



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

CERTIFICATION TEST REPORT

FOR

802.11 b/g/n 1x2 MIMO NETWORKING DEVICE

MODEL NUMBER: UNIFI AP MINI

**FCC ID: SWX-UAPM
IC: 6545A-UAPM**

REPORT NUMBER: 11U14006-1, Revision A

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Prepared for
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NVLAP LAB CODE 200065-0

Revision History

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: UBIQUITI NETWORKS
91E TASMAN DRIVE,
SAN JOSE 95134, USA

EUT DESCRIPTION: 802.11 b/g/n 1X2 MIMO NETWORKING DEVICE

MODEL: UniFi AP Mini

SERIAL NUMBER: 03057 for Emissions Unit and
03055 for Conducted Unit

DATE TESTED: August 26, 2011- October 15, 2011

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 UL 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 an 802.11b/g/n MIMO transceiver Unifi Mini.

The radio module is manufactured by Ubiquiti Network.

5.2. 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	17.17	52.12
2412 - 2462	802.11g	26.08	405.51
2412 - 2462	802.11n HT20	26.01	399.02
2422 - 2452	802.11n HT40	25.50	354.81

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an internal antenna, with a maximum gain of 3 dBi.

5.4. SOFTWARE AND FIRMWARE

The EUT driver software installed during testing was Art2_Ver_2_54BIN_Mini.

The test utility software used during testing was Start_Art "mytx_2g"

Firmware is AirOS v5.5

5.5. WORST-CASE CONFIGURATION AND MODE

The worst-case channel is determined as the channel with the highest output power. Radiated emissions below 1 GHz and power line conducted emissions were performed with the EUT set to transmit at the channel with highest output power.

The following worst-case data rates, as provided by the client, were used for the testing purpose:

802.11b mode = 1 Mbps

802.11g mode = 6 Mbps

802.11n 20MHz mode = MCS0

802.11n 40MHz mode = MCS0

The EUT has two positions, either wall mounted or ceiling mounted, the two positions were investigated and it was found that ceiling-mounted orientation is worst-case; therefore, final testing was performed with the EUT orientated as ceiling-mounted (flat on the table).

6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	Dell	Vostro 1520	00144-365-878-185	N/A
AC/DC Adapter	Dell	HA65NS2-00	CN-0MN44-47890-965-D26H-A02	N/A
Carrire PoE	Ubiquiti	UBI-POE-24-1	1101-0009610	DoC

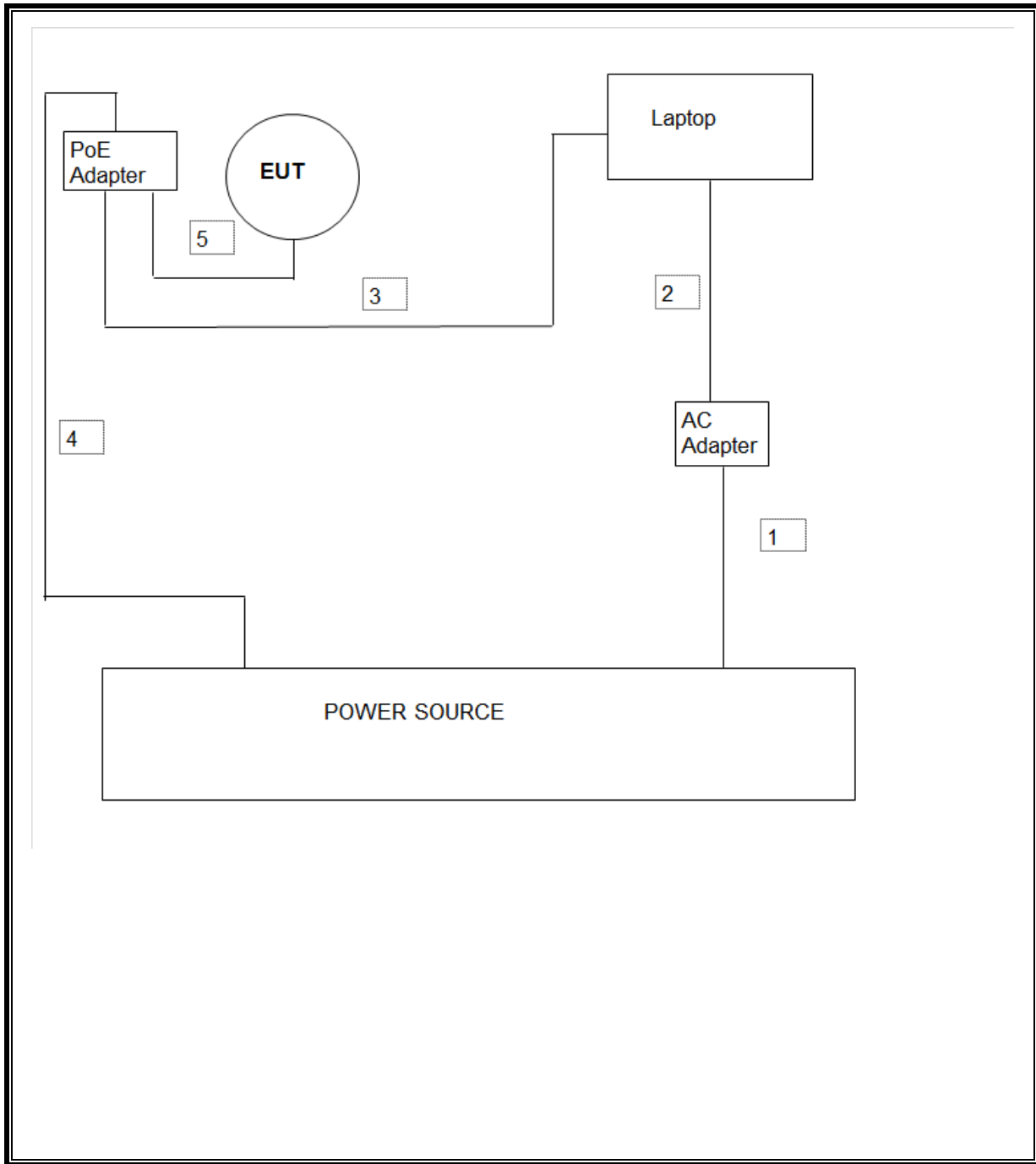
I/O CABLES

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	1	USA115VAC	Unshielded	0.8 m	N/A
2	DC	1	DC Plug	Unshielded	1 m	Ferrite at Laptop
3	WLAN	1	RJ45	Shielded	1.8 m	N/A
4	AC	1	USA115VAC	Unshielded	0.5 m	N/A
5	PoE	1	DC Plug	Shielded	1.8 m	N/A

TEST SETUP

The EUT is connected to a host laptop computer and powered by the PoE adapter during the tests. Test software exercised the radio card.

SETUP DIAGRAM FOR TESTS



7. 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
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01052	6/13/2011	6/13/2011
Preamplifier, 1300 MHz	Agilent / HP	8447D	C01048	7/16/2011	7/16/2012
BiLog Antenna	ETS	3117	C01005	7/25/2011	7/25/2012
Antenna, Horn, 18 GHz	EMCO	3115	C00945	6/26/2011	6/26/2012
Antenna, Horn, 26.5 GHz	ARA	SMH-28	C01015	8/16/2011	8/16/2012
Power meter	Agilent	E4416A	PPM3	3/22/2011	3/22/2012
Power Sensor	Agilent	E9327A	T233	3/22/2011	3/22/2012
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-B	N02481	11/10/2010	11/10/2011
EMI Test Receiver	R & S	ESC17	1000741	7/2/2011	7/2/2012
LISN, 30 MHz	FCC	LISN-50/250-25-	N02625	11/10/2010	11/10/2011
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C00986	8/11/2011	8/11/2012

8. ANTENNA PORT TEST RESULTS

8.1. 802.11b MODE IN THE 2.4 GHz BAND

8.1.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

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

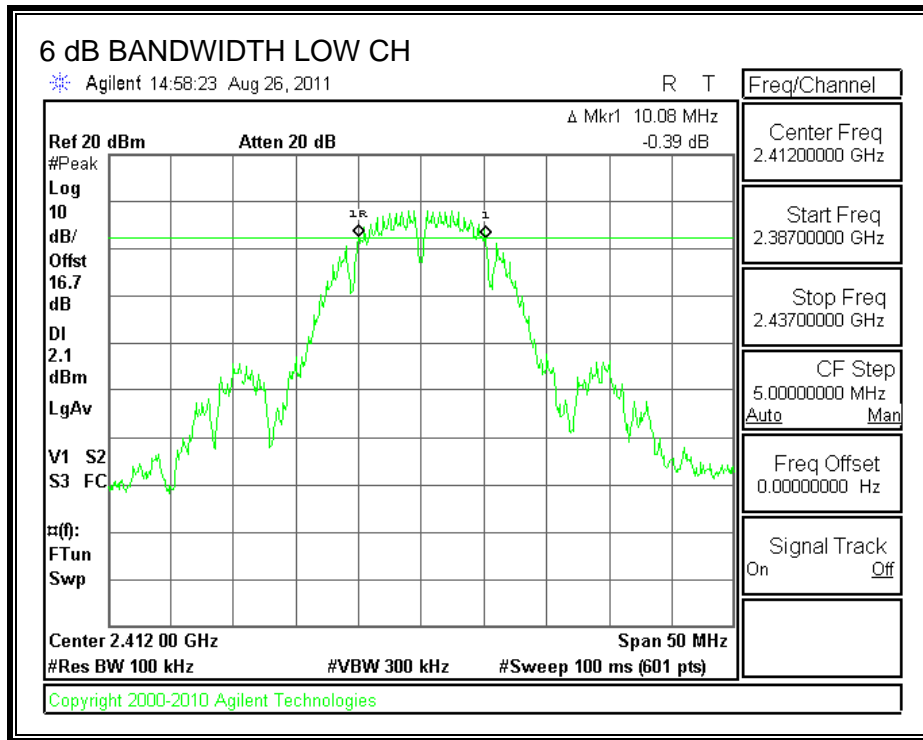
TEST PROCEDURE

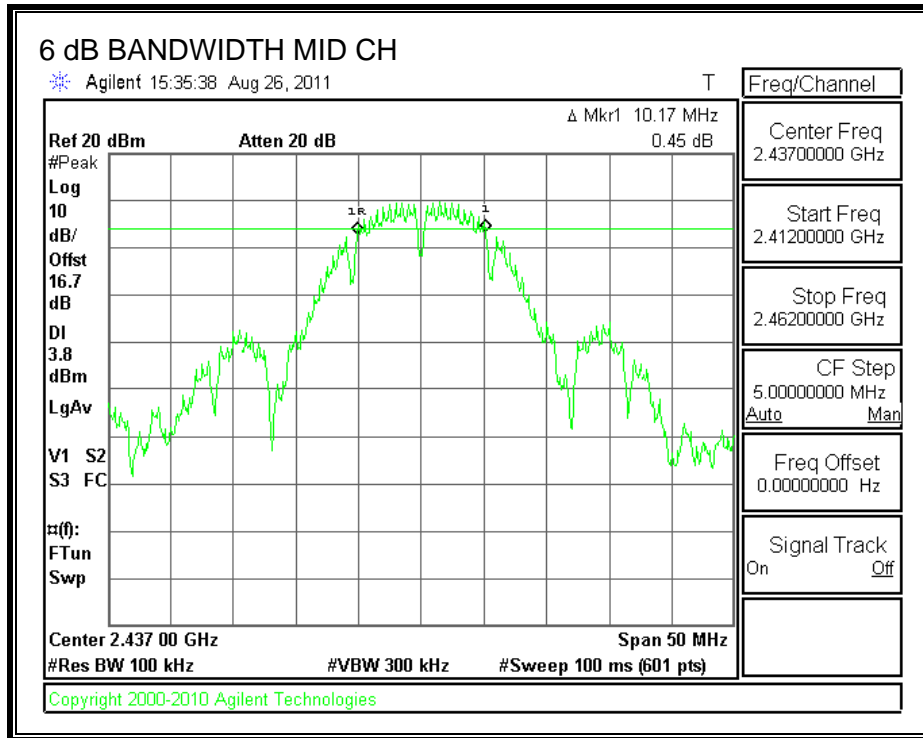
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

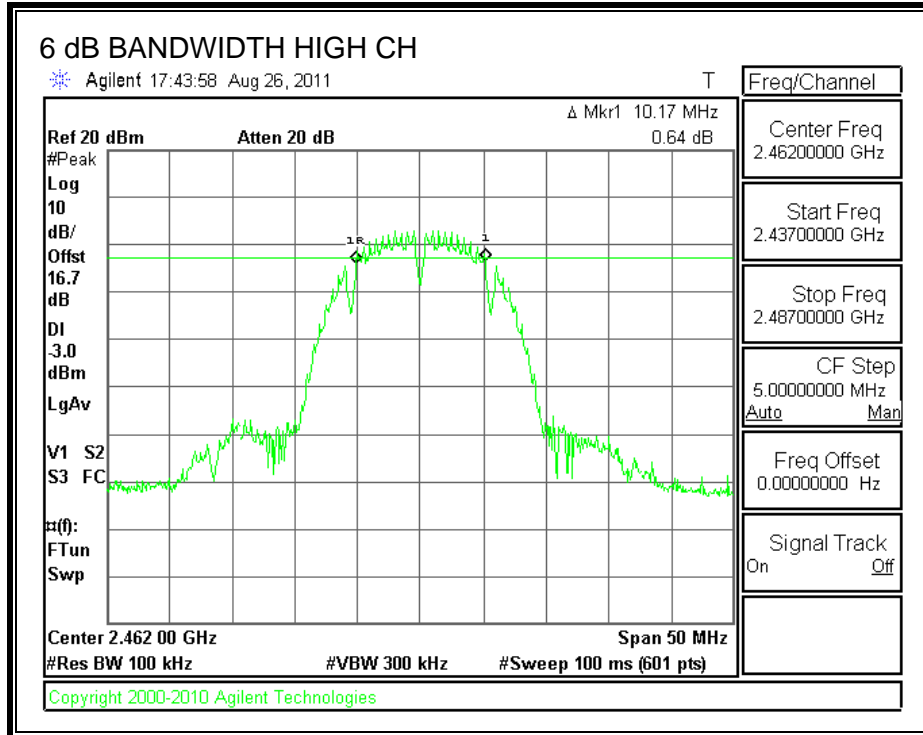
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	10.08	0.5
Middle	2437	10.17	0.5
High	2462	10.17	0.5

6 dB BANDWIDTH







8.1.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

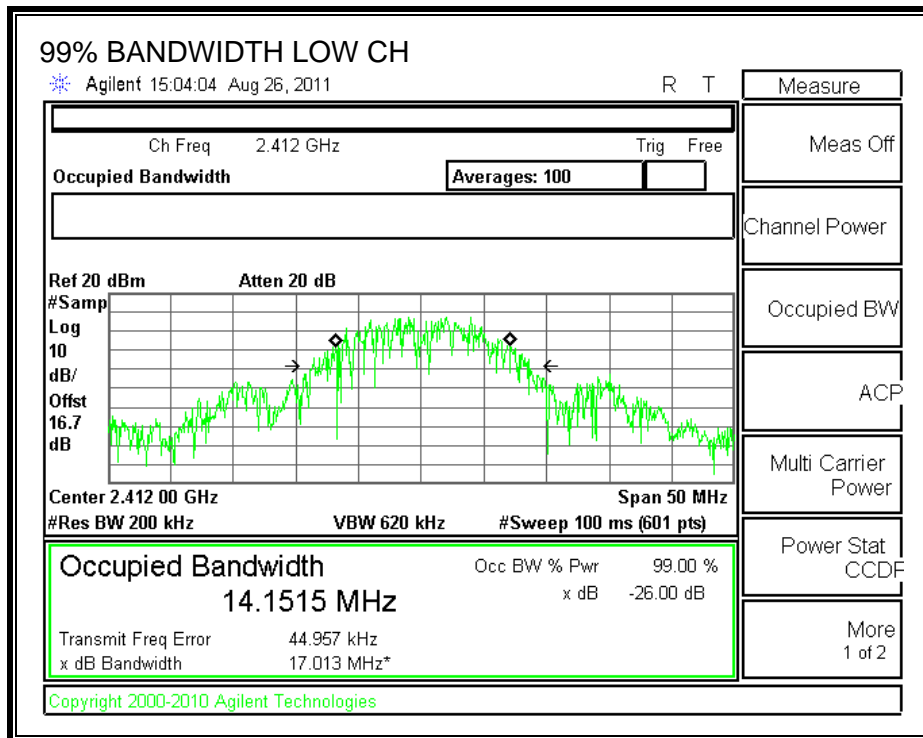
TEST PROCEDURE

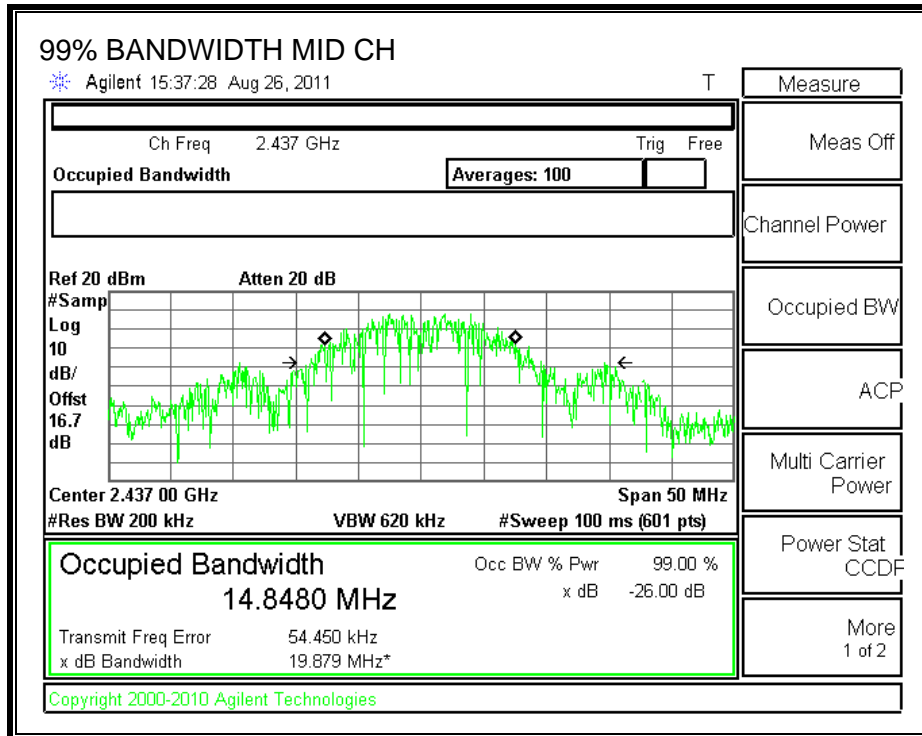
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

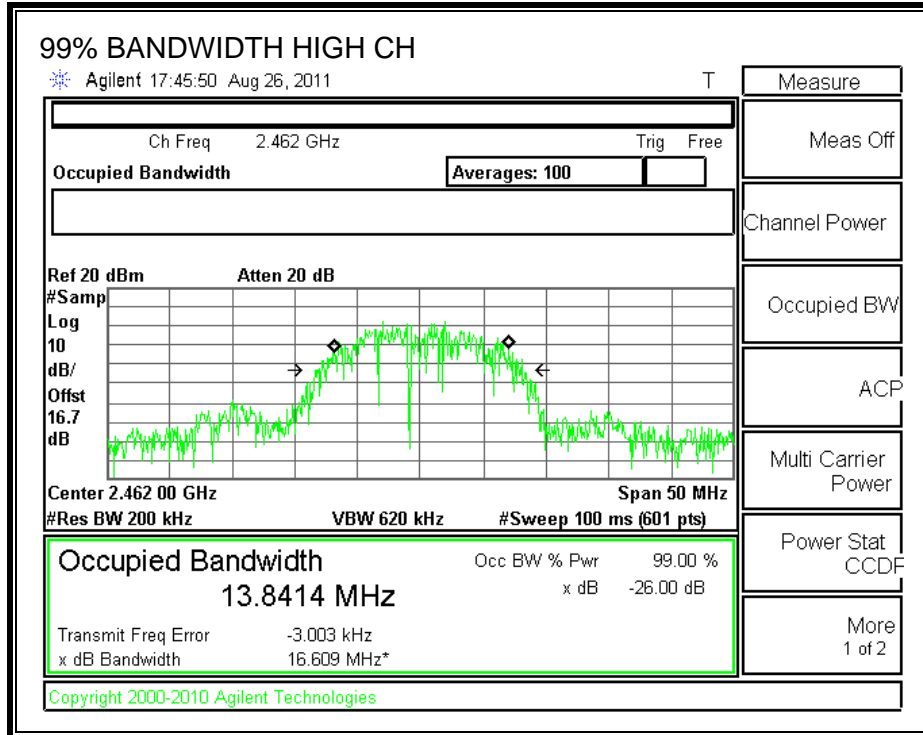
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	14.5150
Middle	2437	14.8480
High	2462	13.8414

99% BANDWIDTH







8.1.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

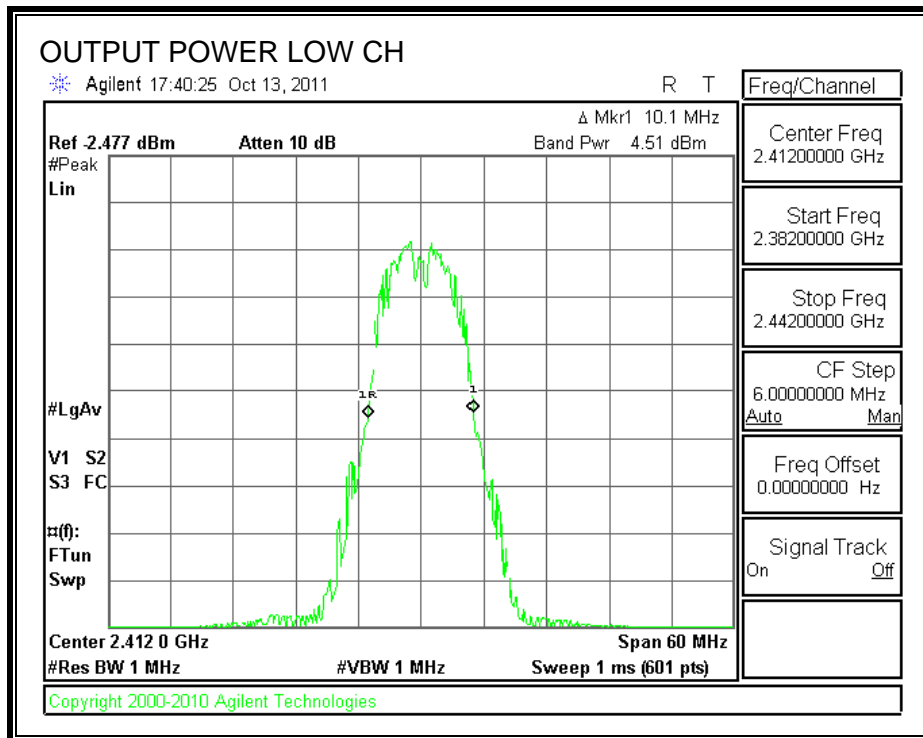
TEST PROCEDURE

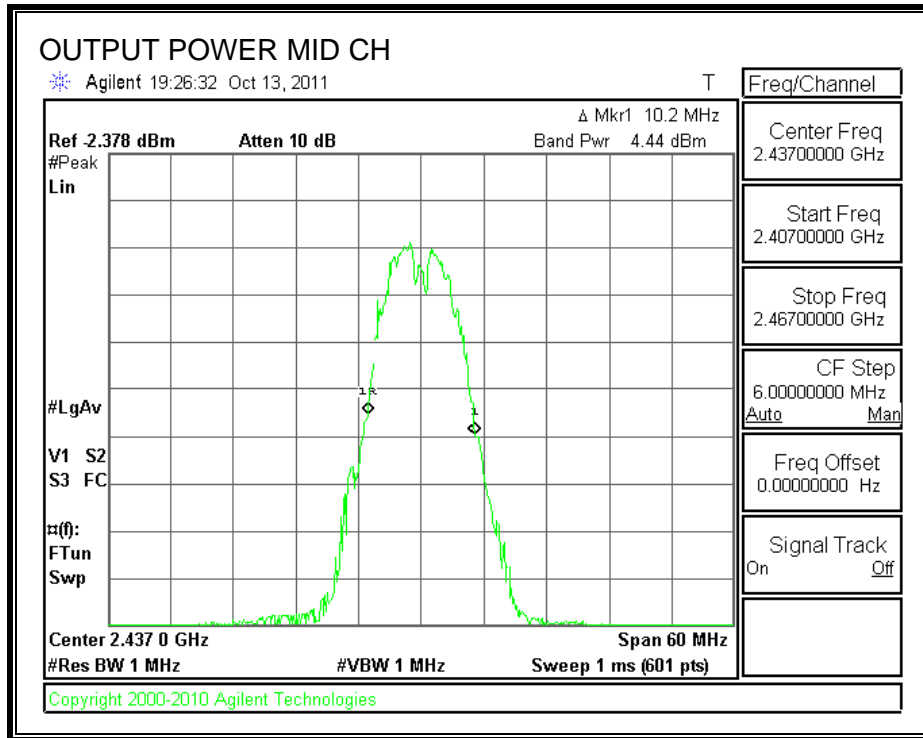
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

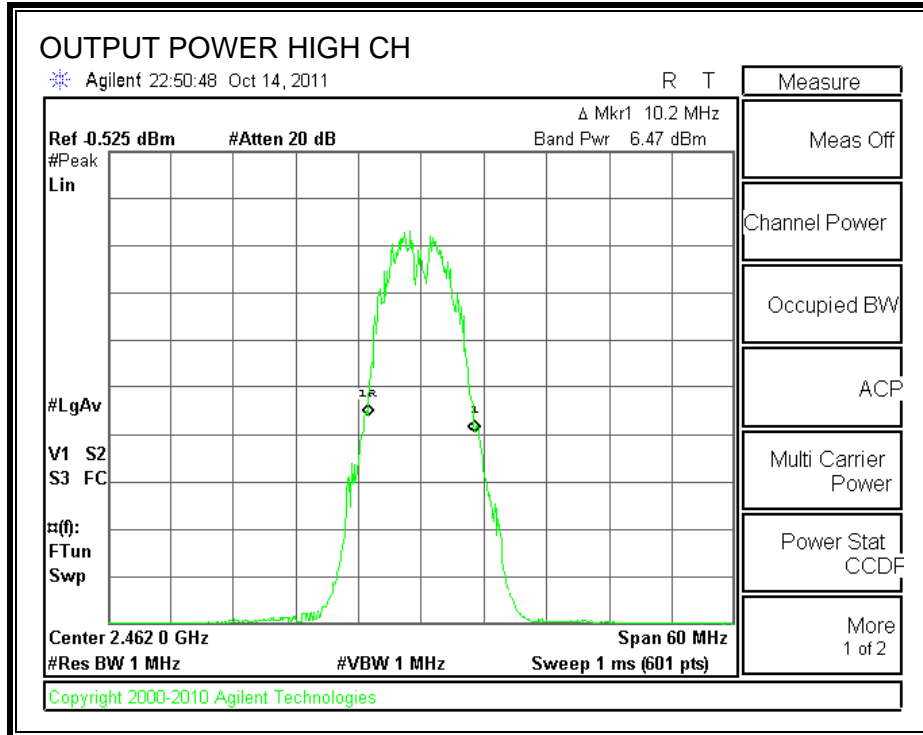
RESULTS

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Attenuator and Cable Offset (dB)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	4.51	10.7	15.21	30	-14.79
Middle	2437	4.44	10.7	15.14	30	-14.86
High	2462	6.47	10.7	17.17	30	-12.83

OUTPUT POWER







8.1.4. 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 10.7 dB (including 10 dB pad and .7 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Power (dBm)
Low	2412	12.40
Middle	2437	12.20
High	2462	13.90

8.1.5. 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.

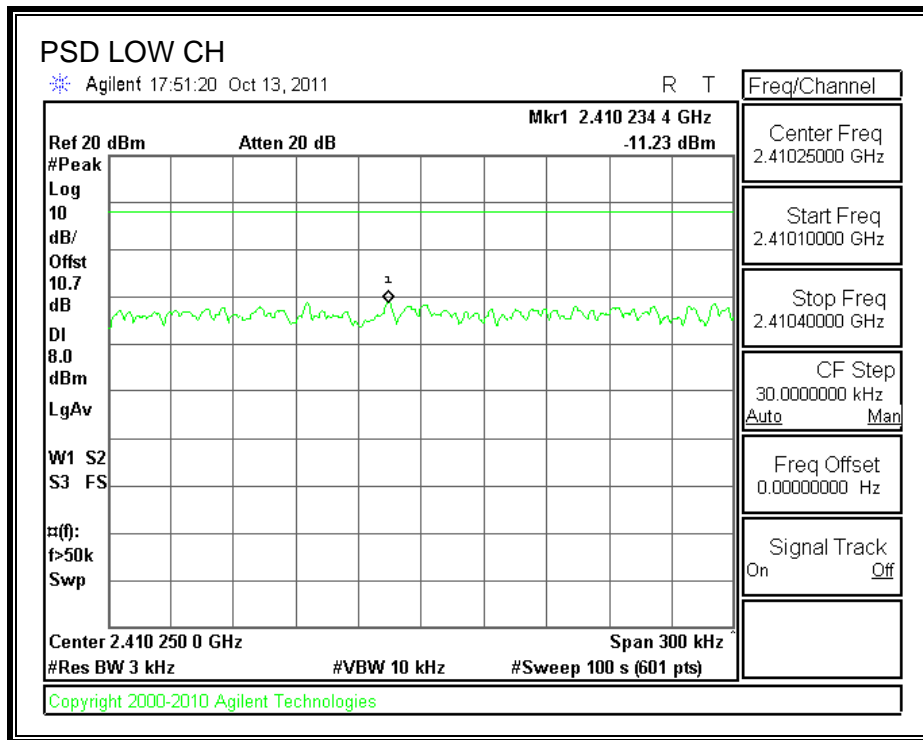
TEST PROCEDURE

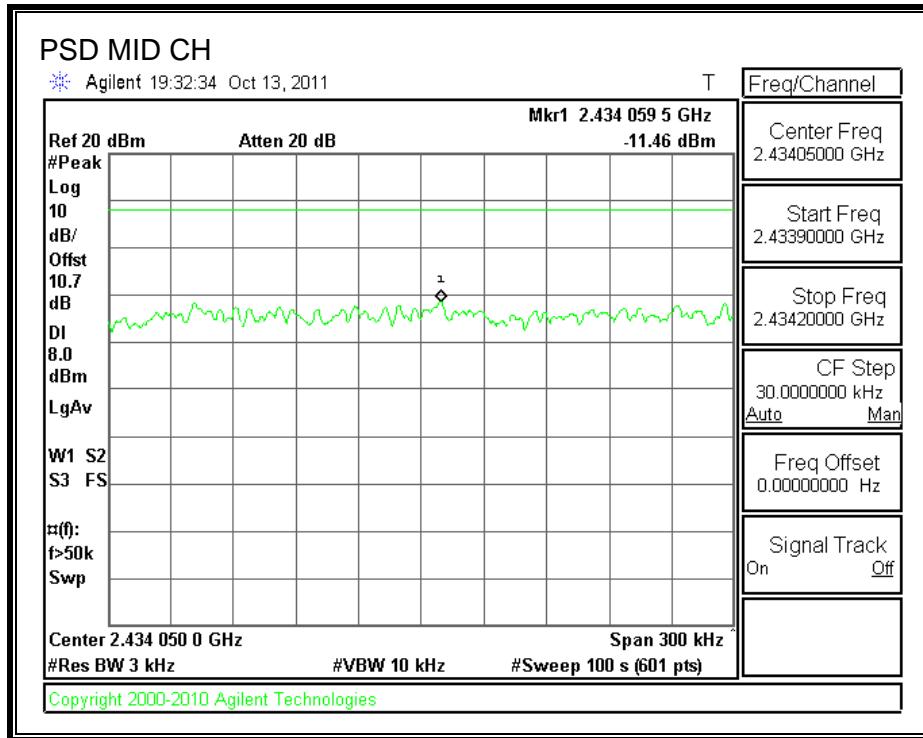
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

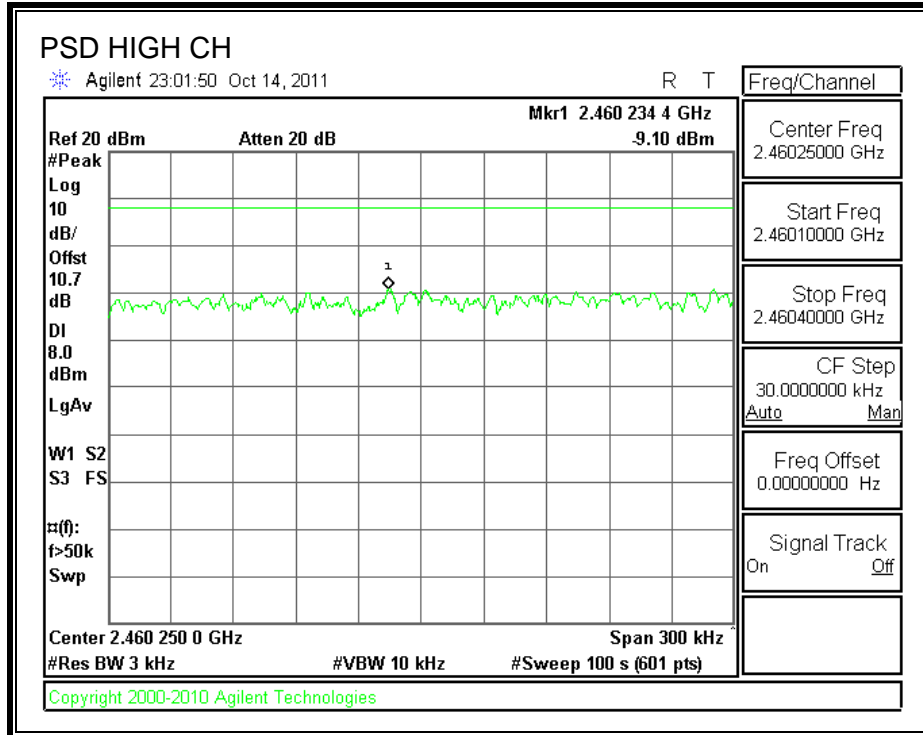
RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-11.23	8	-19.23
Middle	2437	-11.46	8	-19.46
High	2462	-9.10	8	-17.10

