

FCC REPORT

Certification

Applicant Name:

SAMSUNG Electronics Co.,Ltd.

Date of Issue:

September 08, 2017

Test Site/Location:

HCT CO., LTD.,

74, Seoicheon-ro 578beon-gil, Majang-myeon,
Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA**Address:**129, Samsung-ro, Yeongtong-gu, Suwon-si,
Gyeonggi-do, 16677, Rep. of Korea**Report No.:** HCT-R-1709-F001-1**FCC ID:****A3LSLS-BU10J****APPLICANT:****SAMSUNG Electronics Co.,Ltd.****FCC Model:**

SLS-BU10J

EUT Type:

Excellent Home LTE

Frequency Range:LTE Band 13 : 746 ~ 757 MHz
LTE Band 4 : 2110 ~ 2155 MHz**Conducted Output Power:**

50 mW / path (Total 2 path = 50 mW + 50 mW = 100 mW)

FCC Rule Part(s):

CFR 47 Part 2, Part 27

Data of Test:

August 21, 2017 ~ September 08, 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 : Kyung Soo Kang**
Engineer of Telecommunication testing center**Approved by : Jong Seok Lee**
Manager of Telecommunication testing center

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Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-R-1709-F001	September 04, 2017	- First Approval Report
HCT-R-1709-F001-1	September 08, 2017	- Added the PAR(Peak-to-Average Ratio) test results.

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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
Contact person	Name: Jong In KIM / Principal Research Engineer E-mail : jered.kim@samsung.com Tel: +82-31-279-3092 Fax: +82-31-279-0476

1.2. PRODUCT INFORMATION

EUT TYPE	Excellent Home LTE			
POWER SUPPLY	90 Vac ~ 264 Vac			
EMISSION DESIGNATOR			Emission Designator	
	Mode (MHz)	Tx Frequency (MHz)	QPSK (G7D)	16QAM/64QAM (W7D)
	LTE Band 13 (10)	751	8M93G7D	8M95W7D
	LTE Band 4 (10)	2115 ~ 2150	8M92G7D	8M95W7D
	LTE Band 4 (15)	2117.5 ~ 2147.5	13M5G7D	13M4W7D
	LTE Band 4 (20)	2120 ~ 2145	18M0G7D	18M0W7D
FREQUENCY RANGES	LTE Band 13 : 746 ~ 757 MHz LTE Band 4 : 2110 ~ 2155 MHz			
TX OUTPUT POWER	50 mW / path (Total 2 path = 50 mW + 50 mW = 100 mW)			
CHANNEL BANDWIDTH	LTE Band 13 : 10 MHz / LTE Band 4 : 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: Ace Technology Antenna type: Planar Inverted F Antenna Peak Gain:			
	Frequency [MHz]	Gain [dBi]		
		Path 1 (Left)		Path 2 (Right)
		746 ~ 756	0.0	2.8
	2110 ~ 2155	4.2	4.5	

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, 64QAM) modes were tested.

Test results are only attached worst cases.

3.3. MAXIMUM MEASUREMENT UNCERTAINTY

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	$f \leq 1$ GHz	± 4.80 dB
	$f > 1$ GHz	± 6.07 dB
Frequency Stability	-	$\pm 1.22 \times 10^{-6}$

3.4. STANDARDS ENVIRONMENTAL TEST CONDITIONS

Temperature :	+ 15 °C to + 35 °C
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	N5182A /Signal Generator	03/29/2017	Annual	MY50141649
Agilent	N9020A / Signal Analyzer	07/18/2017	Annual	MY49100060
NANGYEUL CO., LTD.	NY-THR18750 / Temperature and Humidity Chamber	10/21/2016	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	12/11/2015	Biennial	9120D-1191
Schwarzbeck	BBHA9170 / Horn Antenna(15 GHz ~ 40 GHz)	04/25/2017	Biennial	BBHA9170342
Rohde & Schwarz	FSP / Spectrum Analyzer	09/29/2016	Annual	836650/016
Rohde & Schwarz	FSV40-N / Spectrum Analyzer	09/23/2016	Annual	101068-SZ
Wainwright Instruments	WHKX10-2700-3000-18000-40SS / High Pass Filter	08/01/2017	Annual	4
Wainwright Instruments	WHK1.2/15G-10EF	04/10/2017	Annual	4
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

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 loss 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 measured at each antenna port and then summed mathematically 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 1(Left) = 17.03 dBm + 0.00 dBi – 2.15 dB = 14.88 dBm

Port 2(Right) = 16.71 dBm + 2.8 dBi - 2.15 dB = 17.36 dBm

EIRP of Band 4 : Port 1(Left) = 17.34 dBm + 4.20 dBi = 21.54 dBm

Port 2(Right) = 17.06 dBm + 4.5 dBi = 21.56 dBm

Test Results:

LTE Band 13 (10 MHz)

Test Data at Output Port 1

Frequency (MHz)	Output Power					
	QPSK		16QAM		64QAM	
	dBm	mW	dBm	mW	dBm	mW
751	17.03	50.47	17.00	50.12	16.77	47.53

Test Data at Output Port 2

Frequency (MHz)	Output Power					
	QPSK		16QAM		64QAM	
	dBm	mW	dBm	mW	dBm	mW
751	16.67	46.45	16.60	45.71	16.71	46.88

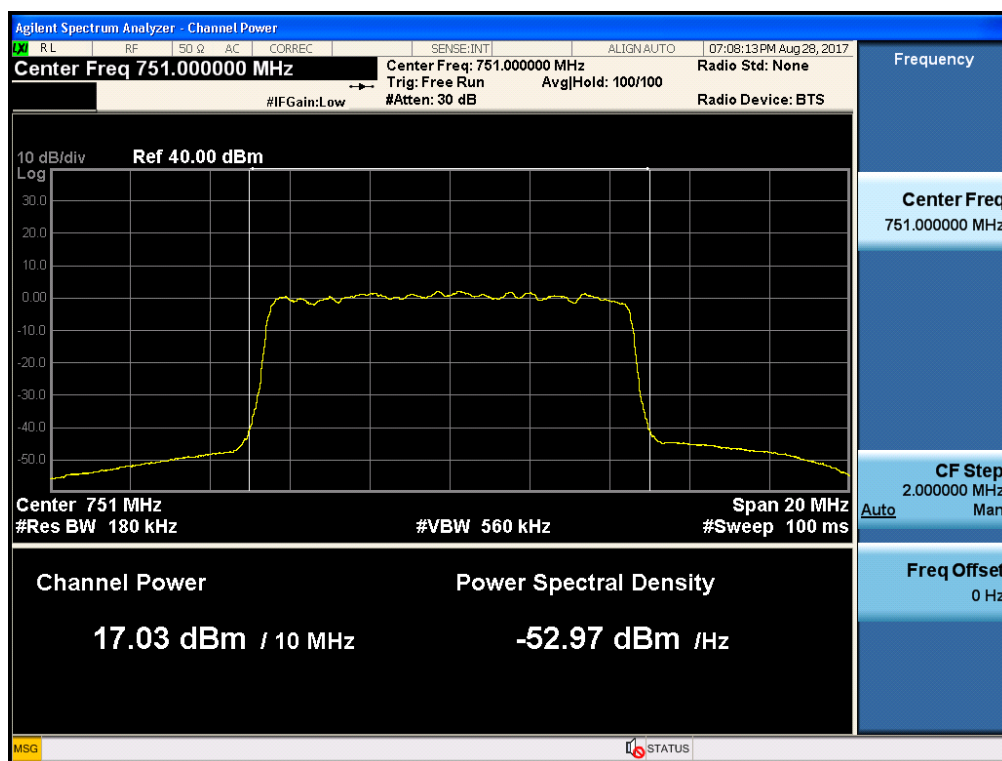
Sum Data of Port 1 and Port 2

Frequency (MHz)	Output Power		
	QPSK	16QAM	64QAM
	mW	mW	mW
751.00	96.92	95.83	94.41

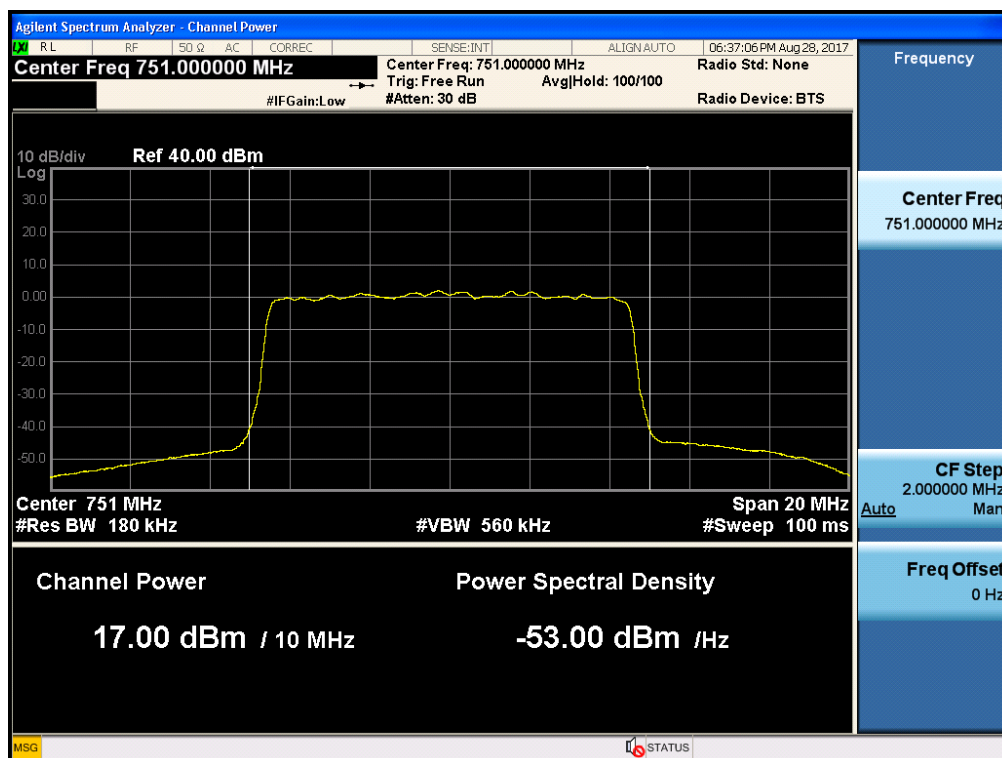
LTE Band 13 (10 MHz)

Plot Data for Output Port 1

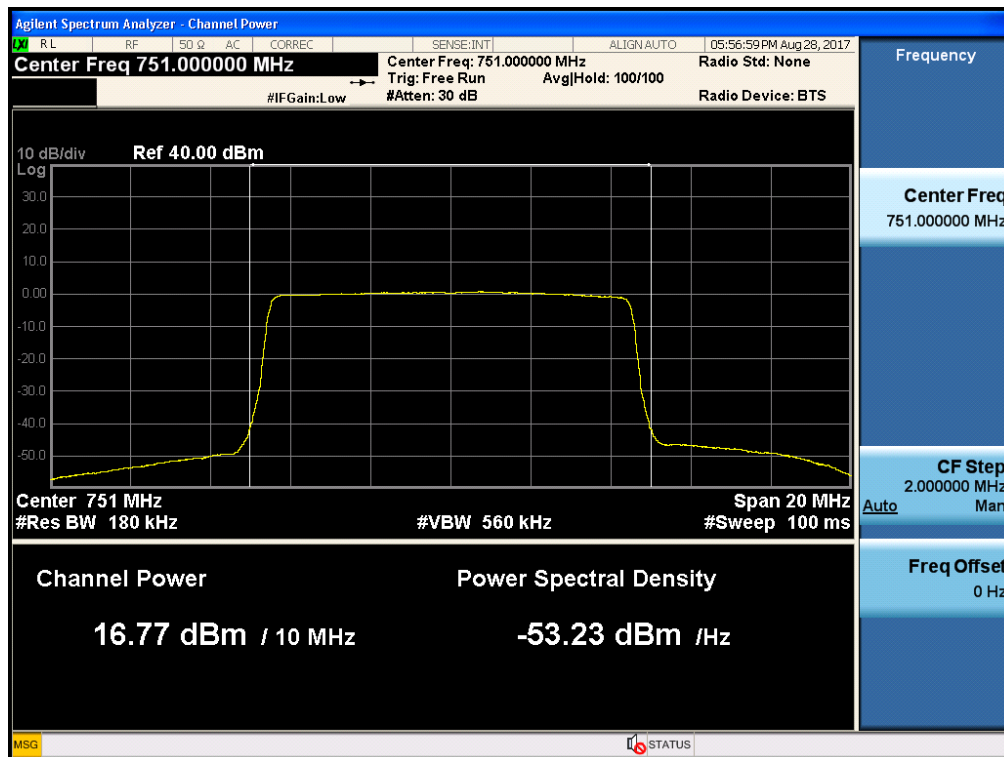
(QPSK)



(16QAM)

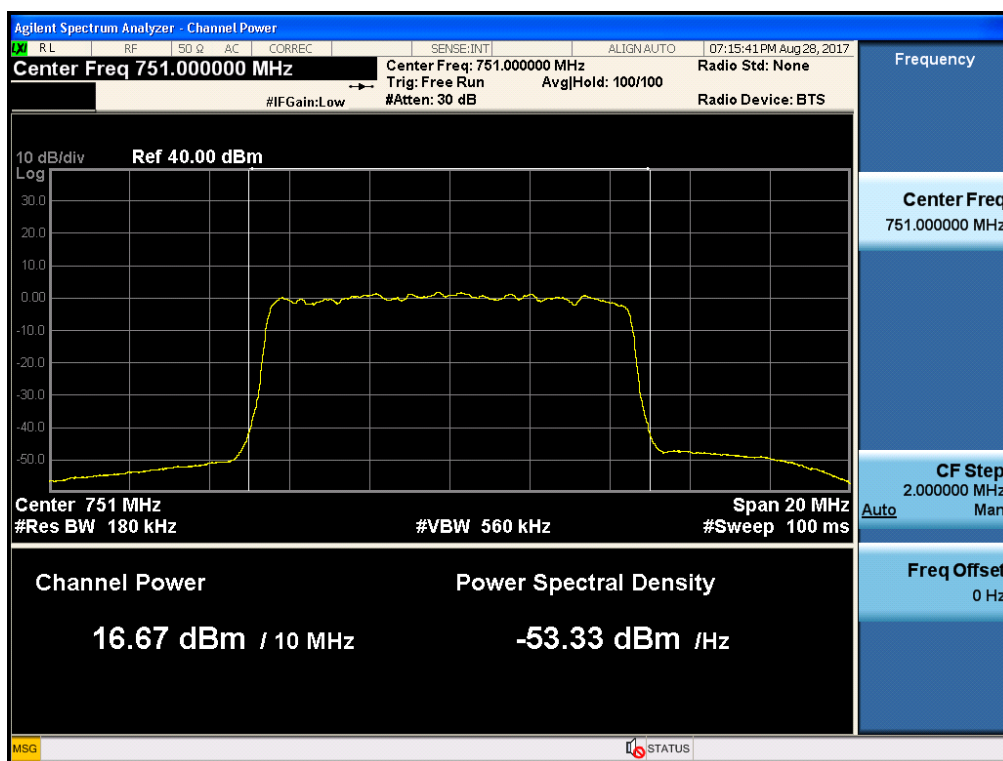


(64QAM)

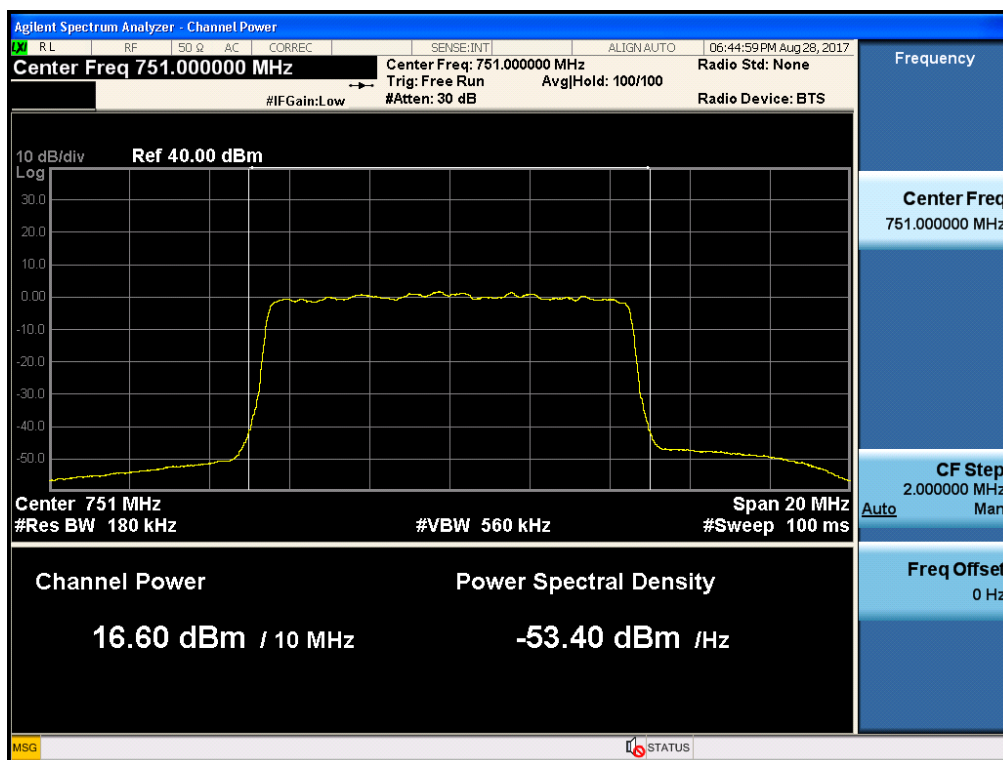


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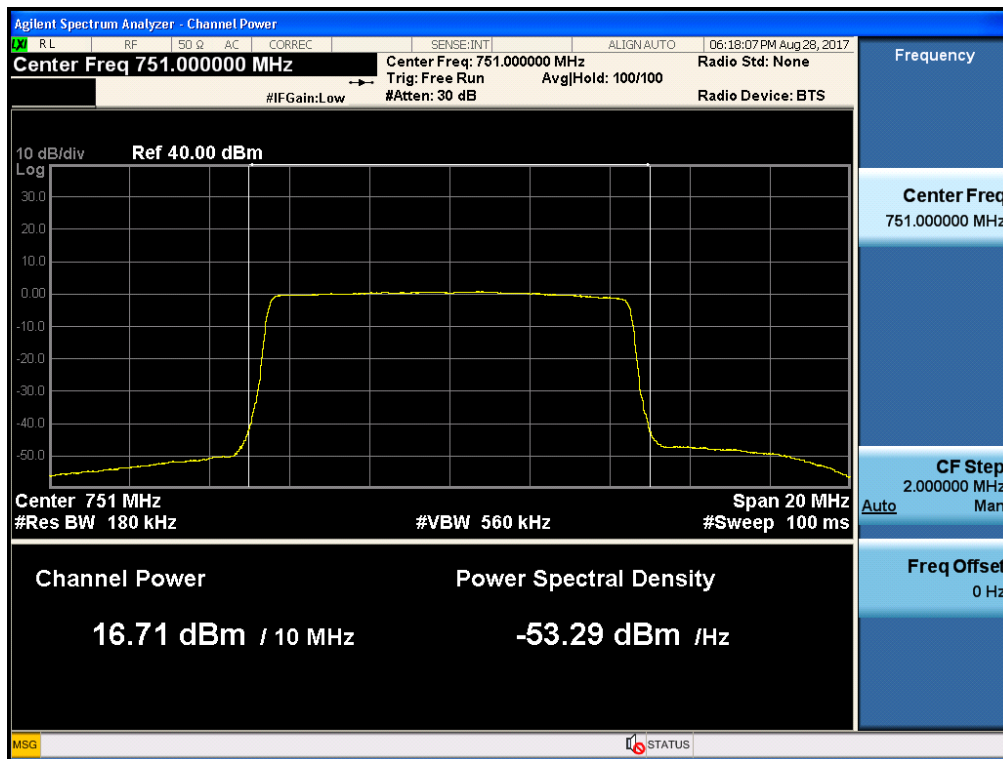
(QPSK)



(16QAM)



(64QAM)



LTE Band 4 (10 MHz)

Test Data at Output Port 1

Frequency (MHz)	Output Power					
	QPSK		16QAM		64QAM	
	dBm	mW	dBm	mW	dBm	mW
2115.00	17.15	51.88	16.99	50.00	16.98	49.89
2132.50	17.21	52.60	17.29	53.58	17.16	52.00
2150.00	17.34	54.20	17.22	52.72	17.24	52.97

Test Data at Output Port 2

Frequency (MHz)	Output Power					
	QPSK		16QAM		64QAM	
	dBm	mW	dBm	mW	dBm	mW
2115.00	16.85	48.42	16.89	48.87	16.94	49.43
2132.50	16.86	48.53	16.72	46.99	16.77	47.53
2150.00	16.96	49.66	16.79	47.75	16.67	46.45

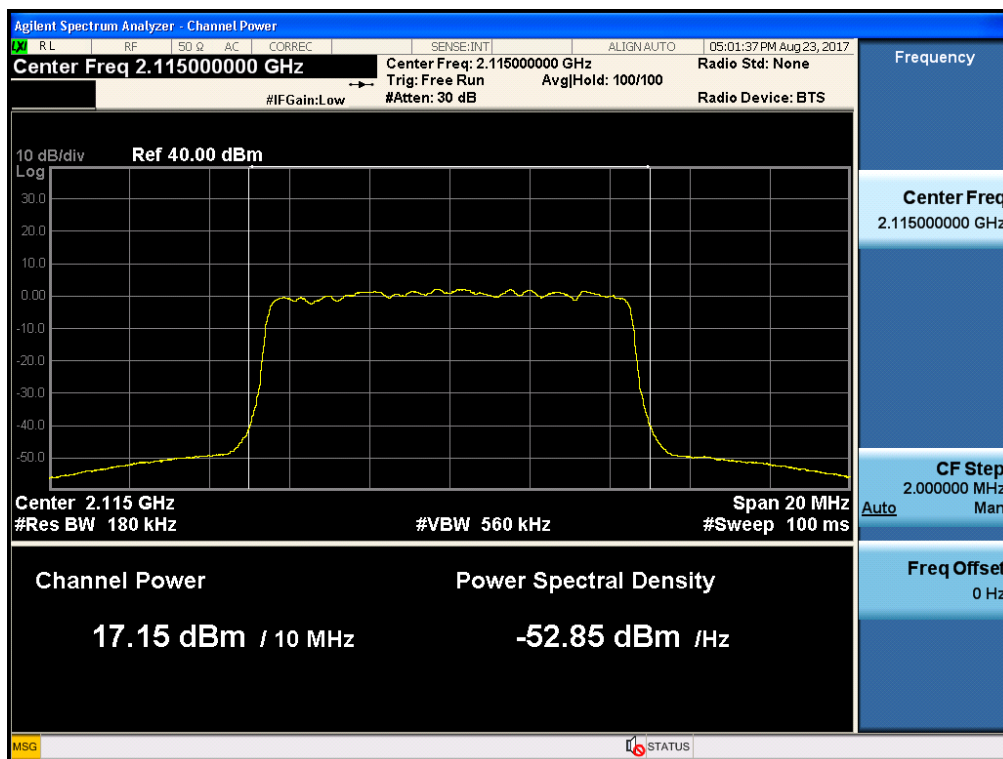
Sum Data of Port 1 and Port 2

Frequency (MHz)	Output Power		
	QPSK	16QAM	64QAM
	mW	mW	mW
2115.00	100.30	98.87	99.32
2132.50	101.13	100.57	99.53
2150.00	103.86	100.48	99.42

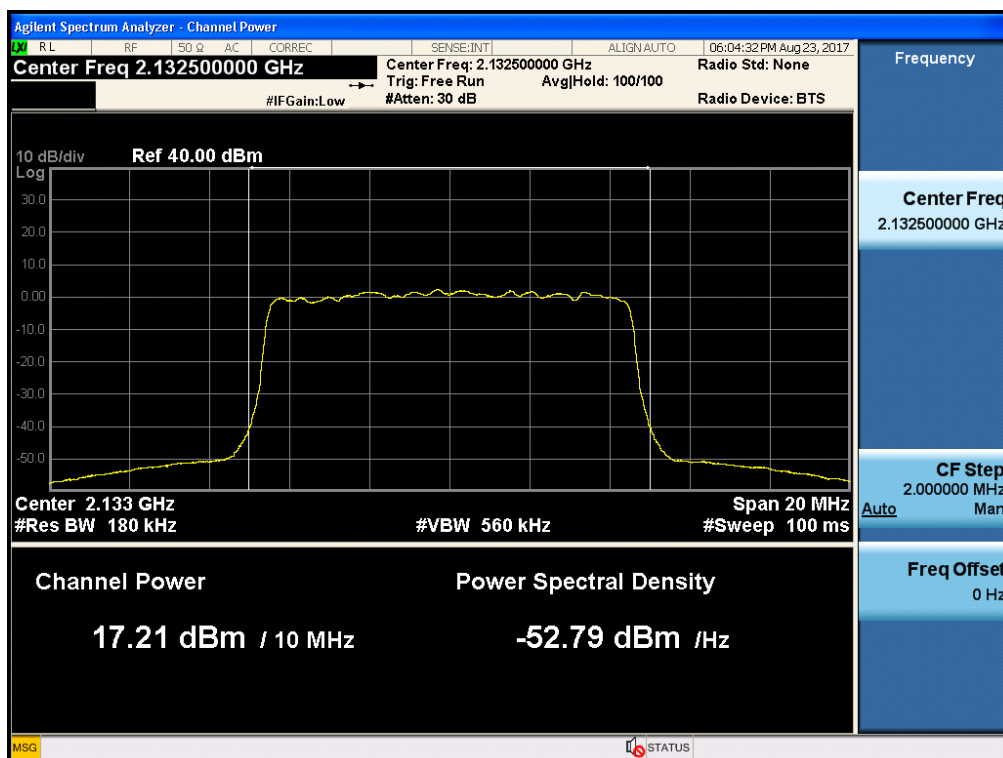
LTE Band 4 (10 MHz)

Plot Data for Output Port 1

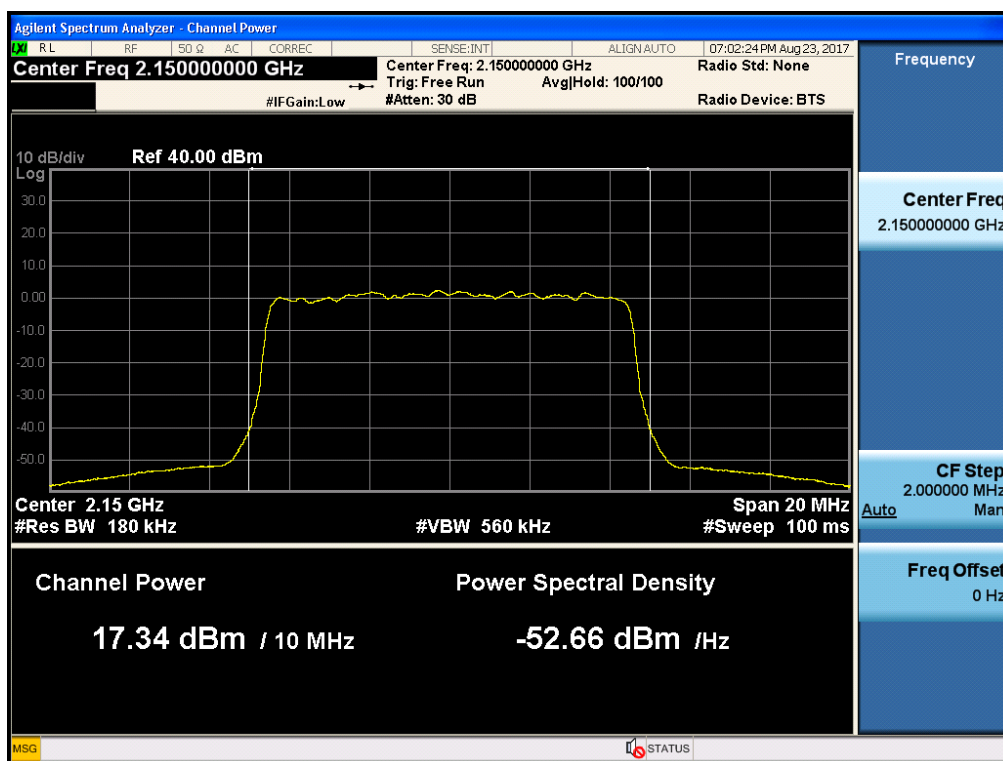
(QPSK Low Channel)



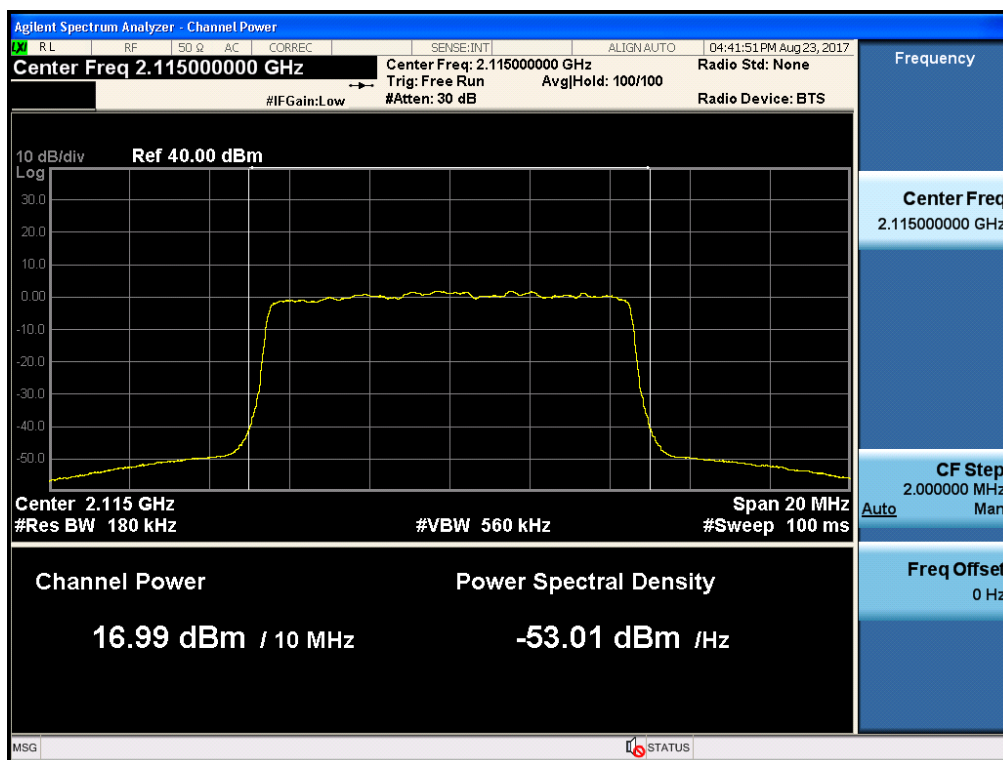
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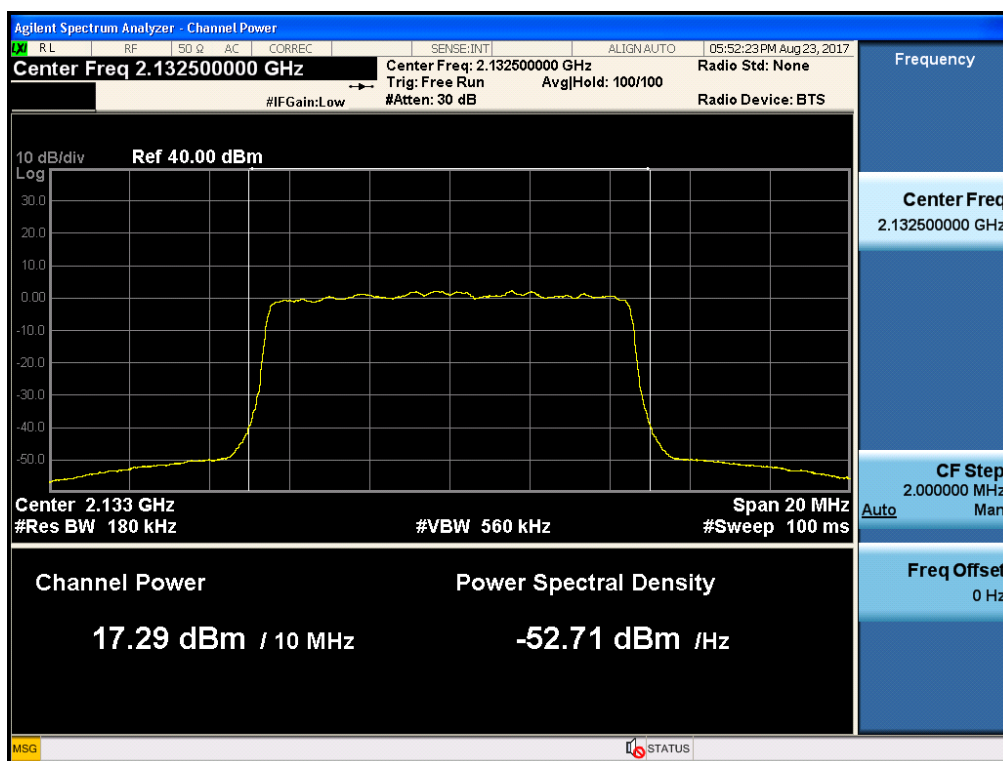
(QPSK High Channel)



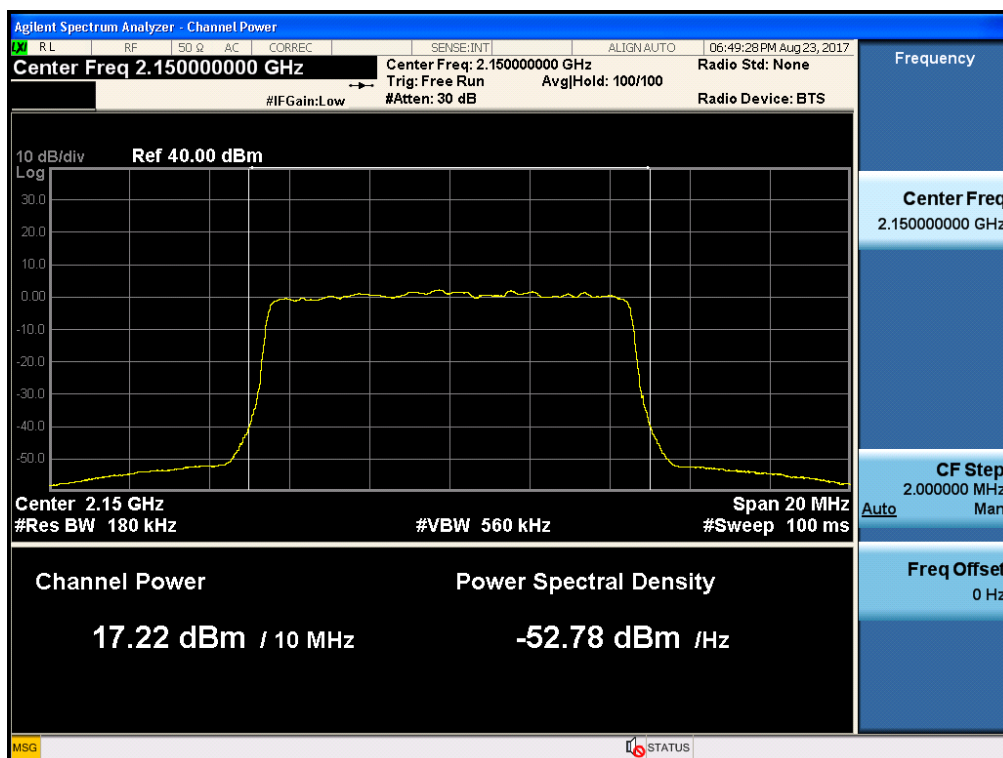
(16QAM Low Channel)



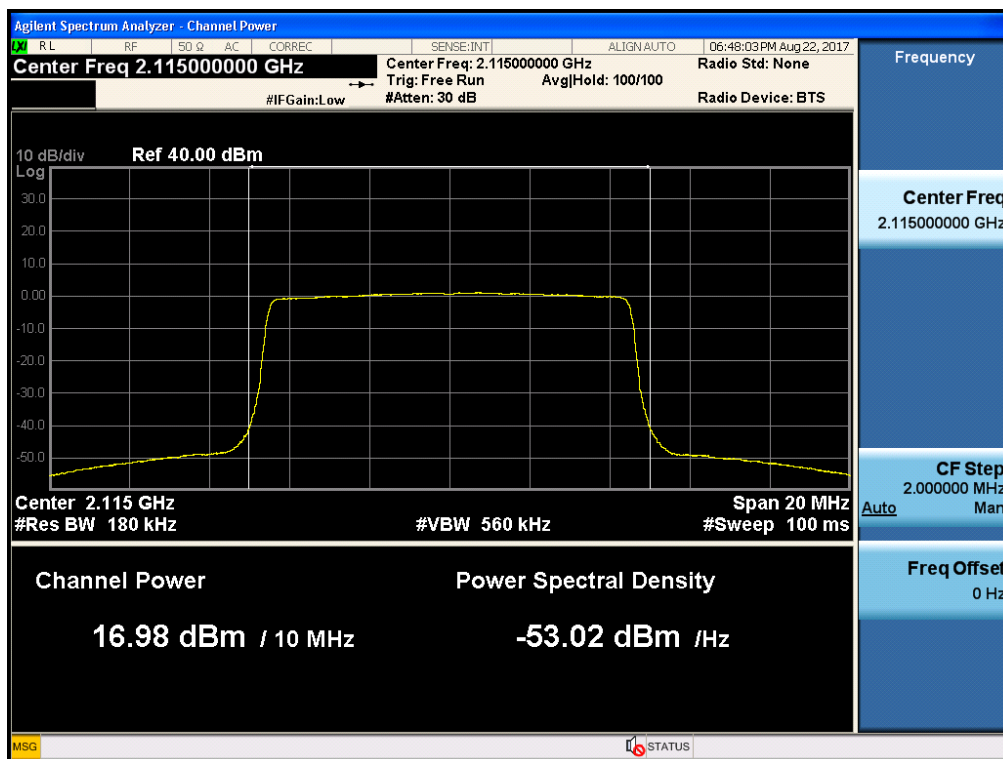
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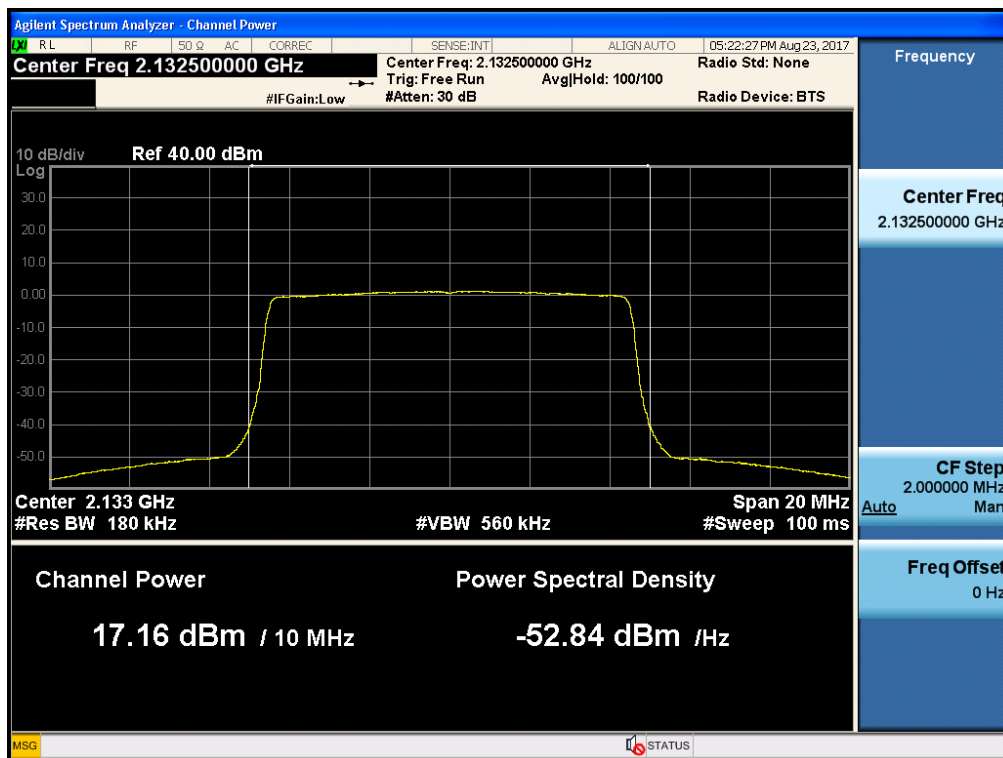
(16QAM High Channel)



