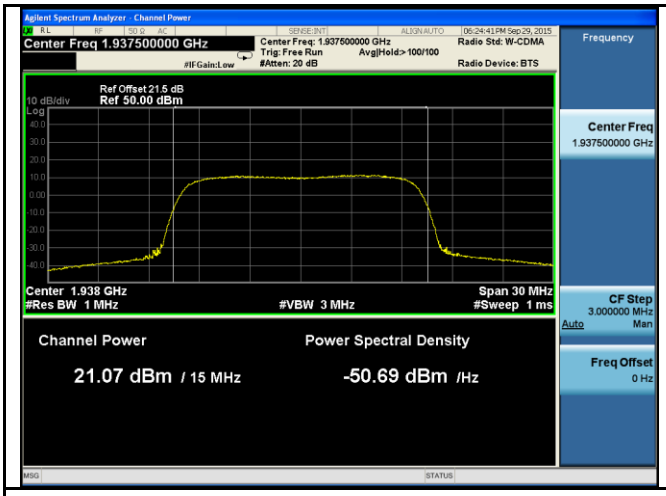
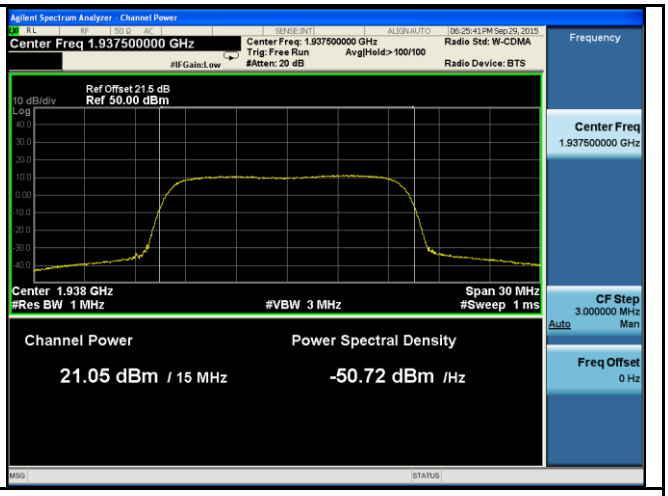
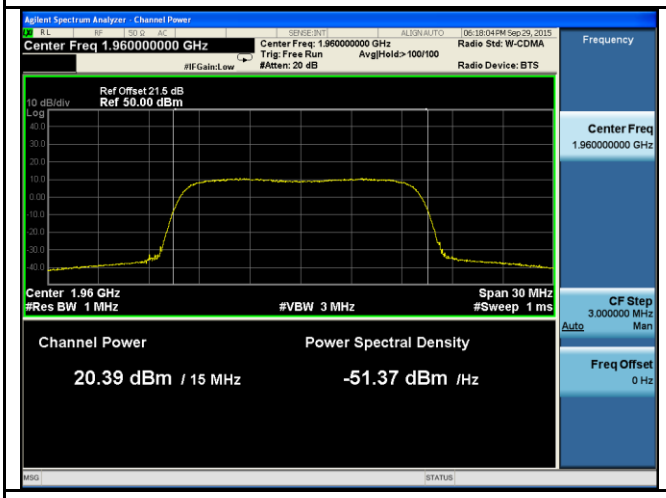
Test Plots for Band 2-64QAM-15MHz



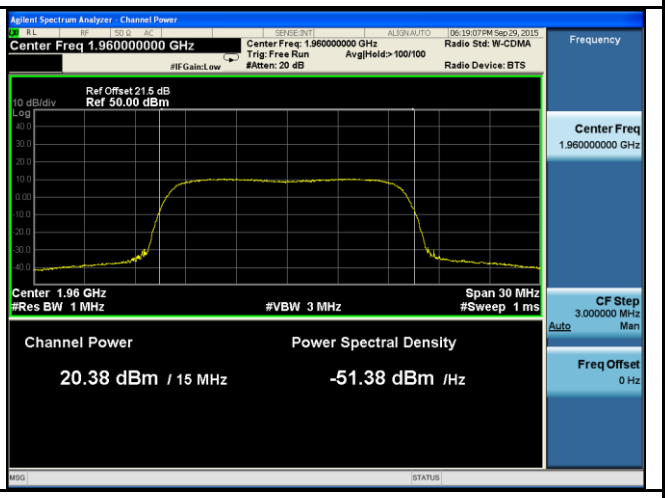
PWR- Band2-64QAM-15M BW-Low CH-Port1



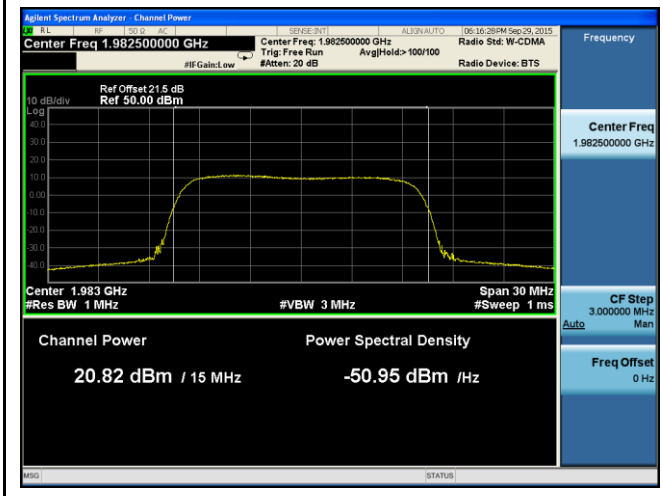
PWR- Band2-64QAM-15M BW-Low CH-Port2



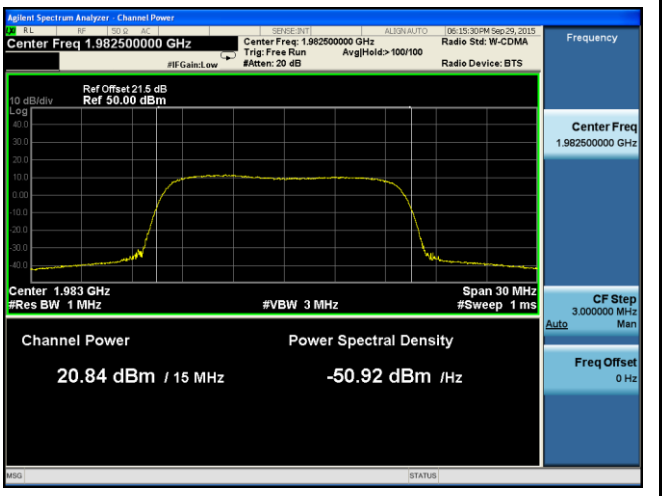
PWR- Band2-64QAM-15M BW-Mid CH-Port1



PWR- Band2-64QAM-15M BW-Mid CH-Port2

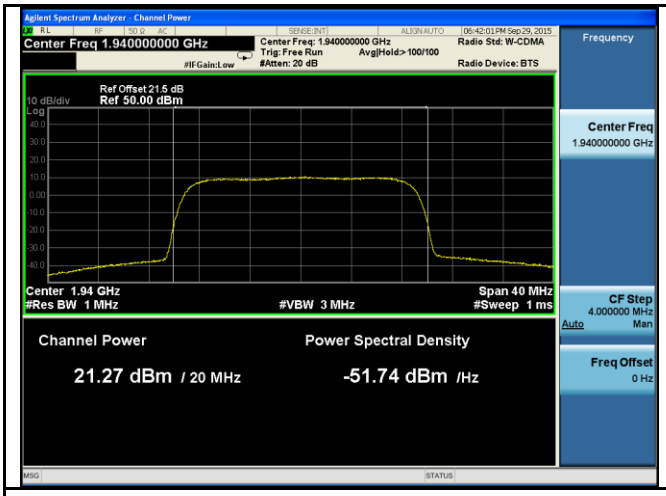


PWR- Band2-64QAM-15M BW-High CH-Port1

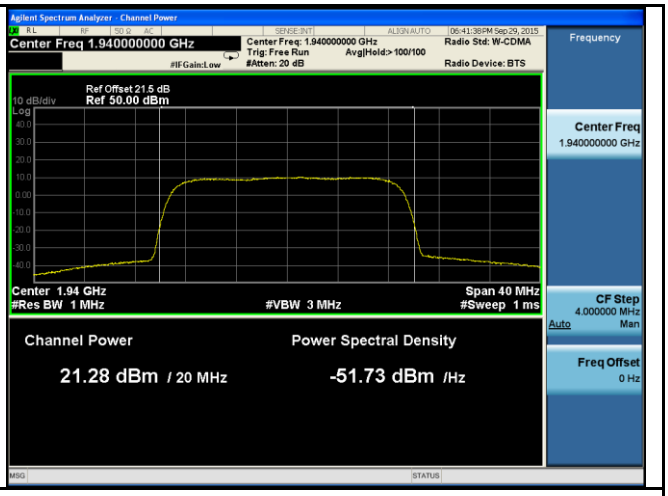


PWR- Band2-64QAM-15M BW-High CH-Port2

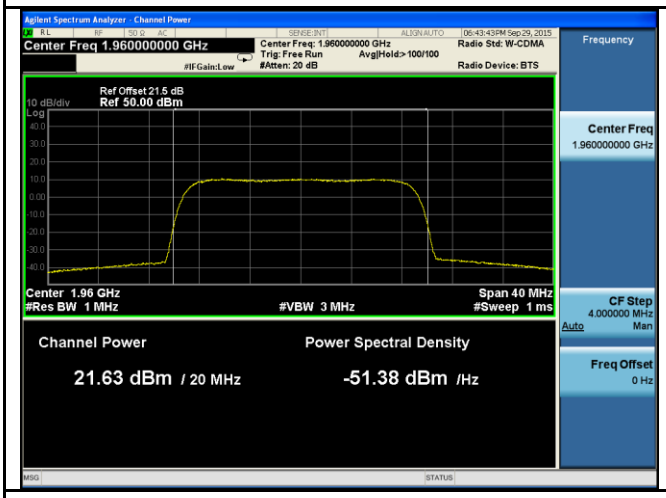
Test Plots for Band 2-64QAM-20MHz



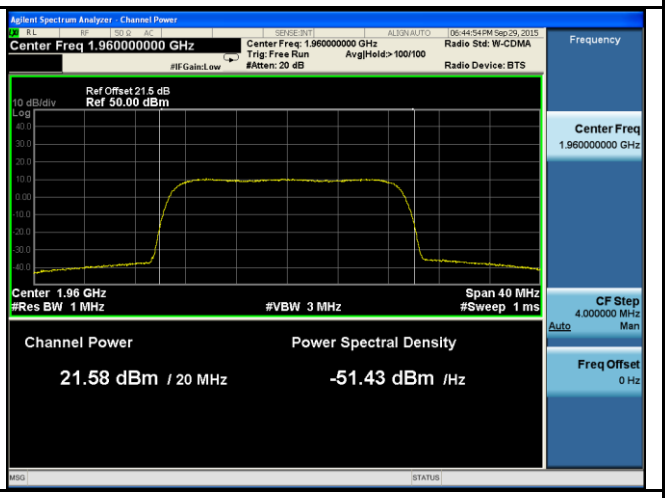
PWR-Band4-64QAM-20M BW-Low CH-Port1



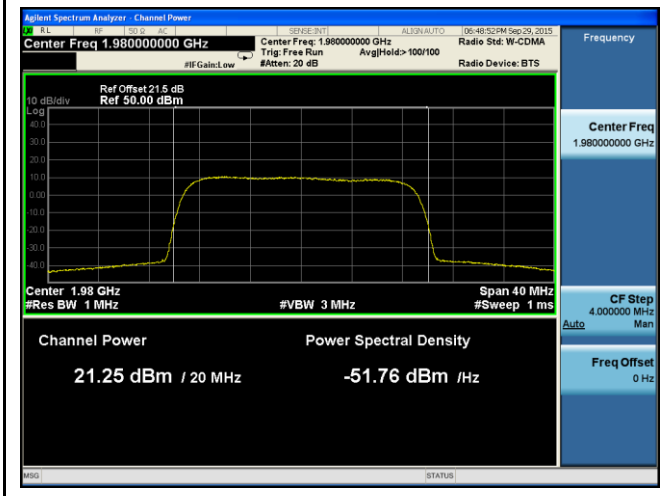
PWR-Band4-64QAM-20M BW-Low CH-Port2



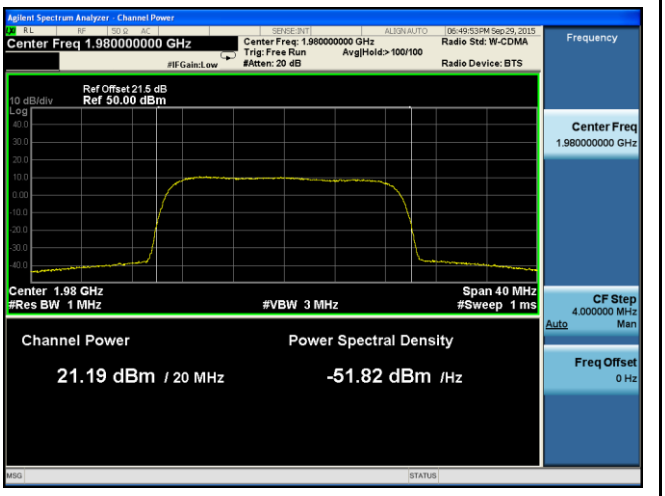
PWR-Band2-64QAM-20M BW-Mid CH-Port1



PWR- Band2-64QAM-20M BW-Mid CH-Port2



PWR- Band2-64QAM-20M BW-High CH-Port1

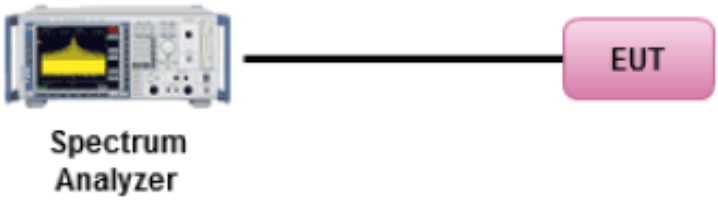


PWR- Band2-64QAM-20M BW-High CH-Port2

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.	☒
47CFR24.232 RSS-132(5.4)	(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.	☒

