



**FCC CFR47 PART 15 SUBPART C  
INDUSTRY CANADA RSS-210 ISSUE 7  
CERTIFICATION TEST REPORT**

**FOR  
802.11ag/Draft 802.11n WLAN PCI-E Mini Card**

**MODEL NUMBER: BCM94322MC  
FCC ID: QDS-BRCM1036  
IC: 4324A-BRCM1036**

**REPORT NUMBER: 07U11529-1**

**ISSUE DATE: JANUARY 25, 2008**

*Prepared for*  
**BROADCOM CORPORATION  
190 MATHILDA PLACE  
SUNNYVALE, CA 94086, USA**

*Prepared by*  
**COMPLIANCE CERTIFICATION SERVICES  
47173 BENICIA STREET  
FREMONT, CA 94538, U.S.A.  
TEL: (510) 771-1000  
FAX: (510) 661-0888**



**NVLAP LAB CODE 200065-0**

Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
--	1-25-08	Initial Issue	Hsin Fu Shih

**TABLE OF CONTENTS**

**1. ATTESTATION OF TEST RESULTS..... 6**

**2. TEST METHODOLOGY ..... 7**

**3. FACILITIES AND ACCREDITATION..... 7**

**4. CALIBRATION AND UNCERTAINTY ..... 7**

    4.1. MEASURING INSTRUMENT CALIBRATION..... 7

    4.2. MEASUREMENT UNCERTAINTY..... 7

**5. EQUIPMENT UNDER TEST ..... 8**

    5.1. DESCRIPTION OF EUT..... 8

    5.2. MAXIMUM OUTPUT POWER..... 8

    5.3. DESCRIPTION OF AVAILABLE ANTENNAS..... 9

    5.4. SOFTWARE AND FIRMWARE..... 9

    5.5. WORST-CASE CONFIGURATION AND MODE ..... 9

    5.6. DESCRIPTION OF TEST SETUP..... 10

**6. TEST AND MEASUREMENT EQUIPMENT ..... 12**

**7. ANTENNA PORT TEST RESULTS ..... 13**

    7.1. 802.11b MODE..... 13

        7.1.1. 6 dB BANDWIDTH ..... 13

        7.1.2. 99% BANDWIDTH ..... 16

        7.1.3. OUTPUT POWER ..... 19

        7.1.4. POWER SPECTRAL DENSITY ..... 21

        7.1.5. CONDUCTED SPURIOUS EMISSIONS..... 23

    7.2. 802.11g MODE..... 27

        7.2.1. 6 dB BANDWIDTH ..... 27

        7.2.2. 99% BANDWIDTH ..... 29

        7.2.3. OUTPUT POWER ..... 31

        7.2.4. POWER SPECTRAL DENSITY ..... 33

        7.2.5. CONDUCTED SPURIOUS EMISSIONS..... 35

    7.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND..... 39

        7.3.1. 6 dB BANDWIDTH ..... 39

        7.3.2. 99% BANDWIDTH ..... 43

        7.3.3. OUTPUT POWER ..... 47

        7.3.4. POWER SPECTRAL DENSITY ..... 51

7.3.5.	CONDUCTED SPURIOUS EMISSIONS.....	53
7.4.	802.11n HT40 MODE IN THE 2.4 GHz BAND.....	57
7.4.1.	6 dB BANDWIDTH .....	57
7.4.2.	99% BANDWIDTH .....	61
7.4.3.	OUTPUT POWER .....	65
7.4.4.	POWER SPECTRAL DENSITY .....	69
7.4.5.	CONDUCTED SPURIOUS EMISSIONS.....	71
7.5.	802.11a MODE.....	75
7.5.1.	6 dB BANDWIDTH .....	75
7.5.2.	99% BANDWIDTH .....	77
7.5.3.	OUTPUT POWER .....	79
7.5.4.	POWER SPECTRAL DENSITY .....	81
7.5.5.	CONDUCTED SPURIOUS EMISSIONS.....	83
7.6.	802.11n HT20 MODE IN THE 5.8 GHz BAND.....	87
7.6.1.	6 dB BANDWIDTH .....	87
7.6.2.	99% BANDWIDTH .....	91
7.6.3.	OUTPUT POWER .....	95
7.6.4.	POWER SPECTRAL DENSITY .....	99
7.6.5.	CONDUCTED SPURIOUS EMISSIONS.....	101
7.7.	802.11n HT40 MODE IN THE 5.8 GHz BAND.....	105
7.7.1.	6 dB BANDWIDTH .....	105
7.7.2.	99% BANDWIDTH .....	108
7.7.3.	OUTPUT POWER .....	111
7.7.4.	POWER SPECTRAL DENSITY .....	114
7.7.5.	CONDUCTED SPURIOUS EMISSIONS.....	116
<b>8.</b>	<b>RADIATED TEST RESULTS .....</b>	<b>119</b>
8.1.	LIMITS AND PROCEDURE .....	119
8.2.	TRANSMITTER ABOVE 1 GHz .....	120
8.2.1.	802.11b MODE.....	120
8.2.2.	802.11g MODE.....	129
8.2.3.	802.11n HT20 MODE IN THE 2.4 GHz BAND .....	138
8.2.4.	802.11n HT40 MODE IN THE 2.4 GHz BAND .....	152
8.2.5.	802.11a MODE.....	161
8.2.6.	802.11n HT20 MODE IN THE 5.8 GHz BAND .....	162
8.2.7.	802.11n HT40 MODE IN THE 5.8 GHz BAND .....	163

---

8.3. RECEIVER ABOVE 1 GHz ..... 164

8.3.1. 20 MHz BANDWIDTH IN THE 2.4 GHz BAND ..... 164

8.3.2. 40 MHz BANDWIDTH IN THE 2.4 GHz BAND ..... 165

8.3.3. 20 MHz BANDWIDTH IN THE 5 GHz BAND ..... 166

8.3.4. 40 MHz BANDWIDTH IN THE 5 GHz BAND ..... 167

8.4. WORST-CASE BELOW 1 GHz..... 168

9. AC POWER LINE CONDUCTED EMISSIONS ..... 172

10. MAXIMUM PERMISSIBLE EXPOSURE ..... 175

11. SETUP PHOTOS ..... 179

**1. ATTESTATION OF TEST RESULTS**

**COMPANY NAME:** BROADCOM CORPORATION  
190 MATHILDA PLACE  
SUNNYVALE, CA 94086, USA

**EUT DESCRIPTION:** 802.11ag / Draft 802n WLAN PCI-E MINI CARD

**MODEL:** BCM94322MC

**SERIAL NUMBER:** P208 \_S/N 194 for 2.4 GHz  
P304 \_S/N 354 for 5.8 GHz BAND

**DATE TESTED:** DECEMBER 09 to JANUARY 23, 2008

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C and Subpart E	No Non-Compliance Noted
RSS-210 Issue 7 Annex 8 and RSS-GEN Issue 2	No Non-Compliance Noted

Compliance Certification Services, Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

**Note:** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by Compliance Certification Services and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification Services will constitute fraud and shall nullify the document. No part of this report may be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any government agency.

Approved & Released For CCS By:

Tested By:



HSIN FU SHIH  
EMC SUPERVISOR  
COMPLIANCE CERTIFICATION SERVICES

VIEN TRAN  
EMC ENGINEER  
COMPLIANCE CERTIFICATION SERVICES

## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2003, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 2, and RSS-210 Issue 7.

## 3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <http://www.ccsemc.com>.

## 4. CALIBRATION AND UNCERTAINTY

### 4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

### 4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Radiated Emission, 30 to 200 MHz	+/- 3.3 dB
Radiated Emission, 200 to 1000 MHz	+4.5 / -2.9 dB
Radiated Emission, 1000 to 2000 MHz	+4.5 / -2.9 dB
Power Line Conducted Emission	+/- 2.9 dB

Uncertainty figures are valid to a confidence level of 95%.

**5. EQUIPMENT UNDER TEST**

**5.1. DESCRIPTION OF EUT**

The EUT is an 802.11ag/Draft 802.11n Wireless LAN Transceiver module and manufactured by Broadcom. Model number is BCM94322MC.

**5.2. MAXIMUM OUTPUT POWER**

The transmitter has a maximum peak conducted output power as follows:

2400 to 2483.5 MHz Authorized Band

Frequency Range (MHz)	Mode	Peak Power Chain 0 (dBm)	Peak Power Chain 1 (dBm)	Total Peak Power (dBm)	Output Power (mW)
2412 - 2462	802.11b Legacy	N/A	N/A	24.85	305.49
2412 - 2462	802.11g Legacy	N/A	N/A	26.45	441.57
2412 - 2462	802.11n 20MHz SISO	covered by the worst case 802.11g Mode Legacy testing			
2412 - 2462	802.11g CDD	covered by the worst case 802.11n 20MHz CDD			
2412 - 2462	802.11n 20MHz CDD	26.03	25.99	29.02	798.06
2422 - 2452	802.11n 40MHz CDD	20.15	20.71	23.45	221.27

5725 to 5850 MHz Authorized Band

Frequency Range (MHz)	Mode	Peak Power Chain 0 (dBm)	Peak Power Chain 1 (dBm)	Total Peak Power (dBm)	Output Power (mW)
5745 - 5825	802.11a Legacy	N/A	N/A	24.25	266.07
5745 - 5825	802.11n 20MHz SISO	covered by the worst case 802.11a Mode Legacy testing			
5745 - 5825	802.11a Mode CDD	covered by the worst case 802.11n 20MHz CDD			
5745 - 5825	802.11n 20MHz CDD	24.15	24.17	27.17	521.23
5755 - 5795	802.11n 40MHz CDD	24.06	24.25	27.17	520.76



**5.3. DESCRIPTION OF AVAILABLE ANTENNAS**

The radio utilizes a stamped metal antenna (Hitachi, HMT05/HFT17-DL07), with a maximum gains as table below:

Band	Ant Main	Ant Aux	10 <sup>^</sup> (Ant Main /10)	10 <sup>^</sup> (Ant Aux/10)	10 <sup>^</sup> (ant main/10)+10 <sup>^</sup> (ant aux/10)	10*log[10 <sup>^</sup> (ant main/10)+10 <sup>^</sup> (ant aux/10)] (dBm)
2.4-2.4835GHz	3.90	3.90	2.455	2.455	4.909	6.910
5.725-5.825GHz	5.80	5.80	3.802	3.802	7.604	8.810

**5.4. SOFTWARE AND FIRMWARE**

The EUT driver software installed during testing was BCMWL5, rev. 4.170.63.0.

The test utility software used during testing was wl\_tool, rev. 4.170 RC63

**5.5. WORST-CASE CONFIGURATION AND MODE**

The worst-case data rate for each mode is determined to be as follows, based on preliminary tests of the chipset utilized in this radio.

All final tests in the 802.11b mode were made at 1 Mb/s.

All final tests in the 802.11g mode were made at 6 Mb/s.

All final tests in the 802.11n HT20 mode were made at MCS0.

All final tests in the 802.11n HT40 mode were made at MCS0.

All final tests in the 802.11a mode were made at 6 Mb/s.

All final tests in the 802.11n HT20 mode were made at MCS0.

All final tests in the 802.11n HT40 mode were made at MCS0.

For radiated emissions below 1 GHz the worst-case configuration is determined to be the mode and channel with the highest output power.

**5.6. DESCRIPTION OF TEST SETUP**

**SUPPORT EQUIPMENT**

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	Dell	Inspiron 1526	CN-0SE2C2-70166-77L-0011	DoC
AC Adapter	Dell	HP-0Q065B83	CN-0N2765-7890-421-0063	DoC

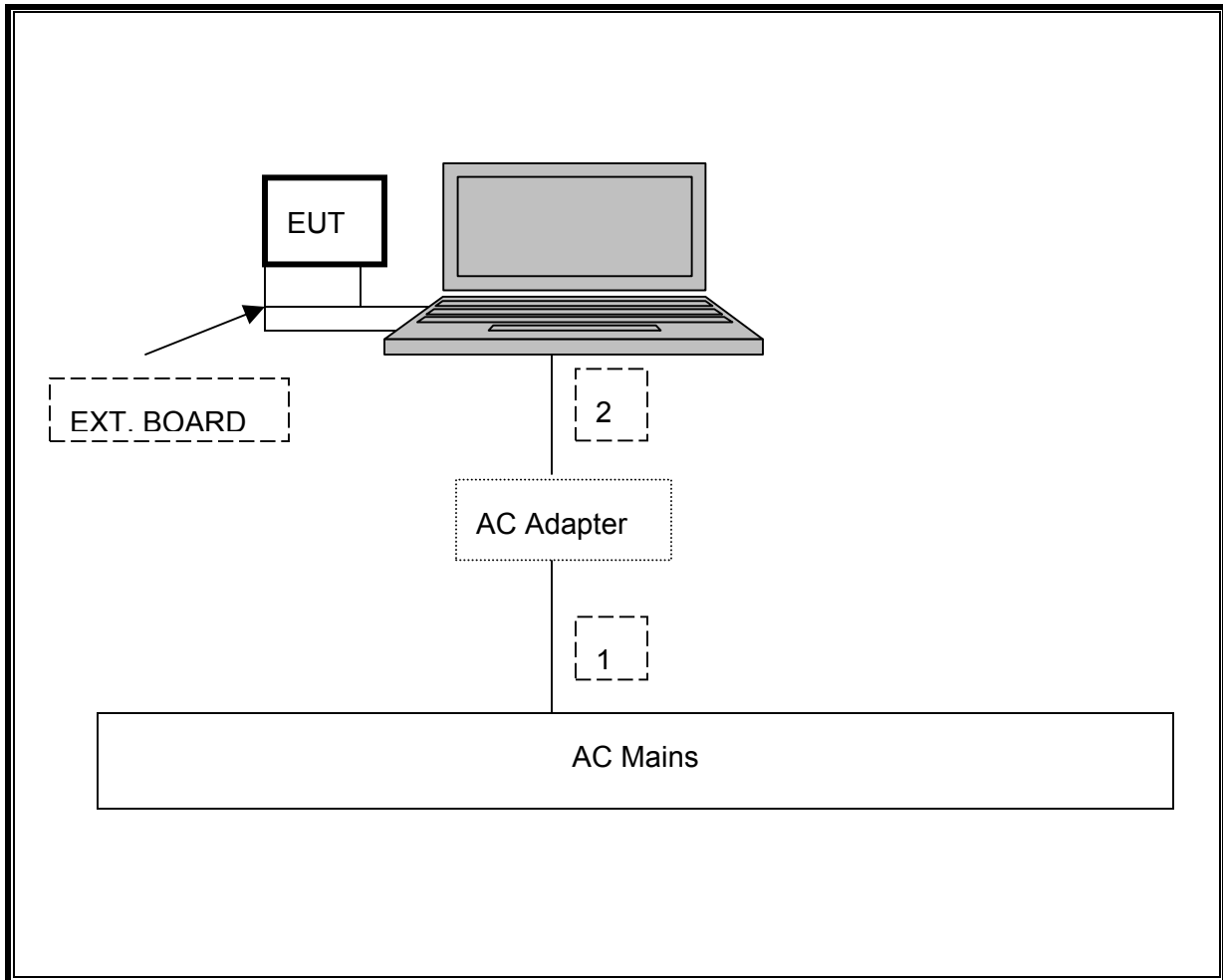
**I/O CABLES**

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	1	AC	Unshielded	1.2 m	N/A
2	DC	1	DC	Unshielded	1.2 m	N/A

**TEST SETUP**

The EUT is installed in a host laptop computer via Express card to MiniPCI-E adapter boards during the tests. Test software exercised the radio card.

**SETUP DIAGRAM FOR TESTS**



**6. TEST AND MEASUREMENT EQUIPMENT**

The following test and measurement equipment was utilized for the tests documented in this report:

TEST EQUIPMENT LIST					
Description	Manufacturer	Model	Asset	Cal Date	Cal Due
EMI Receiver, 2.9 GHz	Agilent / HP	8542E	C00957	2/6/2007	6/12/2008
RF Filter Section, 2.9 GHz	Agilent / HP	85420E	C00958	2/6/2007	6/12/2008
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00885	5/9/2007	5/9/2008
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	10/25/2007	10/25/2008
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-BNC	N02481	10/25/2007	10/25/2008
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	10/16/2006	1/27/2008
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01012	5/2/2006	8/7/2008
Antenna, Horn, 18 GHz	ETS	3117	C01006	4/15/2007	4/15/08
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01052	8/3/2007	8/3/08
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01011	10/13/2007	10/13/08
Peak Power Meter	Agilent / HP	E4416A	C00963	02/14/07	12/02/08
Peak / Average Power Sensor	Agilent	E9327A	C00964	02/14/07	12/02/08
Antenna, Horn 26 ~ 40 GHz	ARA	MWH-2640/B	C01009	4/13/2008	4/13/2008
4.0 GHz High Pass Filter	Micro Tronics	HPM13351	N/A	N/A	N/A
2.4 - 2.5 Reject Filter	Micro Tronics	BRM50702	N/A	N/A	N/A
7.6 GHz High Pass Filter	Micro Tronics	HPM13350	N/A	N/A	N/A
5.75 - 5.8 Reject Filter	Micro Tronics	BRC13192	N/A	N/A	N/A

## 7. ANTENNA PORT TEST RESULTS

### 7.1. 802.11b MODE

#### 7.1.1. 6 dB BANDWIDTH

#### LIMITS

FCC §15.247 (a) (2) & IC RSS-210 A8.2 (a)

The minimum 6 dB bandwidth shall be at least 500 kHz.

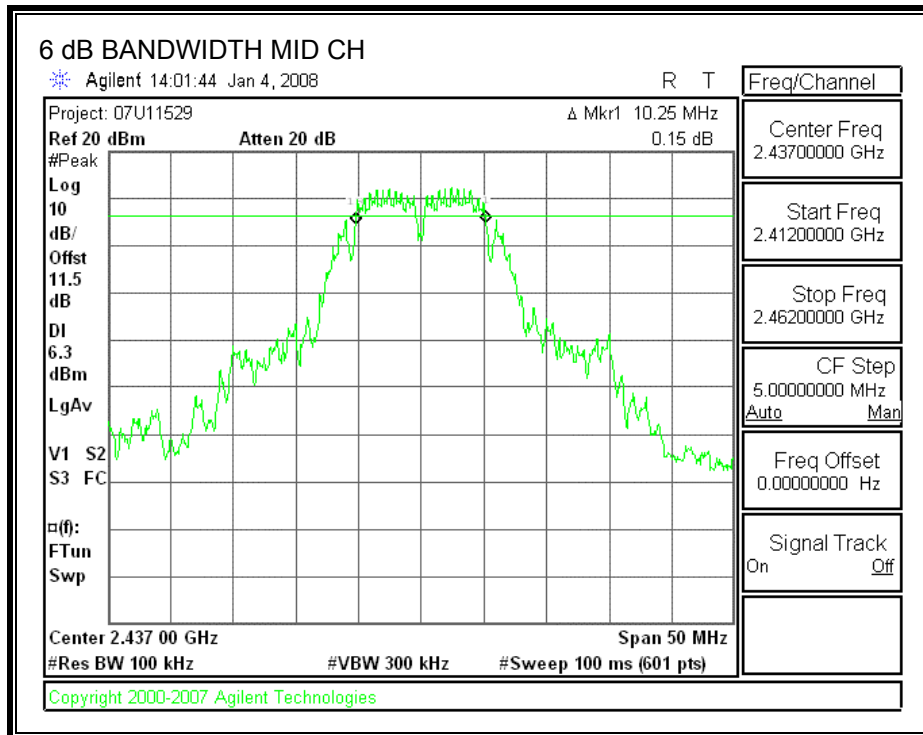
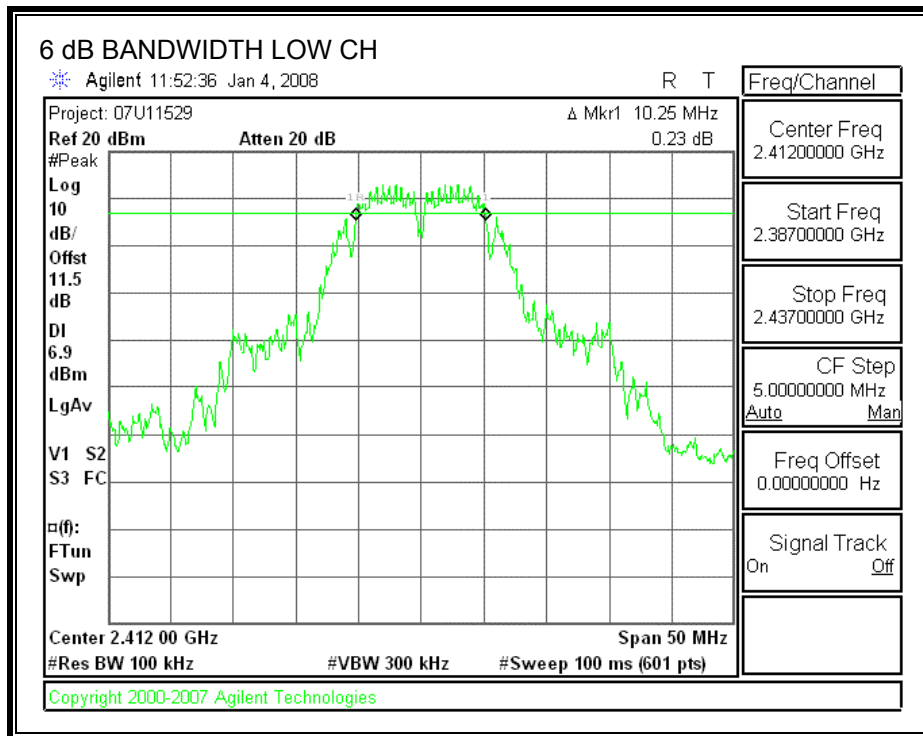
#### TEST PROCEDURE

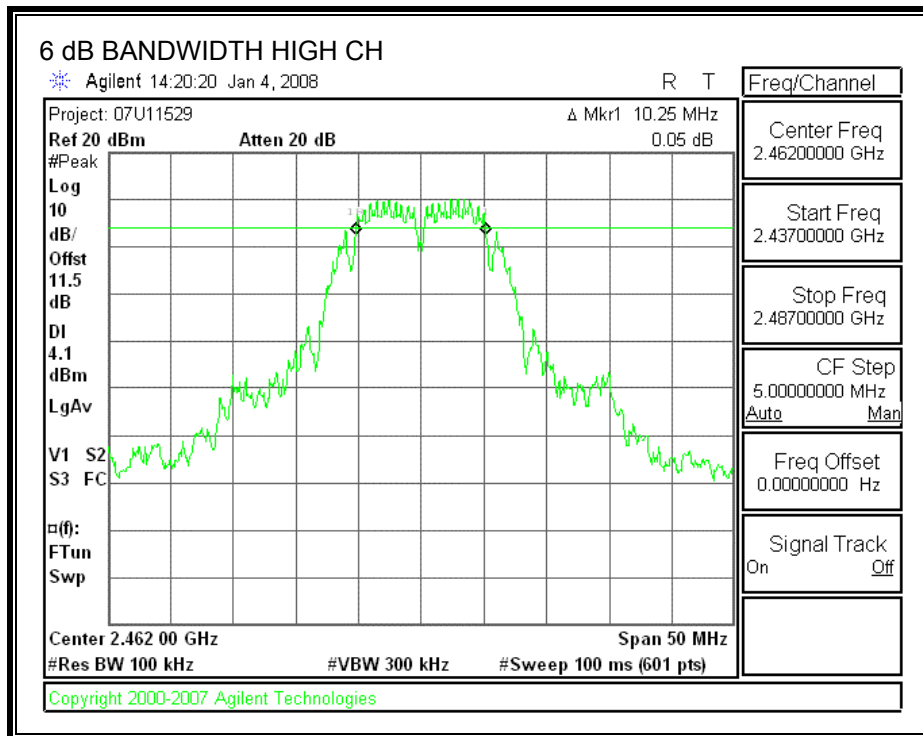
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

#### RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	10.25	0.5
Middle	2437	10.25	0.5
High	2462	10.25	0.5

**6 dB BANDWIDTH**





### 7.1.2. 99% BANDWIDTH

#### LIMITS

None; for reporting purposes only.

#### TEST PROCEDURE

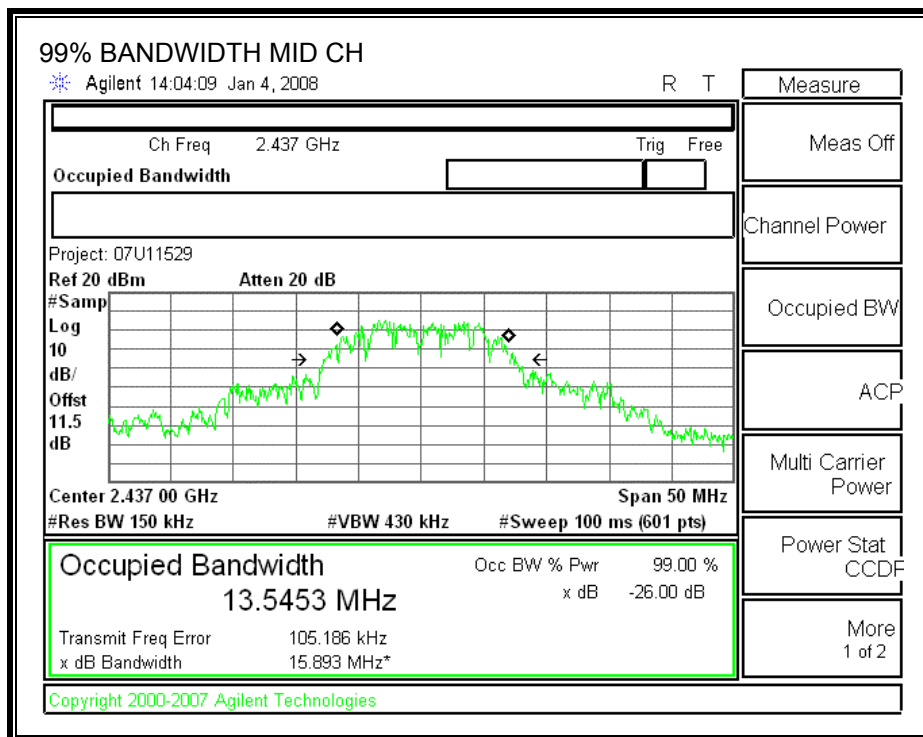
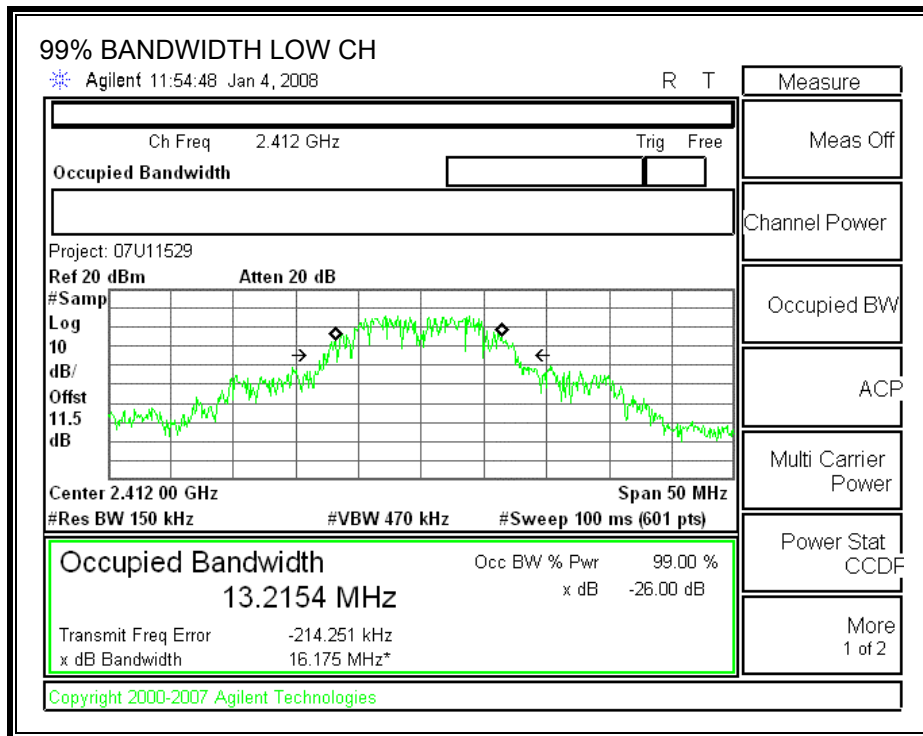
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

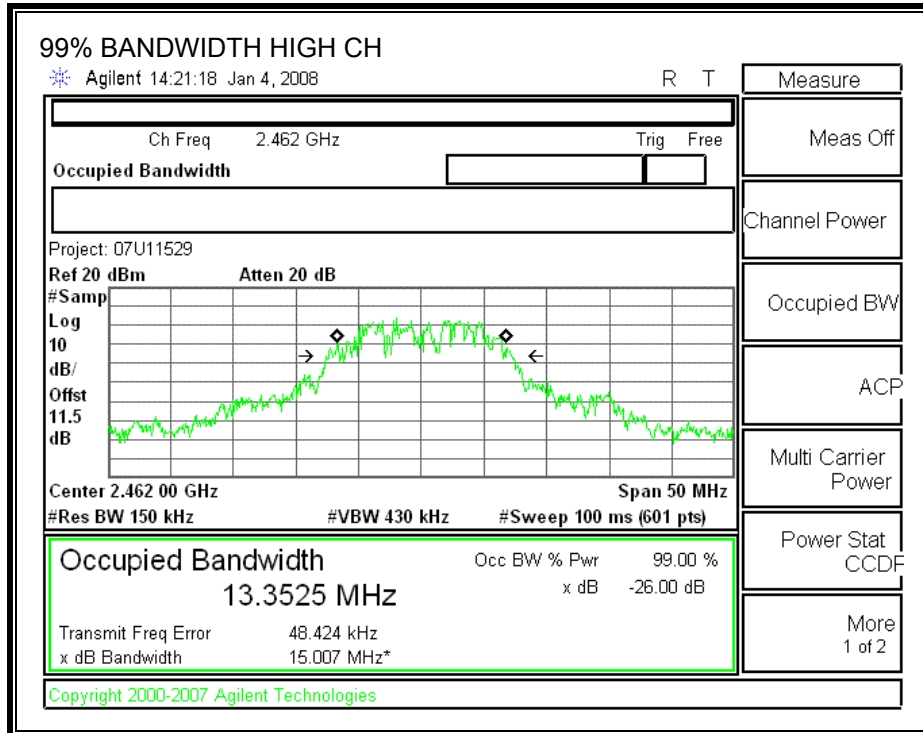
#### RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	13.2154
Middle	2437	13.5453
High	2462	13.3525



**99% BANDWIDTH**





**7.1.3. OUTPUT POWER**

**LIMITS**

FCC §15.247 (b) & IC RSS-210 A8.4

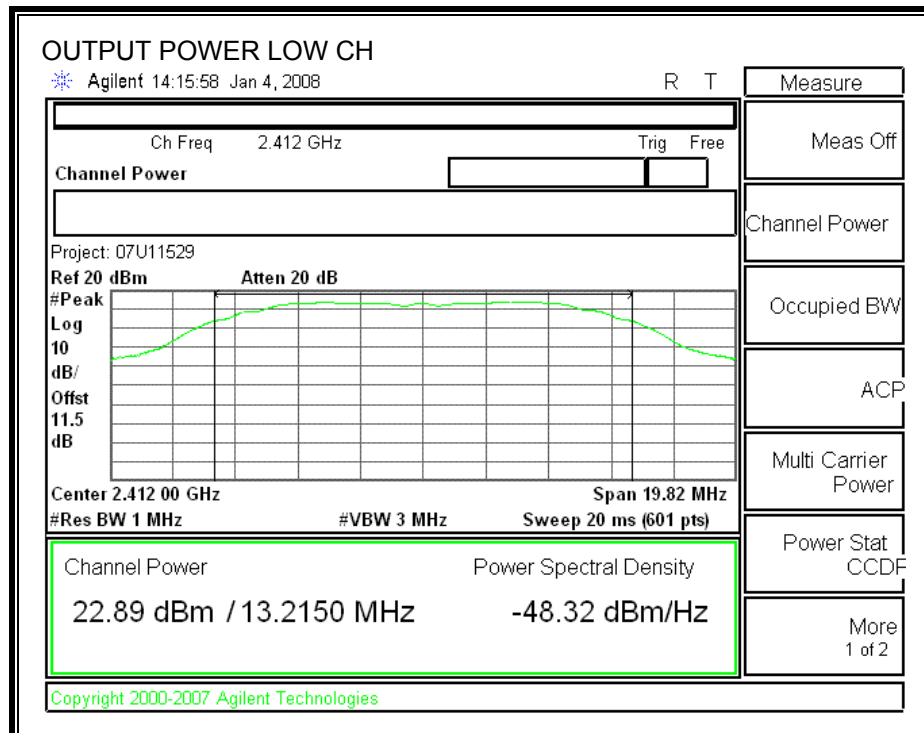
The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 30 dBm.

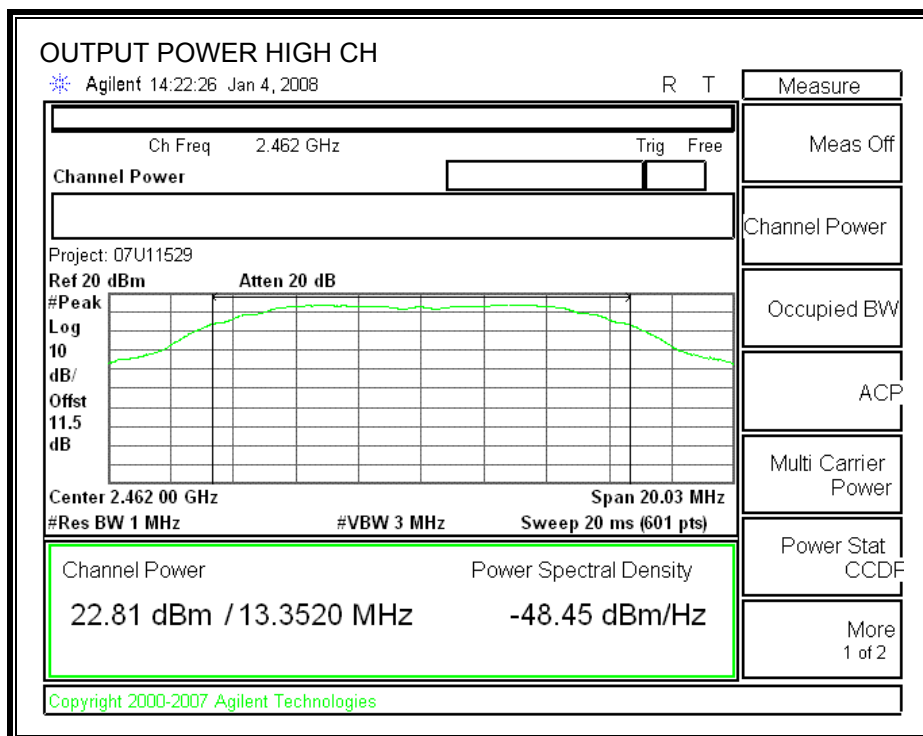
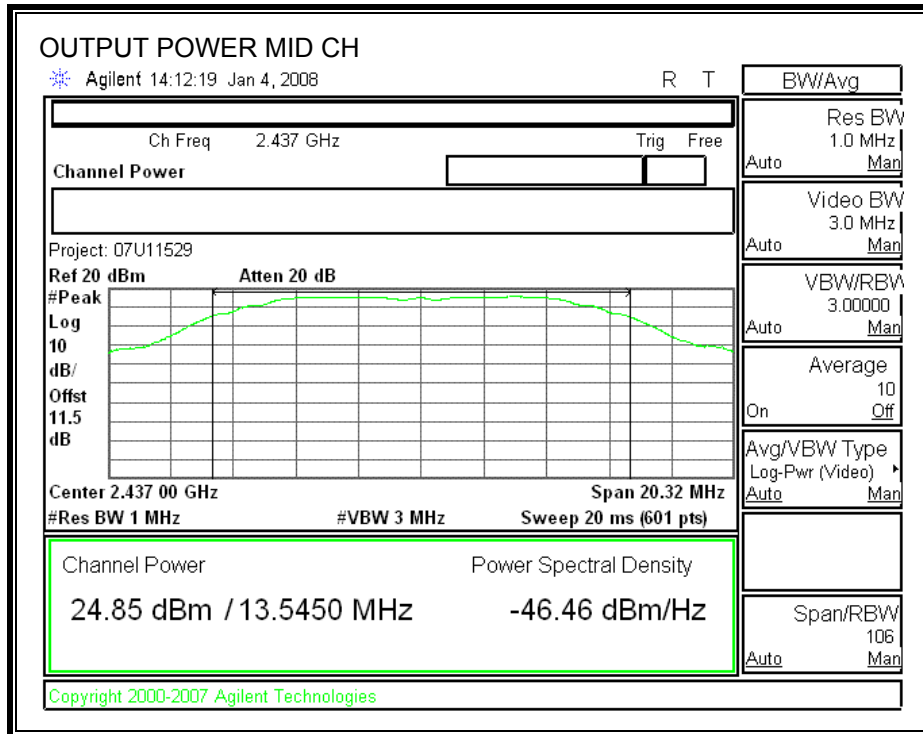
**TEST PROCEDURE**

Peak power is measured using the spectrum analyzer's internal channel power integration function. Power is integrated over a bandwidth greater than or equal to the 99% bandwidth.

**RESULTS**

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	22.89	30	-7.11
Middle	2437	24.85	30	-5.15
High	2462	22.81	30	-7.19





**7.1.4. POWER SPECTRAL DENSITY**

**LIMITS**

FCC §15.247 (e) & IC RSS-210 A8.2 (b)

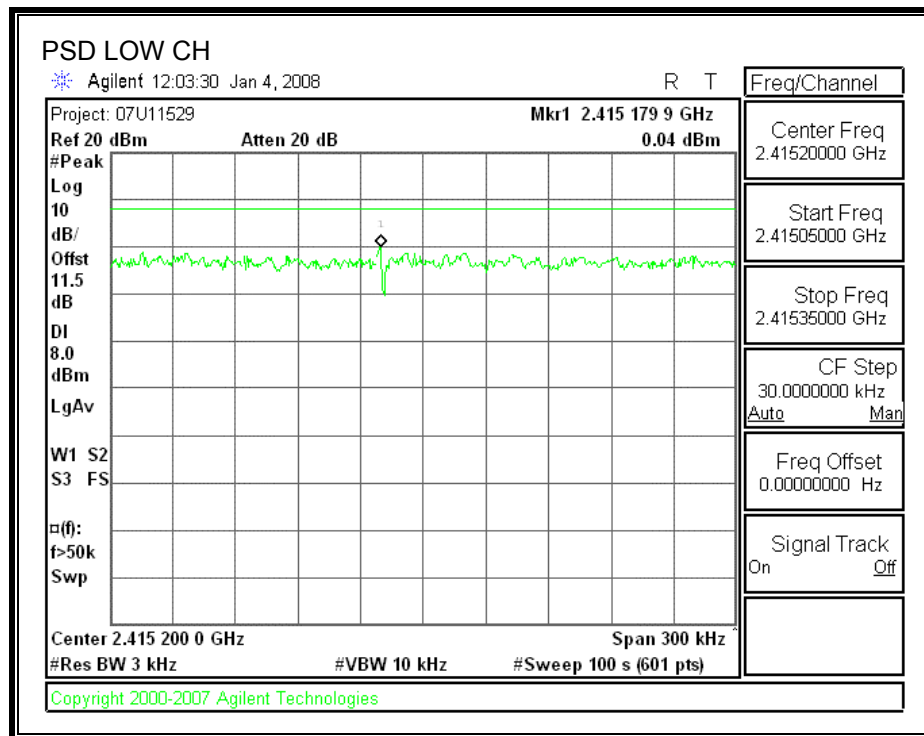
The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

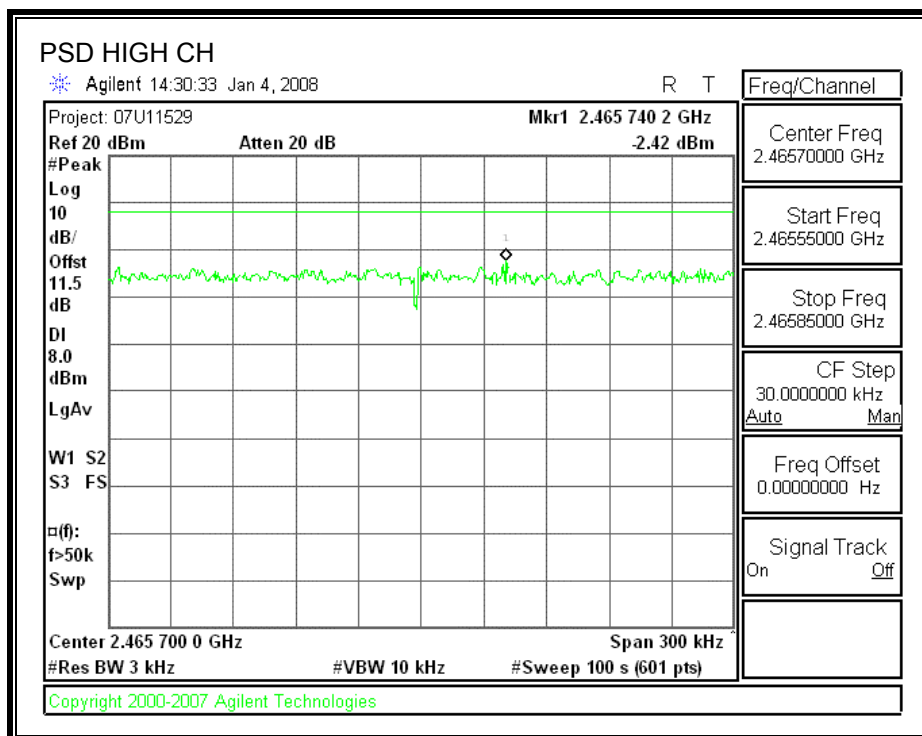
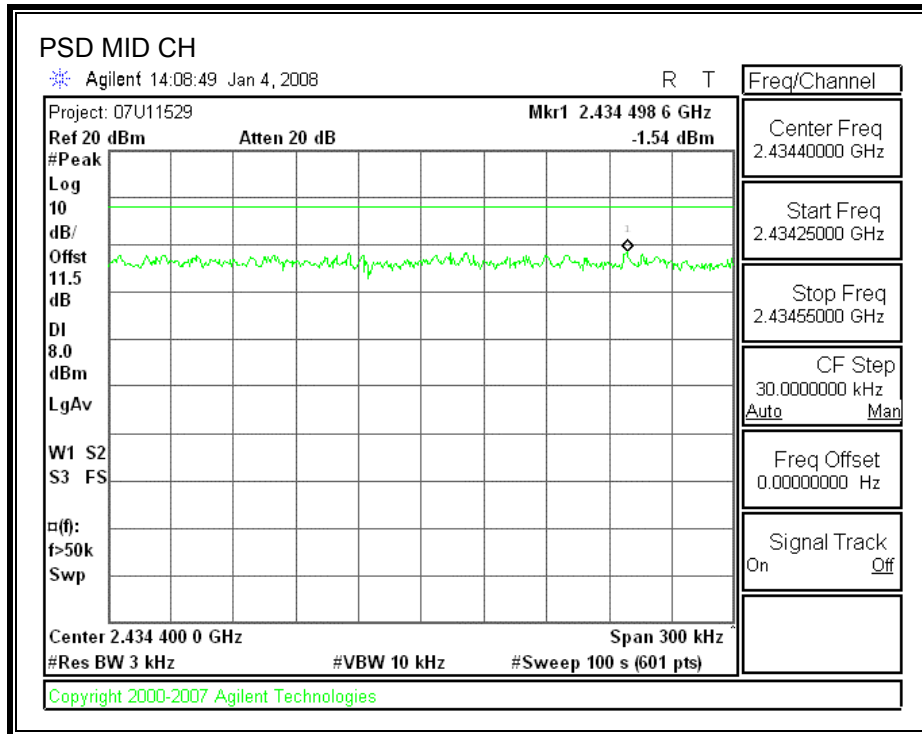
**TEST PROCEDURE**

Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

**RESULTS**

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	0.04	8	-7.96
Middle	2437	-1.54	8	-9.54
High	2462	-2.42	8	-10.42





### **7.1.5. CONDUCTED SPURIOUS EMISSIONS**

#### **LIMITS**

FCC §15.247 (d)

IC RSS-210 A8.5

Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

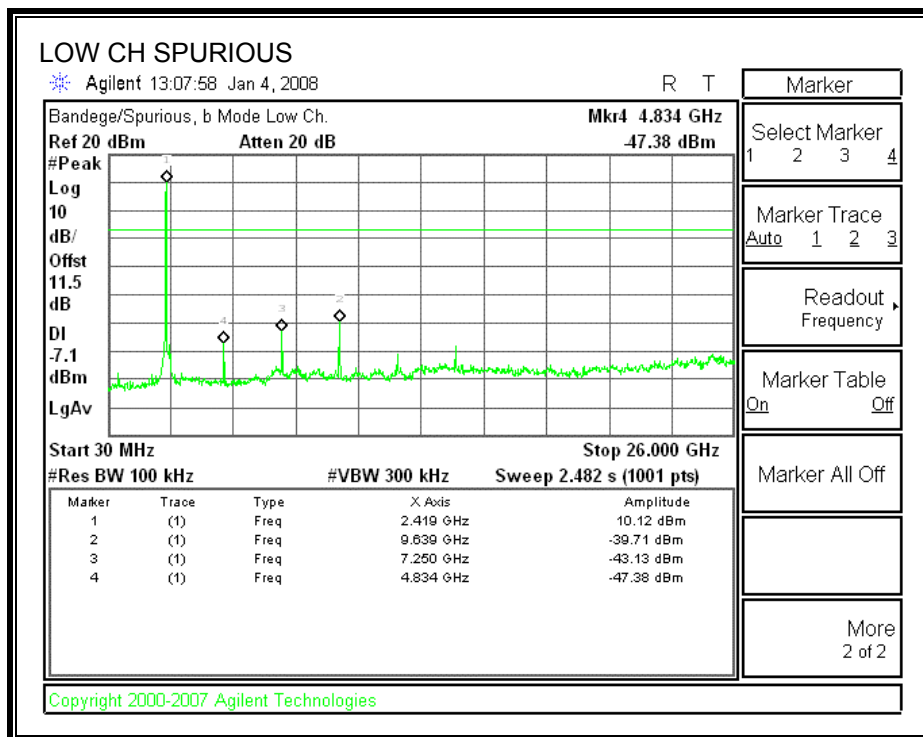
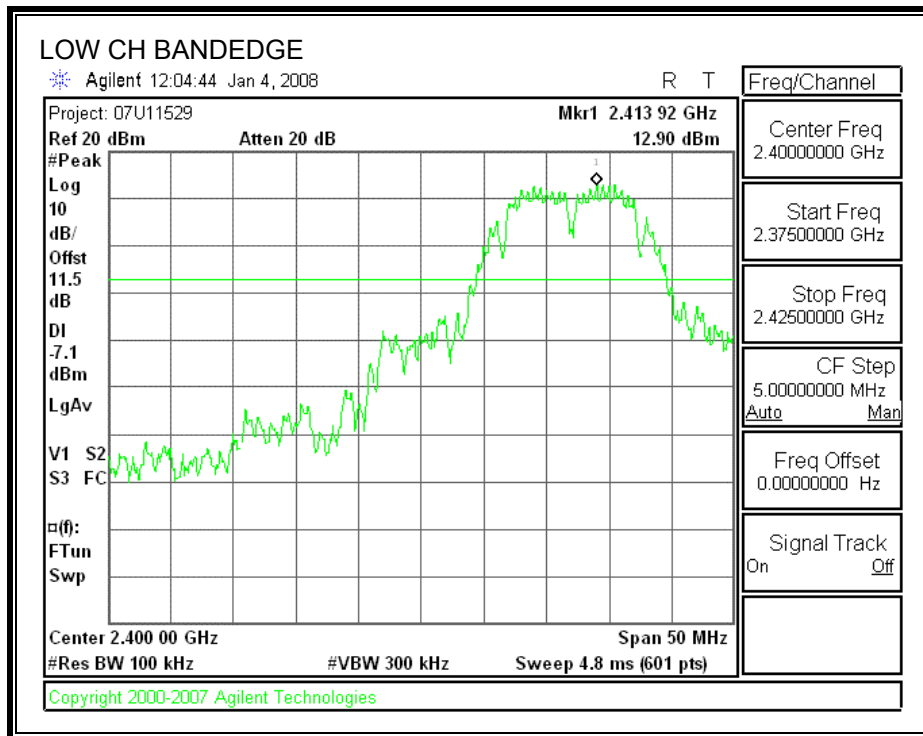
#### **TEST PROCEDURE**

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

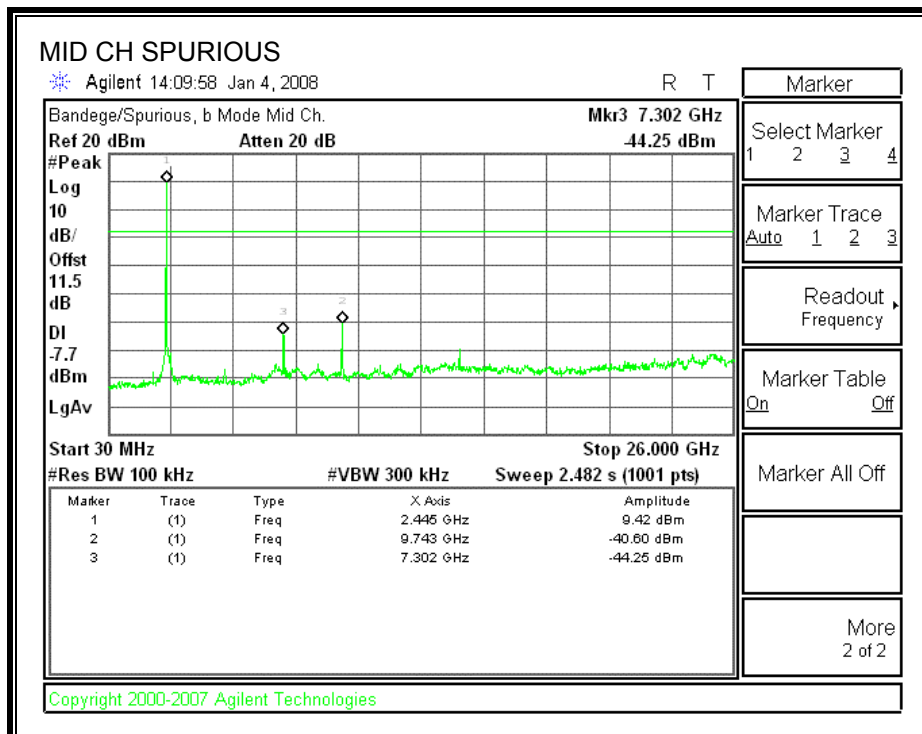
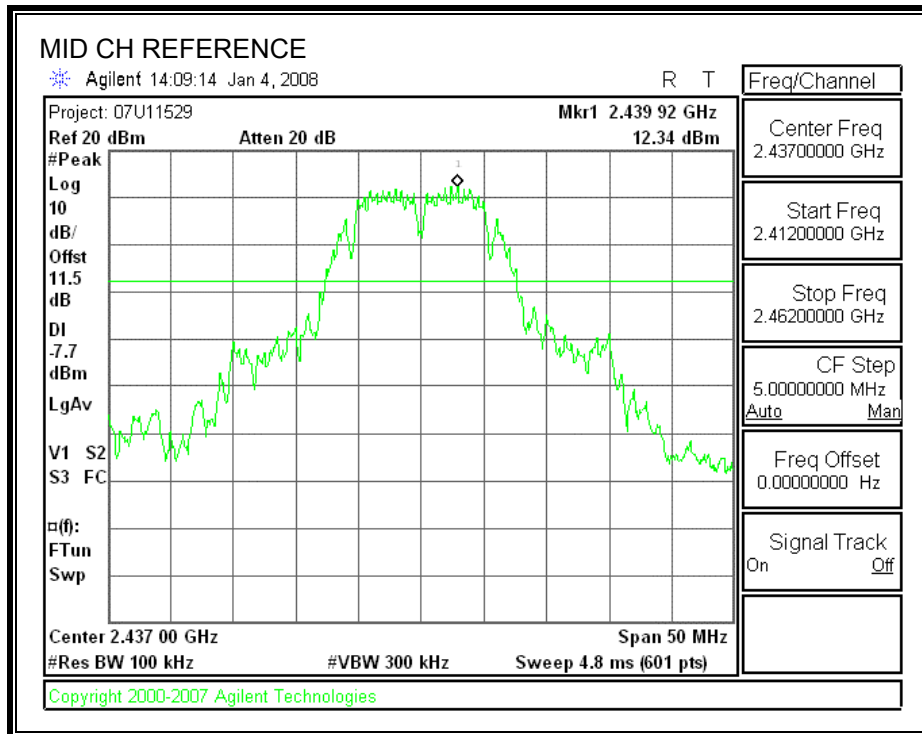
#### **RESULTS**

**SPURIOUS EMISSIONS, LOW CHANNEL**

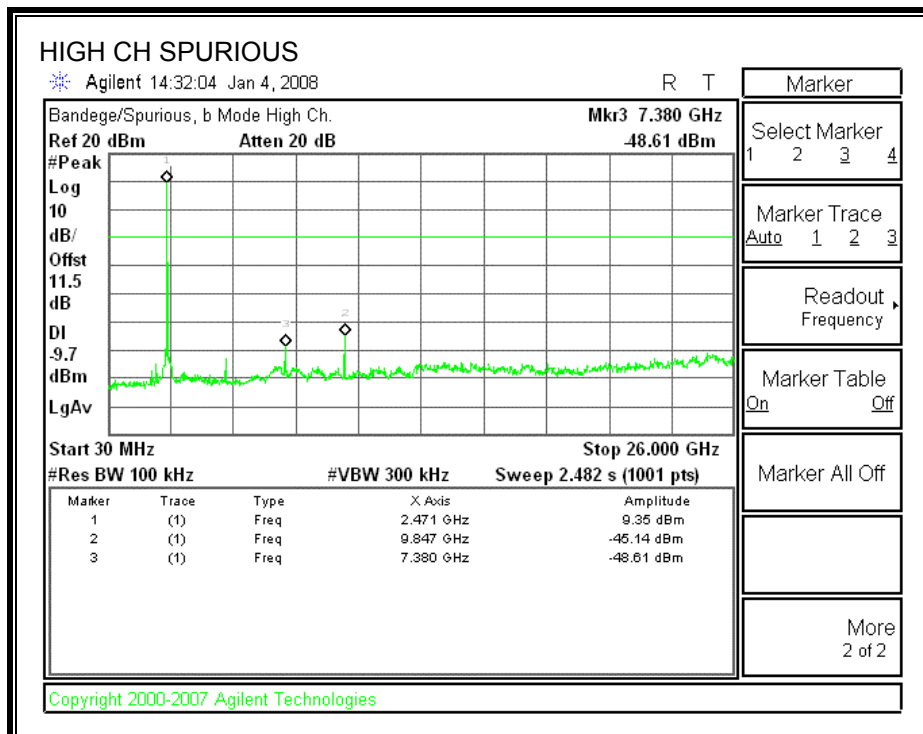
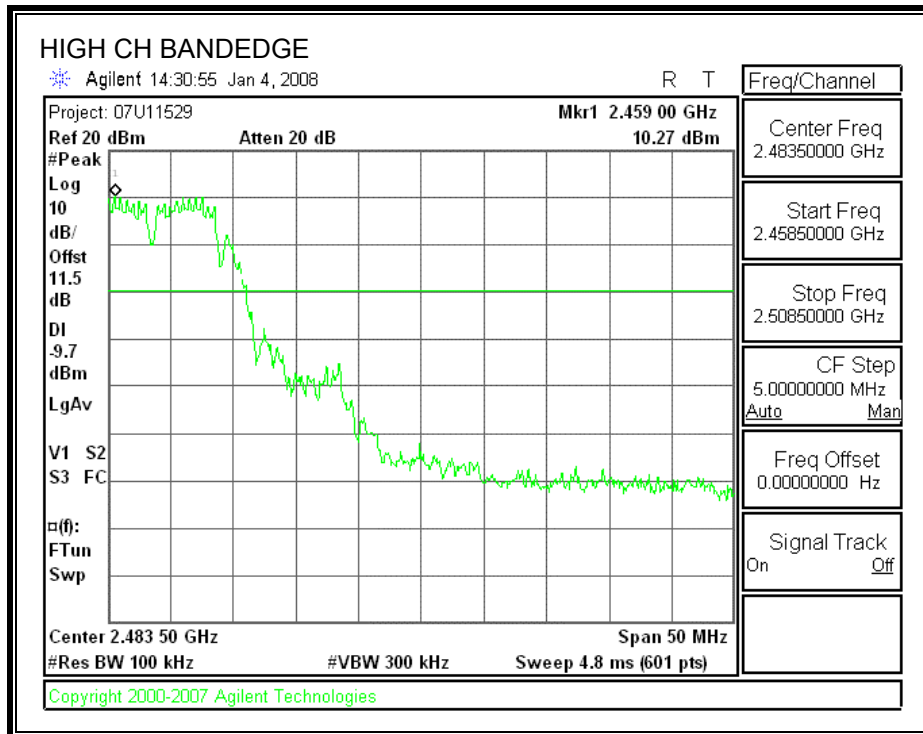




**SPURIOUS EMISSIONS, MID CHANNEL**



**SPURIOUS EMISSIONS, HIGH CHANNEL**



**7.2. 802.11g MODE**

**7.2.1. 6 dB BANDWIDTH**

**LIMITS**

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

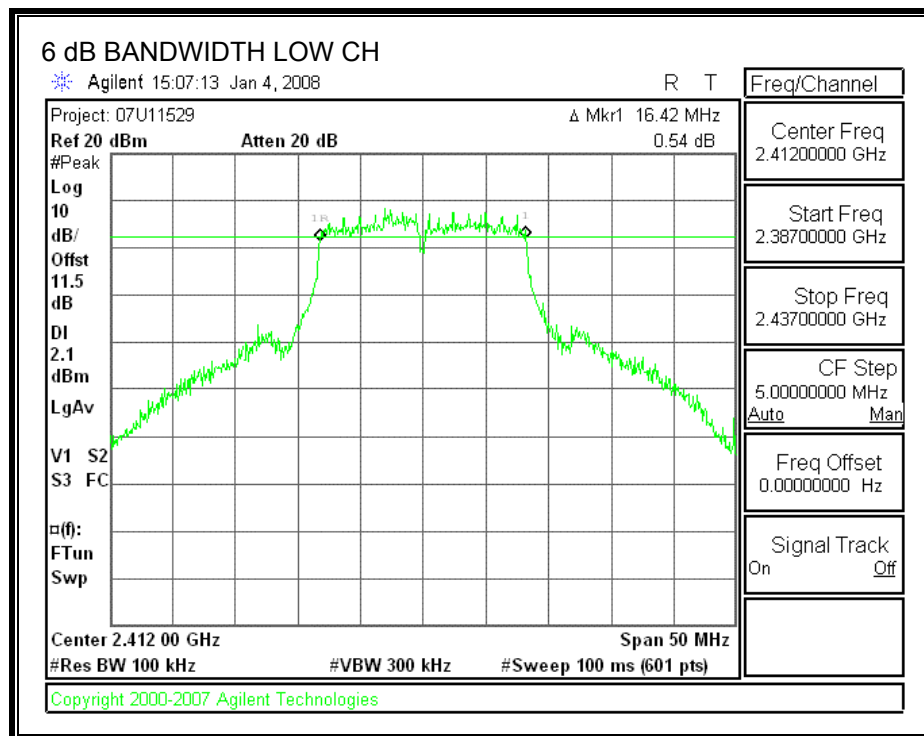
The minimum 6 dB bandwidth shall be at least 500 kHz.

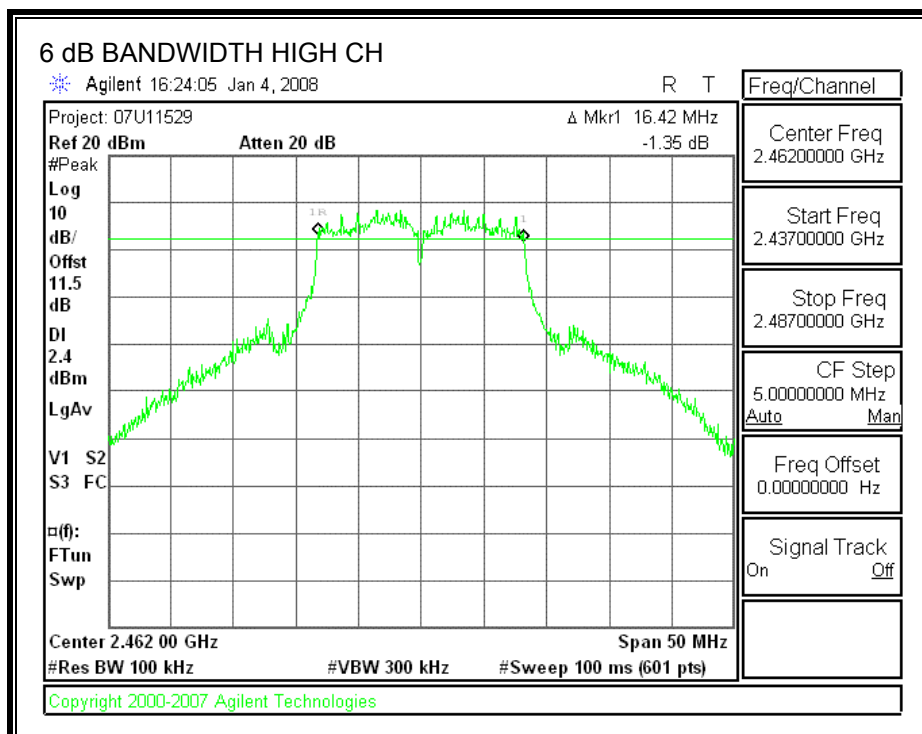
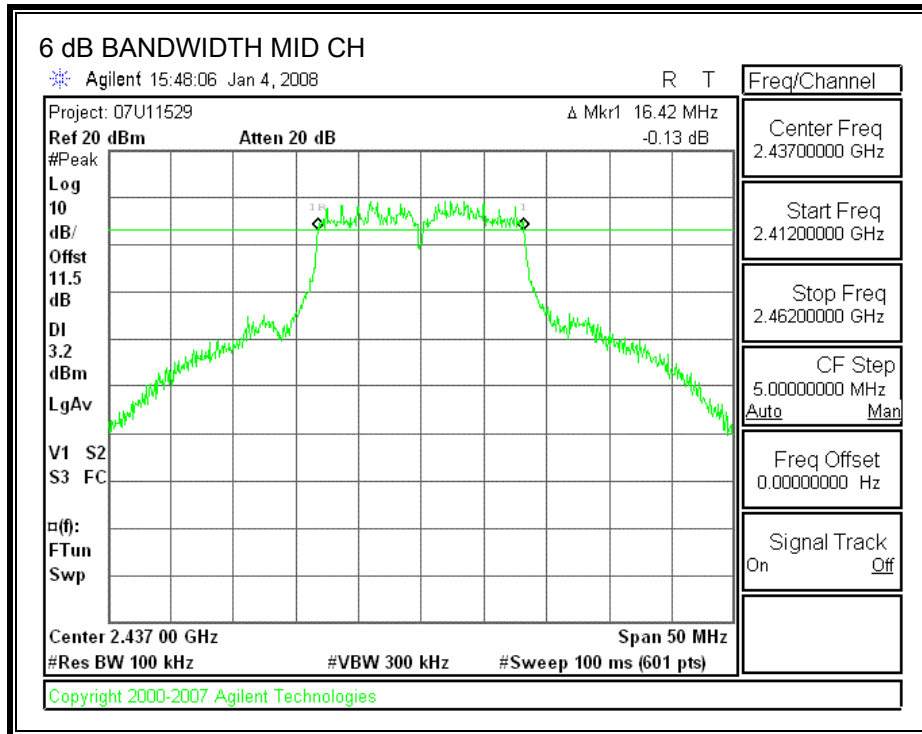
**TEST PROCEDURE**

The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

**RESULTS**

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	16.42	0.5
Middle	2437	16.42	0.5
High	2462	16.42	0.5





**7.2.2. 99% BANDWIDTH**

**LIMITS**

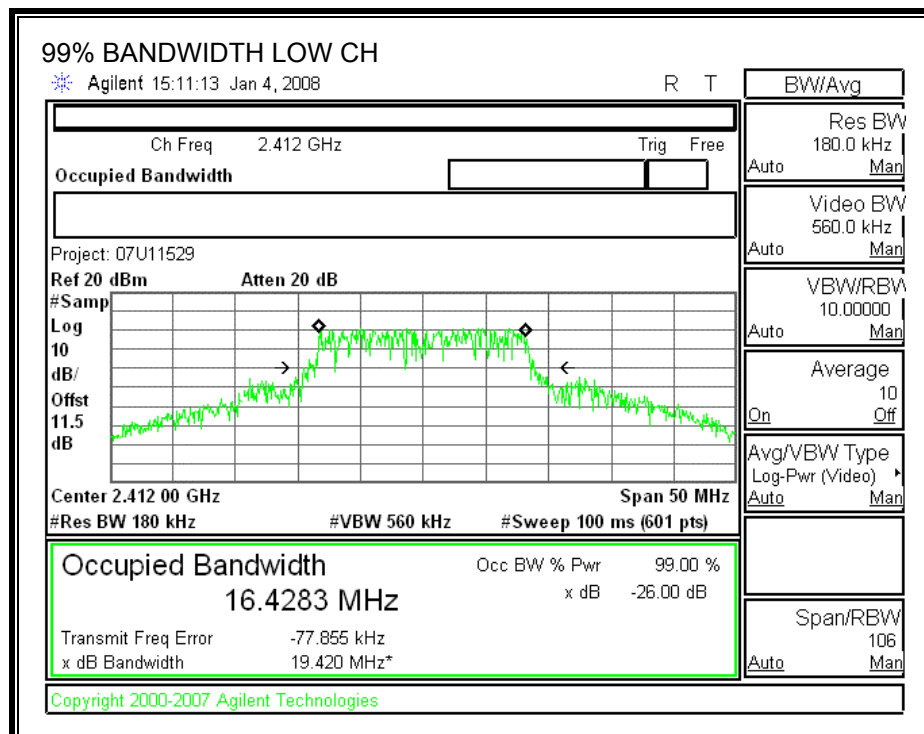
None; for reporting purposes only.

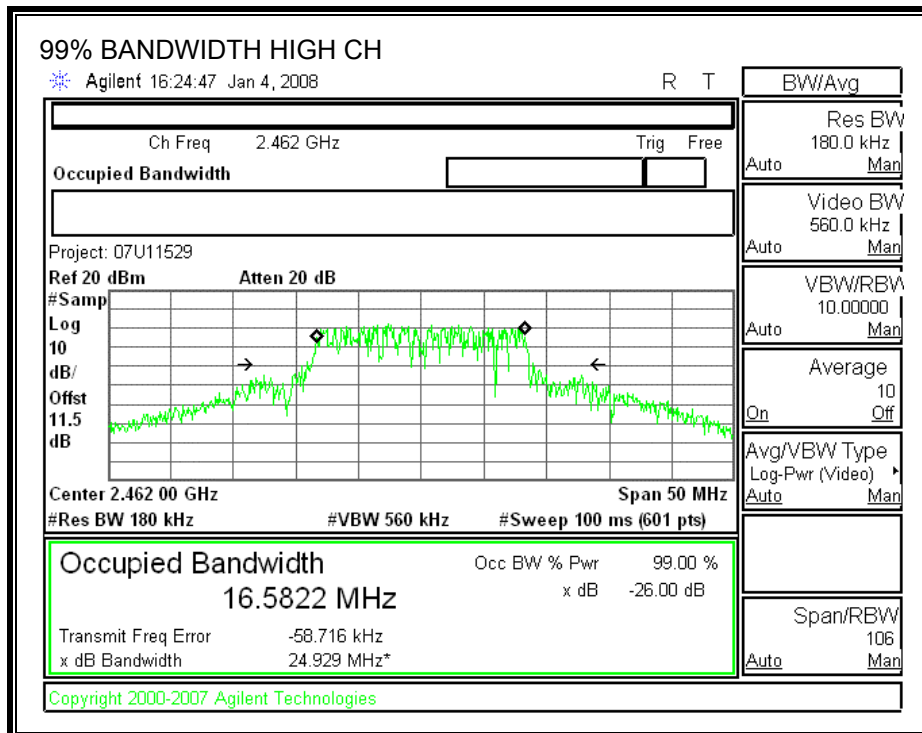
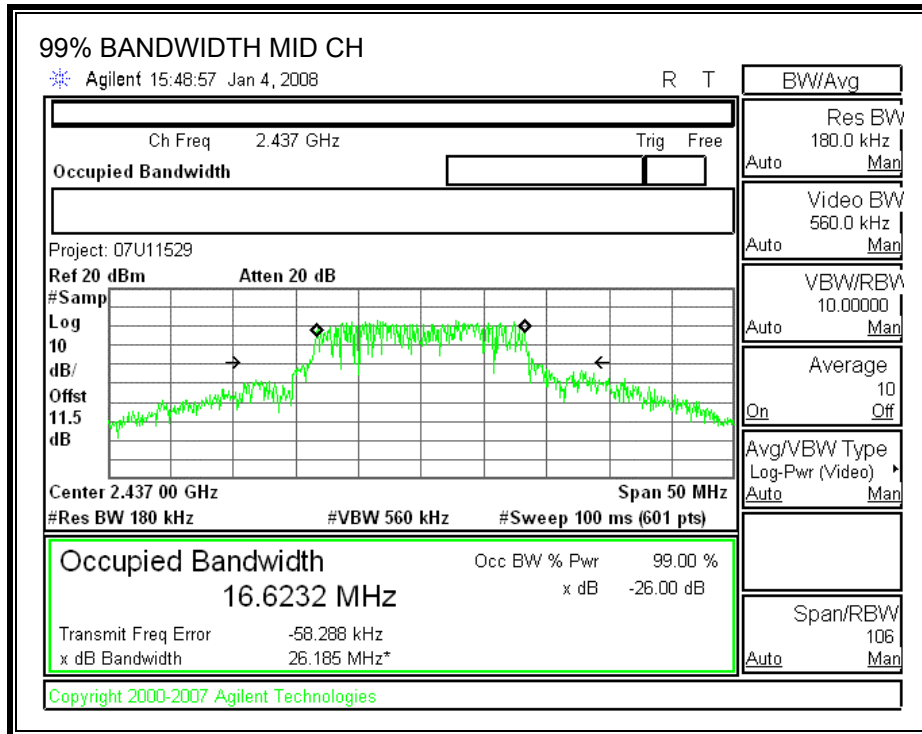
**TEST PROCEDURE**

The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

**RESULTS**

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	16.4283
Middle	2437	16.6232
High	2462	16.5822





**7.2.3. OUTPUT POWER**

**LIMITS**

FCC §15.247 (b)

IC RSS-210 A8.4

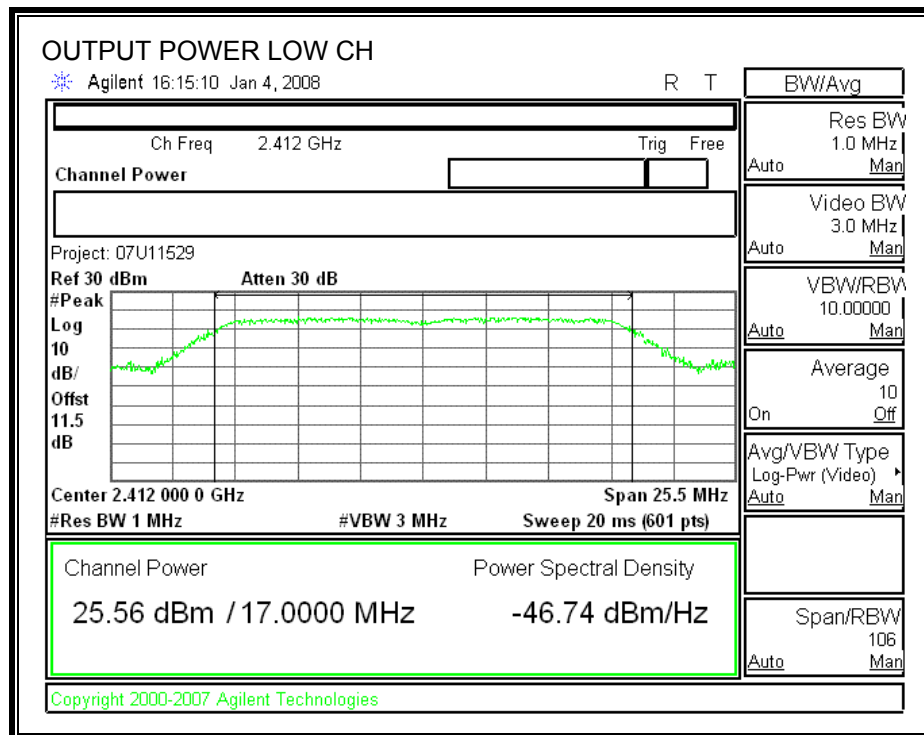
The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 30 dBm.

