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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 05, 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-FC002

FCC ID: **A3LSMM-BMR004**

APPLICANT: **SAMSUNG Electronics Co.,Ltd.**

FCC Model: SMM-BMR004

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 (G7D)	16QAM/64QAM/256QAM (D7W)
LTE (5 MHz)	1930 ~ 1995	4M58G7D	4M56D7W
LTE (10 MHz)	1930 ~ 1995	-	9M14D7W
LTE (15 MHz)	1930 ~ 1995	13M8G7D	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: November 22, 2017 ~ December 14, 2017

Note: Refer to existing report 'HCTR1209FR14-1' and 'HCTR1305RF21' 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

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Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-1801-FC002	January 05, 2018	- First Approval Report

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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: 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	

Mode	Tx Frequency (MHz)	Emission Designator	
		QPSK (G7D)	16QAM/64QAM/256QAM (W7D)
LTE (5 MHz)	1930 ~ 1995	4M58G7D	4M56W7D
LTE (10 MHz)	1930 ~ 1995	-	9M14W7D
LTE (15 MHz)	1930 ~ 1995	13M8G7D	13M8W7D

※ 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 90

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, 65QAM, 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: 162.605 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	43.01	19.999
	Middle	1962.50	43.23	21.038
	High	1992.50	43.08	20.324

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	42.99	19.907
	Middle	1962.50	43.16	20.701
	High	1992.50	43.13	20.559

Test Data at Downlink Port 2

Mod.	Channel	Frequency (MHz)	Measured Output Power	
			(dBm)	(W)
QPSK	Low	1932.50	42.87	19.364
	Middle	1962.50	43.04	20.137
	High	1992.50	42.67	18.493
16QAM	Low	1932.50	42.93	19.634
	Middle	1962.50	43.10	20.417
	High	1992.50	42.82	19.143
64QAM	Low	1932.50	42.80	19.055
	Middle	1962.50	43.16	20.701
	High	1992.50	42.83	19.187
256QAM	Low	1932.50	42.97	19.815
	Middle	1962.50	43.10	20.417
	High	1992.50	42.79	19.011

Test Data at Downlink Port 3

Mod.	Channel	Frequency (MHz)	Measured Output Power	
			(dBm)	(W)
QPSK	Low	1932.50	43.22	20.989
	Middle	1962.50	43.17	20.749
	High	1992.50	42.96	19.770
16QAM	Low	1932.50	43.20	20.893
	Middle	1962.50	43.26	21.184
	High	1992.50	42.93	19.634
64QAM	Low	1932.50	43.09	20.370
	Middle	1962.50	43.20	20.893
	High	1992.50	42.99	19.907
256QAM	Low	1932.50	43.23	21.038
	Middle	1962.50	43.13	20.559
	High	1992.50	43.01	19.999

Sum Data of Port 2 and Port 3

Mod.	Channel	Frequency (MHz)	Measured Output Power (W)
QPSK	Low	1932.50	40.353
	Middle	1962.50	40.886
	High	1992.50	38.263
16QAM	Low	1932.50	40.527
	Middle	1962.50	41.601
	High	1992.50	38.777
64QAM	Low	1932.50	39.425
	Middle	1962.50	41.594
	High	1992.50	39.094

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	80.759
	Middle	1962.50	82.715
	High	1992.50	79.893

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	46.05	40.272
	Middle	1962.50	46.01	39.902
	High	1990.00	45.91	38.994

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	46.20	41.687
	Middle	1962.50	46.20	41.687
	High	1990.00	45.82	38.194

Test Data at Downlink Port 2

Mod.	Channel	Frequency (MHz)	Measured Output Power	
			(dBm)	(W)
QPSK	Low	1935.00	45.96	39.446
	Middle	1962.50	45.97	39.537
	High	1990.00	46.00	39.811
16QAM	Low	1935.00	45.85	38.459
	Middle	1962.50	45.89	38.815
	High	1990.00	46.08	40.551
64QAM	Low	1935.00	45.94	39.264
	Middle	1962.50	46.02	39.994
	High	1990.00	46.05	40.272
256QAM	Low	1935.00	45.83	38.282
	Middle	1962.50	45.79	37.931
	High	1990.00	45.94	39.264

Test Data at Downlink Port 3

Mod.	Channel	Frequency (MHz)	Measured Output Power	
			(dBm)	(W)
QPSK	Low	1935.00	46.26	42.267
	Middle	1962.50	46.11	40.832
	High	1990.00	46.20	41.687
16QAM	Low	1935.00	46.30	42.658
	Middle	1962.50	46.25	42.170
	High	1990.00	46.20	41.687
64QAM	Low	1935.00	46.30	42.658
	Middle	1962.50	46.28	42.462
	High	1990.00	46.11	40.832
256QAM	Low	1935.00	46.27	42.364
	Middle	1962.50	46.09	40.644
	High	1990.00	46.13	41.020

Sum Data of Port 2 and Port 3

Mod.	Channel	Frequency (MHz)	Measured Output Power (W)
QPSK	Low	1935.00	81.713
	Middle	1962.50	80.369
	High	1990.00	81.498
16QAM	Low	1935.00	81.117
	Middle	1962.50	80.985
	High	1990.00	82.238
64QAM	Low	1935.00	81.922
	Middle	1962.50	82.456
	High	1990.00	81.104

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	1935.00	162.605
	Middle	1962.50	160.164
	High	1990.00	157.472

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	43.13	20.559
	Middle	1962.50	42.83	19.187
	High	1990.00	43.16	20.701

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	43.29	21.330
	Middle	1962.50	43.23	21.038
	High	1990.00	43.06	20.230

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	42.81	19.099
	Middle	1962.50	42.66	18.450
	High	1990.00	42.85	19.275

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	42.84	19.231
	Middle	1962.50	43.27	21.232
	High	1990.00	43.00	19.953

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	1935.00	80.219
	Middle	1962.50	79.907
	High	1990.00	80.159

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	45.79	37.931
	Middle	1962.50	45.98	39.628
	High	1985.00	45.79	37.931

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	46.09	40.644
	Middle	1962.50	46.19	41.591
	High	1985.00	45.87	38.637

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	45.61	36.392
	Middle	1962.50	45.87	38.637
	High	1985.00	45.77	37.757

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	45.99	39.719
	Middle	1962.50	45.89	38.815
	High	1985.00	46.08	40.551

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	1940.00	154.686
	Middle	1962.50	158.671
	High	1985.00	154.876

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	44.59	28.774
	Middle	1962.50	44.62	28.973
	High	1987.50	44.57	28.642
16QAM	Low	1937.50	44.45	27.861
	Middle	1962.50	44.47	27.990
	High	1987.50	44.50	28.184
64QAM	Low	1937.50	44.44	27.797
	Middle	1962.50	44.47	27.990
	High	1987.50	44.44	27.797
256QAM	Low	1937.50	44.36	27.290
	Middle	1962.50	44.49	28.119
	High	1987.50	44.46	27.925

Test Data at Downlink Port 1

Mod.	Channel	Frequency (MHz)	Measured Output Power	
			(dBm)	(W)
QPSK	Low	1937.50	44.38	27.416
	Middle	1962.50	44.54	28.445
	High	1987.50	44.56	28.576
16QAM	Low	1937.50	44.43	27.733
	Middle	1962.50	44.49	28.119
	High	1987.50	44.57	28.642
64QAM	Low	1937.50	44.31	26.977
	Middle	1962.50	44.42	27.669
	High	1987.50	44.50	28.184
256QAM	Low	1937.50	44.24	26.546
	Middle	1962.50	44.42	27.669
	High	1987.50	44.47	27.990

Test Data at Downlink Port 2

Mod.	Channel	Frequency (MHz)	Measured Output Power	
			(dBm)	(W)
QPSK	Low	1937.50	44.66	29.242
	Middle	1962.50	44.74	29.785
	High	1987.50	44.66	29.242
16QAM	Low	1937.50	44.67	29.309
	Middle	1962.50	44.65	29.174
	High	1987.50	44.59	28.774
64QAM	Low	1937.50	44.64	29.107
	Middle	1962.50	44.66	29.242
	High	1987.50	44.61	28.907
256QAM	Low	1937.50	44.74	29.785
	Middle	1962.50	44.61	28.907
	High	1987.50	44.55	28.510

Test Data at Downlink Port 3

Mod.	Channel	Frequency (MHz)	Measured Output Power	
			(dBm)	(W)
QPSK	Low	1937.50	44.49	28.119
	Middle	1962.50	44.64	29.107
	High	1987.50	44.57	28.642
16QAM	Low	1937.50	44.55	28.510
	Middle	1962.50	44.63	29.040
	High	1987.50	44.64	29.107
64QAM	Low	1937.50	44.54	28.445
	Middle	1962.50	44.55	28.510
	High	1987.50	44.52	28.314
256QAM	Low	1937.50	44.57	28.642
	Middle	1962.50	44.53	28.379
	High	1987.50	44.62	28.973

