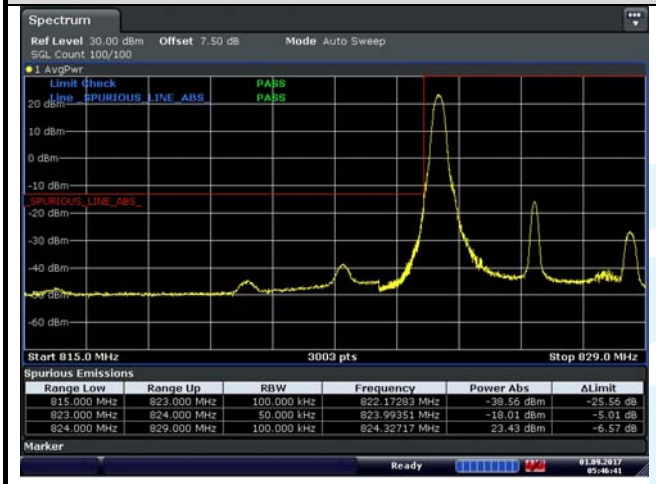
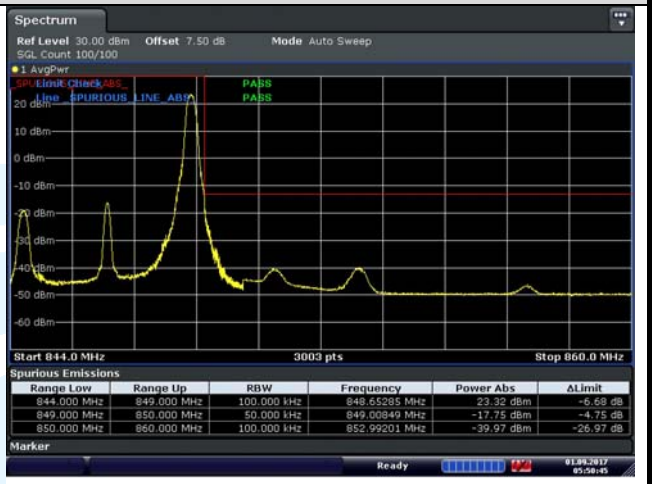
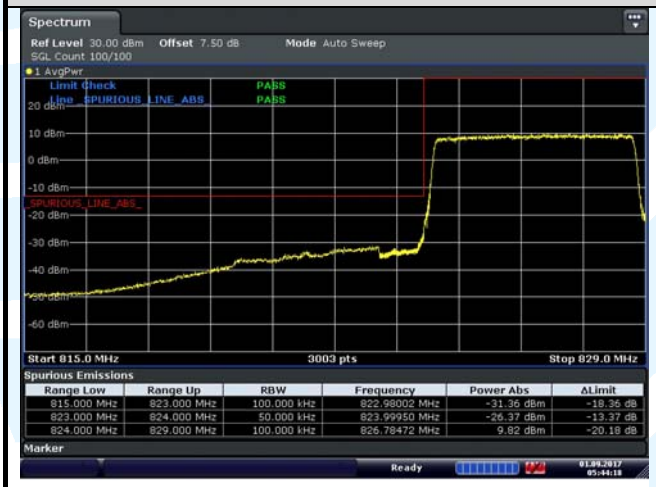
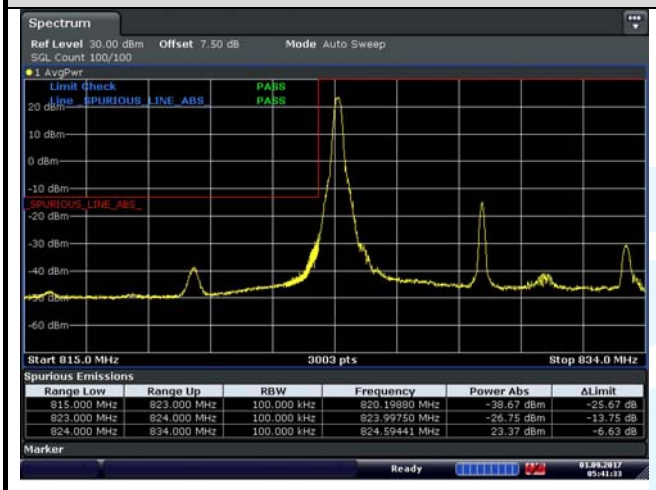
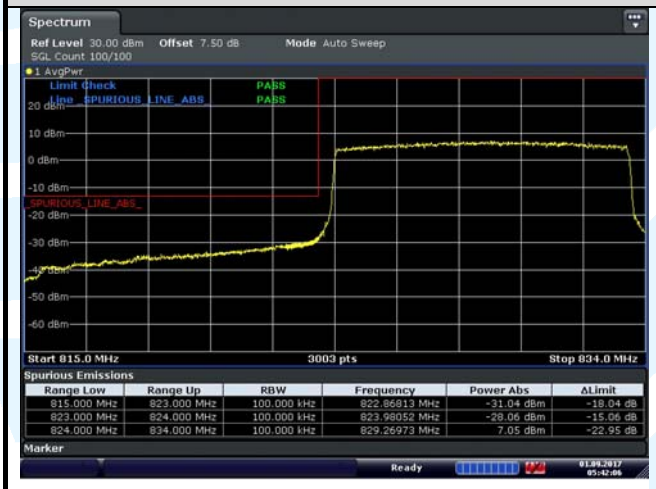
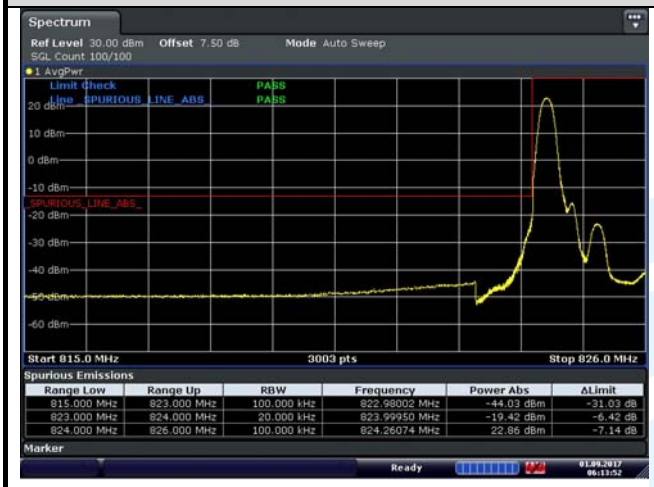
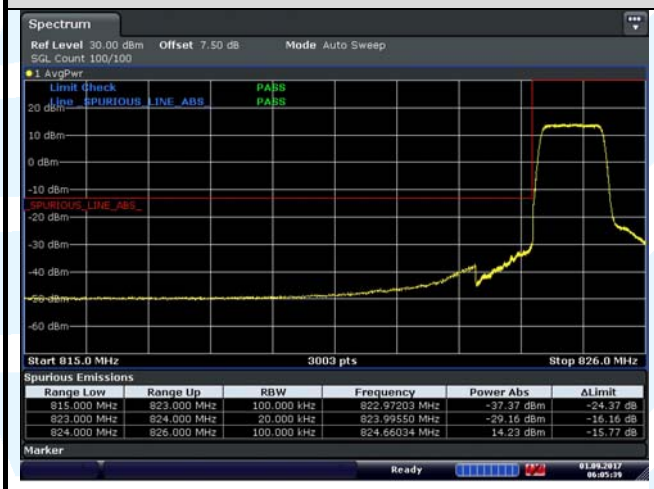
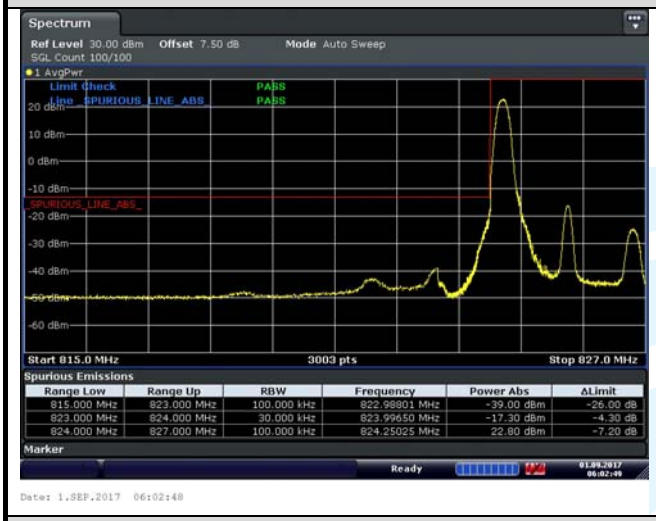
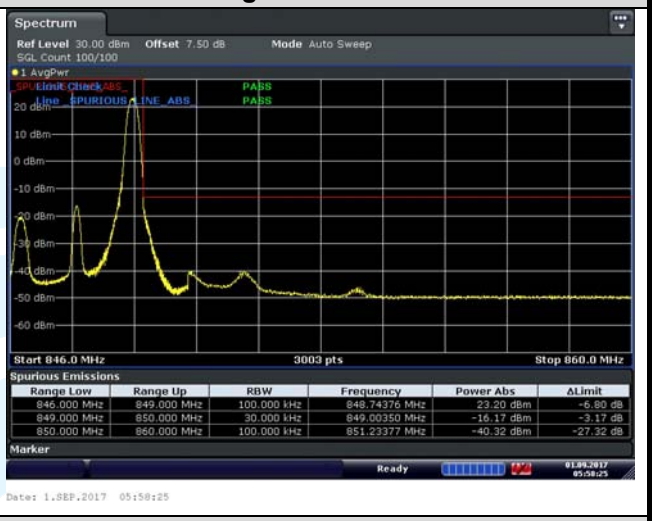
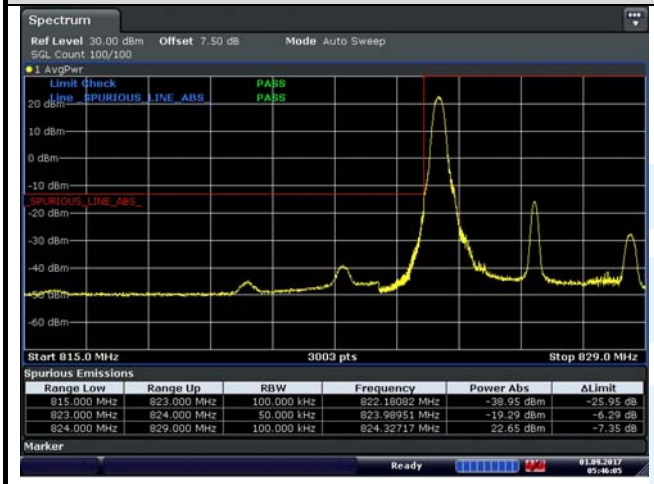
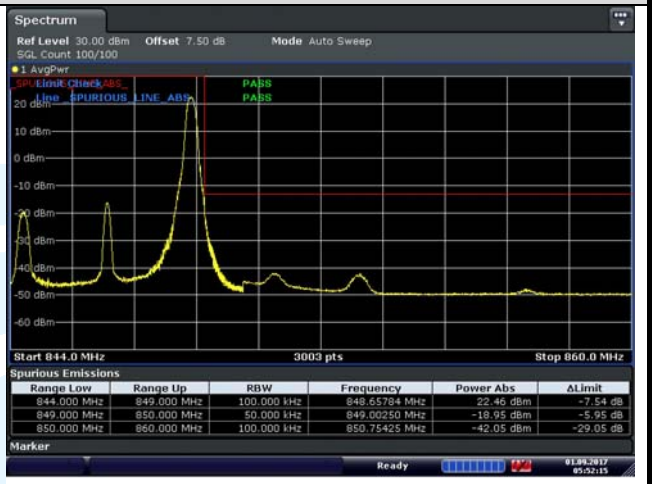
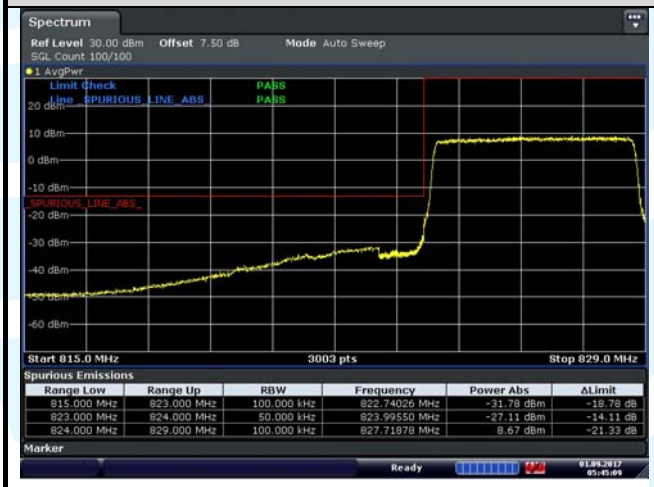
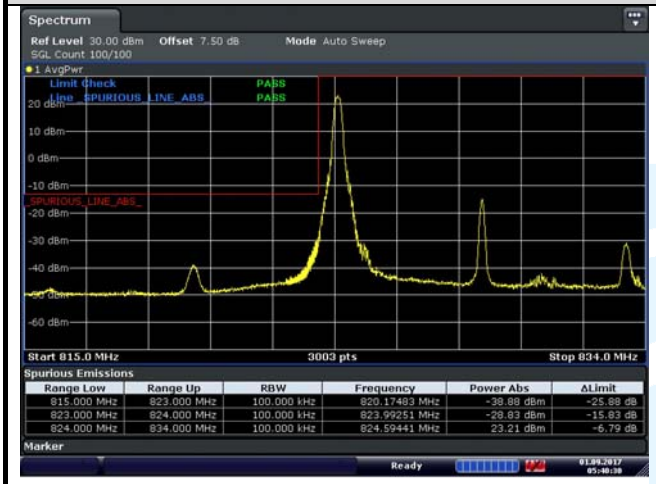
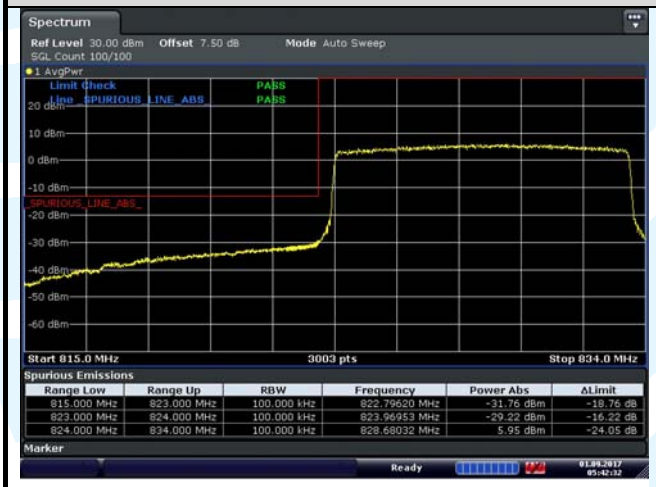
LTE Band 5 / 5 MHz / QPSK	
1 RB	
Lowest Channel	Highest Channel
	
Full RB	
Lowest Channel	Highest Channel
	

LTE Band 5 / 10 MHz / QPSK	
1 RB	
Lowest Channel	Highest Channel
	
Full RB	
Lowest Channel	Highest Channel
	

LTE Band 5 / 1.4 MHz / 16QAM	
1 RB	
Lowest Channel	Highest Channel
	
Full RB	
Lowest Channel	Highest Channel
	

LTE Band 5 / 3 MHz / 16QAM	
1 RB	
Lowest Channel	Highest Channel
	
Full RB	
Lowest Channel	Highest Channel

LTE Band 5 / 5 MHz / 16QAM	
1 RB	
Lowest Channel	Highest Channel
	
Full RB	
Lowest Channel	Highest Channel
	

LTE Band 5 / 10 MHz / 16QAM	
1 RB	
Lowest Channel	Highest Channel
	
Full RB	
Lowest Channel	Highest Channel
	

5.6 SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Test Requirement: FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 22.917(a)(b)

