



7. Peak to Average Ratio Test

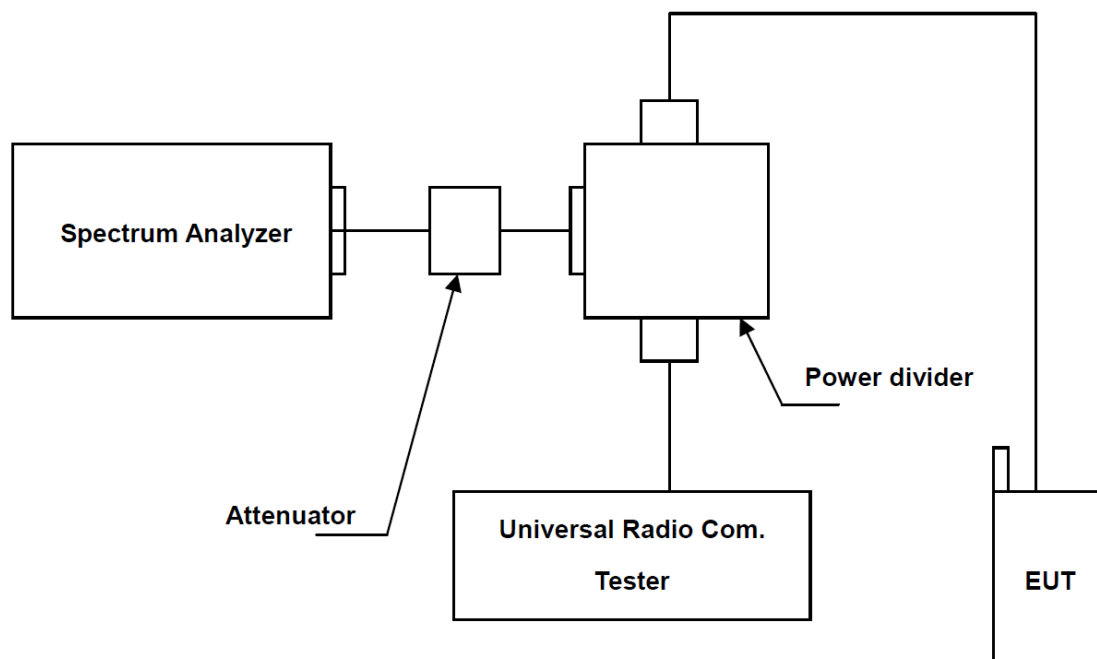
7.1. Test Limit

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.

7.2. Test Procedures

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

7.3. Test Setup





7.4. Test Result and Data

Cat M1

Band	Mode	Bandwidth (MHz)	RB size	Channel	Frequency (MHz)	PAR (dB)	Limit	Result
LTE Band 4	QPSK	1.4	1RB	20175	1732.5	9.59	13	Pass
	16QAM			20175	1732.5	12	13	Pass
	QPSK	3		20175	1732.5	9.51	13	Pass
	16QAM			20175	1732.5	10.48	13	Pass
	QPSK	5		20175	1732.5	9.83	13	Pass
	16QAM			20175	1732.5	9.85	13	Pass
	QPSK	10		20175	1732.5	9.8	13	Pass
	16QAM			20175	1732.5	9.83	13	Pass
	QPSK	15		20175	1732.5	9.73	13	Pass
	16QAM			20175	1732.5	10.27	13	Pass
	QPSK	20		20175	1732.5	11.72	13	Pass
	16QAM			20175	1732.5	11.06	13	Pass

Band	Mode	Bandwidth (MHz)	RB size	Channel	Frequency (MHz)	PAR (dB)	Limit	Result
LTE Band 12	QPSK	1.4	1RB	23095	707.5	10.23	13	Pass
	16QAM			23095	707.5	11.37	13	Pass
	QPSK	3		23095	707.5	8.83	13	Pass
	16QAM			23095	707.5	10.43	13	Pass
	QPSK	5		23095	707.5	9.48	13	Pass
	16QAM			23095	707.5	9.45	13	Pass
	QPSK	10		23095	707.5	8.79	13	Pass
	16QAM			23095	707.5	9.96	13	Pass

Band	Mode	Bandwidth (MHz)	RB size	Channel	Frequency (MHz)	PAR (dB)	Limit	Result
LTE Band 13	QPSK	5	1RB	23230	782	9.6	13	Pass
	16QAM			23230	782	10.11	13	Pass
	QPSK	10		23230	782	9.22	13	Pass
	16QAM			23230	782	10.3	13	Pass



NB-IoT

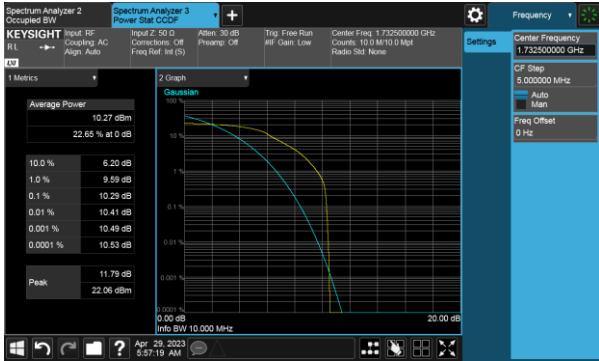
Band	Mode	Sub-carrier spacing (KHz)	Opration Channel/ Frequency(MHz)	PAR (dB)	Limit	Result
LTE Band 4	BPSK	3.75	20175/1732.5	2.9	13	Pass
	QPSK	3.75	20175/1732.5	2.62	13	Pass
	BPSK	15	20175/1732.5	4.83	13	Pass
	QPSK	15	20175/1732.5	6.68	13	Pass

Band	Mode	Sub-carrier spacing (KHz)	Opration Channel/ Frequency(MHz)	PAR (dB)	Limit	Result
LTE Band 12	BPSK	3.75	23095/707.5	2.59	13	Pass
	QPSK	3.75	23095/707.5	3.22	13	Pass
	BPSK	15	23095/707.5	4.42	13	Pass
	QPSK	15	23095/707.5	6.02	13	Pass

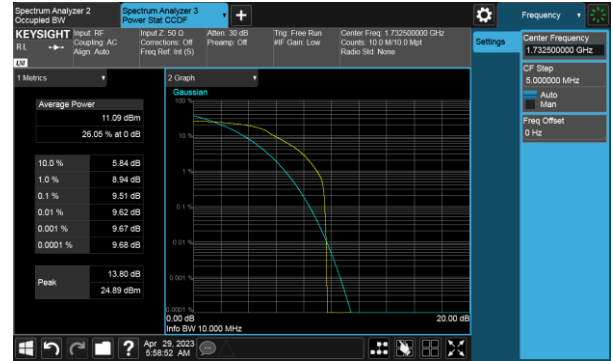
Band	Mode	Sub-carrier spacing (KHz)	Opration Channel/ Frequency(MHz)	PAR (dB)	Limit	Result
LTE Band 13	BPSK	3.75	23230/782	2.68	13	Pass
	QPSK	3.75	23230/782	3.27	13	Pass
	BPSK	15	23230/782	4.49	13	Pass
	QPSK	15	23230/782	5.95	13	Pass