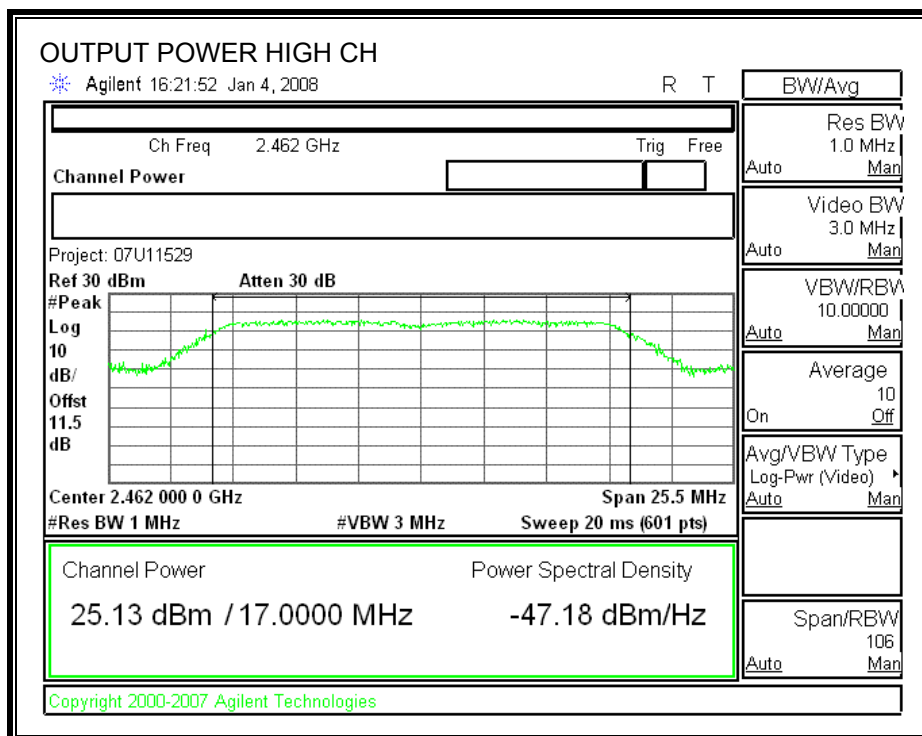
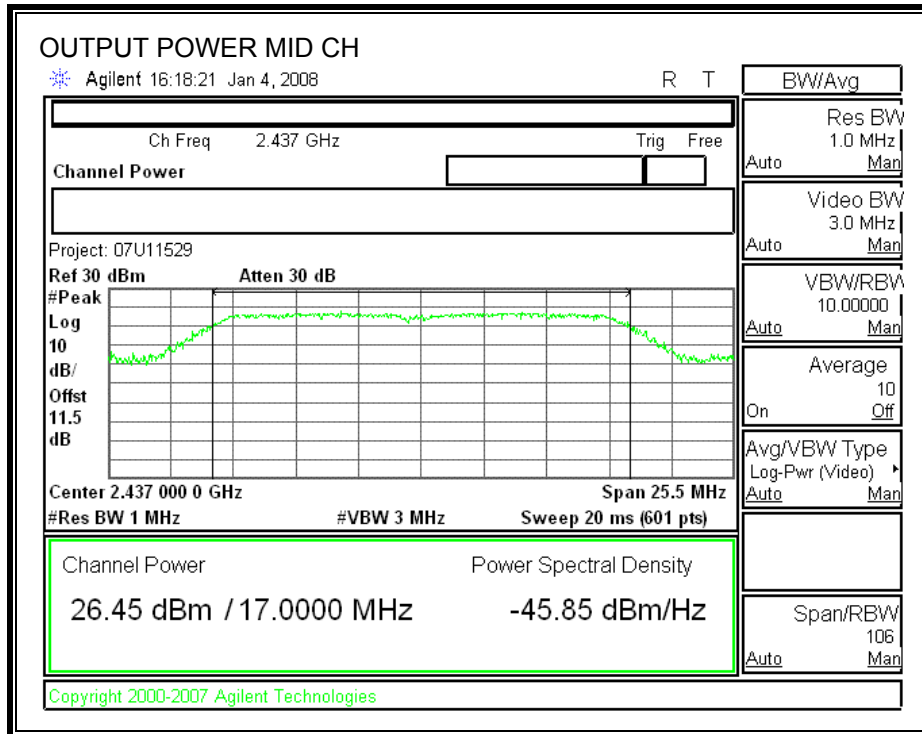
**TEST PROCEDURE**

Peak power is measured using the spectrum analyzer's internal channel power integration function. Power is integrated over a bandwidth greater than or equal to the 99% bandwidth.

**RESULTS**

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	25.56	30	-4.44
Middle	2437	26.45	30	-3.55
High	2462	25.13	30	-4.87







**7.2.4. POWER SPECTRAL DENSITY**

**LIMITS**

FCC §15.247 (e) & IC RSS-210 A8.2 (b)

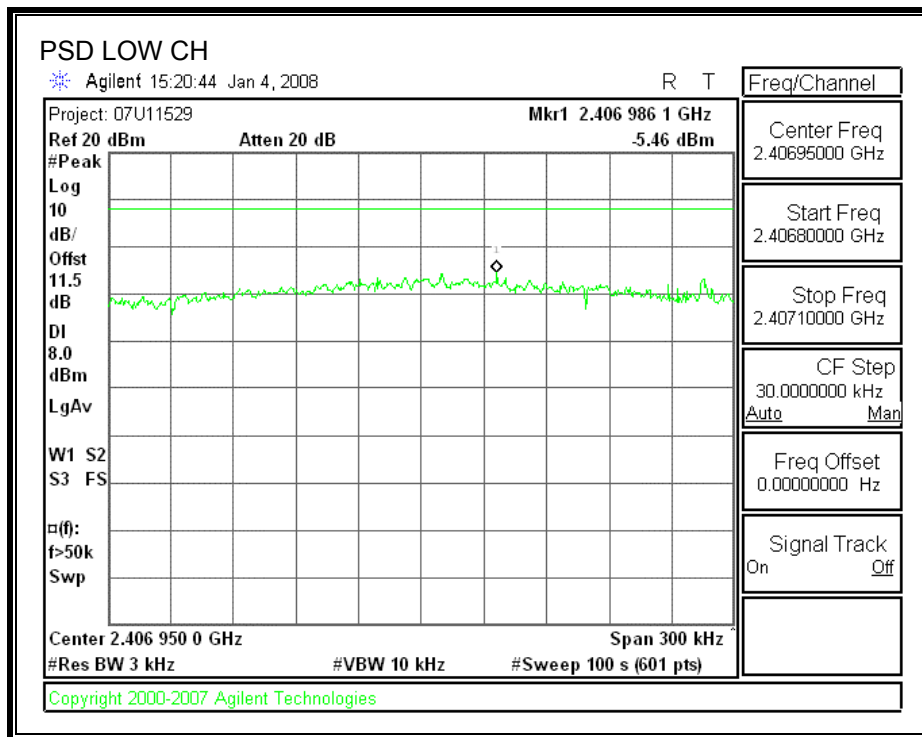
The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

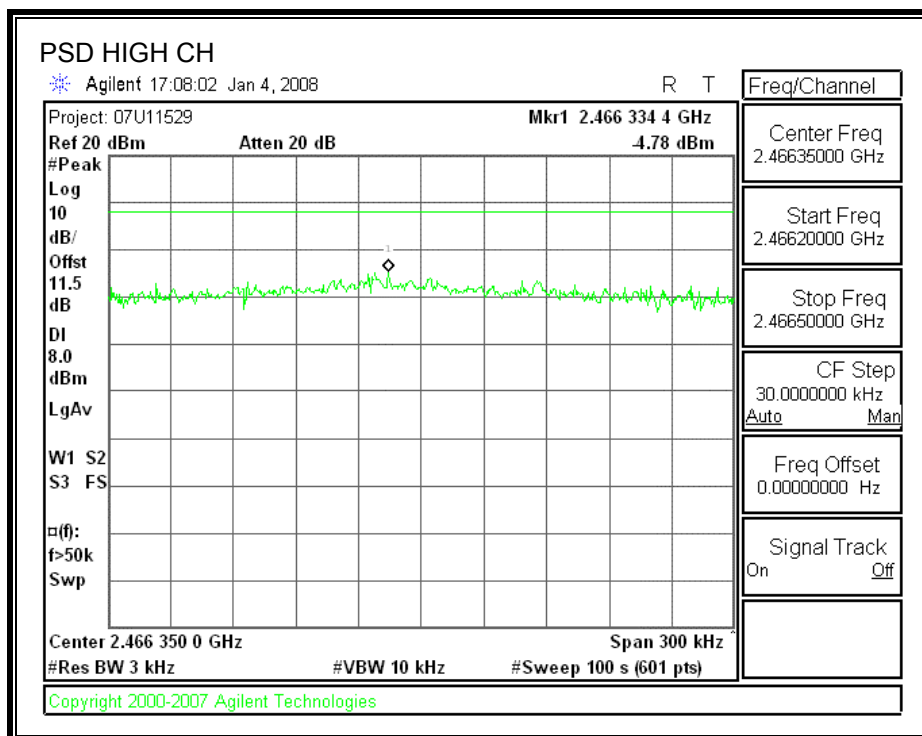
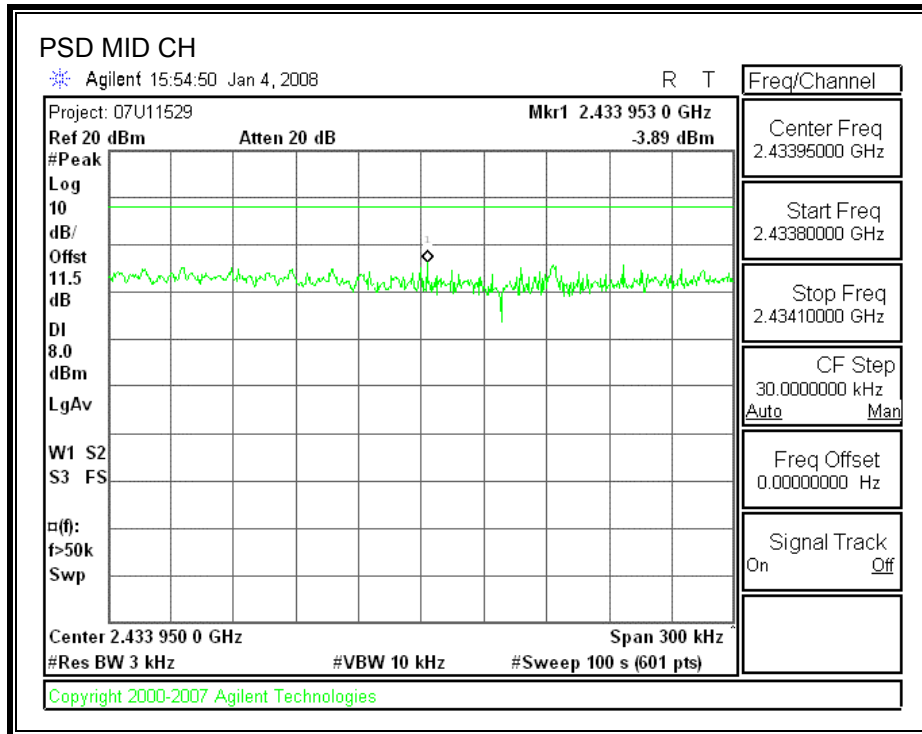
**TEST PROCEDURE**

Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

**RESULTS**

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-5.46	8	-13.46
Middle	2437	-3.89	8	-11.89
High	2462	-4.78	8	-12.78





## **7.2.5. CONDUCTED SPURIOUS EMISSIONS**

### **LIMITS**

FCC §15.247 (d)

IC RSS-210 A8.5

Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

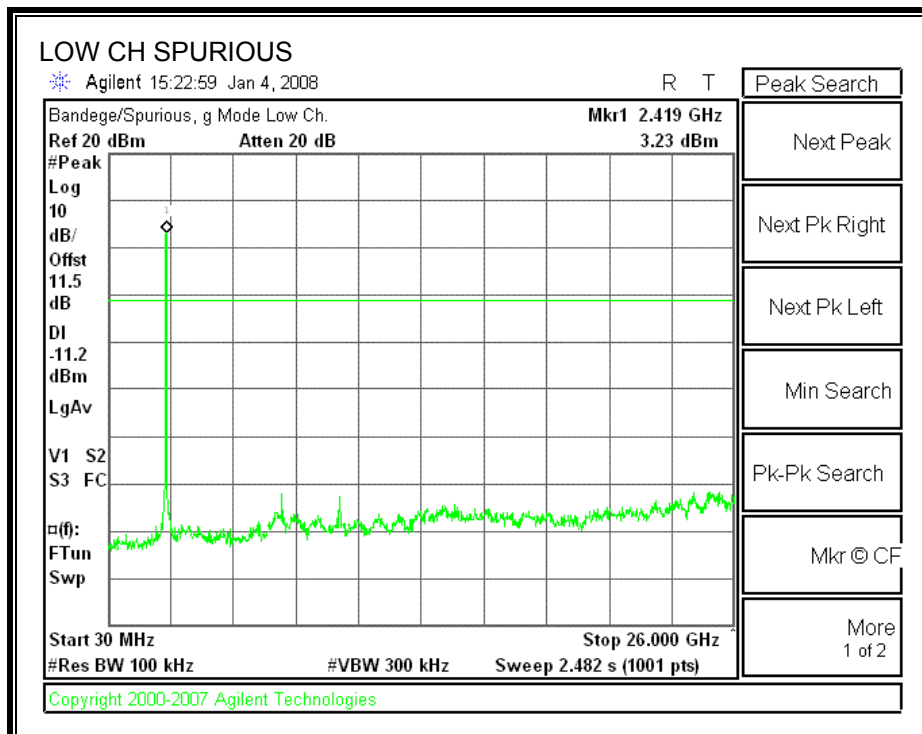
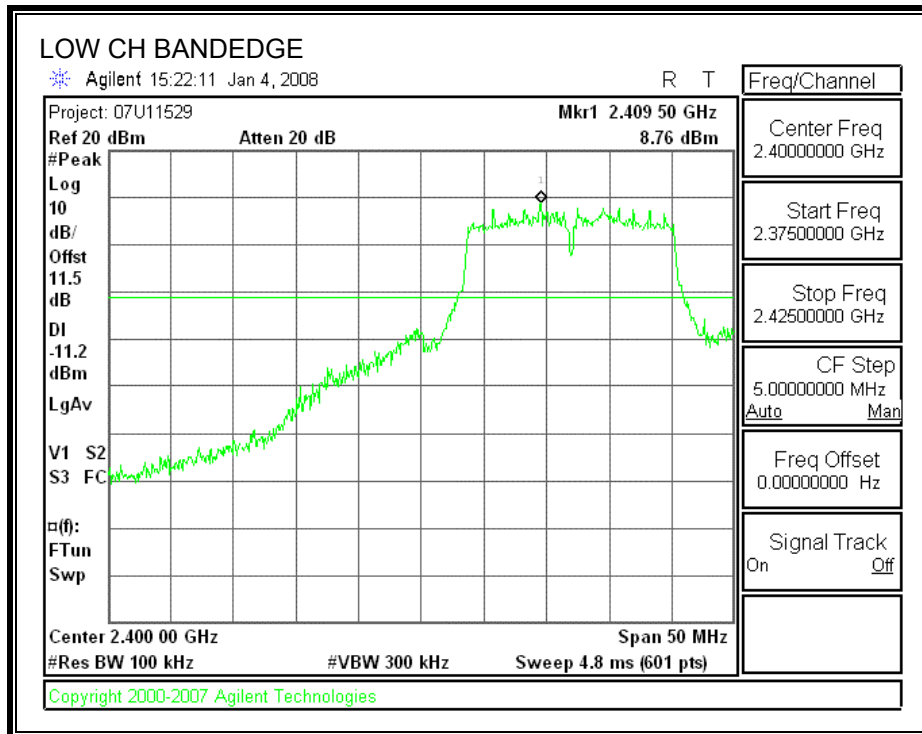
### **TEST PROCEDURE**

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

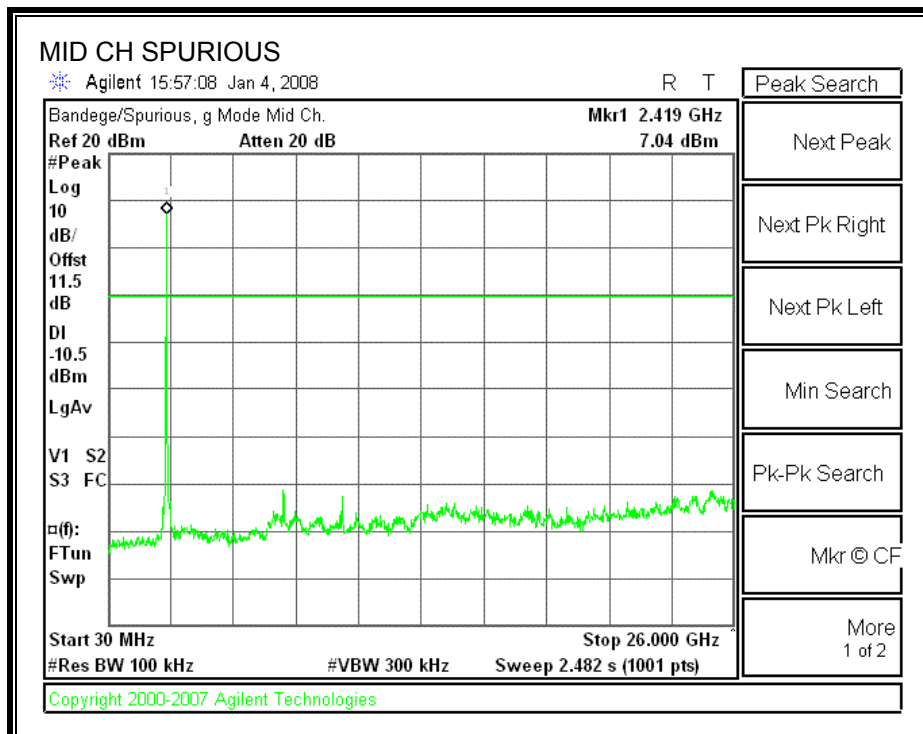
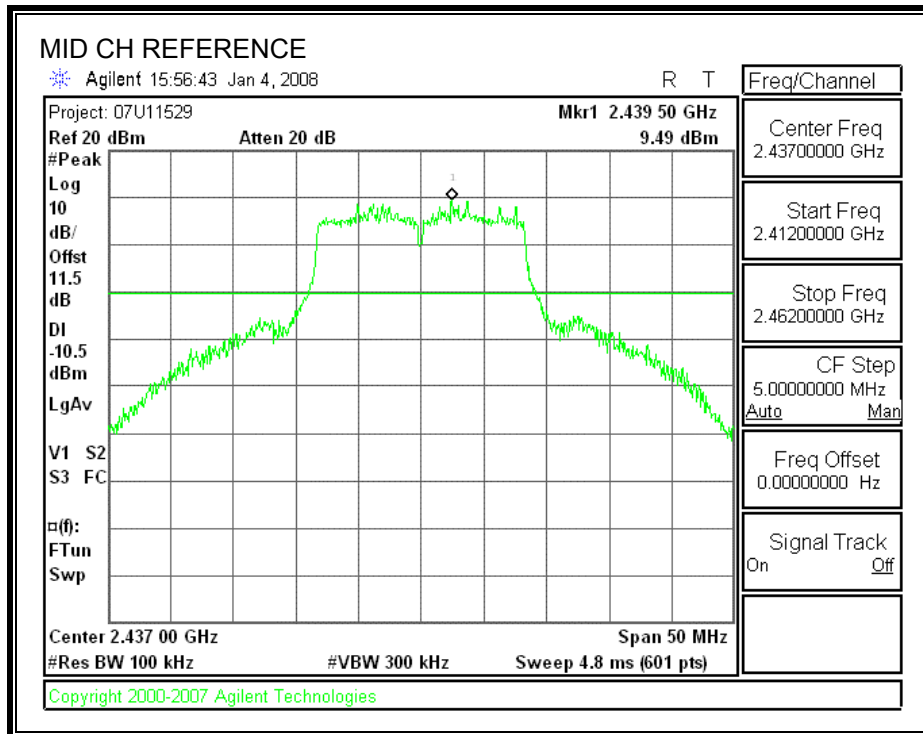
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

### **RESULTS**

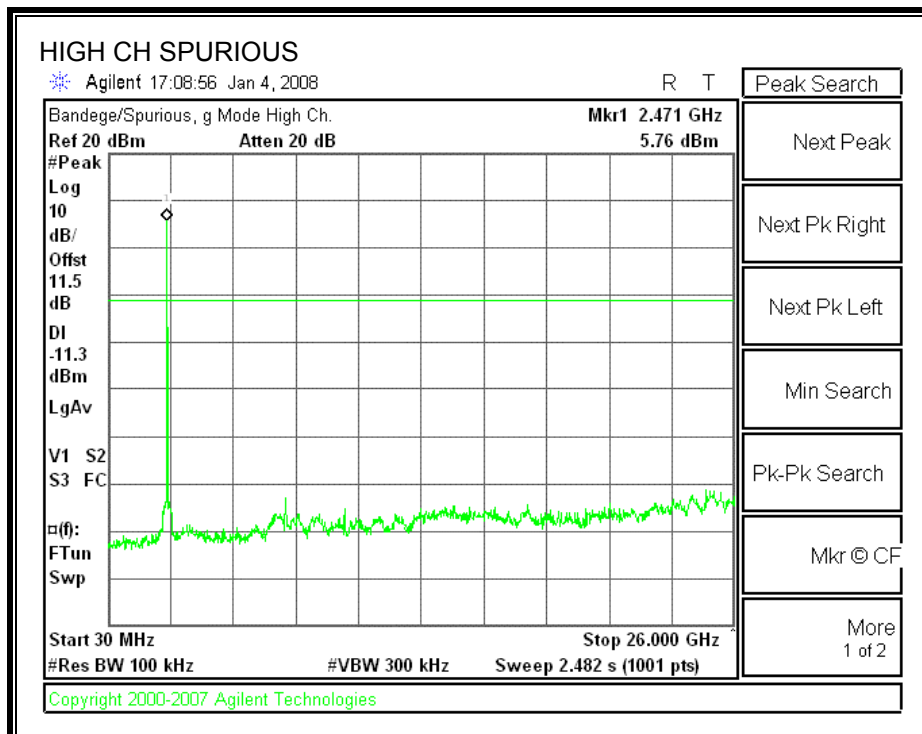
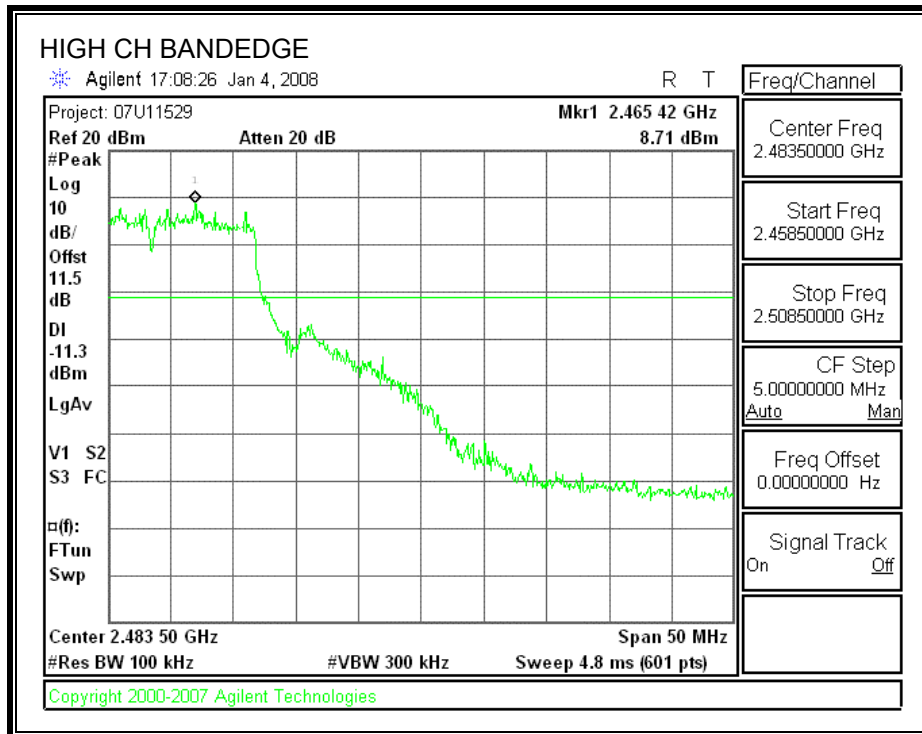
**SPURIOUS EMISSIONS, LOW CHANNEL**



**SPURIOUS EMISSIONS, MID CHANNEL**



**SPURIOUS EMISSIONS, HIGH CHANNEL**



**7.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND**

**7.3.1. 6 dB BANDWIDTH**

**LIMITS**

FCC §15.247 (a) (2) & IC RSS-210 A8.2 (a)

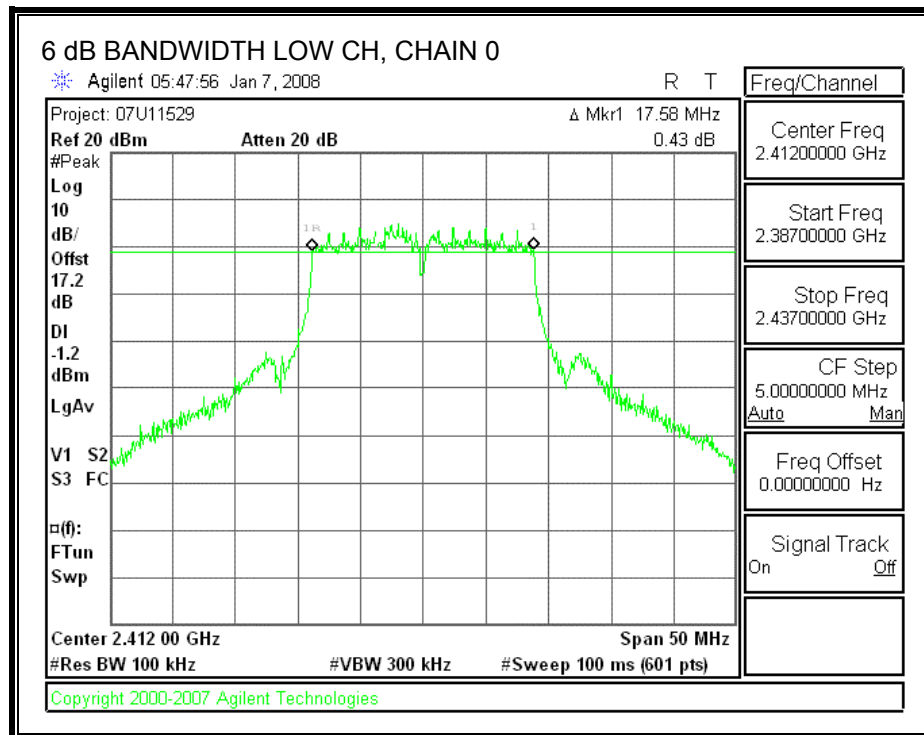
The minimum 6 dB bandwidth shall be at least 500 kHz.

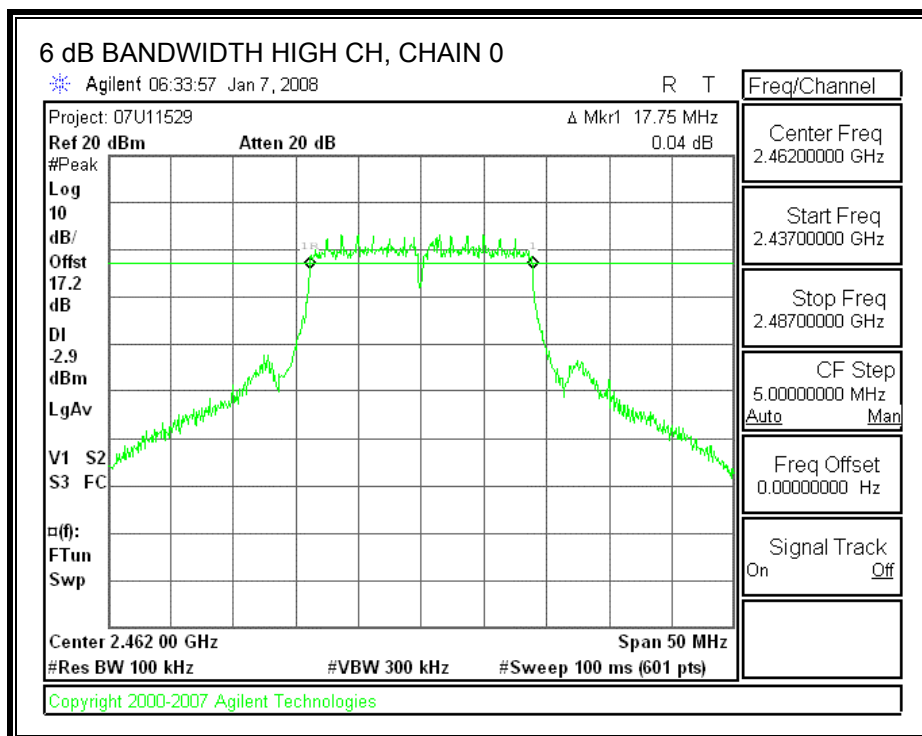
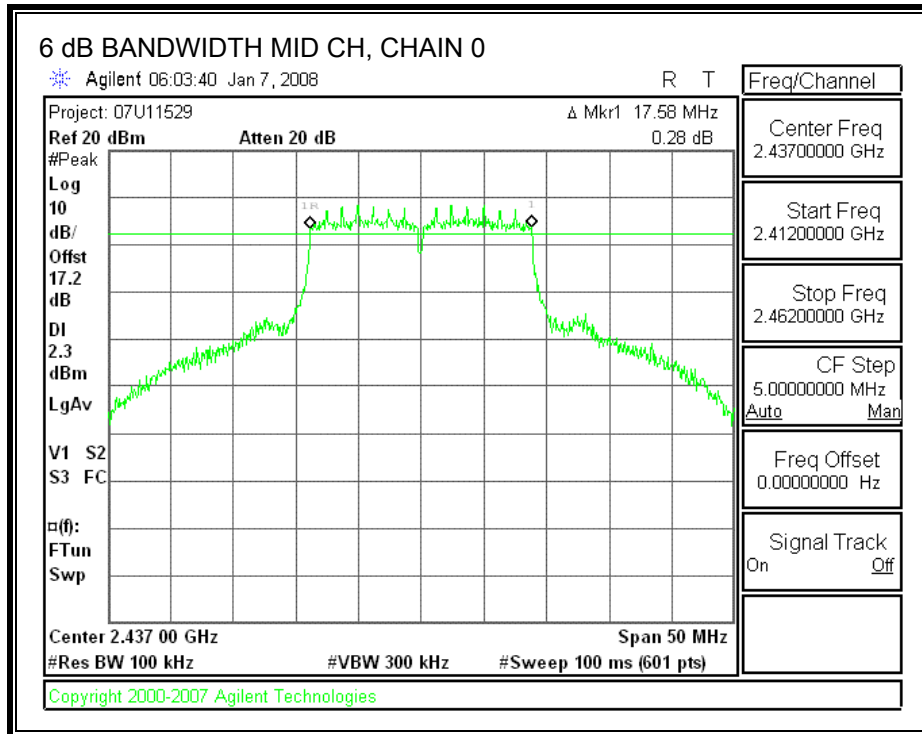
**TEST PROCEDURE**

The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

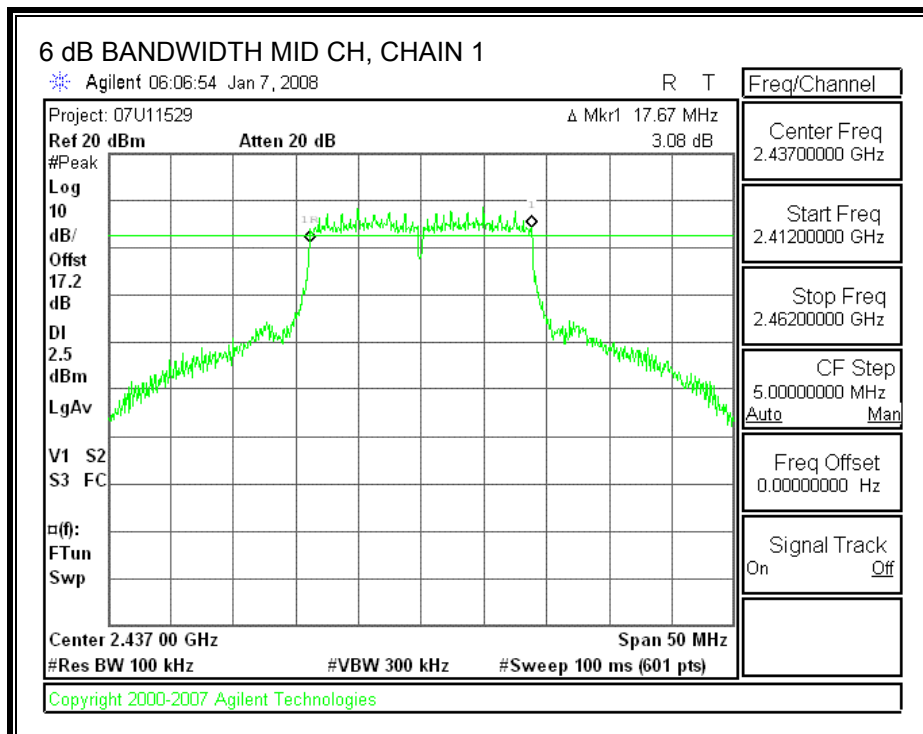
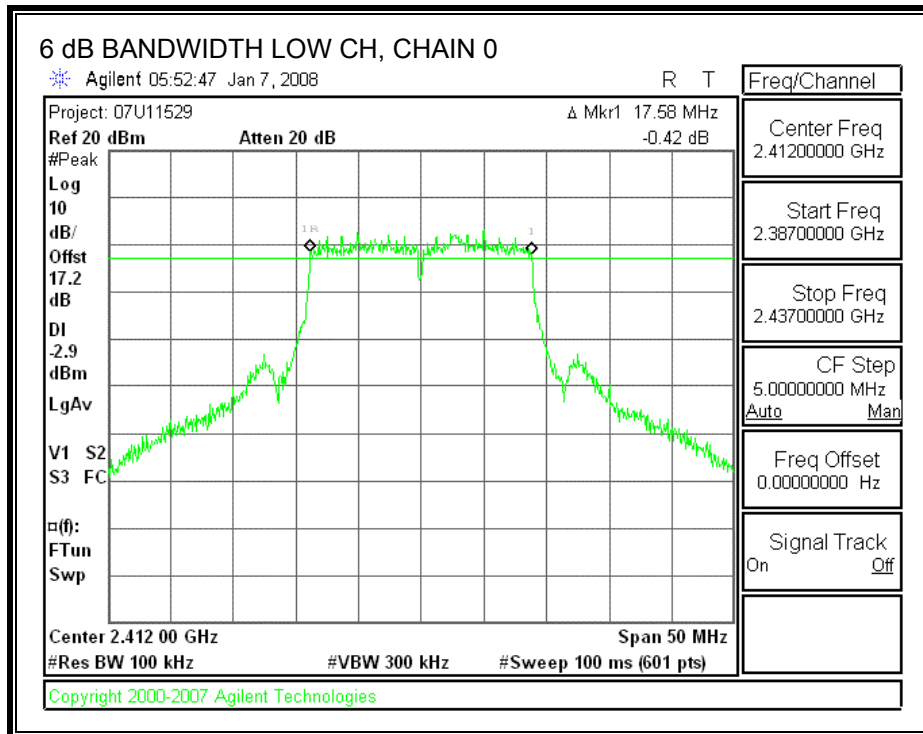
**RESULTS**

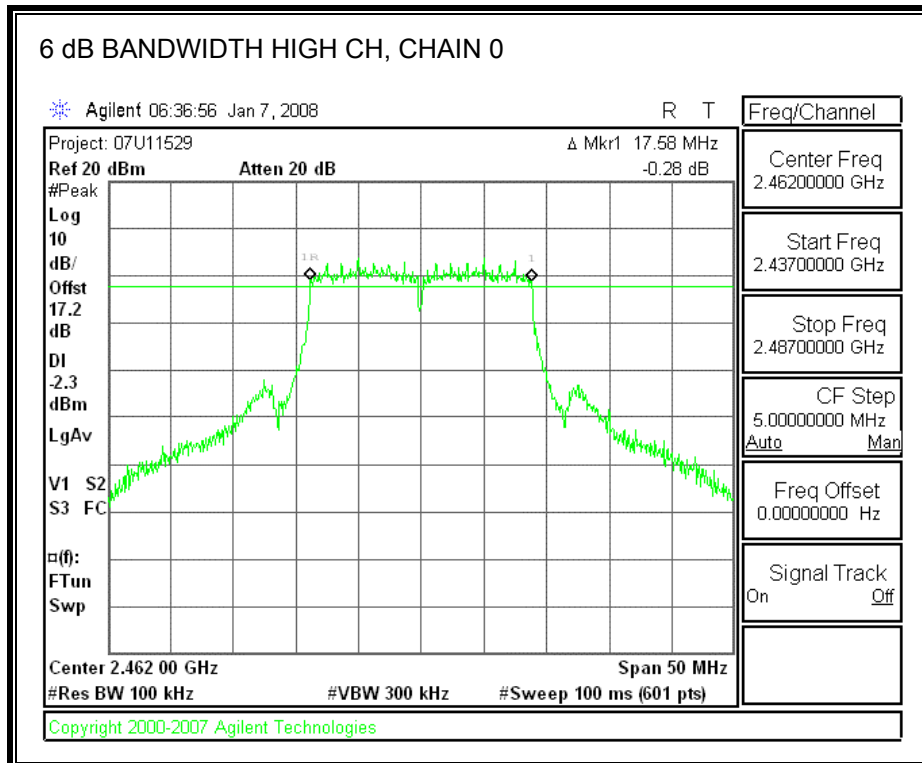
Channel	Frequency (MHz)	Chain 0 6 dB BW (MHz)	Chain 1 6 dB BW (MHz)	Minimum Limit (MHz)
Low	2412	17.58	17.58	0.5
Middle	2437	17.58	17.67	0.5
High	2462	17.75	17.58	0.5











**7.3.2. 99% BANDWIDTH**

**LIMITS**

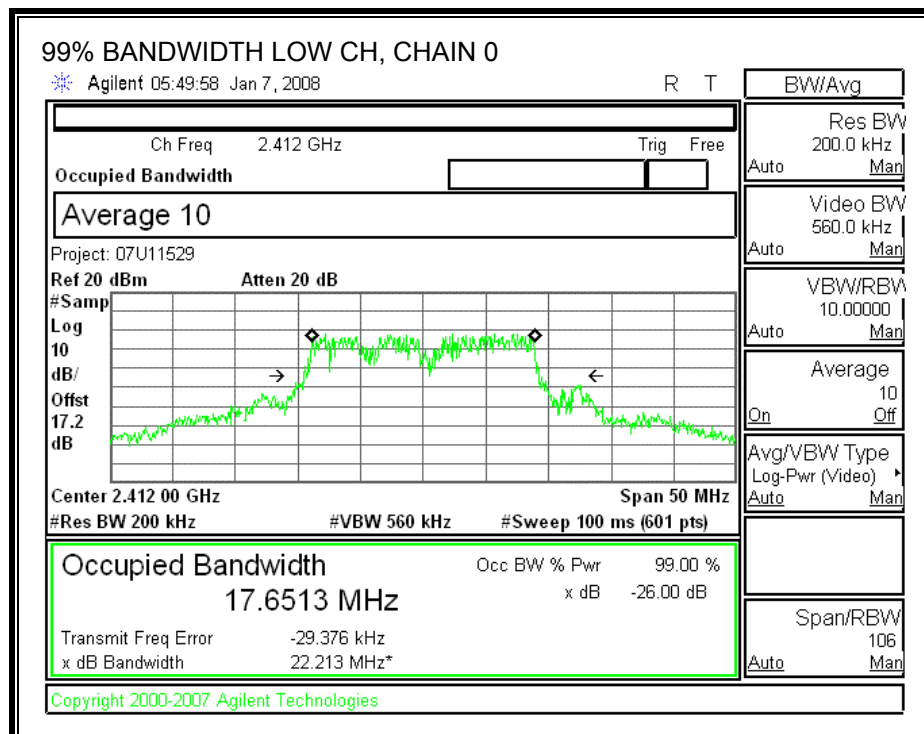
None; for reporting purposes only.

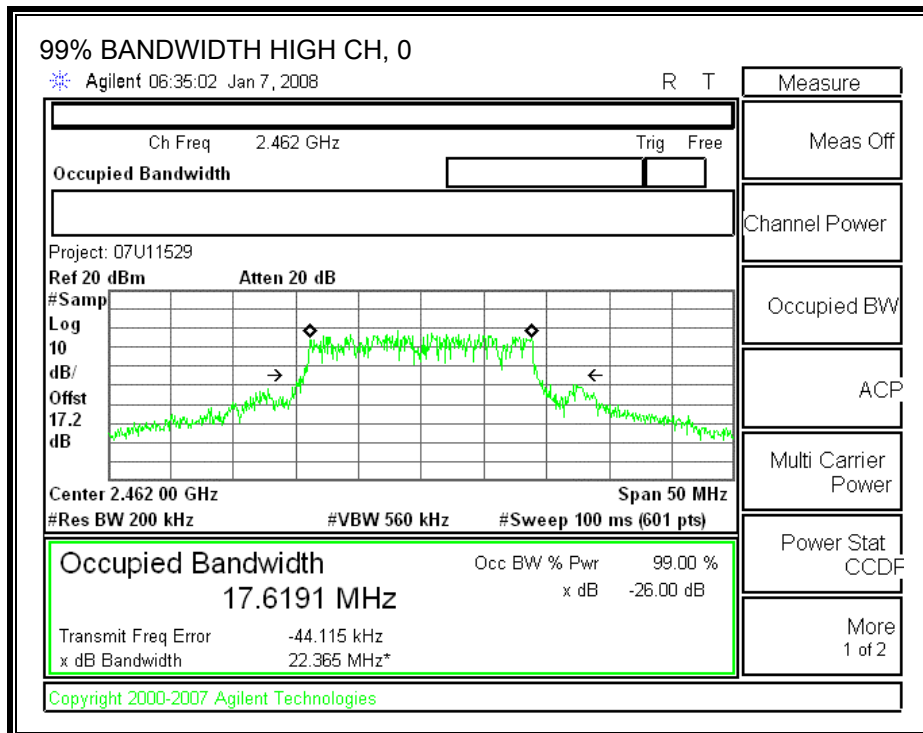
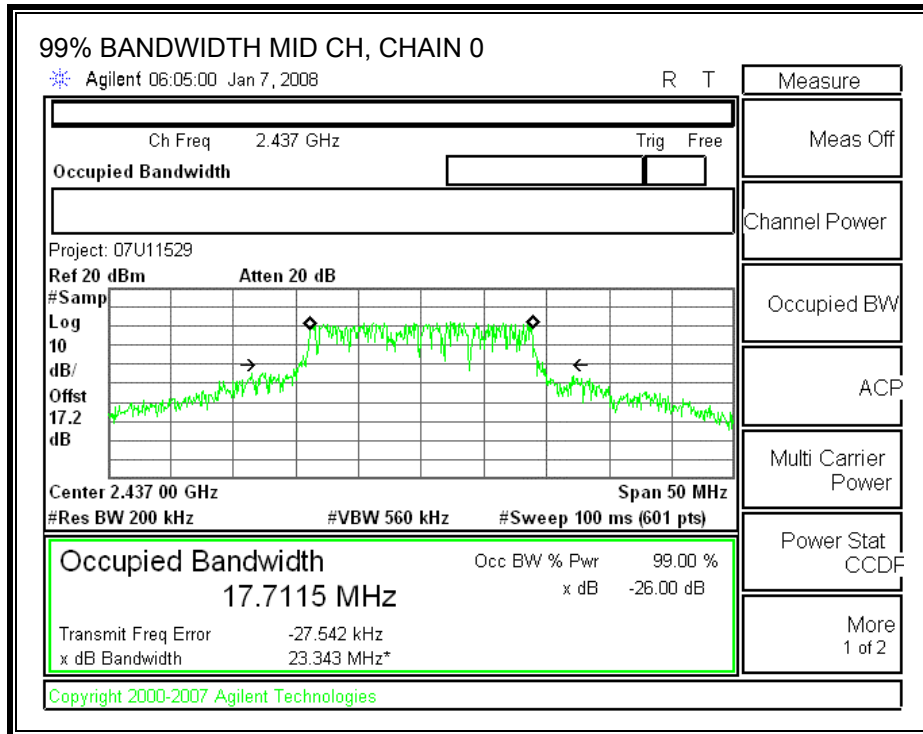
**TEST PROCEDURE**

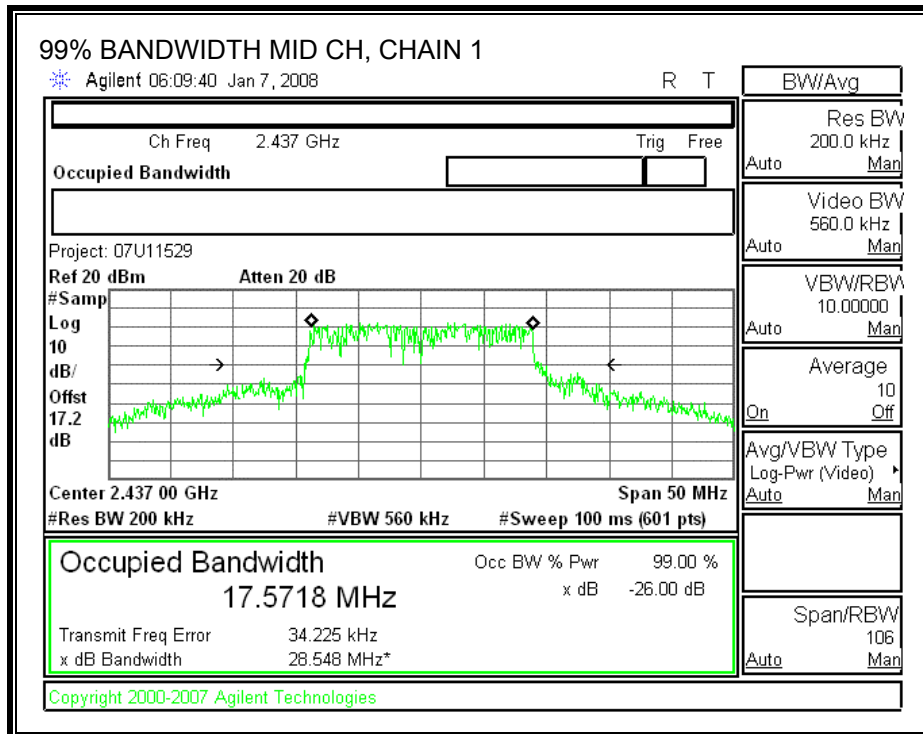
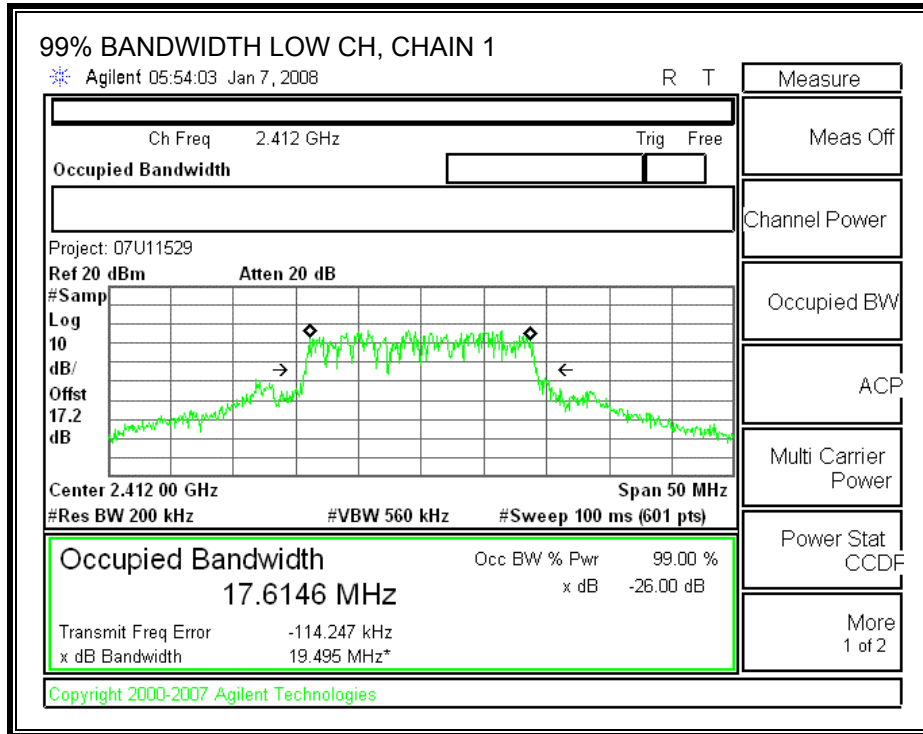
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

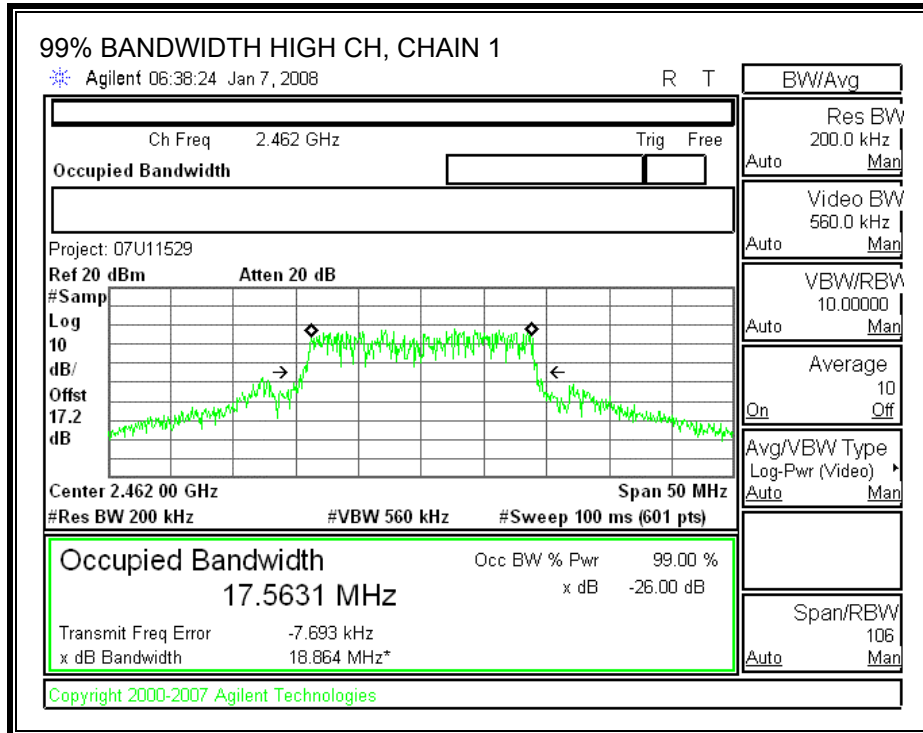
**RESULTS**

Channel	Frequency (MHz)	Chain 0 99% Bandwidth (MHz)	Chain 1 99% Bandwidth (MHz)
Low	2412	17.6513	17.6146
Middle	2437	17.7115	17.5718
High	2462	17.6191	17.5631









### 7.3.3. OUTPUT POWER

#### LIMITS

FCC §15.247 (b) & IC RSS-210 A8.4

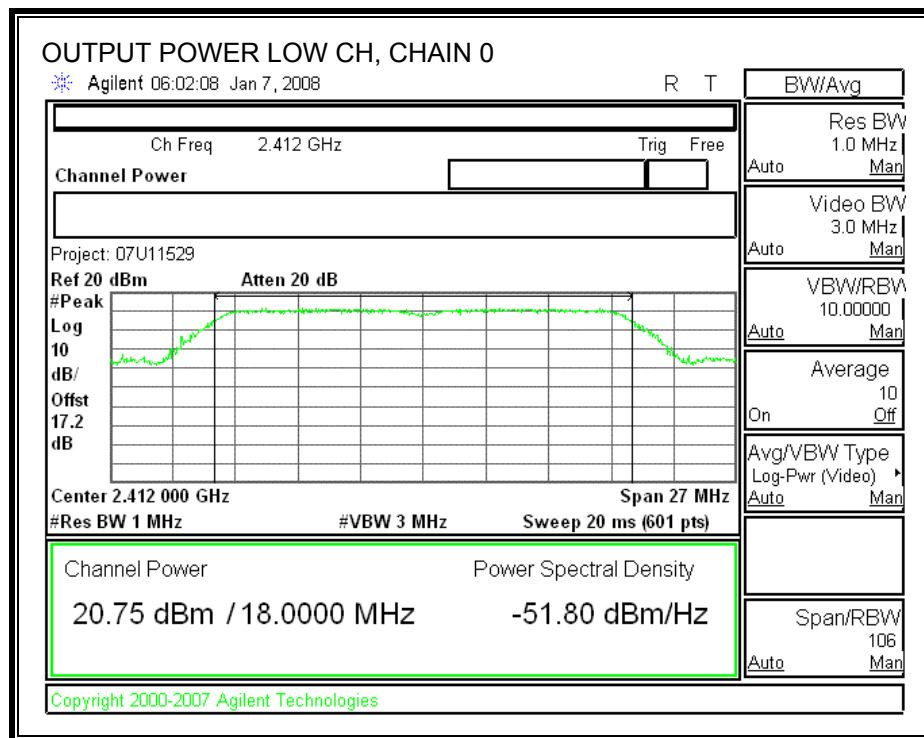
The maximum antenna gain is 6.91 dBi for other than fixed, point-to-point operations, therefore the limit is 29.09 dBm.

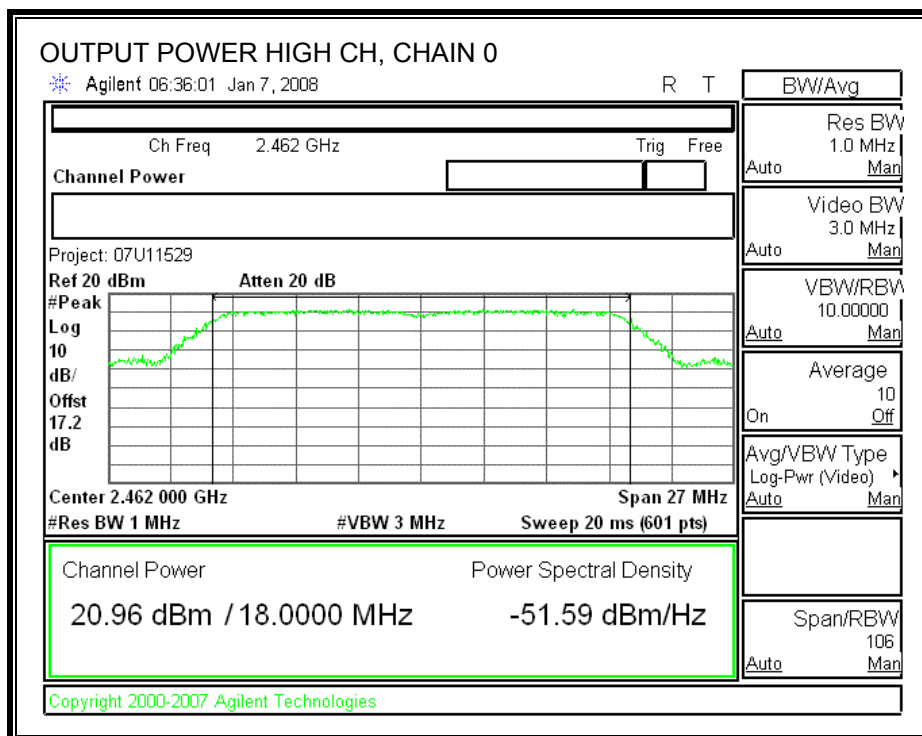
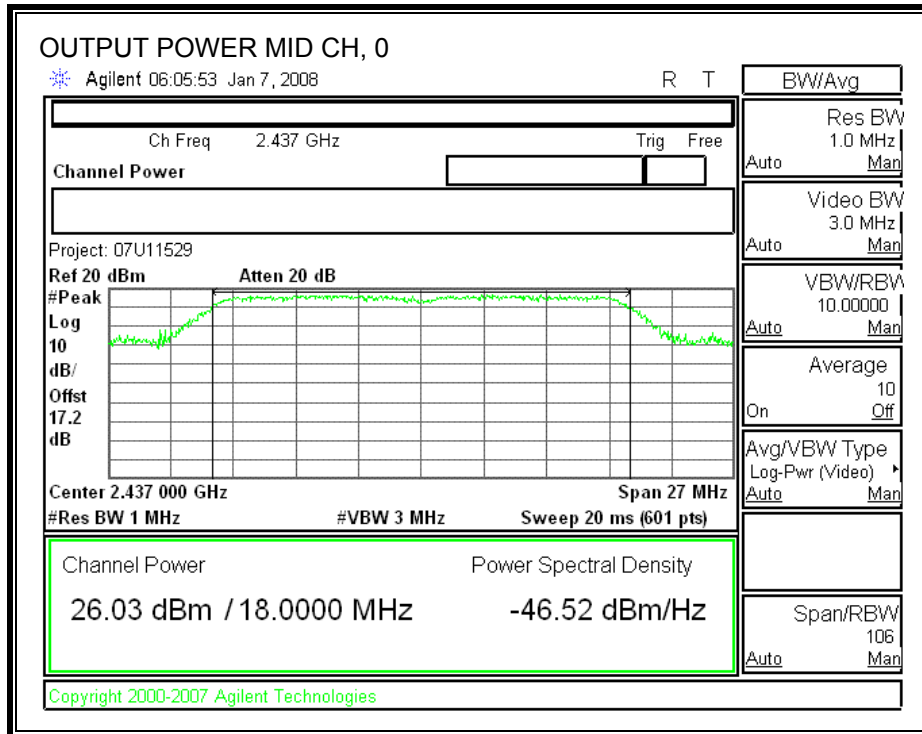
#### TEST PROCEDURE

Peak power is measured using the spectrum analyzer's internal channel power integration function. Power is integrated over a bandwidth greater than or equal to the 99% bandwidth.