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

Mod.	Channel	Frequency (MHz)	Measured Output Power (W)
QPSK	Low	1937.50	113.551
	Middle	1962.50	116.310
	High	1987.50	115.102
16QAM	Low	1937.50	113.413
	Middle	1962.50	114.323
	High	1987.50	114.707
64QAM	Low	1937.50	112.326
	Middle	1962.50	113.411
	High	1987.50	113.202
256QAM	Low	1937.50	112.263
	Middle	1962.50	113.074
	High	1987.50	113.398

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	45.86	38.548
	Middle	1962.50	45.97	39.537
	High	1985.00	45.87	38.637
16QAM	Low	1940.00	45.95	39.355
	Middle	1962.50	45.98	39.628
	High	1985.00	45.86	38.548
64QAM	Low	1940.00	45.94	39.264
	Middle	1962.50	45.96	39.446
	High	1985.00	45.91	38.994
256QAM	Low	1940.00	45.85	38.459
	Middle	1962.50	45.98	39.628
	High	1985.00	45.88	38.726

Test Data at Downlink Port 1

Mod.	Channel	Frequency (MHz)	Measured Output Power	
			(dBm)	(W)
QPSK	Low	1940.00	45.76	37.670
	Middle	1962.50	45.92	39.084
	High	1985.00	45.91	38.994
16QAM	Low	1940.00	45.87	38.637
	Middle	1962.50	45.91	38.994
	High	1985.00	45.84	38.371
64QAM	Low	1940.00	45.78	37.844
	Middle	1962.50	45.95	39.355
	High	1985.00	45.80	38.019
256QAM	Low	1940.00	45.76	37.670
	Middle	1962.50	45.91	38.994
	High	1985.00	45.83	38.282

Test Data at Downlink Port 2

Mod.	Channel	Frequency (MHz)	Measured Output Power	
			(dBm)	(W)
QPSK	Low	1940.00	46.18	41.495
	Middle	1962.50	46.03	40.087
	High	1985.00	45.96	39.446
16QAM	Low	1940.00	46.07	40.458
	Middle	1962.50	46.04	40.179
	High	1985.00	45.98	39.628
64QAM	Low	1940.00	46.10	40.738
	Middle	1962.50	46.03	40.087
	High	1985.00	45.99	39.719
256QAM	Low	1940.00	46.10	40.738
	Middle	1962.50	46.03	40.087
	High	1985.00	45.96	39.446

Test Data at Downlink Port 3

Mod.	Channel	Frequency (MHz)	Measured Output Power	
			(dBm)	(W)
QPSK	Low	1940.00	45.98	39.628
	Middle	1962.50	45.92	39.084
	High	1985.00	45.98	39.628
16QAM	Low	1940.00	45.99	39.719
	Middle	1962.50	45.96	39.446
	High	1985.00	45.99	39.719
64QAM	Low	1940.00	46.03	40.087
	Middle	1962.50	45.99	39.719
	High	1985.00	45.99	39.719
256QAM	Low	1940.00	46.03	40.087
	Middle	1962.50	45.95	39.355
	High	1985.00	45.98	39.628

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

Mod.	Channel	Frequency (MHz)	Measured Output Power (W)
QPSK	Low	1940.00	157.341
	Middle	1962.50	157.792
	High	1985.00	156.705
16QAM	Low	1940.00	158.169
	Middle	1962.50	158.247
	High	1985.00	156.266
64QAM	Low	1940.00	157.933
	Middle	1962.50	158.607
	High	1985.00	156.451
256QAM	Low	1940.00	156.954
	Middle	1962.50	158.064
	High	1985.00	156.082

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	44.69	29.444
	Middle	1962.50	44.68	29.376
	High	1987.50	44.97	31.405
16QAM	Low	1937.50	44.74	29.785
	Middle	1962.50	44.76	29.923
	High	1987.50	44.77	29.992
64QAM	Low	1937.50	44.69	29.444
	Middle	1962.50	44.74	29.785
	High	1987.50	44.76	29.923
256QAM	Low	1937.50	44.66	29.242
	Middle	1962.50	44.70	29.512
	High	1987.50	44.68	29.376

Test Data at Downlink Port 1

Mod.	Channel	Frequency (MHz)	Measured Output Power	
			(dBm)	(W)
QPSK	Low	1937.50	44.60	28.840
	Middle	1962.50	44.60	28.840
	High	1987.50	44.97	31.405
16QAM	Low	1937.50	44.63	29.040
	Middle	1962.50	44.64	29.107
	High	1987.50	44.74	29.785
64QAM	Low	1937.50	44.59	28.774
	Middle	1962.50	44.63	29.040
	High	1987.50	44.70	29.512
256QAM	Low	1937.50	44.52	28.314
	Middle	1962.50	44.62	28.973
	High	1987.50	44.66	29.242

Test Data at Downlink Port 2

Mod.	Channel	Frequency (MHz)	Measured Output Power	
			(dBm)	(W)
QPSK	Low	1937.50	44.86	30.620
	Middle	1962.50	44.80	30.200
	High	1987.50	44.82	30.339
16QAM	Low	1937.50	44.94	31.189
	Middle	1962.50	44.79	30.130
	High	1987.50	44.66	29.242
64QAM	Low	1937.50	44.87	30.690
	Middle	1962.50	44.81	30.269
	High	1987.50	44.72	29.648
256QAM	Low	1937.50	44.82	30.339
	Middle	1962.50	44.80	30.200
	High	1987.50	44.71	29.580

Test Data at Downlink Port 3

Mod.	Channel	Frequency (MHz)	Measured Output Power	
			(dBm)	(W)
QPSK	Low	1937.50	44.94	31.189
	Middle	1962.50	44.92	31.046
	High	1987.50	44.96	31.333
16QAM	Low	1937.50	44.98	31.477
	Middle	1962.50	44.93	31.117
	High	1987.50	44.91	30.974
64QAM	Low	1937.50	44.87	30.690
	Middle	1962.50	44.95	31.261
	High	1987.50	44.92	31.046
256QAM	Low	1937.50	44.89	30.832
	Middle	1962.50	44.92	31.046
	High	1987.50	44.92	31.046

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

Mod.	Channel	Frequency (MHz)	Measured Output Power (W)
QPSK	Low	1937.50	120.093
	Middle	1962.50	119.462
	High	1987.50	124.482
16QAM	Low	1937.50	121.491
	Middle	1962.50	120.277
	High	1987.50	119.993
64QAM	Low	1937.50	119.598
	Middle	1962.50	120.355
	High	1987.50	120.129
256QAM	Low	1937.50	118.727
	Middle	1962.50	119.731
	High	1987.50	119.244

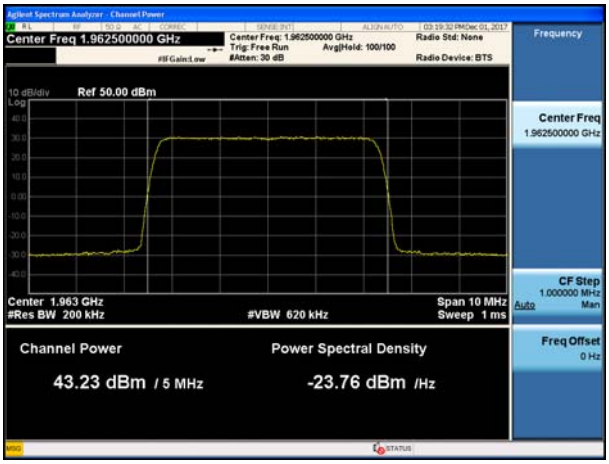
Note:

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)

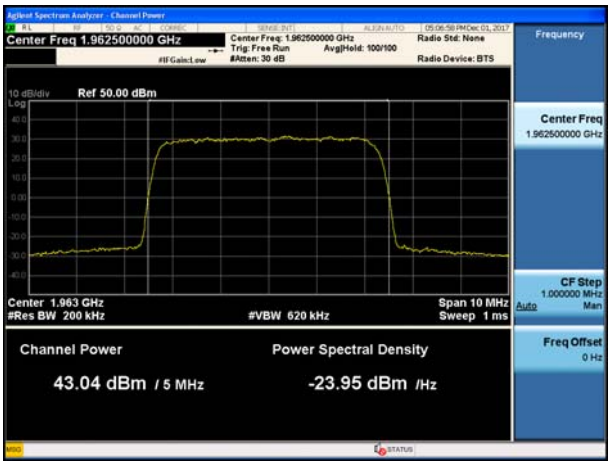
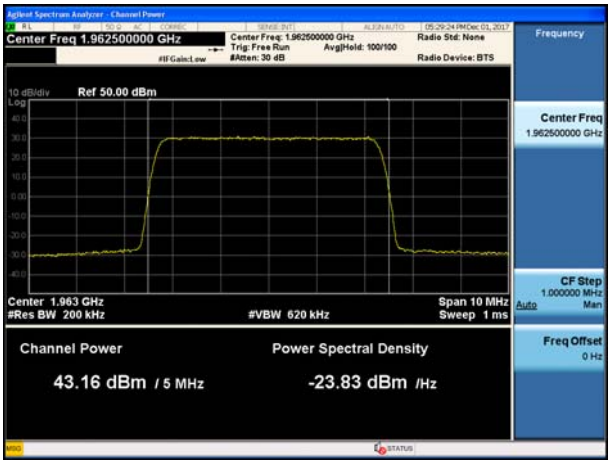
Mod.	Channel
256QAM	Middle