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	03/10/2014 03/03/2015 – 04/13/2015 09/24/2015 – 09/30/2015	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 Data for LTE band 4

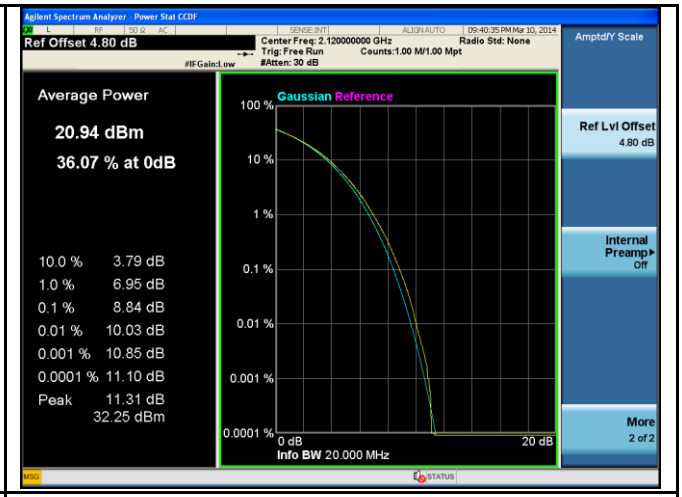
Type	Channel	Frequency (MHz)	Peak-Average Ratio (dB)	Peak-Average Ratio (dB)
5MHz BW, QPSK	Low	2112.5	9.16	13
	Mid	2132.5	9.06	13
	High	2152.5	8.86	13
5MHz BW, 64QAM	Low	2112.5	9.19	13
	Mid	2132.5	9.02	13
	High	2152.5	8.87	13
10MHz BW, QPSK	Low	2115	8.88	13
	Mid	2132	8.89	13
	High	2150	8.85	13
10MHz BW, 64QAM	Low	2115	8.77	13
	Mid	2132	8.76	13
	High	2150	8.76	13
15MHz BW, QPSK	Low	2117.5	8.73	13
	Mid	2132.5	8.53	13
	High	2147.5	8.57	13
15MHz BW, 64QAM	Low	2117.5	8.67	13
	Mid	2132.5	8.50	13
	High	2147.5	8.51	13
20MHz BW, QPSK	Low	2120	8.84	13
	Mid	2132	8.84	13
	High	2145	8.83	13
20MHz BW, 64QAM	Low	2120	9.36	13
	Mid	2132	9.33	13
	High	2145	9.36	13

Test Data for LTE band 2 (QPSK is the worst case)

Type	Channel	Frequency (MHz)	Peak-Average Ratio (dB)	Peak-Average Ratio (dB)
5MHz BW, QPSK	Low	1932.5	9.69	13
	Mid	1960.0	9.69	13
	High	1987.5	9.54	13
10MHz BW, QPSK	Low	1935.0	9.85	13
	Mid	1960.0	9.75	13
	High	1985.0	10.02	13
15MHz BW, QPSK	Low	1937.5	9.78	13
	Mid	1960.0	9.81	13
	High	1982.5	9.76	13
20MHz BW, QPSK	Low	1940.0	9.90	13
	Mid	1960.0	9.82	13
	High	1980.0	9.82	13

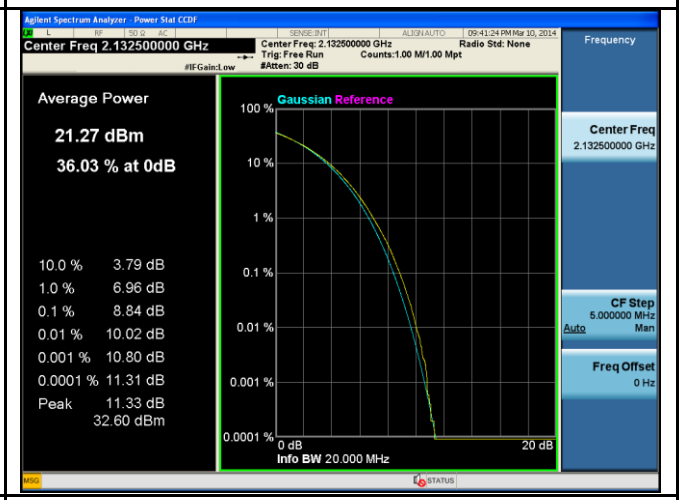
Test Plots for Band 4:

PK-AV-Ratio-Band4-QPSK-10M BW-Low



PK-AV-Ratio-Band4-QPSK-20M BW-Low

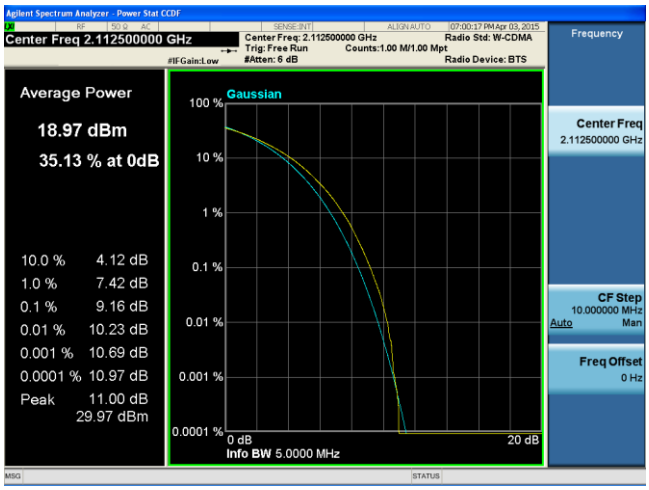
PK-AV-Ratio-Band4-QPSK-10M BW-Mid



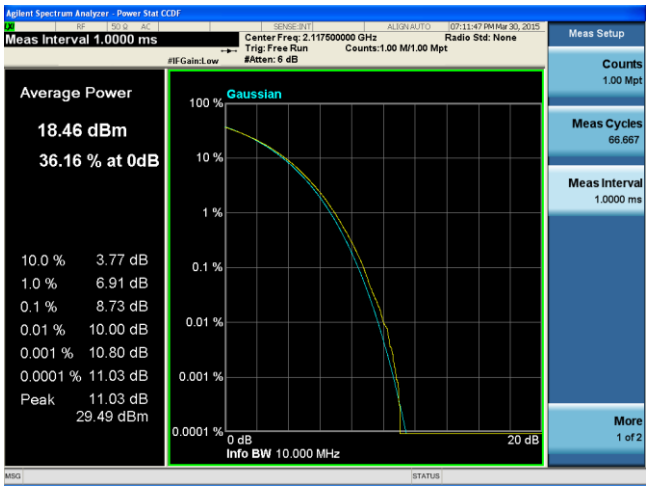
PK-AV-Ratio-Band4-QPSK-20M BW-Mid

PK-AV-Ratio-Band4-QPSK-10M BW-High

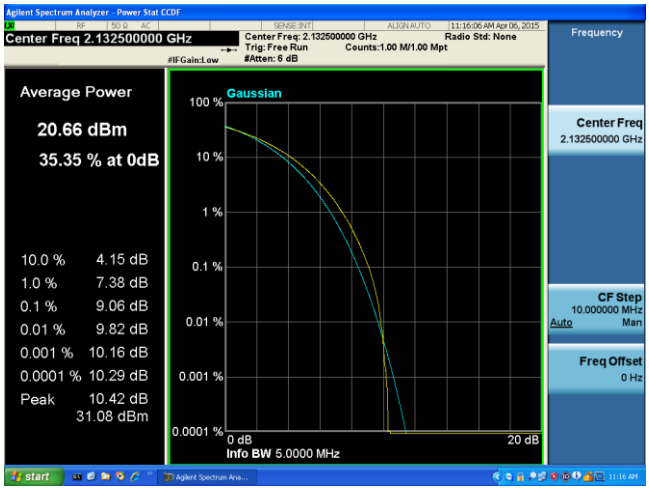
PK-AV-Ratio-Band4-QPSK-20M BW-High



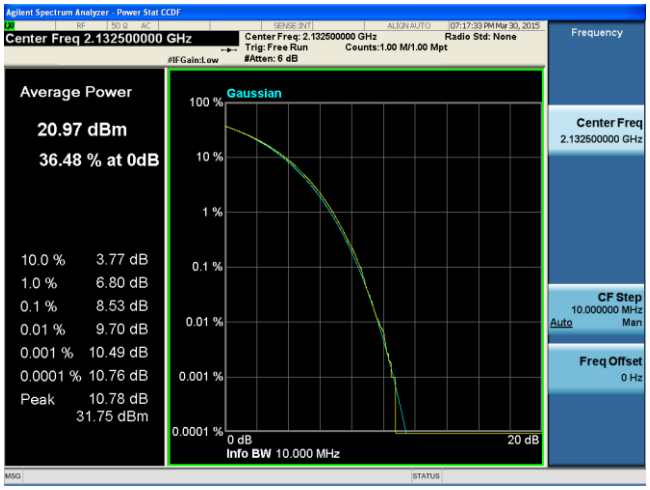
PK-AV-Ratio-Band4-QPSK-5M BW-Low



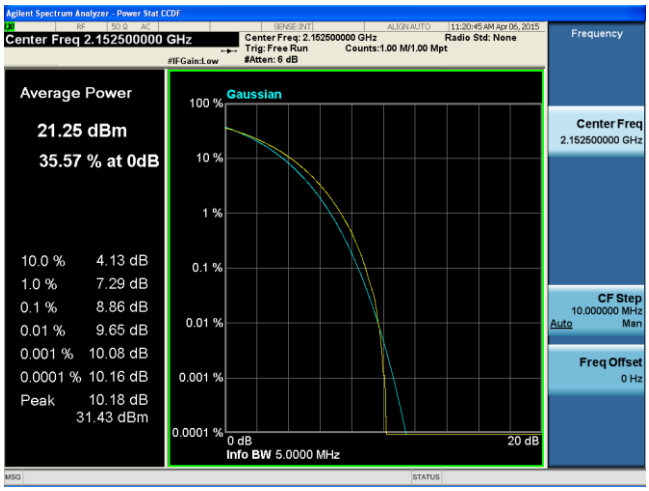
PK-AV-Ratio-Band4-QPSK-15M BW-Low



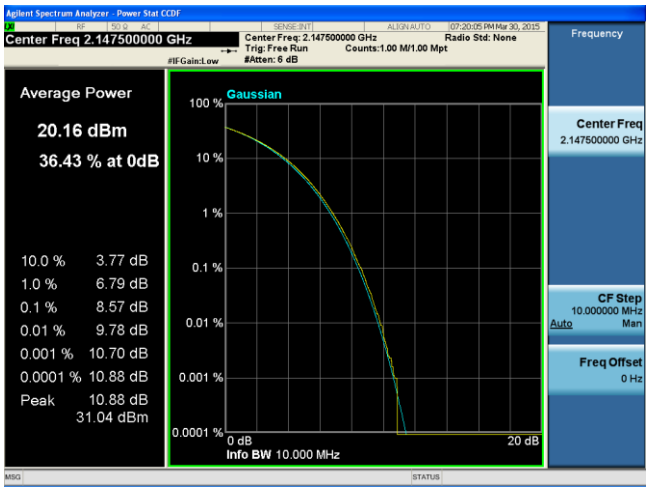
PK-AV-Ratio-Band4-QPSK-5M BW-Mid



PK-AV-Ratio-Band4-QPSK-15M BW-Mid



PK-AV-Ratio-Band4-QPSK-5M BW-High

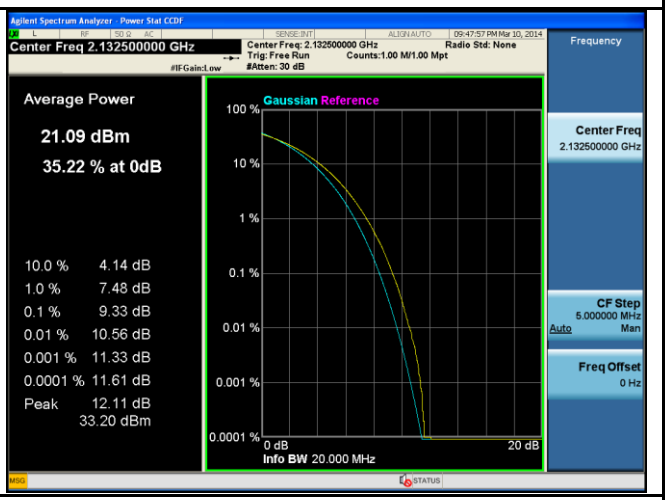


PK-AV-Ratio-Band4-QPSK-15M BW-High

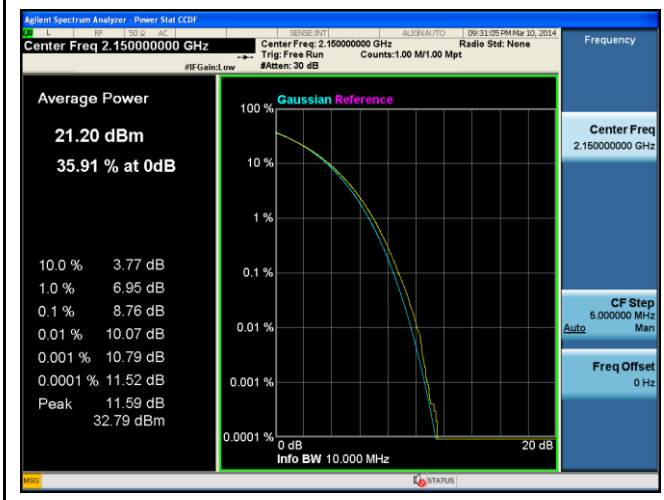
PK-AV-Ratio-Band4-64QAM-10M BW-Low

PK-AV-Ratio-Band4-64QAM-20M BW-Low

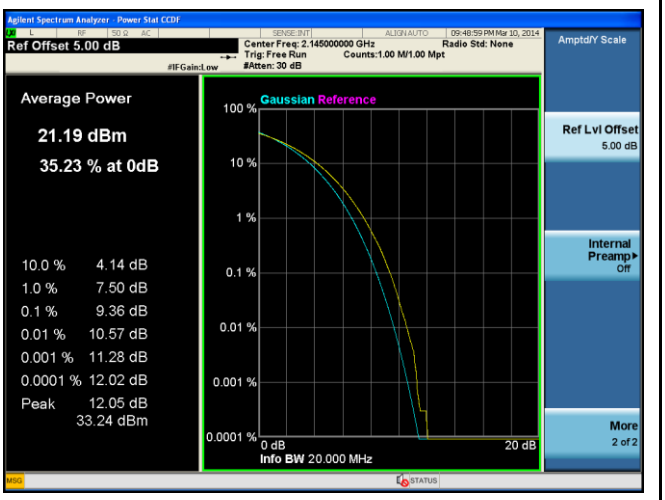
PK-AV-Ratio-Band4-64QAM-10M BW-Mid



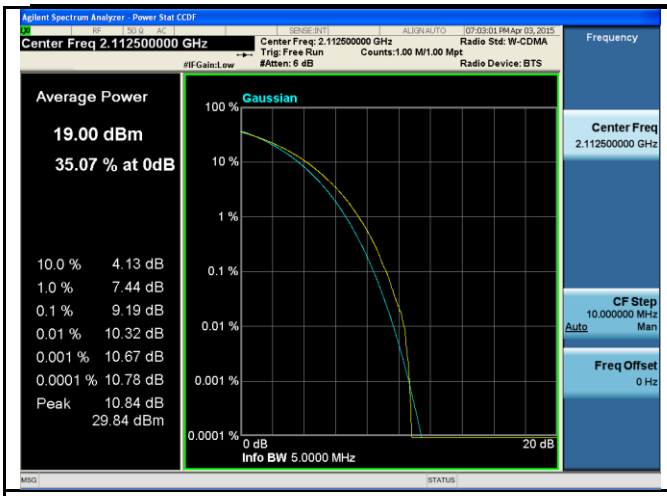
PK-AV-Ratio-Band4-64QAM-20M BW-Mid



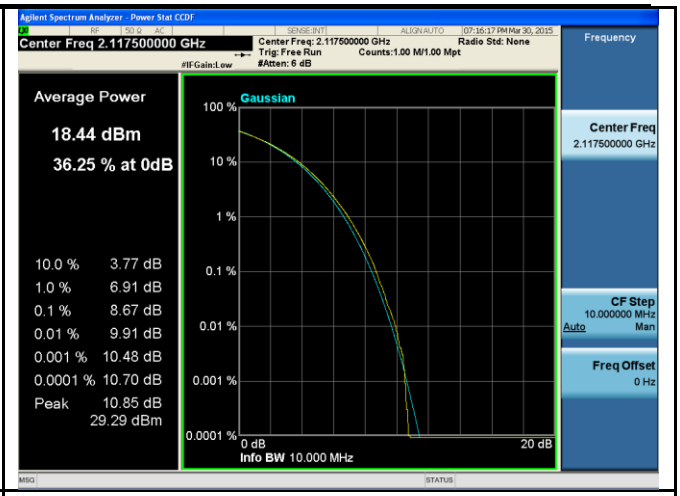
PK-AV-Ratio-Band4-64QAM-10M BW-High



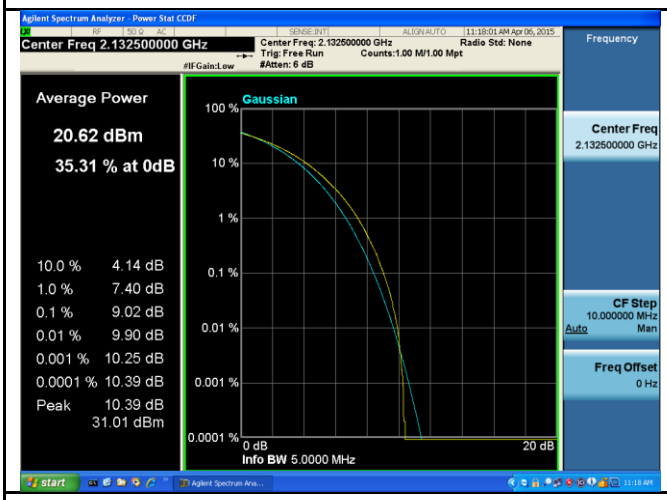
PK-AV-Ratio-Band4-64QAM-20M BW-High



PK-AV-Ratio-Band4-64QAM-5M BW-Low

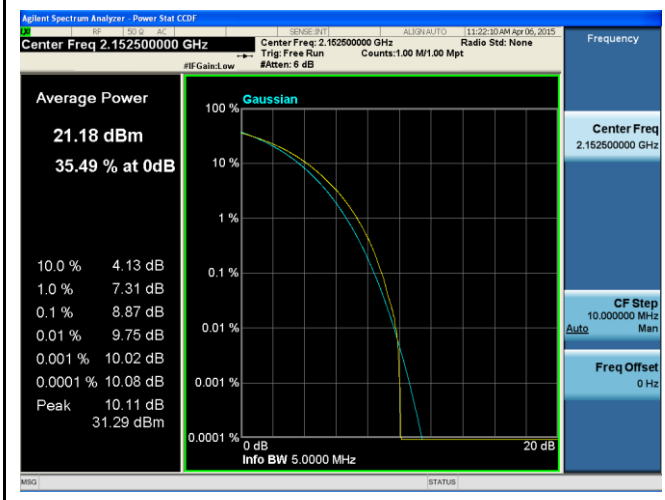


PK-AV-Ratio-Band4-64QAM-15M BW-Low

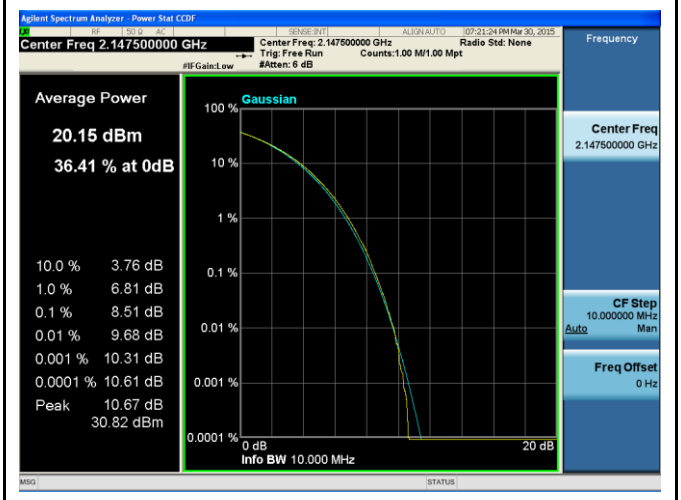


PK-AV-Ratio-Band4-64QAM-5M BW-Mid

PK-AV-Ratio-Band4-64QAM-15M BW-Mid

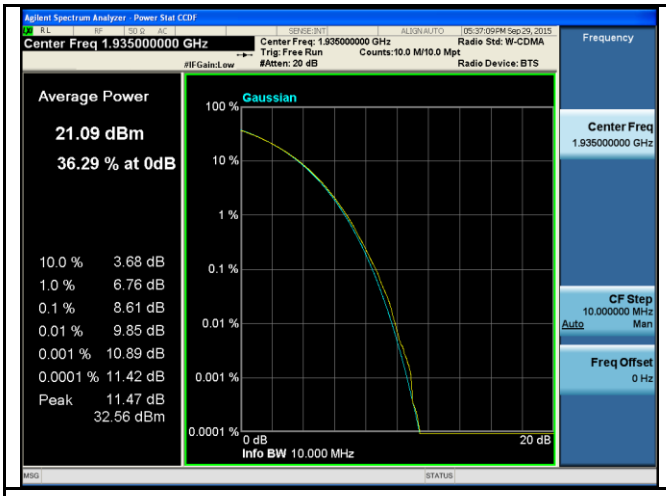


PK-AV-Ratio-Band4-64QAM-5M BW-High



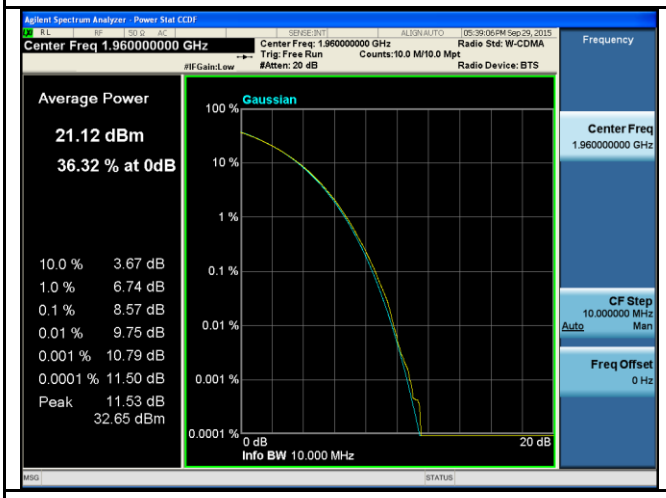
PK-AV-Ratio-Band4-64QAM-15M BW-High

Test Plots for Band 2:

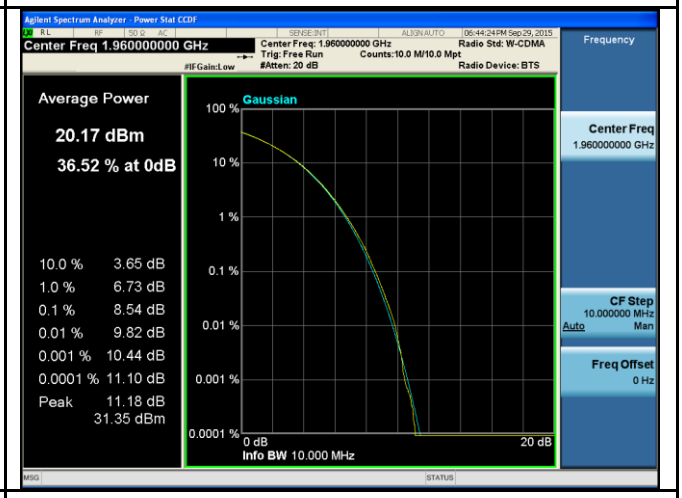


PK-AV-Ratio-Band2-QPSK-10M BW-Low

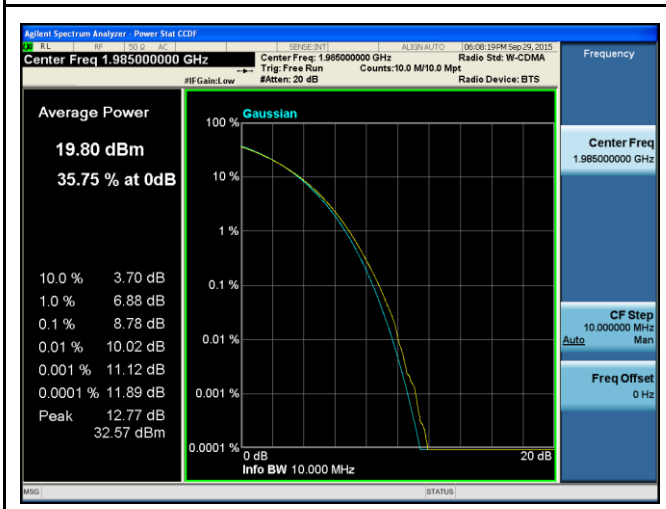
PK-AV-Ratio- Band2-QPSK-20M BW-Low



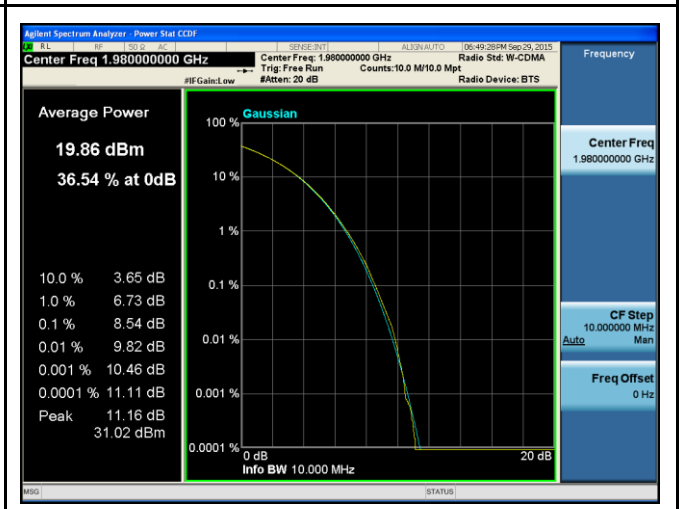
PK-AV-Ratio- Band2-QPSK-10M BW-Mid



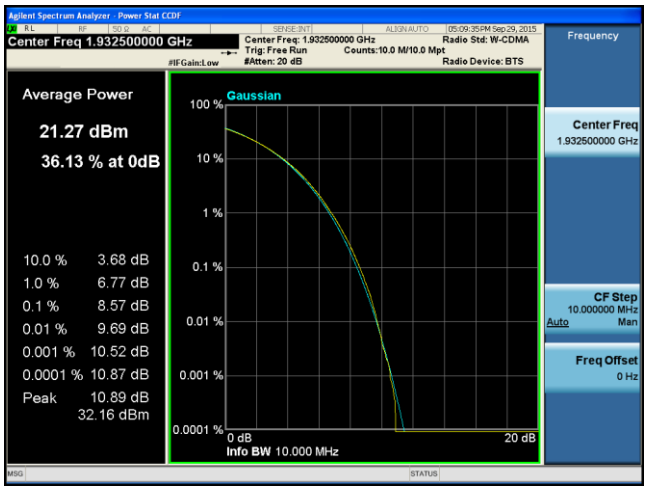
PK-AV-Ratio- Band2-QPSK-20M BW-Mid



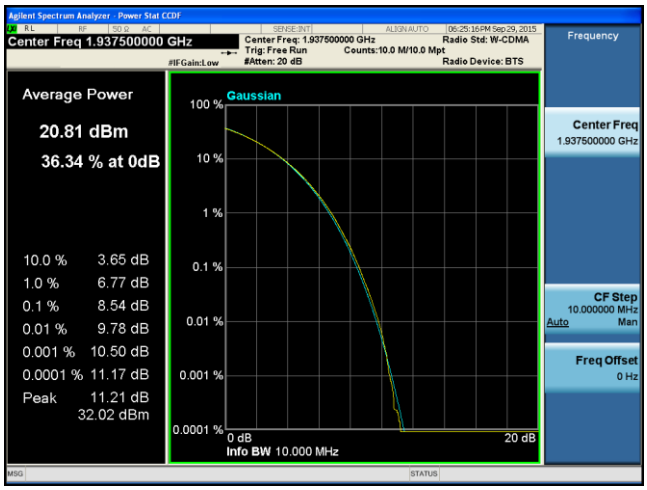
PK-AV-Ratio- Band2-QPSK-10M BW-High



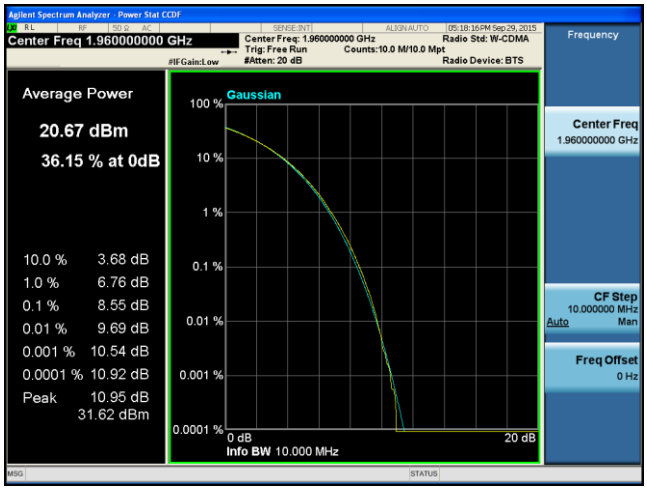
PK-AV-Ratio- Band2-QPSK-20M BW-High



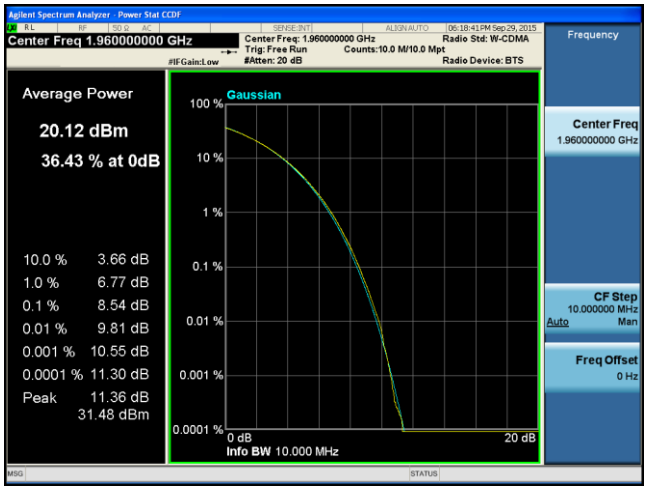
PK-AV-Ratio- Band2-QPSK-5M BW-Low



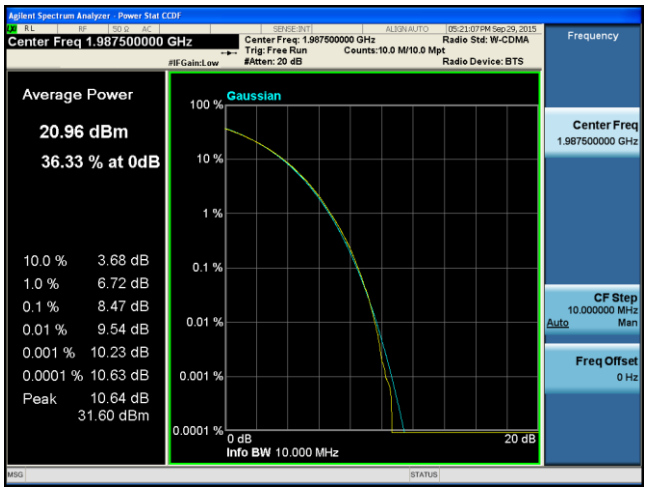
PK-AV-Ratio- Band2-QPSK-15M BW-Low



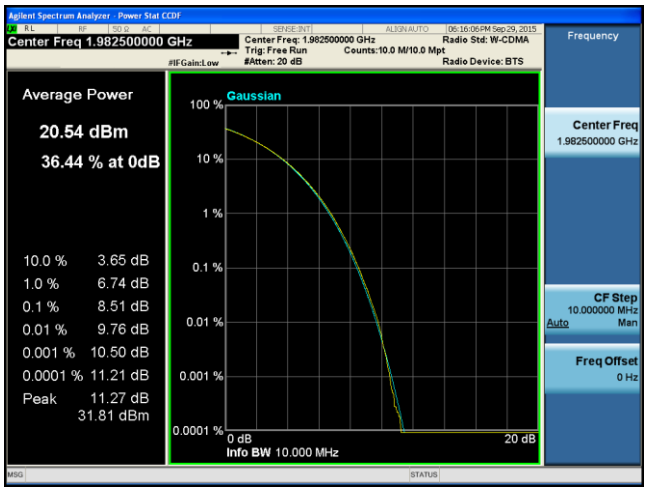
PK-AV-Ratio- Band2-QPSK-5M BW-Mid



PK-AV-Ratio- Band2-QPSK-15M BW-Mid



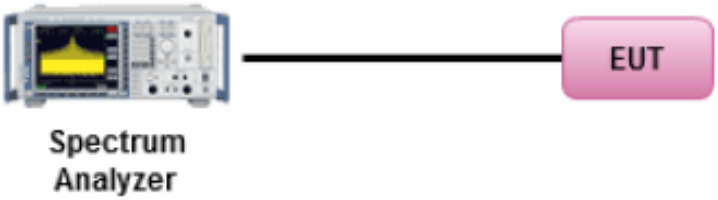
PK-AV-Ratio- Band2-QPSK-5M BW-High



PK-AV-Ratio- Band2-QPSK-15M BW-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	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. The 99% bandwidths are measured using spectrum analyzer's internal meas function.	
Test Date	02/27/2014 – 03/202014 03/03/2015 – 04/13/2015 09/24/2015 – 09/30/2015	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 Data

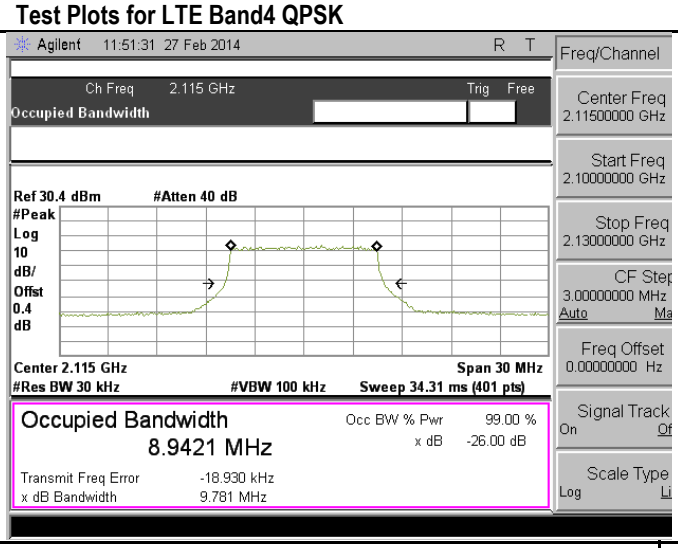
99% Bandwidth measurement result for LTE band 4

Type	Channel	Channel Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Occupied Bandwidth (MHz)
5MHz BW, QPSK	Low	2112.5	4.48	5.06
	Mid	2132.5	4.48	5.10
	High	2152.5	4.48	5.07
5MHz BW, 64QAM	Low	2112.5	4.48	5.09
	Mid	2132.5	4.48	5.03
	High	2152.5	4.48	5.06
10MHz BW, QPSK	Low	2115	8.94	9.78
	Mid	2132	8.93	9.79
	High	2150	8.93	9.70
10MHz BW, 64QAM	Low	2115	8.96	9.29
	Mid	2132	8.94	9.25
	High	2150	8.93	9.90
15MHz BW, QPSK	Low	2117.5	13.36	14.21
	Mid	2132.5	13.35	14.06
	High	2147.5	13.38	14.25
15MHz BW, 64QAM	Low	2117.5	13.37	14.30
	Mid	2132.5	13.36	14.29
	High	2147.5	13.35	14.30
20MHz BW, QPSK	Low	2120	17.80	19.19
	Mid	2132	17.81	18.94
	High	2145	17.81	19.31
20MHz BW, 64QAM	Low	2120	17.82	18.66
	Mid	2132	17.79	18.61
	High	2145	17.81	18.83

