HCT CO., LTD.

CERTIFICATION DIVISION
SAN 136-1, AMI-RI , BUBAL-EUP, ICHEON-SI, KYOUNGKI-DO, 467-701, KOREA
TEL : +82 31 639 8518 FAX : +82 31 639 8525 www.hct.co.kr

CERTIFICATE OF COMPLIANCE

FCC PART 27 Certification

Applicant Name:

SeAH ICT Co., Ltd.
16F, IT Venture Tower East Wing 78 Garak-Dong
Songpa-Gu Seoul, South Korea

Date of Issue: December 13, 2010
Test Site/Location:
HCT CO., LTD., 105-1, Jangam-ri, Majang-Myeon, Icheon-si, Kyunggi-Do, Korea(Lab)
Test Report No.: HCTR1012FR13

FCC ID : Y2FRAS2141

APPLICANT : SeAH ICT Co., Ltd.

EUT Type	:	MOBILE WIMAX RADIO ACCESS SYSTEM
Manufacturer	:	SeAH ICT Co., Ltd.
Model name	:	RAS2141
Frequency of Operation	:	2608 MHz ~ 2644 MHz
FCC Rule Part(s)	:	FCC Part 27 Subpart (c).
Emission Designator	:	4M58G7D(QPSK), 4M58W7D(16QAM/64QAM)
Test Procedure(s)	:	ANSI/TIA-603C-2004
Application Type	:	Certification
Data of issue	:	December 13, 2010

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.

Chang Seok Choi
Report prepared by
: Chang Seok Choi
Test engineer of RF Team

Approved by
: Sang Jun Lee
Manager of RF Team

Revision

TEST REPORT NO.	DATE	DESCRIPTION
HCTR1012FR13	December 13,2010	First Approval Report

C O N T E N T S

1. GENERAL INFORMATION

1.1. CLIENT INFORMATION

Company	**SeAH ICT Co., Ltd.**
Contact Point	**16F, IT Venture Tower East Wing 78 Garak-Dong Songpa-Gu Seoul, South Korea**
Contact person	**Name: Sung-Yeol Lee / Senior Research Engineer E-mail : sungyeol.lee@seahict.com Tel: +82-2-2142-1682 Fax: +82-2-2142-1670**

1.2. PRODUCT INFORMATION

EUT TYPE	MOBILE WIMAX RADIO ACCESS SYSTEM
EMISSION DESIGNATOR	4M58G7D (QPSK), 4M58W7D(16QAM/64QAM)
OPERATING FREQUENCY	2608 MHz ~ 2644 MHz
TX OUTPUT POWER	5 W (37 dBm) / Carrier / Path
CHANNEL BANDWIDTH	10 MHz
MODULATION TYPE	OFDMA(QPSK, 16QAM, 64QAM)
MAXIMUM CAPACITY	1 Carriers / 3 Sectors
SYSTEM INPUT VOLTAGE	AC 88~ 264 V

1.3. OPERATING DESCRIPTION OF EUT

[Figure 1 RAS2141 System]

2. TEST SUMMARY

2.1. STANDARDS

The following tests were conducted on a sample of the equipment for the purpose of demonstrating compliance With **FCC Part 27**

SECTION	TEST ITEMS	RESULTS
2.1046, 27.50(h)	Conducted Output Power	Compliant
2.1049, 27.53(m)	Occupied Bandwidth	Compliant
2.1051, 27.53(m)	Spurious Emissions at Antenna Terminals	Compliant
2.1051, 27.53(m)	Band edge	Compliant
2.1053, 27.53(m)	Spurious Radiated Emissions.	Compliant
2.1055(a)(1), 27.54	Frequency Stability over Temperature variation	Compliant
2.1055(d), 27.54	Frequency stability over Voltage variation	Compliant

2.2. MODE OF OPERATION DURING THE TEST

The EUT was operated in a manner representative of the typical usage of the equipment.
During all testing, system components were manipulated within the confines of typical usage to maximize each emission. All Modulation (QPSK, 16QAM, and 64QAM) modes were tested, and the worst case was recorded in this test report.
The device does not supply antenna(s) with the system, so the dummy loads were connected to the RF output ports for radiated spurious emission testing.

3. STANDARDS ENVIRONMENTAL TEST CONDITIONS

Temperature :	**+ 15 ℃ to + 35 ℃**
Relative humidity:	**30 % to 60 %**
Air pressure	**860 mbar to 1060 mbar**

4. TEST EQUIPMENT

Manufacturer	Model / Equipment	Serial No.	Calibration Due
Schwarzbeck	BBHA 9120D / Double Ridged Horn Antenna	296	09/23/2011
Schwarzbeck	BBHA 9120D / Double Ridged Horn Antenna	147	04/13/2011
Schwarzbeck	VULB 9168 / TRILOG Antenna	9168-200	01/06/2011
HD	MA240 / Antenna Position Tower	556	N/A
EMCO	1050 / Turn Table	114	N/A
HD GmbH	HD 100 / Controller	13	N/A
HD GmbH	KMS 560 / SlideBar	12	N/A
MITEQ	AFS44-00102650-42-10P44-PS	1532439	04/05/2011
EMCO	6502/Loop Antenna	9009-2536	01/13/2012
R&S	ESI40 / EMI TEST Receiver	831564/003	10/30/2011
Wainwright Instrument	WHF6.0/26.5G-6SS / High Pass Filter	1	05/12/2011
DaeYoung	DFSS60 / AC Power Supply	1003030-1	07/26/2011
WEINSCHEL	67-30-33 / Attenuator	BU5347	01/06/2011
WEINSCHEL	67-30-33 / Attenuator	BR0530	01/14/2011
WEINSCHEL	AF117A-69-31 / STEP ATTENUATOR	11787	11/12/2011
WEINSCHEL	AF117A-69-31 / STEP ATTENUATOR	639	11/12/2011
Agilent	N9020A / MXA Signal Analyzer	US46220219	03/03/2011
Agilent	11636B / Power Divider	11377	12/24/2010
Schwarzbeck	BBHA 9120D / Double Ridged Horn Antenna	296	09/23/2011

5. CONDUCTED OUTPUT POWER

5.1. Applicable Standard

According to FCC §2.1046 & 27.5(h)

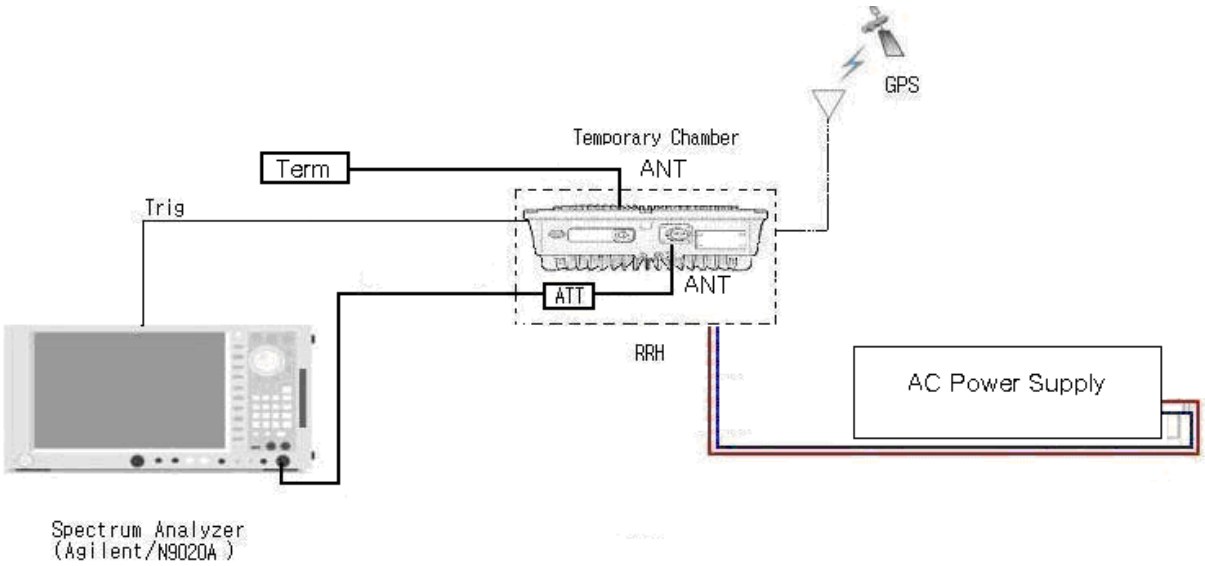
1) *Main, booster and base stations.* (i) The maximum EIRP of a main, booster or base station shall not exceed 33 dBW + 10log(X/Y) dBW, where X is the actual channel width in MHz and Y is either 6 MHz if prior to transition or the station is in the MBS following transition or 5.5 MHz if the station is in the LBS and UBS following transition, except as provided in paragraph (h)(1)(ii) of this section.

5.2. Test Equipment List and Details

Manufacturer	Model / Equipment	Serial No.	Calibration Due
DaeYoung	DFSS60 / AC Power Supply	1003030-1	07/26/2011
WEINSCHEL	67-30-33 / Attenuator	BU5347	01/06/2011
WEINSCHEL	67-30-33 / Attenuator	BR0530	01/14/2011
WEINSCHEL	AF117A-69-31 / STEP ATTENUATOR	11787	11/12/2011
WEINSCHEL	AF117A-69-31 / STEP ATTENUATOR	639	11/12/2011
Agilent	N9020A / MXA Signal Analyzer	US46220219	03/03/2011
Agilent	11636B / Power Divider	11377	12/24/2010

5.3. Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.



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 banswidth of the spectrum analyzer was comparable to the emission bandwidth.

.

5.3.1. Environmental Conditions:

Temperature:	27 °C
Relative Humidity:	17 %

5.4. Test Result

: PASS

5.4.1. Test Data at Output Port 0

Modulation	Channel	Frequency	Measured Output Power	
			dBm	W
QPSK	Low	2613	37.18	5.224
	Middle	2626	37.34	5.420
	High	2639	37.12	5.152
16QAM	Low	2613	37.23	5.284
	Middle	2626	37.09	5.117
	High	2639	37.05	5.070
64QAM	Low	2613	37.27	5.333
	Middle	2626	37.28	5.346
	High	2639	37.23	5.284

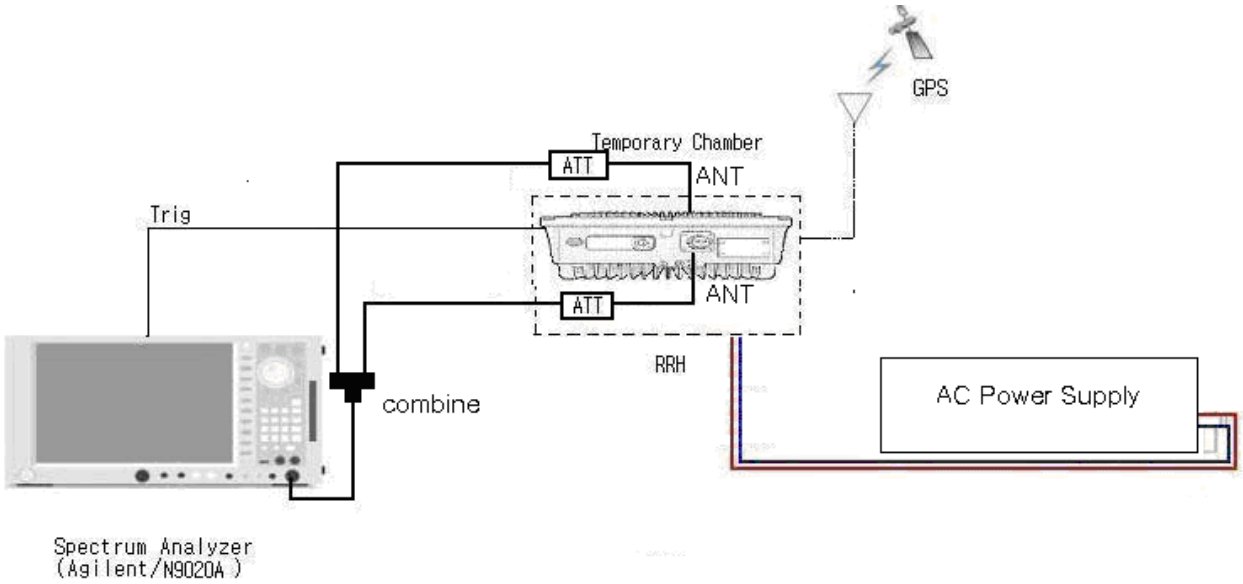
5.4.2. Test Data at Output Port 1

Modulation	Channel	Frequency	Measured Output Power	
			dBm	W
QPSK	Low	2613	37.46	5.572
	Middle	2626	37.28	5.346
	High	2639	37.13	5.164
16QAM	Low	2613	37.34	5.420
	Middle	2626	37.17	5.212
	High	2639	37.07	5.093
64QAM	Low	2613	37.19	5.236
	Middle	2626	37.34	5.420
	High	2639	37.16	5.200

5.4.3. Combined Test Data at Output Port

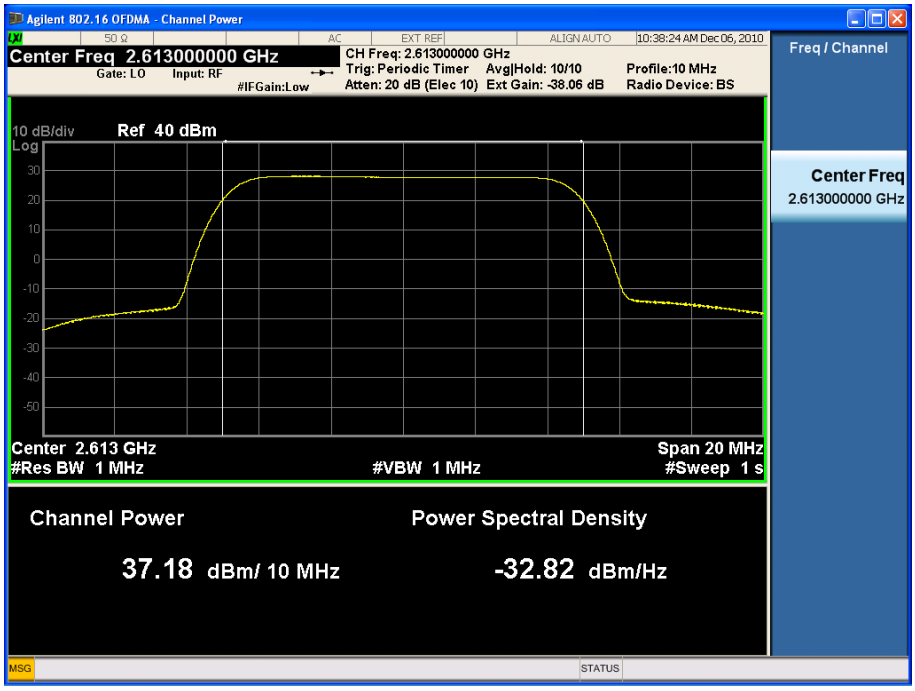
Modulation	Channel	Frequency	Measured Output Power	
			dBm	W
QPSK	Low	2613	40.23	10.544
	Middle	2626	40.24	10.568
	High	2639	40.22	10.520
16QAM	Low	2613	40.31	10.740
	Middle	2626	39.91	9.795
	High	2639	39.77	9.484
64QAM	Low	2613	40.04	10.093
	Middle	2626	40.36	10.864
	High	2639	39.67	9.268

[Combine test diagram]

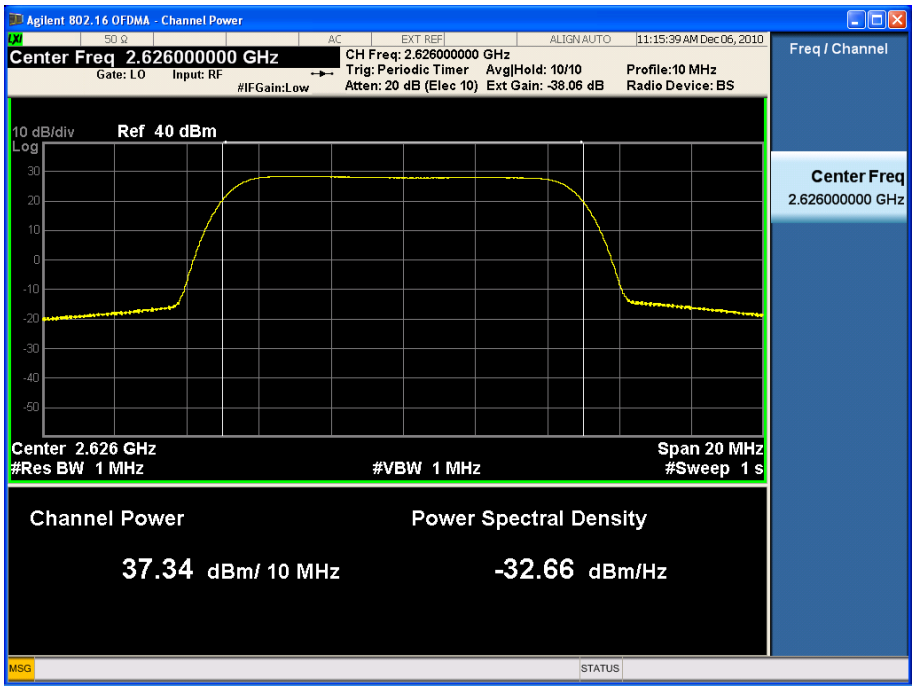


5.4.4. Plot Data for Output Port 0 (Conducted Output Power)

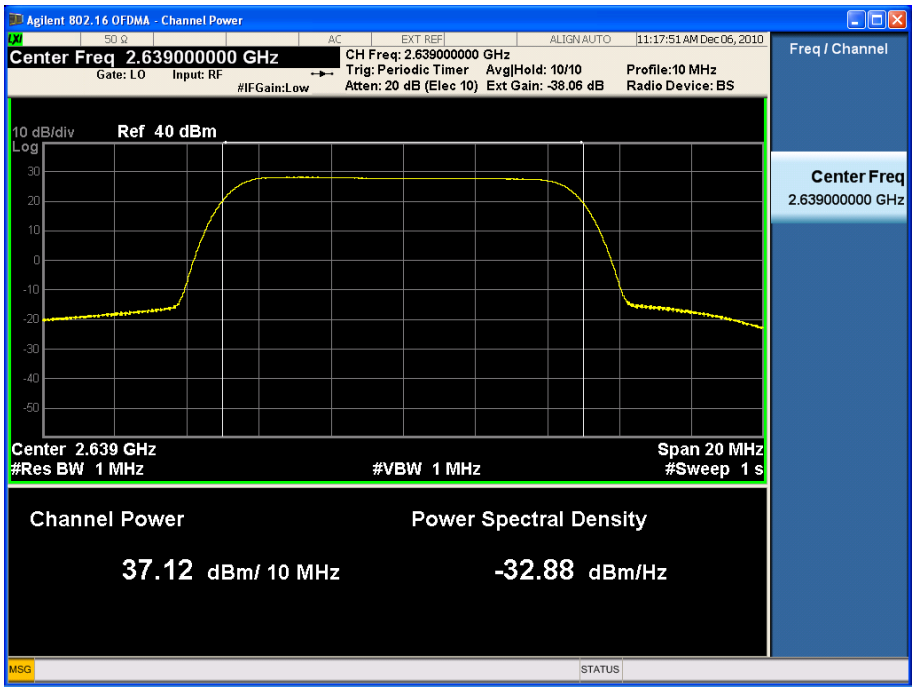
(QPSK Low Channel)



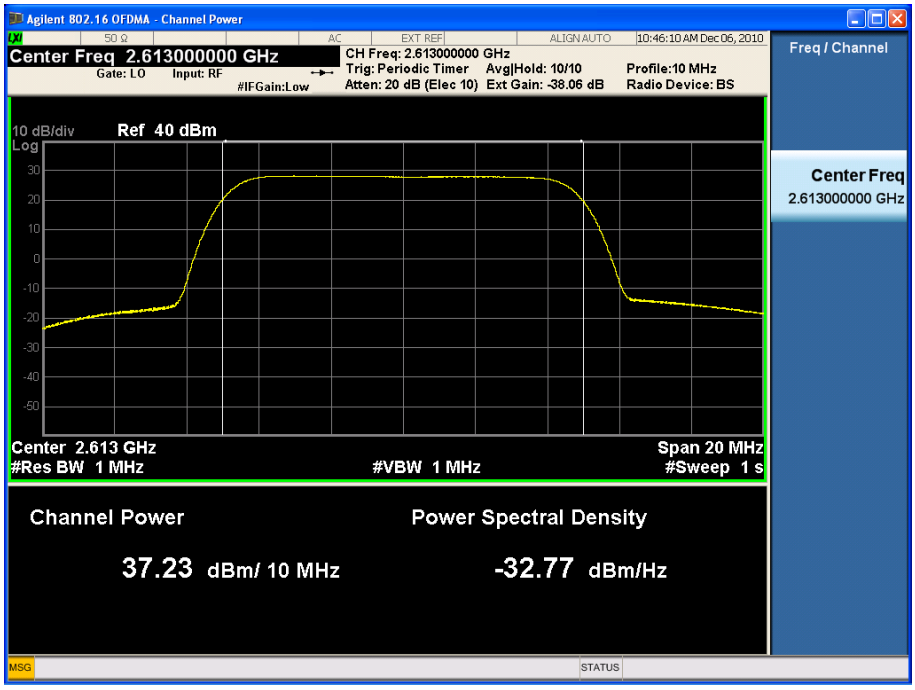
(QPSK Middle Channel)



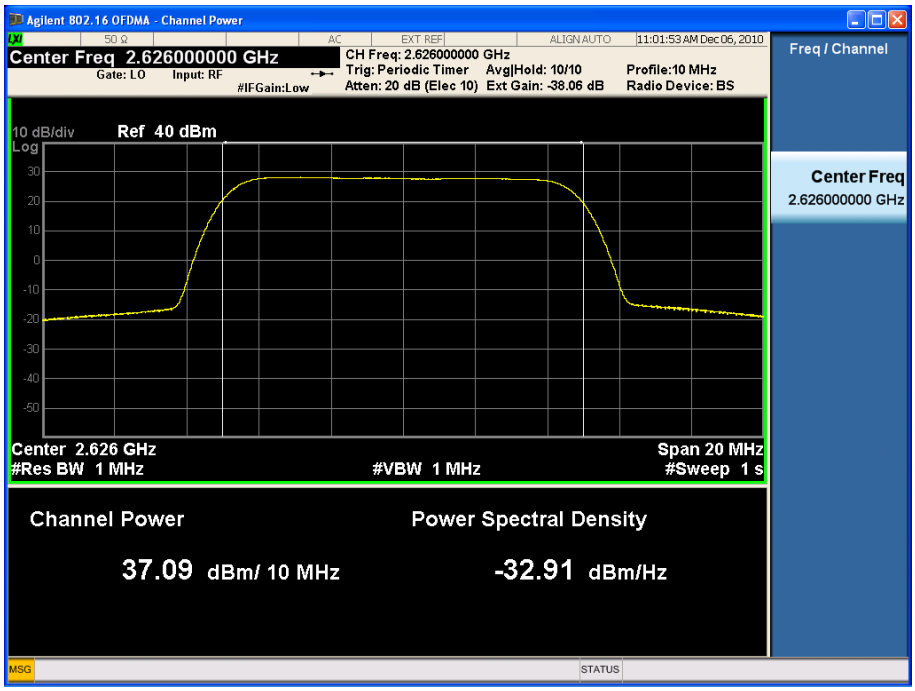
(QPSK High Channel)



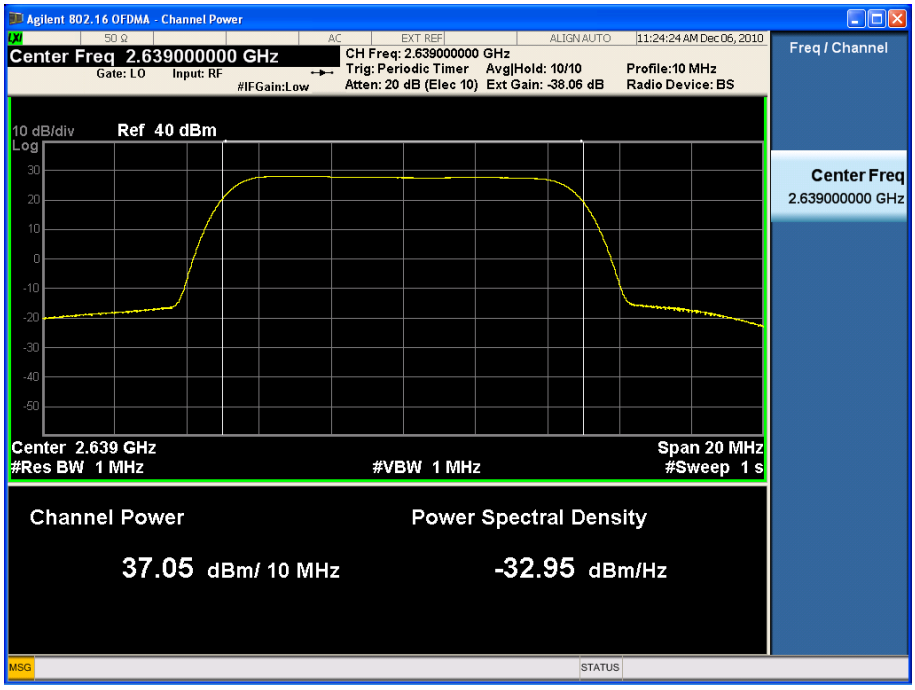
(16QAM Low Channel)



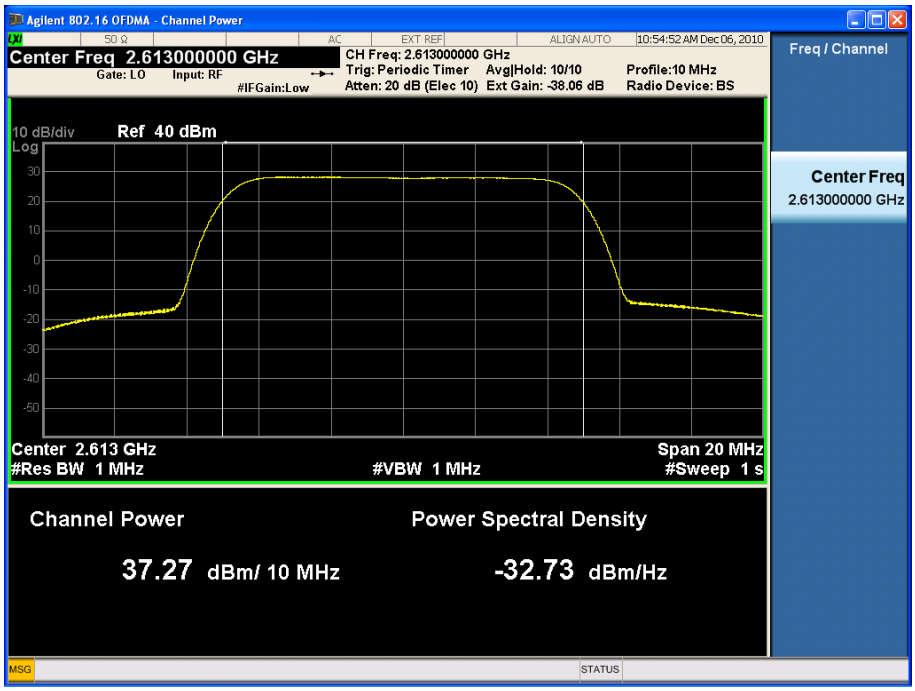
(16QAM Middle Channel)



