



**FCC CFR47 PART 15 SUBPART C
INDUSTRY CANADA RSS-210 ISSUE 8**

CERTIFICATION TEST REPORT

FOR

2WIRE WIRELESS 802.11b/g/n ADSL RESIDENTIAL GATEWAY

MODEL NUMBERS: 4111N, 4112N*

**FCC ID: PGR2W4100N
IC: 3439B-4100N**

REPORT NUMBER: 10U13493-1

ISSUE DATE: JANUARY 4, 2011

Prepared for
**PACE AMERICAS
310 PROVIDENCE MINE ROAD,
NEVADA CITY, CALIFORNIA 95959 UNITED STATES**

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

* Explanation of models differences are contained in the body of this report.



NVLAP LAB CODE 200065-0

Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
--	01/03/11	Initial Issue	F. Ibrahim

TABLE OF CONTENTS

- 1. ATTESTATION OF TEST RESULTS..... 5**
- 2. TEST METHODOLOGY 6**
- 3. FACILITIES AND ACCREDITATION..... 6**
- 4. CALIBRATION AND UNCERTAINTY 6**
 - 4.1. *MEASURING INSTRUMENT CALIBRATION*..... 6
 - 4.2. *SAMPLE CALCULATION*..... 6
 - 4.3. *MEASUREMENT UNCERTAINTY*..... 6
- 5. EQUIPMENT UNDER TEST 7**
 - 5.1. *DESCRIPTION OF EUT*..... 7
 - 5.2. *DESCRIPTION OF MODEL(S) DIFFERENCES*..... 7
 - 5.3. *MAXIMUM OUTPUT POWER*..... 7
 - 5.4. *DESCRIPTION OF AVAILABLE ANTENNAS*..... 7
 - 5.5. *SOFTWARE AND FIRMWARE*..... 8
 - 5.6. *WORST-CASE CONFIGURATION AND MODE* 8
 - 5.7. *DESCRIPTION OF TEST SETUP*..... 9
- 6. TEST AND MEASUREMENT EQUIPMENT 11**
- 7. ANTENNA PORT TEST RESULTS 12**
 - 7.1. *802.11b MODE IN THE 2.4 GHz BAND*..... 12
 - 7.1.1. 6 dB BANDWIDTH 12
 - 7.1.2. 99% BANDWIDTH 16
 - 7.1.3. OUTPUT POWER 20
 - 7.1.4. AVERAGE POWER 24
 - 7.1.5. POWER SPECTRAL DENSITY 25
 - 7.1.6. CONDUCTED SPURIOUS EMISSIONS..... 29
 - 7.2. *802.11g MODE IN THE 2.4 GHz BAND*..... 33
 - 7.2.1. 6 dB BANDWIDTH 33
 - 7.2.2. 99% BANDWIDTH 36
 - 7.2.3. OUTPUT POWER 40
 - 7.2.4. AVERAGE POWER 44
 - 7.2.5. POWER SPECTRAL DENSITY 45
 - 7.2.6. CONDUCTED SPURIOUS EMISSIONS..... 49
 - 7.3. *802.11n HT20 MODE IN THE 2.4 GHz BAND SINGLE CHAIN* 54
 - 7.3.1. 6 dB BANDWIDTH 54
 - 7.3.2. 99% BANDWIDTH 57
 - 7.3.3. OUTPUT POWER 60
 - 7.3.4. AVERAGE POWER 64
 - 7.3.5. POWER SPECTRAL DENSITY 65
 - 7.3.6. CONDUCTED SPURIOUS EMISSIONS..... 69

7.4. 802.11n HT20 MODE IN THE 2.4 GHz BAND DUAL CHAIN 73
7.4.1. 6 dB BANDWIDTH 73
7.4.2. 99% BANDWIDTH 78
7.4.3. OUTPUT POWER 82
7.4.4. AVERAGE POWER 89
7.4.5. POWER SPECTRAL DENSITY 90
7.4.6. CONDUCTED SPURIOUS EMISSIONS 94
7.5. 802.11n HT40 MODE IN THE 2.4 GHz BAND SINGLE CHAIN 98
7.5.1. 6 dB BANDWIDTH 98
7.5.2. 99% BANDWIDTH 100
7.5.3. OUTPUT POWER 102
7.5.4. AVERAGE POWER 104
7.5.5. POWER SPECTRAL DENSITY 105
7.5.6. CONDUCTED SPURIOUS EMISSIONS 107
7.6. 802.11n HT40 MODE IN THE 2.4 GHz BAND DUAL CHAIN 112
7.6.1. 6 dB BANDWIDTH 112
7.6.2. 99% BANDWIDTH 114
7.6.3. OUTPUT POWER 116
7.6.4. AVERAGE POWER 118
7.6.5. POWER SPECTRAL DENSITY 119
7.6.6. CONDUCTED SPURIOUS EMISSIONS 121
7.7. RECEIVE SPURIOUS 126
8. RADIATED TEST RESULTS 127
8.1. LIMITS AND PROCEDURE 127
8.2. WORST-CASE BELOW 1 GHz 128
8.3. TRANSMITTER ABOVE 1 GHz 131
8.3.1. TX ABOVE 1 GHz FOR 802.11b MODE IN THE 2.4 GHz BAND 131
8.3.2. TX ABOVE 1 GHz FOR 802.11g MODE IN THE 2.4 GHz BAND 139
8.3.3. TX ABOVE 1 GHz 802.11n HT20 1TX IN 2.4 GHz BAND 149
8.3.4. TX ABOVE 1 GHz 802.11n HT20 2TX IN 2.4 GHz BAND 159
8.3.5. TX ABOVE 1 GHz 802.11n HT40 1TX IN 2.4 GHz BAND 165
8.3.6. TX ABOVE 1 GHz 802.11n HT40 2TX IN 2.4 GHz BAND 171
9. AC POWER LINE CONDUCTED EMISSIONS 177
10. MAXIMUM PERMISSIBLE EXPOSURE 183
11. SETUP PHOTOS 186

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: PACE AMERICAS
310 PROVIDENCE MINE ROAD,
NEVADA CITY, CALIFORNIA 95959 UNITED STATES

EUT DESCRIPTION: 2WIRE WIRELESS 802.11b/g/n ADSL RESIDENTIAL GATEWAY

MODEL: 4111N, 4112N

SERIAL NUMBER: 37101E005077, 37101E005082.

DATE TESTED: NOVEMBER 9-19, 2010

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-210 Issue 8 Annex 8	Pass
INDUSTRY CANADA RSS-GEN Issue 3	Pass

Compliance Certification Services (UL CCS) tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL CCS based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. 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 UL CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by CCS will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For UL CCS By:



FRANK IBRAHIM
EMC SUPERVISOR
UL CCS

Tested By:



THANH NGUYEN
EMC ENGINEER
UL CCS

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2009, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 3, and RSS-210 Issue 8.

3. FACILITIES AND ACCREDITATION

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

UL 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. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamp Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	3.52 dB
Radiated Disturbance, 30 to 1000 MHz	4.94 dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a WIRELESS 802.11b/g/n ADSL RESIDENTIAL GATEWAY.

5.2. DESCRIPTION OF MODEL(S) DIFFERENCES

4111N:

Ethernet WAN: 1 port (Fast Ethernet - 10/100)

Ethernet LAN: 4 port (Fast Ethernet - 10/100)

4112N:

Ethernet WAN: 1 port (10/100/1000)

Ethernet LAN: 1 port (GigE- 1000) - 3 ports (Fast Ethernet - 10/100)

4112N was selected as a representative model.

5.3. MAXIMUM OUTPUT POWER

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

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2412 - 2462	802.11b	26.13	410.20
2412 - 2462	802.11g	25.59	362.24
2412 - 2462	802.11n HT20	24.89	308.32
2422 - 2452	802.11n HT40	22.31	170.22

5.4. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes two stamped Metal PIFA antennas with, with a maximum gain of 2.72 dBi.

5.5. SOFTWARE AND FIRMWARE

Gateway Firmware: 8.99.4.31-factory-41XX

Wireless driver: 5.60.120.1.cpe4.06L.2

Telnet: BusyBox v1.15.3

5.6. WORST-CASE CONFIGURATION AND MODE

The worst-case channel is determined as the channel with the highest output power. Radiated emissions 30-1000 MHz was performed with the EUT set to the channel with highest output power.

Worst-case data rates were provided by the client as follows:

802.11b Mode: (20 MHz BW operation) – 1Mbps, CCK

802.11g Mode: (20 MHz BW operation) – 6 Mbps, OFDM

802.11n MIMO HT20 Mode: (20 MHz BW operation) – MCS0, 6.5Mbps, OFDM

802.11n MIMO HT40 Mode: (40 MHz BW operation) – MCS0, 6.5Mbps, OFDM

EUT is for desktop configurations; therefore two possible orientations (X and Y) were investigated and it was determined that orientation Y was worst-case, see photos for details.

Based on input from the client Chain 0 was selected as a default for testing the modes that require tests on single chain, such as 11b, 11g, HT20 single chain, and HT40 single chain.

For conducted spurious and PPSD preliminary investigation was conducted for individual chains versus combiner and it was determined that combiner was worst-case, therefore final measurement were performed using combiner.

5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	Dell	Latitude 131L	2Wire, Inc #2	DoC
AC/DC Adapter	Dell	LA65NS0-00	CN-0DF263-71615-71P-7FA6	DoC
AC/DC Adapter	2Wire, Inc.	EADP-12LB A	2Wire, Inc # 1	N/A

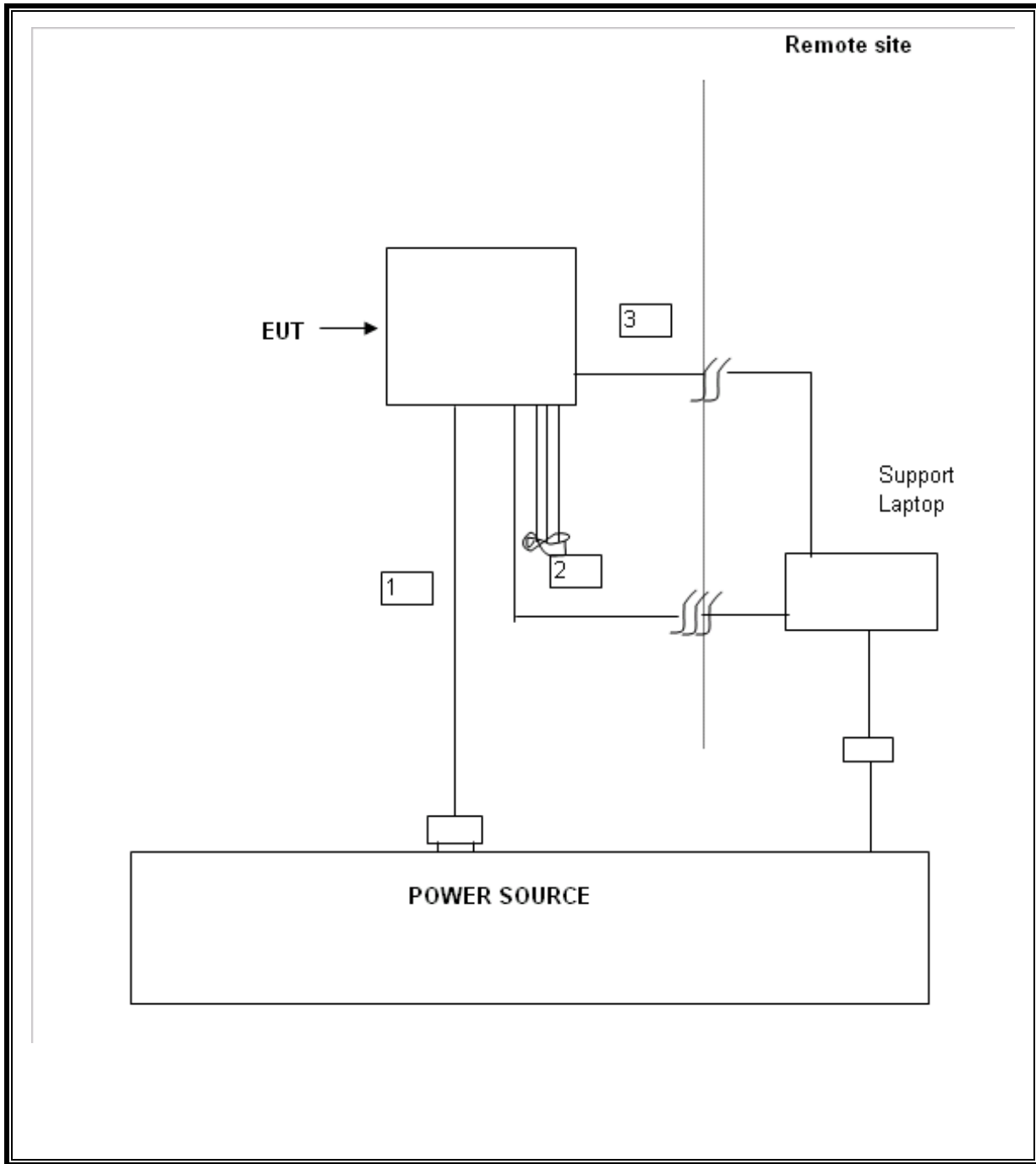
I/O CABLES

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	DC	1	DC Plug	Unshielded	1.5m	N/A
2	WLAN	1	RJ45	Unshielded	1.5m	to the remote PC.
3	WLAN	3	RJ45	Unshielded	1.5m	Unterminated
4	ADSL	1	RJ11	Unshielded	1.5m	to the remote PC.

TEST SETUP

The EUT is a standalone device. Test software was used to exercise the radio.

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
Antenna, Bilog, 2 GHz	Sundt Sciences	JB1	C01011	1/14/2009	12/18/2010
Preamplifier, 1300MHz	Agilent / HP	8447D	C00885	3/31/2009	12/19/2010
PSA Series Spectrum Analyzer	Agilent / HP	E4446A	C01069	1/5/2010	4/5/2011
Power Meter	Bornton	4541RF PWR Meter	C01189	3/23/2010	3/23/2011
Power sensor	Bornton	56006	6871	3/23/2010	3/23/2011
Antenna, Horn, 18 GHz	EMCO	3115	C00945	4/22/2009	12/18/2010
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01052	8/5/2009	12/17/2010
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	11/11/2010	11/11/2011
LISN, 10 kHz ~ 30MHz	Solar	8012-50-R-24-BNC	N02481	11/11/2010	11/11/2011
EM Receiver	R&S	ESH-S 20	N02396	6/8/2009	5/6/2011

7. ANTENNA PORT TEST RESULTS

7.1. 802.11b MODE IN THE 2.4 GHz BAND

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.

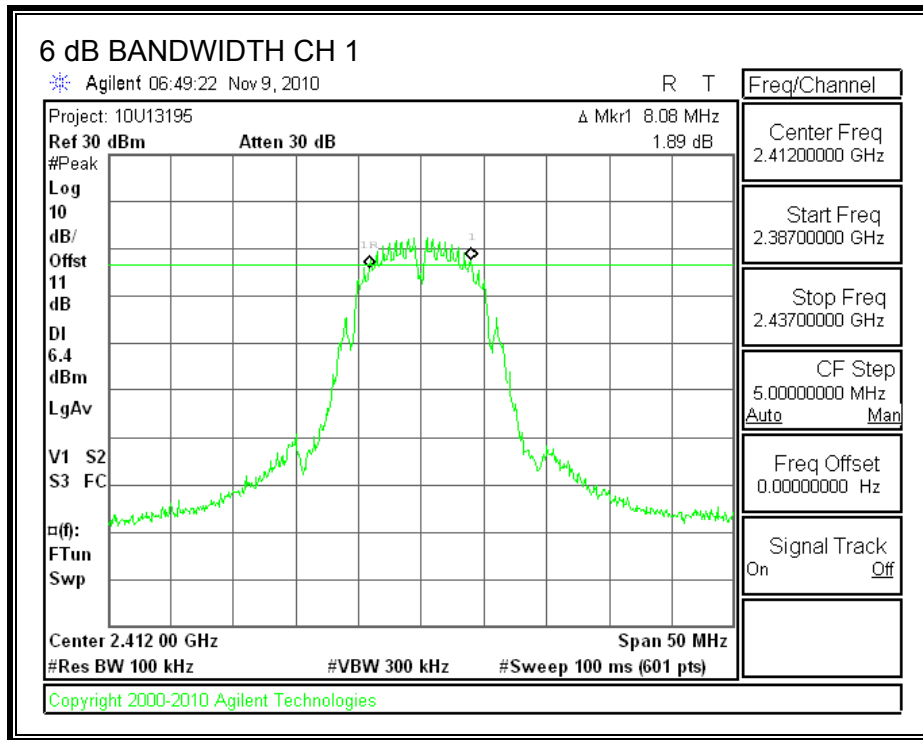
TEST PROCEDURE

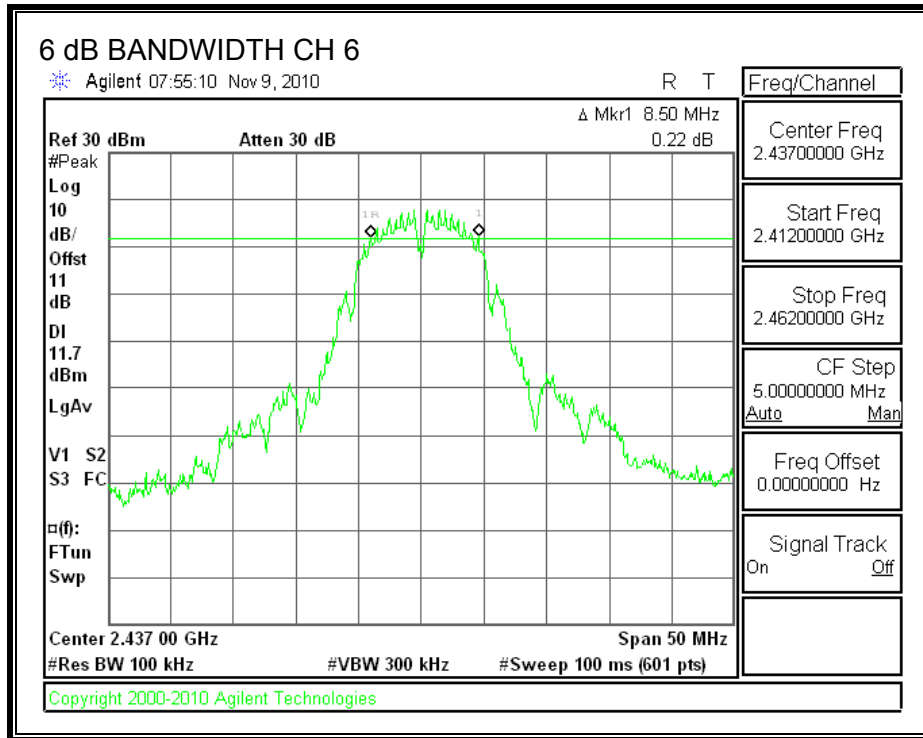
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

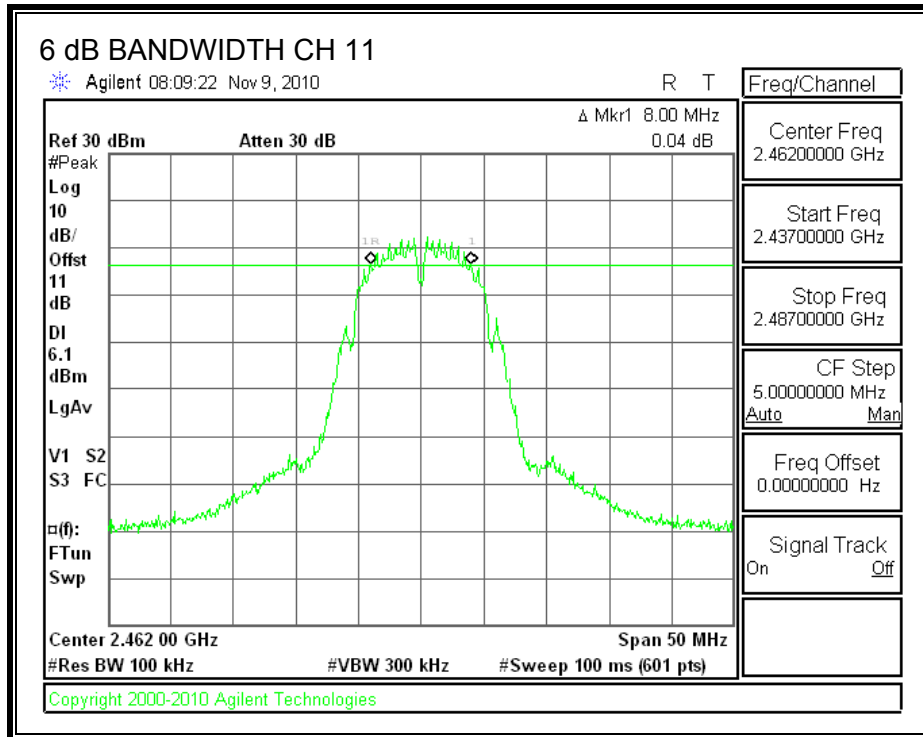
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
1	2412	8.08	0.5
6	2437	8.50	0.5
11	2462	8.00	0.5

6 dB BANDWIDTH







7.1.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

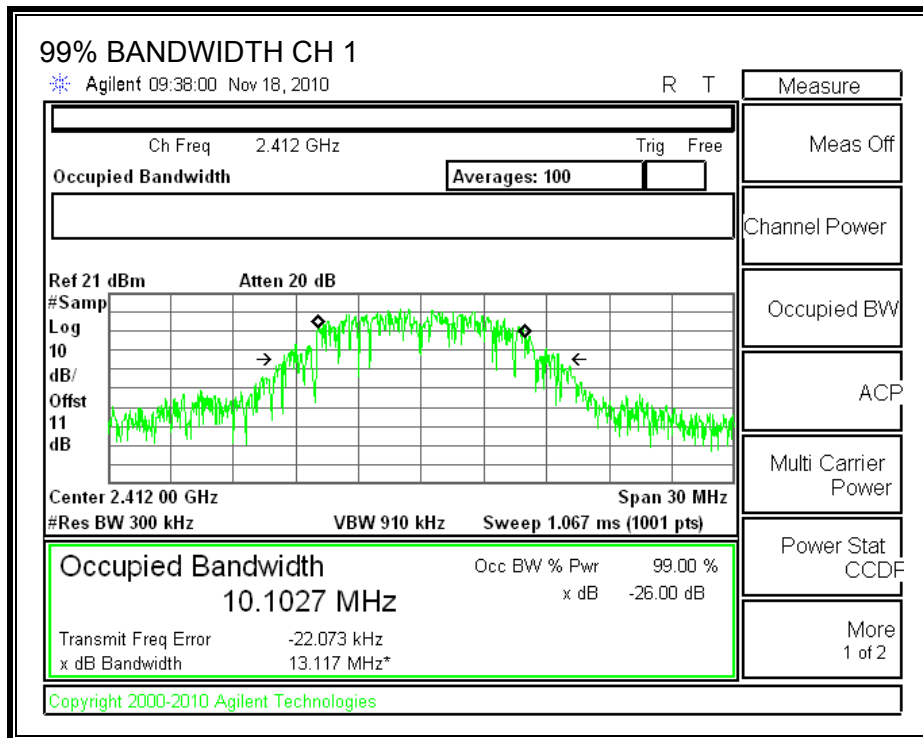
TEST PROCEDURE

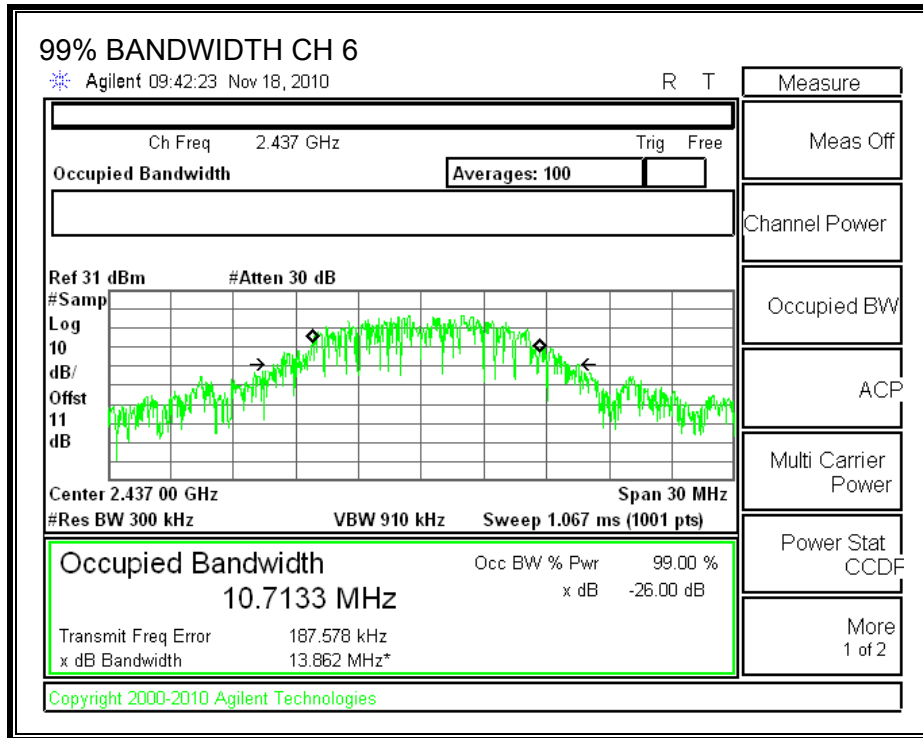
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

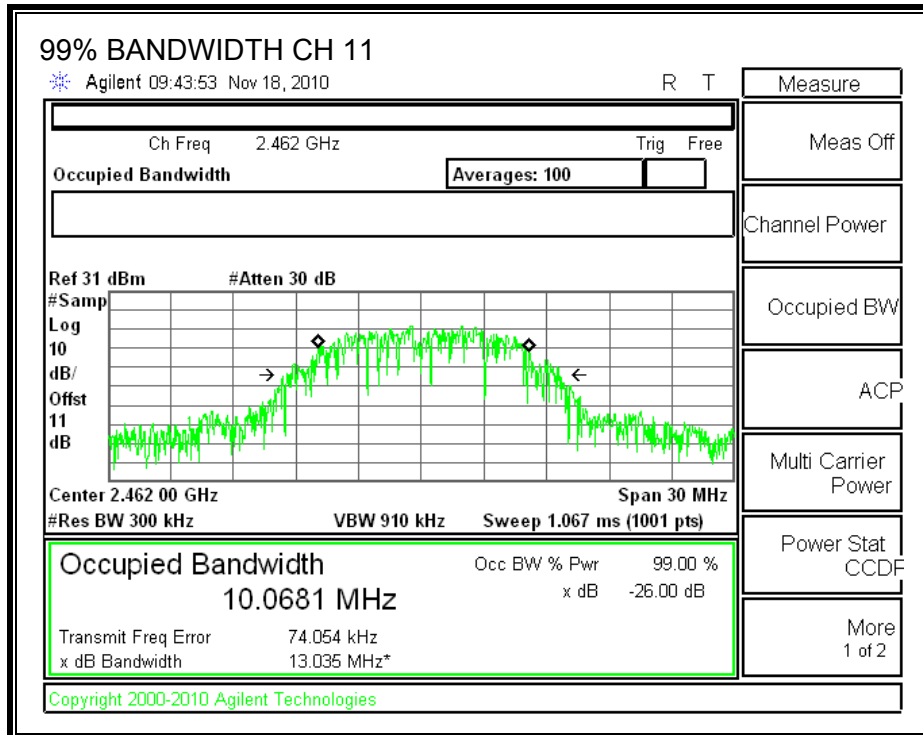
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
1	2412	10.1027
6	2437	10.7133
11	2462	10.0681

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.

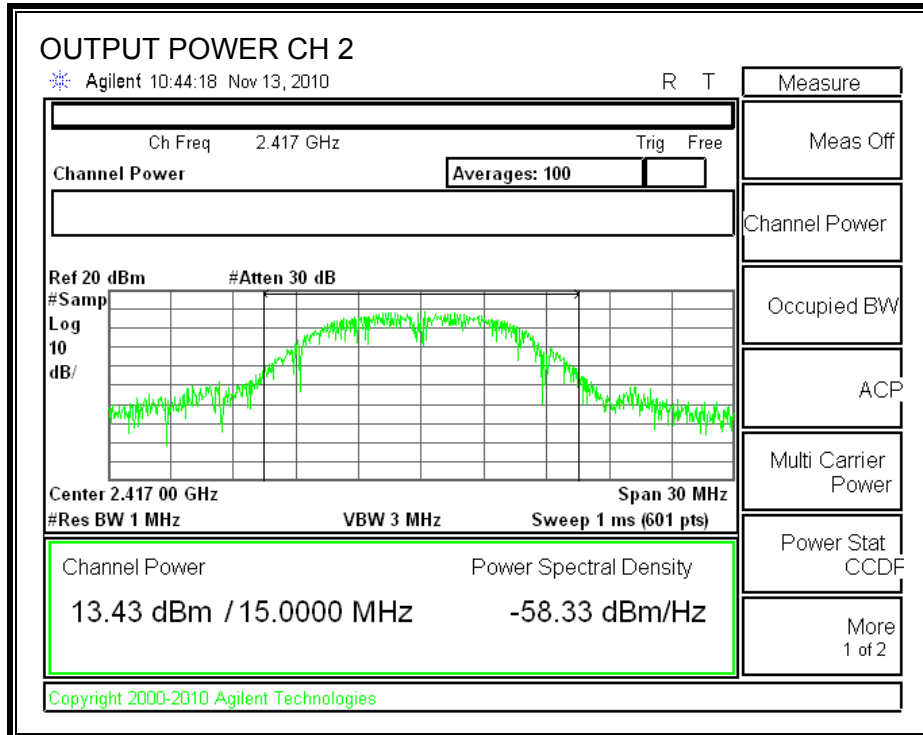
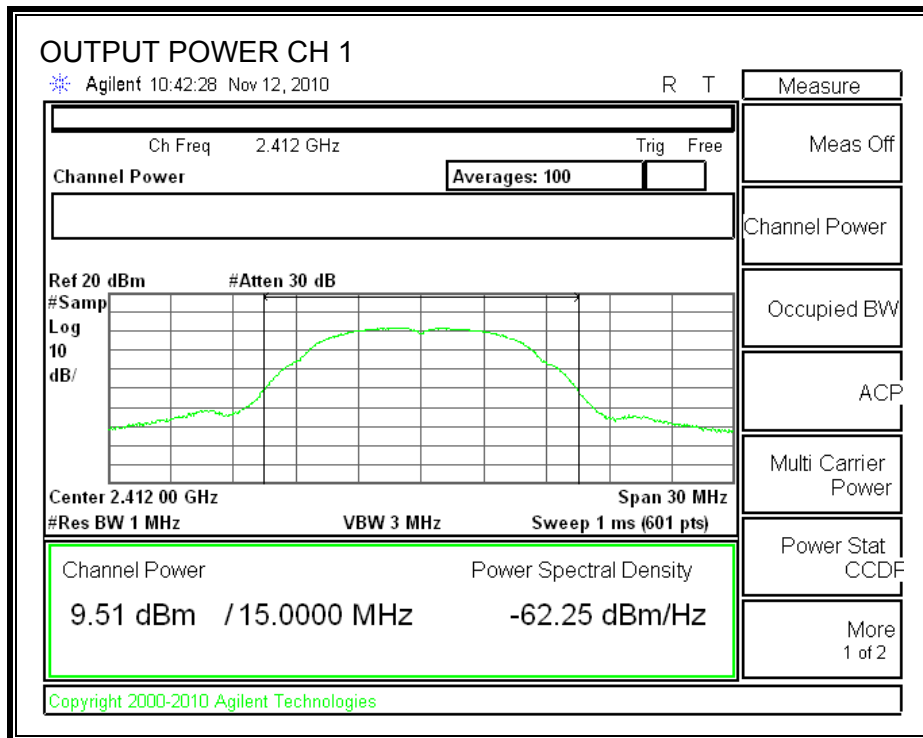
TEST PROCEDURE

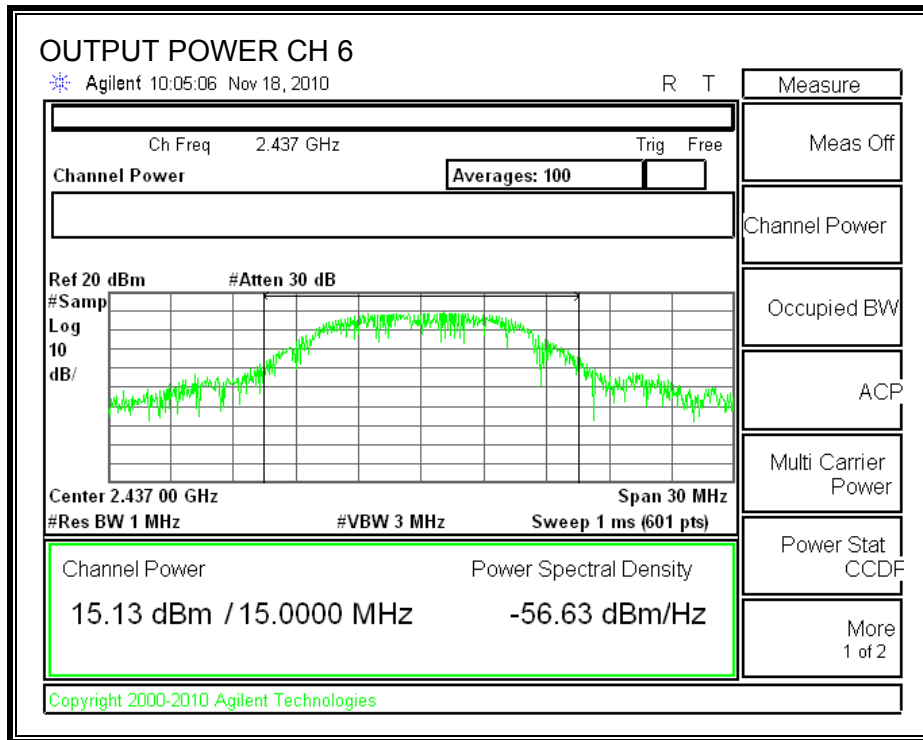
Output power was measured based on the use of RMS averaging over a time interval in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

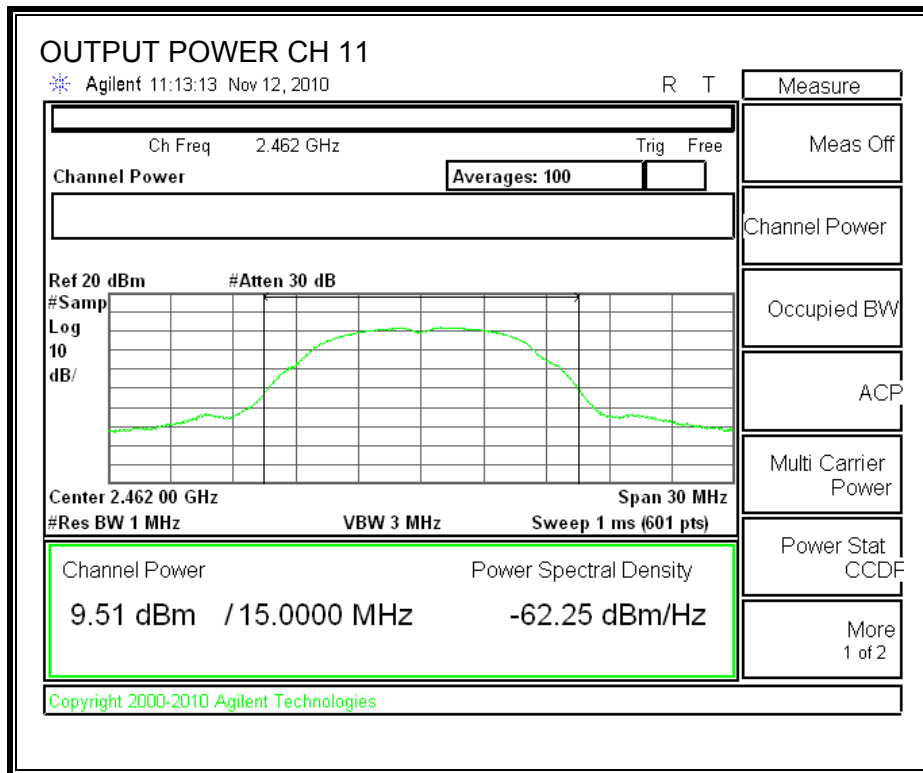
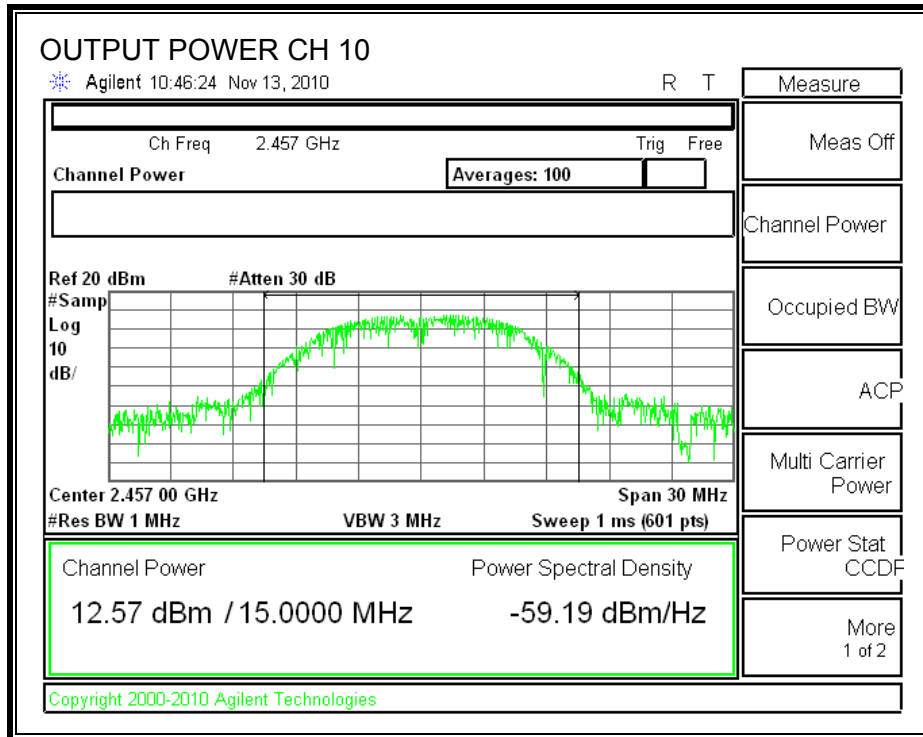
RESULTS

Channel	Frequency (MHz)	Spectrum Analyzer Reading (dBm)	Attenuator and Cable Offset (dB)	Output Power (dBm)	Limit (dBm)	Margin (dB)
1	2412	9.51	11	20.51	30	-9.49
2	2417	13.43	11	24.43	30	-5.57
6	2437	15.13	11	26.13	30	-3.87
10	2457	12.57	11	23.57	30	-6.43
11	2462	9.51	11	20.51	30	-9.49

OUTPUT POWER







7.1.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 11dB (including 10 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Power (dBm)
1	2412	20.55
2	2417	24.36
6	2437	24.27
10	2457	23.22
11	2462	20.461

7.1.5. 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.

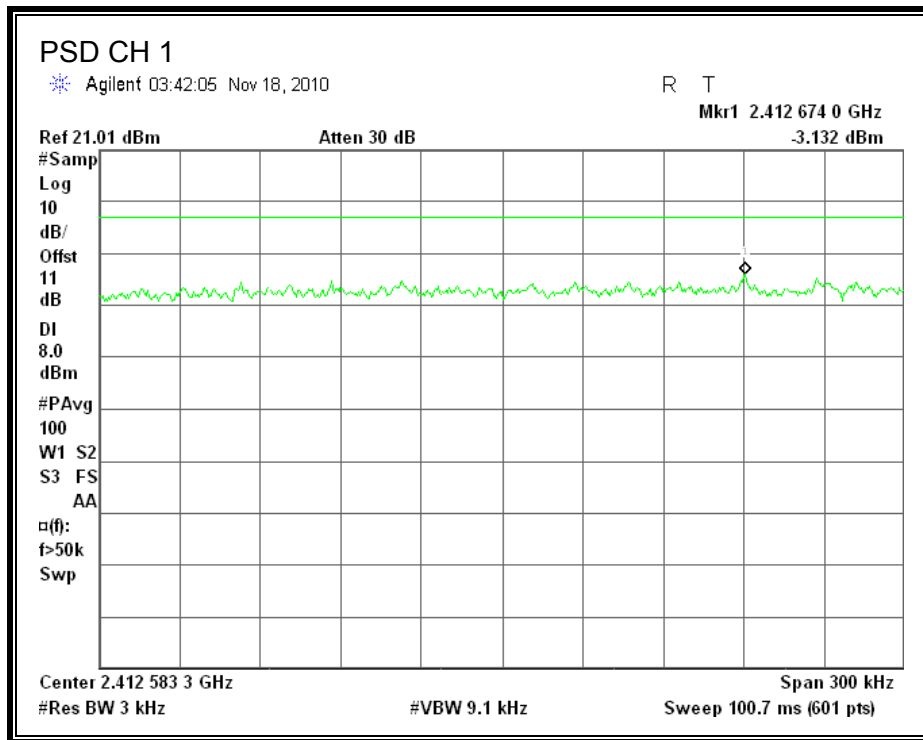
TEST PROCEDURE

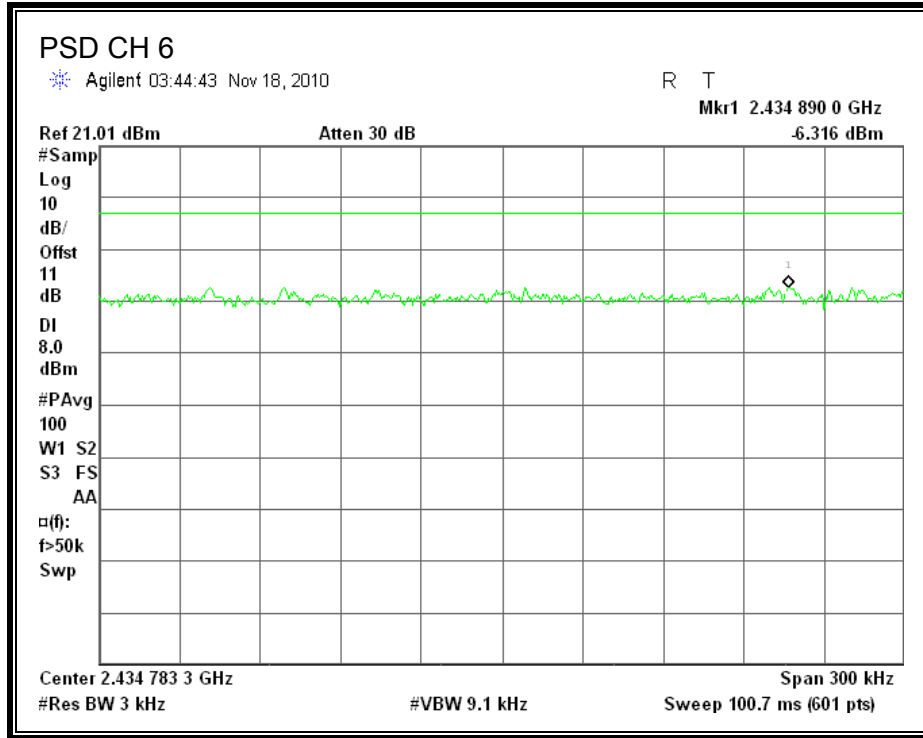
Output power was measured based on the use of RMS averaging over a time interval, therefore the power spectral density was measured using PSD Option 2 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

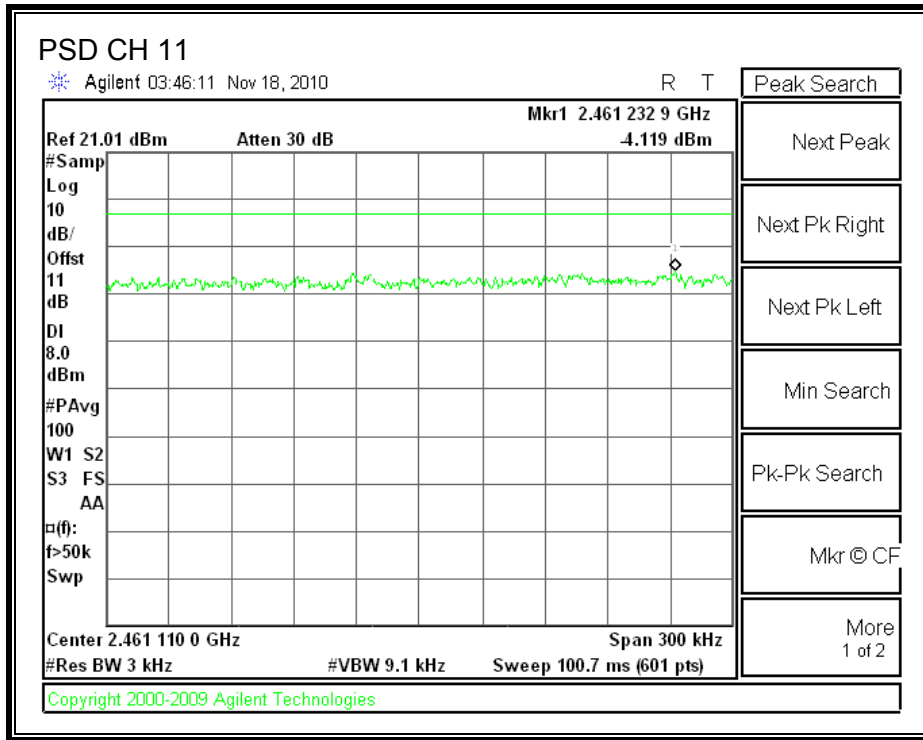
RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
1	2412	-3.132	8	-11.132
6	2437	-6.316	8	-14.316
11	2462	-4.119	8	-12.119

POWER SPECTRAL DENSITY







7.1.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Output power was measured based on the use of RMS averaging over a time interval, therefore the required attenuation is 30 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.

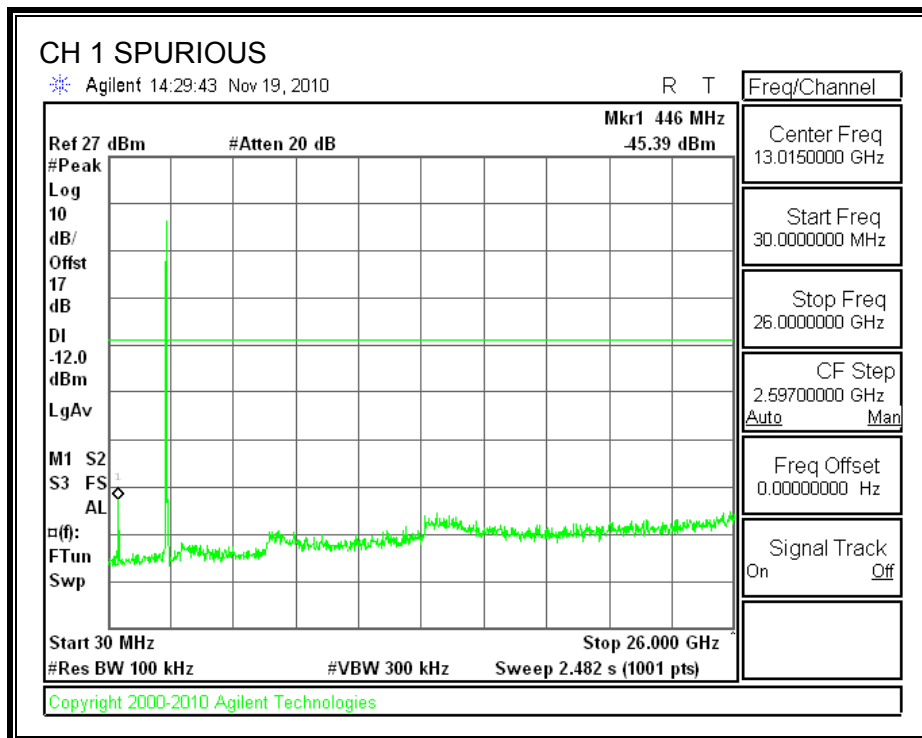
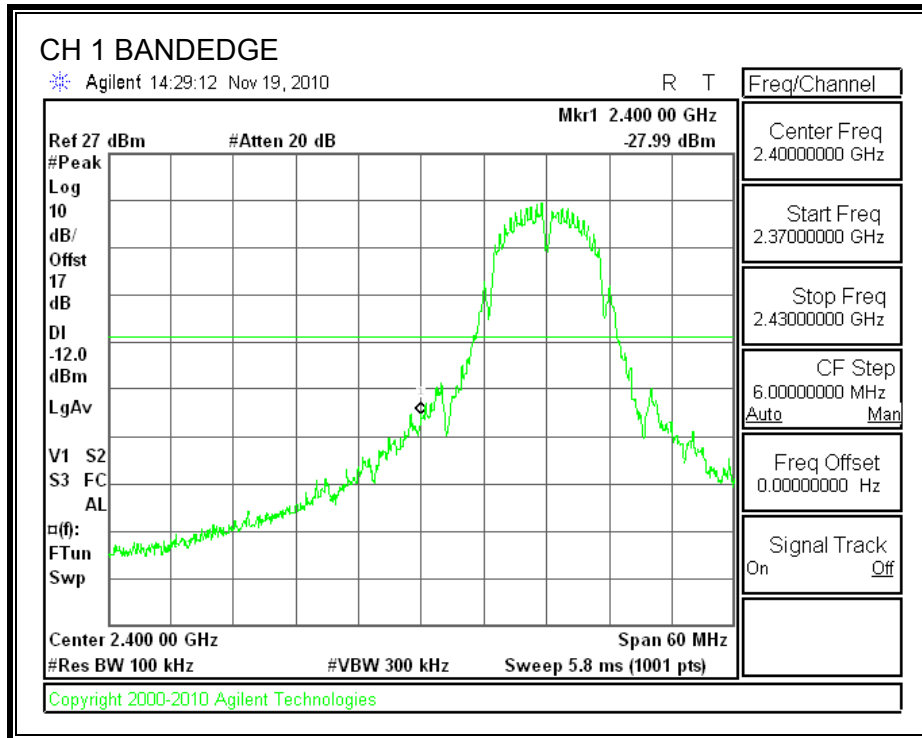
The EUT was set to transmit at mid channel, 30 dBc display line was set with reference to mid channel level.

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

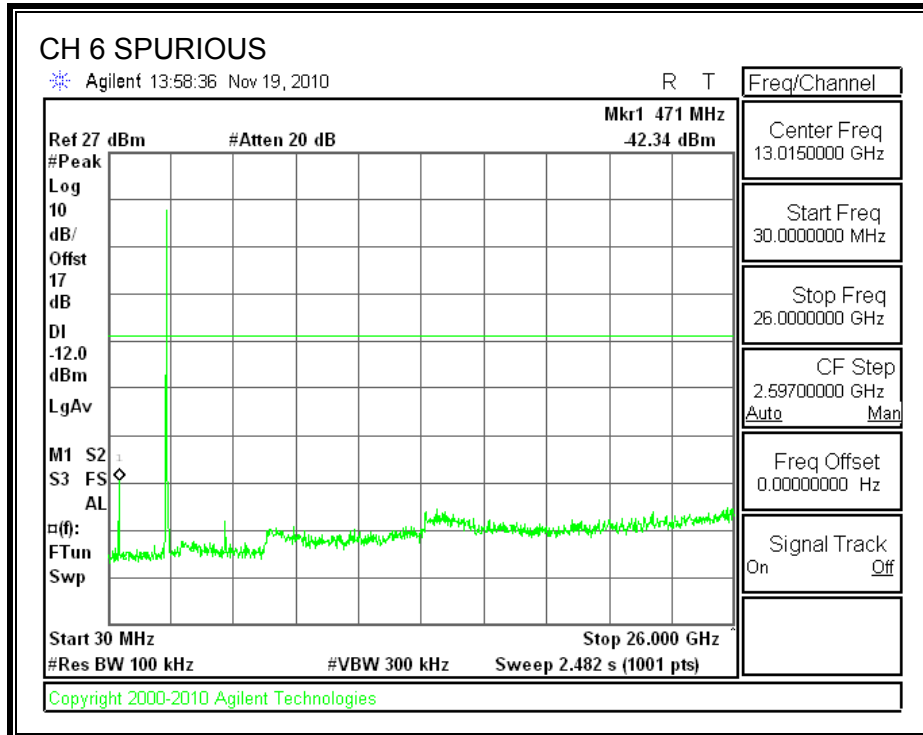
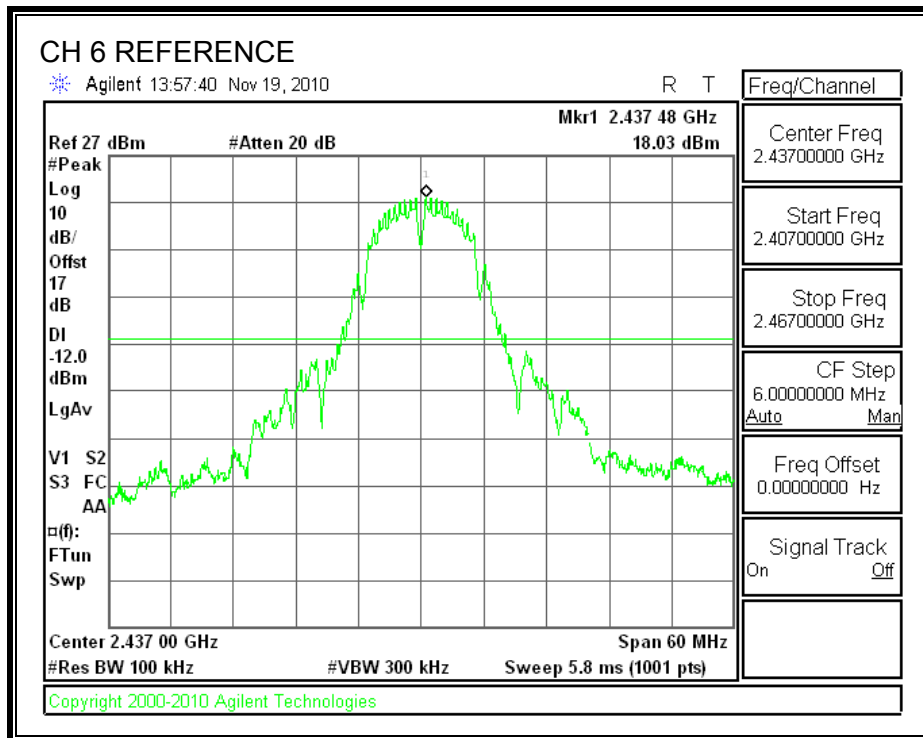
Note: channels 1 and 11 were tested at the power levels of channels 2 and 10 respectively, the power levels for CH2 and CH10 are higher than the power levels of CH1 and CH11; hence this is worst-case measurement.

RESULTS

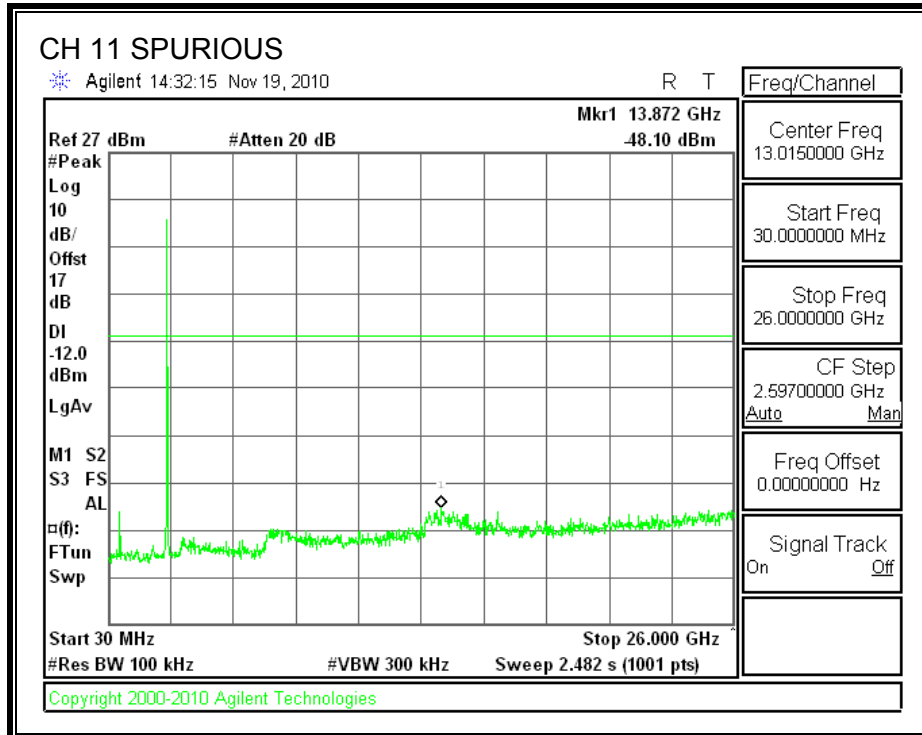
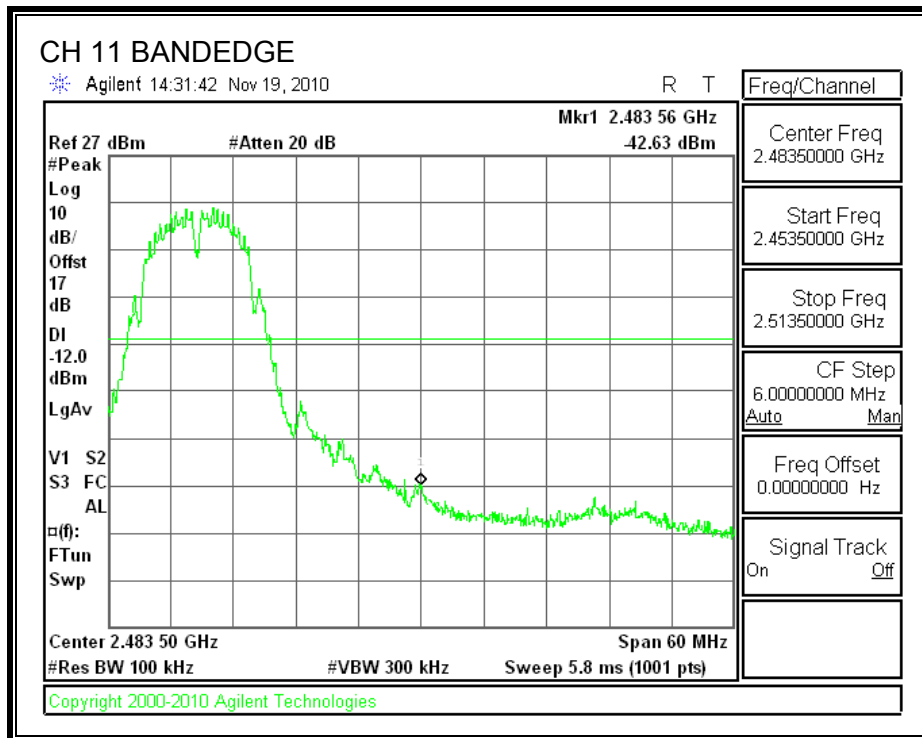
SPURIOUS EMISSIONS, CHANNEL 1



SPURIOUS EMISSIONS, CHANNEL 6



SPURIOUS EMISSIONS, CHANNEL 11



REACHED HERE IN MY REVIEW

7.2. 802.11g MODE IN THE 2.4 GHz BAND

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.

