



FCC CFR47 PART 15 SUBPART C

CERTIFICATION TEST REPORT

FOR

CDMA, LTE, WIMAX, AND WIFI MOBILE HOT SPOT

MODEL NUMBER: AC803S

FCC ID: N7NAC803S

REPORT NUMBER: 11U14068-2, Revision A

ISSUE DATE: MARCH 22, 2012

Prepared for

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NVLAP LAB CODE 200065-0

Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
--	03/08/12	Initial Issue	F. Ibrahim
A	03/22/12	Revised section 5.5	F. Ibrahim

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SIERRA WIRELESS INC.
2200 FARADAY AVE. SUITE 150
CARLSBAD, CA 92008, U.S.A.

EUT DESCRIPTION: CDMA, LTE, WIMAX, AND WIFI MOBILE HOT SPOT

MODEL: AC803S

SERIAL NUMBER: N7NAC803

DATE TESTED: DECEMBER 14 -27, 2011

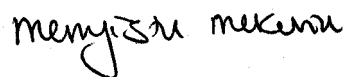
APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-210 Issue 8 Annex 8	Pass
INDUSTRY CANADA RSS-GEN Issue 3	Pass

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:



FRANK IBRAHIM
EMC SUPERVISOR
UL CCS

MENGISTU MEKURIA
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 Mobile hotspot that features CDMA, LTE, WIMAX, and WIFI transceiver that is manufactured by Sierra Wireless Inc.

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	19.53	89.74
2412 - 2462	802.11g	22.01	158.85
2412 - 2462	802.11n HT20	22.20	165.96
2422 - 2452	802.11n HT40	20.53	112.98

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a Chip antenna, with a maximum gain of 2 dBi.

5.4. SOFTWARE AND FIRMWARE

The EUT is linked with Agilent 8960 Communication Test Set.

5.5. WORST-CASE CONFIGURATION AND MODE

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 as worst-case scenario.

Since the EUT is a portable device, for the fundamental tests the X, Y and Z orientations and the worst-case among X, Y, and Z with an AC Adapter have been investigated, After the investigations the X position with an AC Adapter was turned out to be the worst-case. All final radiated emission testing was performed with the EUT placed in the worst-case orientation.

The worst-case data rate for each mode is determined to be as follows, based on preliminary tests of the chipset utilized in this radio, covered under project number 10U13412-4A.

802.11b mode: 1 Mb/s.

802.11g mode: 6 Mb/s.

802.11n HT20: MCS0.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST			
Description	Manufacturer	Model	Serial Number
AC ADAPTER	Sierra Wireless	SSW-2013	201034

I/O CABLES (RF Conducted Test)

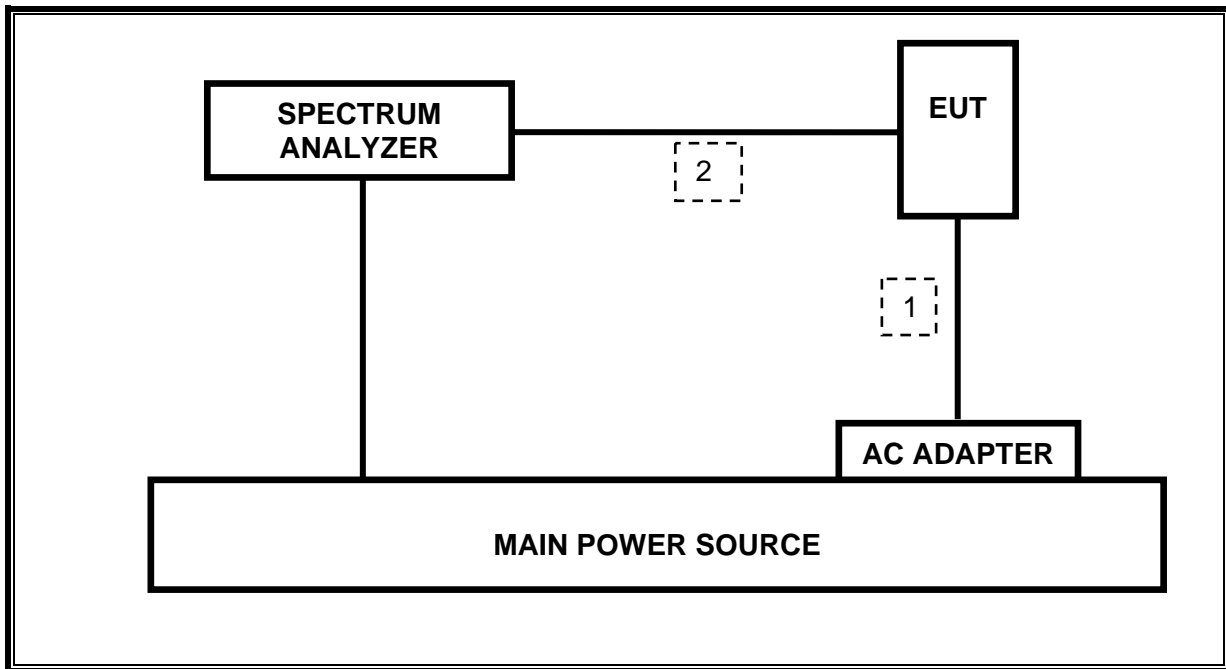
I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	DC	1	MINI USB	UN-SHELDED	1.0m	N/A
2	RF	1	RF	SHELDED	0.1m	N/A

I/O CABLES (RF Radiated Test)

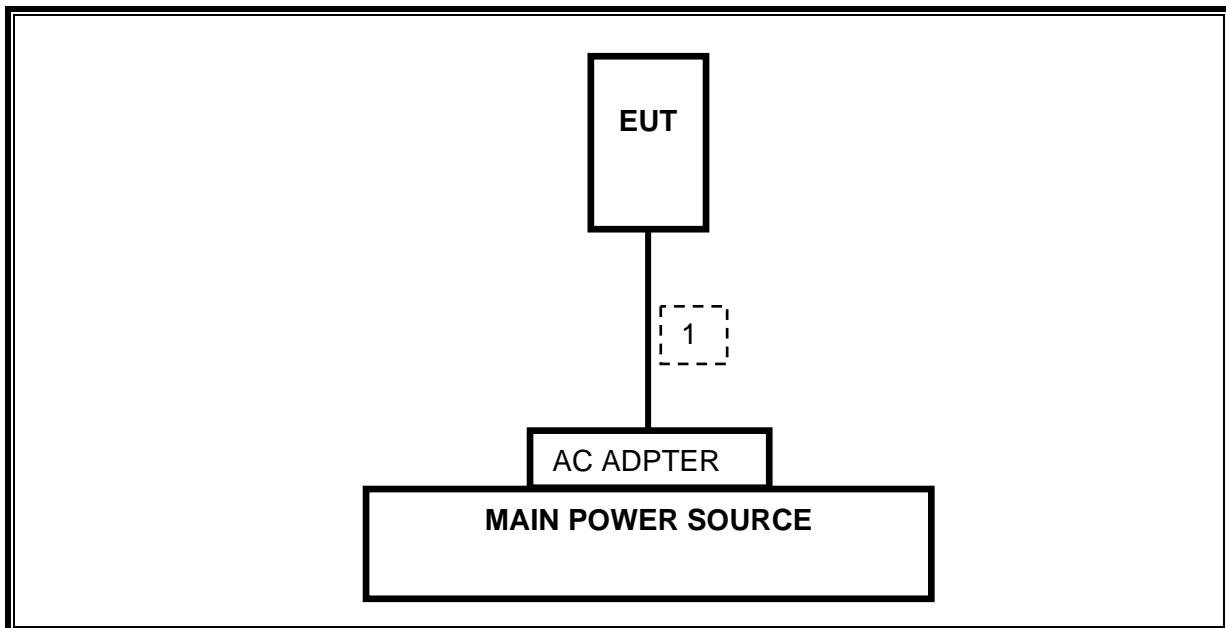
I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	DC	1	MINI USB	UN-SHELDED	1.0m	N/A

Note: The EUT is a stand-alone unit during the tests. Test software exercised the radio card.

CONDUCTED SETUP DIAGRAM FOR TESTS



RADIATED 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	C01069	04/07/12
Spectrum Analyzer, 26.5 GHz	Agilent / HP	E4440A	C01178	08/30/12
EMI Test Receiver, 9 kHz-7 GHz	R & S	ESCI 7	1000741	07/06/12
Power Sensor, 18 GHz	Agilent / HP	8481A	N/A	02/08/12
Power Meter	Agilent / HP	437B	N/A	02/08/12
Antenna, Horn, 18 GHz	EMCO	3115	C00783	06/29/12
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01011	07/16/12
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01052	07/12/12
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00885	01/27/12
Reject Filter, 2.4-2.5 GHz	Micro-Tronics	BRC13192	N02683	CNR
LISN, 30 MHz	FCC	50/250-25-2	C00626	12/13/12

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.

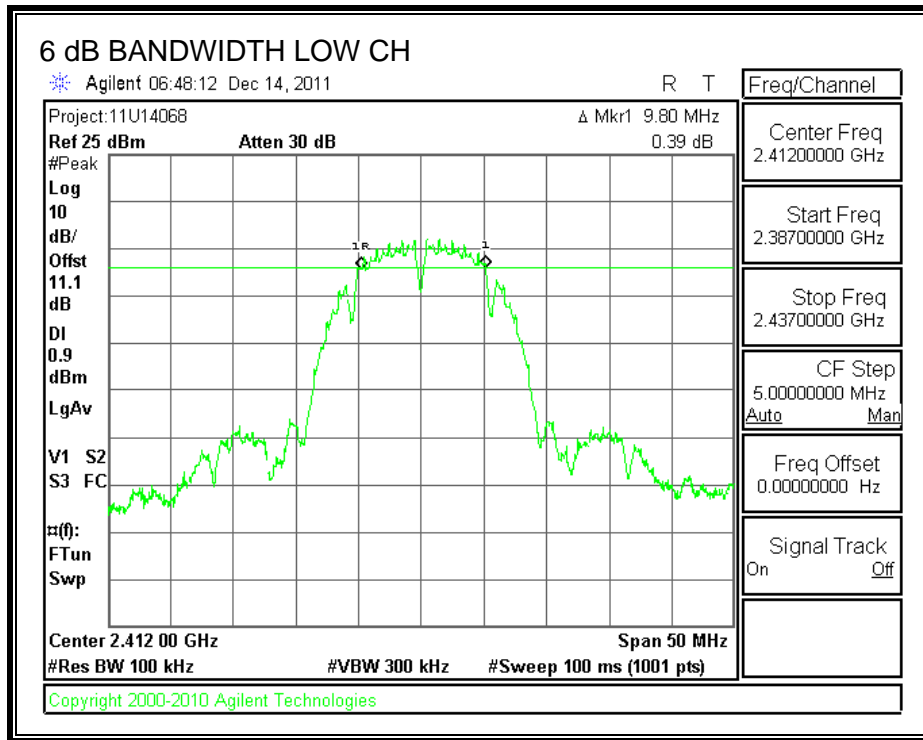
TEST PROCEDURE

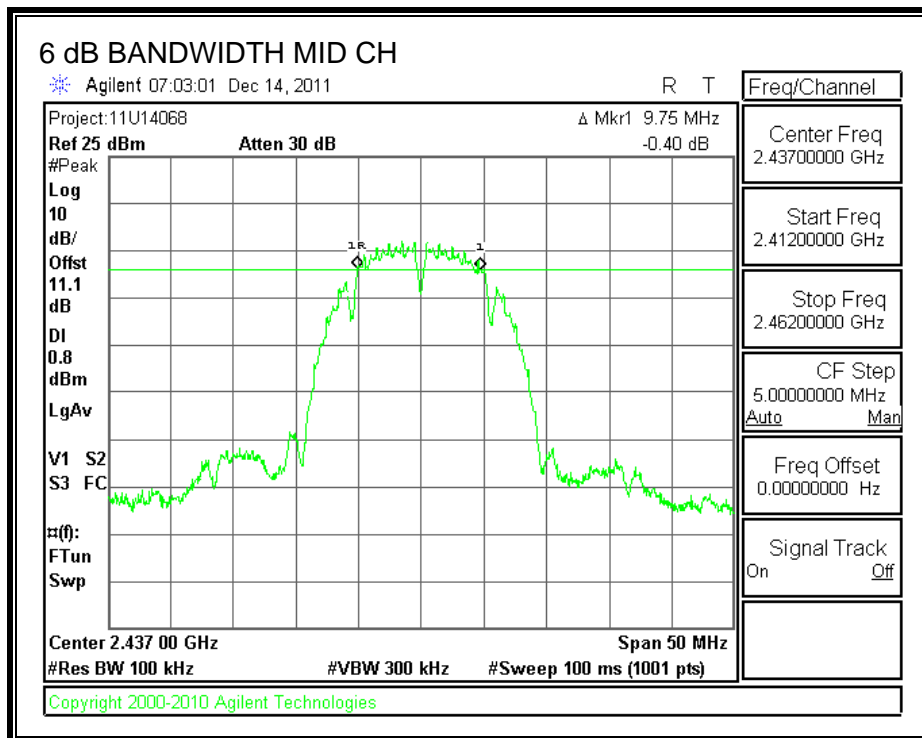
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

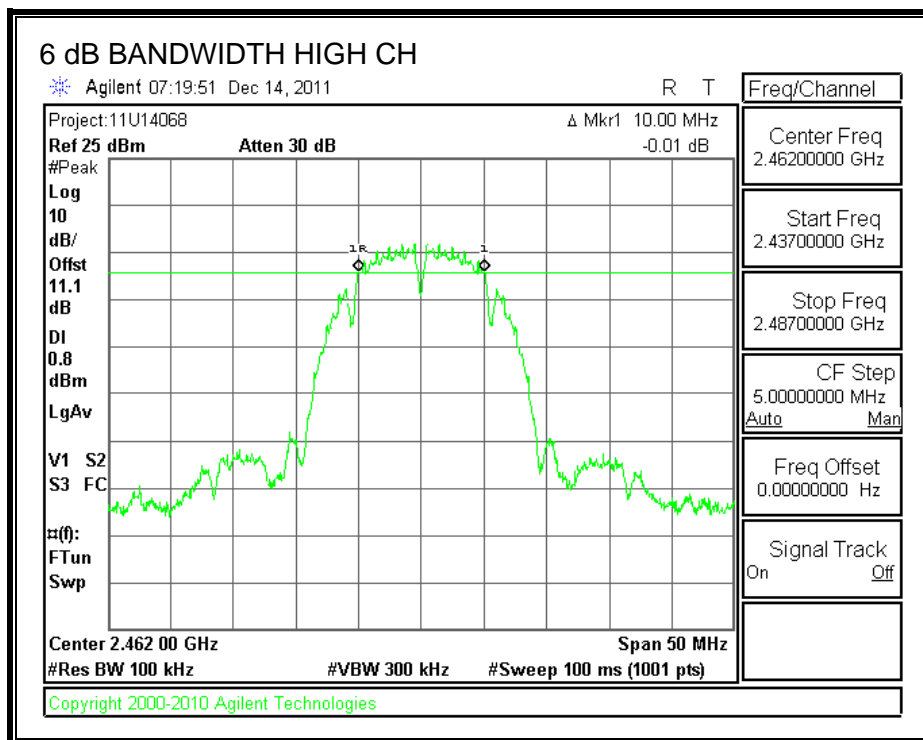
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	9.80	0.5
Middle	2437	9.75	0.5
High	2462	10.00	0.5

6 dB BANDWIDTH







7.1.2. 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.

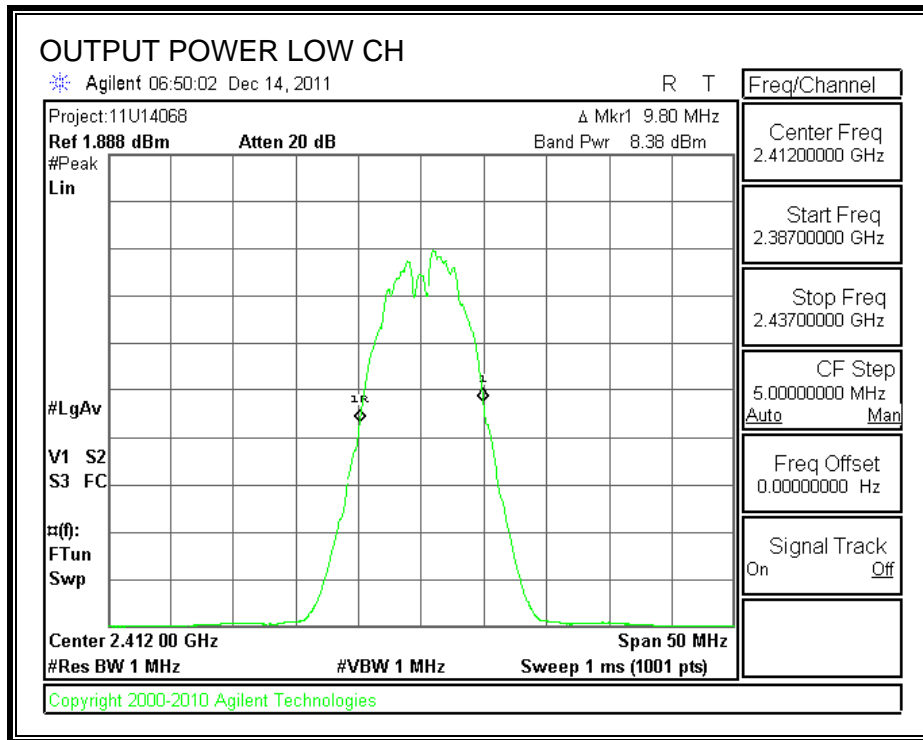
TEST PROCEDURE

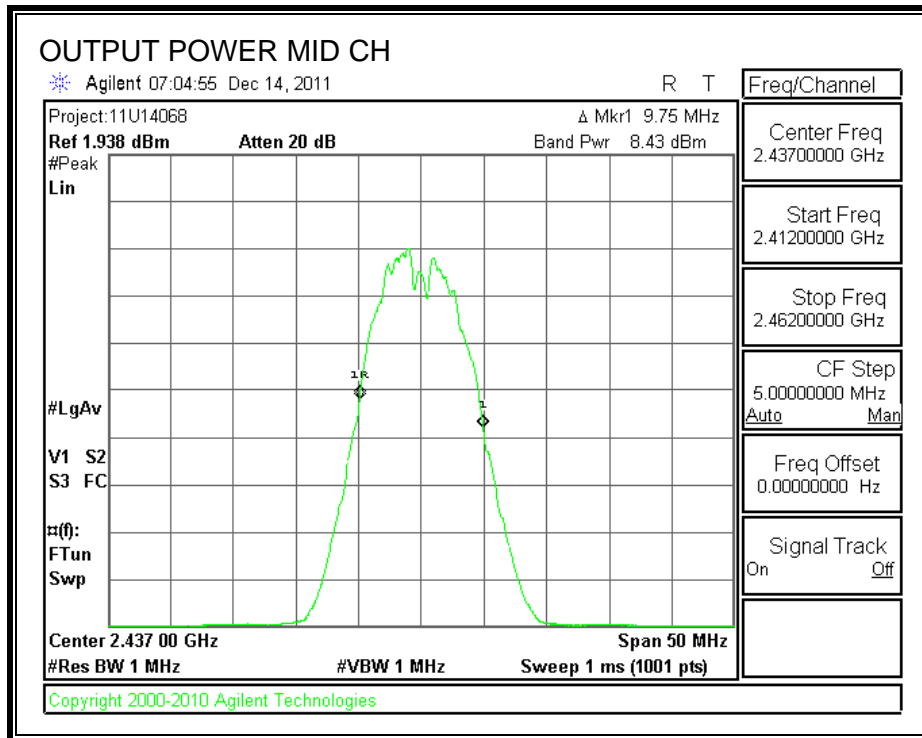
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

