HCT CO.,LTD.
74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA
TEL: +82-31-645-6300 FAX: +82-31-645-6401

FCC REPORT

FCC Class II Permissive Change

Applicant Name:
SAMSUNG Electronics Co.,Ltd.

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

Date of Issue:
January 12, 2018

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

Report No.: HCT-RF-1801-FC005

FCC ID:	**A3LSMM-2LD0581902**
APPLICANT:	**SAMSUNG Electronics Co.,Ltd.**

FCC Model: SMM-2LD0581900

EUT Type: Remote Radio Head

Frequency Range: 1930 MHz ~ 1995 MHz

Tx Output Power: 160 W (40 W * 4)

Emission Designator

Mode	Tx Frequency (MHz)	Emission Designator	
		QPSK (G7W)	16QAM/64QAM/256QAM (D7W)
LTE (5 MHz)	1930 ~ 1995	4M57G7W	4M58D7W
LTE (10 MHz)	1930 ~ 1995	-	9M13D7W
LTE (15 MHz)	1930 ~ 1995	13M8G7W	13M8D7W

※ 10 MHz QPSK emission designator can be found in previously issued report

FCC Rule Part(s): FCC CFR 47 Part 2, Part 24

Data of Test: December 15, 2017 ~ December 22, 2017

Note: Refer to existing report 'HCTR1108FR14, HCTR1108FR15, HCTR1210FR28' and 'HCTR1305FR15' for data not included.

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

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-1801-FC005	January 12, 2018	- First Approval Report

Table of Contents

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: Hwan Youl Kim / Principal Research Engineer E-mail : hwanyoul.kim@samsung.com

1.2. PRODUCT INFORMATION

EUT Type	Remote Radio Head
Power Supply	DC -48 V
Emission Designator	<table><tr><th rowspan="2">Mode</th><th rowspan="2">Tx Frequency (MHz)</th><th colspan="2">Emission Designator</th></tr><tr><th>QPSK (G7W)</th><th>16QAM/64QAM/256QAM (D7W)</th></tr><tr><td>LTE (5 MHz)</td><td>1930 ~ 1995</td><td>4M57G7W</td><td>4M58D7W</td></tr><tr><td>LTE (10 MHz)</td><td>1930 ~ 1995</td><td>-</td><td>9M13D7W</td></tr><tr><td>LTE (15 MHz)</td><td>1930 ~ 1995</td><td>13M8G7W</td><td>13M8D7W</td></tr></table>※ 10 MHz QPSK emission designator can be found in previously issued report
Frequency Range	1930 MHz ~ 1995 MHz
Conducted Output Power	160 W (40W * 4)
Channel Bandwidths	LTE Band 25, 5 MHz / 10 MHz / 15 MHz Bandwidth
Modulation Type	QPSK, 16QAM, 64QAM, 256QAM
Antenna Specification	Manufacturer does not provide an antenna.

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 24

SECTION	TEST ITEMS	RESULTS
§2.1046, §24.232	Conducted Output Power	Compliant
§2.1049	Occupied Bandwidth	Compliant
§2.1051, §24.238	Spurious Emissions at Antenna Terminals	Compliant
§2.1053, §24.238	Radiated Spurious Emissions.	Compliant
§2.1055, §24.235	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 LTE modulation (QPSK, 16QAM, 64QAM, 256QAM) modes were tested.

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	N9020A / Spectrum Analyzer	09/15/2017	Annual	MY46471250
Weinschel	67-30-33 / Fixed Attenuator	02/09/2017	Annual	CC7264
Weinschel	67-30-33 / Fixed Attenuator	02/09/2017	Annual	BU5347
Weinschel	67-30-33 / Fixed Attenuator	09/14/2017	Annual	N/A
Weinschel	67-30-33 / Fixed Attenuator	09/14/2017	Annual	N/A
Rohde&Schwarz	ATT / 10dB Attenuator	08/21/2017	Annual	N/A
KIKUSUI	PWR800L / DC Power Supply	03/28/2017	Annual	RE001154
KIKUSUI	PWR800L / DC Power Supply	07/18/2017	Annual	RK000880
NANGYEUL CO., LTD.	NY-THR18750 / Temperature and Humidity Chamber	10/21/2017	Annual	NY-2009012201A
Audix	AM4000 / Antenna Position Tower	N/A	N/A	N/A
Innco system	CT0800 / Turn Table	N/A	N/A	N/A
Audix	EM1000 / Controller	N/A	N/A	060520
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	06/30/2017	Biennial	9120D-1300
Rohde & Schwarz	FSP / Spectrum Analyzer	09/21/2017	Annual	836650/016
Rohde & Schwarz	FSV40-N / Spectrum Analyzer	09/27/2017	Annual	101068-SZ
Wainwright Instruments	WHKX10-900-1000-15000-40SS	07/21/2017	Annual	5
CERNEX	CBLU1183540 / Power Amplifier	01/25/2017	Annual	24614
CERNEX	CBL06185030 / Power Amplifier	01/25/2017	Annual	24615

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.

§ 24.232 Power and antenna height limits.

(a)(1) Base stations with an emission bandwidth of 1 MHz or less are limited to 1640 watts equivalent isotropically radiated power (EIRP) with an antenna height up to 300 meters HAAT, except as described in paragraph (b) below.

(2) Base stations with an emission bandwidth greater than 1 MHz are limited to 1640 watts/MHz equivalent isotropically radiated power (EIRP) with an antenna height up to 300 meters HAAT, except as described in paragraph (b) below.

(3) Base station antenna heights may exceed 300 meters HAAT with a corresponding reduction in power; see Tables 1 and 2 of this section.

(4) The service area boundary limit and microwave protection criteria specified in §§24.236 and 24.237 apply.

Table 1—Reduced Power for Base Station Antenna Heights Over 300 Meters, With Emission Bandwidth of 1 MHz or Less

HAAT in meters	Maximum EIRP watts
≤300	1640

≤500	1070
≤1000	490
≤1500	270
≤2000	160

Table 2—Reduced Power for Base Station Antenna Heights Over 300 Meters, With Emission Bandwidth Greater Than 1 MHz

HAAT in meters	Maximum EIRP watts/MHz
≤300	1640
≤500	1070
≤1000	490
≤1500	270
≤2000	160

(b)(1) Base stations that are located in counties with population densities of 100 persons or fewer per square mile, based upon the most recently available population statistics from the Bureau of the Census, with an emission bandwidth of 1 MHz or less are limited to 3280 watts equivalent isotropically radiated power (EIRP) with an antenna height up to 300 meters HAAT.

(2) Base stations that are located in counties with population densities of 100 persons or fewer per square mile, based upon the most recently available population statistics from the Bureau of the Census, with an emission bandwidth greater than 1 MHz are limited to 3280 watts/MHz equivalent isotropically radiated power (EIRP) with an antenna height up to 300 meters HAAT.

(3) Base station antenna heights may exceed 300 meters HAAT with a corresponding reduction in power; see Tables 3 and 4 of this section.

(4) The service area boundary limit and microwave protection criteria specified in §§24.236 and 24.237 apply.

(5) Operation under this paragraph (b) at power limits greater than permitted under paragraph (a) of this section must be coordinated in advance with all broadband PCS licensees authorized to operate on adjacent frequency blocks within 120 kilometers (75 miles) of the base station and is limited to base stations located more than 120 kilometers (75 miles) from the Canadian border and more than 75 kilometers (45 miles) from the Mexican border.

Table 3—Reduced Power for Base Station Antenna Heights Over 300 Meters, With Emission Bandwidth of 1 MHz or Less

HAAT in meters	Maximum EIRP watts
≤300	3280

≤500	2140
≤1000	980
≤1500	540
≤2000	320

Table 4—Reduced Power for Base Station Antenna Heights Over 300 Meters, With Emission Bandwidth Greater Than 1 MHz

HAAT in meters	Maximum EIRP watts/MHz
≤300	3280
≤500	2140
≤1000	980
≤1500	540
≤2000	320

(c) Mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.
(d) Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of §24.51. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.
(e) 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.

Note to §24.232: Height above average terrain (HAAT) is to be calculated using the method set forth in §24.53 of this part.

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 measured at each antenna port and then summed mathematically to determine the total emission level from the device.

Note:

1) Maximum ERP is sufficient level to pass the limit.
2) Sum data is in a tolerance of specification provided from manufacturer.

RF Output power tolerance: ±1 dB (each port)
Maximum output power for one port: 50.362 W (46.02 dBm + 1 dB)
*Maximum output sum power: 50.362 W * 4 = 201.448 W*
Measured sum maximum power: 165.311 W

The measured value is lower than the specification value.

Test Results:

5 MHz / 1 Carrier (20 W)

Test Data at Downlink Port 0

Mod.	Channel	Frequency (MHz)	Measured Output Power	
			(dBm)	(W)
QPSK	Low	1932.50	-	-
	Middle	1962.50	-	-
	High	1992.50	-	-
16QAM	Low	1932.50	-	-
	Middle	1962.50	-	-
	High	1992.50	-	-
64QAM	Low	1932.50	-	-
	Middle	1962.50	-	-
	High	1992.50	-	-
256QAM	Low	1932.50	42.81	19.099
	Middle	1962.50	42.79	19.011
	High	1992.50	42.91	19.543

Test Data at Downlink Port 1

Mod.	Channel	Frequency (MHz)	Measured Output Power	
			(dBm)	(W)
QPSK	Low	1932.50	-	-
	Middle	1962.50	-	-
	High	1992.50	-	-
16QAM	Low	1932.50	-	-
	Middle	1962.50	-	-
	High	1992.50	-	-
64QAM	Low	1932.50	-	-
	Middle	1962.50	-	-
	High	1992.50	-	-
256QAM	Low	1932.50	42.82	19.143
	Middle	1962.50	42.78	18.967
	High	1992.50	42.87	19.364

Test Data at Downlink Port 2

Mod.	Channel	Frequency (MHz)	Measured Output Power	
			(dBm)	(W)
QPSK	Low	1932.50	42.82	19.143
	Middle	1962.50	42.74	18.793
	High	1992.50	43.00	19.953
16QAM	Low	1932.50	42.80	19.055
	Middle	1962.50	42.80	19.055
	High	1992.50	42.99	19.907
64QAM	Low	1932.50	42.81	19.099
	Middle	1962.50	42.83	19.187
	High	1992.50	43.02	20.045
256QAM	Low	1932.50	42.81	19.099
	Middle	1962.50	42.83	19.187
	High	1992.50	42.90	19.498

Test Data at Downlink Port 3

Mod.	Channel	Frequency (MHz)	Measured Output Power	
			(dBm)	(W)
QPSK	Low	1932.50	42.82	19.143
	Middle	1962.50	42.80	19.055
	High	1992.50	42.92	19.588
16QAM	Low	1932.50	42.83	19.187
	Middle	1962.50	42.80	19.055
	High	1992.50	42.95	19.724
64QAM	Low	1932.50	42.82	19.143
	Middle	1962.50	42.77	18.923
	High	1992.50	43.02	20.045
256QAM	Low	1932.50	42.83	19.187
	Middle	1962.50	42.82	19.143
	High	1992.50	42.91	19.543

Sum Data of Port 2 and Port 3

Mod.	Channel	Frequency (MHz)	Measured Output Power (W)
QPSK	Low	1932.50	38.286
	Middle	1962.50	37.848
	High	1992.50	39.541
16QAM	Low	1932.50	38.242
	Middle	1962.50	38.110
	High	1992.50	39.631
64QAM	Low	1932.50	38.242
	Middle	1962.50	38.110
	High	1992.50	40.090

Sum Data of Port 0, Port 1, Port 2 and Port 3

Mod.	Channel	Frequency (MHz)	Measured Output Power (W)
QPSK	Low	1932.50	For sum power of all port, refer to exiting report data
	Middle	1962.50	
	High	1992.50	
16QAM	Low	1932.50	
	Middle	1962.50	
	High	1992.50	
64QAM	Low	1932.50	
	Middle	1962.50	
	High	1992.50	
256QAM	Low	1932.50	76.528
	Middle	1962.50	76.308
	High	1992.50	77.948

5 MHz + 5 MHz / 2 Carriers (20 W + 20 W)

Test Data at Downlink Port 0

Mod.	Channel	Frequency (MHz)	Measured Output Power	
			(dBm)	(W)
QPSK	Low	1935.00	-	-
	Middle	1962.50	-	-
	High	1990.00	-	-
16QAM	Low	1935.00	-	-
	Middle	1962.50	-	-
	High	1990.00	-	-
64QAM	Low	1935.00	-	-
	Middle	1962.50	-	-
	High	1990.00	-	-
256QAM	Low	1935.00	45.72	37.325
	Middle	1962.50	45.73	37.411
	High	1990.00	45.96	39.446

Test Data at Downlink Port 1

Mod.	Channel	Frequency (MHz)	Measured Output Power	
			(dBm)	(W)
QPSK	Low	1935.00	-	-
	Middle	1962.50	-	-
	High	1990.00	-	-
16QAM	Low	1935.00	-	-
	Middle	1962.50	-	-
	High	1990.00	-	-
64QAM	Low	1935.00	-	-
	Middle	1962.50	-	-
	High	1990.00	-	-
256QAM	Low	1935.00	45.81	38.107
	Middle	1962.50	45.83	38.282
	High	1990.00	45.94	39.264

Test Data at Downlink Port 2

Mod.	Channel	Frequency (MHz)	Measured Output Power	
			(dBm)	(W)
QPSK	Low	1935.00	45.57	36.058
	Middle	1962.50	45.79	37.931
	High	1990.00	45.97	39.537
16QAM	Low	1935.00	45.88	38.726
	Middle	1962.50	45.89	38.815
	High	1990.00	45.98	39.628
64QAM	Low	1935.00	45.71	37.239
	Middle	1962.50	45.73	37.411
	High	1990.00	45.91	38.994
256QAM	Low	1935.00	45.57	36.058
	Middle	1962.50	45.65	36.728
	High	1990.00	45.88	38.726

Test Data at Downlink Port 3

Mod.	Channel	Frequency (MHz)	Measured Output Power	
			(dBm)	(W)
QPSK	Low	1935.00	45.73	37.411
	Middle	1962.50	45.95	39.355
	High	1990.00	45.91	38.994
16QAM	Low	1935.00	45.83	38.282
	Middle	1962.50	45.88	38.726
	High	1990.00	45.94	39.264
64QAM	Low	1935.00	45.90	38.905
	Middle	1962.50	45.89	38.815
	High	1990.00	45.80	38.019
256QAM	Low	1935.00	45.74	37.497
	Middle	1962.50	45.73	37.411
	High	1990.00	45.90	38.905

Sum Data of Port 2 and Port 3

Mod.	Channel	Frequency (MHz)	Measured Output Power (W)
QPSK	Low	1935.00	73.469
	Middle	1962.50	77.286
	High	1990.00	78.531
16QAM	Low	1935.00	77.008
	Middle	1962.50	77.541
	High	1990.00	78.892
64QAM	Low	1935.00	76.144
	Middle	1962.50	76.226
	High	1990.00	77.013

Sum Data of Port 0, Port 1, Port 2 and Port 3

Mod.	Channel	Frequency (MHz)	Measured Output Power (W)
QPSK	Low	1935.00	For sum power of all port, refer to exiting report data
	Middle	1962.50	
	High	1990.00	
16QAM	Low	1935.00	
	Middle	1962.50	
	High	1990.00	
64QAM	Low	1935.00	
	Middle	1962.50	
	High	1990.00	
256QAM	Low	1935.00	148.987
	Middle	1962.50	149.832
	High	1990.00	156.341

