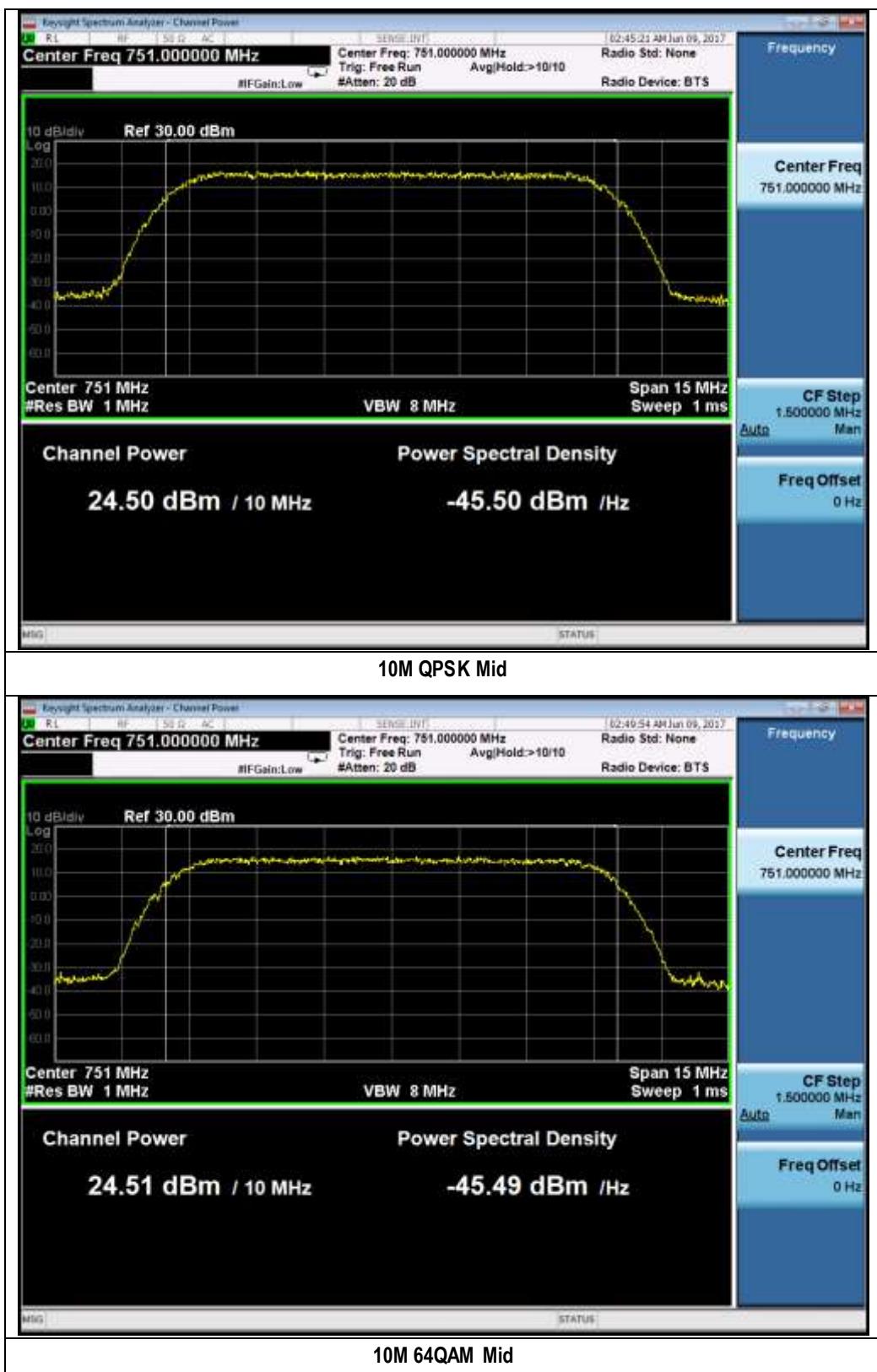


Test Plots for Band 13

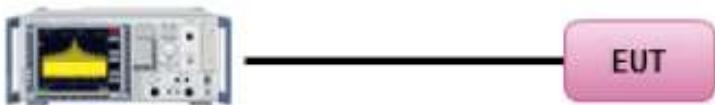
Chain 1:



Chain 2:


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.	<input checked="" type="checkbox"/>
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.	<input checked="" type="checkbox"/>
Test Setup	 <p>Spectrum Analyzer</p>		
Test Procedure	<ul style="list-style-type: none"> - 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	06/08/2017 – 06/10/2017	Environmental condition	Temperature 23°C Relative Humidity 48% Atmospheric Pressure 1008mbar
Remark	NONE		
Result	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	

Test Data Yes N/A

Test Plot Yes (See below) N/A

Test was done by Chen Ge at RF Test Site.

Test Data for LTE band 2:

Type	Channel	Frequency (MHz)	Peak-Average Ratio (dB)	Limit (dB)
5MHz BW, QPSK	Low	1932.5	8.18	13
	Mid	1960	8.16	13
	High	1987.5	8.17	13
5MHz BW, 64QAM	Low	1932.5	8.22	13
	Mid	1960	8.26	13
	High	1987.5	8.12	13
10MHz BW, QPSK	Low	1935	7.70	13
	Mid	1960	7.84	13
	High	1985	7.57	13
10MHz BW, 64QAM	Low	1935	7.78	13
	Mid	1960	7.70	13
	High	1985	7.66	13
15MHz BW, QPSK	Low	1937.5	8.92	13
	Mid	1960	8.86	13
	High	1982.5	8.86	13
15MHz BW, 64QAM	Low	1937.5	8.81	13
	Mid	1960	8.85	13
	High	1982.5	8.83	13
20MHz BW, QPSK	Low	1940	9.51	13
	Mid	1960	9.59	13
	High	1980	9.62	13
20MHz BW, 64QAM	Low	1940	9.41	13
	Mid	1960	9.41	13
	High	1980	9.35	13

Test Data for LTE band 4:

Type	Channel	Frequency (MHz)	Peak-Average Ratio (dB)	Limit (dB)
5MHz BW, QPSK	Low	2112.5	8.17	13
	Mid	2132.5	8.26	13
	High	2152.5	8.16	13
5MHz BW, 64QAM	Low	2112.5	8.26	13
	Mid	2132.5	8.32	13
	High	2152.5	8.22	13
10MHz BW, QPSK	Low	2115.0	7.72	13
	Mid	2132.5	7.70	13
	High	2150.0	7.75	13
10MHz BW, 64QAM	Low	2115.0	7.77	13
	Mid	2132.5	7.73	13
	High	2150.0	7.71	13
15MHz BW, QPSK	Low	2117.5	8.90	13
	Mid	2132.5	8.89	13
	High	2147.5	8.92	13
15MHz BW, 64QAM	Low	2117.5	8.86	13
	Mid	2132.5	8.83	13
	High	2147.5	8.83	13
20MHz BW, QPSK	Low	2120.0	9.51	13
	Mid	2132.5	9.57	13
	High	2145.0	9.61	13
20MHz BW, 64QAM	Low	2120.0	9.35	13
	Mid	2132.5	9.44	13
	High	2145.0	9.38	13

Test Data for LTE band 25:

Type	Channel	Frequency (MHz)	Peak-Average Ratio (dB)	Limit (dB)
5MHz BW, QPSK	High	1992.5	8.09	13
5MHz BW, 64QAM	High	1992.5	8.05	13
10MHz BW, QPSK	High	1990	7.77	13
10MHz BW, 64QAM	High	1990	7.73	13
15MHz BW, QPSK	High	1987.5	8.86	13
15MHz BW, 64QAM	High	1987.5	8.83	13
20MHz BW, QPSK	High	1985	9.58	13
20MHz BW, 64QAM	High	1985	9.37	13

Test Data for LTE band 66:

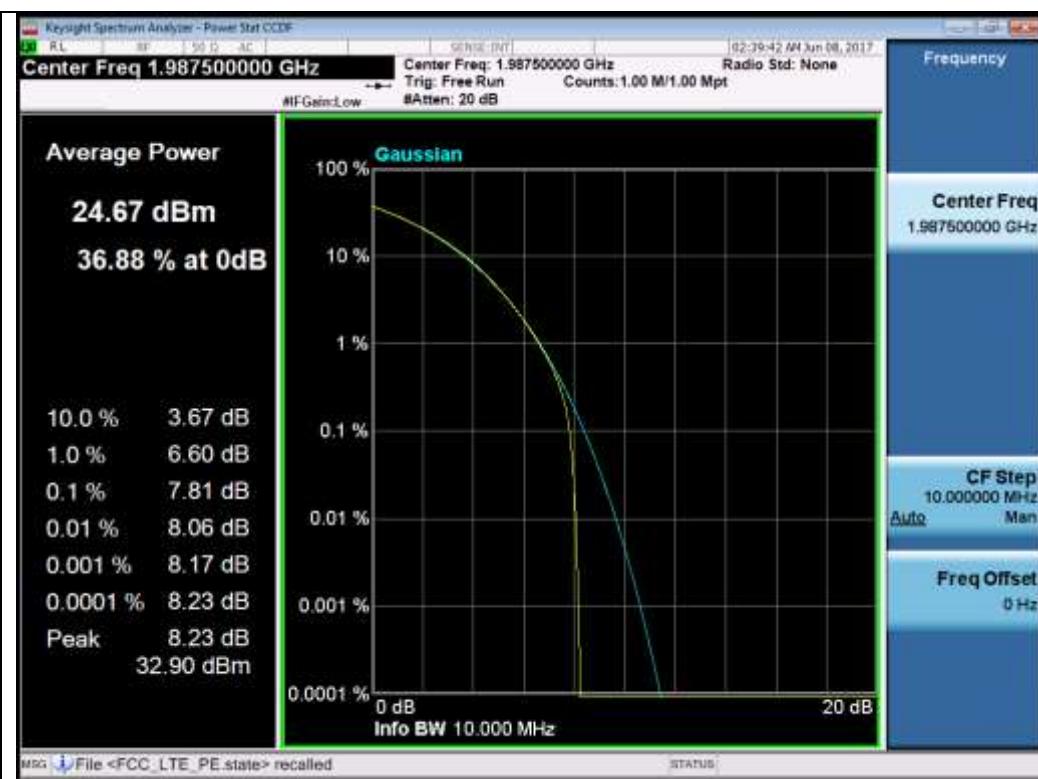
Type	Channel	Frequency (MHz)	Peak-Average Ratio (dB)	Limit (dB)
5MHz BW, QPSK	High	2197.5	8.08	13
5MHz BW, 64QAM	High	2197.5	8.16	13
10MHz BW, QPSK	High	2195	7.87	13
10MHz BW, 64QAM	High	2195	7.75	13
15MHz BW, QPSK	High	2192.5	9.00	13
15MHz BW, 64QAM	High	2192.5	9.53	13
20MHz BW, QPSK	High	2190	9.68	13
20MHz BW, 64QAM	High	2190	9.66	13

Test Data for LTE band 13:

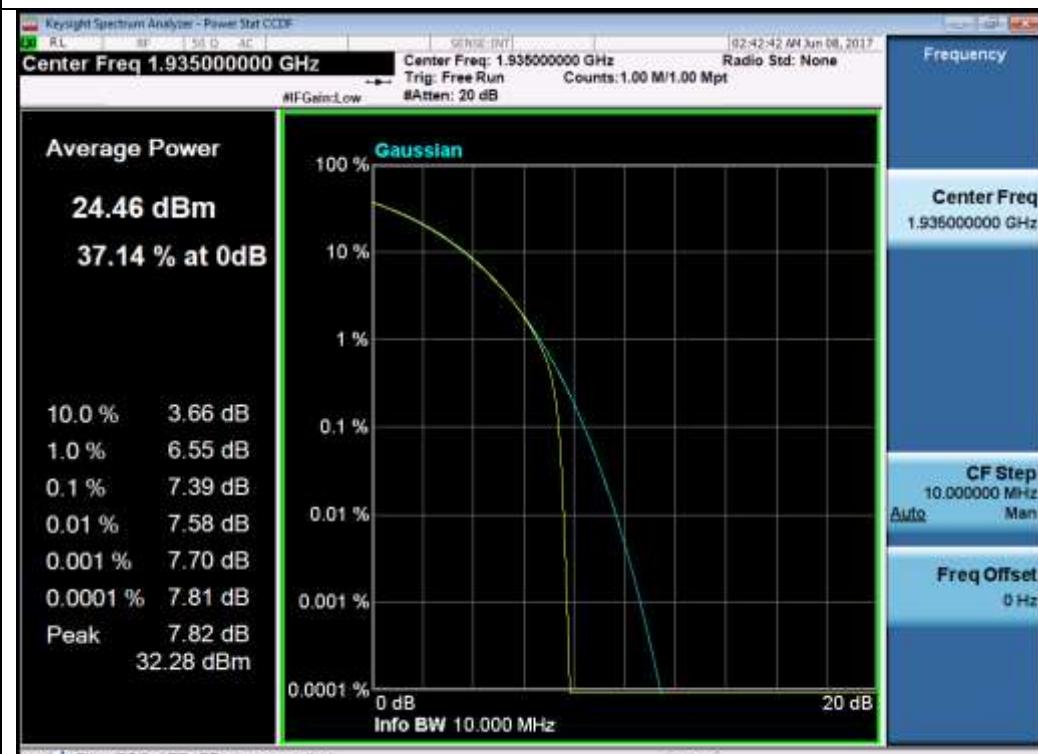
Type	Channel	Frequency (MHz)	Peak-Average Ratio (dB)	Limit (dB)
10MHz BW, QPSK	Mid	751	7.94	13
10MHz BW, 64QAM	Mid	751	7.98	13

Test Plots for LTE band 2:





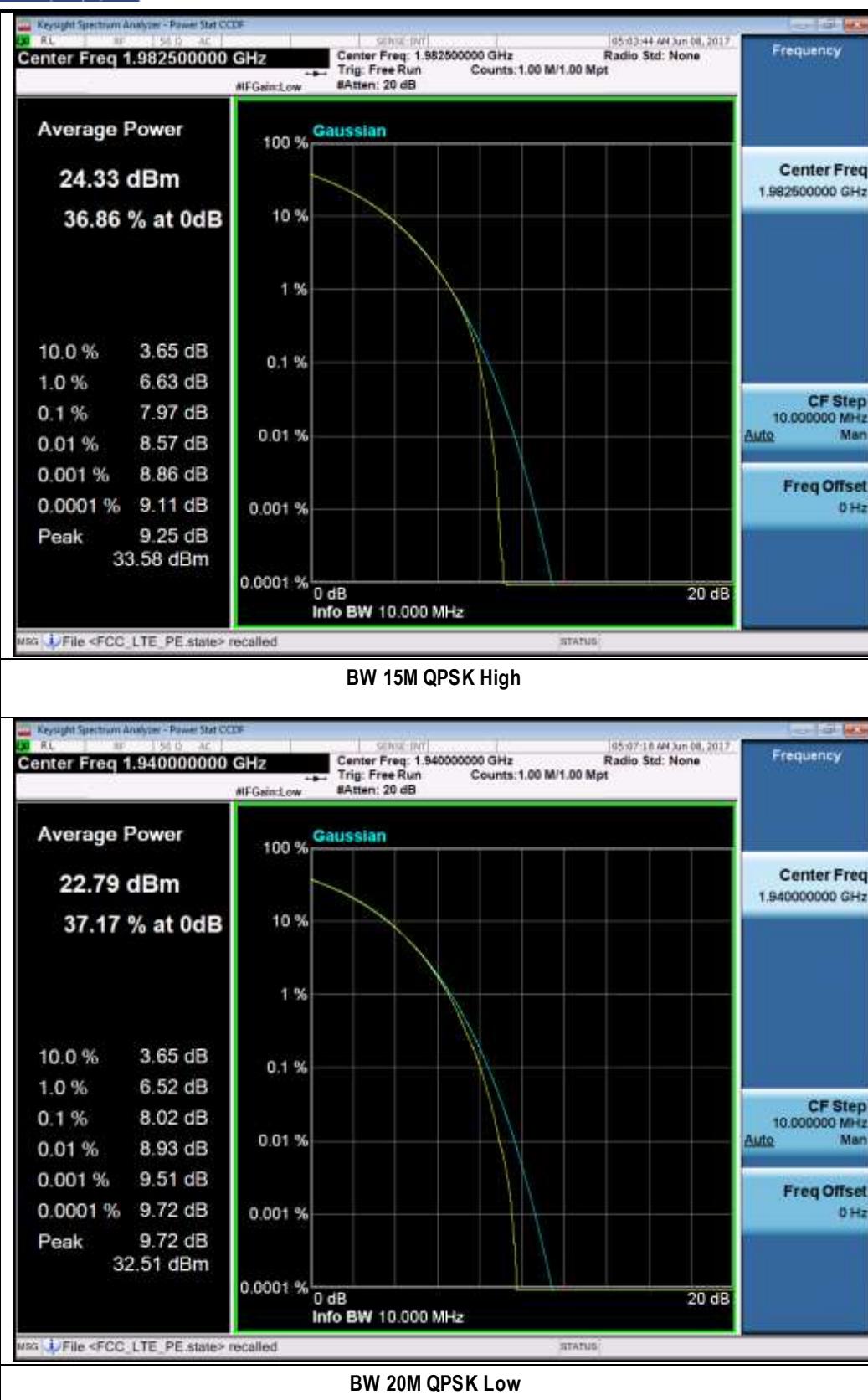
BW 5M QPSK High



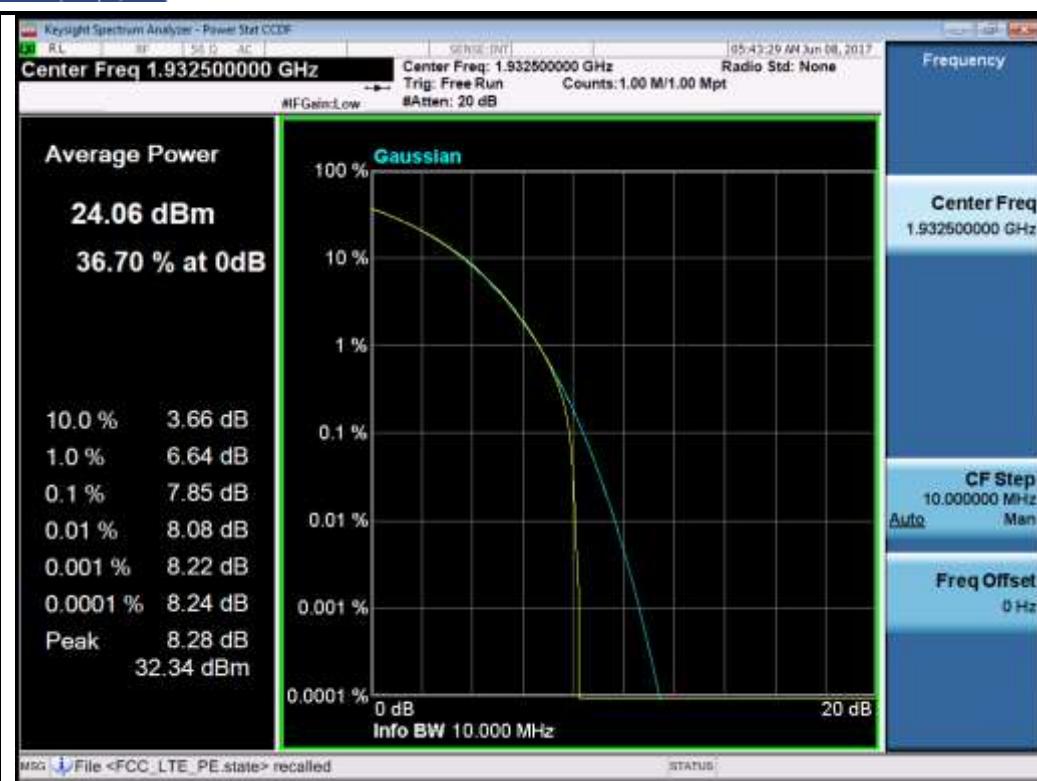
BW 10M QPSK Low



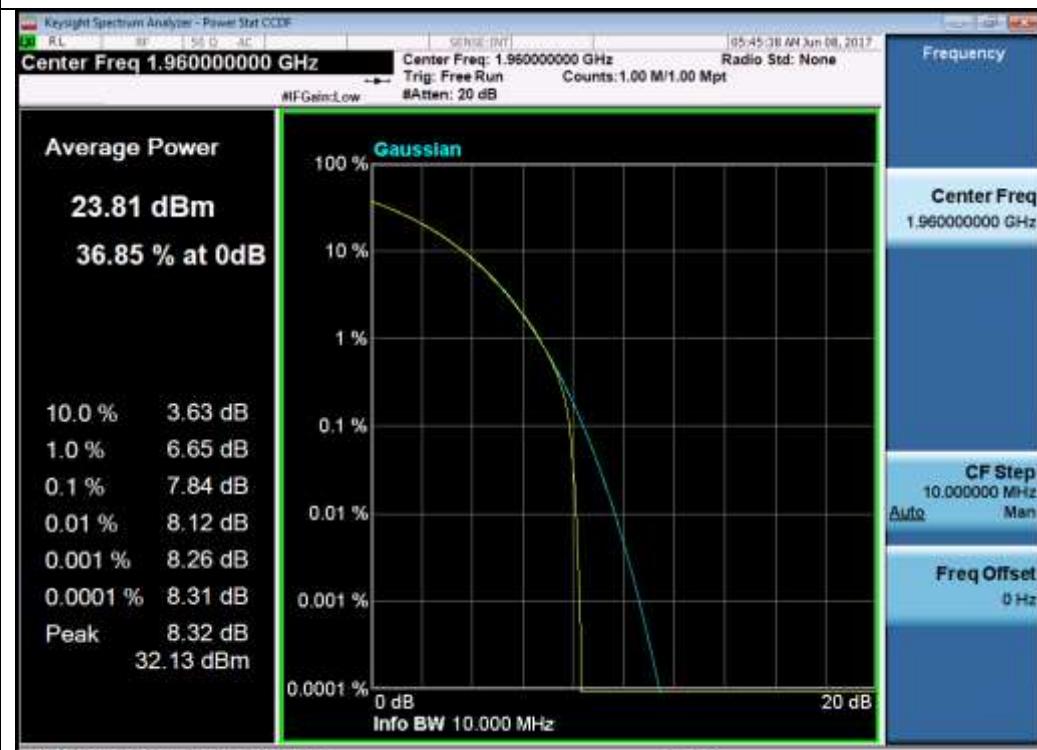








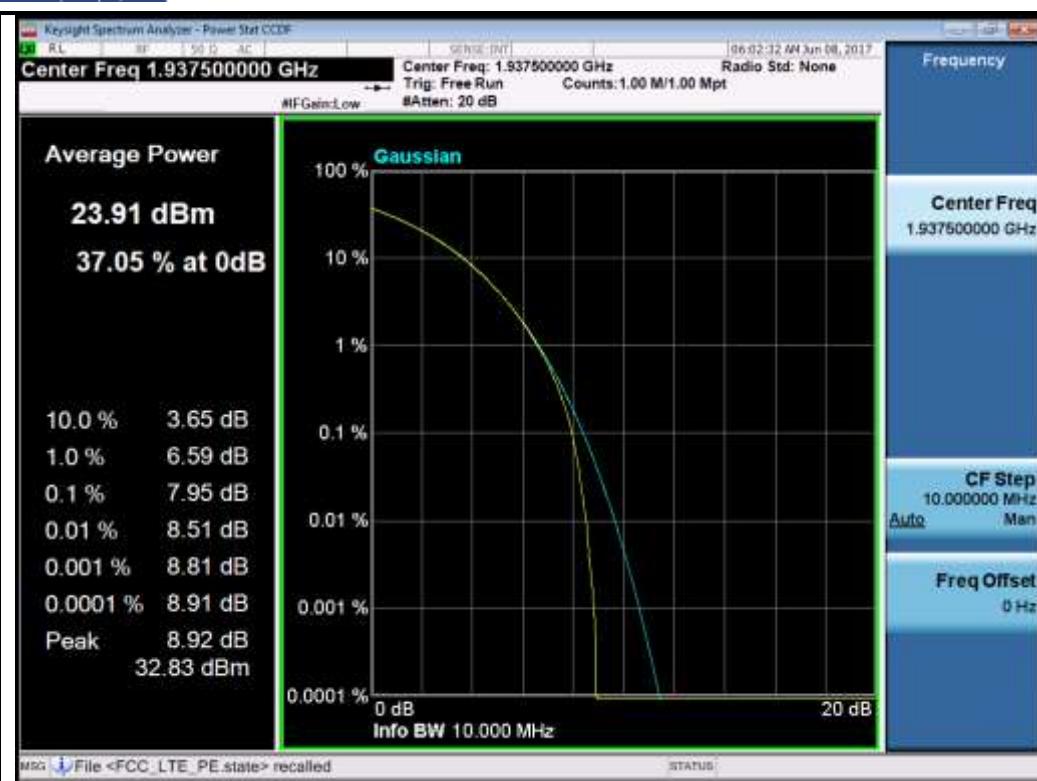
BW 5M 64QAM Low



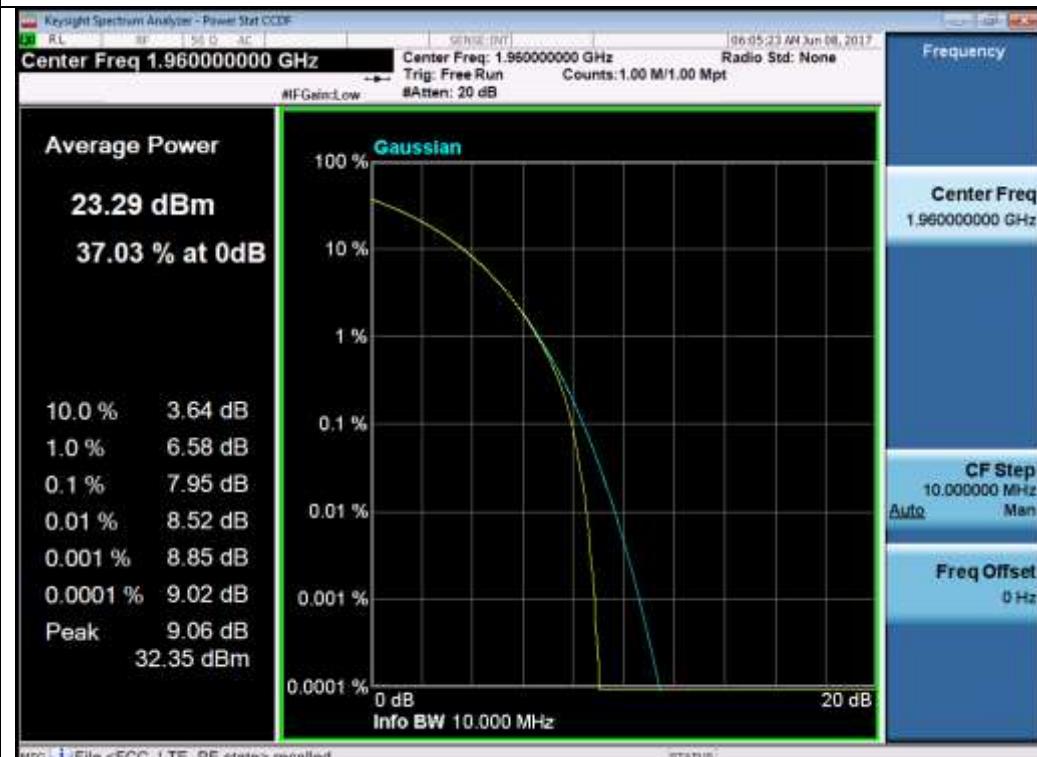
BW 5M 64QAM Mid







BW 15M 64QAM Low



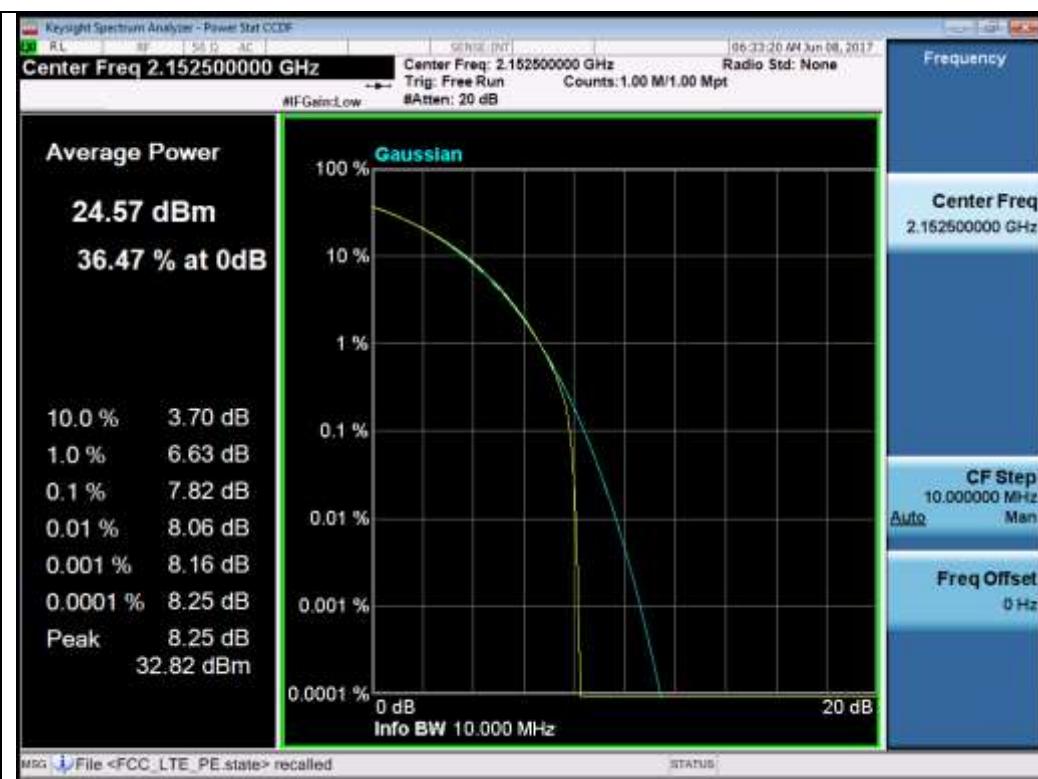
BW 15M 64QAM Mid





Test Plots for LTE band 4:



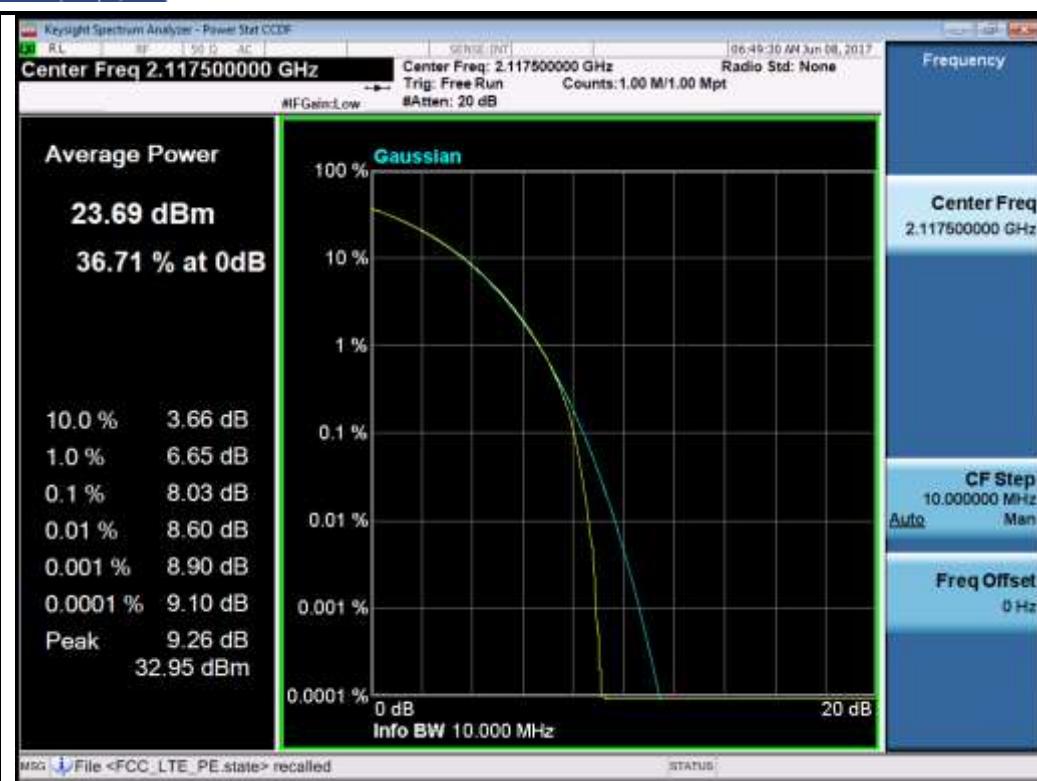


BW 5M QPSK High

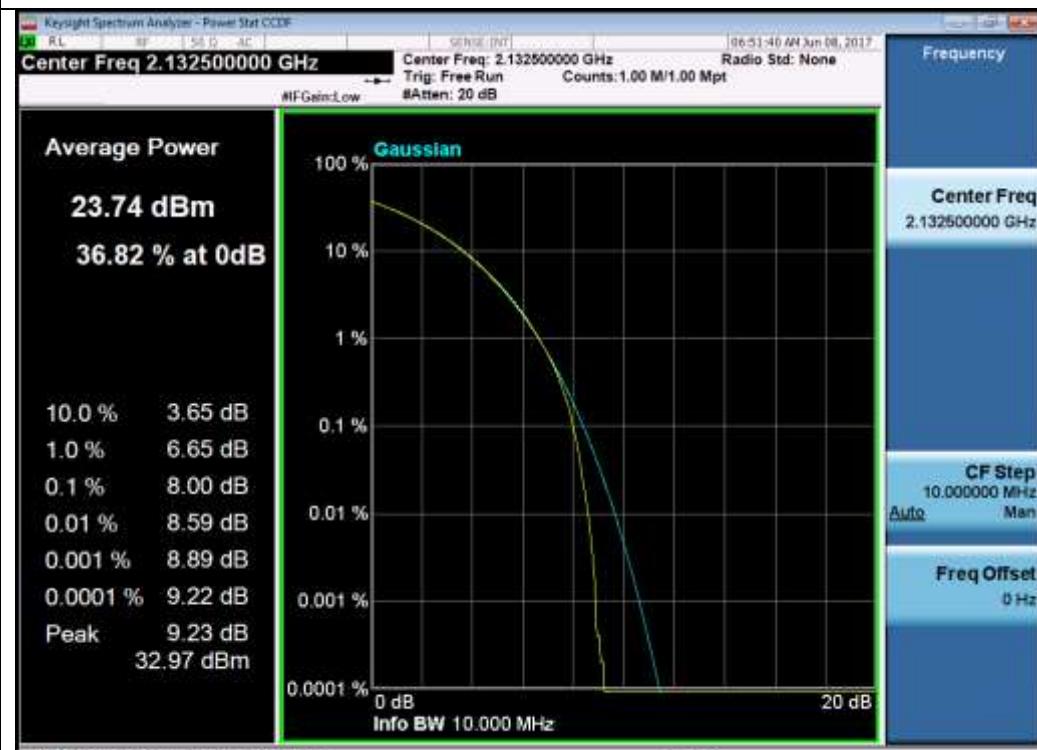


BW 10M QPSK Low





BW 15M QPSK Low



BW 15M QPSK Mid



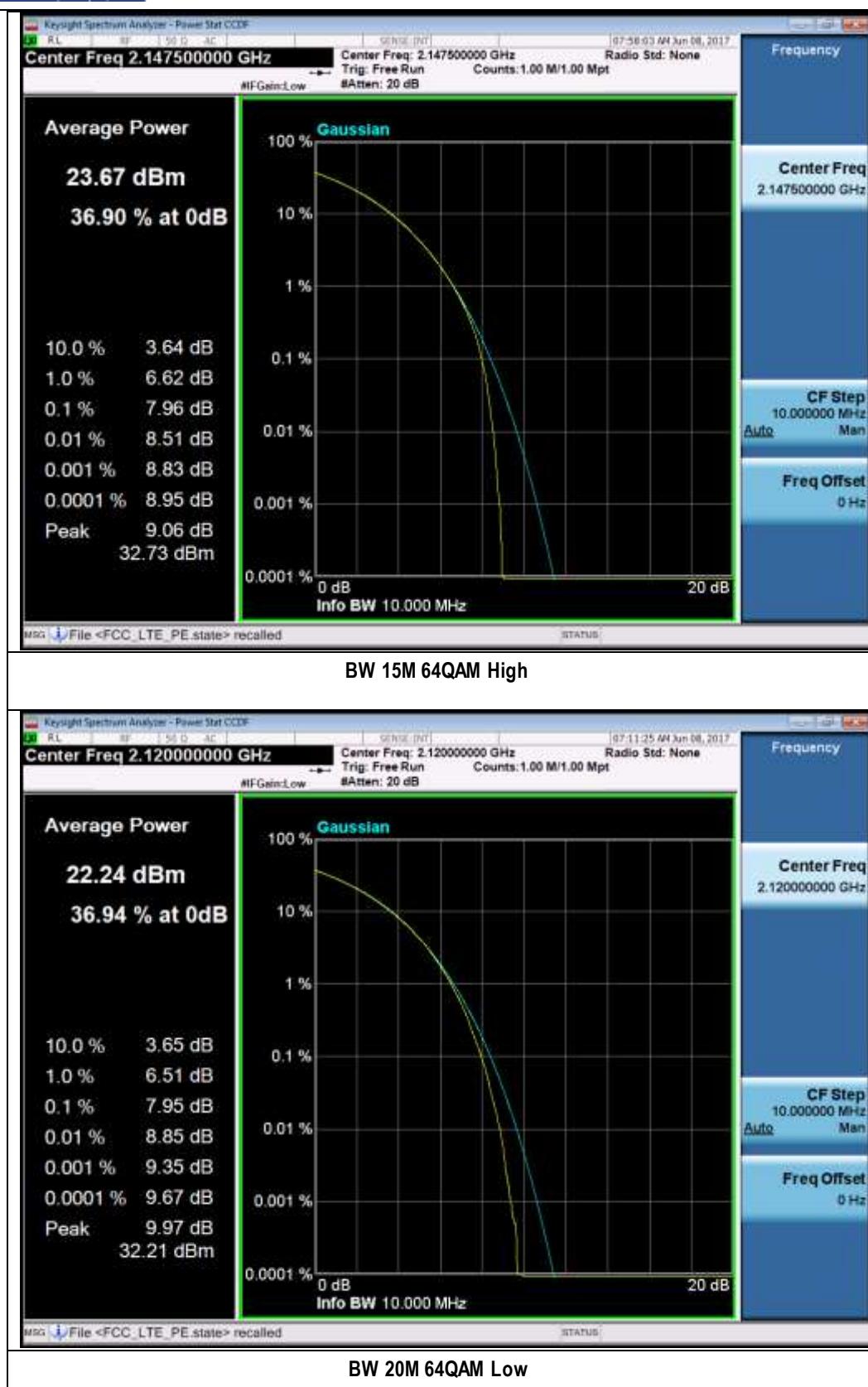






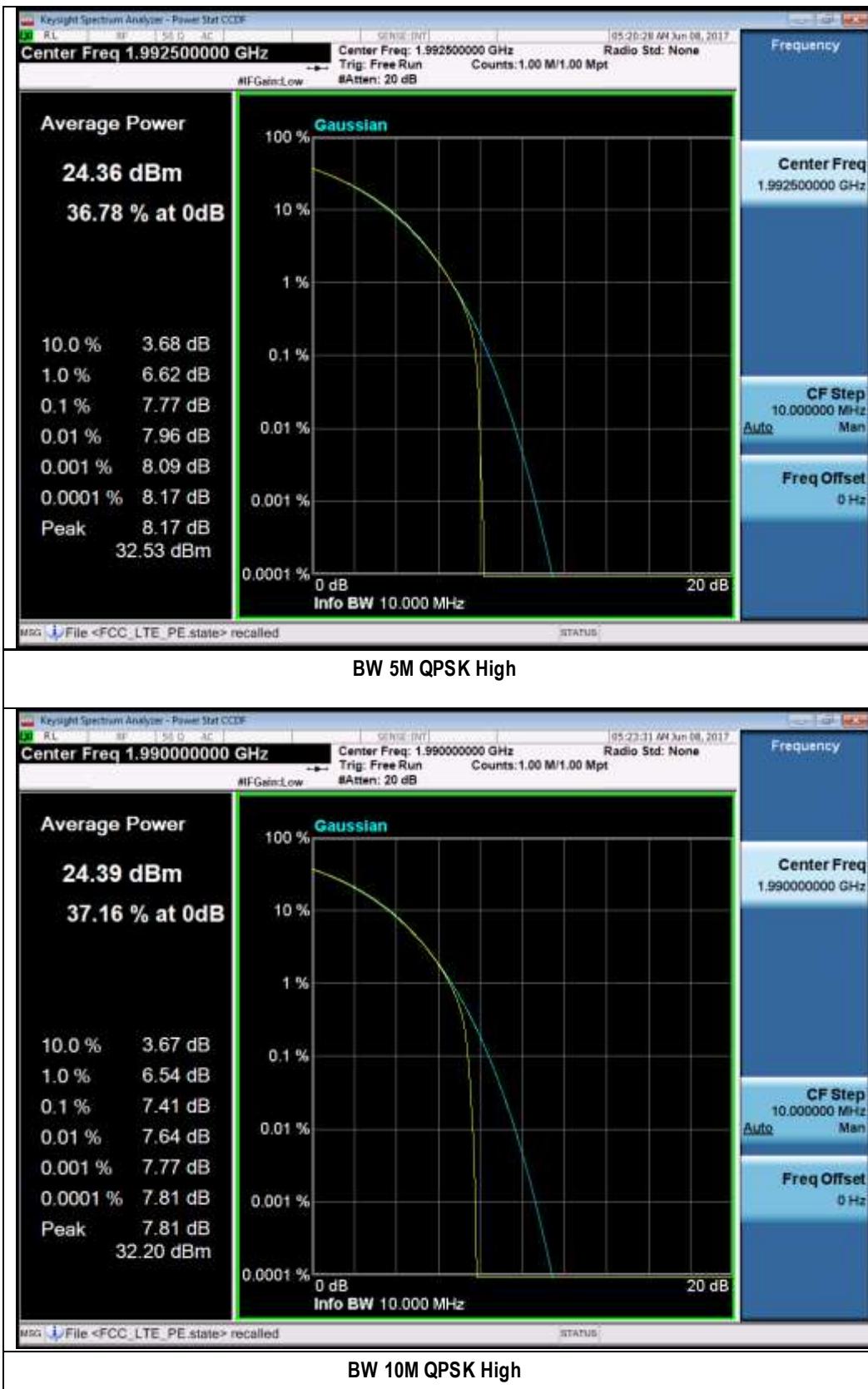


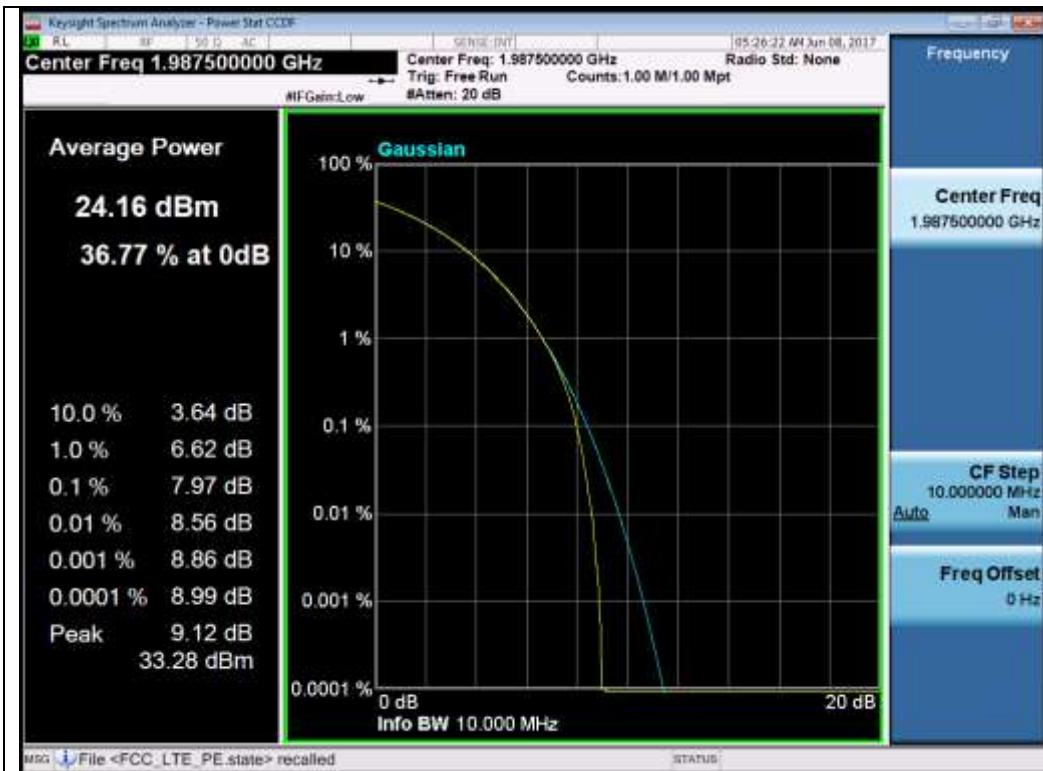




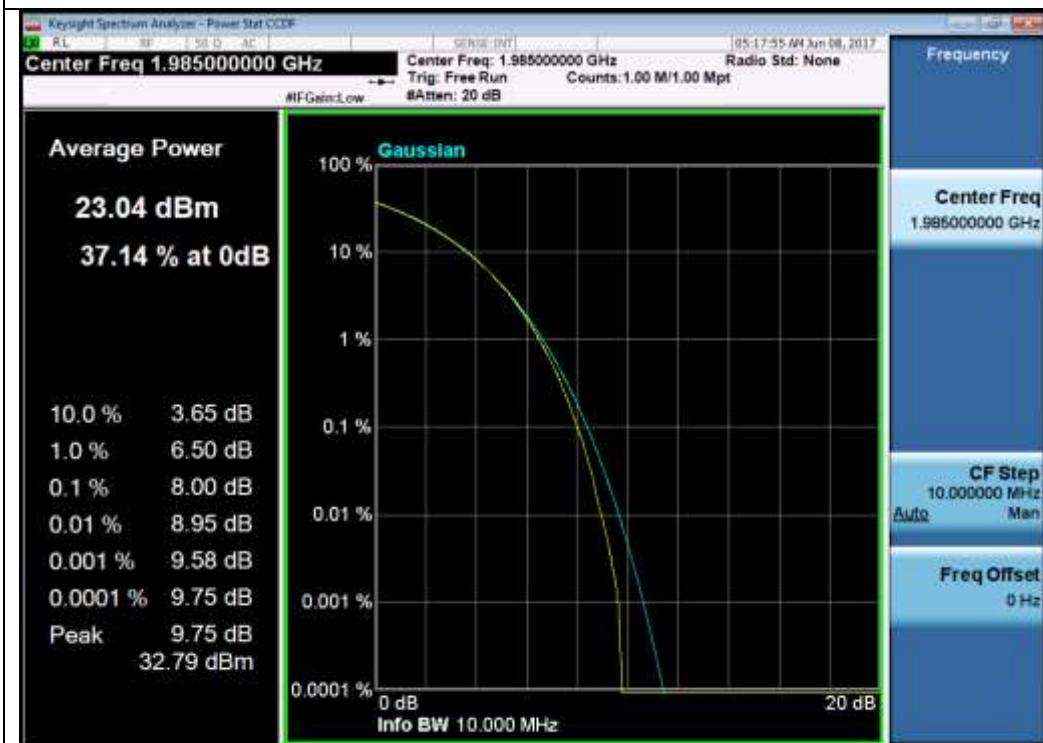


Test Plots for LTE band 25:

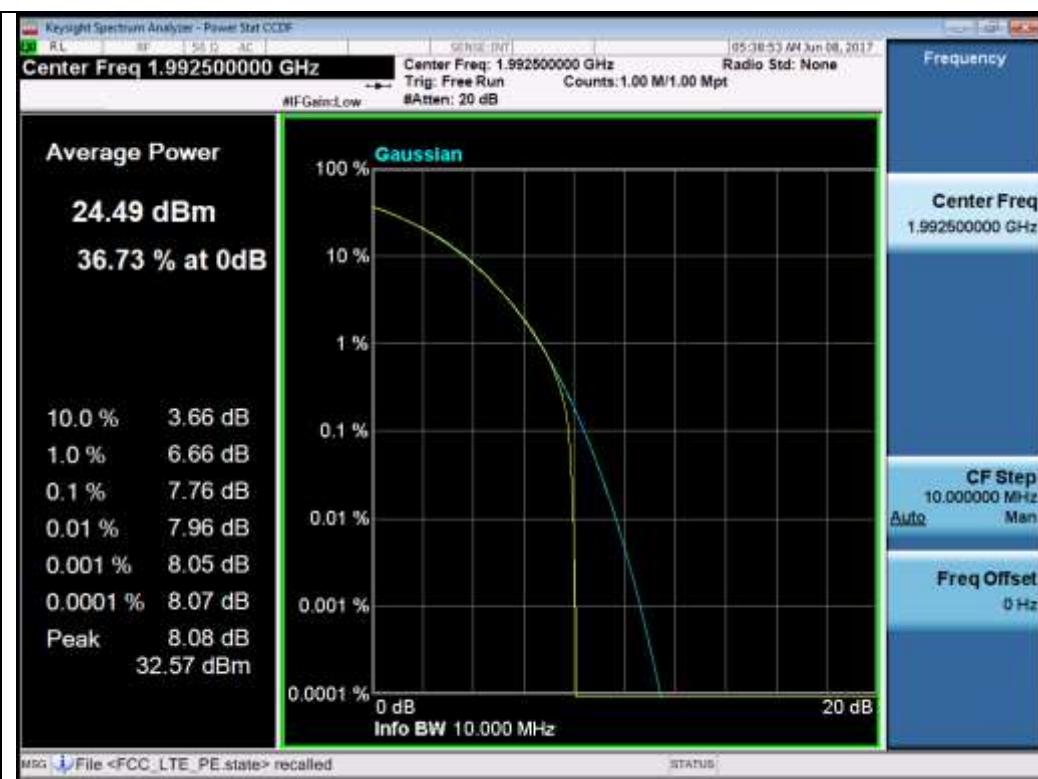




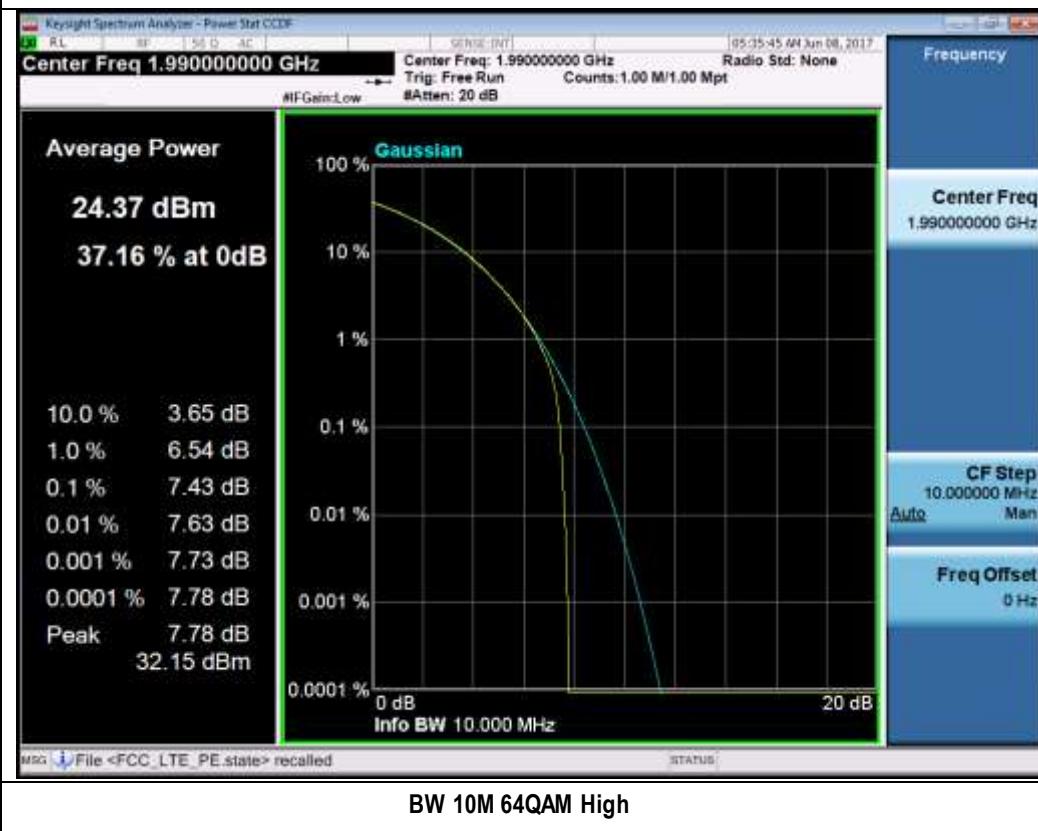
BW 15M QPSK High



BW 20M QPSK High



BW 5M 64QAM High



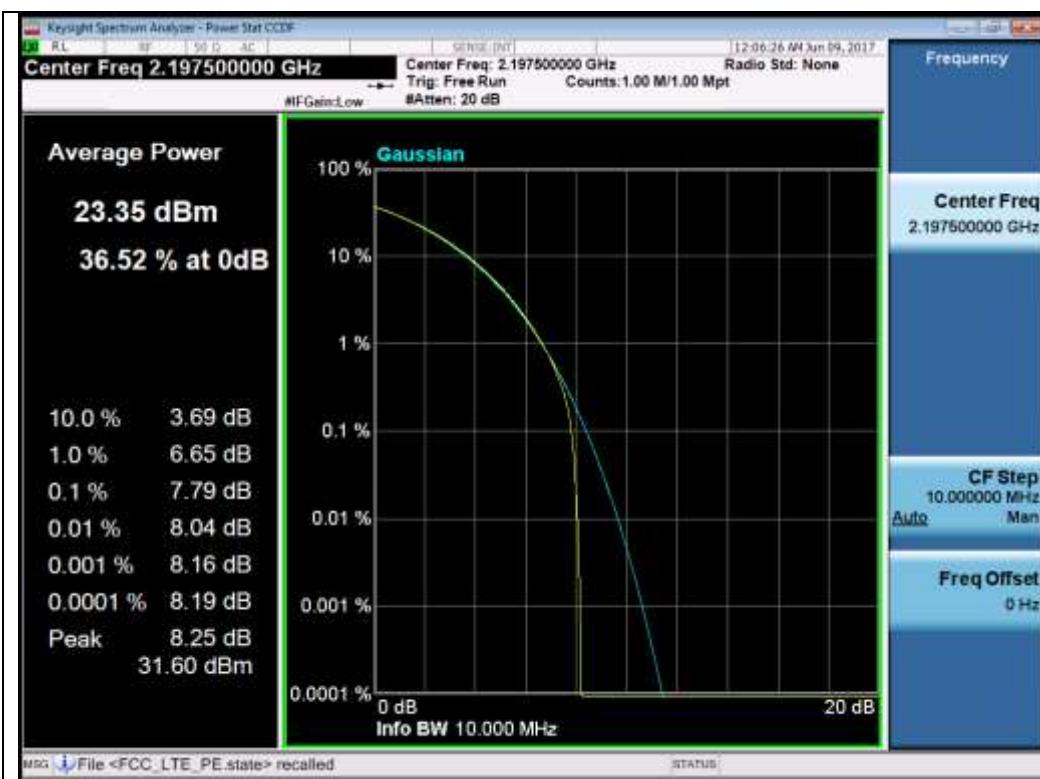
BW 10M 64QAM High



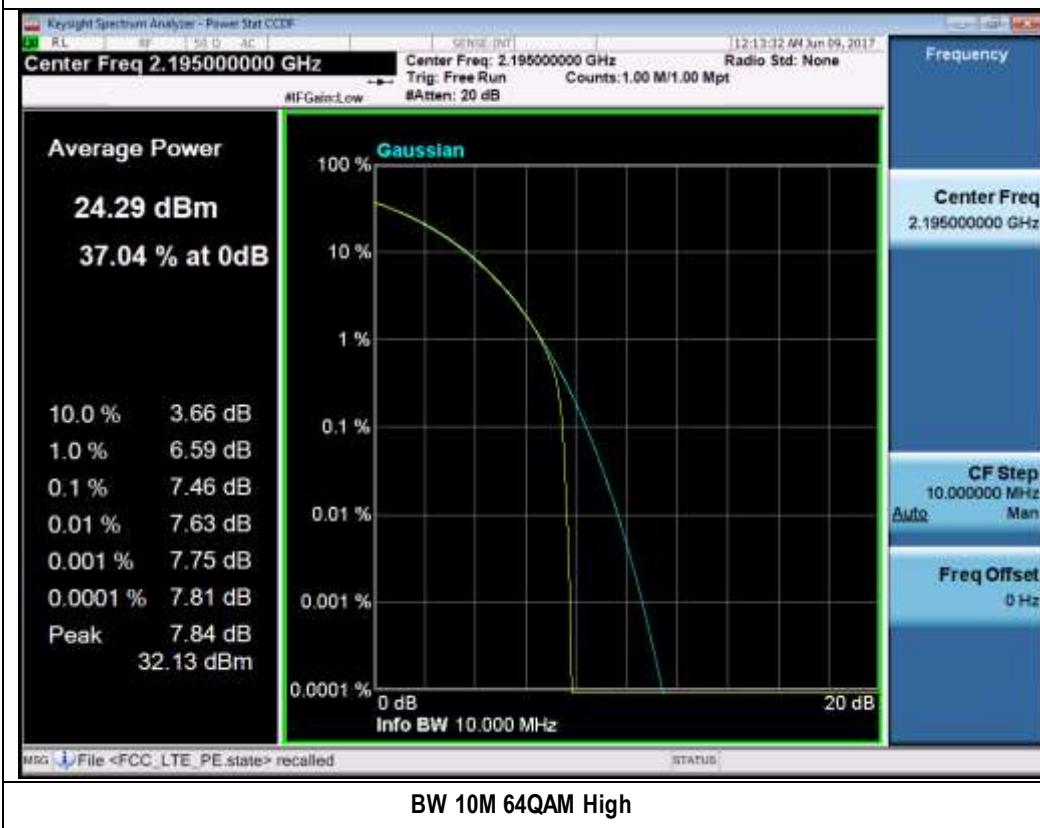
Test Plots for LTE band 66:







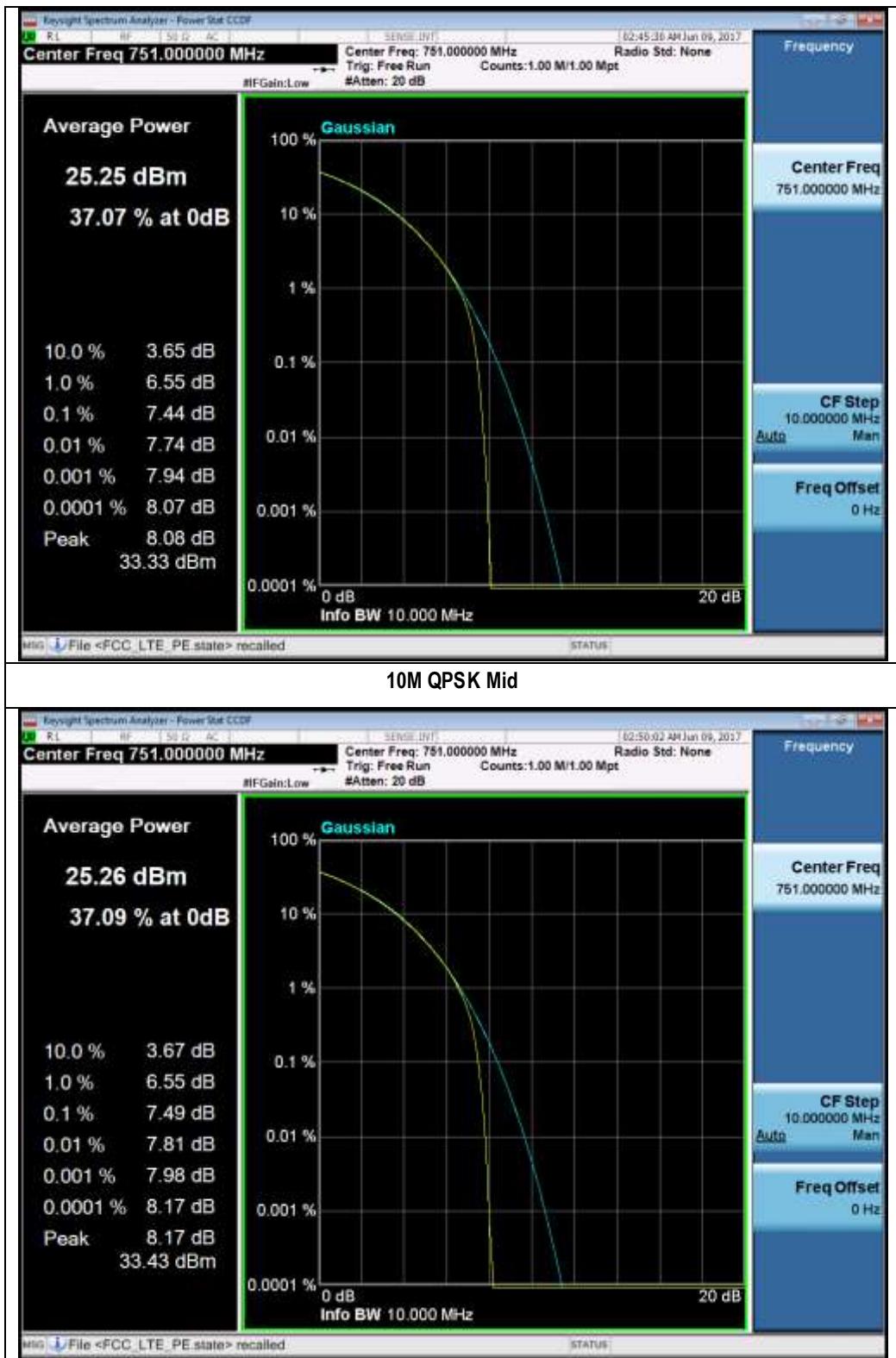
BW 5M 64QAM High



BW 10M 64QAM High

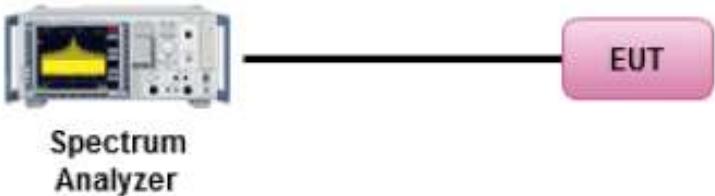


Test Plots for LTE band 13:



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)	<input checked="" type="checkbox"/>
Test Setup	 <p>Spectrum Analyzer ————— EUT</p>	
Procedure	<p><u>99% Occupied bandwidth measurement procedure</u></p> <ul style="list-style-type: none"> - Allow the trace to stabilize. - Use the spectrum analyzer built-in measurement function to determine the 26 dB bandwidth 99% OBW. <ul style="list-style-type: none"> 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. <p>Repeat above steps for different test channel and other modulation type.</p>	
Test Date	06/08/2017 – 06/10/2017	Environmental condition Temperature 23°C Relative Humidity 48% Atmospheric Pressure 1008mbar
Remark	NONE	
Result	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail

Test Data Yes N/A

Test Plot Yes (See below) N/A

Test was done by Chen Ge at RF Test Site.