POWER SPECTRAL DENSITY







8.1.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

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

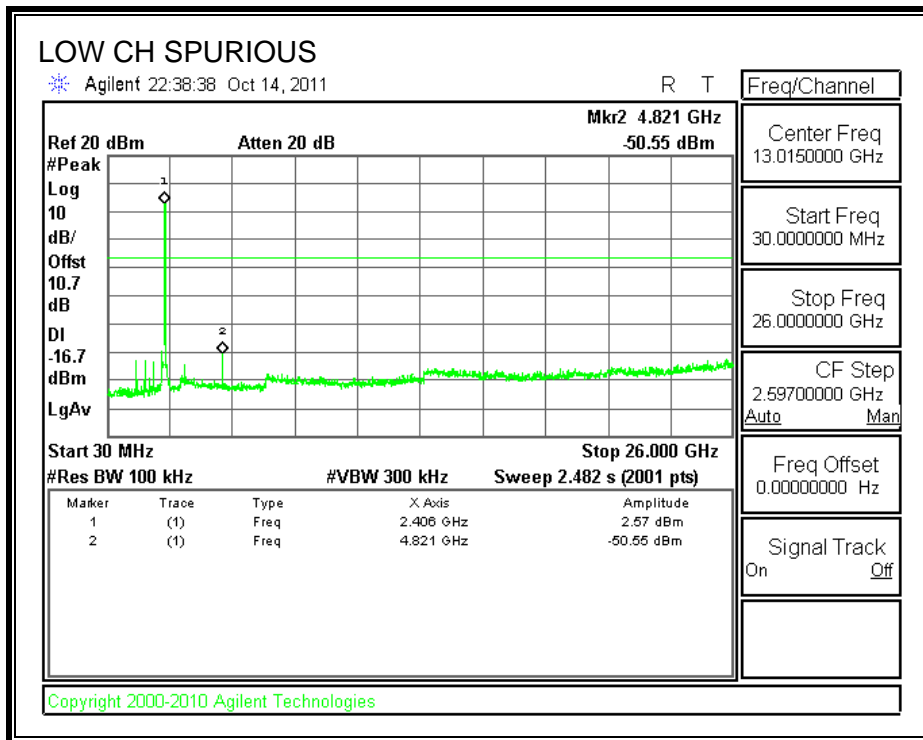
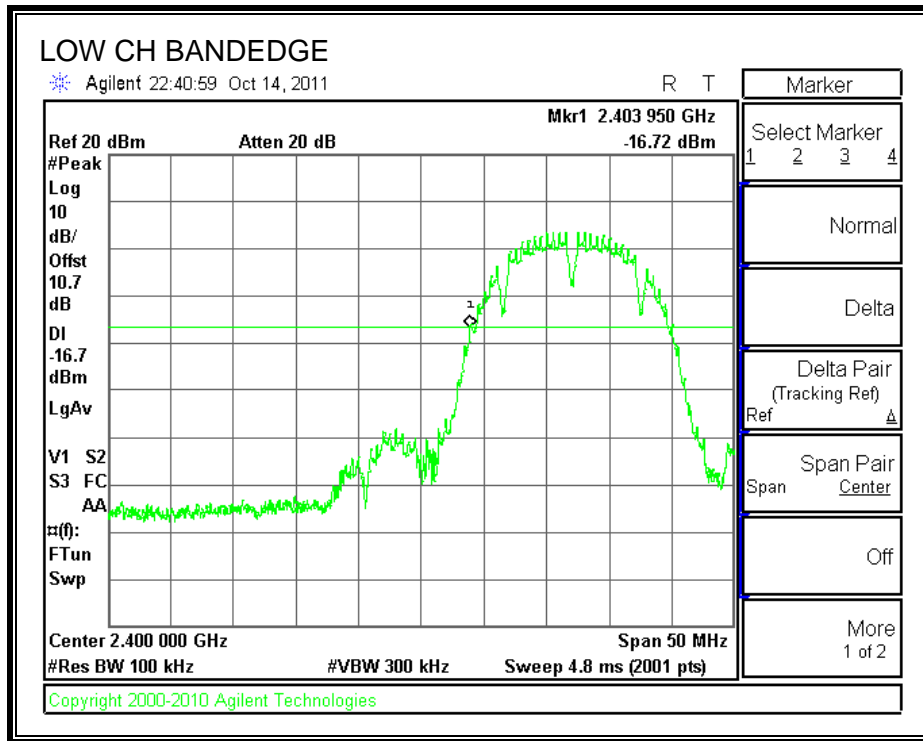
TEST PROCEDURE

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

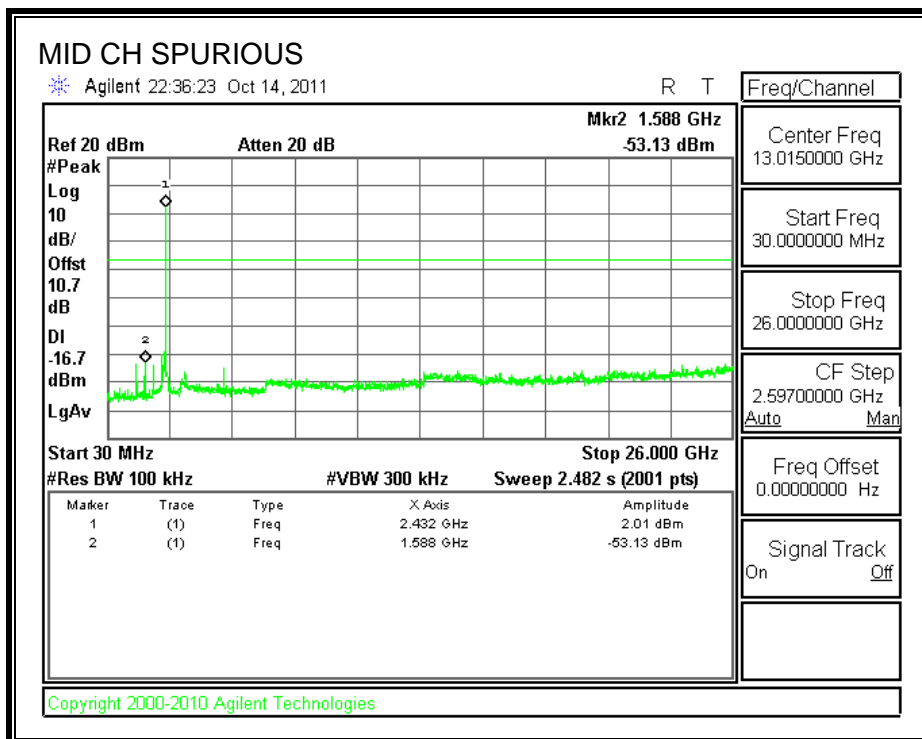
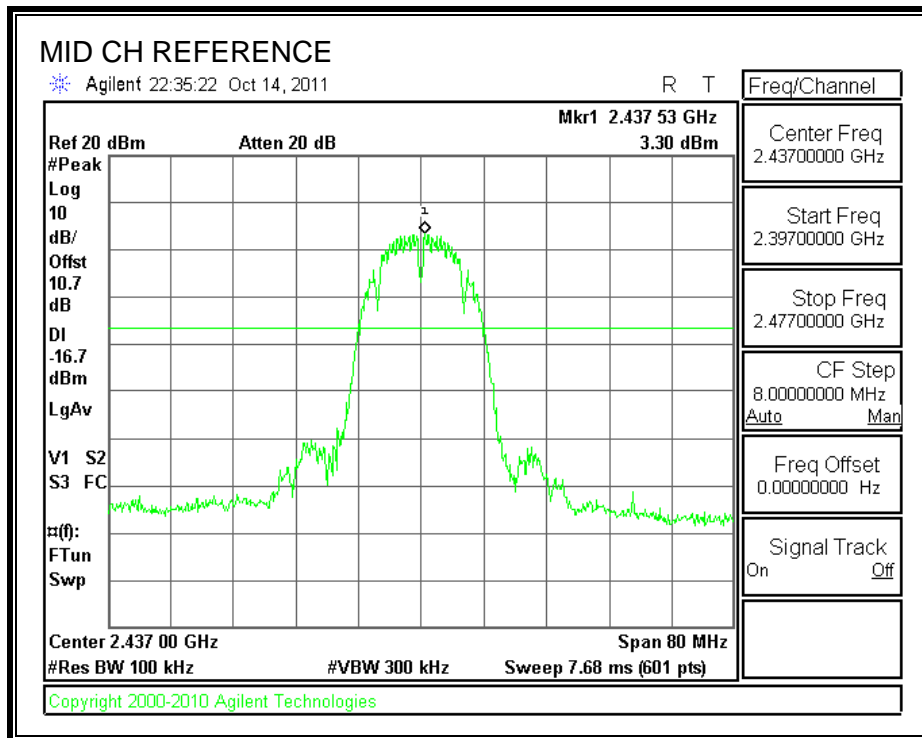
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

RESULTS

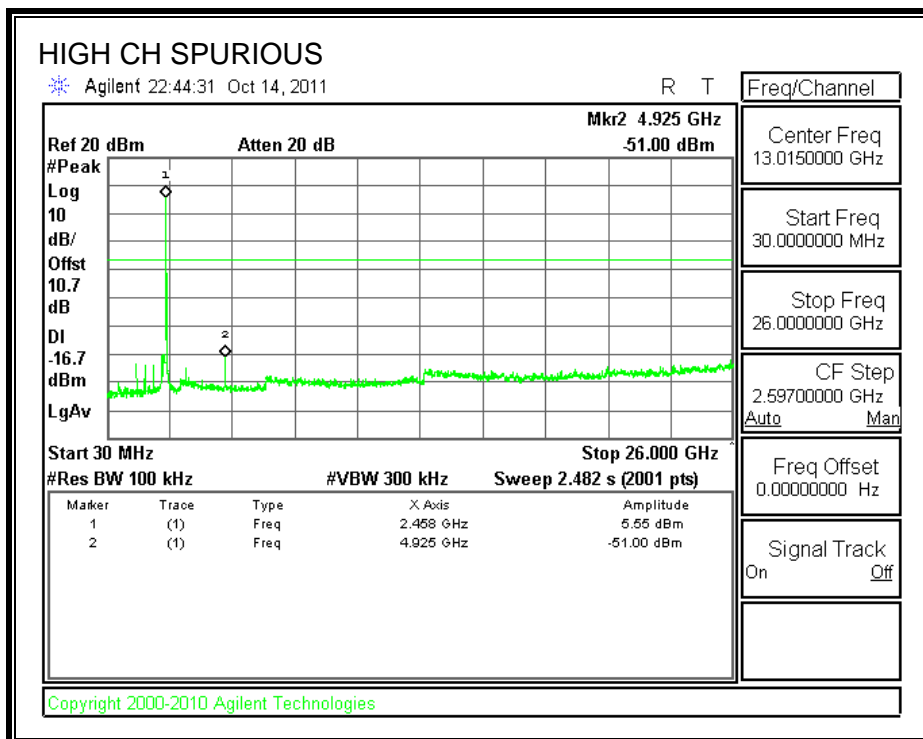
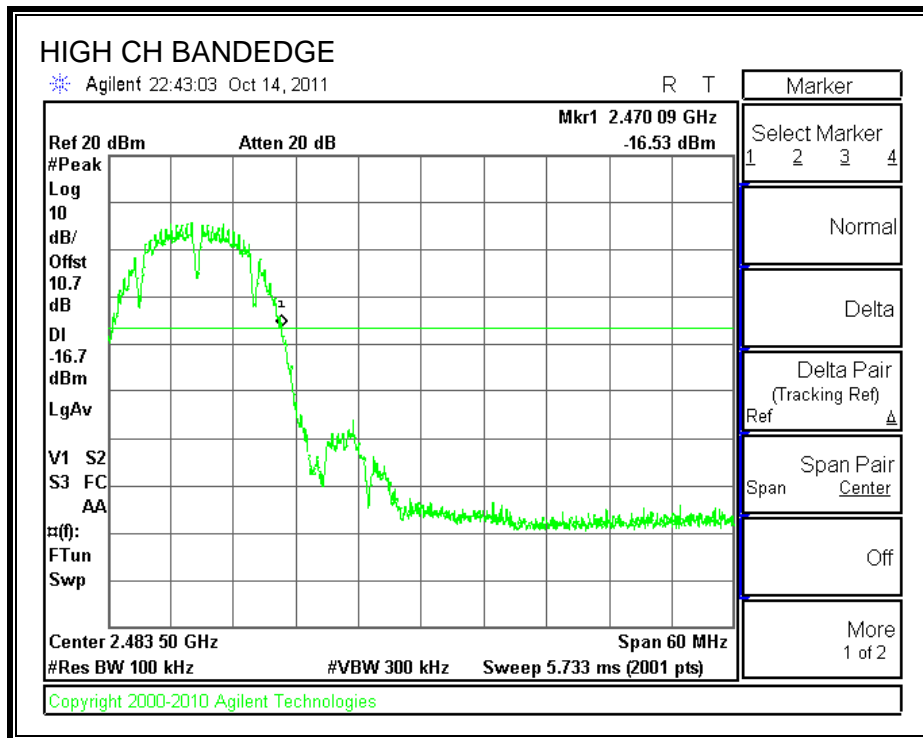
SPURIOUS EMISSIONS, LOW CHANNEL



SPURIOUS EMISSIONS, MID CHANNEL



SPURIOUS EMISSIONS, HIGH CHANNEL



8.2. 802.11g MODE IN THE 2.4 GHz BAND

8.2.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

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

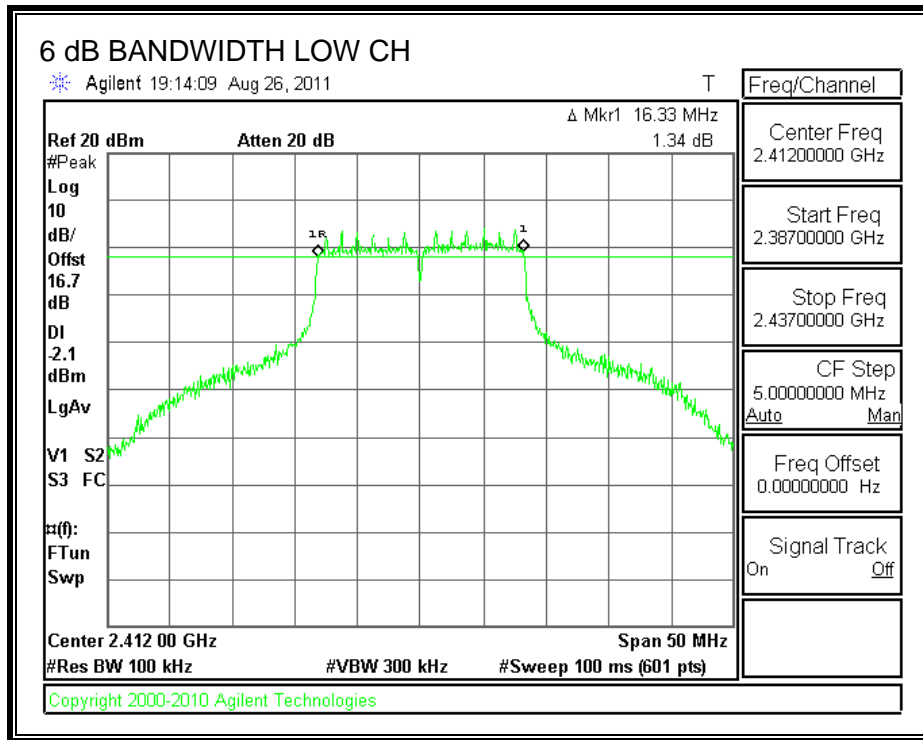
TEST PROCEDURE

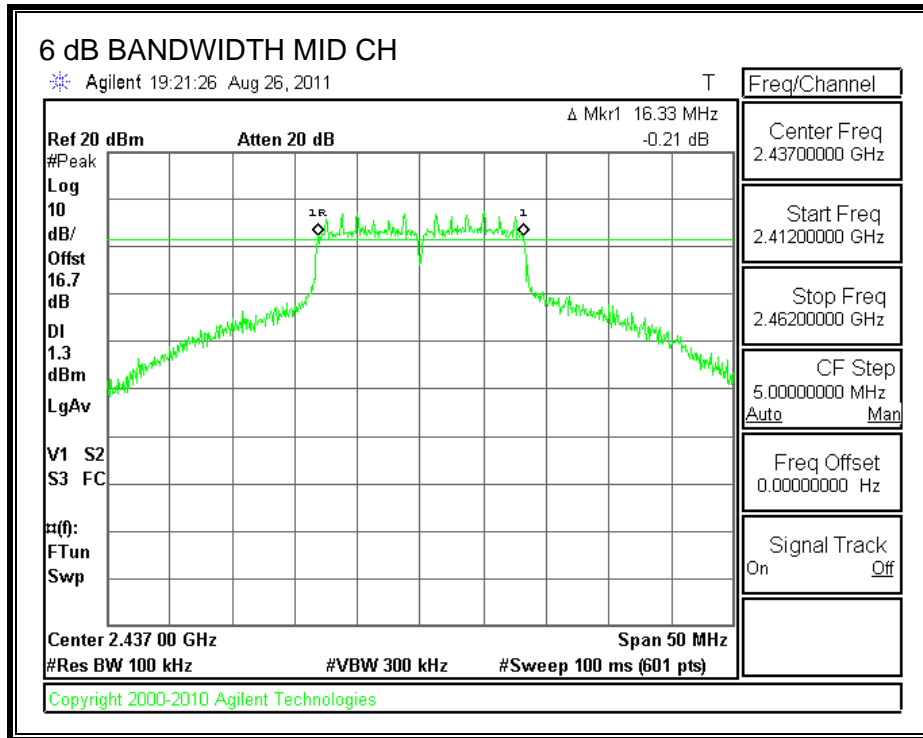
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

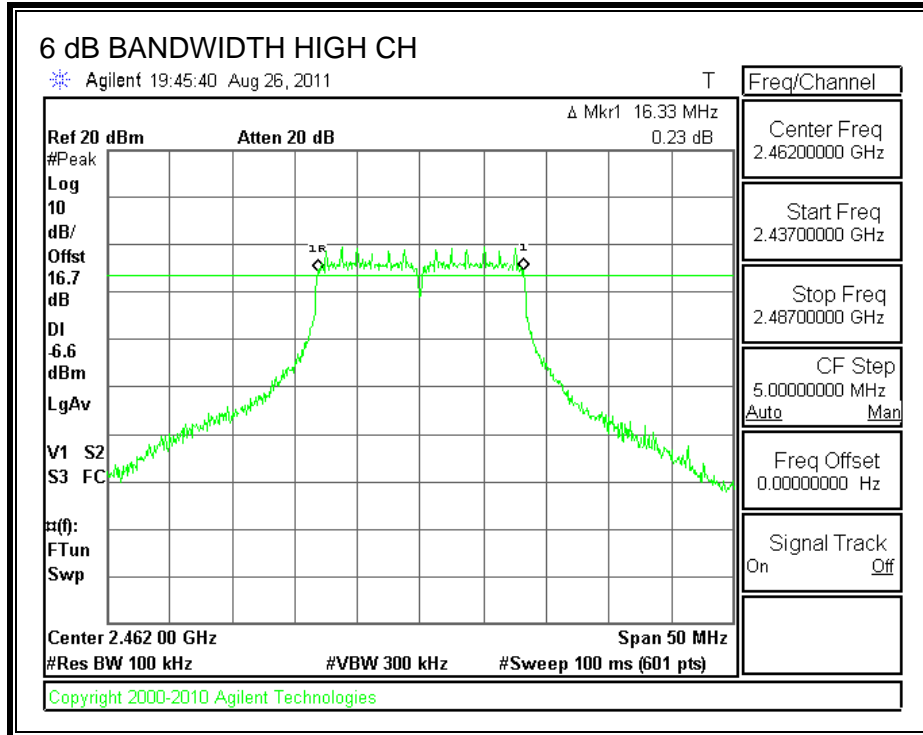
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	16.33	0.5
Middle	2437	16.33	0.5
High	2462	16.33	0.5

6 dB BANDWIDTH







8.2.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

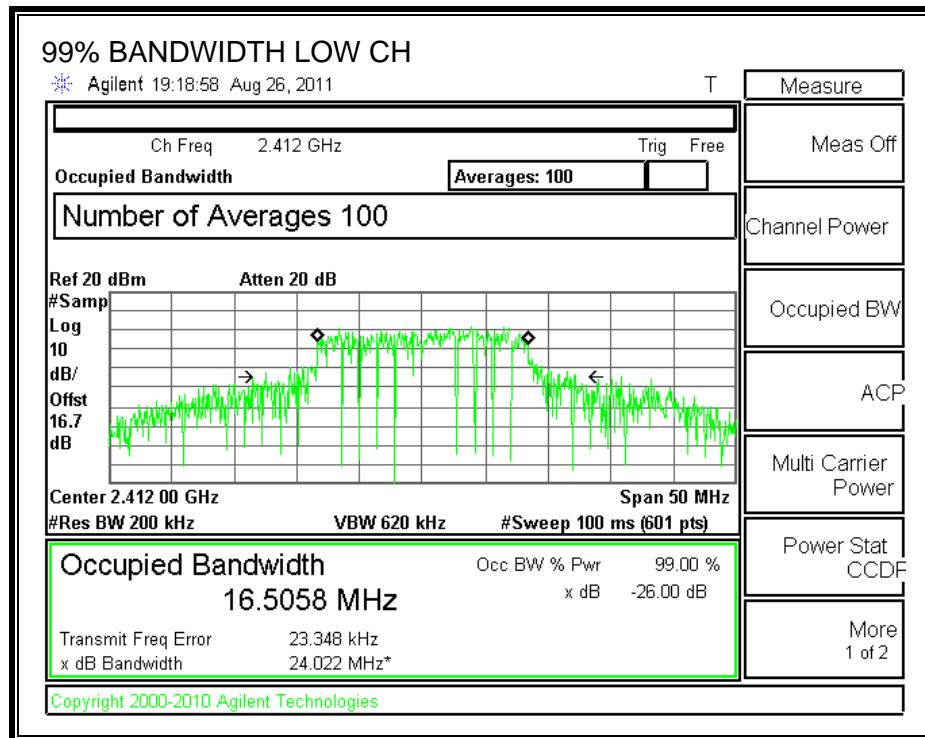
TEST PROCEDURE

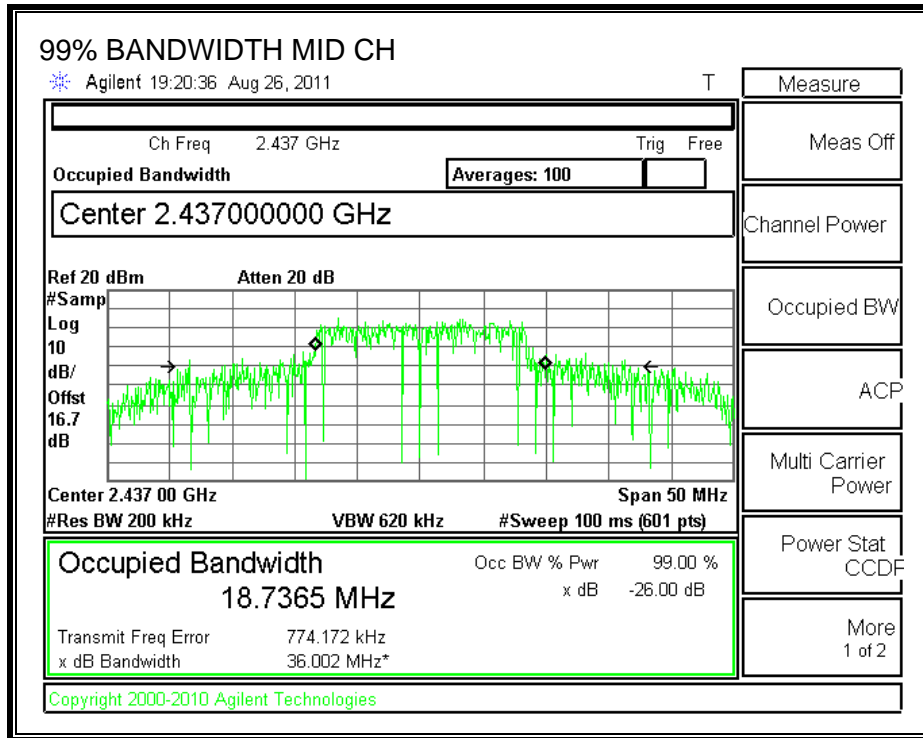
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

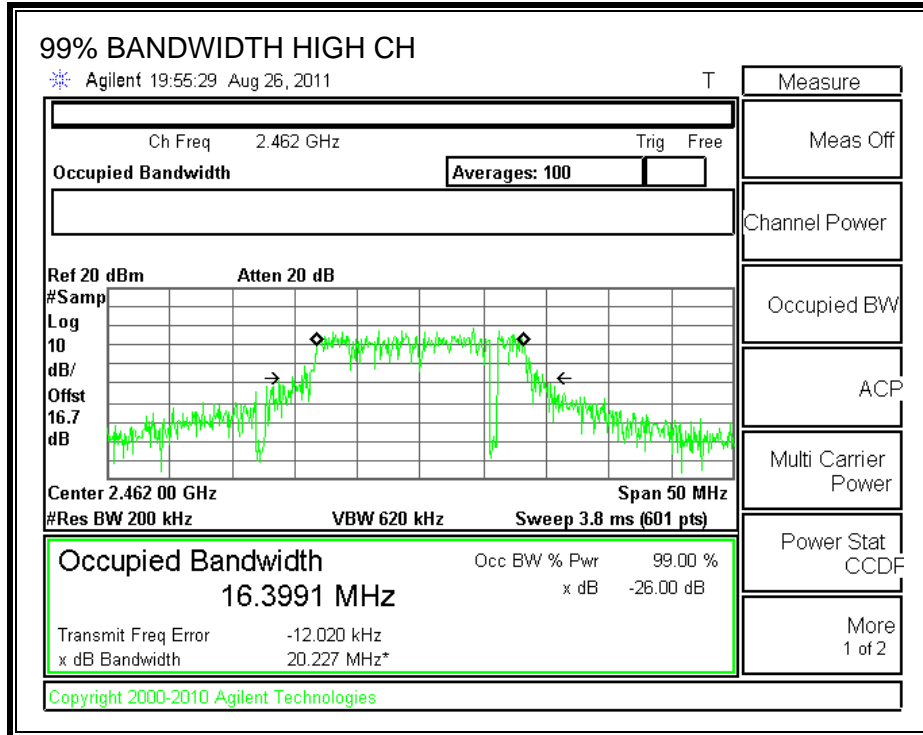
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	16.5058
Middle	2437	18.7365
High	2462	16.3991

99% BANDWIDTH







8.2.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

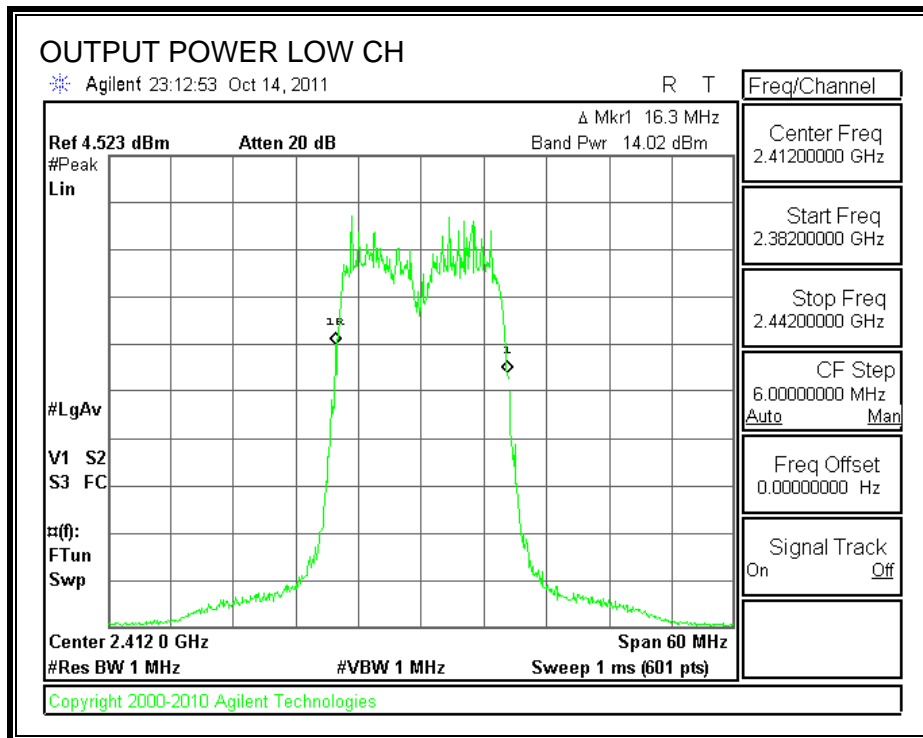
TEST PROCEDURE

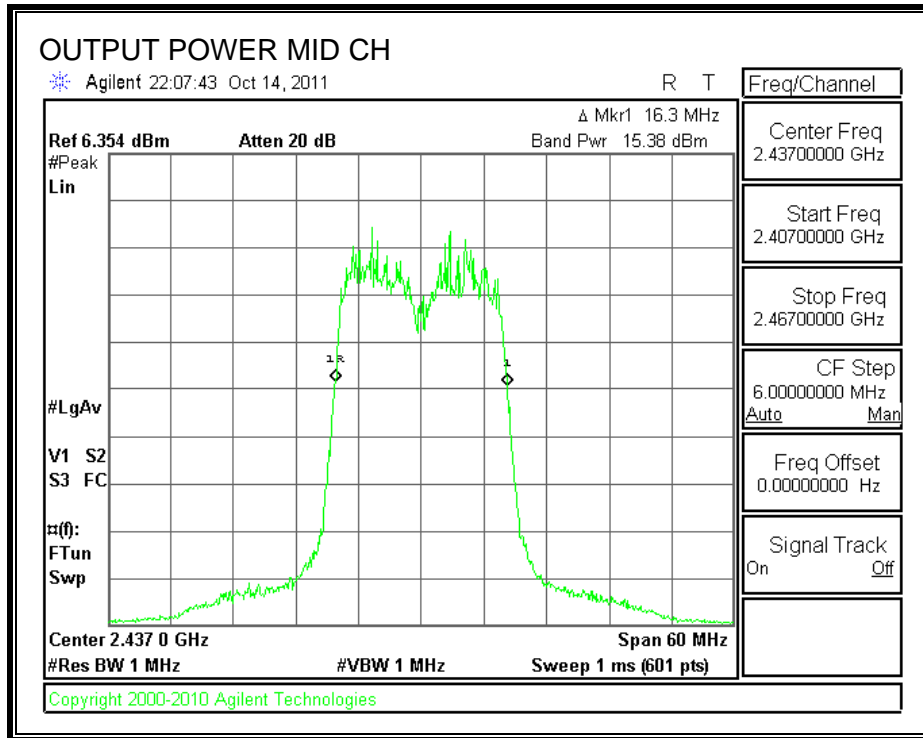
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

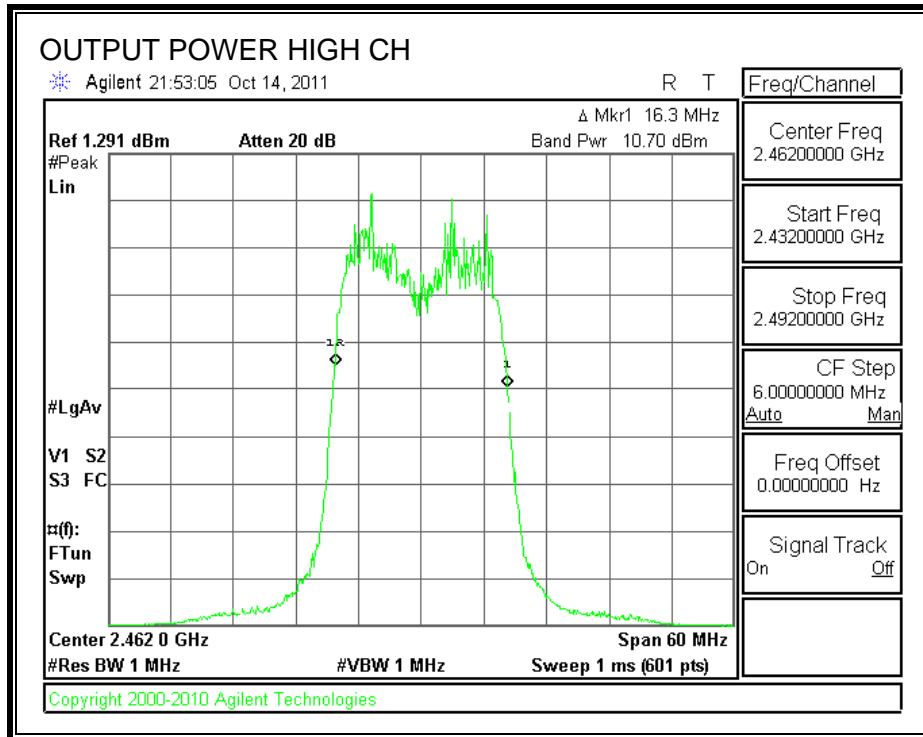
RESULTS

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Attenuator and Cable Offset (dB)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	14.02	10.7	24.72	30	-5.28
Middle	2437	15.38	10.7	26.08	30	-3.92
High	2462	10.7	10.7	21.40	30	-8.60

OUTPUT POWER







8.2.4. 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 17 dB (including 10 dB pad and 7 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Power (dBm)
Low	2412	17.14
Middle	2437	18.23
High	2462	13.60

8.2.5. 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.