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

Limit:

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 Procedure:

The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range. b. Measuring frequency range is from 30 MHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower. Set RBW & VBW to 100 kHz for the measurement below 1 GHz, and 1 MHz for the measurement above 1 GHz.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

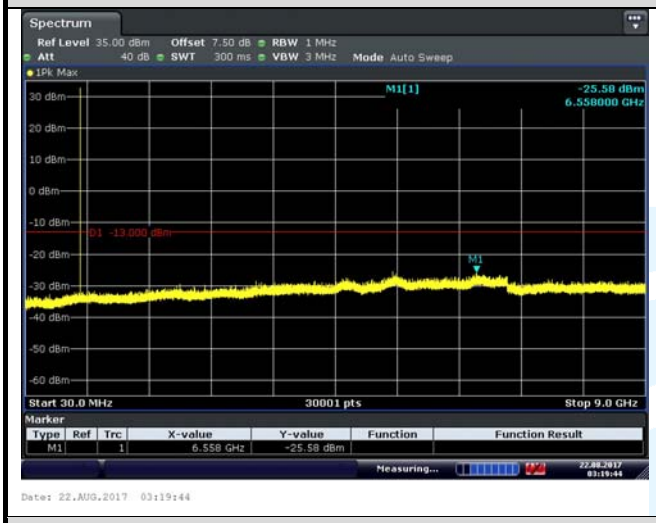
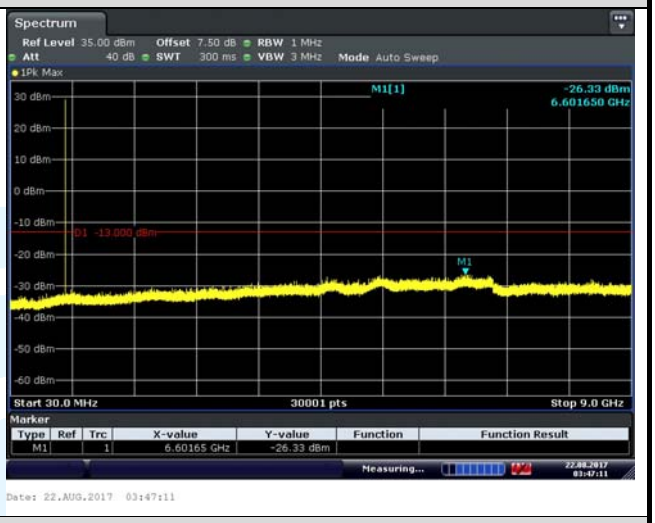
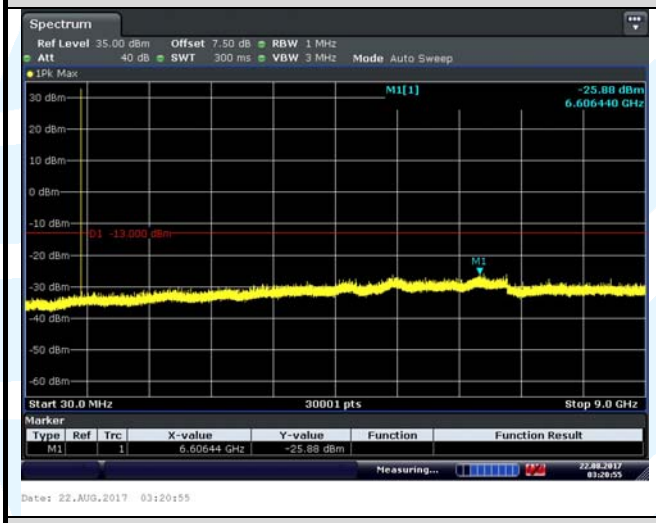
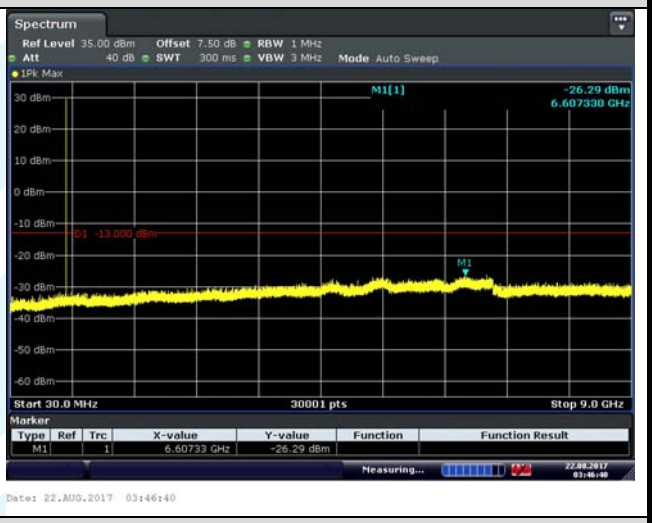
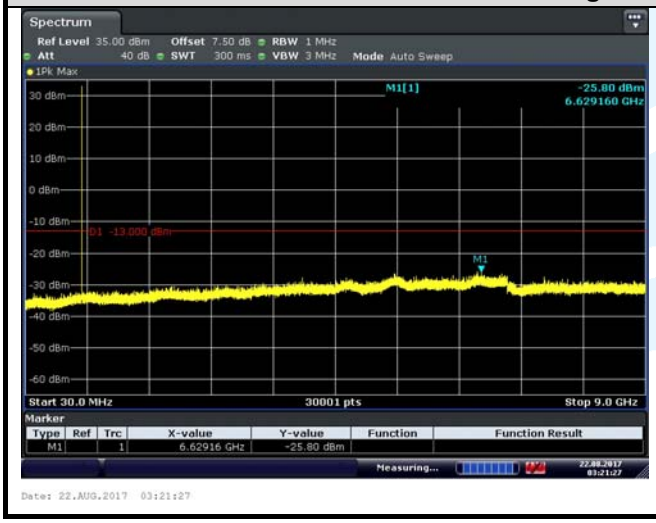
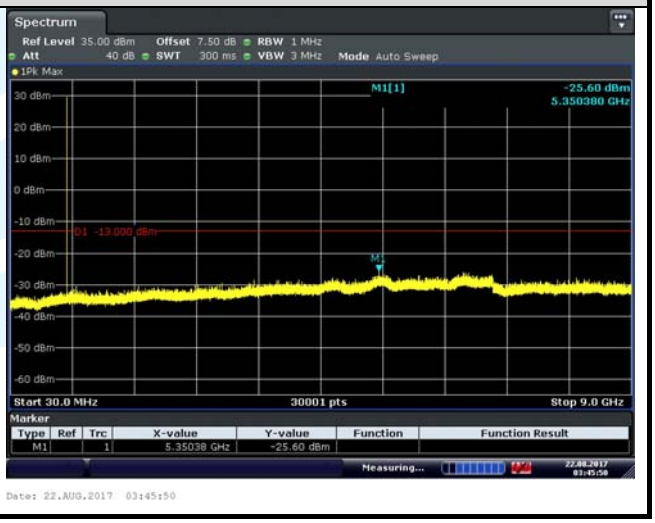
Test Setup: Refer to section 4.2.2 for details.

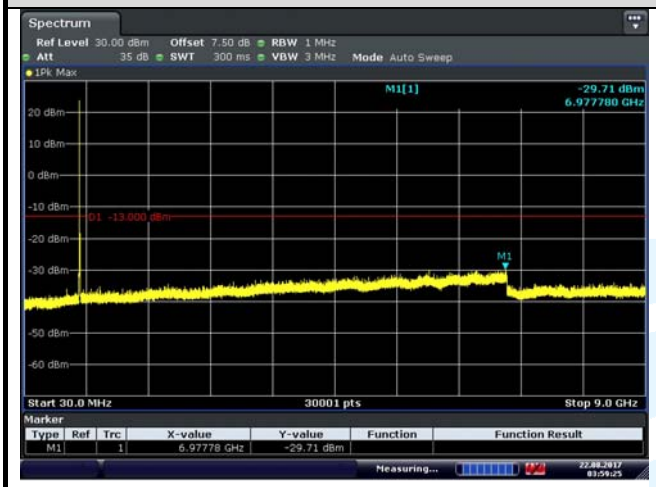
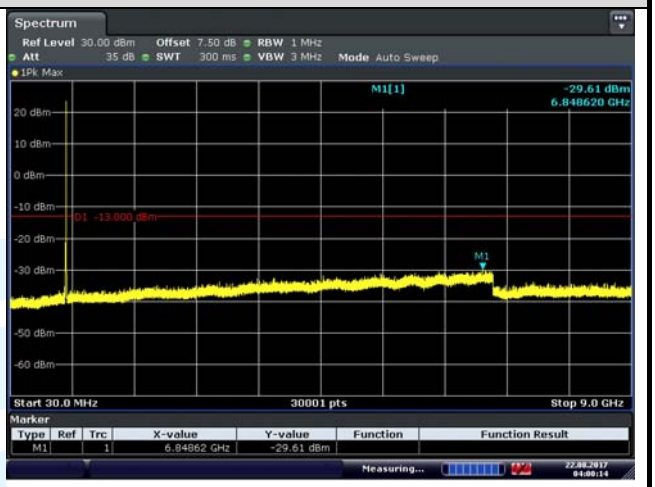
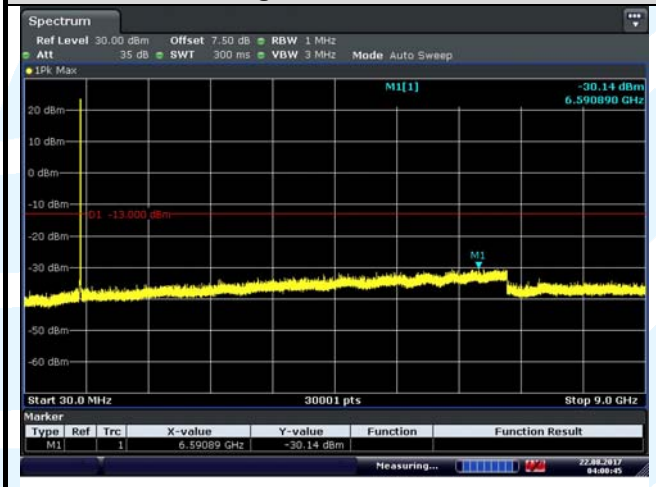
Instruments Used: Refer to section 3 for details

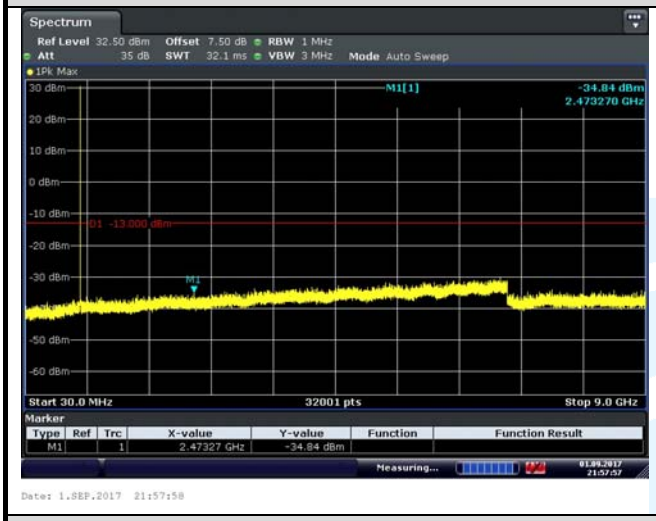
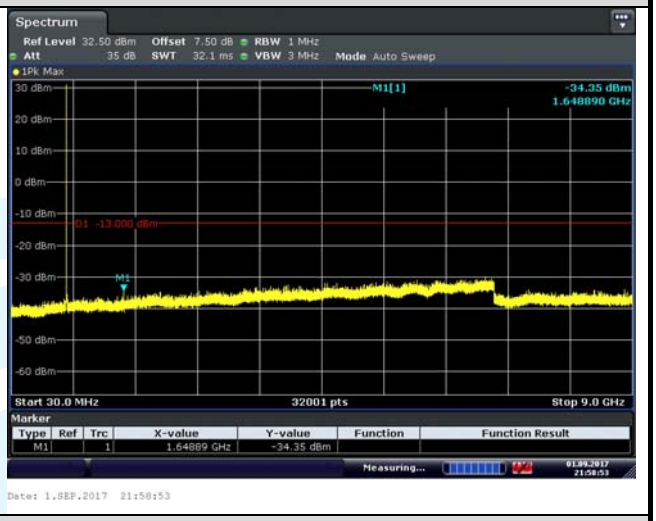
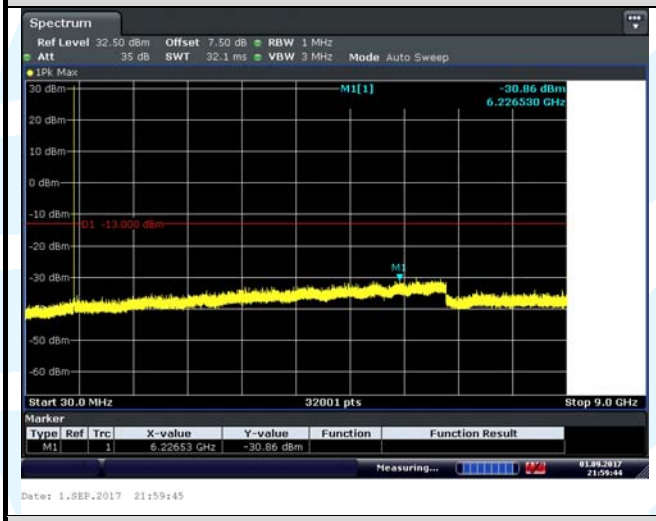
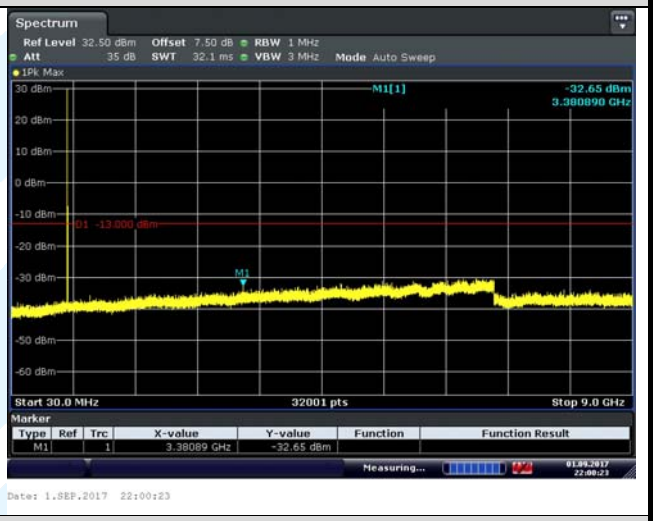
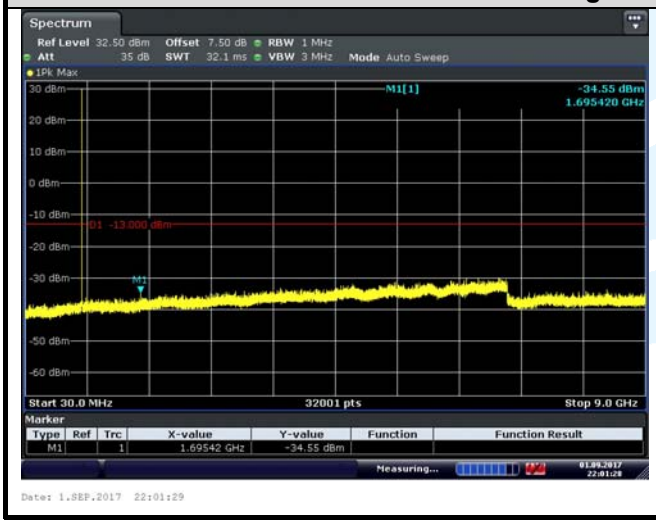
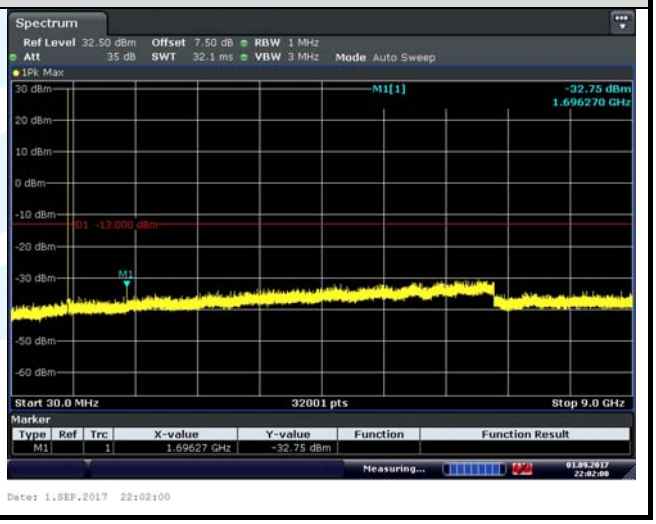
Test Mode: Link mode