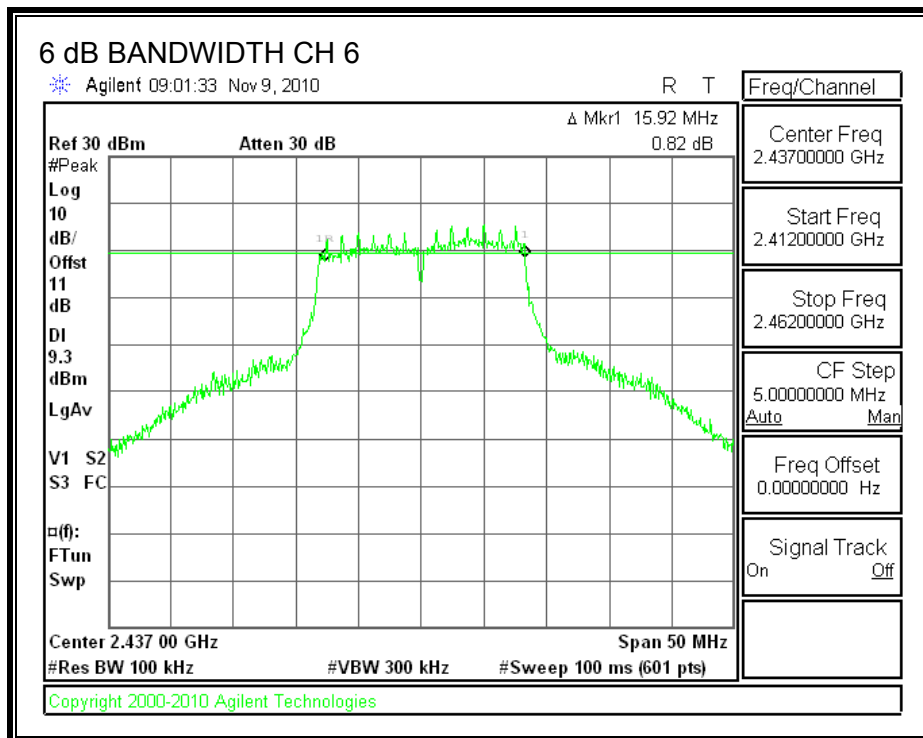
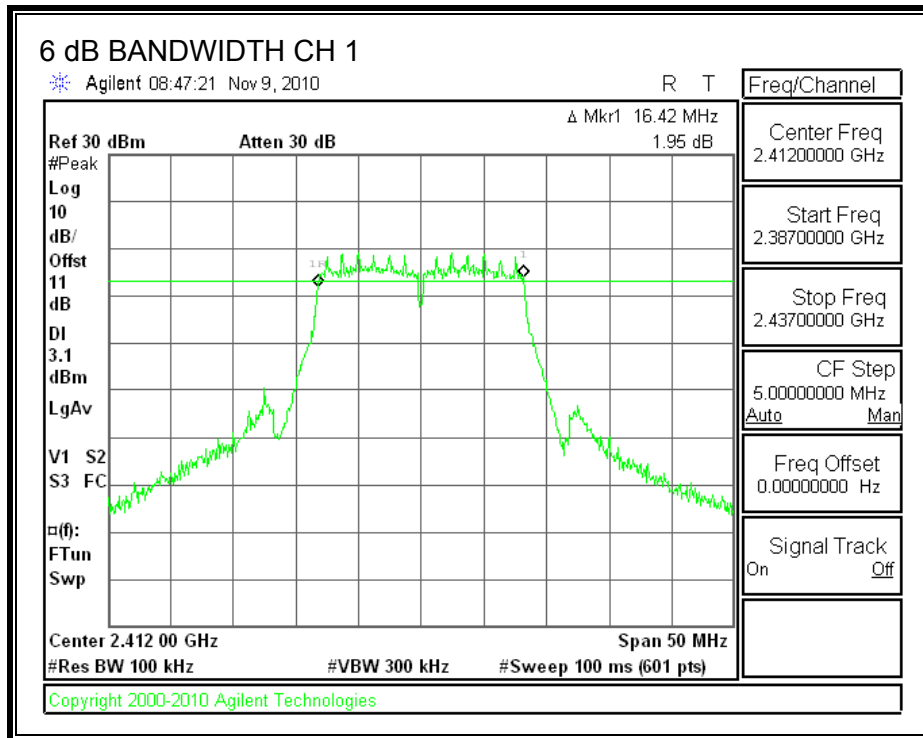
TEST PROCEDURE

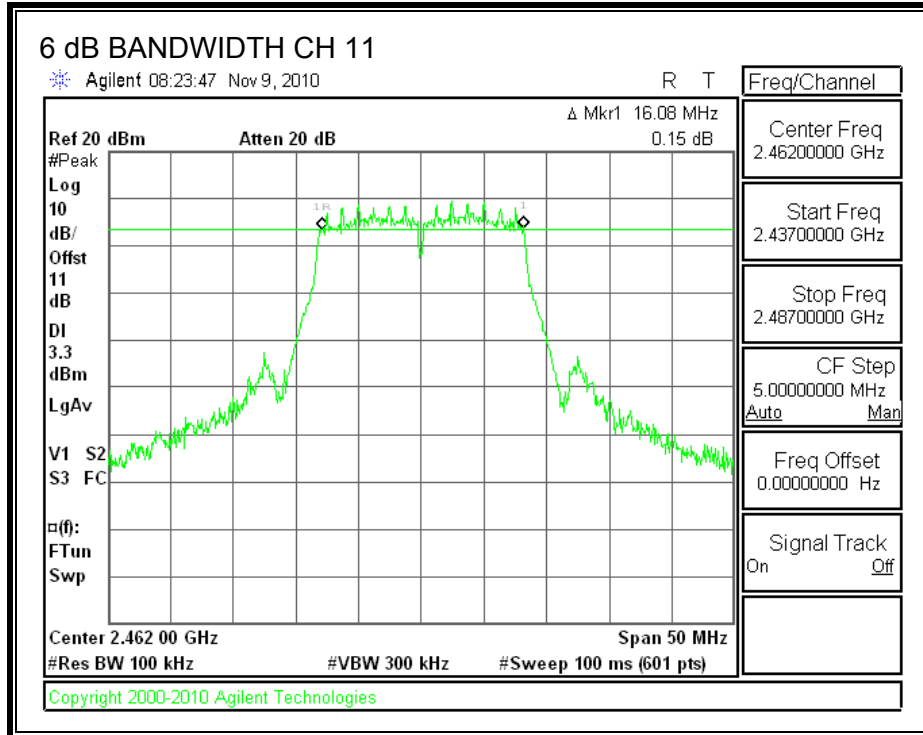
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
1	2412	16.42	0.5
6	2437	15.92	0.5
11	2462	16.08	0.5

6 dB BANDWIDTH





7.2.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

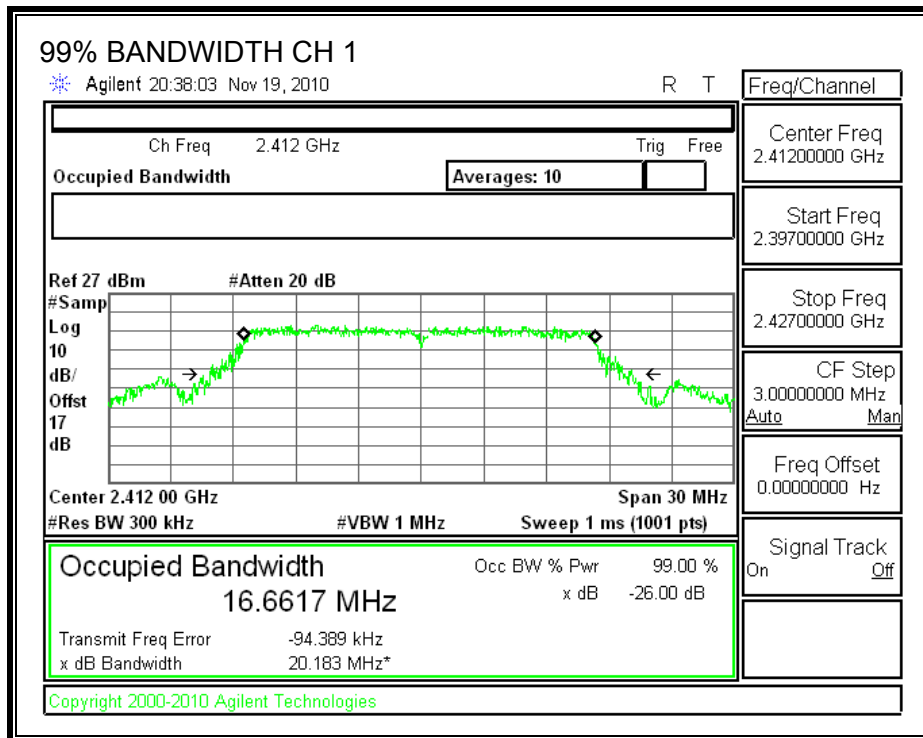
TEST PROCEDURE

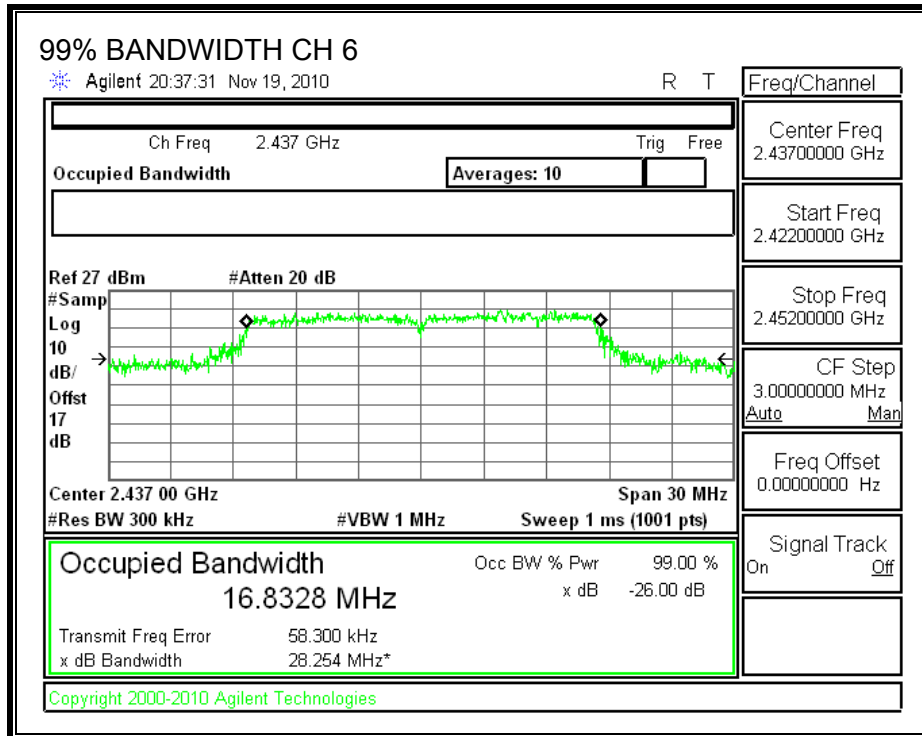
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

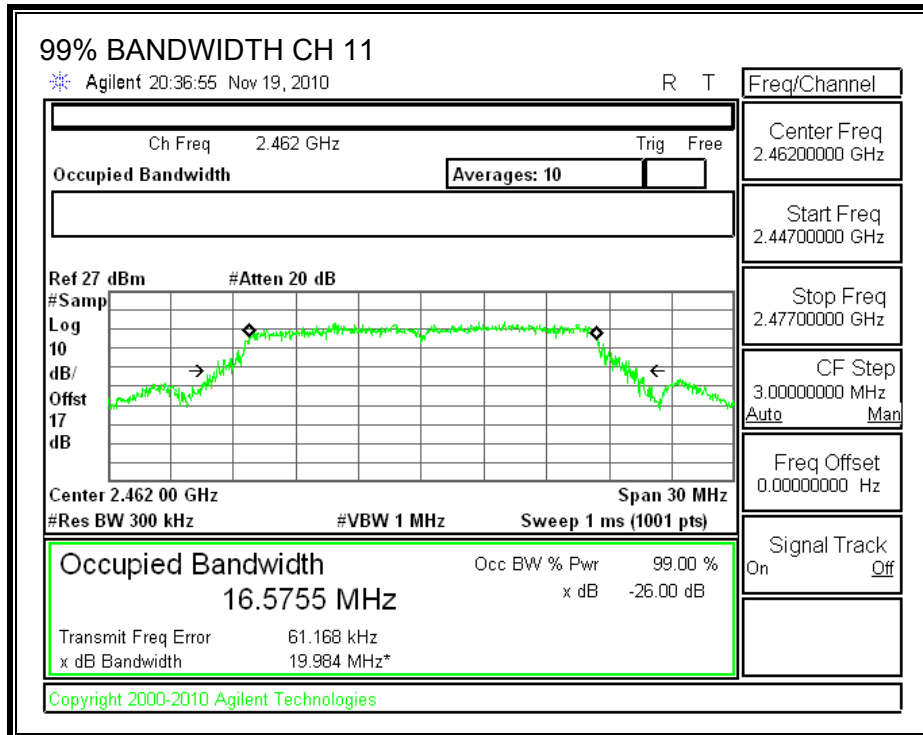
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
1	2412	16.6617
6	2437	16.8328
11	2462	16.5755

99% BANDWIDTH







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.

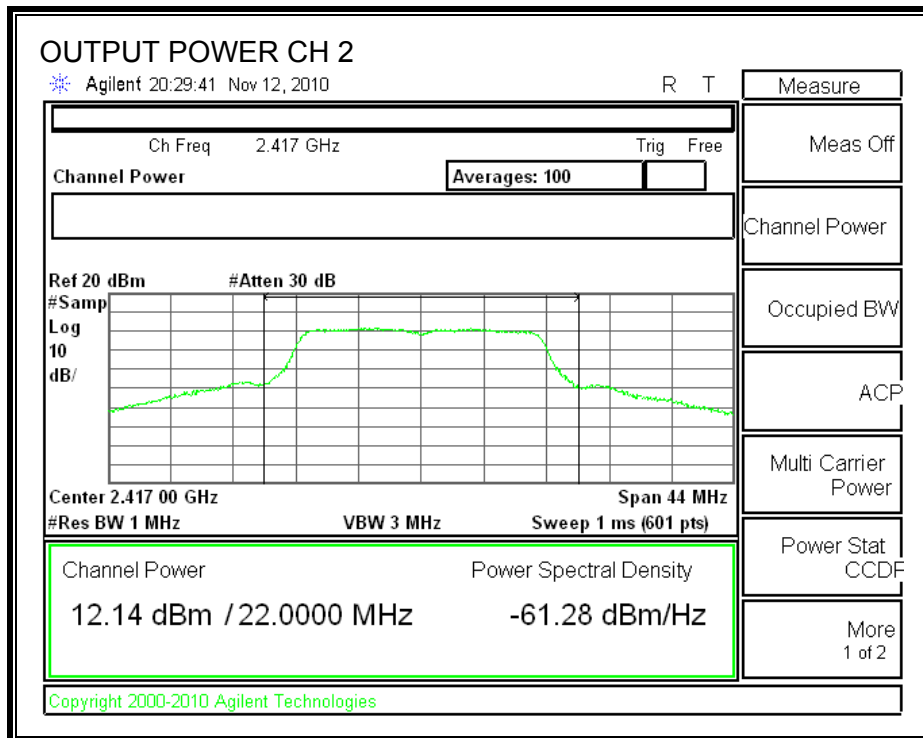
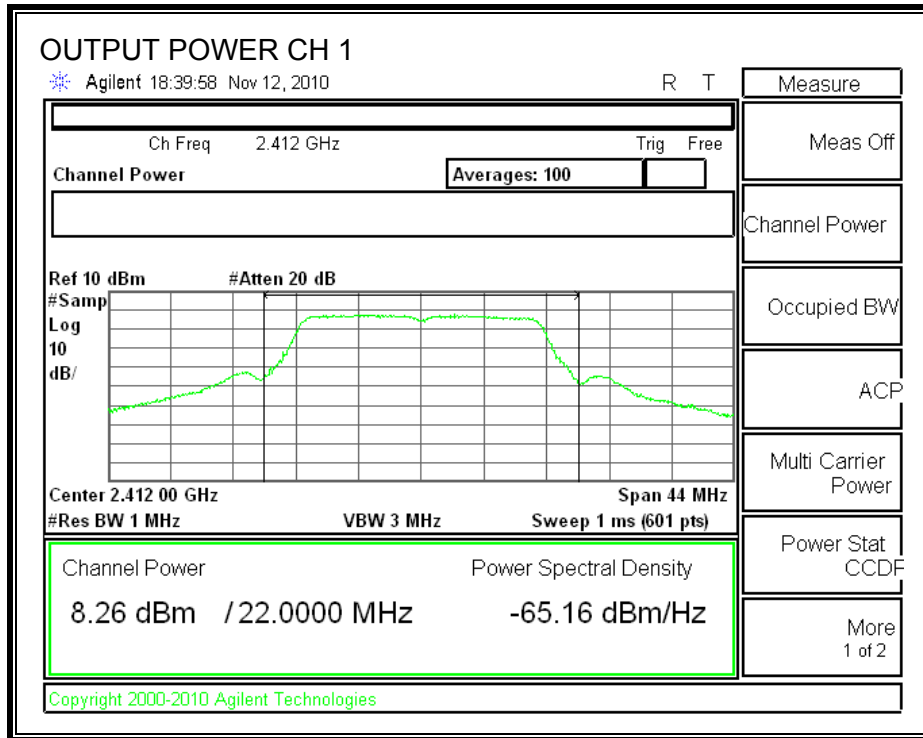
TEST PROCEDURE

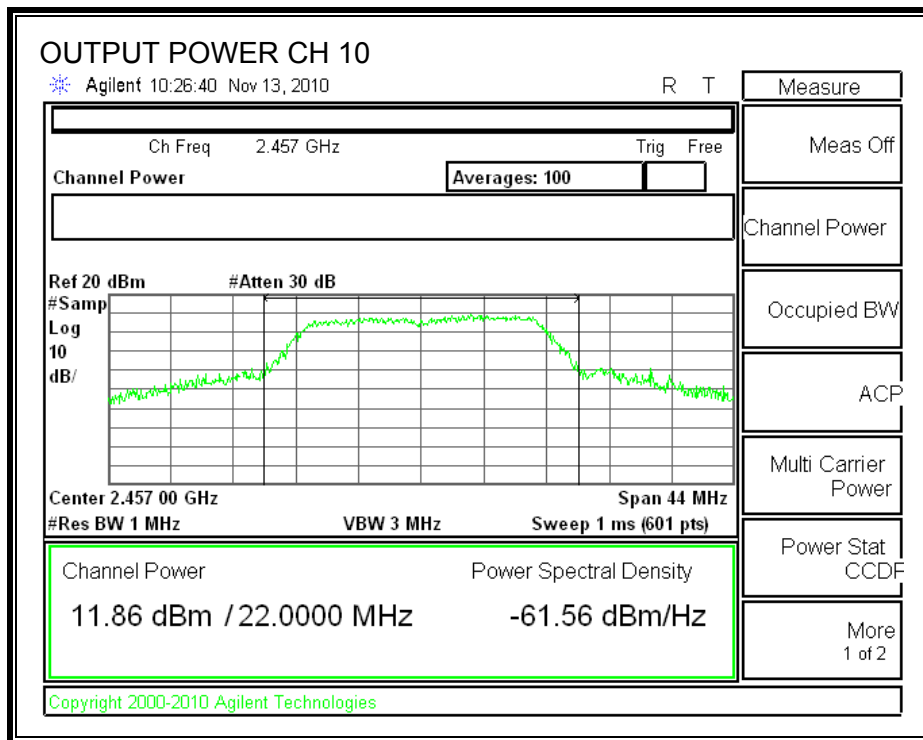
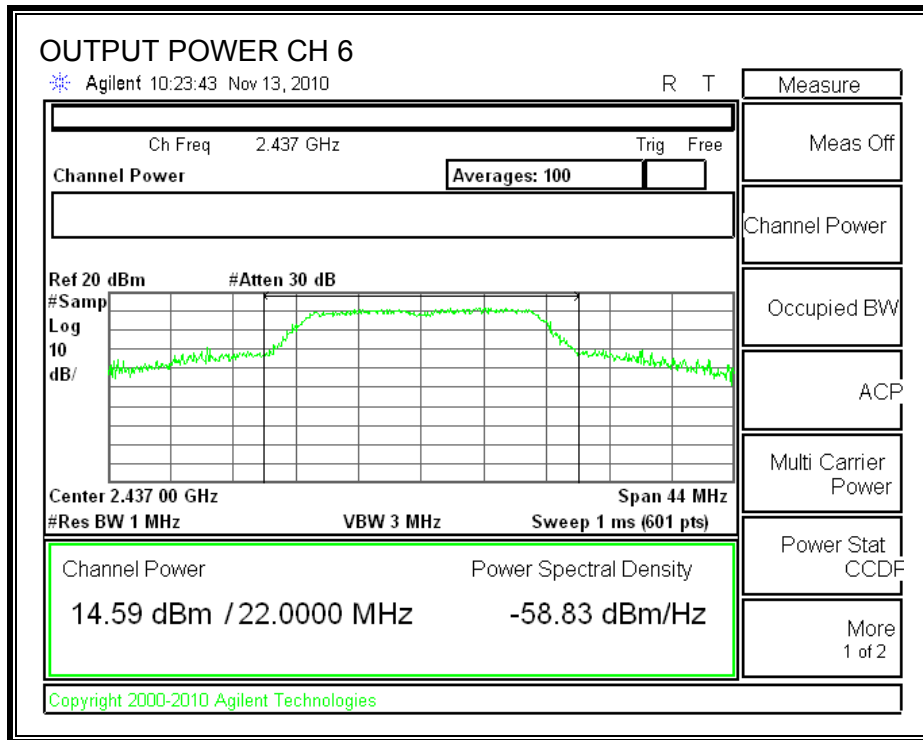
Output power was measured based on the use of RMS averaging over a time interval in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

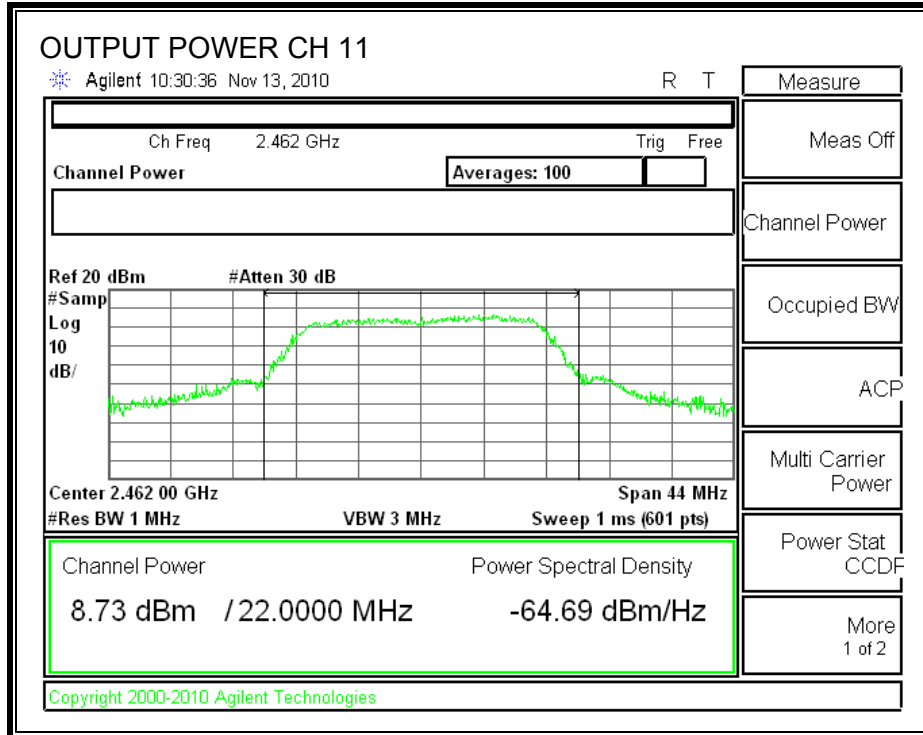
RESULTS FOR 6Mbps

Channel	Frequency (MHz)	Spectrum Analyzer Reading (dBm)	Attenuator and Cable Offset (dB)	Output Power (dBm)	Limit (dBm)	Margin (dB)
1	2412	8.26	11	19.26	30	-10.74
2	2417	12.14	11	23.14	30	-6.86
6	2437	14.59	11	25.59	30	-4.41
10	2457	11.86	11	22.86	30	-7.14
11	2462	8.73	11	19.73	30	-10.27

OUTPUT POWER 802.11g 6Mbps







7.2.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 11 (including 10 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

802.11 g 6Mbps

Channel	Frequency (MHz)	Power (dBm)
1	2412	19.445
2	2417	23.363
6	2437	25.314
10	2457	22.458
11	2462	19.395

7.2.5. 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.

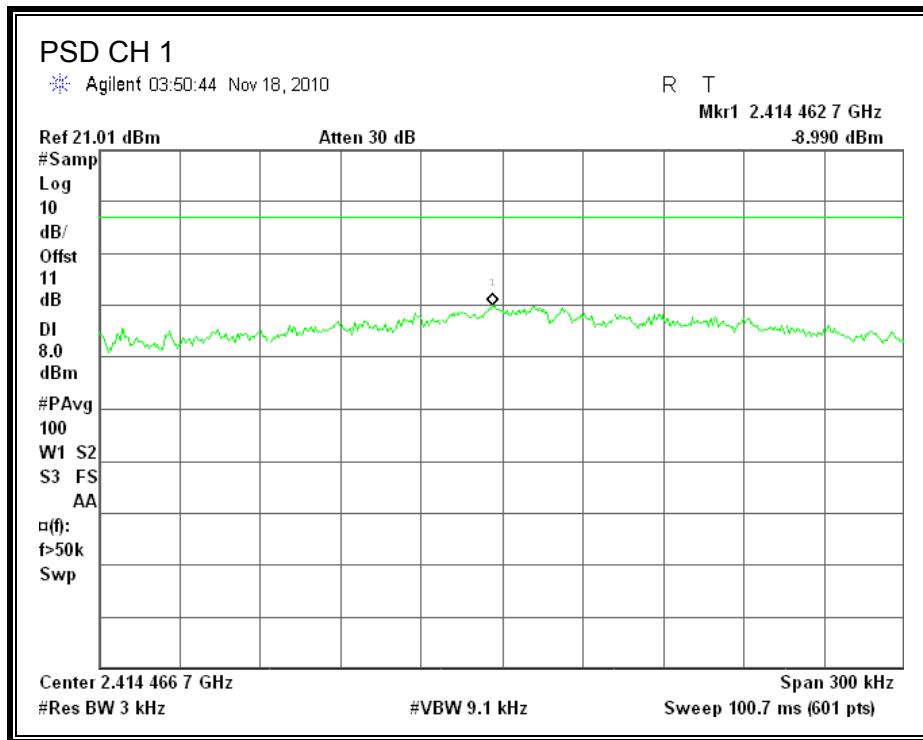
TEST PROCEDURE

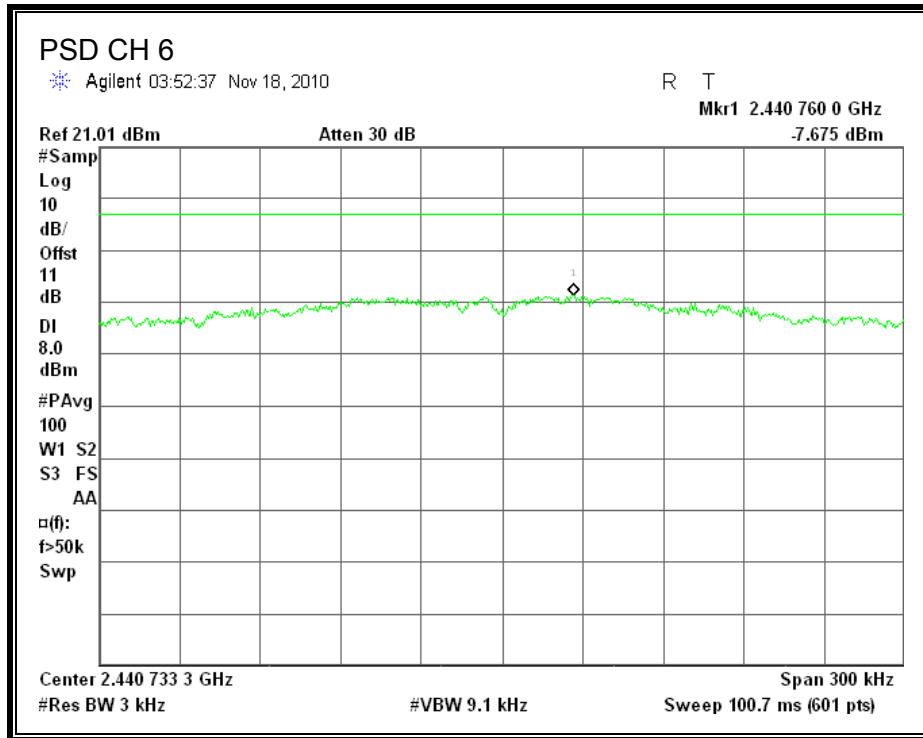
Output power was measured based on the use of RMS averaging over a time interval, therefore the power spectral density was measured using PSD Option 2 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

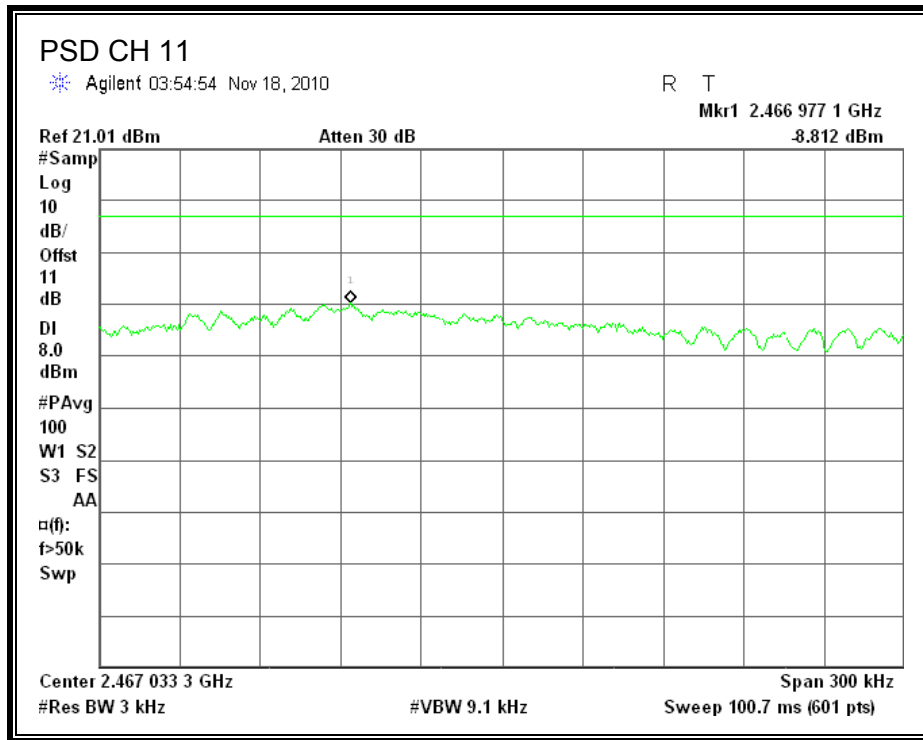
RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
1	2412	-8.990	8	-16.990
6	2437	-7.675	8	-15.675
11	2462	-8.812	8	-16.812

POWER SPECTRAL DENSITY







7.2.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Output power was measured based on the use of RMS averaging over a time interval, therefore the required attenuation is 30 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.

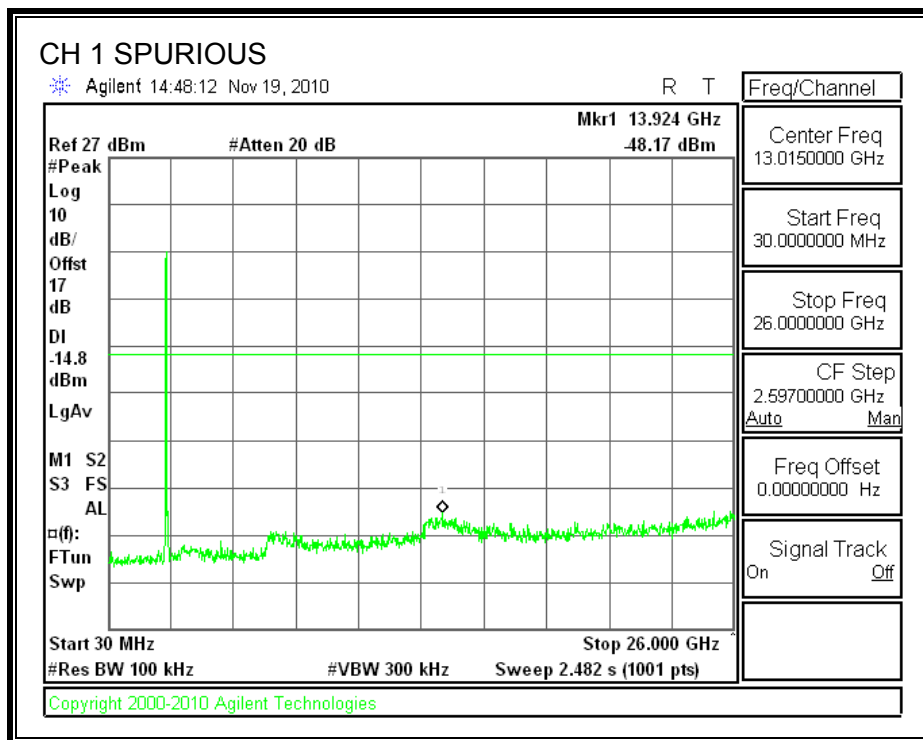
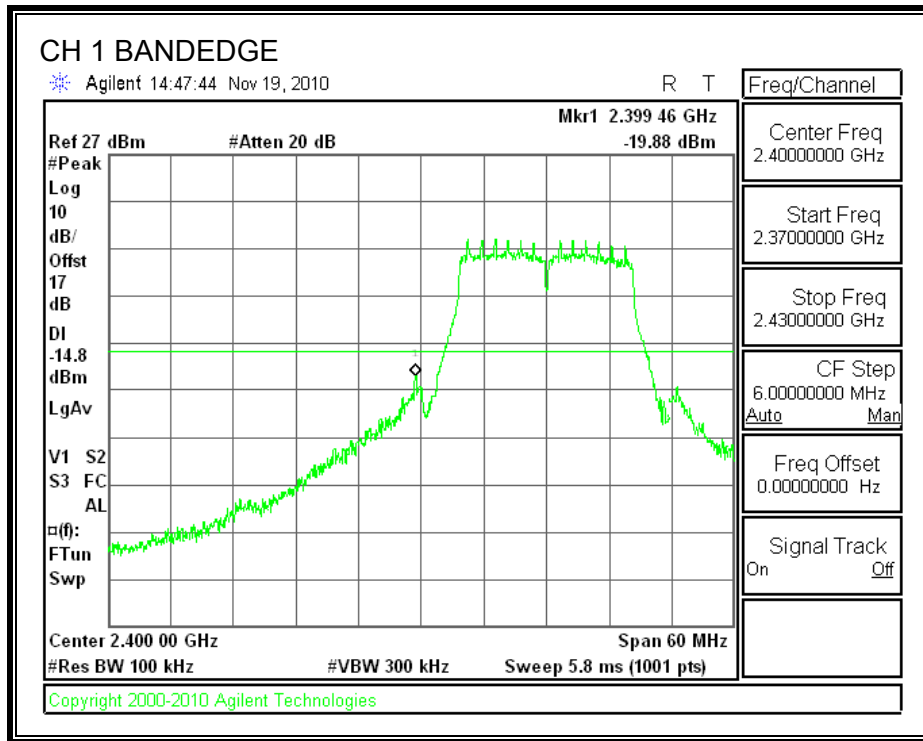
The EUT was set to transmit at mid channel, 30 dBc display line was set with reference to mid channel level.

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

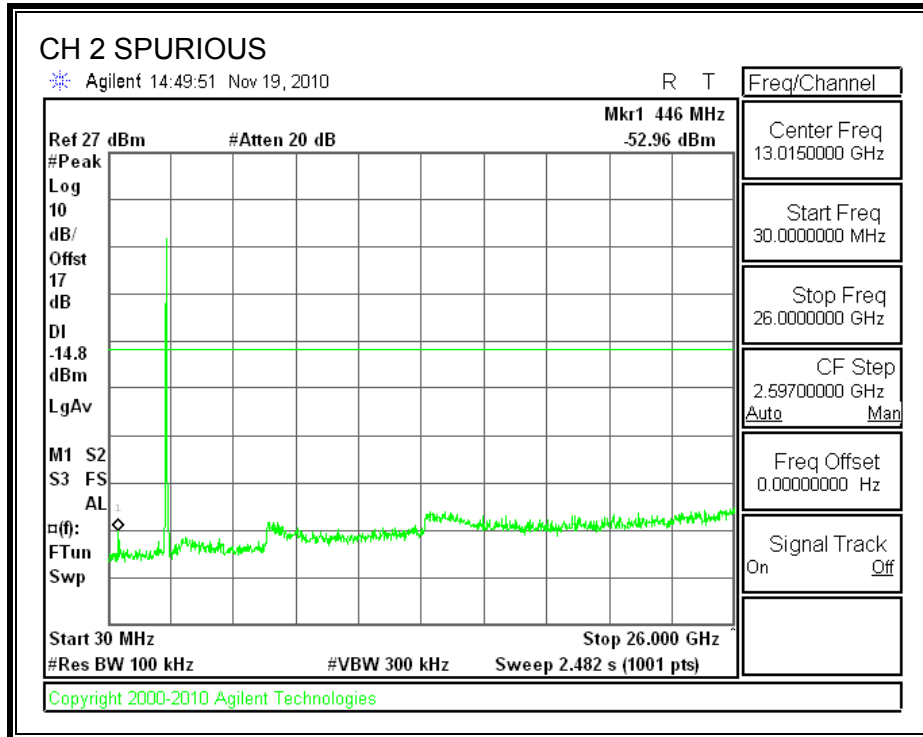
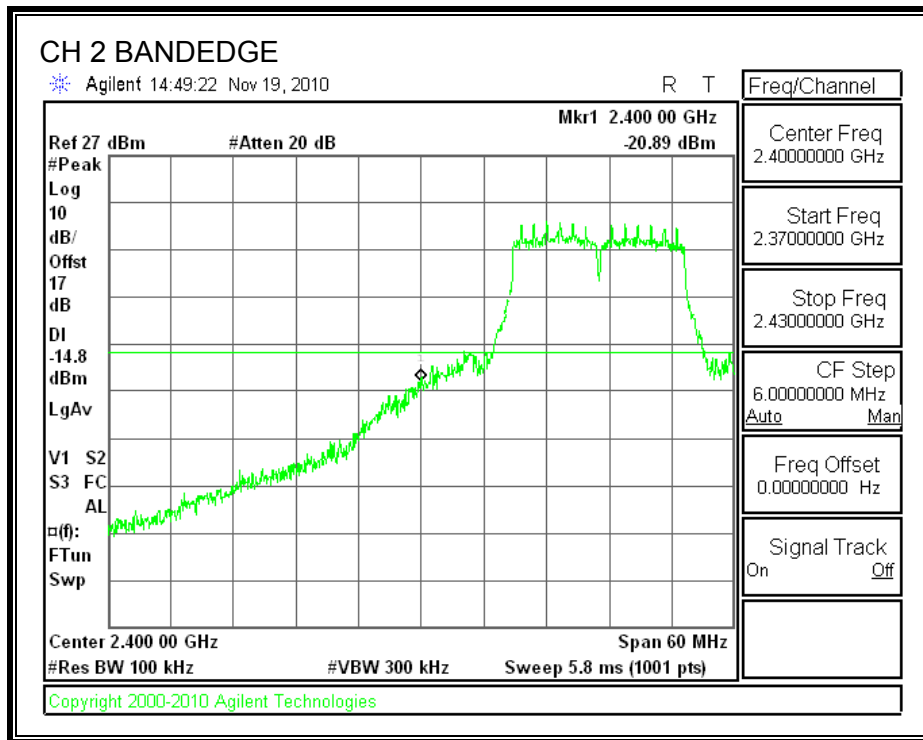
Note: channel 11 was tested at the power levels of channel 10, the power levels for CH10 is higher than the power levels of CH11; hence this is worst-case measurement.

RESULTS

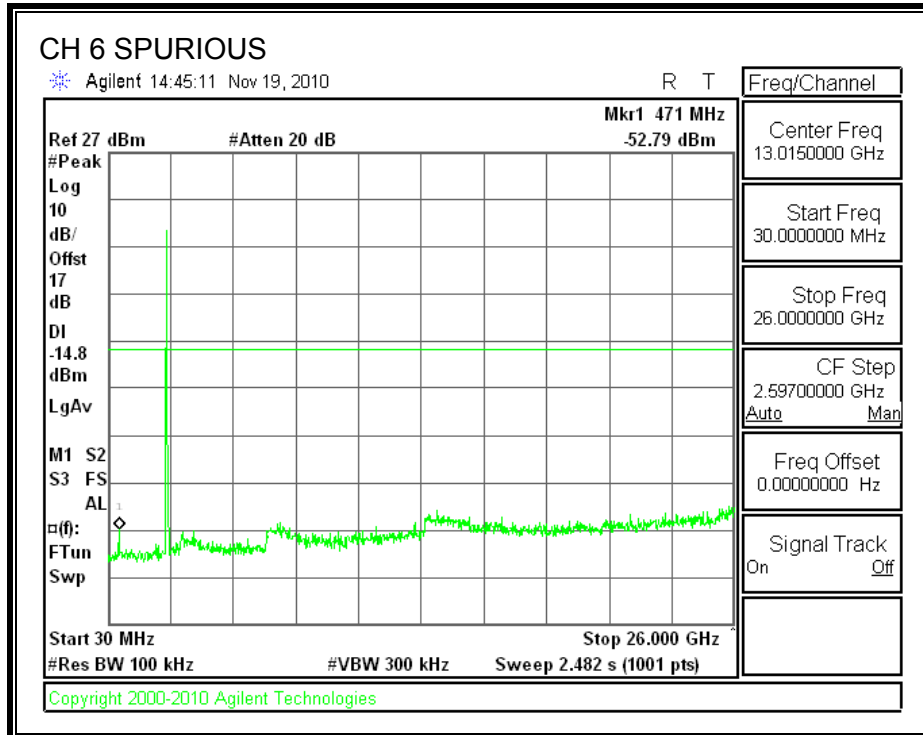
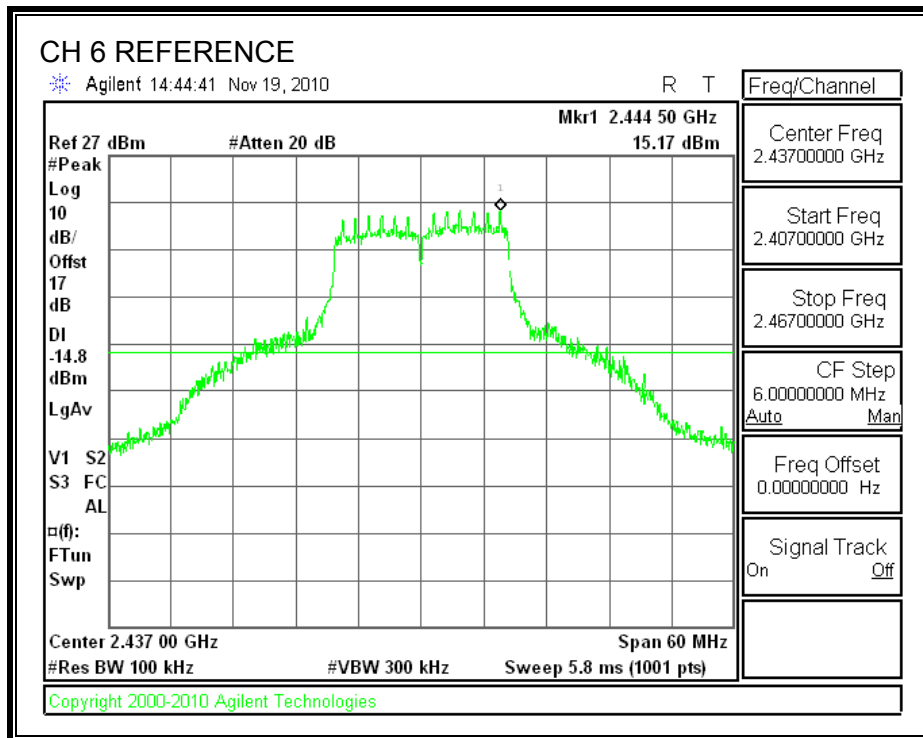
SPURIOUS EMISSIONS, CHANNEL 1



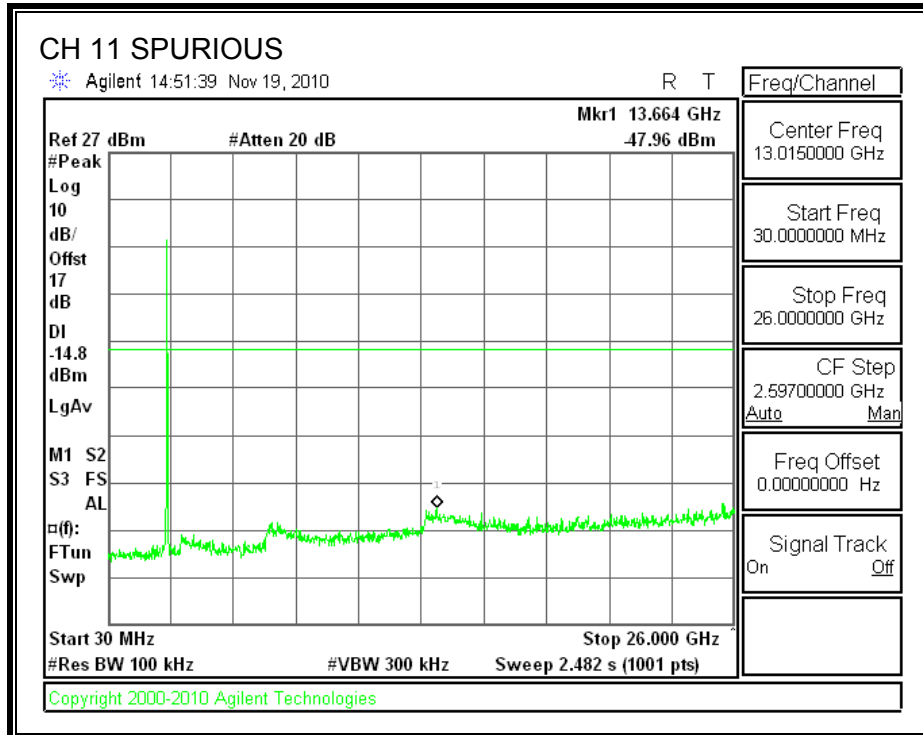
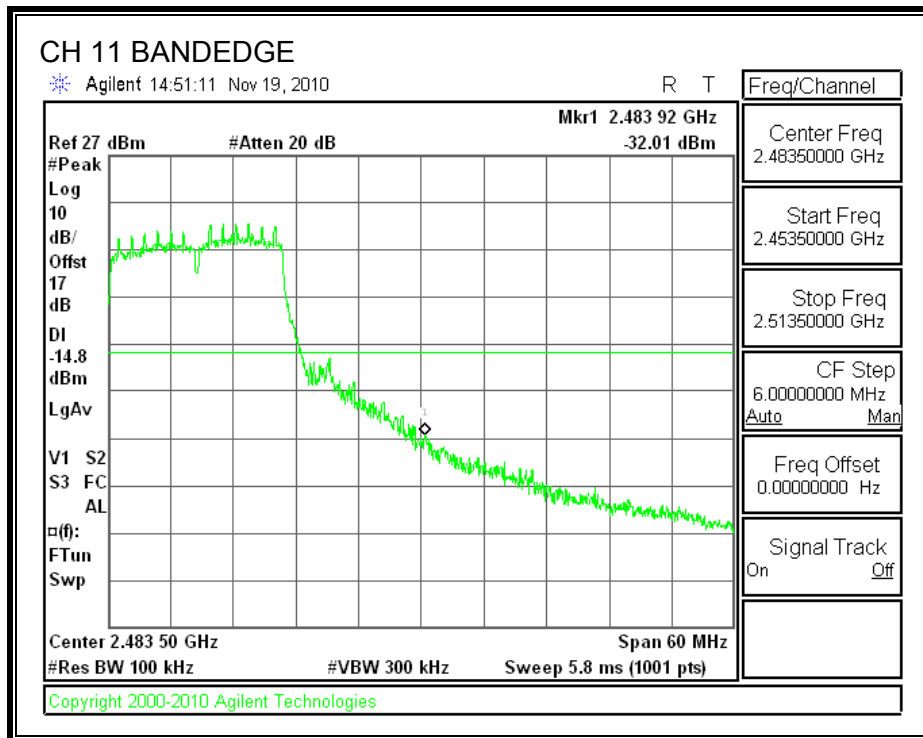
SPURIOUS EMISSIONS, CHANNEL 2



SPURIOUS EMISSIONS, CHANNEL 6



SPURIOUS EMISSIONS, CHANNEL 11



7.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND SINGLE CHAIN

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.

