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74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA
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FCC REPORT

FCC Certification

Applicant Name:
SAMSUNG Electronics Co.,Ltd.

Address:
129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea

Date of Issue:
November 16, 2017

Test Site/Location:
HCT CO., LTD.,
74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA

Report No.: HCT-R-1711-F008

FCC ID: A3LSLS-BU10G

APPLICANT: SAMSUNG Electronics Co., Ltd.

FCC Model(s): SLS-BU10G

EUT Type: 4G LTE Network Extender 2 for Enterprise

Frequency of Operation: DL 746 – 756 MHz (Band 13)
DL 2110 – 2180 MHz (Band 66)

Emission Designator:

Mode (MHz)	Frequency (MHz)	Emission Designator	
		QPSK (G7D)	16QAM/64QAM (W7D)
LTE Band 13 (10)	751.0	8M94G7D	8M96W7D
LTE Band 66 (5)	2112.5 ~ 2177.5	4M44G7D	4M45W7D
LTE Band 66 (10)	2115.0 ~ 2175.0	8M96G7D	8M97W7D
LTE Band 66 (15)	2117.5 ~ 2172.5	13M4G7D	13M3W7D
LTE Band 66 (20)	2120.0 ~ 2170.0	17M9G7D	17M9W7D

TX Output Power : 500 mW (250 mW * 2 ports)

FCC Rule Part(s): FCC CFR 47 Part 2, 27.

Data of Test: October 18, 2017 ~ November 16, 2017

Engineering Statement:

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of FCC Part 27 of the FCC Rules under normal use and maintenance.

Report prepared by : Se Wook Park
Engineer of Telecommunication testing center

Approved by : Jong Seok Lee
Manager of Telecommunication testing center

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Report Revision

TEST REPORT NO.	DATE	DESCRIPTION
HCT-R-1711-F008	November 16, 2017	- First Approval Report

Result of Test

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1. GENERAL INFORMATION

1.1. CLIENT INFORMATION

Company	**Samsung Electronics Co., Ltd.**
Contact Point	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea

1.2. PRODUCT INFORMATION

MODEL	SLS-BU10G
EUT TYPE	4G LTE Network Extender 2 for Enterprise
POWER SUPPLY	AC [90 ~ 264] VAC PoE : 48 VDC
EMISSION DESIGNATOR	

Mode (MHz)	Frequency (MHz)	Emission Designator	
		QPSK (G7D)	16QAM/64QAM (W7D)
LTE Band 13 (10)	751.0	8M95G7D	8M96W7D
LTE Band 66 (5)	2112.5 ~ 2177.5	4M44G7D	4M45W7D
LTE Band 66 (10)	2115.0 ~ 2175.0	8M96G7D	8M97W7D
LTE Band 66 (15)	2117.5 ~ 2172.5	13M3G7D	13M4W7D
LTE Band 66 (20)	2120.0 ~ 2170.0	17M9G7D	17M9W7D

OPERATING FREQUENCY	LTE Band 13: 746 ~ 756 MHz LTE Band 66: 2110 ~ 2180 MHz
TX OUTPUT POWER	500 mW (250 mW * 2 ports)
CHANNEL BANDWIDTH	Band 13 : 10 MHz Band 66 : 5 MHz, 10 MHz, 15 MHz, 20 MHz
MEASUREMENT STANDARDS	ANSI/TIA-603-D-2010, KDB 971168 D01 v02r02,
MODULATION TYPE	QPSK, 16QAM, 64QAM
ANTENNA SPECIFICATION	Manufacturer: ETHERTRONICS INC. Antenna type: Internal Antenna Peak Gain:

Frequency [MHz]	Gain [dBi]	
	Port 4	Port 5
746 ~ 756	2.0	2.0
2110 ~ 2180	4.0	4.0

2. FACILITIES AND ACCREDITATIONS

2.1. FACILITIES

The SAC(Semi-Anechoic Chamber) and conducted measurement facility used to collect the radiated data are located at the 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA. The site is constructed in conformance with the requirements of ANSI C63.4. (Version :2014) and CISPR Publication 22. Detailed description of test facility was submitted to the Commission and accepted dated July 07, 2015 (Registration Number: 90661).

2.2. EQUIPMENT

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.
Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.
All receiving equipment conforms to CISPR Publication 16-1, “Radio Interference Measuring Apparatus and Measurement Methods.”

3. TEST SPECIFICATIONS

3.1. STANDARDS

The following tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 2, Part 27

SECTION	TEST ITEMS	RESULTS
§2.1046, §27.50(b), (d)	Conducted Output Power	Compliant
§2.1049	Occupied Bandwidth	Compliant
§2.1051, §27.53(c), (f), (h)	Spurious Emissions at Antenna Terminals	Compliant
§2.1051, §27.53(c), (h)	Band edge	Compliant
§2.1053, §27.53(c), (h)	Spurious Radiated Emissions.	Compliant
§2.1055, §27.54	Frequency Stability	Compliant

3.2. MODE OF OPERATION DURING THE TEST

The EUT is operated in a manner representative of the typical usage of the equipment.

During all testing, system components were manipulated within the confines of typical usage to maximize each emission. All Modulation (QPSK, 16QAM and 64QAM) modes were tested.

The EUT is supported power supply both of the AC/DC Adapter and PoE. Test results are only attached worst cases.

3.3. MAXIMUM MEASUREMENTUNCERTAINTY

The value of the measurement uncertainty for the measurement of each parameter.
Coverage factor *k* = 2, Confidence levels of 95 %

Description	Condition	Uncertainty
Conducted RF Output Power	-	± 0.72 dB
Occupied Bandwidth	OBW ≤ 20 MHz	± 52 kHz
Spurious Emissions at Antenna Terminals	-	± 1.08 dB
Radiated Spurious Emissions	f ≤ 1 GHz f > 1 GHz	± 4.80 dB ± 6.07 dB
Frequency Stability	-	± 1.22 x 10^{-6}

3.4. STANDARDS ENVIRONMENTAL TEST CONDITIONS

Temperature :	**+ 15 ℃ to + 35 ℃**
Relative humidity:	**30 % to 60 %**
Air pressure	**860 mbar to 1 060 mbar**

4. TEST EQUIPMENT

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Agilent	N9030A / Signal Analyzer	11/30/2016	Annual	MY49431210
Weinschel	67-30-33 / Fixed Attenuator	02/09/2017	Annual	CC7264
Rohde&Schwarz	ATT / 10dB Attenuator	08/10/2017	Annual	N/A
NANGYEUL CO., LTD.	NY-THR18750 / Temperature and Humidity Chamber	10/21/2017	Annual	NY-2009012201A
Innco system	MA4000-EP / Antenna Position Tower	N/A	N/A	N/A
Innco system	CT0800 / Turn Table	N/A	N/A	N/A
Innco system	CO3000 / Controller(Antenna mast)	N/A	N/A	CO3000-4p
ETS	2090 / Controller(Turn table)	N/A	N/A	1646
Rohde&Schwarz	Loop Antenna	04/19/2017	Biennial	1513-175
Schwarzbeck	VULB 9168 / Hybrid Antenna	04/06/2017	Biennial	760
Schwarzbeck	BBHA 9120D / Horn Antenna	08/25/2016	Biennial	1300
Schwarzbeck	BBHA9170 / Horn Antenna(15 GHz ~ 40 GHz)	04/25/2017	Biennial	BBHA9170124
Rohde & Schwarz	FSP / Spectrum Analyzer	09/06/2017	Annual	100688
Rohde & Schwarz	FSV40-N / Spectrum Analyzer	09/27/2017	Annual	101068-SZ
Wainwright Instruments	WHKX10-900-1G-15G / Highpass Filter	07/21/2017	Annual	5
Wainwright Instruments	WHK3.0/18G-10EF / Highpass Filter	06/12/2017	Annual	8
CERNEX	CBLU1183540 / Power Amplifier	01/25/2017	Annual	24614
CERNEX	CBL06185030 / Power Amplifier	01/25/2017	Annual	24615
CERNEX	CBL18265035 / Power Amplifier	01/23/2017	Annual	22966
CERNEX	CBL26405040 / Power Amplifier	06/30/2017	Annual	25956

5. CONDUCTED OUTPUT POWER

Test Requirements:

§ 2.1046 Measurements required: RF power output:

(a) For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in § 2.1033(c)(8).The electrical characteristics of the radio frequency load attached to the output terminals when this test is made shall be stated.

(b) For single sideband, independent sideband, and single channel, controlled carrier radio telephone transmitters, the procedure specified in paragraph (a) of this section shall be employed and, in addition, the transmitter shall be modulated during the test as specified and as applicable in § 2.1046 (b) (1-5). In all tests, the input level of the modulating signal shall be such as to develop rated peak envelope power or carrier power, as appropriate, for the transmitter.

(c) For measurements conducted pursuant to paragraphs (a) and (b) of this section, all calculations and methods used by the applicant for determining carrier power or peak envelope power, as appropriate, on the basis of measured power in the radio frequency load attached to the transmitter output terminals shall be shown. Under the test conditions specified, no components of the emission spectrum shall exceed the limits specified in the applicable rule parts as necessary for meeting occupied bandwidth or emission limitations.

§27.50 Power limits and duty cycle.

(b) The following power and antenna height limits apply to transmitters operating in the 746-758 MHz, 775-788 MHz and 805-806 MHz bands:

(1) Fixed and base stations transmitting a signal in the 757-758 and 775-776 MHz bands must not exceed an effective radiated power (ERP) of 1000 watts and an antenna height of 305 m height above average terrain (HAAT), except that antenna heights greater than 305 m HAAT are permitted if power levels are reduced below 1000 watts ERP in accordance with Table 1 of this section.

(2) Fixed and base stations transmitting a signal in the 746-757 MHz and 776-787 MHz bands with an emission bandwidth of 1 MHz or less must not exceed an ERP of 1000 watts and an antenna height of 305 m HAAT, except that antenna heights greater than 305 m HAAT are permitted if power levels are reduced below 1000 watts ERP in accordance with Table 1 of this section.

(3) Fixed and base stations located in a county with population density of 100 or fewer persons per square mile, based upon the most recently available population statistics from the Bureau of the Census, and transmitting a signal in the 746-757 MHz and 776-787 MHz bands with an emission bandwidth of 1 MHz or less must not exceed an ERP of 2000 watts and an antenna

height of 305 m HAAT, except that antenna heights greater than 305 m HAAT are permitted if power levels are reduced below 2000 watts ERP in accordance with Table 2 of this section.

(4) Fixed and base stations transmitting a signal in the 746-757 MHz and 776-787 MHz bands with an emission bandwidth greater than 1 MHz must not exceed an ERP of 1000 watts/MHz and an antenna height of 305 m HAAT, except that antenna heights greater than 305 m HAAT are permitted if power levels are reduced below 1000 watts/MHz ERP in accordance with Table 3 of this section.

(5) Fixed and base stations located in a county with population density of 100 or fewer persons per square mile, based upon the most recently available population statistics from the Bureau of the Census, and transmitting a signal in the 746-757 MHz and 776-787 MHz bands with an emission bandwidth greater than 1 MHz must not exceed an ERP of 2000 watts/MHz and an antenna height of 305 m HAAT, except that antenna heights greater than 305 m HAAT are permitted if power levels are reduced below 2000 watts/MHz ERP in accordance with Table 4 of this section.

(6) Licensees of fixed or base stations transmitting a signal in the 746-757 MHz and 776-787 MHz bands at an ERP greater than 1000 watts must comply with the provisions set forth in paragraph (b)(8) of this section and §27.55(c).

(7) Licensees seeking to operate a fixed or base station located in a county with population density of 100 or fewer persons per square mile, based upon the most recently available population statistics from the Bureau of the Census, and transmitting a signal in the 746-757 MHz and 776-787 MHz bands at an ERP greater than 1000 watts must:

(i) Coordinate in advance with all licensees authorized to operate in the 698-758 MHz, 775-788, and 805-806 MHz bands within 120 kilometers (75 miles) of the base or fixed station;

(ii) coordinate in advance with all regional planning committees, as identified in §90.527 of this chapter, with jurisdiction within 120 kilometers (75 miles) of the base or fixed station.

(8) Licensees authorized to transmit in the 746-757 MHz and 776-787 MHz bands and intending to operate a base or fixed station at a power level permitted under the provisions of paragraph (b)(6) of this section must provide advanced notice of such operation to the Commission and to licensees authorized in their area of operation. Licensees who must be notified are all licensees authorized to operate in the 758-775 MHz and 788-805 MHz bands under part 90 of this chapter within 75 km of the base or fixed station and all regional planning committees, as identified in §90.527 of this chapter, with jurisdiction within 75 km of the base or fixed station. Notifications must provide the location and operating parameters of the base or fixed station, including the station's ERP, antenna coordinates, antenna height above ground, and vertical antenna pattern, and such notifications must be provided at least 90 days prior to the commencement of station operation.

(9) Control stations and mobile stations transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands and fixed stations transmitting in the 787-788 MHz and 805-806 MHz bands

are limited to 30 watts ERP.

(10) Portable stations (hand-held devices) transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands are limited to 3 watts ERP.

(11) For transmissions in the 757-758, 775-776, 787-788, and 805-806 MHz bands, maximum composite transmit power shall be measured over any interval of continuous transmission using instrumentation calibrated in terms of RMS-equivalent voltage. The measurement results shall be properly adjusted for any instrument limitations, such as detector response times, limited resolution bandwidth capability when compared to the emission bandwidth, etc., so as to obtain a true maximum composite measurement for the emission in question over the full bandwidth of the channel.

(12) For transmissions in the 746-757 and 776-787 MHz bands, licensees may employ equipment operating in compliance with either the measurement techniques described in paragraph (b)(11) of this section or a Commission-approved average power technique. In both instances, equipment employed must be authorized in accordance with the provisions of §27.51.

(d) The following power and antenna height requirements apply to stations transmitting in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz and 2180-2200 MHz bands:

(1) The power of each fixed or base station transmitting in the 1995-2000 MHz, 2110-2155 MHz, 2155-2180 MHz or 2180-2200 MHz band and located in any county with population density of 100 or fewer persons per square mile, based upon the most recently available population statistics from the Bureau of the Census, is limited to:

(i) An equivalent isotropically radiated power (EIRP) of 3280 watts when transmitting with an emission bandwidth of 1 MHz or less;

(ii) An EIRP of 3280 watts/MHz when transmitting with an emission bandwidth greater than 1 MHz.

(2) The power of each fixed or base station transmitting in the 1995-2000 MHz, the 2110-2155 MHz 2155-2180 MHz band, or 2180-2200 MHz band and situated in any geographic location other than that described in paragraph (d)(1) of this section is limited to:

(i) An equivalent isotropically radiated power (EIRP) of 1640 watts when transmitting with an emission bandwidth of 1 MHz or less;

(ii) An EIRP of 1640 watts/MHz when transmitting with an emission bandwidth greater than 1 MHz.

(3) A licensee operating a base or fixed station in the 2110-2155 MHz band utilizing a power greater than 1640 watts EIRP and greater than 1640 watts/MHz EIRP must coordinate such operations in advance with all Government and non-Government satellite entities in the 2025-2110 MHz band. A licensee operating a base or fixed station in the 2110-2180 MHz band utilizing power greater than 1640 watts EIRP and greater than 1640 watts/MHz EIRP must be coordinated in advance with the following licensees authorized to operate within 120 kilometers

(75 miles) of the base or fixed station operating in this band: All Broadband Radio Service (BRS) licensees authorized under this part in the 2155-2160 MHz band and all advanced wireless services (AWS) licensees authorized to operate on adjacent frequency blocks in the 2110-2180 MHz band.

(4) Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP. Fixed stations operating in the 1710-1755 MHz band are limited to a maximum antenna height of 10 meters above ground. Mobile and portable stations operating in these bands must employ a means for limiting power to the minimum necessary for successful communications.

(5) Equipment employed must be authorized in accordance with the provisions of §24.51. 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 (d)(6) of this section. 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.

(6) Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage. The measurement results shall be properly adjusted for any instrument limitations, such as detector response times, limited resolution bandwidth capability when compared to the emission bandwidth, sensitivity, etc., so as to obtain a true peak measurement for the emission in question over the full bandwidth of the channel.

(7) Fixed, mobile, and portable (hand-held) stations operating in the 2000-2020 MHz band are limited to 2 watts EIRP, except that the total power of any portion of an emission that falls within the 2000-2005 MHz band may not exceed 5 milliwatts. A licensee of AWS-4 authority may enter into private operator-to-operator agreements with all 1995-2000 MHz licensees to operate in 2000-2005 MHz at power levels above 5 milliwatts EIRP; except the total power of the AWS-4 mobile emissions may not exceed 2 watts EIRP.

(8) A licensee operating a base or fixed station in the 2180-2200 MHz band utilizing a power greater than 1640 watts EIRP and greater than 1640 watts/MHz EIRP must be coordinated in advance with all AWS licensees authorized to operate on adjacent frequency blocks in the 2180-2200 MHz band.

(9) Fixed, mobile and portable (hand-held) stations operating in the 1915-1920 MHz band are limited to 300 milliwatts EIRP.

(10) A licensee operating a base or fixed station in the 1995-2000 MHz band utilizing a power greater than 1640 watts EIRP and greater than 1640 watts/MHz EIRP must be coordinated in advance with all PCS G Block licensees authorized to operate on adjacent frequency blocks in the 1990-1995 MHz band within 120 kilometers of the base or fixed station operating in this band.

Test Procedures:

According to FCC §2.1046 (a), for transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in § 2.1033(c). The electrical characteristics of the radio frequency load attached to the output terminals when this test is made shall be stated.

1) The radio frequency load attached to the EUT antenna terminal was 50 Ohm. The lost of the cables the test system is calibrated to correct the reading.
2) The spectrum analyzer was set to RMS Detector function and Average mode.
3) The resolution bandwidth of the spectrum analyzer was comparable to the emission bandwidth.
4) The conducted emission level is meaured at each antenna port and then summed mathmatically to determine the total emission level from the device. (500m W = 250mW x 2 Ports)

Note:

The maximum ERP/EIRP for each band are sufficient level to pass the limit.

ERP of Band 13 : Port 4, 5 = 24.20 dBm + 2.0 dBi - 2.15 dB = 24.05 dBm

EIRP of Band 66 : Port 4, 5 = 23.36 dBm + 4.0 dBi = 27.36 dBm

Test Results:

700 MHz_LTE 10 MHz

Test Data at Output Port 4

Frequency (MHz)	Output Power					
	QPSK		16QAM		64QAM	
	dBm	W	dBm	W	dBm	W
751.00	23.73	0.236	23.77	0.238	23.79	0.239

Test Data at Output Port 5

Frequency (MHz)	Output Power					
	QPSK		16QAM		64QAM	
	dBm	W	dBm	W	dBm	W
751.00	24.20	0.263	23.94	0.248	23.66	0.232

Sum Data of Port 4 and Port 5

Frequency (MHz)	Output Power		
	QPSK	16QAM	64QAM
	W	W	W
751.00	0.499	0.486	0.471

700 MHz_LTE 10 MHz

Plot Data for Output Port 4 (Conducted Output Power)

(QPSK Middle Channel)

(16QAM Middle Channel)

(64QAM Middle Channel)

700 MHz_LTE 10 MHz

Plot Data for Output Port 5 (Conducted Output Power)

(QPSK Middle Channel)

(16QAM Middle Channel)

(64QAM Middle Channel)

AWS 2100_LTE 5 MHz

Test Data at Output Port 4

Frequency (MHz)	Output Power					
	QPSK		16QAM		64QAM	
	dBm	W	dBm	W	dBm	W
2112.50	22.60	0.182	22.60	0.182	22.65	0.184
2145.00	22.81	0.191	22.84	0.192	22.87	0.194
2177.50	22.77	0.189	22.69	0.186	22.67	0.185

Test Data at Output Port 5

Frequency (MHz)	Output Power					
	QPSK		16QAM		64QAM	
	dBm	W	dBm	W	dBm	W
2112.50	22.70	0.186	22.47	0.177	22.64	0.184
2145.00	22.63	0.183	22.64	0.184	22.67	0.185
2177.50	22.59	0.182	22.62	0.183	22.50	0.178

Sum Data of Port 4 and Port 5

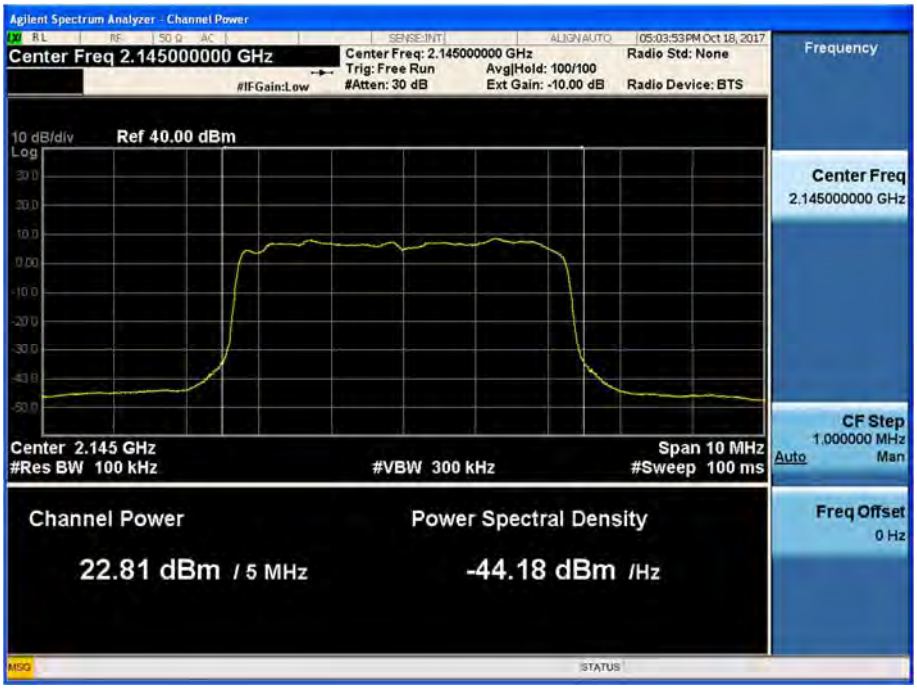
Frequency (MHz)	Output Power		
	QPSK	16QAM	64QAM
	W	W	W
2112.50	0.368	0.359	0.368
2145.00	0.374	0.376	0.379
2177.50	0.371	0.369	0.363

AWS 2100_LTE 5 MHz

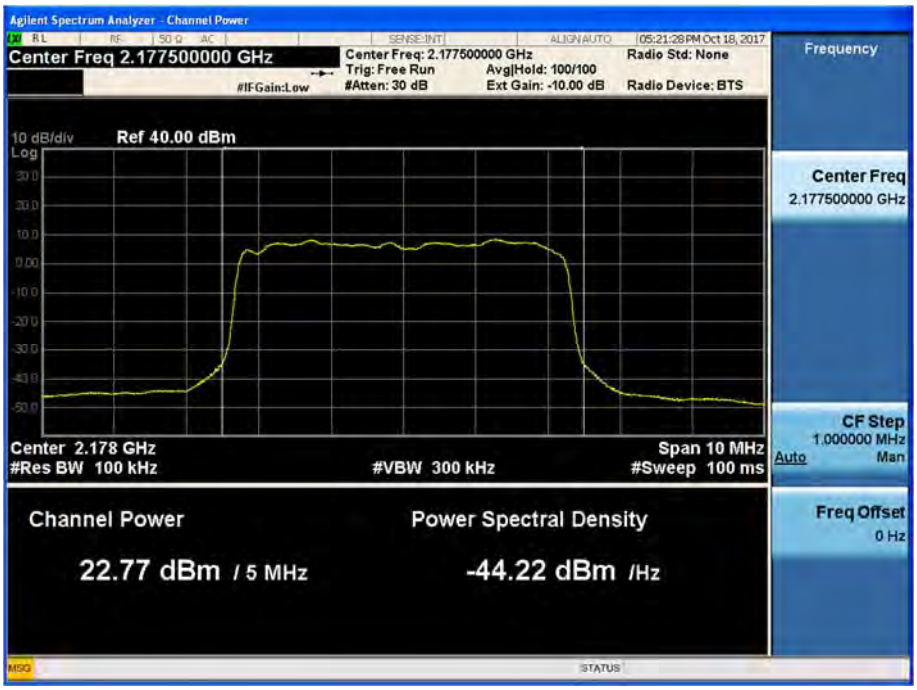
Plot Data for Output Port 4 (Conducted Output Power)

(QPSK Low Channel)

(QPSK Middle Channel)



(QPSK High Channel)



