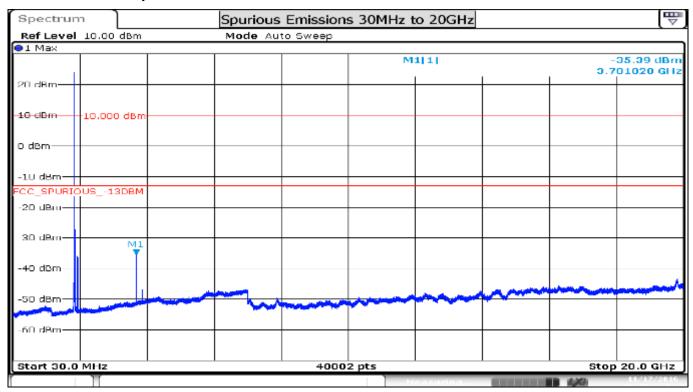
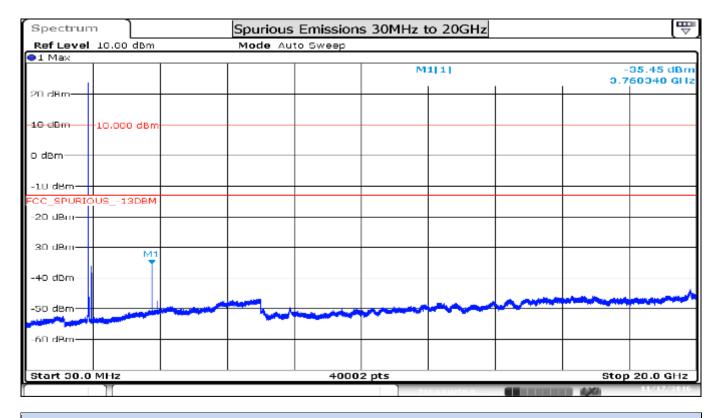


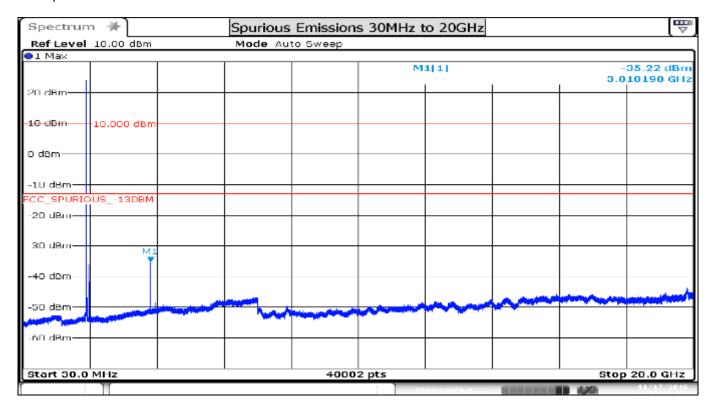
Conduced Spurious Emission Results Screenshots B.4.4



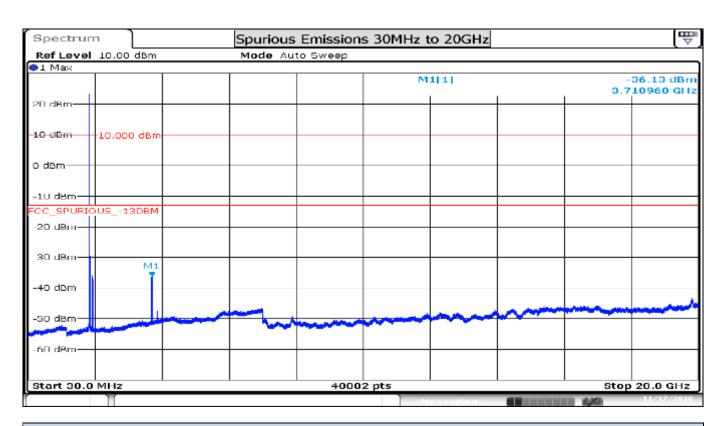
LTE 2 QPSK BW10MHz 1855MHz Channel Low 18650 1RB-0



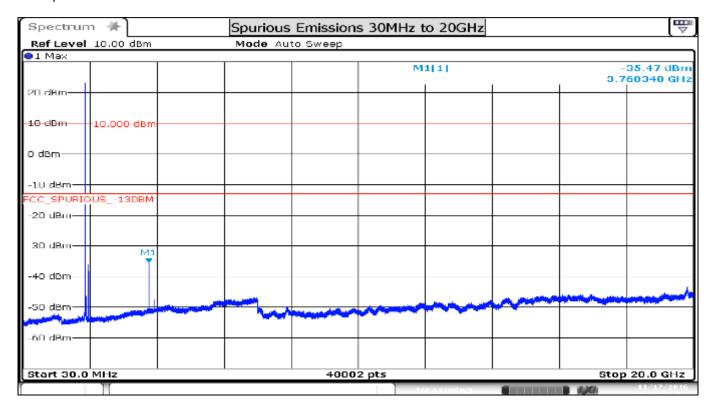
LTE 2 QPSK BW10MHz 1880MHz Channel Mid 18900 1RB-0



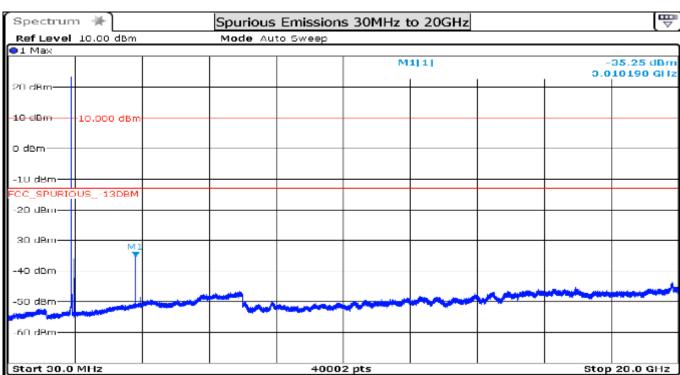
LTE 2 QPSK BW10MHz 1905MHz Channel High 19150 1RB-0

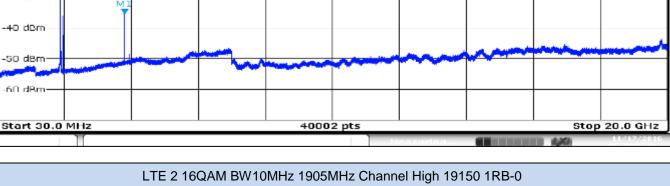


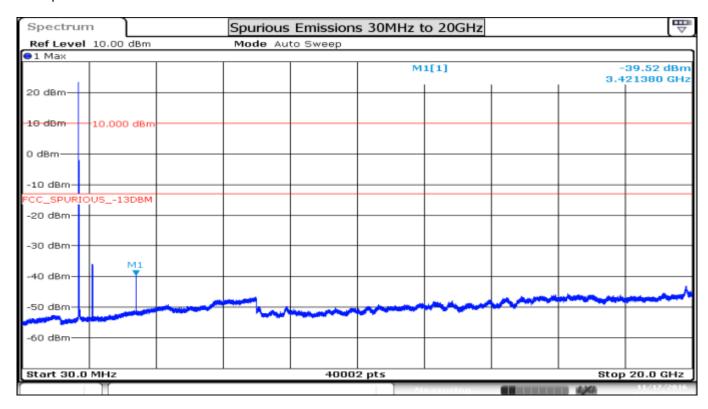
LTE 2 16QAM BW10MHz 1855MHz Channel Low 18650 1RB-0



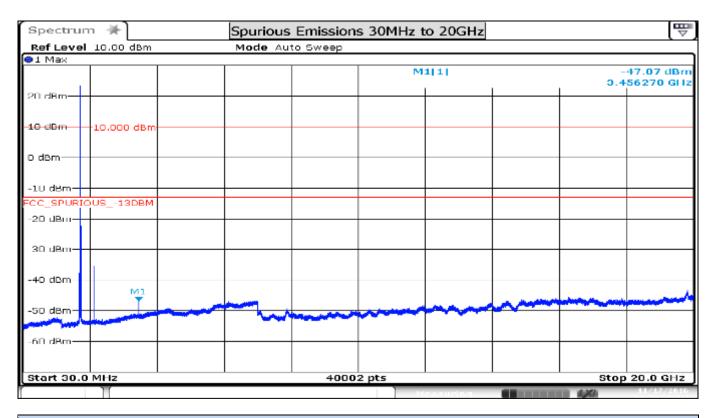
LTE 2 16QAM BW10MHz 1880MHz Channel Mid 18900 1RB-0



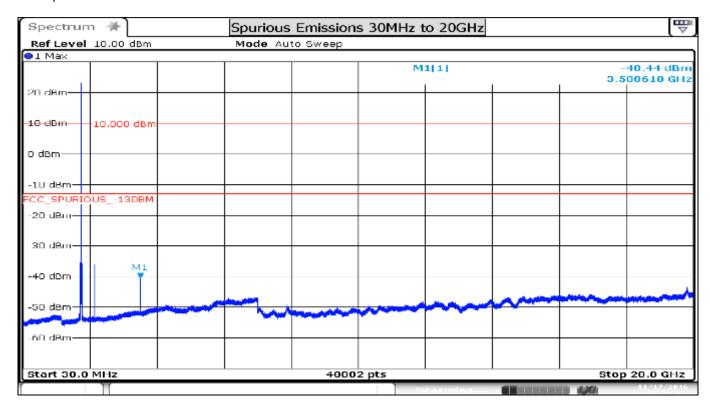




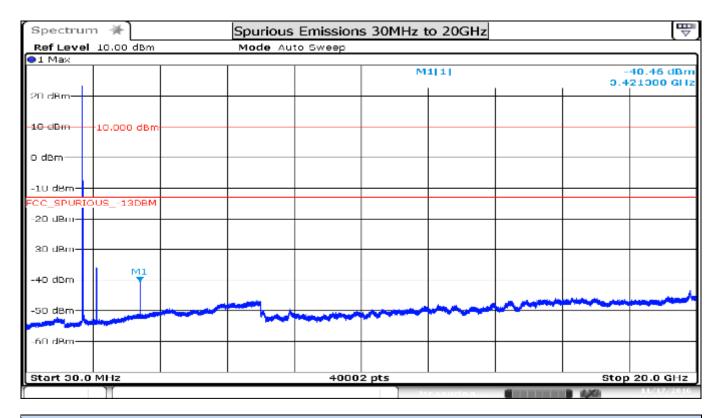




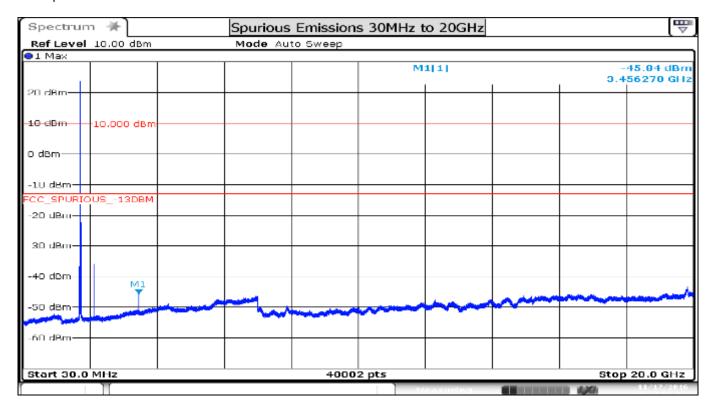
LTE 4 QPSK BW10MHz 1732.5MHz Channel Mid 20175 1RB-0



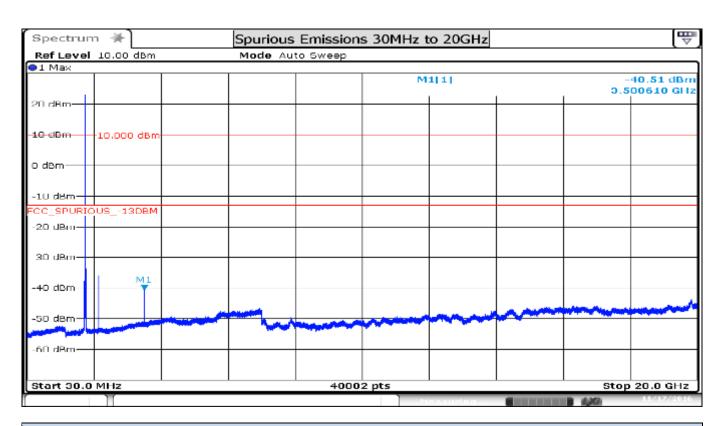




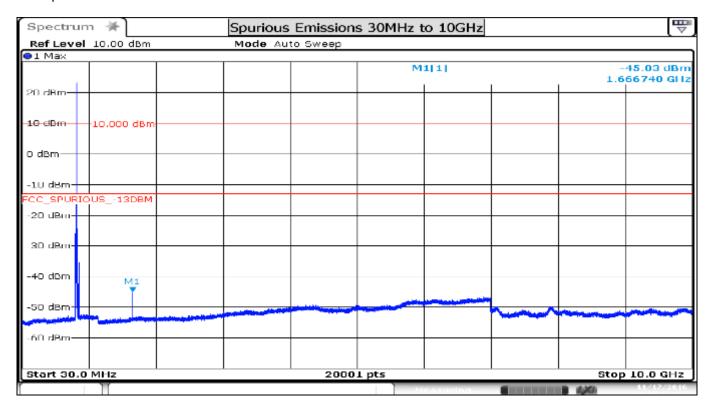
LTE 4 16QAM BW10MHz 1715MHz Channel Low 20000 1RB-0