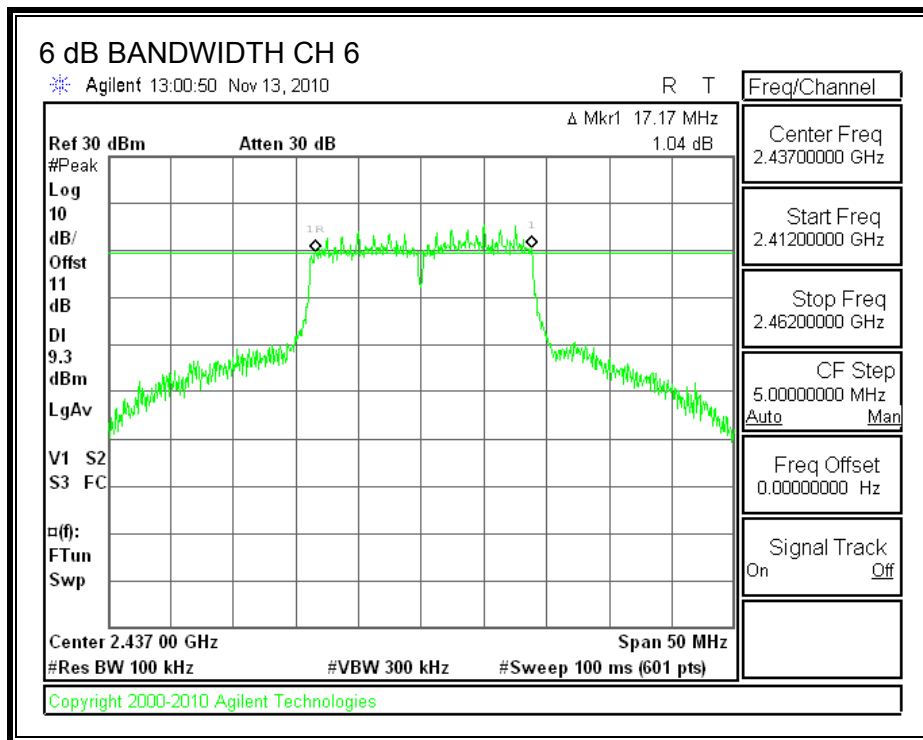
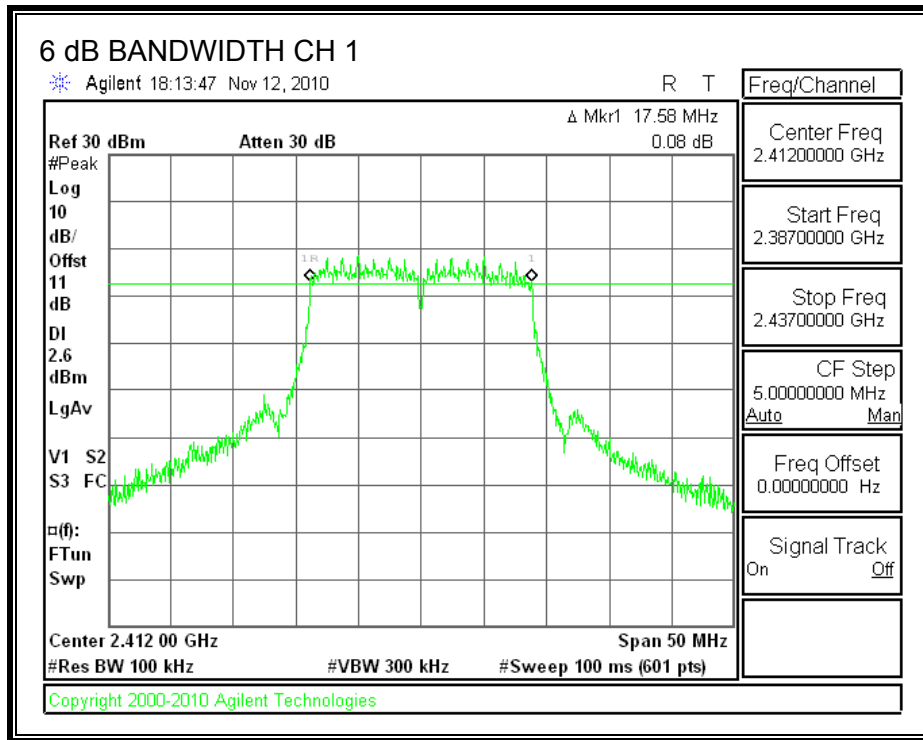
TEST PROCEDURE

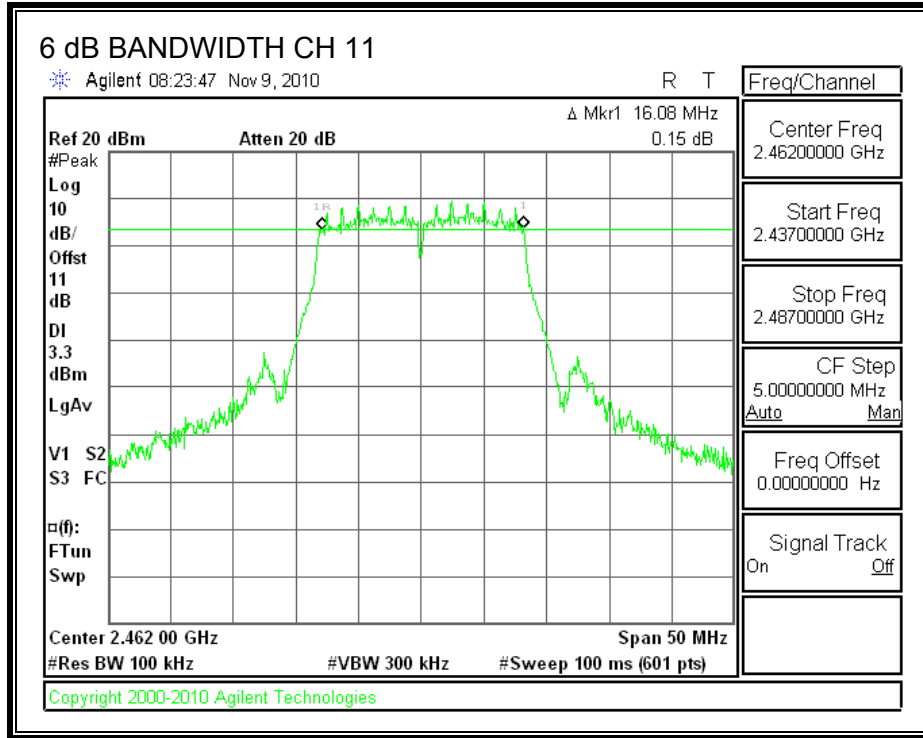
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
1	2412	17.58	0.5
6	2437	17.17	0.5
11	2462	16.08	0.5

6 dB BANDWIDTH





7.3.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

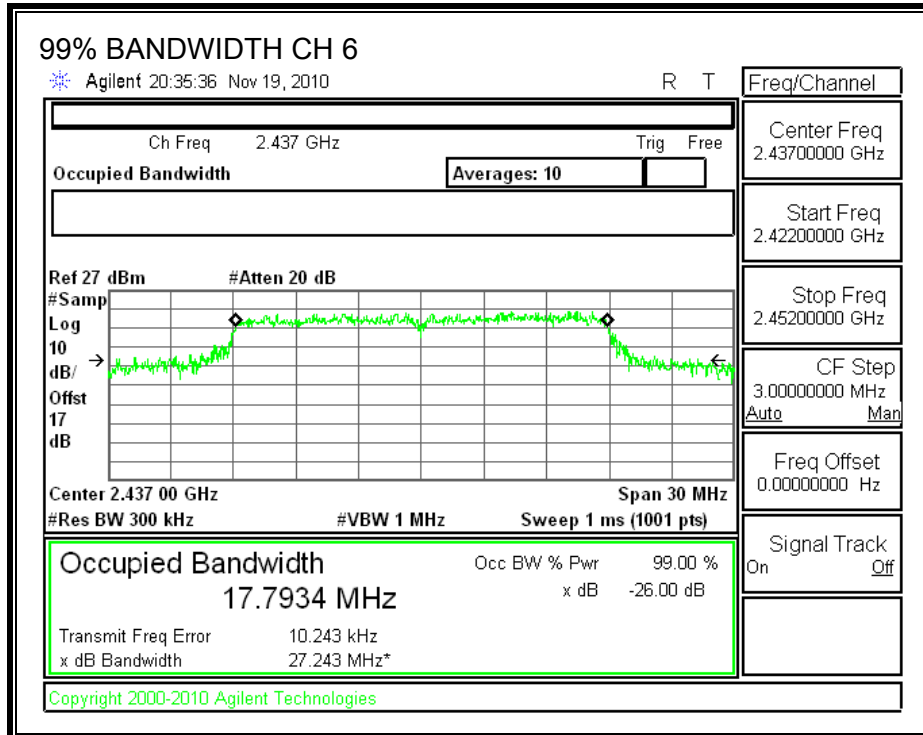
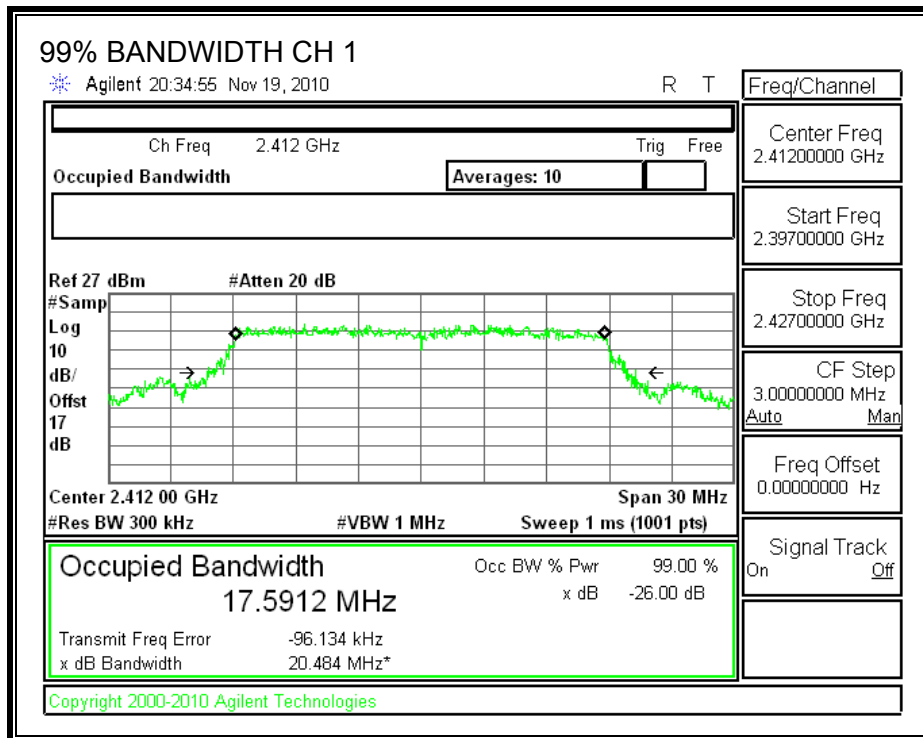
TEST PROCEDURE

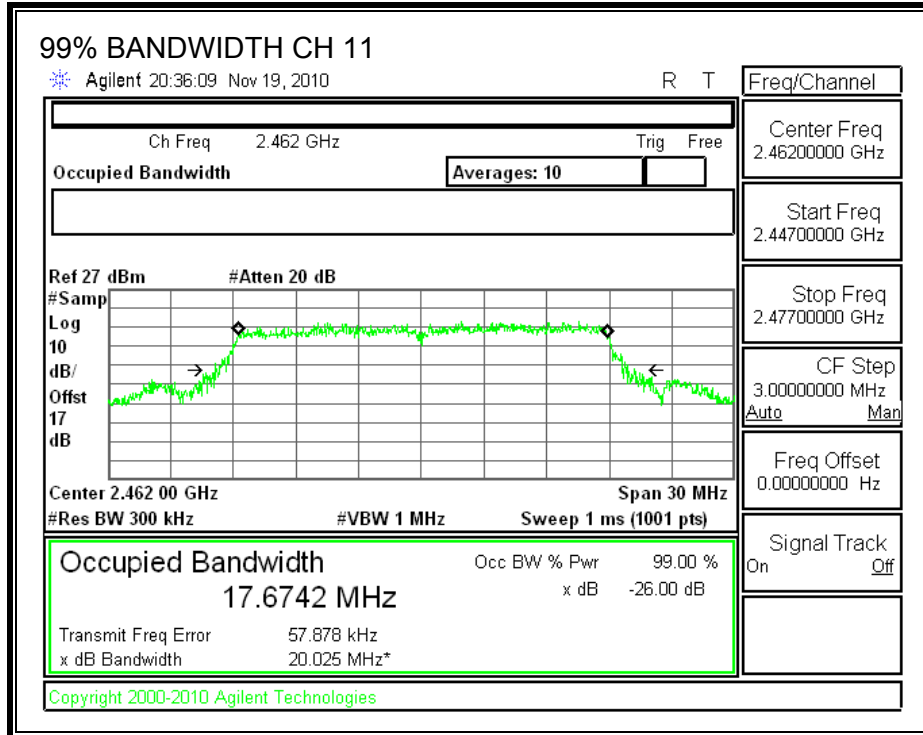
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
1	2412	17.5912
6	2437	17.7934
11	2462	17.6742

99% BANDWIDTH





7.3.3. 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.

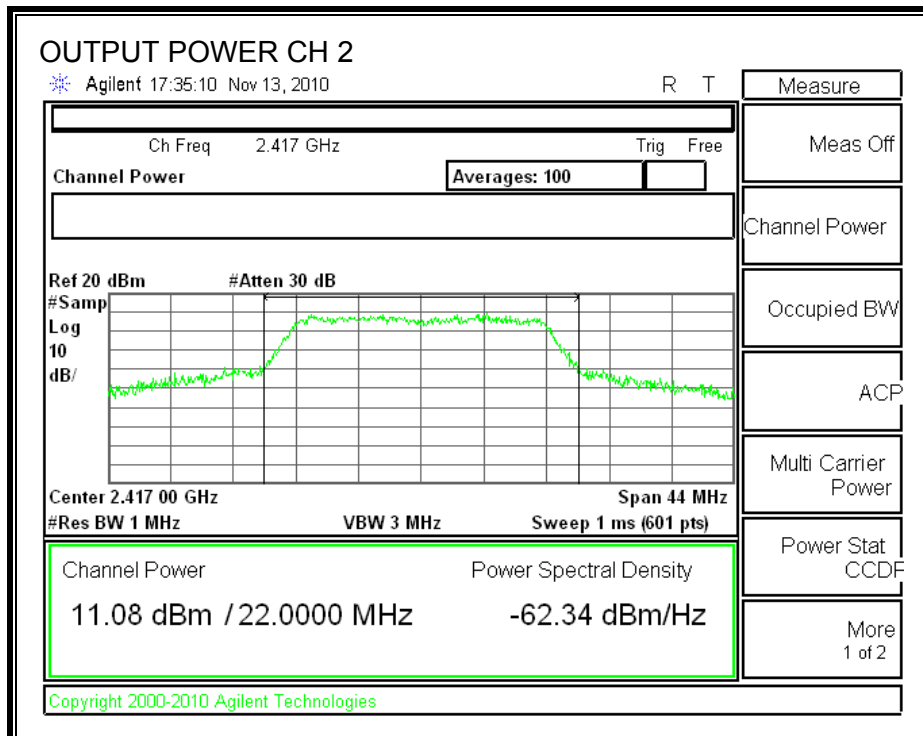
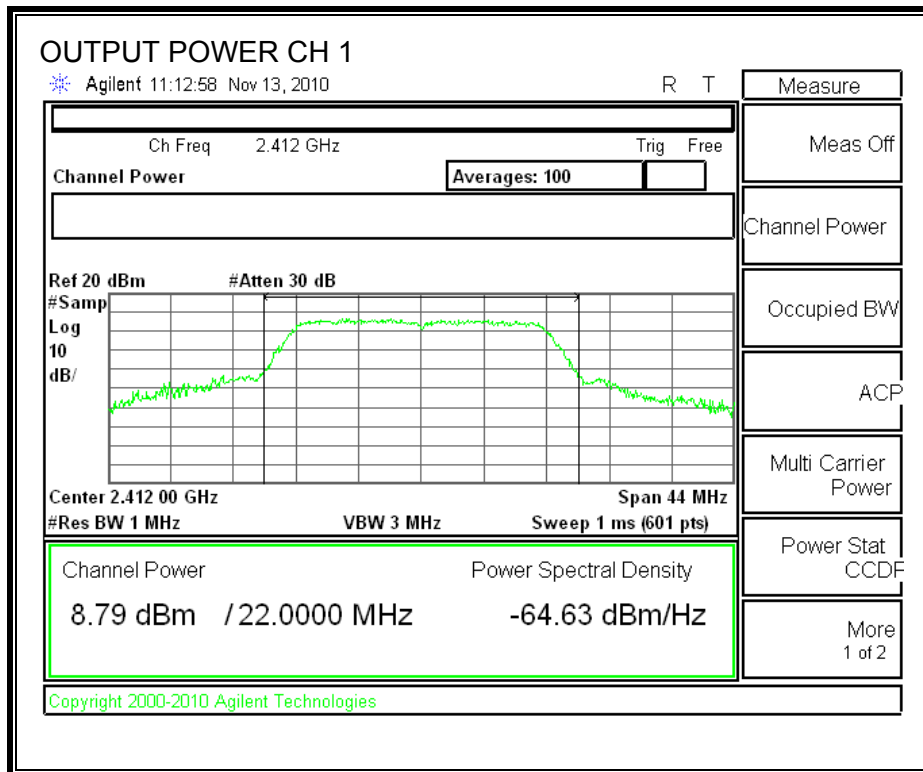
TEST PROCEDURE

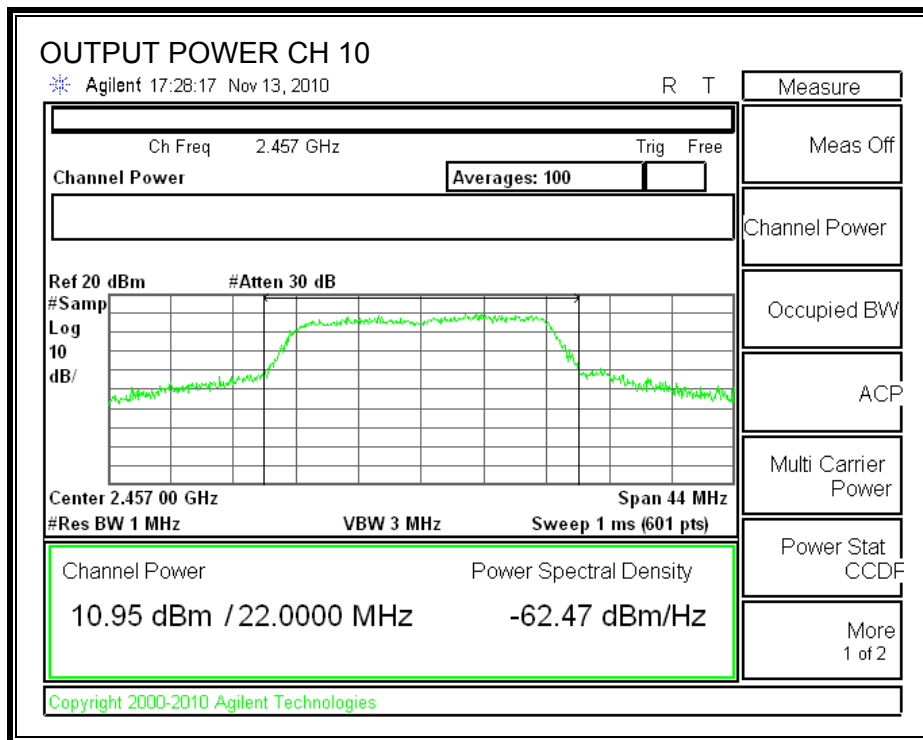
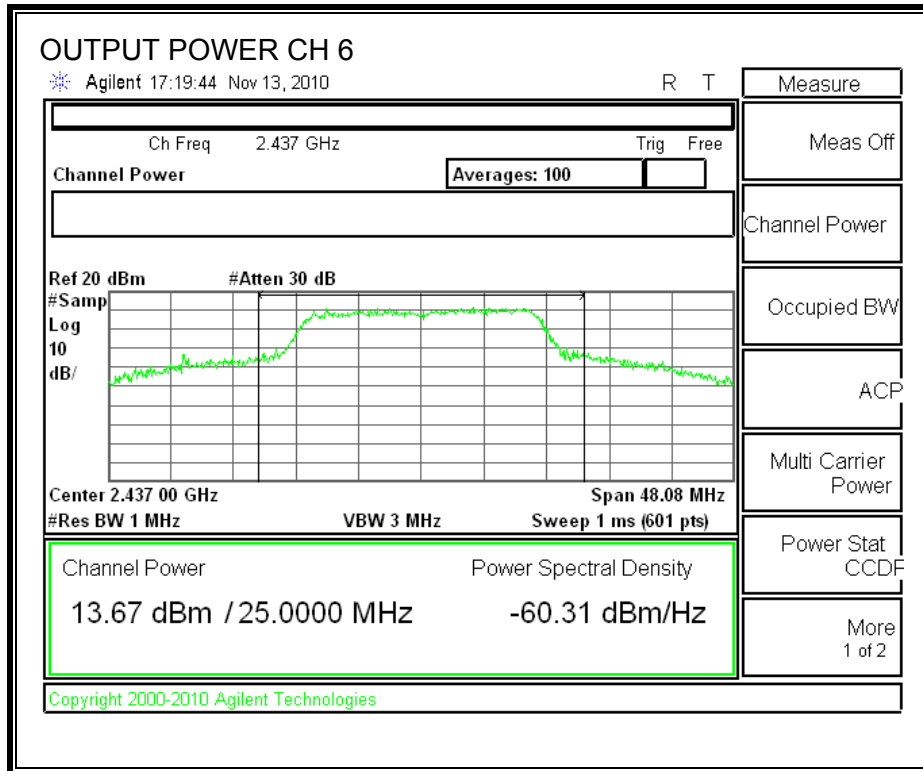
Output power was measured based on the use of RMS averaging over a time interval in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

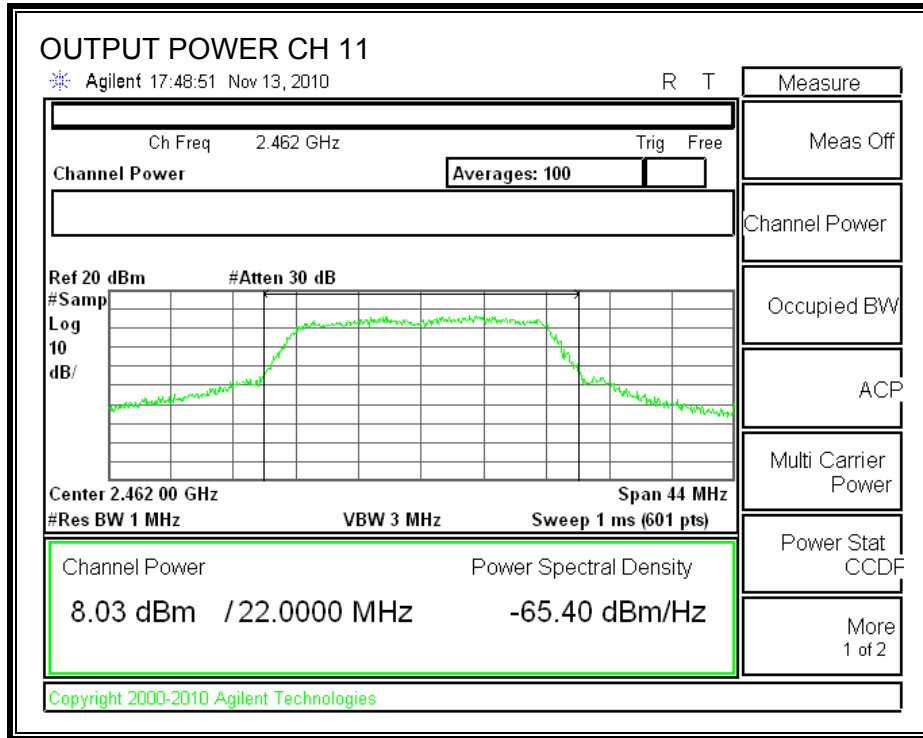
RESULTS

Channel	Frequency (MHz)	Limit (dBm)	Power (dBm)	Attenuator + Cable Offset (dB)	Total Power (dBm)	Margin (dB)
1	2412	30.00	8.79	11.00	19.79	-10.21
2	2417	30.00	11.08	11.00	22.08	-7.92
6	2437	30.00	13.67	11.00	24.67	-5.33
10	2457	30.00	10.95	11.00	21.95	-8.05
11	2462	30.00	8.03	11.00	19.03	-10.97

OUTPUT POWER







7.3.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 11.3 dB (including 10 dB pad and 1.3dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Power (dBm)
1	2412	19.435
2	2417	22.198
6	2437	24.817
10	2457	21.892
11	2462	19.066

7.3.5. 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.

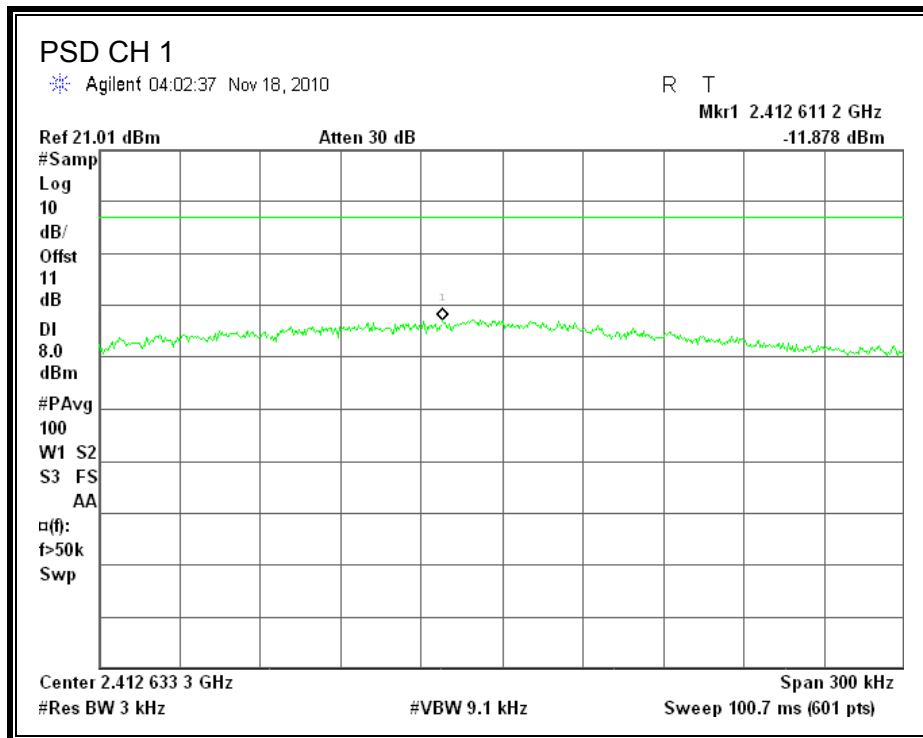
TEST PROCEDURE

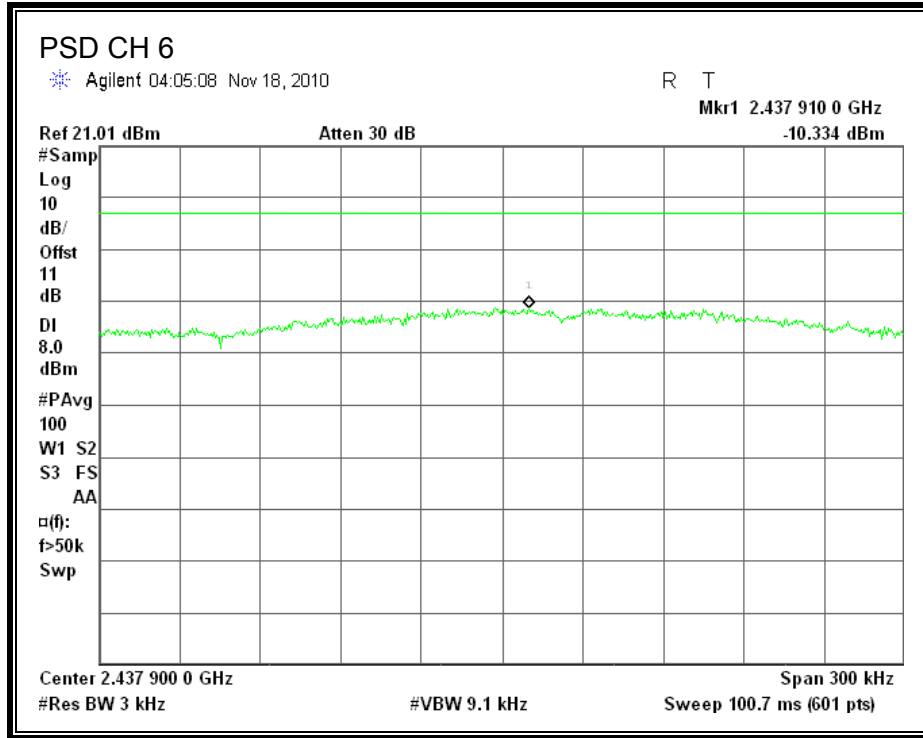
Output power was measured based on the use of RMS averaging over a time interval, therefore the power spectral density was measured using PSD Option 2 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

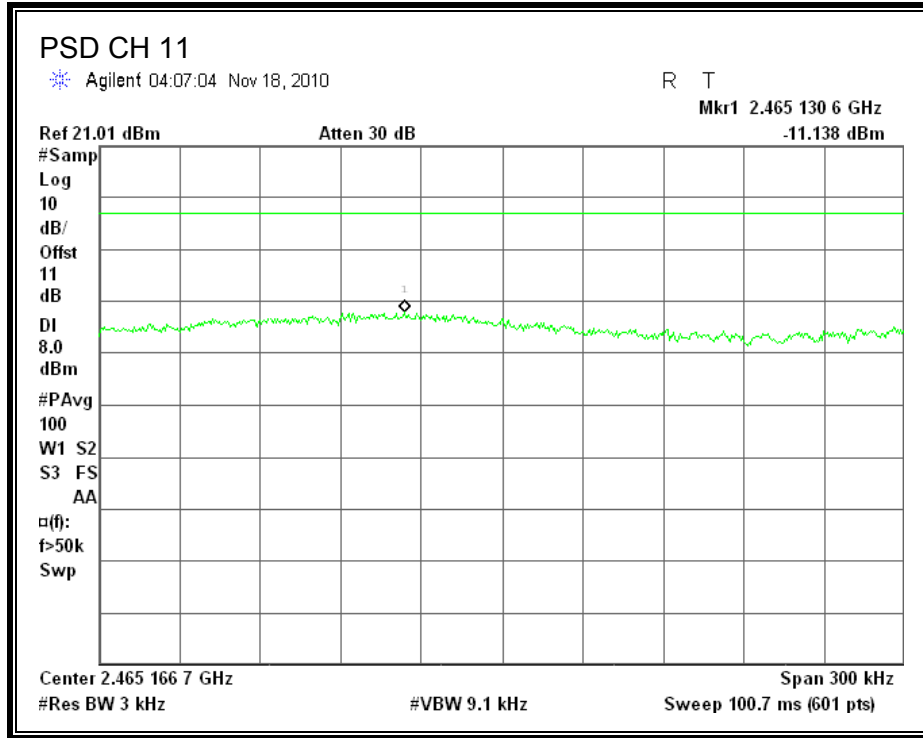
RESULTS

Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Margin (dB)
1	2412	-11.878	8	-19.88
6	2437	-10.334	8	-18.33
11	2462	-11.138	8	-19.14

POWER SPECTRAL DENSITY







7.3.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Output power was measured based on the use of RMS averaging over a time interval, therefore the required attenuation is 30 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.

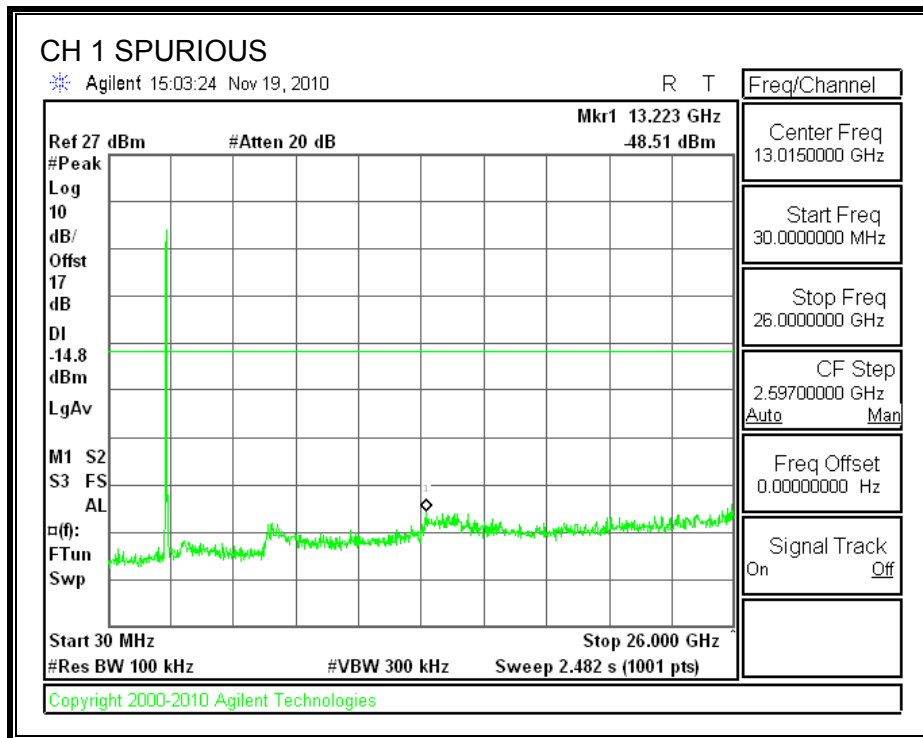
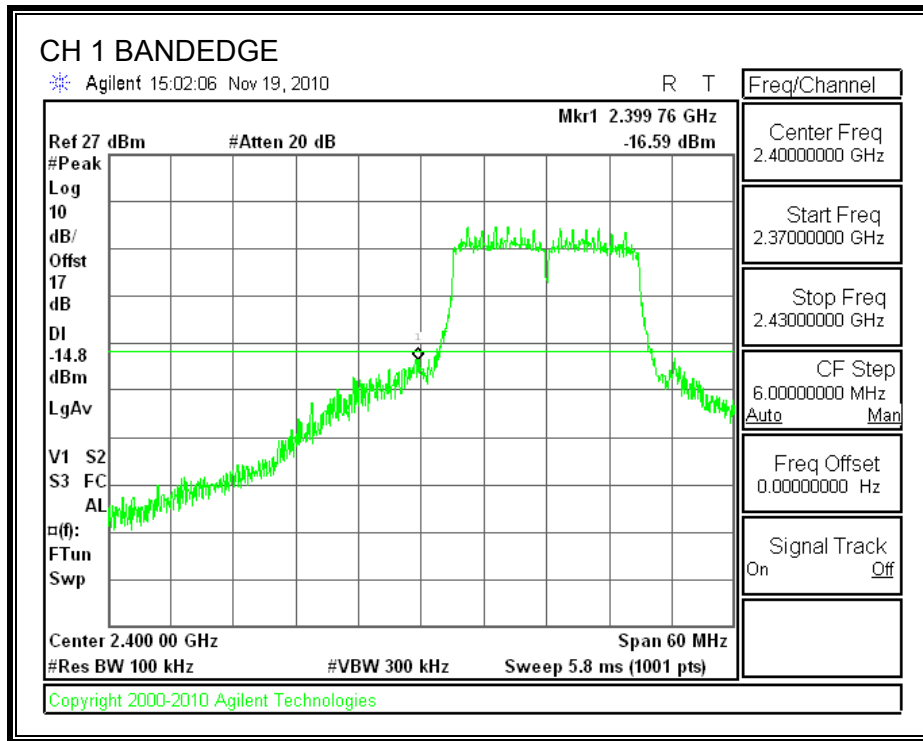
The EUT was set to transmit at mid channel, 30 dBc display line was set with reference to mid channel level.

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

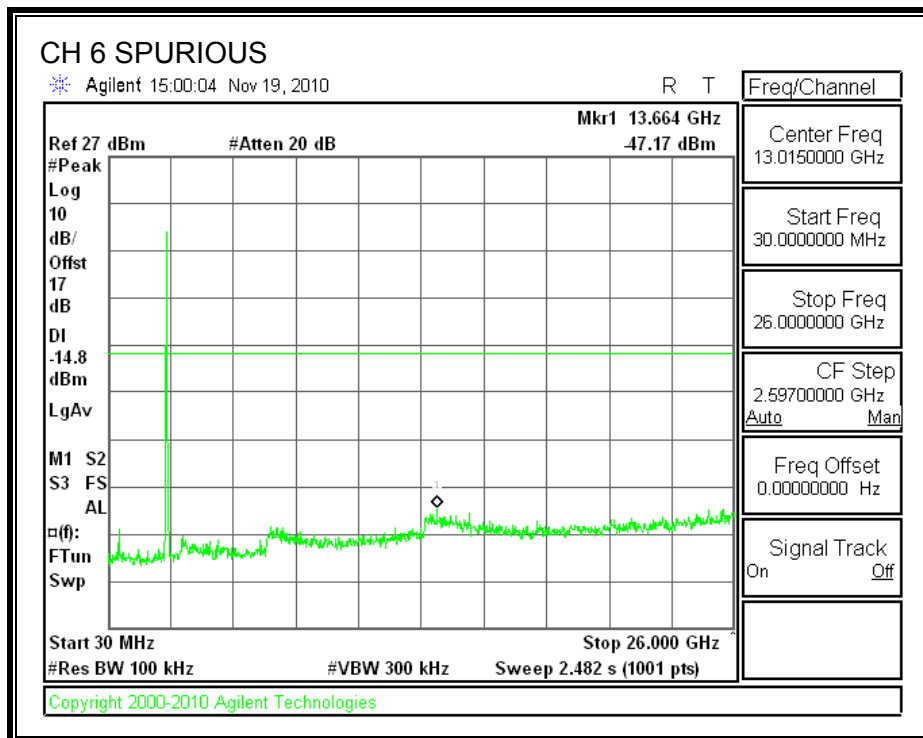
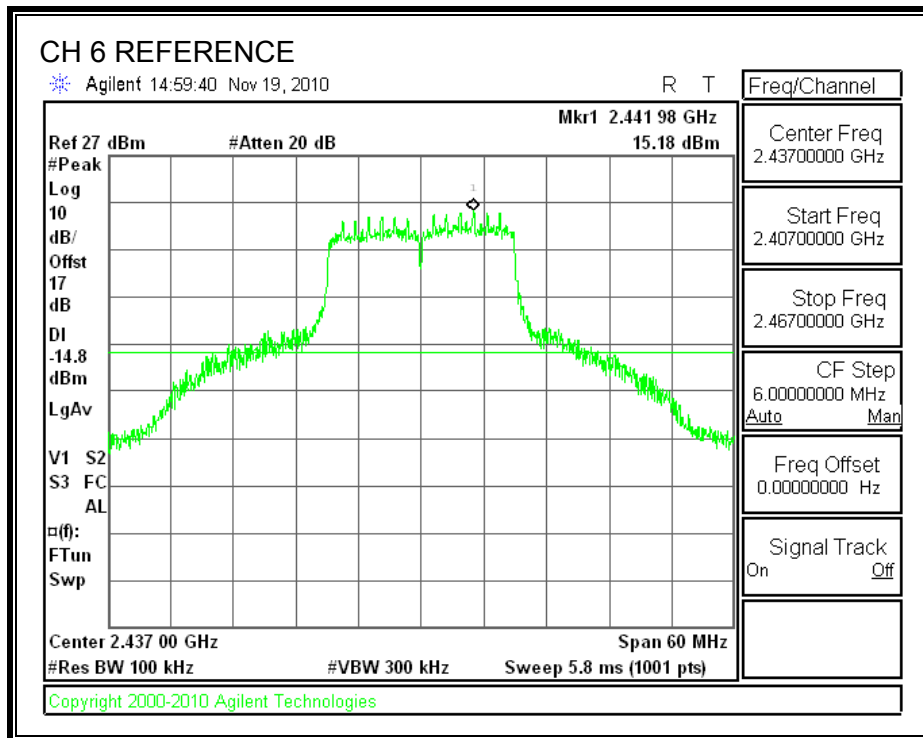
Note: channels 1 and 11 were tested at the power levels of channels 2 and 10 respectively, the power levels for CH2 and CH10 are higher than the power levels of CH1 and CH11; hence this is worst-case measurement.

RESULTS

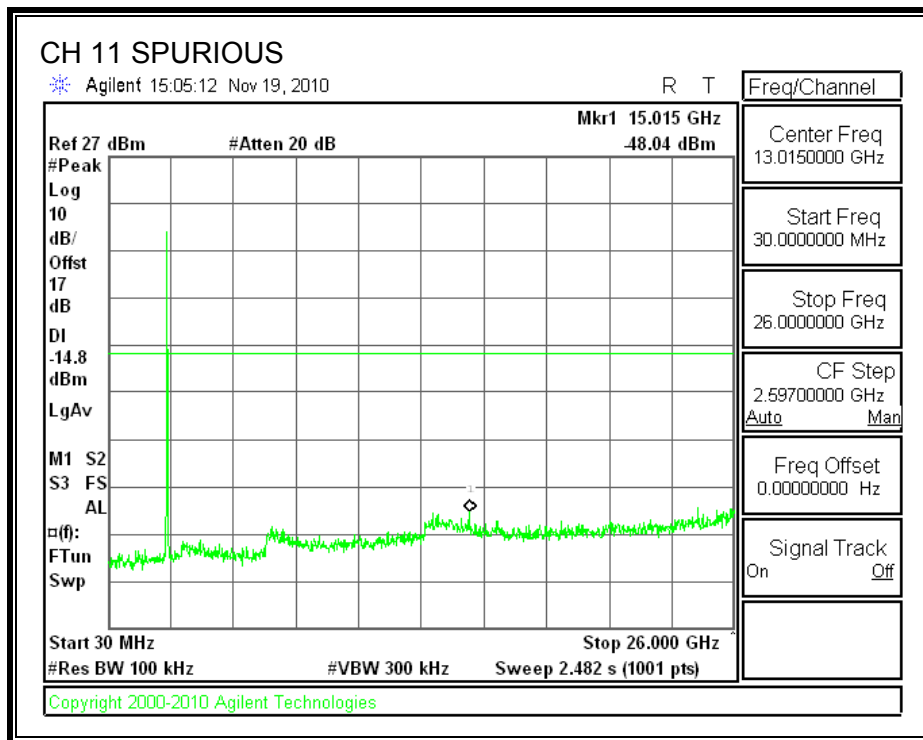
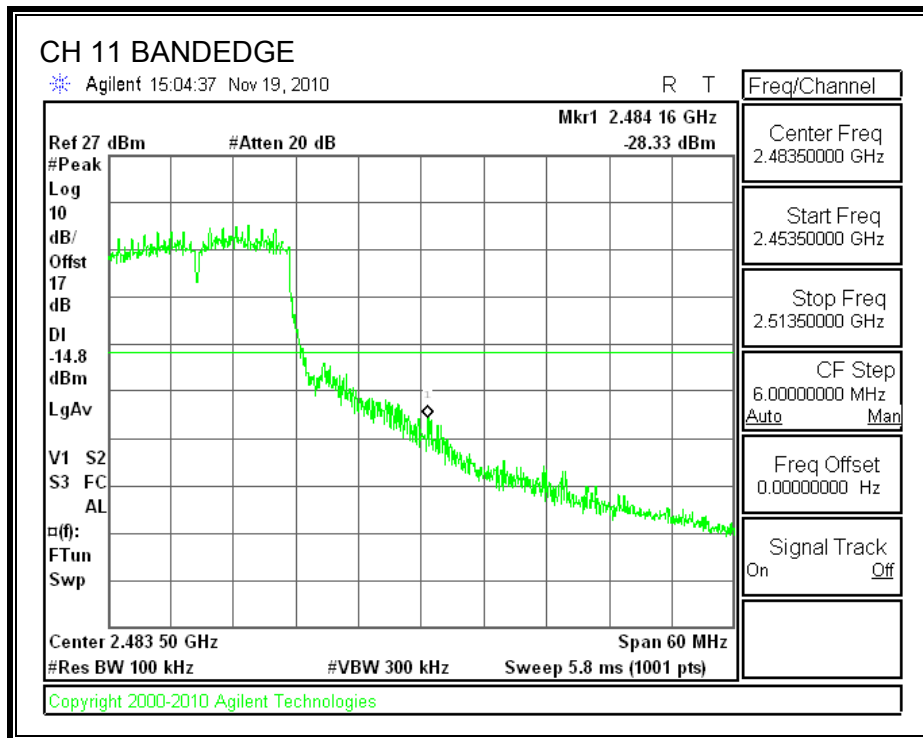
SPURIOUS EMISSIONS, CHANNEL 1



SPURIOUS EMISSIONS, CHANNEL 6



SPURIOUS EMISSIONS, CHANNEL 11



7.4. 802.11n HT20 MODE IN THE 2.4 GHz BAND DUAL CHAIN

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.

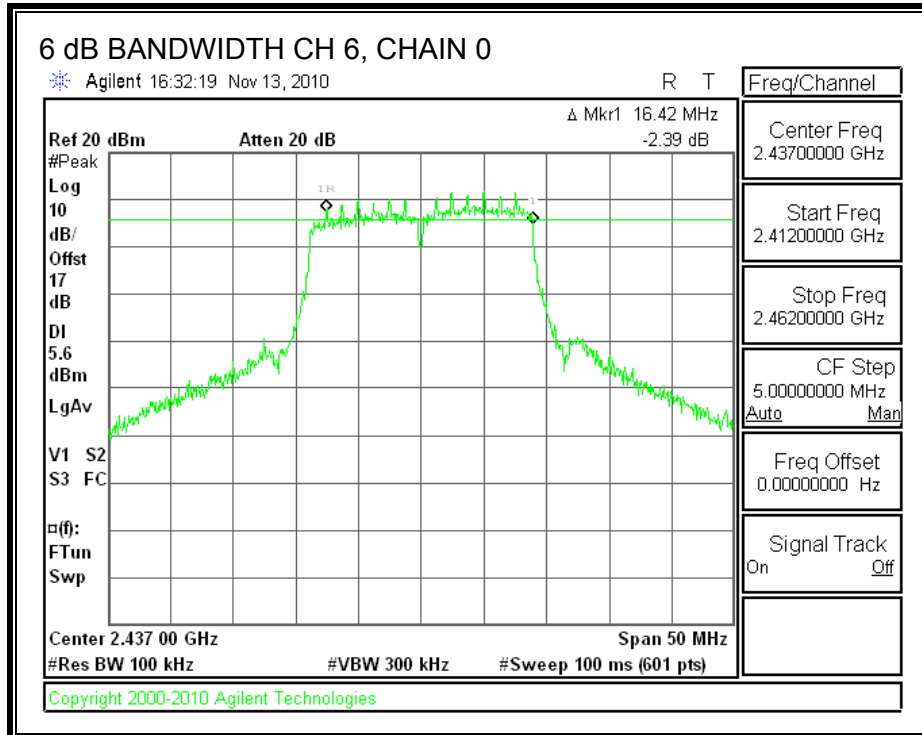
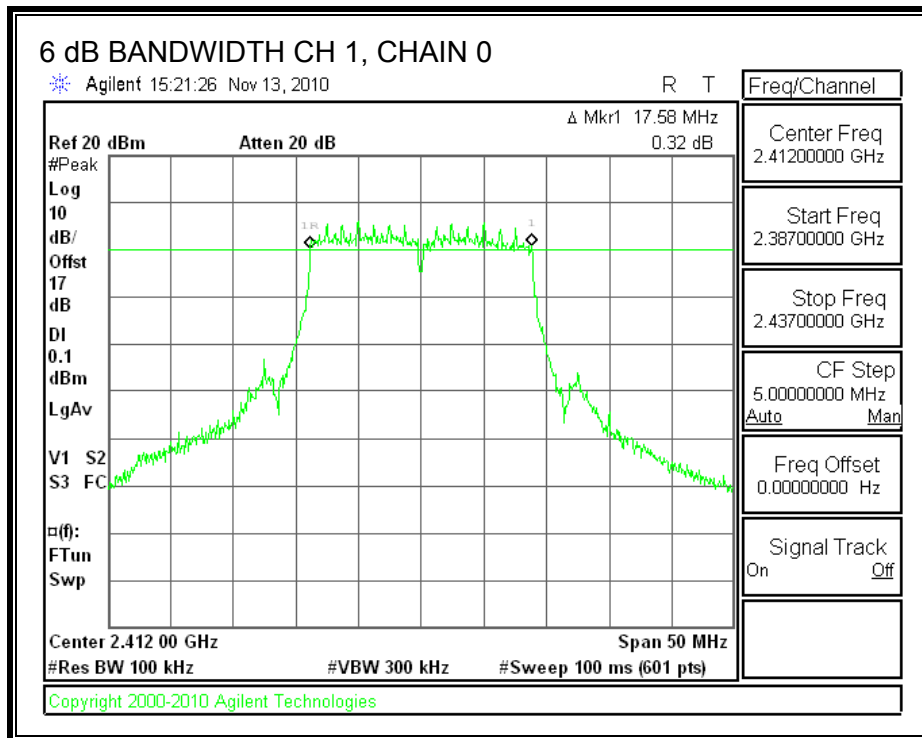
TEST PROCEDURE

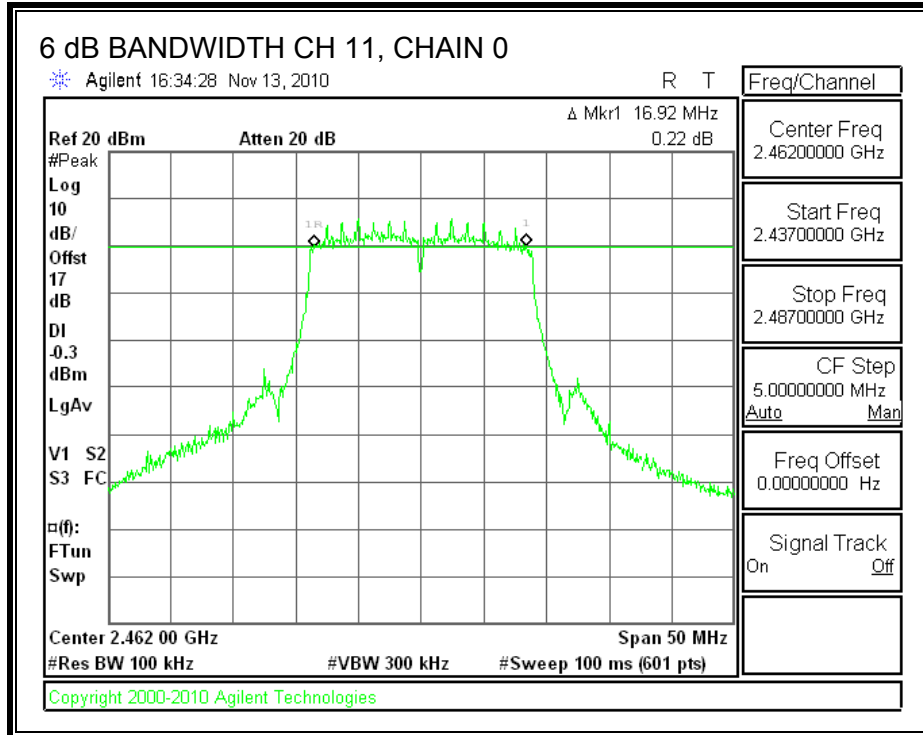
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

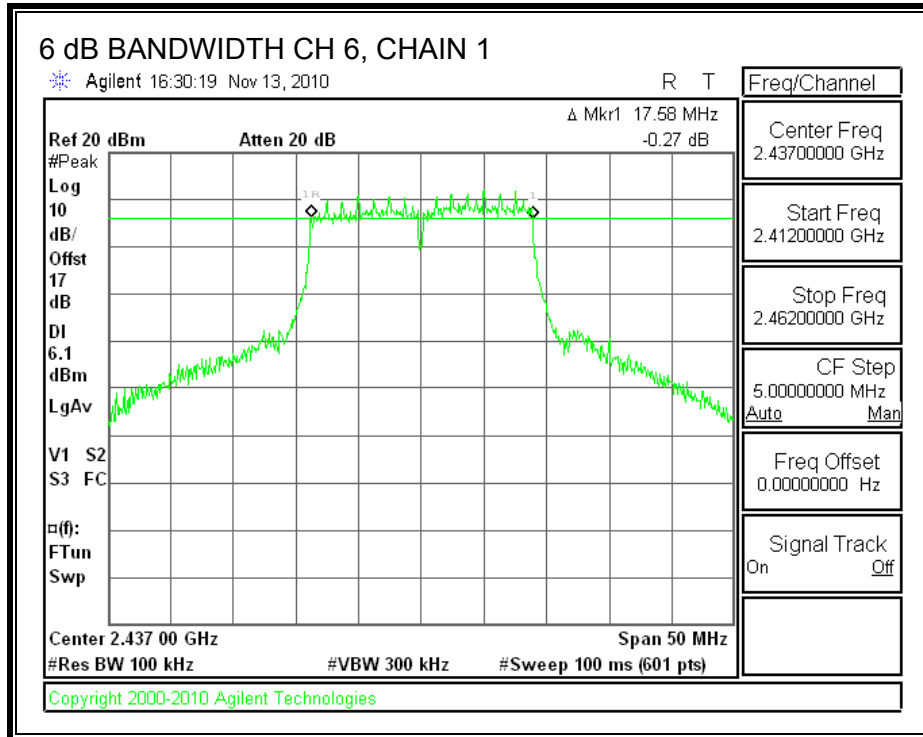
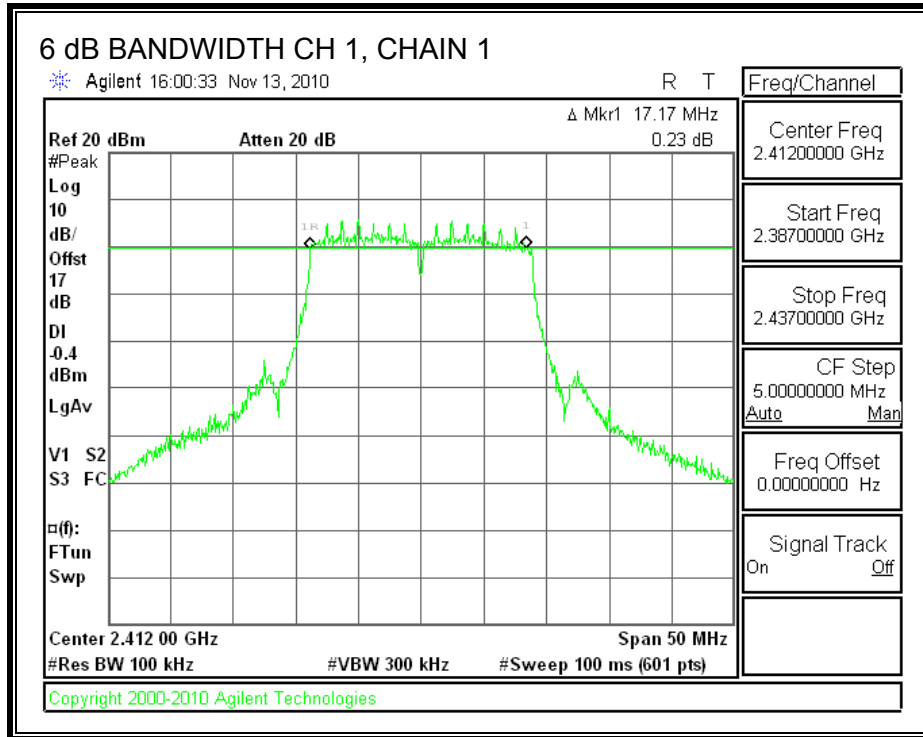
Channel	Frequency (MHz)	Chain 0 6 dB BW (MHz)	Chain 1 6 dB BW (MHz)	Minimum Limit (MHz)
1	2412	17.58	17.17	0.5
6	2437	16.42	17.58	0.5
11	2462	16.92	16.33	0.5

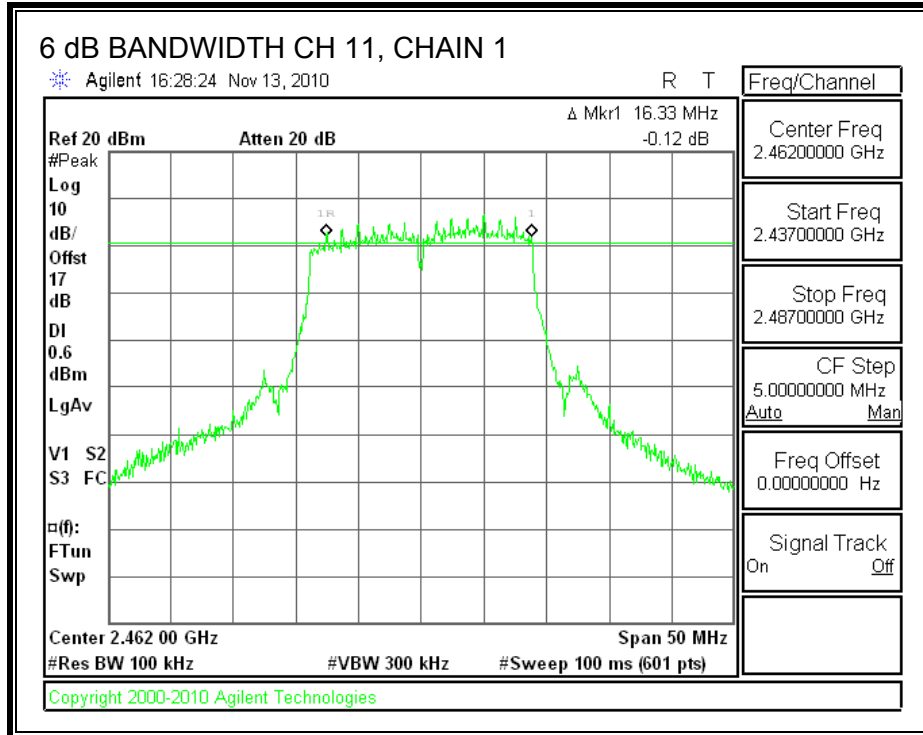
6 dB BANDWIDTH, CHAIN 0





6 dB BANDWIDTH, CHAIN 1





7.4.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

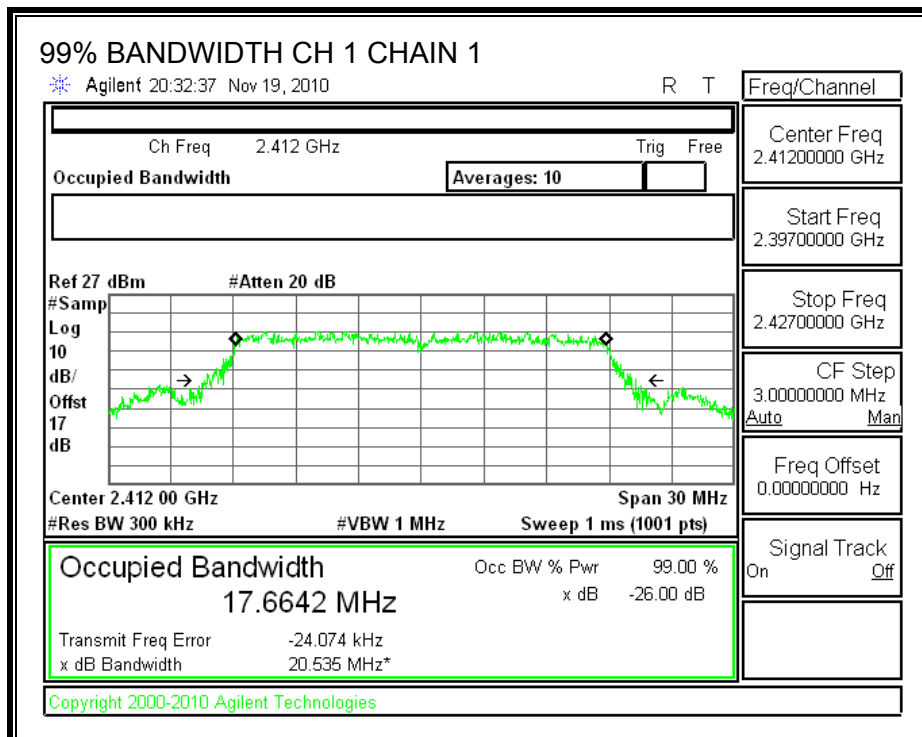
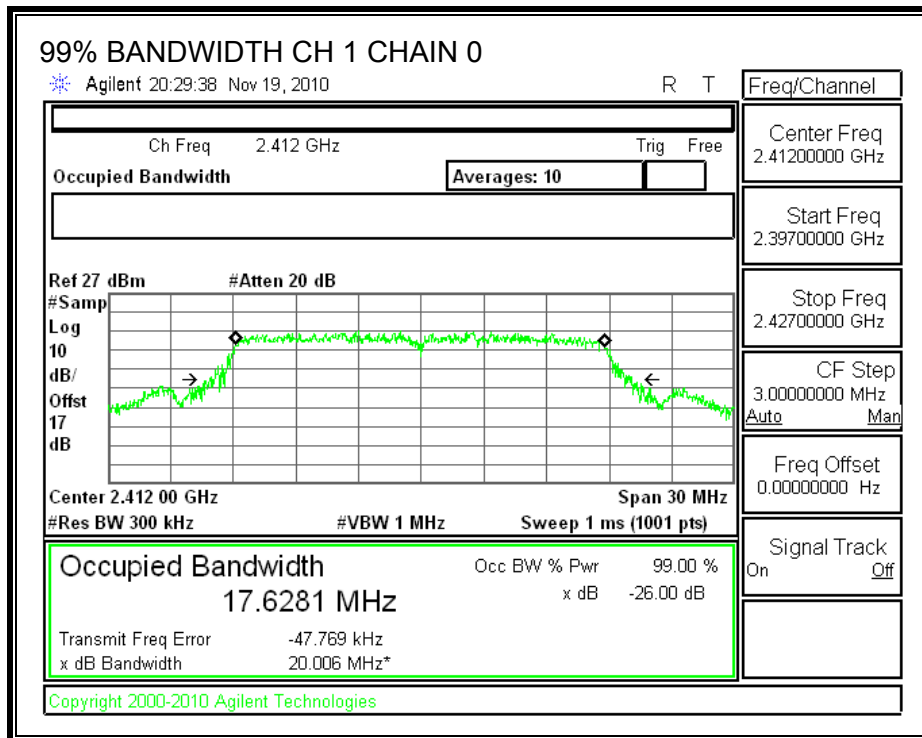
TEST PROCEDURE

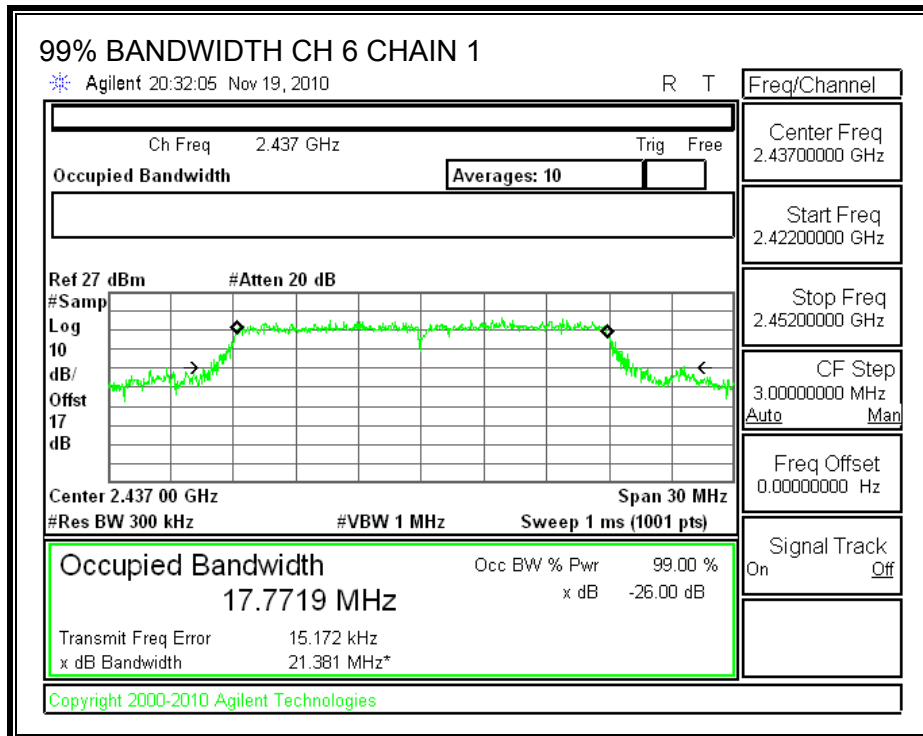
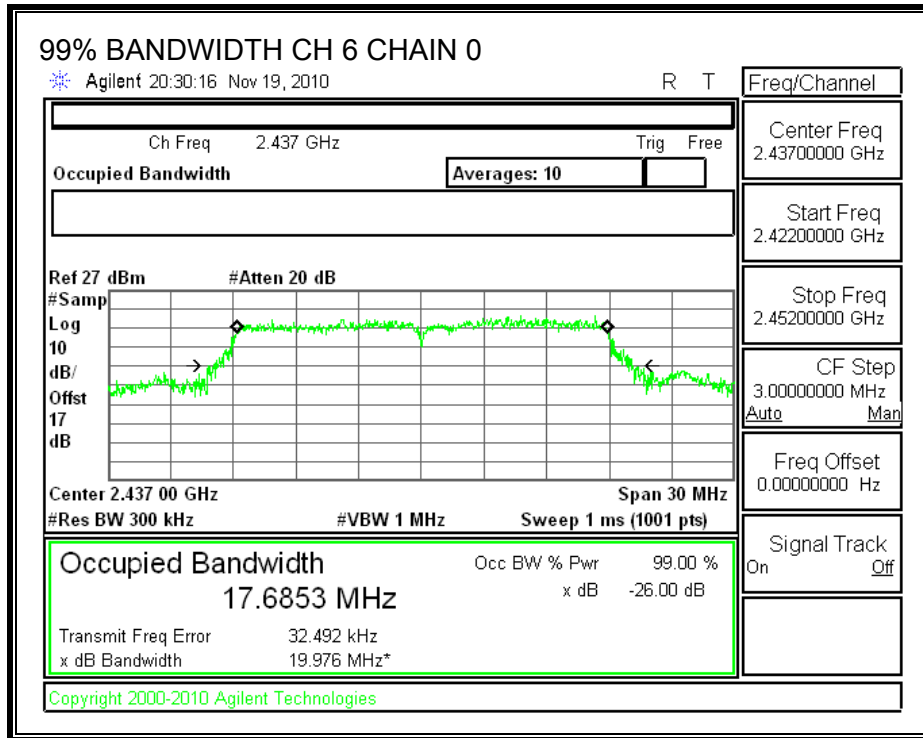
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

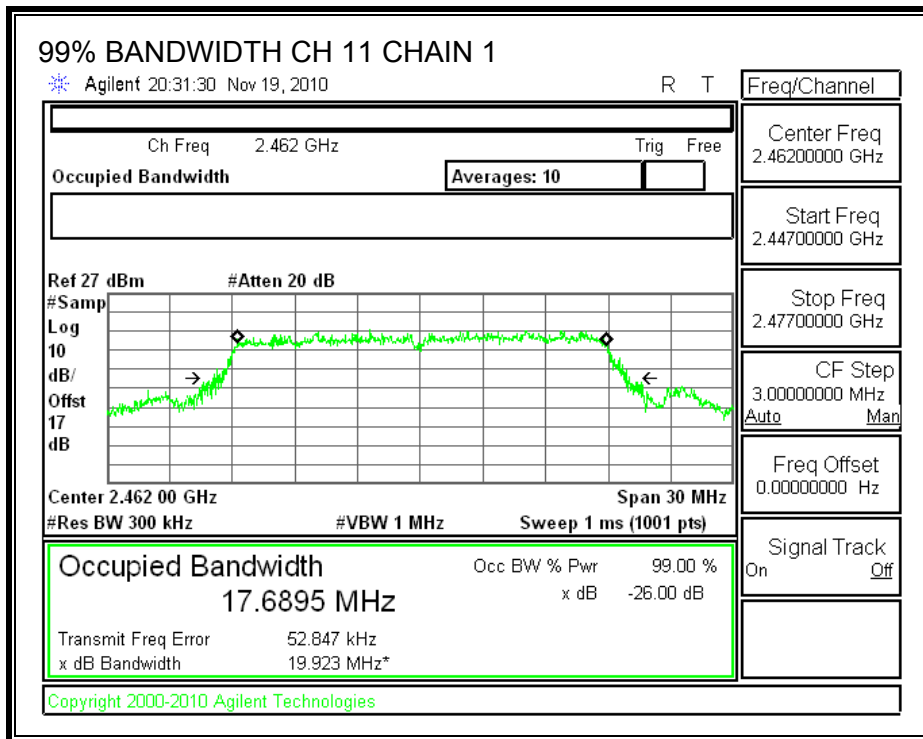
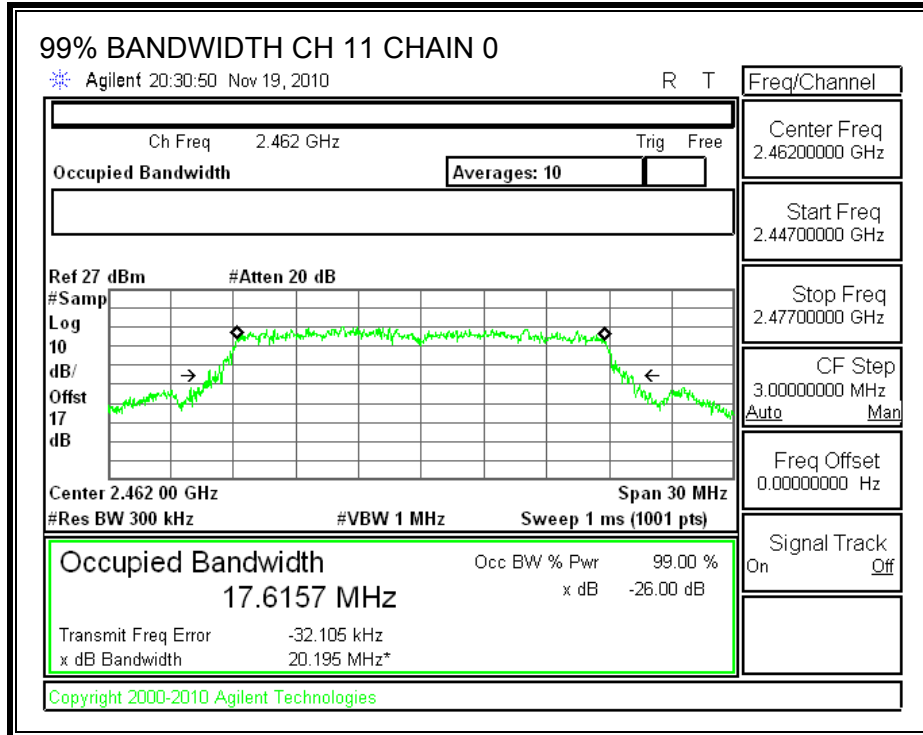
RESULTS

Channel	Frequency (MHz)	Chain 0 99% Bandwidth (MHz)	Chain 1 99% Bandwidth (MHz)
1	2412	17.6281	17.6642
6	2437	17.6853	17.7719
11	2462	17.6157	17.6895

99% BANDWIDTH







7.4.3. 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.

