



5M 64QAM High



10M 64QAM Mid

Test Plots for Band 14:
Chain 0:



5M QPSK Low



5M QPSK High



10M QPSK Mid



5M 64QAM Low



5M 64QAM High



10M 64QAM Mid

Chain 1:



5M QPSK Low



5M QPSK High

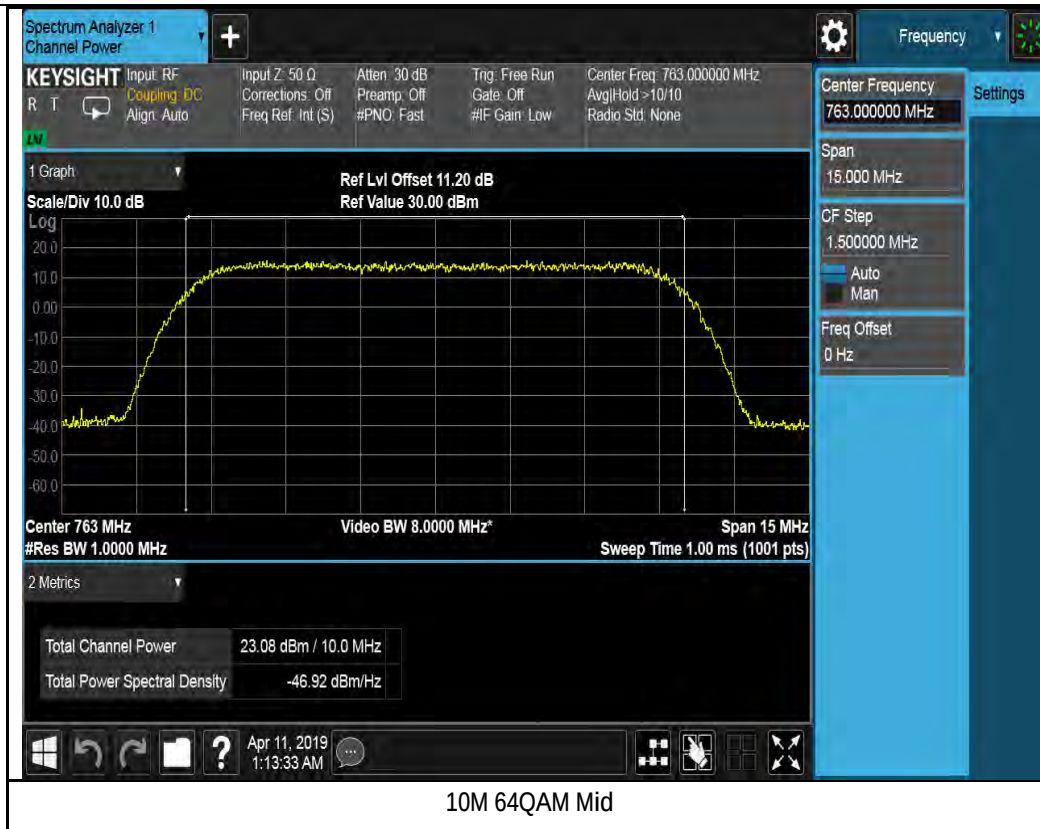




5M 64QAM Low



5M 64QAM High



10.2 Peak-Average Ratio

Requirement(s):

Spec	Item	Requirement	Applicable
47CFR24.232	(d)	Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of §24.51. 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.	☒
47CFR27.50	(b)	The peak-to-average power ratio (PAPR) of the transmitter output power must not exceed 13 dB. The PAPR measurements should be made using either an instrument with complementary cumulative distribution function (CCDF) capabilities to determine that PAPR will not exceed 13 dB for more than 0.1 percent of the time or other Commission approved procedure. The measurement must be performed using a signal corresponding to the highest PAPR expected during periods of continuous transmission.	☒
Test Setup			
Test Procedure	- EUT was set for low, mid, high channel with modulated mode and highest RF output power. - The spectrum analyzer was connected to the antenna terminal.		
Test Date	04/01/2019 – 04/16/2019	Environmental condition	Temperature 23°C Relative Humidity 48% Atmospheric Pressure 1008mbar
Remark	NONE		
Result	☒ Pass ☐ Fail		

Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Gary Chou at RF Test Site.

Test Data for LTE band 25:

Type	Channel	Frequency (MHz)	Peak-Average Ratio (dB)	Limit (dB)
5MHz BW, QPSK	Low	1932.5	8.22	13
	Mid	1962.5	8.18	13
	High	1992.5	8.20	13
5MHz BW, 64QAM	Low	1932.5	8.40	13
	Mid	1962.5	8.26	13
	High	1992.5	8.14	13
10MHz BW, QPSK	Low	1935	7.80	13
	Mid	1962.5	7.73	13
	High	1990	7.76	13
10MHz BW, 64QAM	Low	1935	7.77	13
	Mid	1962.5	7.75	13
	High	1990	7.77	13
15MHz BW, QPSK	Low	1937.5	8.74	13
	Mid	1962.5	8.68	13
	High	1987.5	8.59	13
15MHz BW, 64QAM	Low	1937.5	8.59	13
	Mid	1962.5	8.49	13
	High	1987.5	8.65	13
20MHz BW, QPSK	Low	1940	9.11	13
	Mid	1962.5	9.11	13
	High	1985	9.05	13
20MHz BW, 64QAM	Low	1940	8.88	13
	Mid	1962.5	8.85	13
	High	1985	8.91	13

Test Data for LTE band 66:

Type	Channel	Frequency (MHz)	Peak-Average Ratio (dB)	Limit (dB)
5MHz BW, QPSK	Low	2112.5	8.33	13
	Mid	2145	8.34	13
	High	2177.5	8.30	13
5MHz BW, 64QAM	Low	2112.5	8.30	13
	Mid	2145	8.32	13
	High	2177.5	8.11	13
10MHz BW, QPSK	Low	2115	7.68	13
	Mid	2145	7.71	13
	High	2175	7.91	13
10MHz BW, 64QAM	Low	2115	7.73	13
	Mid	2145	7.67	13
	High	2175	7.76	13
15MHz BW, QPSK	Low	2117.5	9.02	13
	Mid	2145	8.92	13
	High	2172.5	8.51	13
15MHz BW, 64QAM	Low	2117.5	8.89	13
	Mid	2145	8.84	13
	High	2172.5	8.52	13
20MHz BW, QPSK	Low	2120	9.09	13
	Mid	2145	9.20	13
	High	2170	9.10	13
20MHz BW, 64QAM	Low	2120	9.01	13
	Mid	2145	8.89	13
	High	2170	8.94	13

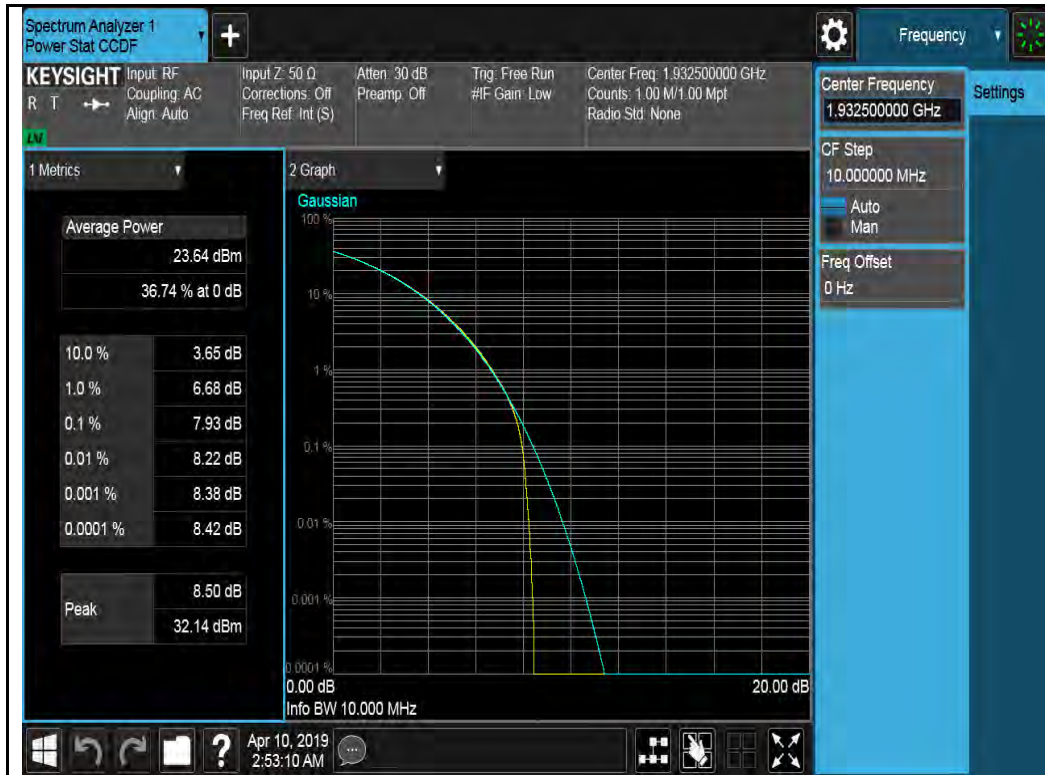
Test Data for LTE band 13:

Type	Channel	Frequency (MHz)	Peak-Average Ratio (dB)	Limit (dB)
5MHz BW, QPSK	Low	748.2	8.17	13
	High	753.5	8.19	13
5MHz BW, 64QAM	Low	748.2	8.18	13
	High	753.5	8.14	13
10MHz BW, QPSK	Mid	751	7.71	13
10MHz BW, 64QAM	Mid	751	7.70	13

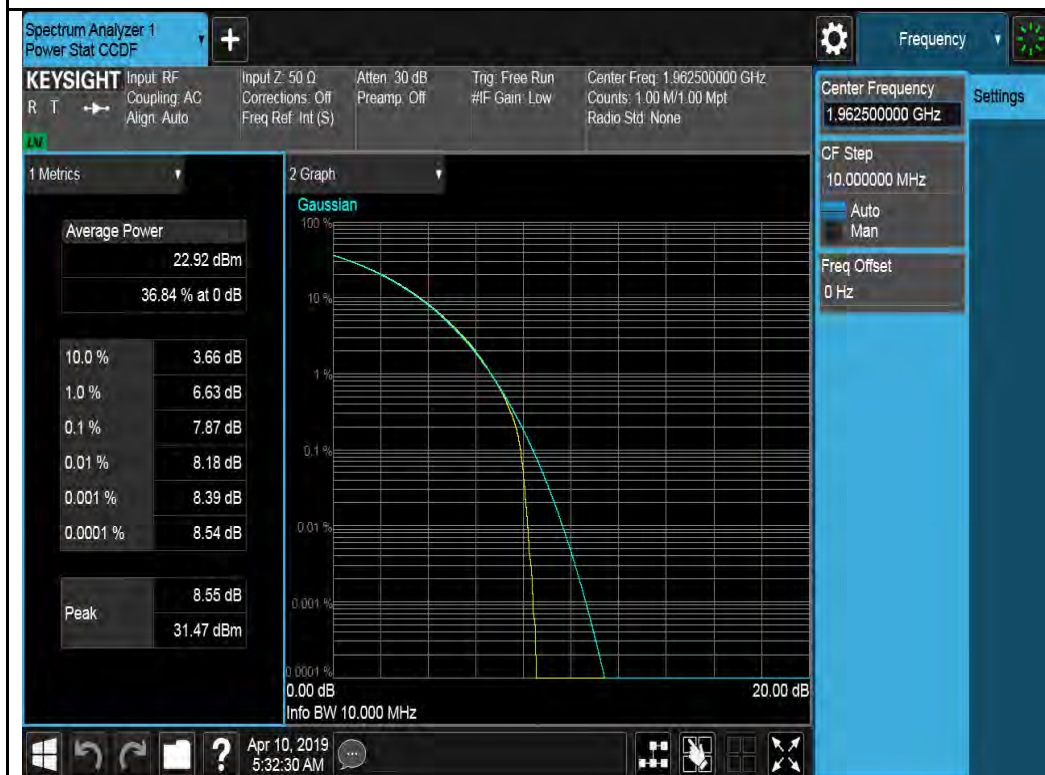
Test Data for LTE band 14:

Type	Channel	Frequency (MHz)	Peak-Average Ratio (dB)	Limit (dB)
5MHz BW, QPSK	Low	760.5	8.18	13
	High	765.5	8.08	13
5MHz BW, 64QAM	Low	760.5	8.17	13
	High	765.5	7.98	13
10MHz BW, QPSK	Mid	763	8.19	13
10MHz BW, 64QAM	Mid	763	7.68	13

Test Plots for Band 25:



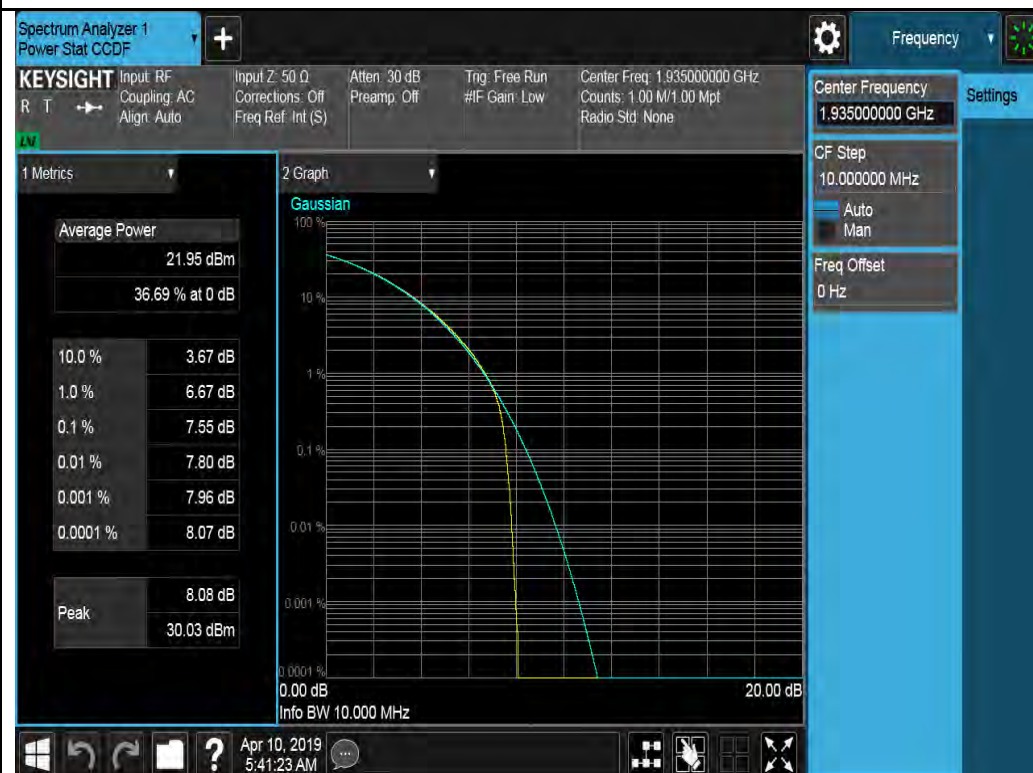
5M QPSK Low



5M QPSK Mid



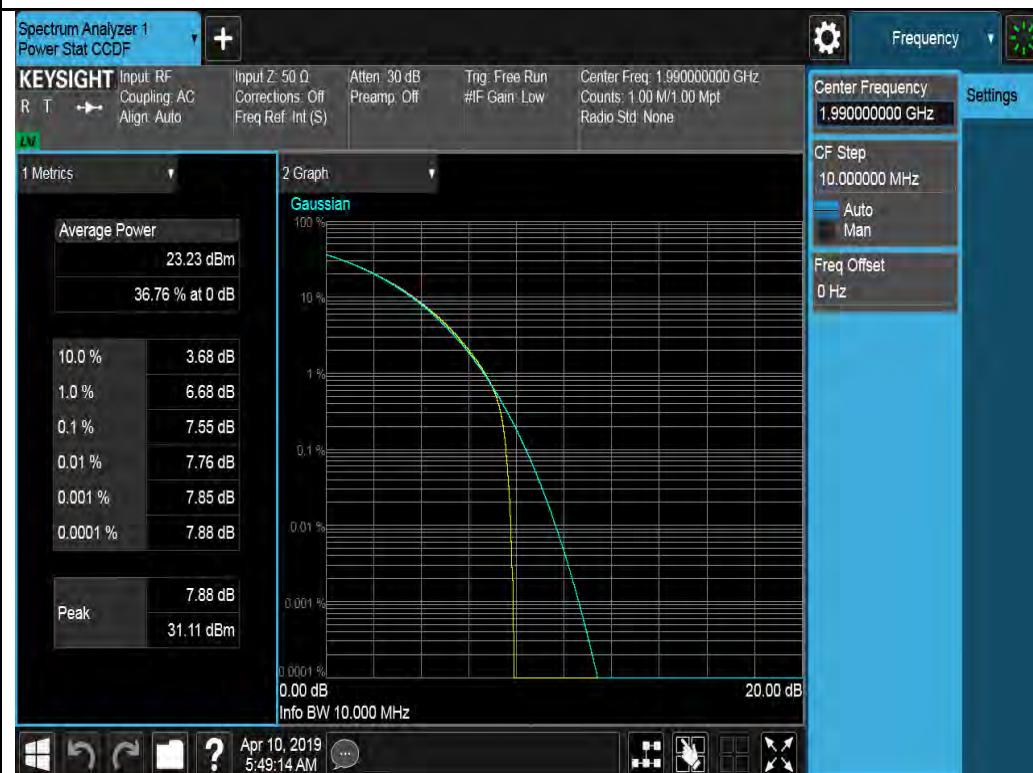
5M QPSK High



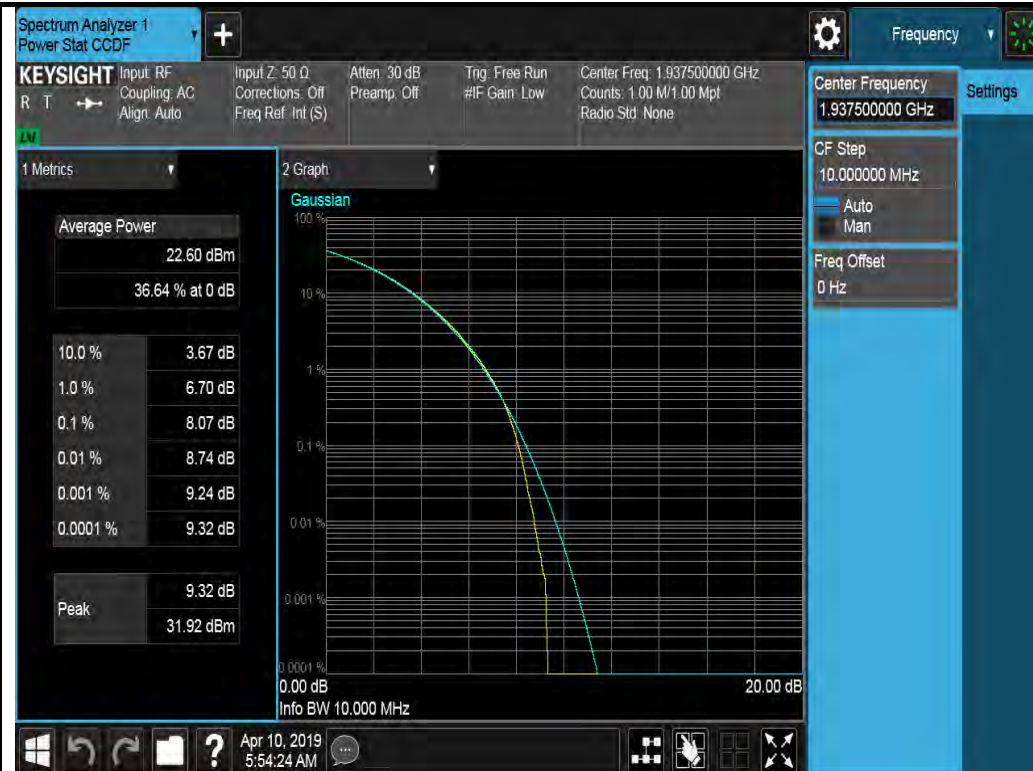
10M QPSK Low



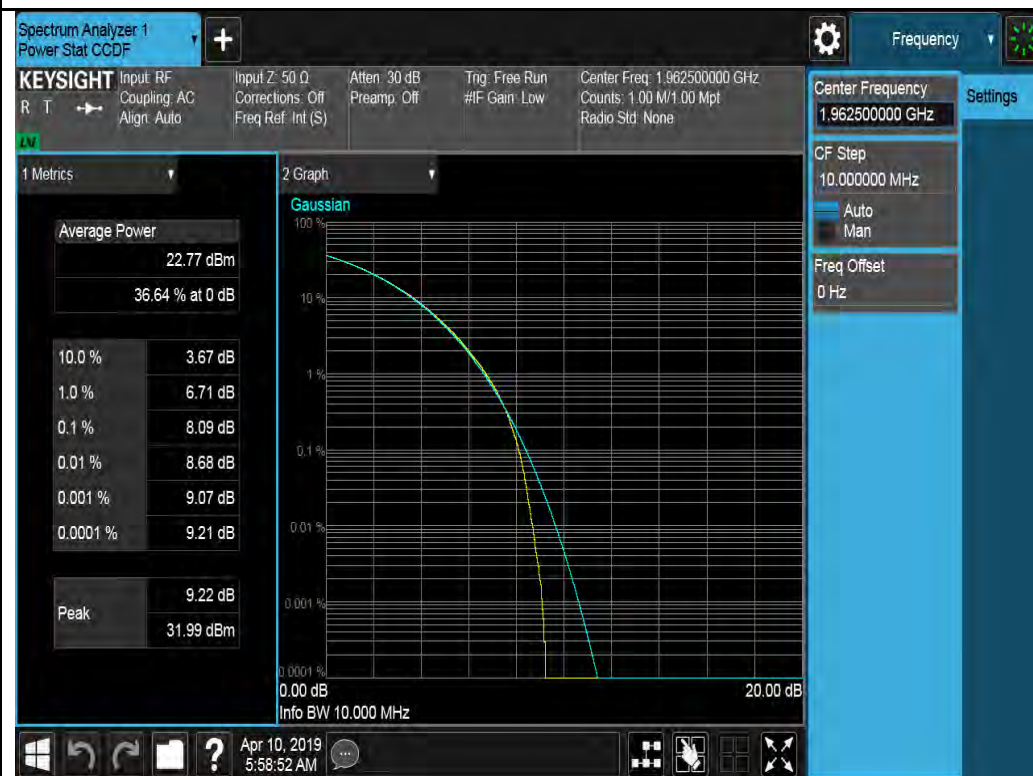
10M QPSK Mid



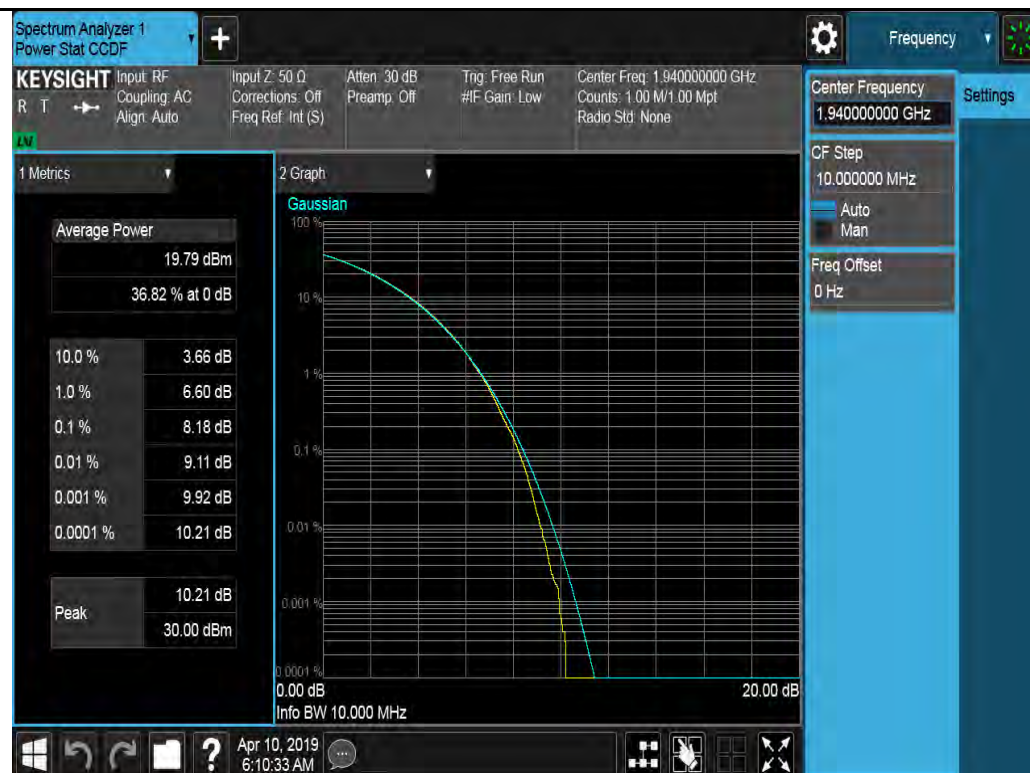
10M QPSK High



15M QPSK Low



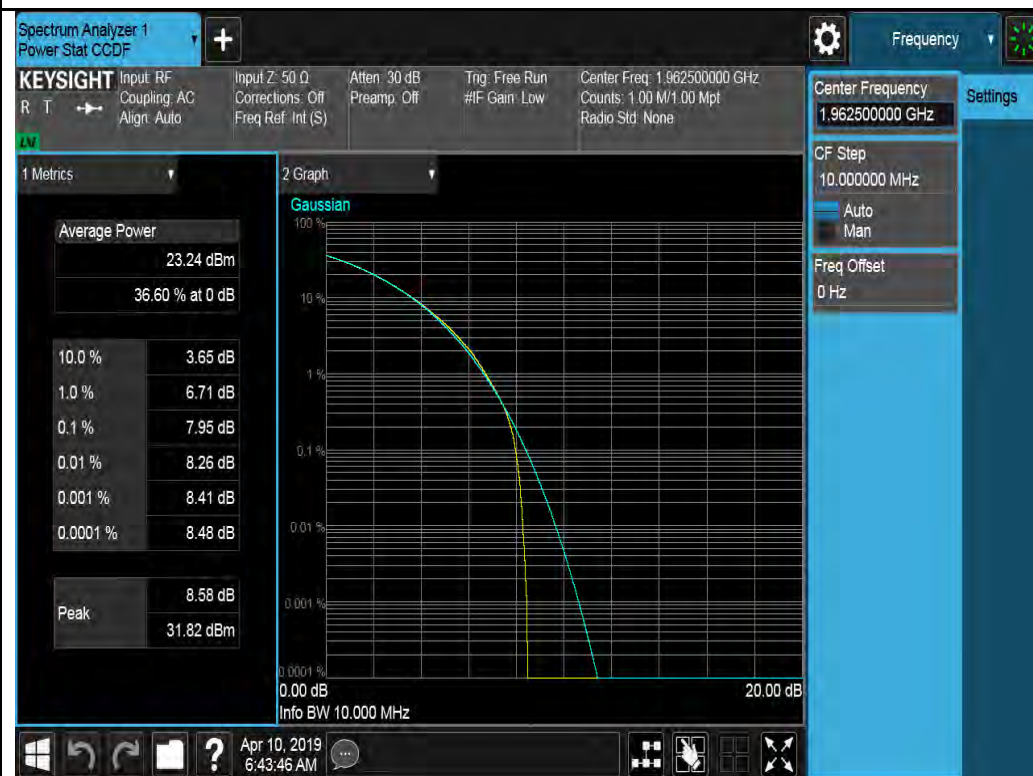
15M QPSK Mid







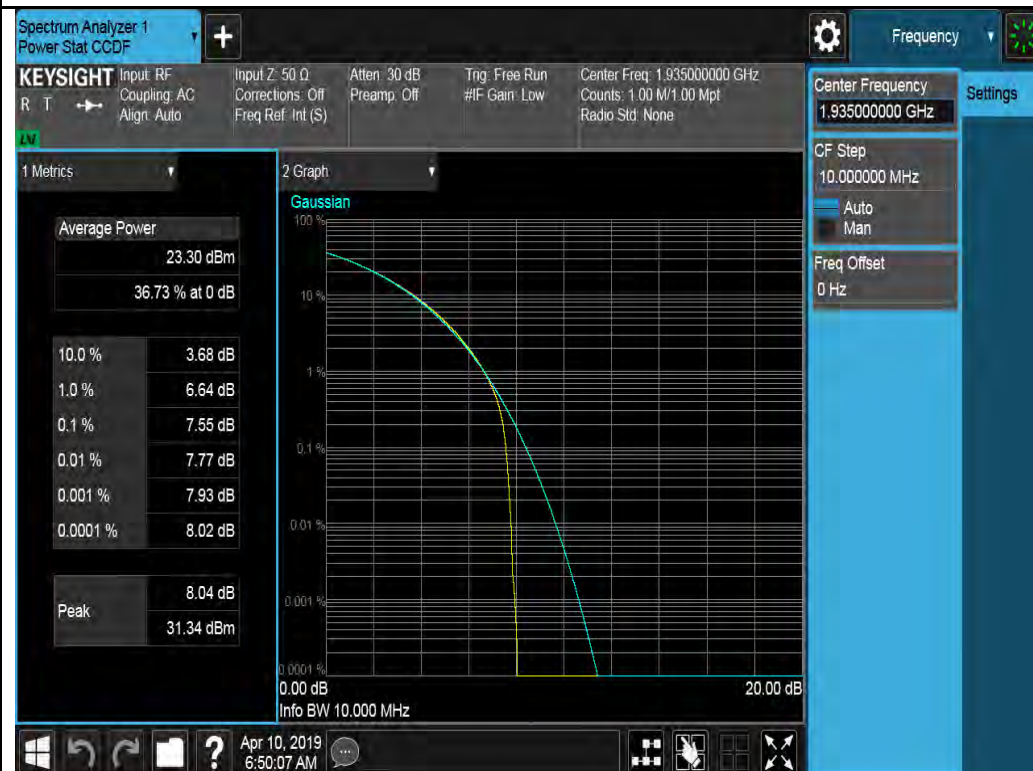
5M 64QAM Low