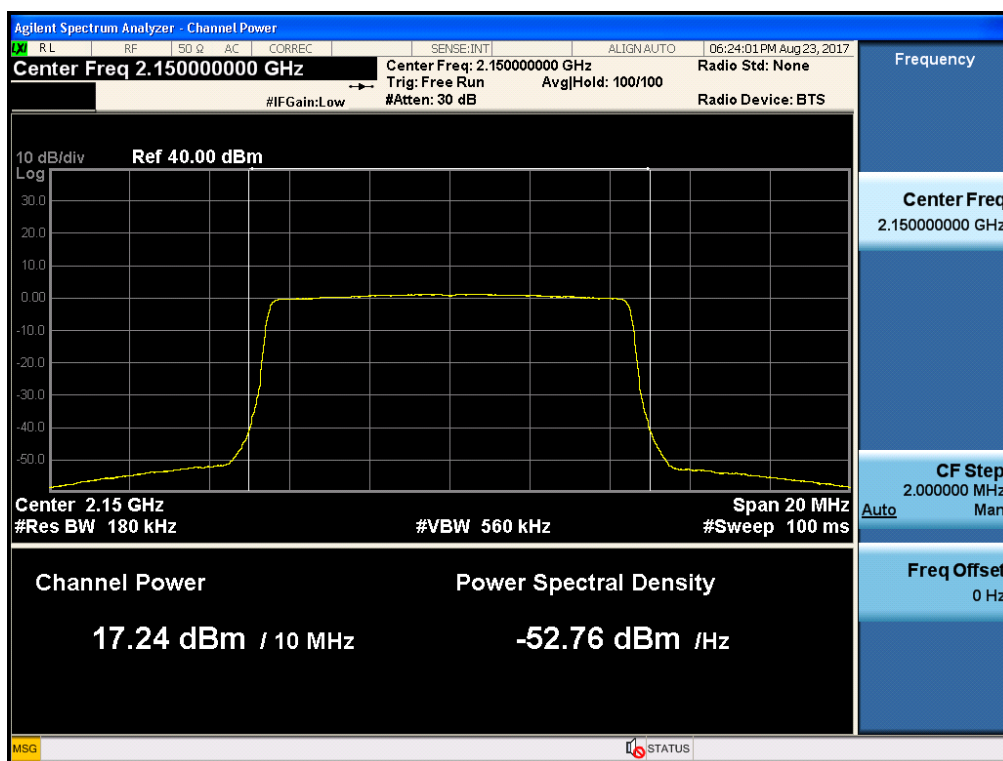
(64QAM Low Channel)



(64QAM Middle Channel)

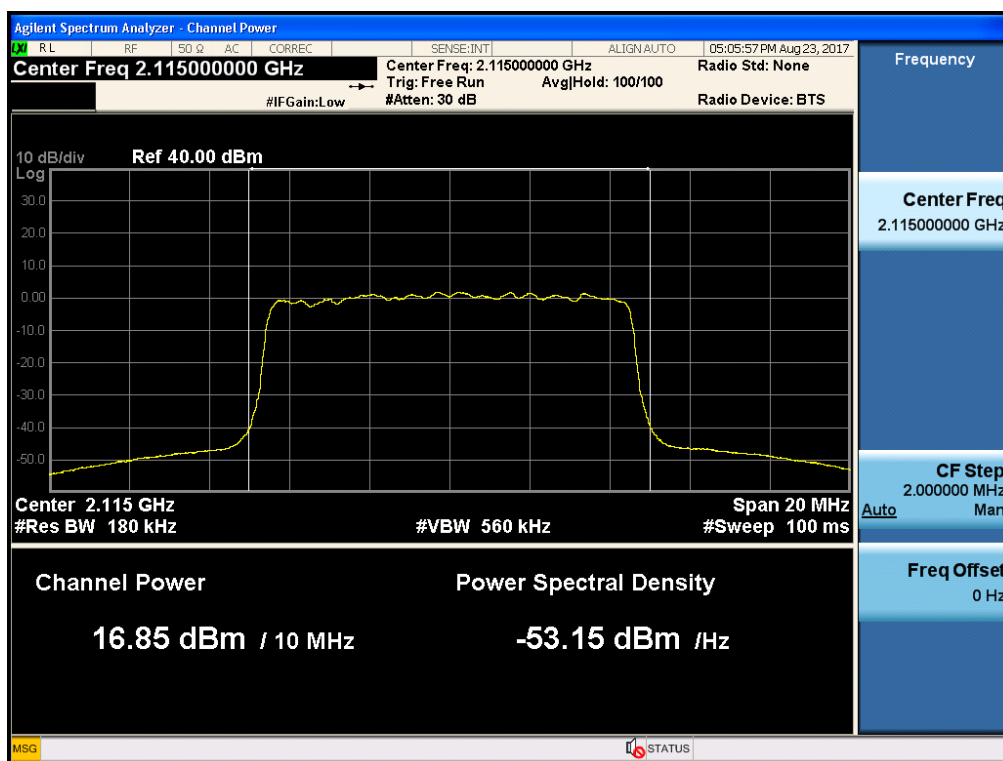


(64QAM High Channel)

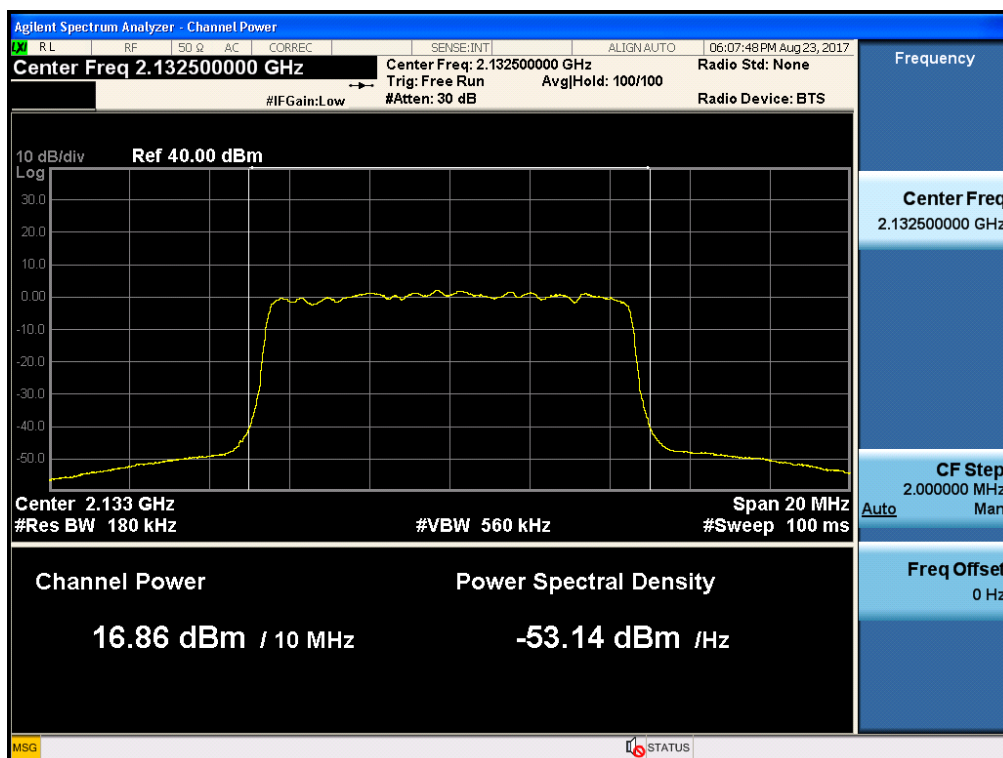


Plot Data for Output Port 2

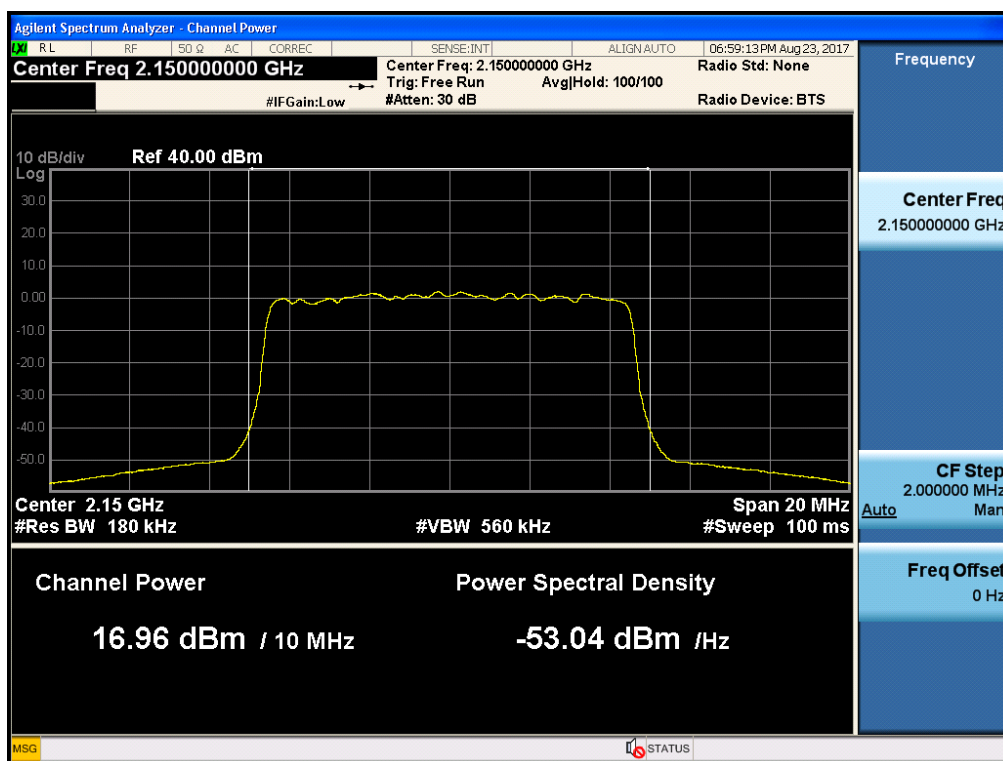
(QPSK Low Channel)



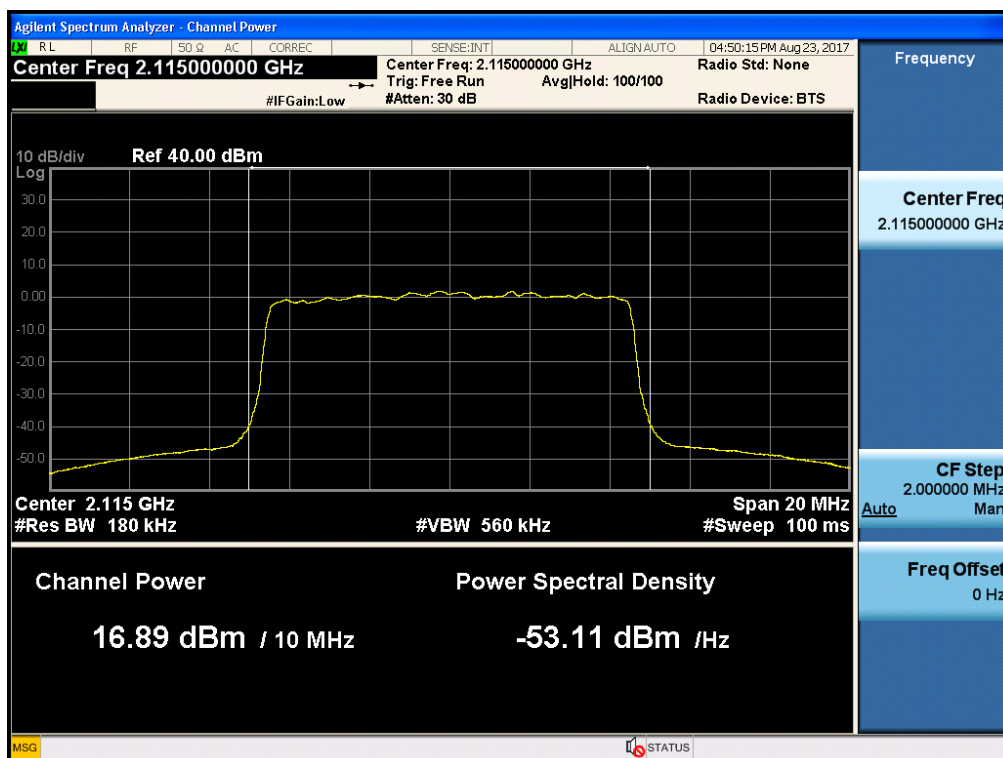
(QPSK Middle Channel)



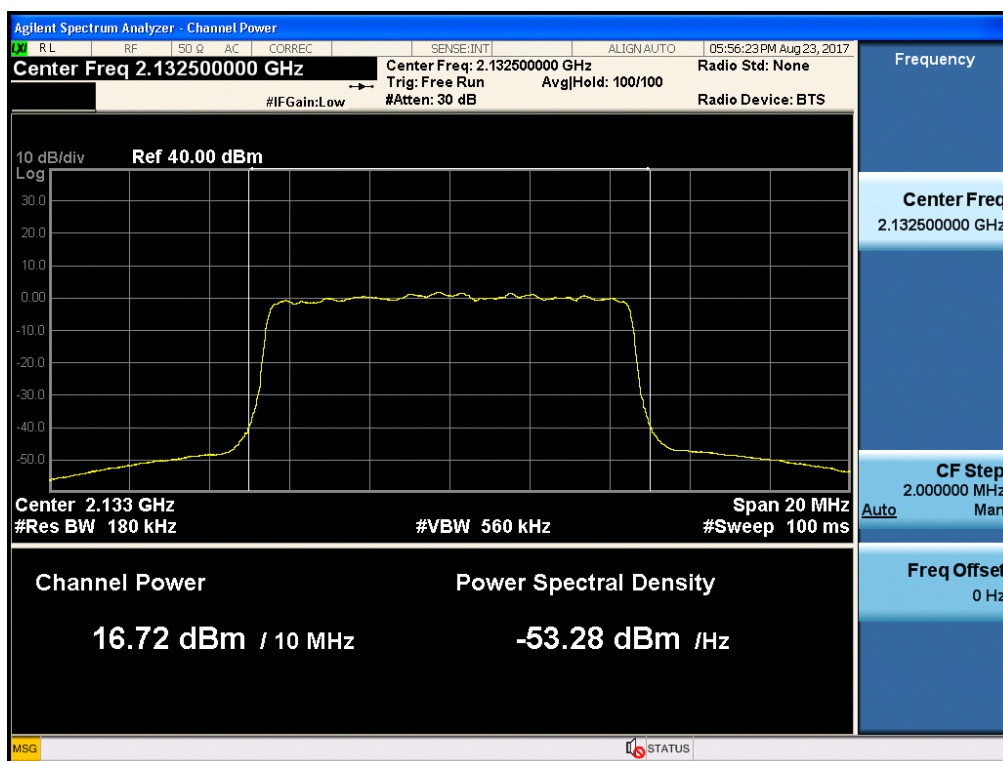
(QPSK High Channel)



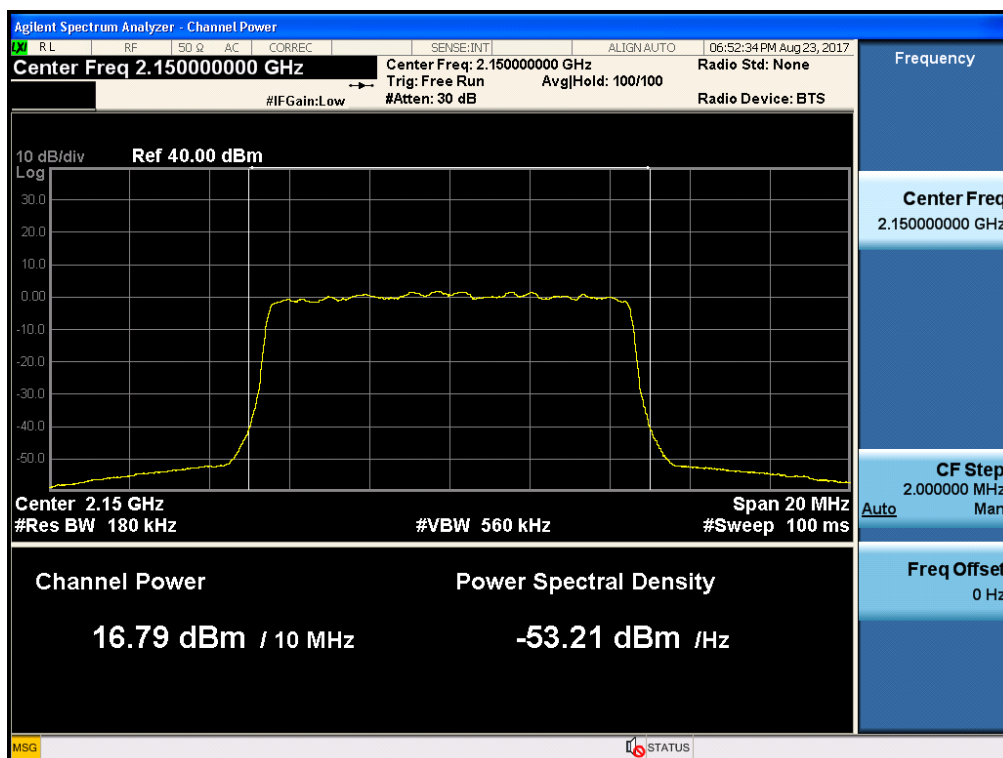
(16QAM Low Channel)



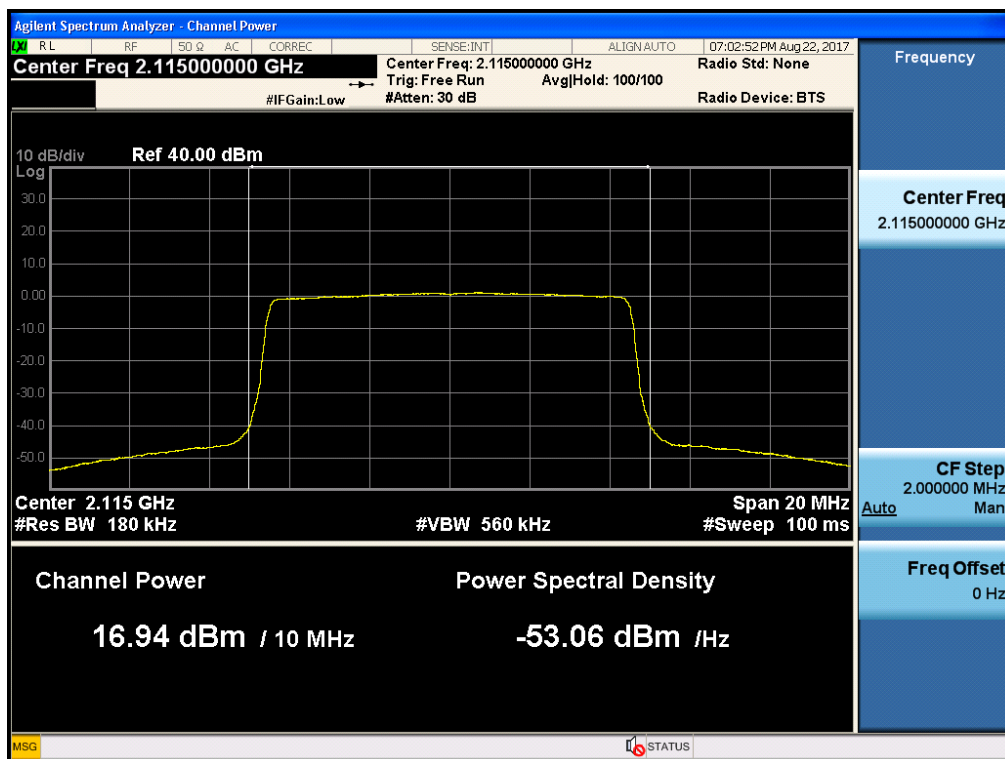
(16QAM Middle Channel)



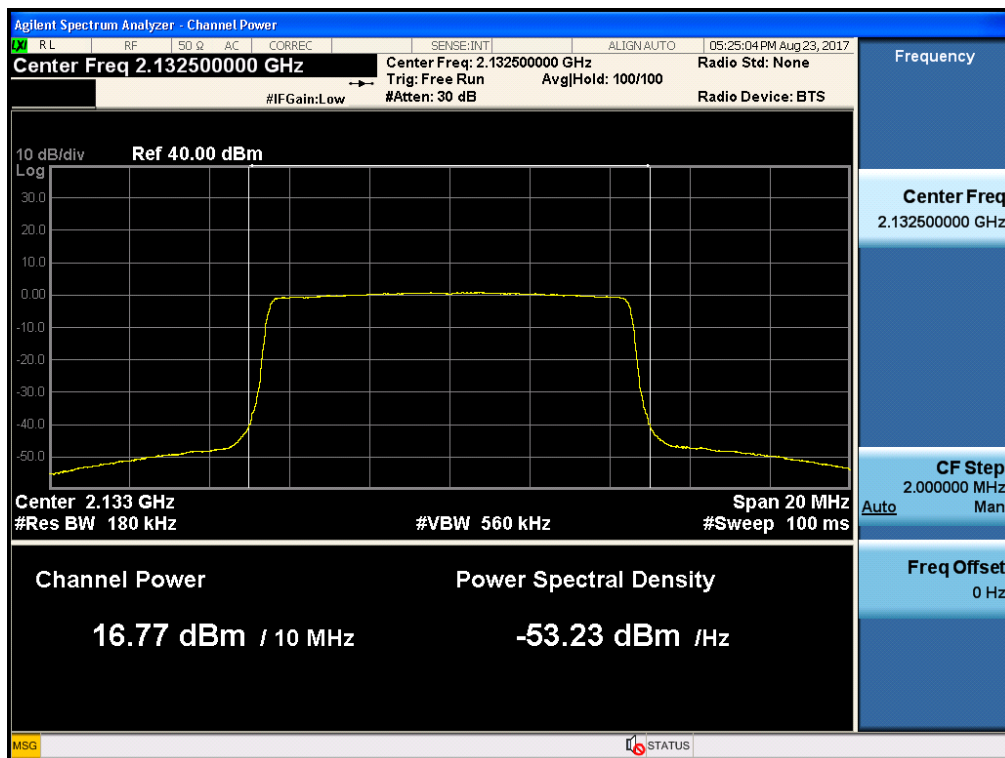
(16QAM High Channel)



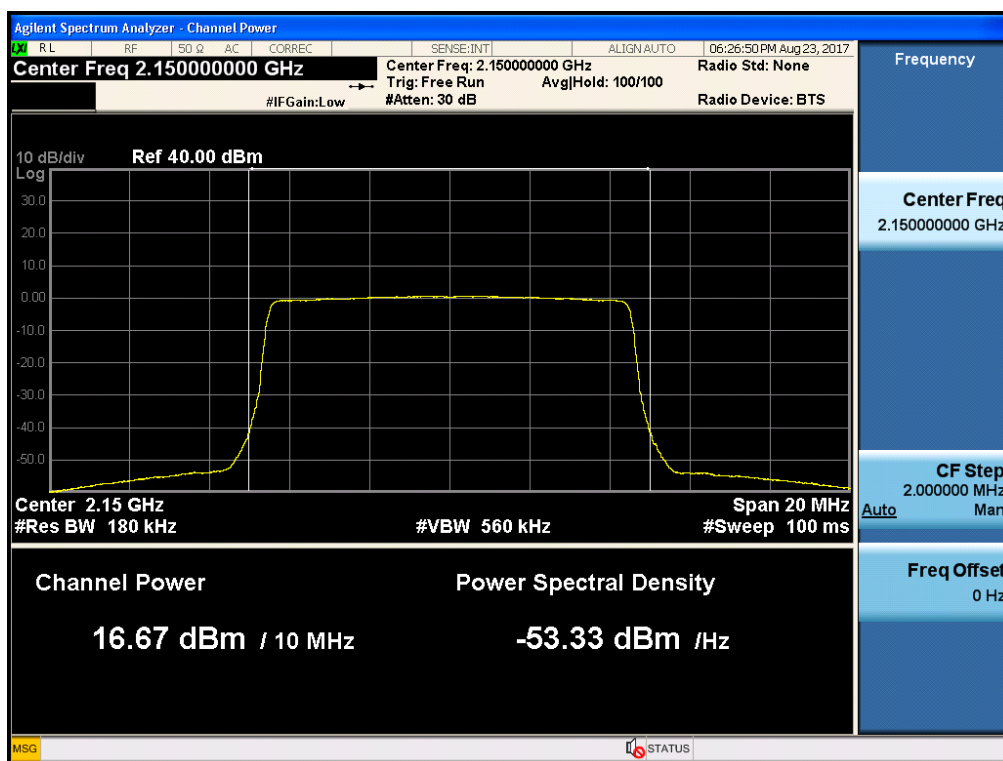
(64QAM Low Channel)



(64QAM Middle Channel)



(64QAM High Channel)



LTE Band 4 (15 MHz)

Test Data at Output Port 1

Frequency (MHz)	Output Power					
	QPSK		16QAM		64QAM	
	dBm	mW	dBm	mW	dBm	mW
2117.50	16.98	49.89	16.39	43.55	16.91	49.09
2132.50	17.30	53.70	17.02	50.35	16.49	44.57
2147.50	17.20	52.48	16.70	46.77	17.09	51.17

Test Data at Output Port 2

Frequency (MHz)	Output Power					
	QPSK		16QAM		64QAM	
	dBm	mW	dBm	mW	dBm	mW
2117.50	16.61	45.81	16.46	44.26	16.63	46.03
2132.50	16.69	46.67	16.90	48.98	16.58	45.50
2147.50	16.74	47.21	16.42	43.85	16.56	45.29

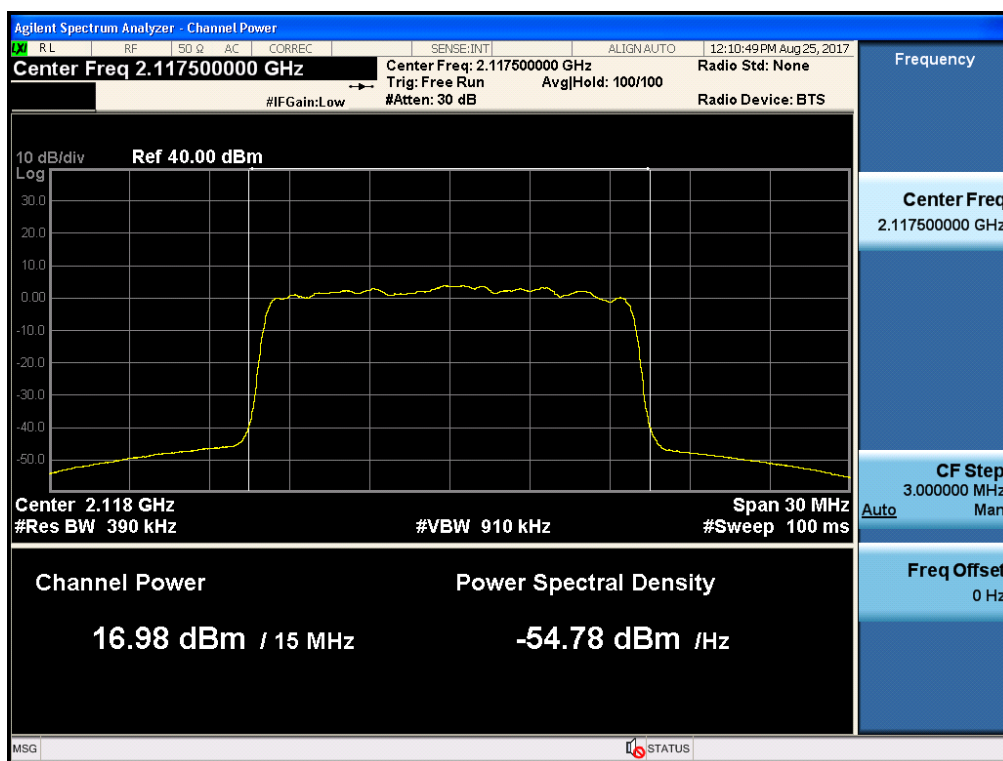
Sum Data of Port 1 and Port 2

Frequency (MHz)	Output Power		
	QPSK	16QAM	64QAM
	mW	mW	mW
2117.50	95.70	87.81	95.12
2132.50	100.37	99.33	90.06
2147.50	99.69	90.63	96.46

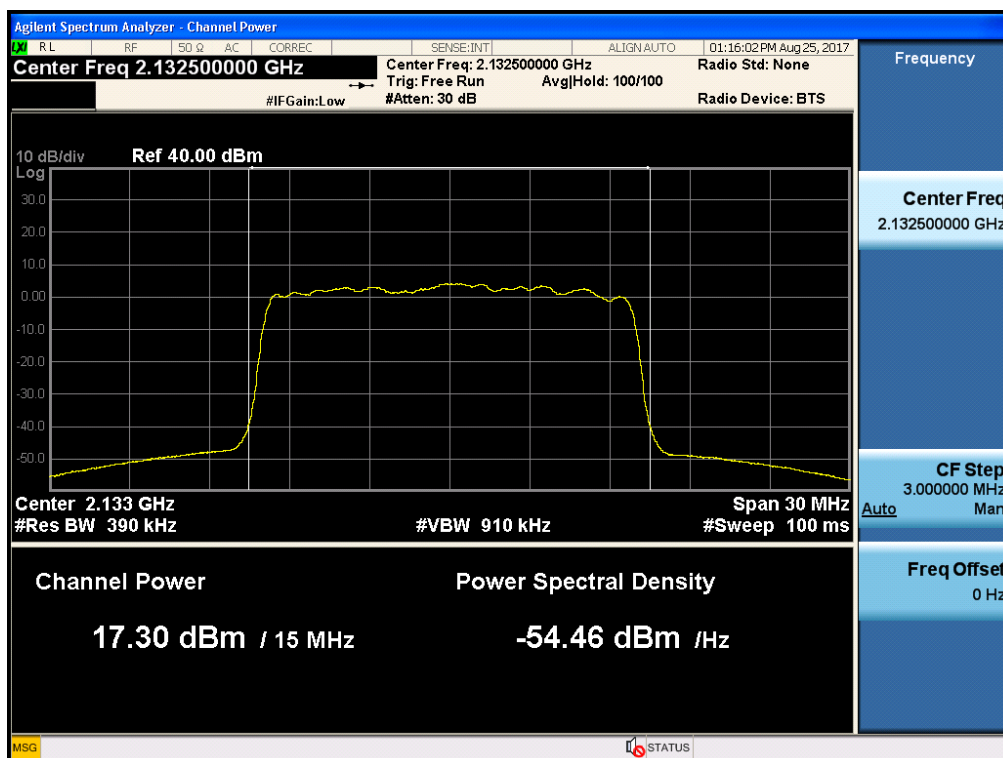
LTE Band 4 (15 MHz)

Plot Data for Output Port 1

(QPSK Low Channel)



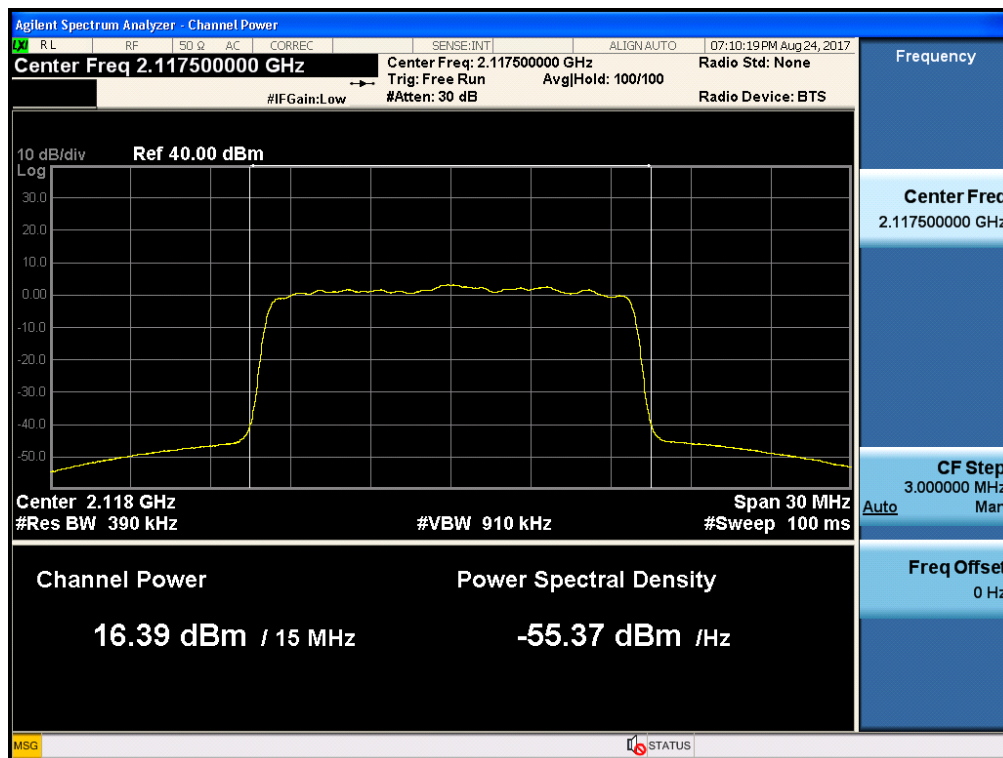
(QPSK Middle Channel)



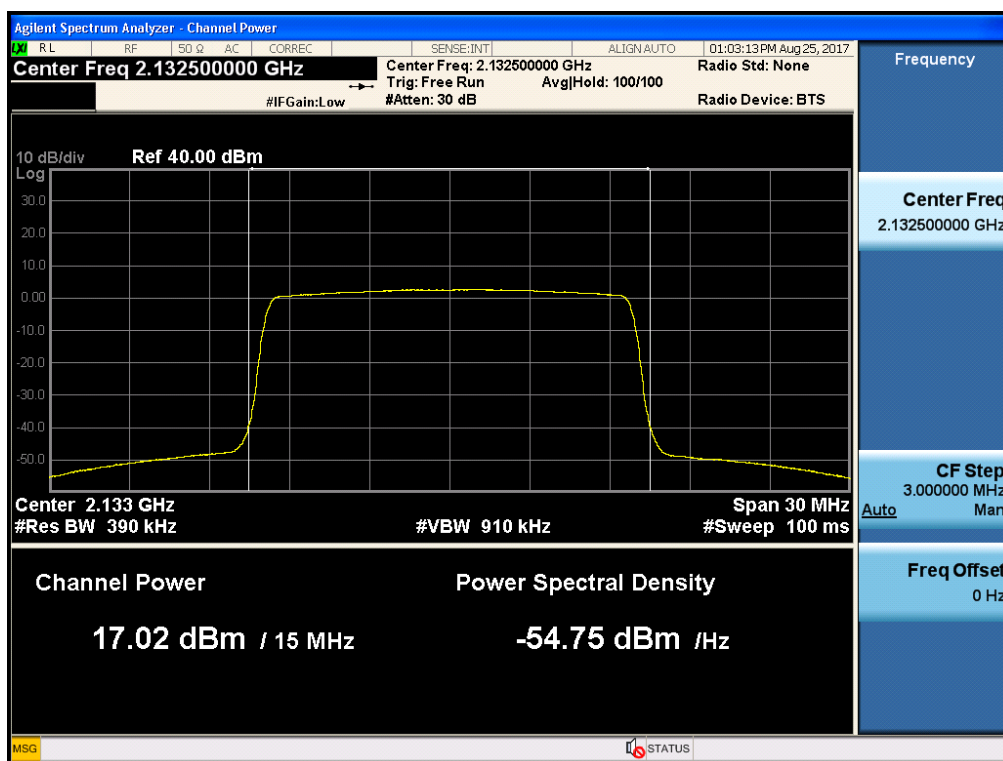
(QPSK High Channel)



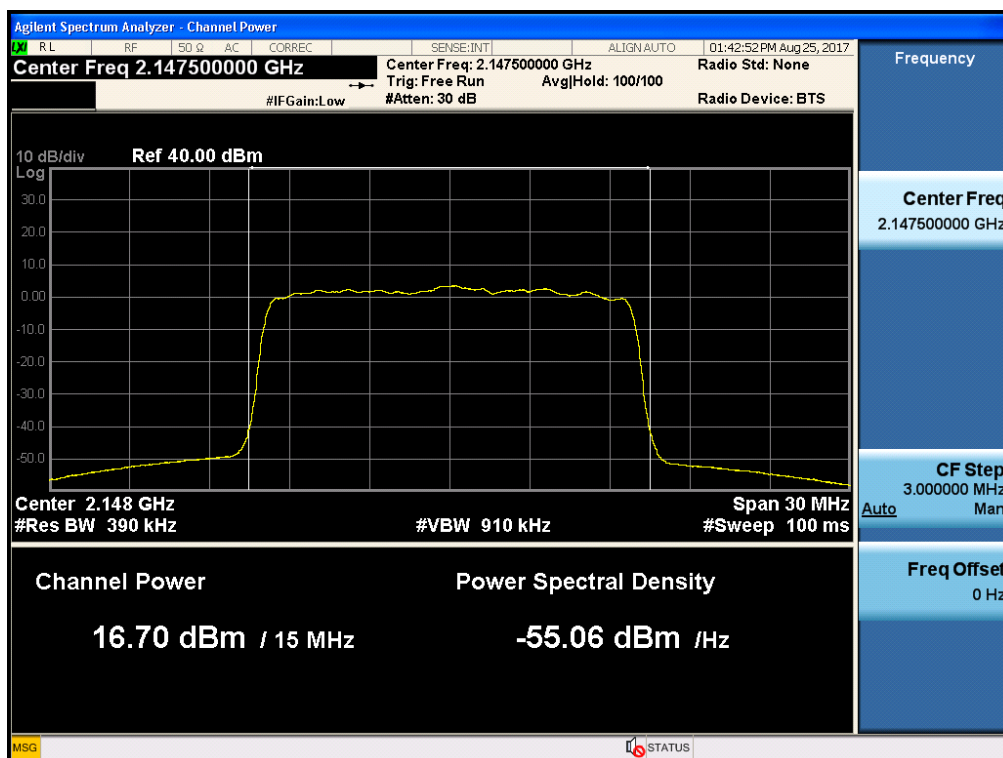
(16QAM Low Channel)



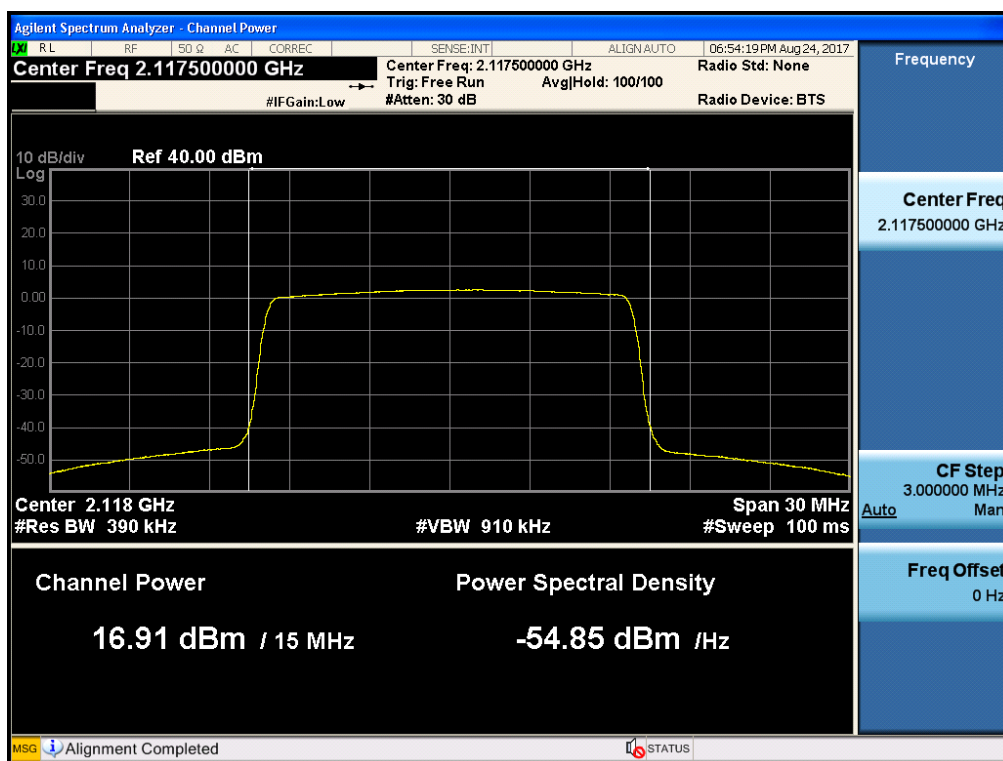
(16QAM Middle Channel)