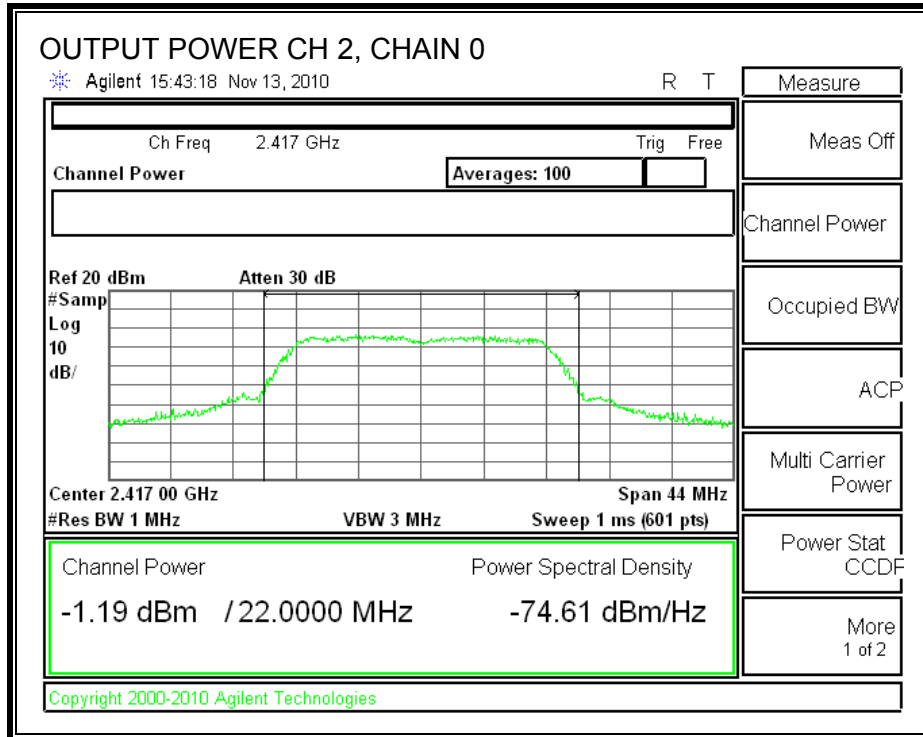
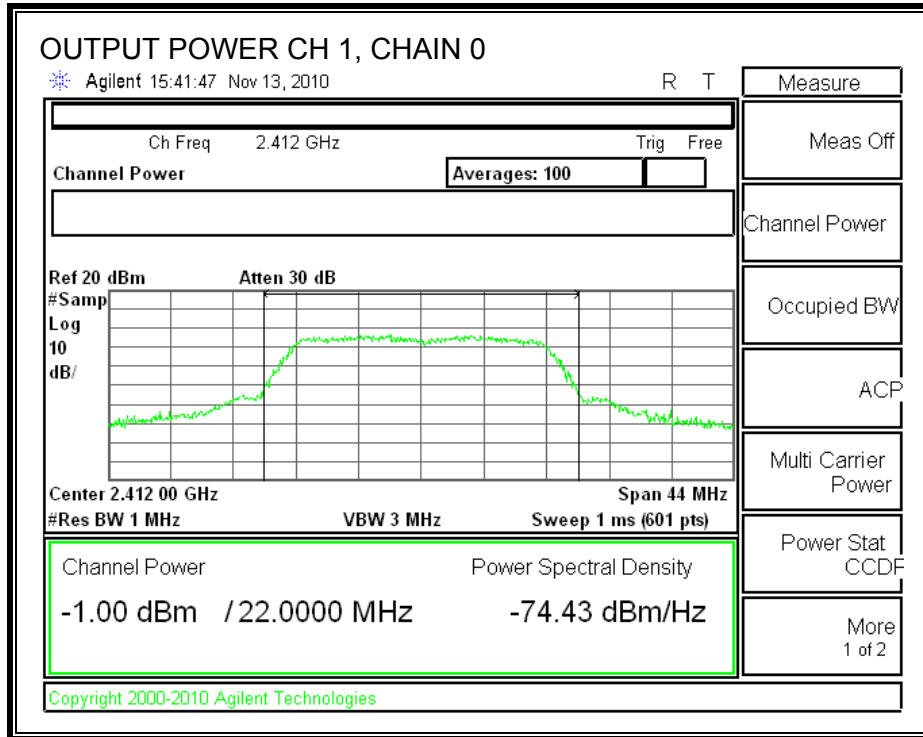
TEST PROCEDURE

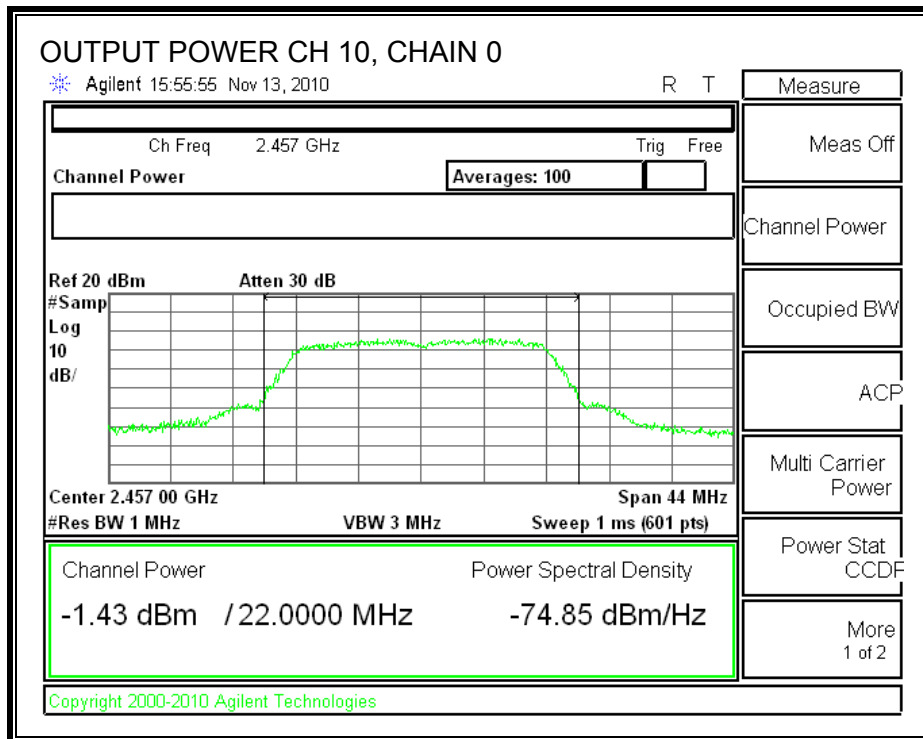
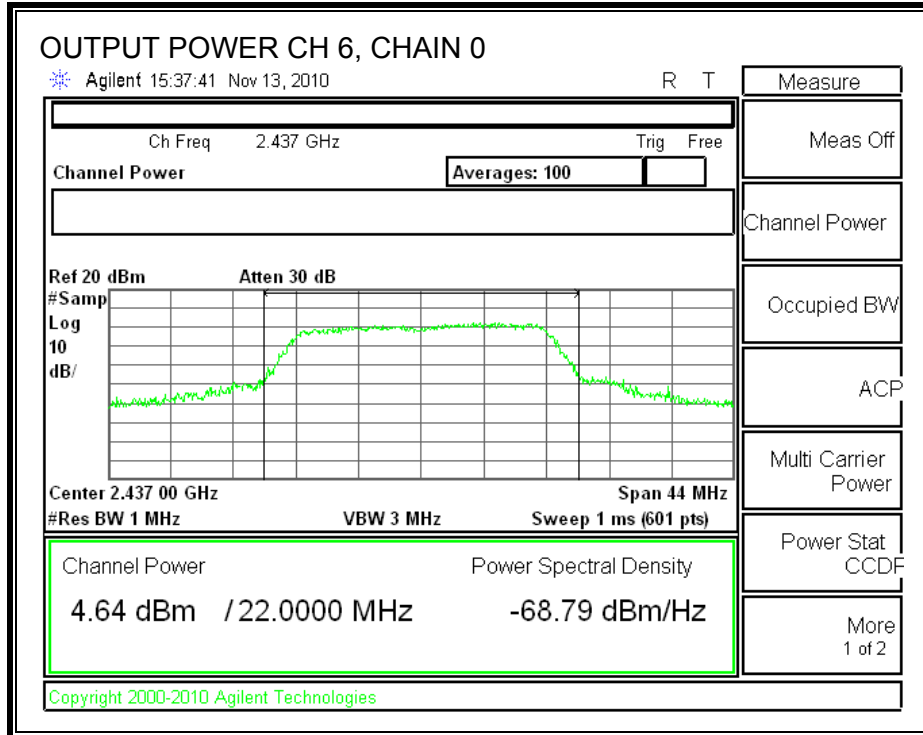
Output power was measured based on the use of RMS averaging over a time interval in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

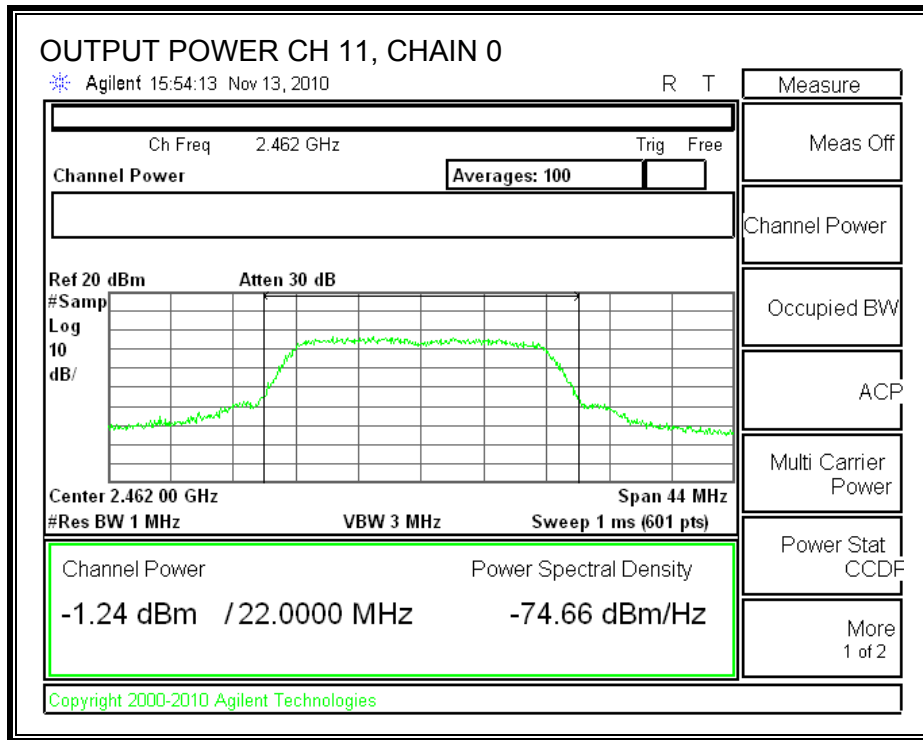
RESULTS

Channel	Frequency (MHz)	Limit (dBm)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Attenuator + Cable Offset (dB)	Total Power (dBm)	Margin (dB)
1	2412	30.00	-1.00	-0.49	17.00	19.27	-10.73
2	2417	30.00	-1.19	-0.49	17.00	19.18	-10.82
6	2437	30.00	4.64	5.10	17.00	24.89	-5.11
10	2457	30.00	-1.43	-0.68	17.00	18.97	-11.03
11	2462	30.00	-1.24	-0.66	17.00	19.07	-10.93

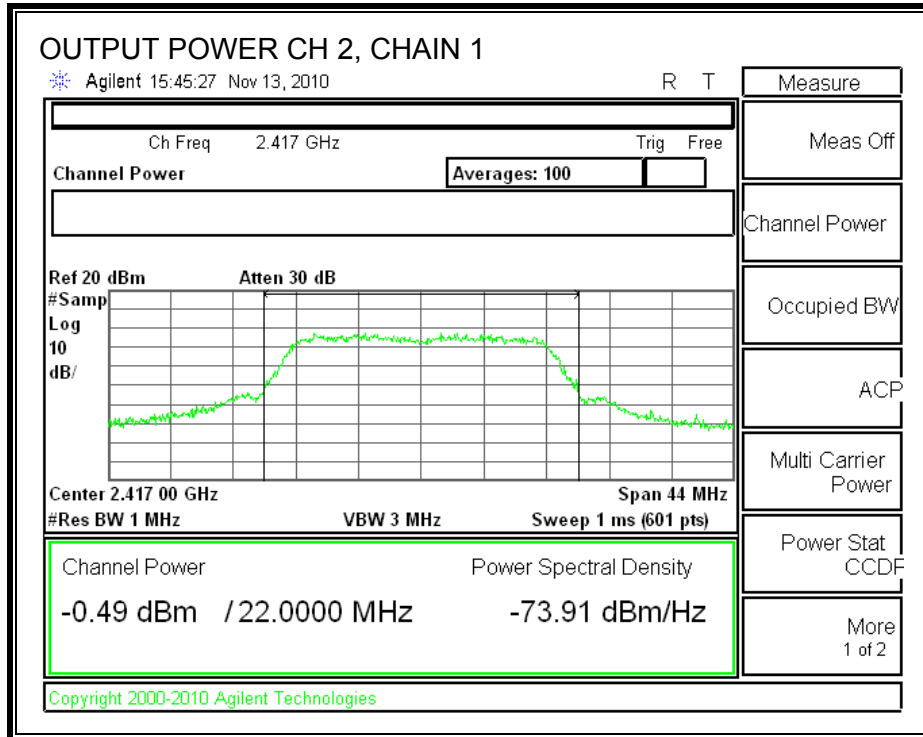
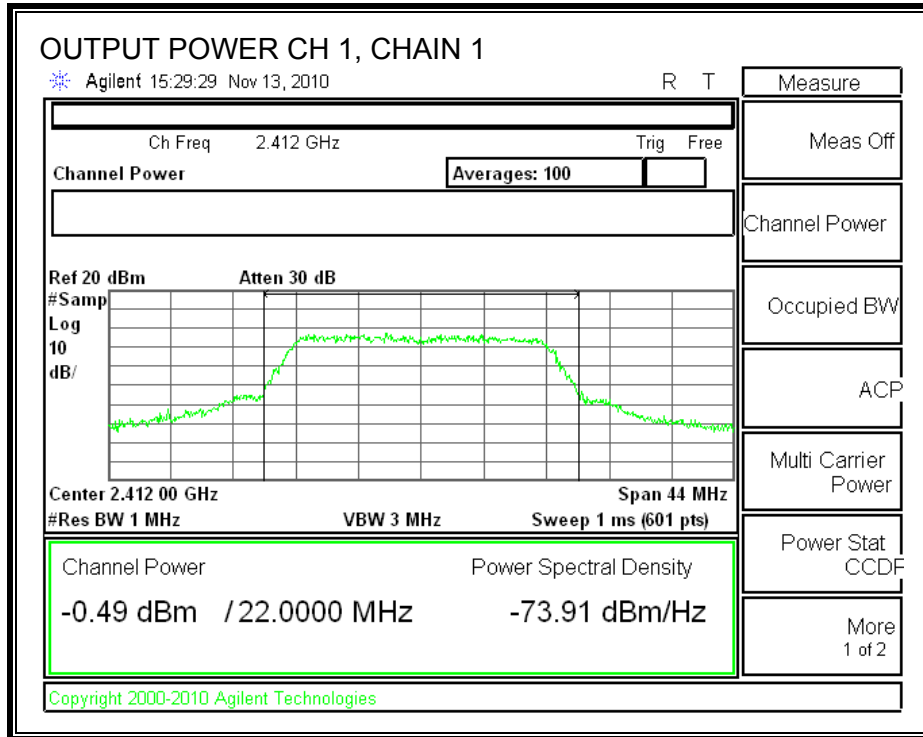
CHAIN 0 OUTPUT POWER

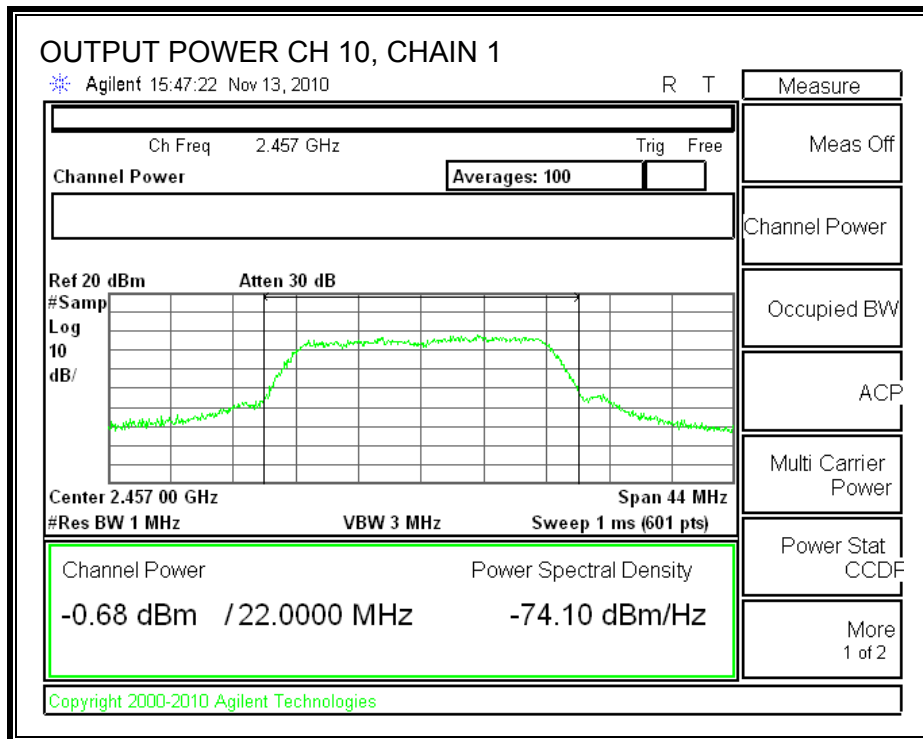
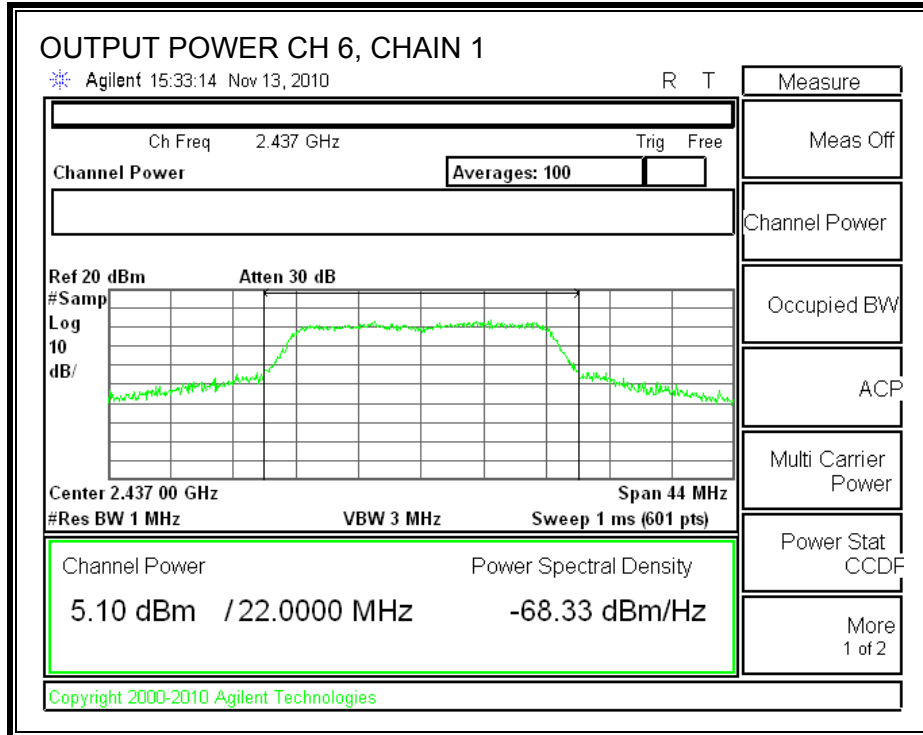


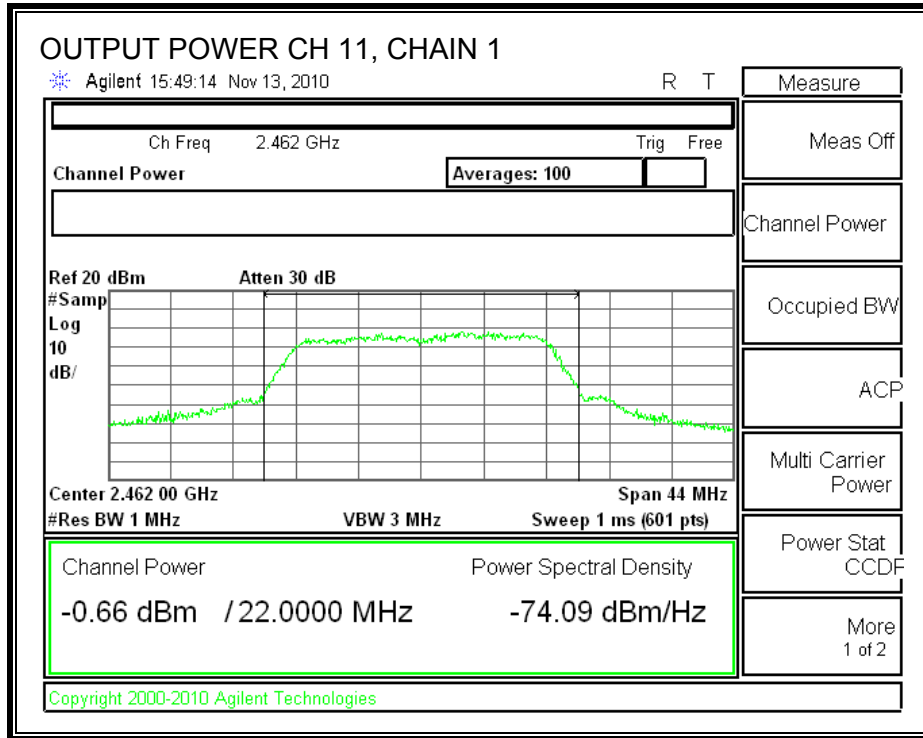




CHAIN 1 OUTPUT POWER







7.4.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 11 dB (including 10 dB pad and 1dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)
1	2412	15.867	16.387	19.15
2	2417	15.825	16.33	19.10
6	2437	21.364	21.679	24.53
10	2457	15.568	16.053	18.83
11	2462	15.621	16.188	18.92

7.4.5. 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.

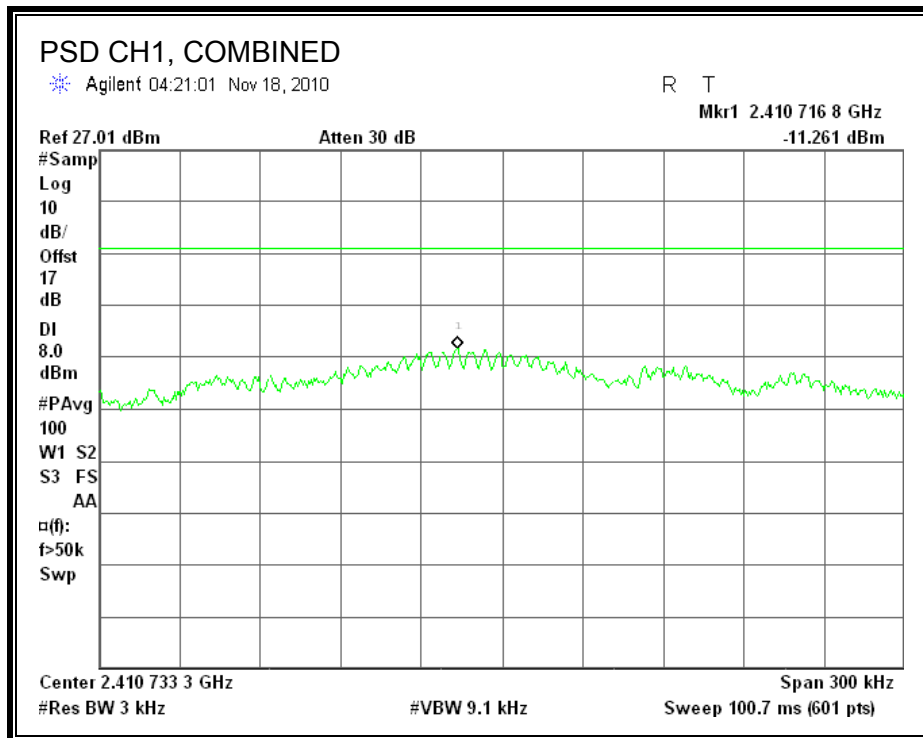
TEST PROCEDURE

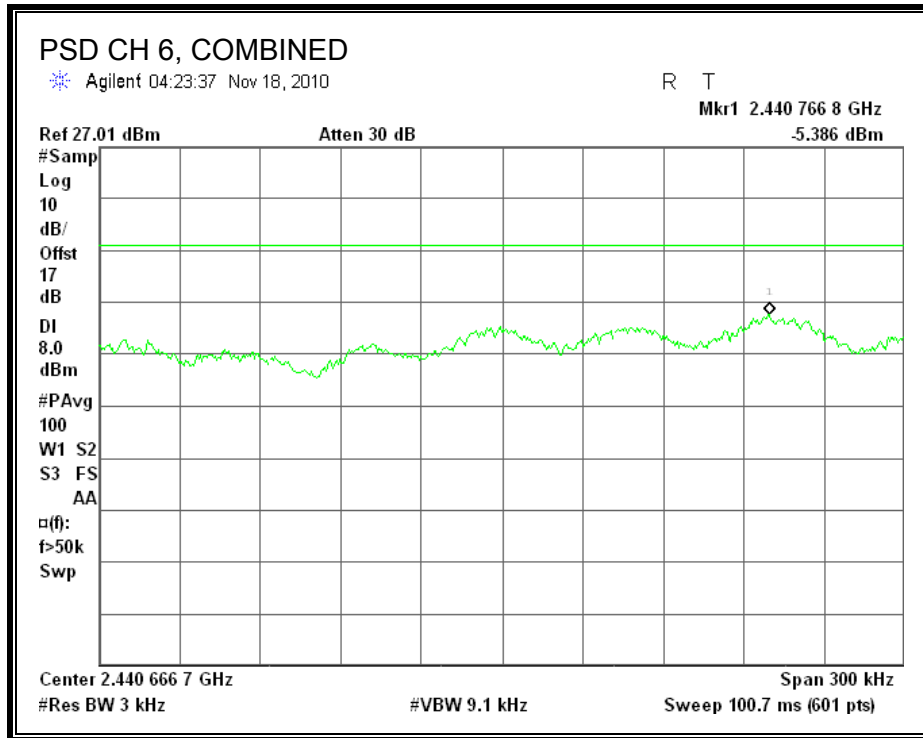
Output power was measured based on the use of RMS averaging over a time interval, therefore the power spectral density was measured using PSD Option 2 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

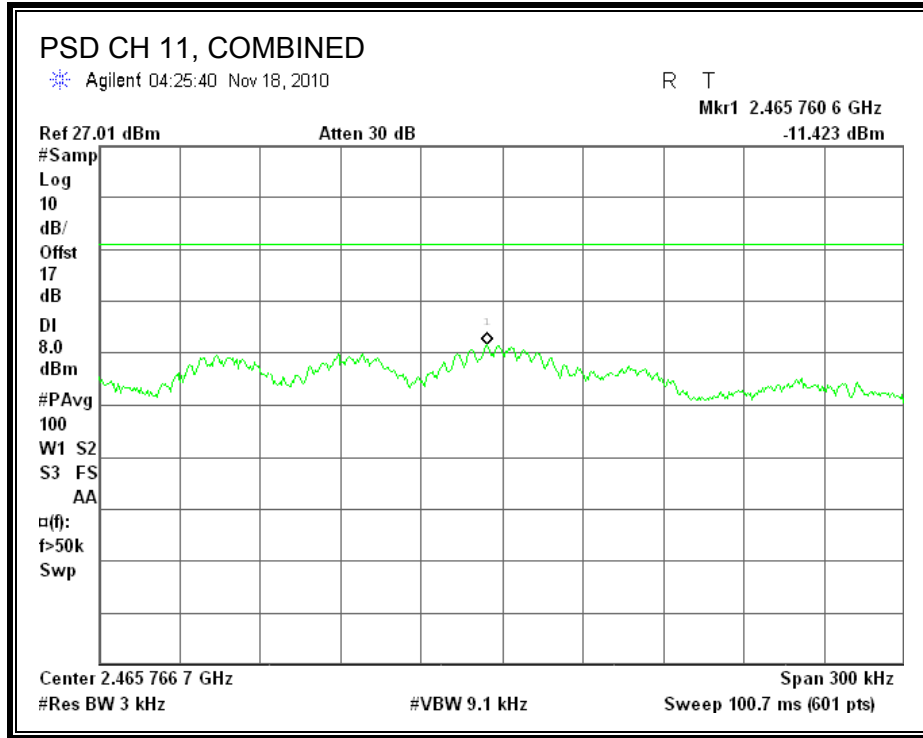
RESULTS

Channel	Frequency (MHz)	Combined PSD (dBm)	Limit (dBm)	Margin (dB)
1	2412	-11.261	8	-19.261
6	2437	-5.386	8	-13.386
11	2462	-11.423	8	-19.423

POWER SPECTRAL DENSITY, COMBINED







7.4.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Output power was measured based on the use of RMS averaging over a time interval, therefore the required attenuation is 30 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.

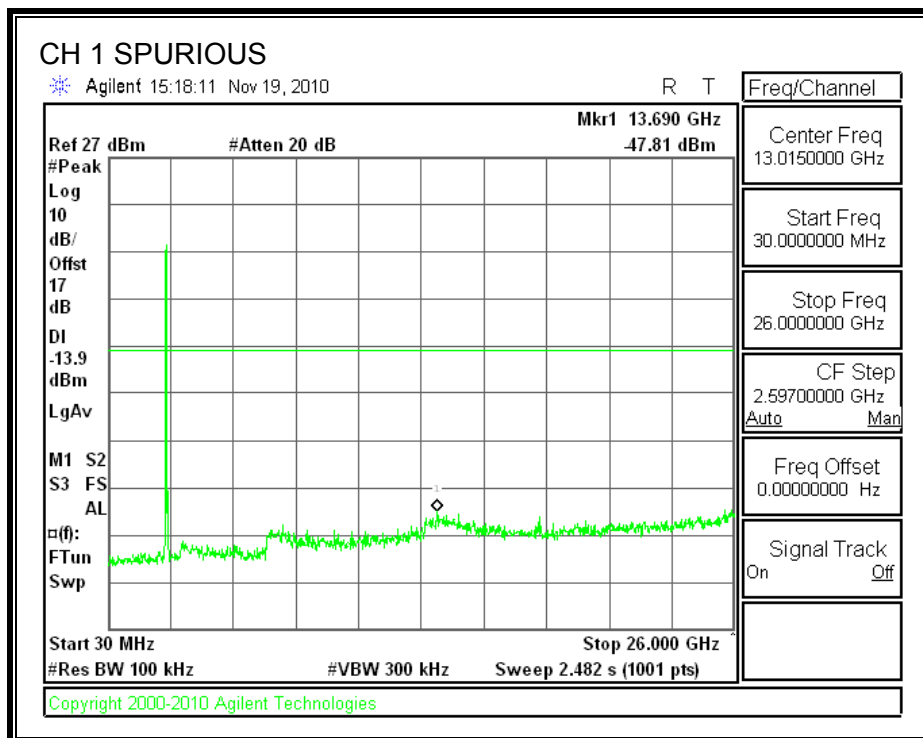
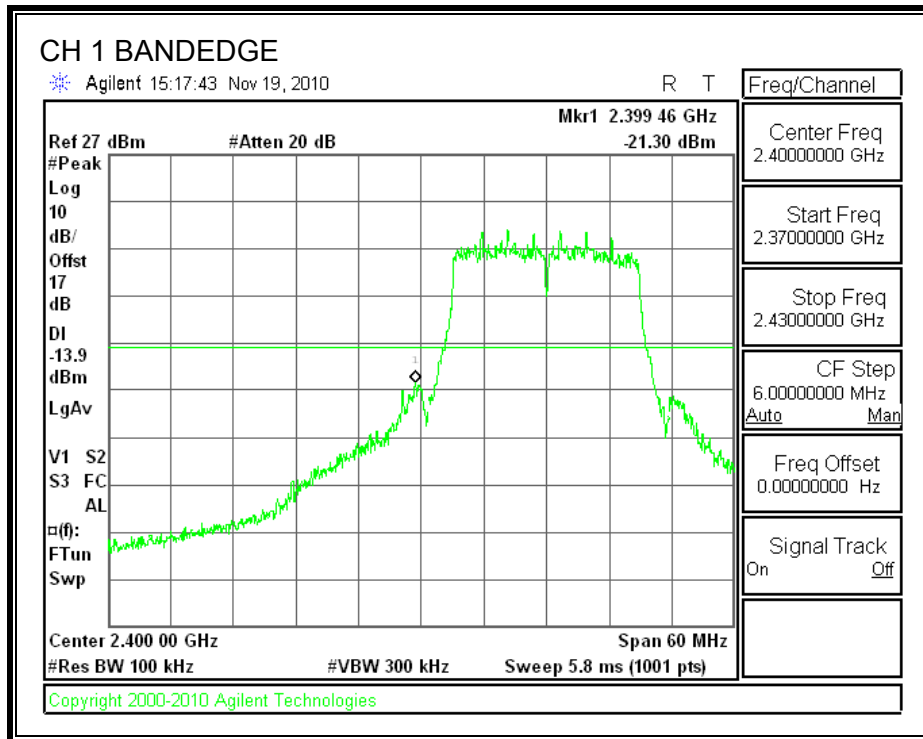
The EUT was set to transmit at mid channel, 30 dBc display line was set with reference to mid channel level.

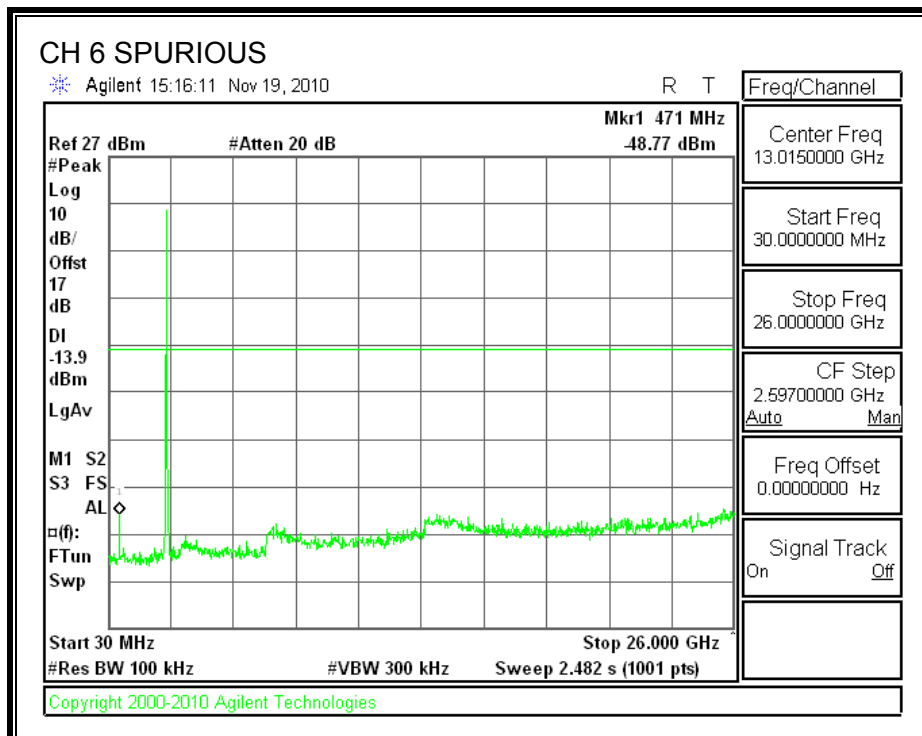
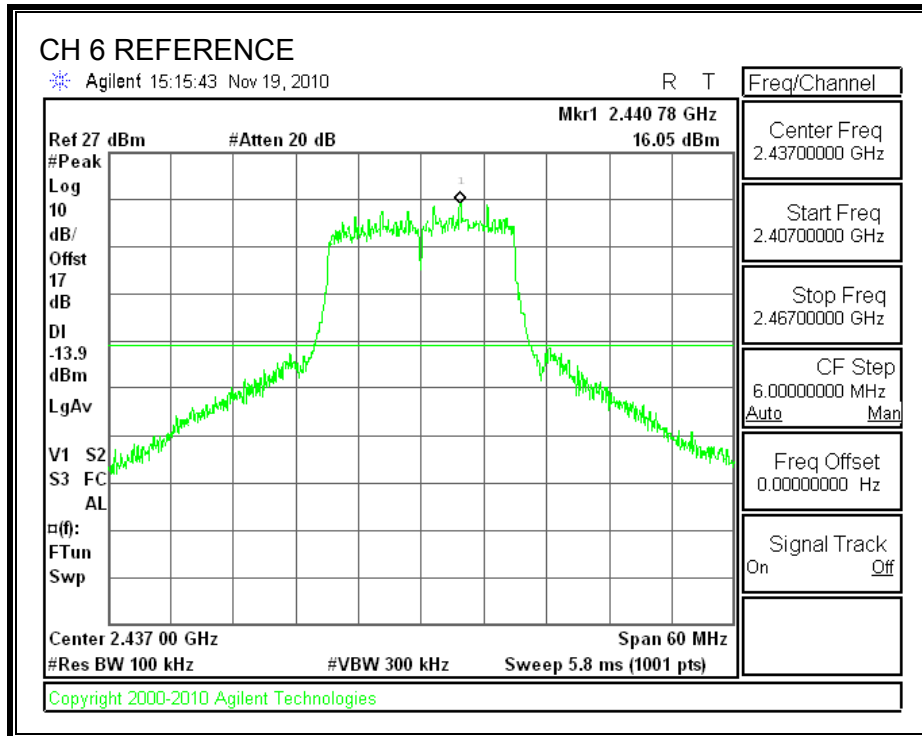
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

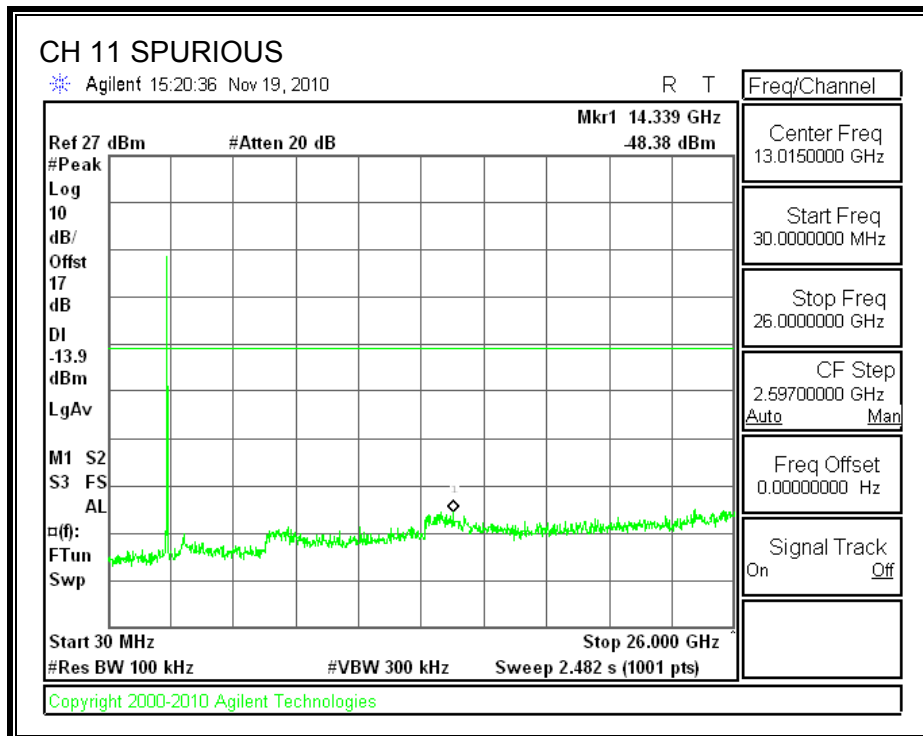
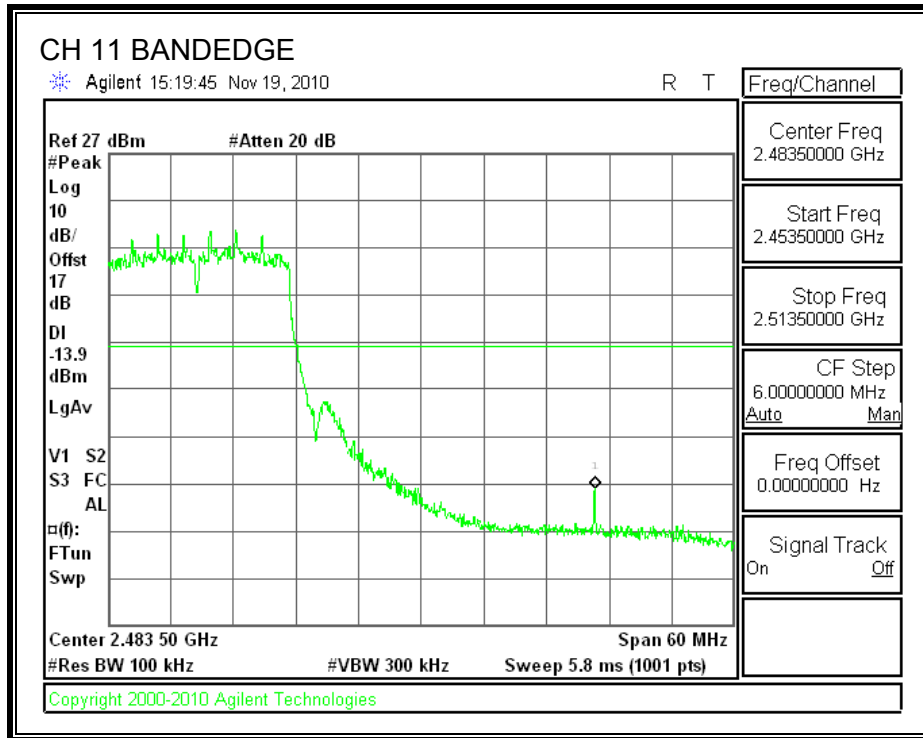
Note: channels 1 and 11 were tested at the power levels of channels 2 and 10 respectively, the power levels for CH2 and CH10 are higher than the power levels of CH1 and CH11; hence this is worst-case measurement.

RESULTS

SPURIOUS EMISSIONS







7.5. 802.11n HT40 MODE IN THE 2.4 GHz BAND SINGLE CHAIN

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.

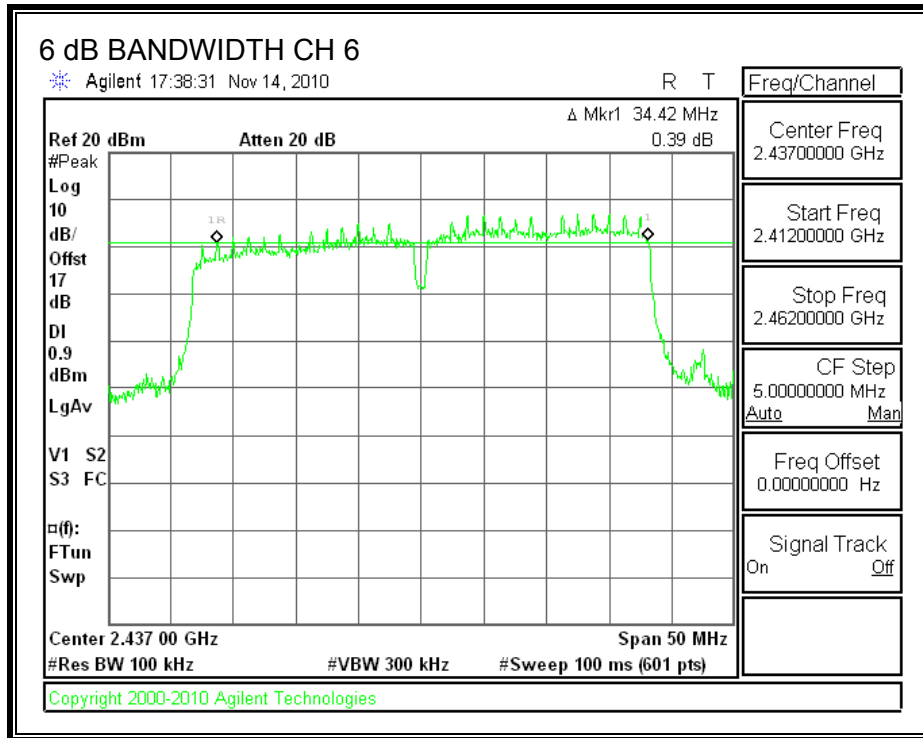
TEST PROCEDURE

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 BW (MHz)	Minimum Limit (MHz)
6	2437	34.42	0.5

6 dB BANDWIDTH



7.5.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

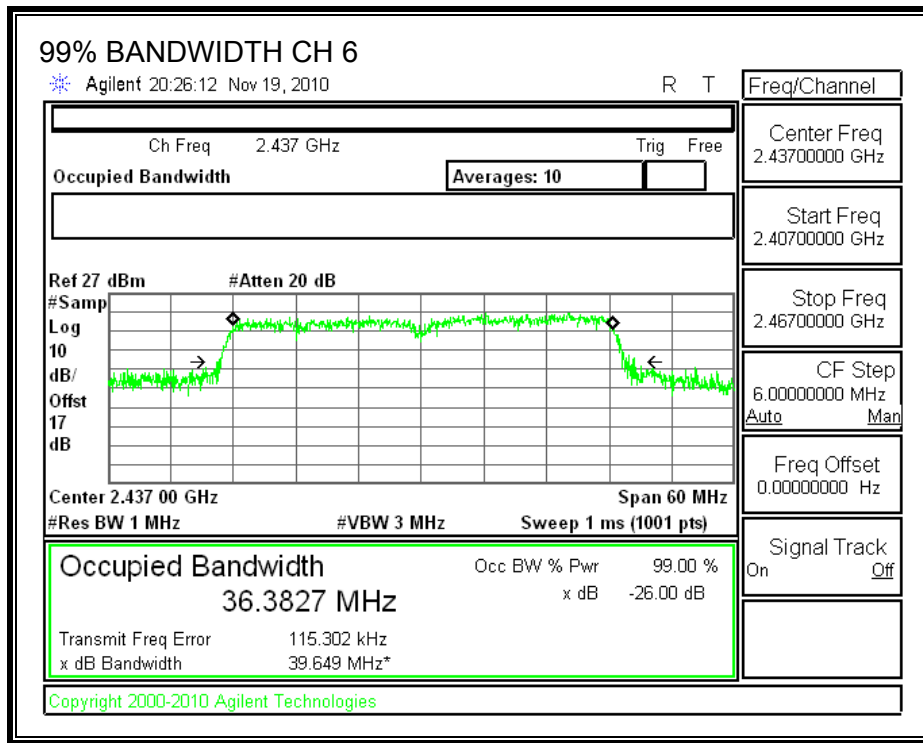
TEST PROCEDURE

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)
6	2437	36.3827

99% BANDWIDTH



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.

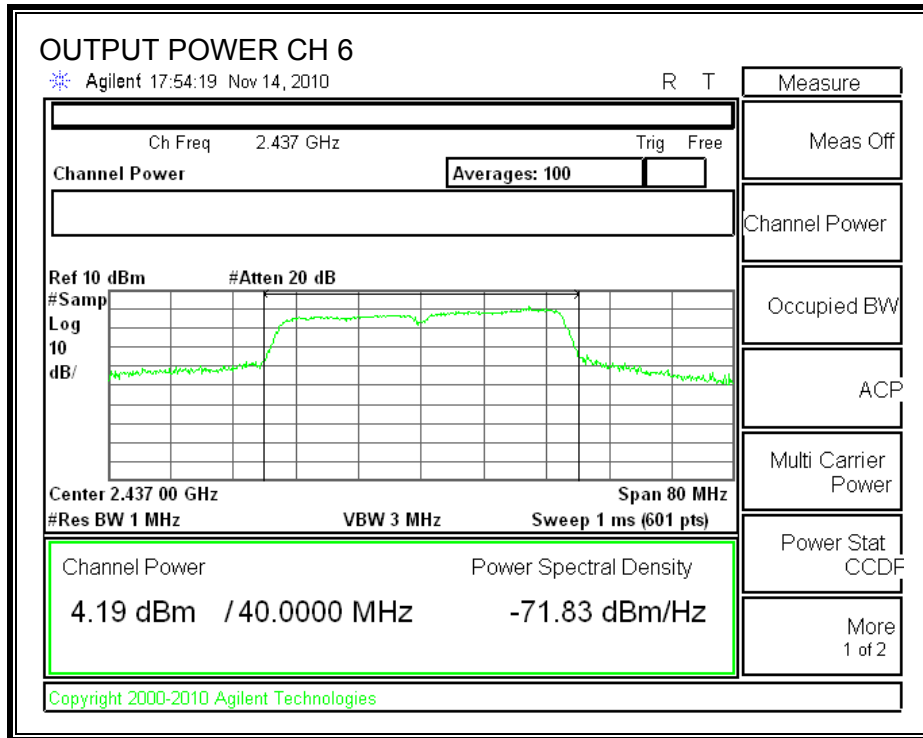
TEST PROCEDURE

Output power was measured based on the use of RMS averaging over a time interval in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

RESULTS

Channel	Frequency (MHz)	Limit (dBm)	Power (dBm)	Attenuator + Cable Offset (dB)	Total Power (dBm)	Margin (dB)
6	2437	30.00	4.19	17.00	21.19	-8.81

OUTPUT POWER



7.5.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 11 dB (including 10 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Power (dBm)
6	2437	21.826

7.5.5. 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.