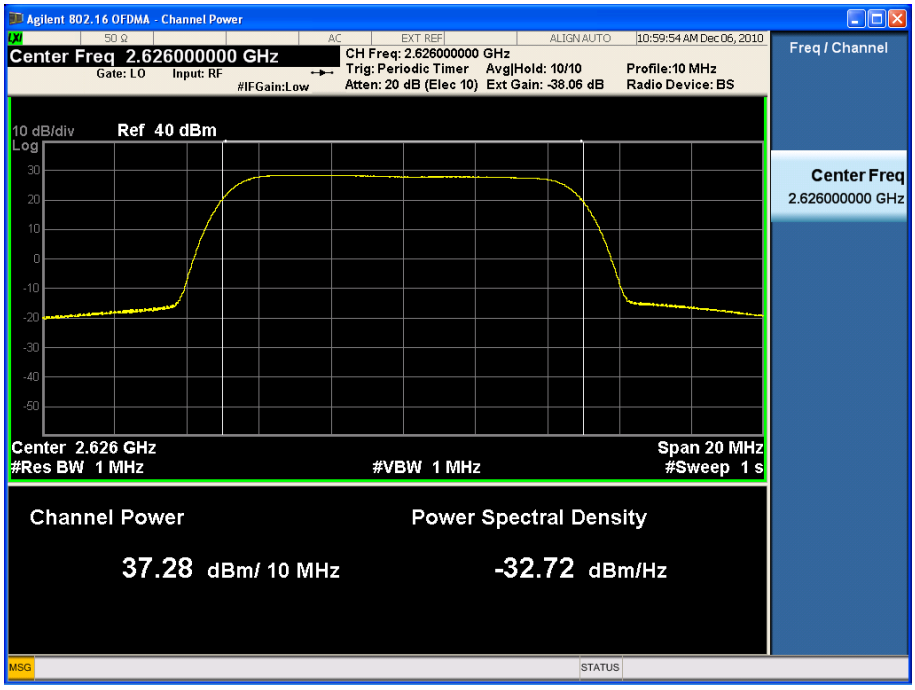
(16QAM High Channel)



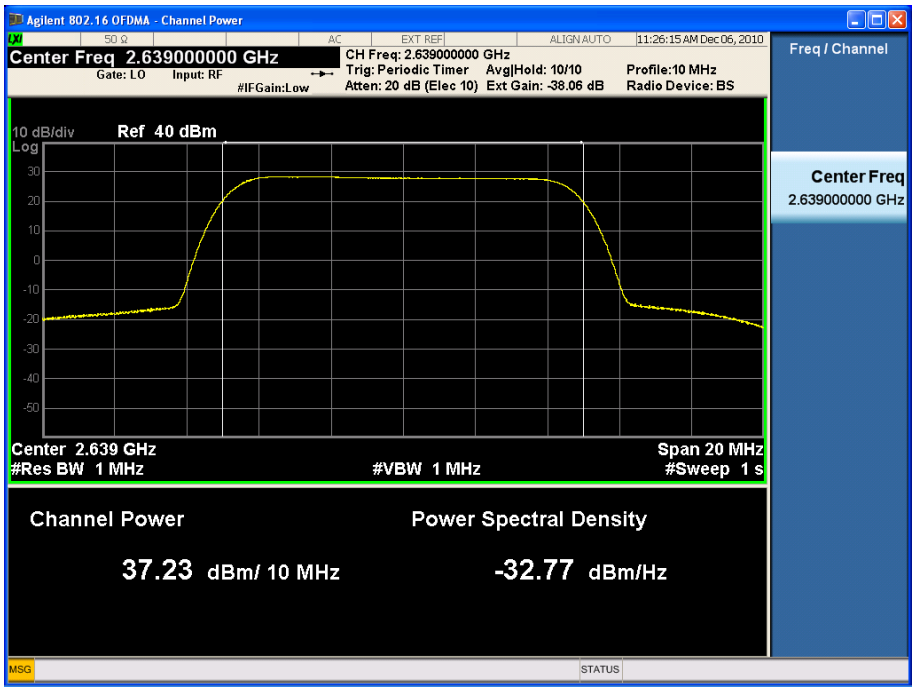
(64QAM Low Channel)



(64QAM Middle Channel)

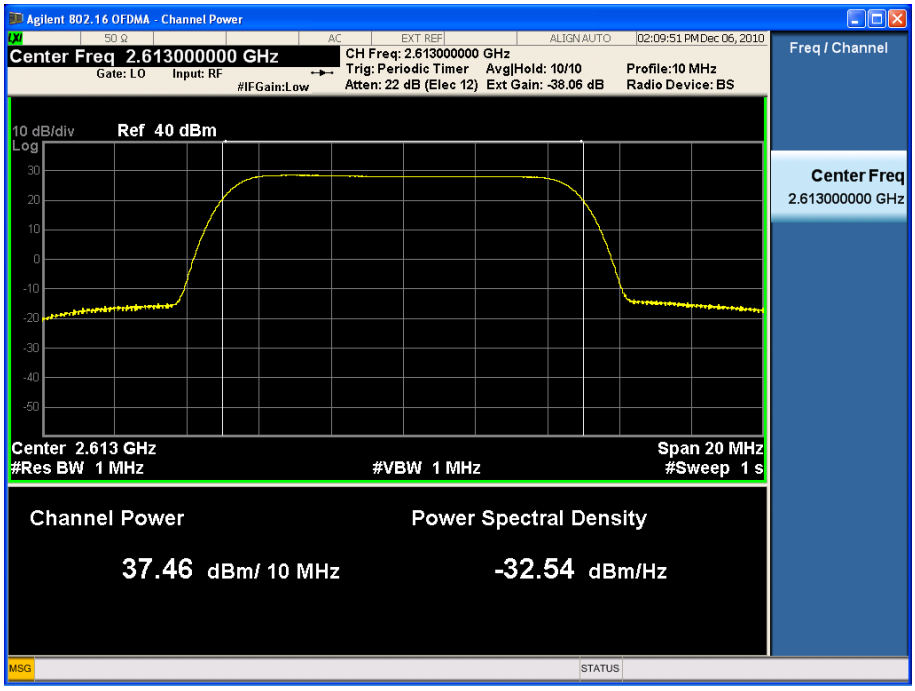


(64QAM High Channel)

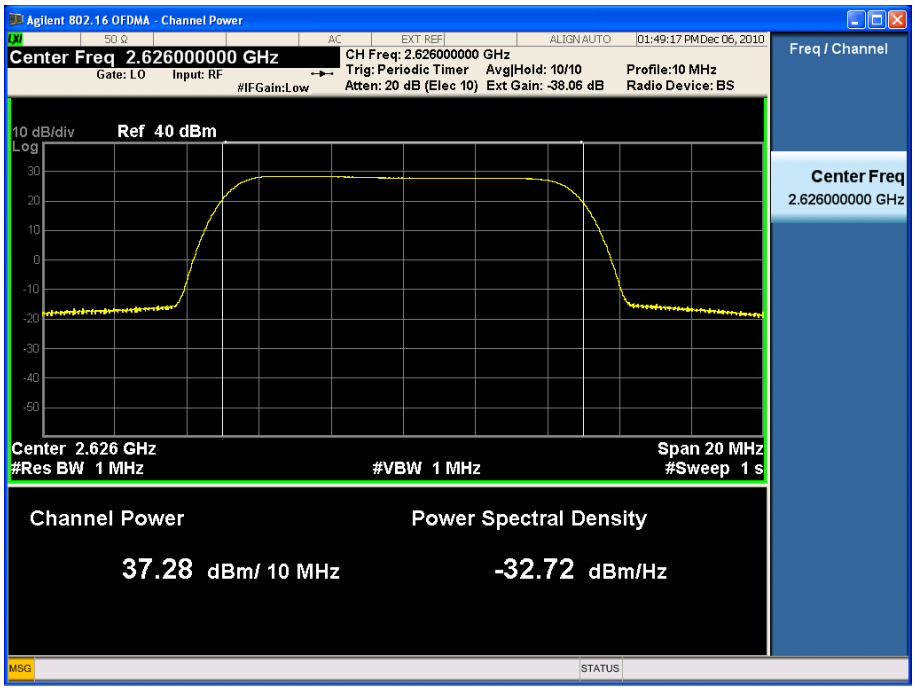


5.4.5. Plot Data for Output Port 1 (Conducted Output Power)

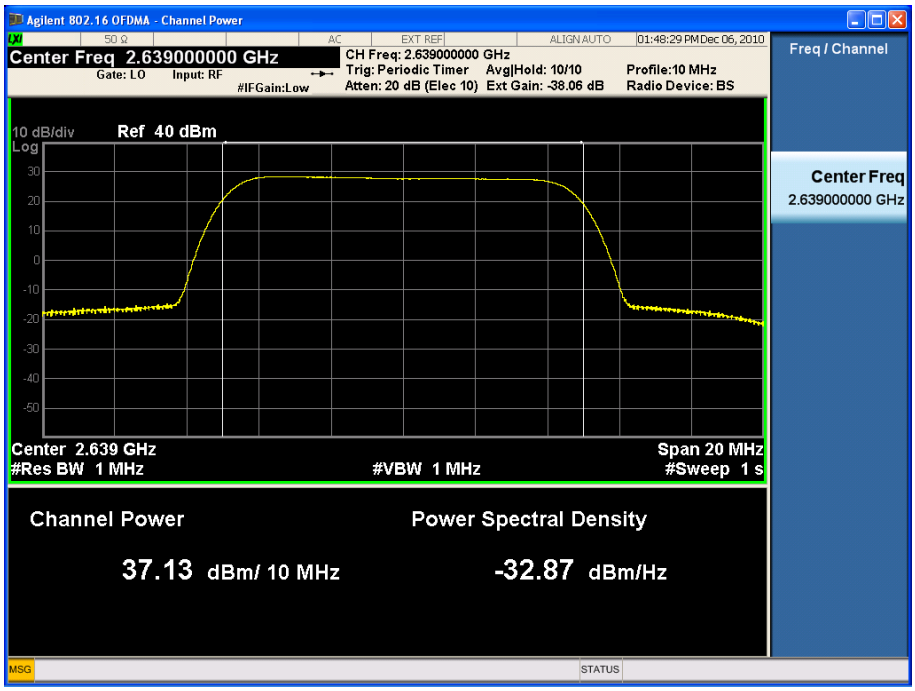
(QPSK Low Channel)



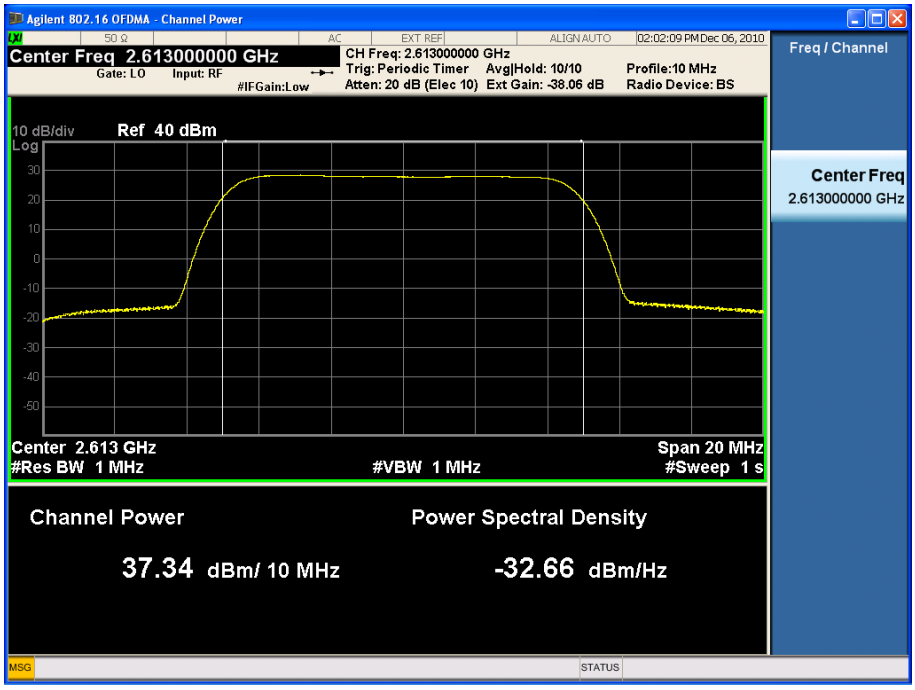
(QPSK Middle Channel)



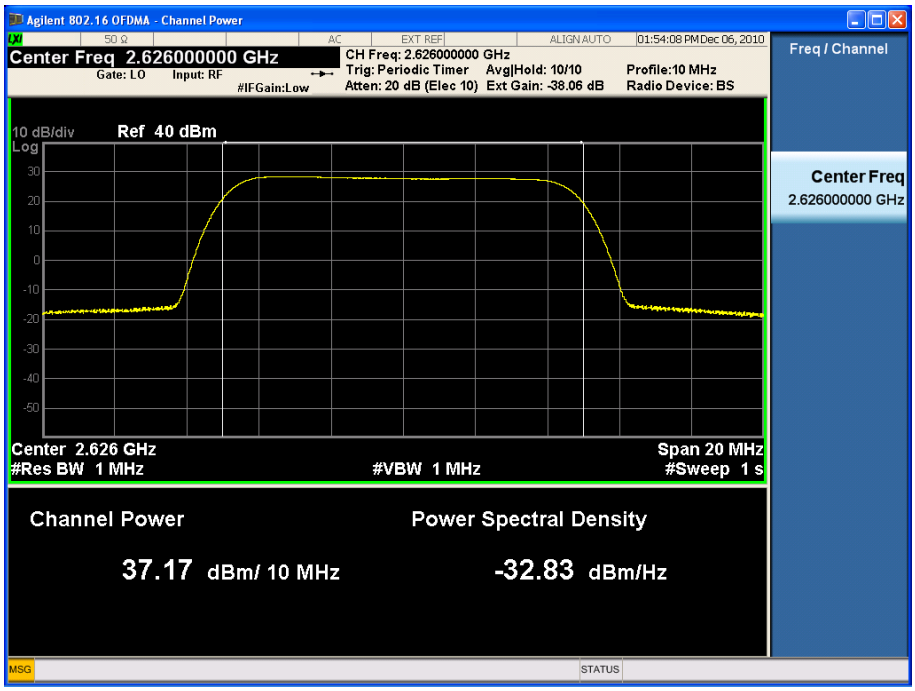
(QPSK High Channel)



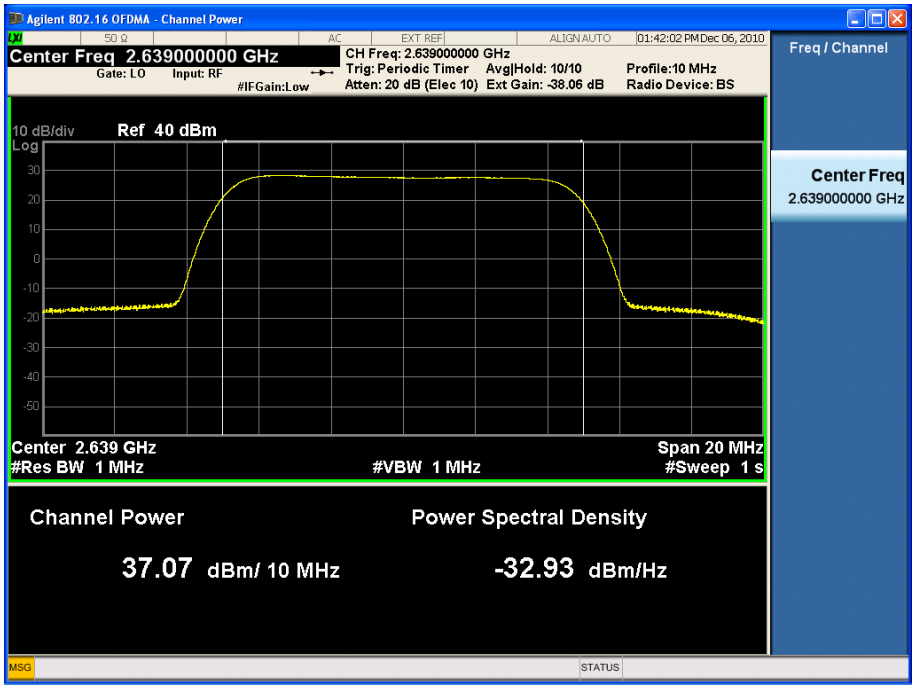
(16QAM Low Channel)



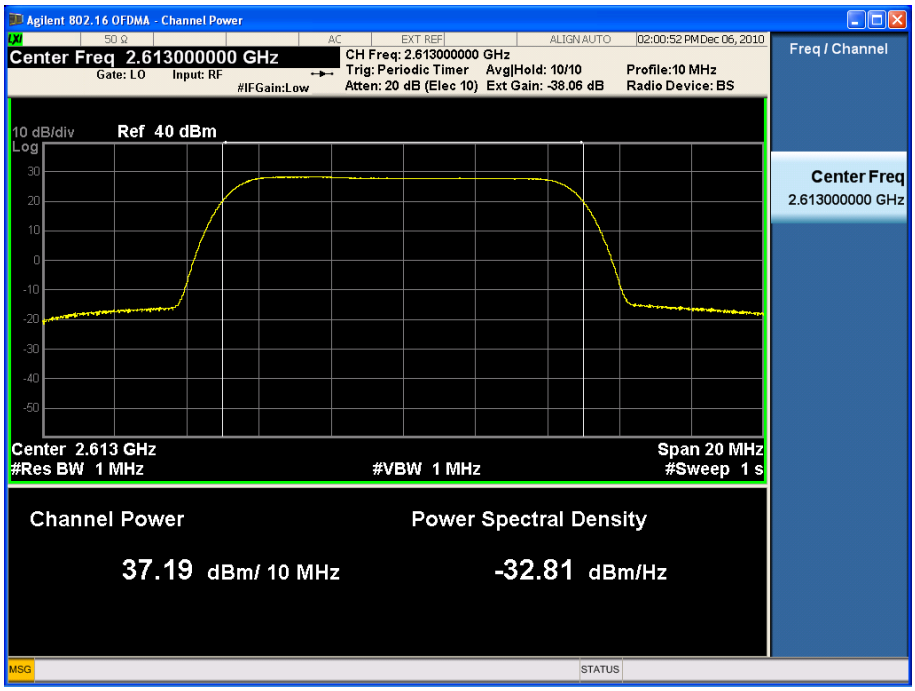
(16QAM Middle Channel)



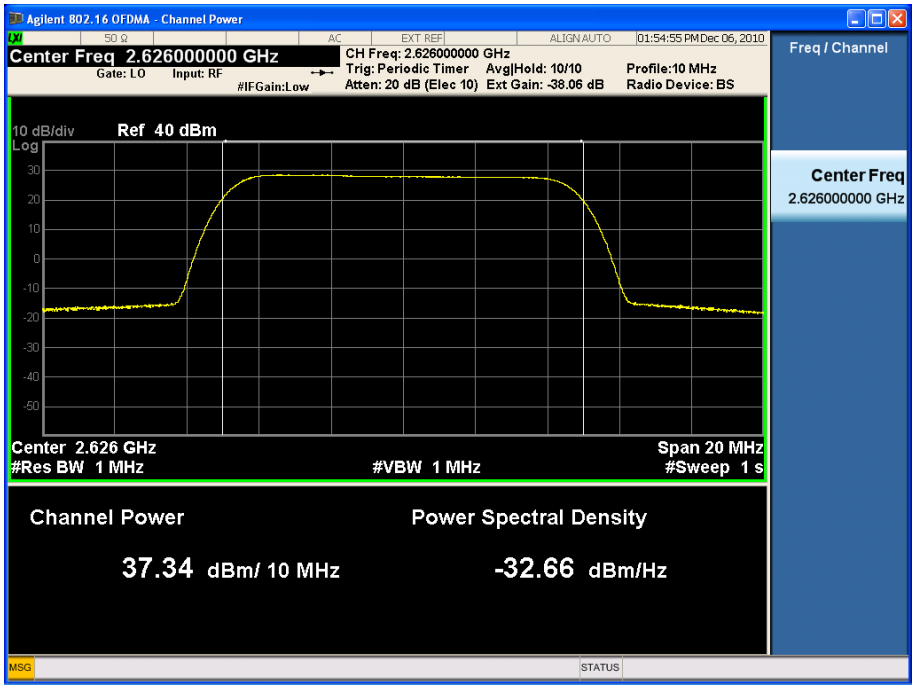
(16QAM High Channel)



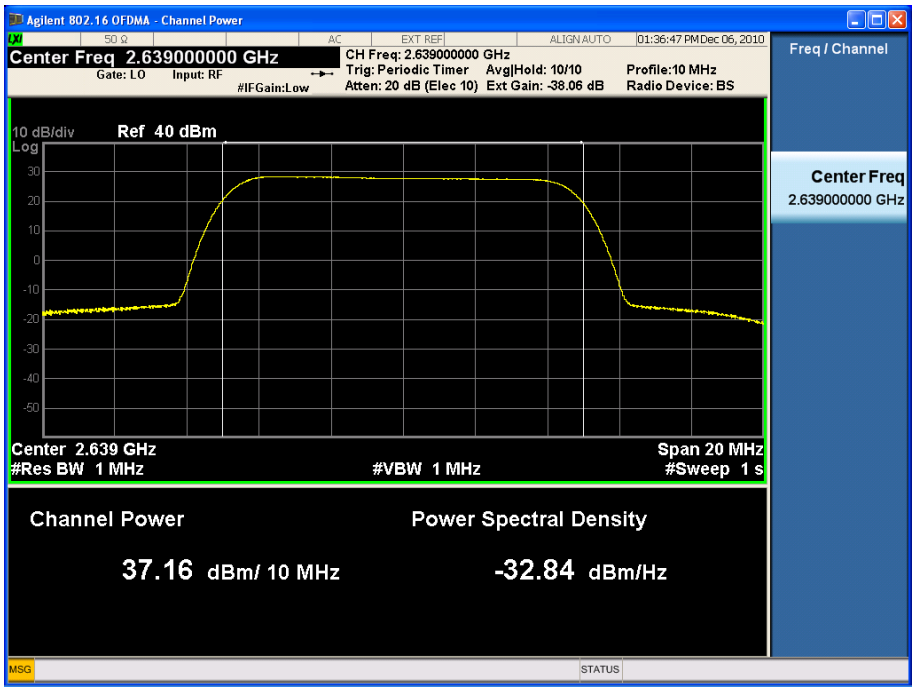
(64QAM Low Channel)



(64QAM Middle Channel)

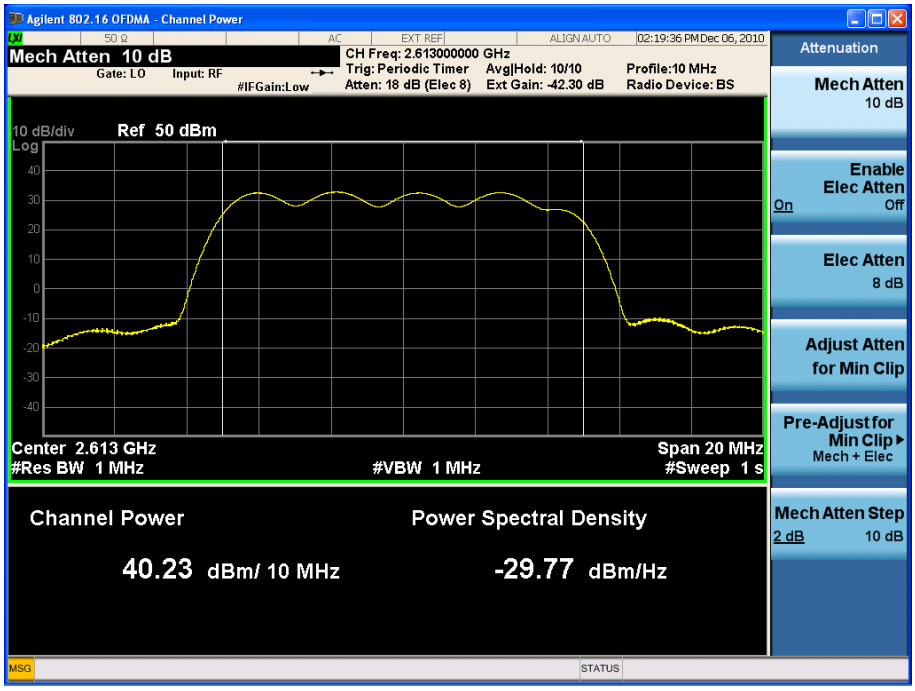


(64QAM High Channel)

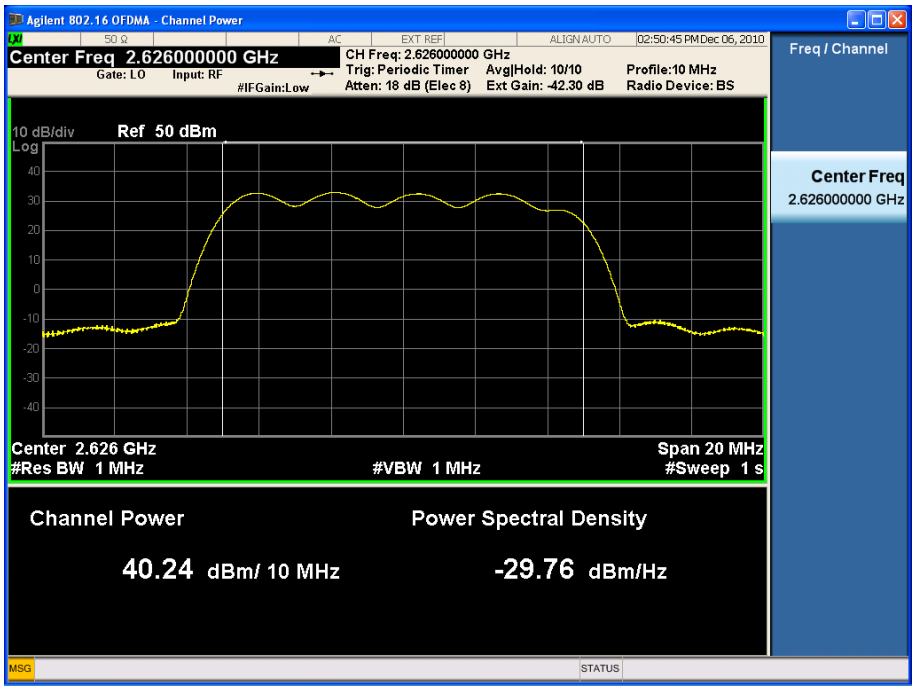


5.4.6. Combined Plot Data for Output (Conducted Output Power)

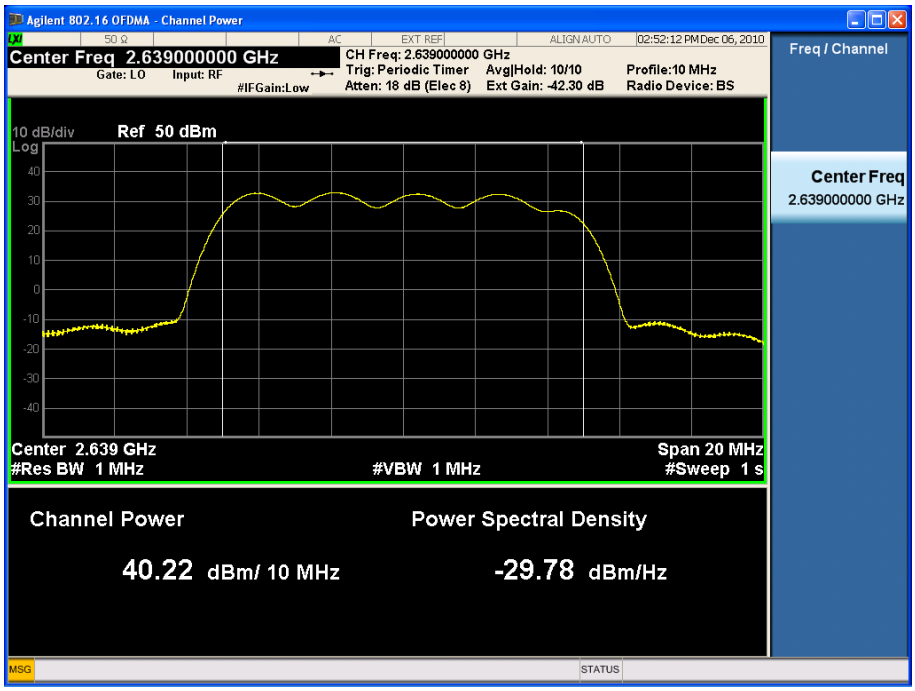
(QPSK Low Channel)