TestData

99% Bandwidth measurement result for LTE band 2:

Type	Channel	Channel Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Occupied Bandwidth (MHz)
5MHz BW, QPSK	Low	1932.5	4.42	4.66
	Mid	1960	4.42	4.67
	High	1987.5	4.42	4.66
5MHz BW, 64QAM	Low	1932.5	4.42	4.65
	Mid	1960	4.42	4.65
	High	1987.5	4.43	4.68
10MHz BW, QPSK	Low	1935	8.89	9.33
	Mid	1960	8.90	9.35
	High	1985	8.88	9.42
10MHz BW, 64QAM	Low	1935	8.90	9.39
	Mid	1960	8.91	9.35
	High	1985	8.90	9.31
15MHz BW, QPSK	Low	1937.5	13.26	13.73
	Mid	1960	13.26	13.84
	High	1982.5	13.25	13.78
15MHz BW, 64QAM	Low	1937.5	13.27	13.83
	Mid	1960	13.27	13.82
	High	1982.5	13.28	13.79
20MHz BW, QPSK	Low	1940	17.79	18.45
	Mid	1960	17.78	18.43
	High	1980	17.79	18.49
20MHz BW, 64QAM	Low	1940	17.81	18.39
	Mid	1960	17.79	18.41
	High	1980	17.80	18.41

99% Bandwidth measurement result for LTE band 4:

Type	Channel	Channel Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Occupied Bandwidth (MHz)
5MHz BW, QPSK	Low	2112.5	4.42	4.68
	Mid	2132.5	4.42	4.66
	High	2152.5	4.43	4.67
5MHz BW, 64QAM	Low	2112.5	4.42	4.67
	Mid	2132.5	4.42	4.67
	High	2152.5	4.42	4.65
10MHz BW, QPSK	Low	2115.0	8.90	9.29
	Mid	2132.5	8.89	9.35
	High	2150.0	8.90	9.35
10MHz BW, 64QAM	Low	2115.0	8.91	9.35
	Mid	2132.5	8.91	9.34
	High	2150.0	8.90	9.33
15MHz BW, QPSK	Low	2117.5	13.28	13.85
	Mid	2132.5	13.26	13.78
	High	2147.5	13.27	13.78
15MHz BW, 64QAM	Low	2117.5	13.29	13.79
	Mid	2132.5	13.28	13.79
	High	2147.5	13.29	13.78
20MHz BW, QPSK	Low	2120.0	17.80	18.47
	Mid	2132.5	17.83	18.50
	High	2145.0	17.79	18.46
20MHz BW, 64QAM	Low	2120.0	17.81	18.43
	Mid	2132.5	17.81	18.45
	High	2145.0	17.87	18.36

99% Bandwidth measurement result for LTE band 25:

Type	Channel	Channel Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Occupied Bandwidth (MHz)
5MHz BW, QPSK	High	1992.5	4.42	4.68
5MHz BW, 64QAM	High	1992.5	4.42	4.68
10MHz BW, QPSK	High	1990	8.90	9.33
10MHz BW, 64QAM	High	1990	8.90	9.33
15MHz BW, QPSK	High	1987.5	13.26	13.80
15MHz BW, 64QAM	High	1987.5	13.26	13.80
20MHz BW, QPSK	High	1985	17.79	18.42
20MHz BW, 64QAM	High	1985	17.80	18.43

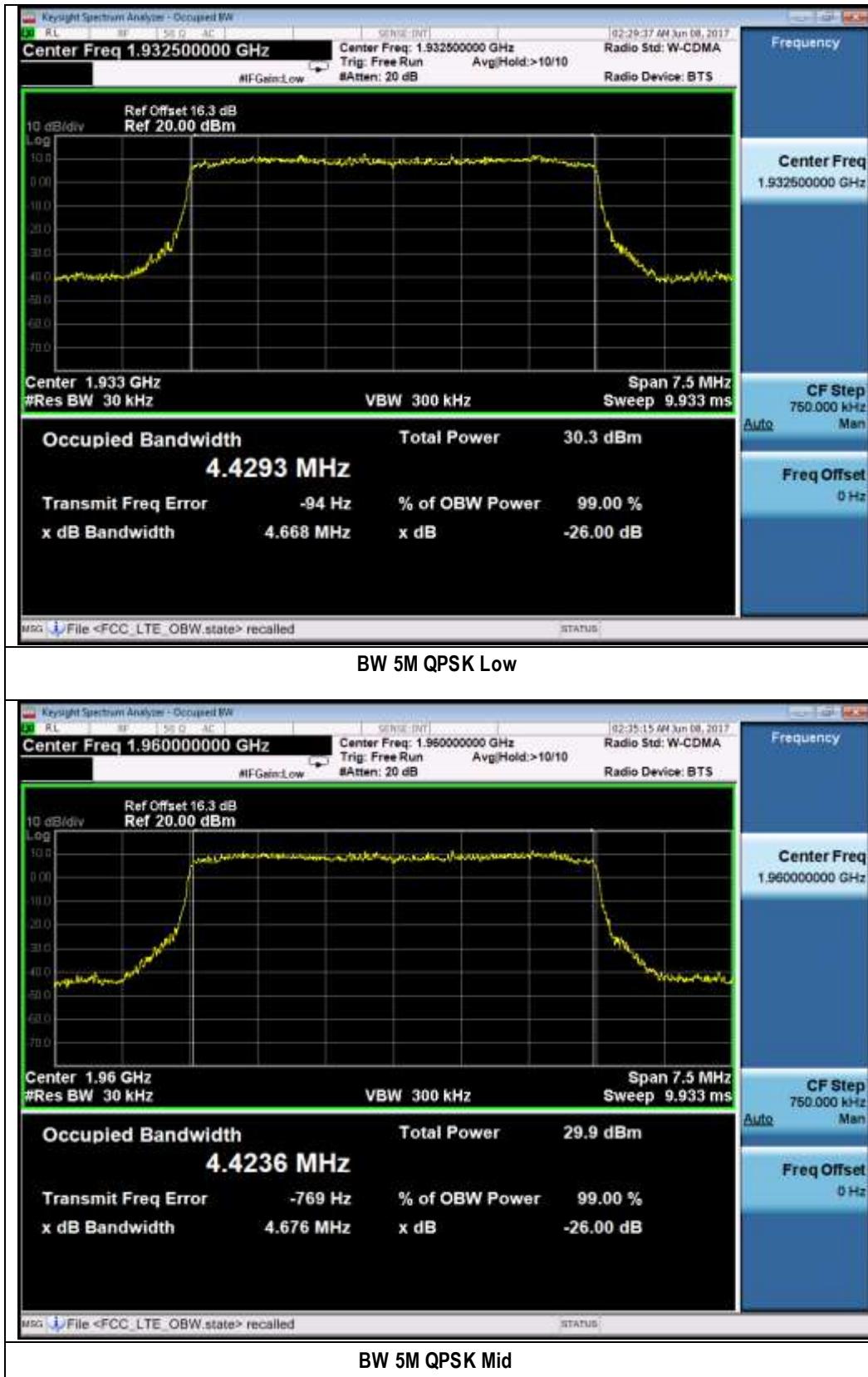
99% Bandwidth measurement result for LTE band 66:

Type	Channel	Channel Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Occupied Bandwidth (MHz)
5MHz BW, QPSK	High	2197.5	4.42	4.65
5MHz BW, 64QAM	High	2197.5	4.43	4.70
10MHz BW, QPSK	High	2195	8.90	9.30
10MHz BW, 64QAM	High	2195	8.90	9.31
15MHz BW, QPSK	High	2192.5	13.29	13.79
15MHz BW, 64QAM	High	2192.5	13.29	13.76
20MHz BW, QPSK	High	2190	17.82	18.51
20MHz BW, 64QAM	High	2190	17.83	18.41

99% Bandwidth measurement result for LTE band 13:

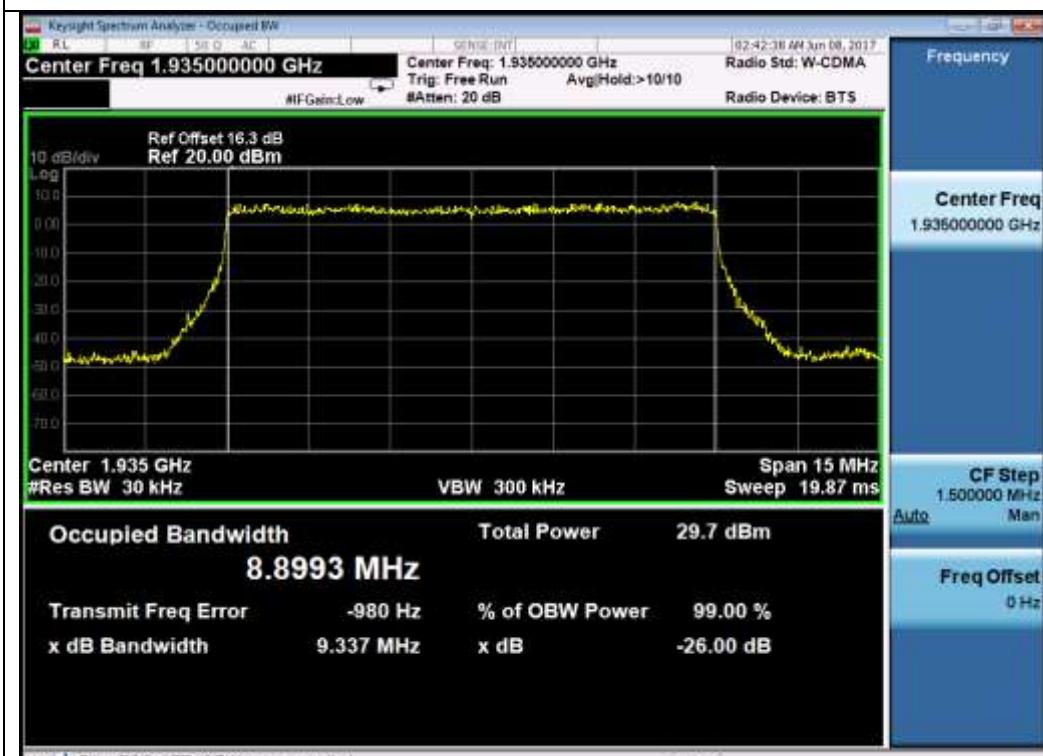
Type	Channel	Channel Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Occupied Bandwidth (MHz)
10MHz BW, QPSK	Mid	751	8.90	9.36
10MHz BW, 64QAM	Mid	751	8.90	9.34

Test Plot for Occupied Bandwidth band 2:

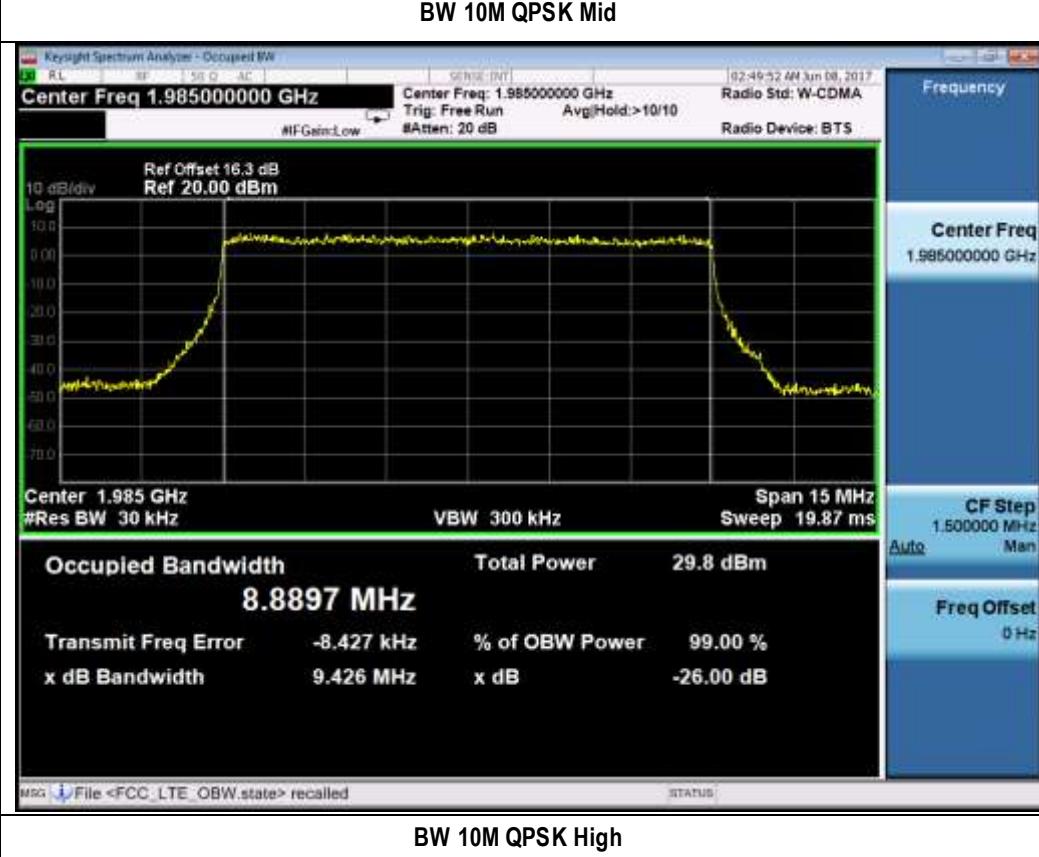


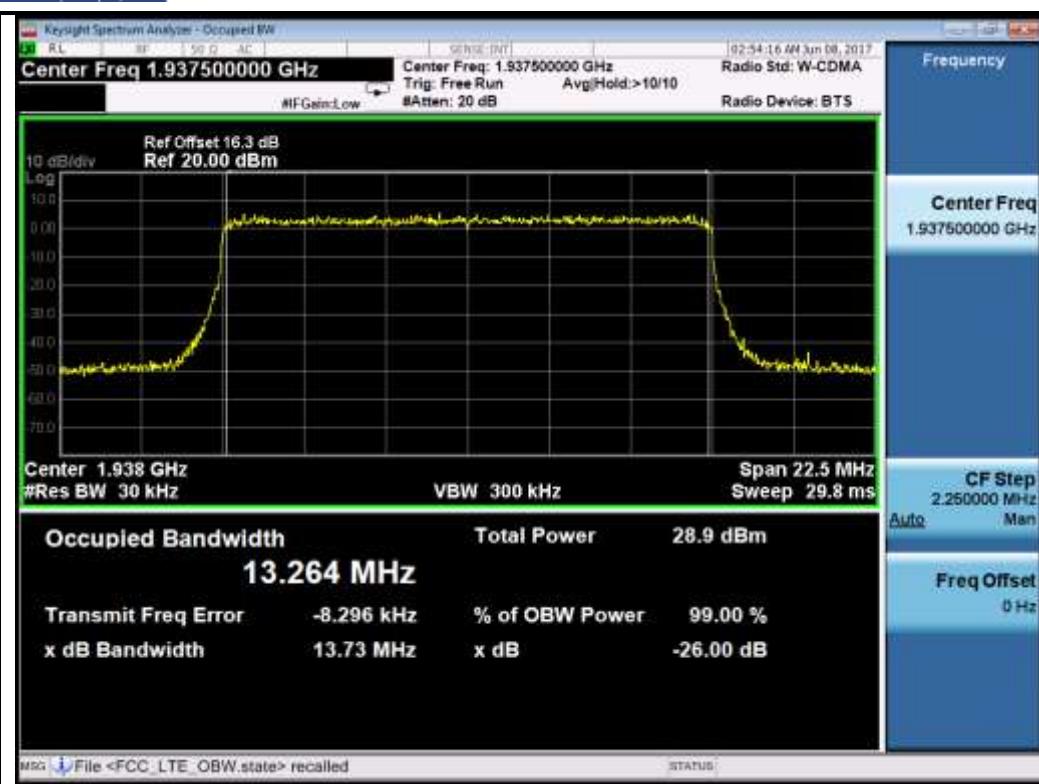


BW 5M QPSK High

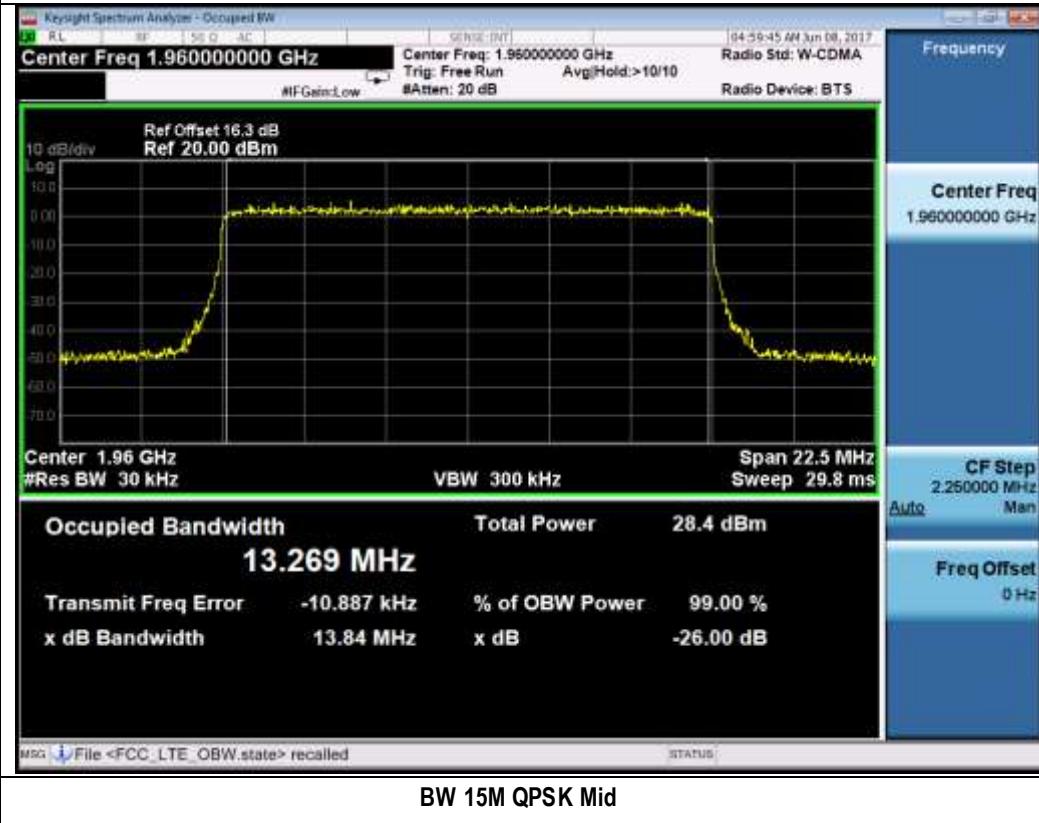


BW 10M QPSK Low





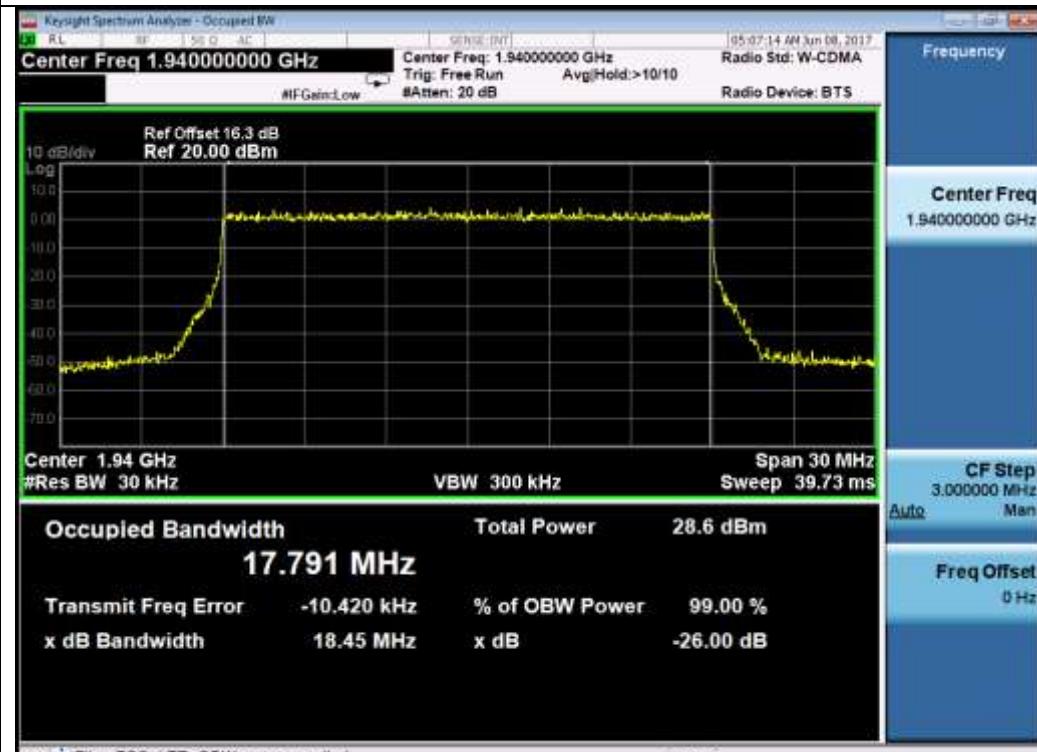
BW 15M QPSK Low



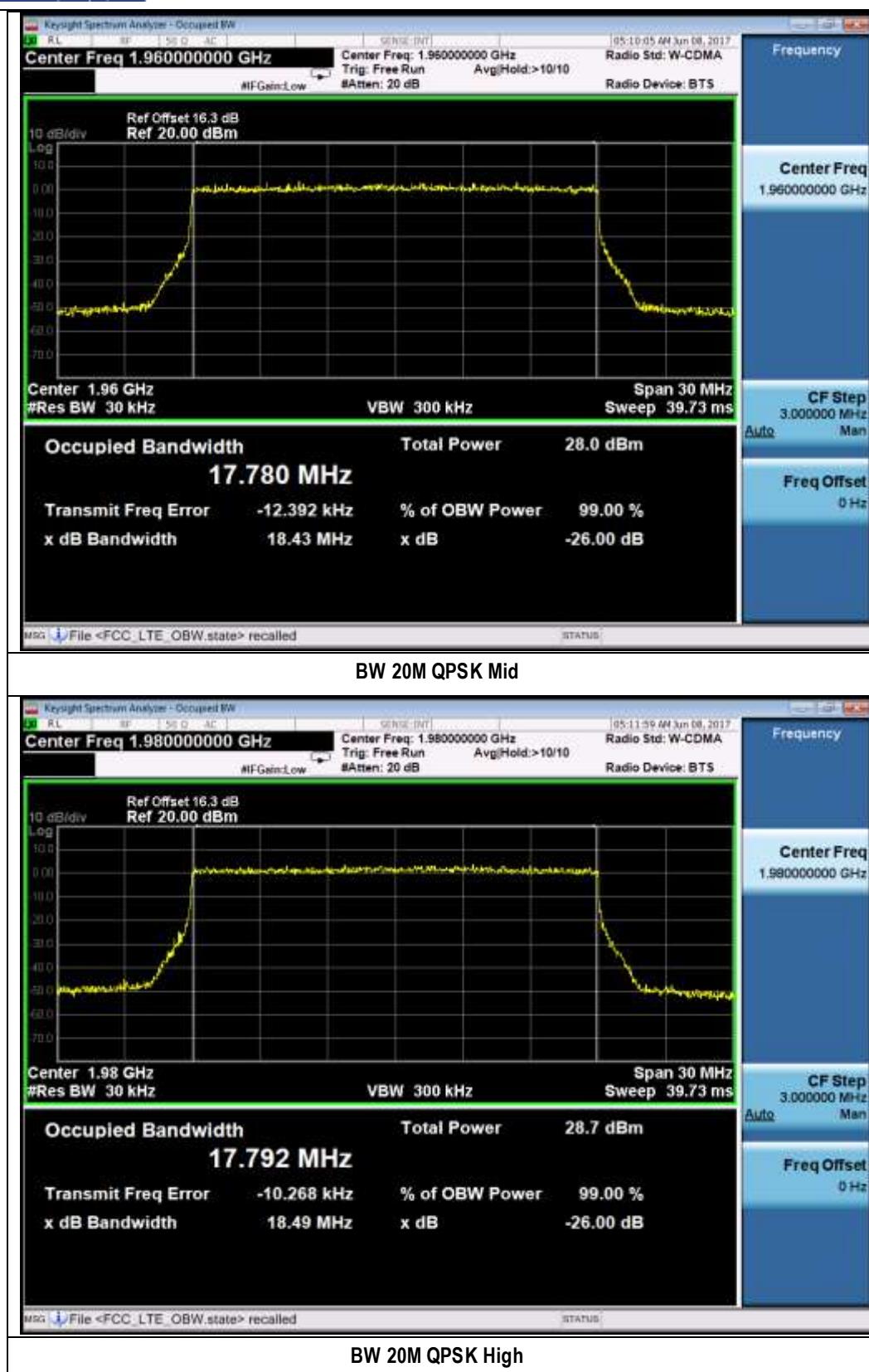
BW 15M QPSK Mid



BW 15M QPSK High

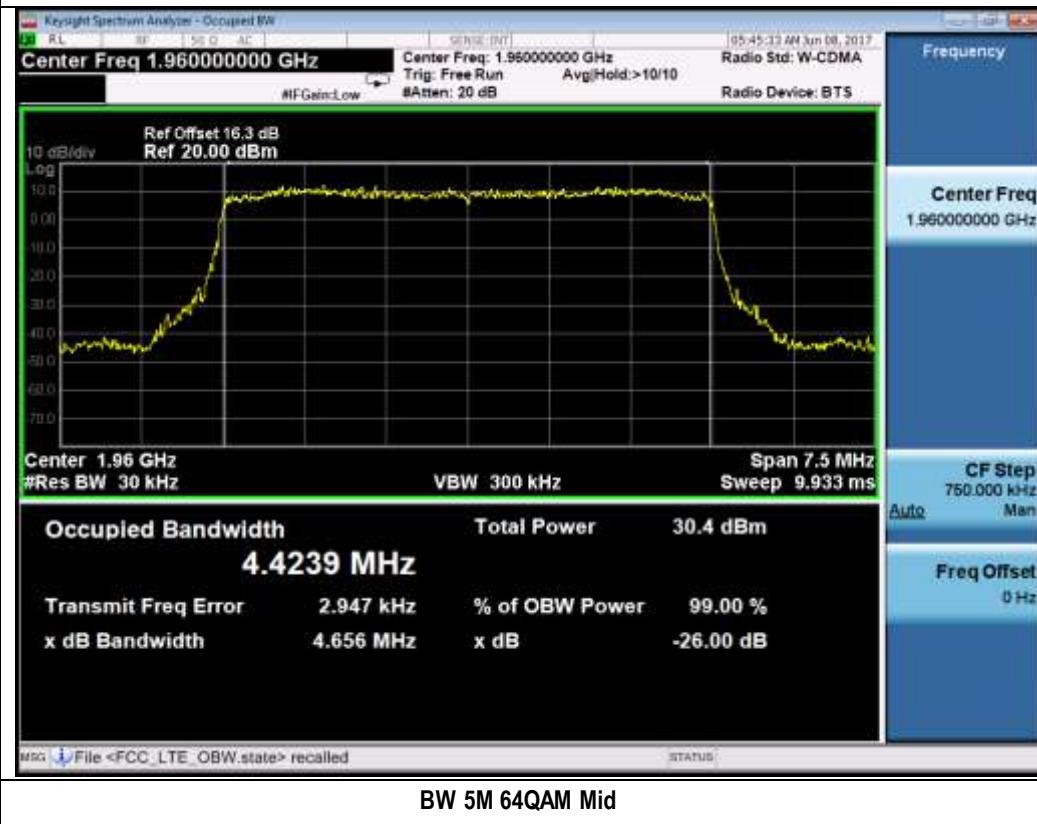


BW 20M QPSK Low





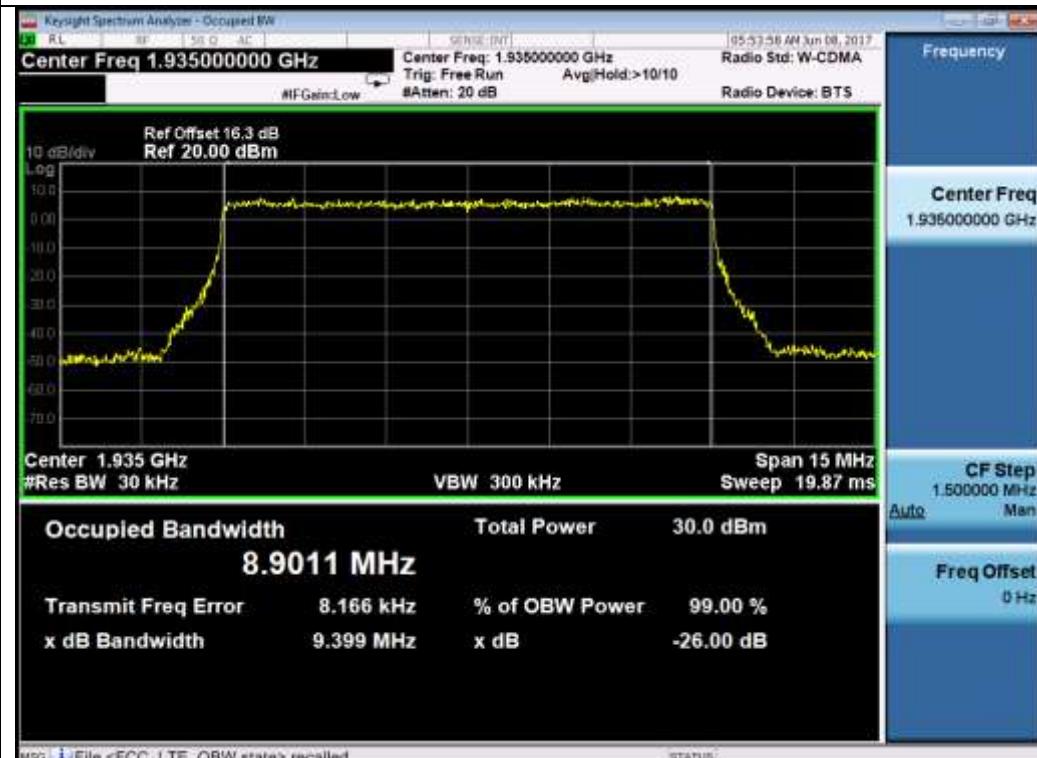
