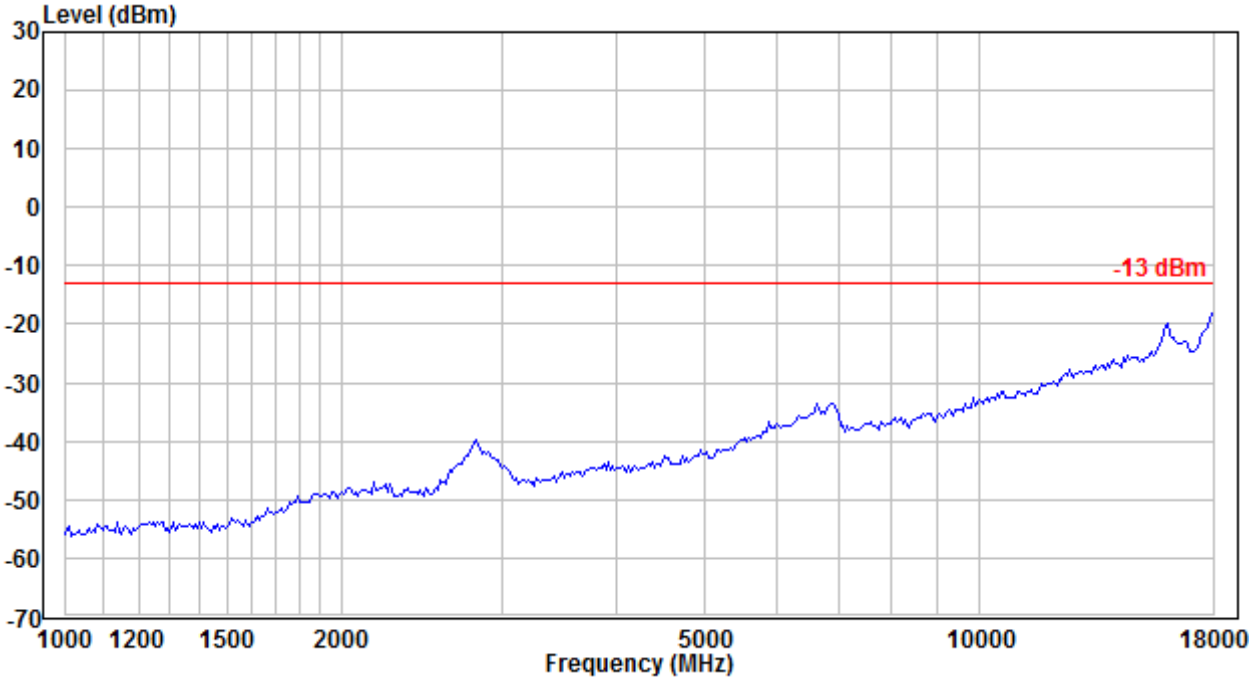
Vertical



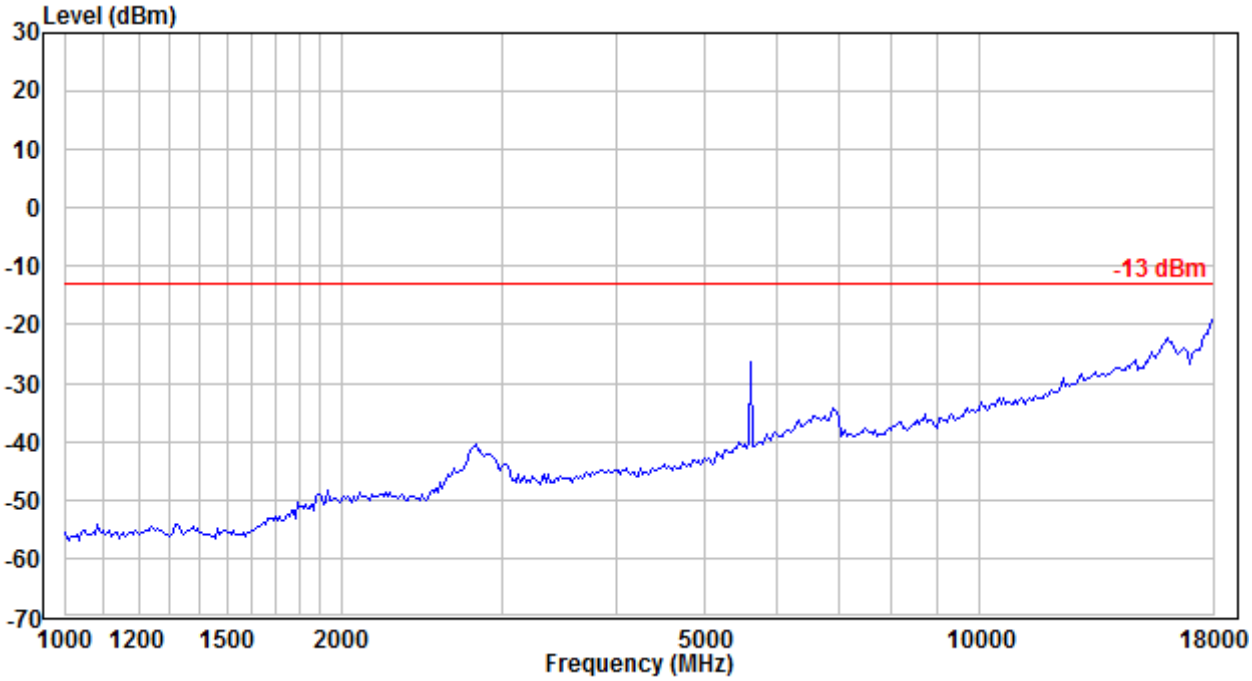
5.8.2 Radiated Emission Test Data (Above 1GHz)