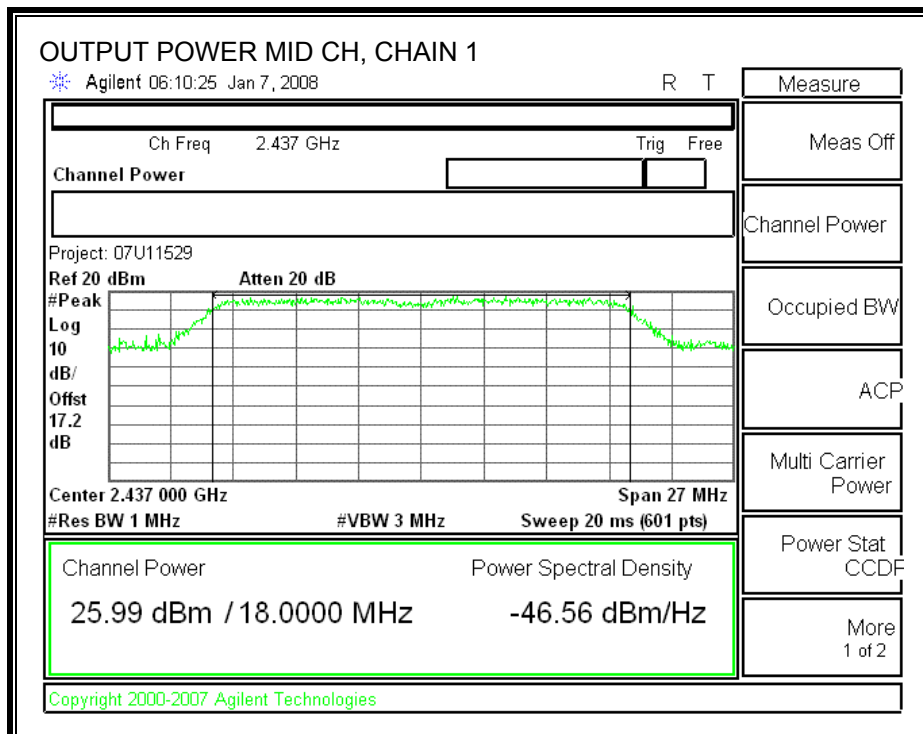
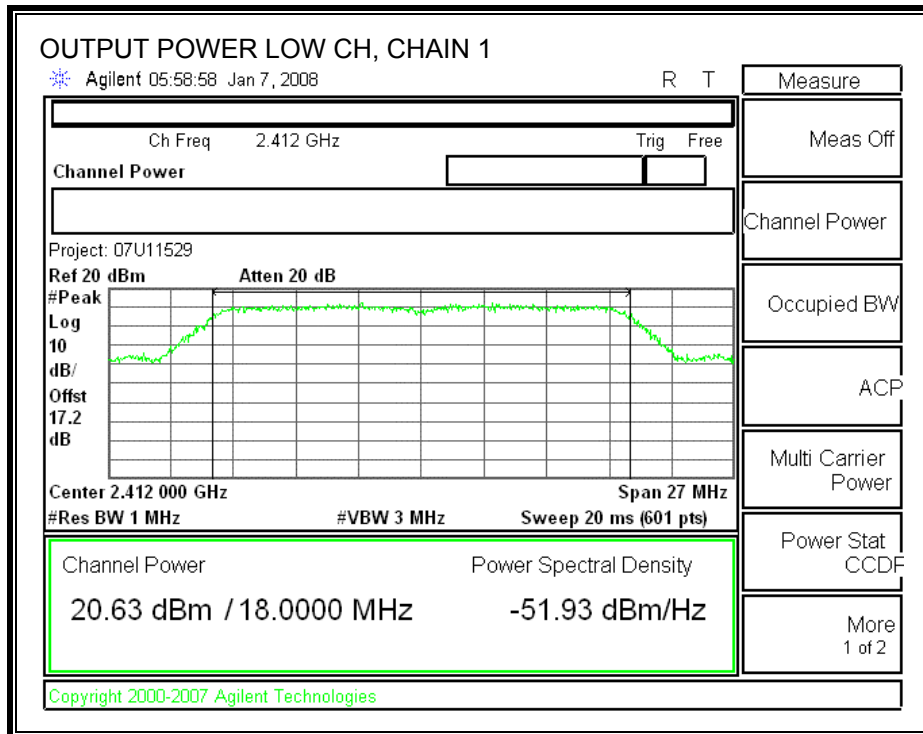
#### RESULTS

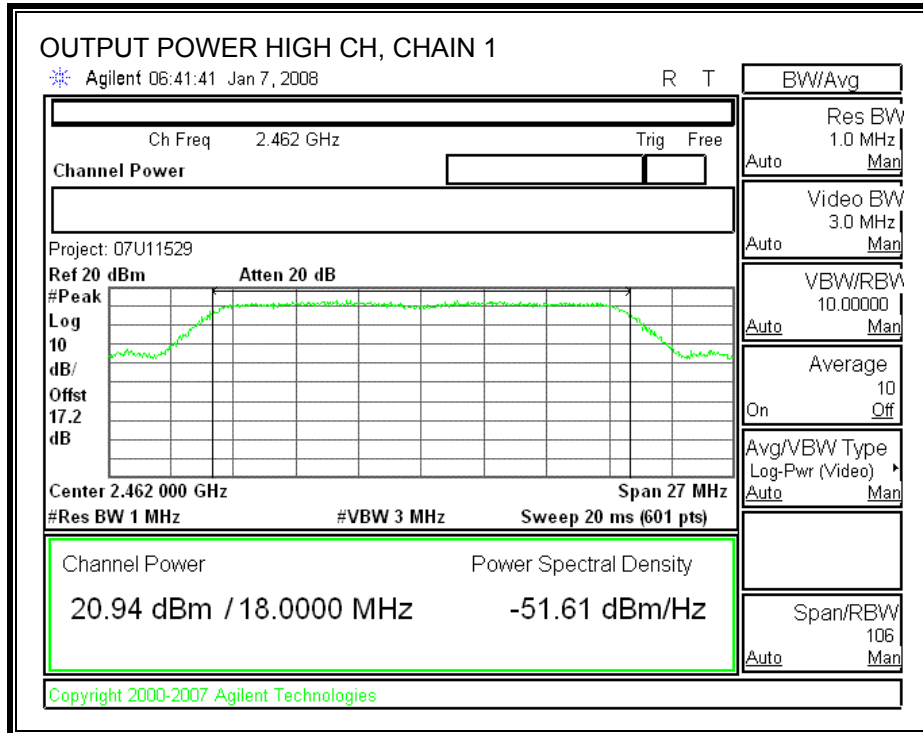
Channel	Frequency (MHz)	Limit (dBm)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)	Margin (dB)
Low	2412	29.09	20.75	20.63	23.70	-5.39
Mid	2437	29.09	26.03	25.99	29.02	-0.07
High	2462	29.09	20.96	20.94	23.96	-5.13











**7.3.4. POWER SPECTRAL DENSITY**

**LIMITS**

FCC §15.247 (e) & IC RSS-210 A8.2 (b)

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

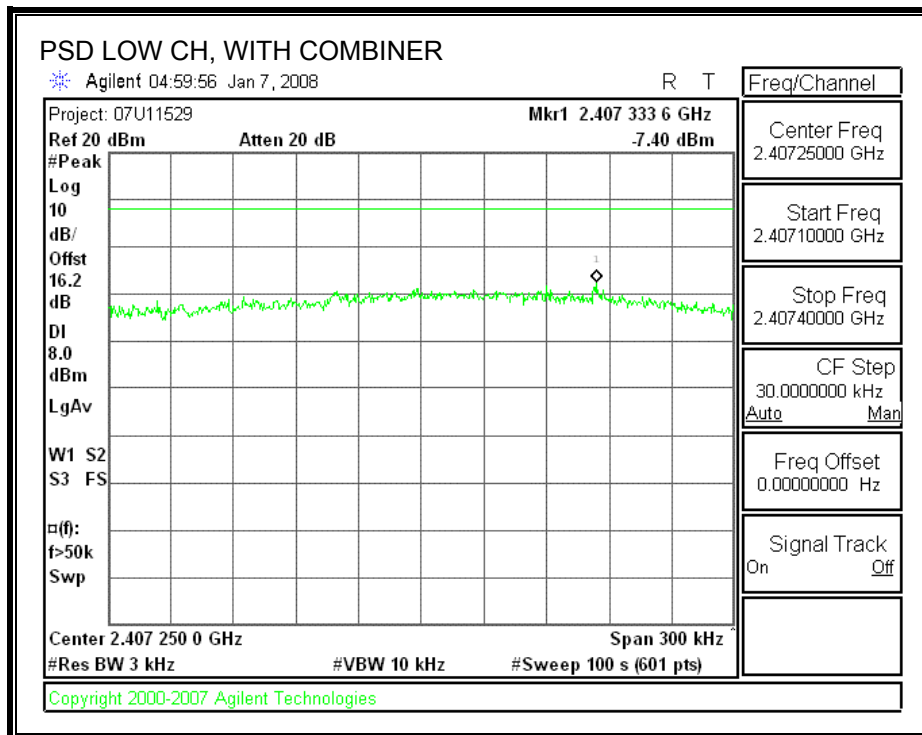
**TEST PROCEDURE**

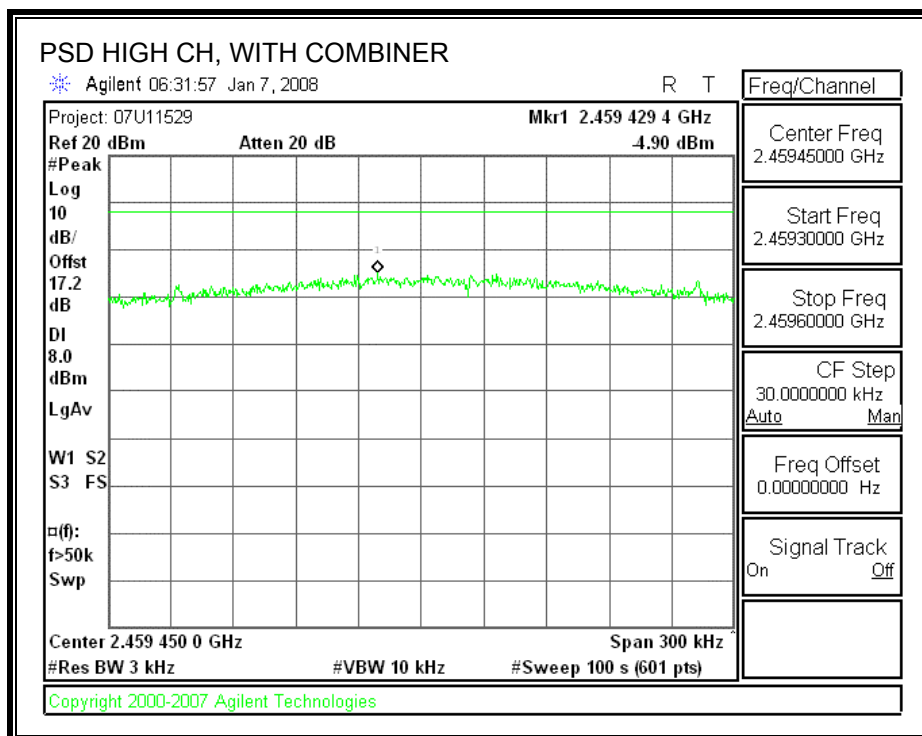
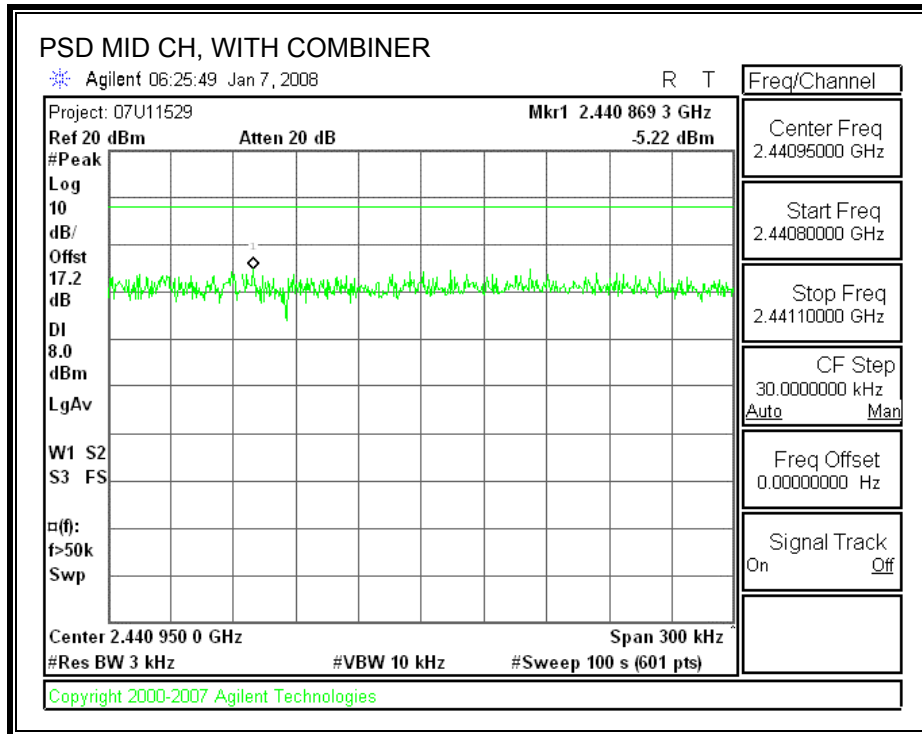
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

**RESULTS**

Channel	Frequency (MHz)	PSD with Combiner (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-7.40	8	-15.40
Middle	2437	-5.22	8	-13.22
High	2462	-4.90	8	-12.90

**POWER SPECTRAL DENSITY, WITH COMBINER**





### **7.3.5. CONDUCTED SPURIOUS EMISSIONS**

#### **LIMITS**

FCC §15.247 (d)

IC RSS-210 A8.5

Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

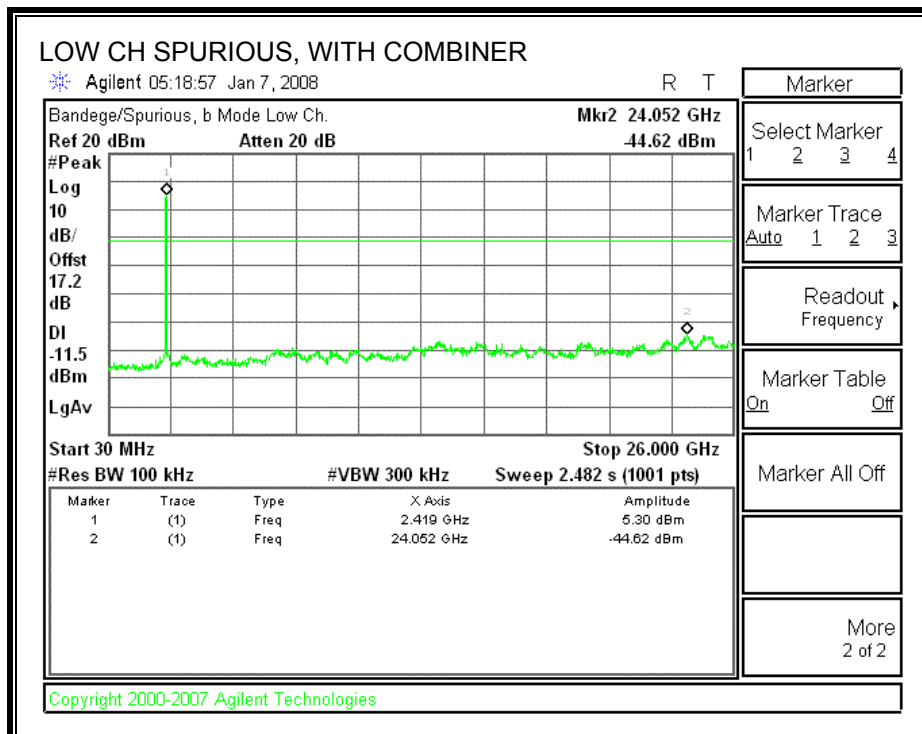
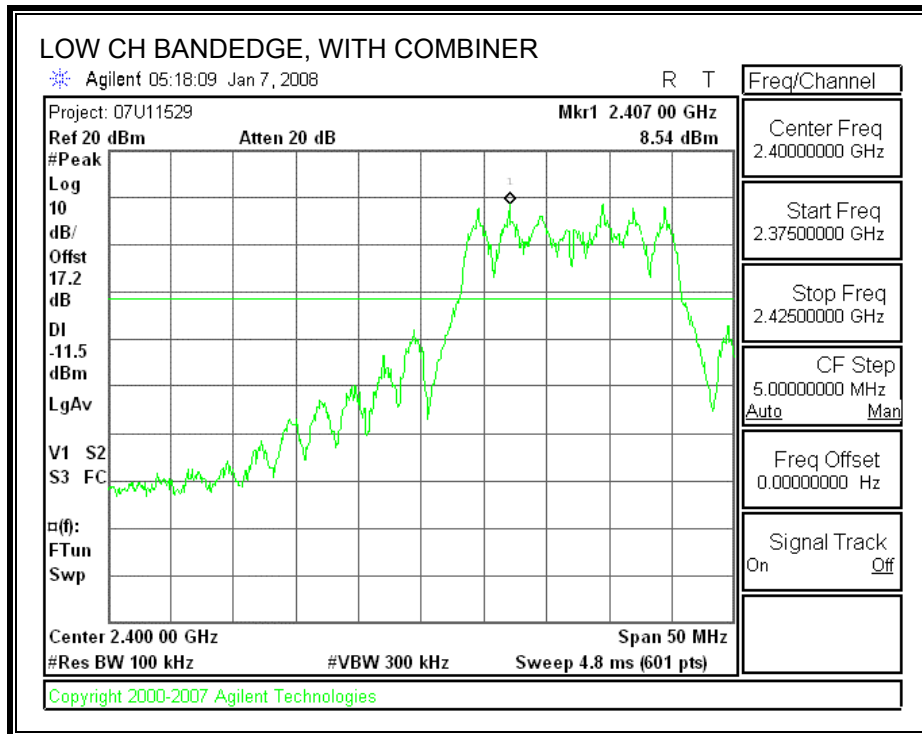
#### **TEST PROCEDURE**

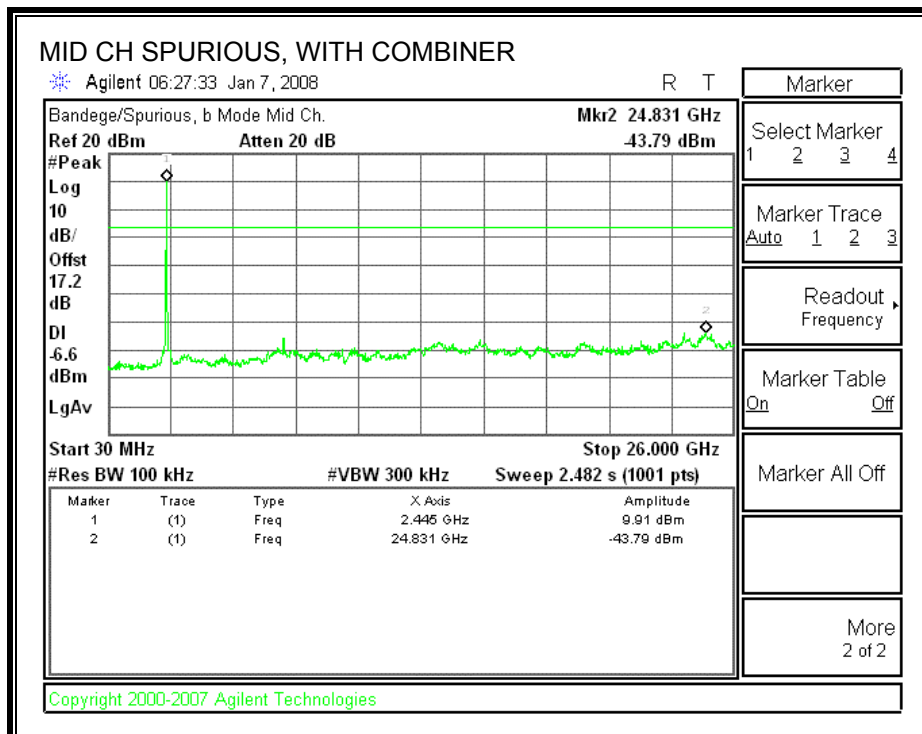
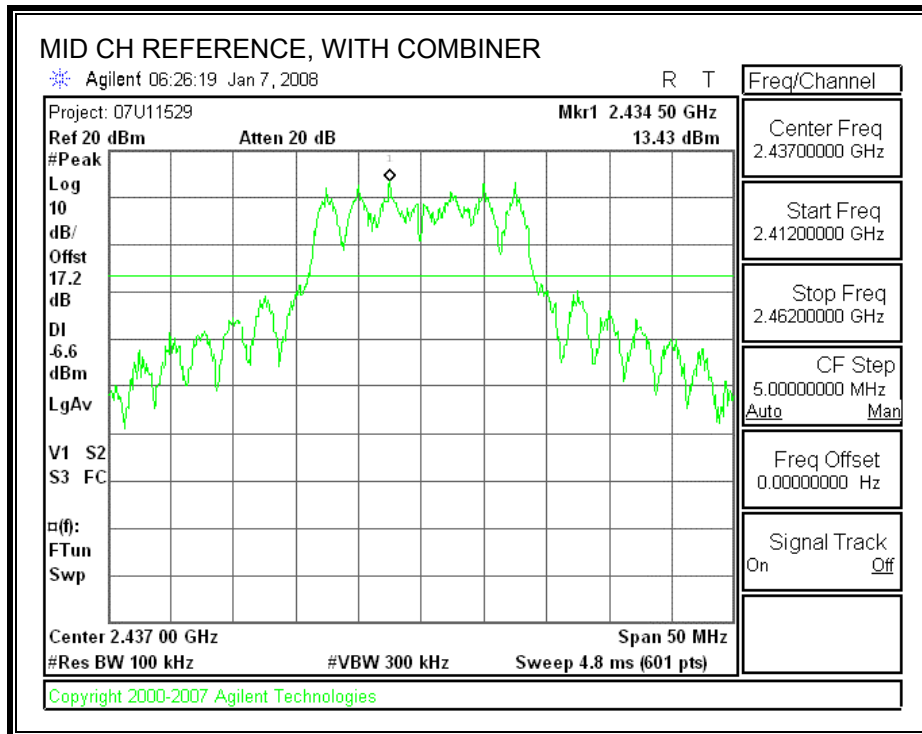
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

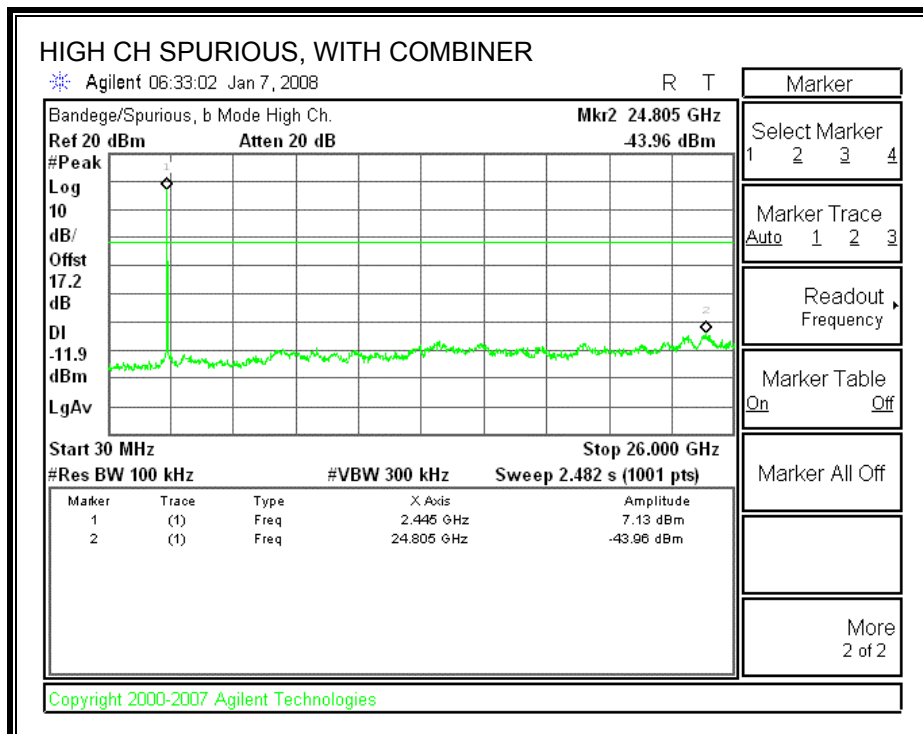
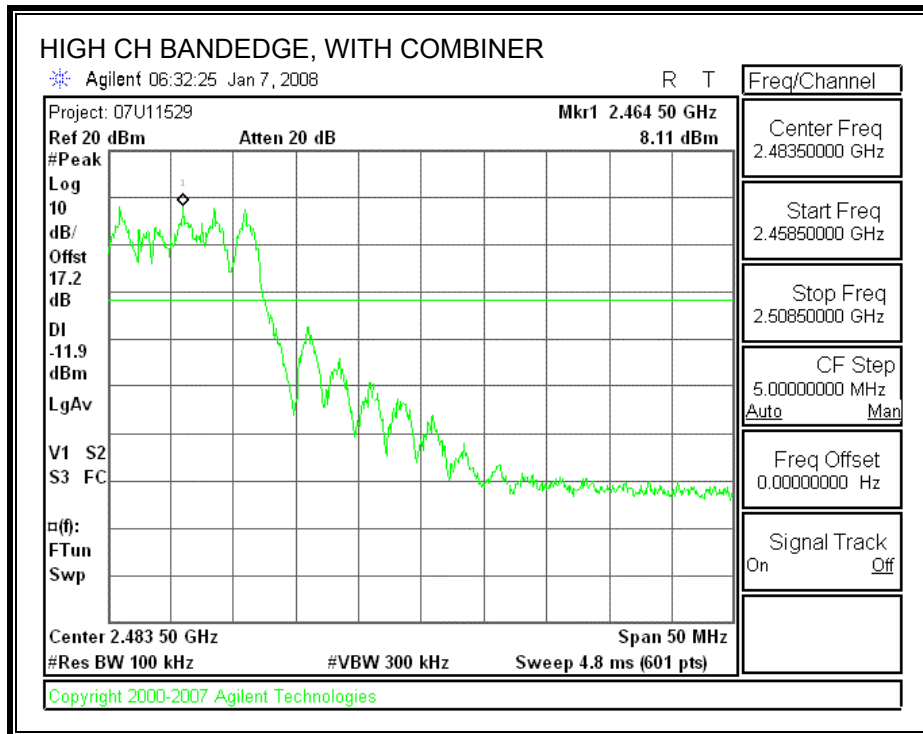
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

#### **RESULTS**

**SPURIOUS EMISSIONS WITH COMBINER**









**7.4. 802.11n HT40 MODE IN THE 2.4 GHz BAND**

**7.4.1. 6 dB BANDWIDTH**

**LIMITS**

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

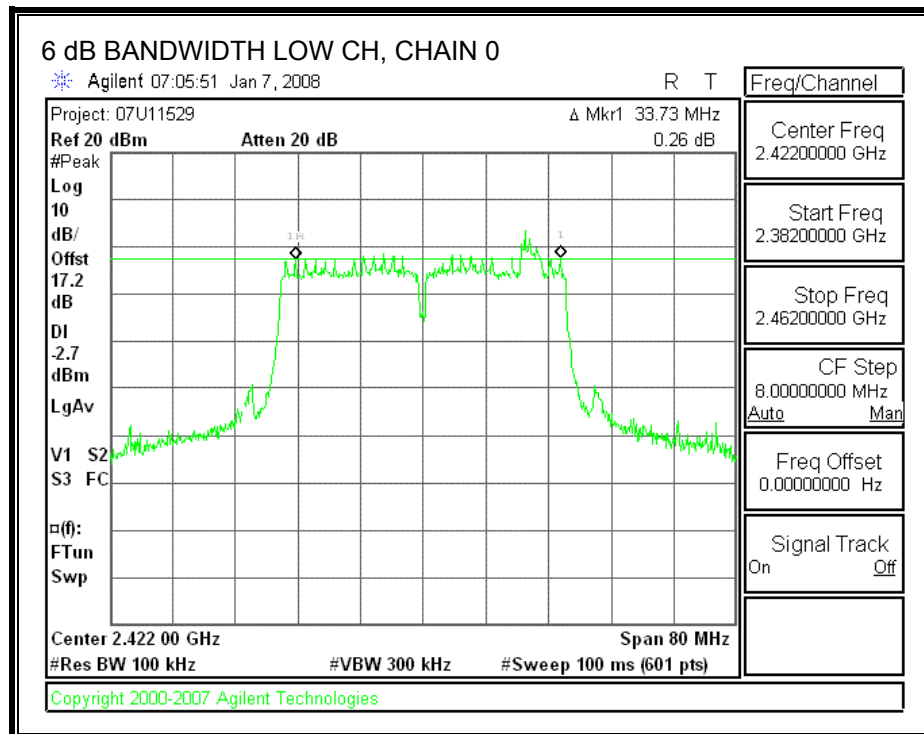
The minimum 6 dB bandwidth shall be at least 500 kHz.

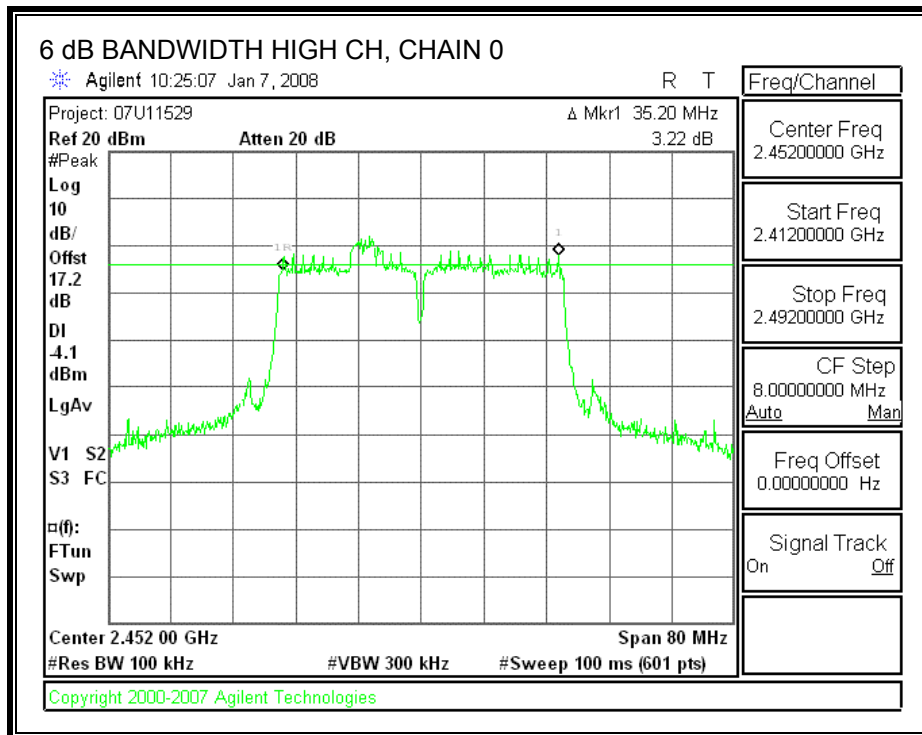
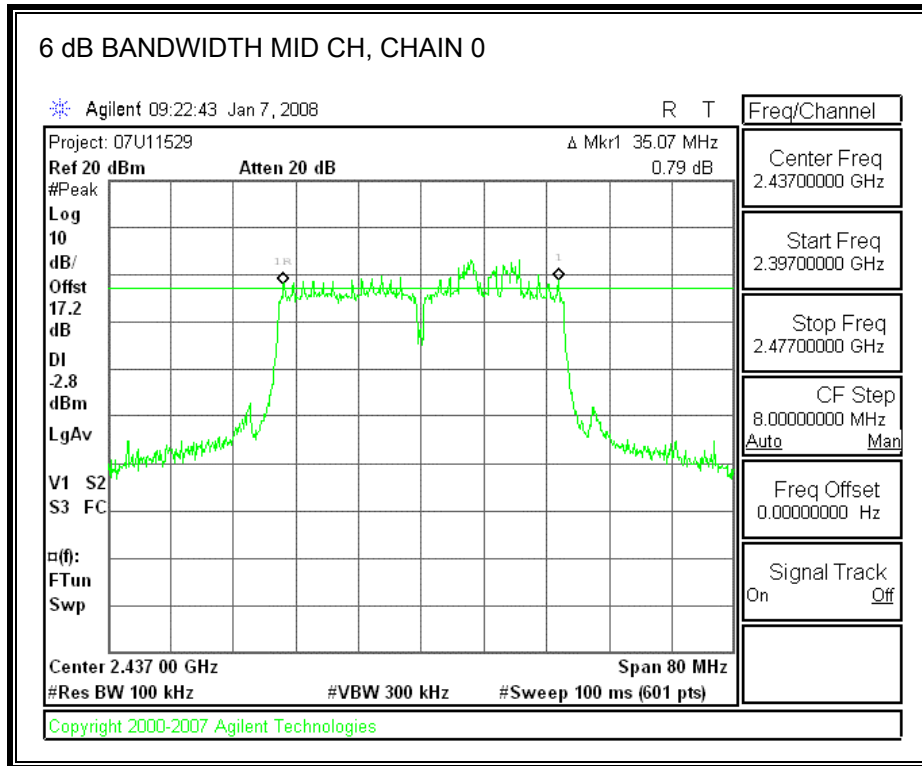
**TEST PROCEDURE**

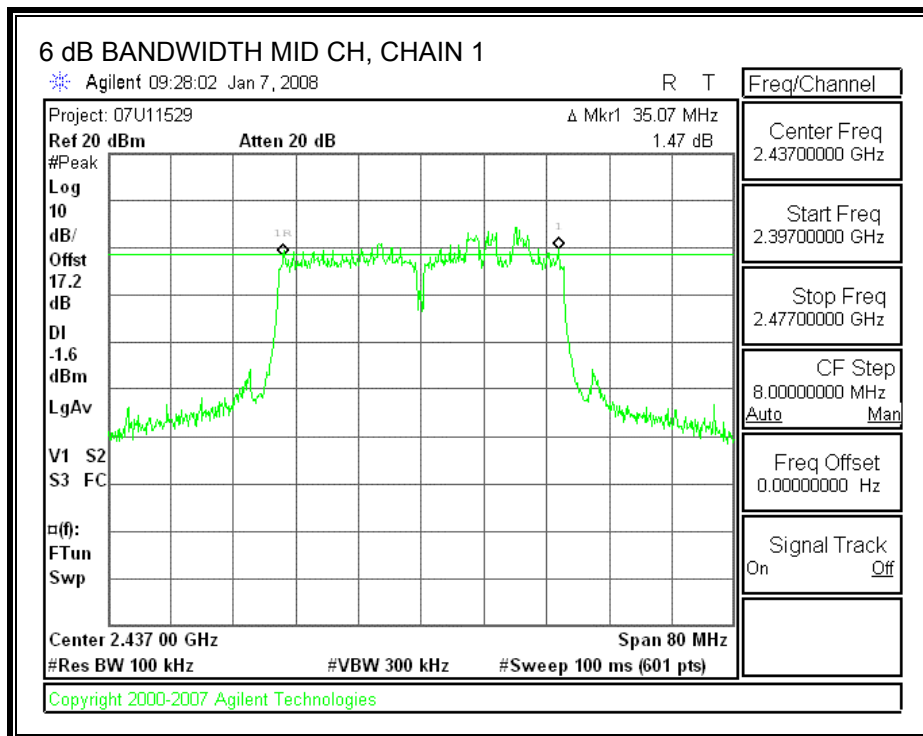
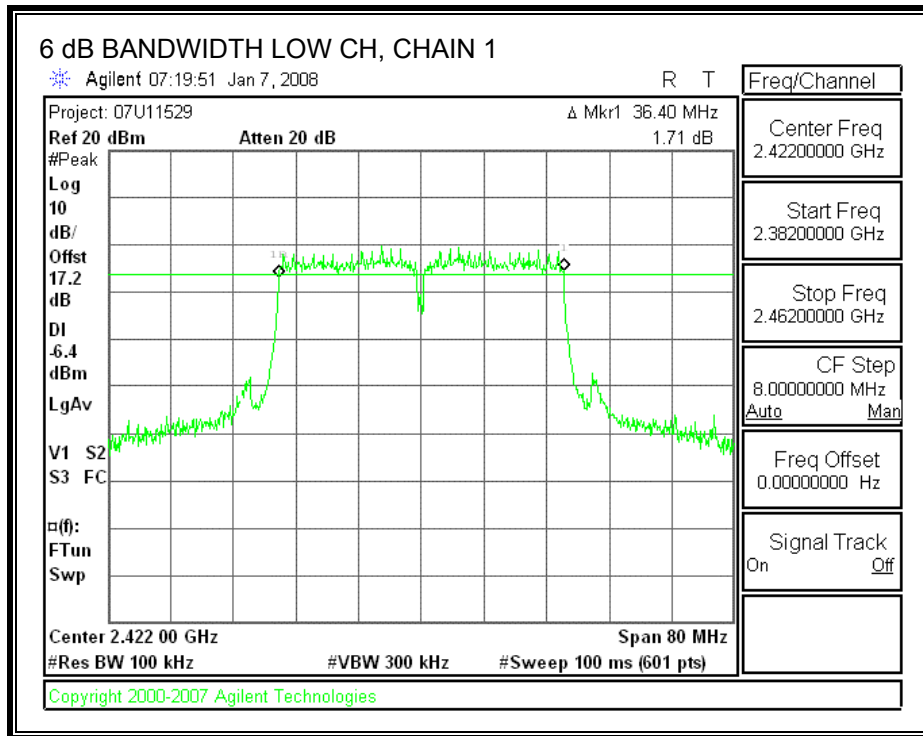
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

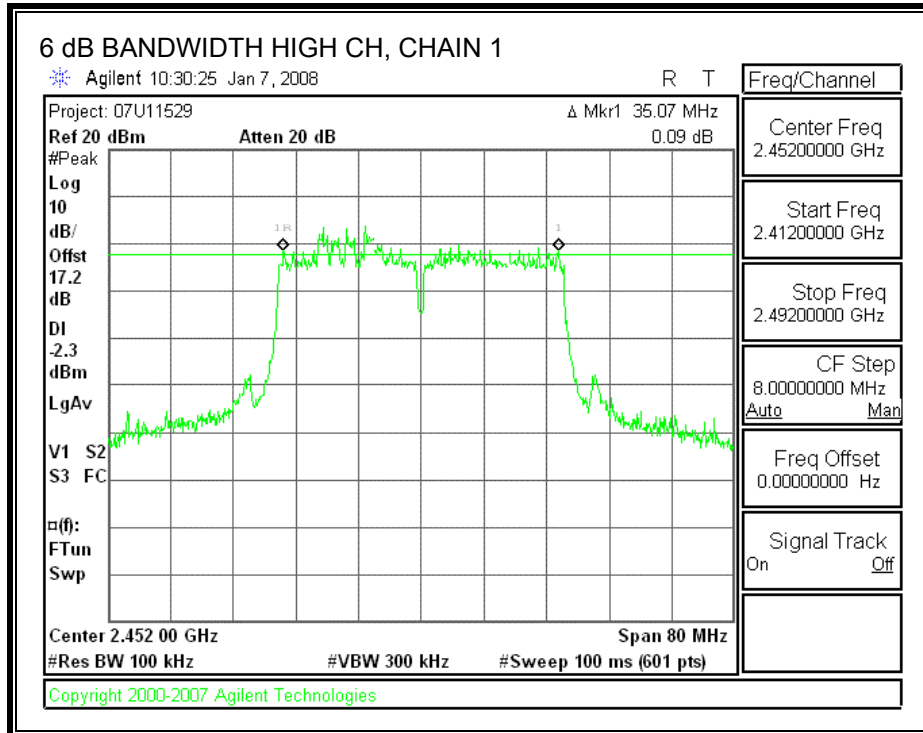
**RESULTS**

Channel	Frequency (MHz)	Chain 0 6 dB BW (MHz)	Chain 1 6 dB BW (MHz)	Minimum Limit (MHz)
Low	2417	33.73	36.40	0.5
Middle	2437	35.07	35.07	0.5
High	2457	35.2	35.07	0.5









**7.4.2. 99% BANDWIDTH**

**LIMITS**

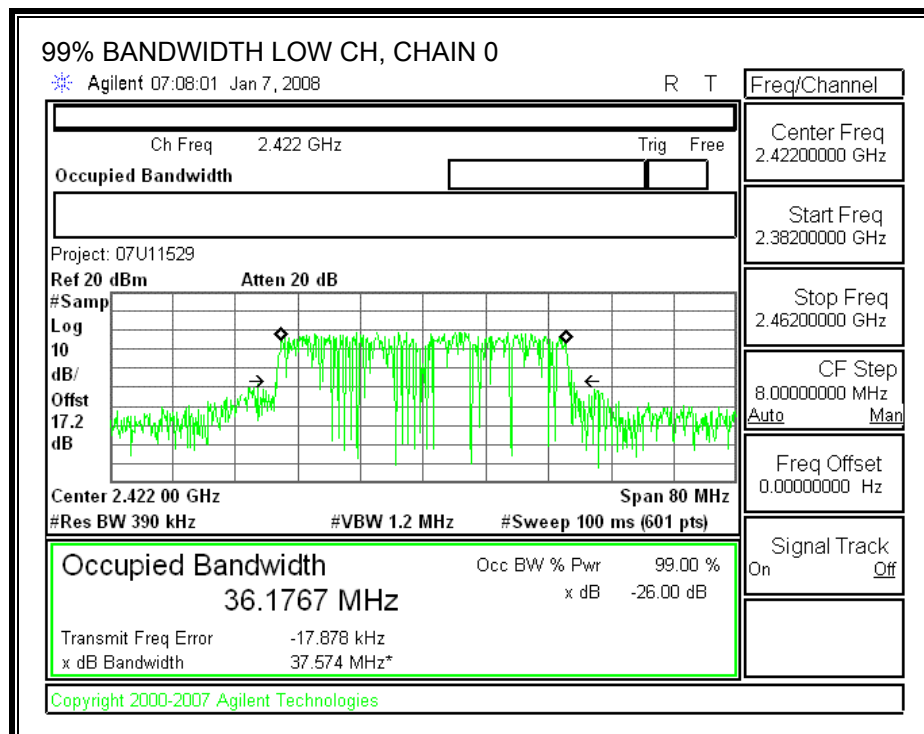
None; for reporting purposes only.

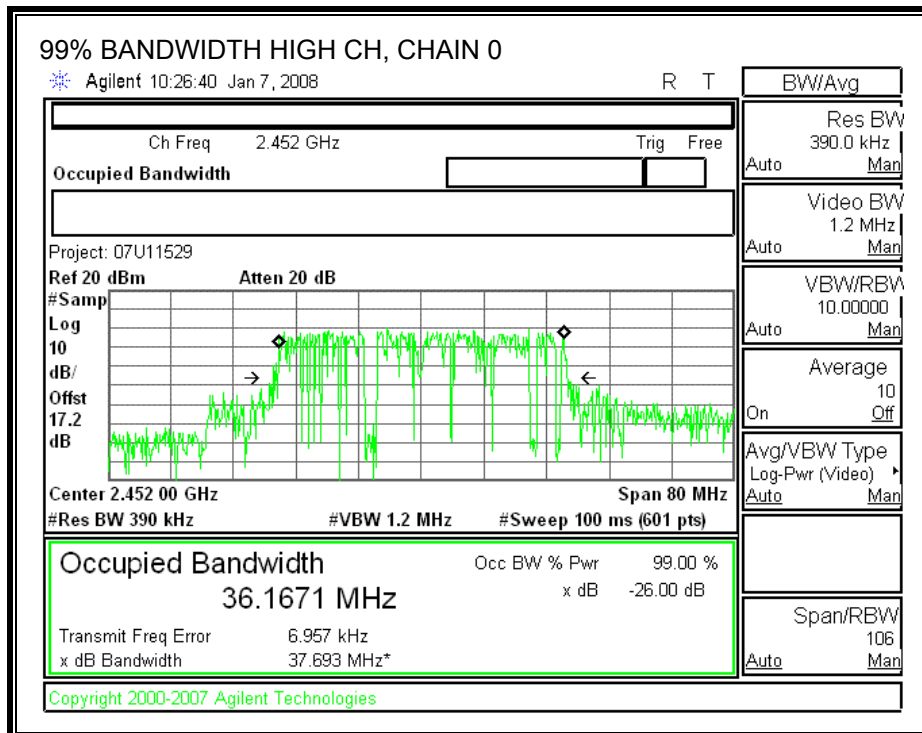
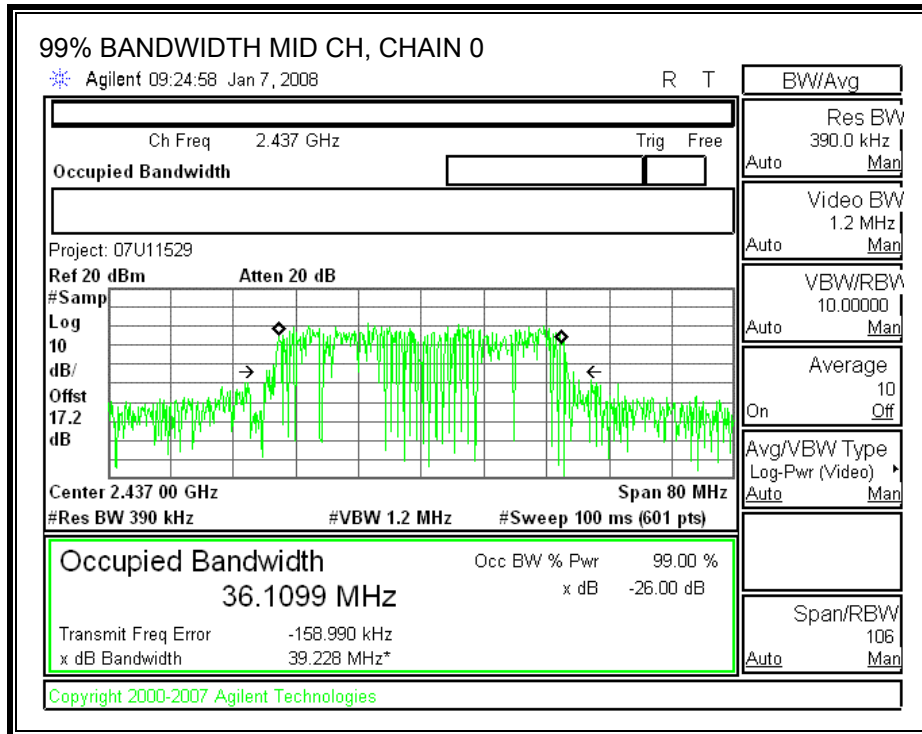
**TEST PROCEDURE**

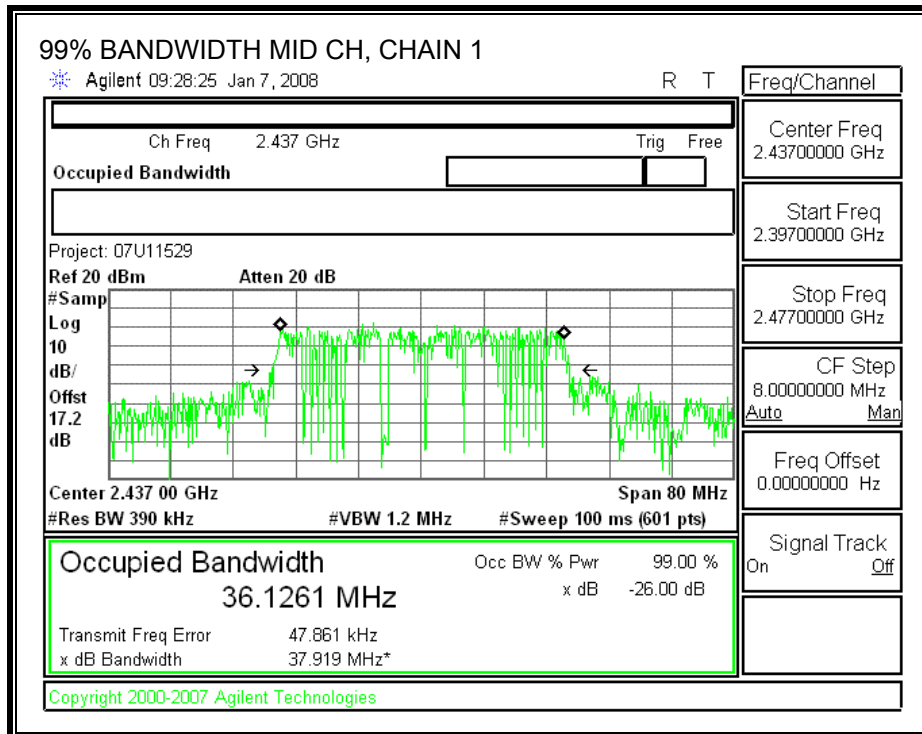
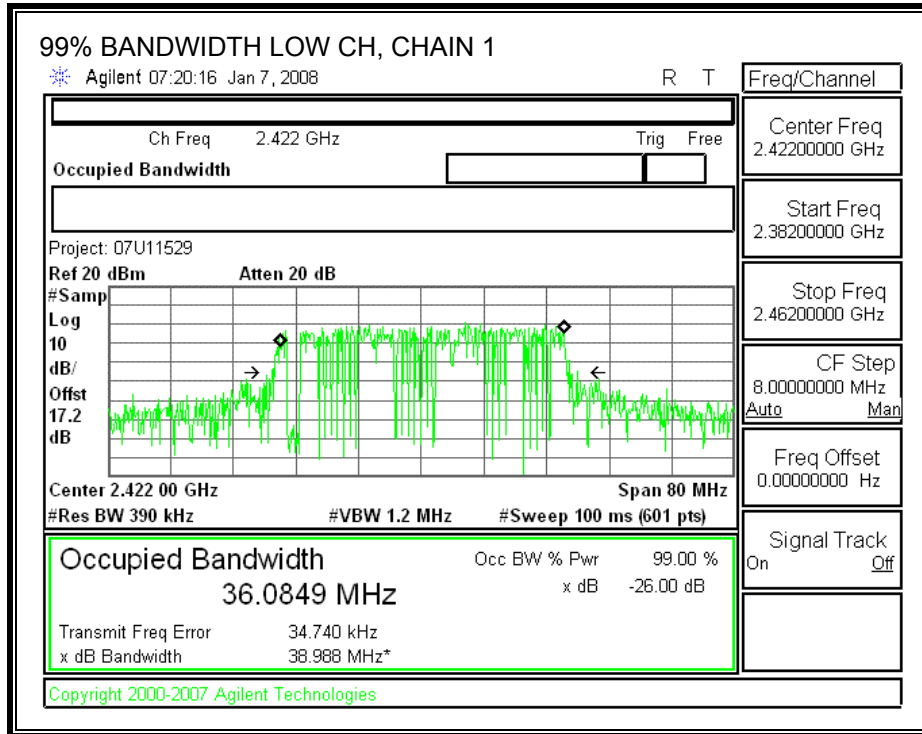
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

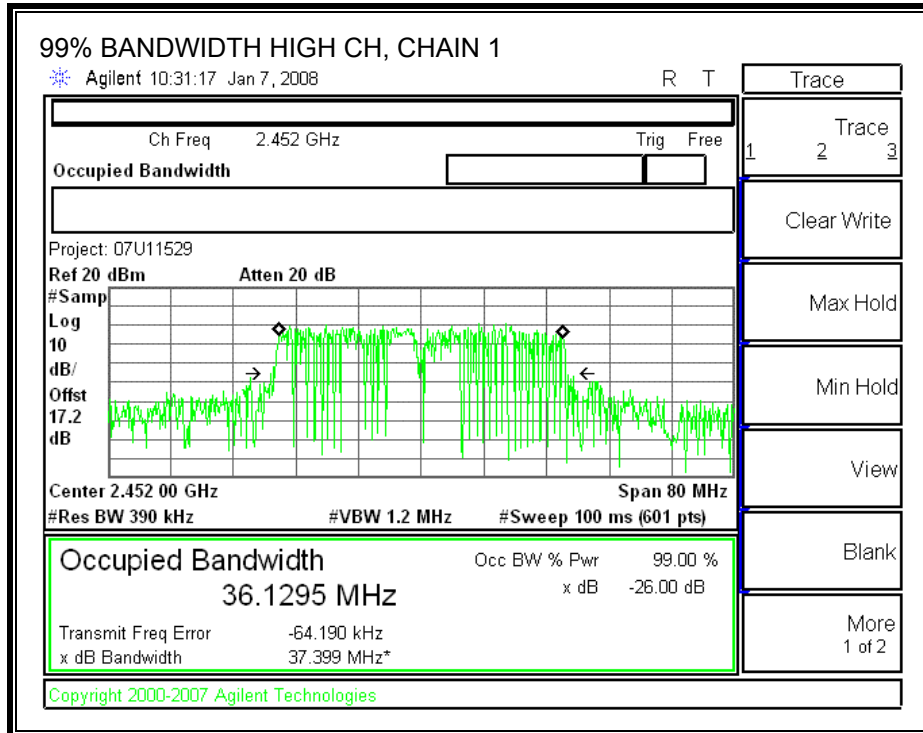
**RESULTS**

Channel	Frequency (MHz)	Chain 0 99% Bandwidth (MHz)	Chain 1 99% Bandwidth (MHz)
Low	2422	36.1767	36.0849
Middle	2437	36.1099	36.1261
High	2452	36.1671	36.1295











### 7.4.3. OUTPUT POWER

#### LIMITS

FCC §15.247 (b) & IC RSS-210 A8.4

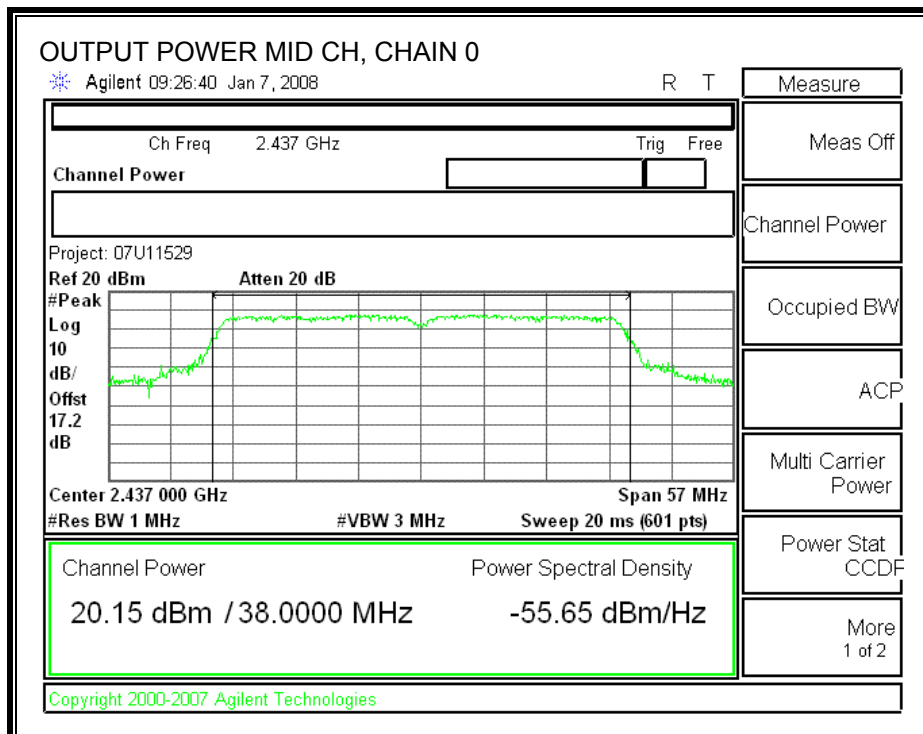
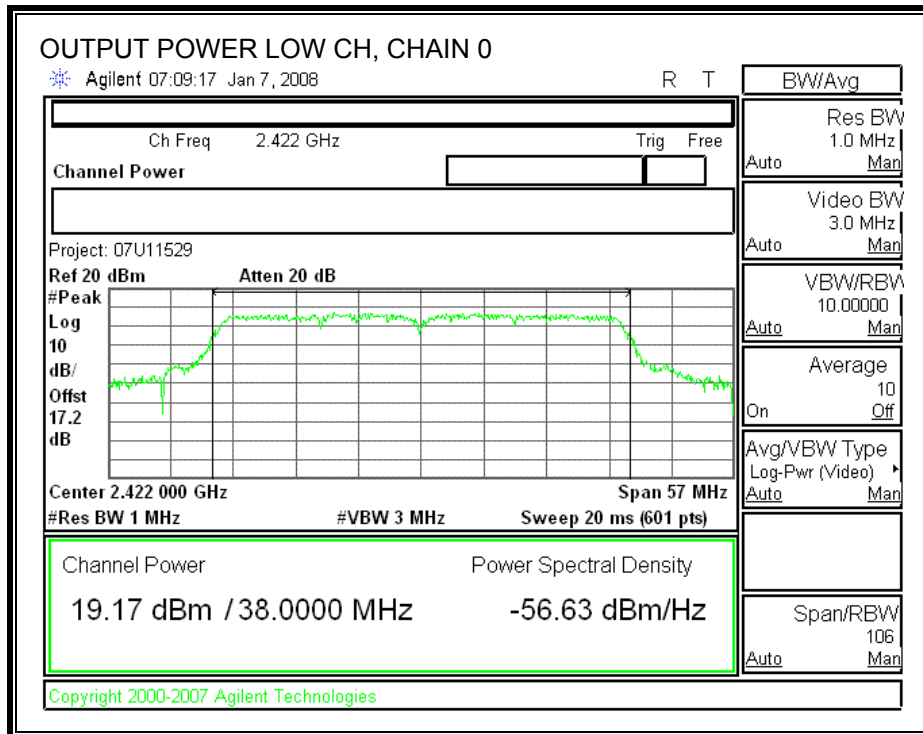
The maximum antenna gain is 6.91 dBi for other than fixed, point-to-point operations, therefore the limit is 29.09 dBm.

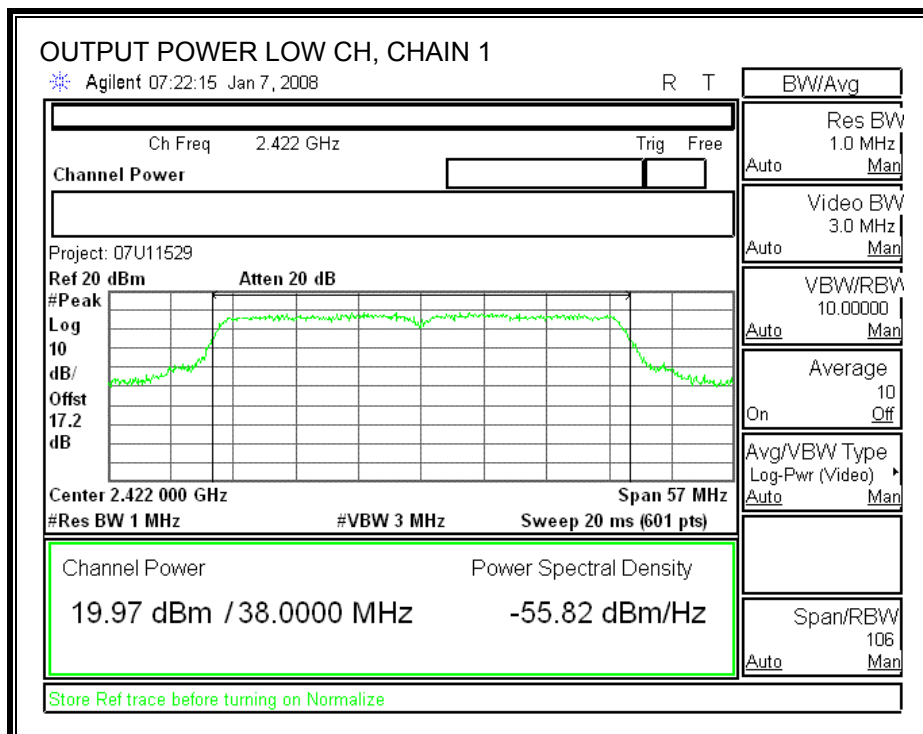
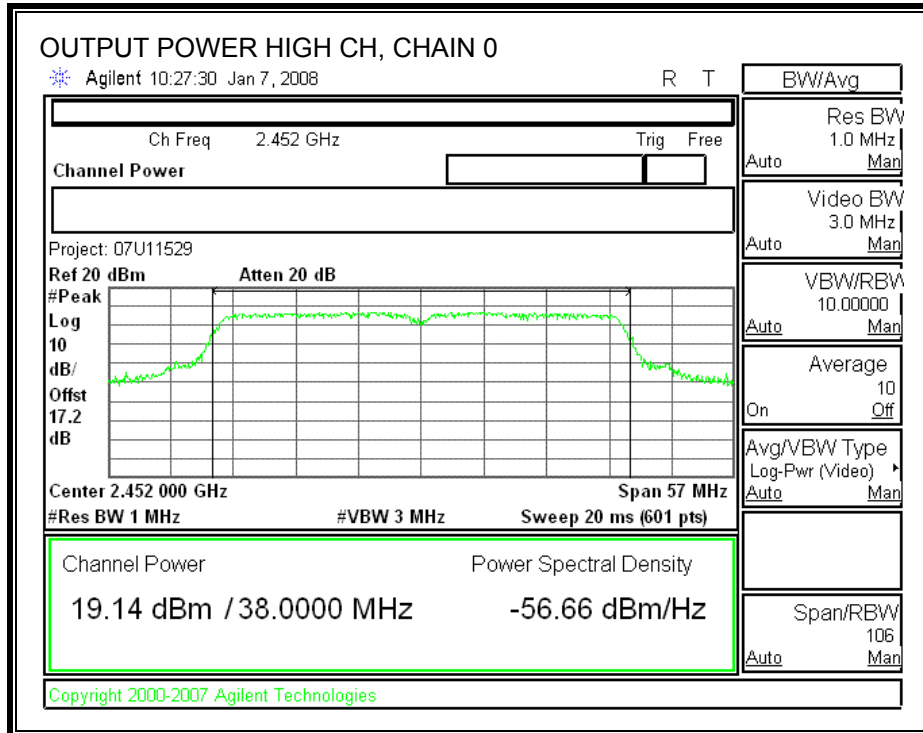
#### TEST PROCEDURE

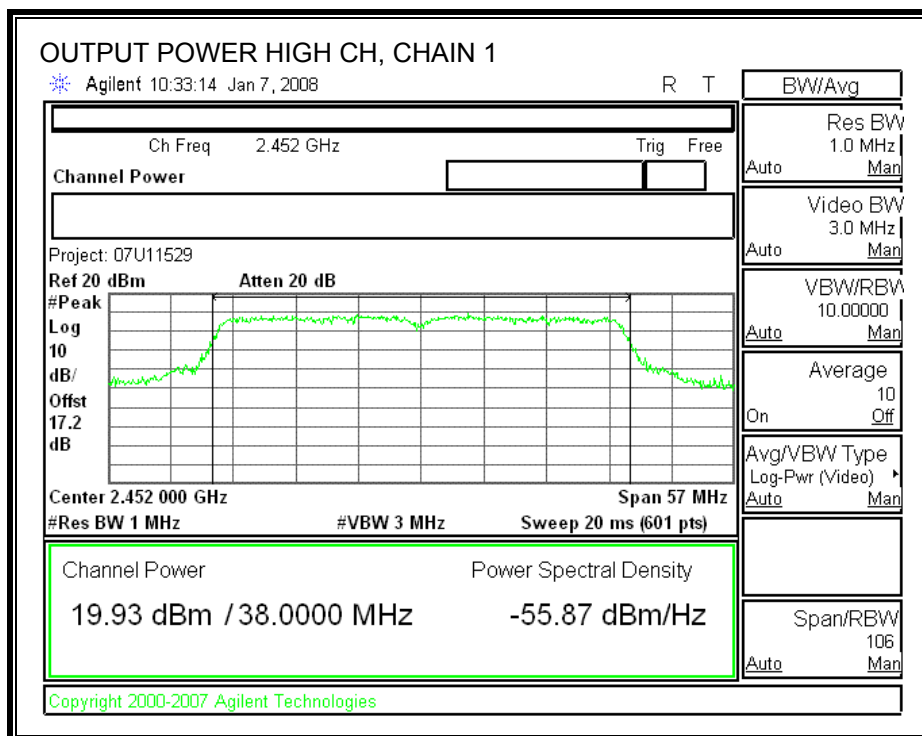
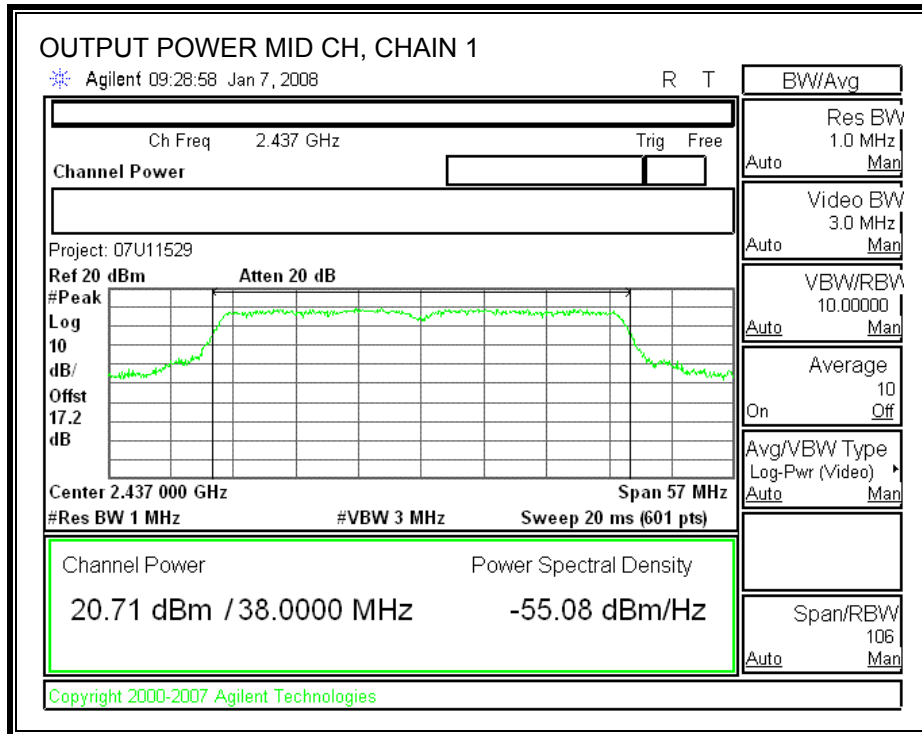
Peak power is measured using the spectrum analyzer's internal channel power integration function. Power is integrated over a bandwidth greater than or equal to the 99% bandwidth.

#### RESULTS

Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	2422	19.17	19.97	22.60	29.09	-6.49
Mid	2437	20.15	20.71	23.45	29.09	-5.64
High	2452	19.14	19.93	22.56	29.09	-6.53







**7.4.4. POWER SPECTRAL DENSITY**

**LIMITS**

FCC §15.247 (e) & IC RSS-210 A8.2 (b)

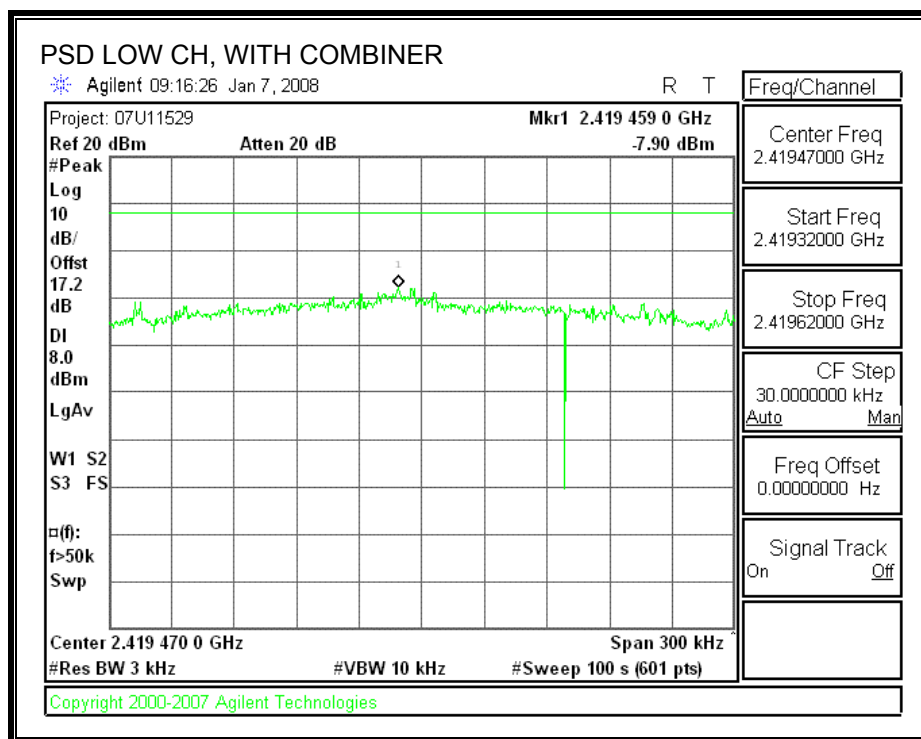
The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

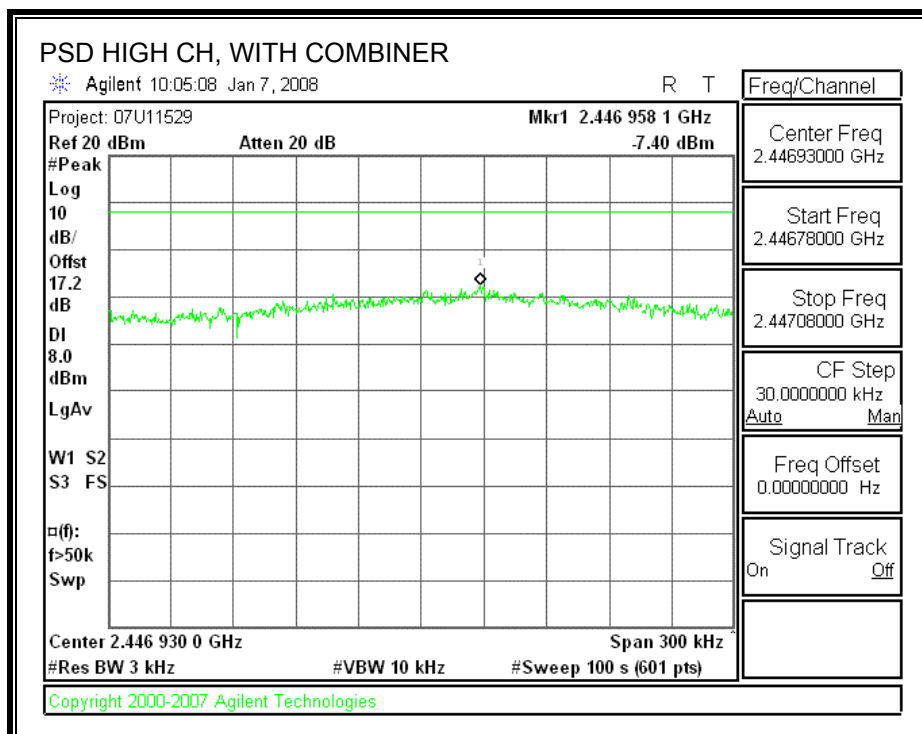
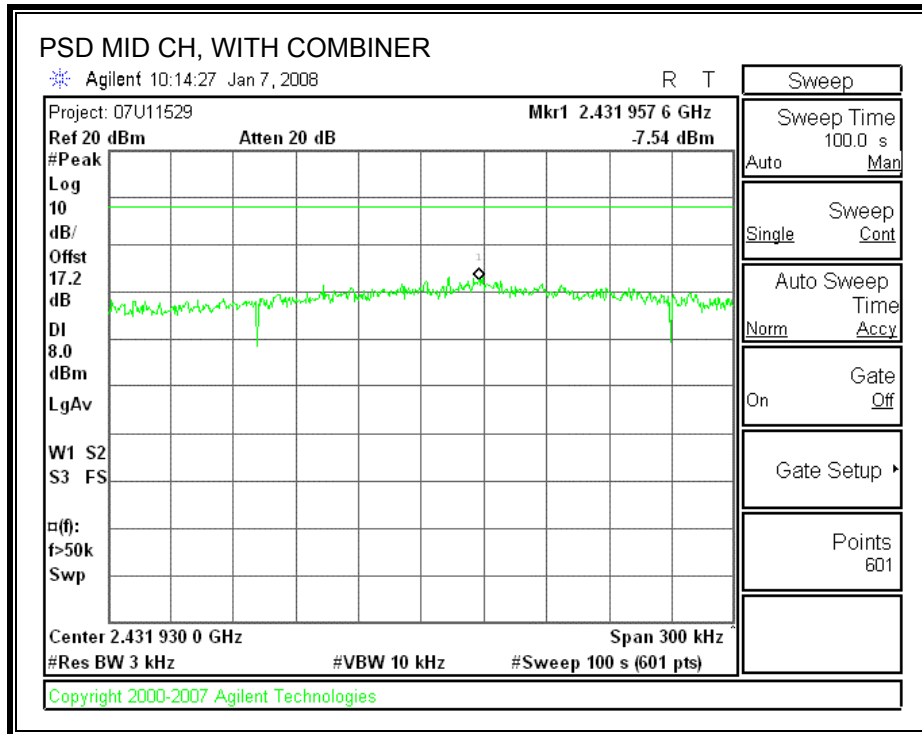
**TEST PROCEDURE**

Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

**RESULTS**

Channel	Frequency (MHz)	PSD with Combiner (dBm)	Limit (dBm)	Margin (dB)
Low	2417	-7.90	8	-15.90
Middle	2437	-7.54	8	-15.54
High	2457	-7.40	8	-15.40





#### **7.4.5. CONDUCTED SPURIOUS EMISSIONS**

##### **LIMITS**

FCC §15.247 (d)

IC RSS-210 A8.5

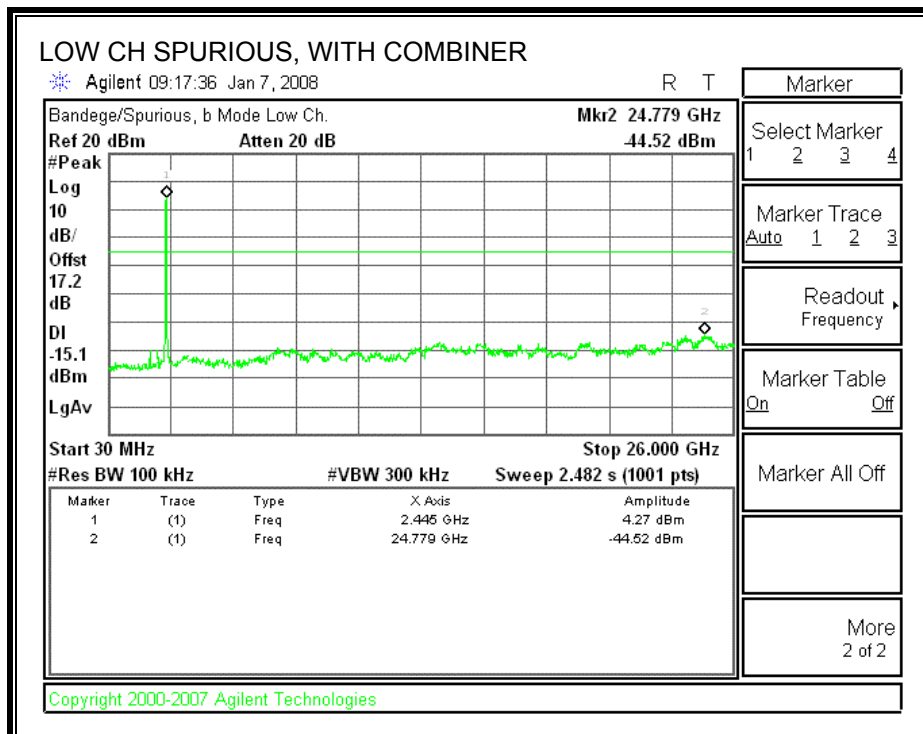
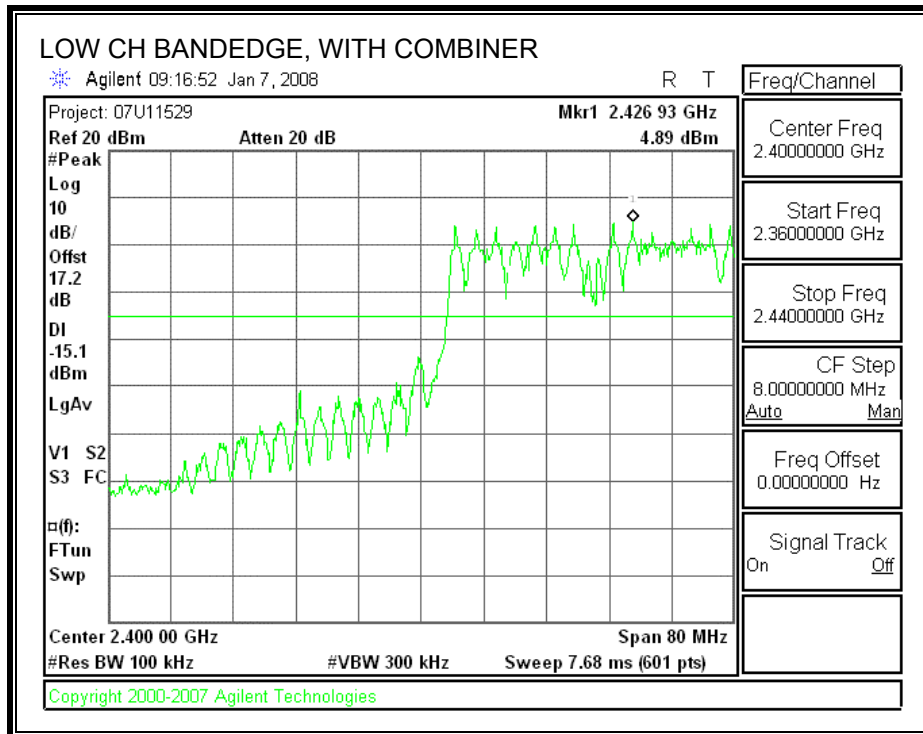
Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

##### **TEST PROCEDURE**

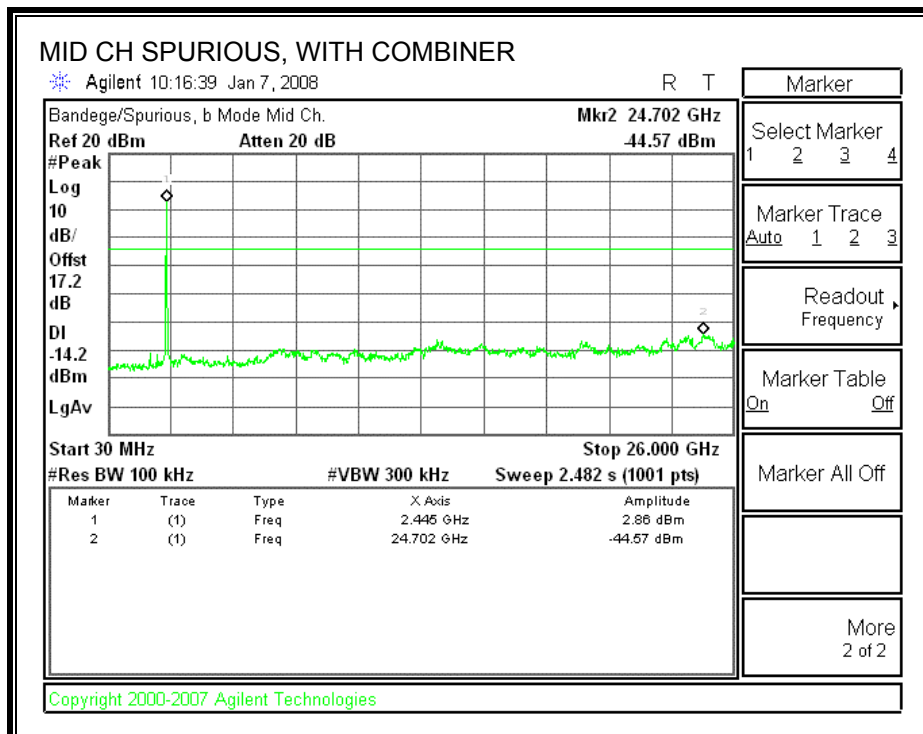
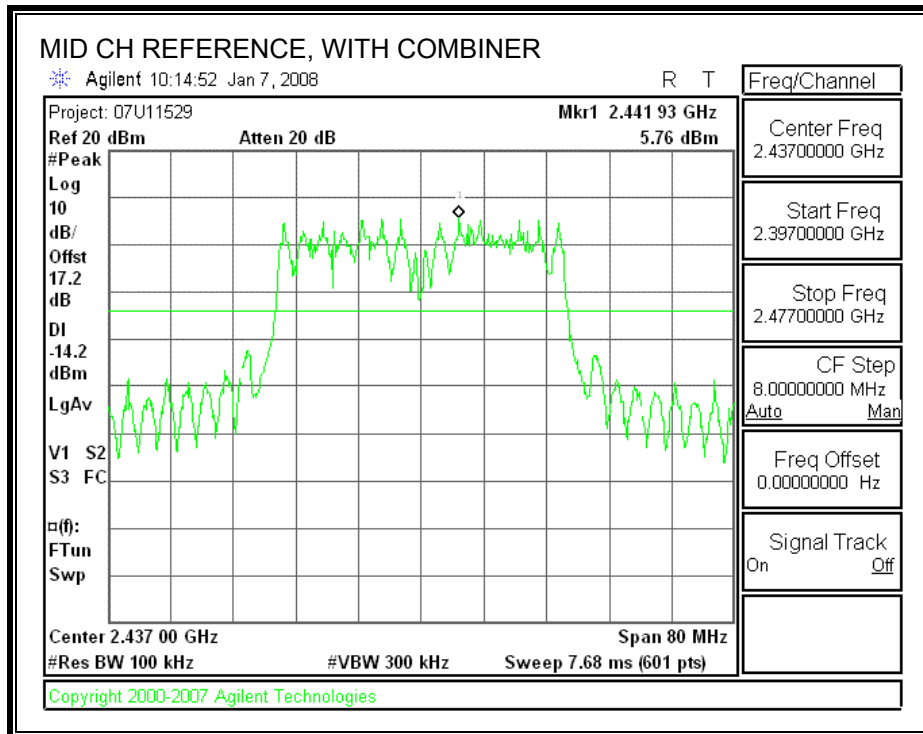
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

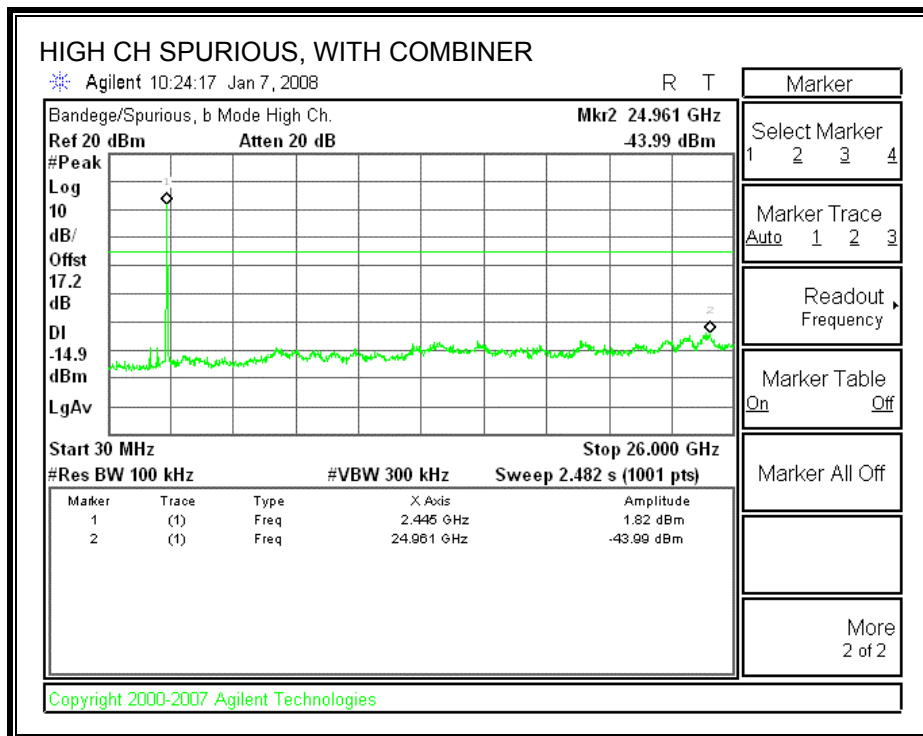
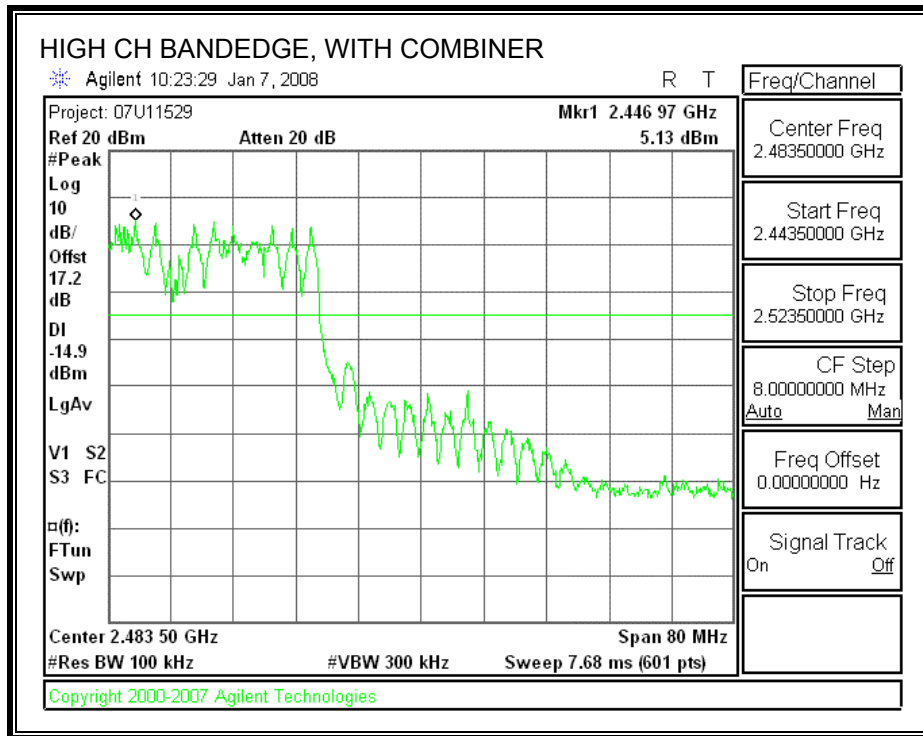
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

##### **RESULTS**









**7.5. 802.11a MODE**

**7.5.1. 6 dB BANDWIDTH**

**LIMITS**

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

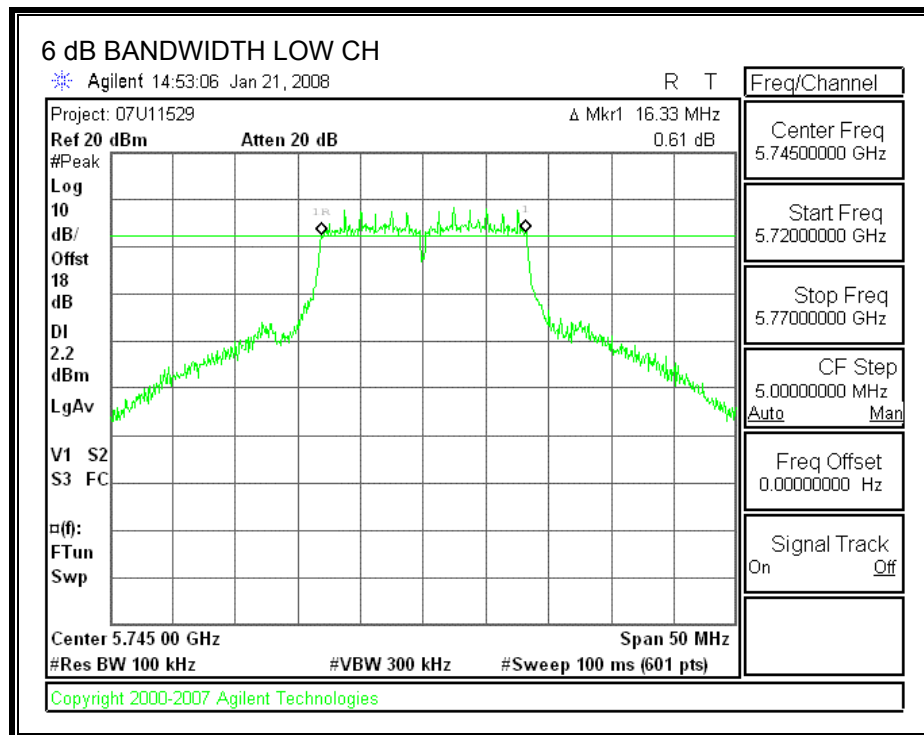
The minimum 6 dB bandwidth shall be at least 500 kHz.