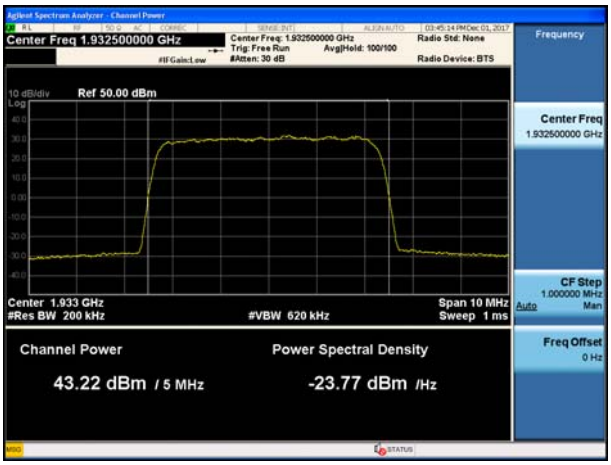
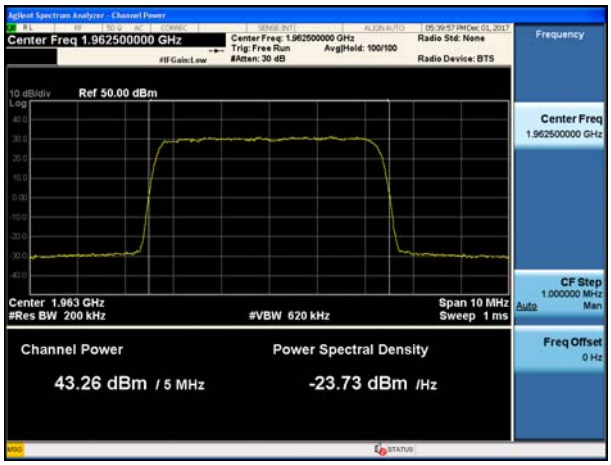
Plot Data for Output Port 1 (Conducted Output Power)

Mod.	Channel
256QAM	Middle

Plot Data for Output Port 2 (Conducted Output Power)

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

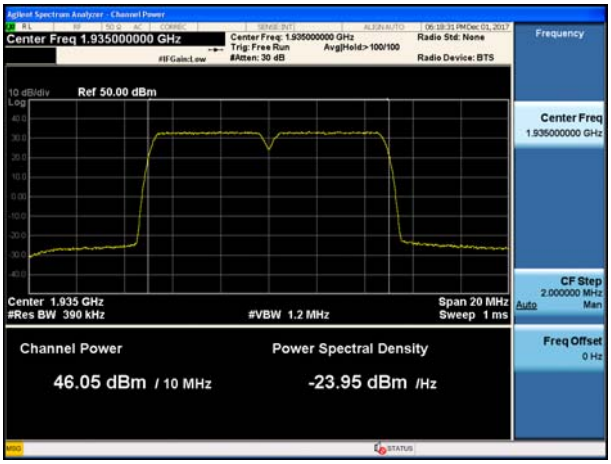
Plot Data for Output Port 3 (Conducted Output Power)

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

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

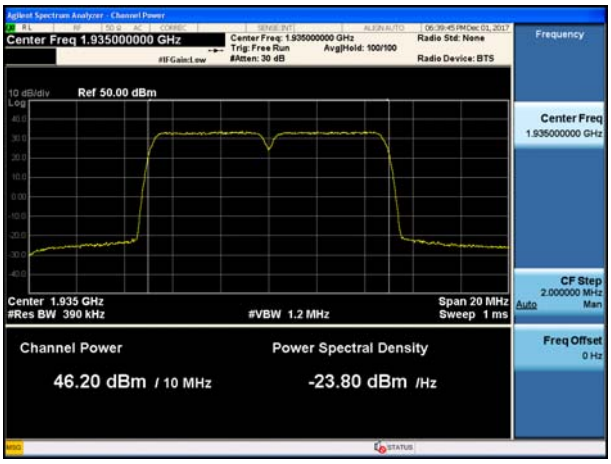
Plot Data for Output Port 0 (Conducted Output Power)

Mod.	Channel
256QAM	Low

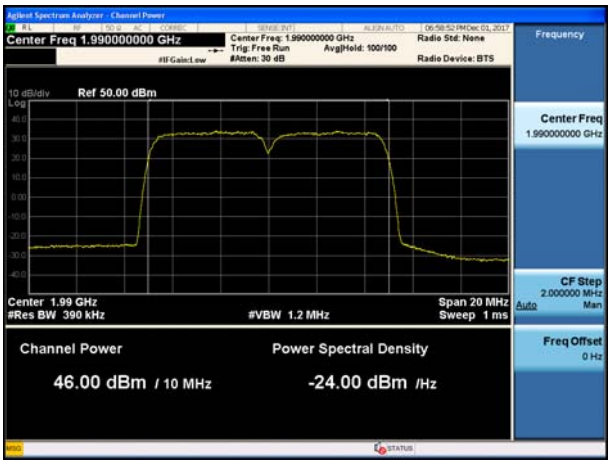
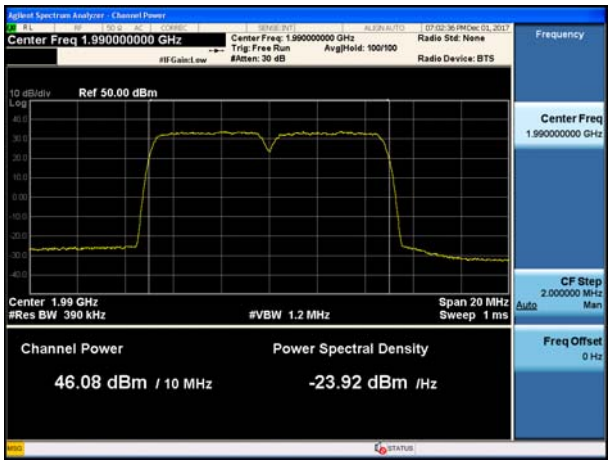
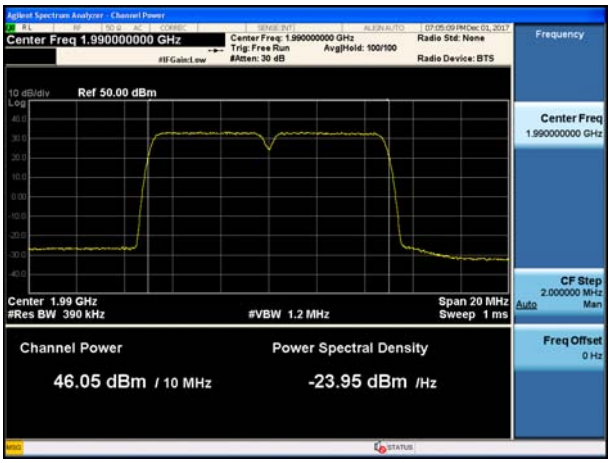
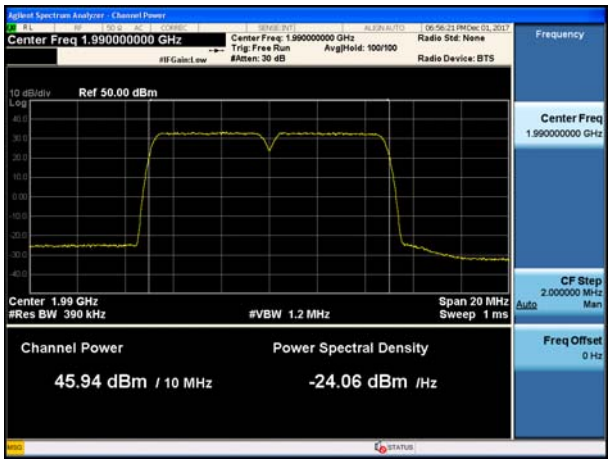


Plot Data for Output Port 1 (Conducted Output Power)