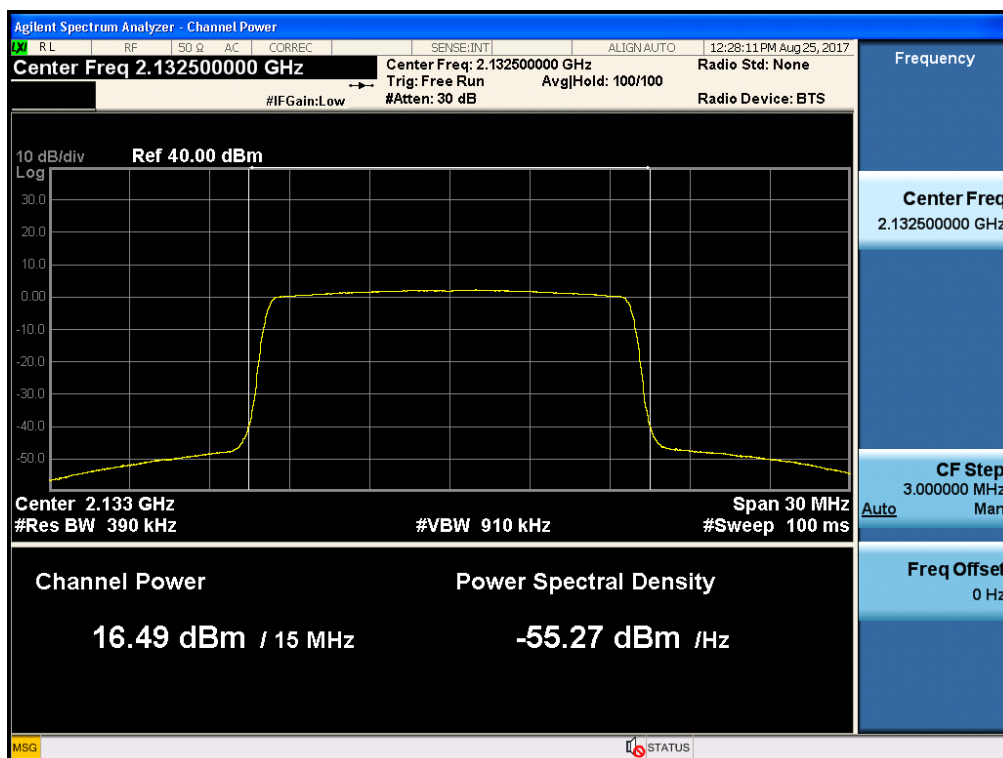
(16QAM High Channel)



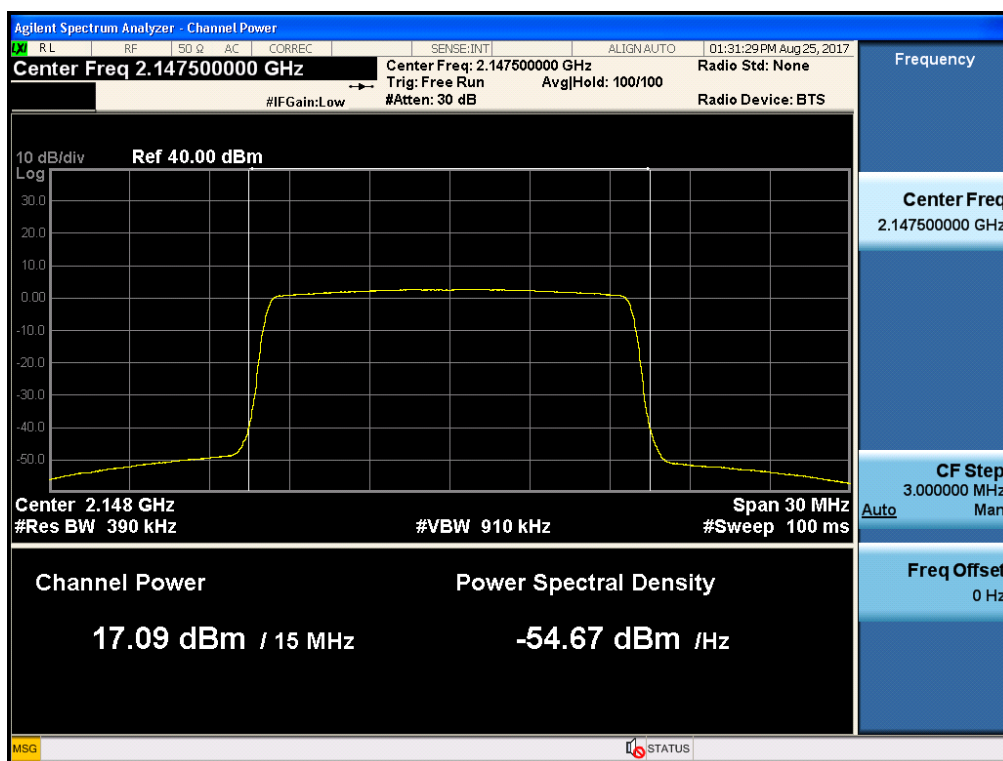
(64QAM Low Channel)



(64QAM Middle Channel)

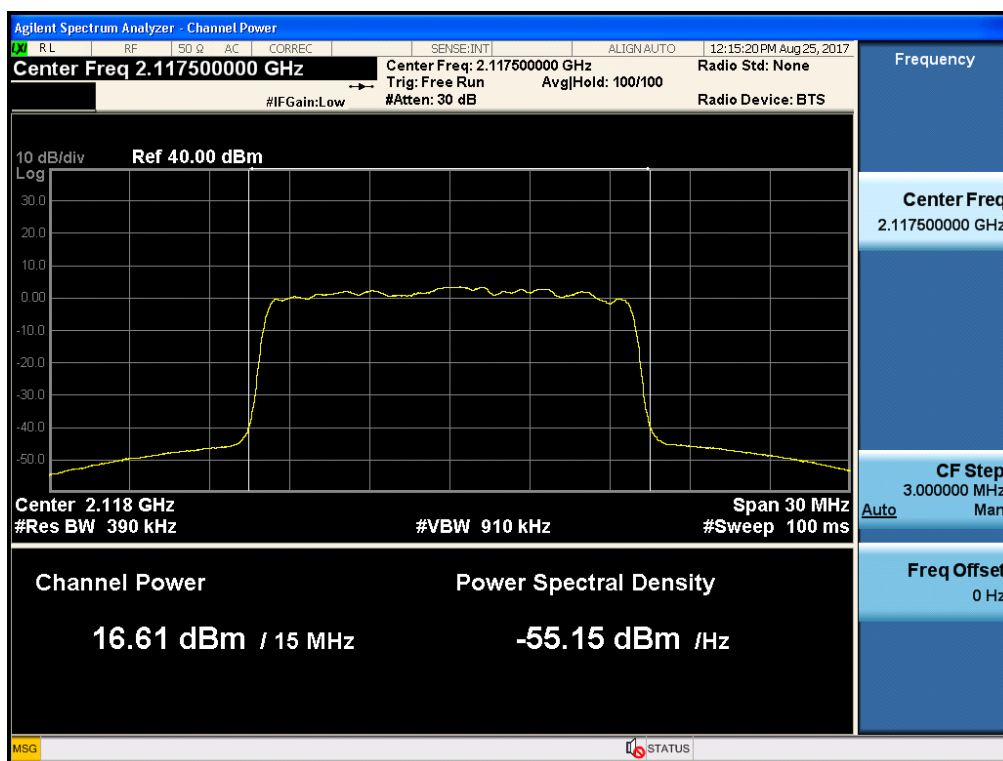


(64QAM High Channel)

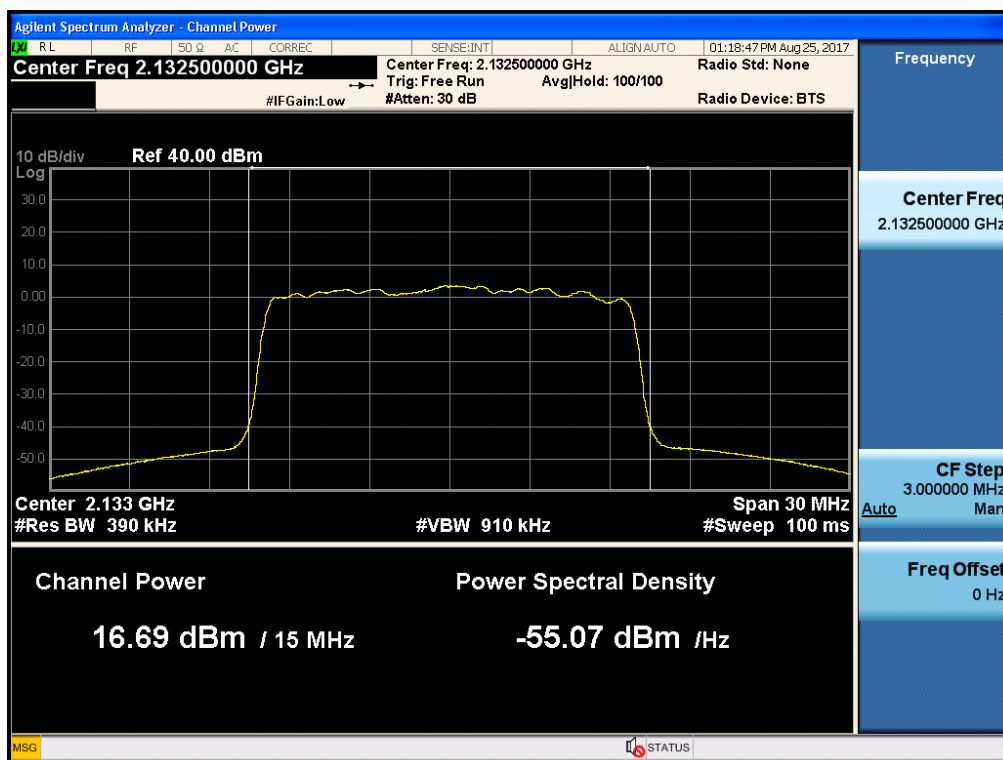


Plot Data for Output Port 2

(QPSK Low Channel)



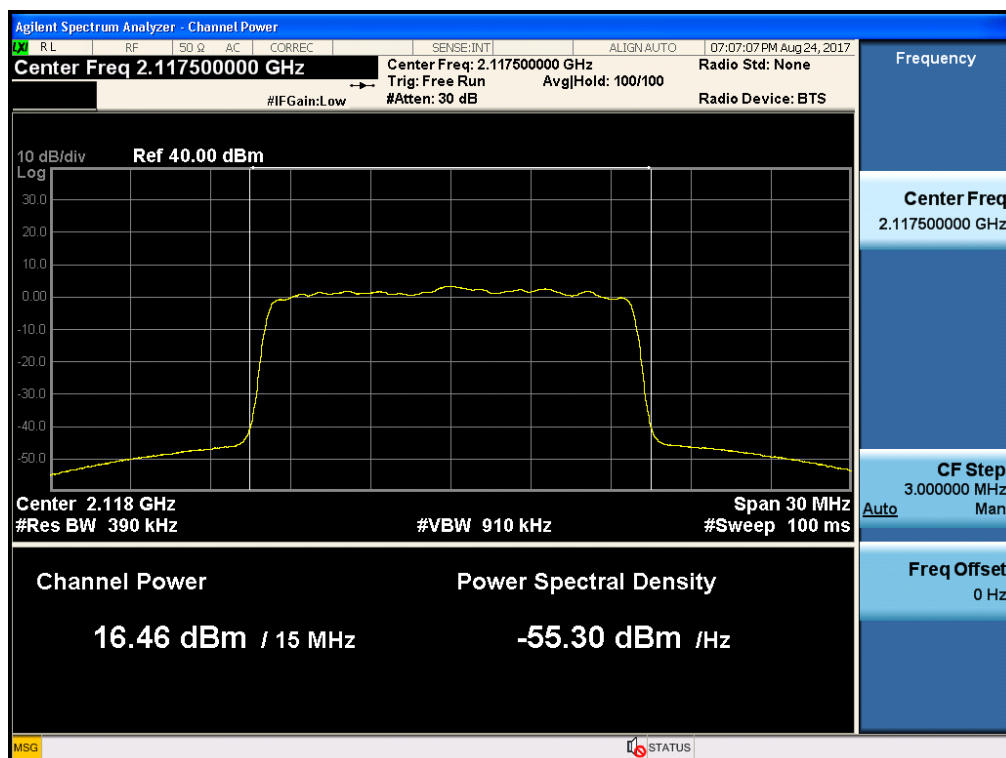
(QPSK Middle Channel)



(QPSK High Channel)



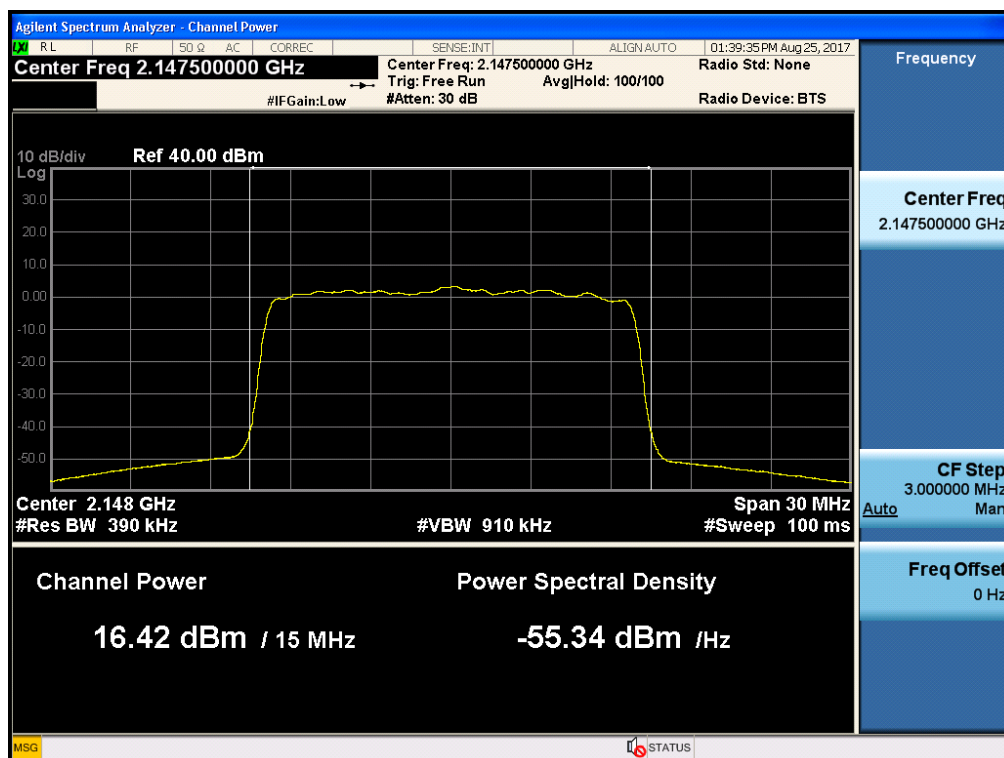
(16QAM Low Channel)



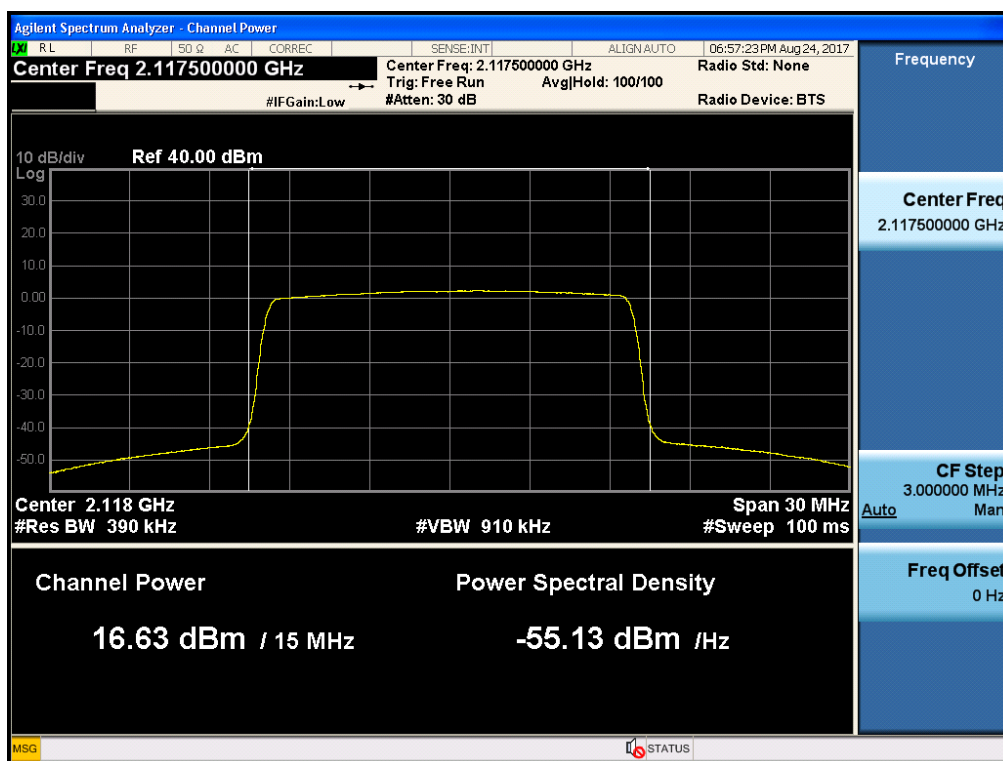
(16QAM Middle Channel)



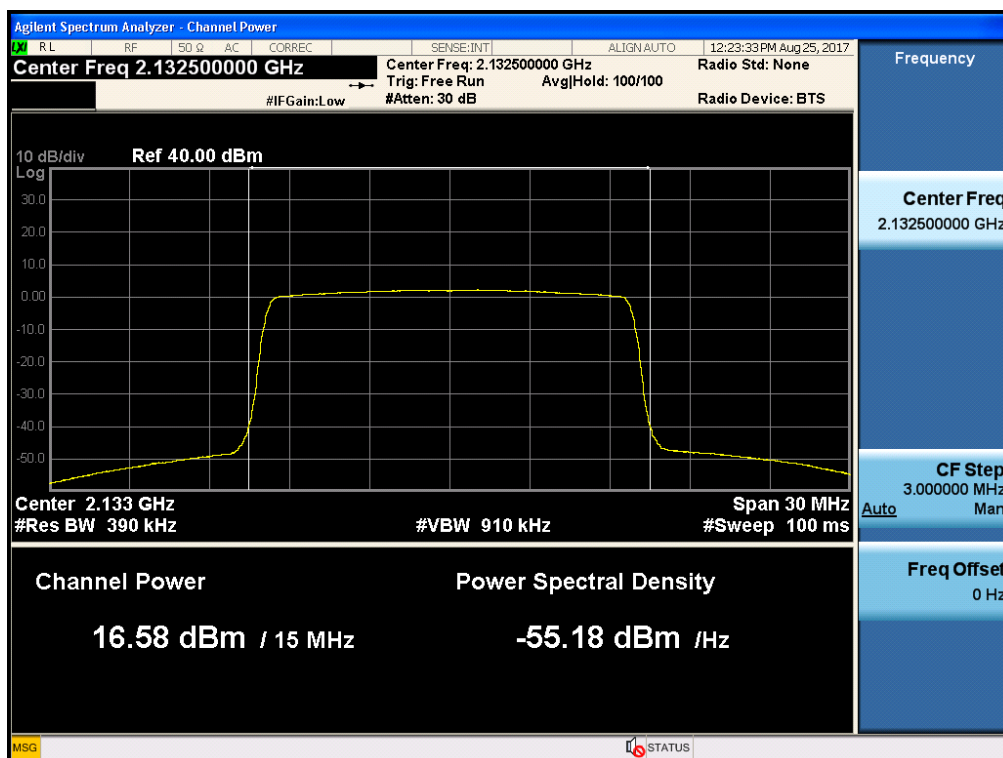
(16QAM High Channel)



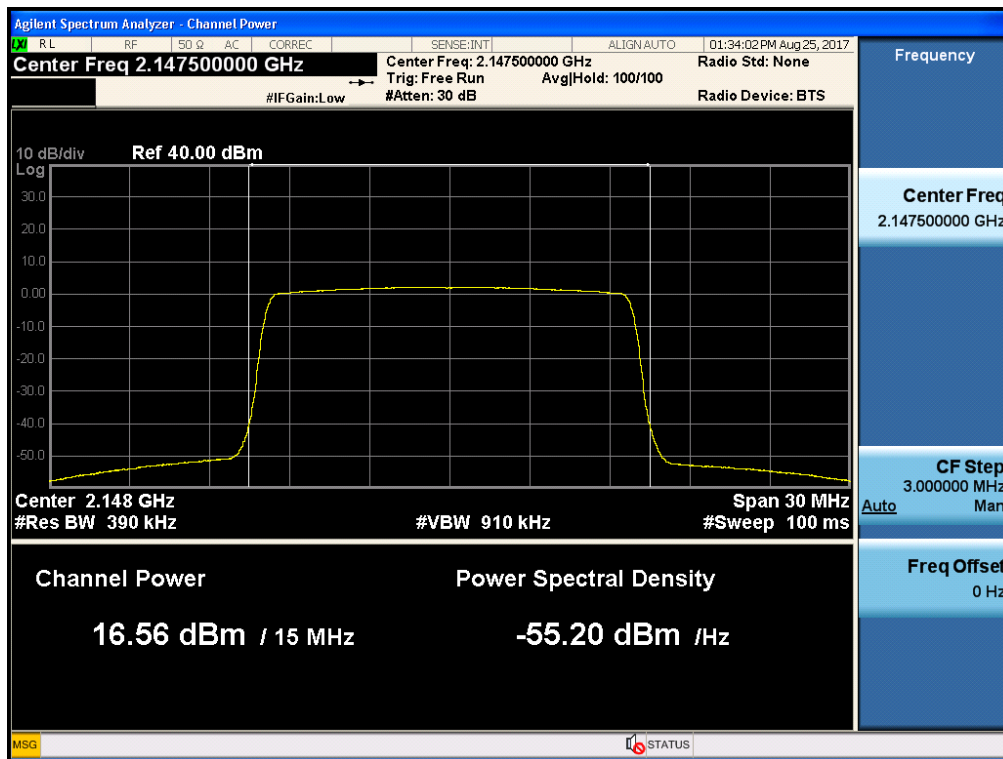
(64QAM Low Channel)



(64QAM Middle Channel)



(64QAM High Channel)



LTE Band 4 (20 MHz)

Test Data at Output Port 1

Frequency (MHz)	Output Power					
	QPSK		16QAM		64QAM	
	dBm	mW	dBm	mW	dBm	mW
2120.00	17.18	52.24	17.28	53.46	17.27	53.33
2132.50	17.20	52.48	16.99	50.00	16.96	49.66
2145.00	17.18	52.24	17.19	52.36	17.24	52.97

Test Data at Output Port 2

Frequency (MHz)	Output Power					
	QPSK		16QAM		64QAM	
	dBm	mW	dBm	mW	dBm	mW
2120.00	16.83	48.19	16.91	49.09	16.69	46.67
2132.50	16.78	47.64	16.78	47.64	16.78	47.64
2145.00	16.65	46.24	16.87	48.64	17.06	50.82

Sum Data of Port 1 and Port 2

Frequency (MHz)	Output Power		
	QPSK	16QAM	64QAM
	mW	mW	mW
2120.00	100.43	102.55	100.00
2132.50	100.12	97.65	97.30
2145.00	98.48	101.00	103.78

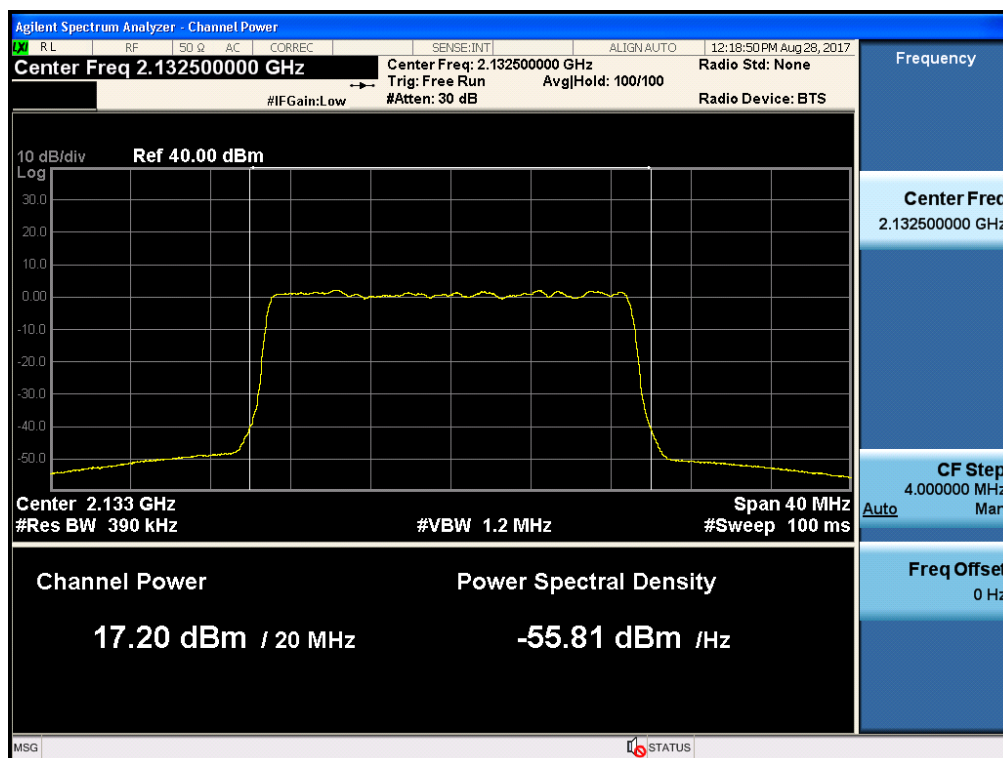
LTE Band 4 (20 MHz)

Plot Data for Output Port 1

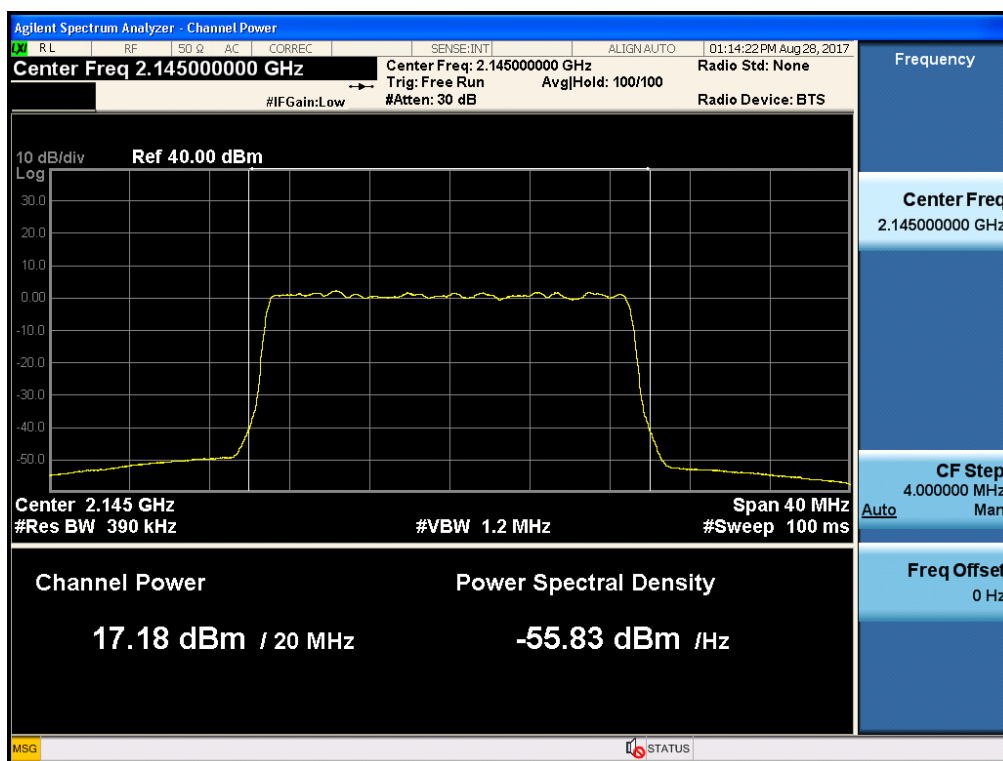
(QPSK Low Channel)



(QPSK Middle Channel)



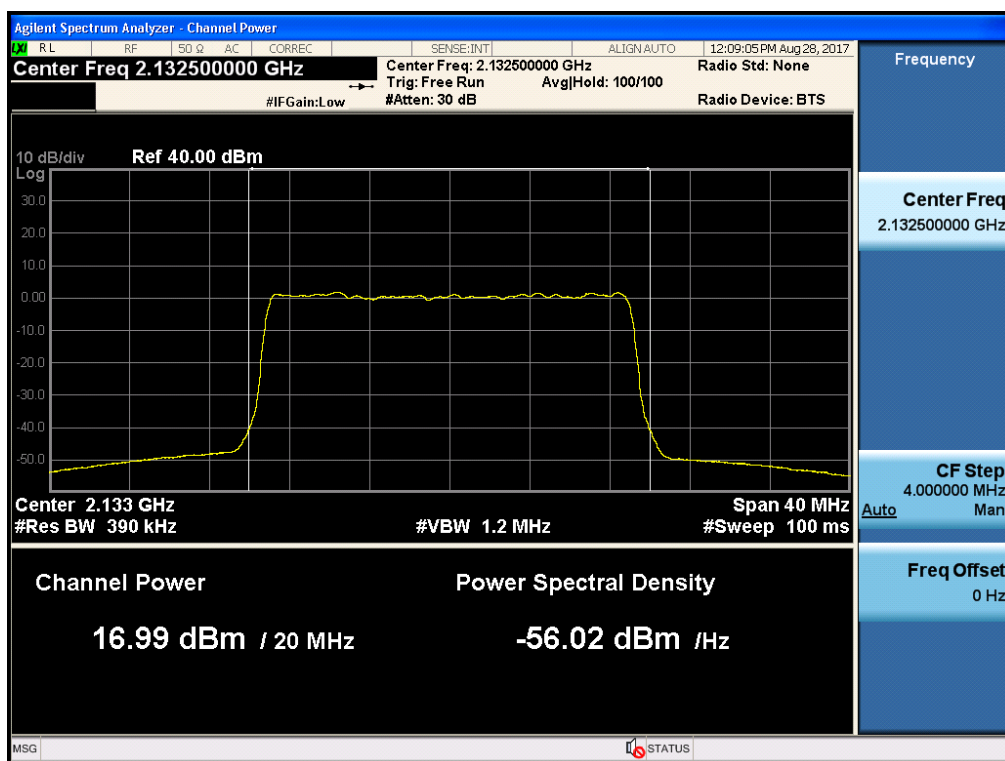
(QPSK High Channel)



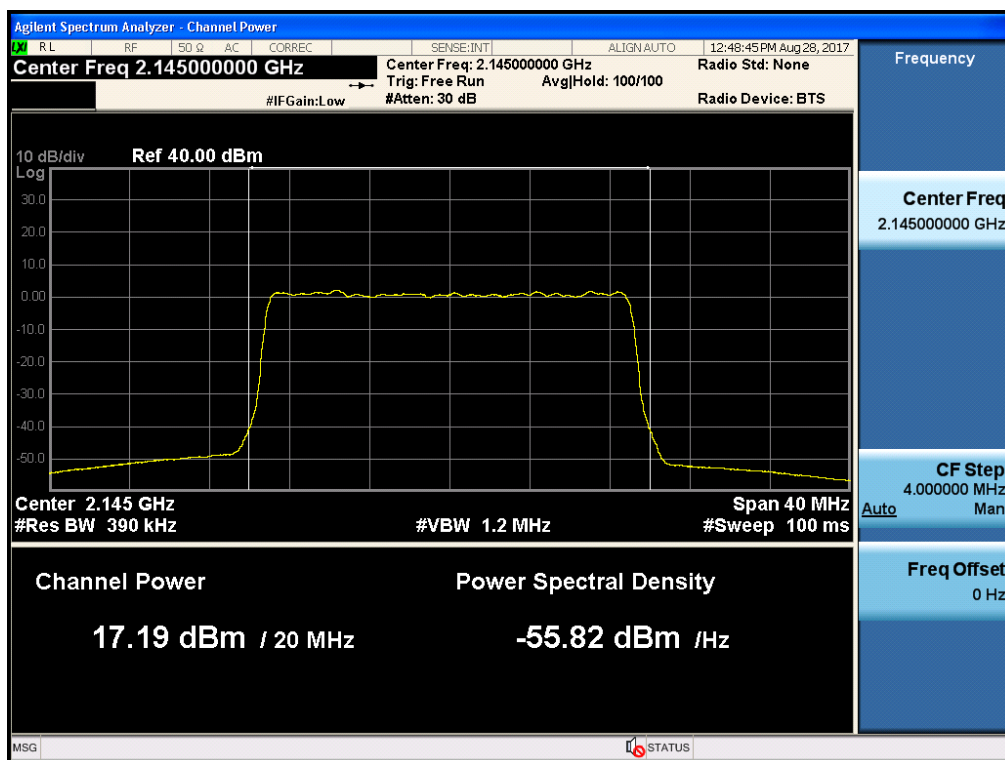
(16QAM Low Channel)



(16QAM Middle Channel)



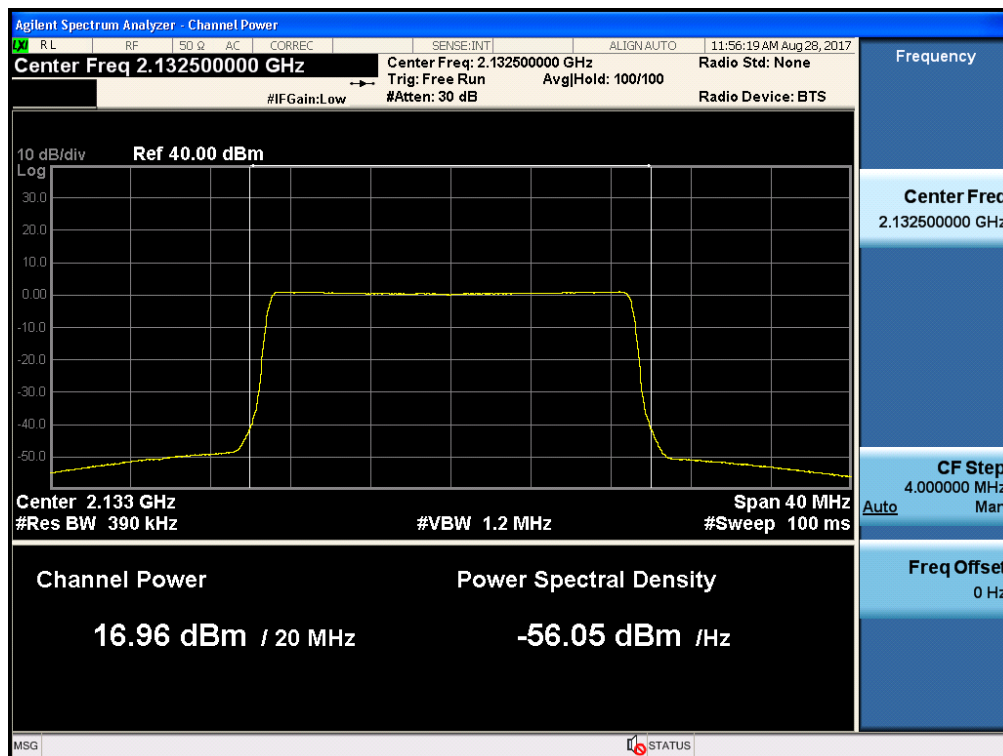
(16QAM High Channel)



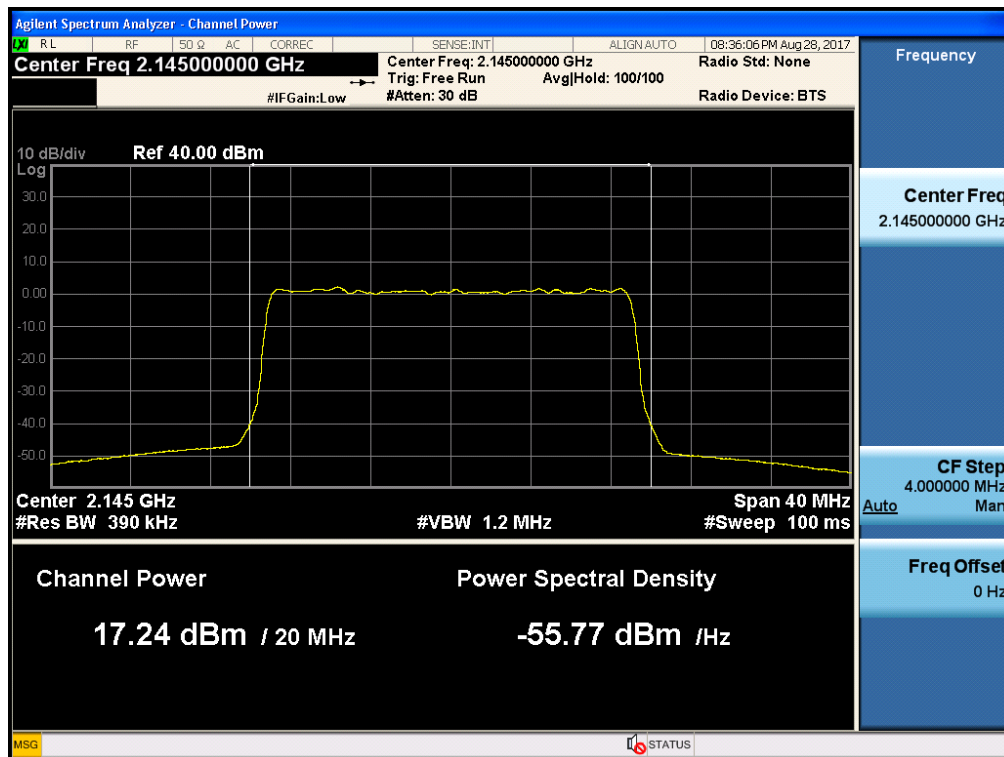
(64QAM Low Channel)



(64QAM Middle Channel)



(64QAM High Channel)