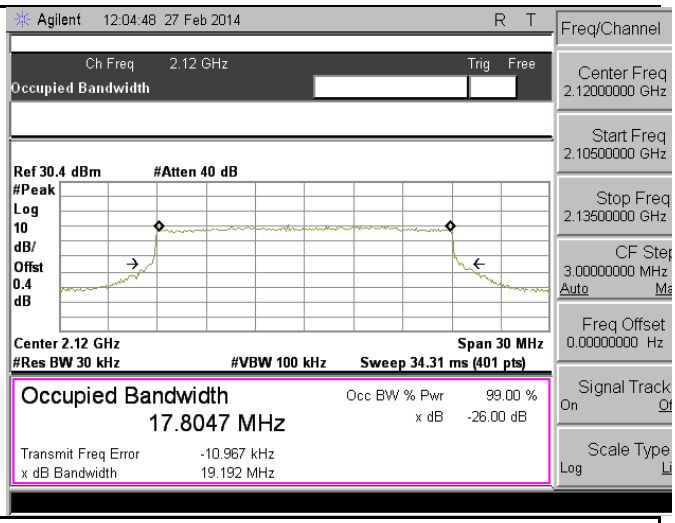
99% Bandwidth measurement result for LTE band 2

Type	Channel	Channel Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Occupied Bandwidth (MHz)
5MHz BW, QPSK	Low	1932.5	4.40	4.62
	Mid	1960.0	4.41	4.66
	High	1987.5	4.41	4.67
5MHz BW, 64QAM	Low	1932.5	4.43	4.68
	Mid	1960.0	4.42	4.68
	High	1987.5	4.39	4.61
10MHz BW, QPSK	Low	1935.0	8.86	9.31
	Mid	1960.0	8.86	9.26
	High	1985.0	8.88	9.33
10MHz BW, 64QAM	Low	1935.0	8.87	9.29
	Mid	1960.0	8.87	9.33
	High	1985.0	8.87	9.28
15MHz BW, QPSK	Low	1937.5	13.31	13.75
	Mid	1960.0	13.30	13.72
	High	1982.5	13.28	13.86
15MHz BW, 64QAM	Low	1937.5	13.27	13.89
	Mid	1960.0	13.28	13.95
	High	1982.5	13.28	13.86
20MHz BW, QPSK	Low	1940.0	17.54	18.22
	Mid	1960.0	17.60	18.27
	High	1980.0	17.51	18.16
20MHz BW, 64QAM	Low	1940.0	17.49	18.29
	Mid	1960.0	17.56	18.36
	High	1980.0	17.56	18.27