5M 64QAM Mid

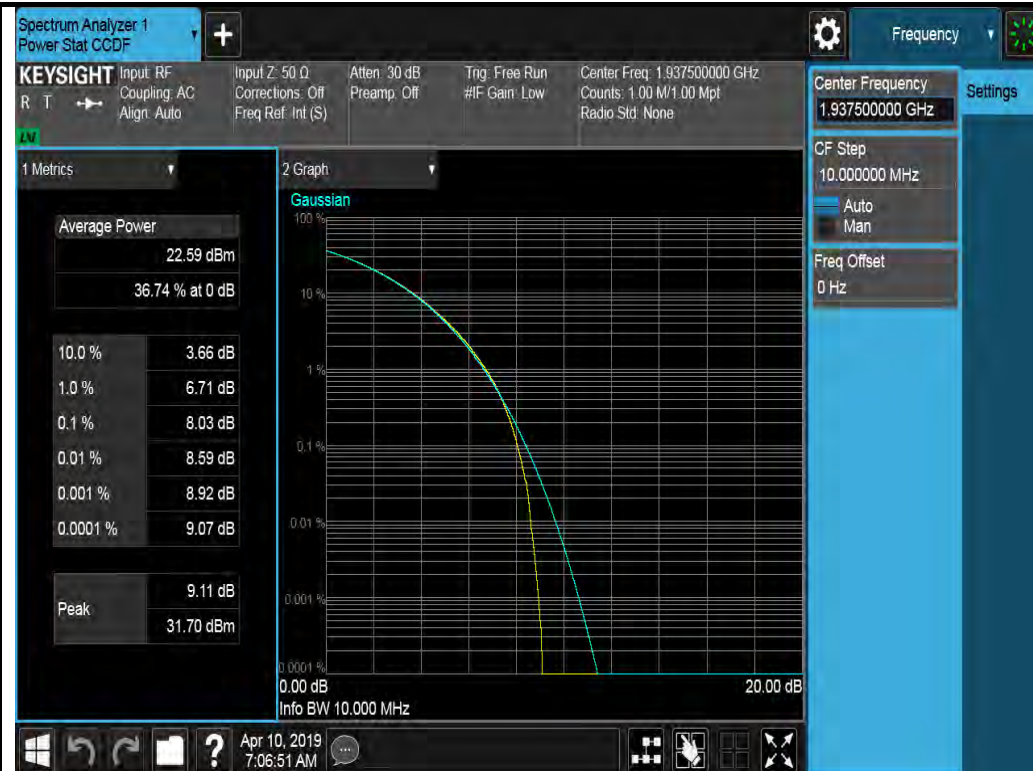


5M 64QAM High

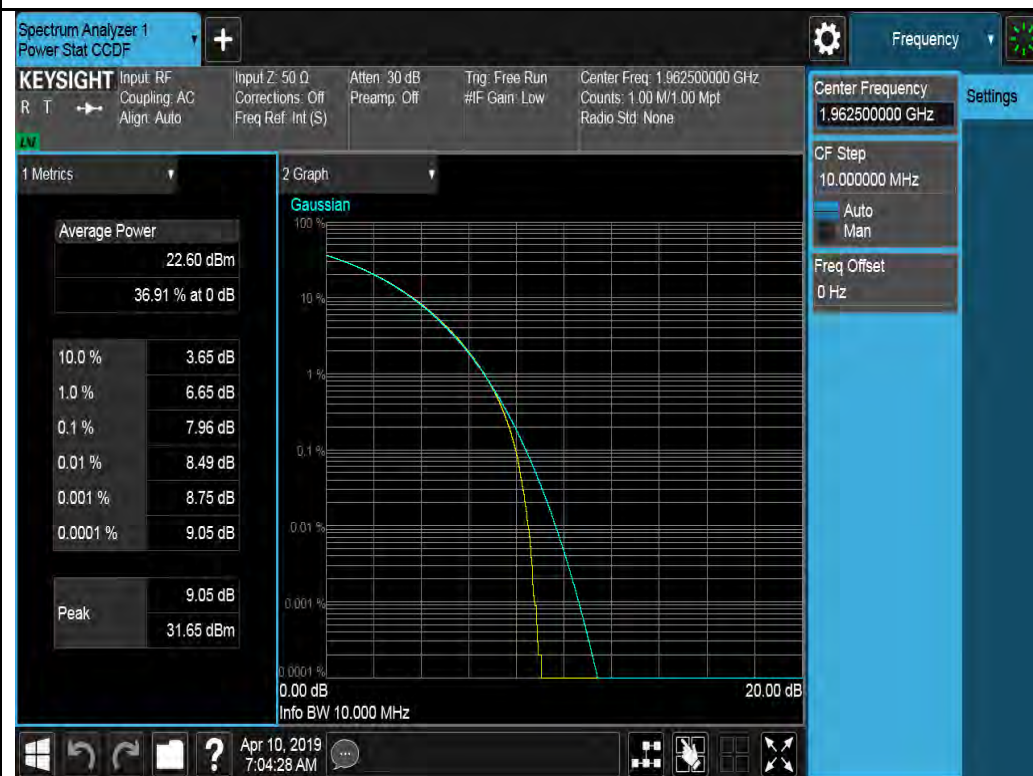


10M 64QAM Low

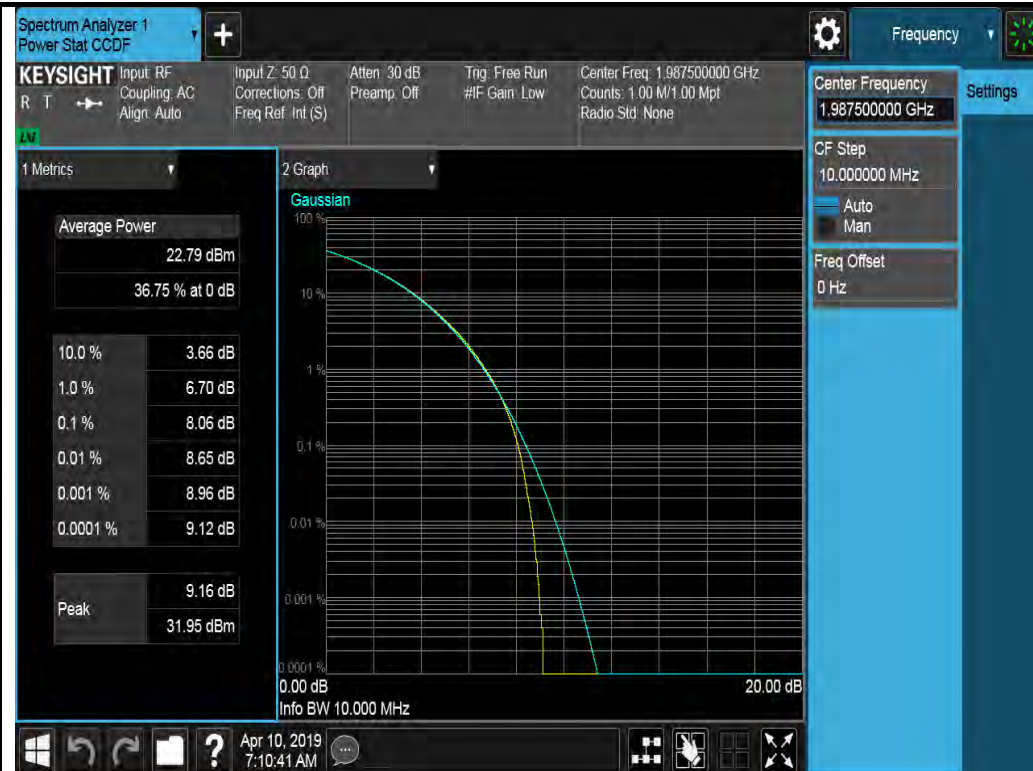




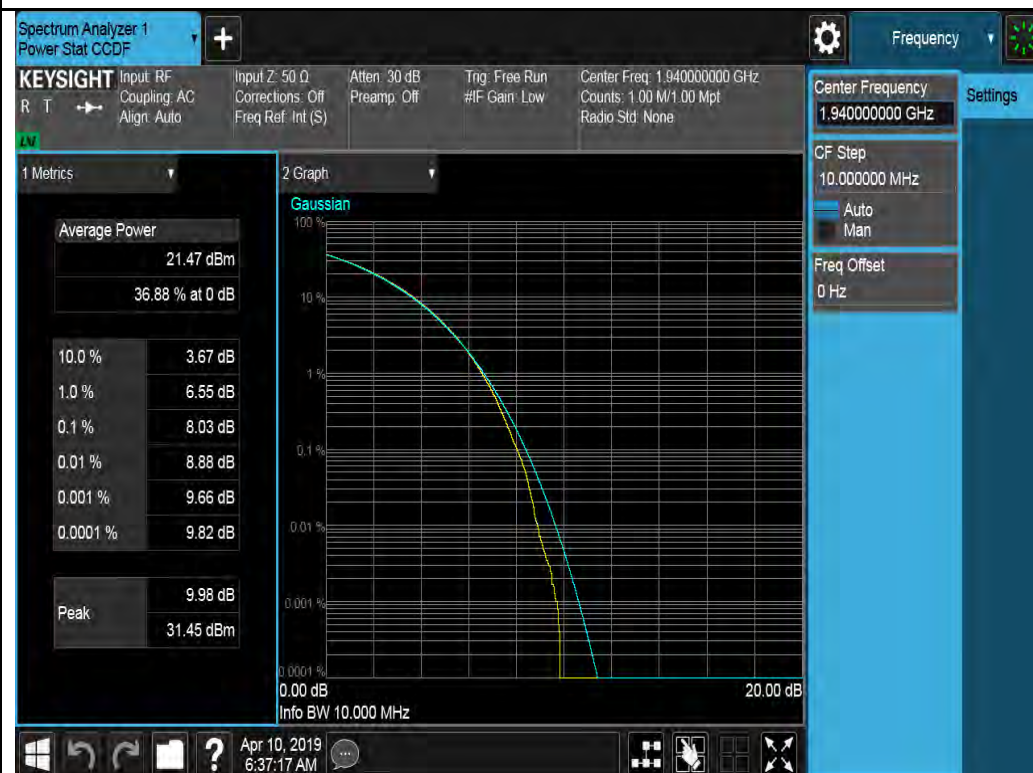
15M 64QAM Low



15M 64QAM Mid



15M 64QAM High



20M 64QAM Low

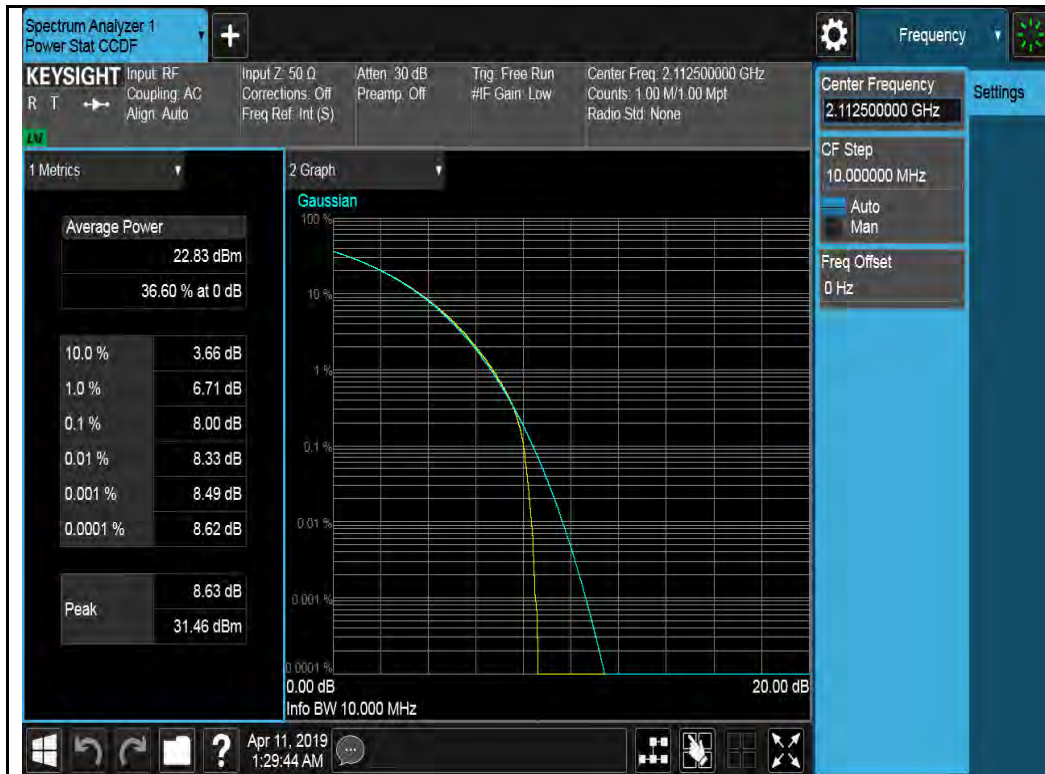


20M 64QAM Mid



20M 64QAM High

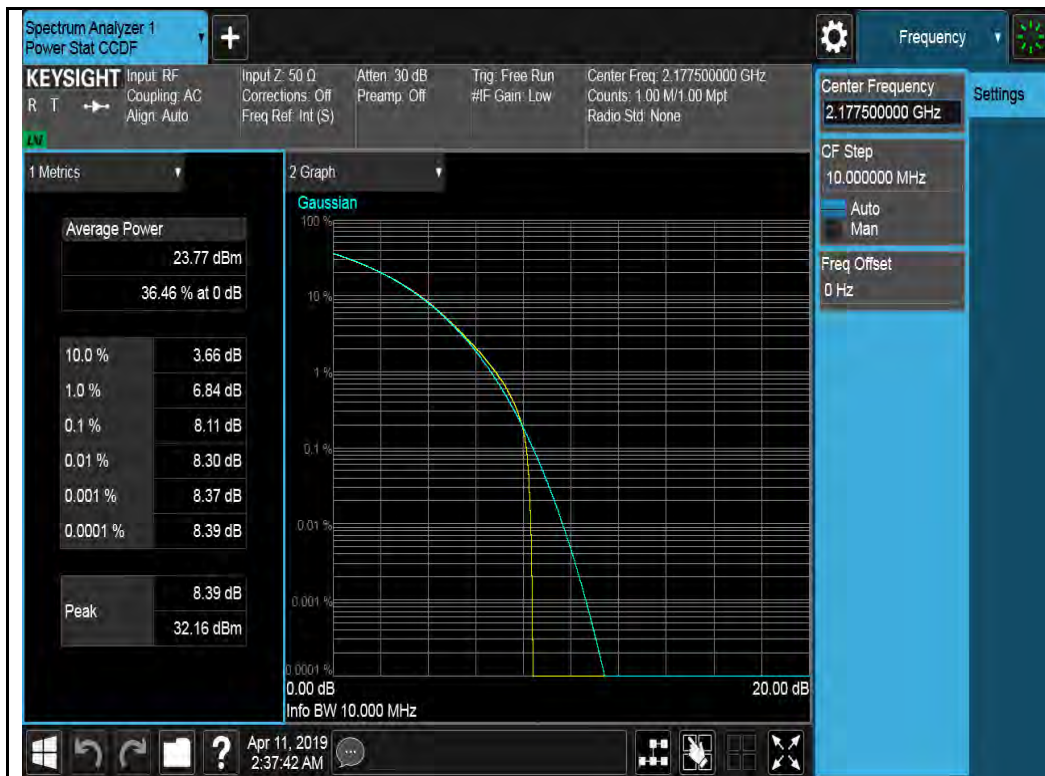
Test Plots for Band 66:



5M QPSK Low



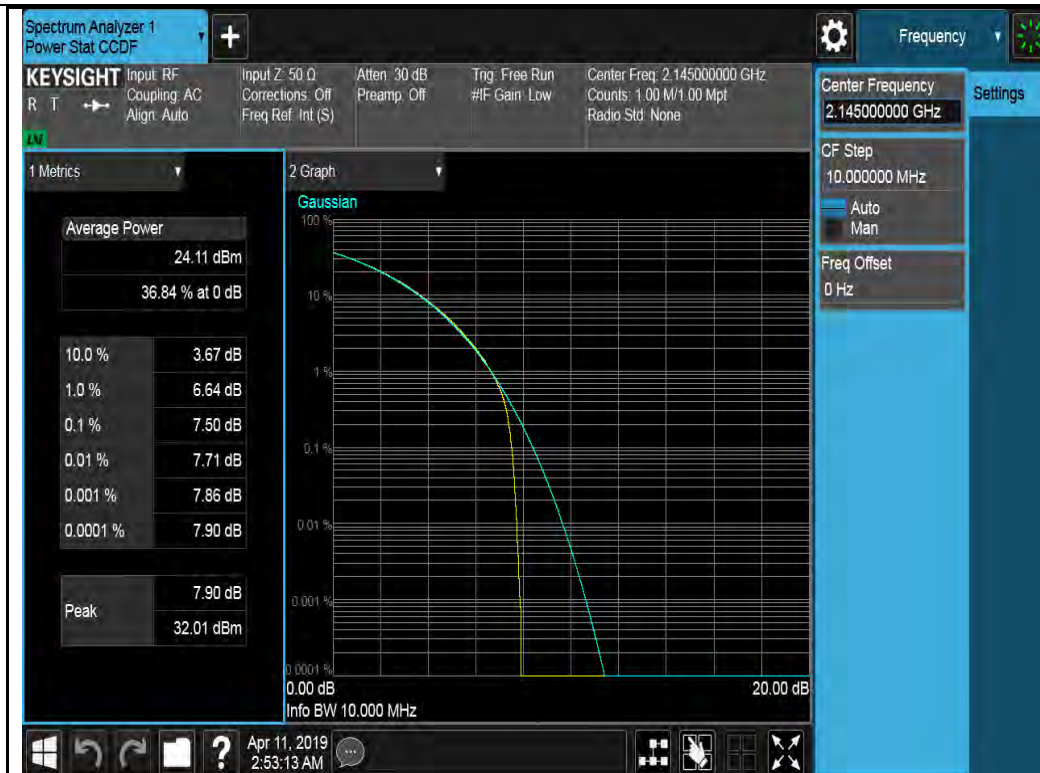
5M QPSK Mid



5M QPSK High



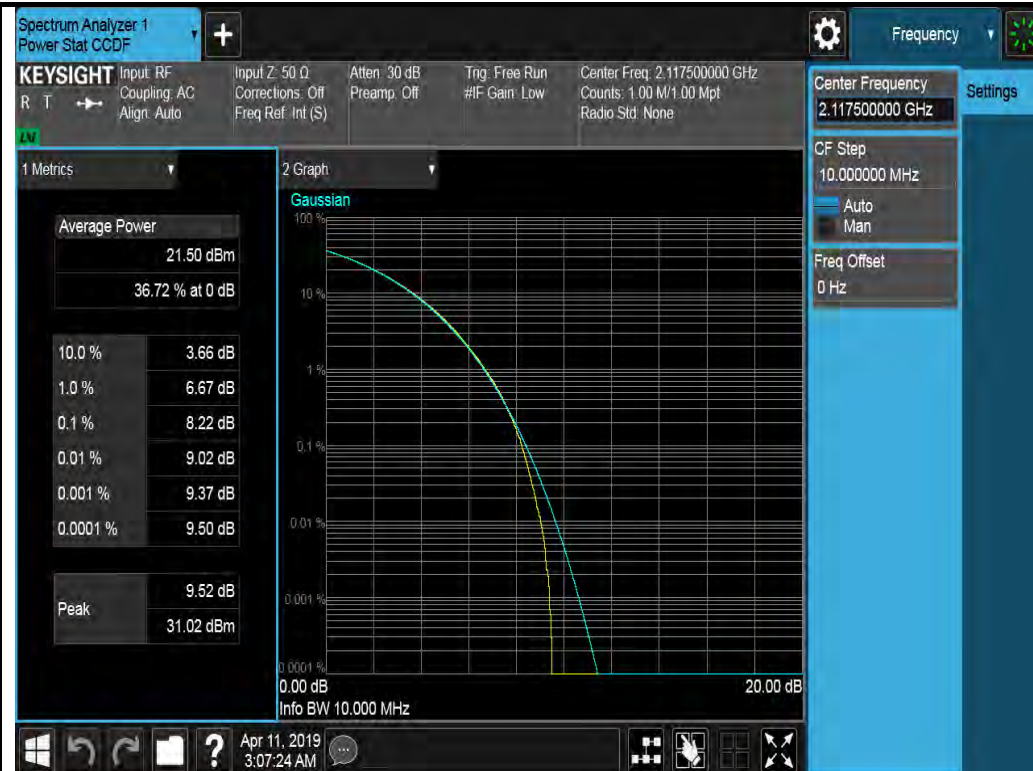
10M QPSK Low



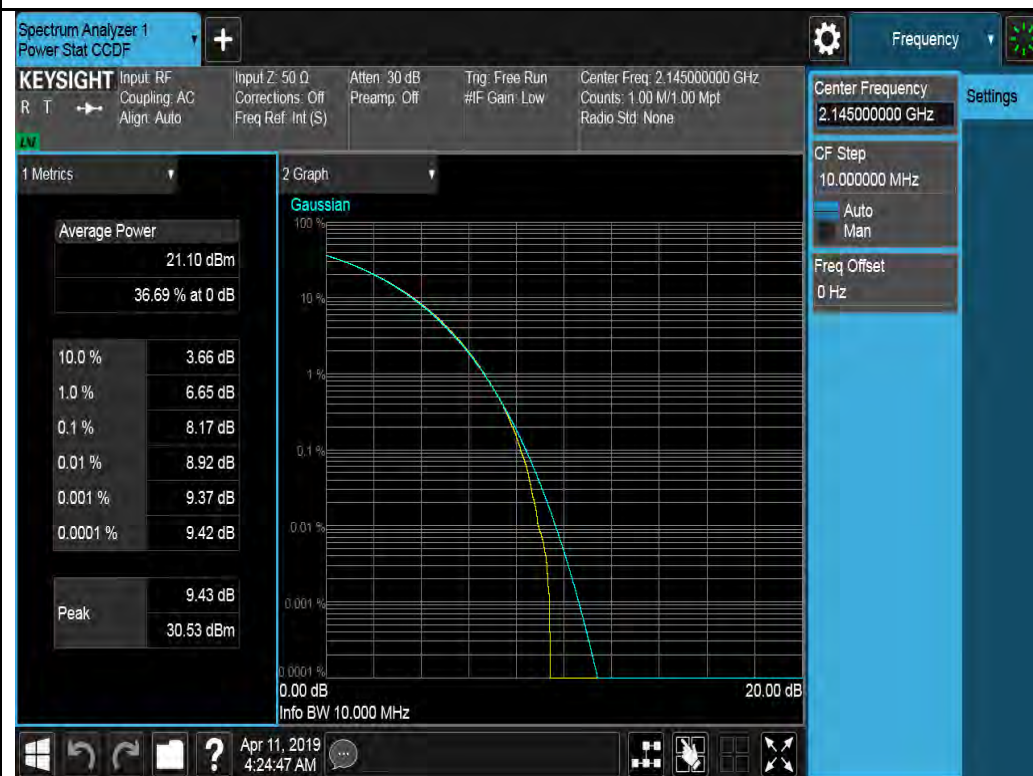
10M QPSK Mid



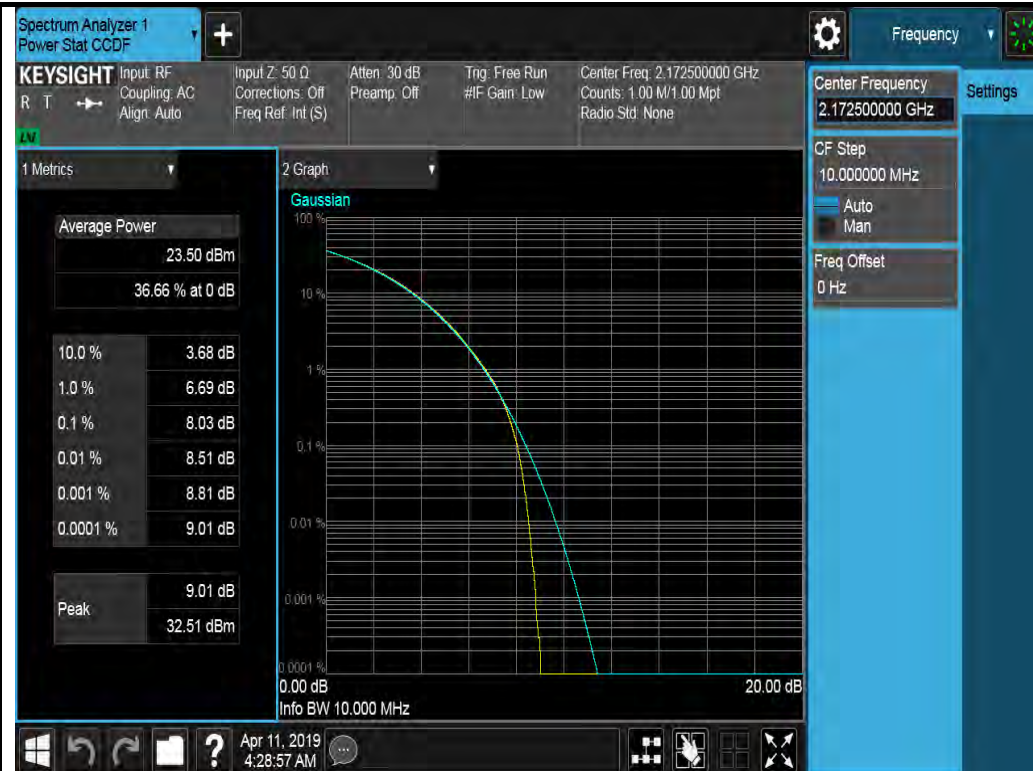
10M QPSK High



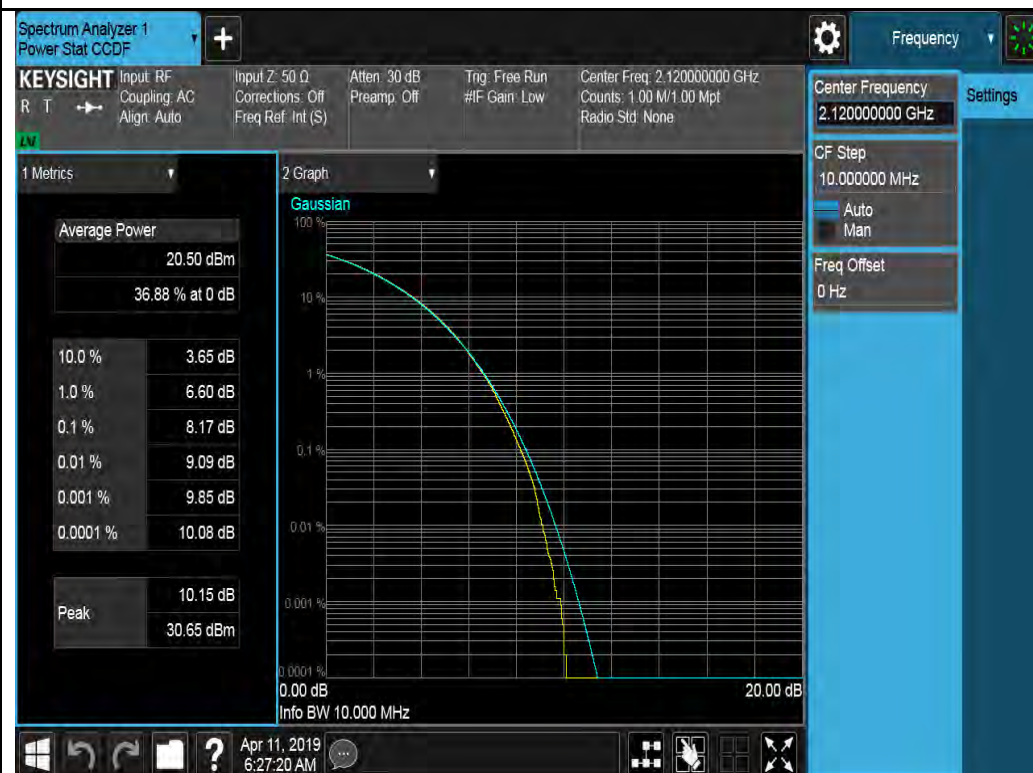
15M QPSK Low



15M QPSK Mid



15M QPSK High



20M QPSK Low



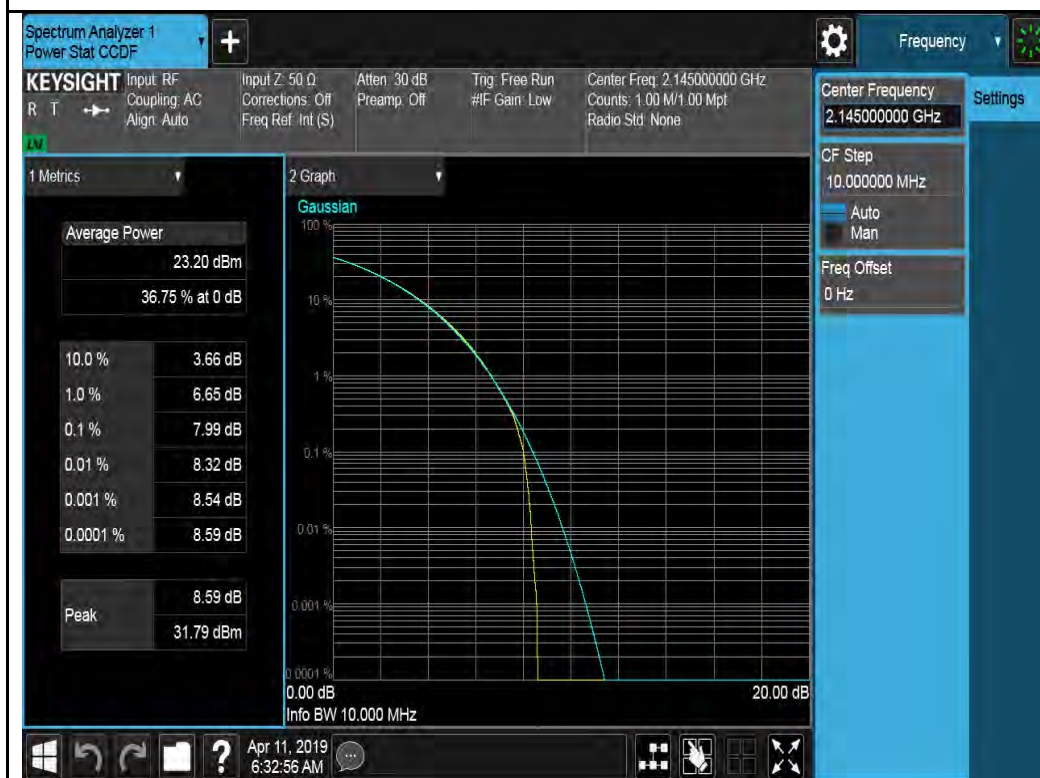
20M QPSK Mid



20M QPSK High



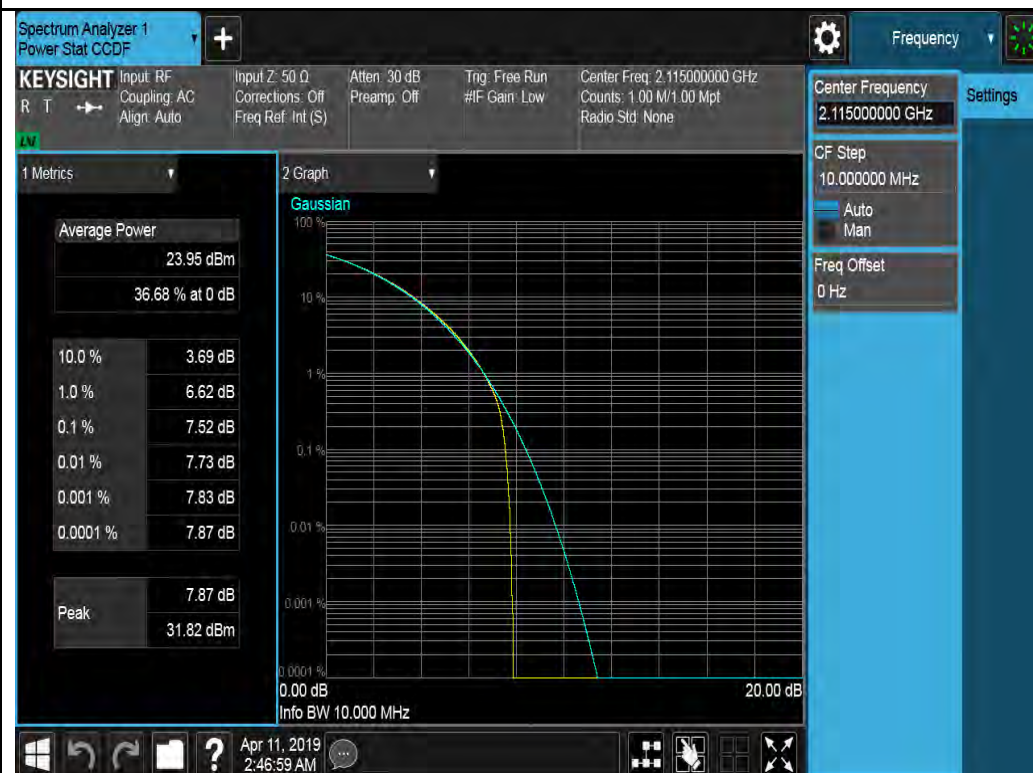
