



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

CERTIFICATION TEST REPORT

FOR

Cellular/PCS CDMA and LTE PHONE with Bluetooth and WLAN

MODEL NUMBER: LS840, LG-LS840, LGLS840*

FCC ID: ZNFLS840

REPORT NUMBER: 11U14124-3

ISSUE DATE: NOVEMBER 21, 2011

Prepared for
**LG ELECTRONICS MOBILECOMM U.S.A., INC.
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*The models covered by this report are identical



NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	11/21/11	Initial Issue	

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: LG ELECTRONICS MOBILECOMM U.S.A., INC.
 10101 OLD GROVE ROAD
 SAN DIEGO, CA 92131

EUT DESCRIPTION: Cellular/PCS CDMA and LTE PHONE with Bluetooth and WLAN

MODEL: LS840, LG-LS840, LGLS840

SERIAL NUMBER: 74000549, 74000556, 74000559

DATE TESTED: OCTOBER 31 ~ NOVEMBER 3, 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:

Tested By:




DAVE WEAVER
 EMC SUPERVISOR
 UL CCS

TOM CHEN
 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 smart phone with the feature of PCS/CDMA and LTE PHONE with BLUETOOTH AND WLAN.

The radio module is manufactured by Broadcom.

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	14.85	30.55
2412 - 2462	802.11g	11.50	14.13
2412 - 2462	802.11n HT20 SISO	10.25	10.59

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a Direct Printed Antenna with a maximum peak gain of -1.69 dBi.

5.4. SOFTWARE AND FIRMWARE

The EUT software installed during testing was LS840Z06

The test utility software used during testing was WiFi FCC Test.

5.5. WORST-CASE CONFIGURATION AND MODE

Radiated emissions below 1 GHz and power line conducted emissions were performed with the EUT set to the channel with highest output power.

For the fundamental investigation, since the EUT is a portable device that has three orientations; X, Y and Z orientations have been investigated, also with AC/DC adapter, and earphone, and the worst case was found to be at X orientation with AC/USB adapter and earphone.

Worst-case data rates used based on an input from the client were as follows:

802.11b mode: 1 Mbps

802.11g mode: 6 Mbps

802.11n mode: MCS0

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
AC Adapter	LG Electronics	MCS-02WS	SA14258000036	N/A
Ear Phone	LG Electronics	N/A	N/A	N/A

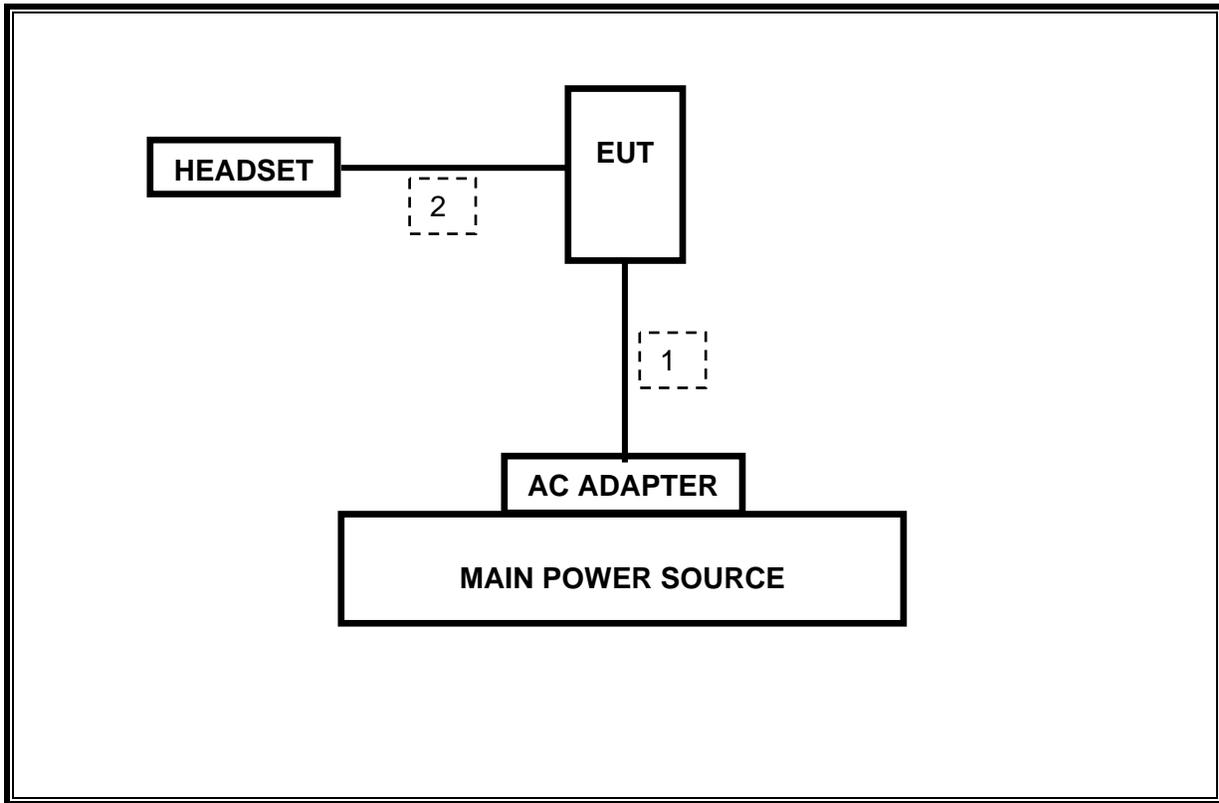
I/O CABLES

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	DC	1	MINI USB	Un-Shielded	1.0m	External ferrite added
2	AUDIO	1	MINI JACK	Un-Shielded	1.0m	Volume control on cable

TEST SETUP

The EUT is a stand-alone device and was tested with AC/USB adapter and earphone.

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 Due
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01012	09/02/12
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C00749	07/18/12
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00558	01/27/12
Antenna, Horn, 18 GHz	EMCO	3115	C00872	09/20/12
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01171	07/16/12
Reject Filter, 2.4-2.5 GHz	Micro-Tronics	BRM50702	N02685	CNR
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01159	08/11/12
P-Series single channel Power	Agilent / HP	N1911A		08/04/12
Peak / Average Power Sensor	Agilent / HP	E9323A		08/04/12
EMI Test Receiver, 9 kHz-7 GHz	R & S	ESCI 7	1000741	07/06/12
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	11/10/11

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.

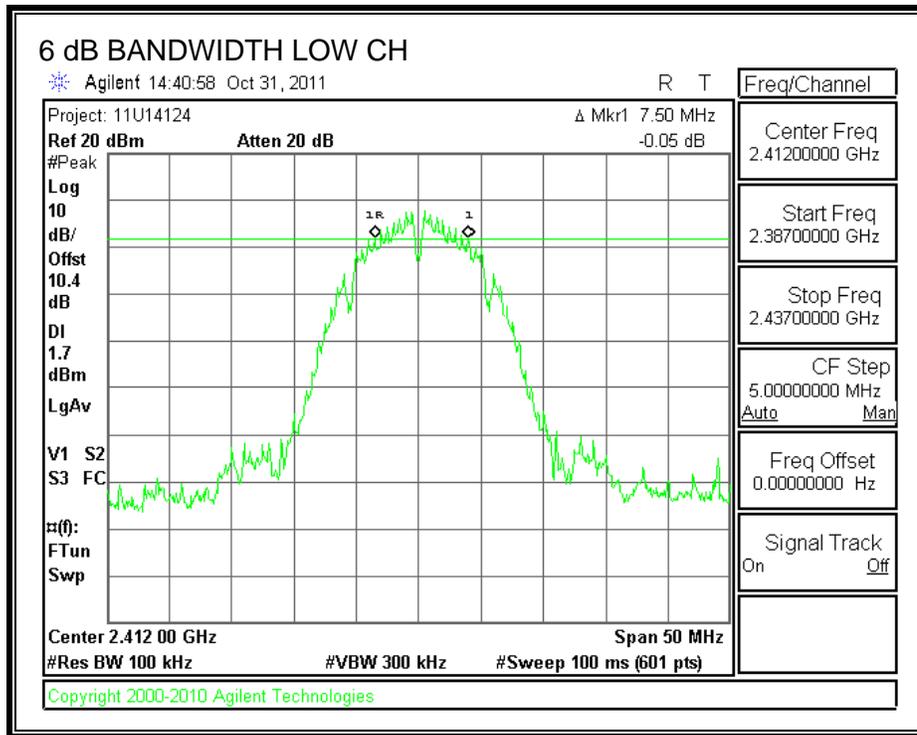
TEST PROCEDURE

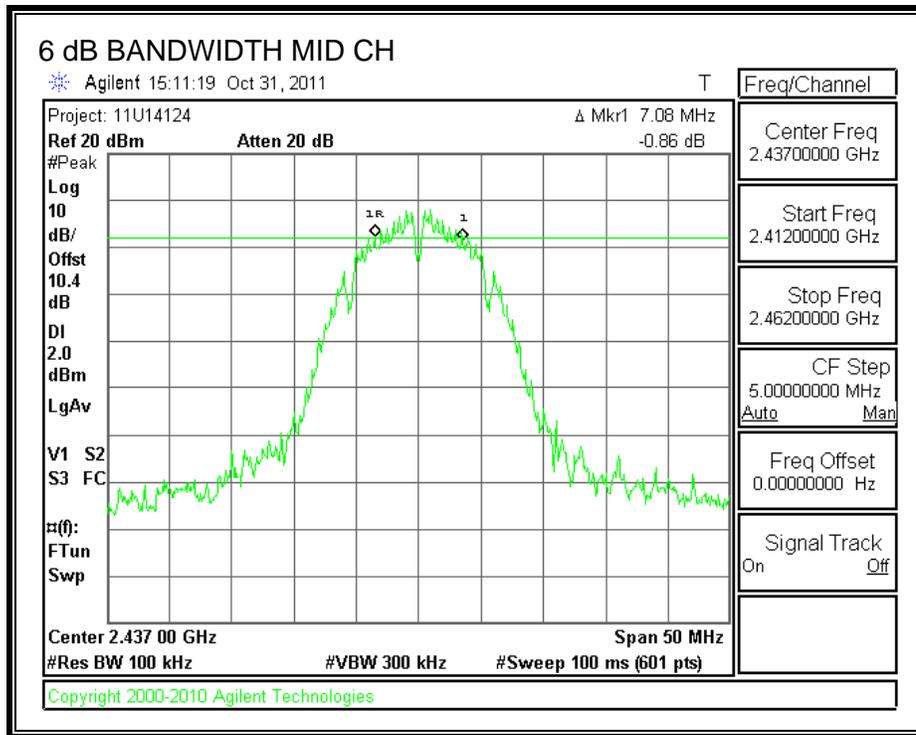
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

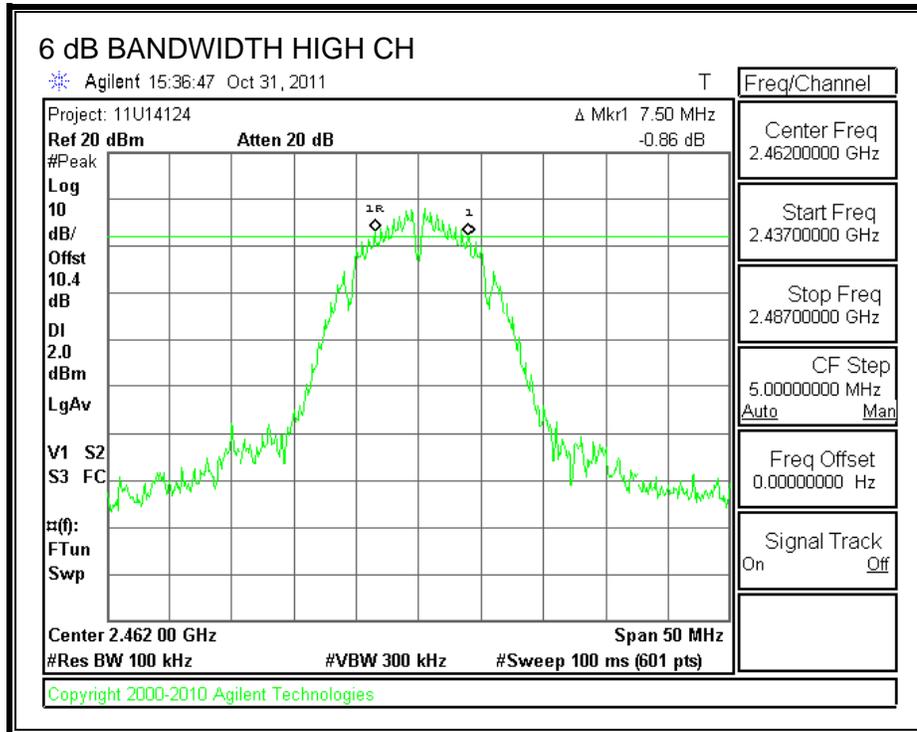
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	7.50	0.5
Middle	2437	7.08	0.5
High	2462	7.50	0.5

6 dB BANDWIDTH







7.1.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

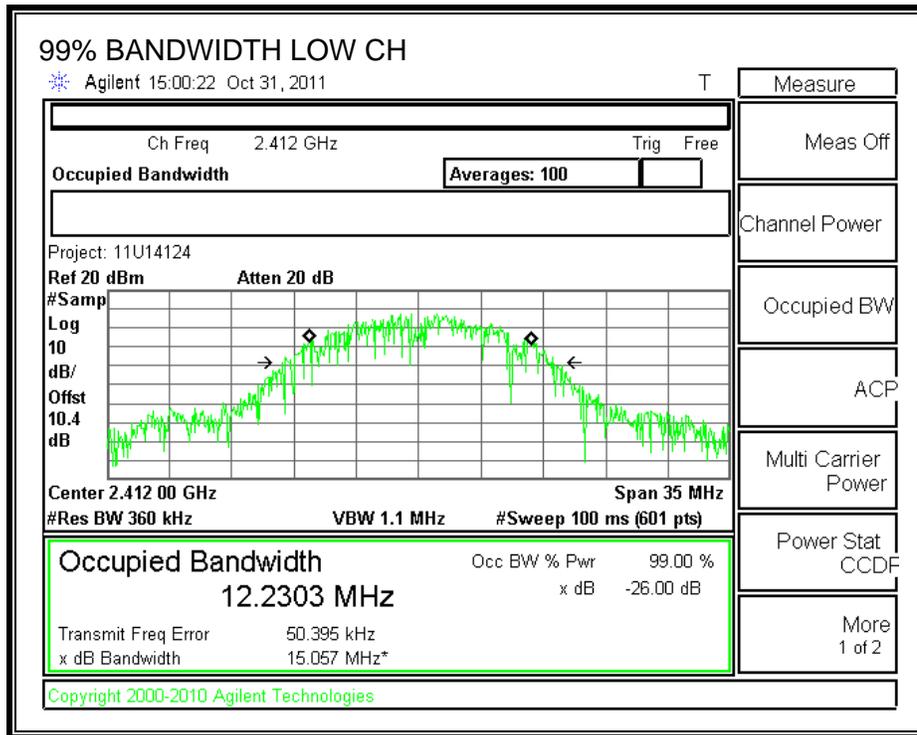
TEST PROCEDURE

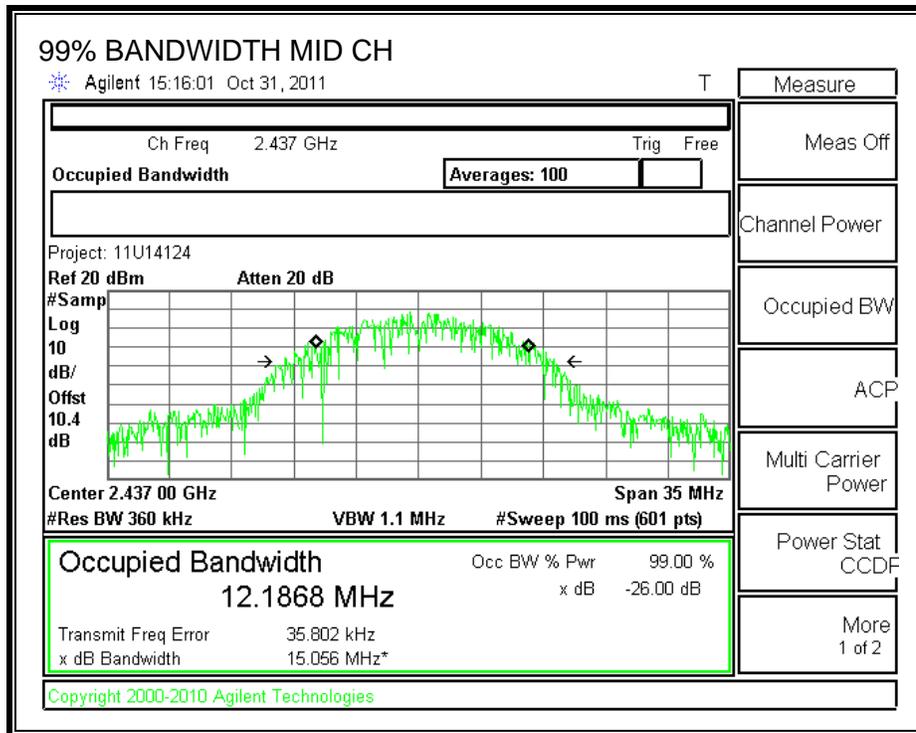
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

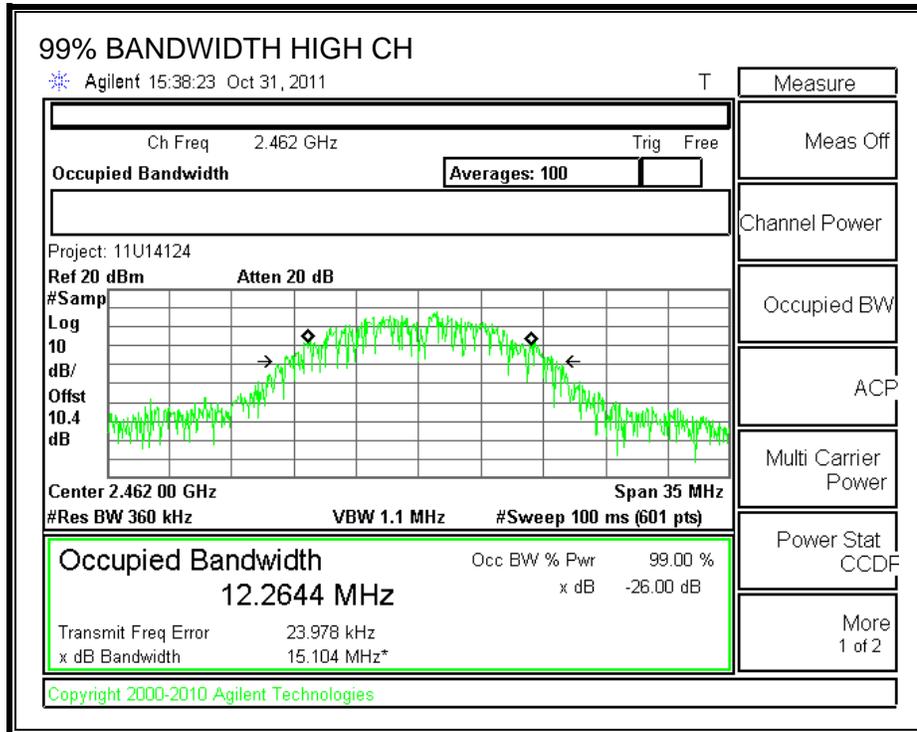
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	12.2303
Middle	2437	12.1868
High	2462	12.2644

99% BANDWIDTH







7.1.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

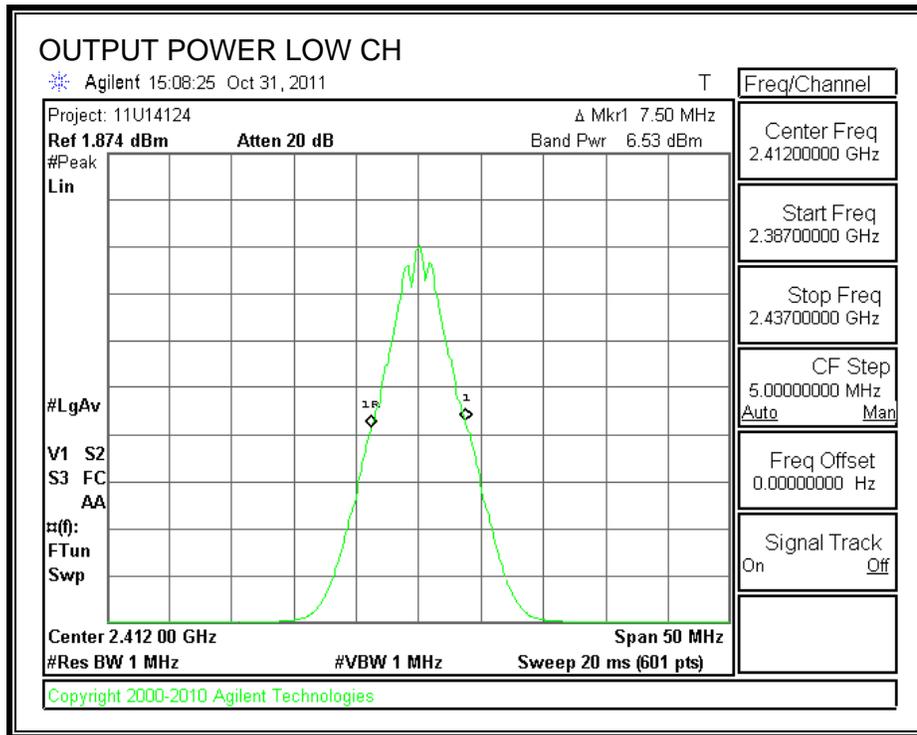
TEST PROCEDURE

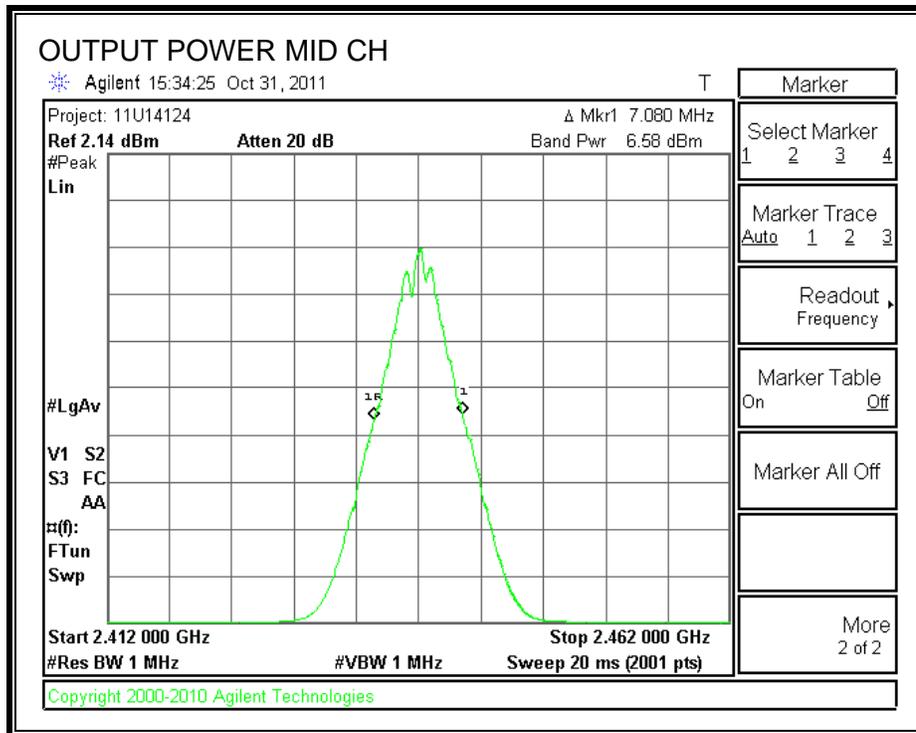
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

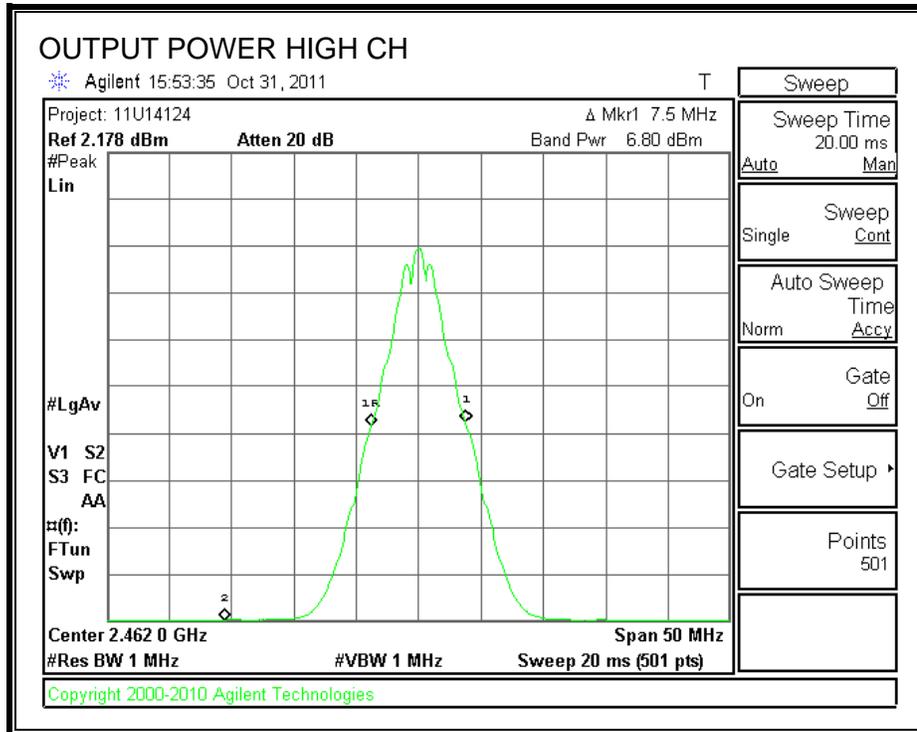
RESULTS

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Attenuator and Cable Offset (dB)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	6.35	10.4	16.75	30	-13.25
Middle	2437	6.58	10.4	16.98	30	-13.02
High	2462	6.80	10.4	17.20	30	-12.80