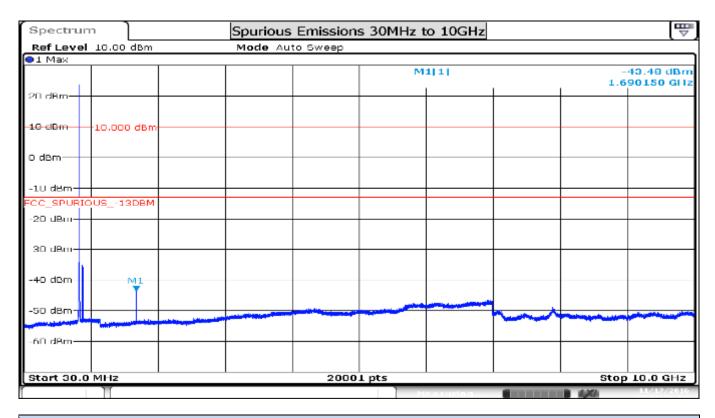




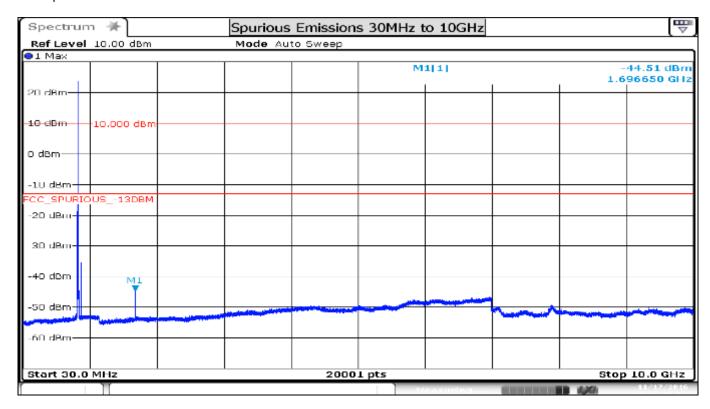
LTE 4 16QAM BW10MHz 1750MHz Channel High 20350 1RB-0

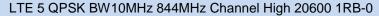


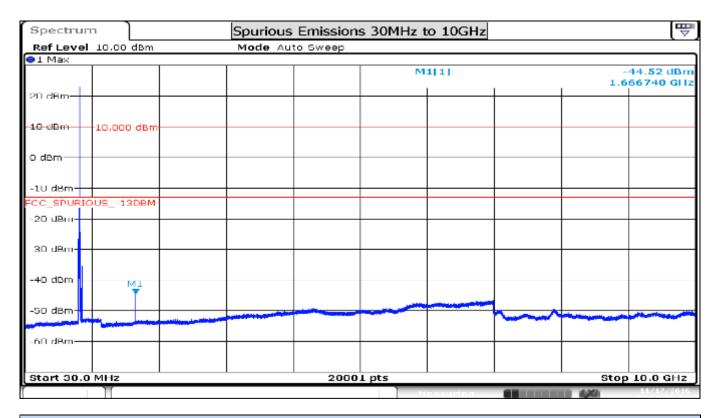




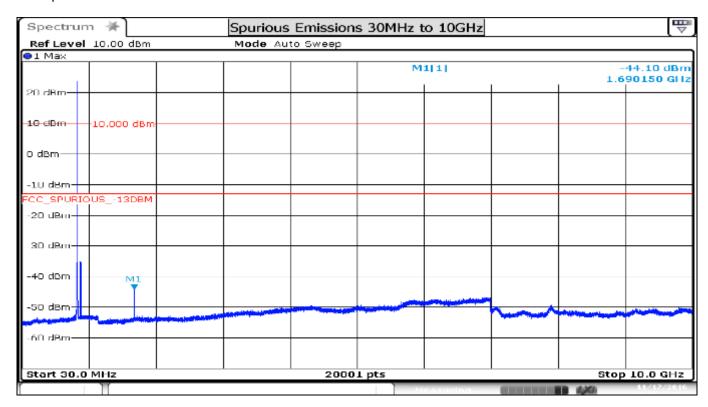
LTE 5 QPSK BW10MHz 836.5MHz Channel Mid 20525 1RB-0

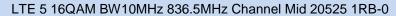


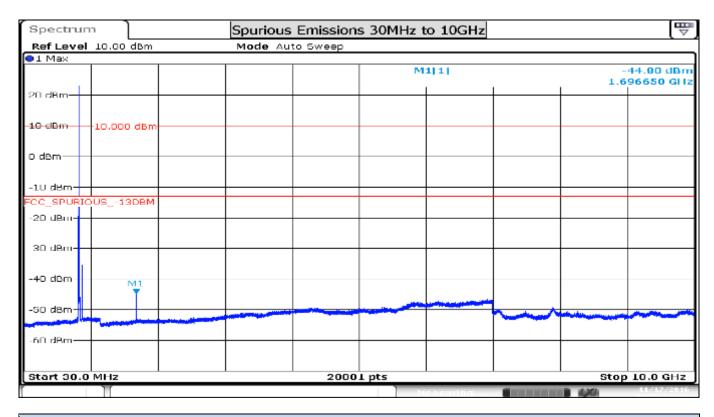




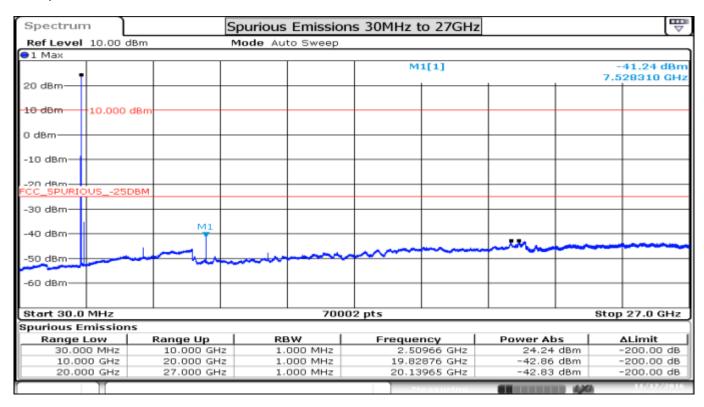
LTE 5 16QAM BW10MHz 829MHz Channel Low 20450 1RB-0



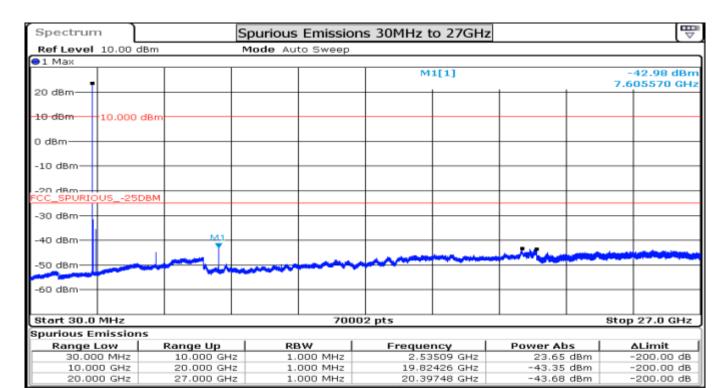




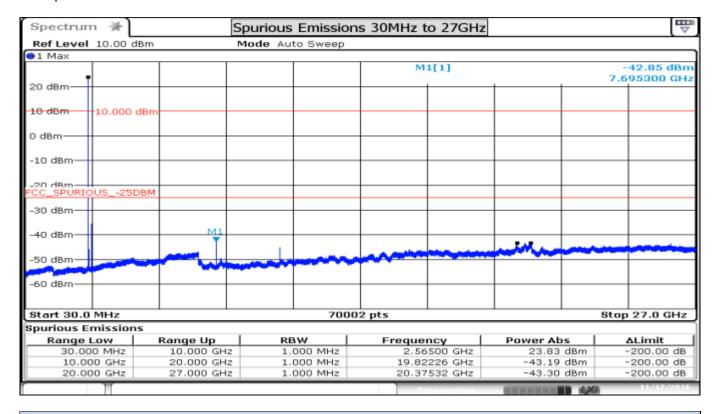
LTE 5 16QAM BW10MHz 844MHz Channel High 20600 1RB-0



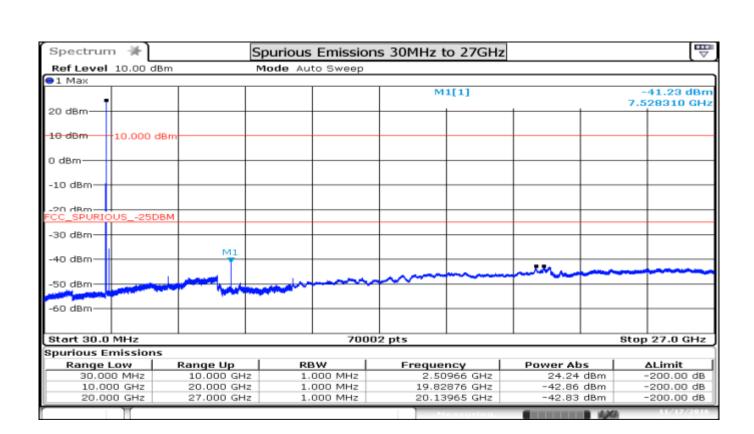
LTE 7 QPSK BW10MHz 2505MHz Channel Low 20800 1RB-0



LTE 7 QPSK BW10MHz 2535MHz Channel Mid 21100 1RB-0

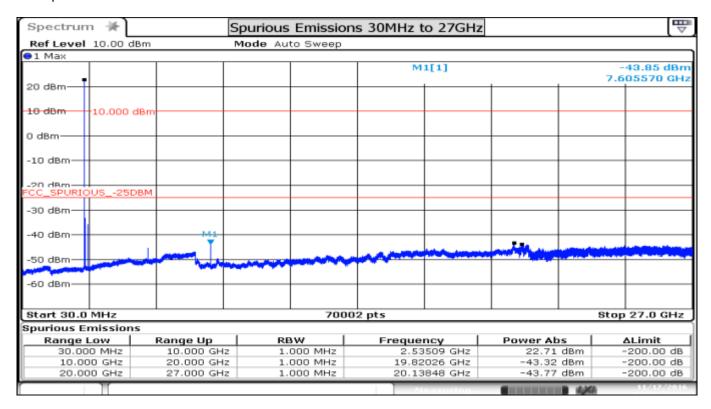


LTE 7 QPSK BW10MHz 2565MHz Channel High 21400 1RB-0

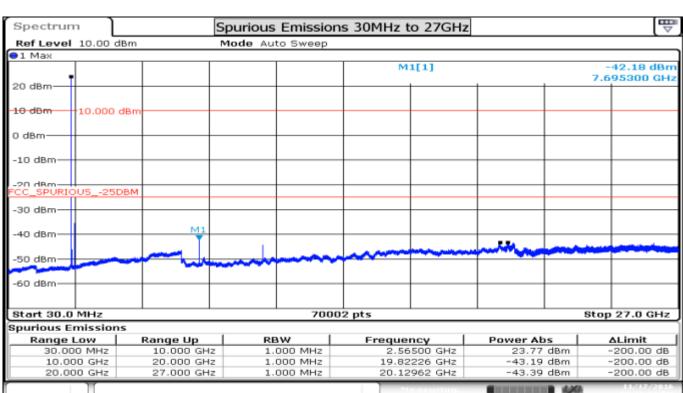


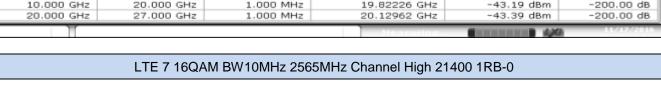


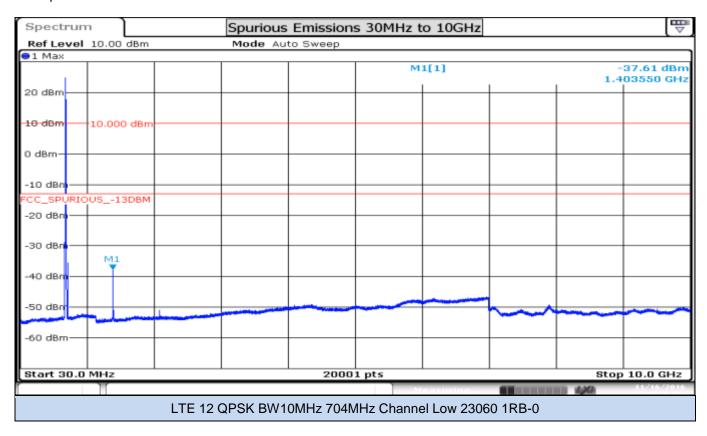
LTE 7 16QAM BW10MHz 2505MHz Channel Low 20800 1RB-0

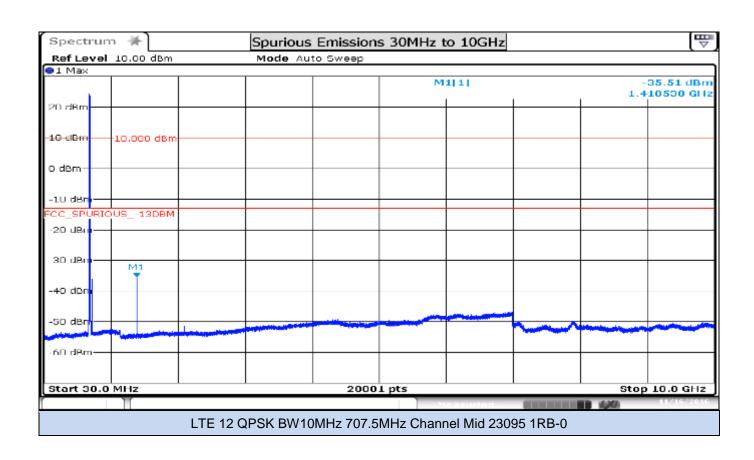


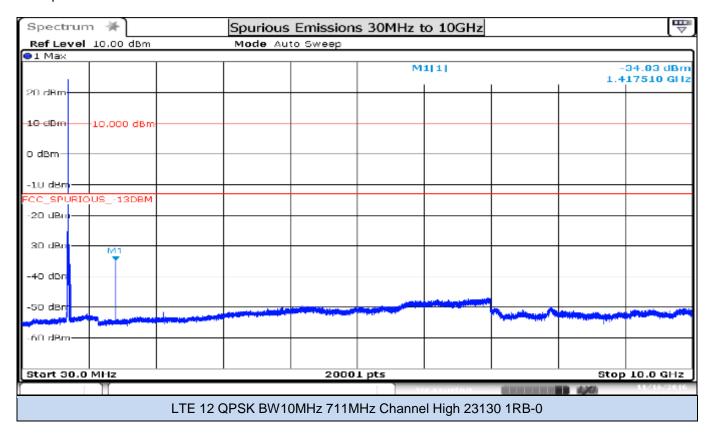
LTE 7 16QAM BW10MHz 2535MHz Channel Mid 21100 1RB-0