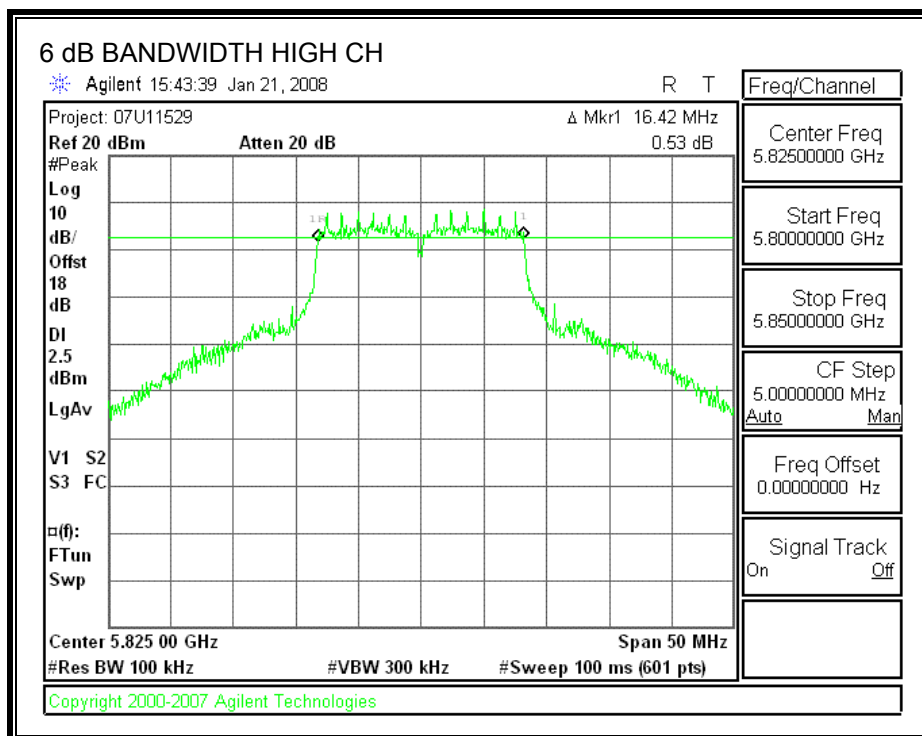
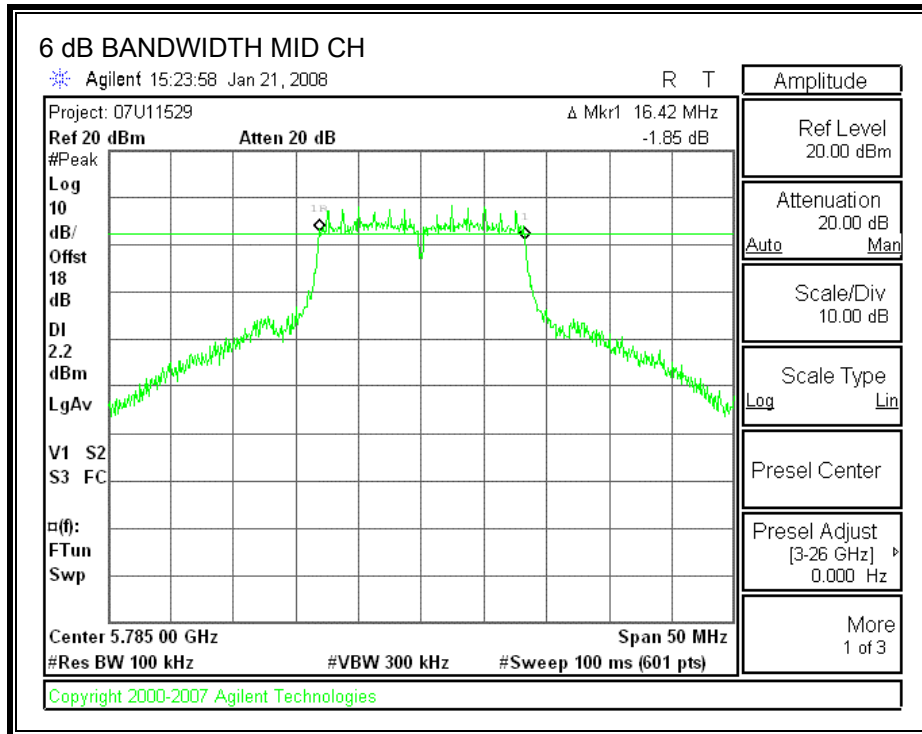
**TEST PROCEDURE**

The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

**RESULTS**

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	5745	16.33	0.5
Middle	5785	16.42	0.5
High	5825	16.42	0.5





**7.5.2. 99% BANDWIDTH**

**LIMITS**

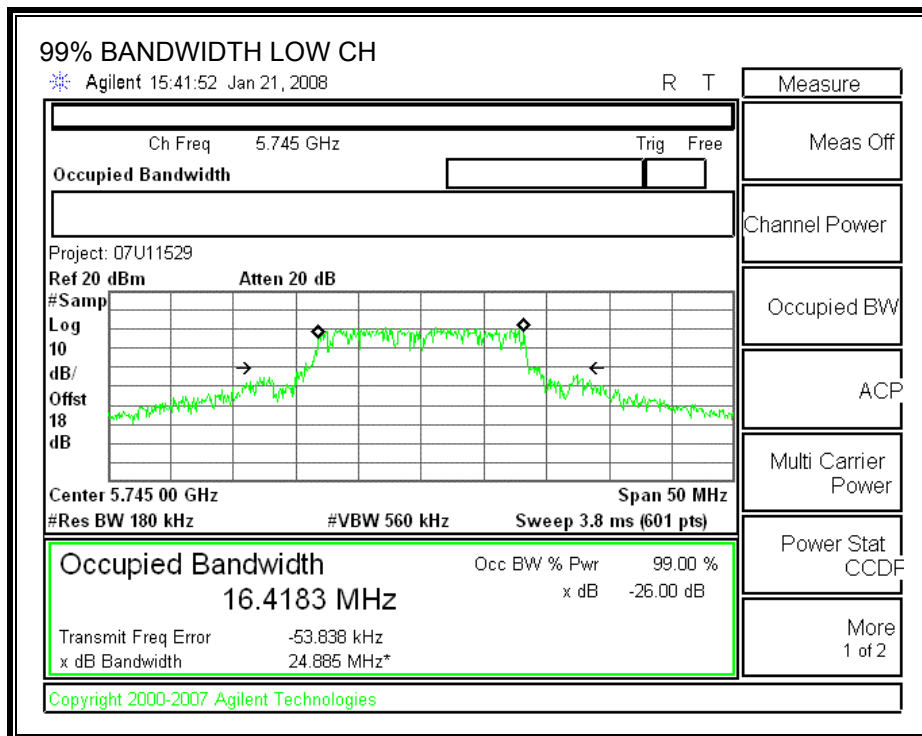
None; for reporting purposes only.

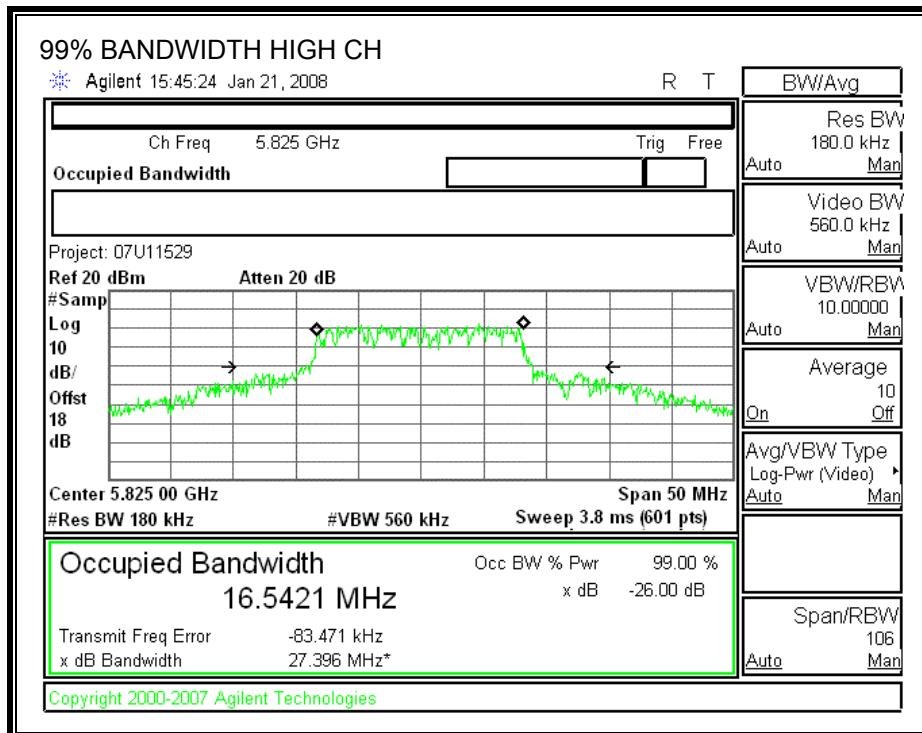
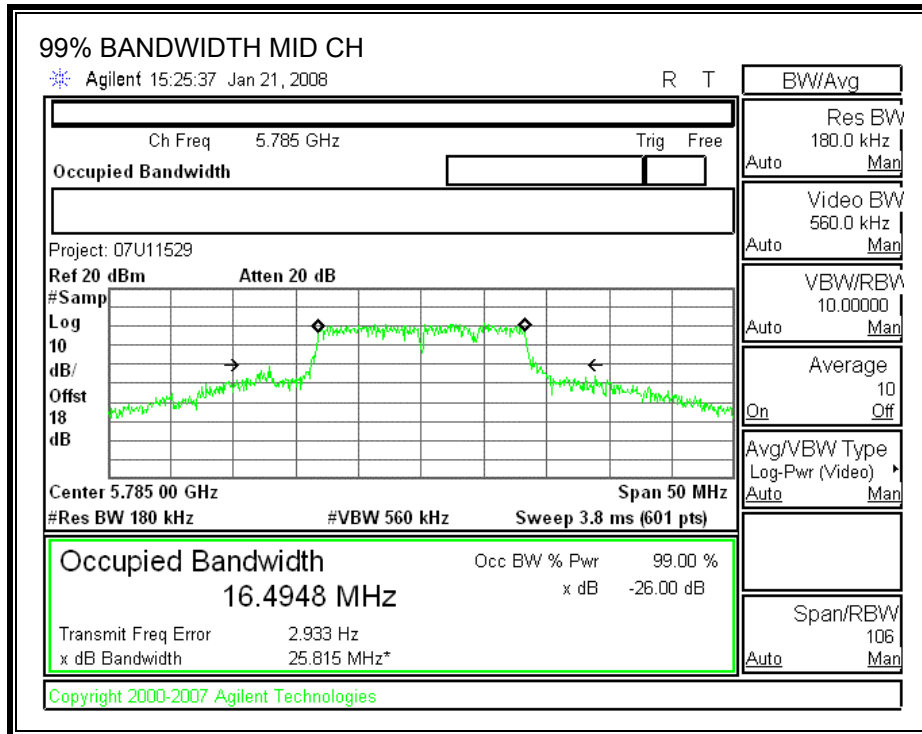
**TEST PROCEDURE**

The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

**RESULTS**

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5745	16.4183
Middle	5785	16.4948
High	5825	16.5421





### 7.5.3. OUTPUT POWER

#### LIMITS

FCC §15.247 (b) & IC RSS-210 A8.4

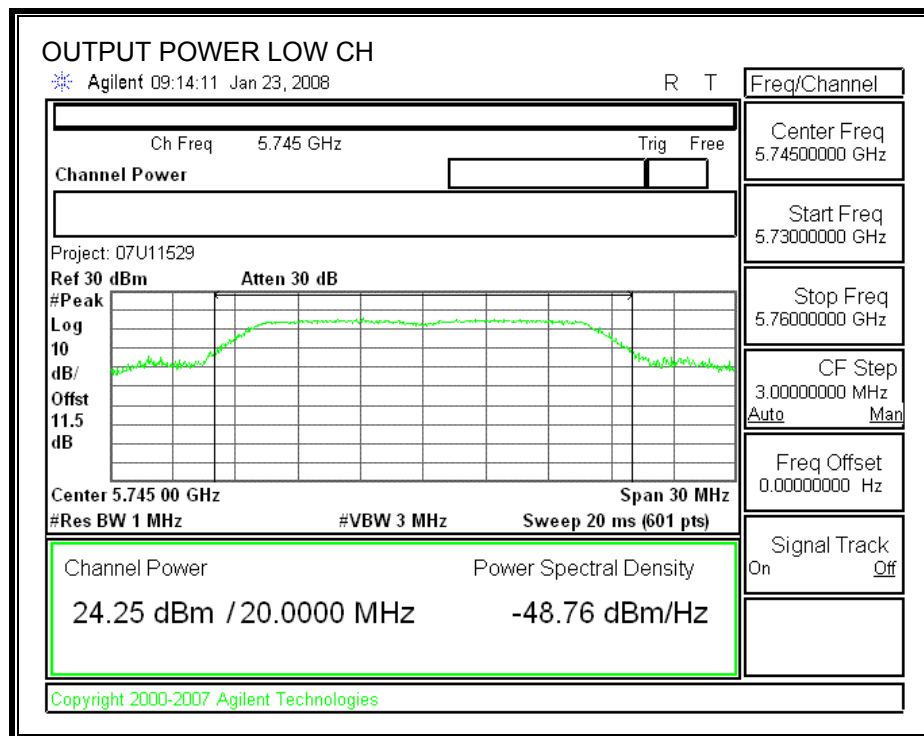
The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 30 dBm.

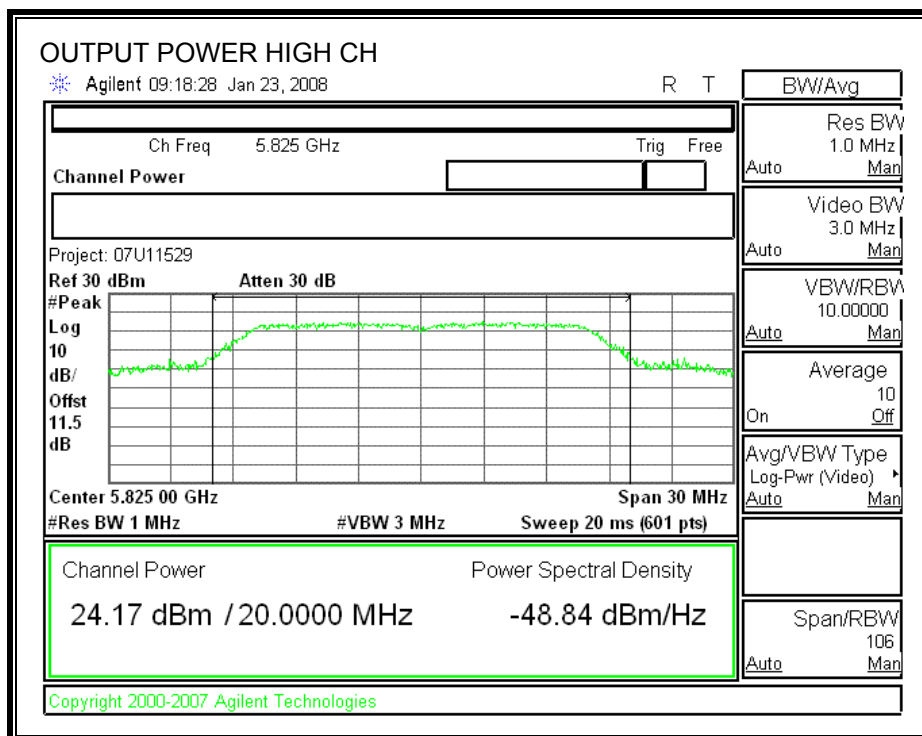
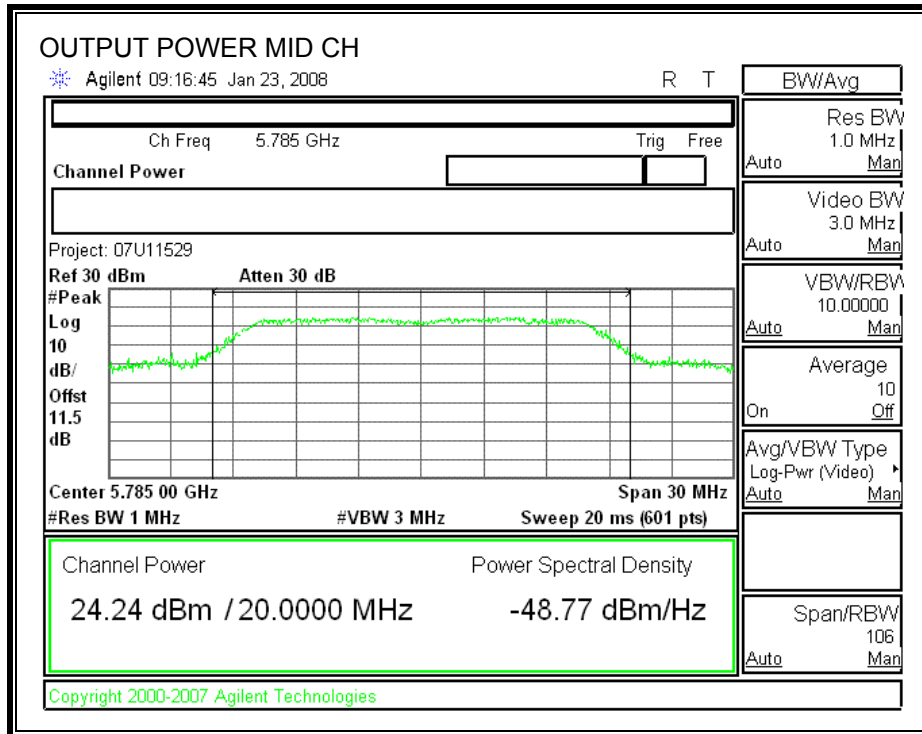
#### TEST PROCEDURE

Peak power is measured using the spectrum analyzer's internal channel power integration function. Power is integrated over a bandwidth greater than or equal to the 99% bandwidth.

#### RESULTS

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	5745	24.25	30	-5.75
Middle	5785	24.24	30	-5.76
High	5825	24.17	30	-5.83







**7.5.4. POWER SPECTRAL DENSITY**

**LIMITS**

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

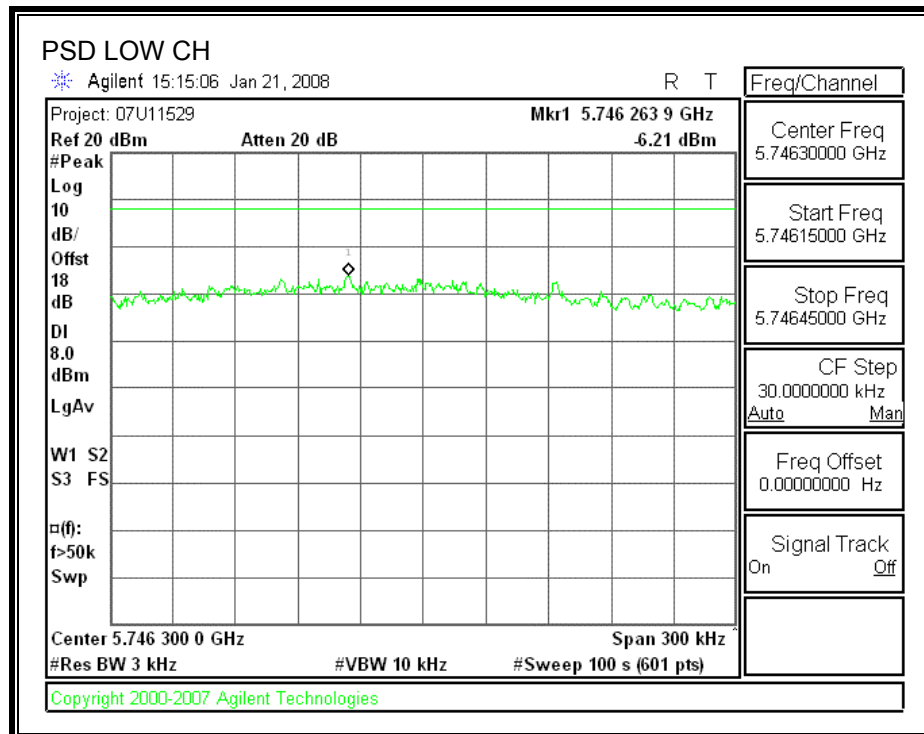
The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

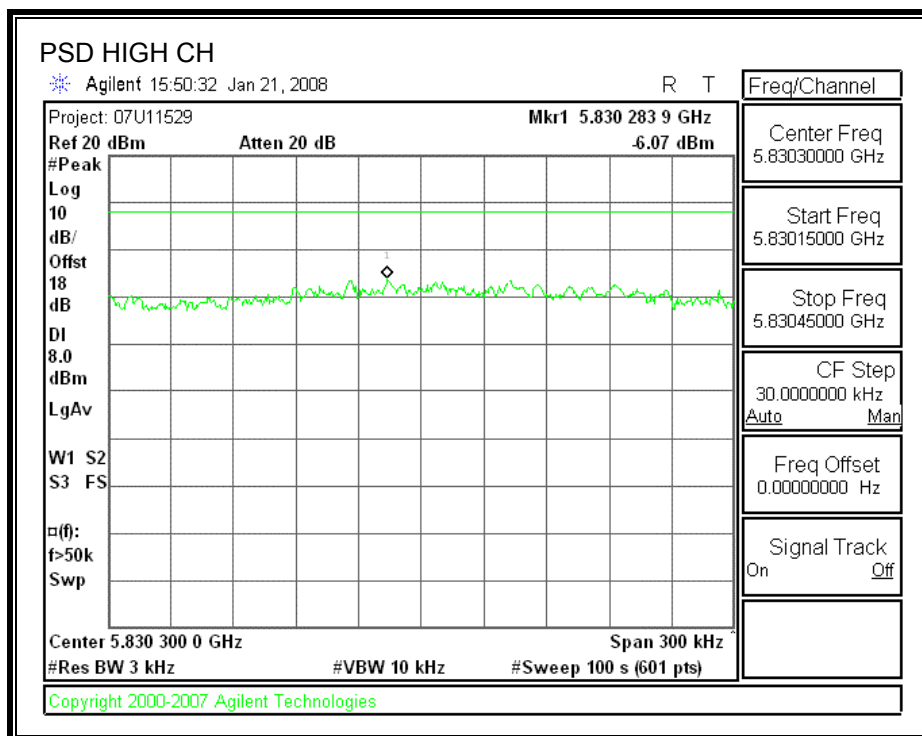
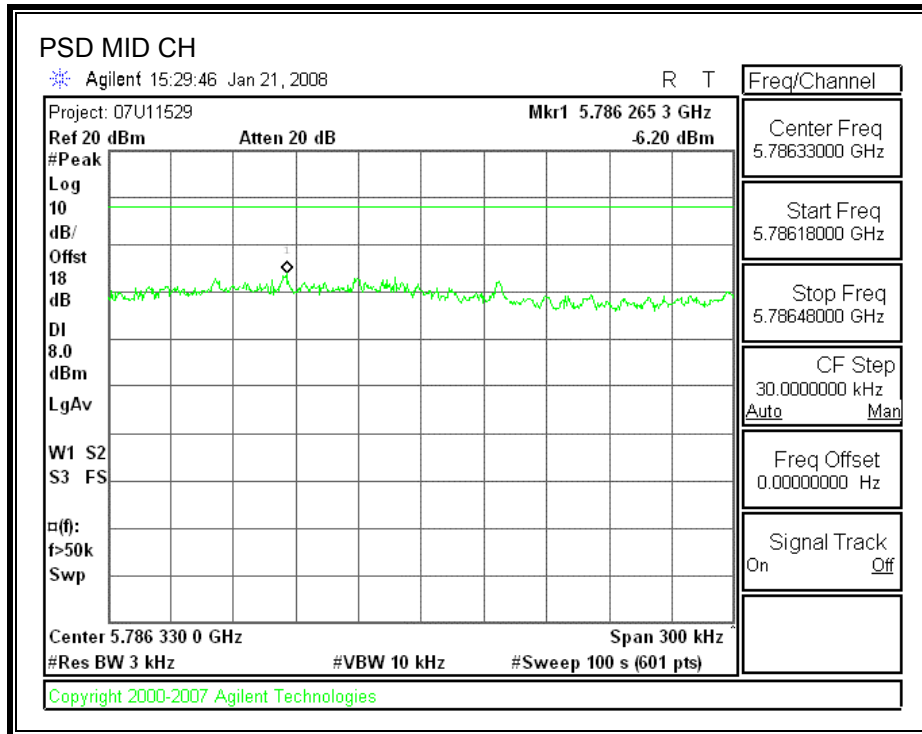
**TEST PROCEDURE**

Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

**RESULTS**

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5745	-6.21	8	-14.21
Middle	5785	-6.20	8	-14.20
High	5825	-6.07	8	-14.07





## **7.5.5. CONDUCTED SPURIOUS EMISSIONS**

### **LIMITS**

FCC §15.247 (d)

IC RSS-210 A8.5

Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

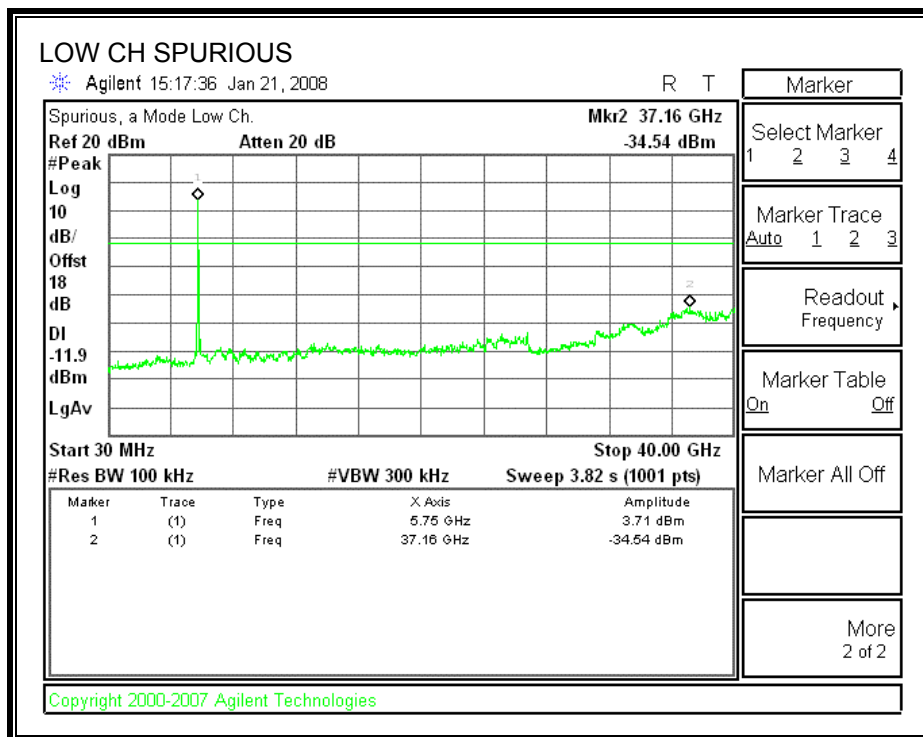
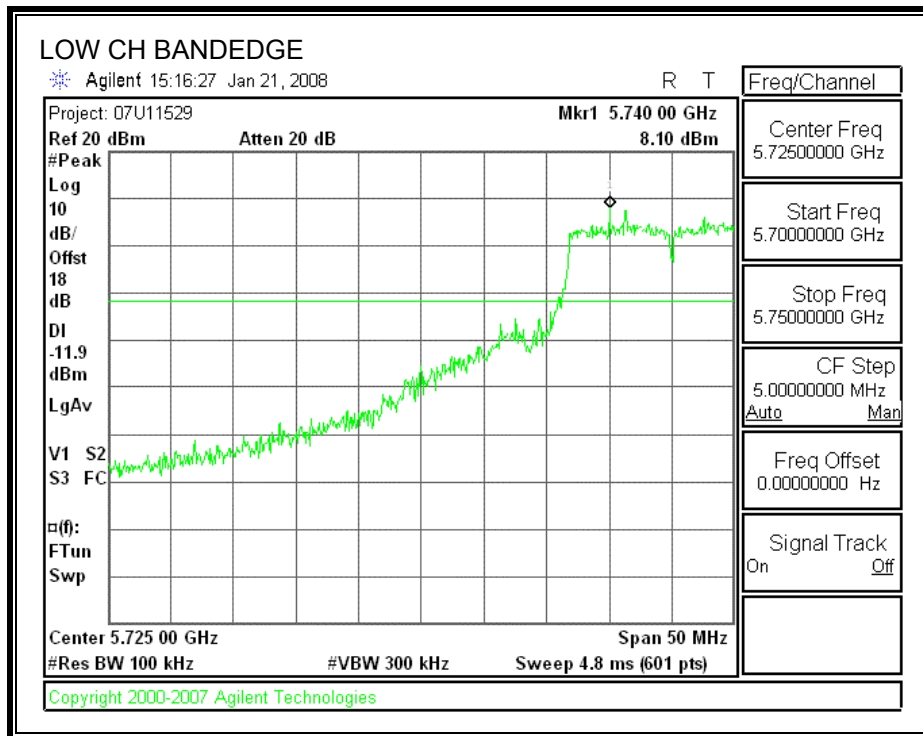
### **TEST PROCEDURE**

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

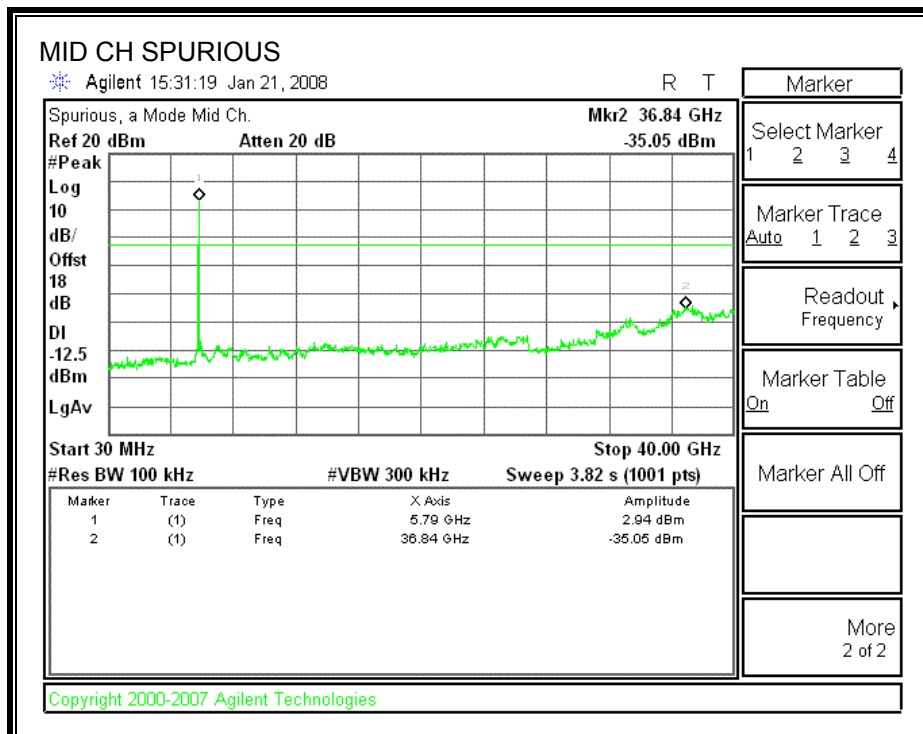
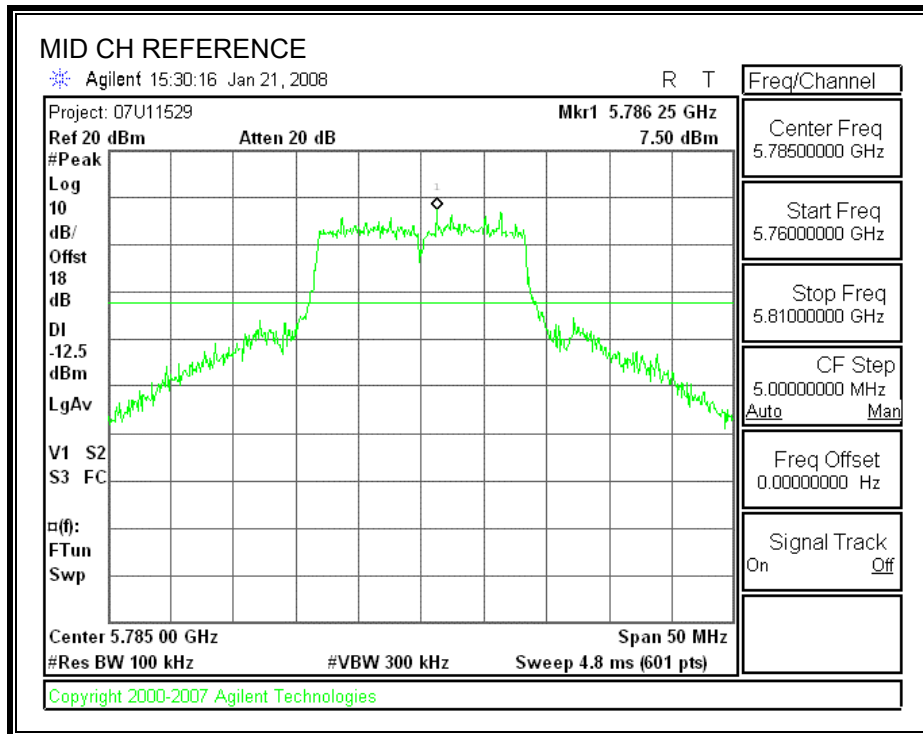
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

### **RESULTS**

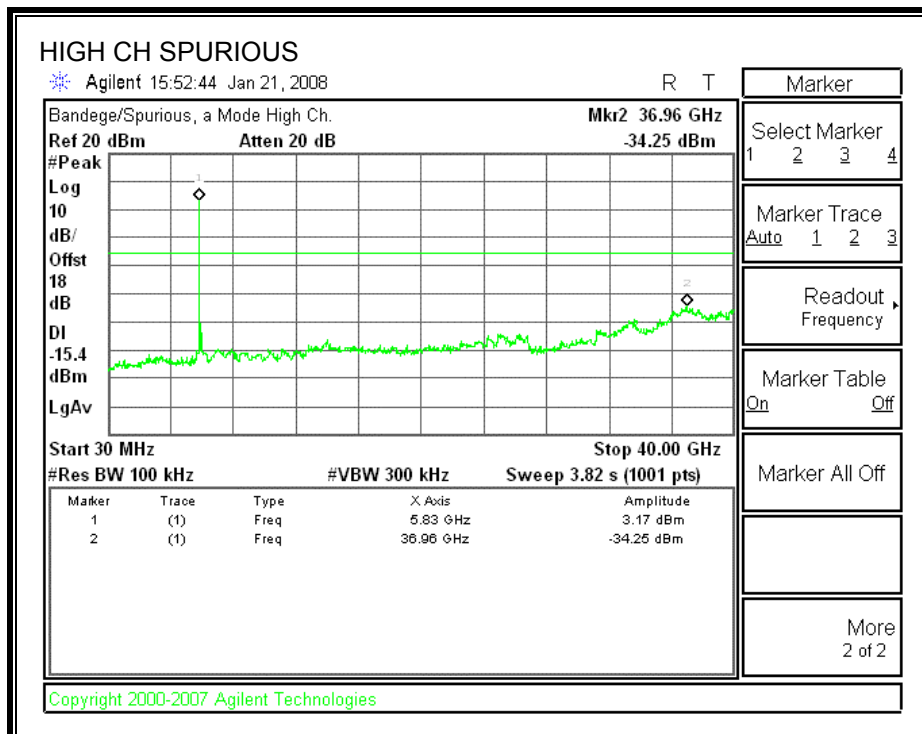
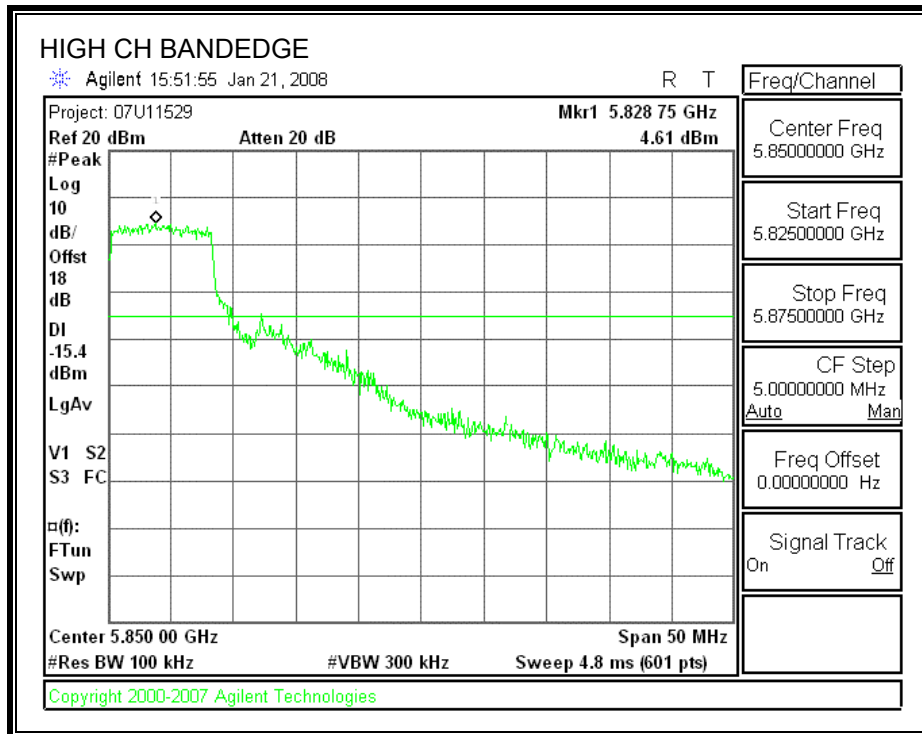
**SPURIOUS EMISSIONS, LOW CHANNEL**



**SPURIOUS EMISSIONS, MID CHANNEL**



**SPURIOUS EMISSIONS, HIGH CHANNEL**



**7.6. 802.11n HT20 MODE IN THE 5.8 GHz BAND**

**7.6.1. 6 dB BANDWIDTH**

**LIMITS**

FCC §15.247 (a) (2) & IC RSS-210 A8.2 (a)

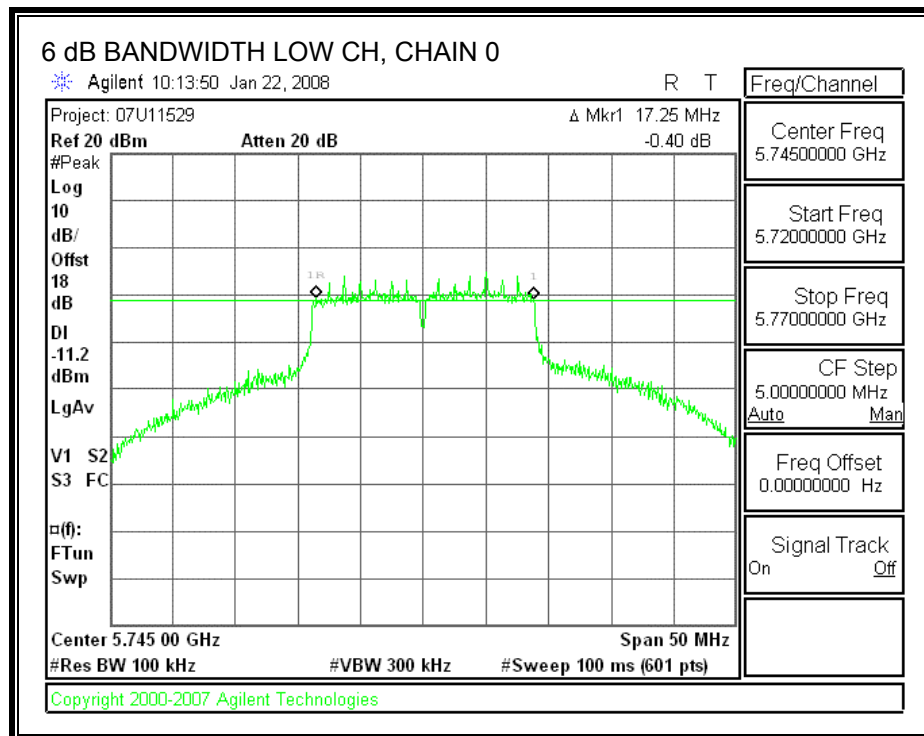
The minimum 6 dB bandwidth shall be at least 500 kHz.

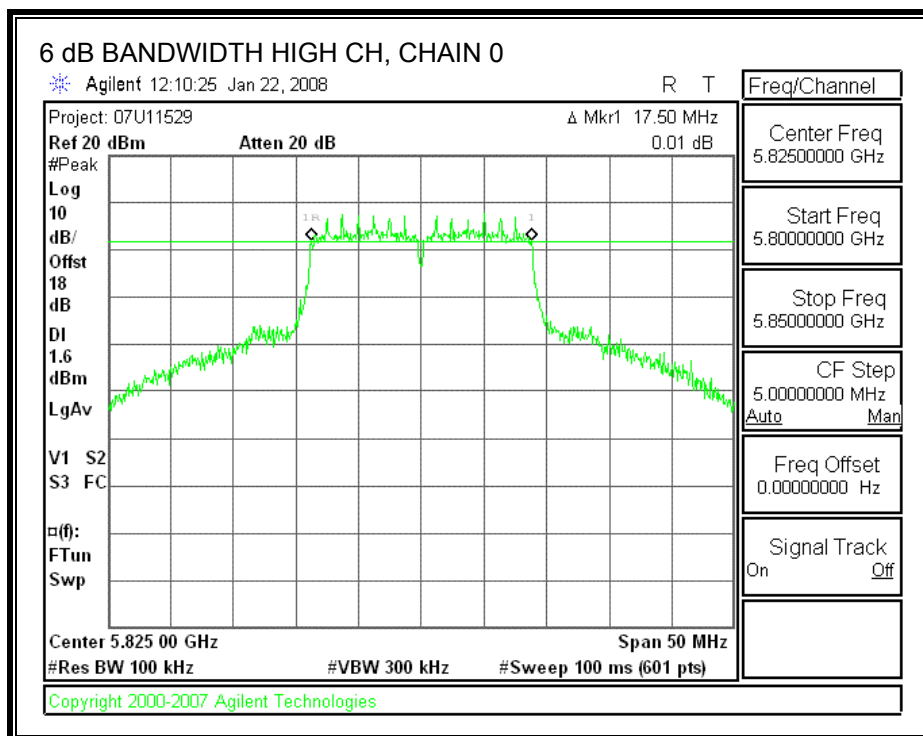
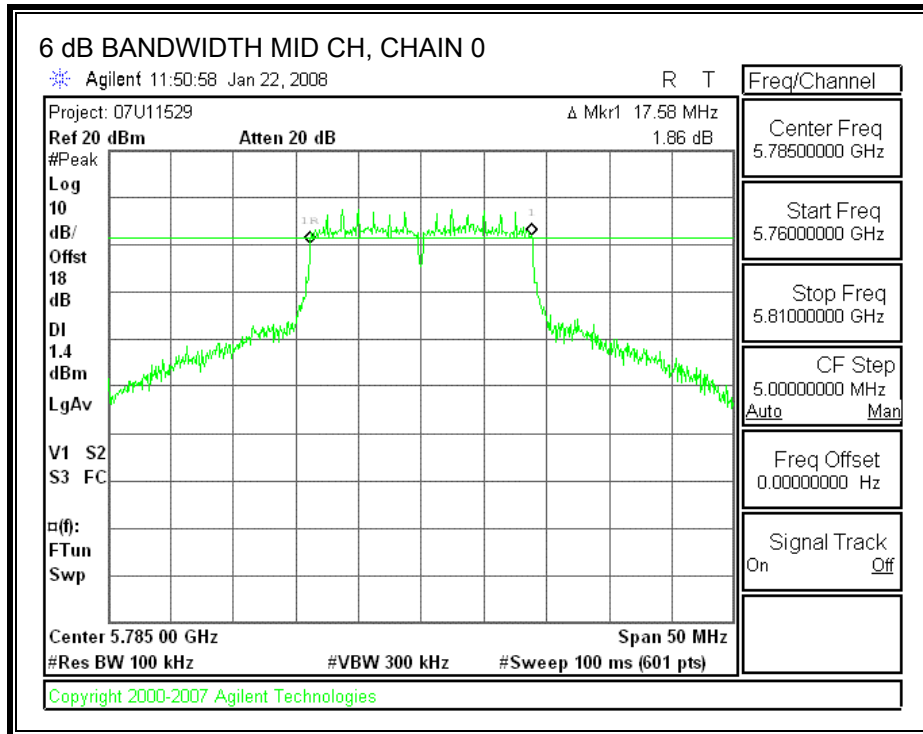
**TEST PROCEDURE**

The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

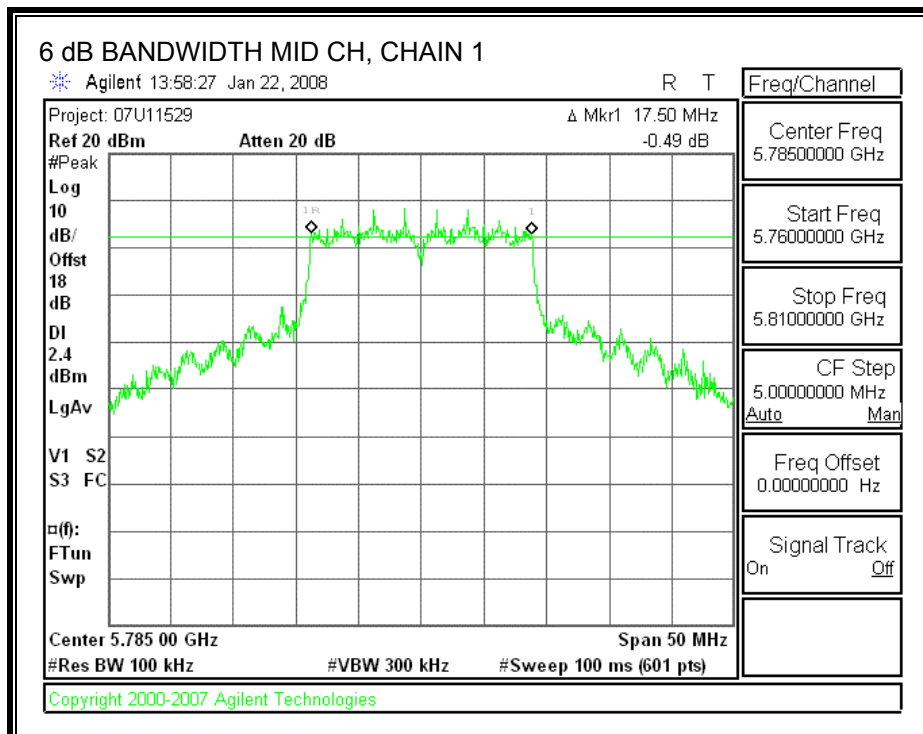
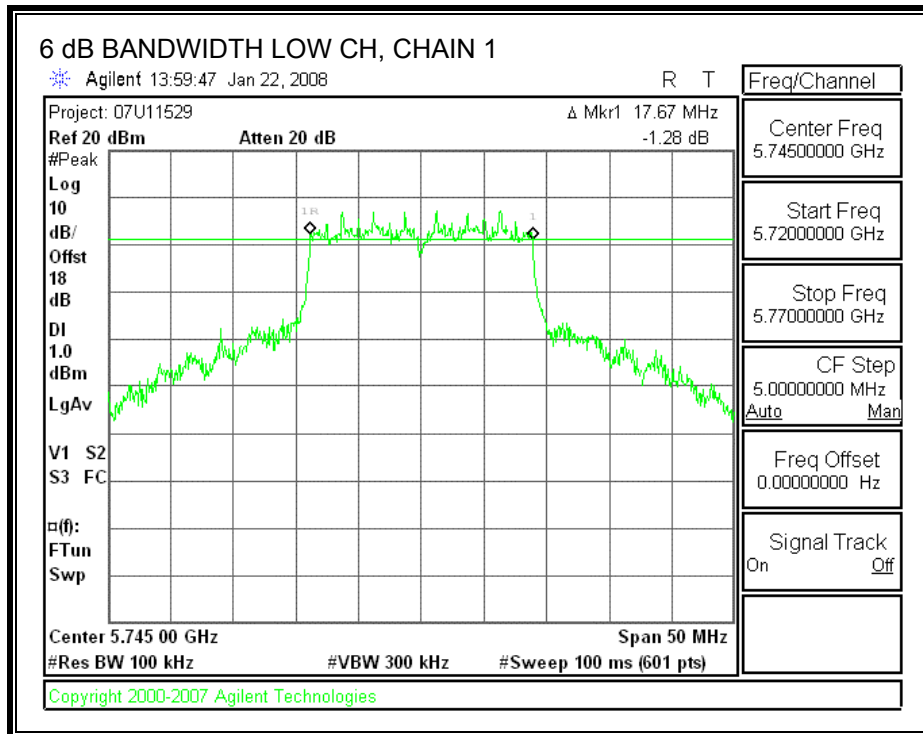
**RESULTS**

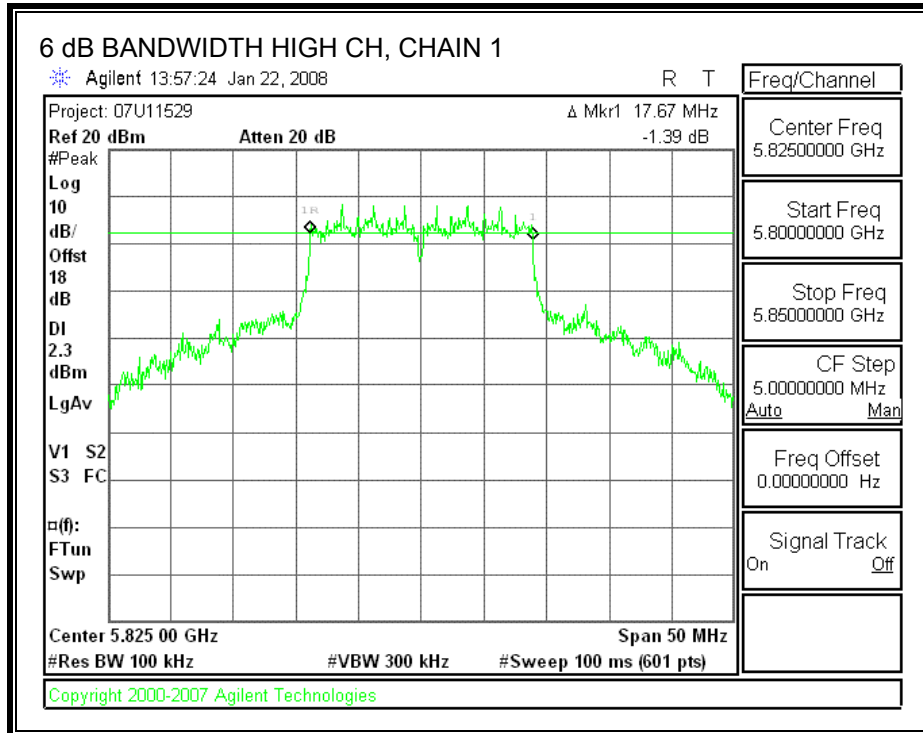
Channel	Frequency (MHz)	Chain 0 6 dB BW (MHz)	Chain 1 6 dB BW (MHz)	Minimum Limit (MHz)
Low	5745	17.25	17.67	0.5
Middle	5785	17.58	17.5	0.5
High	5825	17.50	17.67	0.5











**7.6.2. 99% BANDWIDTH**

**LIMITS**

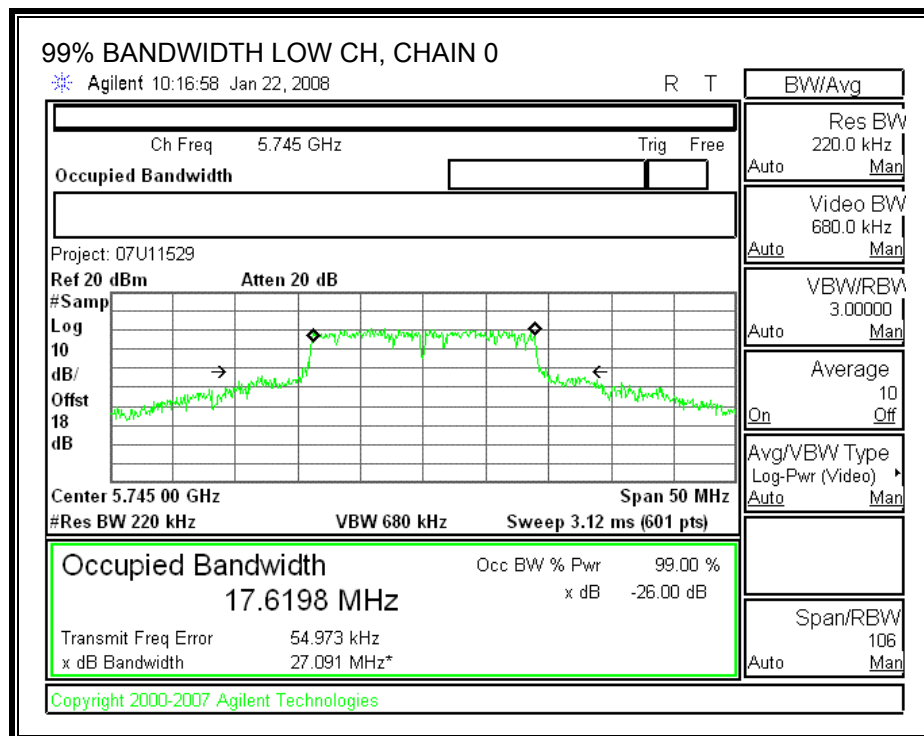
None; for reporting purposes only.

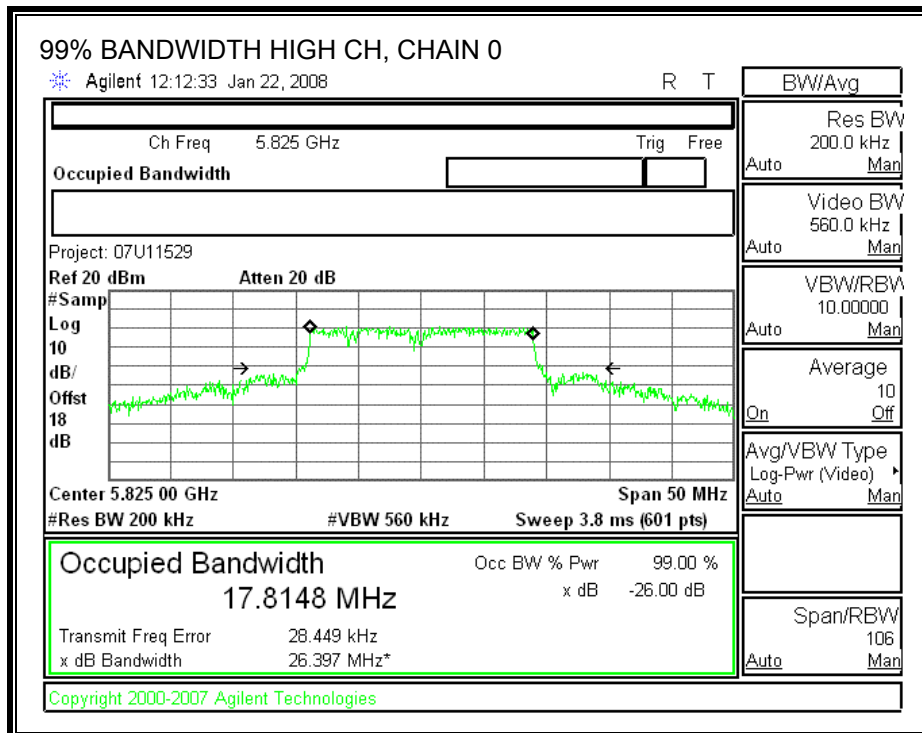
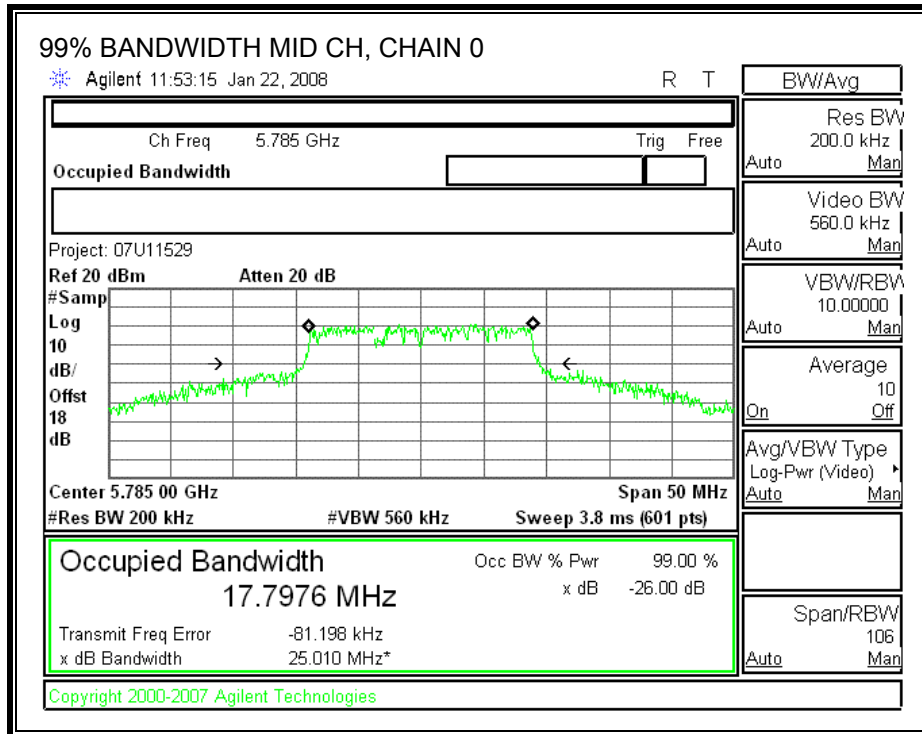
**TEST PROCEDURE**

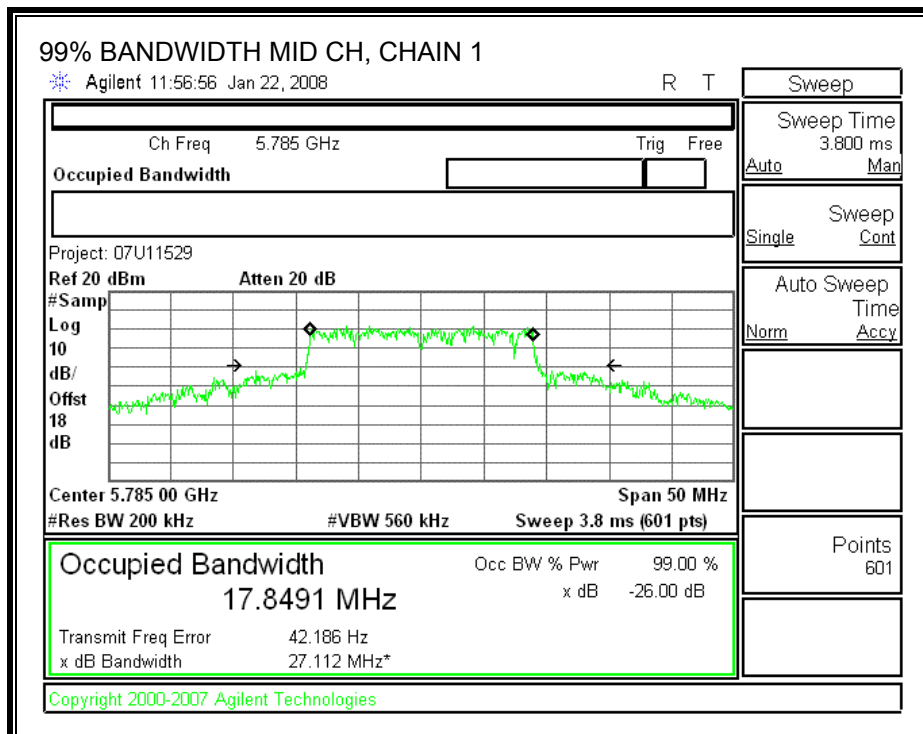
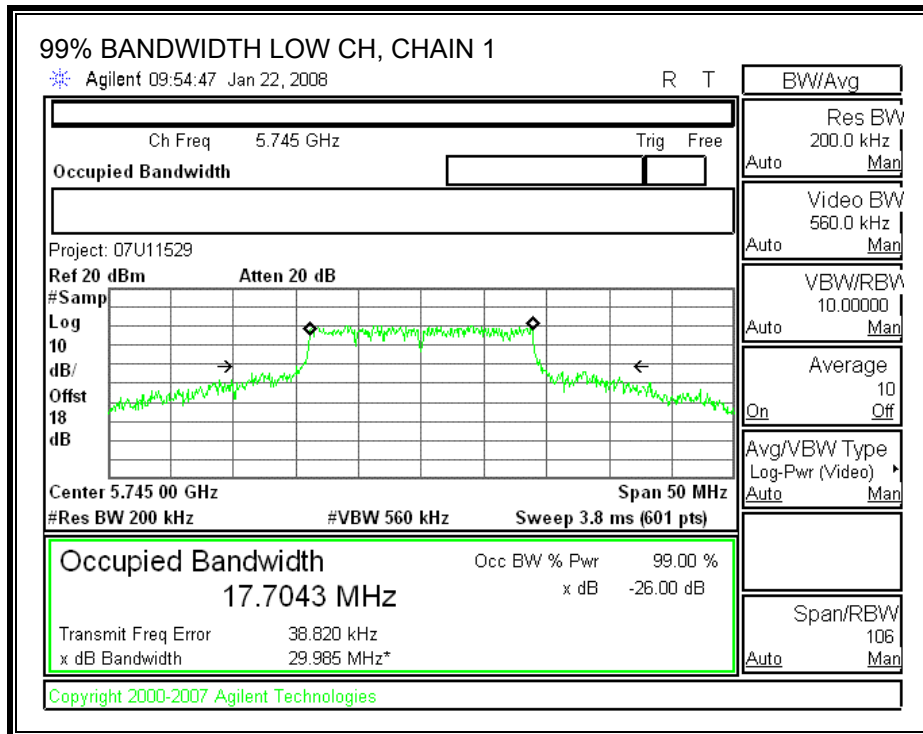
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

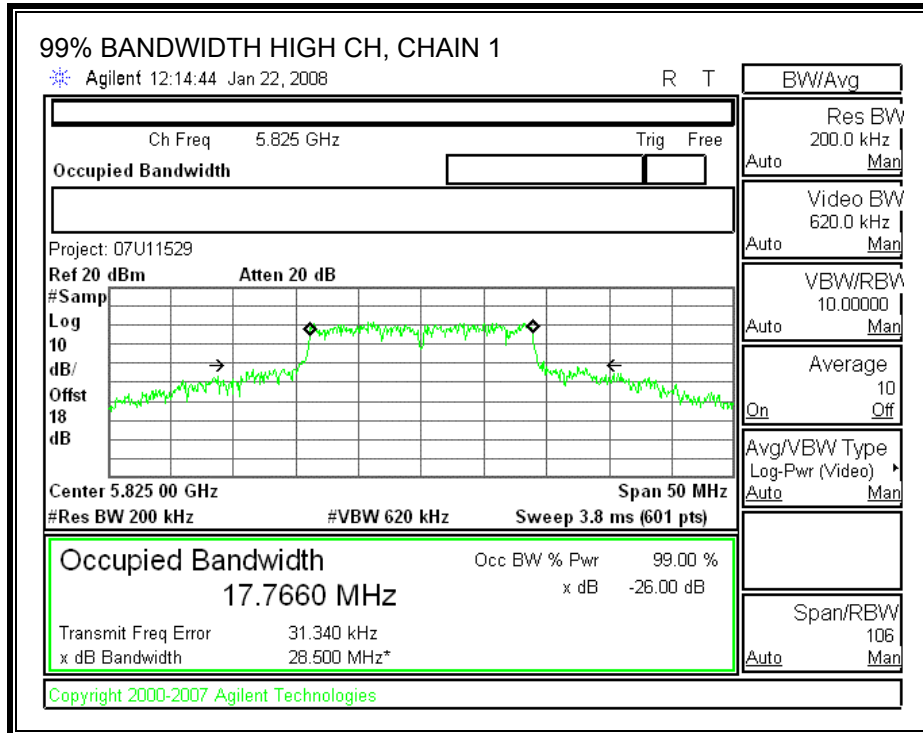
**RESULTS**

Channel	Frequency (MHz)	Chain 0 99% Bandwidth (MHz)	Chain 1 99% Bandwidth (MHz)
Low	5745	17.6198	17.7043
Middle	5785	17.7976	17.8491
High	5825	17.8148	17.7660









**7.6.3. OUTPUT POWER**

**LIMITS**

FCC §15.247 (b) & IC RSS-210 A8.4

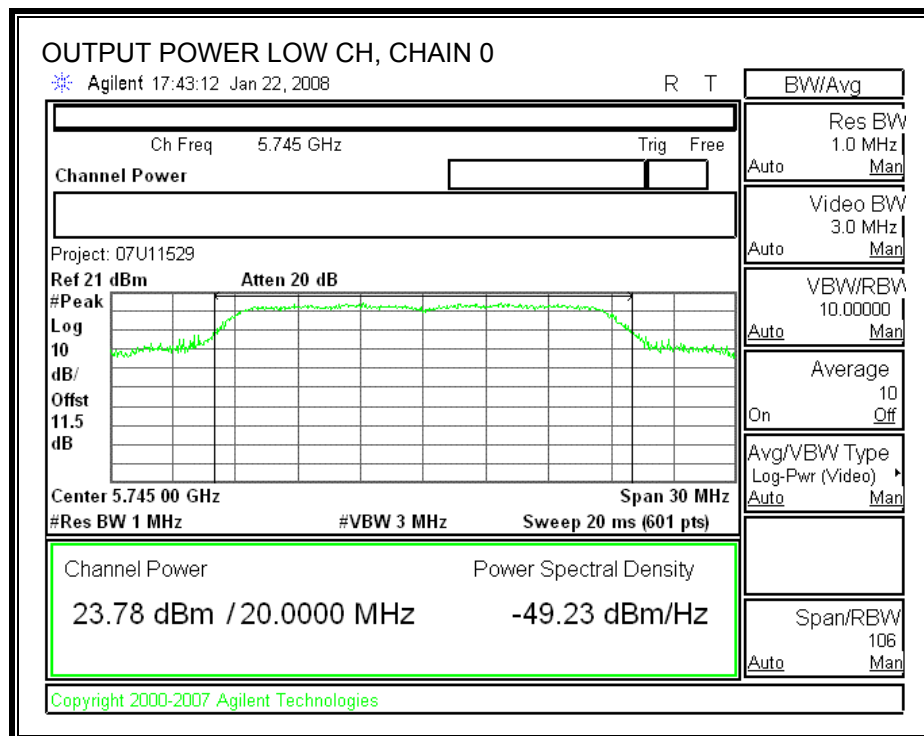
The maximum antenna gain is 8.81 dBi for other than fixed, point-to-point operations, therefore the limit is 27.19 dBm.