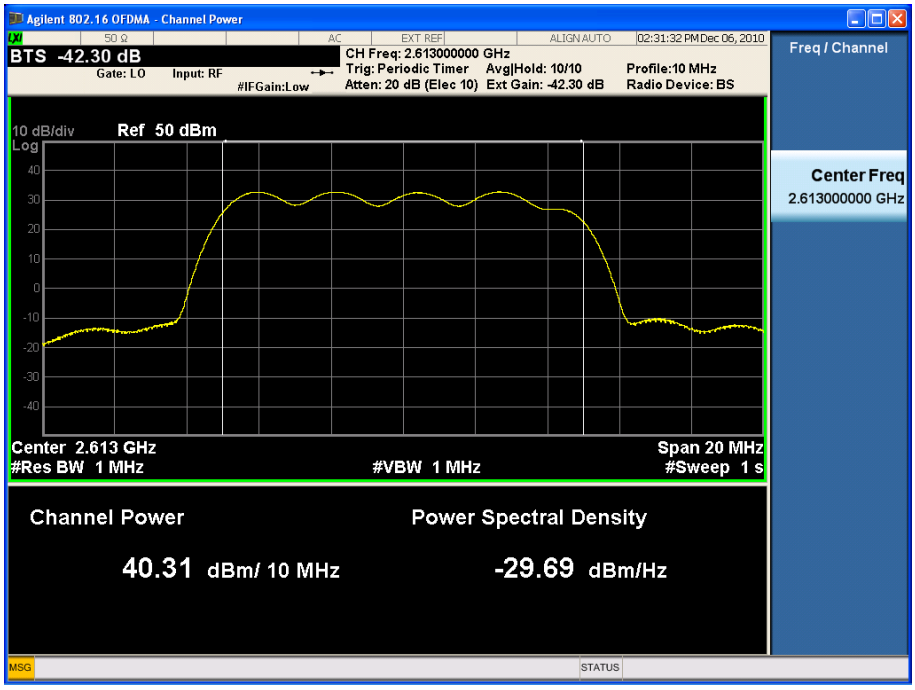
(QPSK Middle Channel)



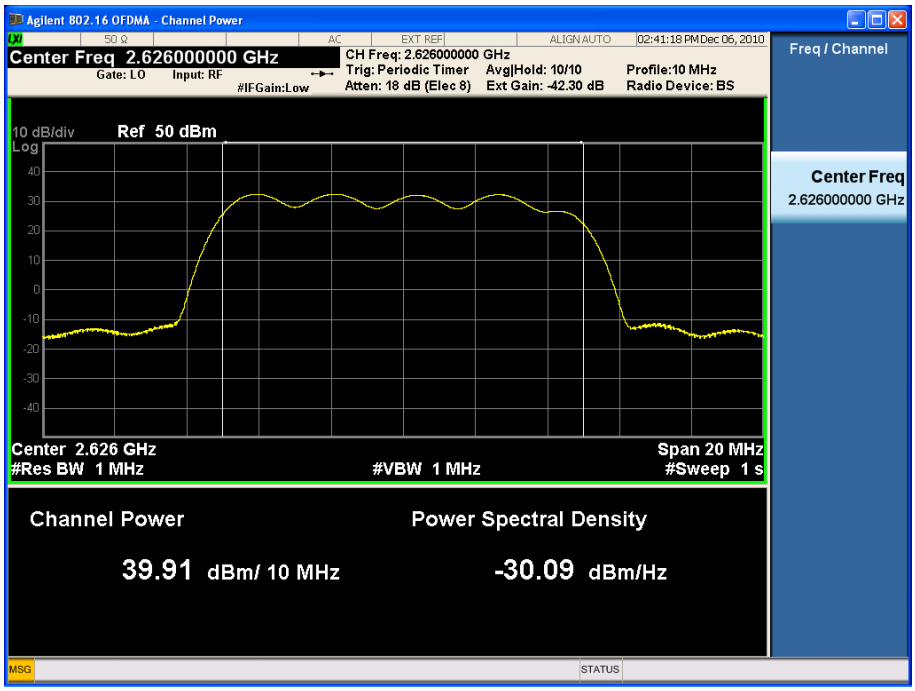
(QPSK High Channel)



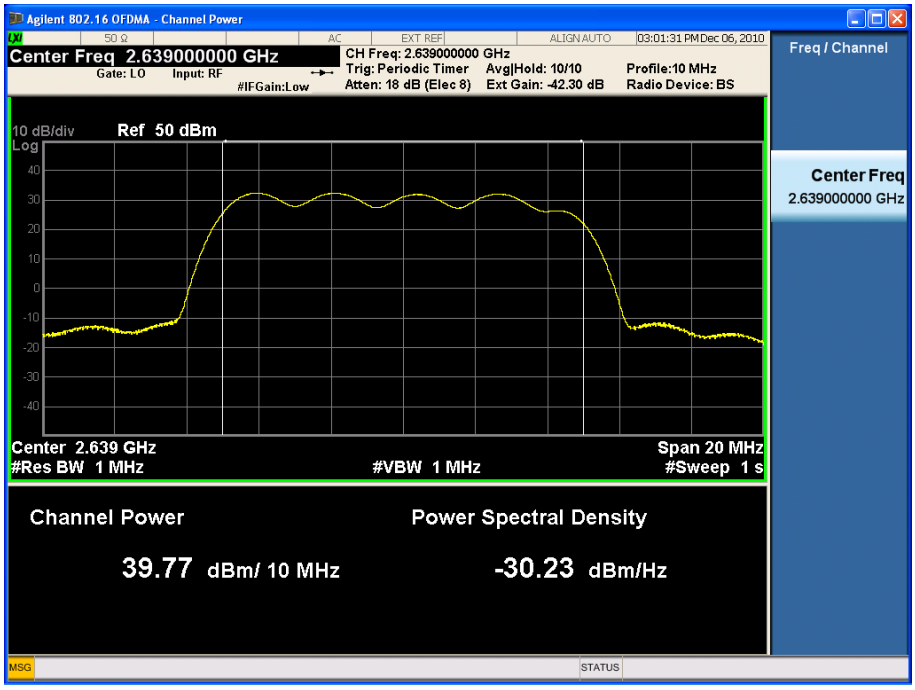
(16QAM Low Channel)



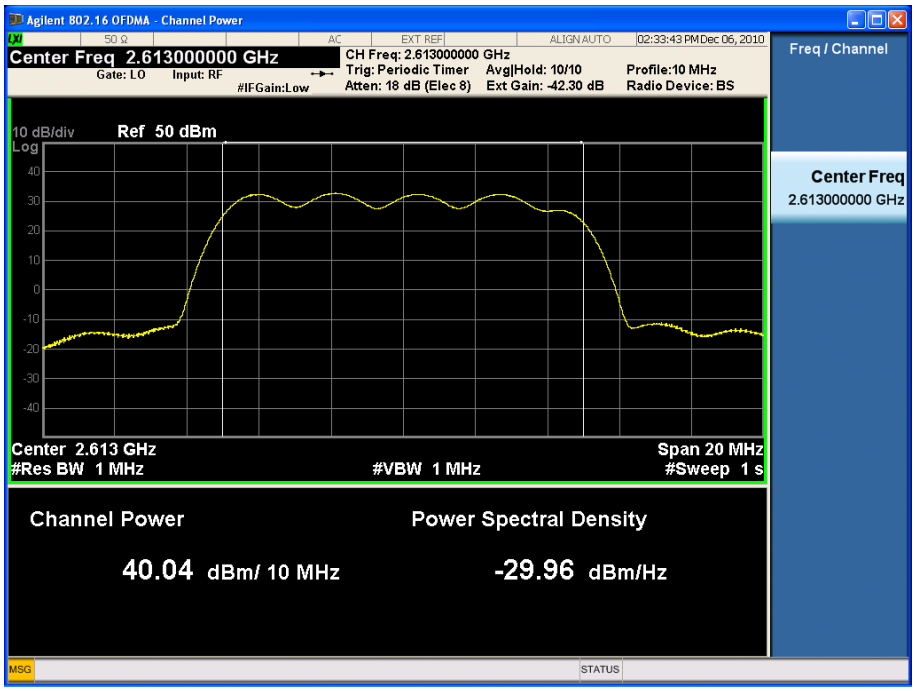
(16QAM Middle Channel)



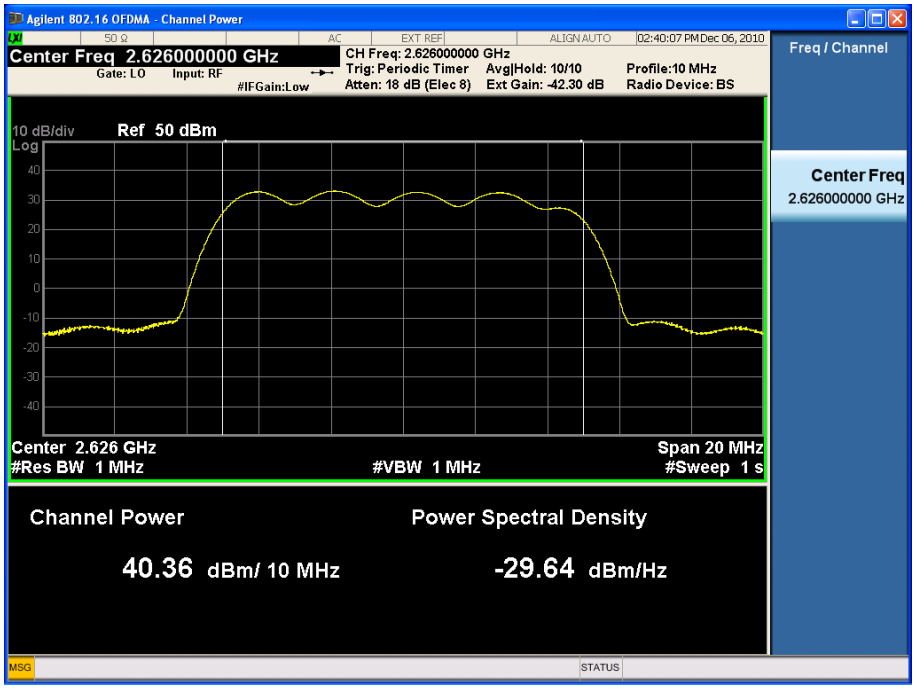
(16QAM High Channel)



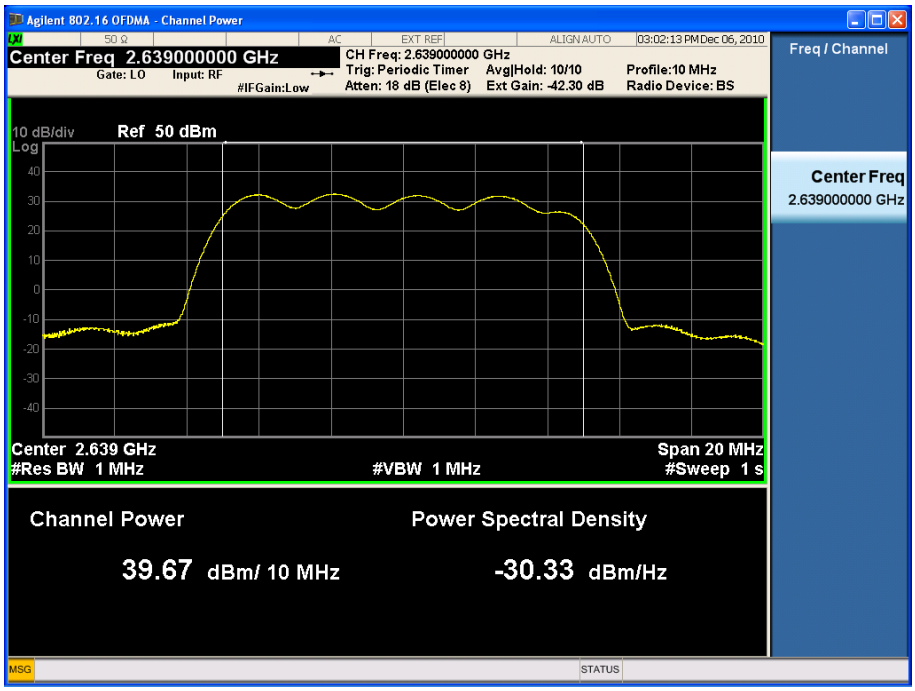
(64QAM Low Channel)



(64QAM Middle Channel)



(64QAM High Channel)



6. OCCUPIED BANDWIDTH

6.1. Applicable Standard

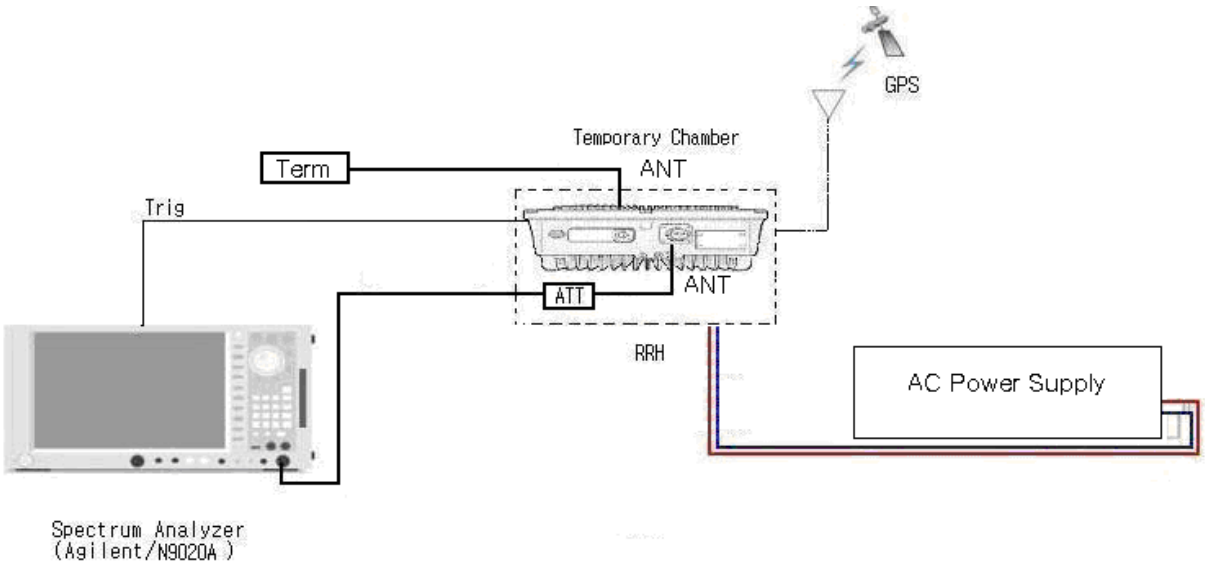
Requirements: CFR 47, Section 27.53(m)(6) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (*i.e.* 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power. With respect to television operations, measurements must be made of the separate visual and aural operating powers at sufficiently frequent intervals to ensure compliance with the rules.

6.2.Test Equipment List and Details

Manufacturer	Model / Equipment	Serial No.	Calibration Due
DaeYoung	DFSS60 / AC Power Supply	1003030-1	07/26/2011
WEINSCHEL	67-30-33 / Attenuator	BU5347	01/06/2011
WEINSCHEL	67-30-33 / Attenuator	BR0530	01/14/2011
WEINSCHEL	AF117A-69-31 / STEP ATTENUATOR	11787	11/12/2011
WEINSCHEL	AF117A-69-31 / STEP ATTENUATOR	639	11/12/2011
Agilent	N9020A / MXA Signal Analyzer	US46220219	03/03/2011
Agilent	11636B / Power Divider	11377	12/24/2010

6.3. Test Procedure

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 analyser 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 analyser. It was set to measure the bandwidth where 99% of the signal power was contained. The analyser automatically configures the measurement bandwidths to make an accurate measurement based on the channel bandwidth and channel spacing of the EUT.

6.3.1. Environmental Conditions:

Temperature:	25 ℃
Relative Humidity:	22 %

6.4. Test Result

: PASS

6.4.1. Test Data at Output 0

Modulation	Channel	Frequency	Measured Bandwidth	
			99 %	26 dB
QPSK	Low	2613	9.0996	9.444
	Middle	2626	9.1037	9.457
	High	2639	9.1024	9.456
16QAM	Low	2613	9.1024	9.454
	Middle	2626	9.1038	9.451
	High	2639	9.1054	9.451
64QAM	Low	2613	9.1023	9.454
	Middle	2626	9.1000	9.450
	High	2639	9.1096	9.459

6.4.2. Test Data at Output Port 1

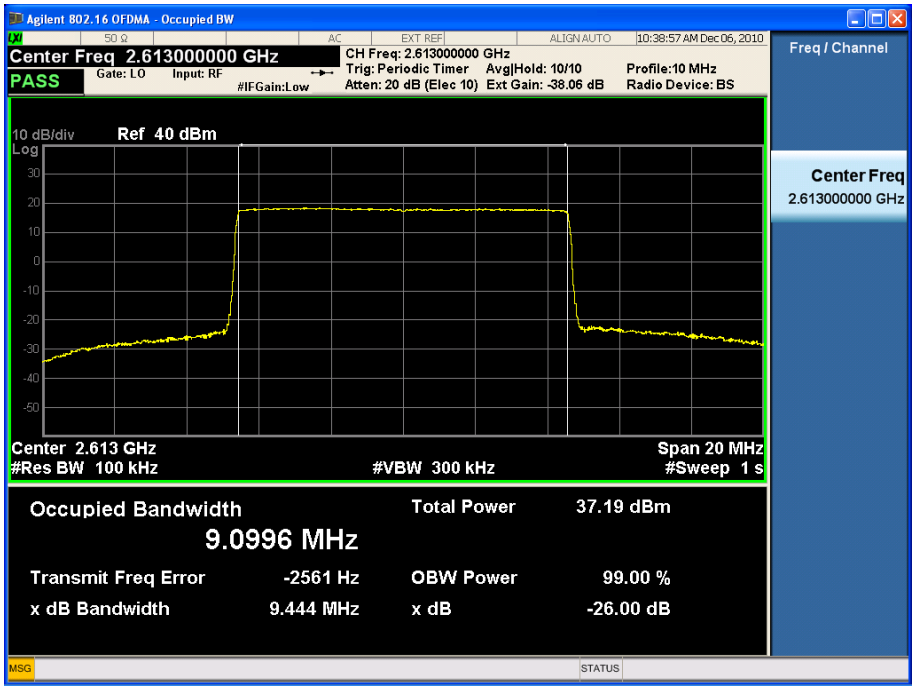
Modulation	Channel	Frequency	Measured Bandwidth	
			99 %	26 dB
QPSK	Low	2613	9.1032	9.448
	Middle	2626	9.1032	9.450
	High	2639	9.0991	9.448
16QAM	Low	2613	9.1074	9.457
	Middle	2626	9.1068	9.456
	High	2639	9.1026	9.455
64QAM	Low	2613	9.1107	9.458
	Middle	2626	9.1111	9.456
	High	2639	9.1074	9.454

6.4.3. Combined Test Data at Output Port

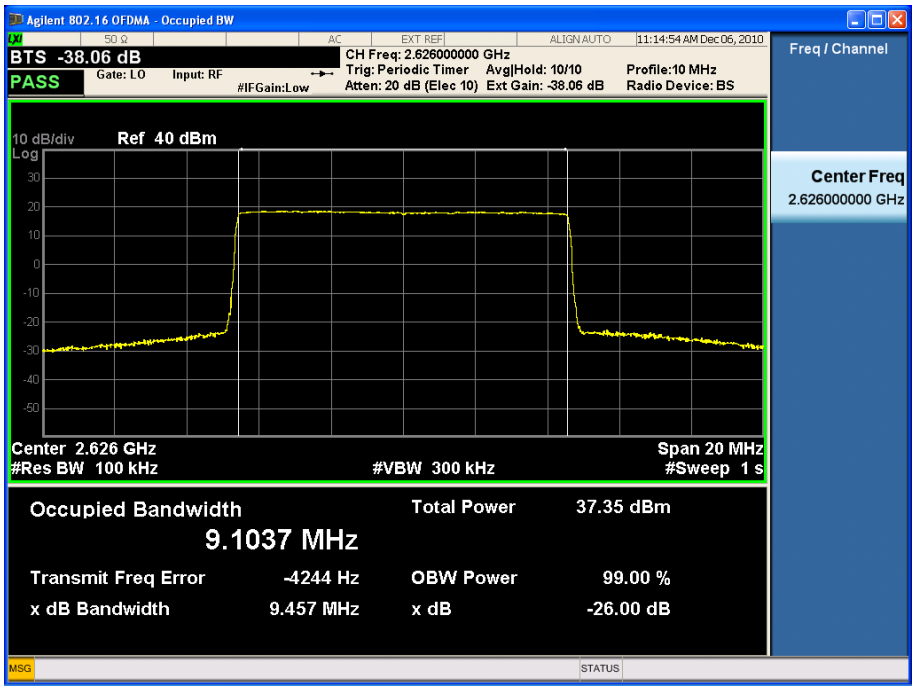
Modulation	Channel	Frequency	Measured Bandwidth	
			99 %	26 dB
QPSK	Low	2613	9.1360	9.436
	Middle	2626	9.1393	9.436
	High	2639	9.1390	9.435
16QAM	Low	2613	9.1389	9.438
	Middle	2626	9.1436	9.441
	High	2639	9.1428	9.440
64QAM	Low	2613	9.1445	9.438
	Middle	2626	9.1484	9.440
	High	2639	9.1467	9.439

6.4.4. Test Plot at Output Port 0

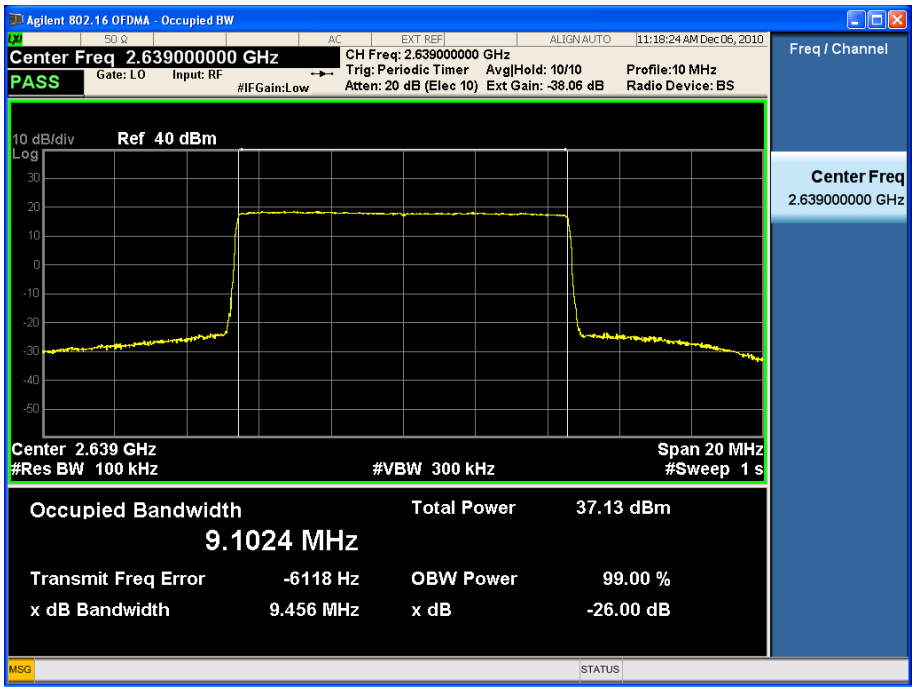
(QPSK Low Channel)



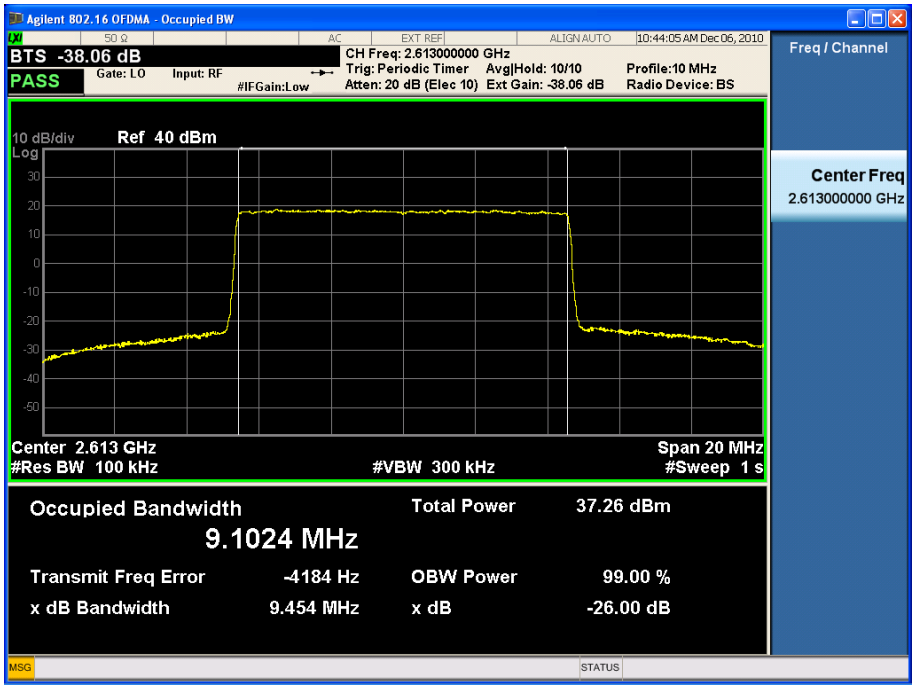
(QPSK Middle Channel)



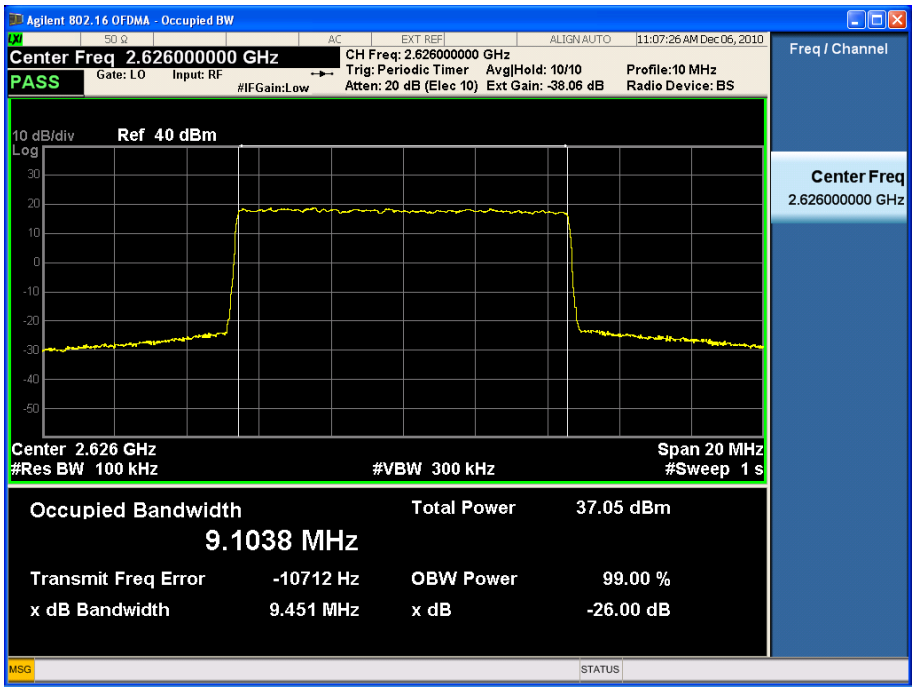
(QPSK High Channel)