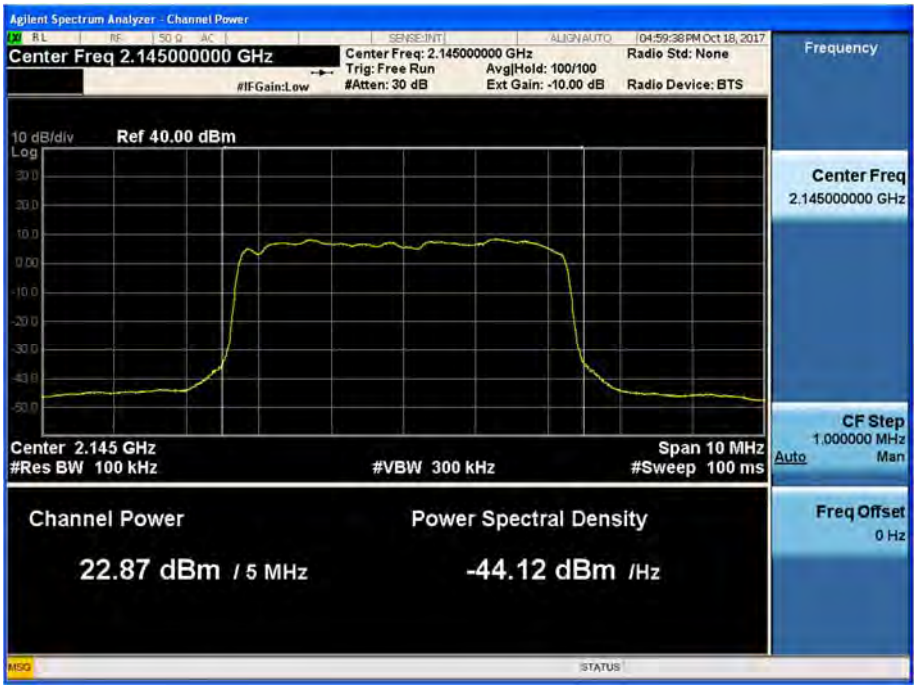
(16QAM Low Channel)

(16QAM Middle Channel)

(16QAM High Channel)

(64QAM Low Channel)

(64QAM Middle Channel)

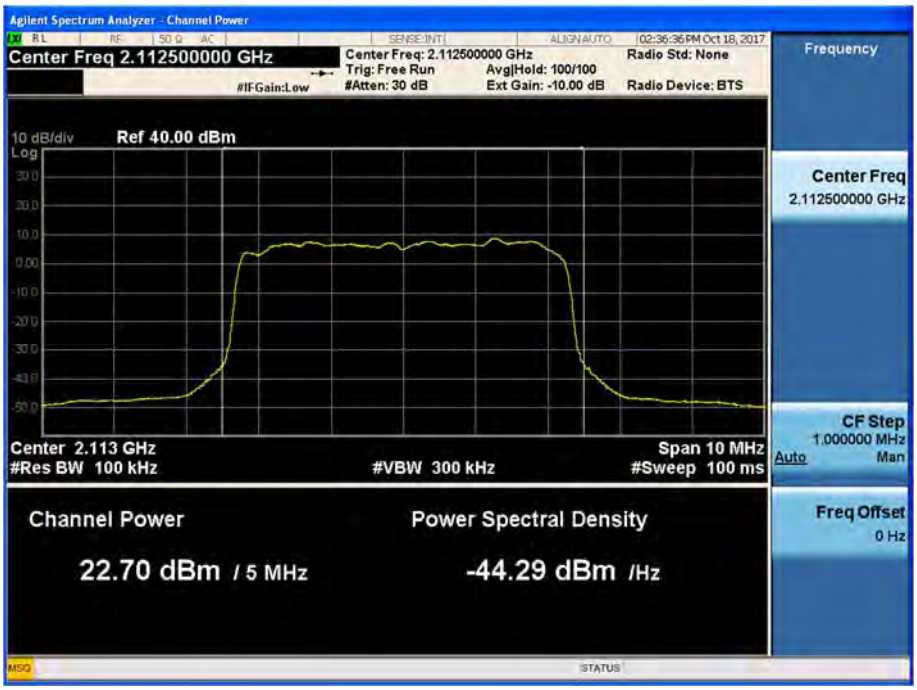


(64QAM High Channel)

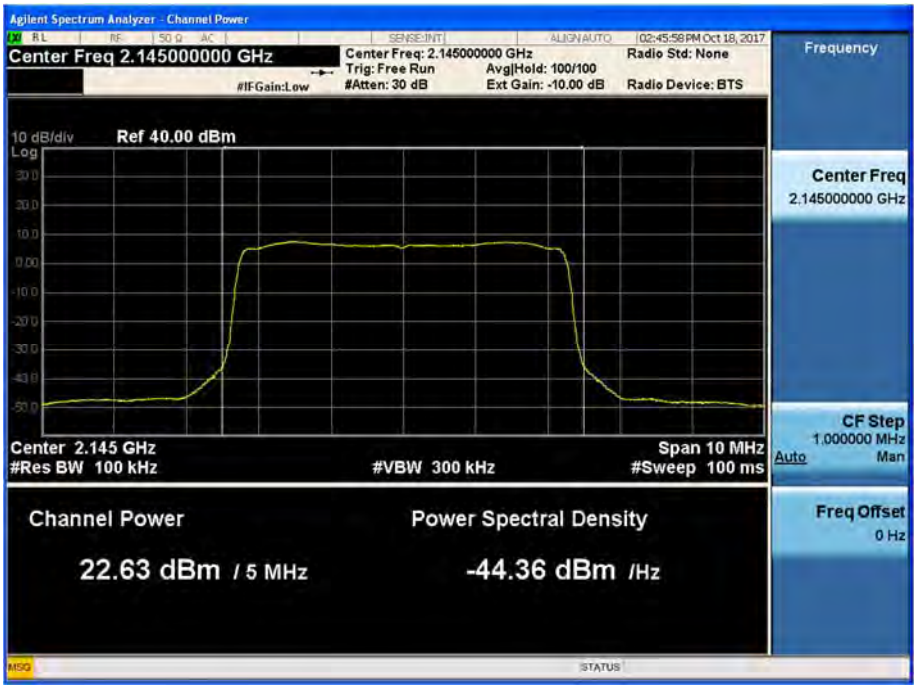
AWS 2100_LTE 5 MHz

Plot Data for Output Port 5 (Conducted Output Power)

(QPSK Low Channel)



(QPSK Middle Channel)



(QPSK High Channel)

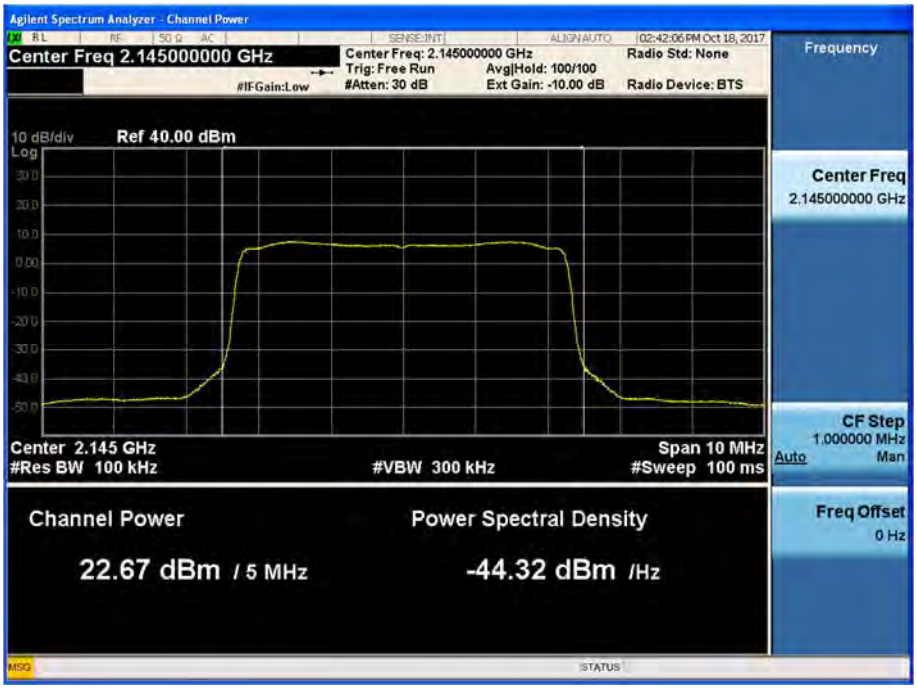
(16QAM Low Channel)

(16QAM Middle Channel)

(16QAM High Channel)

(QPSK Low Channel)

(QPSK Middle Channel)



(QPSK High Channel)

AWS 2100_LTE 10 MHz

Test Data at Output Port 4

Frequency (MHz)	Output Power					
	QPSK		16QAM		64QAM	
	dBm	W	dBm	W	dBm	W
2115.00	22.81	0.191	22.86	0.193	22.91	0.195
2145.00	23.36	0.217	23.33	0.215	23.03	0.201
2175.00	23.14	0.206	23.17	0.207	23.23	0.210

Test Data at Output Port 5

Frequency (MHz)	Output Power					
	QPSK		16QAM		64QAM	
	dBm	W	dBm	W	dBm	W
2115.00	23.28	0.213	23.13	0.206	23.25	0.211
2145.00	23.18	0.208	23.05	0.202	23.05	0.202
2175.00	23.04	0.201	23.03	0.201	23.07	0.203

Sum Data of Port 4 and Port 5

Frequency (MHz)	Output Power		
	QPSK	16QAM	64QAM
	W	W	W
2115.00	0.404	0.399	0.406
2145.00	0.425	0.417	0.403
2175.00	0.407	0.408	0.413

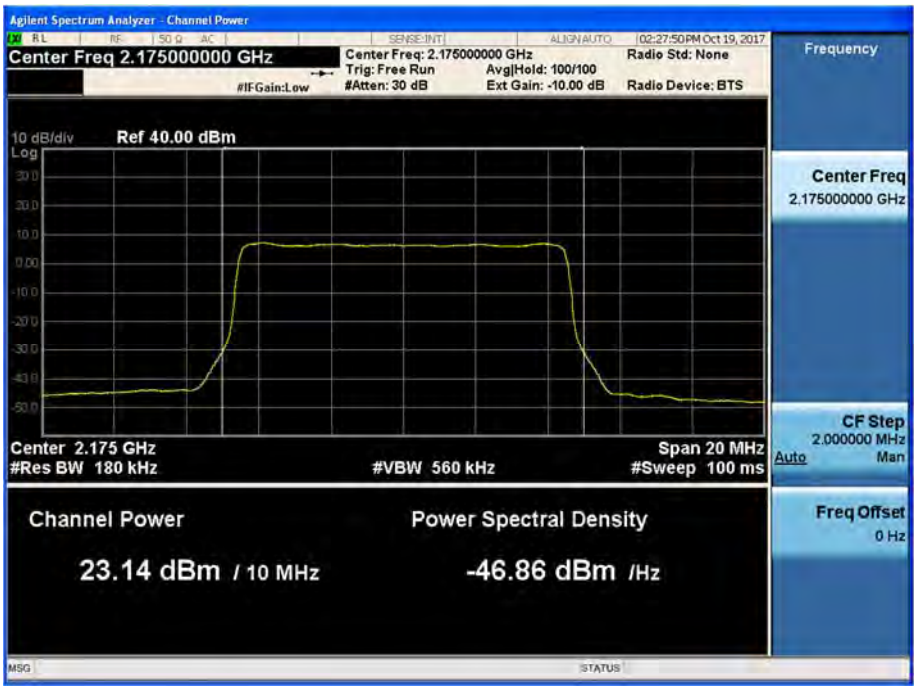
AWS 2100_LTE 10 MHz

Plot Data for Output Port 4 (Conducted Output Power)

(QPSK Low Channel)

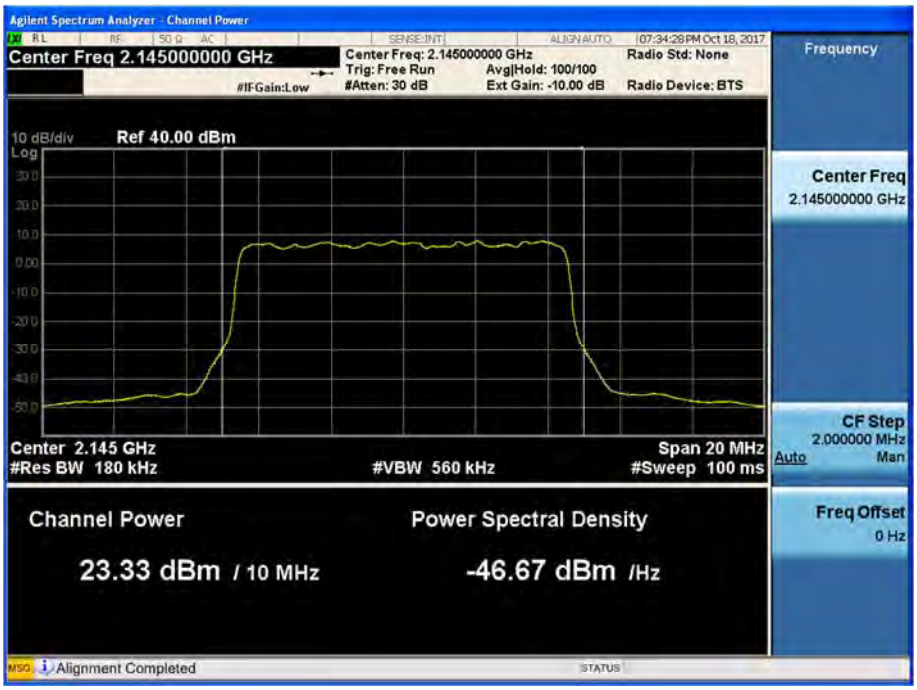
(QPSK Middle Channel)

(QPSK High Channel)



(16QAM Low Channel)

(16QAM Middle Channel)



(16QAM High Channel)

(64QAM Low Channel)

(64QAM Middle Channel)

(64QAM High Channel)

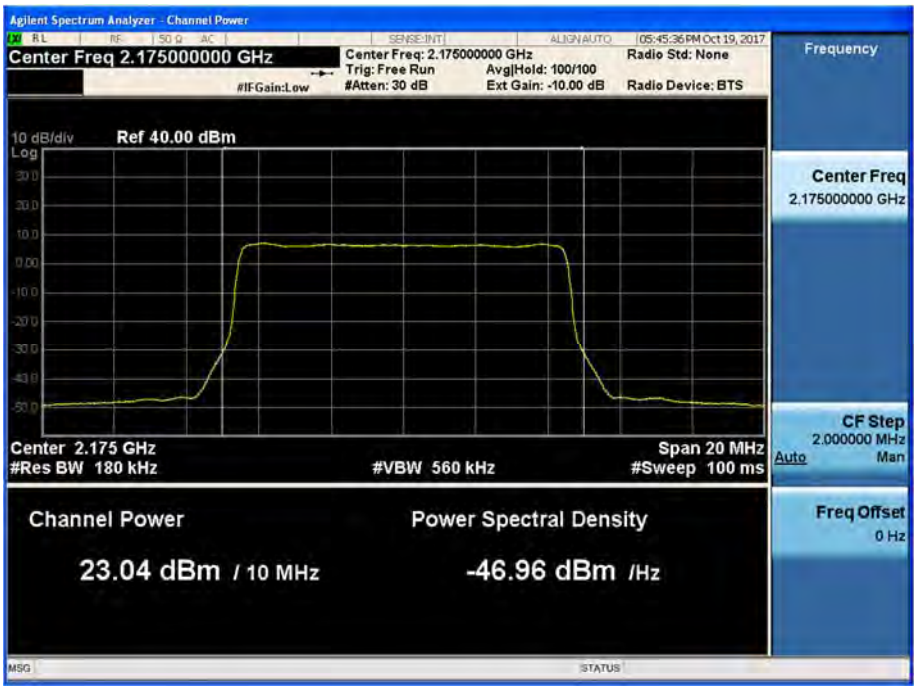
AWS 2100_LTE 10 MHz

Plot Data for Output Port 5 (Conducted Output Power)

(QPSK Low Channel)

(QPSK Middle Channel)

(QPSK High Channel)



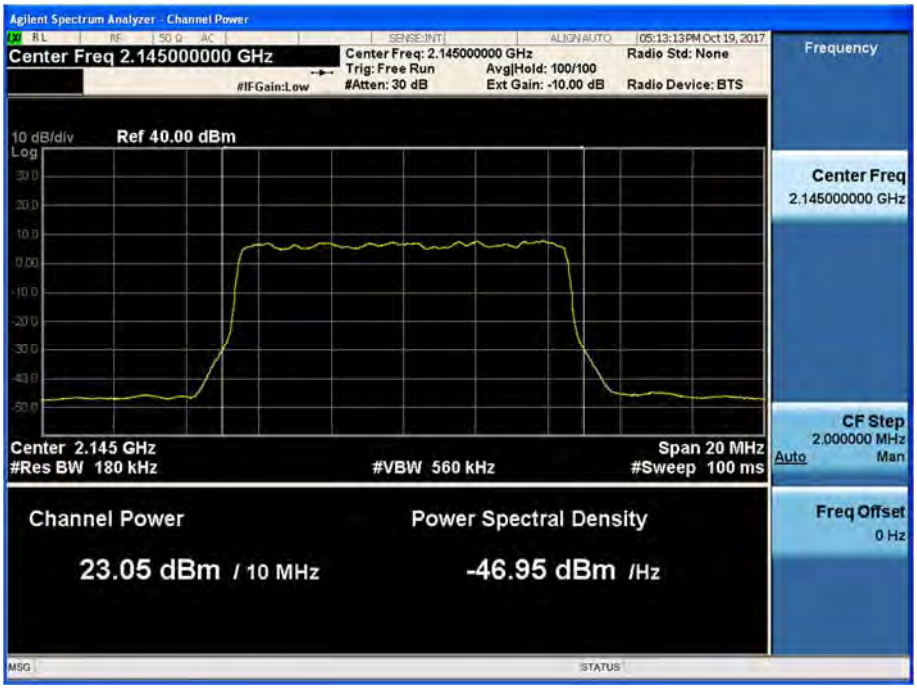
(16QAM Low Channel)

(16QAM Middle Channel)

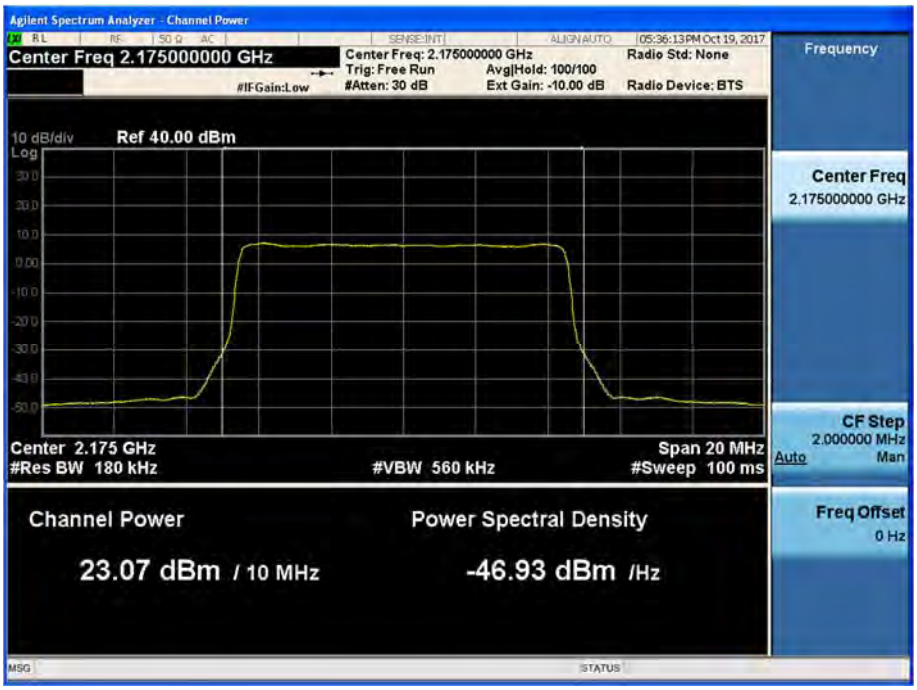
(16QAM High Channel)

(64QAM Low Channel)

(64QAM Middle Channel)



(64QAM High Channel)



AWS 2100_LTE 15 MHz

Test Data at Output Port 4

Frequency (MHz)	Output Power					
	QPSK		16QAM		64QAM	
	dBm	W	dBm	W	dBm	W
2117.50	22.56	0.174	22.56	0.172	22.57	0.177
2145.00	22.60	0.181	22.61	0.184	22.66	0.177
2172.50	22.32	0.174	22.36	0.175	22.47	0.177

Test Data at Output Port 5

Frequency (MHz)	Output Power					
	QPSK		16QAM		64QAM	
	dBm	W	dBm	W	dBm	W
2117.50	22.40	0.174	22.35	0.172	22.49	0.177
2145.00	22.58	0.181	22.64	0.184	22.47	0.177
2172.50	22.39	0.173	22.43	0.175	22.48	0.177

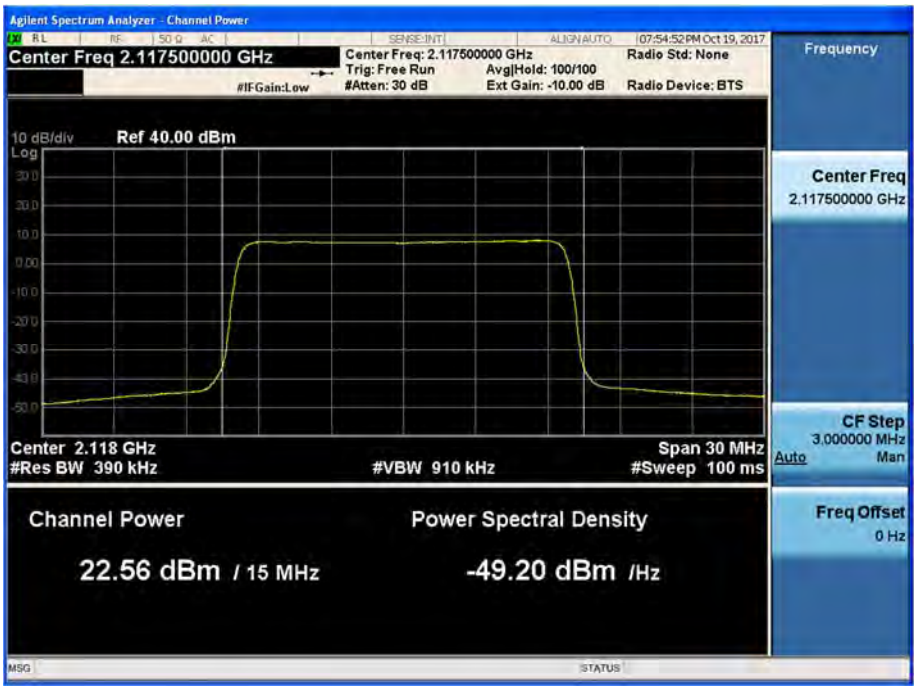
Sum Data of Port 4 and Port 5

Frequency (MHz)	Output Power		
	QPSK	16QAM	64QAM
	W	W	W
2117.50	0.348	0.344	0.354
2145.00	0.362	0.368	0.354
2172.50	0.347	0.35	0.354

AWS 2100_LTE 15 MHz

Plot Data for Output Port 4 (Conducted Output Power)

(QPSK Low Channel)



(QPSK Middle Channel)

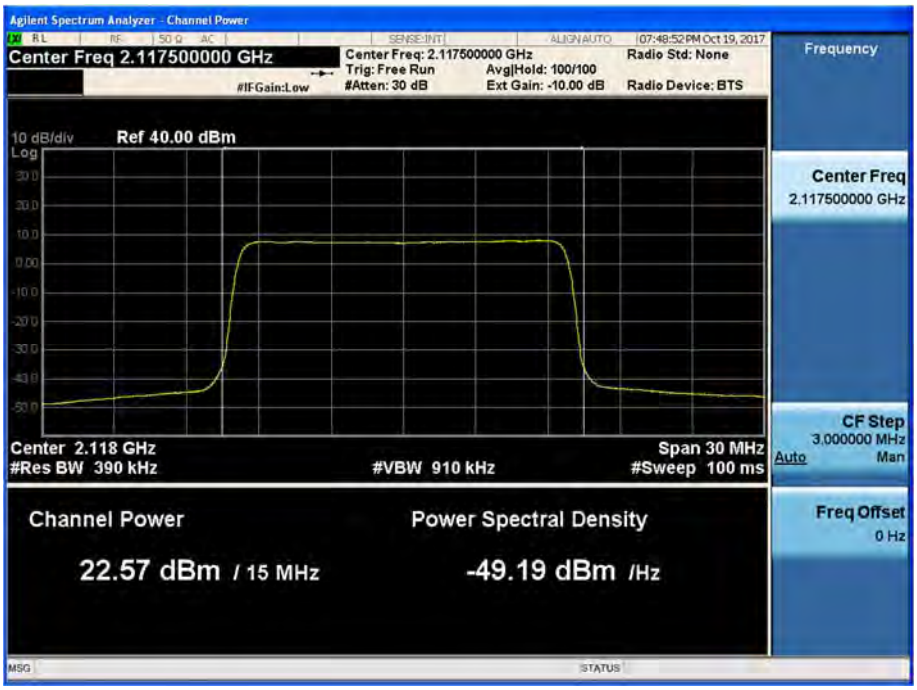
(QPSK High Channel)

(16QAM Low Channel)

(16QAM Middle Channel)