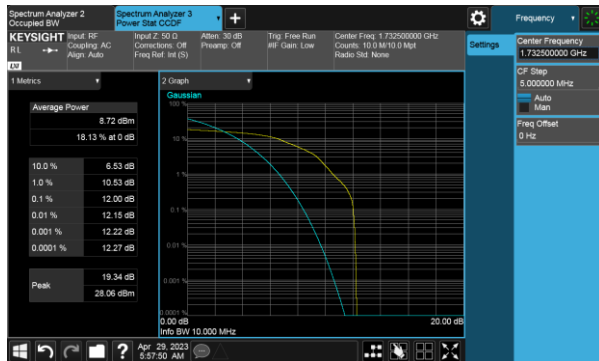
Cat M1
LTE Band 4 QPSK 1.4MHz, CH 20175



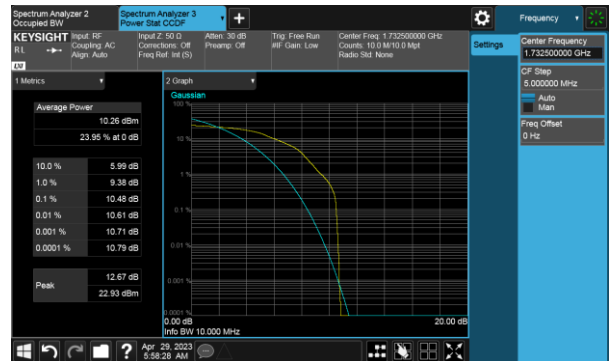
LTE Band 4 QPSK 3MHz, CH 20175



LTE Band 4 16QAM 1.4MHz, CH 20175

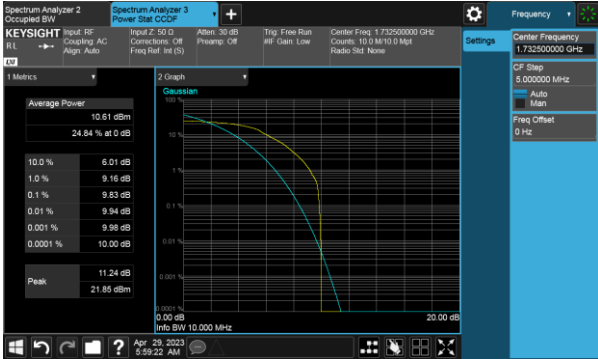


LTE Band 4 16QAM 3MHz, CH 20175

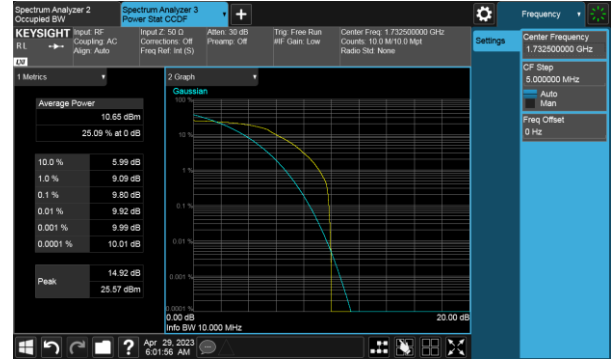




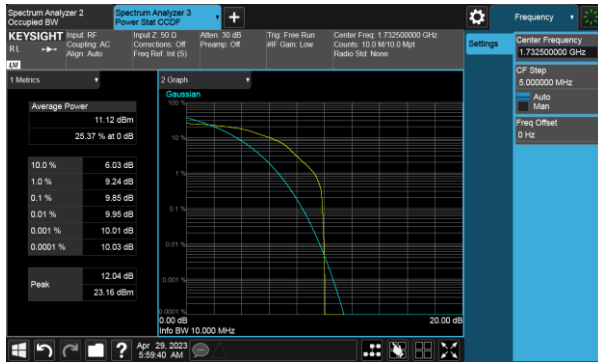
Cat M1
LTE Band 4 QPSK 5MHz, CH 20175



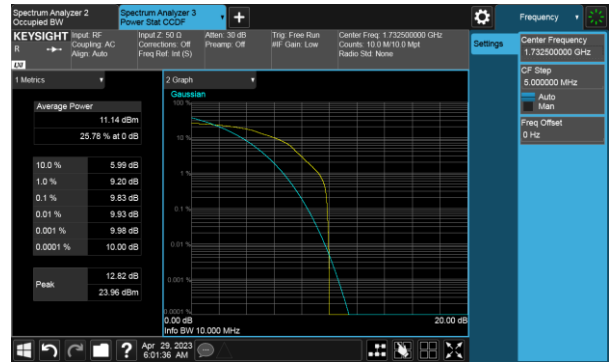
LTE Band 4 QPSK 10MHz, CH 20175



LTE Band 4 16QAM 5MHz, CH 20175

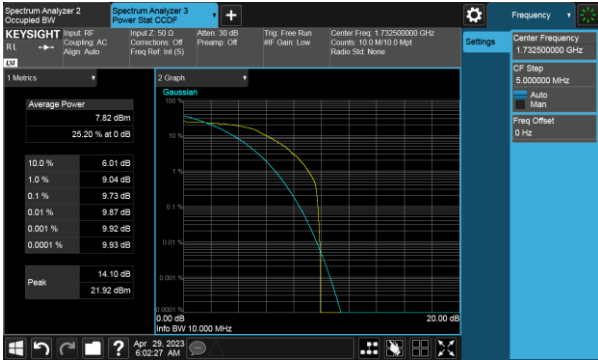


LTE Band 4 16QAM 10MHz, CH 20175

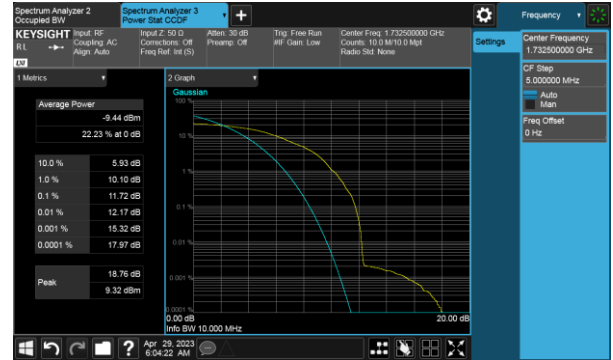




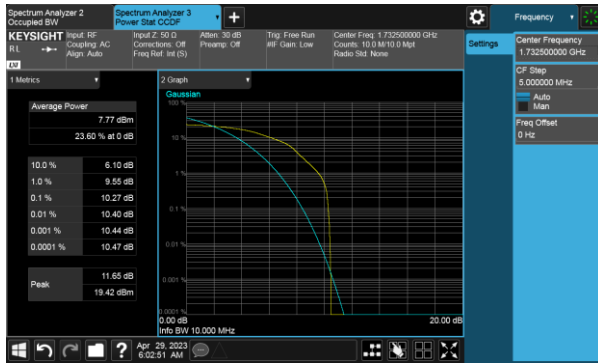
Cat M1
LTE Band 4 QPSK 15MHz, CH 20175



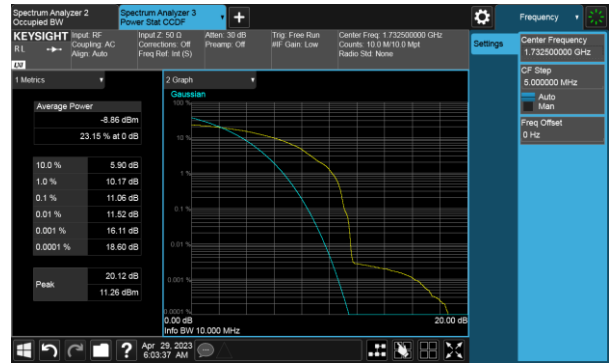
LTE Band 4 QPSK 20MHz, CH 20175



LTE Band 4 16QAM 15MHz, CH 20175



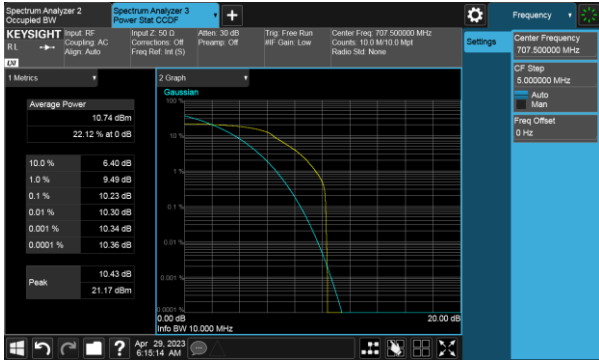
LTE Band 4 16QAM 20MHz, CH 20175



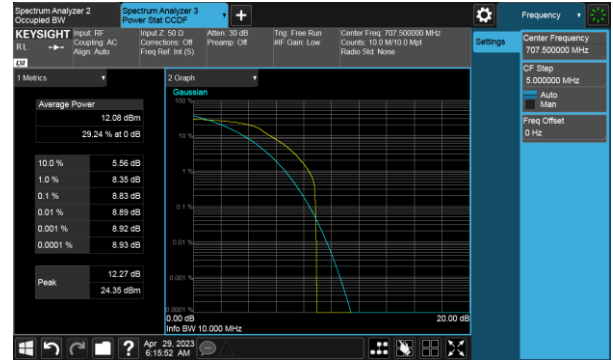


Cat M1

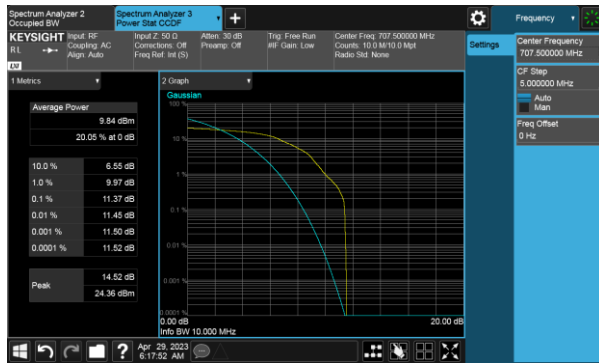
LTE Band 12 QPSK 1.4MHz, CH 23095



