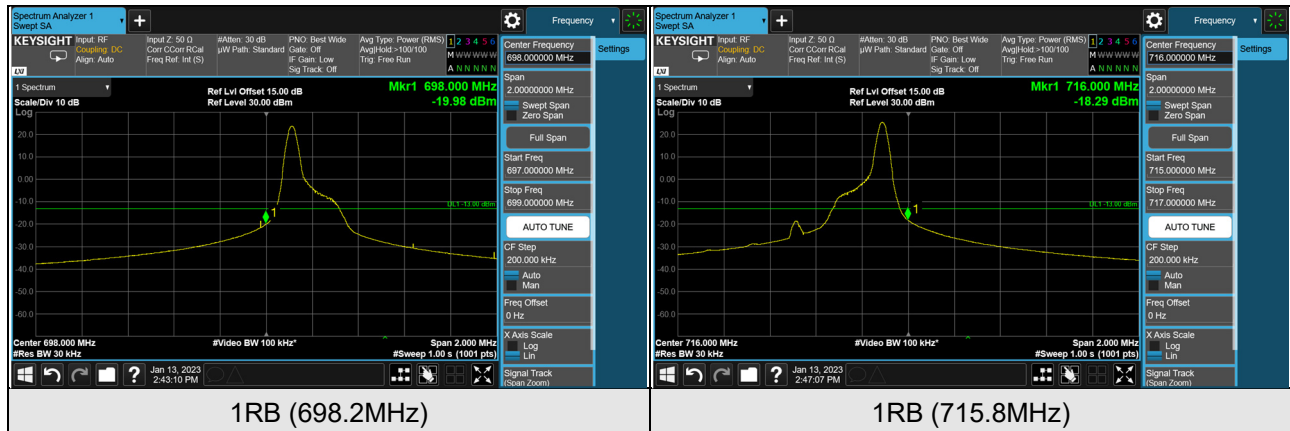
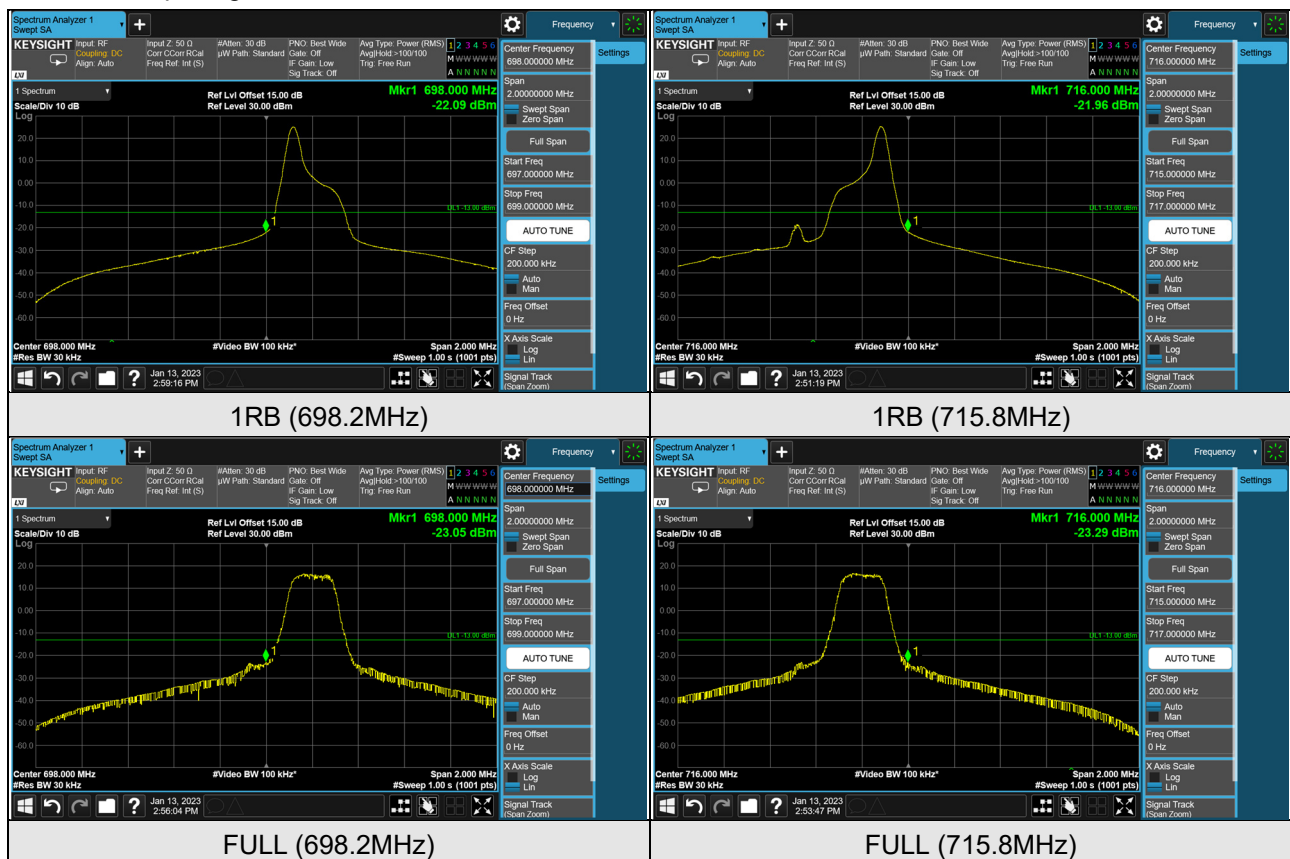


LTE Band 85

Sub-carrier Spacing: 3.75kHz



Sub-carrier Spacing: 15kHz

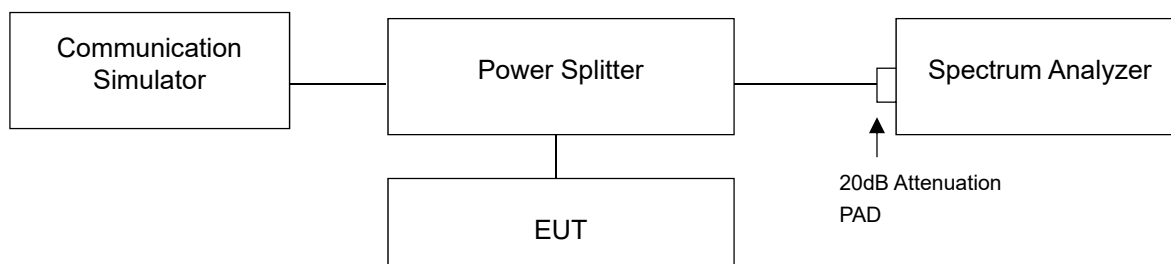


4.6 Peak to Average Ratio

4.6.1 Limits of Peak to Average Ratio Measurement

In measuring transmissions in this band using an average power technique, the peak to-average ratio (PAR) of the transmission may not exceed 13 dB

4.6.2 Test Setup



4.6.3 Test Procedures

- Set resolution/measurement bandwidth $\geq$ signal's occupied bandwidth;
- Set the number of counts to a value that stabilizes the measured CCDF curve;
- Record the maximum PAPR level associated with a probability of 0.1%.