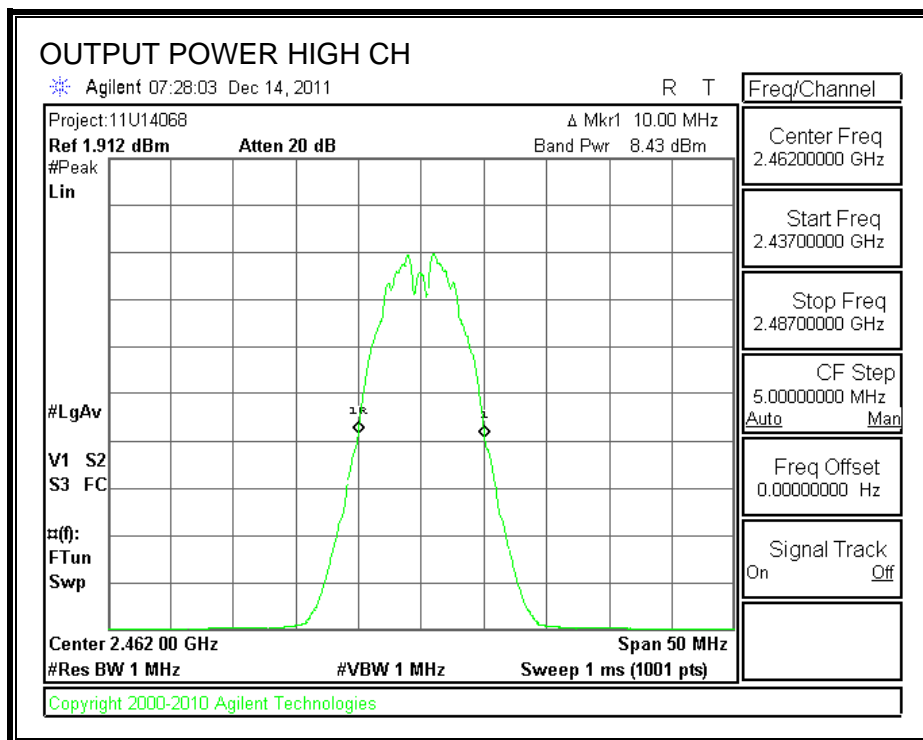
RESULTS

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Attenuator and Cable Offset (dB)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	8.38	11.1	19.48	30	-10.52
Middle	2437	8.43	11.1	19.53	30	-10.47
High	2462	8.42	11.1	19.52	30	-10.48

OUTPUT POWER







7.1.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 11dB (including 10dB pad and 1dB 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	14.60

7.1.4. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

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

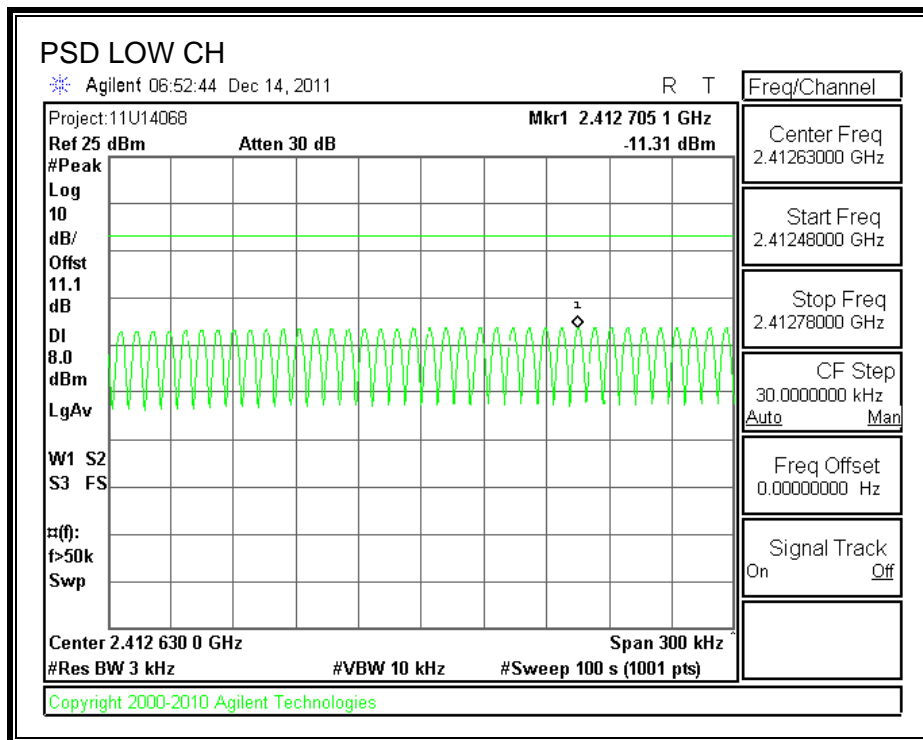
TEST PROCEDURE

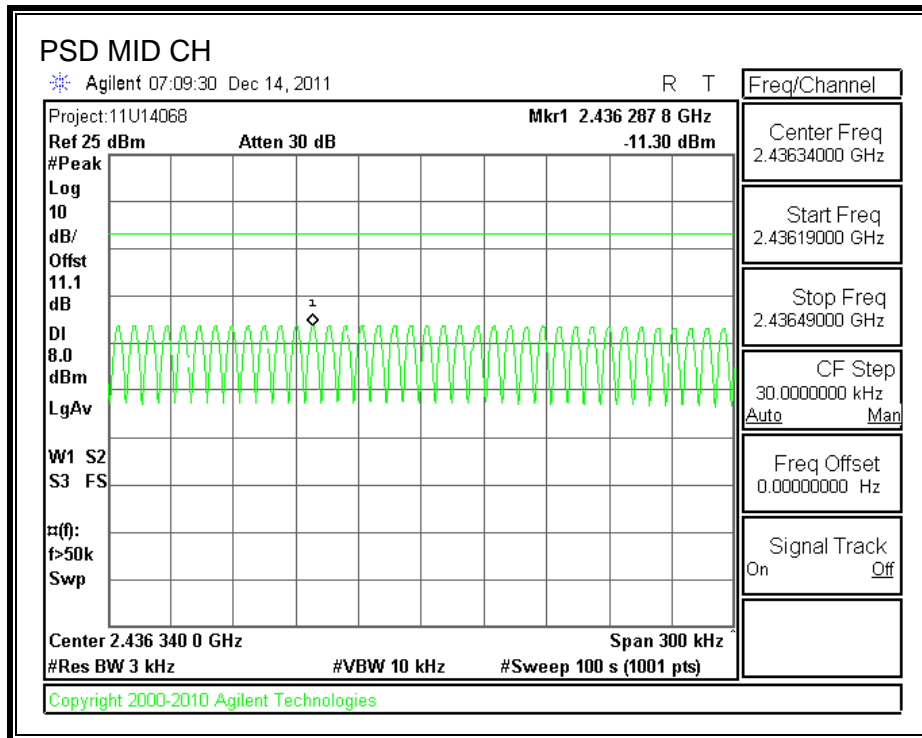
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

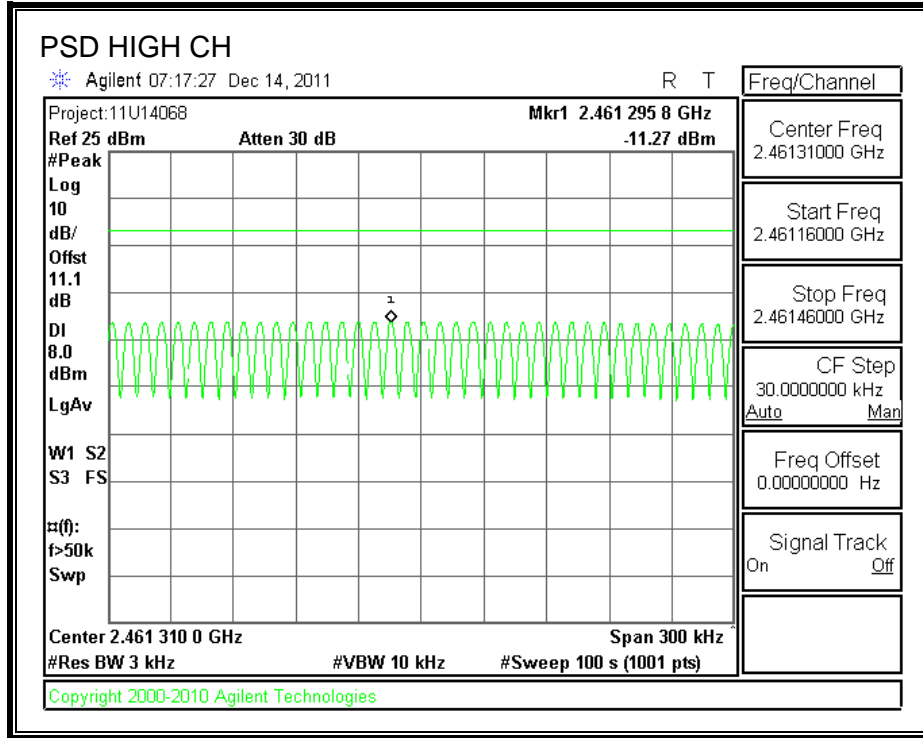
RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-11.31	8	-19.31
Middle	2437	-11.30	8	-19.30
High	2462	-11.27	8	-19.27

POWER SPECTRAL DENSITY







7.1.5. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

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

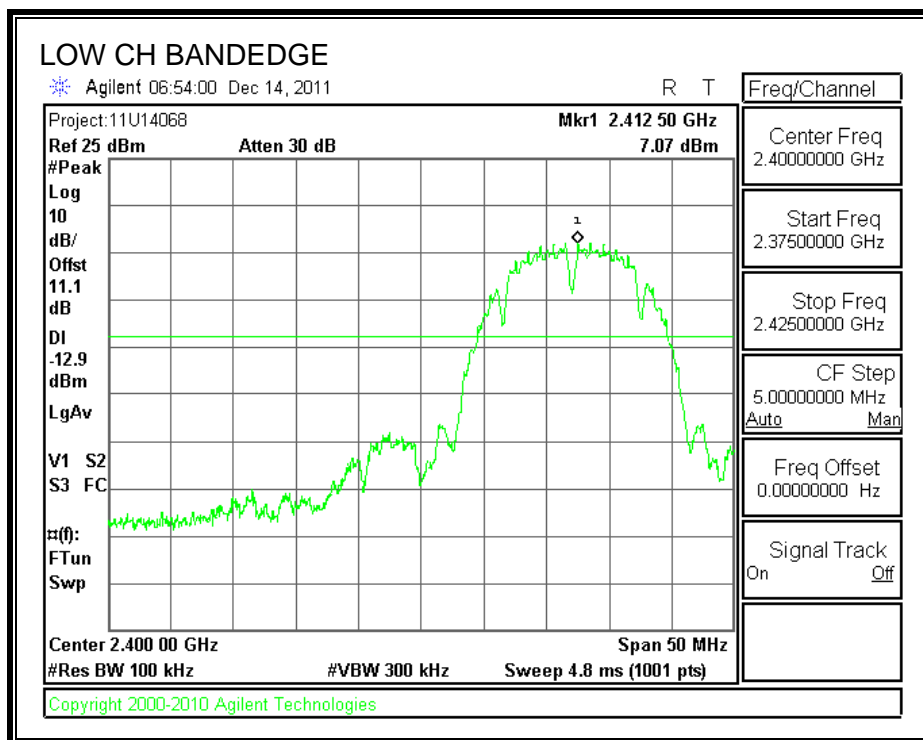
TEST PROCEDURE

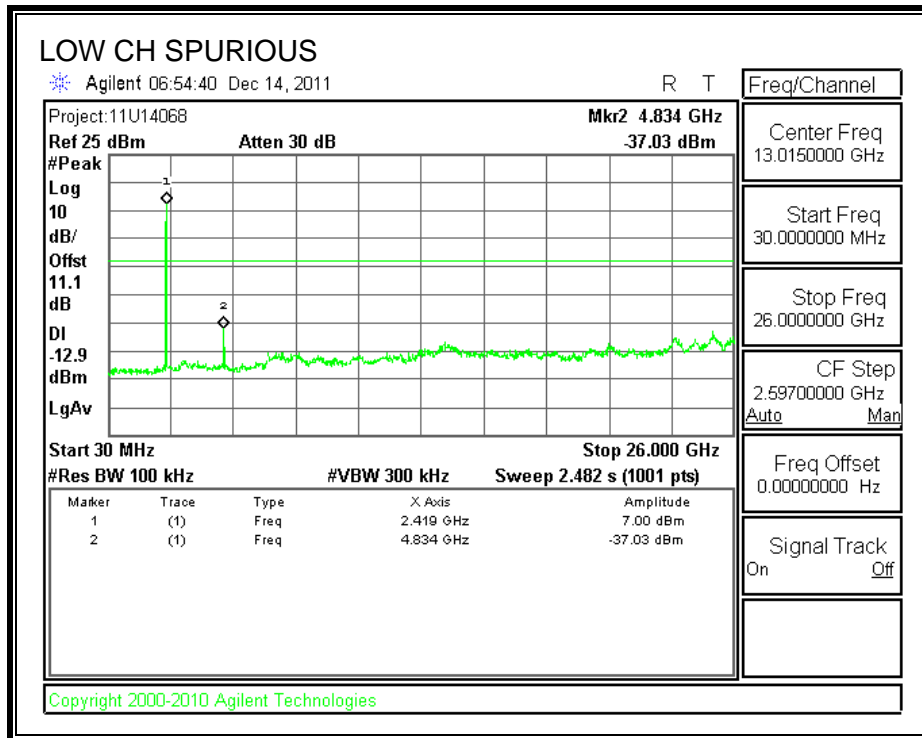
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