GSM 1Tx-slot_Middle Channel

Horizontal

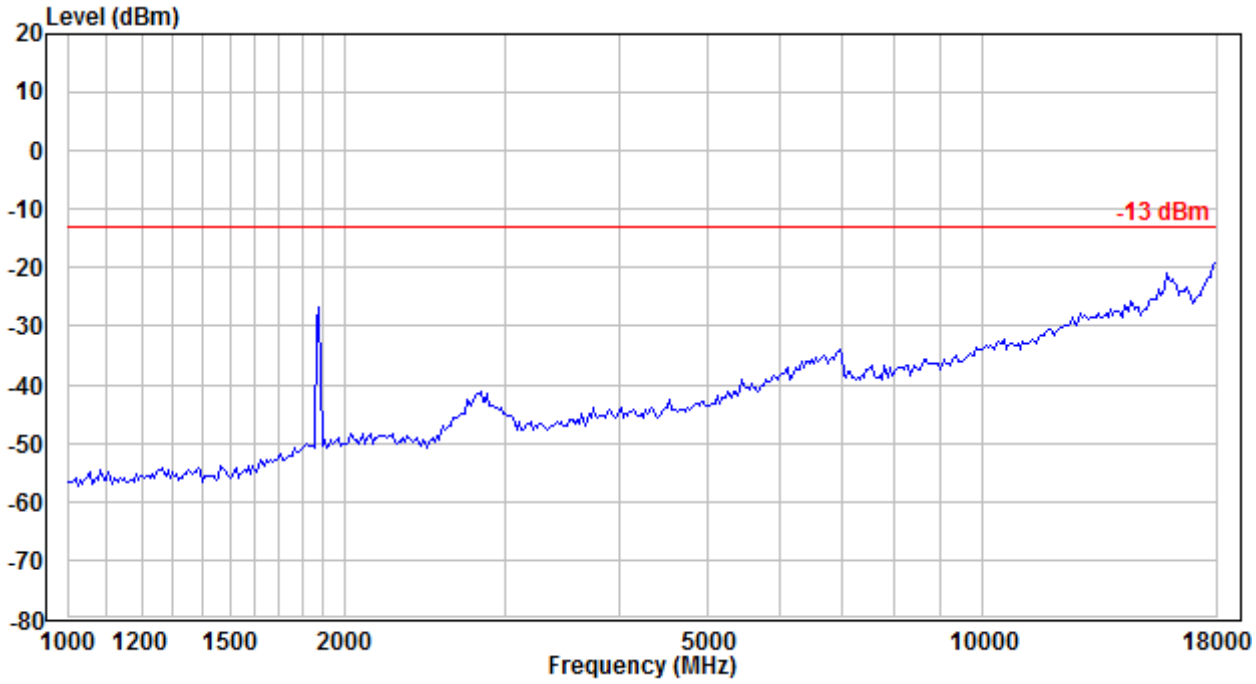


Vertical

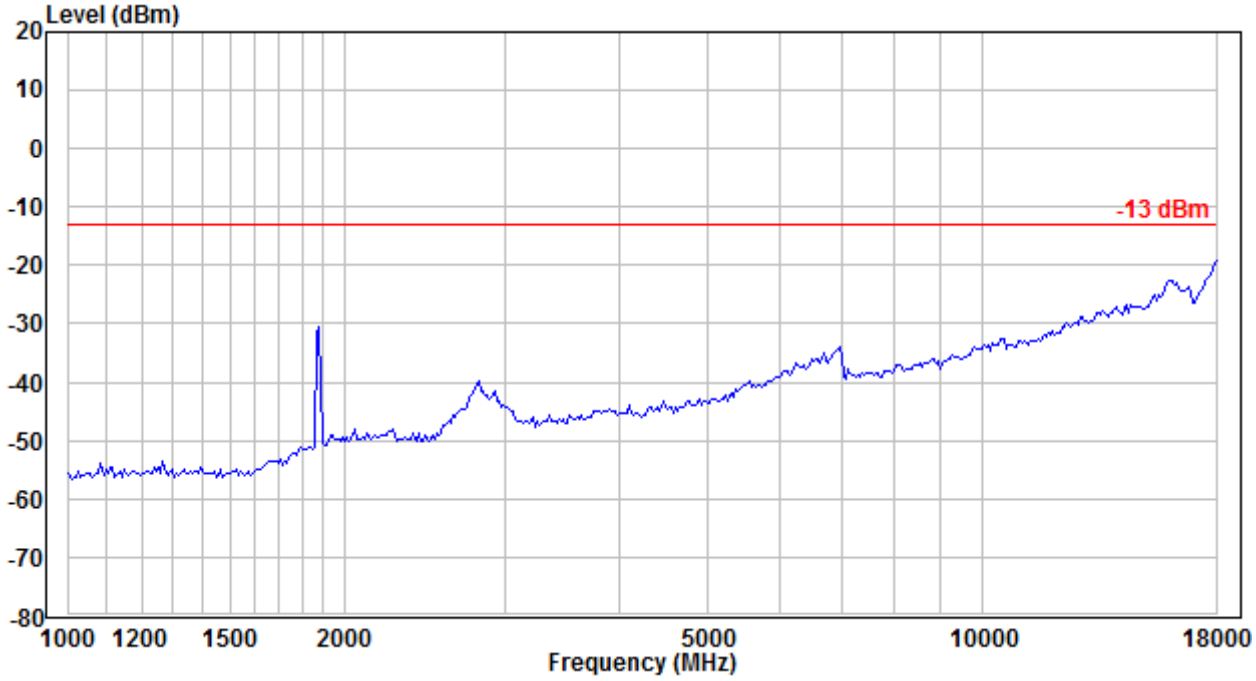


WCDMA RMC 12.2Kbps_Middle Channel

Horizontal

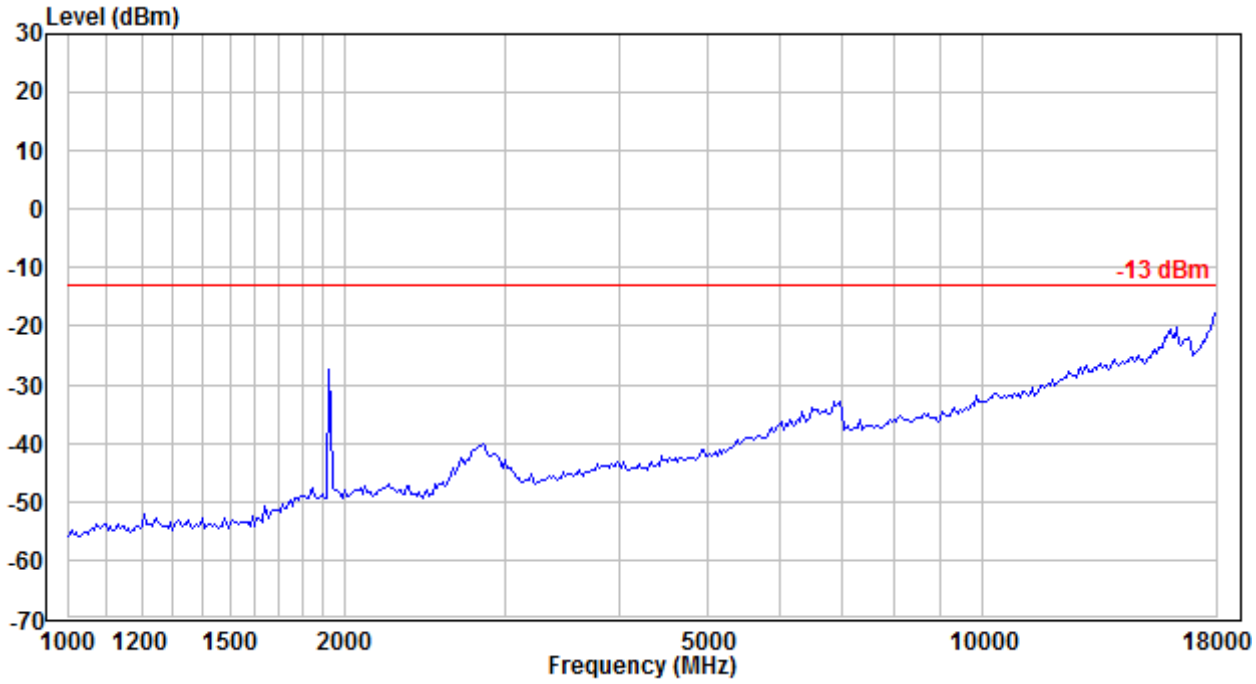


Vertical

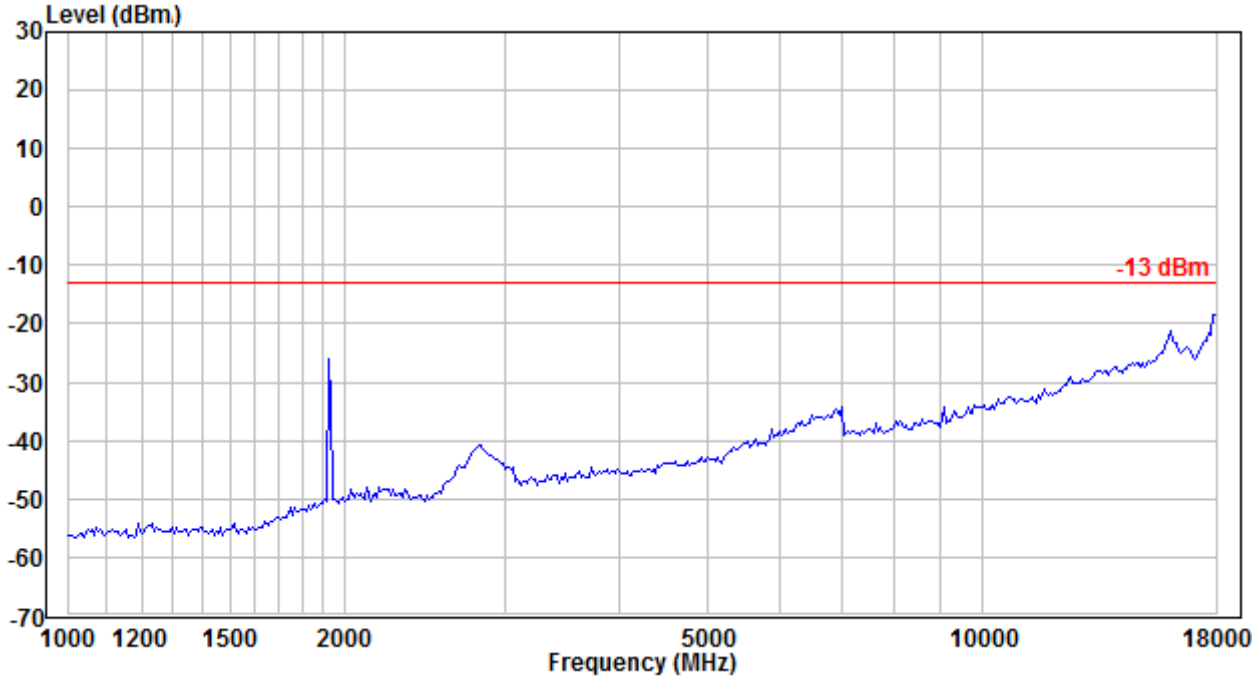


CDMA2000 BC1 1xRTT_Middle Channel

Horizontal

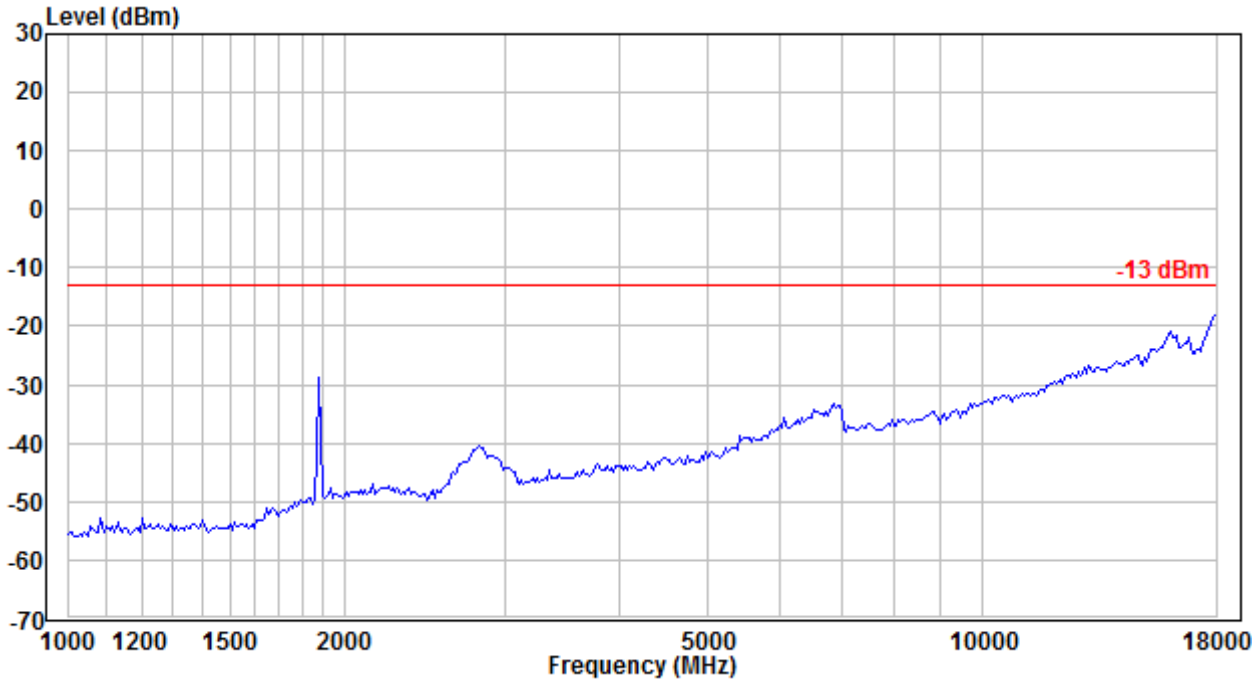


Vertical

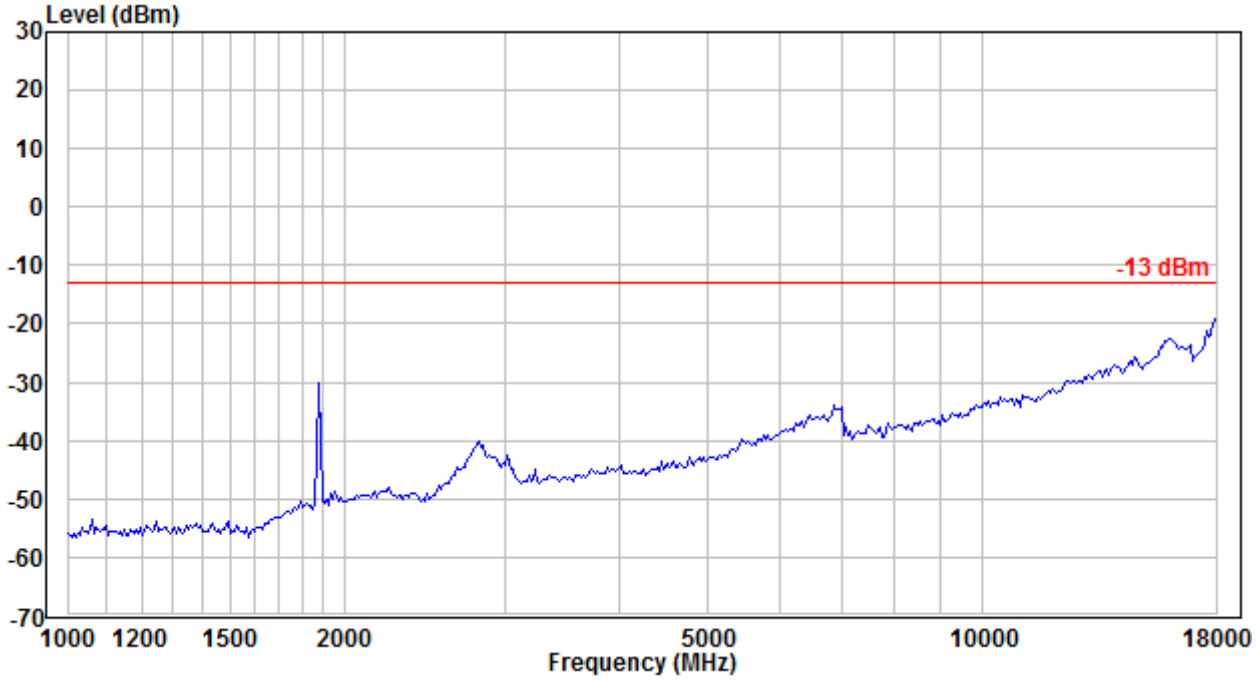


LTE Band 2 / 1.4 MHz / QPSK_ Middle Channel

Horizontal

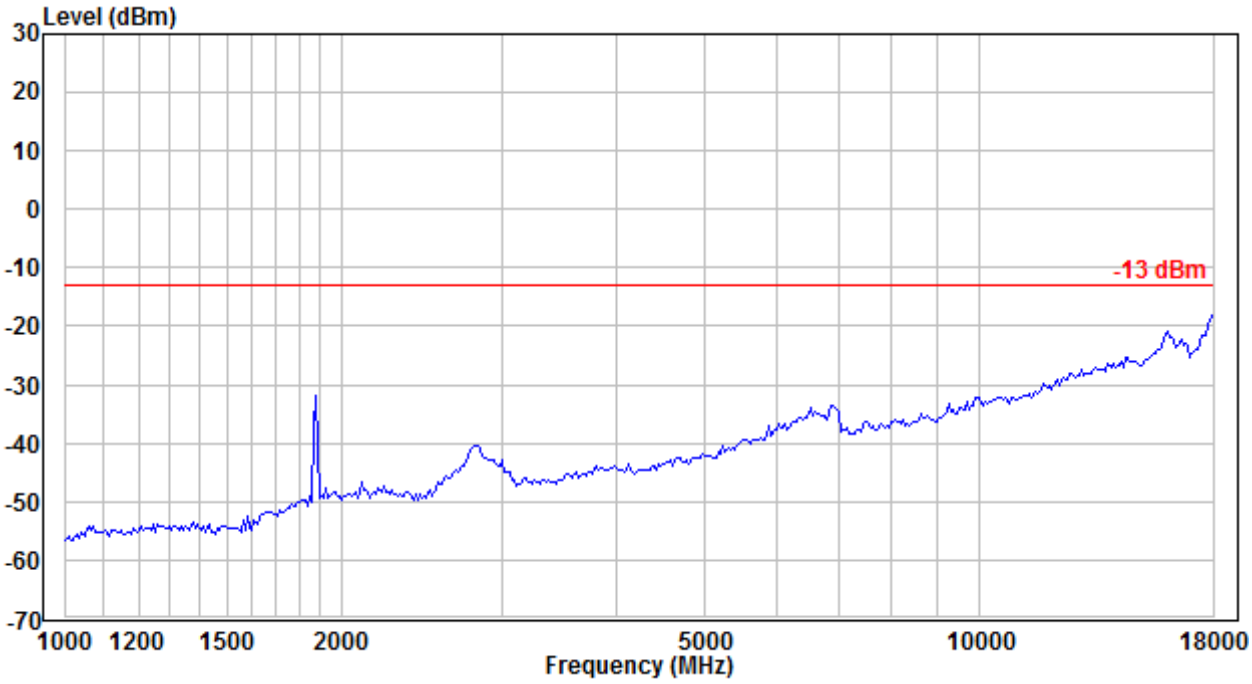


Vertical

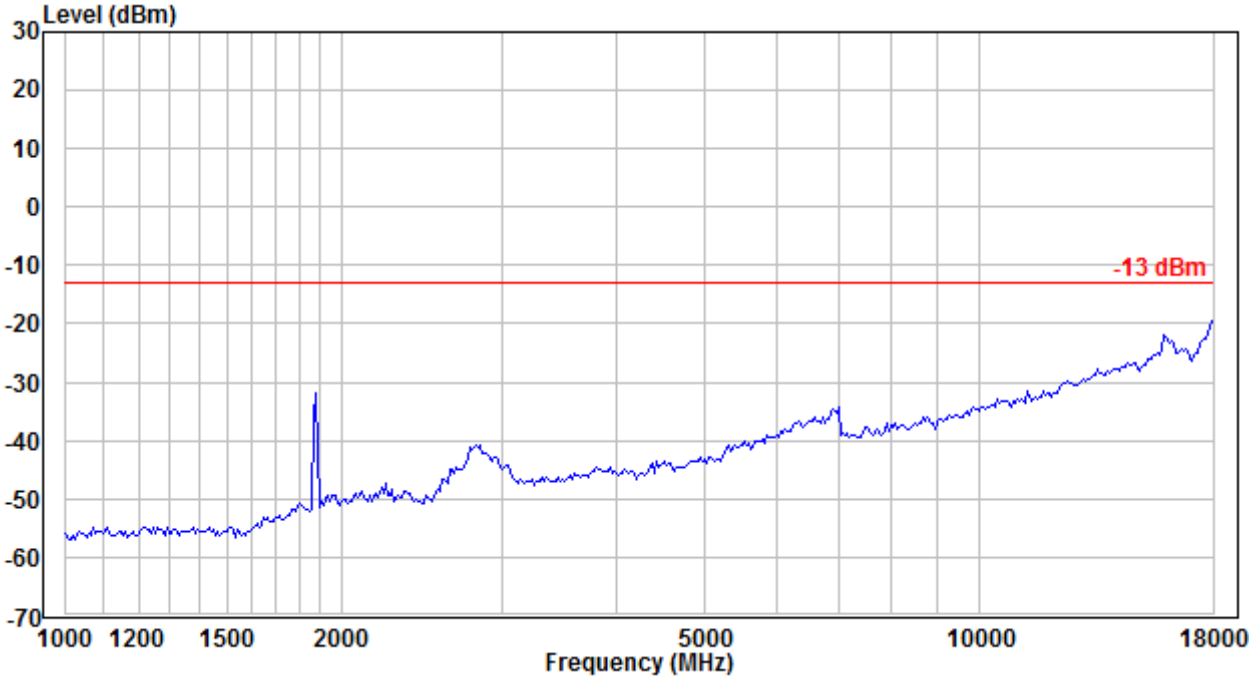


LTE Band 2 / 3 MHz / QPSK_ Middle Channel

Horizontal

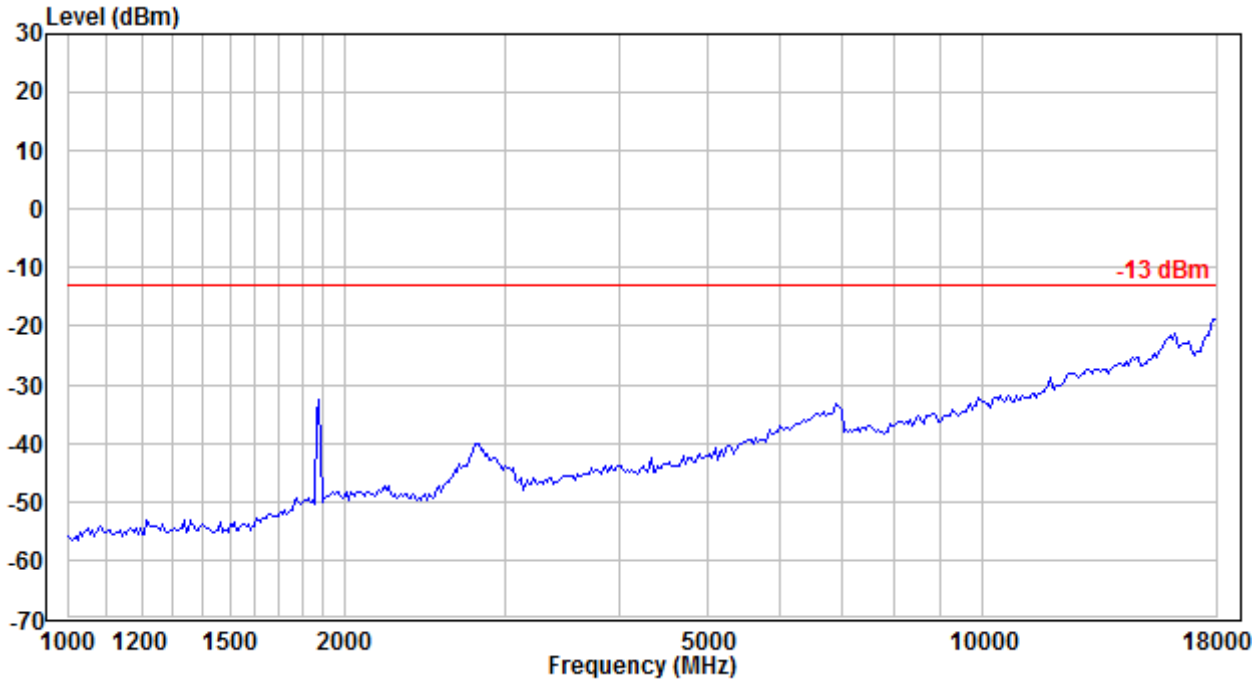


Vertical

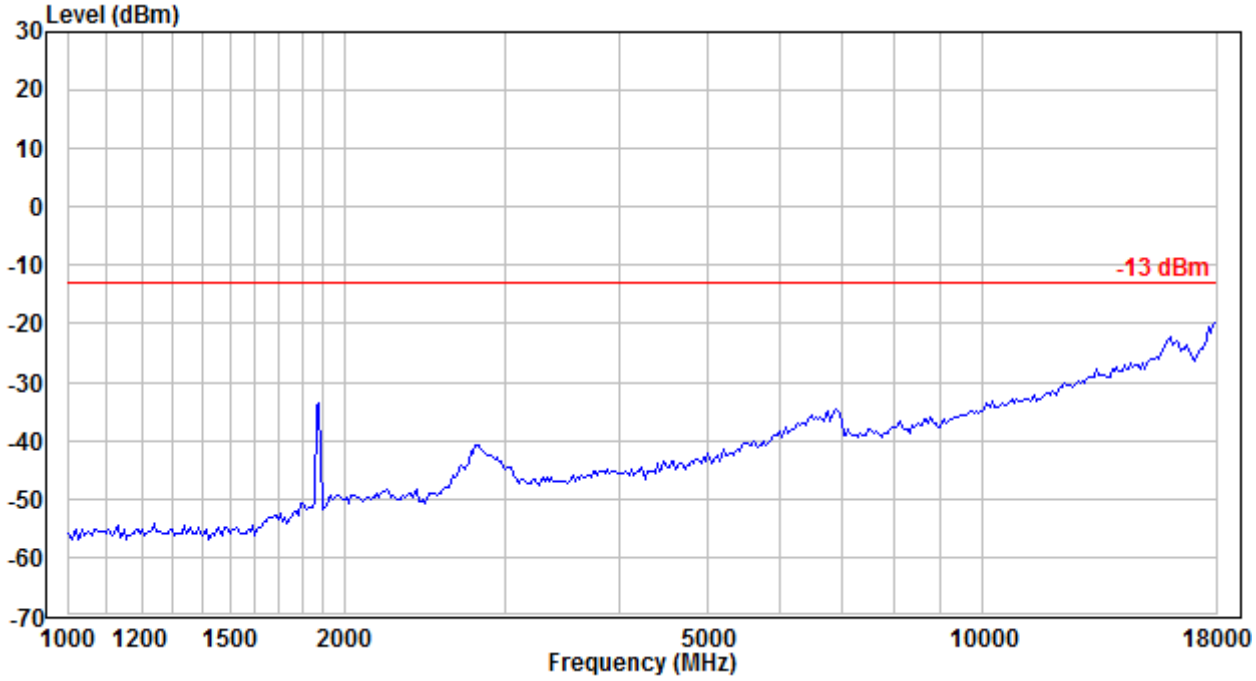


LTE Band 2 / 5 MHz / QPSK_ Middle Channel

Horizontal

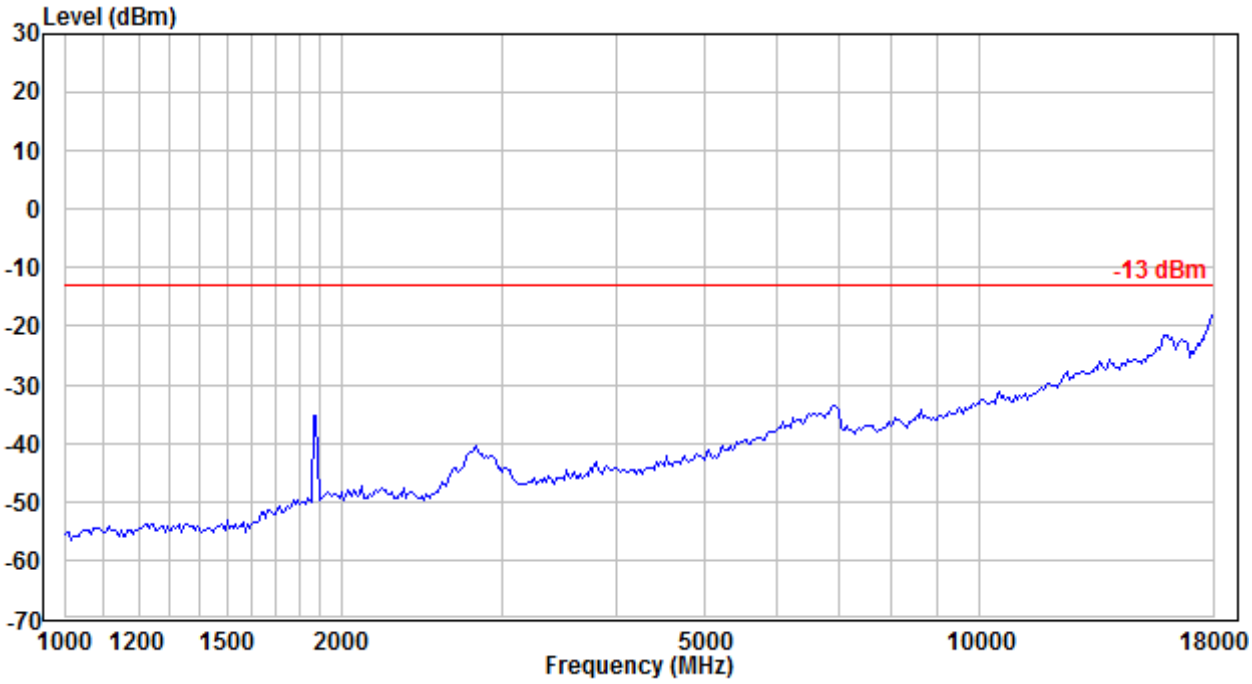


Vertical

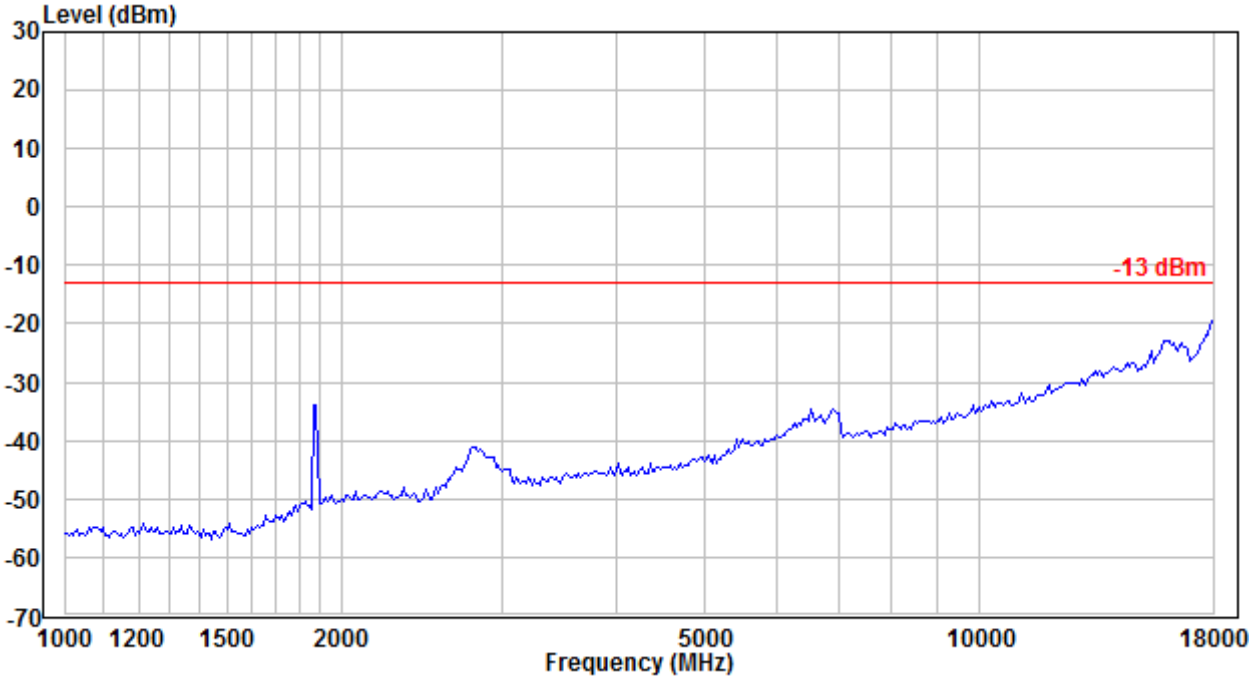


LTE Band 2 / 10 MHz / QPSK_ Middle Channel

Horizontal