4.6.4 Test Results

eMTC

LTE Band 4, Channel Bandwidth 1.4MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
19957	1710.7	3.32	4.86
20175	1732.5	3.53	5.26
20393	1754.3	3.73	5.03

LTE Band 4, Channel Bandwidth 3MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
19965	1711.5	3.41	5.36
20175	1732.5	3.47	5.48
20385	1753.5	3.61	5.67

LTE Band 4, Channel Bandwidth 5MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
19975	1712.5	3.58	3.93
20175	1732.5	3.68	3.88
20375	1752.5	3.78	3.94

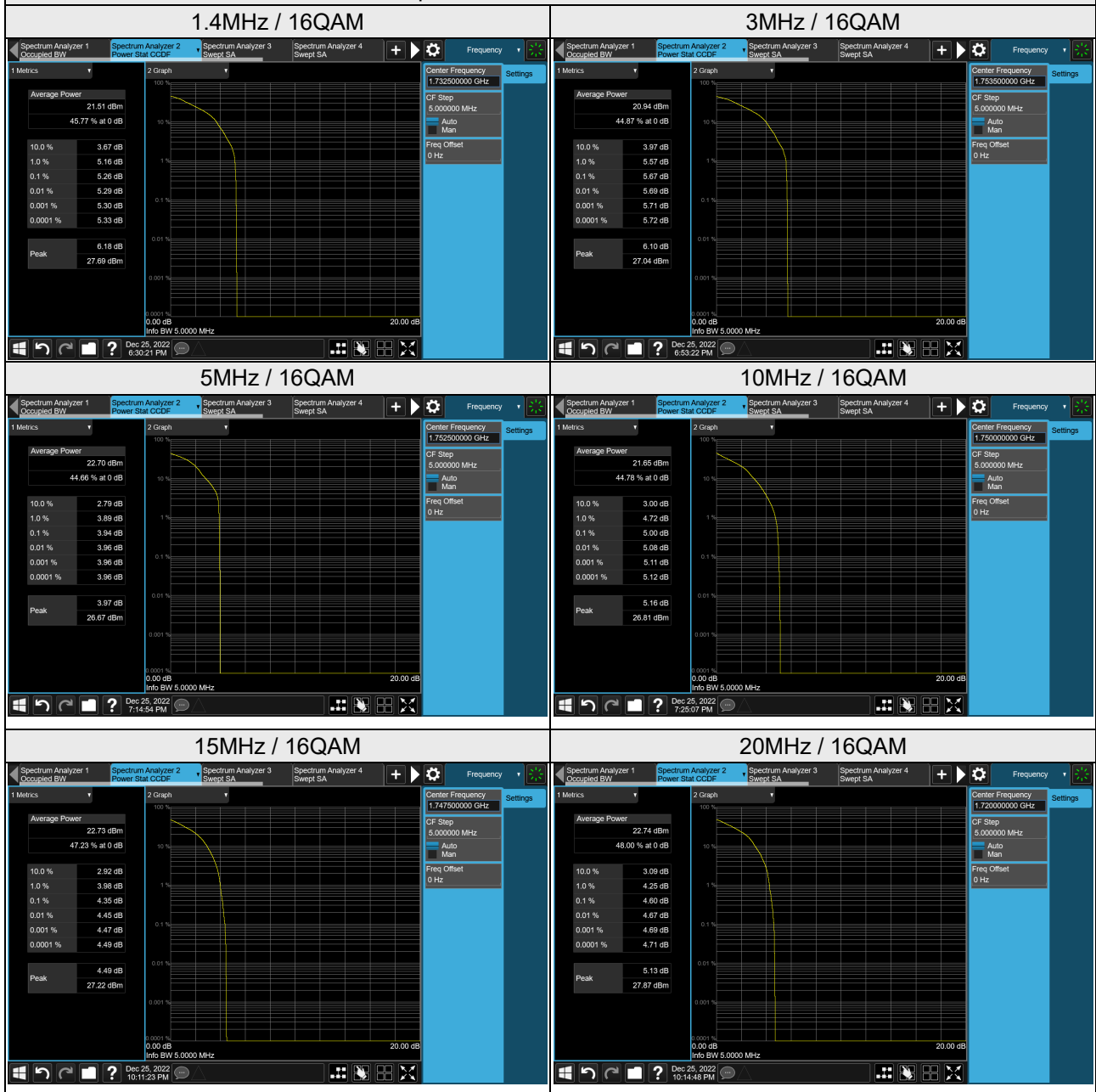
LTE Band 4, Channel Bandwidth 10MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
20000	1715.0	3.69	4.86
20175	1732.5	3.88	4.92
20350	1750.0	3.82	5.00

LTE Band 4, Channel Bandwidth 15MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
20025	1717.5	3.66	4.01
20175	1732.5	3.71	4.02
20325	1747.5	3.95	4.35

LTE Band 4, Channel Bandwidth 20MHz

Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
20050	1720.0	3.88	4.60
20175	1732.5	3.67	4.31
20300	1745.0	3.88	4.26

Spectrum Plot of Worst Value



LTE Band 12, Channel Bandwidth 1.4MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
23017	699.7	4.24	6.07
23095	707.5	4.15	6.07
23173	715.3	4.08	5.86

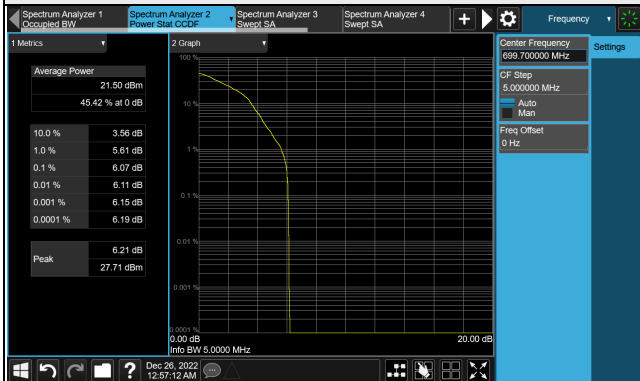
LTE Band 12, Channel Bandwidth 3MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
23025	700.5	4.17	6.36
23095	707.5	4.20	6.36
23165	714.5	4.06	5.88

LTE Band 12, Channel Bandwidth 5MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
23035	701.5	4.18	5.47
23095	707.5	4.21	5.49
23155	713.5	4.12	5.30