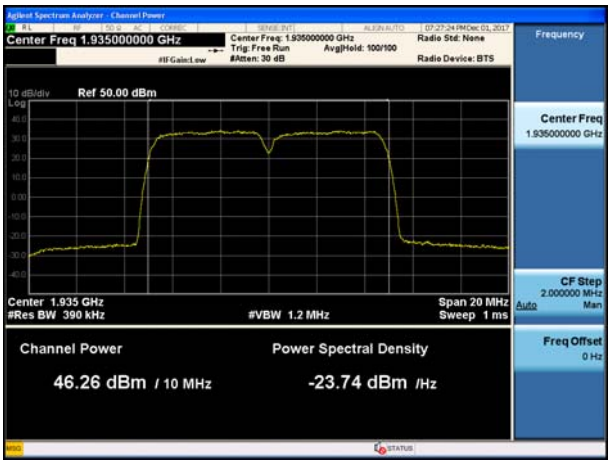
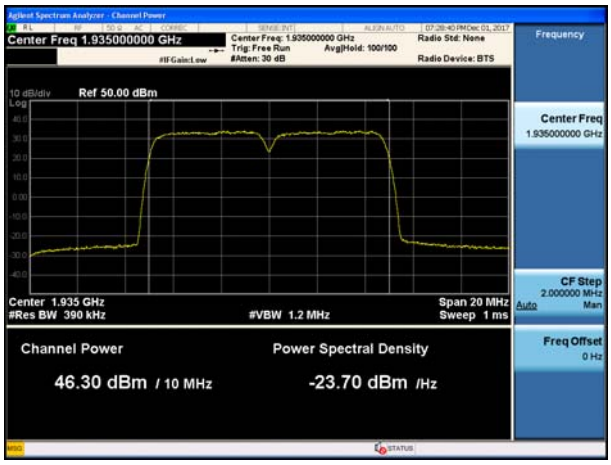
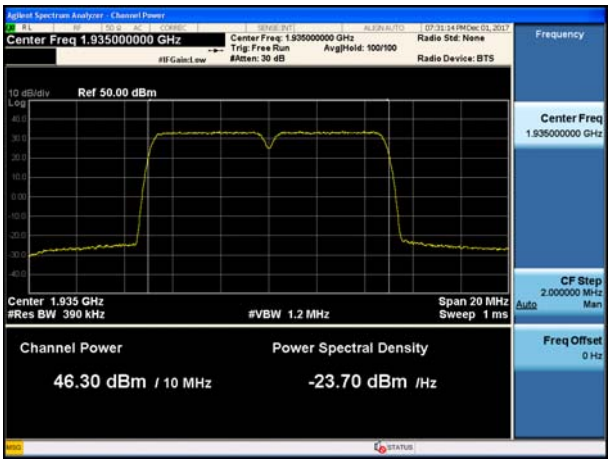
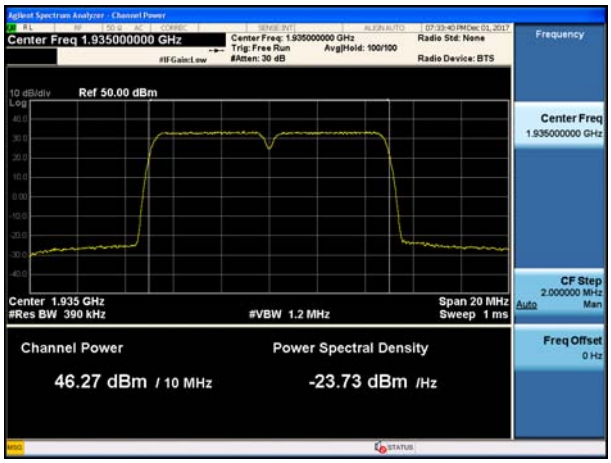
Mod.	Channel
256QAM	Low



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

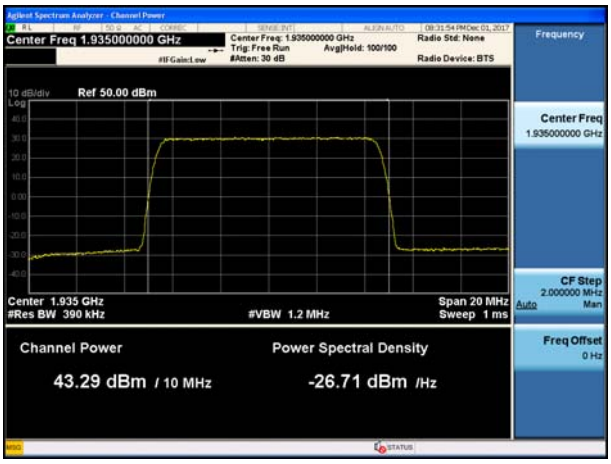
10 MHz / 1 Carrier (20 W)

Plot Data for Output Port 0 (Conducted Output Power)

Mod.	Channel
256QAM	High

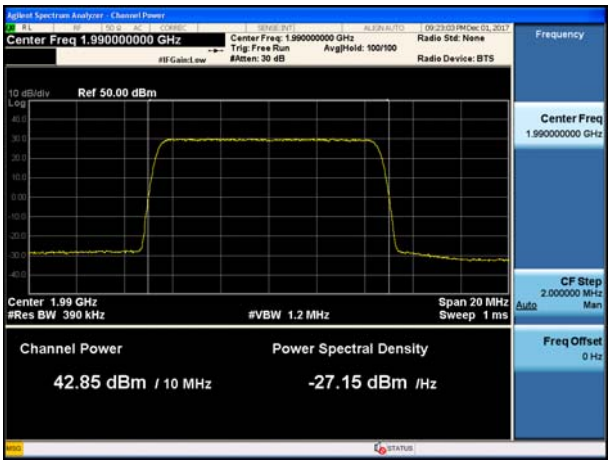
Plot Data for Output Port 1 (Conducted Output Power)

Mod.	Channel
256QAM	Low



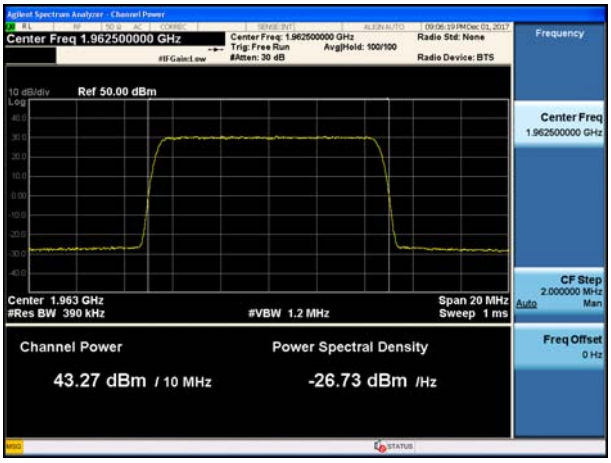
Plot Data for Output Port 2 (Conducted Output Power)

Mod.	Channel
256QAM	High



Plot Data for Output Port 3 (Conducted Output Power)

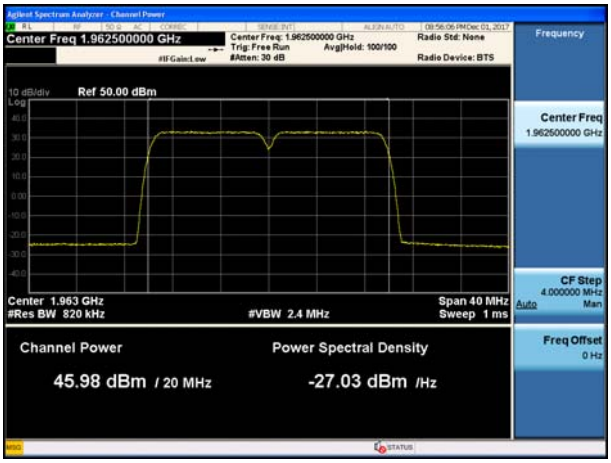
Mod.	Channel
256QAM	Middle



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

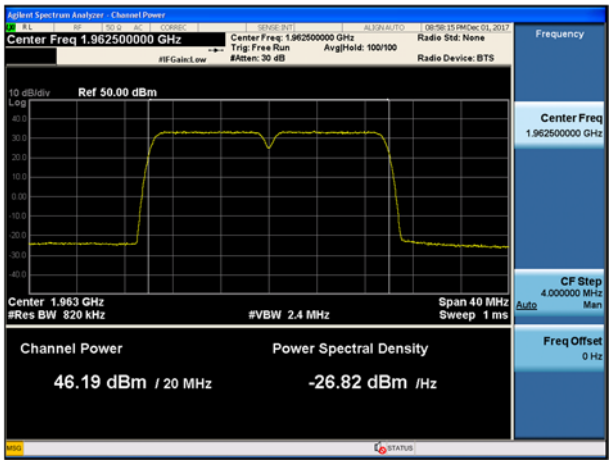
Plot Data for Output Port 0 (Conducted Output Power)

Mod.	Channel
256QAM	Middle



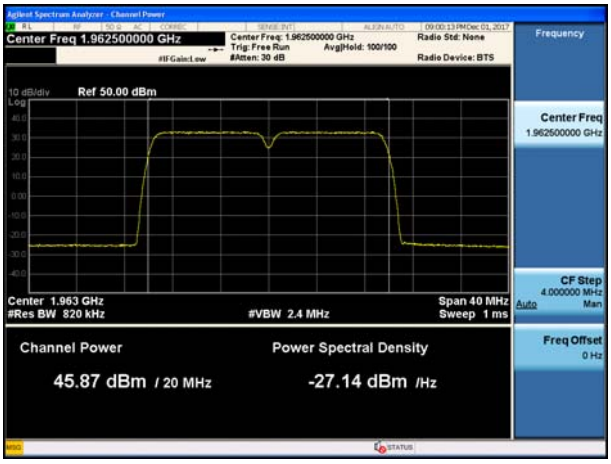
Plot Data for Output Port 1 (Conducted Output Power)