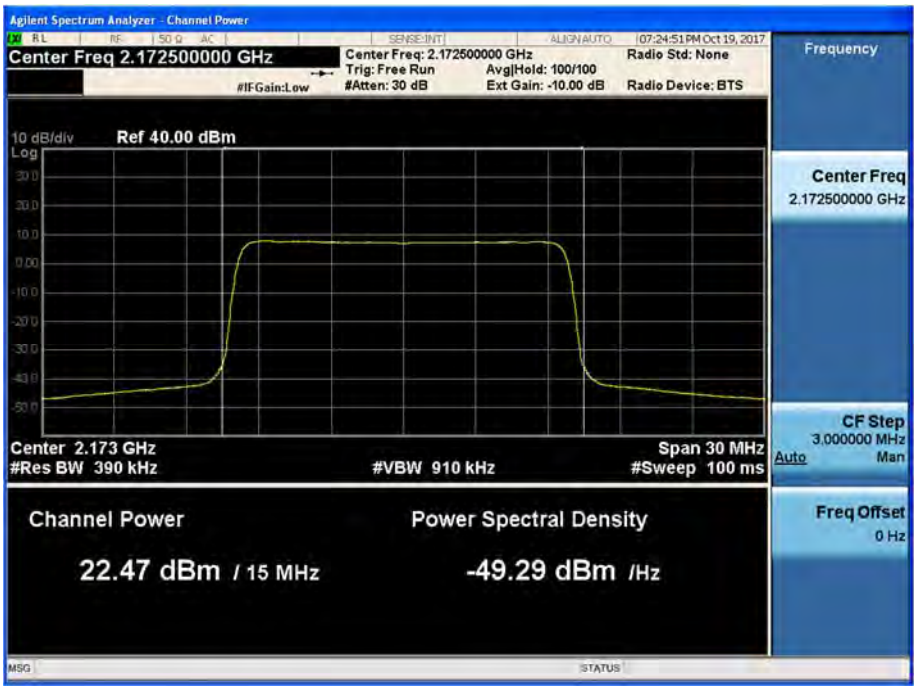
(16QAM High Channel)

(64QAM Low Channel)



(64QAM Middle Channel)

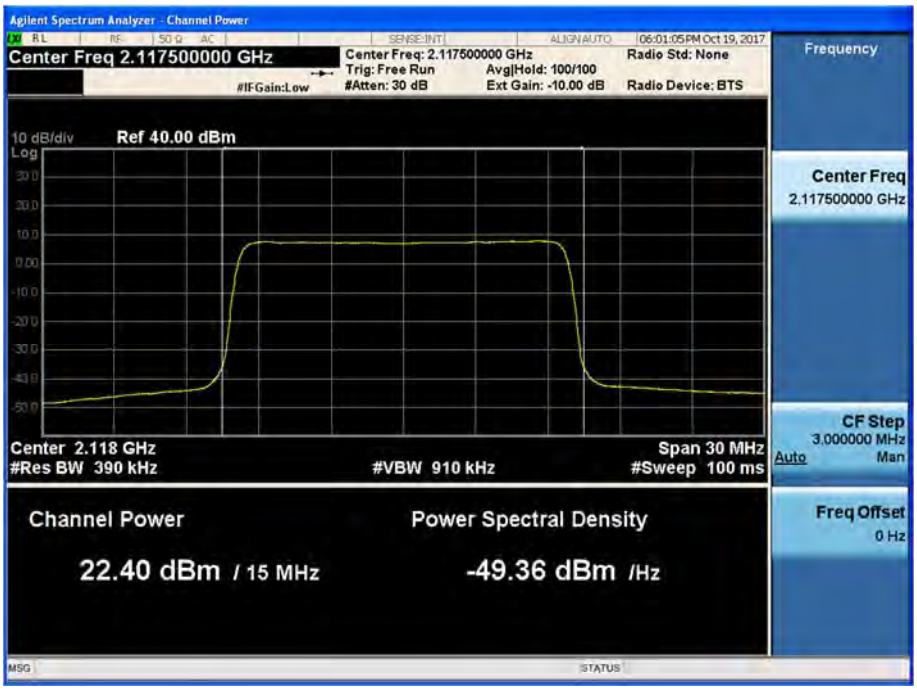
(64QAM High Channel)



AWS 2100_LTE 15 MHz

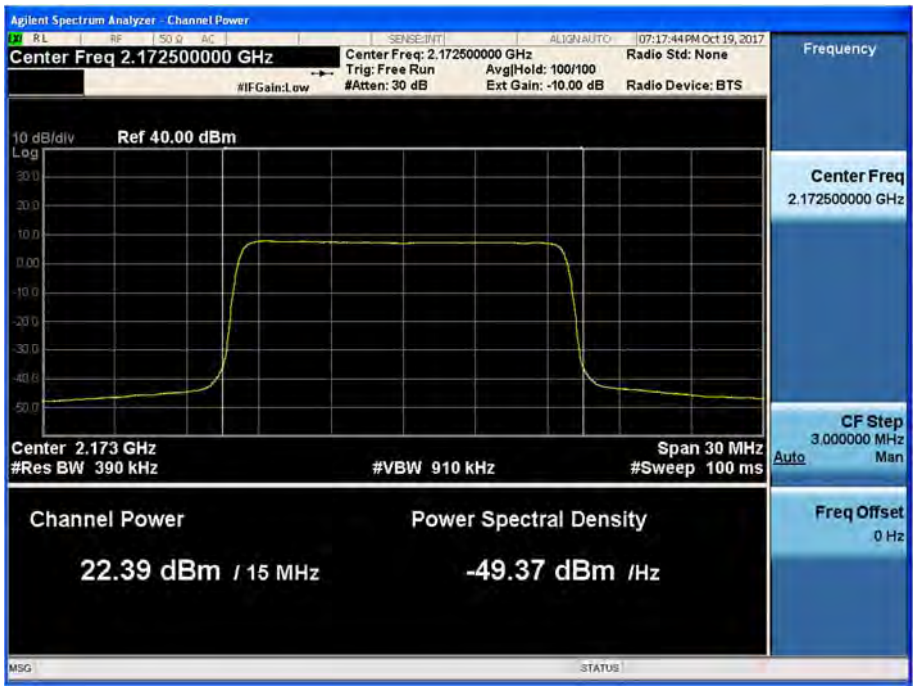
Plot Data for Output Port 5 (Conducted Output Power)

(QPSK Low Channel)



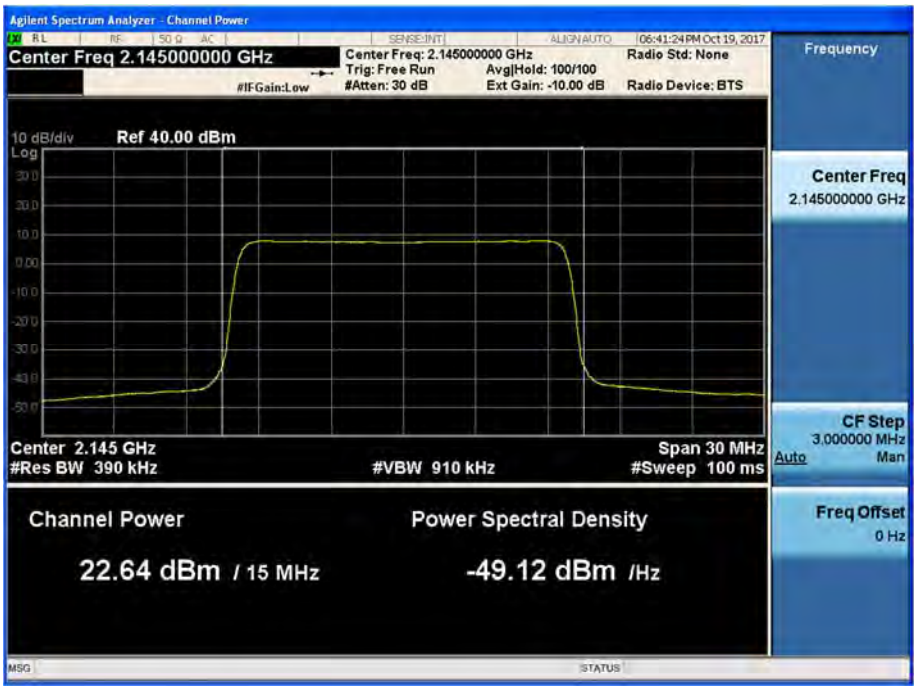
(QPSK Middle Channel)

(QPSK High Channel)



(16QAM Low Channel)

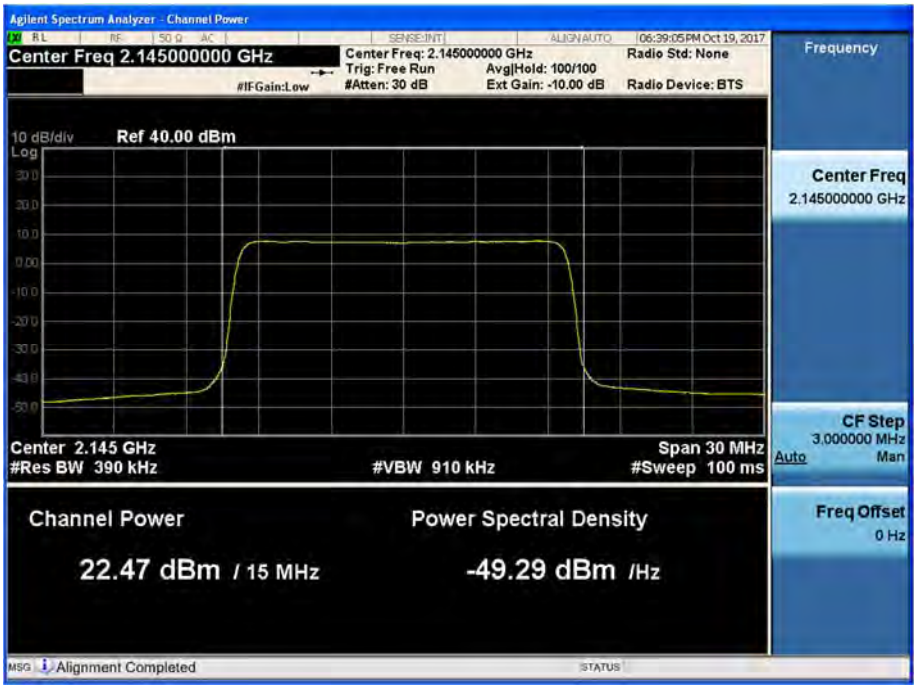
(16QAM Middle Channel)



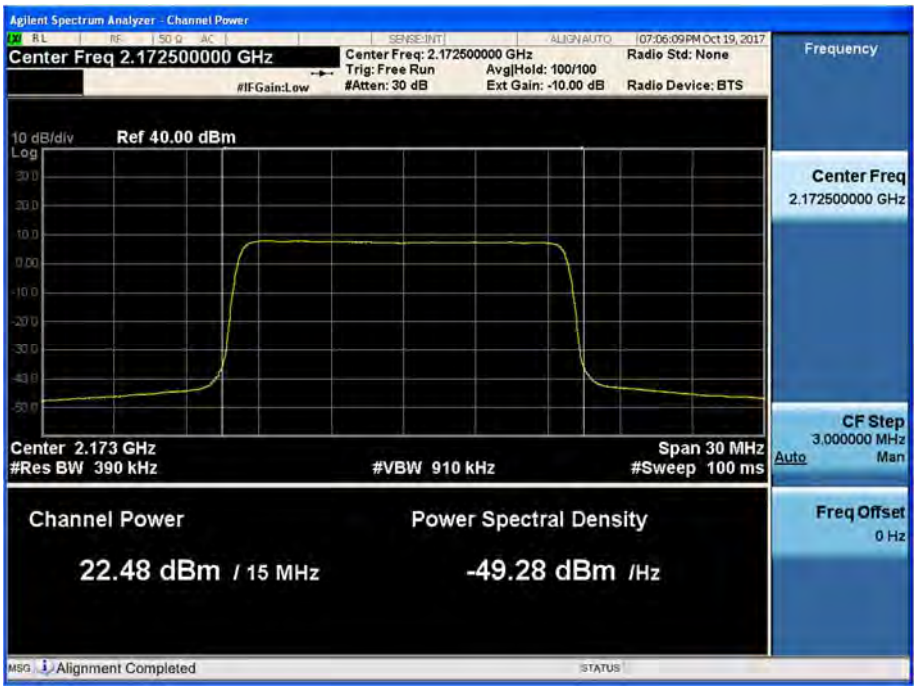
(16QAM High Channel)

(64QAM Low Channel)

(64QAM Middle Channel)



(64QAM High Channel)



AWS 2100_LTE 20 MHz

Test Data at Output Port 4

Frequency (MHz)	Output Power					
	QPSK		16QAM		64QAM	
	dBm	W	dBm	W	dBm	W
2120.00	22.70	0.174	23.13	0.172	23.17	0.177
2145.00	23.30	0.181	23.36	0.184	23.21	0.177
2170.00	23.00	0.174	23.03	0.175	23.13	0.177

Test Data at Output Port 5

Frequency (MHz)	Output Power					
	QPSK		16QAM		64QAM	
	dBm	W	dBm	W	dBm	W
2120.00	22.94	0.197	22.96	0.198	22.98	0.199
2145.00	23.10	0.204	23.12	0.205	23.13	0.206
2170.00	23.02	0.200	22.86	0.193	22.76	0.189

Sum Data of Port 4 and Port 5

Frequency (MHz)	Output Power		
	QPSK	16QAM	64QAM
	W	W	W
2120.00	0.371	0.37	0.376
2145.00	0.385	0.389	0.383
2170.00	0.374	0.368	0.366

AWS 2100_LTE 20 MHz

Plot Data for Output Port 4 (Conducted Output Power)

(QPSK Low Channel)

(QPSK Middle Channel)

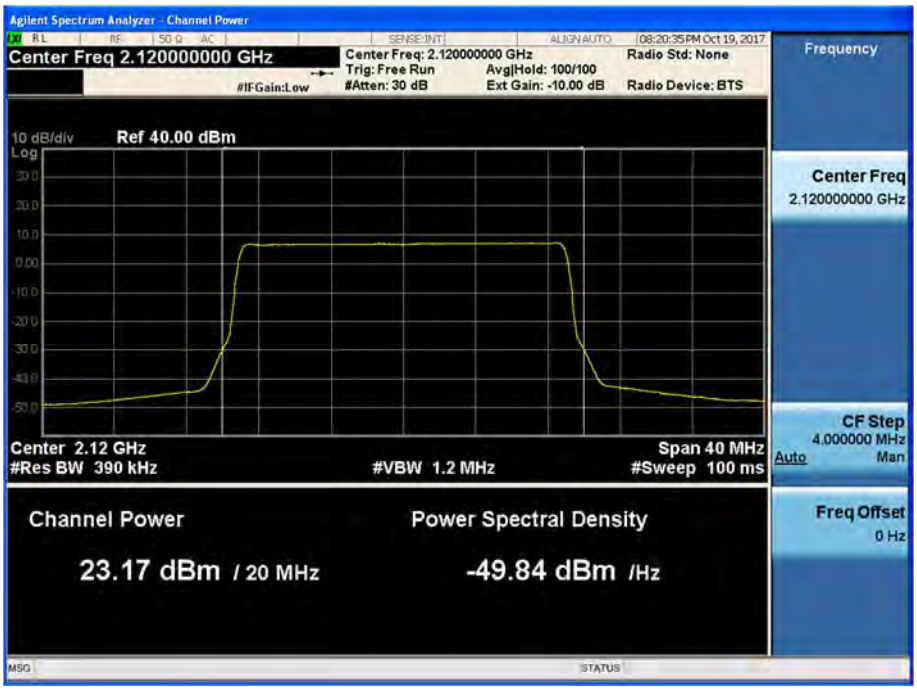
(QPSK High Channel)

(16QAM Low Channel)

(16QAM Middle Channel)

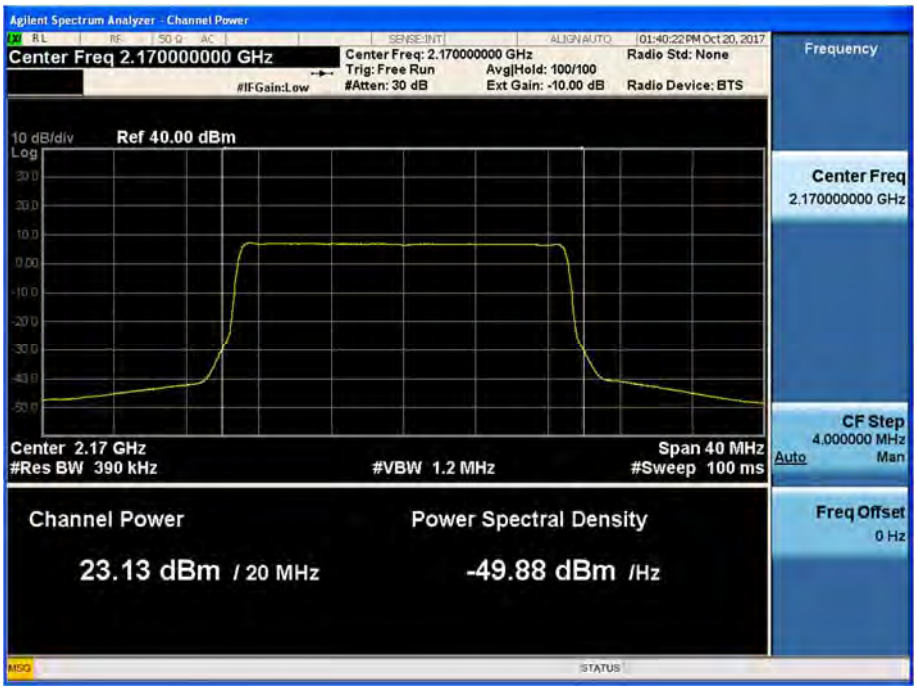
(16QAM High Channel)

(64QAM Low Channel)



(64QAM Middle Channel)

(64QAM High Channel)



AWS 2100_LTE 20 MHz

Plot Data for Output Port 5 (Conducted Output Power)

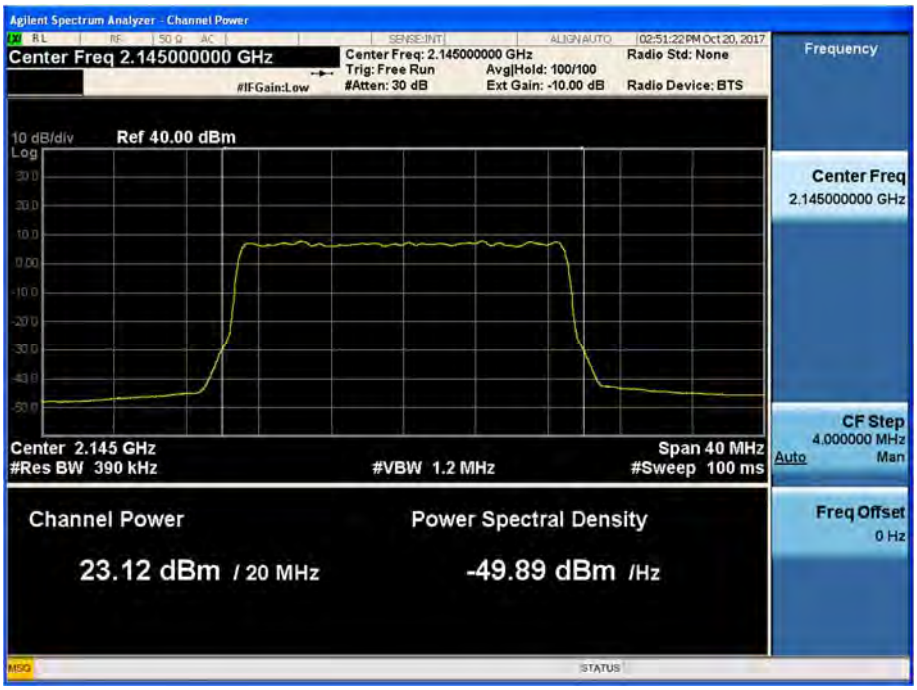
(QPSK Low Channel)

(QPSK Middle Channel)

(QPSK High Channel)

(16QAM Low Channel)

(16QAM Middle Channel)



(16QAM High Channel)

(64QAM Low Channel)

(64QAM Middle Channel)

(64QAM High Channel)

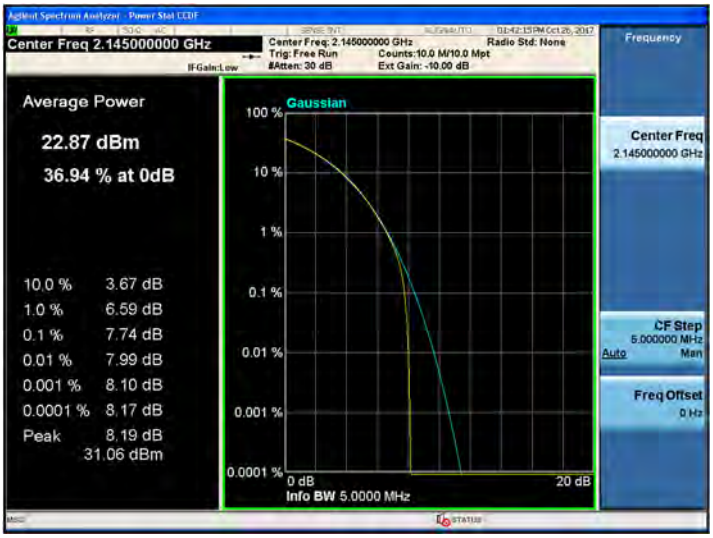
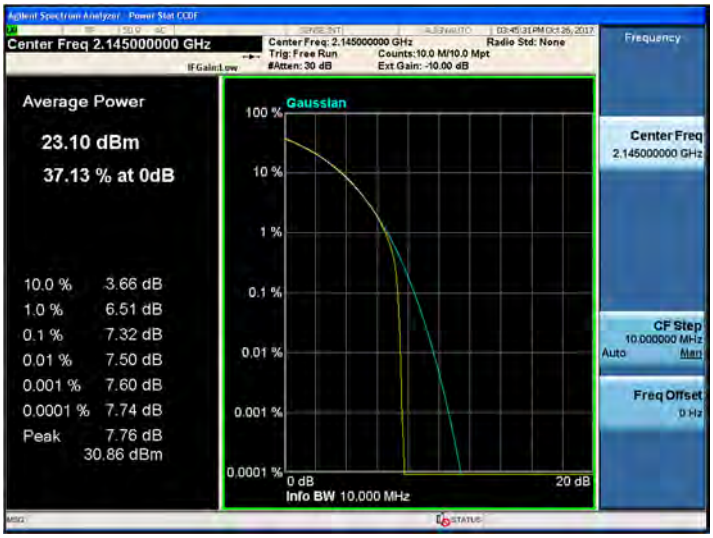
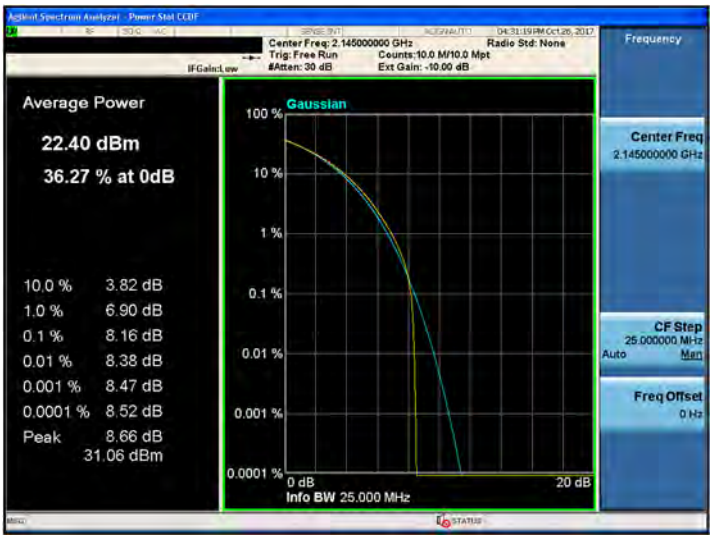
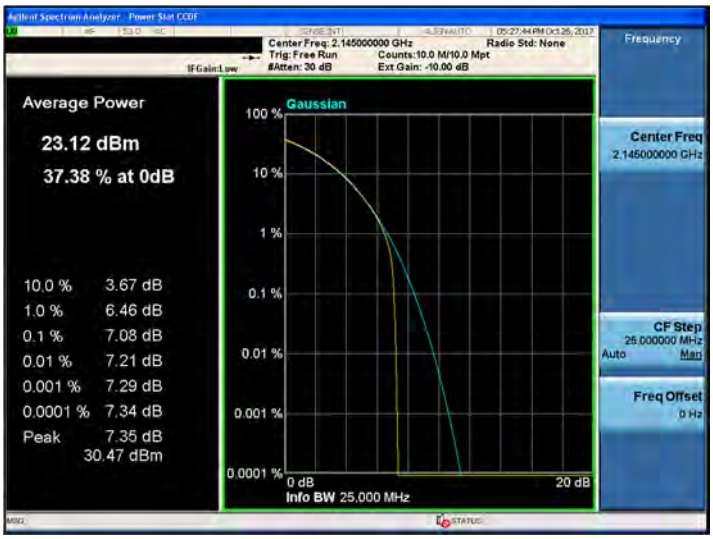
Peak-to-Average Ratio