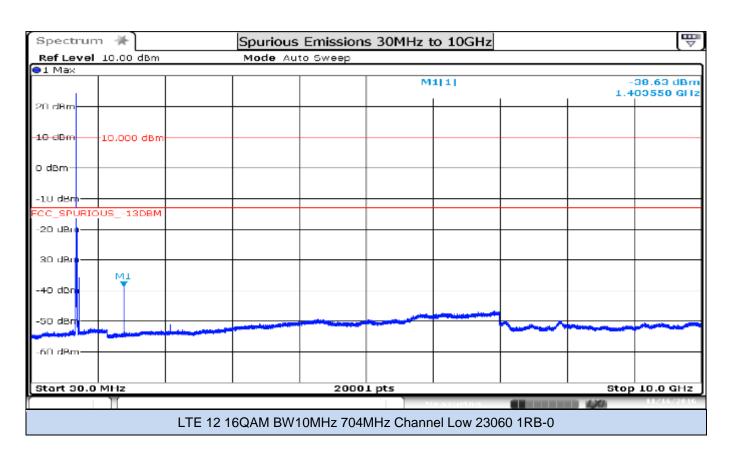


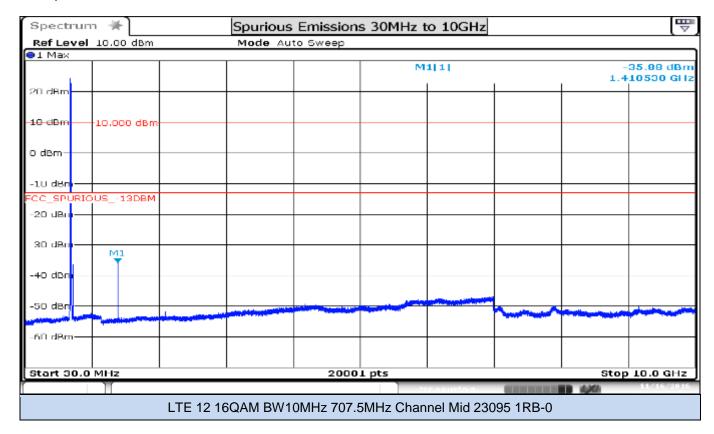


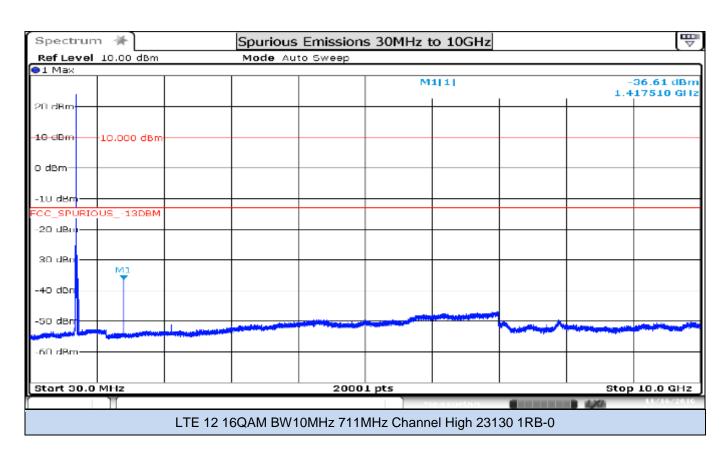


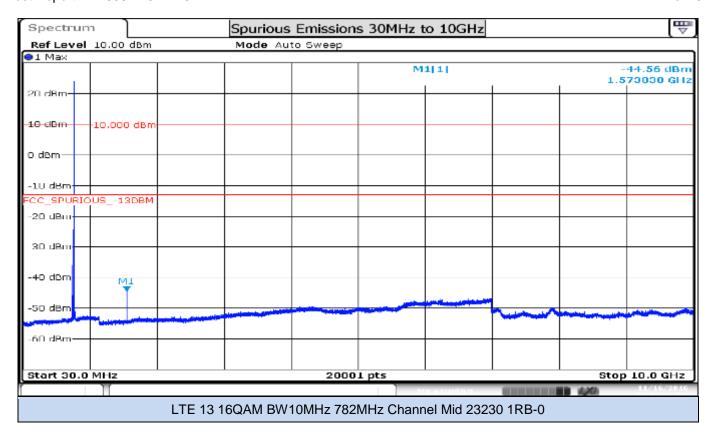


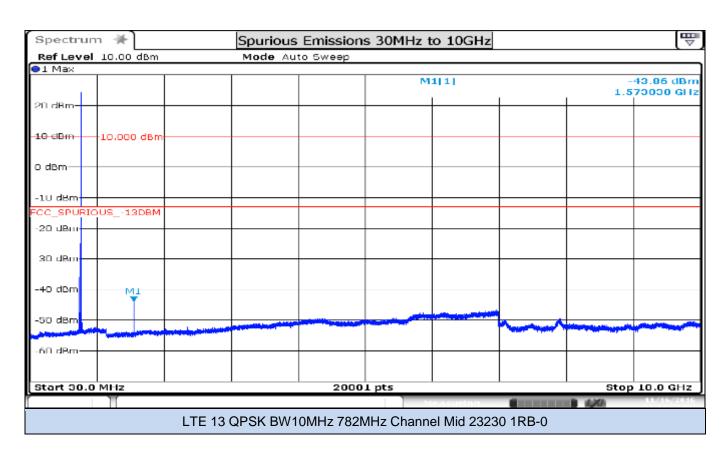














B.5 Frequency Stability

B.5.1 Standard references

BAND	FCC parts	Limits
LTE2		
LTE4	2.1055,	§2.1055 The frequency stability shall be measured with variation of ambient temperature from -30° to $+50^\circ$ centigrade, at intervals of not more than 10° centigrade through the range.
LTE5(19)	22.355,	(d)(2)For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.
LTE7	24.235, 27.54	§22.355 – (for transmitters from 821 to 896 MHz) The carrier frequency shall not depart from the reference frequency in excess of ±2.5 ppm for mobile stations.
LTE12(17)		§24.235 - The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.
LTE13		

B.5.2 Test procedure

The setup showed below is used to measure the frequency stability. The antenna terminal of the EUT is connected to the communication tester (id# 311) and its Frequency Error measurement capability is used. The peak frequency error is recorded (worst-case).

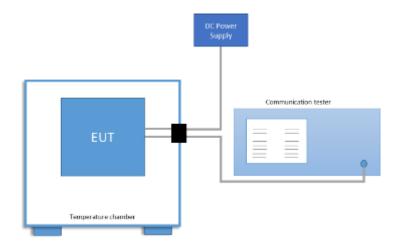
- Temperature = -30 °C to +50 °C
- Voltage = Low 3.23V, Normal 3.8 V, High 4.37V

Frequency Stability vs. Temperature:

The EUT is placed inside a temperature chamber. The temperature is varied from -30°C to +50°C in 10°C increment. For each temperature increment the frequency error is measured after sufficient soak time.

Frequency Stability vs. Voltage:

The frequency error was measured at ambient temperature for voltage set at 85% and 115% of nominal voltage.





B.5.3 Results tables

	Channal	Frog		Tomp	Voltogo	QP	SK	16QAM	
Band	Channel #	Freq. [MHz]	RBs	Temp. Voltage	Freq. Error [Hz]	Freq. Error [ppm]	Freq. Error [Hz]	Freq. Error [ppm]	
				+50		12.9600	0.0069	-15.7300	-0.0084
				+40		13.5800	0.0072	-18.1800	-0.0097
			1880 50	+30	3.8	13.0200	0.0069	21.7000	0.0115
		1880		+20		12.6900	0.0068	23.1600	0.0123
				+10		15.7100	0.0084	12.7600	0.0068
LTE 2	18900			0		8.8800	0.0047	8.9000	0.0047
_				-10		14.1300	0.0075	-16.0600	-0.0085
				-20		10.0900	0.0054	11.1400	0.0059
				-30		11.9700	0.0064	-7.9000	-0.0042
				25	4.37	9.8300	0.0052	9.9600	0.0053
				25	3.23	10.9600	0.0058	11.0100	0.0059

	Channal	From		Tomn	Voltogo	QPSK		16QAM	
Band	Channel #	Freq. [MHz]	RBs	Temp. [ºC]	Voltage [V]	Freq. Error [Hz]	Freq. Error [ppm]	Freq. Error [Hz]	Freq. Error [ppm]
				+50		-12.8700	-0.0074	-11.8900	-0.0069
				+40		-14.9900	-0.0087	15.6500	0.0090
			1732.5 50	+30	3.8	-12.4900	-0.0072	-18.2200	-0.0105
		1732.5		+20		-13.3600	-0.0077	-15.8200	-0.0091
				+10		-11.9600	-0.0069	18.2200	0.0105
LTE 4	20175			0		-10.8600	-0.0063	16.6500	0.0096
-				-10		-9.5800	-0.0055	-17.1100	-0.0099
				-20		10.4400	0.0060	-13.1200	-0.0076
				-30		-13.7500	-0.0079	-12.4300	-0.0072
				25	4.37	11.4200	0.0066	15.3200	0.0088
				25	3.23	12.1300	0.0070	12.6800	0.0073

	Channel	Frog		Tomp	omn Voltogo	QP	QPSK		AM
Band	#	Freq. [MHz]	RBs	Temp. [ºC]	Voltage [V]	Freq. Error [Hz]	Freq. Error [ppm]	Freq. Error [Hz]	Freq. Error [ppm]
				+50		8.5300	0.0102	14.4500	0.0173
				+40		10.7000	0.0128	-10.5900	-0.0127
			836.5 50	+30	3.8	8.0500	0.0096	6.0700	0.0073
		836.5		+20		7.8500	0.0094	-10.8000	-0.0129
				+10		10.6600	0.0127	-9.9000	-0.0118
LTE 5	20525			0		9.9000	0.0118	-10.0400	-0.0120
				-10		9.1100	0.0109	17.7500	0.0212
				-20		6.9200	0.0083	-7.7200	-0.0092
				-30		8.1400	0.0097	6.9200	0.0083
				25	4.37	7.0500	0.0084	7.2300	0.0086
				25	3.23	8.1600	0.0098	7.2800	0.0087



	Channel	Frog		Tomp	Voltage	QP	QPSK		16QAM	
Band	#	Freq. [MHz]	RBs	Temp. Voltage	Freq. Error [Hz]	Freq. Error [ppm]	Freq. Error [Hz]	Freq. Error [ppm]		
				+50		23.0500	0.0091	-19.7800	-0.0078	
				+40		-16.5700	-0.0065	-18.3800	-0.0073	
				+30	3.8	18.1200	0.0071	19.6400	0.0077	
	-TE 21100 253			+20		-17.5500	-0.0069	24.1800	0.0095	
			2535 50	+10		17.8000	0.0070	23.7500	0.0094	
LIE 7		2535		0		-17.4700	-0.0069	-23.7900	-0.0094	
'				-10		-19.2400	-0.0076	-23.8200	-0.0094	
				-20		22.1400	0.0087	-18.4800	-0.0073	
				-30		23.7300	0.0094	27.5200	0.0109	
				25	4.37	17.3200	0.0068	17.4500	0.0069	
				25	3.23	18.3200	0.0072	24.4600	0.0096	

	Channal	Frog		Tomp	yes Velters	QP	QPSK		AM
Band	Channel #	Freq. [MHz]		Temp. Voltage -	Freq. Error [Hz]	Freq. Error [ppm]	Freq. Error [Hz]	Freq. Error [ppm]	
				+50		7.7200	0.0109	-10.4000	-0.0147
				+40		9.1800	0.0130	15.5500	0.0220
			50	+30	3.8	8.2400	0.0116	9.0100	0.0127
		707.5		+20		9.4400	0.0133	6.7100	0.0095
				+10		8.4700	0.0120	13.3600	0.0189
LTE 12	23095			0		8.9700	0.0127	14.8100	0.0209
12				-10		5.7800	0.0082	11.8400	0.0167
				-20		5.9400	0.0084	6.6100	0.0093
				-30		7.6700	0.0108	5.6500	0.0080
				25	4.37	12.5300	0.0177	13.2900	0.0188
				25	3.23	5.0500	0.0071	7.7200	0.0109

	Channal	Frog		Tomp	Temp. Voltage [°C] [V]	QP	QPSK		MA
Band	Channel #	Freq. [MHz]	RBs			Freq. Error [Hz]	Freq. Error [ppm]	Freq. Error [Hz]	Freq. Error [ppm]
				+50		-4.7200	-0.0060	8.6400	0.0110
				+40		7.2700	0.0093	6.2200	0.0080
			782 50	+30	3.8	9.1100	0.0116	-11.3000	-0.0145
				+20		7.0000	0.0090	-9.2000	-0.0118
				+10		8.8400	0.0113	-8.9100	-0.0114
LTE 13	23230	782		0		7.1000	0.0091	-9.6000	-0.0123
10				-10		7.2700	0.0093	-12.2300	-0.0156
				-20		8.9300	0.0114	-8.1400	-0.0104
				-30		9.1600	0.0117	14.8600	0.0190
				25	4.37	10.0600	0.0129	12.5900	0.0161
				25	3.23	9.2400	0.0118	6.4500	0.0082

B.6 Radiated spurious emission

B.6.1 Standard references

BAND	FCC part	RSS part	Limits
LTE 2	2. 1051, 24.238	133-ch6.5.1	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
LTE 4	2. 1051, 27.53	139-ch.6.5	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
LTE 5	2. 1051, 22.917	132-ch.5.5	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
LTE 7	2.1051, 27.53 (m)(4)	199-ch.4.6	For mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz
LTE 12(17)	2.1051, 27.53 (g)	130-ch.4.6	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
LTE 13	2.1051, 27.53 (c)	130-ch.4.6	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 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.