Mod.	Channel
256QAM	Middle



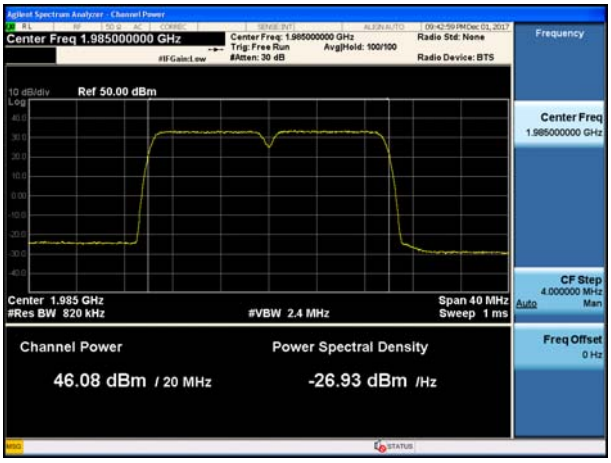
Plot Data for Output Port 2 (Conducted Output Power)

Mod.	Channel
256QAM	Middle



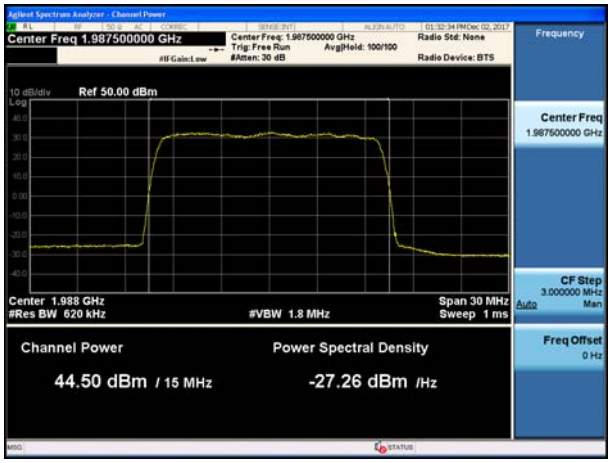
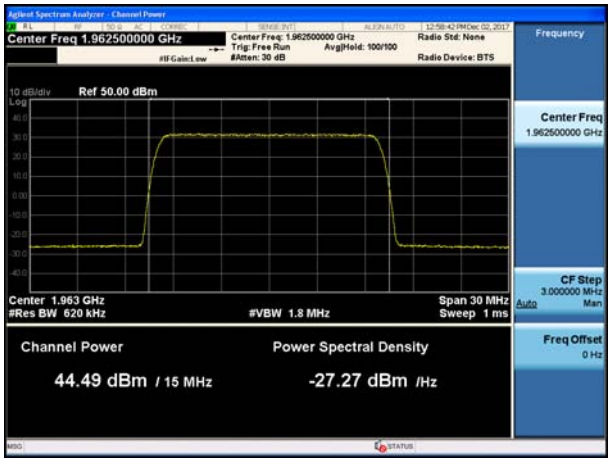
Plot Data for Output Port 3 (Conducted Output Power)

Mod.	Channel
256QAM	High

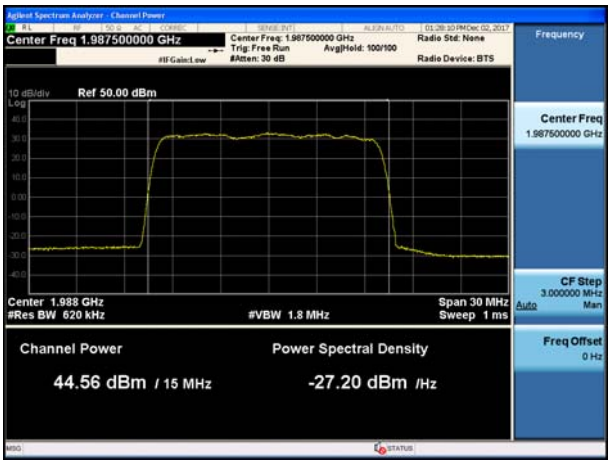
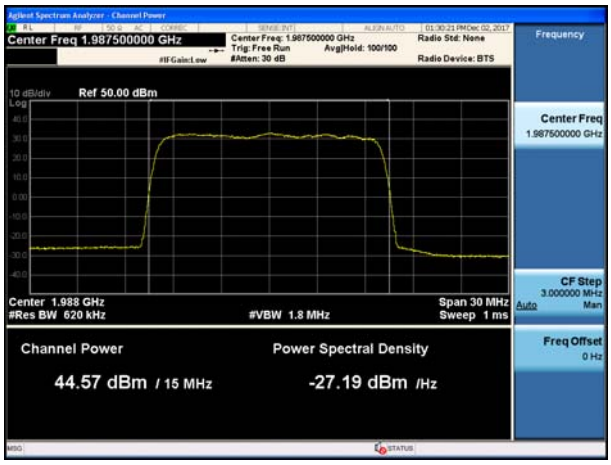
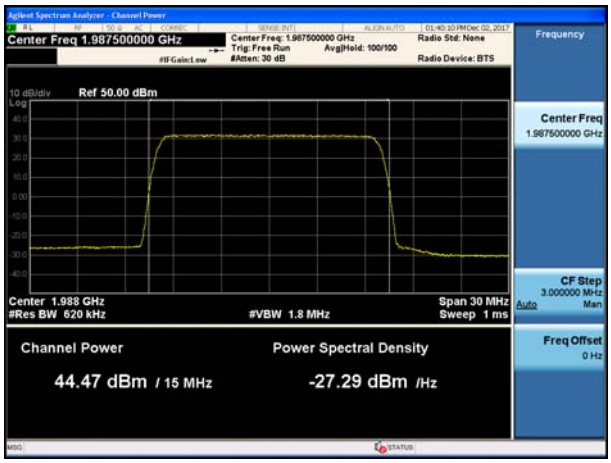


15 MHz / 1 Carrier (30 W)

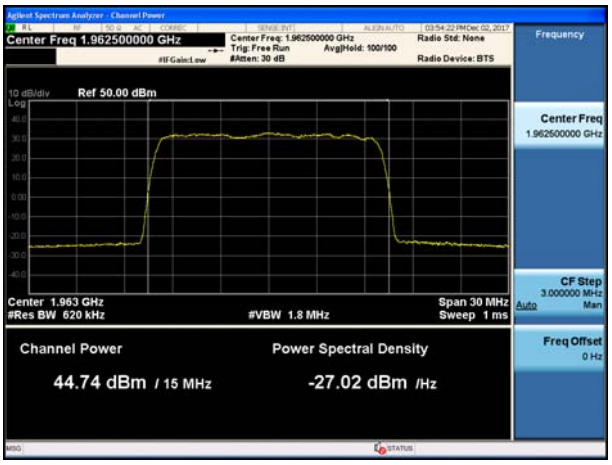
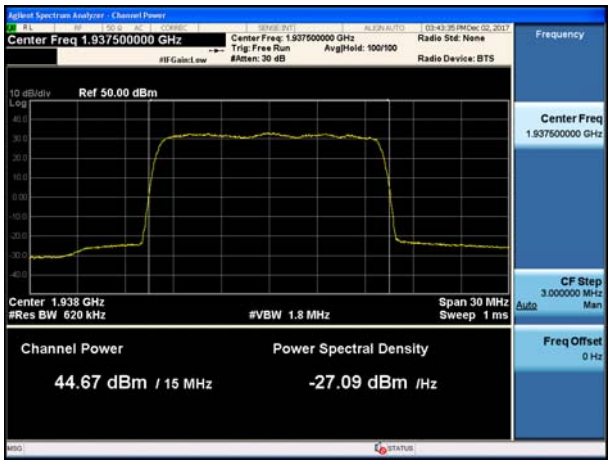
Plot Data for Output Port 0 (Conducted Output Power)

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

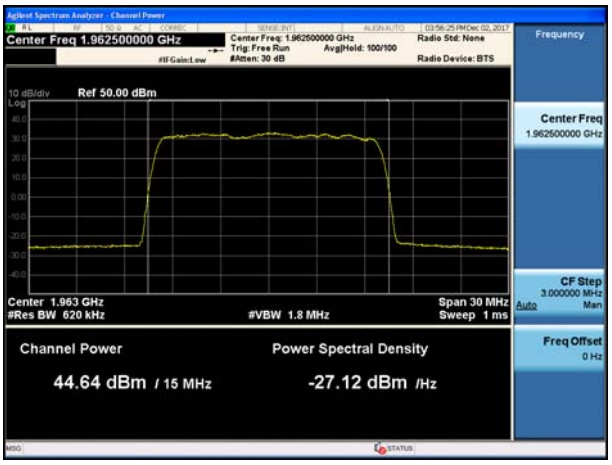
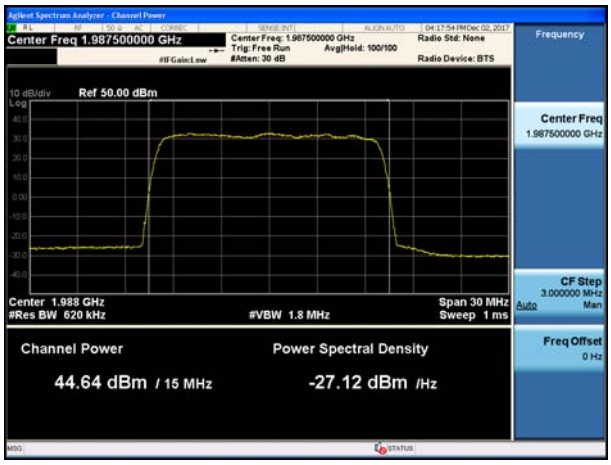
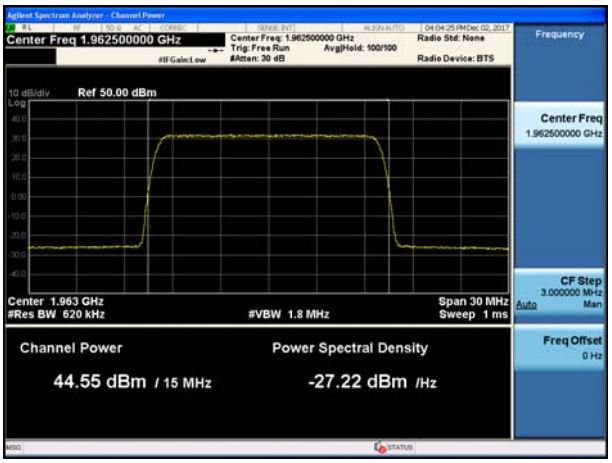
Plot Data for Output Port 1 (Conducted Output Power)