AWS 2100 Test Data

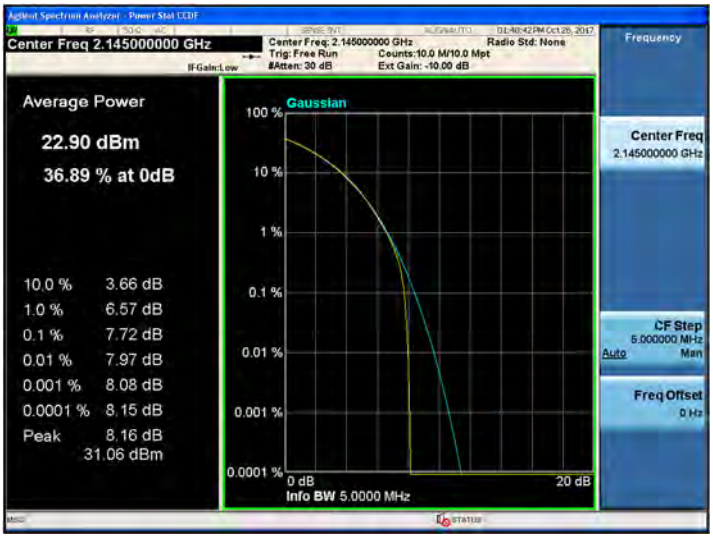
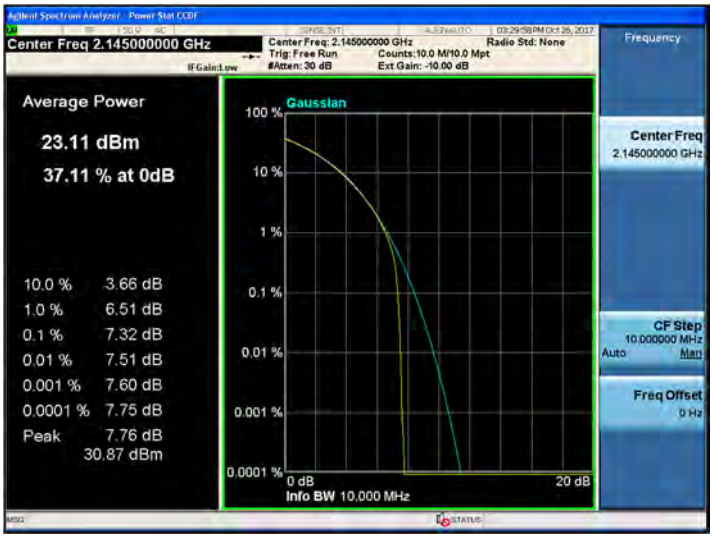
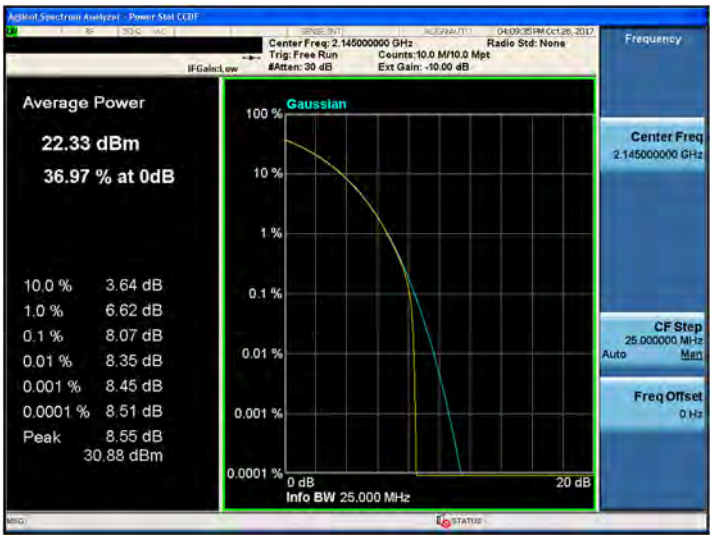
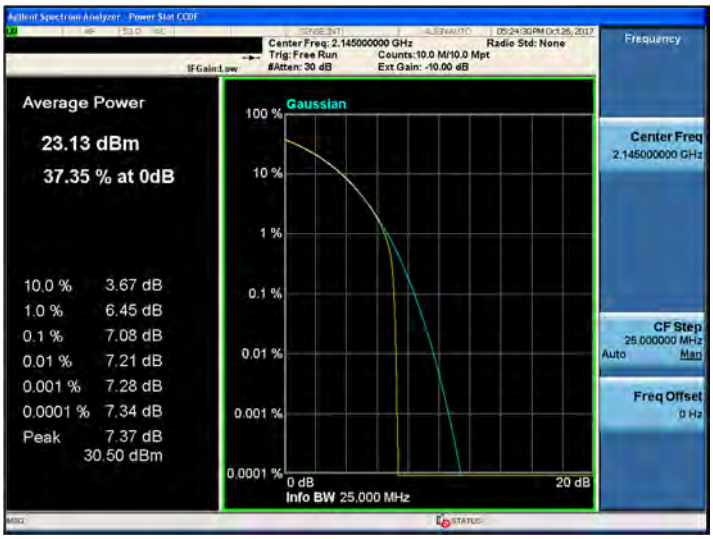
LTE Bandwidth	Frequency (MHz)	PAR [dB]					
		QPSK		16QAM		64QAM	
		Port 4	Port 5	Port 4	Port 5	Port 4	Port 5
5 MHz	2145.00	7.74	7.71	7.72	7.70	7.79	7.71
10 MHz		7.32	7.31	7.32	7.32	7.32	7.31
15 MHz		8.16	8.05	8.07	8.05	7.82	8.05
20 MHz		7.08	7.04	7.08	7.04	7.08	7.03

AWS 2100 Test Plots for Output Port 4

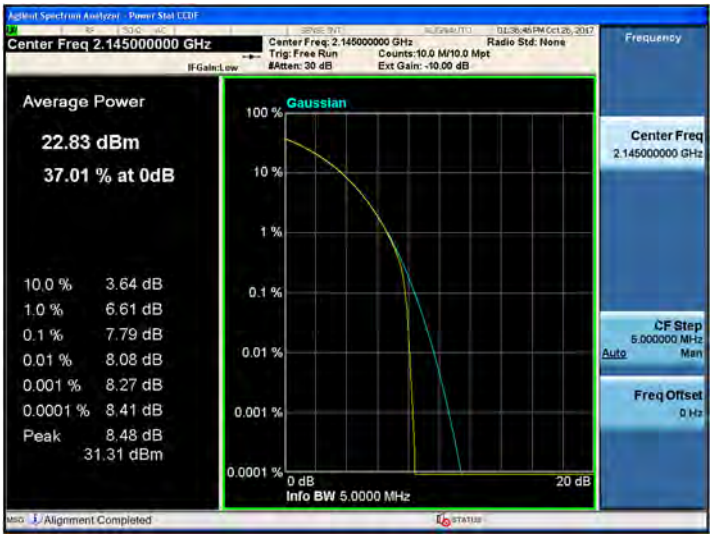
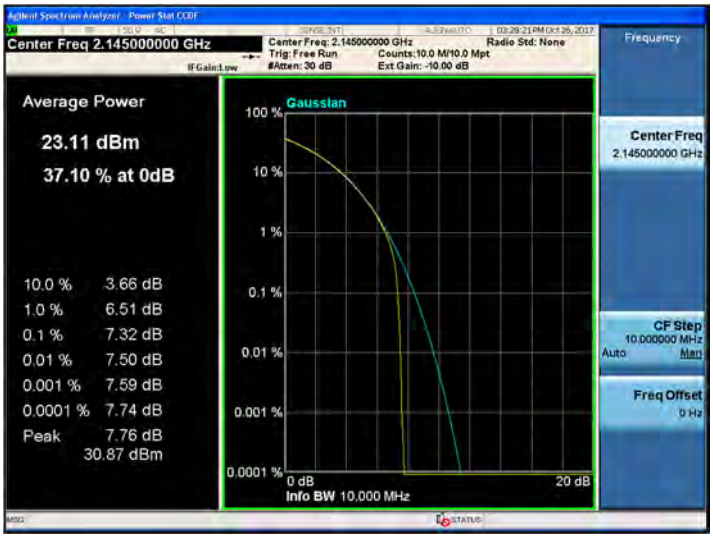
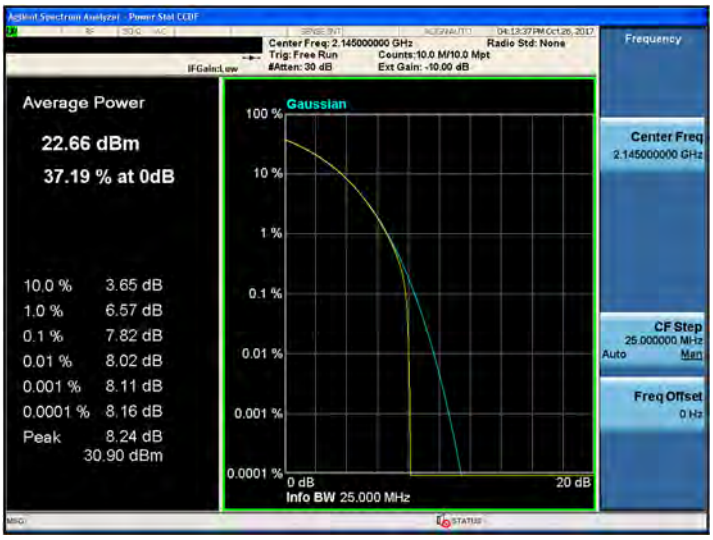
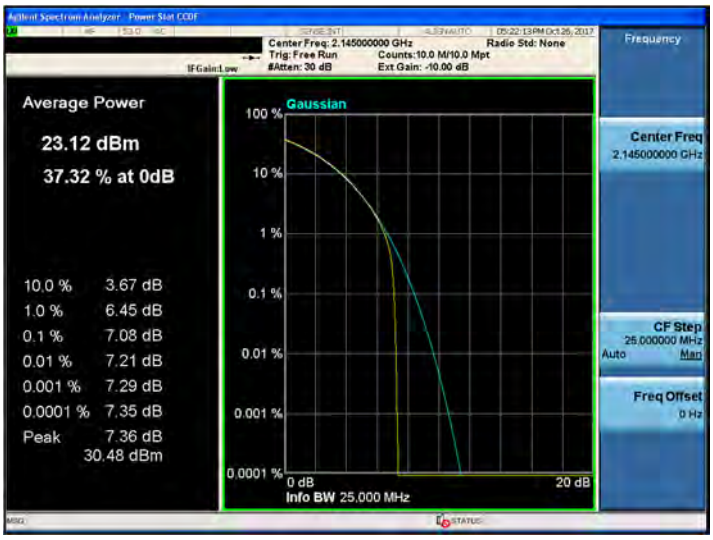
QPSK Mid Channel

LTE_5 MHz Bandwidth	LTE_10 MHz Bandwidth
	
LTE_15 MHz Bandwidth	**LTE_20 MHz Bandwidth**
	

16QAM Mid Channel

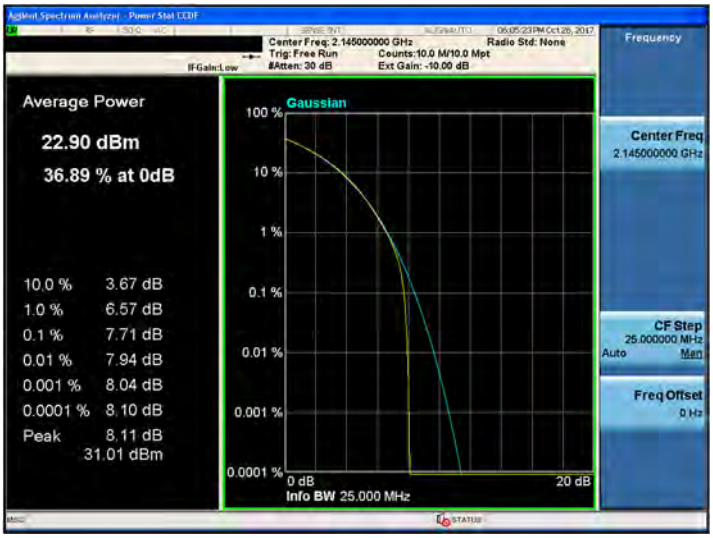
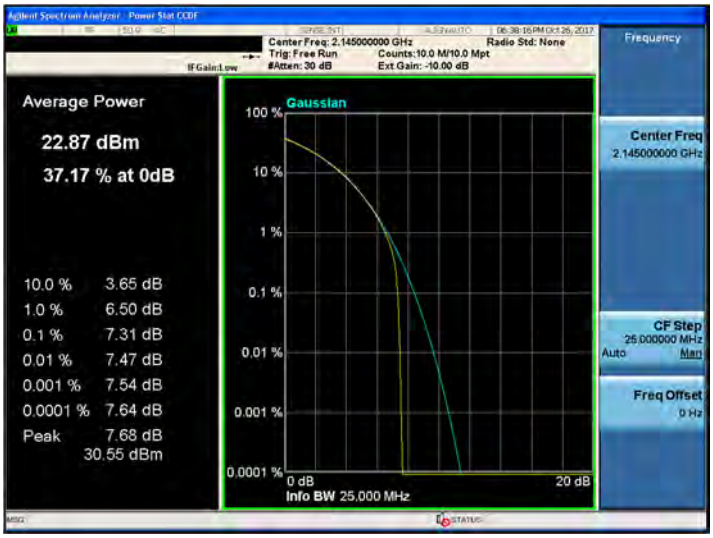
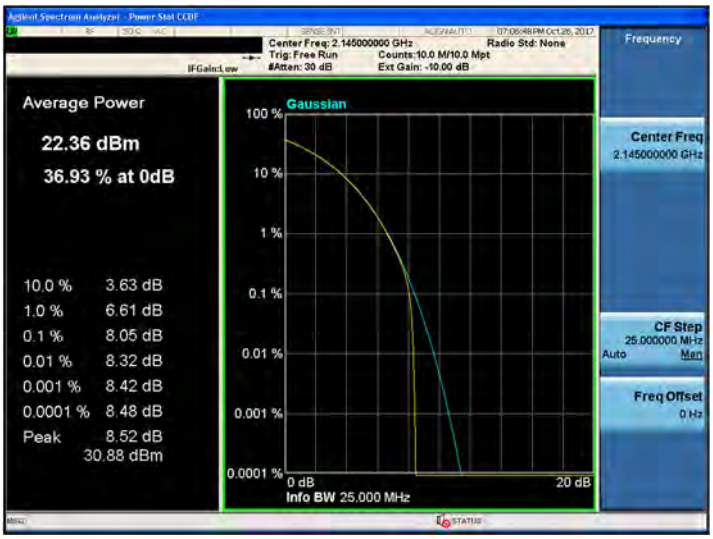
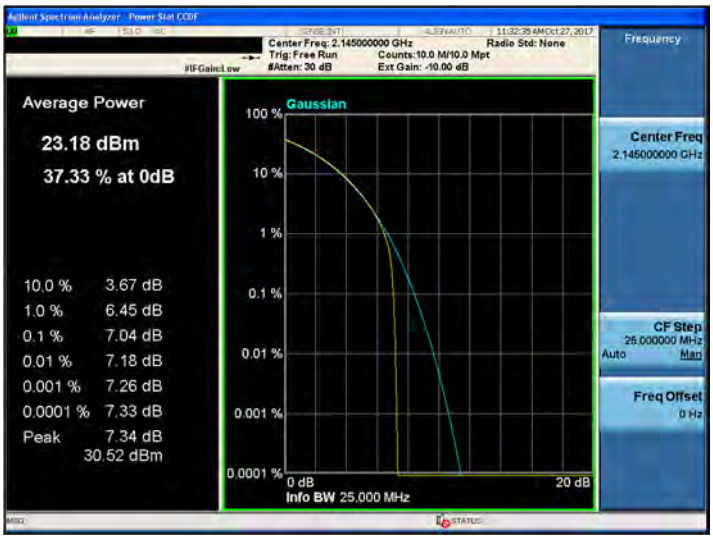
LTE_5 MHz Bandwidth	LTE_10 MHz Bandwidth
	
LTE_15 MHz Bandwidth	**LTE_20 MHz Bandwidth**
	

64QAM Mid Channel

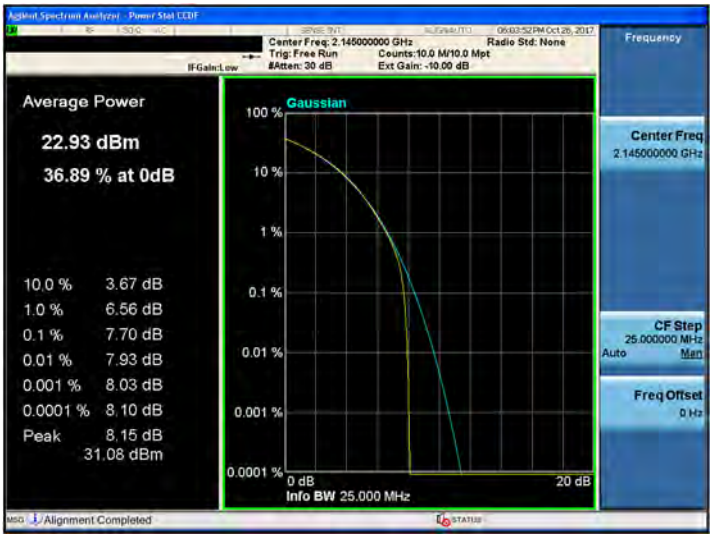
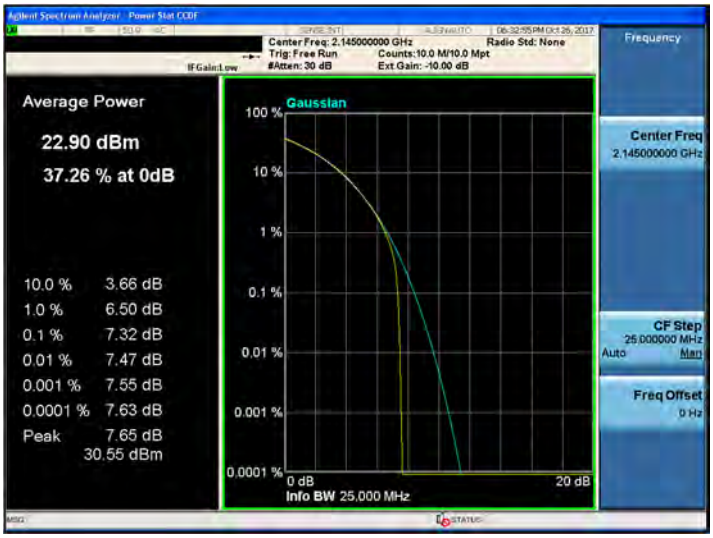
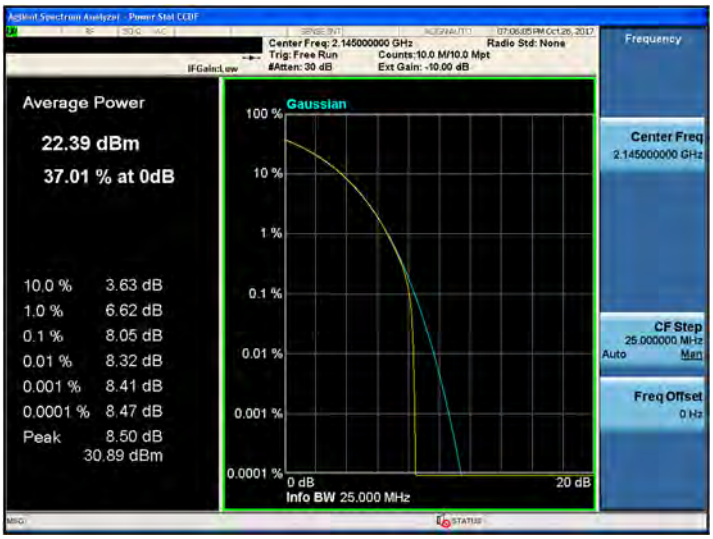
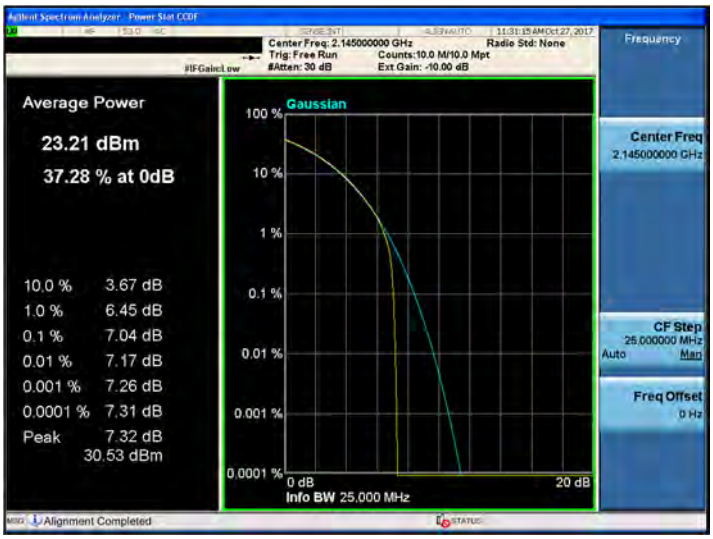
LTE_5 MHz Bandwidth	LTE_10 MHz Bandwidth
	
LTE_15 MHz Bandwidth	**LTE_20 MHz Bandwidth**
	

AWS 2100 Test Plots for Output Port 5

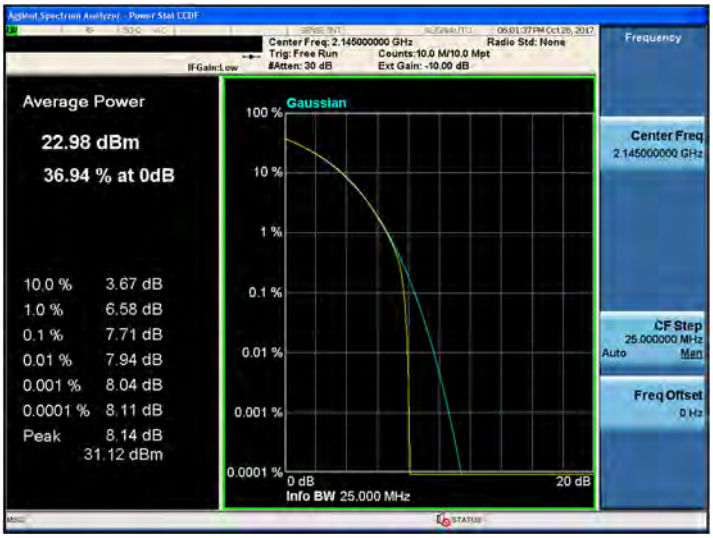
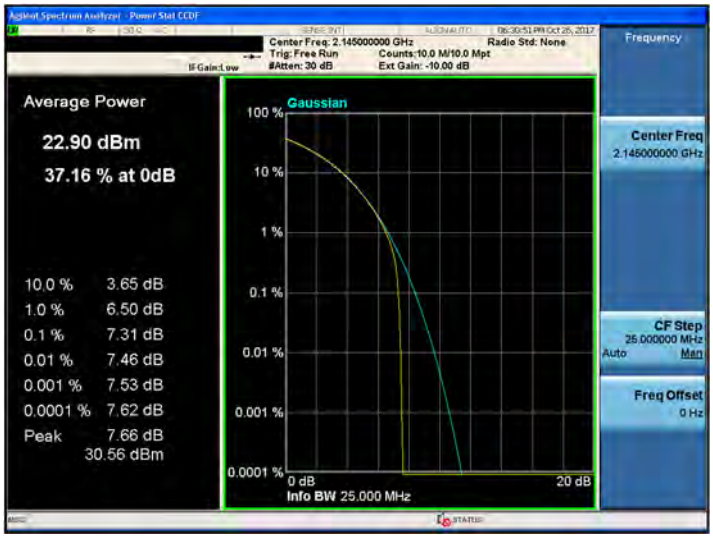
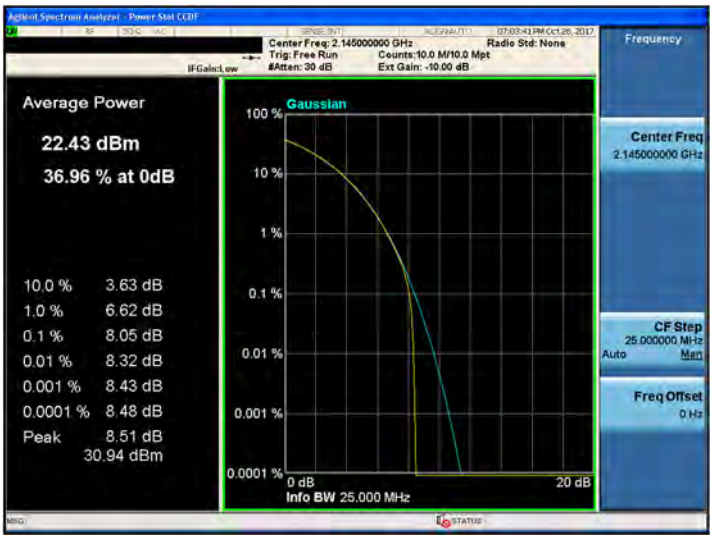
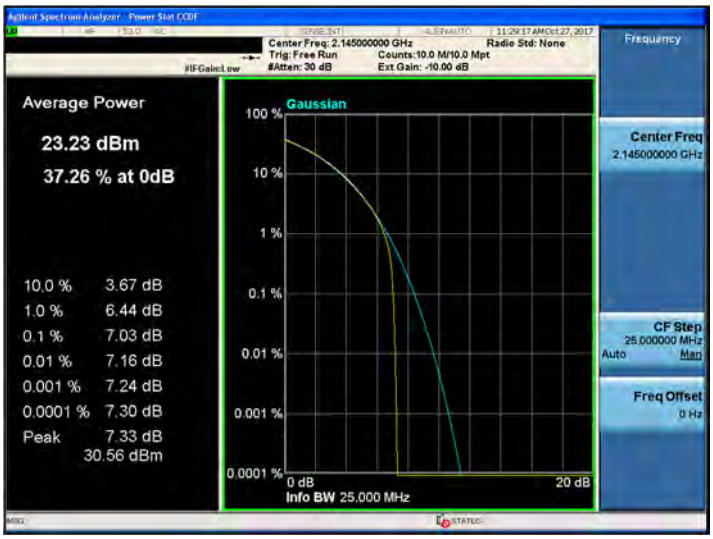
QPSK Mid Channel

LTE_5 MHz Bandwidth	LTE_10 MHz Bandwidth
	
LTE_15 MHz Bandwidth	**LTE_20 MHz Bandwidth**
	

16QAM Mid Channel

LTE_5 MHz Bandwidth	LTE_10 MHz Bandwidth
	
LTE_15 MHz Bandwidth	**LTE_20 MHz Bandwidth**
	

64QAM Mid Channel

LTE_5 MHz Bandwidth	LTE_10 MHz Bandwidth
	
LTE_15 MHz Bandwidth	**LTE_20 MHz Bandwidth**
	

6. OCCUPIED BANDWIDTH

Test Requirements:

§ 2.1049 Measurements required: Occupied bandwidth.