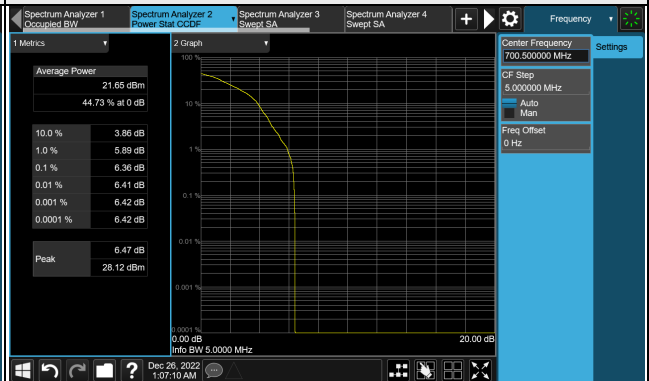
LTE Band 12, Channel Bandwidth 10MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
23060	704.0	4.31	5.55
23095	707.5	4.20	5.98
23130	711.0	4.28	5.84

Spectrum Plot of Worst Value

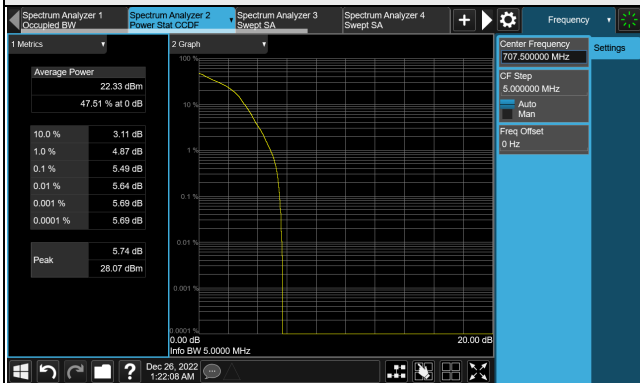
1.4MHz / 16QAM



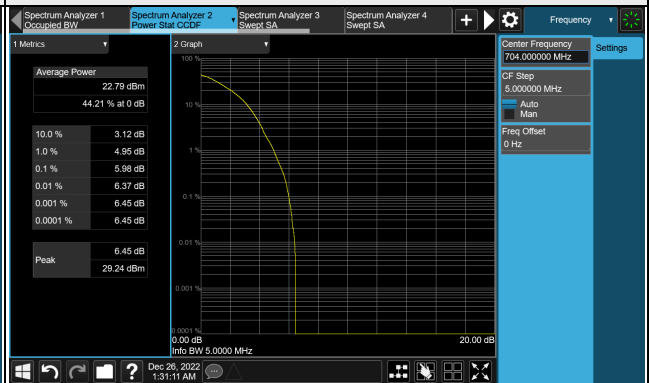
3MHz / 16QAM



5MHz / 16QAM

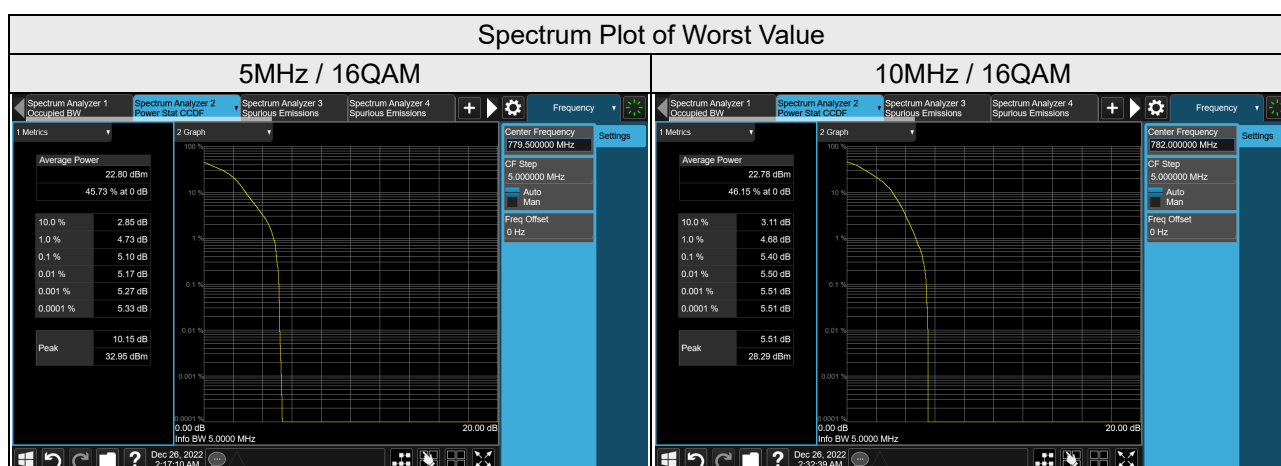


10MHz / 16QAM



LTE Band 13, Channel Bandwidth 5MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
23205	779.5	4.11	5.10
23230	782.0	4.06	4.88
23255	784.5	4.07	4.56

LTE Band 13, Channel Bandwidth 10MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
23230	782.0	4.12	5.40



LTE Band 66, Channel Bandwidth 1.4MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
131979	1710.7	3.40	4.56
132322	1745.0	4.35	6.00
132665	1779.3	4.64	4.62