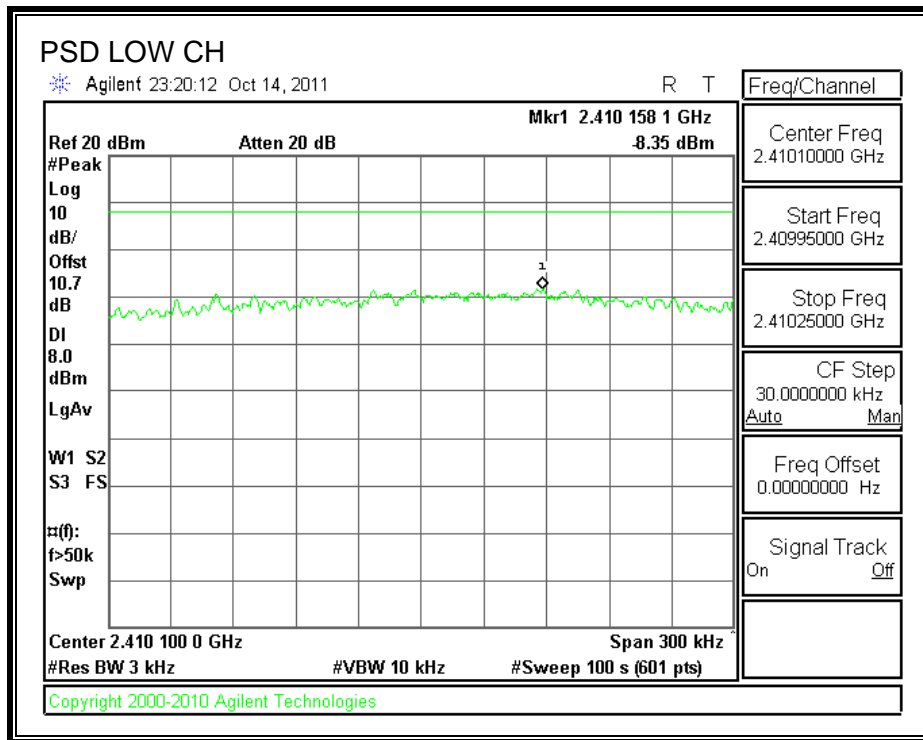
TEST PROCEDURE

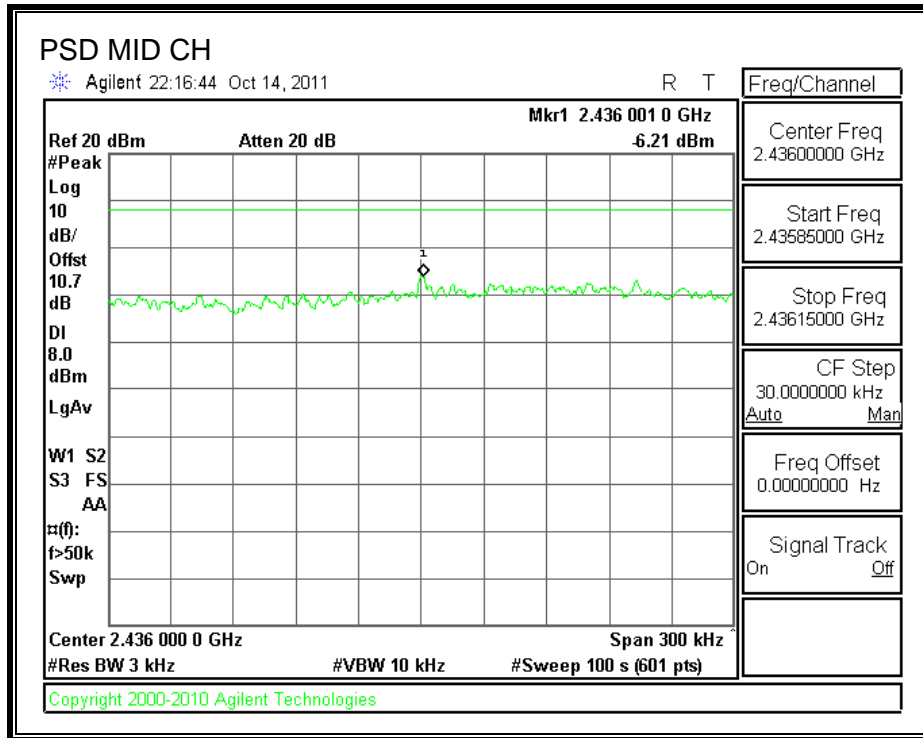
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

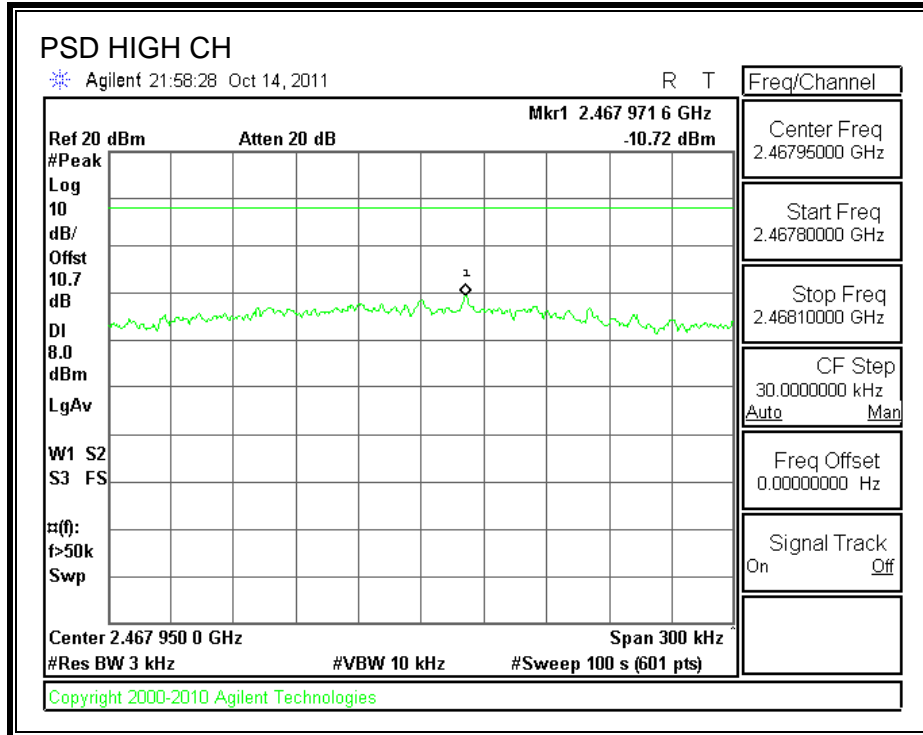
RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-8.35	8	-16.35
Middle	2437	-6.21	8	-14.21
High	2462	-10.72	8	-18.72

POWER SPECTRAL DENSITY







8.2.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

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

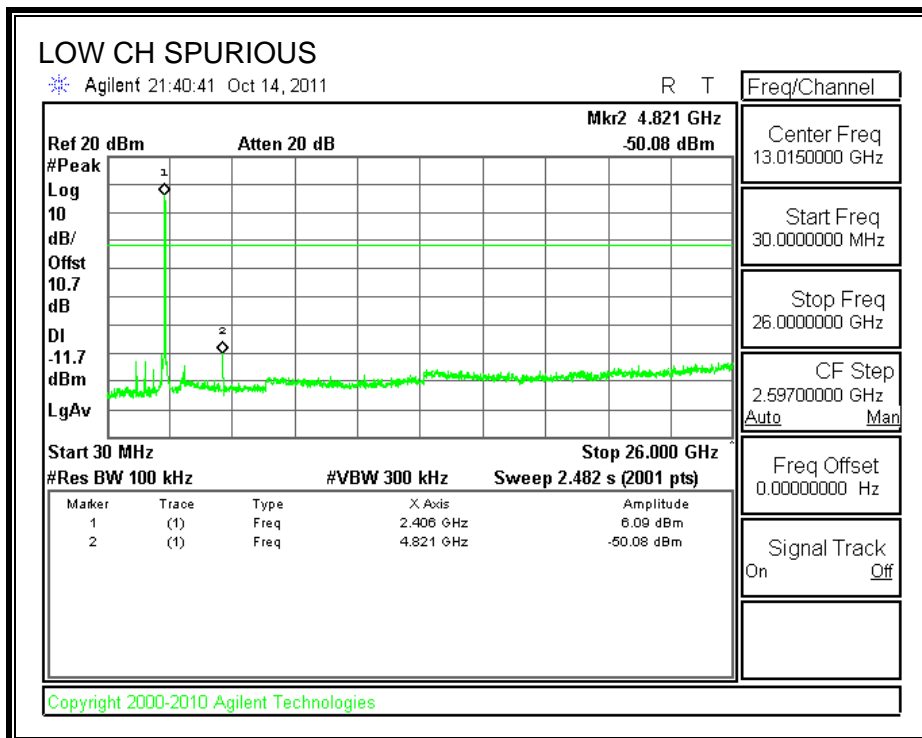
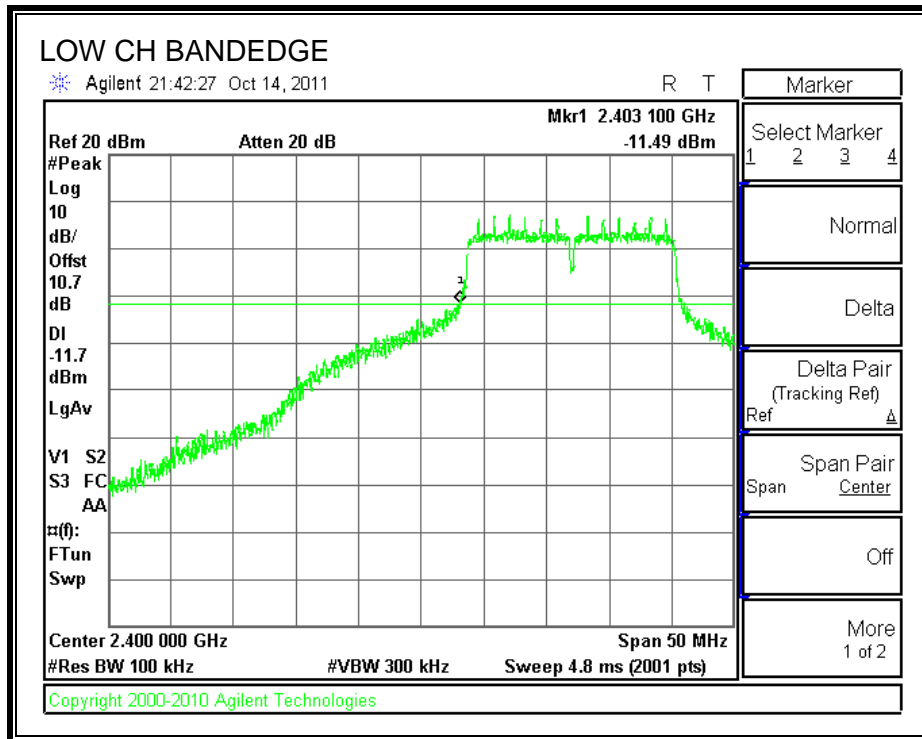
TEST PROCEDURE

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

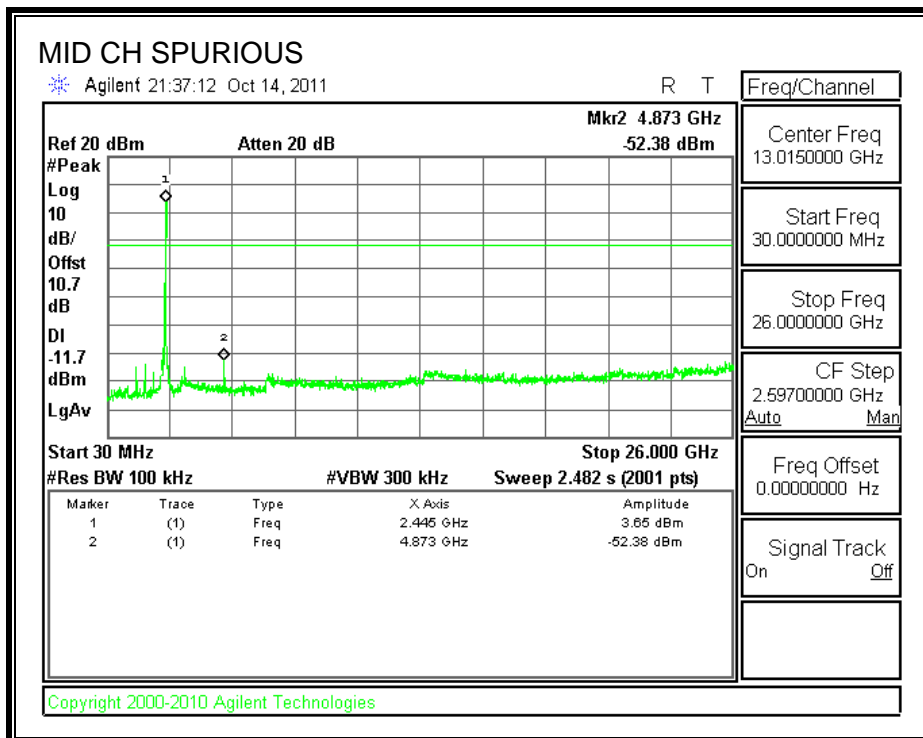
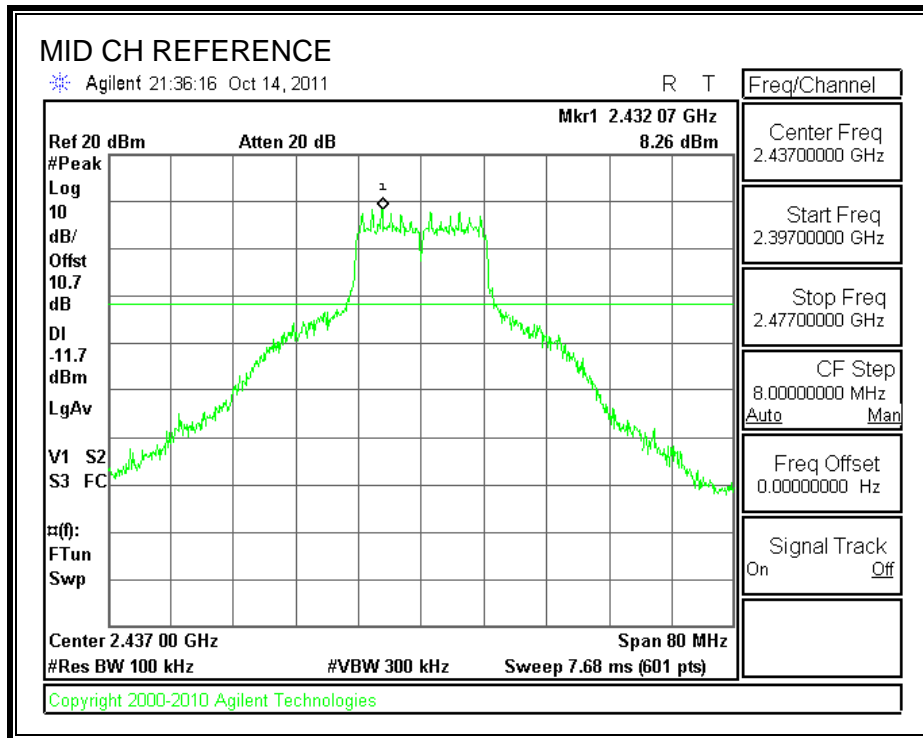
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

RESULTS

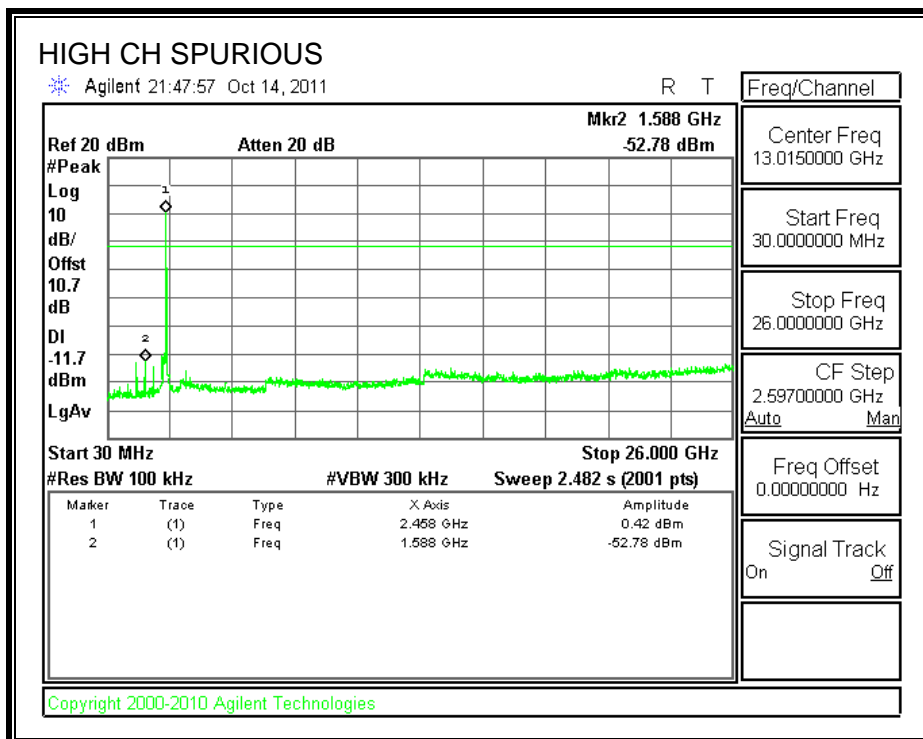
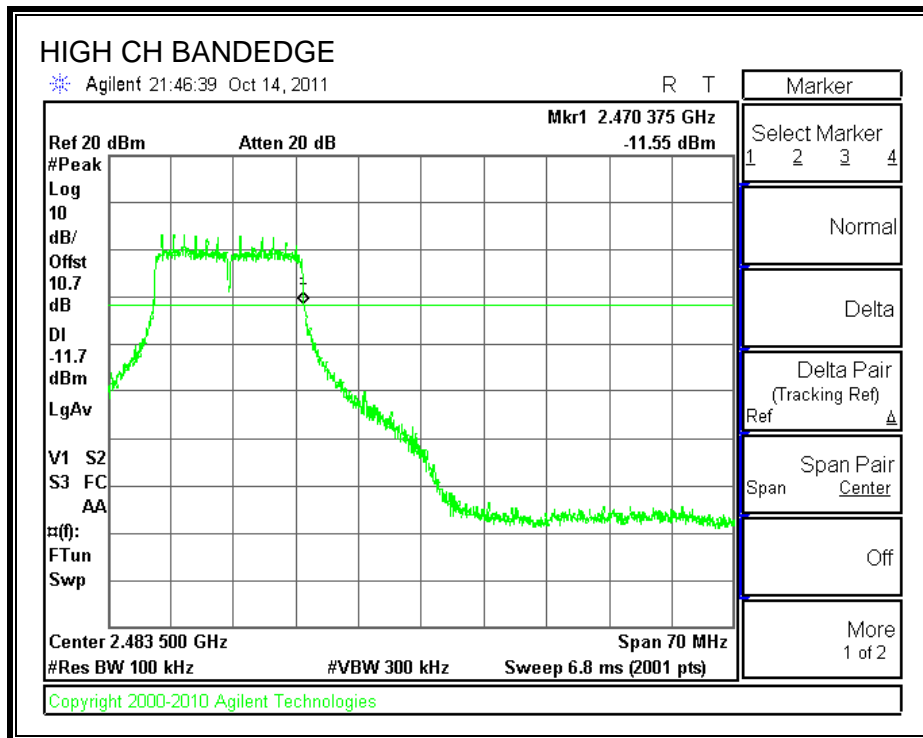
SPURIOUS EMISSIONS, LOW CHANNEL



SPURIOUS EMISSIONS, MID CHANNEL



SPURIOUS EMISSIONS, HIGH CHANNEL



8.3. 802.11HT 20 MODE IN THE 2.4 GHz BAND

8.3.1. 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.

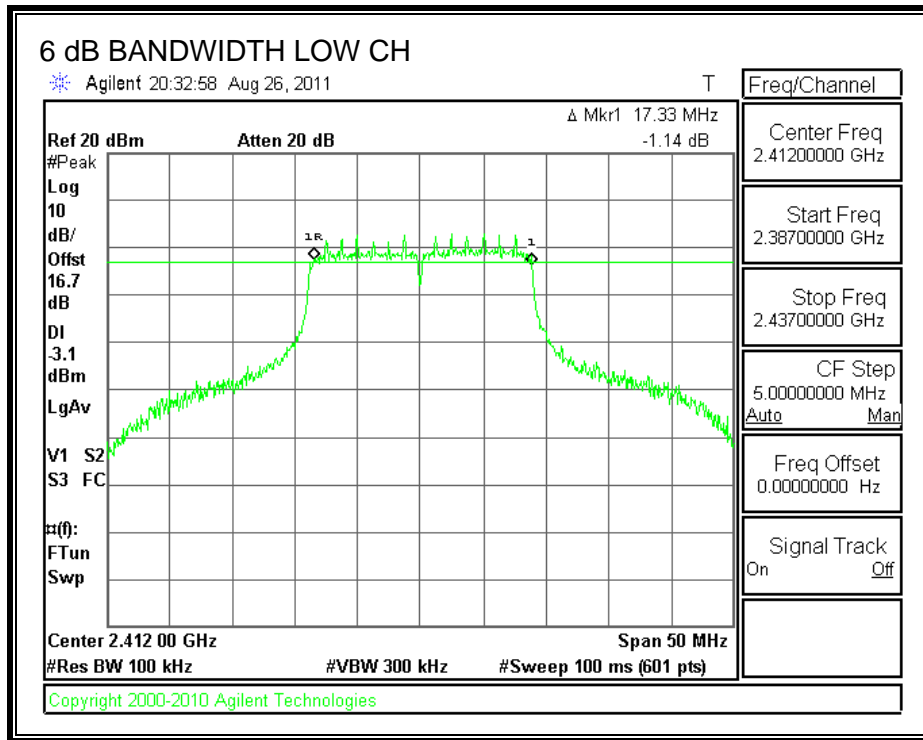
TEST PROCEDURE

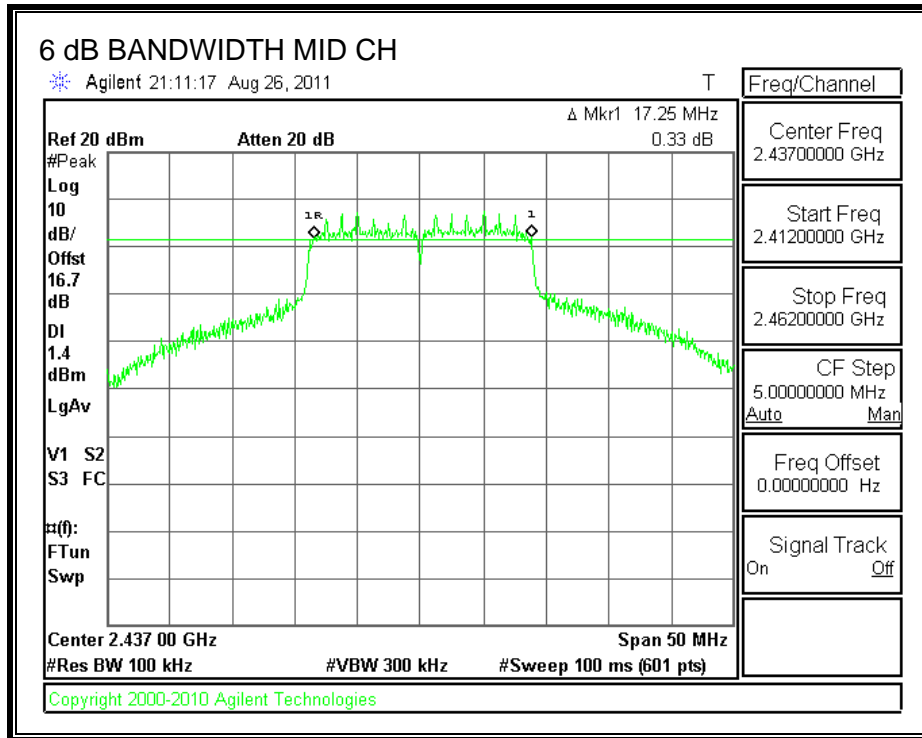
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

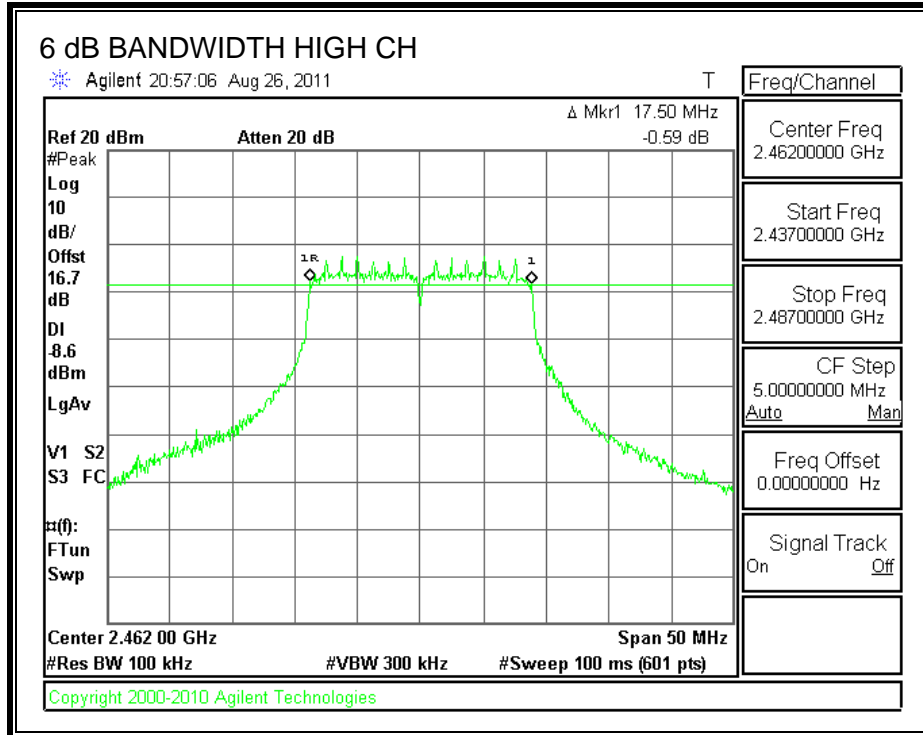
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	17.33	0.5
Middle	2437	17.25	0.5
High	2462	17.5	0.5

6 dB BANDWIDTH







8.3.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

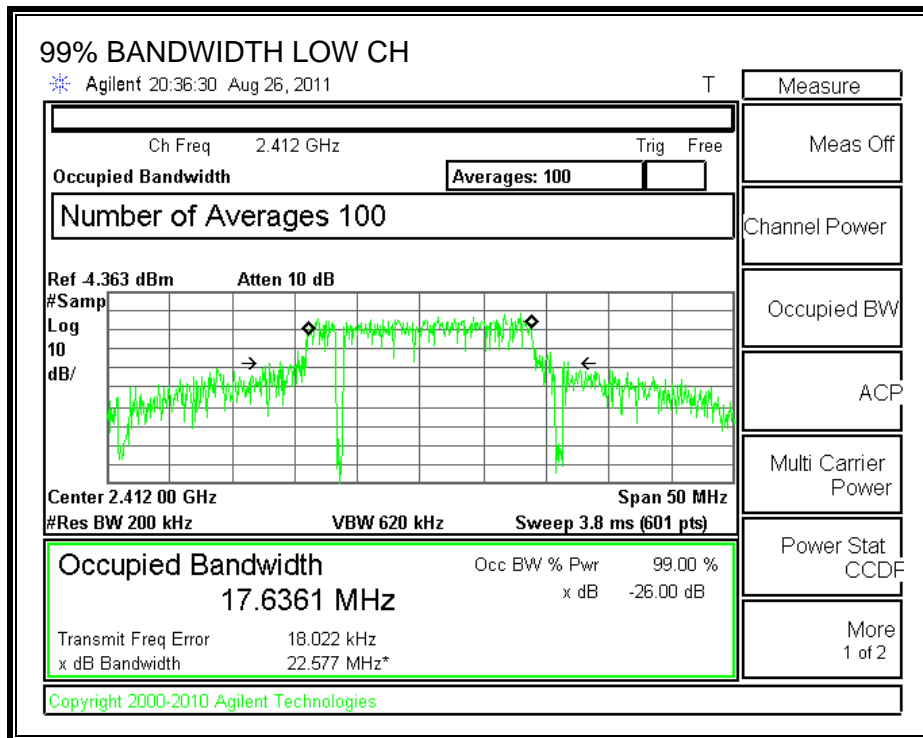
TEST PROCEDURE

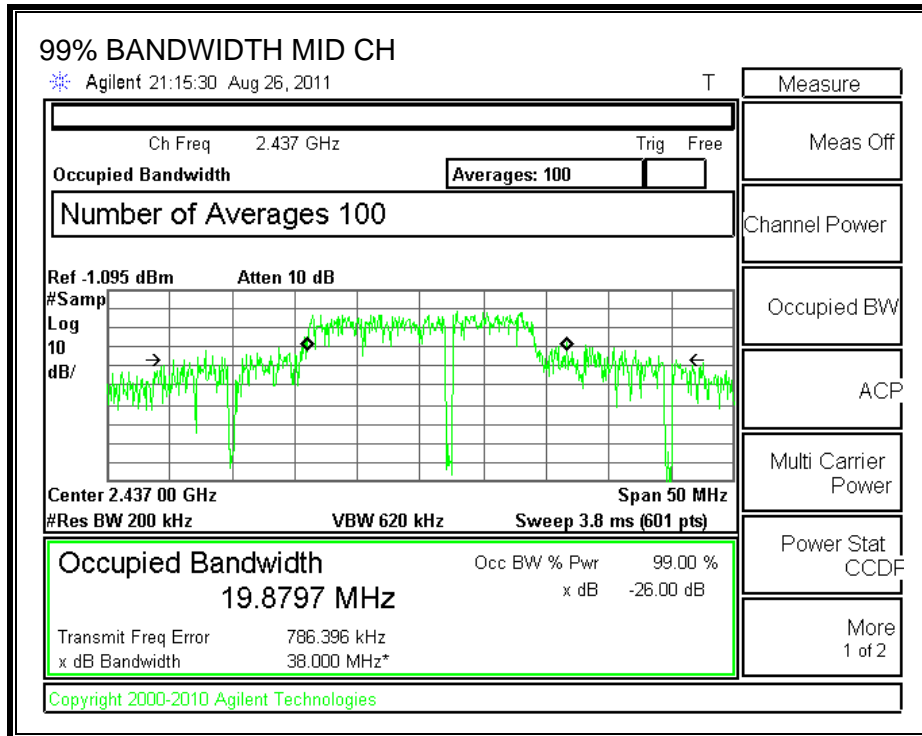
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

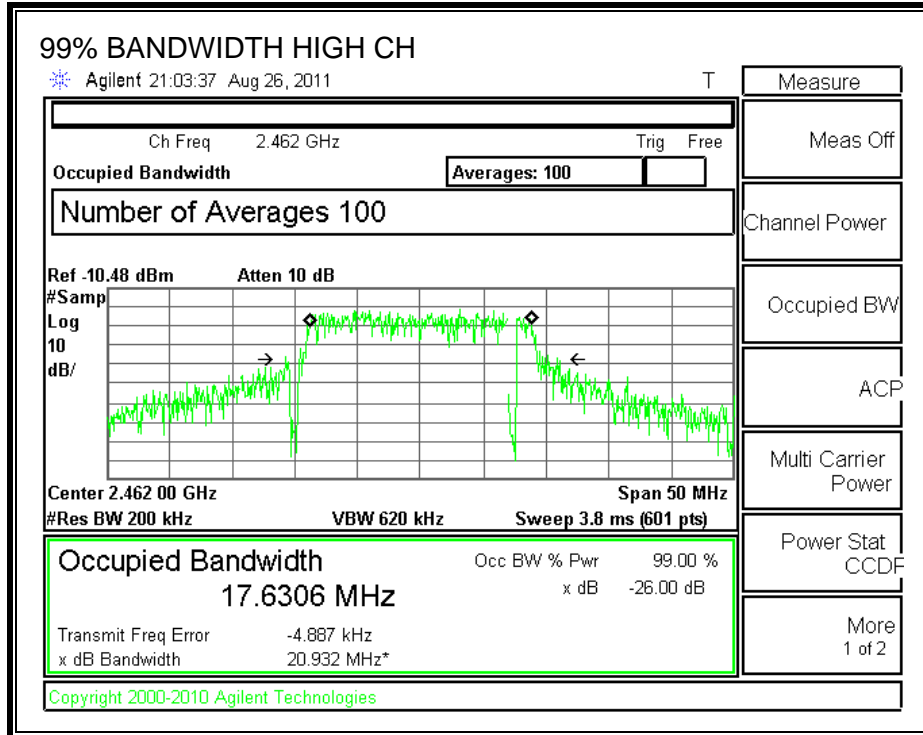
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	17.6361
Middle	2437	19.8797
High	2462	17.6303

99% BANDWIDTH







8.3.3. 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.

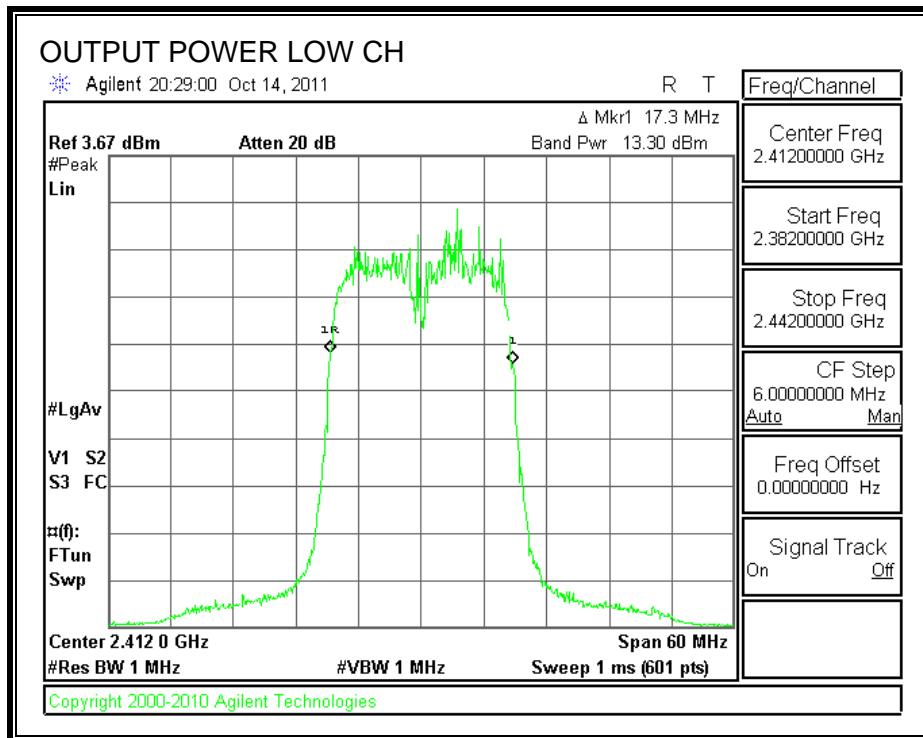
TEST PROCEDURE

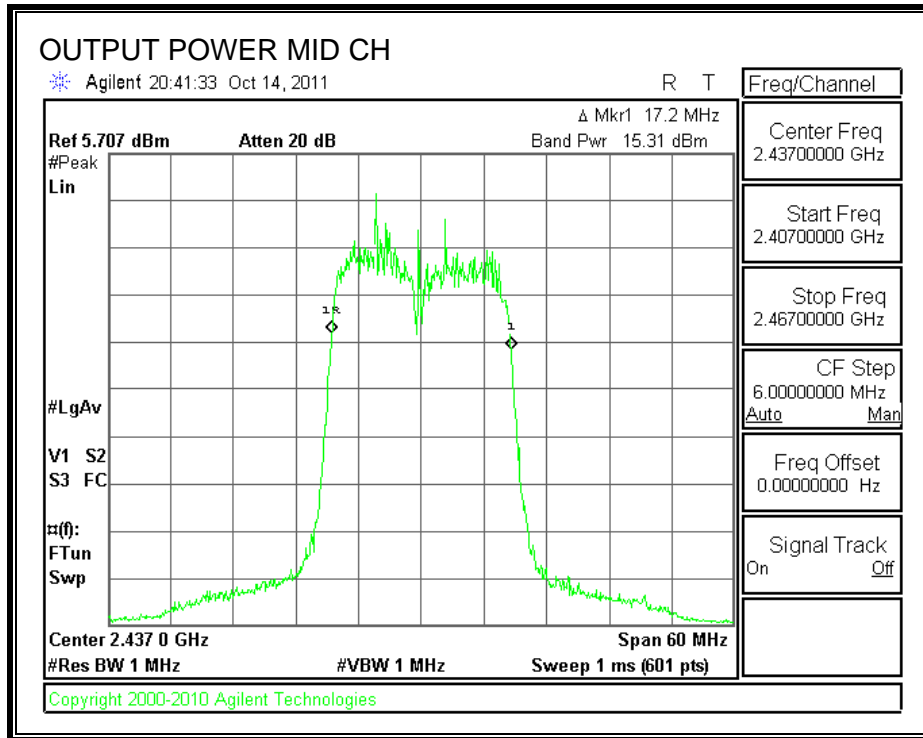
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

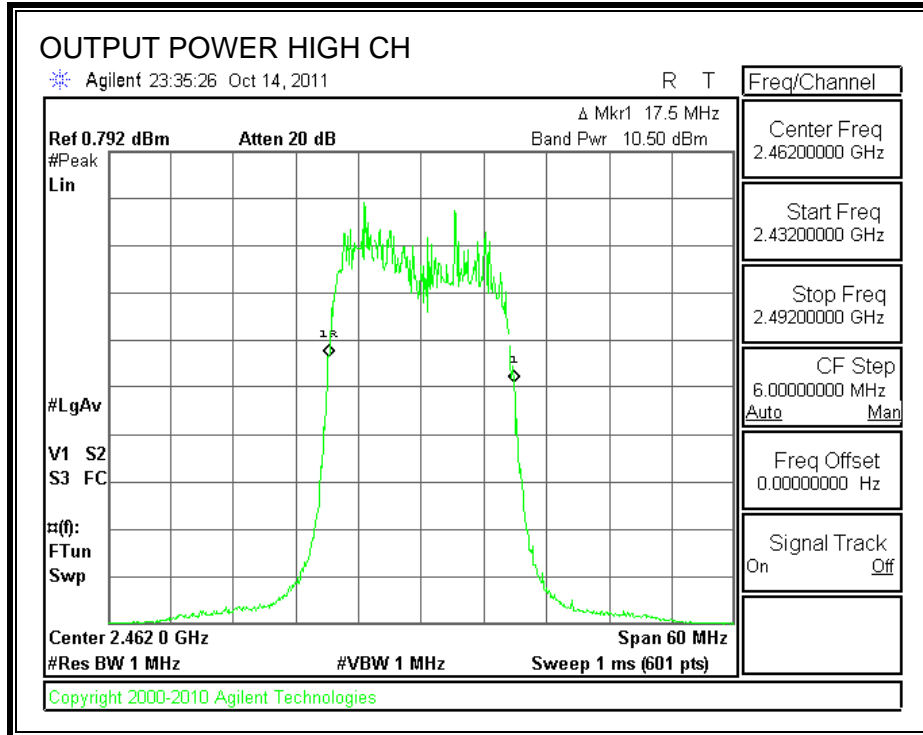
RESULTS

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Attenuator and Cable Offset (dB)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	13.3	10.7	24.00	30	-6.00
Middle	2437	15.31	10.7	26.01	30	-3.99
High	2462	10.5	10.7	21.20	30	-8.80

OUTPUT POWER







8.3.4. 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 17 dB (including 10 dB pad and 7 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Power (dBm)
Low	2412	16.02
Middle	2437	18.24
High	2462	13.70

8.3.5. 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.