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 specified conditions of § 2.1049 (a) through (i) as applicable.

Test Procedures:

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation. The EUT was connected to a spectrum analyzer enabled with an occupied bandwidth function via its antenna port. Measurements were performed to determine the occupied bandwidth in accordance with FCC Part 2.1049. The occupied bandwidth was measured from the fundamental emission at the bottom, middle and top channels. The occupied bandwidth was measured using the built in occupied bandwidth function of the spectrum analyzer. It was set to measure the bandwidth where 99% of the signal power was contained. The analyzer automatically configures the measurement bandwidths to make an accurate measurement based on the channel bandwidth and channel spacing of the EUT.

Test Results:

700 MHz_LTE 10 MHz

Test Data at Output Port 4

Frequency (MHz)	Occupied Bandwidth (MHz)		
	QPSK	16QAM	64QAM
751.00	8.9409	8.9383	8.9460

Test Data at Output Port 5

Frequency (MHz)	Occupied Bandwidth (MHz)		
	QPSK	16QAM	64QAM
751.00	8.9339	8.9596	8.9521

AWS 2100_LTE 5 MHz

Test Data at Output Port 4

Frequency (MHz)	Occupied Bandwidth (MHz)		
	QPSK	16QAM	64QAM
2112.50	4.4400	4.4528	4.4423
2145.00	4.4402	4.4459	4.4419
2177.50	4.4440	4.4381	4.4397

Test Data at Output Port 5

Frequency (MHz)	Occupied Bandwidth (MHz)		
	QPSK	16QAM	64QAM
2112.50	4.4389	4.4444	4.4430
2145.00	4.4392	4.4355	4.4436
2177.50	4.4404	4.4401	4.4353

AWS 2100_LTE 10 MHz

Test Data at Output Port 4

Frequency (MHz)	Occupied Bandwidth (MHz)		
	QPSK	16QAM	64QAM
2115.00	8.9588	8.9531	8.9569
2145.00	8.9608	8.9589	8.9529
2175.00	8.9461	8.9454	8.9403

Test Data at Output Port 5

Frequency (MHz)	Occupied Bandwidth (MHz)		
	QPSK	16QAM	64QAM
2115.00	8.9328	8.9667	8.9265
2145.00	8.9550	8.9523	8.9517
2175.00	8.9398	8.9467	8.9412

AWS 2100_LTE 15 MHz

Test Data at Output Port 4

Frequency (MHz)	Occupied Bandwidth (MHz)		
	QPSK	16QAM	64QAM
2117.50	13.342	13.342	13.347
2145.00	13.336	13.345	13.347
2172.50	13.399	13.342	13.345

Test Data at Output Port 5

Frequency (MHz)	Occupied Bandwidth (MHz)		
	QPSK	16QAM	64QAM
2117.50	13.342	13.345	13.346
2145.00	13.348	13.349	13.344
2172.50	13.340	13.332	13.319

AWS 2100_LTE 20 MHz

Test Data at Output Port 4

Frequency (MHz)	Occupied Bandwidth (MHz)		
	QPSK	16QAM	64QAM
2120.00	17.943	17.906	17.913
2145.00	17.925	17.937	17.897
2170.00	17.890	17.906	17.908

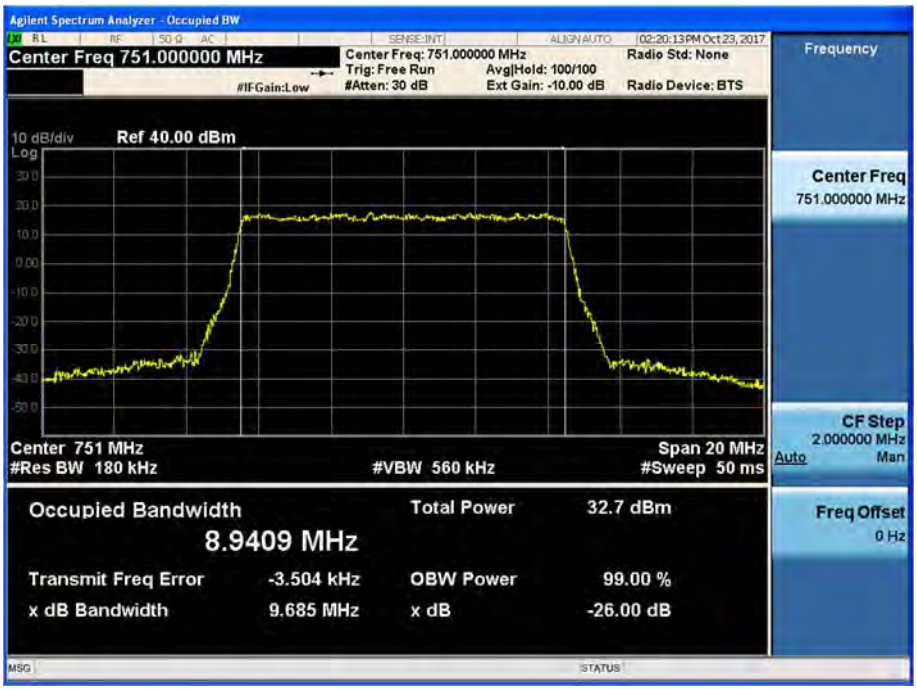
Test Data at Output Port 5

Frequency (MHz)	Occupied Bandwidth (MHz)		
	QPSK	16QAM	64QAM
2120.00	17.905	17.906	17.889
2145.00	17.932	17.934	17.912
2170.00	17.926	17.915	17.881

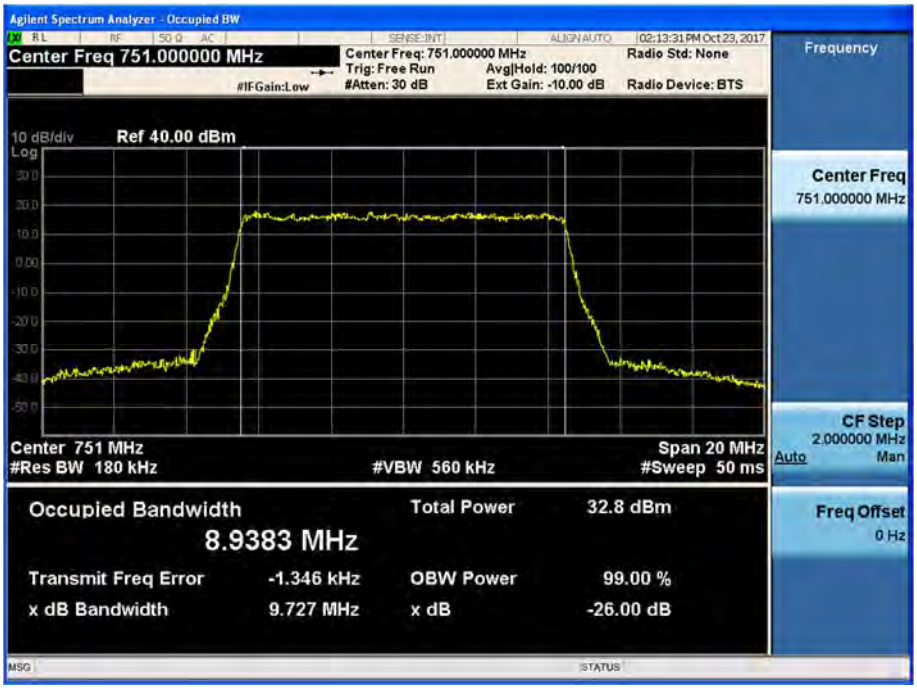
700 MHz_LTE 10 MHz

Test Plot at Output Port 4

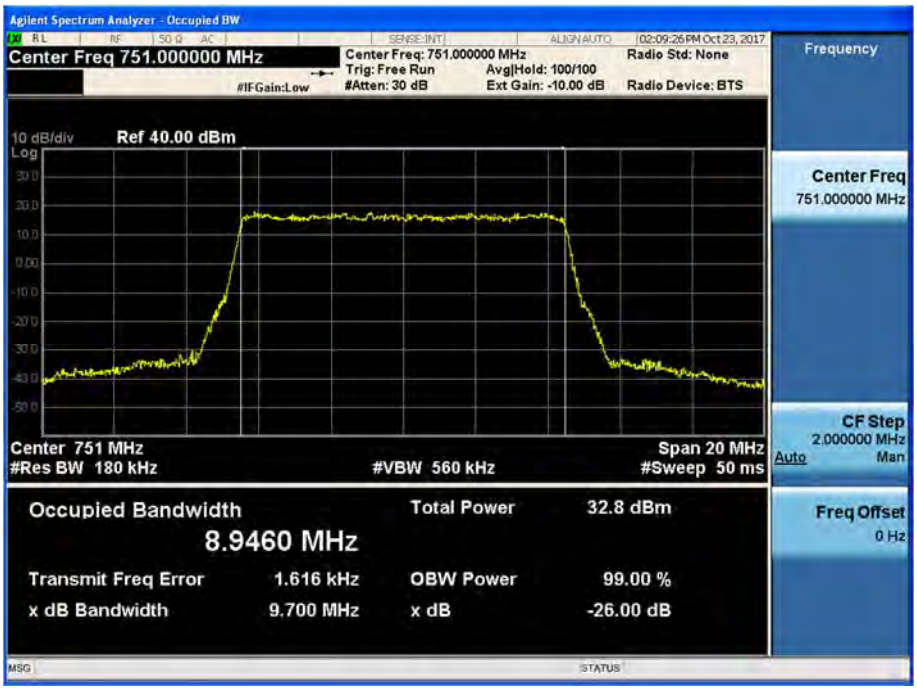
(64QAM Middle Channel)



(16QAM Middle Channel)



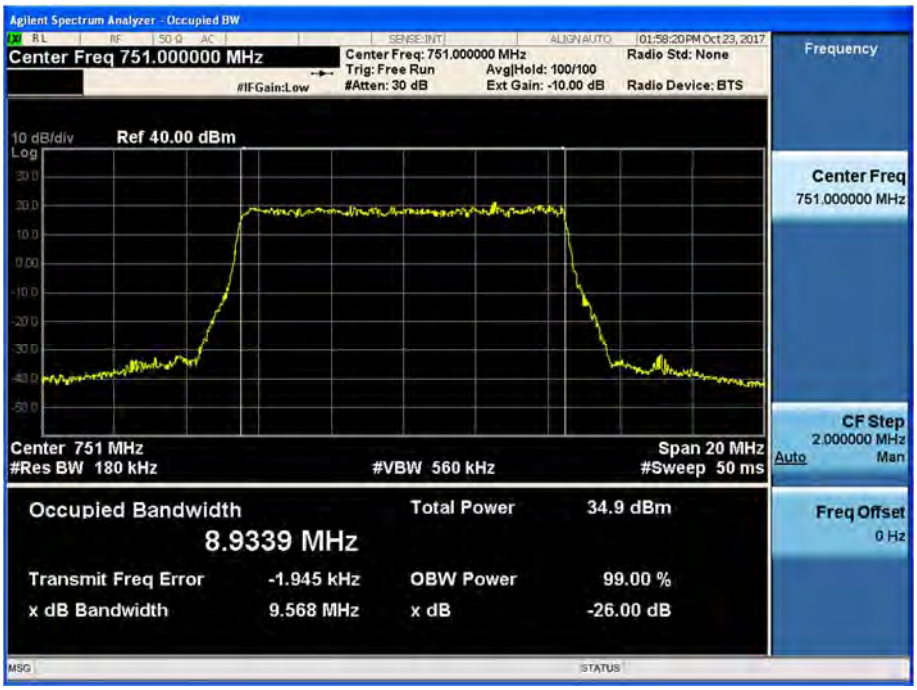
(QPSK Middle Channel)



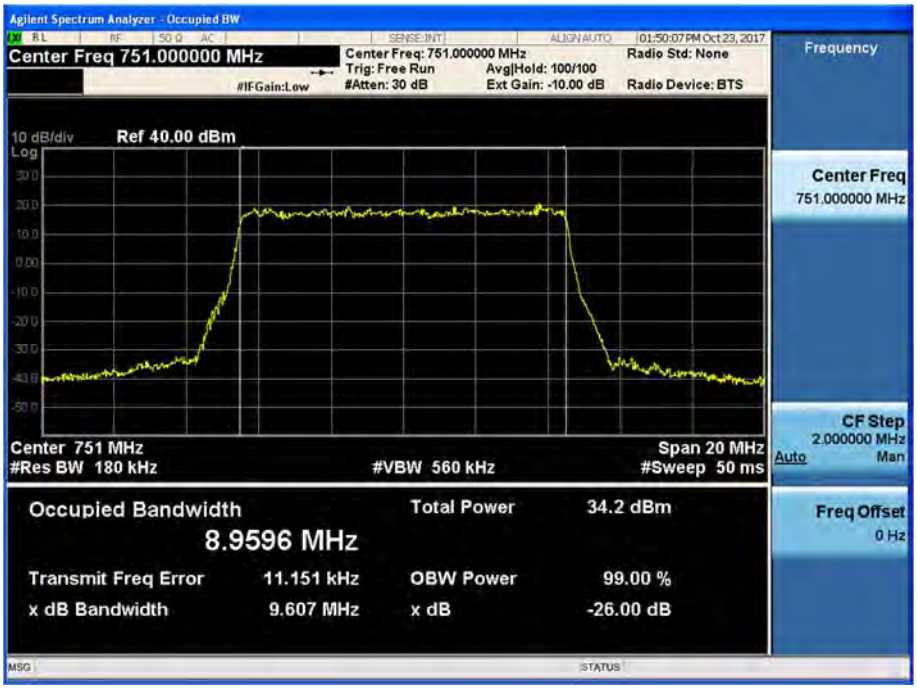
700 MHz_LTE 10 MHz

Test Plot at Output Port 5

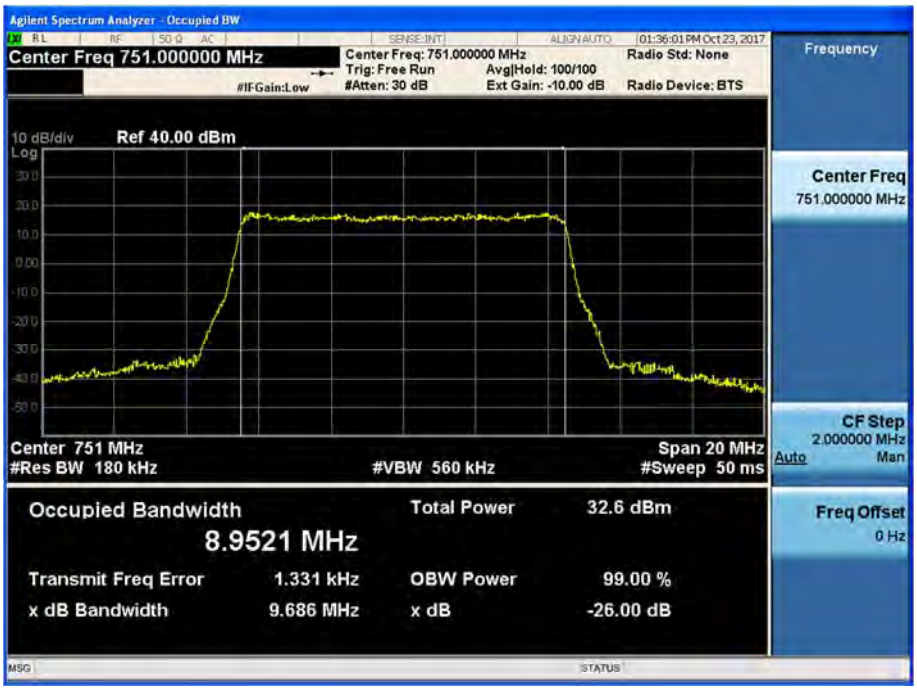
(64QAM Middle Channel)



(16QAM Middle Channel)



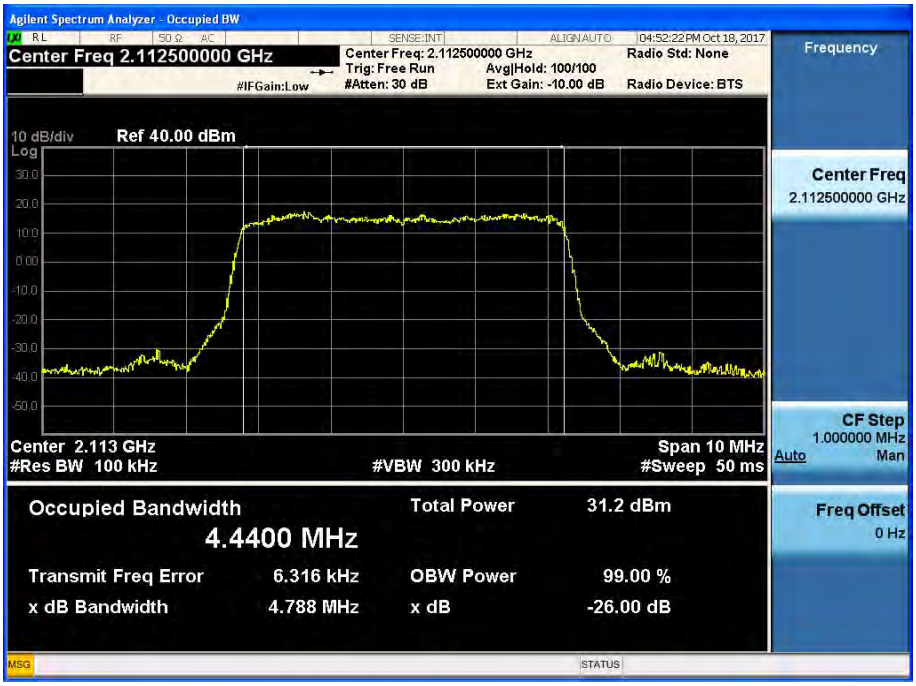
(QPSK Middle Channel)



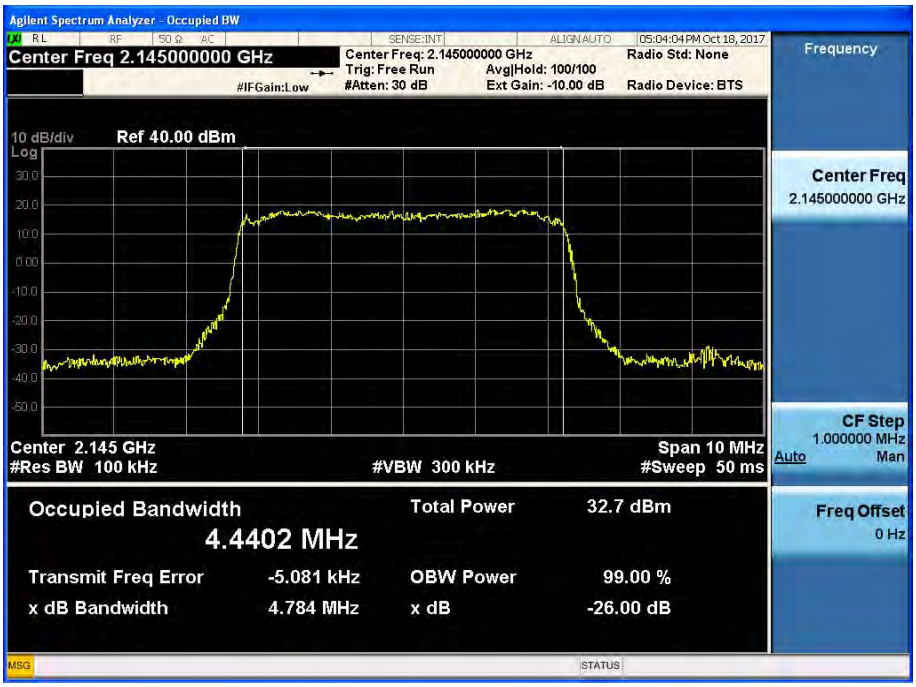
AWS 2100_LTE 5 MHz

Test Plot at Output Port 4

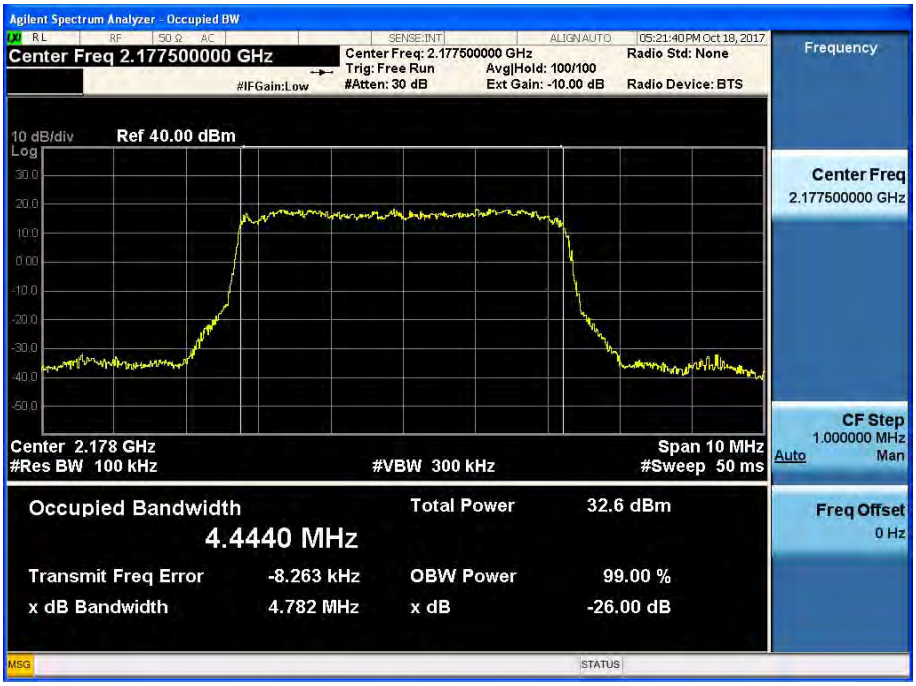
(QPSK Low Channel)



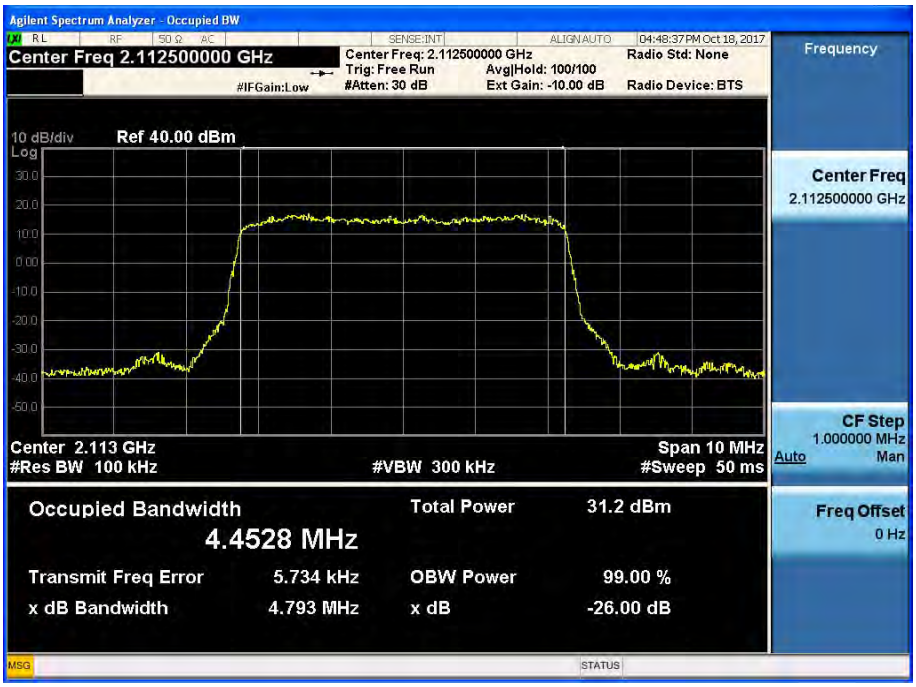
(QPSK Middle Channel)



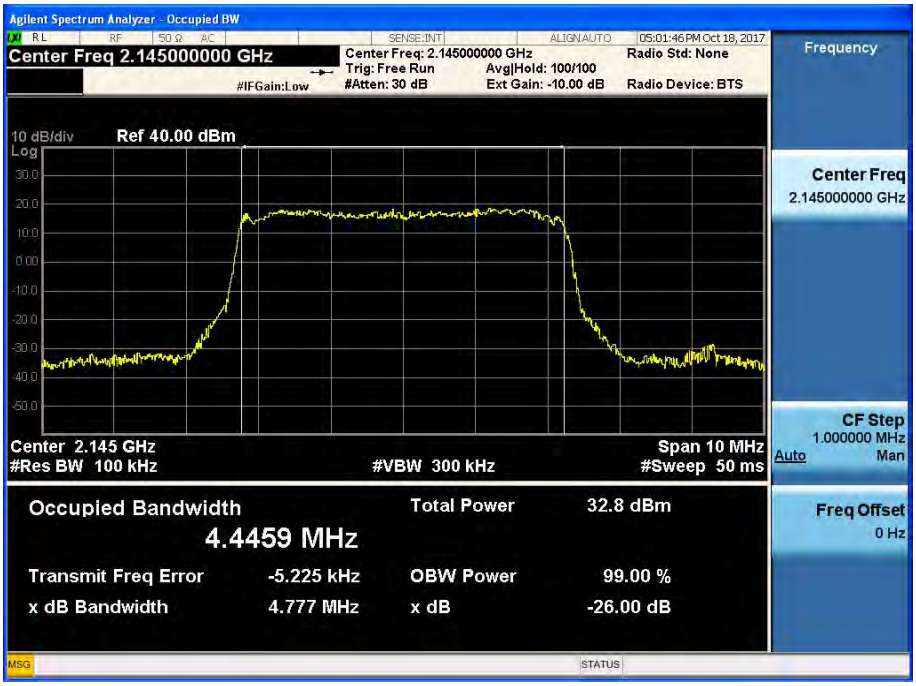
(QPSK High Channel)