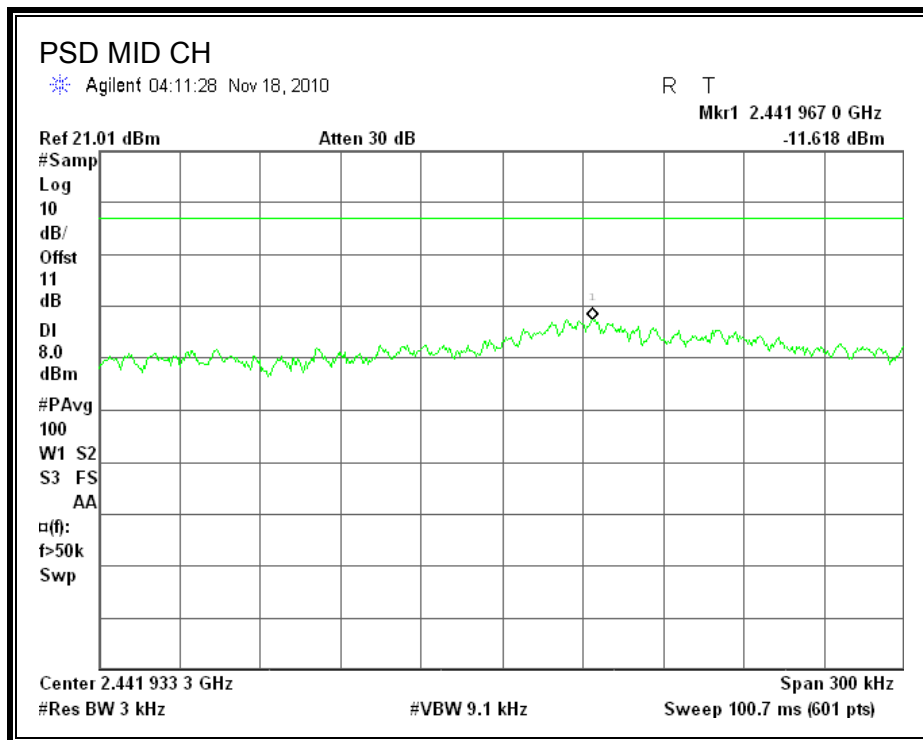
TEST PROCEDURE

Output power was measured based on the use of RMS averaging over a time interval, therefore the power spectral density was measured using PSD Option 2 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

RESULTS

Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Margin (dB)
6	2437	-11.618	8	-19.618

POWER SPECTRAL DENSITY



7.5.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Output power was measured based on the use of RMS averaging over a time interval, therefore the required attenuation is 30 dB.

TEST PROCEDURE

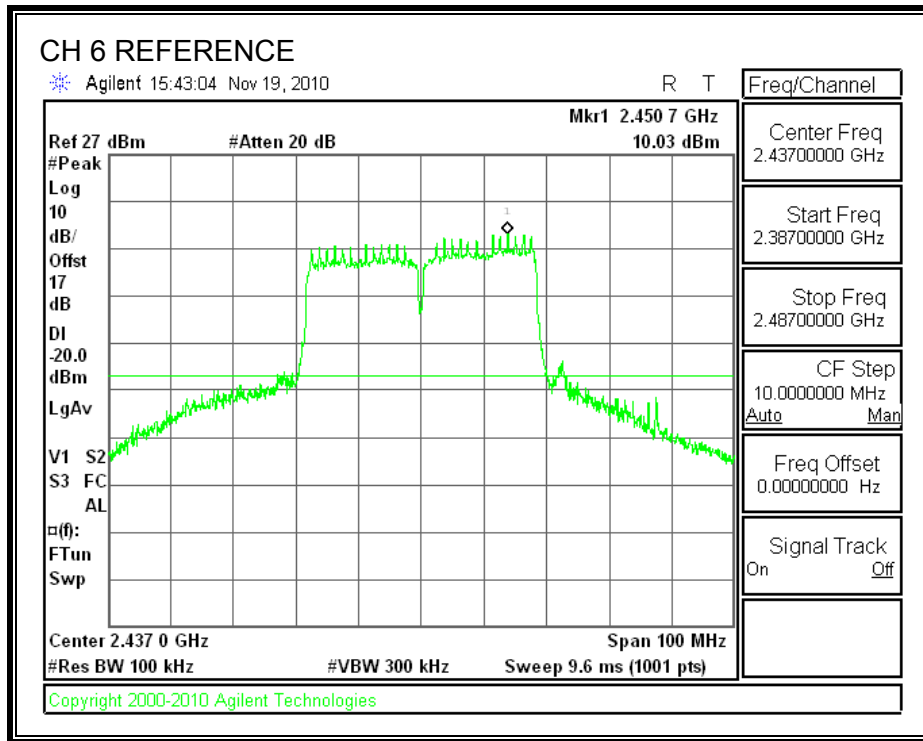
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

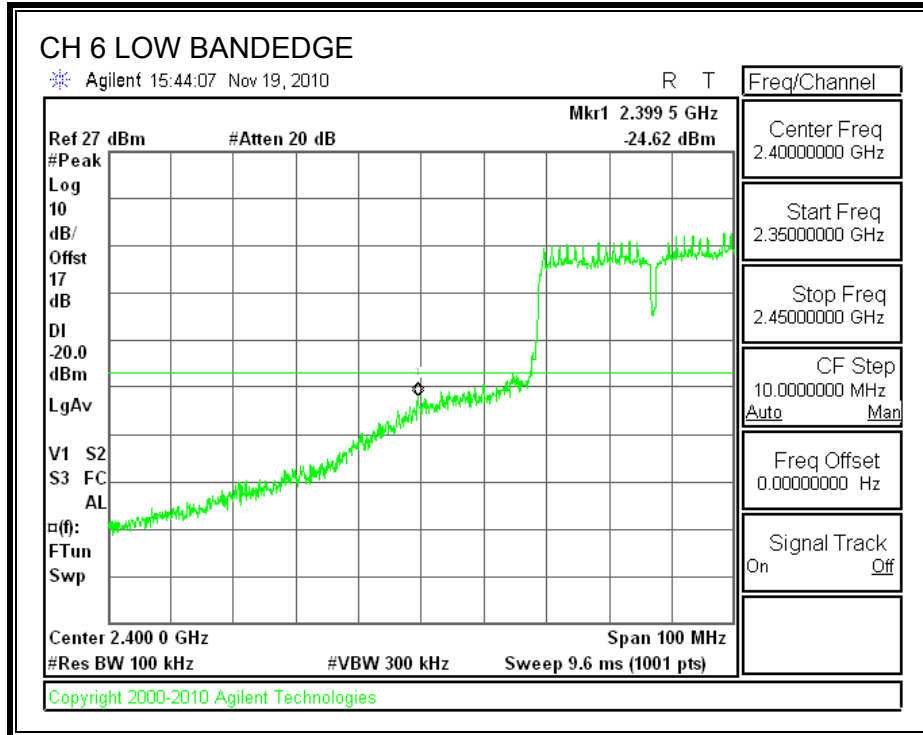
The EUT was set to transmit at mid channel, 30 dBc display line was set with reference to mid channel level.

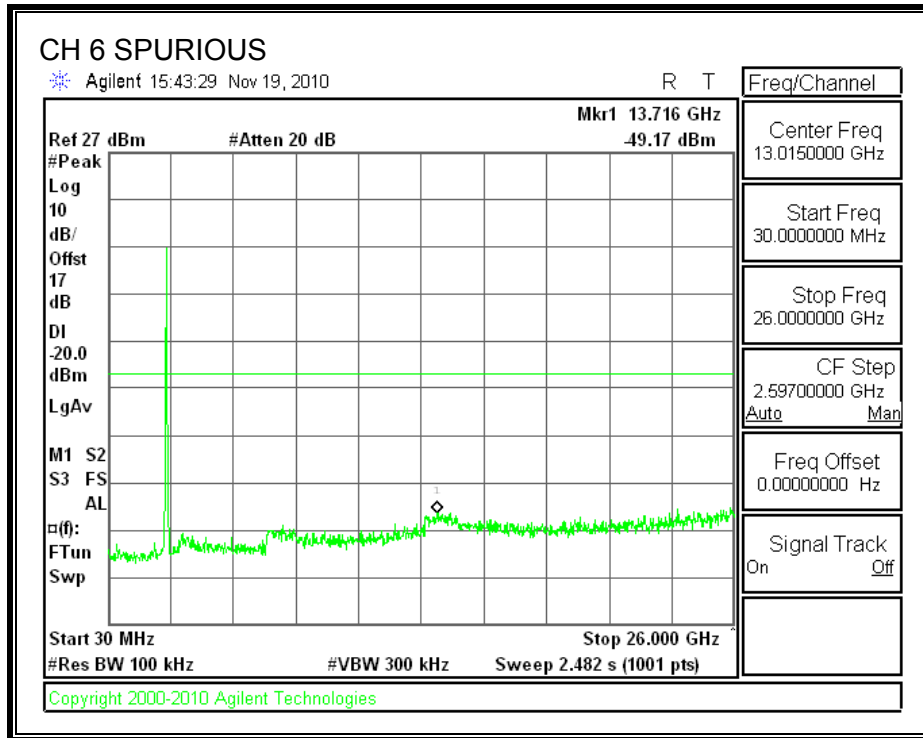
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the middle channel.

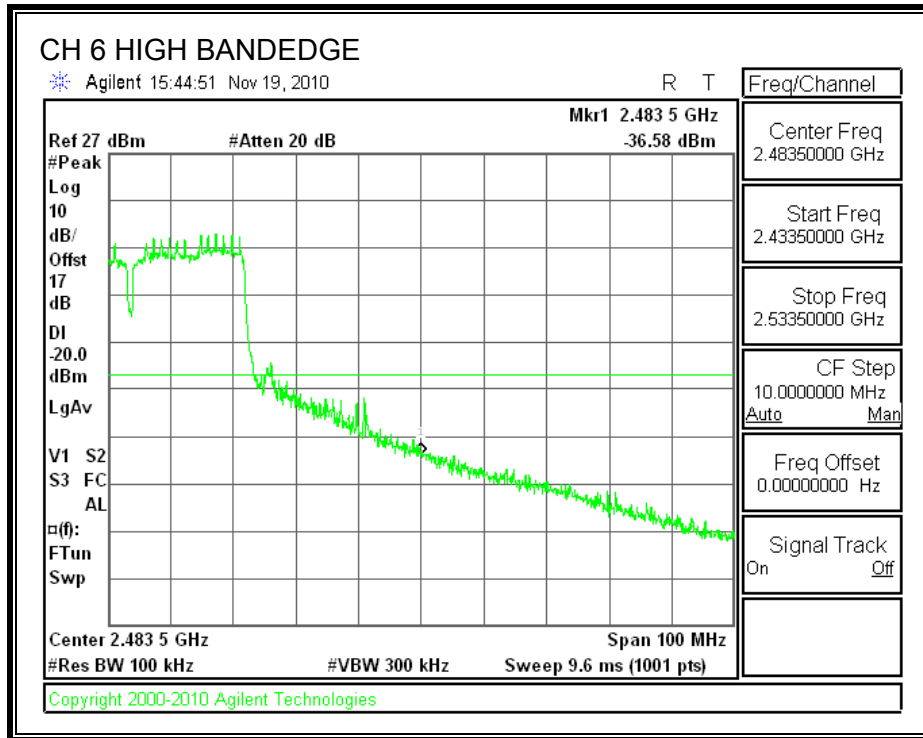
RESULTS

SPURIOUS EMISSIONS









7.6. 802.11n HT40 MODE IN THE 2.4 GHz BAND DUAL CHAIN

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.

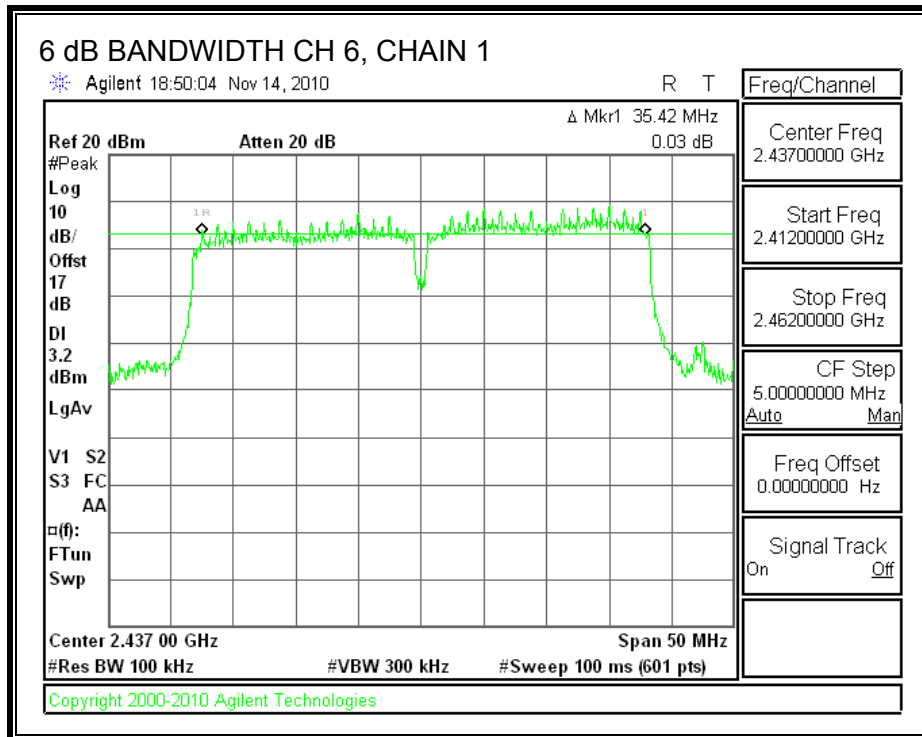
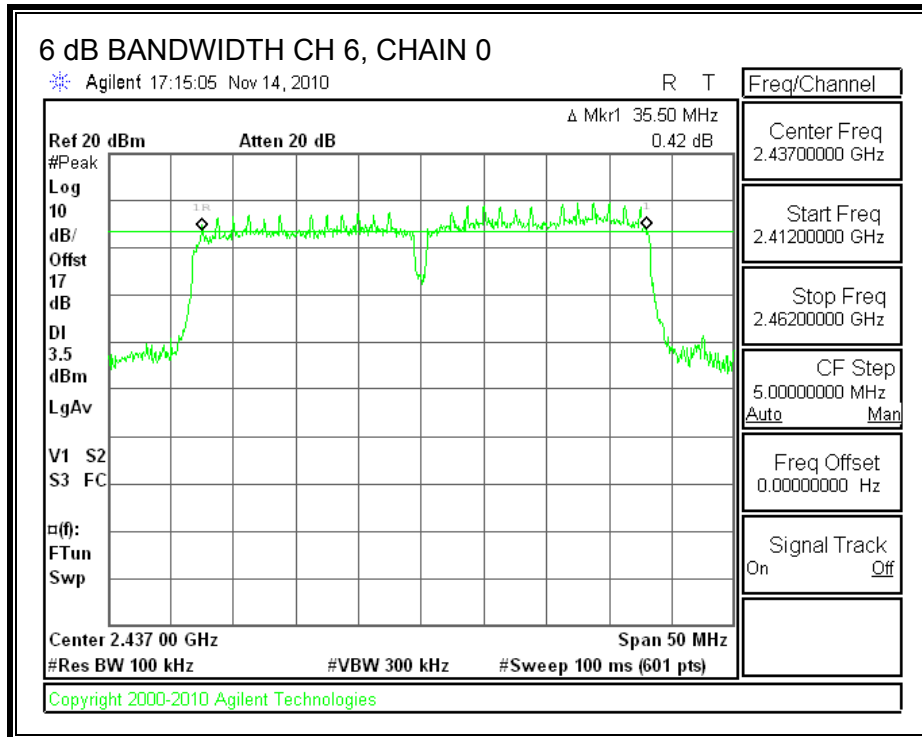
TEST PROCEDURE

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)
6	2437	35.5	35.42	0.5

6 dB BANDWIDTH



7.6.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

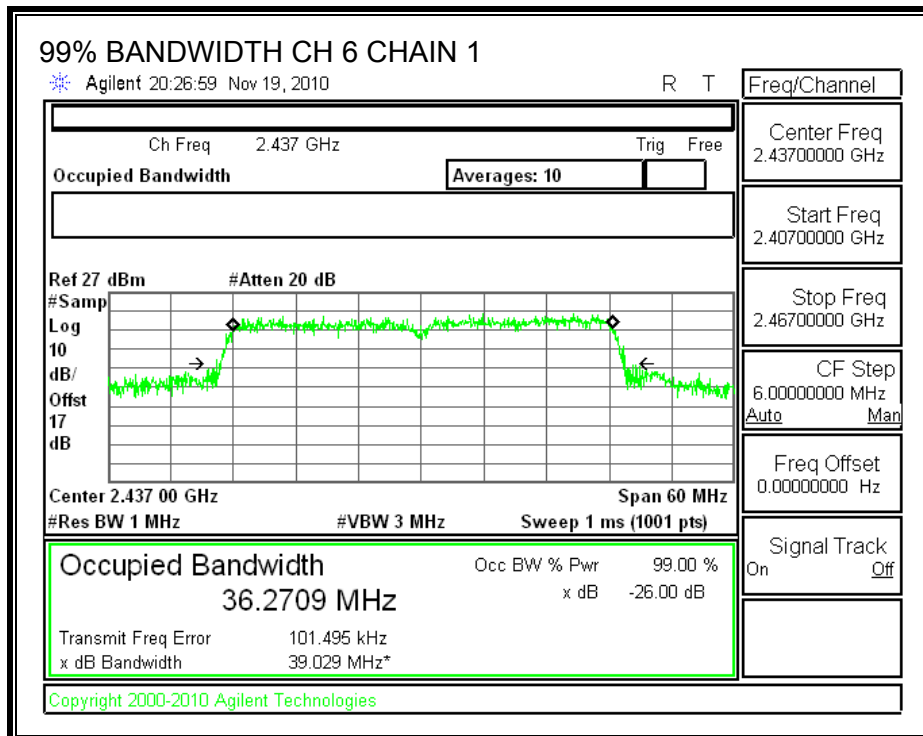
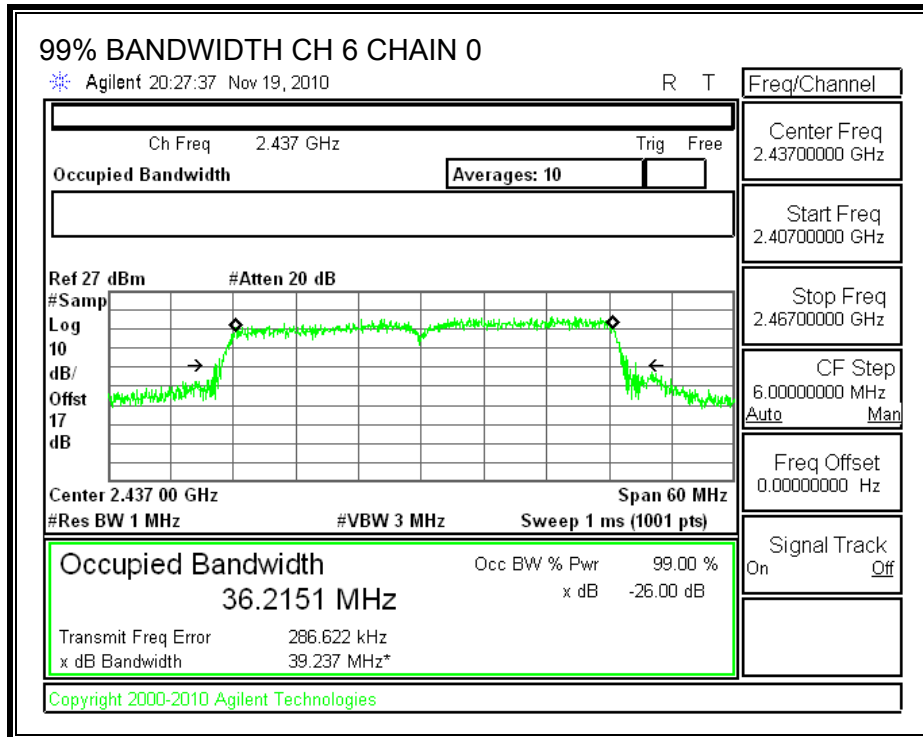
TEST PROCEDURE

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)
6	2437	36.2151	36.2709

99% BANDWIDTH



7.6.3. 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.

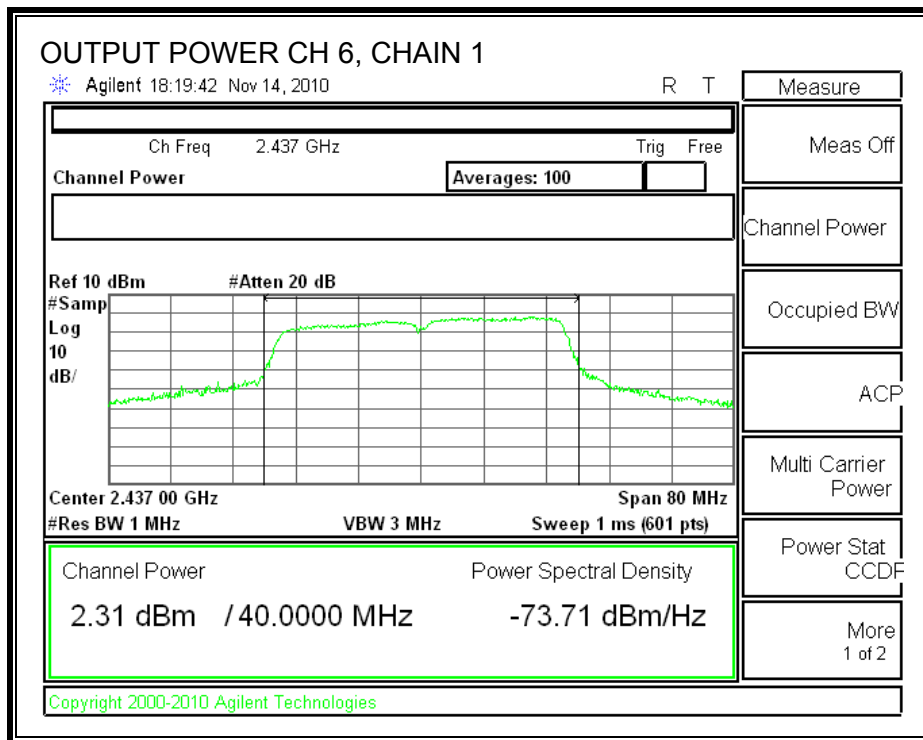
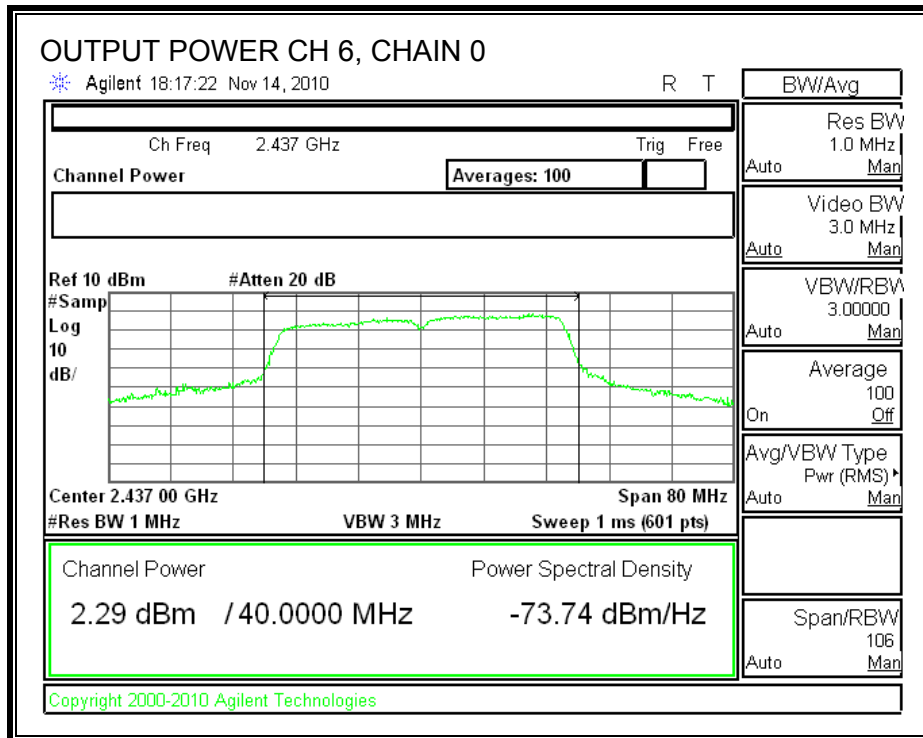
TEST PROCEDURE

Output power was measured based on the use of RMS averaging over a time interval in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

RESULTS

Channel	Frequency (MHz)	Limit (dBm)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Attenuator + Cable Offset (dB)	Total Power (dBm)	Margin (dB)
6	2437	30.00	2.29	2.31	17.00	22.31	-7.69

OUTPUT POWER



7.6.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 11 dB (including 10 dB pad and 1dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)
6	2437	18.931	20.736	22.94

7.6.5. 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.

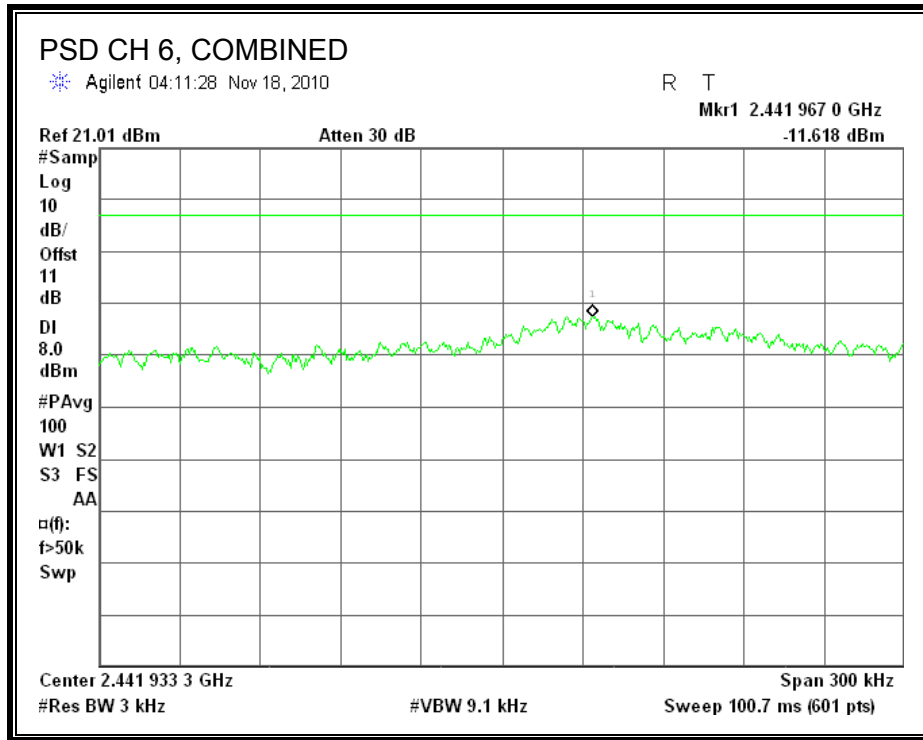
TEST PROCEDURE

Output power was measured based on the use of RMS averaging over a time interval, therefore the power spectral density was measured using PSD Option 2 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

RESULTS

Channel	Frequency (MHz)	Combined PSD (dBm)	Limit (dBm)	Margin (dB)
6	2437	-11.618	8	-19.618

POWER SPECTRAL DENSITY, COMBINED



7.6.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Output power was measured based on the use of RMS averaging over a time interval, therefore the required attenuation is 30 dB.

TEST PROCEDURE

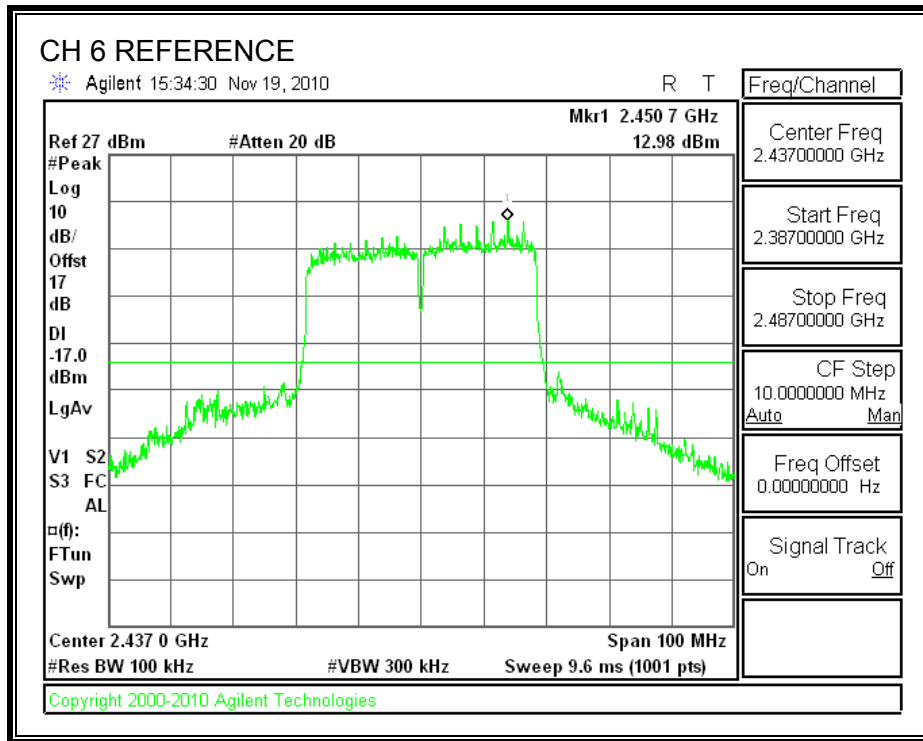
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

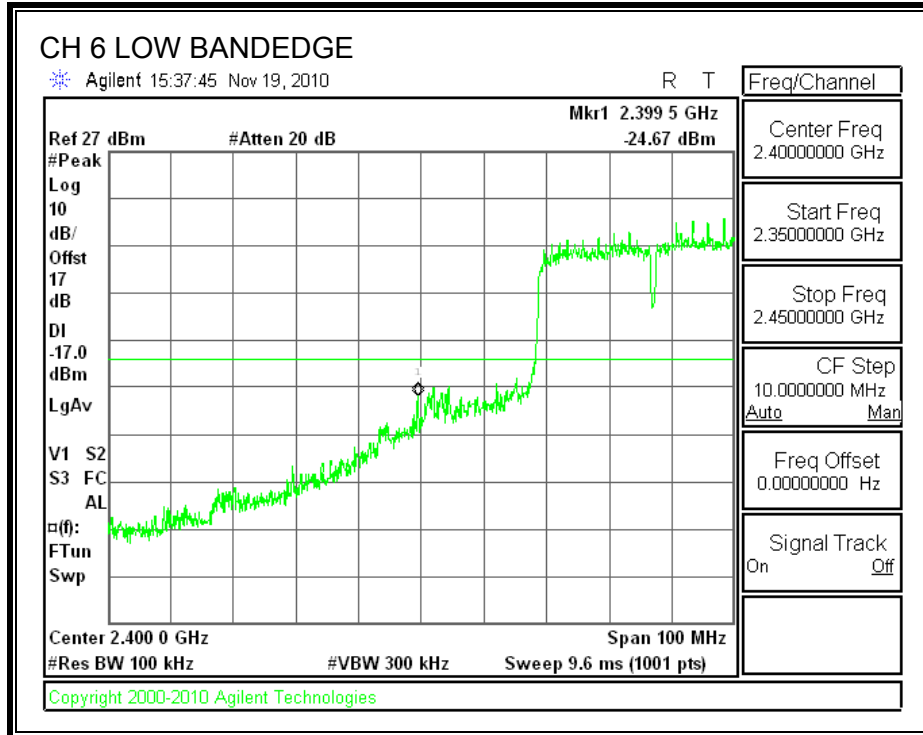
The EUT was set to transmit at mid channel, 30 dBc display line was set with reference to mid channel level.

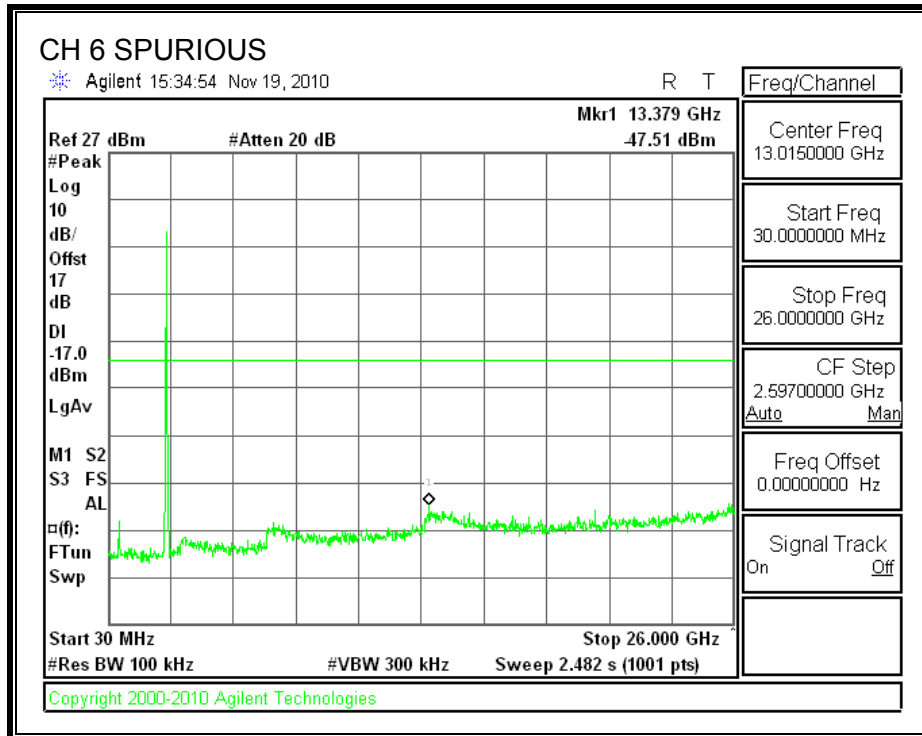
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the middle channel.

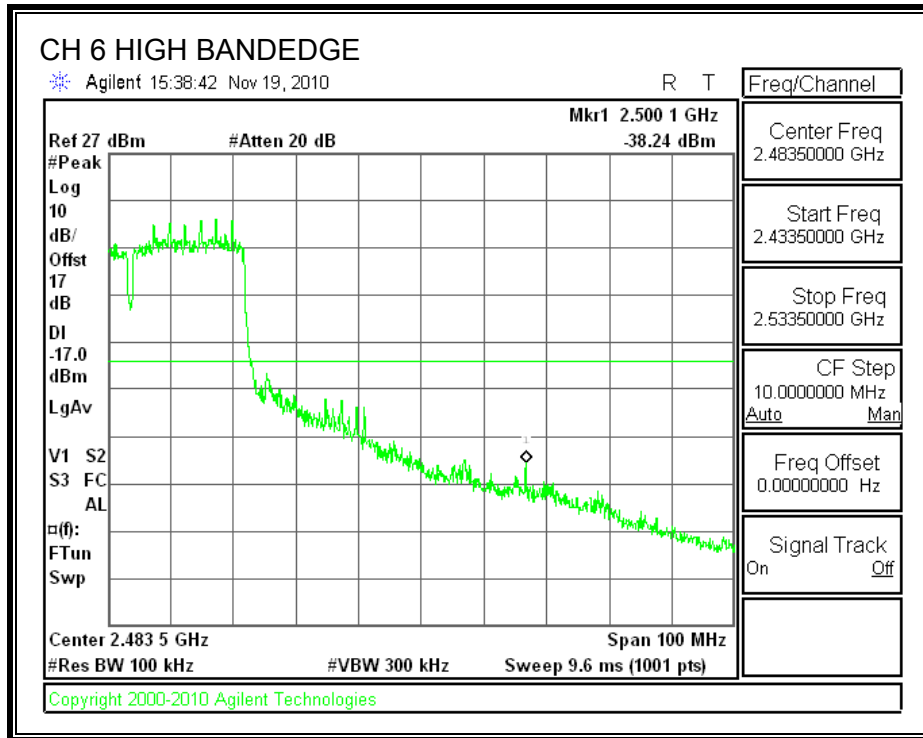
RESULTS

SPURIOUS EMISSIONS

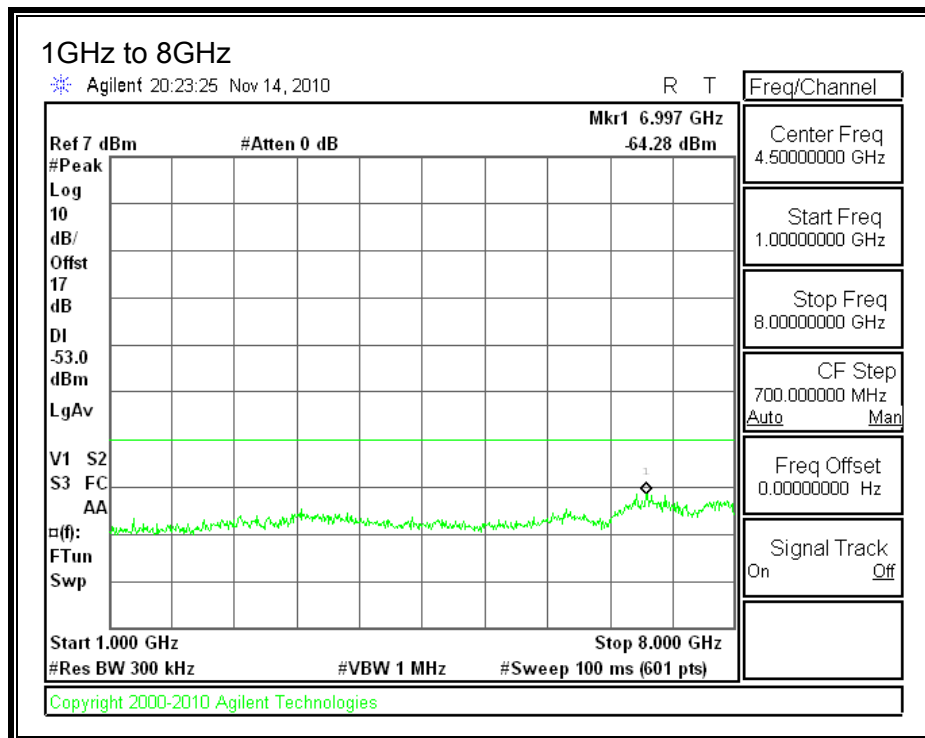
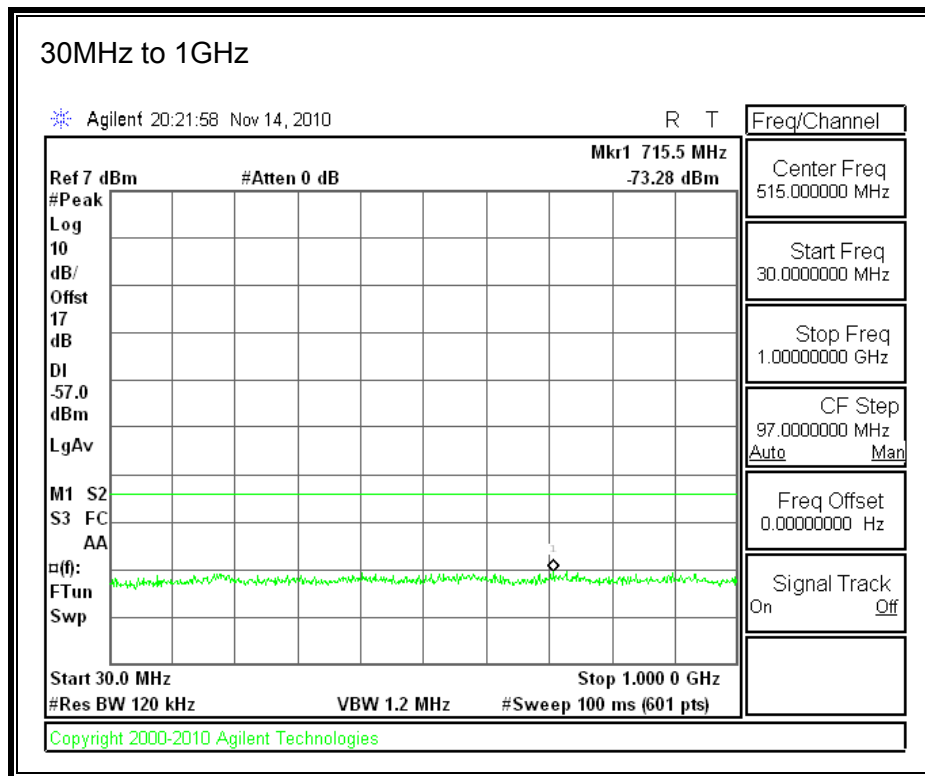








7.7. RECEIVE SPURIOUS



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

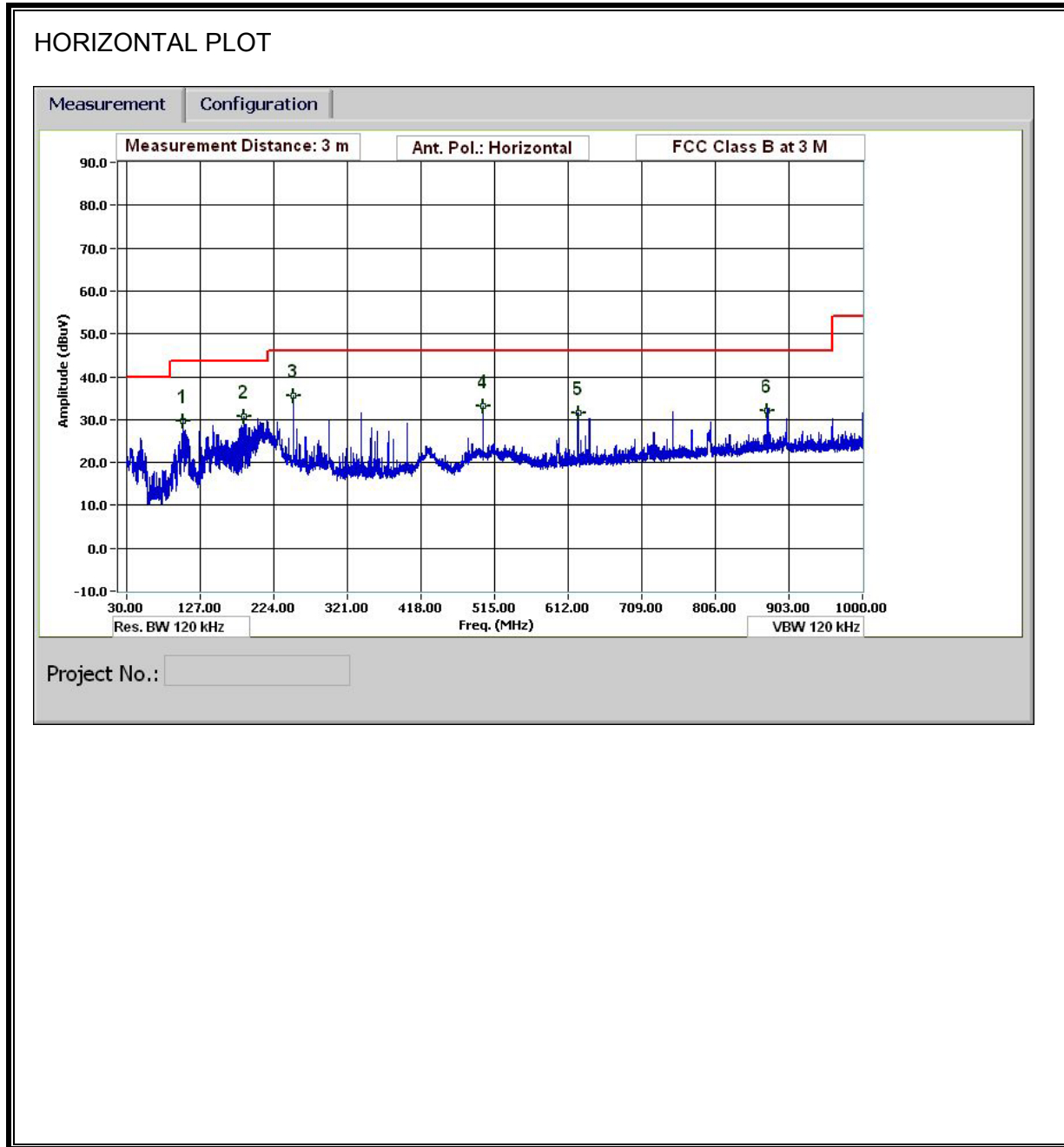
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

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

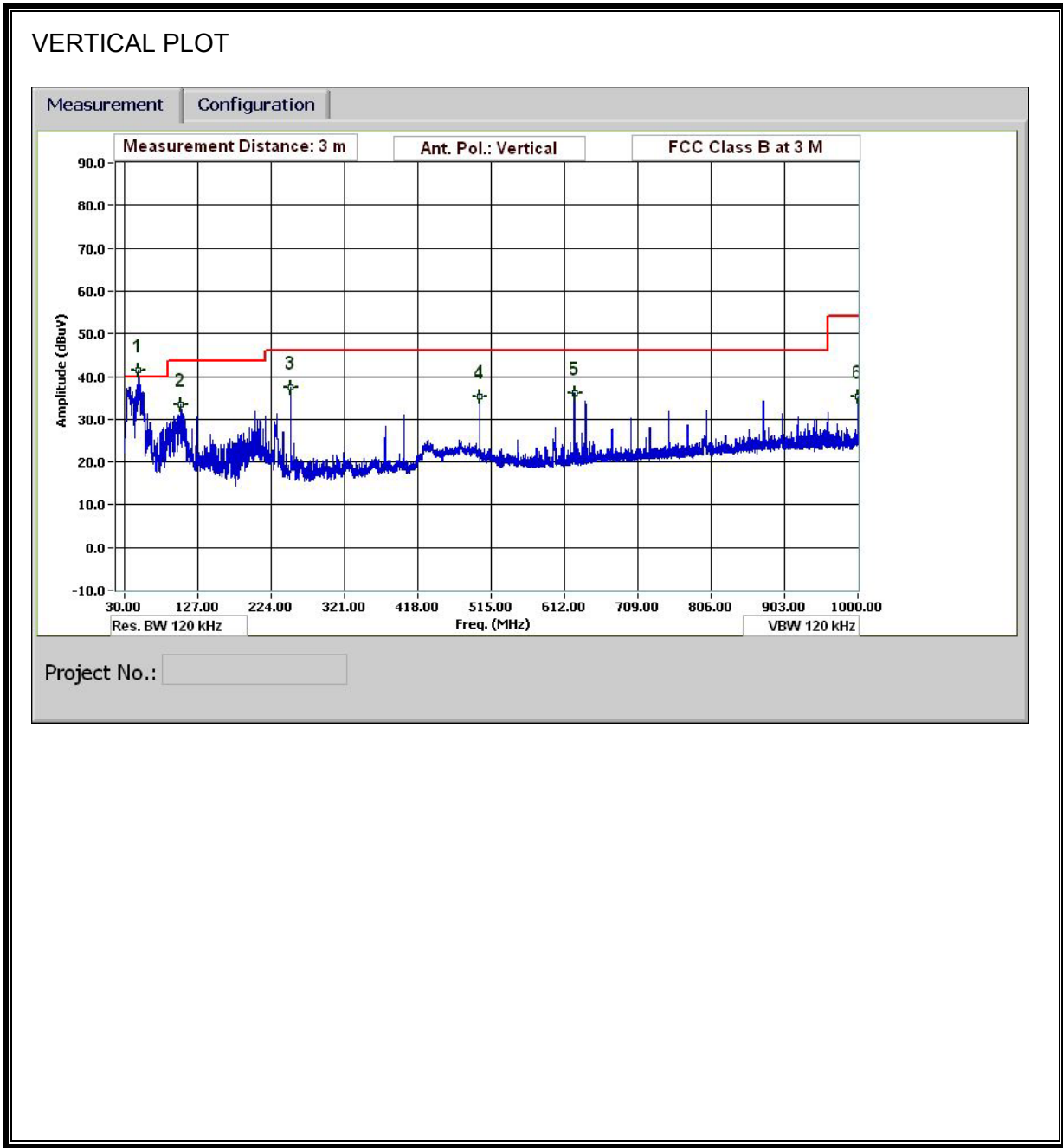
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

8.2. WORST-CASE BELOW 1 GHz

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



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



VERTICAL DATA

30-1000MHz Frequency Measurement															
Compliance Certification Services, Fremont 5m Chamber															
Test Engr:		Thanh Nguyen													
Date:		11/10/10													
Project #:		10U13195													
Company:		2 Wire, Inc.													
Test Target:		FCC Class B													
Mode Oper:		Transmit Worst case													
f	Measurement Frequency	Amp	Preamp Gain	Margin	Margin vs. Limit										
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters												
Read	Analyzer Reading	Filter	Filter Insert Loss												
AF	Antenna Factor	Corr.	Calculated Field Strength												
CL	Cable Loss	Limit	Field Strength Limit												
f MHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Pad dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol V/H	Det. P/A/QP	Ant. High cm	Table Angle Degree	Notes
Upward Position															
Tx worst case															
47.761	3.0	57.2	9.5	0.6	28.4	0.0	0.0	38.9	40.0	-1.1	V	QP	100.0	0 - 360	
104.763	3.0	50.1	10.8	0.9	28.3	0.0	0.0	33.5	43.5	-10.0	V	P	100.0	0 - 360	
249.969	3.0	52.4	11.8	1.4	28.2	0.0	0.0	37.3	46.0	-8.7	V	P	100.0	0 - 360	
499.939	3.0	44.5	16.7	2.0	27.8	0.0	0.0	35.4	46.0	-10.6	V	P	100.0	0 - 360	
624.985	3.0	42.5	18.7	2.3	27.4	0.0	0.0	36.1	46.0	-9.9	V	P	100.0	0 - 360	
1000	3.0	37.8	22.5	3.0	27.9	0.0	0.0	35.3	54.0	-18.7	V	P	100.0	0 - 360	
104.763	3.0	46.3	10.8	0.9	28.3	0.0	0.0	29.8	43.5	-13.7	H	P	100.0	0 - 360	
184.926	3.0	46.7	11.2	1.2	28.2	0.0	0.0	30.9	43.5	-12.6	H	P	100.0	0 - 360	
249.969	3.0	50.5	11.8	1.4	28.2	0.0	0.0	35.5	46.0	-10.5	H	P	100.0	0 - 360	
500.059	3.0	42.2	16.7	2.0	27.8	0.0	0.0	33.1	46.0	-12.9	H	P	100.0	0 - 360	
624.985	3.0	38.0	18.7	2.3	27.4	0.0	0.0	31.6	46.0	-14.4	H	P	100.0	0 - 360	
874.955	3.0	35.4	21.6	2.8	27.7	0.0	0.0	32.1	46.0	-13.9	H	P	100.0	0 - 360	
Rev. 1.27.09															
Note: No other emissions were detected above the system noise floor.															

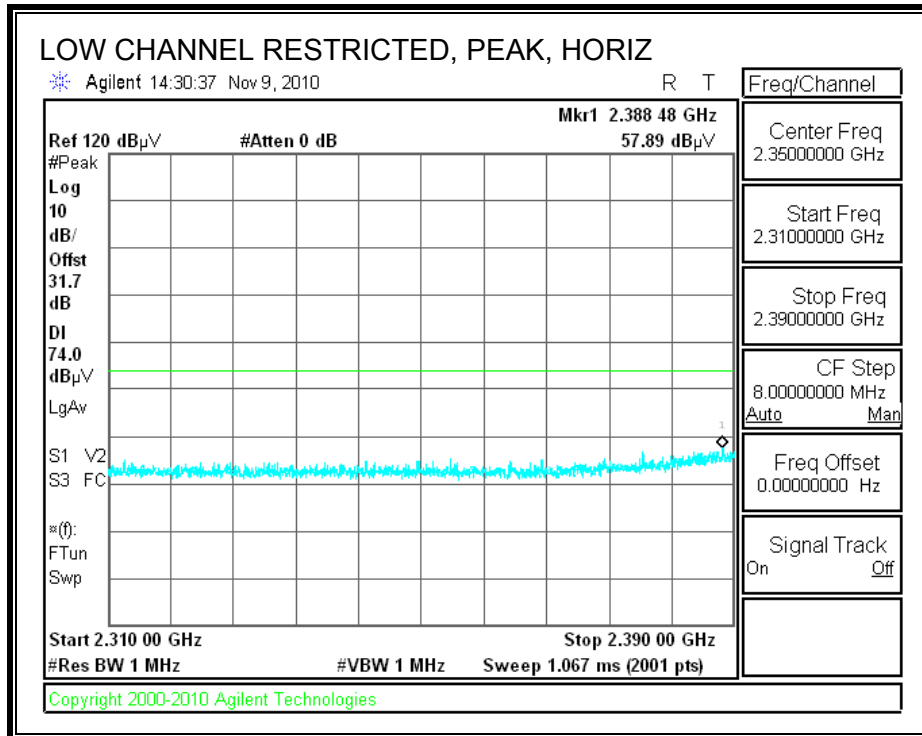
8.3. TRANSMITTER ABOVE 1 GHz

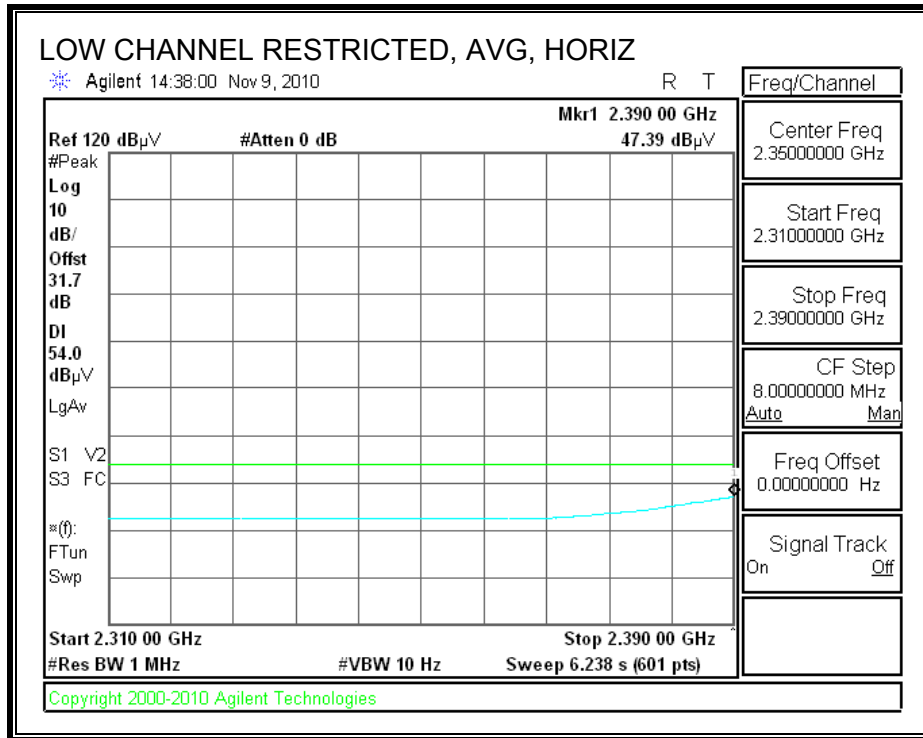
8.3.1. TX ABOVE 1 GHz FOR 802.11b MODE IN THE 2.4 GHz BAND

Note: channel 1 was tested at the power level of channel 2, the power levels for CH2 is higher than the power level of CH1; hence this is worst-case measurement.