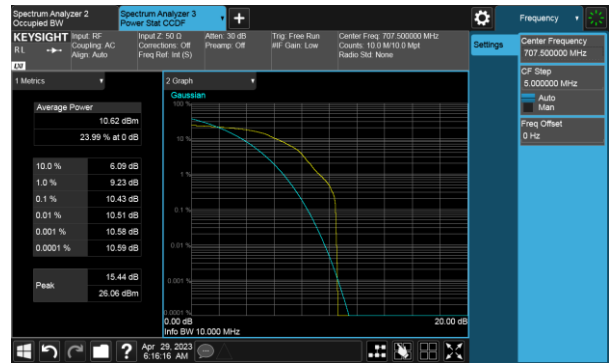
LTE Band 12 QPSK 3MHz, CH 23095



LTE Band 12 16QAM 1.4MHz, CH 23095



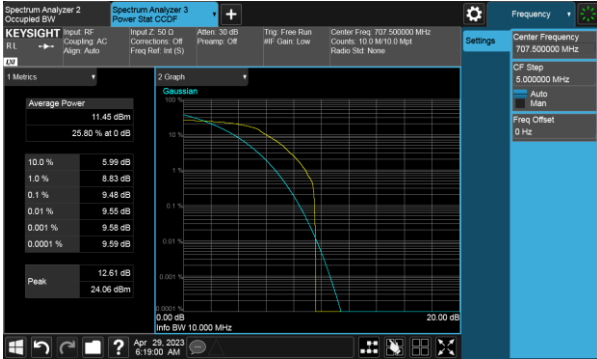
LTE Band 12 16QAM 3MHz, CH 23095



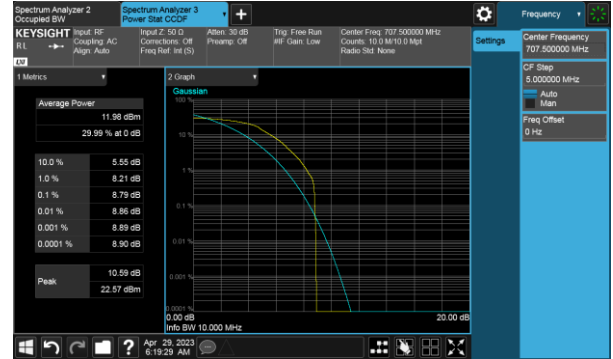


Cat M1

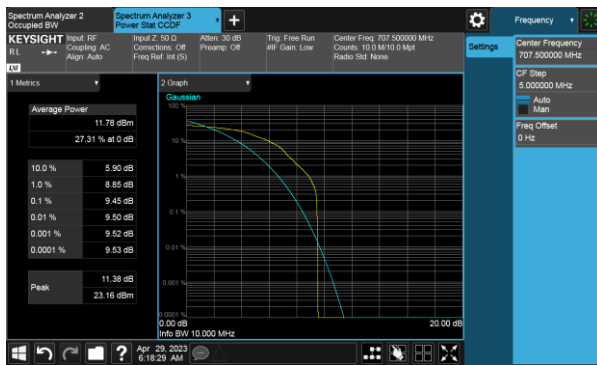
LTE Band 12 QPSK 5MHz, CH 23095



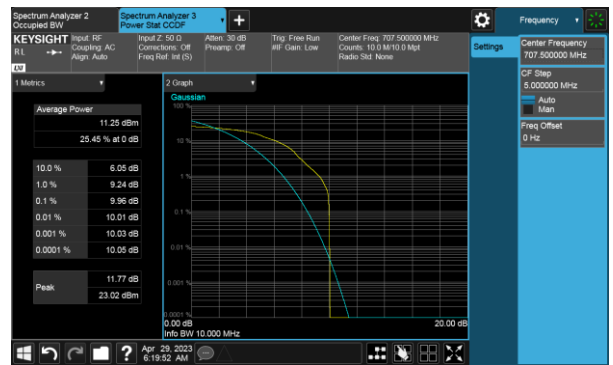
LTE Band 12 QPSK 10MHz, CH 23095



LTE Band 12 16QAM 5MHz, CH 23095

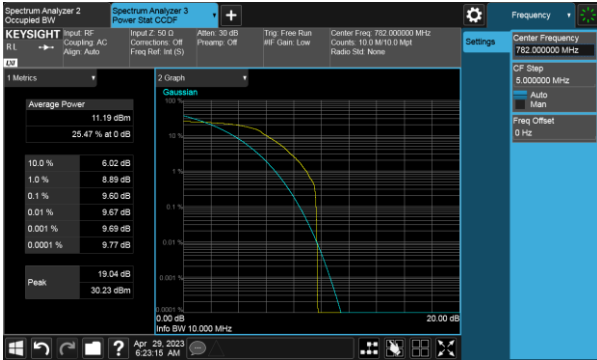


LTE Band 12 16QAM 10MHz, CH 23095

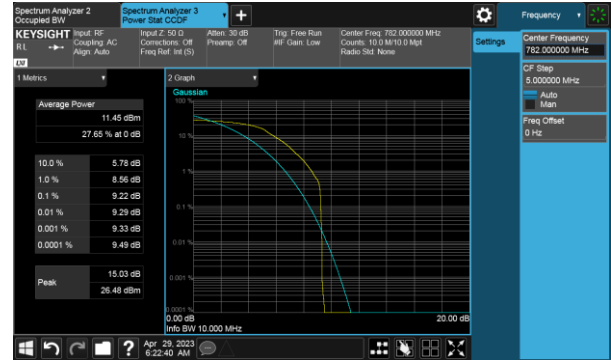




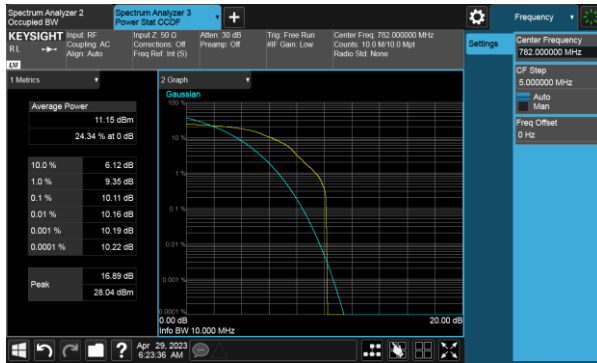
Cat M1
LTE Band 13 QPSK 5MHz, CH 23230



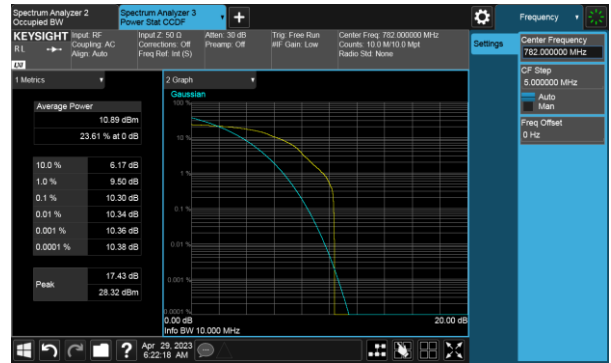
LTE Band 13 QPSK 10MHz, CH 23230



LTE Band 13 16QAM 5MHz, CH 23230

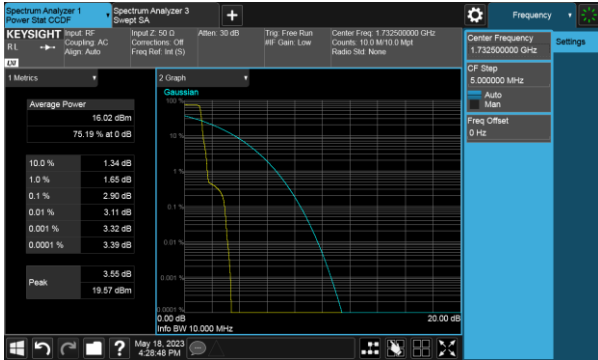


LTE Band 13 16QAM 10MHz, CH 23230

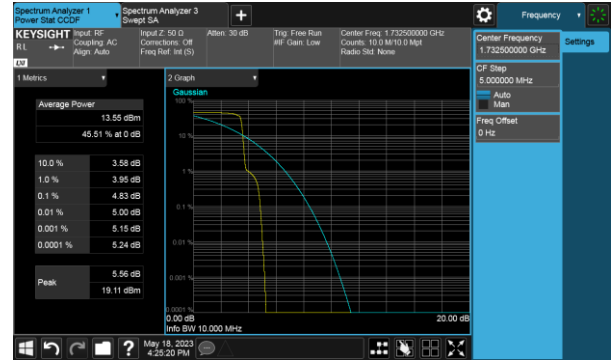




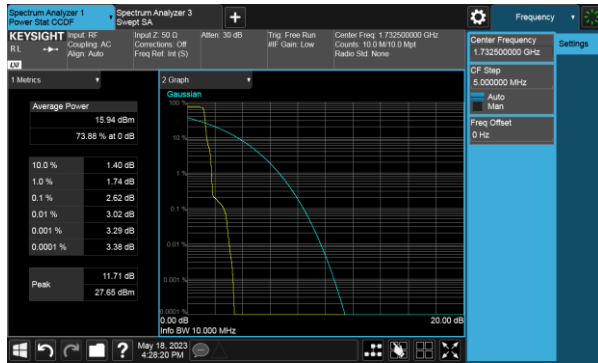
NB-IoT
LTE Band 4 BPSK 3.75KHz, CH 20175



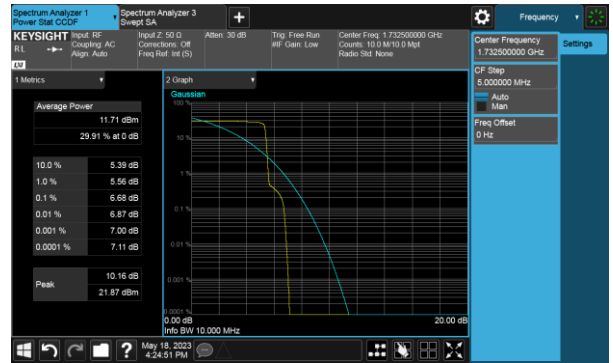