B.6.2 Test procedure

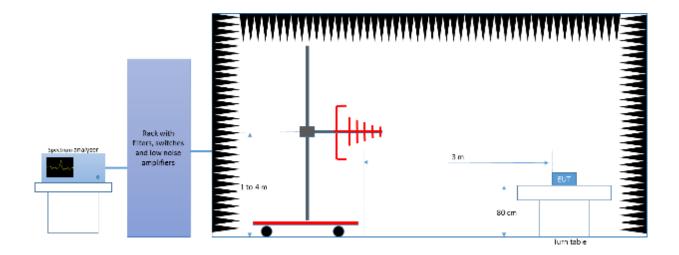
The setup below was used to measure the radiated spurious emissions. The test was done following the FCC OET KDB 971168 D01 v02r02 § 7. The receiver's resolution bandwidth was set to 1MHz and the video bandwidth set to 3MHz for all radiated measurements.

Depending of the frequency range and bands being tested, different antennas and filters were used.

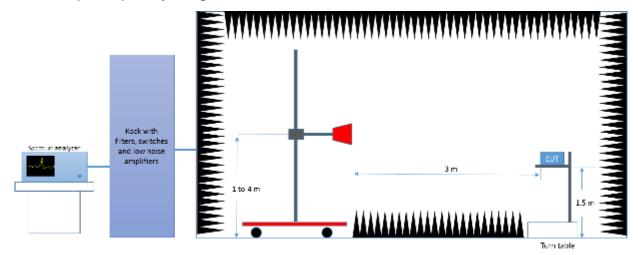
The final measurement is done by varying the antenna height from 1 to 4 meters, the EUT azimuth over 360° and for both Vertical and Horizontal polarizations. The substitution method according to the ANSI/TIA-603-D was used to determine the spurious level identified during the exploratory radiated emissions measurements.

The radiated spurious emission was measured on the worst case configuration selected from the chapter B.1 and on the low, middle and high channel.

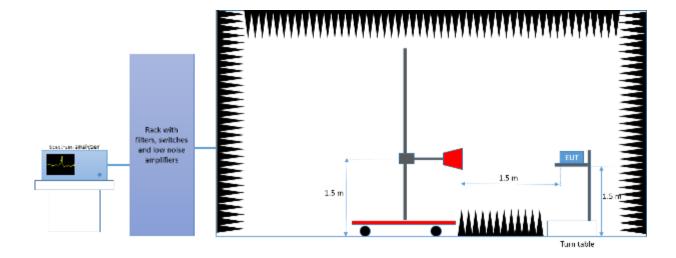
Radiated Setup < 1GHz



Radiated Setup Frequency range 1 GHz to 18 GHz



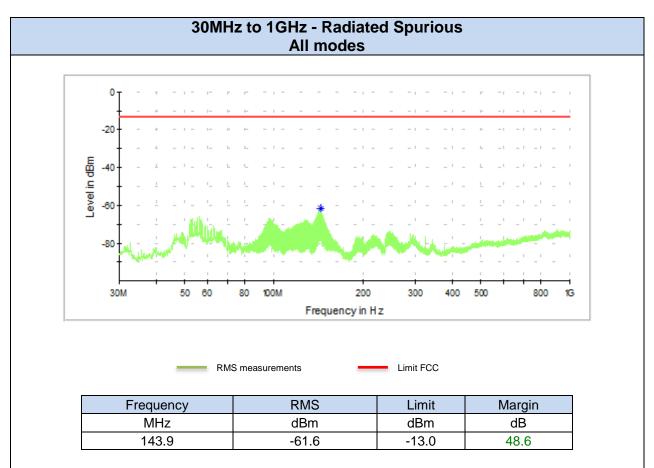
Radiated Setup > 18GHz



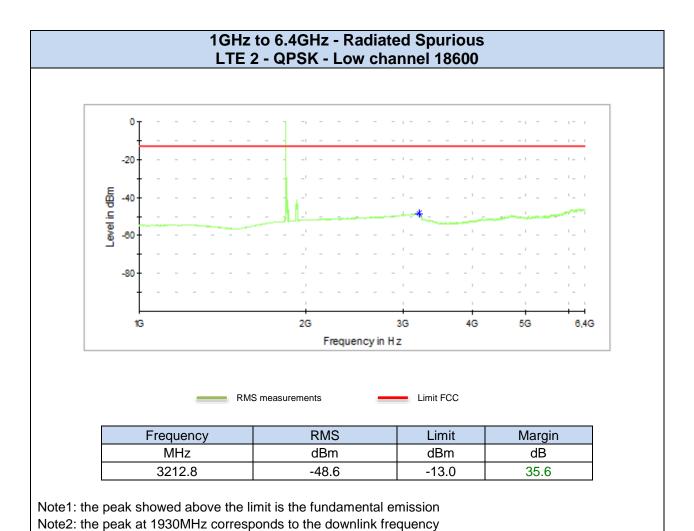


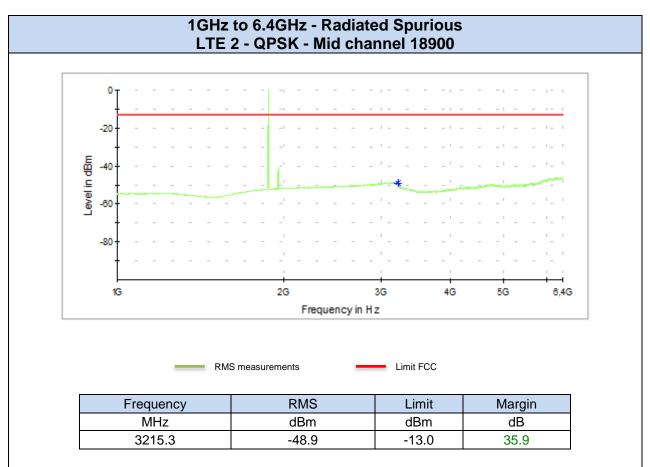
B.6.3 Test Results

LTE₂

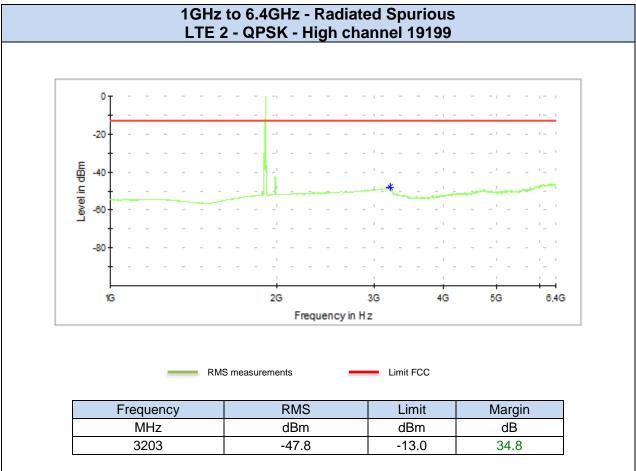


Note 1: The spurious signals detected do not depend on either the operating channel or the modulation mode.

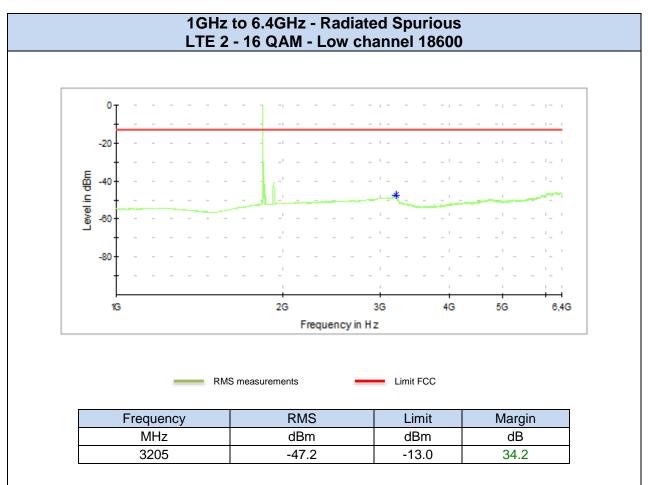




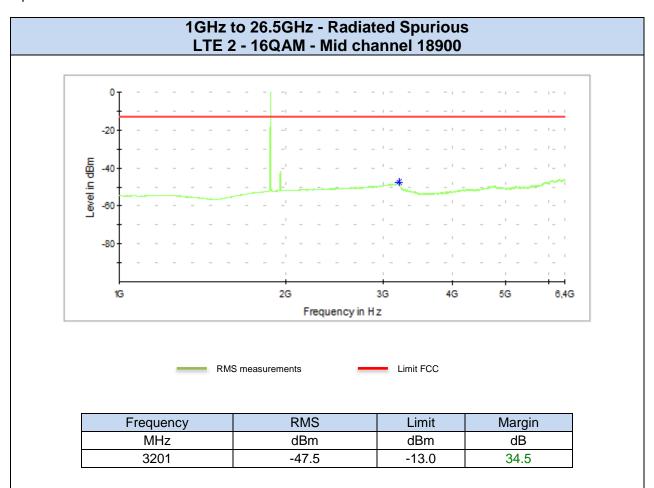
Note1: the peak showed above the limit is the fundamental emission Note2: the peak at 1960MHz corresponds to the downlink frequency



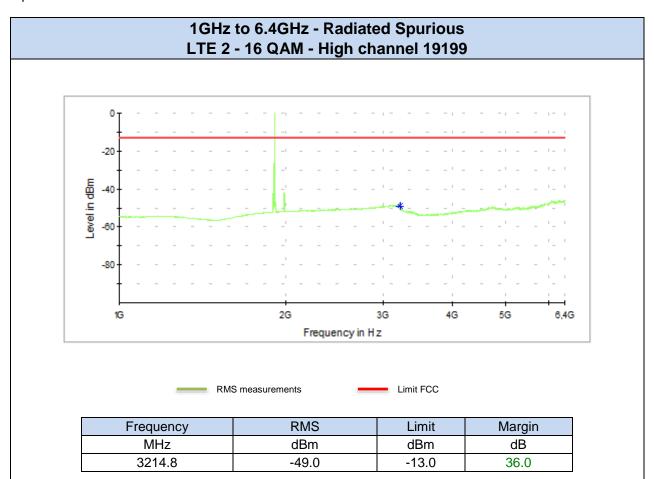
Note1: the peak showed above the limit is the fundamental emission Note2: the peak at 1990MHz corresponds to the downlink frequency



Note1: the peak showed above the limit is the fundamental emission Note2: the peak at 1930MHz corresponds to the downlink frequency

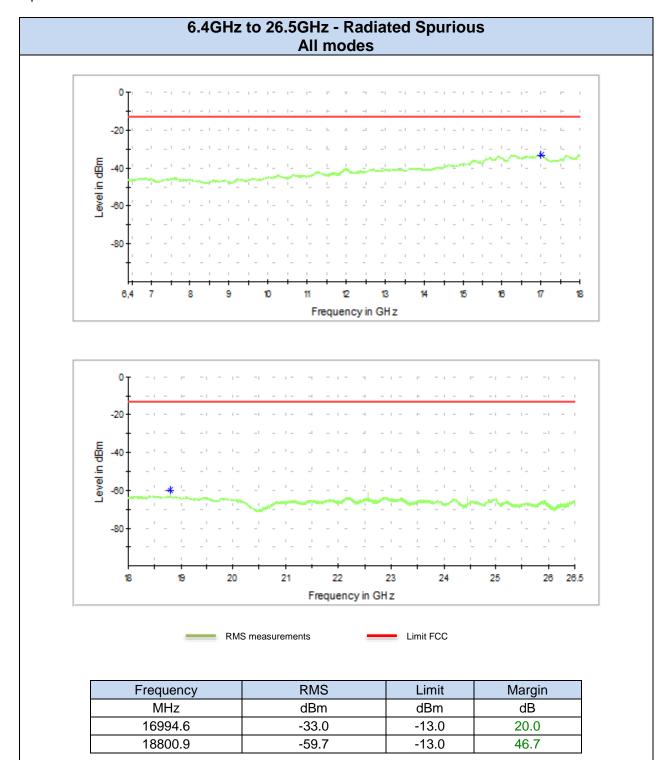


Note1: the peak showed above the limit is the fundamental emission Note2: the peak at 1960MHz corresponds to the downlink frequency



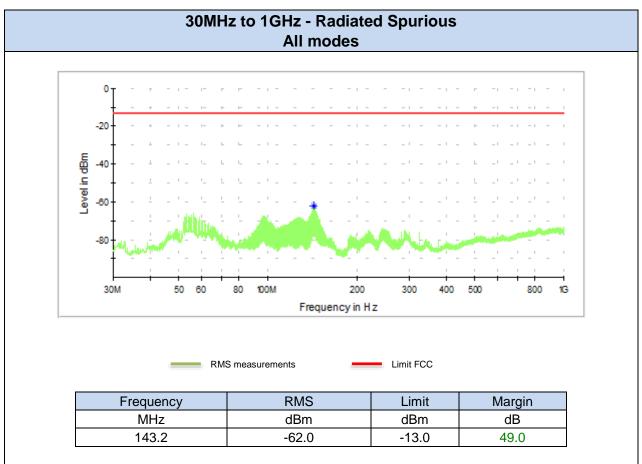
Note1: the peak showed above the limit is the fundamental emission Note2: the peak at 1990MHz corresponds to the downlink frequency





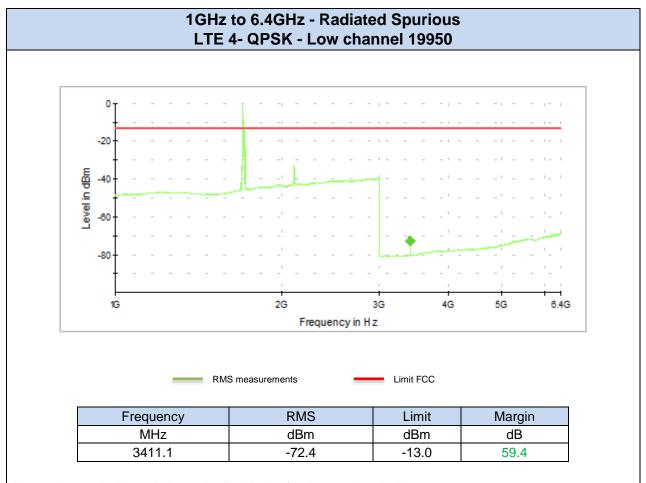
Note 1: The spurious signals detected do not depend on either the operating channel or the modulation mode.