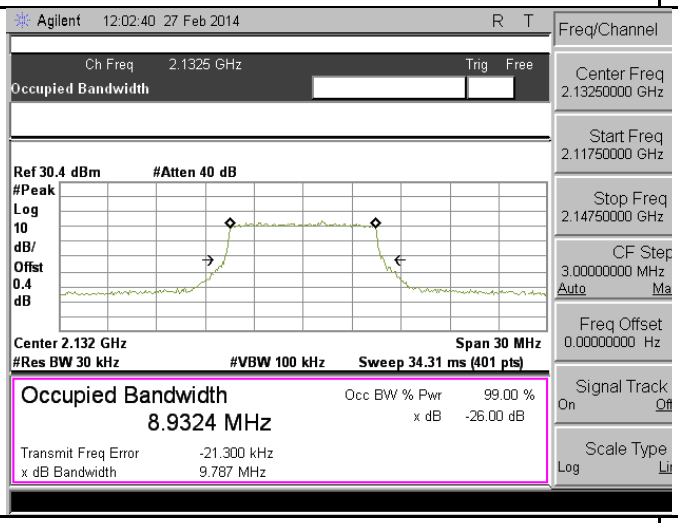
Test Plots for LTE Band4 QPSK



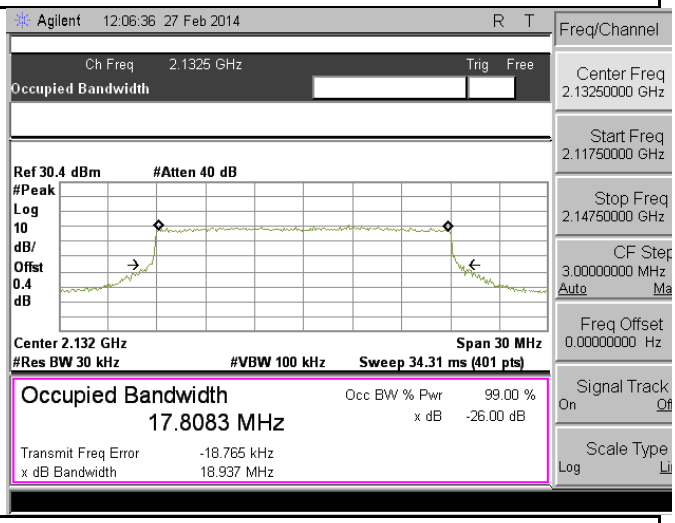
OBW-Band4-10M BW-Low



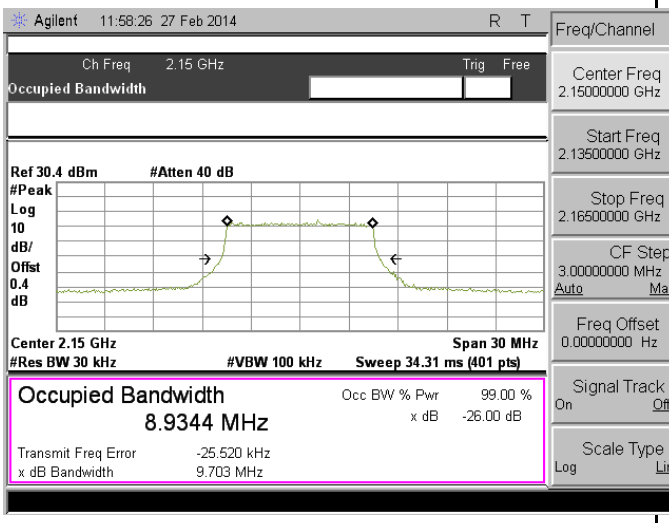
OBW-Band4-20M BW-Low



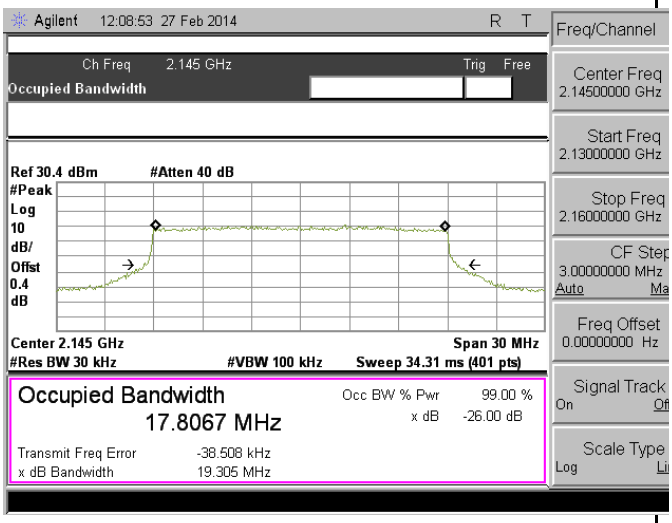
OBW-Band4-10M BW-Mid



OBW-Band4-20M BW-Mid

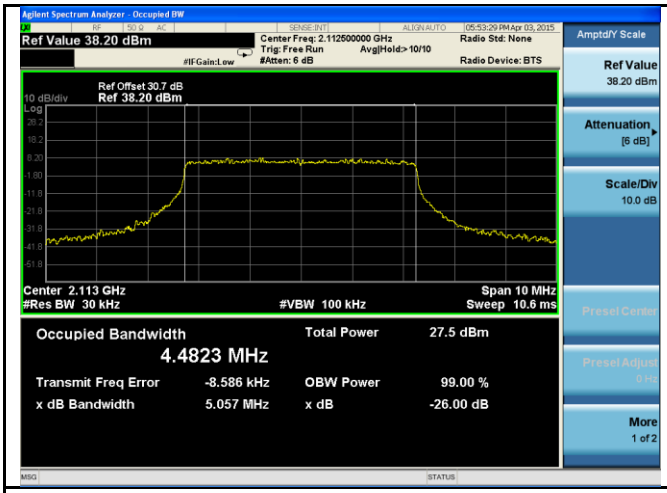


OBW-Band4-10M BW-High

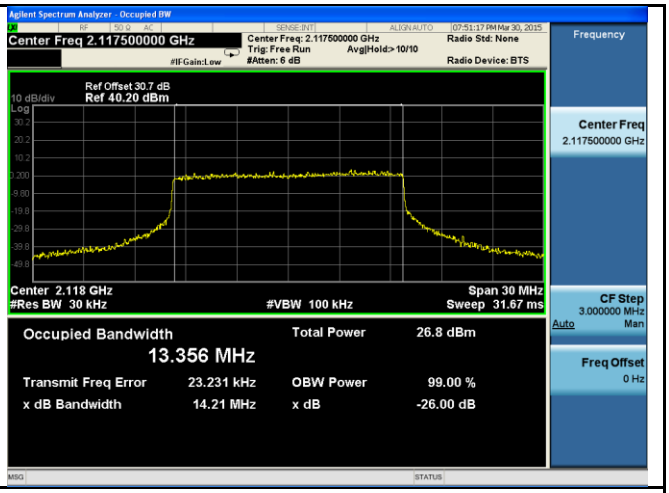


OBW-Band4-20M BW-High

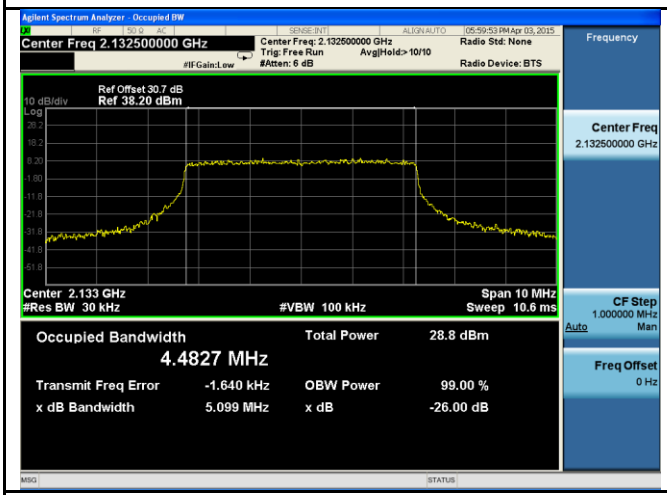
Test Plots for LTE Band4 QPSK



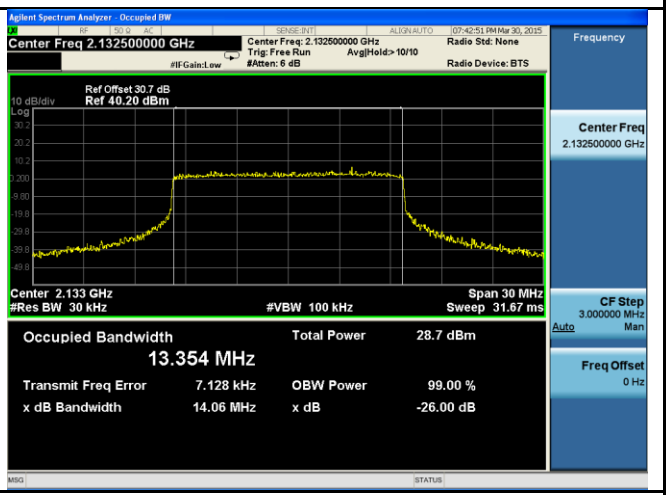
OBW-Band4-5M BW-Low



OBW-Band4-15M BW-Low

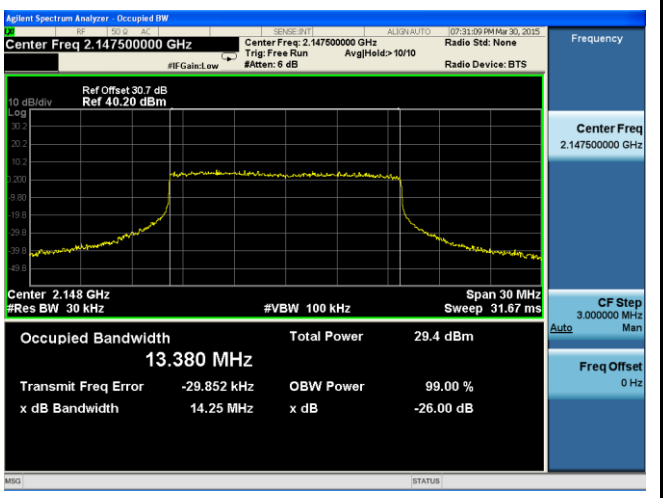


OBW-Band4-5M BW-Mid



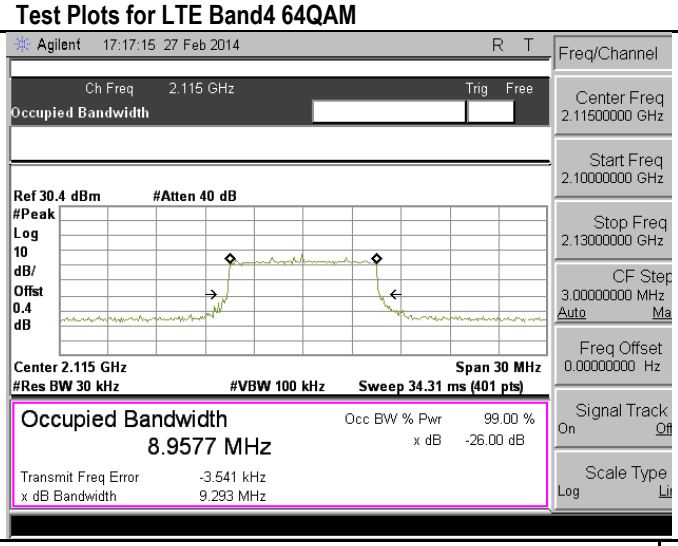
OBW-Band4-15M BW-Mid

OBW-Band4-5M BW-High

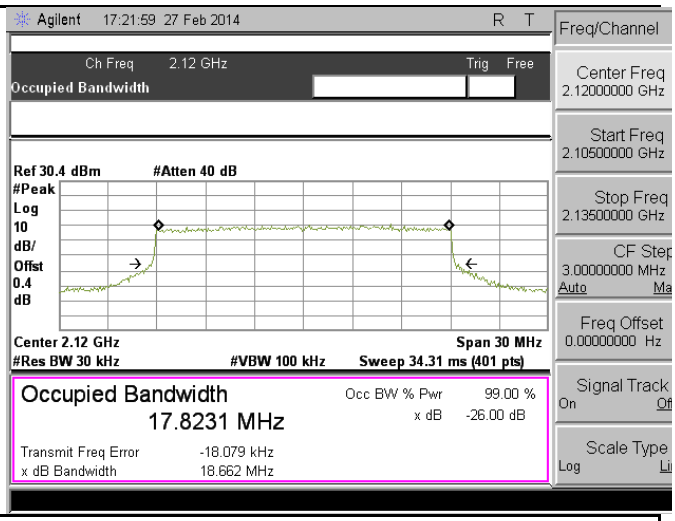


OBW-Band4-15M BW-High