5M 64QAM Low



5M 64QAM Mid



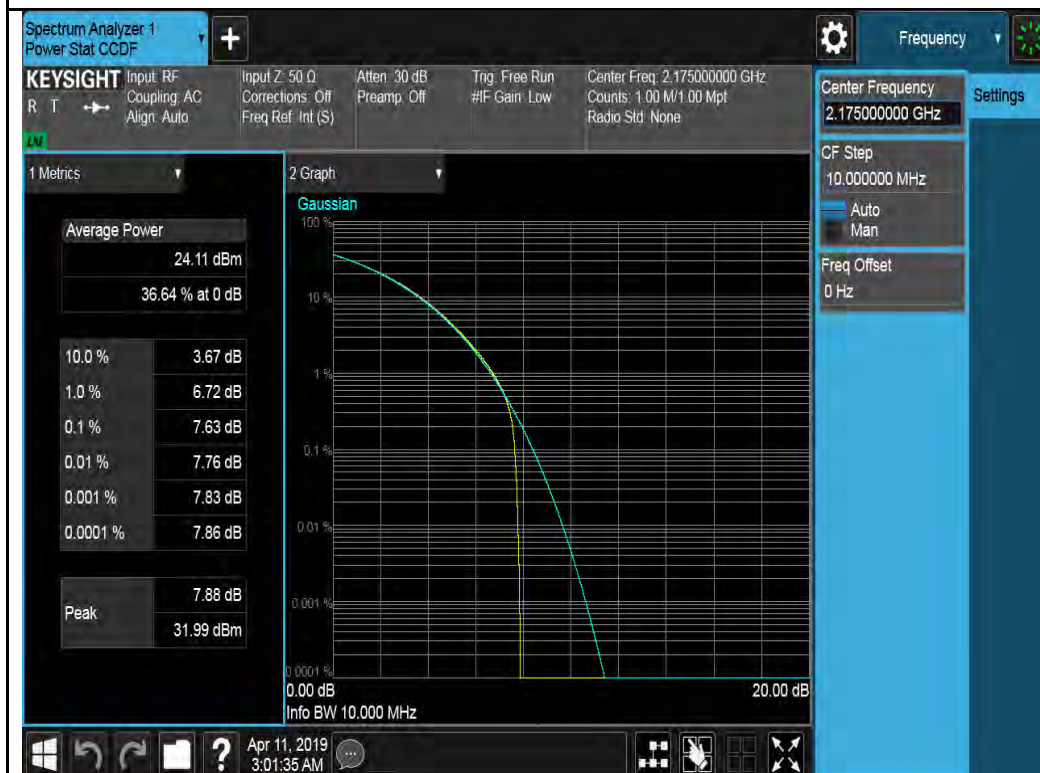
5M 64QAM High



10M 64QAM Low



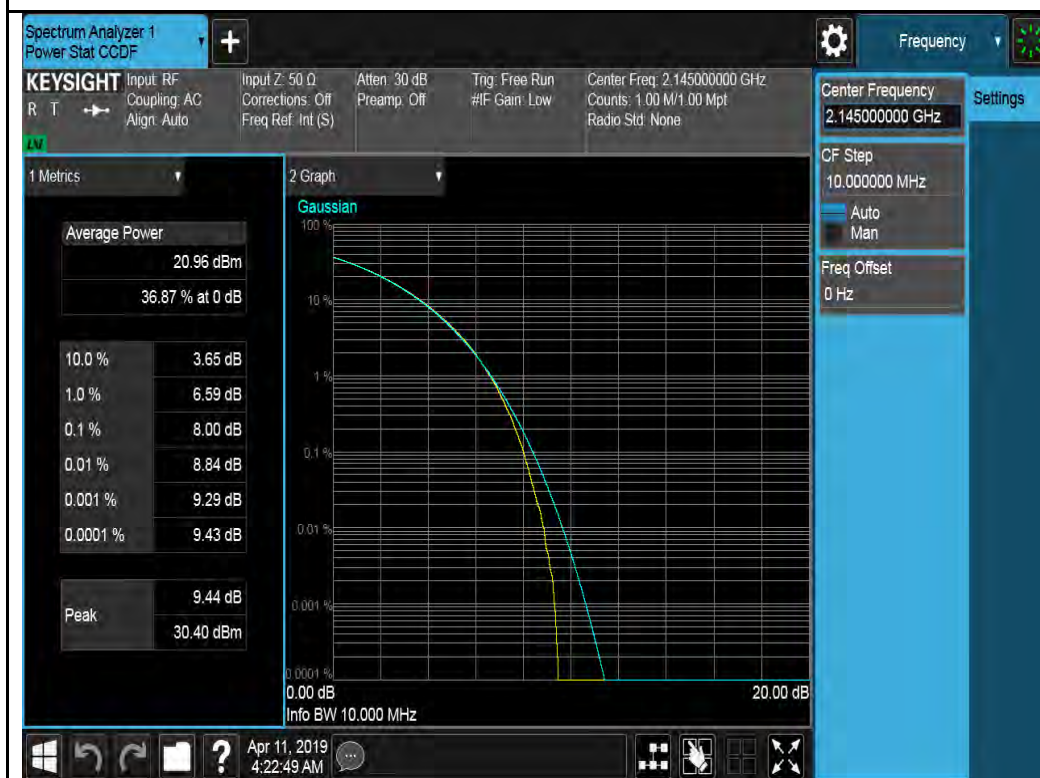
10M 64QAM Mid



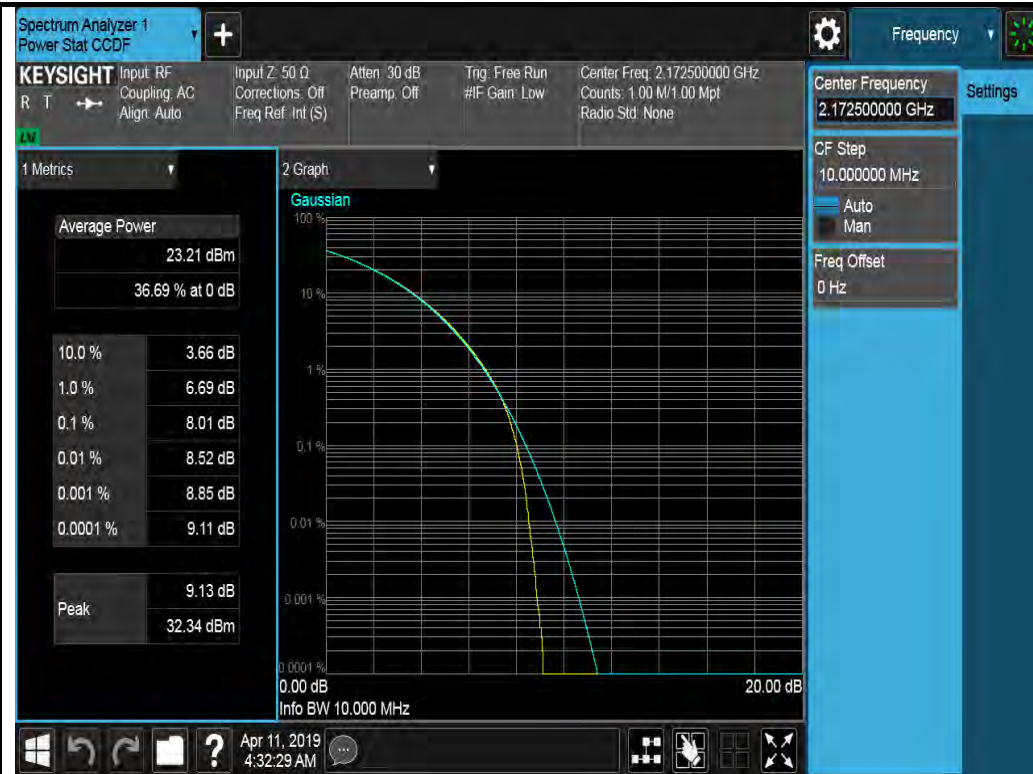
10M 64QAM High



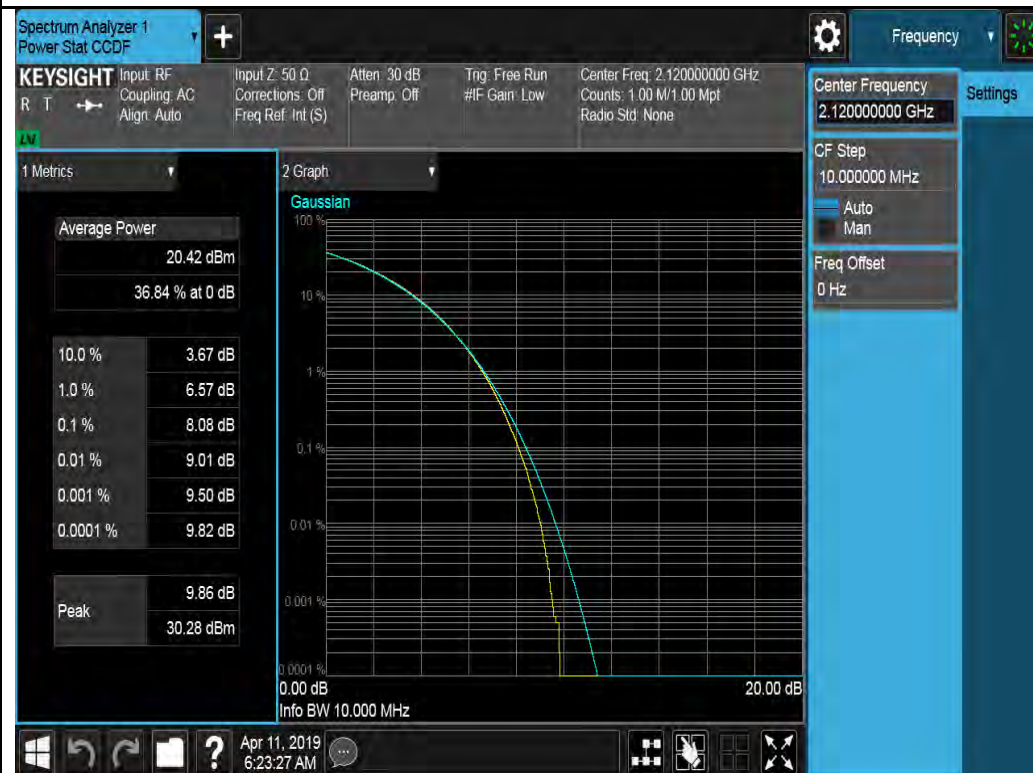
15M 64QAM Low



15M 64QAM Mid



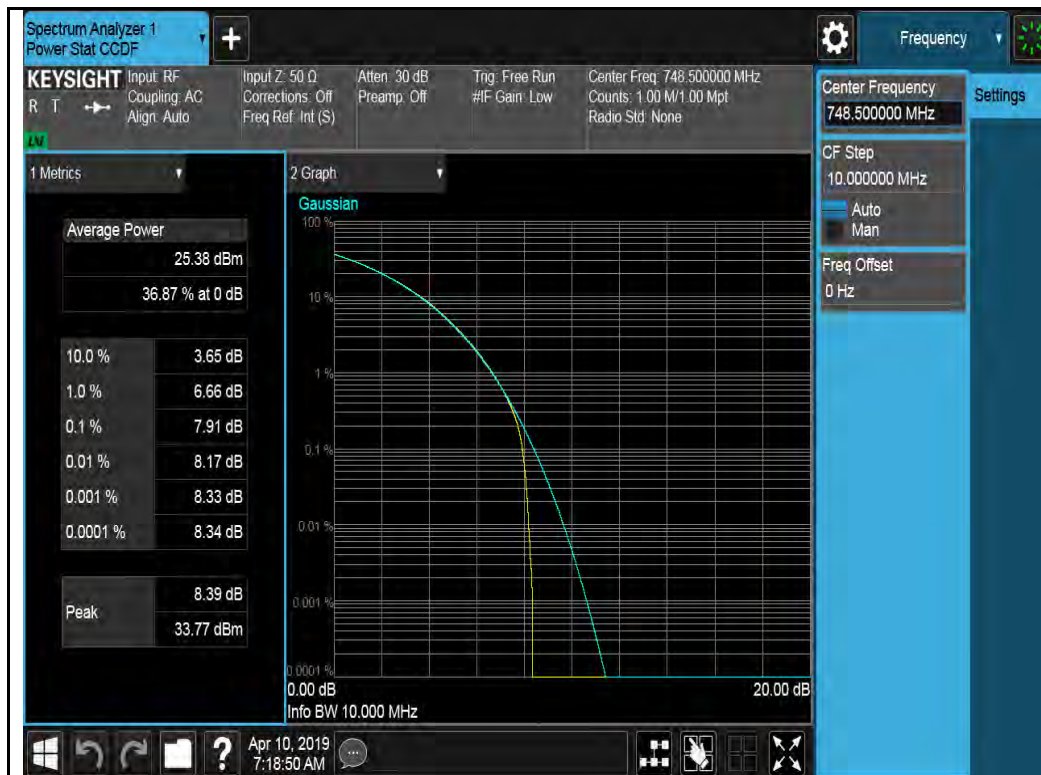
15M 64QAM High



20M 64QAM Low



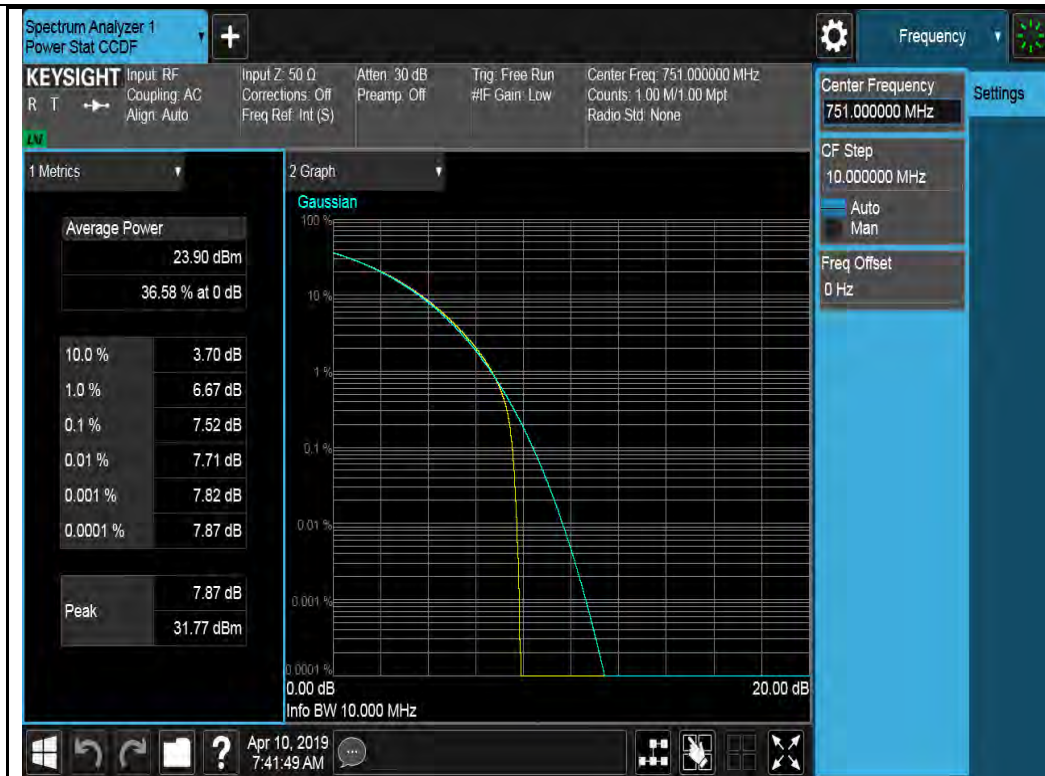
Test Plots for Band 13:



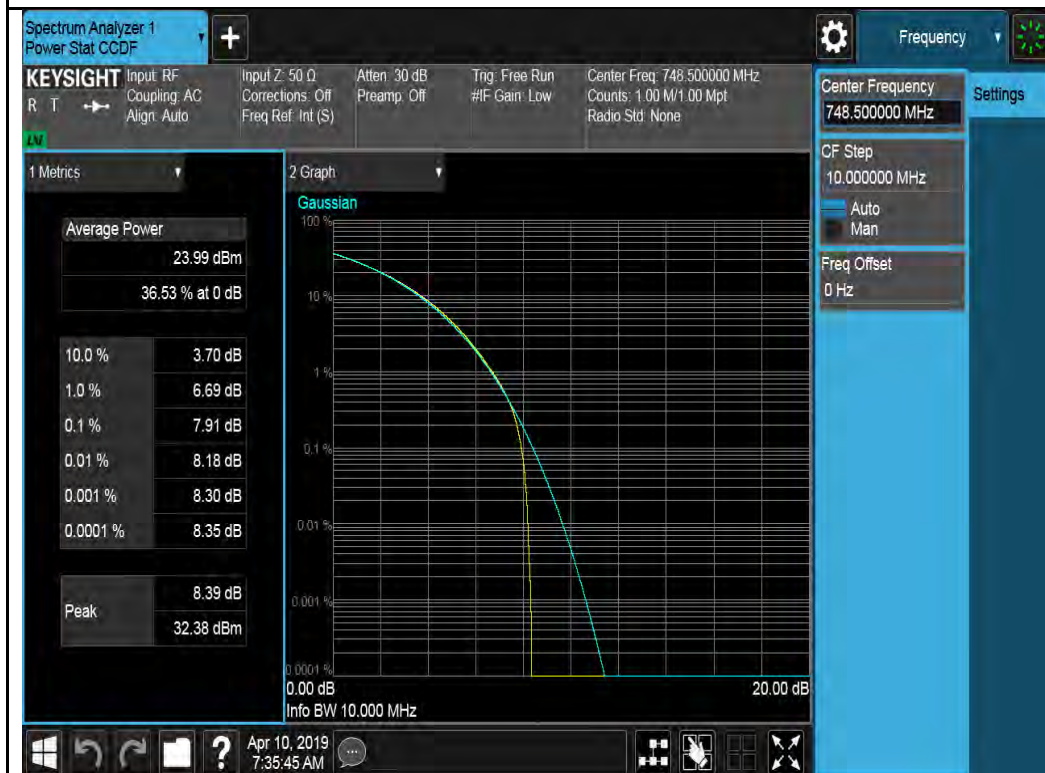
5M QPSK Low



5M QPSK High



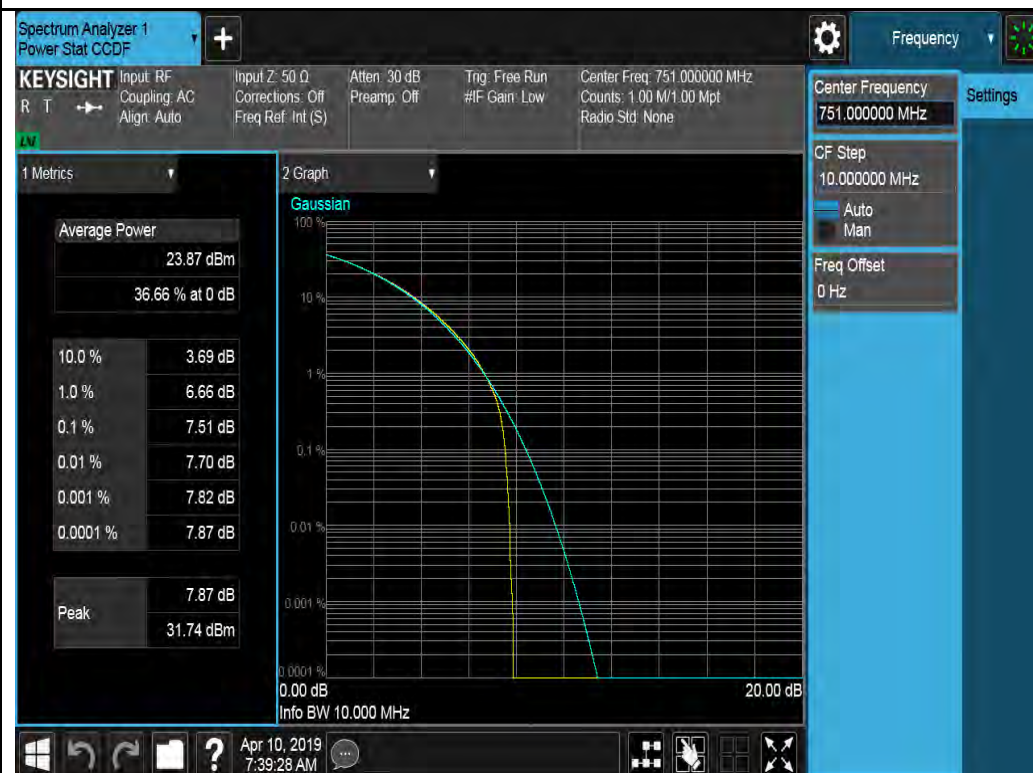
10M QPSK Mid



5M 64QAM Low

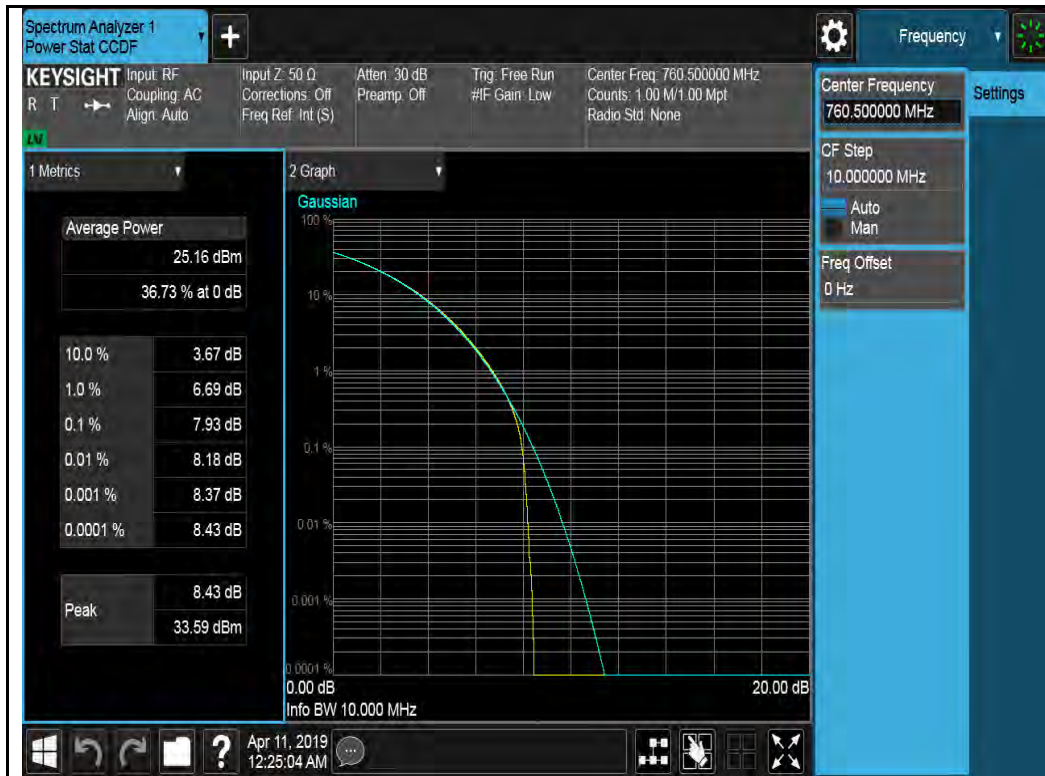


5M 64QAM High

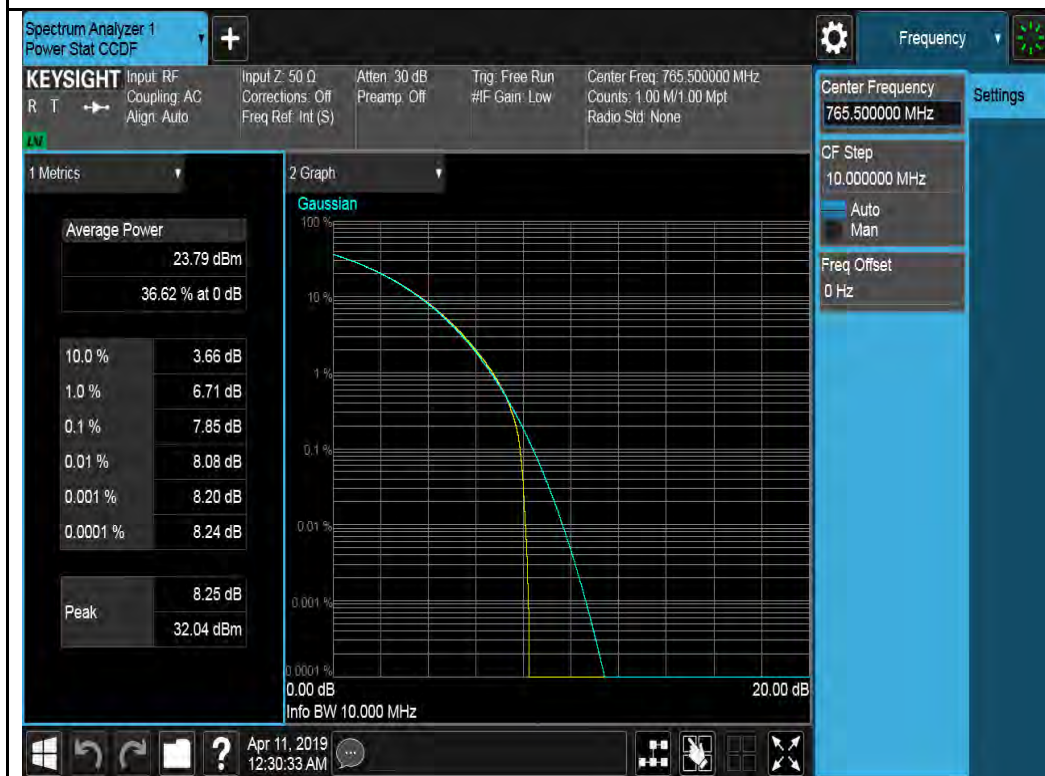


10M 64QAM Mid

Test Plots for Band 14:



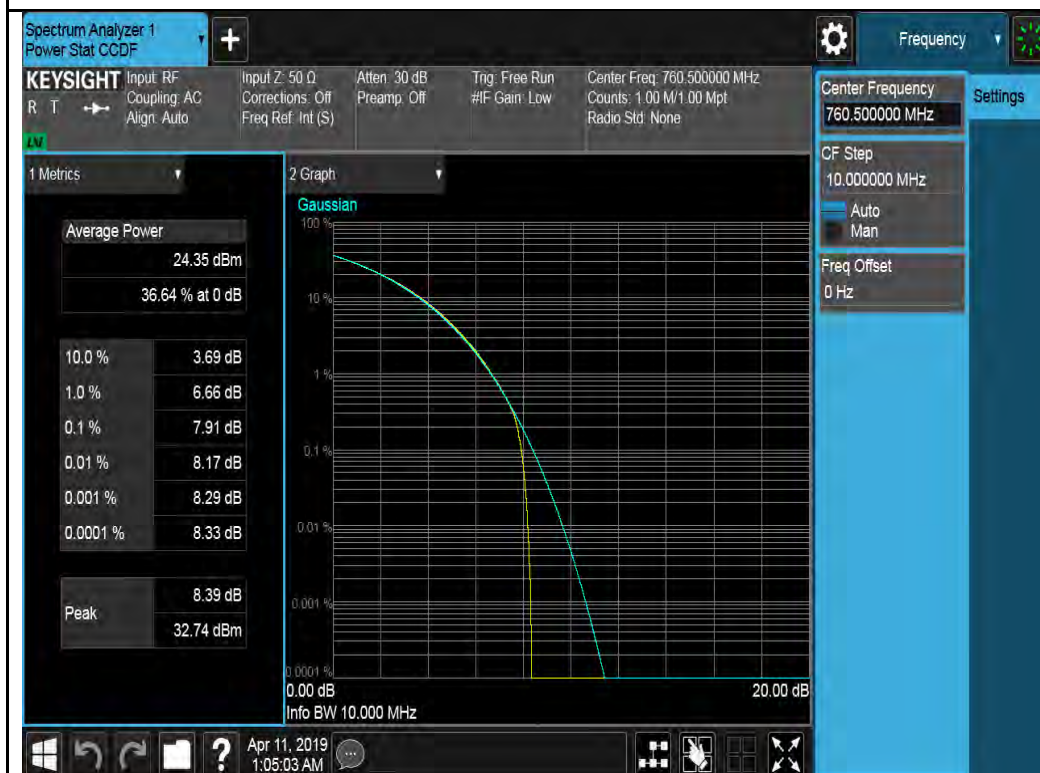
5M QPSK Low



5M QPSK High



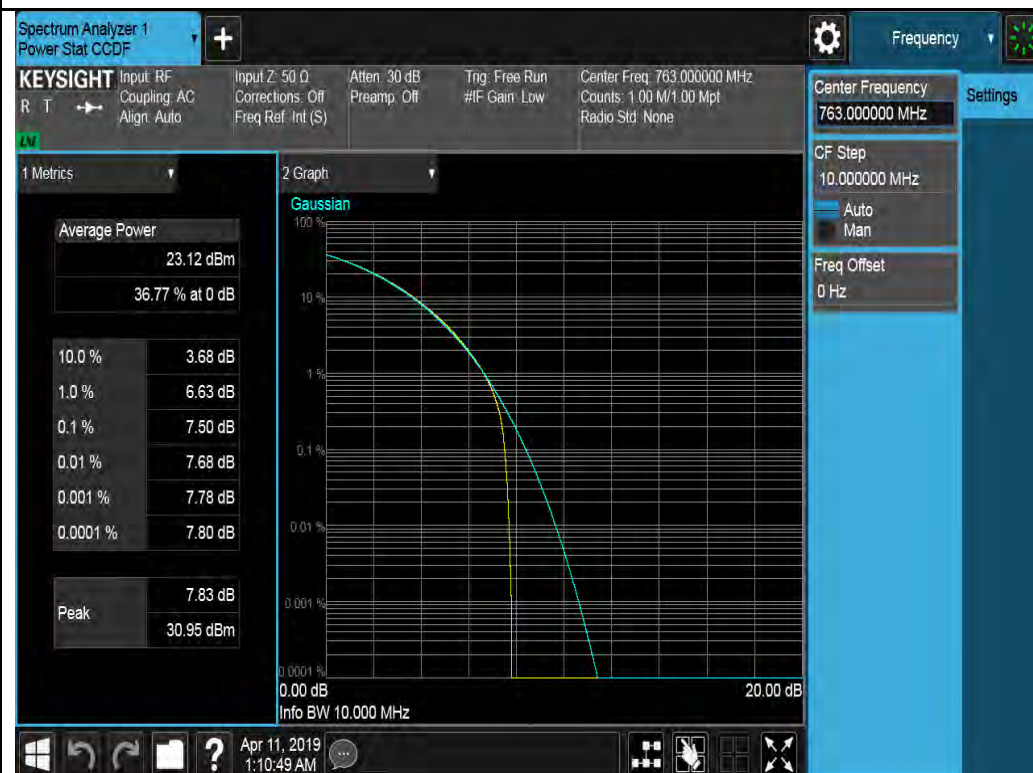
10M QPSK Mid



5M 64QAM Low



5M 64QAM High



10M 64QAM Mid

10.3 Occupied Bandwidth

Requirement(s):

Spec	Requirement	Applicable
47 CFR §2.1049	The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the following conditions of § 2.1049 (a) through (i)	☒
Test Setup		
Procedure	<u>99% Occupied bandwidth measurement procedure</u> - Allow the trace to stabilize. - Use the spectrum analyzer built-in measurement function to determine the 26 dB bandwidth 99% OBW. - o Set RBW = 1% -5% of Emission Bandwidth - o Set VBW = approximately 3 x RBW - o Detector = Peak - o Trace mode = max hold - o Sweep = auto couple - Capture the plot. Repeat above steps for different test channel and other modulation type.	
Test Date	04/01/2019 – 04/16/2019	Environmental condition Temperature 23°C Relative Humidity 48% Atmospheric Pressure 1008mbar
Remark	NONE	
Result	☒ Pass ☐ Fail	

Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Gary Chou at RF Test Site.