<u>LTE 4</u>

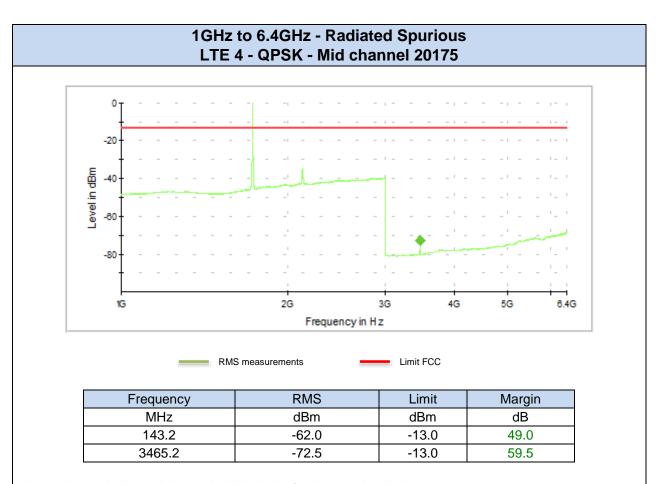


Note 1: The spurious signals detected do not depend on either the operating channel or the modulation mode.



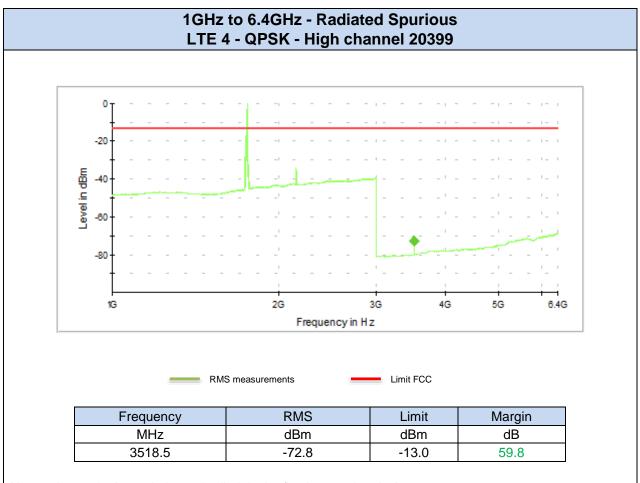


Note1: the peak showed above the limit is the fundamental emission Note2: the peak at 2110MHz corresponds to the downlink frequency

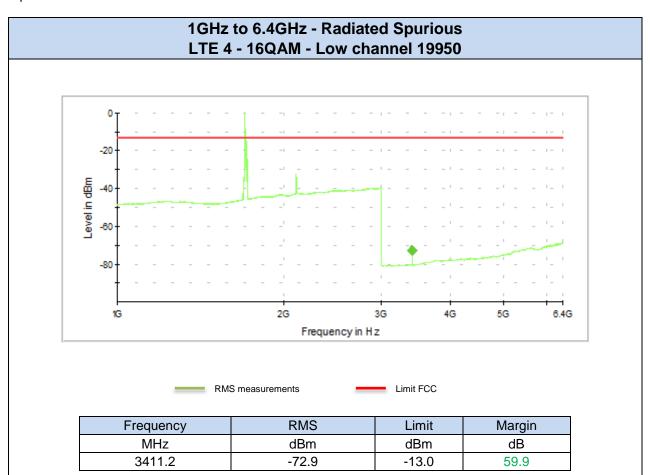


Note1: the peak showed above the limit is the fundamental emission Note2: the peak at 2132.5MHz corresponds to the downlink frequency

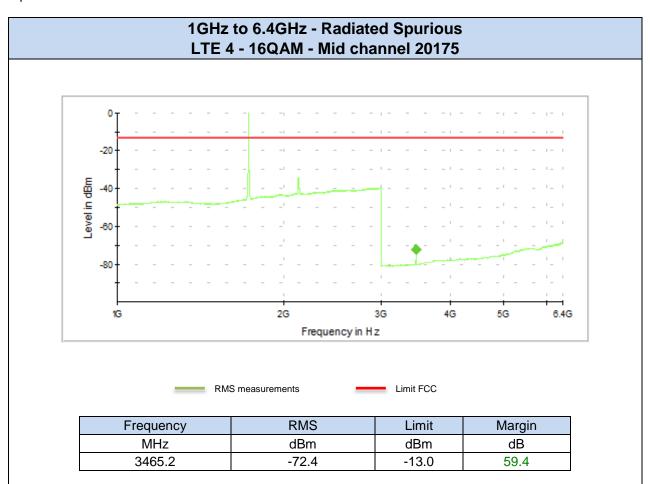




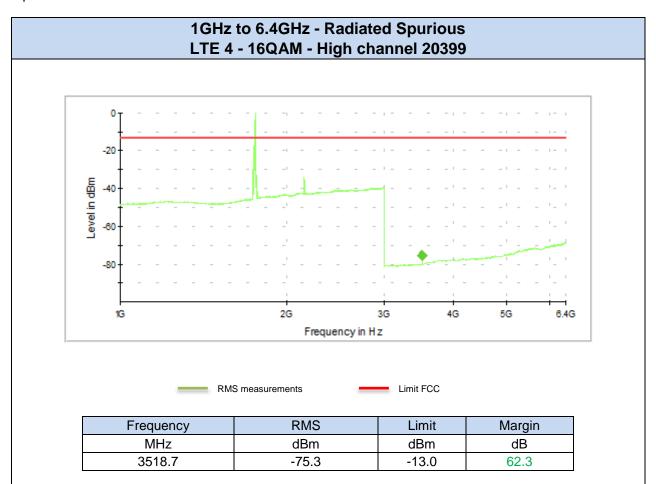
Note1: the peak showed above the limit is the fundamental emission Note2: the peak at 2155MHz corresponds to the downlink frequency



Note1: the peak showed above the limit is the fundamental emission Note2: the peak at 2110MHz corresponds to the downlink frequency

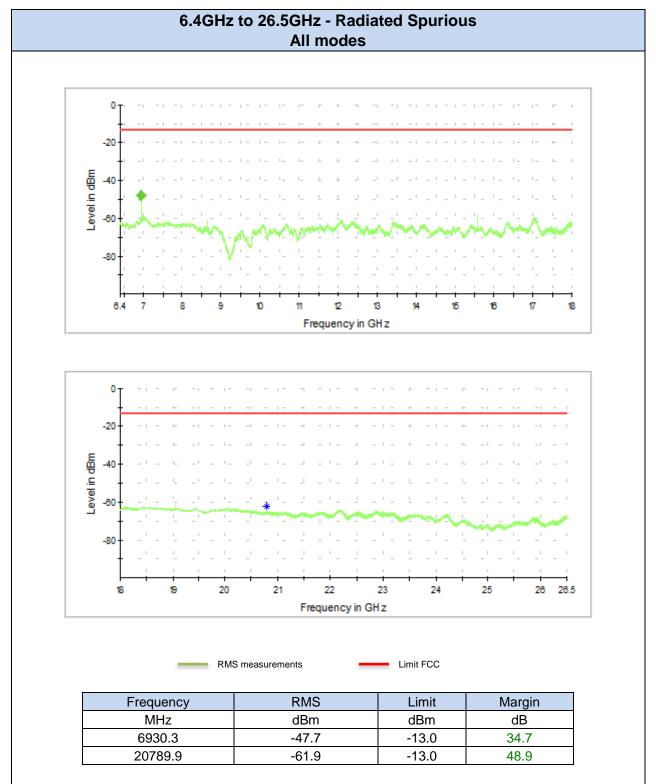


Note1: the peak showed above the limit is the fundamental emission Note2: the peak at 2132.5MHz corresponds to the downlink frequency



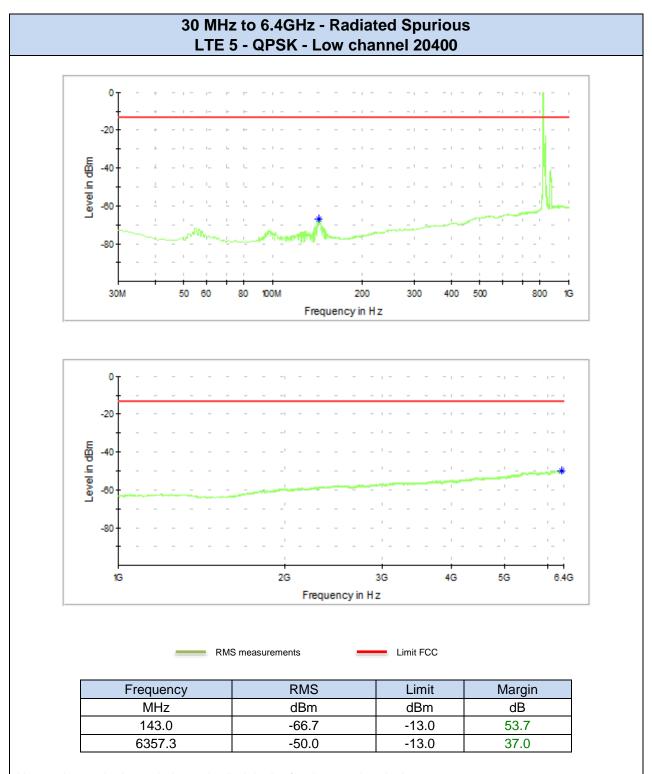
Note1: the peak showed above the limit is the fundamental emission Note2: the peak at 2155MHz corresponds to the downlink frequency





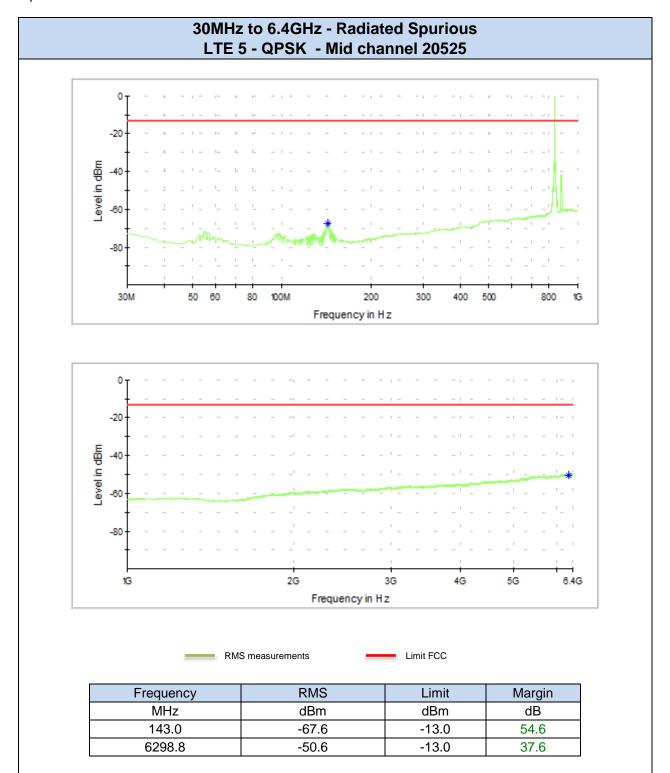
Note 1: The spurious signals detected do not depend on either the operating channel or the modulation mode.