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 10 dB (including 10 dB pad and 0.4 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	14.50
Middle	2437	14.60
High	2462	14.85

7.1.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

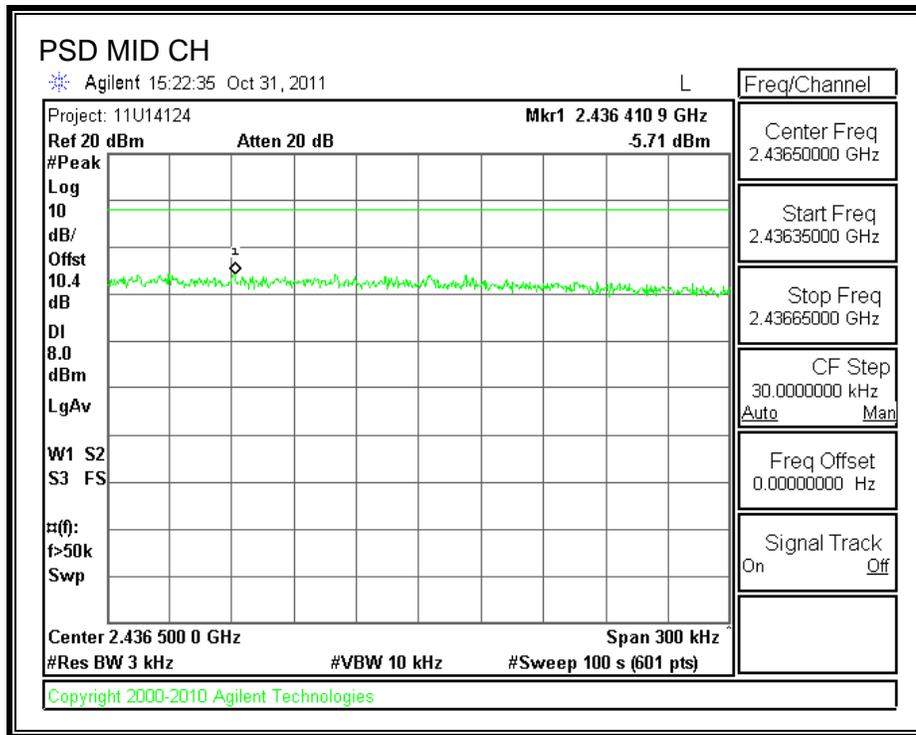
The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

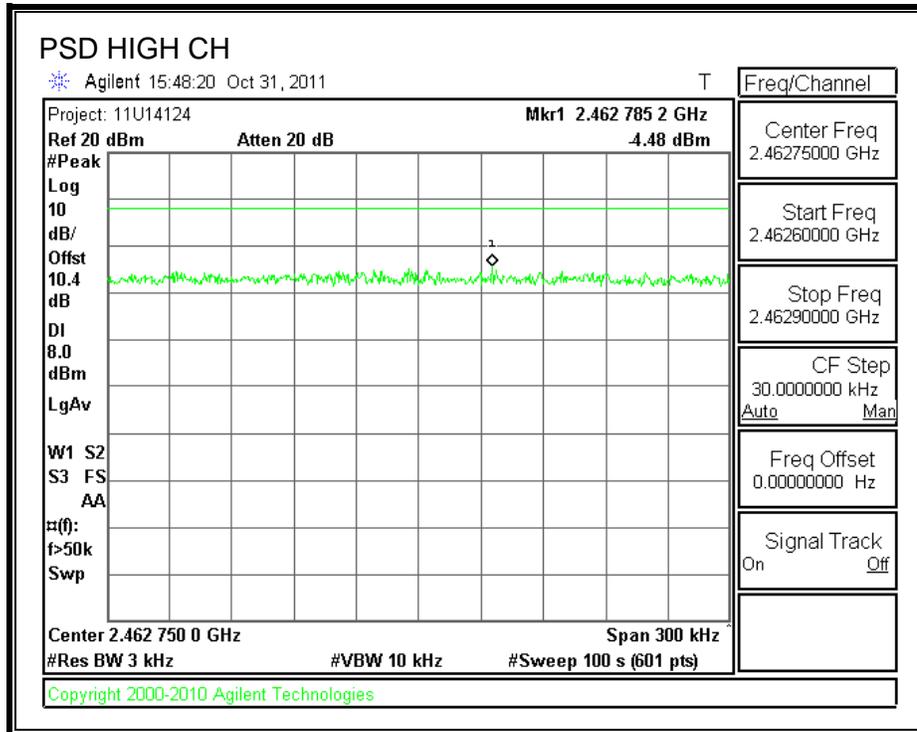
TEST PROCEDURE

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

RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-5.36	8	-13.36
Middle	2437	-5.71	8	-13.71
High	2462	-4.48	8	-12.48





7.1.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

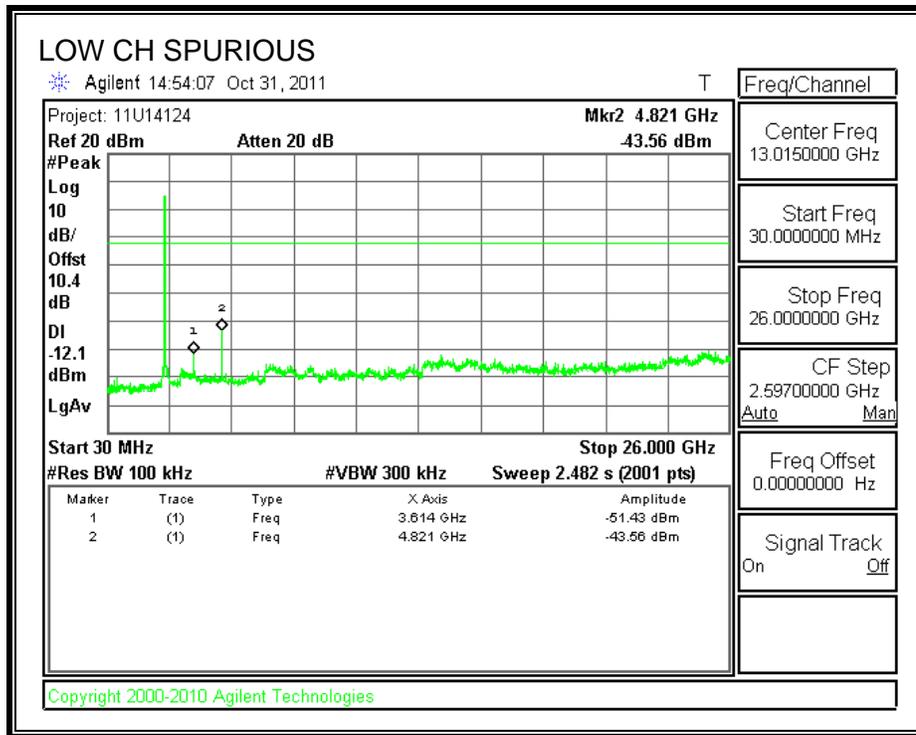
IC RSS-210 A8.5

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

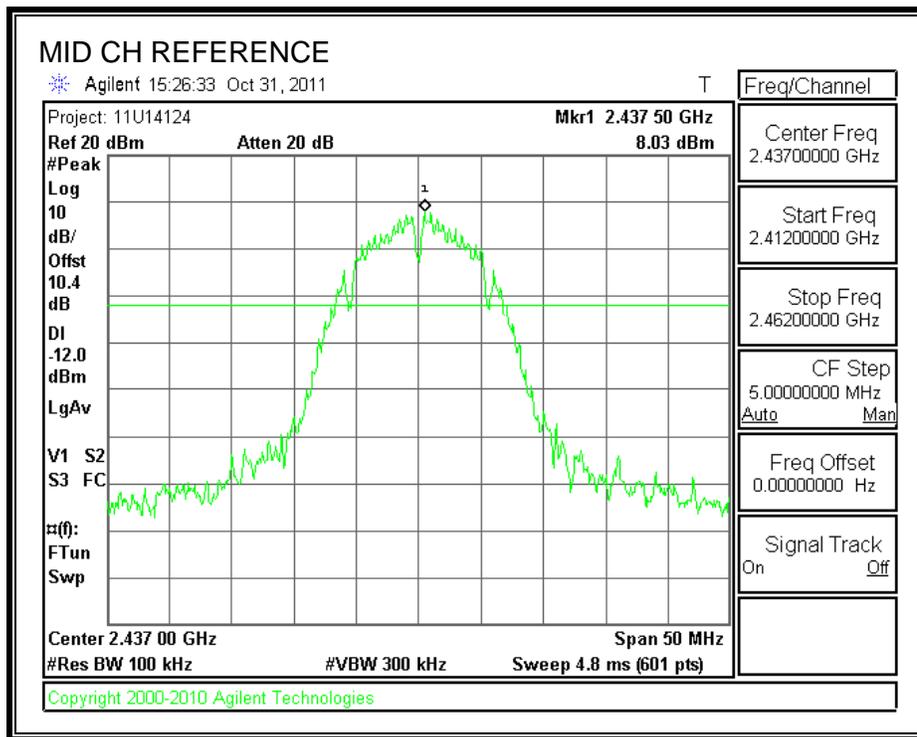
TEST PROCEDURE

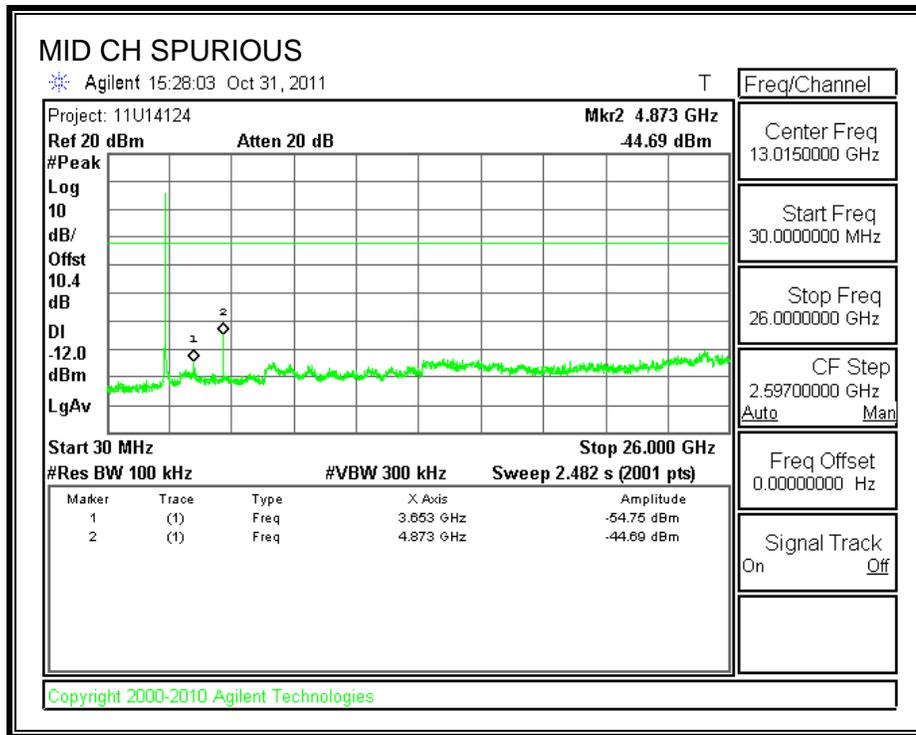
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

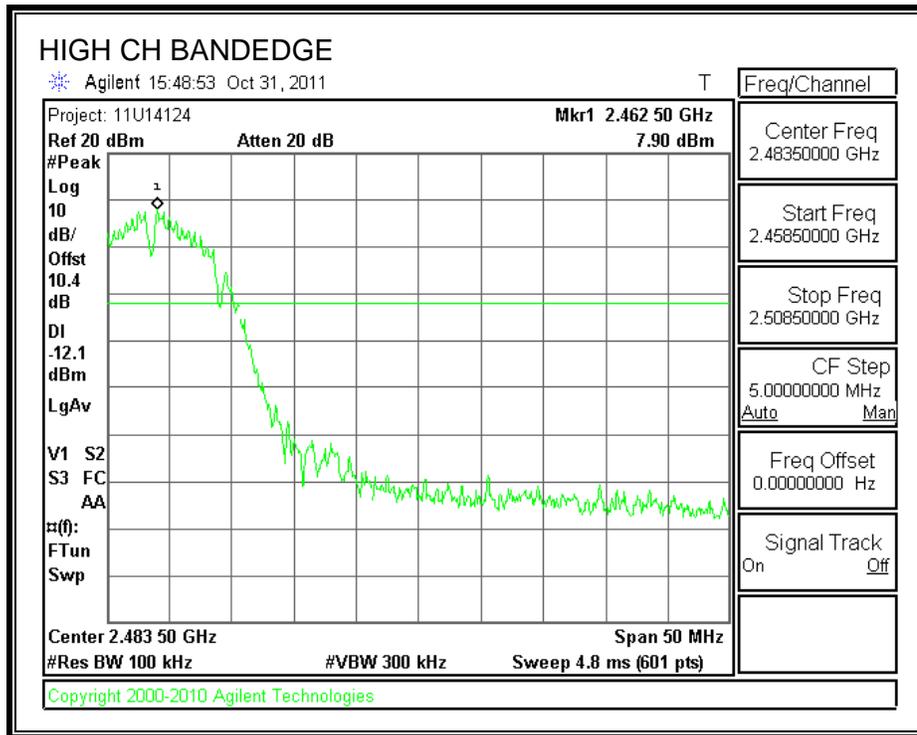


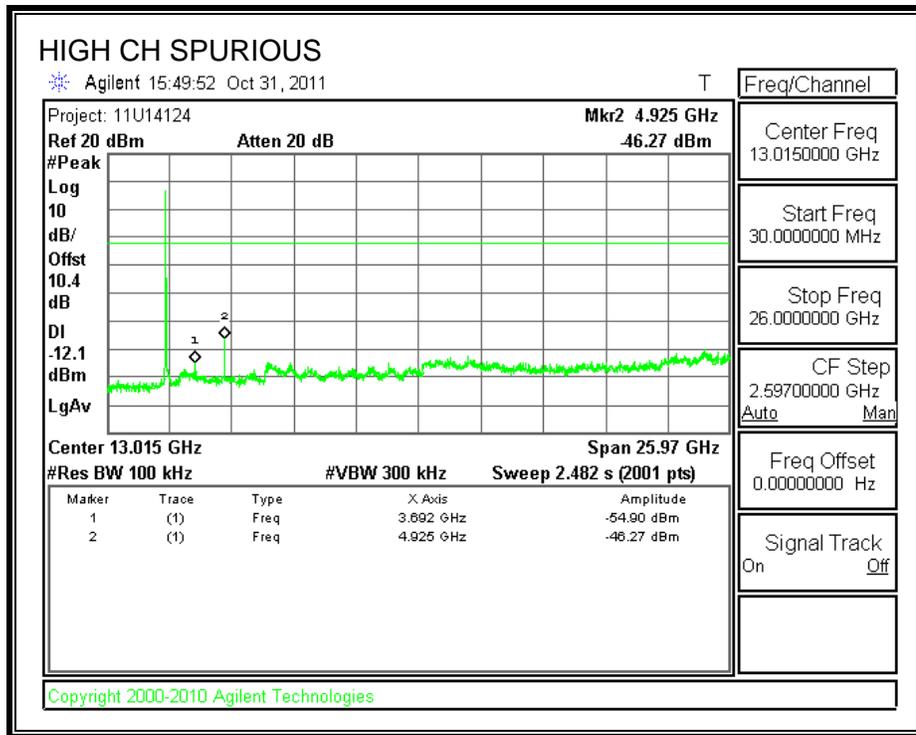
SPURIOUS EMISSIONS, MID CHANNEL





SPURIOUS EMISSIONS, HIGH CHANNEL





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.

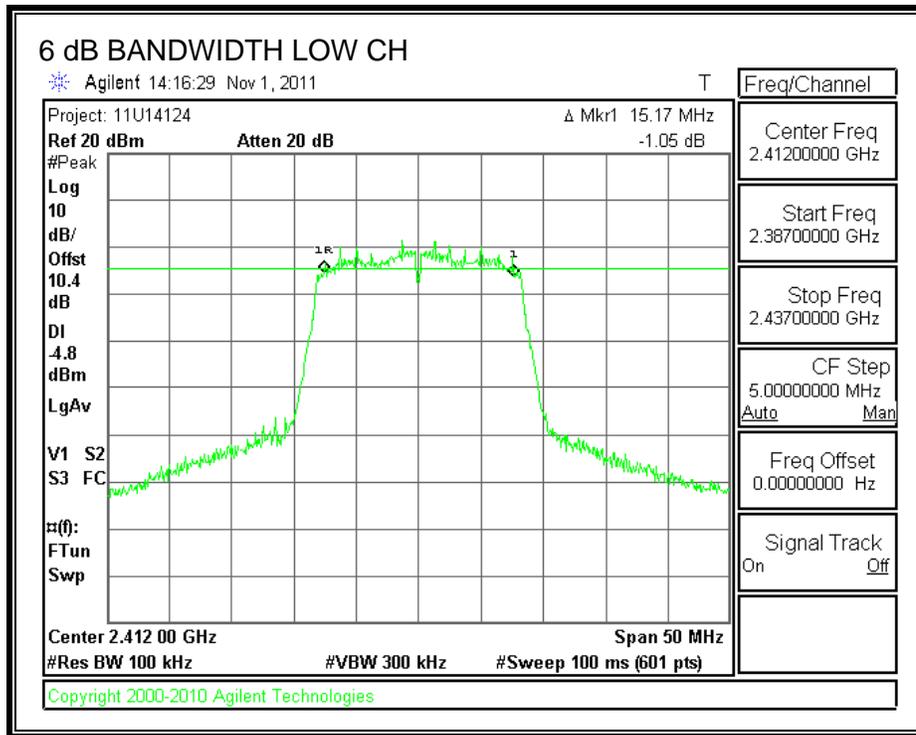
TEST PROCEDURE

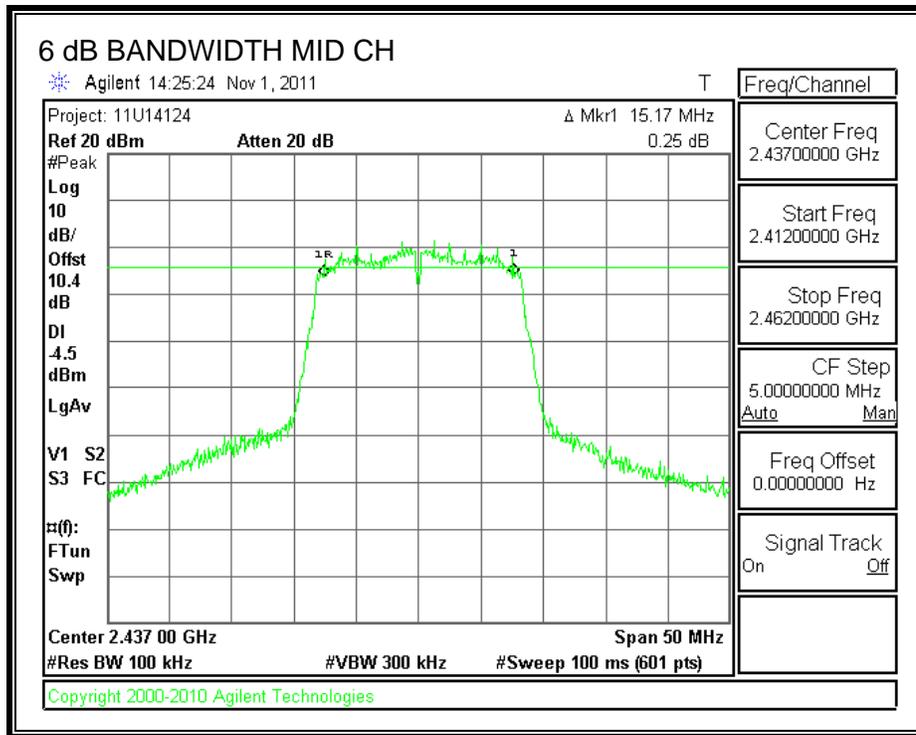
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

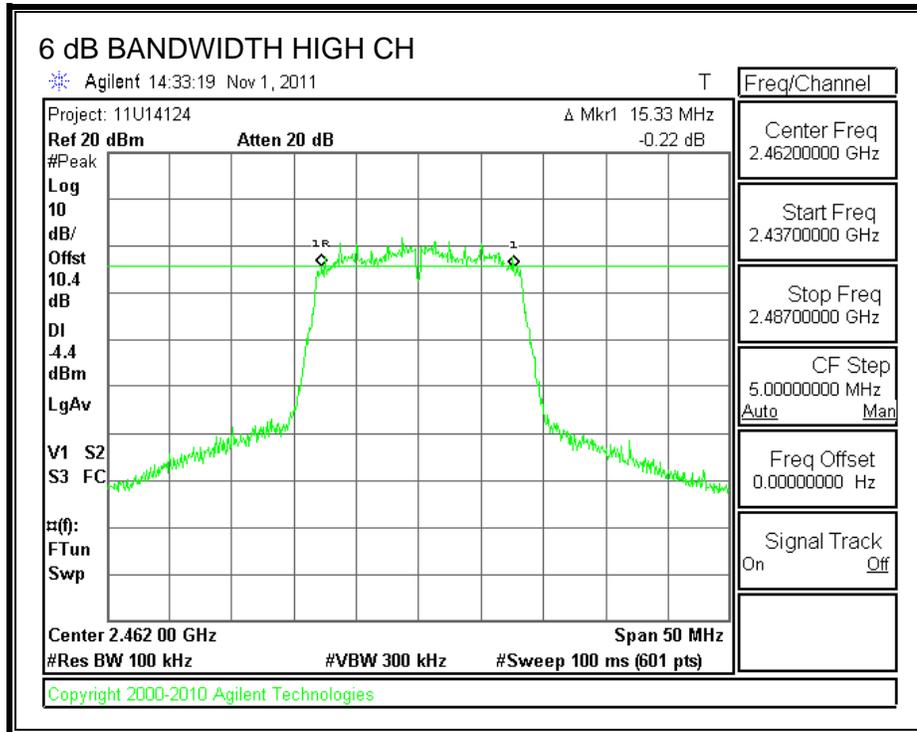
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	15.17	0.5
Middle	2437	15.17	0.5
High	2462	15.33	0.5