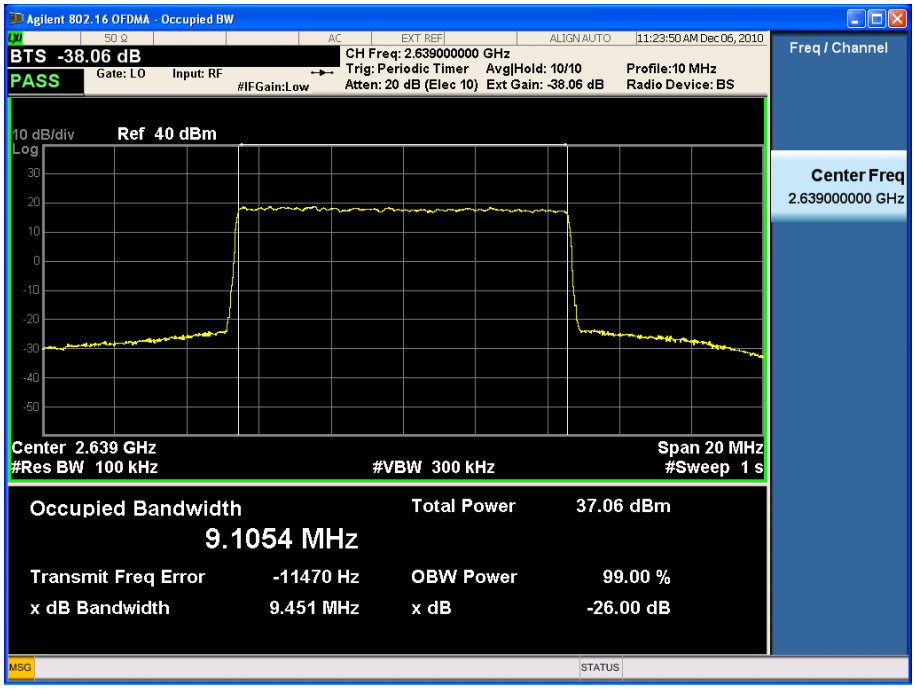
(16QAM Low Channel)



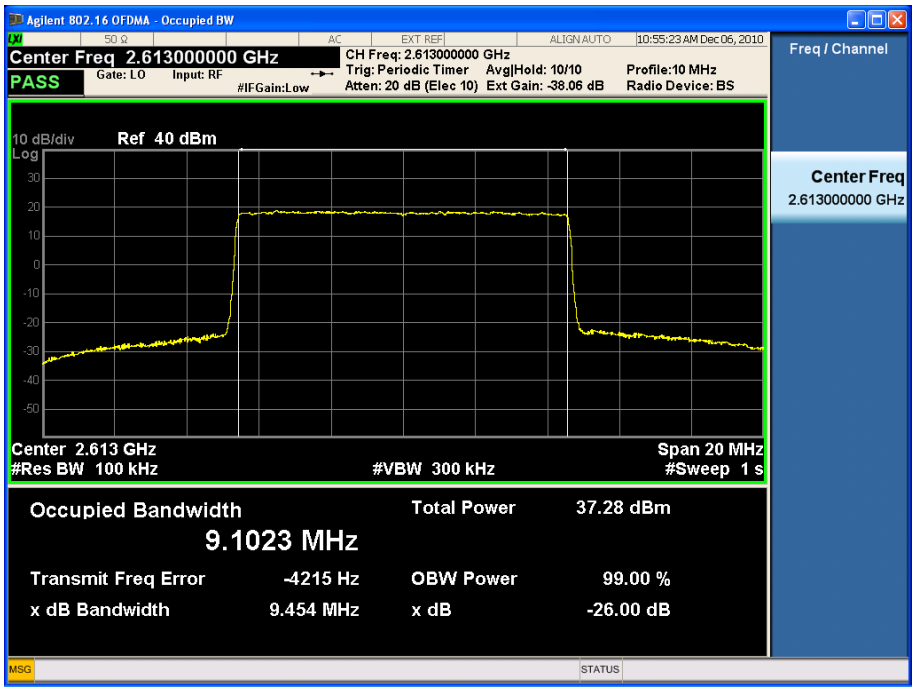
(16QAM Middle Channel)



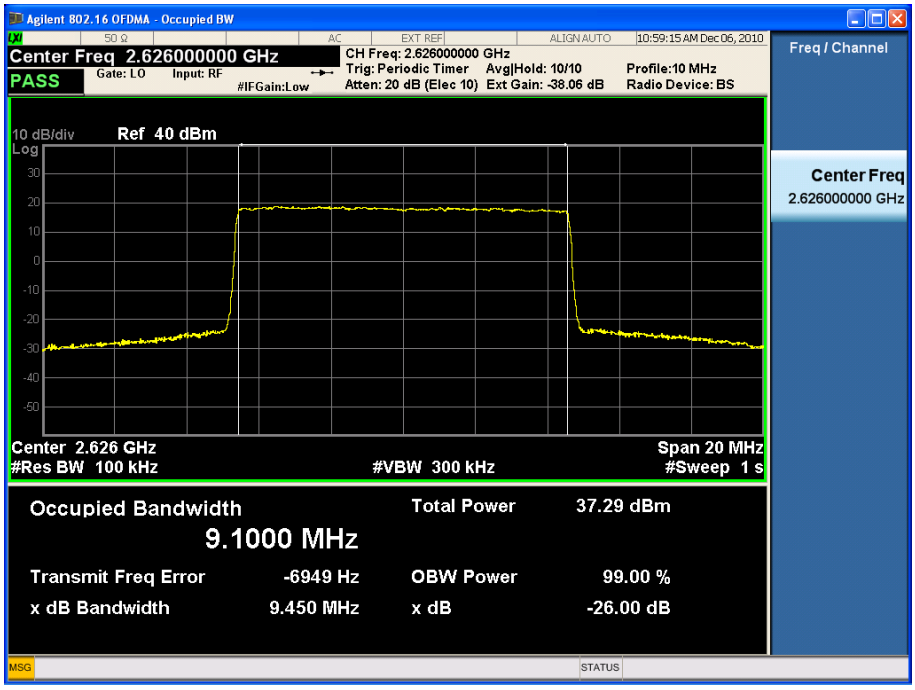
(16QAM High Channel)



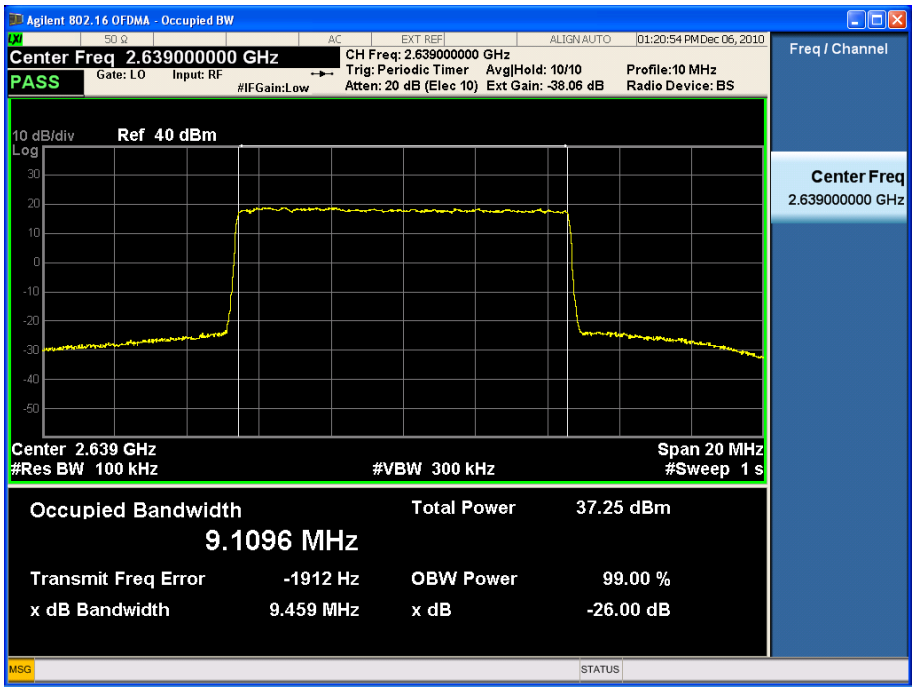
(64QAM Low Channel)



(64QAM Middle Channel)

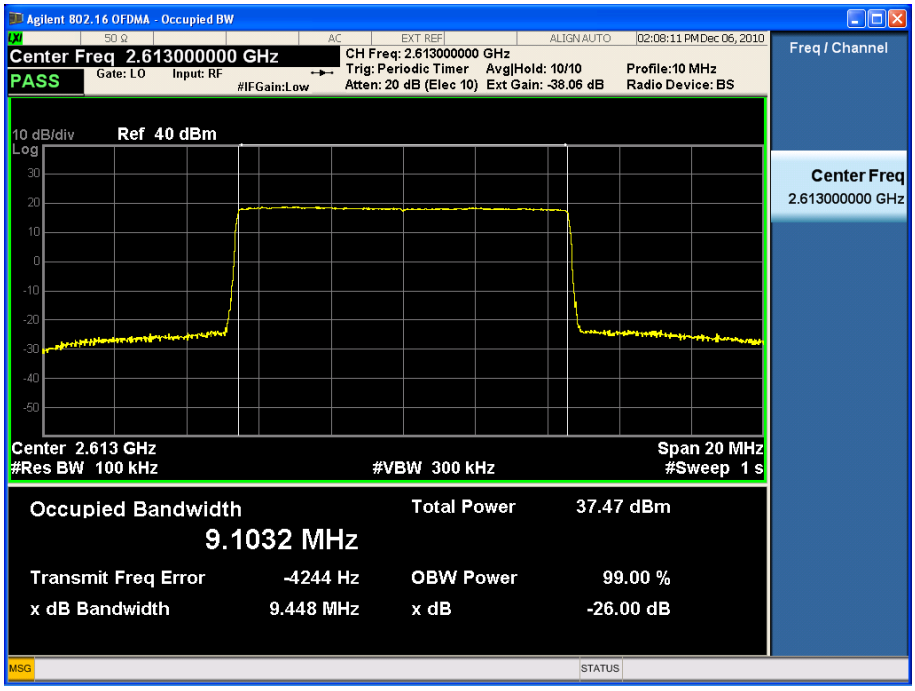


(64QAM High Channel)

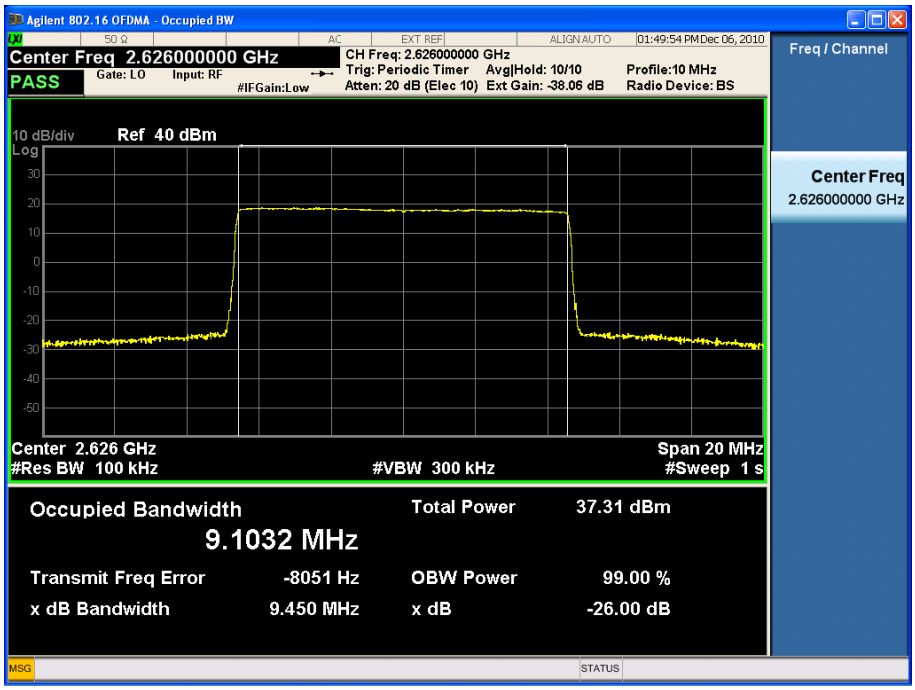


6.4.5. Test Plot at Output Port 1

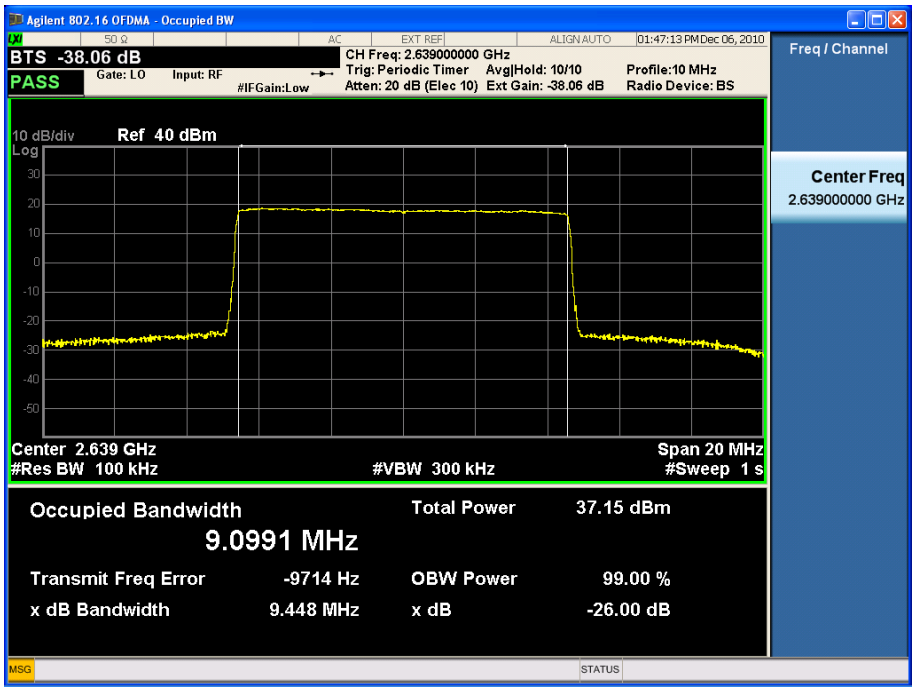
(QPSK Low Channel)



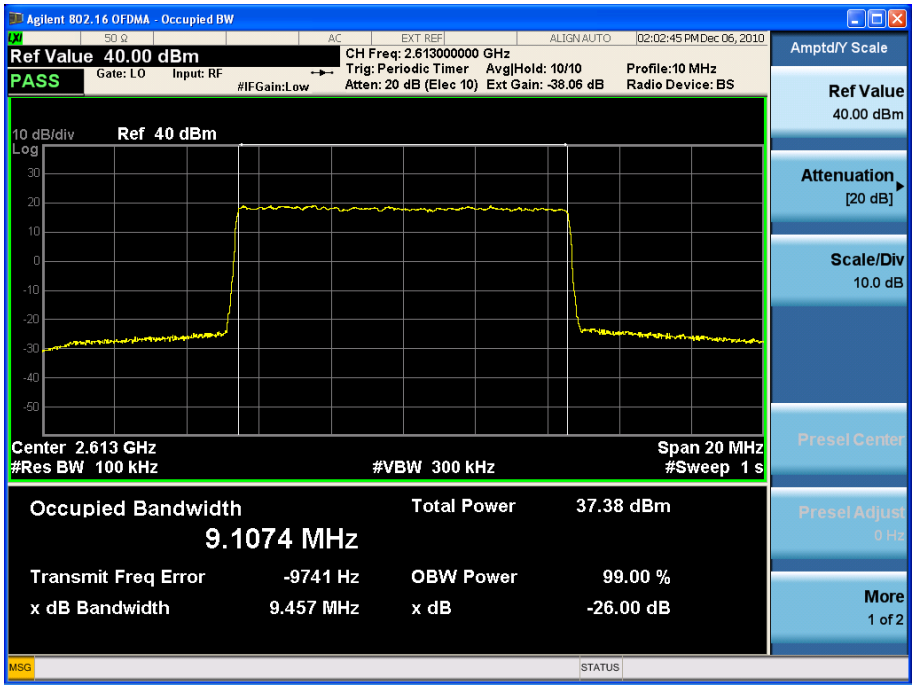
(QPSK Middle Channel)



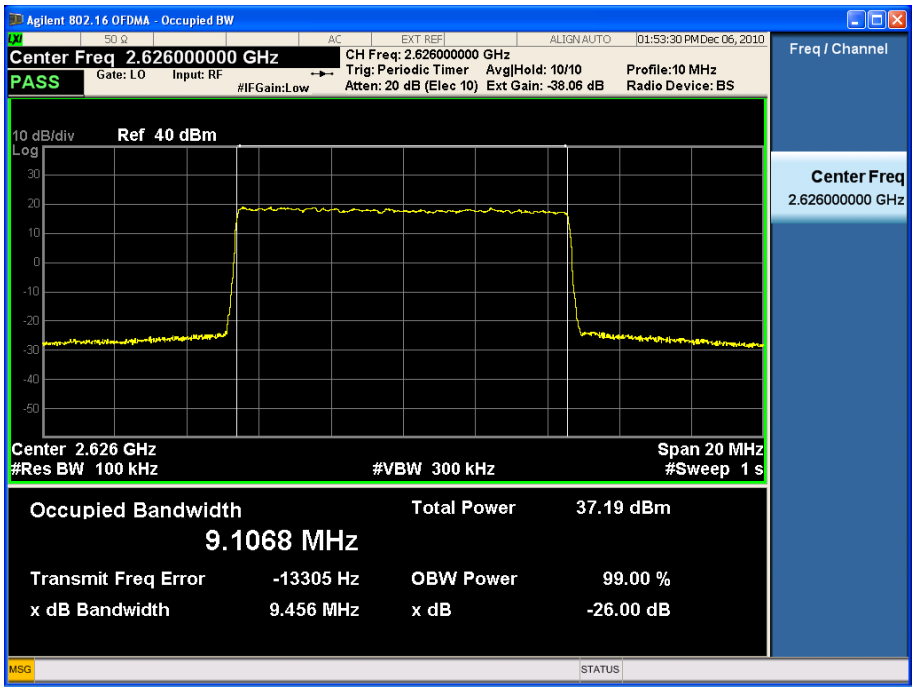
(QPSK High Channel)



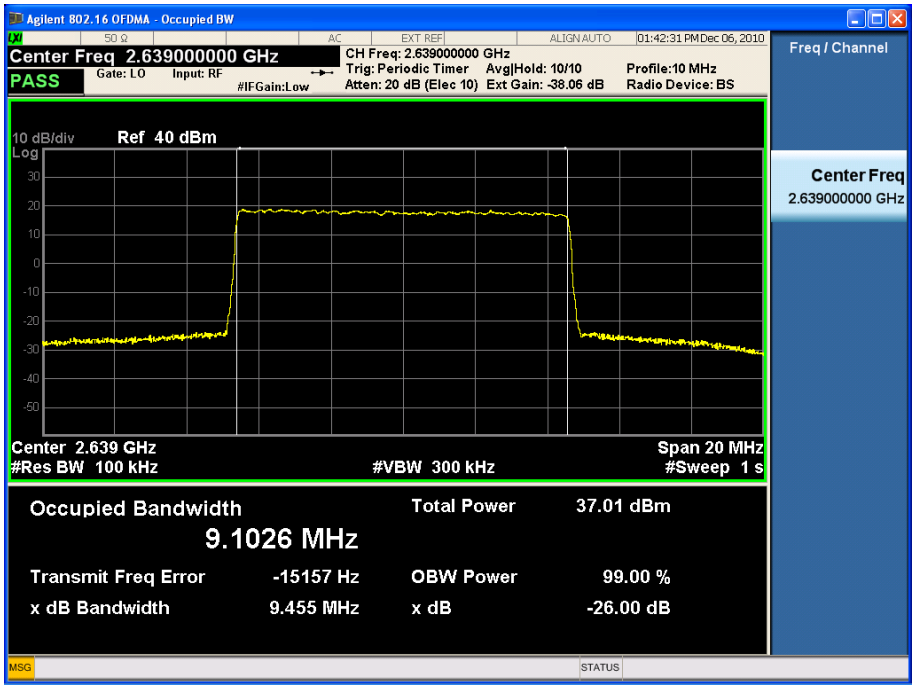
(16QAM Low Channel)



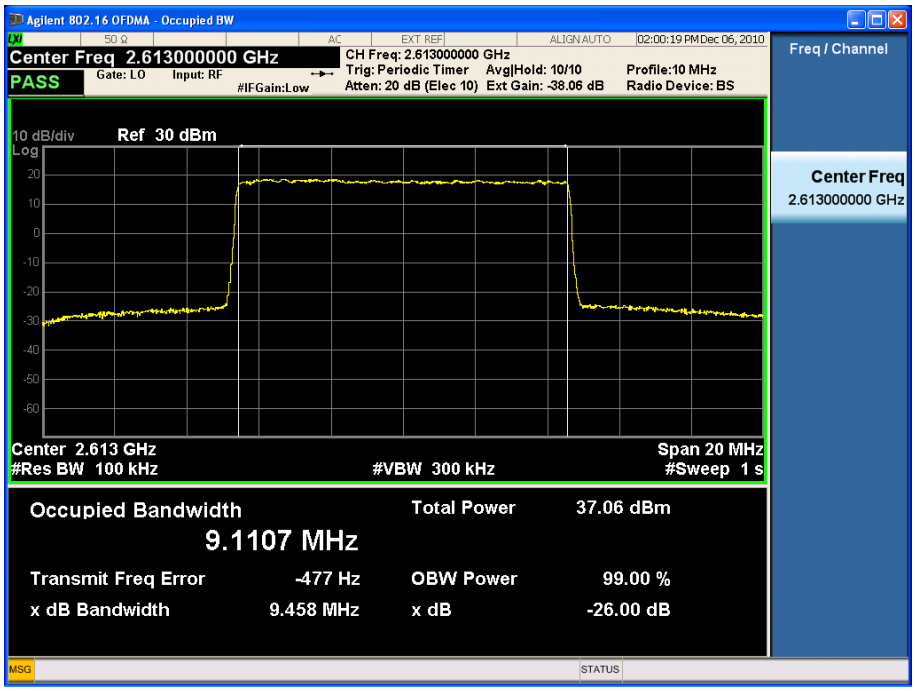
(16QAM Middle Channel)



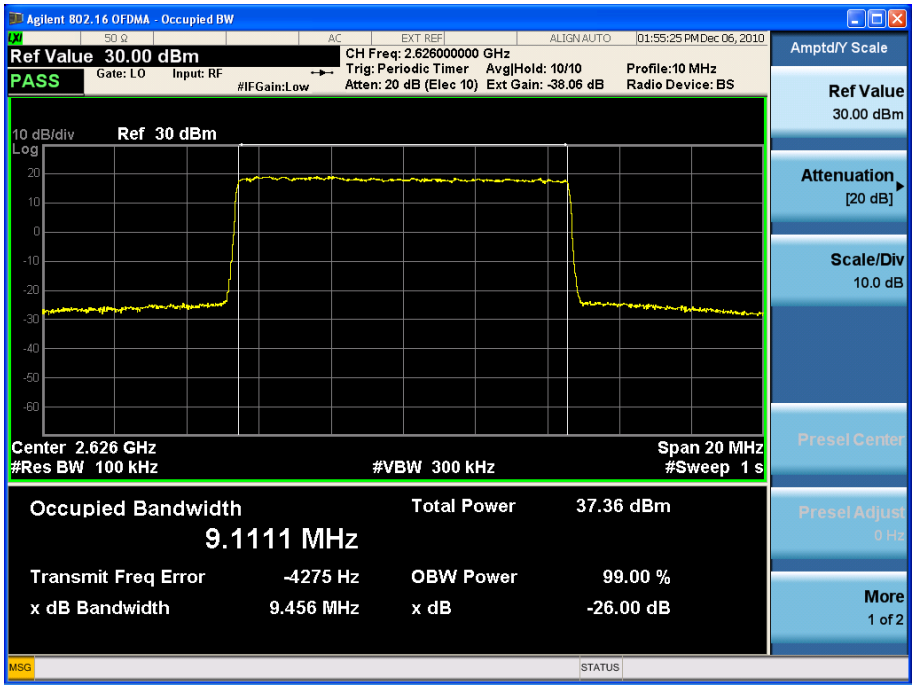
(16QAM High Channel)



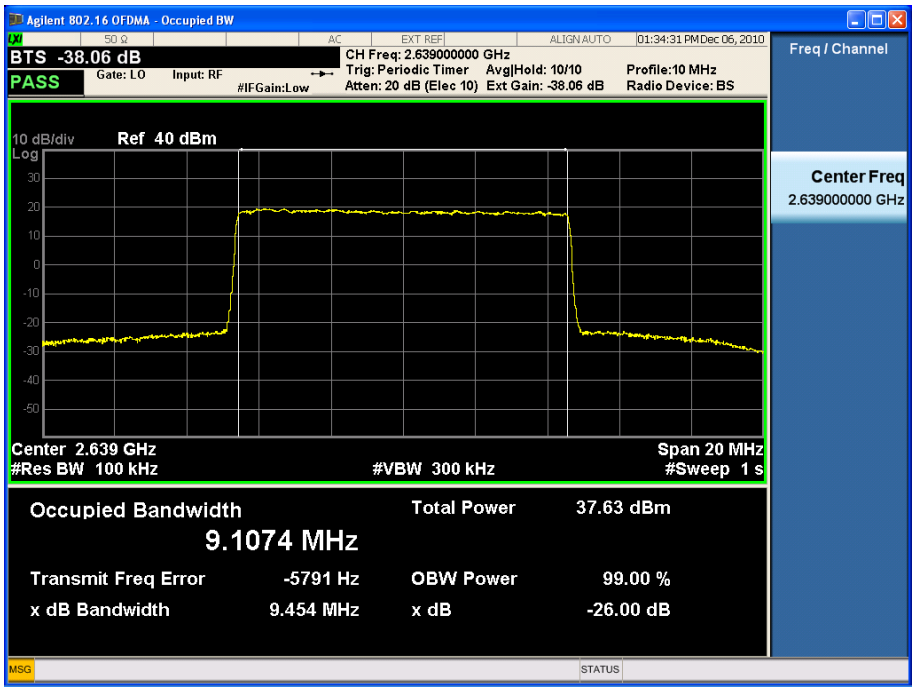
(64QAM Low Channel)



(64QAM Middle Channel)

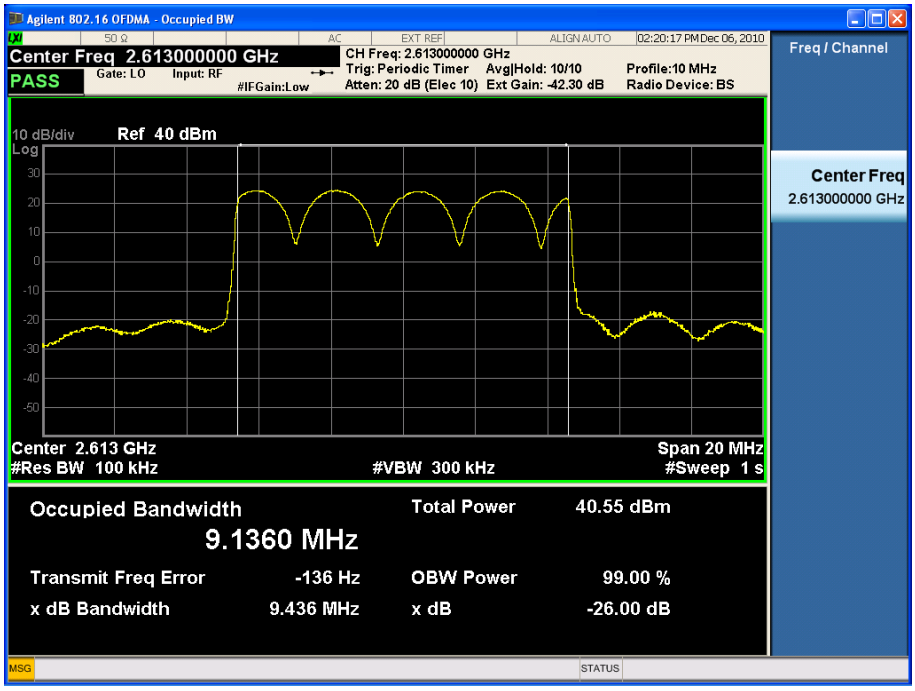


(64QAM High Channel)