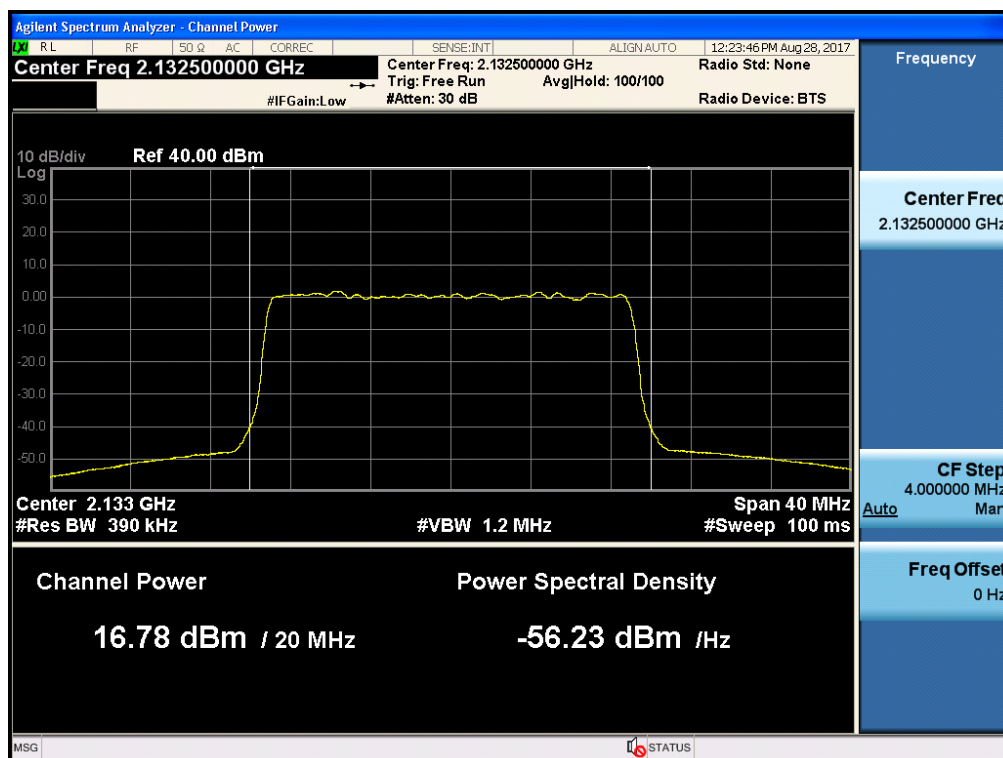


Plot Data for Output Port 2

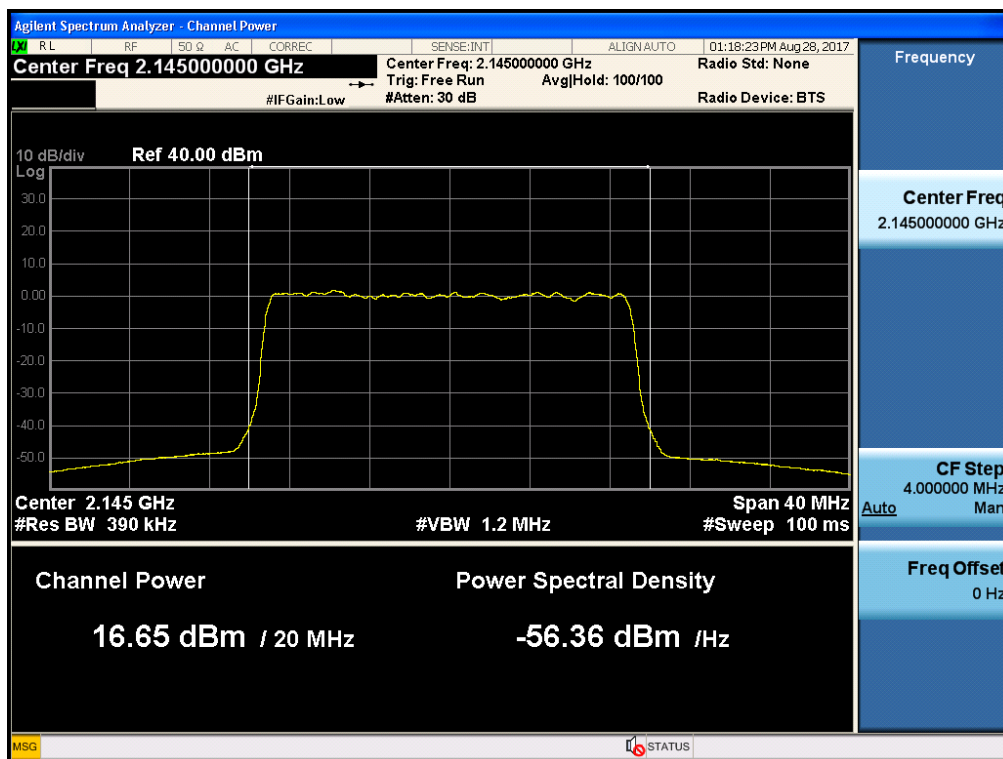
(QPSK Low Channel)



(QPSK Middle Channel)



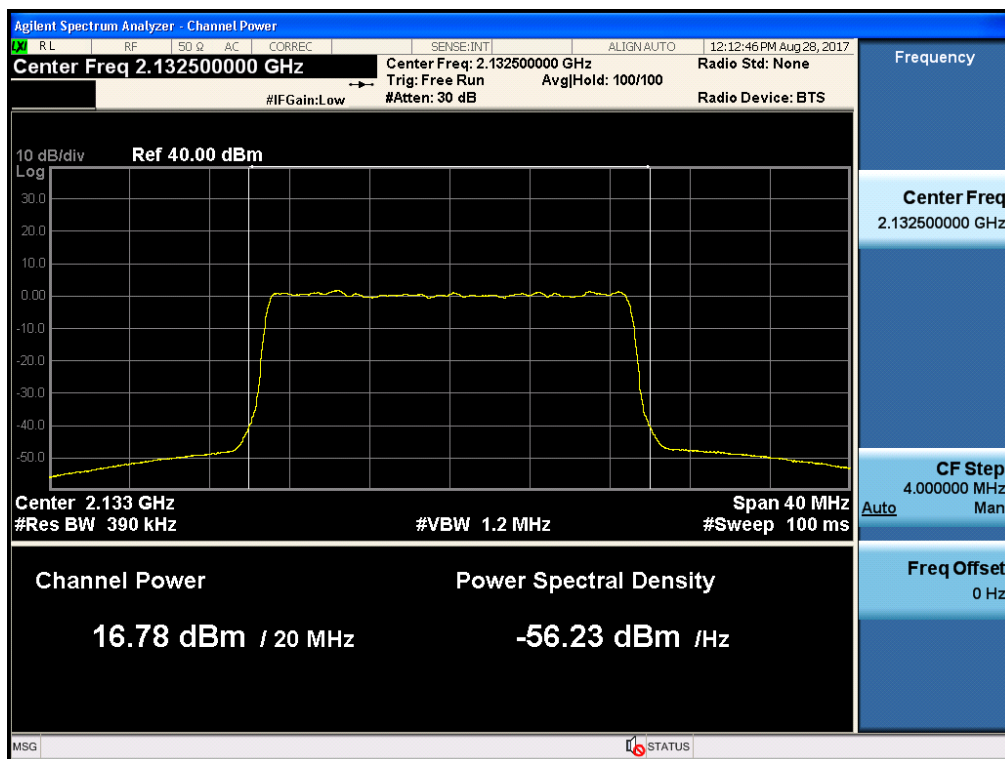
(QPSK High Channel)



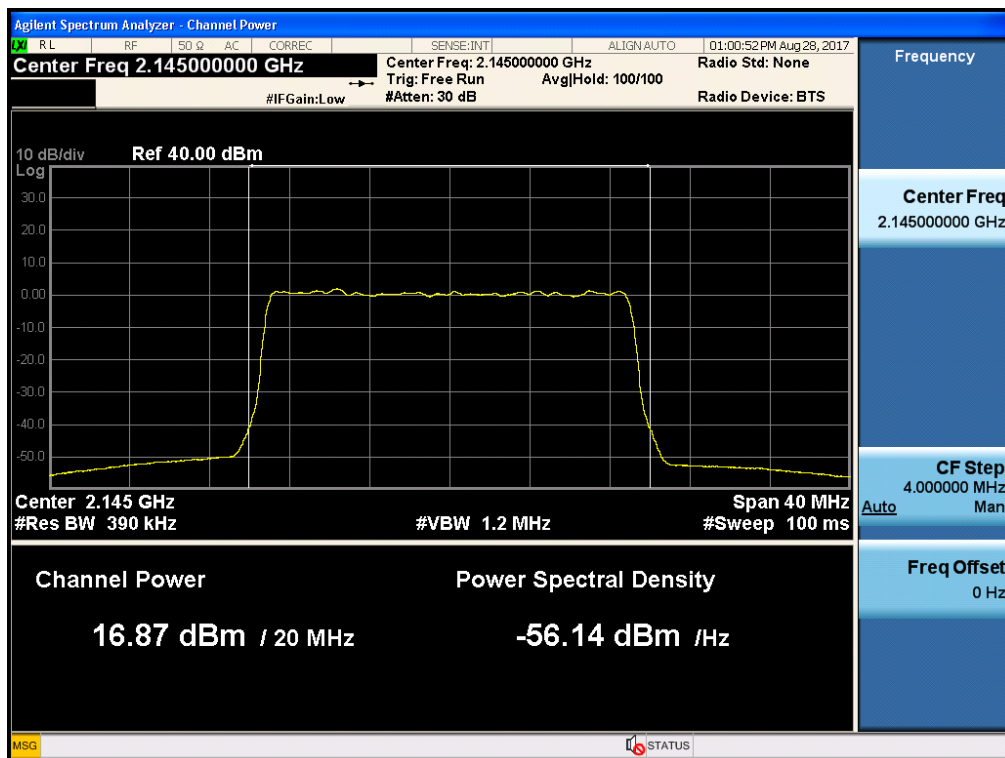
(16QAM Low Channel)



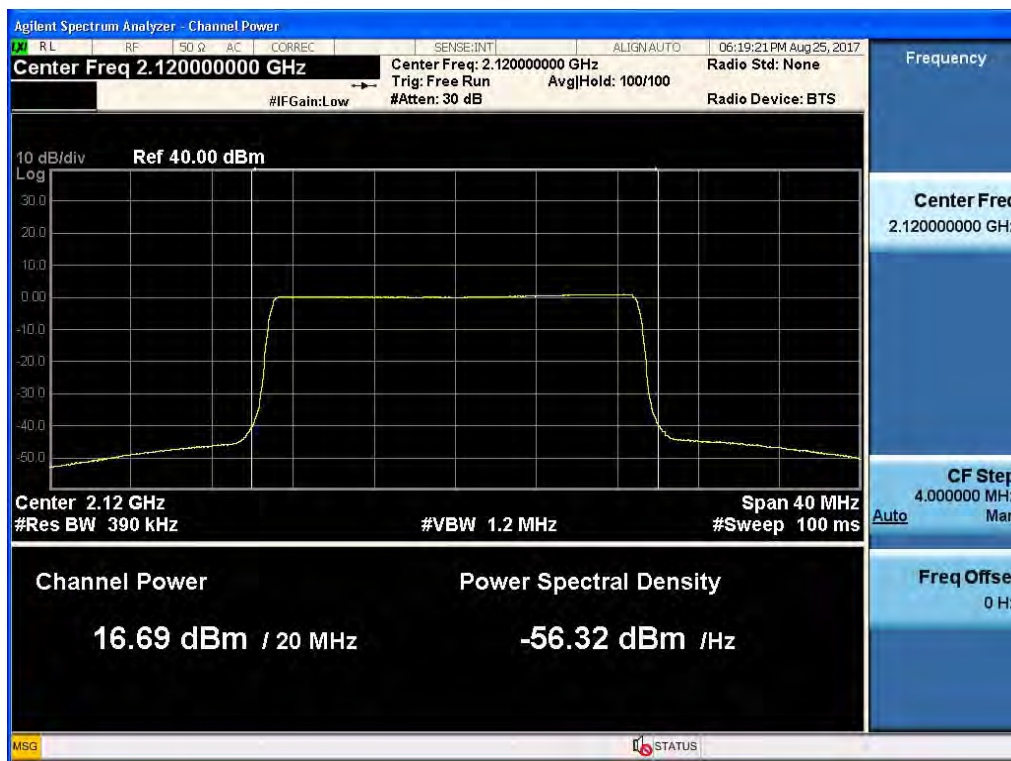
(16QAM Middle Channel)



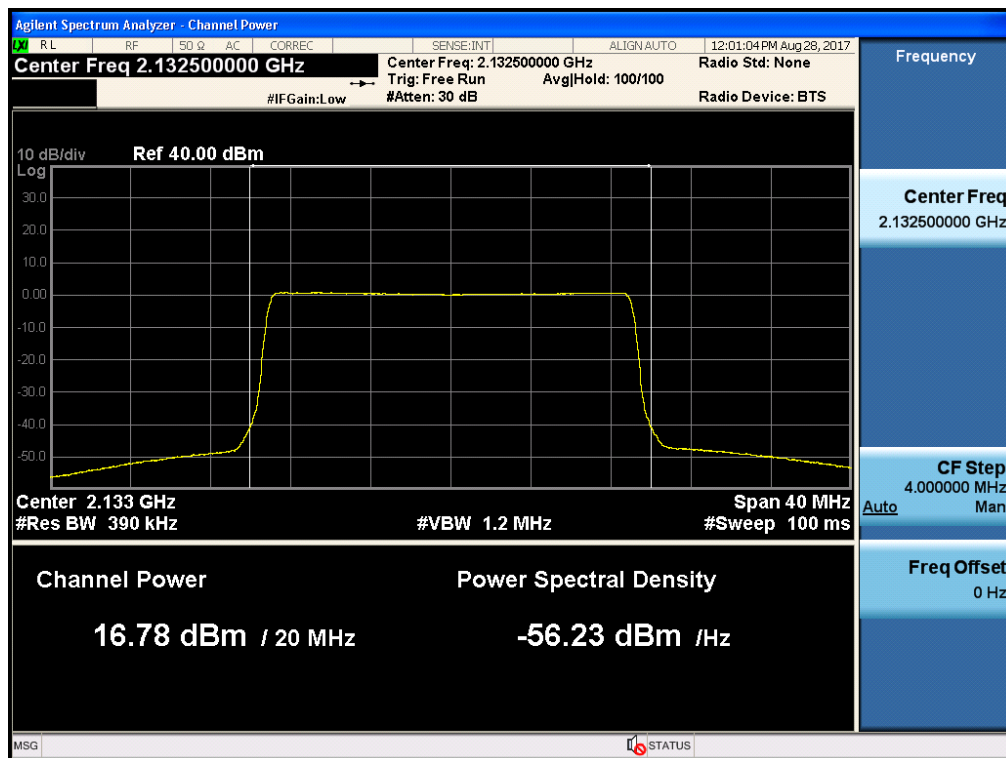
(16QAM High Channel)



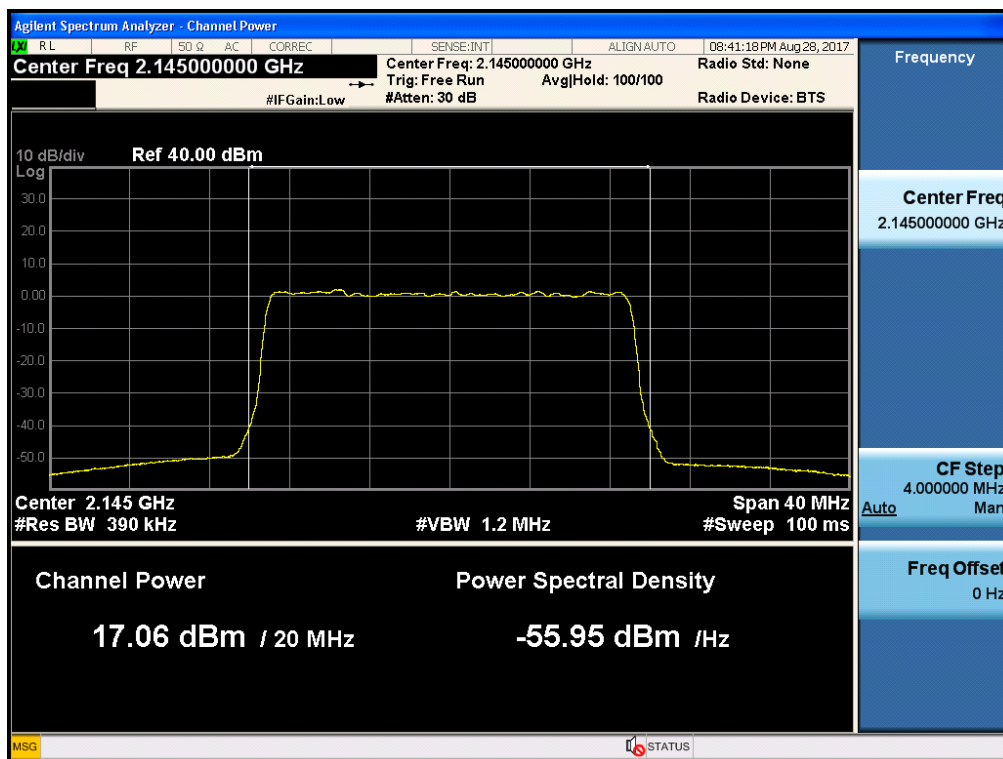
(64QAM Low Channel)



(64QAM Middle Channel)



(64QAM High Channel)



Peak-to-Average Ratio (PAR)**LTE Band 4 (10 MHz)****Test Data at Output Port 1**

Frequency (MHz)	PAR		
	QPSK	16QAM	64QAM
	dB	dB	dB
2132.50	7.59	7.59	7.62

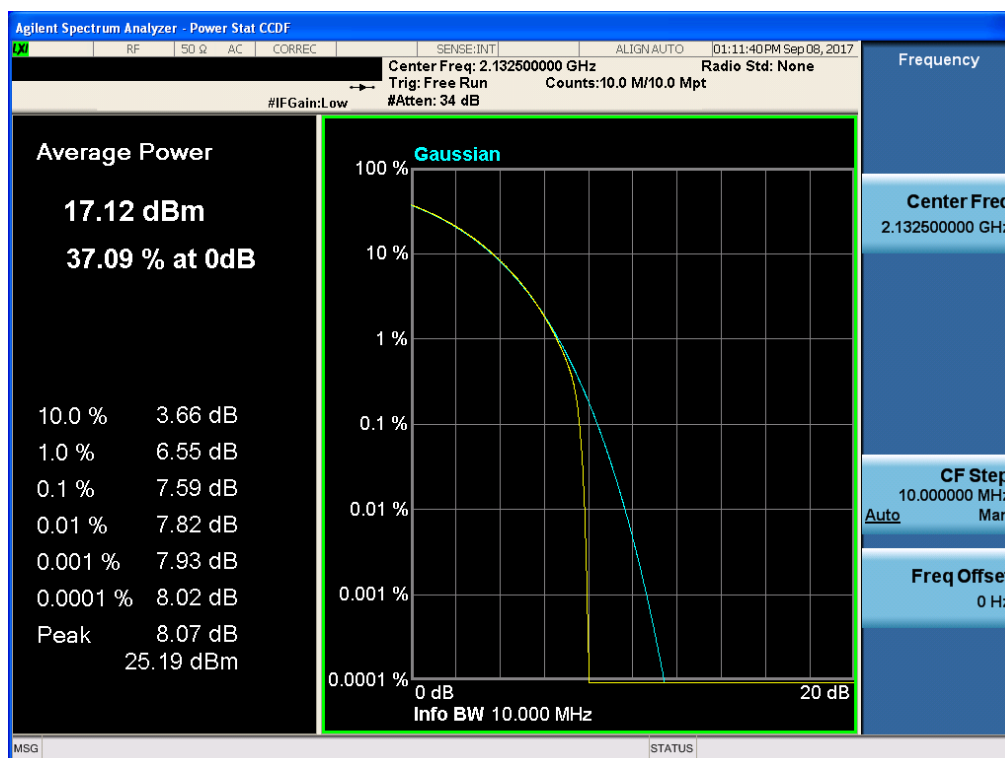
Test Data at Output Port 2

Frequency (MHz)	PAR		
	QPSK	16QAM	64QAM
	dB	dB	dB
2132.50	7.55	7.58	7.62

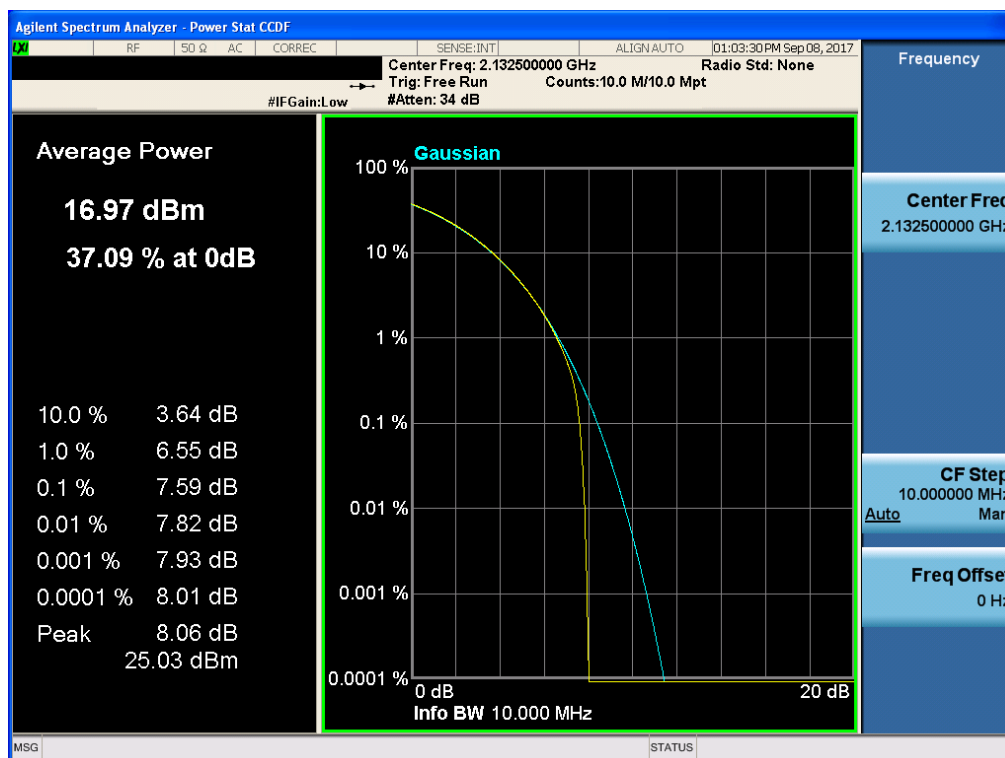
LTE Band 4 (10 MHz)

Plot Data for Output Port 1

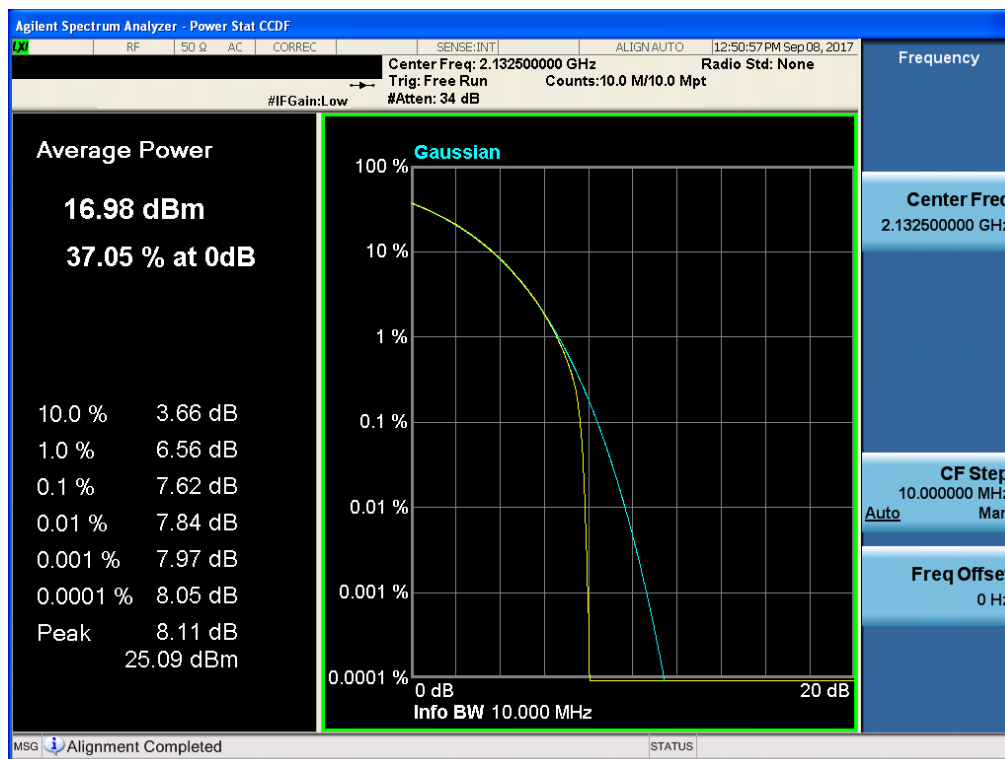
(QPSK)



(16QAM)

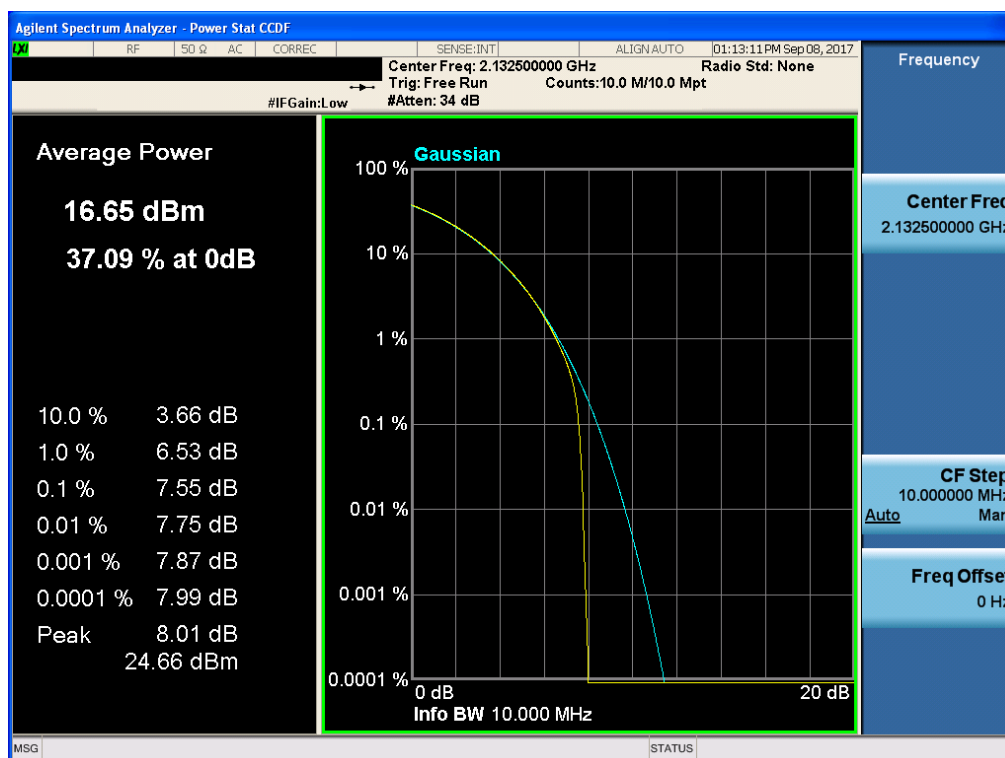


(64QAM)

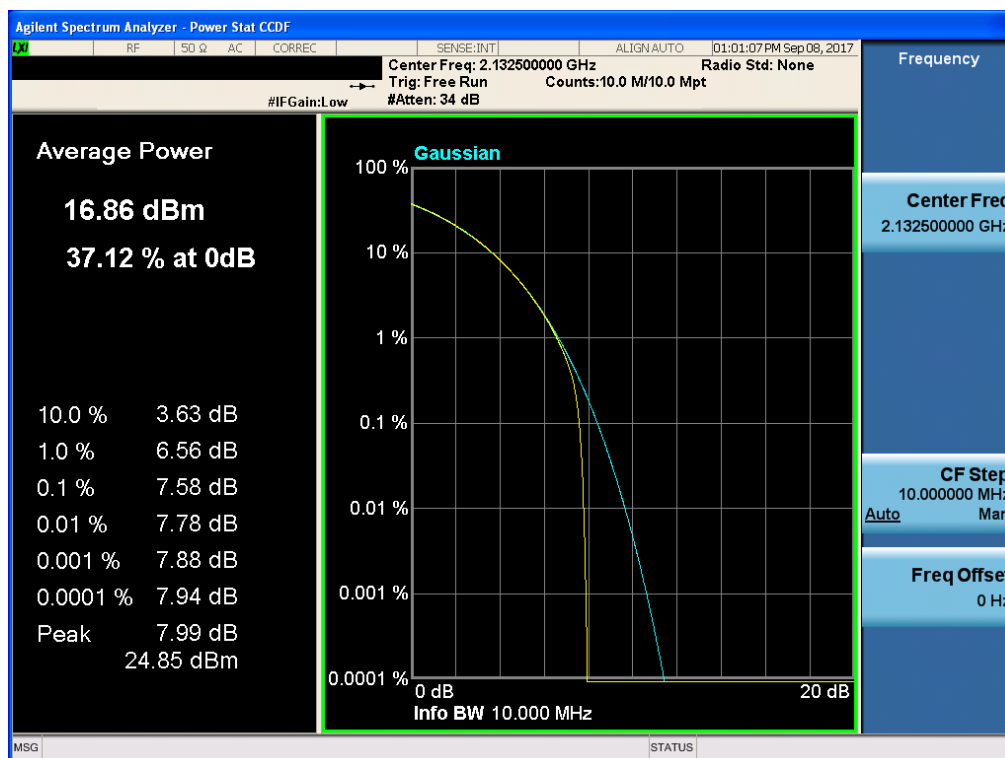


Plot Data for Output Port 2

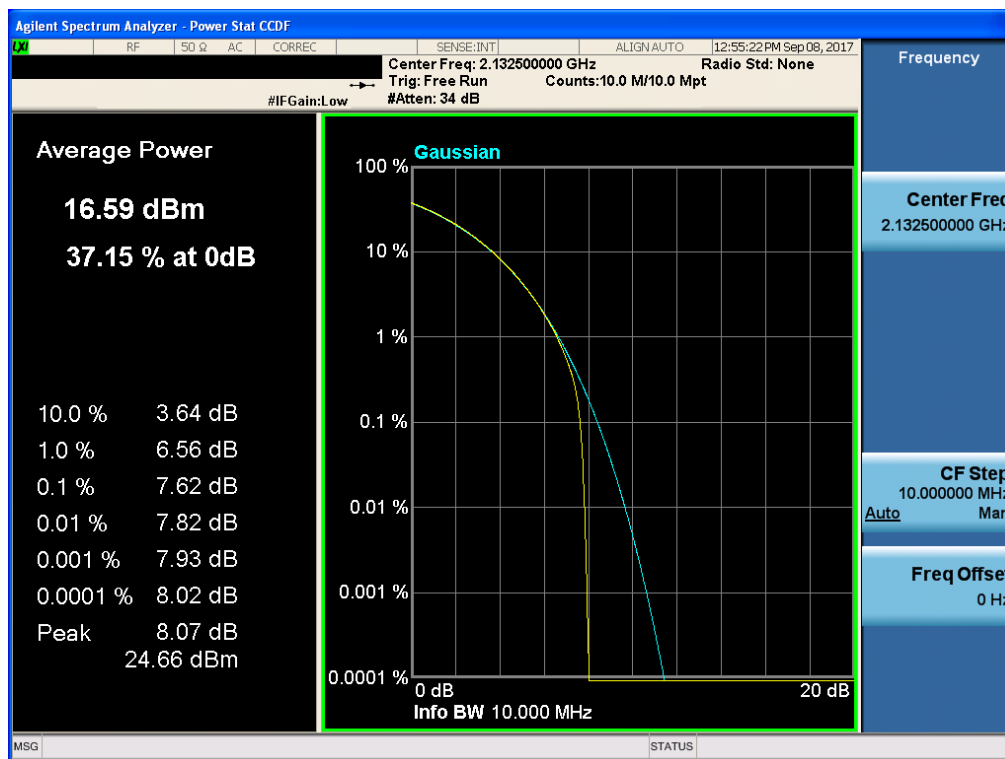
(QPSK)



(16QAM)



(64QAM)



LTE Band 4 (15 MHz)**Test Data at Output Port 1**

Frequency (MHz)	PAR		
	QPSK	16QAM	64QAM
	dB	dB	dB
2132.50	7.53	7.53	7.54

Test Data at Output Port 2

Frequency (MHz)	PAR		
	QPSK	16QAM	64QAM
	dB	dB	dB
2132.50	7.54	7.54	7.55

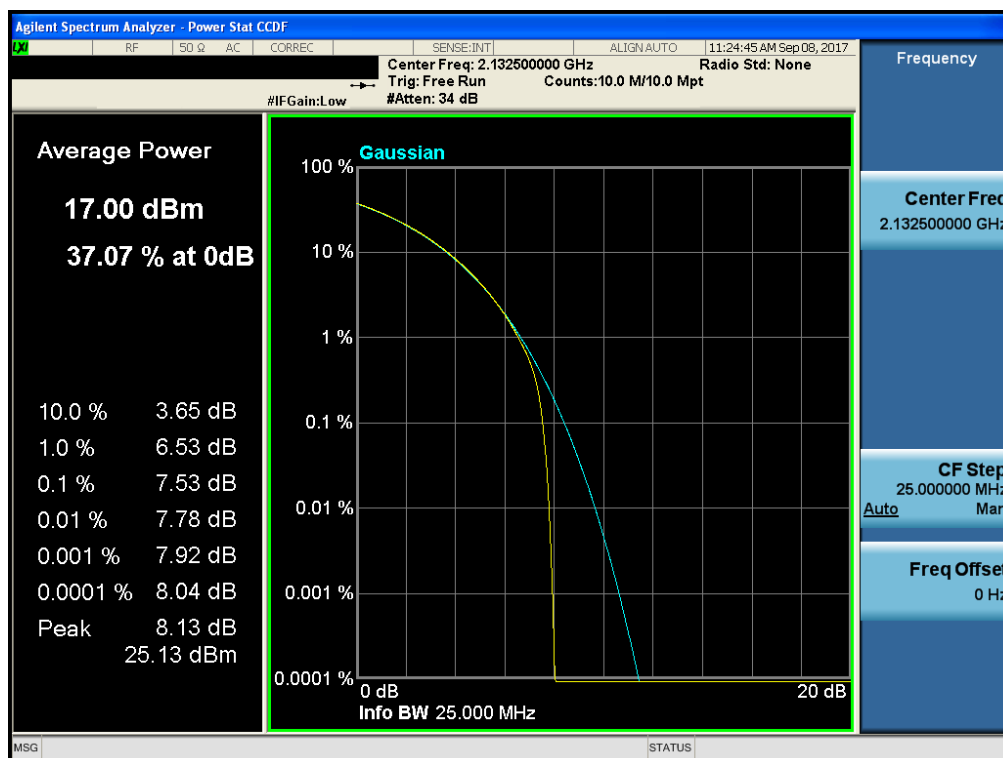
LTE Band 4 (15 MHz)

Plot Data for Output Port 1

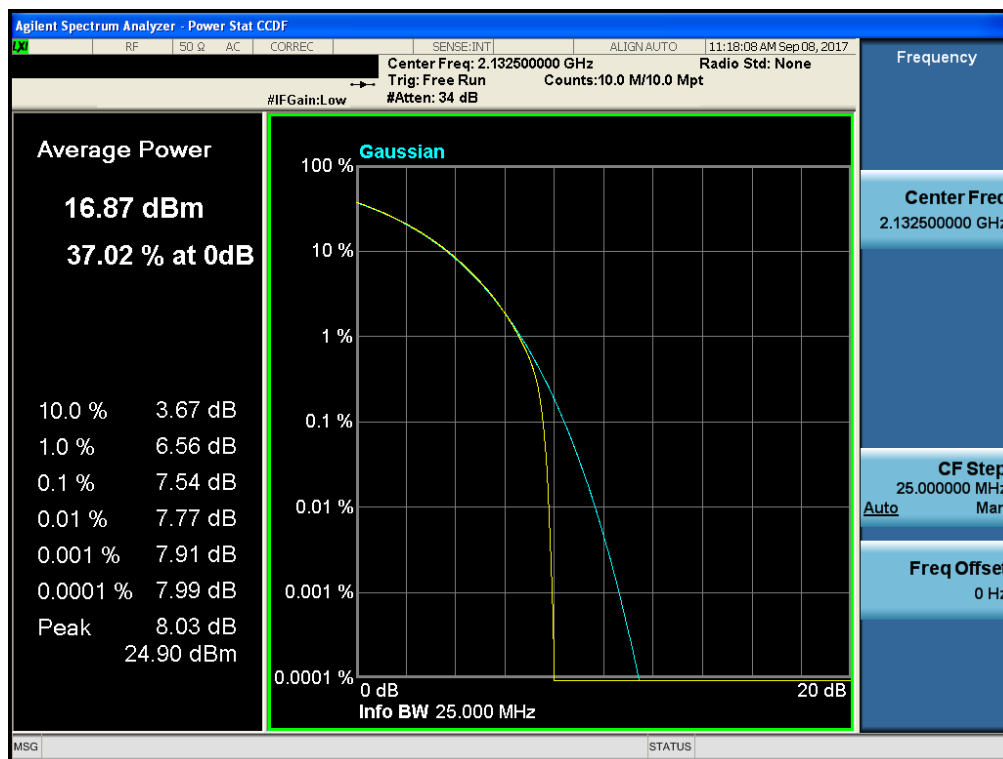
(QPSK)



(16QAM)



(64QAM)

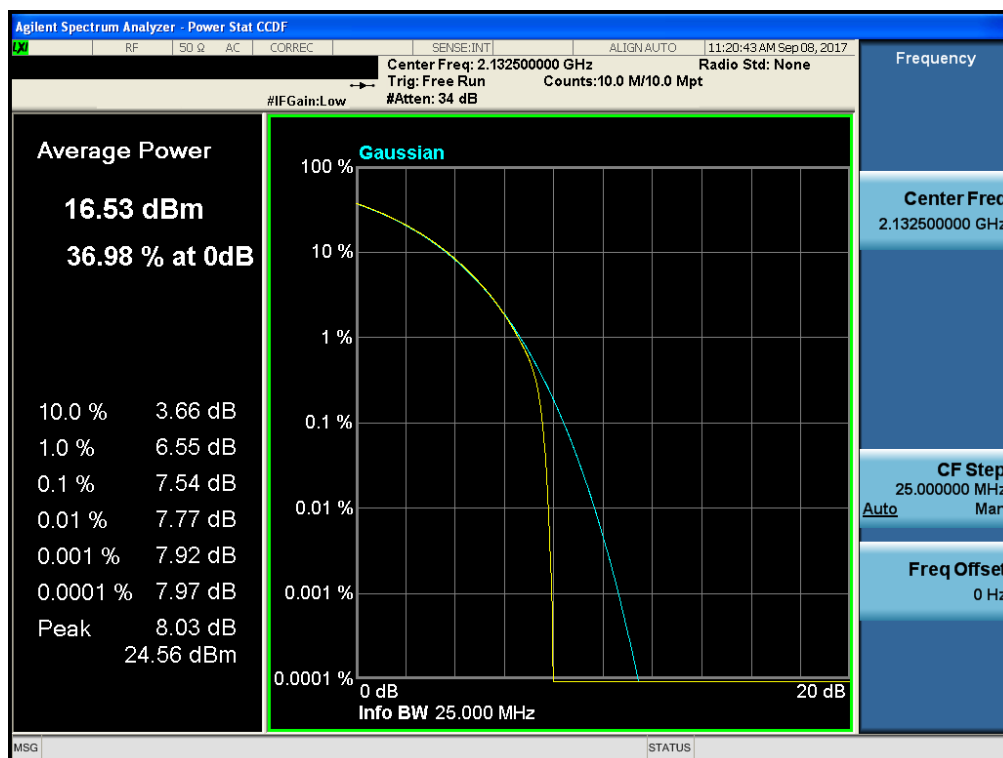


Plot Data for Output Port 2

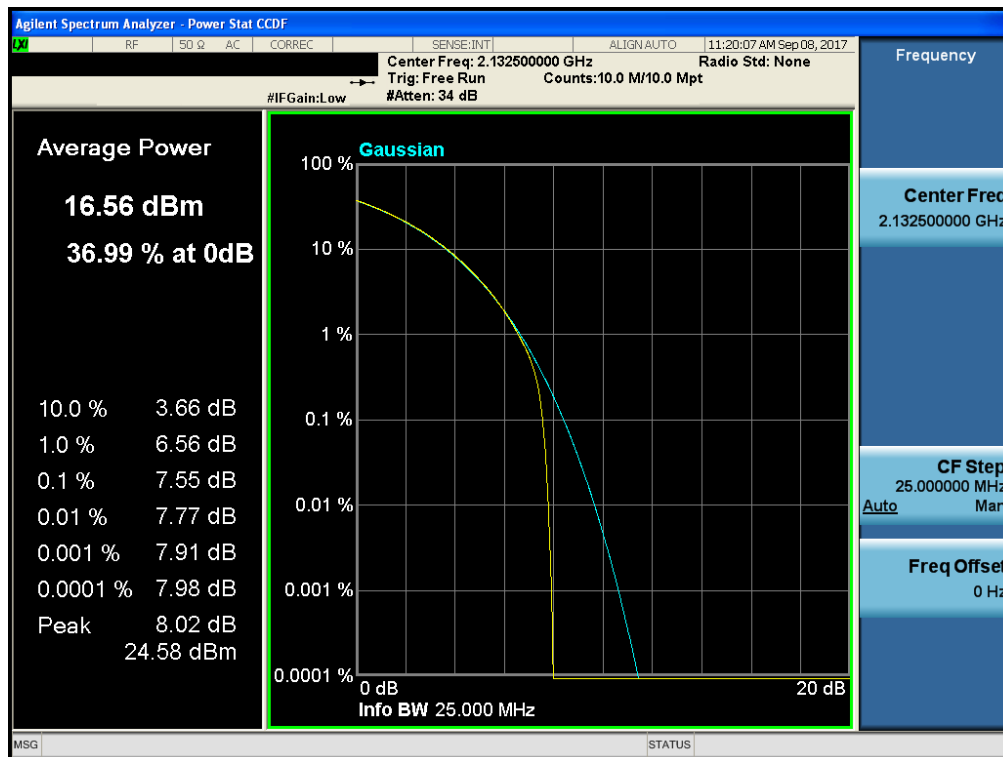
(QPSK)