6 dB BANDWIDTH







7.2.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

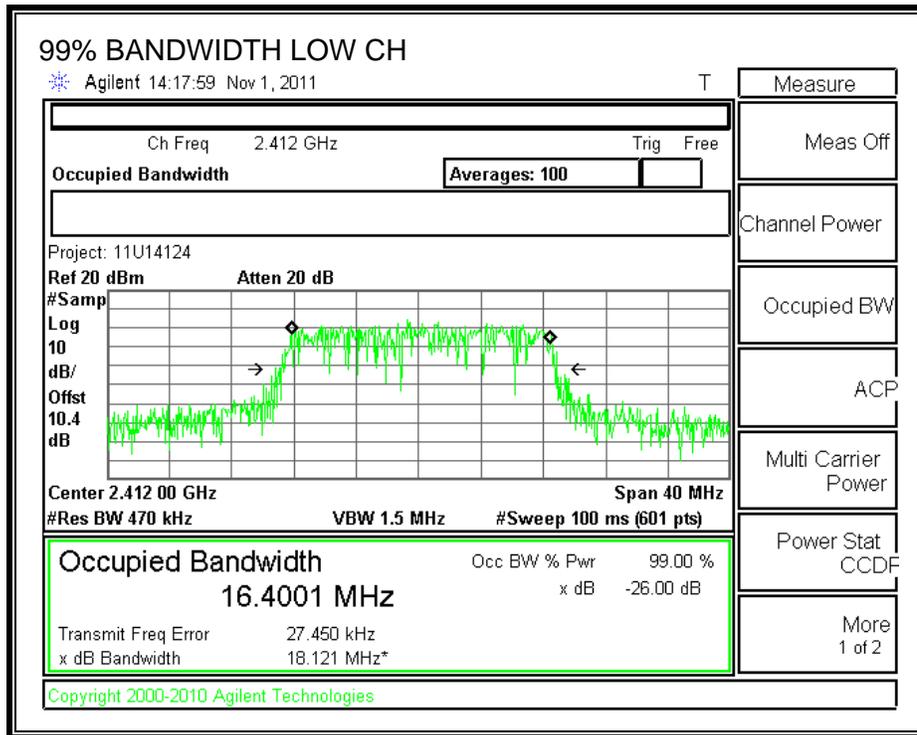
TEST PROCEDURE

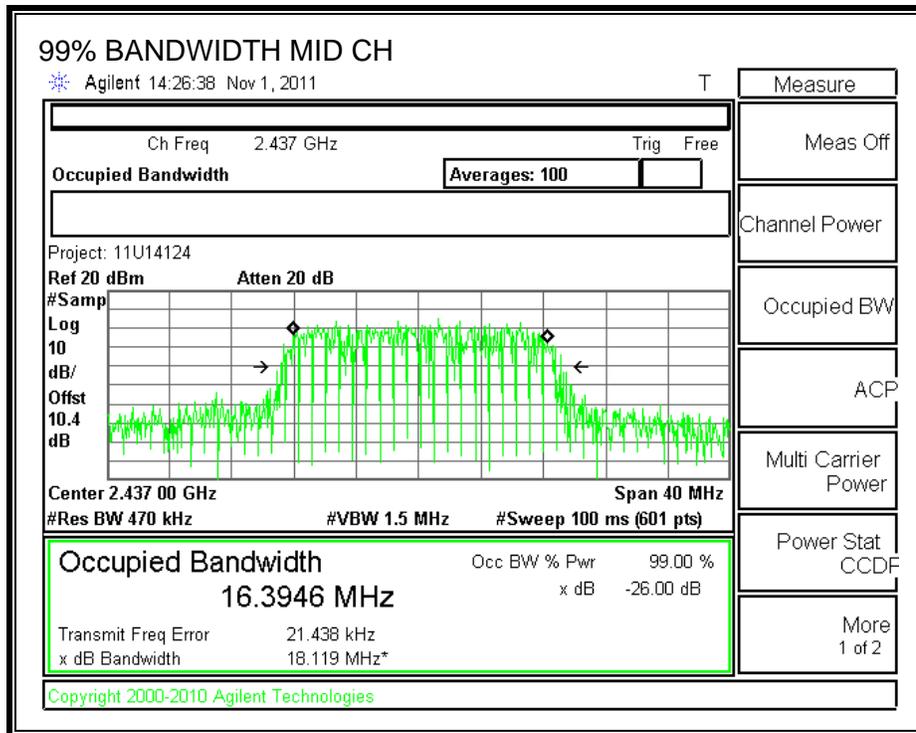
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

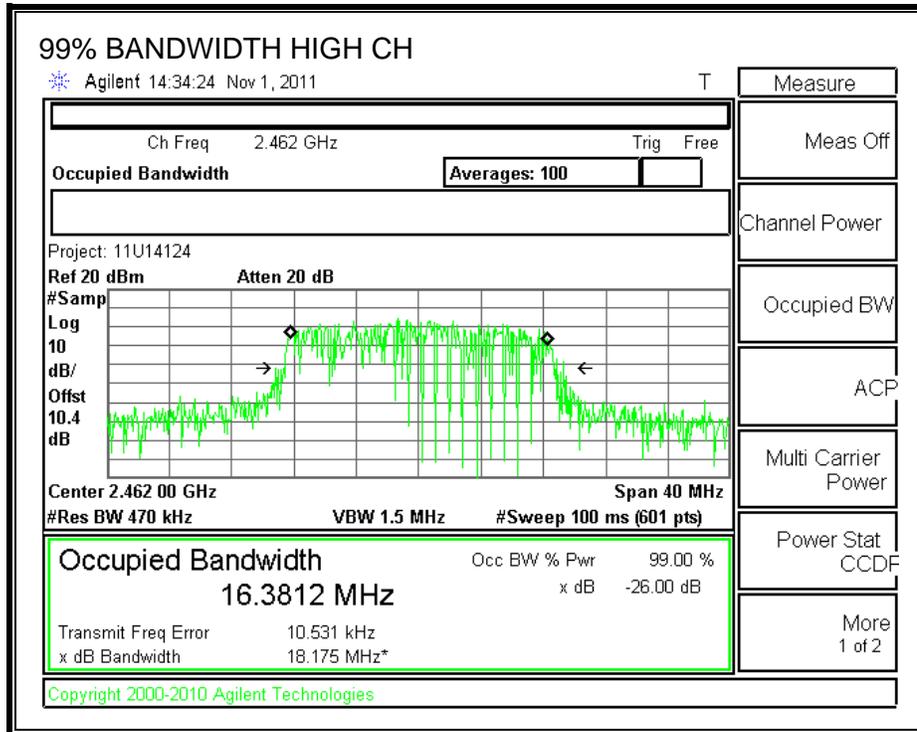
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	16.4001
Middle	2437	16.3946
High	2462	16.3812

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.

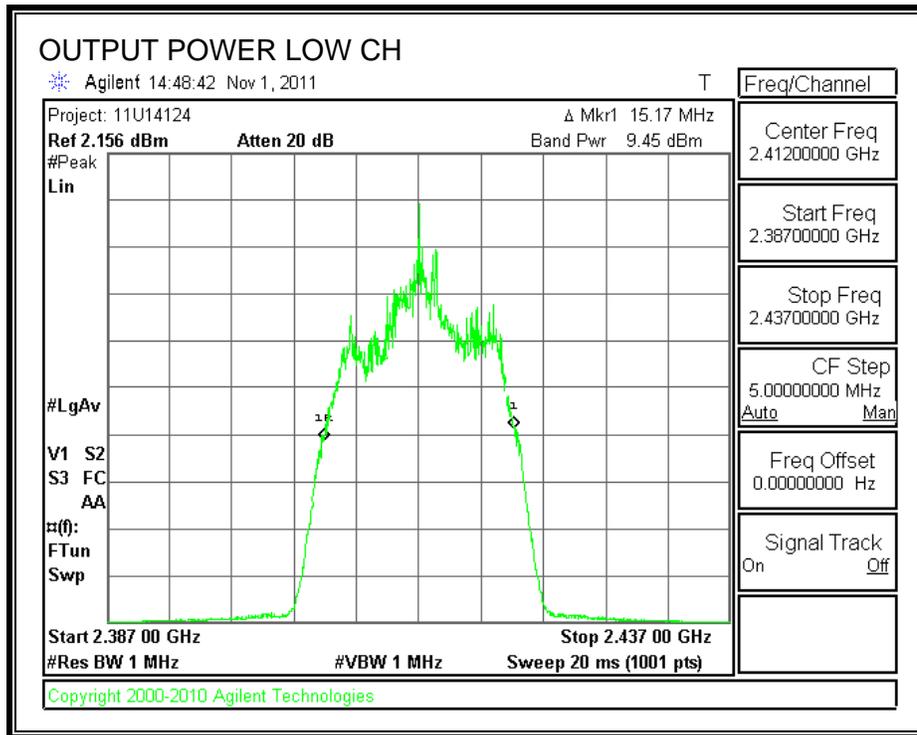
TEST PROCEDURE

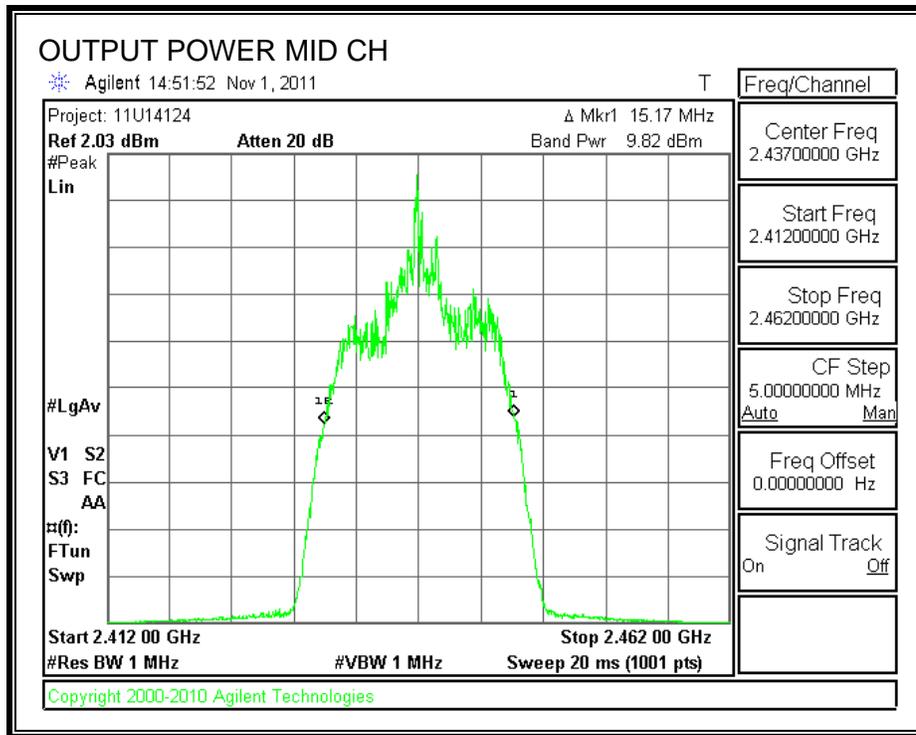
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

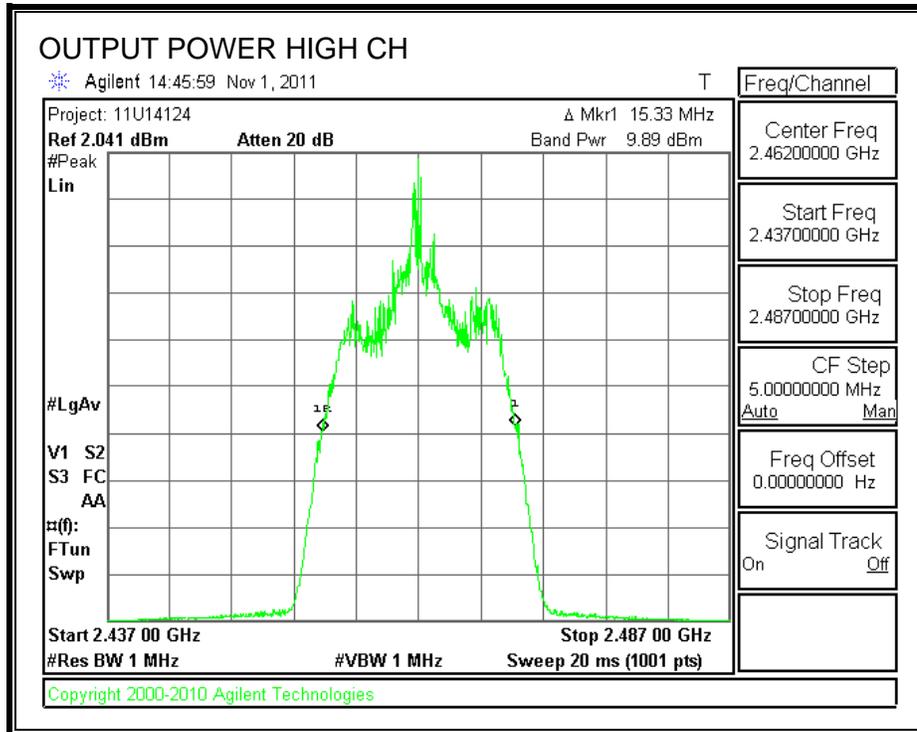
RESULTS

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Attenuator and Cable Offset (dB)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	9.45	10.4	19.85	30	-10.15
Middle	2437	9.82	10.4	20.22	30	-9.78
High	2462	9.89	10.4	20.29	30	-9.71

OUTPUT POWER







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 10 dB (including 10 dB pad and 0.4 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	11.10
Middle	2437	11.25
High	2462	11.50

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.

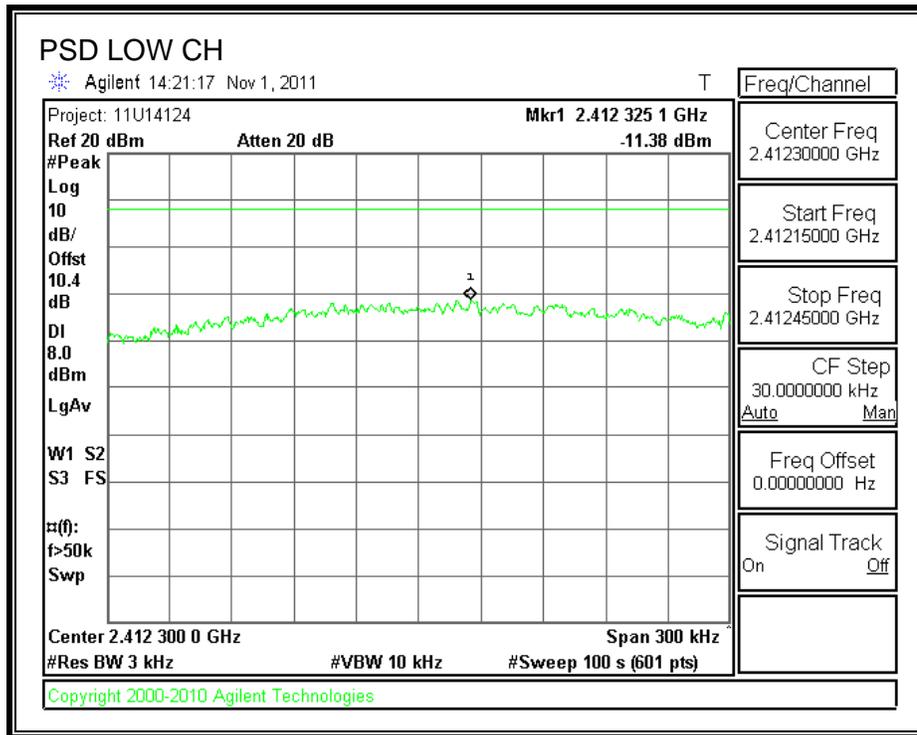
TEST PROCEDURE

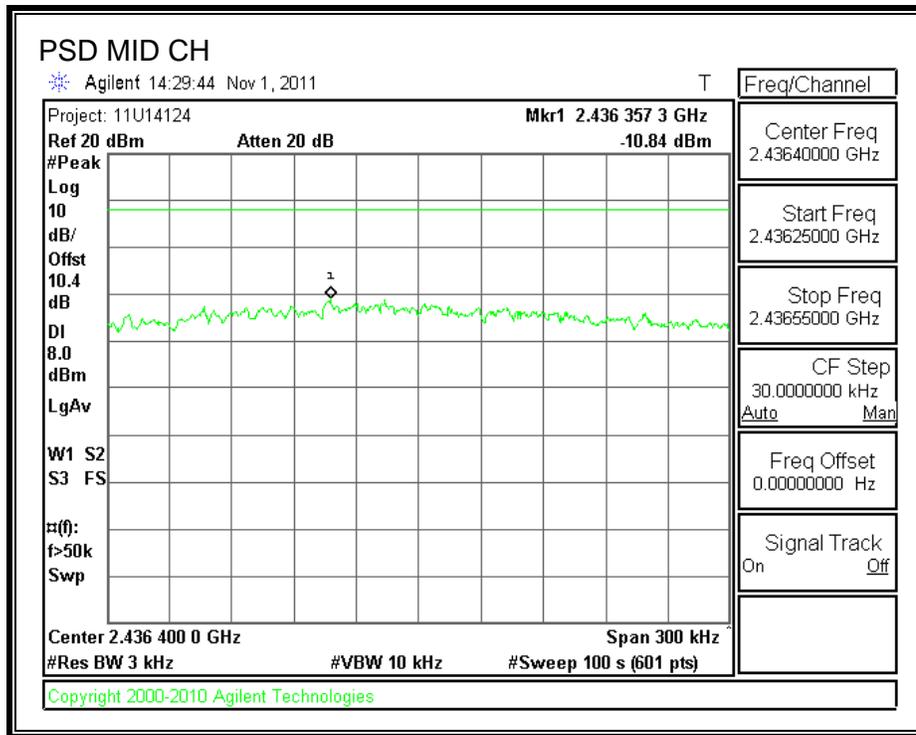
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

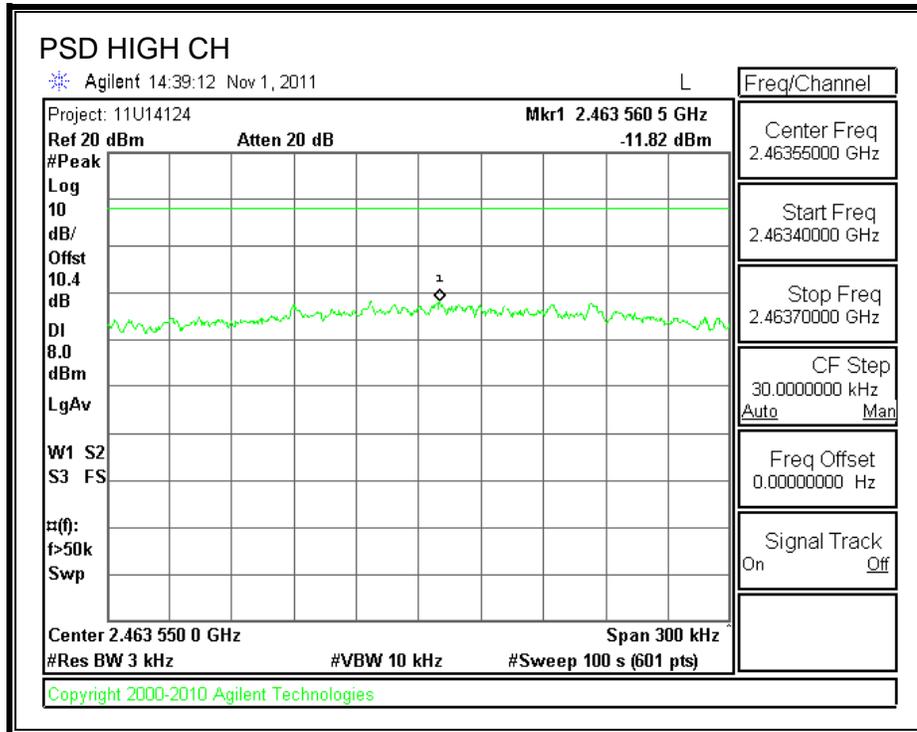
RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-11.38	8	-19.38
Middle	2437	-10.84	8	-18.84
High	2462	-11.82	8	-19.82

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 a peak measurement, therefore the required attenuation is 20 dB.

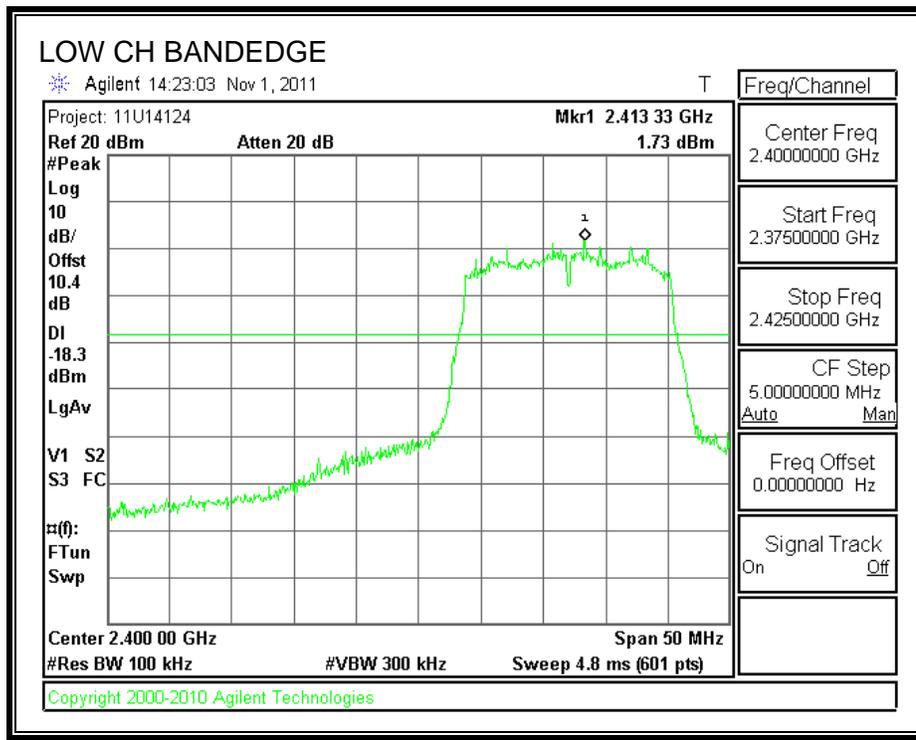
TEST PROCEDURE

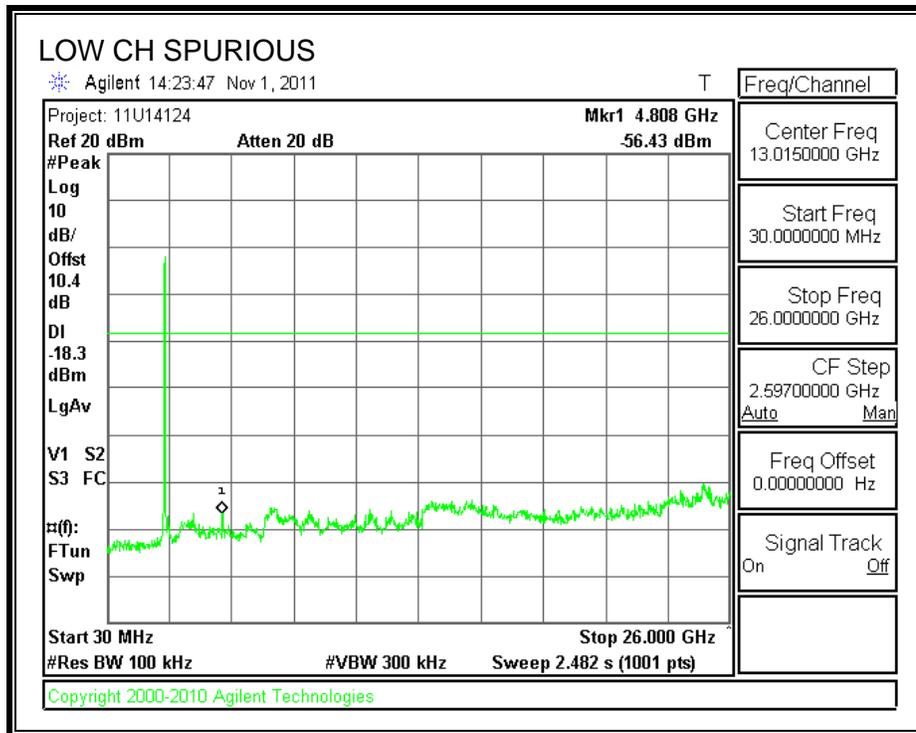
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