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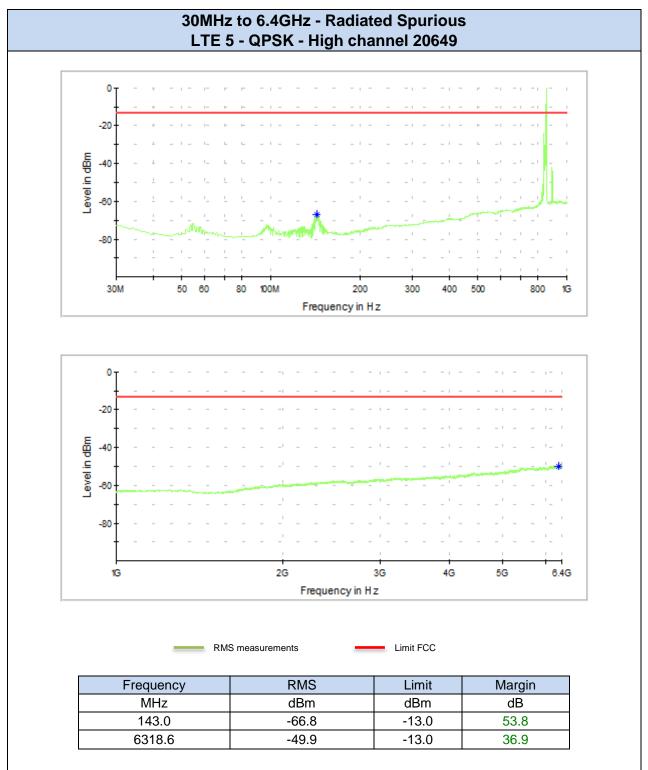
Note1: the peak showed above the limit is the fundamental emission Note2: the peak at 869MHz corresponds to the downlink frequency

Rev. 01

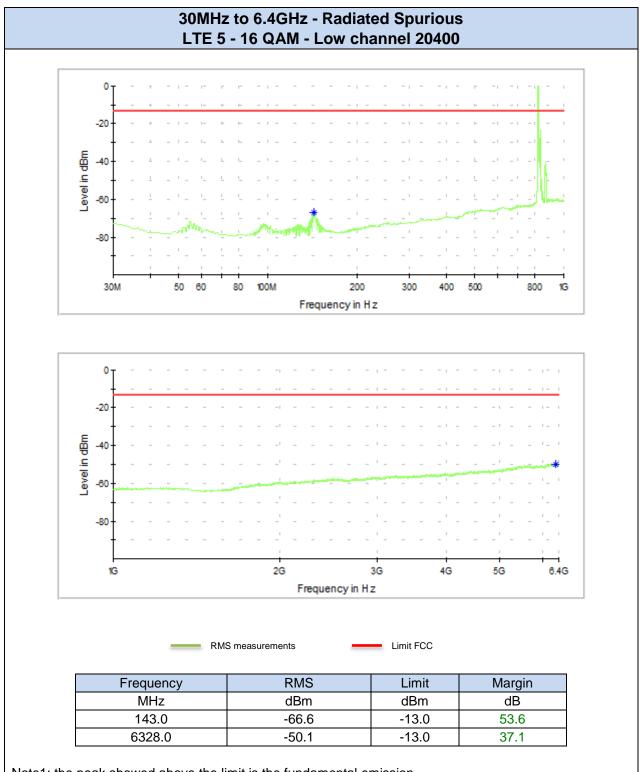


Note1: the peak showed above the limit is the fundamental emission Note2: the peak at 881.5MHz corresponds to the downlink frequency

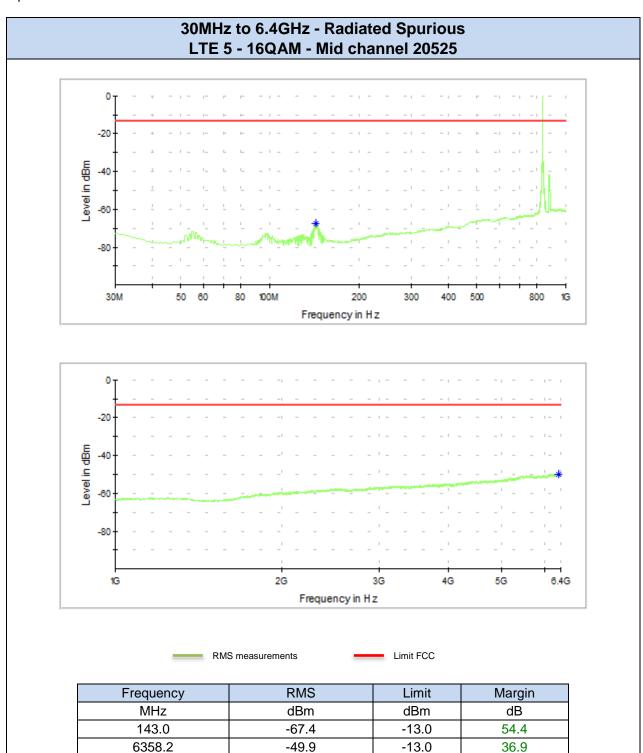




Note1: the peak showed above the limit is the fundamental emission Note2: the peak at 894MHz corresponds to the downlink frequency

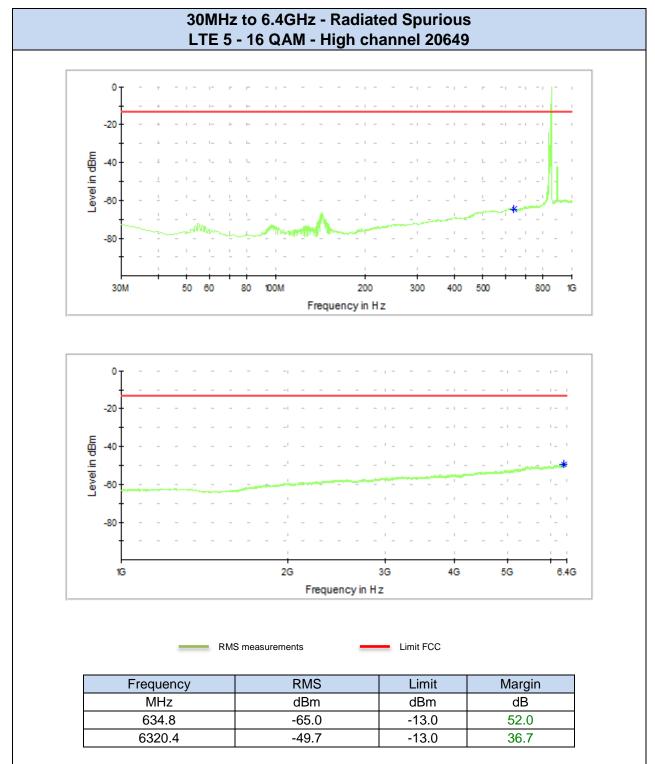


Note1: the peak showed above the limit is the fundamental emission Note2: the peak at 869MHz corresponds to the downlink frequency



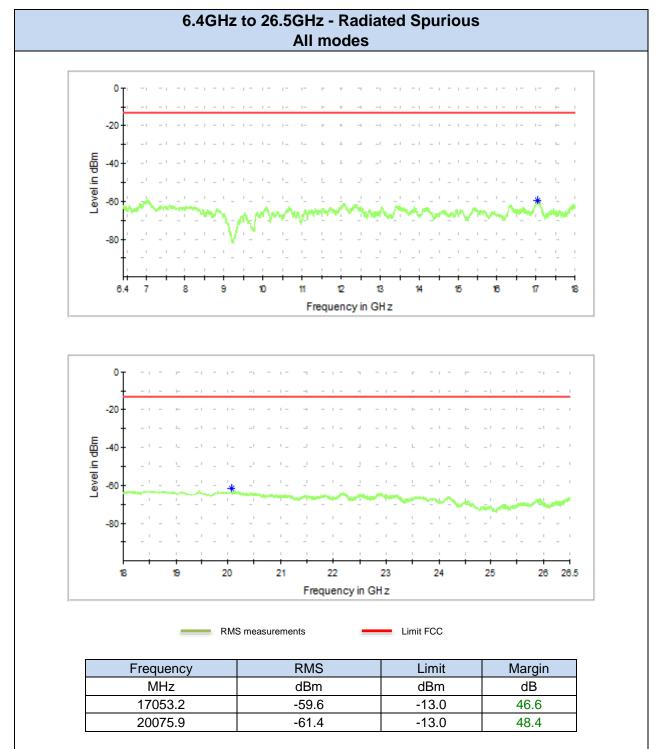
Note1: the peak showed above the limit is the fundamental emission Note2: the peak at 881.5MHz corresponds to the downlink frequency

Rev 01



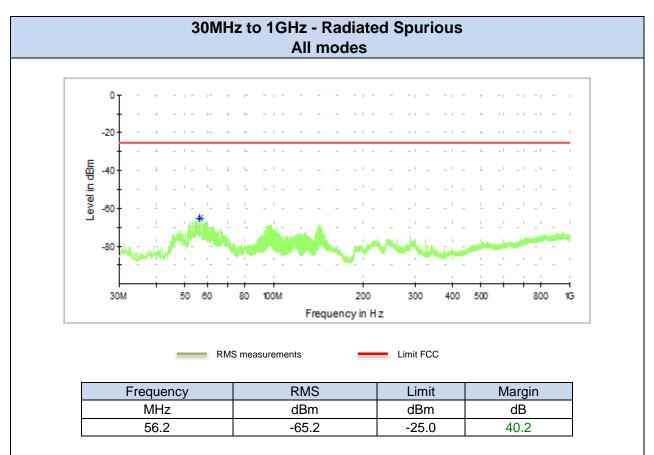
Note1: the peak showed above the limit is the fundamental emission Note2: the peak at 894MHz corresponds to the downlink frequency



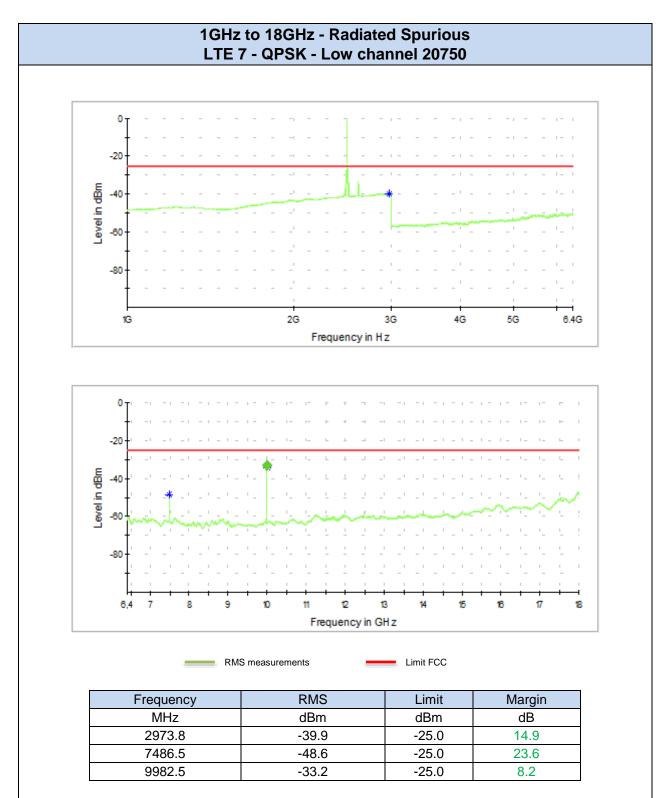


Note 1: The spurious signals detected do not depend on either the operating channel or the modulation mode.

<u>LTE 7</u>

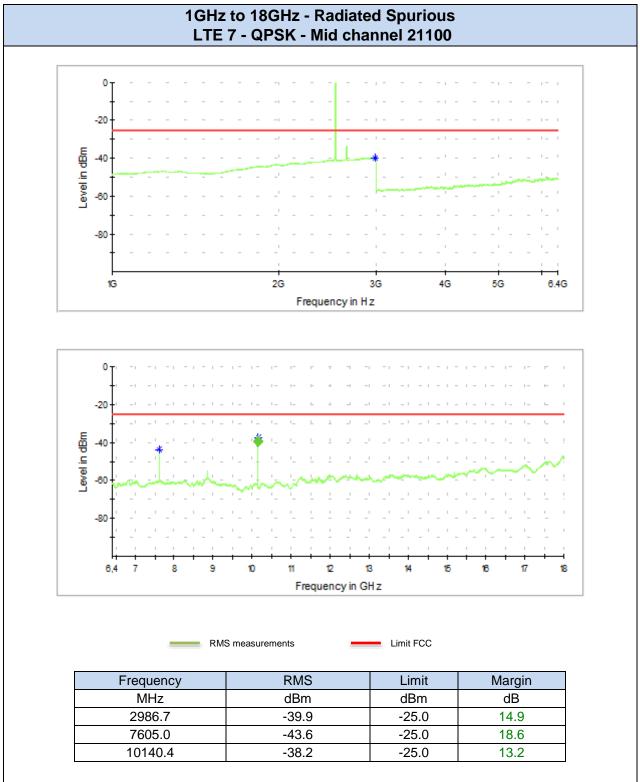


Note 1: The spurious signals detected do not depend on either the operating channel or the modulation mode.



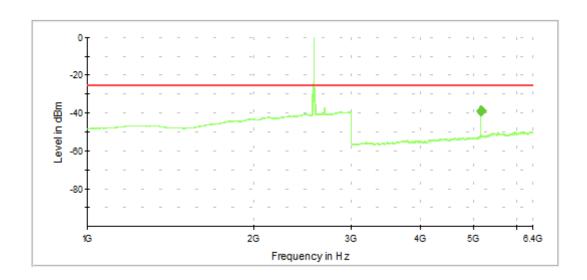
Note1: the peak showed above the limit is the fundamental emission Note2: the peak at 2620MHz corresponds to the downlink frequency

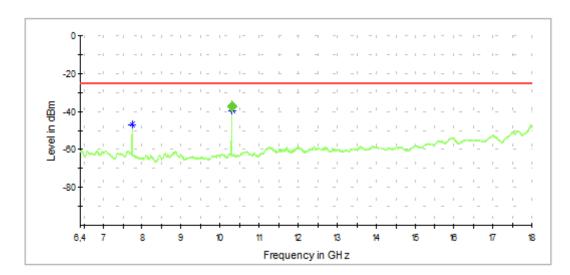




Note1: the peak showed above the limit is the fundamental emission Note2: the peak at 2655MHz corresponds to the downlink frequency





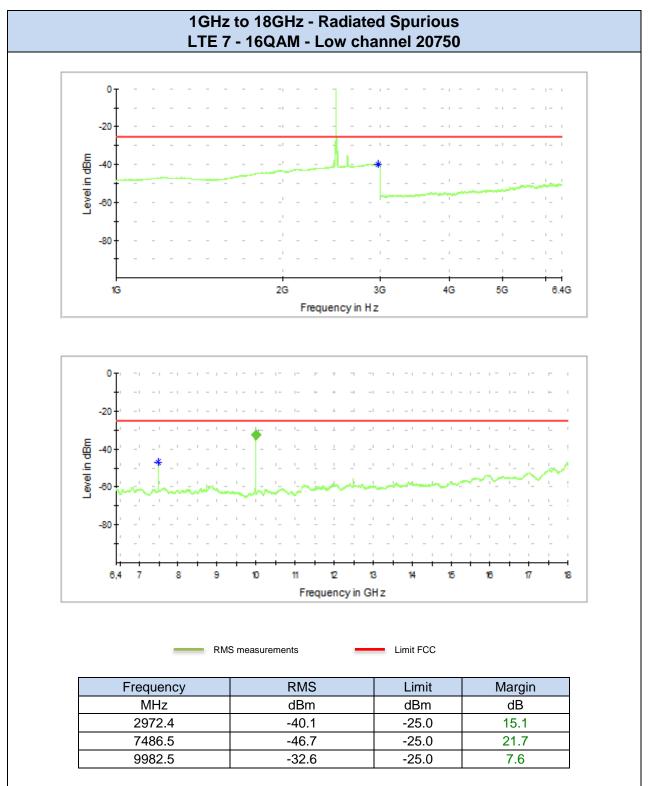


RMS measurements Limit FCC

Frequency	RMS	Limit	Margin
MHz	dBm	dBm	dB
5148.6	-38.7	-25.0	25.7
7723.0	-46.7	-25.0	21.7
10297.1	-37.3	-25.0	12.3