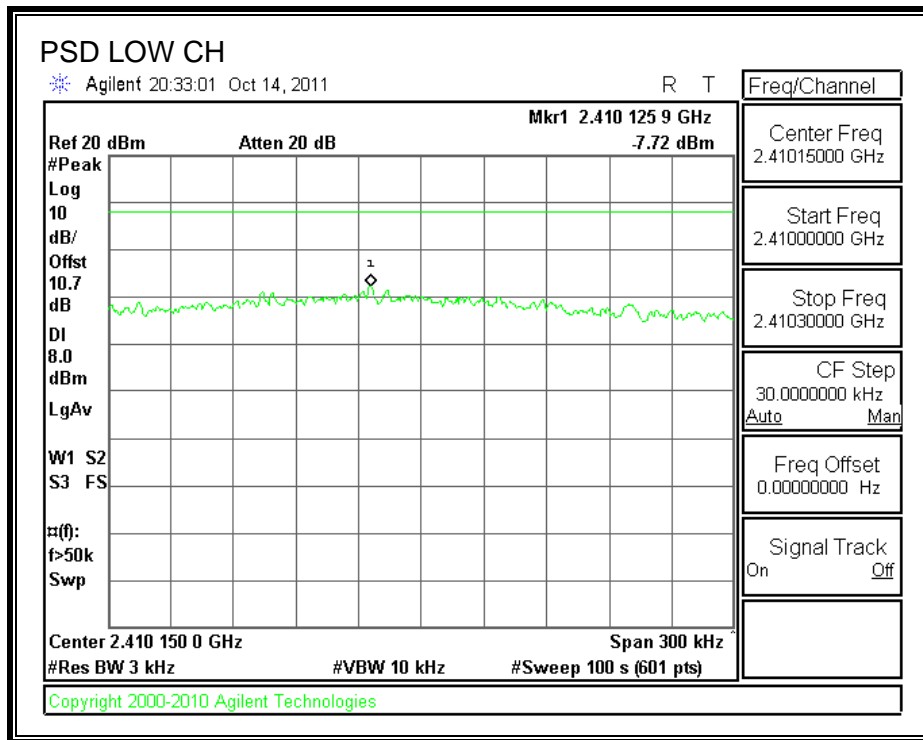
TEST PROCEDURE

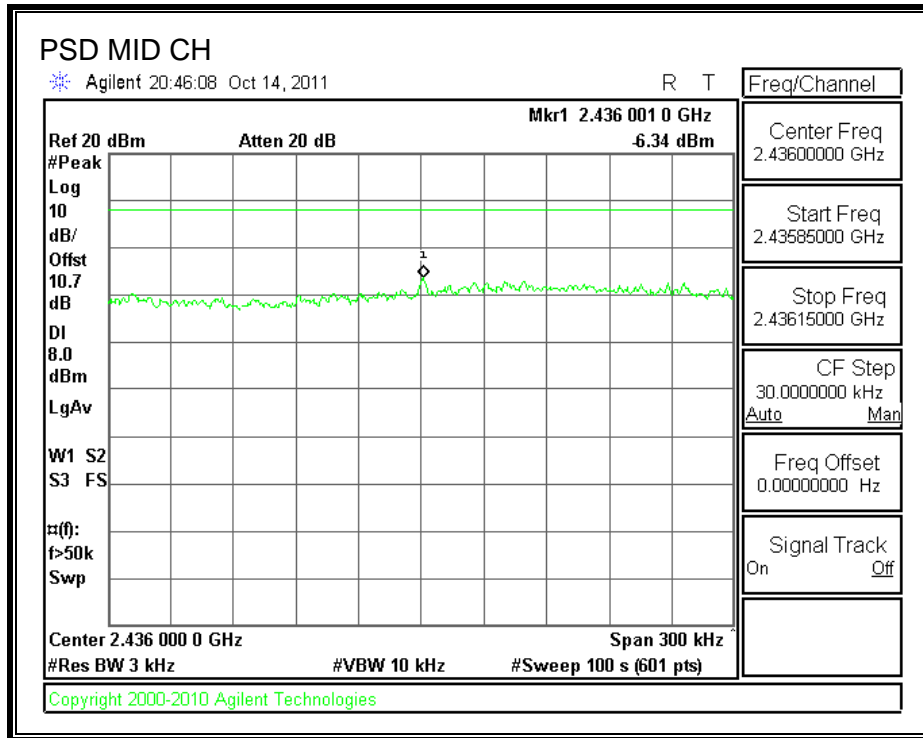
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

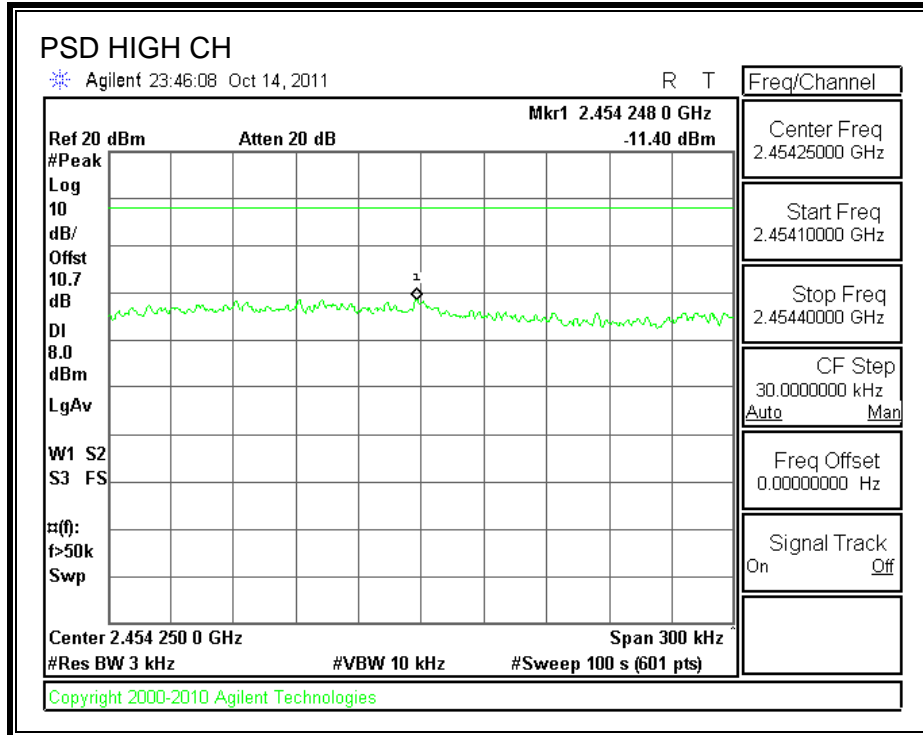
RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-7.72	8	-15.72
Middle	2437	-6.34	8	-14.34
High	2462	-11.40	8	-19.40

POWER SPECTRAL DENSITY







8.3.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

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

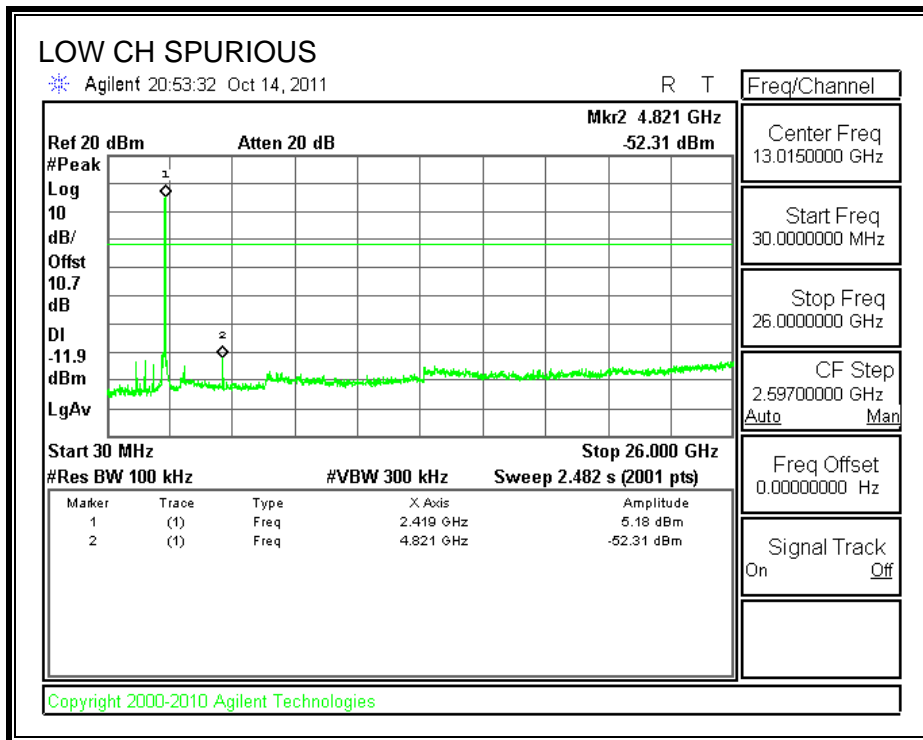
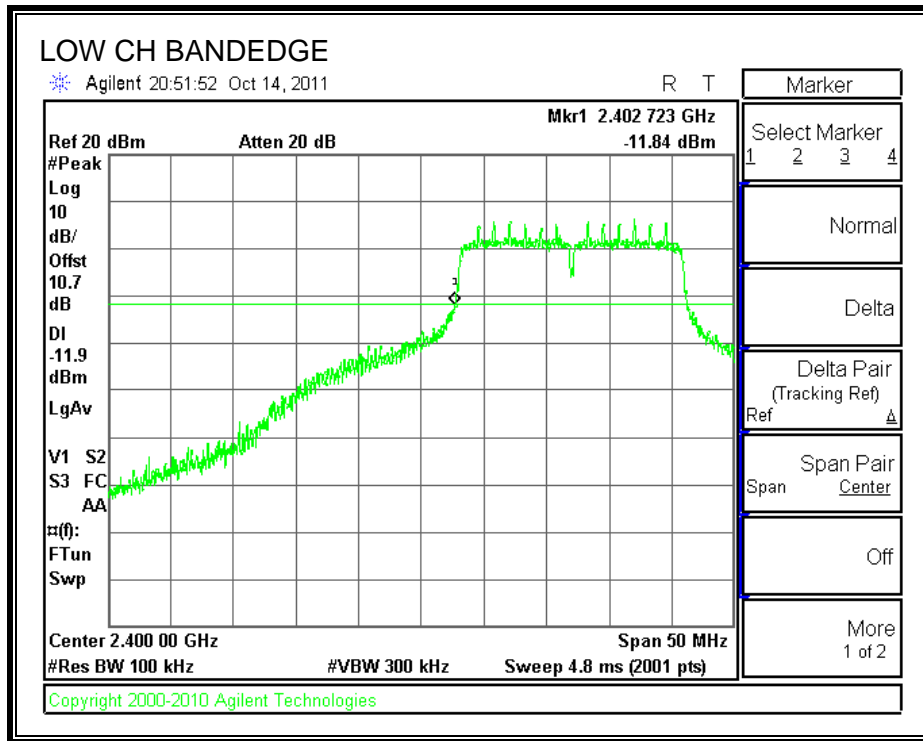
TEST PROCEDURE

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

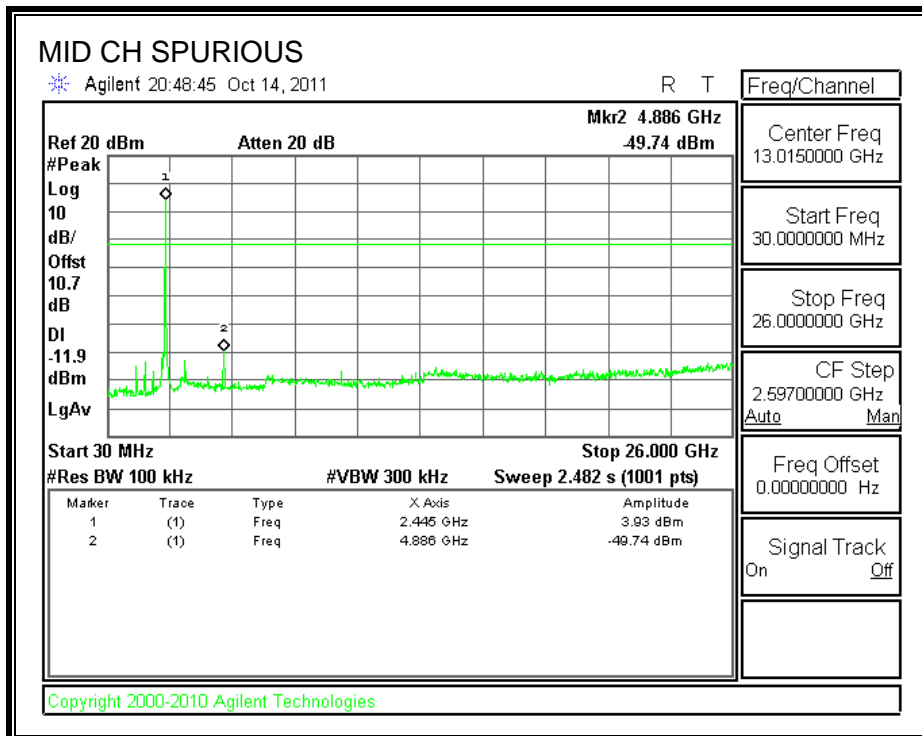
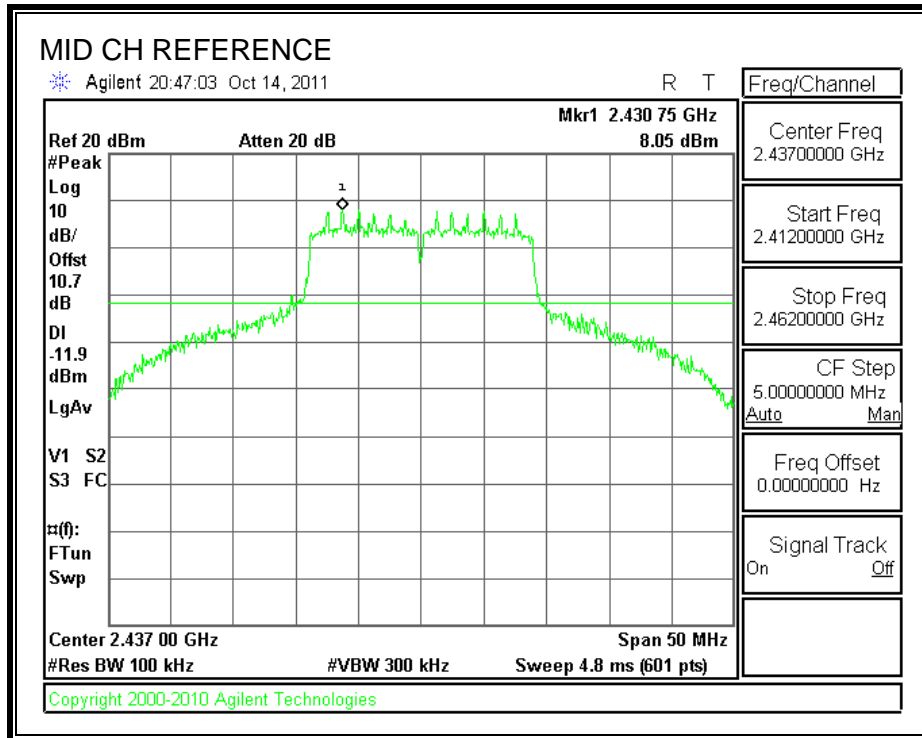
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

RESULTS

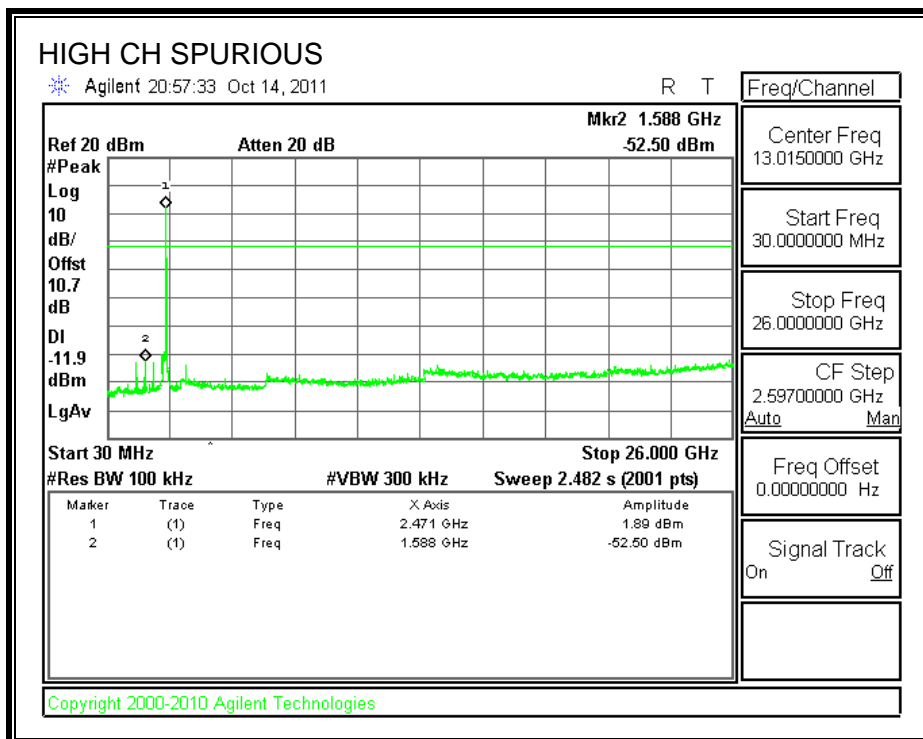
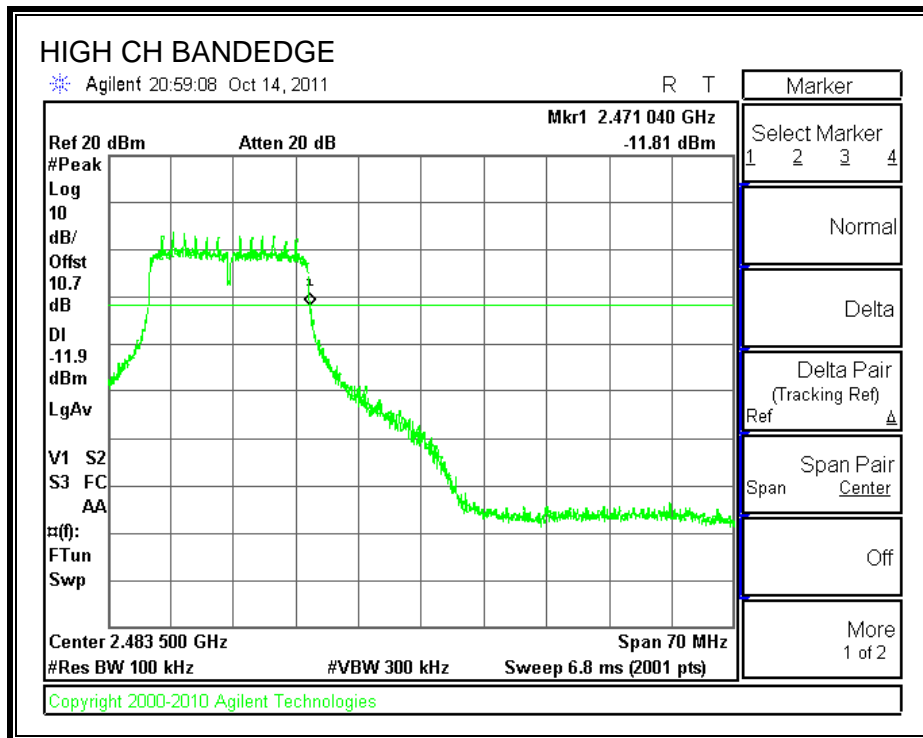
SPURIOUS EMISSIONS, LOW CHANNEL



SPURIOUS EMISSIONS, MID CHANNEL



SPURIOUS EMISSIONS, HIGH CHANNEL



8.4. 802.11n HT40 MODE IN THE 2.4 GHz BAND

8.4.1. 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.

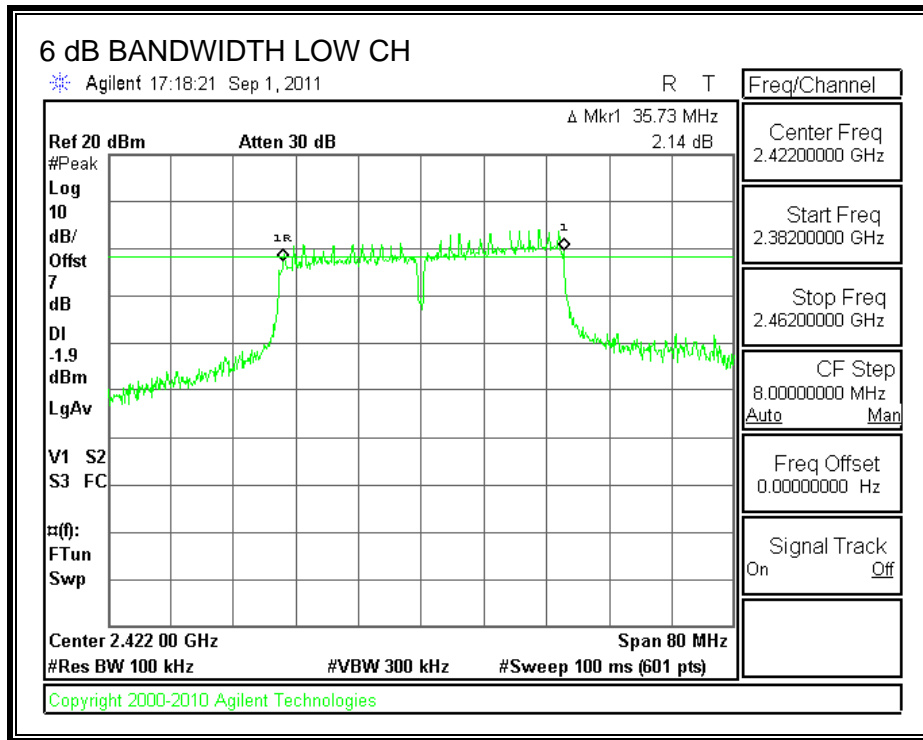
TEST PROCEDURE

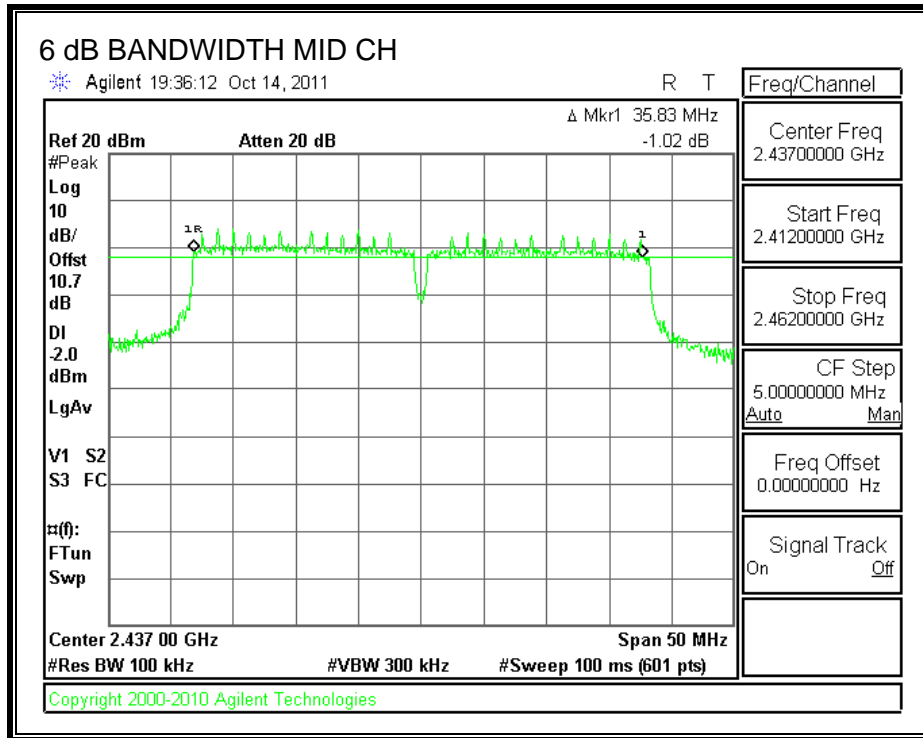
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

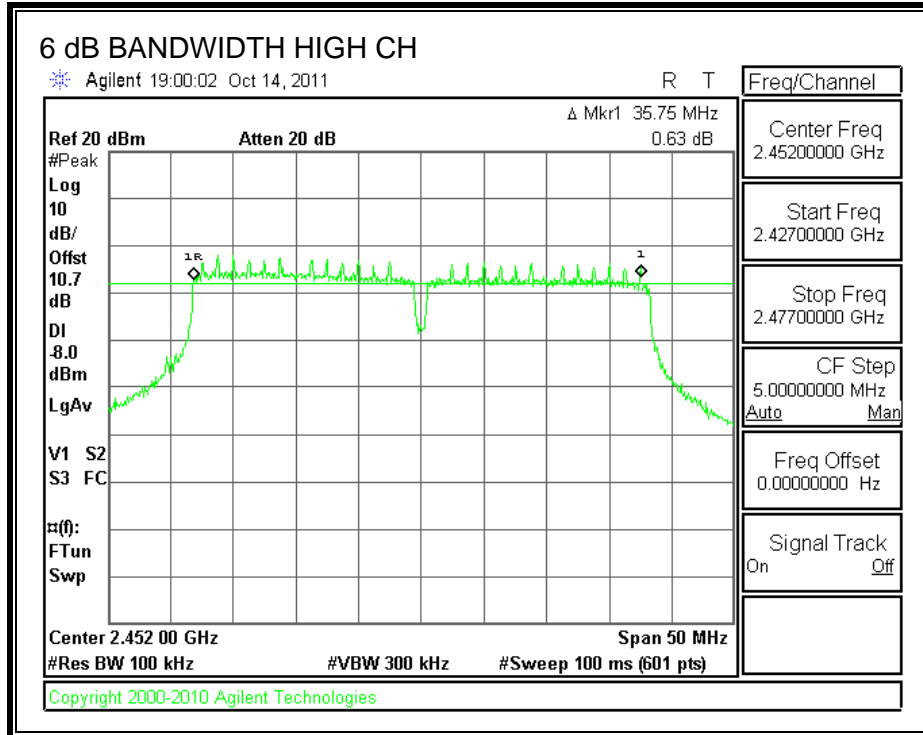
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2422	35.73	0.5
Middle	2437	35.83	0.5
High	2452	35.75	0.5

6 dB BANDWIDTH







8.4.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

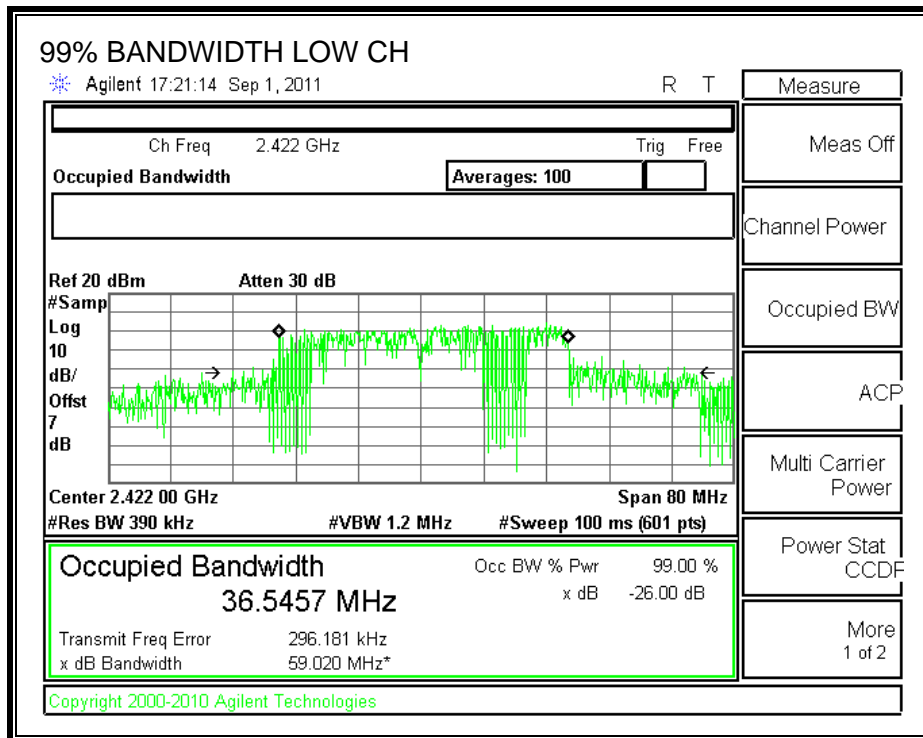
TEST PROCEDURE

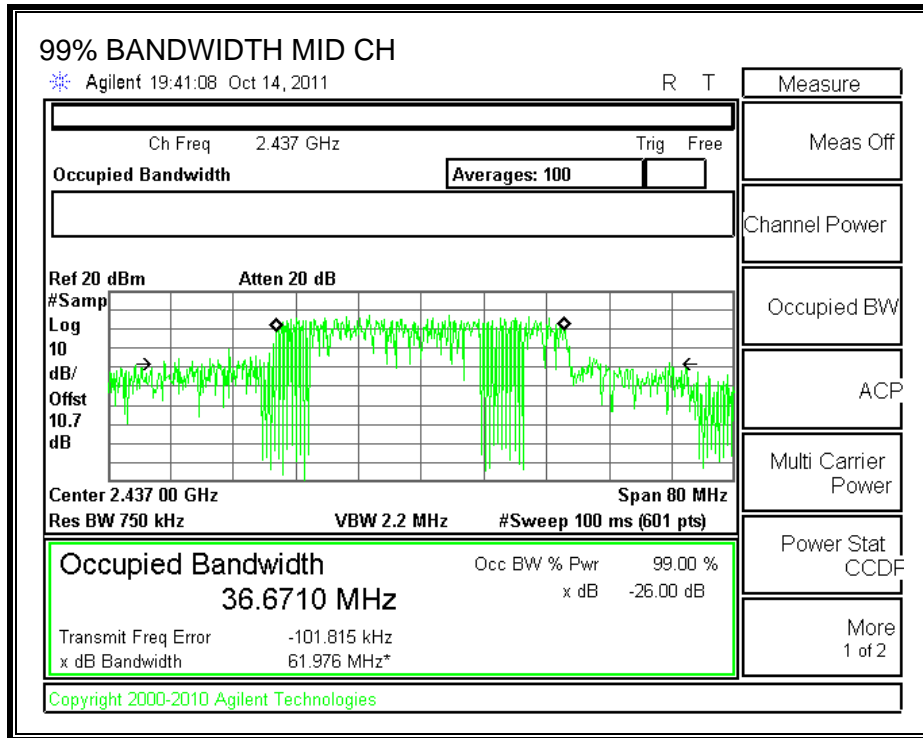
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

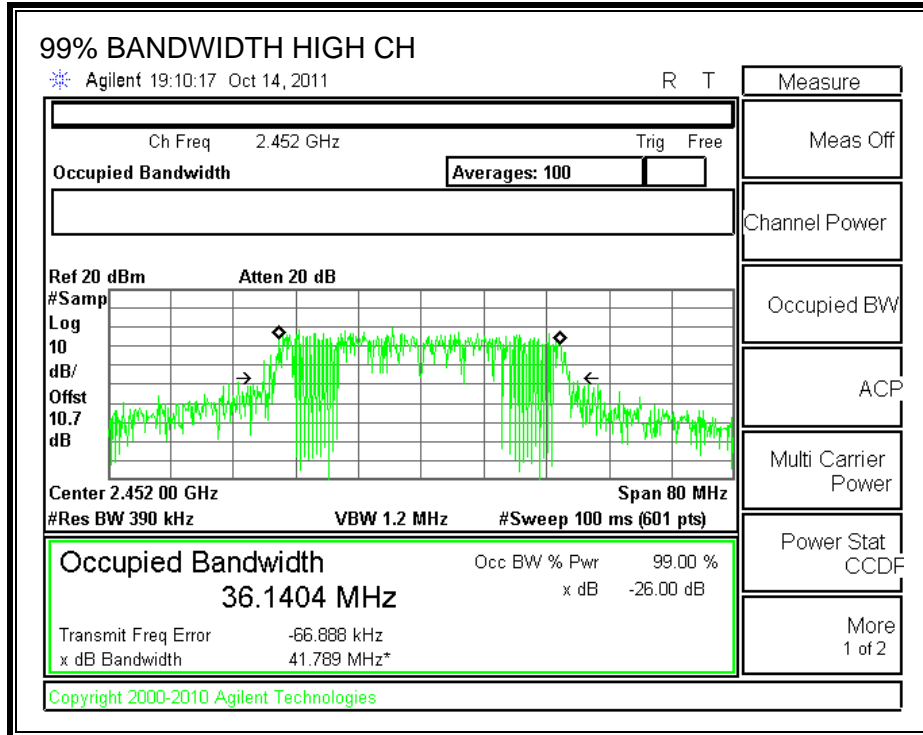
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2422	36.5457
Middle	2437	36.6710
High	2452	36.1404

99% BANDWIDTH







8.4.3. 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.