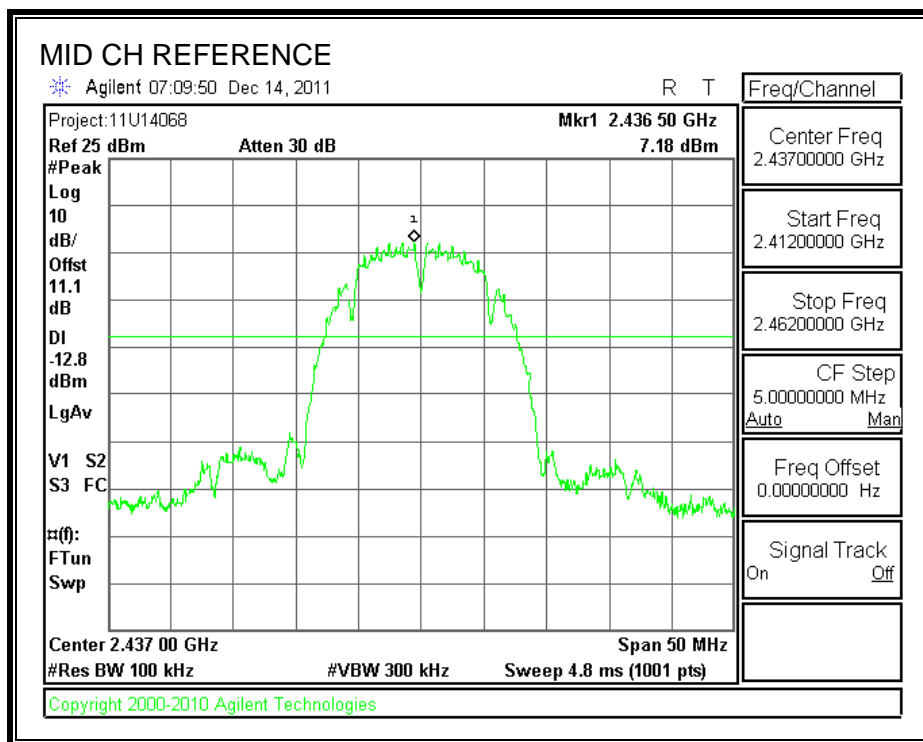
RESULTS

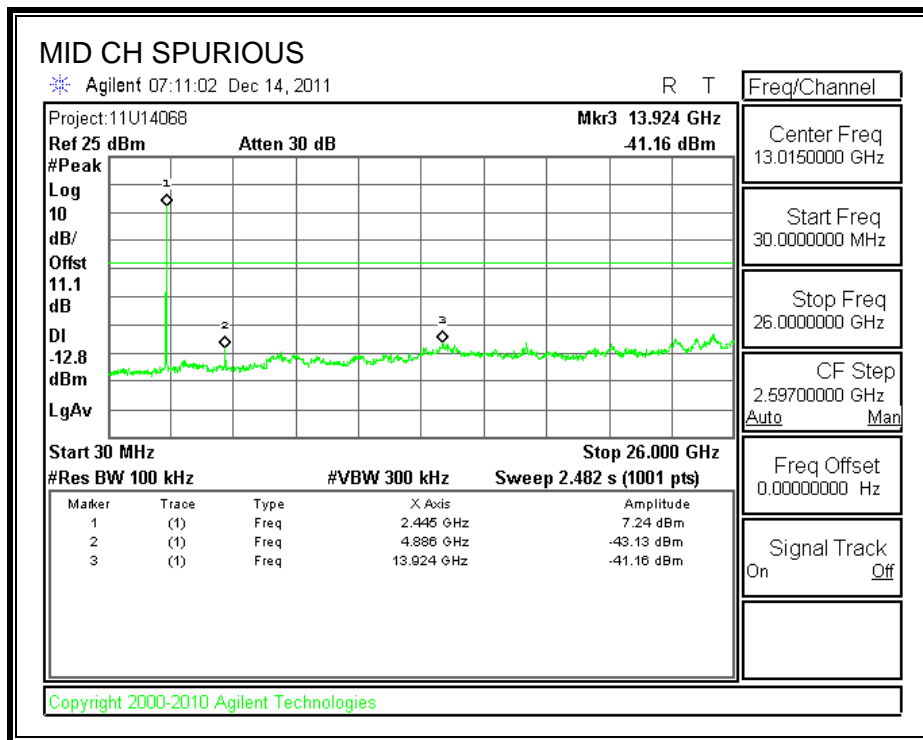
SPURIOUS EMISSIONS, LOW CHANNEL



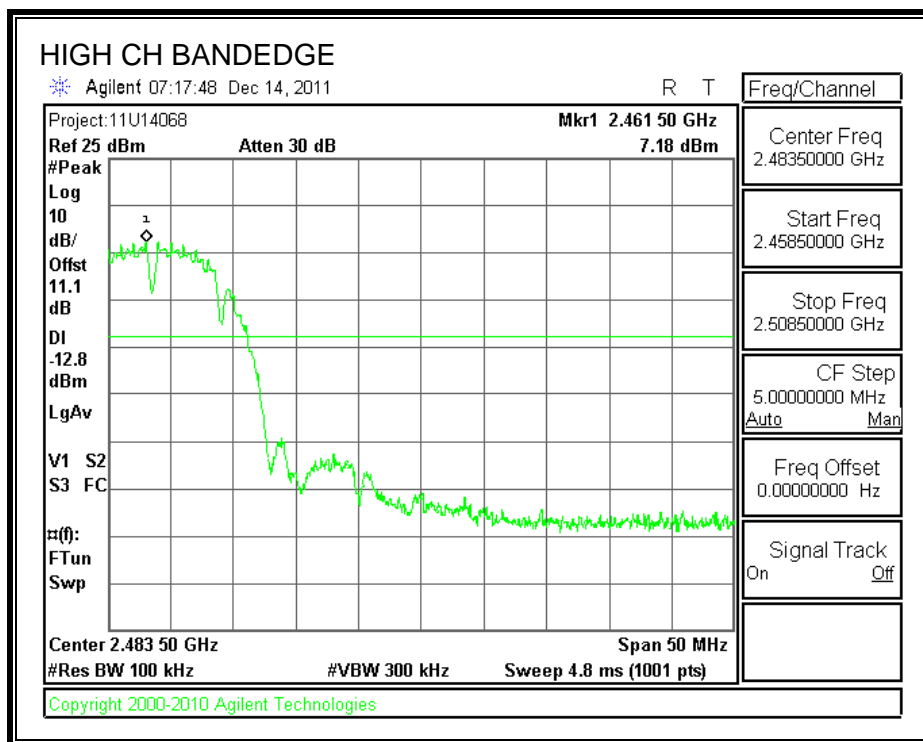


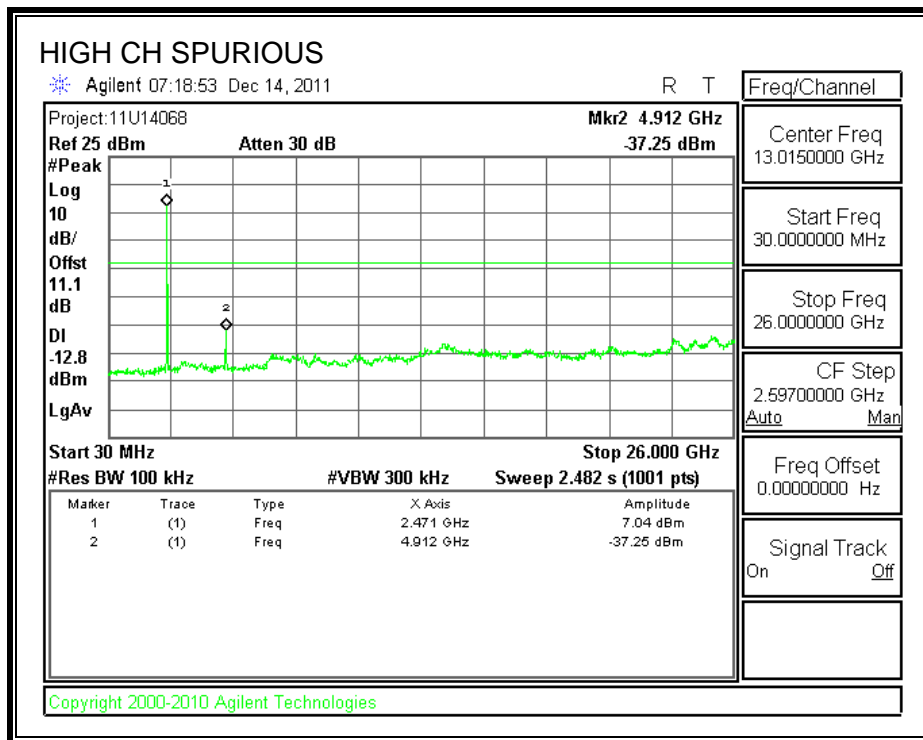
SPURIOUS EMISSIONS, MID CHANNEL





SPURIOUS EMISSIONS, HIGH CHANNEL





7.2. 802.11g MODE 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.

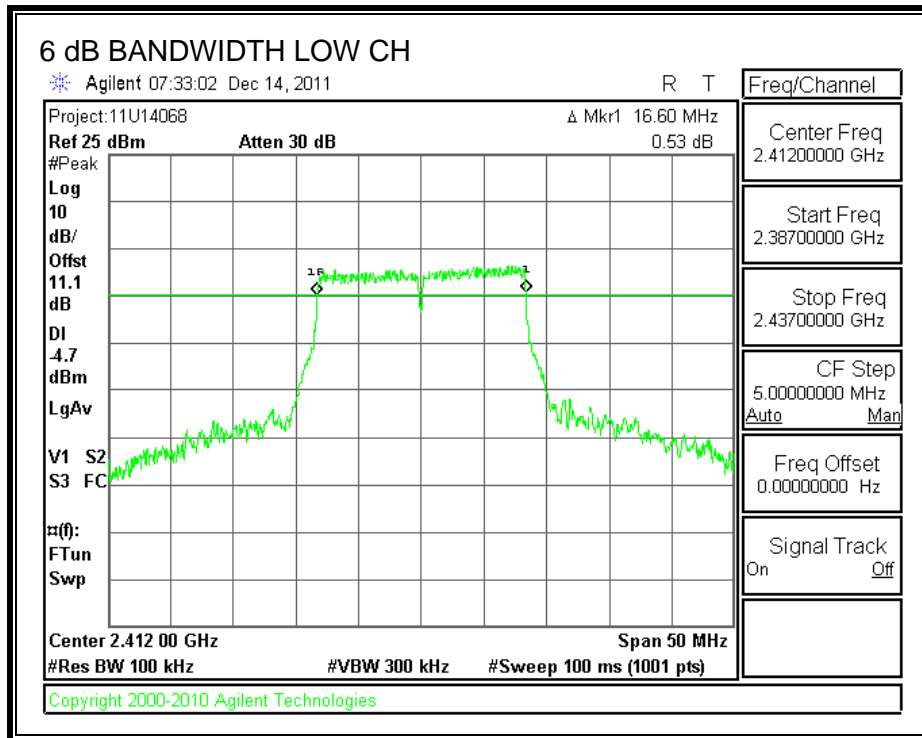
TEST PROCEDURE

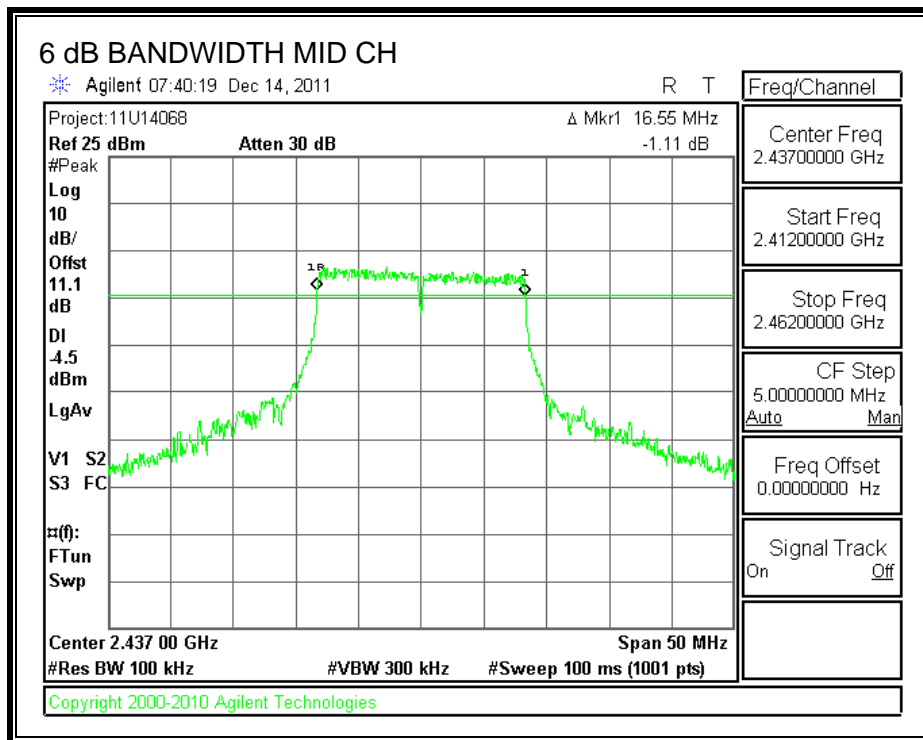
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

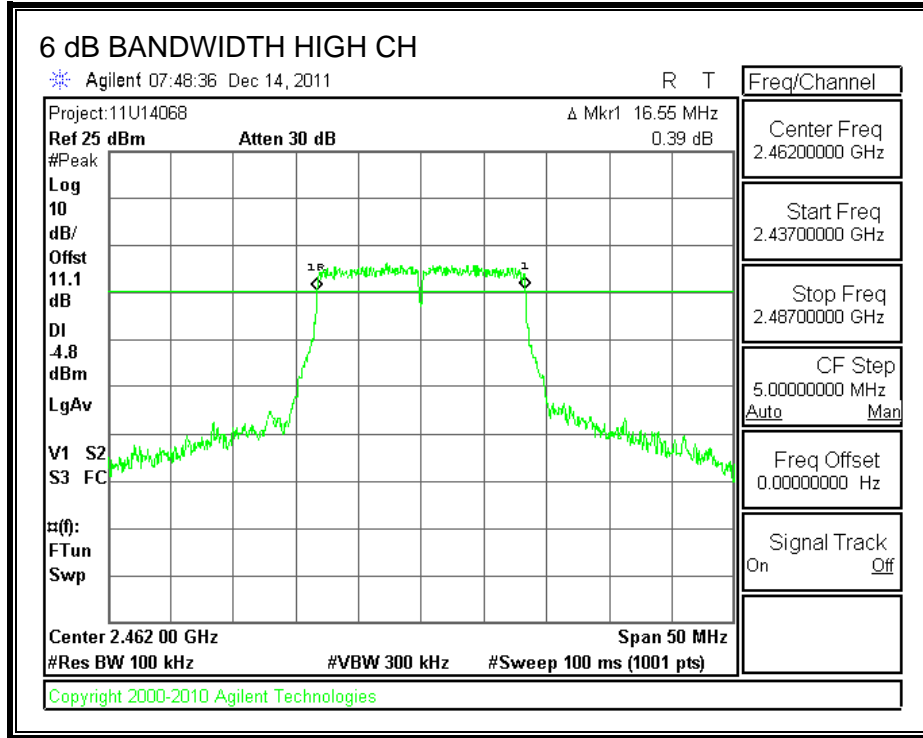
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	16.60	0.5
Middle	2437	16.55	0.5
High	2462	16.55	0.5

6 dB BANDWIDTH







7.2.2. 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.

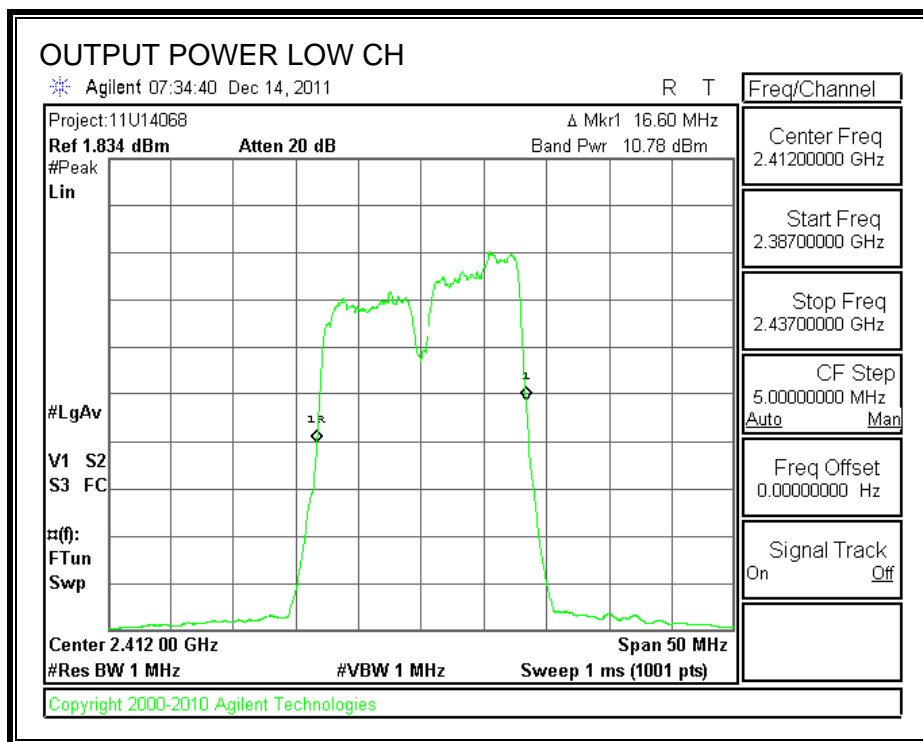
TEST PROCEDURE

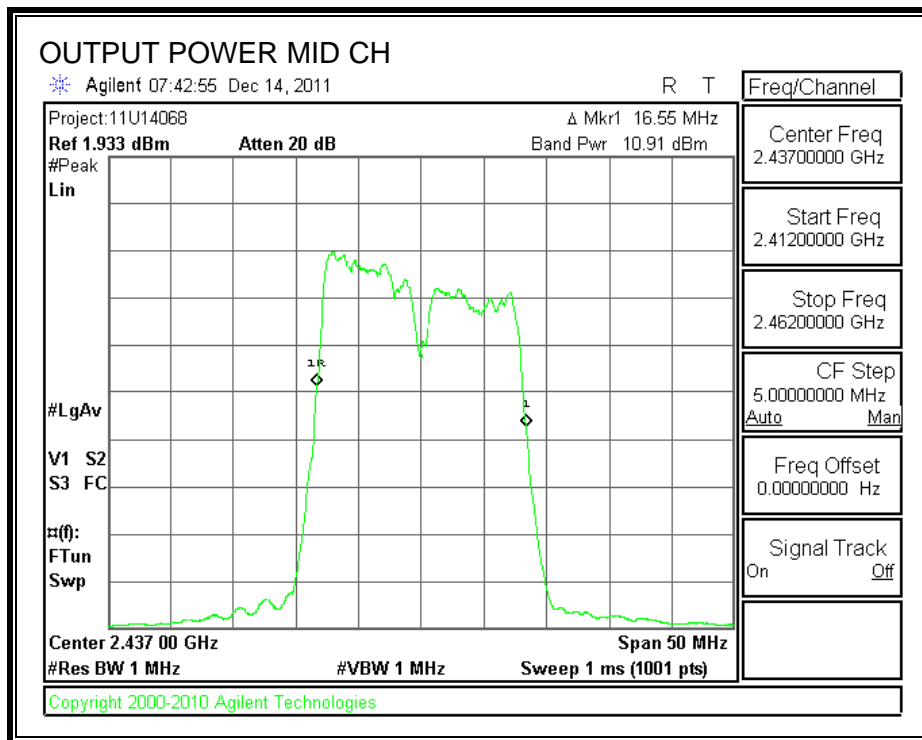
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

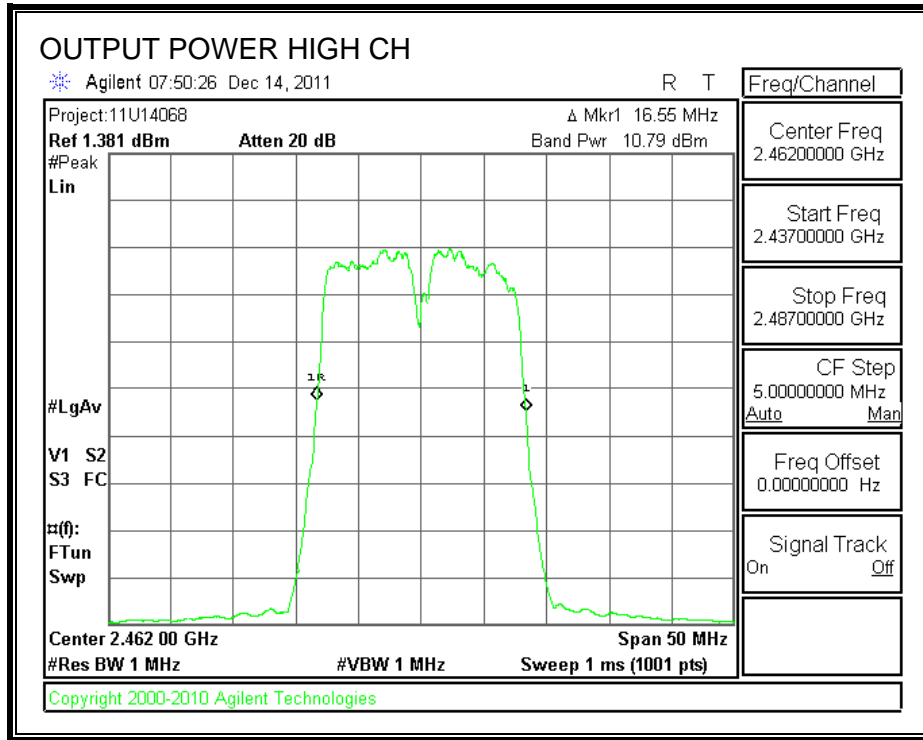
RESULTS

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Attenuator and Cable Offset (dB)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	10.78	11.1	21.88	30	-8.12
Middle	2437	10.91	11.1	22.01	30	-7.99
High	2462	10.79	11.1	21.89	30	-8.11

OUTPUT POWER







7.2.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

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

Channel	Frequency (MHz)	Power (dBm)
Low	2412	12.80
Middle	2437	12.50
High	2462	12.30