Test Data for LTE band 25:

Type	Channel	Channel Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Occupied Bandwidth (MHz)
5MHz BW, QPSK	Low	1932.5	4.42	4.65
	Mid	1962.5	4.42	4.67
	High	1992.5	4.42	4.66
5MHz BW, 64QAM	Low	1932.5	4.42	4.65
	Mid	1962.5	4.42	4.65
	High	1992.5	4.42	4.64
10MHz BW, QPSK	Low	1935	8.90	9.37
	Mid	1962.5	8.90	9.39
	High	1990	8.90	9.37
10MHz BW, 64QAM	Low	1935	8.90	9.36
	Mid	1962.5	8.90	9.36
	High	1990	8.91	9.39
15MHz BW, QPSK	Low	1937.5	13.26	13.77
	Mid	1962.5	13.27	13.85
	High	1987.5	13.29	13.84
15MHz BW, 64QAM	Low	1937.5	13.26	13.86
	Mid	1962.5	13.30	13.76
	High	1987.5	13.29	13.81
20MHz BW, QPSK	Low	1940	17.81	18.60
	Mid	1962.5	17.82	18.51
	High	1985	17.81	18.48
20MHz BW, 64QAM	Low	1940	17.82	18.52
	Mid	1962.5	17.84	18.46
	High	1985	17.82	18.47

Test Data for LTE band 66:

Type	Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Occupied Bandwidth (MHz)
5MHz BW, QPSK	Low	2112.5	4.43	4.67
	Mid	2145	4.42	4.65
	High	2177.5	4.42	4.66
5MHz BW, 64QAM	Low	2112.5	4.42	4.65
	Mid	2145	4.42	4.66
	High	2177.5	4.42	4.66
10MHz BW, QPSK	Low	2115	8.90	9.39
	Mid	2145	8.90	9.39
	High	2175	8.90	9.35
10MHz BW, 64QAM	Low	2115	8.91	9.39
	Mid	2145	8.89	9.38
	High	2175	8.90	9.37
15MHz BW, QPSK	Low	2117.5	13.28	13.80
	Mid	2145	13.27	13.78
	High	2172.5	13.29	13.82
15MHz BW, 64QAM	Low	2117.5	13.28	13.84
	Mid	2145	13.27	13.80
	High	2172.5	13.29	13.84
20MHz BW, QPSK	Low	2120	17.81	18.49
	Mid	2145	17.80	18.53
	High	2170	17.82	18.50
20MHz BW, 64QAM	Low	2120	17.80	18.49
	Mid	2145	17.80	18.44
	High	2170	17.82	18.50

Test Data for LTE band 13:

Type	Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Occupied Bandwidth (MHz)
5MHz BW, QPSK	Low	748.2	4.42	4.66
	High	753.5	4.42	4.65
5MHz BW, 64QAM	Low	748.2	4.42	4.66
	High	753.5	4.42	4.65
10MHz BW, QPSK	Mid	751	8.88	9.34
10MHz BW, 64QAM	Mid	751	8.90	9.32

Test Data for LTE band 14:

Type	Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Occupied Bandwidth (MHz)
5MHz BW, QPSK	Low	760.5	4.42	4.68
	High	765.5	4.42	4.67
5MHz BW, 64QAM	Low	760.5	4.42	4.65
	High	765.5	4.43	4.65
10MHz BW, QPSK	Mid	763	8.89	9.33
10MHz BW, 64QAM	Mid	763	8.90	9.34

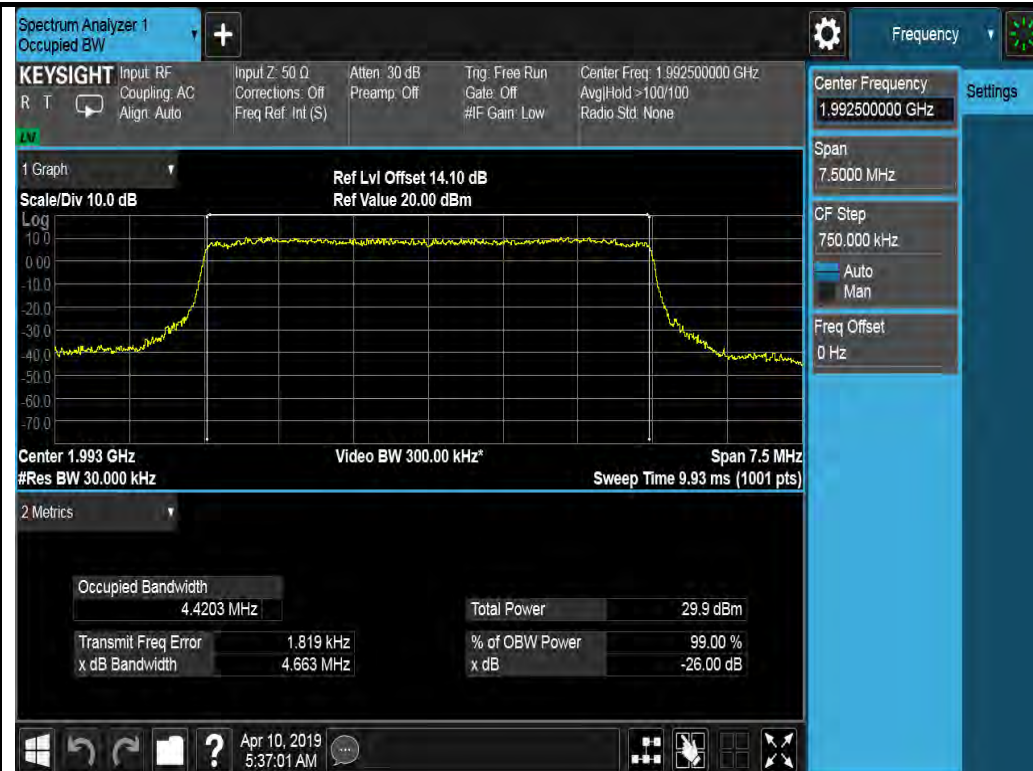
Test Plots for Band 25:



5M QPSK Low



5M QPSK Mid



5M QPSK High



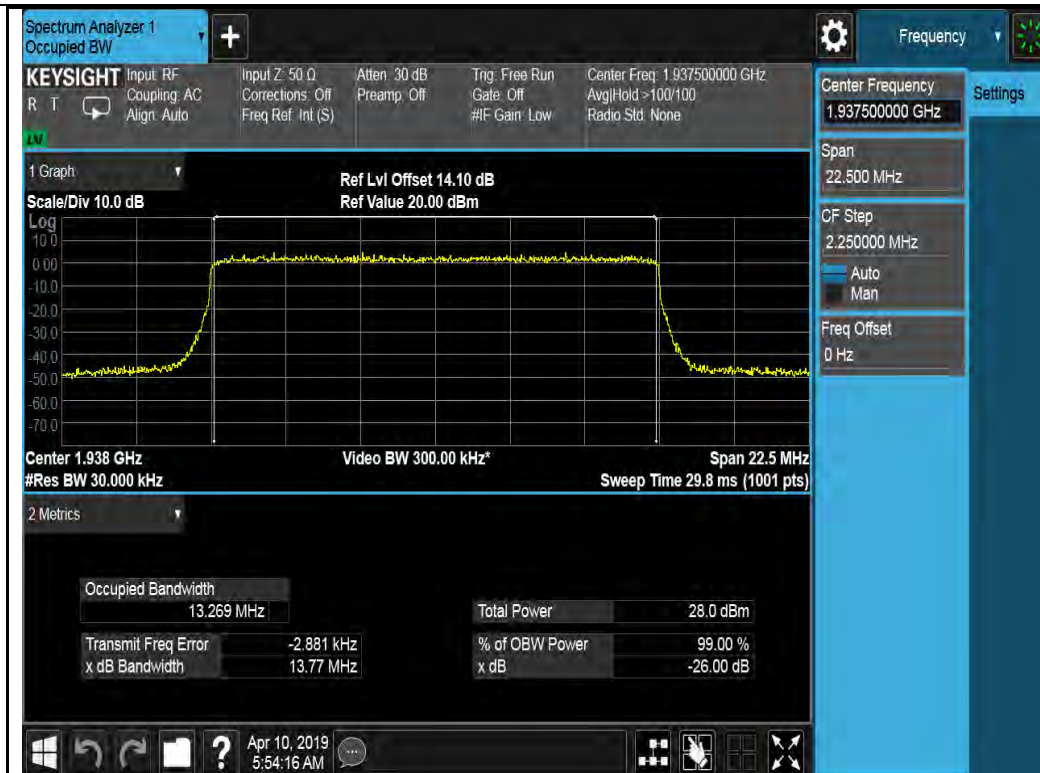
10M QPSK Low



10M QPSK Mid



10M QPSK High



15M QPSK Low



15M QPSK Mid



15M QPSK High



20M QPSK Low



20M QPSK Mid



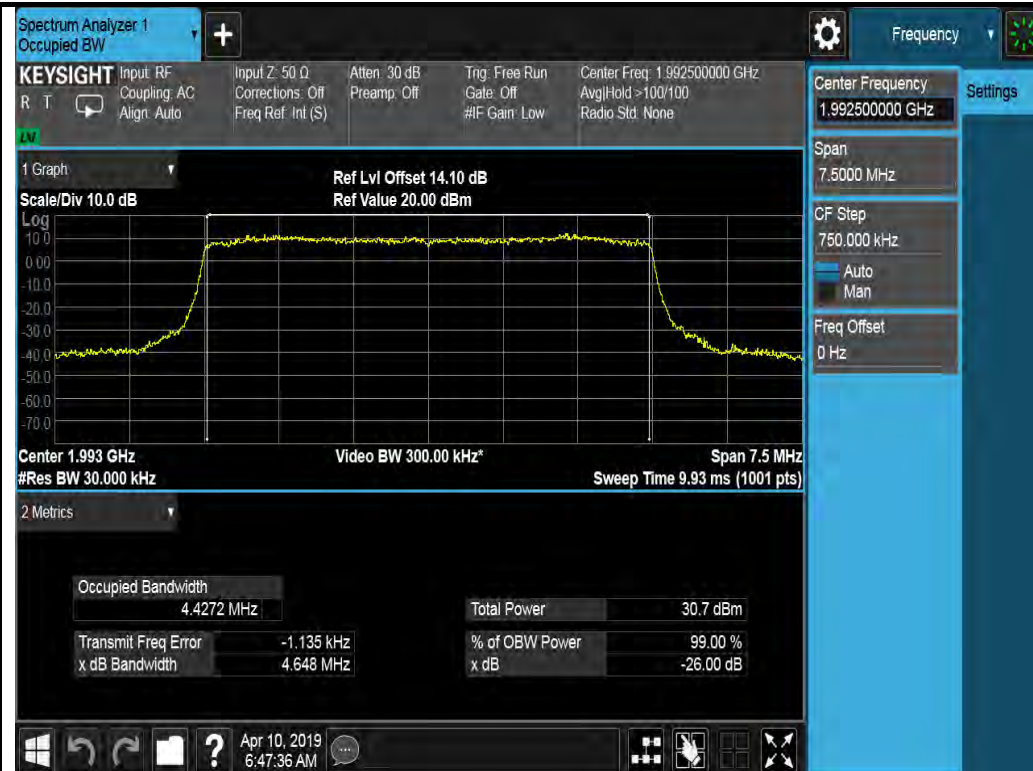
20M QPSK High



5M 64QAM Low



5M 64QAM Mid



5M 64QAM High



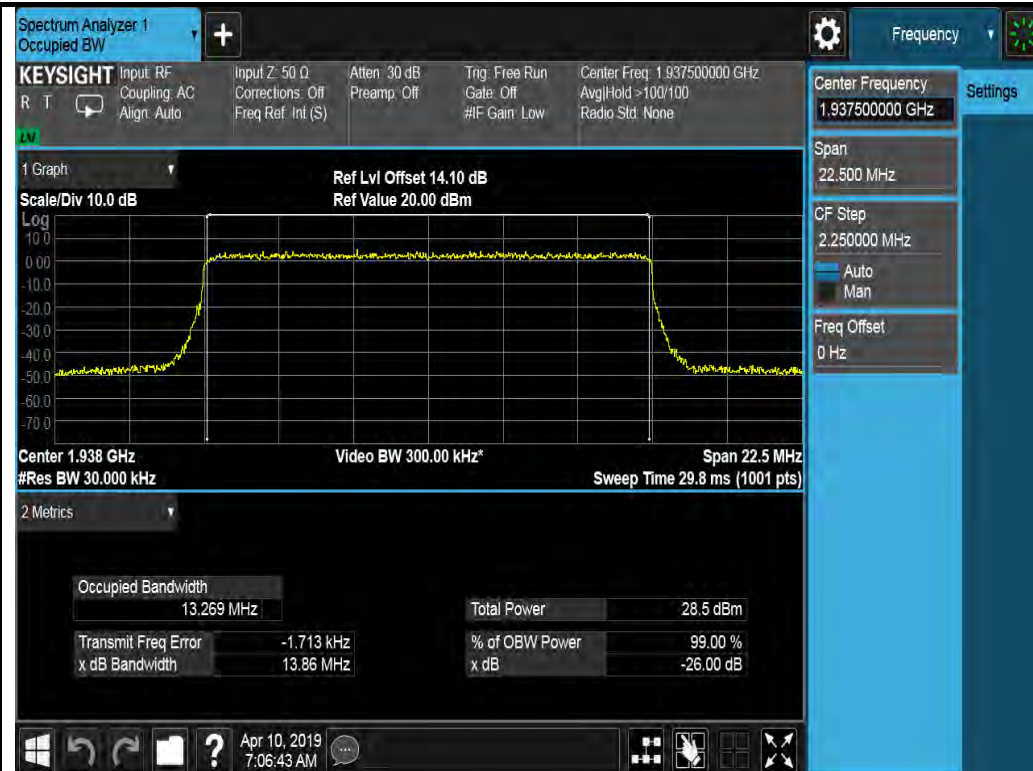
10M 64QAM Low



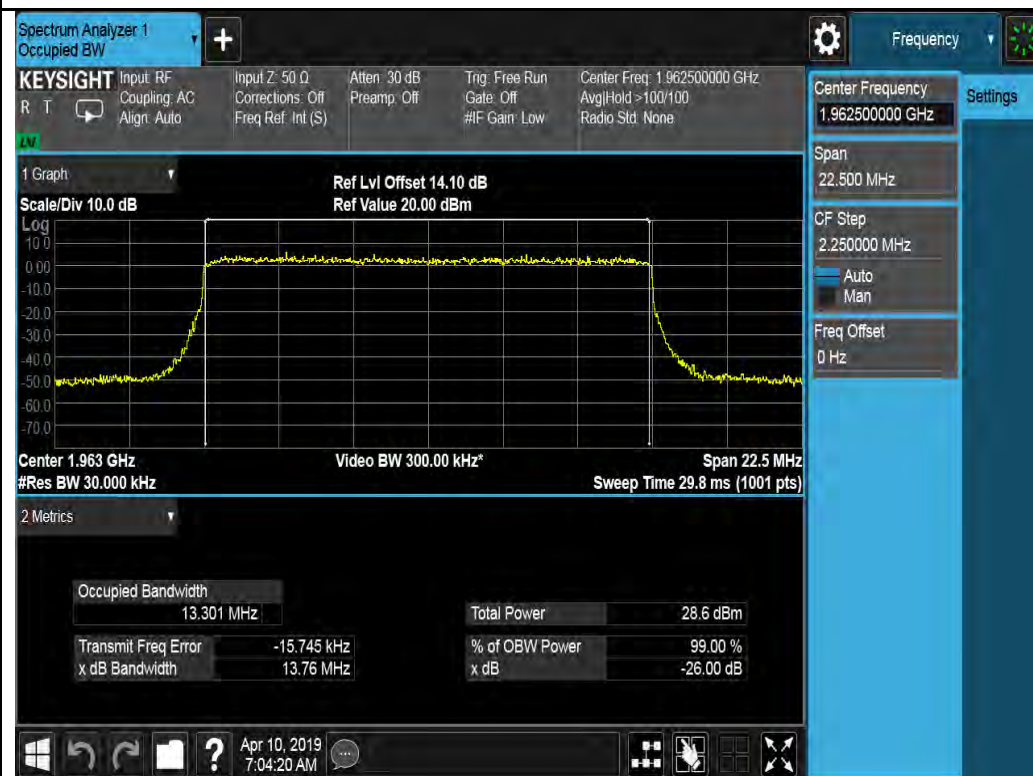
10M 64QAM Mid



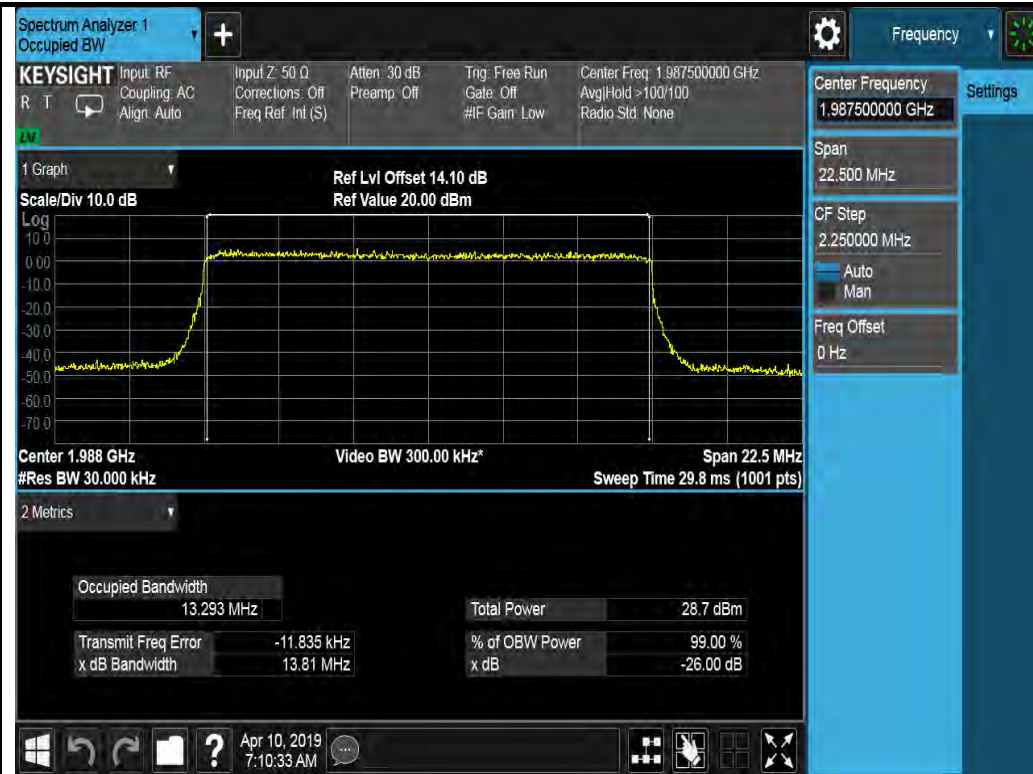
10M 64QAM High



15M 64QAM Low



15M 64QAM Mid



15M 64QAM High



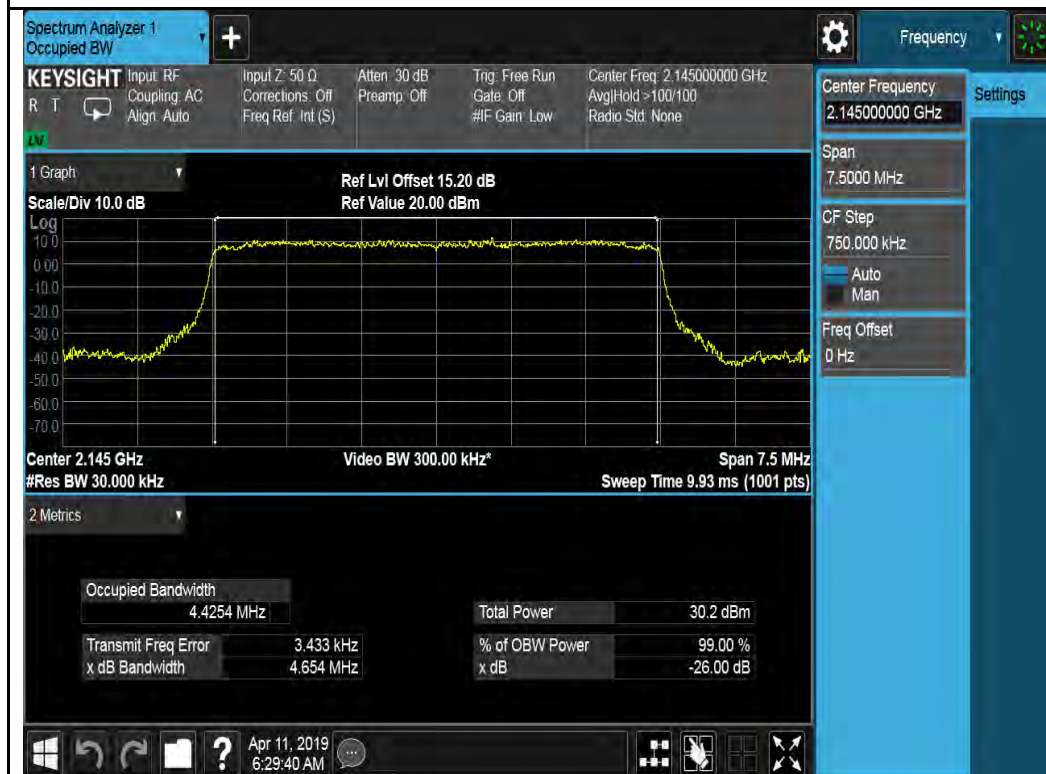
20M 64QAM Low



Test Plots for Band 66:



5M QPSK Low



5M QPSK Mid



5M QPSK High



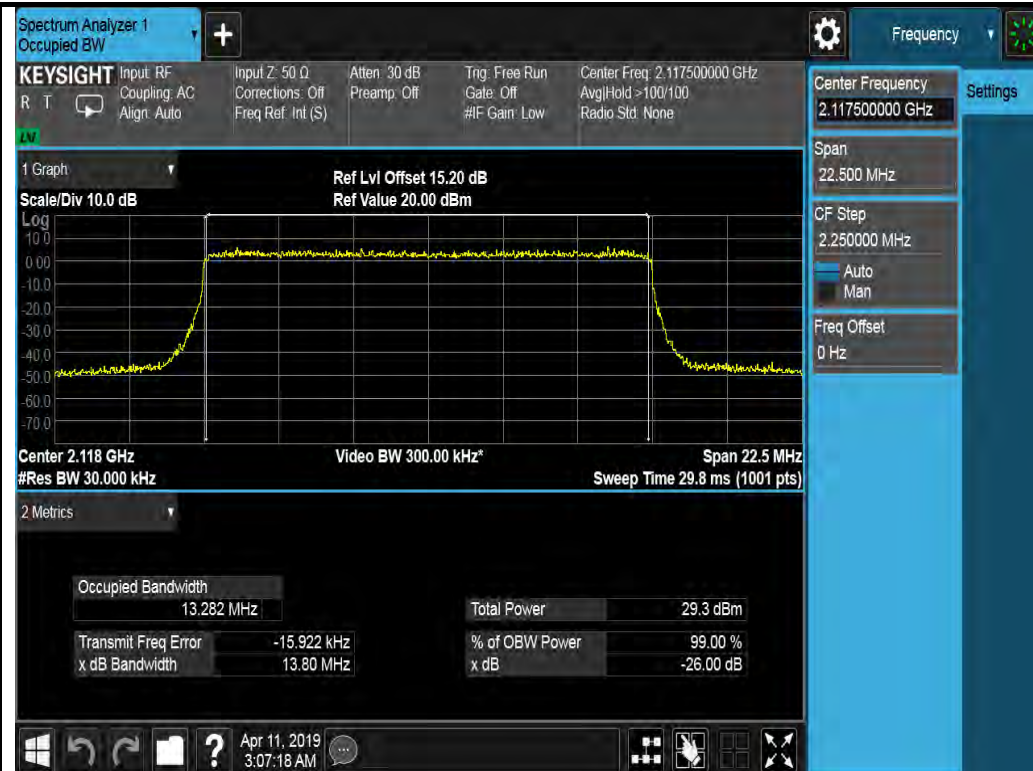
10M QPSK Low



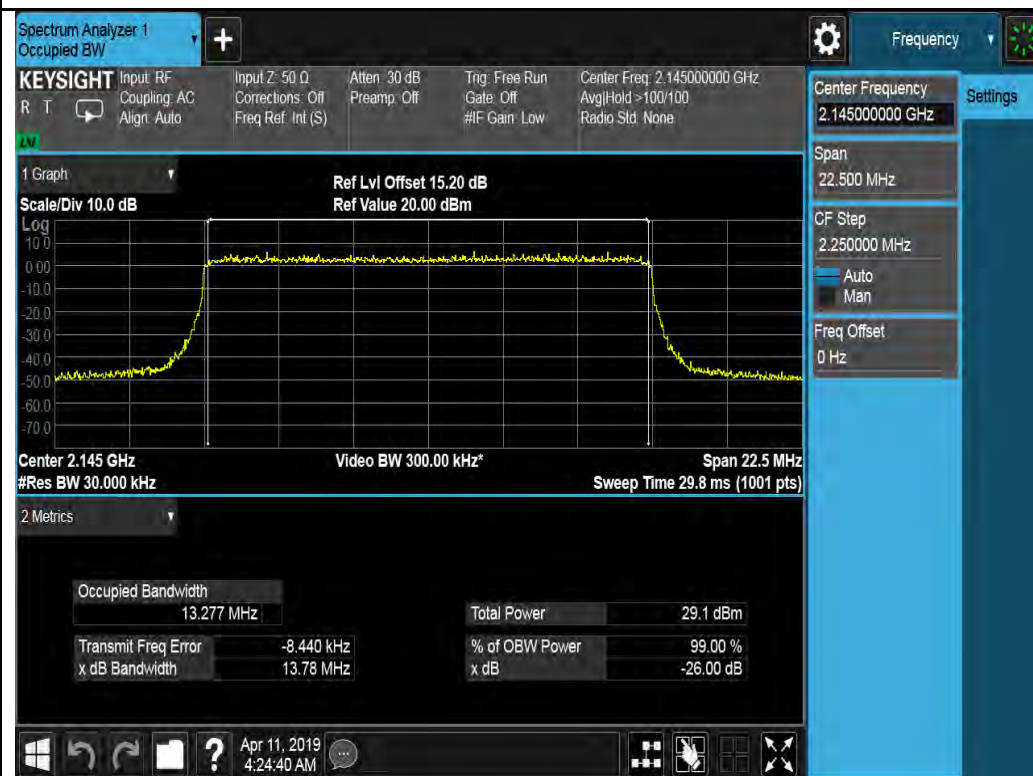
10M QPSK Mid



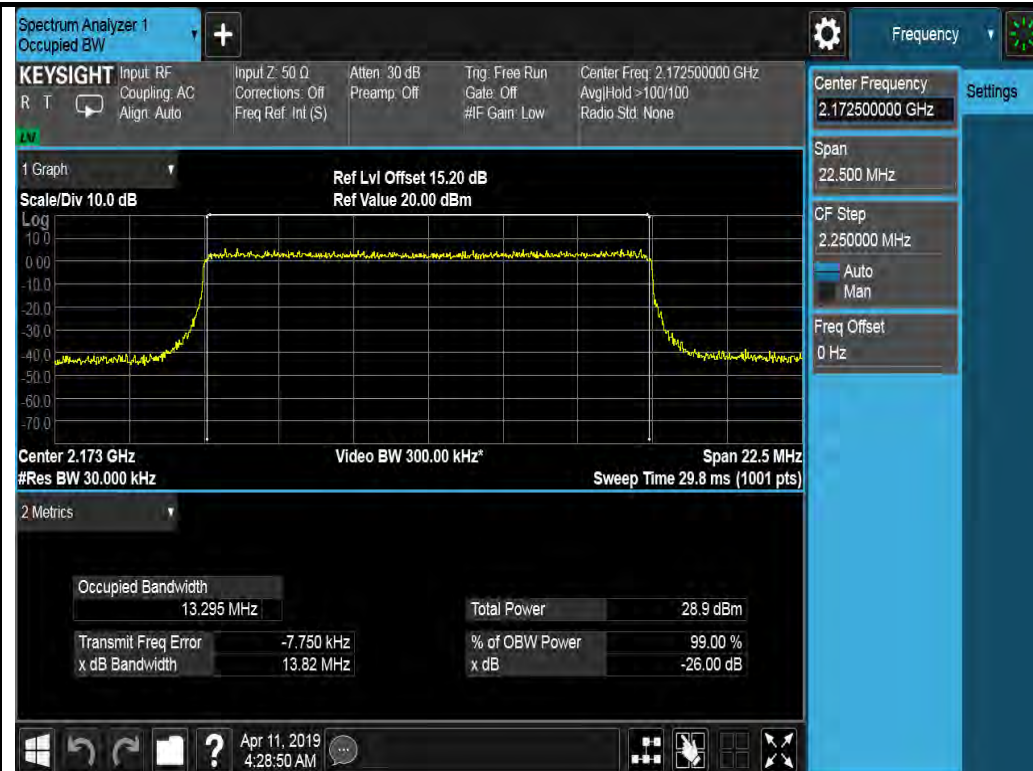
10M QPSK High



15M QPSK Low



15M QPSK Mid



15M QPSK High



20M QPSK Low





5M 64QAM Low



5M 64QAM Mid



5M 64QAM High



10M 64QAM Low