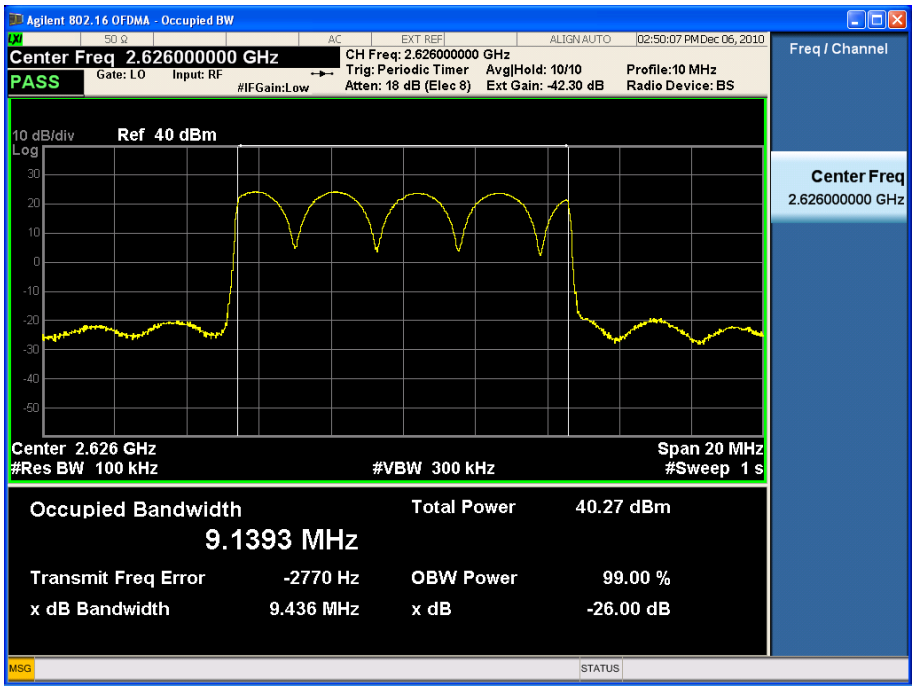


6.4.6. Combined Test Plot at Output Port

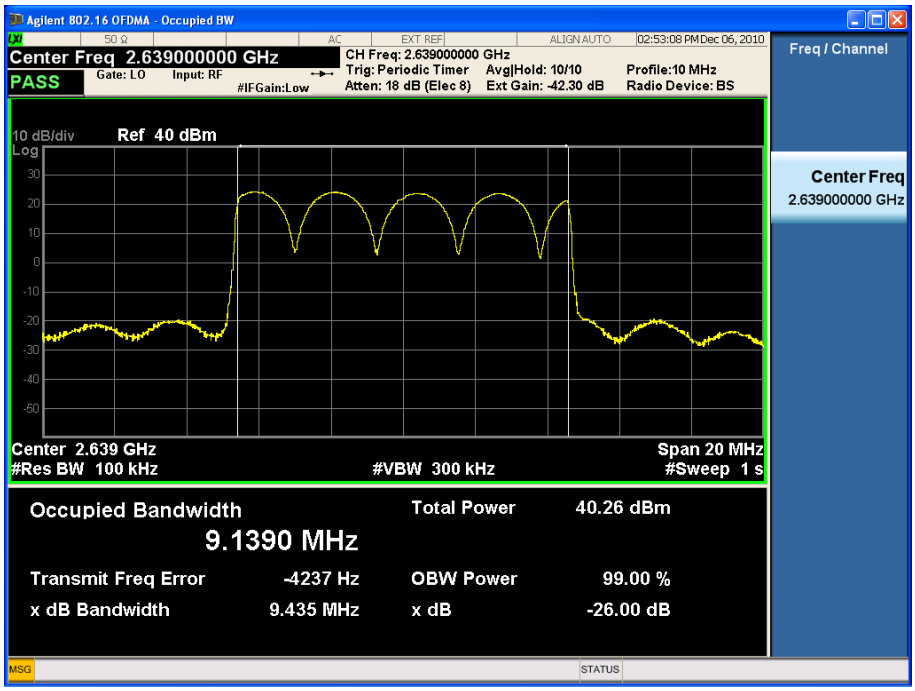
(QPSK Low Channel)



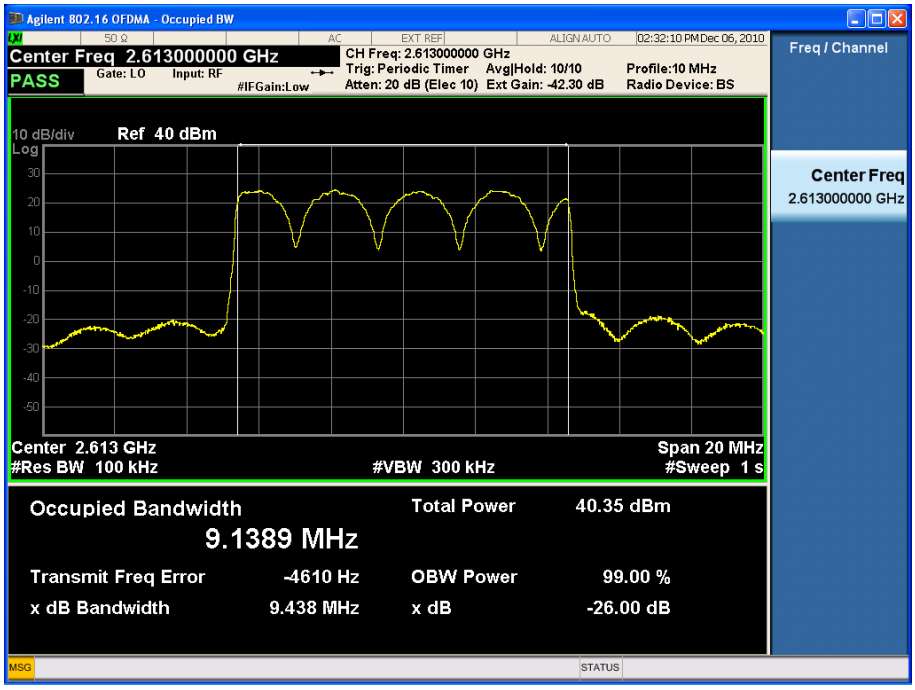
(QPSK Middle Channel)



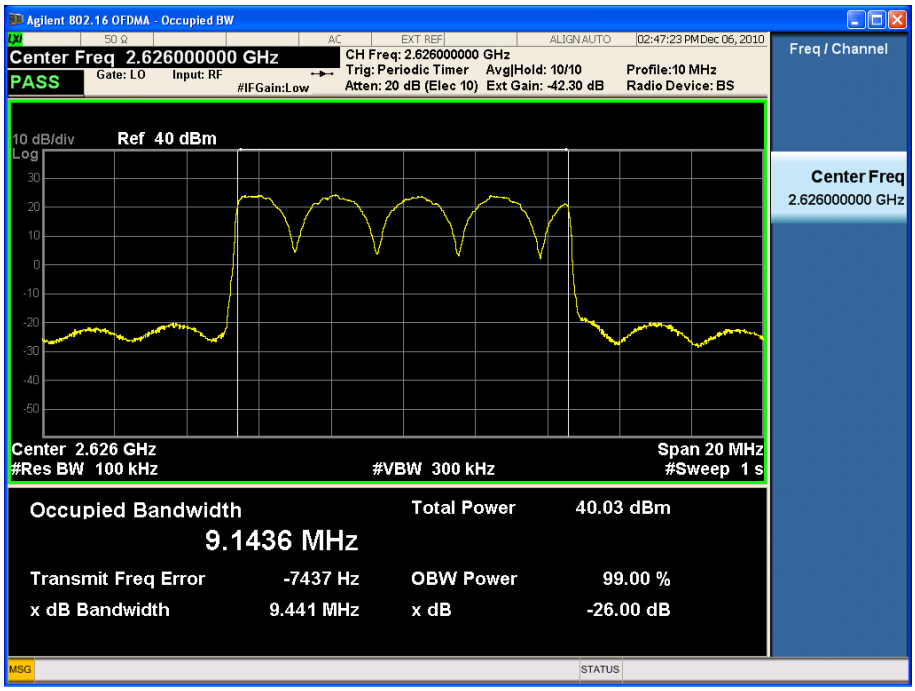
(QPSK High Channel)



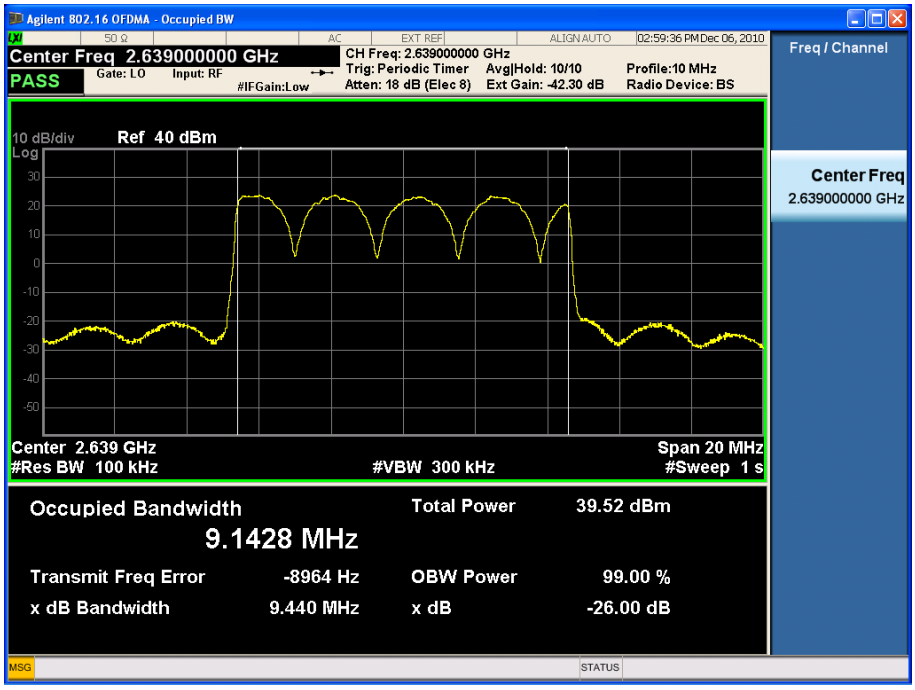
(16QAM Low Channel)



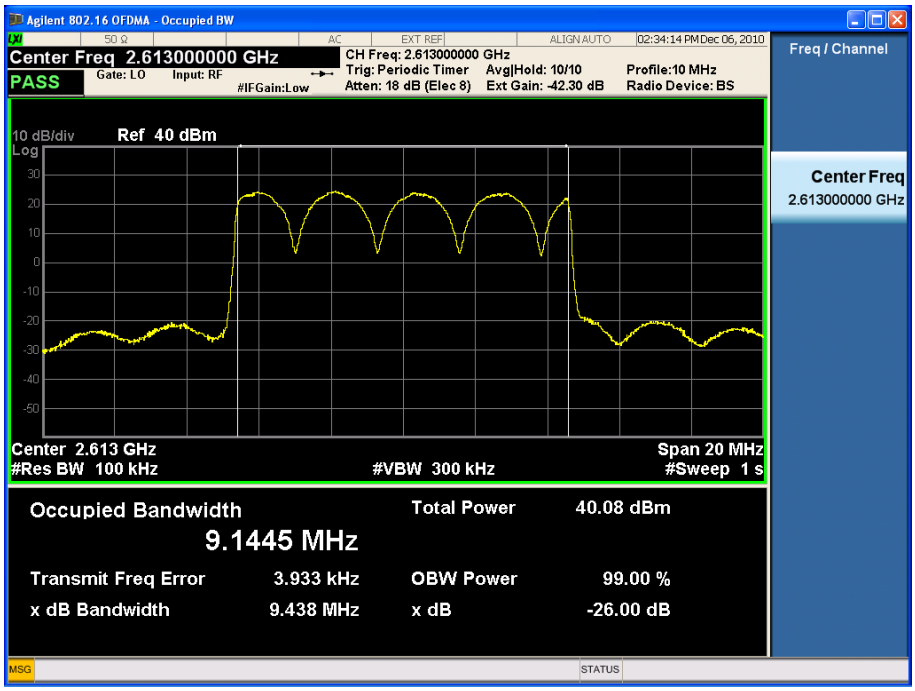
(16QAM Middle Channel)



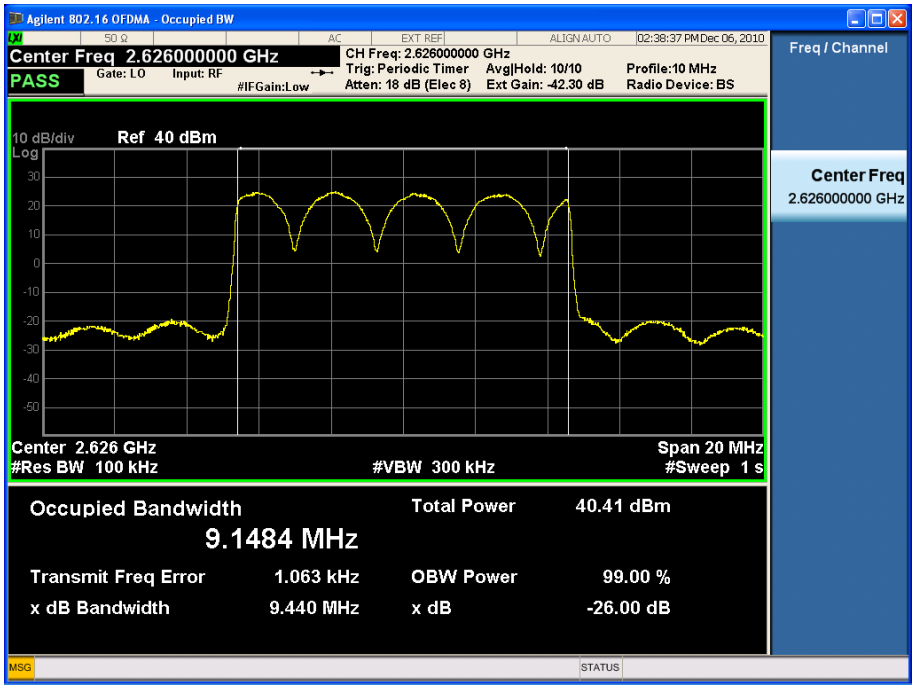
(16QAM High Channel)



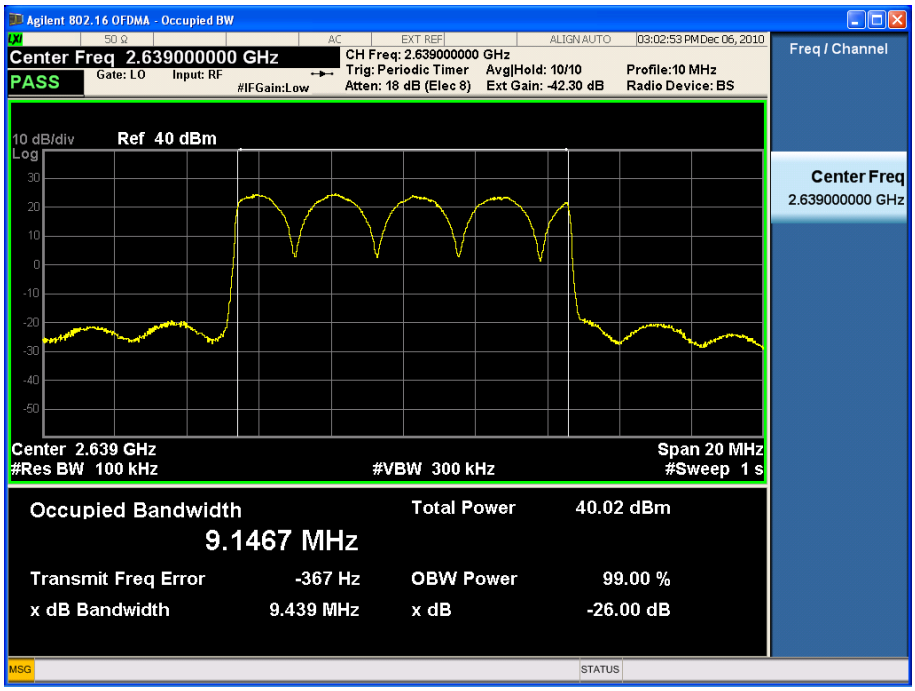
(64QAM Low Channel)



(64QAM Middle Channel)



(64QAM High Channel)



7. BAND EDGES

7.1. Applicable Standard

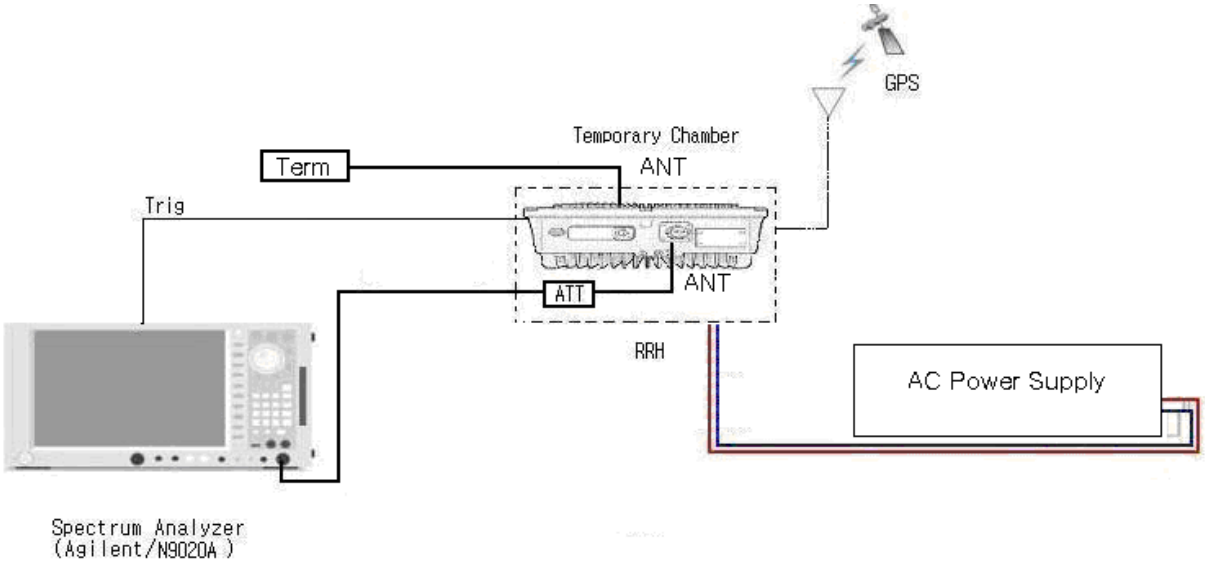
According to §27.53(m), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (p) by a factor of at least 43 + 10 log (p) dB.

7.2. Test Equipment List and Details

Manufacturer	Model / Equipment	Serial No.	Calibration Due
DaeYoung	DFSS60 / AC Power Supply	1003030-1	07/26/2011
WEINSCHEL	67-30-33 / Attenuator	BU5347	01/06/2011
WEINSCHEL	67-30-33 / Attenuator	BR0530	01/14/2011
WEINSCHEL	AF117A-69-31 / STEP ATTENUATOR	11787	11/12/2011
WEINSCHEL	AF117A-69-31 / STEP ATTENUATOR	639	11/12/2011
Agilent	N9020A / MXA Signal Analyzer	US46220219	03/03/2011
Agilent	11636B / Power Divider	11377	12/24/2010

7.3. Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.



The center of the spectrum analyzer was set to block edge frequency.

The EUT provides the MIMO function which is able to transmit on the same channel with same data simultaneously therefore a combiner is used to sum the individual transmitter output power.

The test data is shown as a combined output in the report.

7.3.1. Environmental Conditions

Temperature:	25 °C
Relative Humidity:	18 %

7.4. Test Result

: PASS

7.4.1. Test data at Output 0

Modulation	Channel	Measured Frequency (MHz)	Max. Measured Value (dBm)	Limit (dBm)
QPSK	Low	2613	-24.274	-13.0
	High	2639	-25.079	
16QAM	Low	2613	-24.551	
	High	2639	-24.697	
64QAM	Low	2613	-25.060	
	High	2639	-24.507	

7.4.2. Test data at Output 1

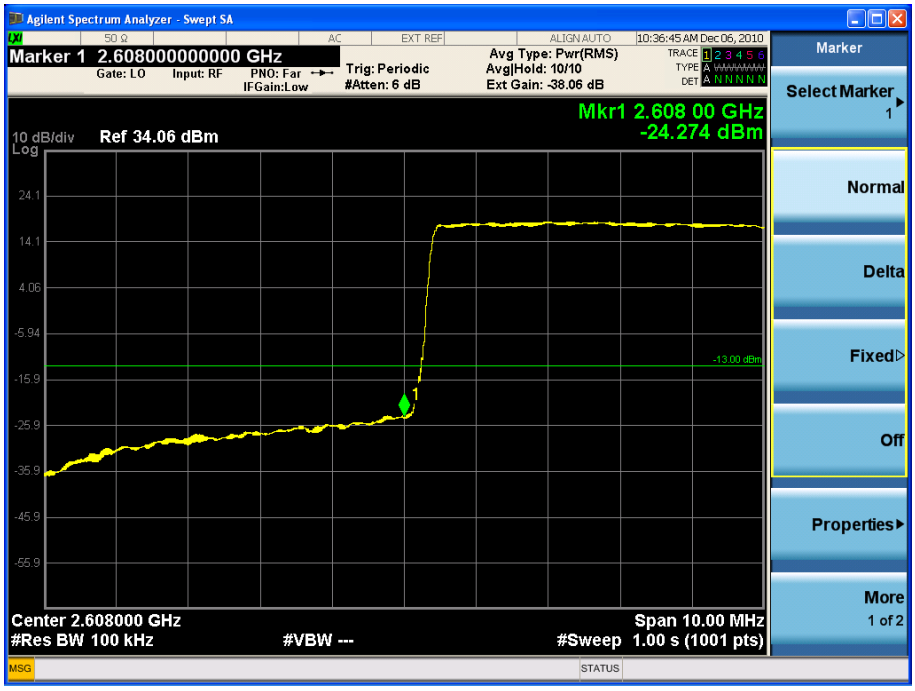
Modulation	Channel	Measured Frequency (MHz)	Max. Measured Value (dBm)	Limit (dBm)
QPSK	Low	2613	-25.832	-13.0
	High	2639	-26.083	
16QAM	Low	2613	-25.699	
	High	2639	-25.425	
64QAM	Low	2613	-25.157	
	High	2639	-23.114	

7.4.3. Combined Test data at Output

Modulation	Channel	Measured Frequency (MHz)	Max. Measured Value (dBm)	Limit (dBm)
QPSK	Low	2613	-22.809	-13.0
	High	2639	-19.881	
16QAM	Low	2613	-22.131	
	High	2639	-19.159	
64QAM	Low	2613	-24.280	
	High	2639	-19.163	

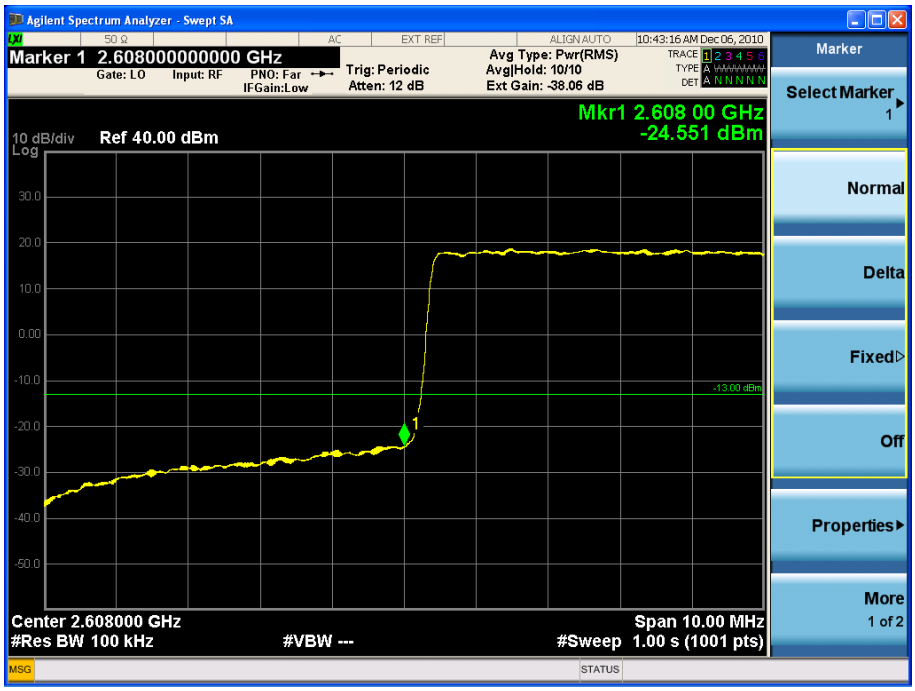
7.4.4. Plot Data at Output 0

(QPSK Low Channel)



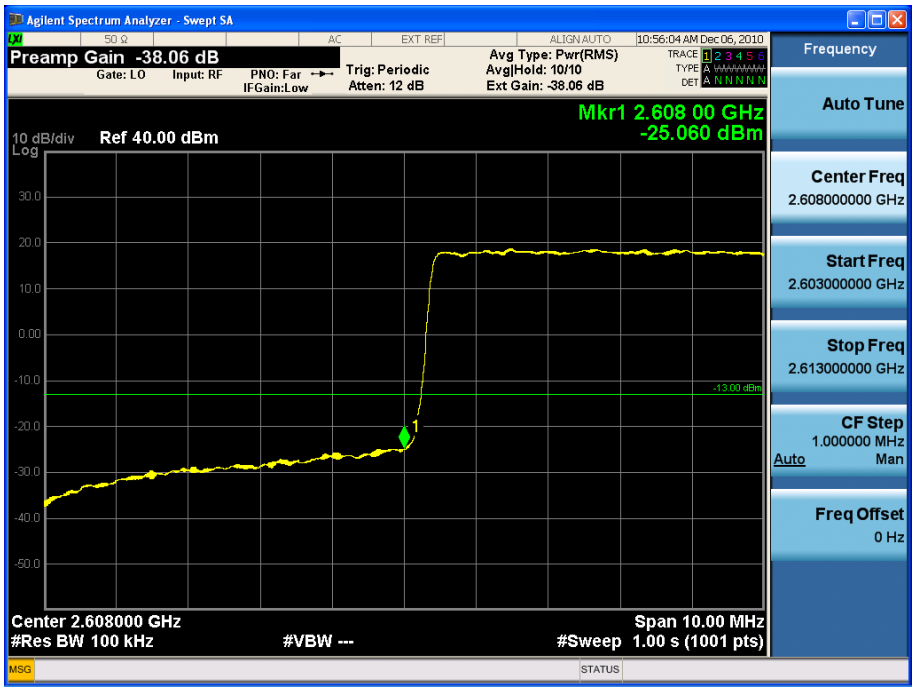
(QPSK High Channel)

(16QAM Low Channel)



(16QAM High Channel)