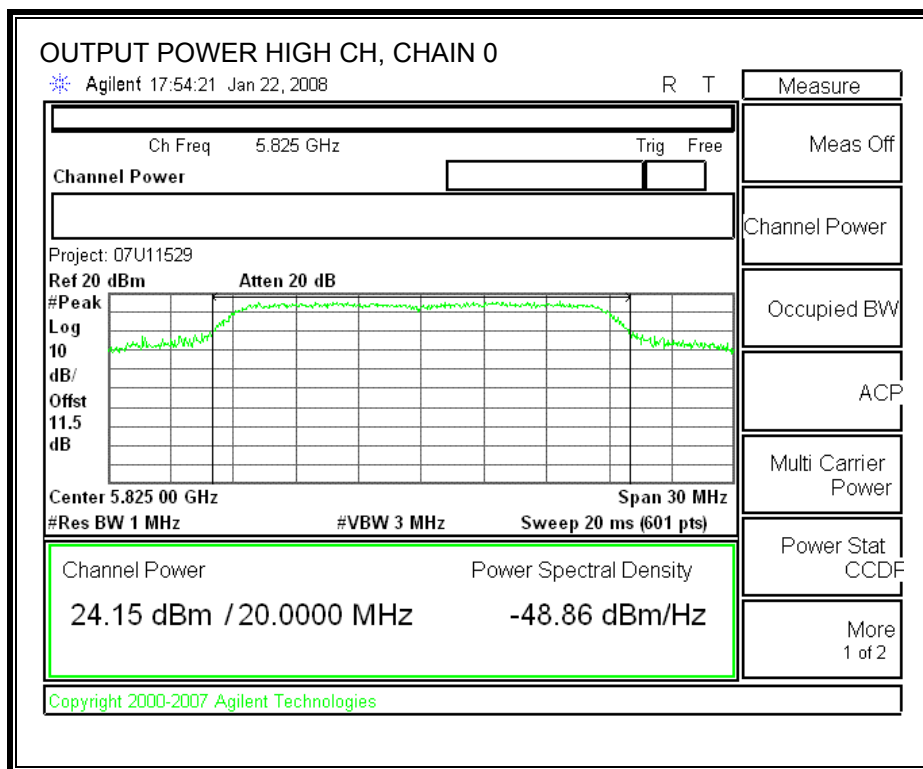
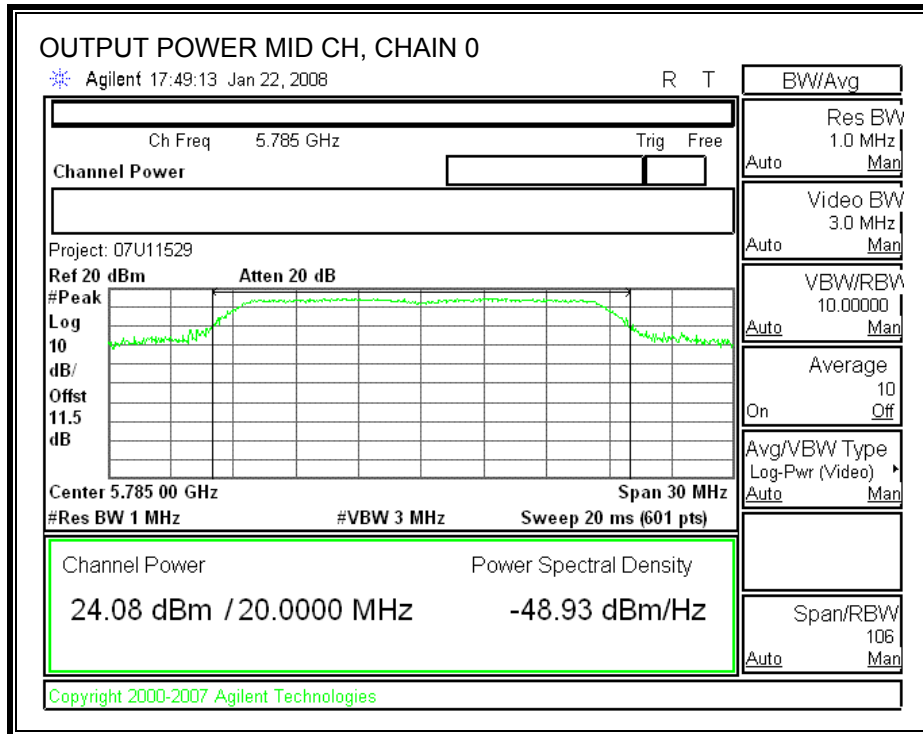
**TEST PROCEDURE**

Peak power is measured using the spectrum analyzer's internal channel power integration function. Power is integrated over a bandwidth greater than or equal to the 99% bandwidth.

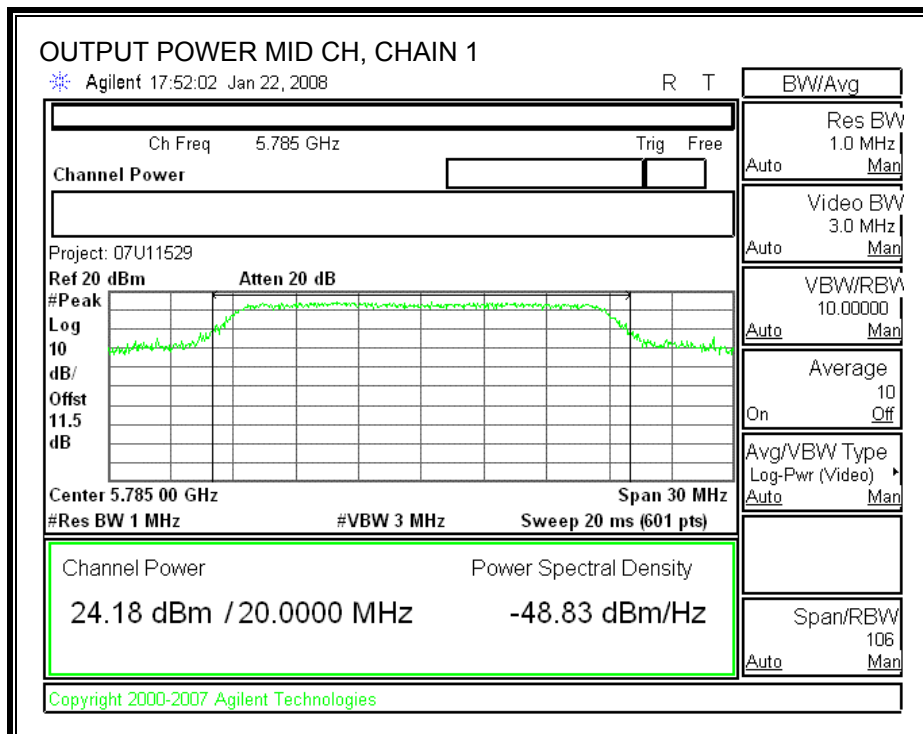
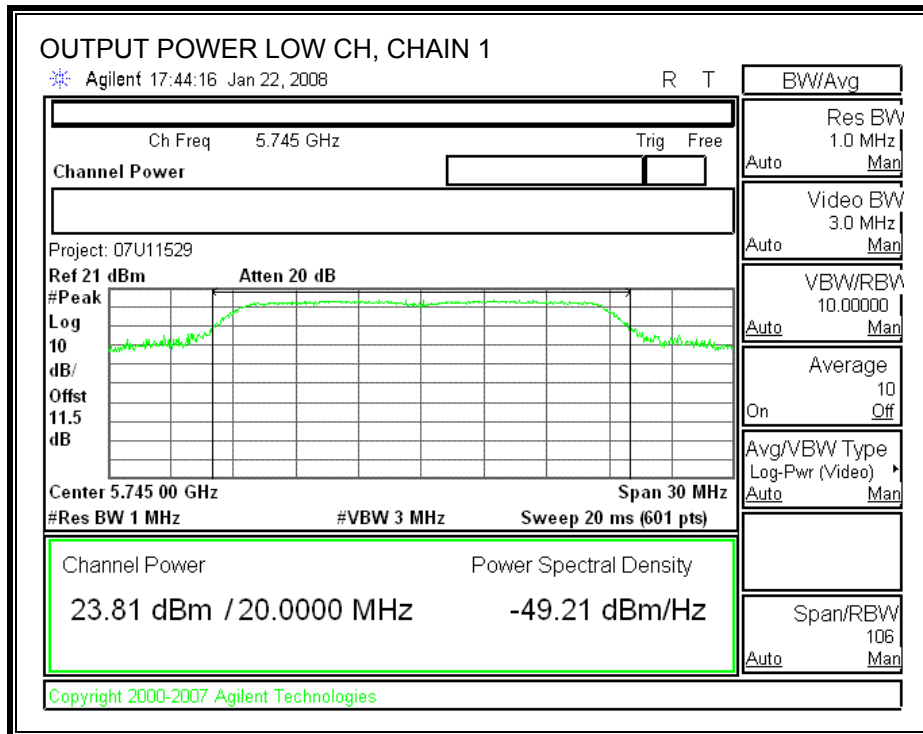
**RESULTS**

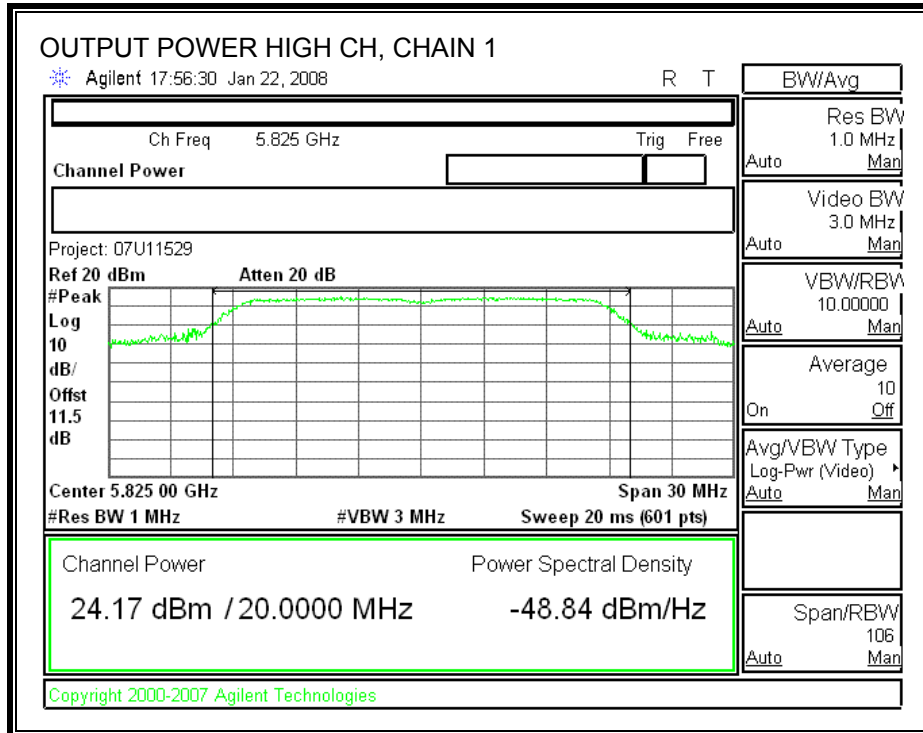
Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5745	23.78	23.81	26.81	27.19	-0.38
Mid	5785	24.08	24.18	27.14	27.19	-0.05
High	5825	24.15	24.17	27.17	27.19	-0.02











**7.6.4. POWER SPECTRAL DENSITY**

**LIMITS**

FCC §15.247 (e) & IC RSS-210 A8.2 (b)

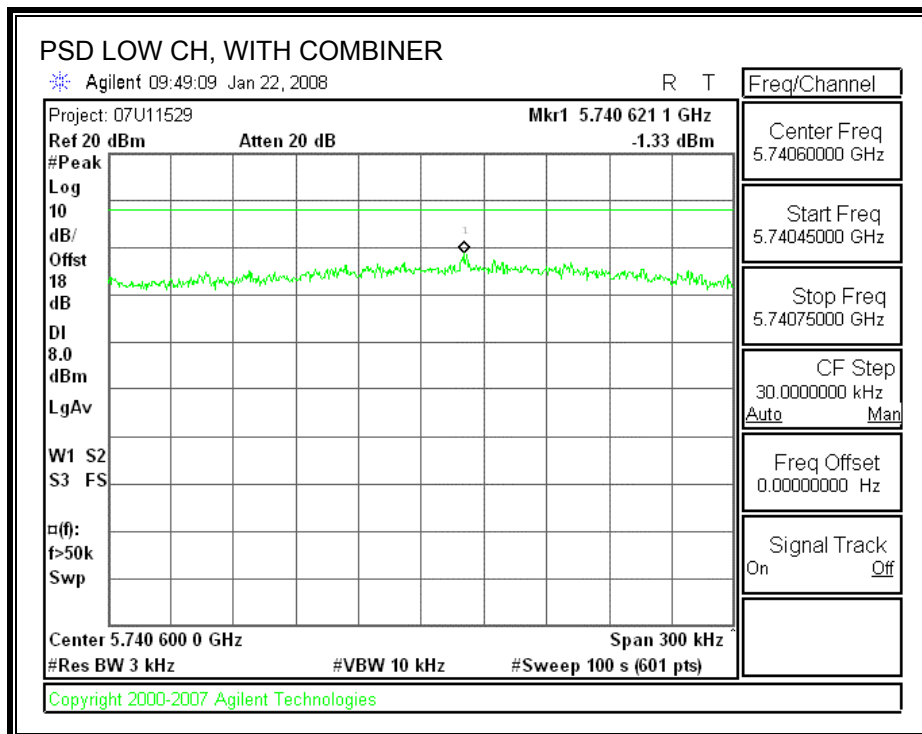
The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

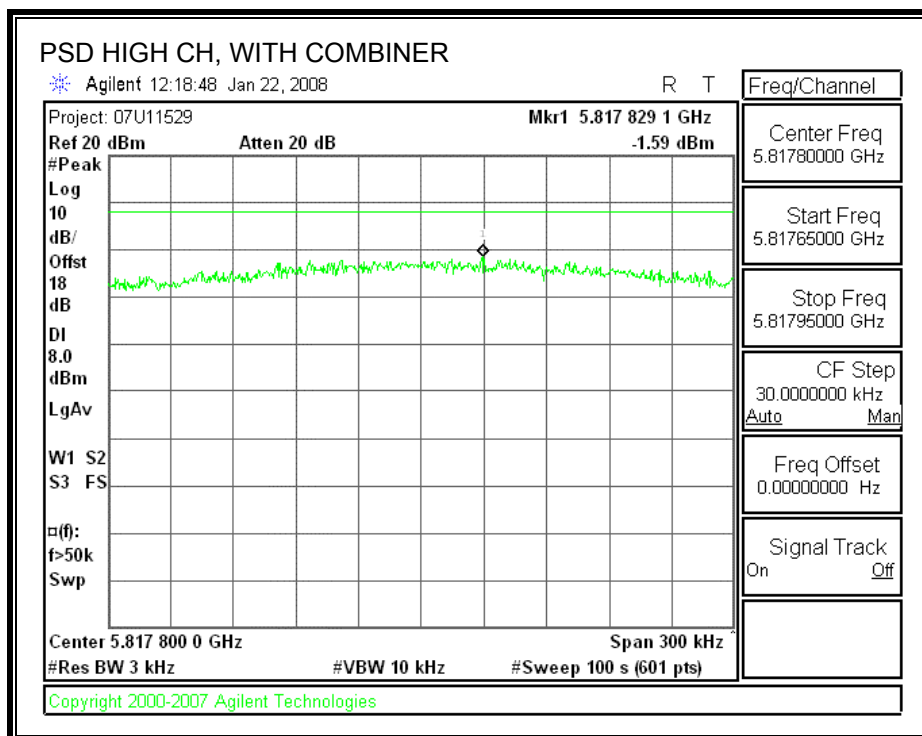
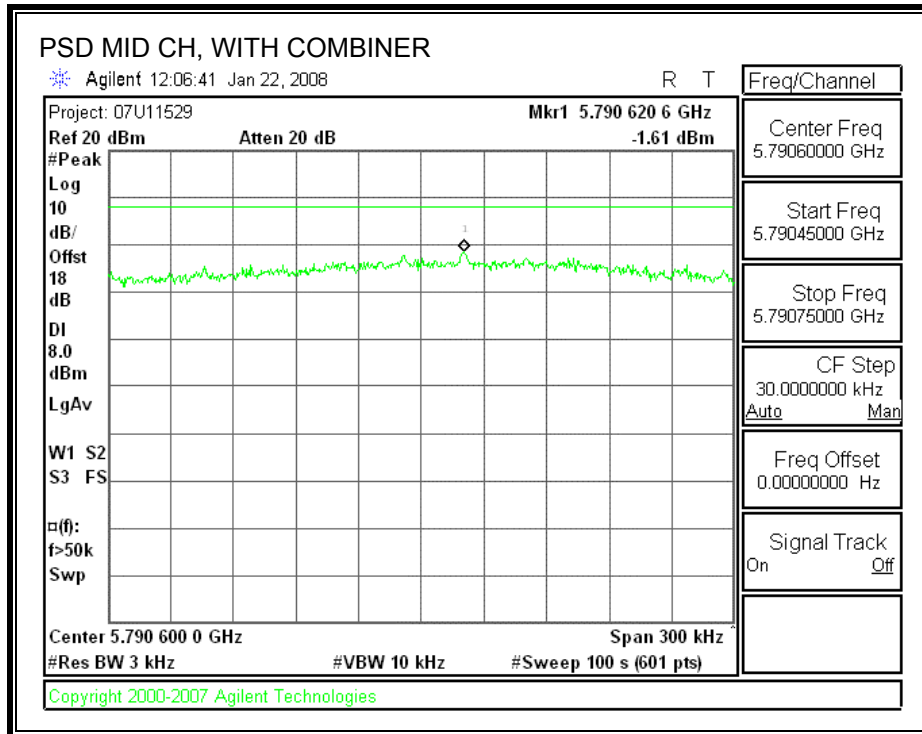
**TEST PROCEDURE**

Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

**RESULTS:**

Channel	Frequency (MHz)	PSD with Combiner (dBm)	Limit (dBm)	Margin (dB)
Low	5745	-1.33	8	-9.33
Middle	5785	-1.61	8	-9.61
High	5825	-1.51	8	-9.51





## **7.6.5. CONDUCTED SPURIOUS EMISSIONS**

### **LIMITS**

FCC §15.247 (d)

IC RSS-210 A8.5

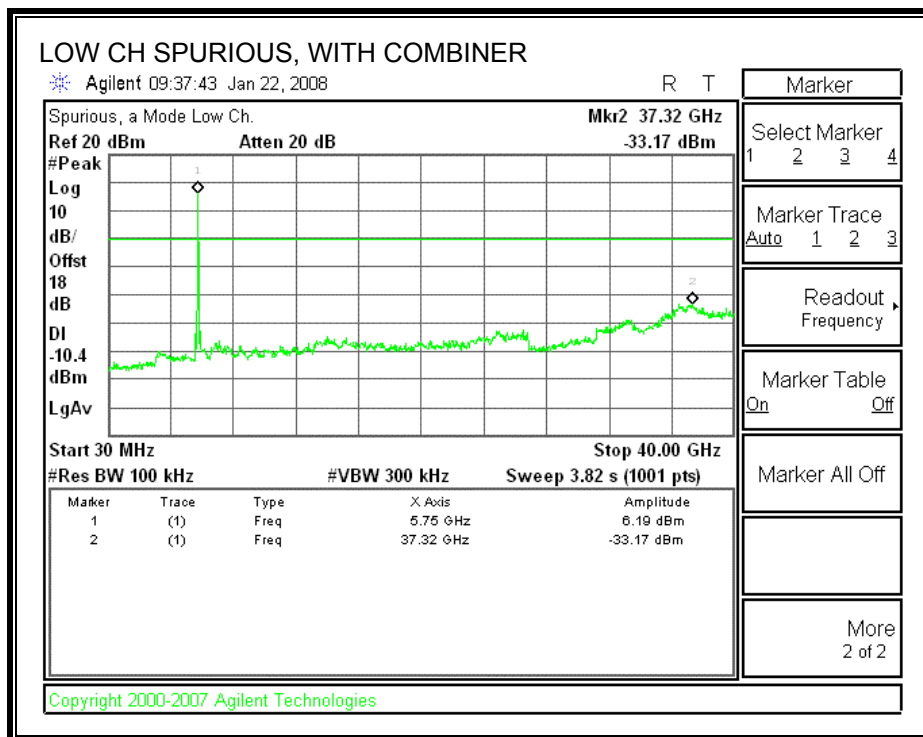
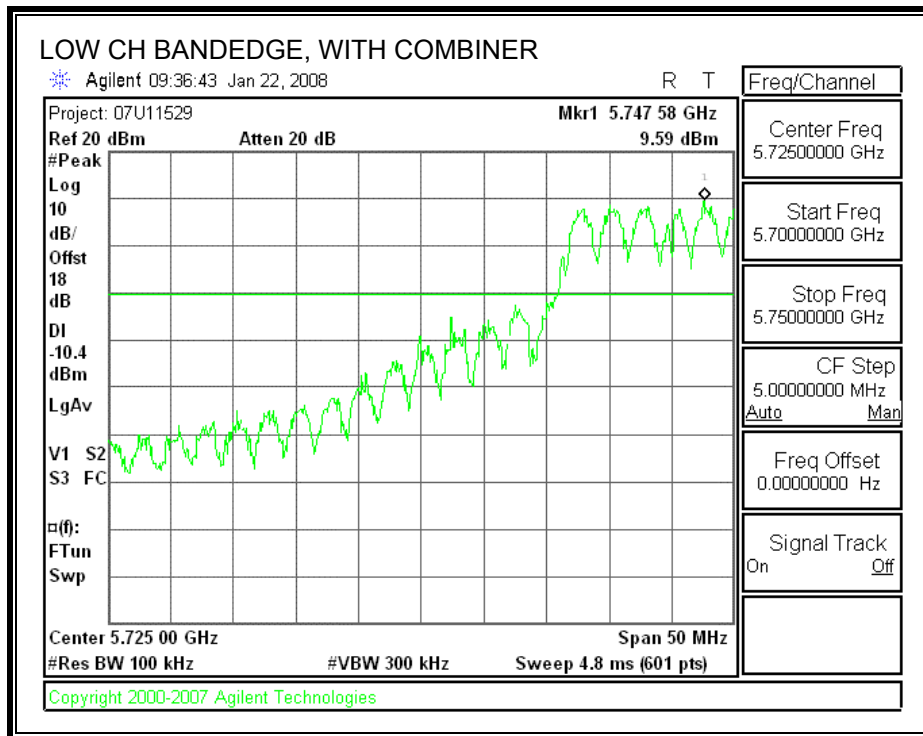
Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

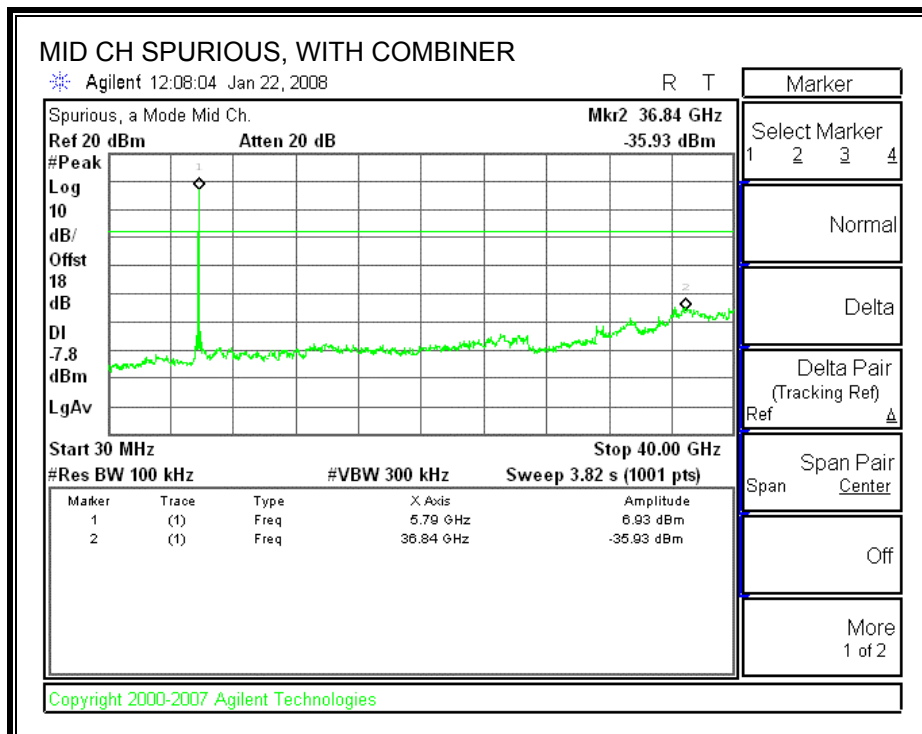
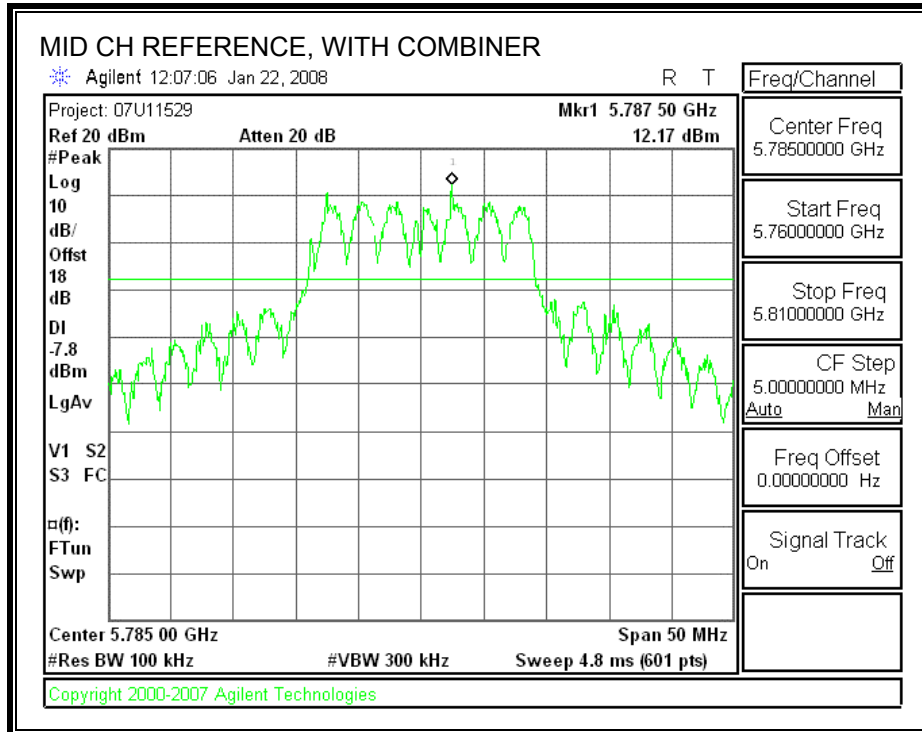
### **TEST PROCEDURE**

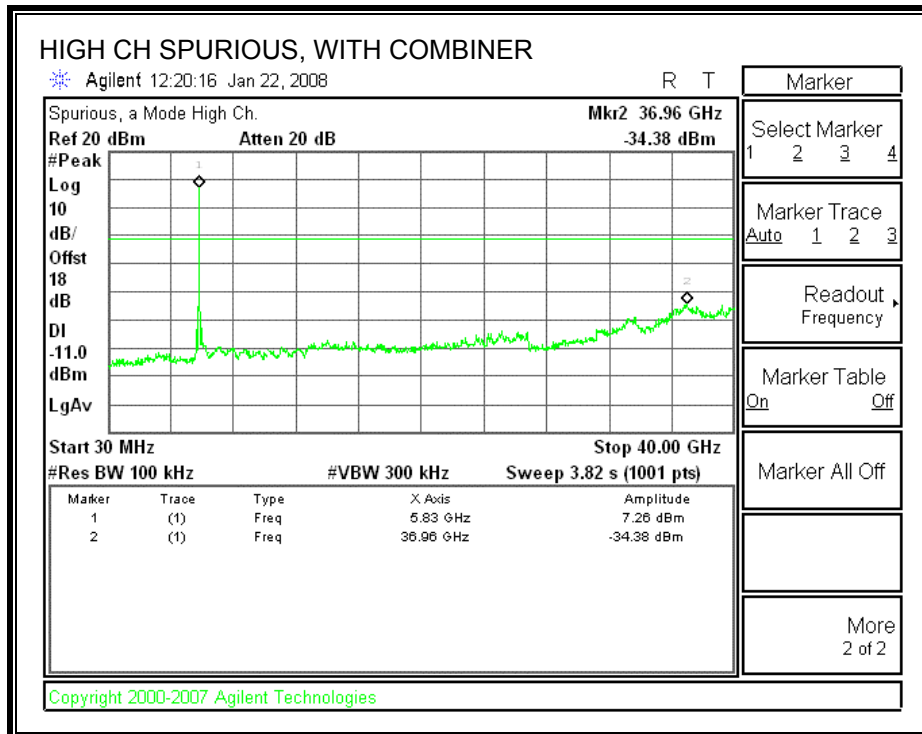
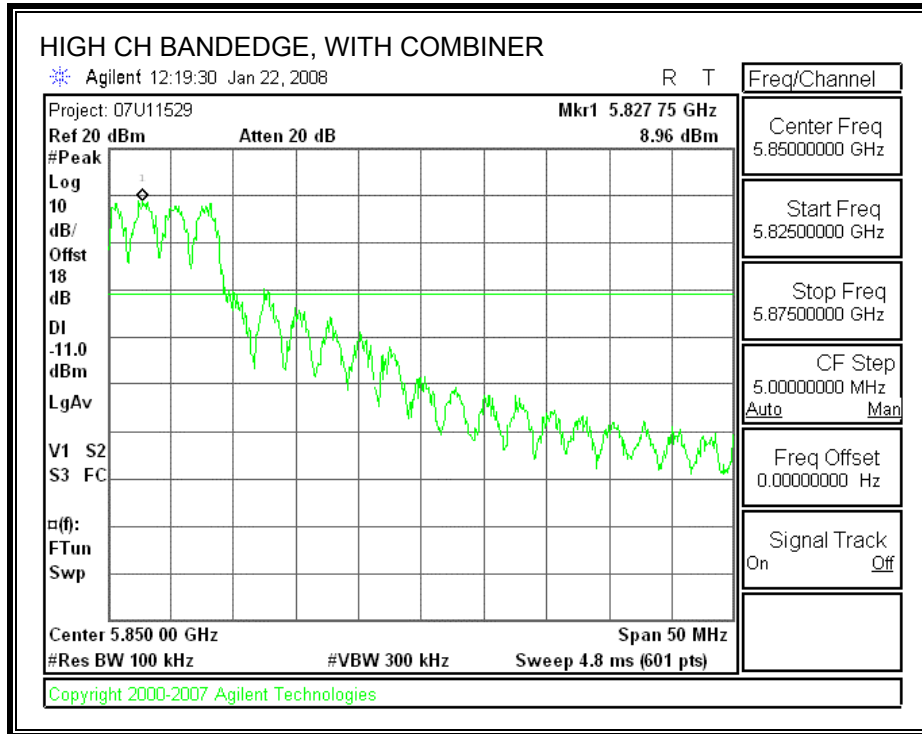
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

### **RESULTS**









**7.7. 802.11n HT40 MODE IN THE 5.8 GHz BAND**

**7.7.1. 6 dB BANDWIDTH**

**LIMITS**

FCC §15.247 (a) (2) & IC RSS-210 A8.2 (a)

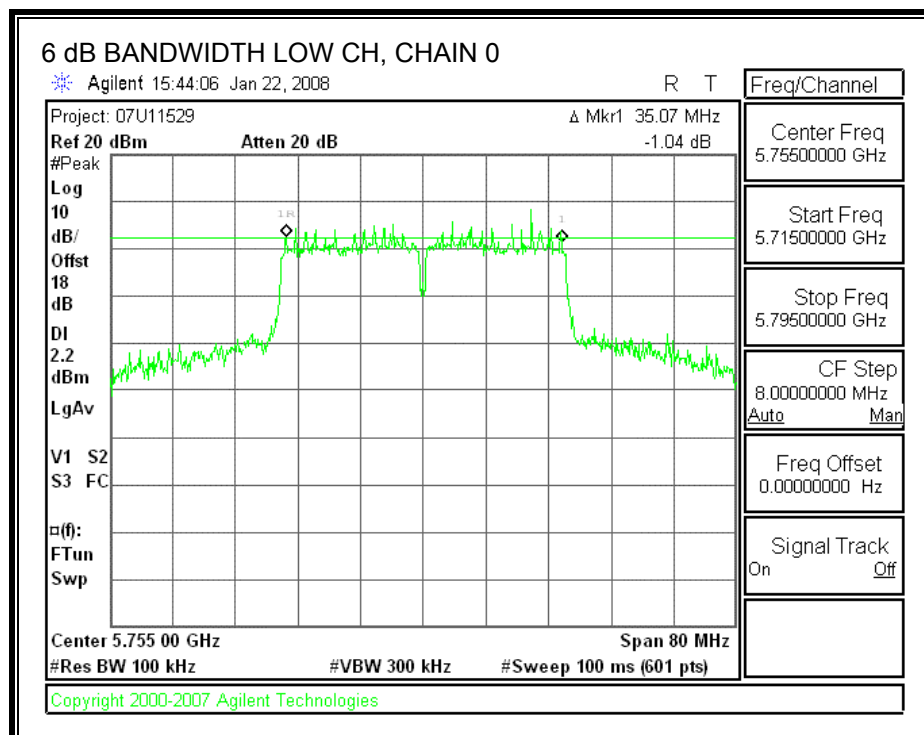
The minimum 6 dB bandwidth shall be at least 500 kHz.

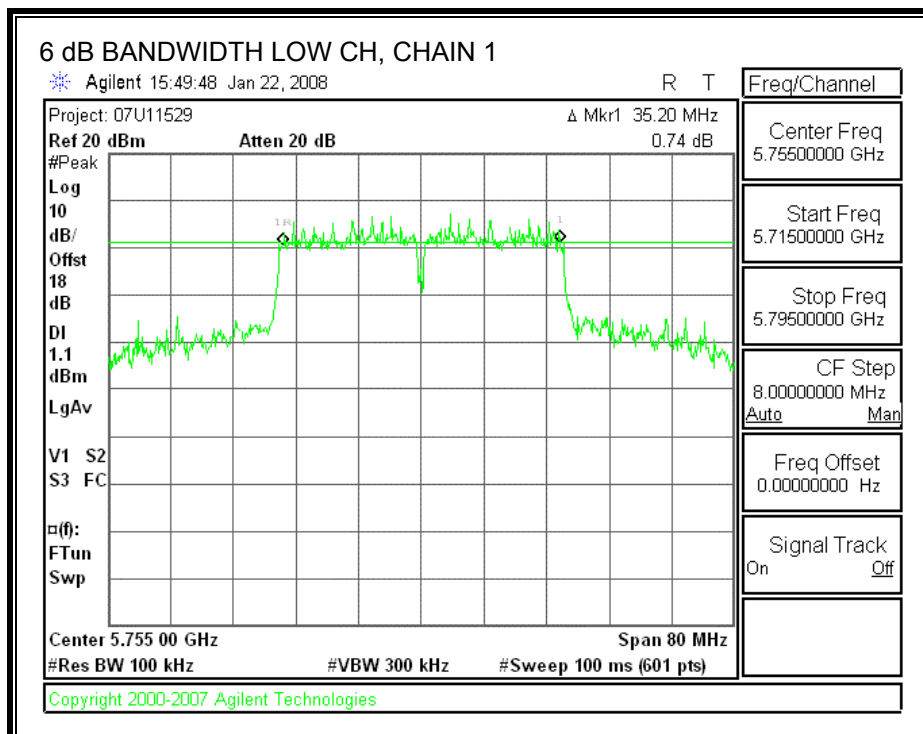
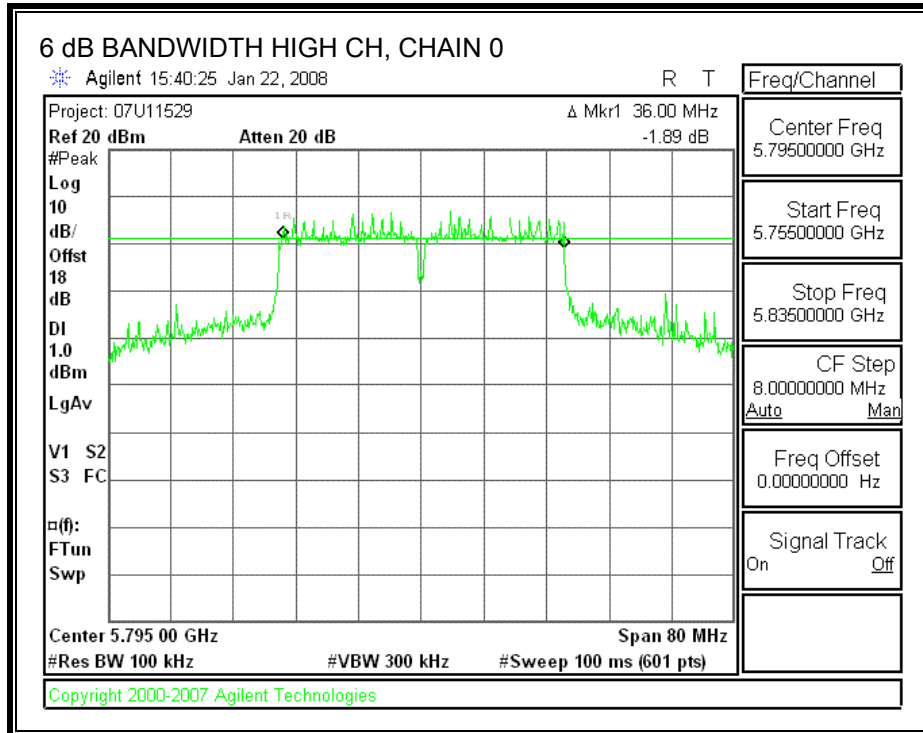
**TEST PROCEDURE**

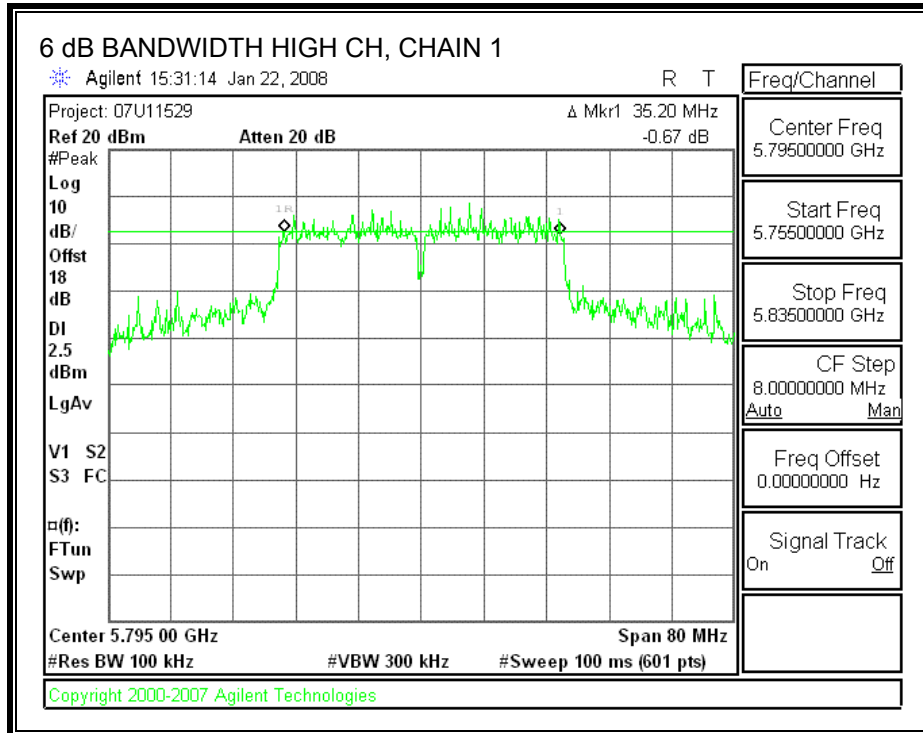
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

**RESULTS**

Channel	Frequency (MHz)	Chain 0 6 dB BW (MHz)	Chain 1 6 dB BW (MHz)	Minimum Limit (MHz)
Low	5755	35.07	35.20	0.5
High	5795	36.00	35.20	0.5







**7.7.2. 99% BANDWIDTH**

**LIMITS**

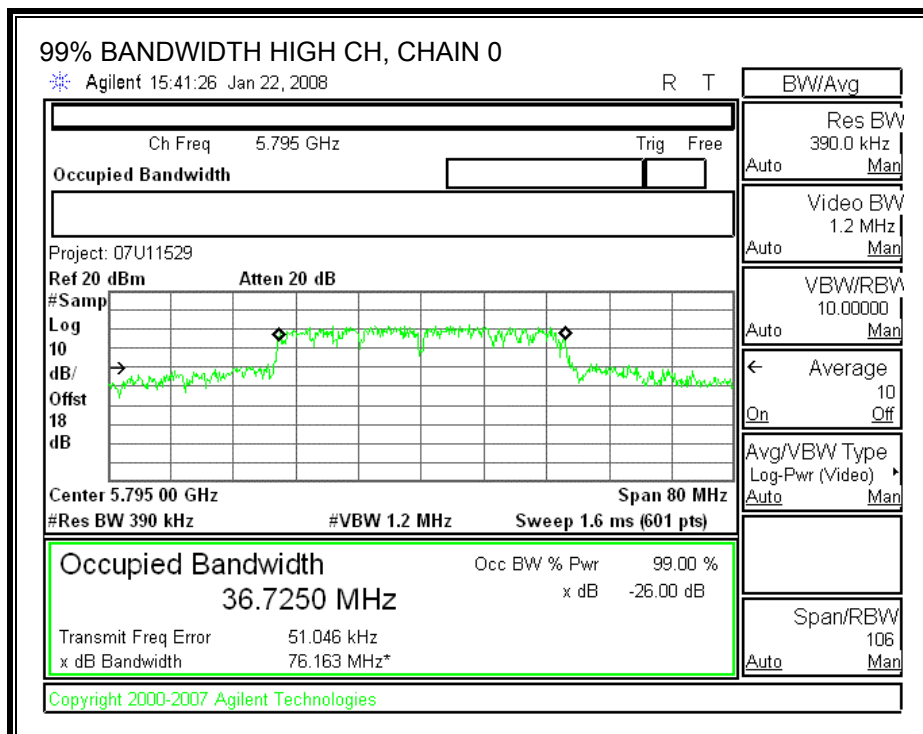
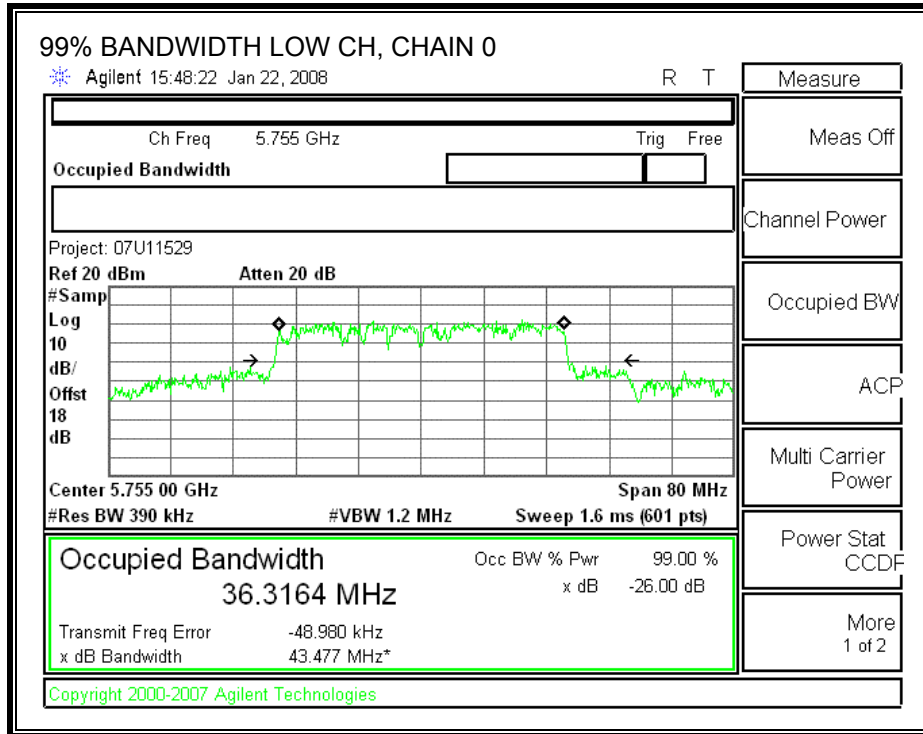
None; for reporting purposes only.

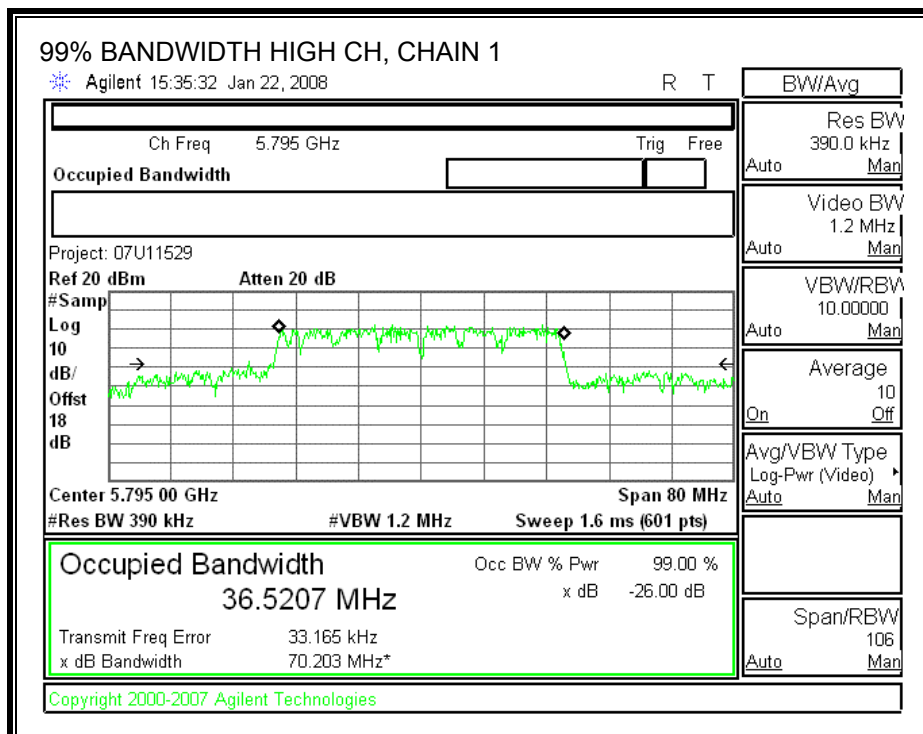
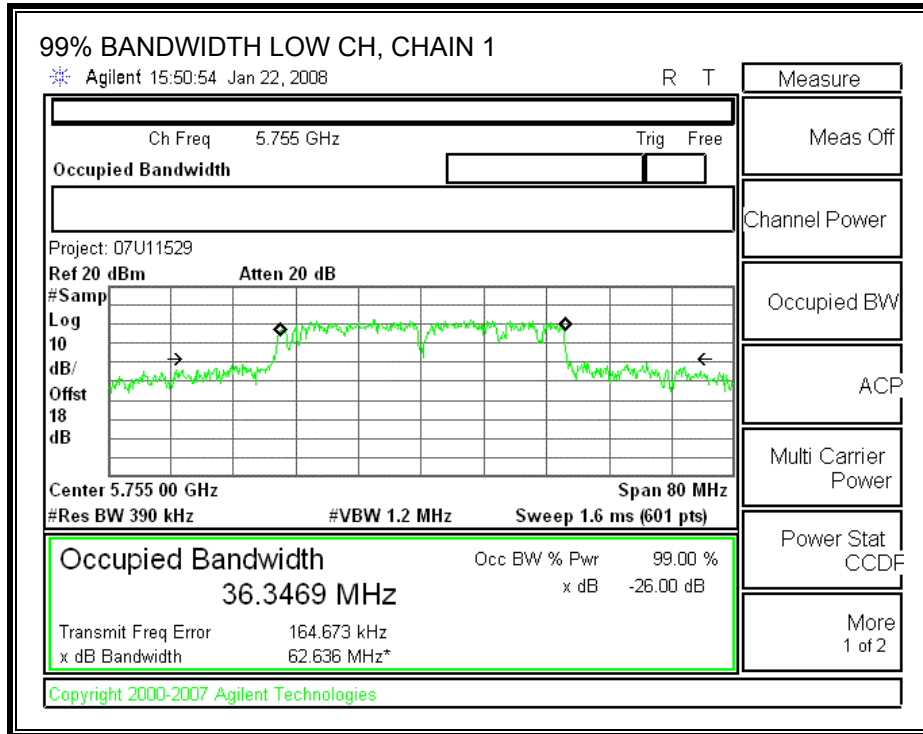
**TEST PROCEDURE**

The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

**RESULTS**

<b>Channel</b>	<b>Frequency (MHz)</b>	<b>Chain 0 99% Bandwidth (MHz)</b>	<b>Chain 1 99% Bandwidth (MHz)</b>
<b>Low</b>	<b>5755</b>	<b>36.3164</b>	<b>36.3469</b>
<b>High</b>	<b>5795</b>	<b>36.7250</b>	<b>36.5207</b>





**7.7.3. OUTPUT POWER**

**LIMITS**

FCC §15.247 (b) & IC RSS-210 A8.4

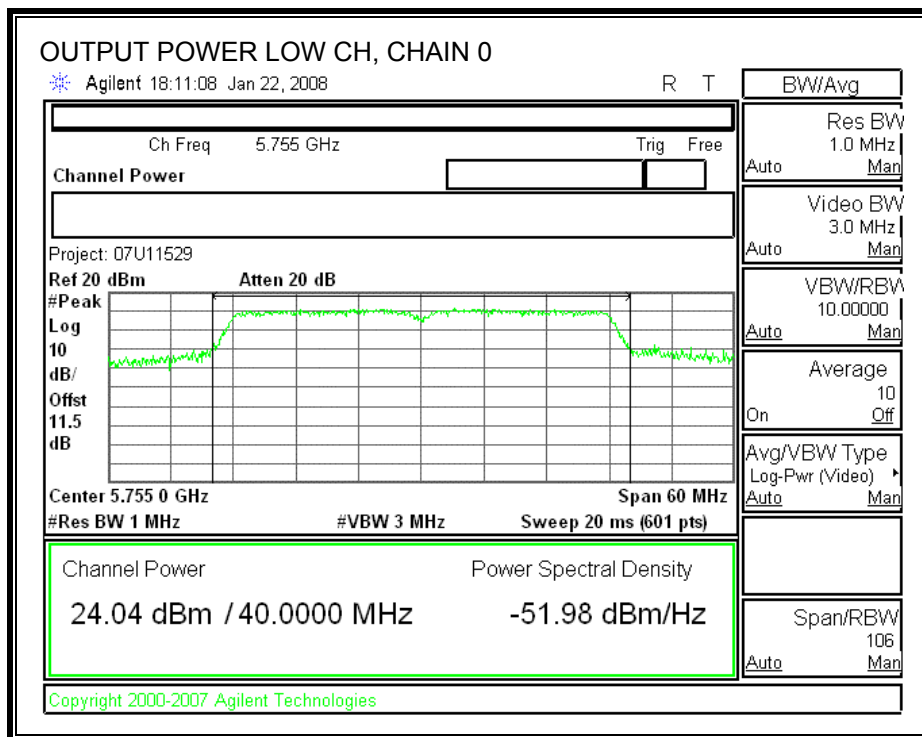
The maximum antenna gain is 8.81 dBi for other than fixed, point-to-point operations, therefore the limit is 27.19 dBm.

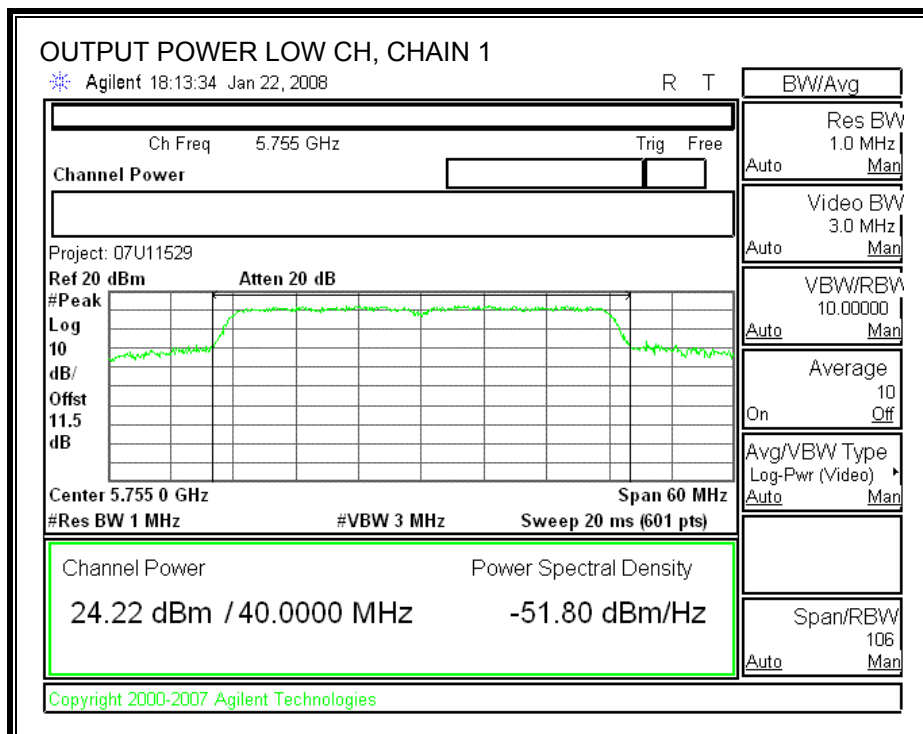
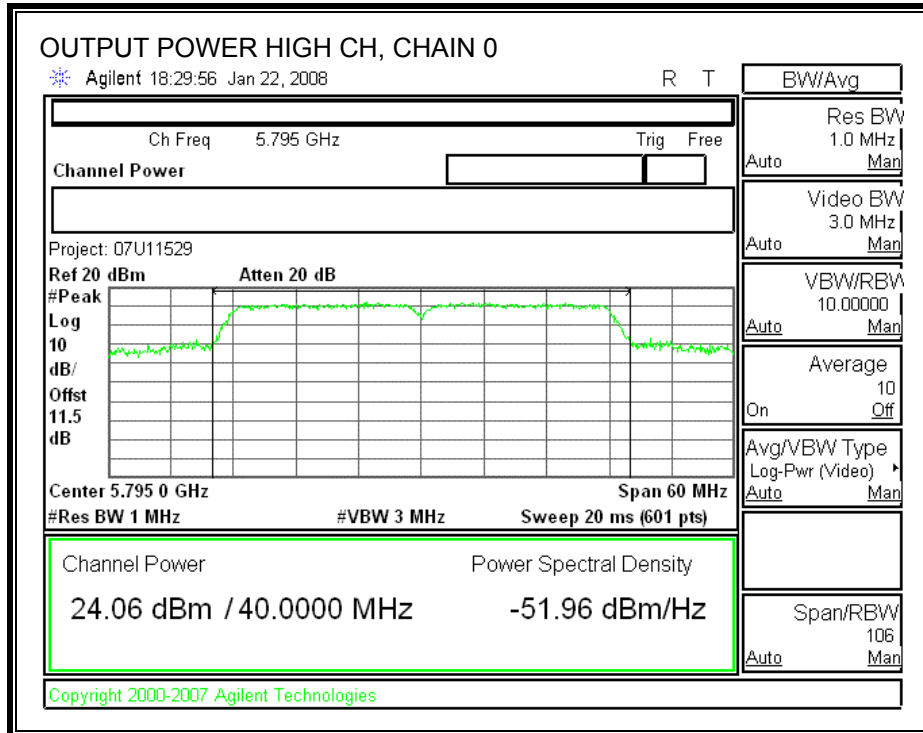
**TEST PROCEDURE**

Peak power is measured using the spectrum analyzer's internal channel power integration function. Power is integrated over a bandwidth greater than or equal to the 99% bandwidth.

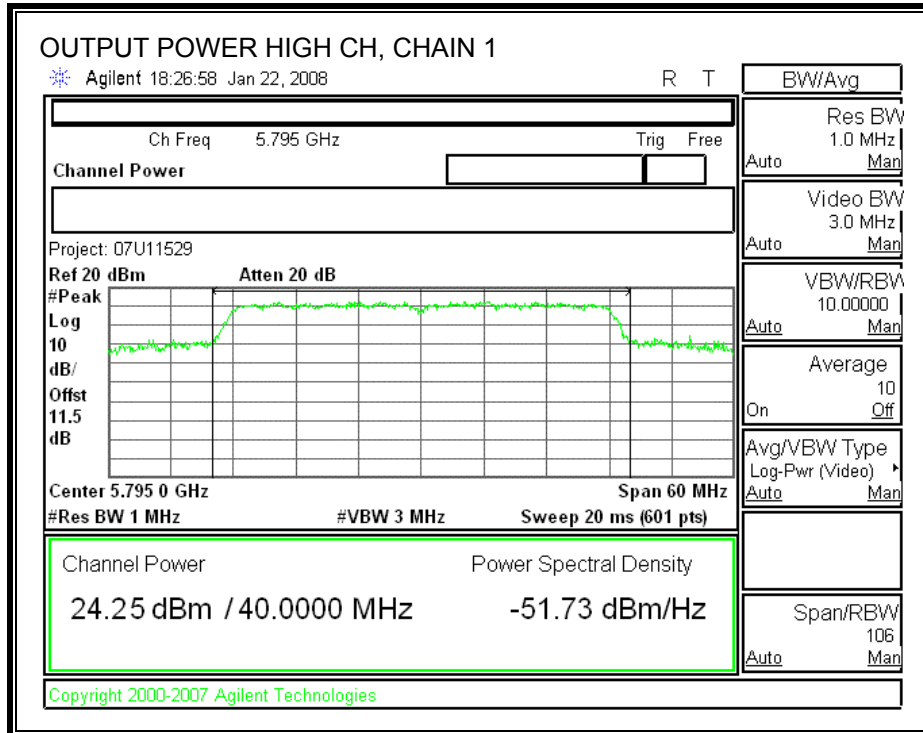
**RESULTS**

Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5755	24.04	24.22	27.14	27.19	-0.05
High	5795	24.06	24.25	27.17	27.19	-0.02









**7.7.4. POWER SPECTRAL DENSITY**

**LIMITS**

FCC §15.247 (e) & IC RSS-210 A8.2 (b)

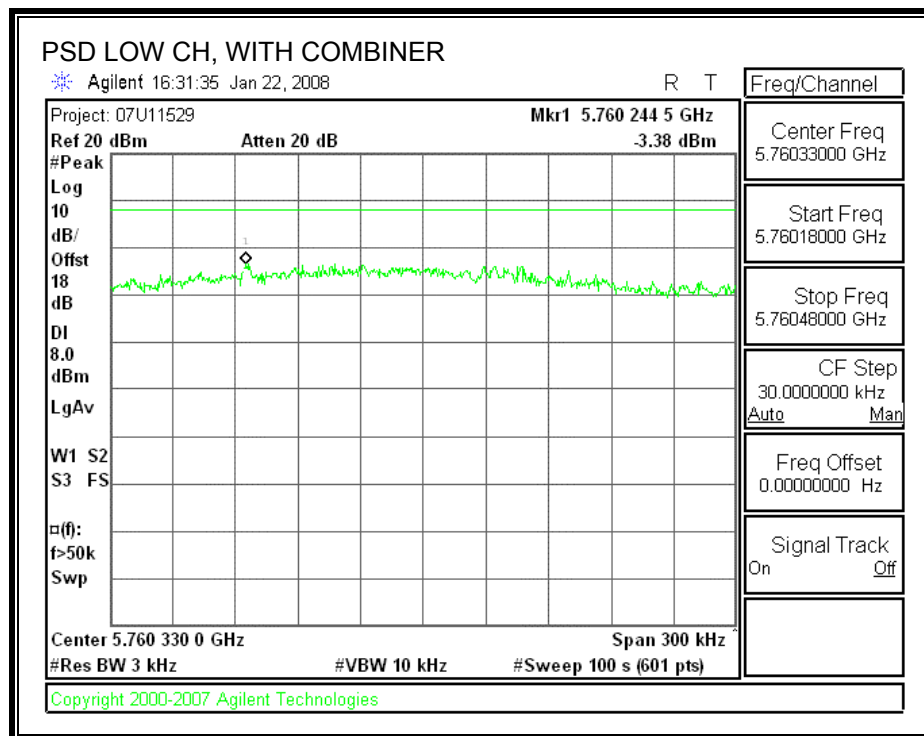
The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

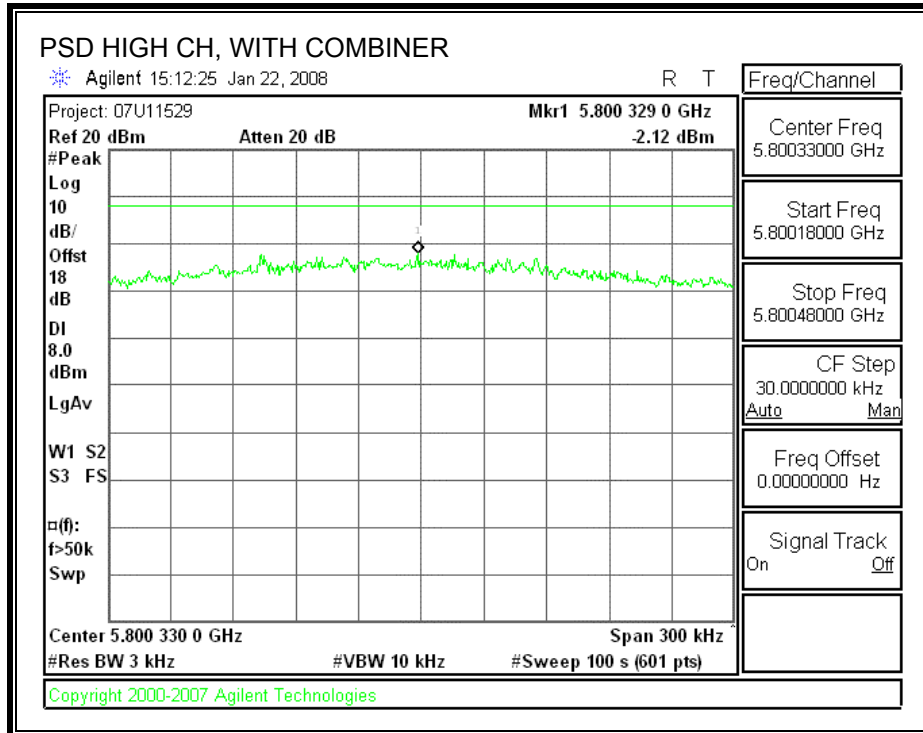
**TEST PROCEDURE**

Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

**RESULTS:**

Channel	Frequency (MHz)	PSD with Combiner (dBm)	Limit (dBm)	Margin (dB)
Low	5755	-3.38	8	-11.38
High	5795	-2.12	8	-10.12





### **7.7.5. CONDUCTED SPURIOUS EMISSIONS**

#### **LIMITS**

FCC §15.247 (d)

IC RSS-210 A8.5

Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

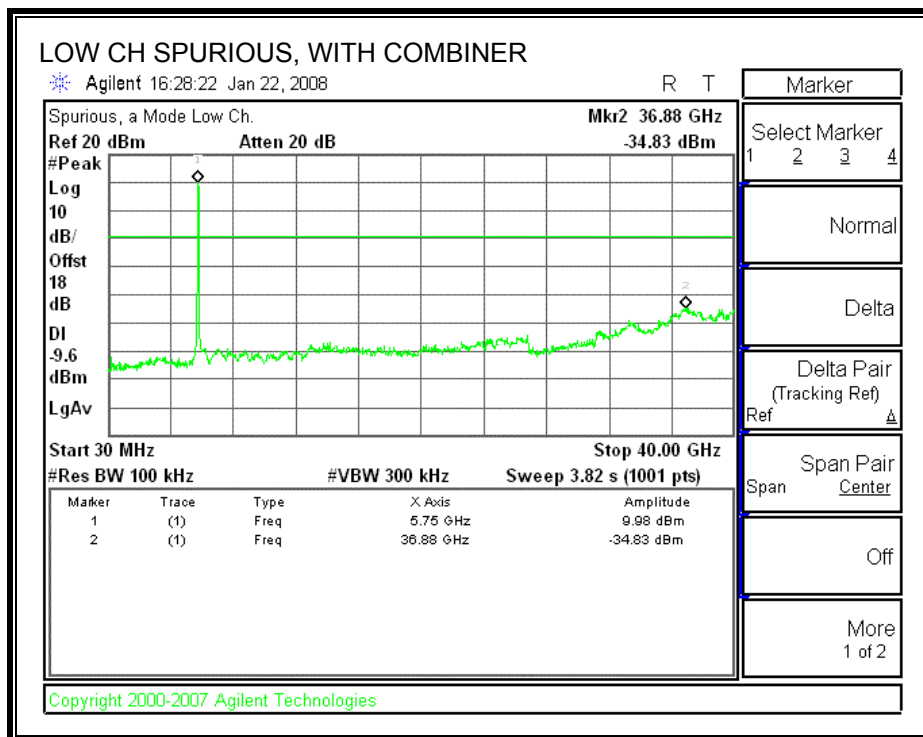
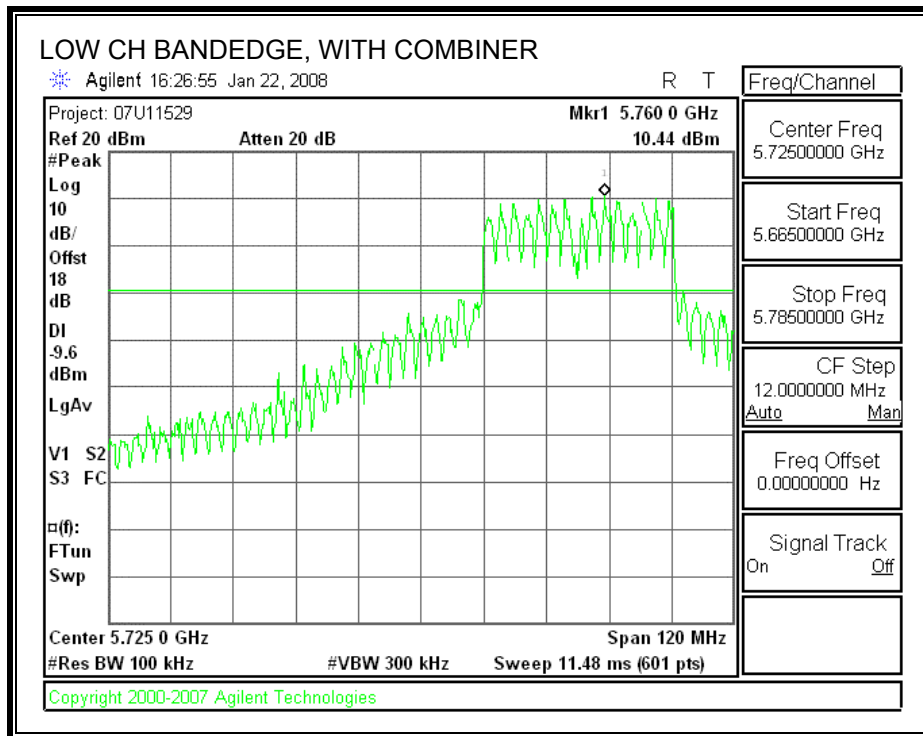
#### **TEST PROCEDURE**

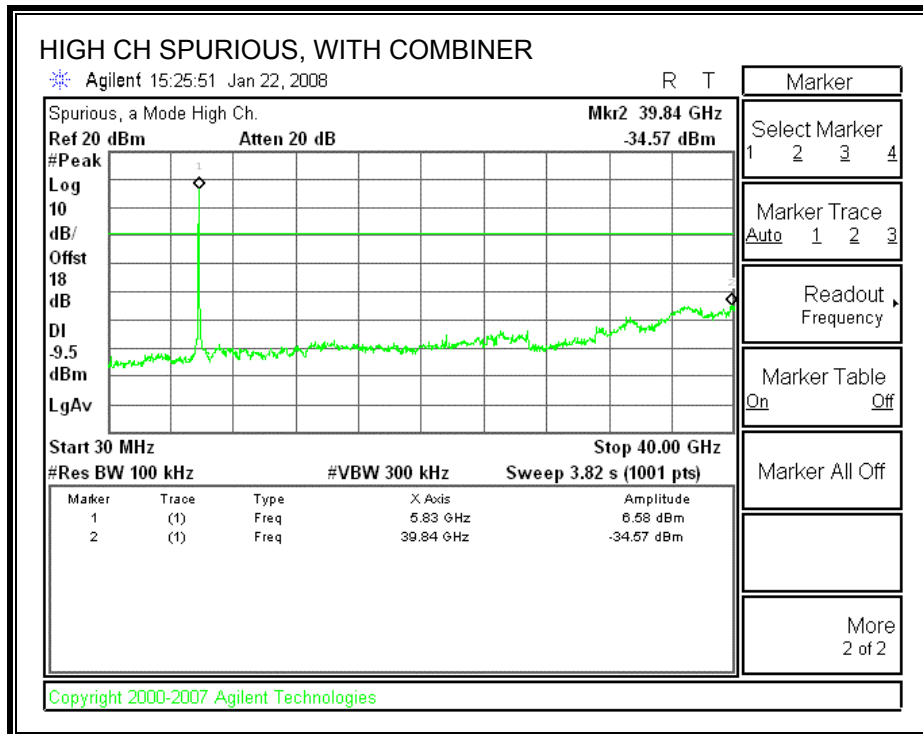
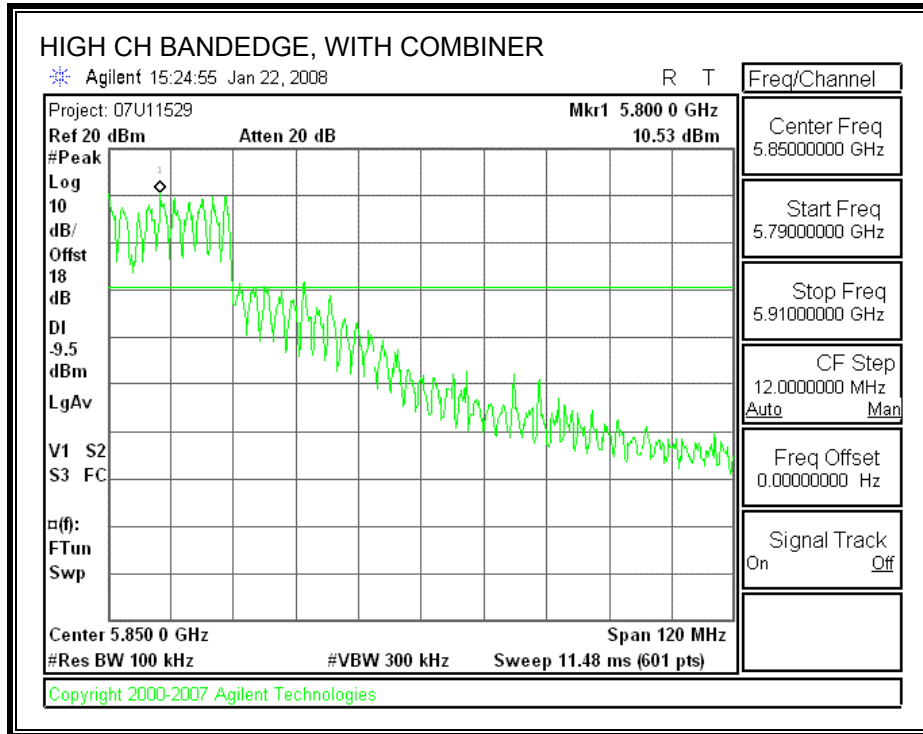
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest and highest channels.