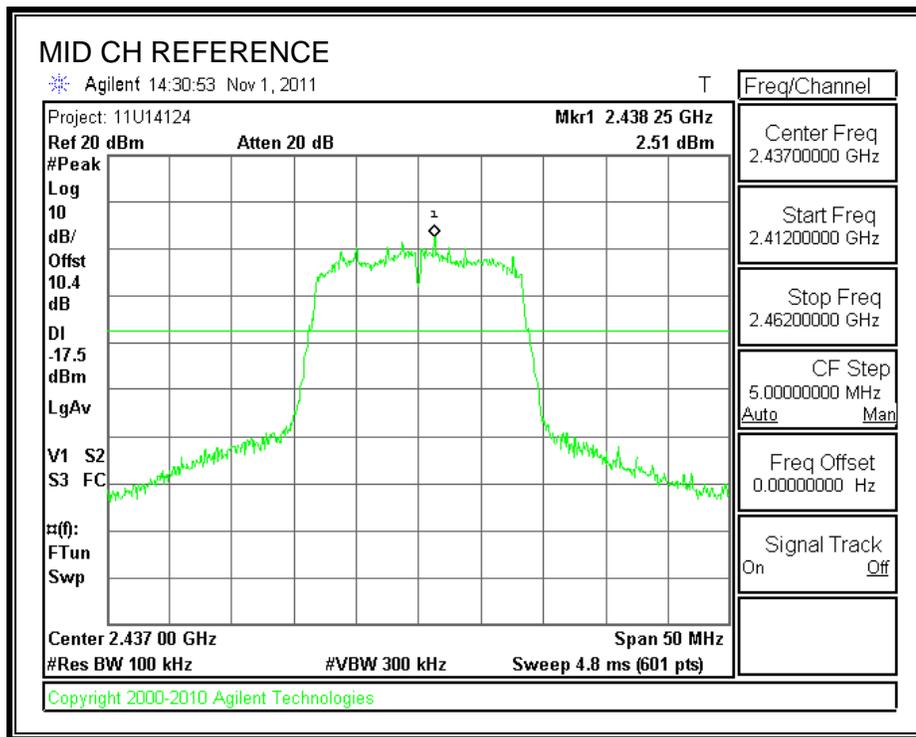
RESULTS

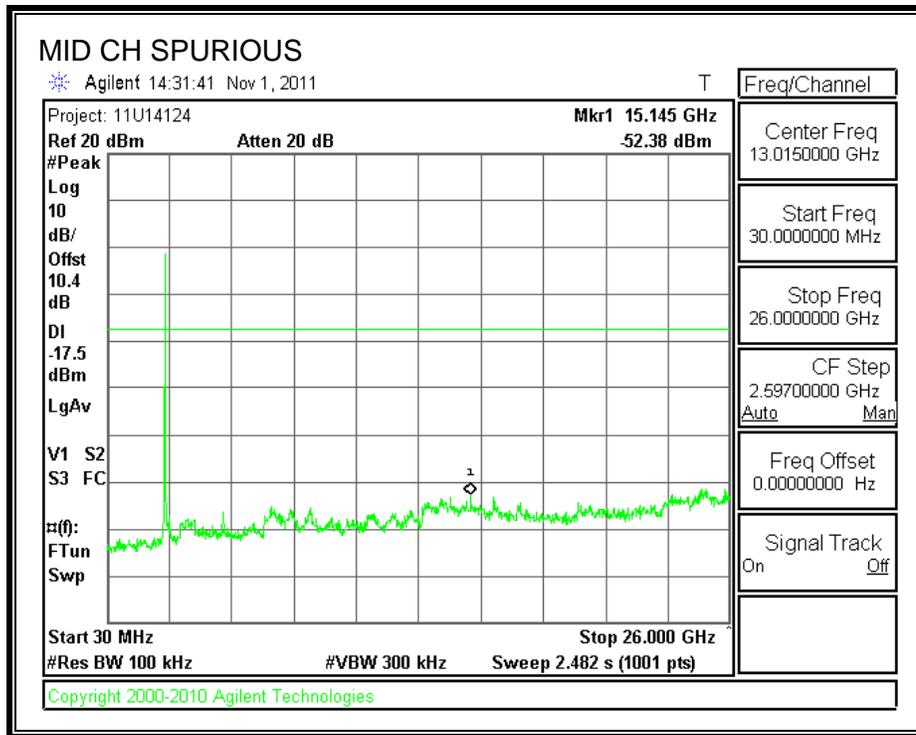
SPURIOUS EMISSIONS, LOW CHANNEL



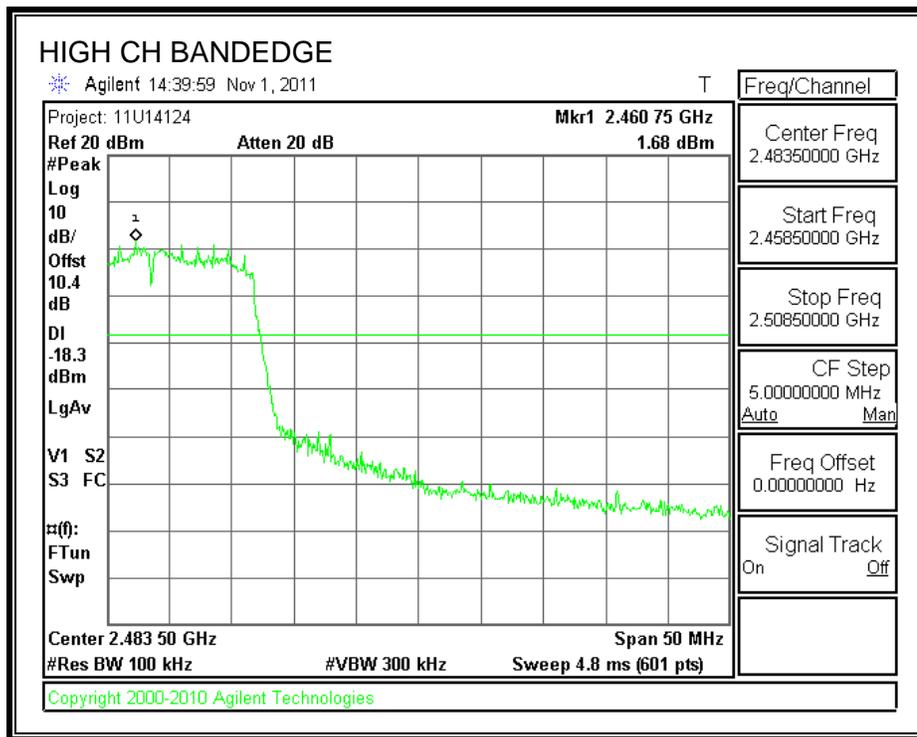


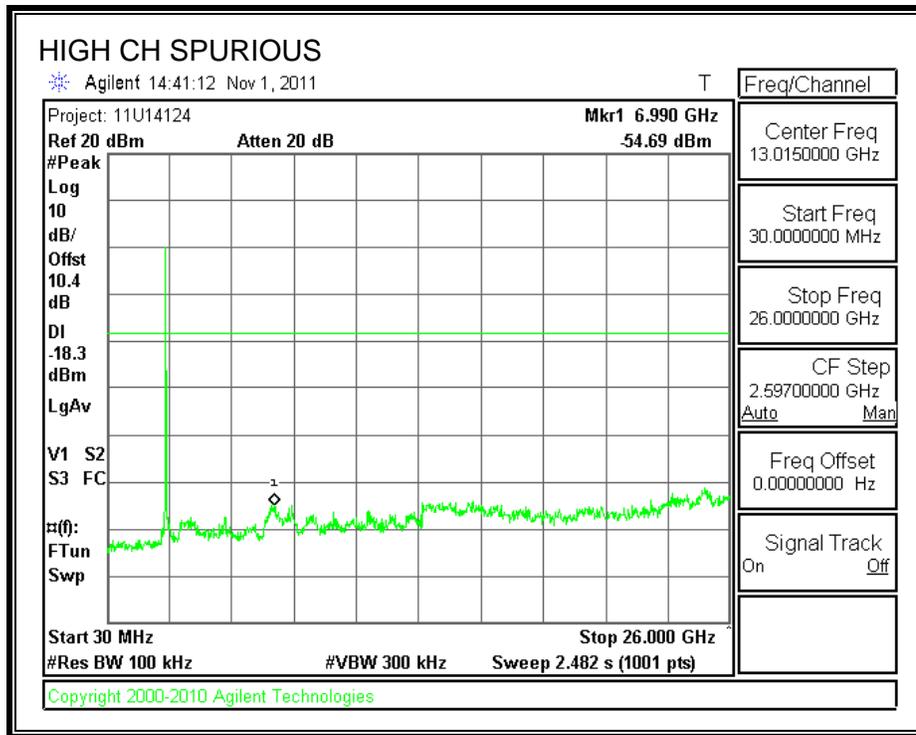
SPURIOUS EMISSIONS, MID CHANNEL





SPURIOUS EMISSIONS, HIGH CHANNEL





7.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND

7.3.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

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

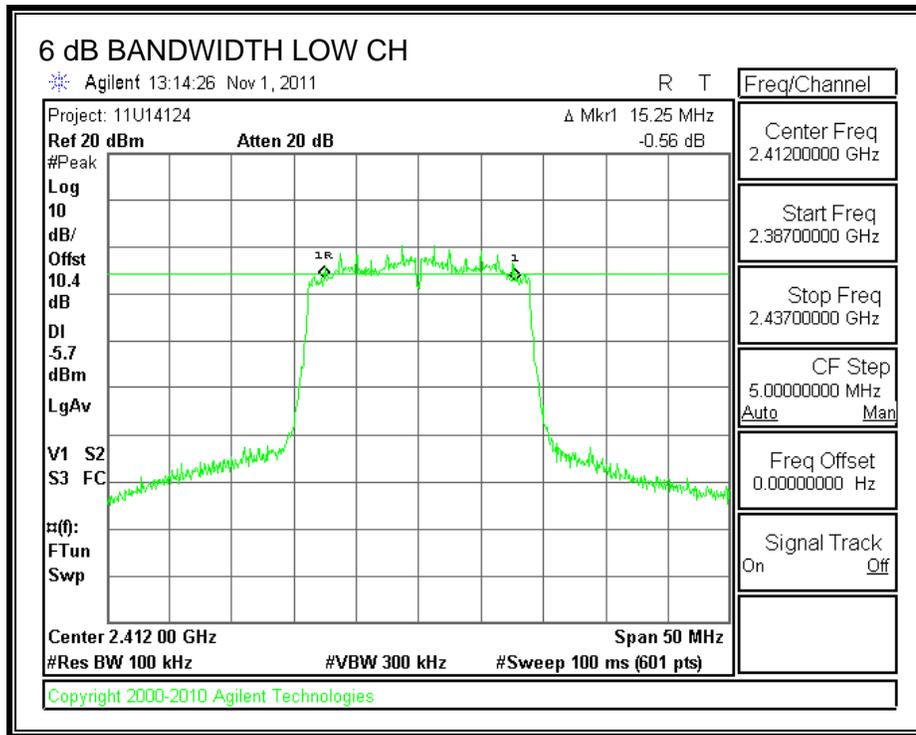
TEST PROCEDURE

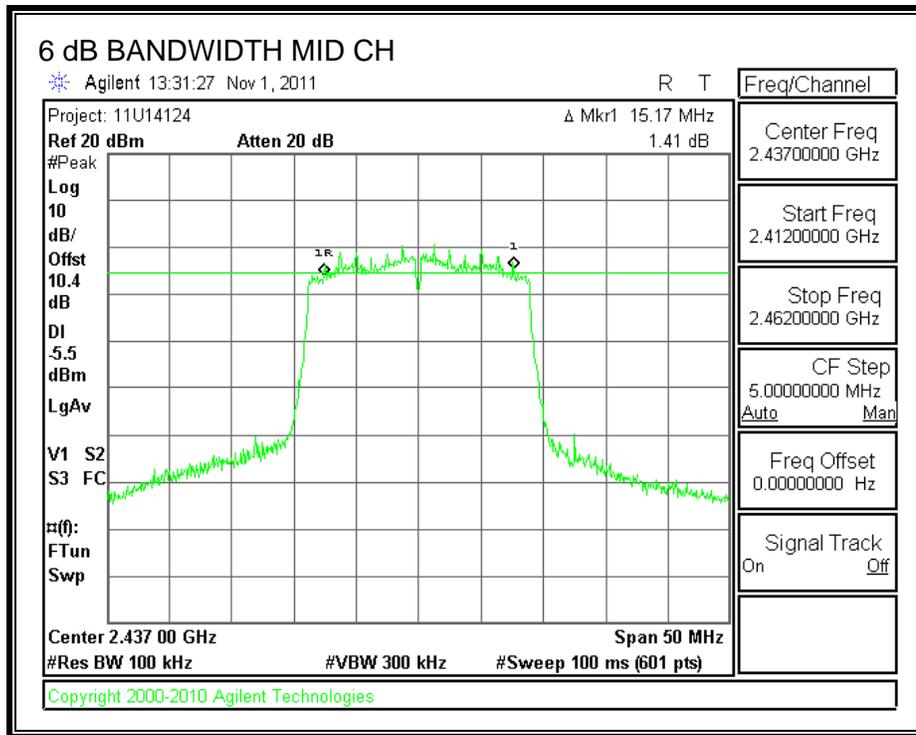
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

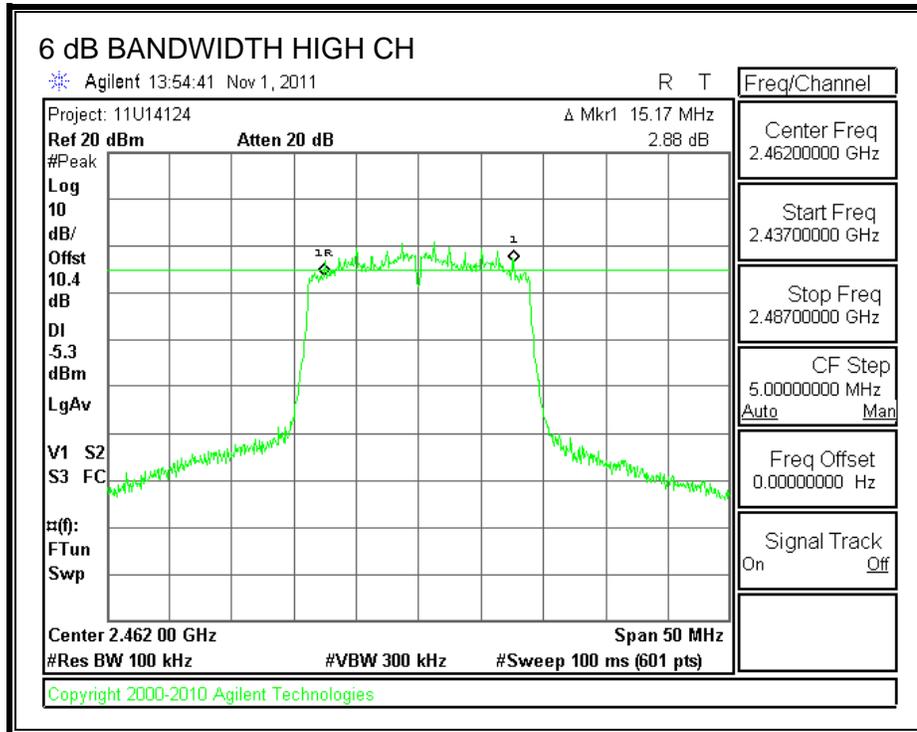
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	15.25	0.5
Middle	2437	15.17	0.5
High	2462	15.17	0.5

6 dB BANDWIDTH







7.3.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

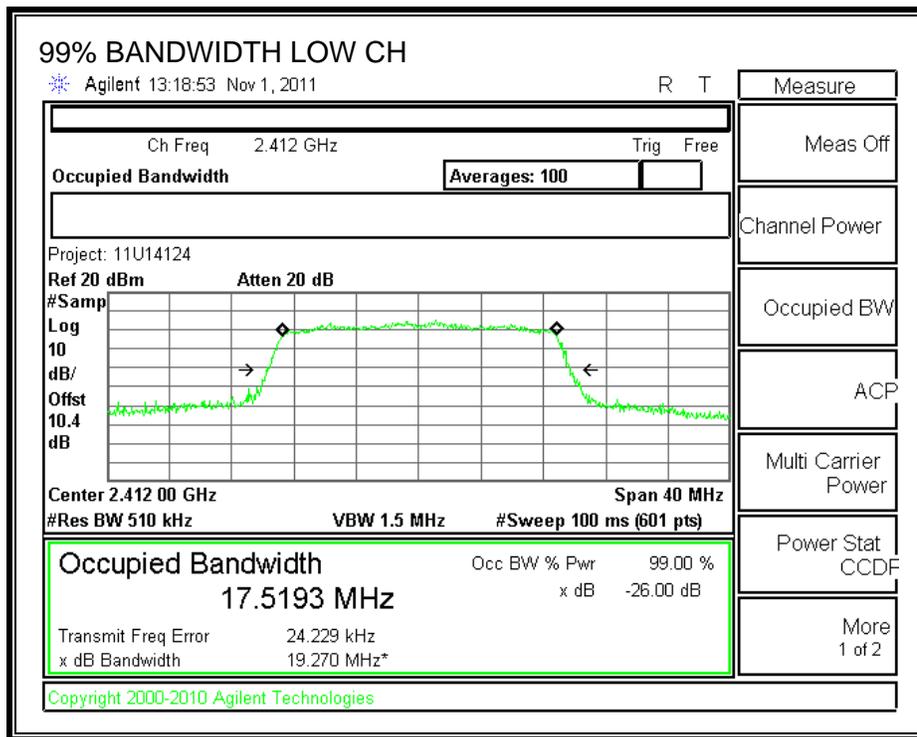
TEST PROCEDURE

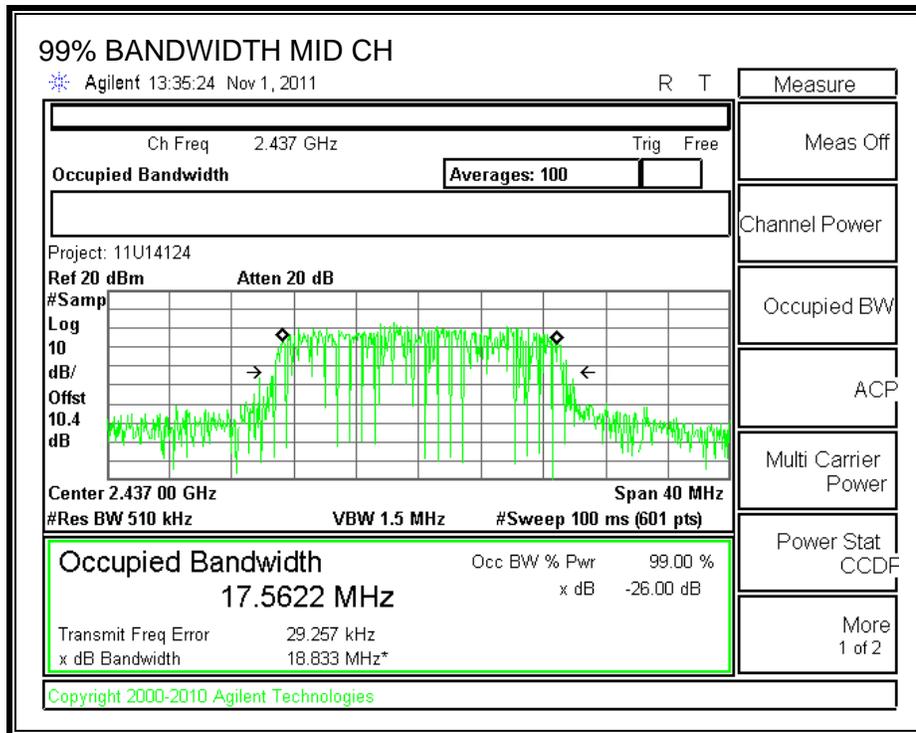
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

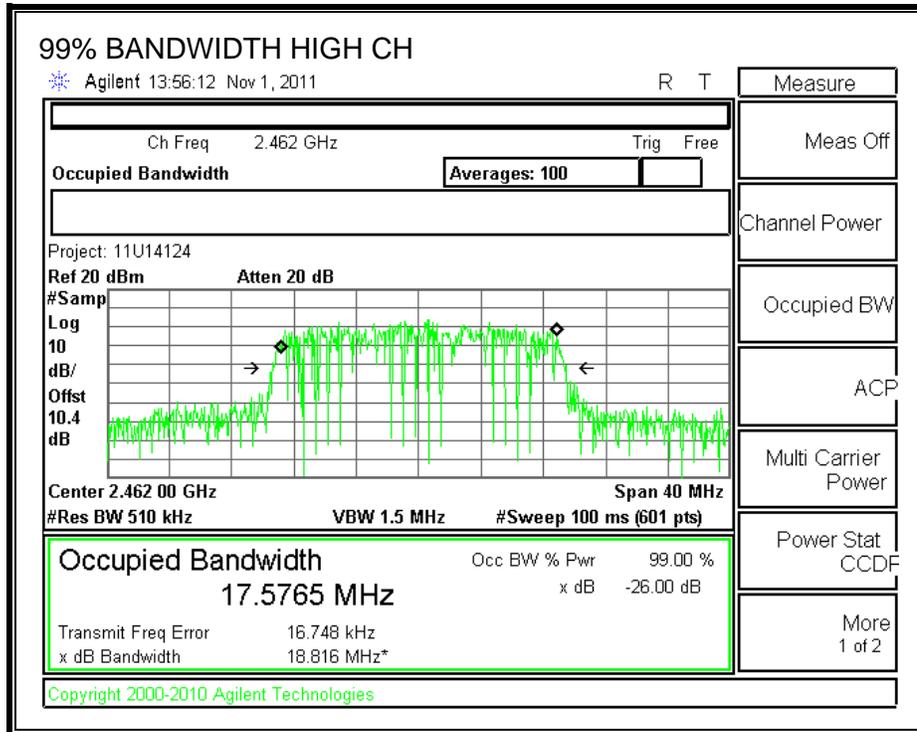
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	17.5193
Middle	2437	17.5622
High	2462	17.5765

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.

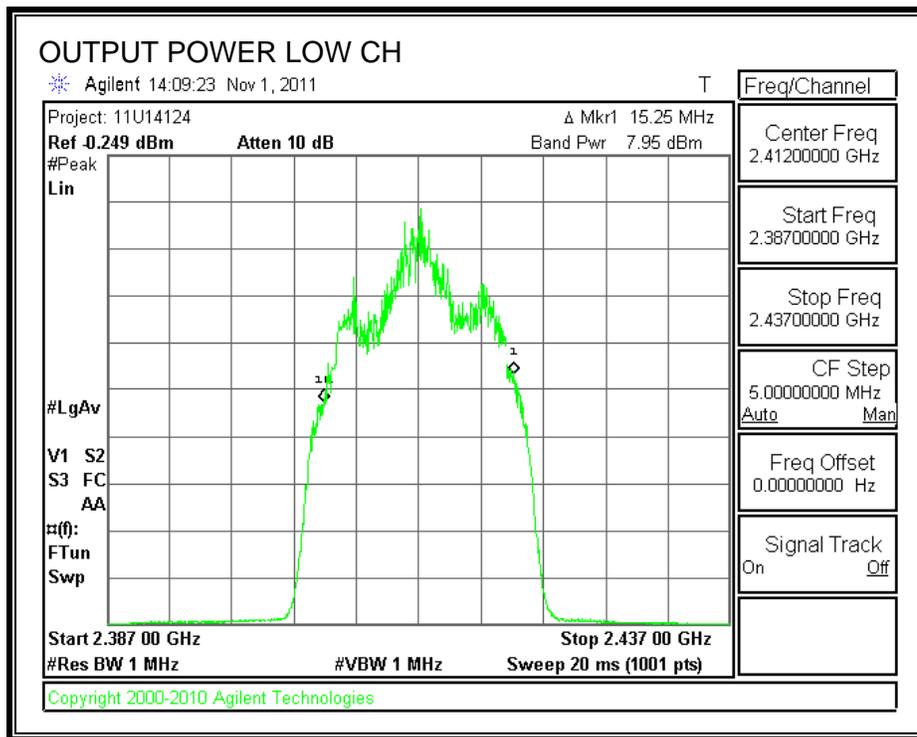
TEST PROCEDURE

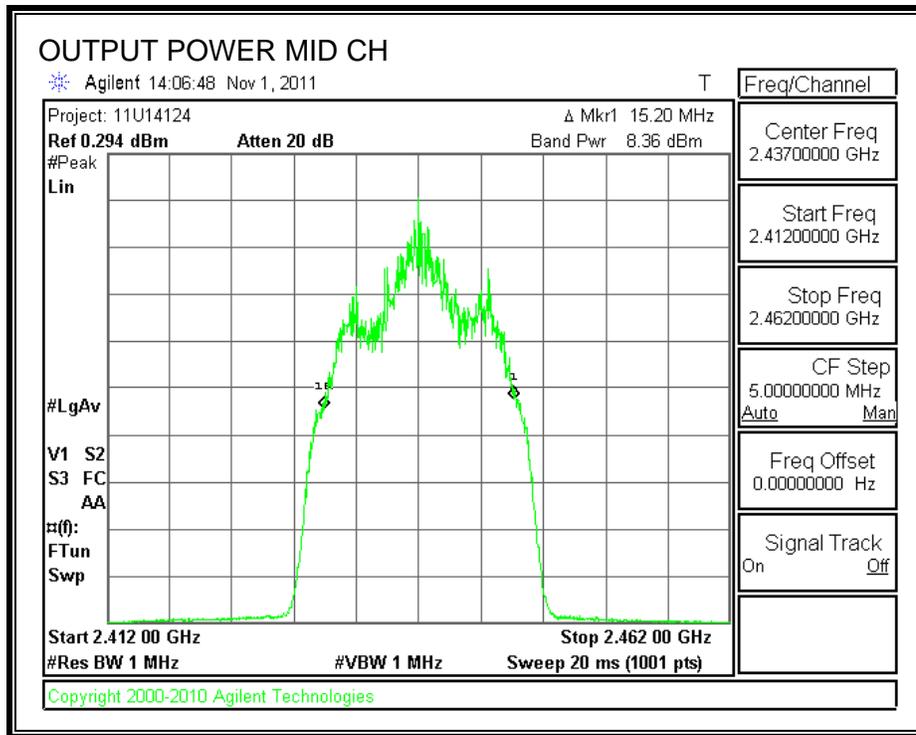
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

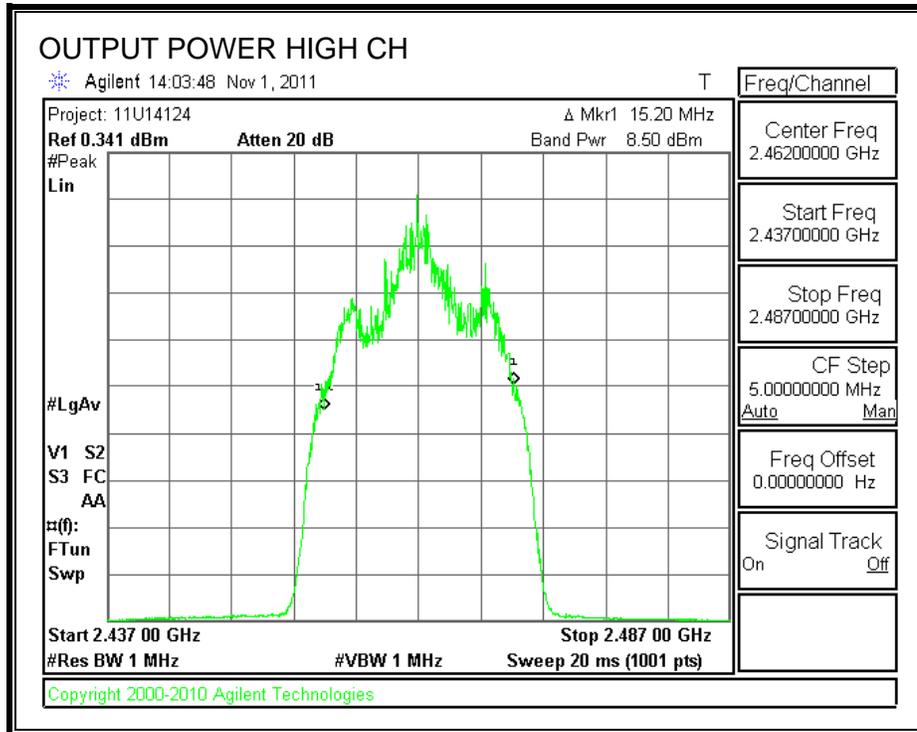
RESULTS

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Attenuator and Cable Offset (dB)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	7.95	10.4	18.35	30	-11.65
Middle	2437	8.36	10.4	18.76	30	-11.24
High	2462	8.5	10.4	18.90	30	-11.10

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 10 dB (including 10 dB pad and 0.4 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	9.90
Middle	2437	10.05
High	2462	10.25

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.