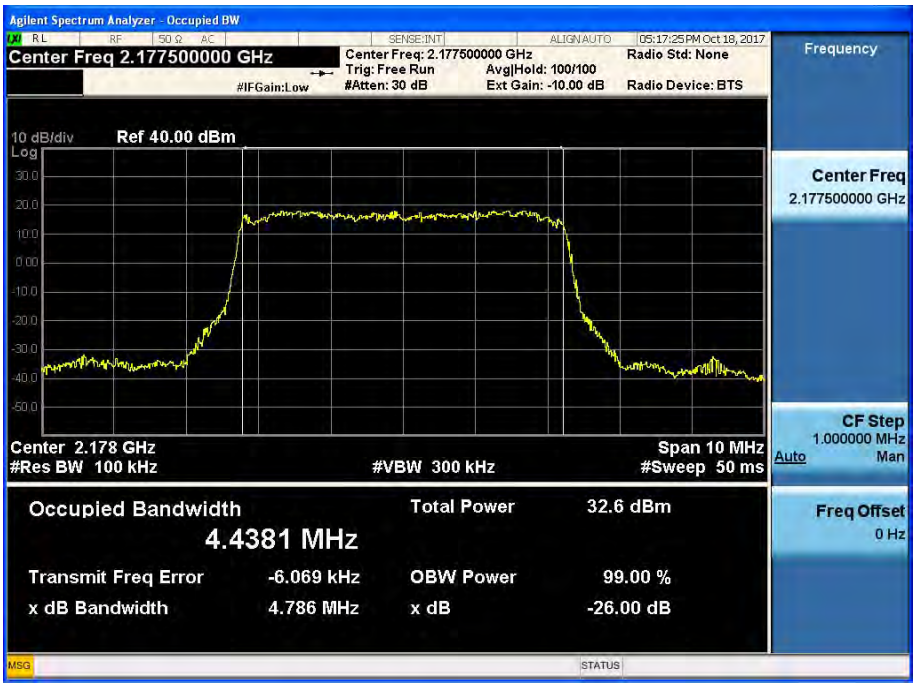
(16QAM Low Channel)



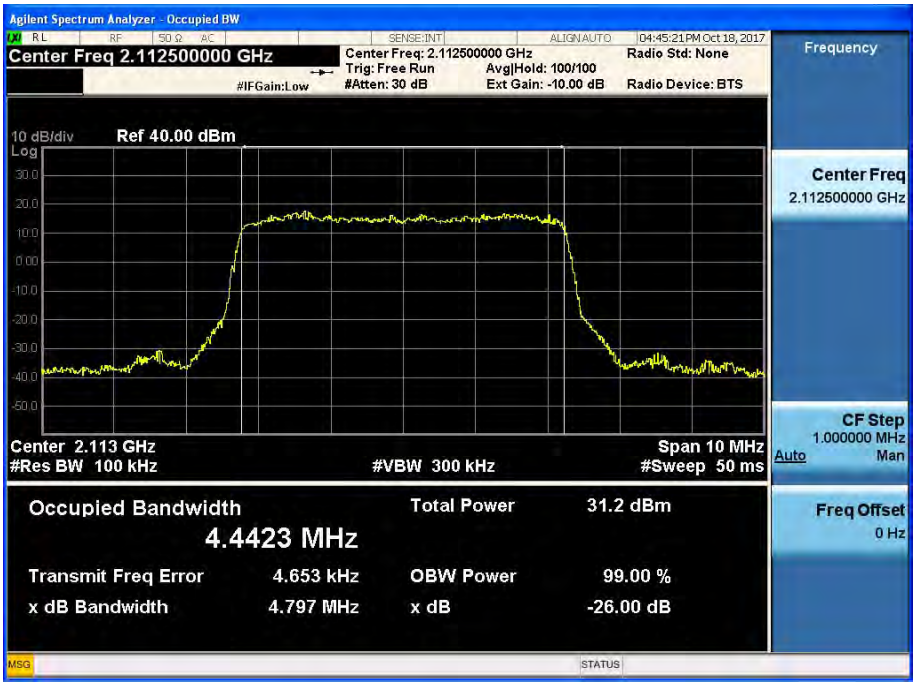
(16QAM Middle Channel)



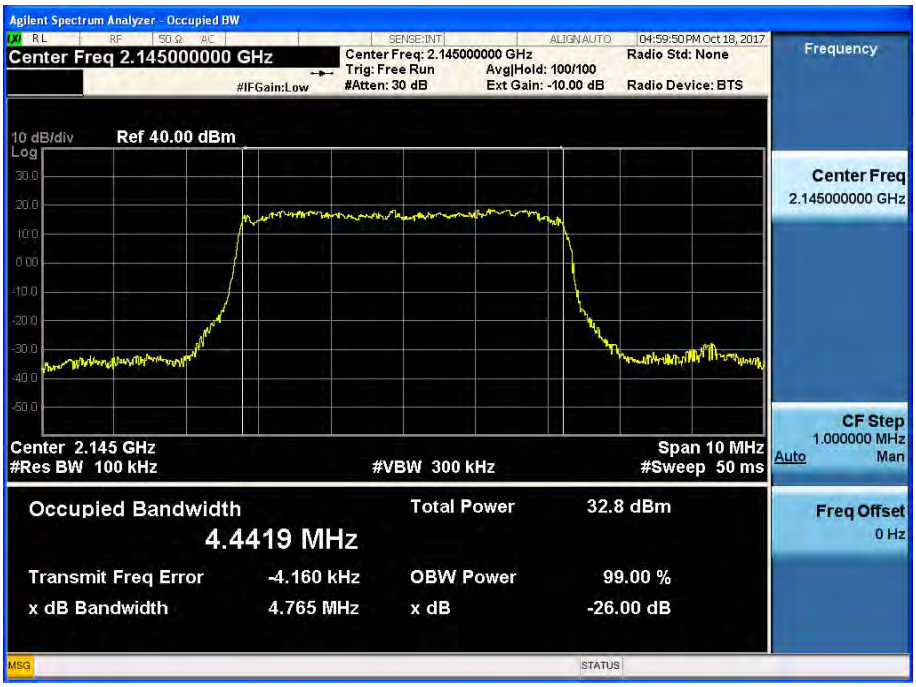
(16QAM High Channel)



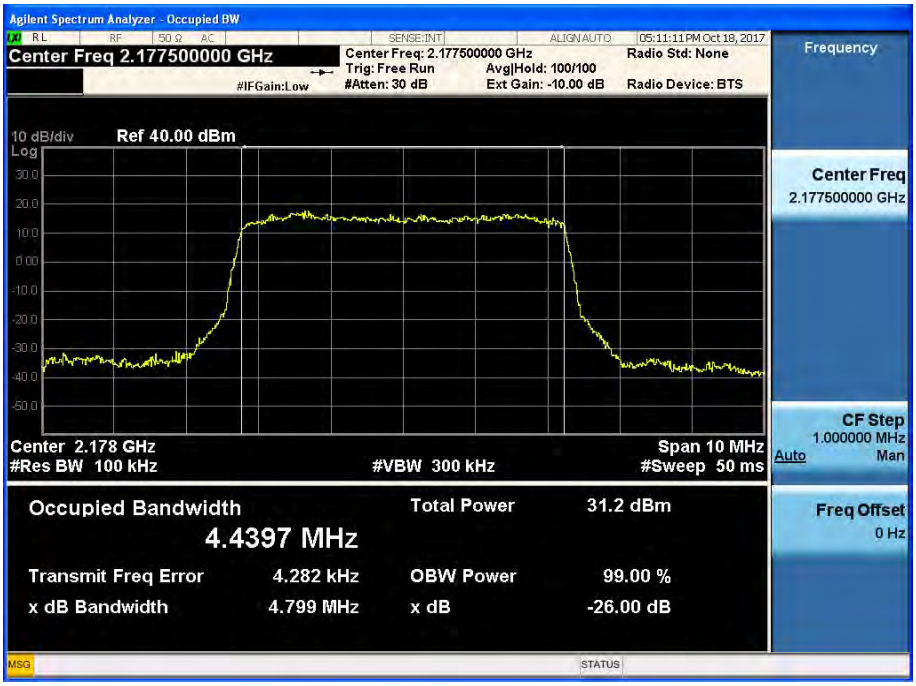
(64QAM Low Channel)



(64QAM Middle Channel)



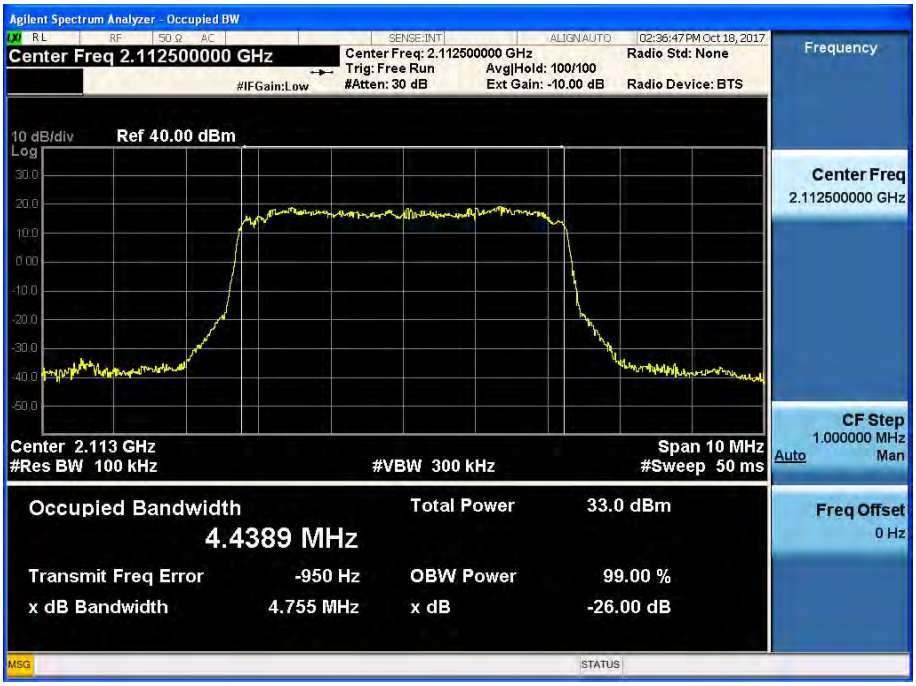
(64QAM High Channel)



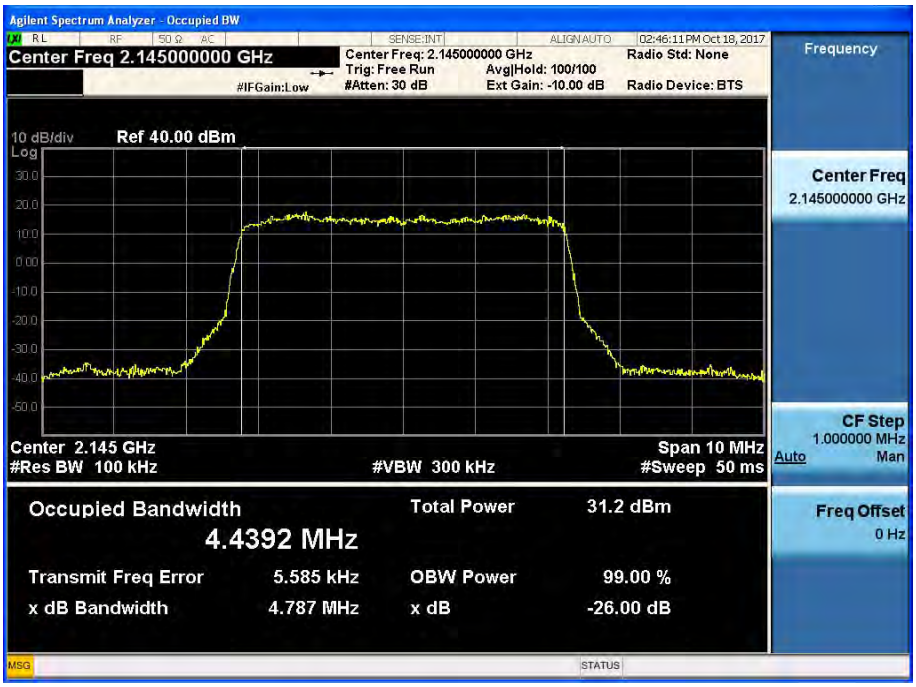
AWS 2100_LTE 5 MHz

Test Plot at Output Port 5

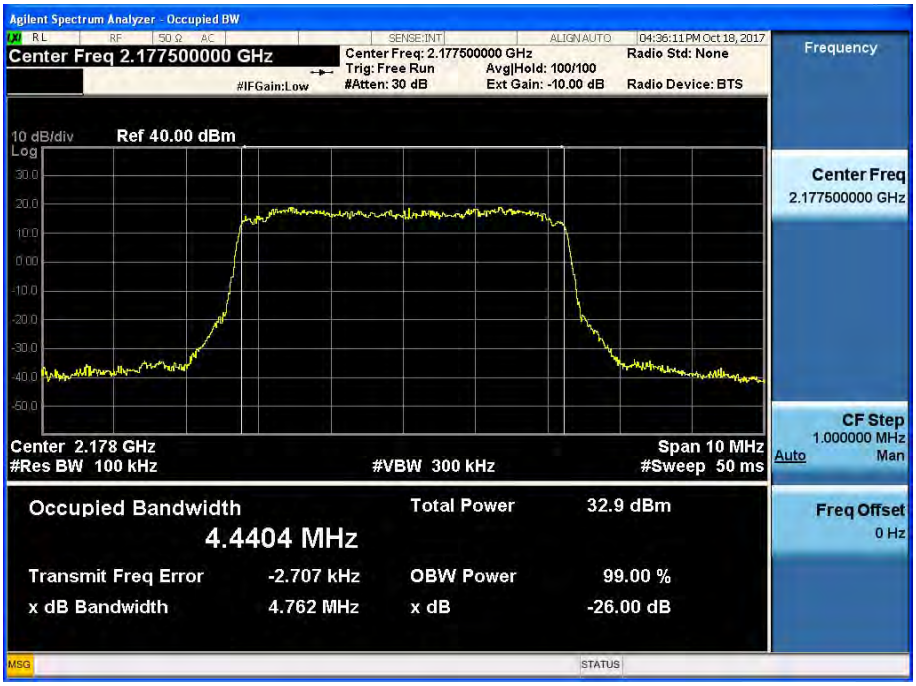
(QPSK Low Channel)



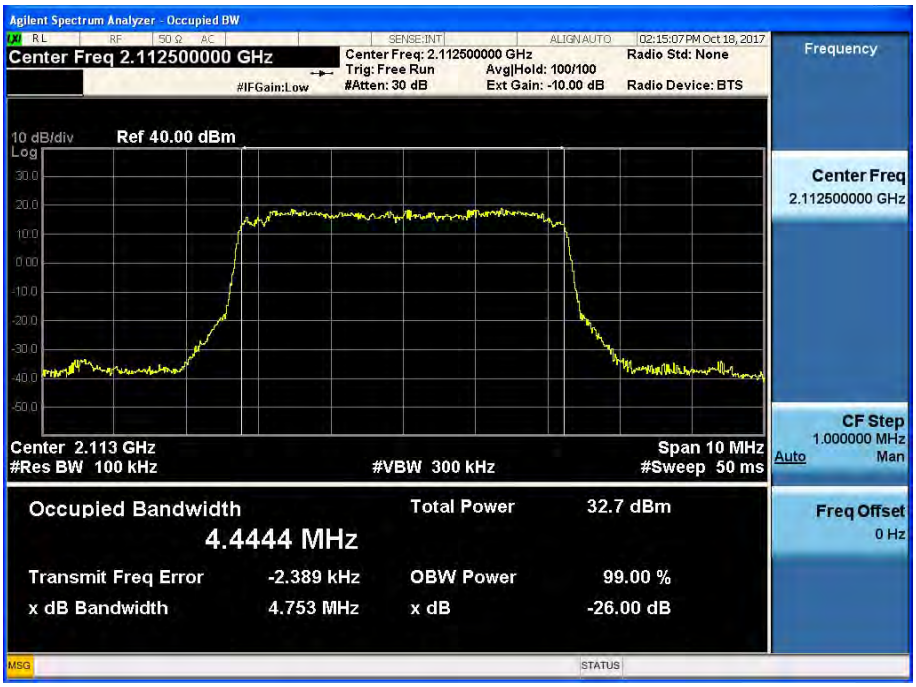
(QPSK Middle Channel)



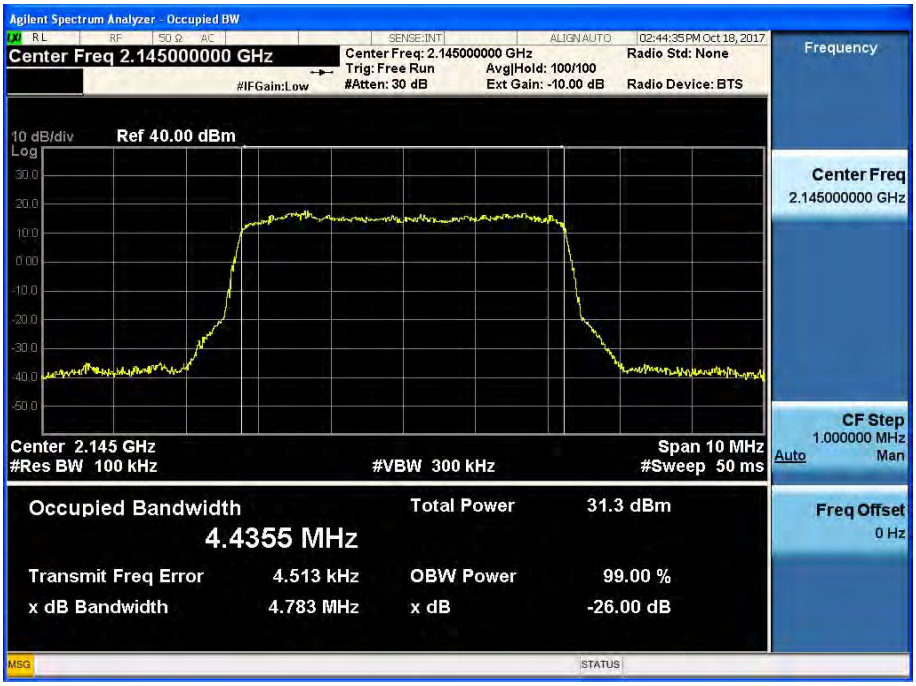
(QPSK High Channel)



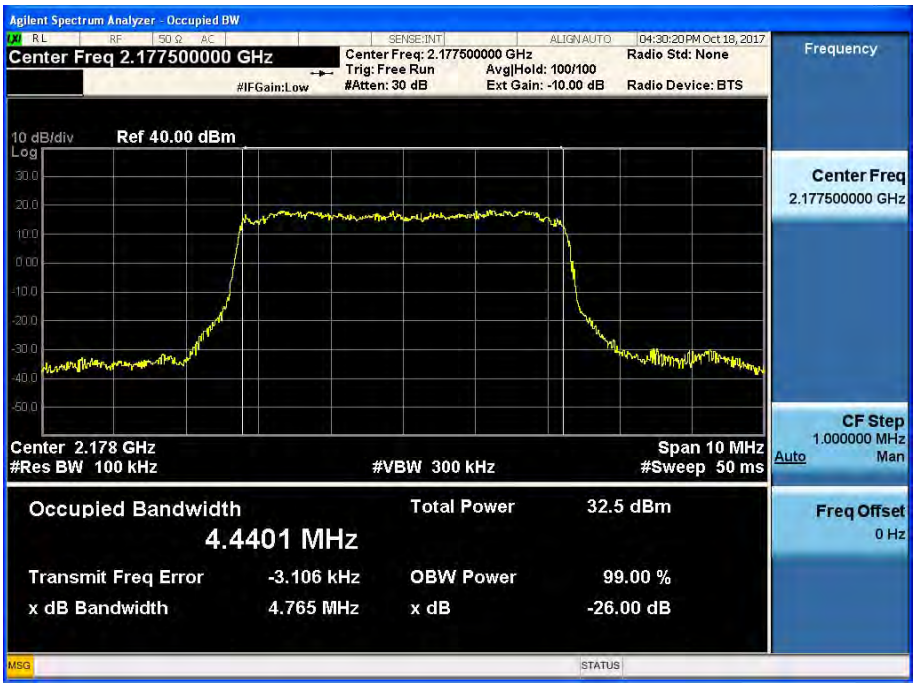
(16QAM Low Channel)



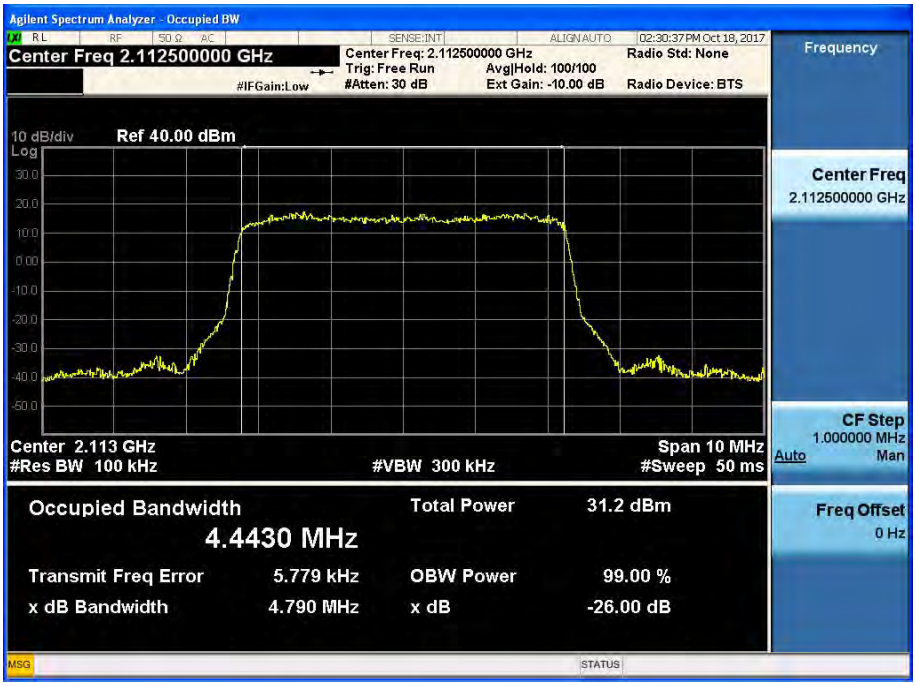
(16QAM Middle Channel)



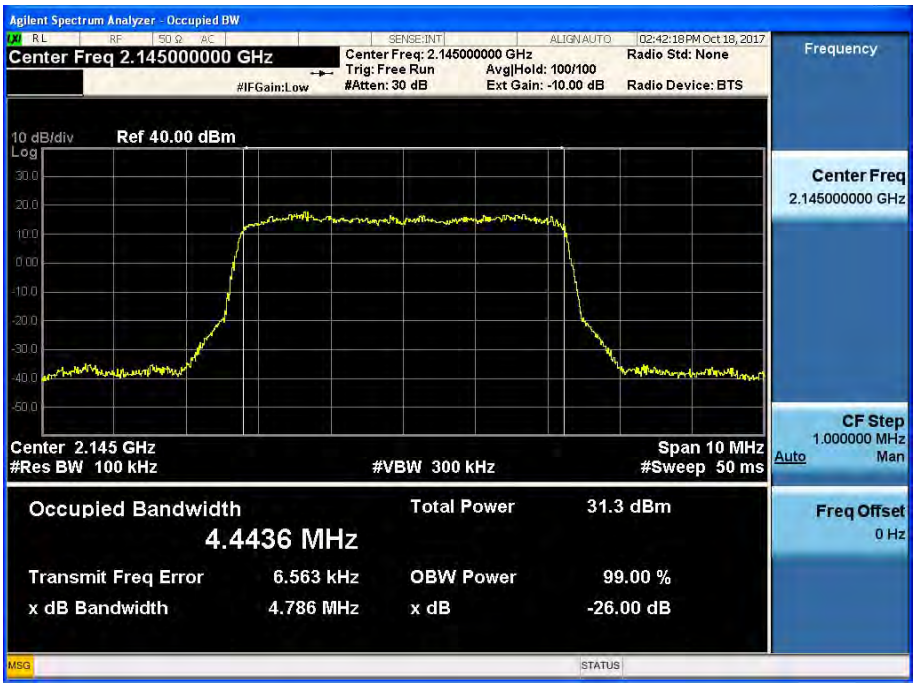
(16QAM High Channel)