#### **RESULTS**

**SPURIOUS EMISSIONS WITH COMBINER**





## 8. RADIATED TEST RESULTS

### 8.1. LIMITS AND PROCEDURE

#### LIMITS

FCC §15.205 and §15.209

IC RSS-210 Clause 2.6 (Transmitter)

IC RSS-GEN Clause 6 (Receiver)

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

#### TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.4. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

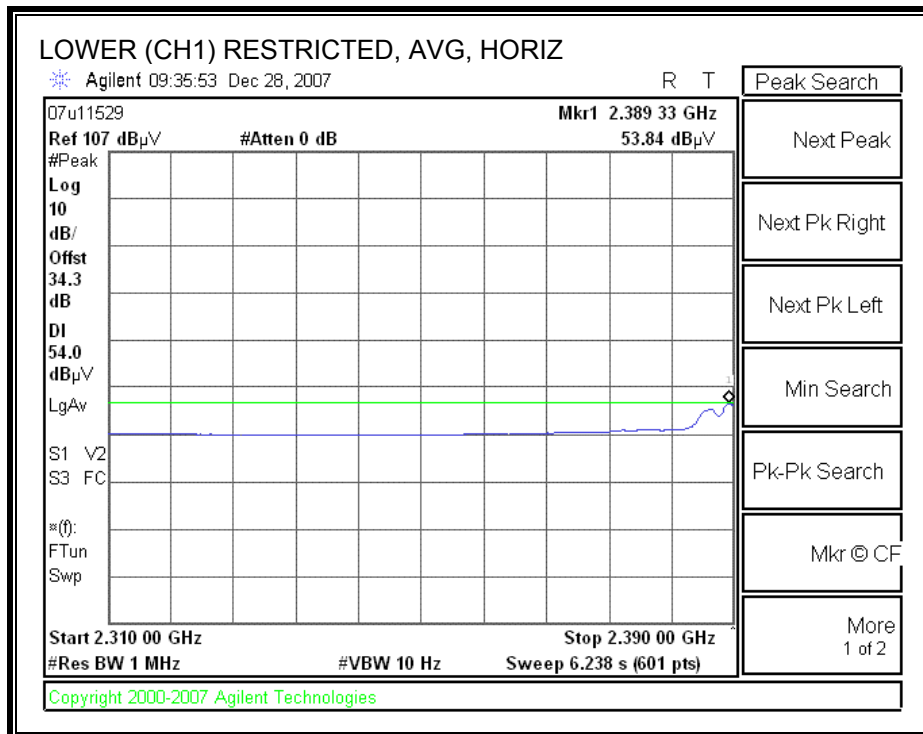
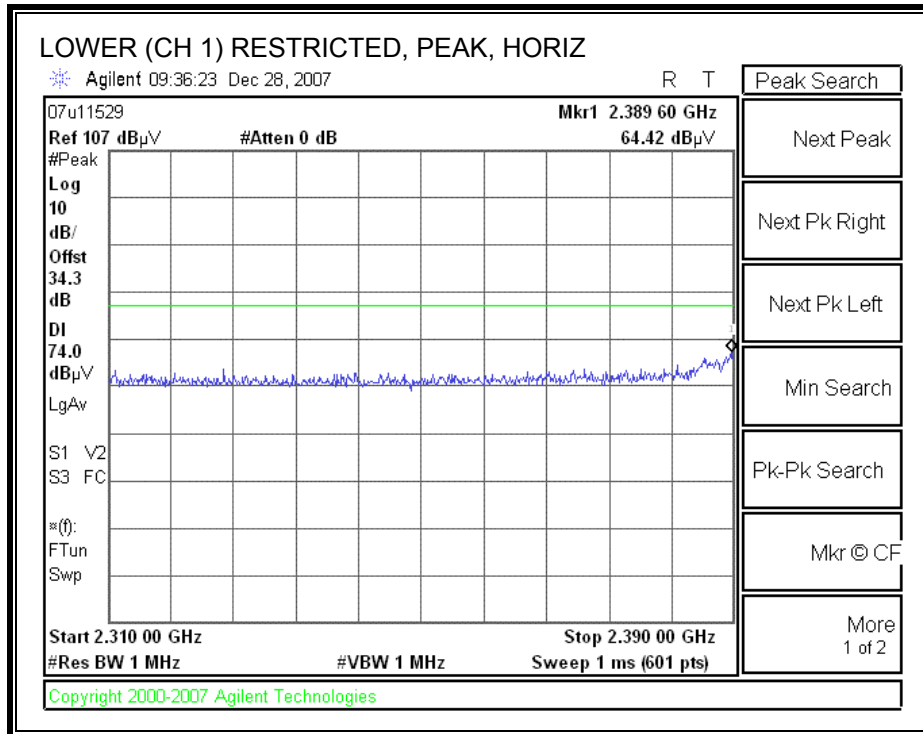
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 5 GHz band.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

**8.2. TRANSMITTER ABOVE 1 GHz**

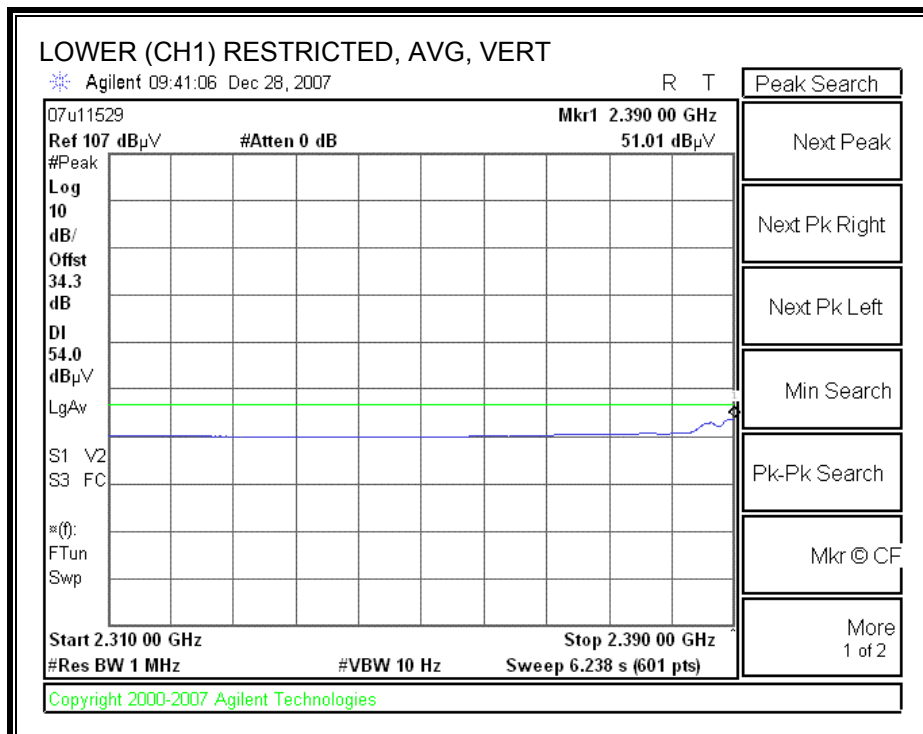
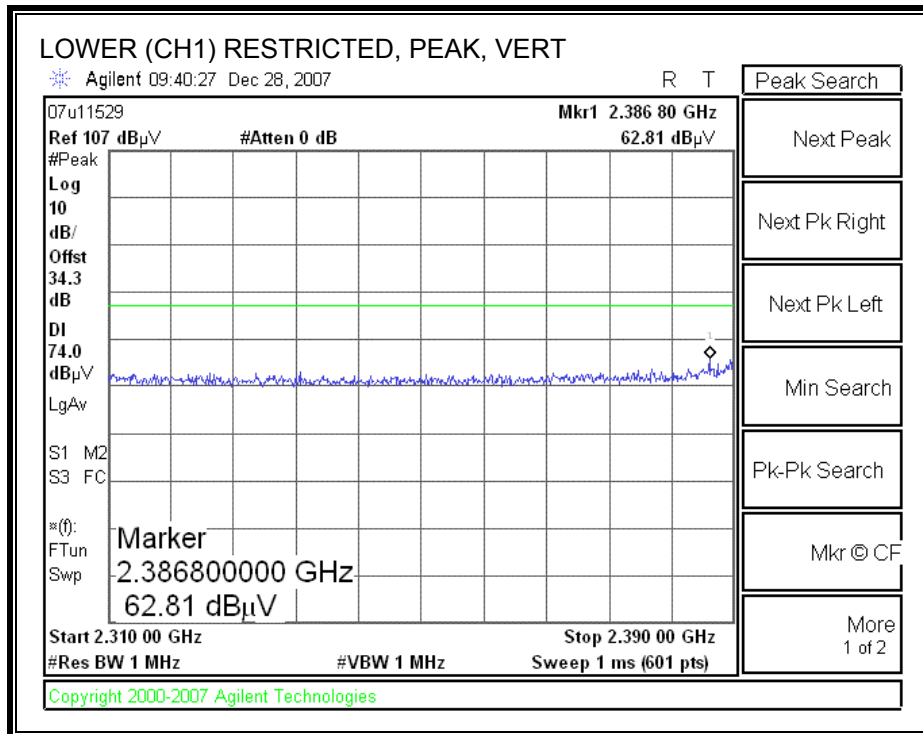
**8.2.1. 802.11b MODE**

**LOWER RESTRICTED BANDEDGE (CHANNEL 1, HORIZONTAL)**

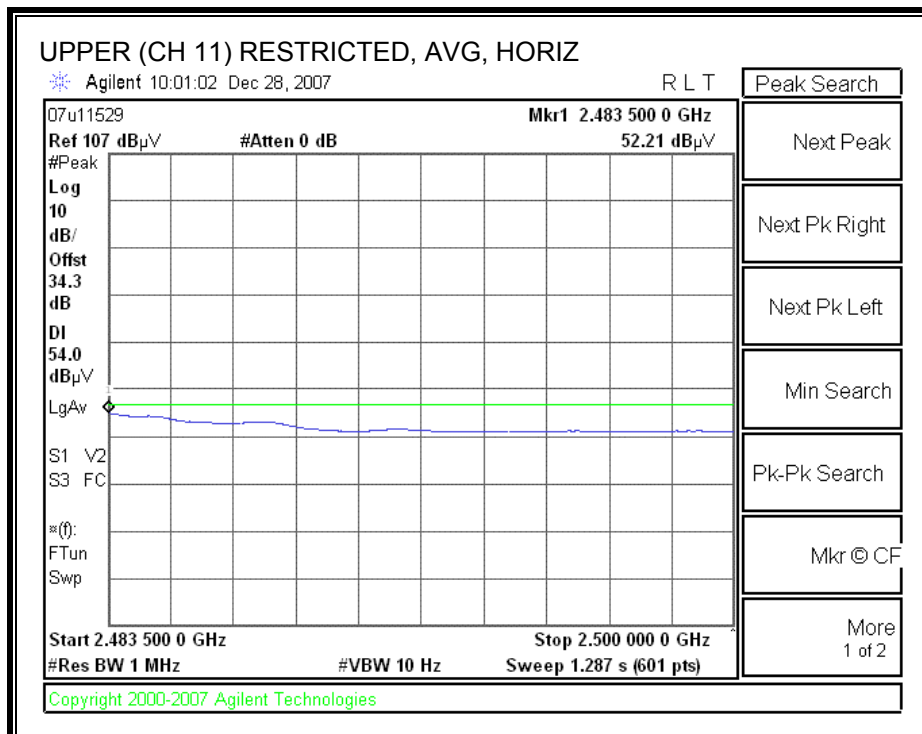
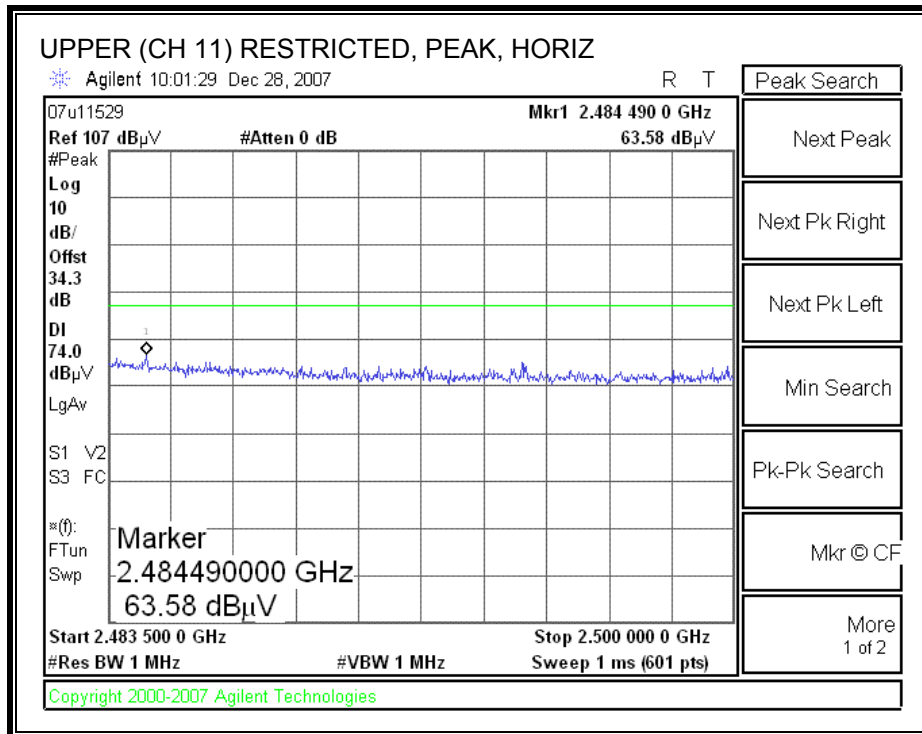




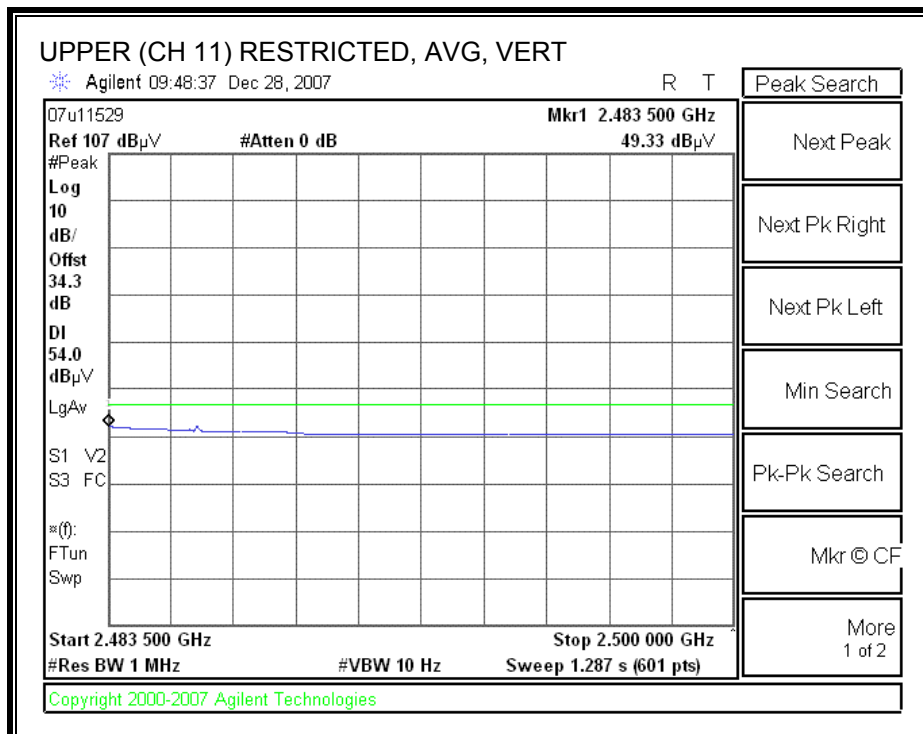
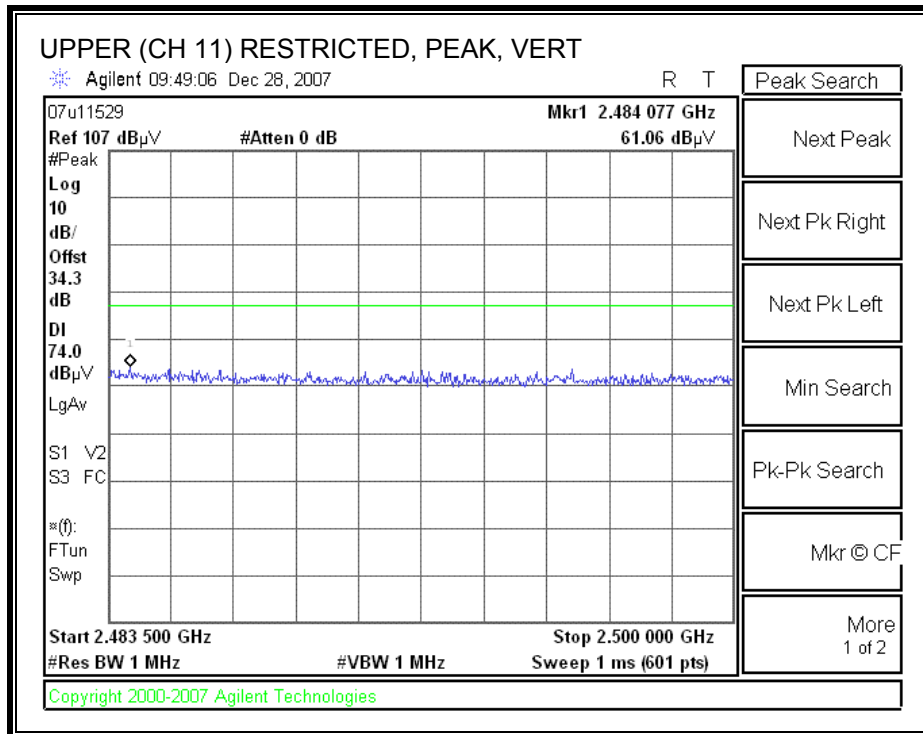
**LOWER RESTRICTED BANDEDGE (CHANNEL 1, VERTICAL)**



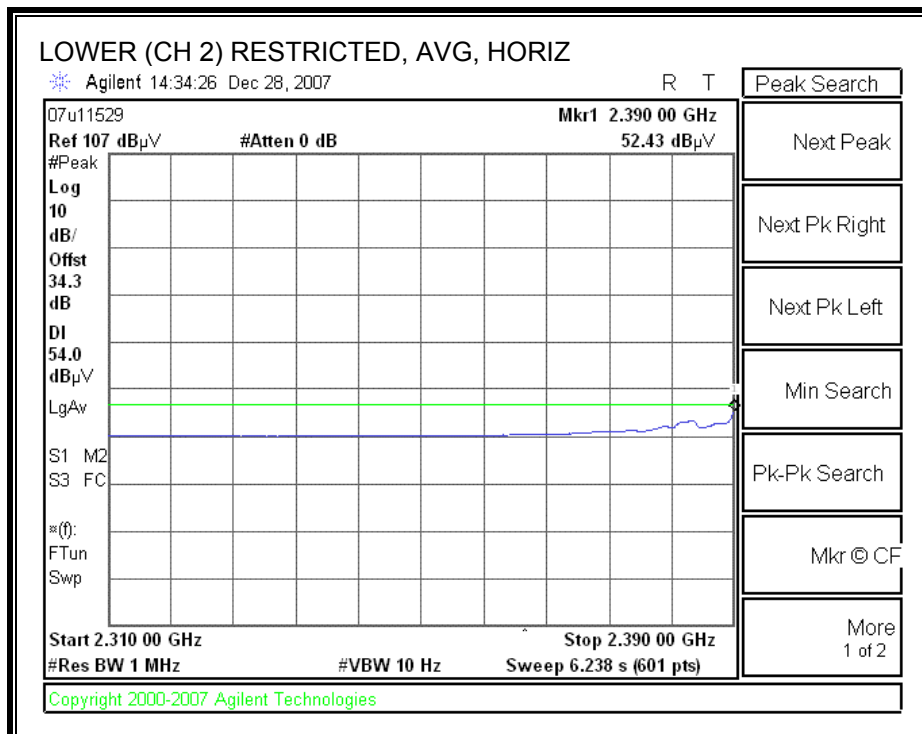
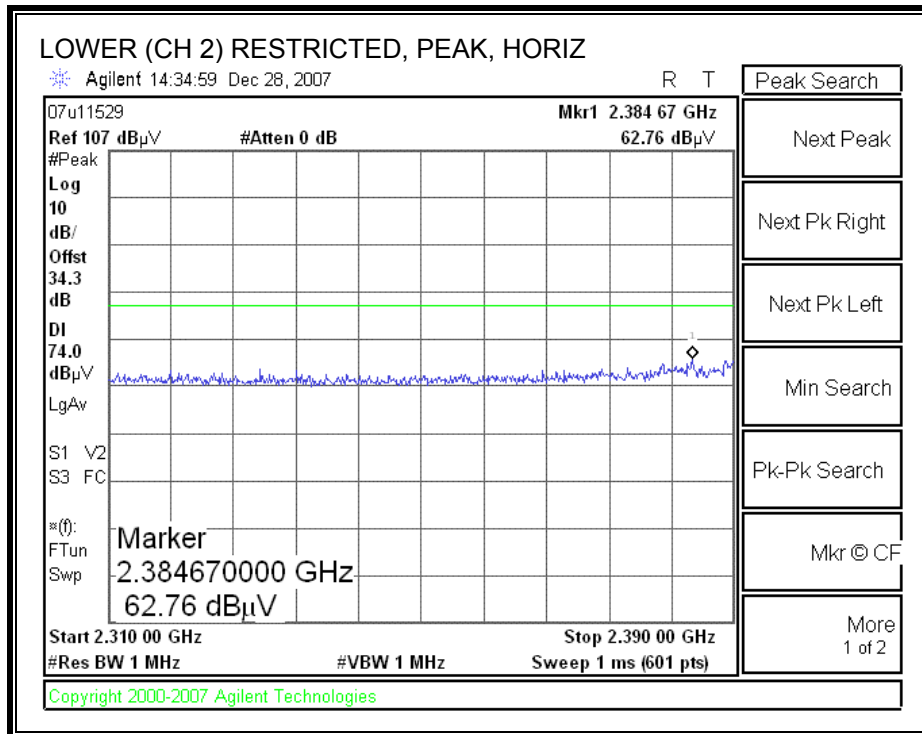
**UPPER RESTRICTED BANDEDGE (CHANNEL 11, HORIZONTAL)**



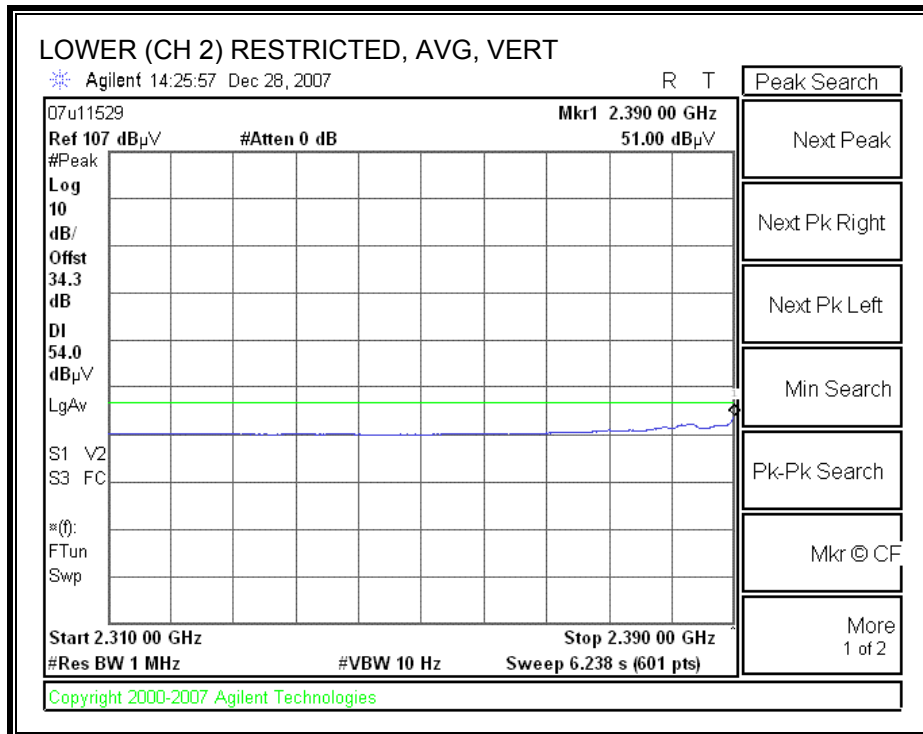
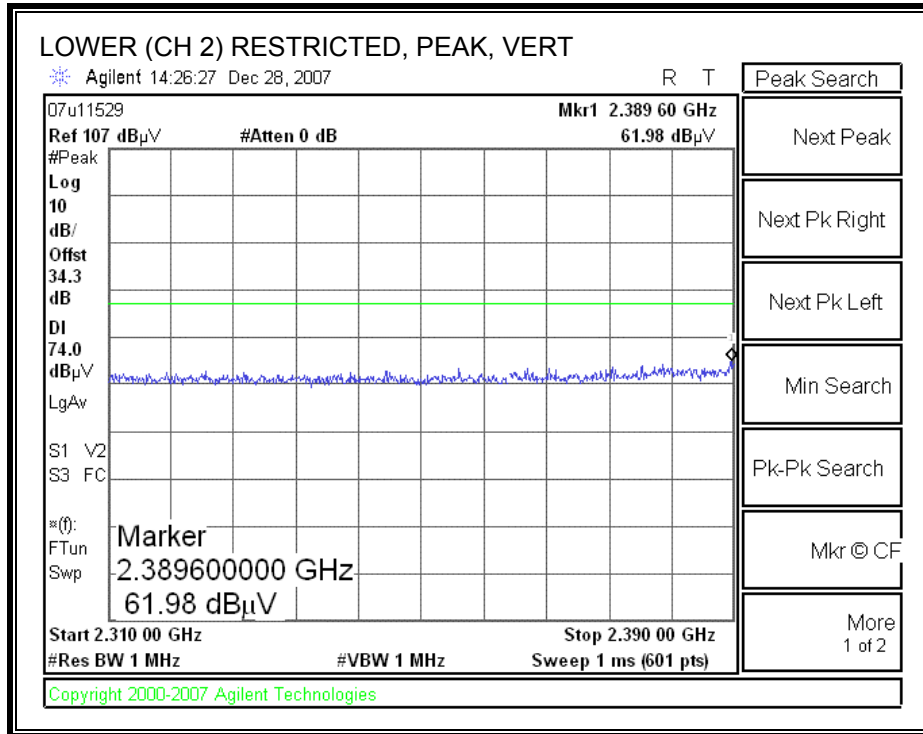
**UPPER RESTRICTED BANDEDGE (CHANNEL 11, VERTICAL)**



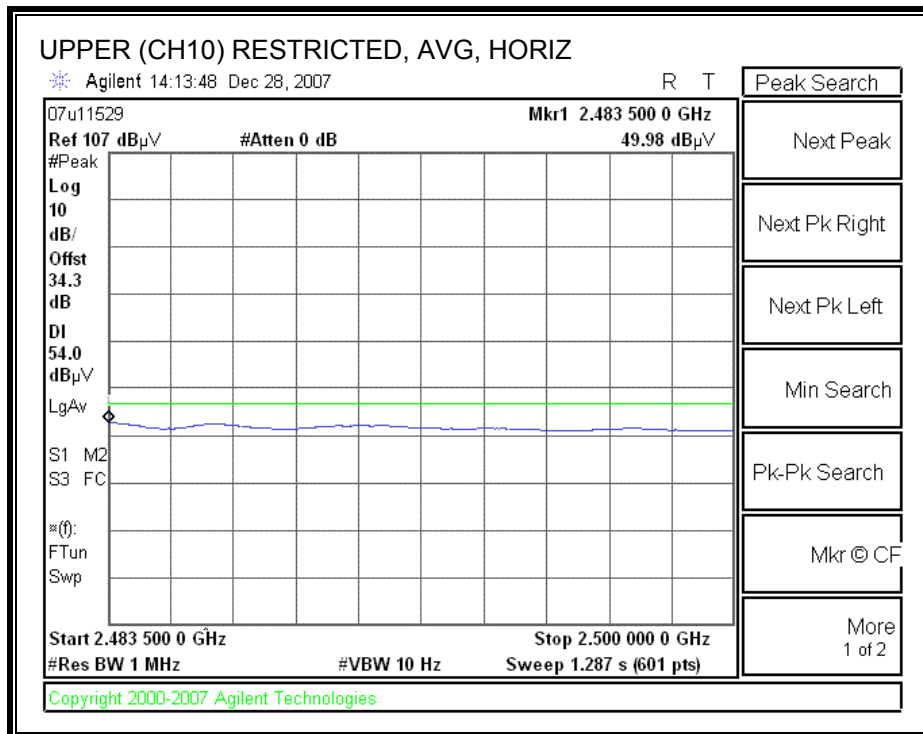
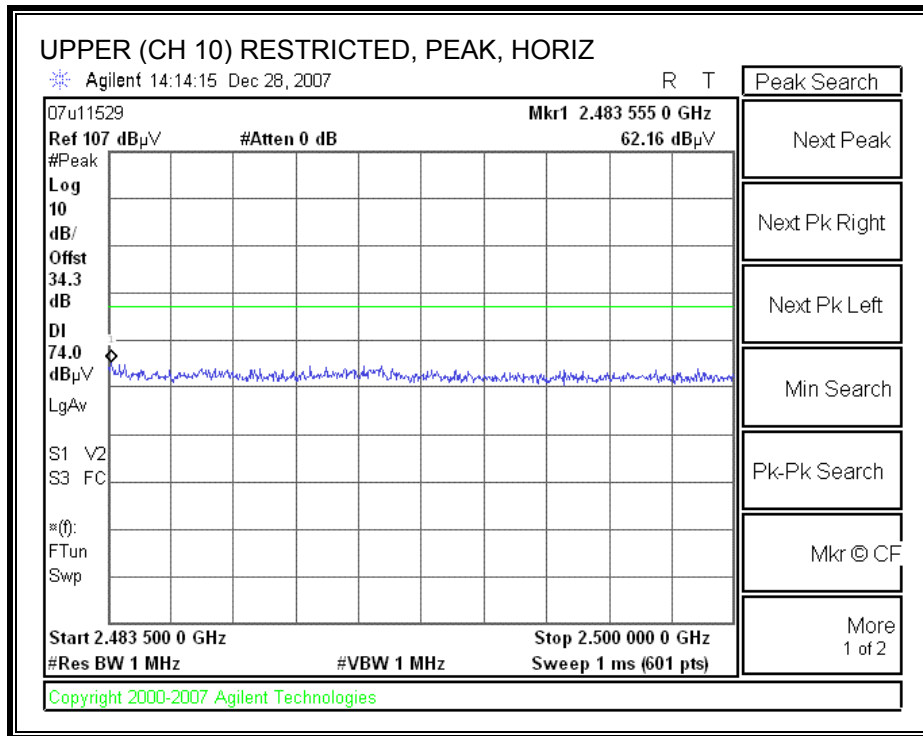
**LOWER RESTRICTED BANDEDGE (CHANNEL 2, HORIZONTAL)**



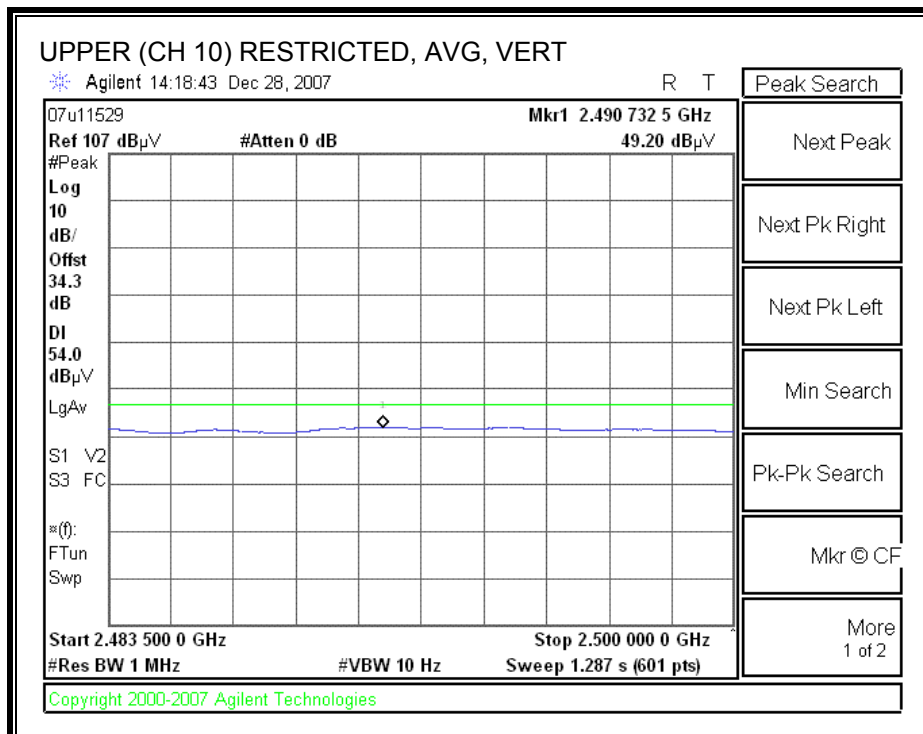
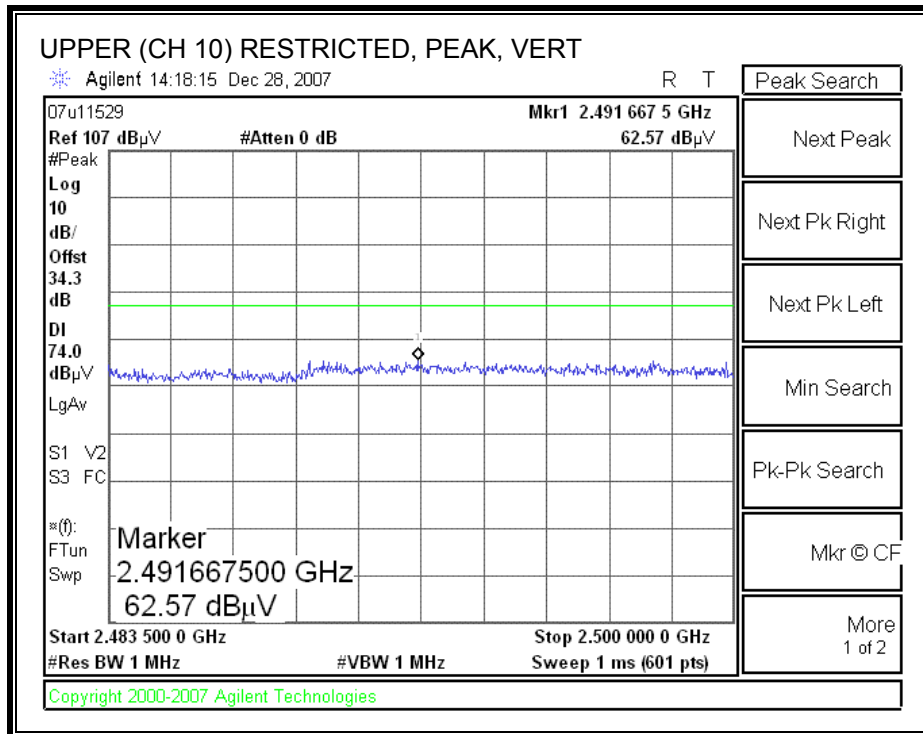
**LOWER RESTRICTED BANDEDGE (CHANNEL 2, VERTICAL)**



**UPPER RESTRICTED BANDEGE (CHANNEL 10, HORIZONTAL)**



**UPPER RESTRICTED BANDEGE (CHANNEL 10, VERTICAL)**



**HARMONICS AND SPURIOUS EMISSIONS**

**High Frequency Measurement**  
 Compliance Certification Services, Fremont 5m Chamber

Company: Broadcom  
 Project #: 07U11529  
 Date: 12/28/2007  
 Test Engineer: Chin Pang  
 Configuration: EUT/Laptop/Antennas  
 Mode: TX, b Mode

**Test Equipment:**

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T145 Agilent 3008A0050			FCC 15.205

Hi Frequency Cables

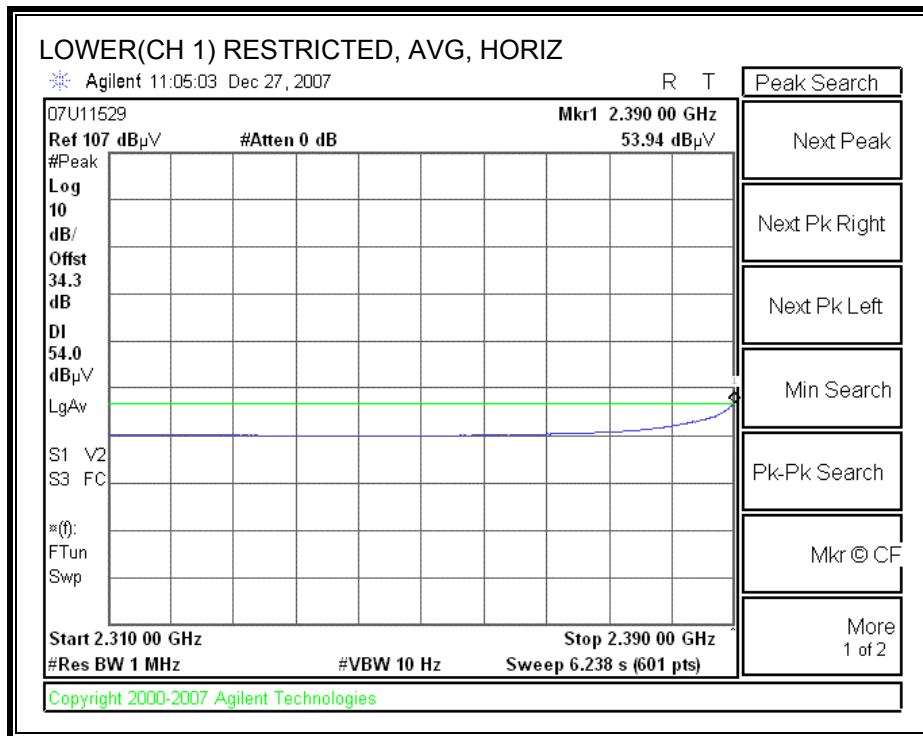
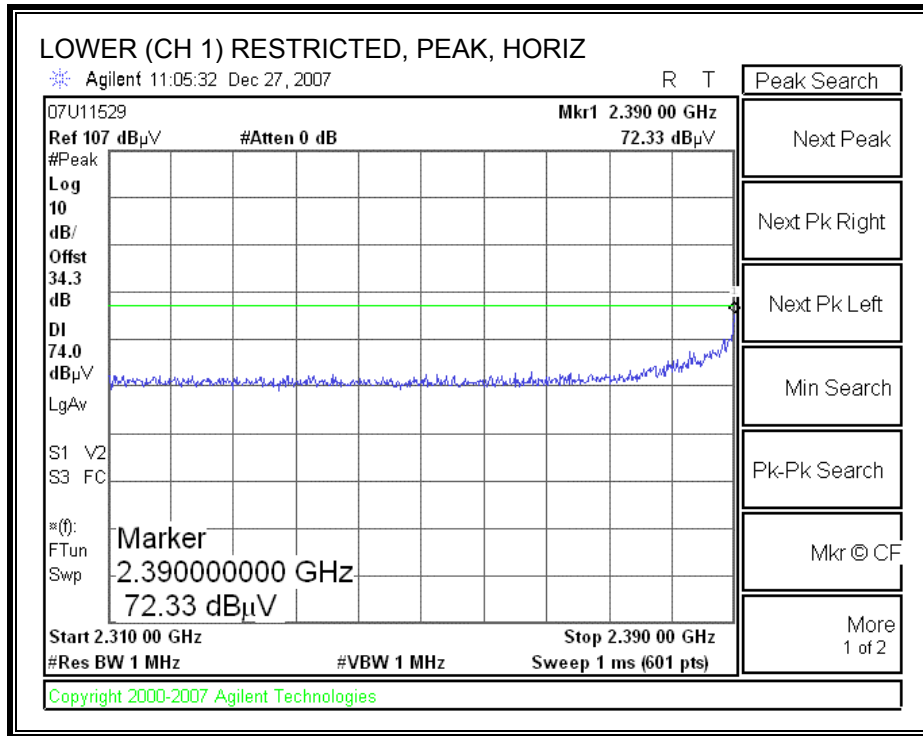
2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter	<b>Peak Measurements</b> RBW=VBW=1MHz <b>Average Measurements</b> RBW=1MHz ; VBW=10Hz
		B-5m Chamber		R_001	

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fldr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
<b>Low Ch</b>															
4.874	3.0	45.6	40.5	33.8	7.2	-34.9	0.0	0.0	51.7	46.6	74	54	-22.3	-7.4	V
4.820	3.0	46.0	41.5	33.7	7.1	-34.8	0.0	0.0	52.0	47.5	74	54	-22.0	-6.5	H
<b>Mid Ch</b>															
4.874	3.0	45.6	38.0	33.8	7.2	-34.9	0.0	0.0	51.7	44.1	74	54	-22.3	-9.9	V
7.311	3.0	46.5	39.0	36.2	8.6	-34.7	0.0	0.0	56.7	49.2	74	54	-17.3	-4.8	V
4.874	3.0	43.3	35.7	33.8	7.2	-34.9	0.0	0.0	49.4	41.8	74	54	-24.6	-12.2	H
7.311	3.0	47.0	40.3	36.2	8.6	-34.7	0.0	0.0	57.2	50.5	74	54	-16.8	-3.5	H
<b>High Ch</b>															
4.924	3.0	45.0	38.1	33.9	7.2	-34.9	0.0	0.0	51.2	44.3	74	54	-22.8	-9.7	V
7.386	3.0	45.0	37.5	36.3	8.7	-34.6	0.0	0.0	55.3	47.8	74	54	-18.7	-6.2	V
4.924	3.0	44.6	38.2	33.9	7.2	-34.9	0.0	0.0	50.8	44.4	74	54	-23.2	-9.6	H
7.386	3.0	46.0	39.3	36.3	8.7	-34.6	0.0	0.0	56.3	49.6	74	54	-17.7	-4.4	H

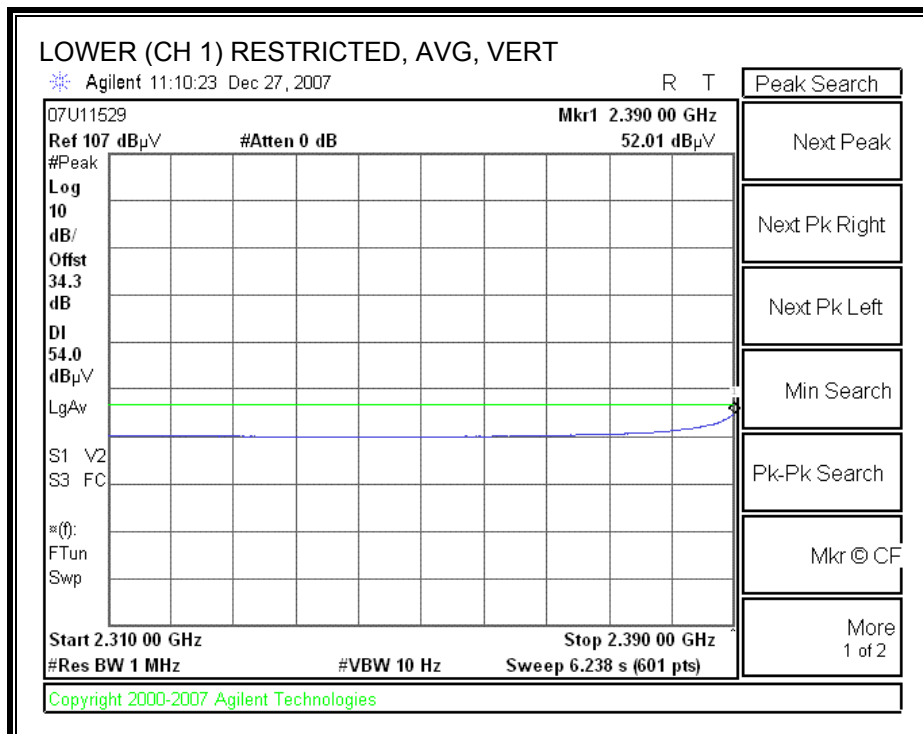
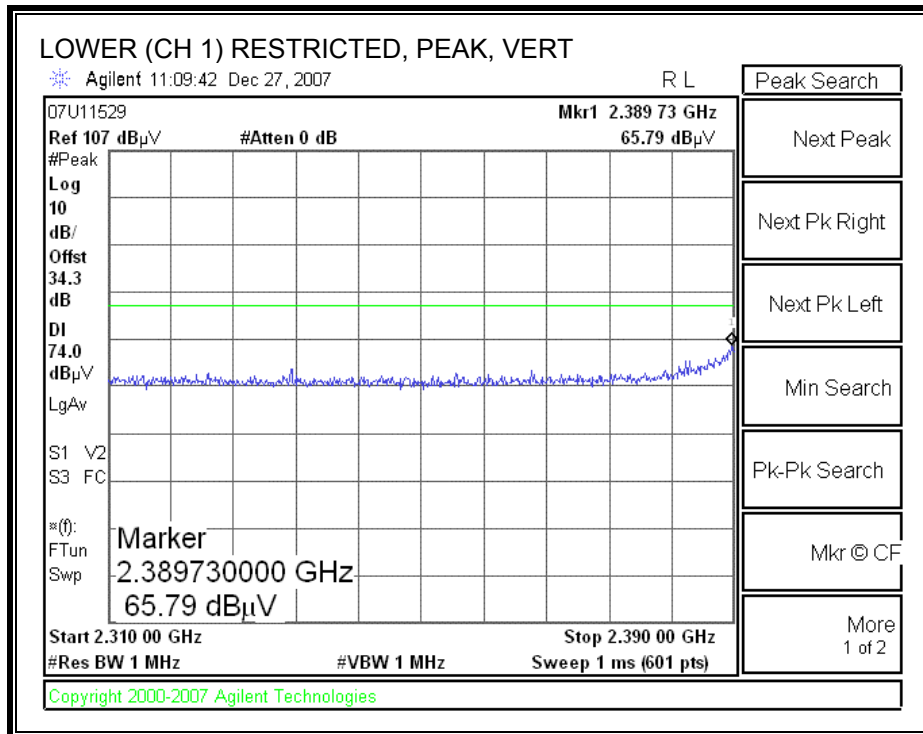
f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter		



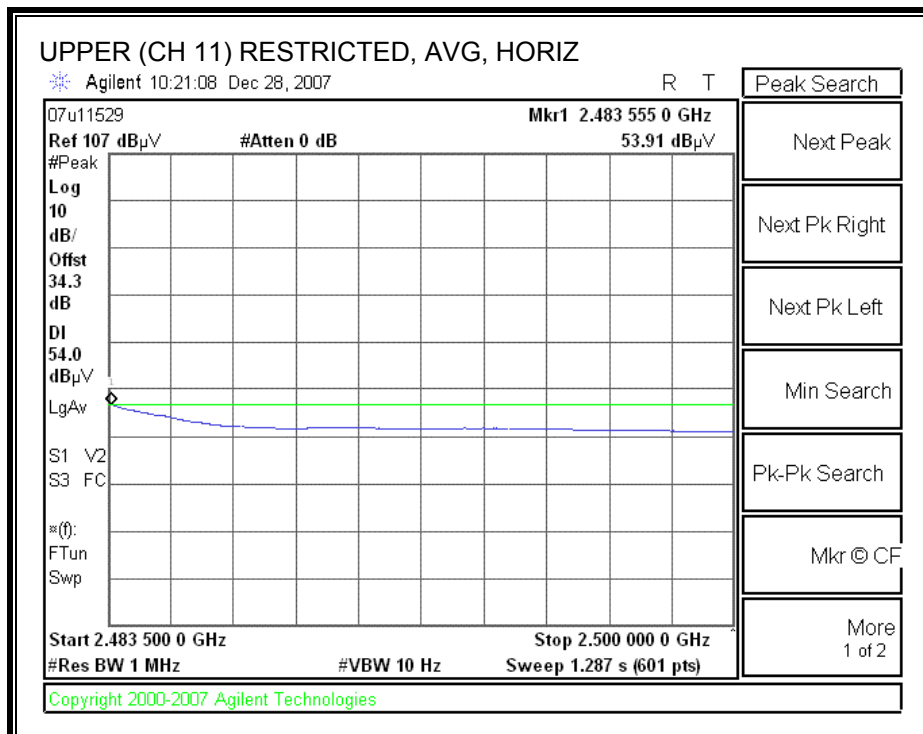
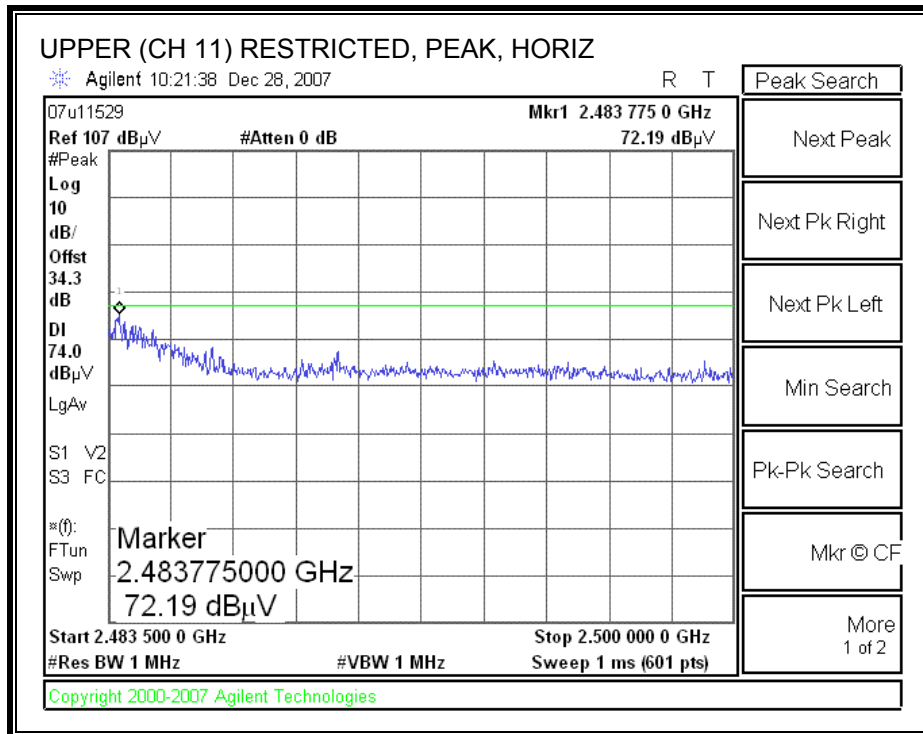
**8.2.2. 802.11g MODE**  
**LOWER RESTRICTED BANDEDGE (CHANNEL 1, HORIZONTAL)**



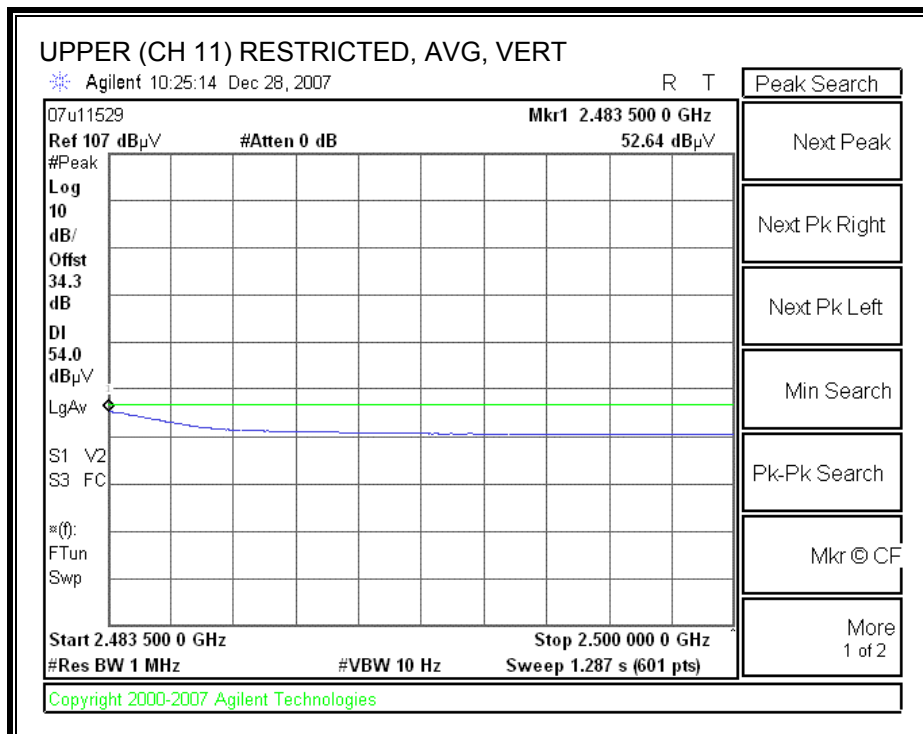
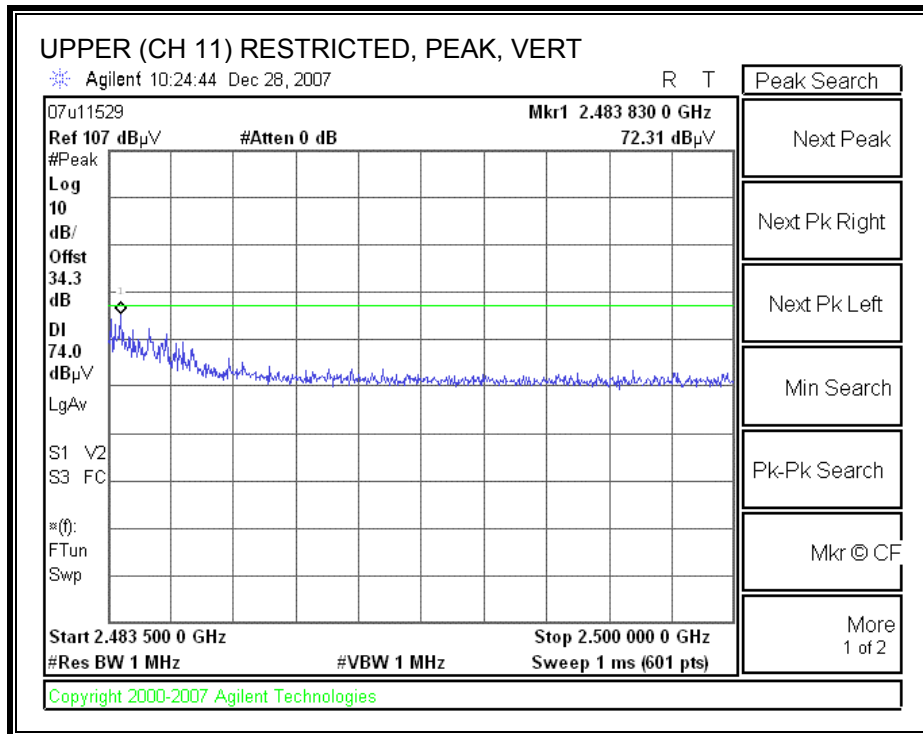
**LOWER RESTRICTED BANDEDGE (CHANNEL 1, VERTICAL)**



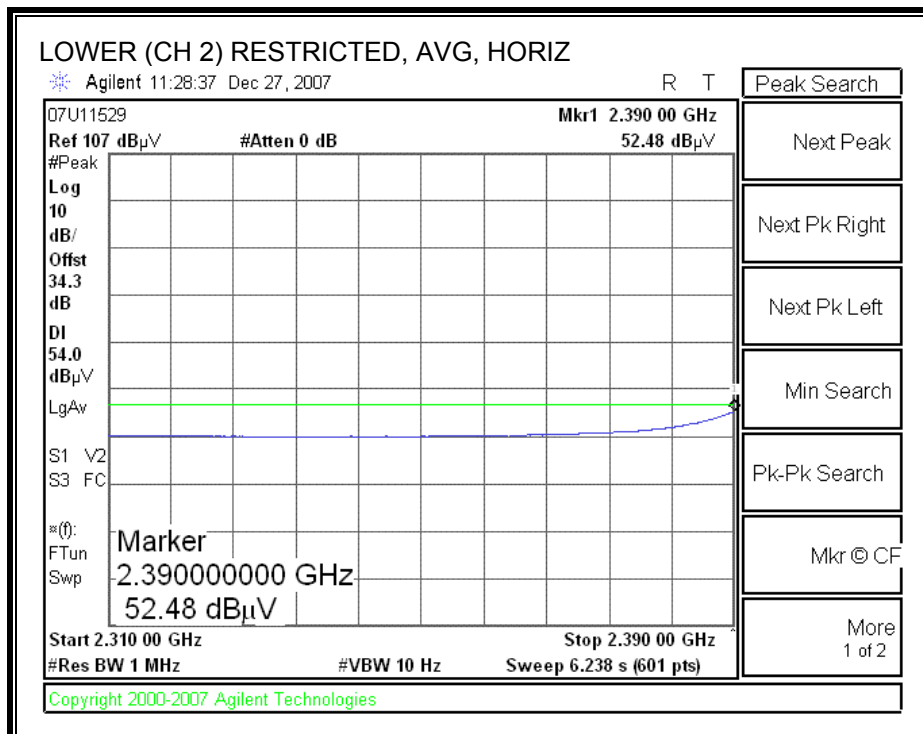
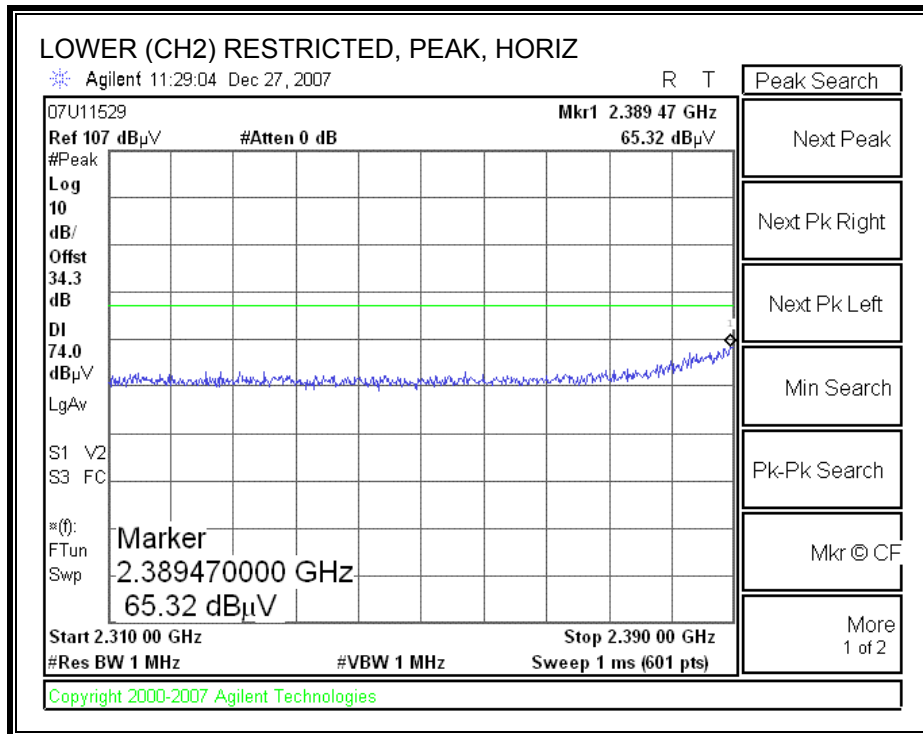
**UPPER RESTRICTED BANDEDGE (CHANNEL 11, HORIZONTAL)**



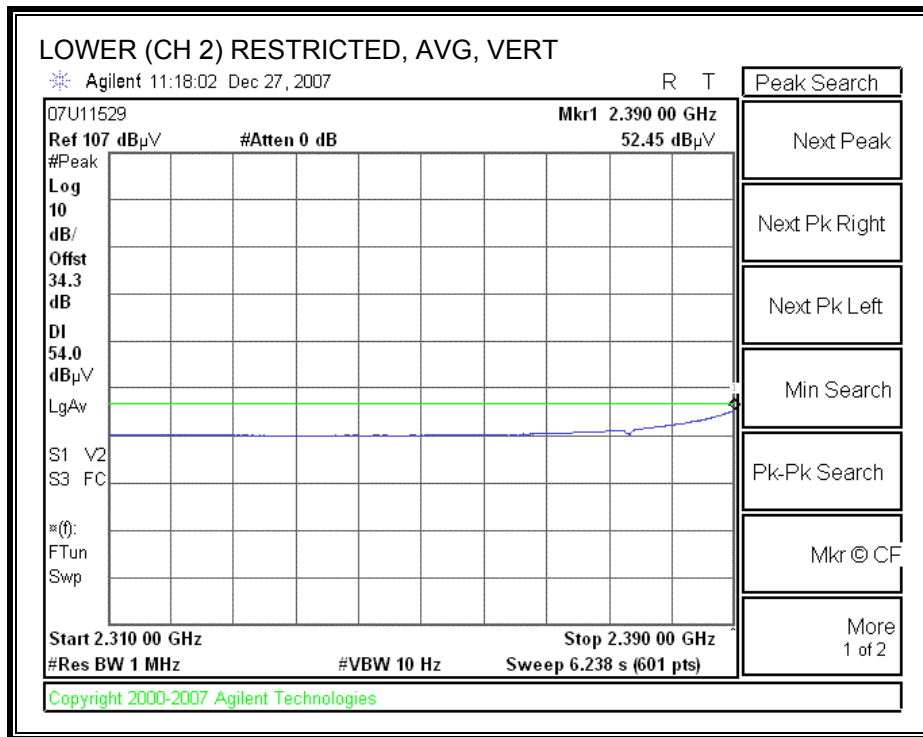
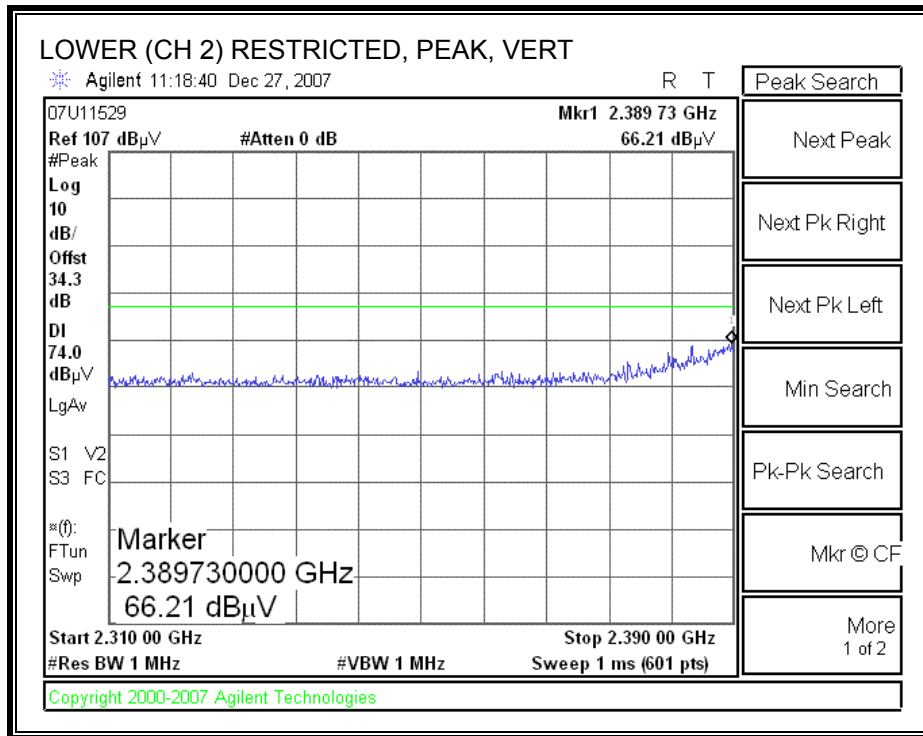
**UPPER RESTRICTED BANDEGE (CHANNEL 11, VERTICAL)**