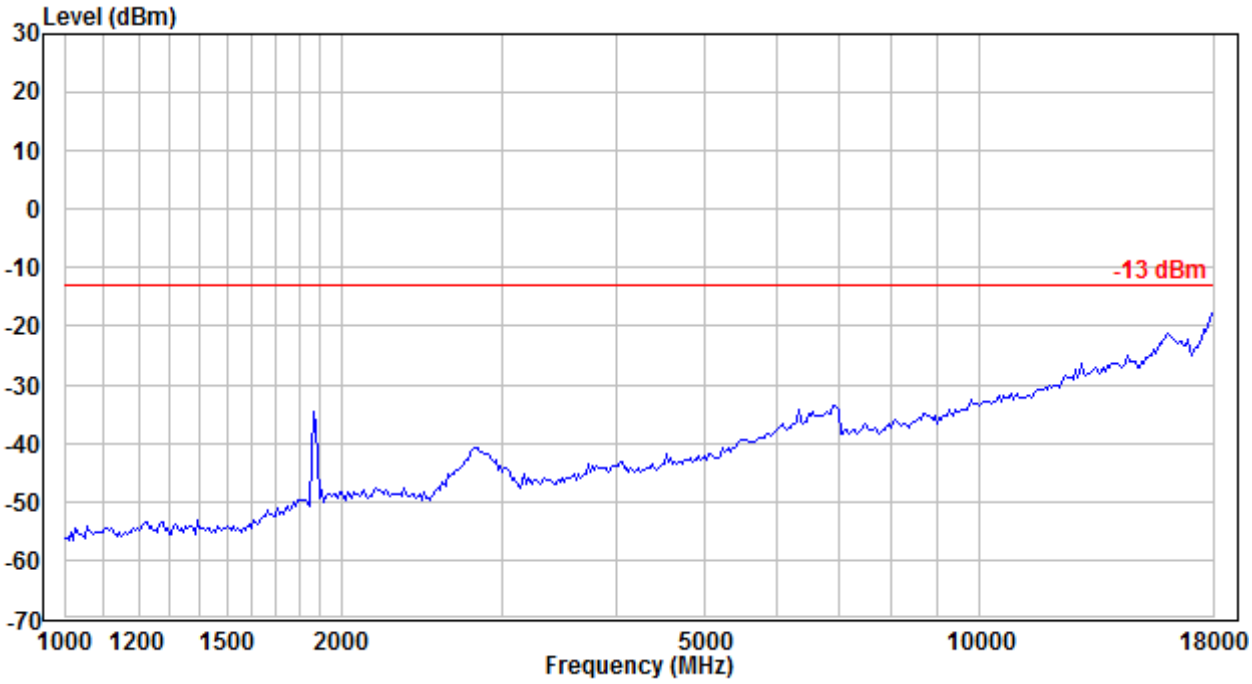


Vertical

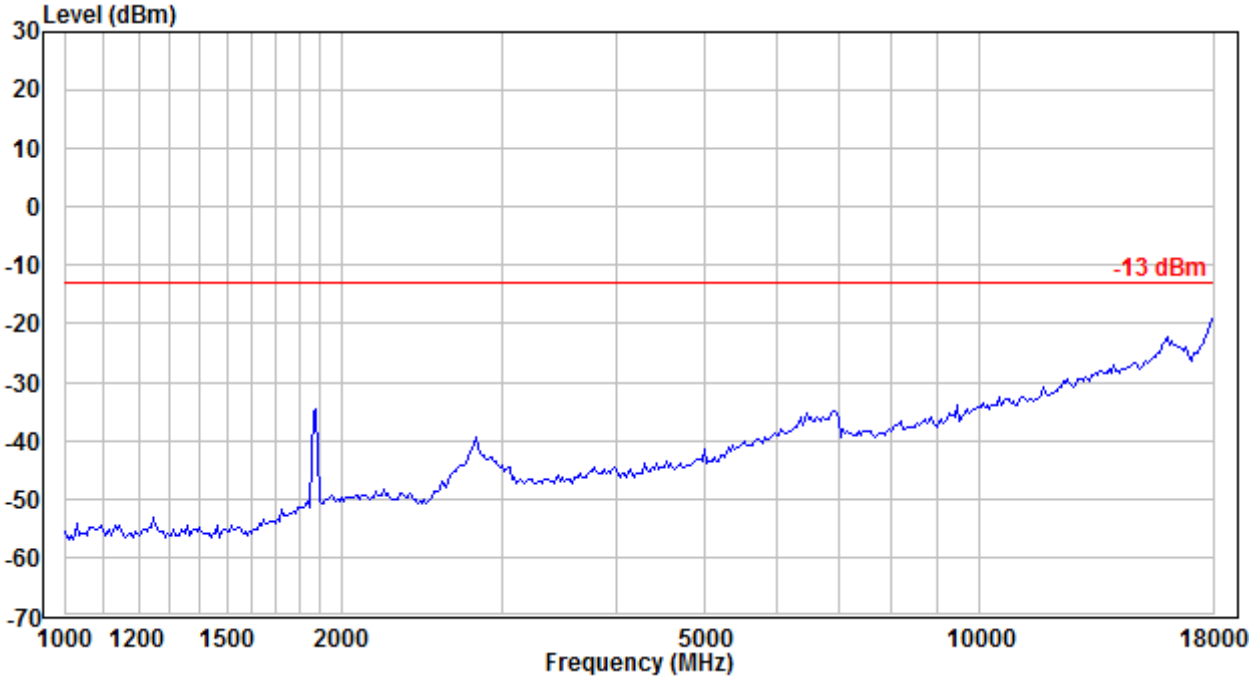


LTE Band 2 / 15 MHz / QPSK_ Middle Channel

Horizontal

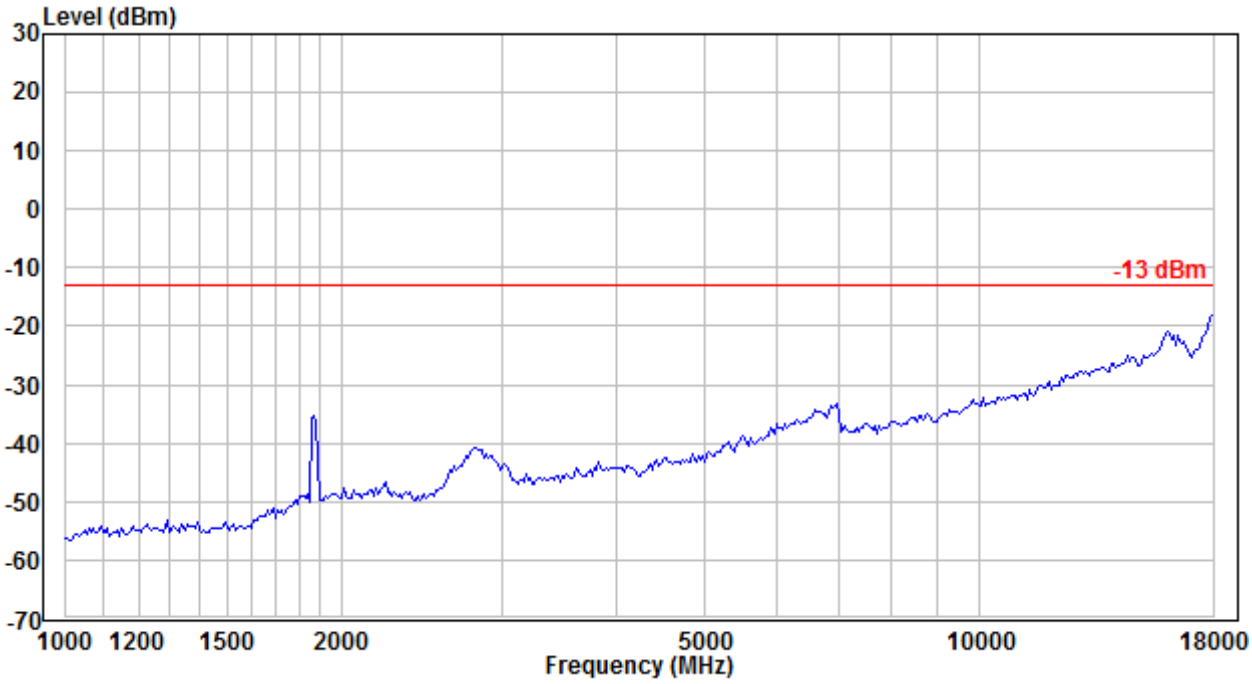


Vertical

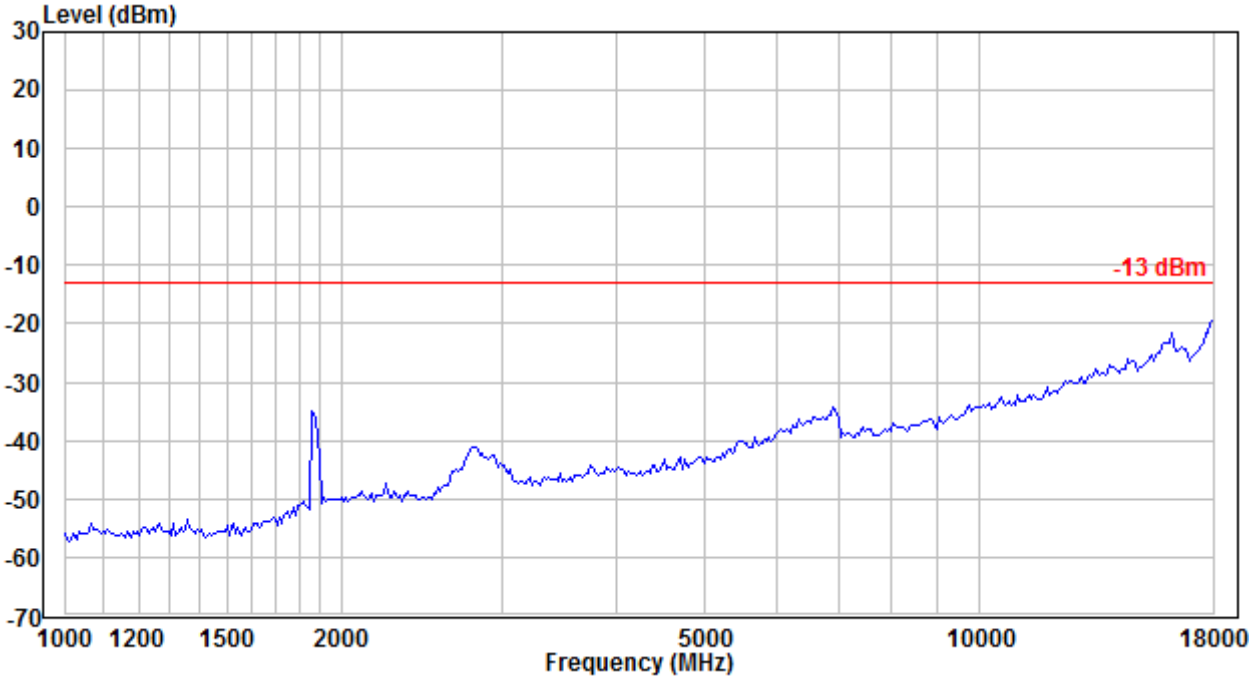


LTE Band 2 / 20 MHz / QPSK_ Middle Channel

Horizontal

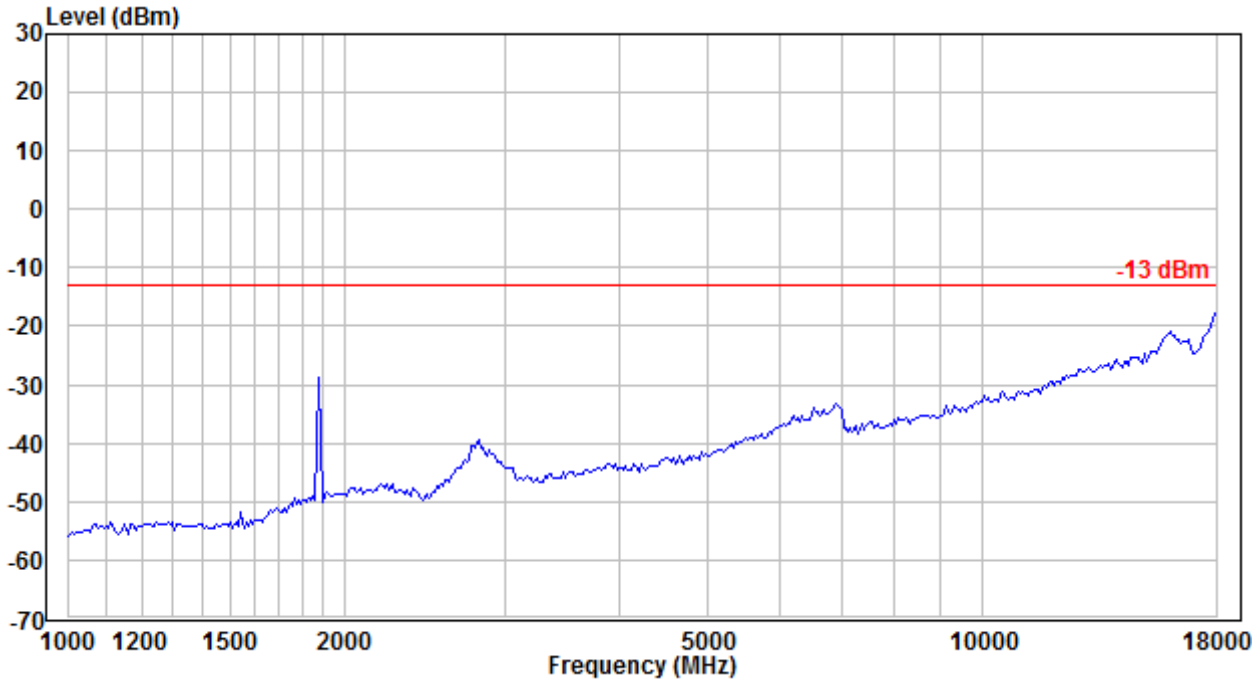


Vertical

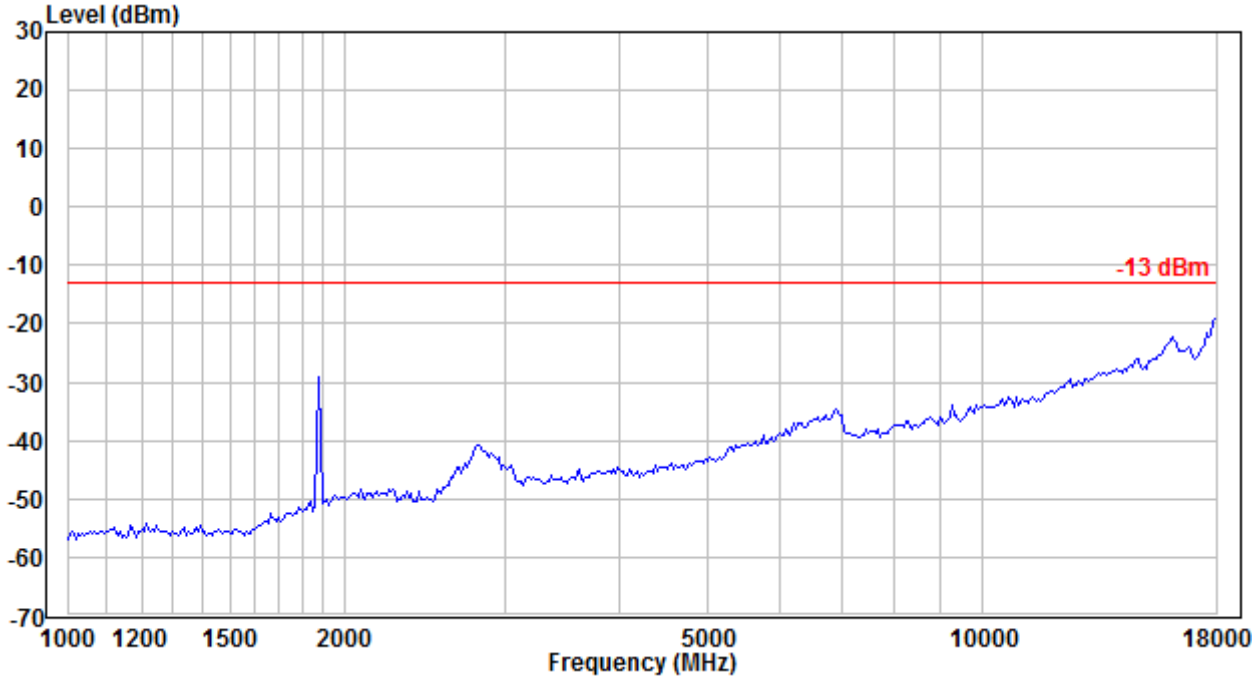


LTE Band 25 / 1.4 MHz / QPSK_ Middle Channel

Horizontal

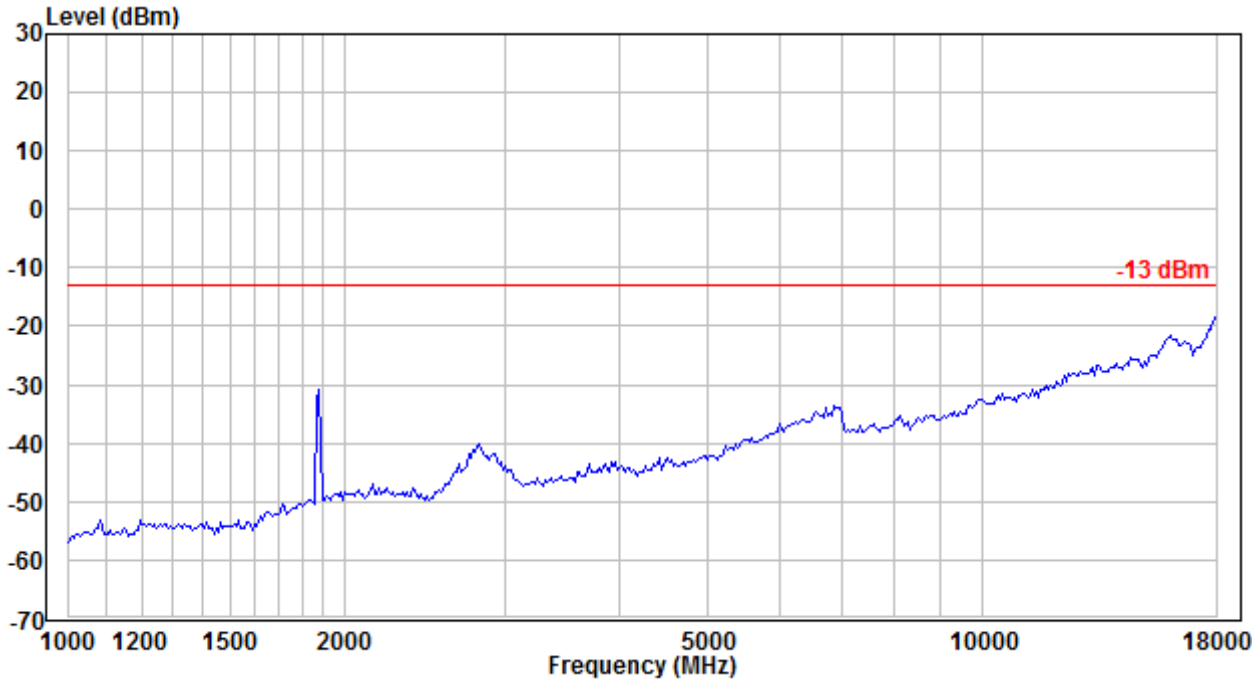


Vertical

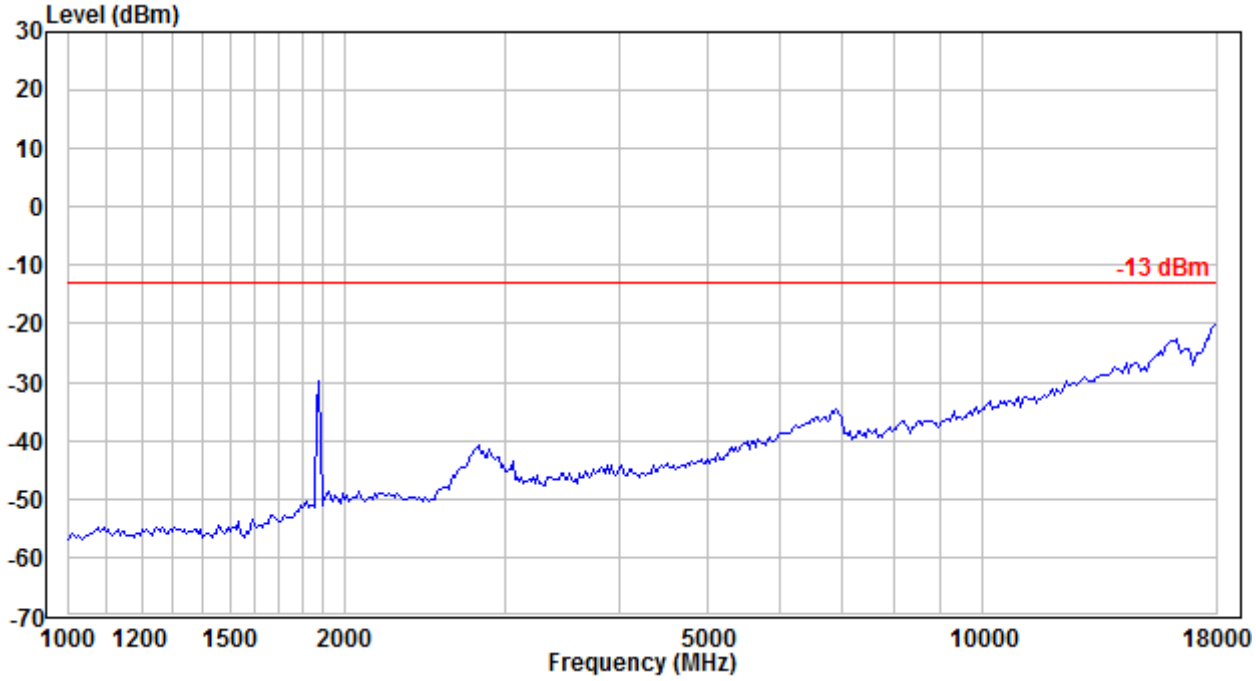


LTE Band 25 / 3 MHz / QPSK_ Middle Channel

Horizontal

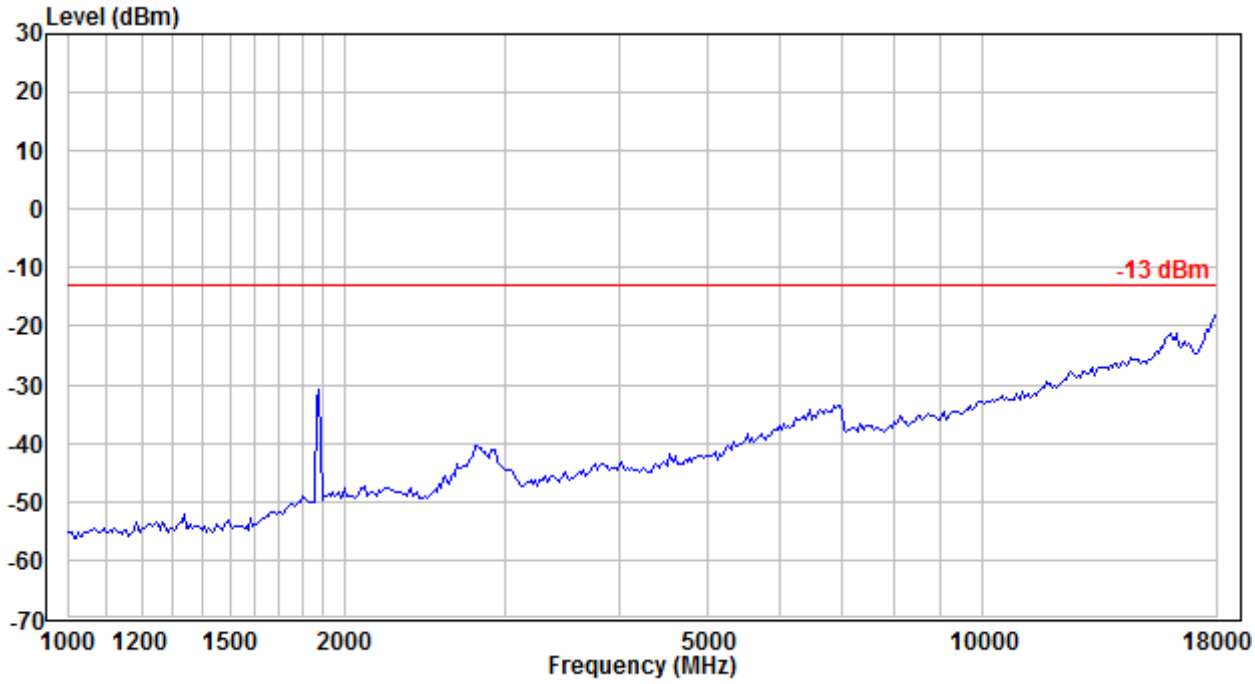


Vertical

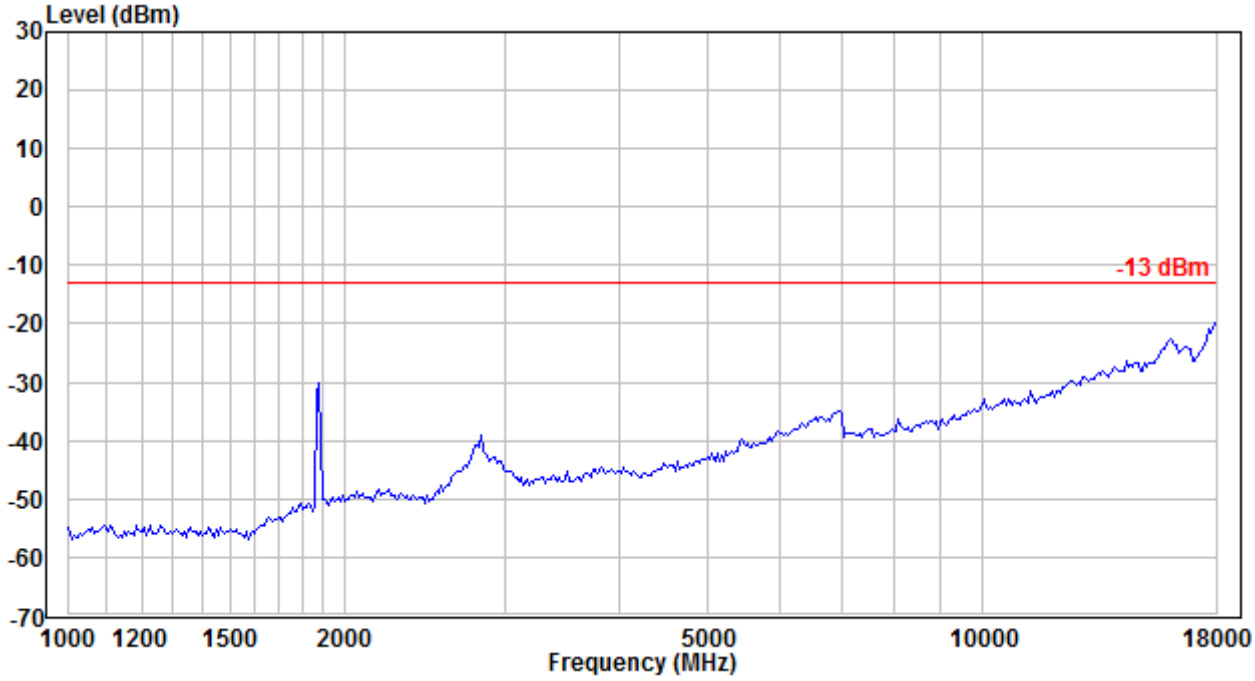


LTE Band 25 / 5 MHz / QPSK_ Middle Channel

Horizontal

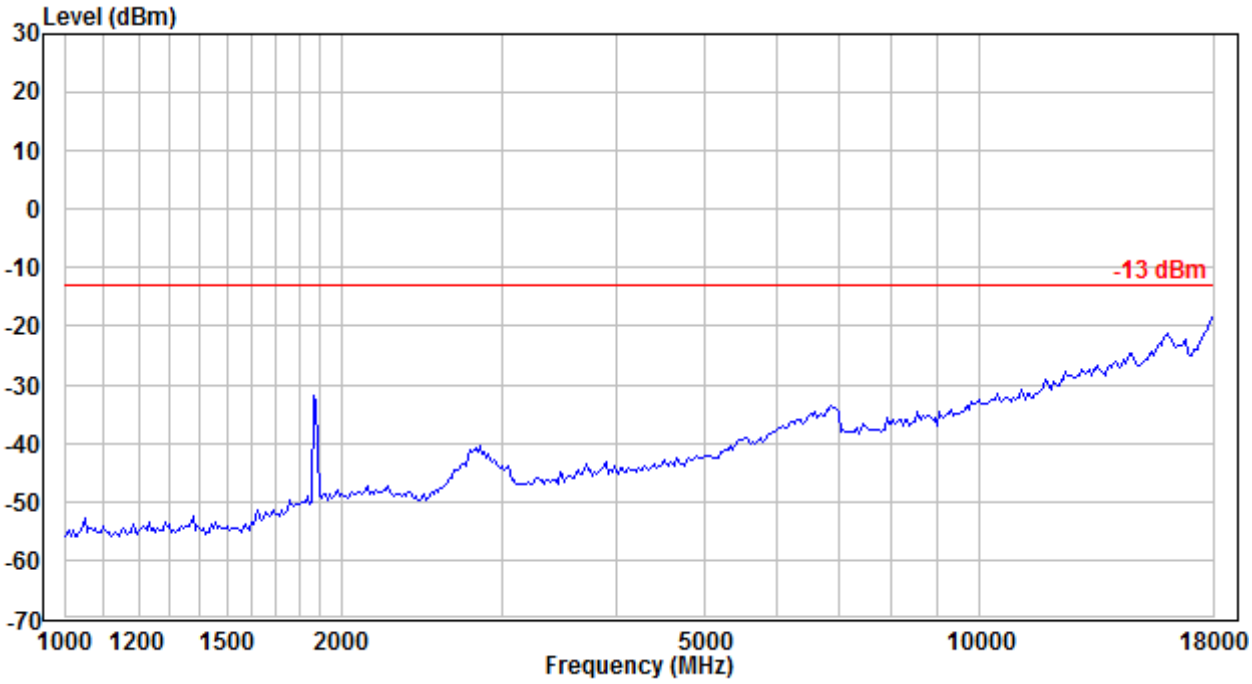


Vertical

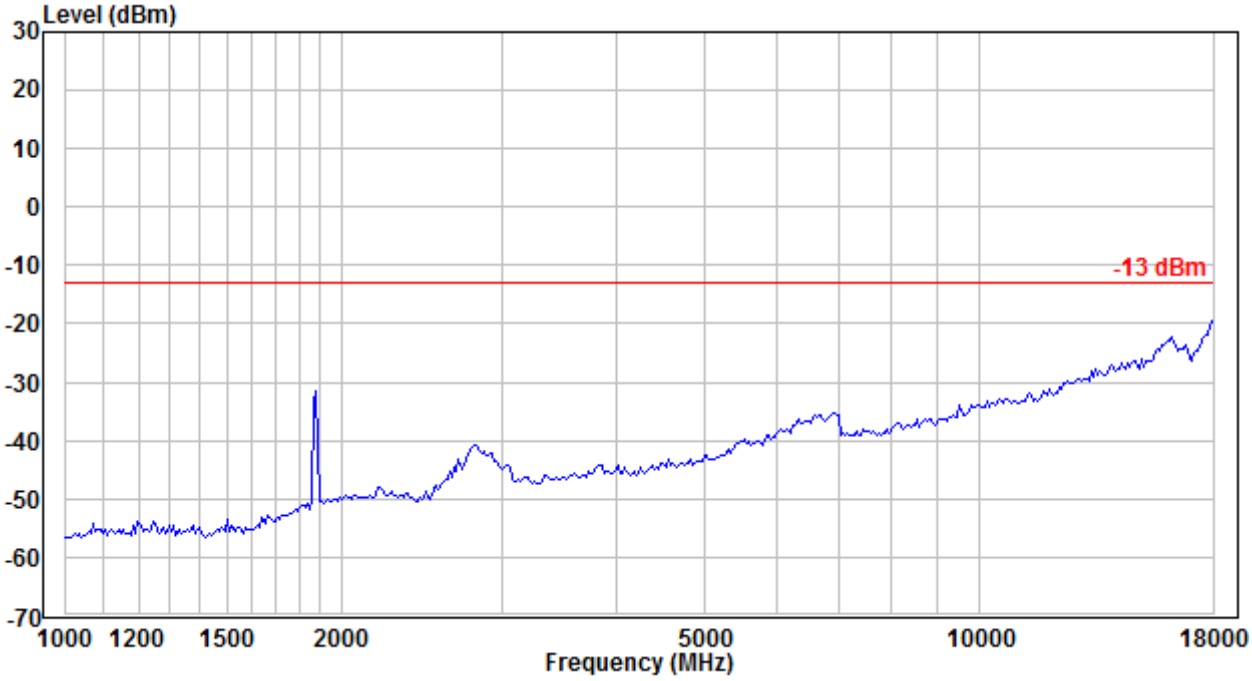


LTE Band 25 / 10 MHz / QPSK_ Middle Channel

Horizontal