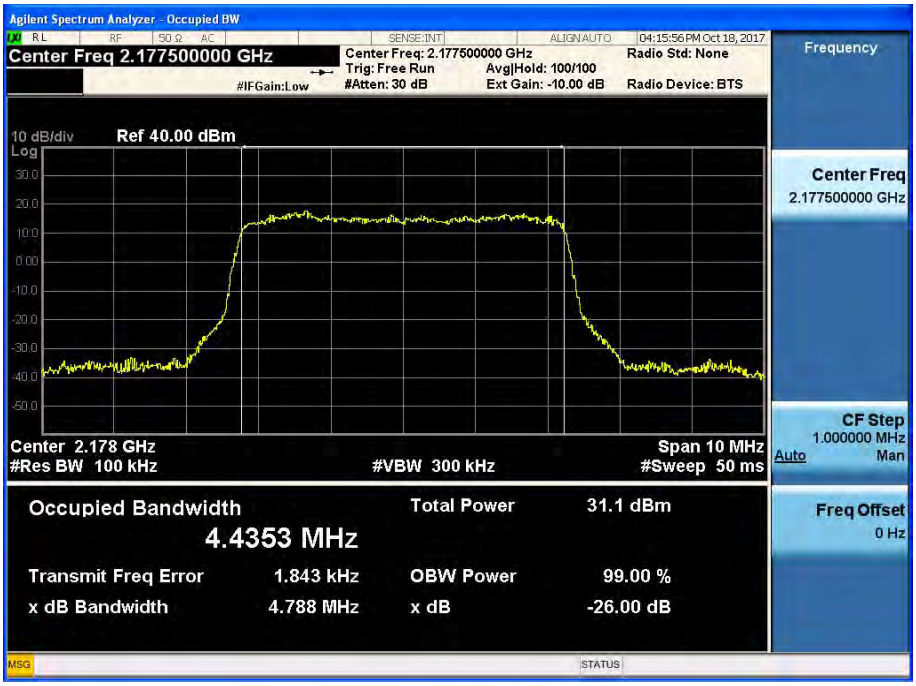
(64QAM Low Channel)



(64QAM Middle Channel)



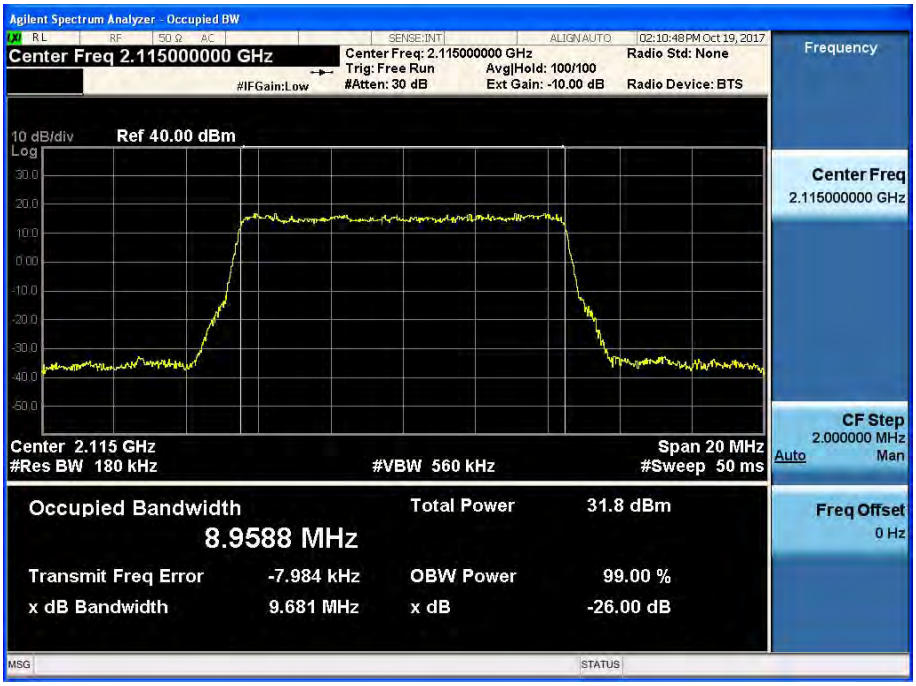
(64QAM High Channel)



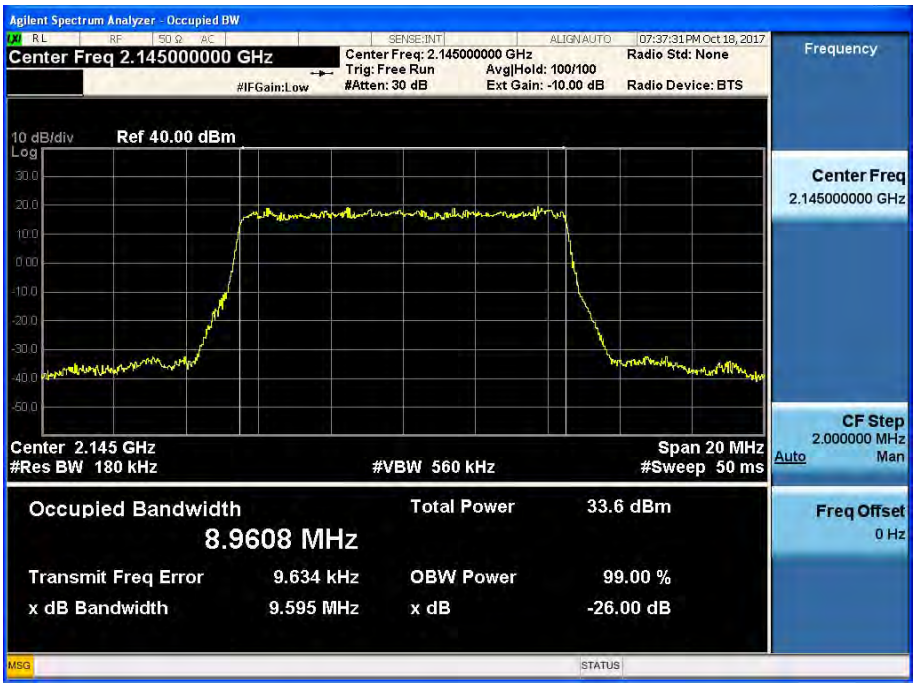
AWS 2100_LTE 10 MHz

Test Plot at Output Port 4

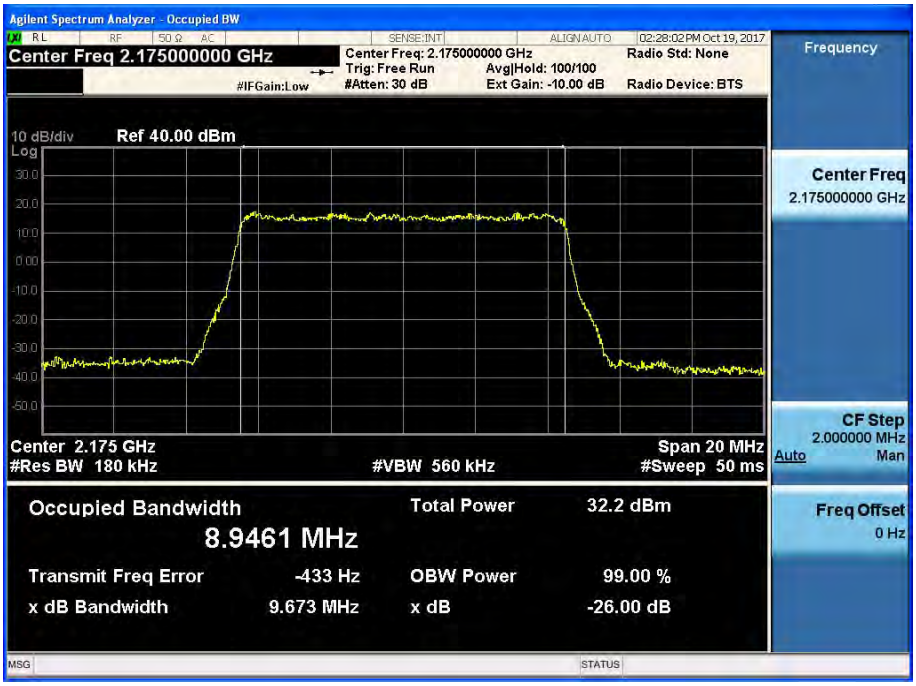
(QPSK Low Channel)



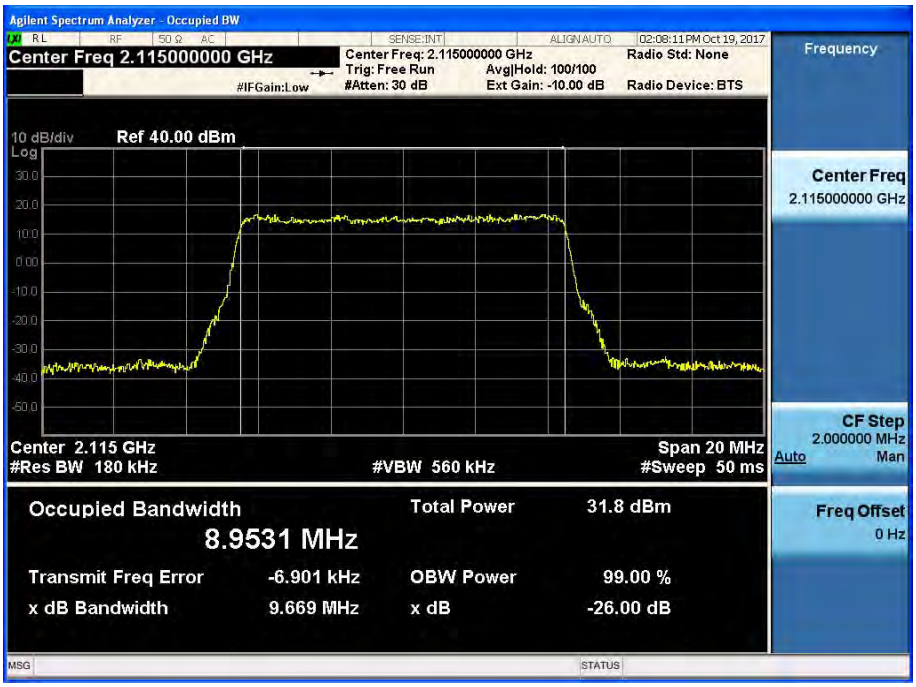
(QPSK Middle Channel)



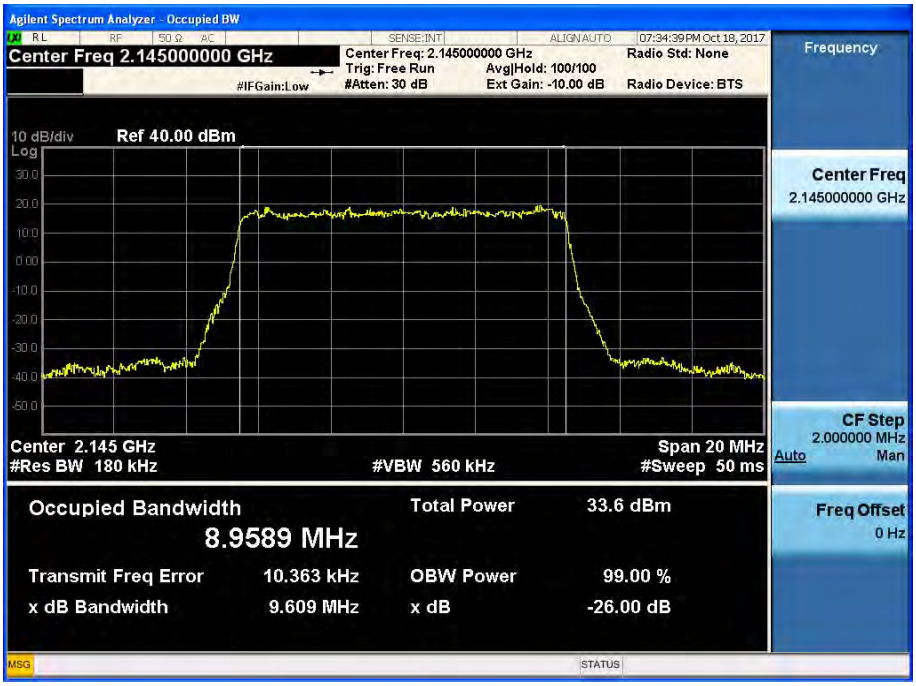
(QPSK High Channel)



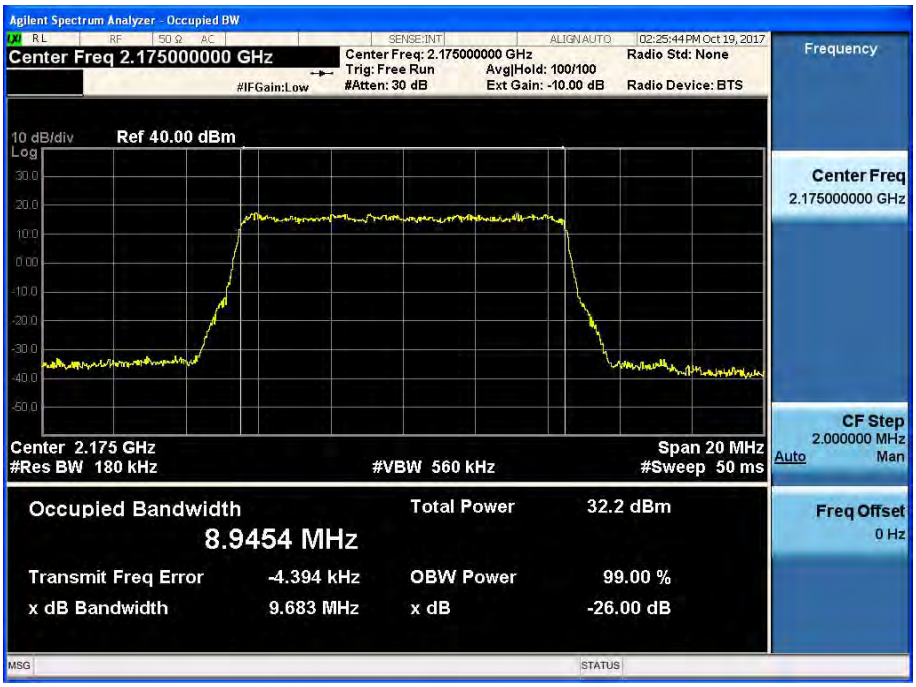
(16QAM Low Channel)



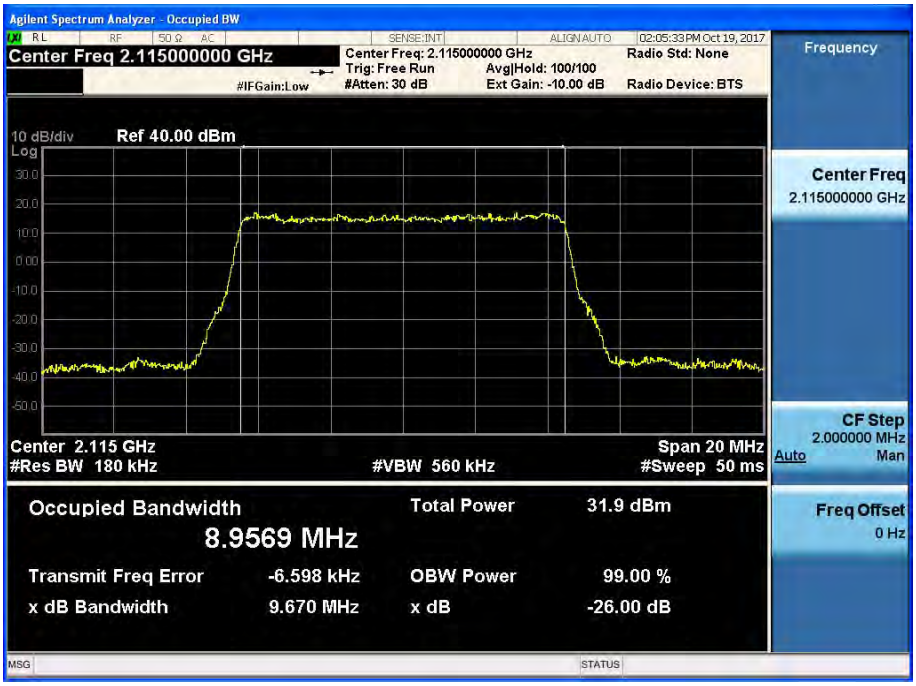
(16QAM Middle Channel)



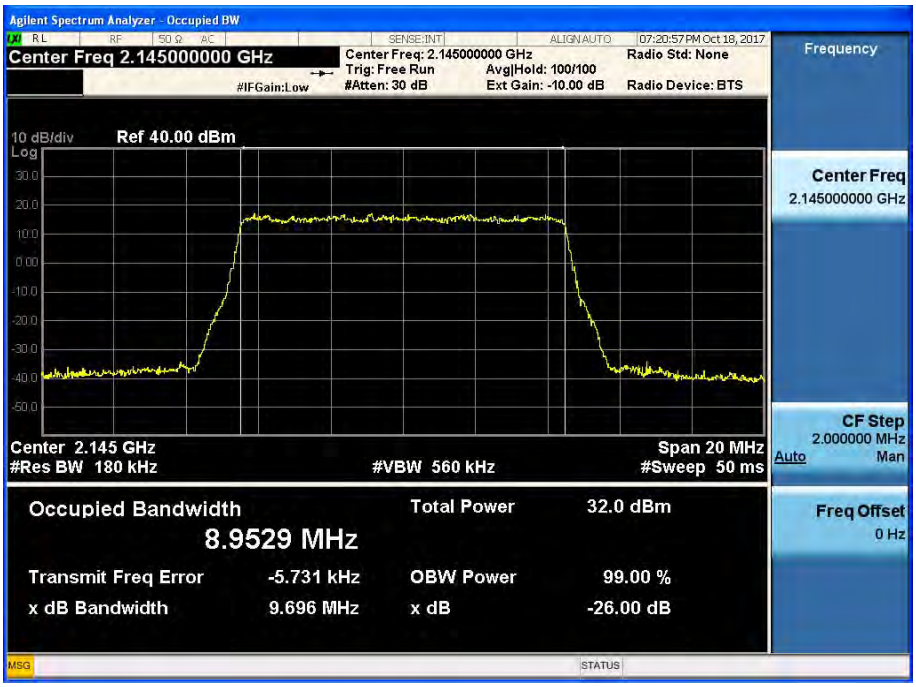
(16QAM High Channel)



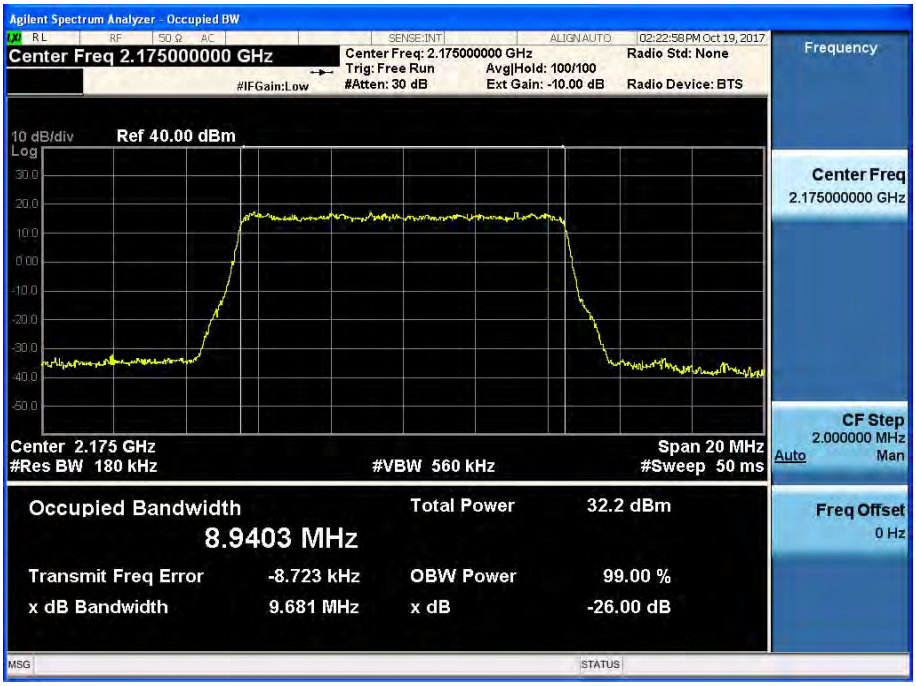
(64QAM Low Channel)



(64QAM Middle Channel)



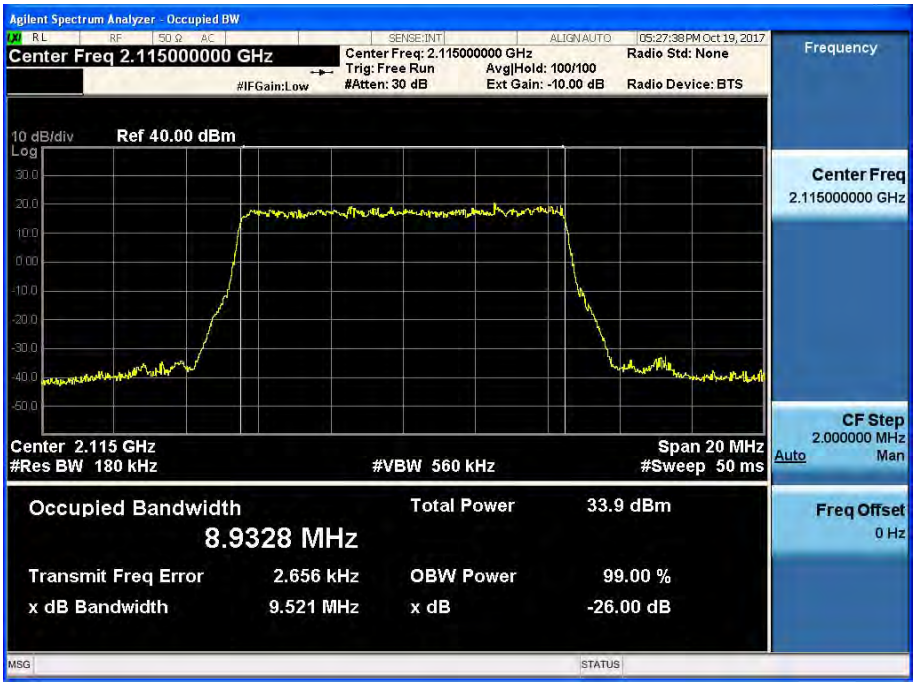
(64QAM High Channel)



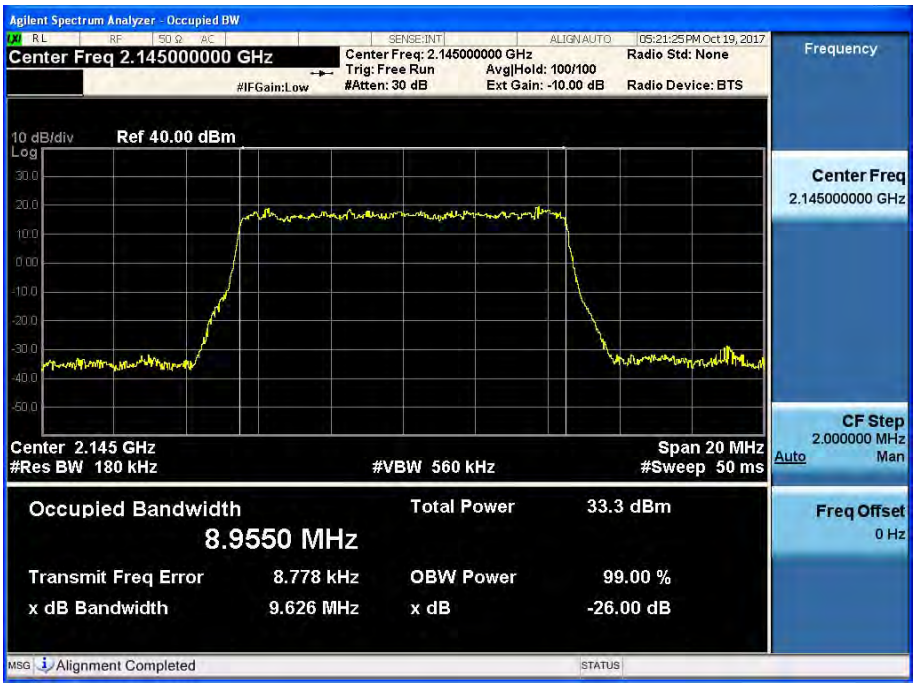
AWS 2100_LTE 10 MHz

Test Plot at Output Port 5

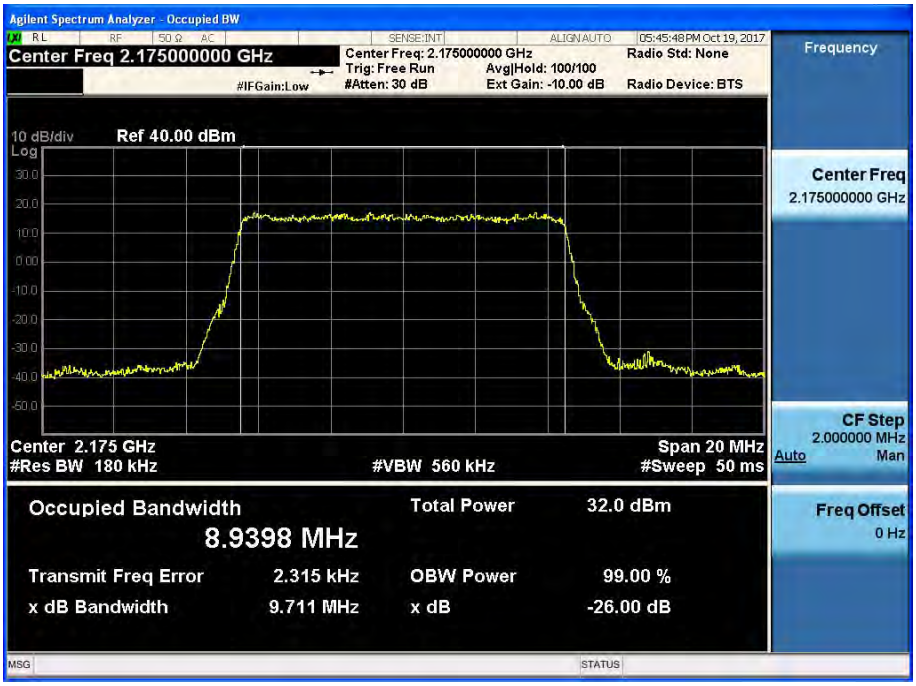
(QPSK Low Channel)