10 MHz / 1 Carrier (20 W)

Test Data at Downlink Port 0

Mod.	Channel	Frequency (MHz)	Measured Output Power	
			(dBm)	(W)
QPSK	Low	1935.00	-	-
	Middle	1962.50	-	-
	High	1990.00	-	-
16QAM	Low	1935.00	-	-
	Middle	1962.50	-	-
	High	1990.00	-	-
64QAM	Low	1935.00	-	-
	Middle	1962.50	-	-
	High	1990.00	-	-
256QAM	Low	1935.00	43.18	20.797
	Middle	1962.50	43.44	22.080
	High	1990.00	43.46	22.182

Test Data at Downlink Port 1

Mod.	Channel	Frequency (MHz)	Measured Output Power	
			(dBm)	(W)
QPSK	Low	1935.00	-	-
	Middle	1962.50	-	-
	High	1990.00	-	-
16QAM	Low	1935.00	-	-
	Middle	1962.50	-	-
	High	1990.00	-	-
64QAM	Low	1935.00	-	-
	Middle	1962.50	-	-
	High	1990.00	-	-
256QAM	Low	1935.00	43.77	23.823
	Middle	1962.50	43.58	22.803
	High	1990.00	43.27	21.232

Test Data at Downlink Port 2

Mod.	Channel	Frequency (MHz)	Measured Output Power	
			(dBm)	(W)
QPSK	Low	1935.00	-	-
	Middle	1962.50	-	-
	High	1990.00	-	-
16QAM	Low	1935.00	-	-
	Middle	1962.50	-	-
	High	1990.00	-	-
64QAM	Low	1935.00	-	-
	Middle	1962.50	-	-
	High	1990.00	-	-
256QAM	Low	1935.00	43.34	21.577
	Middle	1962.50	43.06	20.230
	High	1990.00	43.24	21.086

Test Data at Downlink Port 3

Mod.	Channel	Frequency (MHz)	Measured Output Power	
			(dBm)	(W)
QPSK	Low	1935.00	-	-
	Middle	1962.50	-	-
	High	1990.00	-	-
16QAM	Low	1935.00	-	-
	Middle	1962.50	-	-
	High	1990.00	-	-
64QAM	Low	1935.00	-	-
	Middle	1962.50	-	-
	High	1990.00	-	-
256QAM	Low	1935.00	43.45	22.131
	Middle	1962.50	43.10	20.417
	High	1990.00	43.73	23.605

Sum Data of Port 0, Port 1, Port 2 and Port 3

Mod.	Channel	Frequency (MHz)	Measured Output Power (W)
256QAM	Low	1935.00	88.328
	Middle	1962.50	85.530
	High	1990.00	88.105

10 MHz + 10 MHz / 2 Carriers (20 W + 20 W)

Test Data at Downlink Port 0

Mod.	Channel	Frequency (MHz)	Measured Output Power	
			(dBm)	(W)
QPSK	Low	1940.00	-	-
	Middle	1962.50	-	-
	High	1985.00	-	-
16QAM	Low	1940.00	-	-
	Middle	1962.50	-	-
	High	1985.00	-	-
64QAM	Low	1940.00	-	-
	Middle	1962.50	-	-
	High	1985.00	-	-
256QAM	Low	1940.00	46.27	42.364
	Middle	1962.50	46.05	40.272
	High	1985.00	45.98	39.628

Test Data at Downlink Port 1

Mod.	Channel	Frequency (MHz)	Measured Output Power	
			(dBm)	(W)
QPSK	Low	1940.00	-	-
	Middle	1962.50	-	-
	High	1985.00	-	-
16QAM	Low	1940.00	-	-
	Middle	1962.50	-	-
	High	1985.00	-	-
64QAM	Low	1940.00	-	-
	Middle	1962.50	-	-
	High	1985.00	-	-
256QAM	Low	1940.00	45.91	38.994
	Middle	1962.50	46.50	44.668
	High	1985.00	45.67	36.898

Test Data at Downlink Port 2

Mod.	Channel	Frequency (MHz)	Measured Output Power	
			(dBm)	(W)
QPSK	Low	1940.00	-	-
	Middle	1962.50	-	-
	High	1985.00	-	-
16QAM	Low	1940.00	-	-
	Middle	1962.50	-	-
	High	1985.00	-	-
64QAM	Low	1940.00	-	-
	Middle	1962.50	-	-
	High	1985.00	-	-
256QAM	Low	1940.00	46.21	41.783
	Middle	1962.50	45.19	33.037
	High	1985.00	46.40	43.652

Test Data at Downlink Port 3

Mod.	Channel	Frequency (MHz)	Measured Output Power	
			(dBm)	(W)
QPSK	Low	1940.00	-	-
	Middle	1962.50	-	-
	High	1985.00	-	-
16QAM	Low	1940.00	-	-
	Middle	1962.50	-	-
	High	1985.00	-	-
64QAM	Low	1940.00	-	-
	Middle	1962.50	-	-
	High	1985.00	-	-
256QAM	Low	1940.00	46.25	42.170
	Middle	1962.50	45.69	37.068
	High	1985.00	46.49	44.566

Sum Data of Port 0, Port 1, Port 2 and Port 3

Mod.	Channel	Frequency (MHz)	Measured Output Power (W)
256QAM	Low	1940.00	165.311
	Middle	1962.50	155.045
	High	1985.00	164.744

15 MHz / 1 Carrier (30 W)

Test Data at Downlink Port 0

Mod.	Channel	Frequency (MHz)	Measured Output Power	
			(dBm)	(W)
QPSK	Low	1937.50	44.40	27.542
	Middle	1962.50	44.45	27.861
	High	1987.50	44.75	29.854
16QAM	Low	1937.50	44.37	27.353
	Middle	1962.50	44.51	28.249
	High	1987.50	44.62	28.973
64QAM	Low	1937.50	44.42	27.669
	Middle	1962.50	44.42	27.669
	High	1987.50	44.66	29.242
256QAM	Low	1937.50	44.40	27.542
	Middle	1962.50	44.48	28.054
	High	1987.50	44.59	28.774

Test Data at Downlink Port 1

Mod.	Channel	Frequency (MHz)	Measured Output Power	
			(dBm)	(W)
QPSK	Low	1937.50	44.42	27.669
	Middle	1962.50	44.51	28.249
	High	1987.50	44.83	30.409
16QAM	Low	1937.50	44.42	27.669
	Middle	1962.50	44.51	28.249
	High	1987.50	44.65	29.174
64QAM	Low	1937.50	44.40	27.542
	Middle	1962.50	44.49	28.119
	High	1987.50	44.62	28.973
256QAM	Low	1937.50	44.38	27.416
	Middle	1962.50	44.46	27.925
	High	1987.50	44.65	29.174

Test Data at Downlink Port 2

Mod.	Channel	Frequency (MHz)	Measured Output Power	
			(dBm)	(W)
QPSK	Low	1937.50	44.42	27.669
	Middle	1962.50	44.46	27.925
	High	1987.50	44.81	30.269
16QAM	Low	1937.50	44.40	27.542
	Middle	1962.50	44.48	28.054
	High	1987.50	44.62	28.973
64QAM	Low	1937.50	44.42	27.669
	Middle	1962.50	44.51	28.249
	High	1987.50	44.61	28.907
256QAM	Low	1937.50	44.40	27.542
	Middle	1962.50	44.50	28.184
	High	1987.50	44.61	28.907

Test Data at Downlink Port 3

Mod.	Channel	Frequency (MHz)	Measured Output Power	
			(dBm)	(W)
QPSK	Low	1937.50	44.46	27.925
	Middle	1962.50	44.50	28.184
	High	1987.50	44.76	29.923
16QAM	Low	1937.50	44.44	27.797
	Middle	1962.50	44.49	28.119
	High	1987.50	44.65	29.174
64QAM	Low	1937.50	44.41	27.606
	Middle	1962.50	44.52	28.314
	High	1987.50	44.67	29.309
256QAM	Low	1937.50	44.37	27.353
	Middle	1962.50	44.51	28.249
	High	1987.50	44.63	29.040

Sum Data of Port 0, Port 1, Port 2 and Port 3

Mod.	Channel	Frequency (MHz)	Measured Output Power (W)
QPSK	Low	1937.50	110.805
	Middle	1962.50	112.219
	High	1987.50	120.455
16QAM	Low	1937.50	110.361
	Middle	1962.50	112.671
	High	1987.50	116.294
64QAM	Low	1937.50	110.486
	Middle	1962.50	112.351
	High	1987.50	116.431
256QAM	Low	1937.50	109.853
	Middle	1962.50	112.412
	High	1987.50	115.895

15 MHz + 5 MHz / 2 Carriers (30 W + 10 W)

Test Data at Downlink Port 0

Mod.	Channel	Frequency (MHz)	Measured Output Power	
			(dBm)	(W)
QPSK	Low	1940.00	45.92	39.084
	Middle	1962.50	46.10	40.738
	High	1985.00	45.97	39.537
16QAM	Low	1940.00	46.01	39.902
	Middle	1962.50	46.12	40.926
	High	1985.00	45.81	38.107
64QAM	Low	1940.00	46.03	40.087
	Middle	1962.50	46.15	41.210
	High	1985.00	45.76	37.670
256QAM	Low	1940.00	46.00	39.811
	Middle	1962.50	46.04	40.179
	High	1985.00	45.94	39.264

Test Data at Downlink Port 1

Mod.	Channel	Frequency (MHz)	Measured Output Power	
			(dBm)	(W)
QPSK	Low	1940.00	45.96	39.446
	Middle	1962.50	46.02	39.994
	High	1985.00	45.89	38.815
16QAM	Low	1940.00	45.96	39.446
	Middle	1962.50	46.07	40.458
	High	1985.00	45.73	37.411
64QAM	Low	1940.00	45.99	39.719
	Middle	1962.50	46.05	40.272
	High	1985.00	45.77	37.757
256QAM	Low	1940.00	45.99	39.719
	Middle	1962.50	46.01	39.902
	High	1985.00	45.95	39.355

Test Data at Downlink Port 2

Mod.	Channel	Frequency (MHz)	Measured Output Power	
			(dBm)	(W)
QPSK	Low	1940.00	45.95	39.355
	Middle	1962.50	45.71	37.239
	High	1985.00	45.87	38.637
16QAM	Low	1940.00	46.01	39.902
	Middle	1962.50	46.12	40.926
	High	1985.00	45.72	37.325
64QAM	Low	1940.00	45.95	39.355
	Middle	1962.50	46.15	41.210
	High	1985.00	45.78	37.844
256QAM	Low	1940.00	46.00	39.811
	Middle	1962.50	46.03	40.087
	High	1985.00	45.97	39.537

Test Data at Downlink Port 3

Mod.	Channel	Frequency (MHz)	Measured Output Power	
			(dBm)	(W)
QPSK	Low	1940.00	45.92	39.084
	Middle	1962.50	46.06	40.365
	High	1985.00	45.95	39.355
16QAM	Low	1940.00	45.98	39.628
	Middle	1962.50	46.06	40.365
	High	1985.00	45.78	37.844
64QAM	Low	1940.00	45.98	39.628
	Middle	1962.50	46.15	41.210
	High	1985.00	45.76	37.670
256QAM	Low	1940.00	45.99	39.719
	Middle	1962.50	46.04	40.179
	High	1985.00	45.99	39.719

Sum Data of Port 0, Port 1, Port 2 and Port 3

Mod.	Channel	Frequency (MHz)	Measured Output Power (W)
QPSK	Low	1940.00	156.969
	Middle	1962.50	158.336
	High	1985.00	156.344
16QAM	Low	1940.00	158.878
	Middle	1962.50	162.675
	High	1985.00	150.687
64QAM	Low	1940.00	158.789
	Middle	1962.50	163.902
	High	1985.00	150.941
256QAM	Low	1940.00	159.060
	Middle	1962.50	160.347
	High	1985.00	157.875

10 MHz + 5 MHz / 2 Carriers (20 W + 10 W)

Test Data at Downlink Port 0

Mod.	Channel	Frequency (MHz)	Measured Output Power	
			(dBm)	(W)
QPSK	Low	1937.50	44.78	30.061
	Middle	1962.50	44.33	27.102
	High	1987.50	44.64	29.107
16QAM	Low	1937.50	44.77	29.992
	Middle	1962.50	44.47	27.990
	High	1987.50	44.67	29.309
64QAM	Low	1937.50	44.68	29.376
	Middle	1962.50	44.46	27.925
	High	1987.50	44.68	29.376
256QAM	Low	1937.50	44.65	29.174
	Middle	1962.50	44.45	27.861
	High	1987.50	44.56	28.576

Test Data at Downlink Port 1

Mod.	Channel	Frequency (MHz)	Measured Output Power	
			(dBm)	(W)
QPSK	Low	1937.50	44.75	29.854
	Middle	1962.50	44.51	28.249
	High	1987.50	44.57	28.642
16QAM	Low	1937.50	44.78	30.061
	Middle	1962.50	44.45	27.861
	High	1987.50	44.64	29.107
64QAM	Low	1937.50	44.68	29.376
	Middle	1962.50	44.46	27.925
	High	1987.50	44.73	29.717
256QAM	Low	1937.50	44.76	29.923
	Middle	1962.50	44.43	27.733
	High	1987.50	44.55	28.510

Test Data at Downlink Port 2

Mod.	Channel	Frequency (MHz)	Measured Output Power	
			(dBm)	(W)
QPSK	Low	1937.50	44.73	29.717
	Middle	1962.50	44.49	28.119
	High	1987.50	44.56	28.576
16QAM	Low	1937.50	44.77	29.992
	Middle	1962.50	44.43	27.733
	High	1987.50	44.62	28.973
64QAM	Low	1937.50	44.70	29.512
	Middle	1962.50	44.44	27.797
	High	1987.50	44.64	29.107
256QAM	Low	1937.50	44.73	29.717
	Middle	1962.50	44.44	27.797
	High	1987.50	44.57	28.642

Test Data at Downlink Port 3

Mod.	Channel	Frequency (MHz)	Measured Output Power	
			(dBm)	(W)
QPSK	Low	1937.50	44.74	29.785
	Middle	1962.50	44.46	27.925
	High	1987.50	44.56	28.576
16QAM	Low	1937.50	44.83	30.409
	Middle	1962.50	44.43	27.733
	High	1987.50	44.66	29.242
64QAM	Low	1937.50	44.71	29.580
	Middle	1962.50	44.47	27.990
	High	1987.50	44.67	29.309
256QAM	Low	1937.50	44.73	29.717
	Middle	1962.50	44.43	27.733
	High	1987.50	44.57	28.642

Sum Data of Port 0, Port 1, Port 2 and Port 3

Mod.	Channel	Frequency (MHz)	Measured Output Power (W)
QPSK	Low	1937.50	119.417
	Middle	1962.50	111.395
	High	1987.50	114.901
16QAM	Low	1937.50	120.454
	Middle	1962.50	111.317
	High	1987.50	116.631
64QAM	Low	1937.50	117.844
	Middle	1962.50	111.637
	High	1987.50	117.509
256QAM	Low	1937.50	118.531
	Middle	1962.50	111.124
	High	1987.50	114.370

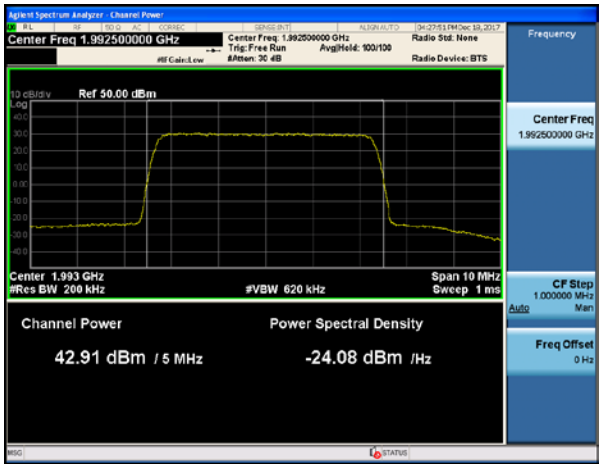
Note:

This test report only contains the worst case plot data for each port and modulation.