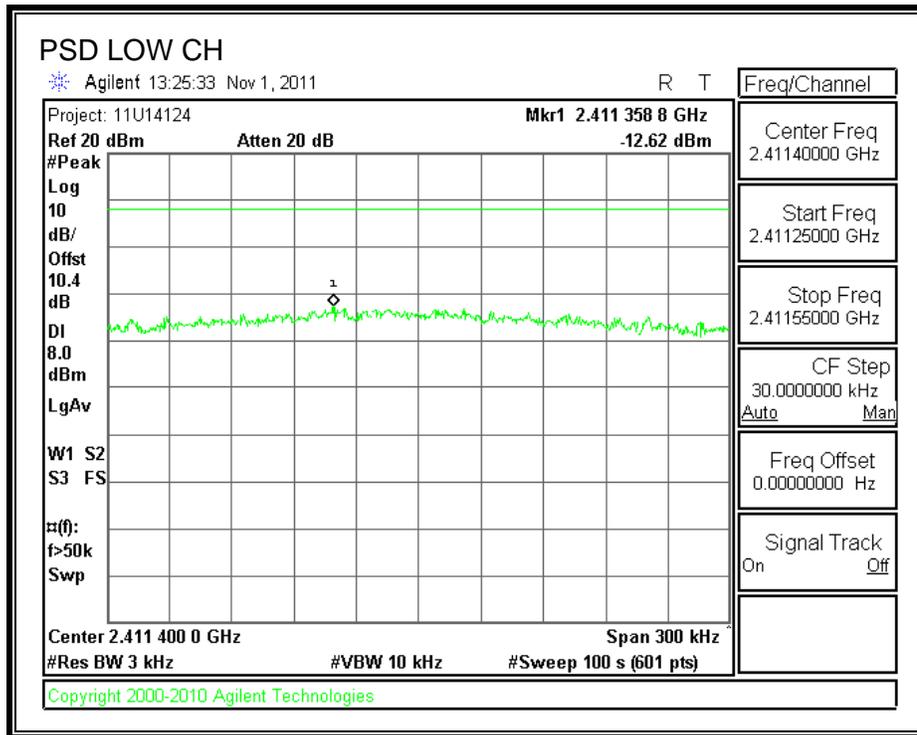
TEST PROCEDURE

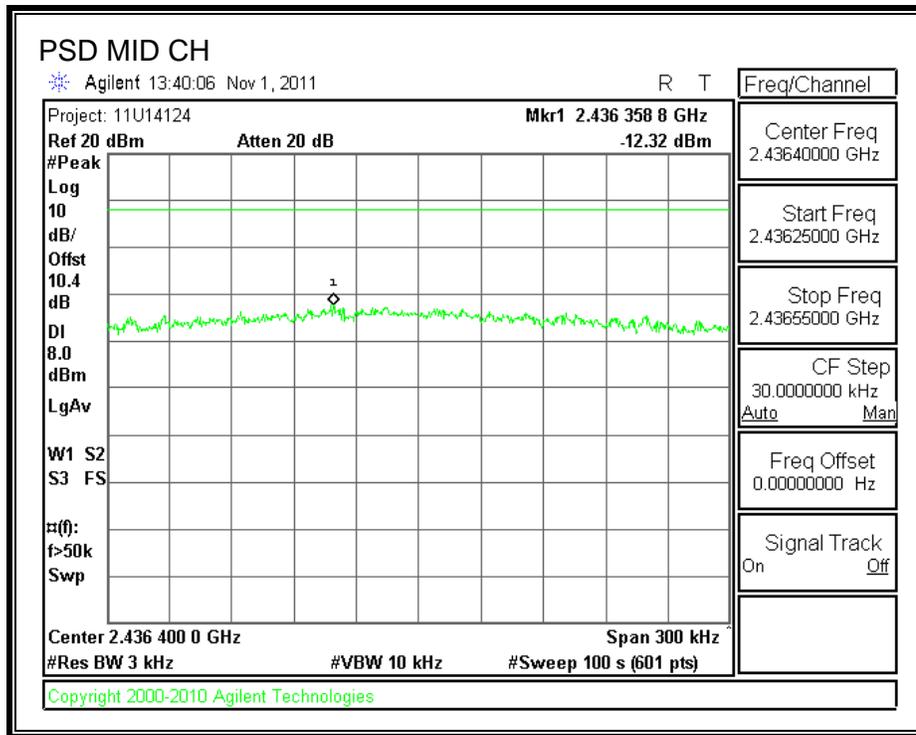
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

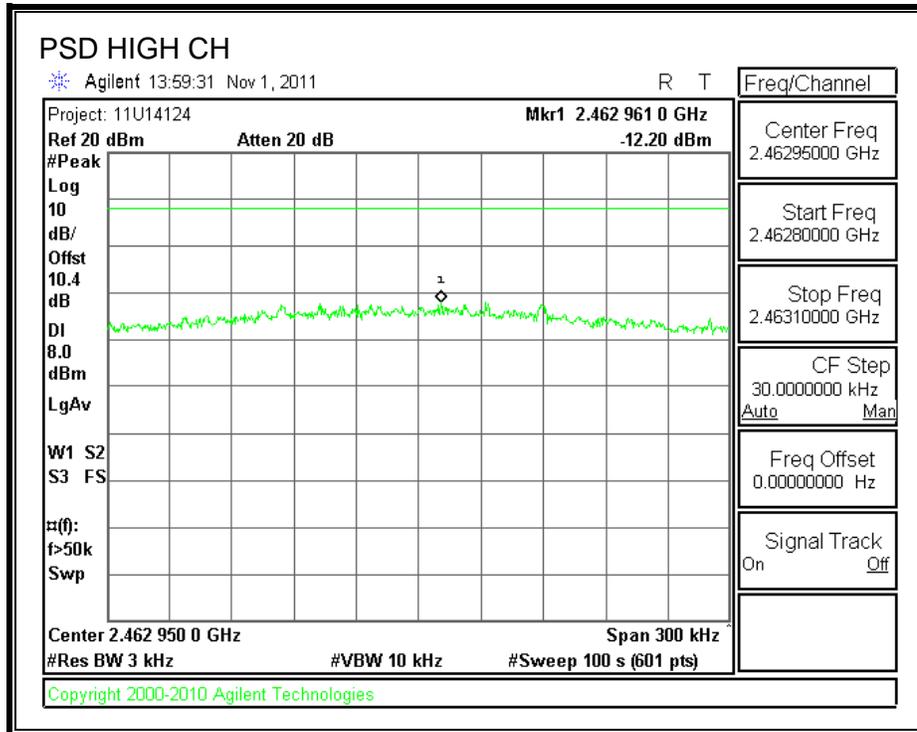
RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-12.62	8	-20.62
Middle	2437	-12.32	8	-20.32
High	2462	-12.20	8	-20.20

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 a peak measurement, therefore the required attenuation is 20 dB.

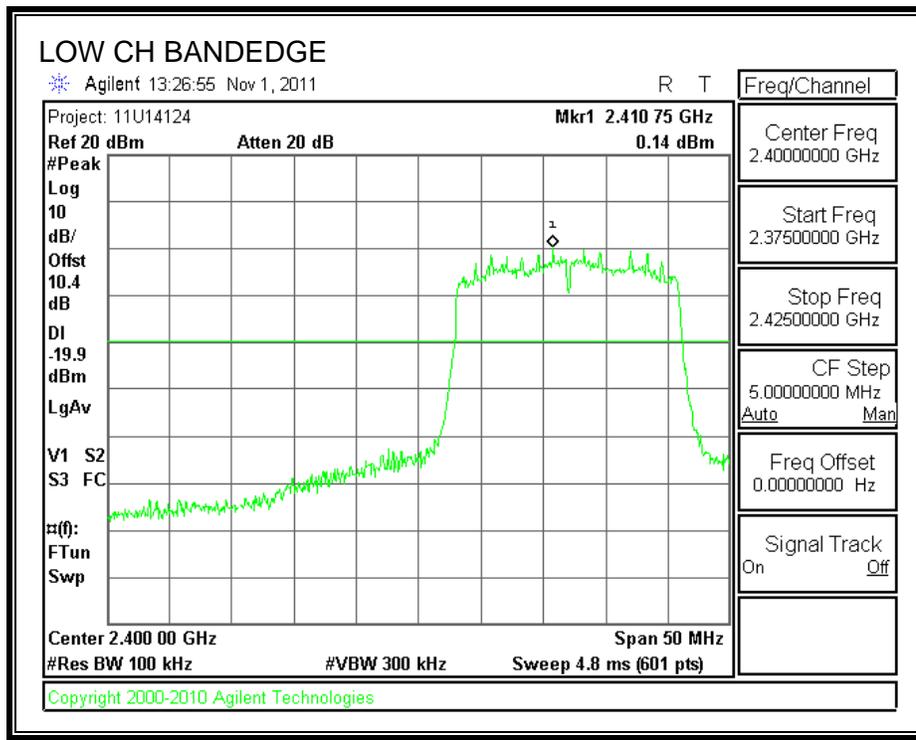
TEST PROCEDURE

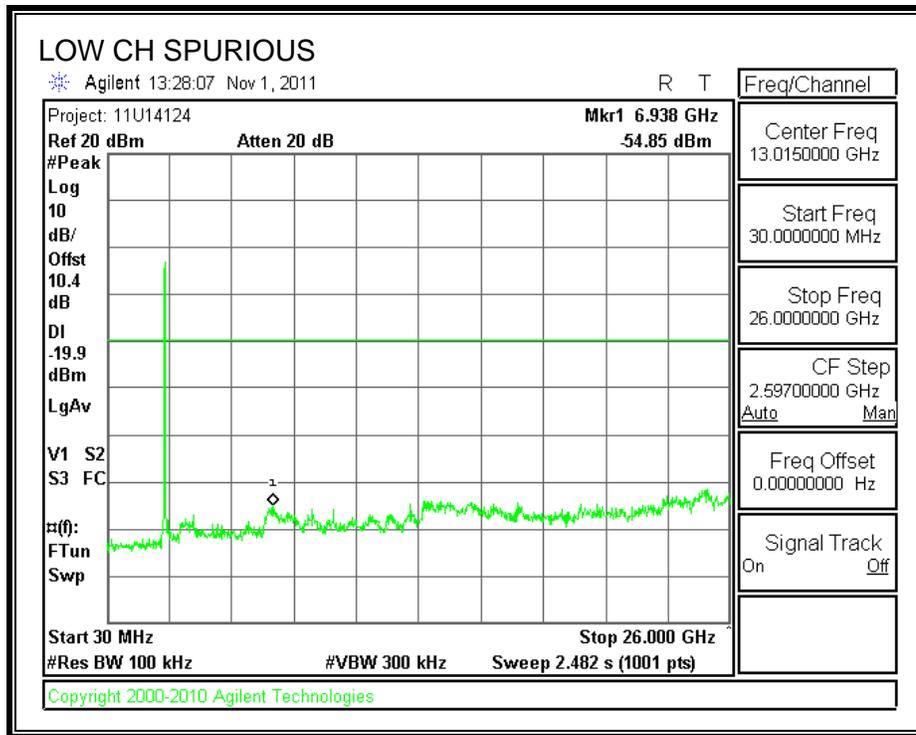
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

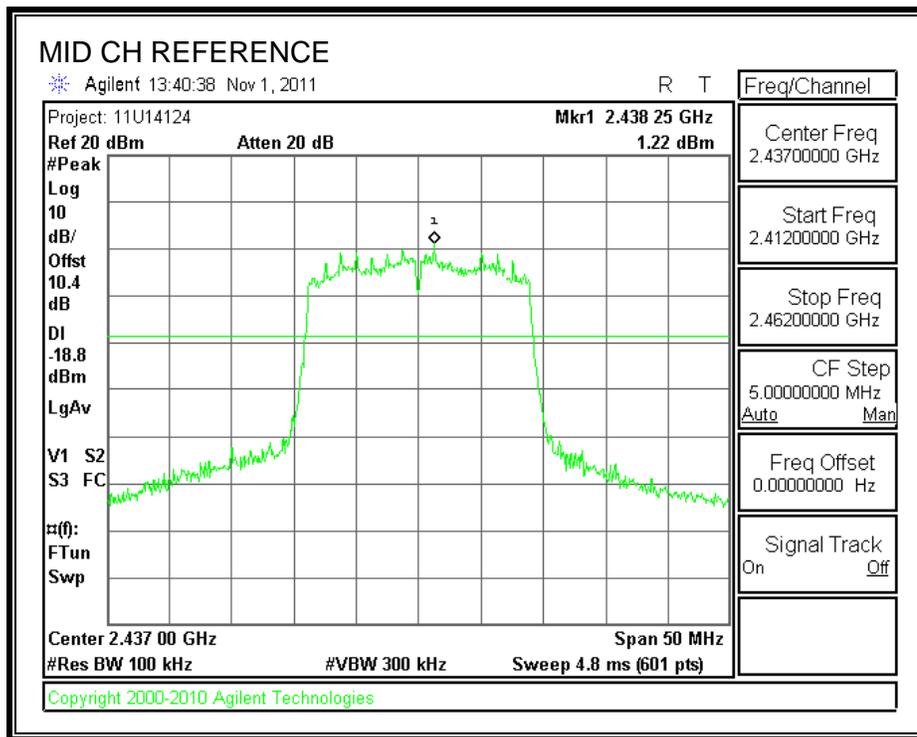
RESULTS

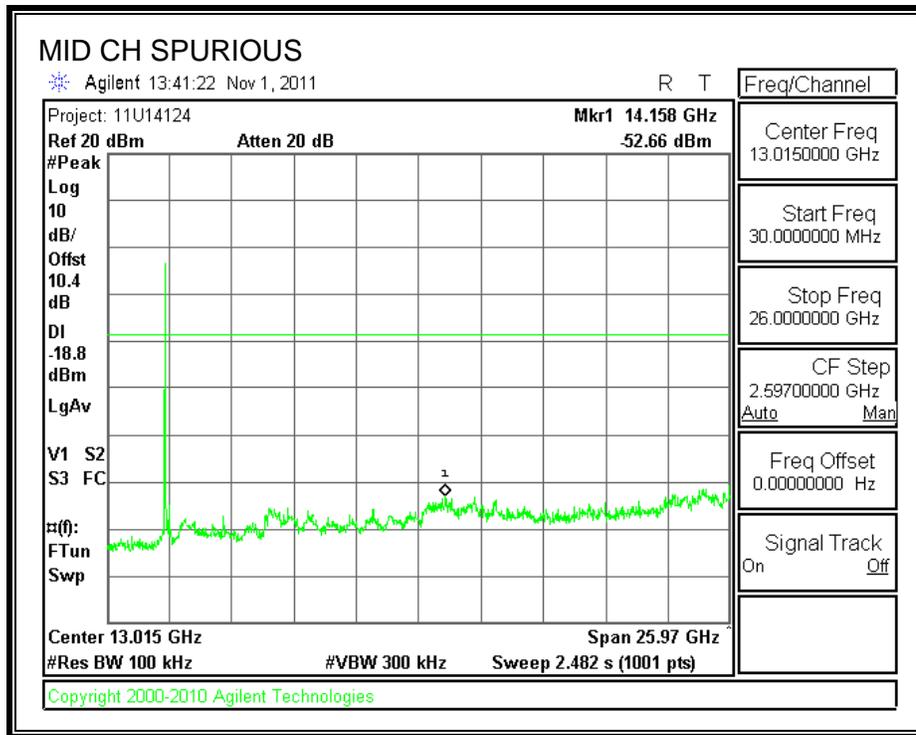
SPURIOUS EMISSIONS, LOW CHANNEL



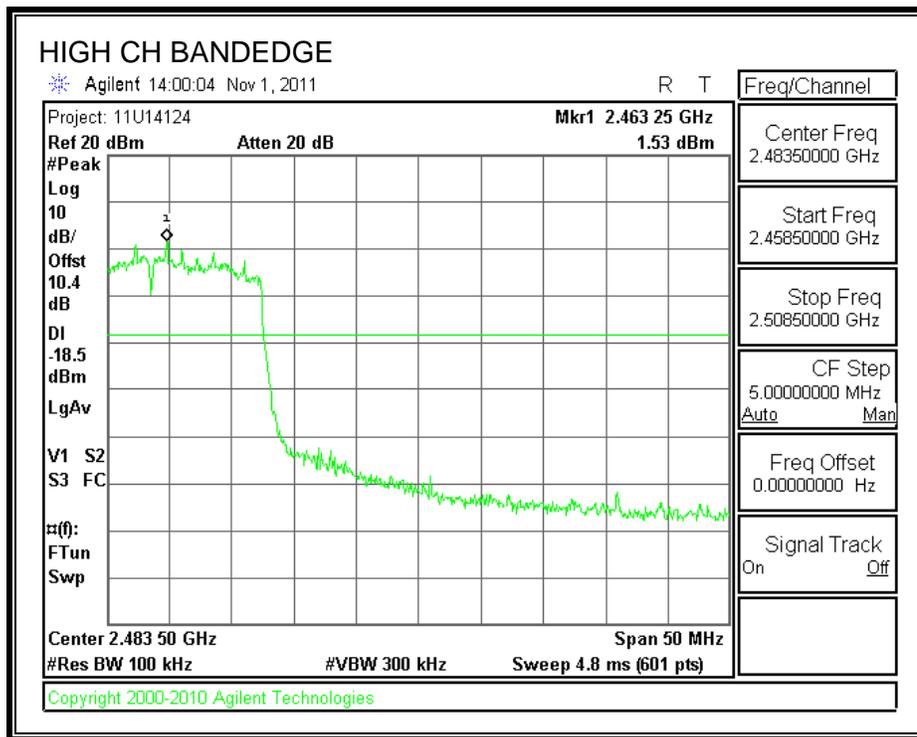


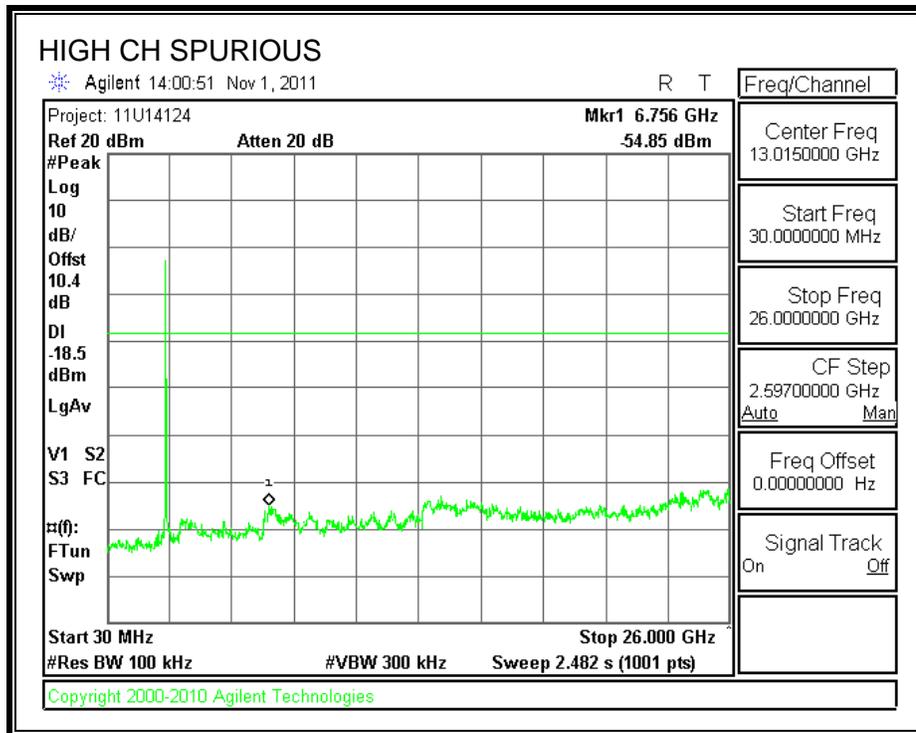
SPURIOUS EMISSIONS, MID CHANNEL





SPURIOUS EMISSIONS, HIGH CHANNEL





8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-210 Clause 2.6 (Transmitter)

IC RSS-GEN Clause 6 (Receiver)

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

TEST PROCEDURE

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

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

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

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

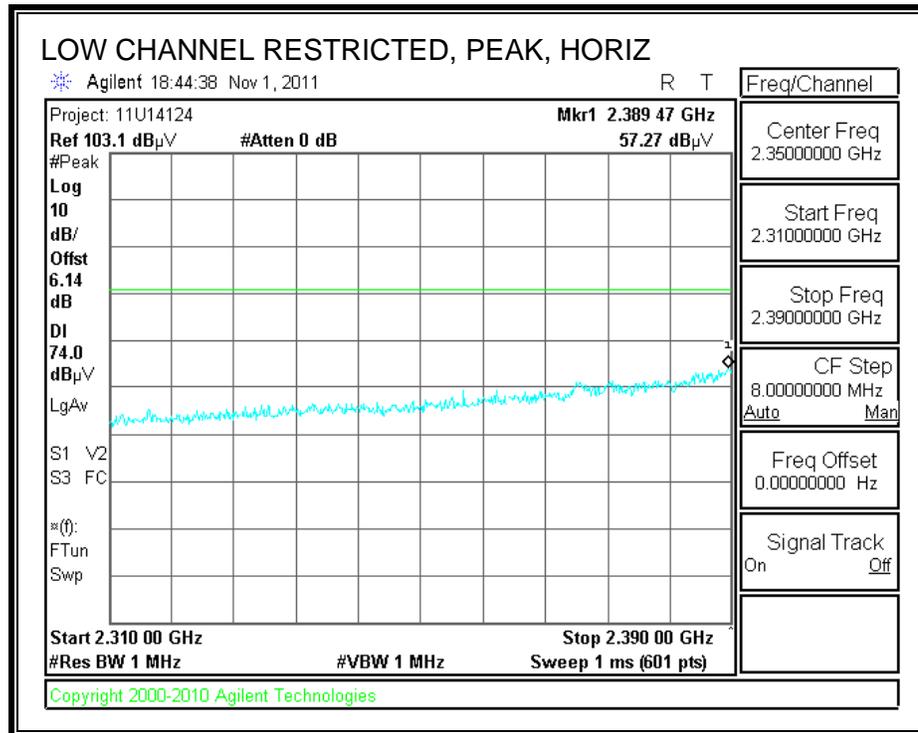
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

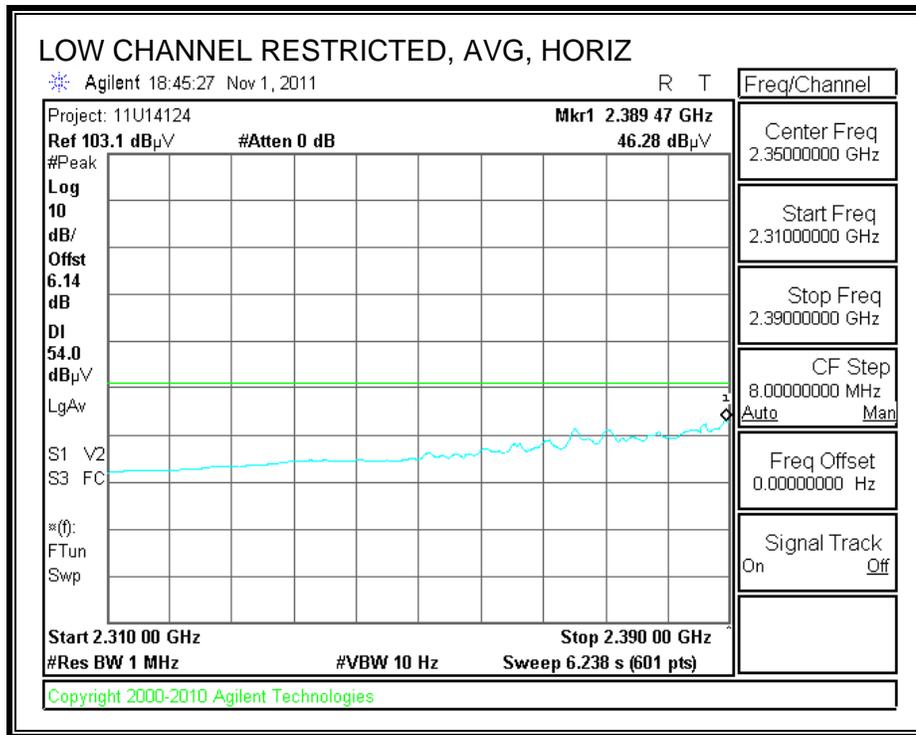
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