LTE Band 4 BPSK 15KHz, CH 20175



LTE Band 4 QPSK 3.75KHz, CH 20175

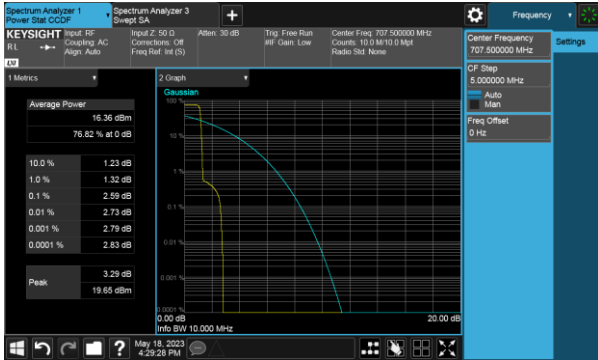


LTE Band 4 QPSK 15KHz, CH 20175

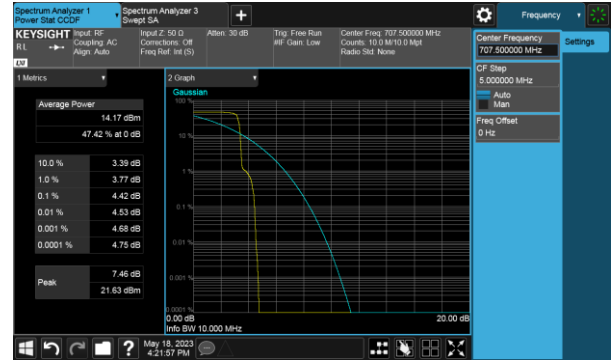




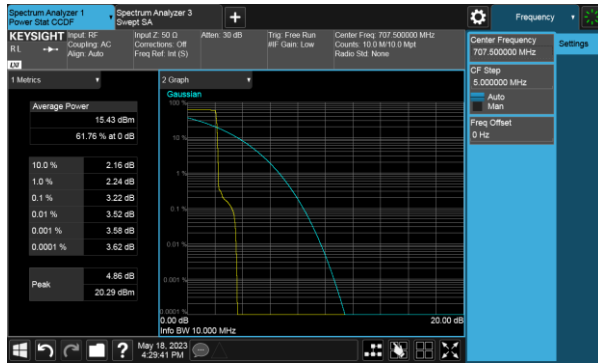
NB-IoT
LTE Band 12 BPSK 3.75KHz, CH 23095



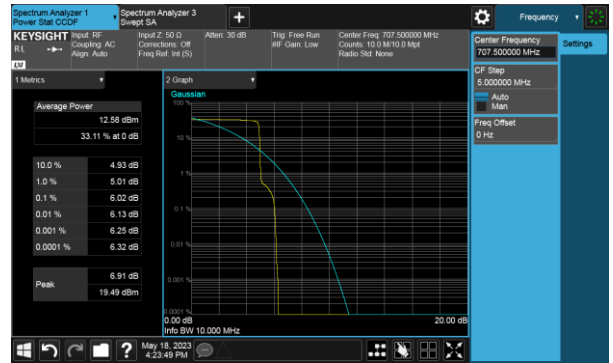
LTE Band 12 BPSK 15KHz, CH 23095



LTE Band 12 QPSK 3.75KHz, CH 23095

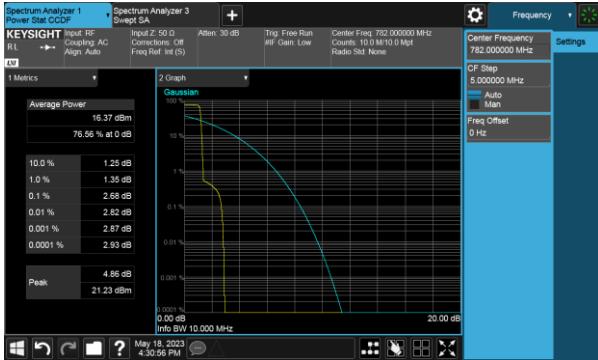


LTE Band 12 QPSK 15KHz, CH 23095

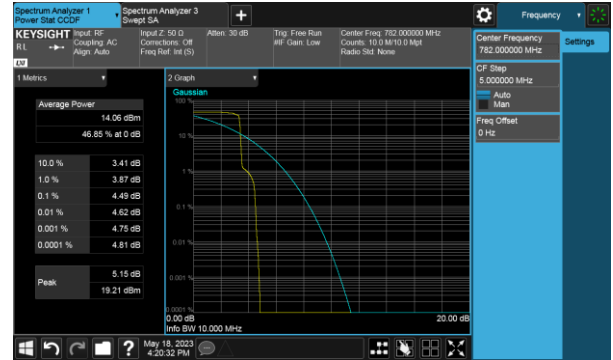




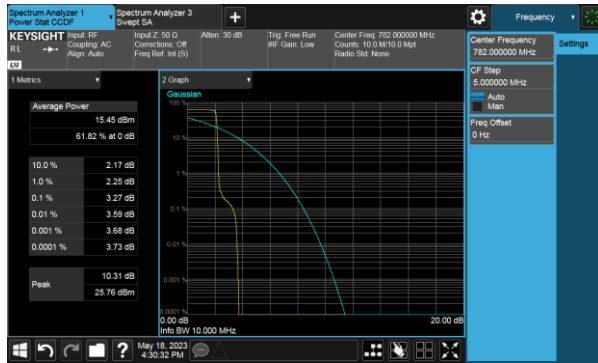
NB-IoT
LTE Band 13 BPSK 3.75KHz, CH 23230



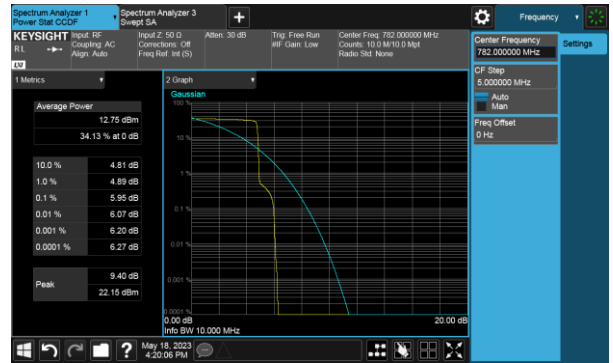
LTE Band 13 BPSK 15KHz, CH 23230



LTE Band 13 QPSK 3.75KHz, CH 23230



LTE Band 13 QPSK 15KHz, CH 23230





8. Band Edge

8.1. Test Limit

§27.53(h)(1):For operations in the 1695–1710 MHz, 1710–1755 MHz, 1755–1780 MHz, 1915–1920 MHz, 1995–2000 MHz, 2000–2020 MHz, 2110–2155 MHz, 2155–2180 MHz, and 2180–2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10} (P)$ dB.