7.2.4. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

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

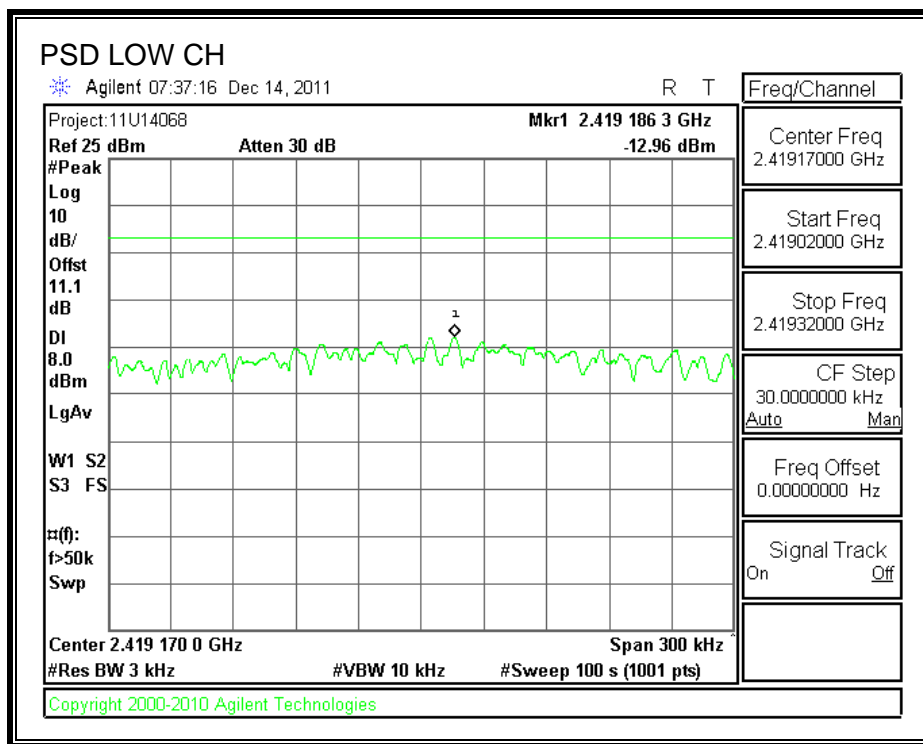
TEST PROCEDURE

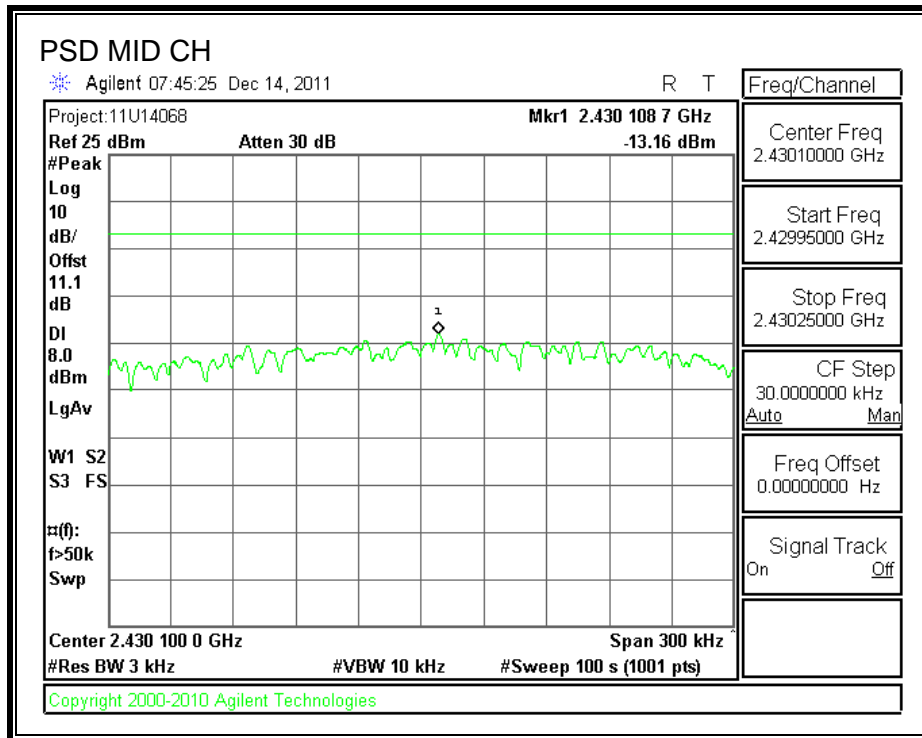
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

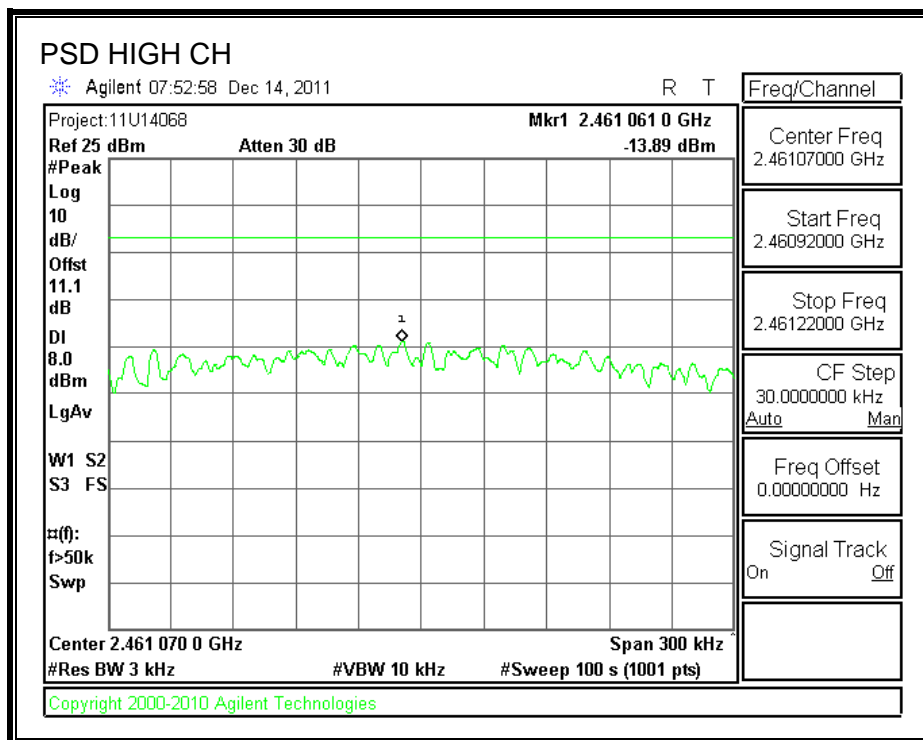
RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-12.96	8	-20.96
Middle	2437	-13.16	8	-21.16
High	2462	-13.89	8	-21.89

POWER SPECTRAL DENSITY







7.2.5. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

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

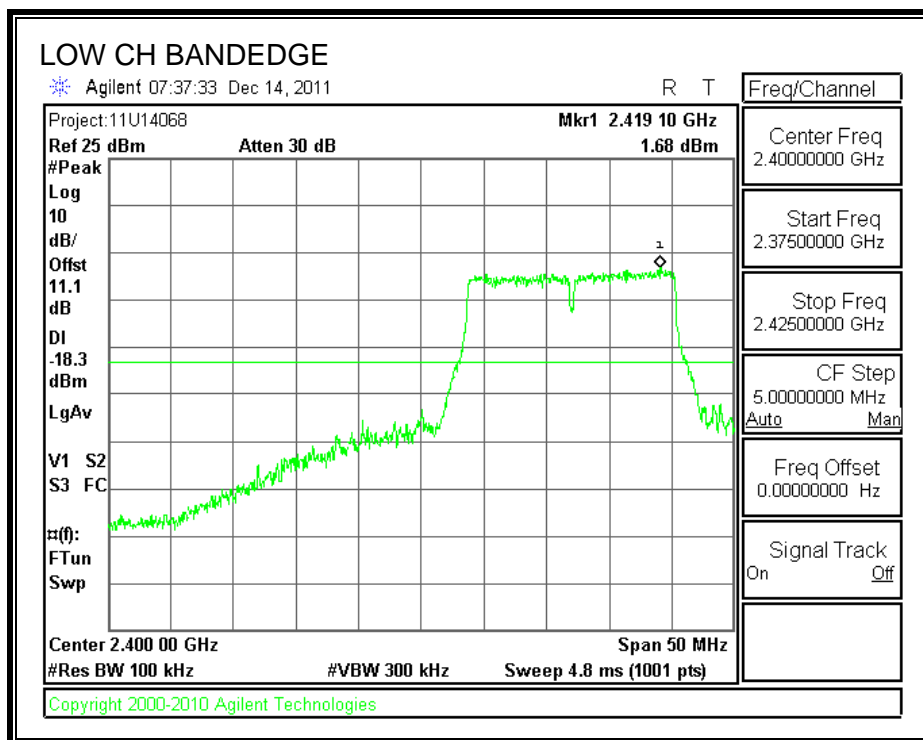
TEST PROCEDURE

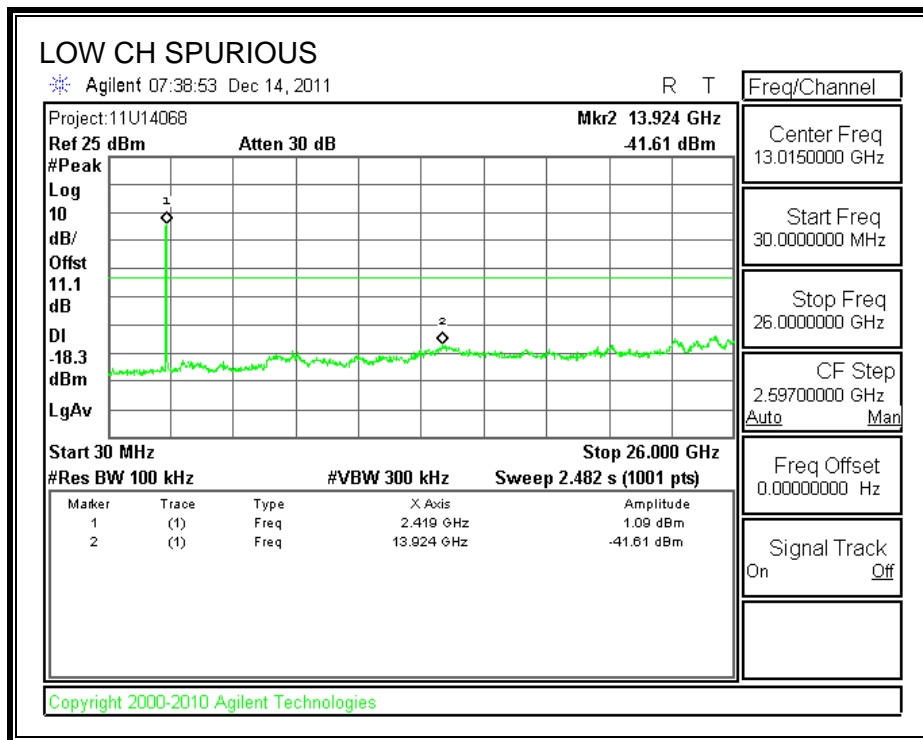
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