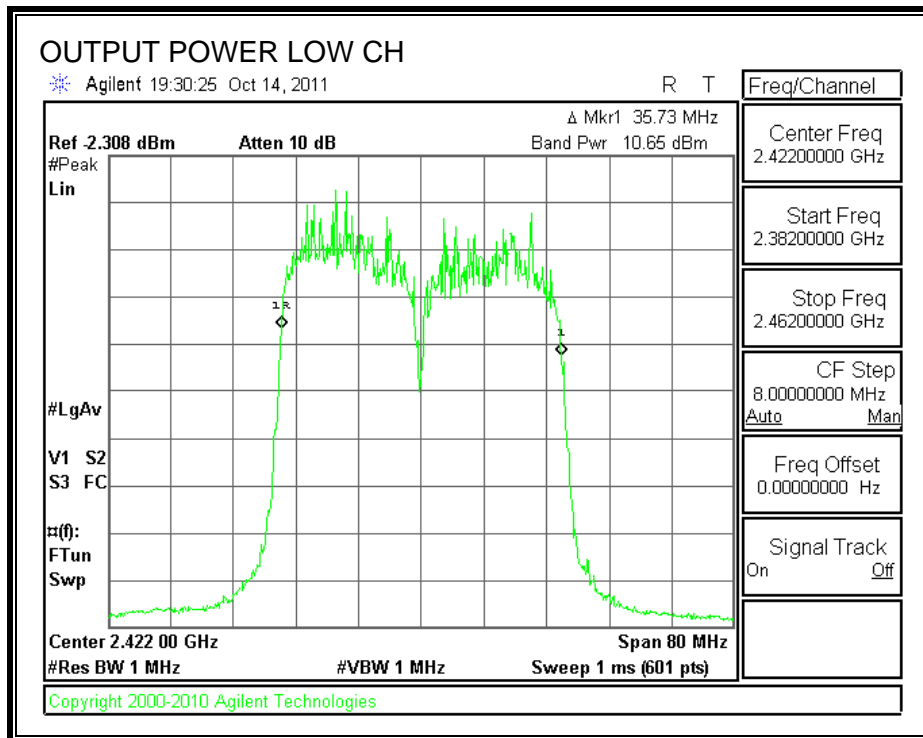
TEST PROCEDURE

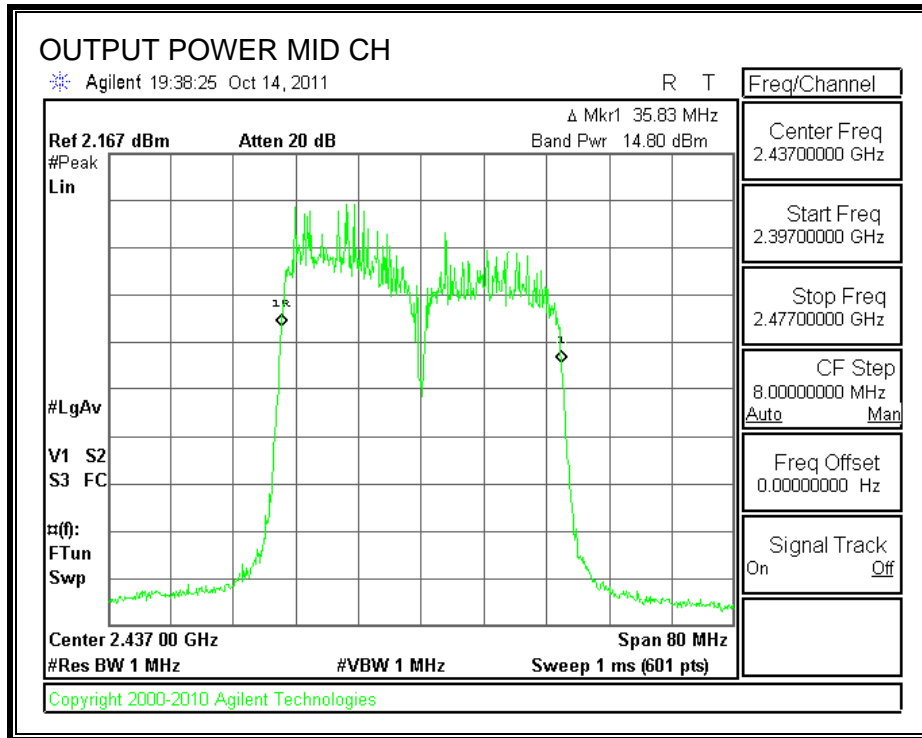
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

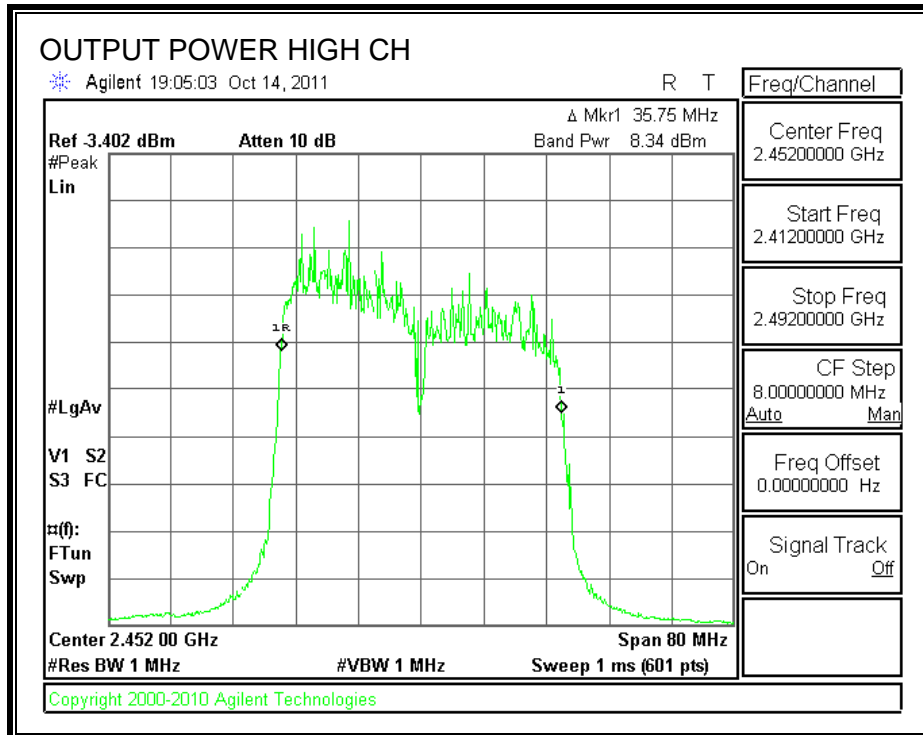
RESULTS

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Attenuator and Cable Offset (dB)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2422	10.65	10.7	21.35	30	-8.65
Middle	2437	14.80	10.7	25.50	30	-4.50
High	2452	8.34	10.7	19.04	30	-10.96

OUTPUT POWER







8.4.4. 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 10.7 dB (including 10 dB pad and .7 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Power (dBm)
Low	2422	13.40
Middle	2437	17.16
High	2452	11.10

8.4.5. 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.

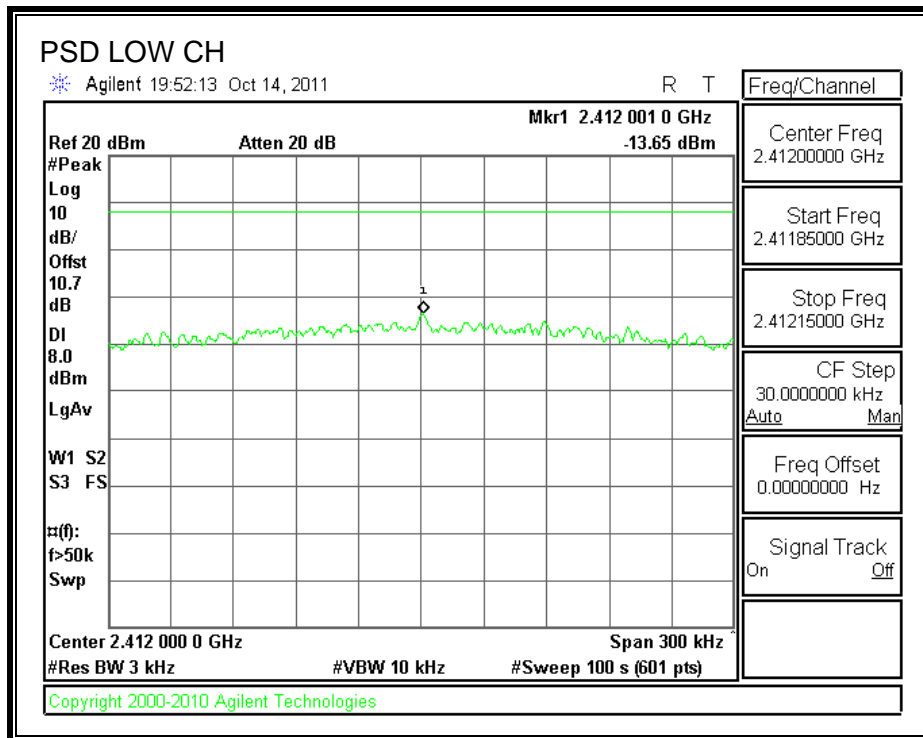
TEST PROCEDURE

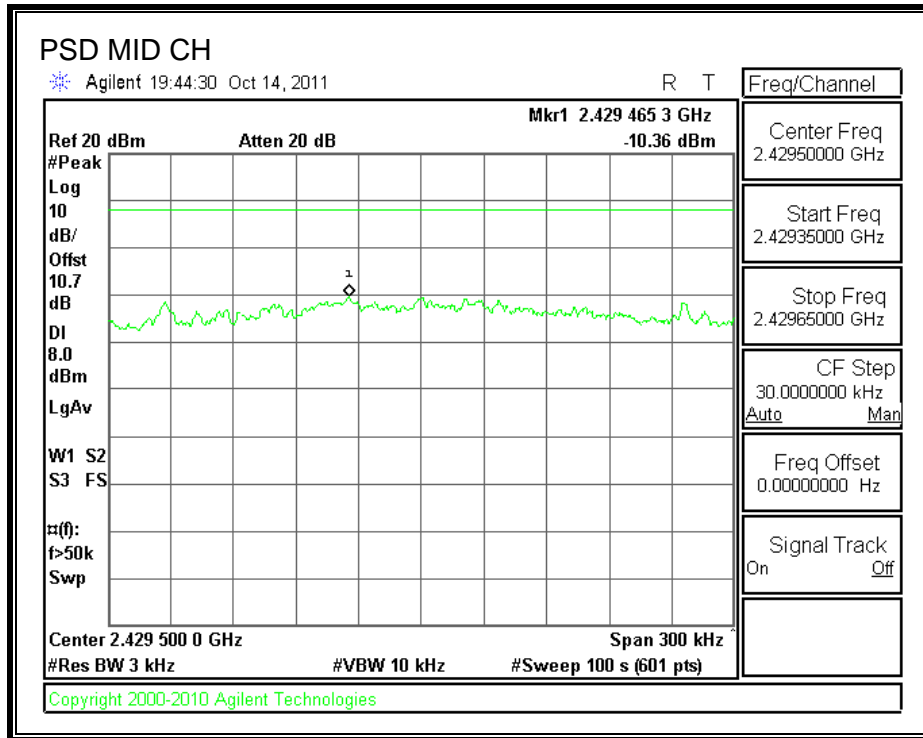
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

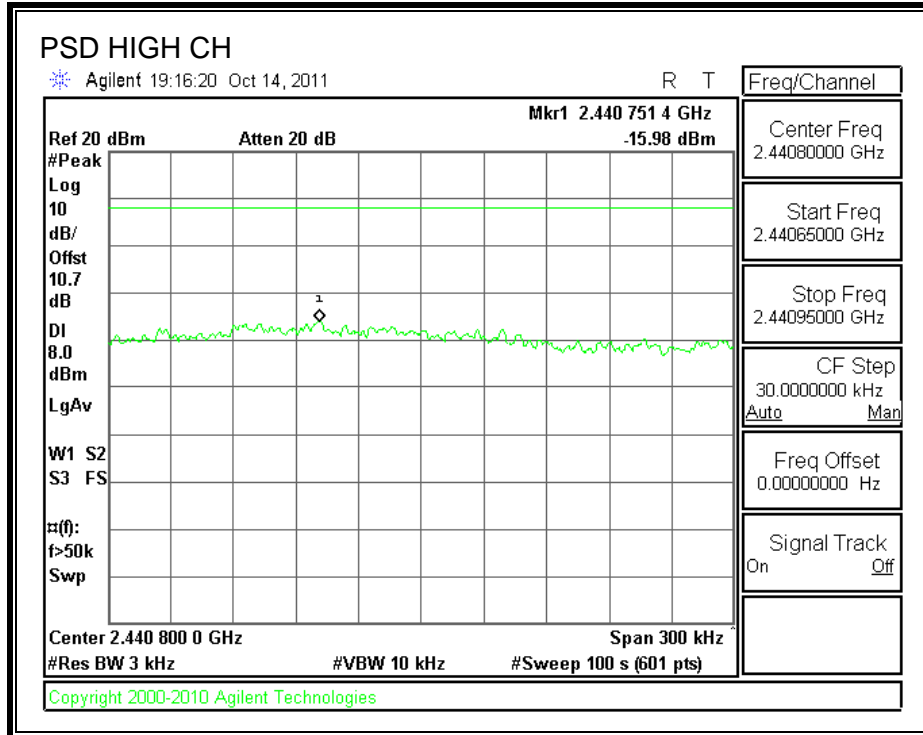
RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2422	-13.65	8	-21.65
Middle	2437	-10.36	8	-18.36
High	2452	-15.98	8	-23.98

POWER SPECTRAL DENSITY







8.4.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

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

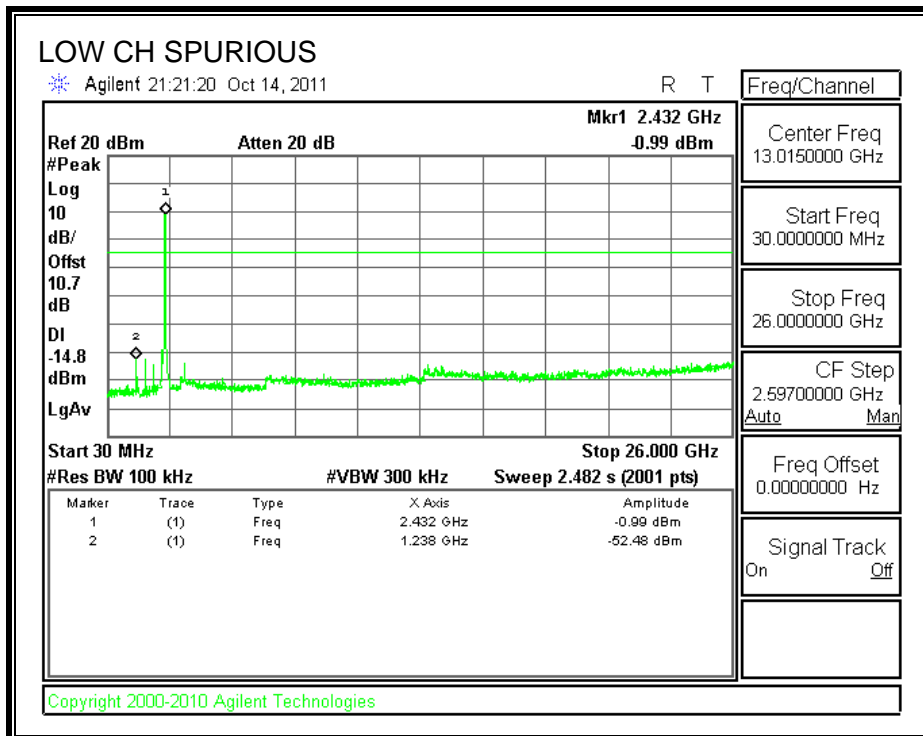
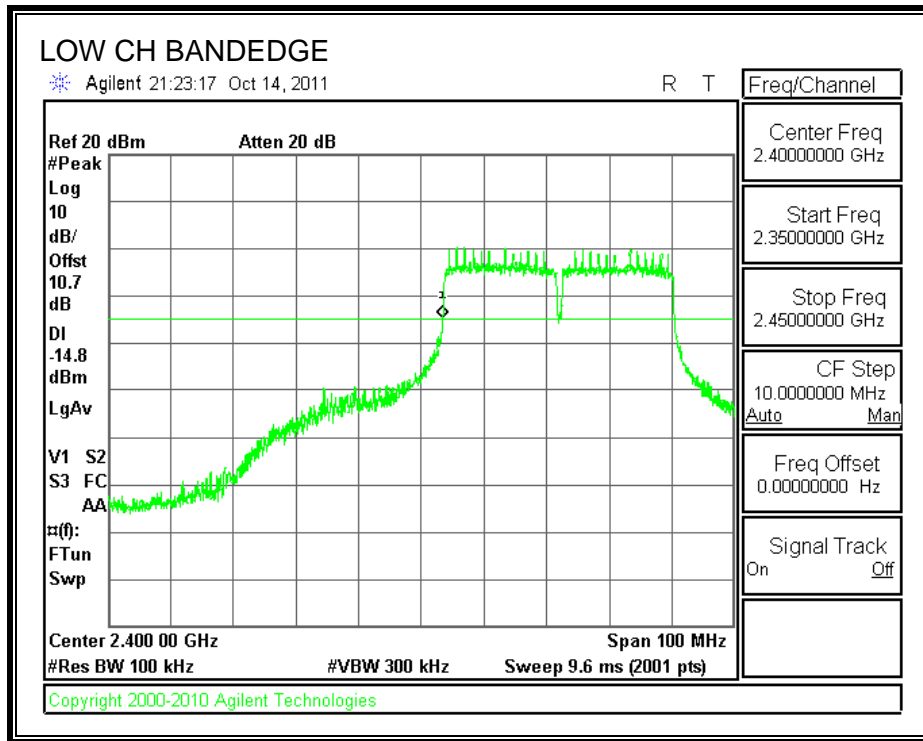
TEST PROCEDURE

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

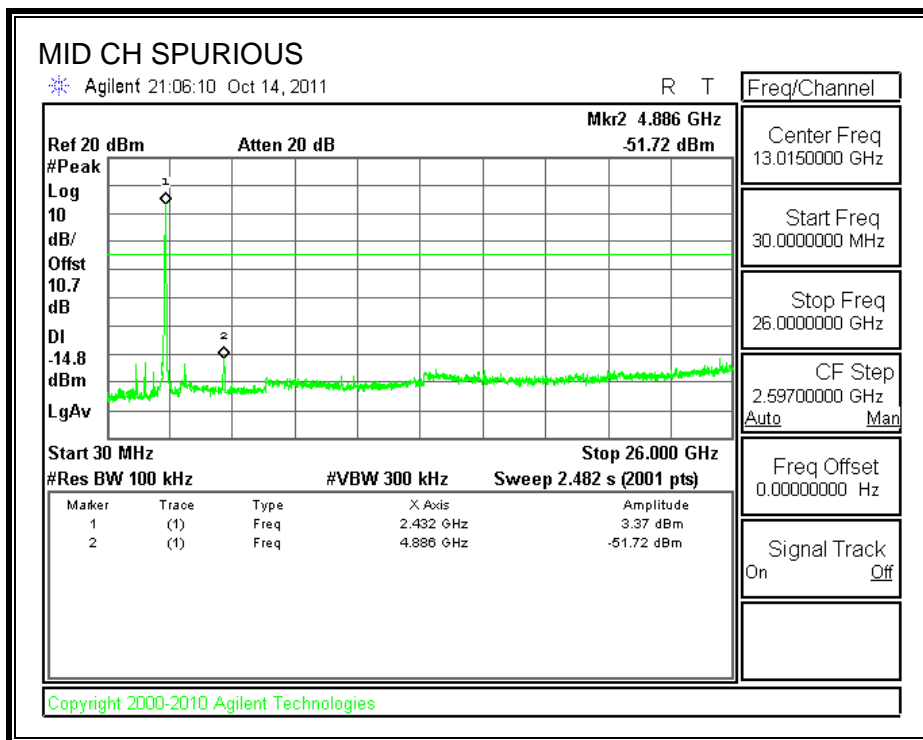
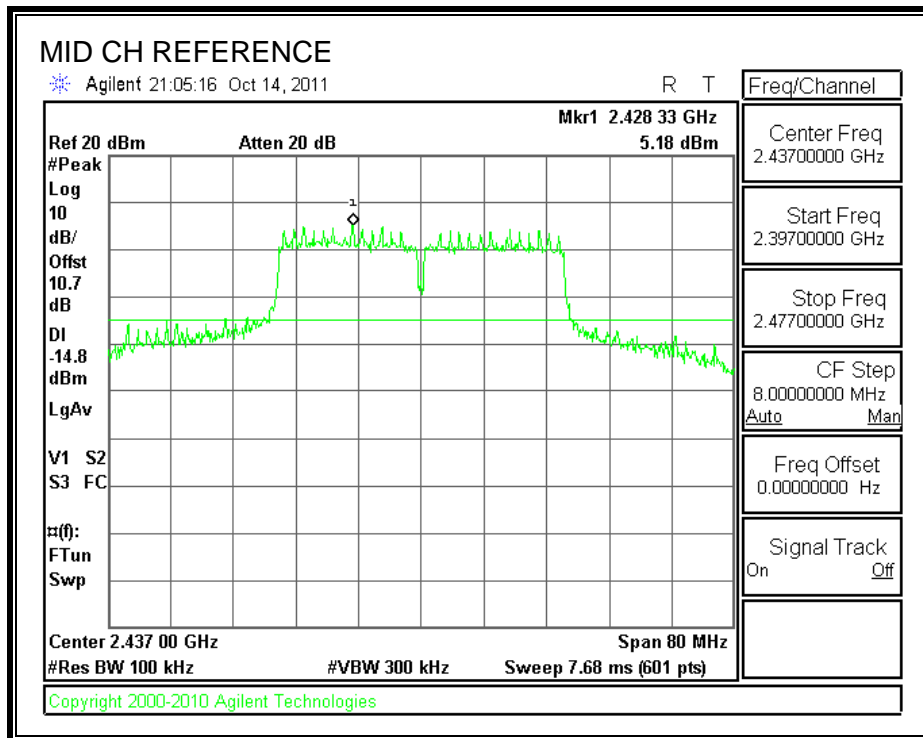
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

RESULTS

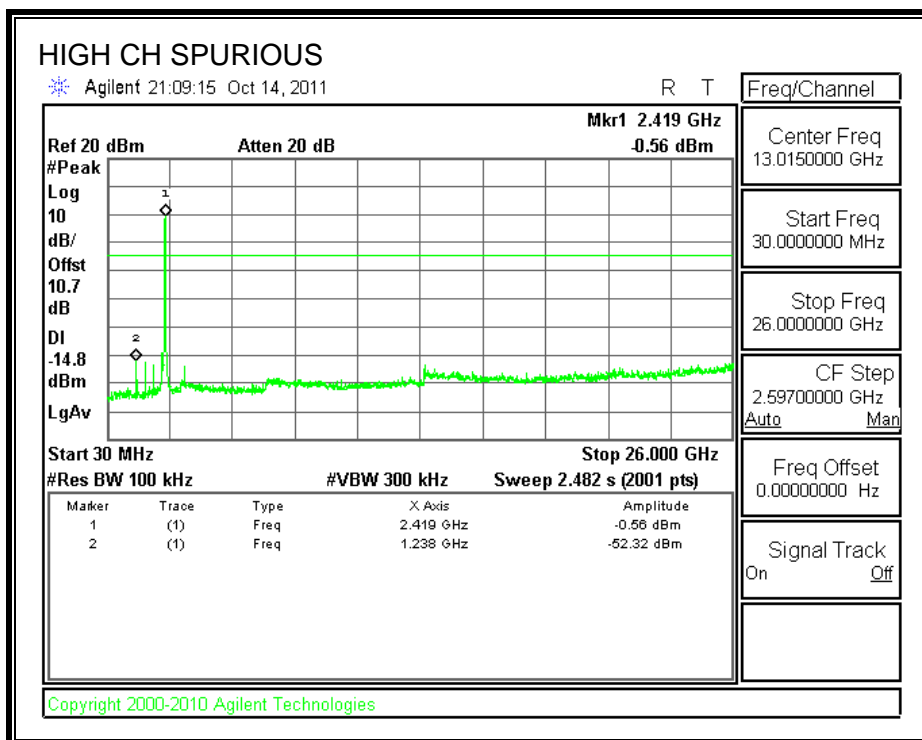
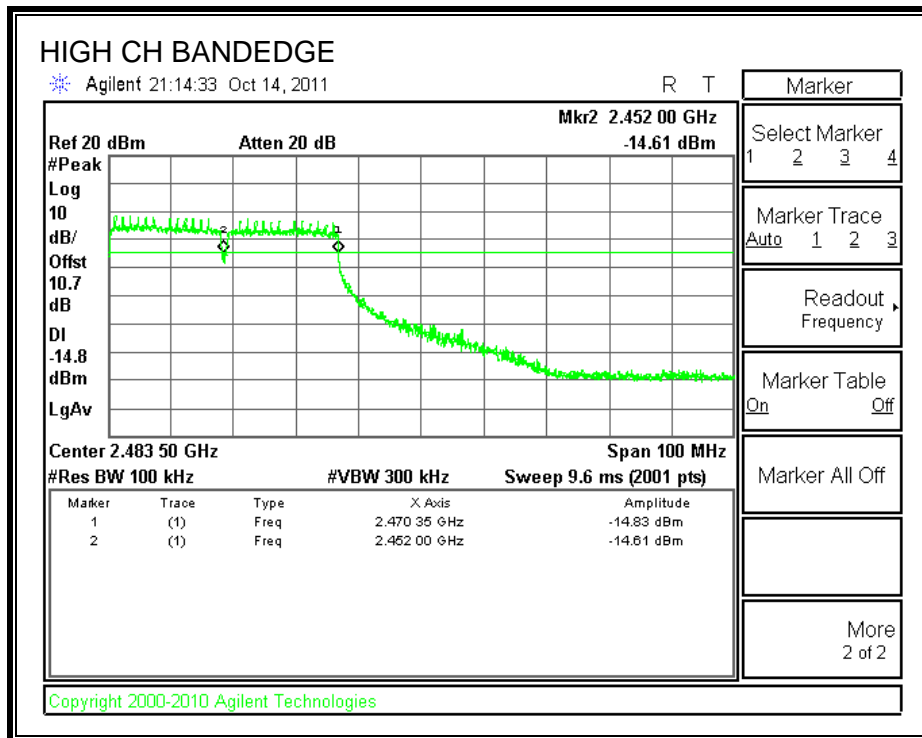
SPURIOUS EMISSIONS, LOW CHANNEL



SPURIOUS EMISSIONS, MID CHANNEL



SPURIOUS EMISSIONS, HIGH CHANNEL



9. RADIATED TEST RESULTS

9.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-210 Clause 2.6 (Transmitter)

IC RSS-GEN Clause 6 (Receiver)

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

TEST PROCEDURE

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

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

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

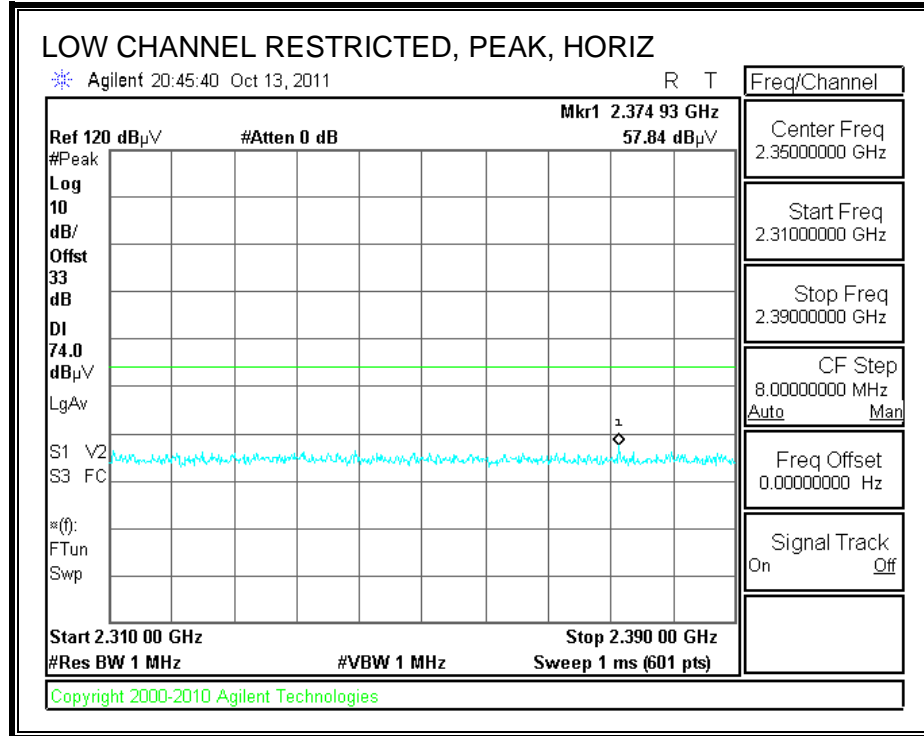
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

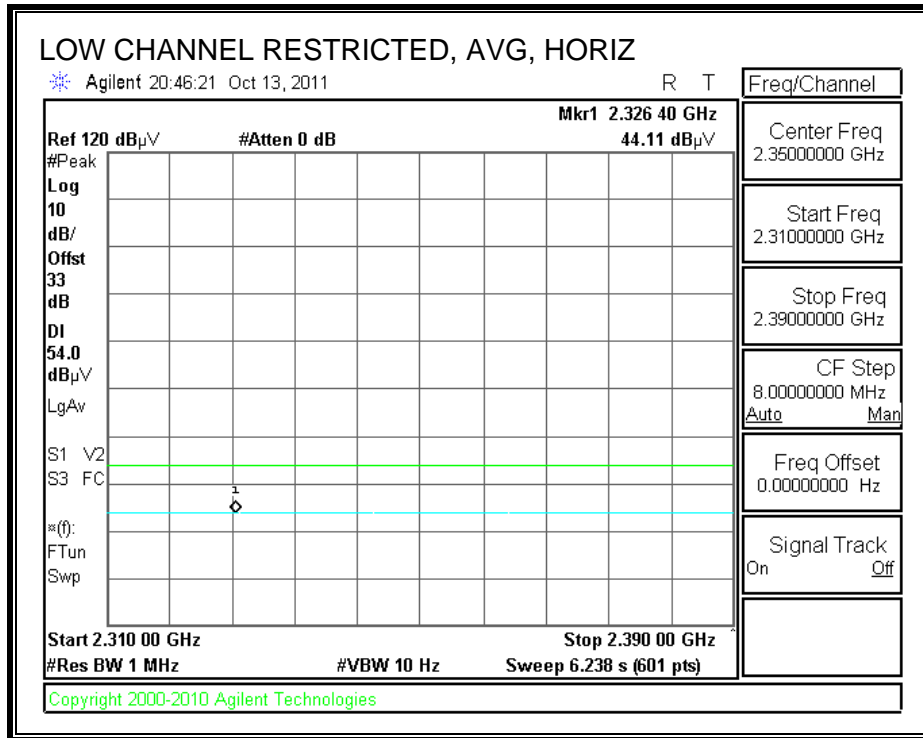
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

9.2. TRANSMITTER ABOVE 1 GHz

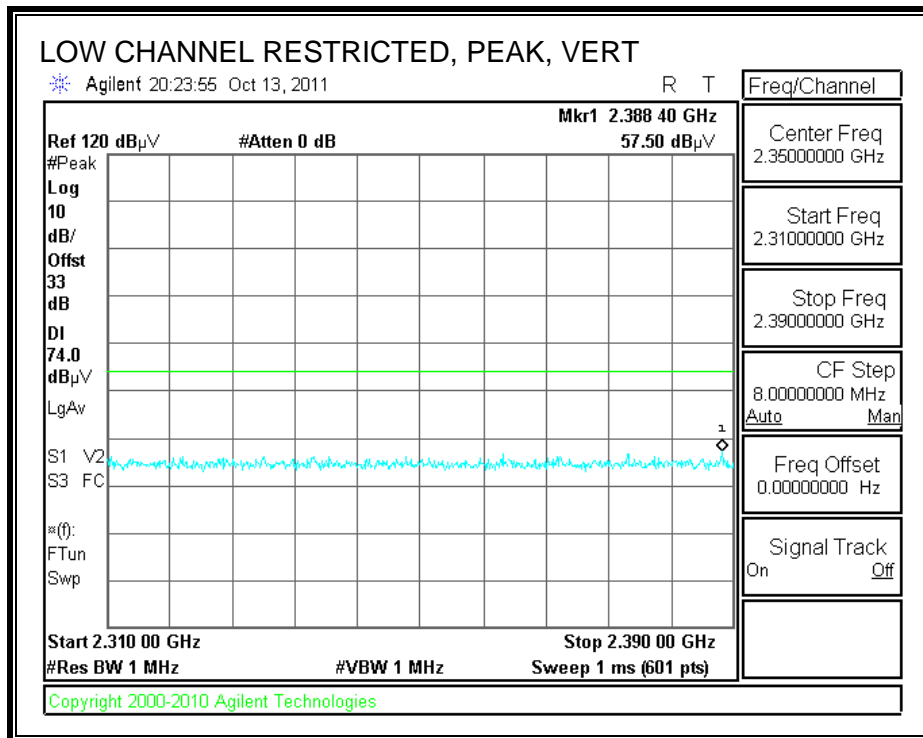
9.2.1. TX ABOVE 1 GHz FOR 802.11b MODE IN THE 2.4 GHz BAND

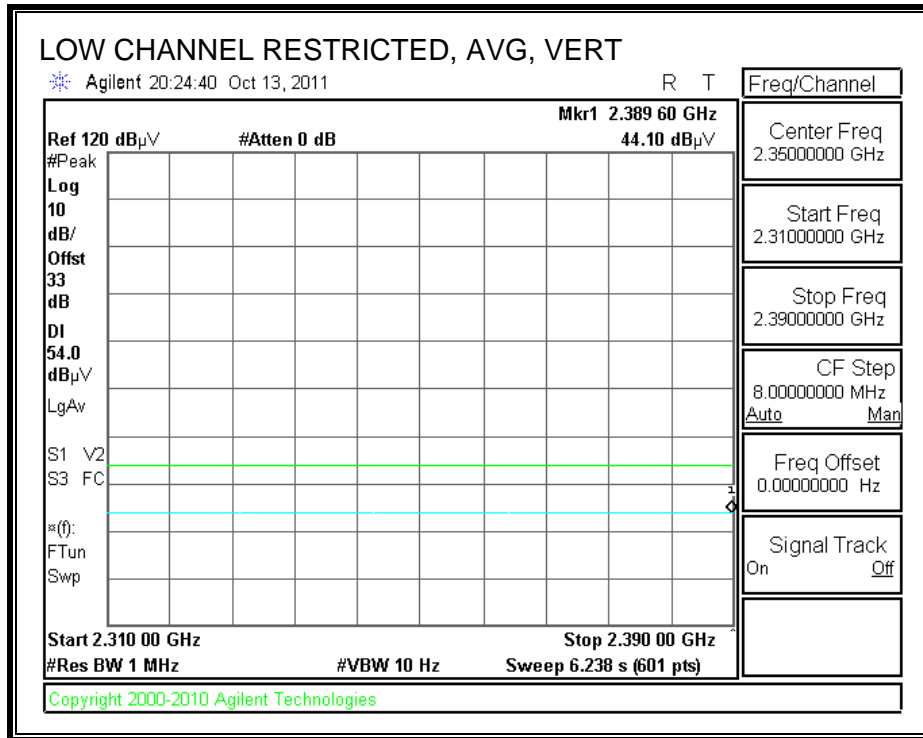
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