§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.

For operations in the 746–758 MHz band and the 776–788 MHz band

§27.53(c)(2):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;

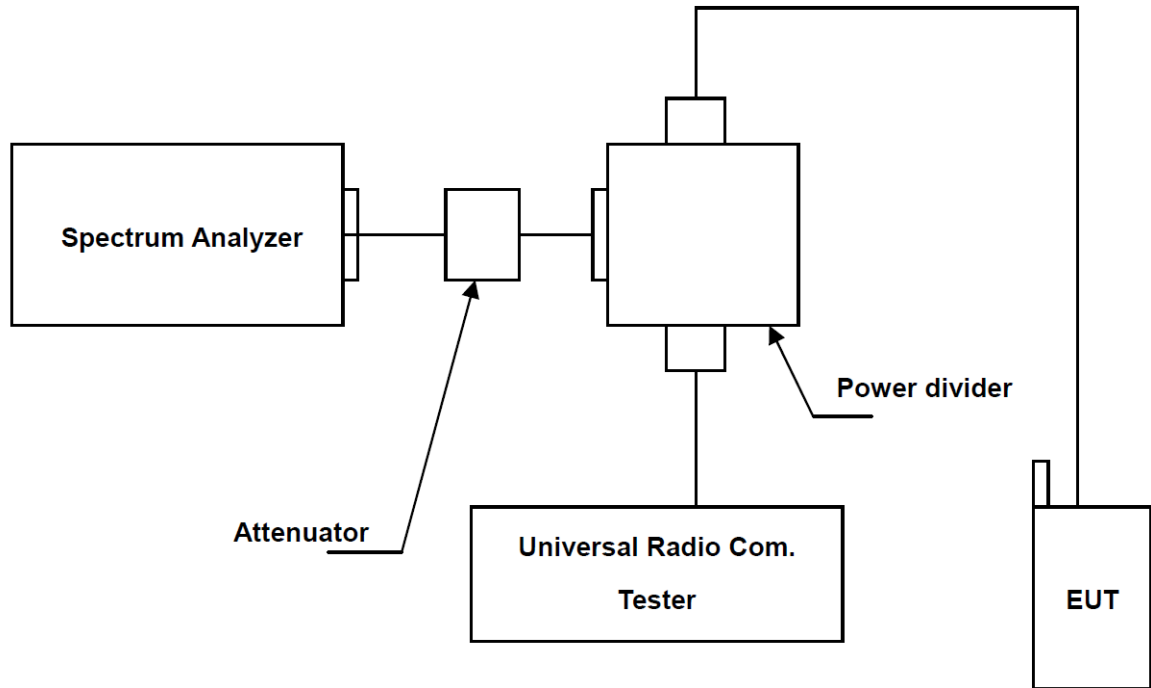
§27.53(c)(4):On all frequencies between 763–775 MHz and 793–805 MHz, by a factor not less than $65 + 10 \log (P)$ dB in a 6.25 kHz band segment, for mobile and portable stations.

8.2. Test Procedures

- a. The EUT was set up for the maximum peak power with WWAN link data modulation. The power was measured with Spectrum Analyzer. All measurements were done at 2 channels (low and high operational frequency range.)
- b. The band edge measurement used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer. This splitter loss and cable loss are the worst loss in the transmitted path track.
- c. The center frequency of spectrum is the band edge frequency. RB of the resolution bandwidth of at least one percent of the emission bandwidth.
- d. Record the max trace plot into the test report.