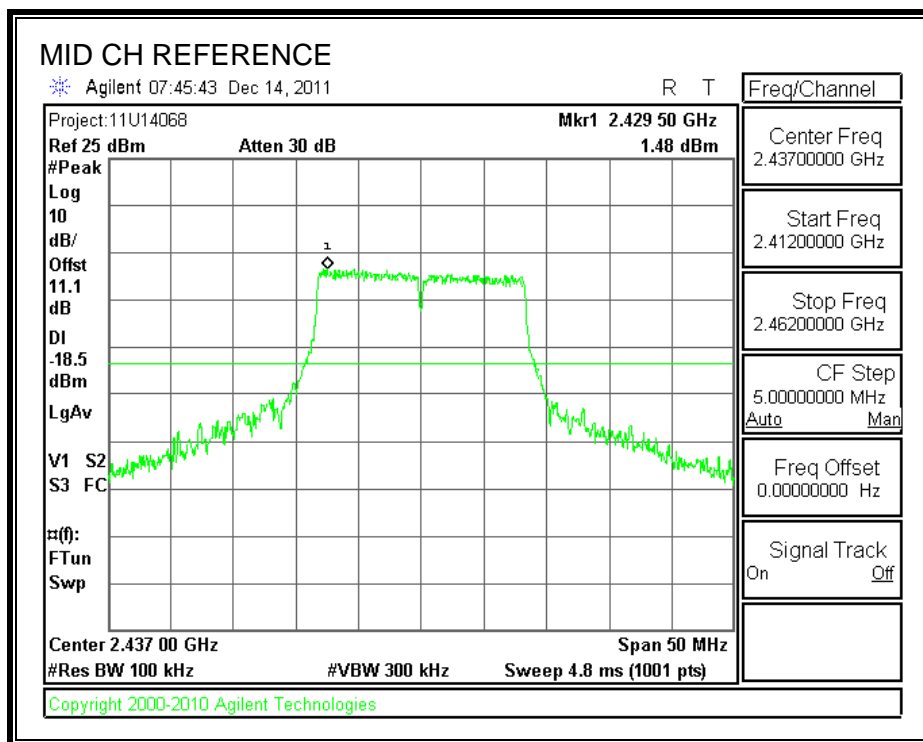
RESULTS

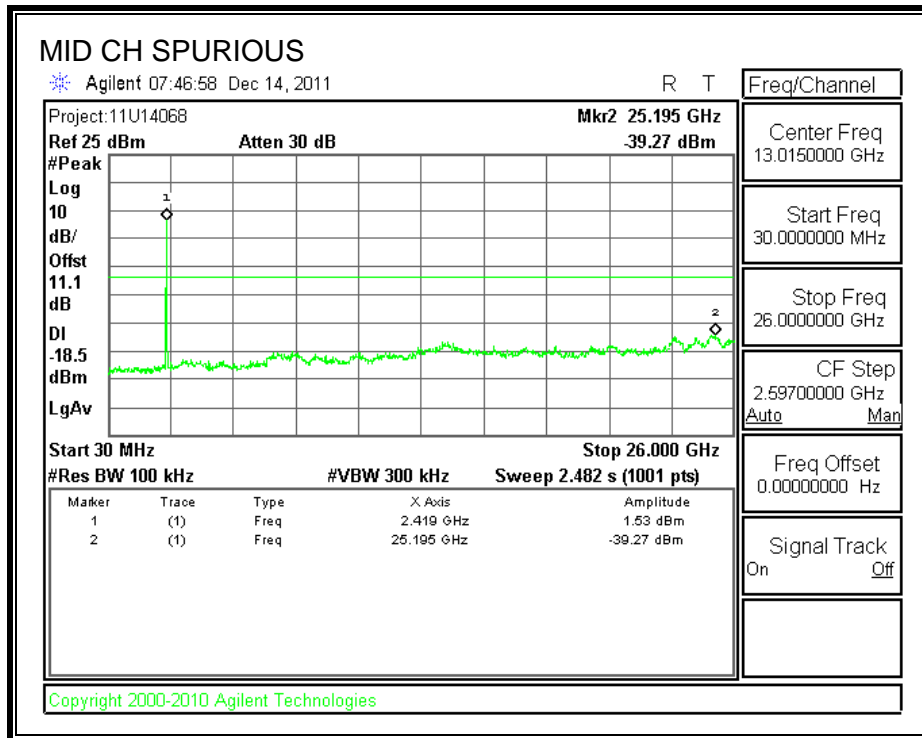
SPURIOUS EMISSIONS, LOW CHANNEL



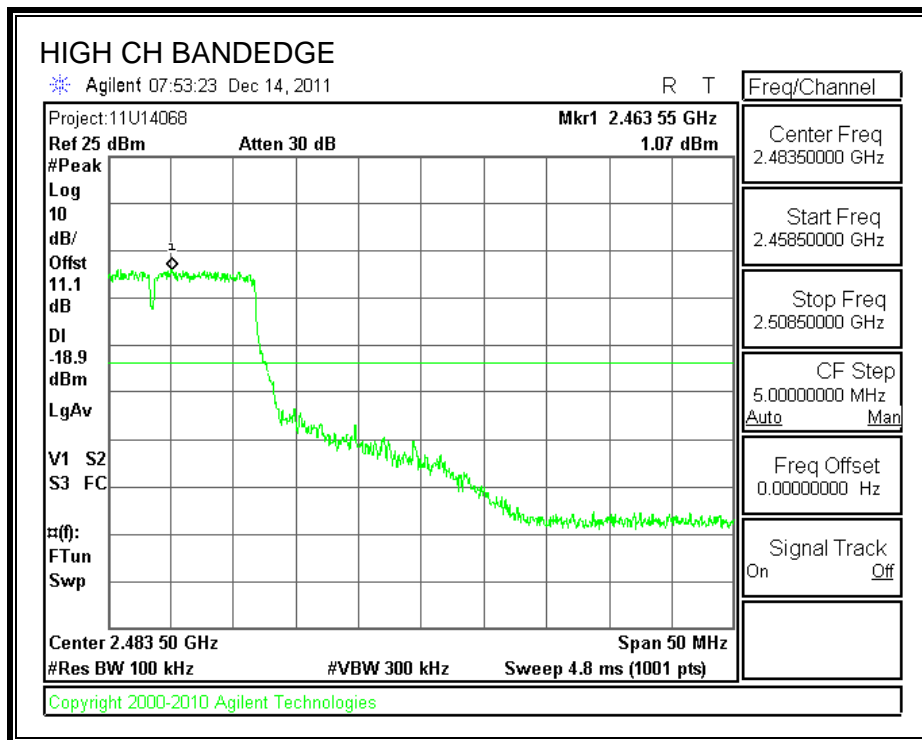


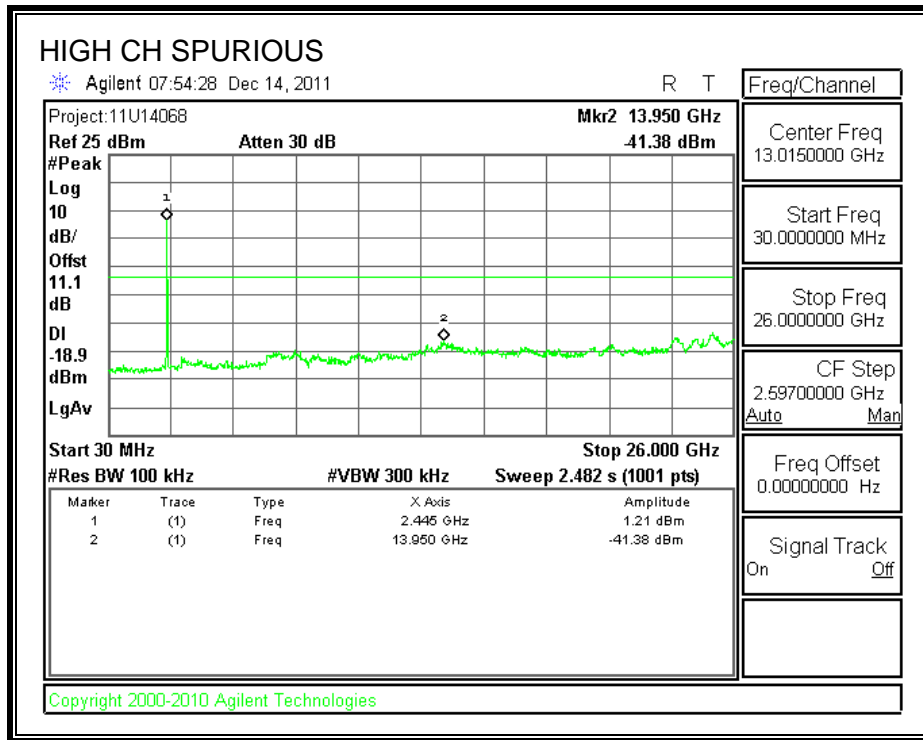
SPURIOUS EMISSIONS, MID CHANNEL





SPURIOUS EMISSIONS, HIGH CHANNEL





7.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND

7.3.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

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

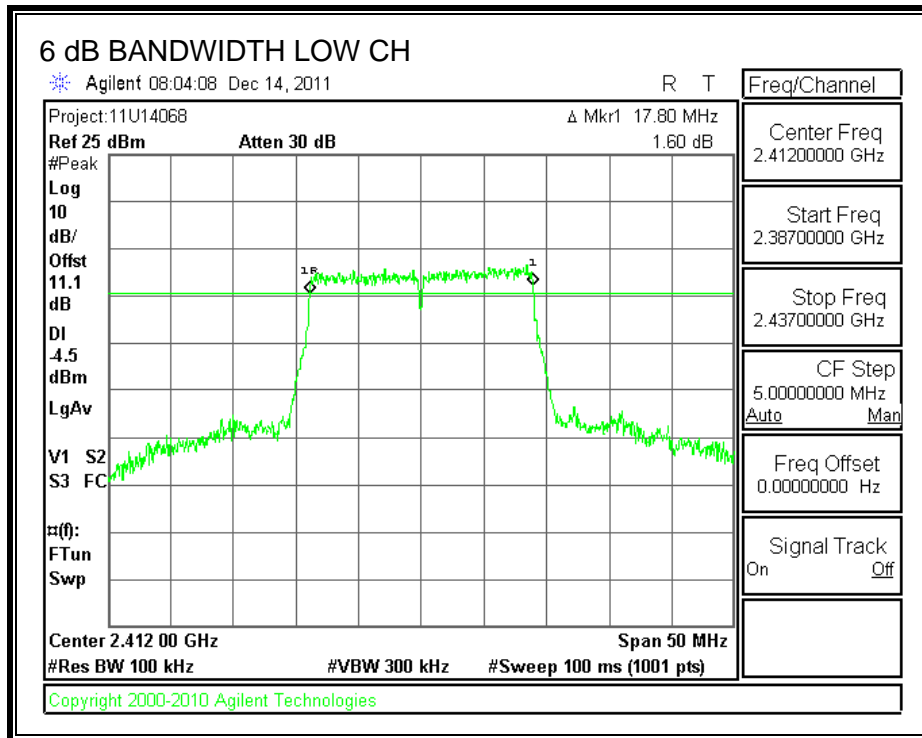
TEST PROCEDURE

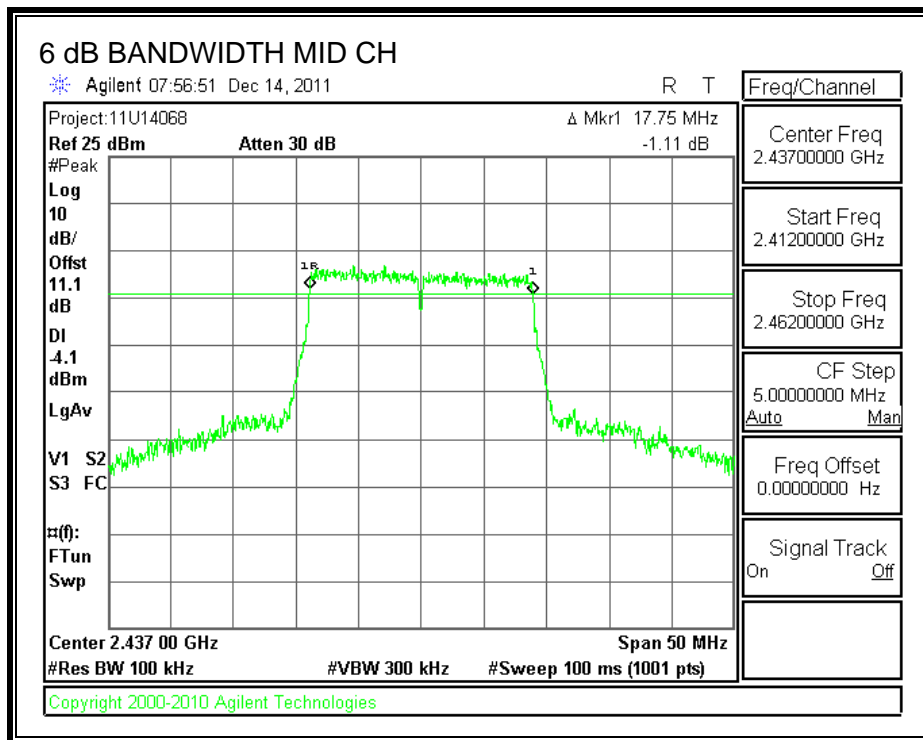
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

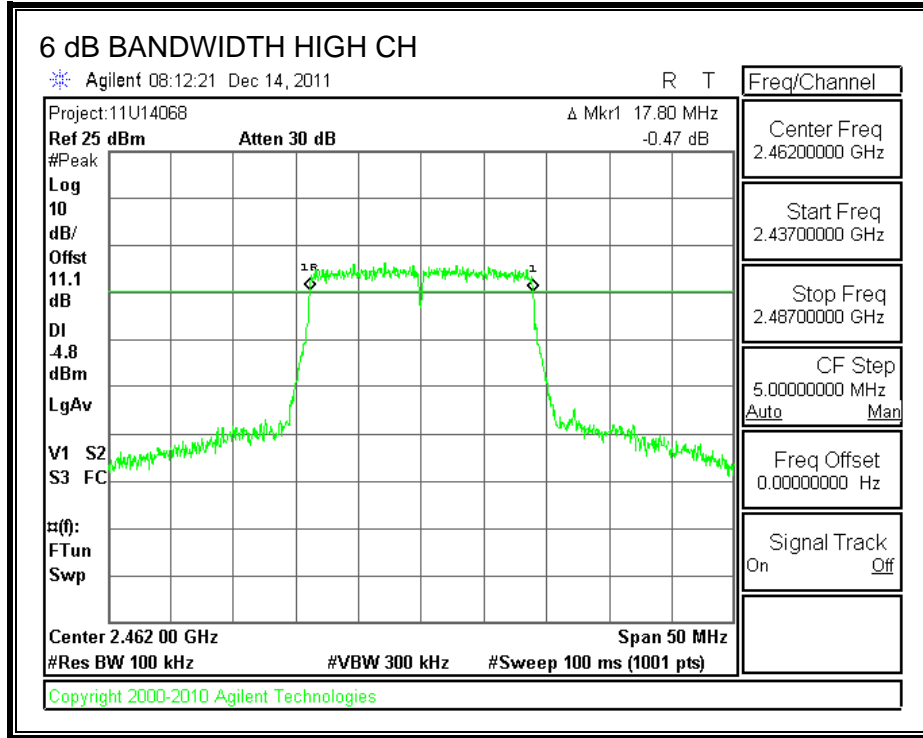
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	17.80	0.5
Middle	2437	17.75	0.5
High	2462	17.80	0.5

6 dB BANDWIDTH







7.3.2. 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.

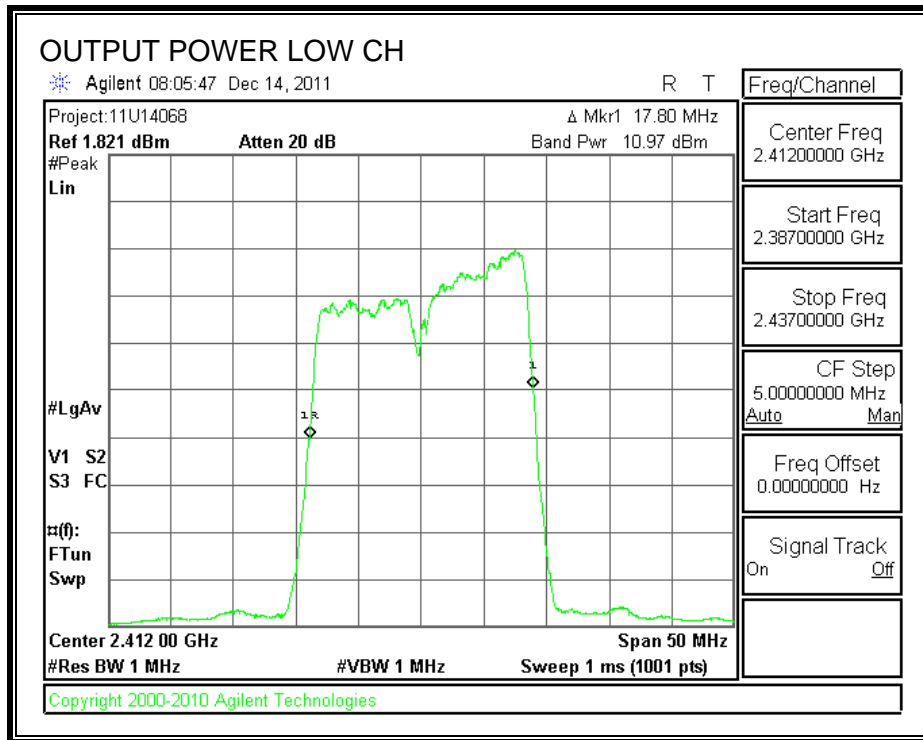
TEST PROCEDURE

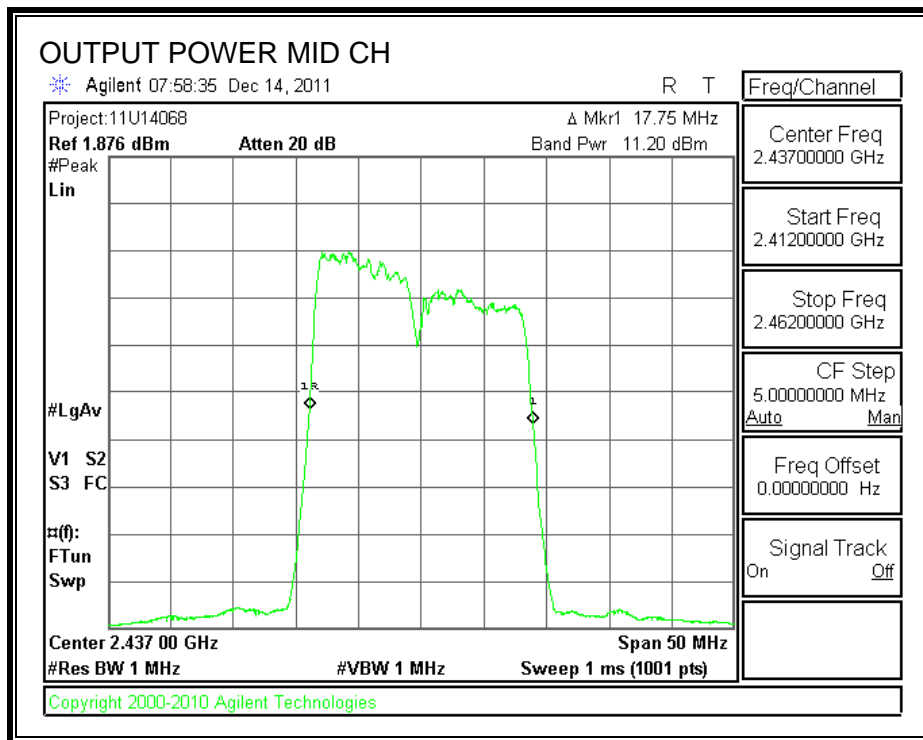
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

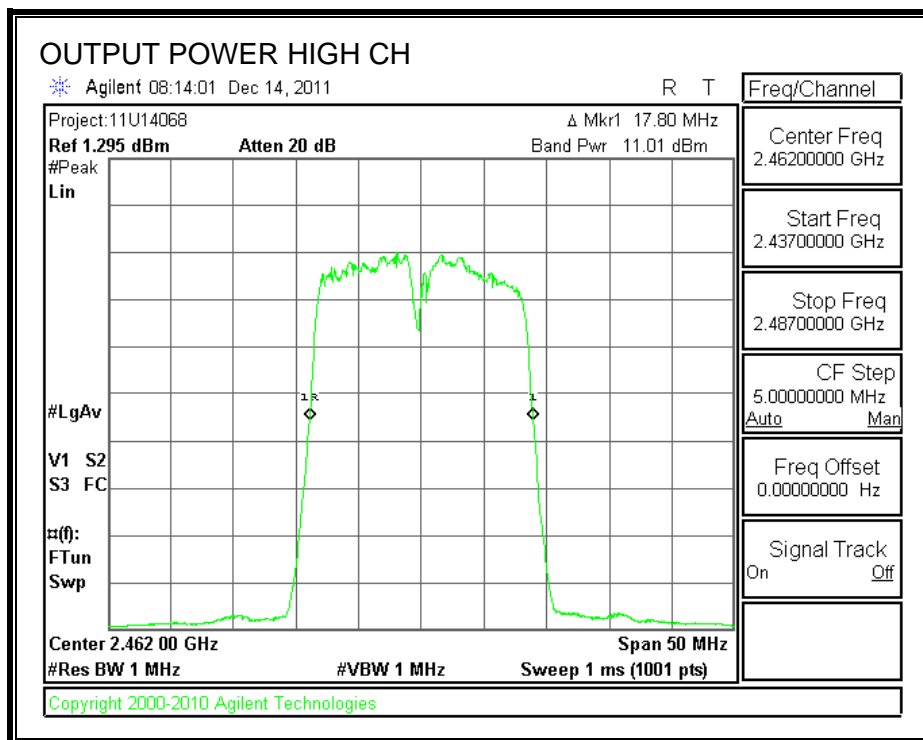
RESULTS

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Attenuator and Cable Offset (dB)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	10.97	11	21.97	30	-8.03
Middle	2437	11.20	11	22.20	30	-7.80
High	2462	11.01	11	22.01	30	-7.99

OUTPUT POWER







7.3.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

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

Channel	Frequency (MHz)	Power (dBm)
Low	2412	12.50
Middle	2437	12.30
High	2462	12.00

7.3.4. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

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

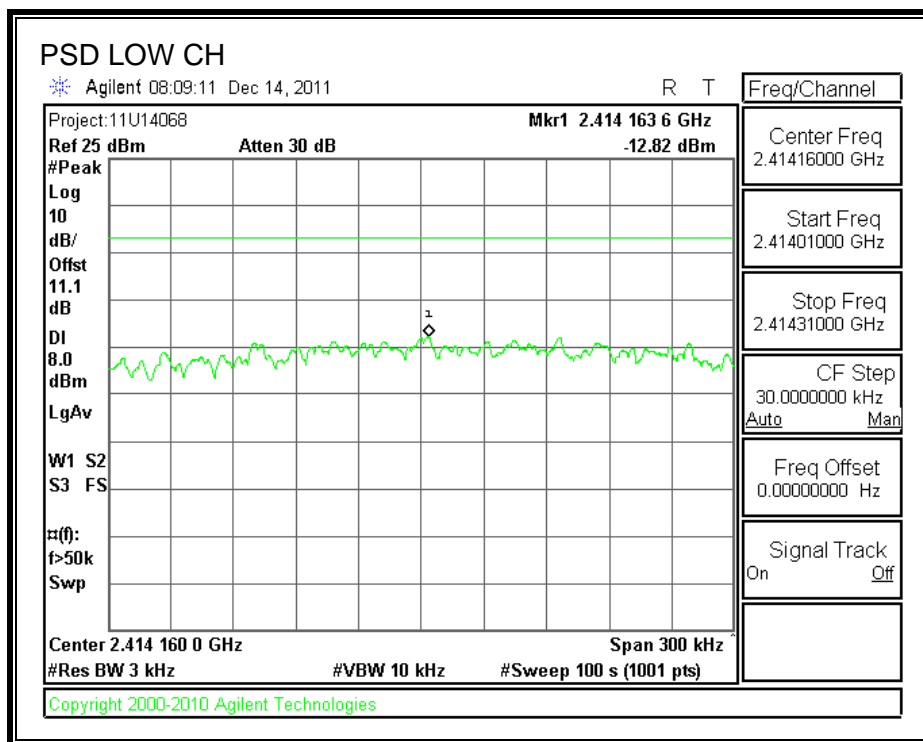
TEST PROCEDURE

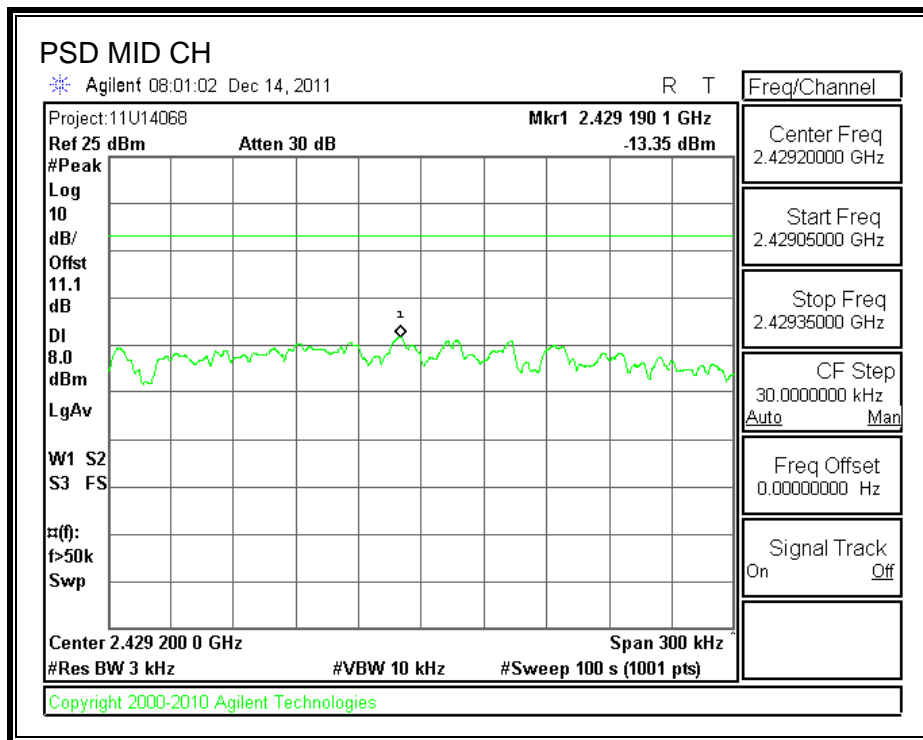
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