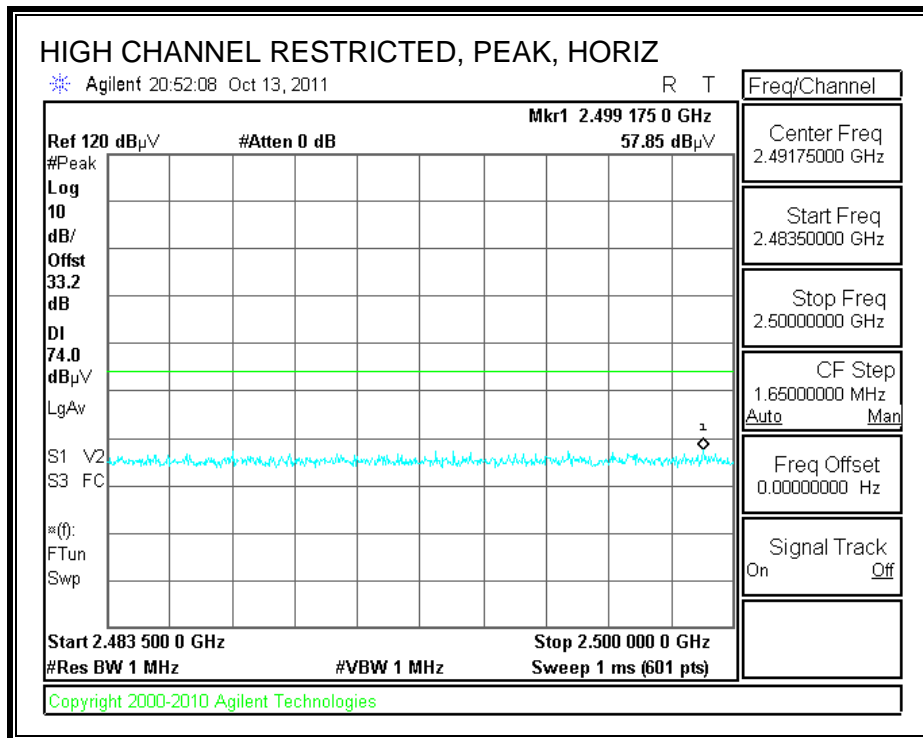


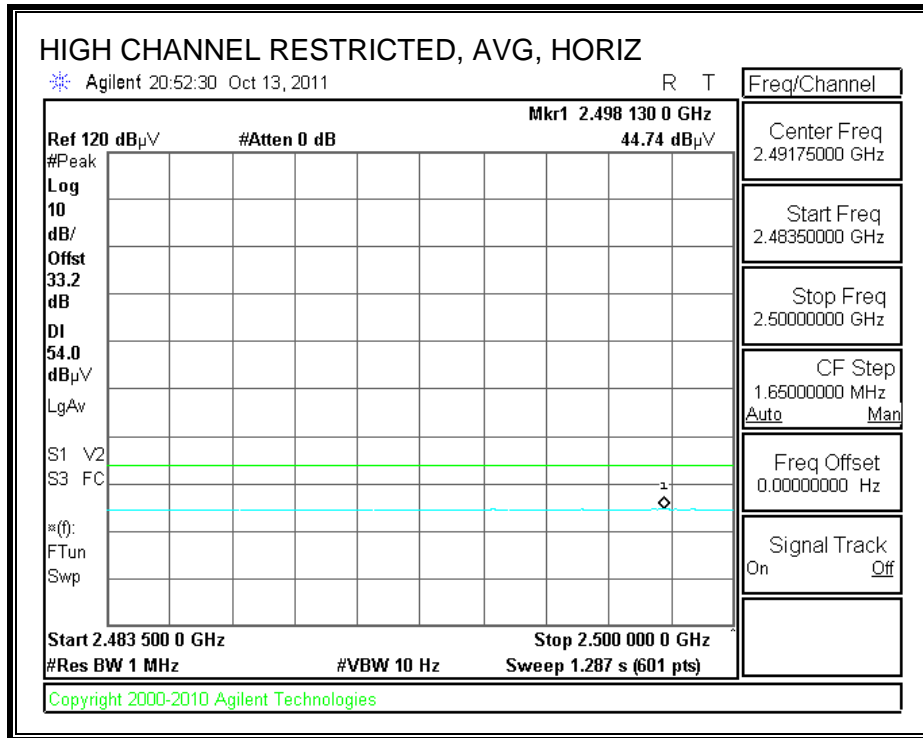
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



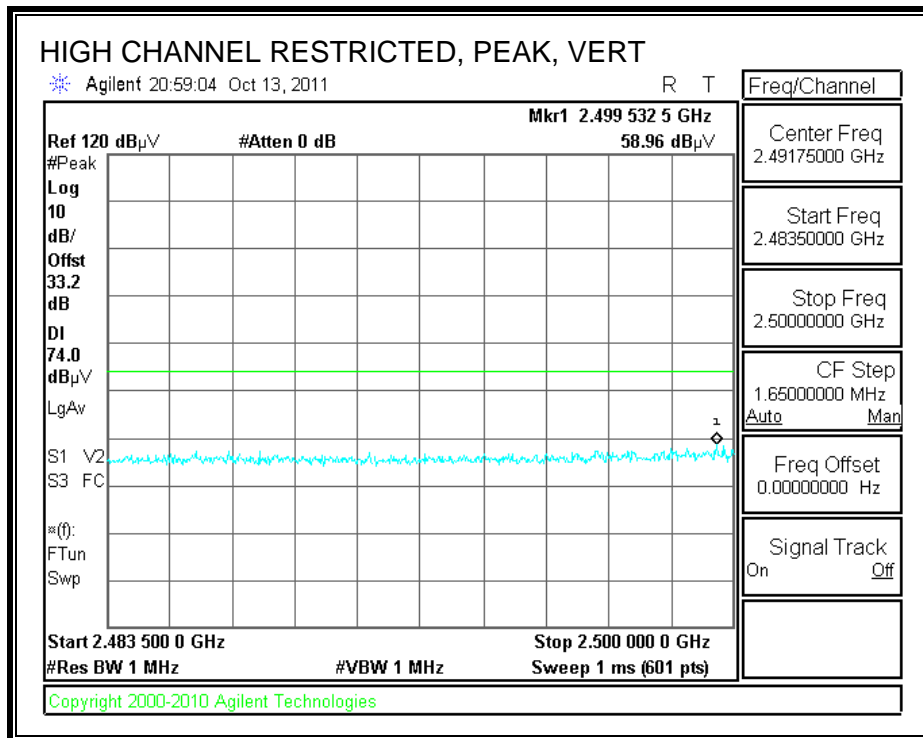


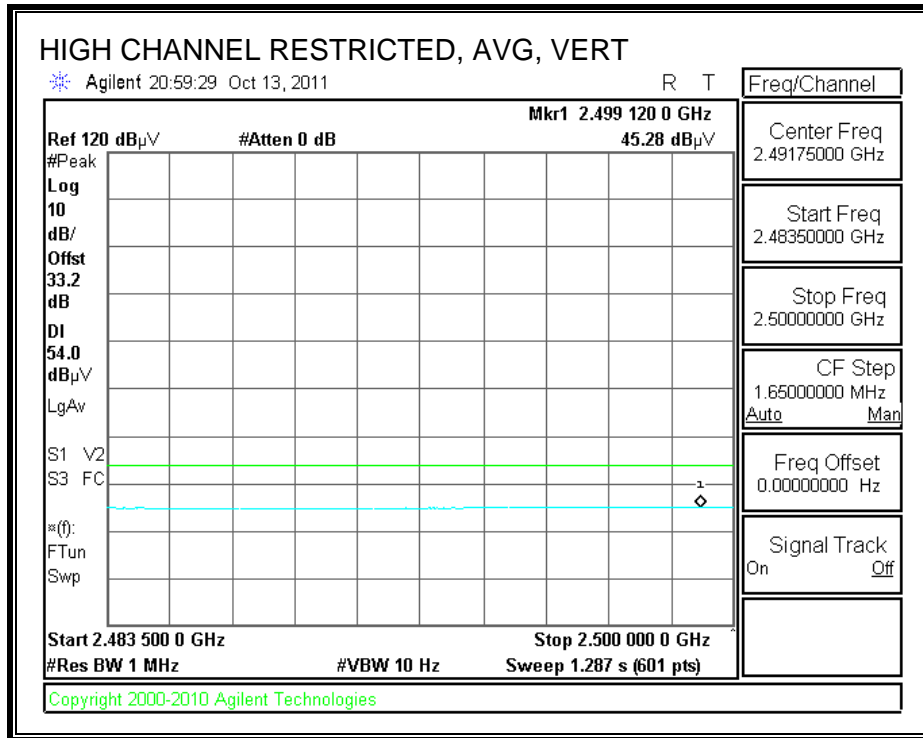
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
 Compliance Certification Services, Fremont 5m Chamber-A

Company: Ubiquiti
 Project #: 11U14006
 Date: 10_7_2011
 Test Engineer: Thanh Nguyen
 Configuration: EUT at worst position, remote PoE, Laptop
 Mode: Transmit mode

Test Equipment:

Horn 1-18GHz	Pre-amplifier 1-26GHz	Pre-amplifier 26-40GHz	Horn > 18GHz	Limit
T59; S/N: 3245 @3m	T145 Agilent 3008A0056		T125; ARA 18-26GHz; S/N:1007	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	20' cable 22807500	HPF_4.0GHz		

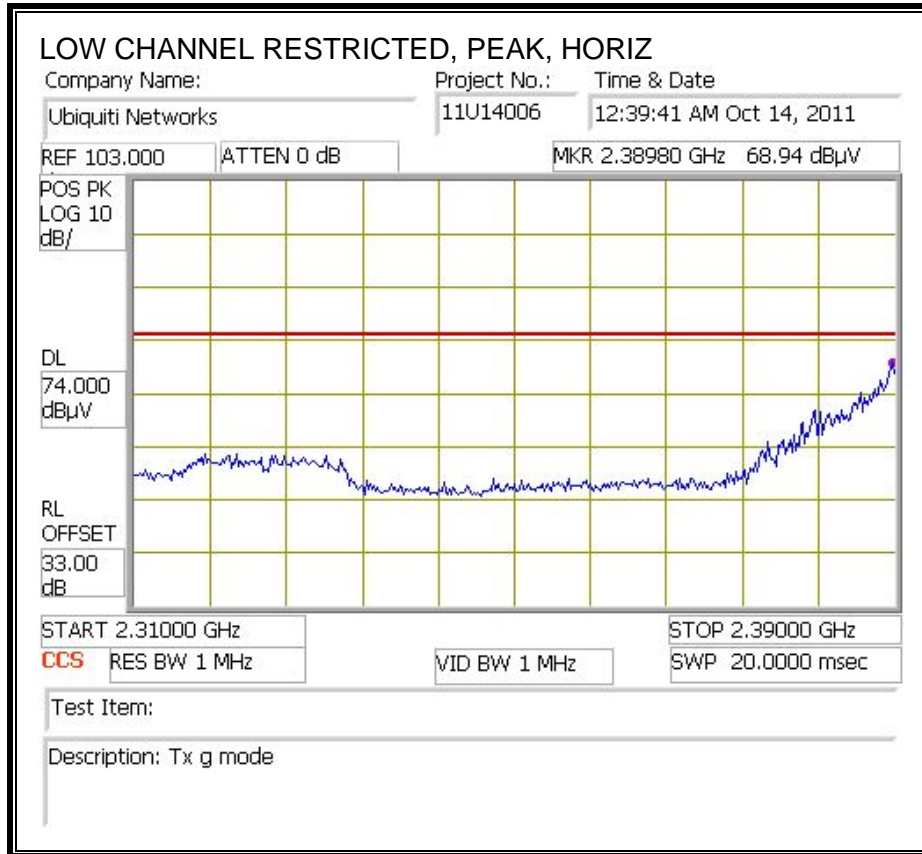
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fitr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Ch															
4.824	3.0	49.2	47.1	33.2	6.2	-34.8	0.0	0.6	54.4	52.3	74	54	-19.6	-1.7	V
4.824	3.0	44.9	40.8	33.2	6.2	-34.8	0.0	0.6	50.1	46.0	74	54	-23.9	-8.0	H
Mid Ch															
4.874	3.0	48.9	46.7	33.2	6.2	-34.8	0.0	0.6	54.2	52.0	74	54	-19.8	-2.0	V
4.874	3.0	45.3	41.7	33.2	6.2	-34.8	0.0	0.6	50.6	47.0	74	54	-23.4	-7.0	H
High Ch															
4.924	3.0	48.5	46.7	33.3	6.3	-34.8	0.0	0.6	53.9	52.1	74	54	-20.1	-1.9	V
4.924	3.0	48.1	46.3	33.3	6.3	-34.8	0.0	0.6	53.5	51.7	74	54	-20.5	-2.3	H
7.386	3.0	36.3	24.2	36.3	8.4	-34.9	0.0	0.6	46.6	34.6	74	54	-27.4	-19.4	Noise floor

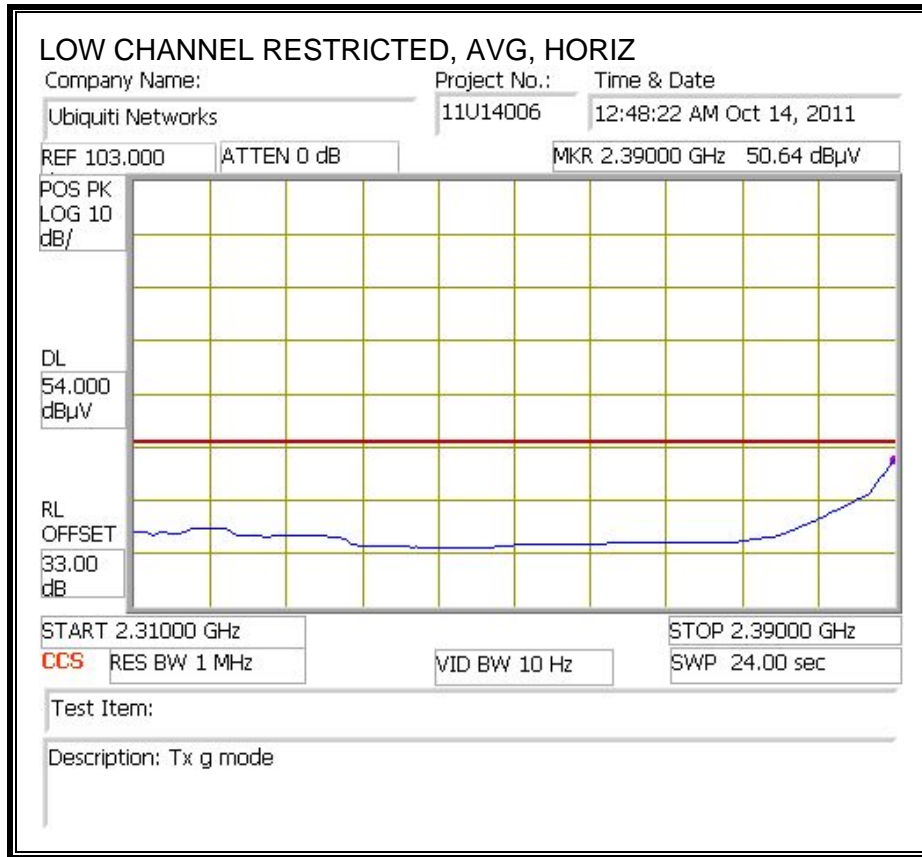
Rev. 07.08.11

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		

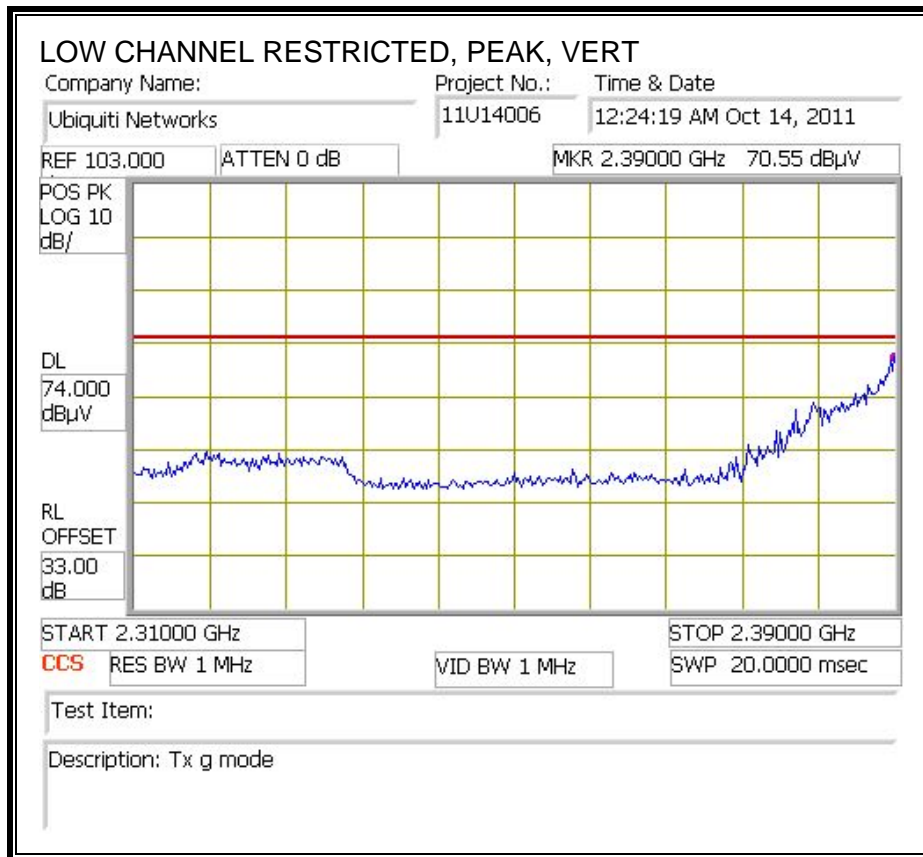
9.2.2. TX ABOVE 1 GHz FOR 802.11g MODE IN THE 2.4 GHz BAND

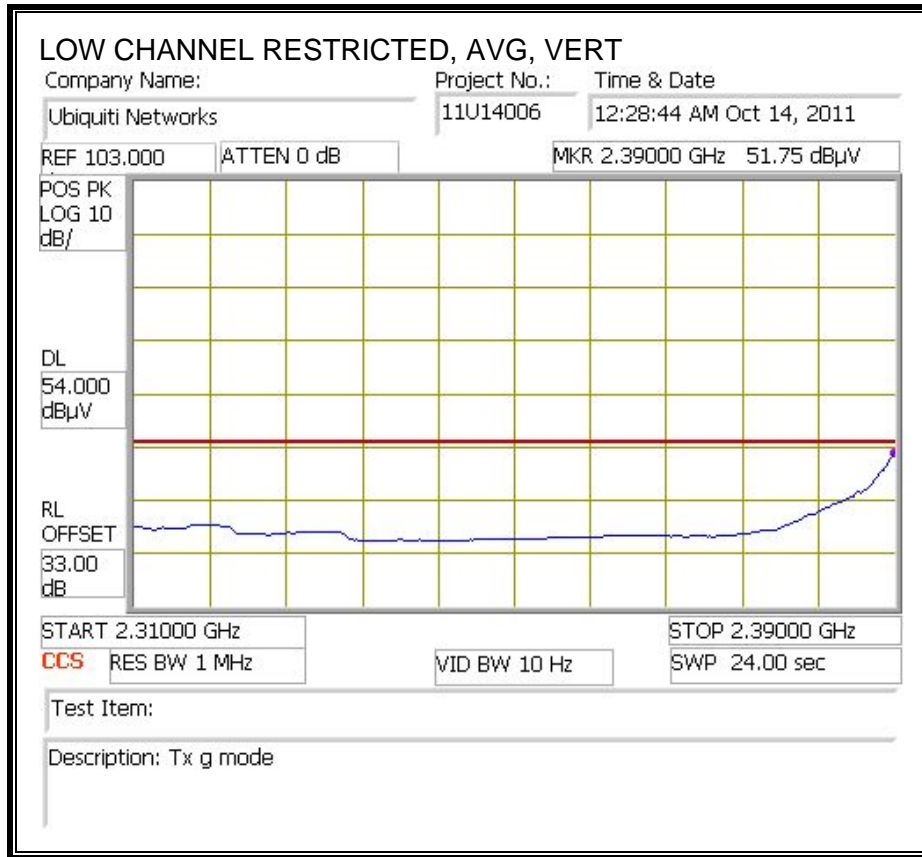
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



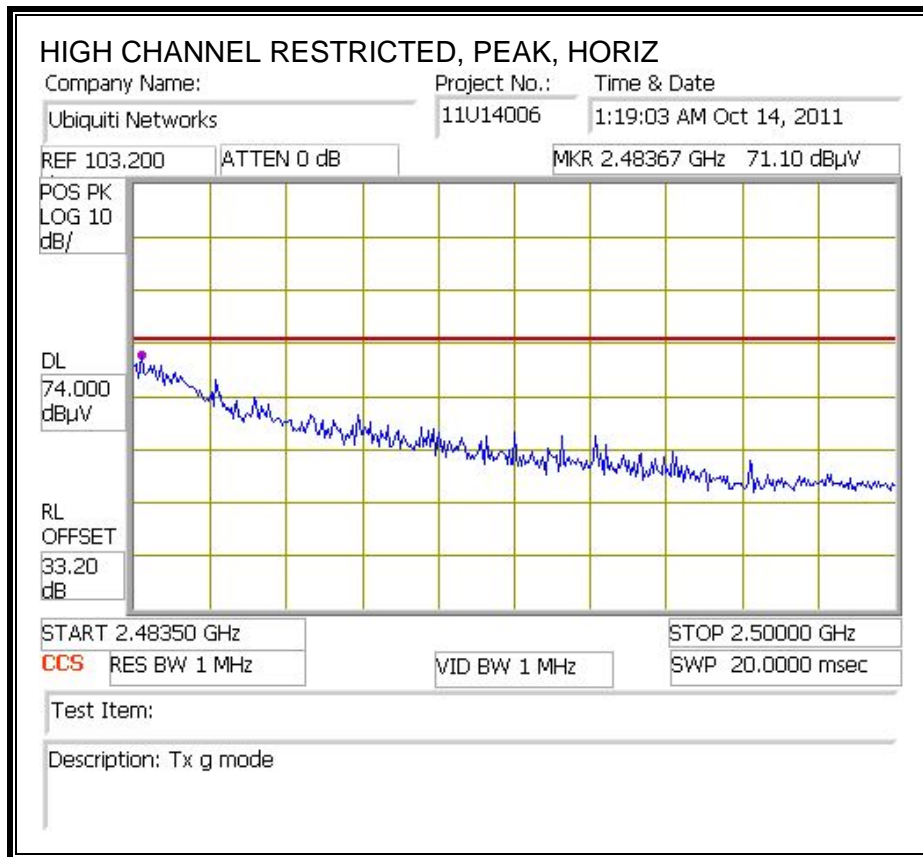


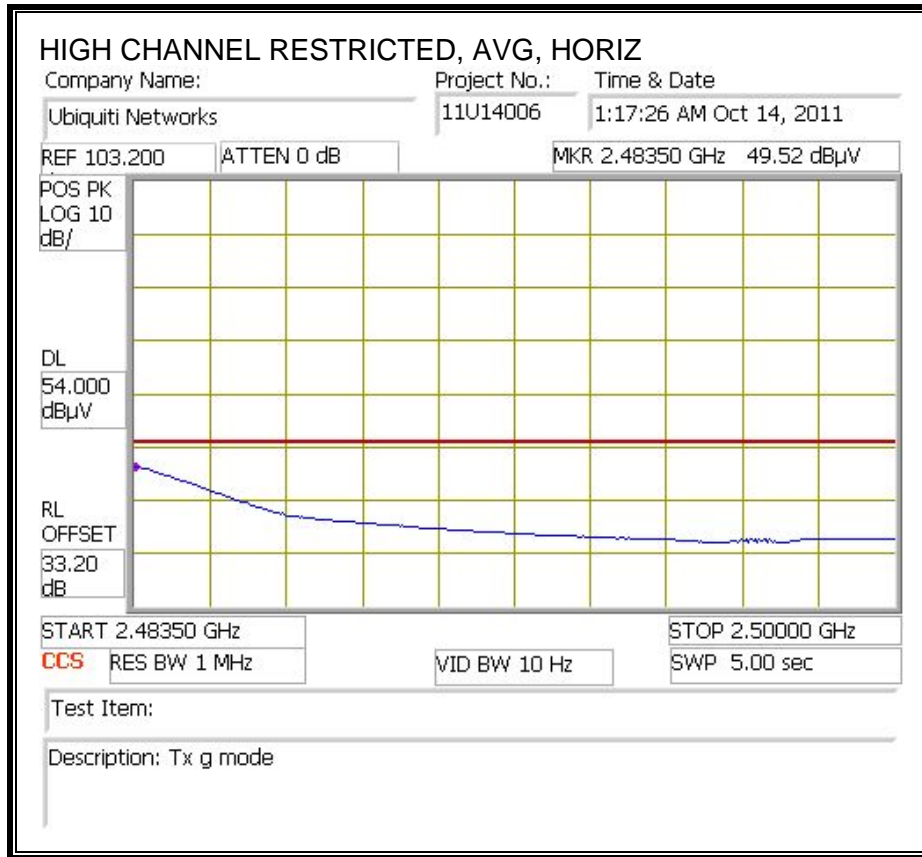
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



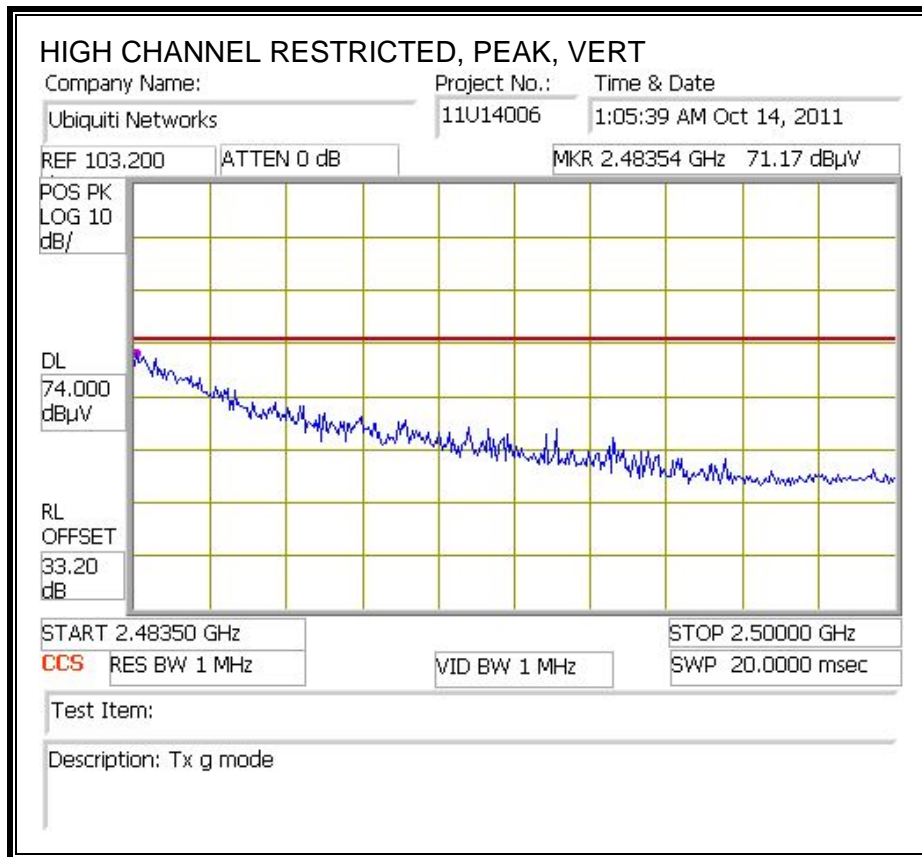


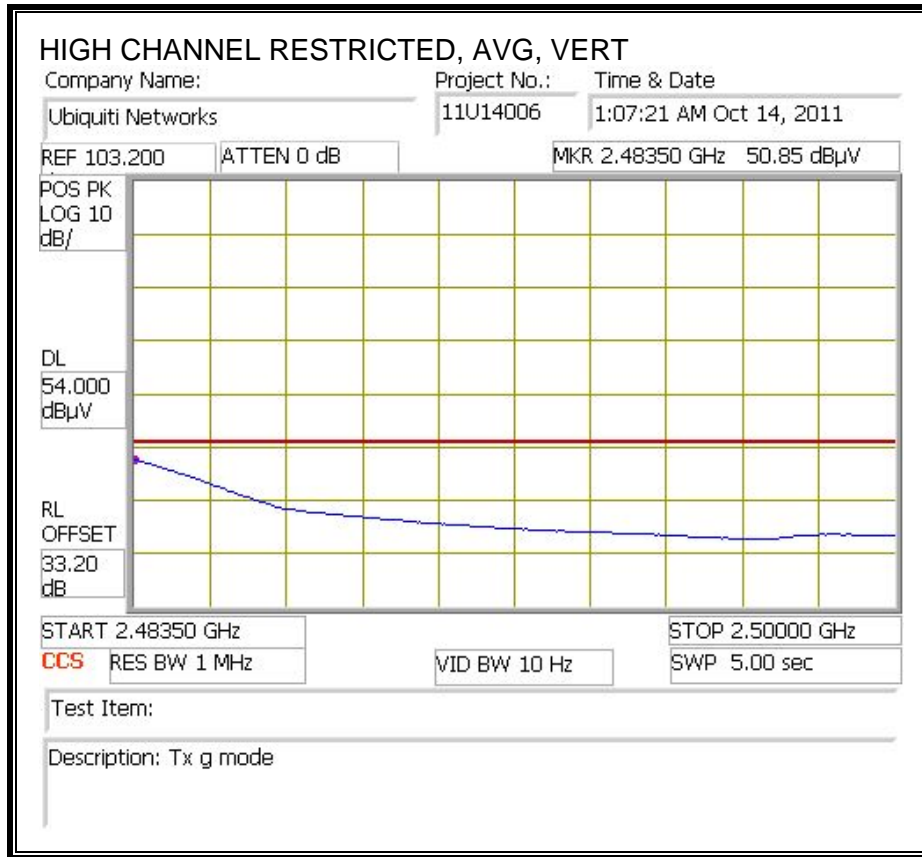
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
 Compliance Certification Services, Fremont 5m Chamber-A

Company: Ubiquiti
 Project #: 11U14006
 Date: 10_13_2011
 Test Engineer: Thanh Nguyen
 Configuration: EUT at worst position, remote PoE, Laptop
 Mode: Transmitting 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		T125; ARA 18-26GHz; S/N:1007	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	20' cable 22807500		R_001	Average Measurements RBW=1MHz; VBW=10Hz

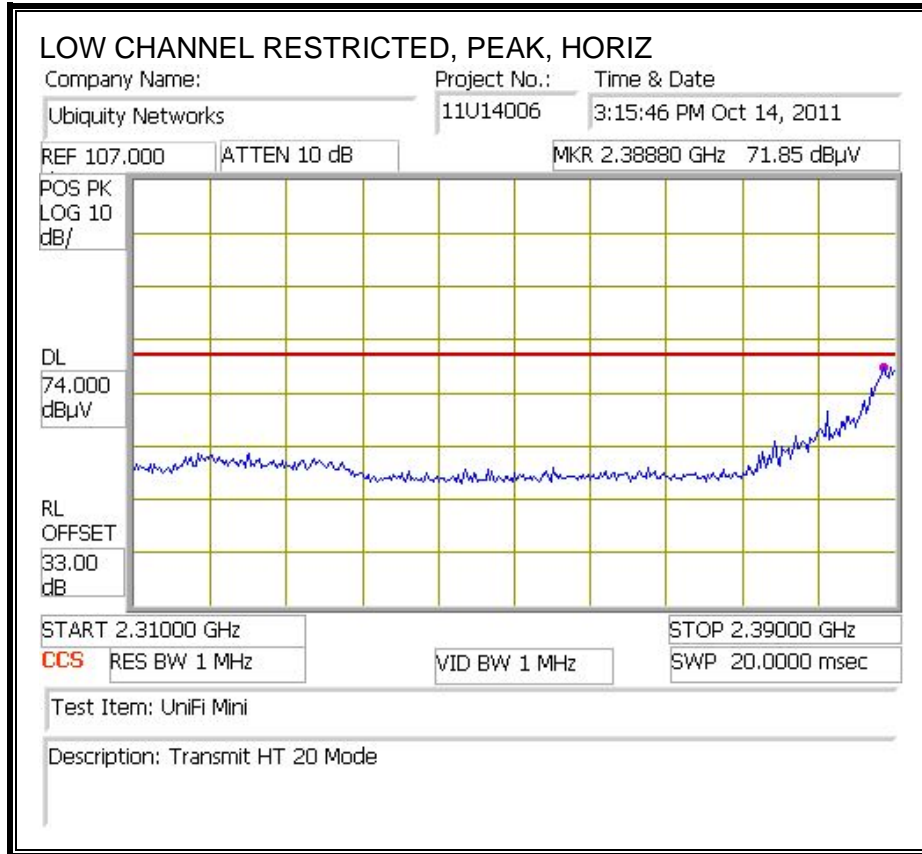
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Ch															
1.000	3.0	58.0	48.8	24.0	2.7	-38.8	0.0	0.0	45.8	36.7	74	54	-28.2	-17.3	V
1.400	3.0	58.7	54.6	25.6	3.2	-38.3	0.0	0.0	49.1	45.1	74	54	-24.9	-8.9	V
4.824	3.0	59.0	43.9	34.6	6.2	-35.5	0.0	0.0	64.3	49.2	74	54	-9.7	-4.8	V
4.824	3.0	62.4	47.6	34.6	6.2	-35.5	0.0	0.0	67.7	52.9	74	54	-6.3	-1.1	V
4.824	3.0	52.6	36.0	34.6	6.2	-35.5	0.0	0.0	57.9	41.3	74	54	-16.1	-12.7	H
Mid Ch															
1.400	3.0	59.3	55.1	25.6	3.2	-38.3	0.0	0.0	49.7	45.5	74	54	-24.3	-8.5	V
1.400	3.0	63.3	56.1	25.6	3.2	-38.3	0.0	0.0	53.8	46.5	74	54	-20.2	-7.5	H
4.874	3.0	55.3	40.3	34.7	6.2	-35.5	0.0	0.0	60.8	45.7	74	54	-13.2	-8.3	V
7.311	3.0	40.6	27.3	36.2	8.4	-35.4	0.0	0.0	49.8	36.5	74	54	-24.2	-17.5	V
4.874	3.0	52.6	38.5	34.7	6.2	-35.5	0.0	0.0	58.1	44.0	74	54	-15.9	-10.0	H
7.311	3.0	38.6	28.3	36.2	8.4	-35.4	0.0	0.0	47.7	37.5	74	54	-26.3	-16.5	H
High Ch															
1.000	3.0	54.4	48.1	24.0	2.7	-38.8	0.0	0.0	42.3	36.0	74	54	-31.7	-18.0	V
4.924	3.0	56.6	44.3	34.8	6.3	-35.5	0.0	0.0	62.1	49.9	74	54	-11.9	-4.1	V
7.386	3.0	48.6	35.2	36.3	8.4	-35.5	0.0	0.0	57.9	44.5	74	54	-16.1	-9.5	V
4.924	3.0	53.9	39.8	34.8	6.3	-35.5	0.0	0.0	59.5	45.3	74	54	-14.5	-8.7	H
7.386	3.0	43.9	31.1	36.3	8.4	-35.5	0.0	0.0	53.2	40.4	74	54	-20.8	-13.6	H