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)

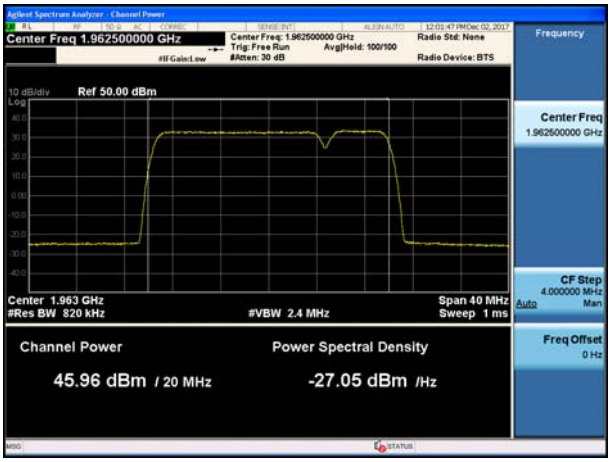
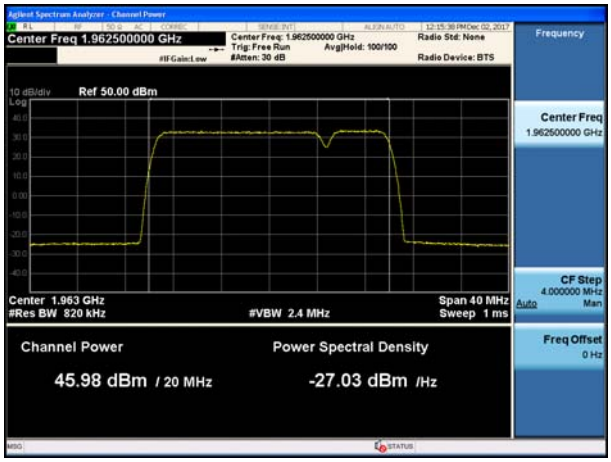
Mod.	Channel	Mod.	Channel
QPSK	Middle	16QAM	Low
			
Mod.	Channel	Mod.	Channel
64QAM	Middle	256QAM	Low

Plot Data for Output Port 3 (Conducted Output Power)

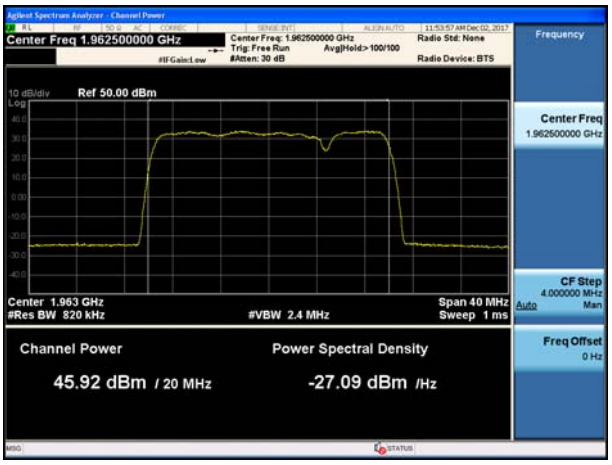
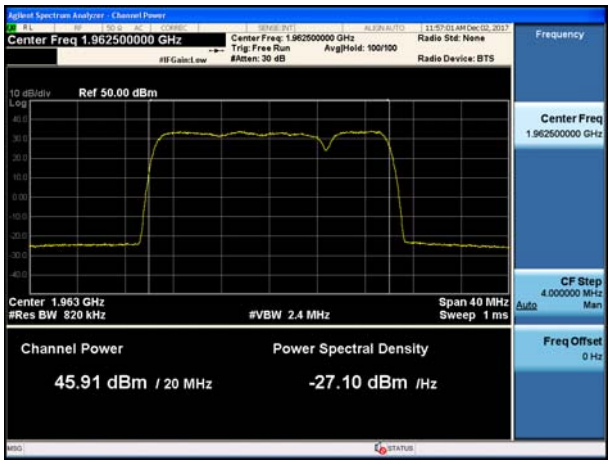
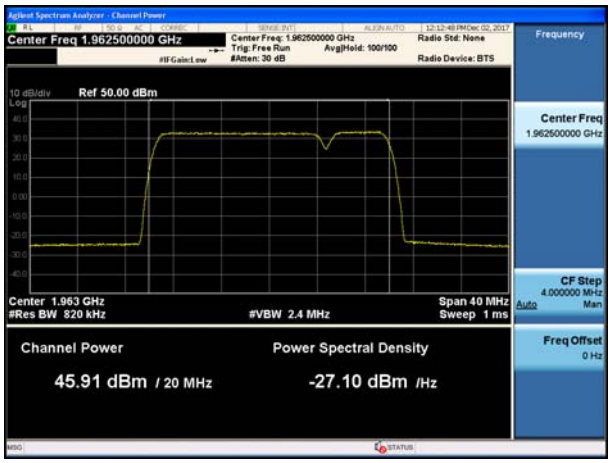
Mod.	Channel	Mod.	Channel
QPSK	Middle	16QAM	High
			
Mod.	Channel	Mod.	Channel
64QAM	Middle	256QAM	High
			

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

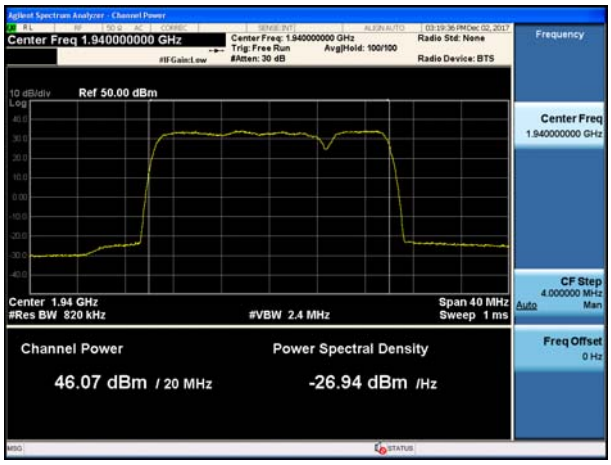
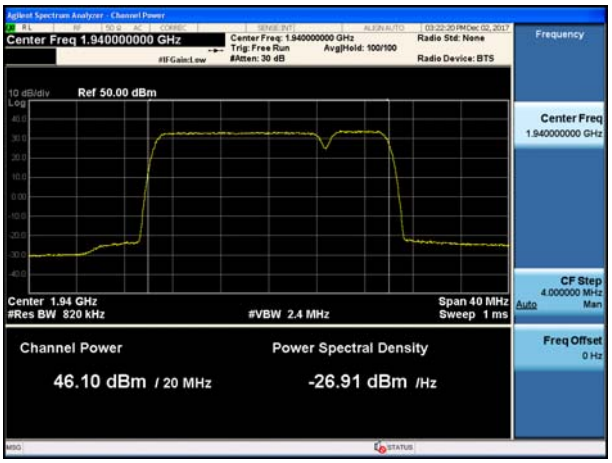
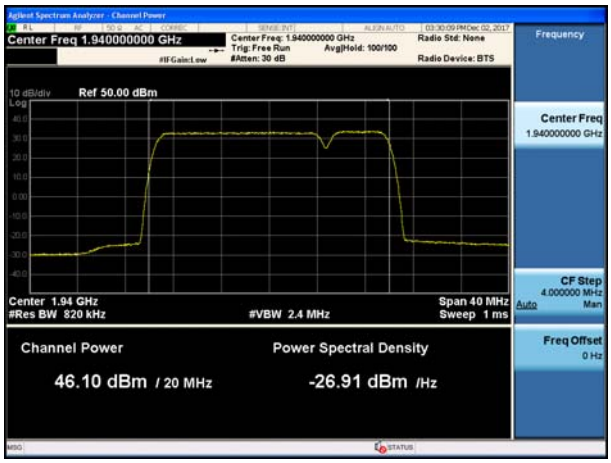
Plot Data for Output Port 0 (Conducted Output Power)