5 MHz / 1 Carrier (20 W)

Plot Data for Output Port 0 (Conducted Output Power)

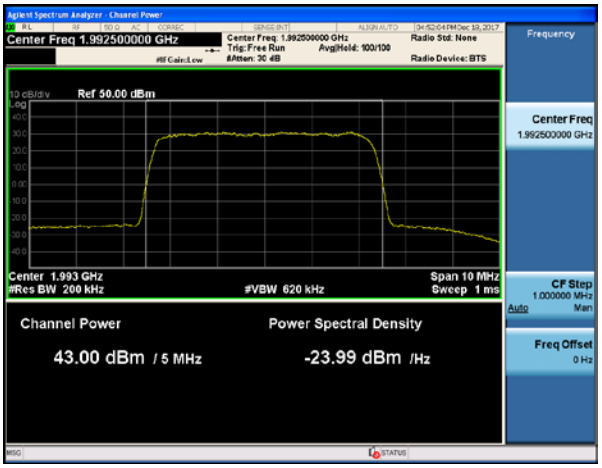
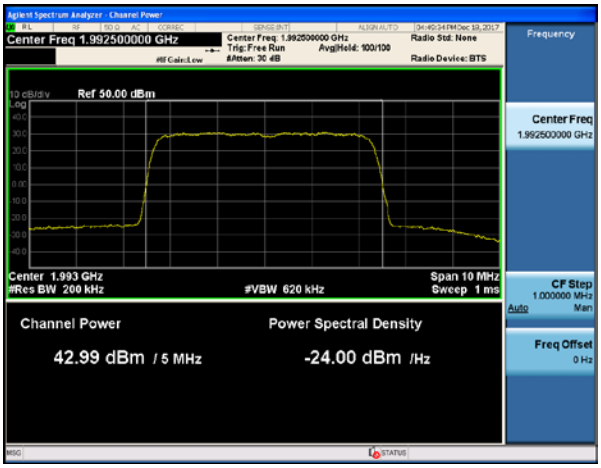
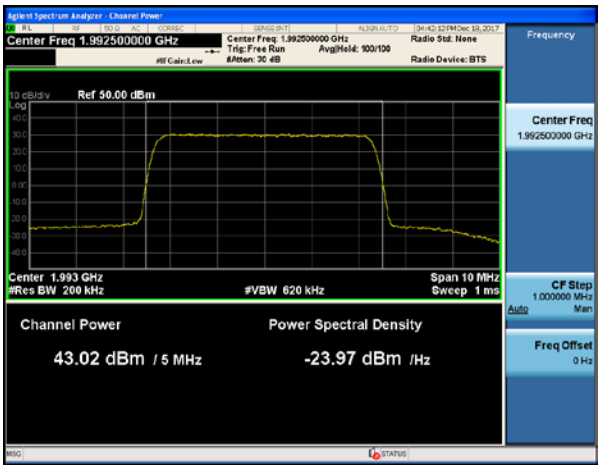
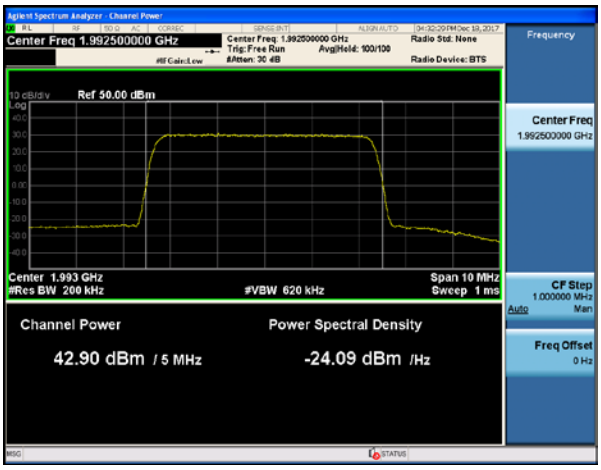
Mod.	Channel
256QAM	High



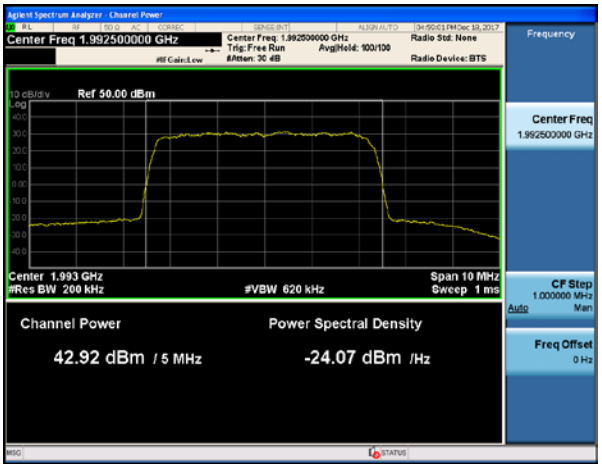
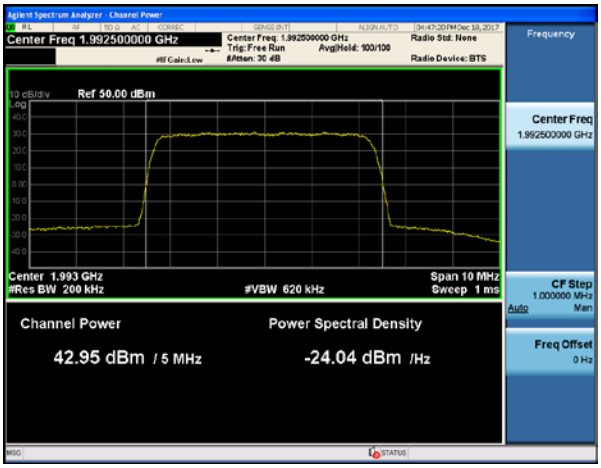
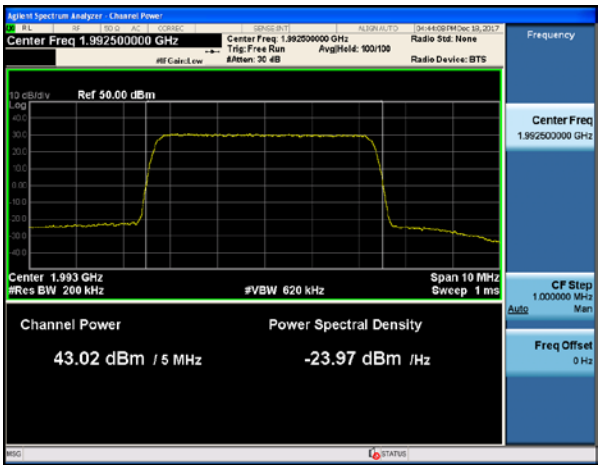
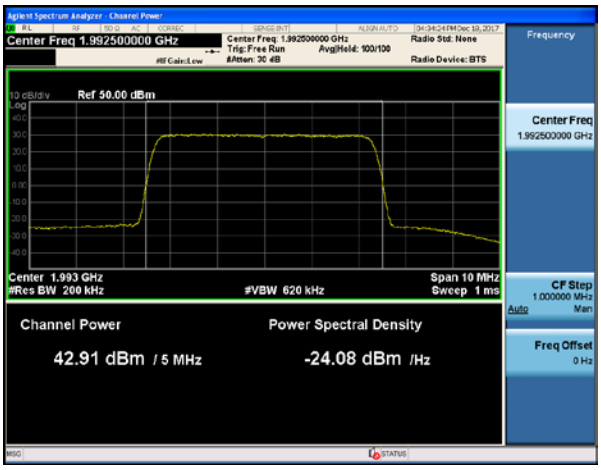
Plot Data for Output Port 1 (Conducted Output Power)

Mod.	Channel
256QAM	High

Plot Data for Output Port 2 (Conducted Output Power)

Mod.	Channel	Mod.	Channel
QPSK	High	16QAM	High
			
Mod.	**Channel**	**Mod.**	**Channel**
64QAM	**High**	**256QAM**	**High**
			

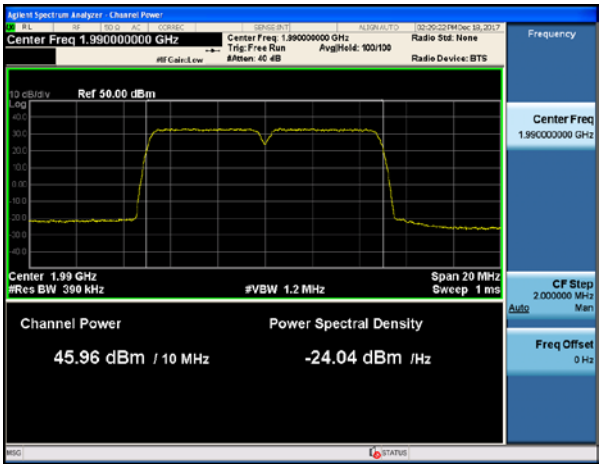
Plot Data for Output Port 3 (Conducted Output Power)

Mod.	Channel	Mod.	Channel
QPSK	High	16QAM	High
			
Mod.	**Channel**	**Mod.**	**Channel**
64QAM	**High**	**256QAM**	**High**
			

5 MHz + 5 MHz / 2 Carriers (20 W + 20 W)

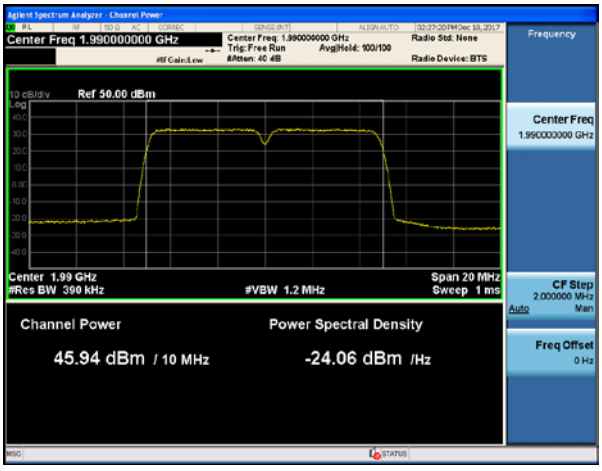
Plot Data for Output Port 0 (Conducted Output Power)

Mod.	Channel
256QAM	High

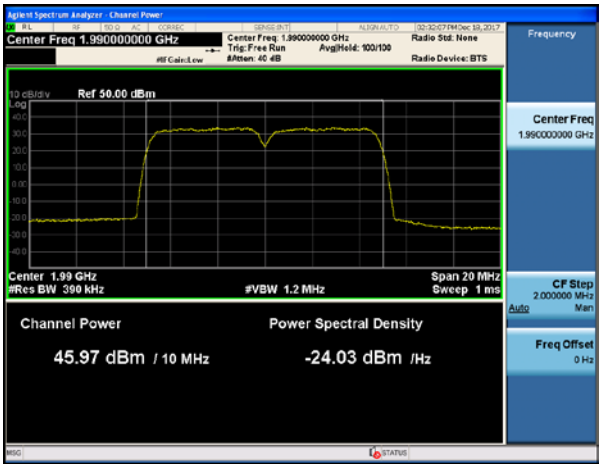
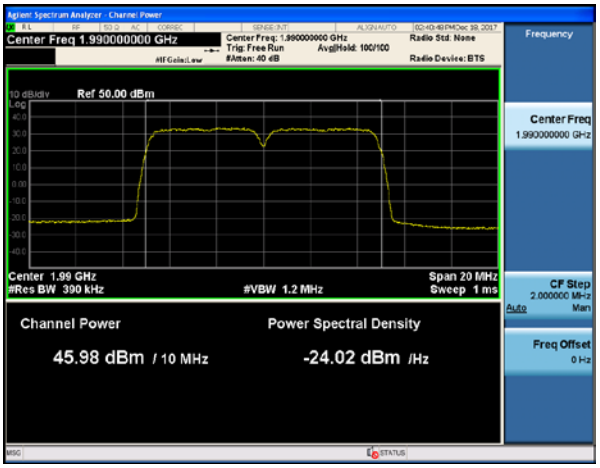
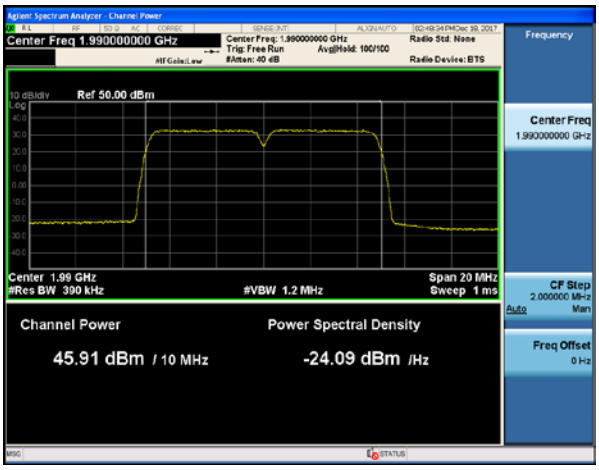
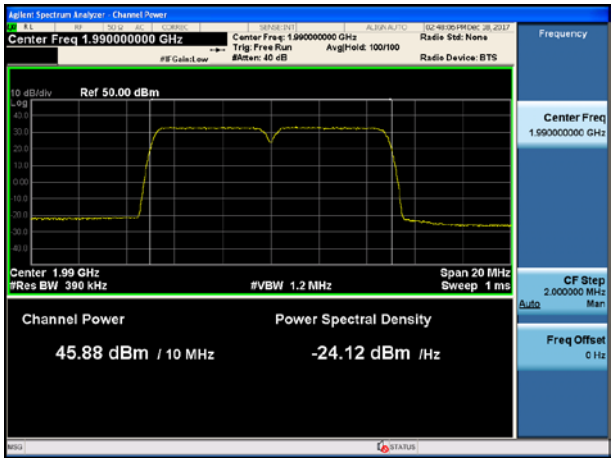


Plot Data for Output Port 1 (Conducted Output Power)