8.2. TRANSMITTER ABOVE 1 GHz

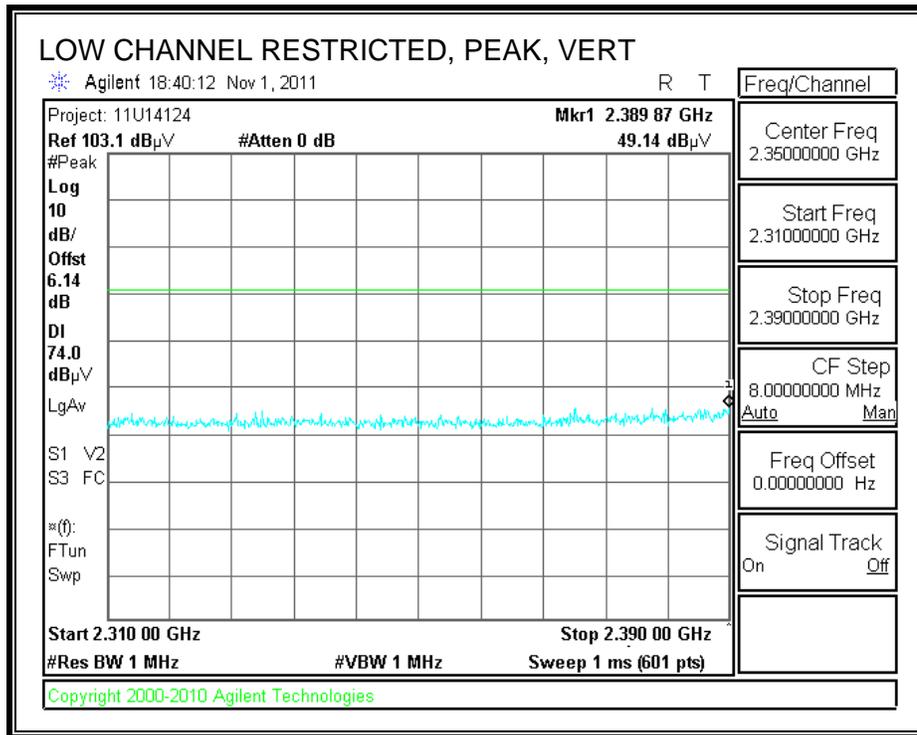
8.2.1. TX ABOVE 1 GHz FOR 802.11b 1TX MODE IN THE 2.4 GHz BAND

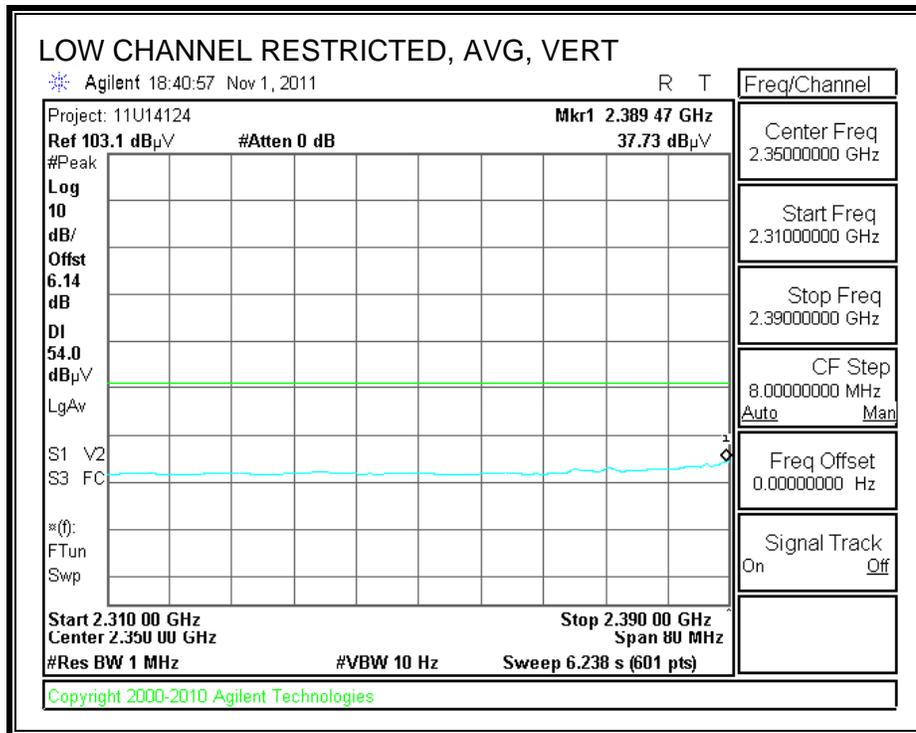
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



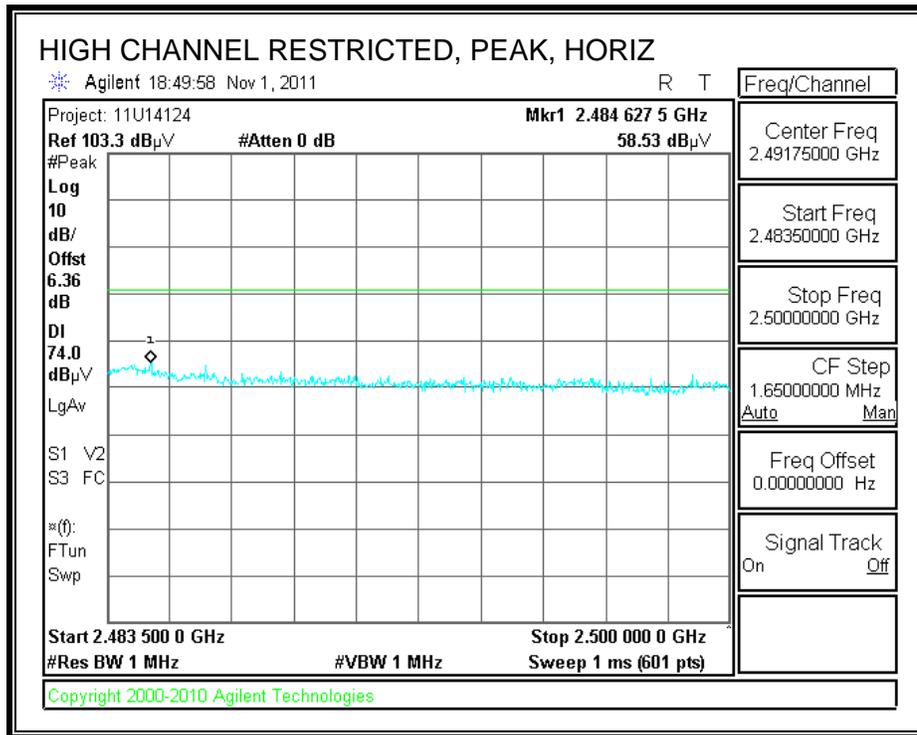


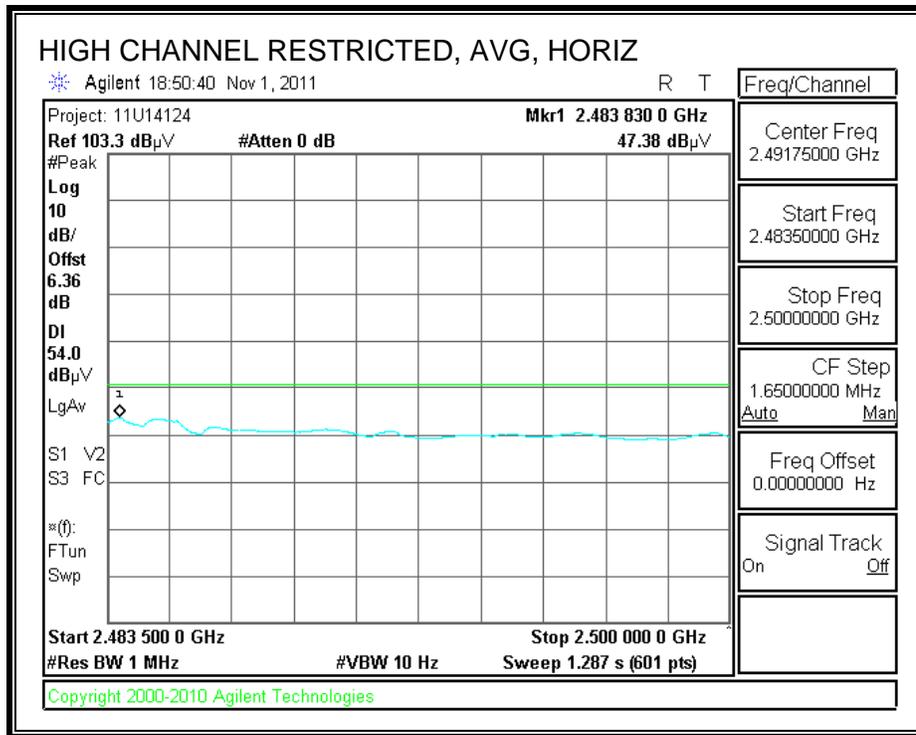
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



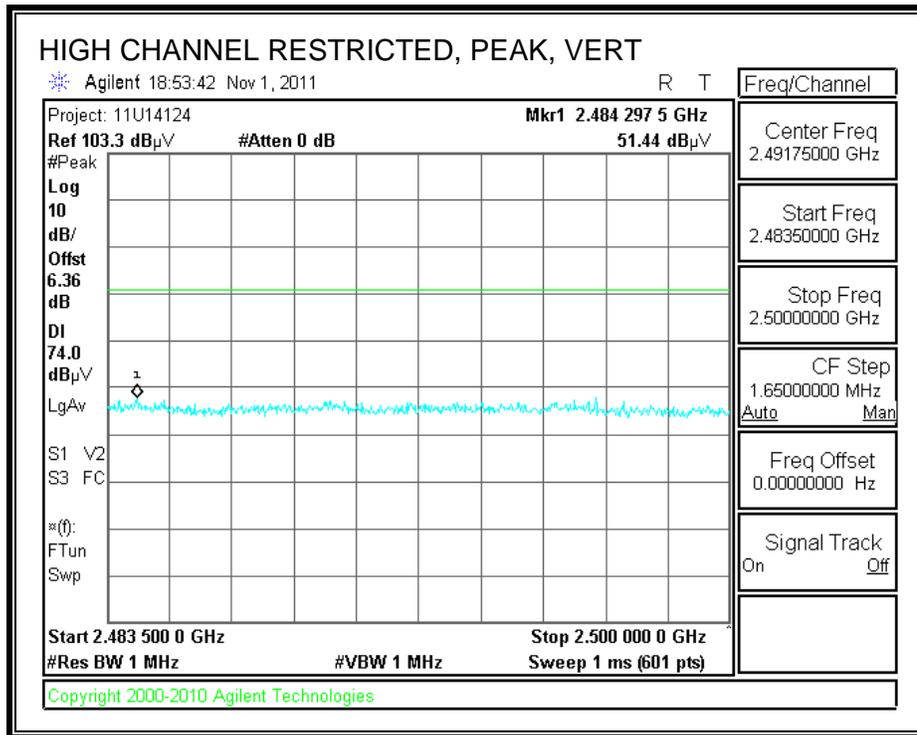


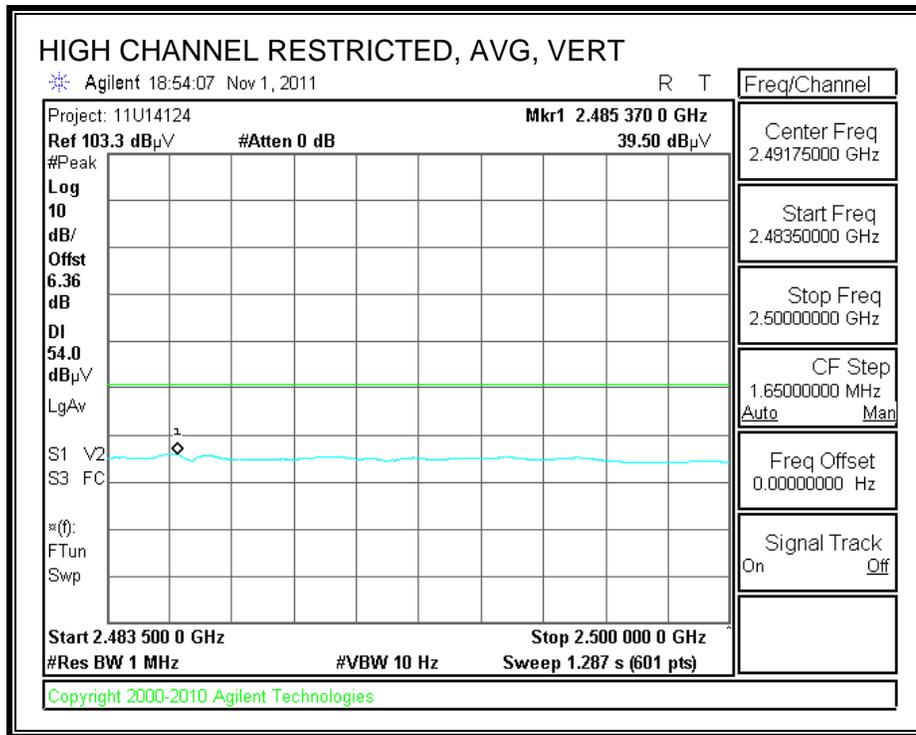
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement

Compliance Certification Services, Fremont 5m Chamber

Test Engr: Tom Chen
 Date: 11/02/11
 Project #: 11U14124
 Company: LG
 Test Target: FCC Class B
 Mode Oper: 802.11b, TX mode

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

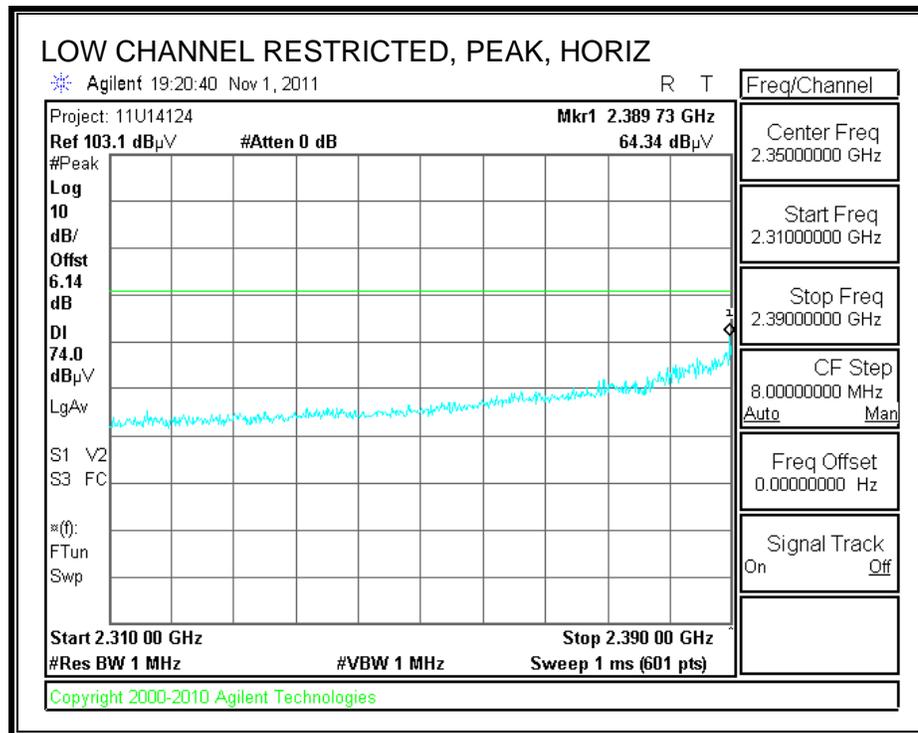
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filtr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol V/H	Det P/A/QP	Notes
2412 MHz 11b													
4.824	3.0	36.6	33.1	5.8	-34.8	0.0	0.0	40.7	74.0	-33.3	H	P	
4.824	3.0	25.2	33.1	5.8	-34.8	0.0	0.0	29.3	54.0	-24.8	H	A	
4.824	3.0	39.3	33.1	5.8	-34.8	0.0	0.0	43.4	74.0	-30.6	V	P	
4.824	3.0	32.5	33.1	5.8	-34.8	0.0	0.0	36.6	54.0	-17.4	V	A	
2437 MHz 11b													
4.874	3.0	38.8	33.2	5.8	-34.8	0.0	0.0	42.9	74.0	-31.1	V	P	
4.874	3.0	30.9	33.2	5.8	-34.8	0.0	0.0	35.1	54.0	-18.9	V	A	
7.311	3.0	35.6	36.3	7.3	-34.1	0.0	0.0	45.0	74.0	-29.0	V	P	
7.311	3.0	23.5	36.3	7.3	-34.1	0.0	0.0	32.9	54.0	-21.1	V	A	
2437 MHz 11b													
4.874	3.0	37.6	33.2	5.8	-34.8	0.0	0.0	41.8	74.0	-32.2	H	P	
4.874	3.0	27.1	33.2	5.8	-34.8	0.0	0.0	31.3	54.0	-22.7	H	A	
7.311	3.0	36.8	36.3	7.3	-34.1	0.0	0.0	46.2	74.0	-27.8	H	P	
7.311	3.0	23.5	36.3	7.3	-34.1	0.0	0.0	32.9	54.0	-21.1	H	A	
2462 MHz 11b													
4.924	3.0	36.3	33.2	5.9	-34.8	0.0	0.0	40.6	74.0	-33.4	H	P	
4.924	3.0	24.5	33.2	5.9	-34.8	0.0	0.0	28.8	54.0	-25.2	H	A	
7.386	3.0	35.4	36.4	7.3	-34.1	0.0	0.0	45.0	74.0	-29.0	H	P	
7.386	3.0	22.9	36.4	7.3	-34.1	0.0	0.0	32.5	54.0	-21.5	H	A	
2462 MHz 11b													
4.924	3.0	38.5	33.2	5.9	-34.8	0.0	0.0	42.7	74.0	-31.3	V	P	
4.924	3.0	28.1	33.2	5.9	-34.8	0.0	0.0	32.4	54.0	-21.6	V	A	
7.386	3.0	34.9	36.4	7.3	-34.1	0.0	0.0	44.5	74.0	-29.5	V	P	
7.386	3.0	22.8	36.4	7.3	-34.1	0.0	0.0	32.4	54.0	-21.6	V	A	

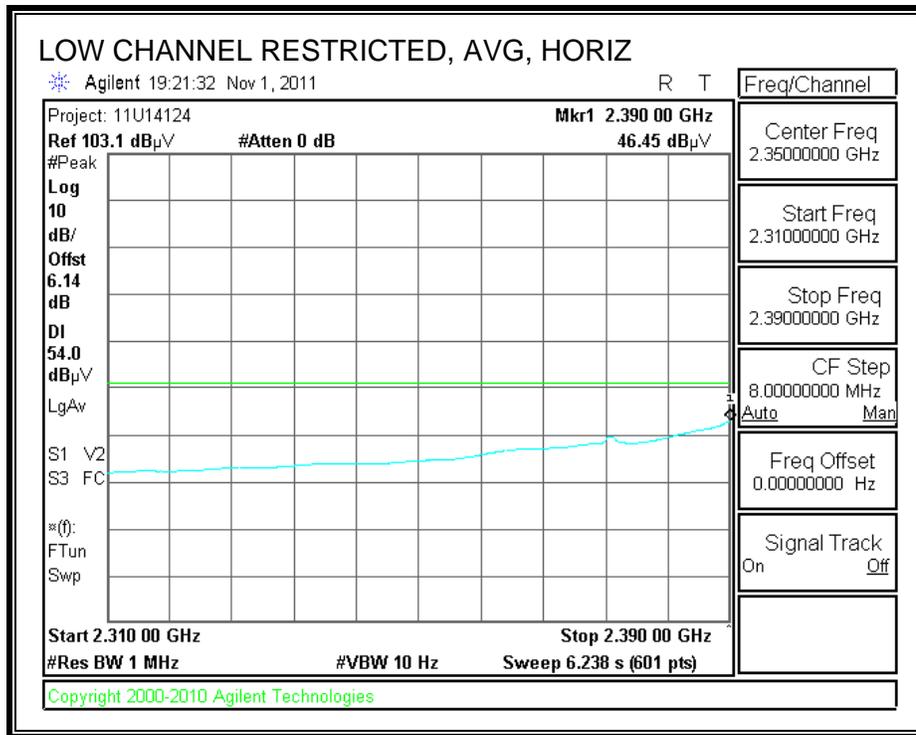
Rev. 4.1.2.7

Note: No other emissions were detected above the system noise floor.

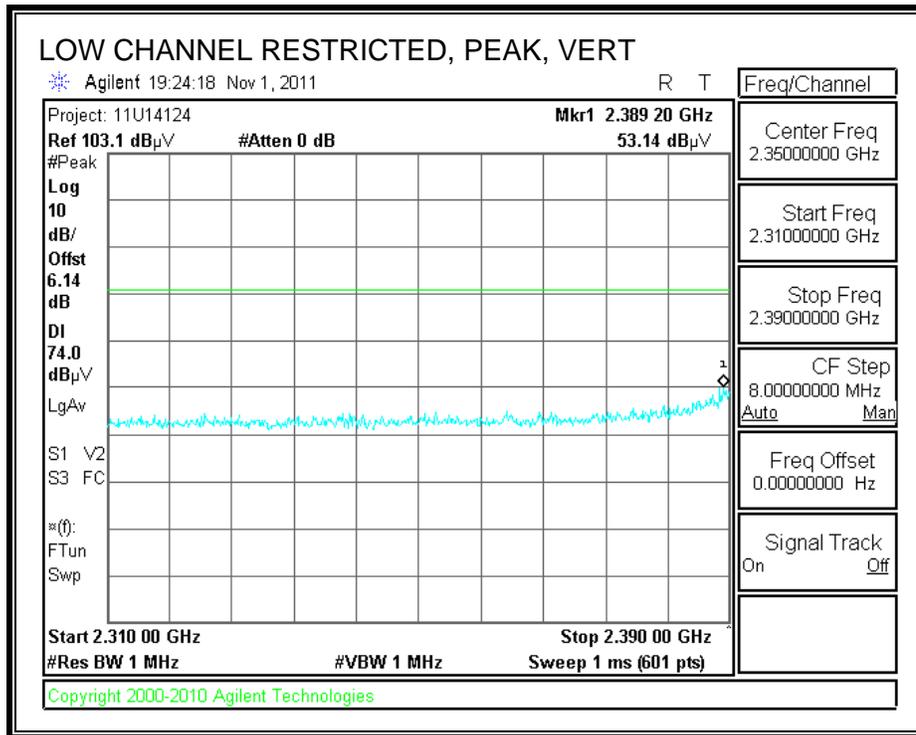
8.2.2. TX ABOVE 1 GHz FOR 802.11g 1TX MODE IN THE 2.4 GHz BAND

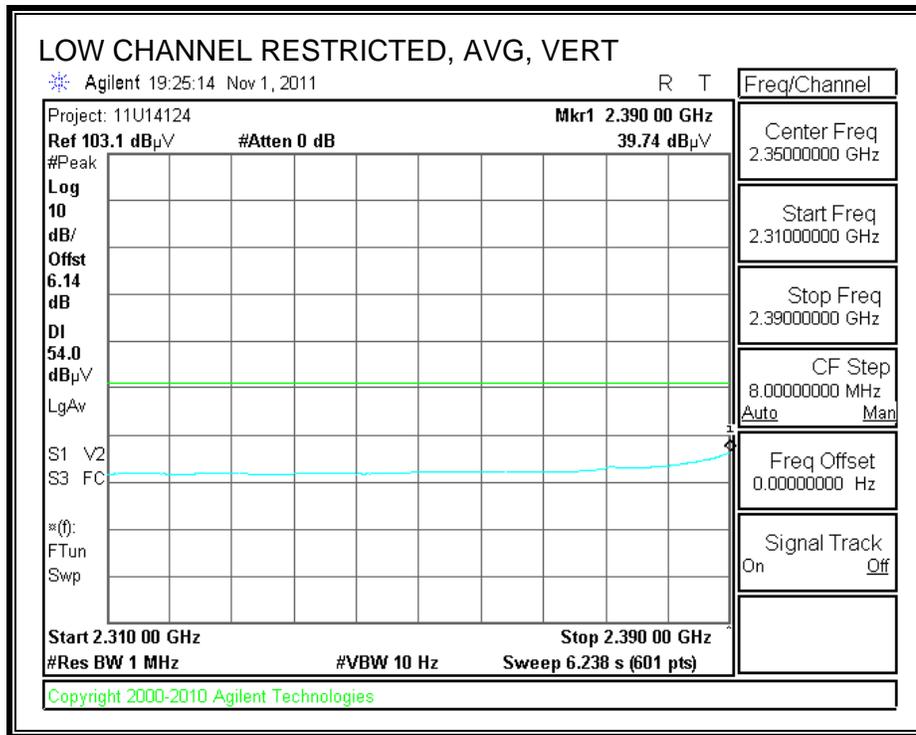
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