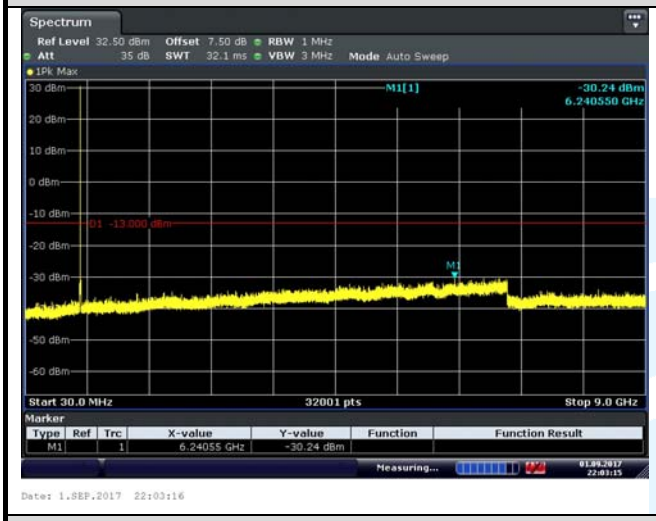
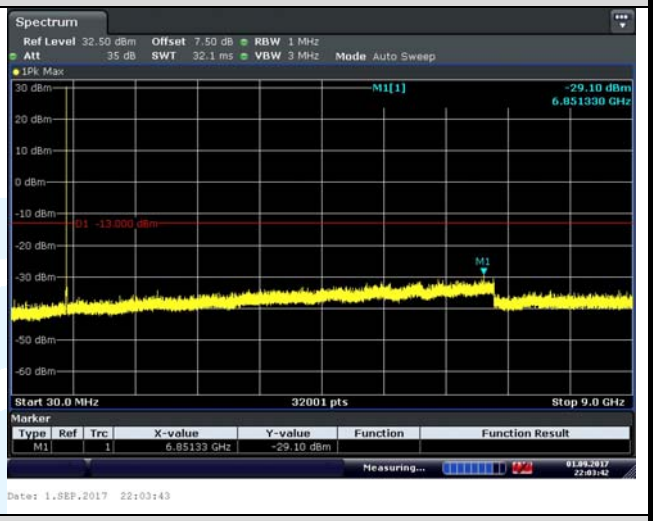
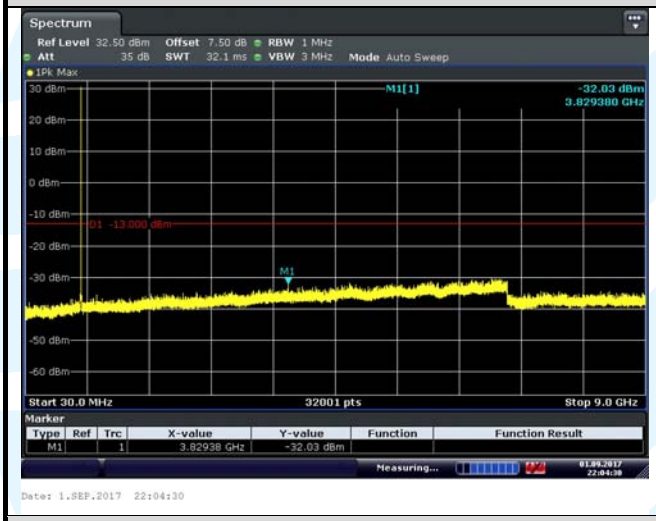
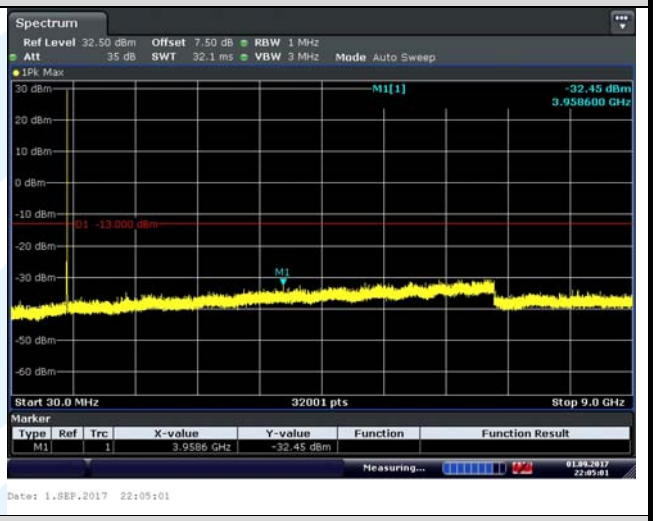
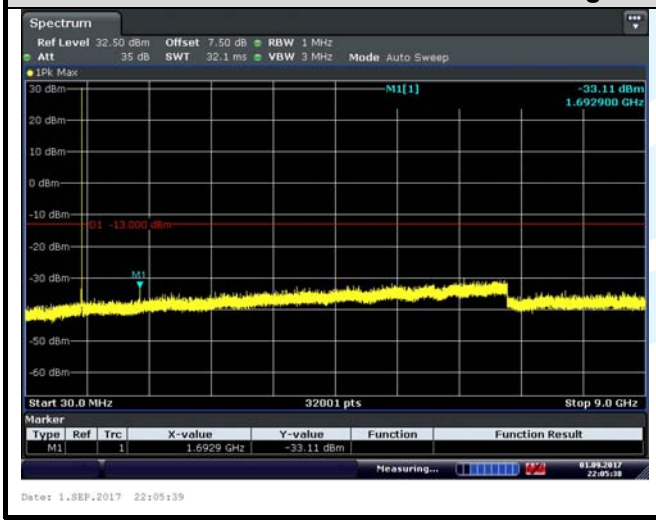
Test Results: Pass

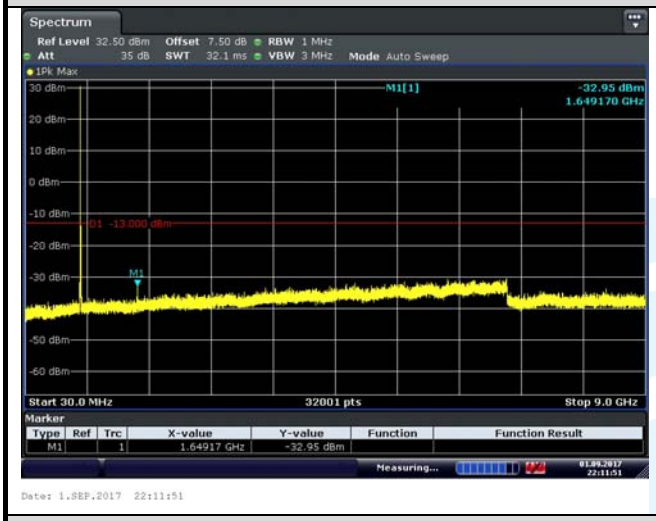
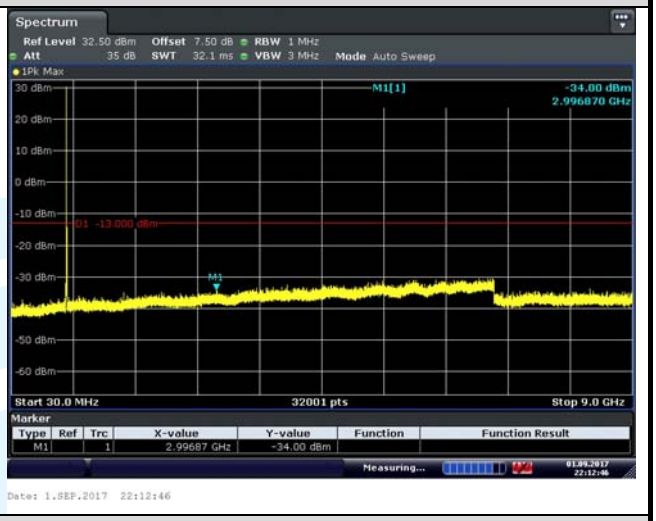
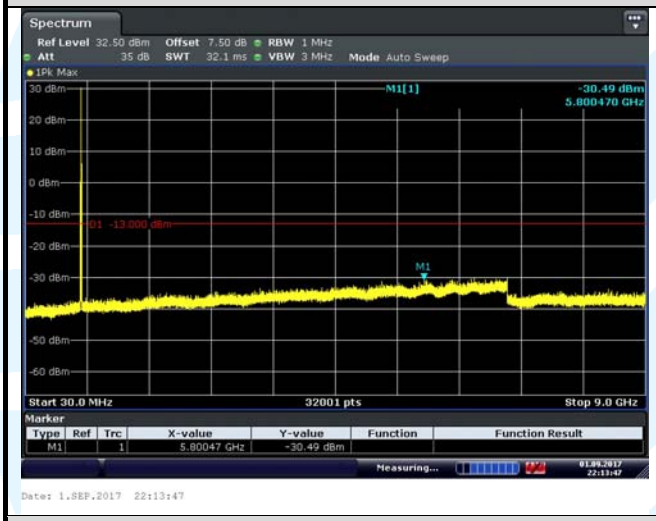
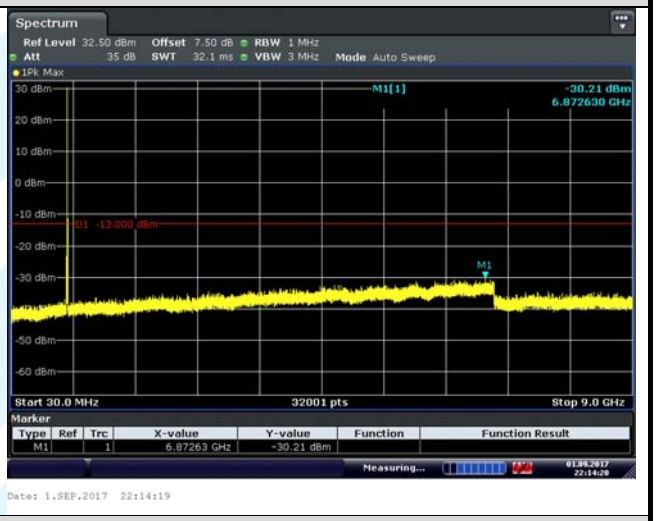
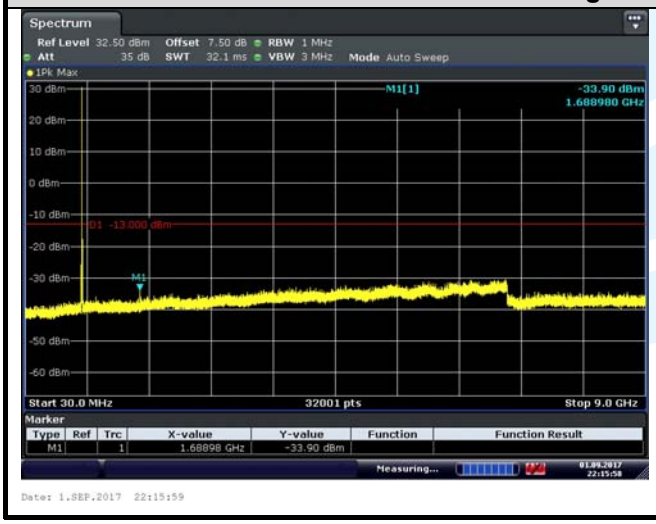
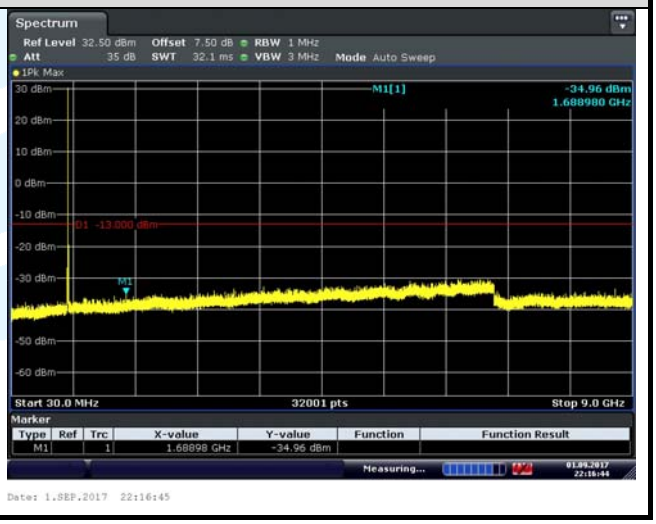
The test plot as follows:

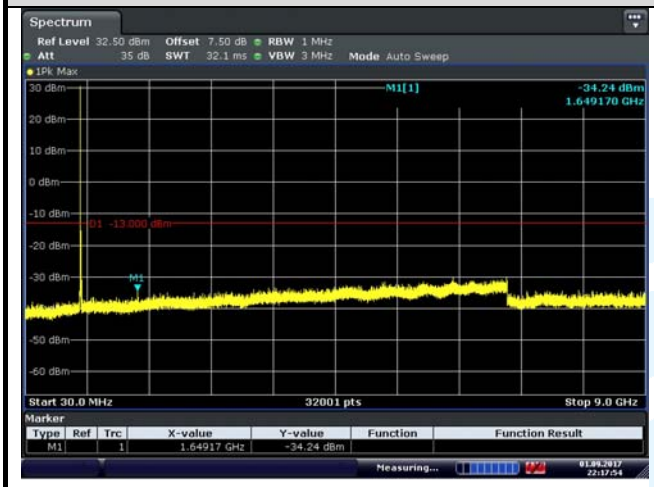
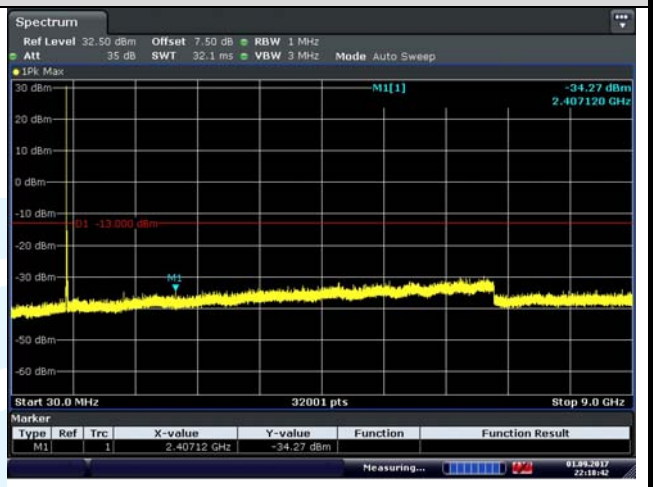
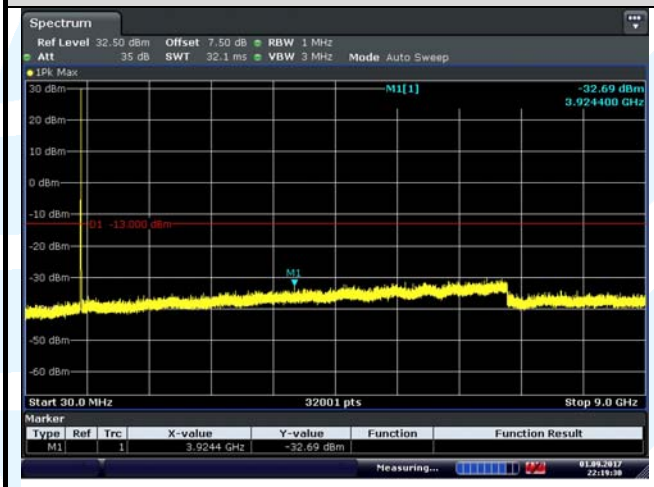
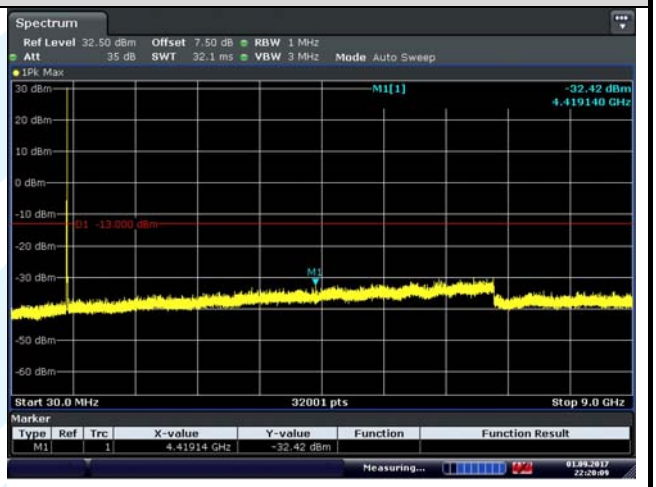
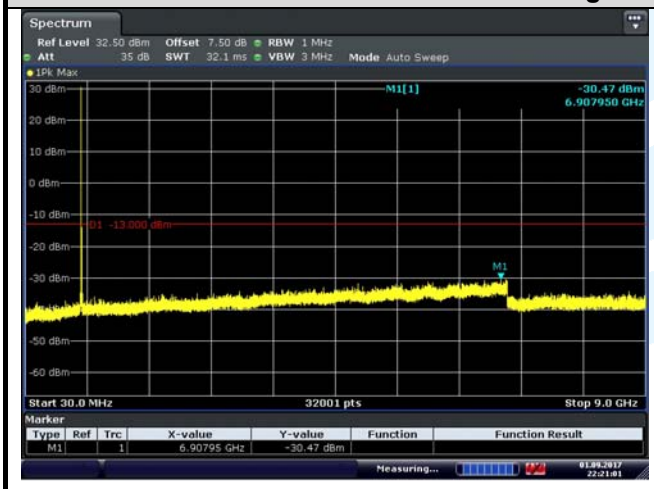
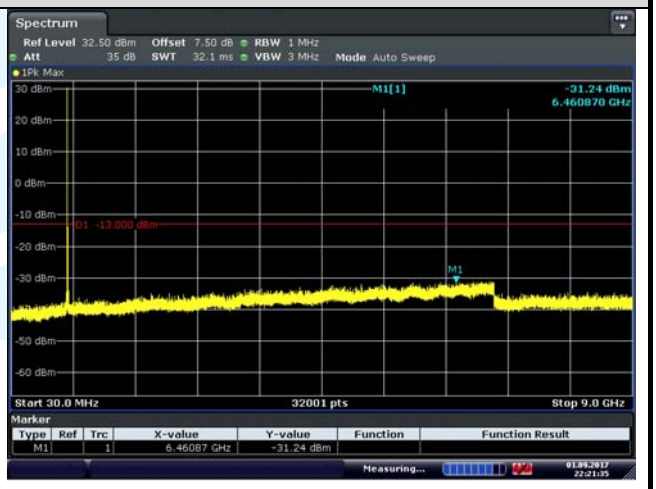
GSM 1Tx-slot	EDGE 1Tx-slot
Lowest Channel	
	
Middle Channel	
	
Highest Channel	
	

WCDMA RMC 12.2Kbps	
Lowest Channel	**Middle Channel**
	
Highest Channel	
	N/A

LTE Band 5_ Channel Bandwidth: 1.4 MHz	
QPSK	16QAM
Lowest Channel	
	
Middle Channel	
	
Highest Channel	
	

LTE Band 5_ Channel Bandwidth: 3 MHz	
QPSK	16QAM
Lowest Channel	
	
Middle Channel	
	
Highest Channel	
	

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

LTE Band 5_ Channel Bandwidth: 10 MHz	
QPSK	16QAM
Lowest Channel	
	
Middle Channel	
	
Highest Channel	
	

5.7 FIELD STRENGTH OF SPURIOUS RADIATION

Test Requirement: FCC 47 CFR Part 2.1053 & FCC 47 CFR Part 22.917(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.

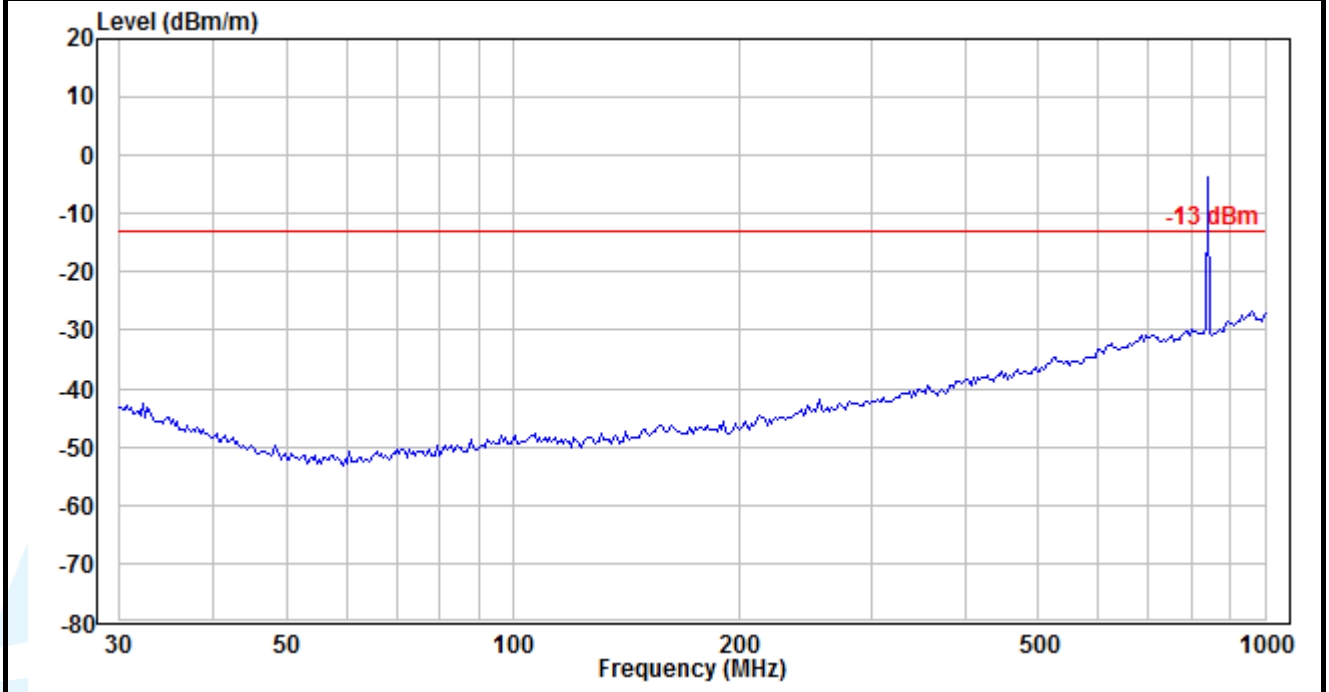
Test Result: Pass

The measurement data as follows:

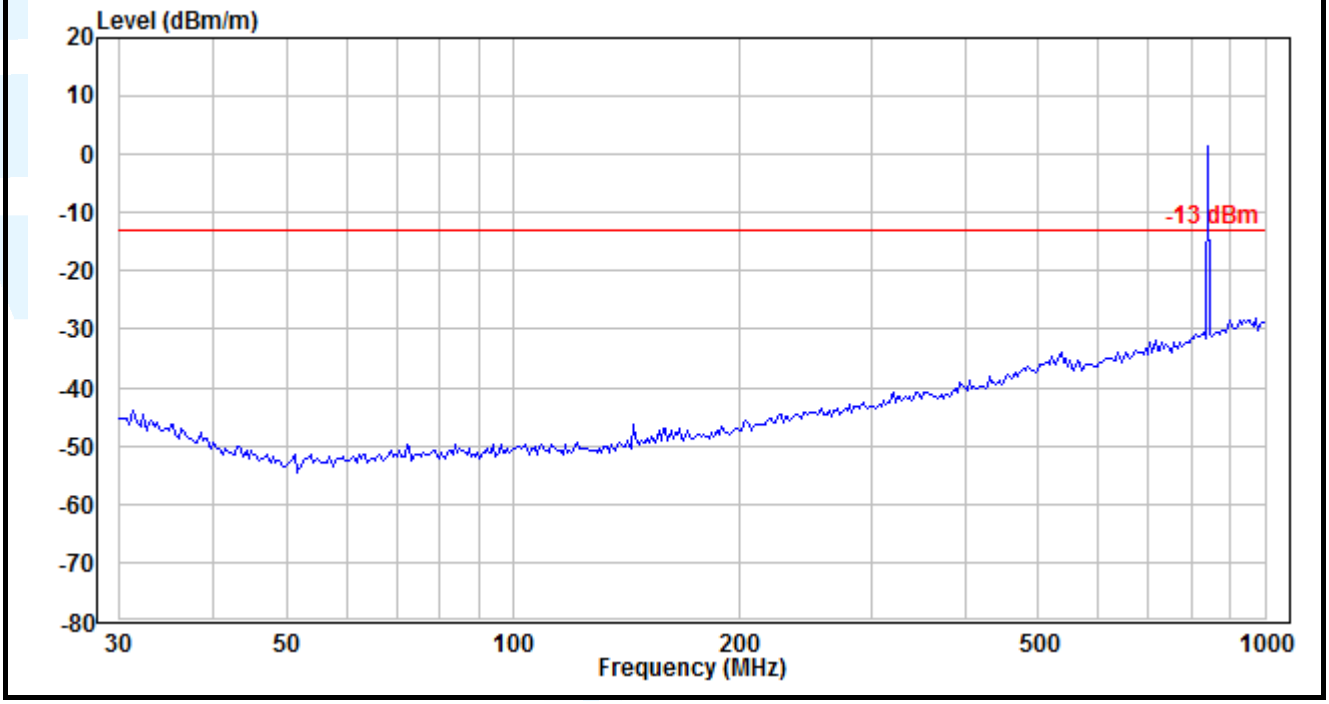
5.7.1 Radiated Emission Test Data (30 MHz to 1 GHz)