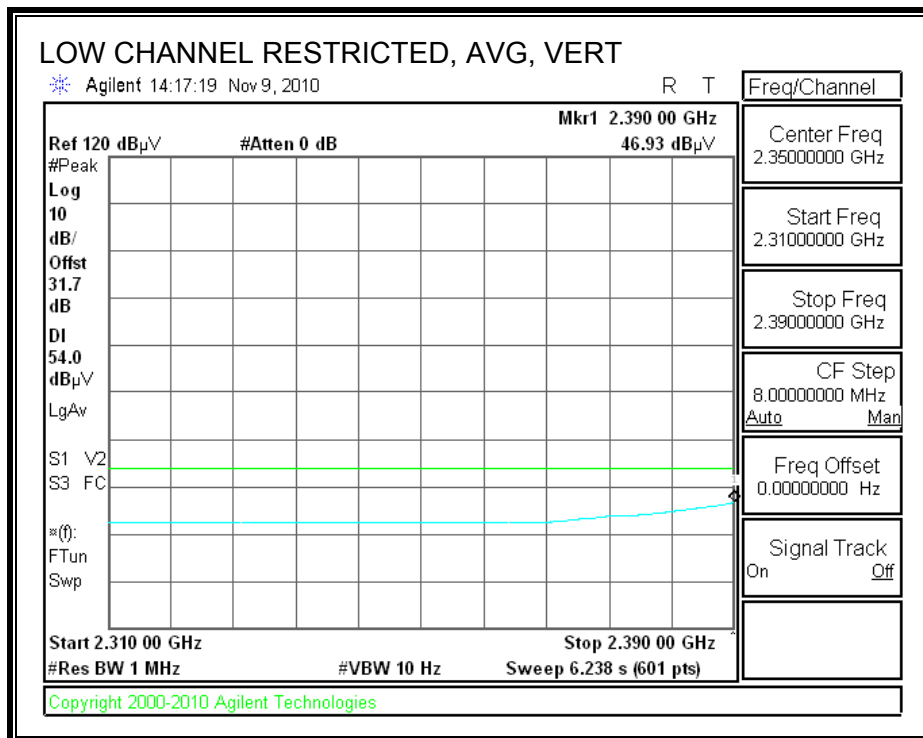
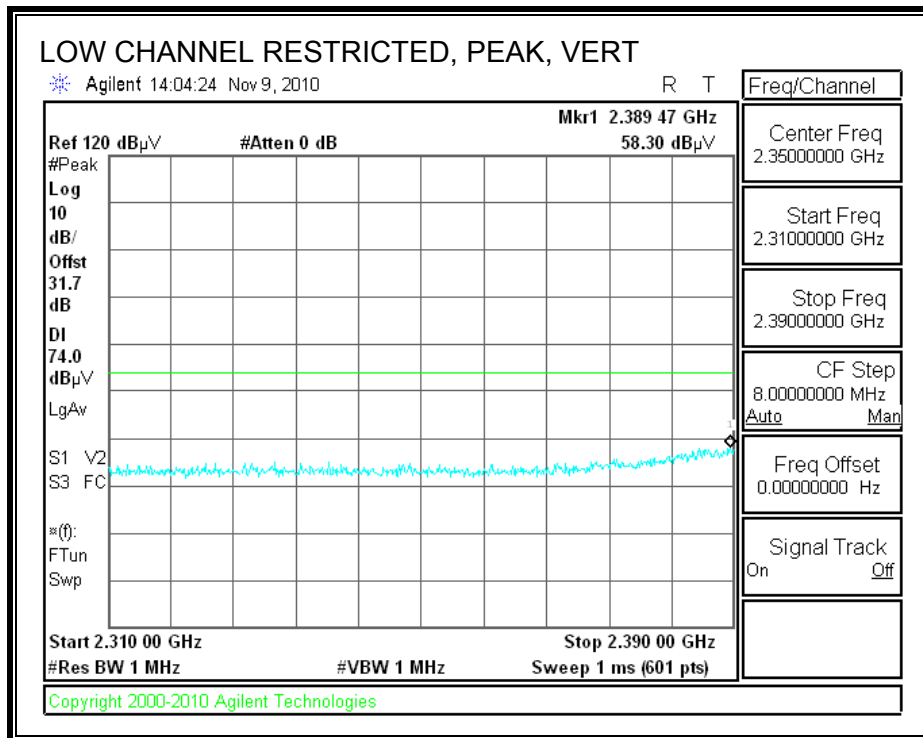
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

CH1



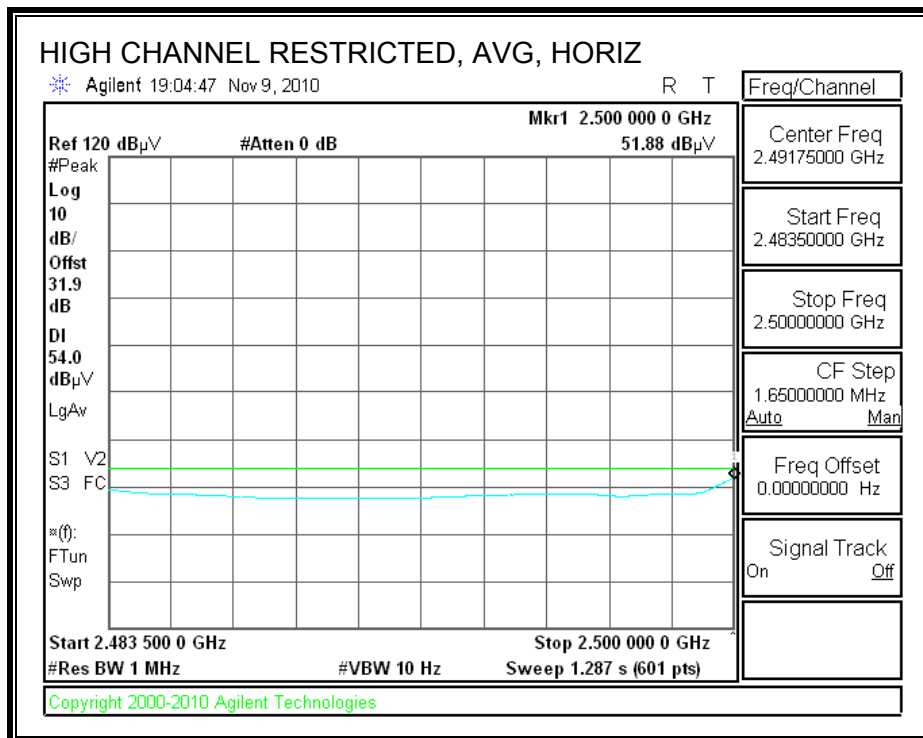
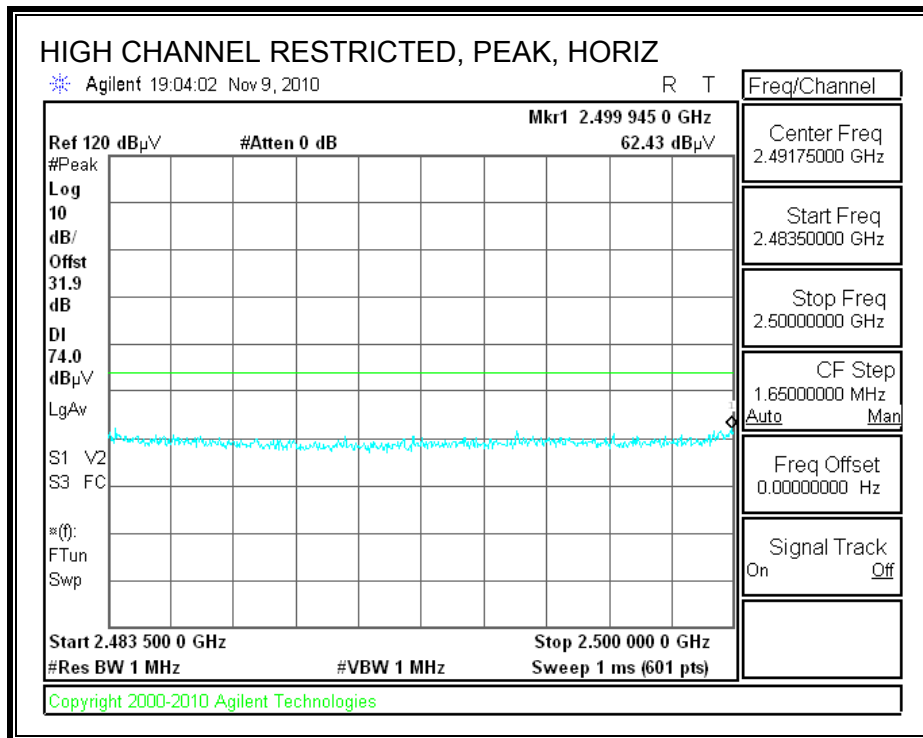


RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

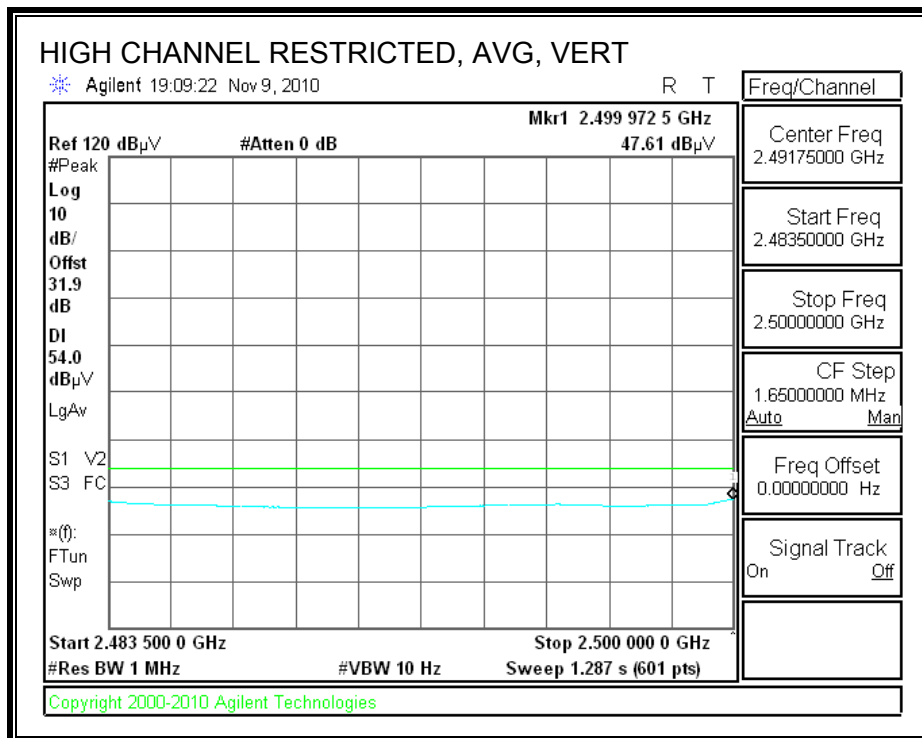
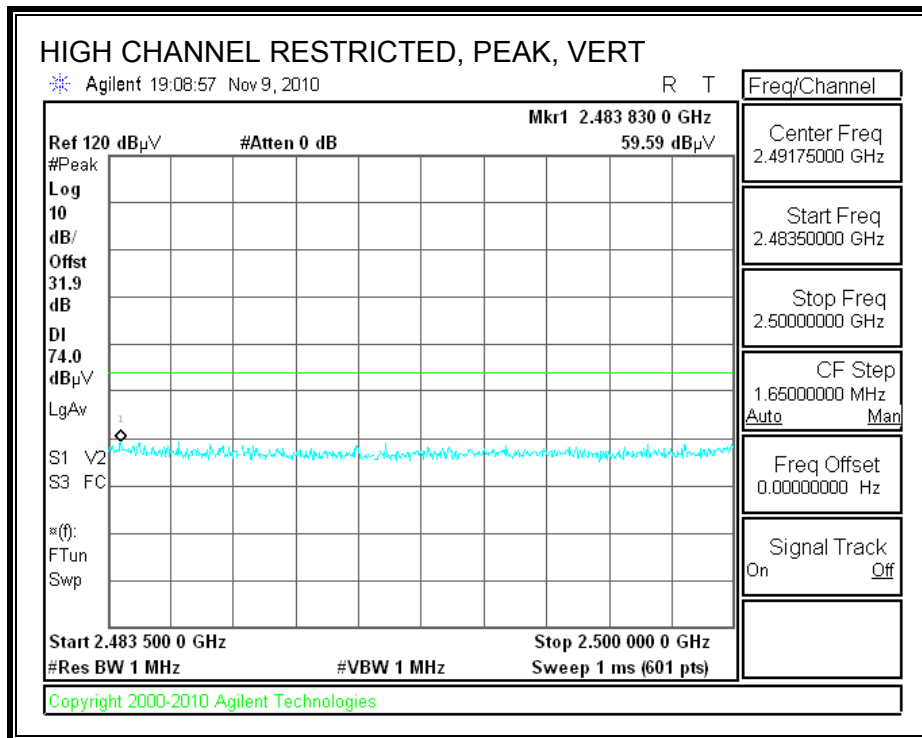


RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

CH10

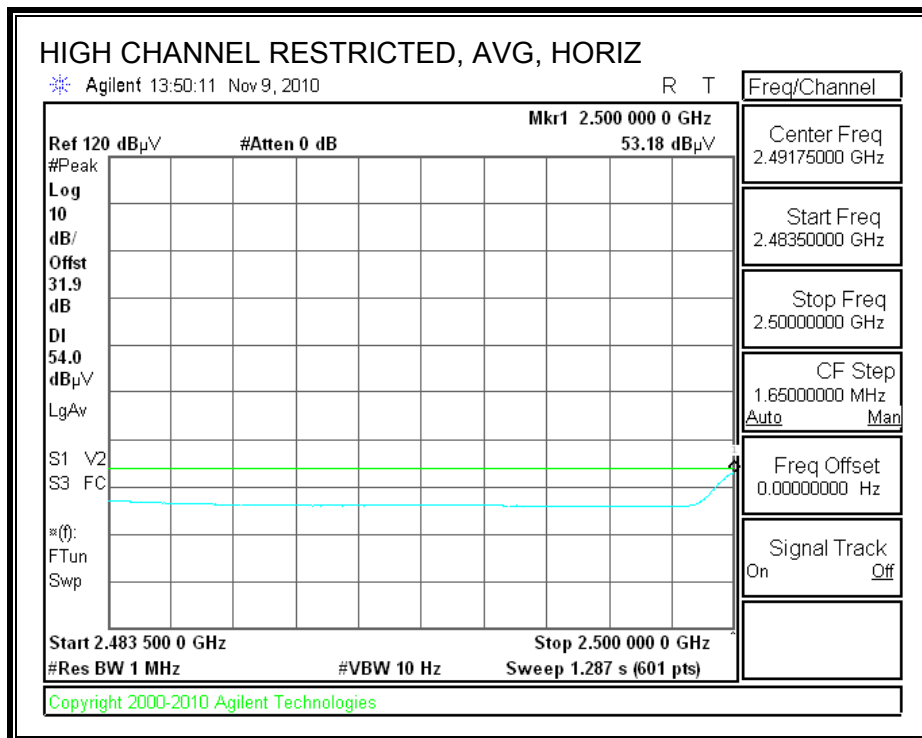
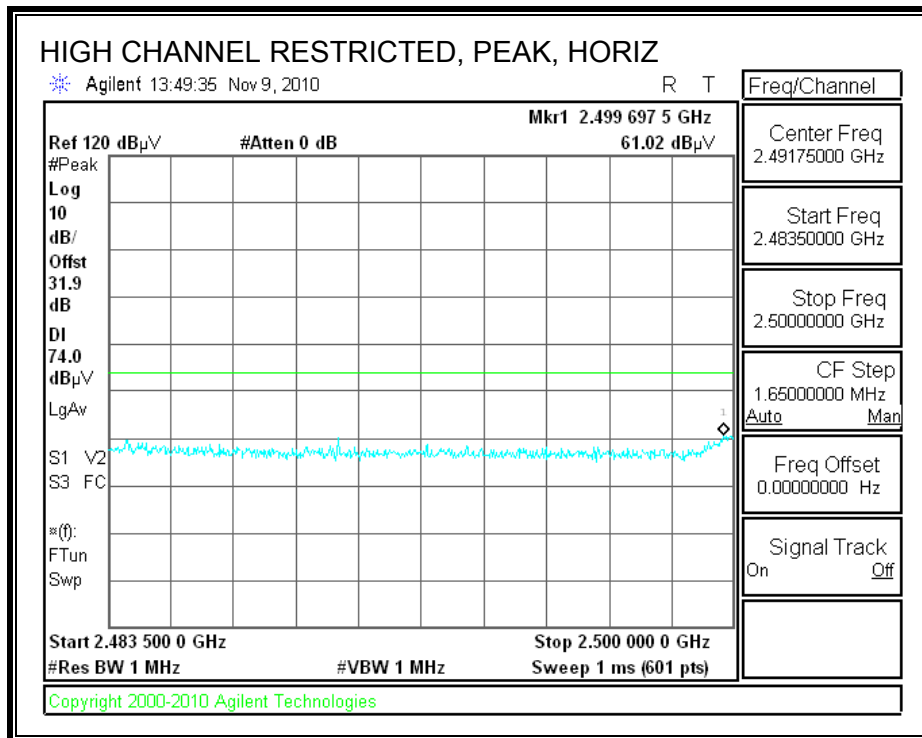


RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

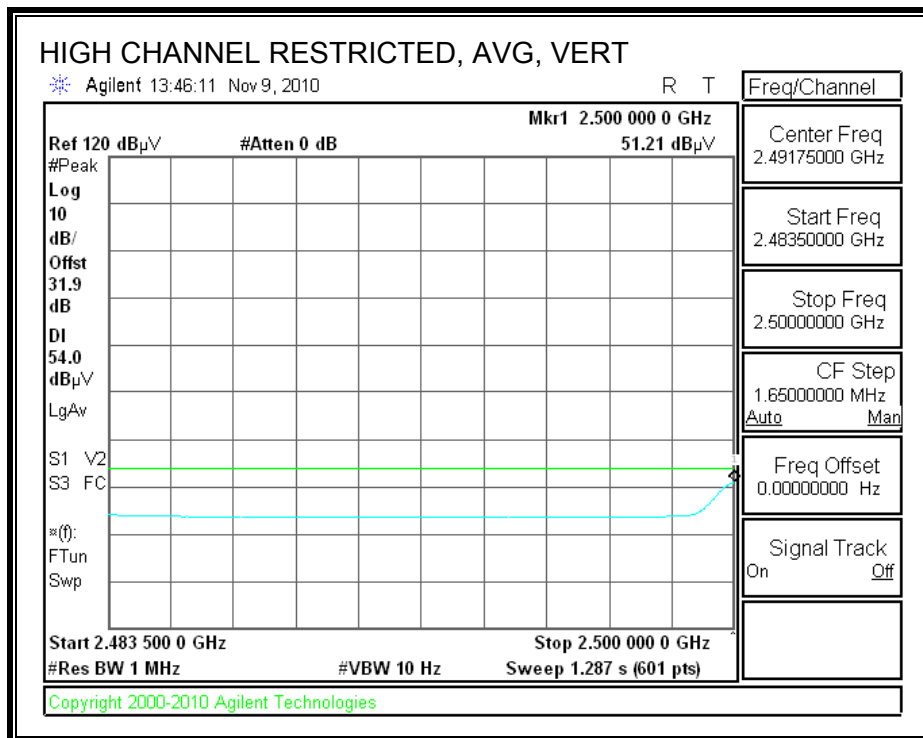
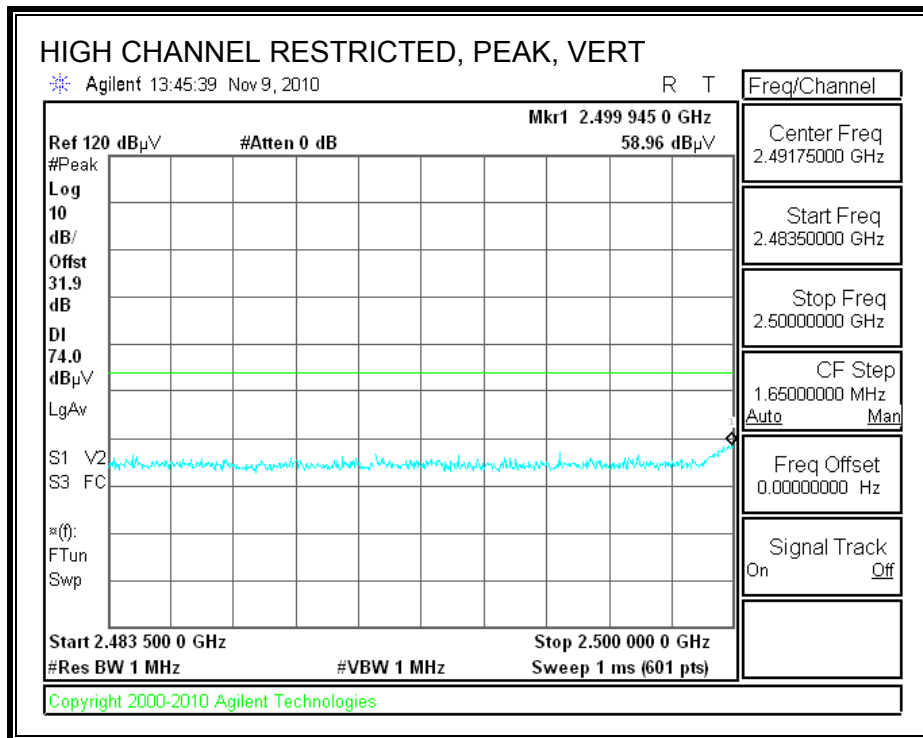


RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

CH11



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



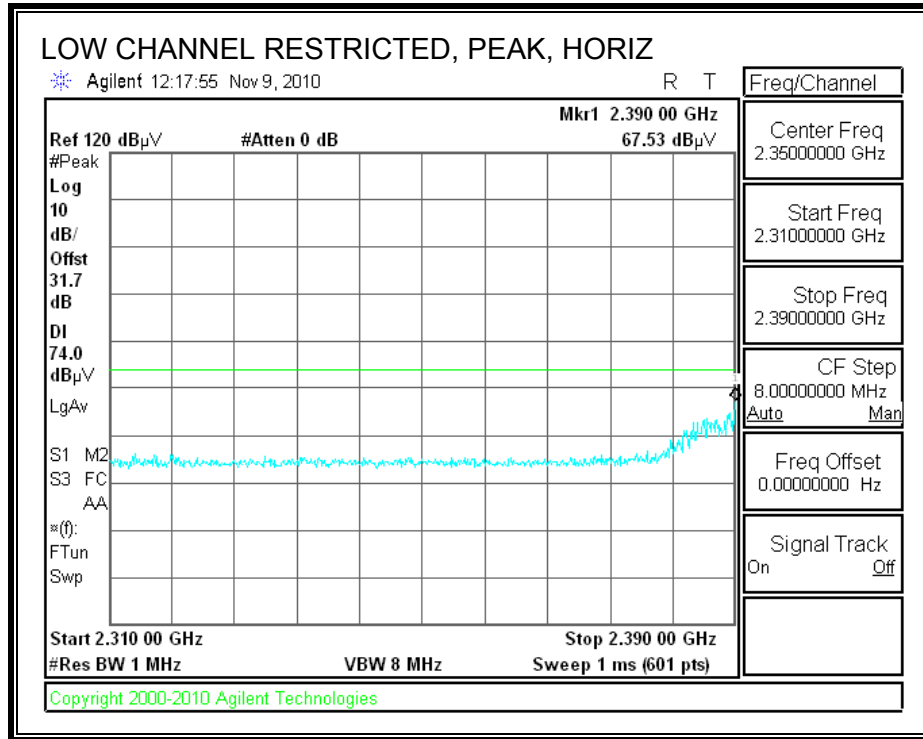
HARMONICS AND SPURIOUS EMISSIONS

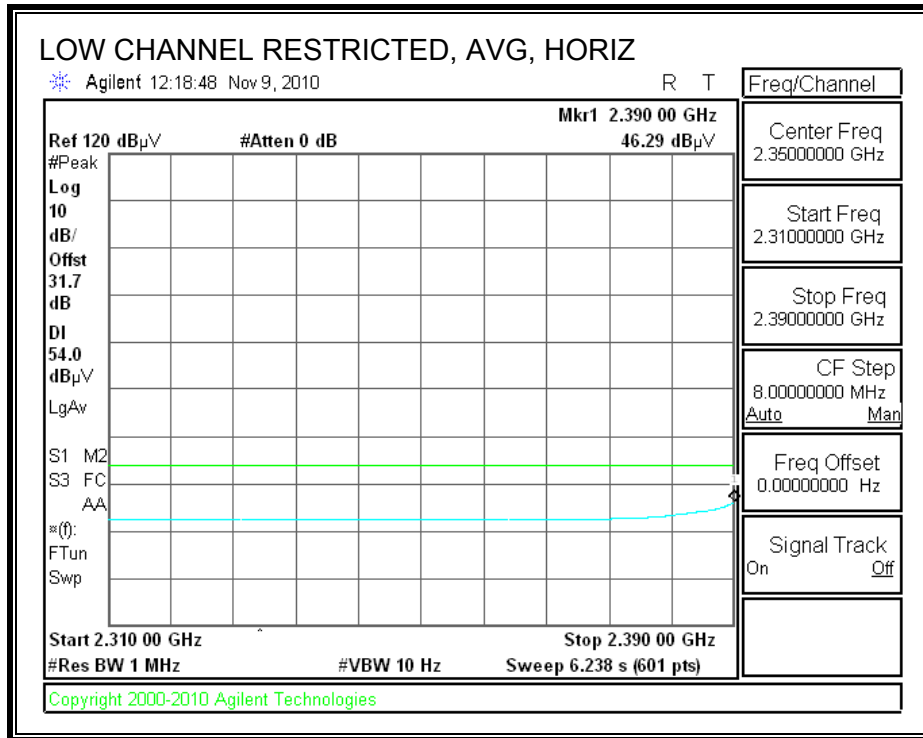
High Frequency Measurement																	
Compliance Certification Services, Fremont 5m Chamber																	
Company:		2 WIRE, Inc.															
Project #:		10U13493															
Date:		11/10/2010															
Test Engineer:		Thanh Nguyen															
Configuration:		EUT only															
Mode:		Transmit b mode															
Test Equipment:																	
Horn 1-18GHz				Pre-amplifier 1-26GHz				Pre-amplifier 26-40GHz				Horn > 18GHz				Limit	
T73; S/N: 6717 @3m				T144 Miteq 3008A00931												FCC 15.205	
Hi Frequency Cables																	
3' cable 22807700				12' cable 22807600				20' cable 22807500				HPF		Reject Filter		Peak Measurements RBW=VBW=1MHz Average Measurements RBW=1MHz; VBW=10Hz	
3' cable 22807700				12' cable 22807600										R_001			
f	Dist	Read Pk	Read Avg.	AF	CL	Amp	D Corr	Filt	Peak	Avg	Pk Lim	Avg Lim	Pk Mar	Avg Mar	Notes		
GHz	(m)	dBuV	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	dB	(V/H)		
Low Channel																	
1.000	3.0	58.7	49.4	23.9	0.8	-39.5	0.0	0.0	43.9	34.6	74	54	-30.1	-19.4	H		
4.824	3.0	47.2	44.0	33.0	2.0	-36.5	0.0	0.0	45.8	42.6	74	54	-28.2	-11.4	H		
12.060	3.0	35.5	25.1	39.0	3.5	-35.4	0.0	0.0	42.5	32.2	74	54	-31.5	-21.8	Noise floor		
4.824	3.0	40.6	33.9	33.0	2.0	-36.5	0.0	0.0	39.2	32.5	74	54	-34.8	-21.5	V		
12.060	3.0	35.5	25.1	39.0	3.5	-35.4	0.0	0.0	42.6	32.1	74	54	-31.4	-21.9	Noise floor		
Mid Channel																	
4.874	3.0	49.2	46.3	33.1	2.0	-36.5	0.0	0.0	47.8	45.0	74	54	-26.2	-9.0	H		
7.311	3.0	41.5	34.4	35.3	2.6	-36.2	0.0	0.0	43.2	36.1	74	54	-30.8	-17.9	H		
12.185	3.0	35.2	25.7	39.0	3.5	-35.4	0.0	0.0	42.3	32.8	74	54	-31.7	-21.2	Noise floor		
4.874	3.0	40.6	32.2	33.1	2.0	-36.5	0.0	0.0	39.2	30.9	74	54	-34.8	-23.1	V		
7.311	3.0	38.8	29.0	35.3	2.6	-36.2	0.0	0.0	40.5	30.6	74	54	-33.5	-23.4	Noise floor		
High Channel																	
4.924	3.0	44.8	40.4	33.1	2.1	-36.5	0.0	0.0	43.6	39.1	74	54	-30.4	-14.9	H		
7.386	3.0	40.4	28.9	35.4	2.6	-36.2	0.0	0.0	42.2	30.7	74	54	-31.8	-23.3	H		
12.310	3.0	35.6	25.6	39.0	3.5	-35.4	0.0	0.0	42.7	32.7	74	54	-31.3	-21.3	Noise floor		
4.924	3.0	38.8	28.4	33.1	2.1	-36.5	0.0	0.0	37.5	27.2	74	54	-36.5	-26.8	V		
7.386	3.0	38.7	27.5	35.4	2.6	-36.2	0.0	0.0	40.5	29.3	74	54	-33.5	-24.7	Noise floor		
Rev. 07.22.09																	
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. TX ABOVE 1 GHz FOR 802.11g MODE IN THE 2.4 GHz BAND

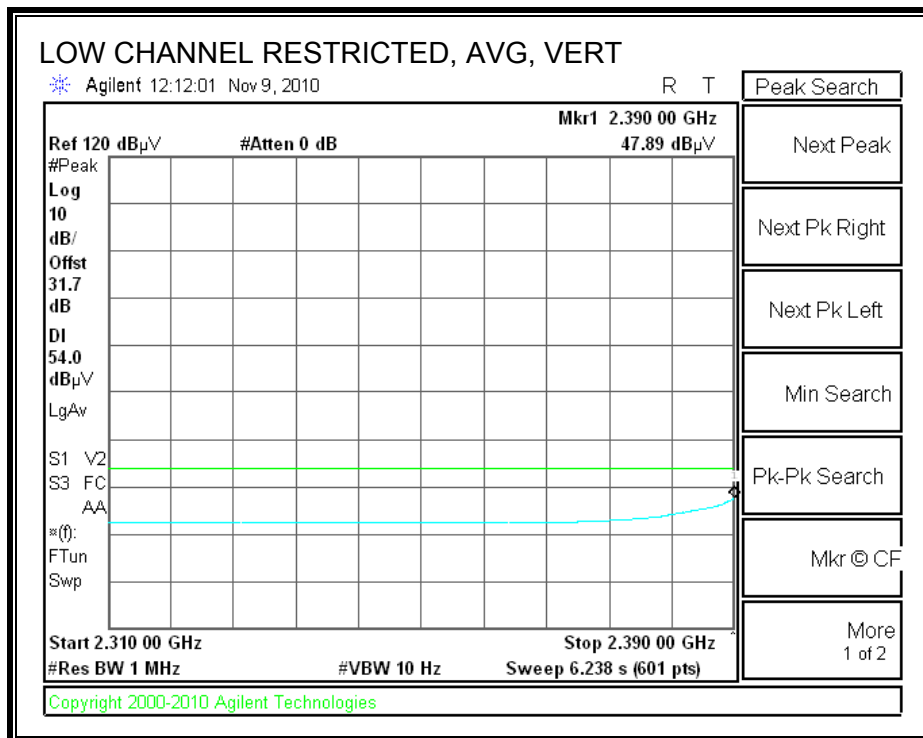
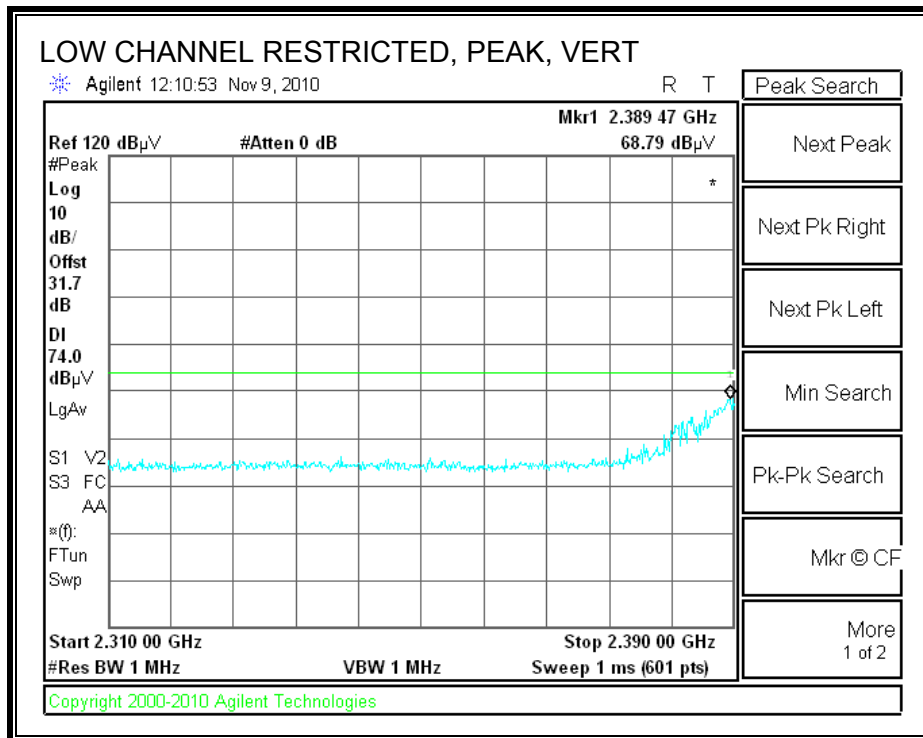
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

CH1



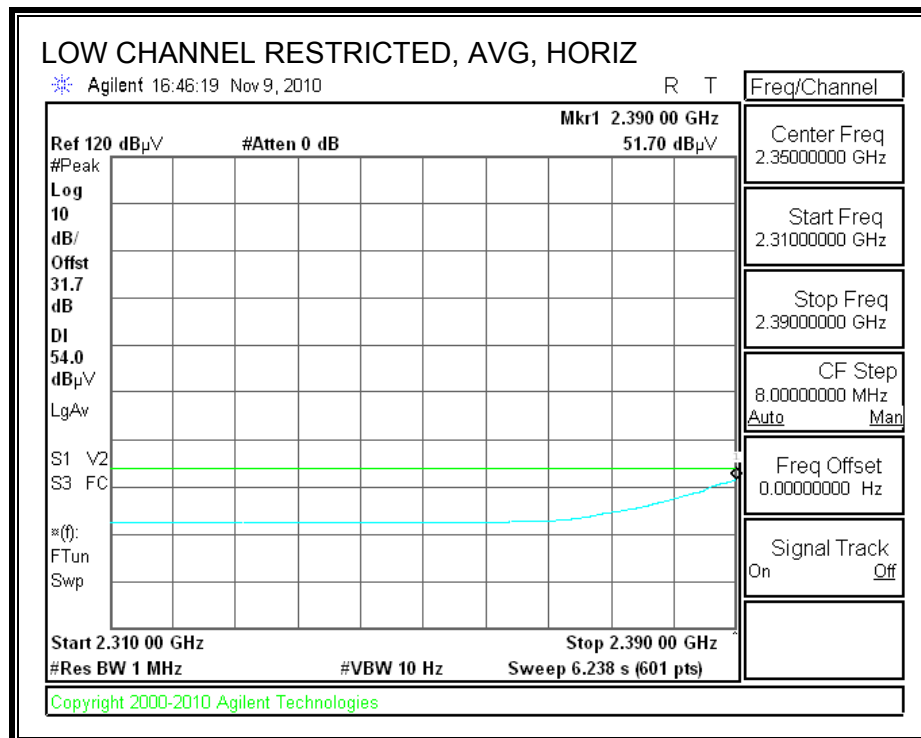
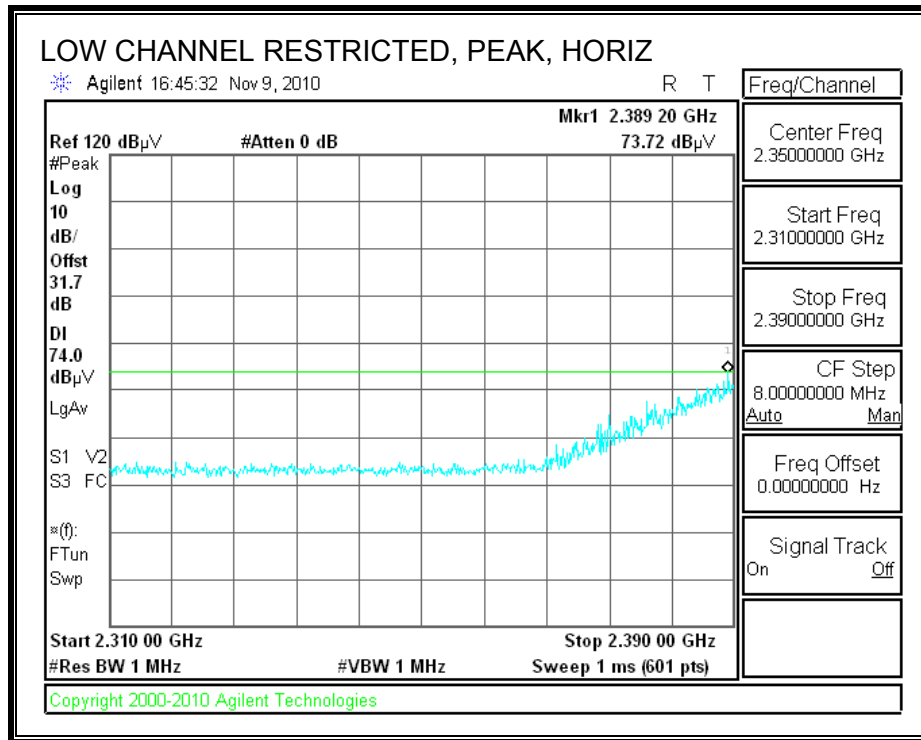


RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

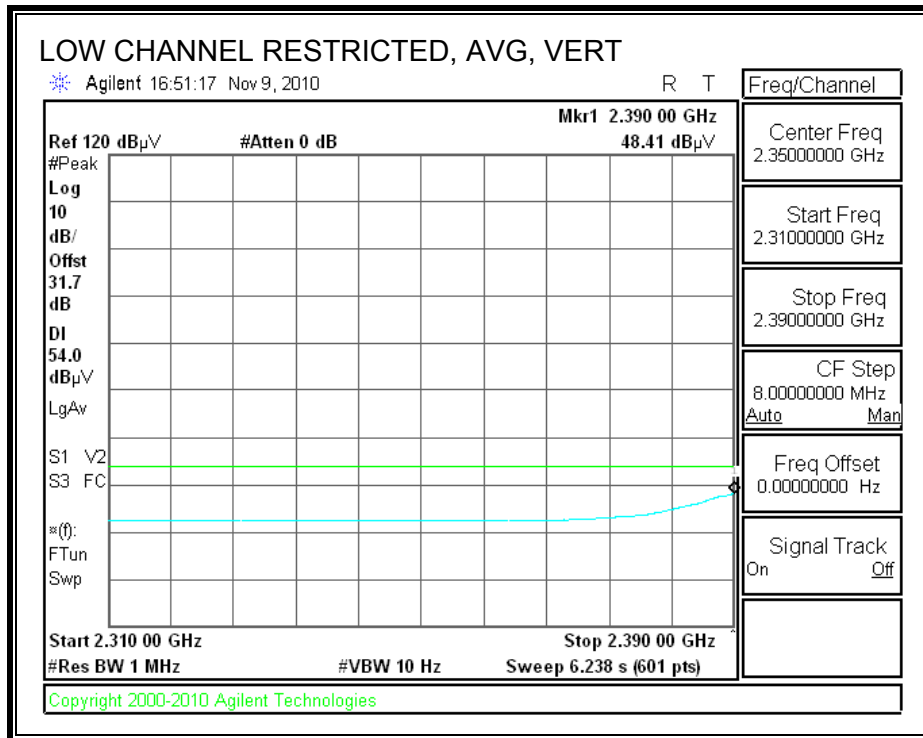
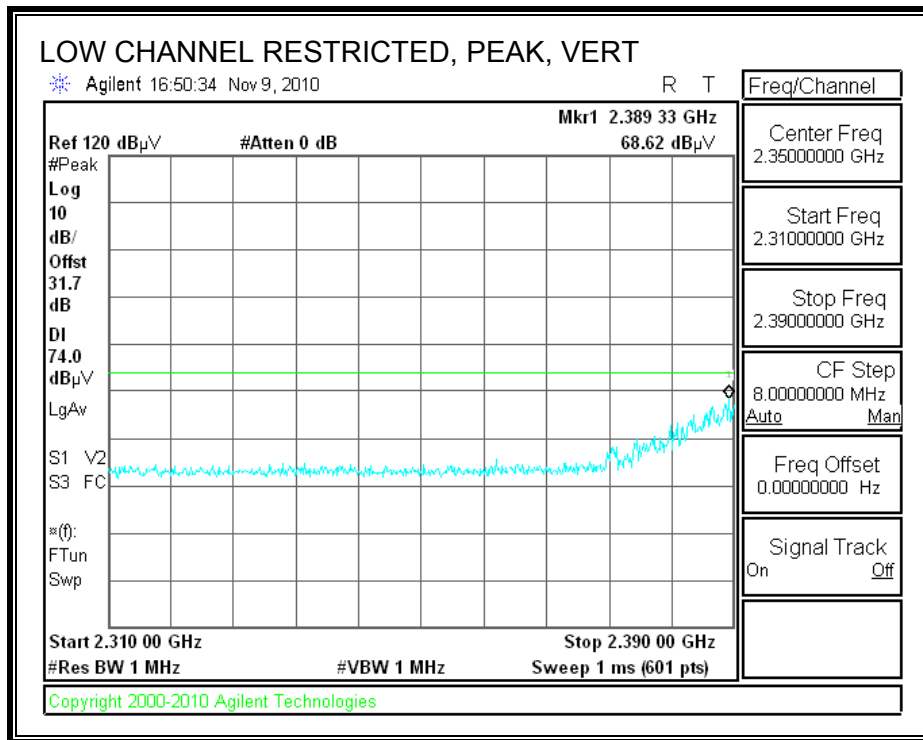


RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

CH2

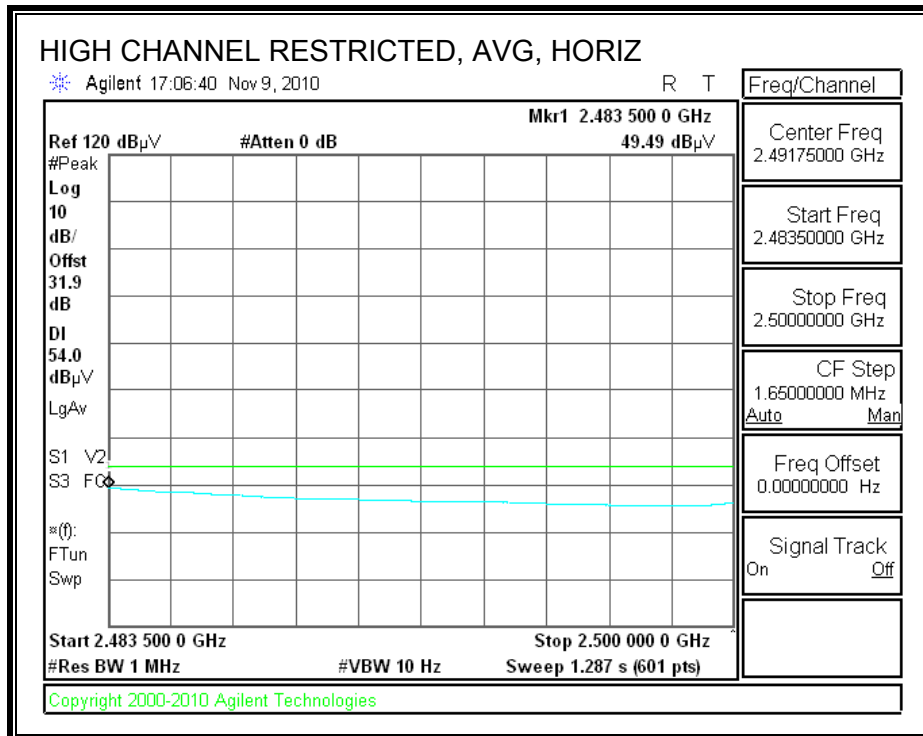
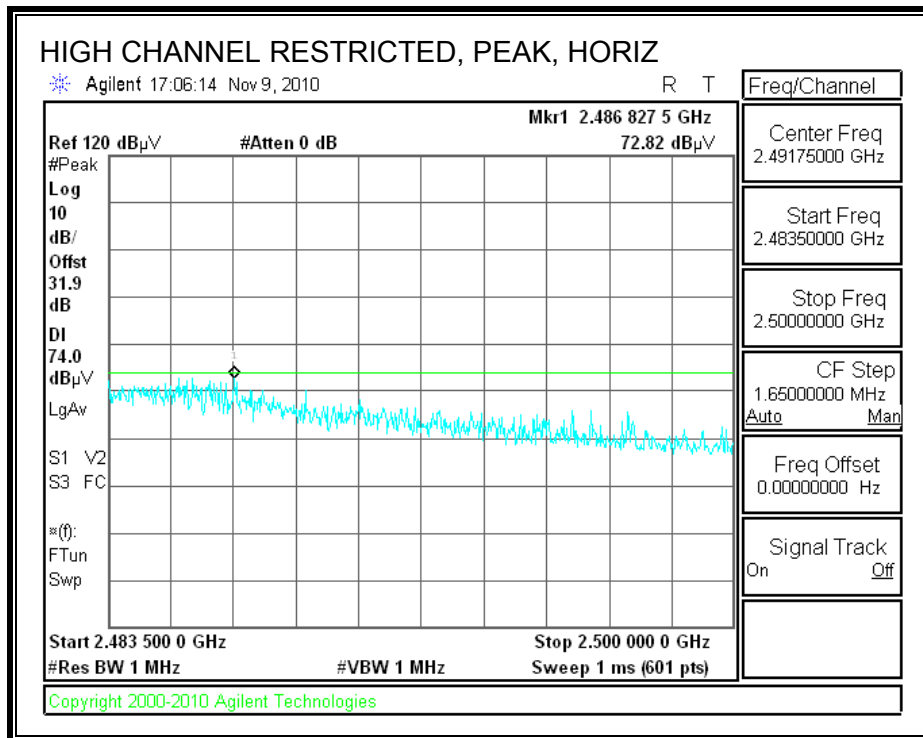


RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

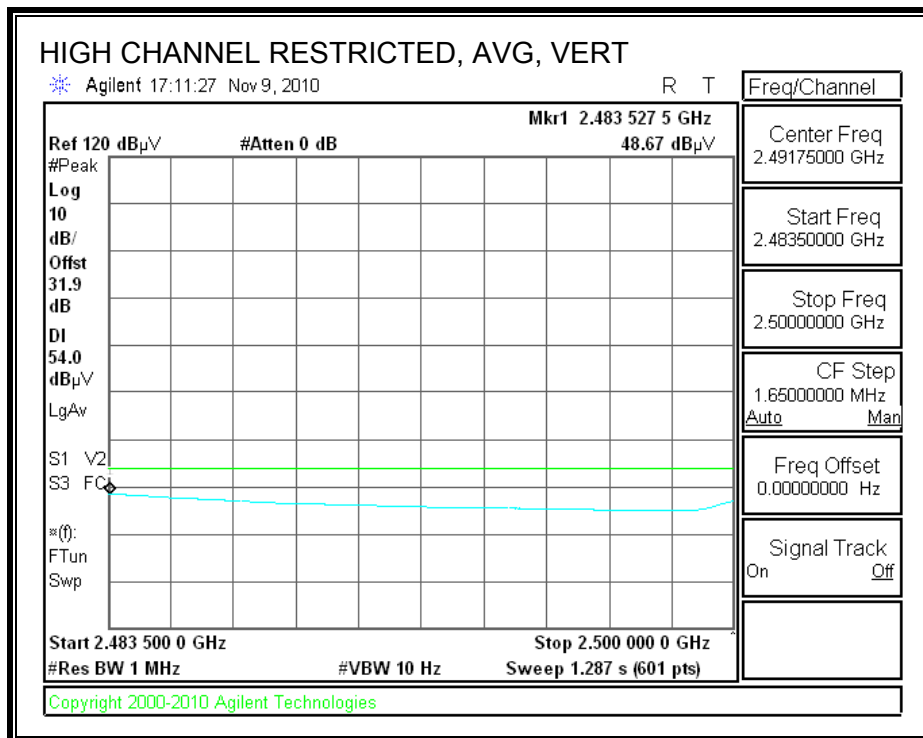
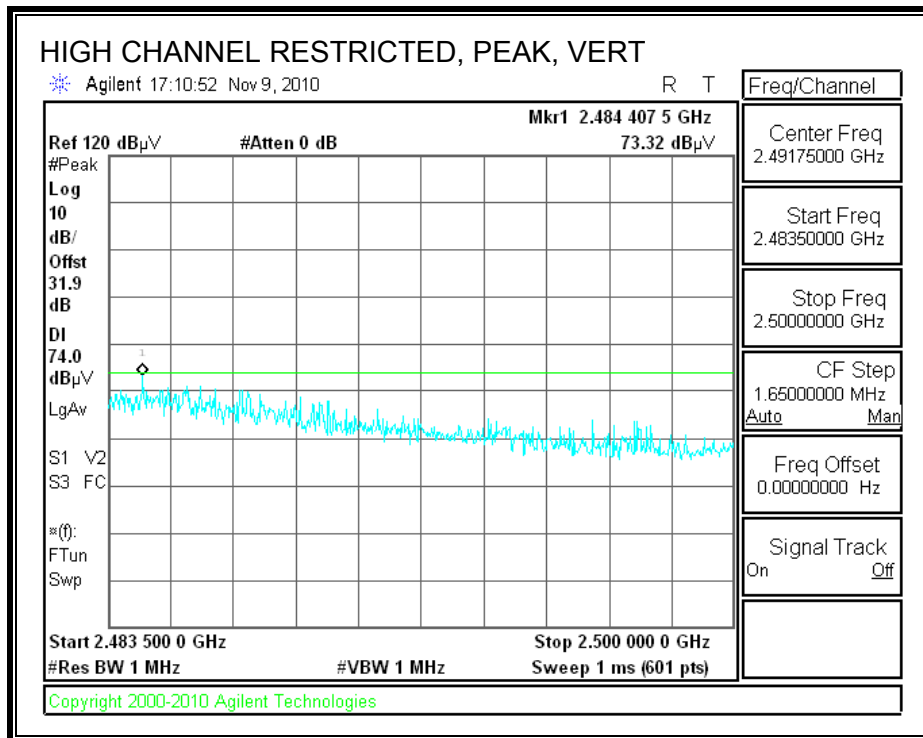


RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

CH10

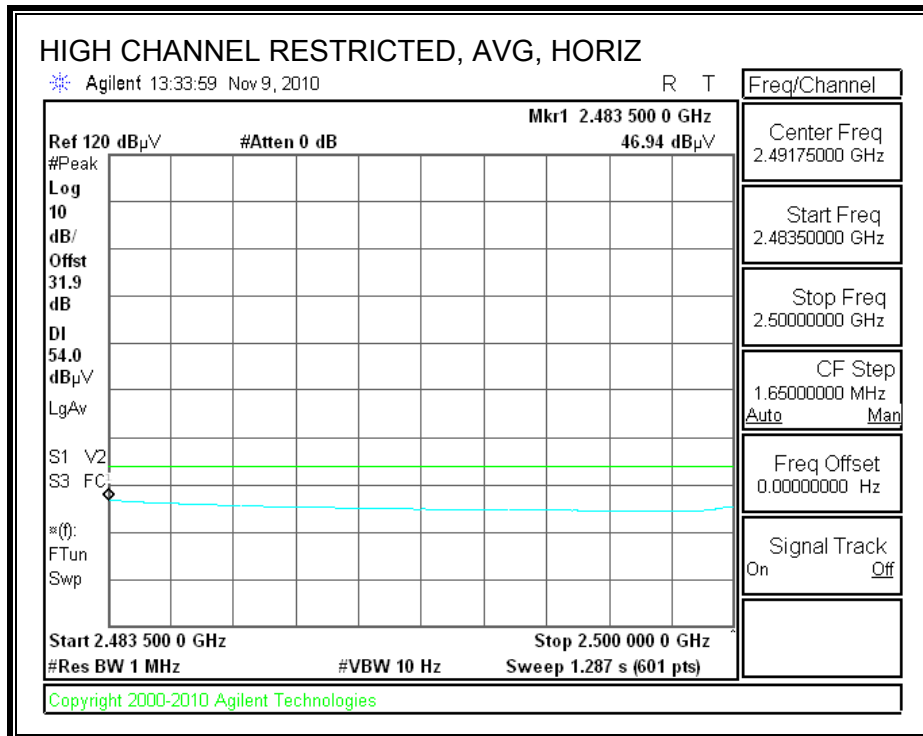
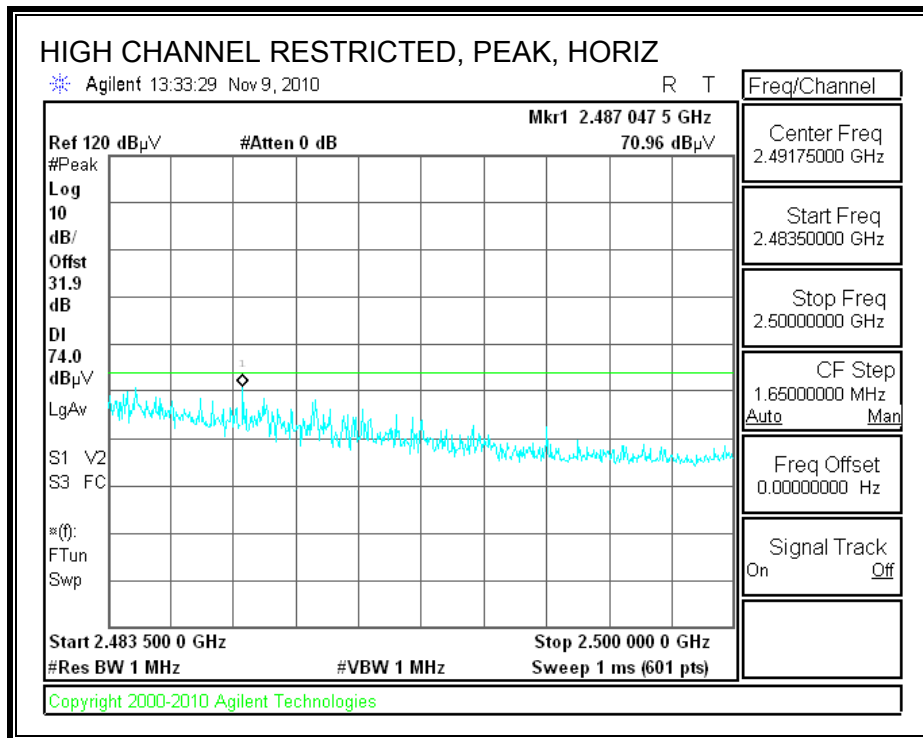


RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

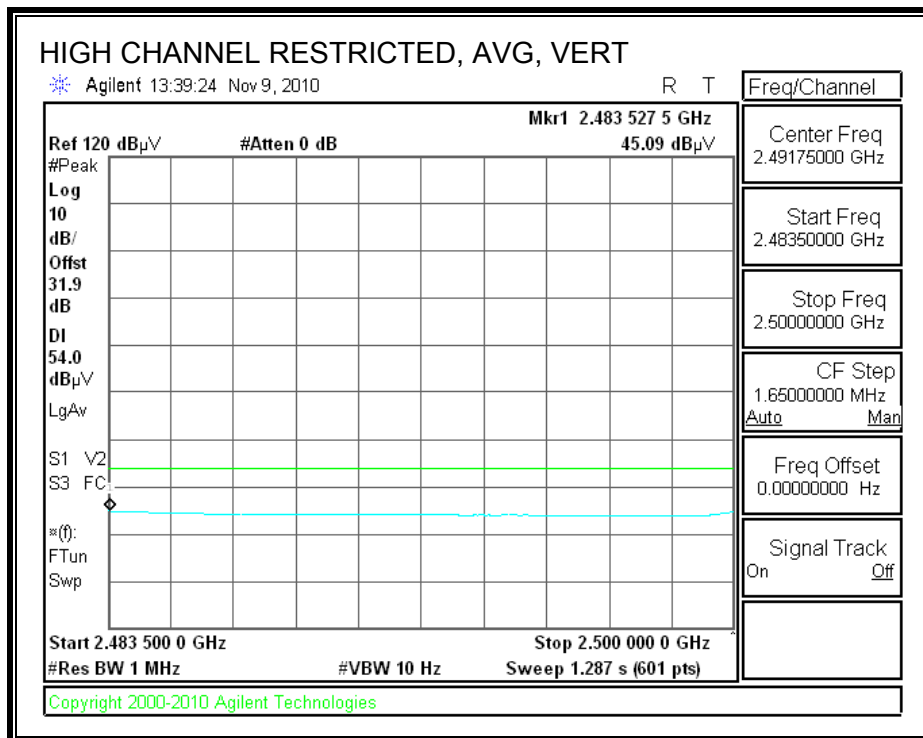
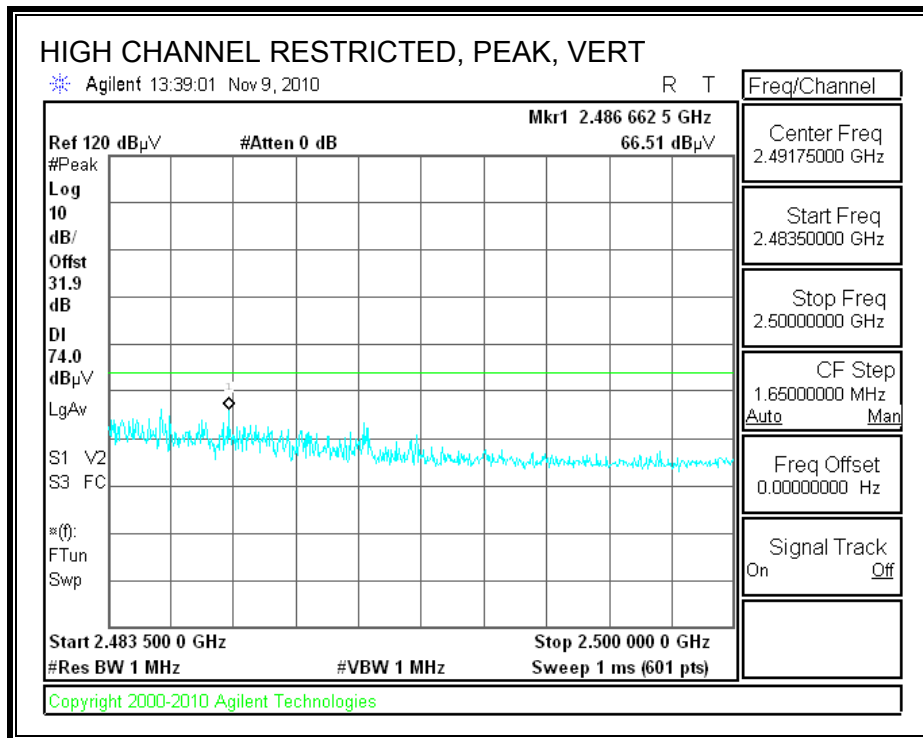


RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

CH11



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
 Compliance Certification Services, Fremont 5m Chamber