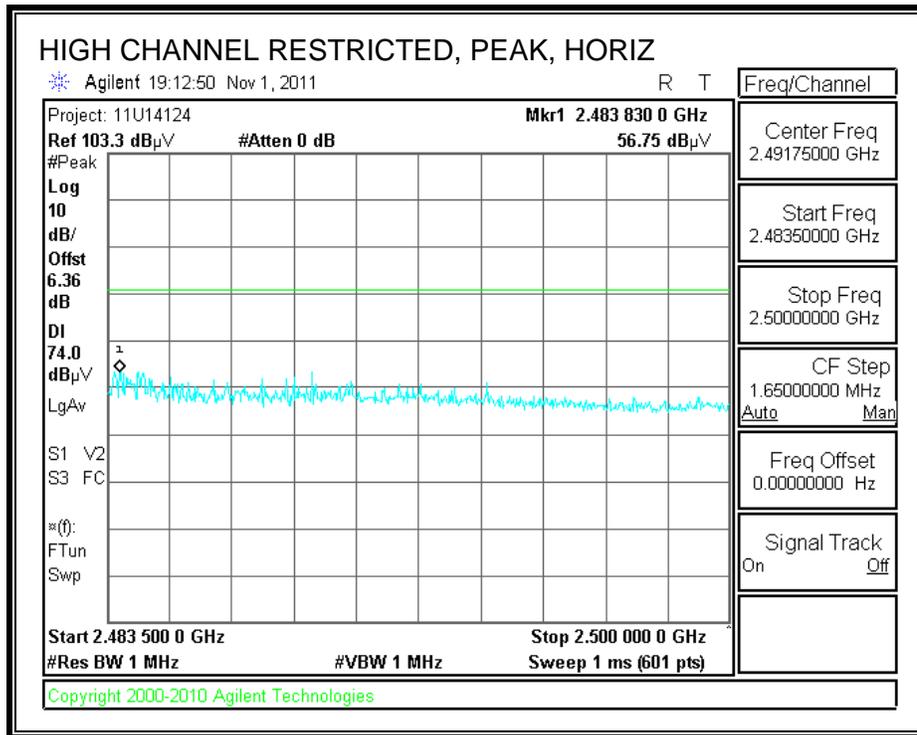


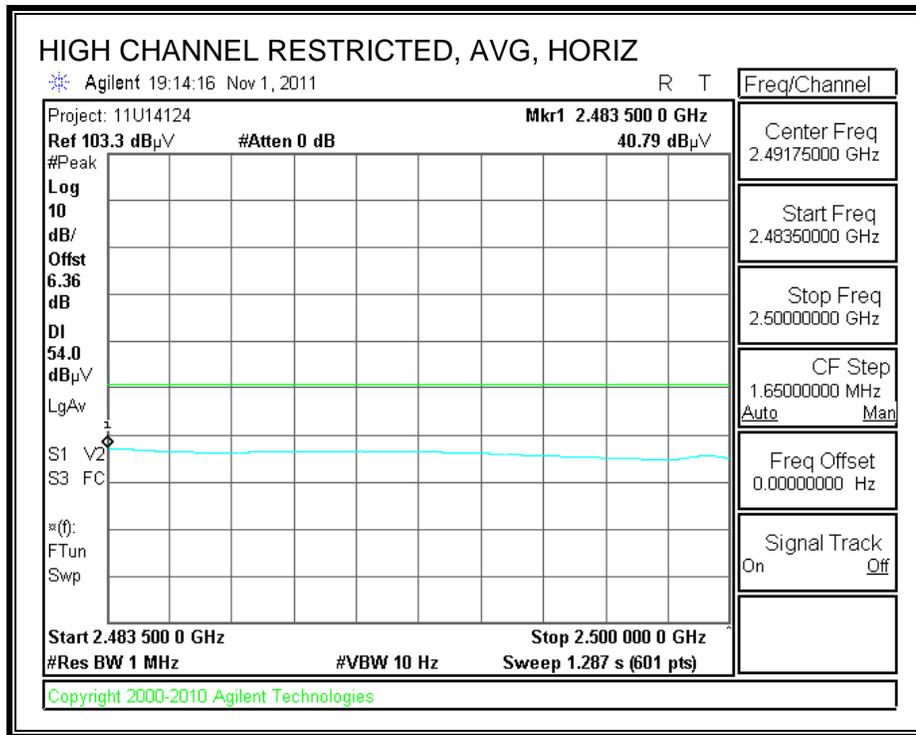
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



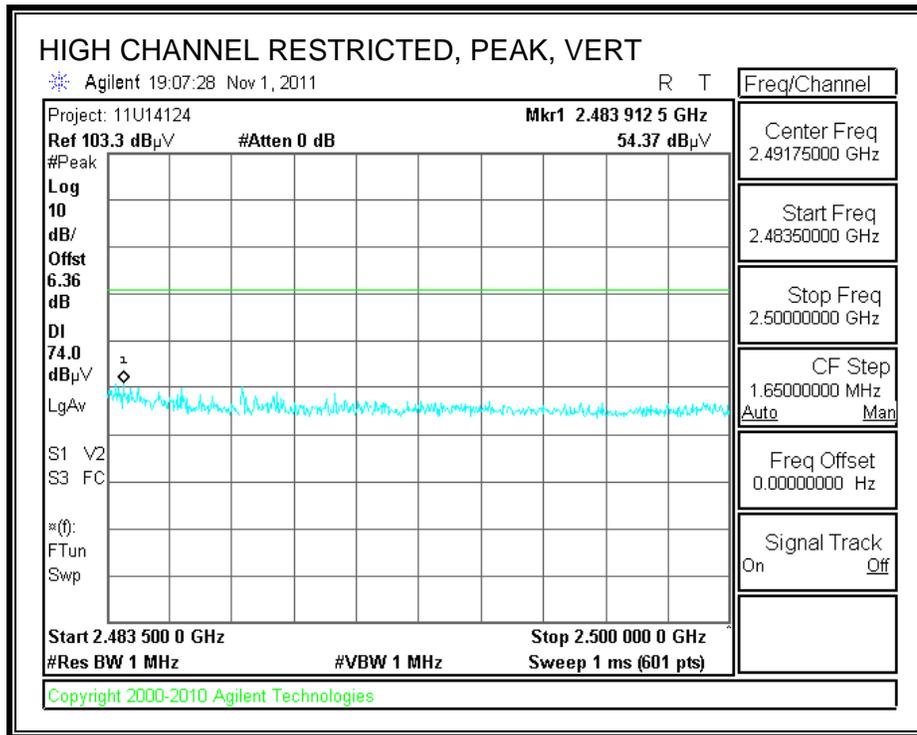


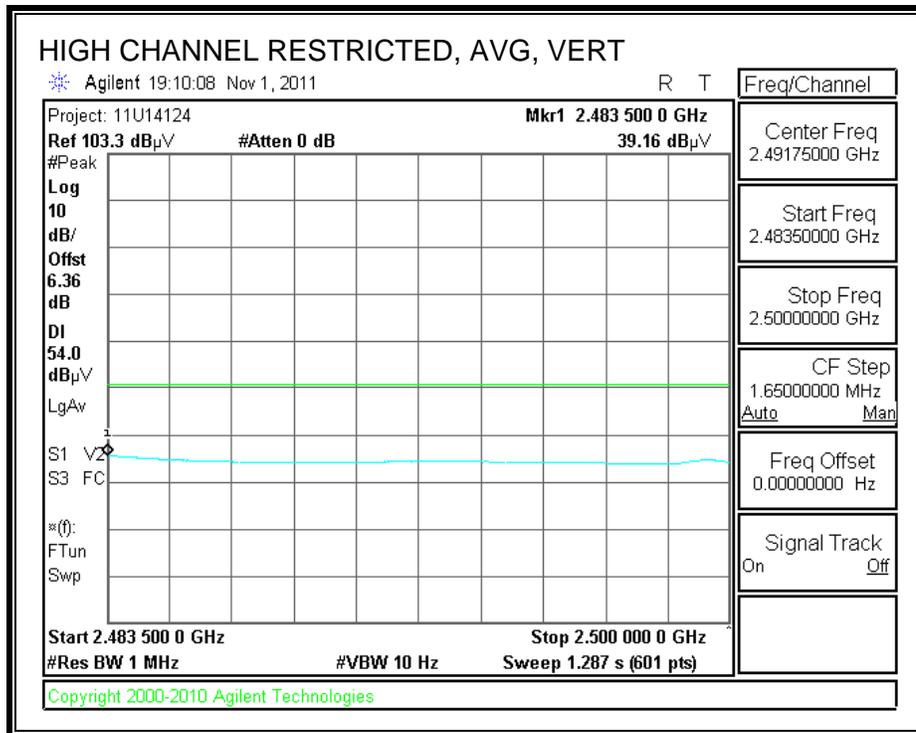
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement

Compliance Certification Services, Fremont 5m Chamber

Test Engr: Tom Chen
 Date: 11/02/11
 Project #: 11U14124
 Company: LG
 Test Target: FCC Class B
 Mode Oper: 802.11g, TX mode

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

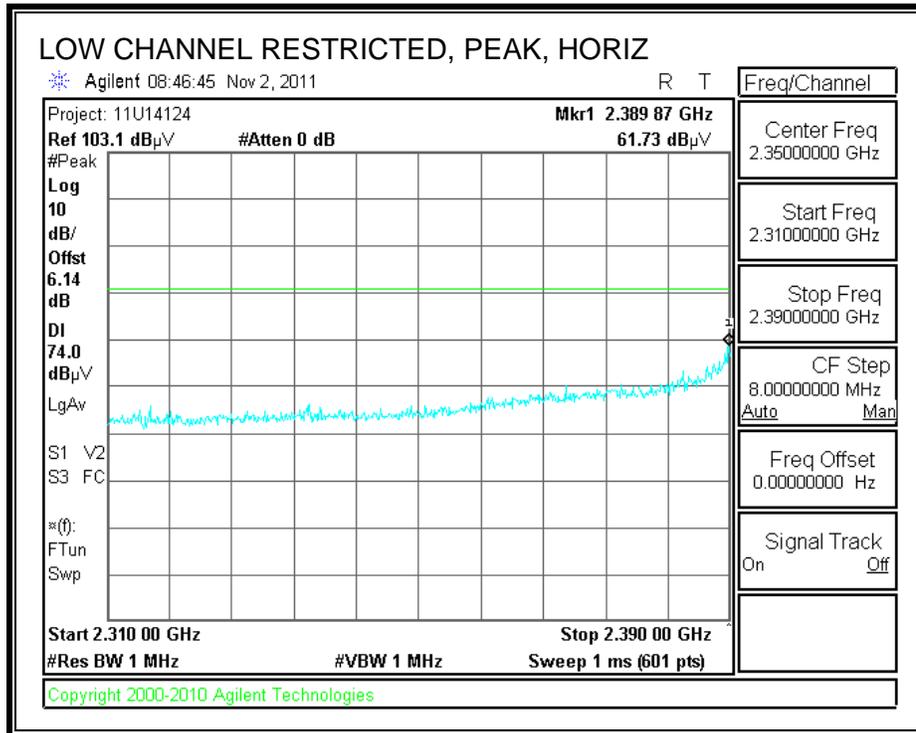
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filtr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol V/H	Det P/A/QP	Notes
2412 MHz 11g													
4.824	3.0	37.1	33.1	5.8	-34.8	0.0	0.0	41.2	74.0	-32.8	H	P	
4.824	3.0	24.4	33.1	5.8	-34.8	0.0	0.0	28.5	54.0	-25.5	H	A	
4.824	3.0	37.3	33.1	5.8	-34.8	0.0	0.0	41.4	74.0	-32.6	V	P	
4.824	3.0	24.4	33.1	5.8	-34.8	0.0	0.0	28.5	54.0	-25.5	V	A	
2437 MHz 11g													
4.874	3.0	37.1	33.2	5.8	-34.8	0.0	0.0	41.3	74.0	-32.7	H	P	
4.874	3.0	24.8	33.2	5.8	-34.8	0.0	0.0	29.0	54.0	-25.0	H	A	
7.311	3.0	35.5	36.3	7.3	-34.1	0.0	0.0	45.0	74.0	-29.0	H	P	
7.311	3.0	23.4	36.3	7.3	-34.1	0.0	0.0	32.9	54.0	-21.1	H	A	
2437 MHz 11g													
4.874	3.0	37.6	33.2	5.8	-34.8	0.0	0.0	41.8	74.0	-32.2	V	P	
4.874	3.0	24.9	33.2	5.8	-34.8	0.0	0.0	29.1	54.0	-24.9	V	A	
7.311	3.0	36.0	36.3	7.3	-34.1	0.0	0.0	45.5	74.0	-28.5	V	P	
7.311	3.0	23.5	36.3	7.3	-34.1	0.0	0.0	32.9	54.0	-21.1	V	A	
2462 MHz 11g													
4.924	3.0	36.2	33.2	5.9	-34.8	0.0	0.0	40.4	74.0	-33.6	H	P	
4.924	3.0	24.1	33.2	5.9	-34.8	0.0	0.0	28.4	54.0	-25.6	H	A	
7.386	3.0	35.3	36.4	7.3	-34.1	0.0	0.0	44.9	74.0	-29.1	H	P	
7.386	3.0	23.1	36.4	7.3	-34.1	0.0	0.0	32.7	54.0	-21.3	H	A	
2462 MHz 11g													
4.924	3.0	37.2	33.2	5.9	-34.8	0.0	0.0	41.5	74.0	-32.5	V	P	
4.924	3.0	24.1	33.2	5.9	-34.8	0.0	0.0	28.4	54.0	-25.6	V	A	
7.386	3.0	36.0	36.4	7.3	-34.1	0.0	0.0	45.7	74.0	-28.4	V	P	
7.386	3.0	23.0	36.4	7.3	-34.1	0.0	0.0	32.7	54.0	-21.3	V	A	

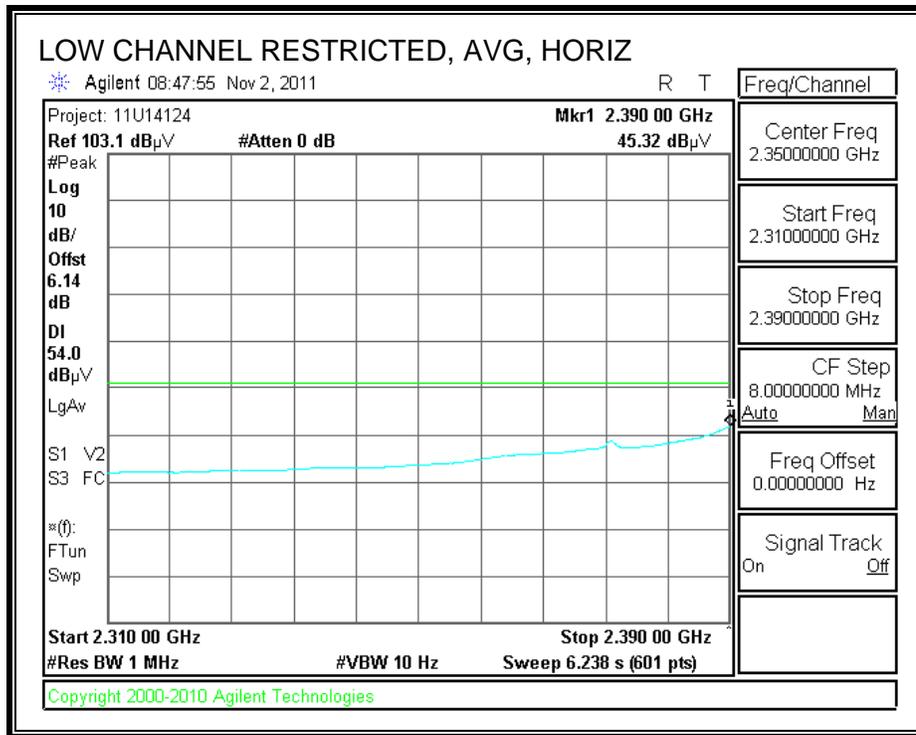
Rev. 4.1.2.7

Note: No other emissions were detected above the system noise floor.

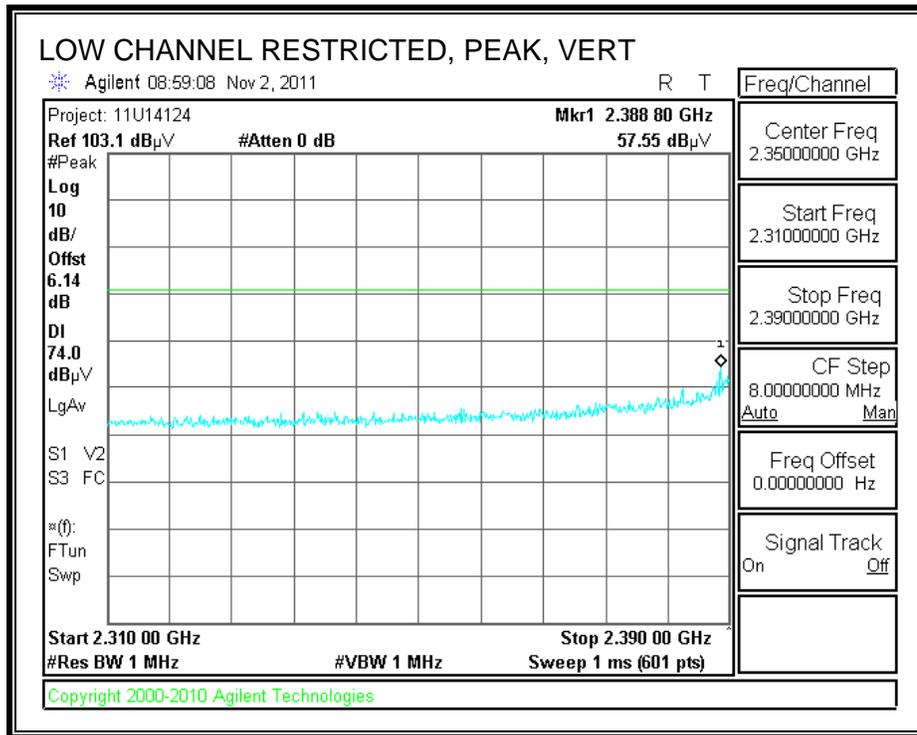
8.2.3. TX ABOVE 1 GHz FOR 802.11n HT20 1TX MODE IN THE 2.4 GHz BAND

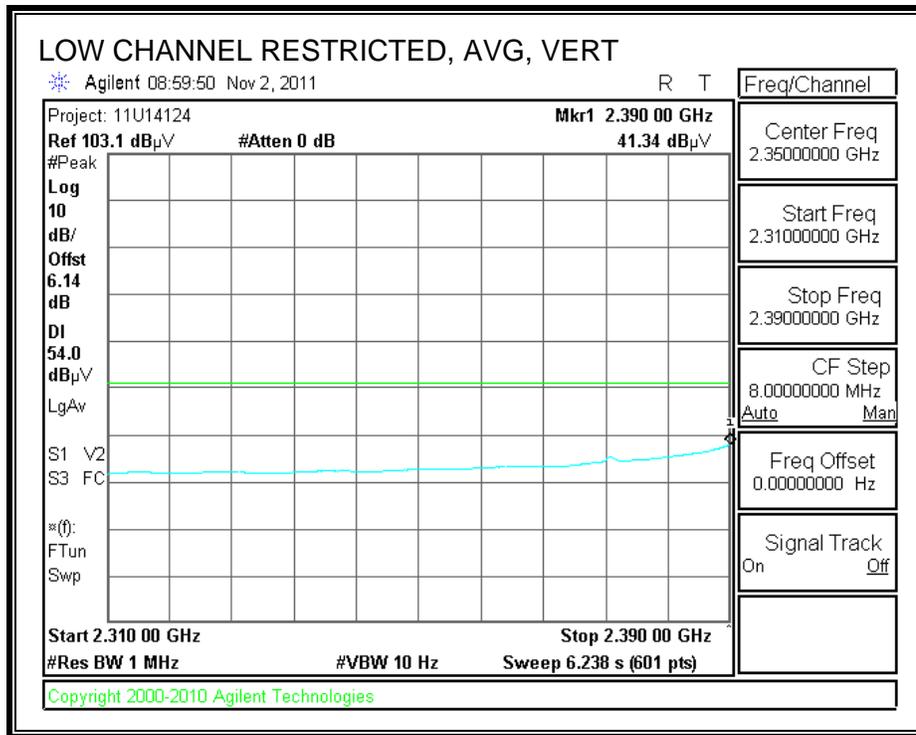
RESTRICTED BANEDGE (LOW CHANNEL, HORIZONTAL)



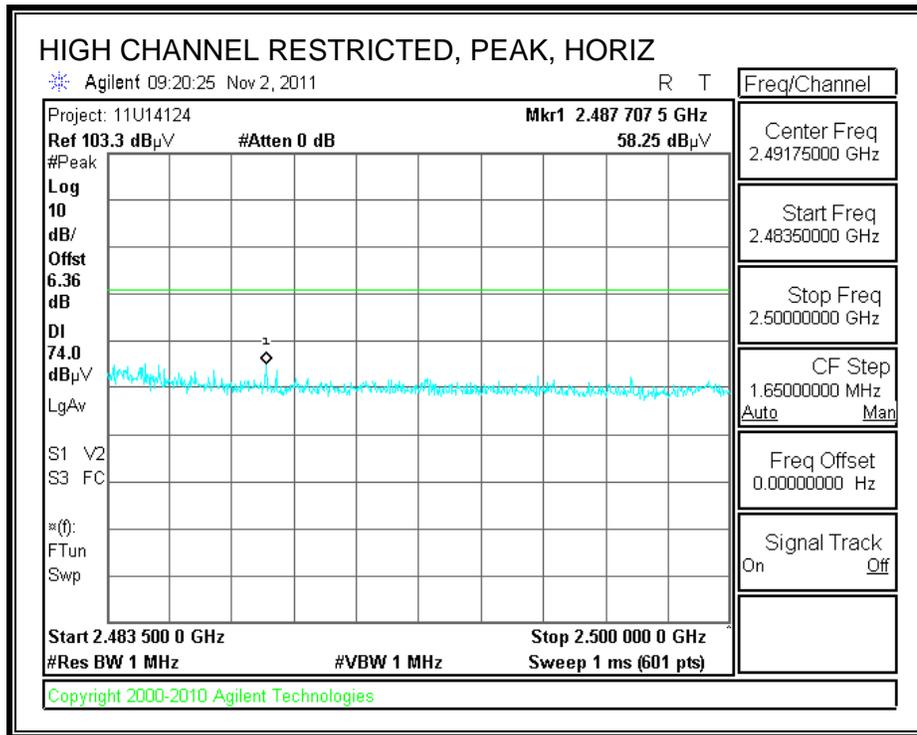


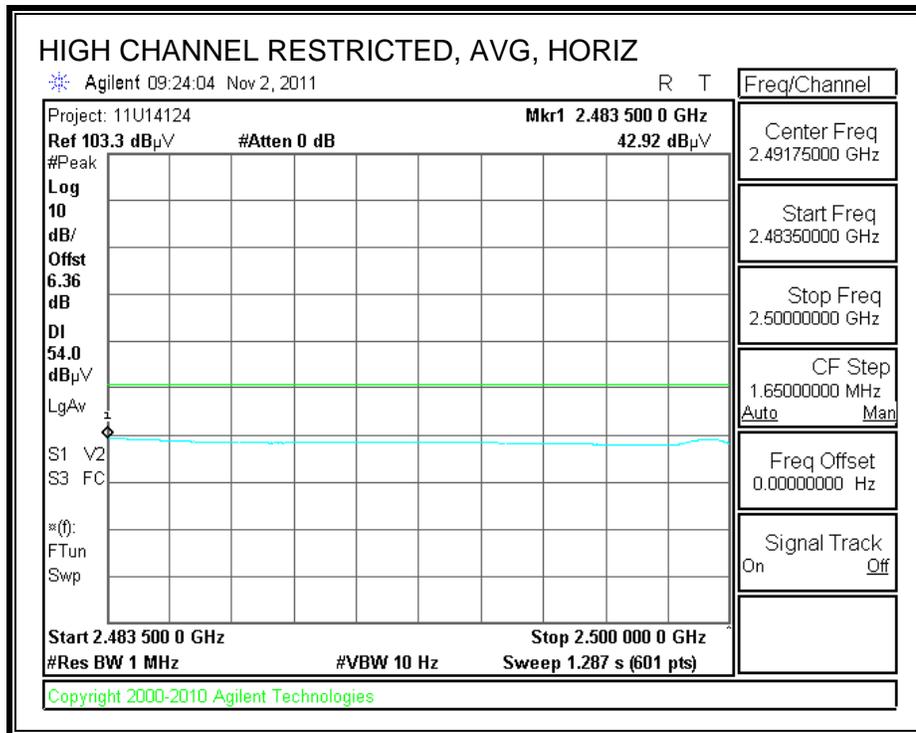
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