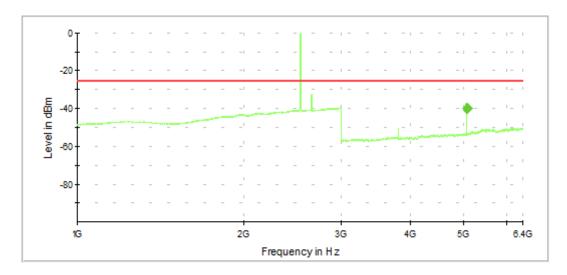
Note1: the peak showed above the limit is the fundamental emission Note2: the peak at 2690MHz corresponds to the downlink frequency





Note1: the peak showed above the limit is the fundamental emission Note2: the peak at 2620MHz corresponds to the downlink frequency





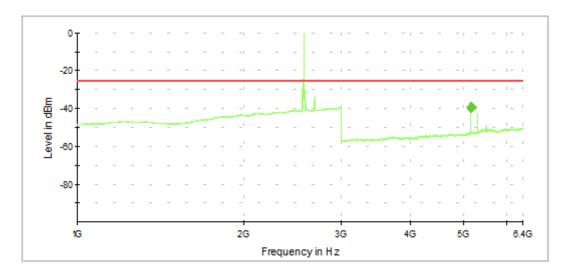


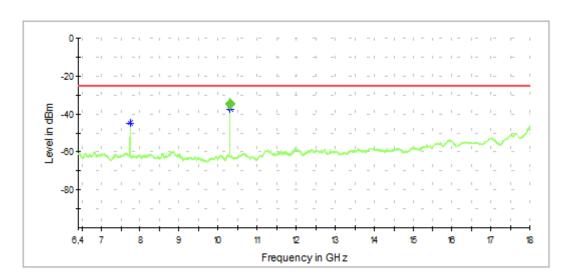
RMS measurements Limit FCC

Frequency	RMS	Limit	Margin
MHz	dBm	dBm	dB
5070.2	-40.0	-25.0	15.0
7605.4	-43.7	-25.0	18.7
10140.3	-36.0	-25.0	11.0

Note1: the peak showed above the limit is the fundamental emission Note2: the peak at 2655MHz corresponds to the downlink frequency



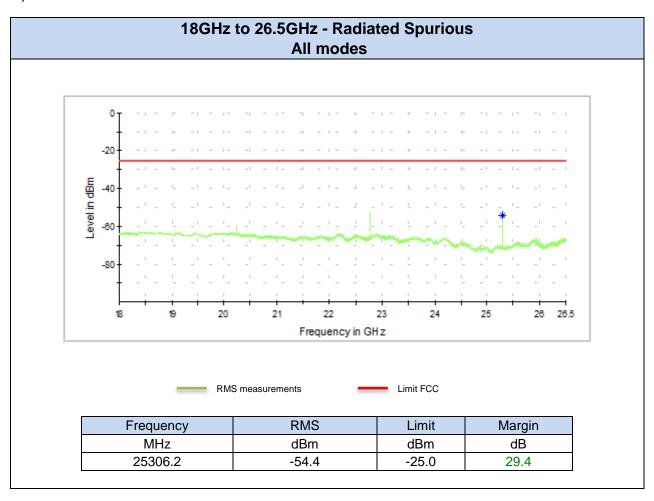




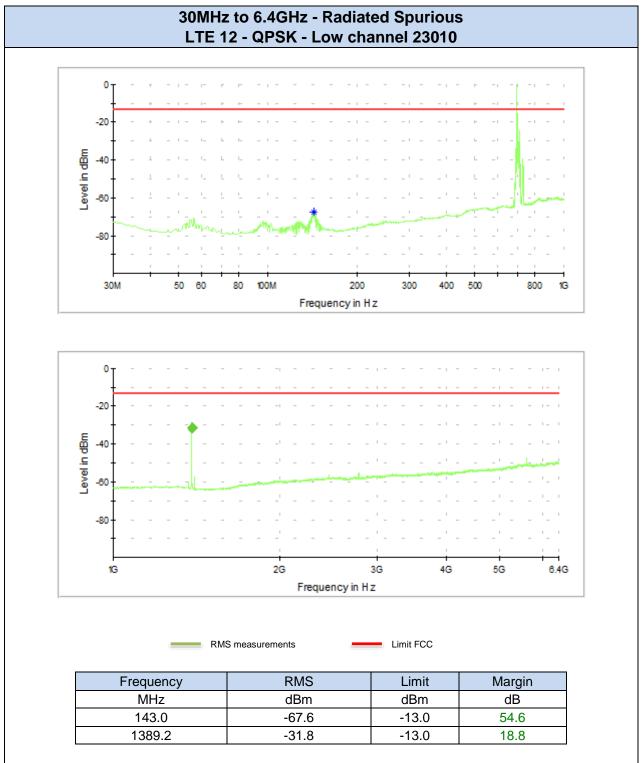
RMS measurements Limit FCC

Frequency	RMS	Limit	Margin
MHz	dBm	dBm	dB
5148.7	-39.6	-25.0	14.6
7722.4	-44.9	-25.0	19.9
10297.1	-35.0	-25.0	10.0

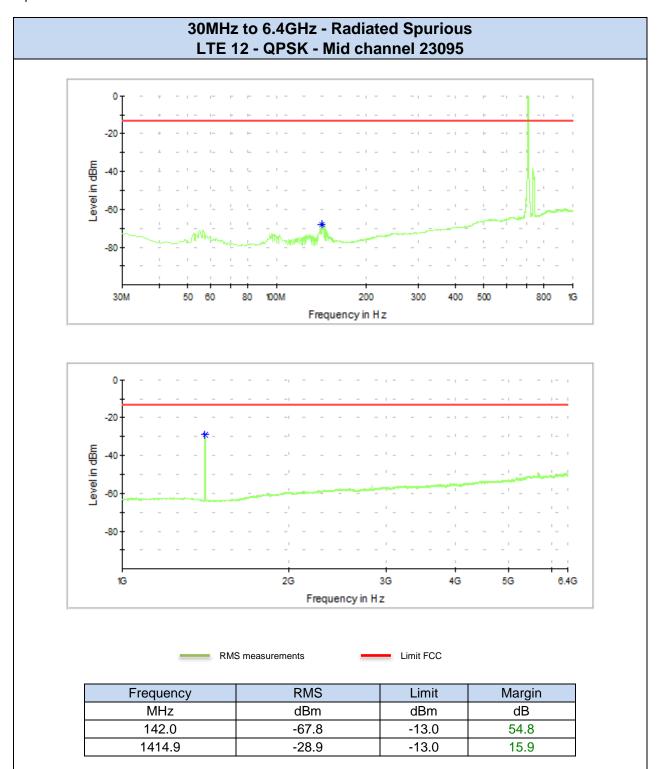
Note1: the peak showed above the limit is the fundamental emission Note2: the peak at 2690MHz corresponds to the downlink frequency



LTE 12(17)

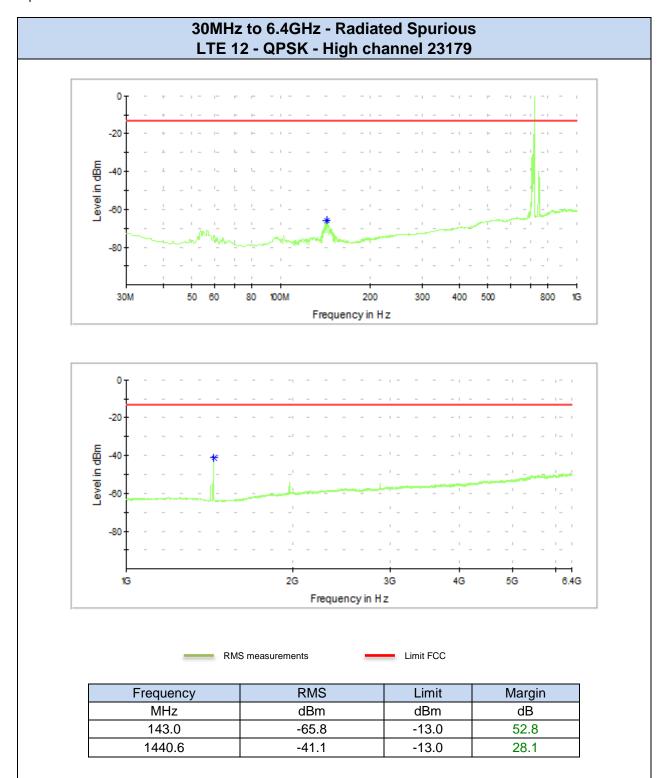


Note1: the peak showed above the limit is the fundamental emission Note2: the peak at 729MHz corresponds to the downlink frequency



Note1: the peak showed above the limit is the fundamental emission Note2: the peak at 737.5MHz corresponds to the downlink frequency

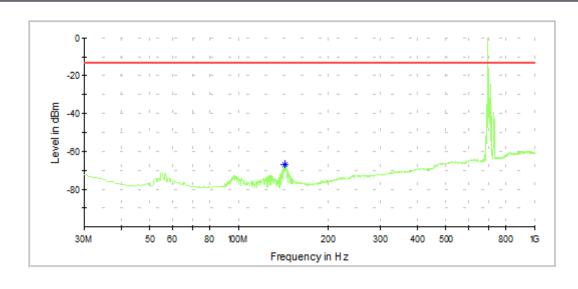


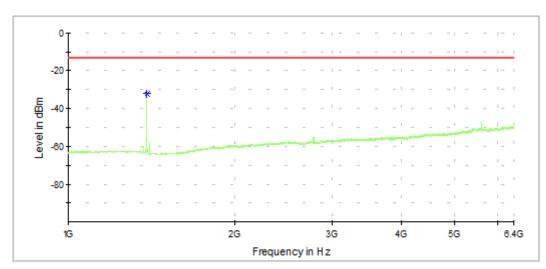


Note1: the peak showed above the limit is the fundamental emission Note2: the peak at 746MHz corresponds to the downlink frequency



30MHz to 6.4GHz - Radiated Spurious LTE 12 - 16 QAM - Low channel 23010





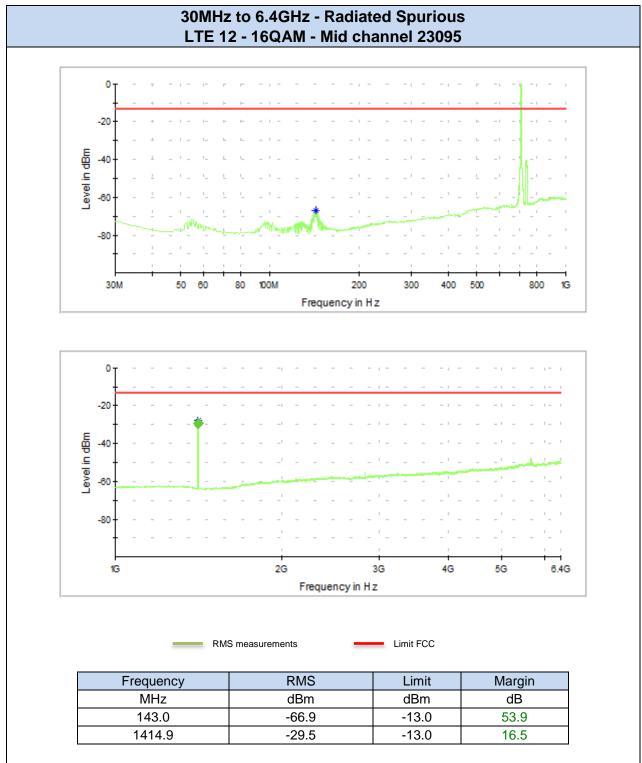
Frequency	RMS	Limit	Margin
MHz	dBm	dBm	dB
143.0	-66.8	-13.0	53.8
1389.3	-32.2	-13.0	19.2

Limit FCC

Note1: the peak showed above the limit is the fundamental emission Note2: the peak at 729MHz corresponds to the downlink frequency

RMS measurements

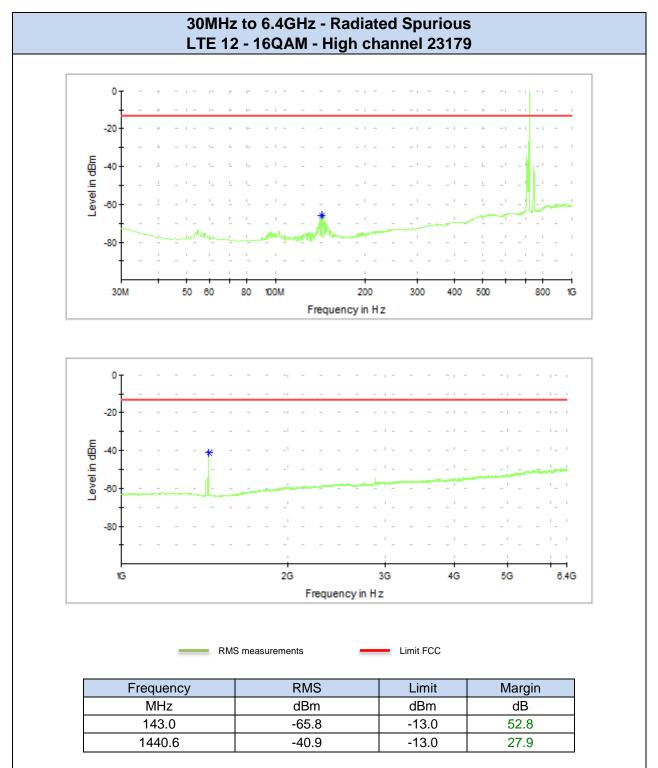




Note1: the peak showed above the limit is the fundamental emission Note2: the peak at 737.5MHz corresponds to the downlink frequency