GSM 1Tx-slot_Middle Channel

Horizontal

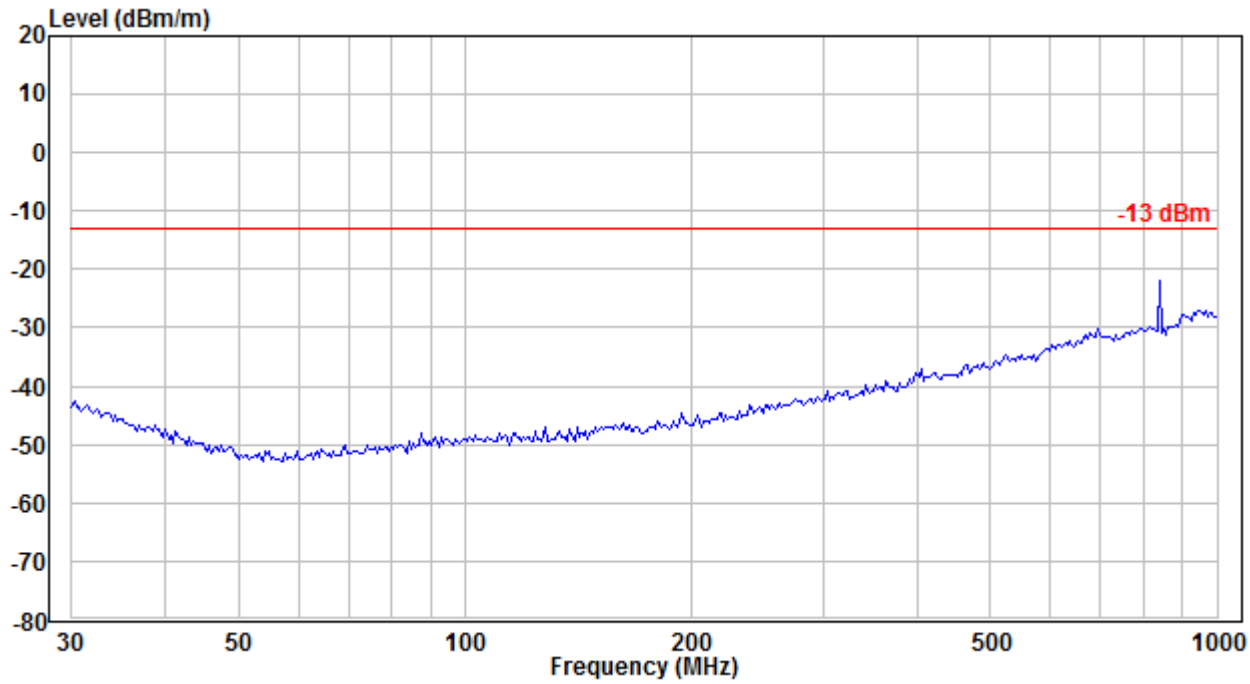


Vertical

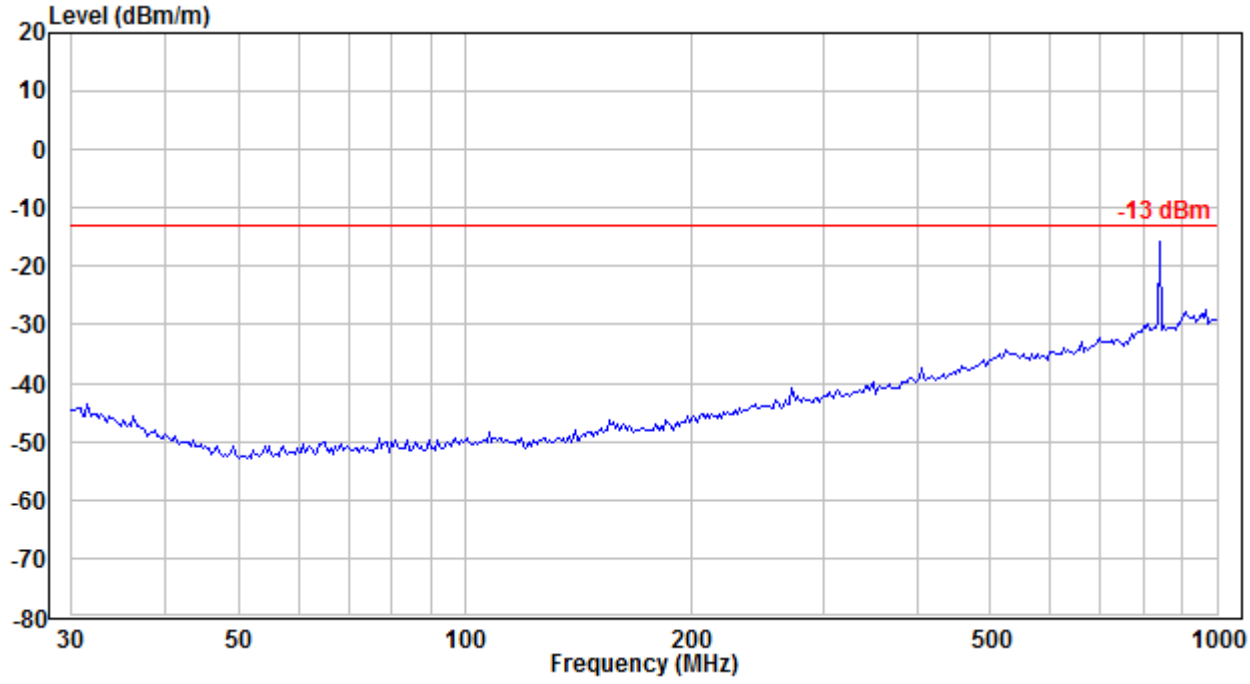


WCDMA RMC 12.2Kbps_Middle Channel

Horizontal

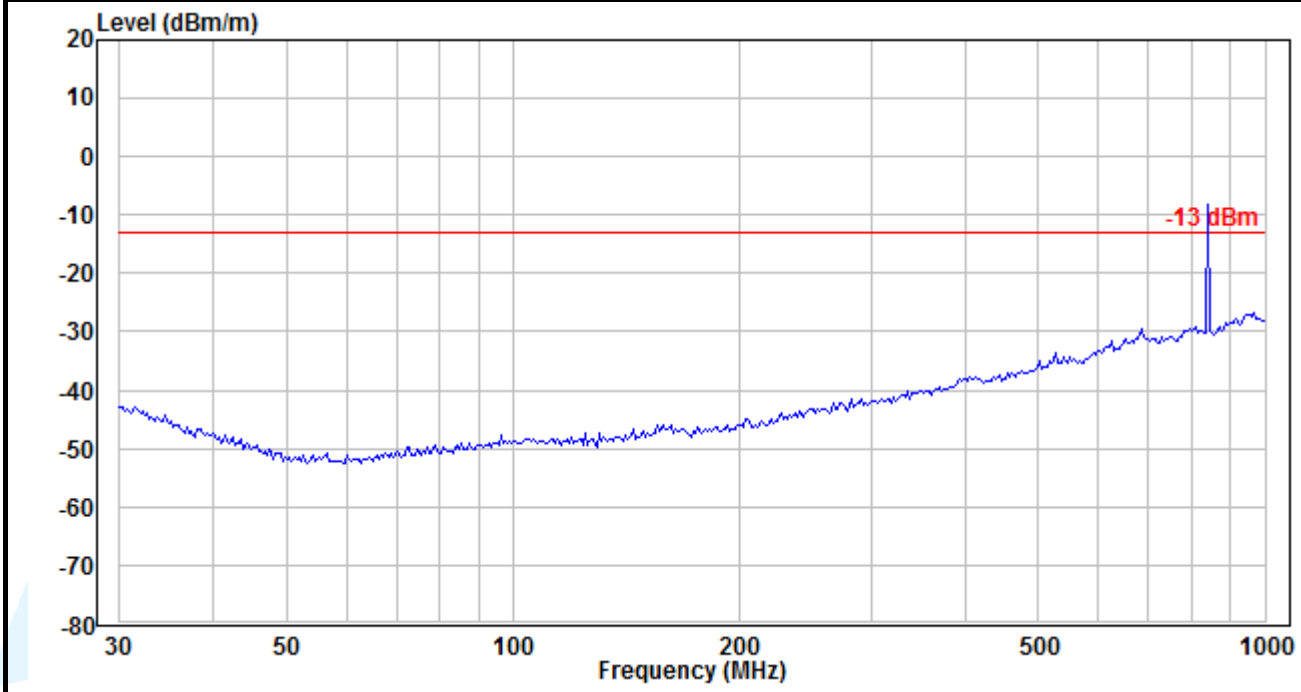


Vertical

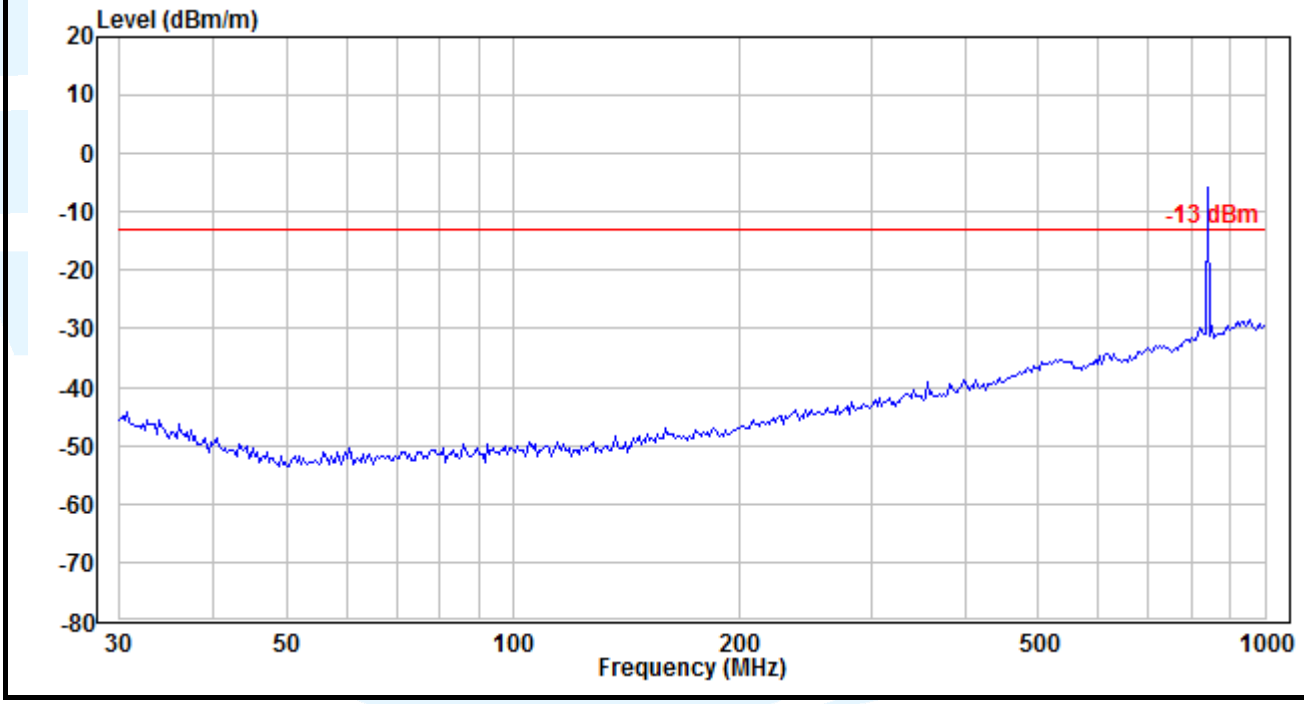


LTE Band 5 / 1.4 MHz / QPSK_ Middle Channel

Horizontal

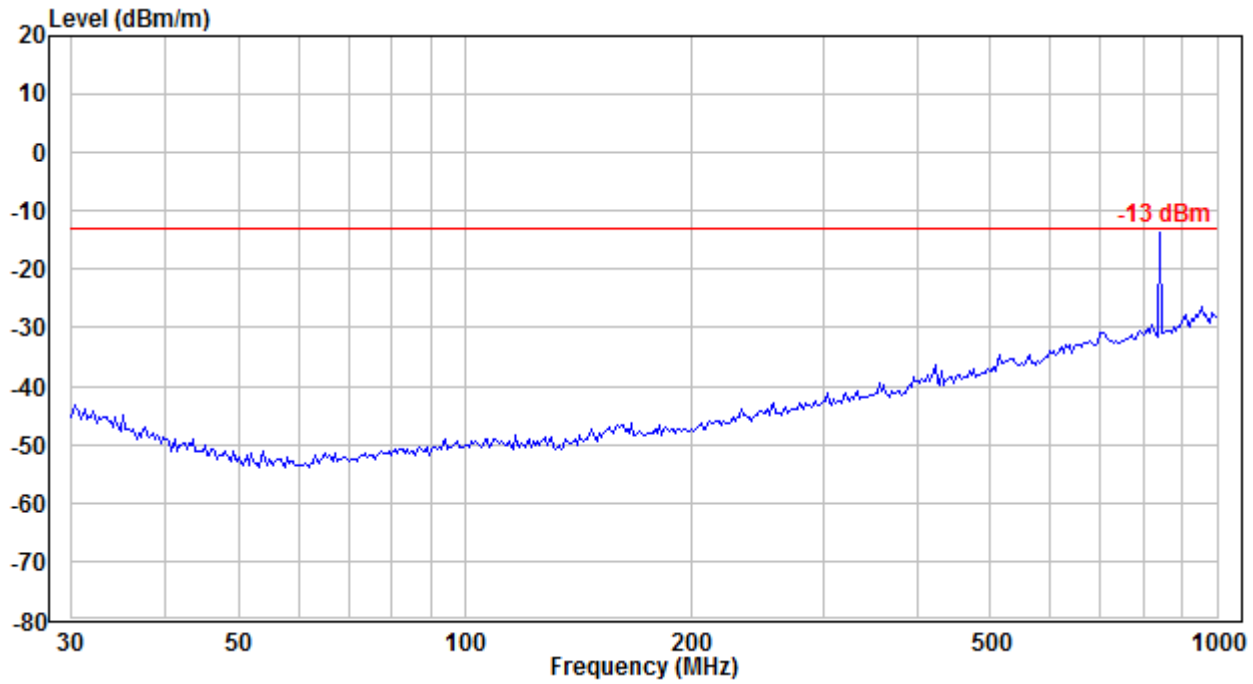


Vertical

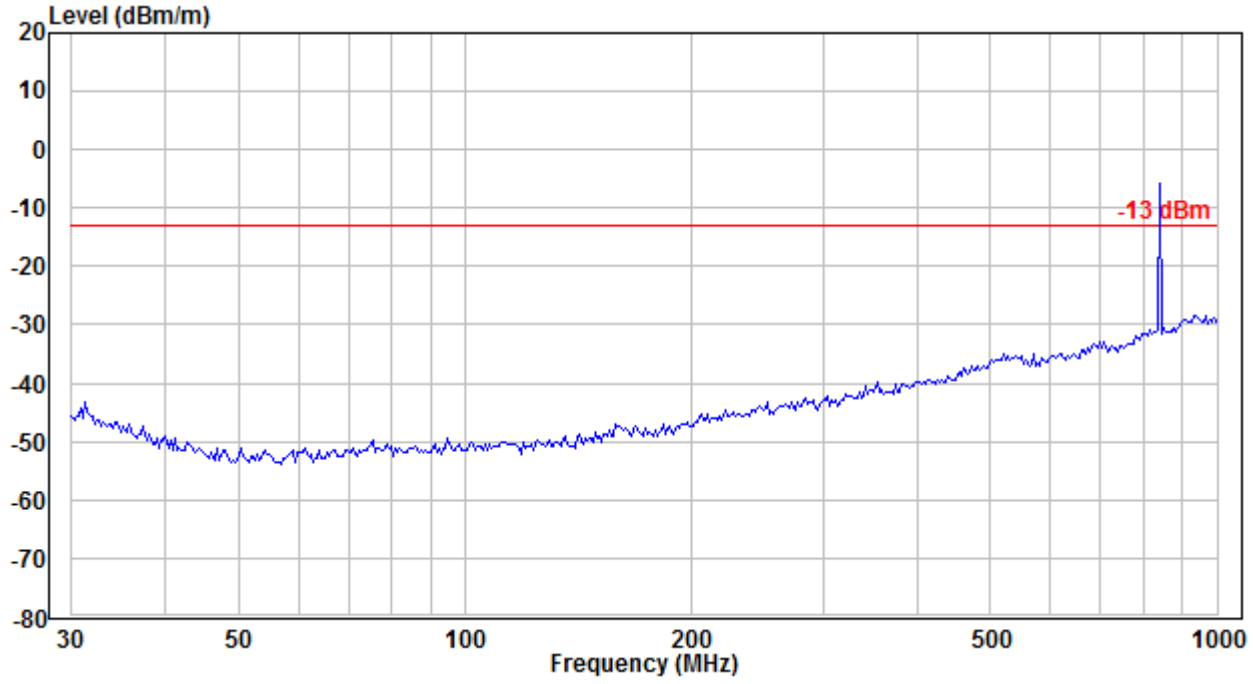


LTE Band 5 / 3 MHz / QPSK_ Middle Channel