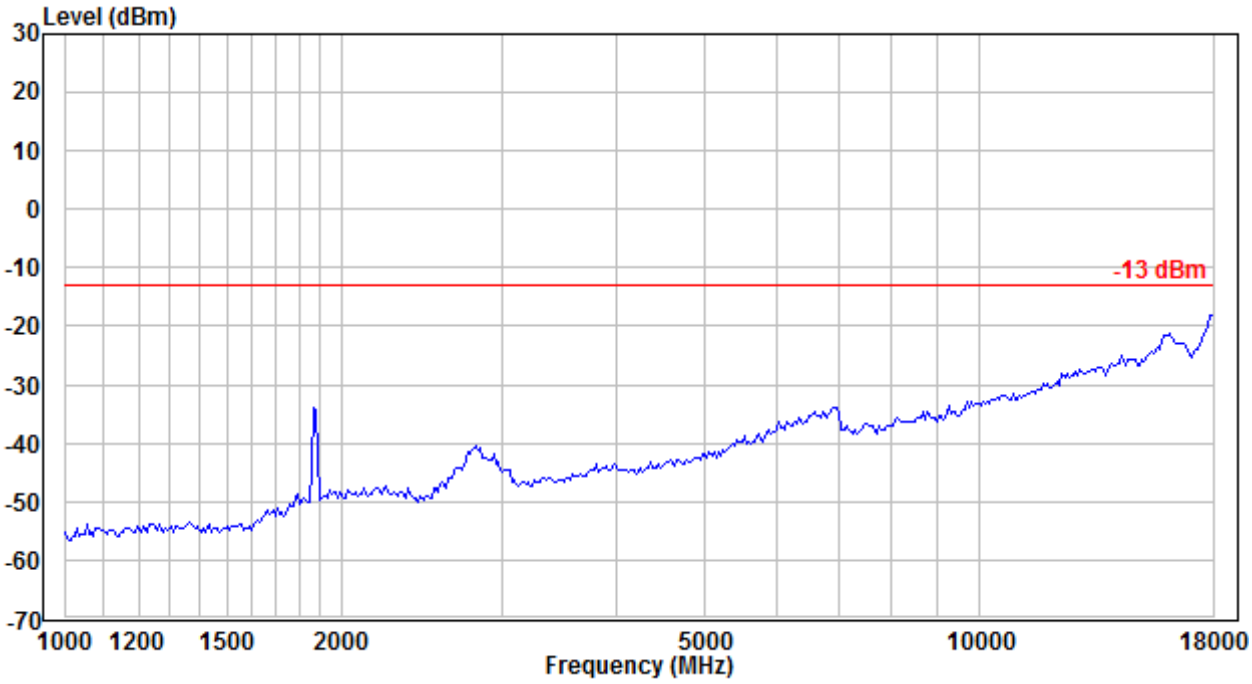


Vertical

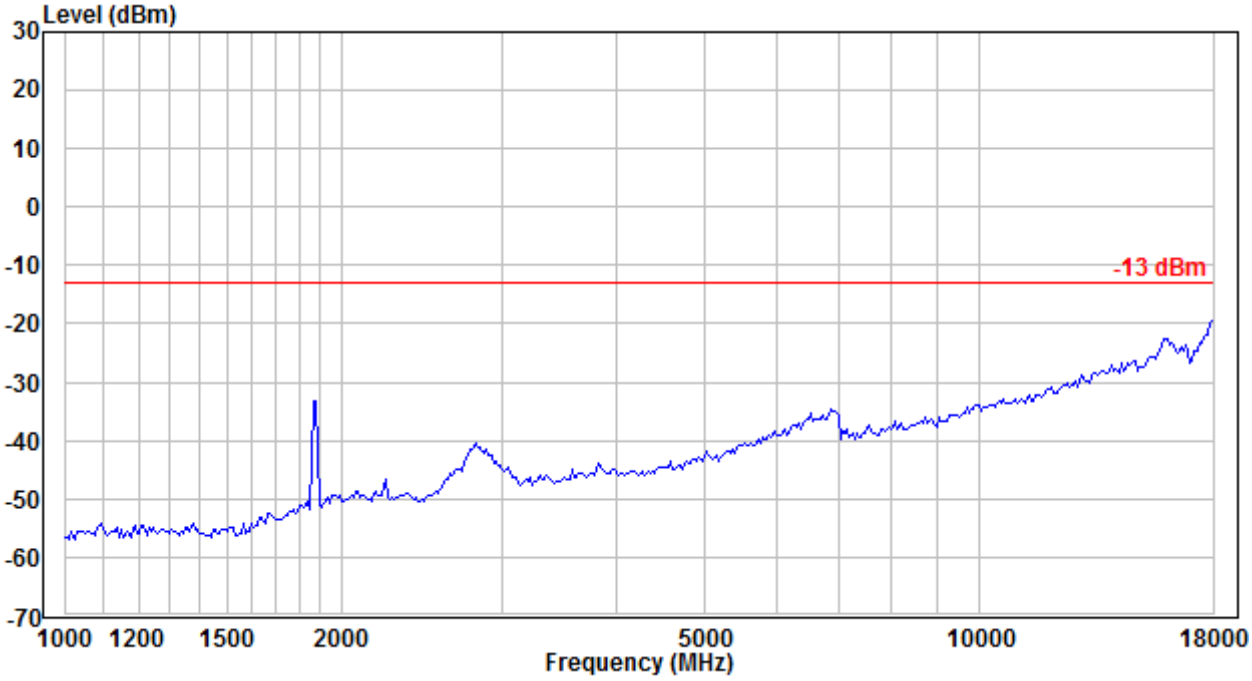


LTE Band 25 / 15 MHz / QPSK_ Middle Channel

Horizontal

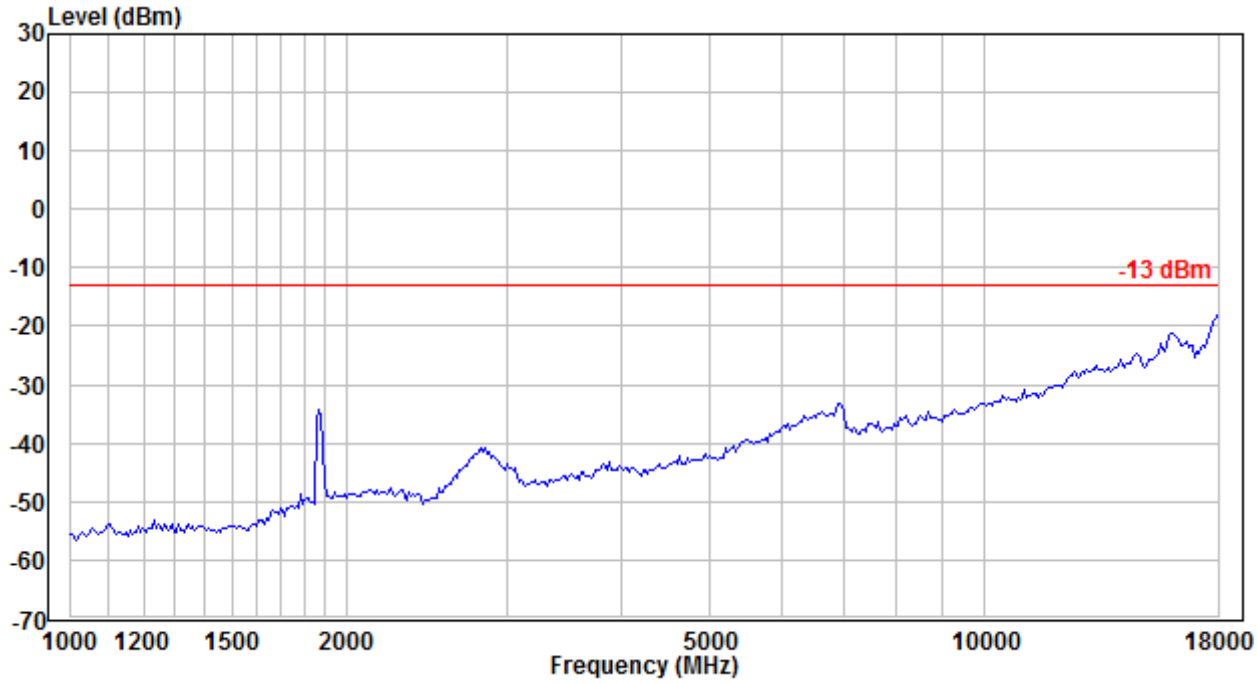


Vertical

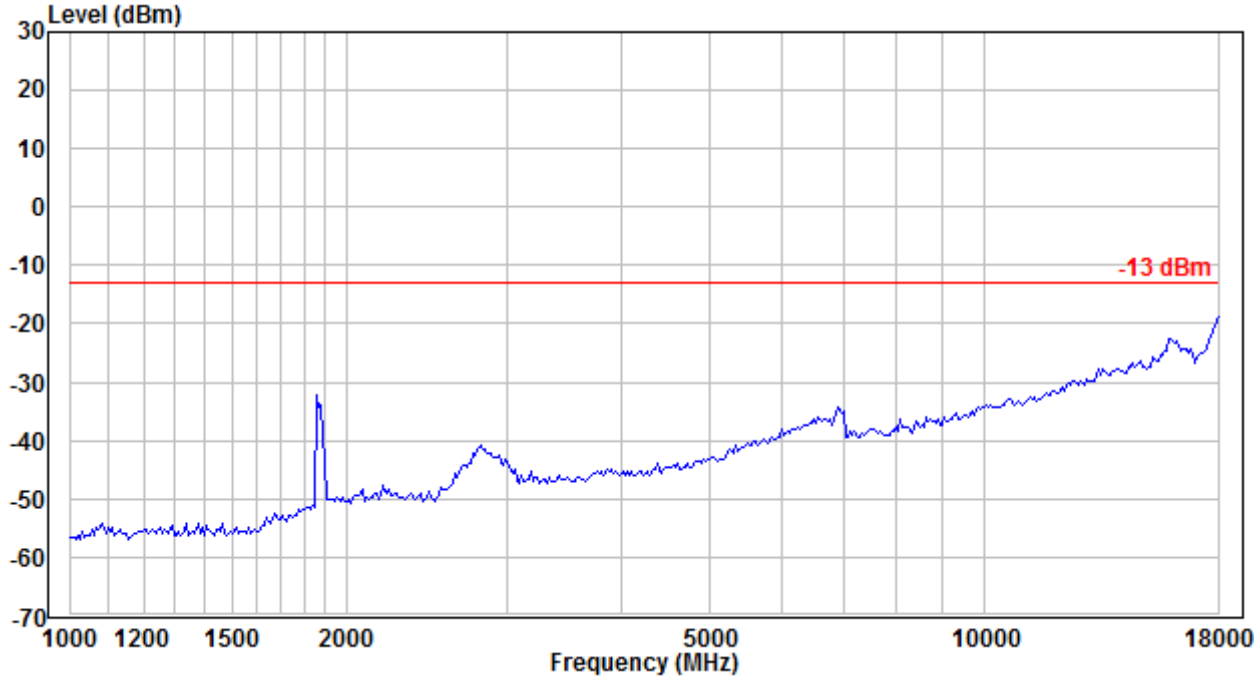


LTE Band 25 / 20 MHz / QPSK_ Middle Channel

Horizontal



Vertical



Remark:

1) The disturbance above 18GHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

2) All tested is under the condition of the main wave is filtered out.

5.9 FREQUENCY STABILITY

Test Requirement: FCC 47 CFR Part 2.1055 & FCC 47 CFR Part 24.235

Test Method: ANSI/TIA/EIA-603-D 2010 & KDB 971168 D01v02r02

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

Test Setup: Refer to section 4.2.2 for details.

Test Procedures:

1) Use CMW 500 or CMU 200 with Frequency Error measurement capability.
   a) Temp. = −30° to + 50°C
   b) Voltage =low voltage, 3.7 Vdc, Normal, 3.85 Vdc and High voltage, 4.4 Vdc.