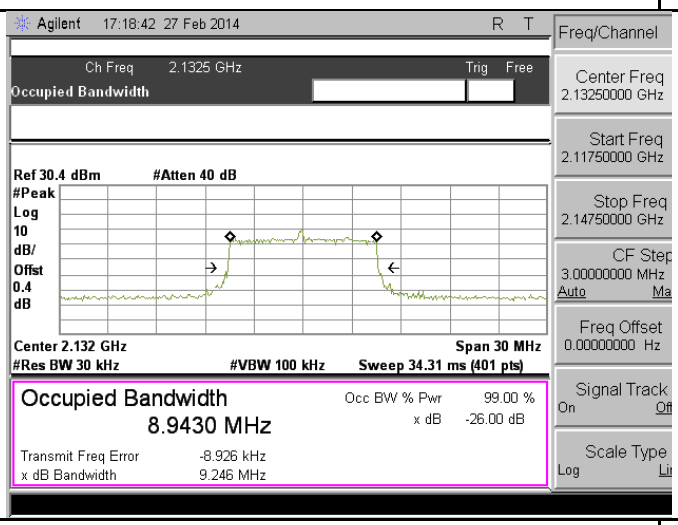
Test Plots for LTE Band4 64QAM



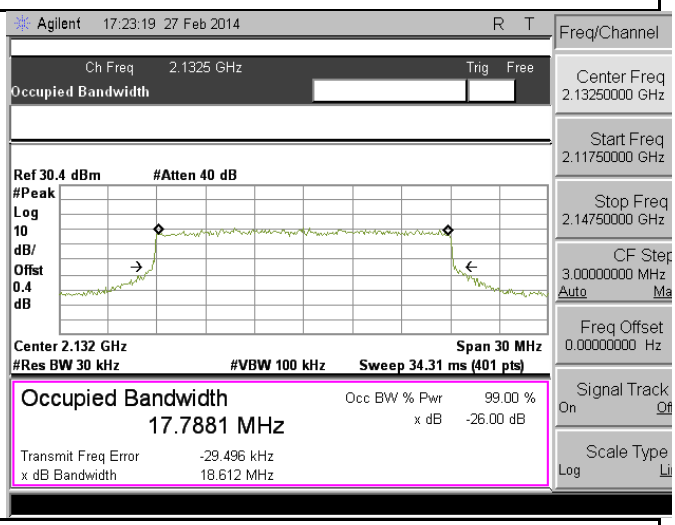
OBW-Band4-10M BW-Low



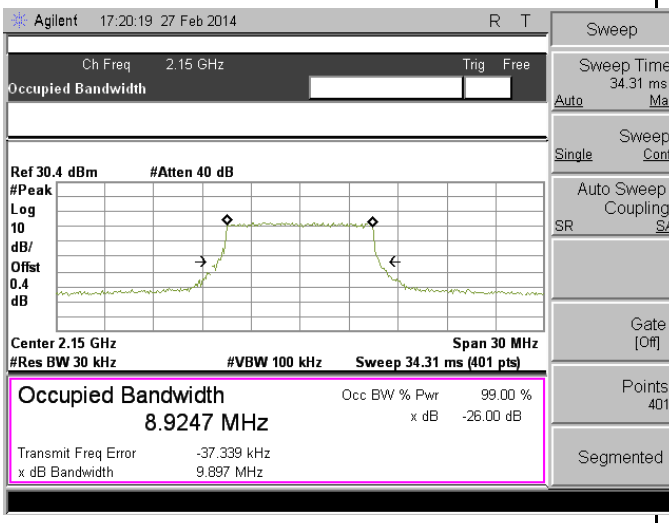
OBW-Band4-20M BW-Low



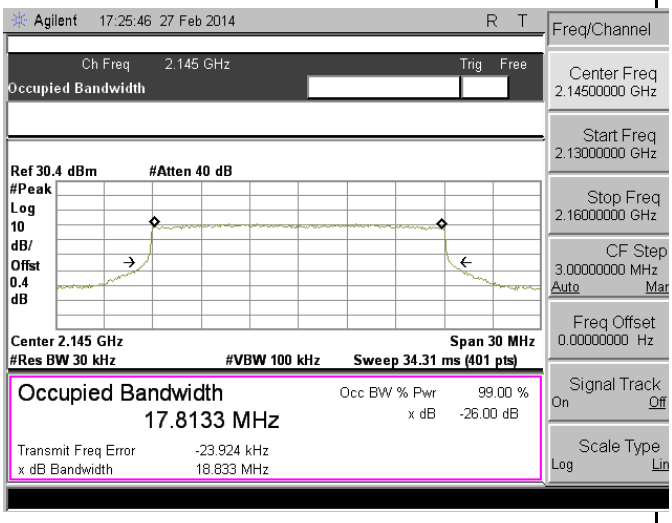
OBW-Band4-10M BW-Mid



OBW-Band4-20M BW-Mid

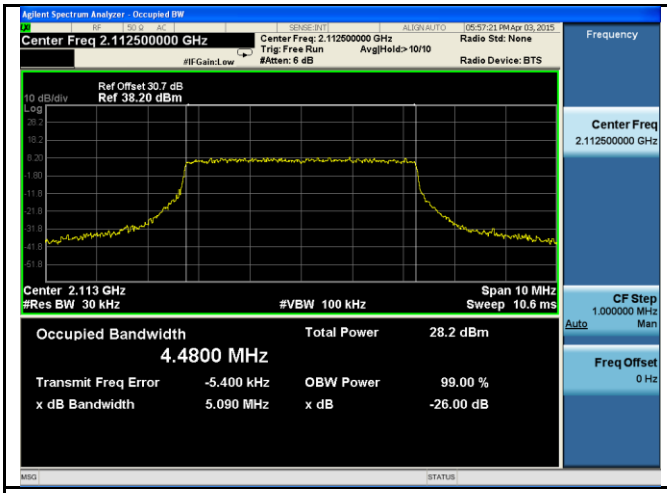


OBW-Band4-10M BW-High

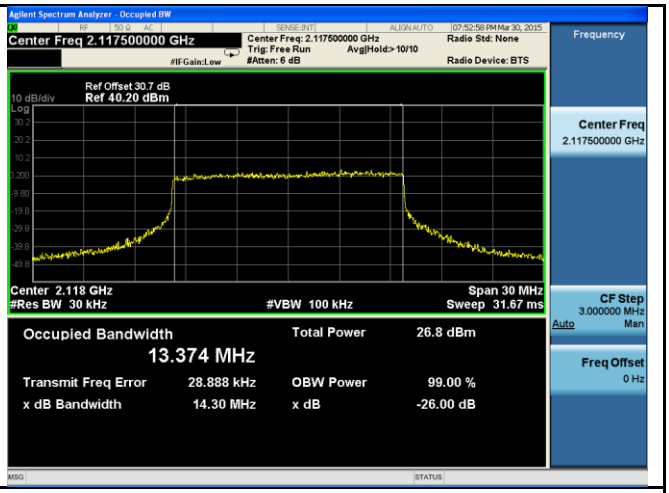


OBW-Band4-20M BW-High

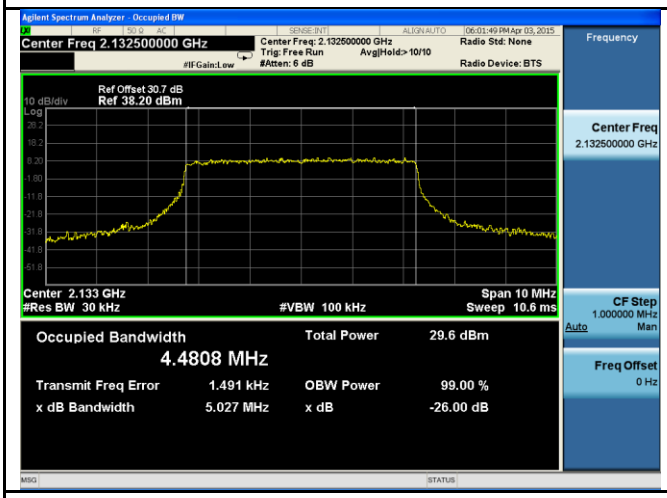
Test Plots for LTE Band4 64QAM



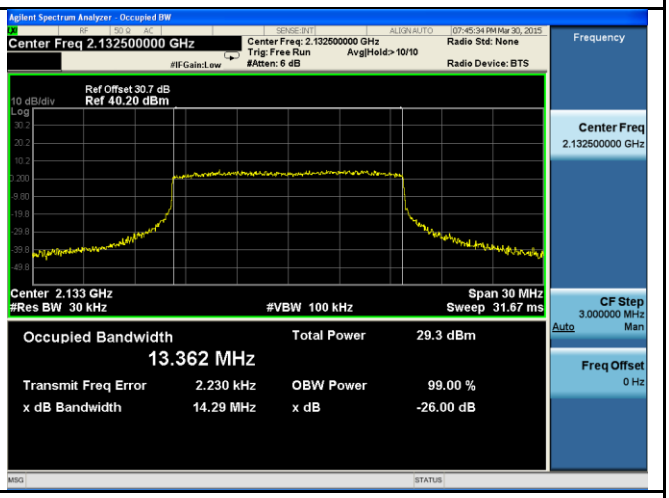
OBW-Band4-5M BW-Low



OBW-Band4-15M BW-Low



OBW-Band4-5M BW-Mid



OBW-Band4-15M BW-Mid

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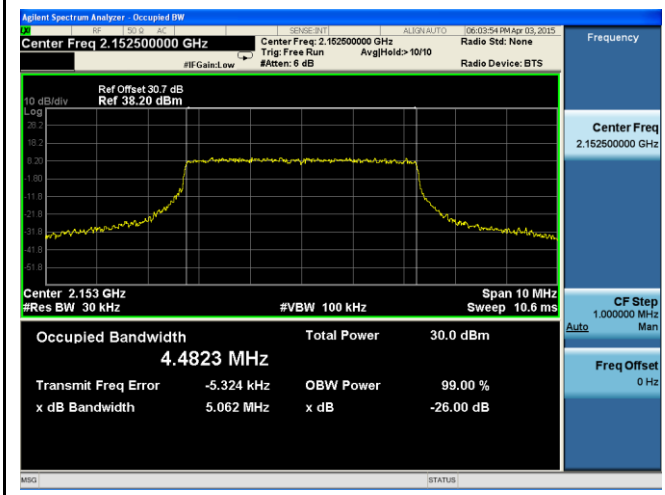
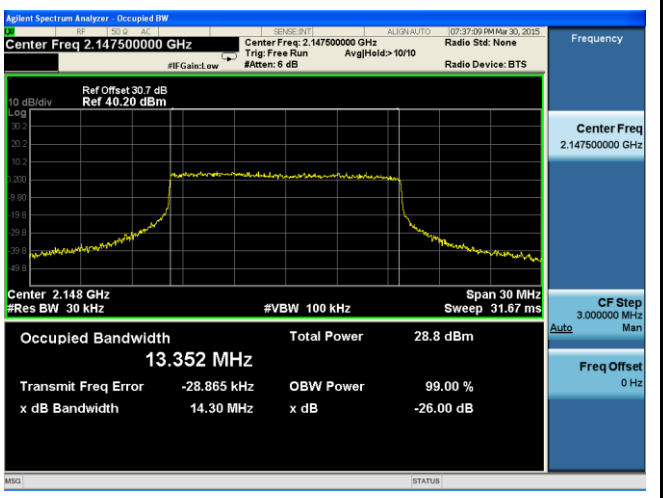
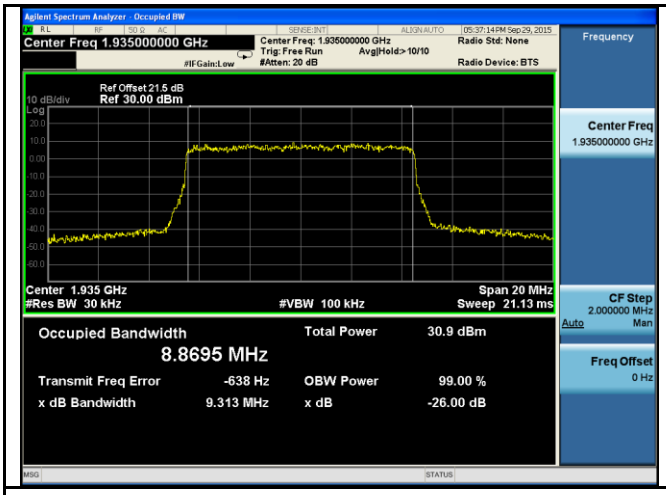