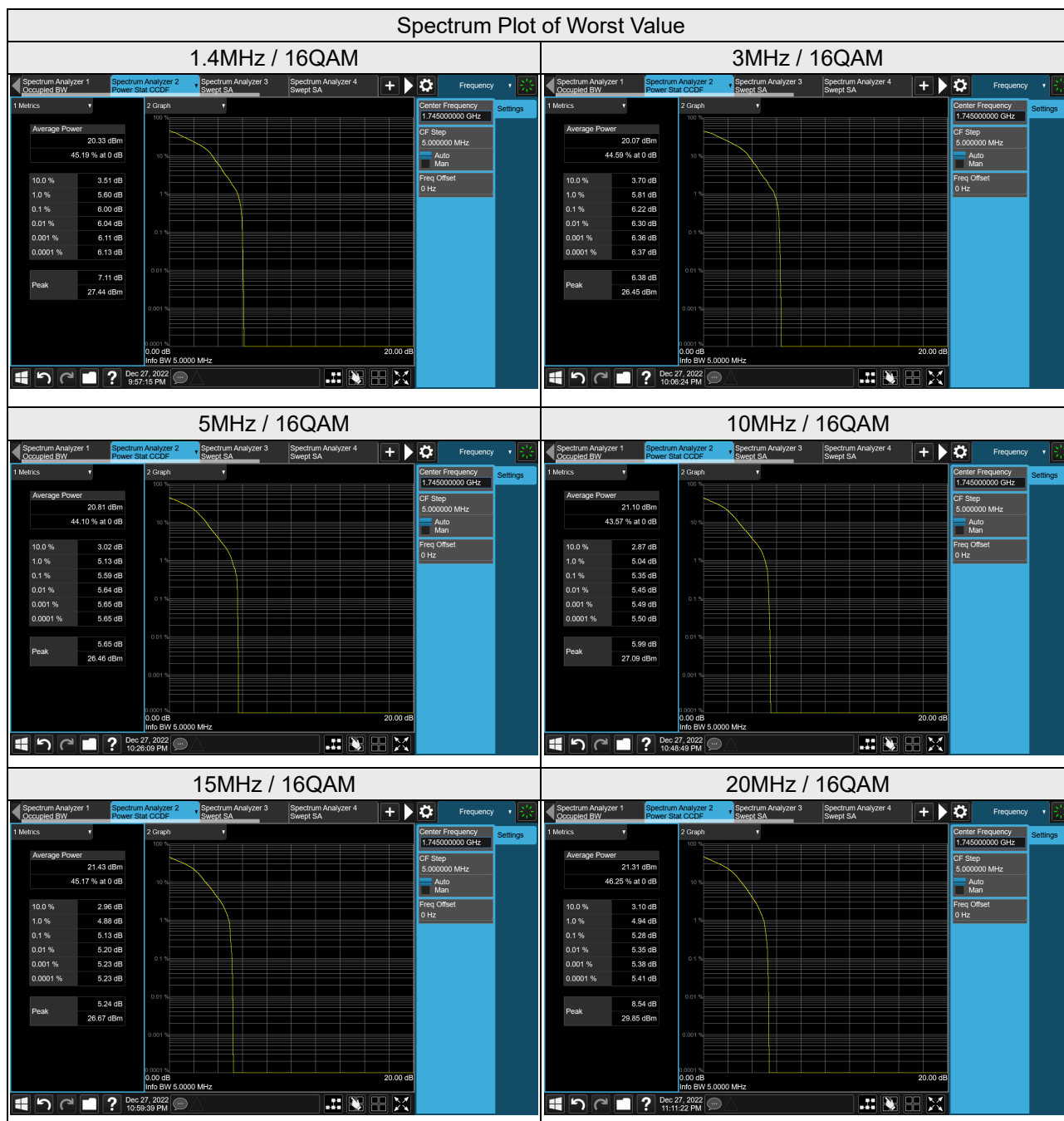
LTE Band 66, Channel Bandwidth 3MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
131987	1711.5	3.39	4.90
132322	1745.0	4.41	6.22
132657	1778.5	2.66	4.21

LTE Band 66, Channel Bandwidth 5MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
131997	1712.5	3.58	3.97
132322	1745.0	4.46	5.59
132647	1777.5	2.70	3.86

LTE Band 66, Channel Bandwidth 10MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
132022	1715.0	3.79	3.95
132322	1745.0	4.35	5.35
132622	1775.0	2.74	3.71

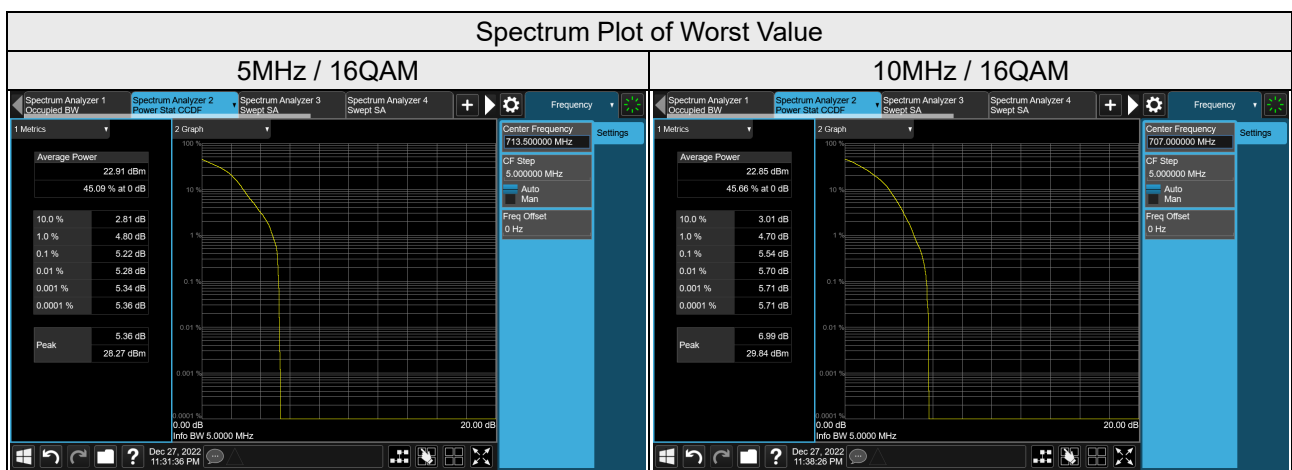
LTE Band 66, Channel Bandwidth 15MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
132047	1717.5	3.59	4.16
132322	1745.0	4.47	5.13
132597	1772.5	2.77	3.61

LTE Band 66, Channel Bandwidth 20MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
132072	1720.0	3.72	3.90
132322	1745.0	4.53	5.28
132572	1770.0	2.92	3.89



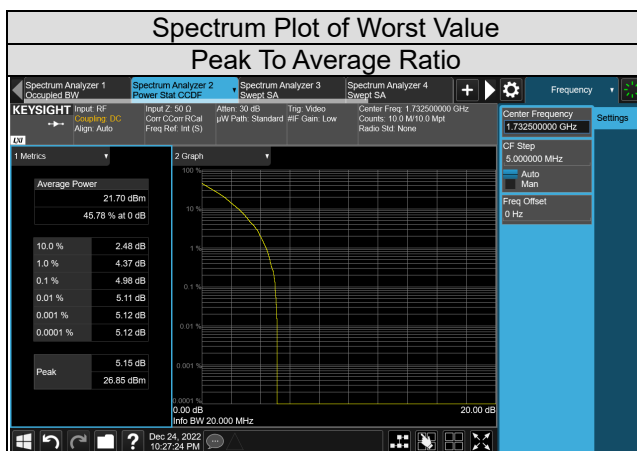
LTE Band 85, Channel Bandwidth 5MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
134027	700.5	4.33	5.00
134092	707.0	4.14	5.16
134157	713.5	4.13	5.22

LTE Band 85, Channel Bandwidth 10MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM
134052	703.0	4.21	5.50
134092	707.0	4.18	5.54
134132	711.0	4.15	5.53