Company: 2 WIRE, Inc.
 Project #: 10U13195
 Date: 11/10/2010
 Test Engineer: Thanh Nguyen
 Configuration: EUT only
 Mode: Transmit g mode

Test Equipment:

Horn 1-18GHz	Pre-amplifier 1-26GHz	Pre-amplifier 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T144 Miteq 3008A00931			FCC 15.205

HI Frequency Cables

3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF	Reject Filter	Peak Measurements RBW=VBW=1MHz
3' cable 22807700	12' cable 22807600			R_001	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)
Low Channel															
4.824	3.0	44.8	32.6	33.0	2.0	-36.5	0.0	0.0	43.4	31.2	74	54	-30.6	-22.8	H
12.060	3.0	35.7	25.9	39.0	3.5	-35.4	0.0	0.0	42.8	33.0	74	54	-31.2	-21.0	Noise floor
4.824	3.0	39.3	33.5	33.0	2.0	-36.5	0.0	0.0	37.9	32.1	74	54	-36.1	-21.9	V
Mid Channel															
4.874	3.0	47.1	35.0	33.1	2.0	-36.5	0.0	0.0	45.7	33.6	74	54	-28.3	-20.4	H
7.311	3.0	38.3	28.7	35.3	2.6	-36.2	0.0	0.0	40.0	30.3	74	54	-34.0	-23.7	H
12.185	3.0	34.6	25.4	39.0	3.5	-35.4	0.0	0.0	41.7	32.5	74	54	-32.3	-21.5	Noise floor
4.874	3.0	39.4	28.4	33.1	2.0	-36.5	0.0	0.0	38.1	27.0	74	54	-35.9	-27.0	V
7.311	3.0	36.9	28.4	35.3	2.6	-36.2	0.0	0.0	38.5	30.0	74	54	-35.5	-24.0	Noise floor
High Channel															
4.924	3.0	43.9	32.4	33.1	2.1	-36.5	0.0	0.0	42.7	31.1	74	54	-31.3	-22.9	H
7.386	3.0	38.4	27.6	35.4	2.6	-36.2	0.0	0.0	40.2	29.4	74	54	-33.8	-24.6	H
12.310	3.0	35.3	25.6	39.0	3.5	-35.4	0.0	0.0	42.4	32.7	74	54	-31.6	-21.3	Noise floor
4.924	3.0	36.9	27.7	33.1	2.1	-36.5	0.0	0.0	35.6	26.4	74	54	-38.4	-27.6	V
7.386	3.0	38.5	27.7	35.4	2.6	-36.2	0.0	0.0	40.3	29.5	74	54	-33.7	-24.5	Noise floor

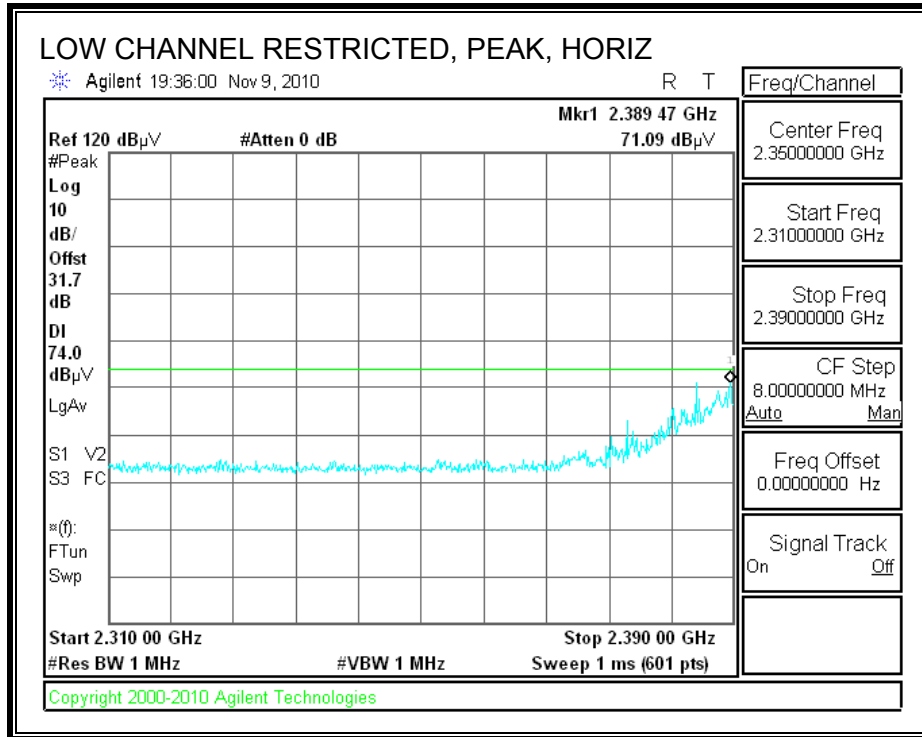
Rev. 07.22.09

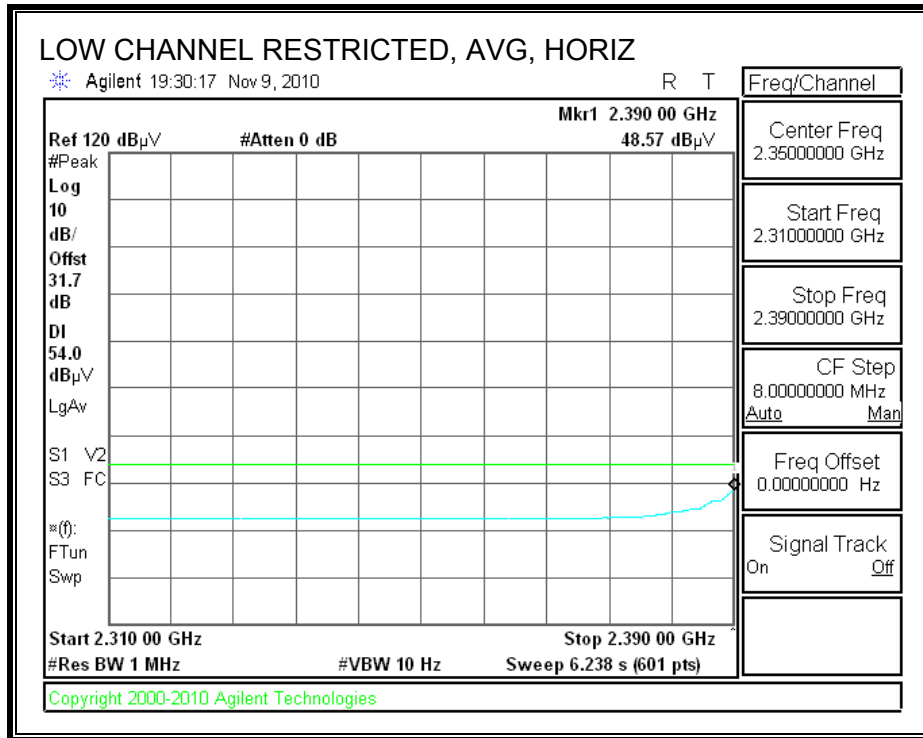
f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field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

8.3.3. TX ABOVE 1 GHz 802.11n HT20 1TX IN 2.4 GHz BAND

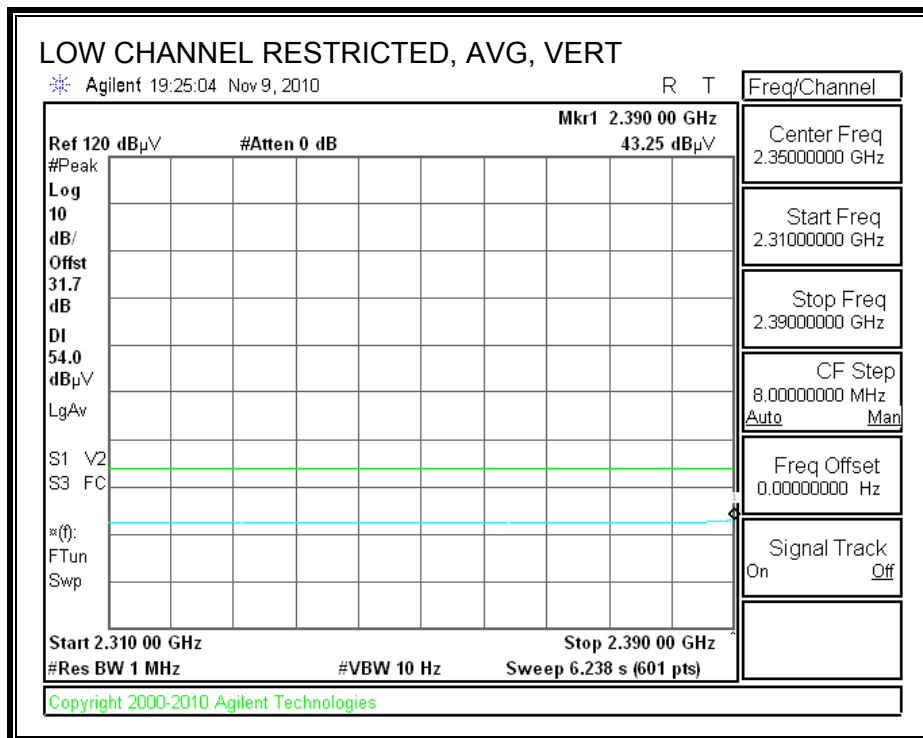
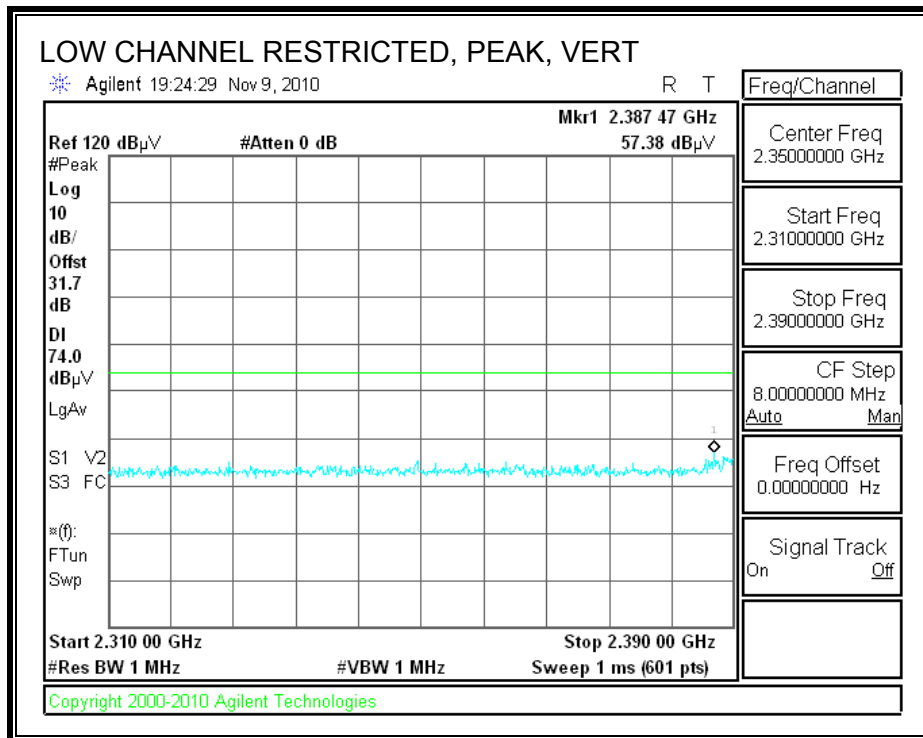
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

CH 1



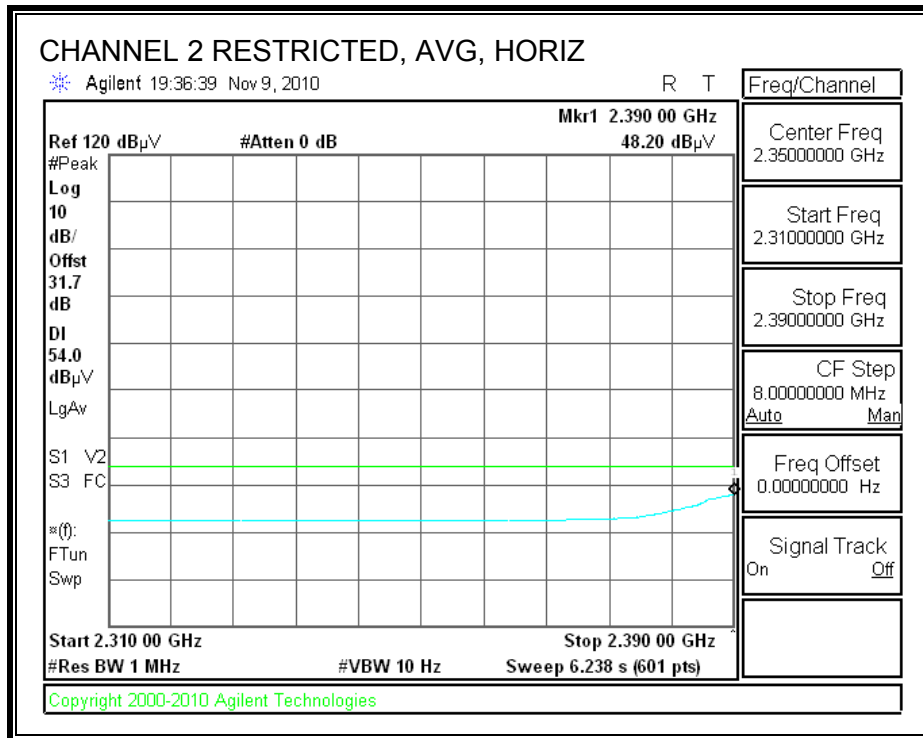
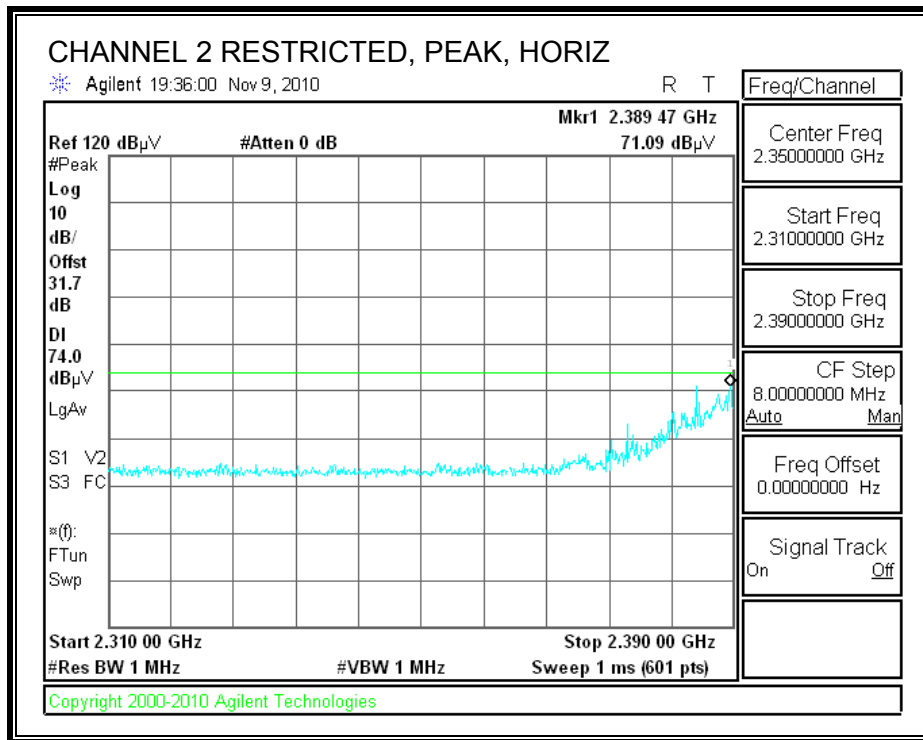


RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

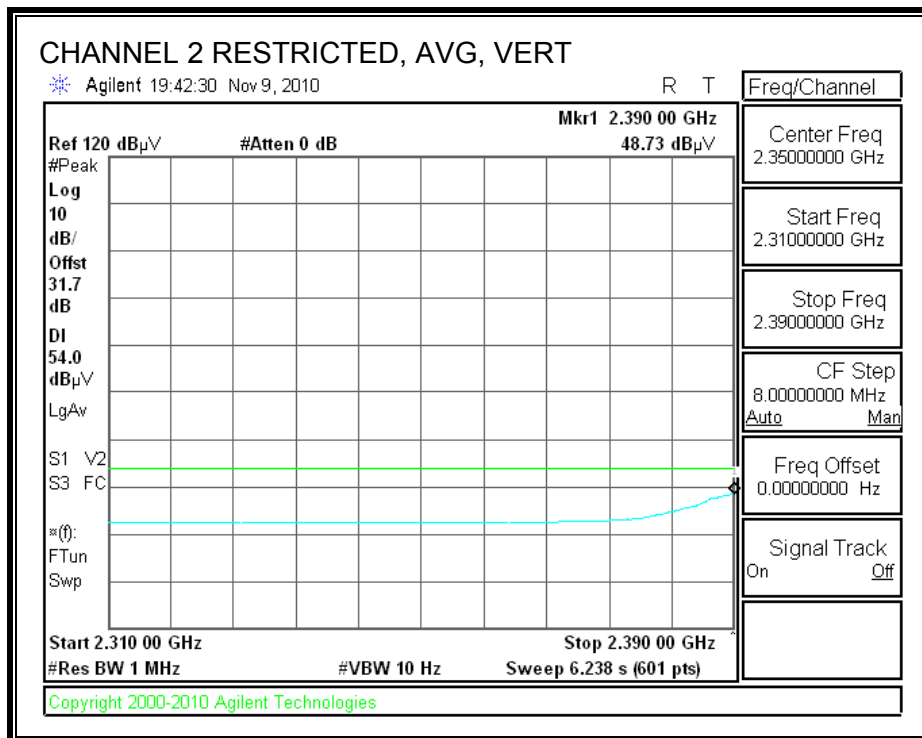
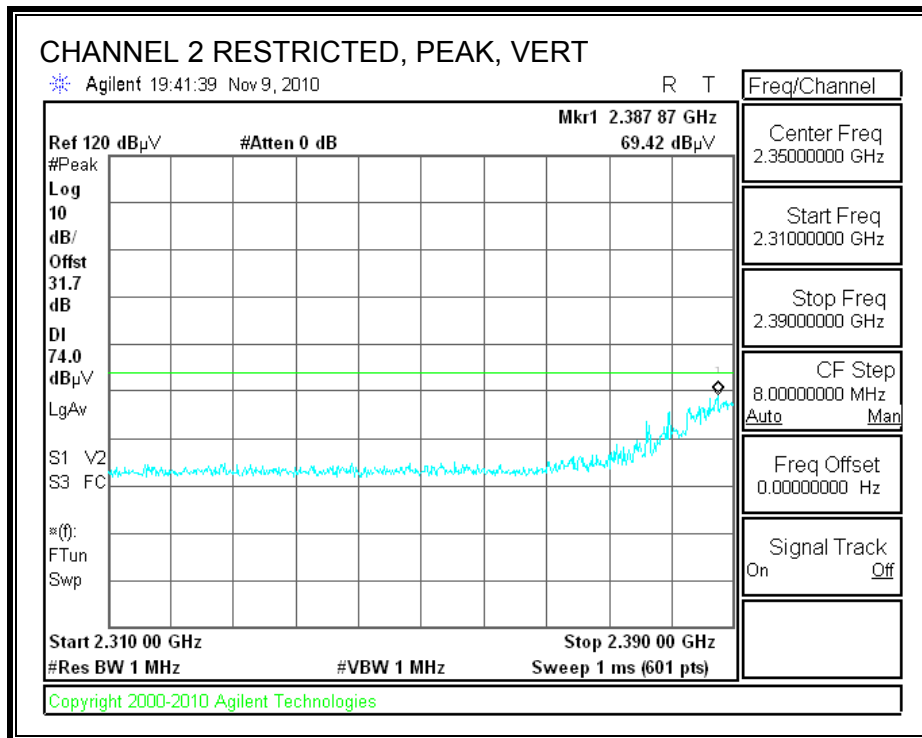


RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

CH 2

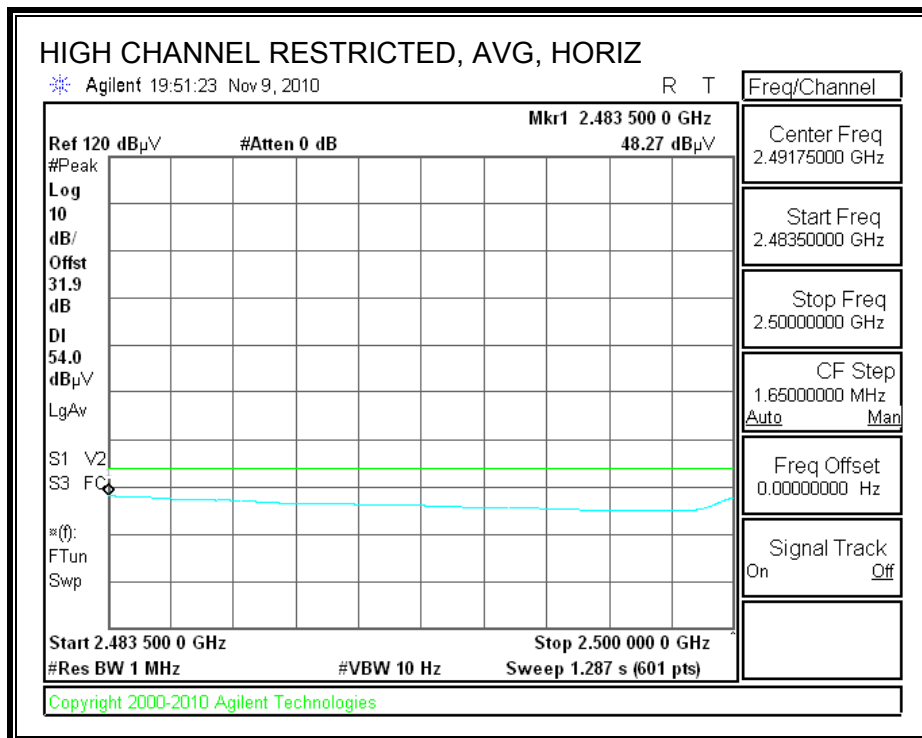
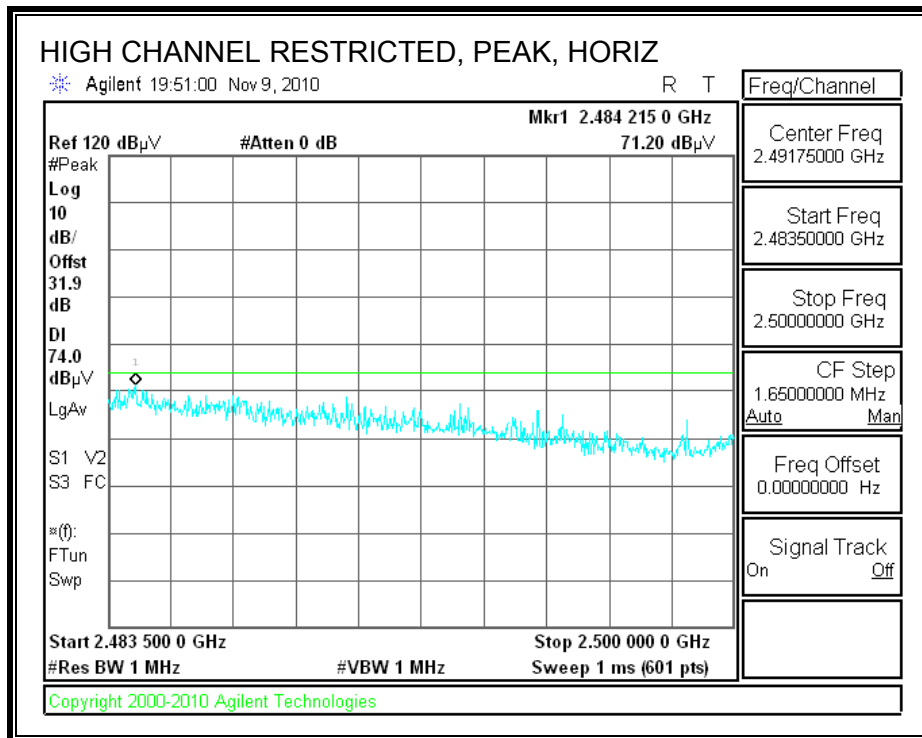


RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

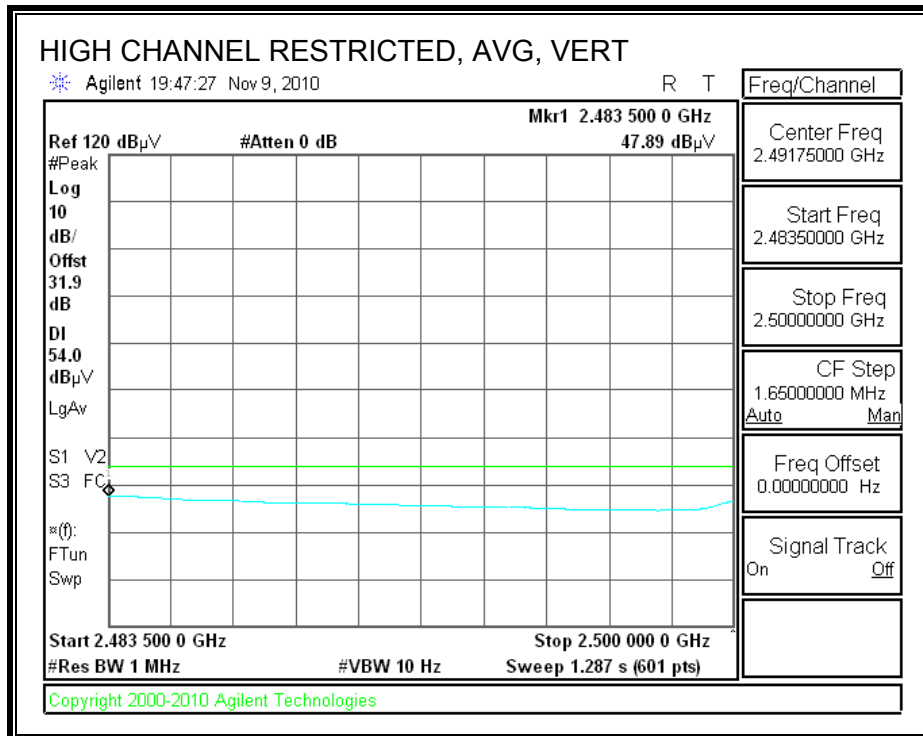
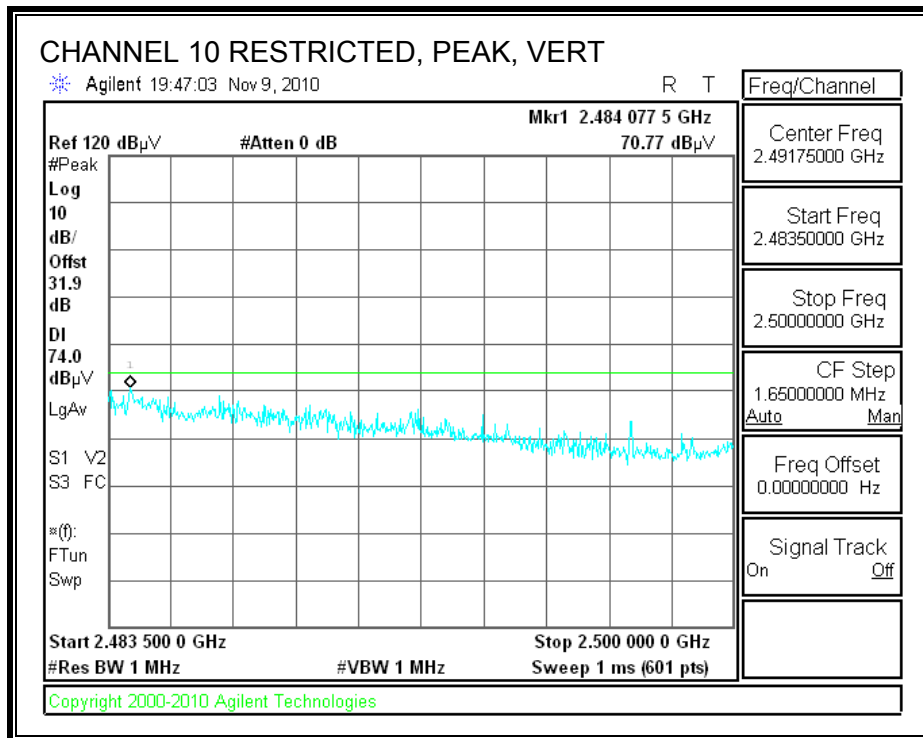


RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

CH 10

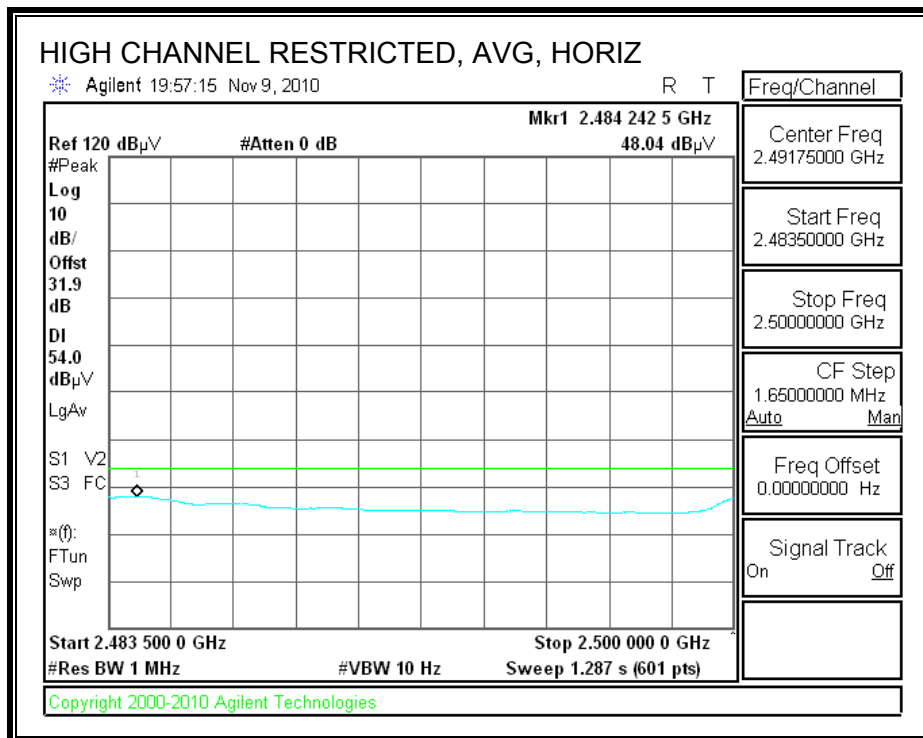
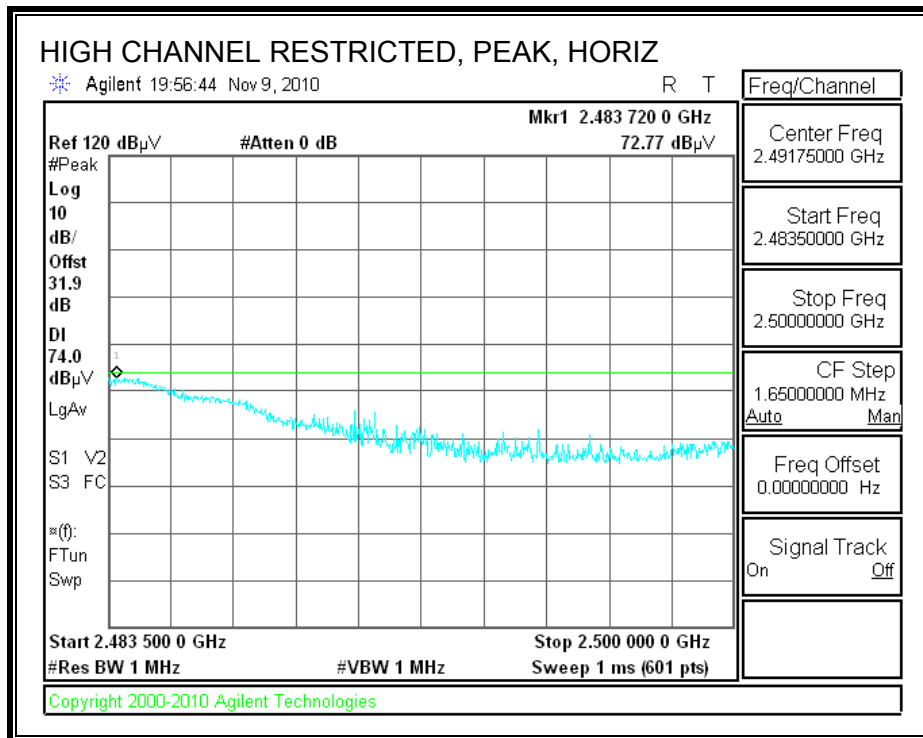


RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

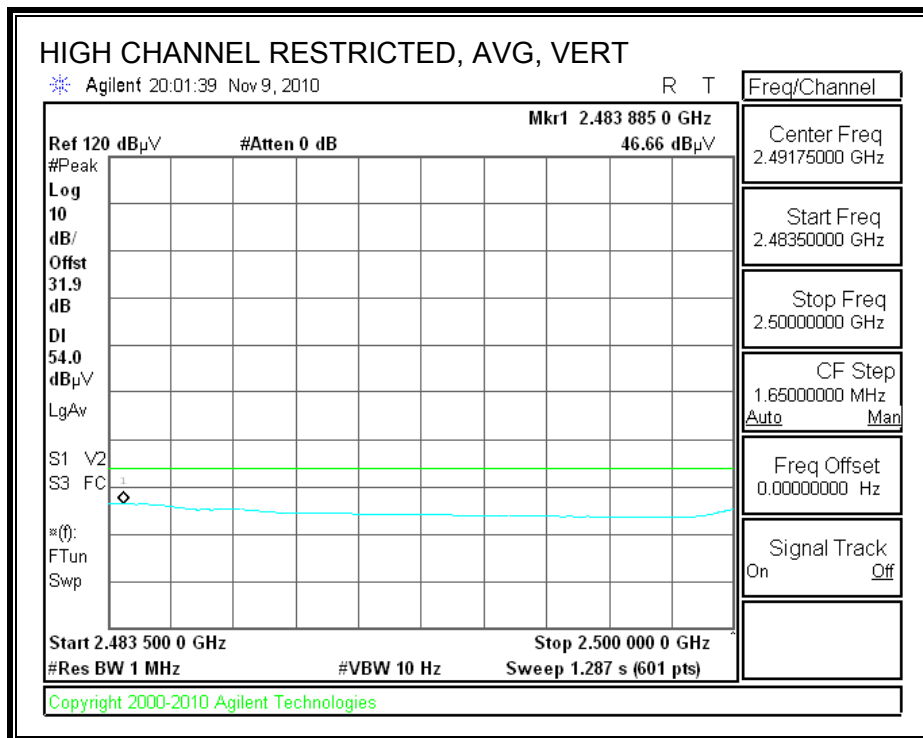
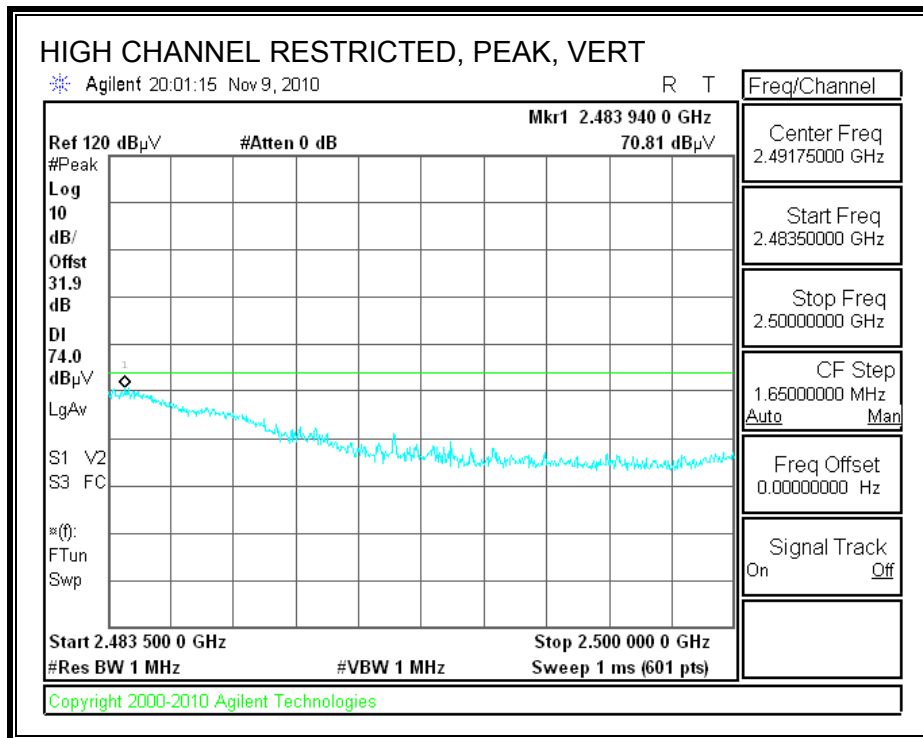


RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

CH 11



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
 Compliance Certification Services, Fremont 5m Chamber

Company: 2 WIRE, Inc.
 Project #: 10U13195
 Date: 11/10/2010
 Test Engineer: Thanh Nguyen
 Configuration: EUT only
 Mode: Transmit HT 20 1TX

Test Equipment:

Horn 1-18GHz T73; S/N: 6717 @3m	Pre-amplifier 1-26GHz T144 Miteq 3008A00931	Pre-amplifier 26-40GHz	Horn > 18GHz	Limit FCC 15.205
------------------------------------	--	------------------------	--------------	---------------------

Hi Frequency Cables

3' cable 22807700 3' cable 22807700	12' cable 22807600 12' cable 22807600	20' cable 22807500	HPF	Reject Filter 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)
Low Channel															
4.824	3.0	45.2	33.0	33.0	2.0	-36.5	0.0	0.0	43.8	31.5	74	54	-30.2	-22.5	H
12.060	3.0	35.2	25.3	39.0	3.5	-35.4	0.0	0.0	42.3	32.3	74	54	-31.7	-21.7	Noise floor
4.824	3.0	39.3	33.7	33.0	2.0	-36.5	0.0	0.0	37.9	32.3	74	54	-36.1	-21.7	V
Mid Channel															
4.874	3.0	48.8	34.3	33.1	2.0	-36.5	0.0	0.0	47.5	33.0	74	54	-26.5	-21.0	H
7.311	3.0	40.3	28.4	35.3	2.6	-36.2	0.0	0.0	42.0	30.1	74	54	-32.0	-23.9	H
12.185	3.0	34.9	25.6	39.0	3.5	-35.4	0.0	0.0	42.0	32.7	74	54	-32.0	-21.3	Noise floor
4.874	3.0	40.2	28.7	33.1	2.0	-36.5	0.0	0.0	38.9	27.3	74	54	-35.1	-26.7	V
7.311	3.0	35.9	28.6	35.3	2.6	-36.2	0.0	0.0	37.5	30.3	74	54	-36.5	-23.7	Noise floor
High Channel															
4.924	3.0	43.2	31.3	33.1	2.1	-36.5	0.0	0.0	42.0	30.0	74	54	-32.0	-24.0	H
7.386	3.0	40.5	28.6	35.4	2.6	-36.2	0.0	0.0	42.3	30.4	74	54	-31.7	-23.6	H
12.310	3.0	38.5	28.6	39.0	3.5	-35.4	0.0	0.0	45.6	35.8	74	54	-28.4	-18.2	Noise floor
4.924	3.0	38.4	28.1	33.1	2.1	-36.5	0.0	0.0	37.1	26.8	74	54	-36.9	-27.2	V
7.386	3.0	37.4	28.2	35.4	2.6	-36.2	0.0	0.0	39.2	30.0	74	54	-34.8	-24.0	Noise floor

Rev. 07.22.09

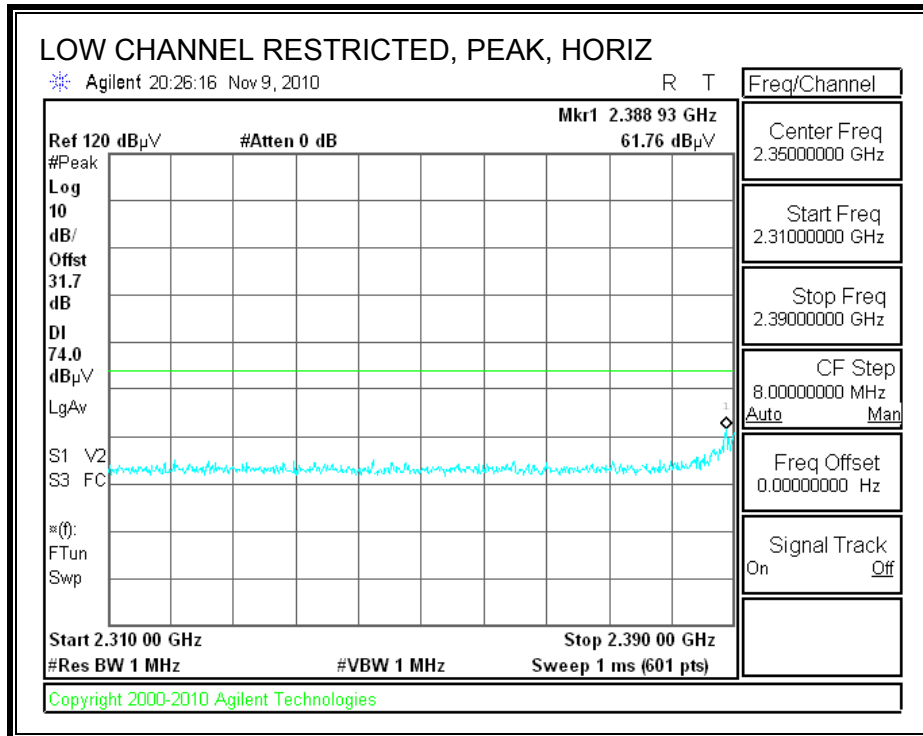
f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field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

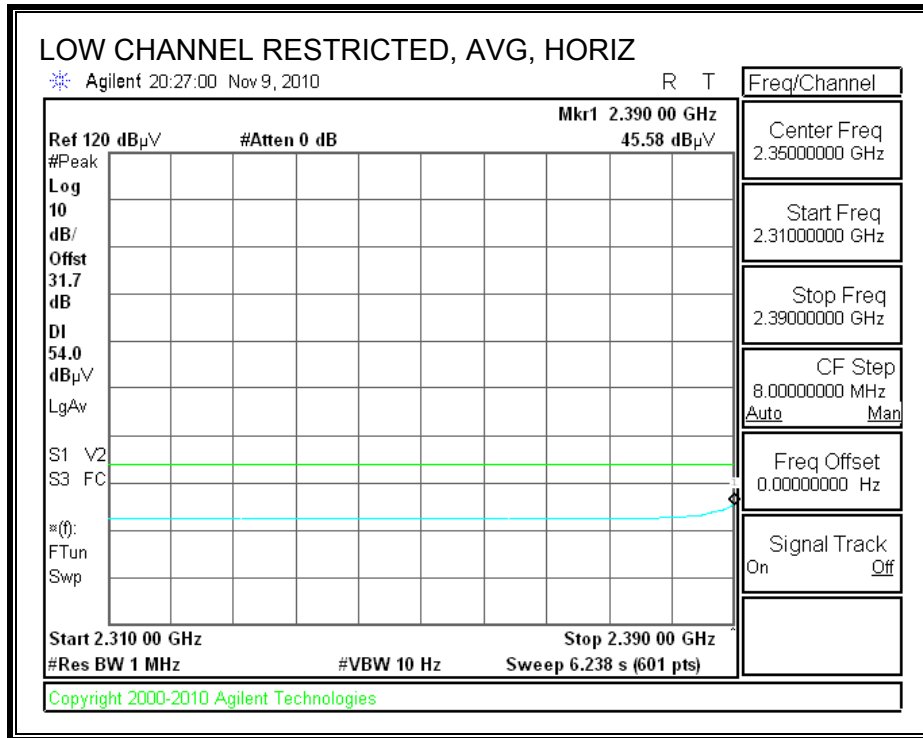
8.3.4. TX ABOVE 1 GHz 802.11n HT20 2TX IN 2.4 GHz BAND

Note: channels 1 and 11 were tested at the power levels of channels 2 and 10 respectively, the power levels for CH2 and CH10 are higher than the power levels of CH1 and CH11; hence this is worst-case measurement.

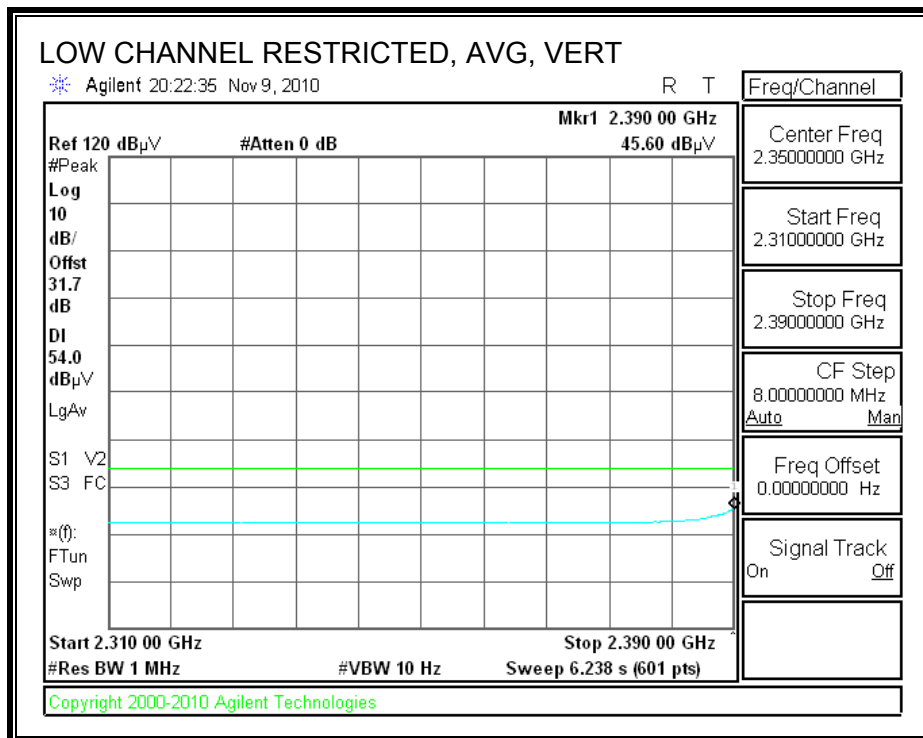
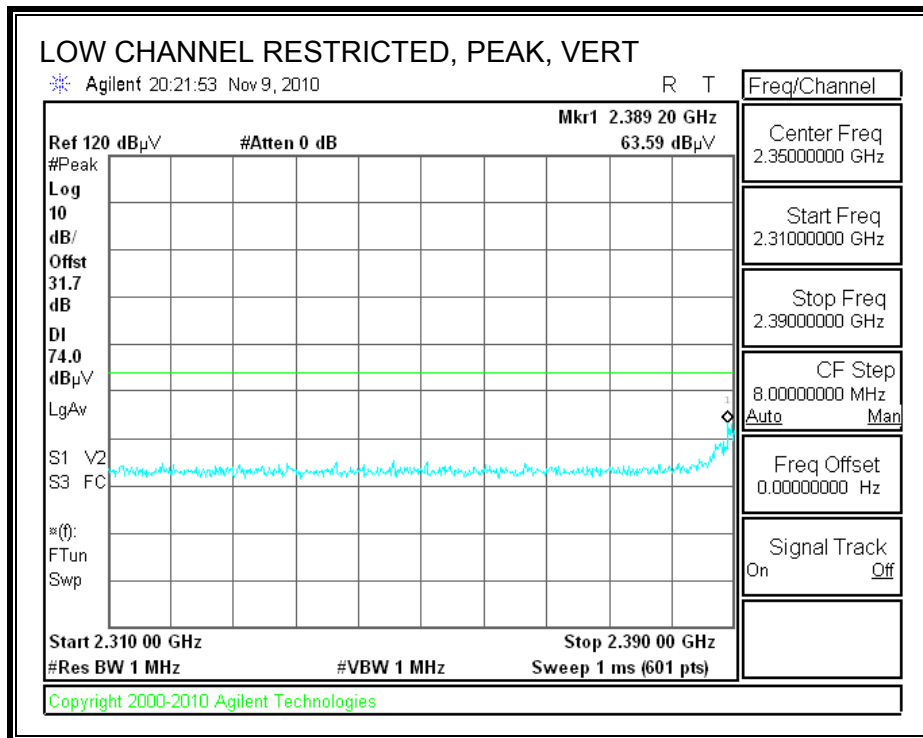
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

CH 1



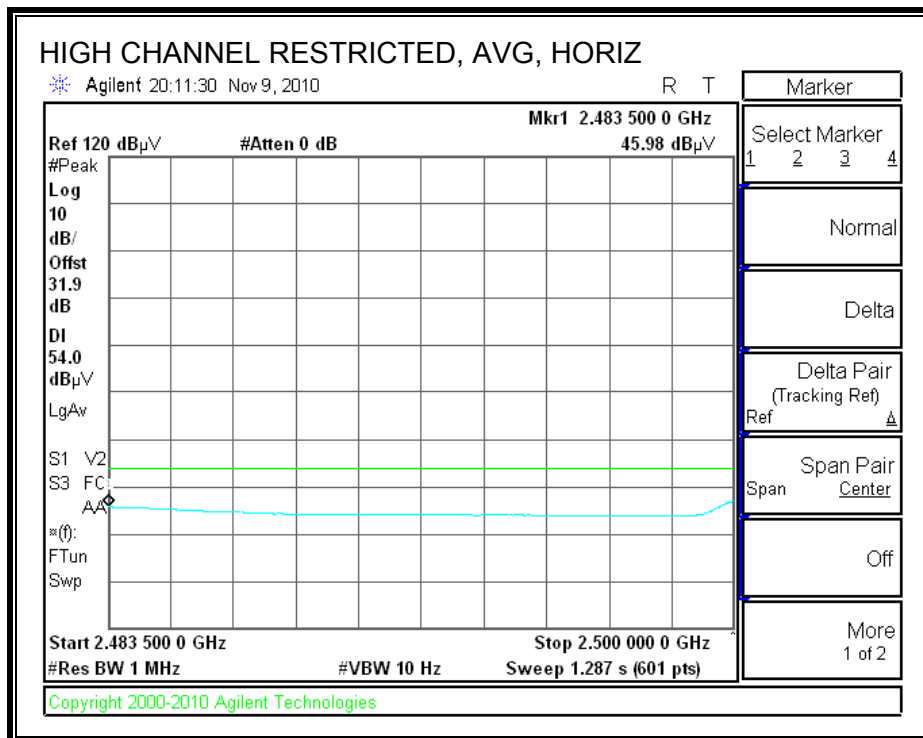
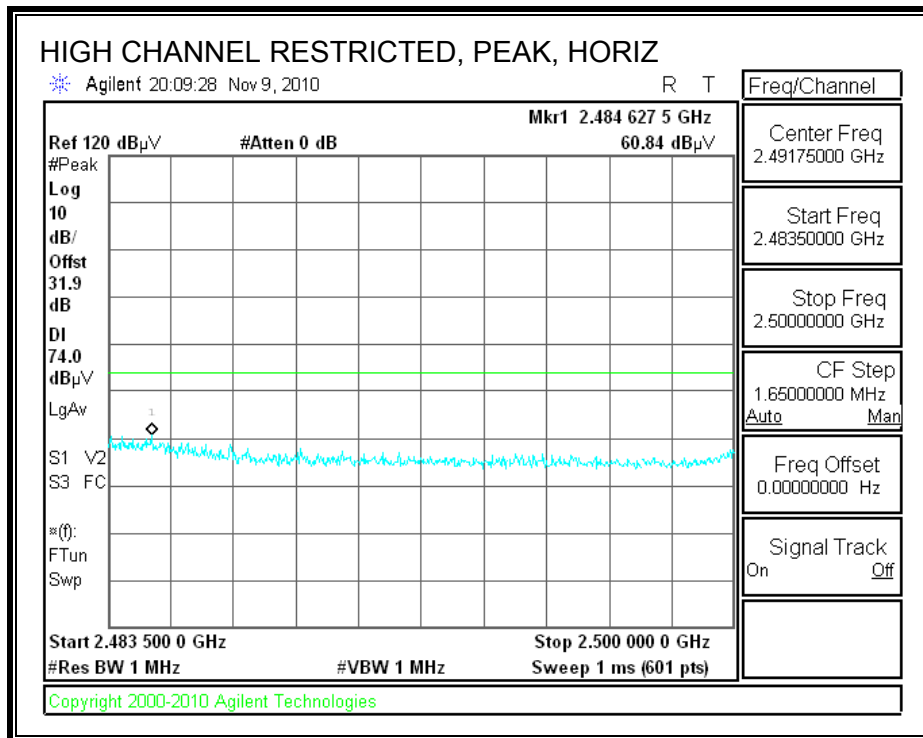


RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

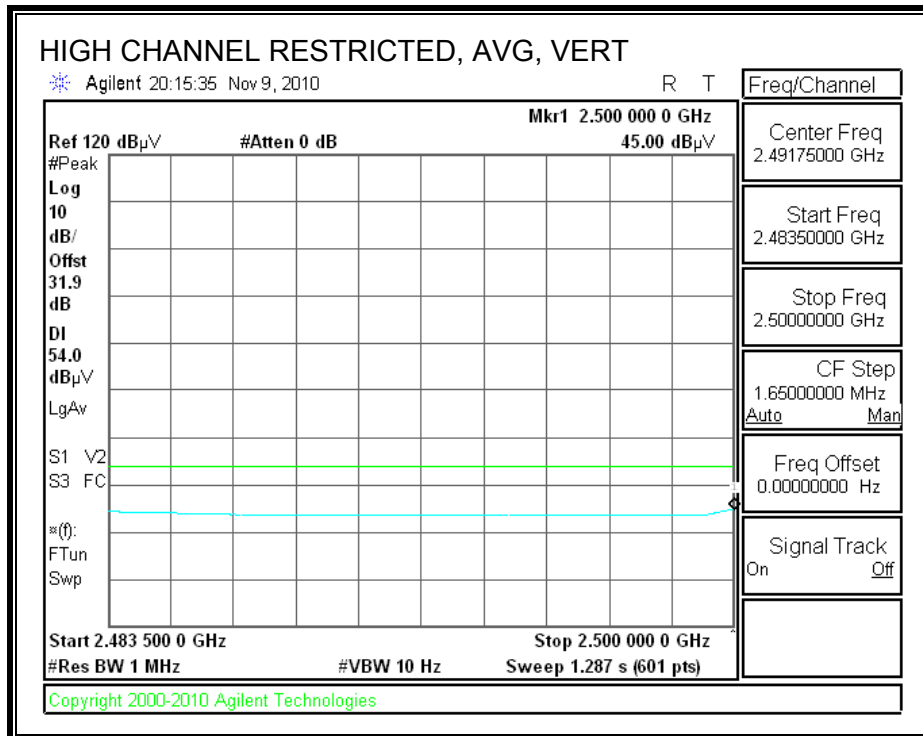
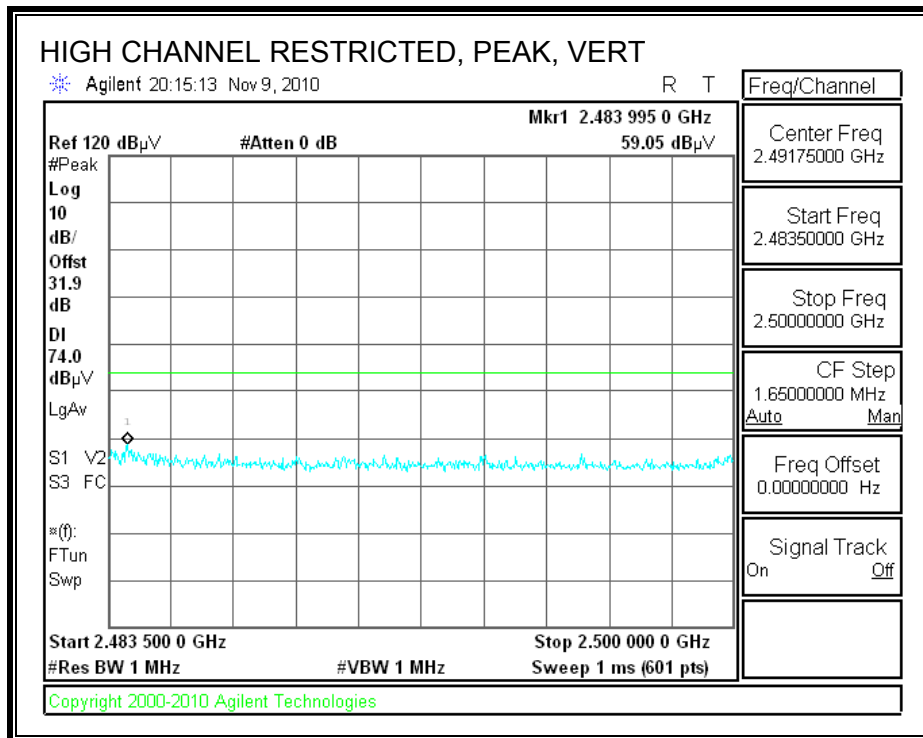


RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

CH 11



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
 Compliance Certification Services, Fremont 5m Chamber

Company: 2 WIRE, Inc.
 Project #: 10U13195
 Date: 11/10/2010
 Test Engineer: Thanh Nguyen
 Configuration: EUT only
 Mode: Transmit HT 20 _2tx