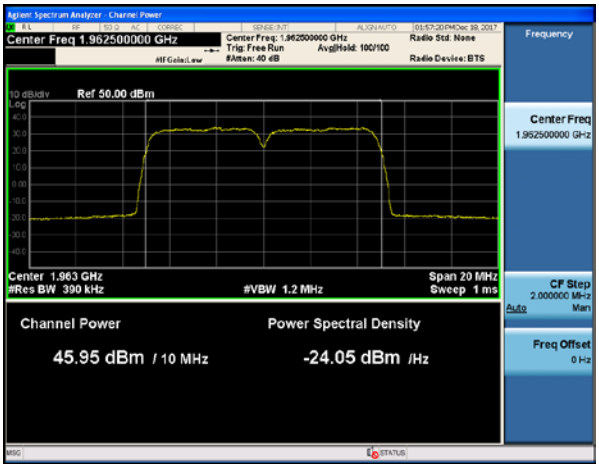
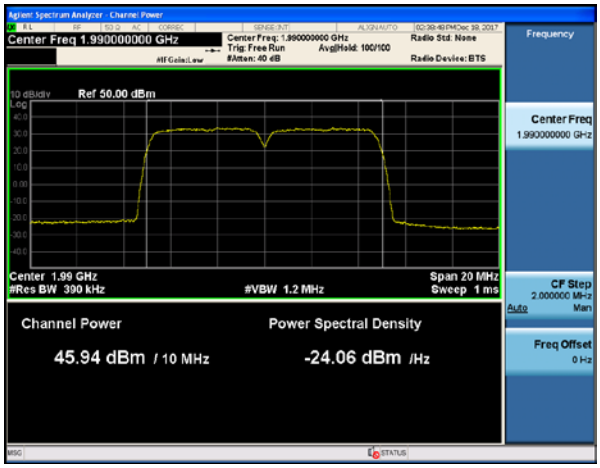
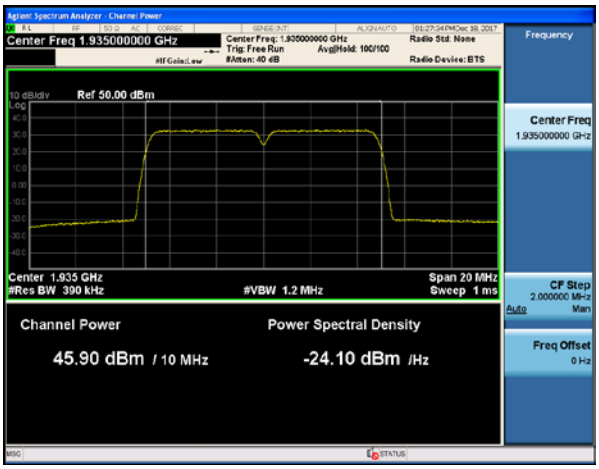
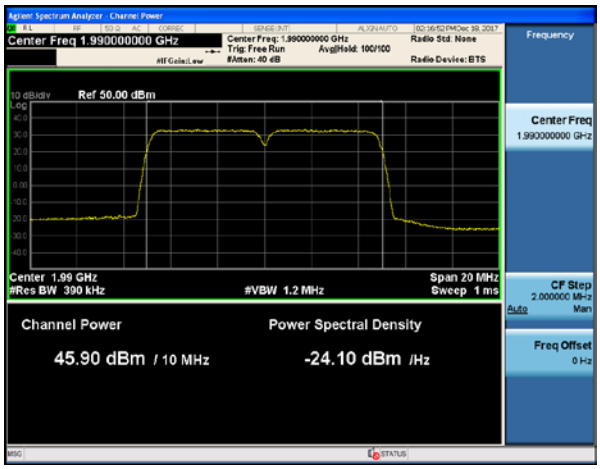
Mod.	Channel
256QAM	High



Plot Data for Output Port 2 (Conducted Output Power)

Mod.	Channel	Mod.	Channel
QPSK	High	16QAM	High
			
Mod.	**Channel**	**Mod.**	**Channel**
64QAM	**High**	**256QAM**	**High**
			

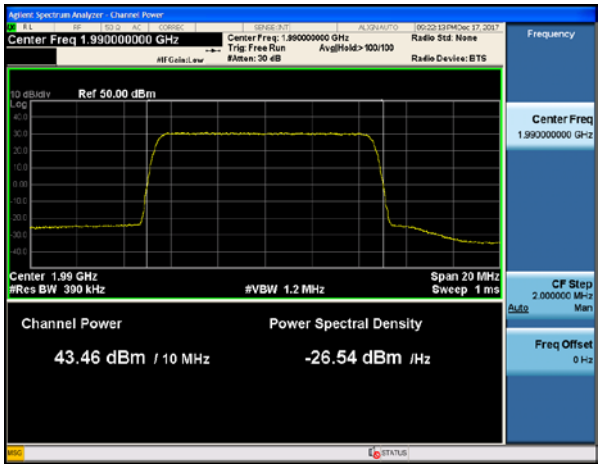
Plot Data for Output Port 3 (Conducted Output Power)

Mod.	Channel	Mod.	Channel
QPSK	Middle	16QAM	High
			
Mod.	**Channel**	**Mod.**	**Channel**
64QAM	**Low**	**256QAM**	**High**
			

10 MHz / 1 Carrier (20 W)

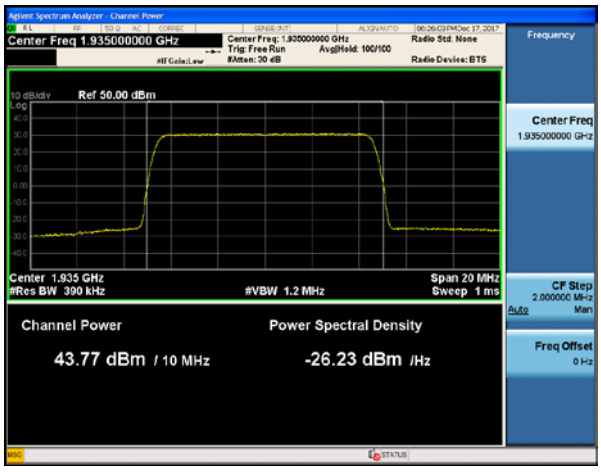
Plot Data for Output Port 0 (Conducted Output Power)

Mod.	Channel
256QAM	High



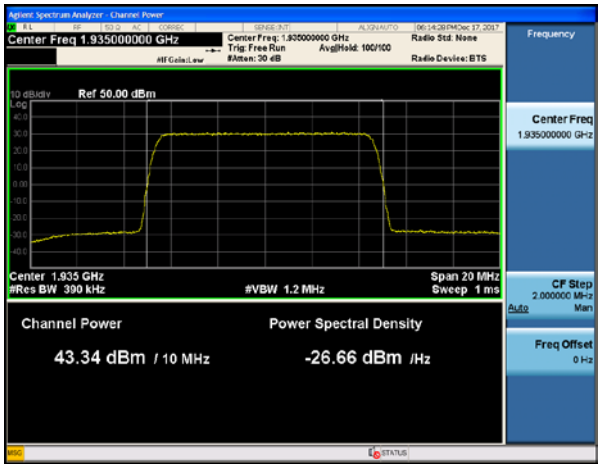
Plot Data for Output Port 1 (Conducted Output Power)

Mod.	Channel
256QAM	Low



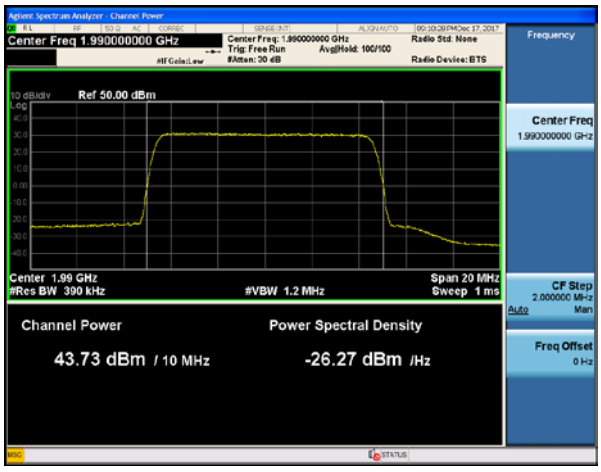
Plot Data for Output Port 2 (Conducted Output Power)

Mod.	Channel
256QAM	Low



Plot Data for Output Port 3 (Conducted Output Power)

Mod.	Channel
256QAM	High



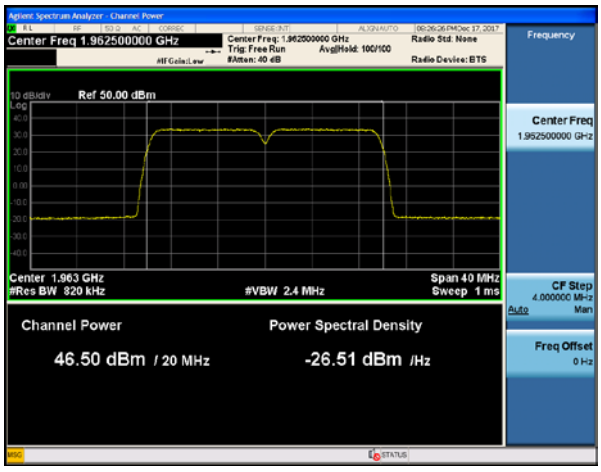
10 MHz + 10 MHz / 2 Carriers (20 W + 20 W)

Plot Data for Output Port 0 (Conducted Output Power)

Mod.	Channel
256QAM	Low

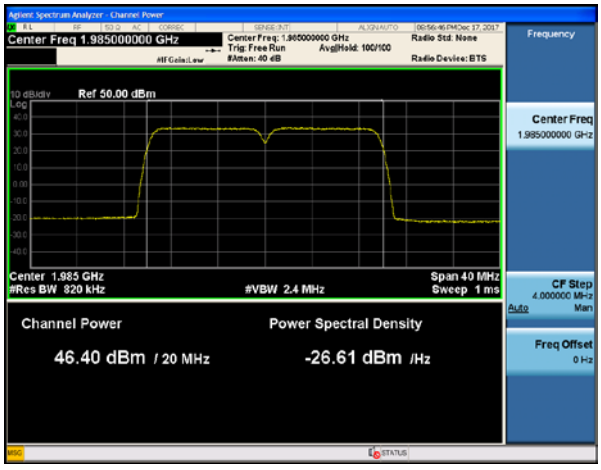
Plot Data for Output Port 1 (Conducted Output Power)

Mod.	Channel
256QAM	Middle



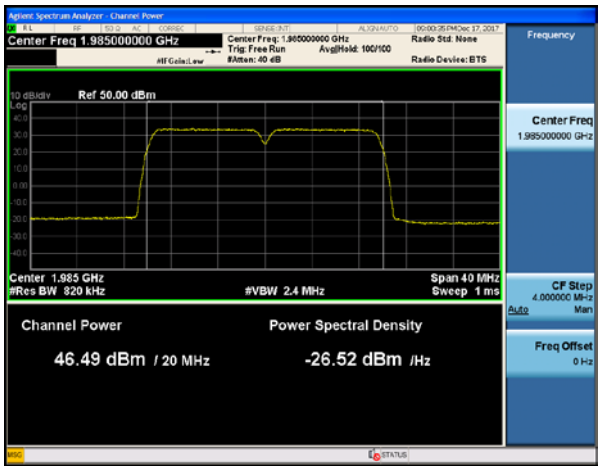
Plot Data for Output Port 2 (Conducted Output Power)

Mod.	Channel
256QAM	High



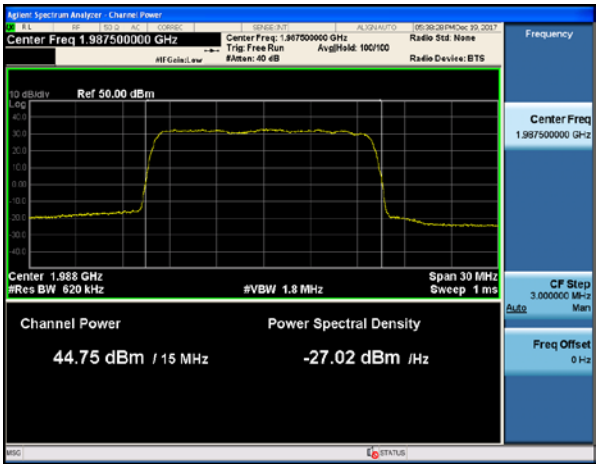
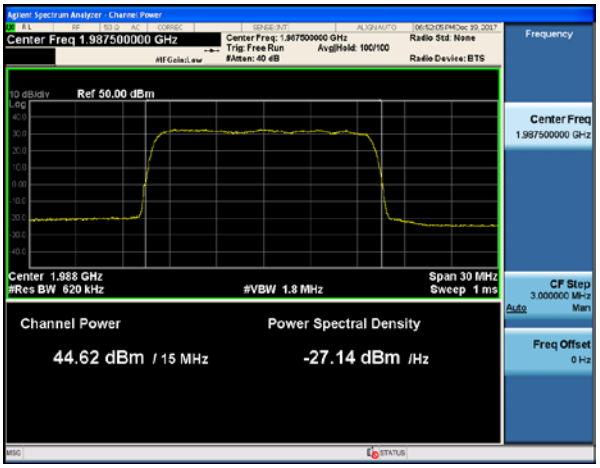
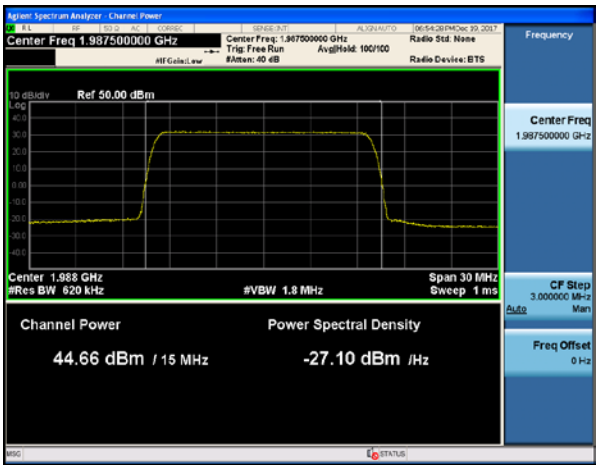
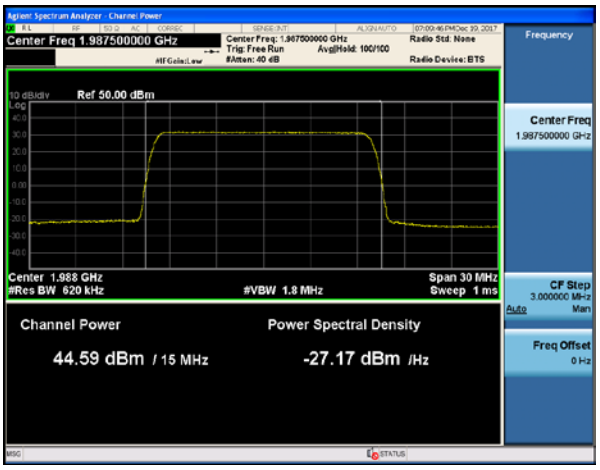
Plot Data for Output Port 3 (Conducted Output Power)