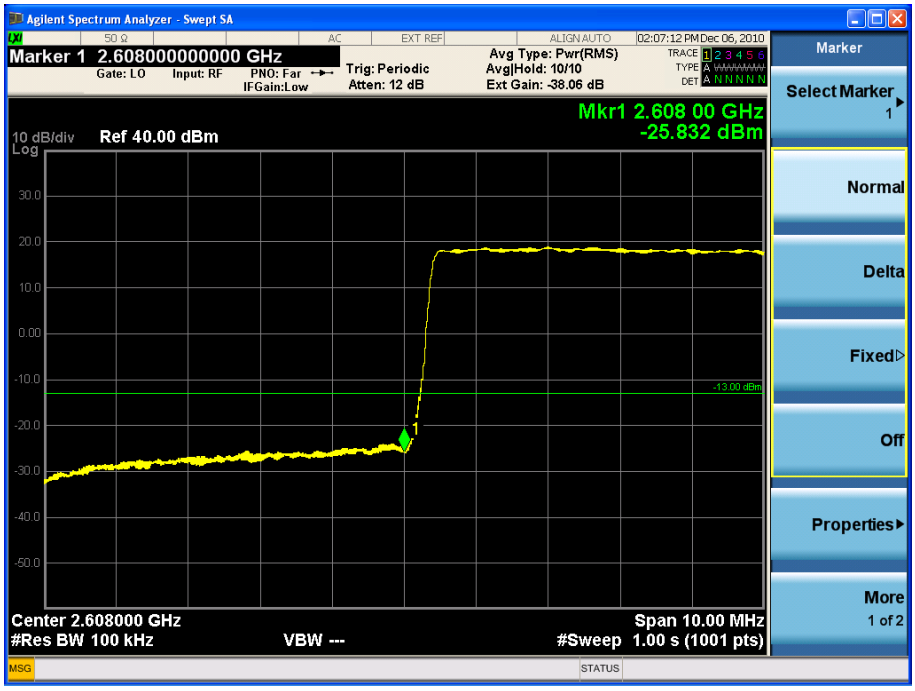
(64QAM Low Channel)



(64QAM High Channel)

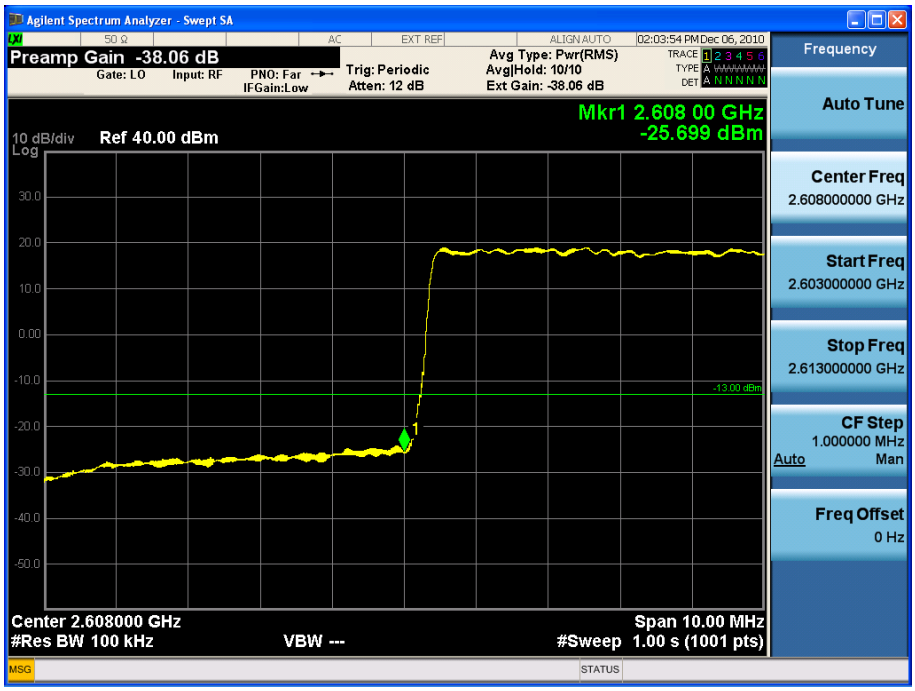
7.4.5. Plot Data at Output 1

(QPSK Low Channel)

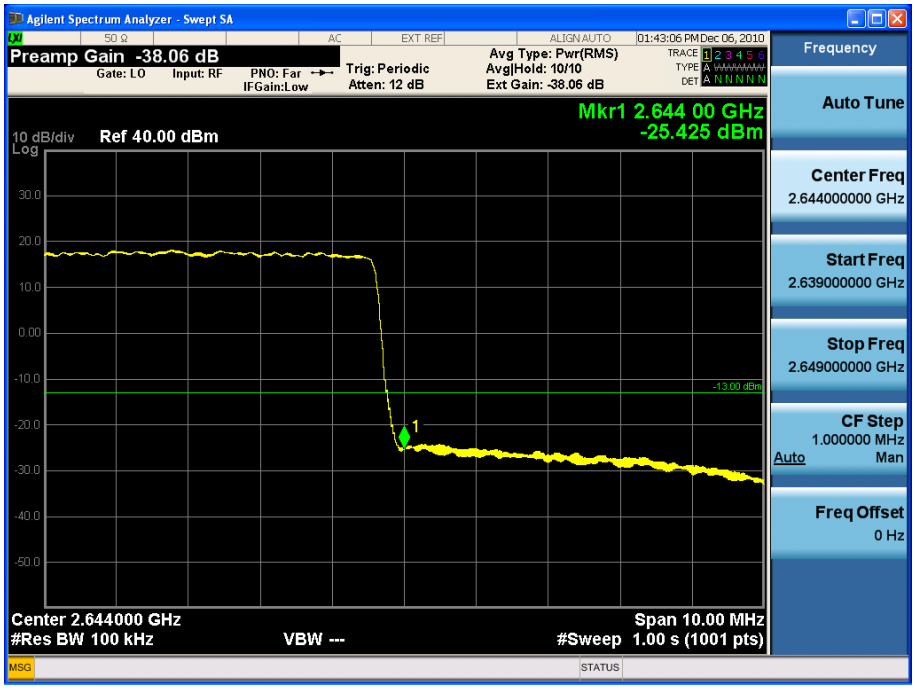


(QPSK High Channel)

(16QAM Low Channel)



(16QAM High Channel)

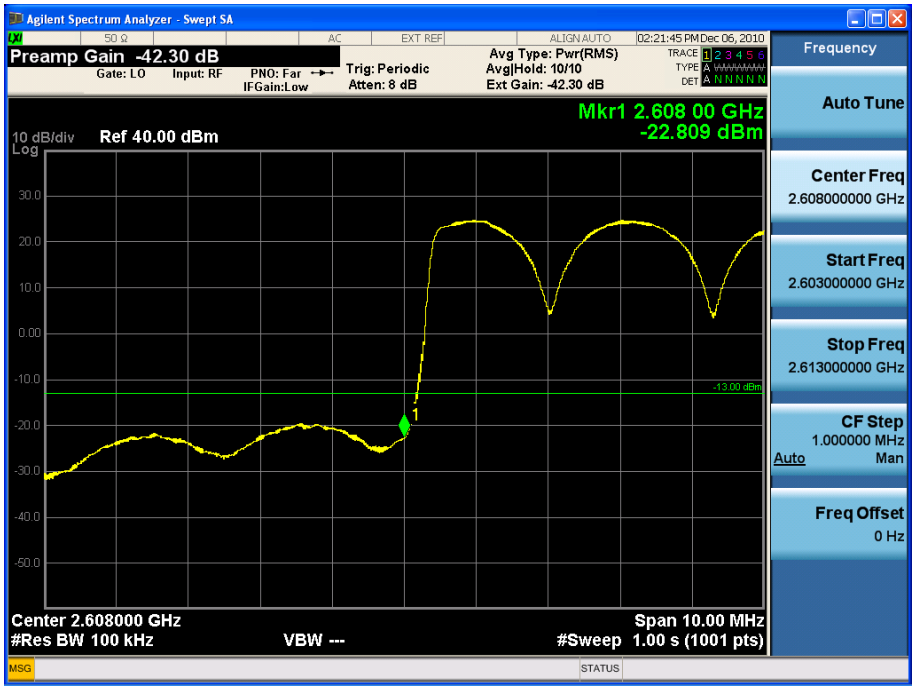


(64QAM Low Channel)

(64QAM High Channel)

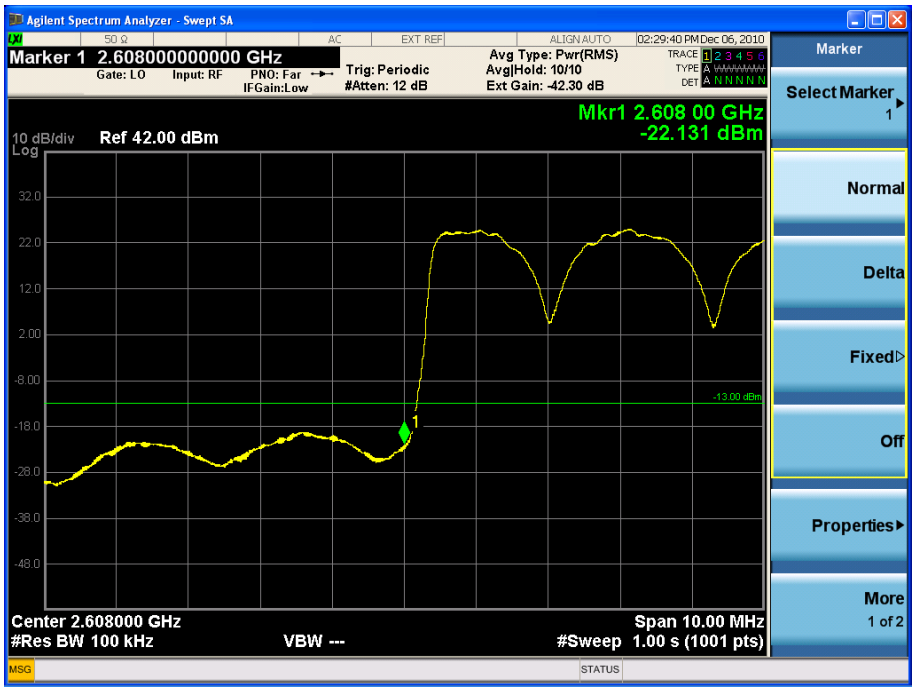
7.4.6. Combined Plot Data at Output

(QPSK Low Channel)



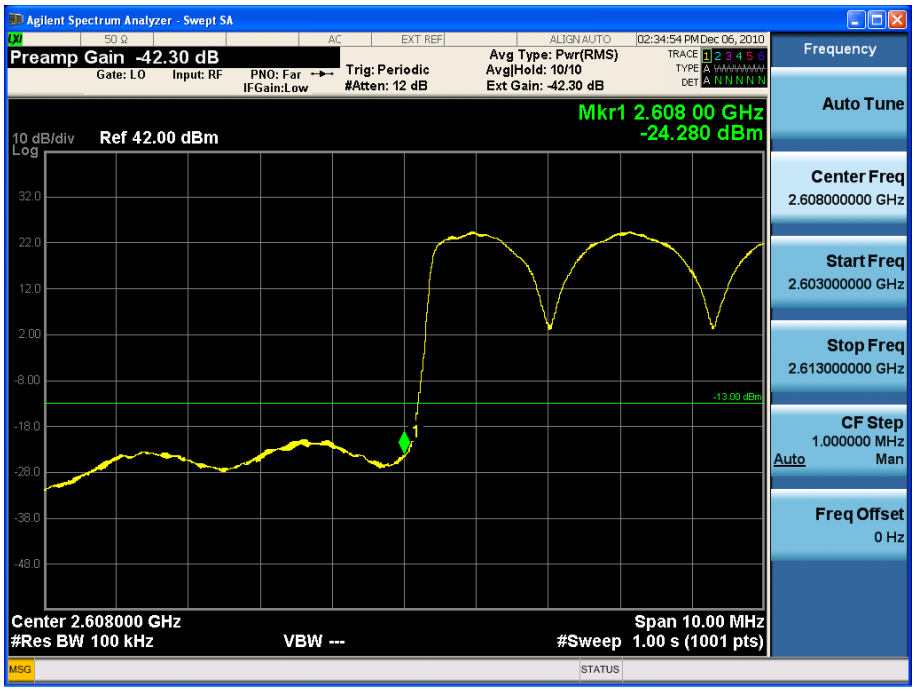
(QPSK High Channel)

(16QAM Low Channel)



(16QAM High Channel)

(64QAM Low Channel)



(64QAM High Channel)

8. SPURIOUS EMISSION AT ANTENNA TERMINAL

8.1. Applicable Standard: CFR 47§2.1051, §27.53

The spectrum was to be investigated to the tenth harmonics of the highest fundamental frequency as specified in §2.1051

8.2. Test Equipment List and Details

Manufacturer	Model / Equipment	Serial No.	Calibration Due
DaeYoung	DFSS60 / AC Power Supply	1003030-1	07/26/2011
WEINSCHEL	67-30-33 / Attenuator	BU5347	01/06/2011
WEINSCHEL	67-30-33 / Attenuator	BR0530	01/14/2011
WEINSCHEL	AF117A-69-31 / STEP ATTENUATOR	11787	11/12/2011
WEINSCHEL	AF117A-69-31 / STEP ATTENUATOR	639	11/12/2011
Agilent	N9020A / MXA Signal Analyzer	US46220219	03/03/2011
Agilent	11636B / Power Divider	11377	12/24/2010

8.3. Test Procedure

The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation.

The resolution bandwidth of the spectrum analyzer was set at 1MHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonic.

The EUT provides the MIMO function which is able to transmit on the same channel with same data simultaneously therefore a combiner is used to sum the individual transmitter output power.

The test data is shown as a combined output in the report.

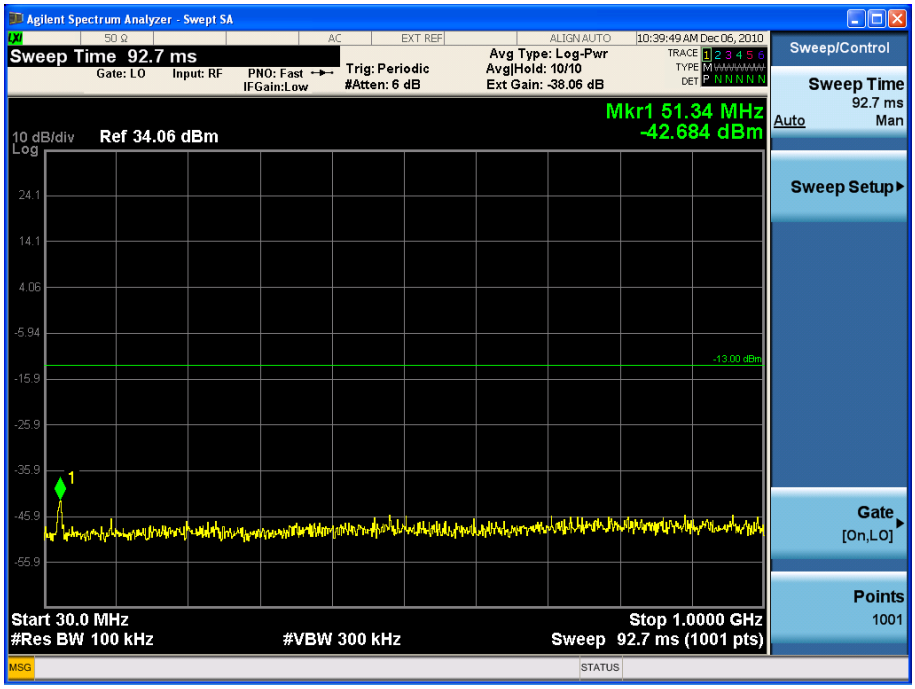
8.3.1 Environmental Conditions:

Temperature:	25 °C
Relative Humidity:	28 %

8.4. Test Result

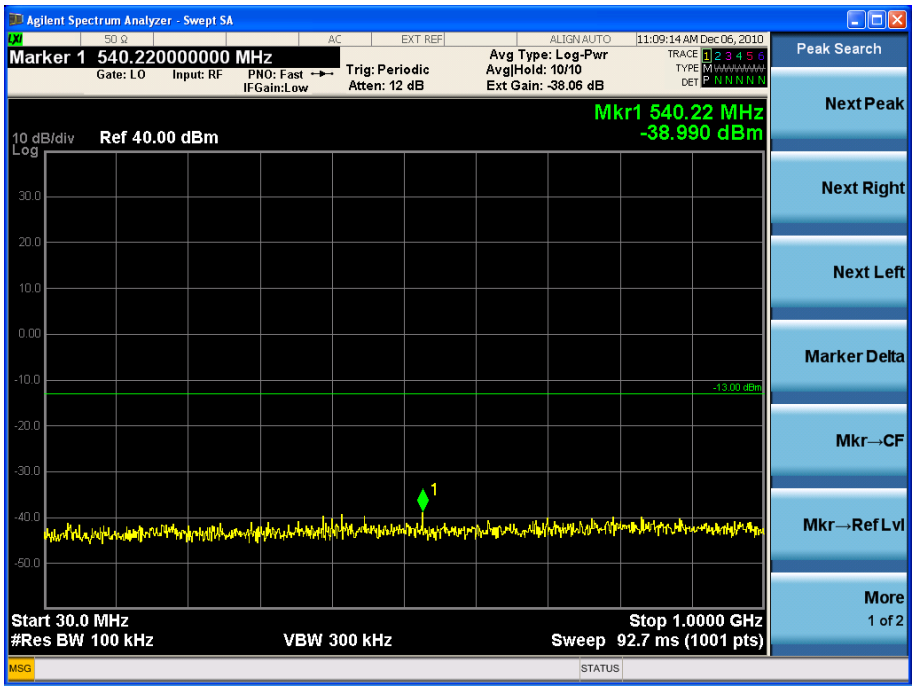
: Pass

8.4.1. Plot Data at Output Port 0
(QPSK Low Channel)



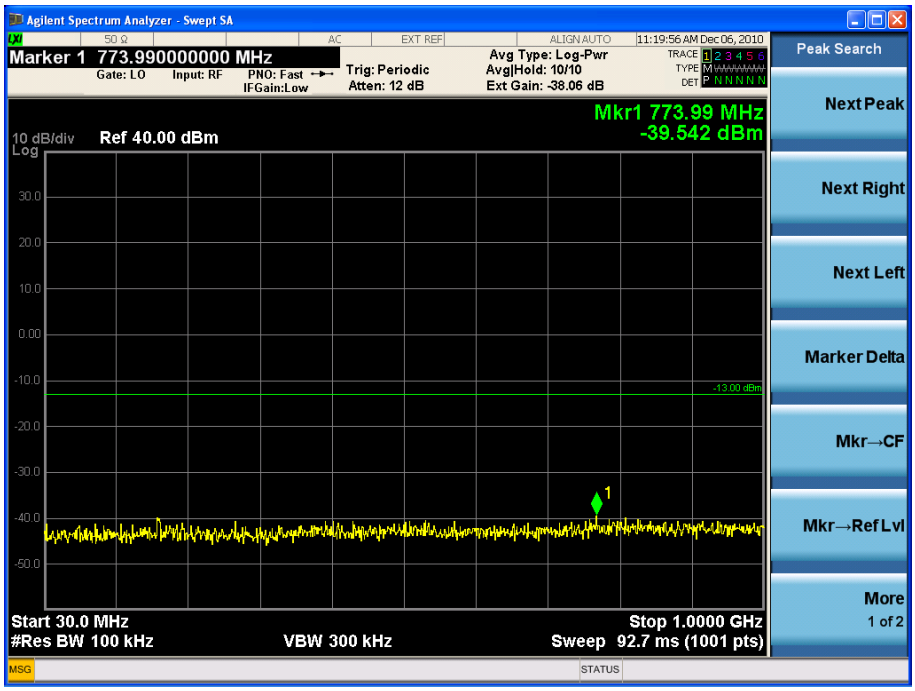
(30 MHz ~ 1 GHz)

(QPSK Middle Channel)



(30 MHz ~ 1 GHz)

(QPSK High Channel)



(30 MHz ~ 1 GHz)

(QPSK Low Channel)

(1 GHz ~ 26.5 GHz)

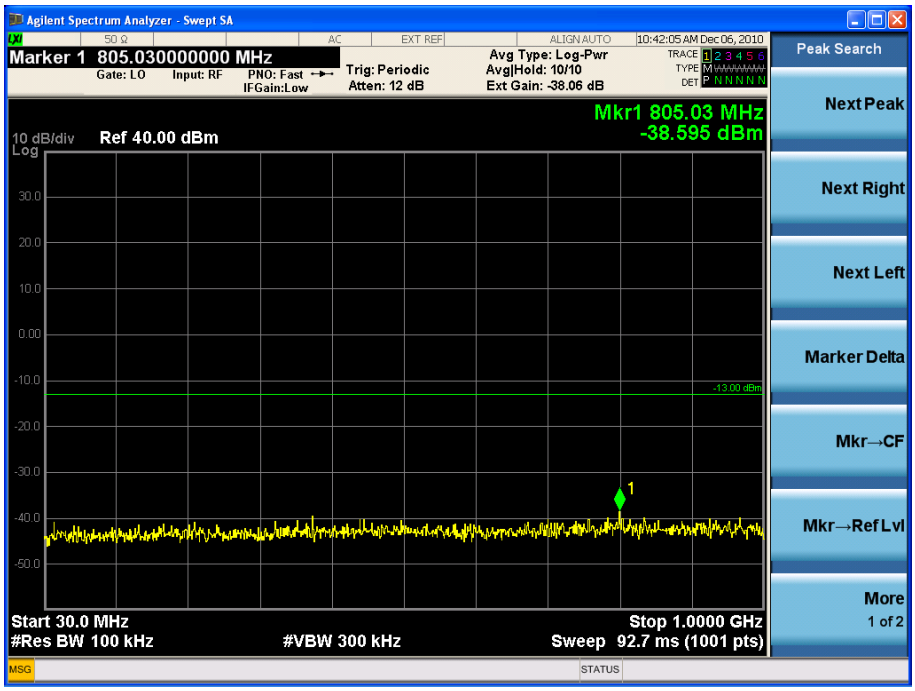
(QPSK Middle Channel)

(1 GHz ~ 26.5 GHz)

(QPSK High Channel)

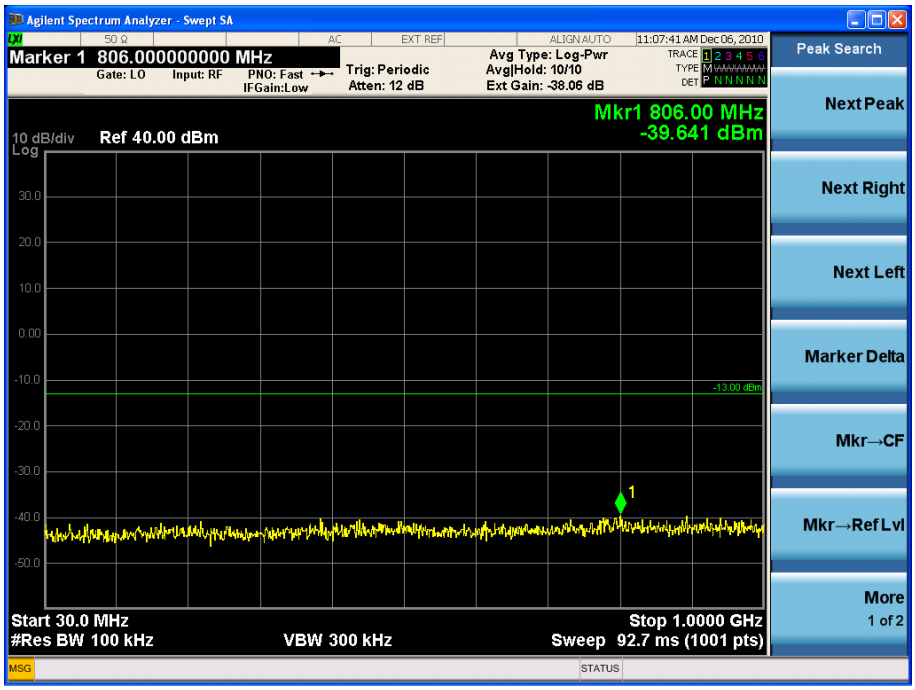
(1 GHz ~ 26.5 GHz)

(16QAM LOW Channel)



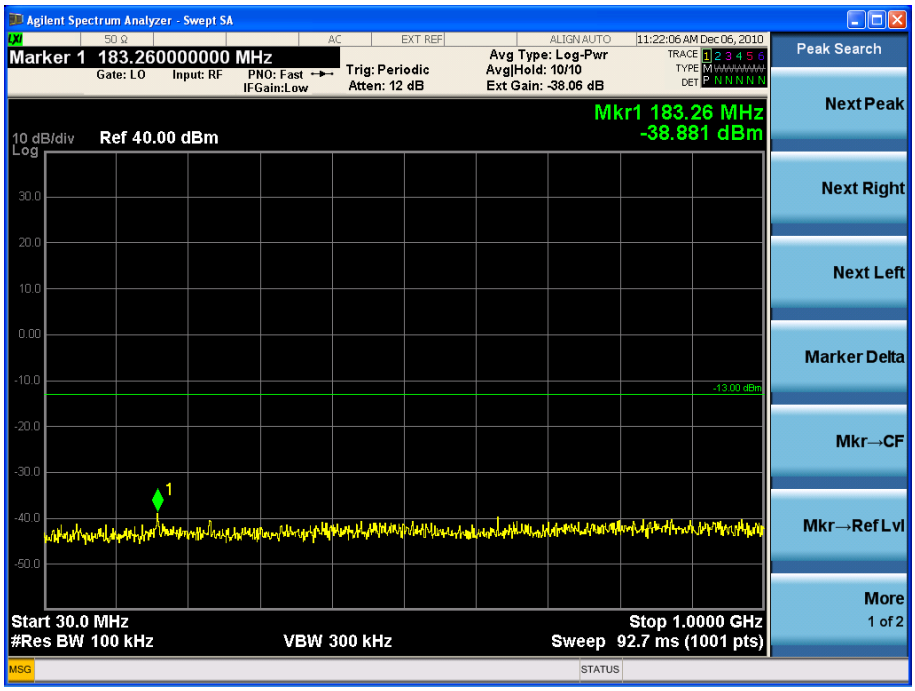
(30 MHz ~ 1 GHz)

(16QAM Middle Channel)



(30 MHz ~ 1 GHz)

(16QAM High Channel)



(30 MHz ~ 1 GHz)

(16QAM LOW Channel)

(1 GHz ~ 26.5 GHz)

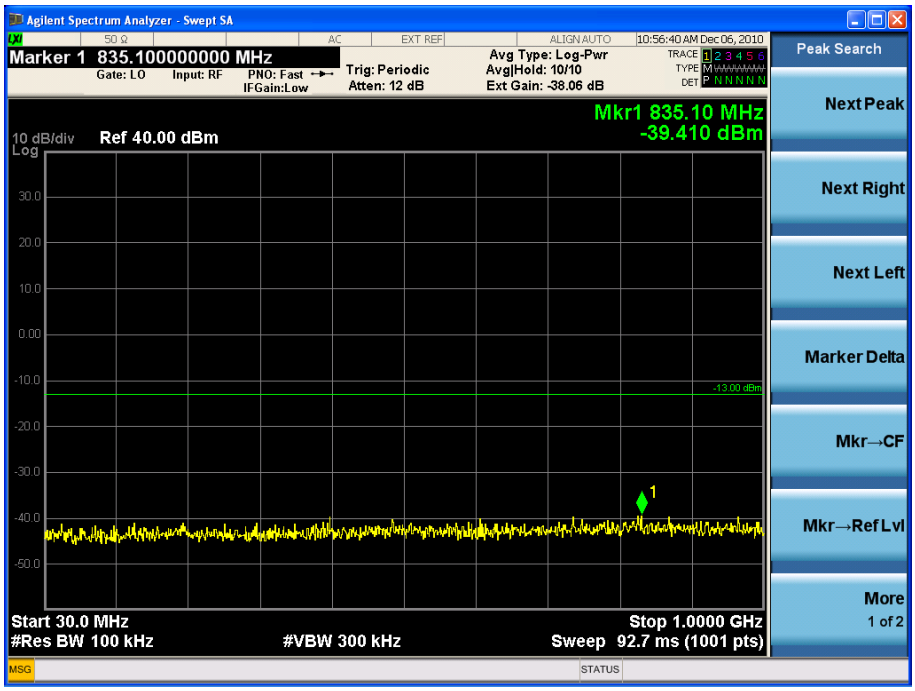
(16QAM Middle Channel)