Horizontal

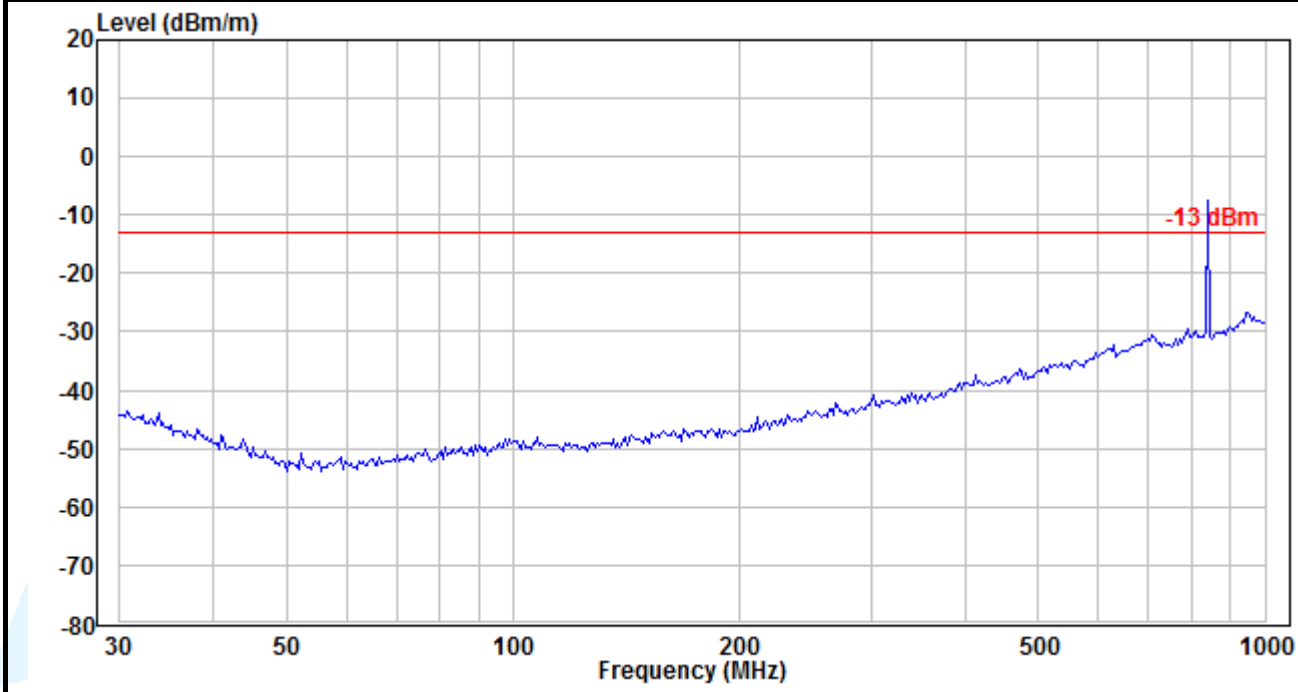


Vertical

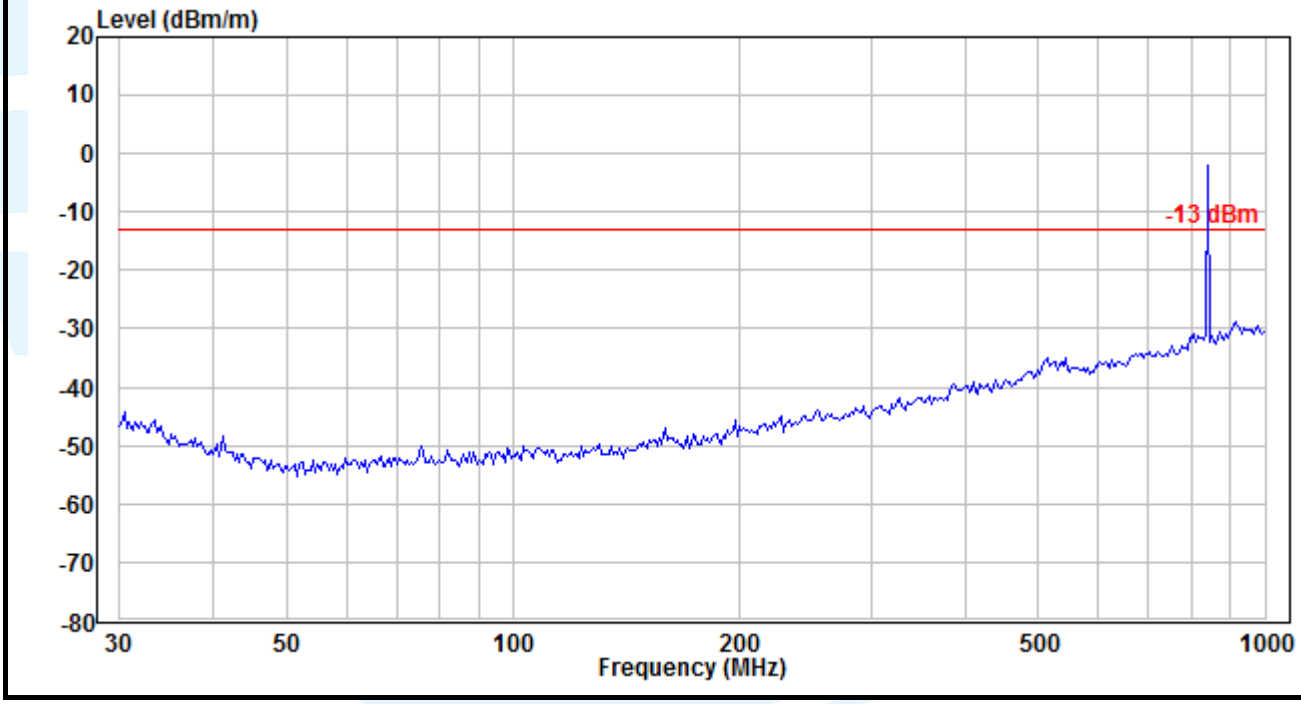


LTE Band 5 / 5 MHz / QPSK_ Middle Channel

Horizontal

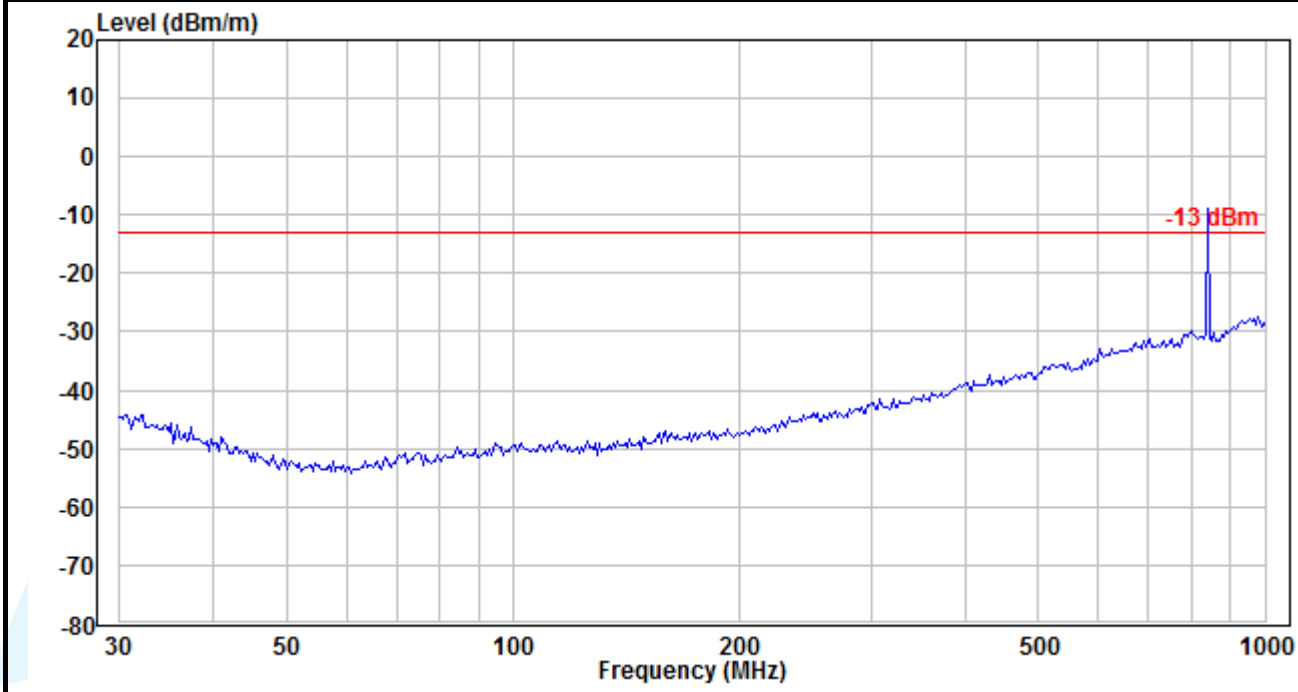


Vertical

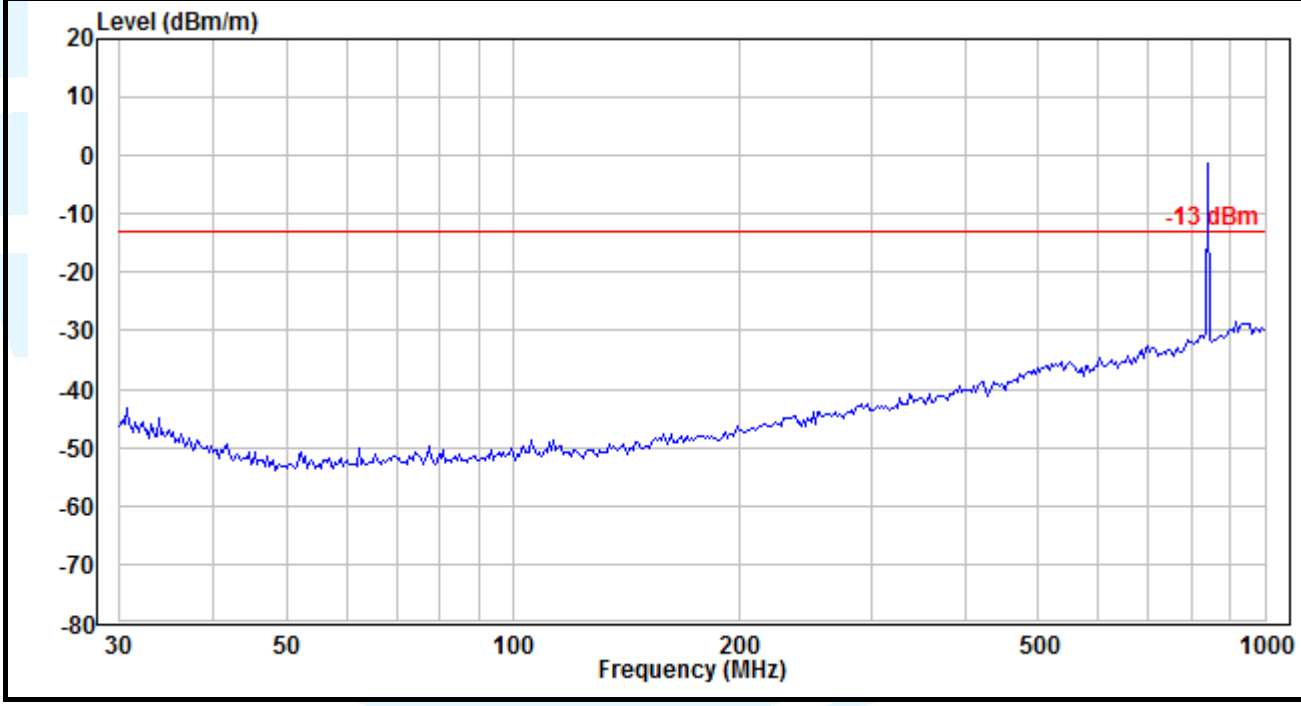


LTE Band 5 / 10 MHz / QPSK_ Middle Channel

Horizontal



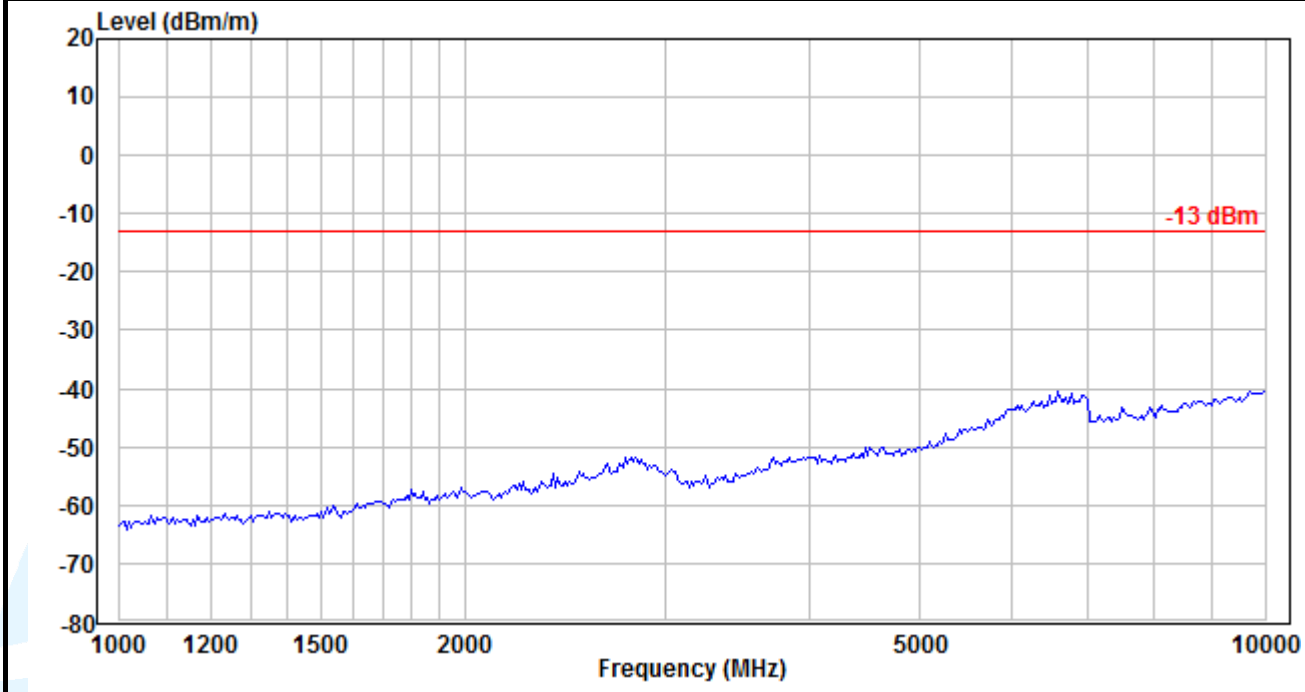
Vertical



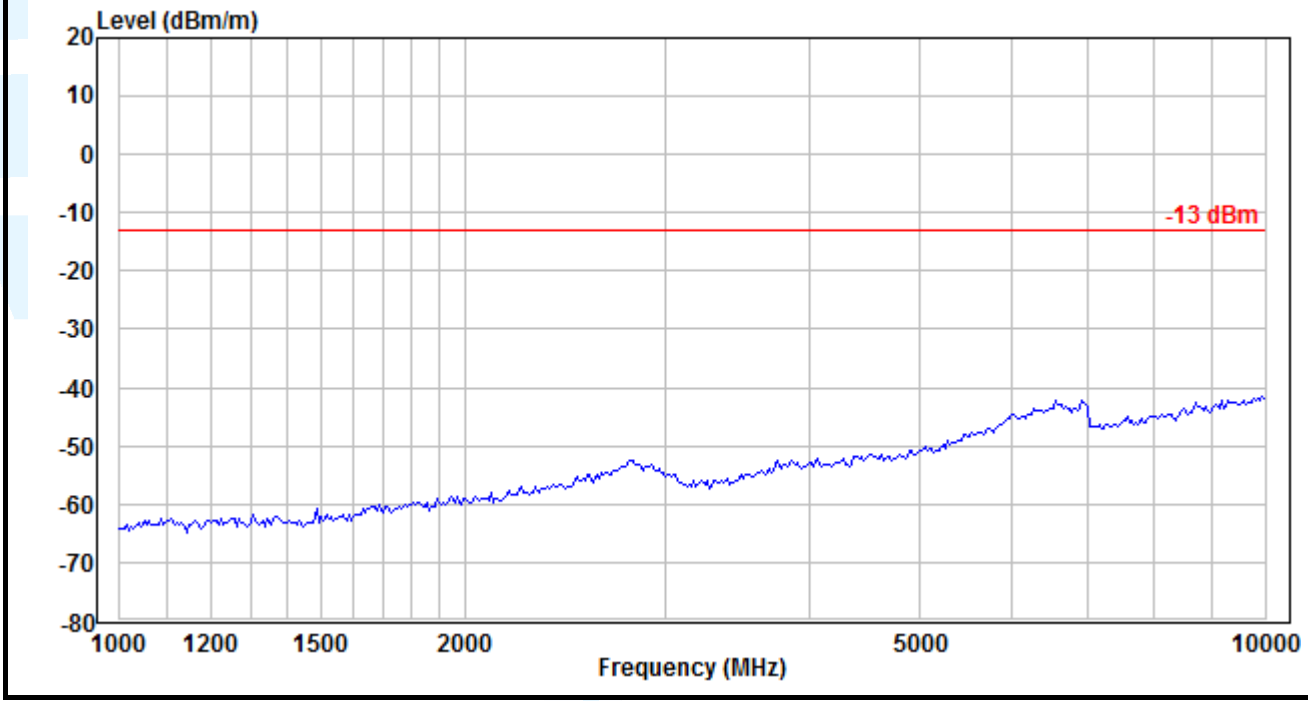
5.7.2 Radiated Emission Test Data (Above 1GHz)