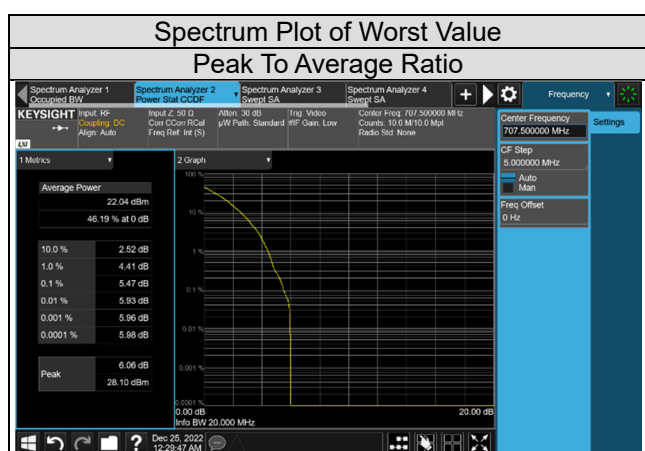


NB-IoT

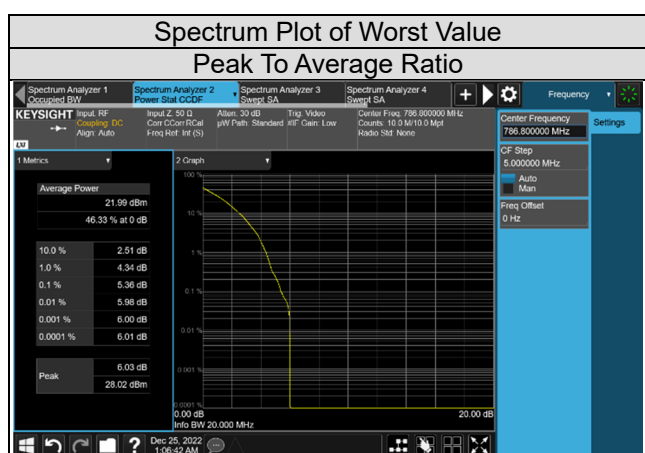
LTE Band 4					
Channel	Frequency (MHz)	Modulation	N _{tones}	Sub-carrier Spacing (kHz)	Peak To Average Ratio (dB)
19952	1710.2	BPSK	1@0	3.75	1.20
		QPSK	12@0	15	4.86
20175	1732.5	BPSK	1@0	3.75	1.21
		QPSK	12@0	15	4.98
20398	1754.8	BPSK	1@47	3.75	1.22
		QPSK	12@0	15	4.97



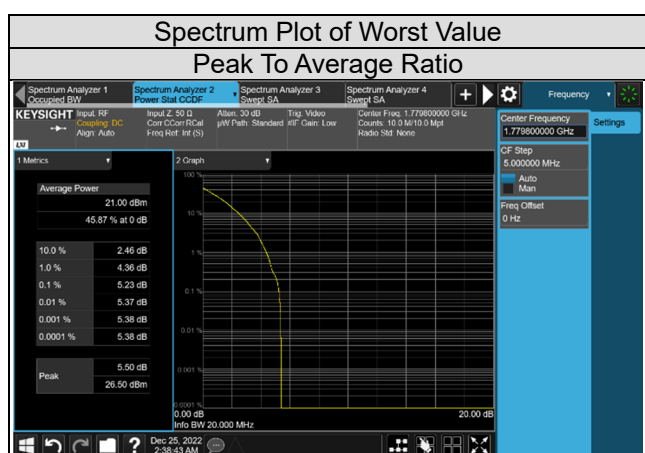
LTE Band 12					
Channel	Frequency (MHz)	Modulation	N _{tones}	Sub-carrier Spacing (kHz)	Peak To Average Ratio (dB)
23012	699.2	BPSK	1@0	3.75	1.27
		QPSK	12@0	15	5.39
23095	707.5	BPSK	1@0	3.75	1.25
		QPSK	12@0	15	5.47
23178	715.8	BPSK	1@47	3.75	1.19
		QPSK	12@0	15	5.38



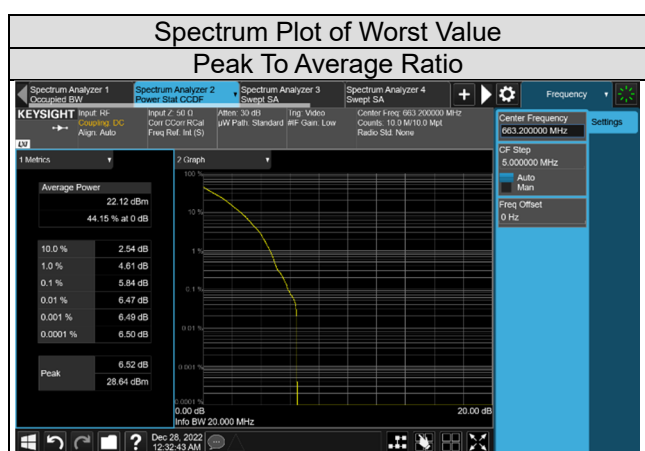
LTE Band 13					
Channel	Frequency (MHz)	Modulation	N _{tones}	Sub-carrier Spacing (kHz)	Peak To Average Ratio (dB)
23182	777.2	BPSK	1@0	3.75	1.19
		QPSK	12@0	15	5.34
23230	782	BPSK	1@0	3.75	1.20
		QPSK	12@0	15	5.34
23278	786.8	BPSK	1@47	3.75	1.17
		QPSK	12@0	15	5.36



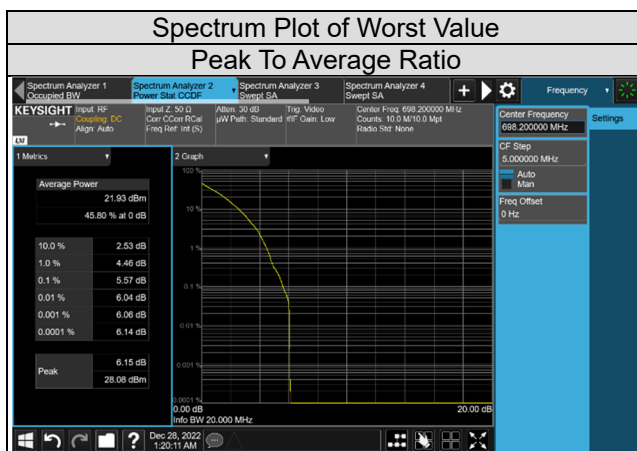
LTE Band 66					
Channel	Frequency (MHz)	Modulation	N _{tones}	Sub-carrier Spacing (kHz)	Peak To Average Ratio (dB)
131974	1710.2	BPSK	1@0	3.75	1.20
		QPSK	12@0	15	4.69
132322	1745	BPSK	1@0	3.75	1.86
		QPSK	12@0	15	5.09
132670	1779.8	BPSK	1@47	3.75	1.81
		QPSK	12@0	15	5.23