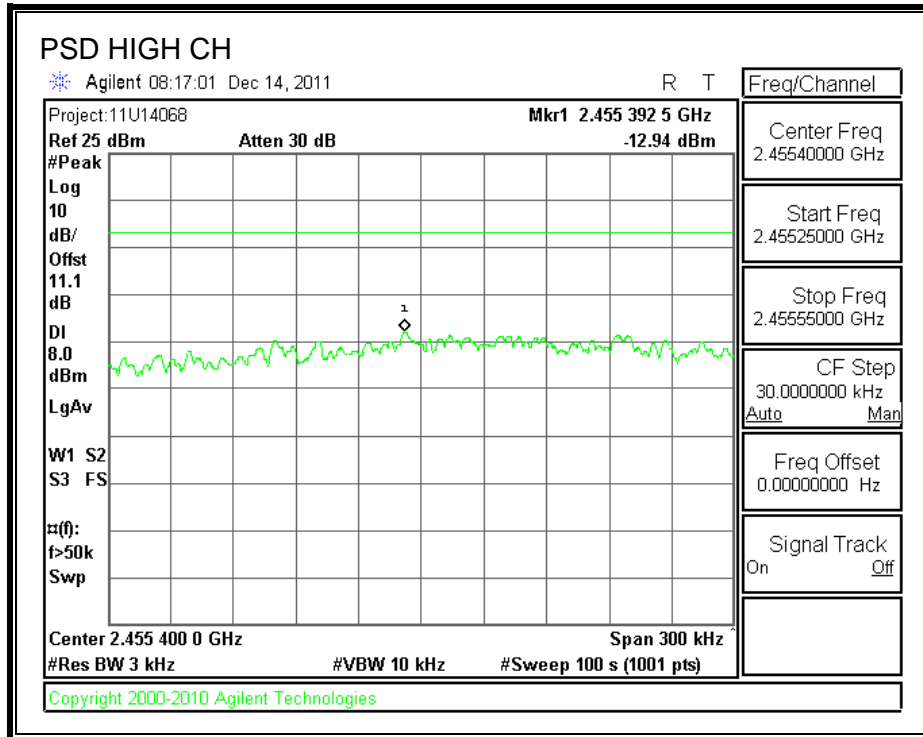
RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-12.82	8	-20.82
Middle	2437	-13.35	8	-21.35
High	2462	-12.94	8	-20.94

POWER SPECTRAL DENSITY







7.3.5. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

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

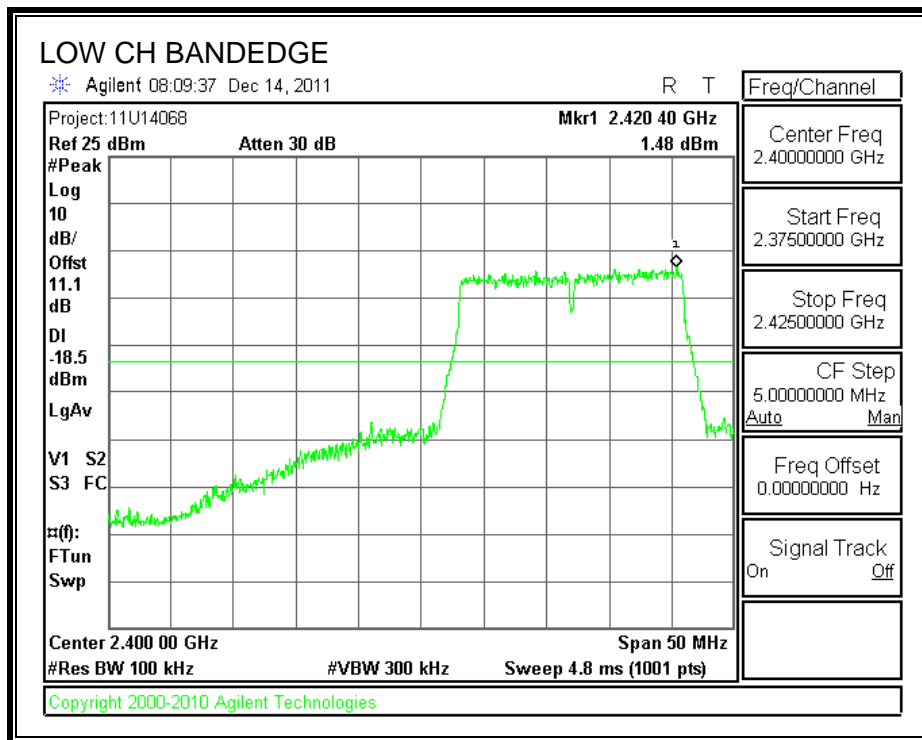
TEST PROCEDURE

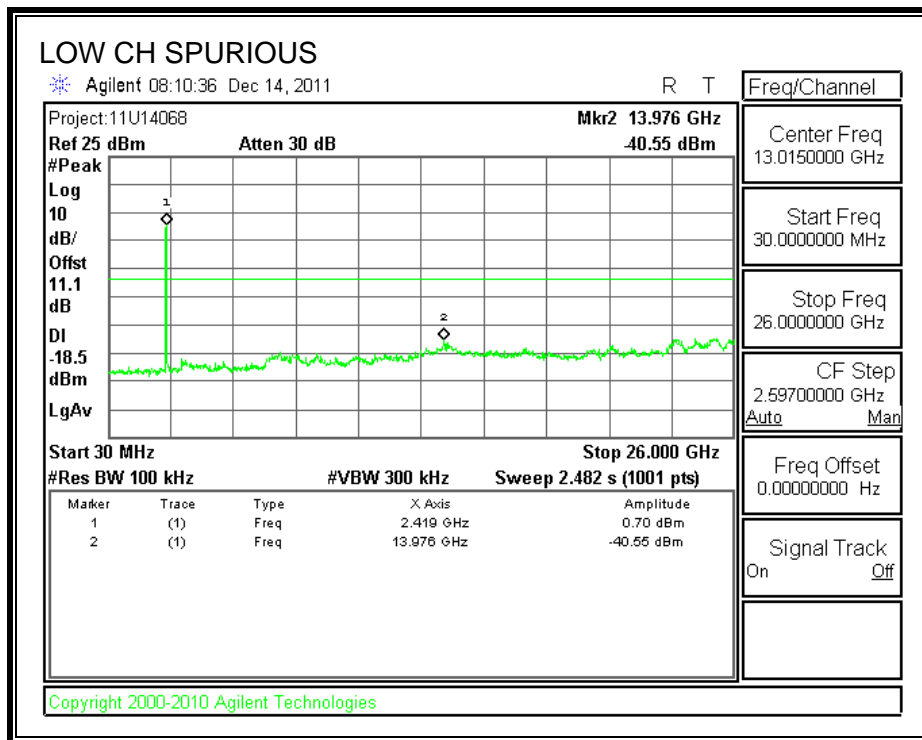
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

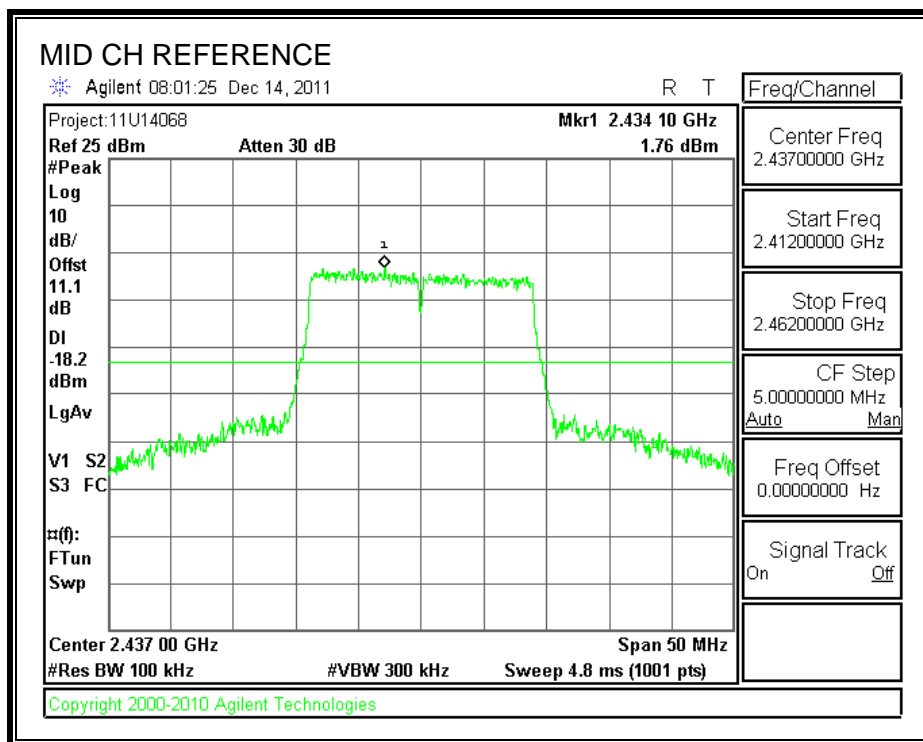
RESULTS

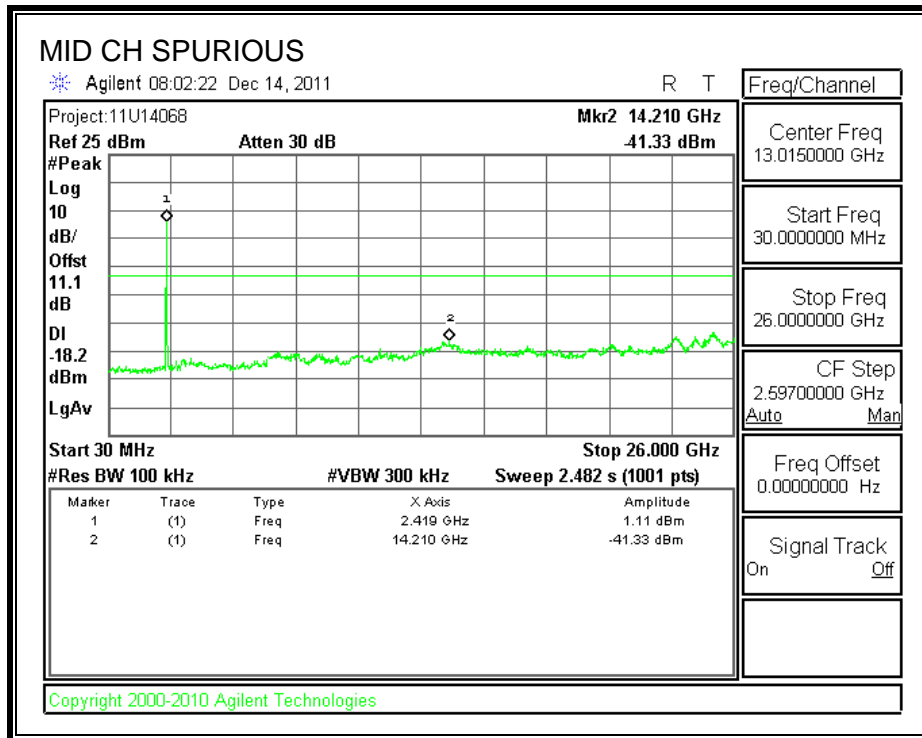
SPURIOUS EMISSIONS, LOW CHANNEL



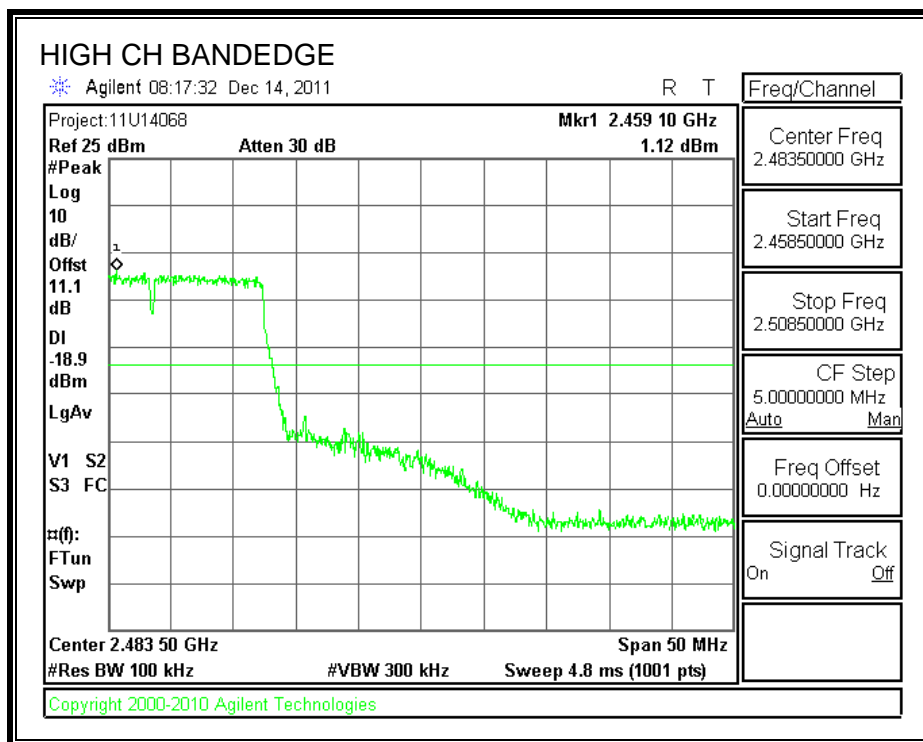


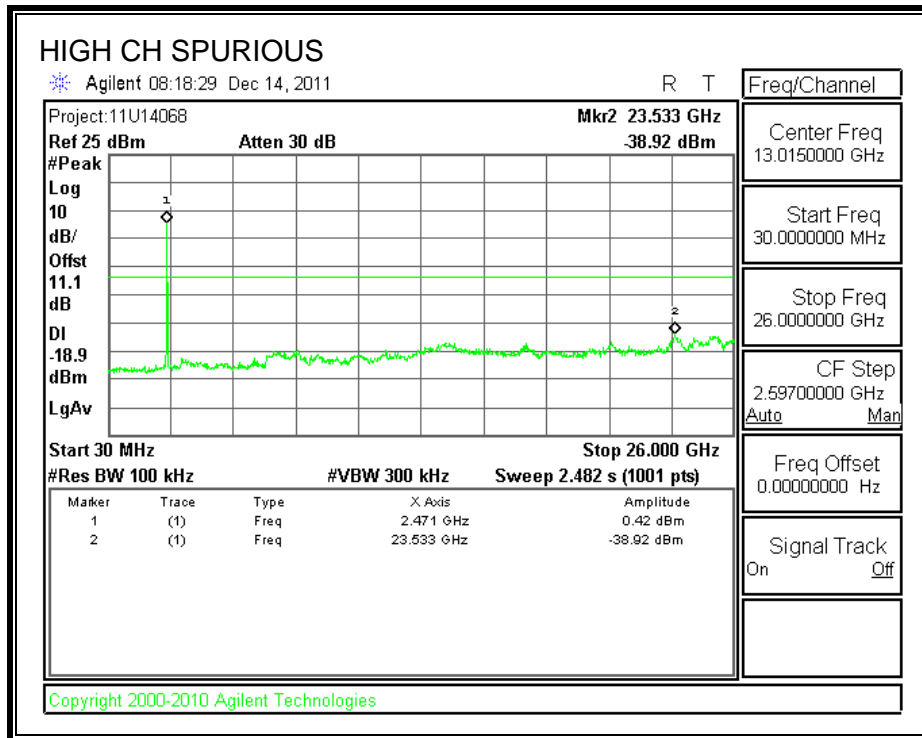
SPURIOUS EMISSIONS, MID CHANNEL





SPURIOUS EMISSIONS, HIGH CHANNEL





7.4. 802.11n HT40 MODE IN THE 2.4 GHz BAND

7.4.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

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

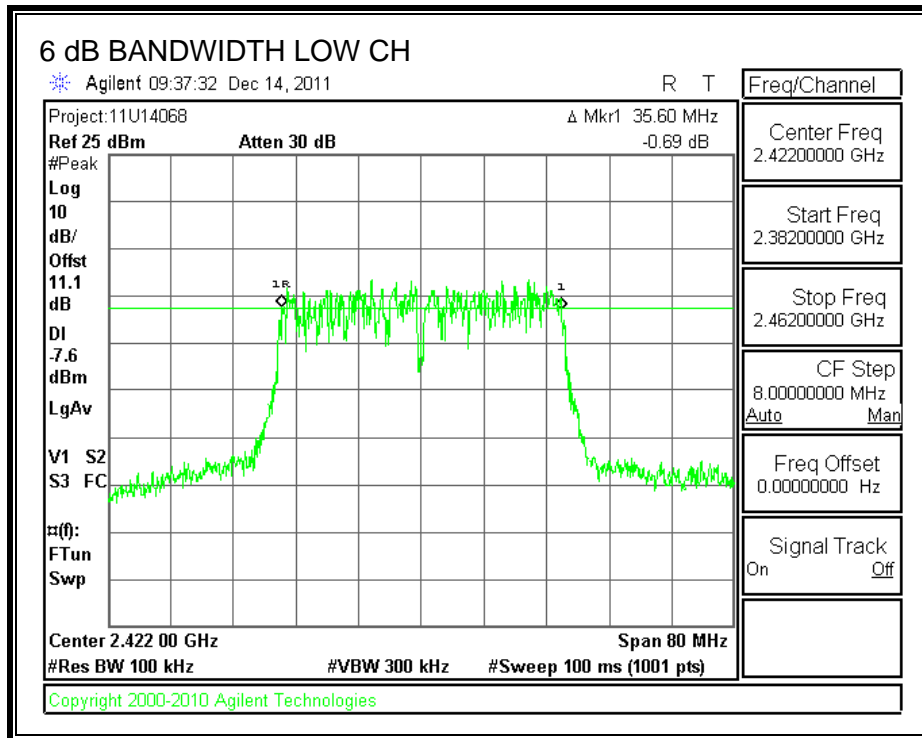
TEST PROCEDURE

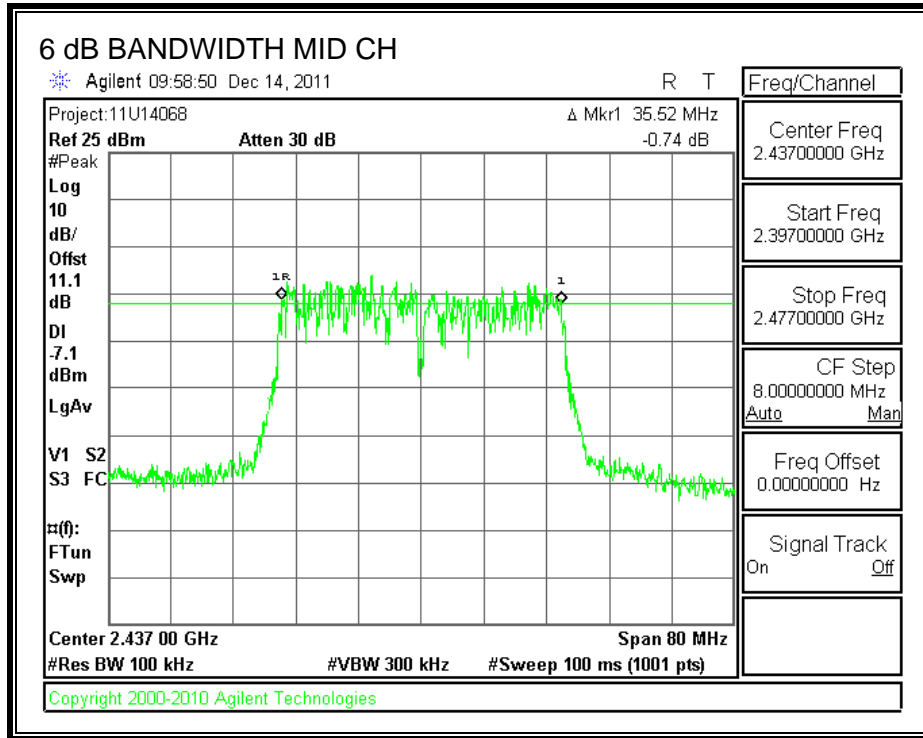
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

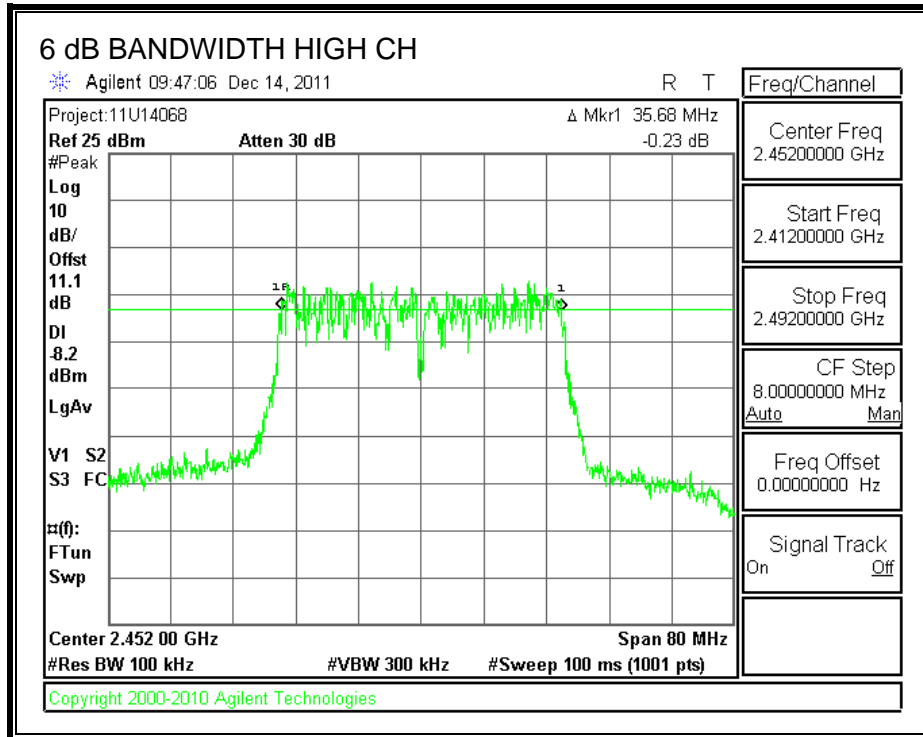
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2422	35.60	0.5
Middle	2437	35.52	0.5
High	2452	35.68	0.5

6 dB BANDWIDTH







7.4.2. 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.