8.3. Test Setup

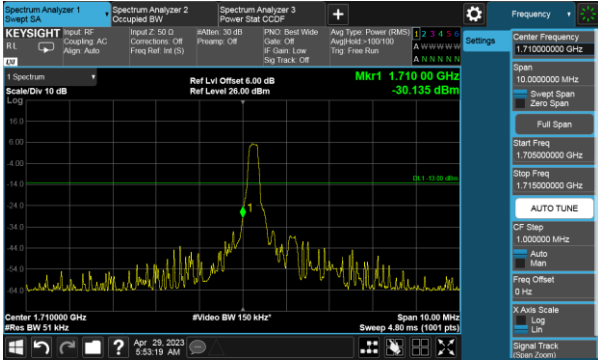




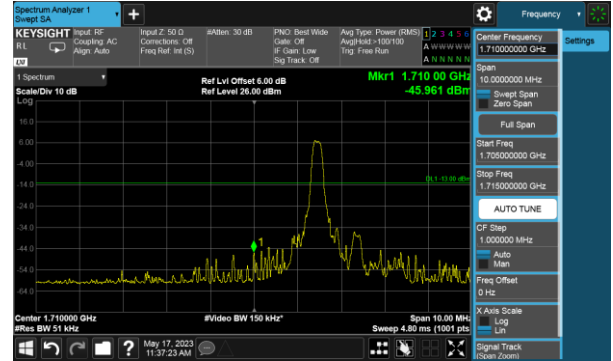
8.4. Test Result and Data

Cat M1

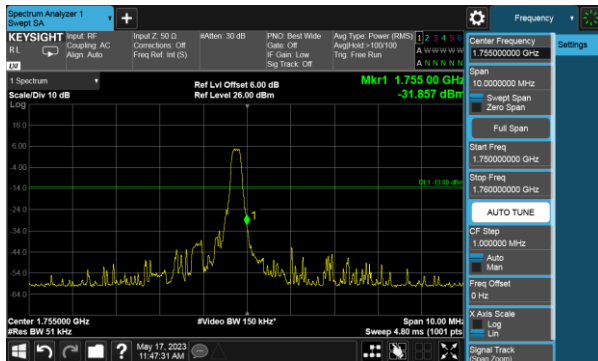
LTE Band 4 QPSK 1.4MHz, CH 19957



LTE Band 4 QPSK 20MHz, CH 20050



LTE Band 4 QPSK 1.4MHz, CH 20393

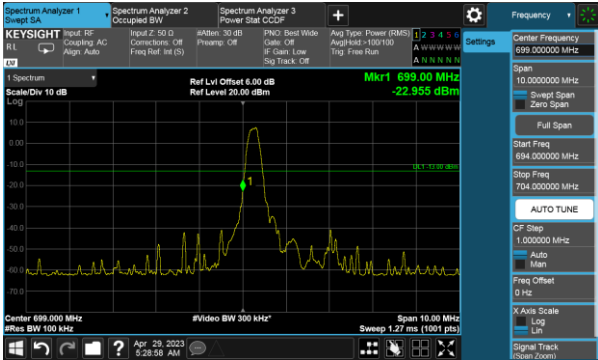


LTE Band 4 QPSK 20MHz, CH 20300

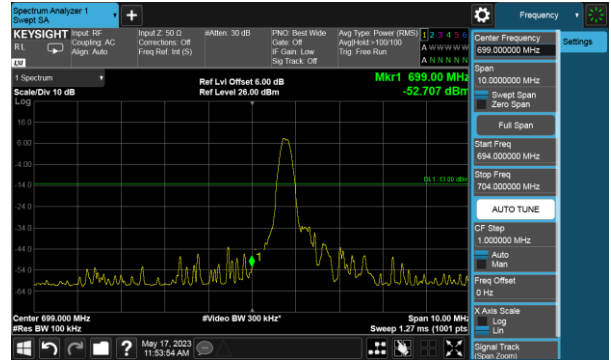




Cat M1
LTE Band 12 QPSK 1.4MHz, CH 23017



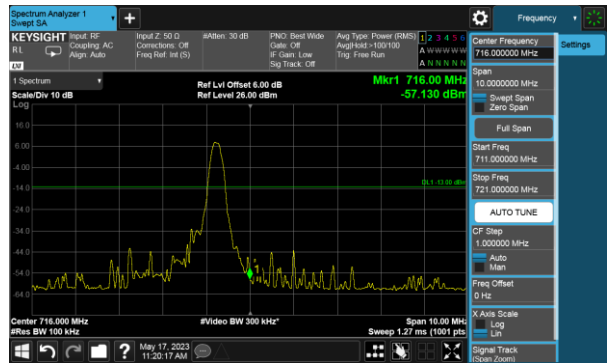
LTE Band 12 QPSK 10MHz, CH 23060



LTE Band 12 QPSK 1.4MHz, CH 23173

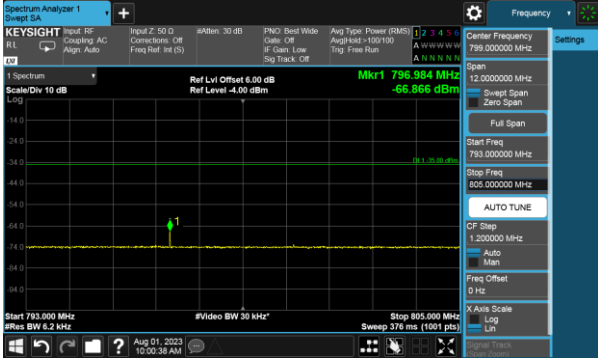


LTE Band 12 QPSK 10MHz, CH 23130

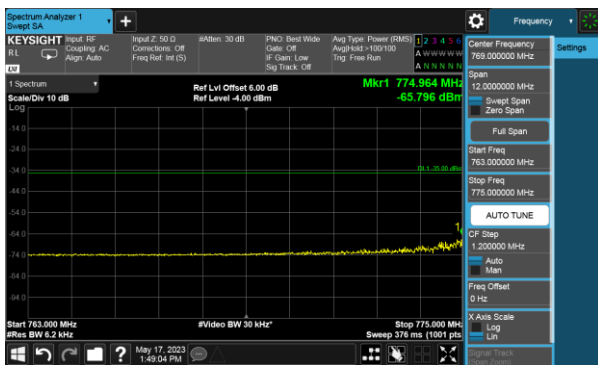
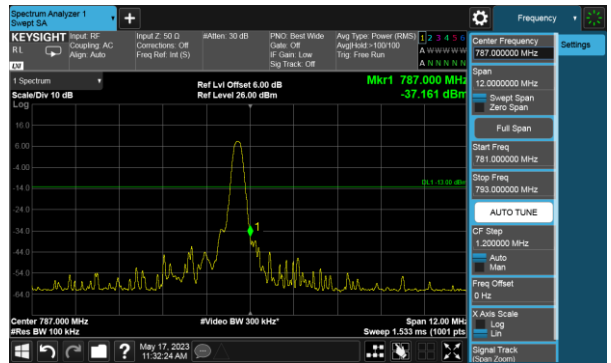
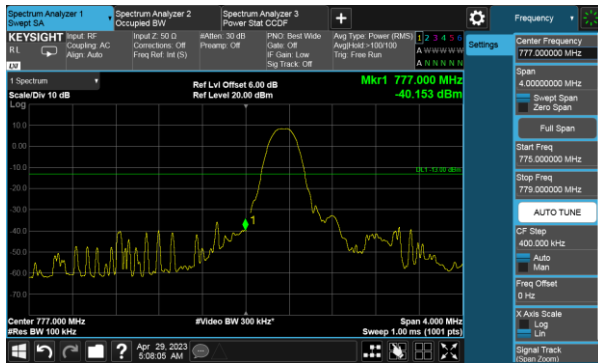




Cat M1
LTE Band 13 QPSK 5MHz, CH 23205



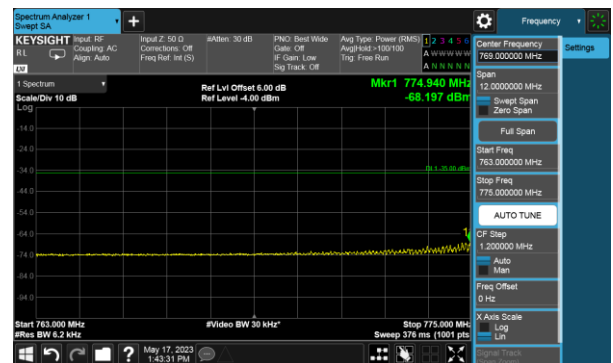
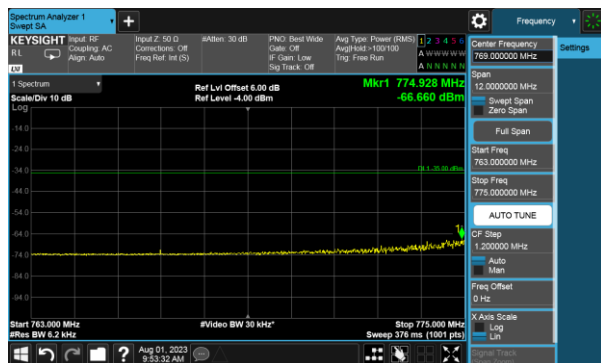
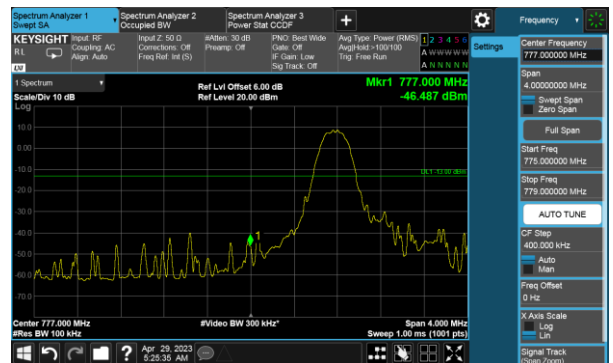
LTE Band 13 QPSK 5MHz, CH 23255