LTE Band 71					
Channel	Frequency (MHz)	Modulation	N _{tones}	Sub-carrier Spacing (kHz)	Peak To Average Ratio (dB)
133124	663.2	BPSK	1@0	3.75	0.88
		QPSK	12@0	15	5.84
133297	680.5	BPSK	1@0	3.75	0.83
		QPSK	12@0	15	5.80
133470	697.8	BPSK	1@47	3.75	2.19
		QPSK	12@0	15	5.75



LTE Band 85					
Channel	Frequency (MHz)	Modulation	N _{tones}	Sub-carrier Spacing (kHz)	Peak To Average Ratio (dB)
134004	698.2	BPSK	1@0	3.75	0.86
		QPSK	12@0	15	5.57
134092	707	BPSK	1@0	3.75	1.87
		QPSK	12@0	15	5.56
134180	715.8	BPSK	1@47	3.75	1.27
		QPSK	12@0	15	5.44



4.7 Conducted Spurious Emissions

4.7.1 Limits of Conducted Spurious Emissions Measurement

For LTE and NB-IoT Band 4, LTE and NB-IoT Band 66:

In the FCC 27.53(h), on any frequency outside a licensee's frequency block, The power of any emission shall be attenuated below the transmitter power (P) by at least $43 + 10 \log (P)$ dB. The emission limit equal to – 13dBm.

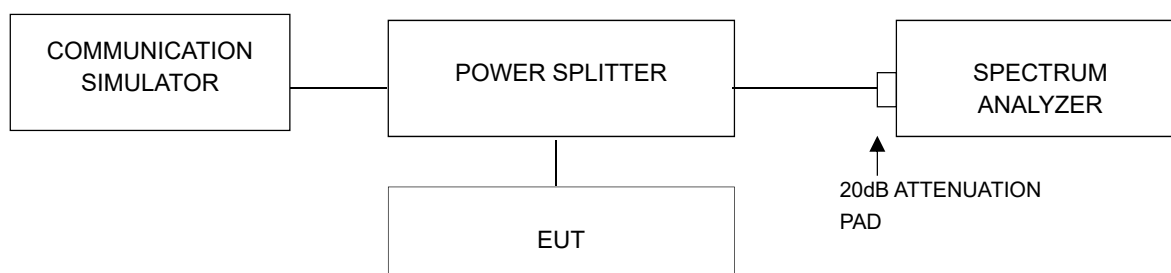
For LTE and NB-IoT Band 12, NB-IoT Band 71, LTE and NB-IoT Band 85:

According to FCC 27.53(g) for operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log (P)$ dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater.

For LTE and NB-IoT Band 13:

According to FCC 27.53(c) (2) for 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.

4.7.2 Test Setup



4.7.3 Test Procedure

- All measurements were done at low, middle and high operational frequency range.
- Measurement refer to ANSI C63.26 section 5.7.
- Measuring frequency range is from 9kHz to 1GHz. 20dB attenuation pad is connected with spectrum. Detector = Average, RBW=1MHz and VBW=3MHz are for conducted emission measurement.
- Measuring frequency range is from 1GHz to 10GHz / 20GHz. 20dB attenuation pad is connected with spectrum. Detector = Average, RBW=1MHz and VBW=3MHz are used for conducted emission measurement.

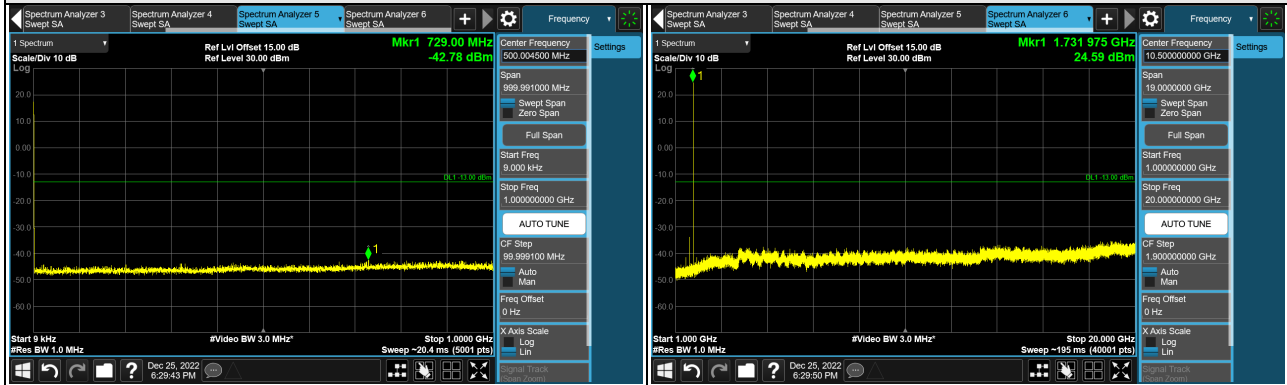
4.7.4 Test Results

eMTC

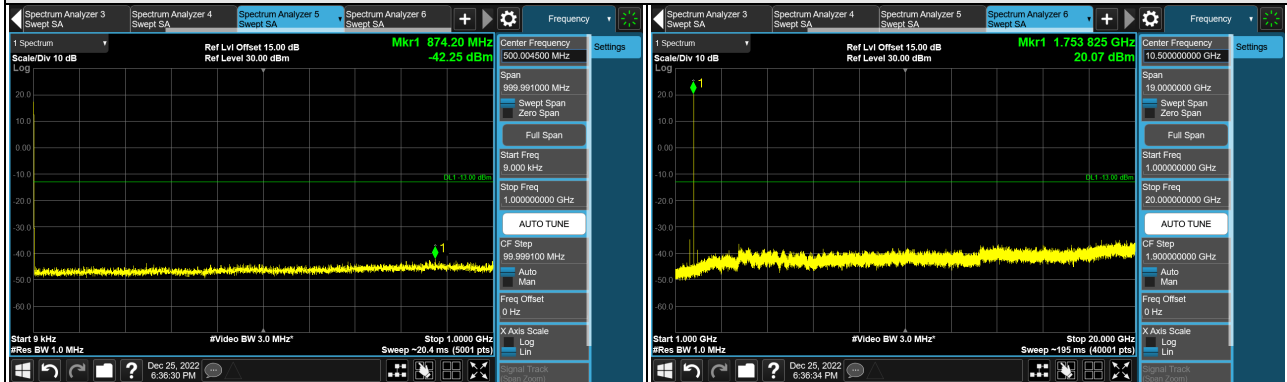
LTE Band 4 (Channel Bandwidth 1.4MHz)



CH 19957 (1710.7MHz)