(16QAM)



(64QAM)



LTE Band 4 (20 MHz)**Test Data at Output Port 1**

Frequency (MHz)	PAR		
	QPSK	16QAM	64QAM
	dB	dB	dB
2132.50	7.54	7.55	7.56

Test Data at Output Port 2

Frequency (MHz)	PAR		
	QPSK	16QAM	64QAM
	dB	dB	dB
2132.50	7.54	7.54	7.55

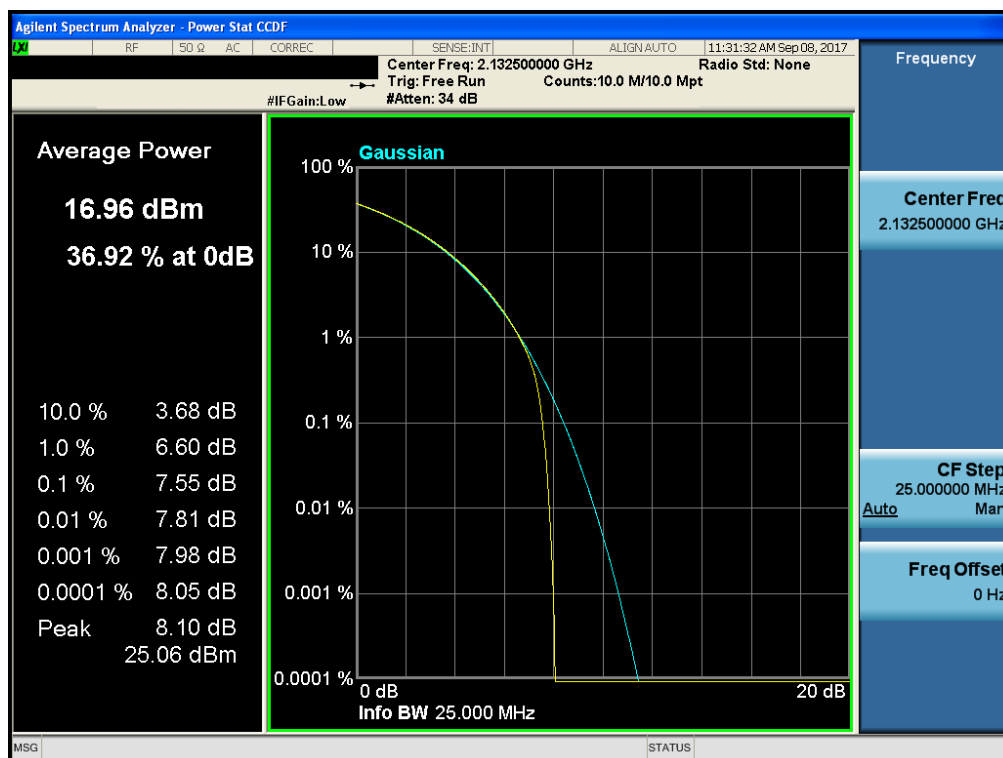
LTE Band 4 (20 MHz)

Plot Data for Output Port 1

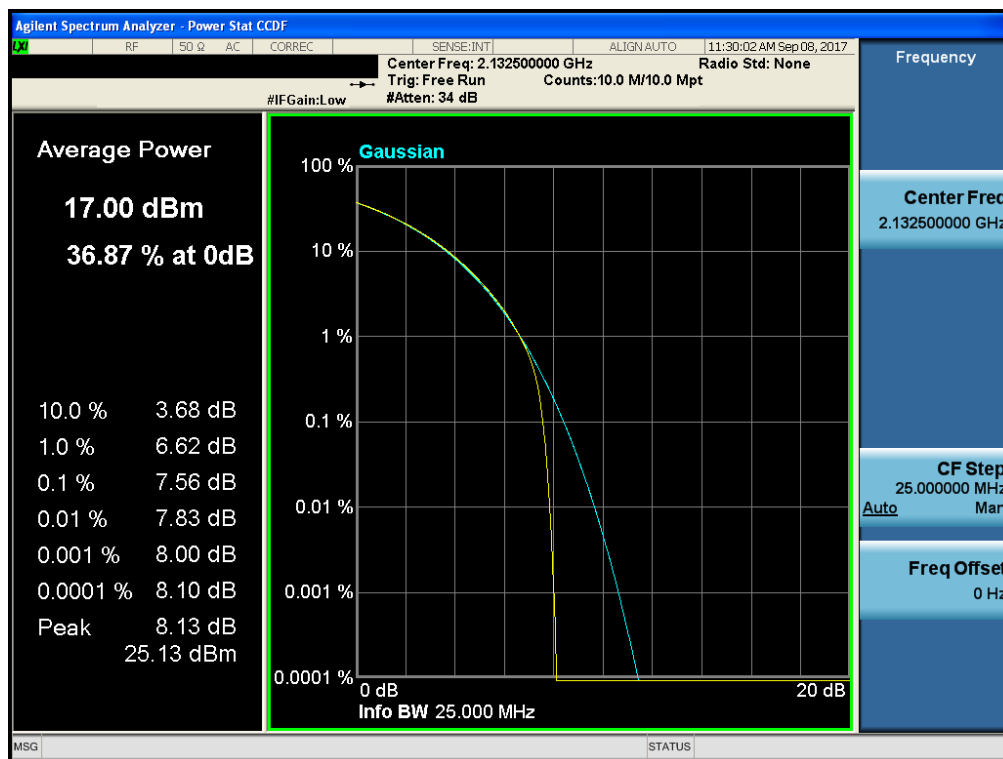
(QPSK)



(16QAM)



(64QAM)

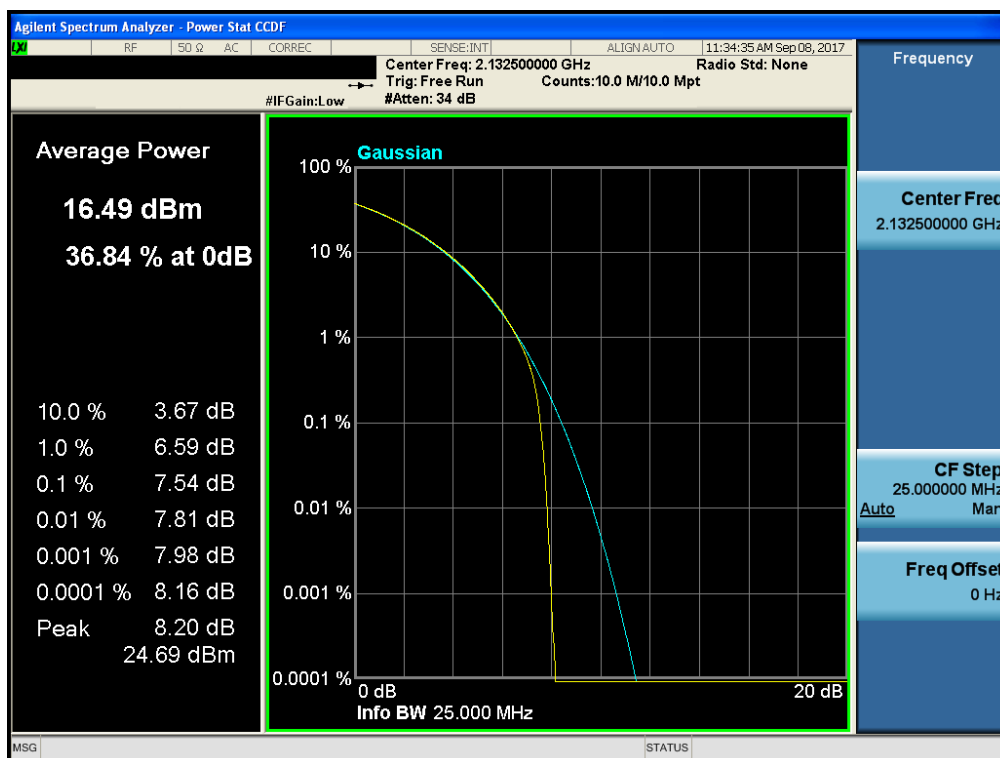


Plot Data for Output Port 2

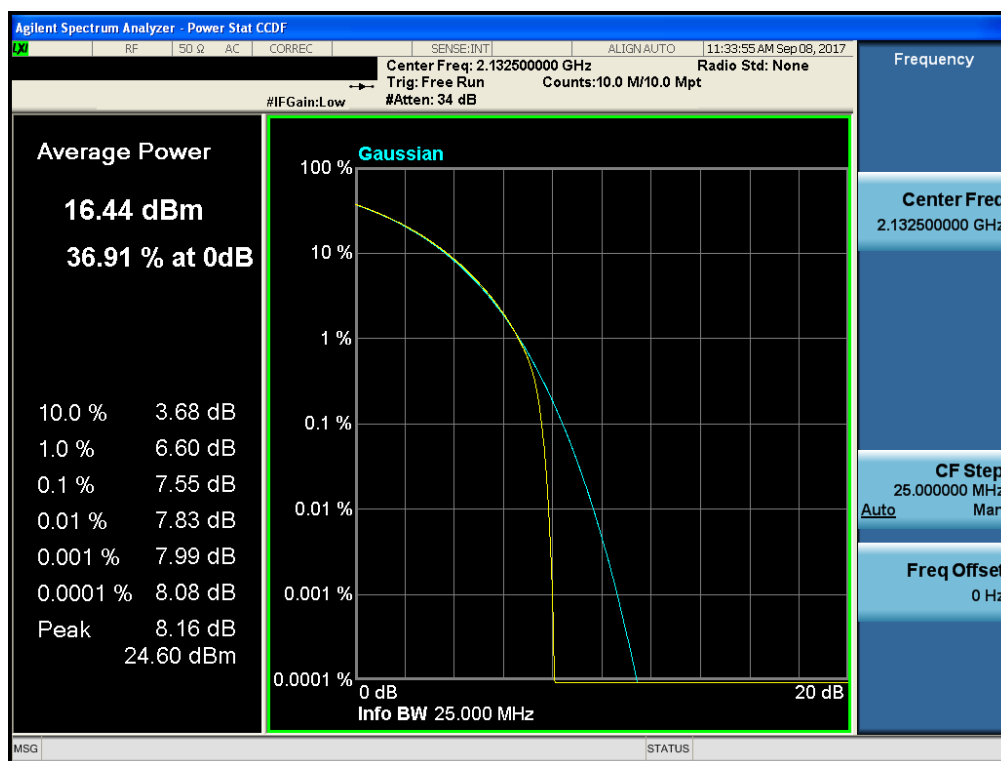
(QPSK)



(16QAM)



(64QAM)



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:**LTE Band 13 (10 MHz)****Test Data at Output Port 1**

Frequency (MHz)	Occupied Bandwidth (MHz)		
	QPSK	16QAM	64QAM
751.00	8.9316	8.9336	8.9460

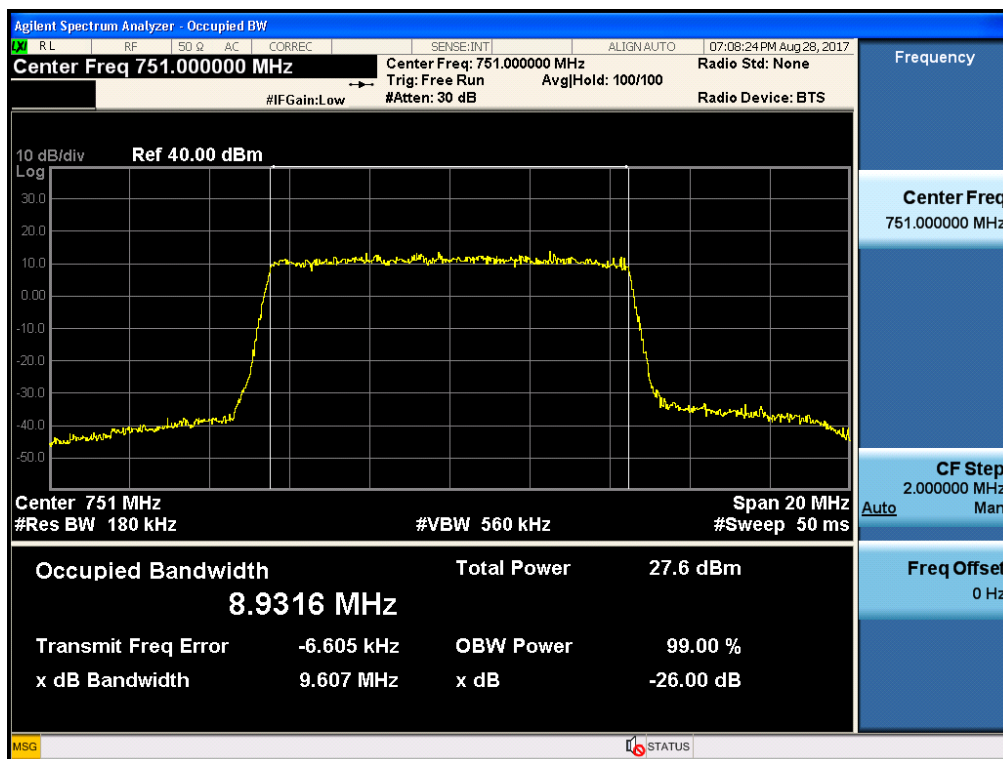
Test Data at Output Port 2

Frequency (MHz)	Occupied Bandwidth (MHz)		
	QPSK	16QAM	64QAM
751.00	8.9340	8.9410	8.9305

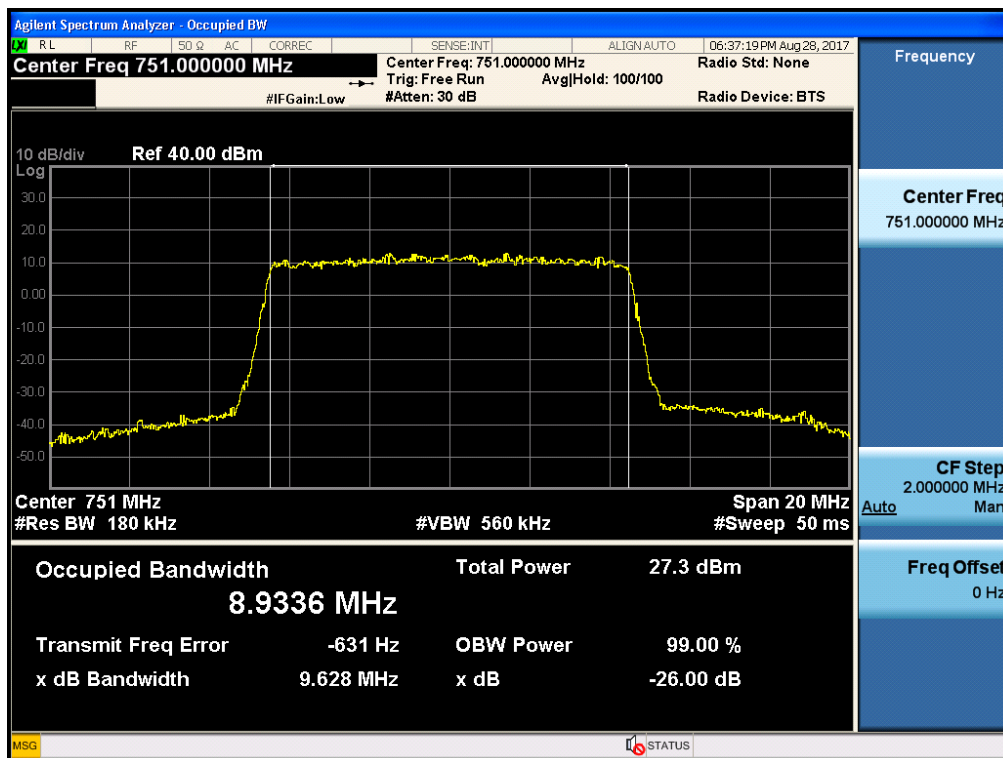
LTE Band 13 (10 MHz)

Test Plot at Output Port 1

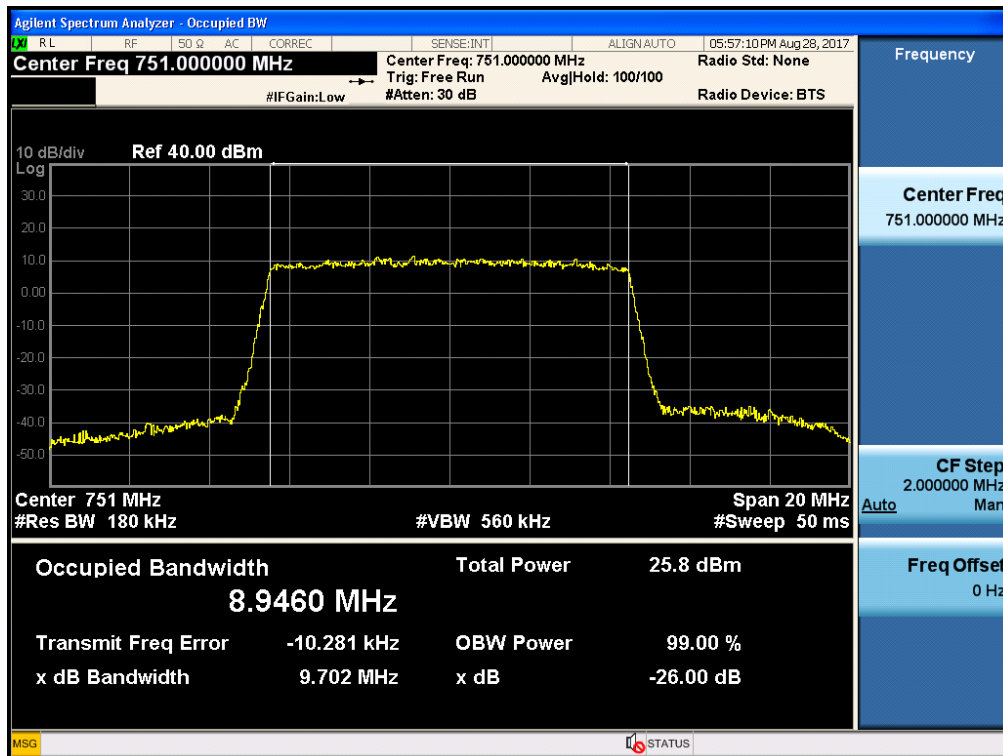
(QPSK)



(16QAM)

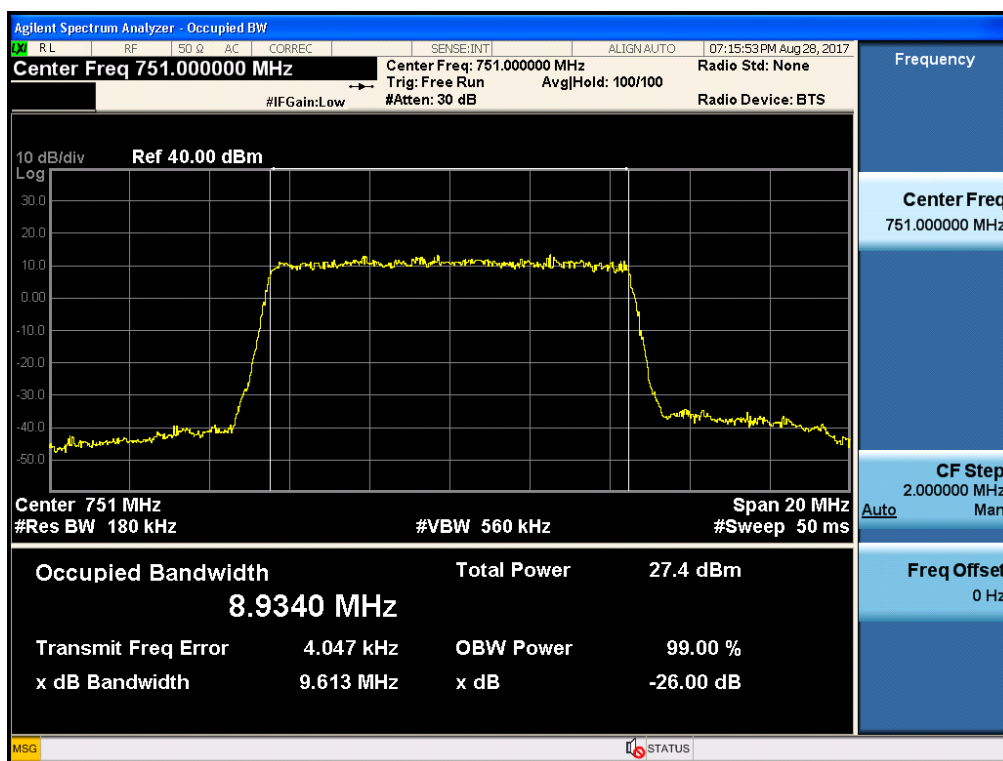


(64QAM)

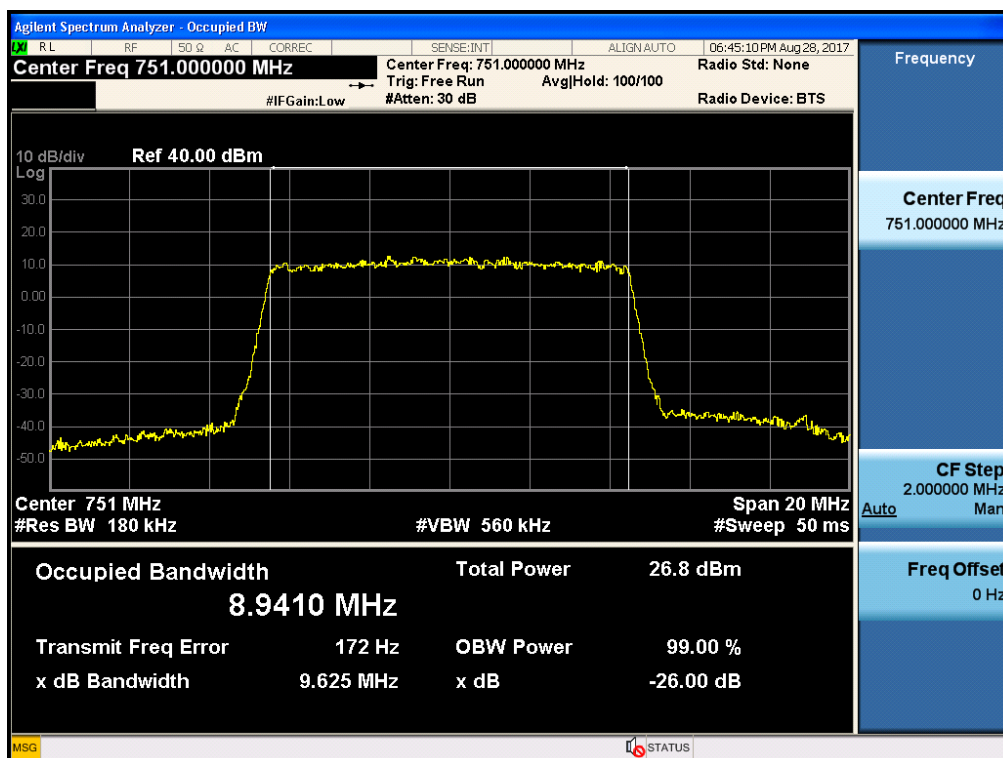


Test Plot at Output Port 2

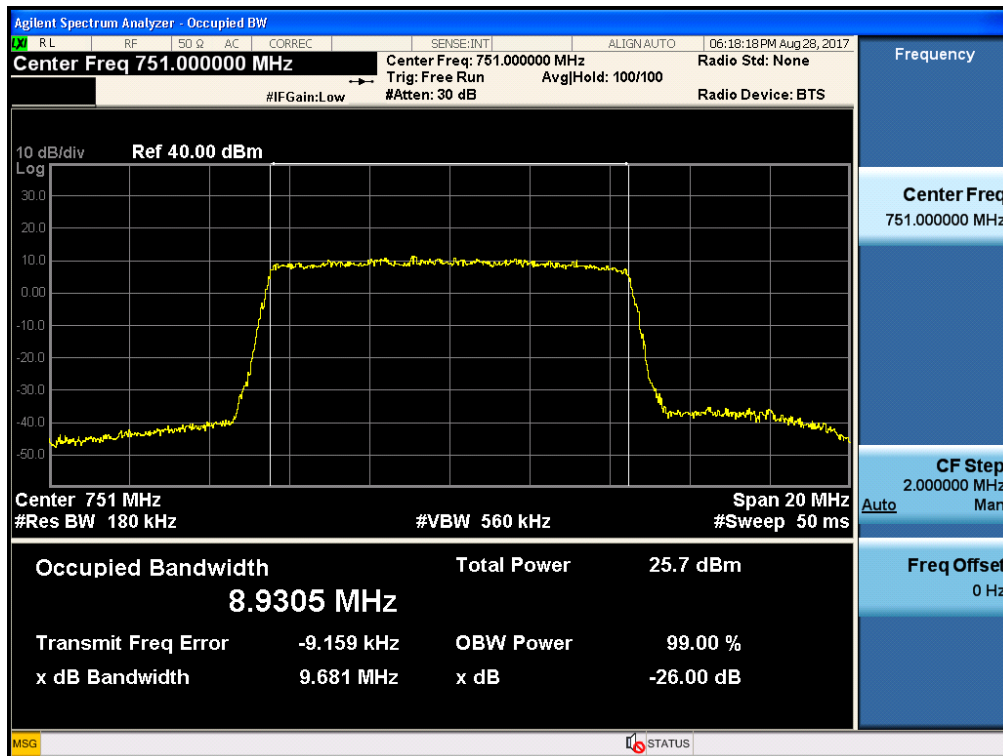
(QPSK)



(16QAM)



(64QAM)



LTE Band 4 (10 MHz)**Test Data at Output Port 1**

Frequency (MHz)	Occupied Bandwidth (MHz)		
	QPSK	16QAM	64QAM
2115.00	8.9068	8.9424	8.9474
2132.50	8.9125	8.9347	8.9419
2150.00	8.9161	8.9447	8.9385

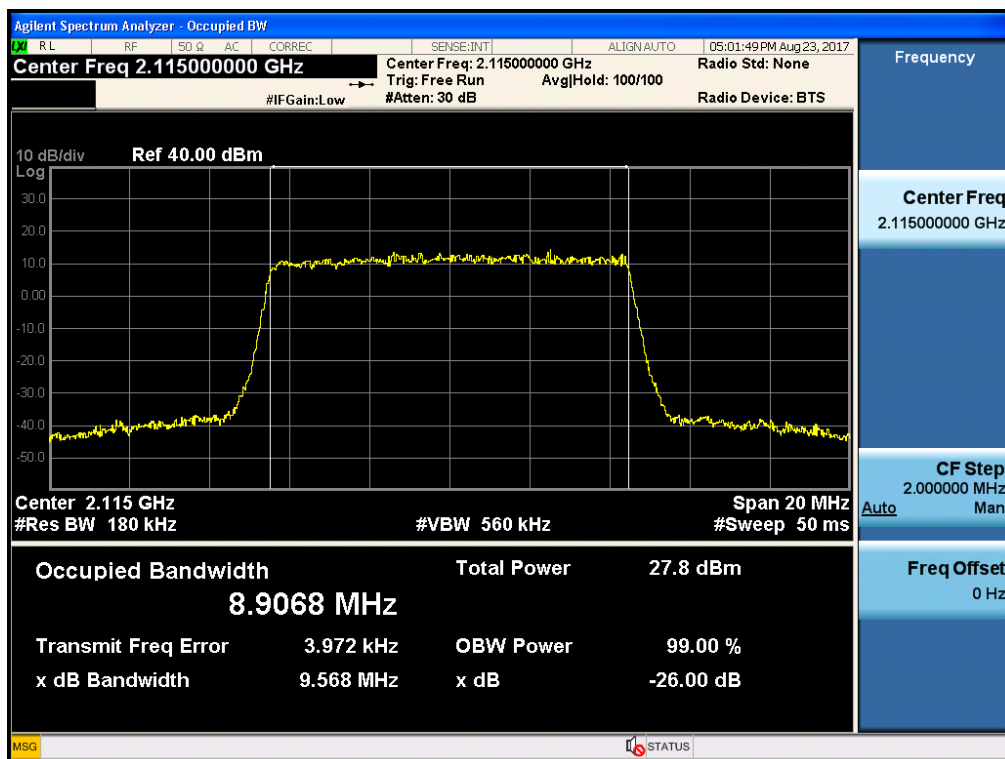
Test Data at Output Port 2

Frequency (MHz)	Occupied Bandwidth (MHz)		
	QPSK	16QAM	64QAM
2115.00	8.9171	8.9388	8.9486
2132.50	8.9143	8.9432	8.9393
2150.00	8.9198	8.9415	8.9445

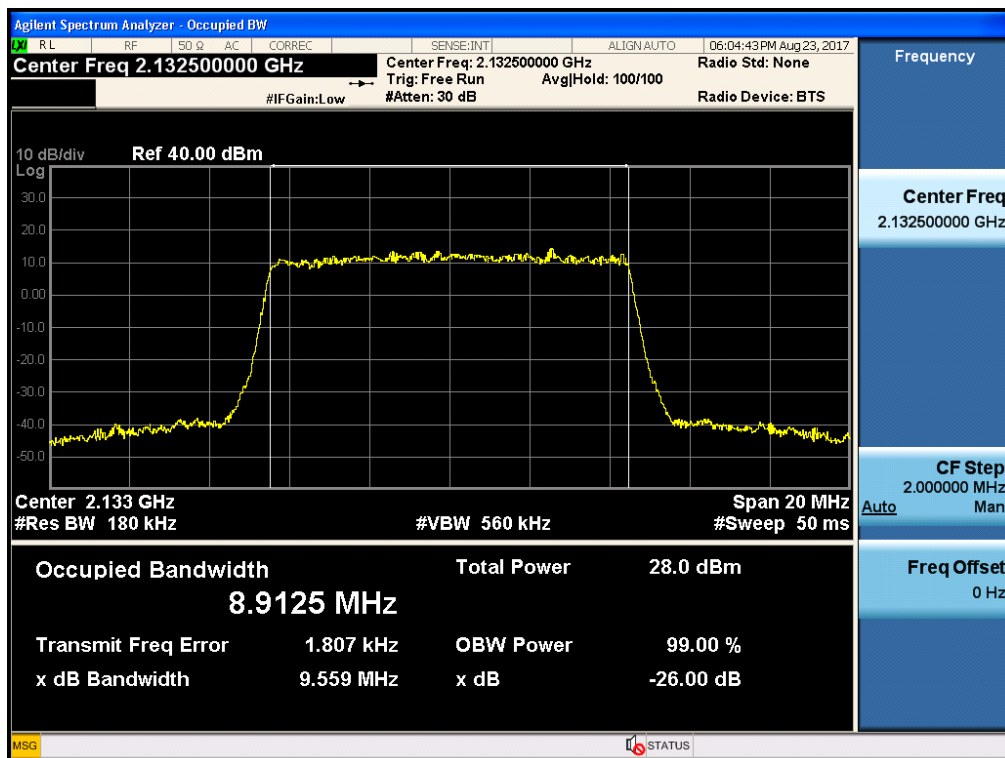
LTE Band 4 (10 MHz)

Test Plot at Output Port 1

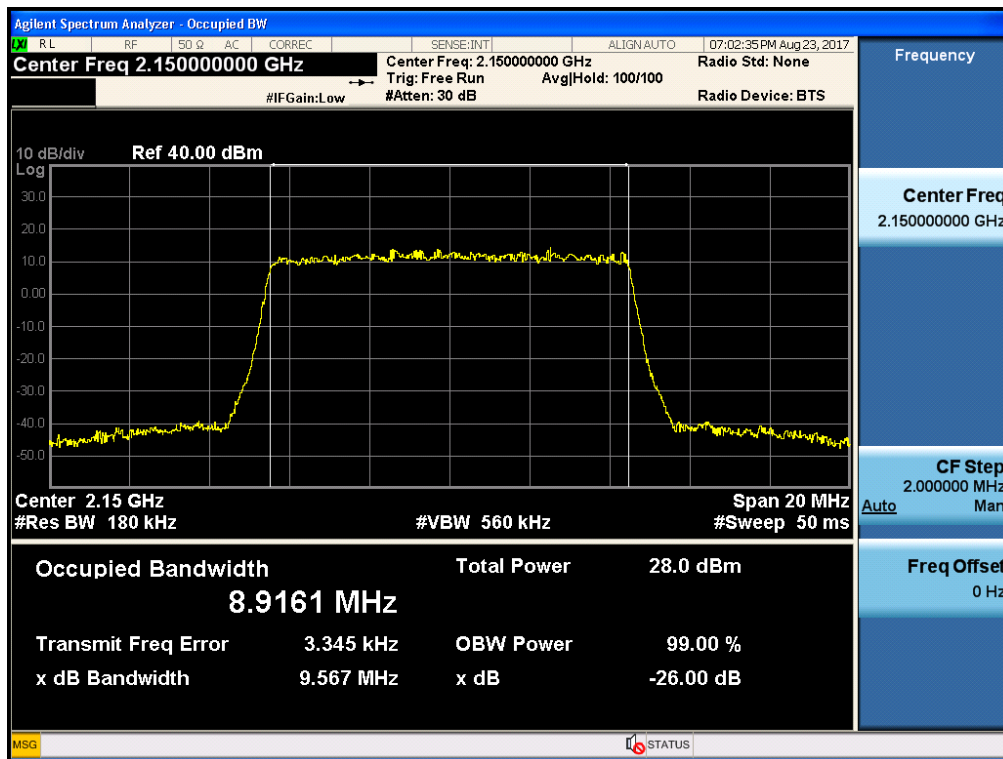
(QPSK Low Channel)



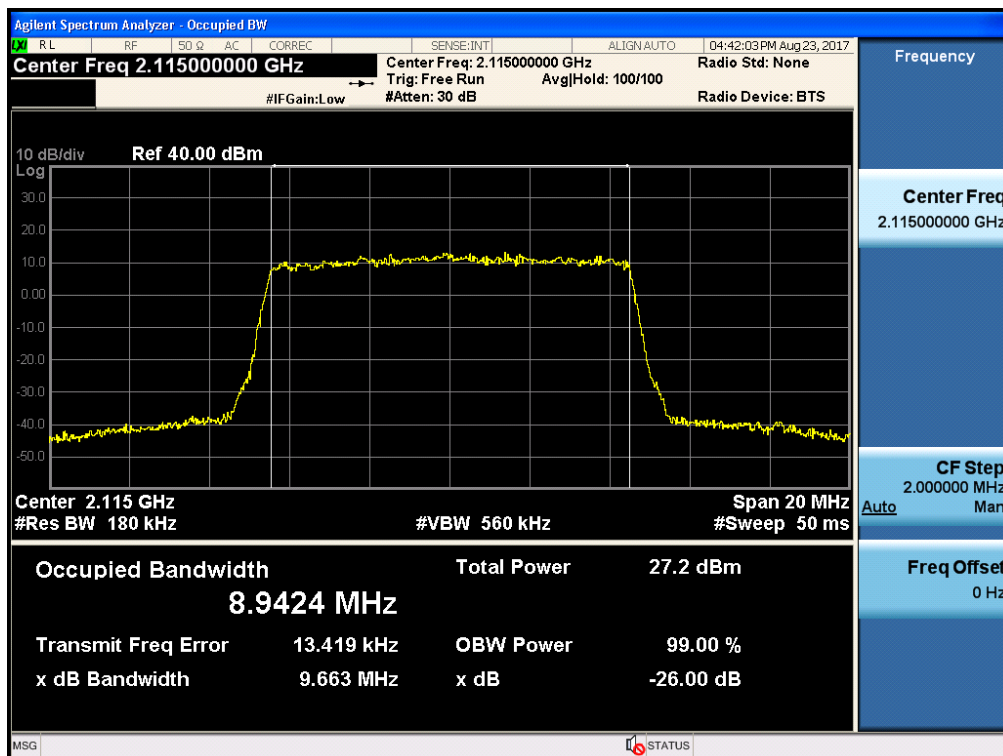
(QPSK Middle Channel)



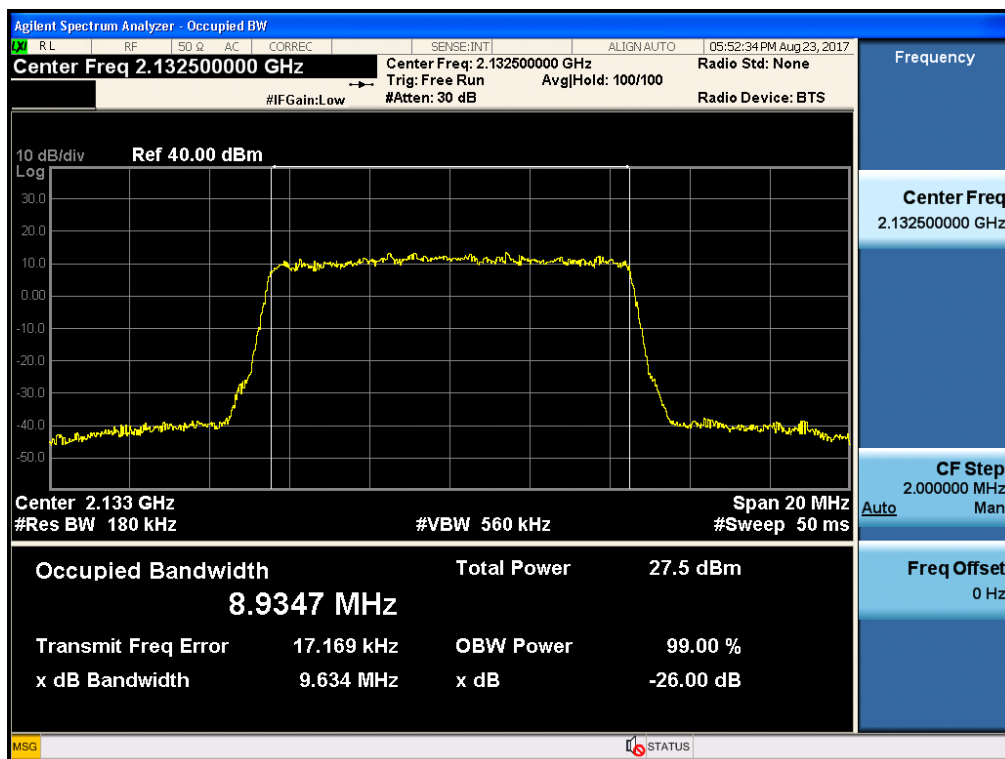
(QPSK High Channel)