(1 GHz ~ 26.5 GHz)

(16QAM High Channel)

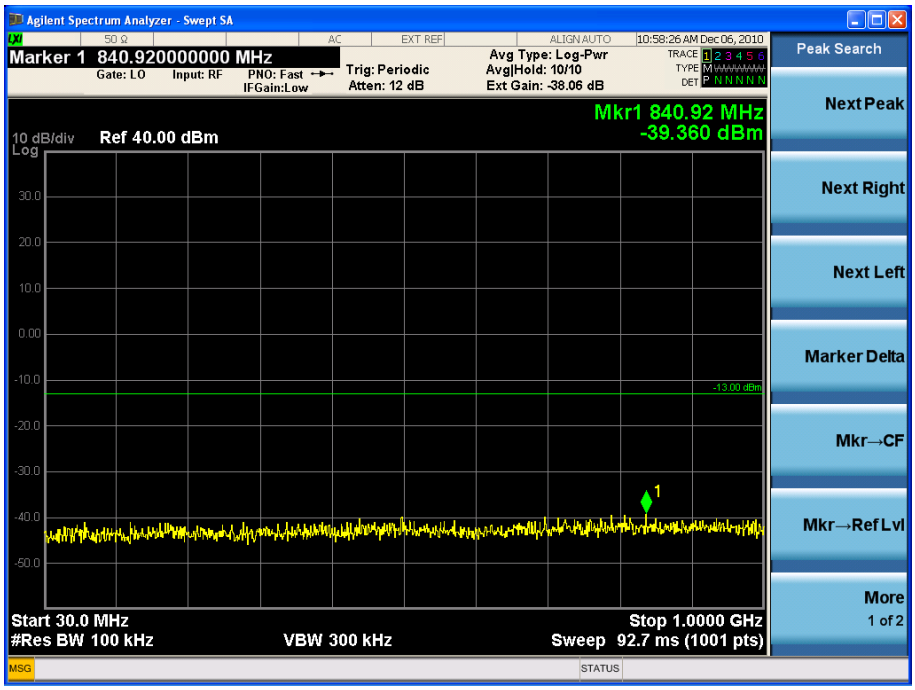
(1 GHz ~ 26.5 GHz)

(64QAM Low Channel)



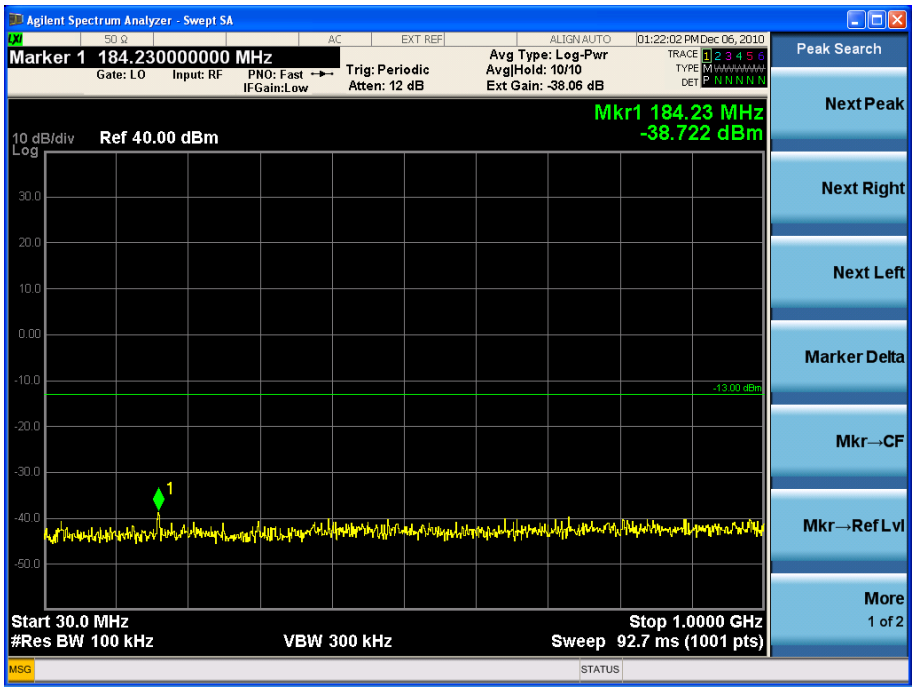
(30 MHz ~ 1 GHz)

(64QAM Middle Channel)



(30 MHz ~ 1 GHz)

(64QAM High Channel)



(30 MHz ~ 1 GHz)

(64QAM Low Channel)

(1 GHz ~ 26.5 GHz)

(64QAM Middle Channel)

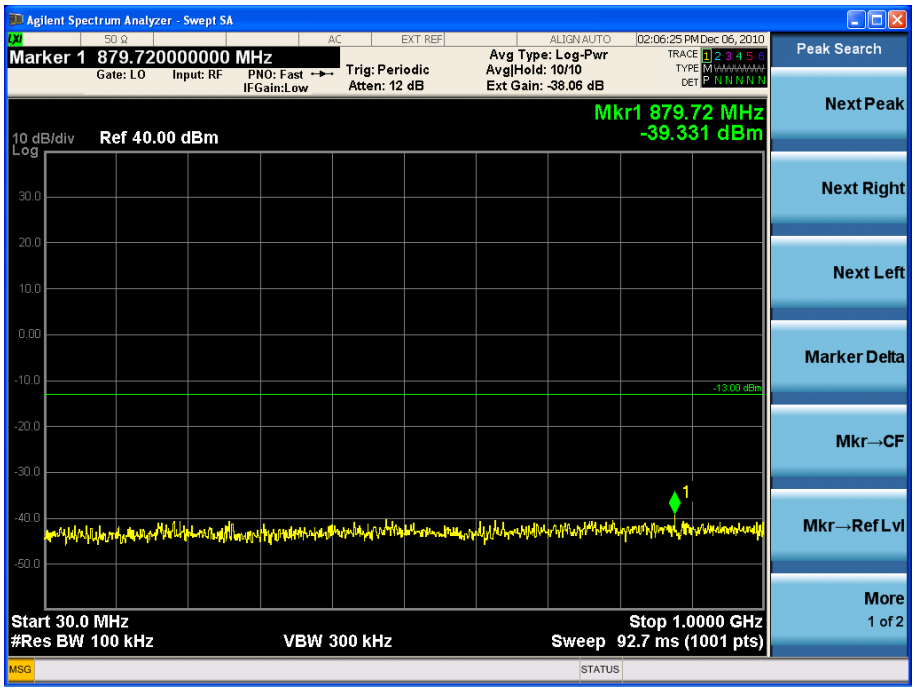
(1 GHz ~ 26.5 GHz)

(64QAM High Channel)

(1 GHz ~ 26.5 GHz)

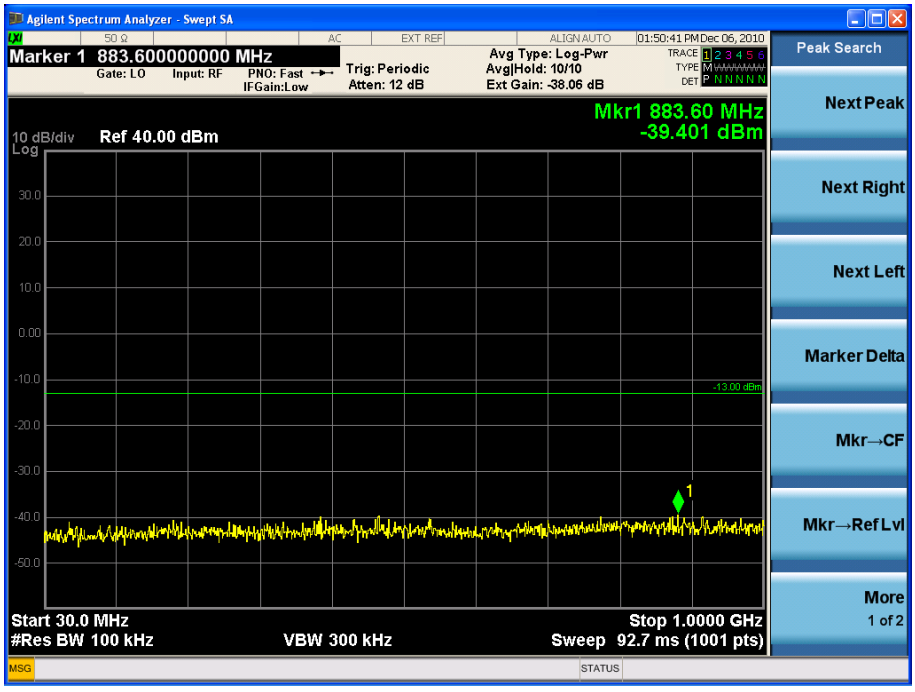
8.4.2. Plot Data at Output Port 1

(QPSK Low Channel)



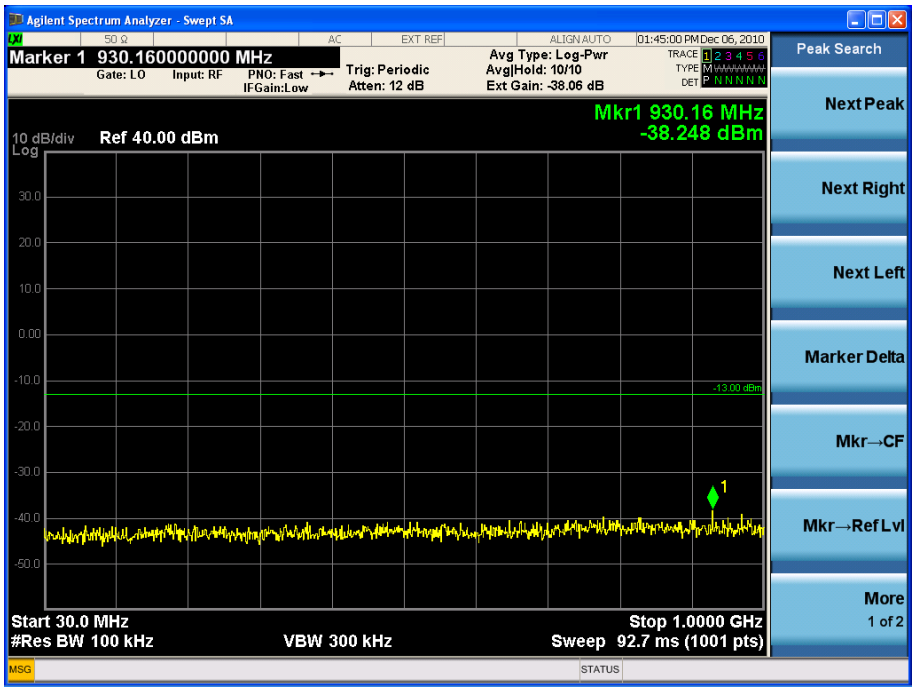
(30 MHz ~ 1 GHz)

(QPSK Middle Channel)



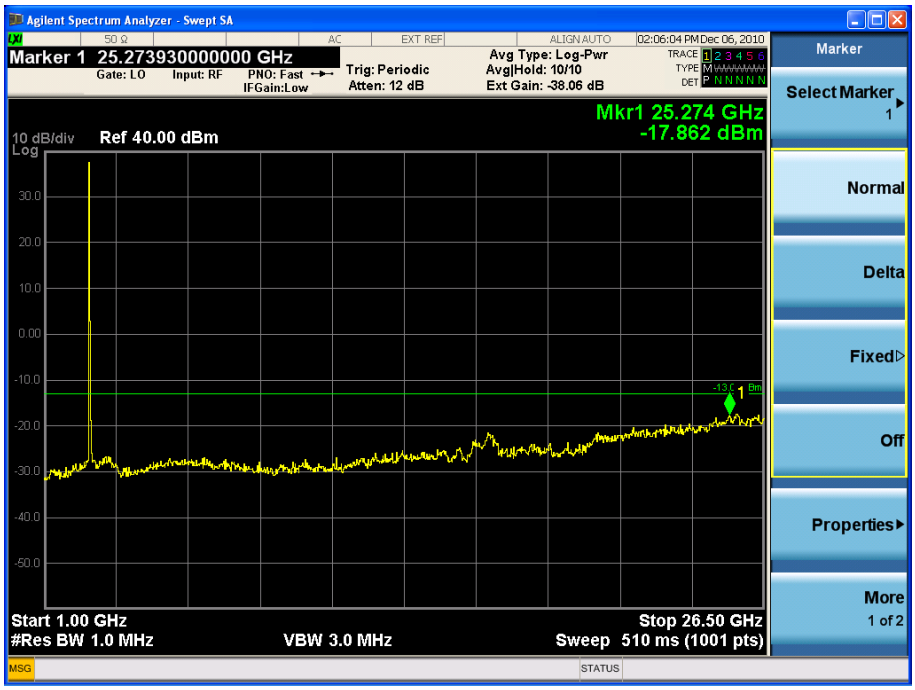
(30 MHz ~ 1 GHz)

(QPSK High Channel)



(30 MHz ~ 1 GHz)

(QPSK Low Channel)



(1 GHz ~ 26.5 GHz)

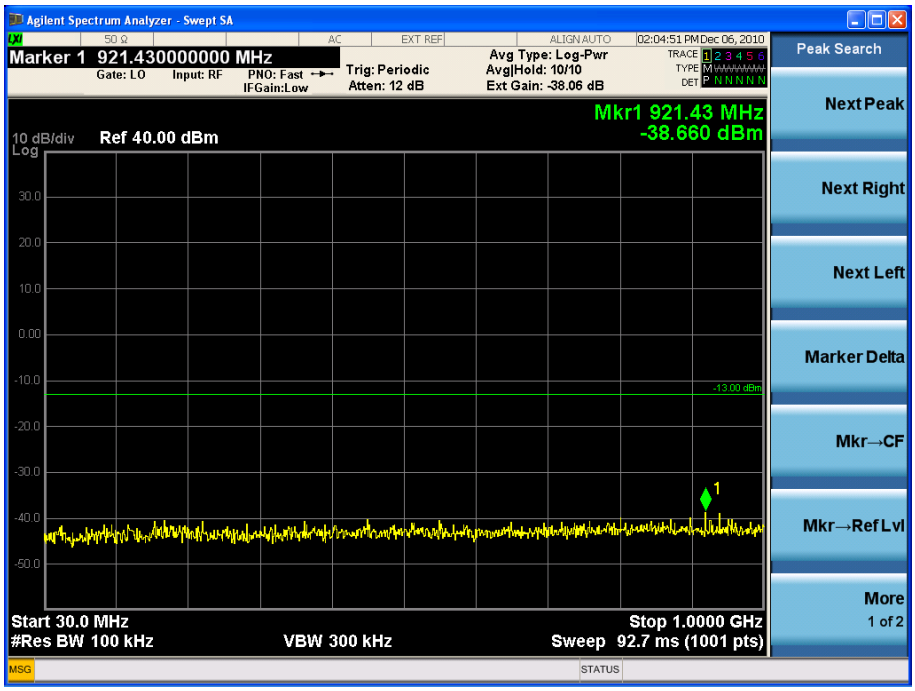
(QPSK Middle Channel)

(1 GHz ~ 26.5 GHz)

(QPSK High Channel)

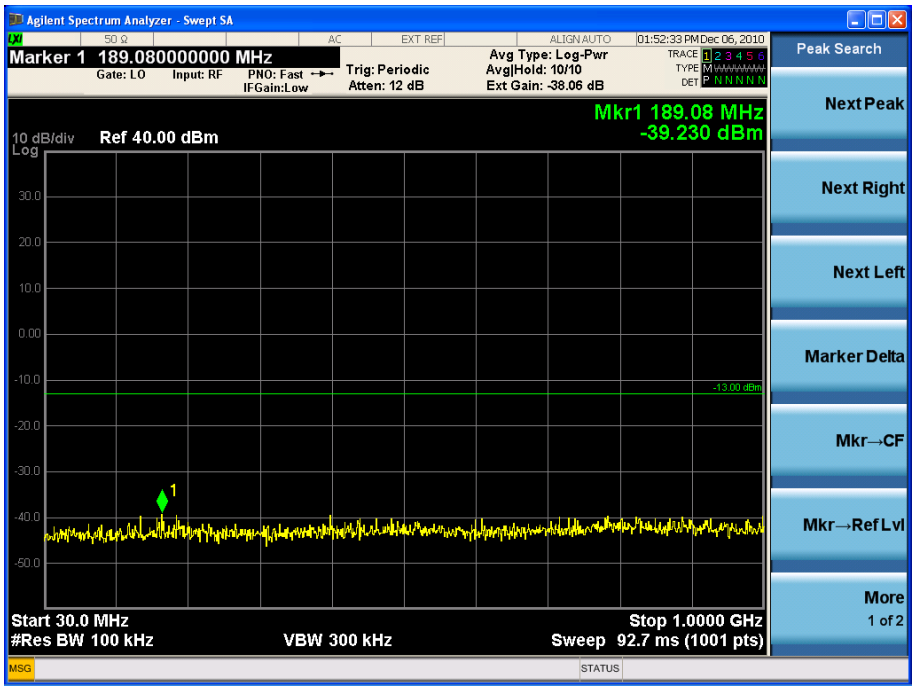
(1 GHz ~ 26.5 GHz)

(16QAM LOW Channel)



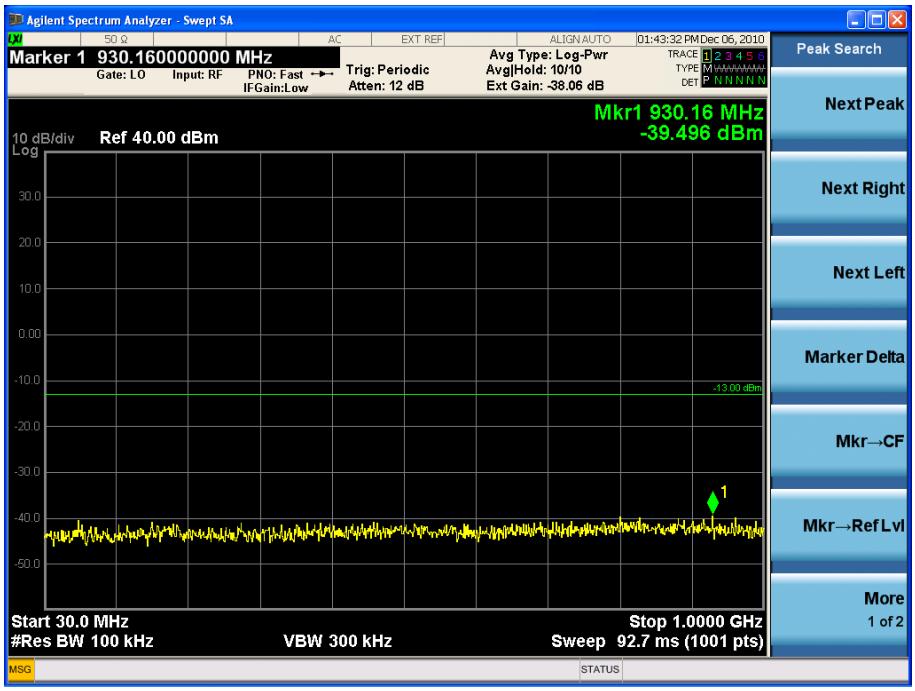
(30 MHz ~ 1 GHz)

(16QAM Middle Channel)



(30 MHz ~ 1 GHz)

(16QAM High Channel)



(30 MHz ~ 1 GHz)

(16QAM LOW Channel)

(1 GHz ~ 26.5 GHz)

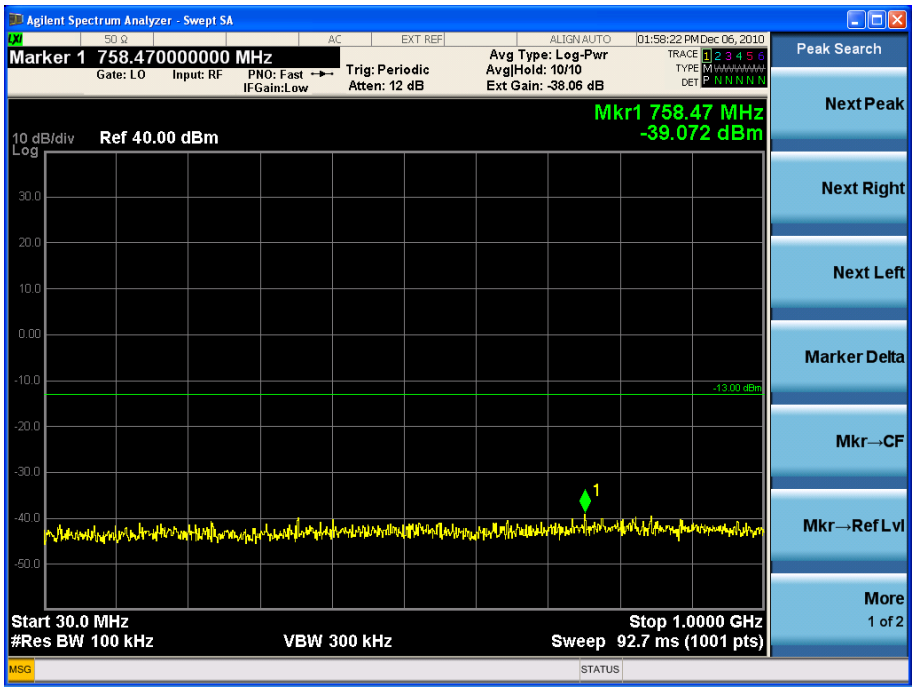
(16QAM Middle Channel)

(1 GHz ~ 26.5 GHz)

(16QAM High Channel)

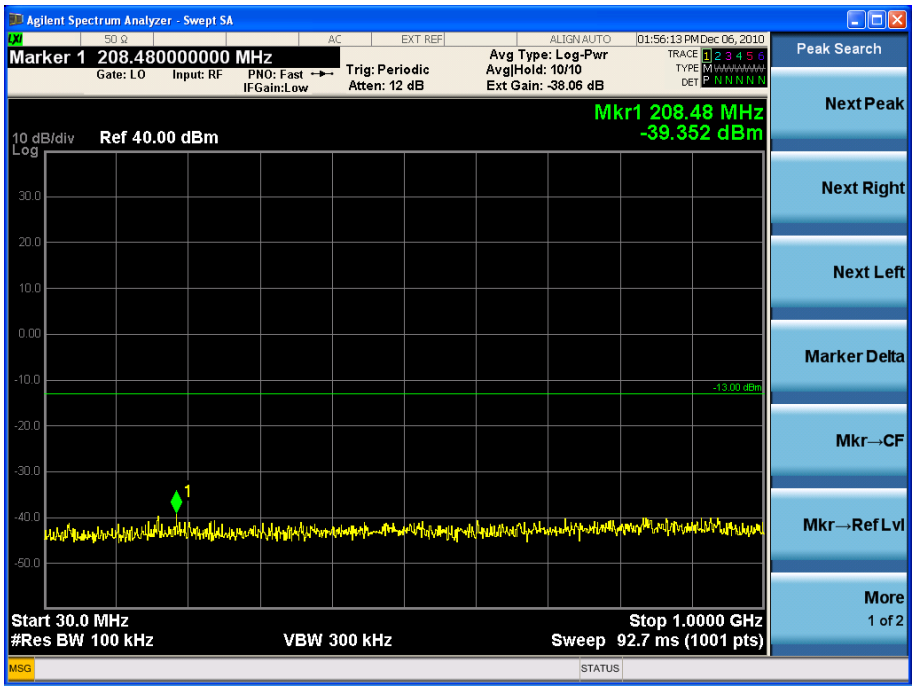
(1 GHz ~ 26.5 GHz)

(64QAM Low Channel)



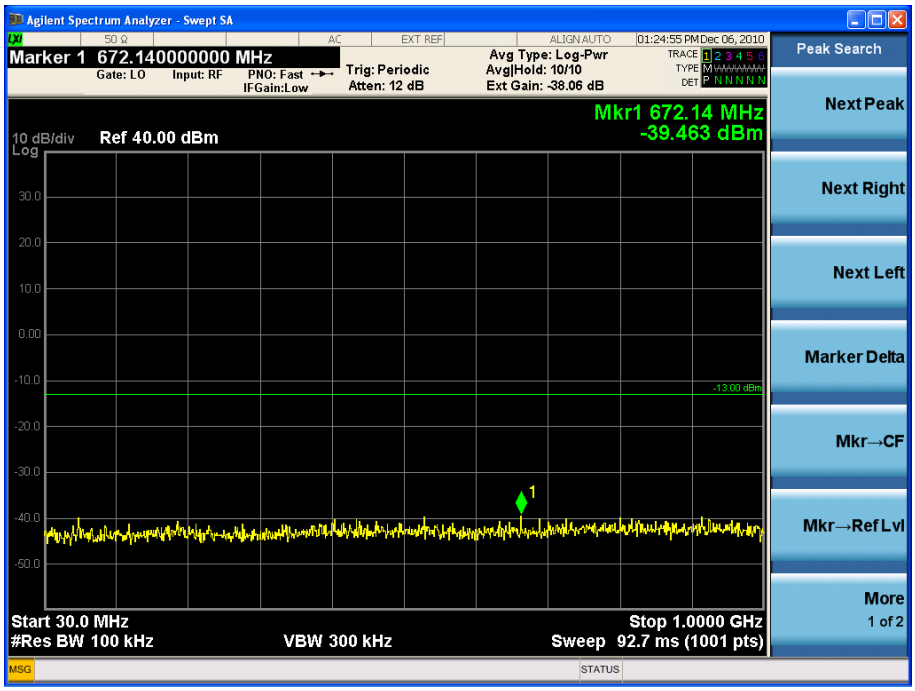
(30 MHz ~ 1 GHz)

(64QAM Middle Channel)



(30 MHz ~ 1 GHz)

(64QAM High Channel)



(30 MHz ~ 1 GHz)

(64QAM Low Channel)

(1 GHz ~ 26.5 GHz)

(64QAM Middle Channel)

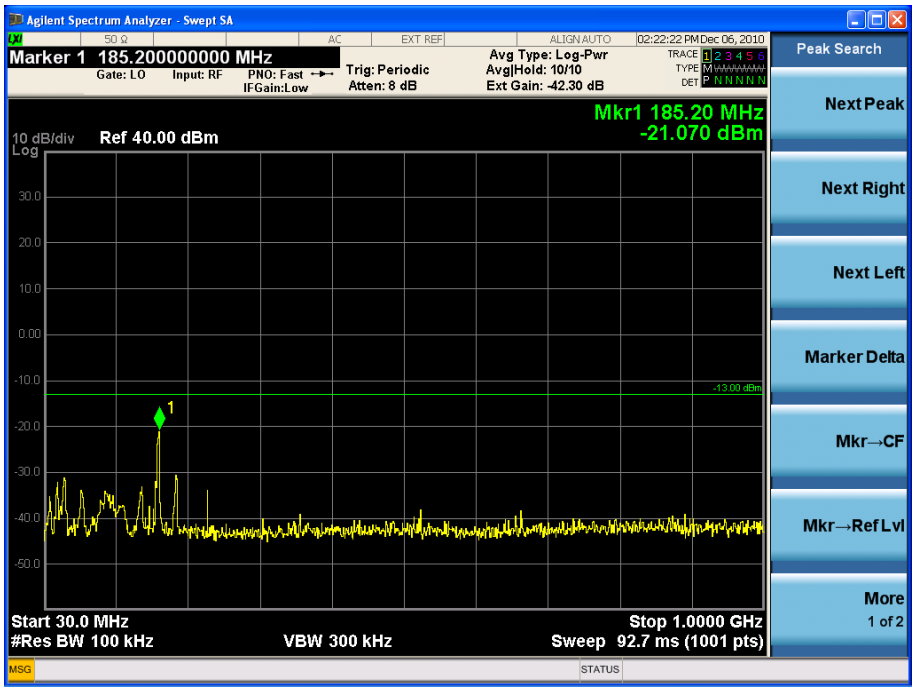
(1 GHz ~ 26.5 GHz)