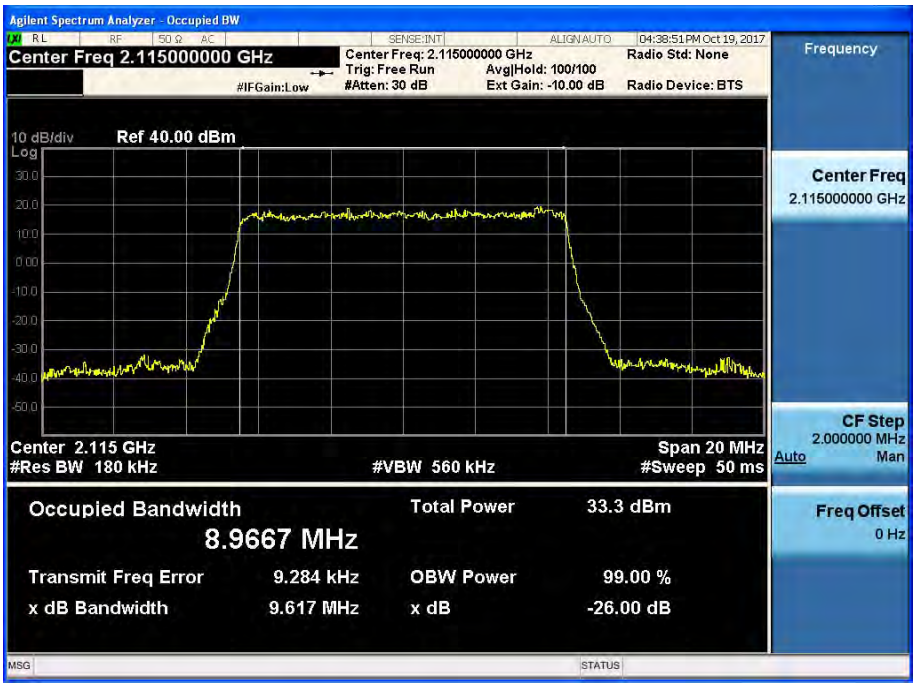
(QPSK Middle Channel)



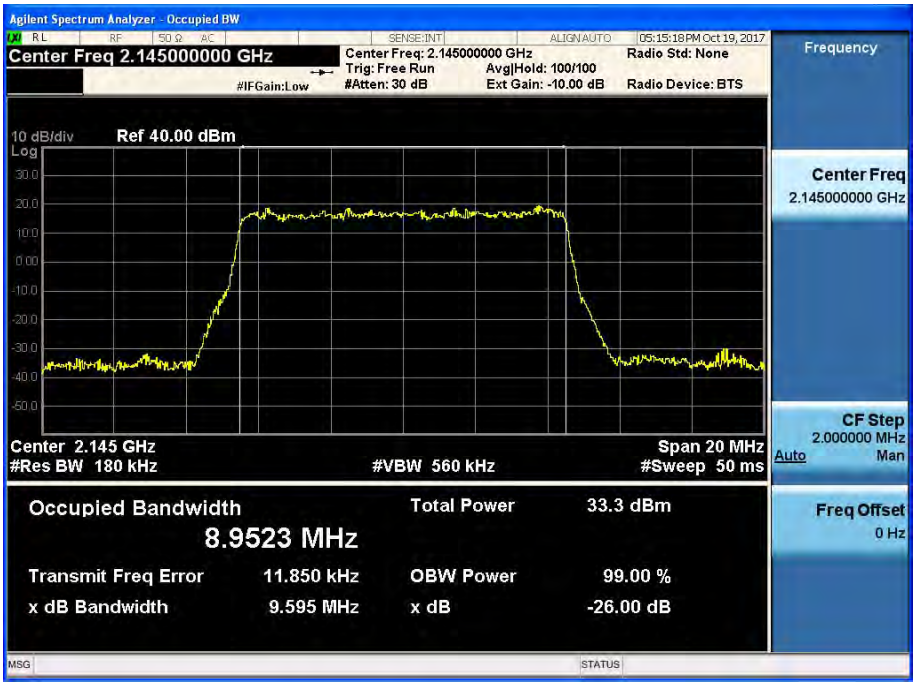
(QPSK High Channel)



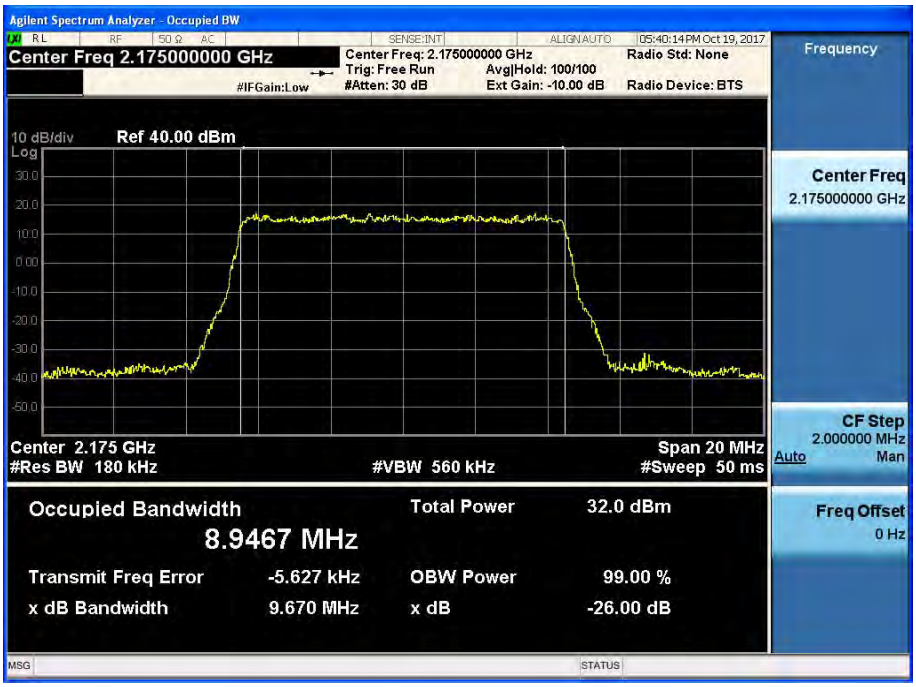
(16QAM Low Channel)



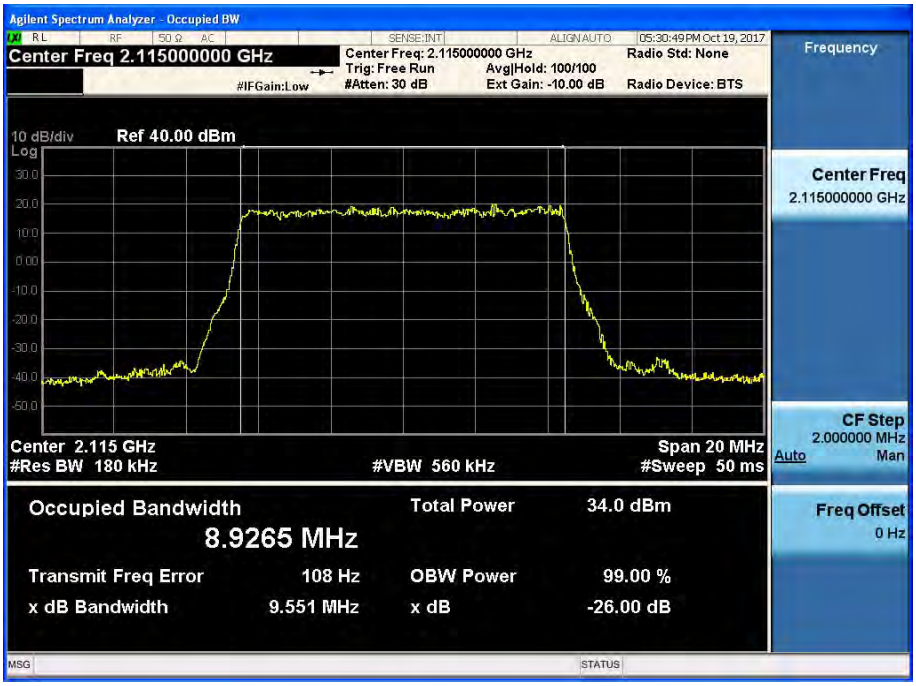
(16QAM Middle Channel)



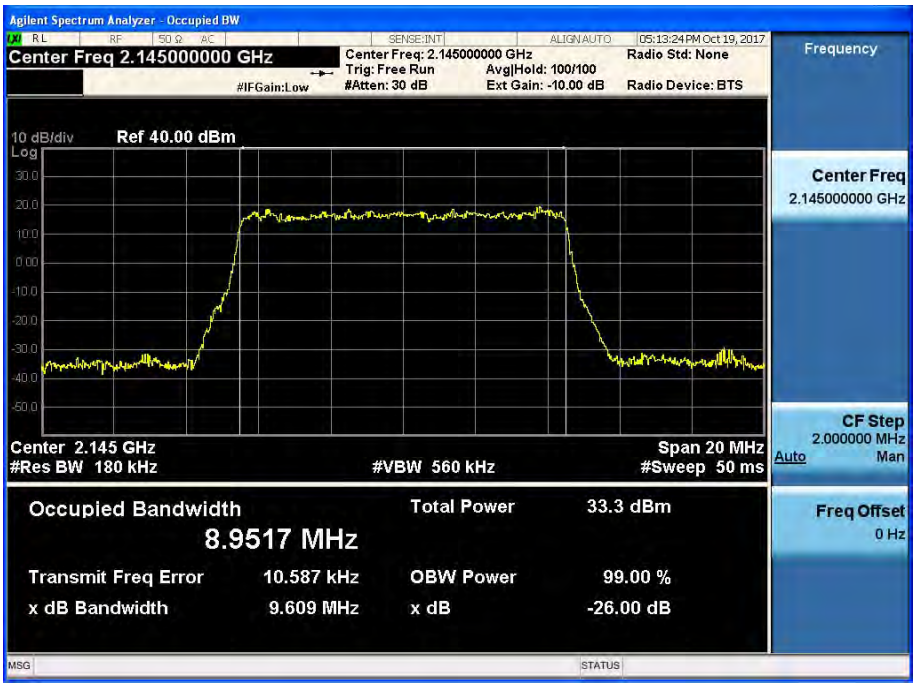
(16QAM High Channel)



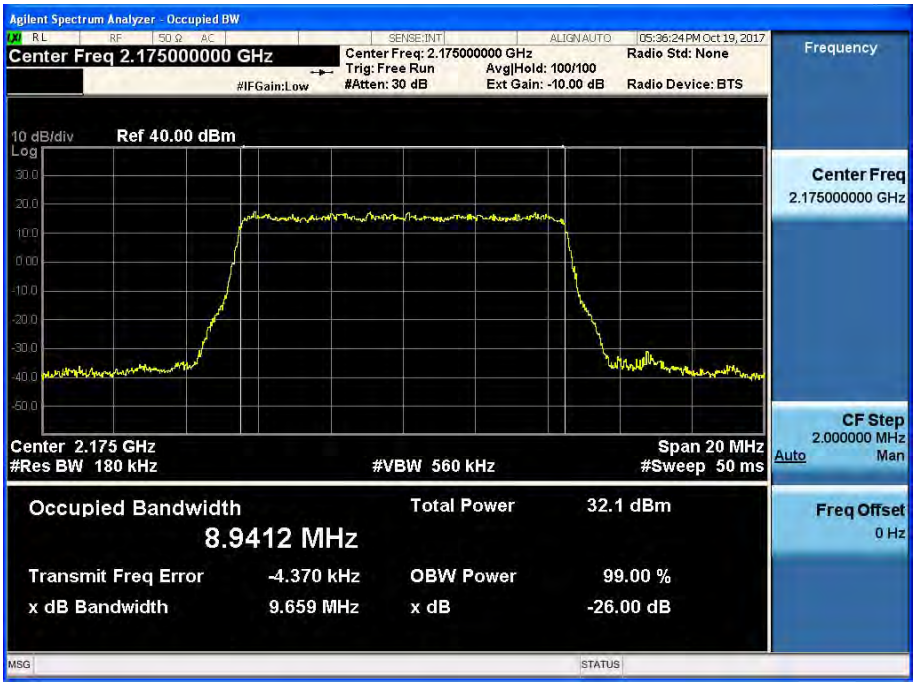
(64QAM Low Channel)



(64QAM Middle Channel)



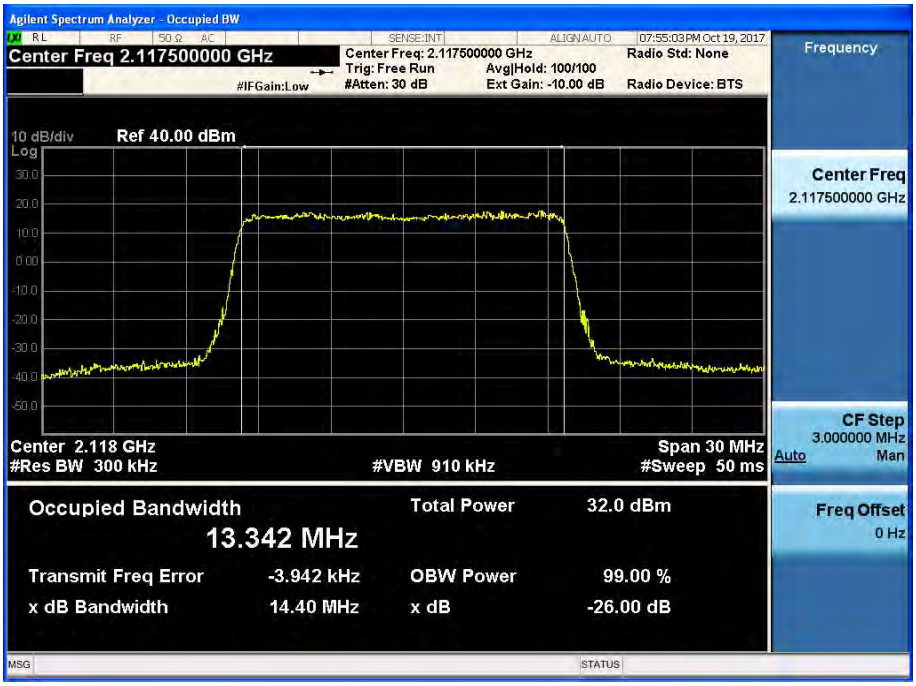
(64QAM High Channel)



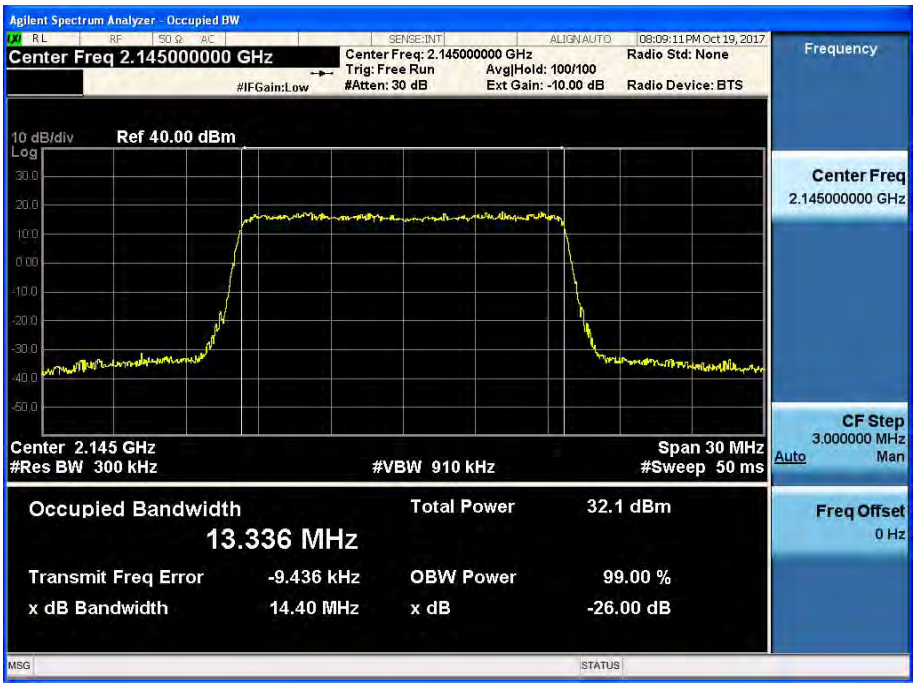
AWS 2100_LTE 15 MHz

Test Plot at Output Port 4

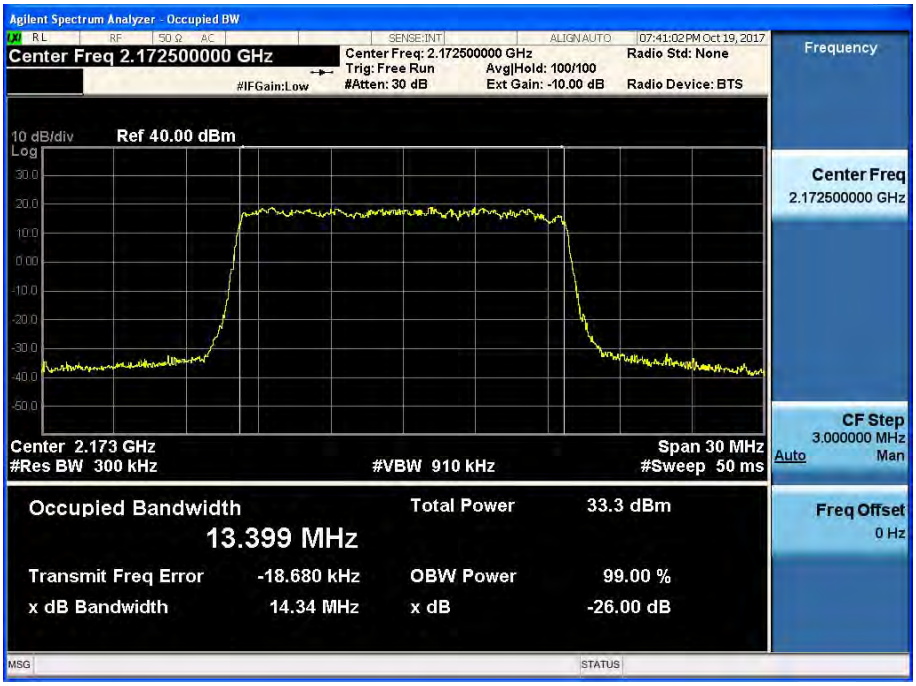
(QPSK Low Channel)



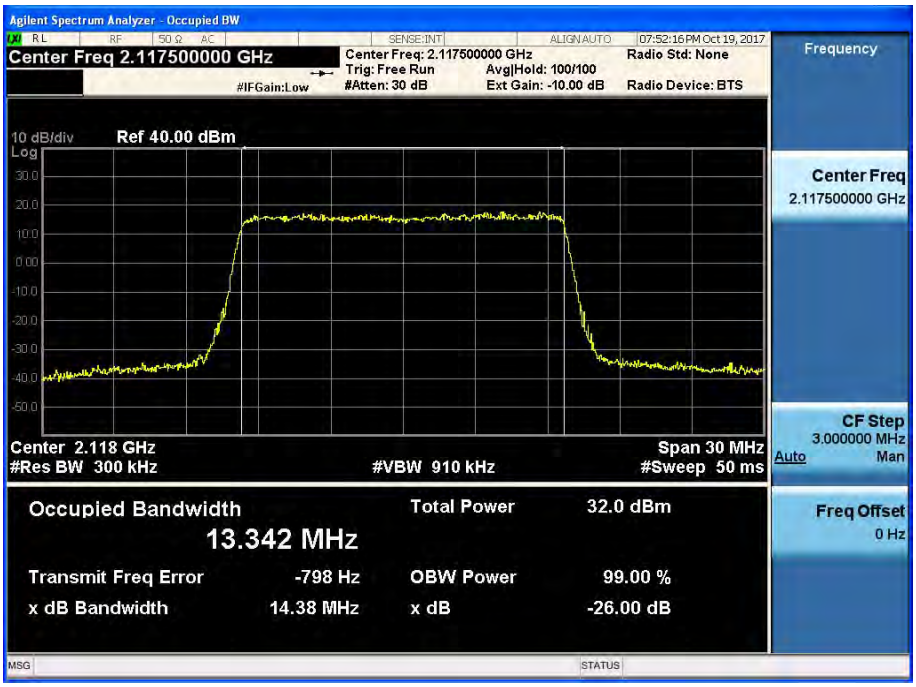
(QPSK Middle Channel)



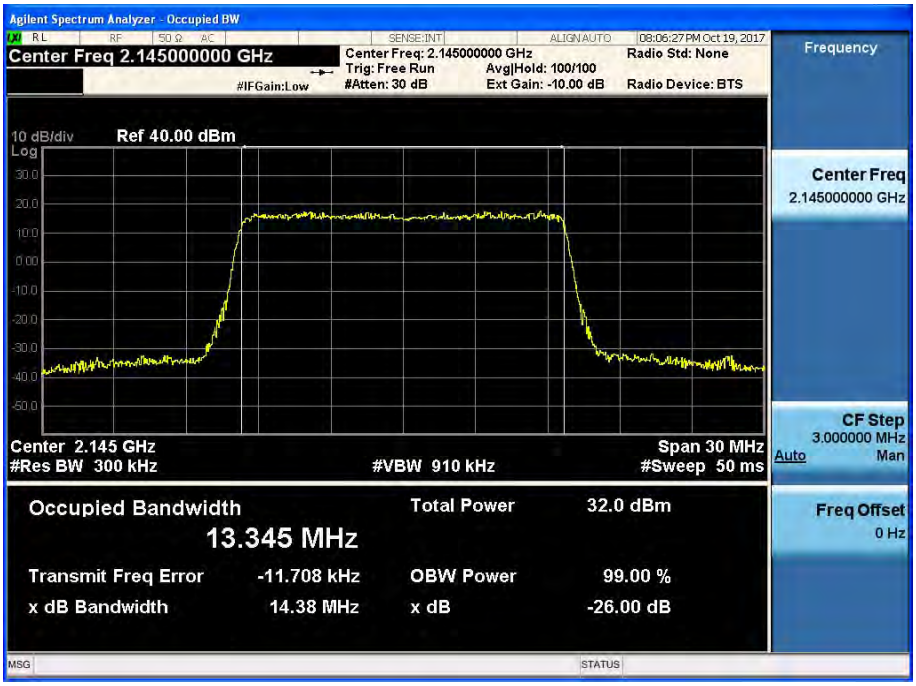
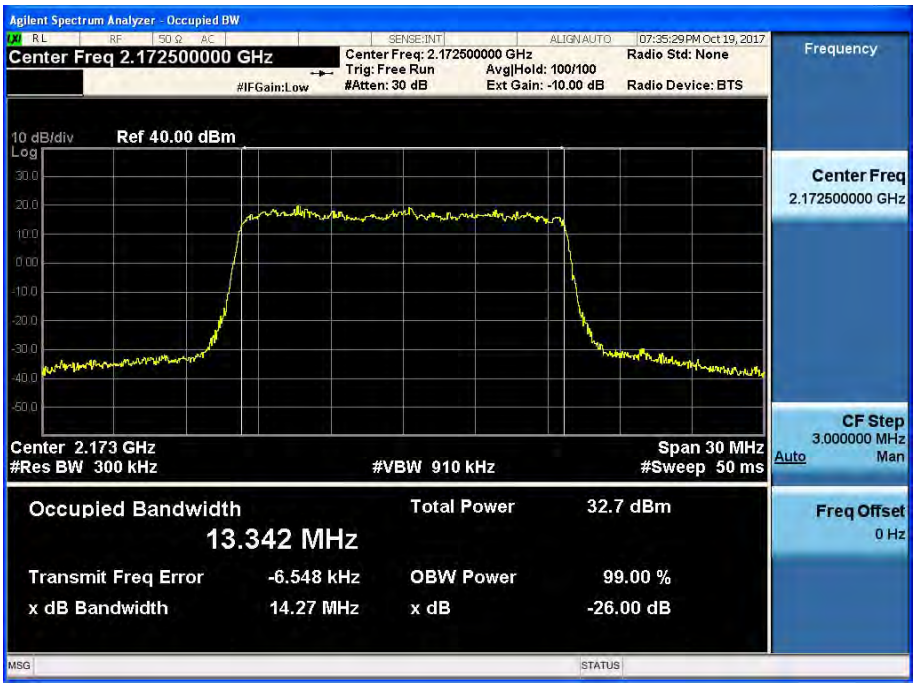
(QPSK High Channel)



(16QAM Low Channel)



(16QAM Middle Channel)



(16QAM High Channel)