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

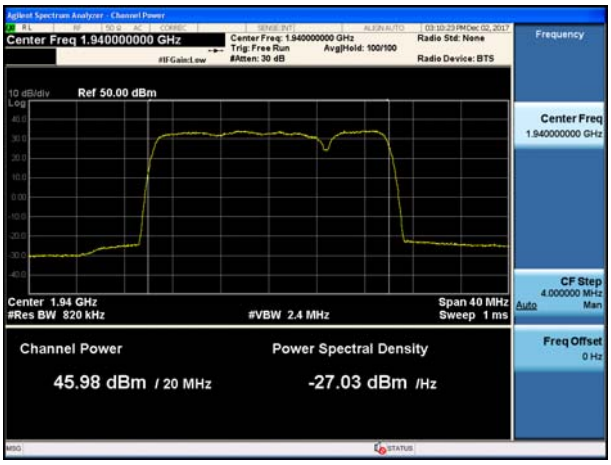
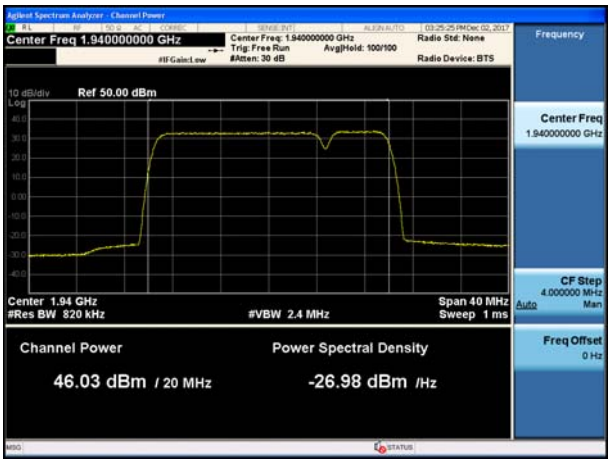
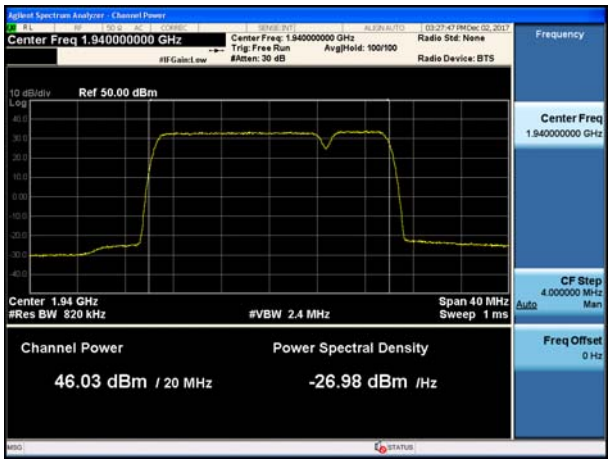
Plot Data for Output Port 1 (Conducted Output Power)

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)

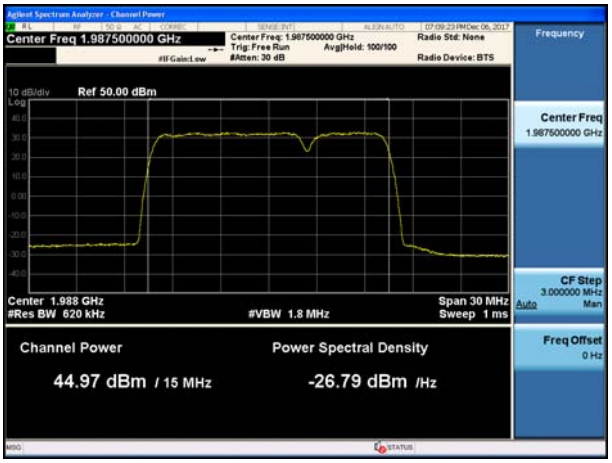
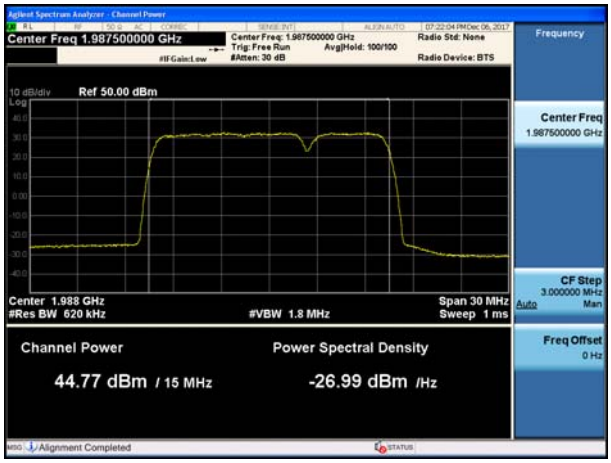
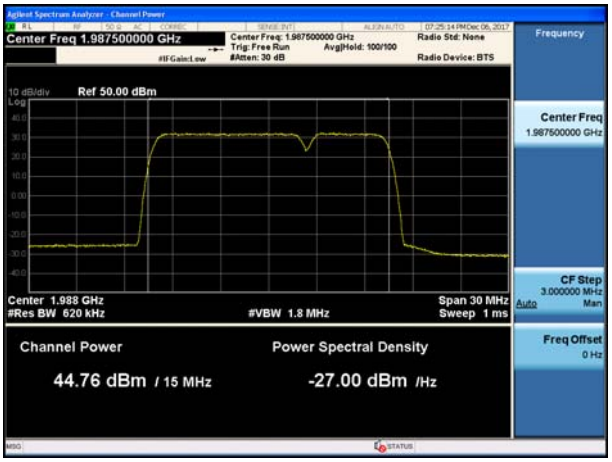
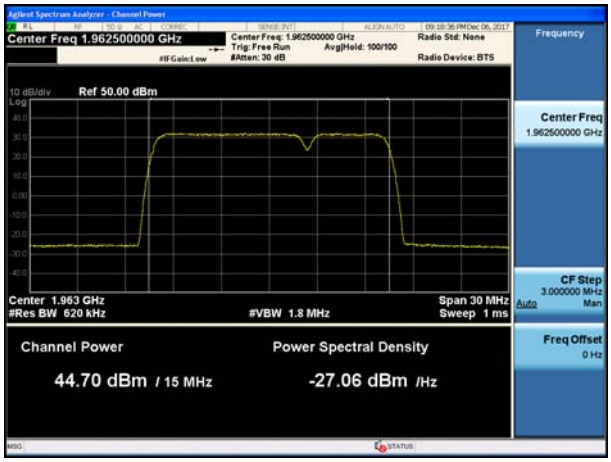
Mod.	Channel	Mod.	Channel
QPSK	Low	16QAM	Low
			
Mod.	Channel	Mod.	Channel
64QAM	Low	256QAM	Low
			

Plot Data for Output Port 3 (Conducted Output Power)

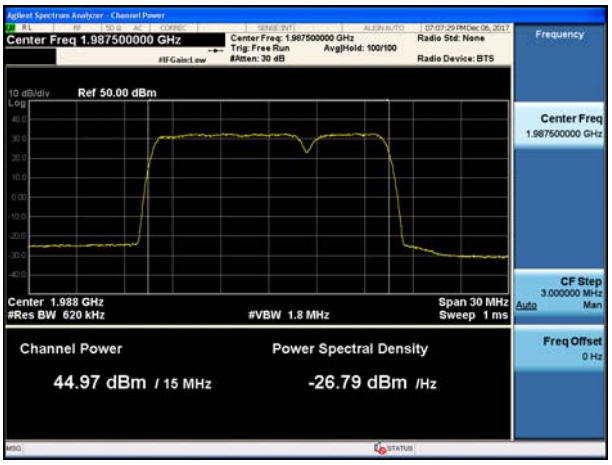
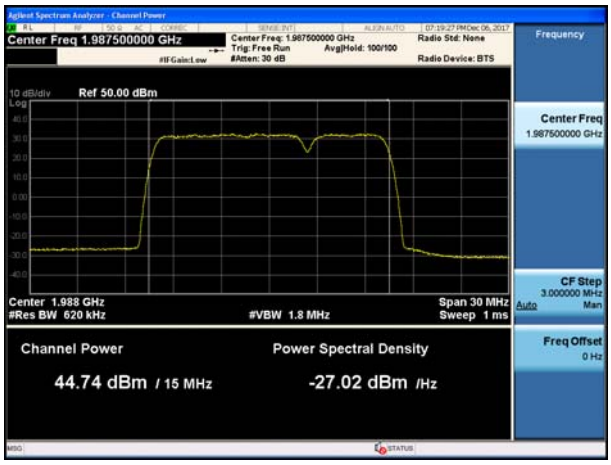
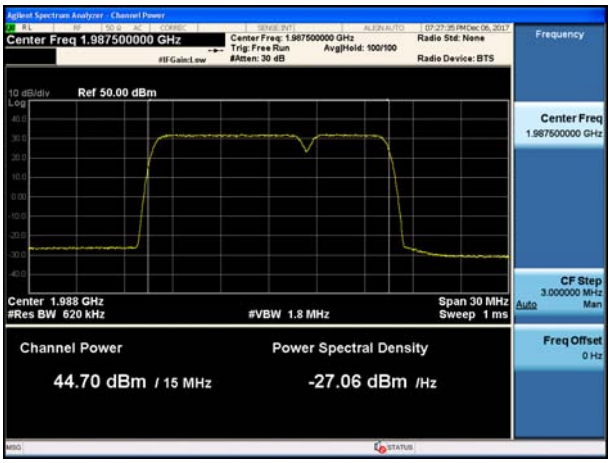
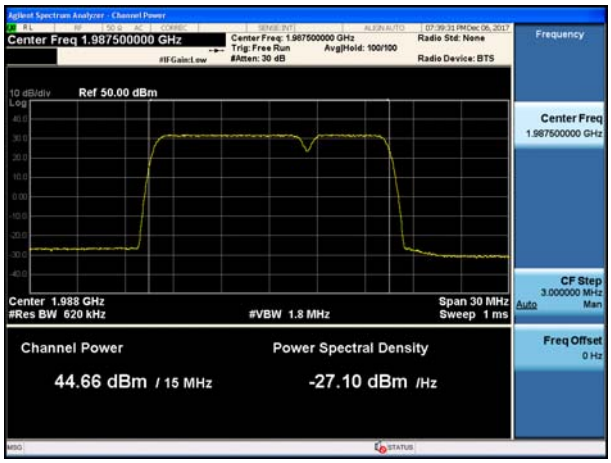
Mod.	Channel	Mod.	Channel
QPSK	Low	16QAM	Low
			