Mod.	Channel
256QAM	High

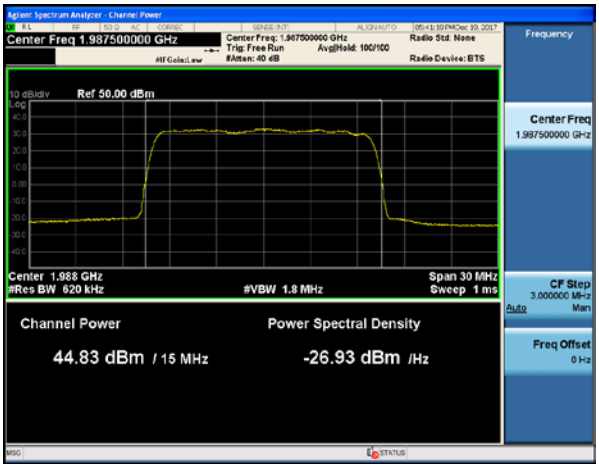
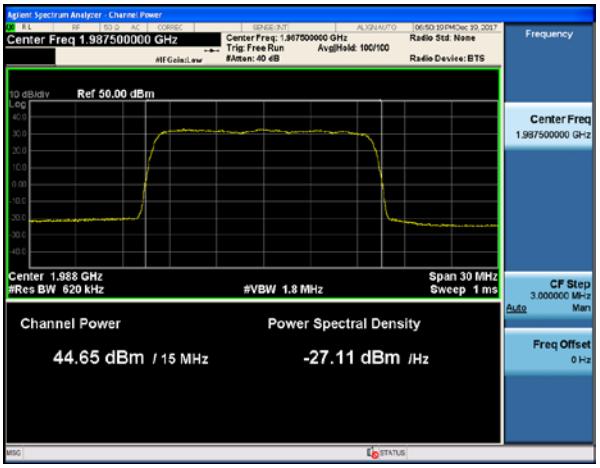
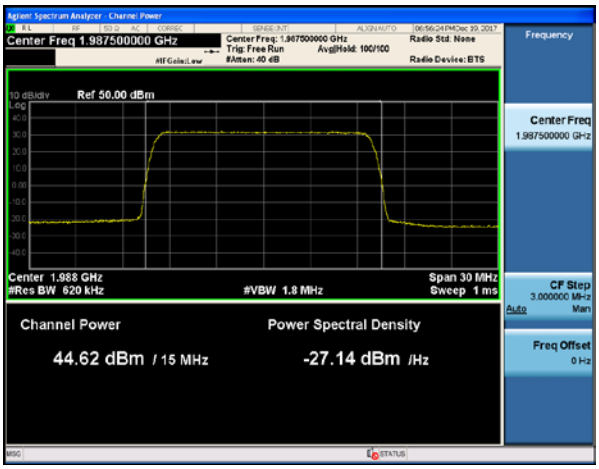
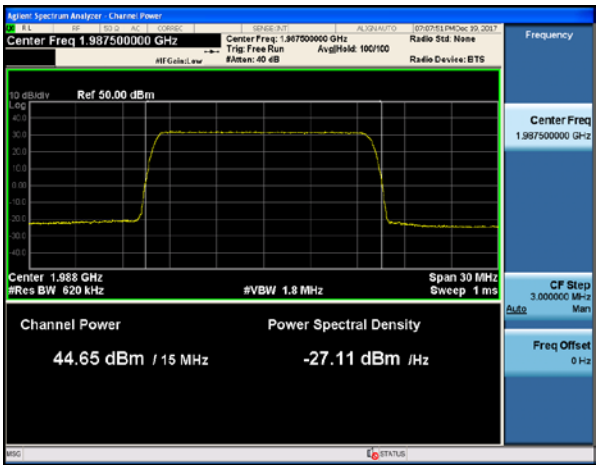


15 MHz / 1 Carrier (30 W)

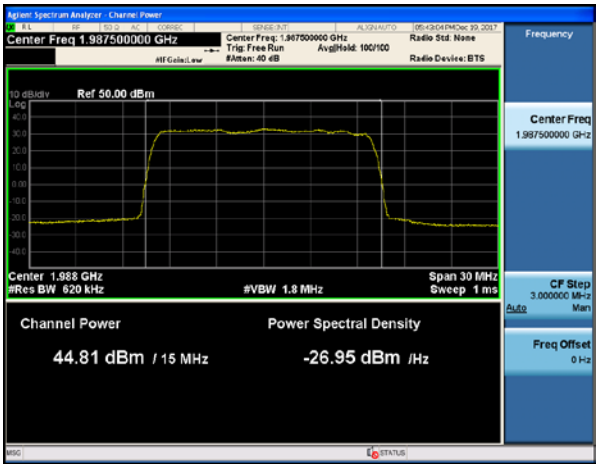
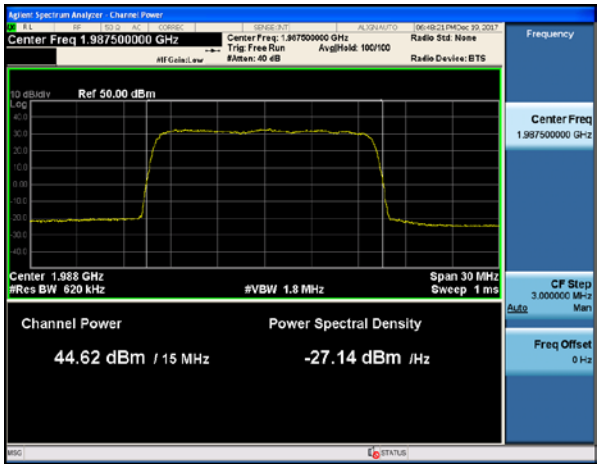
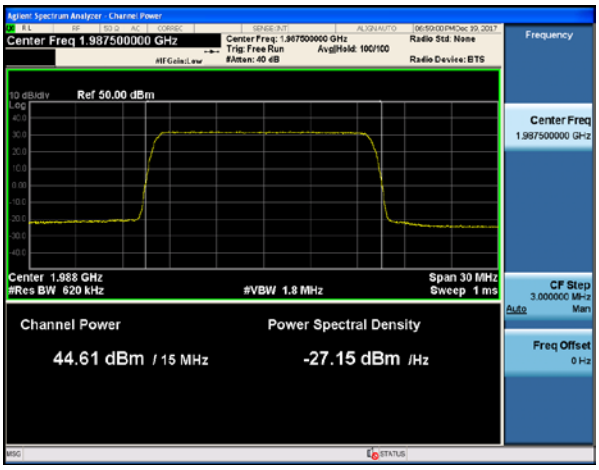
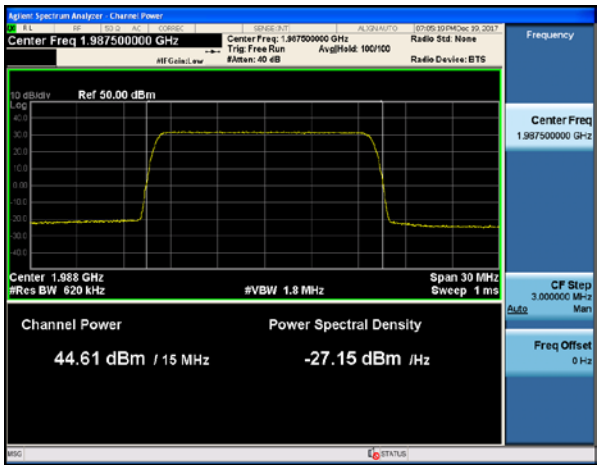
Plot Data for Output Port 0 (Conducted Output Power)

Mod.	Channel	Mod.	Channel
QPSK	High	16QAM	High
			
Mod.	**Channel**	**Mod.**	**Channel**
64QAM	High	256QAM	High
			

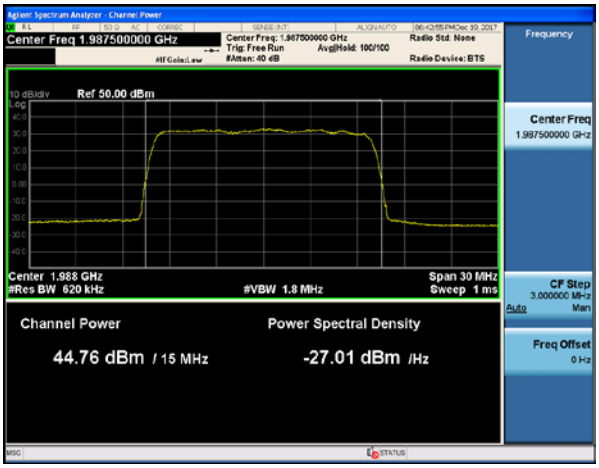
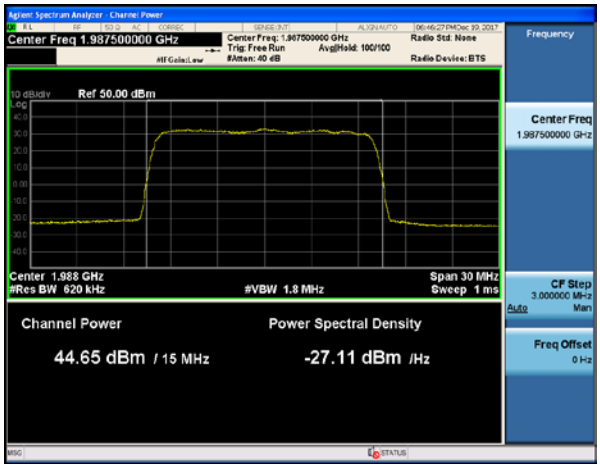
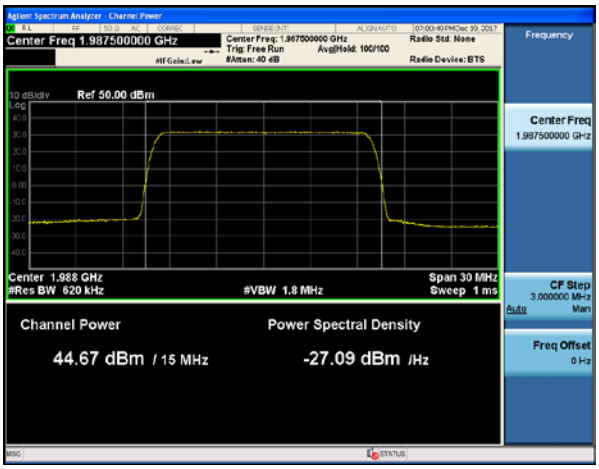
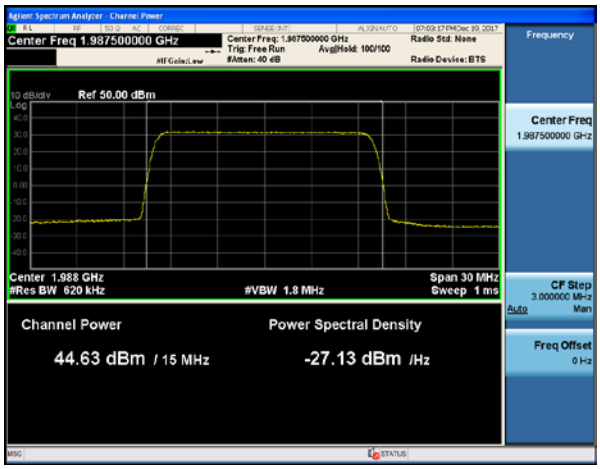
Plot Data for Output Port 1 (Conducted Output Power)

Mod.	Channel	Mod.	Channel
QPSK	High	16QAM	High
			
Mod.	**Channel**	**Mod.**	**Channel**
64QAM	**High**	**256QAM**	**High**
			

Plot Data for Output Port 2 (Conducted Output Power)

Mod.	Channel	Mod.	Channel
QPSK	High	16QAM	High
			
Mod.	**Channel**	**Mod.**	**Channel**
64QAM	**High**	**256QAM**	**High**
			

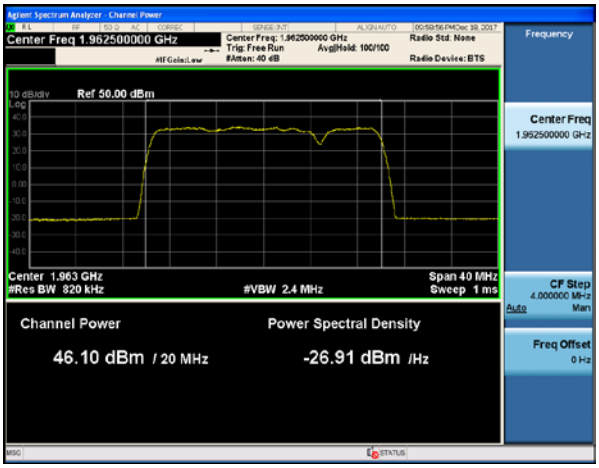
Plot Data for Output Port 3 (Conducted Output Power)

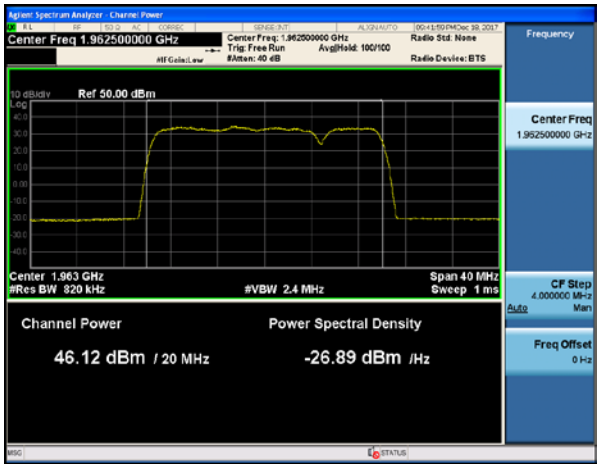
Mod.	Channel	Mod.	Channel
QPSK	High	16QAM	High
			
Mod.	**Channel**	**Mod.**	**Channel**
64QAM	**High**	**256QAM**	**High**
			

15 MHz + 5 MHz / 2 Carriers (30 W + 10 W)

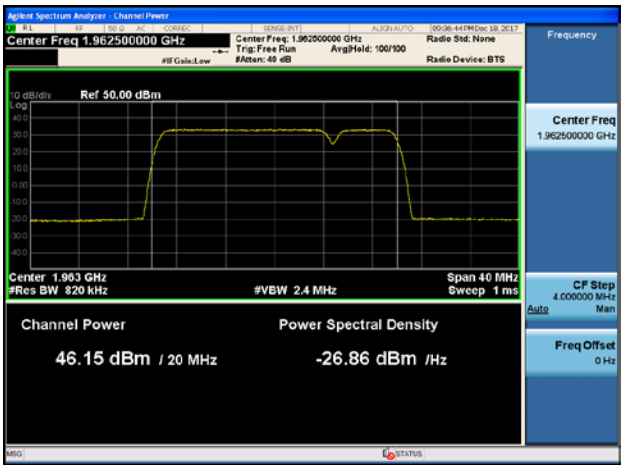
Plot Data for Output Port 0 (Conducted Output Power)

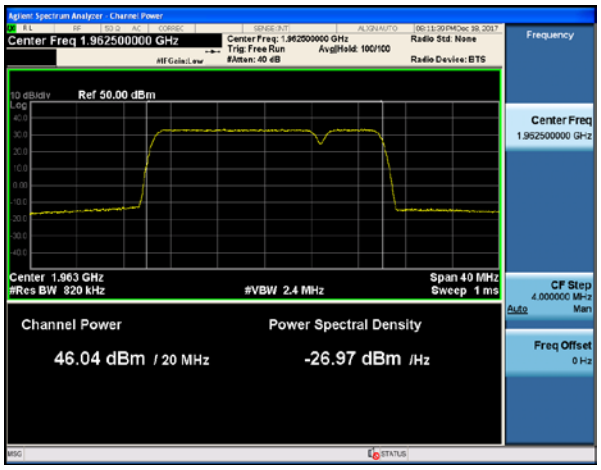
Mod.	Channel	Mod.	Channel
QPSK	Middle	16QAM	Middle