OBW-Band4-5M BW-High

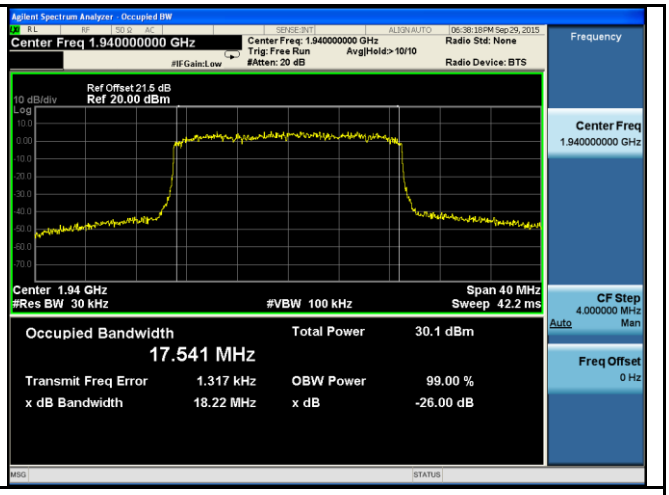


OBW-Band4-15M BW-High

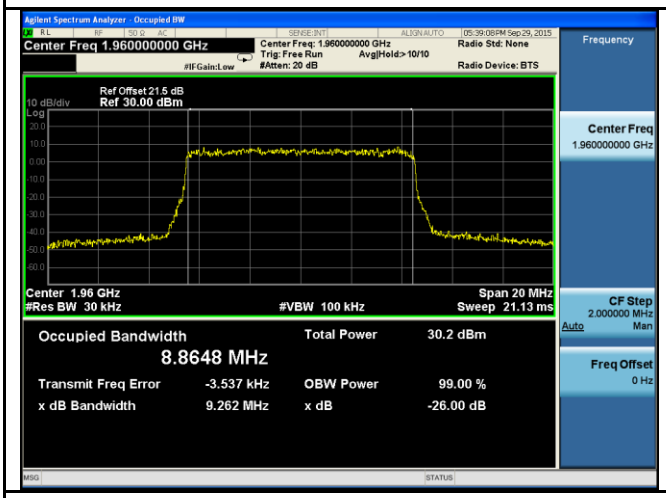
Test Plots for LTE Band2 QPSK



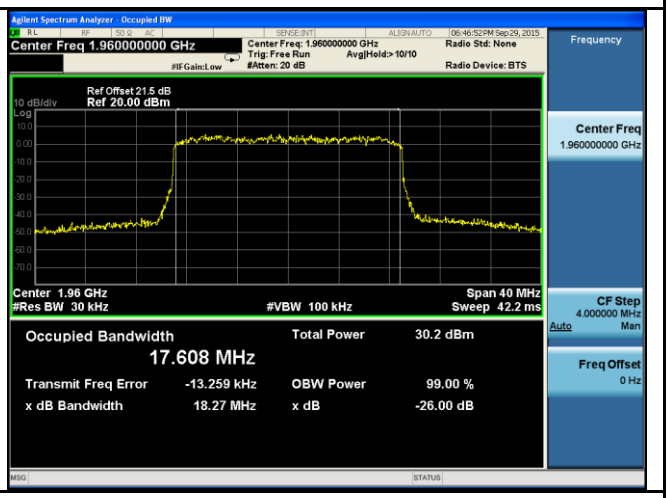
OBW- Band2-10M BW-Low



OBW- Band2-20M BW-Low



OBW- Band2-10M BW-Mid

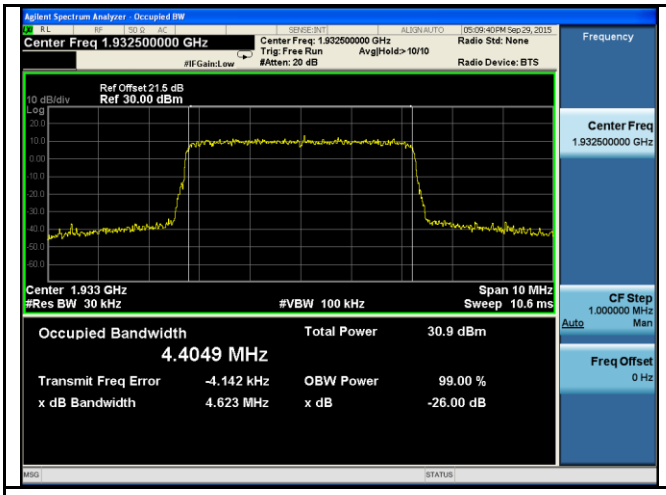


OBW- Band2-20M BW-Mid

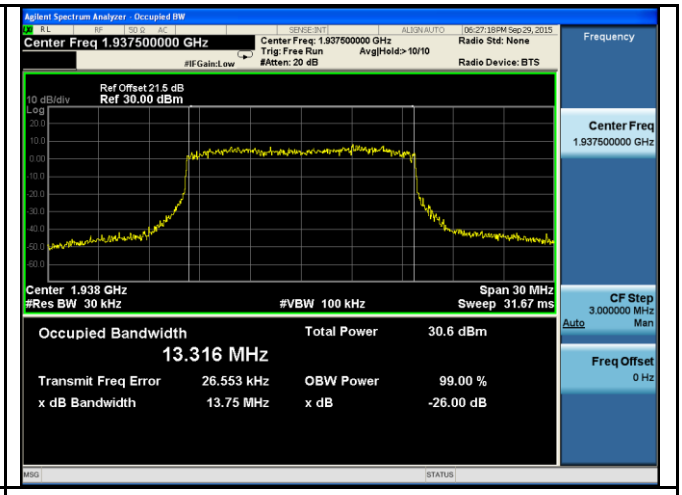
OBW- Band2-10M BW-High

OBW- Band2-20M BW-High

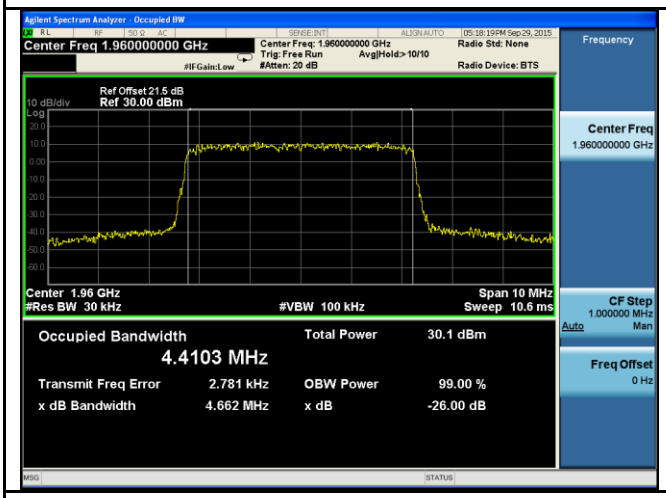
Test Plots for LTE Band2 QPSK



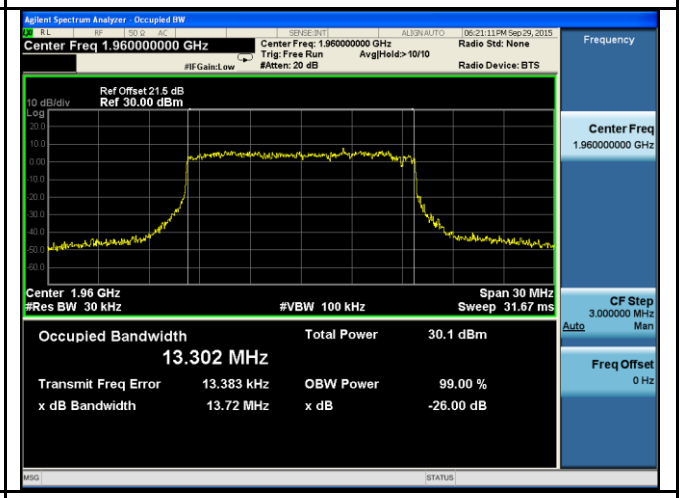
OBW- Band2-5M BW-Low



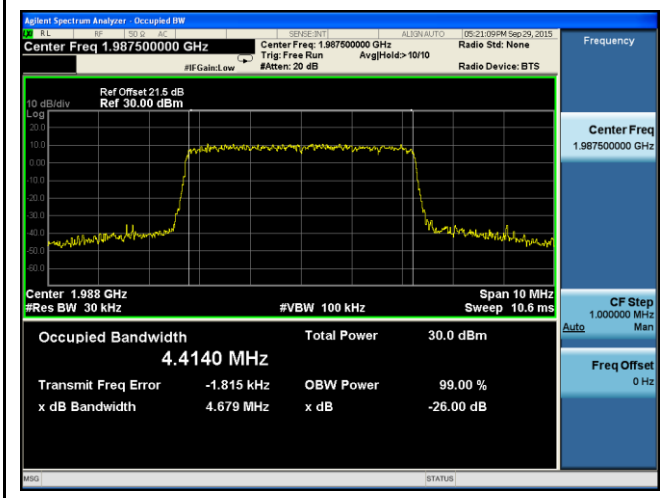
OBW- Band2-15M BW-Low



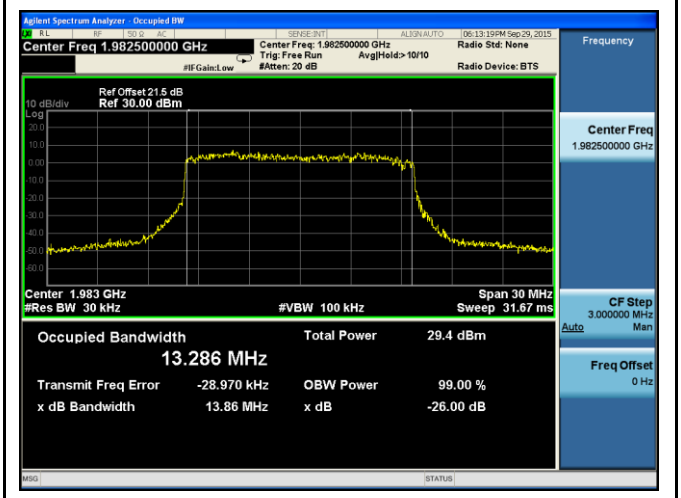
OBW- Band2-5M BW-Mid



OBW- Band2-15M BW-Mid

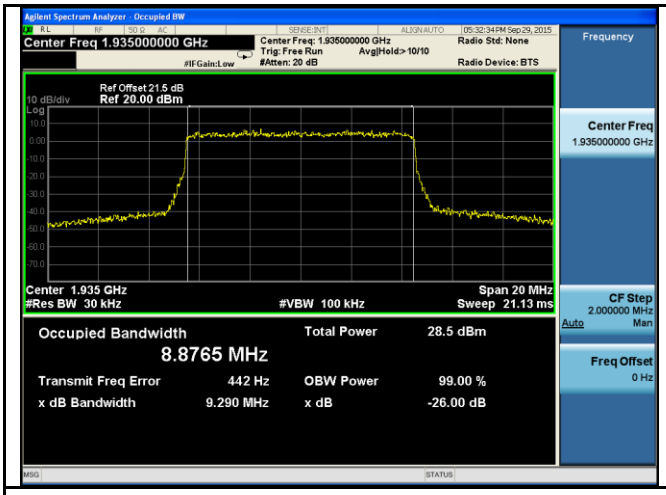


OBW- Band2-5M BW-High

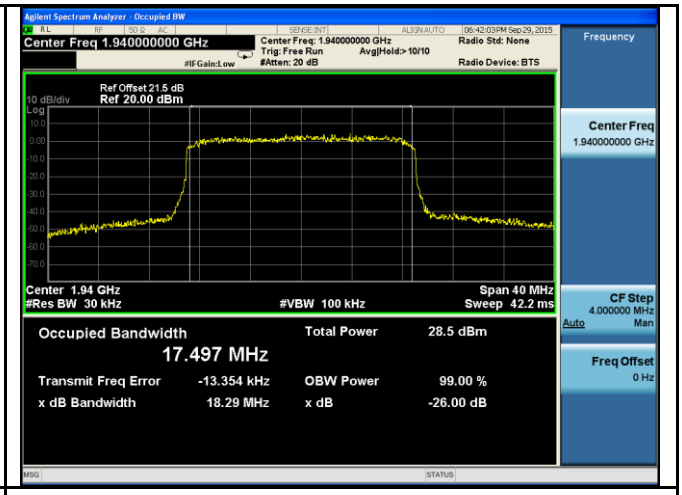


OBW- Band2-15M BW-High

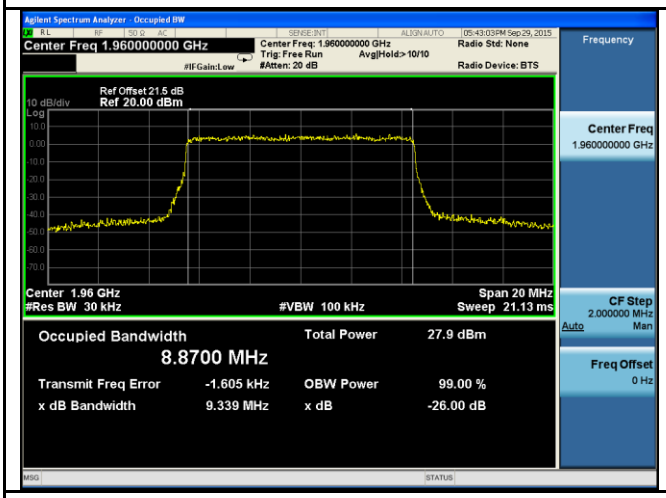
Test Plots for LTE Band2 64QAM



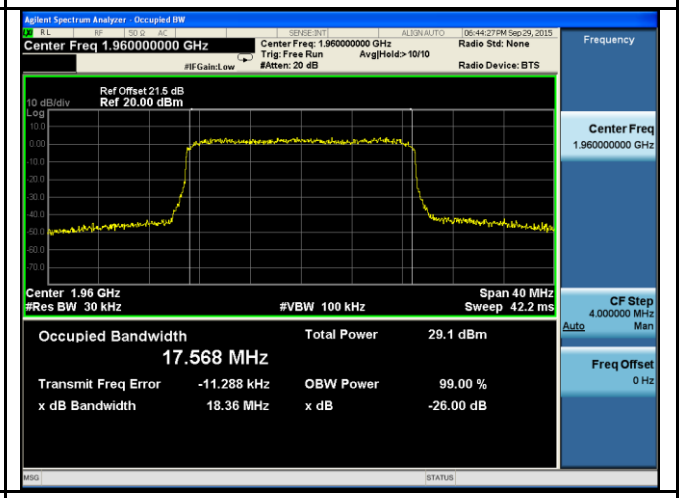
OBW- Band2 -10M BW-Low



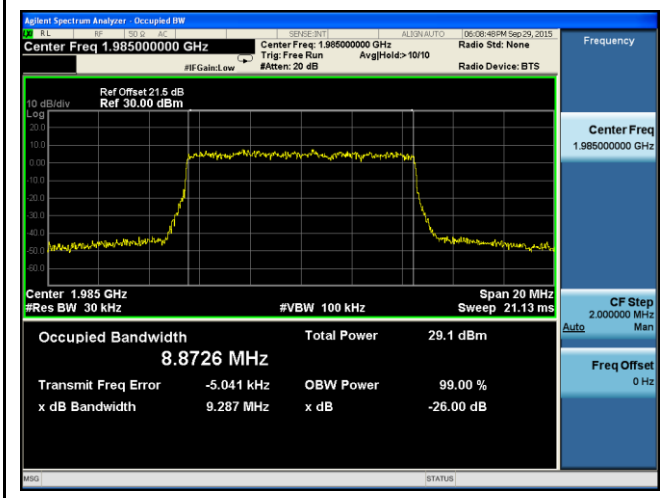
OBW- Band2 -20M BW-Low



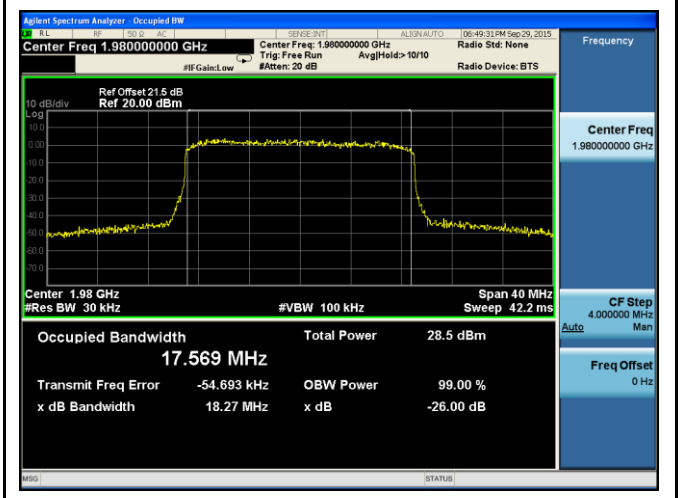
OBW- Band2 -10M BW-Mid



OBW- Band2-20M BW-Mid

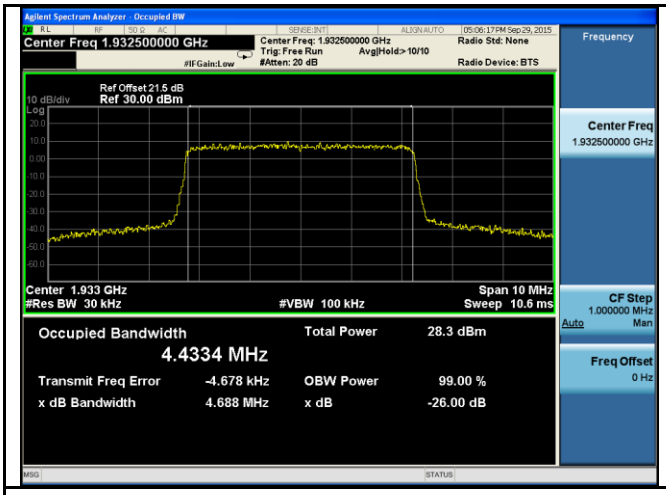


OBW- Band2 -10M BW-High

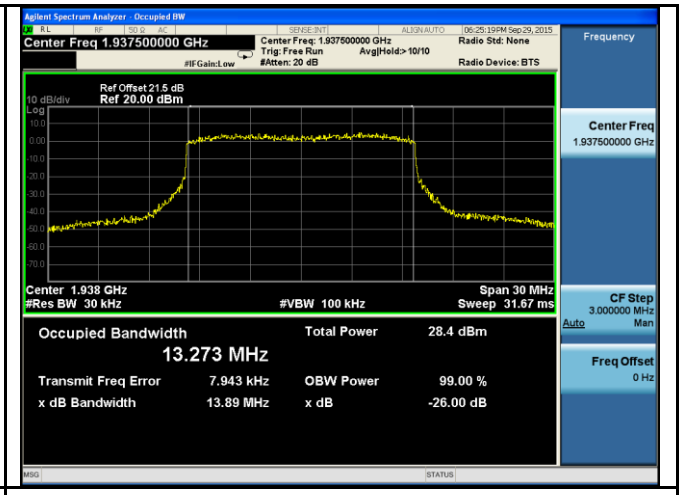


OBW- Band2-20M BW-High

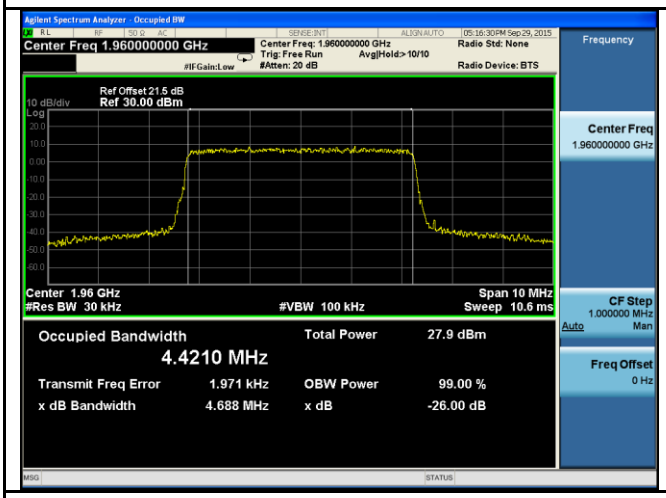
Test Plots for LTE Band2 64QAM



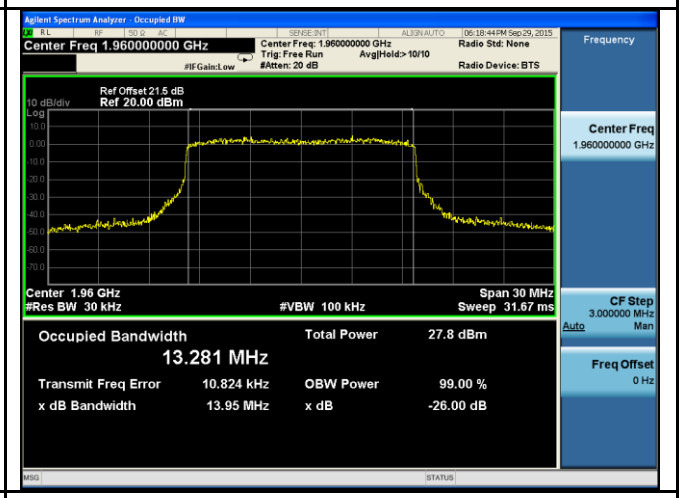
OBW- Band2-5M BW-Low



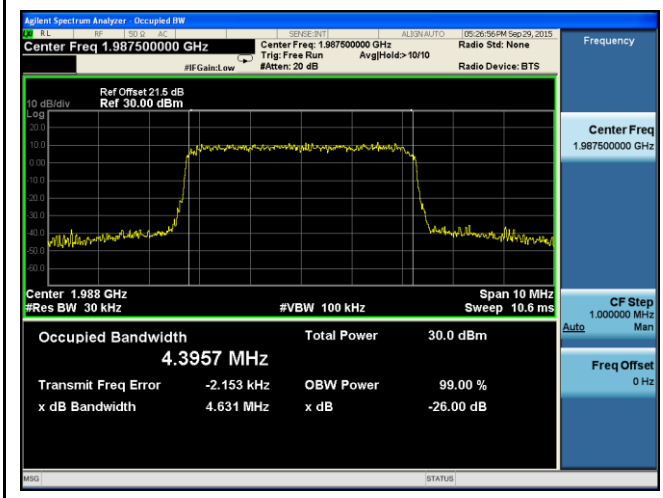
OBW- Band2-15M BW-Low



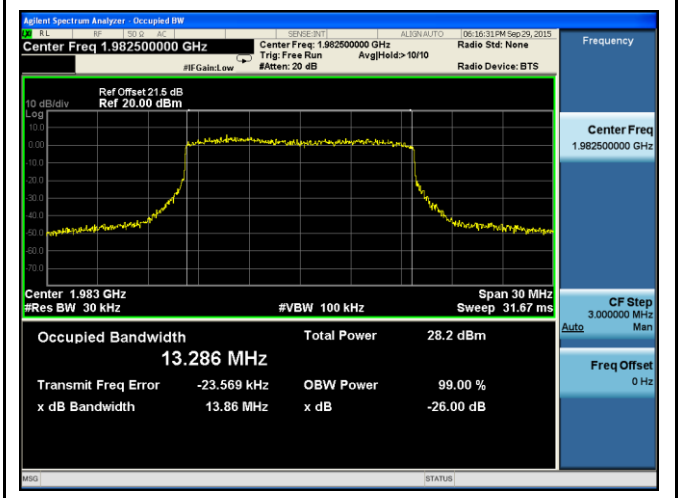
OBW- Band2-5M BW-Mid



OBW- Band2-15M BW-Mid



OBW- Band2-5M BW-High



OBW-Band2-15M BW-High