2) Frequency Stability vs Temperature:

The EUT is place inside a temperature chamber. The temperature is set to 20ºC and allowed to stabilize. After sufficient soak time, the transmitting frequency error is measured. The temperature is increased by 10 degrees, allowed to stabilize and soak, and then the measurement is repeated. This is repeated until +50ºC is reached.

3) Frequency Stability vs Voltage:

The peak frequency error is recorded (worst-case).

Equipment Used: Refer to section 3 for details.

Test Result: Pass

Modulation	Channel/ Frequency (MHz)	Voltage (Vdc)	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Pass/ Fail
GSM 1Tx-slot							
GMSK	661 / 1880.0	VL	TN	27	0.0144	Note 1	Pass
		VN		23	0.0122		Pass
		VH		21	0.0112		Pass
		VN	50	26	0.0138		Pass
			40	25	0.0133		Pass
			30	27	0.0144		Pass
			20	22	0.0117		Pass
			10	22	0.0117		Pass
			0	26	0.0138		Pass
			-10	24	0.0128		Pass
			-20	31	0.0165		Pass
			-30	36	0.0191		Pass

Modulation	Channel/ Frequency (MHz)	Voltage (Vdc)	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Pass/ Fail
EDGE 1Tx-slot							
GMSK	661 / 1880.0	VL	TN	35	0.0186	Note 1	Pass
		VN		35	0.0186		Pass
		VH		32	0.0170		Pass
		VN	50	35	0.0186		Pass
			40	42	0.0223		Pass
			30	45	0.0239		Pass
			20	35	0.0186		Pass
			10	36	0.0191		Pass
			0	34	0.0181		Pass
			-10	36	0.0191		Pass
			-20	43	0.0229		Pass
			-30	46	0.0245		Pass

Modulation	Channel/ Frequency (MHz)	Voltage (Vdc)	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Pass/ Fail
WCDMA RMC 12.2Kbps							
GMSK	9400 / 1880.0	VL	TN	-3	-0.0016	Note 1	Pass
		VN		-5	-0.0027		Pass
		VH		-9	-0.0048		Pass
		VN	50	-2	-0.0011		Pass
			40	-7	-0.0037		Pass
			30	-4	-0.0021		Pass
			20	-8	-0.0043		Pass
			10	-5	-0.0027		Pass
			0	-1	-0.0005		Pass
			-10	-7	-0.0037		Pass
			-20	-1	-0.0005		Pass
			-30	-2	-0.0011		Pass