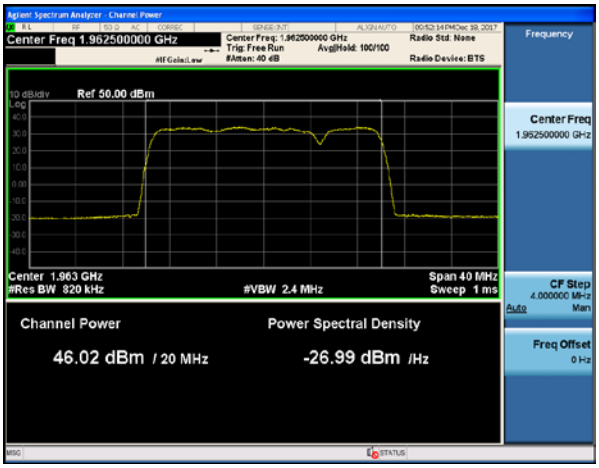
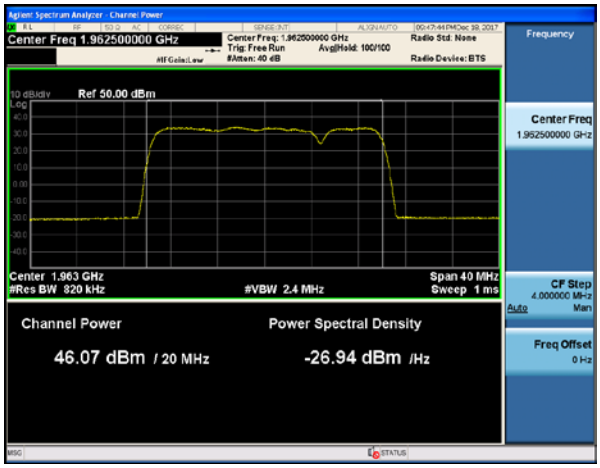
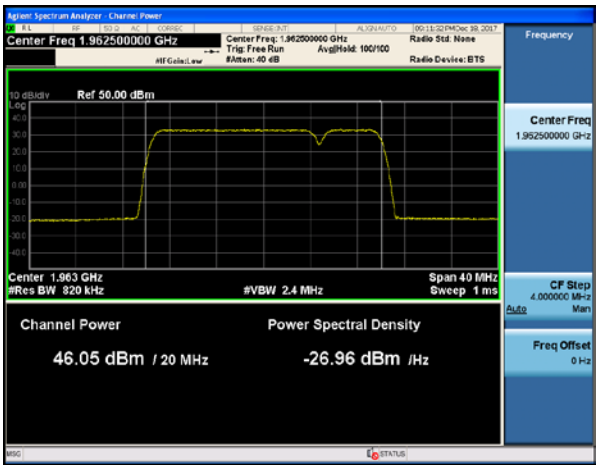
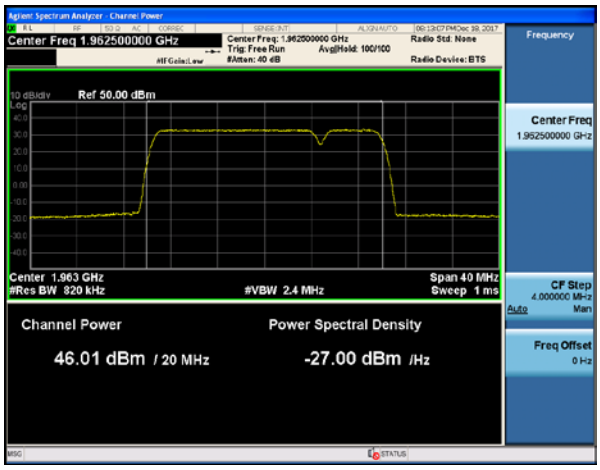


Mod.	Channel	Mod.	Channel
64QAM	Middle	256QAM	Middle

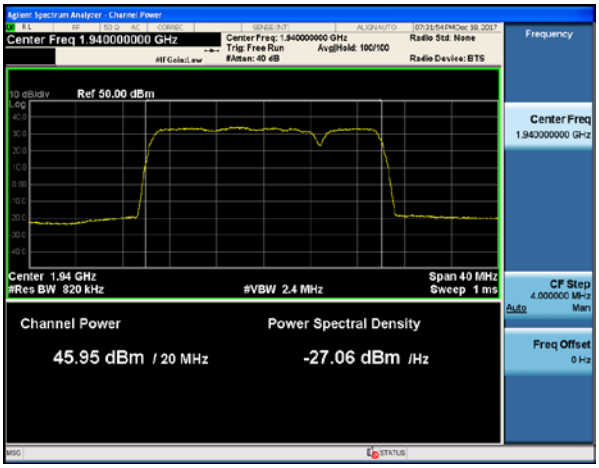
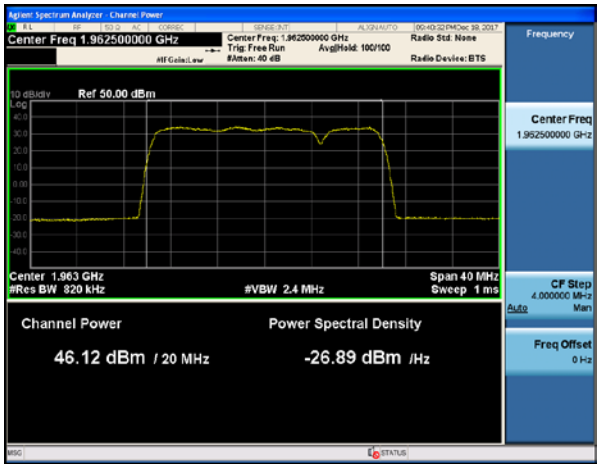
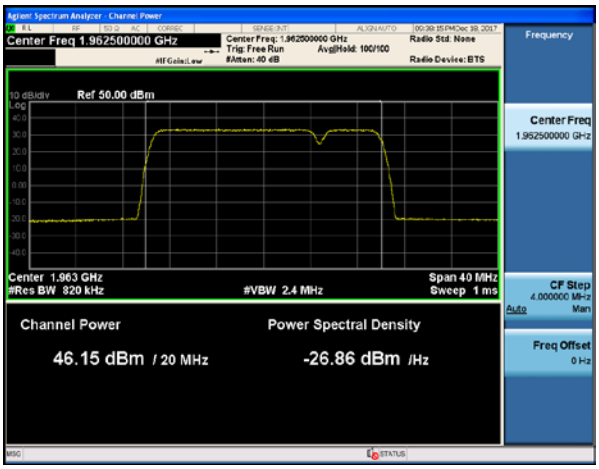
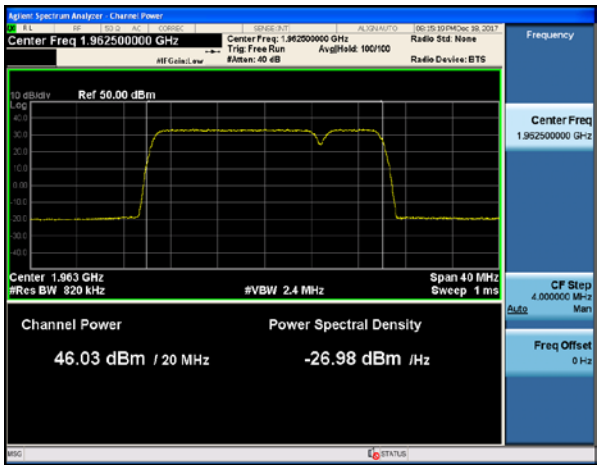




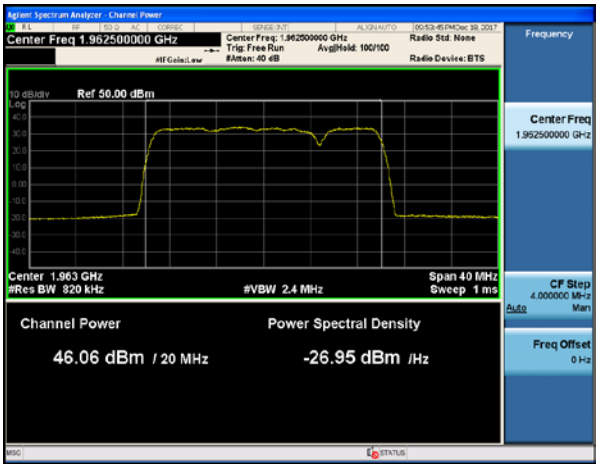
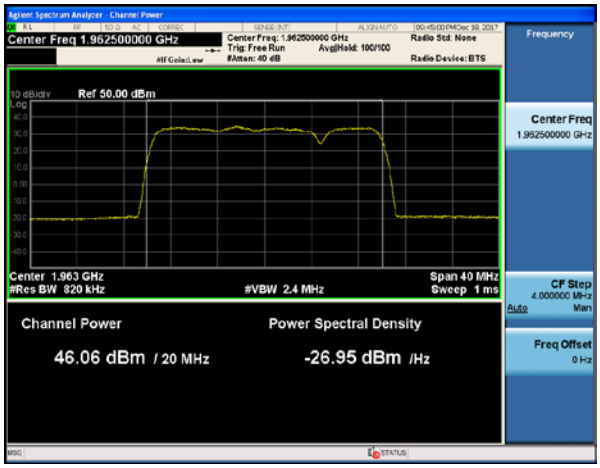
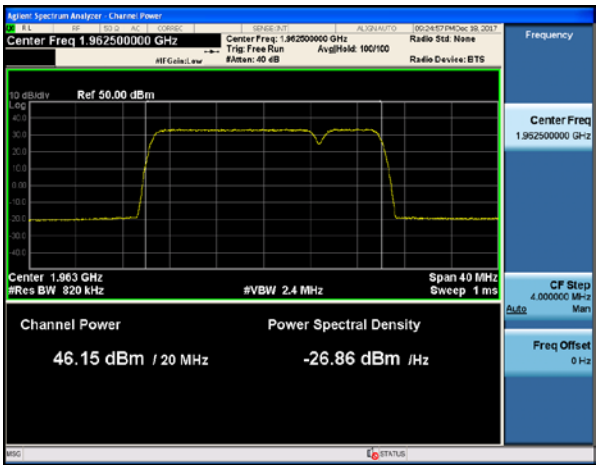
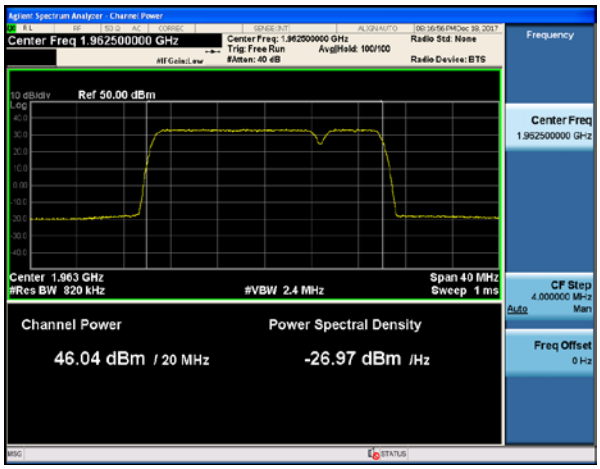
Plot Data for Output Port 1 (Conducted Output Power)

Mod.	Channel	Mod.	Channel
QPSK	Middle	16QAM	Middle
			
Mod.	**Channel**	**Mod.**	**Channel**
64QAM	**Middle**	**256QAM**	**Middle**
			

Plot Data for Output Port 2 (Conducted Output Power)

Mod.	Channel	Mod.	Channel
QPSK	Low	16QAM	Middle
			
Mod.	**Channel**	**Mod.**	**Channel**
64QAM	**Middle**	**256QAM**	**Middle**
			

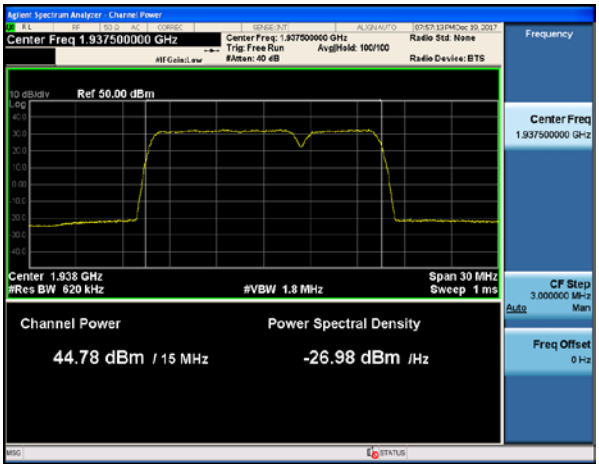
Plot Data for Output Port 3 (Conducted Output Power)

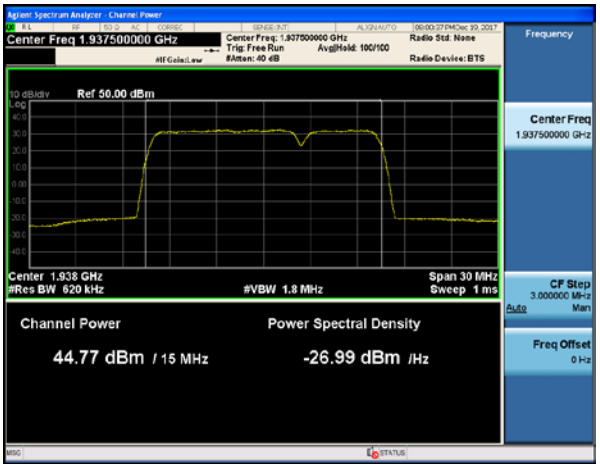
Mod.	Channel	Mod.	Channel
QPSK	Middle	16QAM	Middle
			
Mod.	**Channel**	**Mod.**	**Channel**
64QAM	**Middle**	**256QAM**	**Middle**
			

10 MHz + 5 MHz / 2 Carriers (20 W + 10 W)

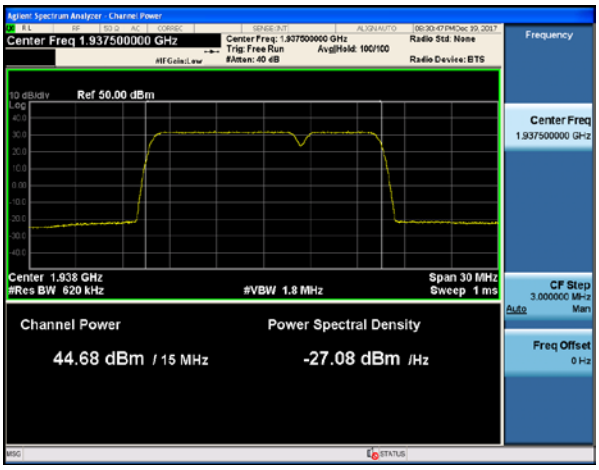
Plot Data for Output Port 0 (Conducted Output Power)