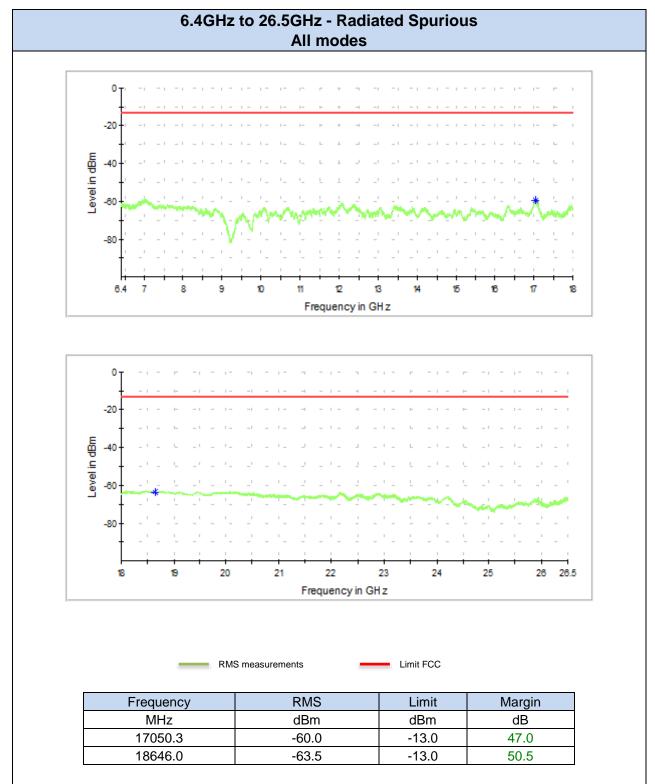


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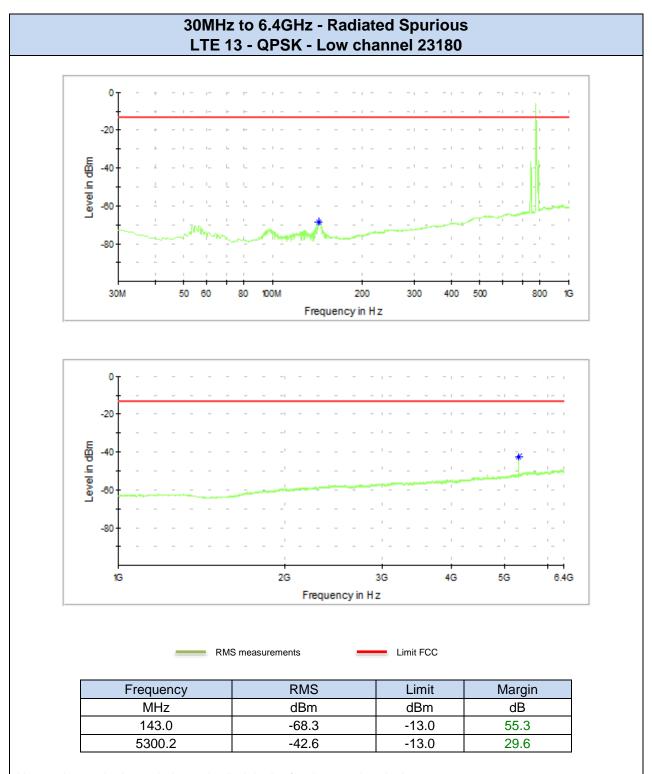
Note1: the peak showed above the limit is the fundamental emission Note2: the peak at 746MHz corresponds to the downlink frequency



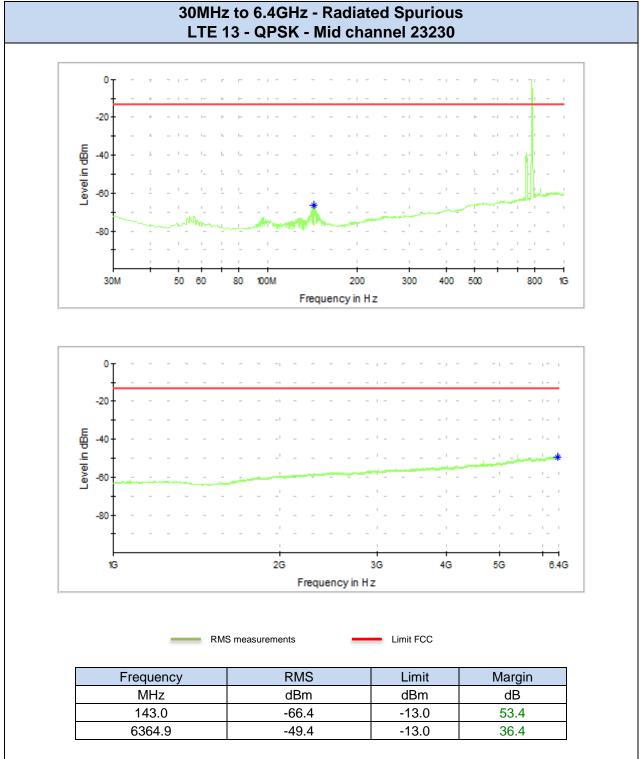


Note 1: The spurious signals detected do not depend on either the operating channel or the modulation mode.

LTE 13

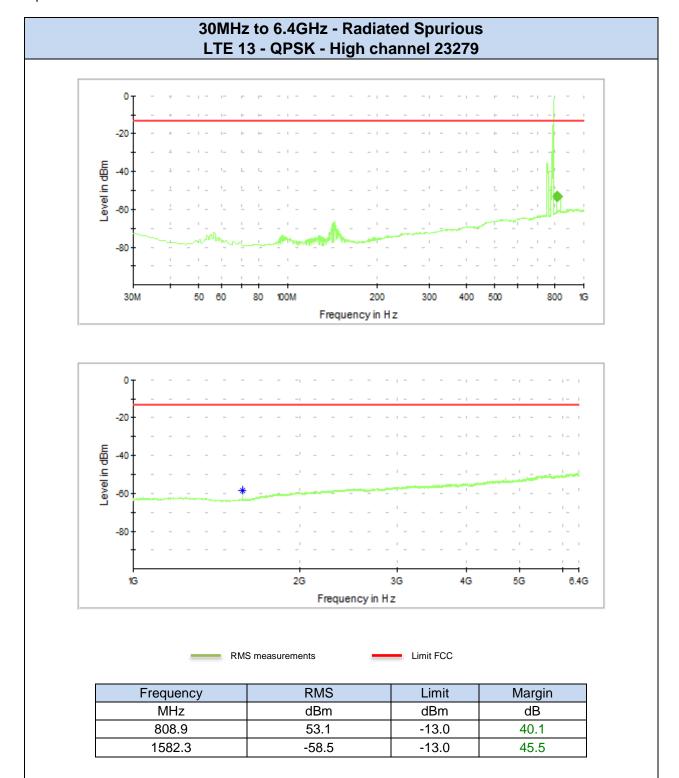


Note1: the peak showed above the limit is the fundamental emission Note2: the peak at 746MHz corresponds to the downlink frequency



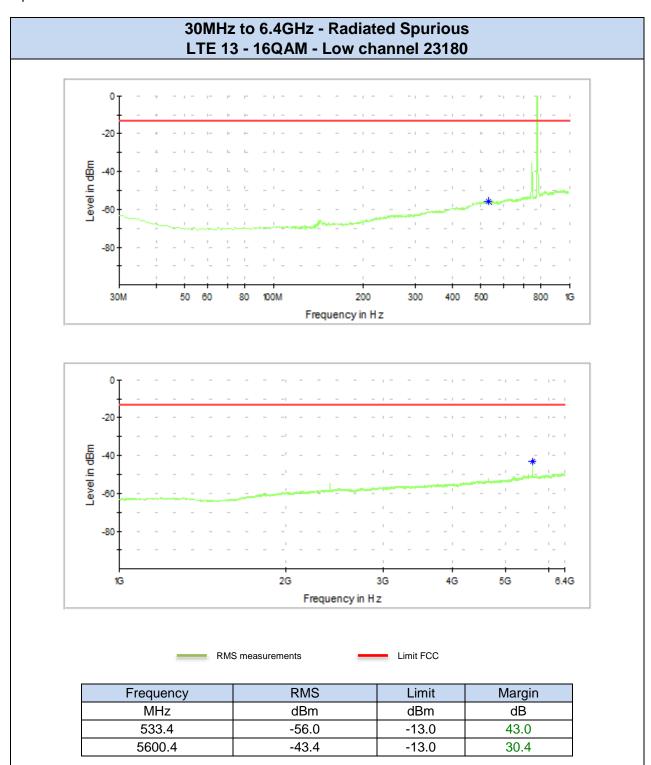
Note1: the peak showed above the limit is the fundamental emission Note2: the peak at 751MHz corresponds to the downlink frequency

Rev. 01



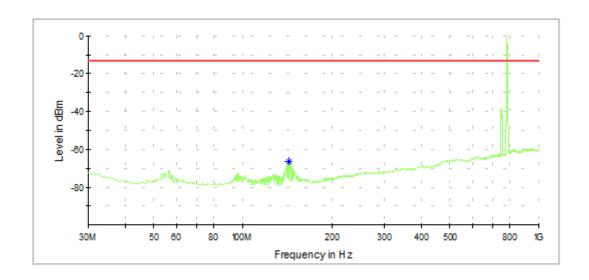
Note1: the peak showed above the limit is the fundamental emission Note2: the peak at 756MHz corresponds to the downlink frequency



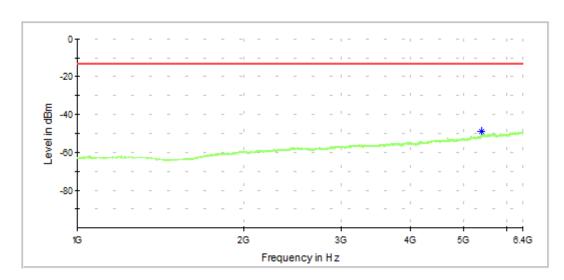


Note1: the peak showed above the limit is the fundamental emission Note2: the peak at 746MHz corresponds to the downlink frequency





LTE 13 - 16QAM - Mid channel 23230

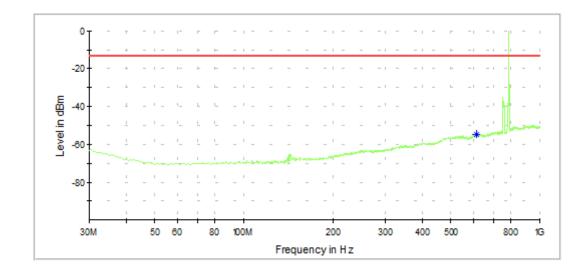


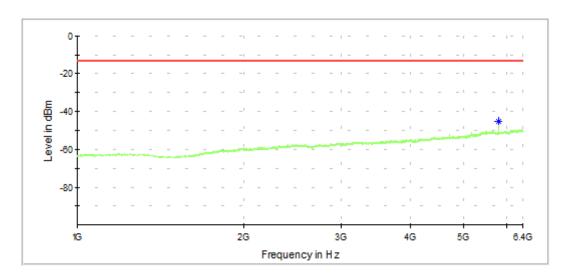
RMS measurements Limit FCC

Frequency	RMS	Limit	Margin
MHz	dBm	dBm	dB
143.0	-66.2	-13.0	53.2
5400.1	-48.8	-13.0	35.8

Note1: the peak showed above the limit is the fundamental emission Note2: the peak at 751MHz corresponds to the downlink frequency





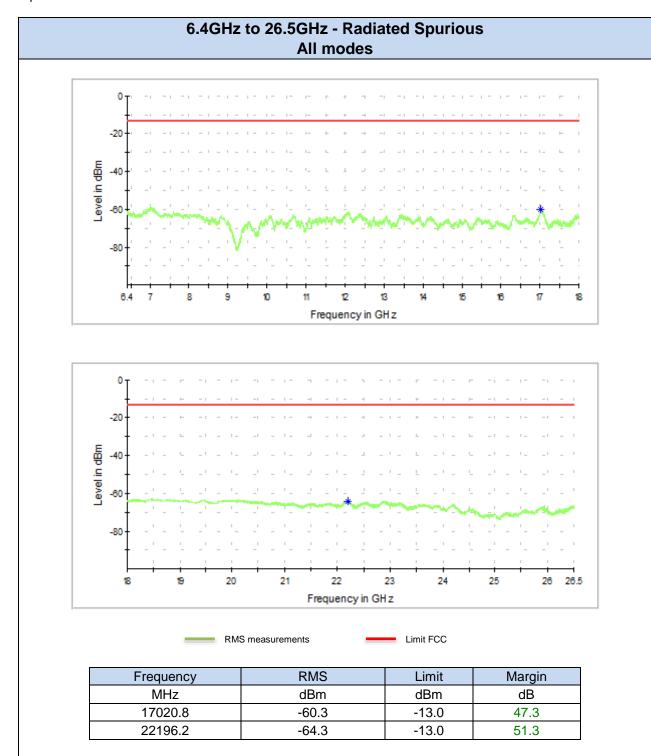


RMS measurements Limit FCC

Frequency	RMS	Limit	Margin
MHz	dBm	dBm	dB
614.9	-54.9	-13.0	41.9
5800.2	-45.5	-13.0	32.5

Note1: the peak showed above the limit is the fundamental emission Note2: the peak at 756MHz corresponds to the downlink frequency





Note 1: The spurious signals detected do not depend on either the operating channel or the modulation mode.