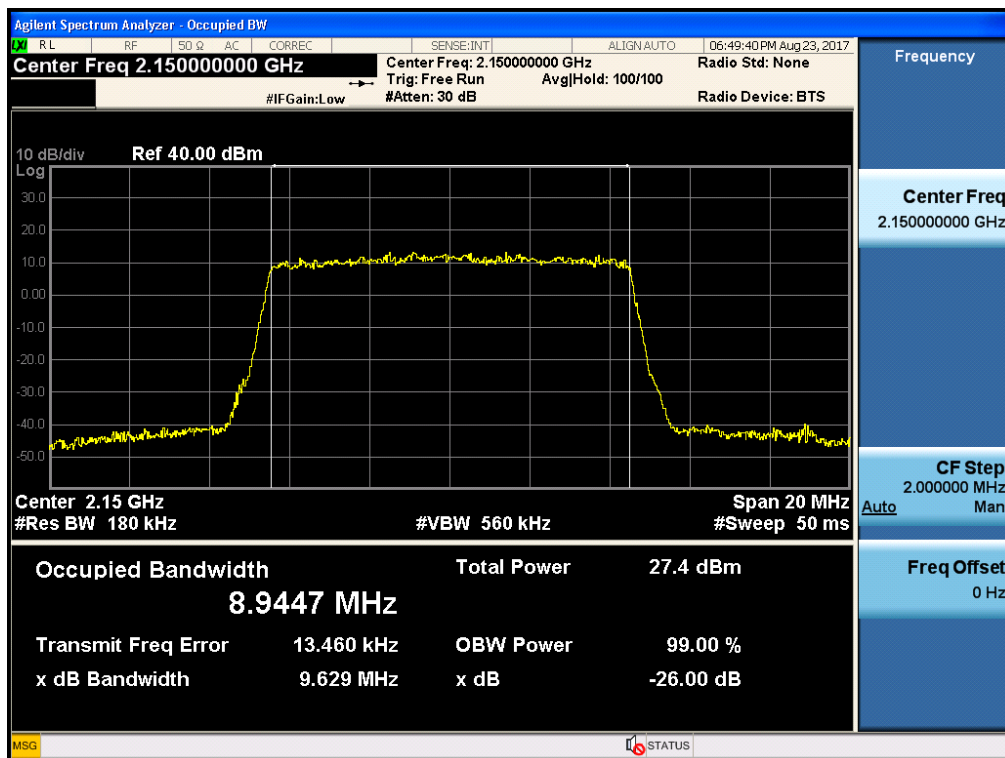
(16QAM Low Channel)



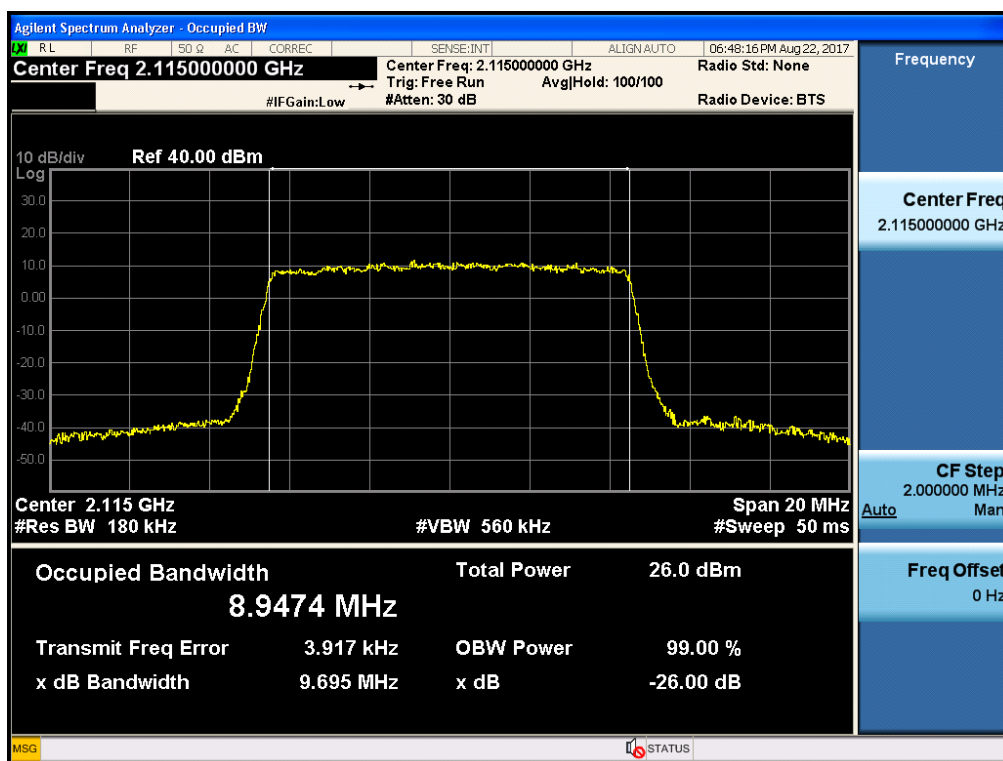
(16QAM Middle Channel)



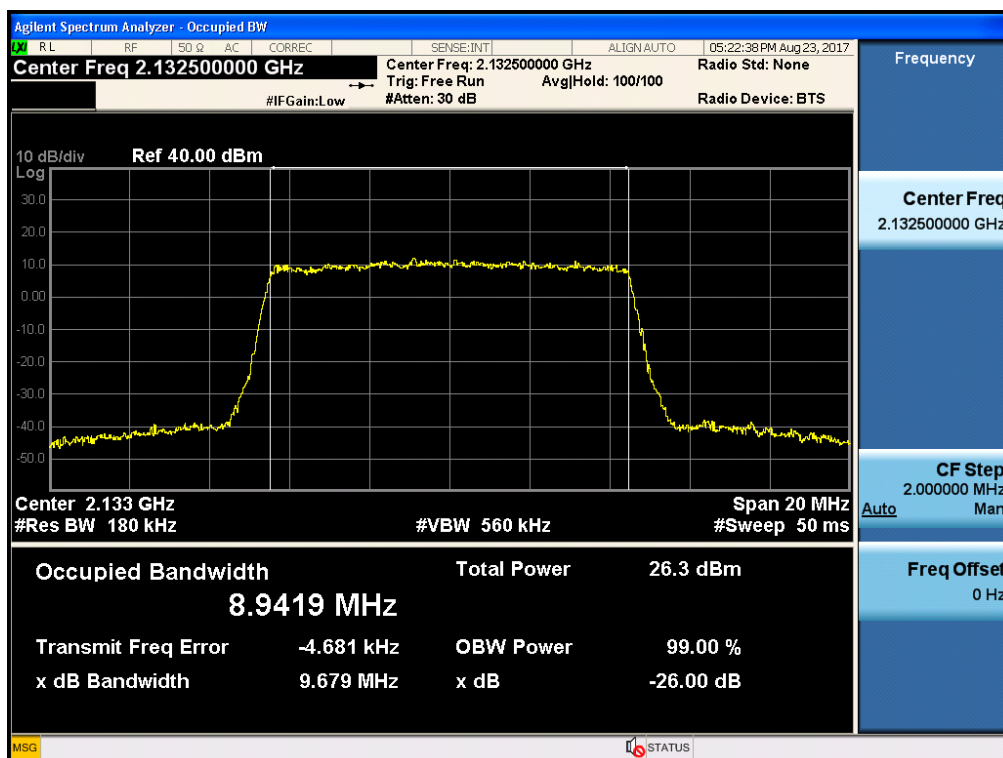
(16QAM High Channel)



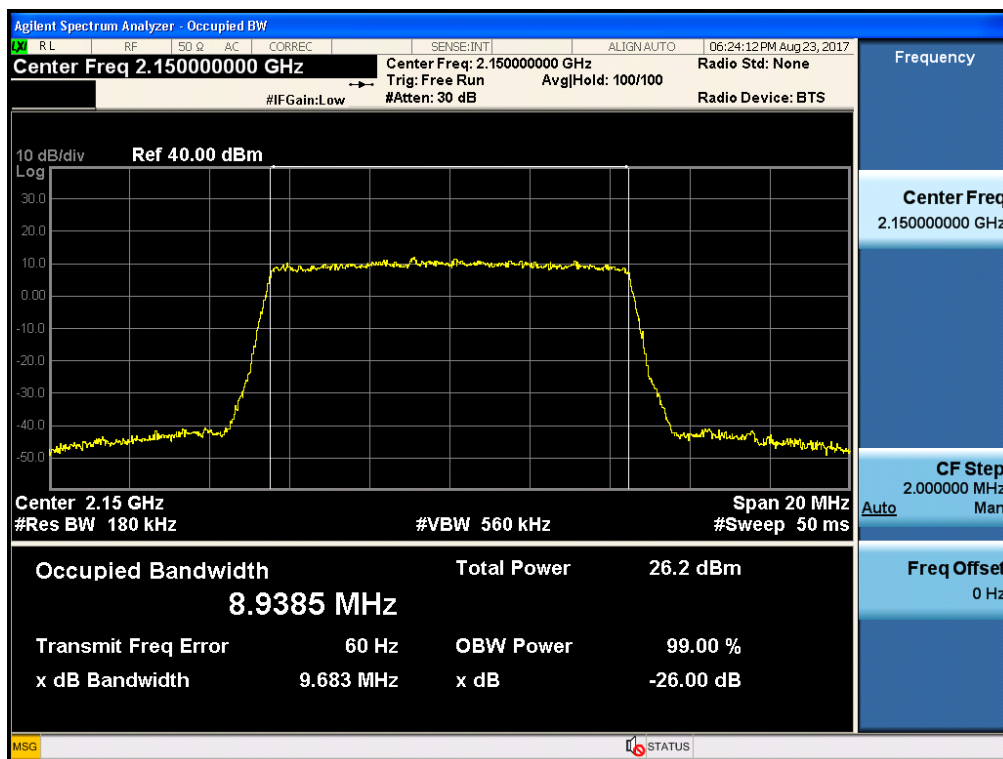
(64QAM Low Channel)



(64QAM Middle Channel)

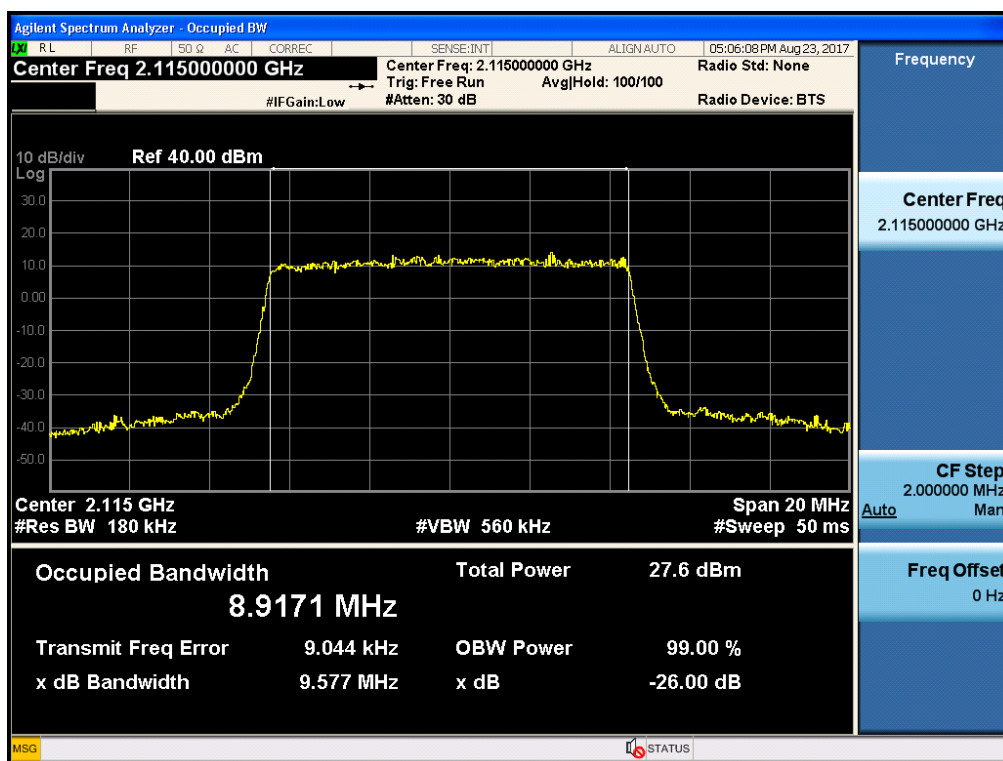


(64QAM High Channel)

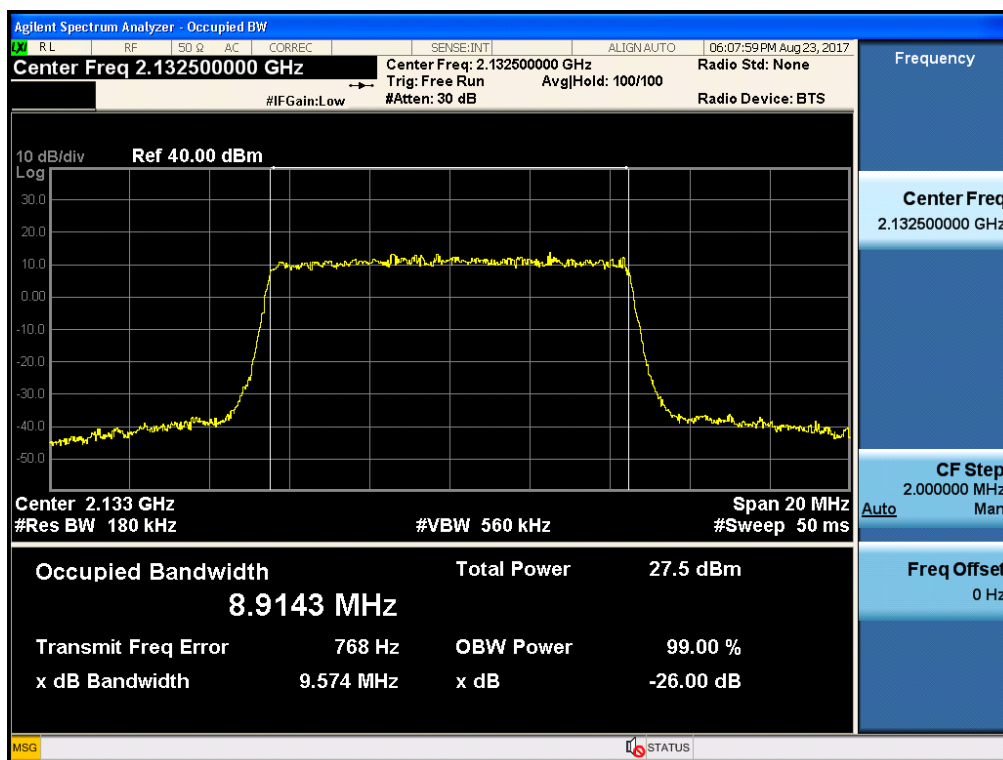


Test Plot at Output Port 2

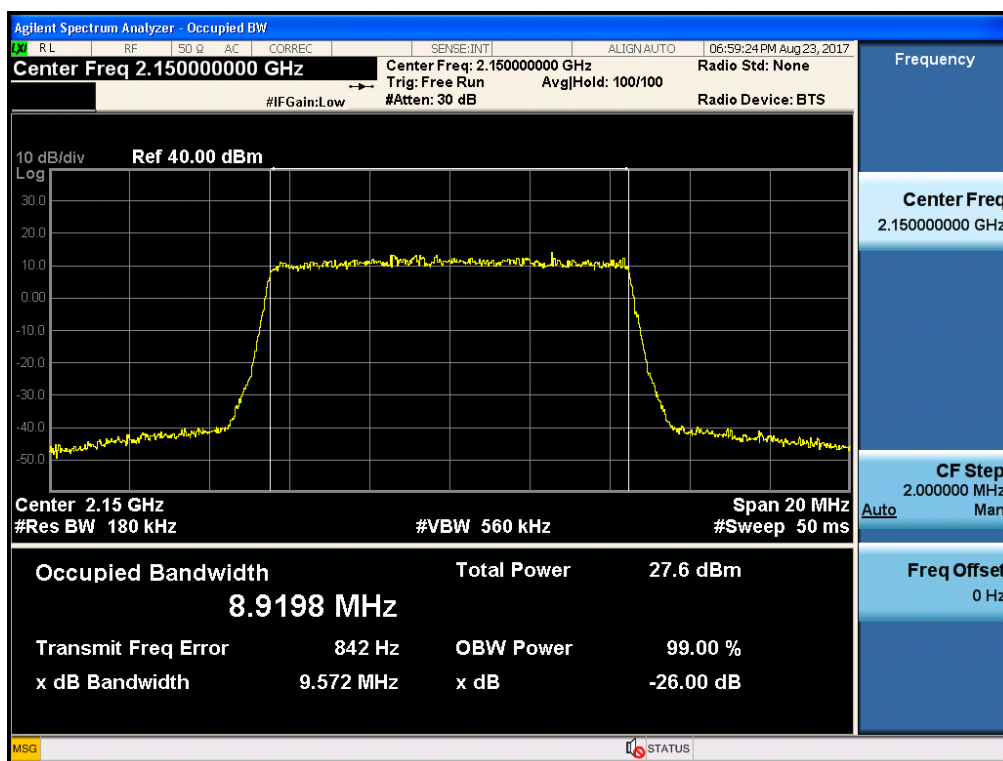
(QPSK Low Channel)



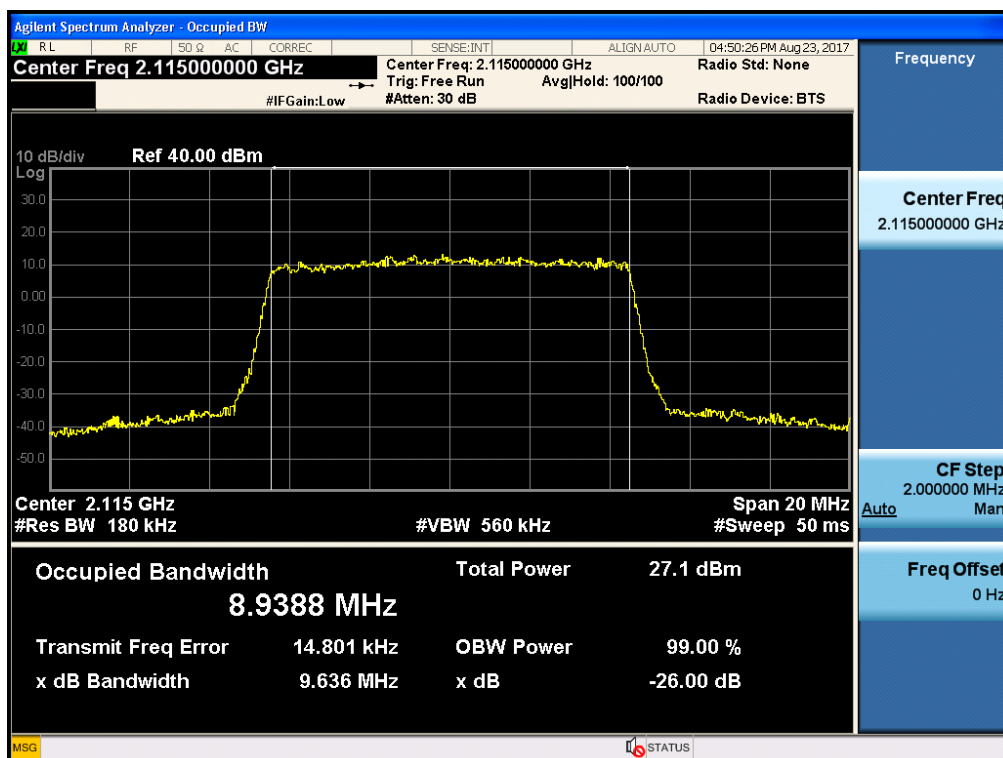
(QPSK Middle Channel)



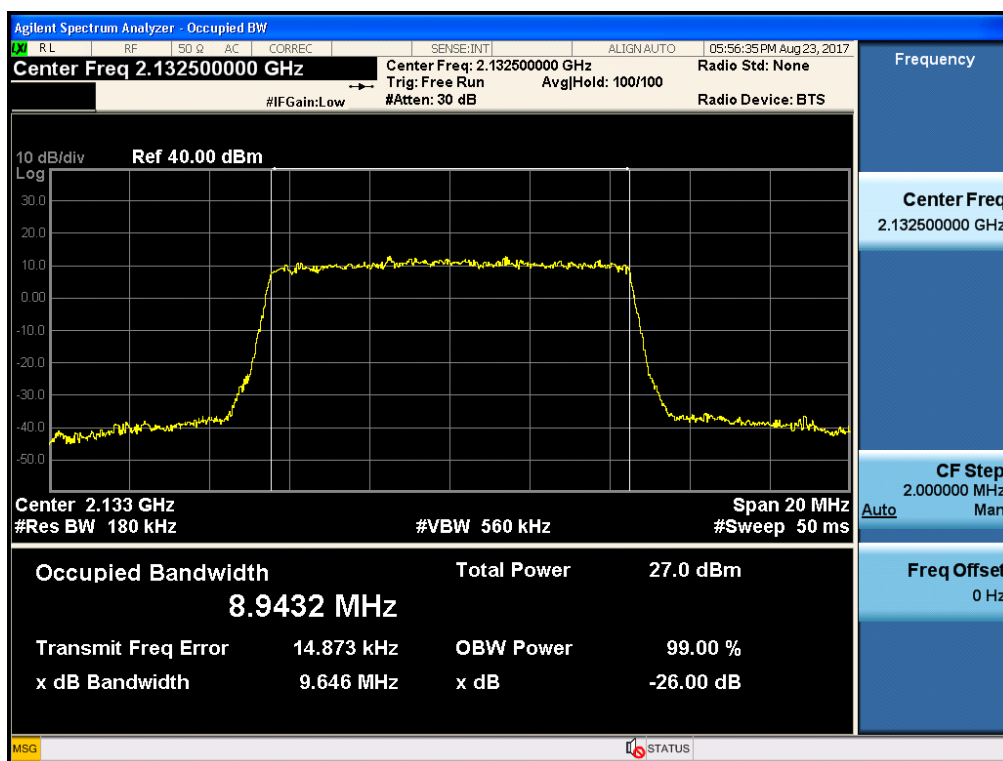
(QPSK High Channel)



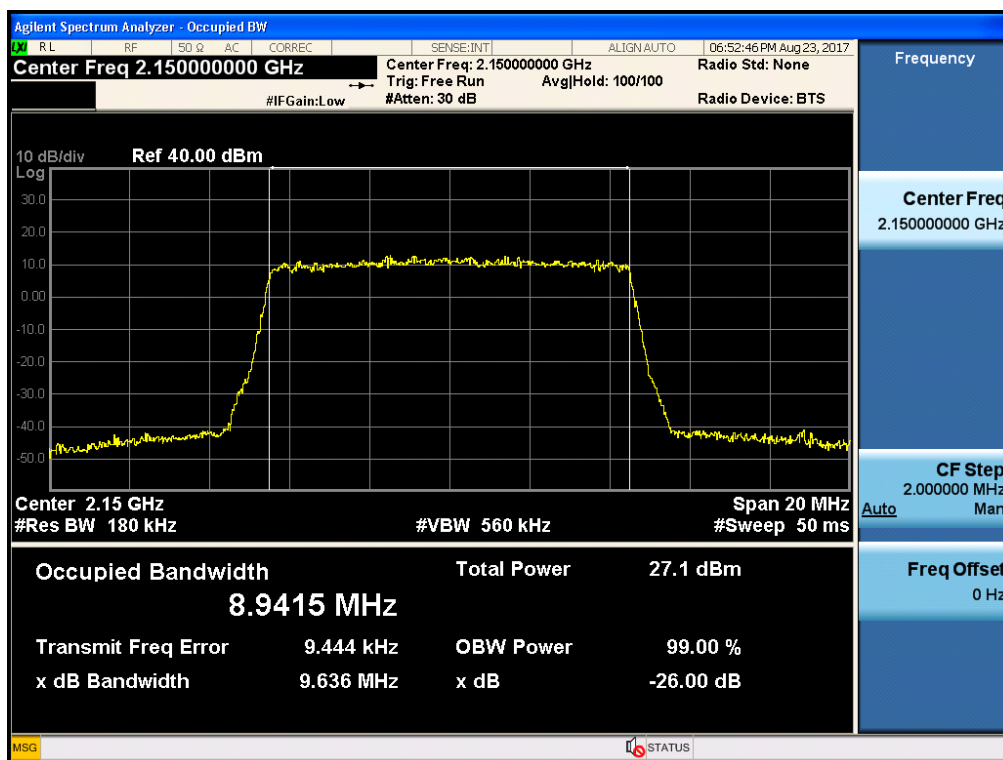
(16QAM Low Channel)



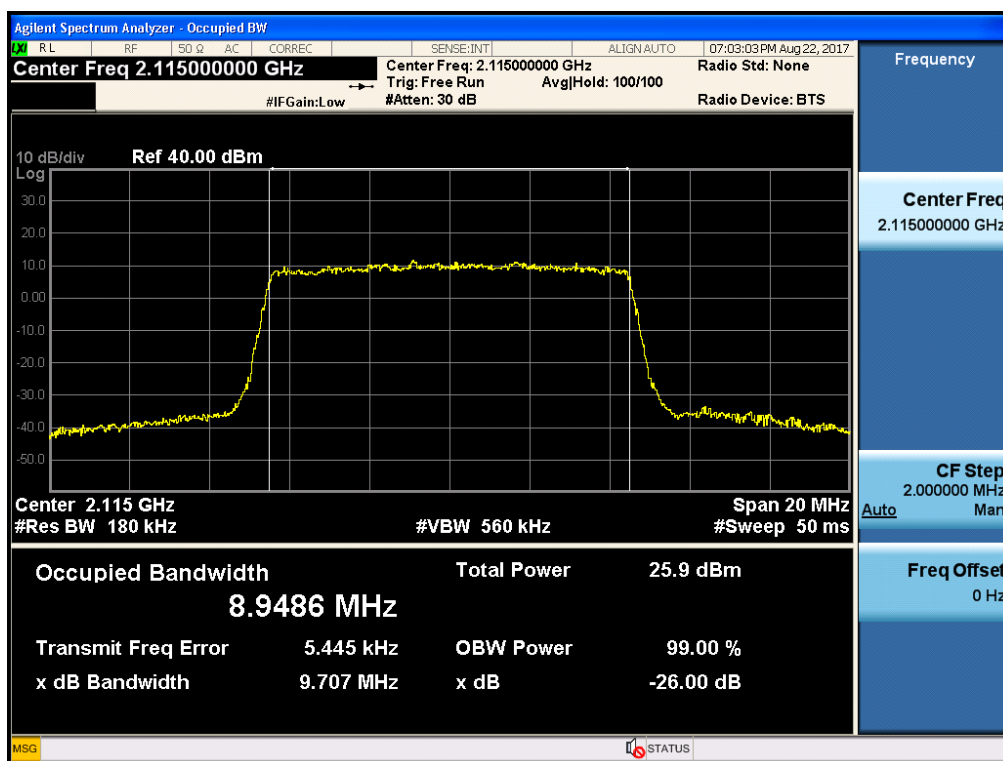
(16QAM Middle Channel)



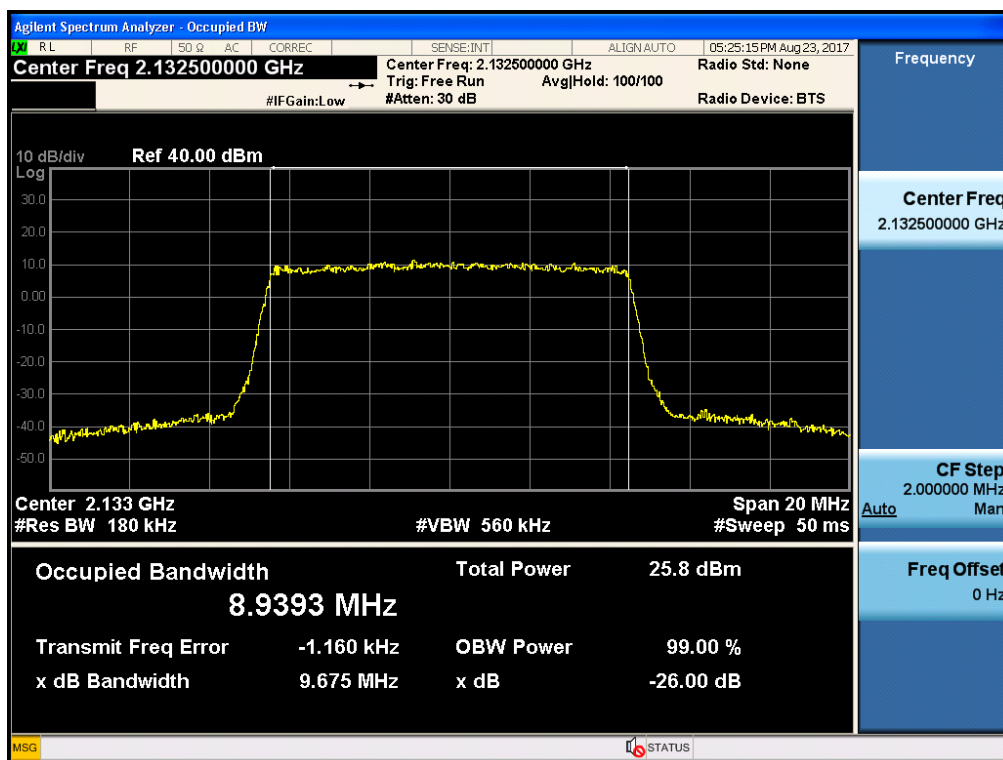
(16QAM High Channel)



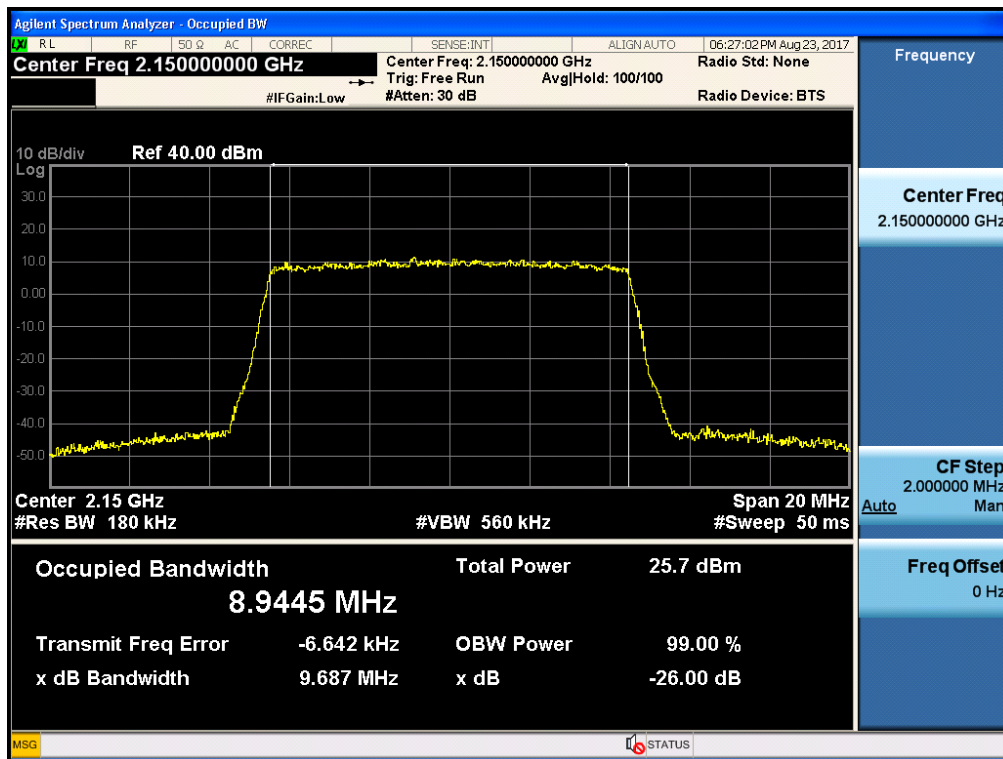
(64QAM Low Channel)



(64QAM Middle Channel)



(64QAM High Channel)



LTE Band 4 (15 MHz)**Test Data at Output Port 1**

Frequency (MHz)	Occupied Bandwidth (MHz)		
	QPSK	16QAM	64QAM
2117.50	13.406	13.409	13.407
2132.50	13.464	13.400	13.406
2147.50	13.465	13.412	13.400

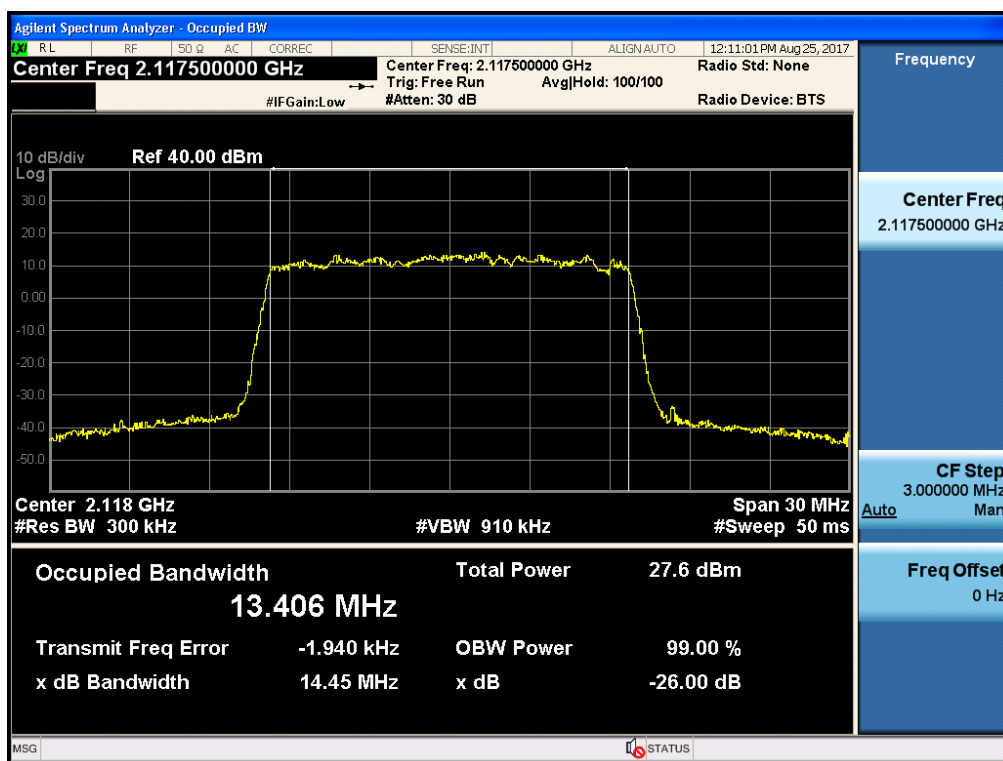
Test Data at Output Port 2

Frequency (MHz)	Occupied Bandwidth (MHz)		
	QPSK	16QAM	64QAM
2117.50	13.442	13.407	13.412
2132.50	13.430	13.411	13.394
2147.50	13.433	13.414	13.414

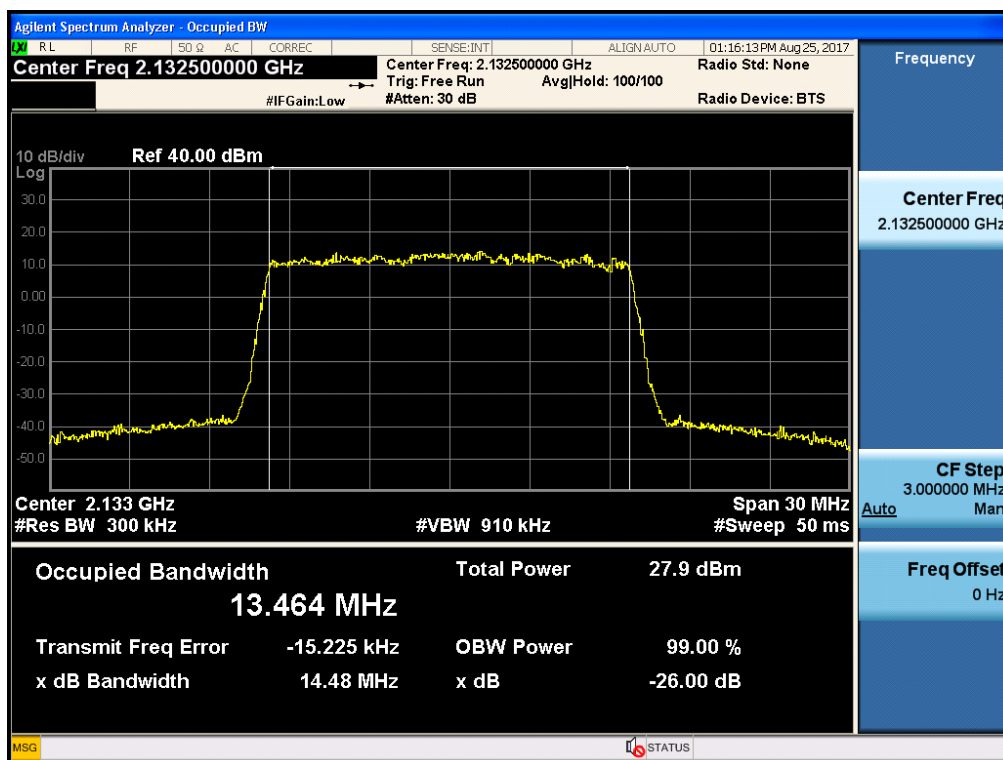
LTE Band 4 (15 MHz)

Test Plot at Output Port 1

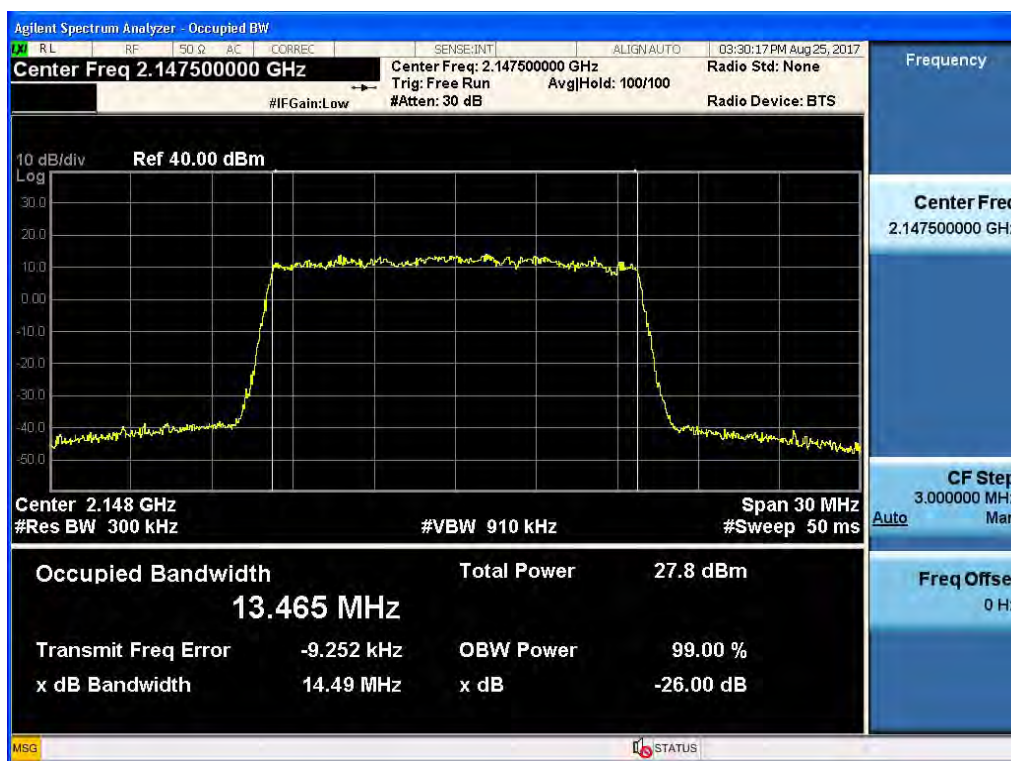
(QPSK Low Channel)