Test Equipment:

Horn 1-18GHz T73: S/N: 6717 @3m	Pre-amplifier 1-26GHz T144 Miteq 3008A00931	Pre-amplifier 26-40GHz	Horn > 18GHz	Limit FCC 15.205
------------------------------------	--	------------------------	--------------	---------------------

Hi Frequency Cables

3' cable 22807700 3' cable 22807700	12' cable 22807600 12' cable 22807600	20' cable 22807500	HPF	Reject Filter 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)
Low Channel															
4.824	3.0	46.2	33.3	33.0	2.0	-36.5	0.0	0.0	44.8	31.9	74	54	-29.2	-22.1	H
4.824	3.0	38.6	29.4	33.0	2.0	-36.5	0.0	0.0	37.2	27.9	74	54	-36.8	-26.1	V
Mid Channel															
4.874	3.0	48.0	34.4	33.1	2.0	-36.5	0.0	0.0	46.6	33.0	74	54	-27.4	-21.0	H
7.311	3.0	41.4	29.5	35.3	2.6	-36.2	0.0	0.0	43.0	31.2	74	54	-31.0	-22.8	H
12.185	3.0	36.2	26.7	39.0	3.5	-35.4	0.0	0.0	43.3	33.8	74	54	-30.7	-20.2	Noise floor
4.874	3.0	38.0	28.7	33.1	2.0	-36.5	0.0	0.0	36.6	27.3	74	54	-37.4	-26.7	V
7.311	3.0	37.8	28.9	35.3	2.6	-36.2	0.0	0.0	39.5	30.6	74	54	-34.5	-23.4	Noise floor
High Channel															
4.924	3.0	43.5	31.7	33.1	2.1	-36.5	0.0	0.0	42.2	30.4	74	54	-31.8	-23.6	H
7.386	3.0	37.4	27.6	35.4	2.6	-36.2	0.0	0.0	39.2	29.4	74	54	-34.8	-24.6	Noise floor
4.924	3.0	38.5	27.9	33.1	2.1	-36.5	0.0	0.0	37.2	26.7	74	54	-36.8	-27.3	V
7.386	3.0	36.7	27.5	35.4	2.6	-36.2	0.0	0.0	38.5	29.3	74	54	-35.5	-24.7	Noise floor

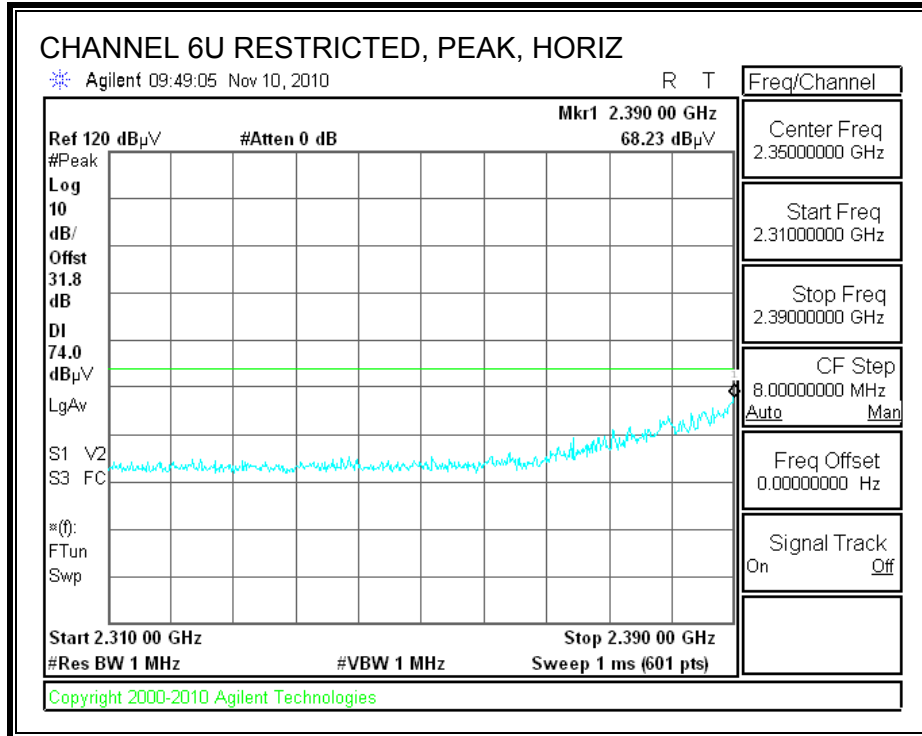
Rev. 07.22.09

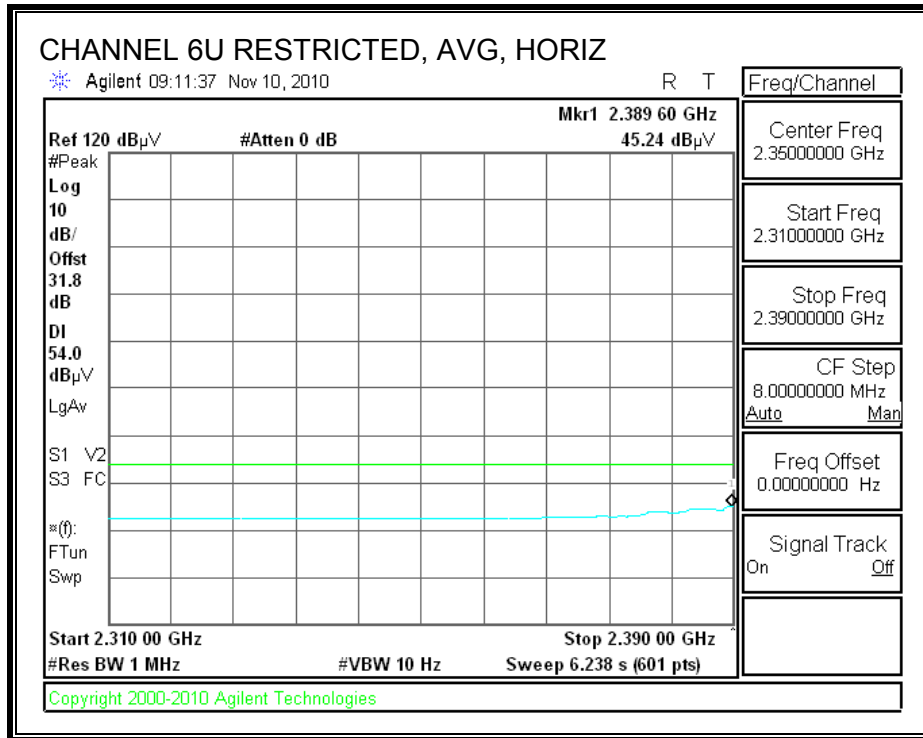
f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field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

8.3.5. TX ABOVE 1 GHz 802.11n HT40 1TX IN 2.4 GHz BAND

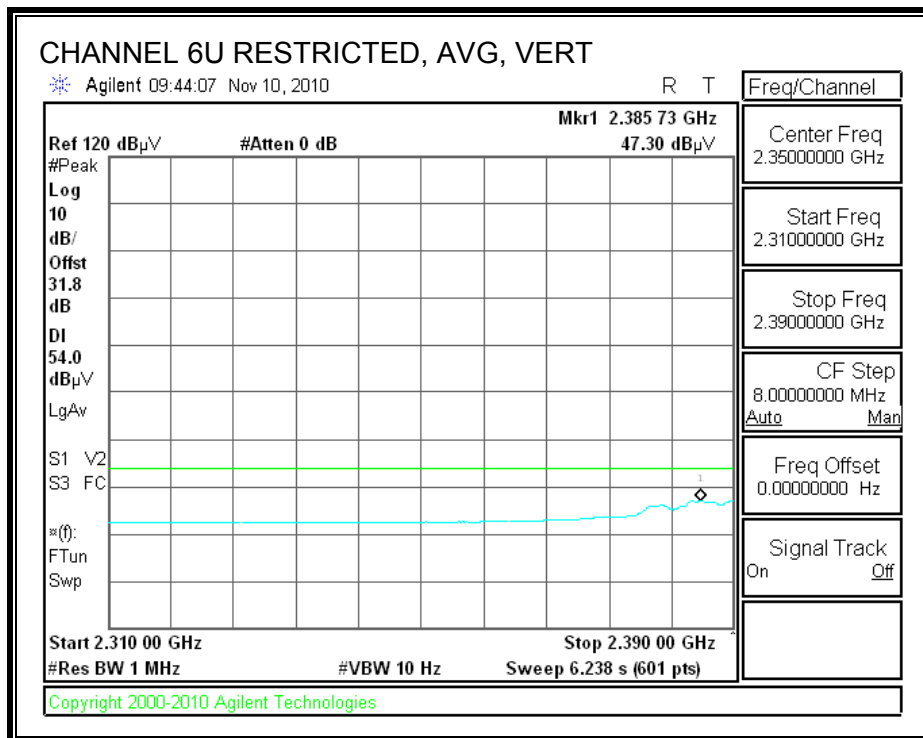
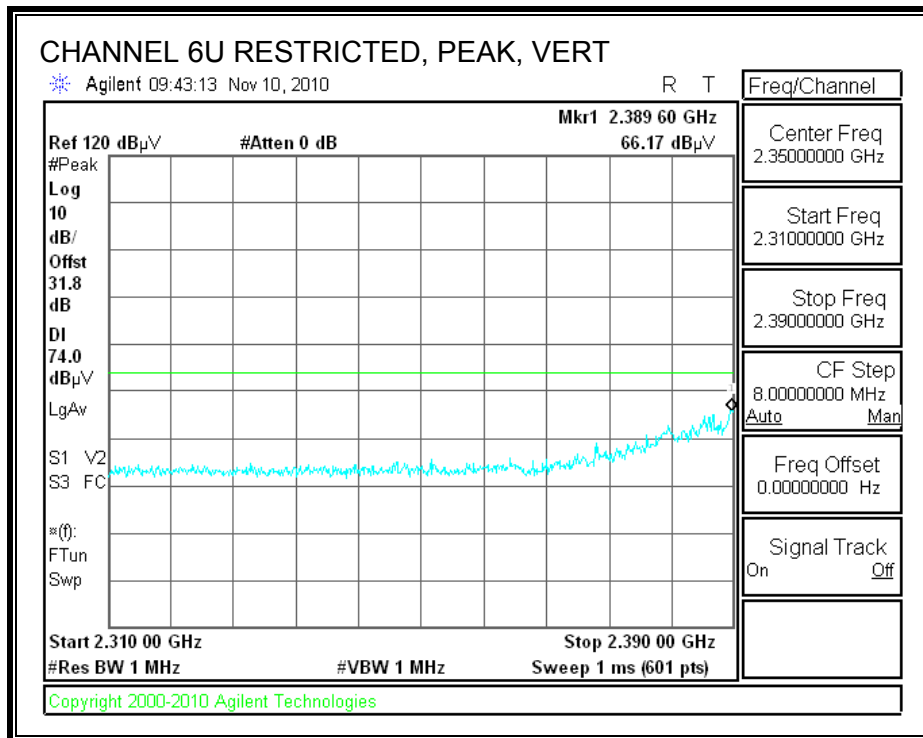
RESTRICTED BANDEDGE (CHANNEL 6U, HORIZONTAL)

LOW BAND EDGE



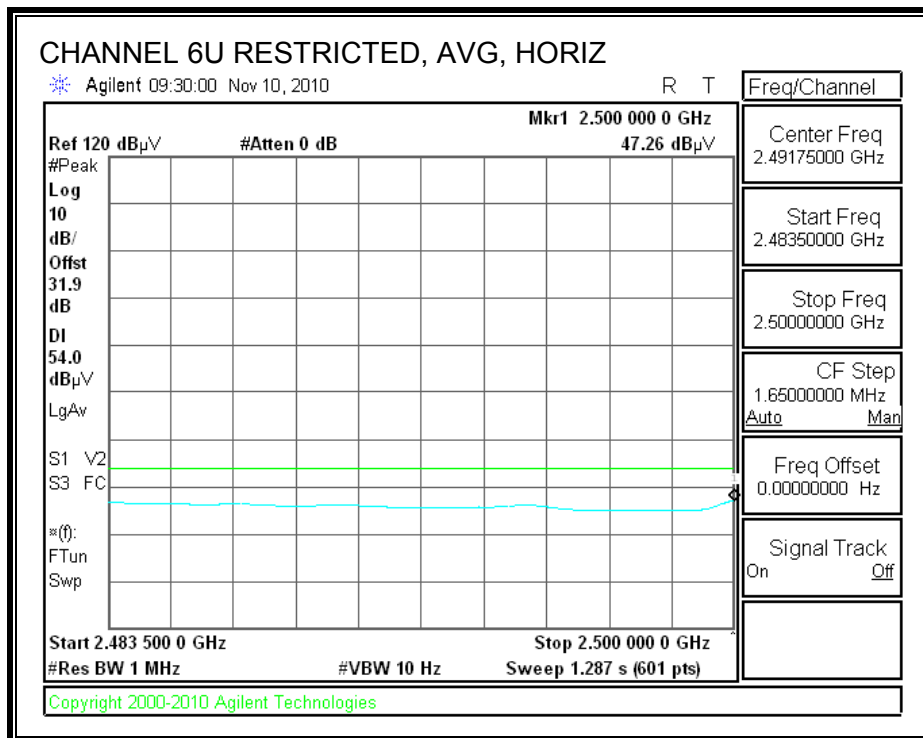
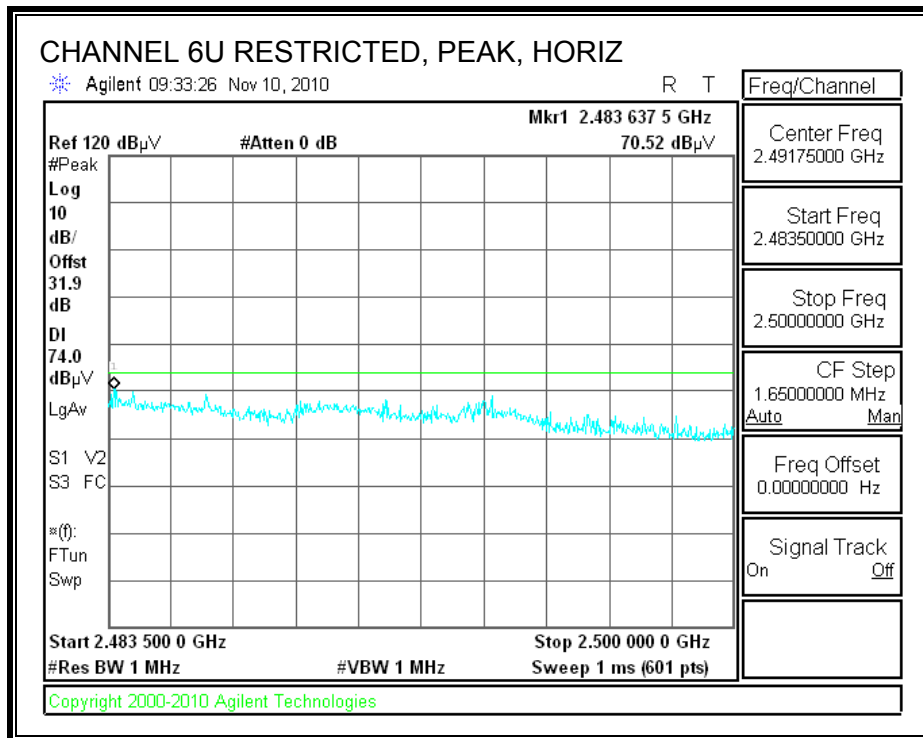


RESTRICTED BANDEDGE (CHANNEL 6U, VERTICAL)

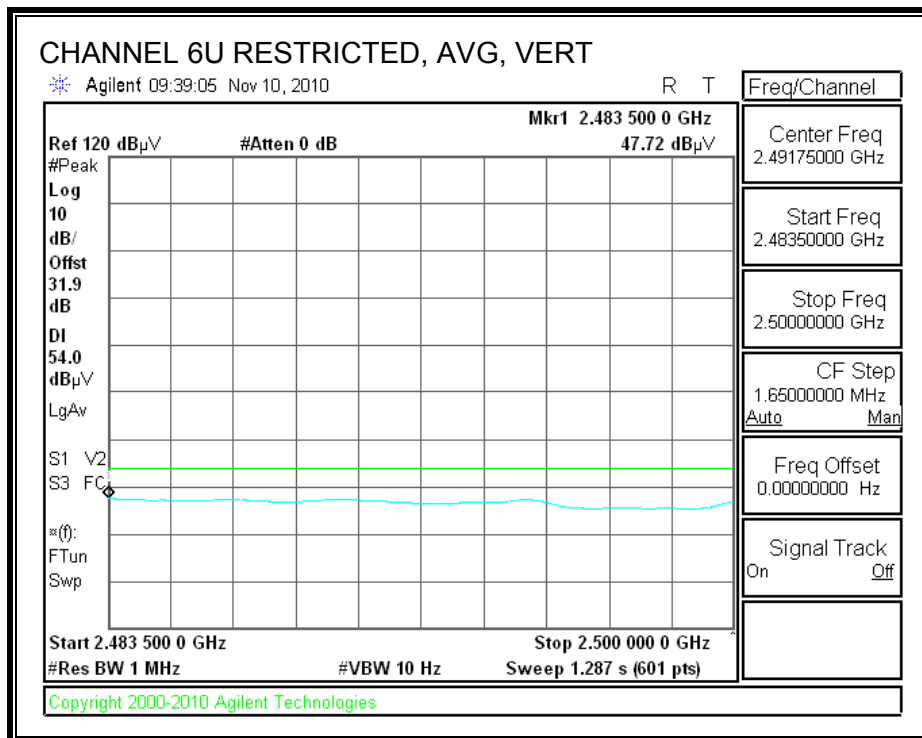
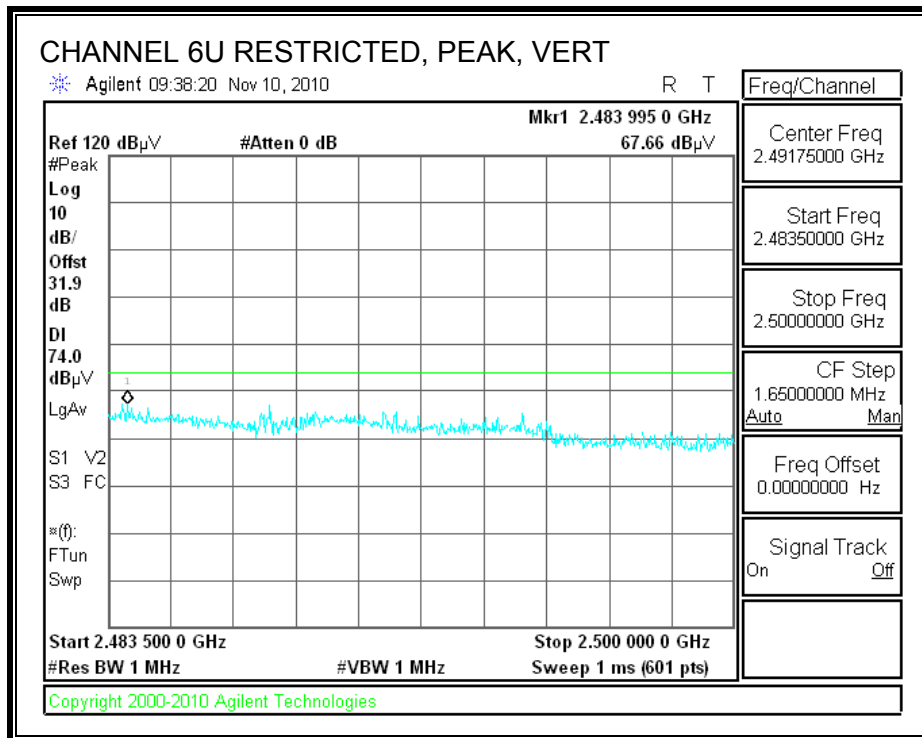


RESTRICTED BANDEDGE (CHANNEL 6U, HORIZONTAL)

HIGH BAND EDGE



RESTRICTED BANDEDGE (CHANNEL 6U, VERTICAL)



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement

Compliance Certification Services, Fremont 5m Chamber

Company: 2 WIRE, Inc.
 Project #: 10U13195
 Date: 11/10/2010
 Test Engineer: Thanh Nguyen
 Configuration: EUT only
 Mode: Transmit HT 40 _1 stream

Test Equipment:

Horn 1-18GHz	Pre-amplifier 1-26GHz	Pre-amplifier 26-40GHz	Horn > 18GHz	Limit
T73: S/N: 6717 @3m	T144 Miteq 3008A00931			FCC 15.205

Hi Frequency Cables

3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF	Reject Filter	Peak Measurements REW=VBW=1MHz
3' cable 22807700	12' cable 22807600			R_001	Average Measurements REW=1MHz; VBW=10Hz

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)
Mid Ch 2437MHz, PWR set 23dBm															
4.874	3.0	45.5	32.8	33.1	2.0	-36.5	0.0	0.0	44.2	31.4	74	54	-29.8	-22.6	H
7.311	3.0	38.4	27.9	35.3	2.6	-36.2	0.0	0.0	40.0	29.5	74	54	-34.0	-24.5	Noise floor
4.874	3.0	38.7	28.1	33.1	2.0	-36.5	0.0	0.0	37.4	26.8	74	54	-36.6	-27.2	Noise floor/V

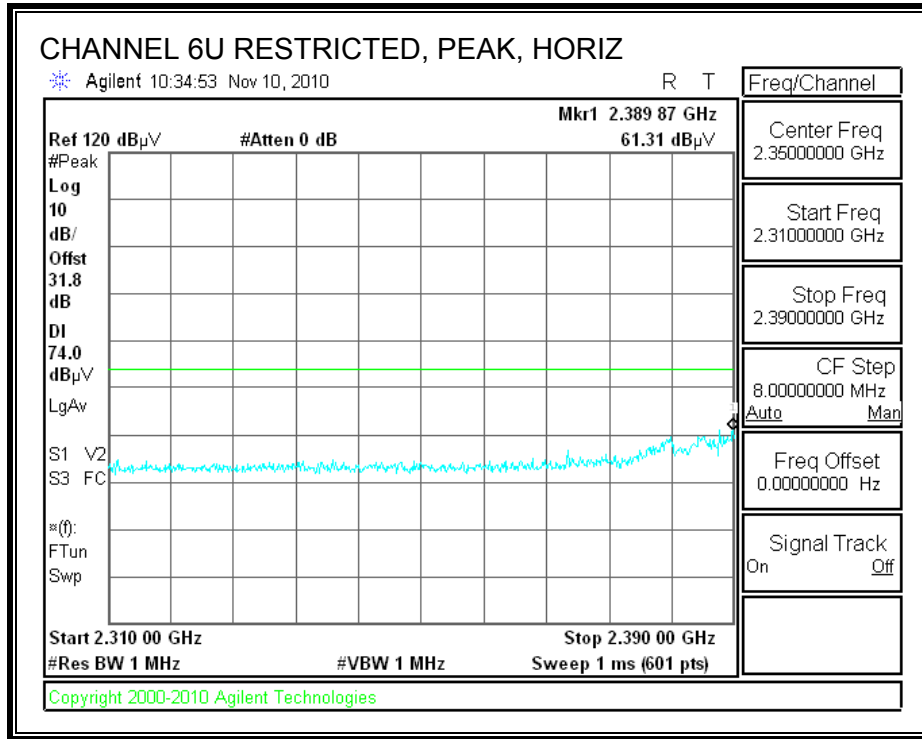
Rev. 07.22.09

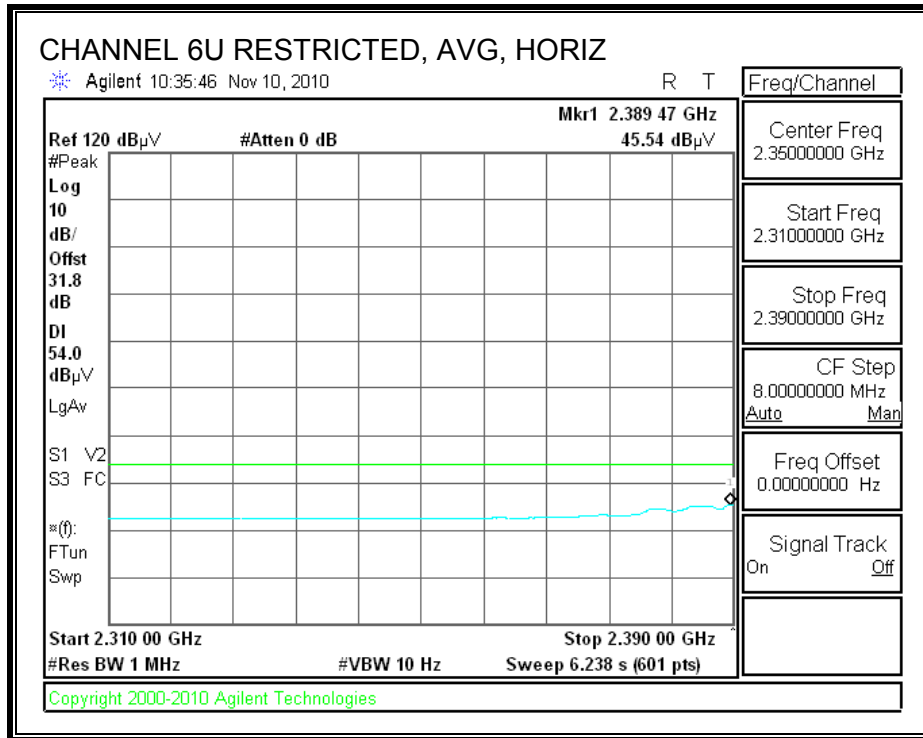
f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field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

8.3.6. TX ABOVE 1 GHz 802.11n HT40 2TX IN 2.4 GHz BAND

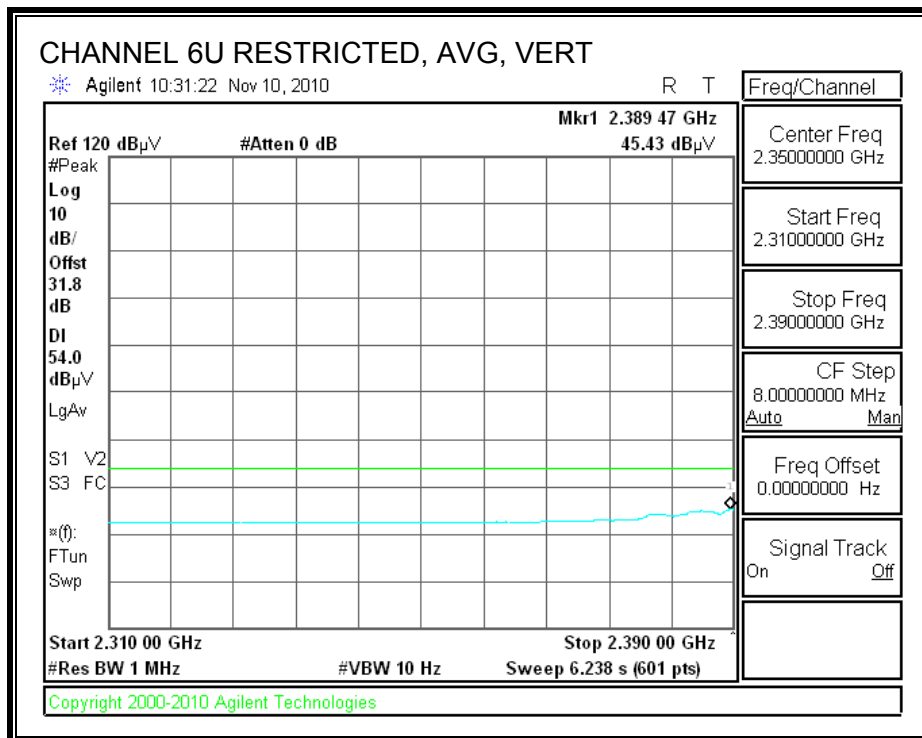
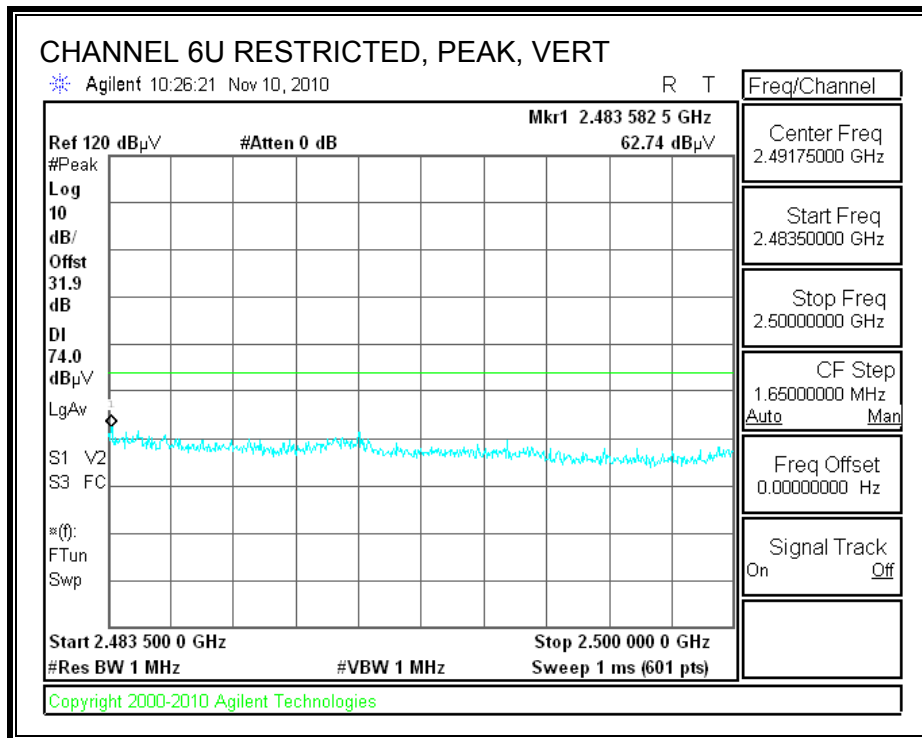
RESTRICTED BANDEDGE (CHANNEL 6U, HORIZONTAL)

LOW BAND EDGE



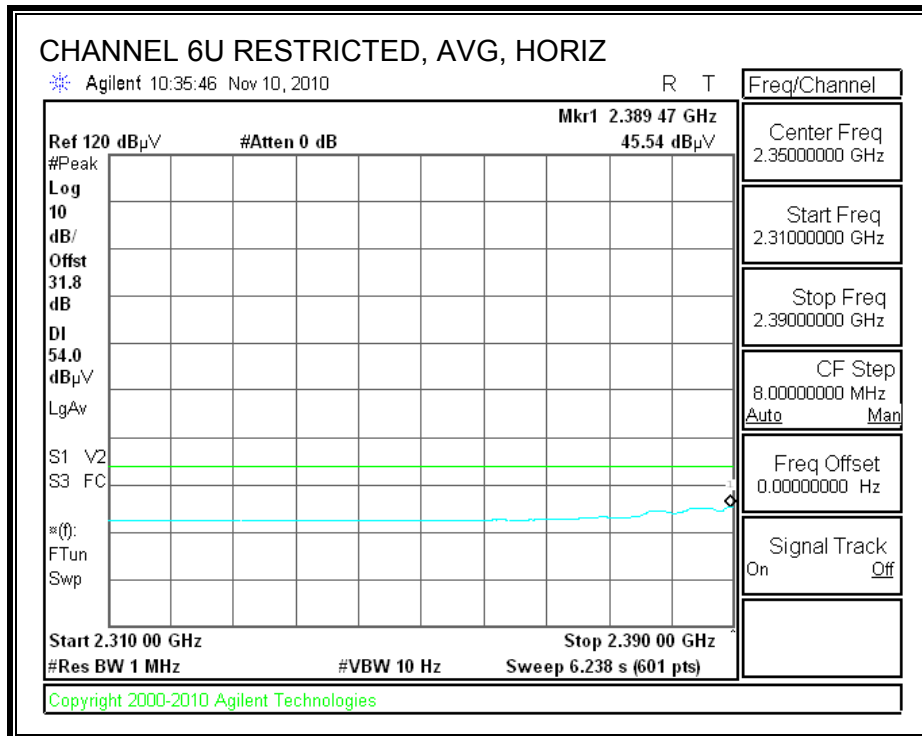
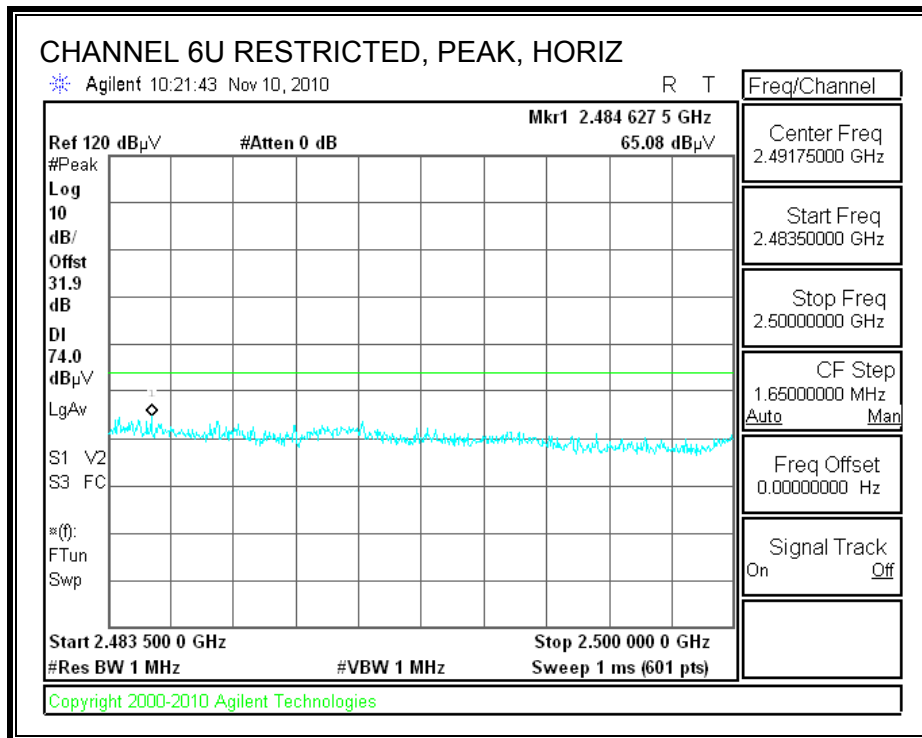


RESTRICTED BANDEDGE (CHANNEL 6U, VERTICAL)

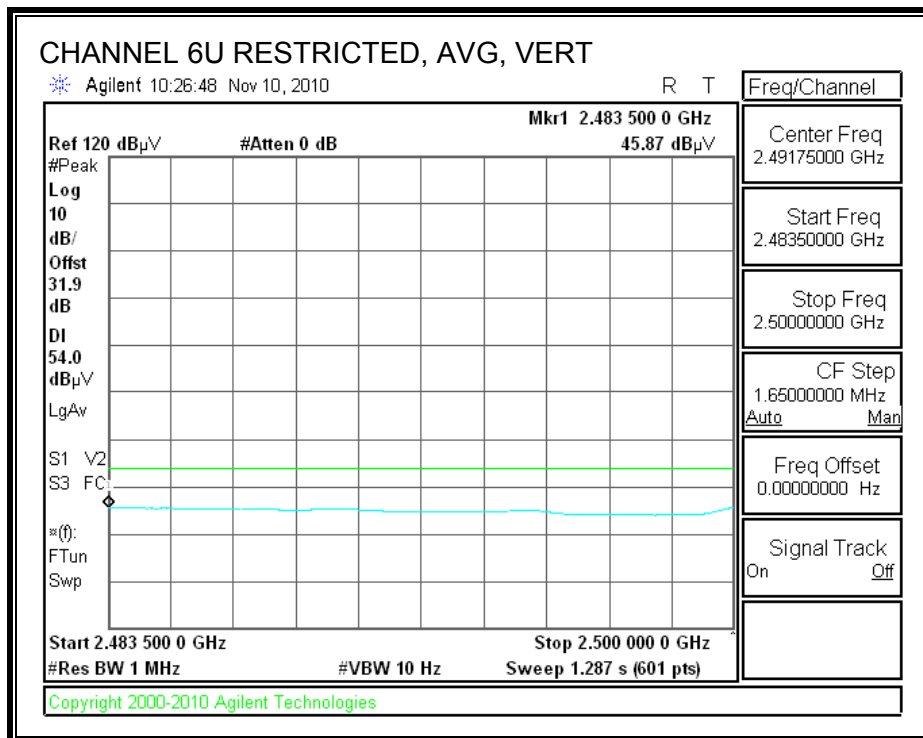
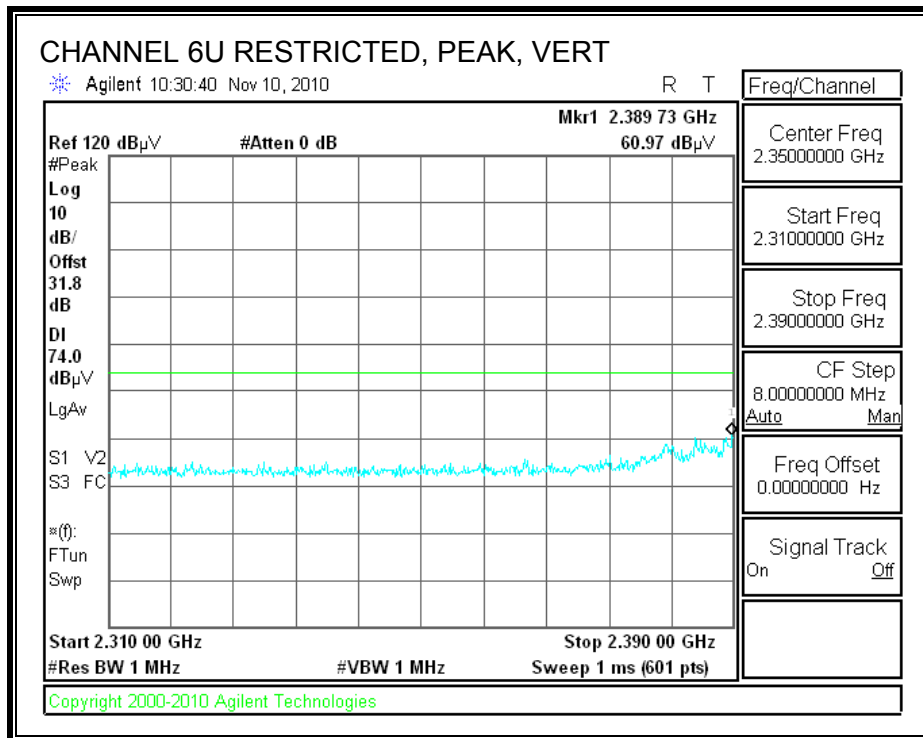


RESTRICTED BANDEDGE (CHANNEL 6U, HORIZONTAL)

HIGH BAND EDGE



RESTRICTED BANDEDGE (CHANNEL 6U, VERTICAL)



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement																	
Compliance Certification Services, Fremont 5m Chamber																	
Company:		2 WIRE, Inc.															
Project #:		10U13195															
Date:		11/10/2010															
Test Engineer:		Thanh Nguyen															
Configuration:		EUT only															
Mode:		Transmit HT 40_2 streams															
Test Equipment:																	
Horn 1-18GHz			Pre-amplifier 1-26GHz			Pre-amplifier 26-40GHz			Horn > 18GHz			Limit					
T73; S/N: 6717 @3m			T144 Miteq 3008A00931									FCC 15.205					
Hi Frequency Cables																	
3' cable 22807700			12' cable 22807600			20' cable 22807500			HPF			Reject Filter		Peak Measurements REW=VEW=1MHz			
3' cable 22807700			12' cable 22807600									R_001		Average Measurements REW=1MHz ; VEW=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)		
Mid Ch 2437MHz, PWR set 23dBm																	
4.874	3.0	45.8	32.8	33.1	2.0	-36.5	0.0	0.0	44.5	31.4	74	54	-29.5	-22.6	H		
7.311	3.0	38.0	27.7	35.3	2.6	-36.2	0.0	0.0	39.7	29.4	74	54	-34.3	-24.6	Noise floor		
4.874	3.0	37.7	28.1	33.1	2.0	-36.5	0.0	0.0	36.3	26.8	74	54	-37.7	-27.2	Noise floor/V		
Rev. 07.22.09																	
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													

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

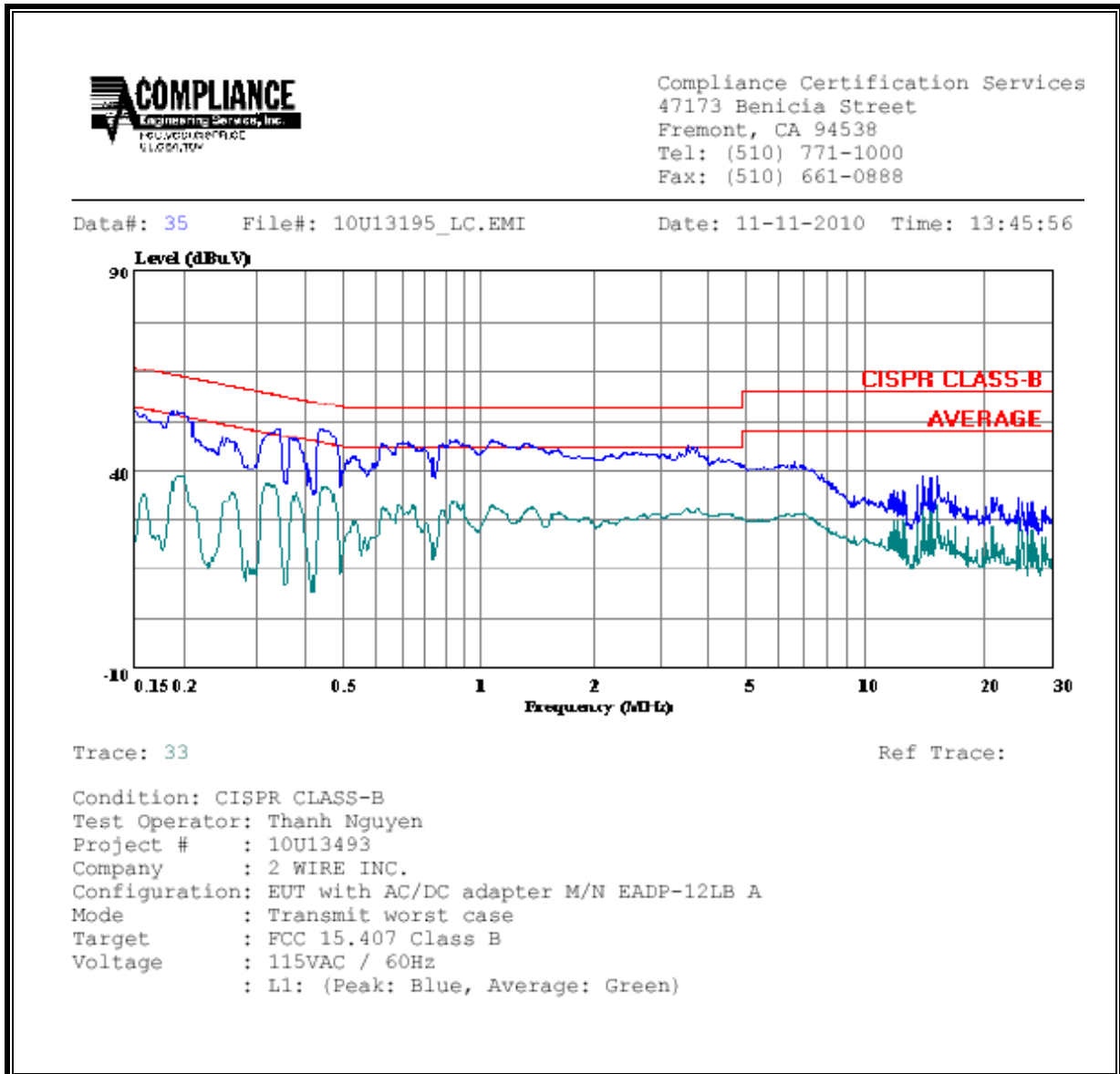
*Decreases with the logarithm of the frequency.

TEST PROCEDURE

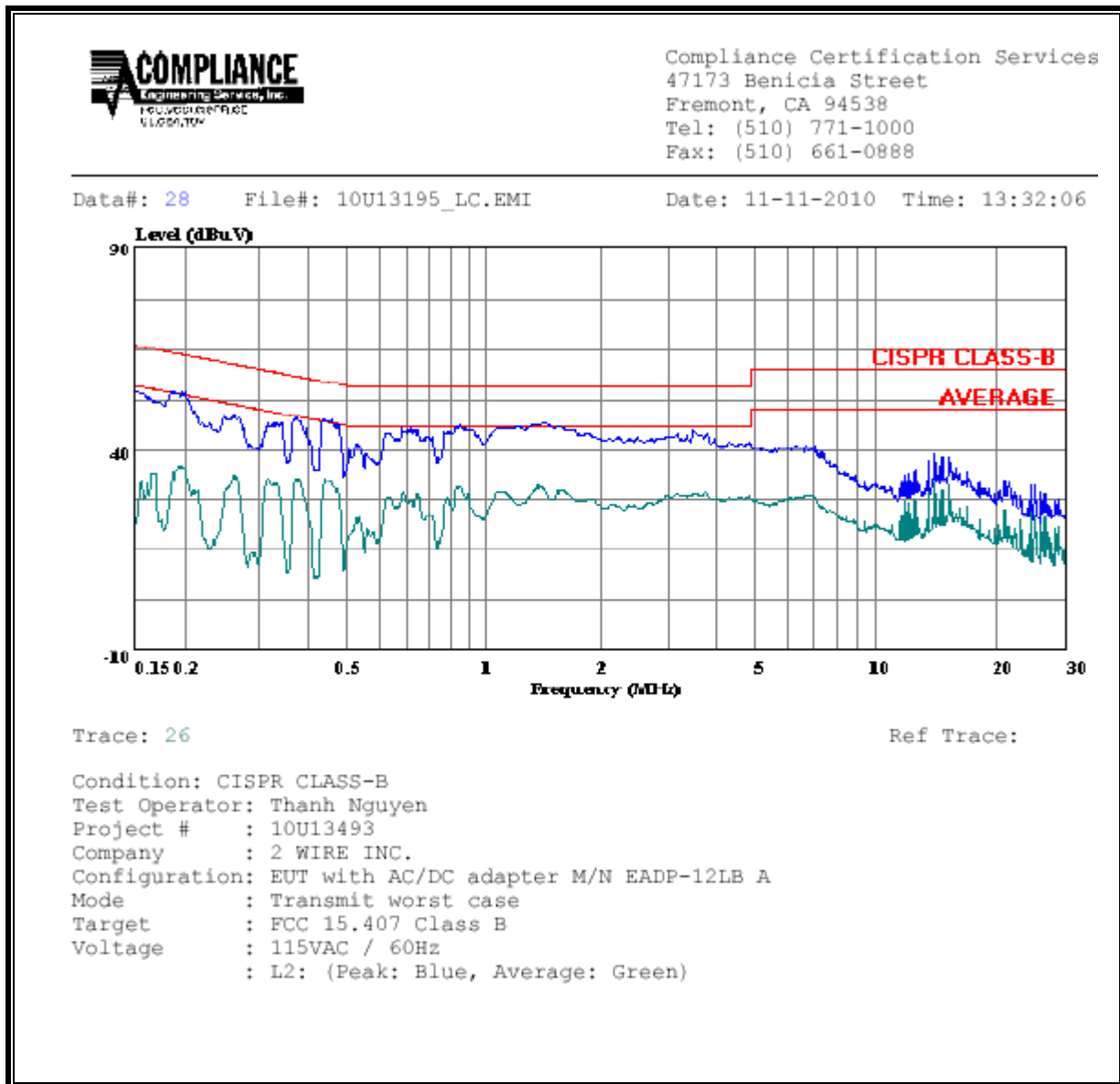
ANSI C63.4

1) For AC/DC Adapter EADP-12LB A

LINE 1 RESULTS

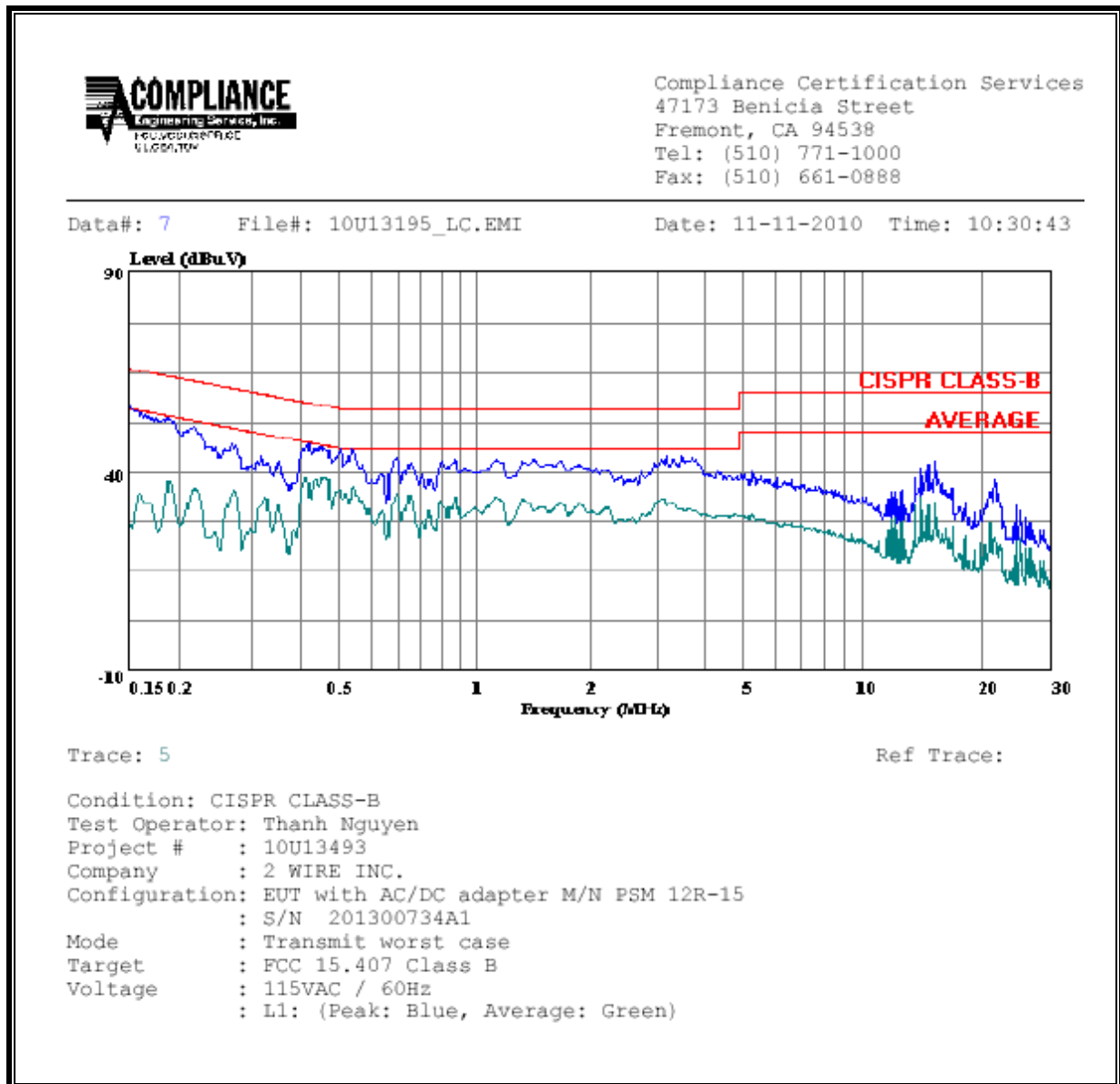


LINE 2 RESULTS

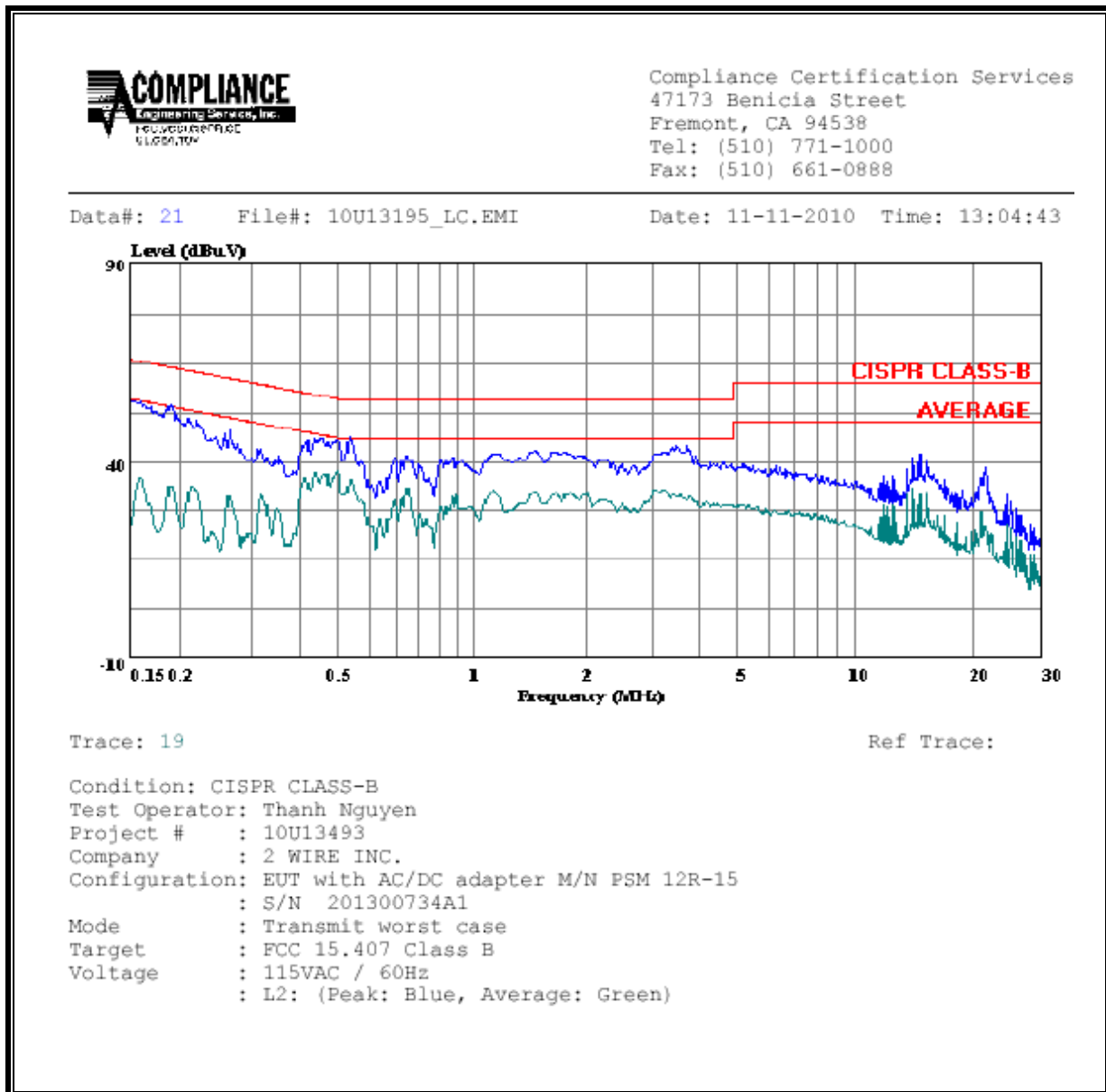


2) For AC/DC Adapter PSM 12R- 15

LINE 1 RESULTS



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 ²)	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 ²)	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 ²)	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 ²)	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 ²)	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> ^{0.5}	0.0042 <i>f</i> ^{0.5}	<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> ^{1.2}
150 000–300 000	0.158 <i>f</i> ^{0.5}	4.21 x 10 ⁻⁴ <i>f</i> ^{0.5}	6.67 x 10 ⁻⁵ <i>f</i>	616 000 / <i>f</i> ^{1.2}

* 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/m² is equivalent to 1 mW/cm².
 3. A magnetic field strength of 1 A/m corresponds to 1.257 microtesla (μT) or 12.57 milligauss (mG).

EQUATIONS

Power density is given by:

$$S = \text{EIRP} / (4 * \text{Pi} * \text{D}^2)$$

where

- S = Power density in W/m²
- EIRP = Equivalent Isotropic Radiated Power in W
- D = Separation distance in m

Power density in units of W/m² is converted to units of mW/cm² by dividing by 10.

Distance is given by:

$$D = \text{SQRT} (\text{EIRP} / (4 * \text{Pi} * S))$$

where

- D = Separation distance in m
- EIRP = Equivalent Isotropic Radiated Power in W
- S = Power density in W/m²

For multiple colocated transmitters operating simultaneously in frequency bands where the limit is identical, the total power density is calculated using the total EIRP obtained by summing the Power * Gain product (in linear units) of each transmitter.

$$\text{Total EIRP} = (P1 * G1) + (P2 * G2) + \dots + (Pn * Gn)$$

where

- Px = Power of transmitter x
- Gx = Numeric gain of antenna x

In the table(s) below, Power and Gain are entered in units of dBm and dBi respectively and conversions to linear forms are used for the calculations.

LIMITS

From FCC §1.1310 Table 1 (B), the maximum value of S = 1.0 mW/cm²

From IC Safety Code 6, Section 2.2 Table 5 Column 4, S = 10 W/m²

RESULTS

Band	Mode	Separation Distance (m)	Output Power (dBm)	Antenna Gain (dBi)	IC Power Density (W/m ²)	FCC Power Density (mW/cm ²)
2.4 GHz	WLAN	0.20	26.13	2.72	1.53	0.153