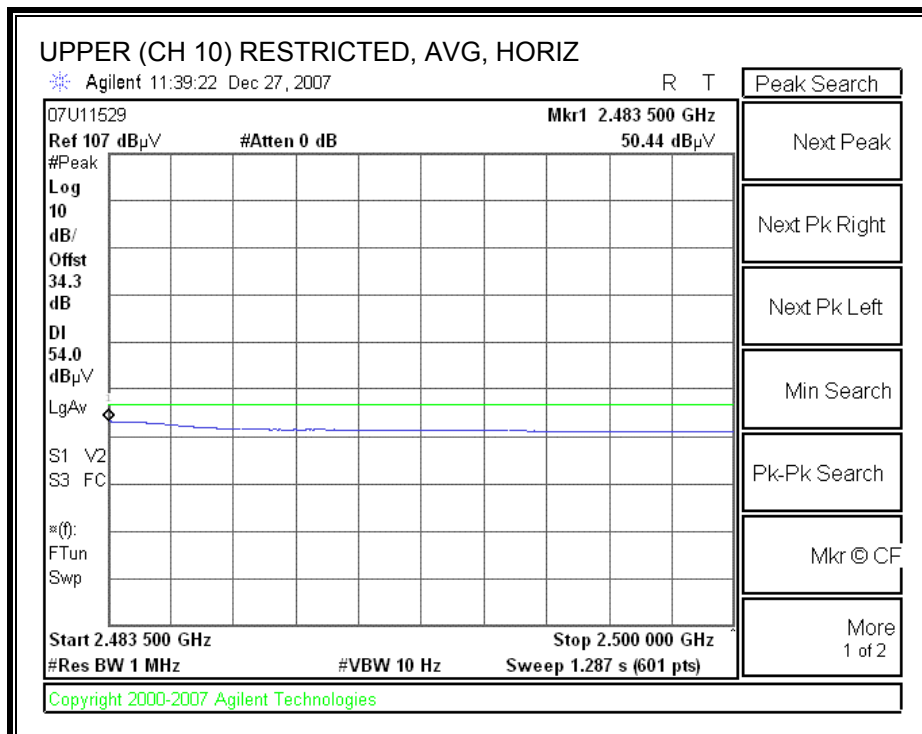
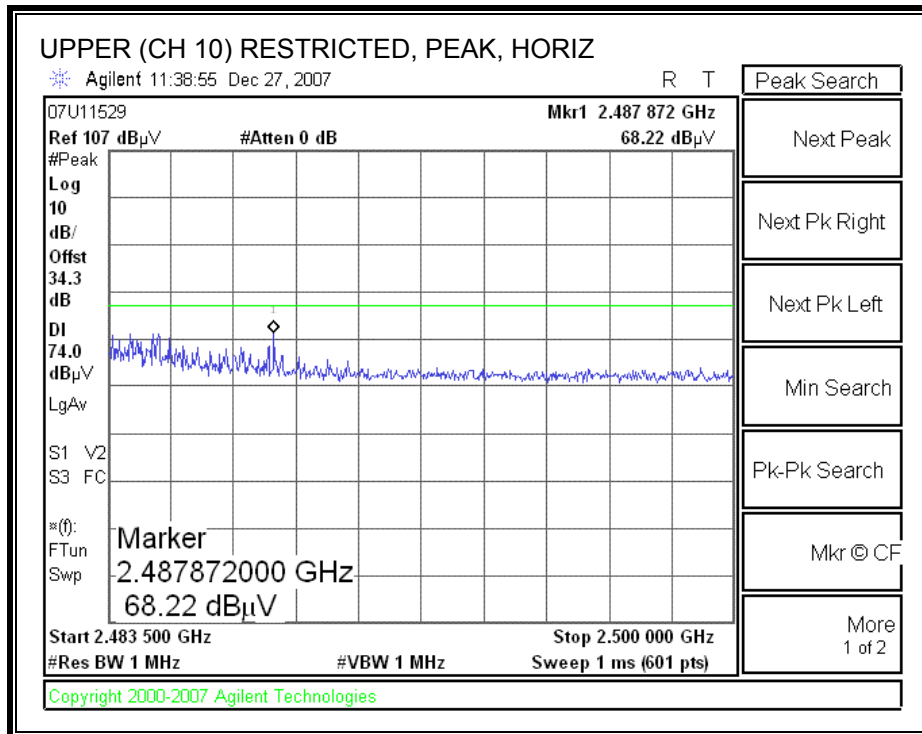
**LOWER RESTRICTED BANDEDGE (CHANNEL 2, HORIZONTAL)**



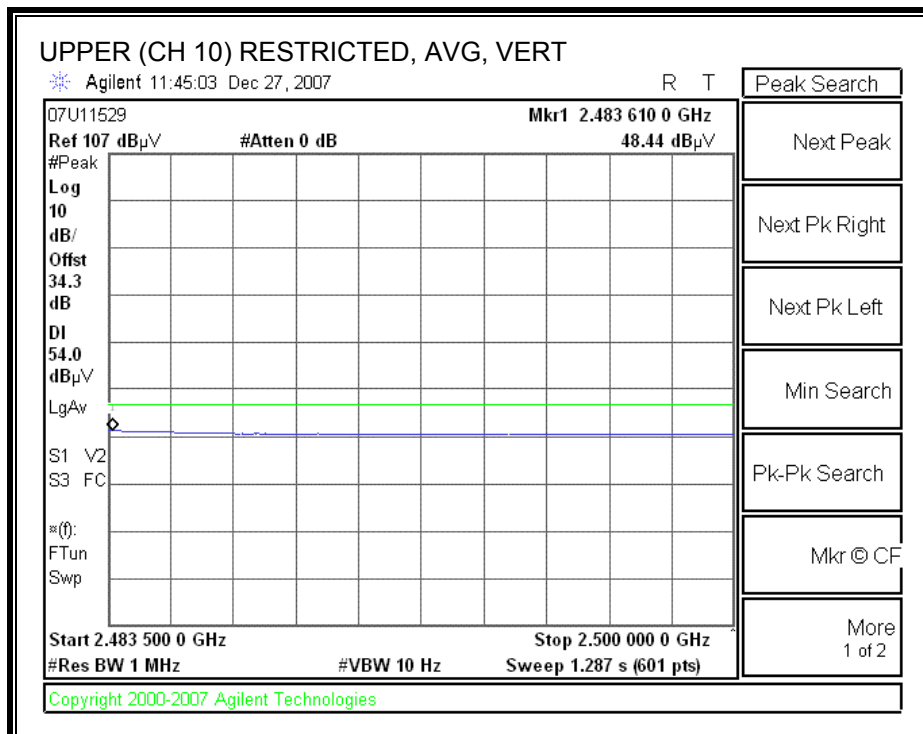
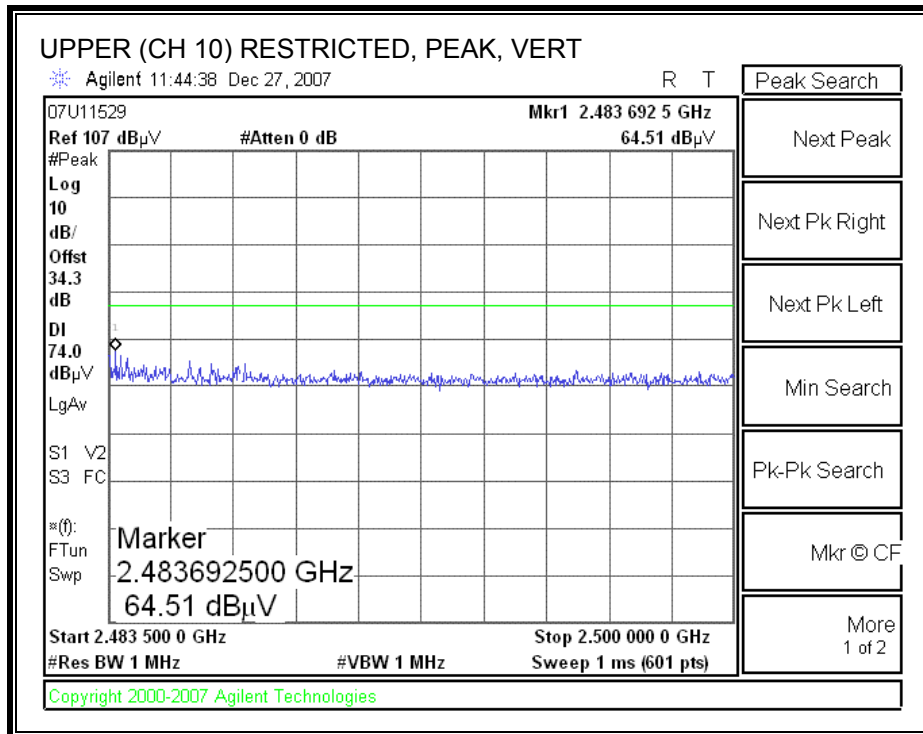
**LOWER RESTRICTED BANDEDGE (CHANNEL 2, VERTICAL)**



**UPPER RESTRICTED BANDEDGE (CHANNEL 10, HORIZONTAL)**



**UPPER RESTRICTED BANDEGE (CHANNEL 10, VERTICAL)**





**HARMONICS AND SPURIOUS EMISSIONS**

**High Frequency Measurement**  
 Compliance Certification Services, Fremont 5m Chamber

Company: Broadcom  
 Project #: 07U11529  
 Date: 12/27/2007  
 Test Engineer: Mengsitu Mekuria  
 Configuration: EUT/Laptop/Antennas  
 Mode: TX, g Mode

Test Equipment:

Horn 1-18GHz	Pre-amplifier 1-26GHz	Pre-amplifier 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T145 Agilent 3008A005c			FCC 15.205

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter	
		B-5m Chamber		R_001	<u>Peak Measurements</u> RBW=VBW=1MHz <u>Average Measurements</u> RBW=1MHz ; VBW=10Hz

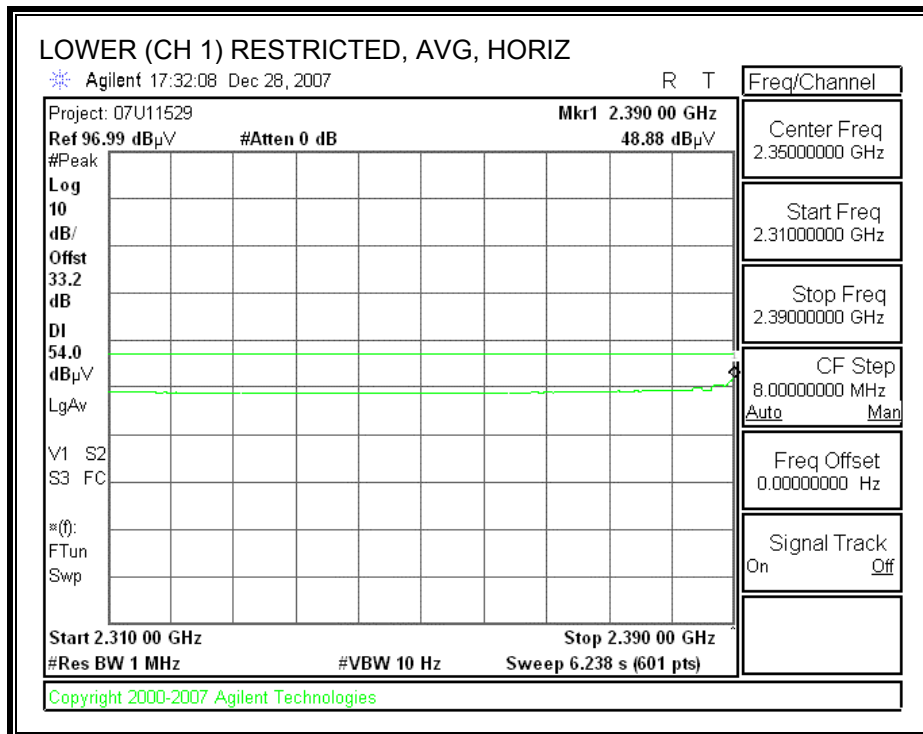
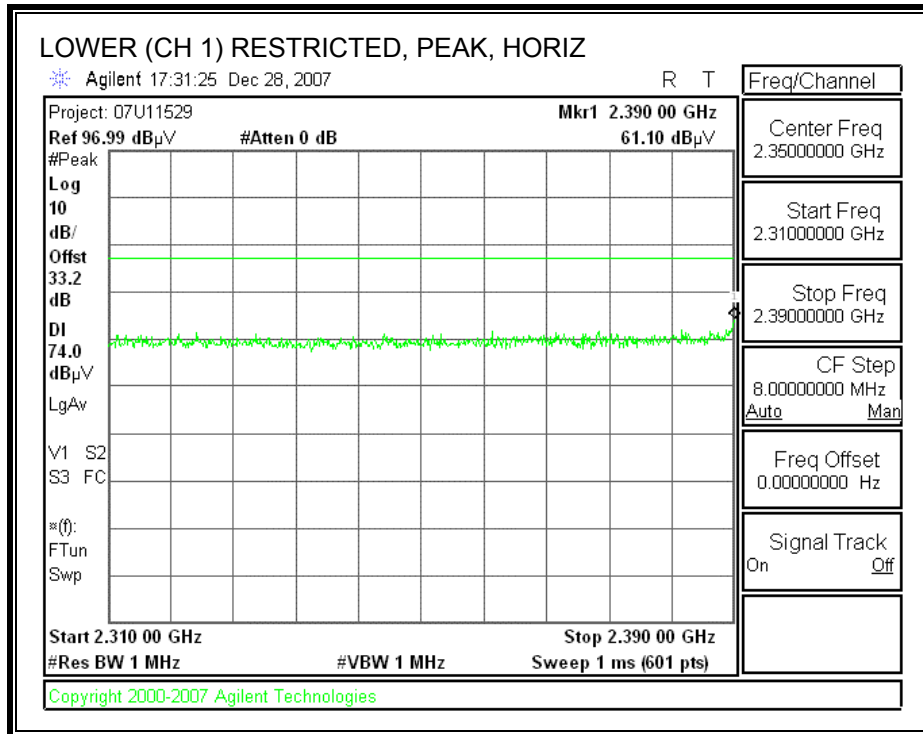
f GHz	Dist (m)	Read Pk dBuV	Read Avg dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
<b>Low Ch</b>															
4.819	3.0	45.8	31.6	33.7	7.1	-34.8	0.0	0.0	51.8	37.6	74	54	-22.2	-16.4	V
4.822	3.0	46.8	33.4	33.7	7.1	-34.8	0.0	0.0	52.8	39.4	74	54	-21.2	-14.6	H
<b>Mid Ch</b>															
4.874	3.0	41.4	28.4	33.8	7.2	-34.9	0.0	0.0	47.5	34.5	74	54	-26.5	-19.5	V
7.311	3.0	49.1	35.1	36.2	8.6	-34.7	0.0	0.0	59.4	45.3	74	54	-14.6	-8.7	V
4.874	3.0	42.6	28.8	33.8	7.2	-34.9	0.0	0.0	48.7	34.9	74	54	-25.3	-19.1	H
7.311	3.0	46.2	33.3	36.2	8.6	-34.7	0.0	0.0	56.5	43.5	74	54	-17.5	-10.5	H
<b>High Ch</b>															
4.924	3.0	42.9	30.0	33.9	7.2	-34.9	0.0	0.0	49.1	36.2	74	54	-24.9	-17.8	V
7.386	3.0	43.9	31.9	36.3	8.7	-34.6	0.0	0.0	54.2	42.2	74	54	-19.8	-11.8	V
4.924	3.0	44.2	30.8	33.9	7.2	-34.9	0.0	0.0	50.4	37.0	74	54	-23.6	-17.0	H
7.386	3.0	44.1	30.7	36.3	8.7	-34.6	0.0	0.0	54.4	41.0	74	54	-19.6	-13.0	H

Rev. 412.7

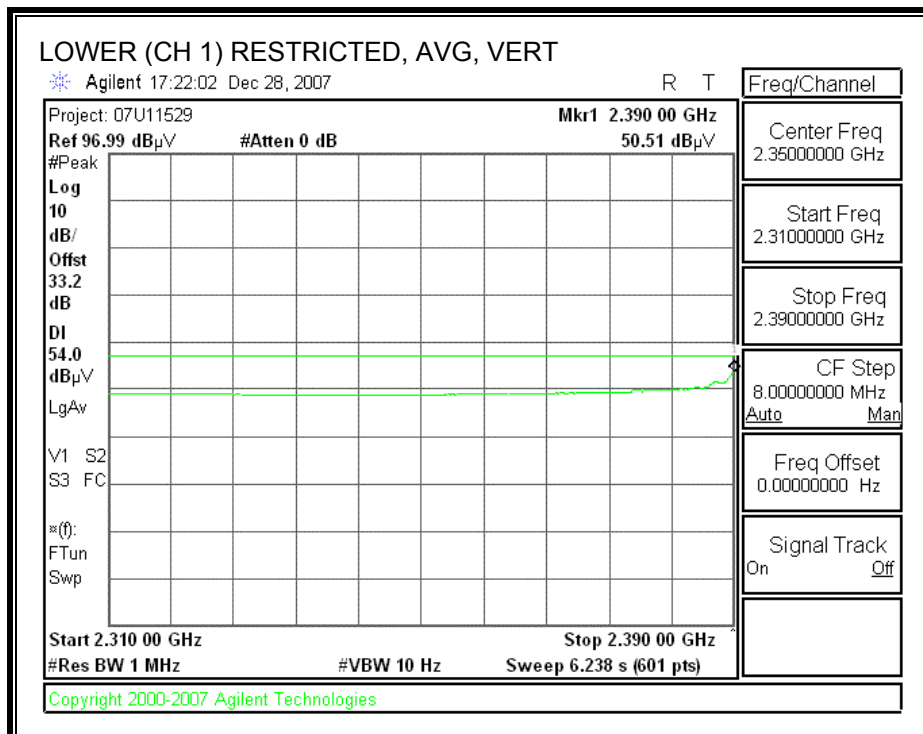
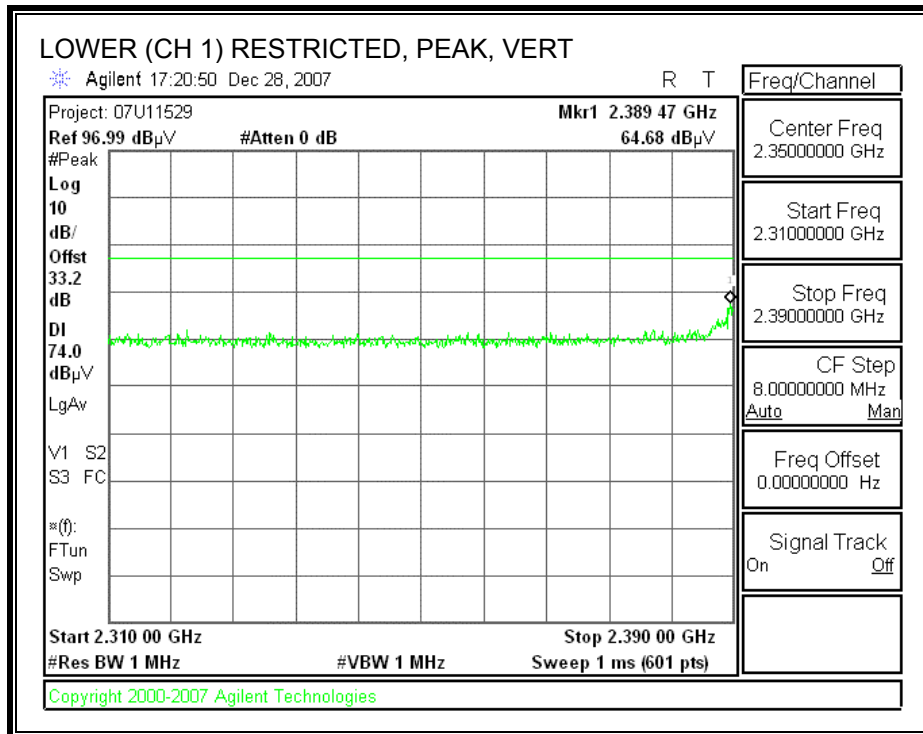
f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter		

**8.2.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND**

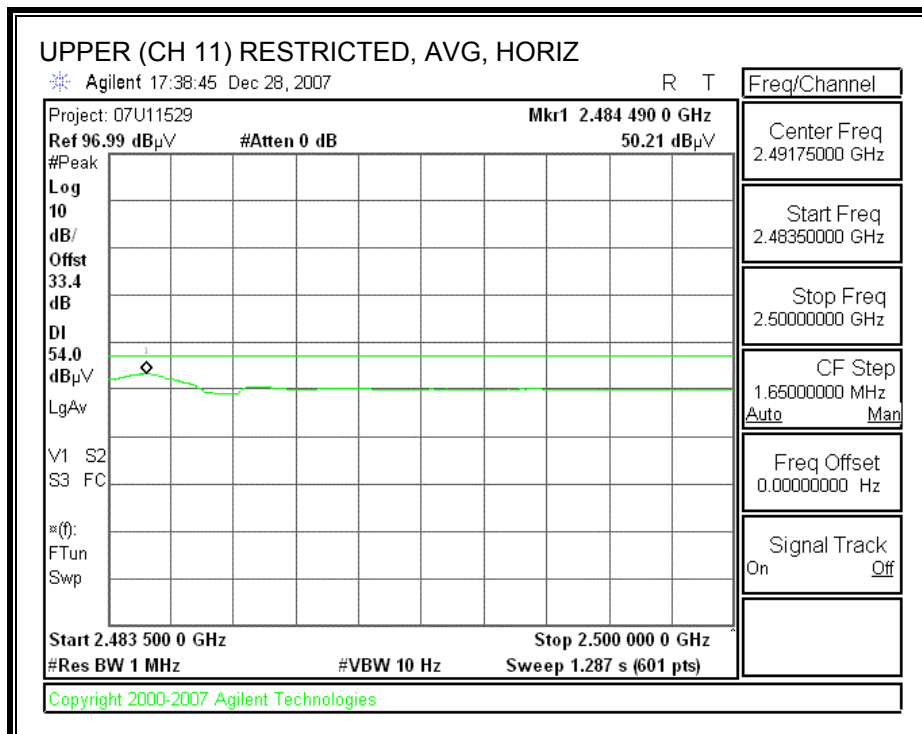
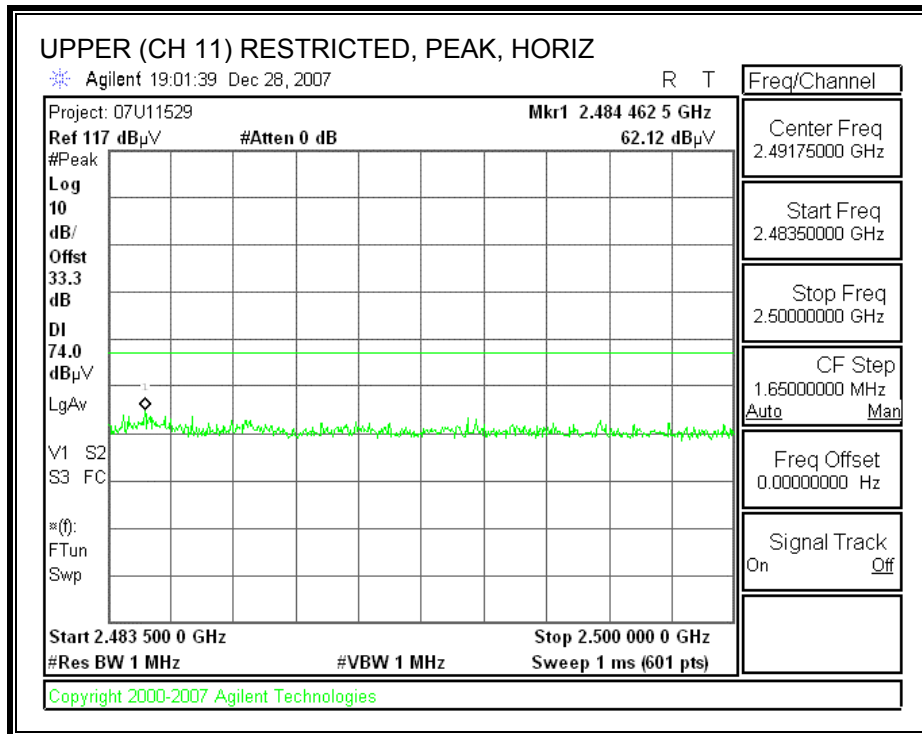
**LOWER RESTRICTED BANDEDGE (CHANNEL 1, HORIZONTAL)**



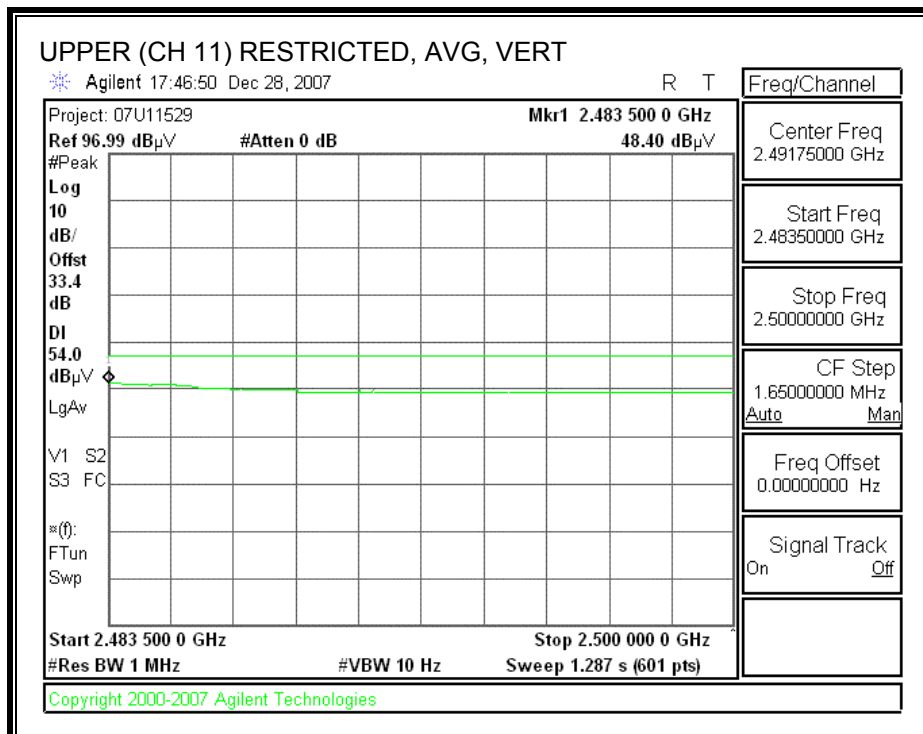
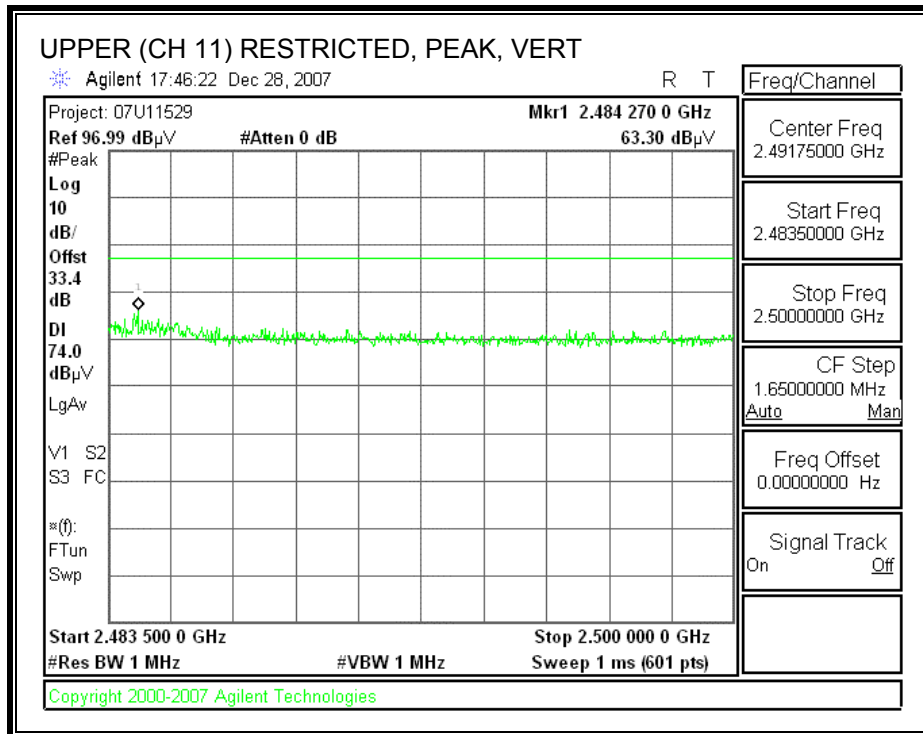
**LOWER RESTRICTED BANDEDGE (CHANNEL 1, VERTICAL)**



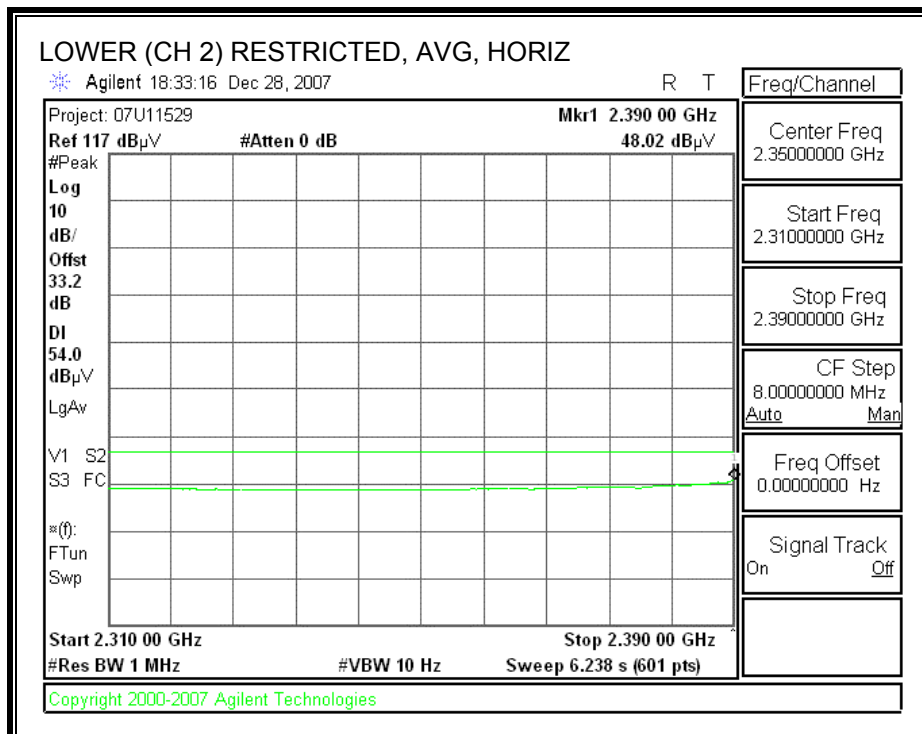
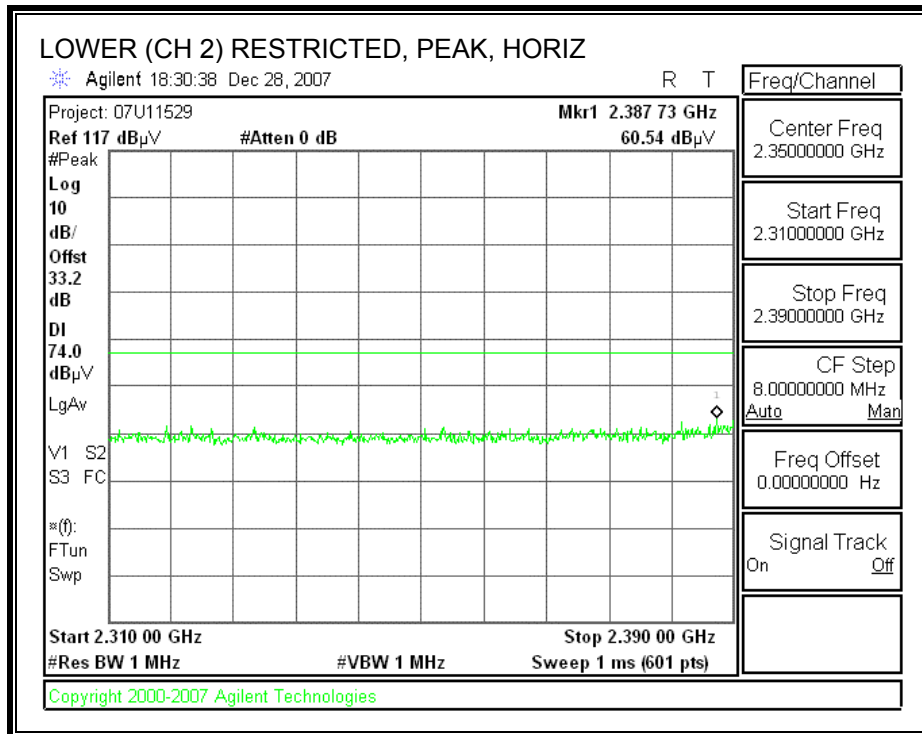
**UPPER RESTRICTED BANDEDGE (CHANNEL 11, HORIZONTAL)**



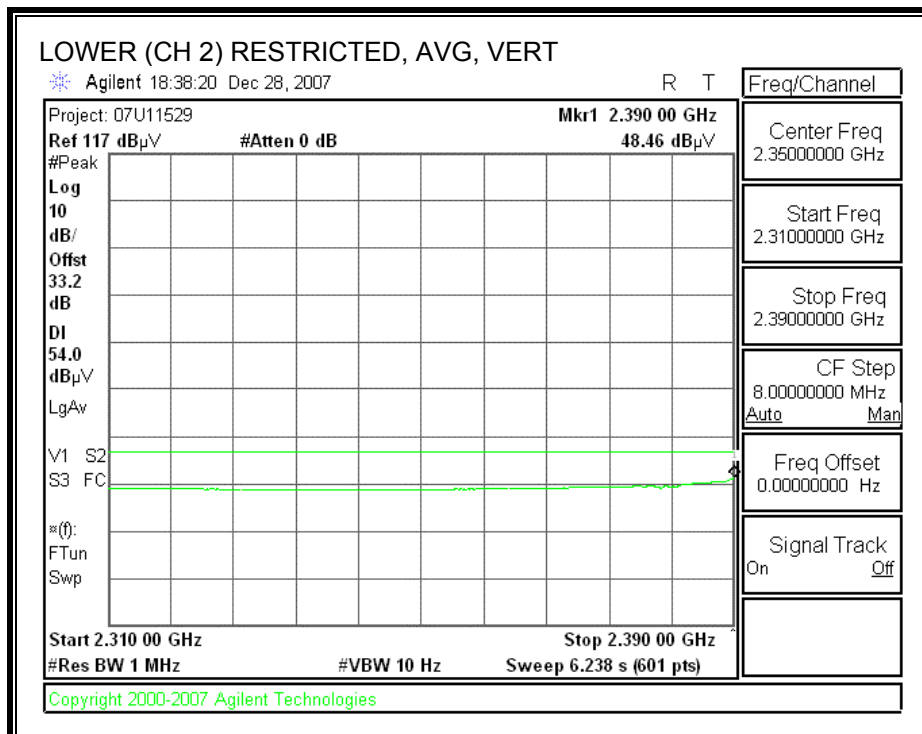
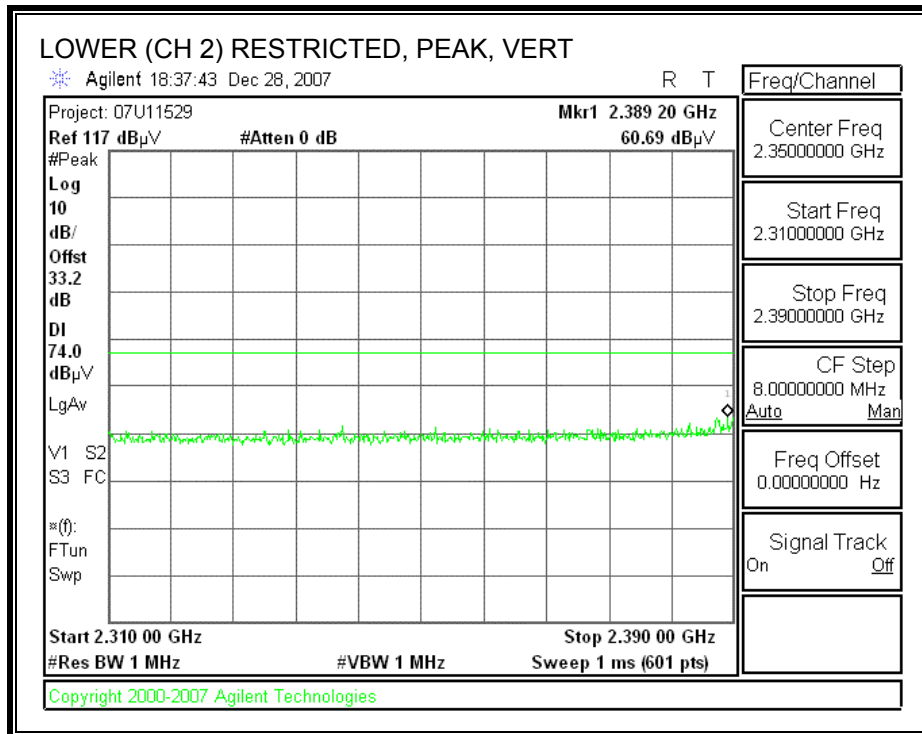
**UPPER RESTRICTED BANDEDGE (HIGH CHANNEL 11, VERTICAL)**



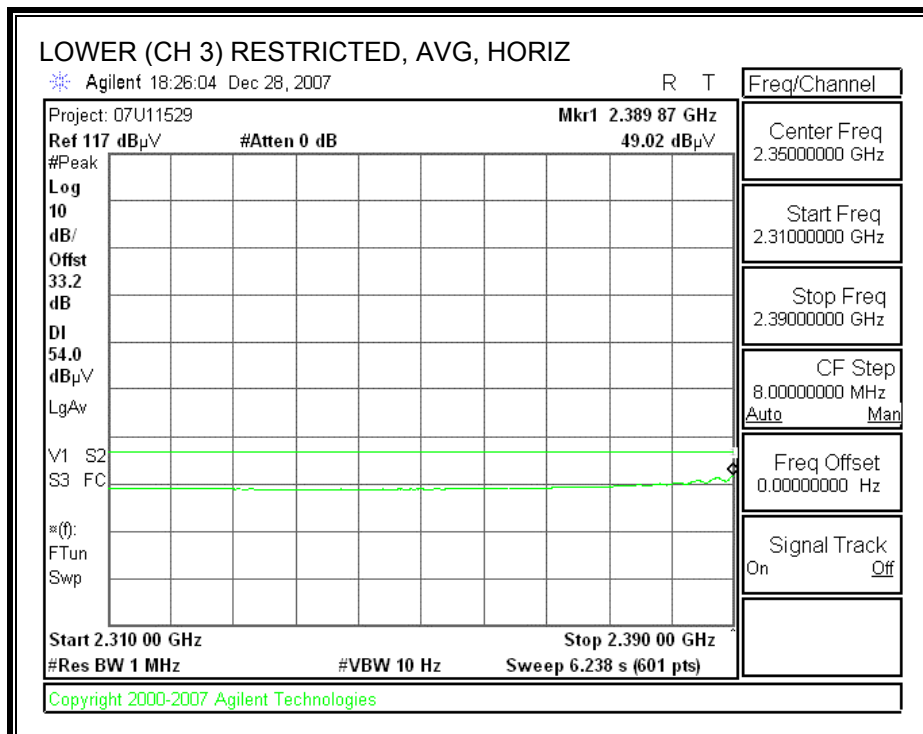
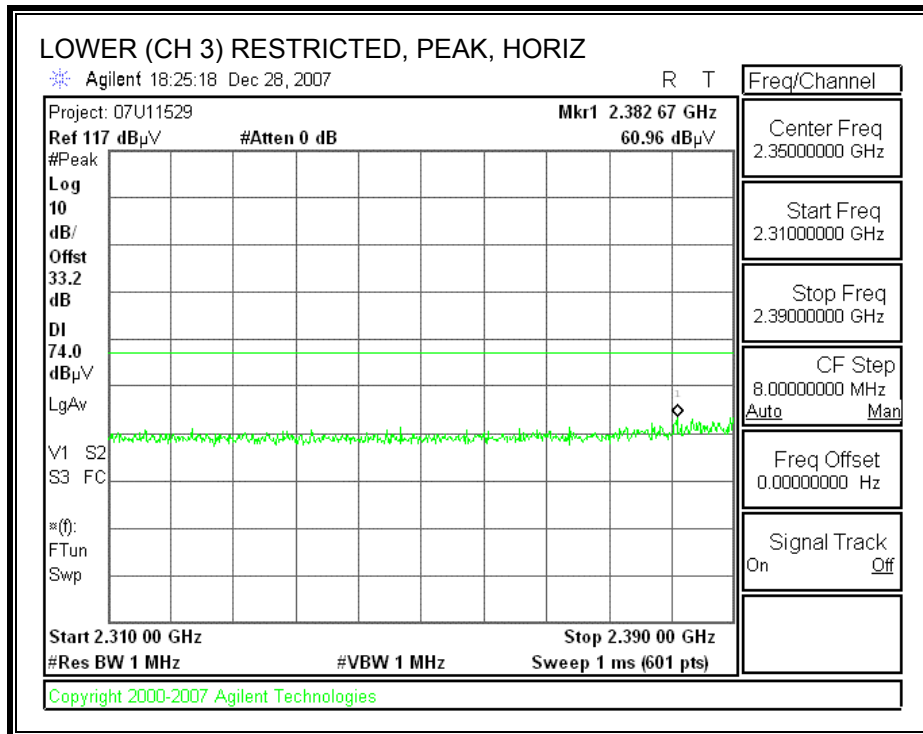
**LOWER RESTRICTED BANDEDGE (CHANNEL 2, HORIZONTAL)**



**LOWER RESTRICTED BANDEDGE (CHANNEL 2, VERTICAL)**

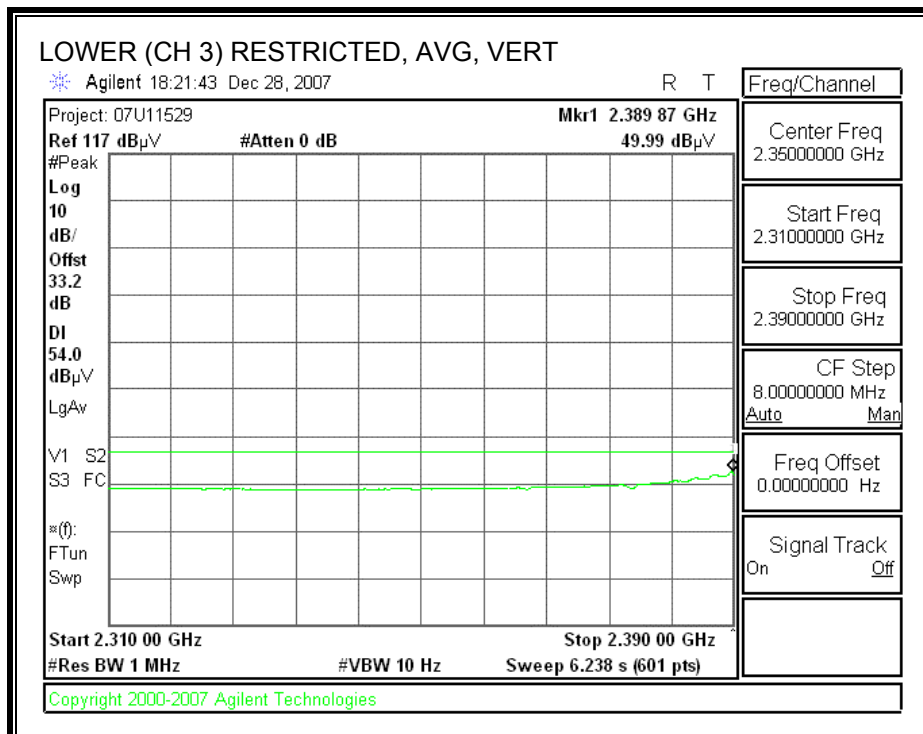
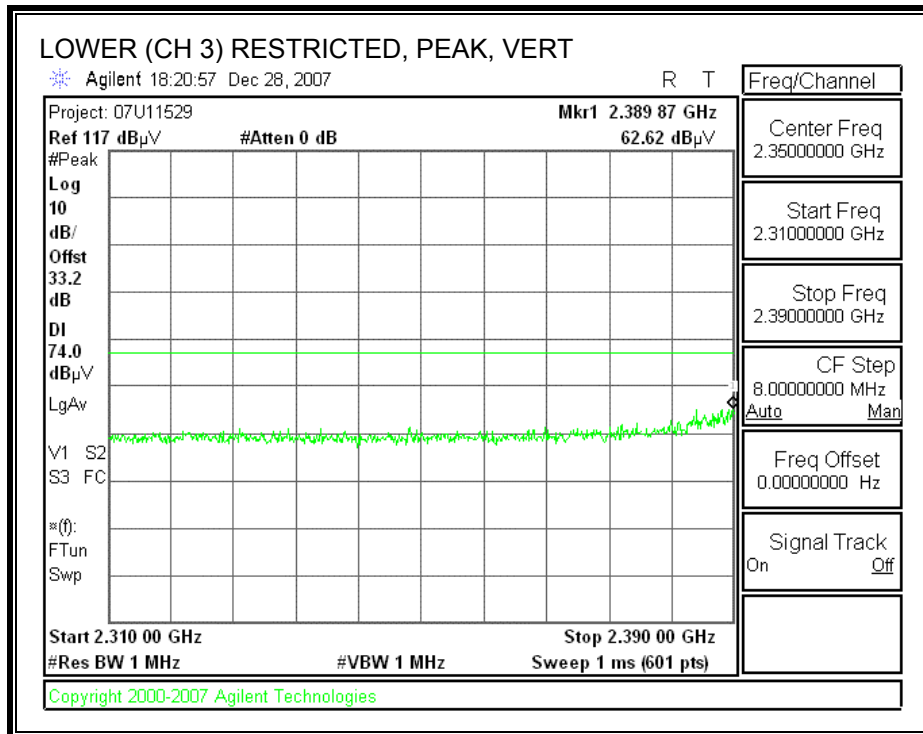


**LOWER RESTRICTED BANDEDGE (CHANNEL 3, HORIZONTAL)**

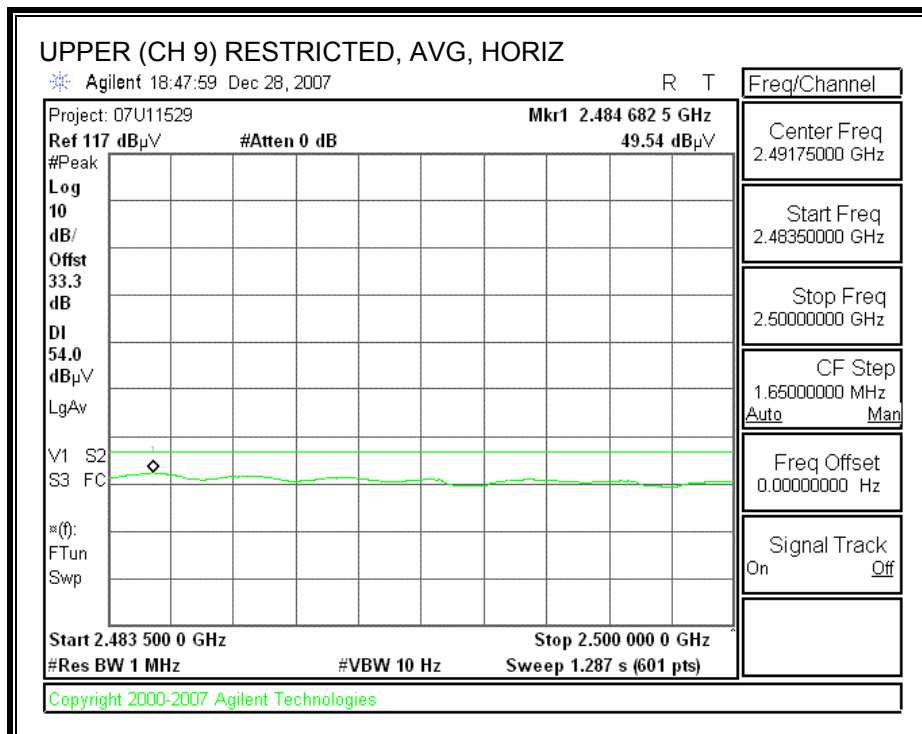
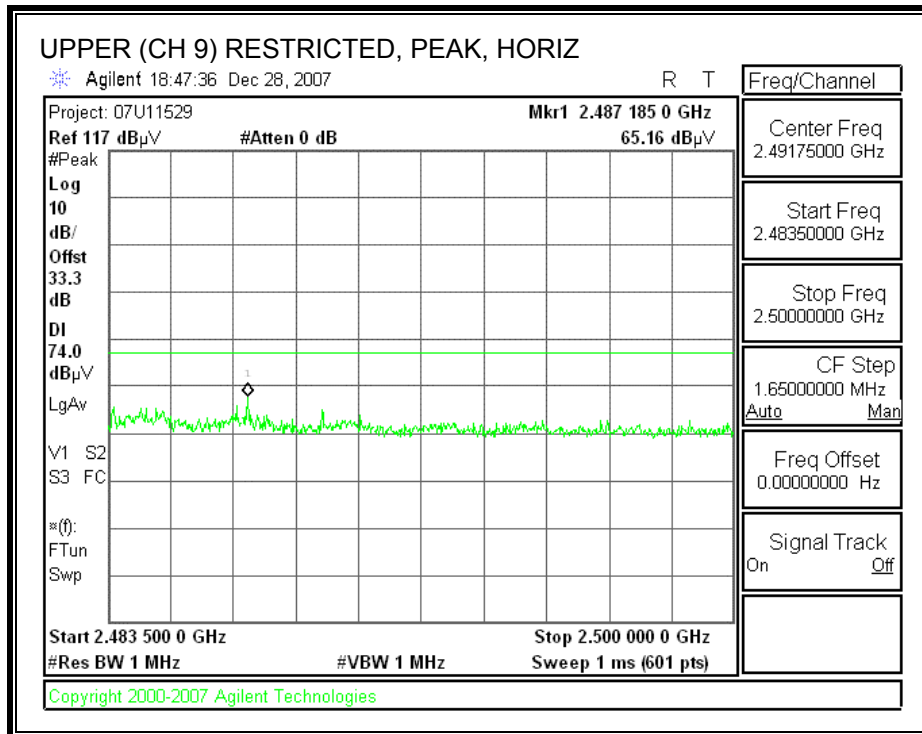




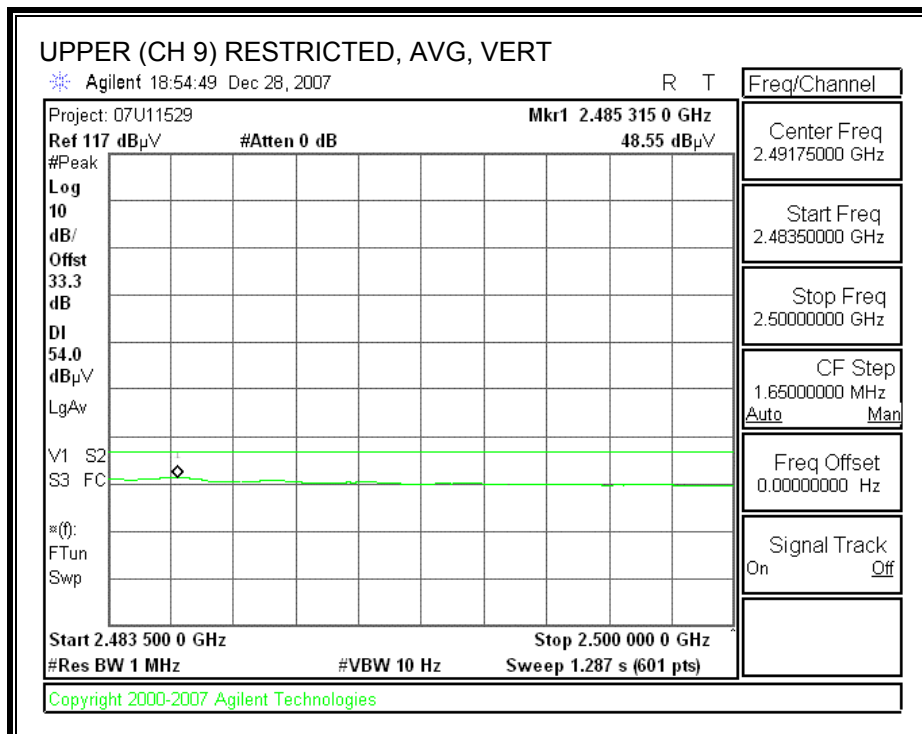
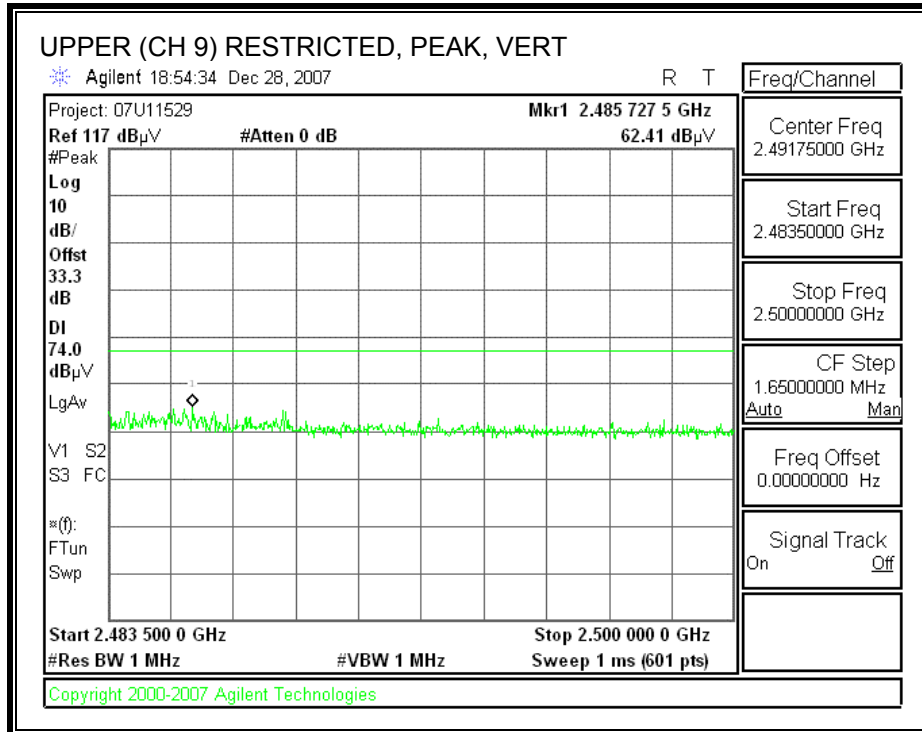
**LOWER RESTRICTED BANDEDGE (CHANNEL 3, VERTICAL)**



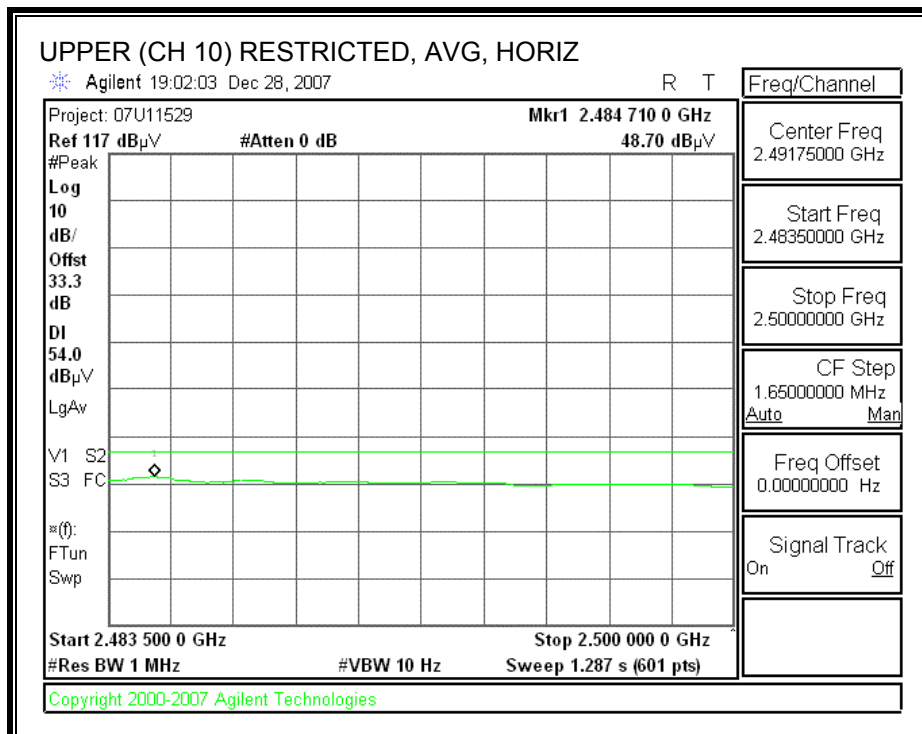
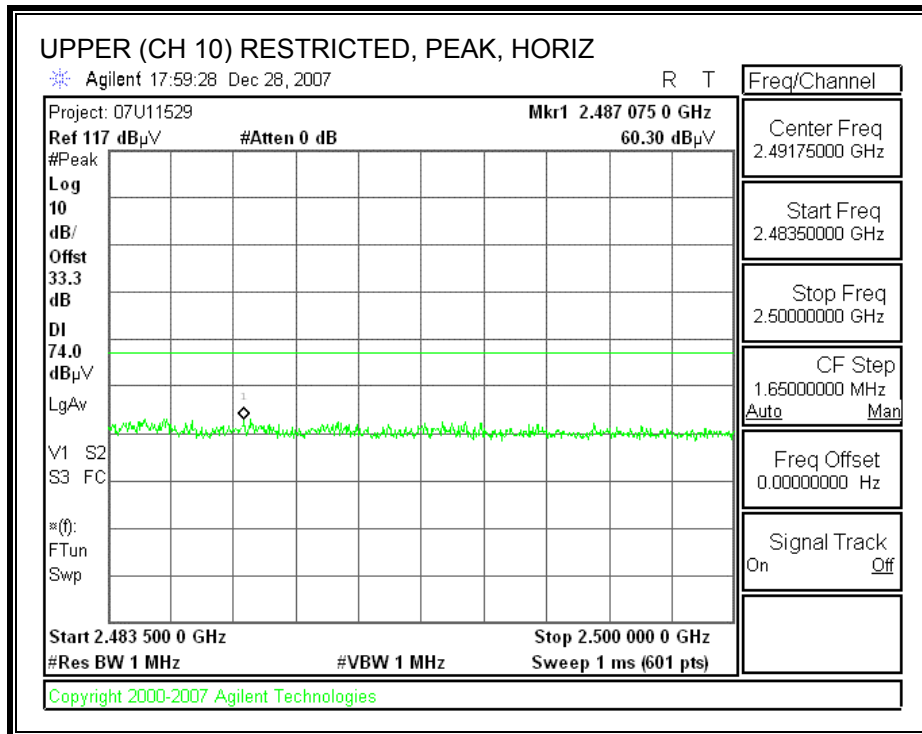
**UPPER RESTRICTED BANDEDGE (CHANNEL 9, HORIZONTAL)**



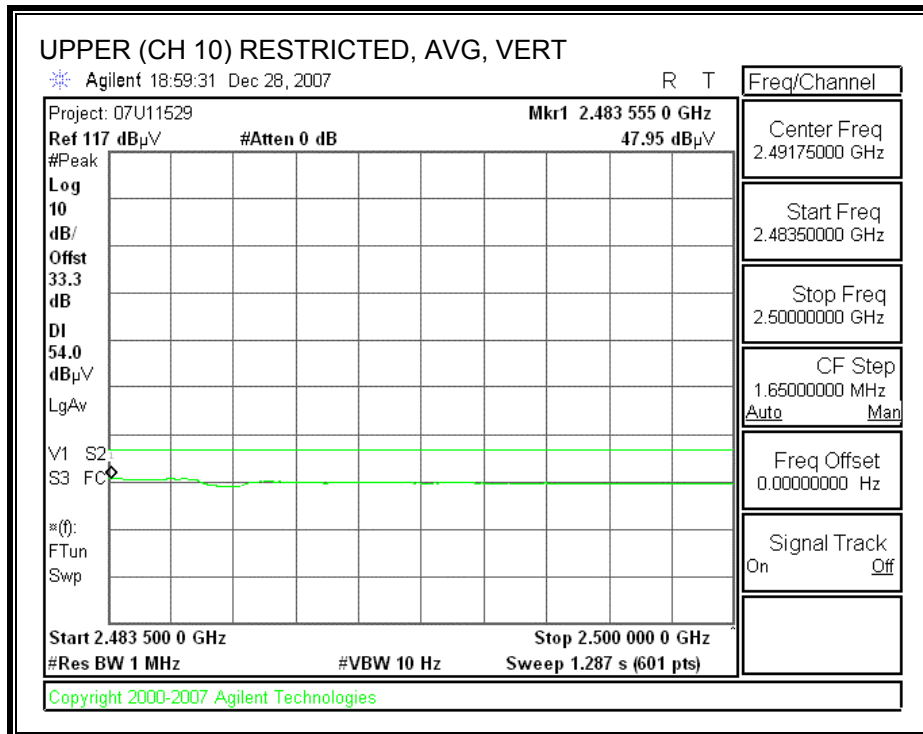
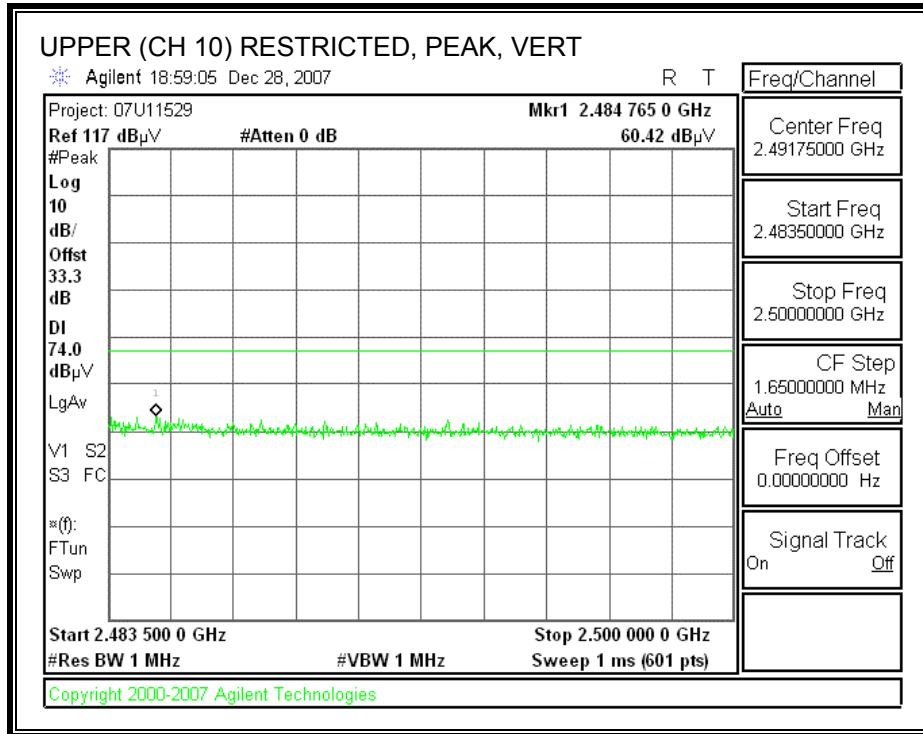
**UPPER RESTRICTED BANDEGE (CHANNEL 9, VERTICAL)**



**UPPER RESTRICTED BANDEDGE (CHANNEL 10, HORIZONTAL)**



**UPPER RESTRICTED BANDEDGE (CHANNEL 10, VERTICAL)**



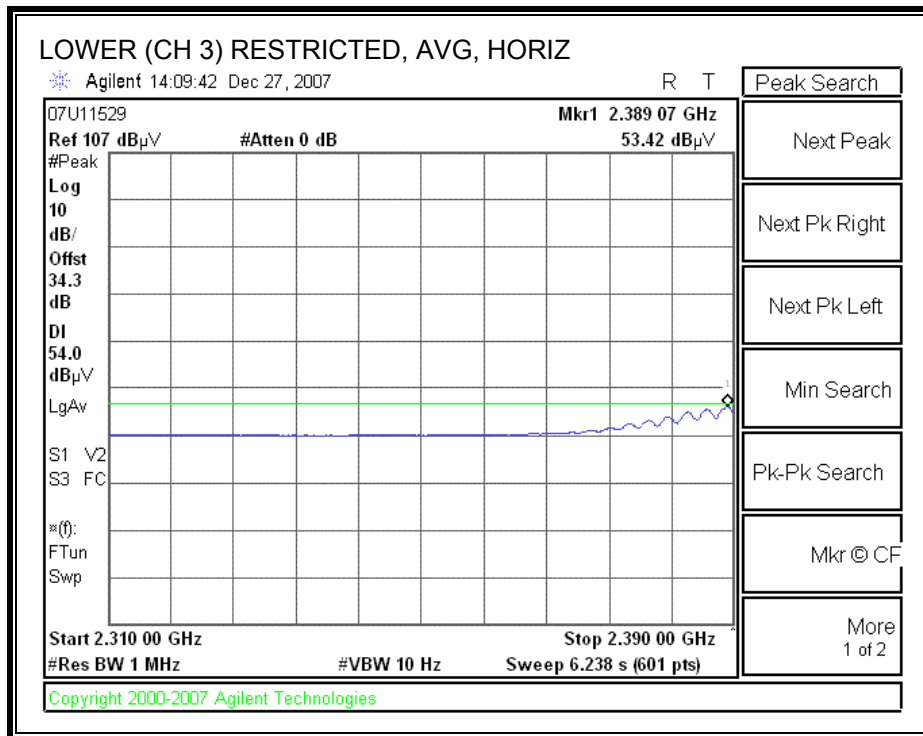
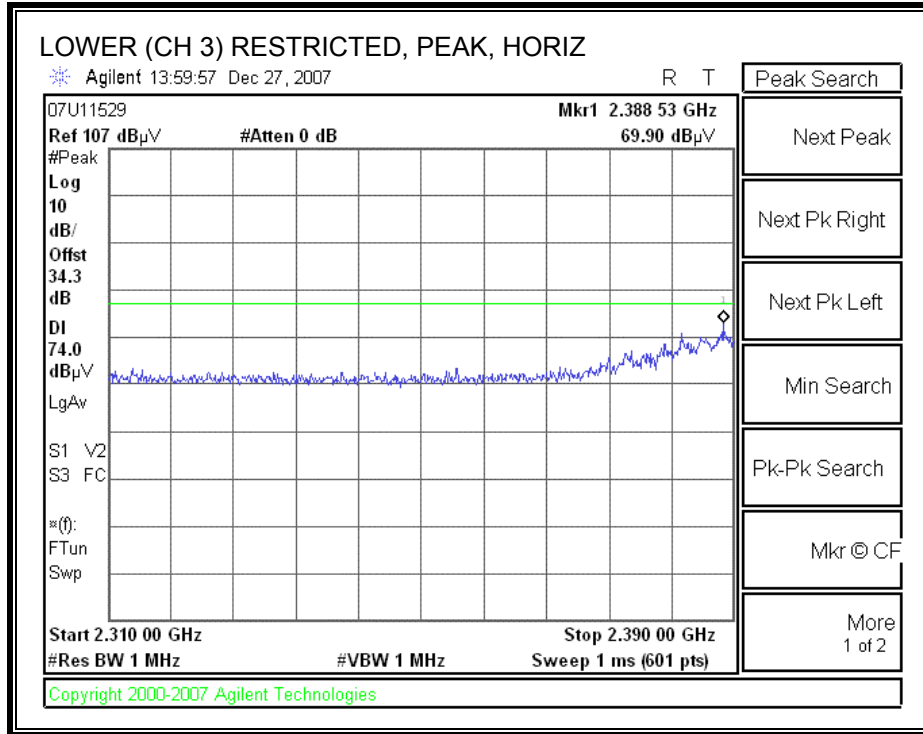
**HARMONICS AND SPURIOUS EMISSIONS (Low & High Channel)**

High Frequency Measurement Compliance Certification Services, Fremont 5m Chamber																																													
Company: Broadcom Project #: 07U11529 Date: 12/27/2007 Test Engineer: Mengsitu Mekuria Configuration: EUT/Laptop/Antennas Mode: TX 2.4GHz Band, 11n 20 MHz MIMO Mode																																													
Test Equipment:																																													
Horn 1-18GHz			Pre-amplifier 1-26GHz			Pre-amplifier 26-40GHz			Horn > 18GHz			Limit																																	
T73; S/N: 6717 @3m			T145 Agilent 3008A0050									FCC 15.205																																	
Hi Frequency Cables																																													
2 foot cable			3 foot cable			12 foot cable			HPF			Reject Filter																																	
						B-5m Chamber						R_001																																	
Peak Measurements RBW=VBW=1MHz Average Measurements RBW=1MHz ; VBW=10Hz																																													
f GHz	Dist (m)	Read Pk dBuV	Read Avg dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filtr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)																														
<b>Low Ch 1</b>																																													
4.819	3.0	41.1	31.4	33.7	7.1	-34.8	0.0	0.0	47.1	37.4	74	54	-26.9	-16.6	V																														
4.822	3.0	41.3	29.2	33.7	7.1	-34.8	0.0	0.0	47.3	35.2	74	54	-26.7	-18.8	H																														
<b>Low Ch 2</b>																																													
4.834	3.0	42.0	29.1	33.8	7.1	-34.8	0.0	0.0	48.1	35.1	74	54	-25.9	-18.9	V																														
4.834	3.0	41.0	28.7	33.8	7.1	-34.8	0.0	0.0	47.0	34.8	74	54	-27.0	-19.2	H																														
<b>High Ch 10</b>																																													
4.919	3.0	42.0	29.1	33.9	7.2	-34.9	0.0	0.0	48.2	35.3	74	54	-25.8	-18.7	V																														
7.366	3.0	43.9	32.0	36.3	8.7	-34.6	0.0	0.0	54.1	42.2	74	54	-19.9	-11.8	V																														
4.919	3.0	42.5	29.2	33.9	7.2	-34.9	0.0	0.0	48.7	35.4	74	54	-25.3	-18.6	H																														
7.366	3.0	44.9	31.3	36.3	8.7	-34.6	0.0	0.0	55.1	41.6	74	54	-18.9	-12.4	H																														
<b>High Ch 11</b>																																													
4.924	3.0	40.6	28.9	33.9	7.2	-34.9	0.0	0.0	46.8	35.1	74	54	-27.2	-18.9	V																														
7.386	3.0	42.6	30.0	36.3	8.7	-34.6	0.0	0.0	52.9	40.3	74	54	-21.1	-13.7	V																														
4.924	3.0	40.5	27.9	33.9	7.2	-34.9	0.0	0.0	46.7	34.1	74	54	-27.3	-19.9	H																														
7.386	3.0	42.9	29.6	36.3	8.7	-34.6	0.0	0.0	53.2	39.9	74	54	-20.8	-14.1	H																														
<table style="width:100%; border: none;"> <tr> <td>f</td> <td>Measurement Frequency</td> <td>Amp</td> <td>Preamp Gain</td> <td>Avg Lim</td> <td>Average Field Strength Limit</td> </tr> <tr> <td>Dist</td> <td>Distance to Antenna</td> <td>D Corr</td> <td>Distance Correct to 3 meters</td> <td>Pk Lim</td> <td>Peak Field Strength Limit</td> </tr> <tr> <td>Read</td> <td>Analyzer Reading</td> <td>Avg</td> <td>Average Field Strength @ 3 m</td> <td>Avg Mar</td> <td>Margin vs. Average Limit</td> </tr> <tr> <td>AF</td> <td>Antenna Factor</td> <td>Peak</td> <td>Calculated Peak Field Strength</td> <td>Pk Mar</td> <td>Margin vs. Peak Limit</td> </tr> <tr> <td>CL</td> <td>Cable Loss</td> <td>HPF</td> <td>High Pass Filter</td> <td></td> <td></td> </tr> </table>																f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit	Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit	Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit	AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit	CL	Cable Loss	HPF	High Pass Filter		
f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit																																								
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit																																								
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit																																								
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit																																								
CL	Cable Loss	HPF	High Pass Filter																																										