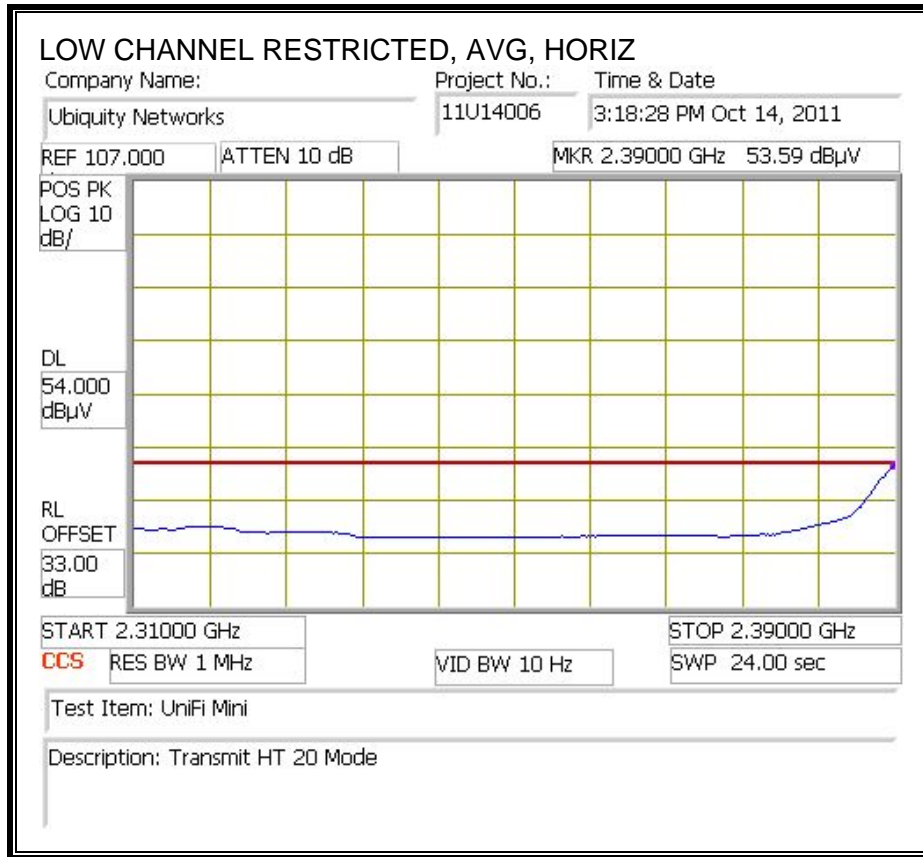
Rev. 07.08.11

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		

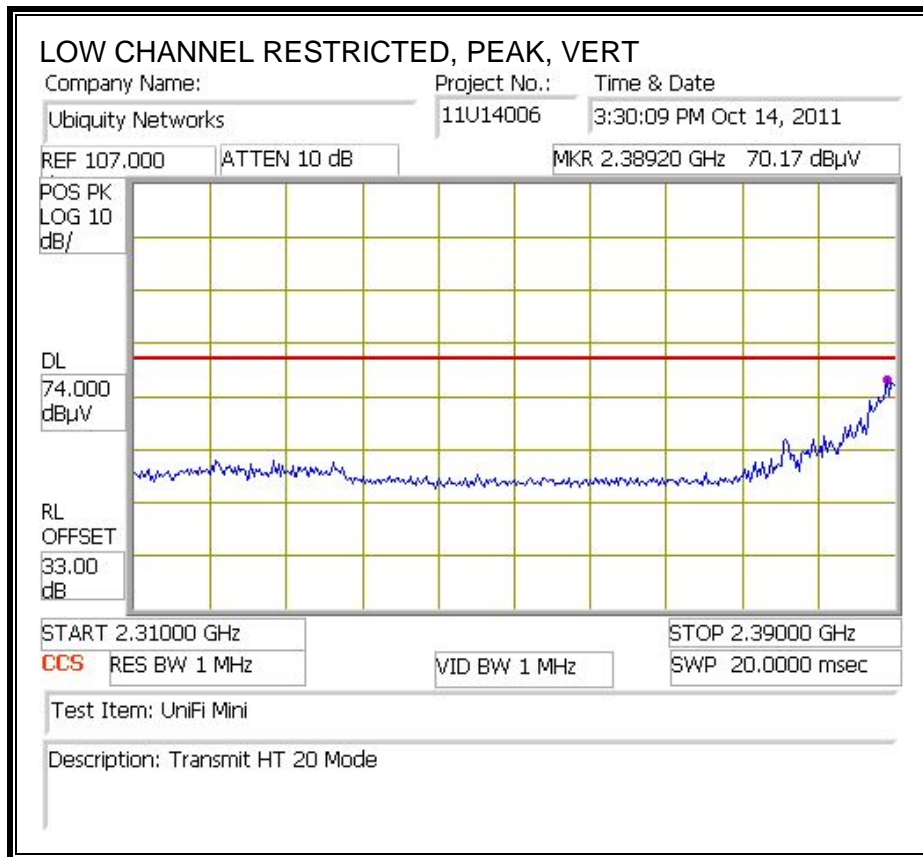
9.2.3. TX ABOVE 1 GHz FOR 802.11n HT20 MODE IN THE 2.4 GHz BAND

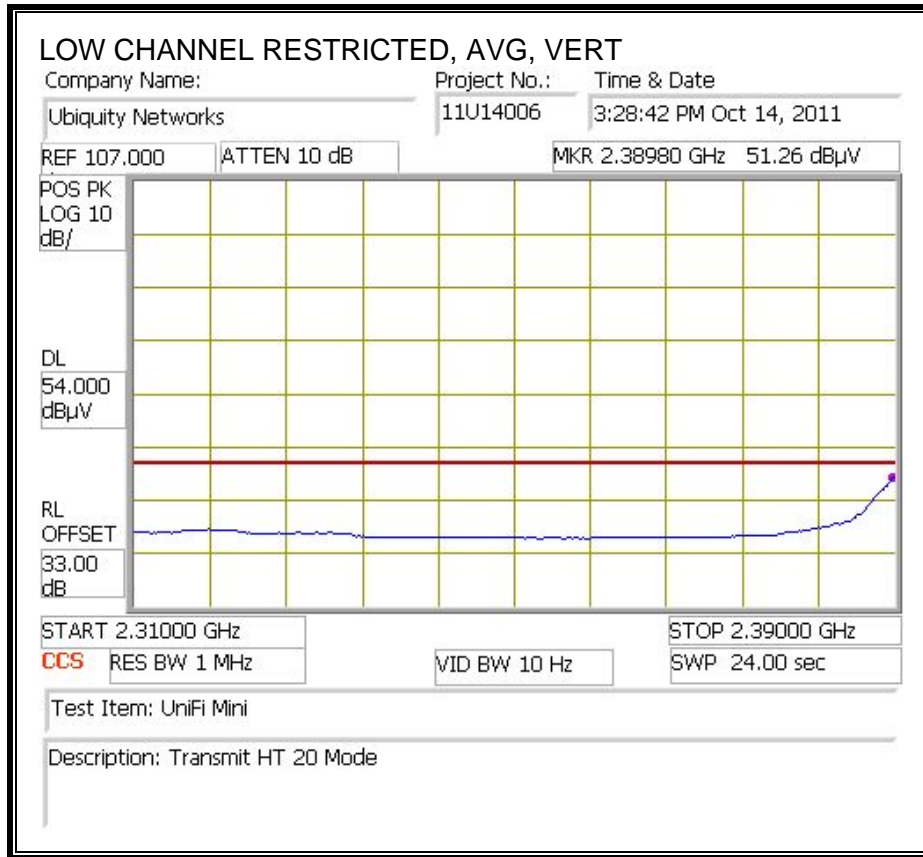
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



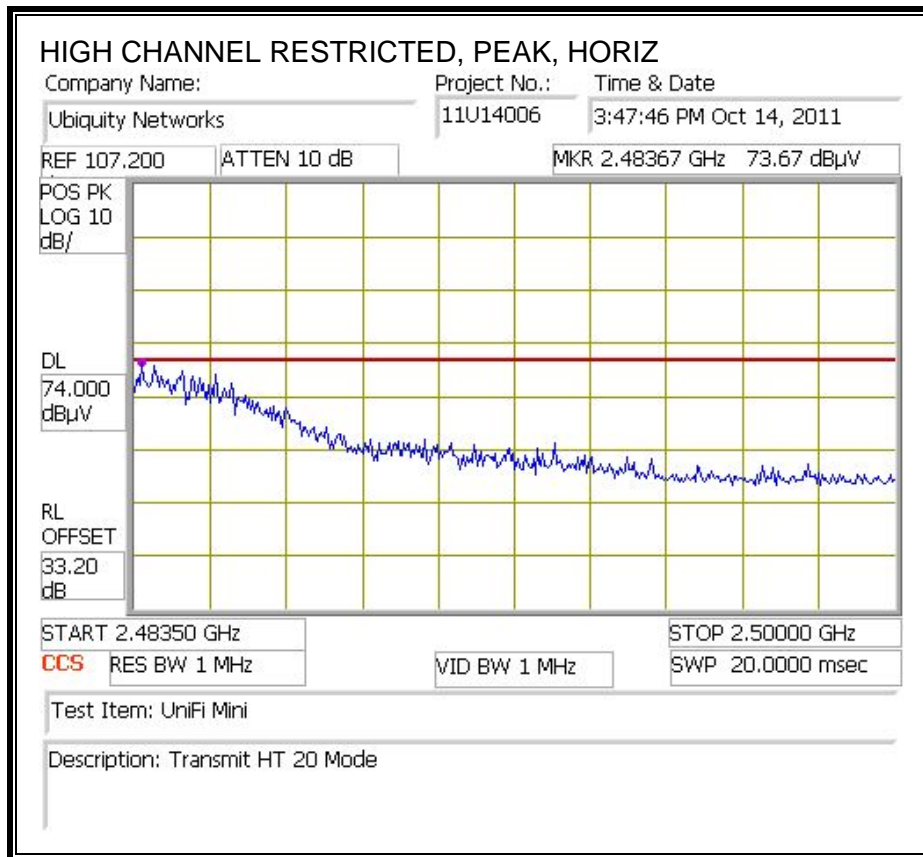


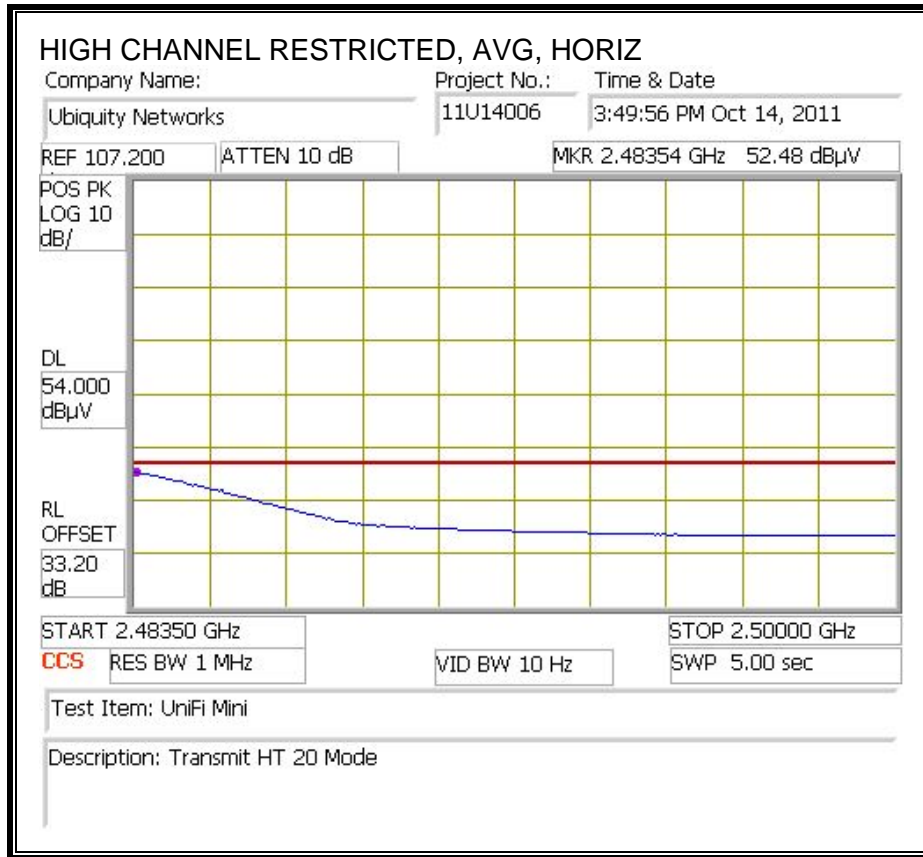
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



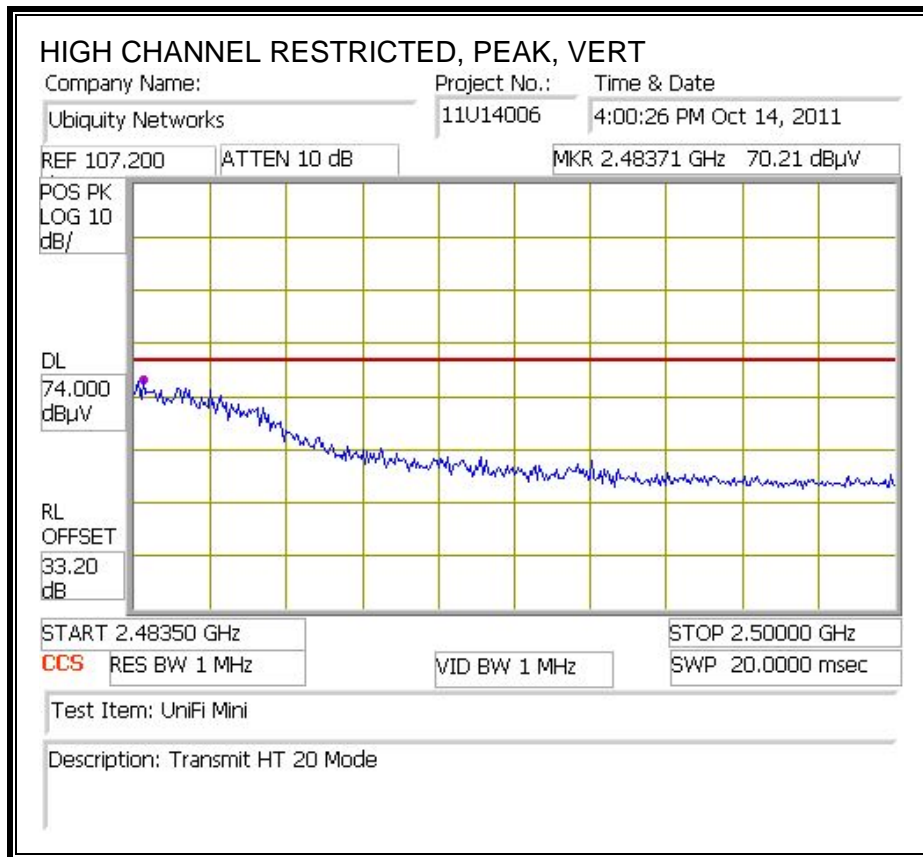


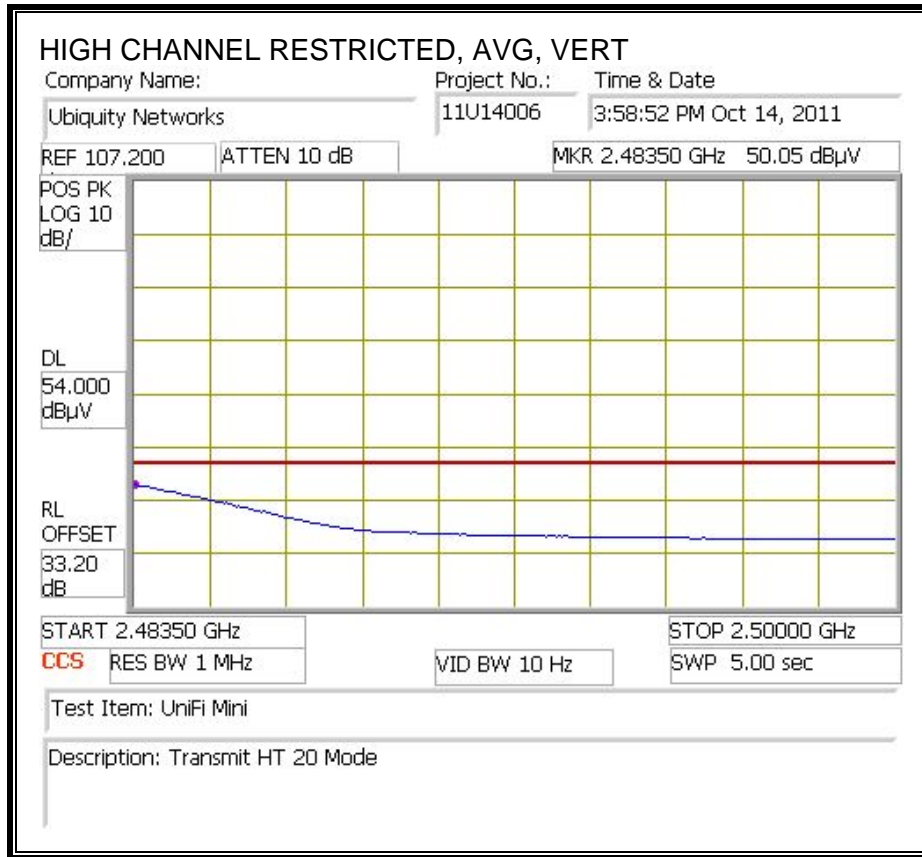
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
 Compliance Certification Services, Fremont 5m Chamber-A

Company: Ubiquiti
 Project #: 11U14006
 Date: 10_13_2011
 Test Engineer: Thanh Nguyen
 Configuration: EUT at worst position, remote PoE, Laptop
 Mode: Transmit HT20 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		T125; ARA 18-26GHz; S/N:1007	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	20' cable 22807500		R_001	Average Measurements RBW=1MHz; VBW=10Hz

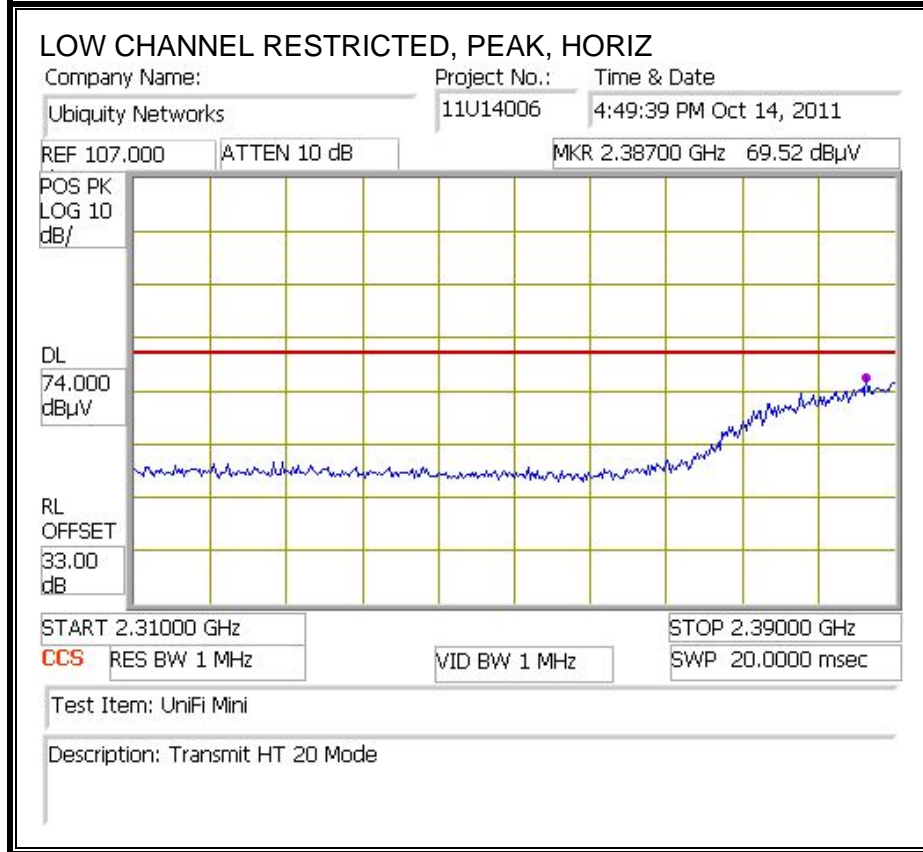
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fldr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Ch															
1.000	3.0	58.0	48.8	24.0	2.7	-38.8	0.0	0.0	45.8	36.7	74	54	-28.2	-17.3	V
1.400	3.0	58.7	54.6	25.6	3.2	-38.3	0.0	0.0	49.1	45.1	74	54	-24.9	-8.9	V
4.824	3.0	60.9	45.5	34.6	6.2	-35.5	0.0	0.0	66.2	50.9	74	54	-7.8	-3.1	V
4.824	3.0	47.4	35.6	34.6	6.2	-35.5	0.0	0.0	52.7	40.9	74	54	-21.3	-13.1	H
Mid Ch															
1.400	3.0	59.3	55.1	25.6	3.2	-38.3	0.0	0.0	49.7	45.5	74	54	-24.3	-8.5	V
1.400	3.0	63.3	56.1	25.6	3.2	-38.3	0.0	0.0	53.8	46.5	74	54	-20.2	-7.5	H
4.874	3.0	57.9	42.4	34.7	6.2	-35.5	0.0	0.0	63.3	47.8	74	54	-10.7	-6.2	V
7.311	3.0	45.4	31.5	36.2	8.4	-35.4	0.0	0.0	54.5	40.7	74	54	-19.5	-13.3	V
4.874	3.0	53.2	40.4	34.7	6.2	-35.5	0.0	0.0	58.6	45.9	74	54	-15.4	-8.1	H
7.311	3.0	41.4	28.4	36.2	8.4	-35.4	0.0	0.0	50.5	37.5	74	54	-23.5	-16.5	H
High Ch															
1.000	3.0	54.4	48.1	24.0	2.7	-38.8	0.0	0.0	42.3	36.0	74	54	-31.7	-18.0	V
4.924	3.0	52.3	38.3	34.8	6.3	-35.5	0.0	0.0	57.9	43.8	74	54	-16.1	-10.2	V
7.386	3.0	41.4	30.3	36.3	8.4	-35.5	0.0	0.0	50.6	39.5	74	54	-23.4	-14.5	V
4.924	3.0	46.4	32.7	34.8	6.3	-35.5	0.0	0.0	51.9	38.3	74	54	-22.1	-15.7	H
7.386	3.0	36.6	28.7	36.3	8.4	-35.5	0.0	0.0	45.8	38.0	74	54	-28.2	-16.0	H

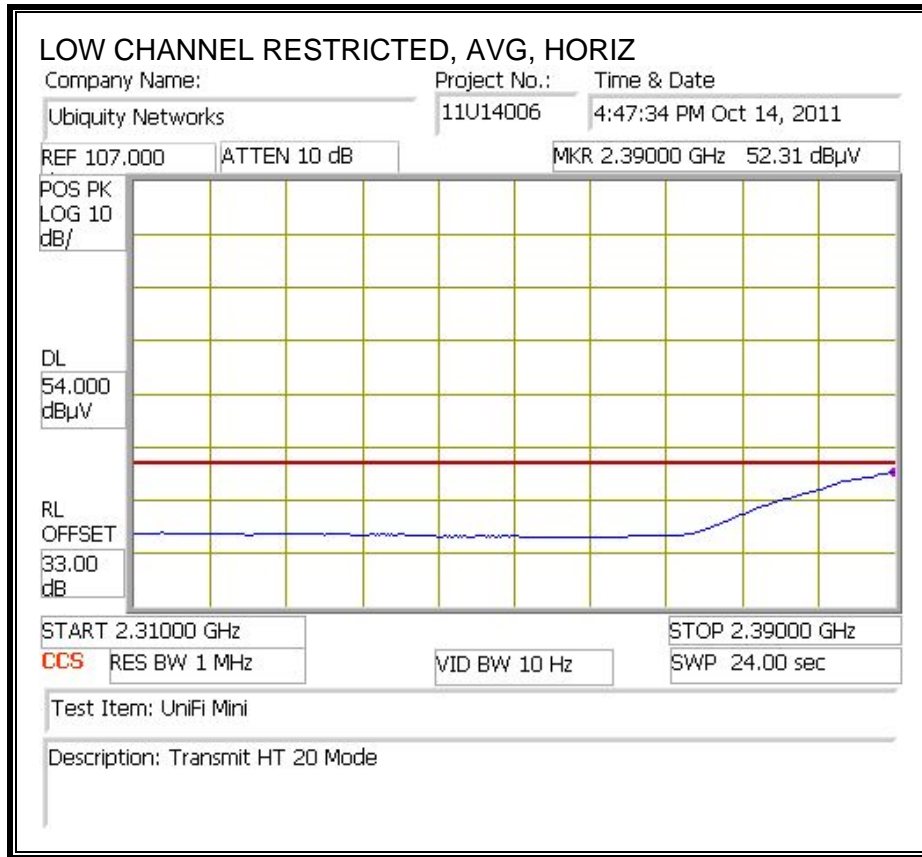
Rev. 07.08.11

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		

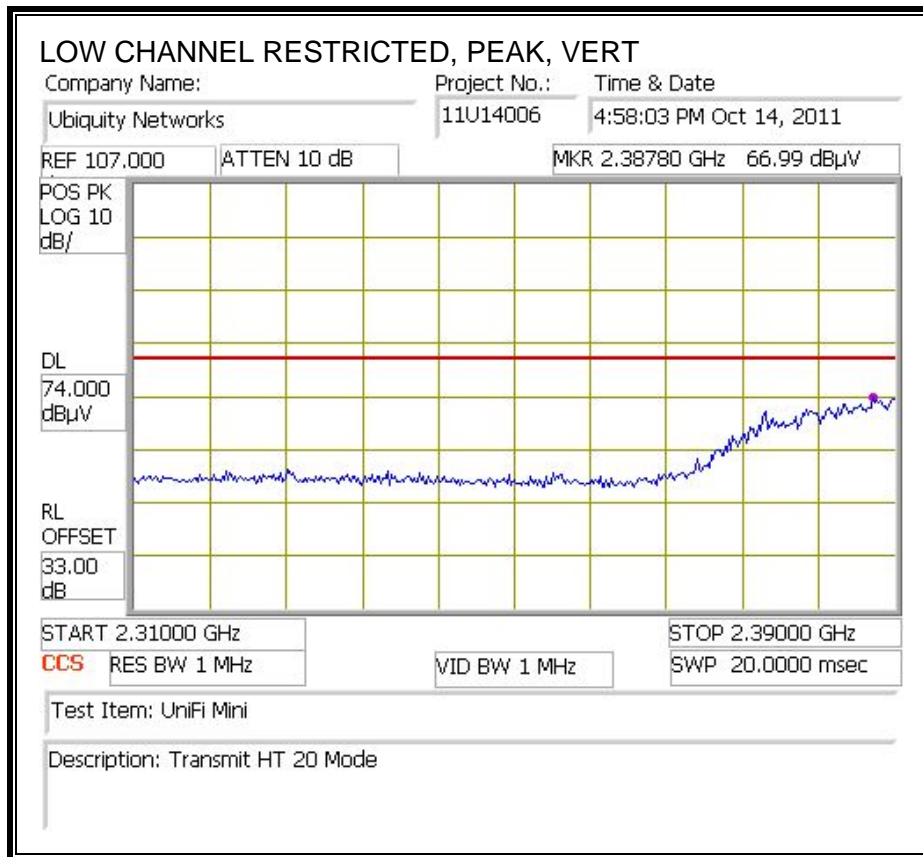
9.2.4. TX ABOVE 1 GHz FOR 802.11n HT40 MODE IN THE 2.4 GHz BAND

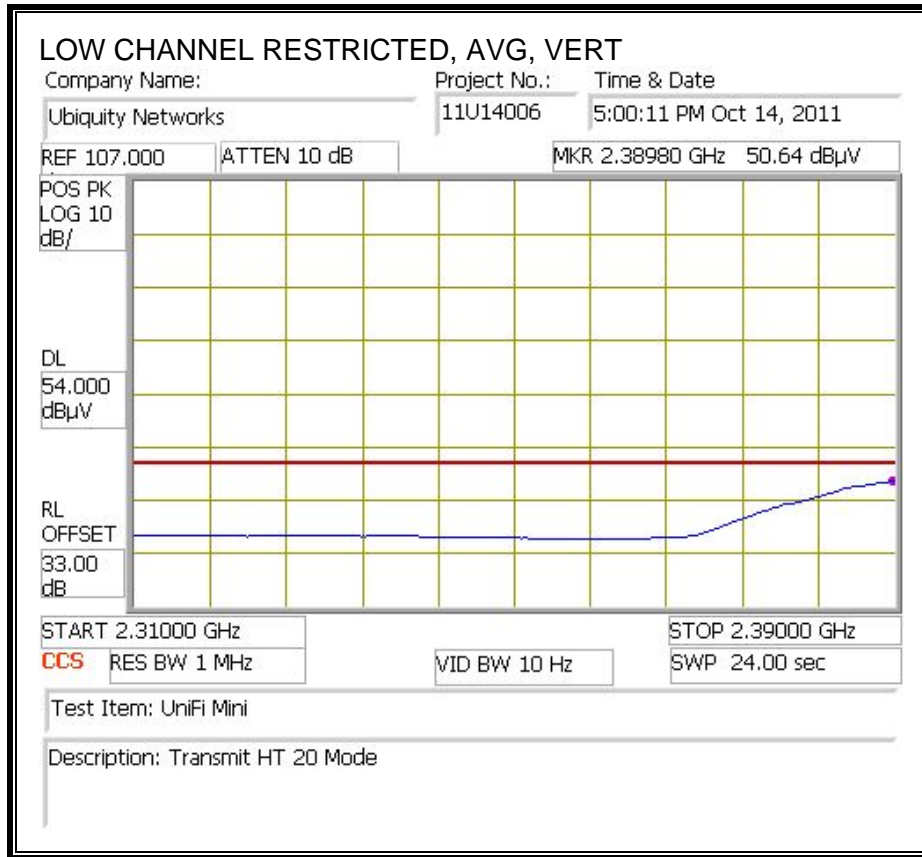
RESTRICTED BANEDGE (LOW CHANNEL, HORIZONTAL)



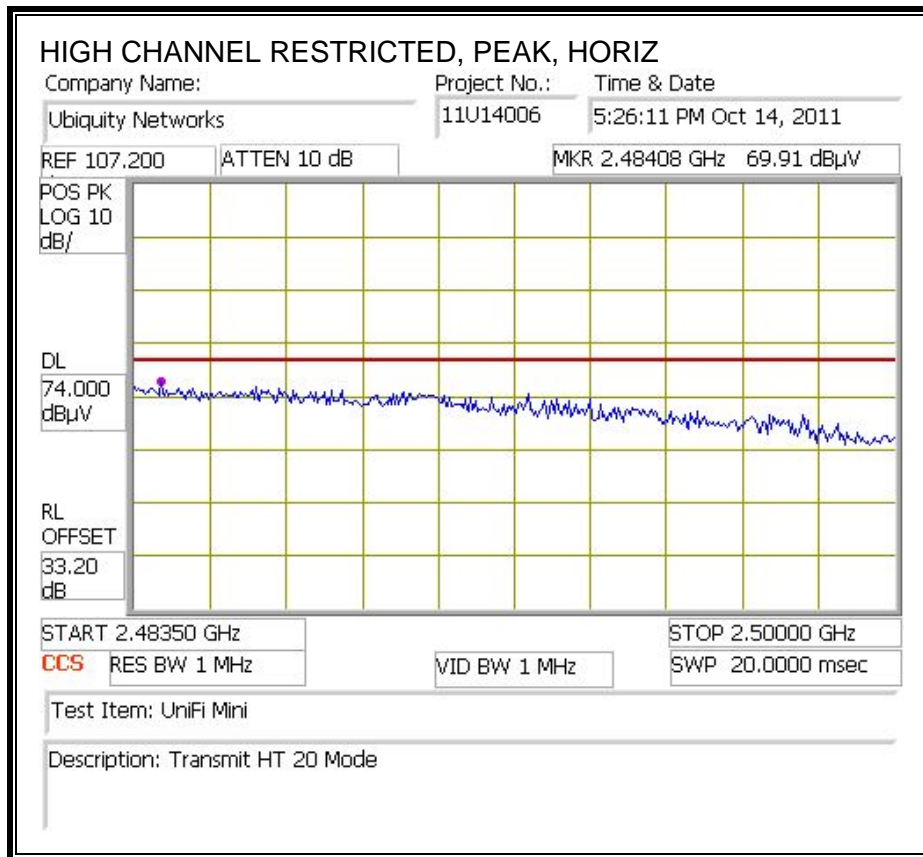


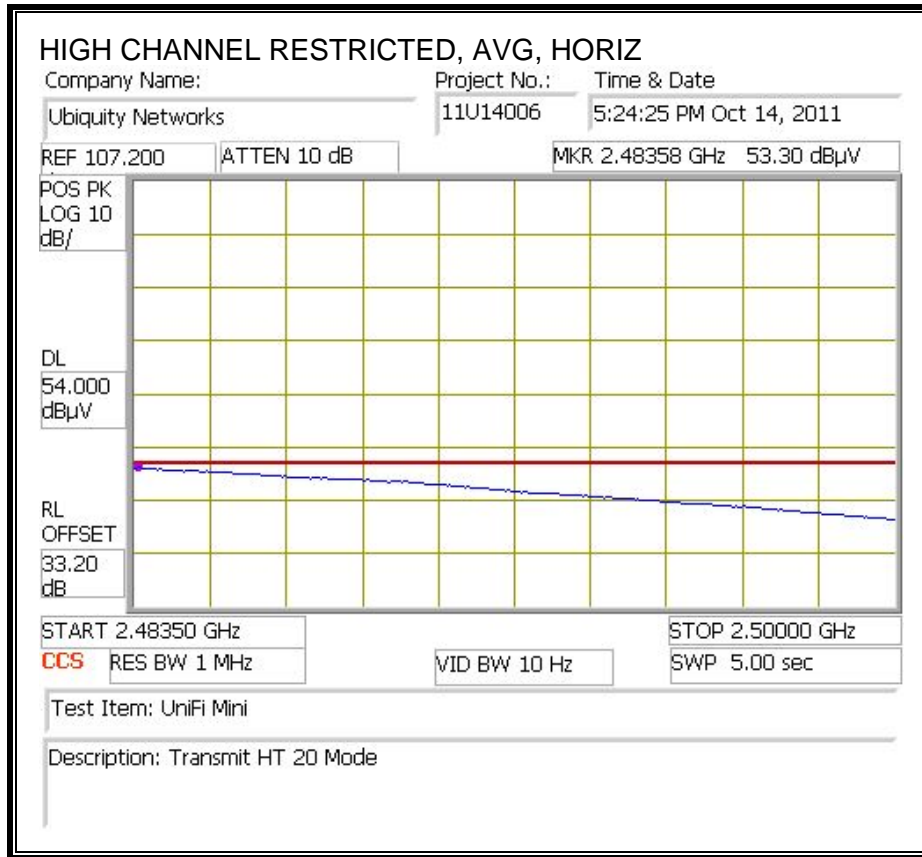
RESTRICTED BANDEGE (LOW CHANNEL, VERTICAL)