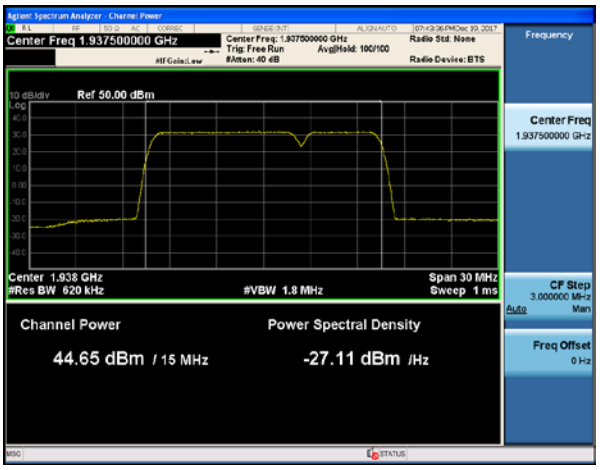
Mod.	Channel	Mod.	Channel
QPSK	Low	16QAM	Low



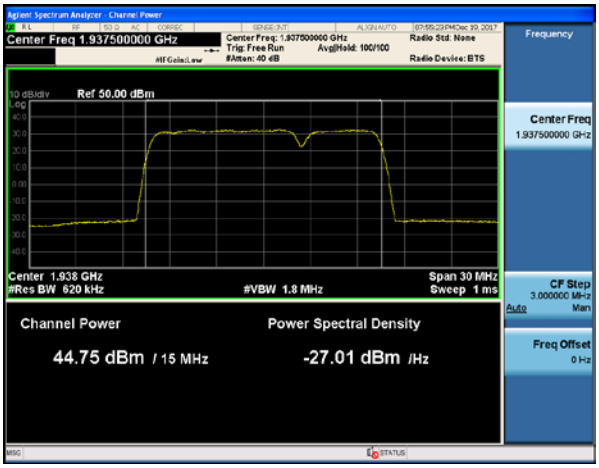
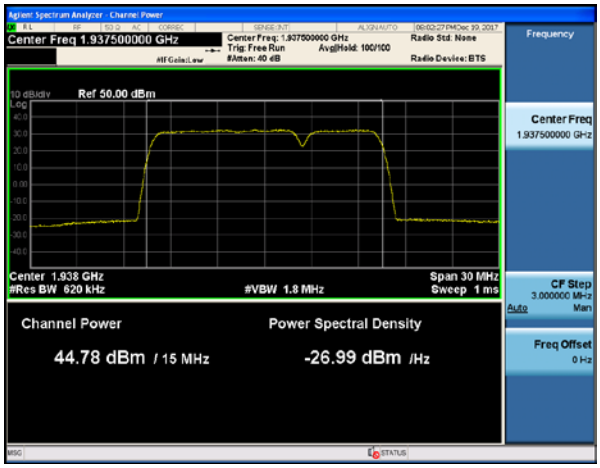
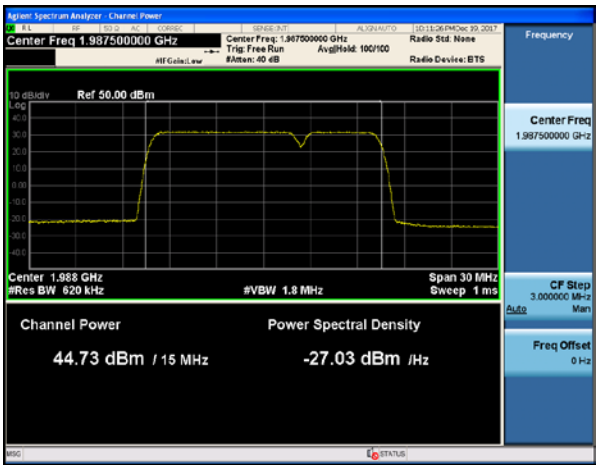
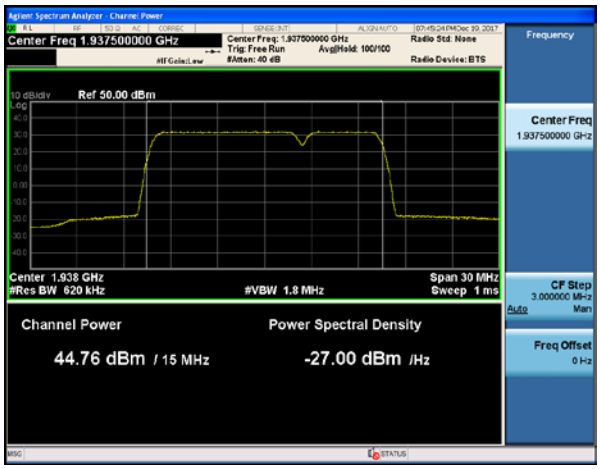


Mod.	Channel	Mod.	Channel
64QAM	Low	256QAM	Low

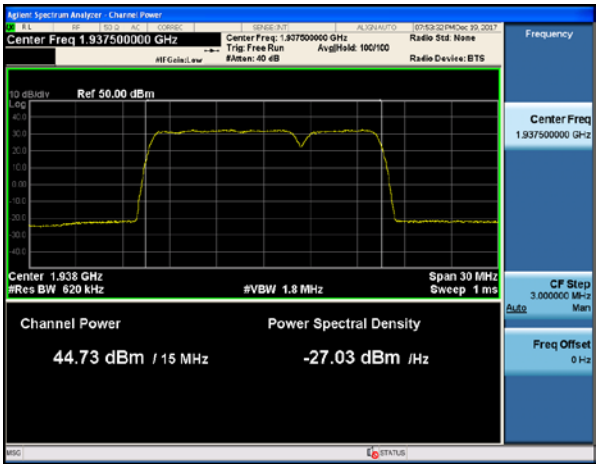
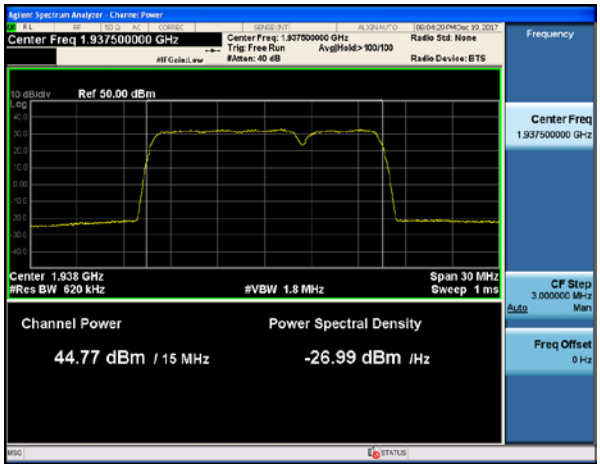
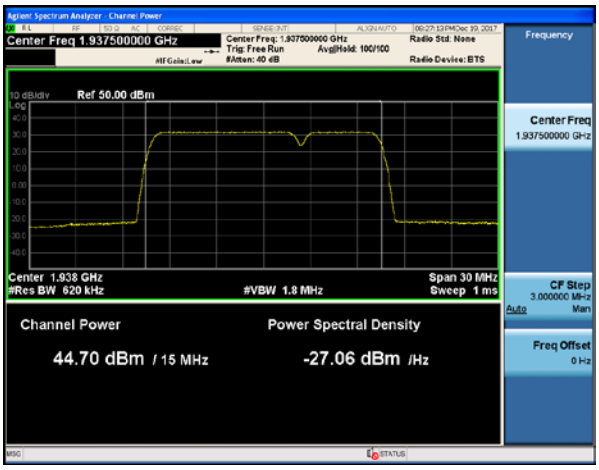
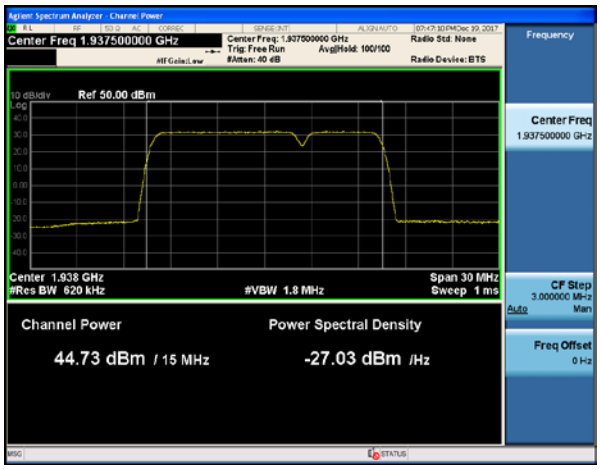




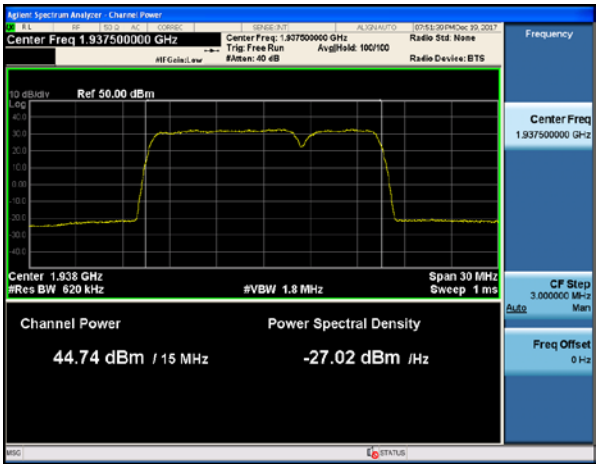
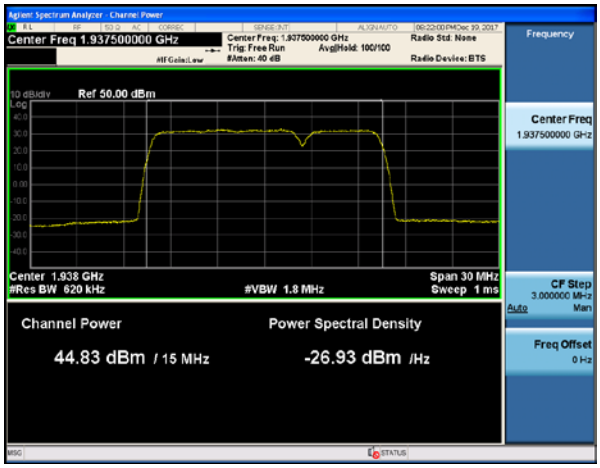
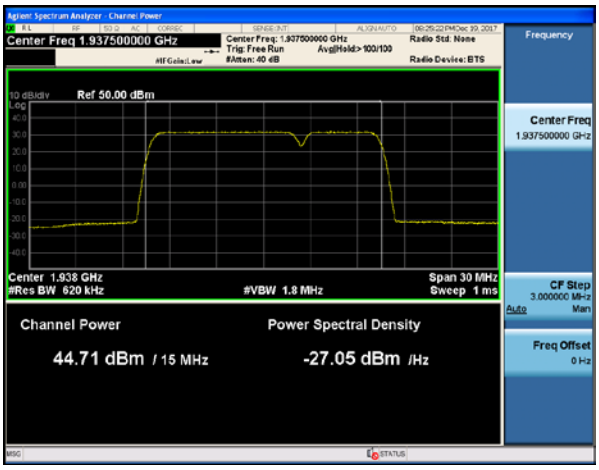
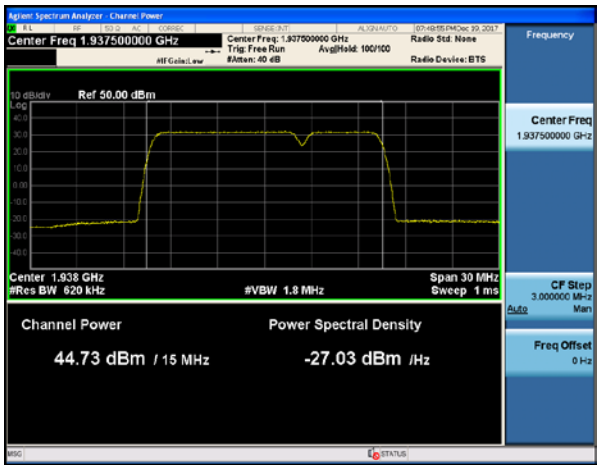
Plot Data for Output Port 1 (Conducted Output Power)

Mod.	Channel	Mod.	Channel
QPSK	Low	16QAM	Low
			
Mod.	**Channel**	**Mod.**	**Channel**
64QAM	**High**	**256QAM**	**Low**
			

Plot Data for Output Port 2 (Conducted Output Power)

Mod.	Channel	Mod.	Channel
QPSK	Low	16QAM	Low
			
Mod.	**Channel**	**Mod.**	**Channel**
64QAM	Low	256QAM	Low
			

Plot Data for Output Port 3 (Conducted Output Power)

Mod.	Channel	Mod.	Channel
QPSK	Low	16QAM	Low
			
Mod.	**Channel**	**Mod.**	**Channel**
64QAM	Low	256QAM	Low
			

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 following conditions as applicable:

(g) Transmitters in which the modulating baseband comprises not more than three independent channels—when modulated by the full complement of signals for which the transmitter is rated. The level of modulation for each channel should be set to that prescribed in rule parts applicable to the services for which the transmitter is intended. If specific modulation levels are not set forth in the rules, the tests should provide the manufacturer's maximum rated condition.

(h) Transmitters employing digital modulation techniques—when modulated by an input signal such that its amplitude and symbol rate represent the maximum rated conditions under which the equipment will be operated. The signal shall be applied through any filter networks, pseudo-random generators or other devices required in normal service. Additionally, the occupied bandwidth shall be shown for operation with any devices used for modifying the spectrum when such devices are optional at the discretion of the user.