**HARMONICS AND SPURIOUS EMISSIONS (Middle Channel)**

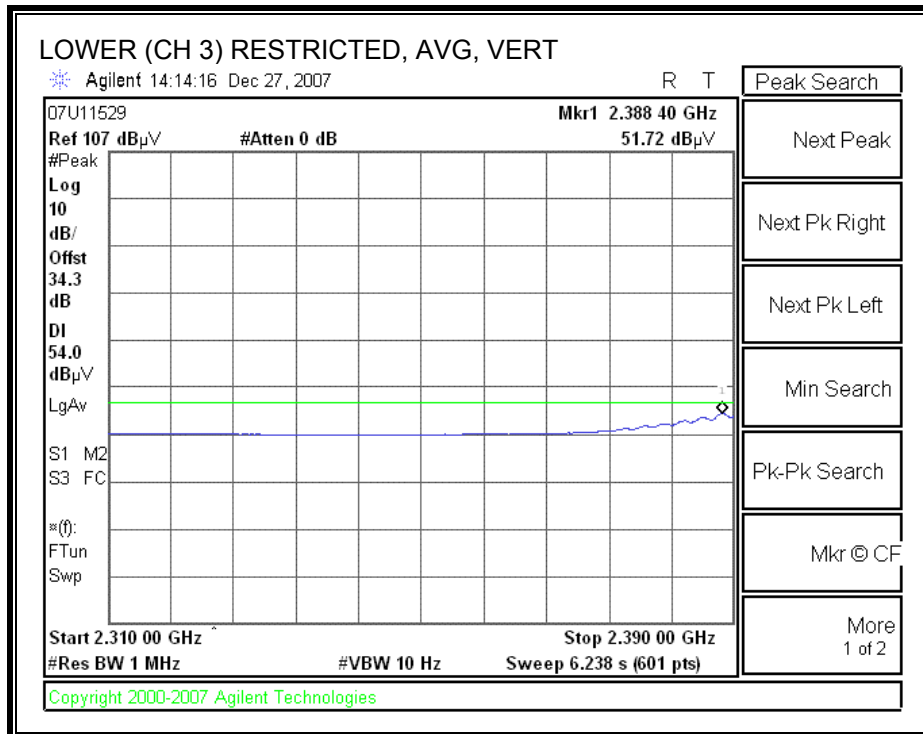
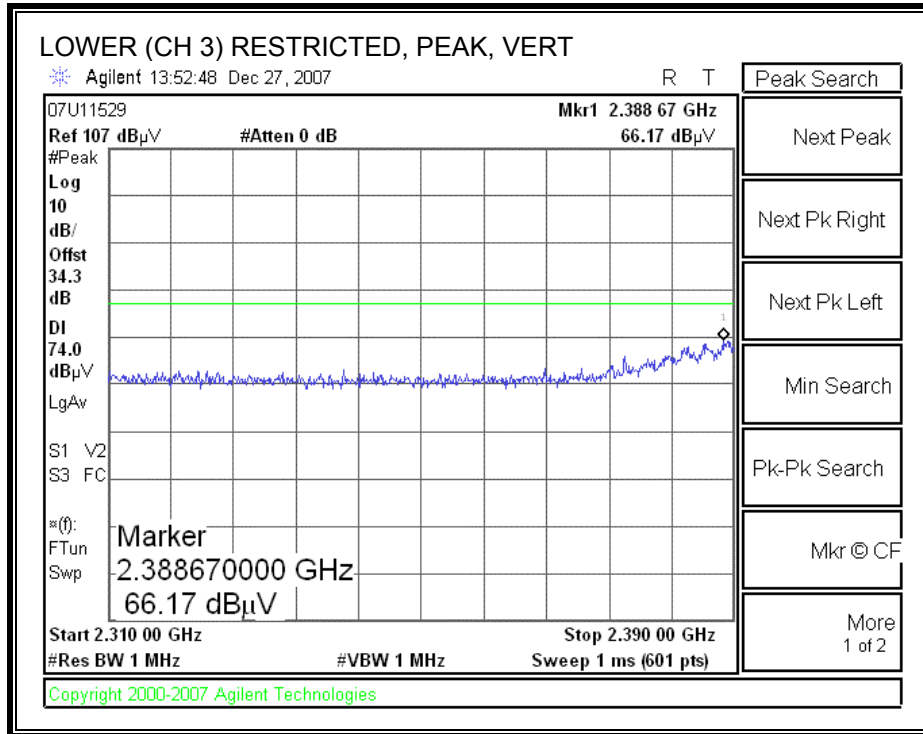
<b>High Frequency Measurement</b>																
Compliance Certification Services, Fremont 5m Chamber																
Company: Broadcom																
Project #: 07U11529																
Date: 12/28/2007																
Test Engineer: Mengsitu Mekuria																
Configuration: EUT/Laptop/Antennas																
Mode: TX, 20 MHz MIMO Mode																
<b>Test Equipment:</b>																
Horn 1-18GHz			Pre-amplifier 1-26GHz			Pre-amplifier 26-40GHz			Horn > 18GHz			Limit				
T73; S/N: 6717 @3m			T145 Agilent 3008A0056									FCC 15.205				
Hi Frequency Cables																
2 foot cable			3 foot cable			12 foot cable			HPF		Reject Filter					
						B-5m Chamber					R_001		Peak Measurements RBW=VBW=1MHz Average Measurements RBW=1MHz ; VBW=10Hz			
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)	
<b>Mid Ch 6</b>																
4.874	3.0	43.9	31.5	33.8	7.2	-34.9	0.0	0.0	50.0	37.6	74	54	-24.0	-16.4	V	
7.311	3.0	49.0	35.6	36.2	8.6	-34.7	0.0	0.0	59.2	45.8	74	54	-14.8	-8.2	V	
4.874	3.0	42.4	29.8	33.8	7.2	-34.9	0.0	0.0	48.5	35.9	74	54	-25.5	-18.1	H	
7.311	3.0	47.6	34.7	36.2	8.6	-34.7	0.0	0.0	57.8	45.0	74	54	-16.2	-9.0	H	
Rev. 4.12.7																
f	Measurement Frequency			Amp	Preamp Gain			Avg Lim	Average Field Strength Limit							
Dist	Distance to Antenna			D Corr	Distance Correct to 3 meters			Pk Lim	Peak Field Strength Limit							
Read	Analyzer Reading			Avg	Average Field Strength @ 3 m			Avg Mar	Margin vs. Average Limit							
AF	Antenna Factor			Peak	Calculated Peak Field Strength			Pk Mar	Margin vs. Peak Limit							
CL	Cable Loss			HPF	High Pass Filter											

**8.2.4. 802.11n HT40 MODE IN THE 2.4 GHz BAND**  
**LOWER RESTRICTED BANDEDGE (CHANNEL 3, HORIZONTAL)**

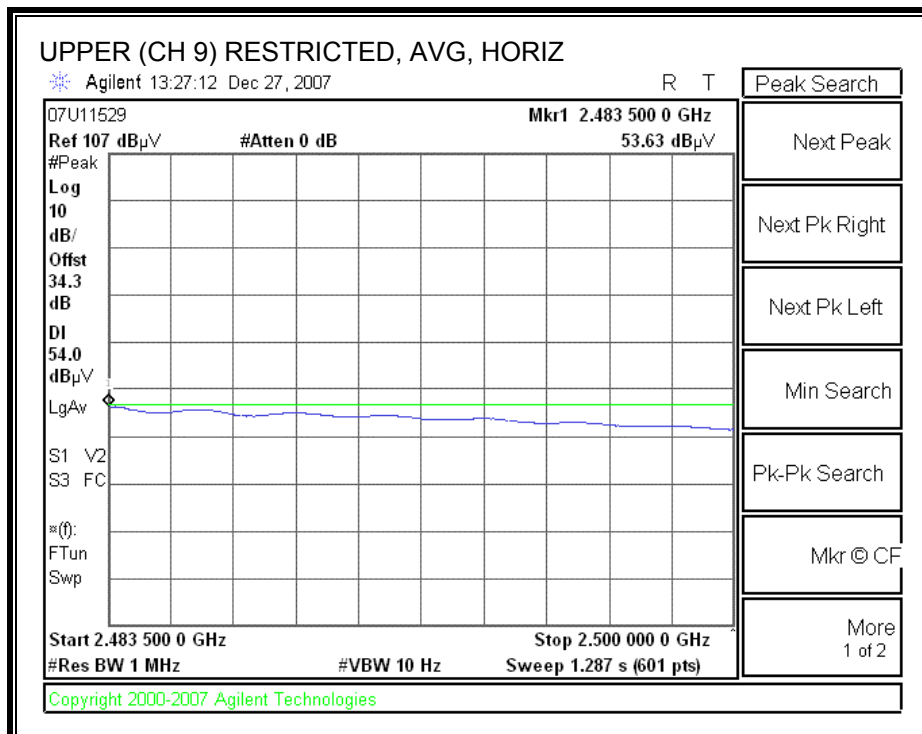
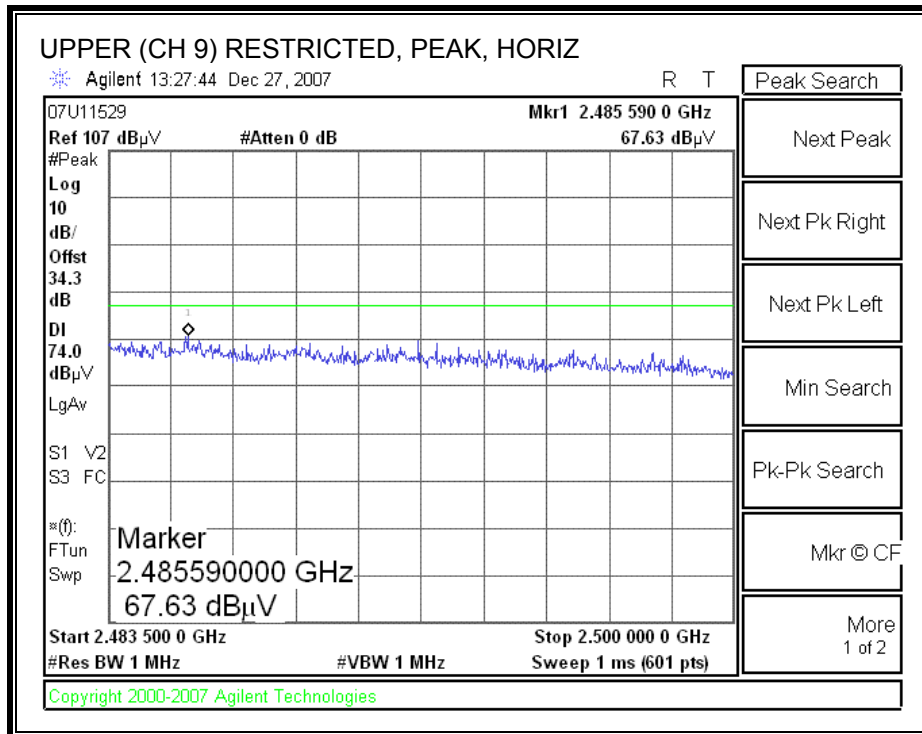




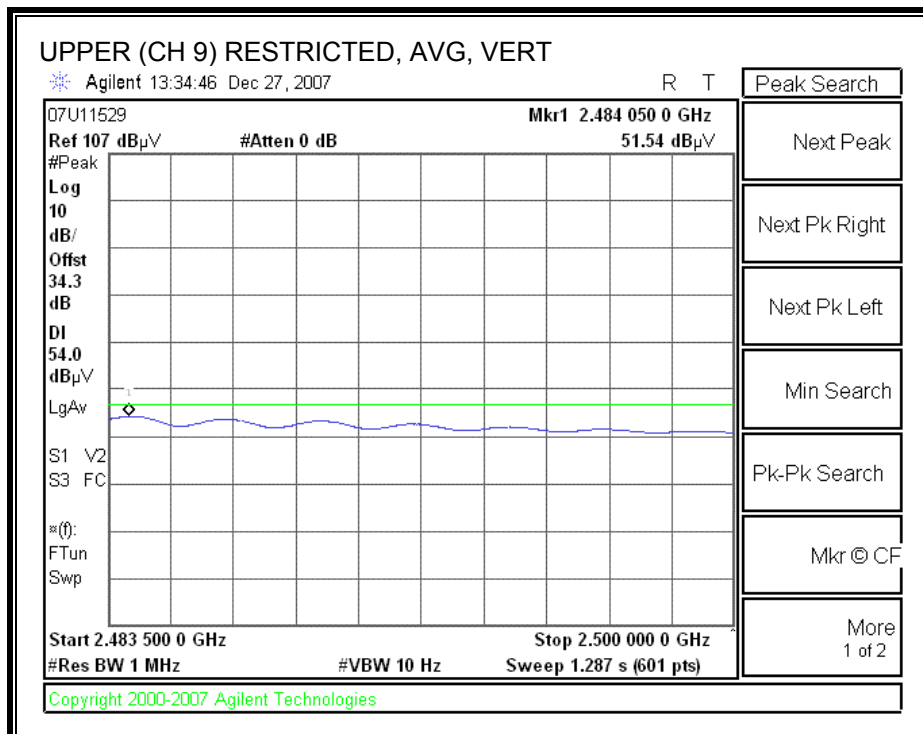
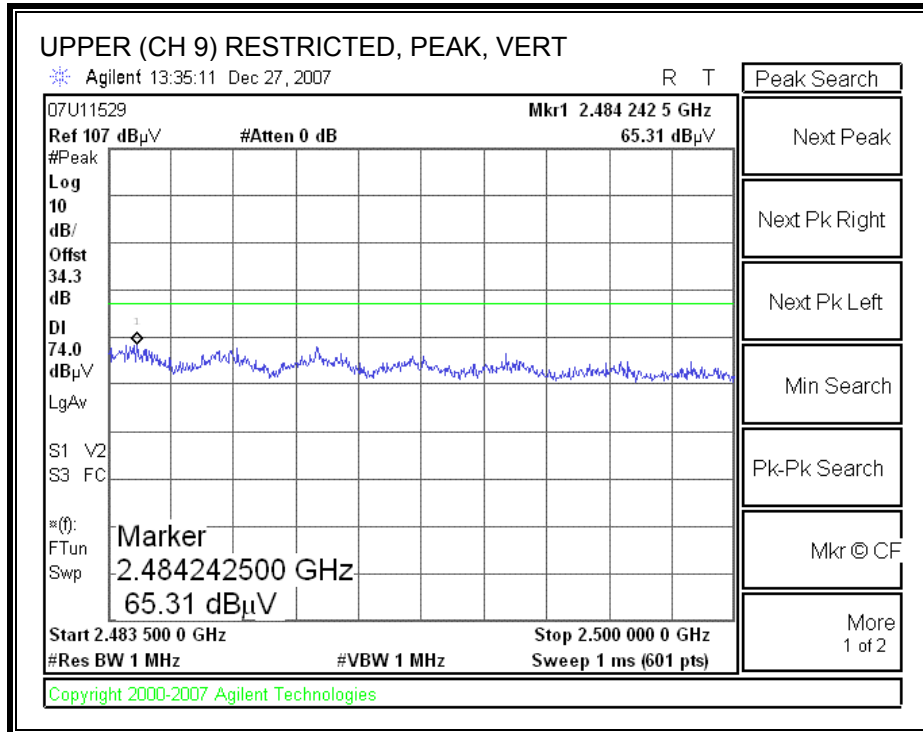
**LOWER RESTRICTED BANDEDGE (CHANNEL 3, VERTICAL)**



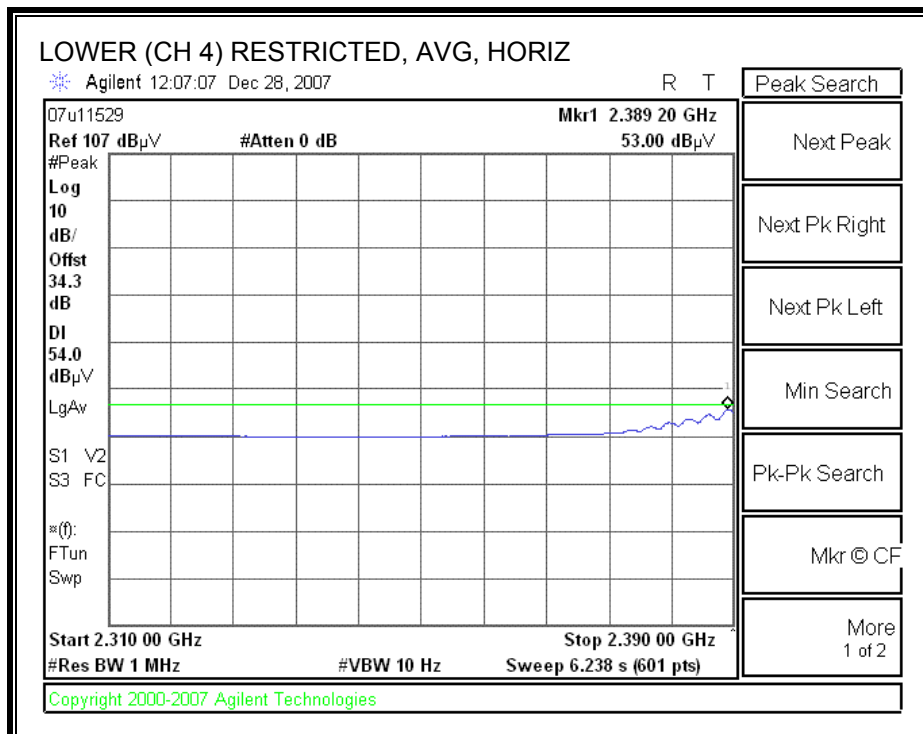
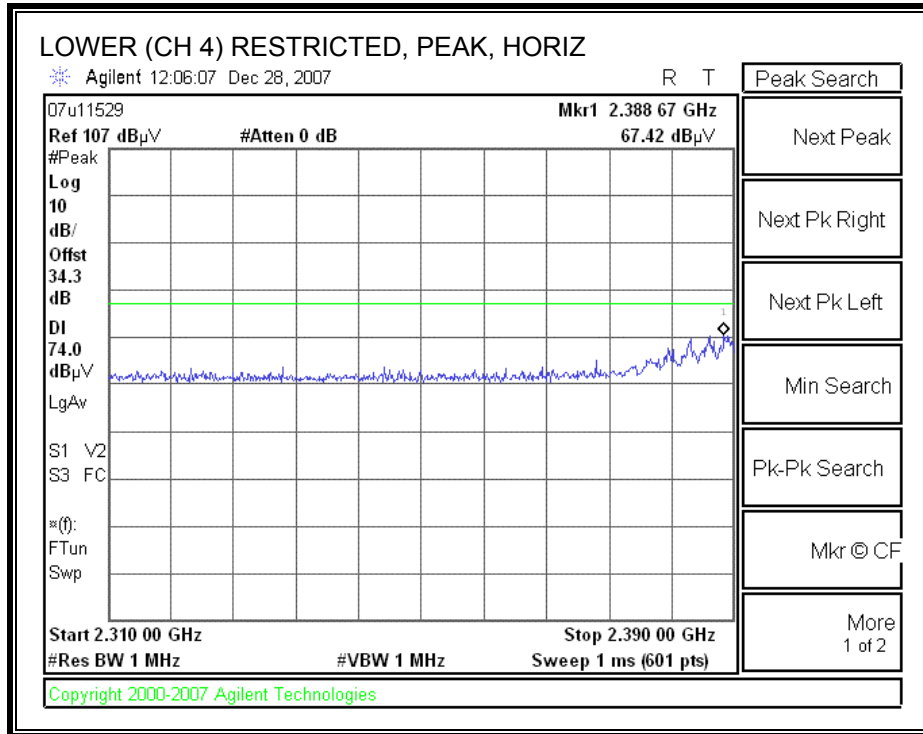
**UPPER RESTRICTED BANDEDGE (CHANNEL 9, HORIZONTAL)**



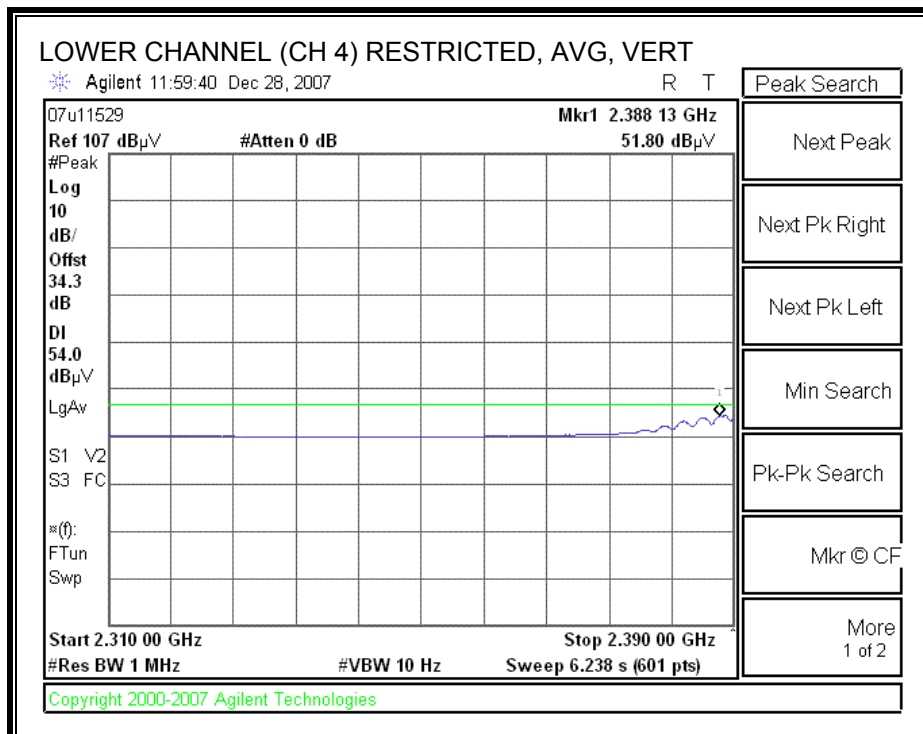
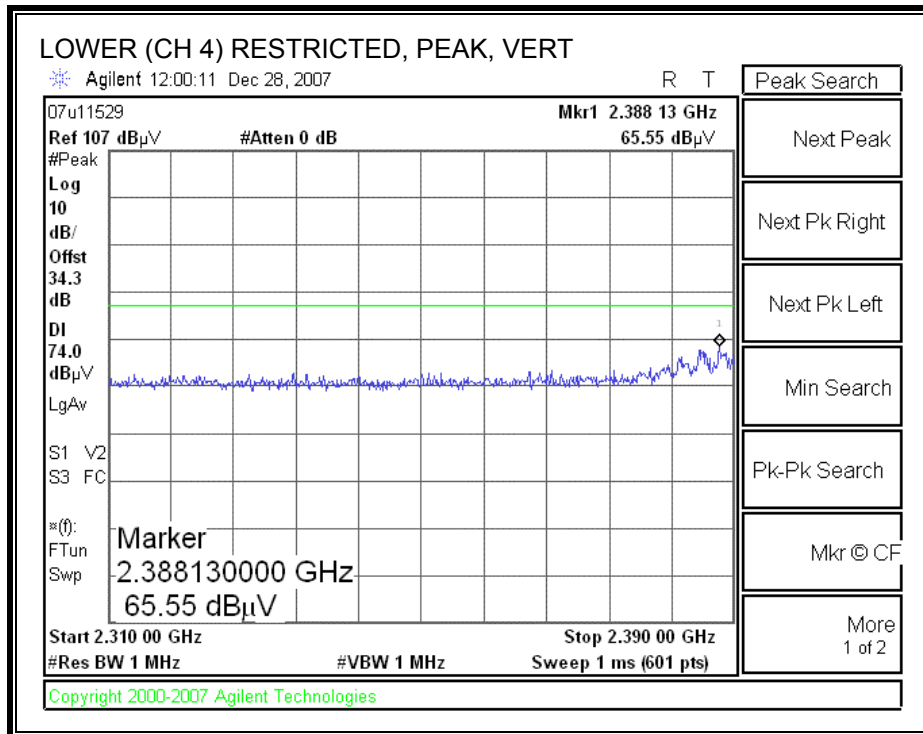
**UPPER RESTRICTED BANDEGE (CHANNEL 9, VERTICAL)**



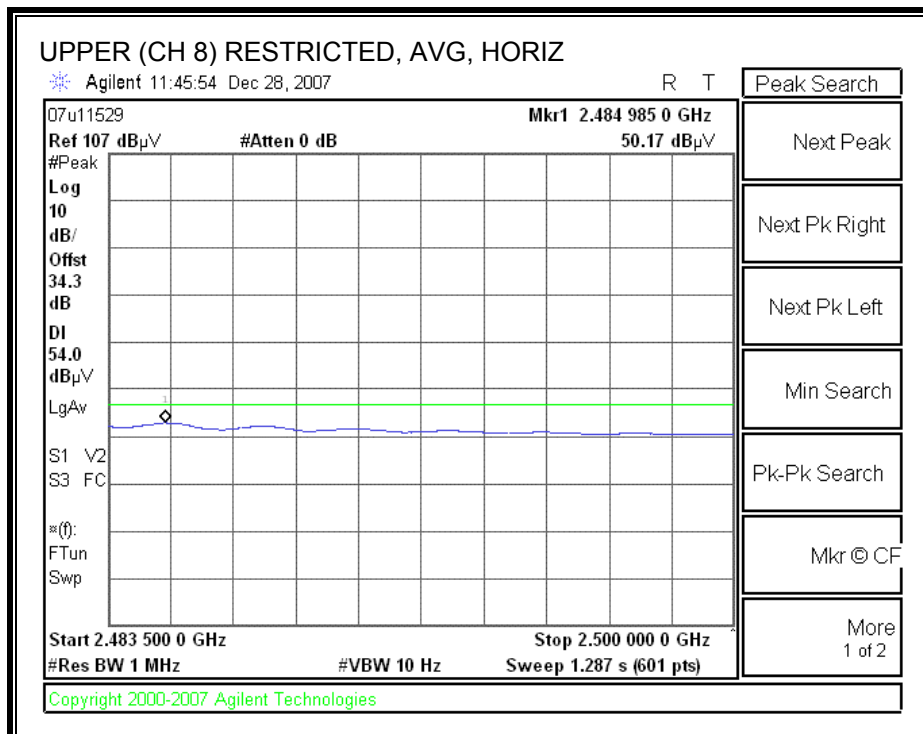
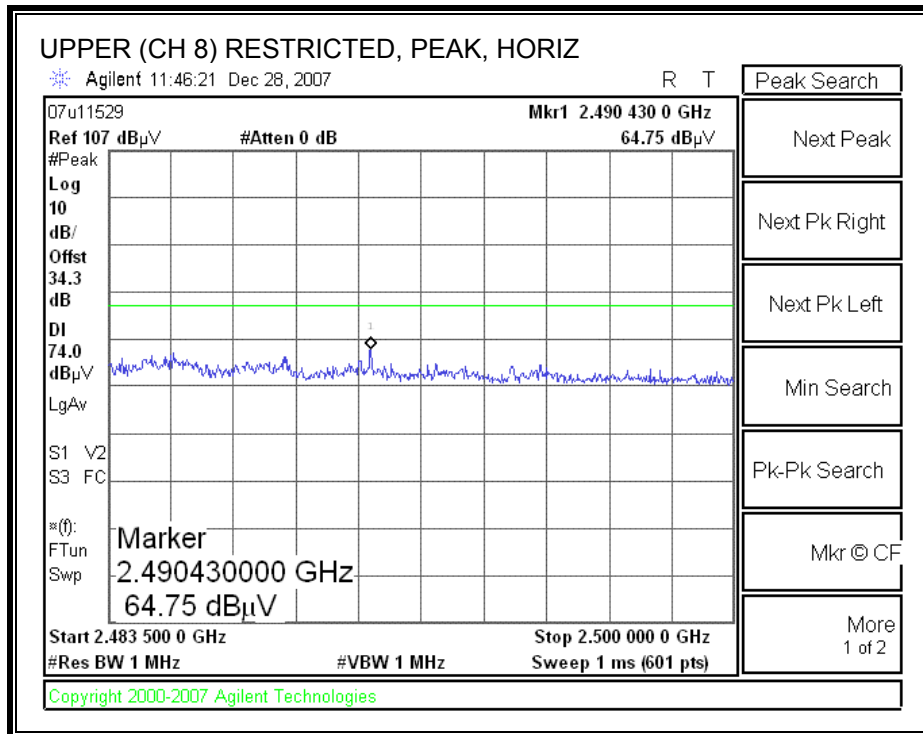
**LOWER RESTRICTED BANDEDGE (CHANNEL 4, HORIZONTAL)**



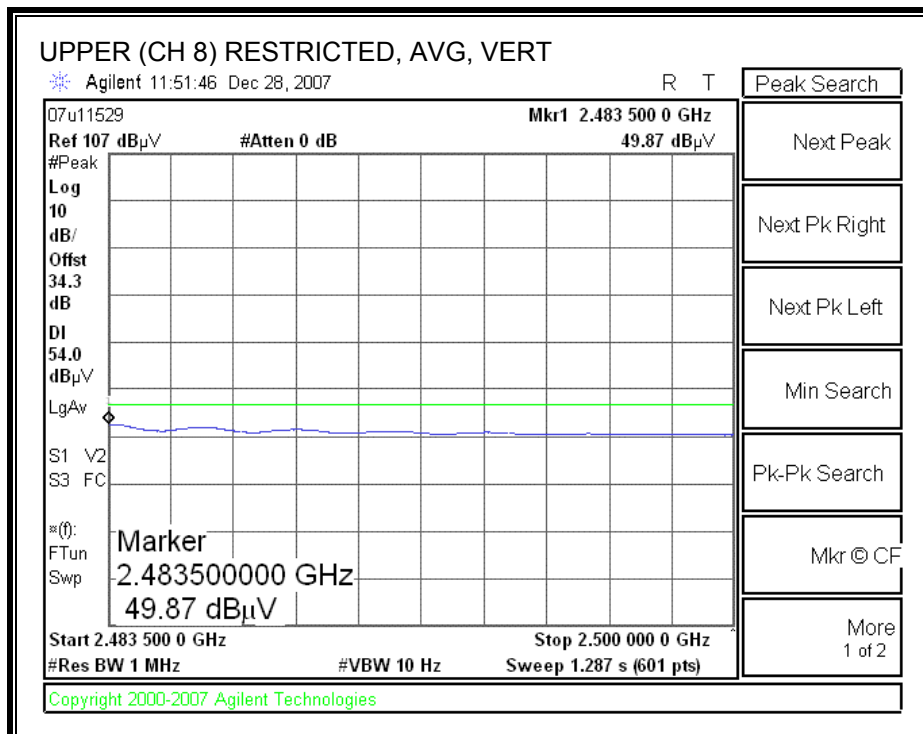
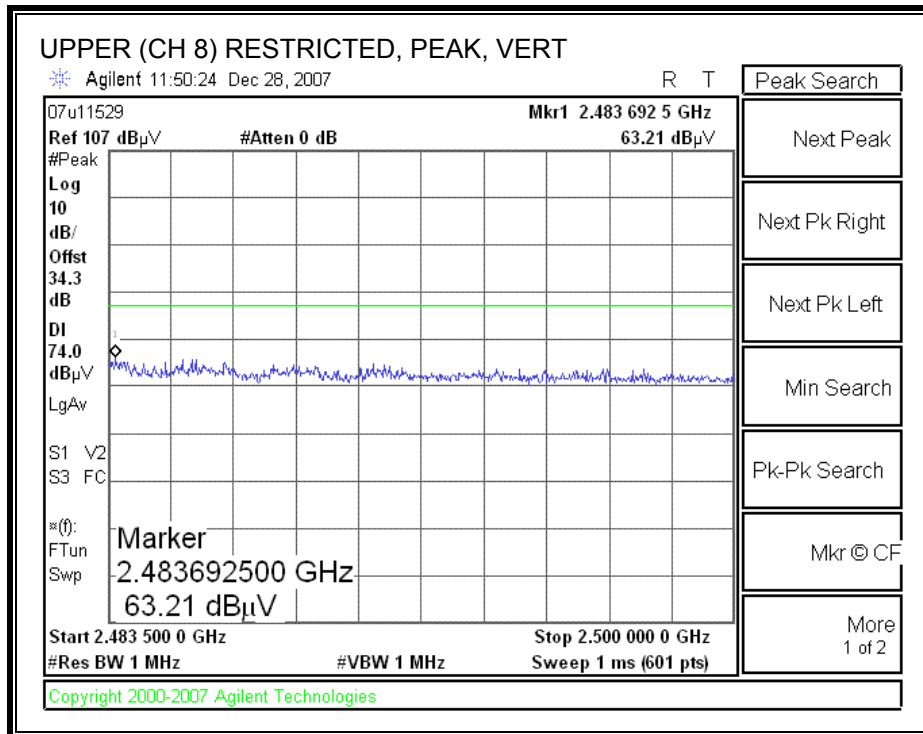
**RESTRICTED BANDEDGE (CHANNEL 4, VERTICAL)**



**UPPER RESTRICTED BANDEDGE (CHANNEL 8, HORIZONTAL)**



**UPPER RESTRICTED BANDEGE (CHANNEL 8, VERTICAL)**







**8.2.5. 802.11a MODE**

**HARMONICS AND SPURIOUS EMISSIONS**

<b>High Frequency Measurement</b> Compliance Certification Services, Fremont 3m Chamber																																																																			
Company: Broadcom Project #: 07U11529 Date: 01/21/2008 Test Engineer: Vien Tran Configuration: EUT with 5.8dBi Antenna Mode: Tx 5.8 GHz Band_11a Legacy																																																																			
<b>Test Equipment:</b>																																																																			
Horn 1-18GHz			Pre-amplifier 1-26GHz			Pre-amplifier 26-40GHz			Horn > 18GHz			Limit																																																							
T60; S/N: 2238 @3m			T34 HP 8449B									FCC 15.205																																																							
<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td colspan="16" style="text-align: center;">Hi Frequency Cables</td> </tr> <tr> <td colspan="4" style="text-align: center;">2 foot cable</td> <td colspan="4" style="text-align: center;">3 foot cable</td> <td colspan="4" style="text-align: center;">12 foot cable</td> <td colspan="2" style="text-align: center;">HPF</td> <td colspan="2" style="text-align: center;">Reject Filter</td> <td colspan="2" style="text-align: center;">           Peak Measurements            RBW=VBW=1MHz            Average Measurements            RBW=1MHz ; VBW=10Hz         </td> </tr> <tr> <td colspan="4"></td> <td colspan="4">Vien 187215002</td> <td colspan="4">Ninous 208946002</td> <td colspan="2">HPF_7.6GHz</td> <td colspan="2"></td> <td colspan="2"></td> </tr> </table>																Hi Frequency Cables																2 foot cable				3 foot cable				12 foot cable				HPF		Reject Filter		Peak Measurements RBW=VBW=1MHz Average Measurements RBW=1MHz ; VBW=10Hz						Vien 187215002				Ninous 208946002				HPF_7.6GHz					
Hi Frequency Cables																																																																			
2 foot cable				3 foot cable				12 foot cable				HPF		Reject Filter		Peak Measurements RBW=VBW=1MHz Average Measurements RBW=1MHz ; VBW=10Hz																																																			
				Vien 187215002				Ninous 208946002				HPF_7.6GHz																																																							
f GHz	Dist (m)	Read Pk dBuV	Read Avg dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filtr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)																																																				
<b>LOW CHANNEL, 5745 MHz</b>																																																																			
11.490	3.0	45.2	34.3	37.4	3.9	-32.5	0.0	0.7	54.7	43.8	74	54	-19.3	-10.2	H																																																				
11.490	3.0	44.3	33.5	37.4	3.9	-32.5	0.0	0.7	53.8	43.0	74	54	-20.2	-11.0	V																																																				
<b>MID CHANNEL, 5785 MHz</b>																																																																			
11.570	3.0	45.2	33.5	37.4	3.9	-32.5	0.0	0.7	54.7	43.0	74	54	-19.3	-11.0	H																																																				
11.570	3.0	43.2	32.2	37.4	3.9	-32.5	0.0	0.7	52.7	41.7	74	54	-21.3	-12.3	V																																																				
<b>HI CHANNEL, 5825 MHz</b>																																																																			
11.690	3.0	44.4	33.1	37.4	3.9	-32.5	0.0	0.7	53.9	42.6	74	54	-20.1	-11.4	H																																																				
11.690	3.0	43.0	32.0	37.4	3.9	-32.5	0.0	0.7	52.5	41.5	74	54	-21.5	-12.5	V																																																				
No other emissions were detected above system noise floor																																																																			
f	Measurement Frequency					Amp	Preamp Gain					Avg Lim	Average Field Strength Limit																																																						
Dist	Distance to Antenna					D Corr	Distance Correct to 3 meters					Pk Lim	Peak Field Strength Limit																																																						
Read	Analyzer Reading					Avg	Average Field Strength @ 3 m					Avg Mar	Margin vs. Average Limit																																																						
AF	Antenna Factor					Peak	Calculated Peak Field Strength					Pk Mar	Margin vs. Peak Limit																																																						
CL	Cable Loss					HPF	High Pass Filter																																																												

**8.2.6. 802.11n HT20 MODE IN THE 5.8 GHz BAND**

**HARMONICS AND SPURIOUS EMISSIONS**

High Frequency Measurement  
 Compliance Certification Services, Fremont 3m Chamber

Company: Broadcom  
 Project #: 07U11529  
 Date: 01/21/2008  
 Test Engineer: Vien Tran  
 Configuration: EUT with 5.8dBi Antenna  
 Mode: Tx 5.8 GHz Band\_1In 20 MHz

Test Equipment:

Horn 1-18GHz T60; S/N: 2238 @3m	Pre-amplifier 1-26GHz T34 HP 8449B	Pre-amplifier 26-40GHz	Horn > 18GHz	Limit FCC 15.205
------------------------------------	---------------------------------------	------------------------	--------------	---------------------

Hi Frequency Cables

2 foot cable	3 foot cable Vien 187215002	12 foot cable Ninous 208946002	HPF HPF_7.6GHz	Reject Filter	Peak Measurements RBW=VBW=1MHz Average Measurements RBW=1MHz ; VBW=10Hz
--------------	--------------------------------	-----------------------------------	-------------------	---------------	--

f GHz	Dist (m)	Read Pk dBuV	Read Avg dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filtr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
<b>LOW CHANNEL, 5745 MHz</b>															
11.490	3.0	45.9	35.0	37.4	3.9	-32.5	0.0	0.7	55.4	44.5	74	54	-18.6	-9.5	H
11.490	3.0	45.0	34.2	37.4	3.9	-32.5	0.0	0.7	54.5	43.7	74	54	-19.5	-10.3	V
<b>MID CHANNEL, 5785 MHz</b>															
11.570	3.0	45.9	34.2	37.4	3.9	-32.5	0.0	0.7	55.4	43.7	74	54	-18.6	-10.3	H
11.570	3.0	43.9	32.9	37.4	3.9	-32.5	0.0	0.7	53.4	42.4	74	54	-20.6	-11.6	V
<b>HI CHANNEL, 5825 MHz</b>															
11.690	3.0	45.1	33.8	37.4	3.9	-32.5	0.0	0.7	54.6	43.3	74	54	-19.4	-10.7	H
11.690	3.0	43.7	32.7	37.4	3.9	-32.5	0.0	0.7	53.2	42.2	74	54	-20.8	-11.8	V

No other emissions were detected above system noise floor

f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter		

**8.2.7. 802.11n HT40 MODE IN THE 5.8 GHz BAND**

**HARMONICS AND SPURIOUS EMISSIONS**

High Frequency Measurement Compliance Certification Services, Fremont 3m Chamber																	
Company: Broadcom Project #: 07U11529 Date: 01/21/2008 Test Engineer: Vien Tran Configuration: EUT with 5.8dBi Antenna Mode: Tx 5.8 GHz Band_11n 40 MHz																	
Test Equipment:																	
Horn 1-18GHz			Pre-amplifier 1-26GHz			Pre-amplifier 26-40GHz			Horn > 18GHz			Limit					
T60; S/N: 2238 @3m			T34 HP 8449B									FCC 15.205					
Hi Frequency Cables																	
2 foot cable			3 foot cable			12 foot cable			HPF		Reject Filter						
			Vien 187215002			Ninous 208946002			HPF_7.6GHz				Peak Measurements RBW=VBW=1MHz Average Measurements RBW=1MHz ; VBW=10Hz				
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)		
<b>LOW CHANNEL, 5755 MHz</b>																	
11.510	3.0	49.1	38.2	37.4	3.9	-32.5	0.0	0.7	58.6	47.7	74	54	-15.4	-6.3	H		
11.510	3.0	48.2	37.4	37.4	3.9	-32.5	0.0	0.7	57.7	46.9	74	54	-16.3	-7.1	V		
<b>HI CHANNEL, 5795 MHz</b>																	
11.590	3.0	48.3	37.0	37.4	3.9	-32.5	0.0	0.7	57.8	46.5	74	54	-16.2	-7.5	H		
11.590	3.0	46.9	35.9	37.4	3.9	-32.5	0.0	0.7	56.4	45.4	74	54	-17.6	-8.6	V		
No other emissions were detected above system noise floor																	
f	Measurement Frequency					Amp	Preamp Gain					Avg Lim	Average Field Strength Limit				
Dist	Distance to Antenna					D Corr	Distance Correct to 3 meters					Pk Lim	Peak Field Strength Limit				
Read	Analyzer Reading					Avg	Average Field Strength @ 3 m					Avg Mar	Margin vs. Average Limit				
AF	Antenna Factor					Peak	Calculated Peak Field Strength					Pk Mar	Margin vs. Peak Limit				
CL	Cable Loss					HPF	High Pass Filter										

**8.3. RECEIVER ABOVE 1 GHz**

**8.3.1. 20 MHz BANDWIDTH IN THE 2.4 GHz BAND**

High Frequency Measurement Compliance Certification Services																	
Company: Broadcom																	
Project #: 07U11529																	
Date: 12/20/2007																	
Test Engineer: Vien Tran																	
Configuration: EUT with 3.9dBi Antenna																	
Mode: Rx 2.4 GHz_Worst-Case																	
Test Equipment:																	
Horn 1-18GHz			Pre-amplifier 1-26GHz			Pre-amplifier 26-40GHz			Horn > 18GHz			Limit					
T60; S/N: 2238 @3m			T34 HP 8449B									RX RSS 210					
Hi Frequency Cables																	
2 foot cable			3 foot cable			12 foot cable			HPF		Reject Filter		Peak Measurements RBW=VBW=1MHz Average Measurements RBW=1MHz ; VBW=10Hz				
William 177079009						Thanh 208946003											
f GHz	Dist (m)	Read Pk dBuV	Read Avg dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)		
1.197	3.0	65.2	49.8	25.9	1.7	-38.0	0.0	0.0	54.9	39.5	74	54	-19.1	-14.5	H		
1.596	3.0	62.7	46.2	26.9	1.9	-37.4	0.0	0.0	54.1	37.6	74	54	-19.9	-16.4	H		
1.994	3.0	64.9	37.4	27.9	2.1	-36.9	0.0	0.0	58.1	30.6	74	54	-15.9	-23.4	H		
2.392	3.0	54.1	38.0	28.5	2.3	-36.3	0.0	0.0	48.6	32.5	74	54	-25.4	-21.5	H		
1.197	3.0	67.6	51.8	25.9	1.7	-38.0	0.0	0.0	57.3	41.5	74	54	-16.7	-12.5	V		
1.596	3.0	70.6	46.9	26.9	1.9	-37.4	0.0	0.0	62.0	38.3	74	54	-12.0	-15.7	V		
1.994	3.0	66.4	39.8	27.9	2.1	-36.9	0.0	0.0	59.6	33.0	74	54	-14.4	-21.0	V		
2.392	3.0	55.9	39.5	28.5	2.3	-36.3	0.0	0.0	50.4	34.0	74	54	-23.6	-20.0	V		
No other emissions were detected above sytem noise floor																	
f	Measurement Frequency					Amp	Preamp Gain					Avg Lim	Average Field Strength Limit				
Dist	Distance to Antenna					D Corr	Distance Correct to 3 meters					Pk Lim	Peak Field Strength Limit				
Read	Analyzer Reading					Avg	Average Field Strength @ 3 m					Avg Mar	Margin vs. Average Limit				
AF	Antenna Factor					Peak	Calculated Peak Field Strength					Pk Mar	Margin vs. Peak Limit				
CL	Cable Loss					HPF	High Pass Filter										

### 8.3.2. 40 MHz BANDWIDTH IN THE 2.4 GHz BAND

**High Frequency Measurement  
Compliance Certification Services**

Company: Broadcom  
 Project #: 07U11529  
 Date: 12/20/2007  
 Test Engineer: Vien Tran  
 Configuration: EUT with 3.9dBi Antenna  
 Mode: Rx 2.4 GHz\_40 MHz BW Worst-Case

**Test Equipment:**

<b>Horn 1-18GHz</b>	<b>Pre-amplifier 1-26GHz</b>	<b>Pre-amplifier 26-40GHz</b>	<b>Horn &gt; 18GHz</b>	<b>Limit</b>
T60; S/N: 2238 @3m	T34 HP 8449B			RX RSS 210

Hi Frequency Cables

<b>2 foot cable</b>	<b>3 foot cable</b>	<b>12 foot cable</b>	<b>HPF</b>	<b>Reject Filter</b>	<b>Peak Measurements</b> RBW=VBW=1MHz <b>Average Measurements</b> RBW=1MHz ; VBW=10Hz
William 177079009		Thanh 208946003			

f GHz	Dist (m)	Read Pk dBuV	Read Avg dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Ftr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
1.197	3.0	63.8	48.4	25.9	1.7	-38.0	0.0	0.0	53.4	38.0	74	54	-20.6	-16.0	H
1.596	3.0	61.3	44.8	26.9	1.9	-37.4	0.0	0.0	52.7	36.2	74	54	-21.3	-17.8	H
2.392	3.0	52.7	36.6	28.5	2.3	-36.3	0.0	0.0	47.2	31.1	74	54	-26.8	-22.9	H
1.197	3.0	66.2	50.4	25.9	1.7	-38.0	0.0	0.0	55.8	40.0	74	54	-18.2	-14.0	V
1.596	3.0	69.2	45.5	26.9	1.9	-37.4	0.0	0.0	60.6	36.9	74	54	-13.4	-17.1	V
2.392	3.0	54.5	38.1	28.5	2.3	-36.3	0.0	0.0	49.0	32.6	74	54	-25.0	-21.4	V

**No other emissions were detected above sytem noise floor**

f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter		

### 8.3.3. 20 MHz BANDWIDTH IN THE 5 GHz BAND

High Frequency Measurement Compliance Certification Services																	
Company: Broadcom Project #: 07U11529 Date: 12/20/2007 Test Engineer: Vien Tran Configuration: EUT with 3.9dBi Antenna Mode: Rx 5 GHz Band_20 MHz BW Worst-Case																	
<b>Test Equipment:</b>																	
Horn 1-18GHz			Pre-amplifier 1-26GHz			Pre-amplifier 26-40GHz			Horn > 18GHz			Limit					
T60; S/N: 2238 @3m			T34 HP 8449B									RX RSS 210					
Hi Frequency Cables																	
2 foot cable			3 foot cable			12 foot cable			HPF			Reject Filter			Peak Measurements RBW=VBW=1MHz Average Measurements RBW=1MHz ; VBW=10Hz		
William 177079009						Ninous 208946002											
f GHz	Dist (m)	Read Pk dBuV	Read Avg dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Ftr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)		
1.988	3.0	68.4	43.7	27.9	2.1	-36.9	0.0	0.0	61.5	36.8	74	54	-12.5	-17.2	H		
2.490	3.0	59.2	39.8	28.8	2.3	-36.3	0.0	0.0	54.1	34.6	74	54	-19.9	-19.4	H		
1.298	3.0	58.8	40.6	26.2	1.8	-37.8	0.0	0.0	48.9	30.7	74	54	-25.1	-23.3	H		
1.988	3.0	70.9	46.1	27.9	2.1	-36.9	0.0	0.0	64.0	39.2	74	54	-10.0	-14.8	V		
2.490	3.0	61.6	42.2	28.8	2.3	-36.3	0.0	0.0	56.5	37.1	74	54	-17.5	-16.9	V		
1.298	3.0	61.2	43.0	26.2	1.8	-37.8	0.0	0.0	51.3	33.1	74	54	-22.7	-20.9	V		
<b>No other emissions were detected above sytem noise floor</b>																	
f	Measurement Frequency					Amp	Preamp Gain					Avg Lim	Average Field Strength Limit				
Dist	Distance to Antenna					D Corr	Distance Correct to 3 meters					Pk Lim	Peak Field Strength Limit				
Read	Analyzer Reading					Avg	Average Field Strength @ 3 m					Avg Mar	Margin vs. Average Limit				
AF	Antenna Factor					Peak	Calculated Peak Field Strength					Pk Mar	Margin vs. Peak Limit				
CL	Cable Loss					HPF	High Pass Filter										

**8.3.4. 40 MHz BANDWIDTH IN THE 5 GHz BAND**

**High Frequency Measurement  
 Compliance Certification Services**

Company: Broadcom  
 Project #: 07U11529  
 Date: 12/20/2007  
 Test Engineer: Vien Tran  
 Configuration: EUT with 3.9dBi Antenna  
 Mode: Rx 5 GHz Band\_Worst-Case

**Test Equipment:**

<b>Horn 1-18GHz</b> T60; S/N: 2238 @3m	<b>Pre-amplifier 1-26GHz</b> T34 HP 8449B	<b>Pre-amplifier 26-40GHz</b>	<b>Horn &gt; 18GHz</b>	<b>Limit</b> RX RSS 210
---	--	-------------------------------	------------------------	----------------------------

Hi Frequency Cables

<b>2 foot cable</b> William 177079009	<b>3 foot cable</b>	<b>12 foot cable</b> Ninous 208946002	<b>HPF</b>	<b>Reject Filter</b>	<b>Peak Measurements</b> RBW=VBW=1MHz <b>Average Measurements</b> RBW=1MHz ; VBW=10Hz
--	---------------------	--	------------	----------------------	--

f GHz	Dist (m)	Read Pk dBuV	Read Avg dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Ftr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
1.988	3.0	67.0	41.1	27.9	2.1	-36.9	0.0	0.0	60.1	34.2	74	54	-13.9	-19.8	H
2.490	3.0	61.1	44.2	28.8	2.3	-36.3	0.0	0.0	56.0	39.1	74	54	-18.0	-14.9	H
1.298	3.0	59.4	45.3	26.2	1.8	-37.8	0.0	0.0	49.5	35.4	74	54	-24.5	-18.6	H
1.988	3.0	72.0	41.9	27.9	2.1	-36.9	0.0	0.0	65.1	35.0	74	54	-8.9	-19.0	V
2.490	3.0	63.3	47.4	28.8	2.3	-36.3	0.0	0.0	58.2	42.3	74	54	-15.8	-11.7	V
1.298	3.0	53.4	37.3	26.2	1.8	-37.8	0.0	0.0	43.5	27.4	74	54	-30.5	-26.6	V

No other emissions were detected above sytem noise floor

f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter		

**8.4. WORST-CASE BELOW 1 GHz**

**2.4 GHz BAND**

**SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)**

HORIZONTAL DATA



Compliance Certification Services  
47173 Benicia Street  
Fremont, CA 94538  
Tel: (510) 771-1000  
Fax: (510) 661-0888

Data#: 16 File#: 30-1000M.EMI Date: 01-09-2008 Time: 11:36:34

Condition: FCC CLASS-B HORIZONTAL  
Test Operator: Vien Tran  
Project # : 07U11529  
Company : Broadcom  
Config : EUT on extended card  
Mode : Tx, 2.4 GHz (worst case)  
Target : FCC CLASS B

Page: 1

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	124.090	48.51	-13.05	35.46	43.50	-8.04	Peak
2	147.370	50.70	-13.67	37.03	43.50	-6.47	Peak
3	341.370	53.09	-11.24	41.85	46.00	-4.15	Peak
4	487.840	47.09	-7.60	39.49	46.00	-6.51	Peak
5	906.880	41.77	-1.05	40.72	46.00	-5.28	Peak



**SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)**

VERTICAL DATA



Compliance Certification Services  
 47173 Benicia Street  
 Fremont, CA 94538  
 Tel: (510) 771-1000  
 Fax: (510) 661-0888

Data#: 18 File#: 30-1000M.EMI Date: 01-09-2008 Time: 11:51:38

Condition: FCC CLASS-B VERTICAL  
 Test Operator: Vien Tran  
 Project # : 07U11529  
 Company : Broadcom  
 Config : EVT on extended card  
 Mode : Tx, 2.4 GHz (worst case)  
 Target : FCC CLASS B

Page: 1

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHZ	dBuV	dB	dBuV/m	dBuV/m	dB	
1	124.090	48.25	-13.05	35.20	43.50	-8.30	Peak
2	146.400	50.13	-13.67	36.46	43.50	-7.04	Peak
3	342.340	53.58	-11.22	42.36	46.00	-3.64	Peak
4	507.240	46.05	-7.20	38.85	46.00	-7.15	Peak
5	905.910	41.56	-1.04	40.52	46.00	-5.48	Peak

**5 GHz BAND**

**SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)**

HORIZONTAL DATA



Compliance Certification Services  
47173 Benicia Street  
Fremont, CA 94538  
Tel: (510) 771-1000  
Fax: (510) 661-0888

Data#: 20 File#: 30-1000M.EMI Date: 01-09-2008 Time: 13:06:04

Condition: FCC CLASS-B HORIZONTAL  
Test Operator: Vien Tran  
Project # : 07U11529  
Company : Broadcom  
Config : EUT on extended card  
Mode : Tx, 5 GHz Band (worst case)  
Target : FCC CLASS B

Page: 1

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	138.640	48.75	-13.21	35.53	43.50	-7.97	Peak
2	342.340	53.09	-11.22	41.87	46.00	-4.13	Peak
3	455.830	46.73	-8.40	38.33	46.00	-7.67	Peak
4	633.340	44.44	-4.77	39.67	46.00	-6.33	Peak
5	906.880	40.22	-1.05	39.17	46.00	-6.83	Peak

**SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)**

VERTICAL DATA



Compliance Certification Services  
47173 Benicia Street  
Fremont, CA 94538  
Tel: (510) 771-1000  
Fax: (510) 661-0888

Data#: 27 File#: 30-1000m.emi Date: 01-24-2008 Time: 09:43:22

Condition: FCC CLASS-B VERTICAL  
Test Operator: Vien Tran  
Project # : 07U11529  
Company : Broadcom  
Config : EUT on extended card  
Mode : Tx, 2.4 GHz (worst case)  
Target : FCC CLASS B

Page: 1

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	124.090	48.25	-13.05	35.20	43.50	-8.30	Peak
2	146.400	50.13	-13.67	36.46	43.50	-7.04	Peak
3	458.740	46.57	-8.36	38.21	46.00	-7.79	Peak
4	507.240	46.05	-7.20	38.85	46.00	-7.15	Peak
5	766.230	42.03	-2.50	39.53	46.00	-6.47	Peak
6	905.910	41.56	-1.04	40.52	46.00	-5.48	Peak

**9. AC POWER LINE CONDUCTED EMISSIONS**

**LIMITS**

FCC §15.207 (a)

RSS-Gen 7.2.2

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

\*Decreases with the logarithm of the frequency.

**TEST PROCEDURE**

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.4.

The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

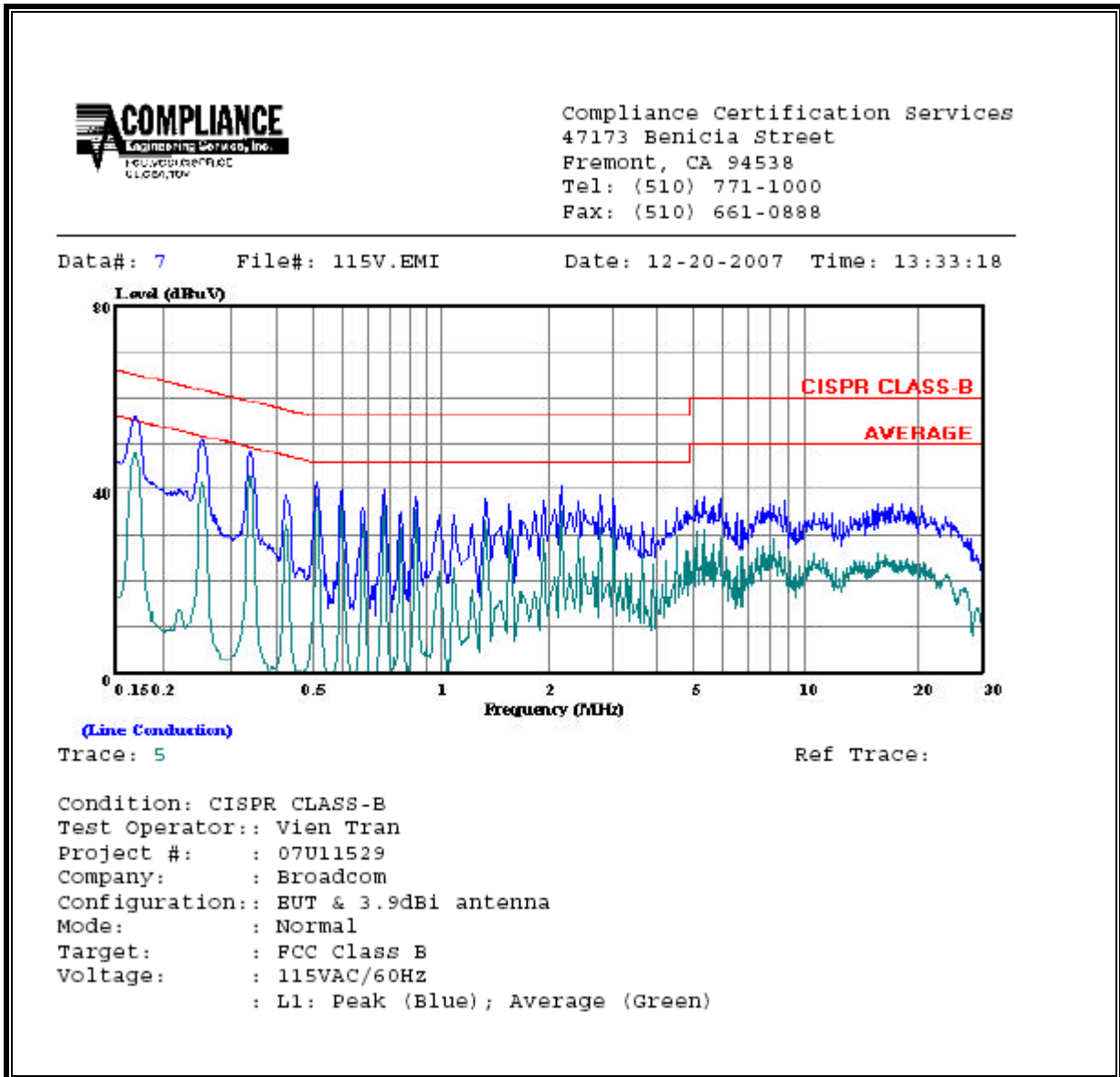
Line conducted data is recorded for both NEUTRAL and HOT lines.

**RESULTS**

**6 WORST EMISSIONS**

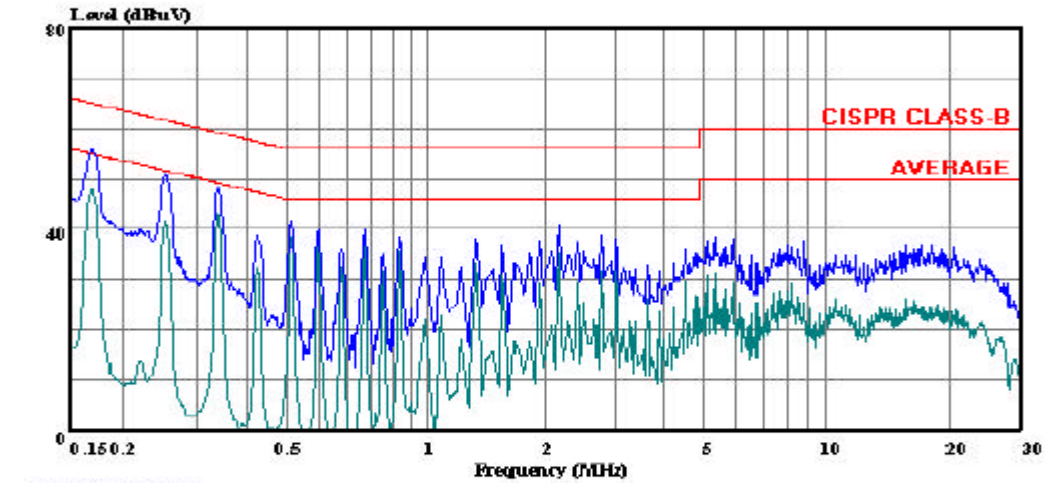
CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq. (MHz)	Reading			Class (dB)	Limit		Margin		Remark L1 / L2
	PK (dBuV)	QP (dBuV)	AV (dBuV)		QP	AV	QP (dB)	AV (dB)	
0.17	55.90	--	47.70	0.00	65.01	55.01	-9.11	-7.31	L1
0.25	50.83	--	41.10	0.00	61.66	51.66	-10.83	-10.56	L1
0.34	48.18	--	43.10	0.00	59.23	49.23	-11.05	-6.13	L1
0.17	55.83	--	47.36	0.00	65.01	55.01	-9.18	-7.65	L2
0.25	51.98	--	43.03	0.00	61.66	51.66	-9.68	-8.63	L2
0.34	48.25	--	42.10	0.00	59.23	49.23	-10.98	-7.13	L2
6 Worst Data									

**LINE 1 RESULTS**



Compliance Certification Services  
47173 Benicia Street  
Fremont, CA 94538  
Tel: (510) 771-1000  
Fax: (510) 661-0888

Data#: 7 File#: 115V.EMI Date: 12-20-2007 Time: 13:33:18



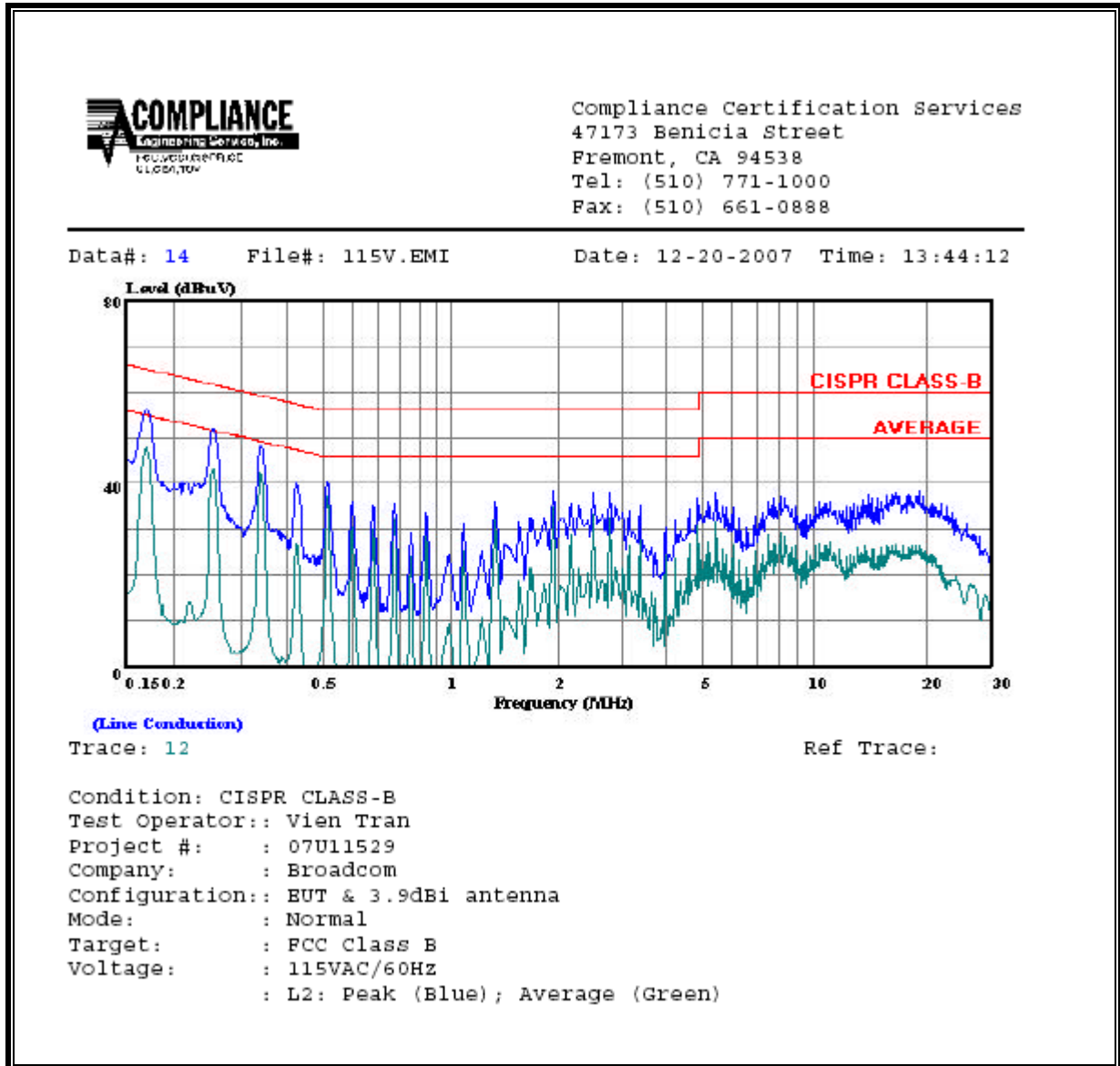
(Line Conduction)

Trace: 5

Ref Trace:

Condition: CISPR CLASS-B  
Test Operator: Vien Tran  
Project #: 07U11529  
Company: Broadcom  
Configuration: EUT & 3.9dBi antenna  
Mode: Normal  
Target: FCC Class B  
Voltage: 115VAC/60Hz  
: L1: Peak (Blue); Average (Green)

**LINE 2 RESULTS**



**10. MAXIMUM PERMISSIBLE EXPOSURE**

**FCC RULES**

§1.1310 The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this chapter.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm <sup>2</sup> )	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0 .....	614	1.63	*(100)	6
3.0–30 .....	1842/f	4.89/f	*(900/f <sup>2</sup> )	6
30–300 .....	61.4	0.163	1.0	6
300–1500 .....	.....	.....	f/300	6
1500–100,000 .....	.....	.....	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34 .....	614	1.63	*(100)	30
1.34–30 .....	824/f	2.19/f	*(180/f <sup>2</sup> )	30

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)—Continued

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm <sup>2</sup> )	Averaging time (minutes)
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

NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

**IC RULES**

IC Safety Code 6, Section 2.2.1 (a) A person other than an RF and microwave exposed worker shall not be exposed to electromagnetic radiation in a frequency band listed in Column 1 of Table 5, if the field strength exceeds the value given in Column 2 or 3 of Table 5, when averaged spatially and over time, or if the power density exceeds the value given in Column 4 of Table 5, when averaged spatially and over time.

**Table 5  
 Exposure Limits for Persons Not Classed As RF and Microwave Exposed Workers (Including the General Public)**

1 Frequency (MHz)	2 Electric Field Strength; rms (V/m)	3 Magnetic Field Strength; rms (A/m)	4 Power Density (W/m <sup>2</sup> )	5 Averaging Time (min)
0.003–1	280	2.19		6
1–10	280/ <i>f</i>	2.19/ <i>f</i>		6
10–30	28	2.19/ <i>f</i>		6
30–300	28	0.073	2*	6
300–1 500	1.585 <i>f</i> <sup>0.5</sup>	0.0042 <i>f</i> <sup>0.5</sup>	<i>f</i> /150	6
1 500–15 000	61.4	0.163	10	6
15 000–150 000	61.4	0.163	10	616 000 / <i>f</i> <sup>1.2</sup>
150 000–300 000	0.158 <i>f</i> <sup>0.5</sup>	4.21 x 10 <sup>-4</sup> <i>f</i> <sup>0.5</sup>	6.67 x 10 <sup>-5</sup> <i>f</i>	616 000 / <i>f</i> <sup>1.2</sup>

\* Power density limit is applicable at frequencies greater than 100 MHz.

- Notes:**
1. Frequency, *f*, is in MHz.
  2. A power density of 10 W/m<sup>2</sup> is equivalent to 1 mW/cm<sup>2</sup>.
  3. A magnetic field strength of 1 A/m corresponds to 1.257 microtesla (μT) or 12.57 milligauss (mG).



## **CALCULATIONS**

Given

$$E = \sqrt{(30 * P * G) / d}$$

and

$$S = E^2 / 3770$$

where

E = Field Strength in Volts/meter

P = Power in Watts

G = Numeric antenna gain

d = Distance in meters

S = Power Density in milliwatts/square centimeter

Combining equations, rearranging the terms to express the distance as a function of the remaining variables, changing to units of Power to mW and Distance to cm, and substituting the logarithmic form of power and gain yields:

$$d = 0.282 * 10^{((P + G) / 20)} / \sqrt{S}$$

where

d = MPE distance in cm

P = Power in dBm

G = Antenna Gain in dBi

S = Power Density Limit in mW/cm<sup>2</sup>

Rearranging terms to calculate the power density at a specific distance yields

$$S = 0.0795 * 10^{((P + G) / 10)} / (d^2)$$

The power density in units of mW/cm<sup>2</sup> is converted to units of W/m<sup>2</sup> by multiplying by a factor of 10.

**LIMITS**

From FCC §1.1310 Table 1 (B), the maximum value of S = 1.0 mW/cm<sup>2</sup>

From IC Safety Code 6, Section 2.2 Table 5 Column 4, S = 10 W/m<sup>2</sup>

**RESULTS**

(MPE distance equals 20 cm)

Mode	Band	MPE Distance (cm)	Output Power (dBm)	Antenna Gain (dBi)	FCC Power Density (mW/cm <sup>2</sup> )	IC Power Density (W/m <sup>2</sup> )
WLAN	2.4 GHz	20.0	29.02	6.91	0.78	7.79
WLAN	5 GHz	20.0	27.17	8.81	0.79	7.88