BW 5M 64QAM Low



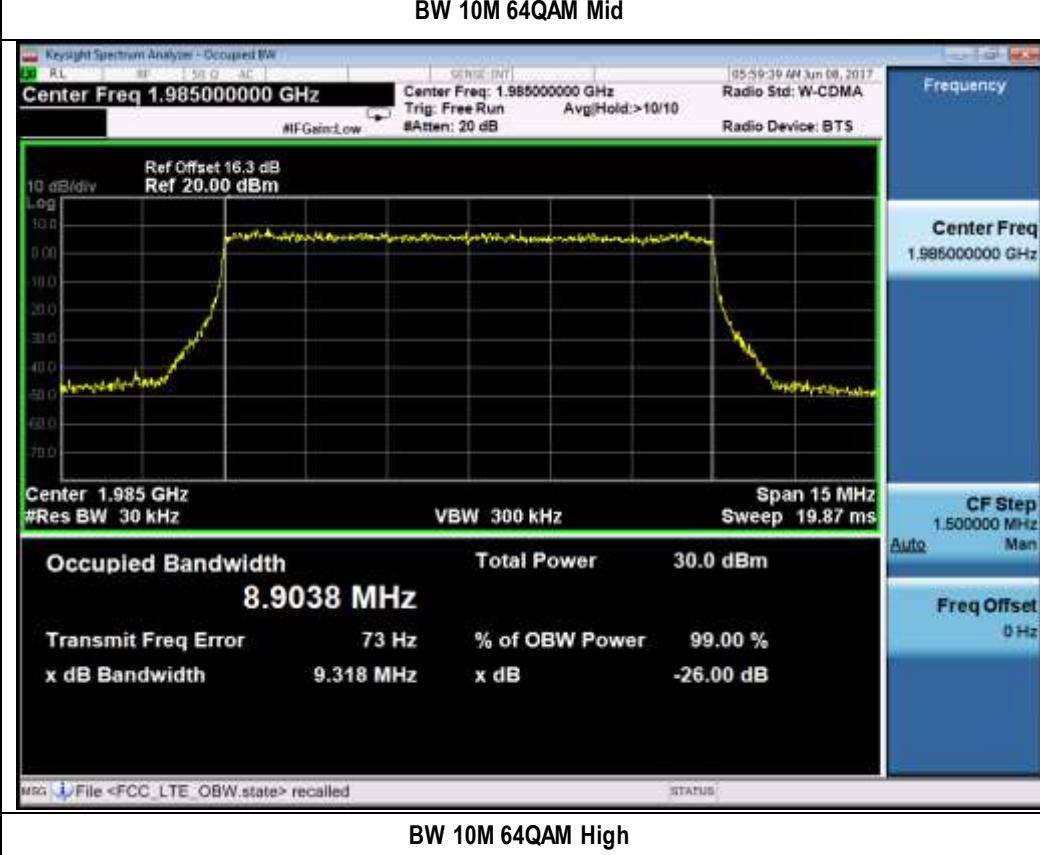
BW 5M 64QAM Mid

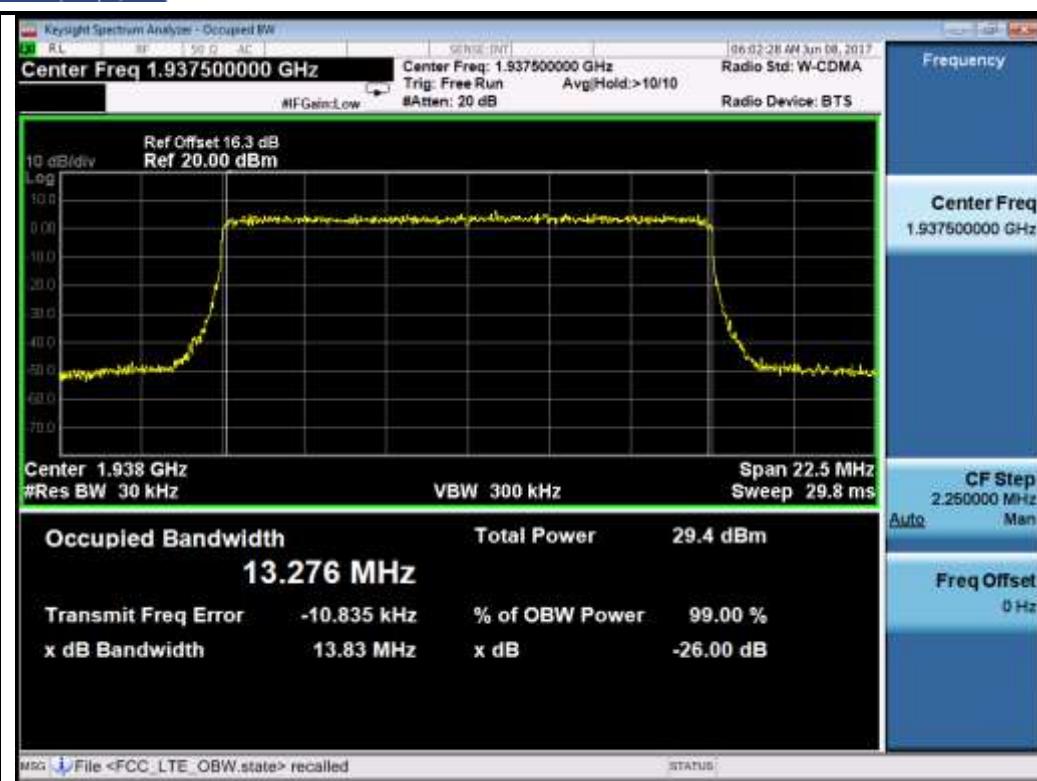


BW 5M 64QAM High

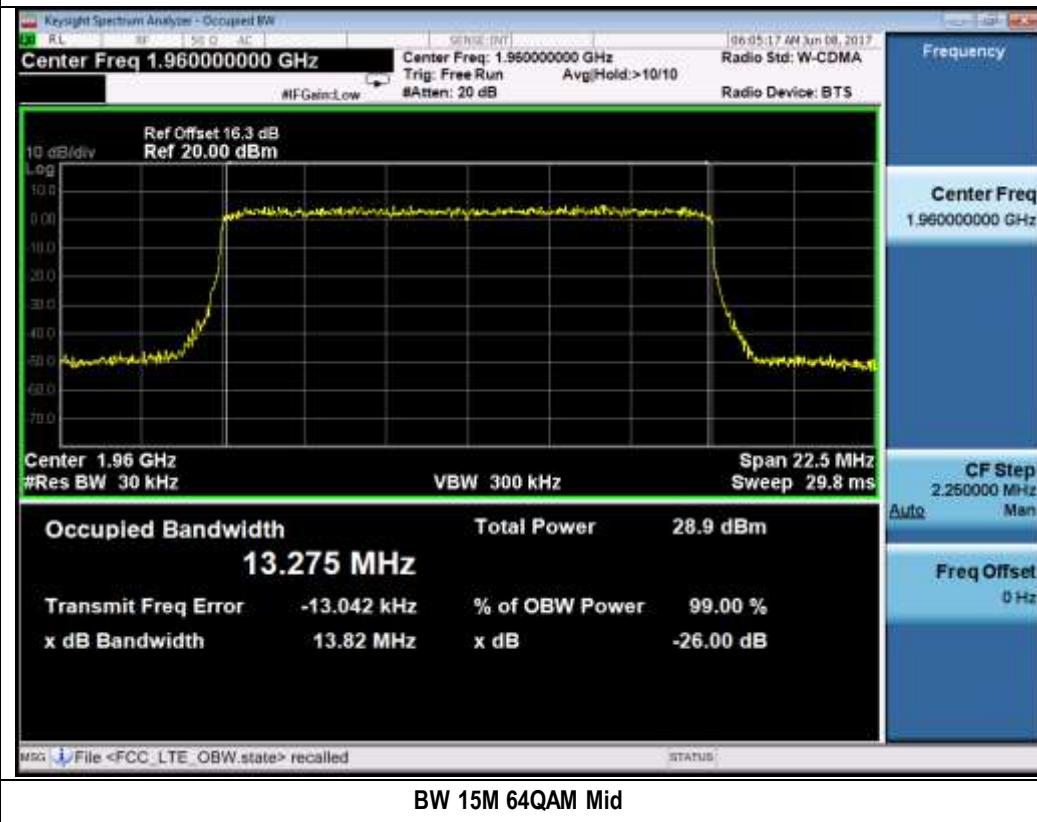


BW 10M 64QAM Low

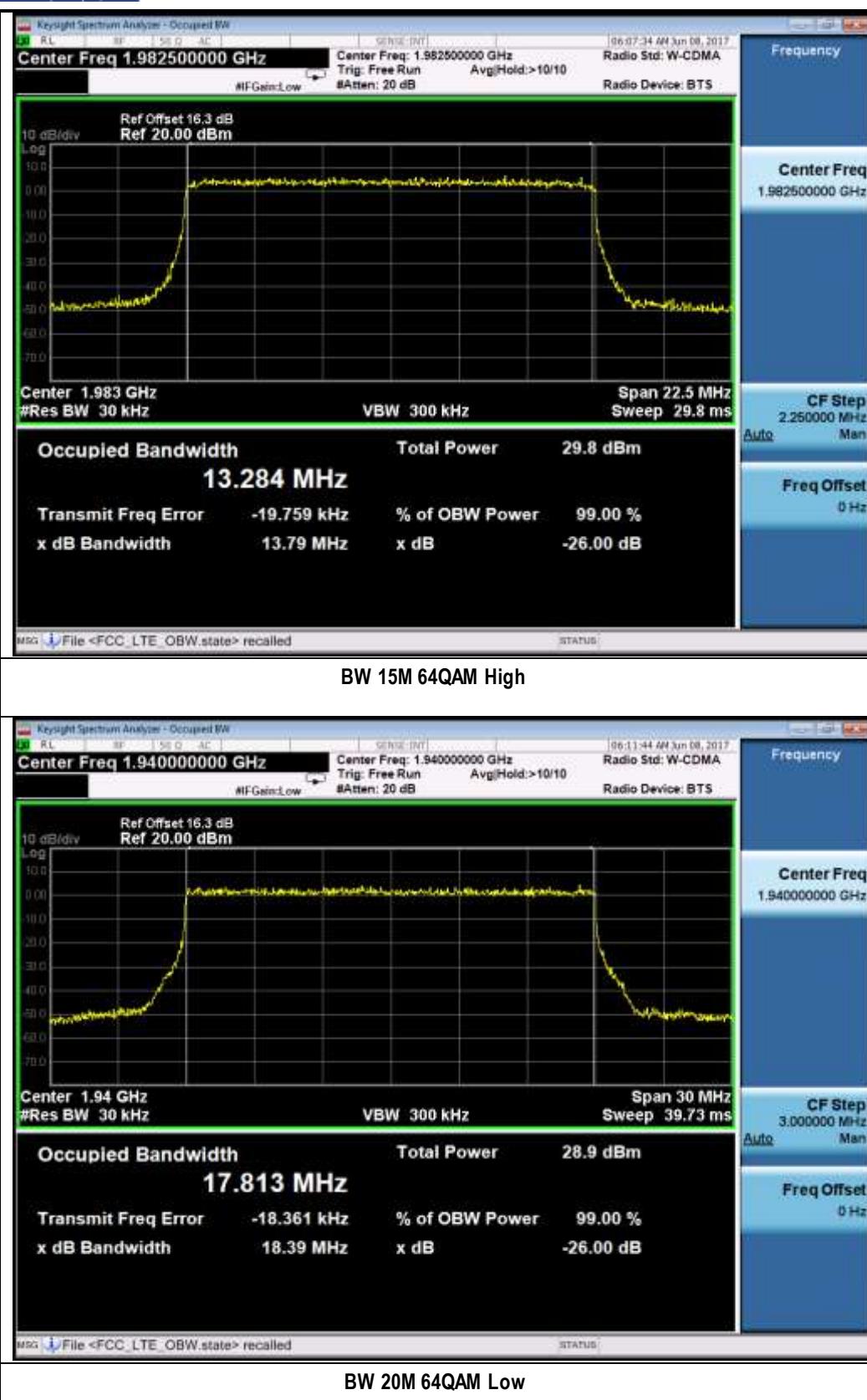


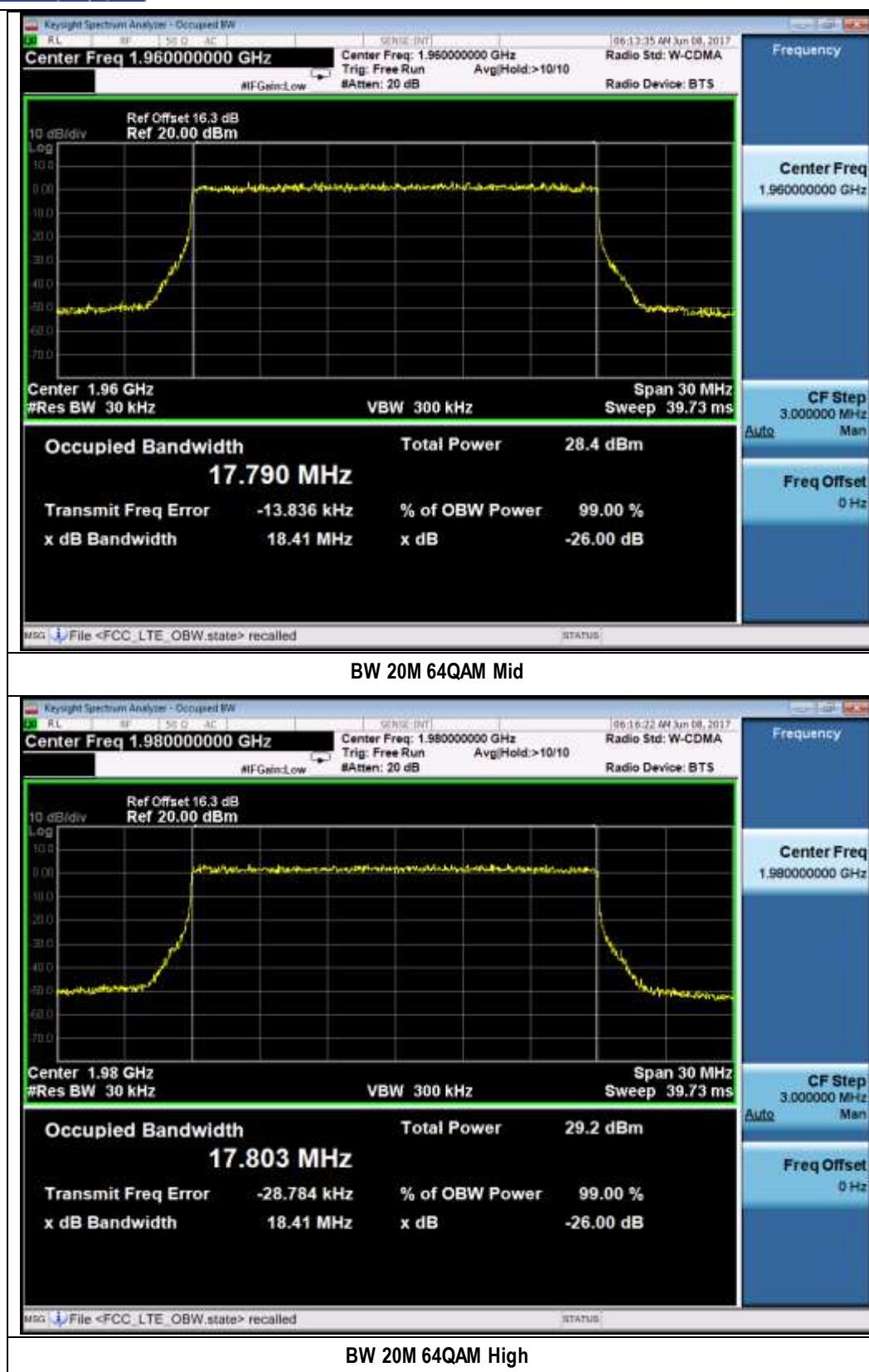


BW 15M 64QAM Low



BW 15M 64QAM Mid



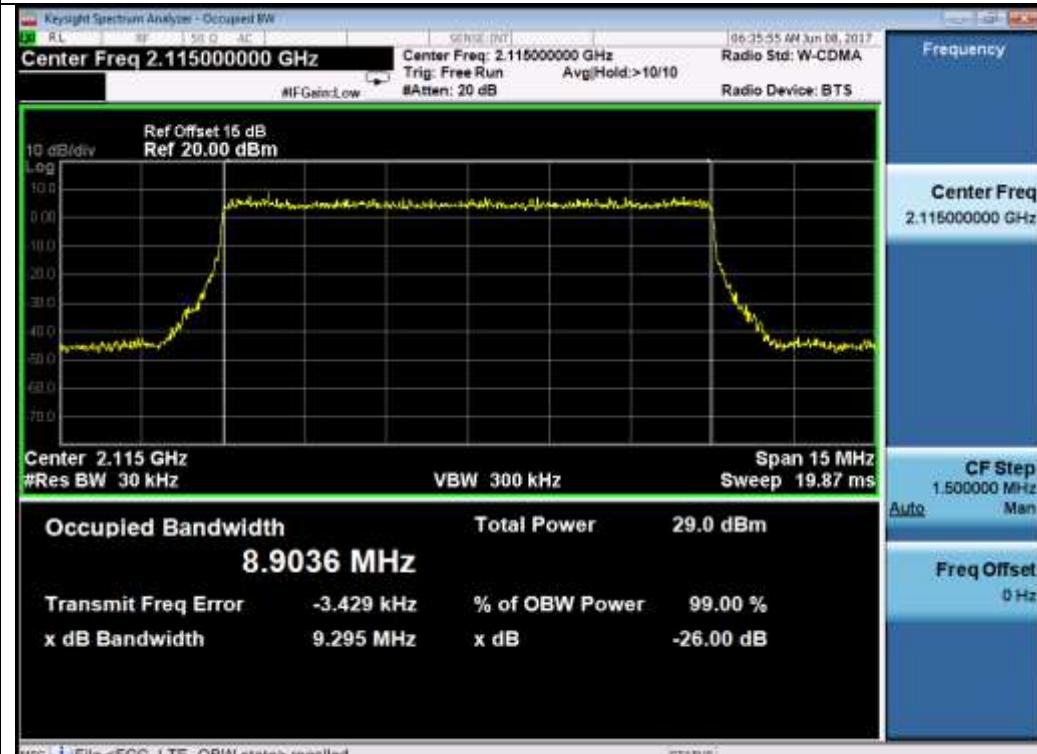


Test Plot for Occupied Bandwidth Band 4:

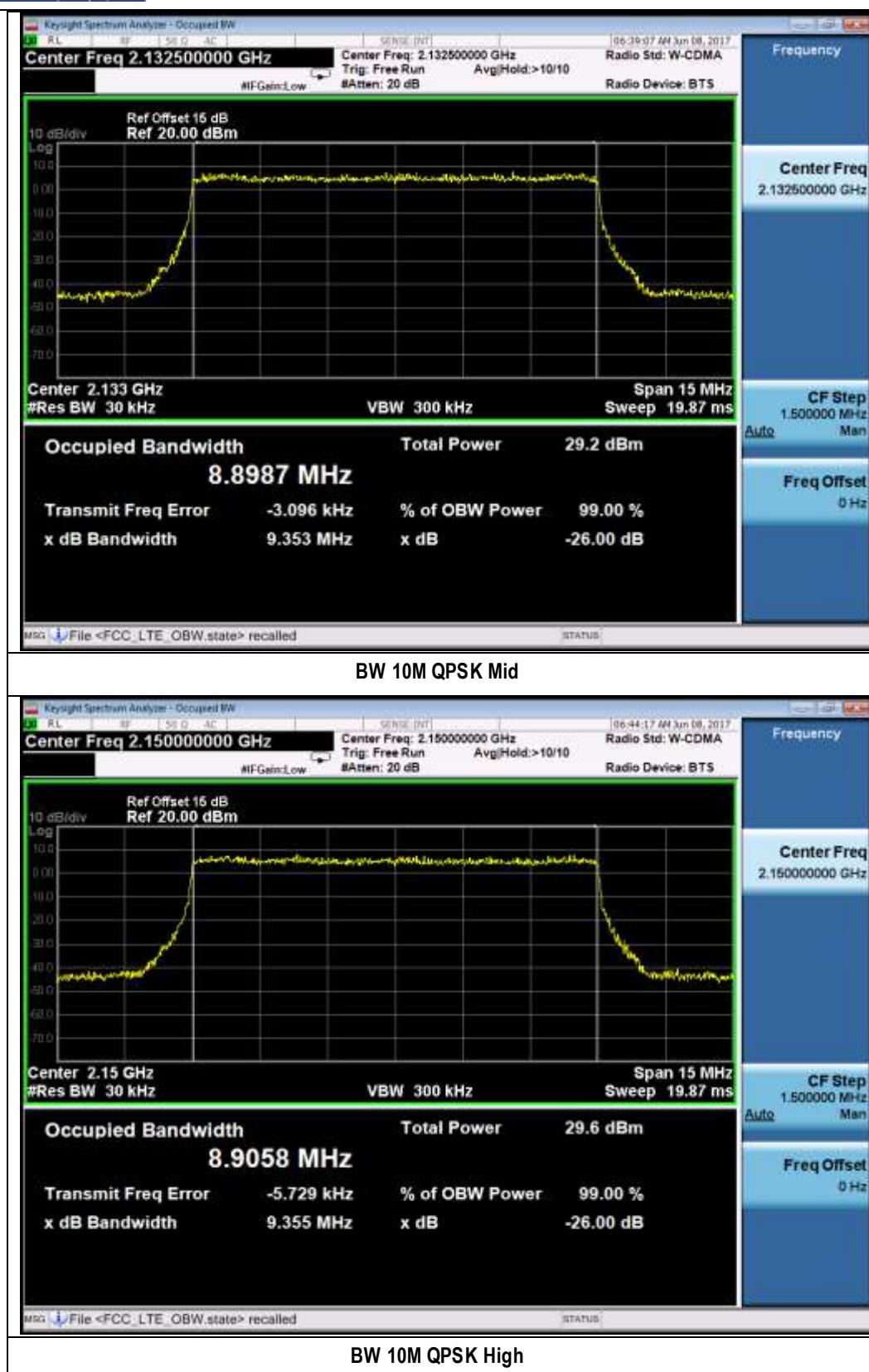


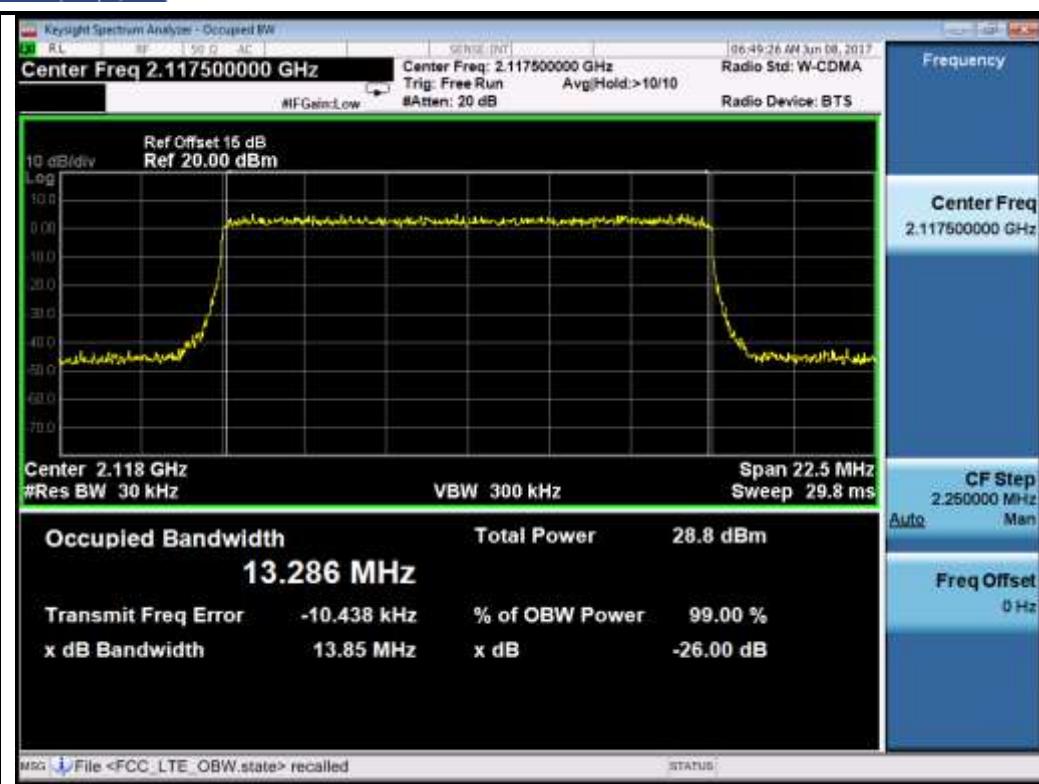


BW 5M QPSK High

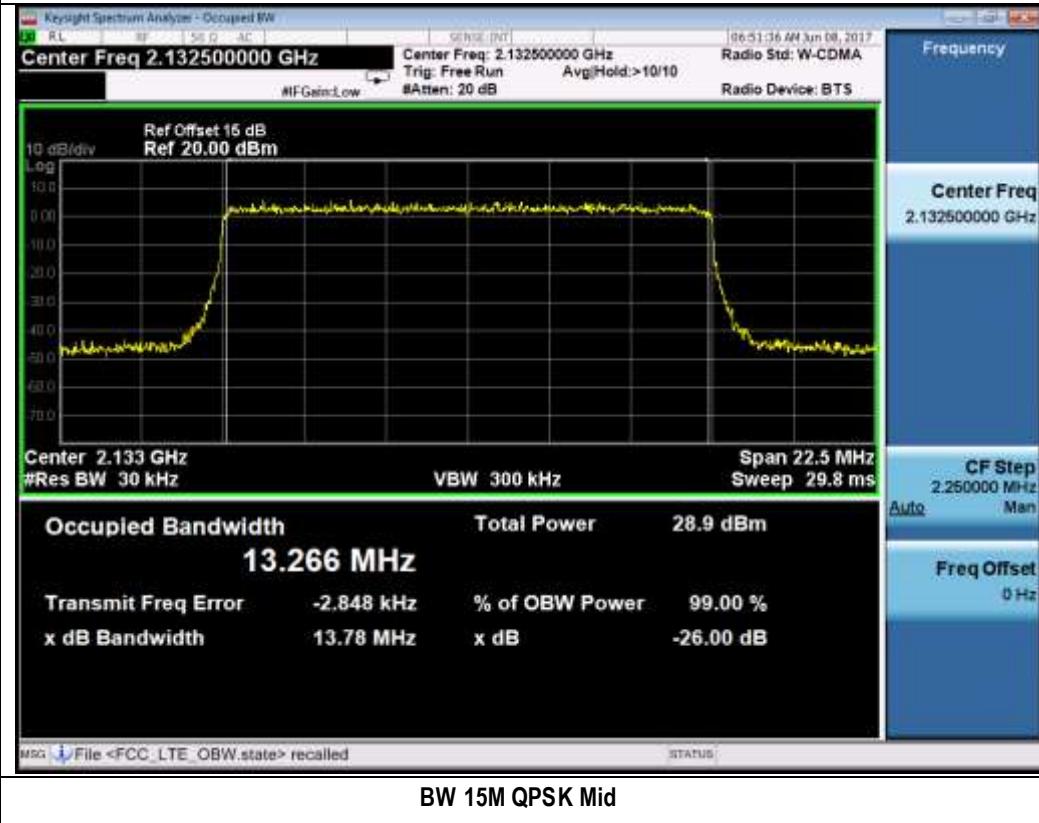


BW 10M QPSK Low





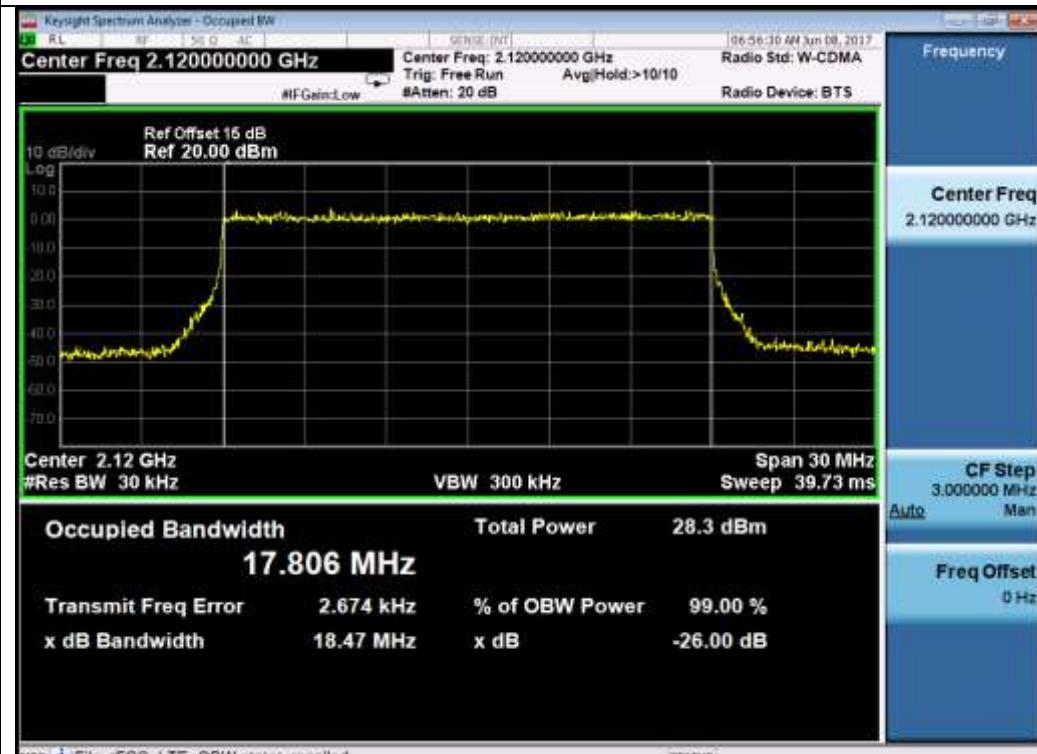
BW 15M QPSK Low



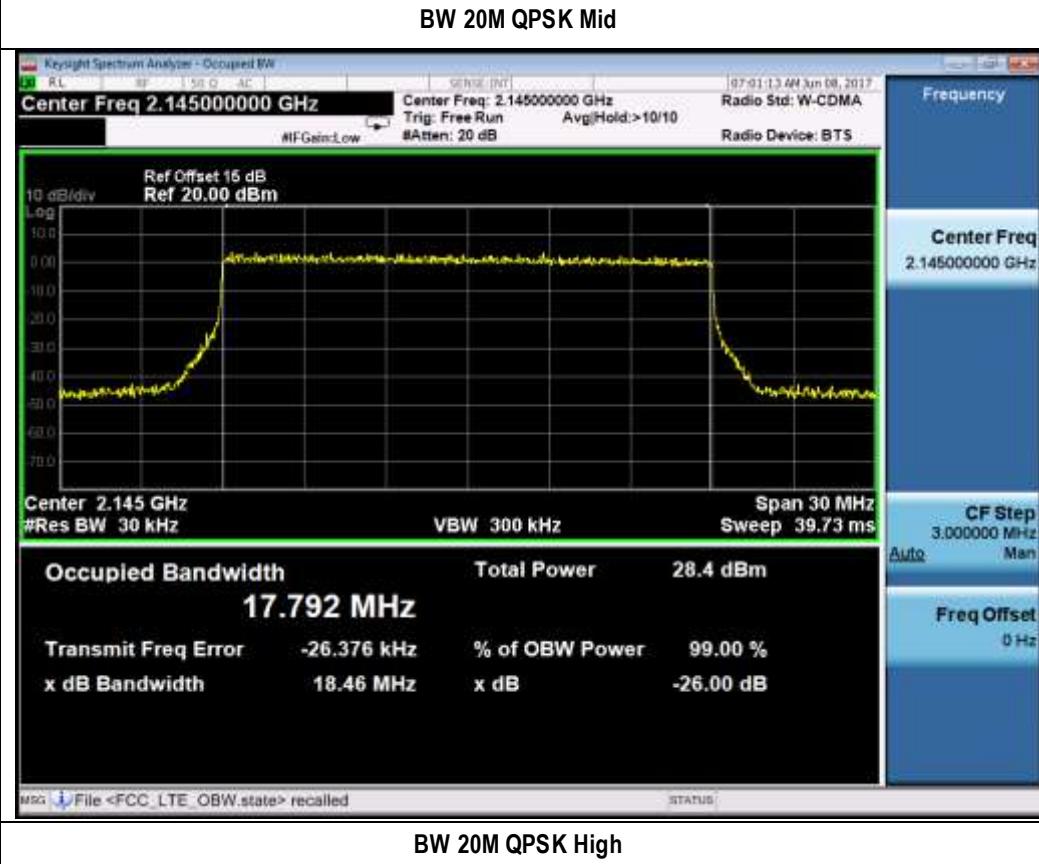
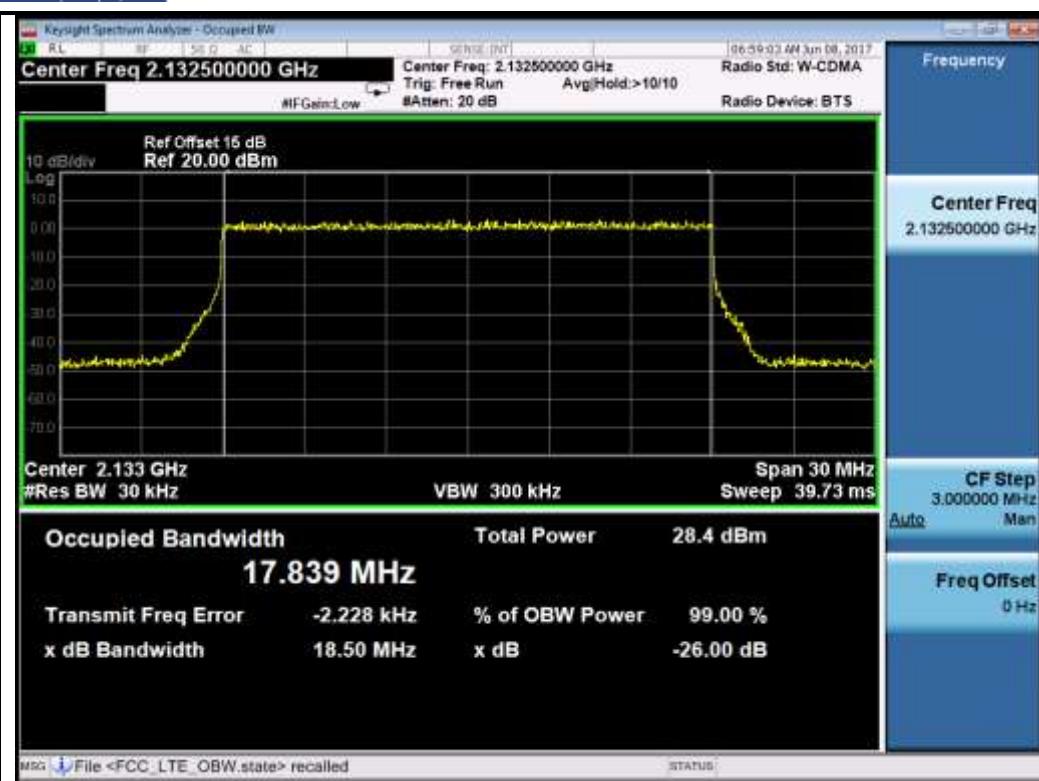
BW 15M QPSK Mid