Modulation	Channel/ Frequency (MHz)	Voltage (Vdc)	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Pass/ Fail
CDMA BC1 1xRTT							
QPSK	600 / 1880.0	VL	TN	13	0.0069	Note 1	Pass
		VN		14	0.0074		Pass
		VH		10	0.0053		Pass
		VN	50	16	0.0085		Pass
			40	19	0.0101		Pass
			30	21	0.0112		Pass
			20	13	0.0069		Pass
			10	16	0.0085		Pass
			0	20	0.0106		Pass
			-10	12	0.0064		Pass
			-20	21	0.0112		Pass
			-30	28	0.0149		Pass

Modulation	Channel/ Frequency (MHz)	Voltage (Vdc)	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Pass/ Fail
LTE Band 2 / 20MHz / Full RB							
QPSK	18900 / 1880.0	VL	TN	20	0.0106	Note 1	Pass
		VN		16	0.0085		Pass
		VH		13	0.0069		Pass
		VN	50	23	0.0122		Pass
			40	22	0.0117		Pass
			30	18	0.0096		Pass
			20	13	0.0069		Pass
			10	19	0.0101		Pass
			0	26	0.0138		Pass
			-10	18	0.0096		Pass
			-20	23	0.0122		Pass
			-30	21	0.0112		Pass

Modulation	Channel/ Frequency (MHz)	Voltage (Vdc)	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Pass/ Fail
LTE Band 25 / 20MHz / Full RB							
QPSK	26340 / 1880.0	VL	TN	19	0.0101	Note 1	Pass
		VN		15	0.0080		Pass
		VH		12	0.0064		Pass
		VN	50	21	0.0112		Pass
			40	13	0.0069		Pass
			30	15	0.0080		Pass
			20	13	0.0069		Pass
			10	18	0.0096		Pass
			0	19	0.0101		Pass
			-10	21	0.0112		Pass
			-20	23	0.0122		Pass
			-30	17	0.0090		Pass

Note 1: The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

APPENDIX 1 PHOTOS OF TEST SETUP

See test photos attached in Appendix 1 for the actual connections between Product and support equipment.

APPENDIX 2 PHOTOS OF EUT CONSTRUCTIONAL DETAILS

Refer to Appendix 2 for EUT external and internal photos.

*** End of Report ***

The test report is effective only with both signature and specialized stamp. The result(s) shown in this report refer only to the sample(s) tested. Without written approval of UnionTrust, this report can't be reproduced except in full.