Cat M1
LTE Band 13 QPSK 10MHz, CH 23230

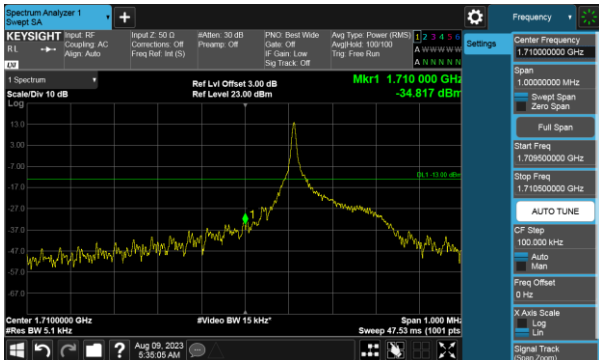
LTE Band 13 QPSK 10MHz, CH 23230



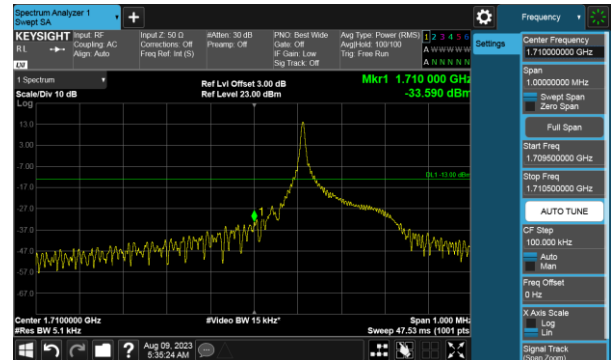


NB-IoT

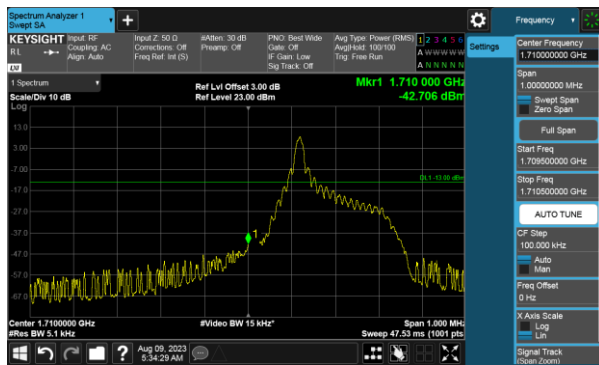
LTE Band 4 QPSK 3.75KHz 1@0 CH 1952



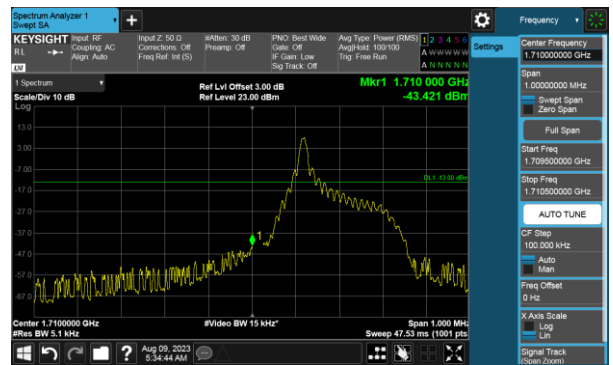
LTE Band 4 BPSK 3.75KHz 1@0 CH 1952



LTE Band 4 QPSK 15KHz 1@0 CH 1952



LTE Band 4 BPSK 15KHz 1@0 CH 1952



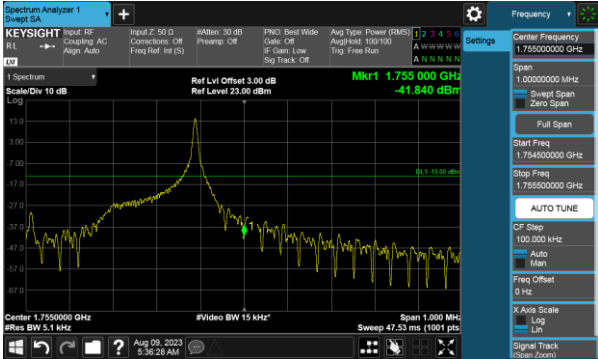
LTE Band 4 QPSK 15KHz 12@0 CH 1952



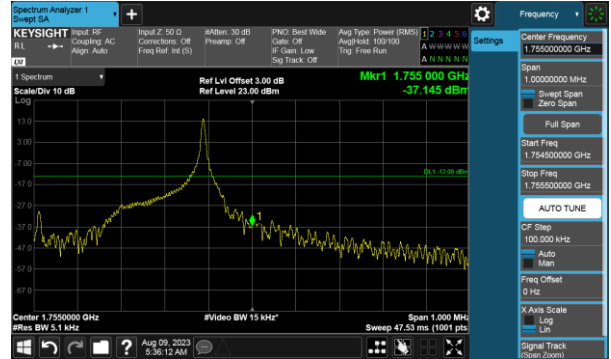


NB-IoT

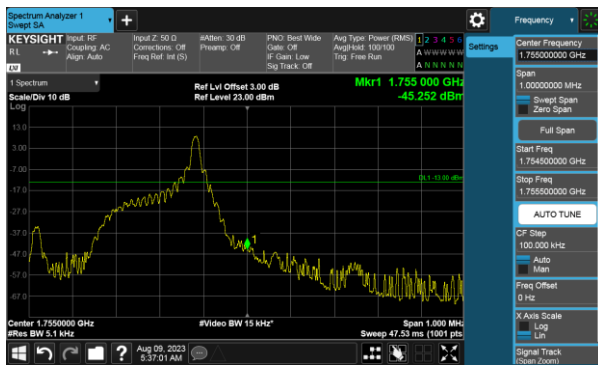
LTE Band 4 QPSK 3.75KHz 1@47 CH 20398



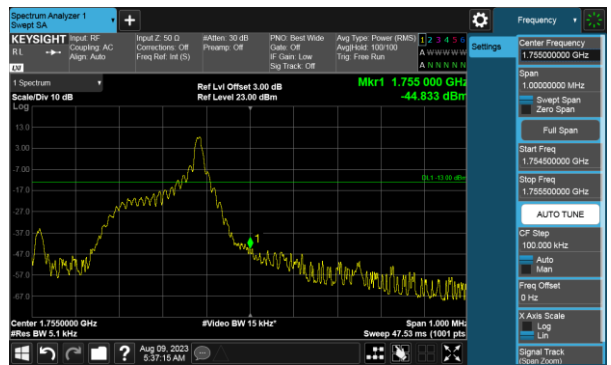
LTE Band 4 BPSK 3.75KHz 1@47 CH 20398



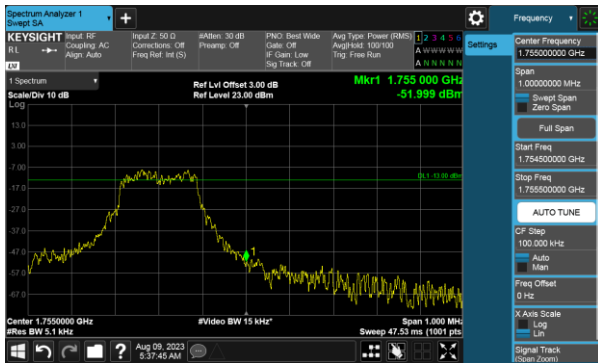
LTE Band 4 QPSK 15KHz 1@11 CH 20398



LTE Band 4 BPSK 15KHz 1@11 CH 20398



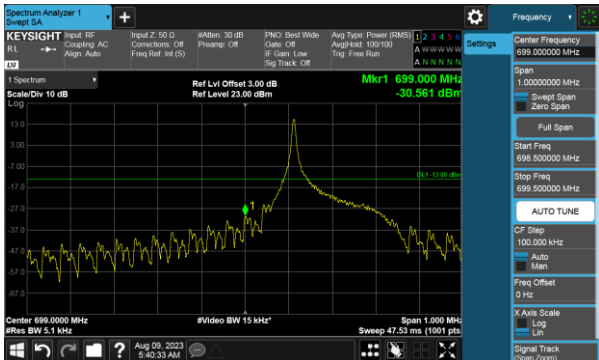
LTE Band 4 QPSK 15KHz 12@0 CH 20398



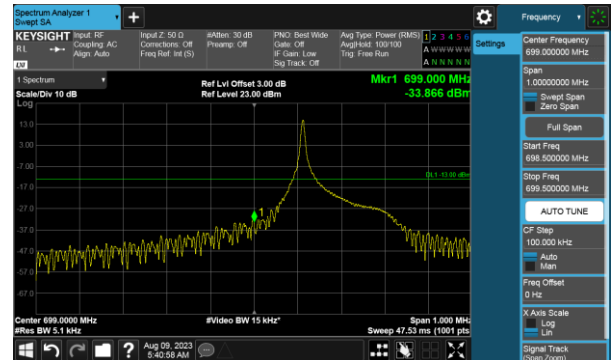


NB-IoT

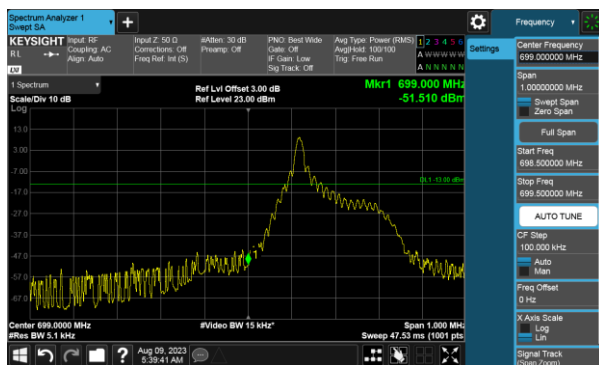
LTE Band 12 QPSK 3.75KHz 1@0 CH 23012