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:

5 MHz / 1 Carrier (20 W)

Test Data at Downlink Port 0

Mod.	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
QPSK	Low	1932.50	-
	Middle	1962.50	-
	High	1992.50	-
16QAM	Low	1932.50	-
	Middle	1962.50	-
	High	1992.50	-
64QAM	Low	1932.50	-
	Middle	1962.50	-
	High	1992.50	-
256QAM	Low	1932.50	4.5608
	Middle	1962.50	4.5566
	High	1992.50	4.5564

Test Data at Downlink Port 1

Mod.	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
QPSK	Low	1932.50	-
	Middle	1962.50	-
	High	1992.50	-
16QAM	Low	1932.50	-
	Middle	1962.50	-
	High	1992.50	-
64QAM	Low	1932.50	-
	Middle	1962.50	-
	High	1992.50	-
256QAM	Low	1932.50	4.5616
	Middle	1962.50	4.5778
	High	1992.50	4.5625

Test Data at Downlink Port 2

Mod.	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
QPSK	Low	1932.50	4.5456
	Middle	1962.50	4.5604
	High	1992.50	4.5498
16QAM	Low	1932.50	4.5291
	Middle	1962.50	4.5469
	High	1992.50	4.5397
64QAM	Low	1932.50	4.5626
	Middle	1962.50	4.5643
	High	1992.50	4.5560
256QAM	Low	1932.50	4.5580
	Middle	1962.50	4.5671
	High	1992.50	4.5555

Test Data at Downlink Port 3

Mod.	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
QPSK	Low	1932.50	4.5708
	Middle	1962.50	4.5720
	High	1992.50	4.5540
16QAM	Low	1932.50	4.5516
	Middle	1962.50	4.5296
	High	1992.50	4.5320
64QAM	Low	1932.50	4.5566
	Middle	1962.50	4.5736
	High	1992.50	4.5692
256QAM	Low	1932.50	4.5664
	Middle	1962.50	4.5791
	High	1992.50	4.5642

5 MHz + 5 MHz / 2 Carriers (20 W + 20 W)

Test Data at Downlink Port 0

Mod.	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
QPSK	Low	1935.00	-
	Middle	1962.50	-
	High	1990.00	-
16QAM	Low	1935.00	-
	Middle	1962.50	-
	High	1990.00	-
64QAM	Low	1935.00	-
	Middle	1962.50	-
	High	1990.00	-
256QAM	Low	1935.00	9.6254
	Middle	1962.50	9.5956
	High	1990.00	9.6012

Test Data at Downlink Port 1

Mod.	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
QPSK	Low	1935.00	-
	Middle	1962.50	-
	High	1990.00	-
16QAM	Low	1935.00	-
	Middle	1962.50	-
	High	1990.00	-
64QAM	Low	1935.00	-
	Middle	1962.50	-
	High	1990.00	-
256QAM	Low	1935.00	9.5859
	Middle	1962.50	9.6076
	High	1990.00	9.6053

Test Data at Downlink Port 2

Mod.	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
QPSK	Low	1935.00	9.5776
	Middle	1962.50	9.5603
	High	1990.00	9.4933
16QAM	Low	1935.00	9.5764
	Middle	1962.50	9.5595
	High	1990.00	9.5730
64QAM	Low	1935.00	9.5778
	Middle	1962.50	9.5663
	High	1990.00	9.6106
256QAM	Low	1935.00	9.5884
	Middle	1962.50	9.5769
	High	1990.00	9.5540

Test Data at Downlink Port 3

Mod.	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
QPSK	Low	1935.00	9.5618
	Middle	1962.50	9.5589
	High	1990.00	9.5792
16QAM	Low	1935.00	9.5642
	Middle	1962.50	9.5870
	High	1990.00	9.5620
64QAM	Low	1935.00	9.5583
	Middle	1962.50	9.5858
	High	1990.00	9.6154
256QAM	Low	1935.00	9.5681
	Middle	1962.50	9.5902
	High	1990.00	9.5771

10 MHz / 1 Carrier (20 W)

Test Data at Downlink Port 0

Mod.	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
QPSK	Low	1935.00	-
	Middle	1962.50	-
	High	1990.00	-
16QAM	Low	1935.00	-
	Middle	1962.50	-
	High	1990.00	-
64QAM	Low	1935.00	-
	Middle	1962.50	-
	High	1990.00	-
256QAM	Low	1935.00	9.0913
	Middle	1962.50	9.1297
	High	1990.00	9.0660

Test Data at Downlink Port 1

Mod.	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
QPSK	Low	1935.00	-
	Middle	1962.50	-
	High	1990.00	-
16QAM	Low	1935.00	-
	Middle	1962.50	-
	High	1990.00	-
64QAM	Low	1935.00	-
	Middle	1962.50	-
	High	1990.00	-
256QAM	Low	1935.00	9.1074
	Middle	1962.50	9.1167
	High	1990.00	9.0827

Test Data at Downlink Port 2

Mod.	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
QPSK	Low	1935.00	-
	Middle	1962.50	-
	High	1990.00	-
16QAM	Low	1935.00	-
	Middle	1962.50	-
	High	1990.00	-
64QAM	Low	1935.00	-
	Middle	1962.50	-
	High	1990.00	-
256QAM	Low	1935.00	9.1010
	Middle	1962.50	9.1008
	High	1990.00	9.1152

Test Data at Downlink Port 3

Mod.	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
QPSK	Low	1935.00	-
	Middle	1962.50	-
	High	1990.00	-
16QAM	Low	1935.00	-
	Middle	1962.50	-
	High	1990.00	-
64QAM	Low	1935.00	-
	Middle	1962.50	-
	High	1990.00	-
256QAM	Low	1935.00	9.1092
	Middle	1962.50	9.0872
	High	1990.00	9.0901

10 MHz + 10 MHz / 2 Carriers (20 W + 20 W)

Test Data at Downlink Port 0

Mod.	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
QPSK	Low	1940.00	-
	Middle	1962.50	-
	High	1985.00	-
16QAM	Low	1940.00	-
	Middle	1962.50	-
	High	1985.00	-
64QAM	Low	1940.00	-
	Middle	1962.50	-
	High	1985.00	-
256QAM	Low	1940.00	19.156
	Middle	1962.50	19.200
	High	1985.00	19.223

Test Data at Downlink Port 1

Mod.	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
QPSK	Low	1940.00	-
	Middle	1962.50	-
	High	1985.00	-
16QAM	Low	1940.00	-
	Middle	1962.50	-
	High	1985.00	-
64QAM	Low	1940.00	-
	Middle	1962.50	-
	High	1985.00	-
256QAM	Low	1940.00	19.198
	Middle	1962.50	19.169
	High	1985.00	19.164

Test Data at Downlink Port 2

Mod.	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
QPSK	Low	1940.00	-
	Middle	1962.50	-
	High	1985.00	-
16QAM	Low	1940.00	-
	Middle	1962.50	-
	High	1985.00	-
64QAM	Low	1940.00	-
	Middle	1962.50	-
	High	1985.00	-
256QAM	Low	1940.00	19.149
	Middle	1962.50	19.171
	High	1985.00	19.138

Test Data at Downlink Port 3

Mod.	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
QPSK	Low	1940.00	-
	Middle	1962.50	-
	High	1985.00	-
16QAM	Low	1940.00	-
	Middle	1962.50	-
	High	1985.00	-
64QAM	Low	1940.00	-
	Middle	1962.50	-
	High	1985.00	-
256QAM	Low	1940.00	19.201
	Middle	1962.50	19.203
	High	1985.00	19.171

15 MHz / 1 Carrier (30 W)

Test Data at Downlink Port 0

Mod.	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
QPSK	Low	1937.50	13.762
	Middle	1962.50	13.740
	High	1987.50	13.721
16QAM	Low	1937.50	13.751
	Middle	1962.50	13.765
	High	1987.50	13.697
64QAM	Low	1937.50	13.659
	Middle	1962.50	13.688
	High	1987.50	13.684
256QAM	Low	1937.50	13.700
	Middle	1962.50	13.731
	High	1987.50	13.661

Test Data at Downlink Port 1

Mod.	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
QPSK	Low	1937.50	13.717
	Middle	1962.50	13.784
	High	1987.50	13.670
16QAM	Low	1937.50	13.748
	Middle	1962.50	13.761
	High	1987.50	13.719
64QAM	Low	1937.50	13.724
	Middle	1962.50	13.695
	High	1987.50	13.673
256QAM	Low	1937.50	13.667
	Middle	1962.50	13.669
	High	1987.50	13.653

Test Data at Downlink Port 2

Mod.	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
QPSK	Low	1937.50	13.725
	Middle	1962.50	13.760
	High	1987.50	13.660
16QAM	Low	1937.50	13.766
	Middle	1962.50	13.724
	High	1987.50	13.765
64QAM	Low	1937.50	13.707
	Middle	1962.50	13.722
	High	1987.50	13.668
256QAM	Low	1937.50	13.651
	Middle	1962.50	13.689
	High	1987.50	13.630

Test Data at Downlink Port 3

Mod.	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
QPSK	Low	1937.50	13.736
	Middle	1962.50	13.731
	High	1987.50	13.630
16QAM	Low	1937.50	13.739
	Middle	1962.50	13.696
	High	1987.50	13.670
64QAM	Low	1937.50	13.702
	Middle	1962.50	13.702
	High	1987.50	13.617
256QAM	Low	1937.50	13.662
	Middle	1962.50	13.670
	High	1987.50	13.638

15 MHz + 5 MHz / 2 Carriers (30 W + 10 W)

Test Data at Downlink Port 0

Mod.	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
QPSK	Low	1940.00	19.243
	Middle	1962.50	19.244
	High	1985.00	19.323
16QAM	Low	1940.00	19.155
	Middle	1962.50	19.258
	High	1985.00	19.156
64QAM	Low	1940.00	19.162
	Middle	1962.50	19.196
	High	1985.00	19.218
256QAM	Low	1940.00	19.252
	Middle	1962.50	19.233
	High	1985.00	19.193

Test Data at Downlink Port 1

Mod.	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
QPSK	Low	1940.00	19.215
	Middle	1962.50	19.198
	High	1985.00	19.243
16QAM	Low	1940.00	19.152
	Middle	1962.50	19.257
	High	1985.00	19.200
64QAM	Low	1940.00	19.199
	Middle	1962.50	19.193
	High	1985.00	19.183
256QAM	Low	1940.00	19.206
	Middle	1962.50	19.194
	High	1985.00	19.169

Test Data at Downlink Port 2

Mod.	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
QPSK	Low	1940.00	19.172
	Middle	1962.50	19.269
	High	1985.00	19.214
16QAM	Low	1940.00	19.135
	Middle	1962.50	19.229
	High	1985.00	19.214
64QAM	Low	1940.00	19.229
	Middle	1962.50	19.205
	High	1985.00	19.212
256QAM	Low	1940.00	19.166
	Middle	1962.50	19.173
	High	1985.00	19.206

Test Data at Downlink Port 3

Mod.	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
QPSK	Low	1940.00	19.234
	Middle	1962.50	19.203
	High	1985.00	19.192
16QAM	Low	1940.00	19.244
	Middle	1962.50	19.219
	High	1985.00	19.215
64QAM	Low	1940.00	19.187
	Middle	1962.50	19.208
	High	1985.00	19.197
256QAM	Low	1940.00	19.232
	Middle	1962.50	19.200
	High	1985.00	19.165

10 MHz + 5 MHz / 2 Carriers (20 W + 10 W)

Test Data at Downlink Port 0

Mod.	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
QPSK	Low	1937.50	14.390
	Middle	1962.50	14.403
	High	1987.50	14.436
16QAM	Low	1937.50	14.422
	Middle	1962.50	14.437
	High	1987.50	14.505
64QAM	Low	1937.50	14.403
	Middle	1962.50	14.393
	High	1987.50	14.348
256QAM	Low	1937.50	14.436
	Middle	1962.50	14.415
	High	1987.50	14.401

Test Data at Downlink Port 1

Mod.	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
QPSK	Low	1937.50	14.388
	Middle	1962.50	14.463
	High	1987.50	14.373
16QAM	Low	1937.50	14.395
	Middle	1962.50	14.343
	High	1987.50	14.416
64QAM	Low	1937.50	14.398
	Middle	1962.50	14.395
	High	1987.50	14.385
256QAM	Low	1937.50	14.392
	Middle	1962.50	14.403
	High	1987.50	14.407

Test Data at Downlink Port 2

Mod.	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
QPSK	Low	1937.50	14.422
	Middle	1962.50	14.394
	High	1987.50	14.434
16QAM	Low	1937.50	14.351
	Middle	1962.50	14.367
	High	1987.50	14.360
64QAM	Low	1937.50	14.415
	Middle	1962.50	14.384
	High	1987.50	14.391
256QAM	Low	1937.50	14.414
	Middle	1962.50	14.403
	High	1987.50	14.369

Test Data at Downlink Port 3

Mod.	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
QPSK	Low	1937.50	14.395
	Middle	1962.50	14.423
	High	1987.50	14.415
16QAM	Low	1937.50	14.435
	Middle	1962.50	14.381
	High	1987.50	14.406
64QAM	Low	1937.50	14.412
	Middle	1962.50	14.391
	High	1987.50	14.431
256QAM	Low	1937.50	14.399
	Middle	1962.50	14.388
	High	1987.50	14.398

Note:

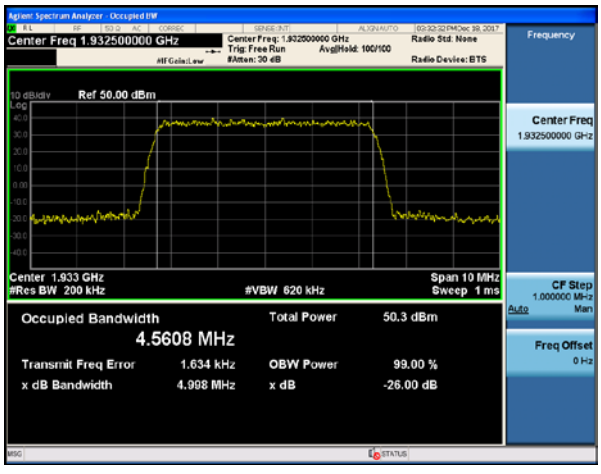
This test report only contains the worst case plot data for each port and modulation.

OCCUPIED BANDWIDTH

5 MHz / 1 Carrier (20 W)

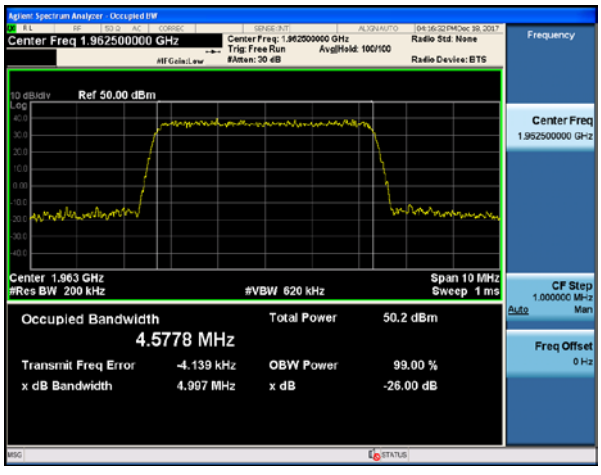
Plot Data for Output Port 0

Mod.	Channel
256QAM	Low

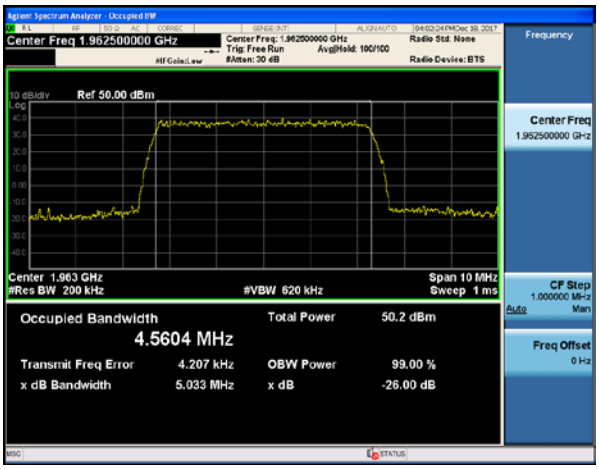
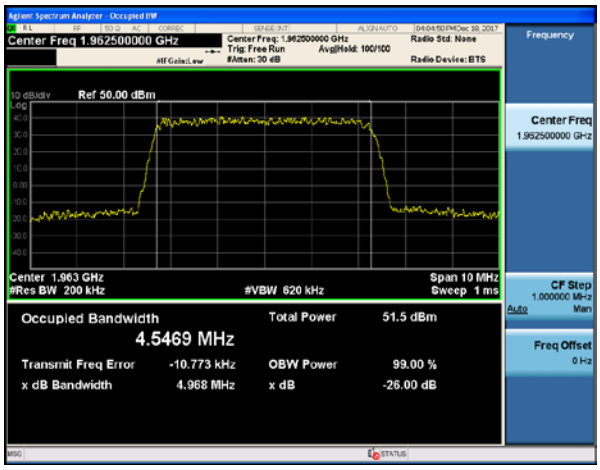


Plot Data for Output Port 1

Mod.	Channel
256QAM	Middle



Plot Data for Output Port 2

Mod.	Channel	Mod.	Channel
QPSK	Middle	16QAM	Middle
			
Mod.	**Channel**	**Mod.**	**Channel**
64QAM	Middle	256QAM	Middle