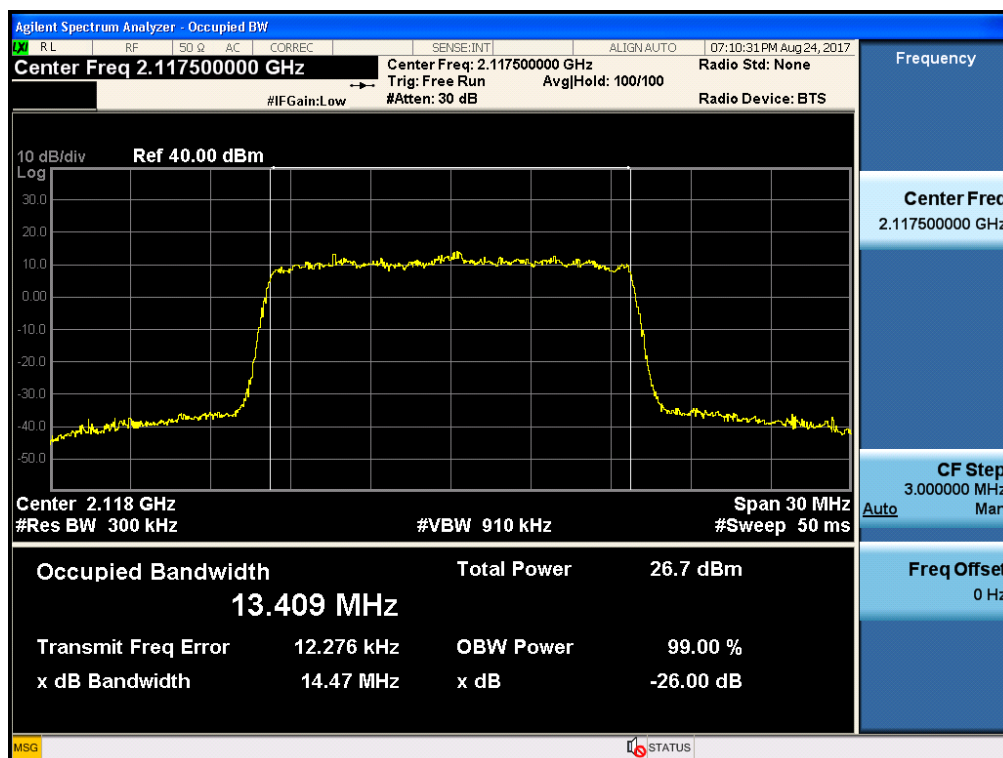
(QPSK Middle Channel)



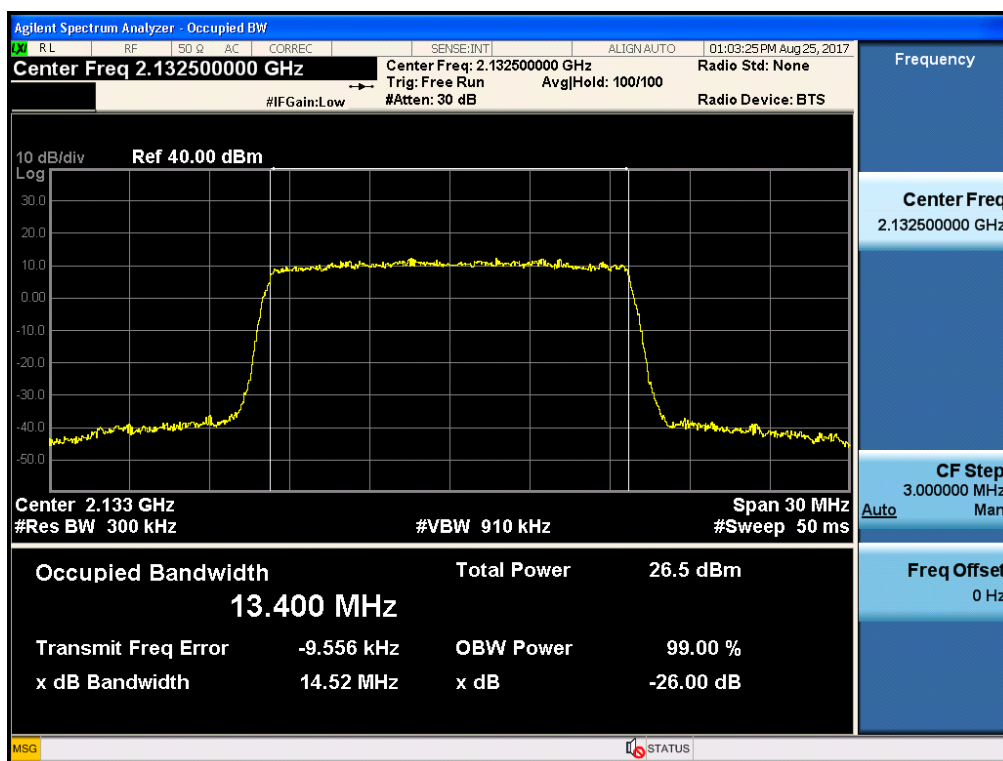
(QPSK High Channel)



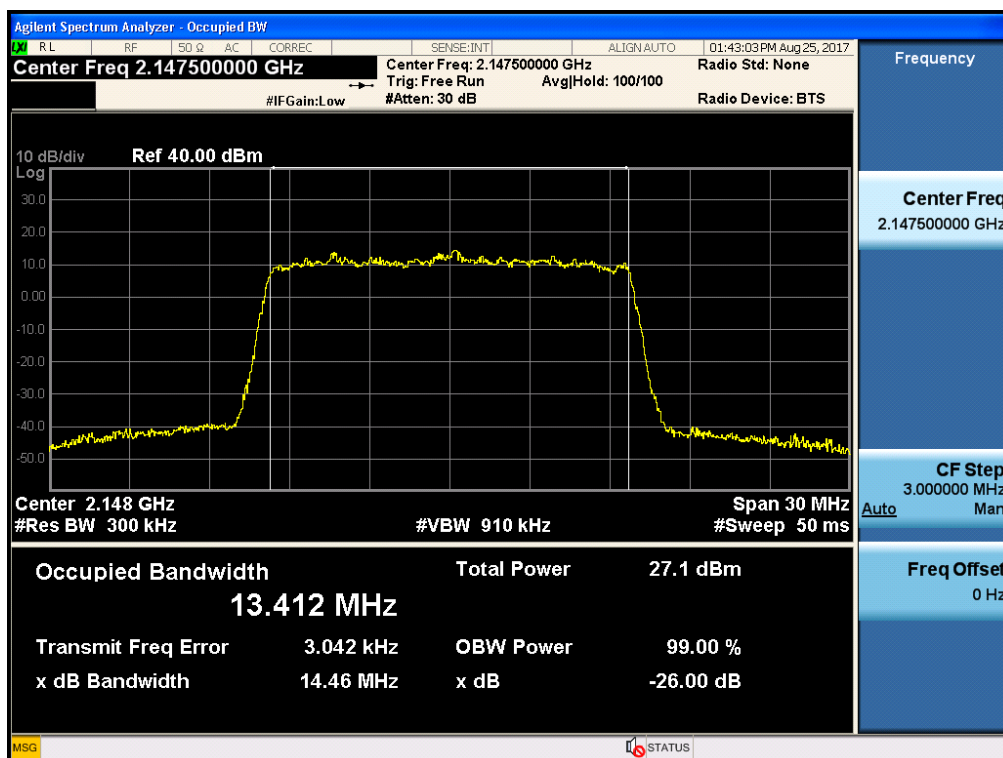
(16QAM Low Channel)



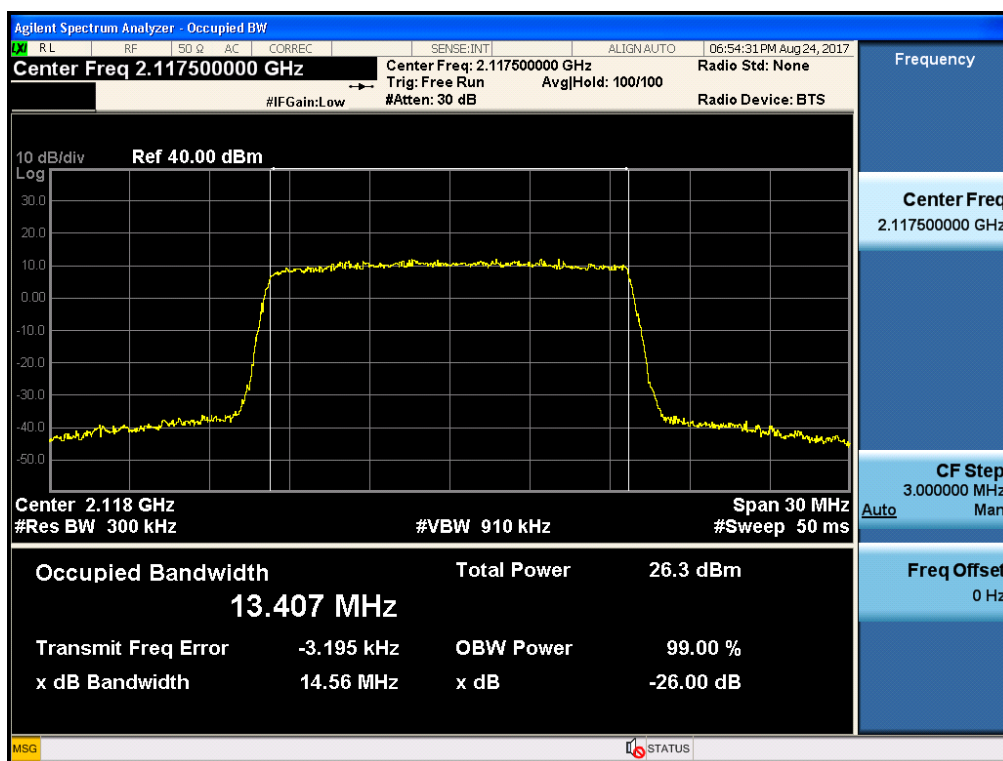
(16QAM Middle Channel)



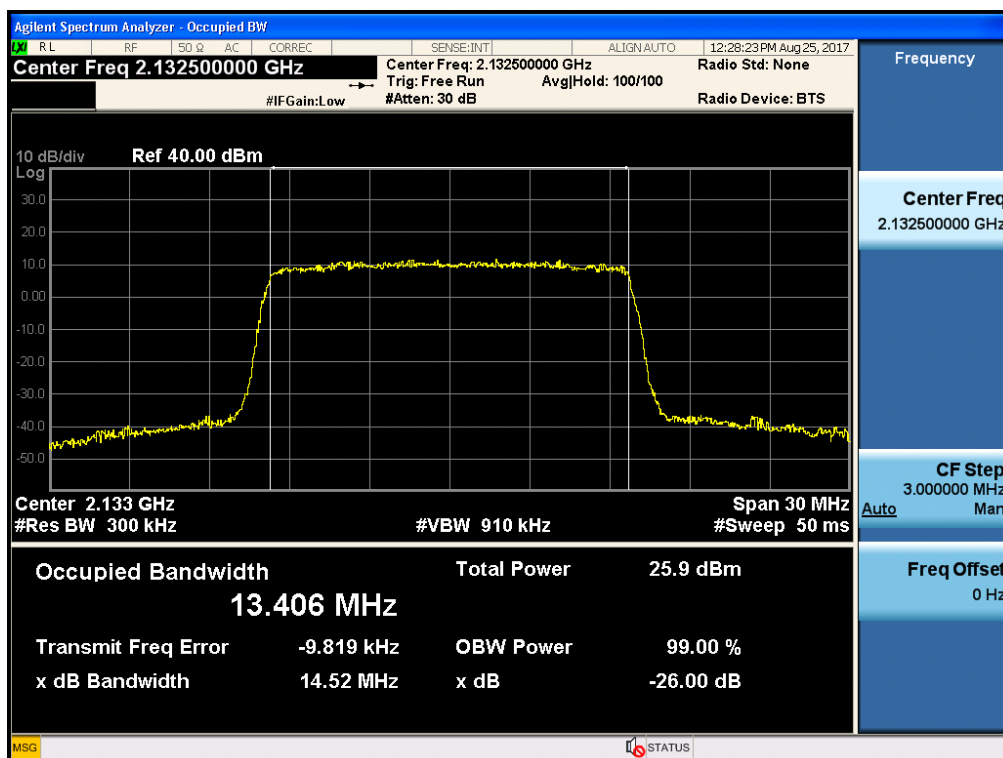
(16QAM High Channel)



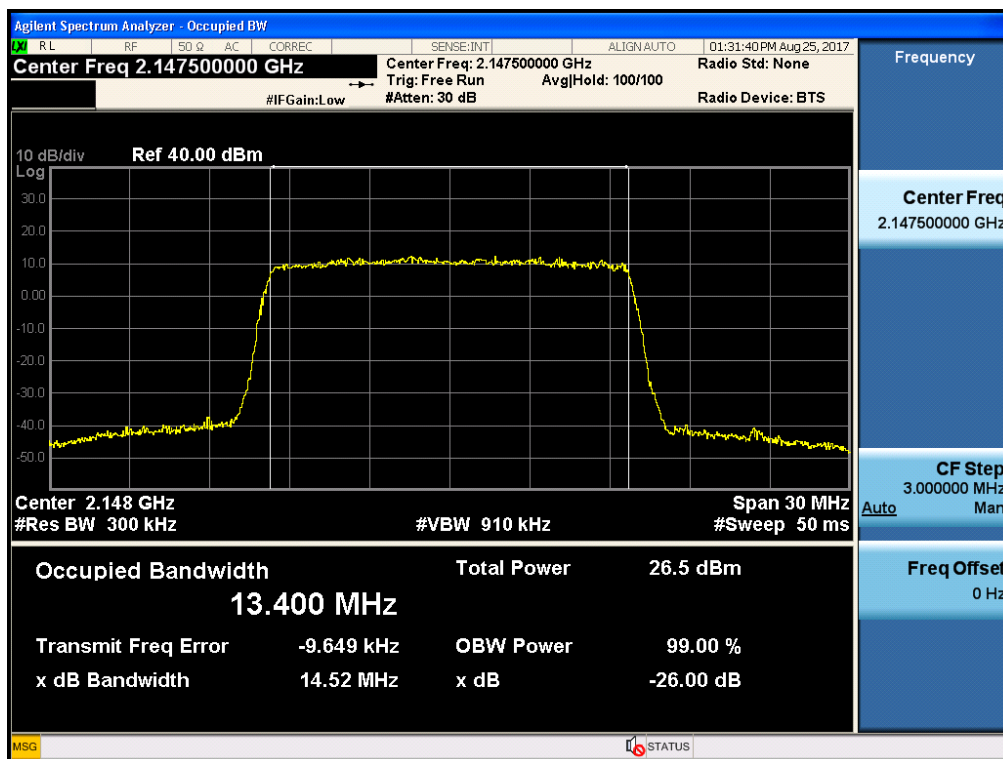
(64QAM Low Channel)



(64QAM Middle Channel)

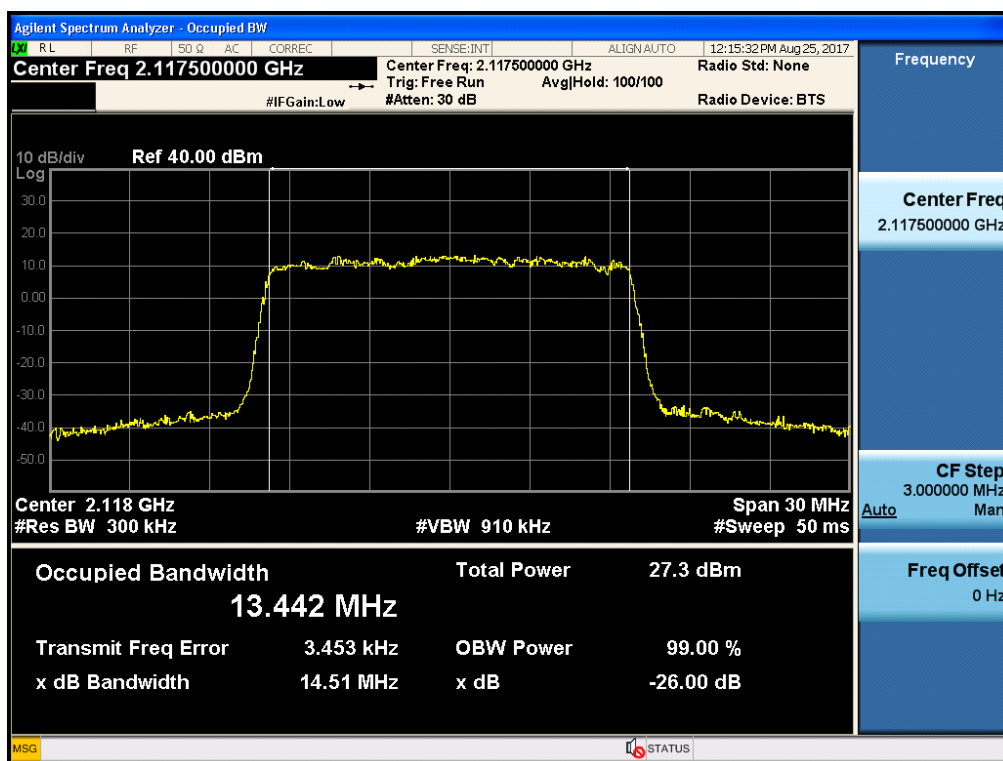


(64QAM High Channel)

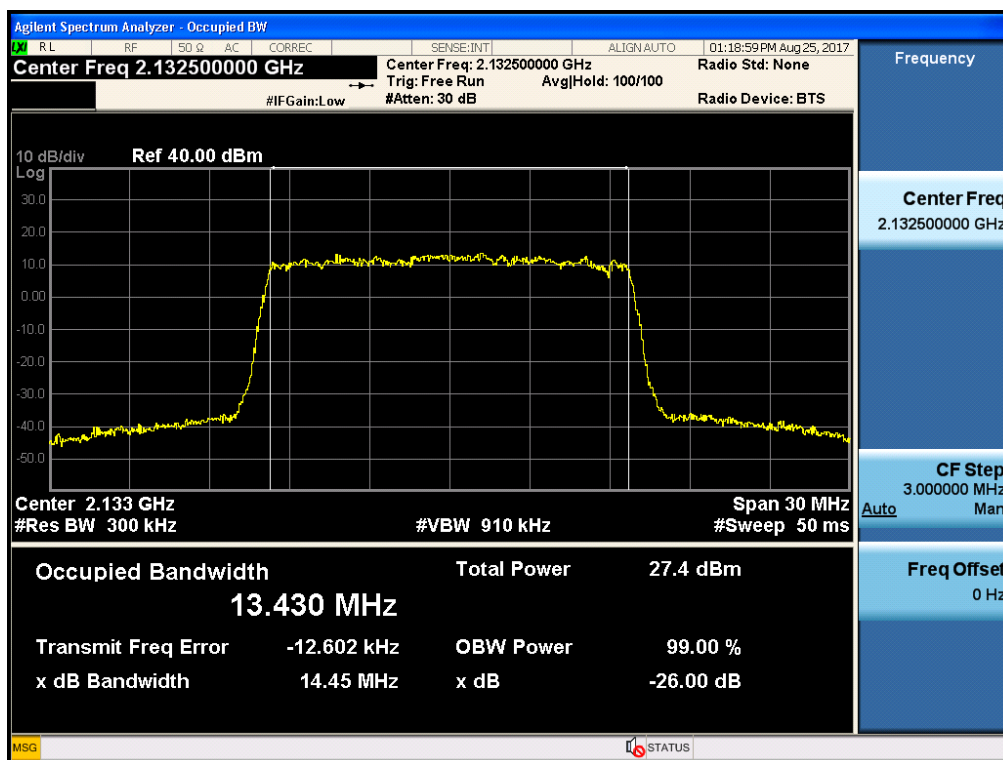


Test Plot at Output Port 2

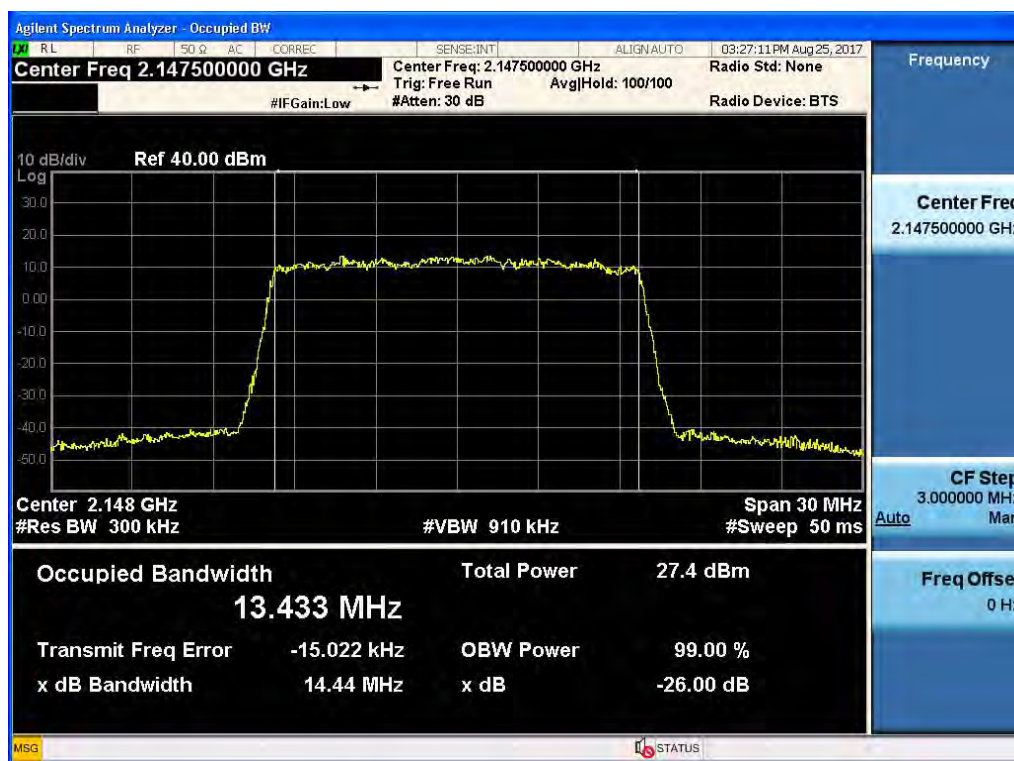
(QPSK Low Channel)



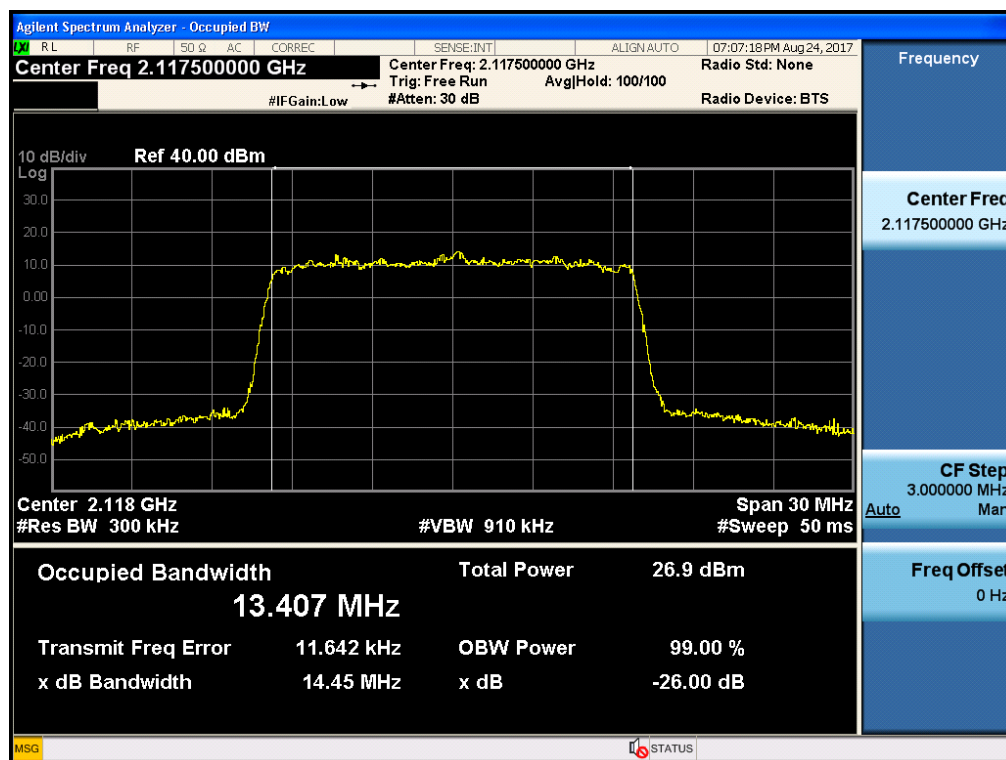
(QPSK Middle Channel)



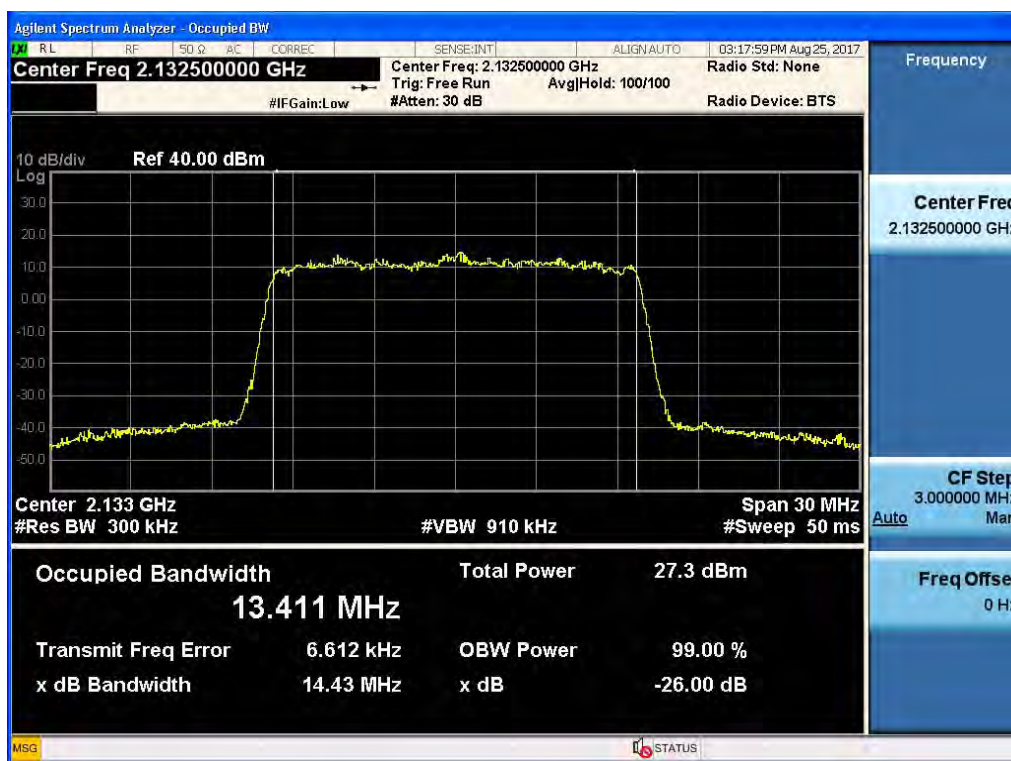
(QPSK High Channel)



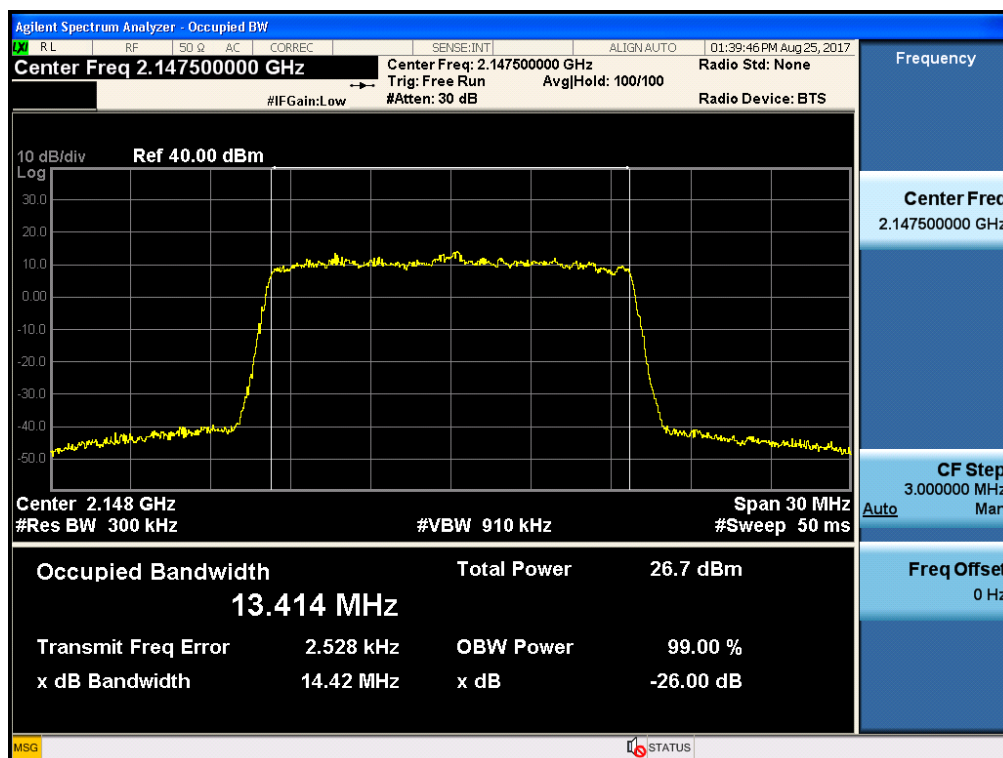
(16QAM Low Channel)



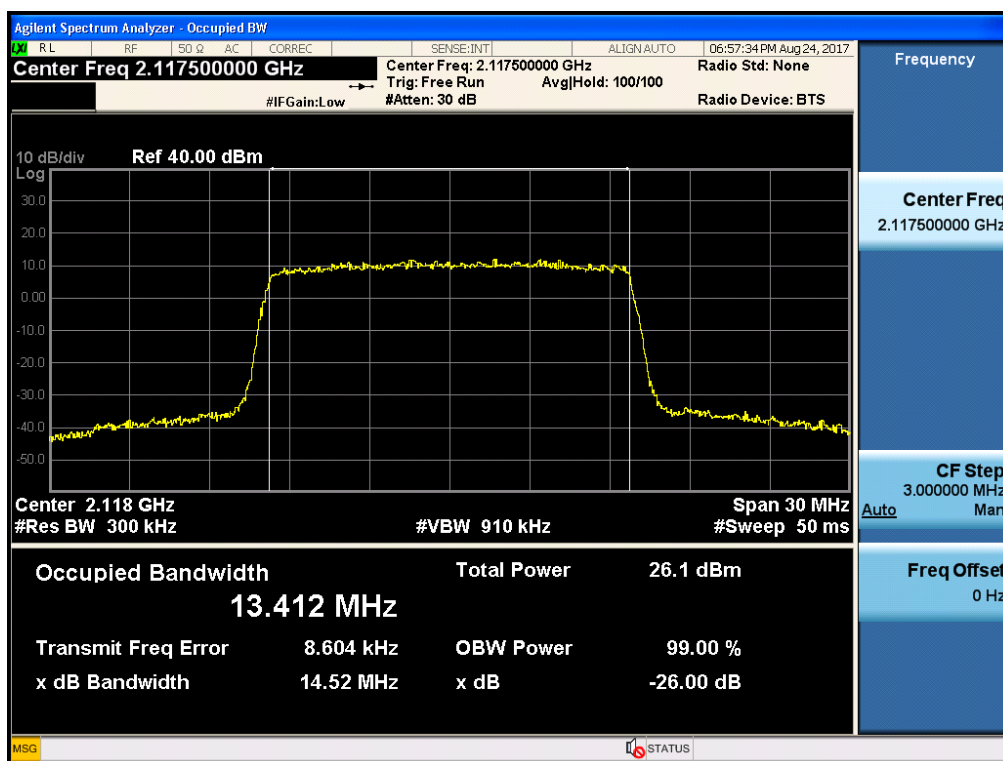
(16QAM Middle Channel)



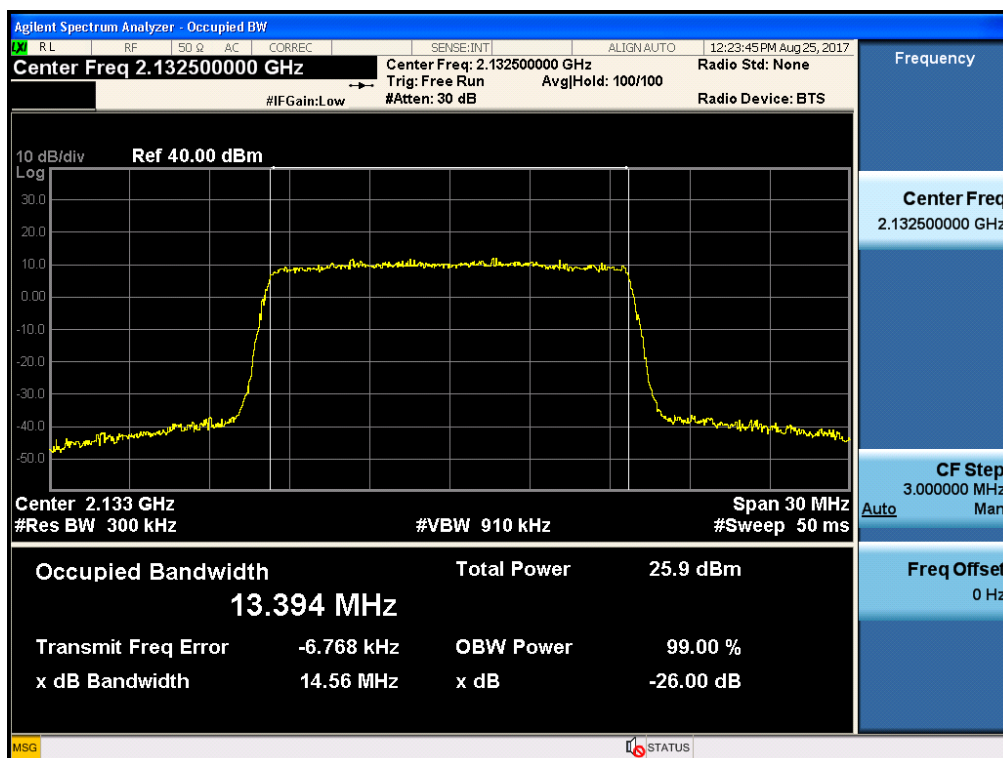
(16QAM High Channel)



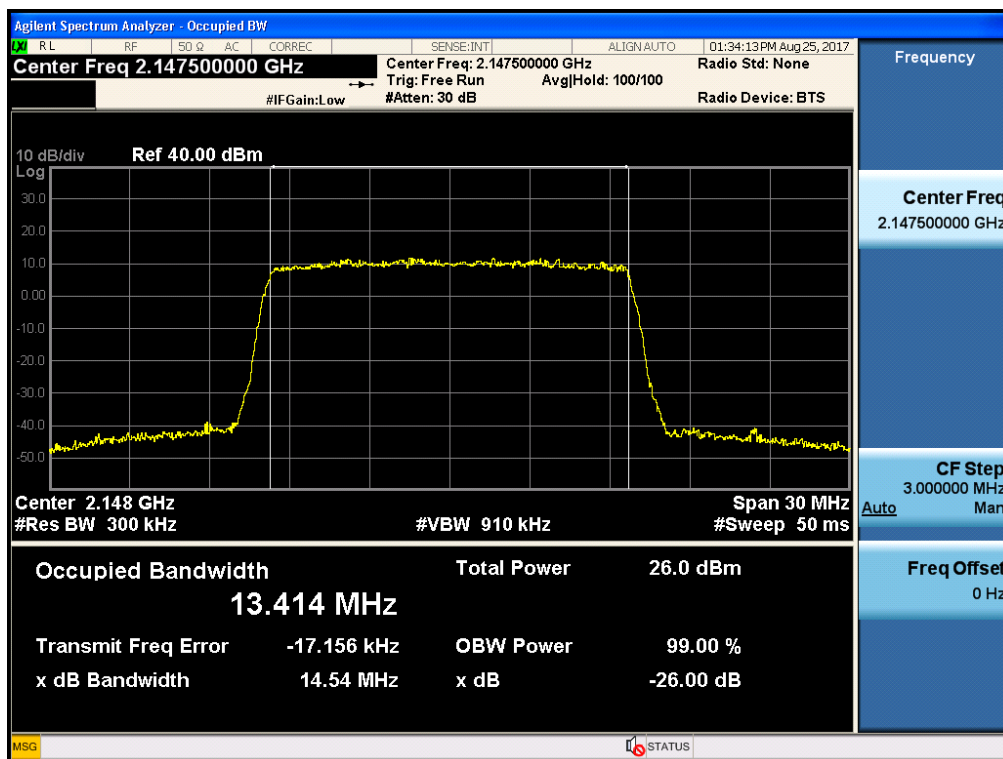
(64QAM Low Channel)



(64QAM Middle Channel)



(64QAM High Channel)



LTE Band 4 (20 MHz)**Test Data at Output Port 1**

Frequency (MHz)	Occupied Bandwidth (MHz)		
	QPSK	16QAM	64QAM
2120.00	17.979	17.956	17.971
2132.50	17.998	17.976	17.970
2145.00	17.979	17.967	17.996

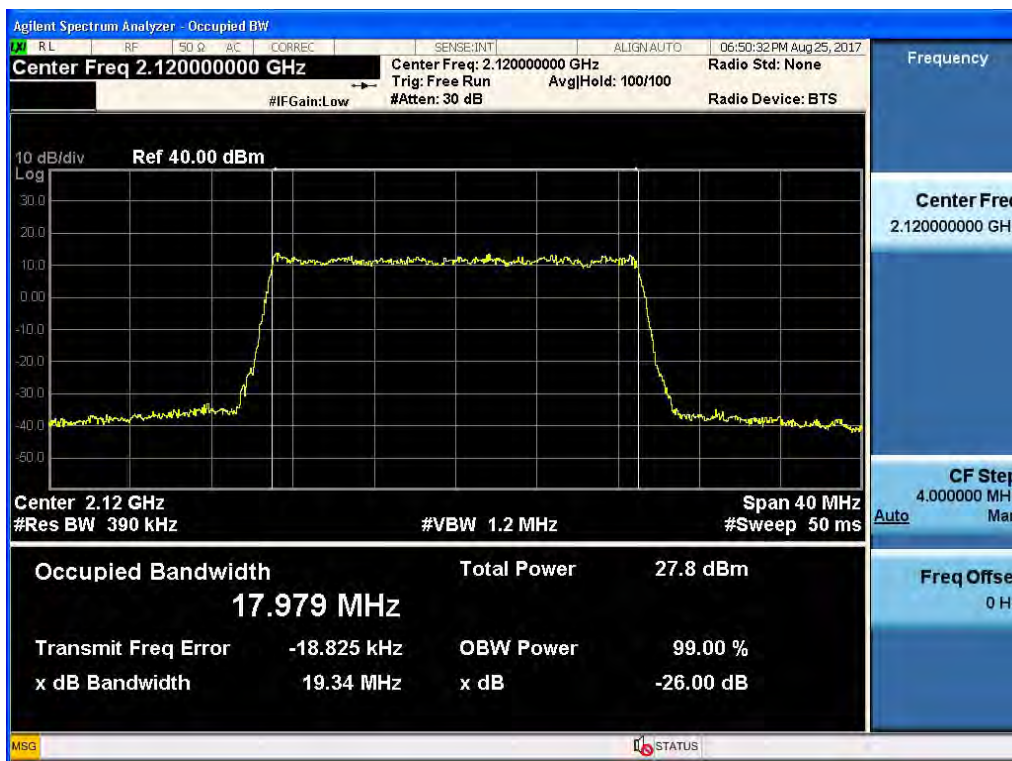
Test Data at Output Port 2

Frequency (MHz)	Occupied Bandwidth (MHz)		
	QPSK	16QAM	64QAM
2120.00	17.983	17.954	17.948
2132.50	17.981	17.969	17.945
2145.00	17.980	17.959	17.997