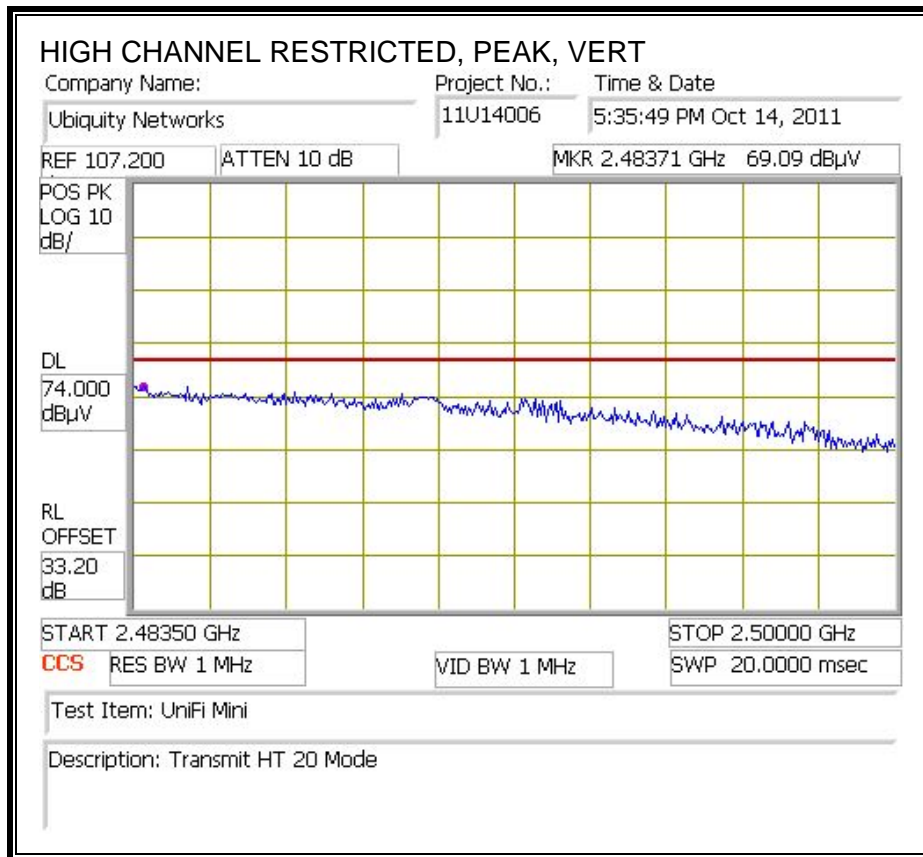


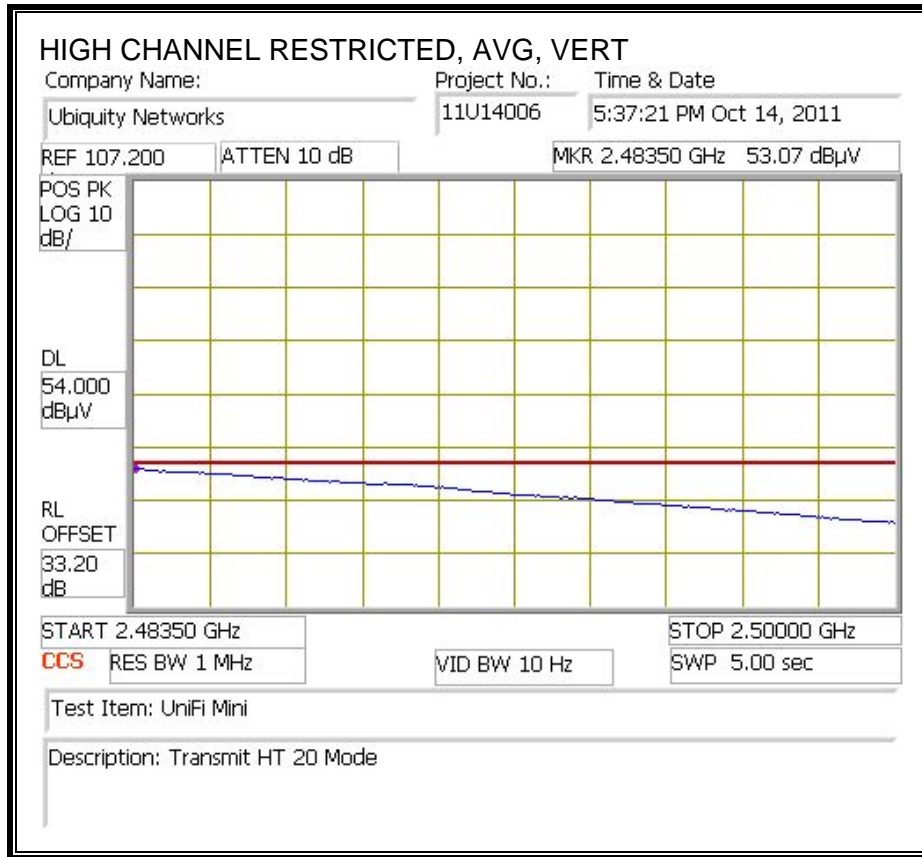
RESTRICTED BANEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
 Compliance Certification Services, Fremont 5m Chamber-A

Company: Ubiquiti
 Project #: 11U14006
 Date: 10_13_2011
 Test Engineer: Thanh Nguyen
 Configuration: EUT at worst position, remote PoE, Laptop
 Mode: Transmit HT 40

Test Equipment:

Horn 1-18GHz	Pre-amplifier 1-26GHz	Pre-amplifier 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T144 Miteq 3008A00931		T125; ARA 18-26GHz; S/N:1007	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	20' cable 22807500		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	Fitr 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 Ch															
4.844	3.0	48.2	32.6	34.7	6.2	-35.5	0.0	0.0	53.6	37.9	74	54	-20.4	-16.1	H
7.266	3.0	34.4	24.4	36.2	8.4	-35.4	0.0	0.0	43.4	33.4	74	54	-30.6	-20.6	H
4.844	3.0	52.4	37.4	34.7	6.2	-35.5	0.0	0.0	57.7	42.7	74	54	-16.3	-11.3	V
7.266	3.0	37.6	25.4	36.2	8.4	-35.4	0.0	0.0	46.7	34.5	74	54	-27.3	-19.5	V
Mid Ch															
4.874	3.0	56.4	42.6	34.7	6.2	-35.5	0.0	0.0	61.8	48.0	74	54	-12.2	-6.0	V
7.311	3.0	40.1	28.6	36.2	8.4	-35.4	0.0	0.0	49.3	37.8	74	54	-24.7	-16.2	V
4.874	3.0	48.6	35.5	34.7	6.2	-35.5	0.0	0.0	54.1	41.0	74	54	-19.9	-13.0	H
7.311	3.0	40.2	26.1	36.2	8.4	-35.4	0.0	0.0	49.4	35.2	74	54	-24.6	-18.8	H
High Ch															
4.904	3.0	50.2	36.6	34.8	6.3	-35.5	0.0	0.0	55.7	42.1	74	54	-18.3	-11.9	V
7.357	3.0	38.4	28.6	36.3	8.4	-35.4	0.0	0.0	47.6	37.9	74	54	-26.4	-16.1	V
4.904	3.0	45.7	31.5	34.8	6.3	-35.5	0.0	0.0	51.2	37.1	74	54	-22.8	-16.9	H
7.357	3.0	42.4	30.3	36.3	8.4	-35.4	0.0	0.0	51.6	39.5	74	54	-22.4	-14.5	H

No other emissions were detected above the system noise floor

Rev. 07.08.11

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		

9.3. RECEIVER ABOVE 1 GHz

9.3.1. RX ABOVE 1 GHz FOR 20 MHz BANDWIDTH IN THE 2.4 GHz BAND

High Frequency Measurement
 Compliance Certification Services, Fremont 5m Chamber-A

Company: Ubiquiti
 Project #: 11U14006
 Date: 10/14/2011
 Test Engineer: Thanh Nguyen
 Configuration: EUT at worst position, remote PoE, Laptop
 Mode: Receive 20MHz.

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T144 Mite q 3008A00931			RX RSS 210

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	20' cable 22807500			

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 Ch															
1.000	3.0	57.3	48.3	24.0	2.7	-38.8	0.0	0.0	45.1	36.2	74	54	-28.9	-17.8	V
1.400	3.0	58.7	54.6	25.6	3.2	-38.3	0.0	0.0	49.1	45.1	74	54	-24.9	-8.9	V
1.600	3.0	58.5	42.4	26.3	3.4	-38.0	0.0	0.0	50.2	34.1	74	54	-23.8	-19.9	V
1.800	3.0	57.2	53.7	27.1	3.6	-37.7	0.0	0.0	50.2	46.8	74	54	-23.8	-7.2	V
2.000	3.0	59.1	54.6	27.9	3.9	-37.5	0.0	0.0	53.3	48.9	74	54	-20.7	-5.1	V
2.200	3.0	56.3	52.1	28.5	4.1	-37.2	0.0	0.0	51.6	47.5	74	54	-22.4	-6.5	V
2.280	3.0	56.5	54.6	28.7	4.2	-37.1	0.0	0.0	52.3	50.4	74	54	-21.7	-3.6	V
2.600	3.0	56.5	52.5	29.8	4.5	-36.8	0.0	0.0	54.0	50.0	74	54	-20.0	-4.0	V
1.400	3.0	62.0	60.6	25.6	3.2	-38.3	0.0	0.0	52.5	51.1	74	54	-21.5	-2.9	H
Mid Ch															
1.400	3.0	56.9	54.4	25.6	3.2	-38.3	0.0	0.0	47.4	44.9	74	54	-26.6	-9.1	V
1.600	3.0	59.2	37.0	26.3	3.4	-38.0	0.0	0.0	50.9	28.8	74	54	-23.1	-25.2	V
1.800	3.0	56.9	54.4	27.1	3.6	-37.7	0.0	0.0	49.9	47.4	74	54	-24.1	-6.6	V
2.000	3.0	58.1	55.1	27.9	3.9	-37.5	0.0	0.0	52.4	49.3	74	54	-21.6	-4.7	V
1.400	3.0	61.6	60.0	25.6	3.2	-38.3	0.0	0.0	52.0	50.5	74	54	-22.0	-3.5	H
High Ch															
1.000	3.0	54.4	48.1	24.0	2.7	-38.8	0.0	0.0	42.3	36.0	74	54	-31.7	-18.0	V
1.400	3.0	59.3	55.1	25.6	3.2	-38.3	0.0	0.0	49.7	45.5	74	54	-24.3	-8.5	V
1.400	3.0	63.3	56.1	25.6	3.2	-38.3	0.0	0.0	53.8	46.5	74	54	-20.2	-7.5	H

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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		

9.3.2. RX ABOVE 1 GHz FOR 40 MHz BANDWIDTH IN THE 2.4 GHz BAND

High Frequency Measurement
 Compliance Certification Services, Fremont 5m Chamber-A

Company: Ubiquiti
 Project #: 11U14006
 Date: 10/14/2011
 Test Engineer: Thanh Nguyen
 Configuration: EUT at worst position, remote PoE, Laptop
 Mode: Receive 40MHz.

Test Equipment:

Horn 1-18GHz T73; S/N: 6717 @3m	Pre-amplifier 1-26GHz T144 Miteq 3008A00931	Pre-amplifier 26-40GHz	Horn > 18GHz	Limit RX RSS 210
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Hi Frequency Cables

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

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filtr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Ch															
1.000	3.0	53.7	45.2	24.0	2.7	-38.8	0.0	0.0	41.5	33.1	74	54	-32.5	-20.9	V
1.400	3.0	58.3	54.2	25.6	3.2	-38.3	0.0	0.0	48.7	44.7	74	54	-25.3	-9.3	V
1.600	3.0	56.4	41.3	26.3	3.4	-38.0	0.0	0.0	48.1	33.1	74	54	-25.9	-20.9	V
1.800	3.0	57.2	50.7	27.1	3.6	-37.7	0.0	0.0	50.2	43.7	74	54	-23.8	-10.3	V
2.000	3.0	59.1	40.3	27.9	3.9	-37.5	0.0	0.0	53.3	34.6	74	54	-20.7	-19.4	V
2.200	3.0	56.3	52.1	28.5	4.1	-37.2	0.0	0.0	51.6	47.5	74	54	-22.4	-6.5	V
2.600	3.0	56.5	52.5	29.8	4.5	-36.8	0.0	0.0	54.0	50.0	74	54	-20.0	-4.0	V
1.400	3.0	62.0	60.6	25.6	3.2	-38.3	0.0	0.0	52.5	51.1	74	54	-21.5	-2.9	H
Mid Ch															
1.400	3.0	56.9	54.4	25.6	3.2	-38.3	0.0	0.0	47.4	44.9	74	54	-26.6	-9.1	V
1.600	3.0	59.2	37.0	26.3	3.4	-38.0	0.0	0.0	50.9	28.8	74	54	-23.1	-25.2	V
1.800	3.0	56.9	54.4	27.1	3.6	-37.7	0.0	0.0	49.9	47.4	74	54	-24.1	-6.6	V
2.000	3.0	58.1	38.4	27.9	3.9	-37.5	0.0	0.0	52.4	32.6	74	54	-21.6	-21.4	V
1.400	3.0	61.6	60.0	25.6	3.2	-38.3	0.0	0.0	52.0	50.5	74	54	-22.0	-3.5	H
High Ch															
1.000	3.0	54.4	48.1	24.0	2.7	-38.8	0.0	0.0	42.3	36.0	74	54	-31.7	-18.0	V
1.200	3.0	54.4	48.1	24.8	3.0	-38.5	0.0	0.0	43.6	37.3	74	54	-30.4	-16.7	V
1.600	3.0	57.2	48.1	26.3	3.4	-38.0	0.0	0.0	49.0	39.9	74	54	-25.0	-14.1	V
2.000	3.0	57.3	37.3	27.9	3.9	-37.5	0.0	0.0	51.5	31.6	74	54	-22.5	-22.4	V
2.600	3.0	52.6	49.4	29.8	4.5	-36.8	0.0	0.0	50.1	46.9	74	54	-23.9	-7.1	V
1.400	3.0	59.8	57.9	25.6	3.2	-38.3	0.0	0.0	50.3	48.4	74	54	-23.7	-5.6	H

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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		

9.4. WORST-CASE BELOW 1 GHz

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

EMISSIONS SPURIOUS DATA										
Manufacturer:		Ubiquiti Networks								
Project:		11U14006								
Model:		UniFi Mini								
Description:		802.11b/g/n 1X1 SISO Networking Device								
Range 1 30 - 1000MHz										
Test Freq. (MHz)	Meter Reading (dBuV)	Detector	Cable Loss [dB]	Pre-Amp Gain [dB]	Antenna Factor [dB]	Value dBuV/m	CFR 47, Part 15 Class B 3 m Limit	Margin	Height [cm]	Polarity
36.9784	42.94	PK	0.7	-28.3	16.3	31.64	40	-8.36	300	Horz
59.4644	51.04	PK	0.8	-28.3	7.9	31.44	40	-8.56	400	Horz
101.3349	54.33	PK	1.1	-28.2	10.2	37.43	43.5	-6.07	200	Horz
187.1113	51.2	PK	1.5	-28.1	11.3	35.9	43.5	-7.6	100	Horz
195.1559	51.76	PK	1.5	-28.1	11.7	36.86	43.5	-6.64	100	Horz
251.9524	56.44	PK	1.7	-28.1	11.9	41.94	46	-4.06	100	Horz
306.8106	51.95	PK	1.9	-28	13.5	39.35	46	-6.65	100	Horz
399.8561	48.9	PK	2.2	-27.8	14.9	38.2	46	-7.8	100	Horz
799.952	42.36	PK	3.2	-27.2	21	39.36	46	-6.64	100	Horz
Range 2 30 - 1000MHz										
Test Freq. (MHz)	Meter Reading (dBuV)	Detector	Cable Loss [dB]	Pre-Amp Gain [dB]	Antenna Factor [dB]	Value dBuV/m	CFR 47, Part 15 Class B 3 m Limit	Margin	Height [cm]	Polarity
48.2214	52.14	PK	0.8	-28.3	9.2	33.84	40	-6.16	100	Vert
108.701	53.37	PK	1.1	-28.2	11.5	37.77	43.5	-5.73	100	Vert
110.8333	52.81	PK	1.1	-28.2	11.9	37.61	43.5	-5.89	100	Vert
111.8026	43.89	PK	1.1	-28.2	12.1	28.89	43.5	-14.61	100	Vert
696.4388	39.68	PK	2.9	-27	19.5	35.08	46	-10.92	100	Vert
359.7302	47.23	PK	2.1	-27.9	14.3	35.73	46	-10.27	100	Vert
897.0683	39.49	PK	3.3	-27.4	21.8	37.19	46	-8.81	100	Vert
932.1543	37.87	PK	3.4	-27.5	22.1	35.87	46	-10.13	100	Vert
1000	44.63	PK	3.5	-27.7	22.5	42.93	54	-11.07	100	Vert

10. 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

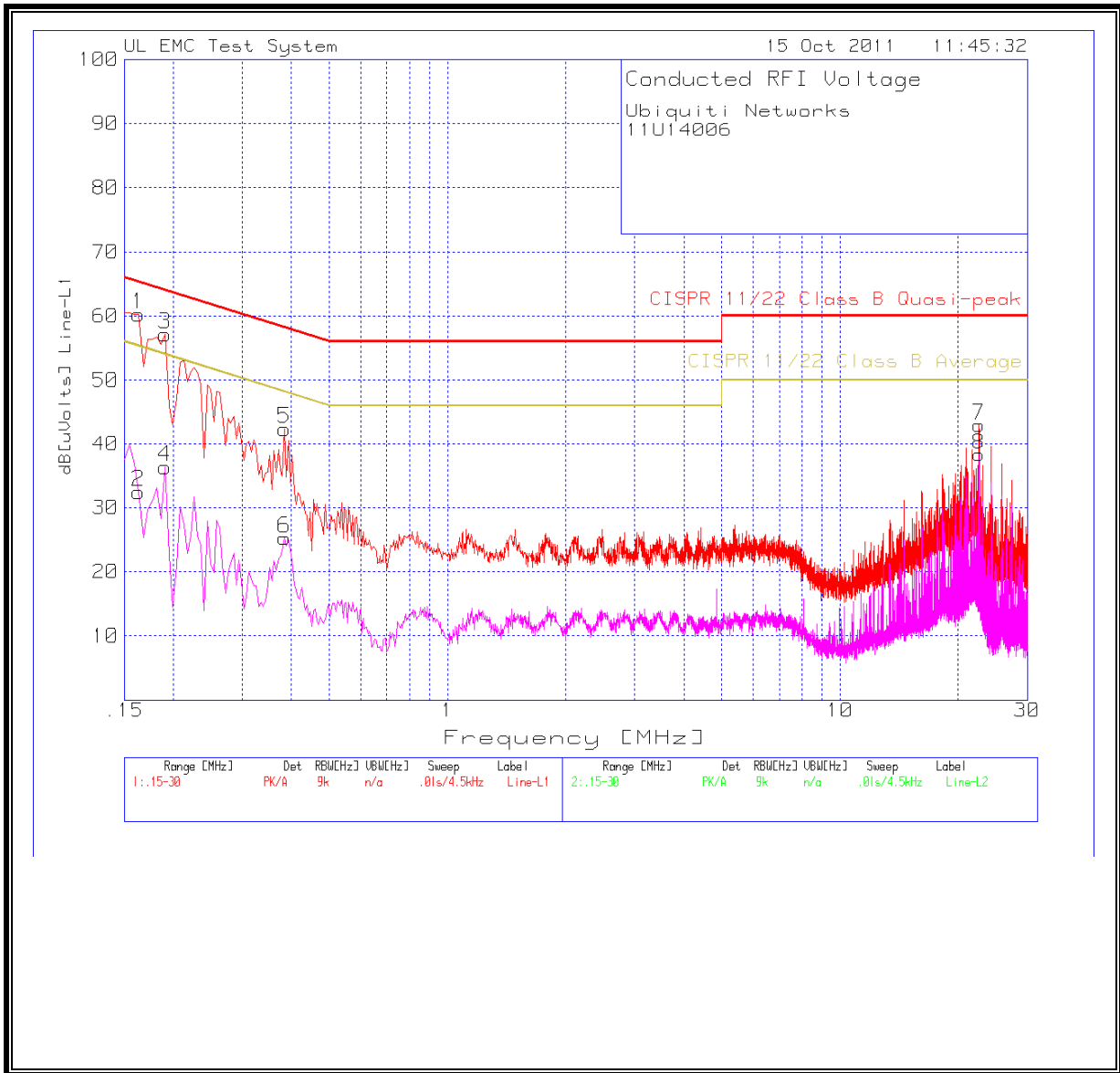
ANSI C63.4

RESULTS

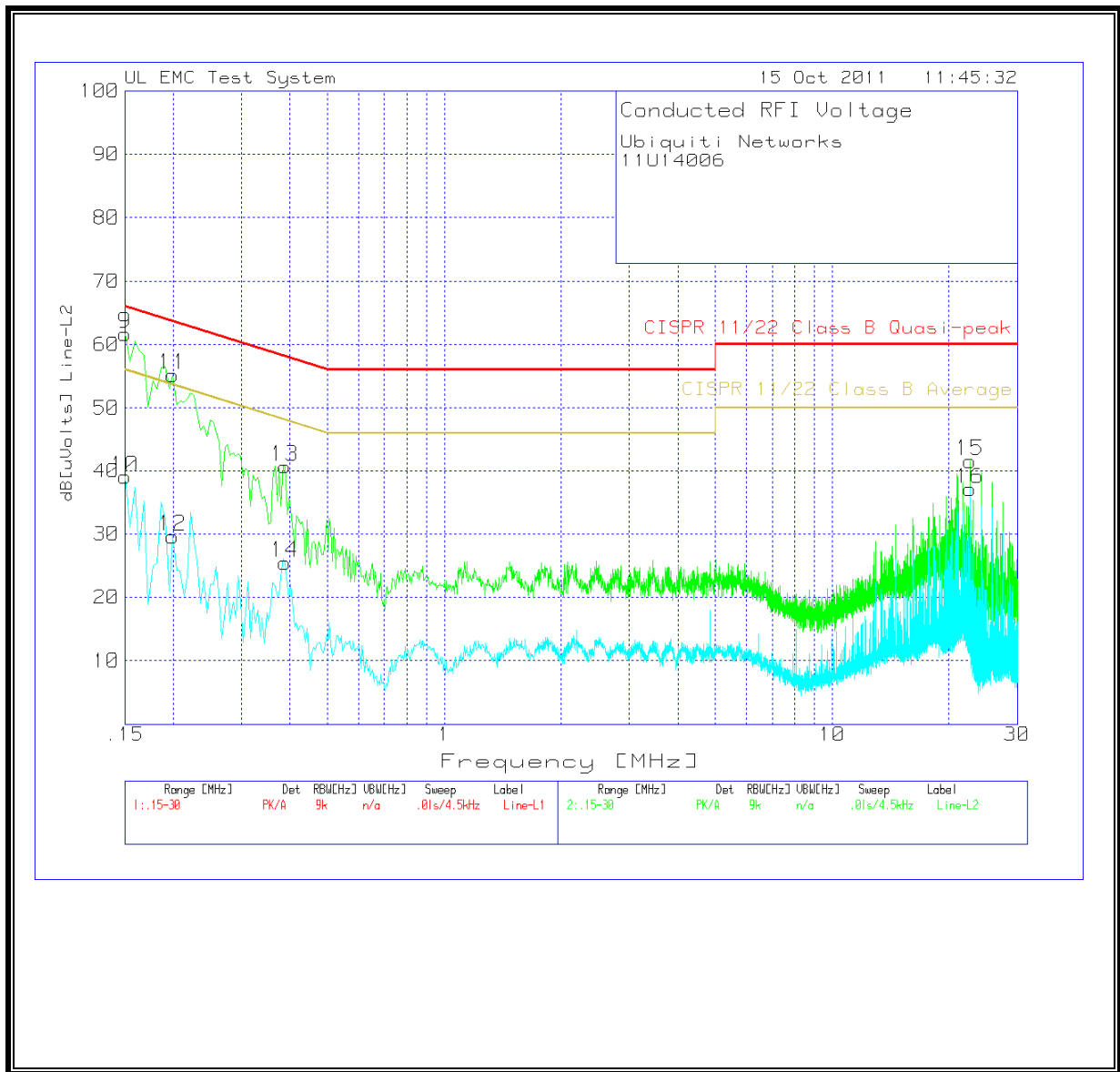
LINE CONDUCTED EMISSIONS

Ubiquiti Networks									
11U14006									
Line-L1 .15 - 30MHz									
Test Freq. (MHz)	Meter Reading	Detector	LISN [dB]	Conduct ed Emission Cable [dB]	Correct Reading (dBuVolts)	Class B Quasi-peak Limit	Quasi-Peak Margin	Class B Average Limit	Average Margin
0.1635	60.27	PK	0	0	60.27	65.3	-5.03		
0.1635	32.47	Av	0	0	32.47	-	-	55.3	-22.83
0.1905	57.19	PK	0	0	57.19	64	-6.81		
0.1905	36.27	Av	0	0	36.27	-	-	54	-17.73
0.384	42.38	PK	0	0	42.38	58.2	-15.82		
0.384	25.25	Av	0	0	25.25	-	-	48.2	-22.95
22.6005	42.98	PK	0	0	42.98	60	-17.02		
22.6005	38.32	Av	0	0	38.32	-	-	50	-11.68
Line-L2 .15 - 30MHz									
Test Freq. (MHz)	Meter Reading	Detector	LISN [dB]	Conduct ed Emission Cable [dB]	Correct Reading (dBuVolts)	Class B Quasi-peak Limit	Quasi-Peak Margin	Class B Average Limit	Average Margin
0.15	61.65	PK	0	0	61.65	66	-4.35		
0.15	39.05	Av	0	0	39.05	-	-	56	-16.95
0.1995	55.23	PK	0	0	55.23	63.6	-8.37		
0.1995	29.64	Av	0	0	29.64	-	-	53.6	-23.96
0.3885	40.68	PK	0	0	40.68	58.1	-17.42		
0.3885	25.42	Av	0	0	25.42	-	-	48.1	-22.68
22.623	41.58	PK	0	0	41.58	60	-18.42		
22.623	37.12	Av	0	0	37.12	-	-	50	-12.88

LINE 1 RESULTS



LINE 2 RESULTS



11. 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

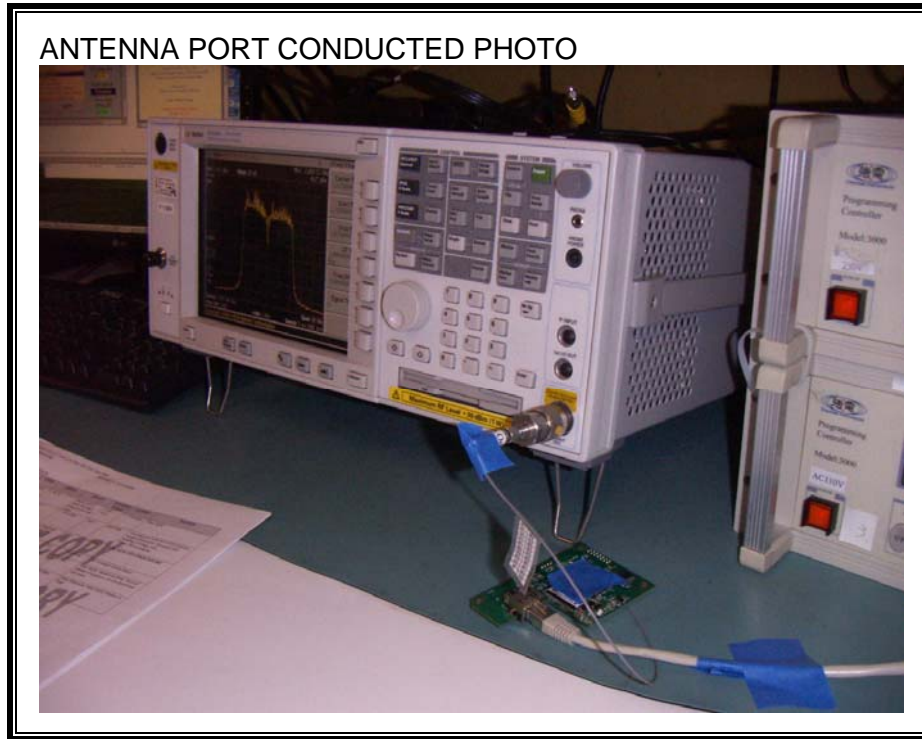
RESULTS

(MPE distance equals 20 cm)

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	18.24	3.00	0.26	0.026

12. SETUP PHOTOS

ANTENNA PORT CONDUCTED RF MEASUREMENT SETUP



RADIATED RF MEASUREMENT SETUP FOR PORTABLE CONFIGURATION

X-AXIS FRONT PHOTO



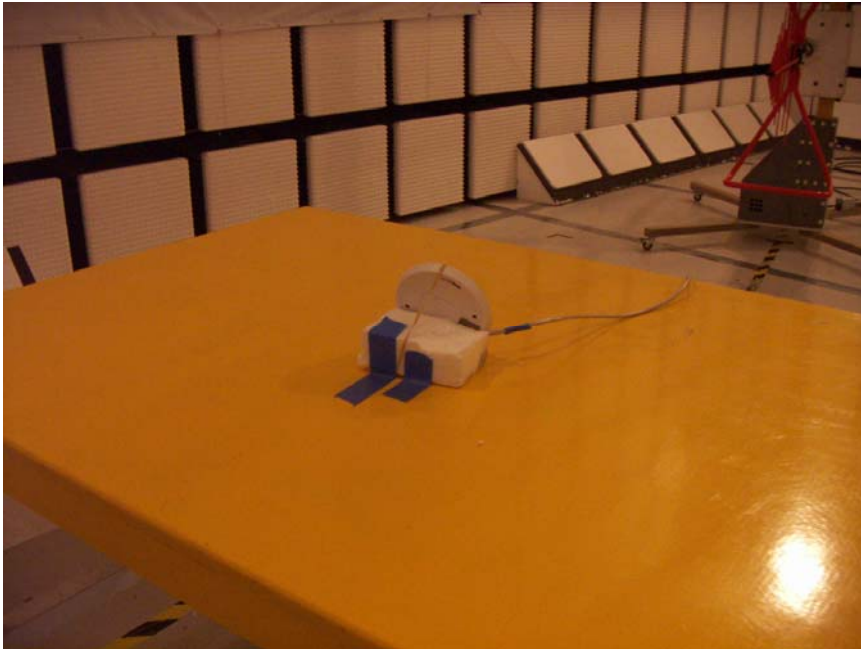
X-AXIS BACK PHOTO



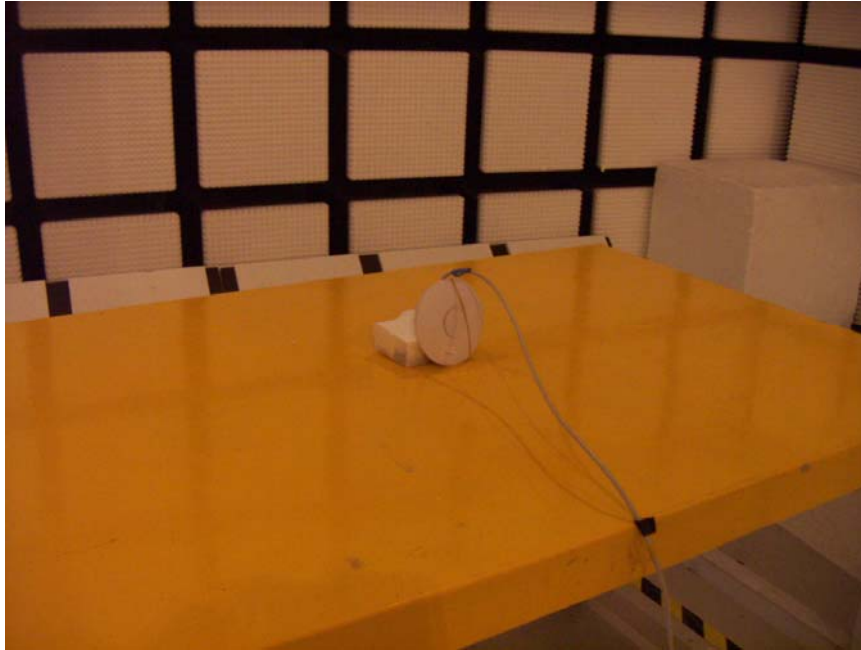
Y-AXIS FRONT PHOTO



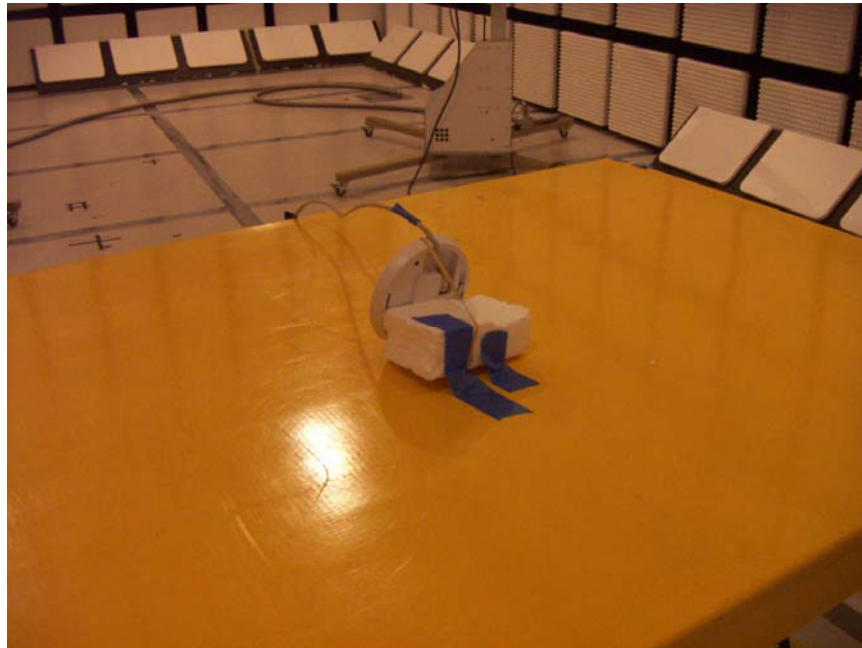
Y-AXIS BACK PHOTO



Z-AXIS FRONT PHOTO

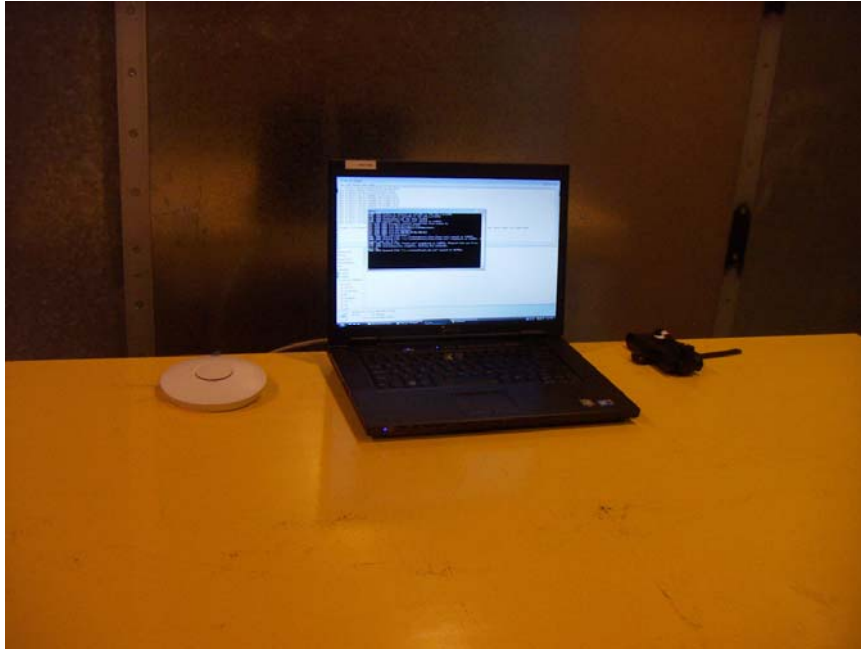


Z-AXIS BACK PHOTO

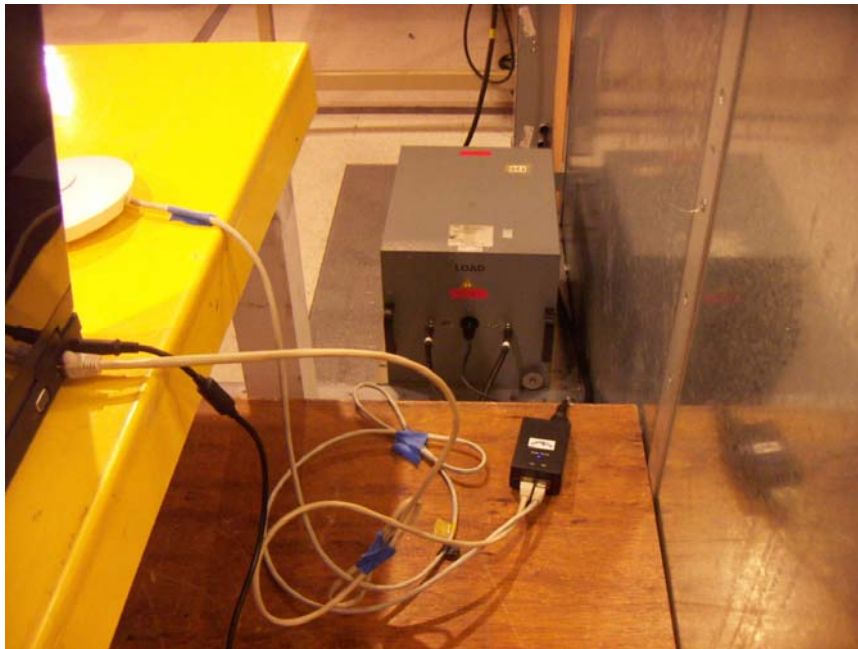


POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP

LINE CONDUCTED FRONT PHOTO



LINE CONDUCTED BACK PHOTO



END OF REPORT