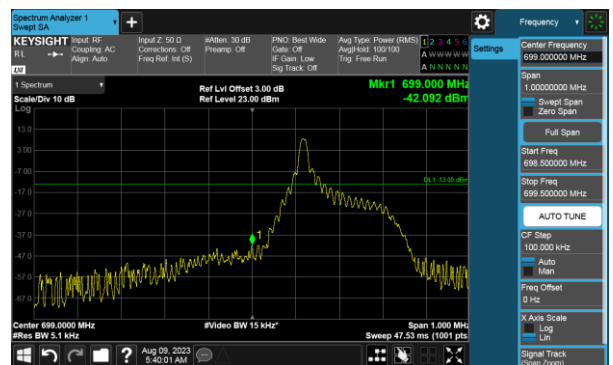
LTE Band 12 BPSK 3.75KHz 1@0 CH 23012



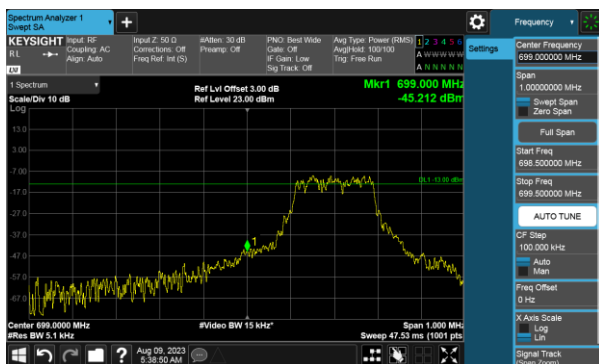
LTE Band 12 QPSK 15KHz 1@0 CH 23012



LTE Band 12 BPSK 15KHz 1@0 CH 23012



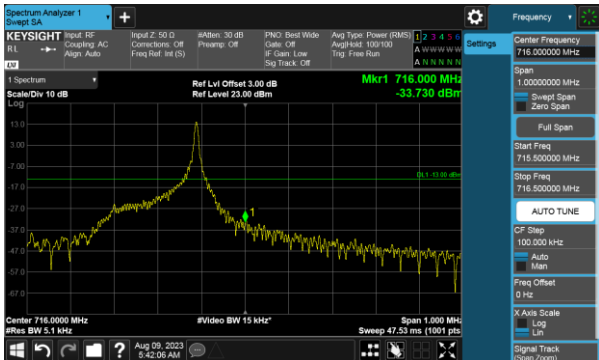
LTE Band 12 QPSK 15KHz 12@0 CH 23012



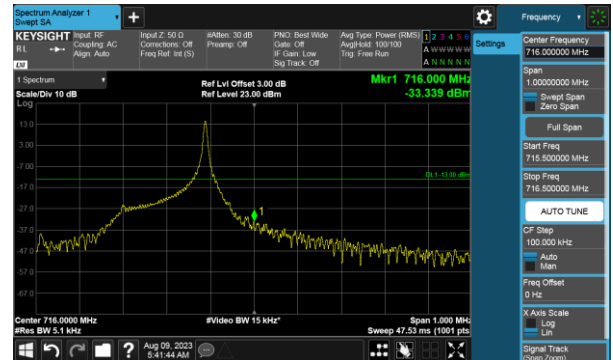


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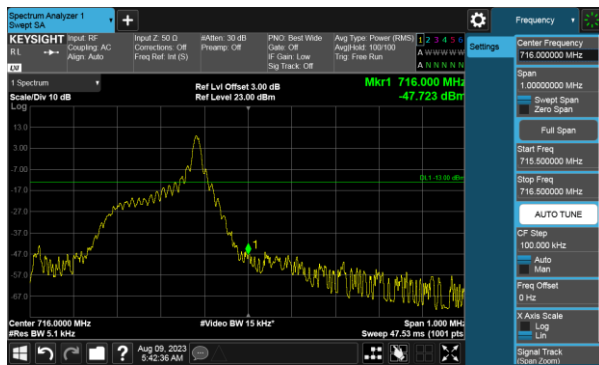
LTE Band 12 QPSK 3.75KHz 1@47 CH 23178



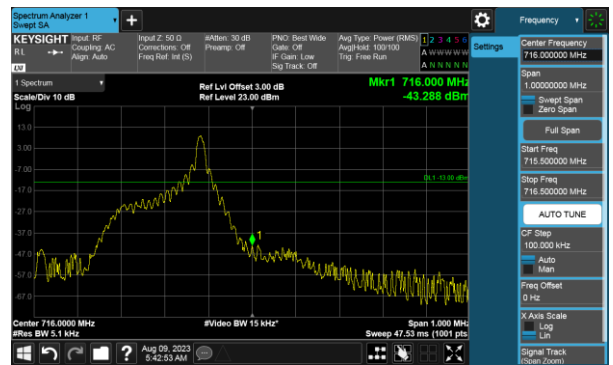
LTE Band 12 BPSK 3.75KHz 1@47 CH 23178



LTE Band 12 QPSK 15KHz 1@11 CH 23178



LTE Band 12 BPSK 15KHz 1@11 CH 23178



LTE Band 12 QPSK 15KHz 12@0 CH 23178

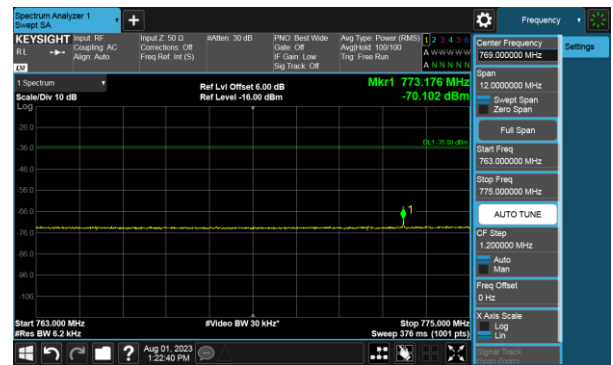
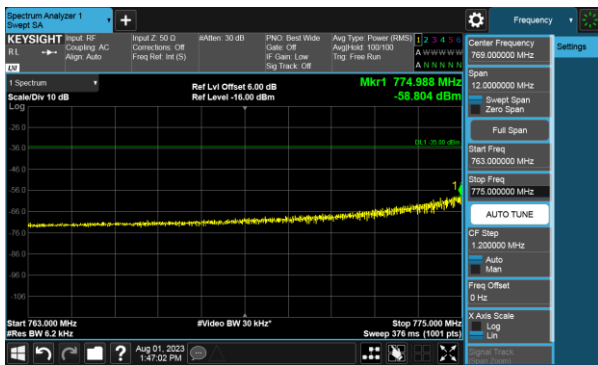
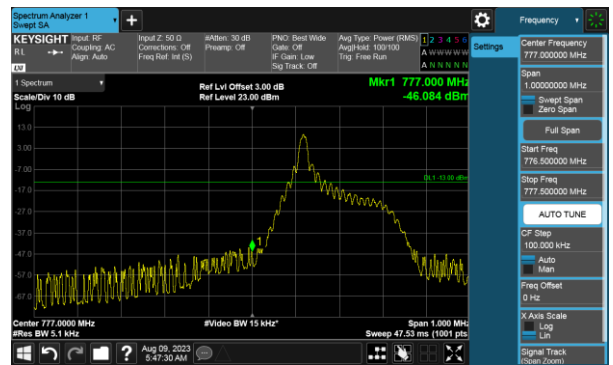
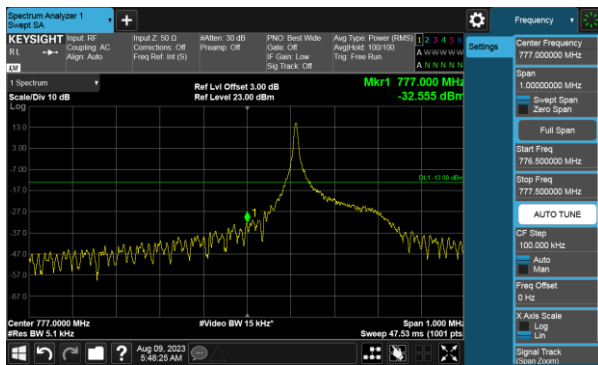
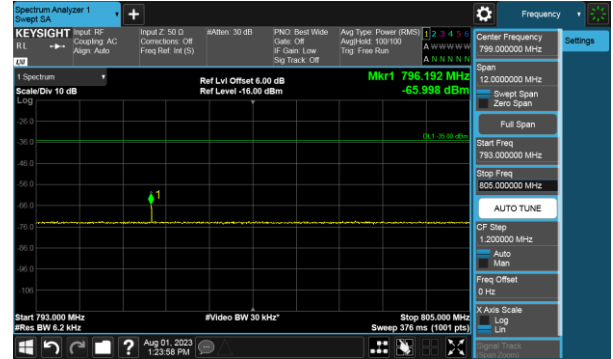




NB-IoT
LTE Band 13 QPSK 3.75KHz 1@0 CH 23182



LTE Band 13 QPSK 15KHz 1@0 CH 23182





NB-IoT
LTE Band 13 QPSK 15KHz 12@0 CH 23182



LTE Band 13 BPSK 3.75KHz 1@0 CH 23182