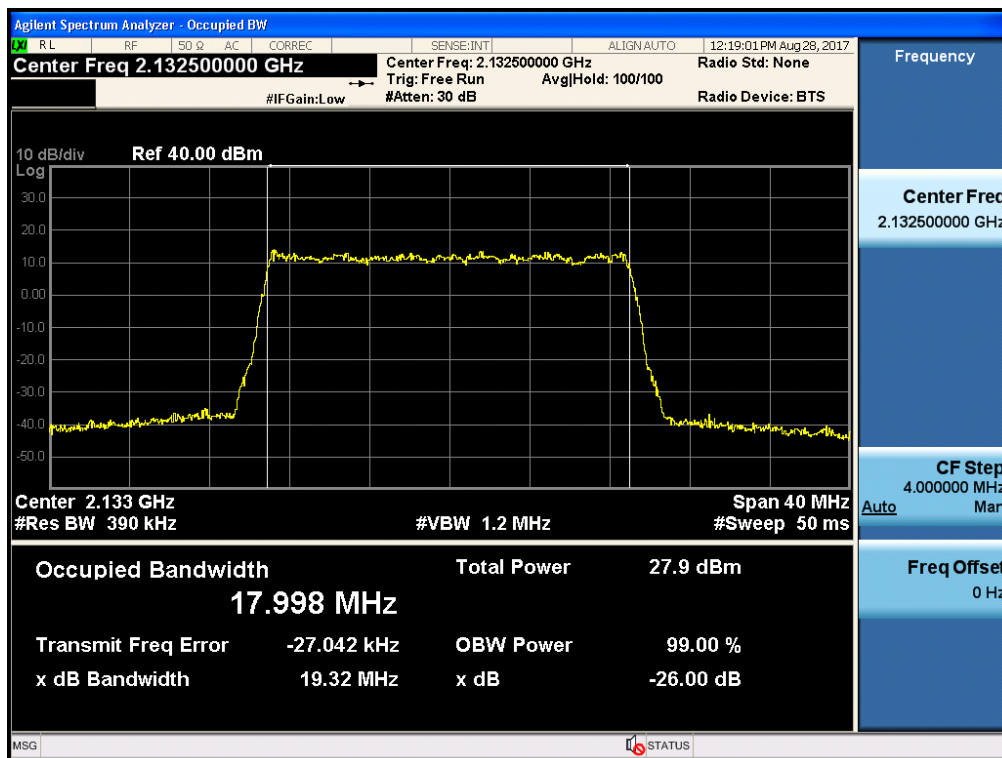
LTE Band 4 (20 MHz)

Test Plot at Output Port 1

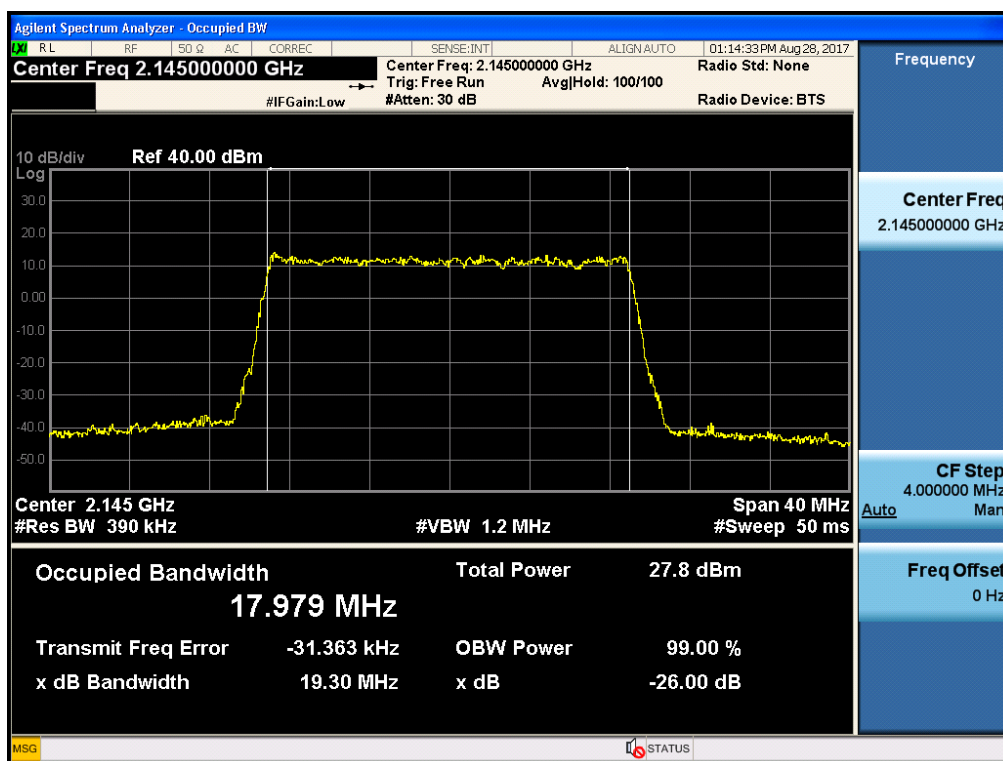
(QPSK Low Channel)



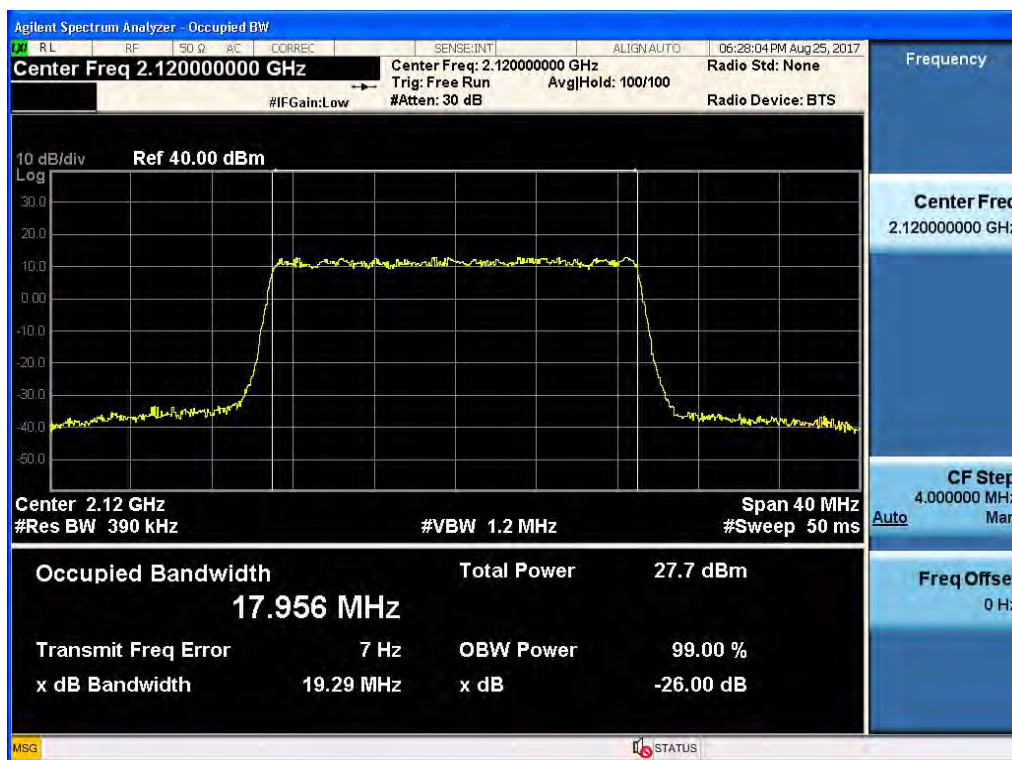
(QPSK Middle Channel)



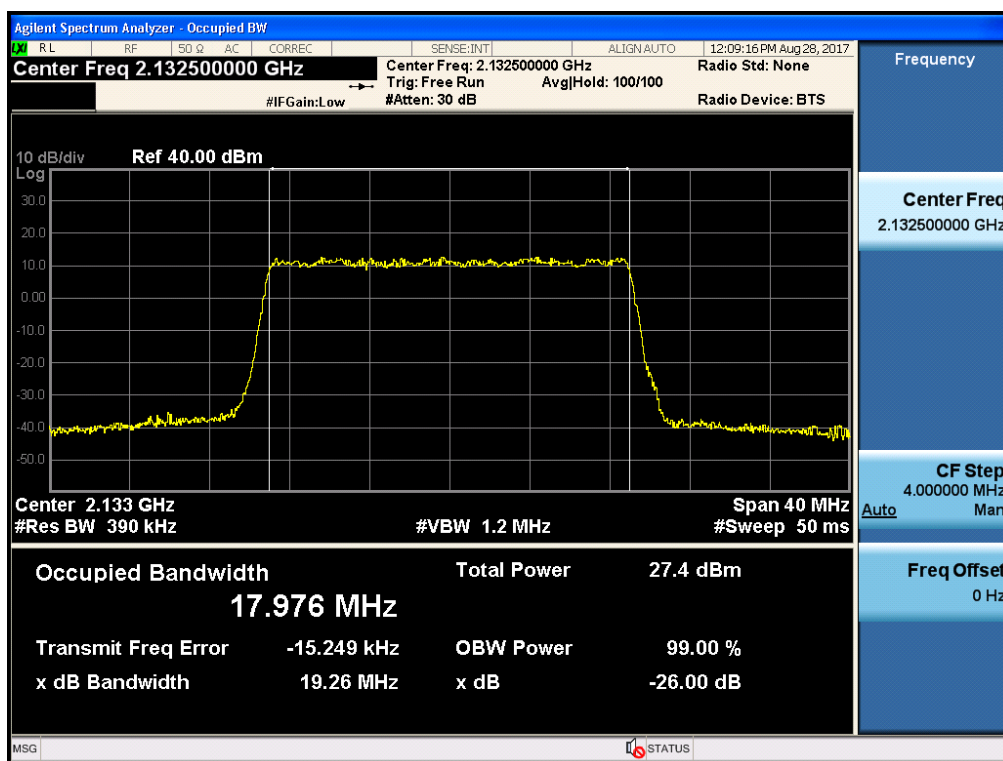
(QPSK High Channel)



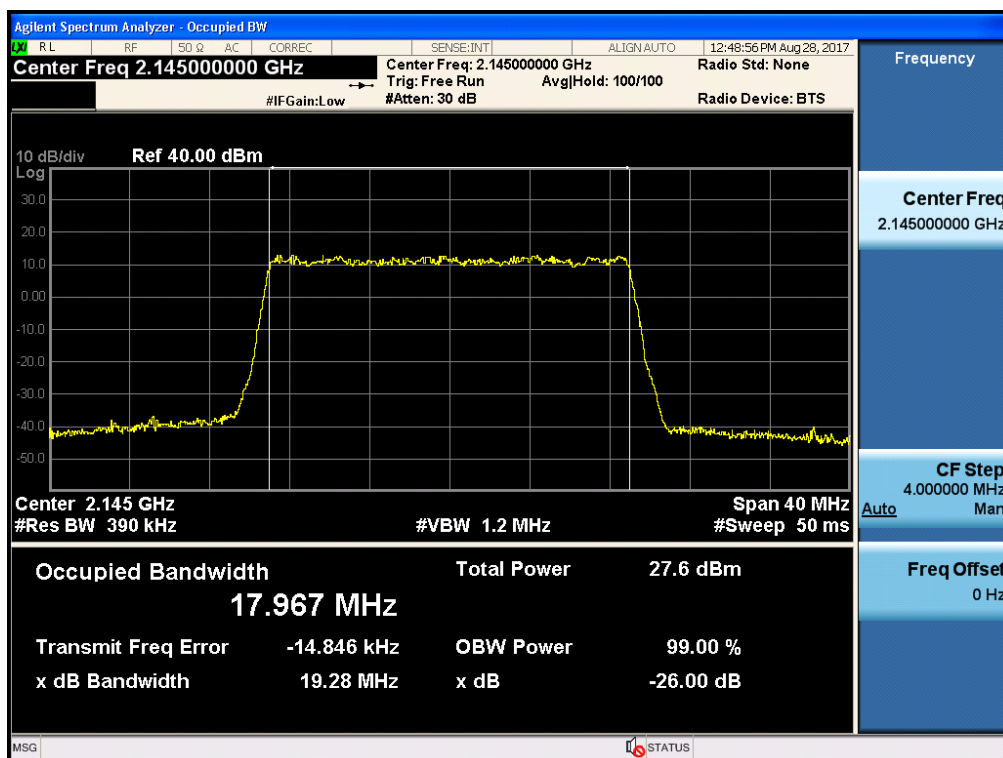
(16QAM Low Channel)



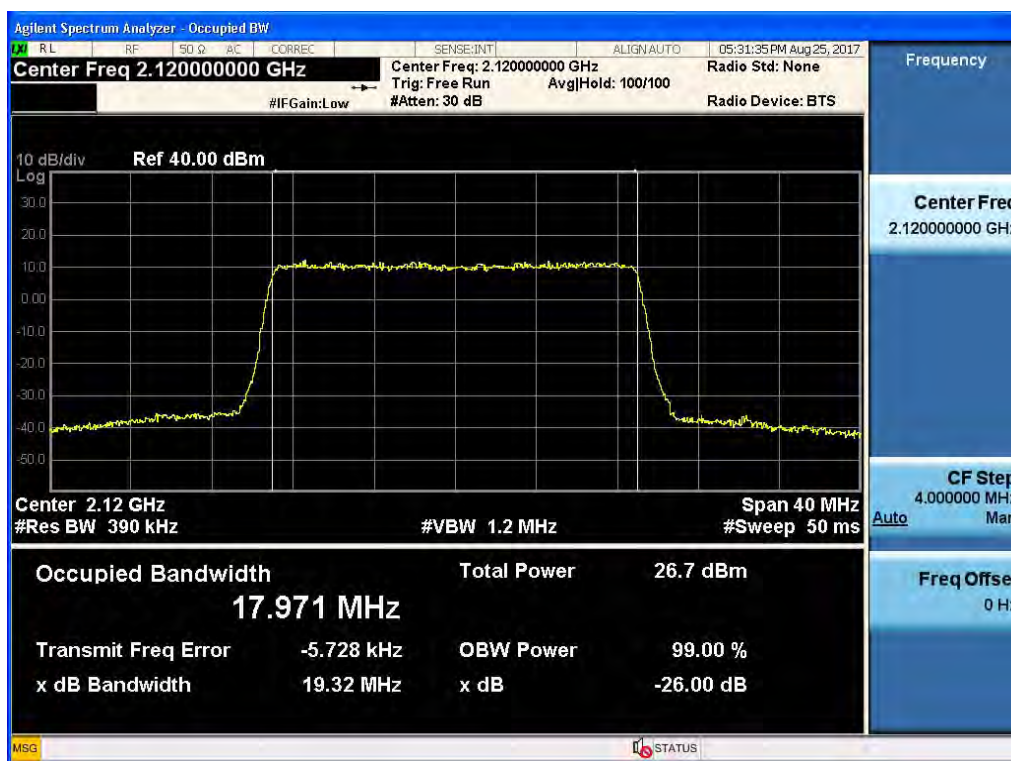
(16QAM Middle Channel)



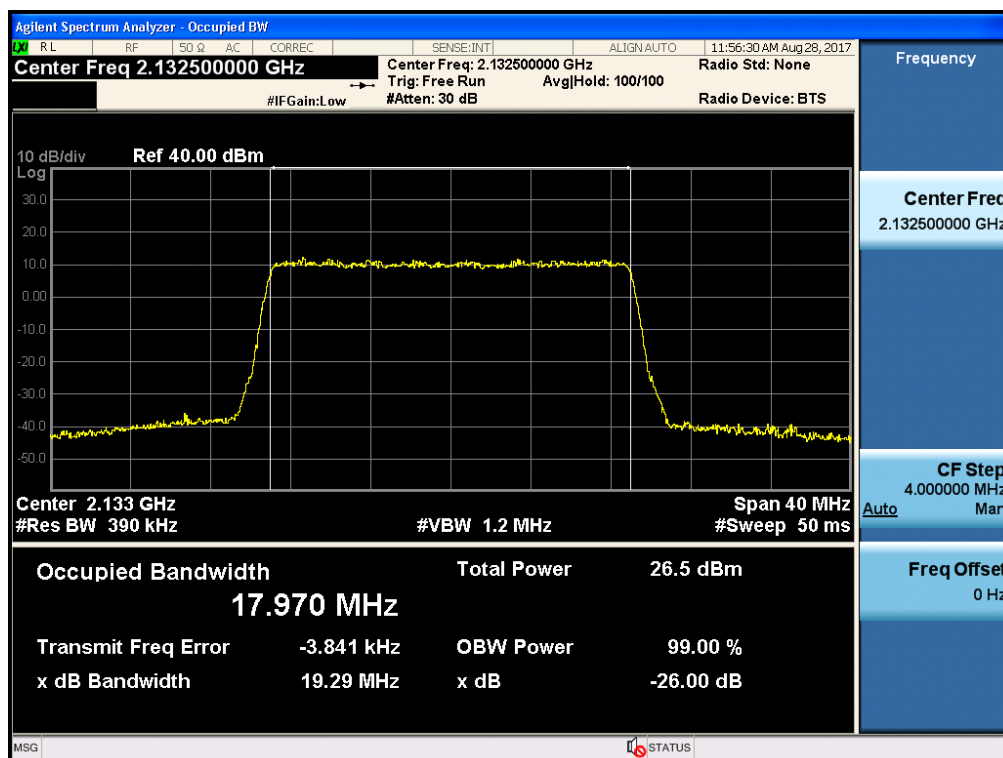
(16QAM High Channel)



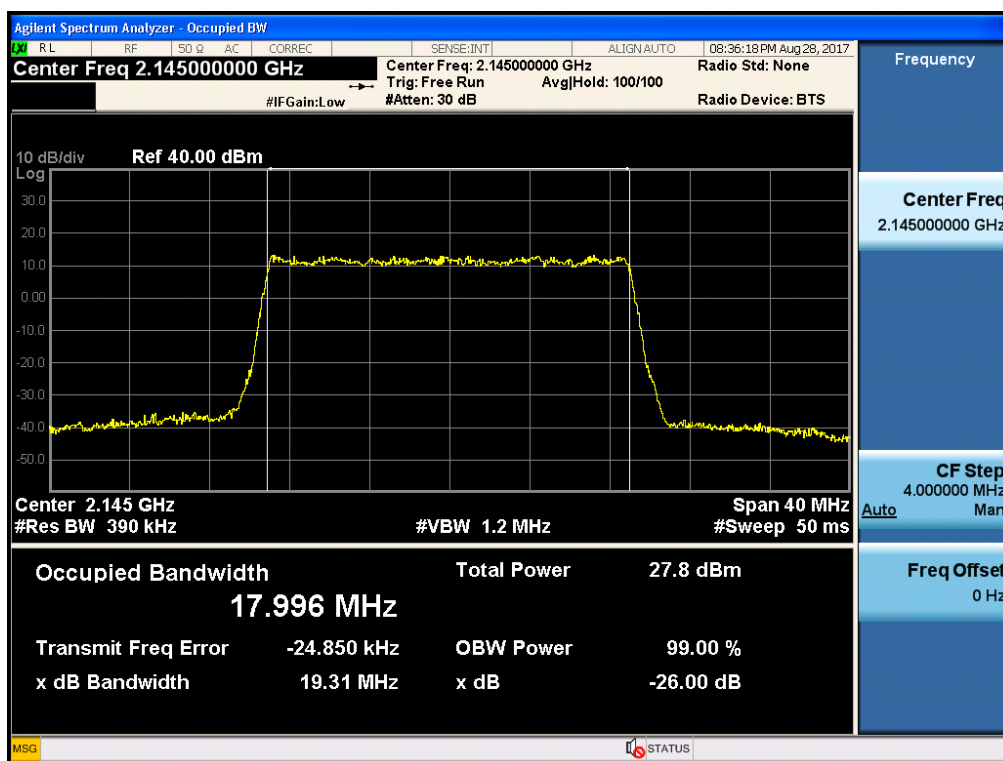
(64QAM Low Channel)



(64QAM Middle Channel)

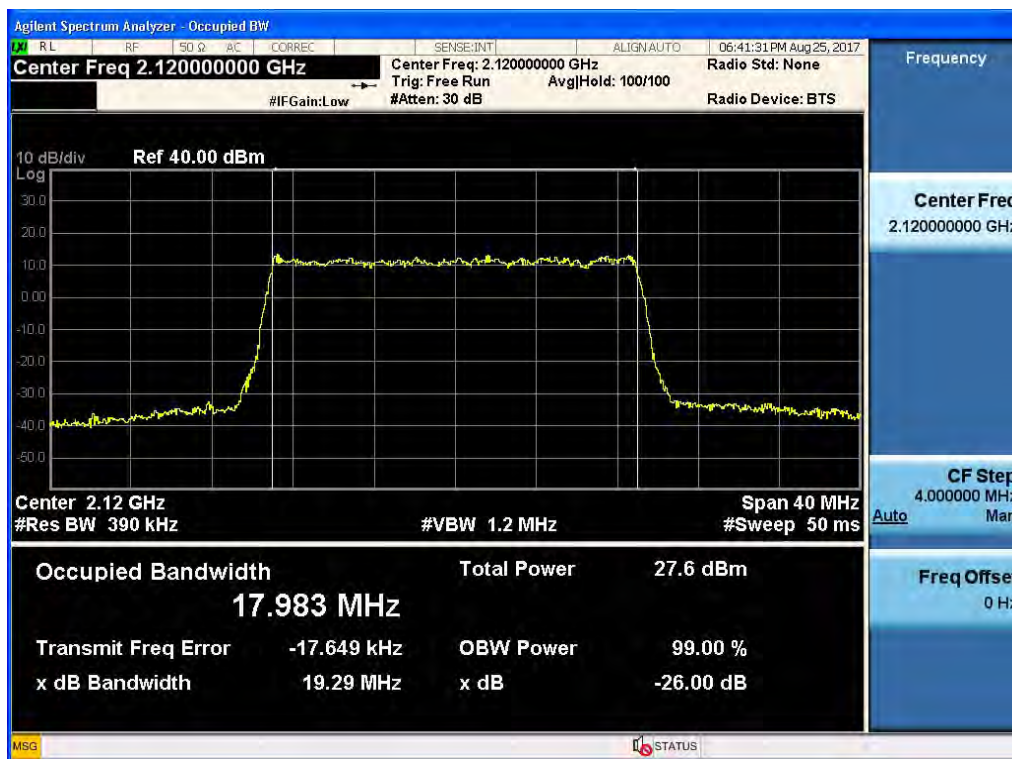


(64QAM High Channel)

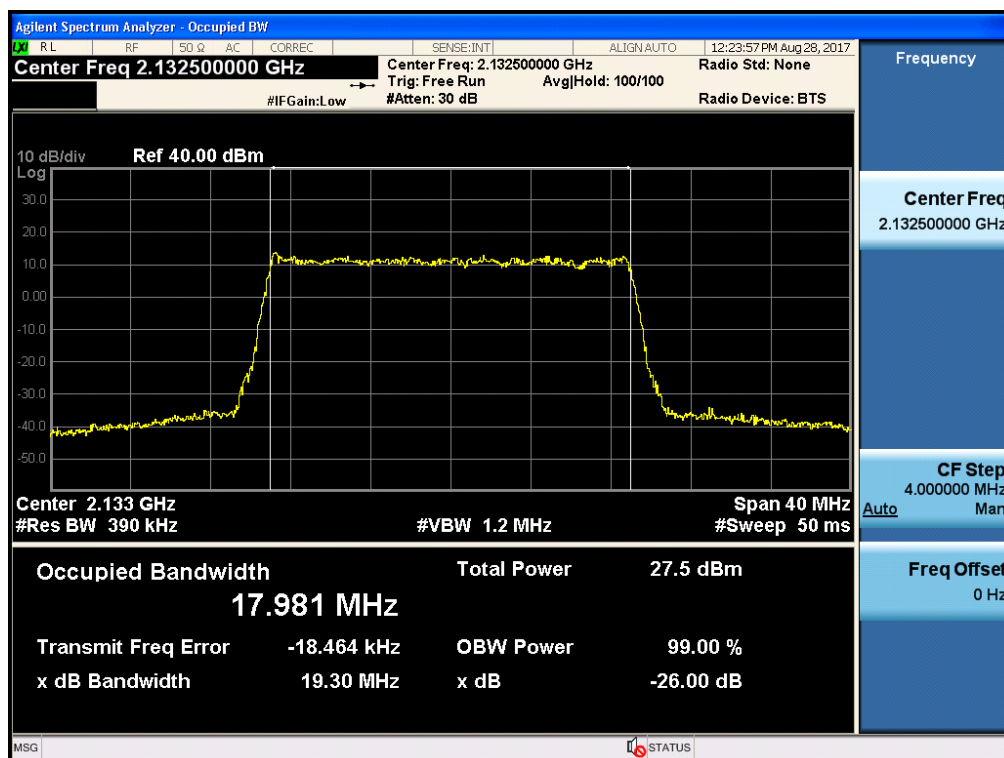


Test Plot at Output Port 2

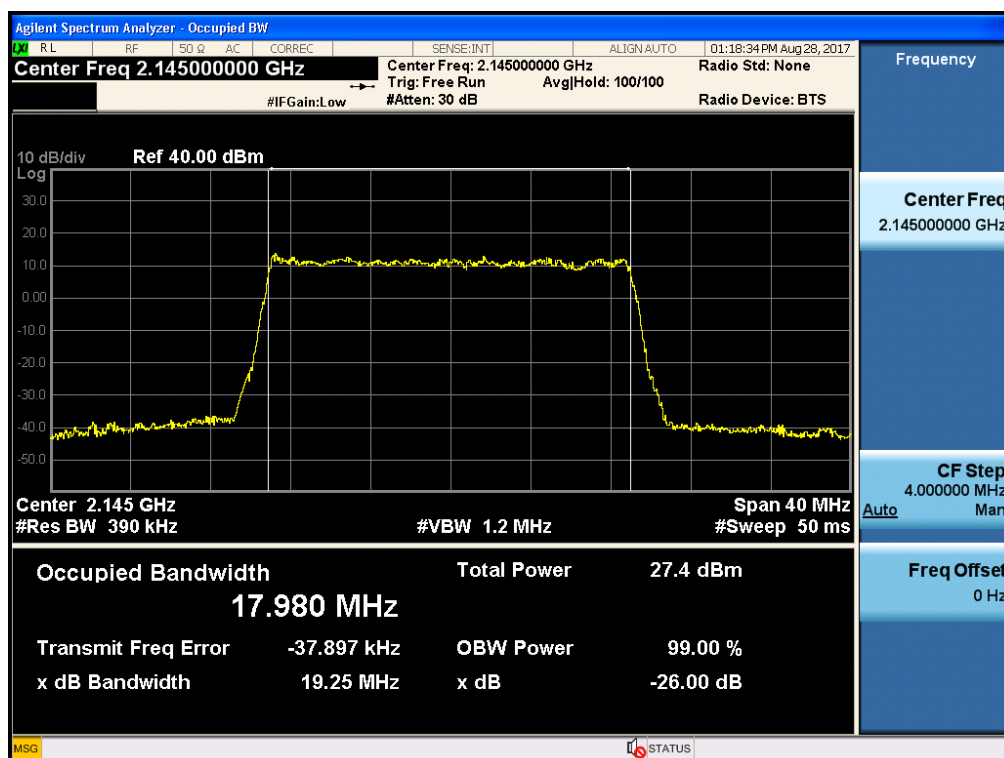
(QPSK Low Channel)



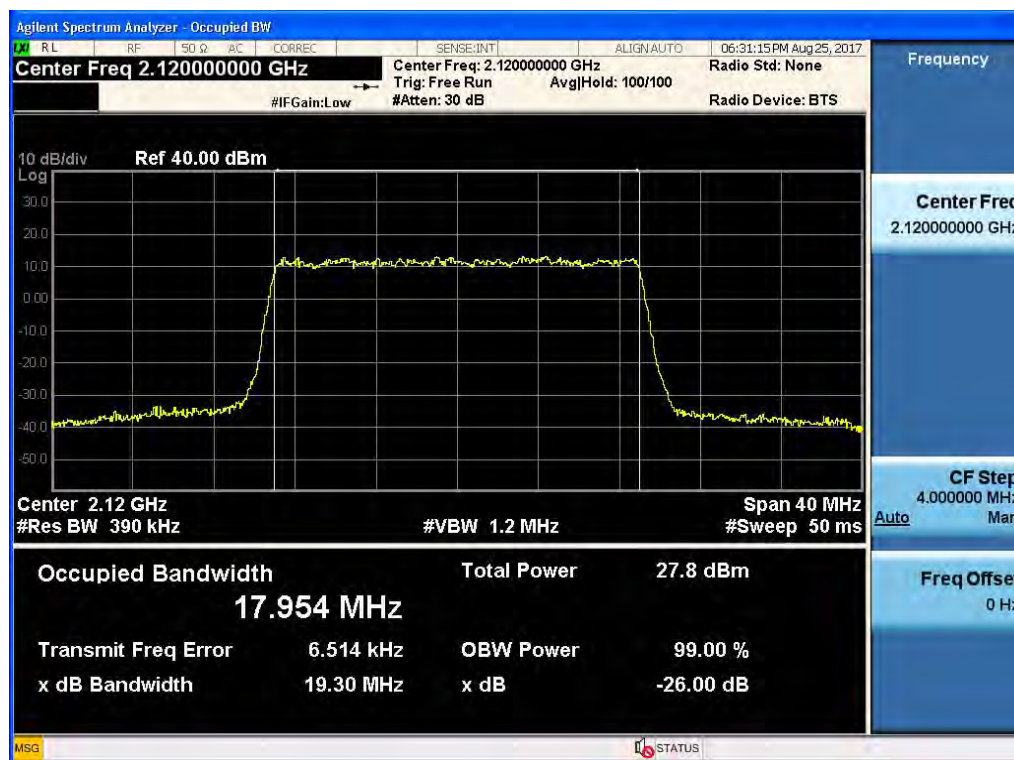
(QPSK Middle Channel)



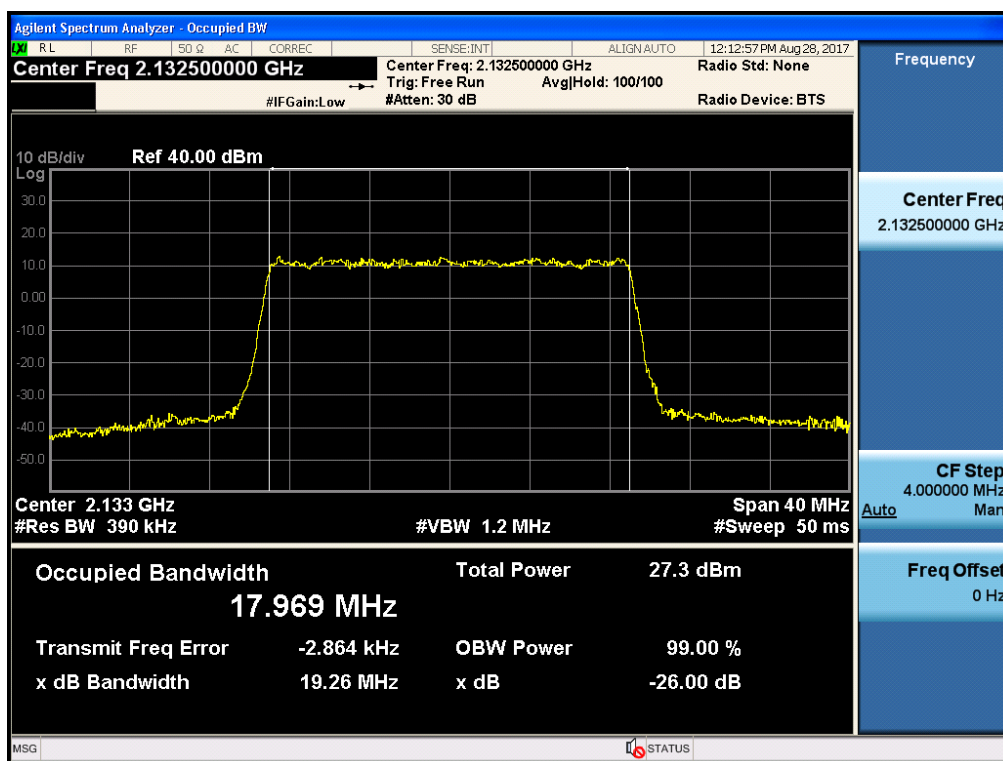
(QPSK High Channel)



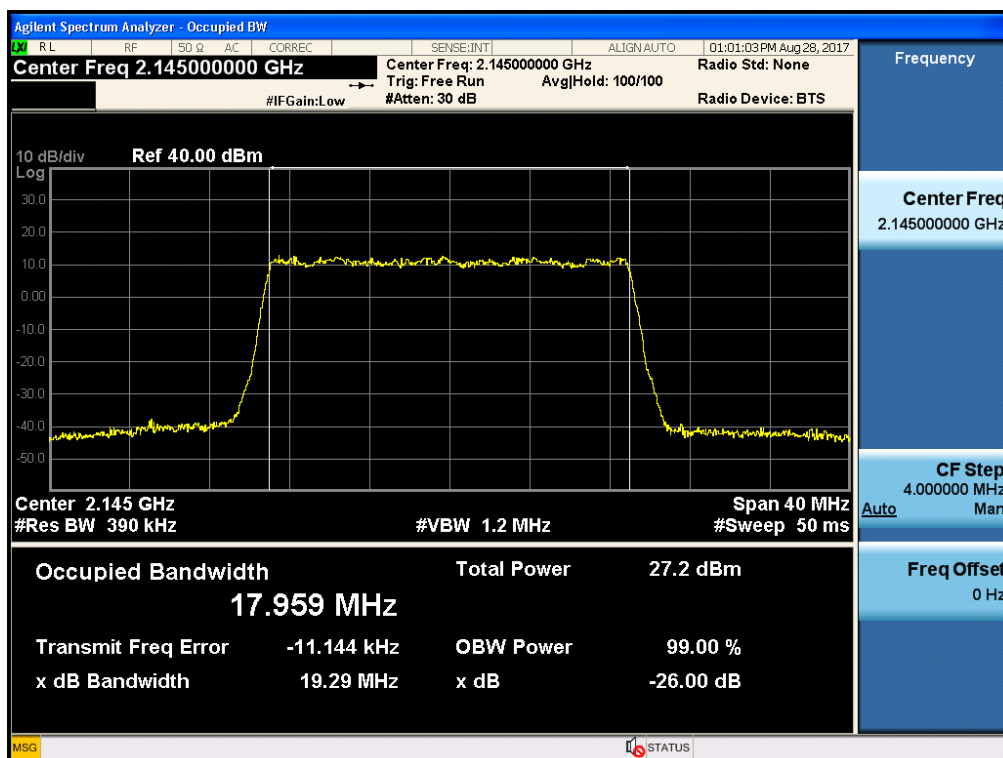
(16QAM Low Channel)



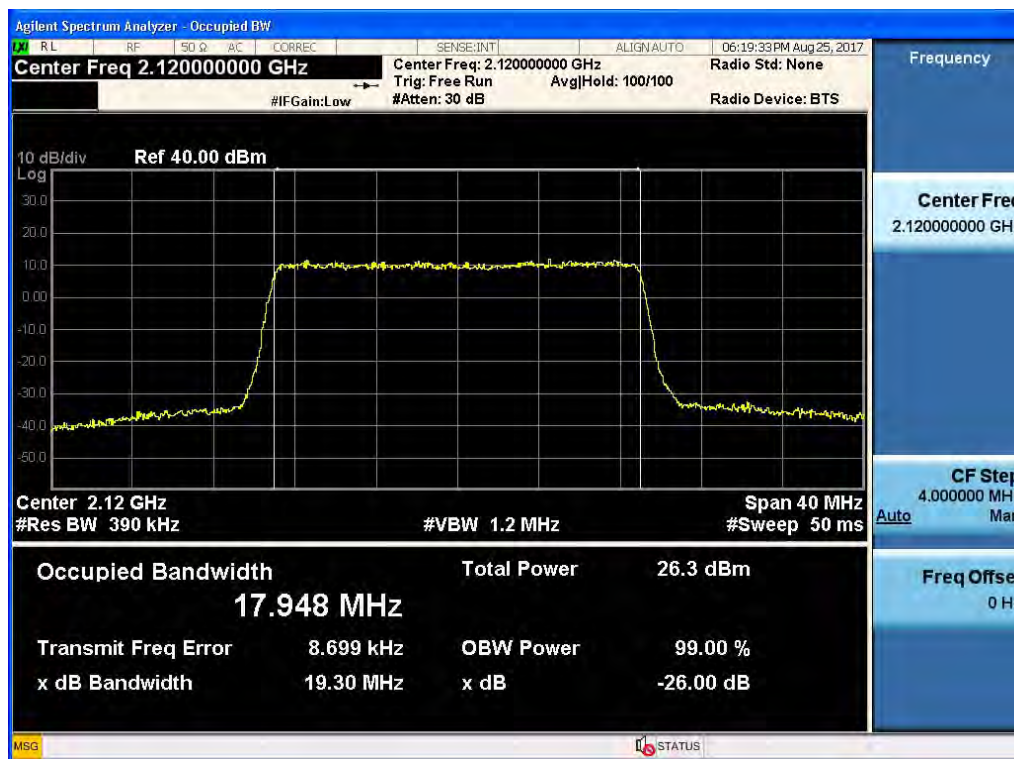
(16QAM Middle Channel)



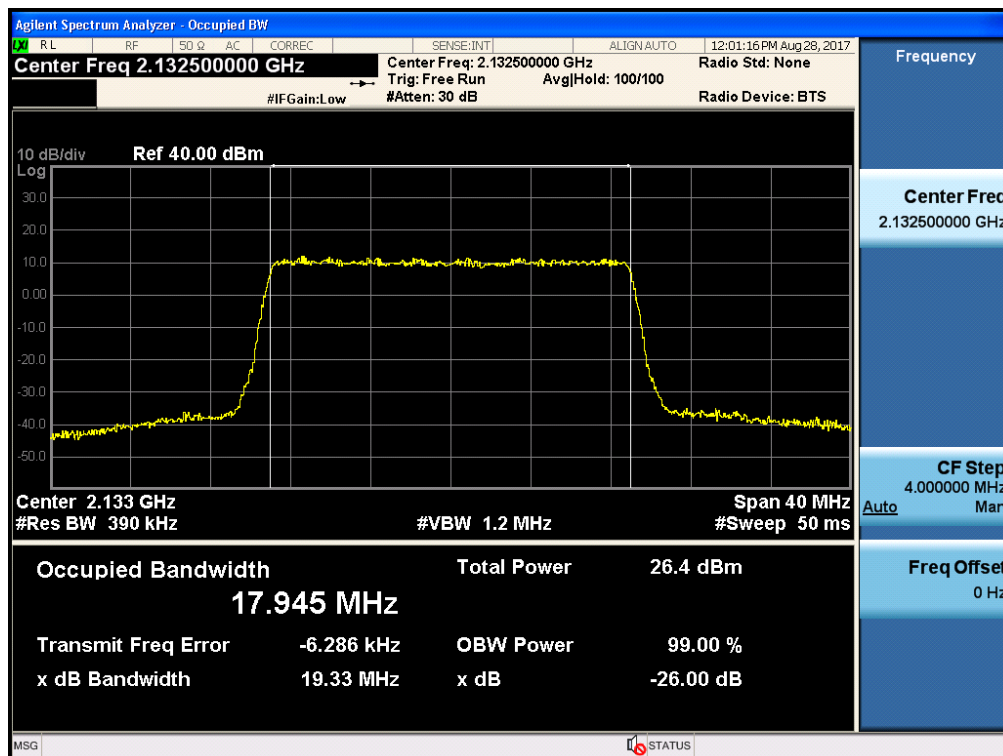
(16QAM High Channel)



(64QAM Low Channel)



(64QAM Middle Channel)



(64QAM High Channel)