GSM 1Tx-slot_Middle Channel

Horizontal

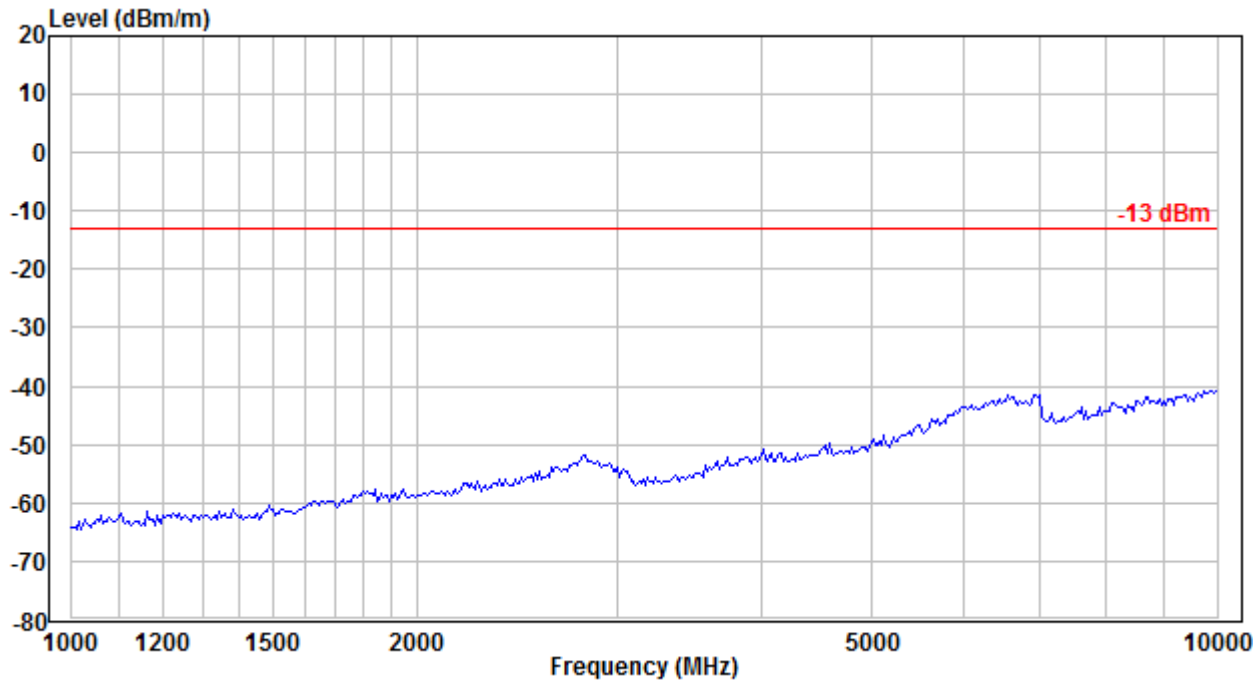


Vertical

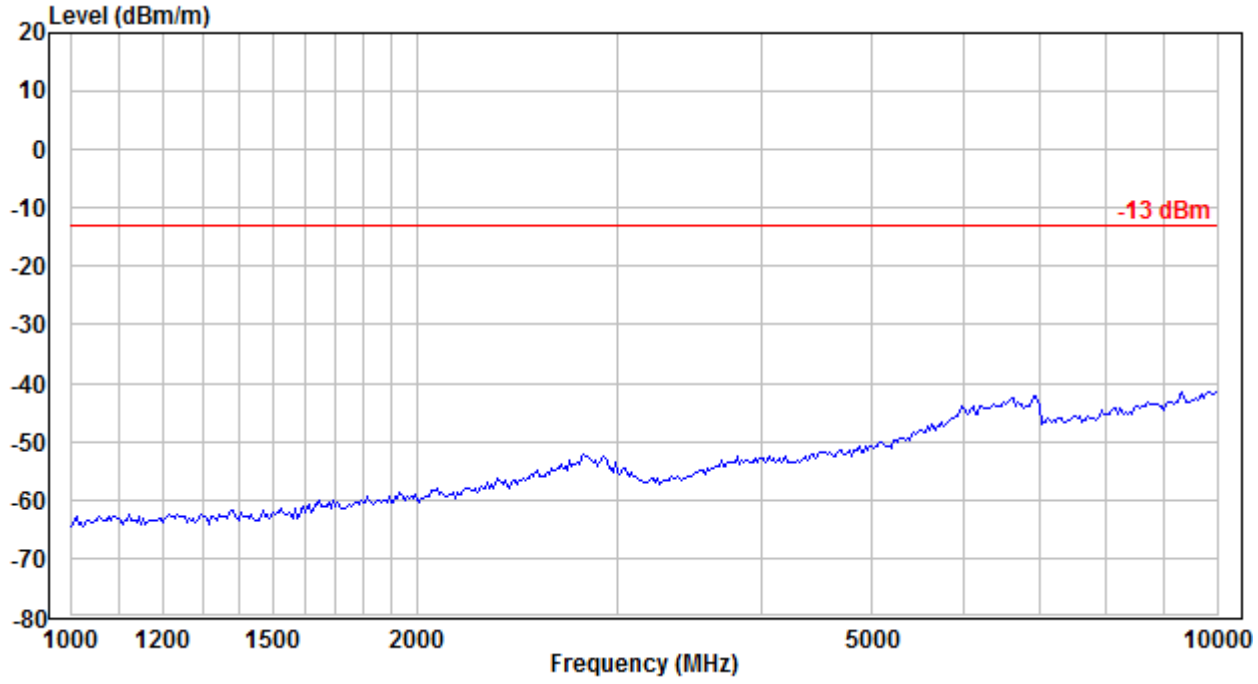


WCDMA RMC 12.2Kbps_Middle Channel

Horizontal

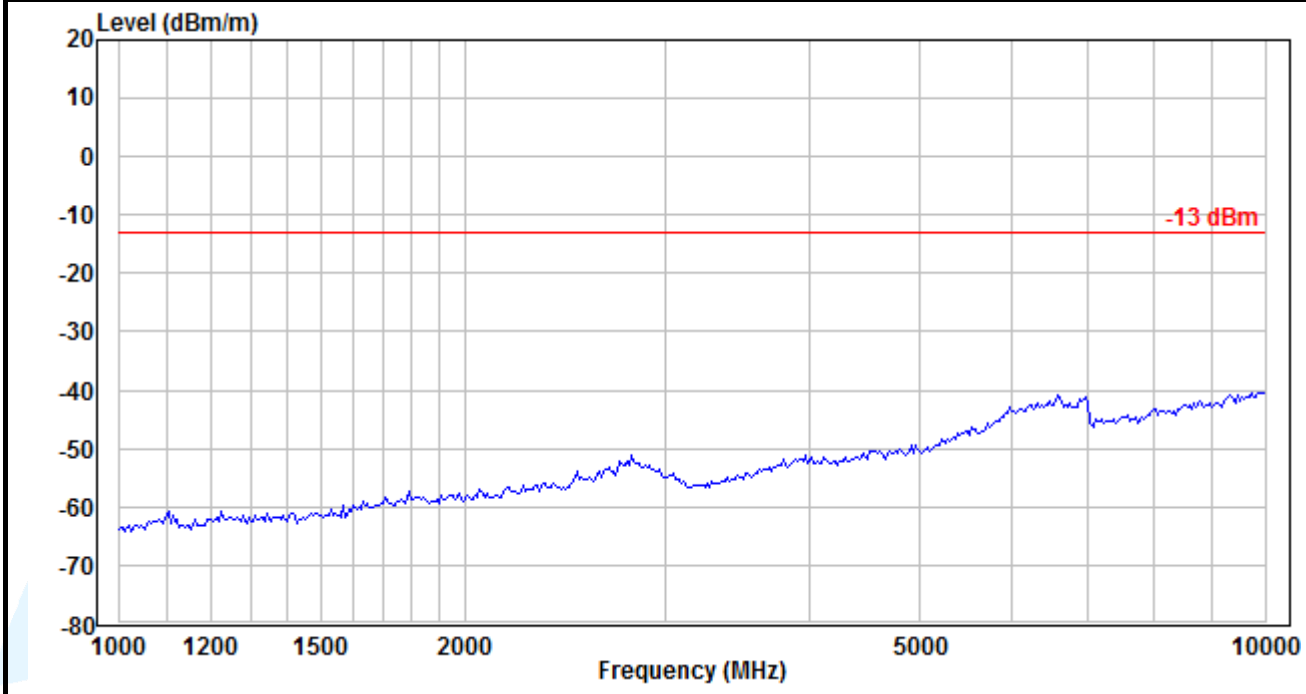


Vertical

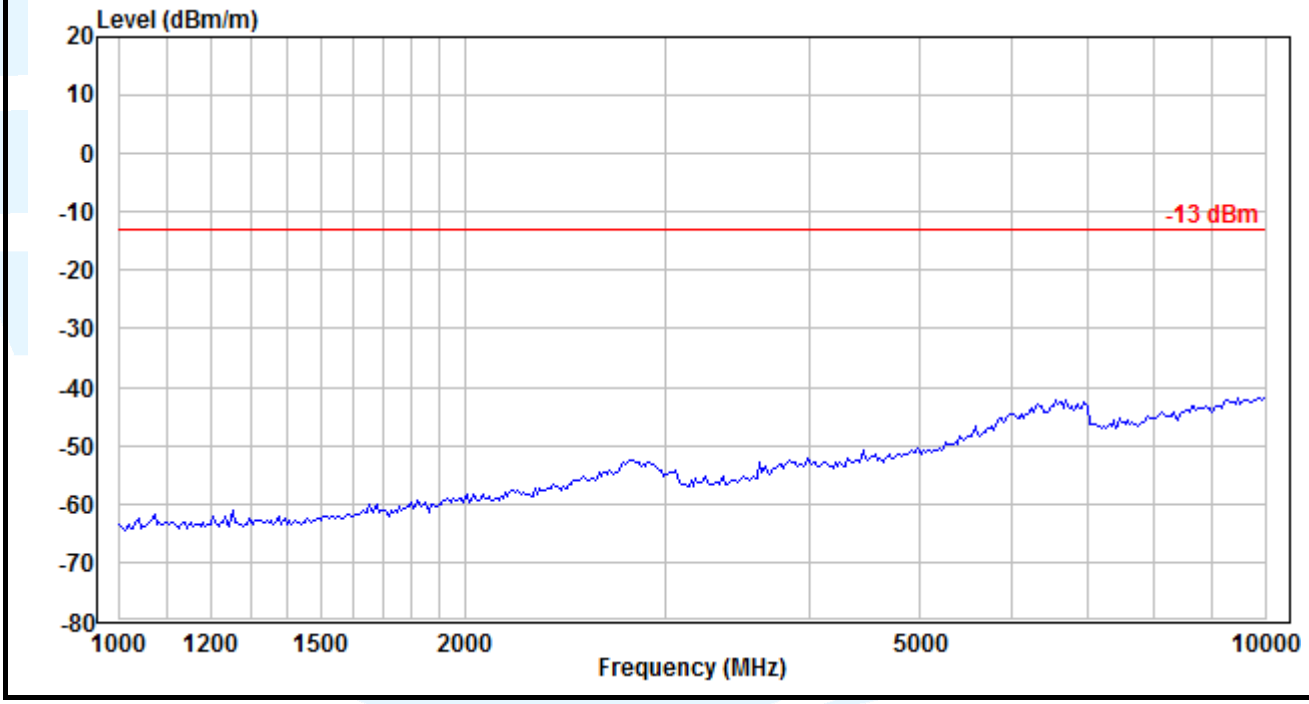


LTE Band 5 / 1.4 MHz / QPSK_ Middle Channel

Horizontal

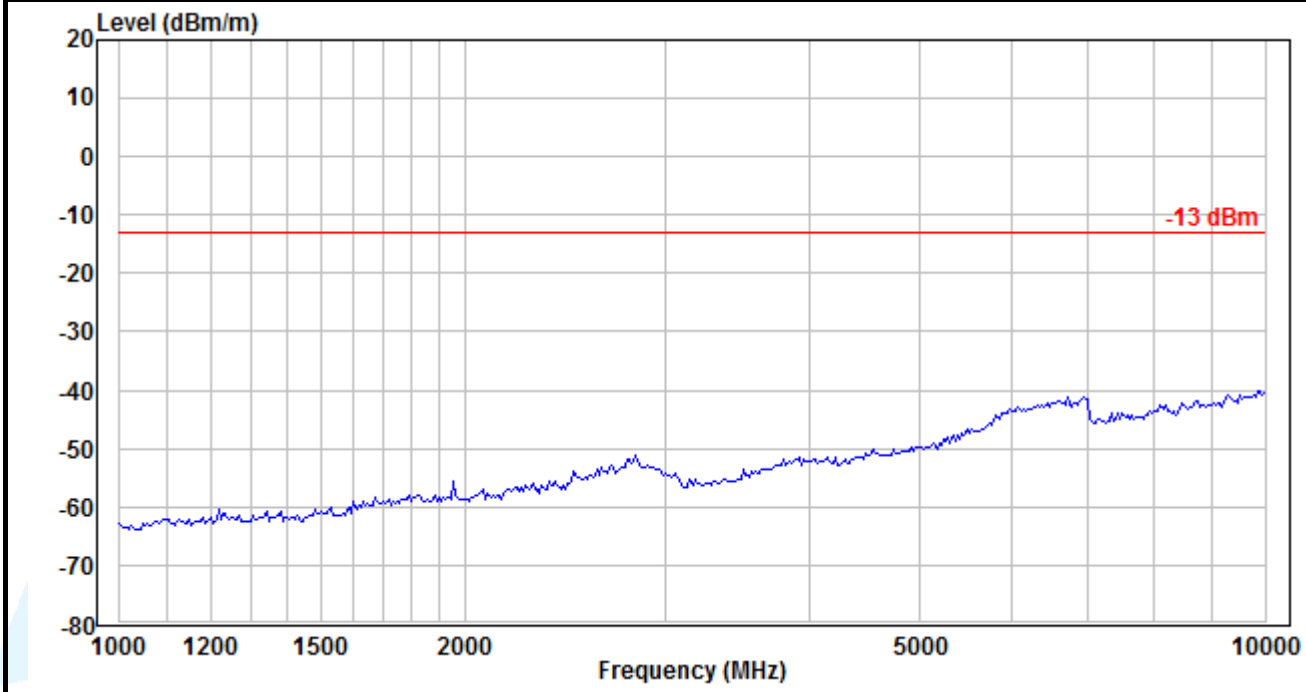


Vertical

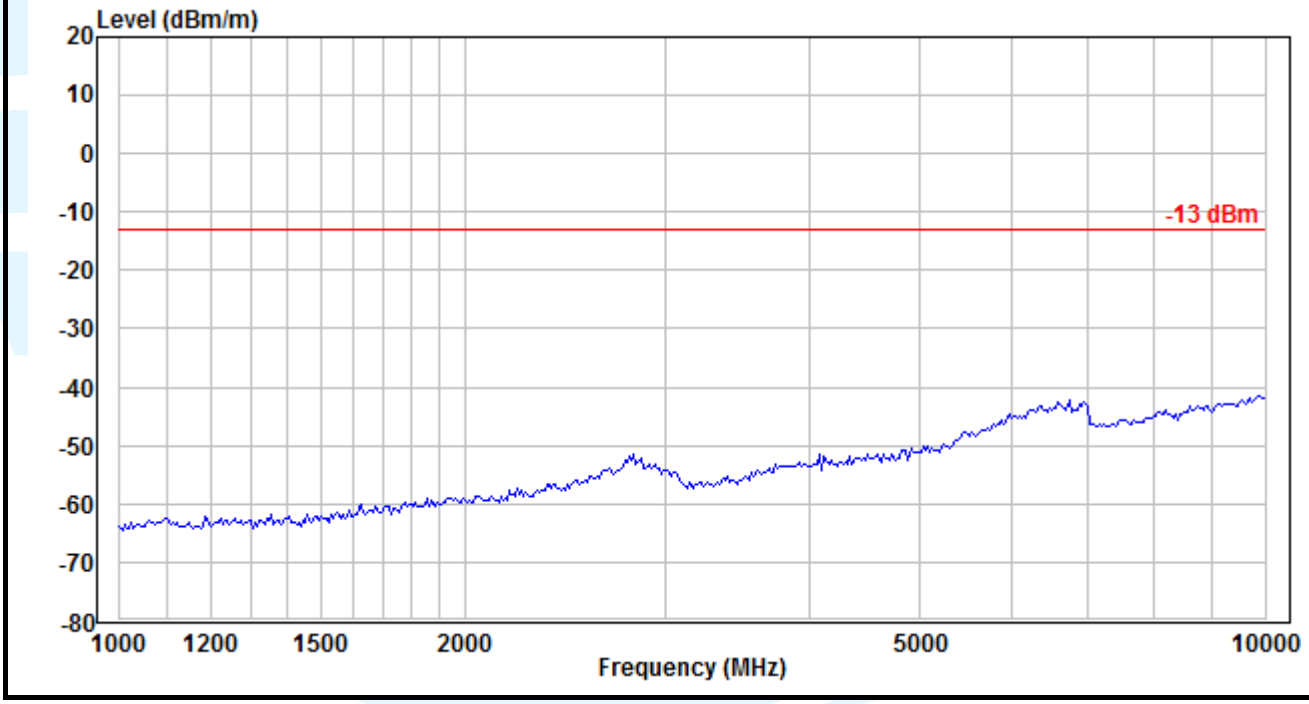


LTE Band 5 / 3 MHz / QPSK_ Middle Channel

Horizontal

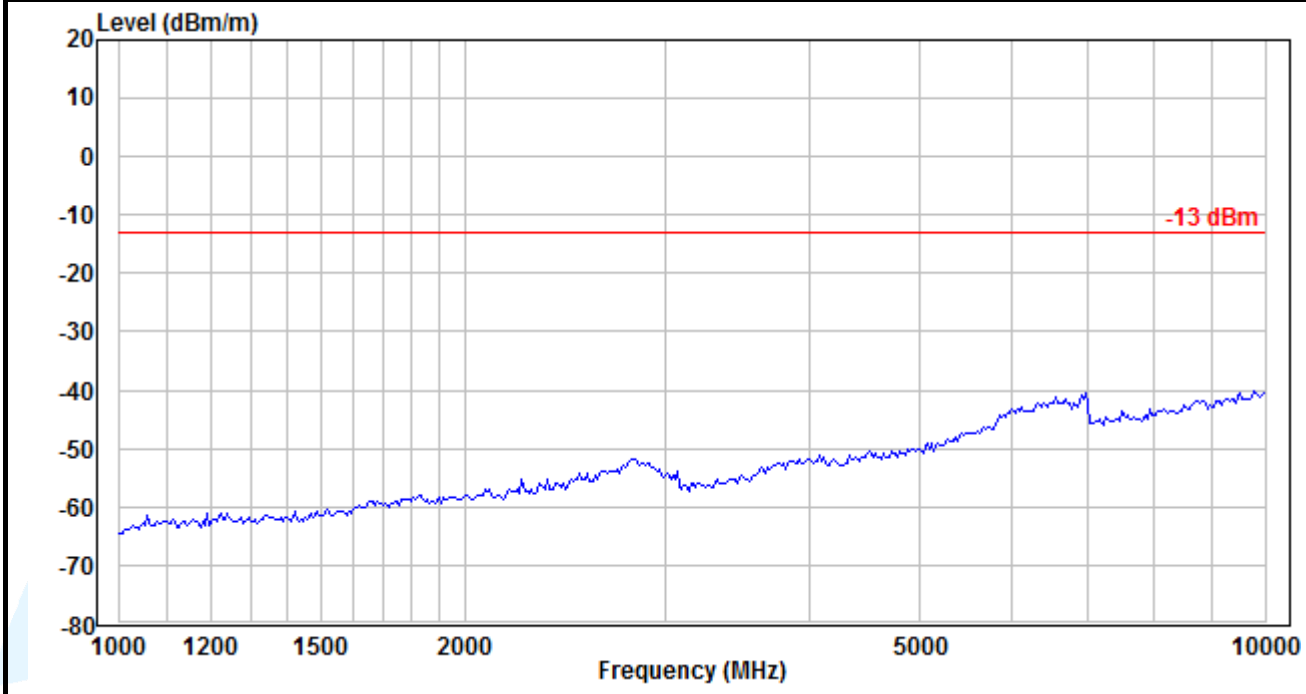


Vertical

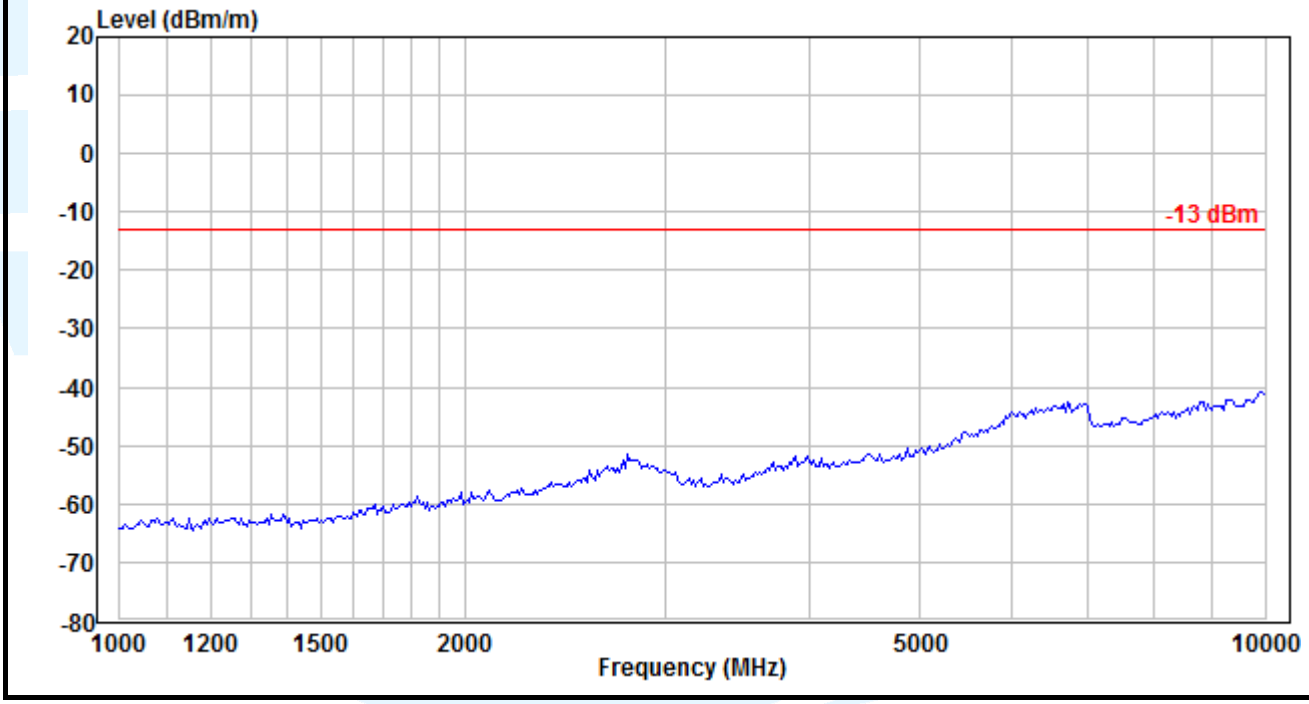


LTE Band 5 / 5 MHz / QPSK_ Middle Channel

Horizontal

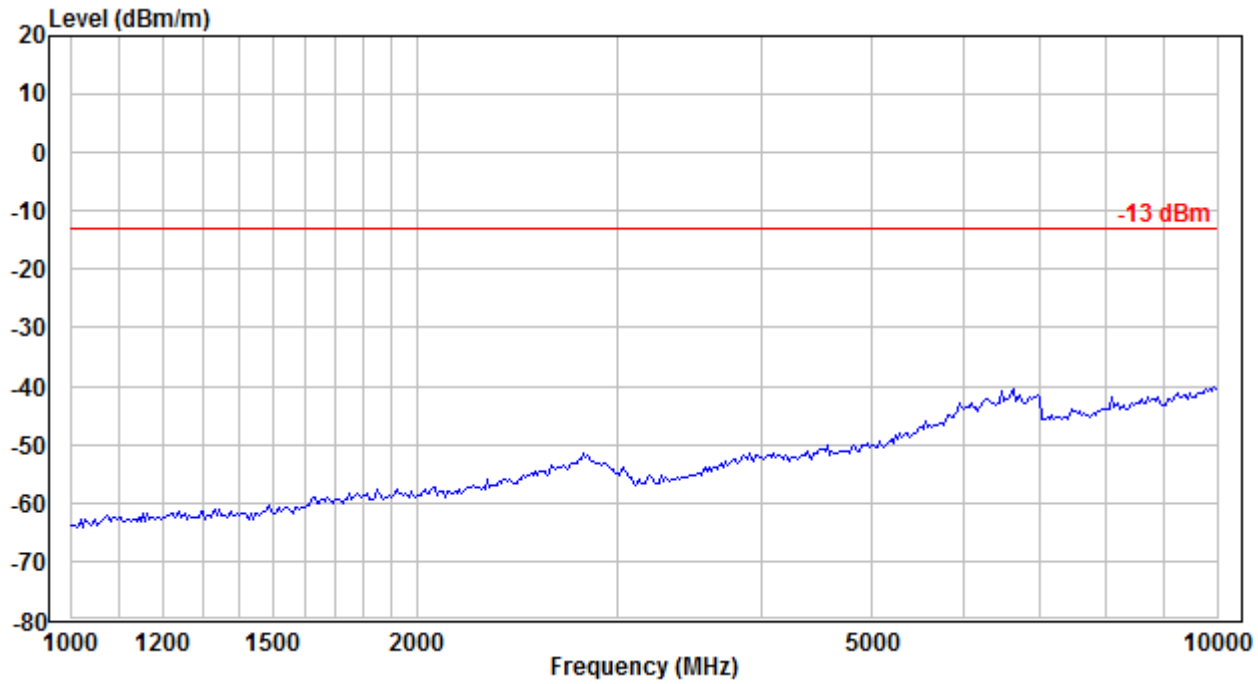


Vertical

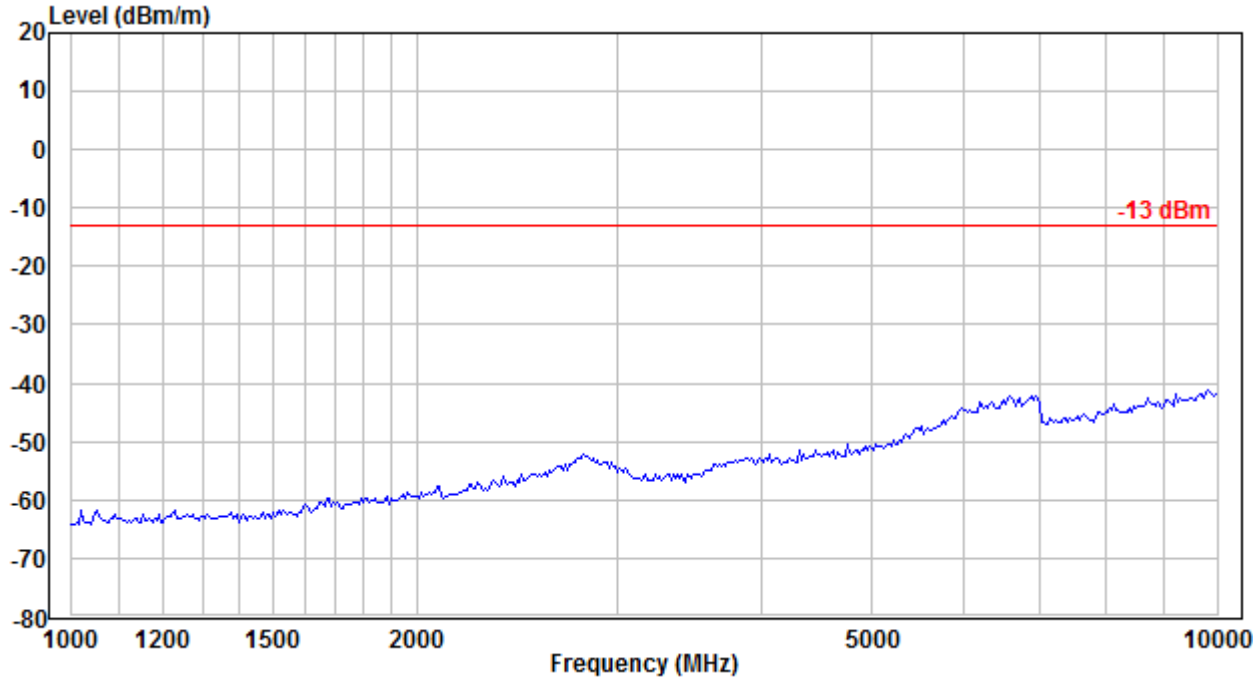


LTE Band 5 / 10 MHz / QPSK_ Middle Channel

Horizontal



Vertical



5.8 FREQUENCY STABILITY

Test Requirement: FCC 47 CFR Part 2.1055 & FCC 47 CFR Part 22.355

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

Limits: The carrier frequency shall not depart from the reference frequency in excess of ±2.5 ppm for mobile stations.

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, 3.6 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	190 / 836.6	VL	TN	5.68	0.0068	± 2.5	Pass
		VN		5.62	0.0067	± 2.5	Pass
		VH		7.94	0.0095	± 2.5	Pass
		VN	50	7.17	0.0086	± 2.5	Pass
			40	6.55	0.0078	± 2.5	Pass
			30	5.61	0.0067	± 2.5	Pass
			20	4.65	0.0056	± 2.5	Pass
			10	4.6	0.0055	± 2.5	Pass
			0	3.54	0.0042	± 2.5	Pass
			-10	2.22	0.0027	± 2.5	Pass
			-20	-3.36	-0.0040	± 2.5	Pass
			-30	-6.72	-0.0080	± 2.5	Pass