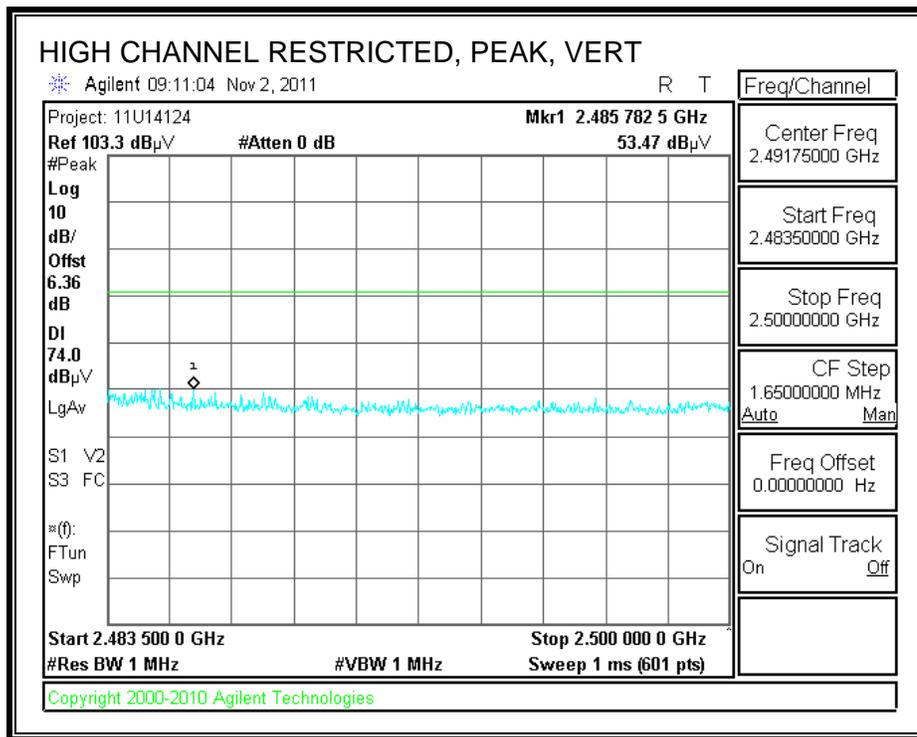


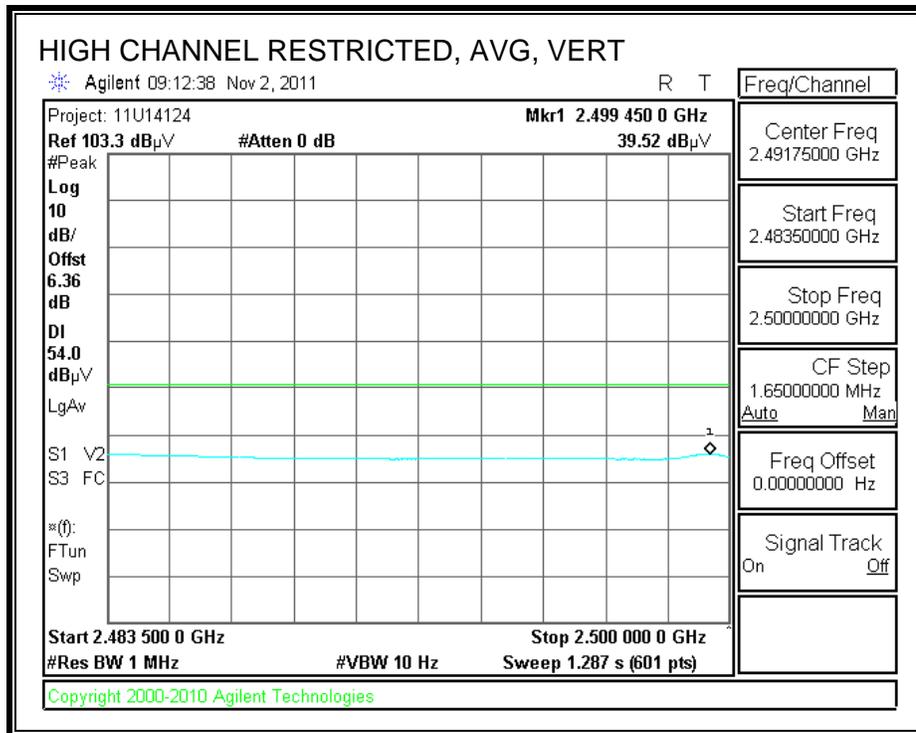
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement

Compliance Certification Services, Fremont 5m Chamber

Test Engr: Tom Chen
 Date: 11/02/11
 Project #: 11U14124
 Company: LG
 Test Target: FCC Class B
 Mode Oper: 802.11n HT20, TX mode

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

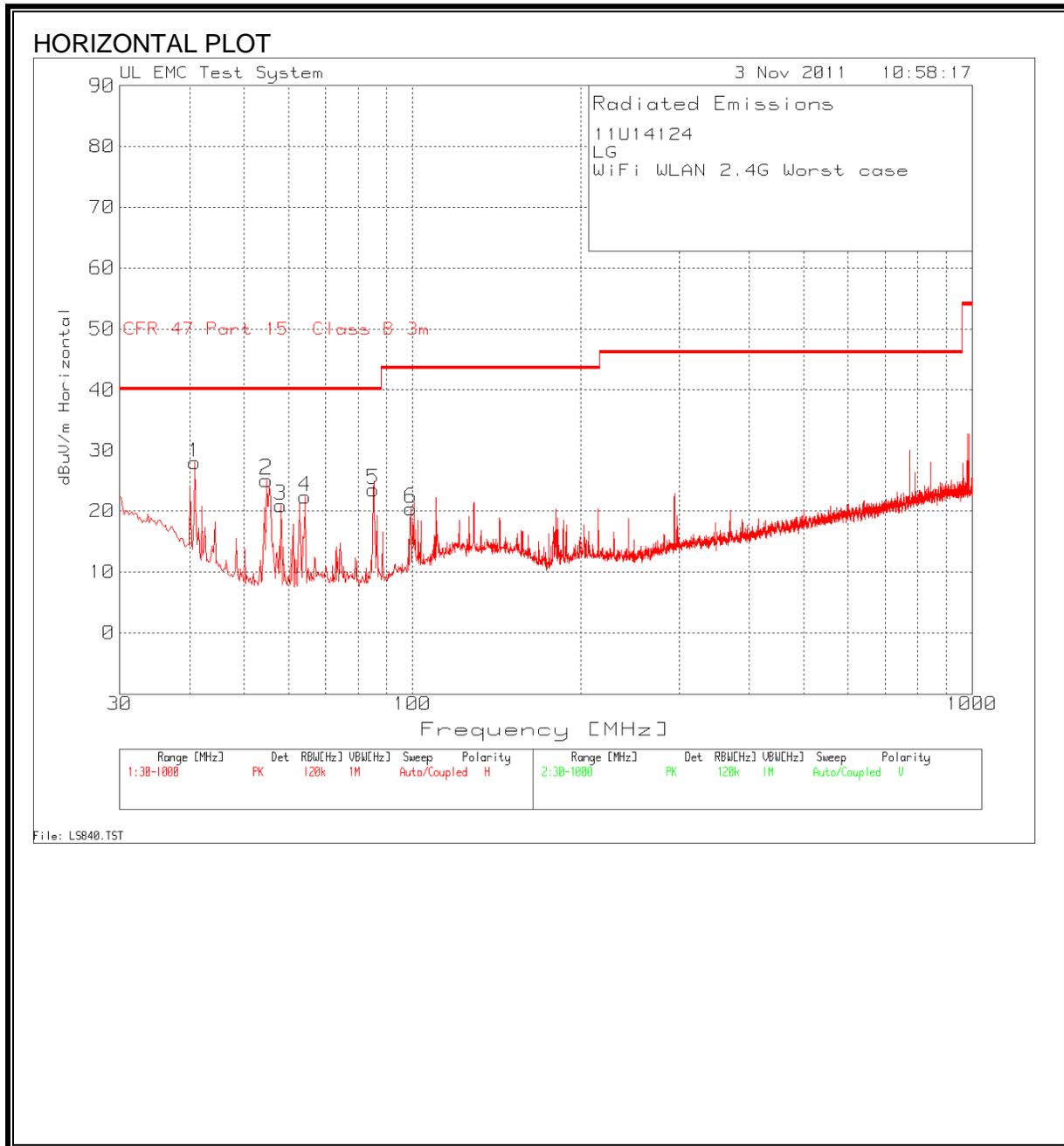
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filtr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol V/H	Det P/A/QP	Notes
2412 MHz HT20													
4.824	3.0	37.5	33.1	5.8	-34.8	0.0	0.0	41.6	74.0	-32.4	V	P	
4.824	3.0	24.5	33.1	5.8	-34.8	0.0	0.0	28.6	54.0	-25.4	V	A	
4.824	3.0	37.5	33.1	5.8	-34.8	0.0	0.0	41.6	74.0	-32.4	H	P	
4.824	3.0	24.4	33.1	5.8	-34.8	0.0	0.0	28.5	54.0	-25.5	H	A	
2437 MHz HT20													
4.874	3.0	37.0	33.2	5.8	-34.8	0.0	0.0	41.2	74.0	-32.8	V	P	
4.874	3.0	24.7	33.2	5.8	-34.8	0.0	0.0	28.9	54.0	-25.1	V	A	
7.311	3.0	36.0	36.3	7.3	-34.1	0.0	0.0	45.5	74.0	-28.5	V	P	
7.311	3.0	23.4	36.3	7.3	-34.1	0.0	0.0	32.9	54.0	-21.1	V	A	
2437 MHz HT20													
4.874	3.0	37.2	33.2	5.8	-34.8	0.0	0.0	41.4	74.0	-32.6	H	P	
4.874	3.0	24.9	33.2	5.8	-34.8	0.0	0.0	29.0	54.0	-25.0	H	A	
7.311	3.0	36.5	36.3	7.3	-34.1	0.0	0.0	45.9	74.0	-28.1	H	P	
7.311	3.0	23.4	36.3	7.3	-34.1	0.0	0.0	32.9	54.0	-21.1	H	A	
2462 MHz HT20													
4.924	3.0	36.2	33.2	5.9	-34.8	0.0	0.0	40.5	74.0	-33.5	H	P	
4.924	3.0	24.2	33.2	5.9	-34.8	0.0	0.0	28.4	54.0	-25.6	H	A	
7.386	3.0	35.9	36.4	7.3	-34.1	0.0	0.0	45.5	74.0	-28.5	H	P	
7.386	3.0	23.0	36.4	7.3	-34.1	0.0	0.0	32.6	54.0	-21.4	H	A	
2462 MHz HT20													
4.924	3.0	36.6	33.2	5.9	-34.8	0.0	0.0	40.8	74.0	-33.2	V	P	
4.924	3.0	24.1	33.2	5.9	-34.8	0.0	0.0	28.3	54.0	-25.7	V	A	
7.386	3.0	34.9	36.4	7.3	-34.1	0.0	0.0	44.5	74.0	-29.5	V	P	
7.386	3.0	22.8	36.4	7.3	-34.1	0.0	0.0	32.4	54.0	-21.6	V	A	

Rev. 4.1.2.7

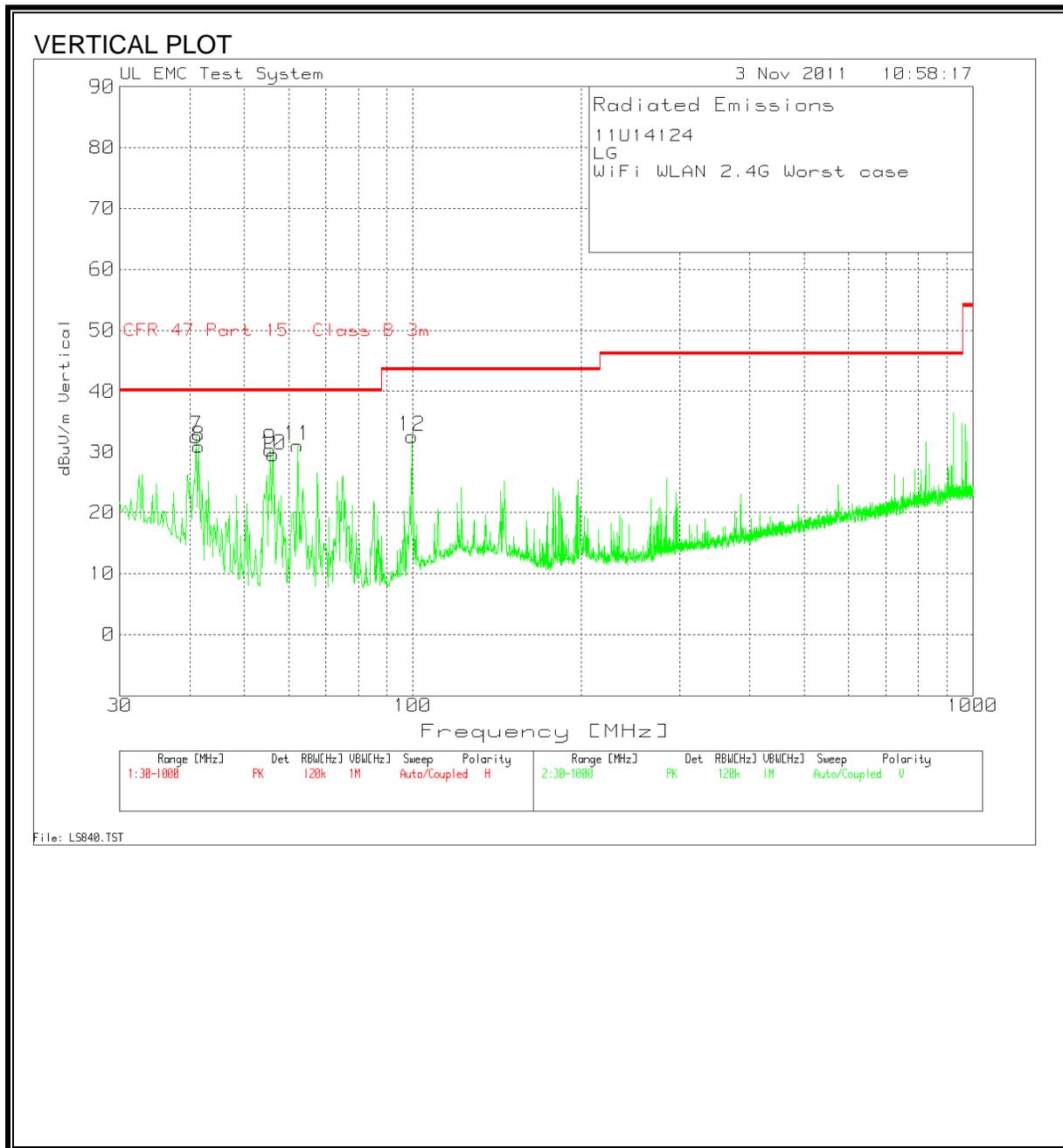
Note: No other emissions were detected above the system noise floor.

8.3. 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)



HORIZONTAL AND VERTICAL DATA

11U14124, LS840										
LG										
WiFi WLAN 2.4G Worst case										
Test Frequency	Meter Reading	Detector	5m A Cable below 1GHz.TXT [dB]	5m A T64 PreAmp below 1GHz.TXT [dB]	5m A T122 Bilog below 1GHz.TXT [dB]		CFR 47 Part 15 Class B 3m	Margin	Height [cm]	Polarity
40.8553	42.22	PK	0.7	-28.3	13.4	28.02	40	-11.98	100	Horz
54.8122	44.47	PK	0.8	-28.3	8.1	25.07	40	-14.93	300	Horz
58.1075	40.36	PK	0.8	-28.3	8	20.86	40	-19.14	200	Horz
64.3106	41.68	PK	0.8	-28.2	8	22.28	40	-17.72	300	Horz
85.052	43.28	PK	1	-28.2	7.4	23.48	40	-16.52	200	Horz
99.3965	37.74	PK	1.1	-28.2	9.8	20.44	43.5	-23.06	100	Horz
Test Frequency	Meter Reading	Detector	5m A Cable below 1GHz.TXT [dB]	5m A T64 PreAmp below 1GHz.TXT [dB]	5m A T122 Bilog below 1GHz.TXT [dB]		CFR 47 Part 15 Class B 3m	Margin	Height [cm]	Polarity
41.0492	46.97	PK	0.7	-28.3	13.2	32.57	40	-7.43	200	Vert
41.4369	45.49	PK	0.7	-28.3	13	30.89	40	-9.11	100	Vert
55.5875	49.75	PK	0.8	-28.3	8.1	30.35	40	-9.65	300	Vert
56.3629	48.96	PK	0.8	-28.3	8.1	29.56	40	-10.44	100	Vert
62.1783	50.6	PK	0.8	-28.3	7.9	31	40	-9	100	Vert
99.5903	49.84	PK	1.1	-28.2	9.8	32.54	43.5	-10.96	200	Vert

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

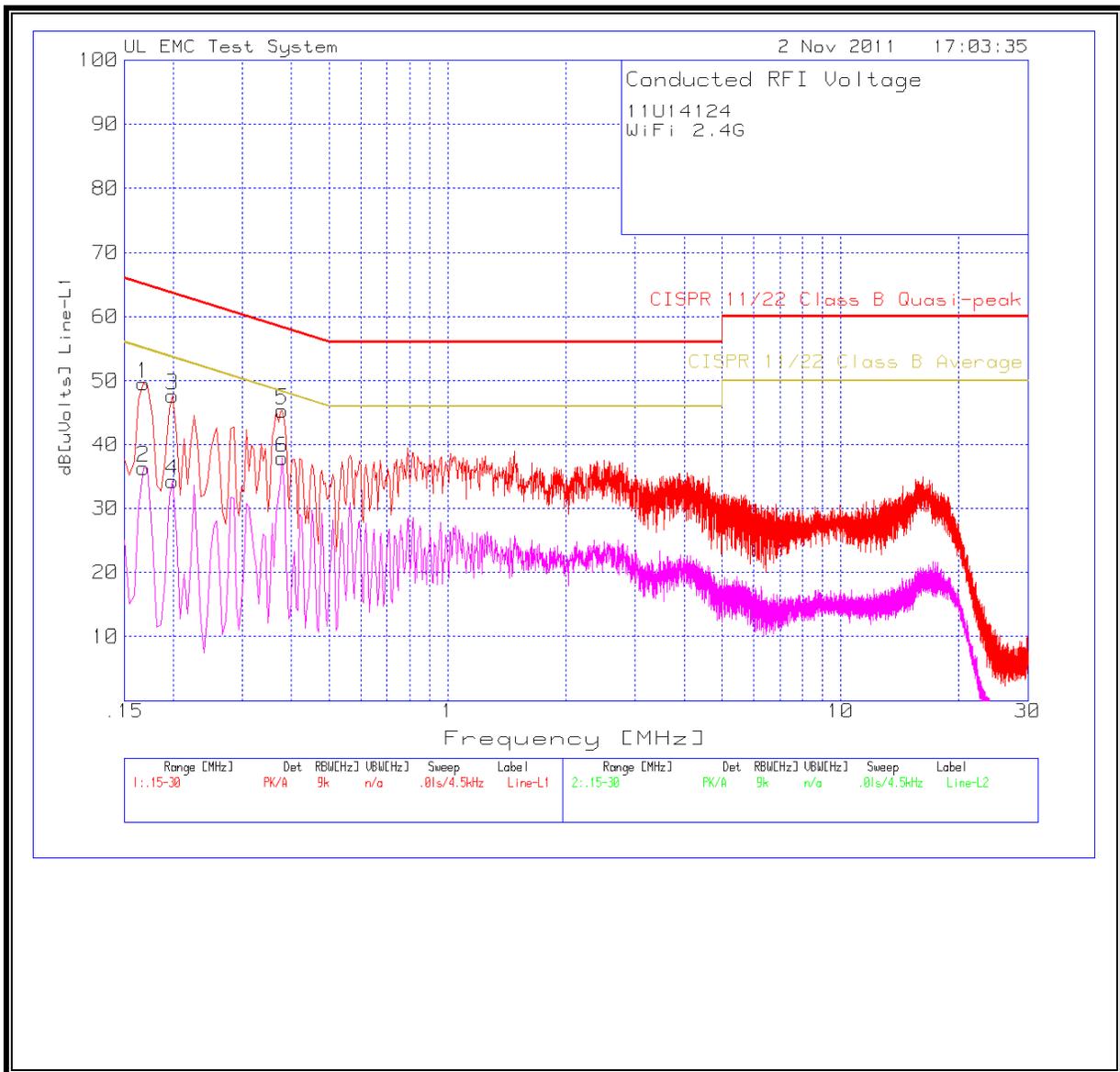
ANSI C63.4

RESULTS

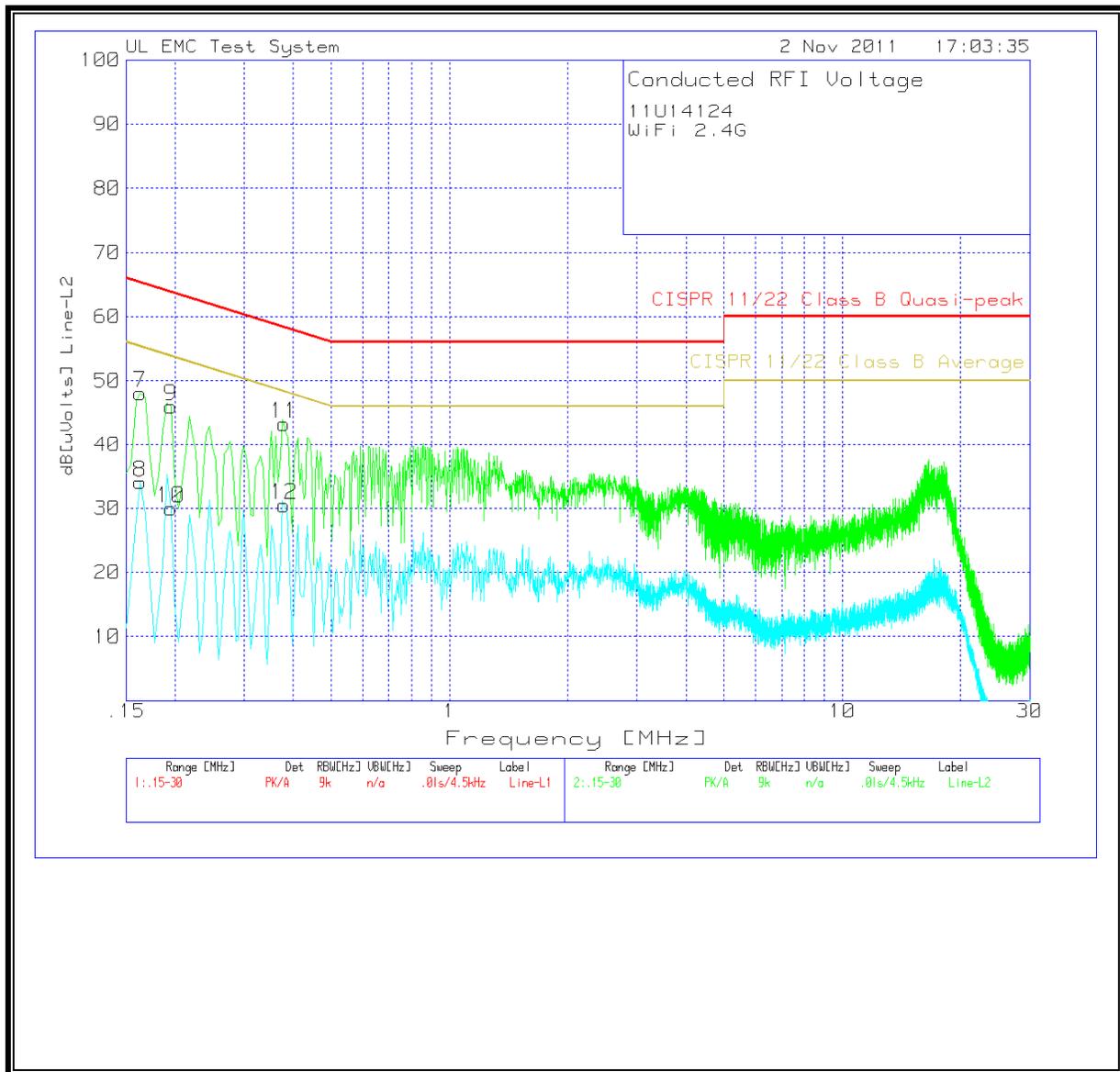
6 WORST EMISSIONS

Line-L1 .15 - 30MHz									
Test Frequency	Meter Reading	Detector	LISN [dB]	Conducted Emission Cable [dB]	dB[uVolt s]	CISPR 11/22 Class B Quasi-peak	Margin	CISPR 11/22 Class B Average	Margin
0.168	49.58	PK	0	0	49.58	65.1	-15.52	55.1	-5.52
0.168	36.27	Av	0	0	36.27	-	-	55.1	-18.83
0.1995	47.65	PK	0	0	47.65	63.6	-15.95	53.6	-5.95
0.1995	34.21	Av	0	0	34.21	-	-	53.6	-19.39
0.3795	45.37	PK	0	0	45.37	58.3	-12.93	48.3	-2.93
0.3795	37.83	Av	0	0	37.83	-	-	48.3	-10.47
Line-L2 .15 - 30MHz									
Test Frequency	Meter Reading	Detector	LISN [dB]	Conducted Emission Cable [dB]	dB[uVolt s]	CISPR 11/22 Class B Quasi-peak	Margin	CISPR 11/22 Class B Average	Margin
0.1635	48.04	PK	0	0	48.04	65.3	-17.26	55.3	-7.26
0.1635	34.05	Av	0	0	34.05	-	-	55.3	-21.25
0.195	46.02	PK	0	0	46.02	63.8	-17.78	53.8	-7.78
0.195	29.93	Av	0	0	29.93	-	-	53.8	-23.87
0.3795	43.32	PK	0	0	43.32	58.3	-14.98	48.3	-4.98
0.3795	30.48	Av	0	0	30.48	-	-	48.3	-17.82

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:

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

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	14.85	-1.69	0.04	0.004