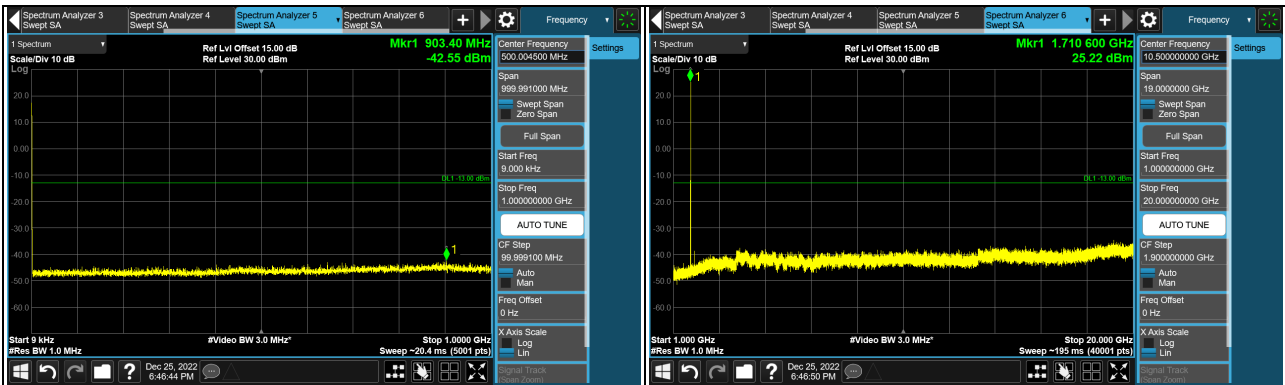
CH 20175 (1732.5MHz)



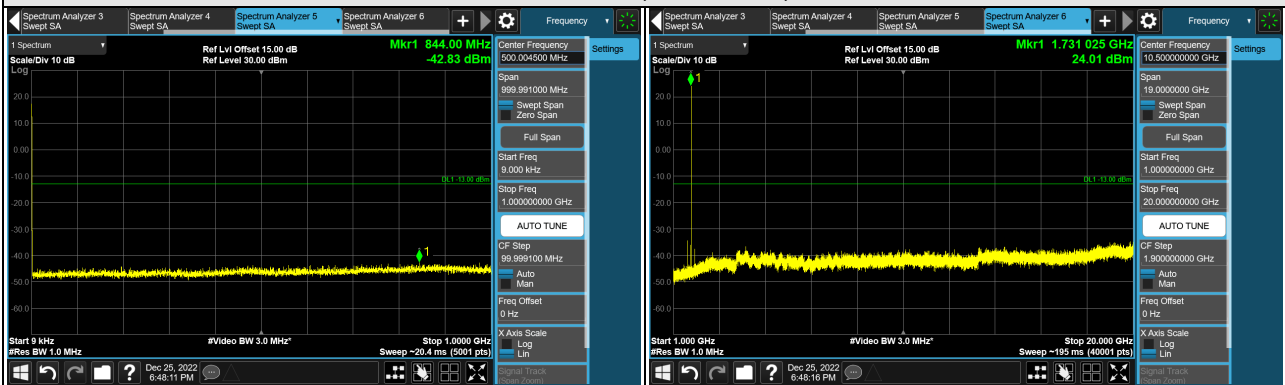
CH 20393 (1754.3MHz)

*The 9kHz signal over the limit is from Spectrum.

LTE Band 4 (Channel Bandwidth 3MHz)



CH 19965 (1711.5MHz)



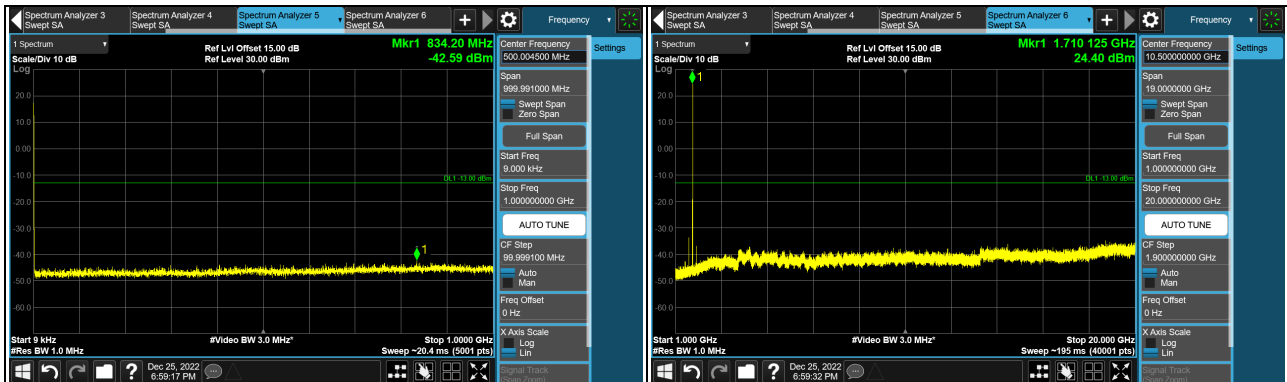
CH 20175 (1732.5MHz)



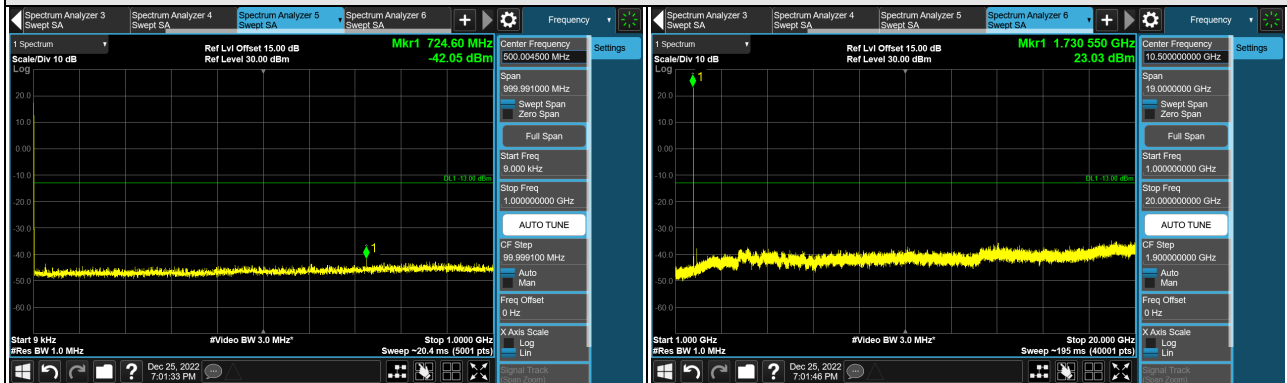
CH 20385 (1753.5MHz)

*The 9kHz signal over the limit is from Spectrum.