Modulation	Channel/ Frequency (MHz)	Voltage (Vdc)	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Pass/ Fail
EDGE 1Tx-slot							
GMSK	190 / 836.6	VL	TN	13.1	0.0157	± 2.5	Pass
		VN		12.2	0.0146	± 2.5	Pass
		VH		12.4	0.0148	± 2.5	Pass
		VN	50	14.5	0.0173	± 2.5	Pass
			40	12.2	0.0146	± 2.5	Pass
			30	12.2	0.0146	± 2.5	Pass
			20	11.6	0.0139	± 2.5	Pass
			10	10.4	0.0124	± 2.5	Pass
			0	8.7	0.0104	± 2.5	Pass
			-10	-0.7	-0.0008	± 2.5	Pass
			-20	-3.2	-0.0038	± 2.5	Pass
			-30	-8.6	-0.0103	± 2.5	Pass

Modulation	Channel/ Frequency (MHz)	Voltage (Vdc)	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Pass/ Fail
WCDMA RMC 12.2Kbps							
GMSK	4182 / 836.4	VL	TN	-1.3	-0.0016	± 2.5	Pass
		VN		-1.4	-0.0017	± 2.5	Pass
		VH		-1.4	-0.0017	± 2.5	Pass
		VN	50	-5.3	-0.0063	± 2.5	Pass
			40	-3.4	-0.0041	± 2.5	Pass
			30	-1.5	-0.0018	± 2.5	Pass
			20	-1.3	-0.0016	± 2.5	Pass
			10	-2.3	-0.0027	± 2.5	Pass
			0	-3.2	-0.0038	± 2.5	Pass
			-10	-4.5	-0.0054	± 2.5	Pass
			-20	-5.1	-0.0061	± 2.5	Pass
			-30	-7.5	-0.0090	± 2.5	Pass

Modulation	Channel/ Frequency (MHz)	Voltage (Vdc)	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Pass/ Fail
LTE Band 5 / 10MHz / Full RB							
QPSK	20525 / 836.5	VL	TN	11	0.0132	± 2.5	Pass
		VN		9	0.0108	± 2.5	Pass
		VH		10	0.0120	± 2.5	Pass
		VN	50	12	0.0143	± 2.5	Pass
			40	10	0.0120	± 2.5	Pass
			30	9	0.0108	± 2.5	Pass
			20	9	0.0108	± 2.5	Pass
			10	7	0.0084	± 2.5	Pass
			0	-1	-0.0012	± 2.5	Pass
			-10	-4	-0.0048	± 2.5	Pass
			-20	-7	-0.0084	± 2.5	Pass
			-30	-9	-0.0108	± 2.5	Pass

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.