(64QAM High Channel)

(1 GHz ~ 26.5 GHz)

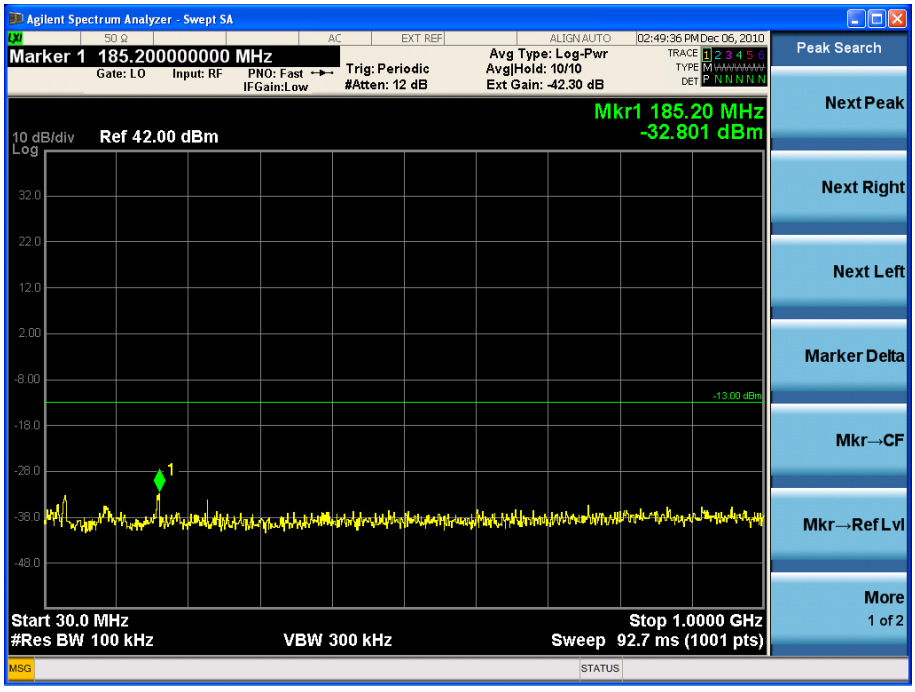
8.4.3. Combined Plot Data at Output

(QPSK Low Channel)



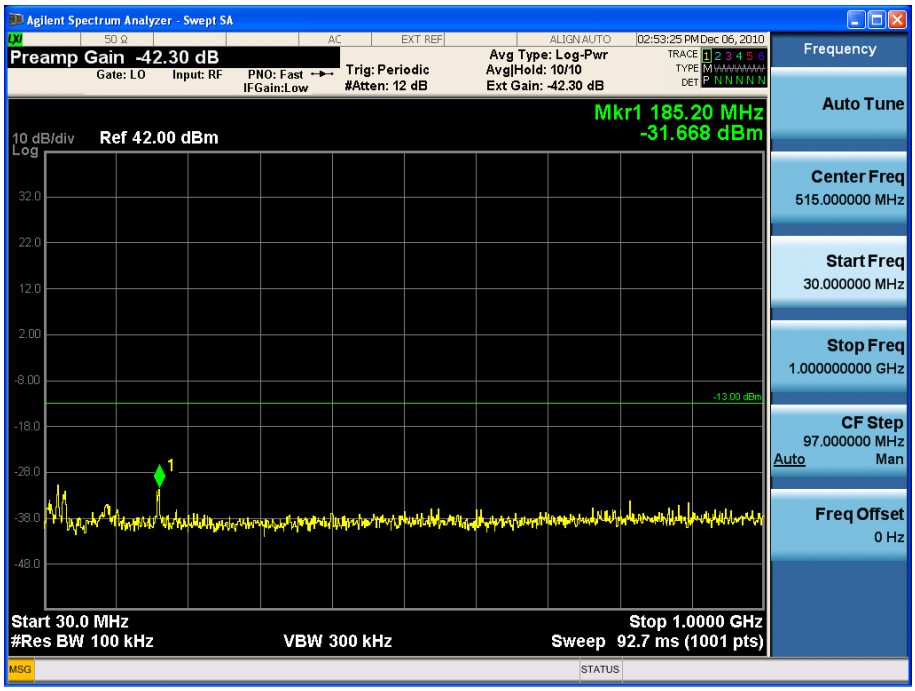
(30 MHz ~ 1 GHz)

(QPSK Middle Channel)



(30 MHz ~ 1 GHz)

(QPSK High Channel)



(30 MHz ~ 1 GHz)

(QPSK Low Channel)

(1 GHz ~ 26.5 GHz)

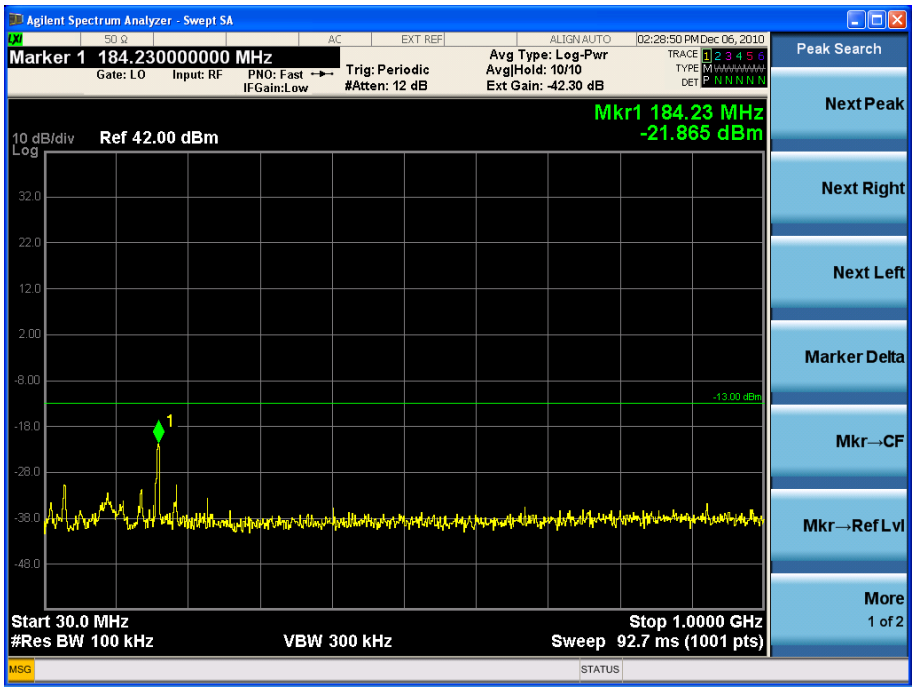
(QPSK Middle Channel)

(1 GHz ~ 26.5 GHz)

(QPSK High Channel)

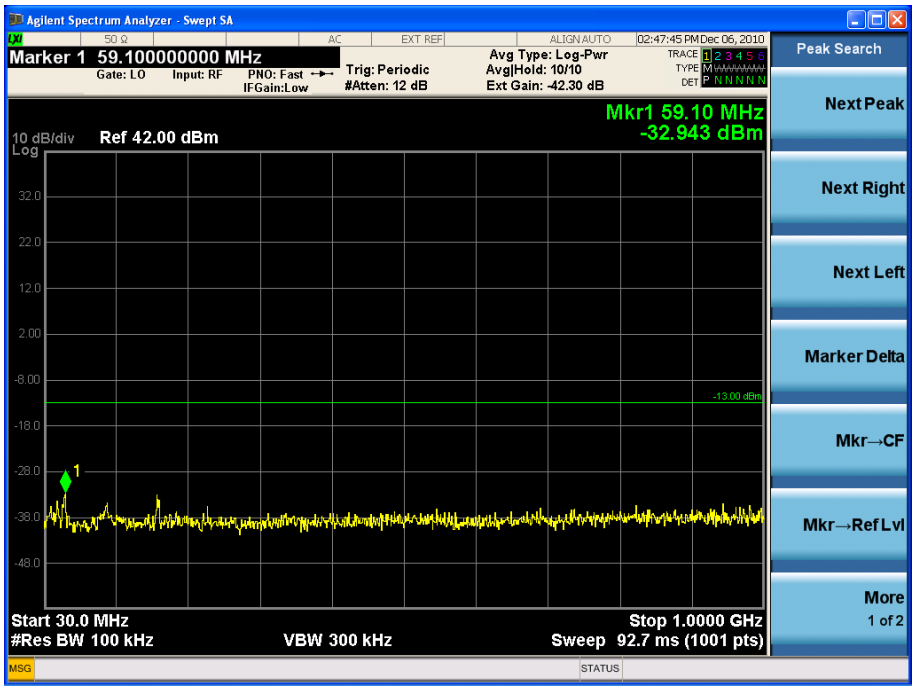
(1 GHz ~ 26.5 GHz)

(16QAM LOW Channel)



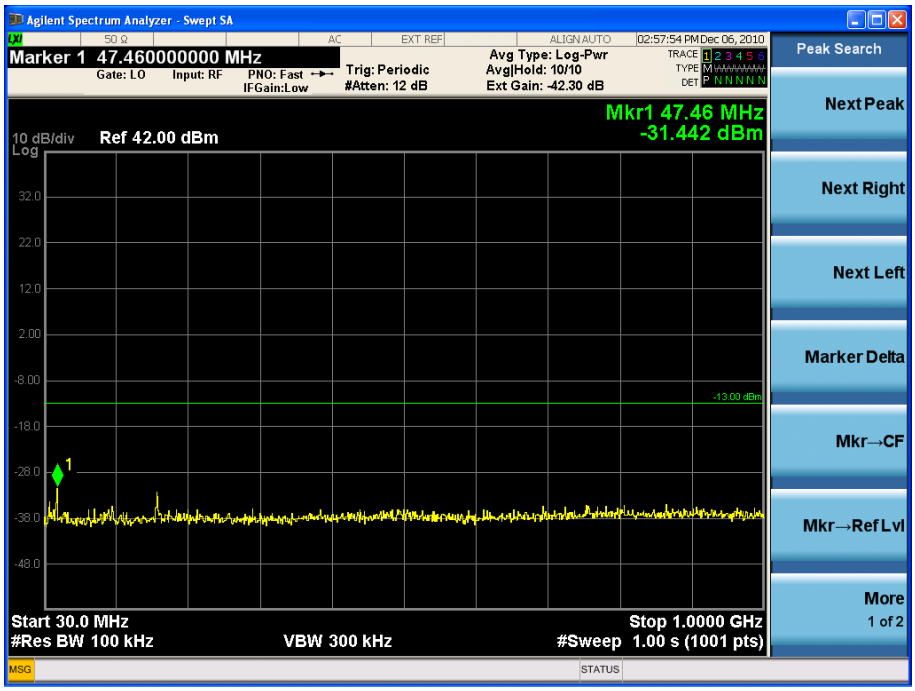
(30 MHz ~ 1 GHz)

(16QAM Middle Channel)



(30 MHz ~ 1 GHz)

(16QAM High Channel)



(30 MHz ~ 1 GHz)

(16QAM LOW Channel)

(1 GHz ~ 26.5 GHz)

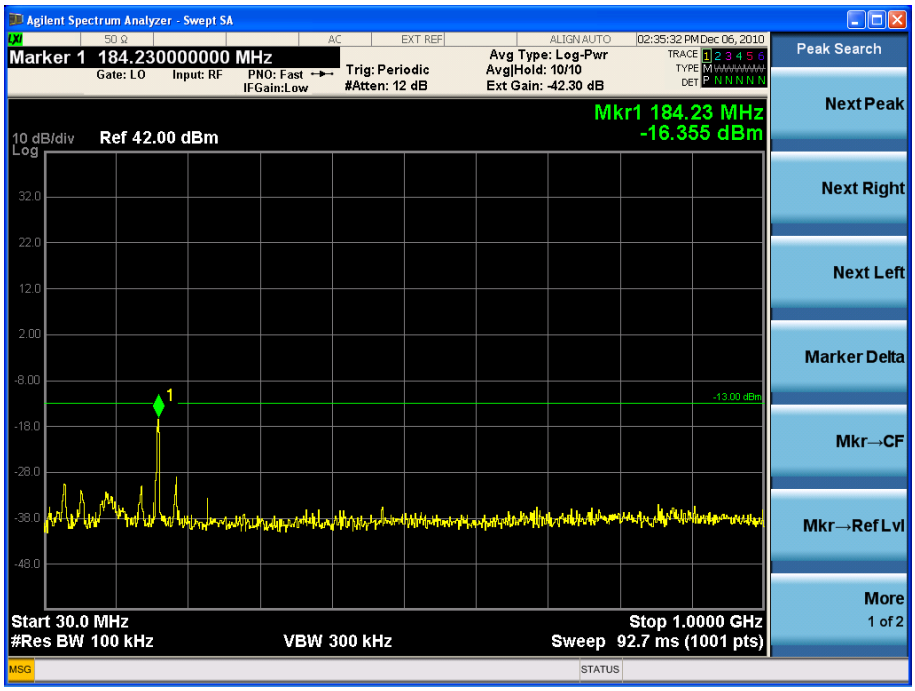
(16QAM Middle Channel)

(1 GHz ~ 26.5 GHz)

(16QAM High Channel)

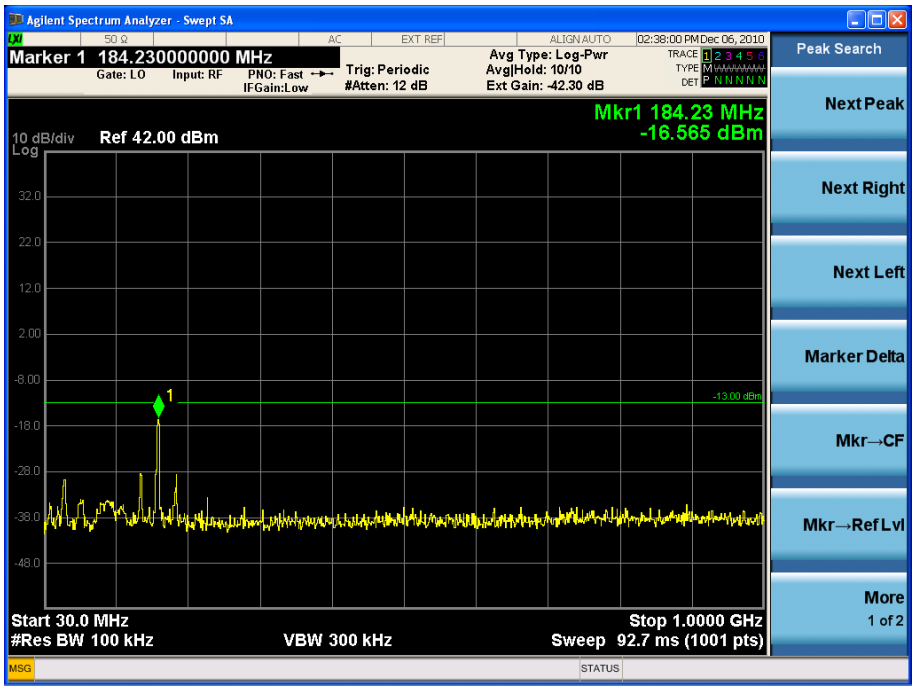
(1 GHz ~ 26.5 GHz)

(64QAM Low Channel)



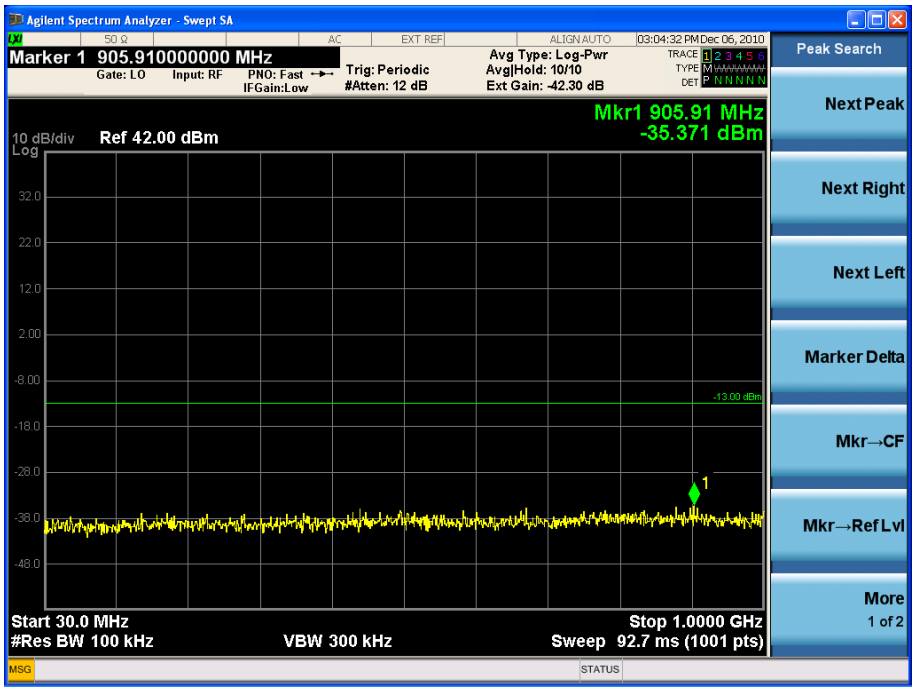
(30 MHz ~ 1 GHz)

(64QAM Middle Channel)



(30 MHz ~ 1 GHz)

(64QAM High Channel)



(30 MHz ~ 1 GHz)

(64QAM Low Channel)

(1 GHz ~ 26.5 GHz)

(64QAM Middle Channel)

(1 GHz ~ 26.5 GHz)

(64QAM High Channel)

(1 GHz ~ 26.5 GHz)

9. RADIATED SPURIOUS EMISSION

9.1 Applicable Standard

(l) For BRS and EBS stations, the power of any emissions outside the licensee's frequency bands of operation shall be attenuated below the transmitter power (P) measured in watts. (2) For fixed and temporary fixed digital stations, the attenuation shall be not less than 43 + 10 log (P) dB, unless a documented interference complaint is received from an adjacent channel licensee. Provided that the complaint cannot be mutually resolved between the parties, both licensees of existing and new systems shall reduce their out-of-band emissions by at least 67 + 10 log (P) dB measured at 3 MHz from their channel's edges for distances between stations exceeding 1.5 km.

9.2 Test Equipment List and Details

Manufacturer	Model / Equipment	Serial No.	Calibration Due
Schwarzbeck	BBHA 9120D /Double Ridged Horn Antenna	296	09/23/2011
Schwarzbeck	BBHA 9120D /Double Ridged Horn Antenna	147	04/13/2011
Schwarzbeck	VULB 9168/ TRILOG Antenna	9168-200	01/06/2011
HD	MA240/ Antenna Position Tower	556	N/A
EMCO	1050/ Turn Table	114	N/A
HD GmbH	HD 100/ Controller	13	N/A
HD GmbH	KMS 560/ SlideBar	12	N/A
MITEQ	AFS44-00102650-42-10P44-PS	1532439	04/05/2011
EMCO	6502/Loop Antenna	9009-2536	01/13/2012
R&S	ESI40 / EMI TEST Receiver	831564/003	10/30/2011

9.3 Test Procedure

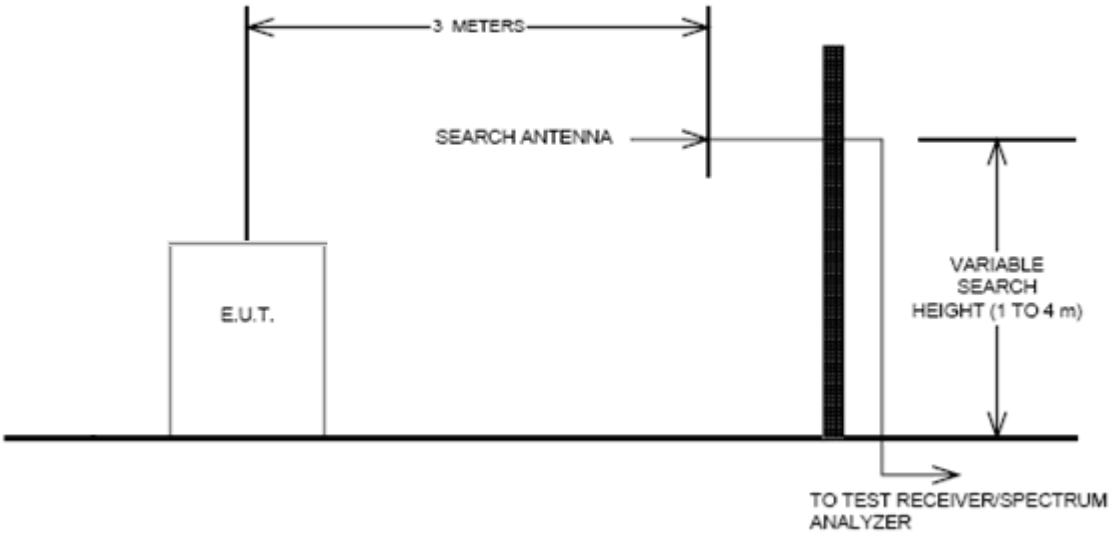
Radiated emission measurements were performed at an semi-anechoic chamber.

The EUT was set at a distance of 3m from the receiving antenna. The EUT's RF ports were terminated to 50ohm load. The EUT was set to transmit at the low, mid and high channels of the transmitter frequency range at its maximum power level. The EUT was rotated about 360° and the receiving antenna scanned from 1-4m in order to capture the maximum emission.

A calibrated antenna source was positioned in place of the EUT and the previously recorded signal was duplicated.

The maximum EIRP of the emission was calculated by adding the forward power to the calibrated source plus its appropriate gain value. These steps were carried out with the receiving antenna in both vertical and horizontal polarization. Harmonic emissions up to the 10th or 40GHz, whichever was the lesser, were investigated.

9.3.1 Radiated Spurious Emissions Test Setup



9.3.2 Environmental Conditions:

Temperature:	26 °C
Relative Humidity:	25 %

9.4 Test Result

: PASS (There were no emissions detected above the noise floor which was at least 20 dB below the limit.)

Frequency	Freq.(MHz)	Substitute Level [dBm]	Ant. Gain (dBd)	C.L	Pol.	ERP (dBm)	Margin (dB)
2626.0	5252.0	-50.4	10.39	4.42	H	-44.43	-31.43
	7878.0	-47.7	9.27	6.76	H	-45.19	-32.19

10. FREQUECNY STABILITY

10.1 Applicable Standard

Requirements: FCC § 2.1055 (a), Part27.54 following: The frequency stability shall be sufficient to ensure that the fundamental emissions stay

10.2 Test Equipment List and Details

Manufacturer	Model / Equipment	Serial No.	Calibration Due
DaeYoung	DFSS60 / AC Power Supply	1003030-1	07/26/2011
WEINSCHEL	67-30-33 / Attenuator	BR0530	01/14/2011
Agilent	N9020A / MXA Signal Analyzer	US46220219	03/03/2011

10.3 Test Procedure

Frequency Stability over Temperature variation:
The equipment under test was connected to an external DC power supply and the RF output was connected to a Spectrum Analyzer via feed-through attenuators. The EUT was placed inside the temperature chamber. RF output cable exited the chamber through an opening made for the purpose.
After the temperature stabilized for approximately 30 minutes, the frequency output was recorded from the VSA8960 S/W via MXA Signal Analyzer.
Frequency stability over Voltage variation: An external variable DC power supply Source.
The voltage was set to 85% and 115% of the nominal value. The output frequency was recorded for each voltage.

10.3.1. Environmental conditions

Temperature:	24 ° C
Relative Humidity:	18 %

10.4. Test Result

: Pass

10.4.1. Frequency Stability over Temperature and Voltage variation

Modulation: QPSK

Reference: 110 VAC at 20°C **Freq.** = 2626,000,000 MHz

Voltage (%)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (Hz)	ppm
100%	+20(Ref)	2626 000 004	4	0	0.0000
	-30	2625 999 995	-5	-9	-0.0034
	-20	2625 999 998	-2	-6	-0.0023
	-10	2625 999 994	-6	-10	-0.0038
	0	2626 000 004	4	0	0.0000
	+10	2626 000 006	6	2	0.0008
	+30	2626 000 009	9	5	0.0019
	+40	2626 000 012	12	8	0.0030
	+50	2626 000 008	8	4	0.0015
115%	+20	2626 000 005	5	1	0.0004
85%	+20	2626 000 002	2	-2	-0.0008

(Output Port 0 Middle CH)

Modulation: 16QAM

Reference: 110 VAC at 20°C **Freq.** = 2626,000,000 MHz

Voltage (%)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (Hz)	ppm
100%	+20(Ref)	2626 000 008	8	0	0.0000
	-30	2626 000 005	5	-3	-0.0011
	-20	2626 000 002	2	-6	-0.0023
	-10	2626 000 006	6	-2	-0.0008
	0	2626 000 008	8	0	0.0000
	+10	2626 000 001	1	-7	-0.0027
	+30	2626 000 005	5	-3	-0.0011
	+40	2626 000 003	3	-5	-0.0019
	+50	2626 000 002	2	-6	-0.0023
115%	+20	2626 000 009	9	1	0.0004
85%	+20	2626 000 002	2	-6	-0.0023

(Output Port 0 Middle CH)

Modulation: 64QAM

Reference: 110 VAC at 20°c **Freq.** = 2626,000,000 MHz

Voltage (%)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (Hz)	ppm
100%	+20(Ref)	2626 000 011	11	0	0.0000
	-30	2626 000 005	5	-6	-0.0023
	-20	2626 000 002	2	-9	-0.0034
	-10	2626 000 007	7	-4	-0.0015
	0	2625 999 994	-6	-17	-0.0065
	+10	2626 000 022	22	11	0.0042
	+30	2625 999 988	-12	-23	-0.0088
	+40	2626 000 015	15	4	0.0015
	+50	2626 000 011	11	0	0.0000
115%	+20	2625 999 997	-3	-14	-0.0053
85%	+20	2626 000 002	2	-9	-0.0034

(Output Port 0 Middle CH)

11. RF EXPOSURE STATEMENT

1. LIMITS

According to §1.1310 and §2.1091 RF exposure is calculated.

(B) Limits for General Population/Uncontrolled Exposures

Frequency range (MHz)	Electric field Strength (V/m)	Magnetic field Strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
0.3 - 1.34.....	614	1.63	*(100)	30
1.34 - 30.....	824/f	2.19/f	*(180/ f^2)	30
30 - 300.....	27.5	0.073	0.2	30
300 - 1500.....	.....	.....	f/1500	30
1500 - 100.000.....	.....	.....	1.0	30

F = frequency in MHz

* = Plane-wave equivalent power density

2. MAXIMUM PERMISSIBLE EXPOSURE Prediction

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$S = PG/4\pi R^2$

S = Power density

P = power input to antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna

Max Peak output Power at antenna input terminal	40.36	dBm
Max Peak output Power at antenna input terminal	10864.25624	mW
Prediction distance	300.000	cm
Prediction frequency	2608.00	MHz
Antenna Gain(typical)	17.0	dBi
Antenna Gain(numeric)	50.11872	-
Power density at prediction frequency (S)	0.48145	mW/cm^2
MPE limit for uncontrolled exposure at prediction frequency	1.00000	mW/cm^2

3. RESULTS

The power density level at 300 cm is 0.48145 mW/cm², which is below the uncontrolled exposure limit of 1.0 mW/cm² at 2608 MHz.