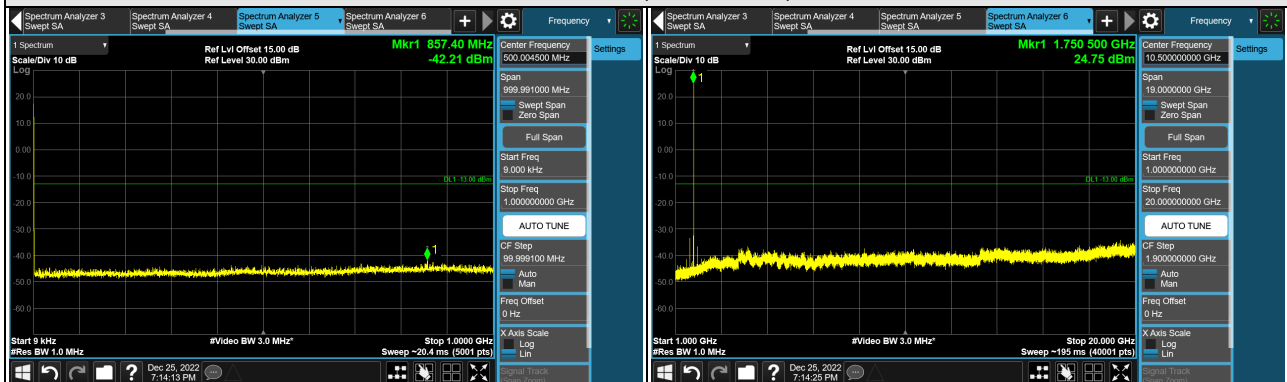
LTE Band 4 (Channel Bandwidth 5MHz)



CH 19975 (1712.5MHz)



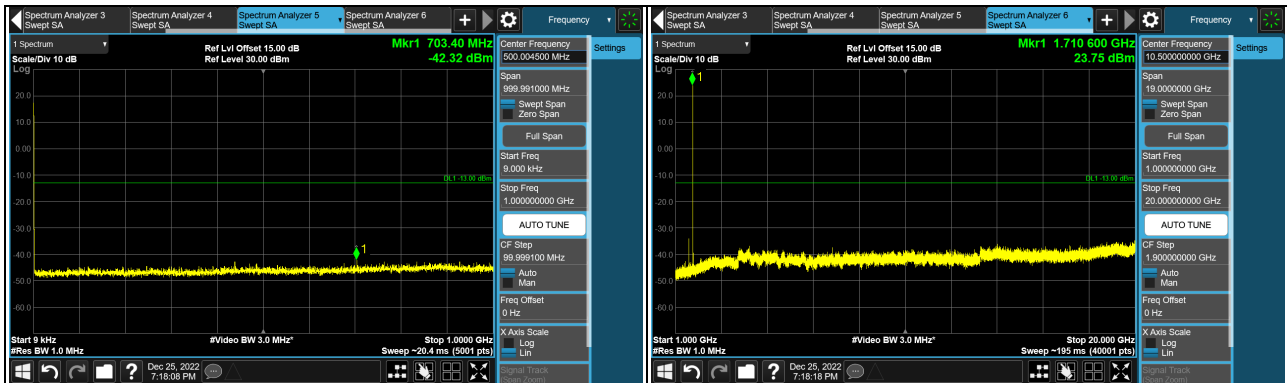
CH 20175 (1732.5MHz)



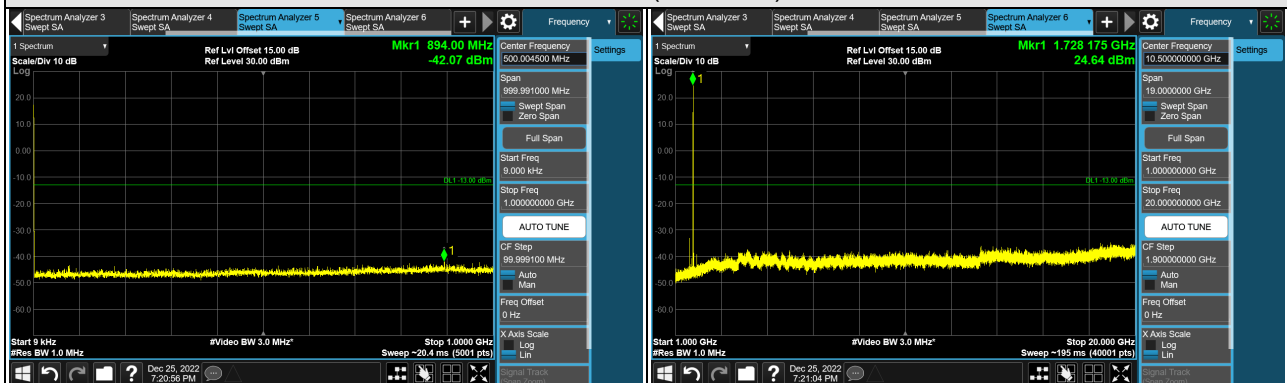
CH 20375 (1752.5MHz)

*The 9kHz signal over the limit is from Spectrum.

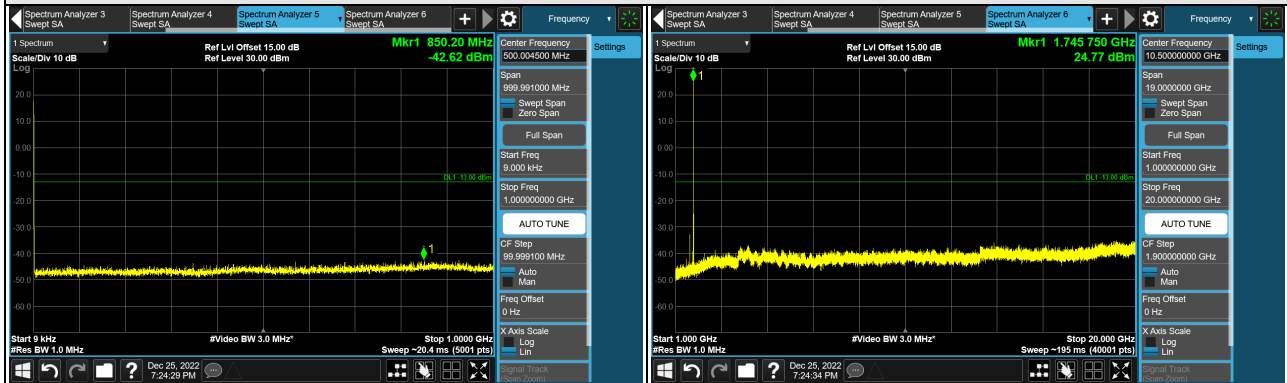
LTE Band 4 (Channel Bandwidth 10MHz)



CH 20000 (1715MHz)



CH 20175 (1732.5MHz)



CH 20350 (1750MHz)

*The 9kHz signal over the limit is from Spectrum.