BW 15M QPSK High

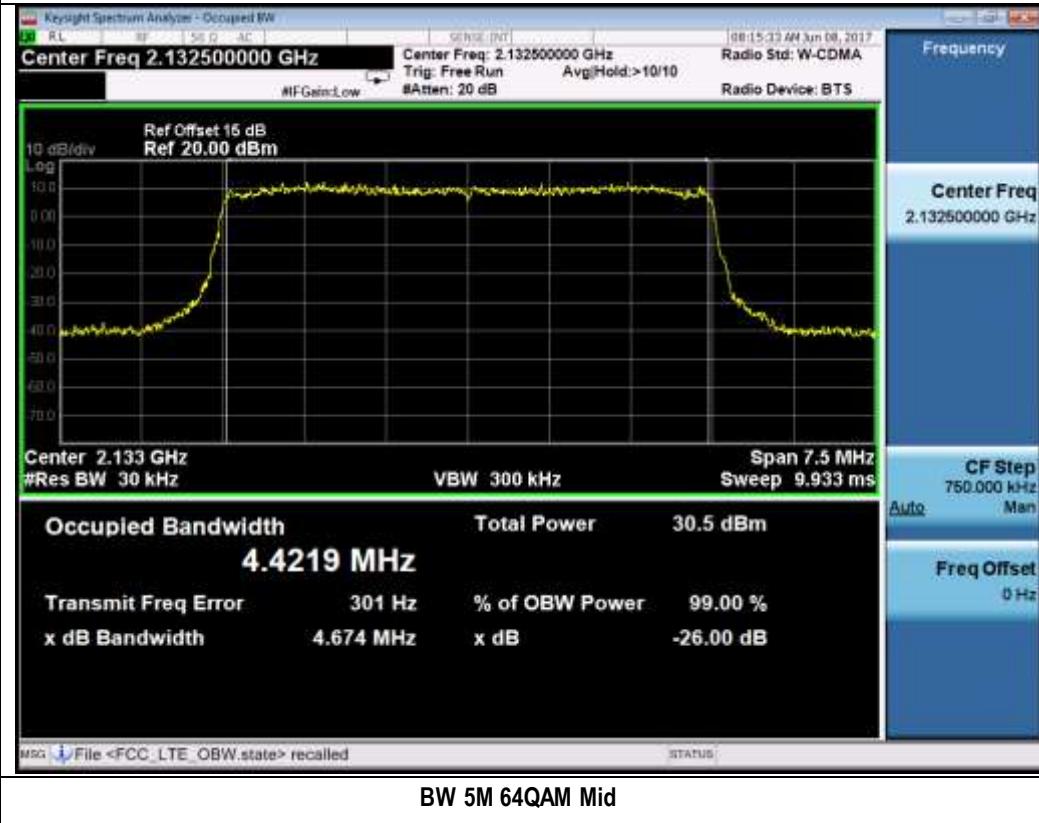


BW 20M QPSK Low





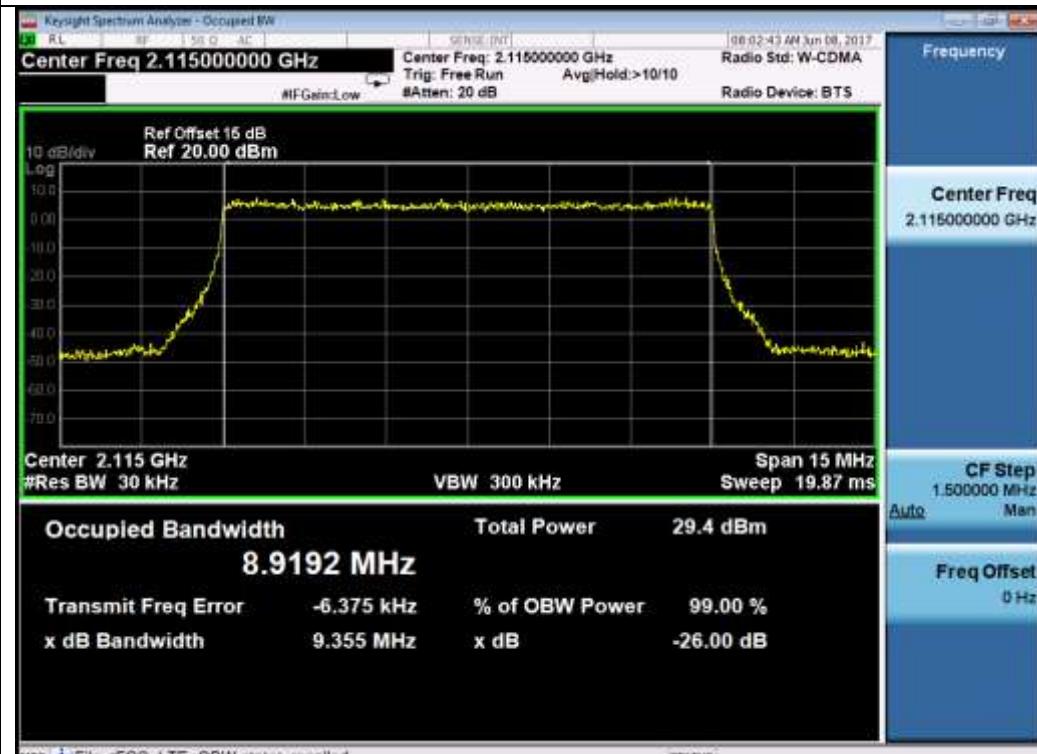
BW 5M 64QAM Low



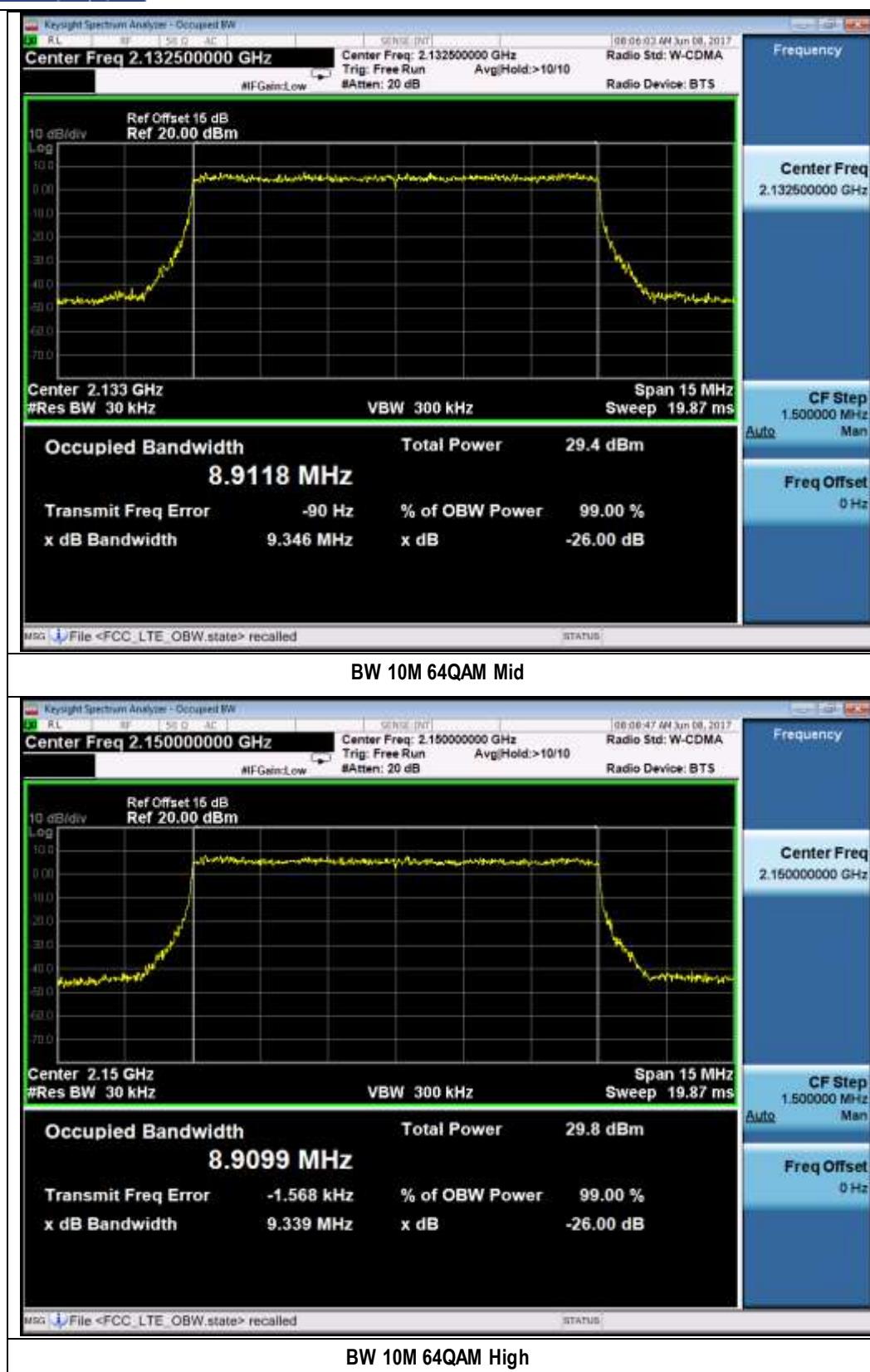
BW 5M 64QAM Mid



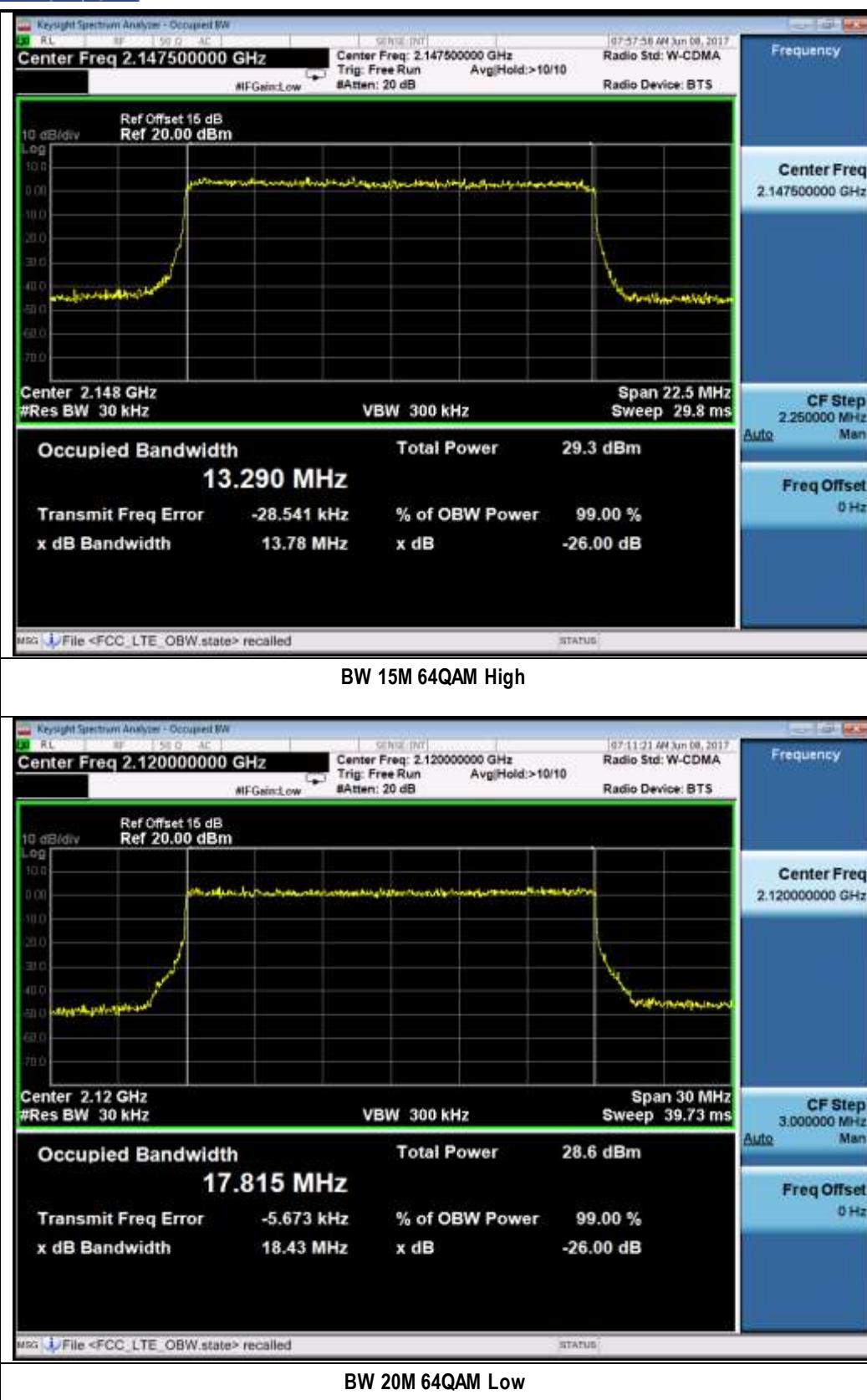
BW 5M 64QAM High

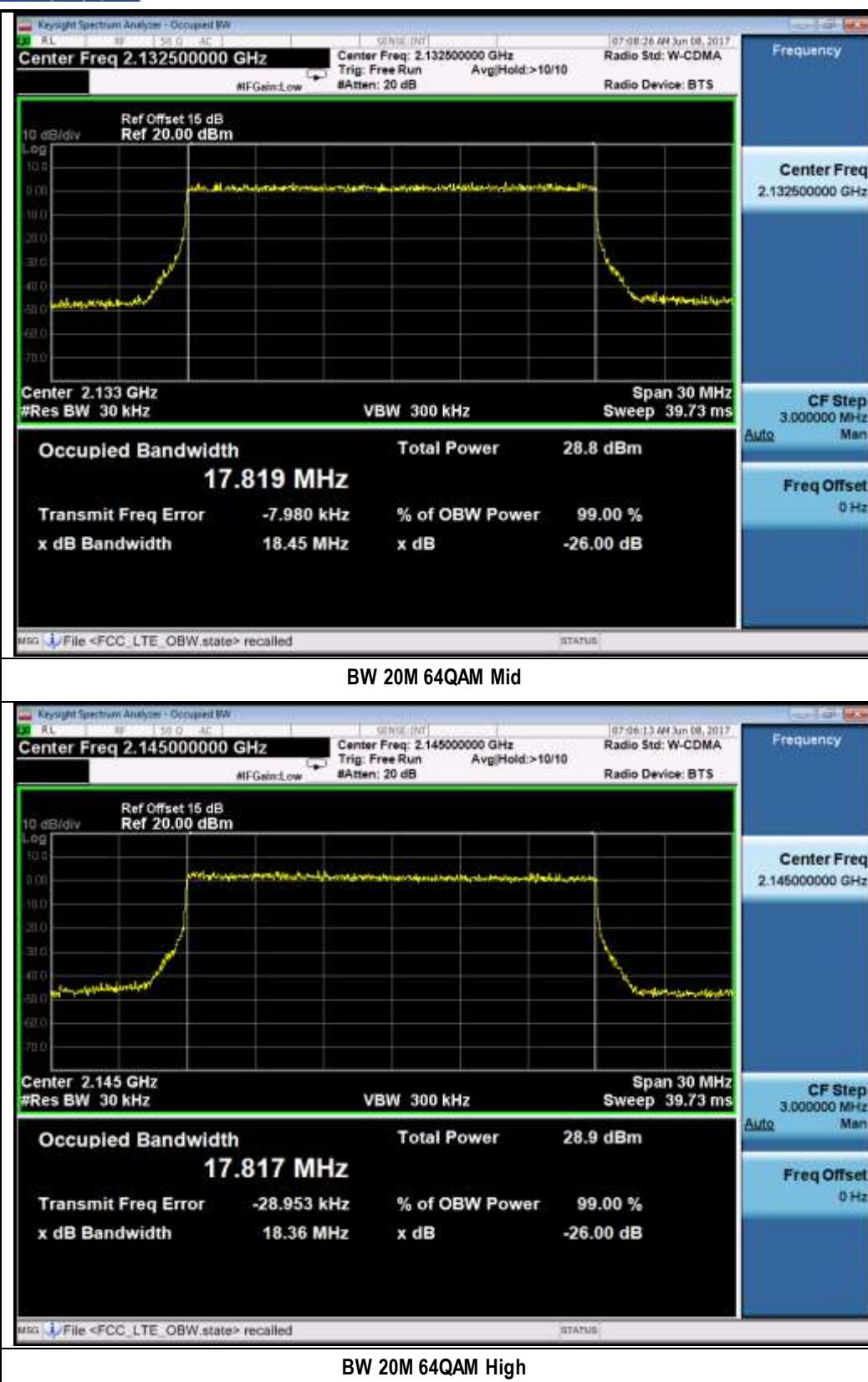


BW 10M 64QAM Low

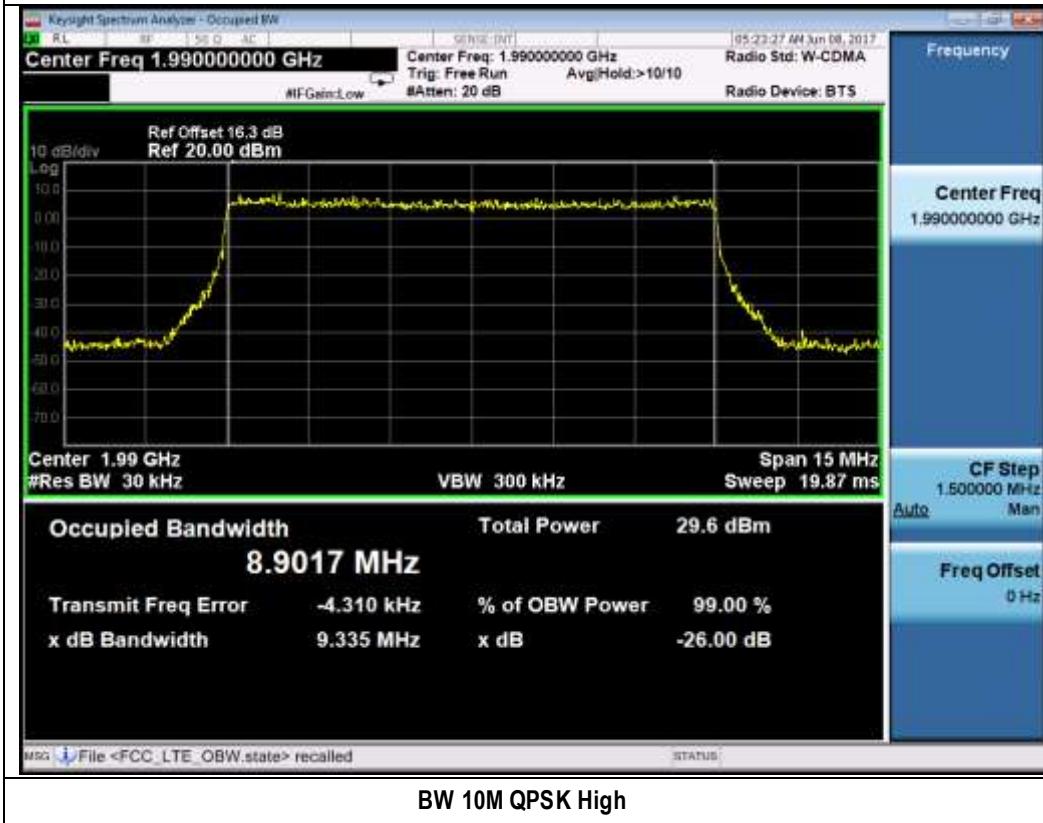








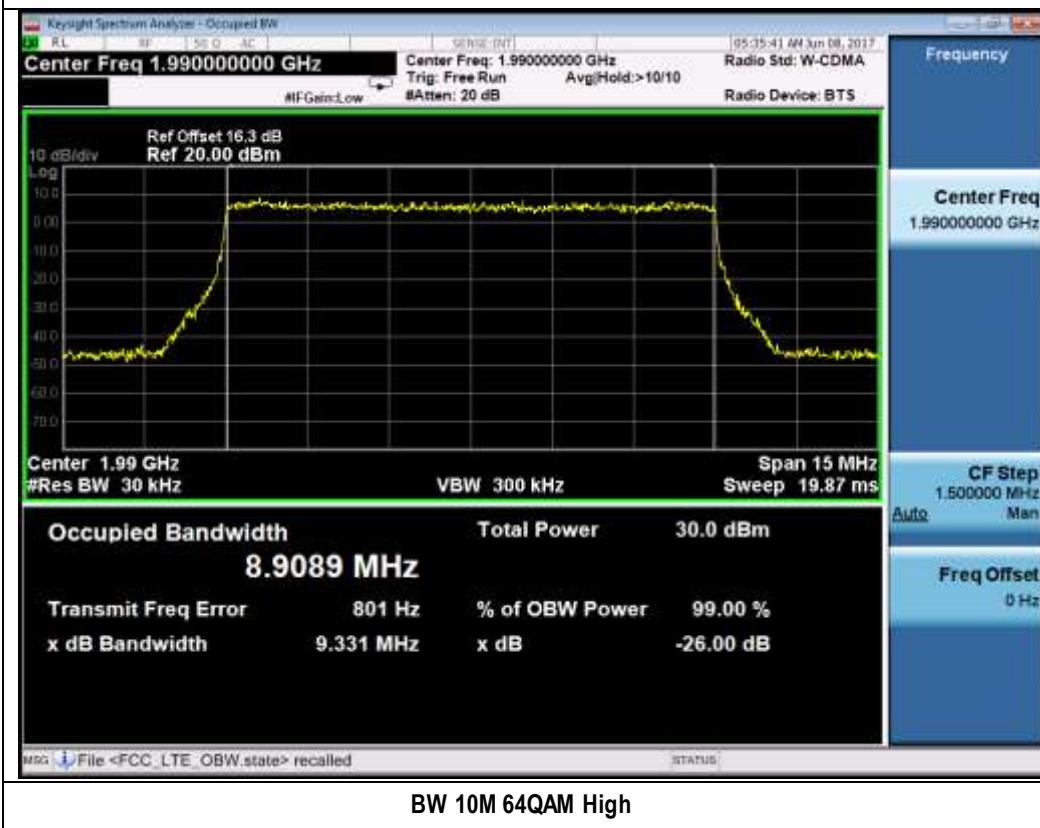
Test Plots for LTE band 25:


BW 5M QPSK High

BW 10M QPSK High





BW 5M 64QAM High



BW 10M 64QAM High



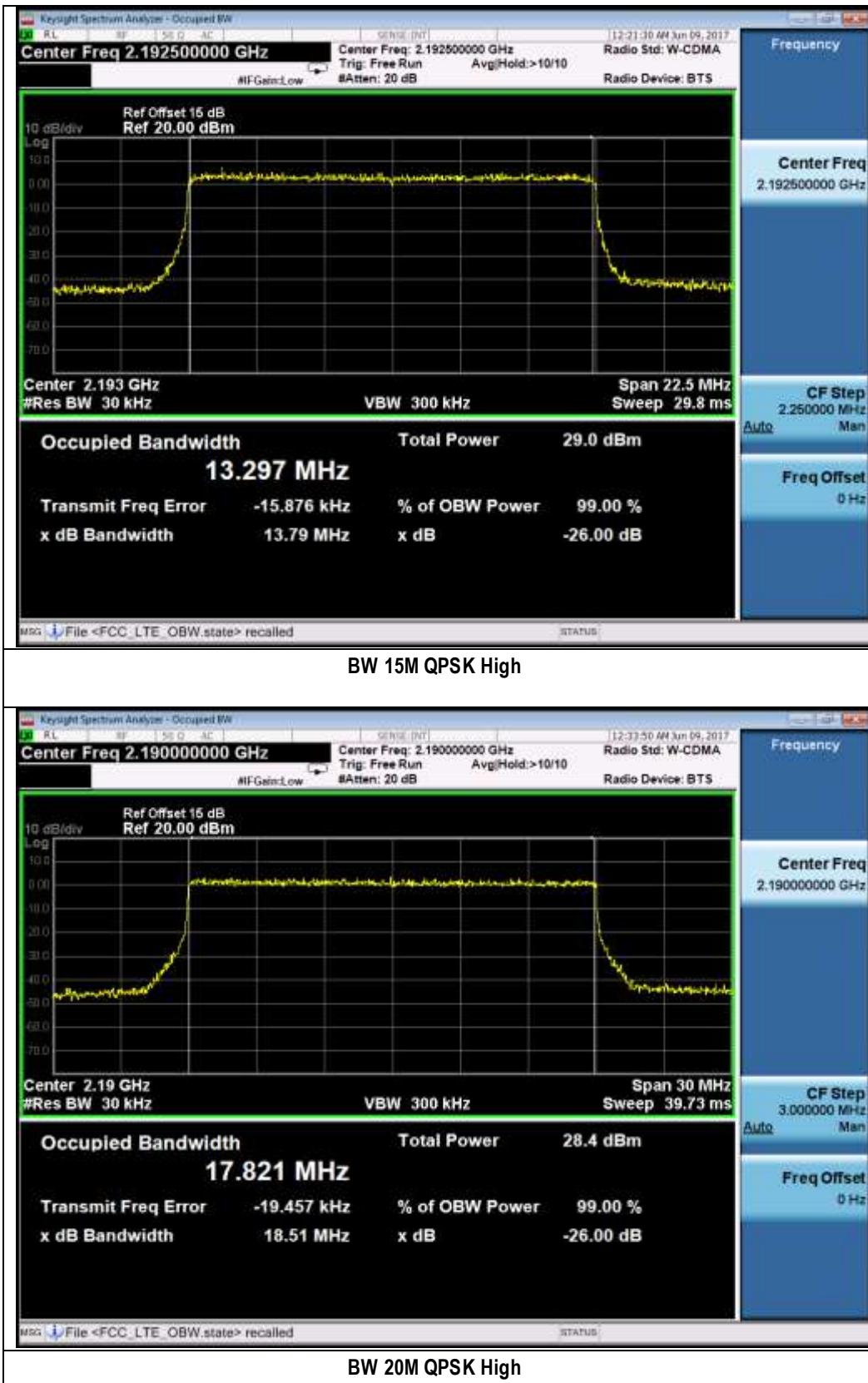
BW 15M 64QAM High



BW 20M 64QAM High

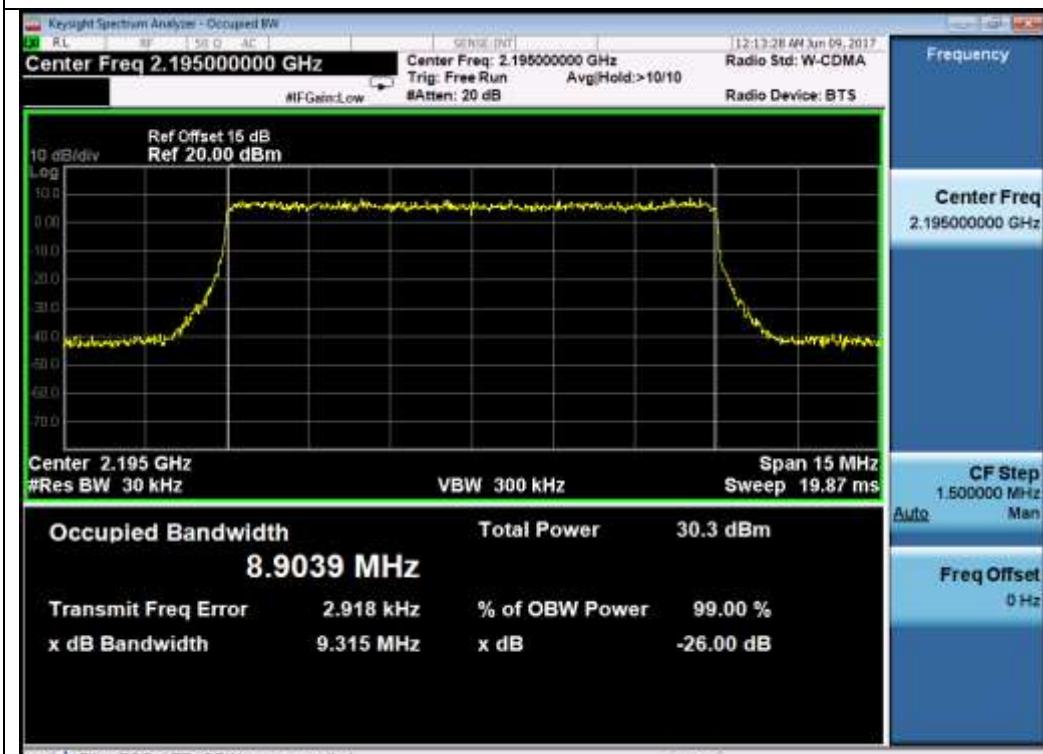
Test Plots for LTE band 66:



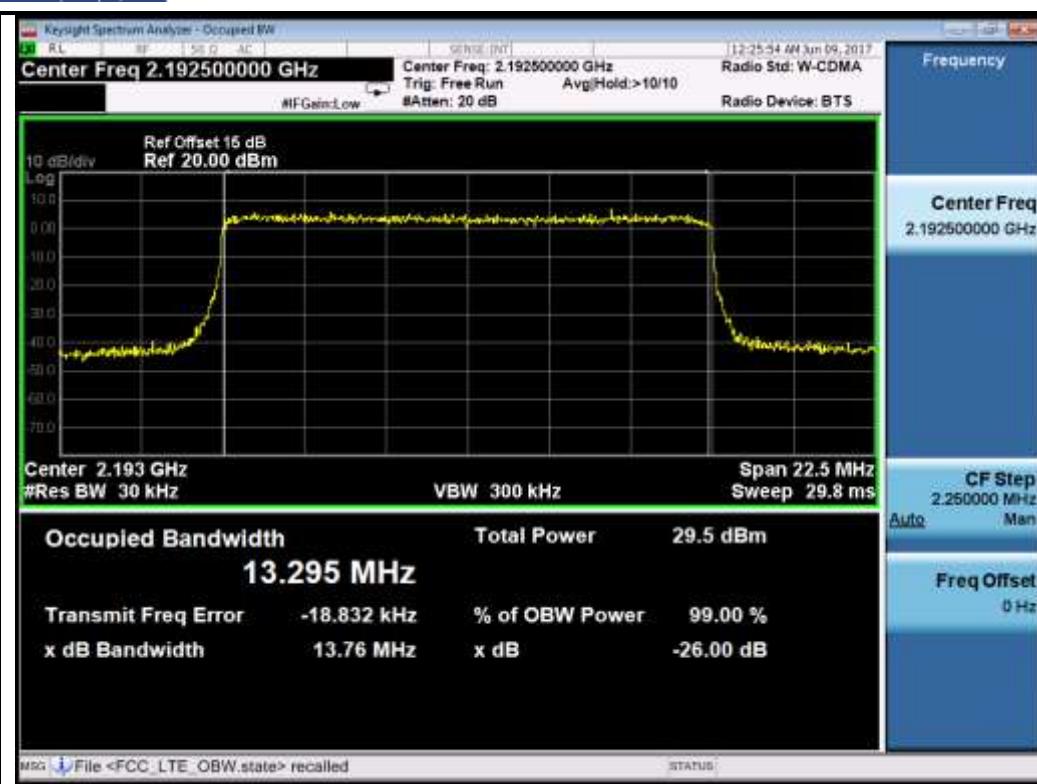




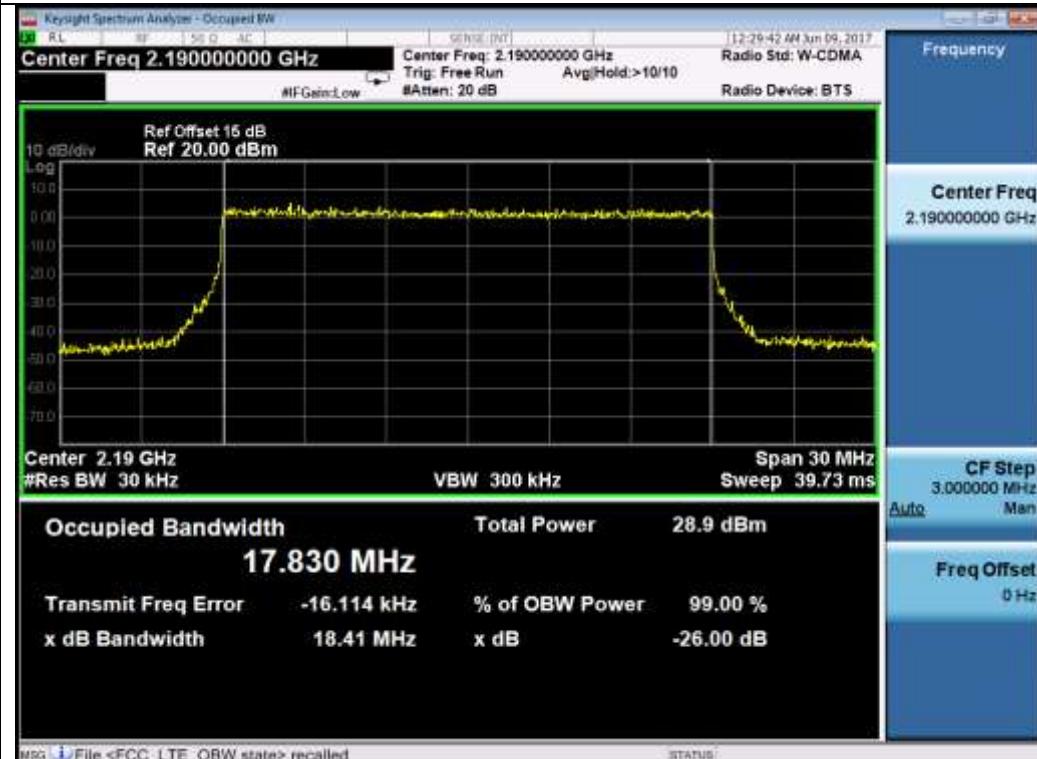
BW 5M 64QAM High



BW 10M 64QAM High



BW 15M 64QAM High



BW 20M 64QAM High

Test Plots for LTE band 13:

