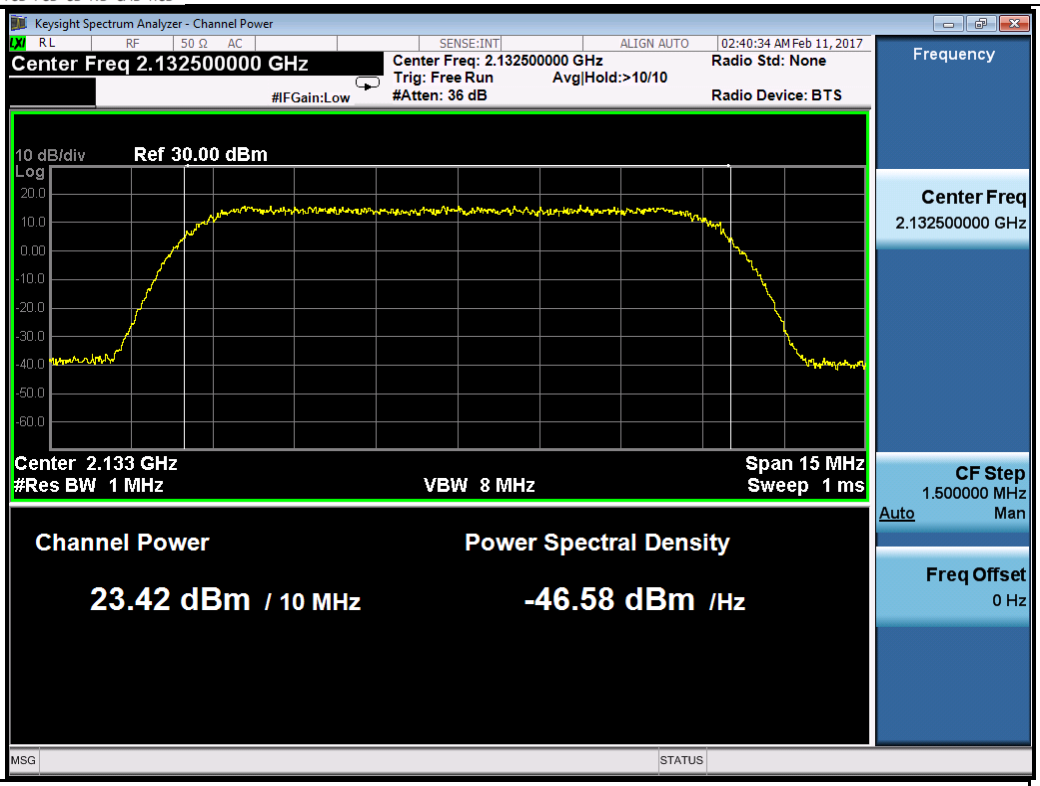
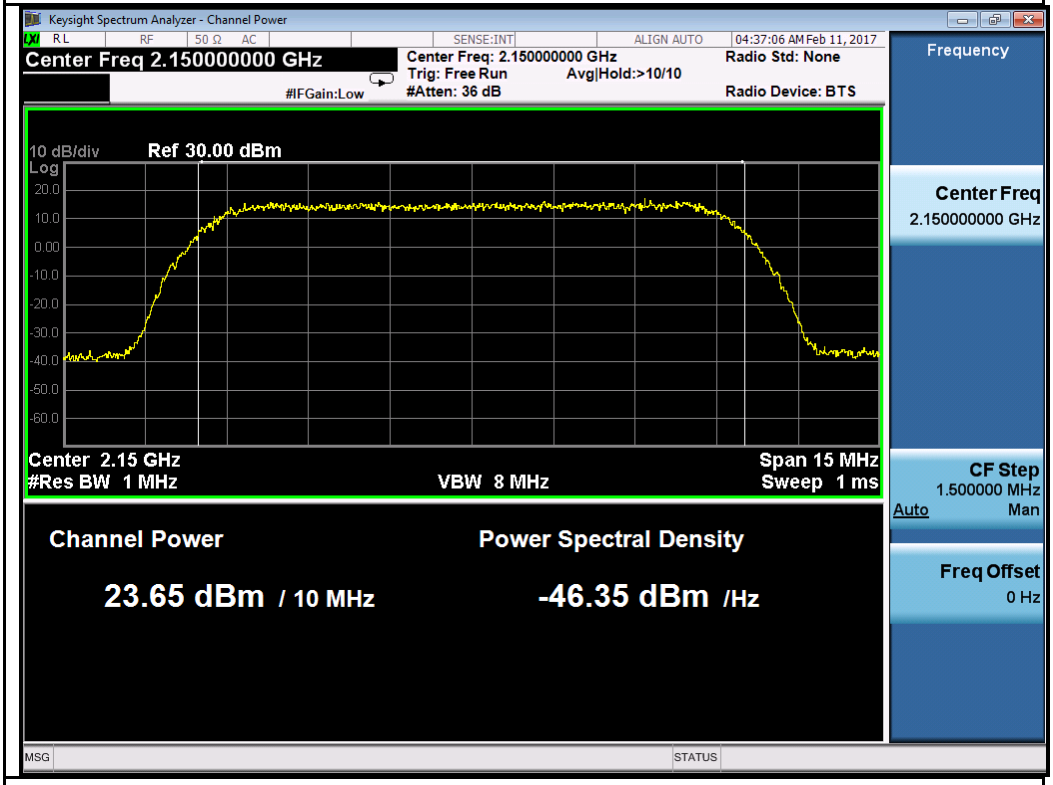
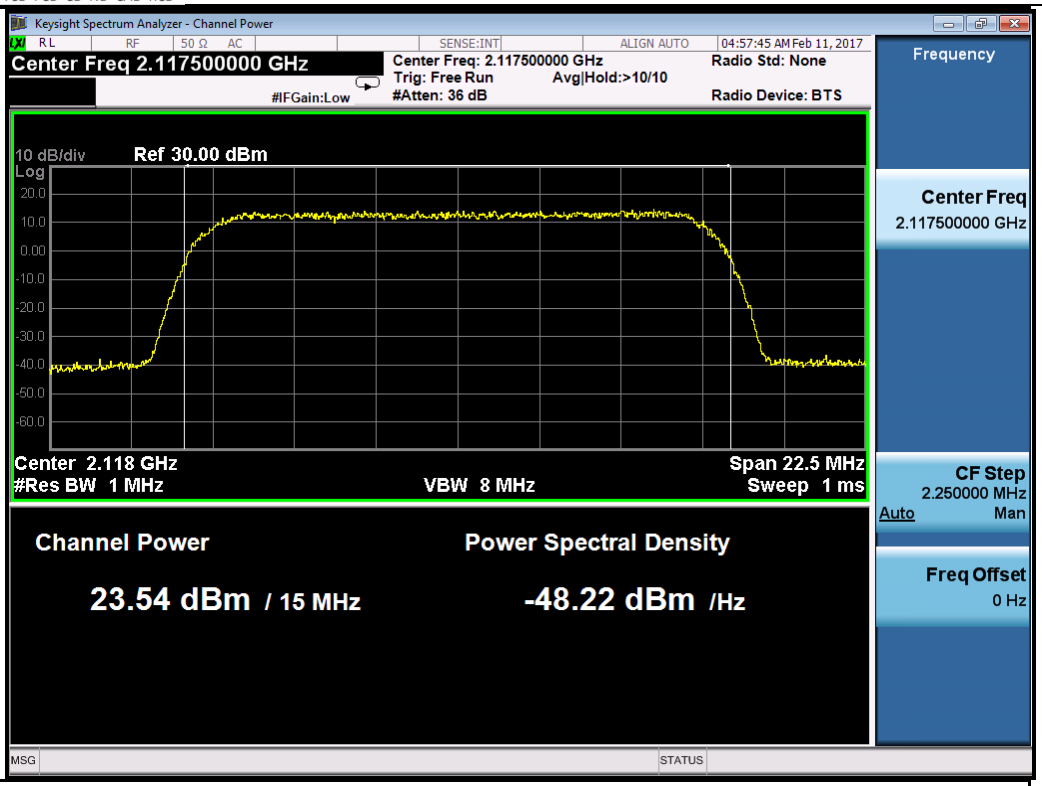


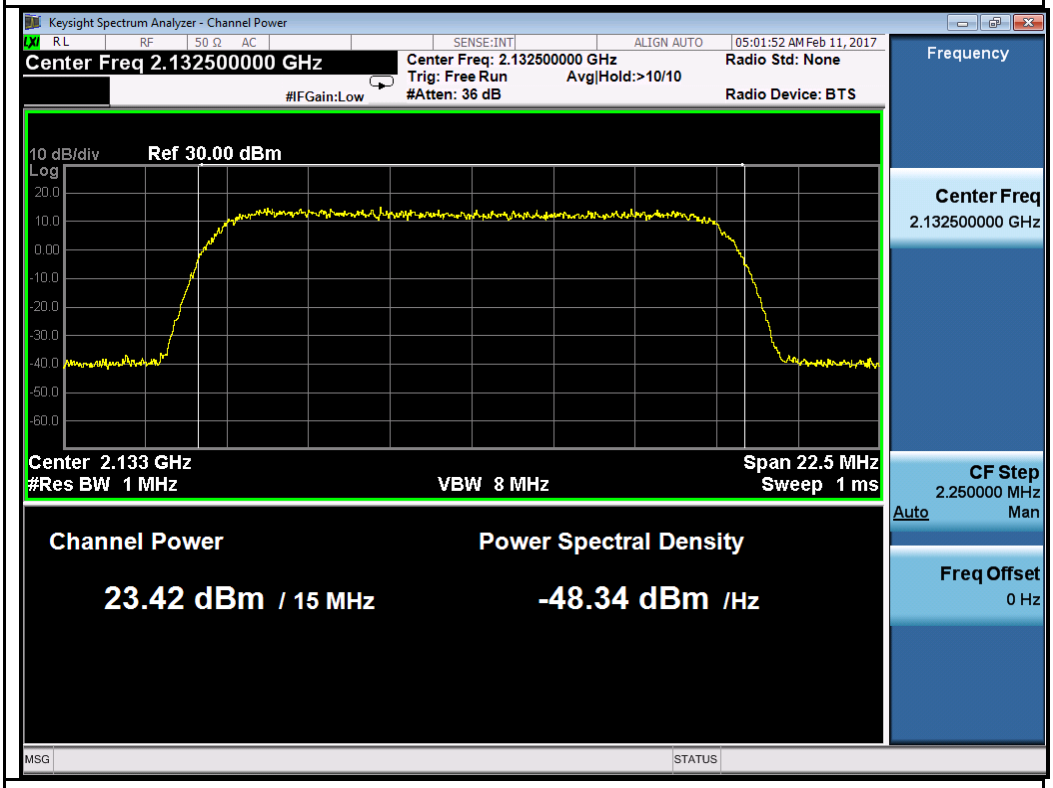
BW 10M 64QAM Mid



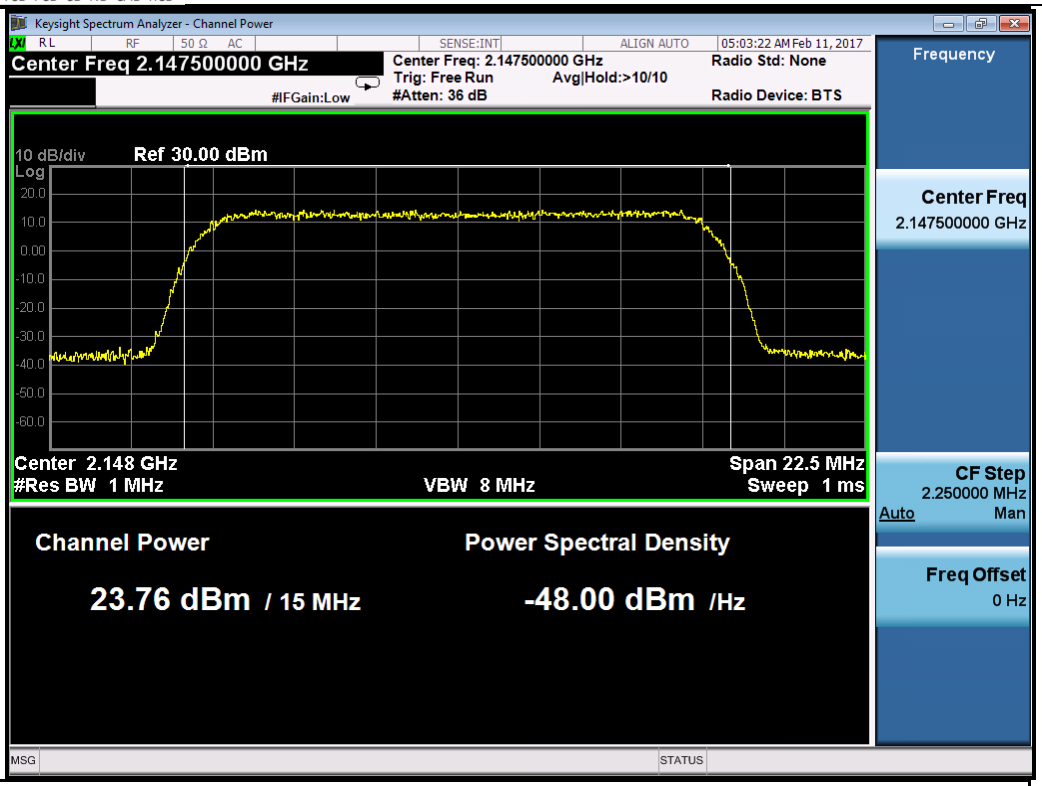
BW 10M 64QAM High



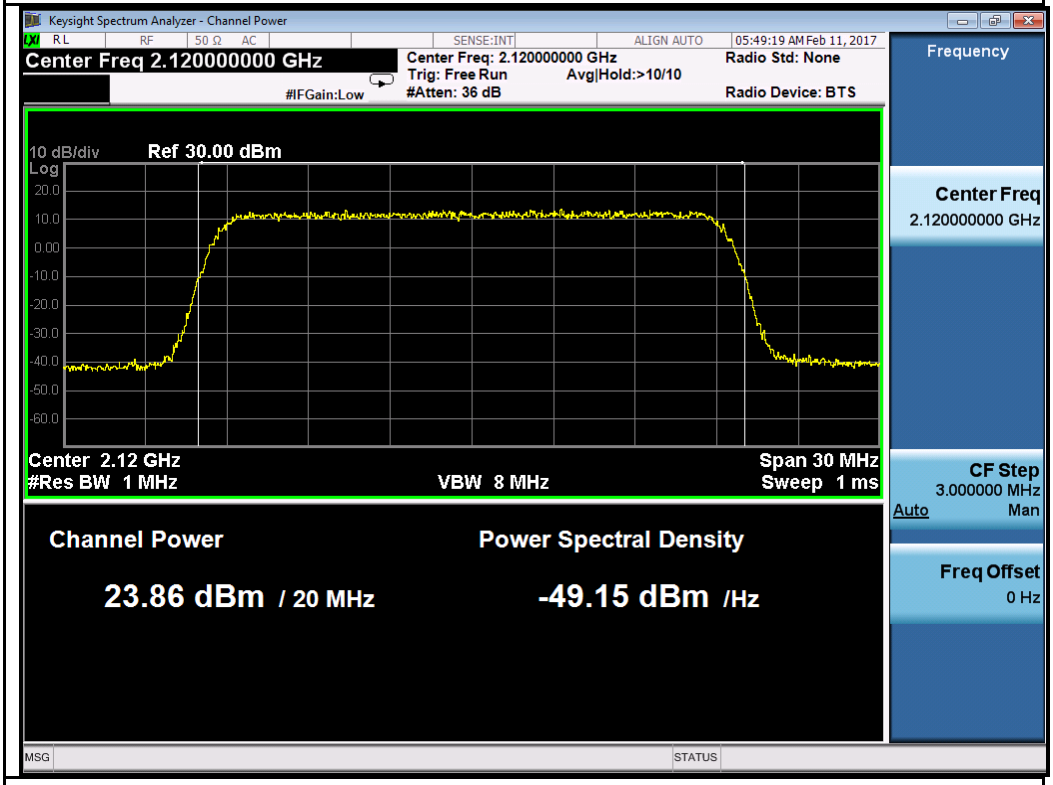
BW 15M 64QAM Low



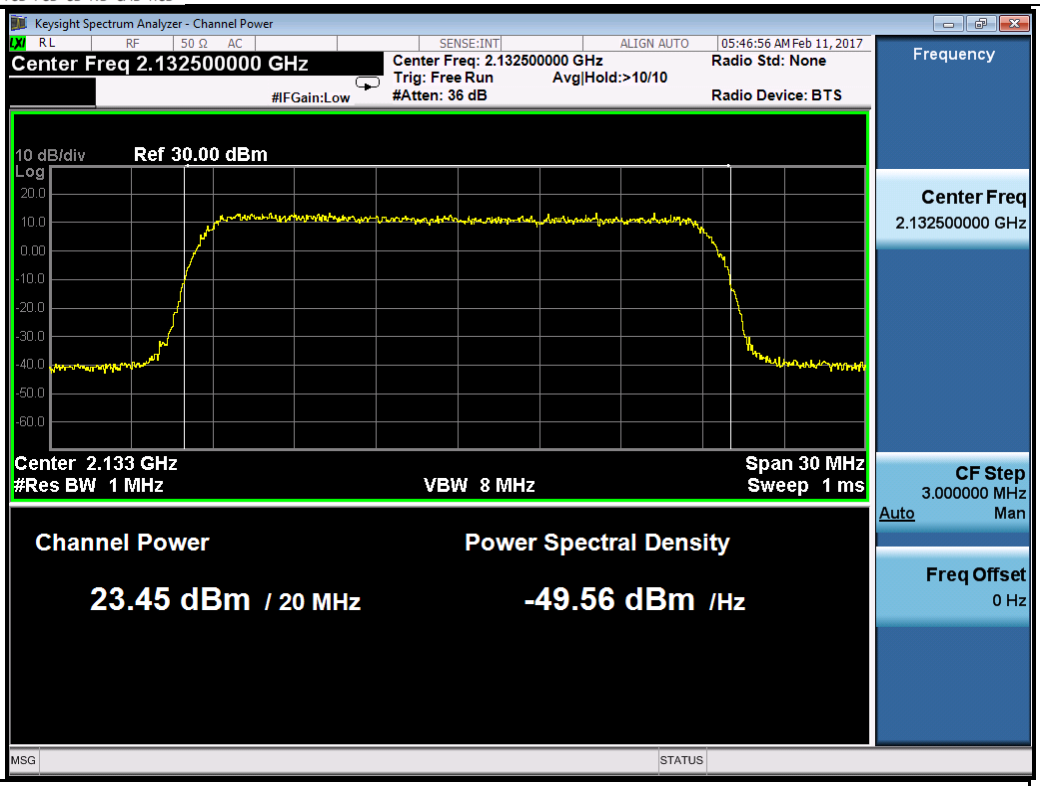
BW 15M 64QAM Mid



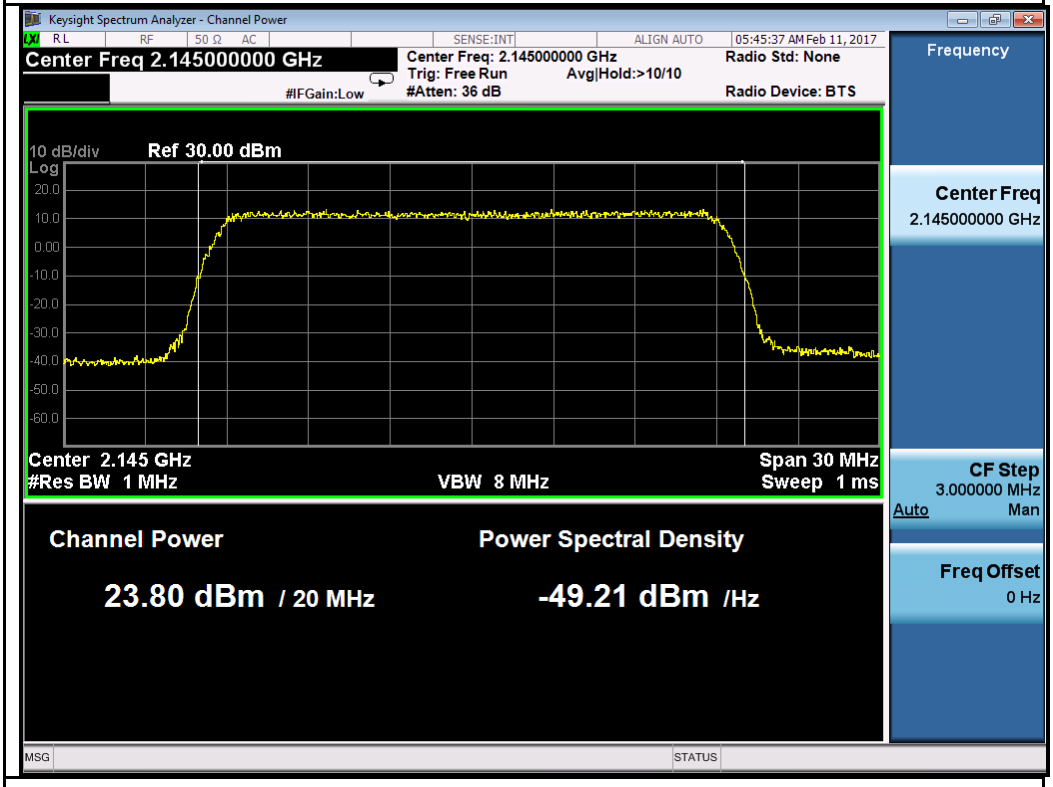
BW 15M 64QAM High



BW 20M 64QAM Low



BW 20M 64QAM Mid

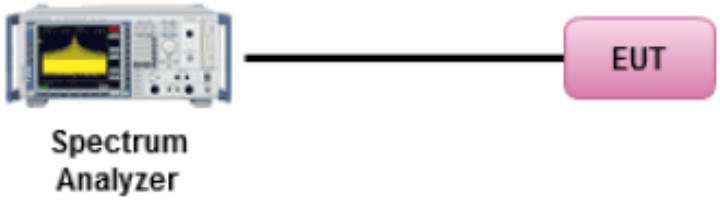


BW 20M 64QAM High

10.2 Peak-Average Ratio

Requirement(s):

Spec	Item	Requirement	Applicable
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	01/13/2017 – 02/10/2017	Environmental condition	Temperature Relative Humidity Atmospheric Pressure	23°C 48% 1008mbar
Remark	NONE			
Result	☒ Pass ☐ Fail			

Test Data ☒ Yes ☐ N/A

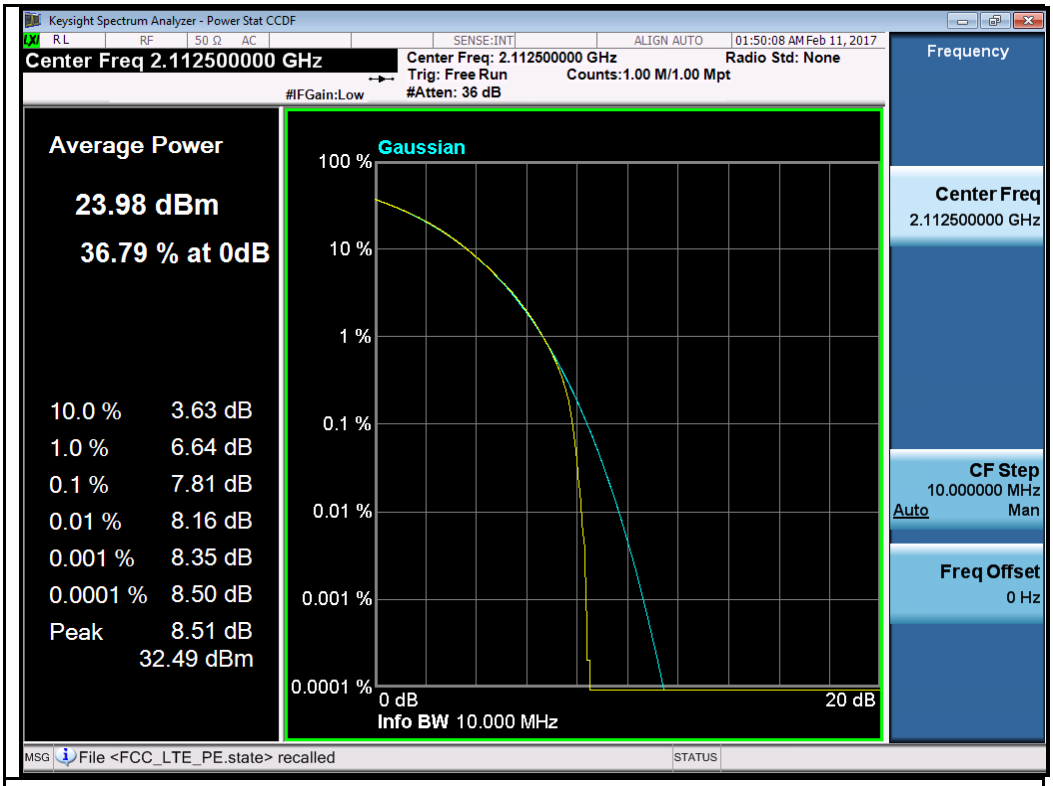
Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Chen Ge at RF Test Site.

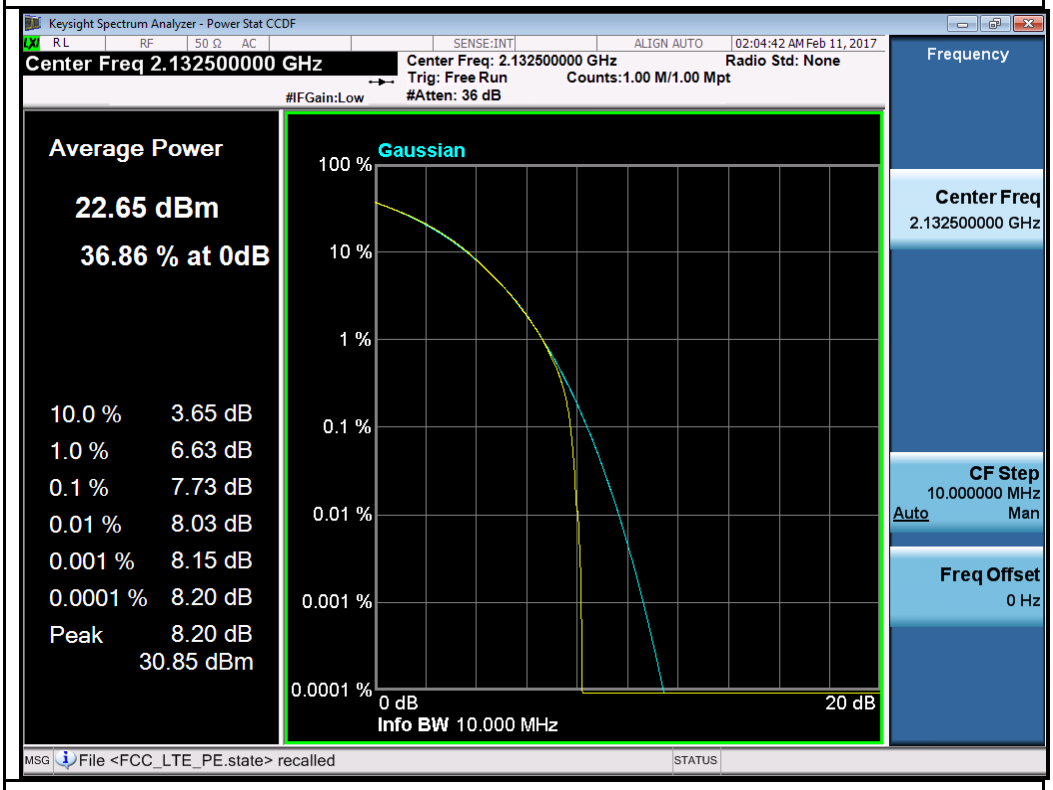
Test Data for LTE band 4:

Type	Channel	Frequency (MHz)	Peak-Average Ratio (dB)	Peak-Average Ratio (dB)
5MHz BW, QPSK	Low	2112.5	8.35	13
	Mid	2132.5	8.15	13
	High	2152.5	7.98	13
5MHz BW, 64QAM	Low	2112.5	8.04	13
	Mid	2132.5	8.05	13
	High	2152.5	7.95	13
10MHz BW, QPSK	Low	2115.0	7.83	13
	Mid	2132.5	7.79	13
	High	2150.0	7.79	13
10MHz BW, 64QAM	Low	2115.0	7.72	13
	Mid	2132.5	7.64	13
	High	2150.0	7.67	13
15MHz BW, QPSK	Low	2117.5	9.24	13
	Mid	2132.5	9.18	13
	High	2147.5	9.27	13
15MHz BW, 64QAM	Low	2117.5	8.84	13
	Mid	2132.5	8.43	13
	High	2147.5	8.71	13
20MHz BW, QPSK	Low	2120.0	9.78	13
	Mid	2132.5	9.74	13
	High	2145.0	9.74	13
20MHz BW, 64QAM	Low	2120.0	9.61	13
	Mid	2132.5	9.79	13
	High	2145.0	9.74	13

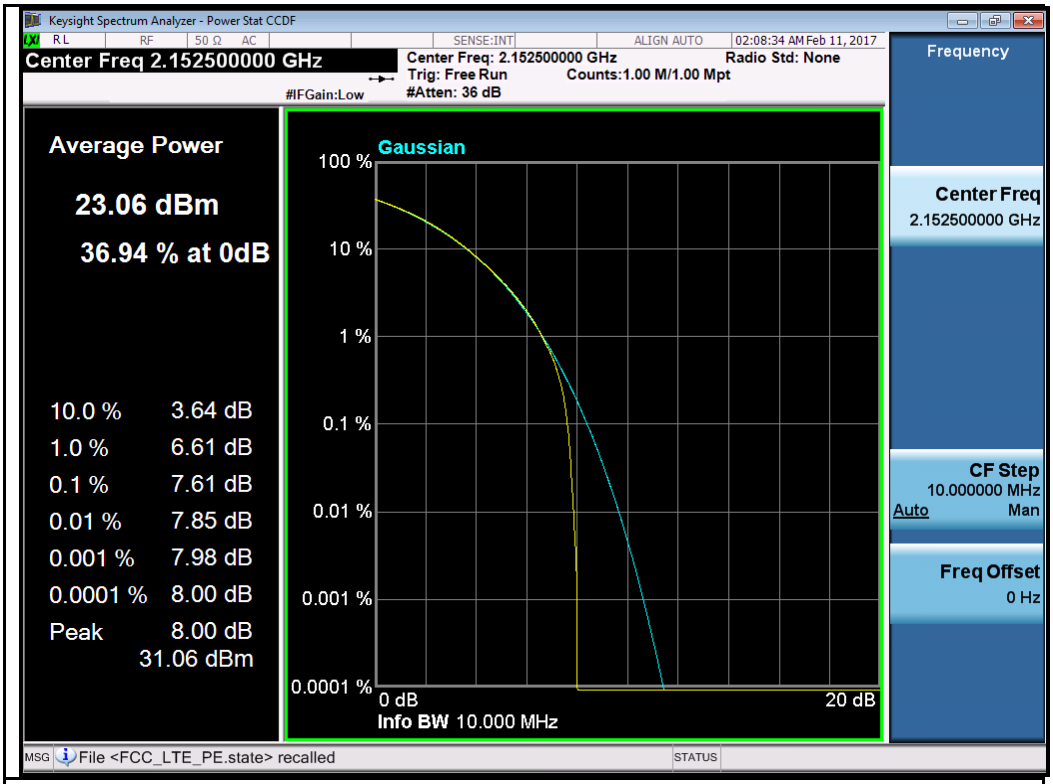
Test Plots for LTE band 4:



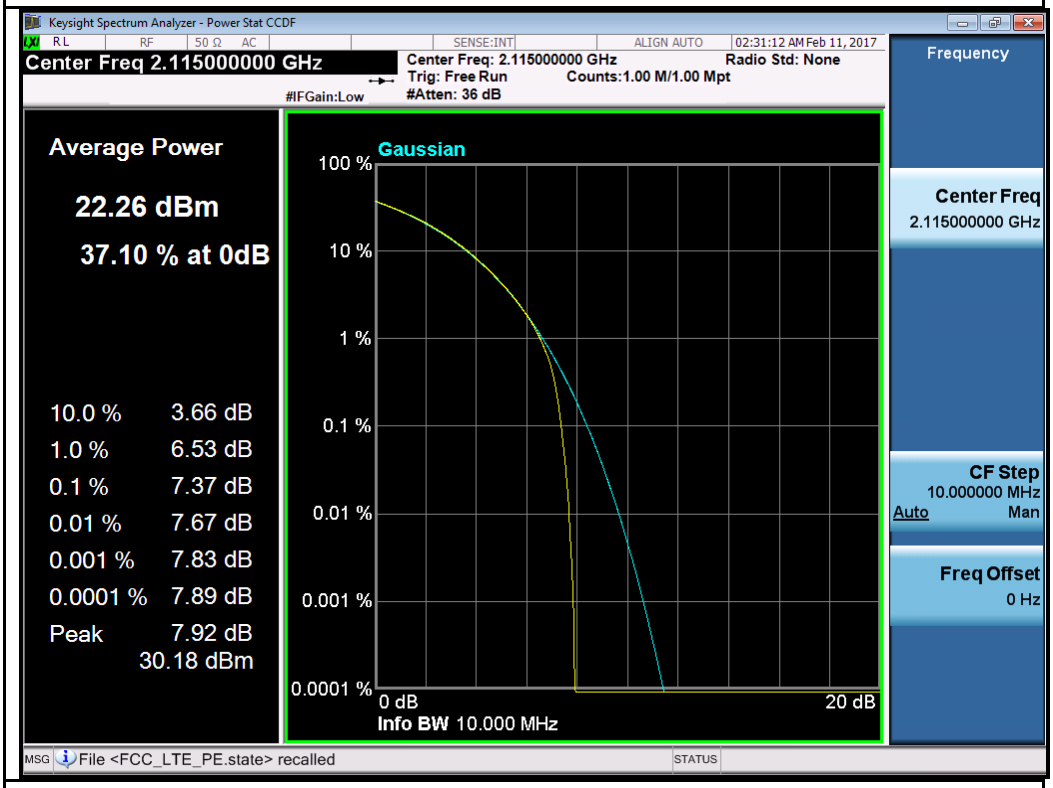
BW 5M QPSK Low



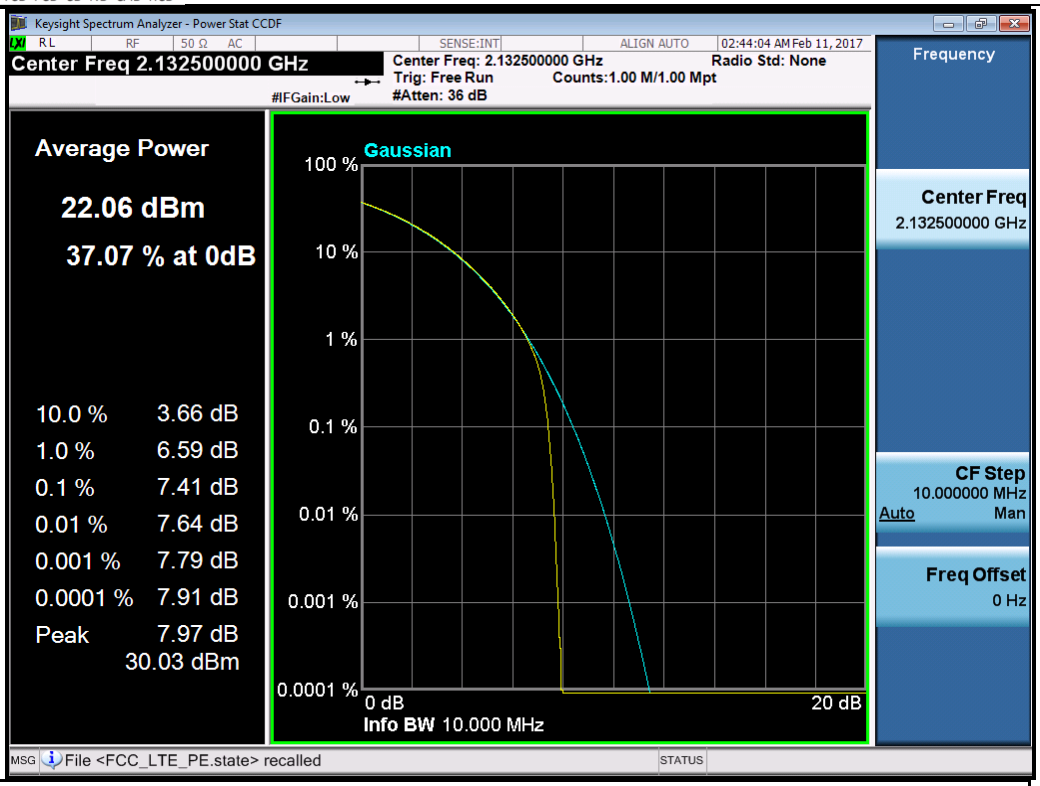
BW 5M QPSK Mid



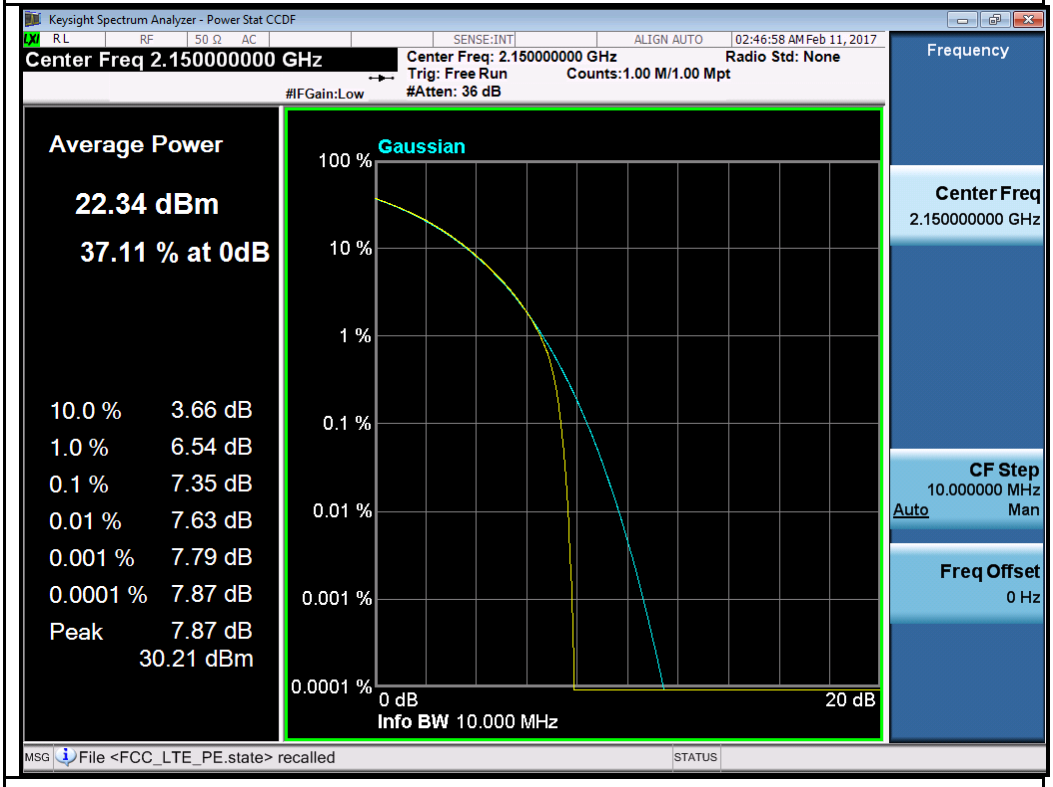
BW 5M QPSK High



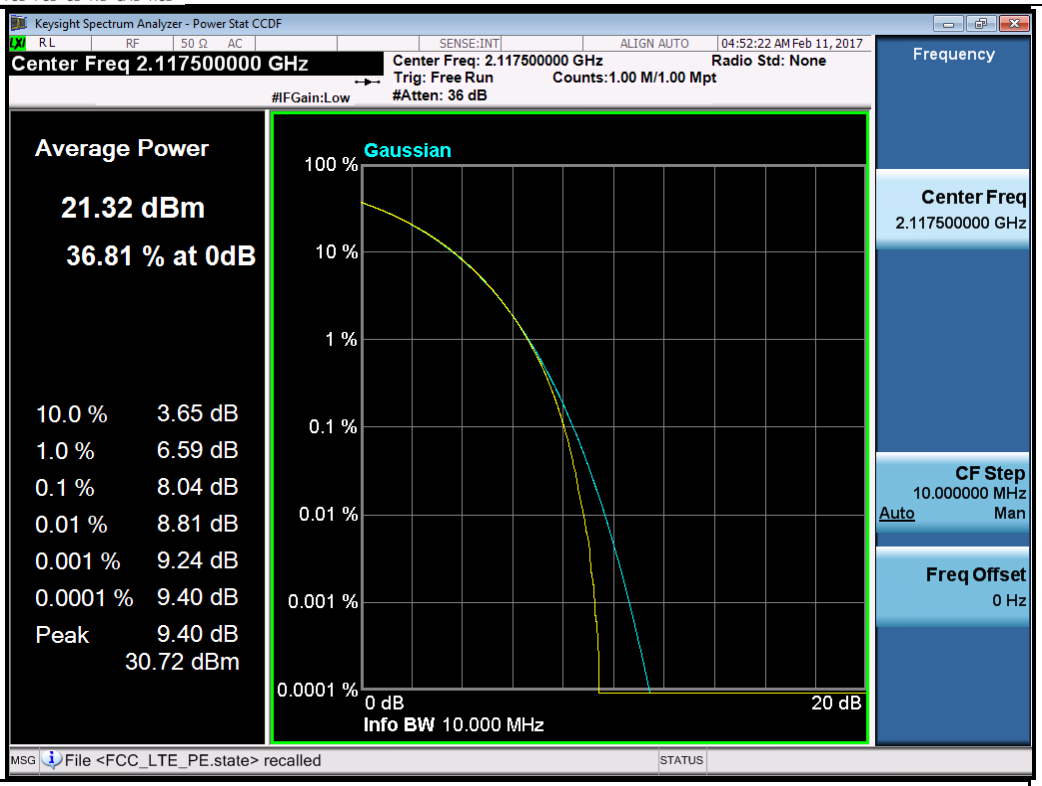
BW 10M QPSK Low



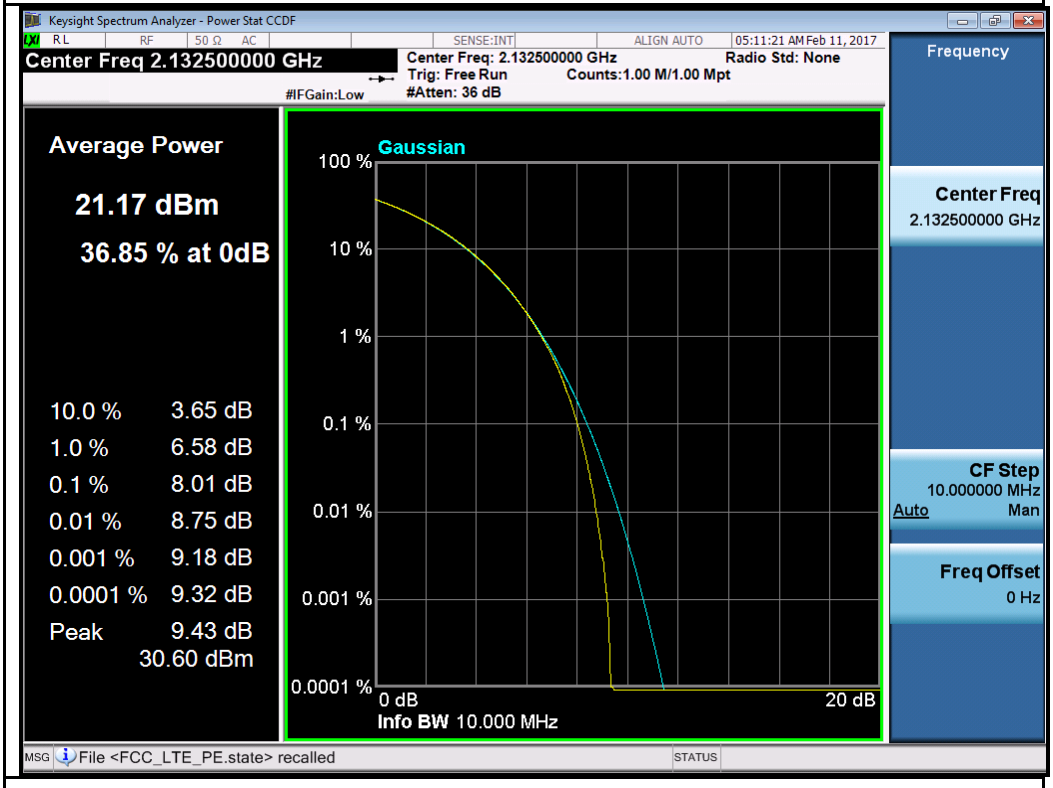
BW 10M QPSK Mid



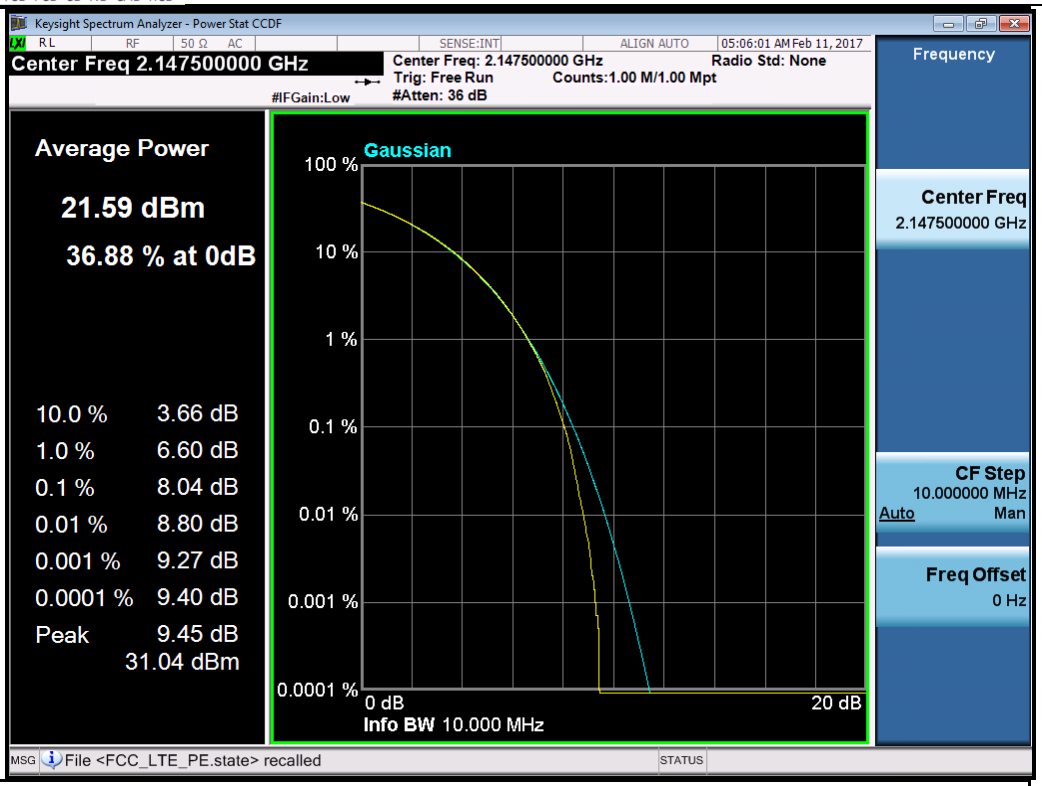
BW 10M QPSK High



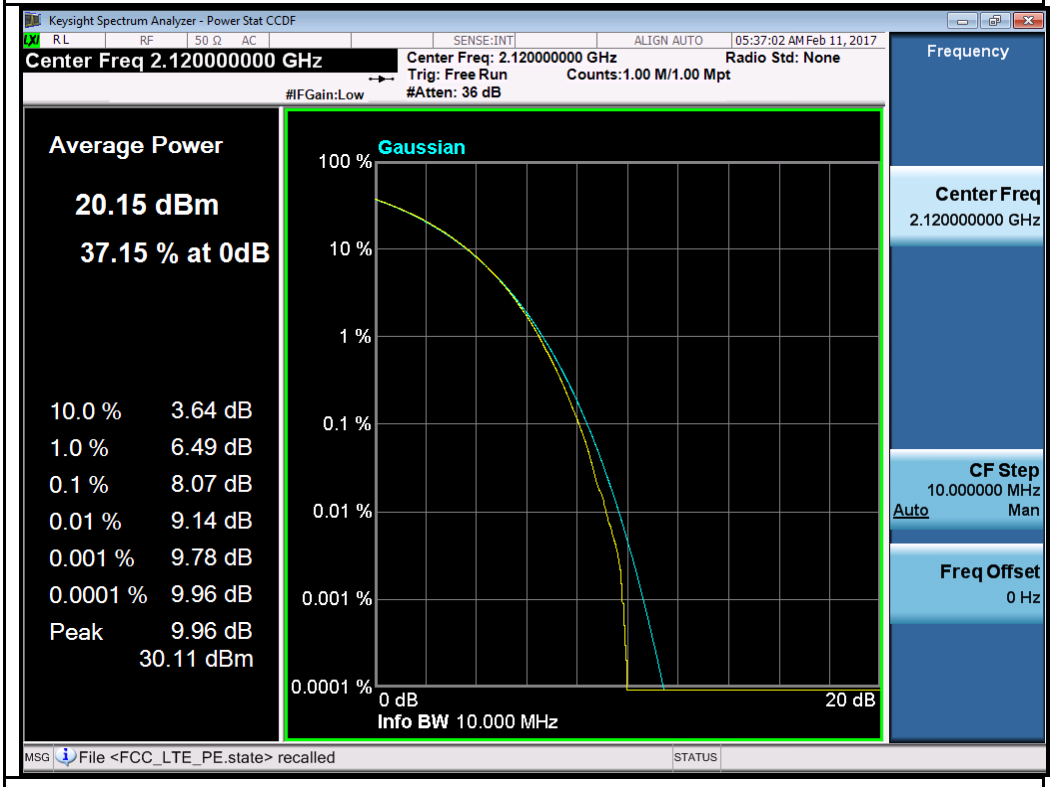
BW 15M QPSK Low



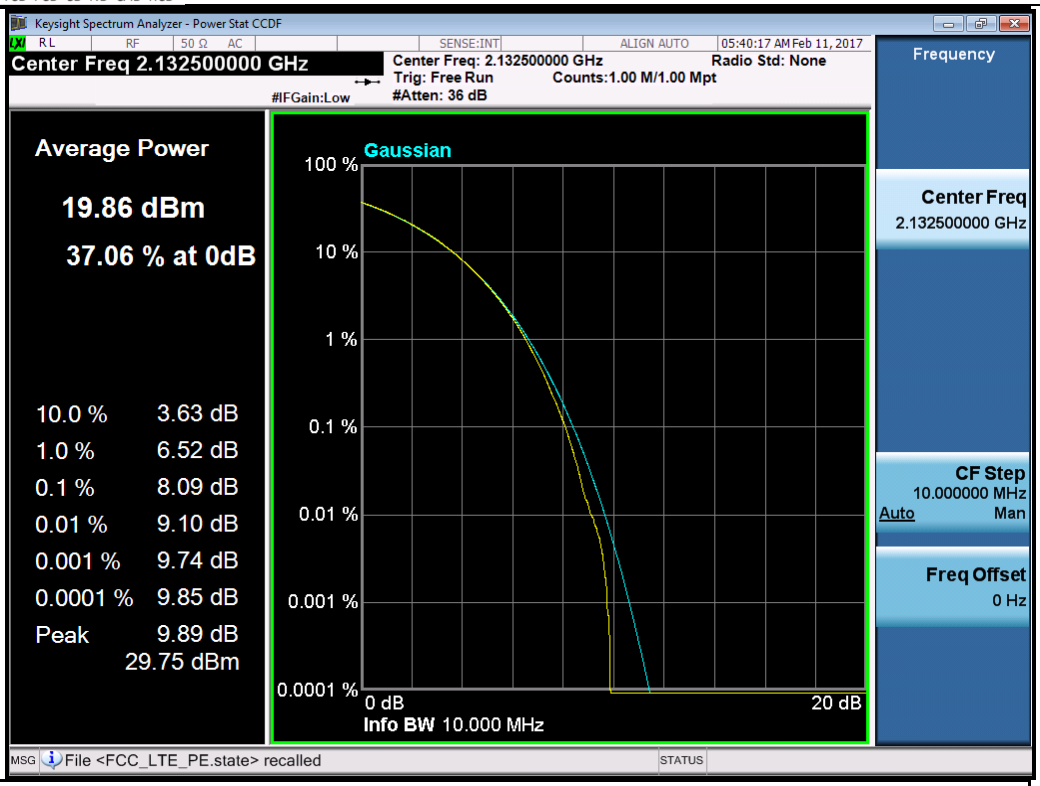
BW 15M QPSK Mid



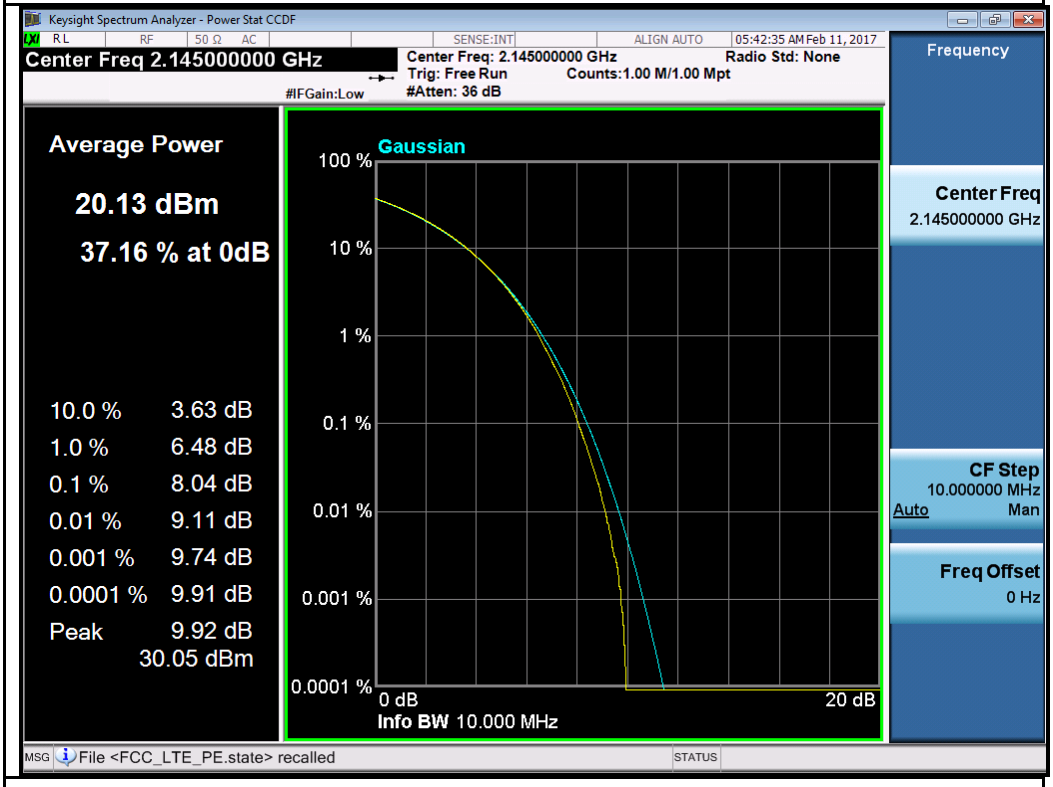
BW 15M QPSK High



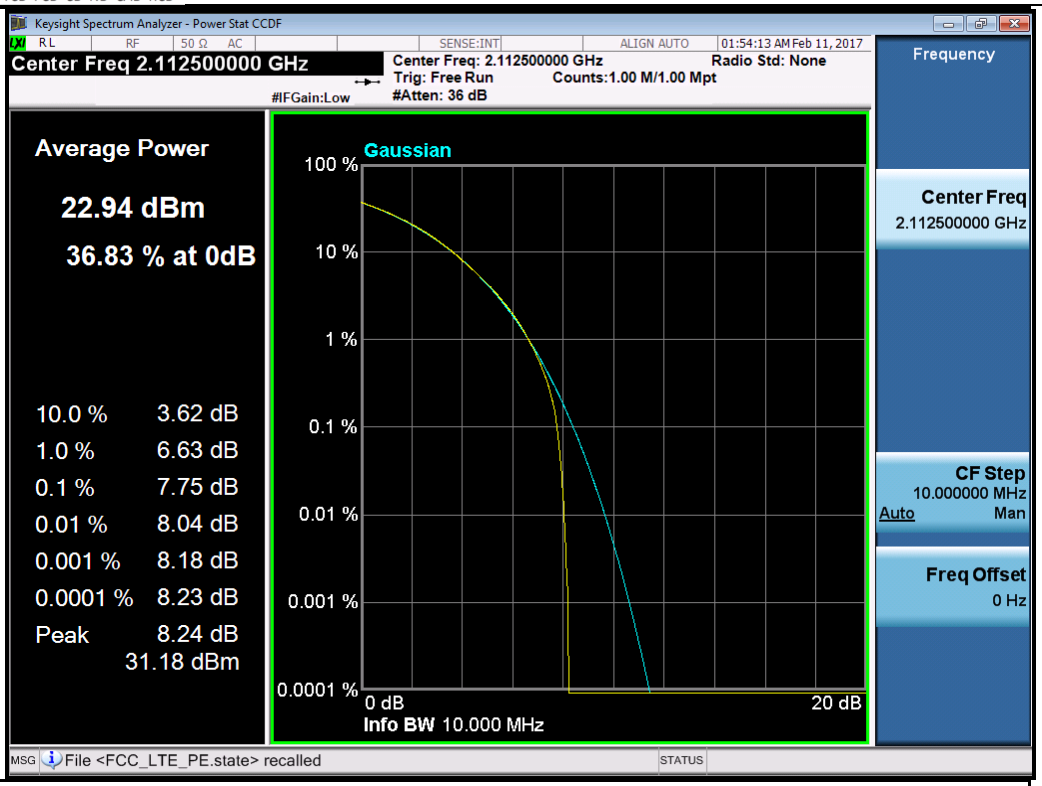
BW 20M QPSK Low



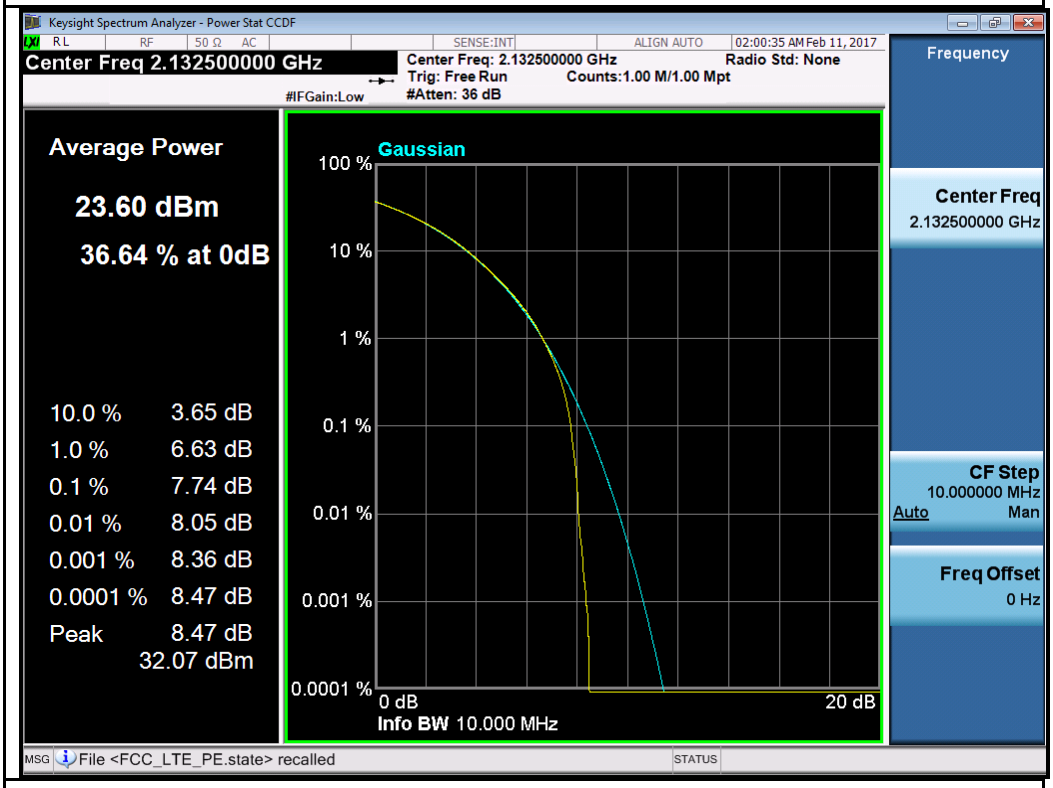
BW 20M QPSK Mid



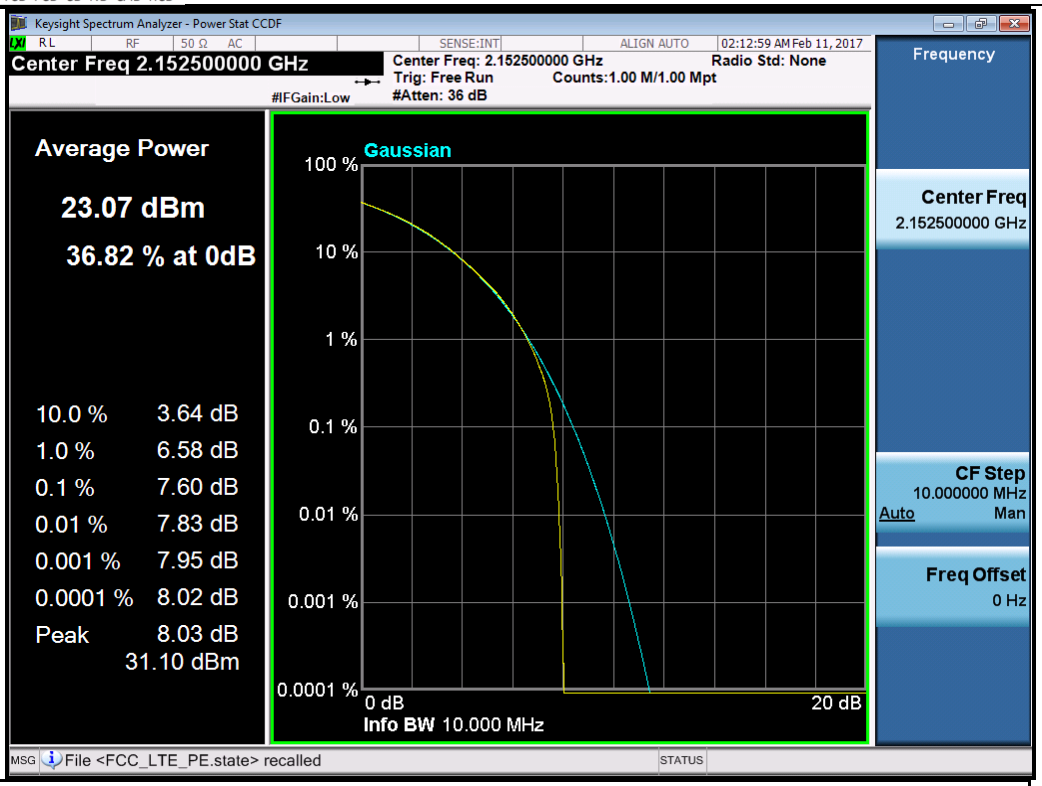
BW 20M QPSK High



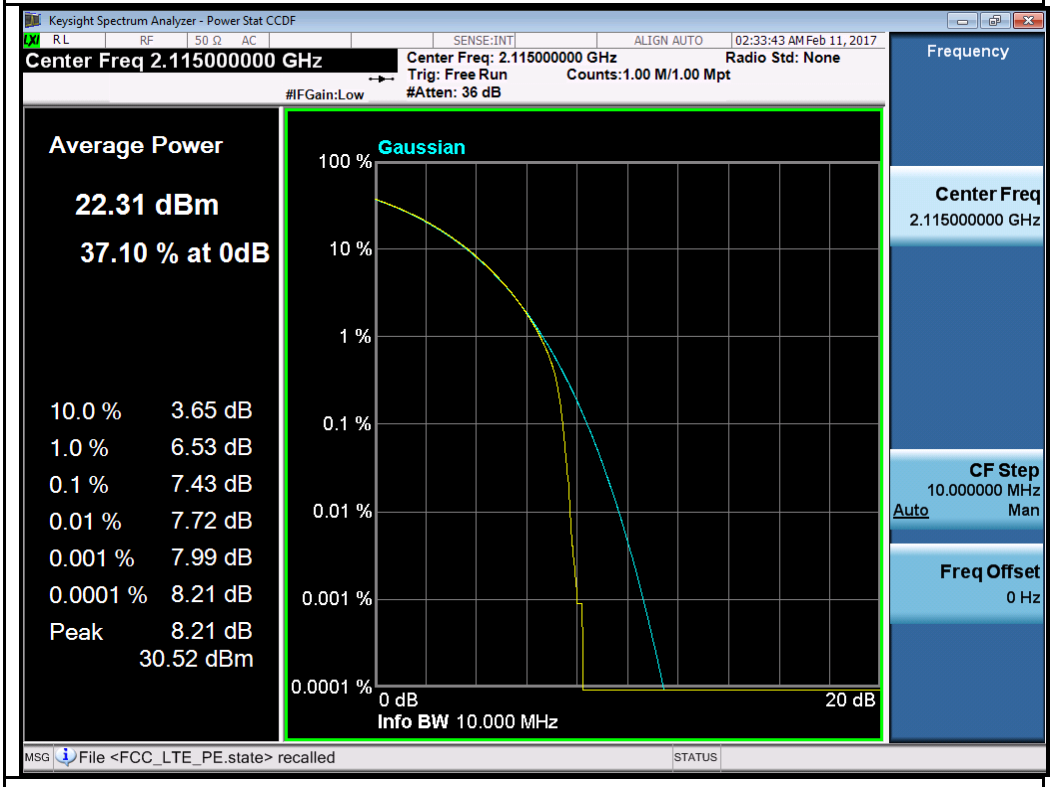
BW 5M 64QAM Low



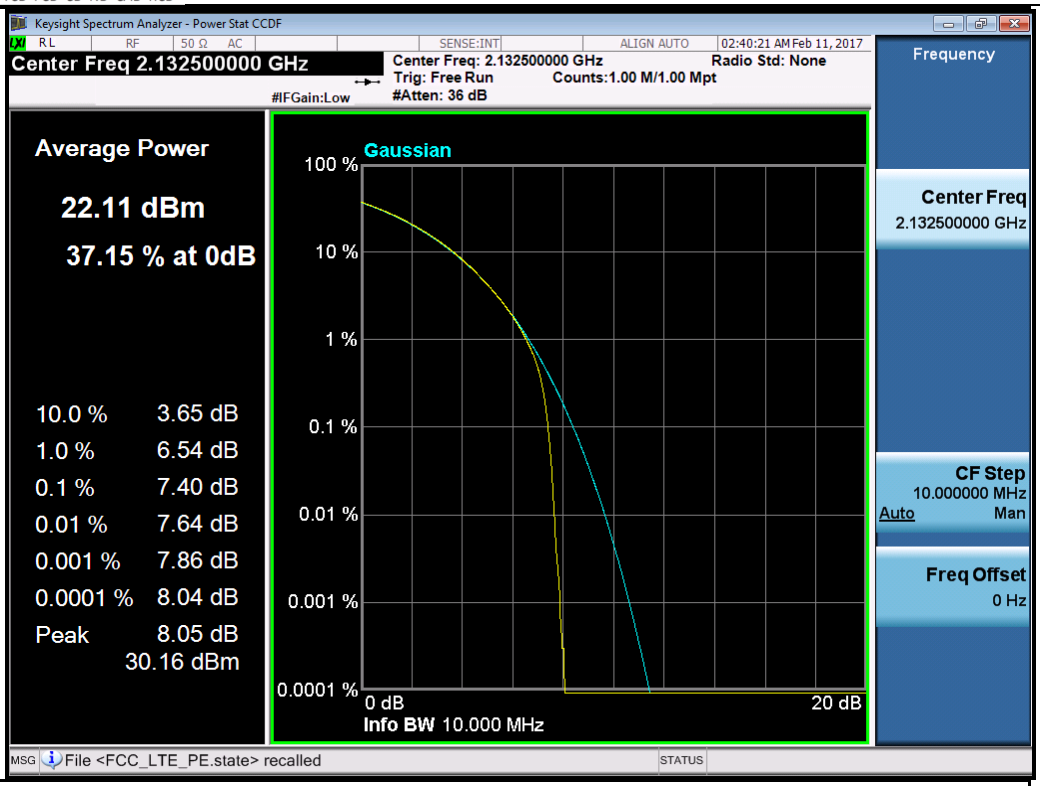
BW 5M 64QAM Mid



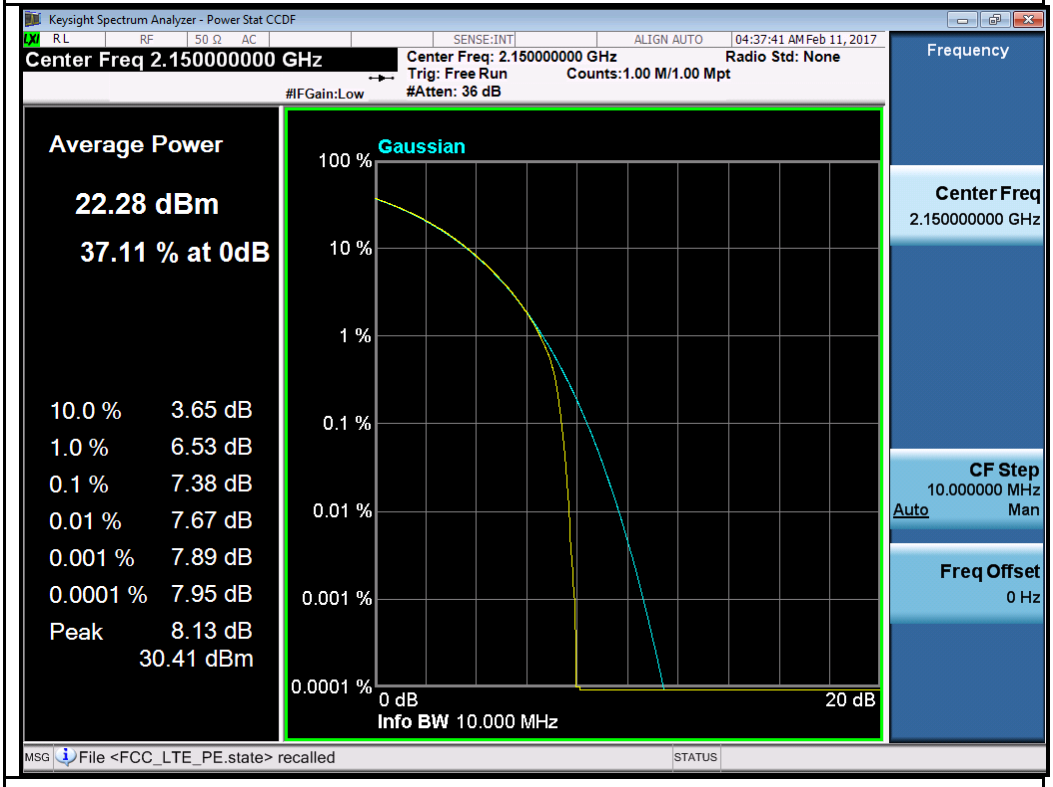
BW 5M 64QAM High



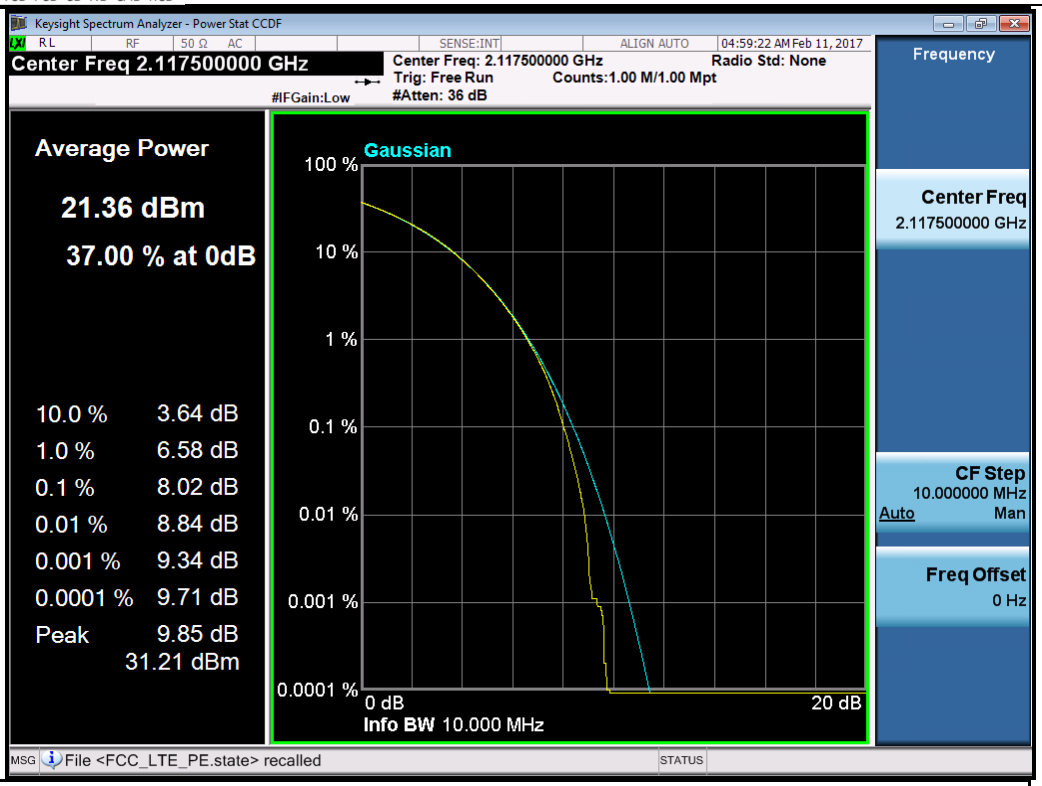
BW 10M 64QAM Low



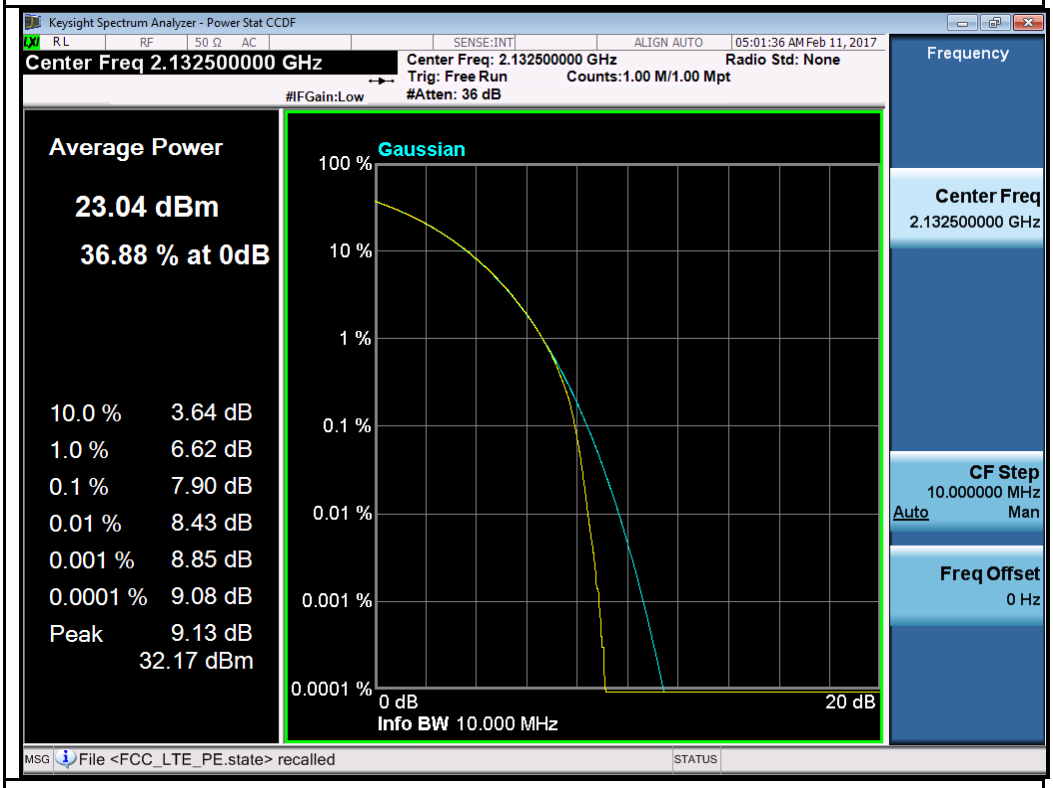
BW 10M 64QAM Mid



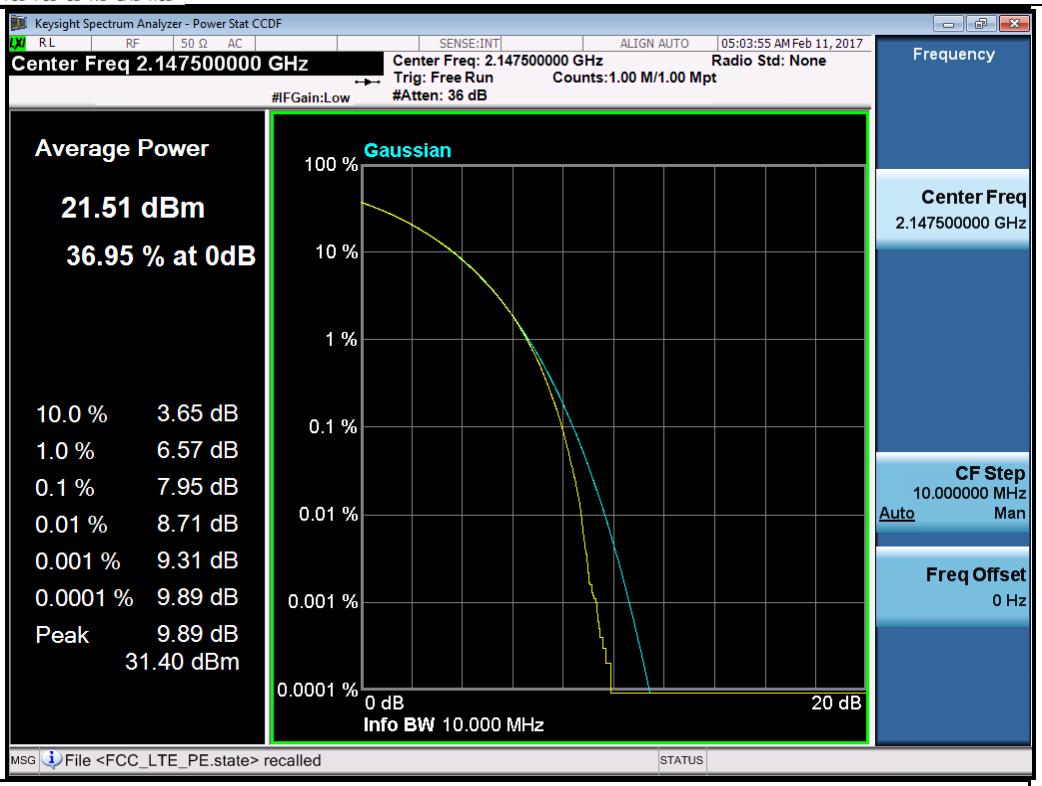
BW 10M 64QAM High



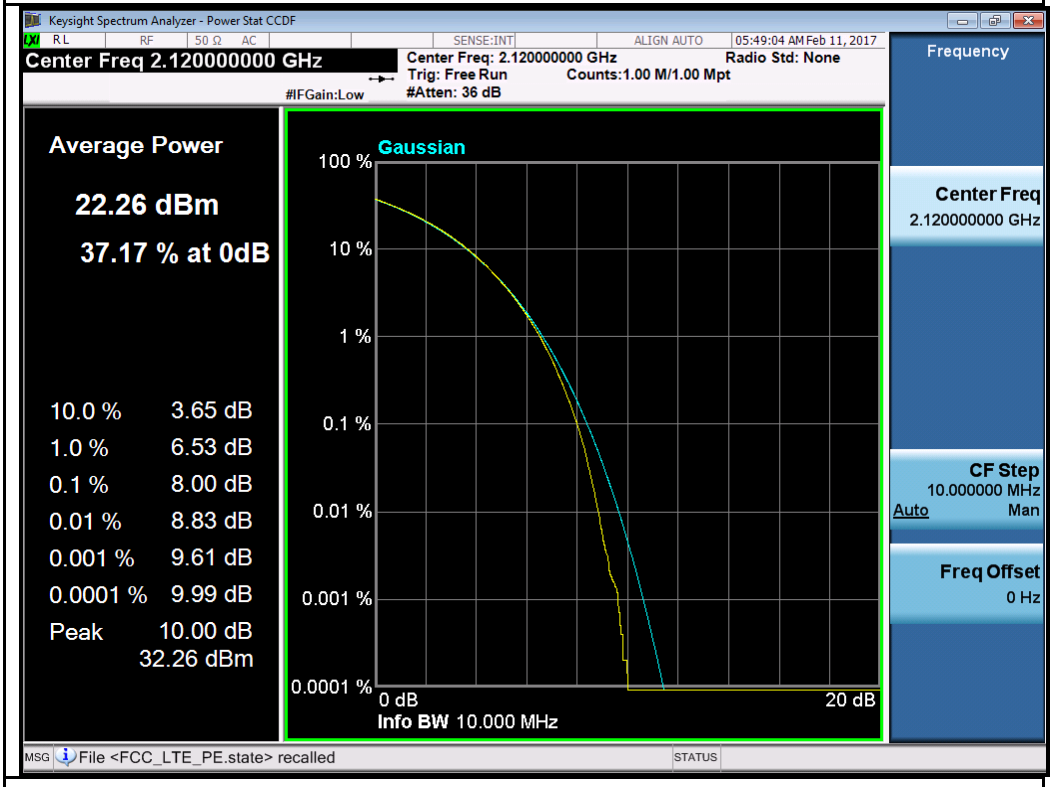
BW 15M 64QAM Low



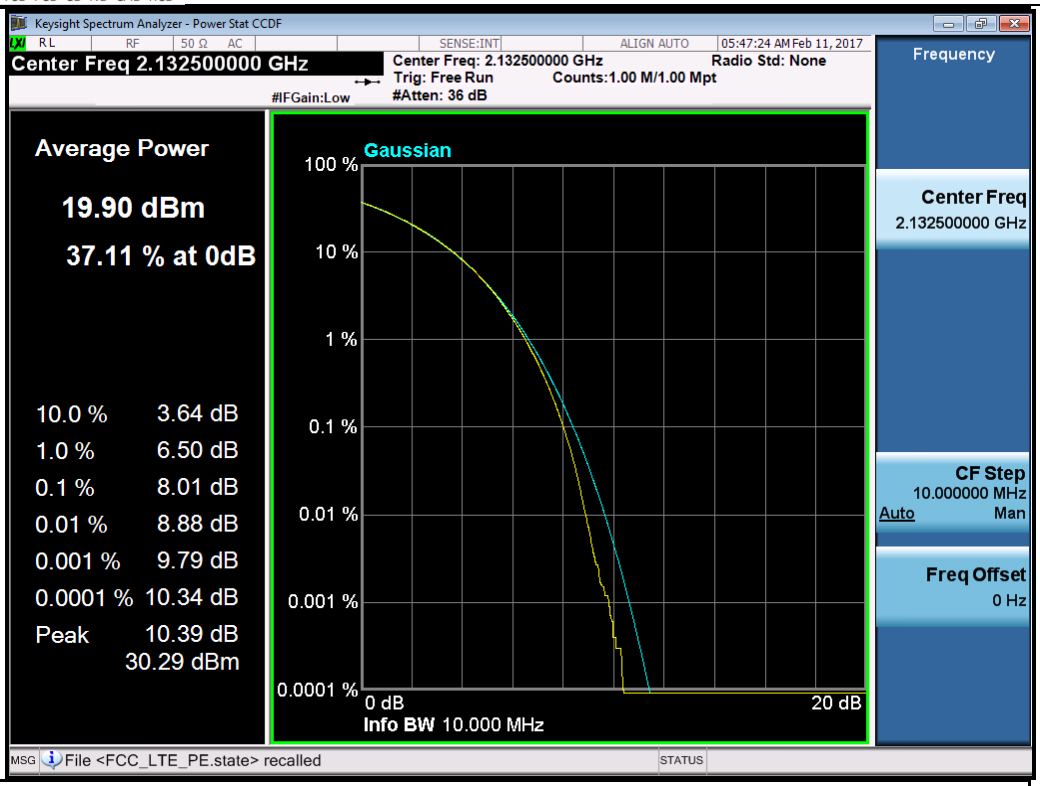
BW 15M 64QAM Mid



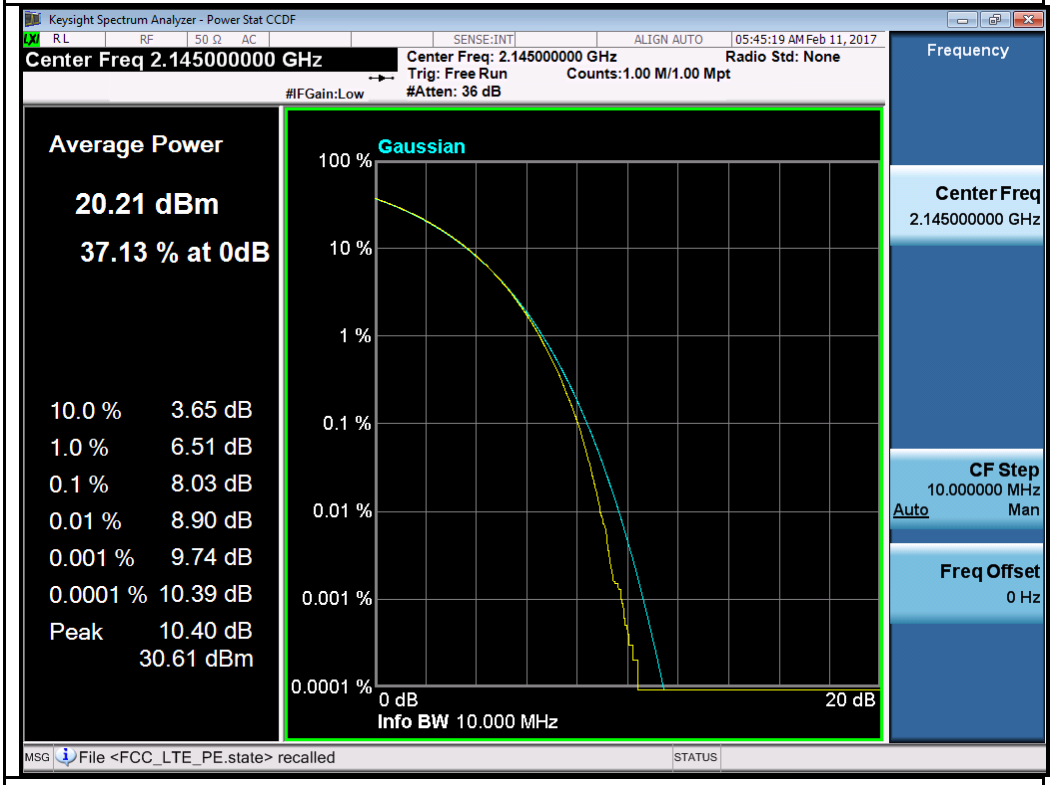
BW 15M 64QAM High



BW 20M 64QAM Low



BW 20M 64QAM Mid

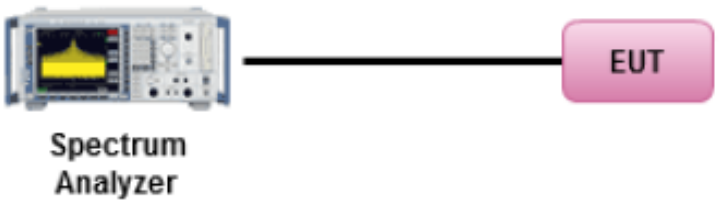


BW 20M 64QAM High

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	99% Occupied bandwidth measurement procedure - 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	01/13/2017 – 02/10/2017	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

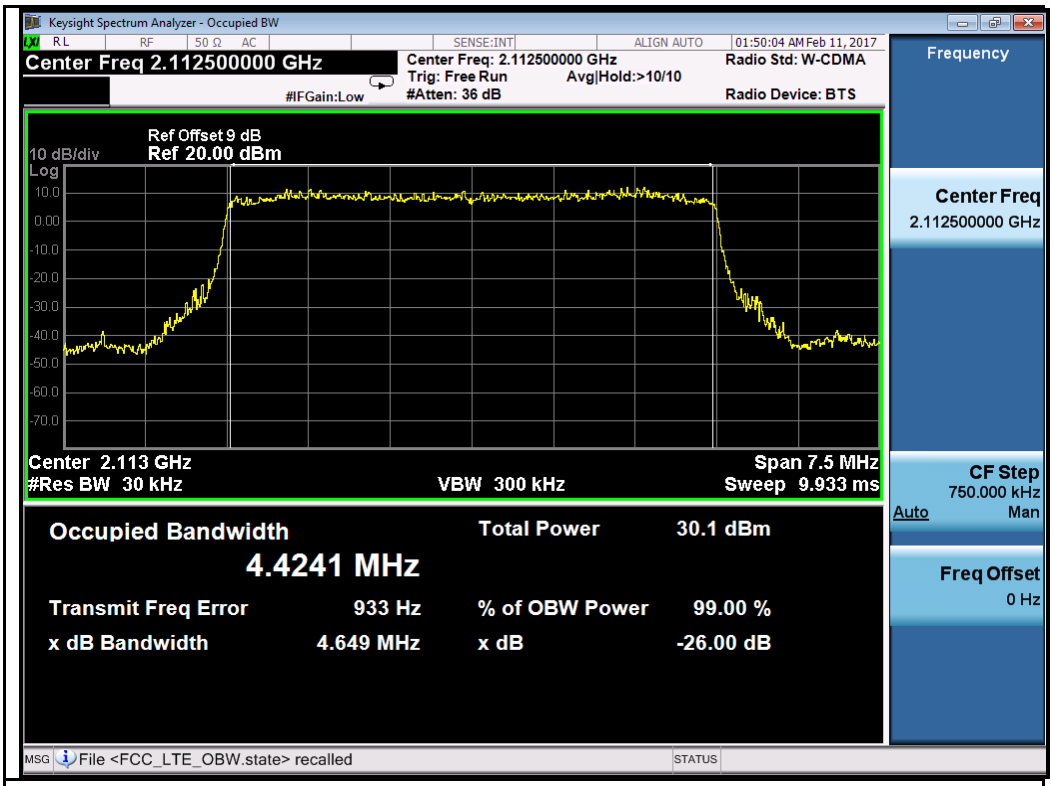
Test was done by Chen Ge at RF Test Site.

Test Data

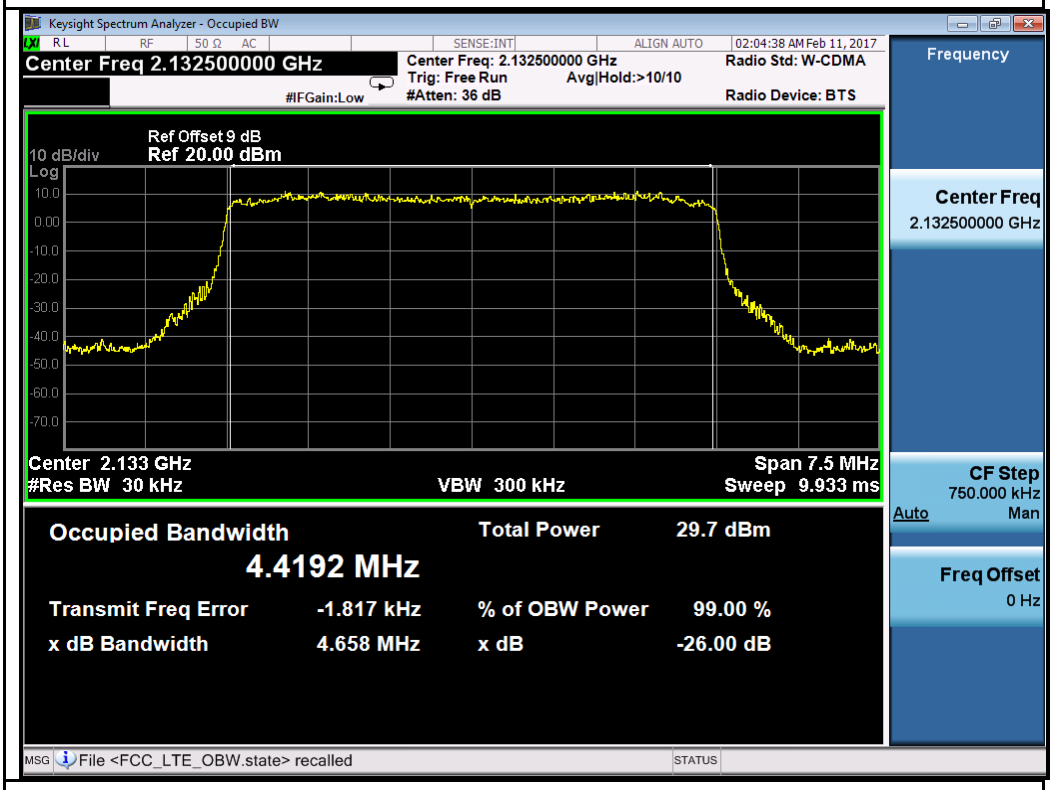
Bandwidth measurement result for LTE band 4:

Type	Channel	Channel Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Occupied Bandwidth (MHz)
5MHz BW, QPSK	Low	2112.5	4.42	4.64
	Mid	2132.5	4.41	4.64
	High	2152.5	4.42	4.66
5MHz BW, 64QAM	Low	2112.5	4.43	4.68
	Mid	2132.5	4.43	4.66
	High	2152.5	4.42	4.64
10MHz BW, QPSK	Low	2115.0	8.89	9.31
	Mid	2132.5	8.90	9.34
	High	2150.0	8.90	9.35
10MHz BW, 64QAM	Low	2115.0	8.90	9.33
	Mid	2132.5	8.91	9.36
	High	2150.0	8.91	9.39
15MHz BW, QPSK	Low	2117.5	13.27	13.85
	Mid	2132.5	13.27	13.78
	High	2147.5	13.28	13.78
15MHz BW, 64QAM	Low	2117.5	13.29	13.78
	Mid	2132.5	13.28	13.81
	High	2147.5	13.29	13.82
20MHz BW, QPSK	Low	2120.0	17.80	18.44
	Mid	2132.5	17.84	18.49
	High	2145.0	17.84	18.56
20MHz BW, 64QAM	Low	2120.0	17.81	18.47
	Mid	2132.5	17.82	18.49
	High	2145.0	17.82	18.51

Test Plot for Occupied Bandwidth:

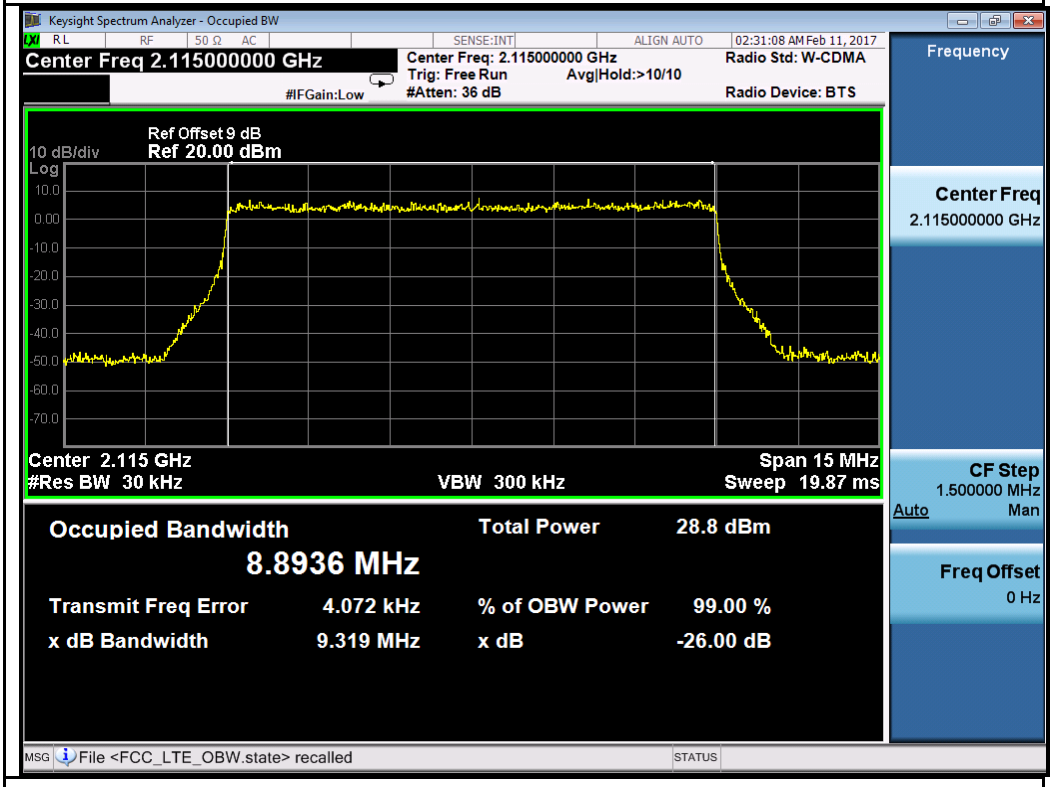


BW 5M QPSK Low

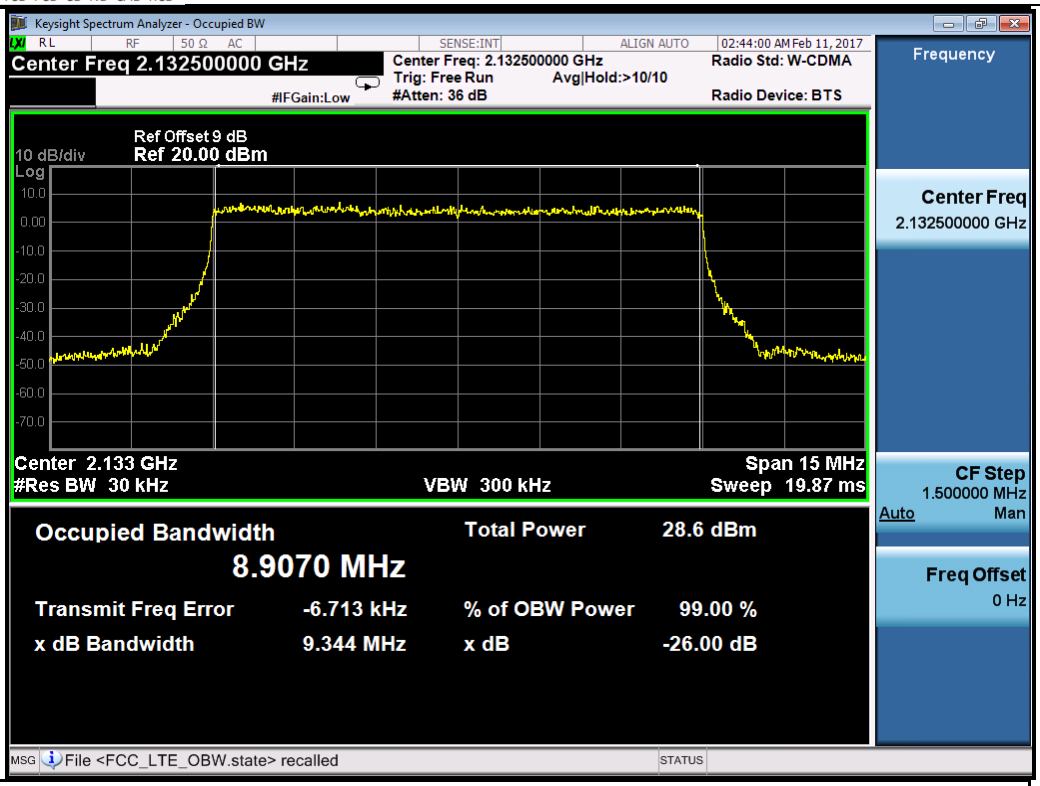


BW 5M QPSK Mid

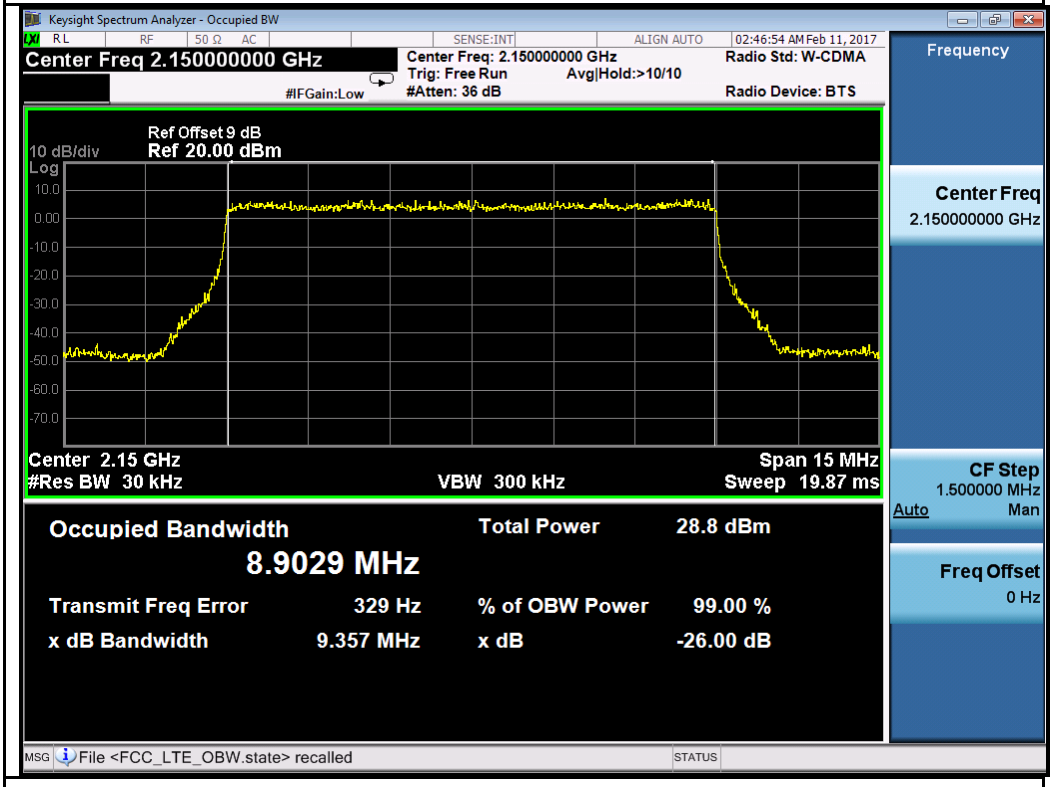
BW 5M QPSK High



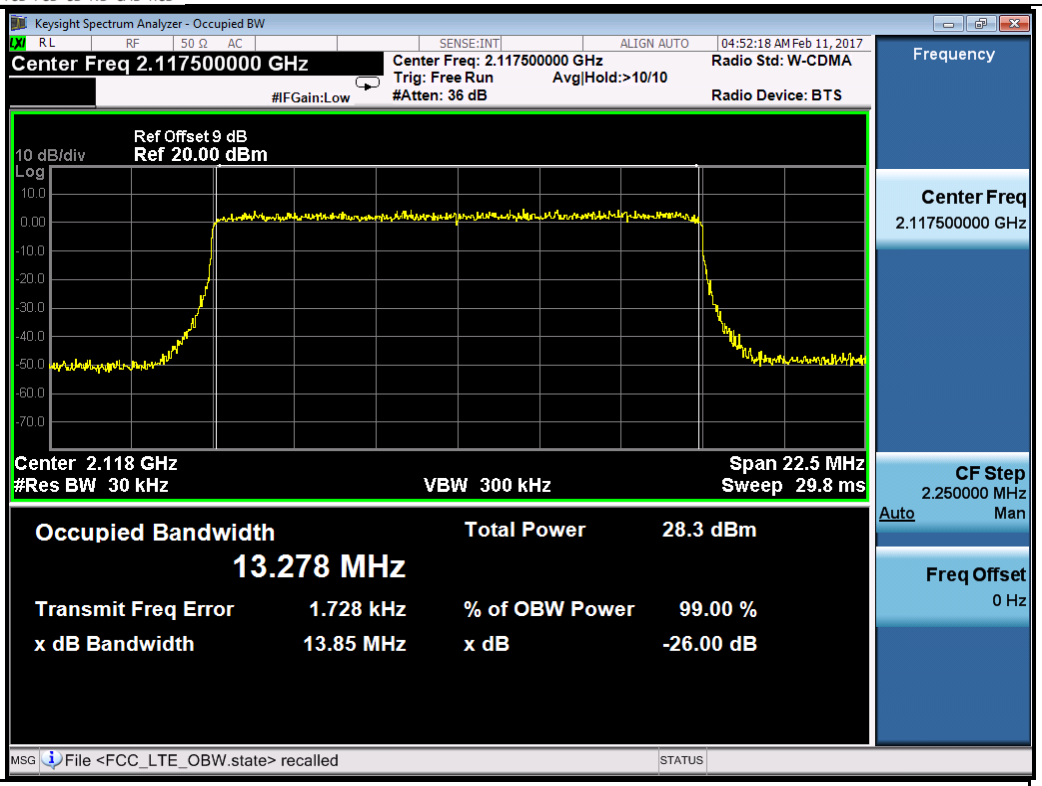
BW 10M QPSK Low



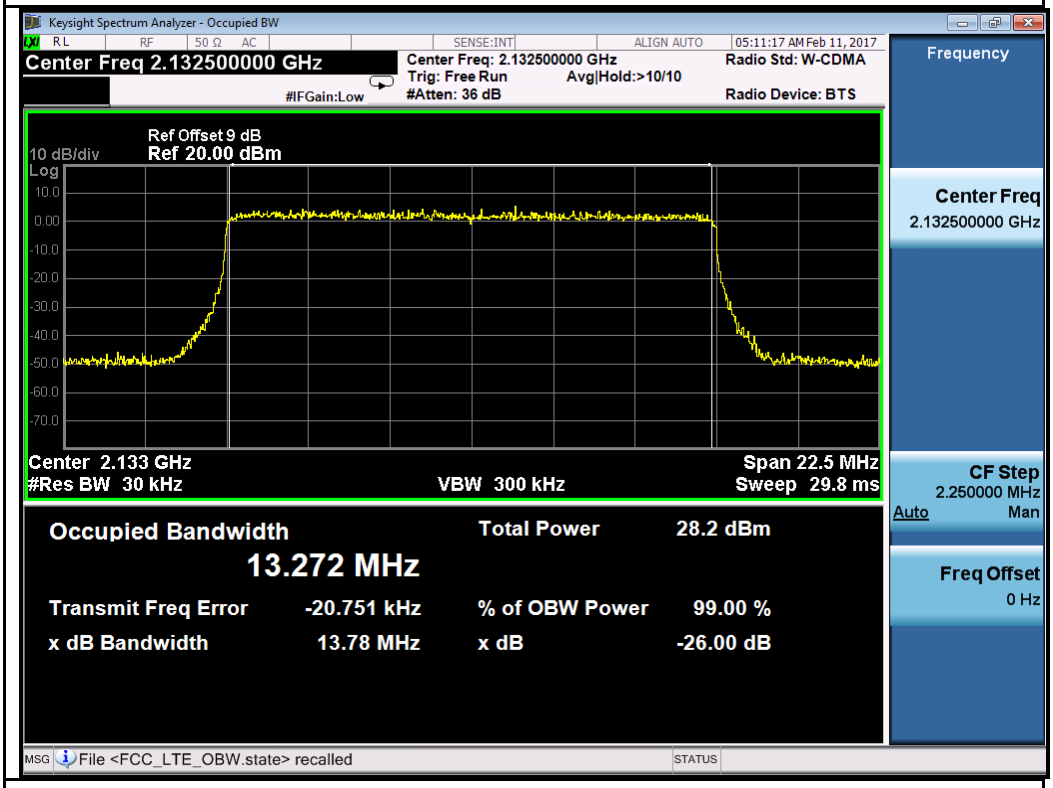
BW 10M QPSK Mid



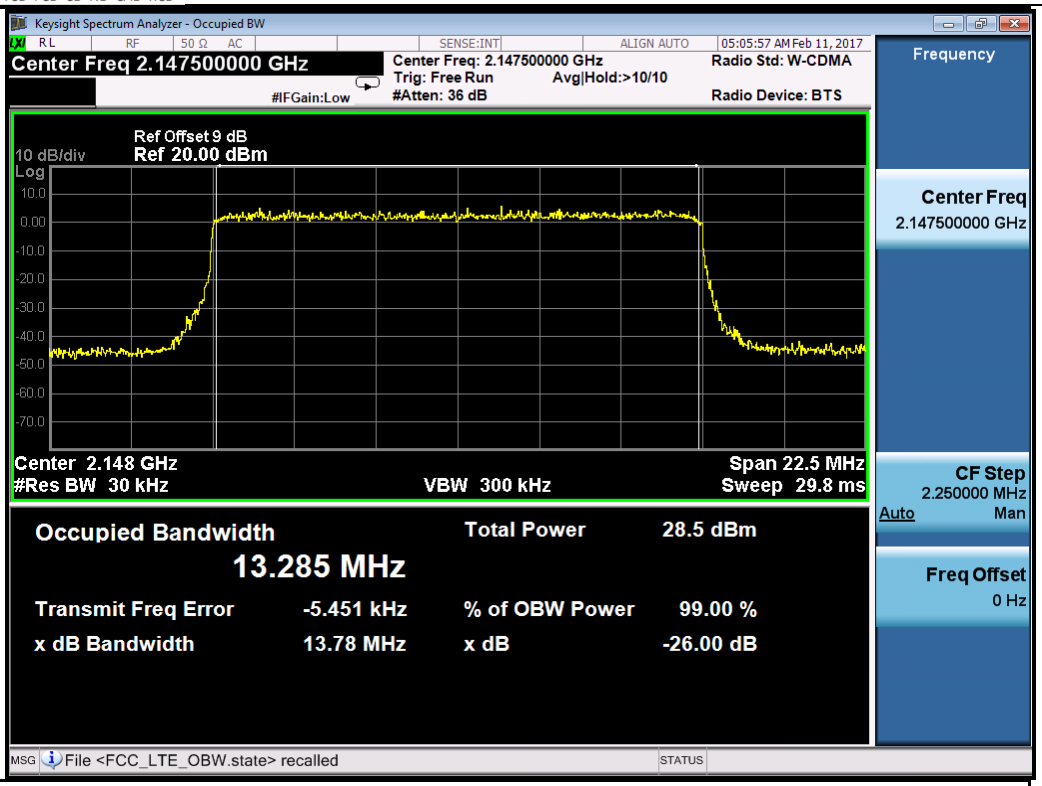
BW 10M QPSK High



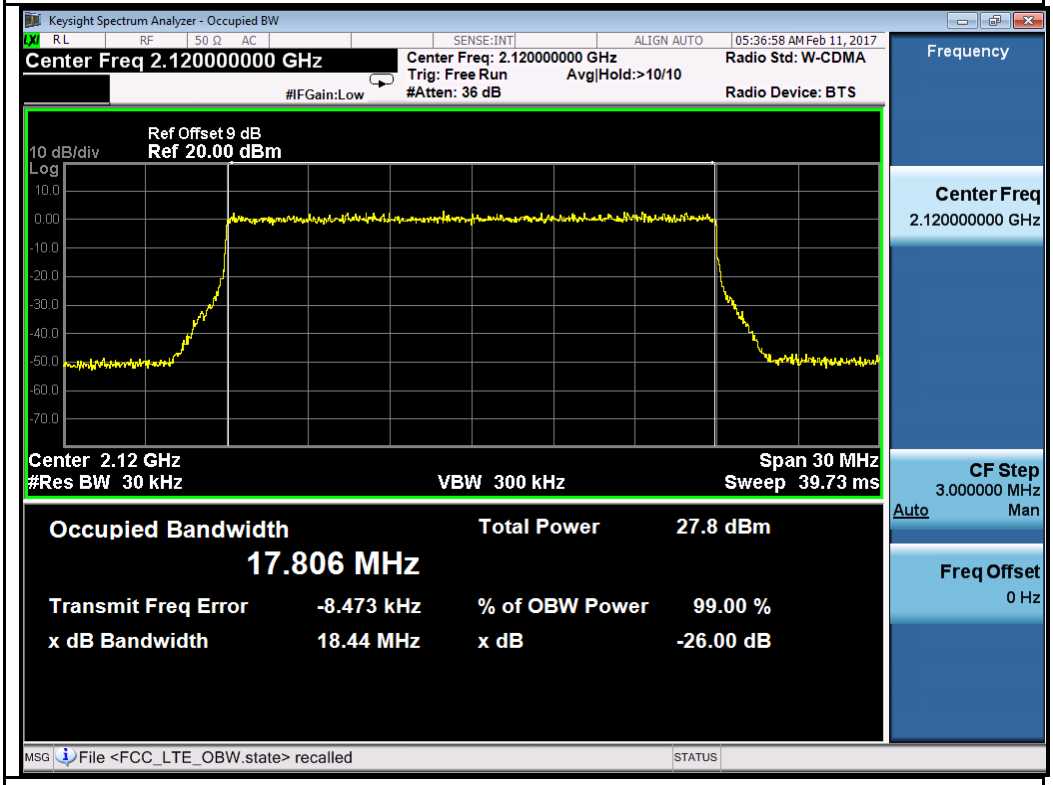
BW 15M QPSK Low



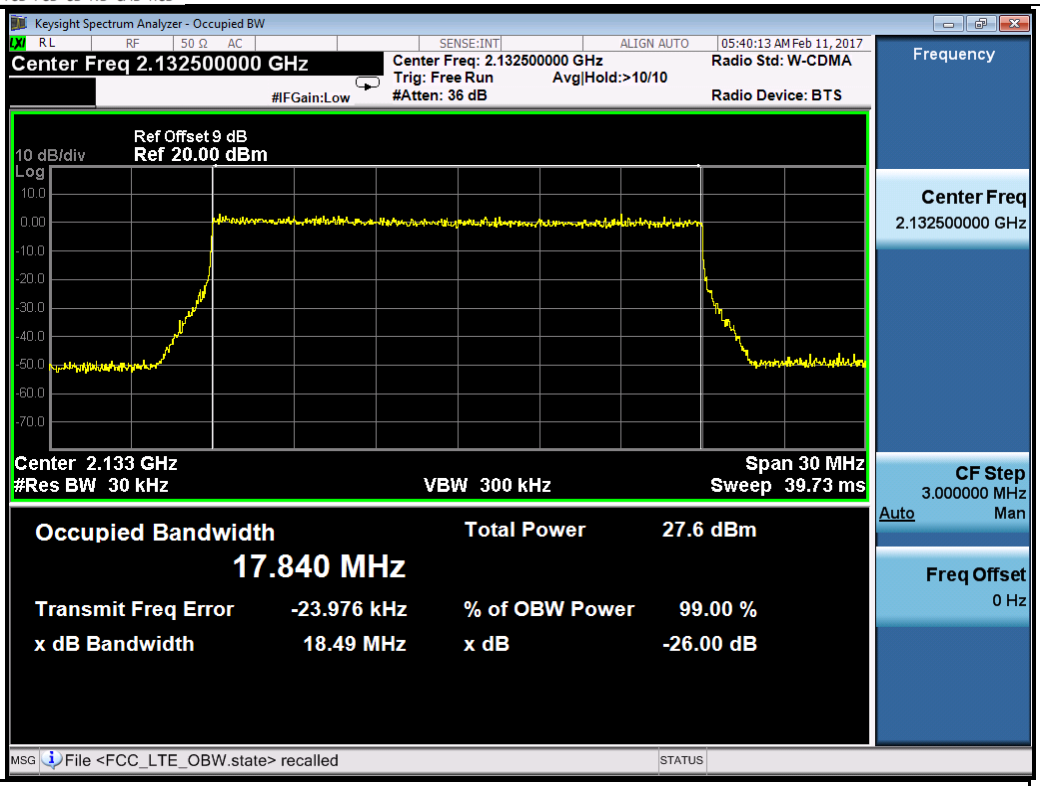
BW 15M QPSK Mid



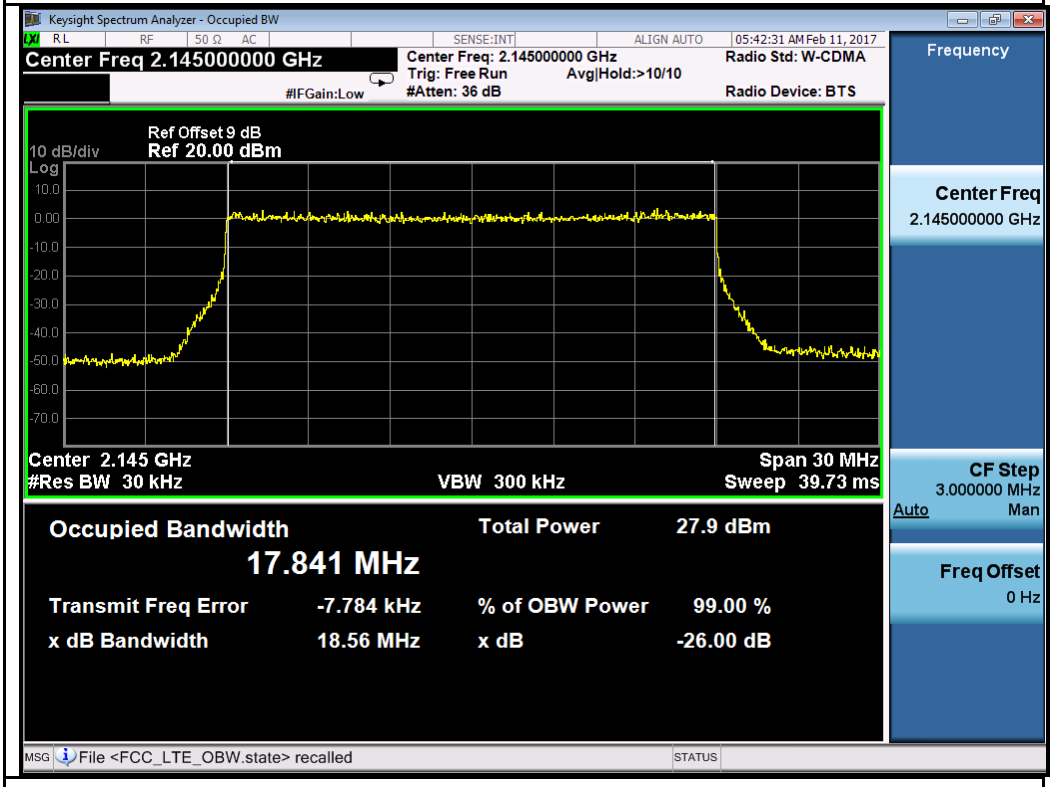
BW 15M QPSK High



BW 20M QPSK Low

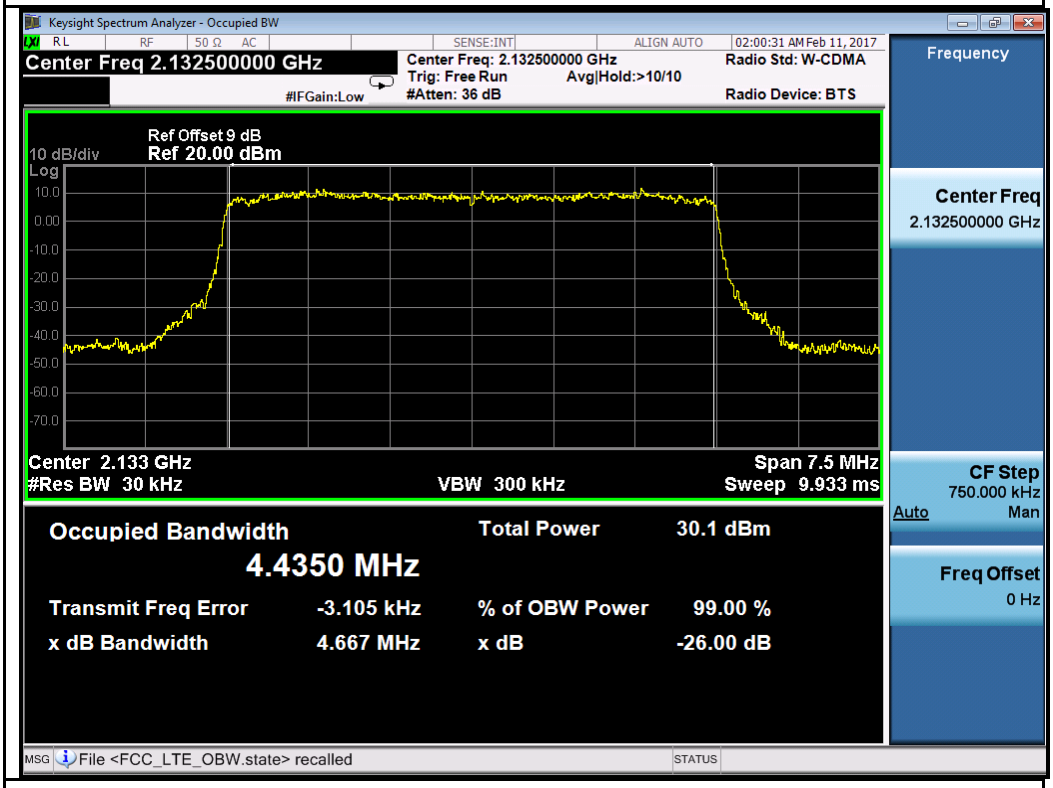


BW 20M QPSK Mid



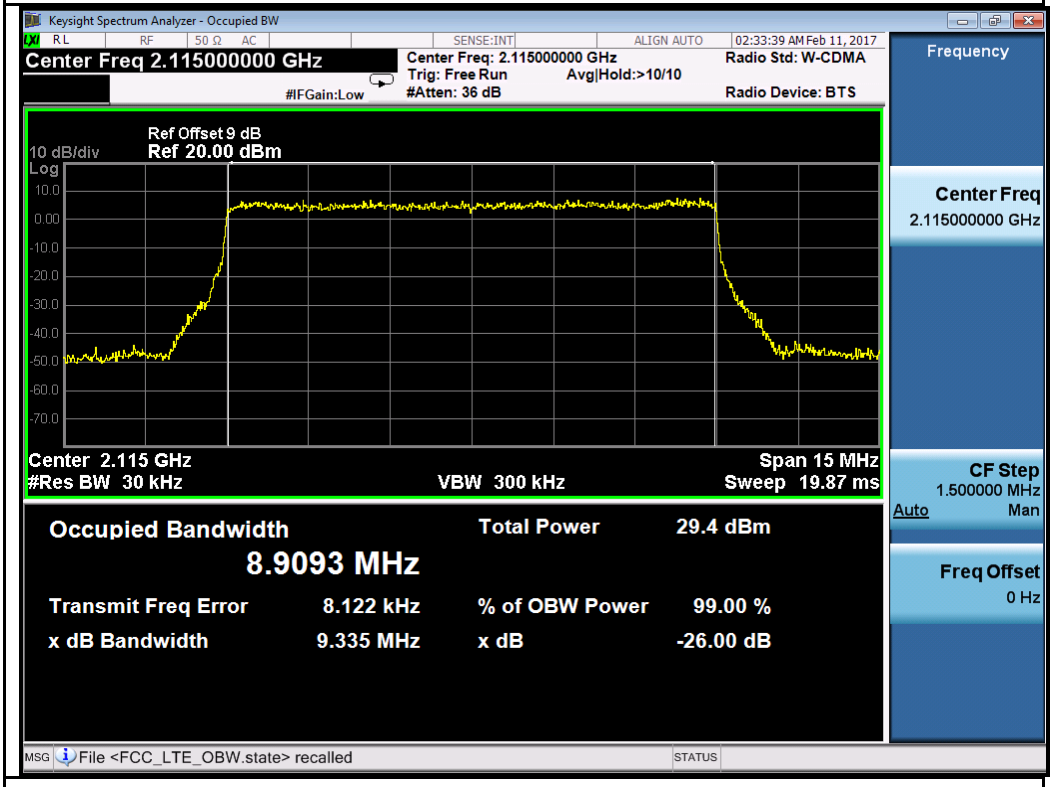
BW 20M QPSK High

BW 5M 64QAM Low

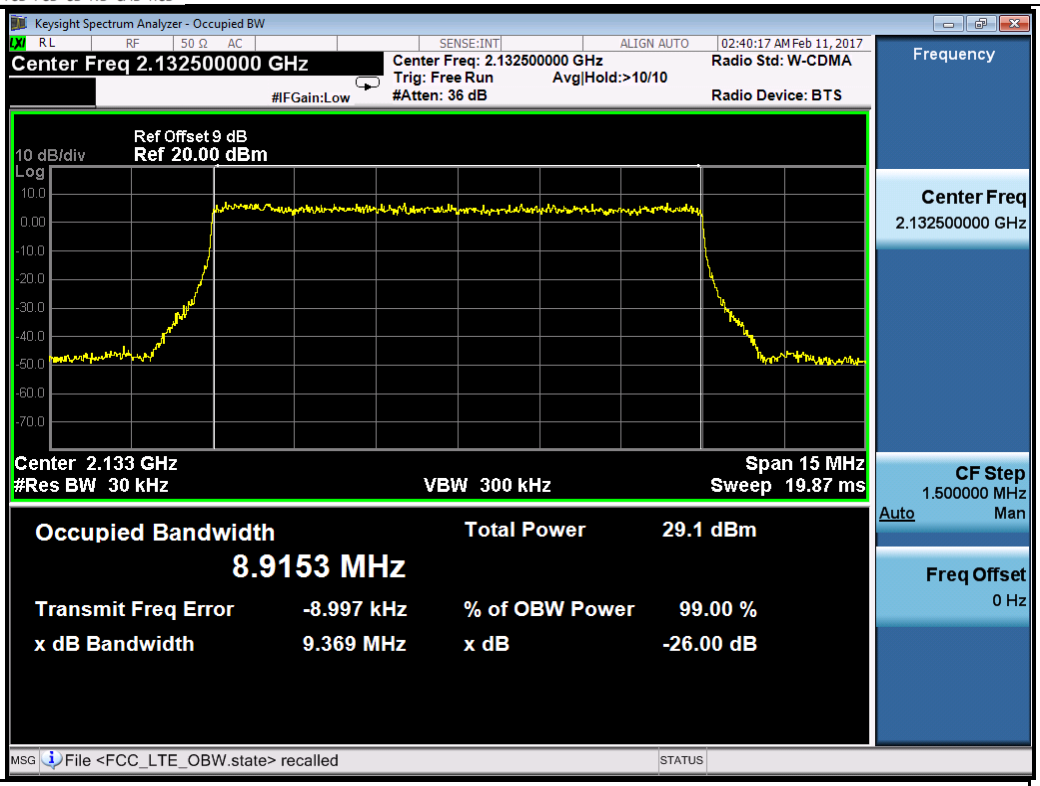


BW 5M 64QAM Mid

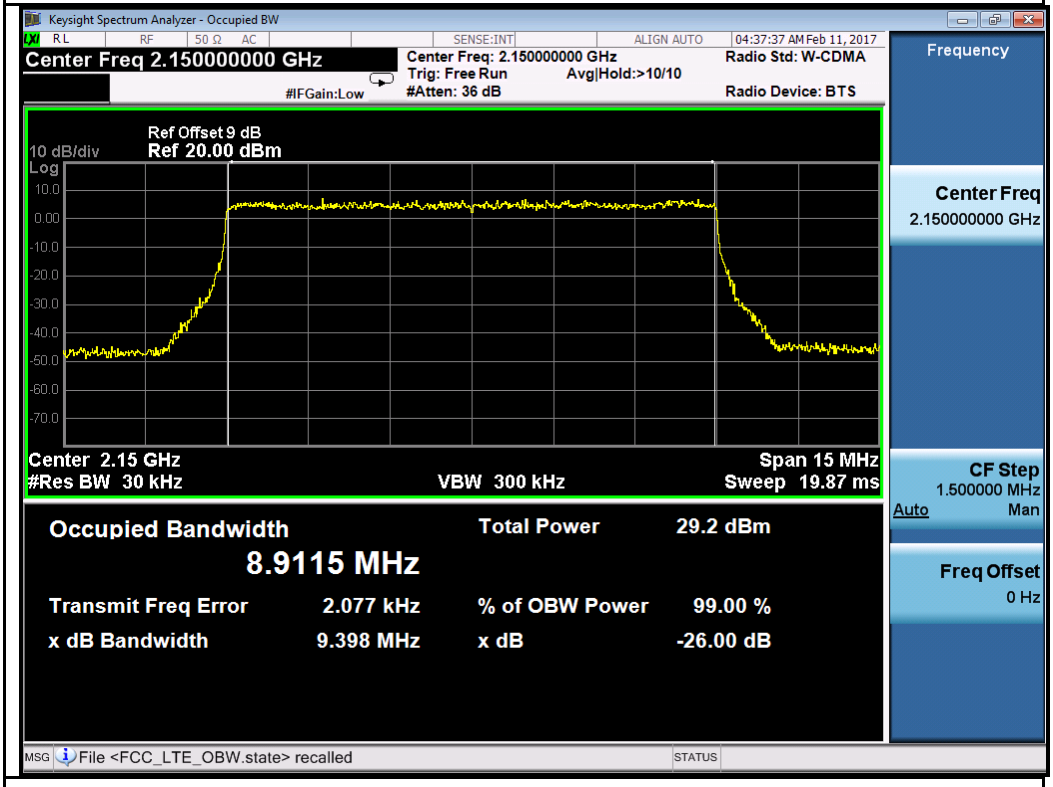
BW 5M 64QAM High



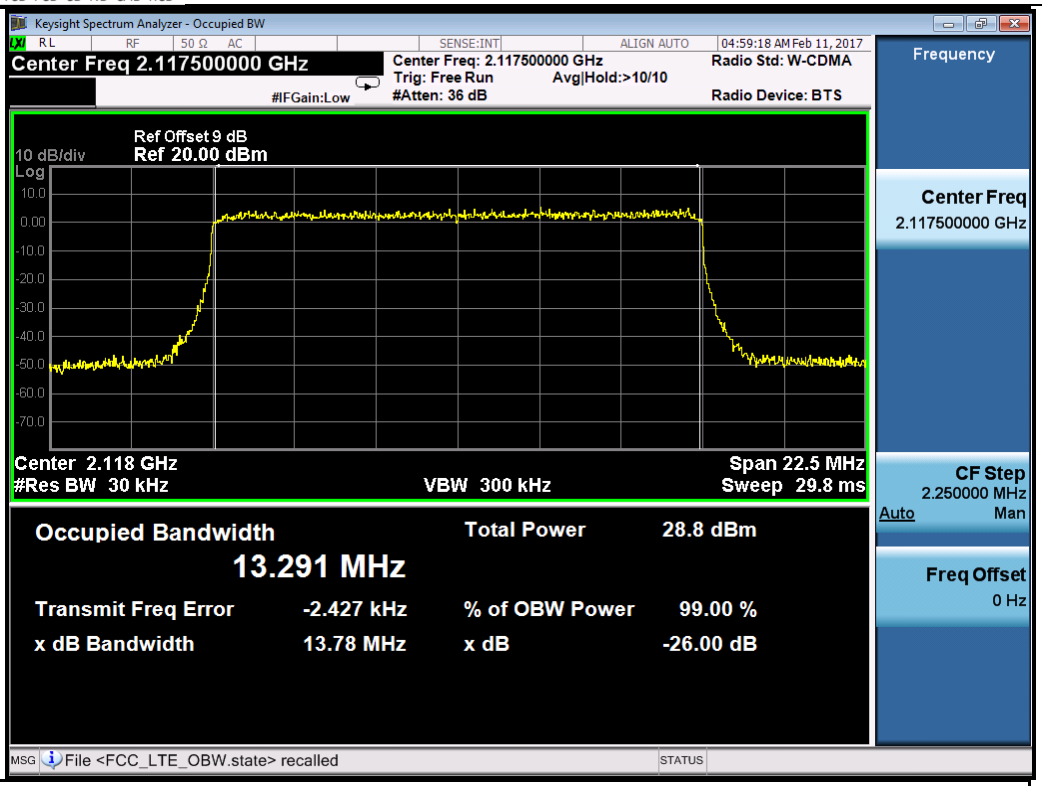
BW 10M 64QAM Low



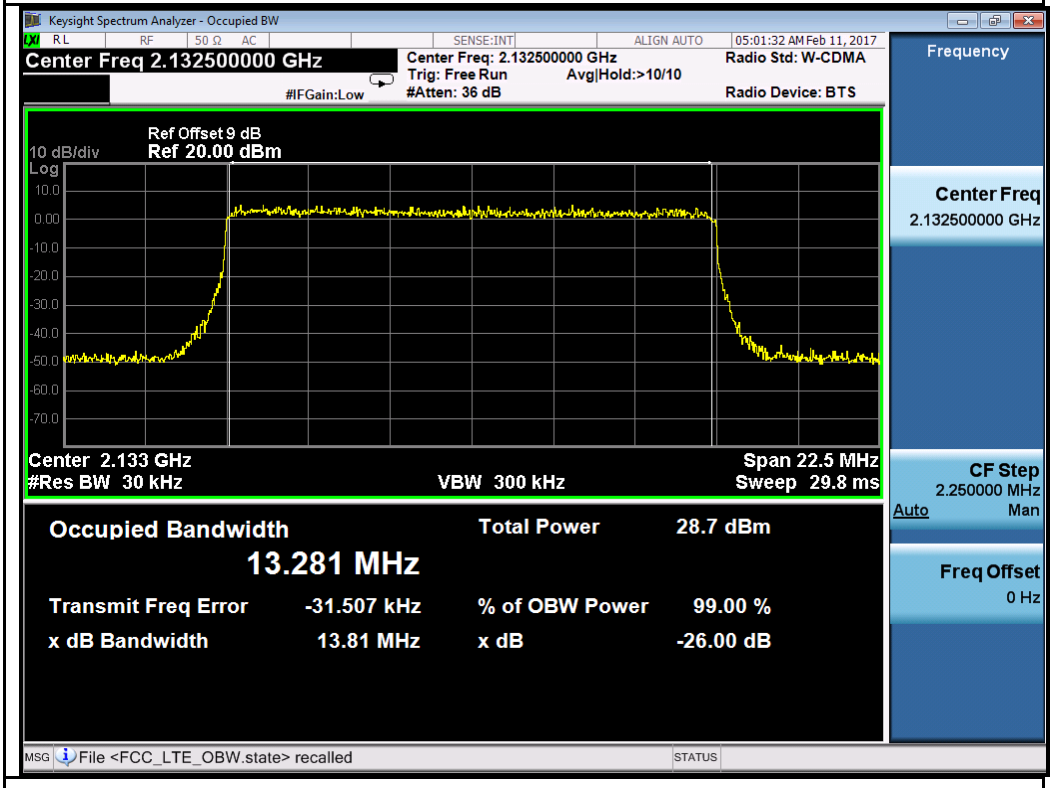
BW 10M 64QAM Mid



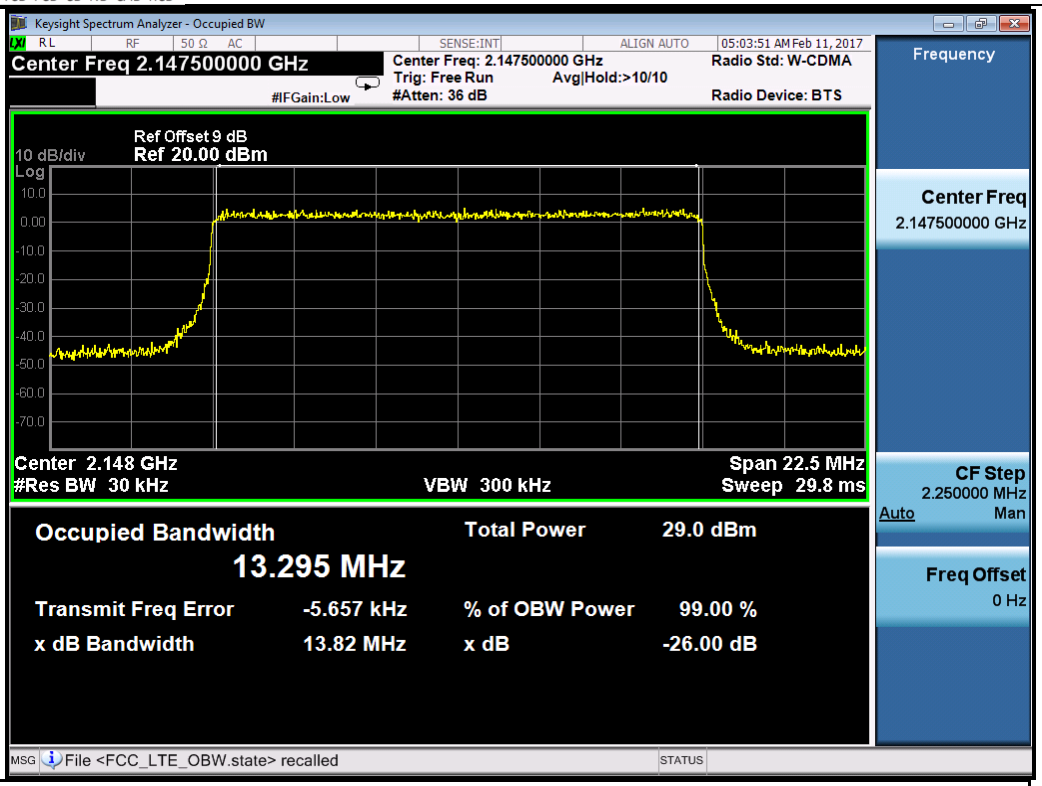
BW 10M 64QAM High



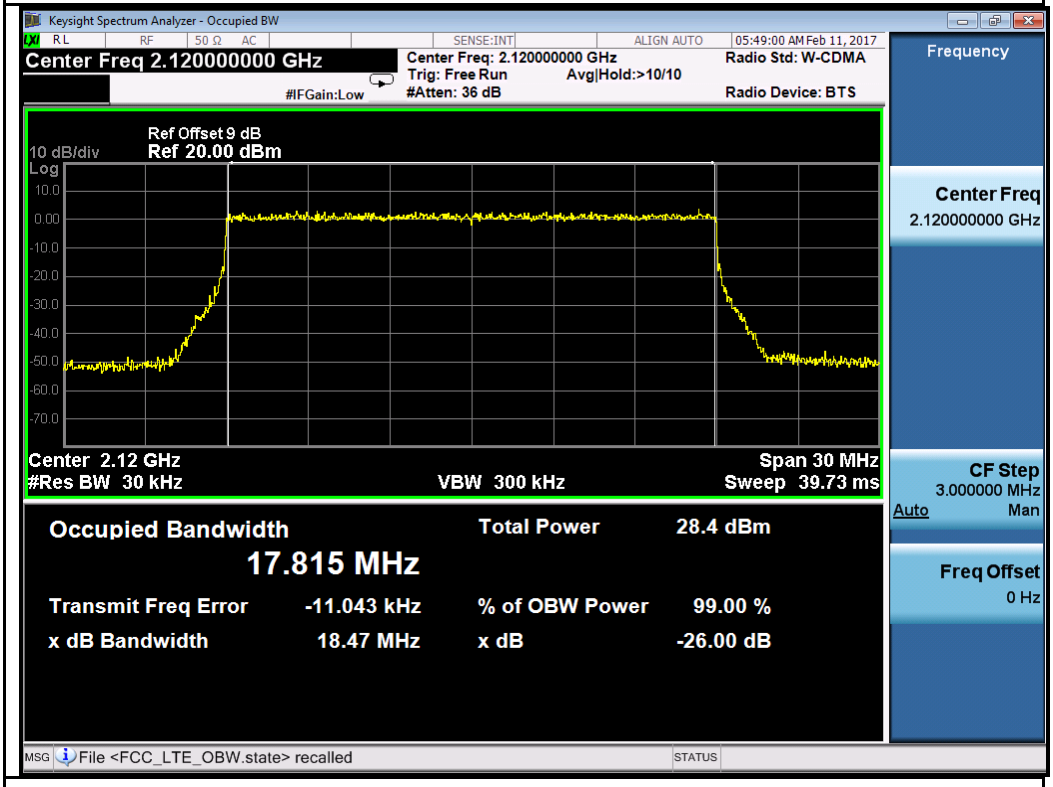
BW 15M 64QAM Low



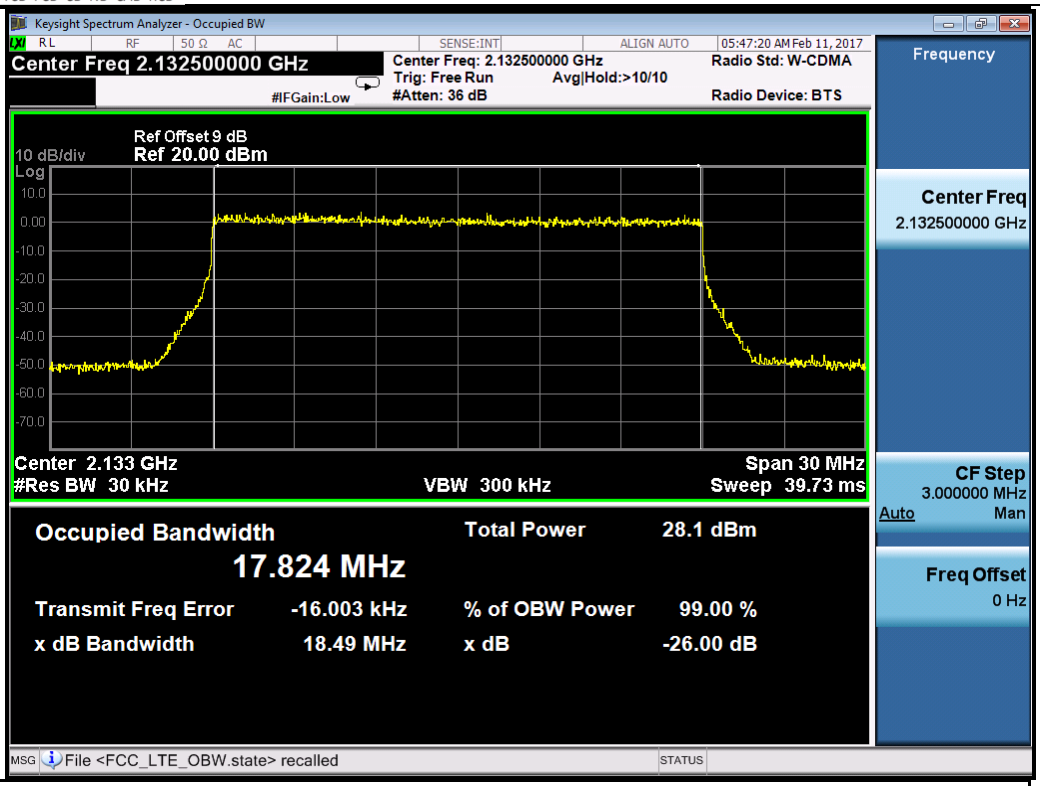
BW 15M 64QAM Mid



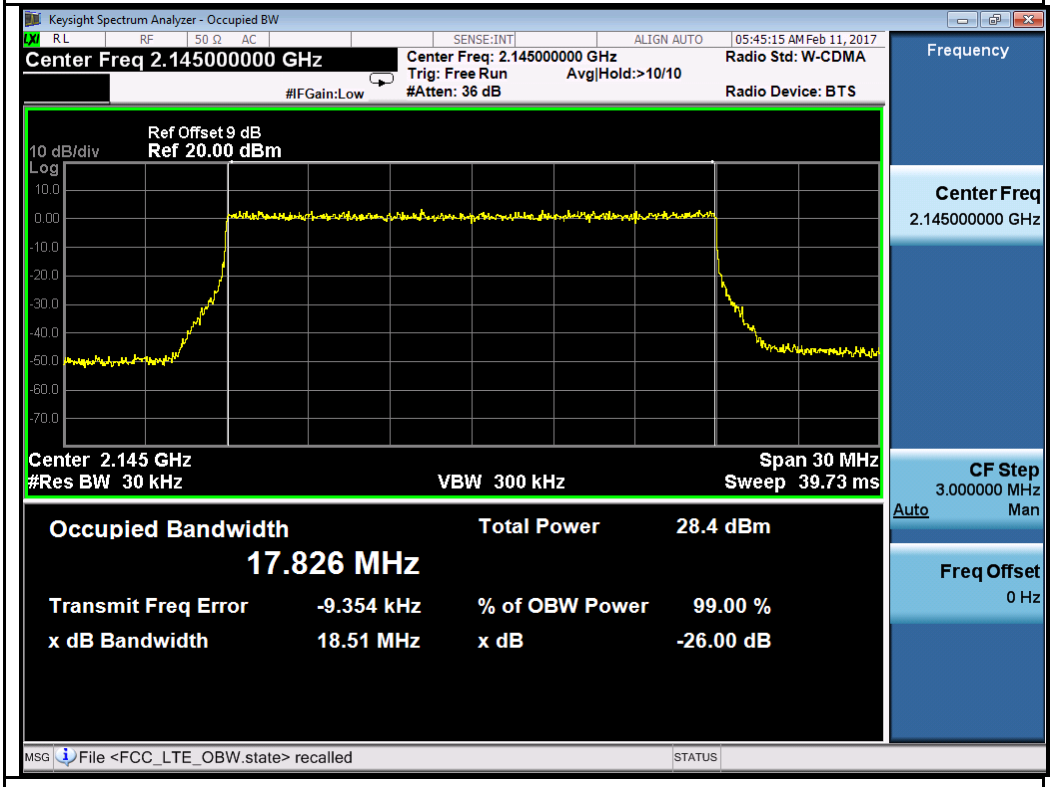
BW 15M 64QAM High



BW 20M 64QAM Low



BW 20M 64QAM Mid

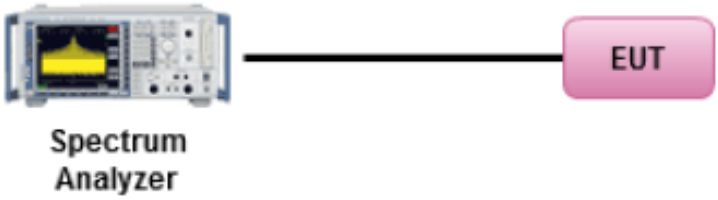


BW 20M 64QAM High

10.4 Band Edge

Requirement(s):

Spec	Item	Requirement	Applicable
47CFR27.53	-	Out of band emissions. 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.	☒

Test Setup				
Test Procedure	1. EUT was set for low , mid, high channel with modulated mode and highest RF output power. 2. The spectrum analyzer was connected to the antenna terminal. 3. A RBW of 1% greater than the 26 dB emission bandwidth should be used for band edge measurement or if narrower RBW is used, a correct factor calculated with formula 10*log (EBW/BW_{meas}) will be added to the result.			
Test Date	01/13/2017 – 02/10/2017	Environmental condition	Temperature Relative Humidity Atmospheric Pressure	22°C 48% 1008mbar
Remark	The EUT was scanned up to 25GHz. Both horizontal and vertical polarities were investigated. The results show only the worst case. Limit calculation: Emission limit = PdBm – [43+ 10 log (PW)] = 10log(1000 x PW) - 43 - 10log(PW) = 30 dBm - 43 = -13 dBm 100KHz RBW was used to make measurement for LTE Band 4 with 20MHz BW, so the correction factor will be added to correct the result to be using 200 KHz RBW.			
Result	☒ Pass ☐ Fail			

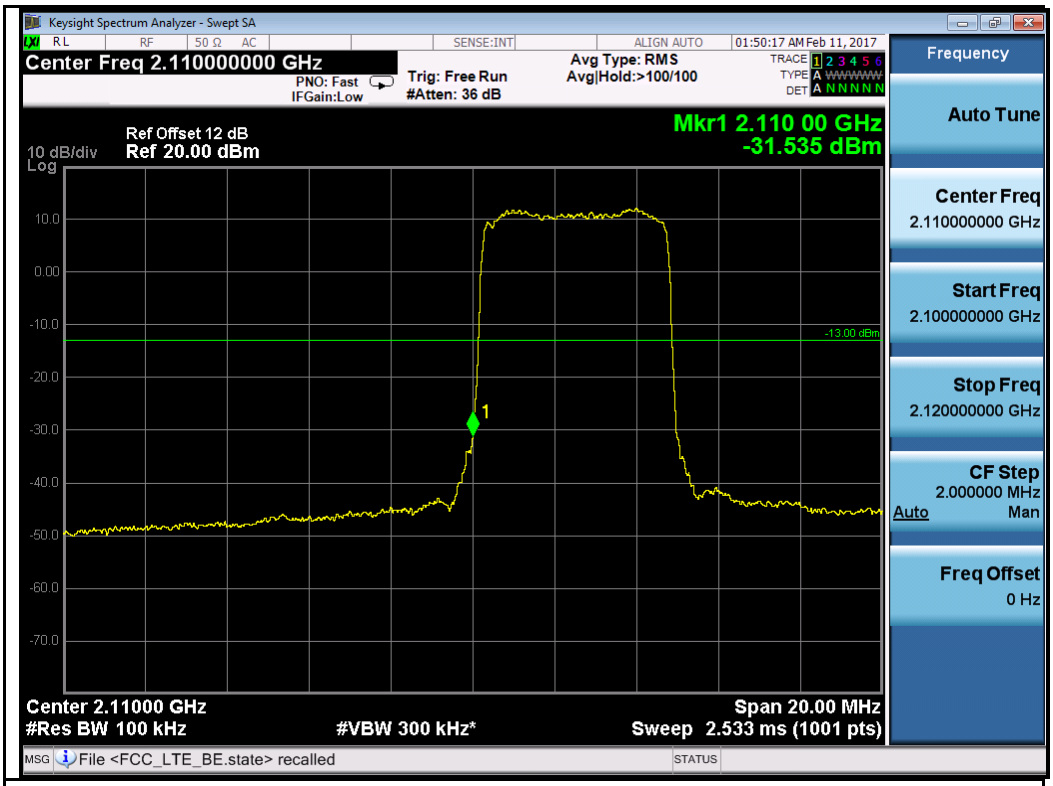
Test Data ☐ Yes ☒ N/A

Test Plot ☒ Yes (See below) ☐ N/A

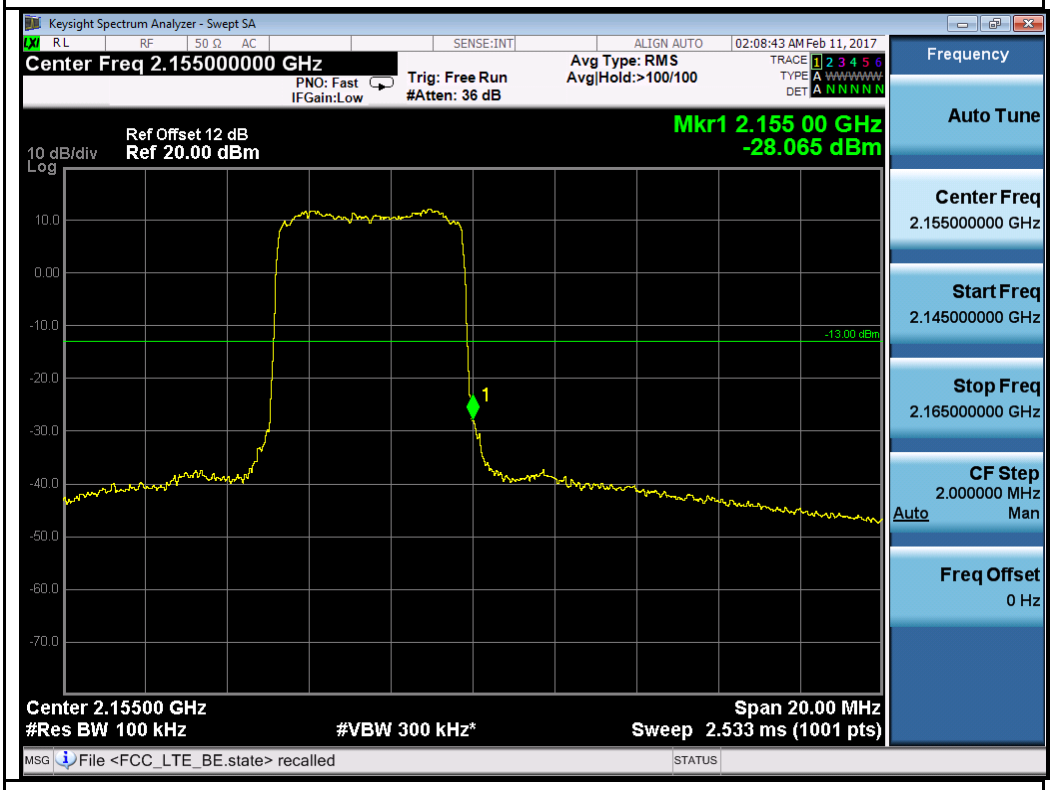
Test was done by Chen Ge at RF Test Site.

Test Plots

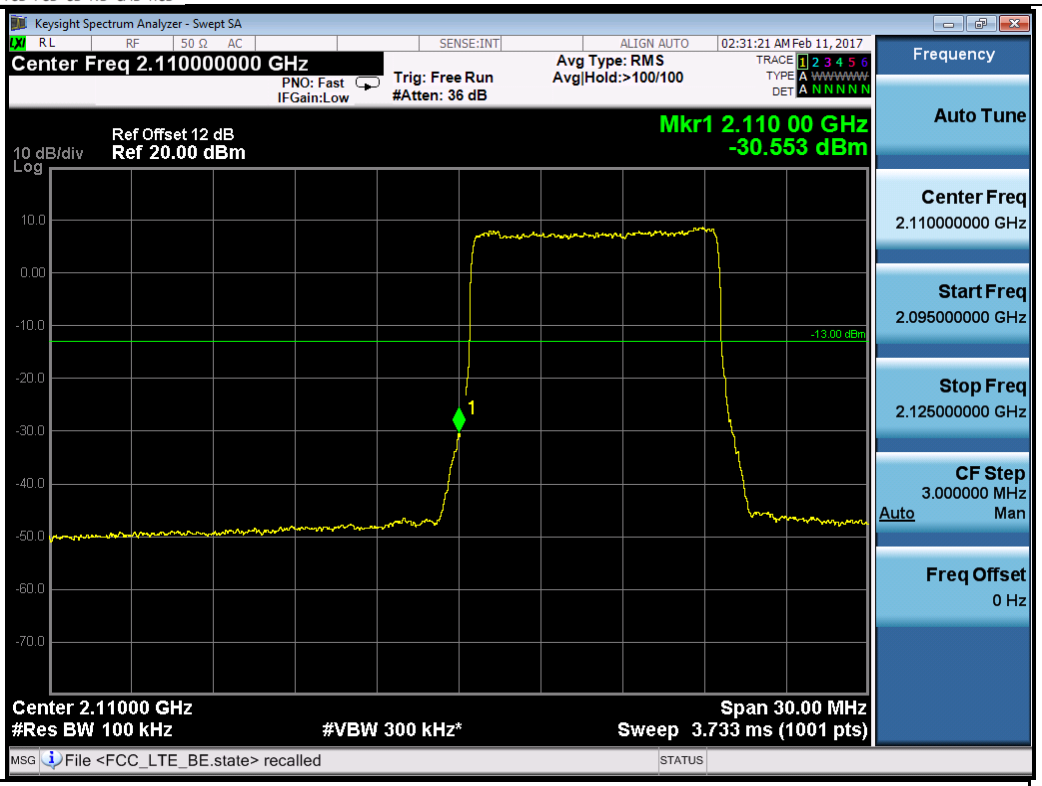
Chain 1:



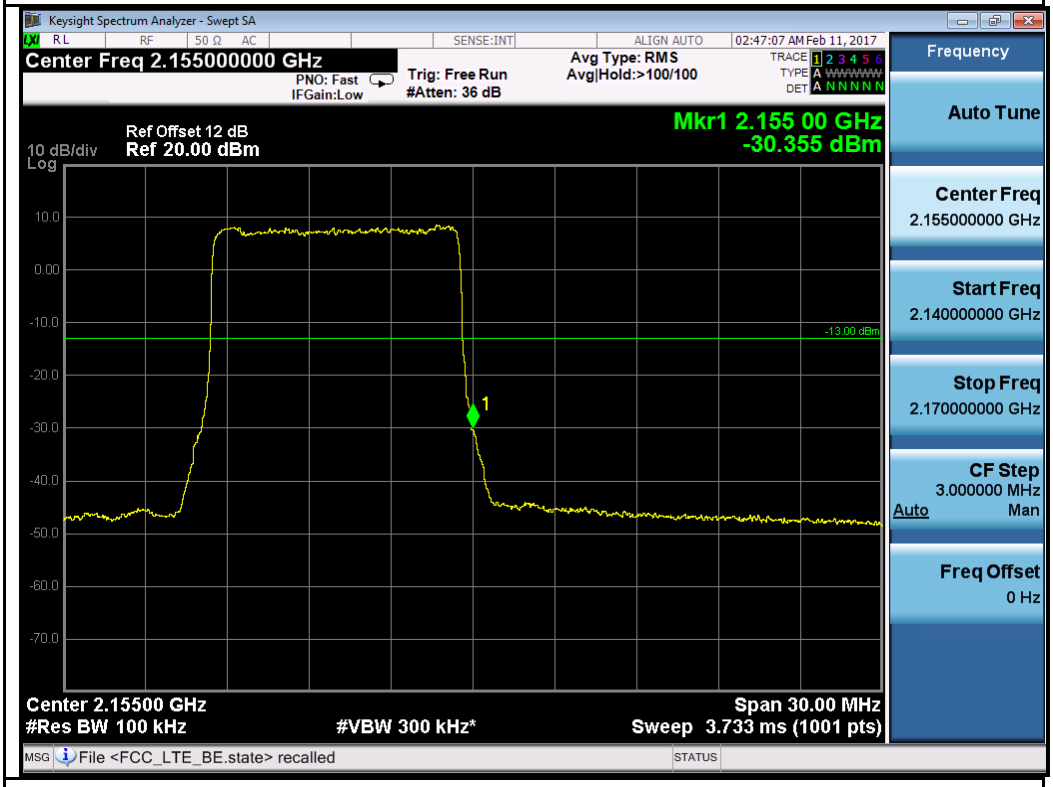
BW 5M QPSK Low



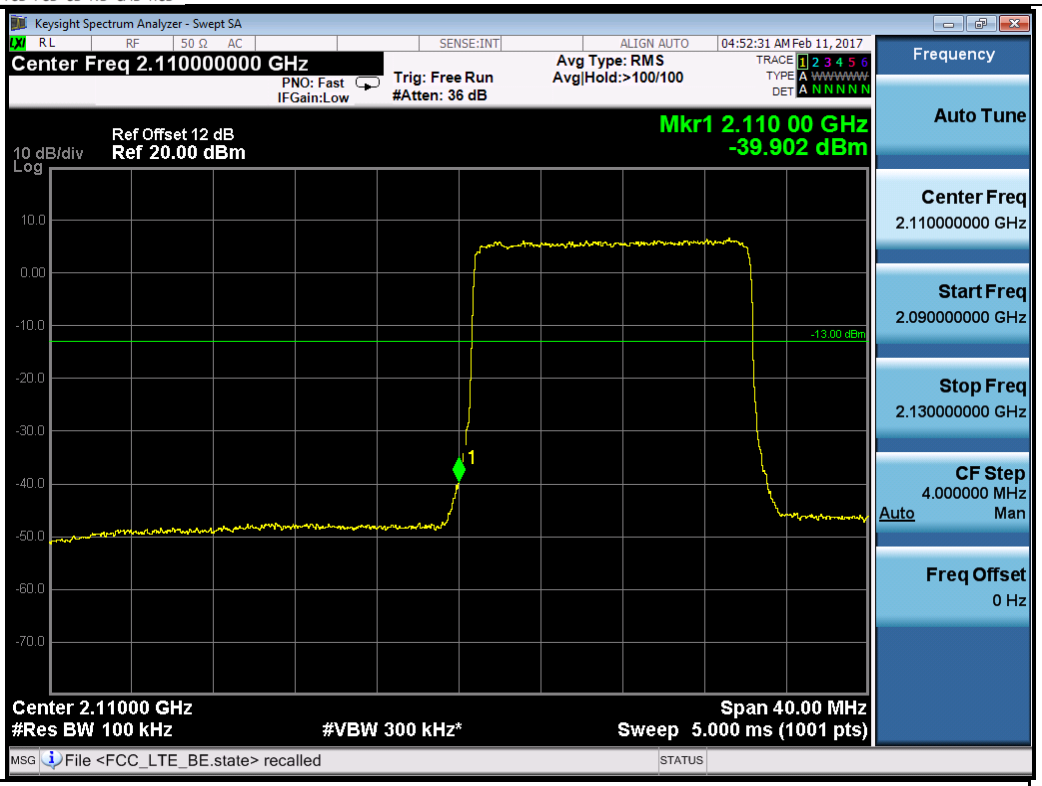
BW 5M QPSK High



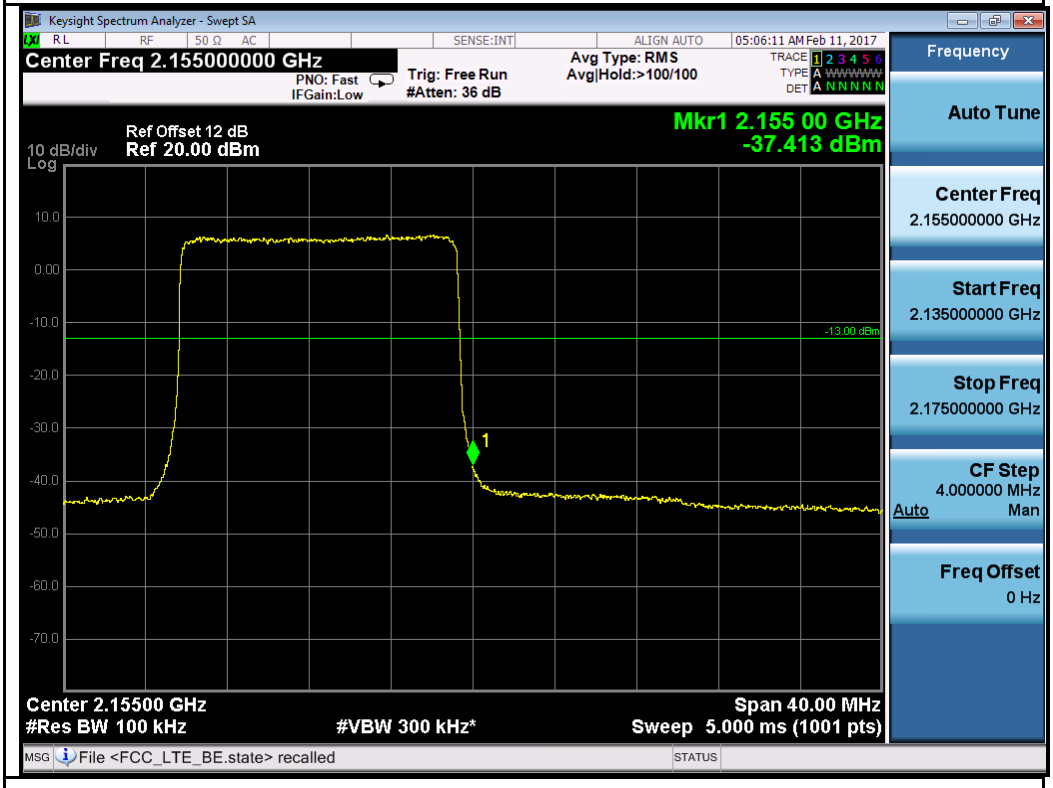
BW 10M QPSK Low



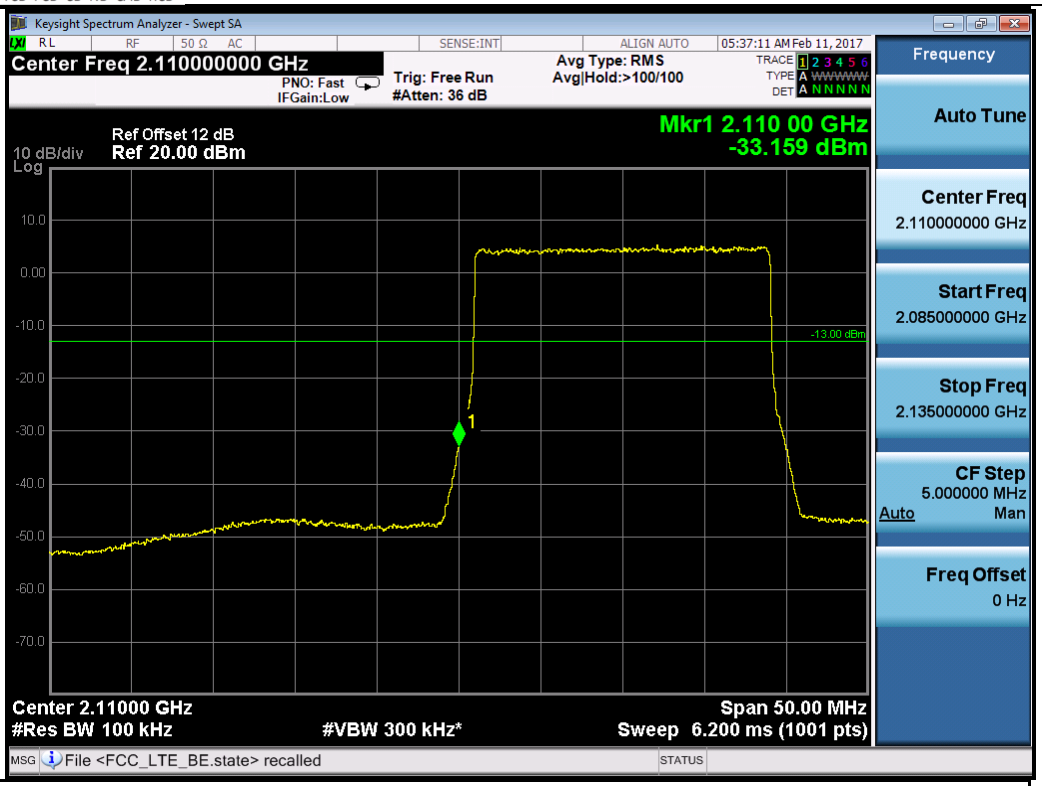
BW 10M QPSK High



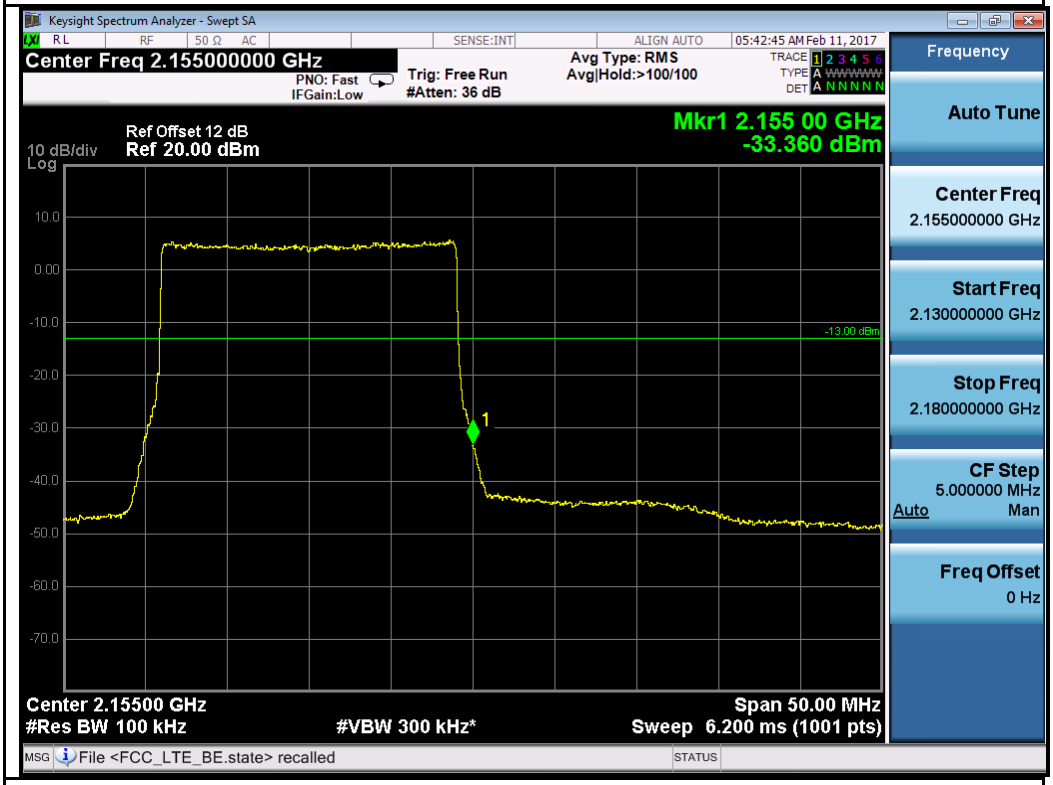
BW 15M QPSK Low



BW 15M QPSK High



BW 20M QPSK Low



BW 20M QPSK High