Mod.	Channel	Mod.	Channel
64QAM	Low	256QAM	Low
			

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

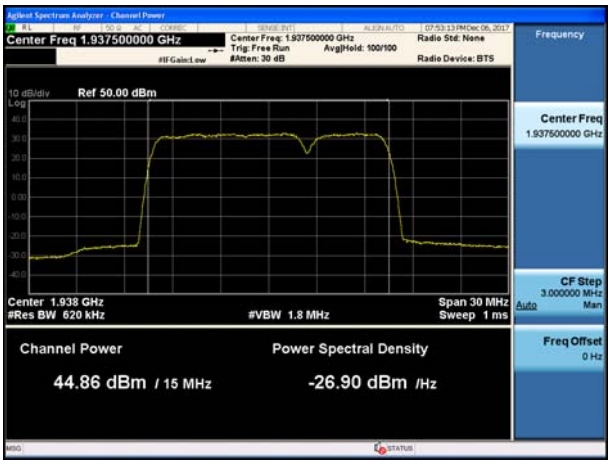
Plot Data for Output Port 0 (Conducted Output Power)

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

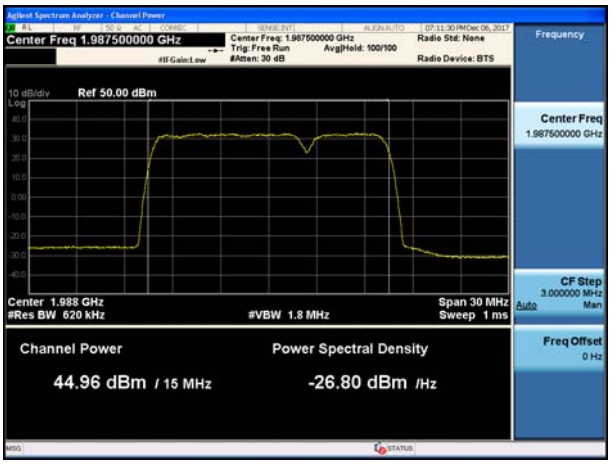
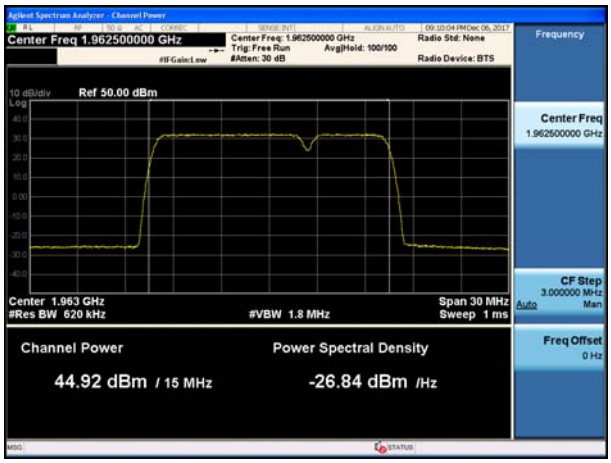
Plot Data for Output Port 1 (Conducted Output Power)

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

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	4.5719
	Middle	1962.50	4.5657
	High	1992.50	4.5522

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	4.5671
	Middle	1962.50	4.5673
	High	1992.50	4.5959

Test Data at Downlink Port 2

Mod.	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
QPSK	Low	1932.50	4.5455
	Middle	1962.50	4.5815
	High	1992.50	4.5489
16QAM	Low	1932.50	4.5756
	Middle	1962.50	4.5755
	High	1992.50	4.5371
64QAM	Low	1932.50	4.5616
	Middle	1962.50	4.5431
	High	1992.50	4.5497
256QAM	Low	1932.50	4.5579
	Middle	1962.50	4.5738
	High	1992.50	4.5606

Test Data at Downlink Port 3

Mod.	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
QPSK	Low	1932.50	4.5818
	Middle	1962.50	4.5822
	High	1992.50	4.5211
16QAM	Low	1932.50	4.5233
	Middle	1962.50	4.5554
	High	1992.50	4.5599
64QAM	Low	1932.50	4.5619
	Middle	1962.50	4.5461
	High	1992.50	4.5567
256QAM	Low	1932.50	4.5810
	Middle	1962.50	4.5752
	High	1992.50	4.5643

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	9.5987
	Middle	1962.50	9.6022
	High	1990.00	9.5814

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	9.5957
	Middle	1962.50	9.6273
	High	1990.00	9.6029

Test Data at Downlink Port 2

Mod.	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
QPSK	Low	1935.00	9.6018
	Middle	1962.50	9.6215
	High	1990.00	9.5746
16QAM	Low	1935.00	9.5040
	Middle	1962.50	9.5377
	High	1990.00	9.5670
64QAM	Low	1935.00	9.5872
	Middle	1962.50	9.5921
	High	1990.00	9.6090
256QAM	Low	1935.00	9.5728
	Middle	1962.50	9.5764
	High	1990.00	9.6051

Test Data at Downlink Port 3

Mod.	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
QPSK	Low	1935.00	9.5738
	Middle	1962.50	9.6020
	High	1990.00	9.5267
16QAM	Low	1935.00	9.5473
	Middle	1962.50	9.6051
	High	1990.00	9.5294
64QAM	Low	1935.00	9.5964
	Middle	1962.50	9.6066
	High	1990.00	9.6241
256QAM	Low	1935.00	9.6143
	Middle	1962.50	9.5986
	High	1990.00	9.5960

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	9.0872
	Middle	1962.50	9.0824
	High	1990.00	9.1226

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	9.1259
	Middle	1962.50	9.1256
	High	1990.00	9.1143

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	9.1014
	Middle	1962.50	9.1194
	High	1990.00	9.0629

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	9.1414
	Middle	1962.50	9.1303
	High	1990.00	9.1258

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	19.146
	Middle	1962.50	19.188
	High	1985.00	19.172

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	19.158
	Middle	1962.50	19.138
	High	1985.00	19.203

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	19.189
	Middle	1962.50	19.233
	High	1985.00	19.176

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	19.205
	Middle	1962.50	19.194
	High	1985.00	19.179

15 MHz / 1 Carrier (30 W)

Test Data at Downlink Port 0

Mod.	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
QPSK	Low	1937.50	13.722
	Middle	1962.50	13.686
	High	1987.50	13.695
16QAM	Low	1937.50	13.712
	Middle	1962.50	13.707
	High	1987.50	13.632
64QAM	Low	1937.50	13.652
	Middle	1962.50	13.647
	High	1987.50	13.679
256QAM	Low	1937.50	13.678
	Middle	1962.50	13.648
	High	1987.50	13.693

Test Data at Downlink Port 1

Mod.	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
QPSK	Low	1937.50	13.700
	Middle	1962.50	13.642
	High	1987.50	13.689
16QAM	Low	1937.50	13.732
	Middle	1962.50	13.770
	High	1987.50	13.719
64QAM	Low	1937.50	13.687
	Middle	1962.50	13.687
	High	1987.50	13.683
256QAM	Low	1937.50	13.656
	Middle	1962.50	13.643
	High	1987.50	13.634

Test Data at Downlink Port 2

Mod.	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
QPSK	Low	1937.50	13.714
	Middle	1962.50	13.741
	High	1987.50	13.663
16QAM	Low	1937.50	13.682
	Middle	1962.50	13.739
	High	1987.50	13.765
64QAM	Low	1937.50	13.647
	Middle	1962.50	13.698
	High	1987.50	13.678
256QAM	Low	1937.50	13.693
	Middle	1962.50	13.622
	High	1987.50	13.647

Test Data at Downlink Port 3

Mod.	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
QPSK	Low	1937.50	13.644
	Middle	1962.50	13.780
	High	1987.50	13.681
16QAM	Low	1937.50	13.699
	Middle	1962.50	13.719
	High	1987.50	13.712
64QAM	Low	1937.50	13.686
	Middle	1962.50	13.670
	High	1987.50	13.677
256QAM	Low	1937.50	13.664
	Middle	1962.50	13.643
	High	1987.50	13.681