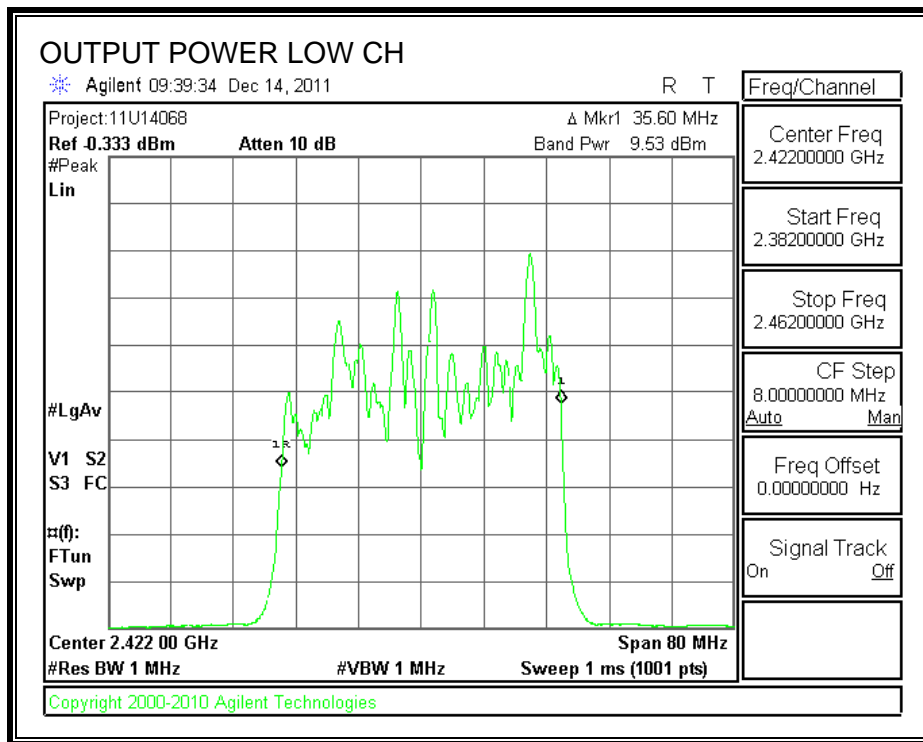
TEST PROCEDURE

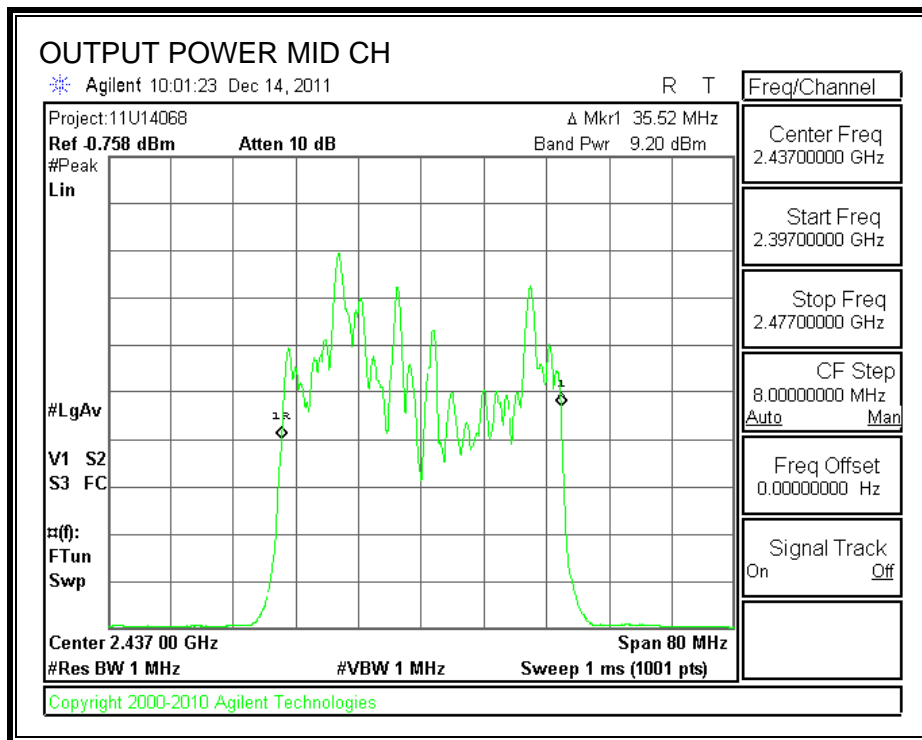
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

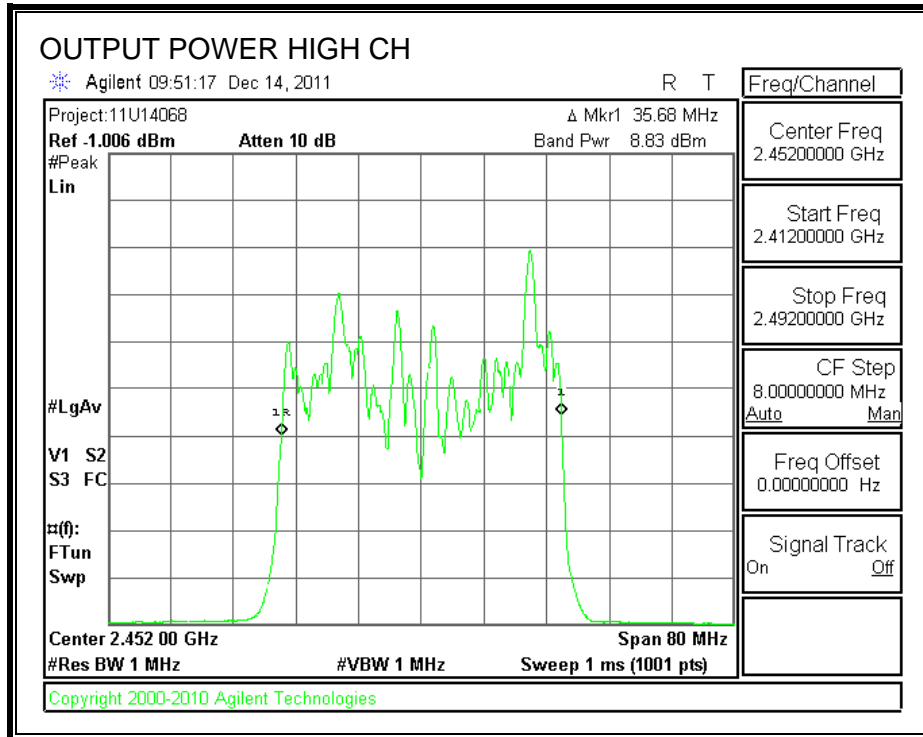
RESULTS

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Attenuator and Cable Offset (dB)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2422	9.53	11	20.53	30	-9.47
Middle	2437	9.20	11	20.20	30	-9.80
High	2452	8.83	11	19.83	30	-10.17

OUTPUT POWER







7.4.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

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

Channel	Frequency (MHz)	Power (dBm)
Low	2422	12.40
Middle	2437	12.20
High	2452	12.00

7.4.4. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

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

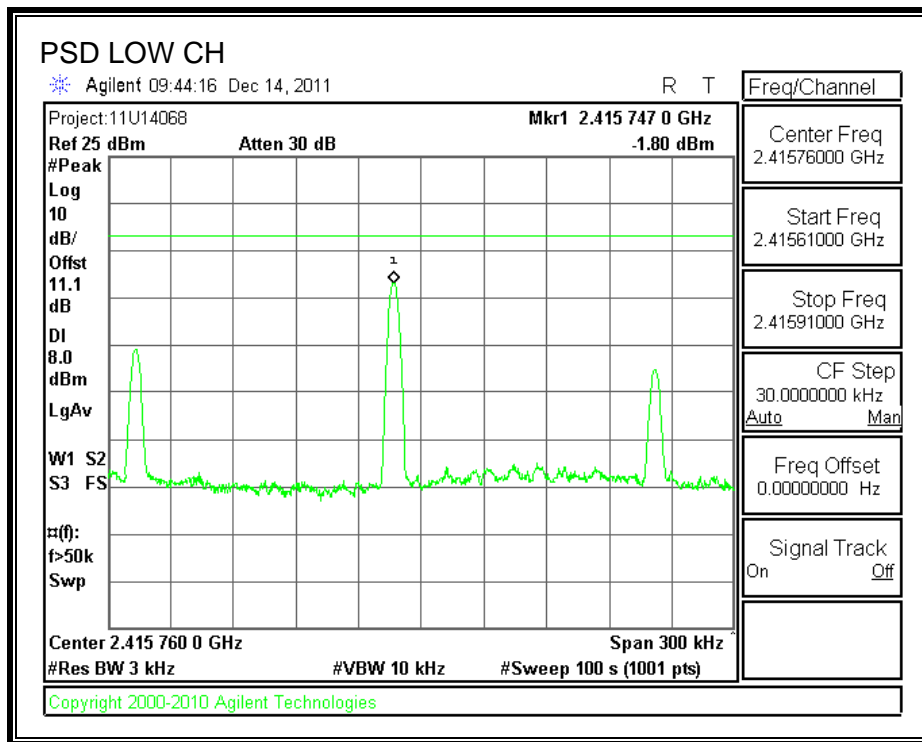
TEST PROCEDURE

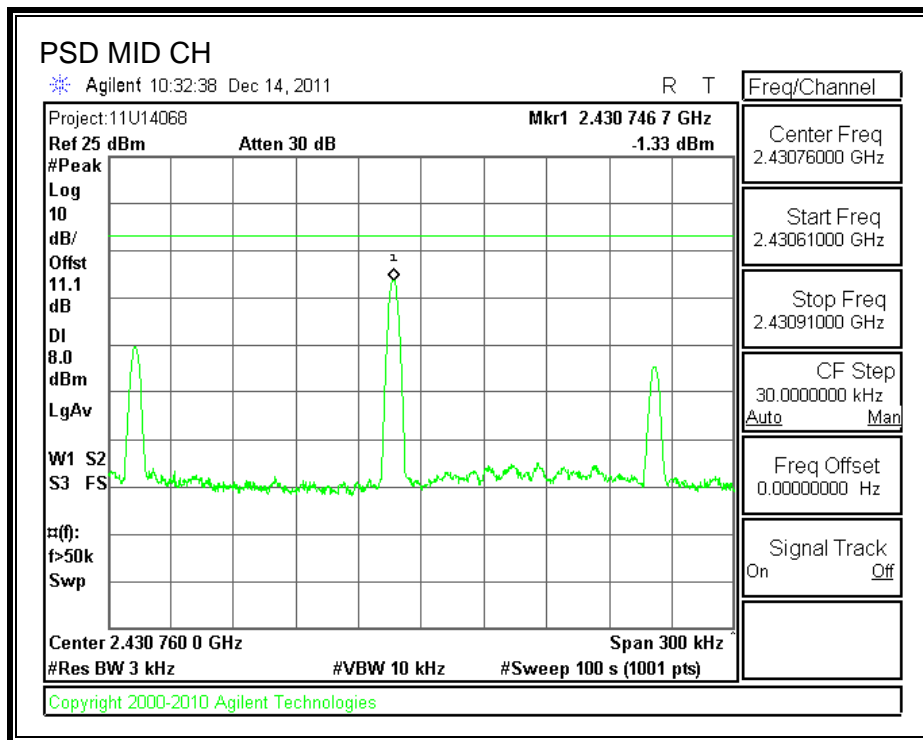
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

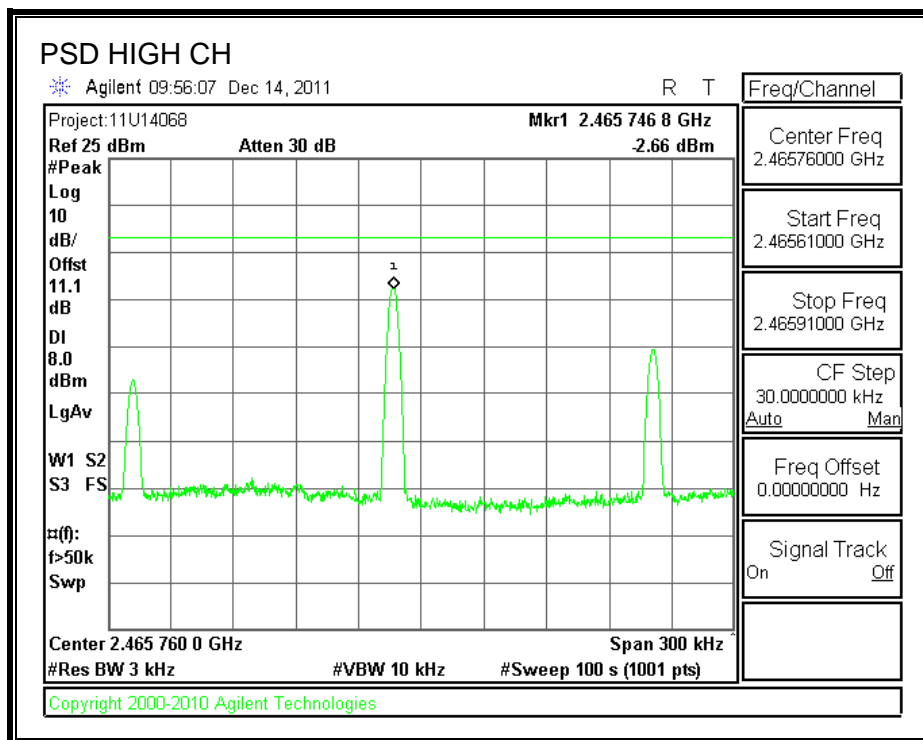
RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2422	-1.80	8	-9.80
Middle	2437	-1.33	8	-9.33
High	2452	-2.66	8	-10.66

POWER SPECTRAL DENSITY







7.4.5. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

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

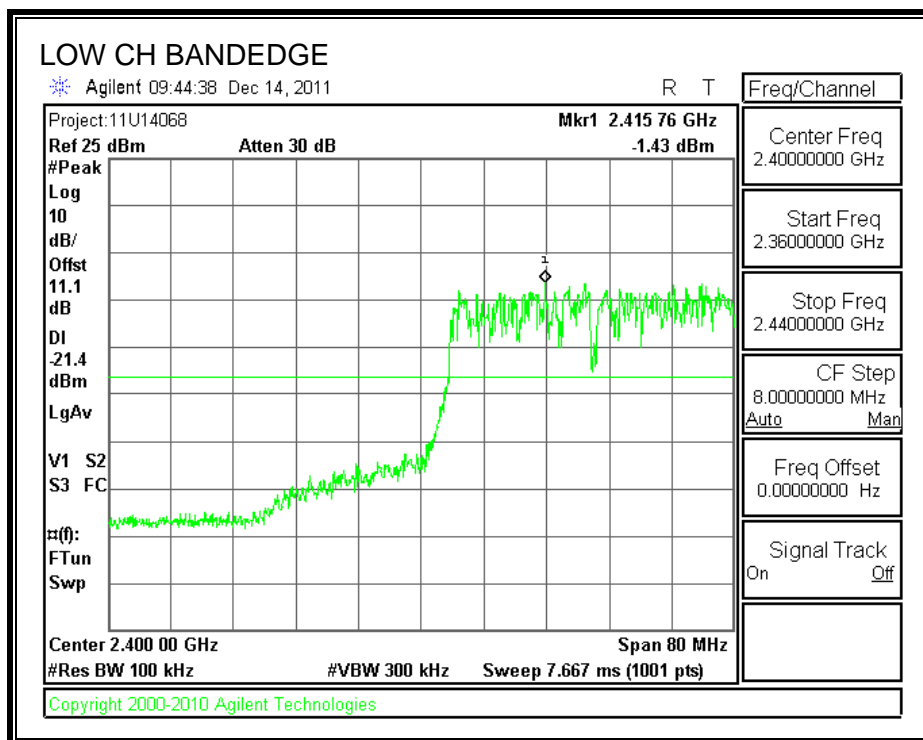
TEST PROCEDURE

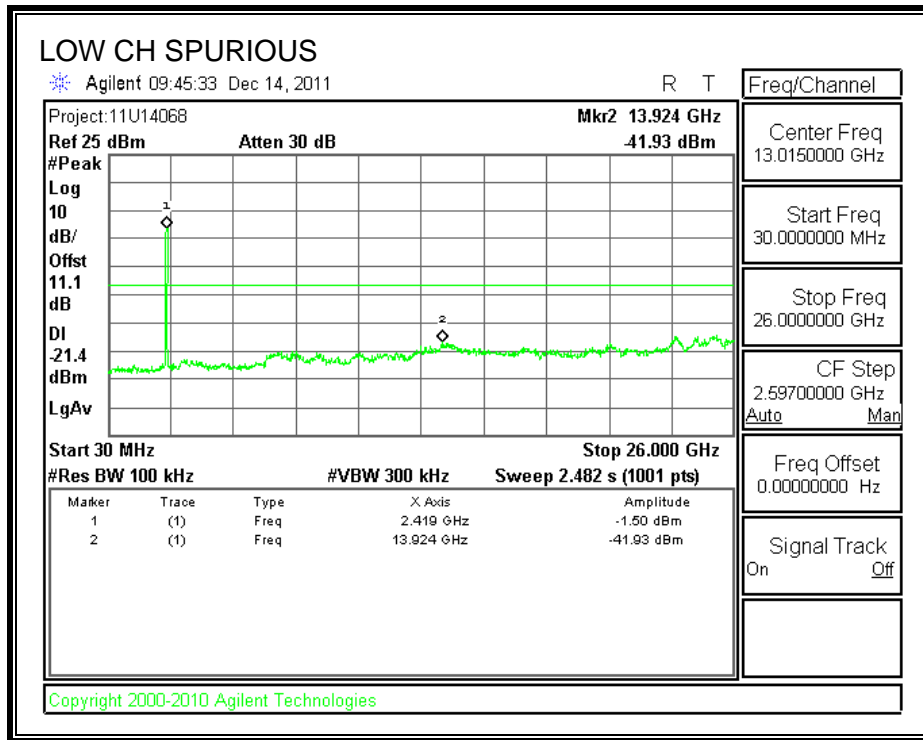
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

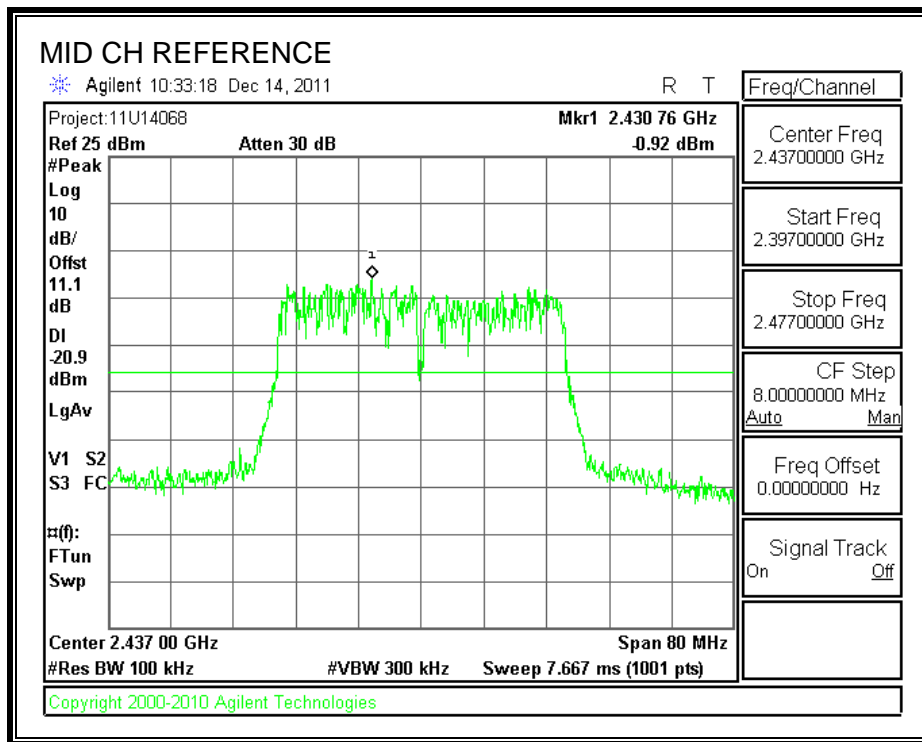
RESULTS

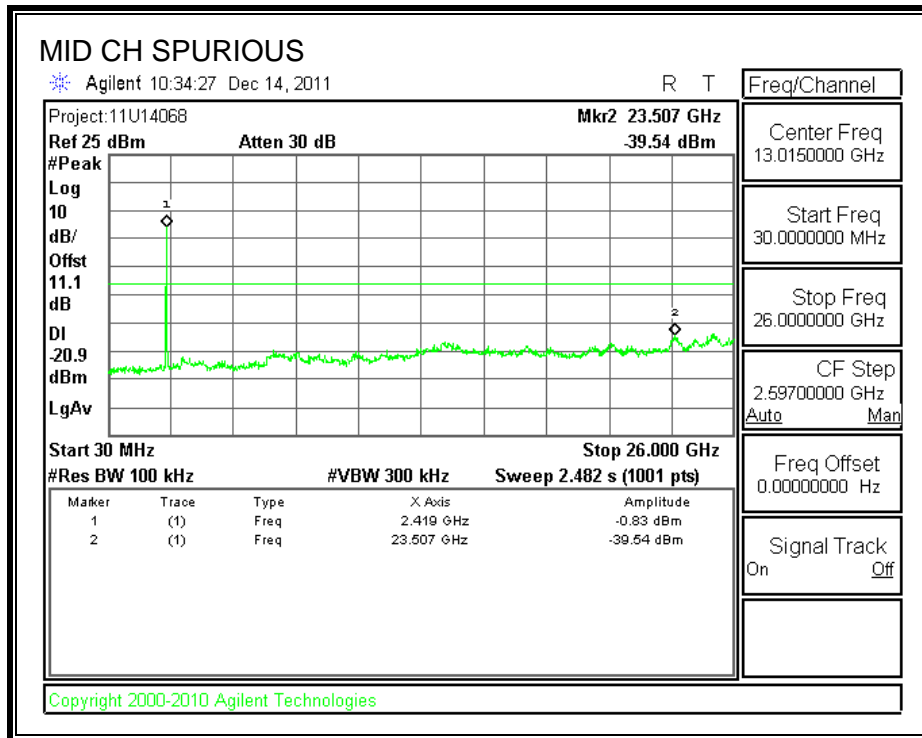
SPURIOUS EMISSIONS, LOW CHANNEL



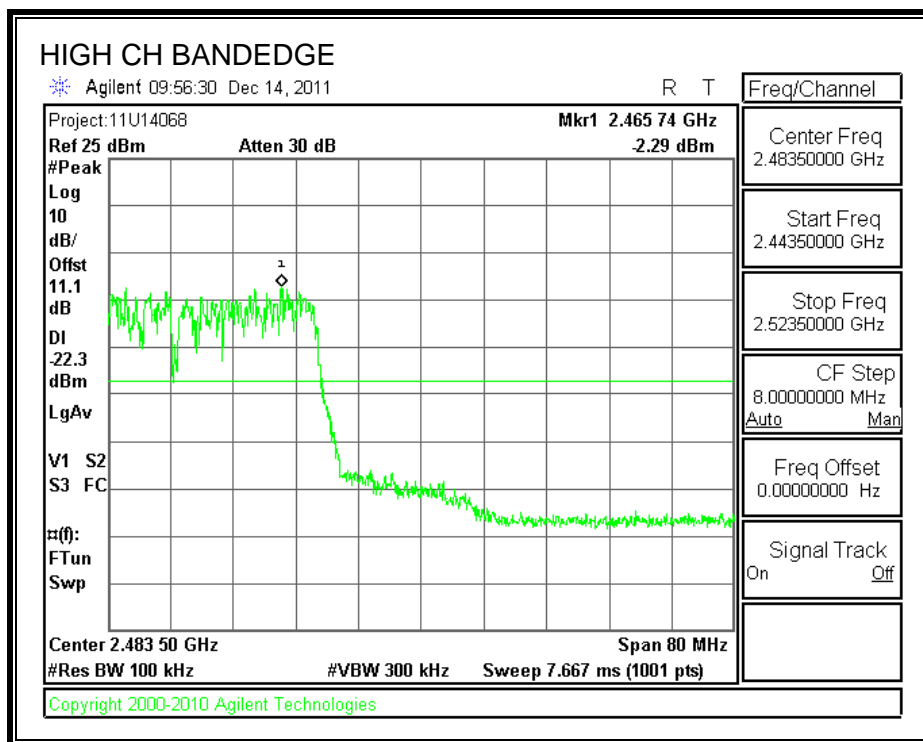


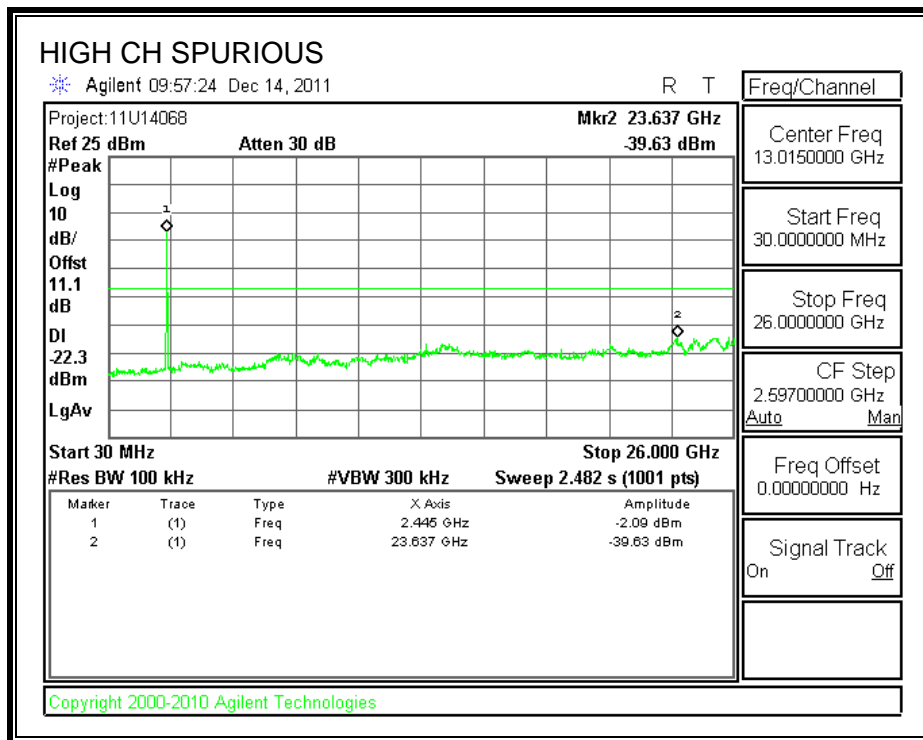
SPURIOUS EMISSIONS, MID CHANNEL





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.

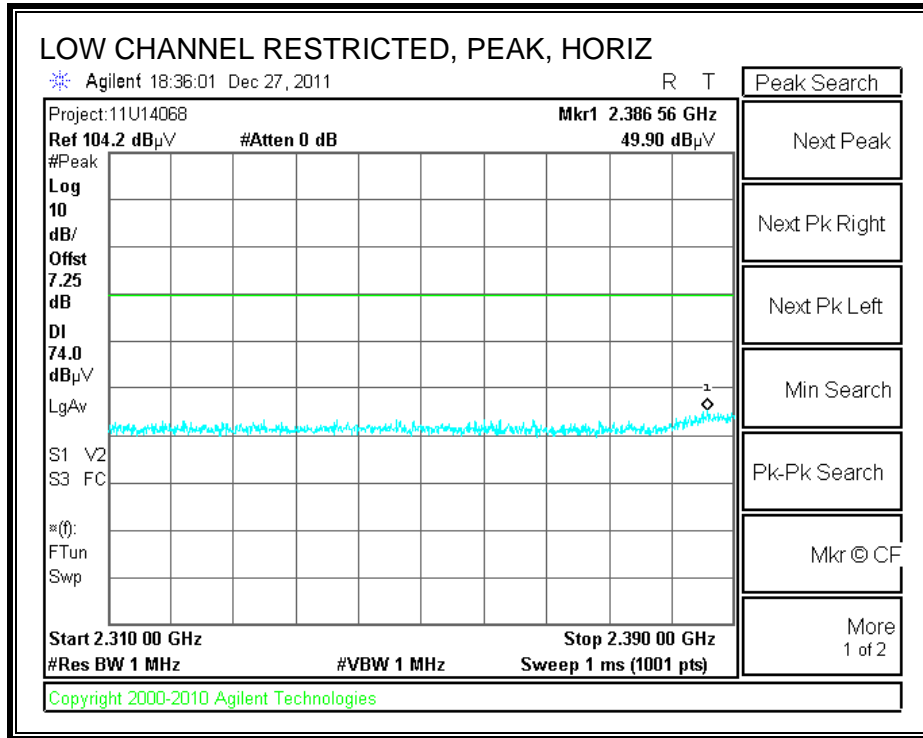
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

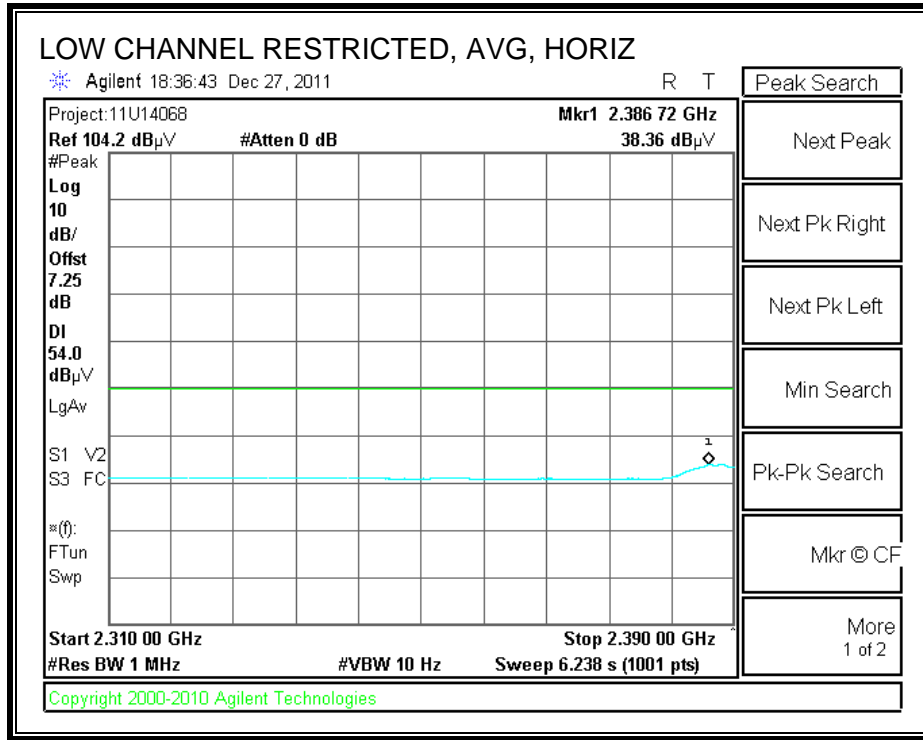
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

8.2. TRANSMITTER ABOVE 1 GHz

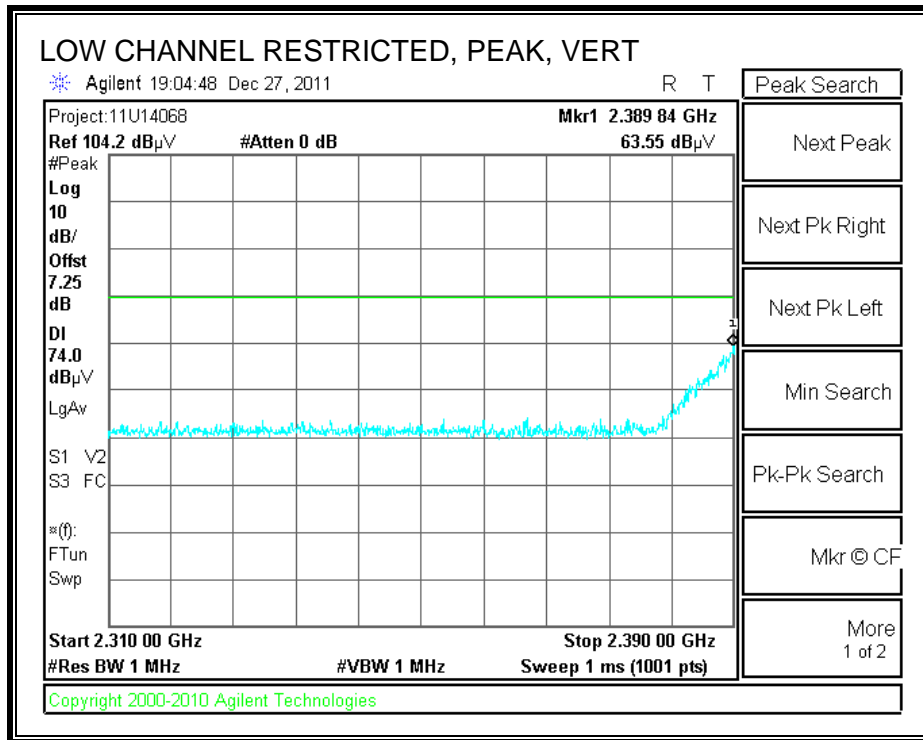
8.2.1. TX ABOVE 1 GHz FOR 802.11b 1TX MODE IN THE 2.4 GHz BAND

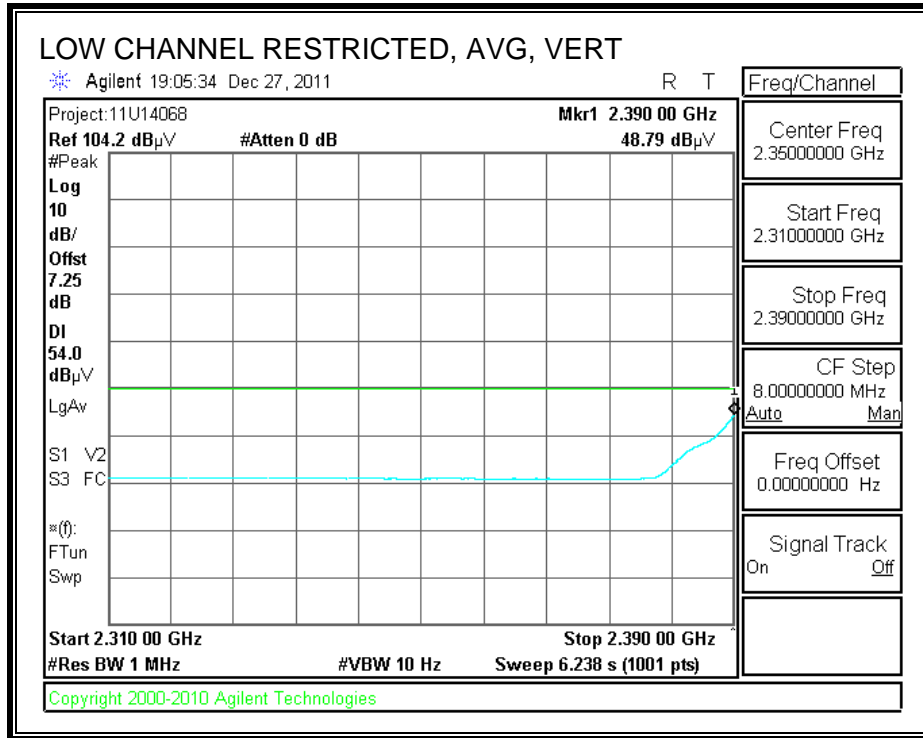
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



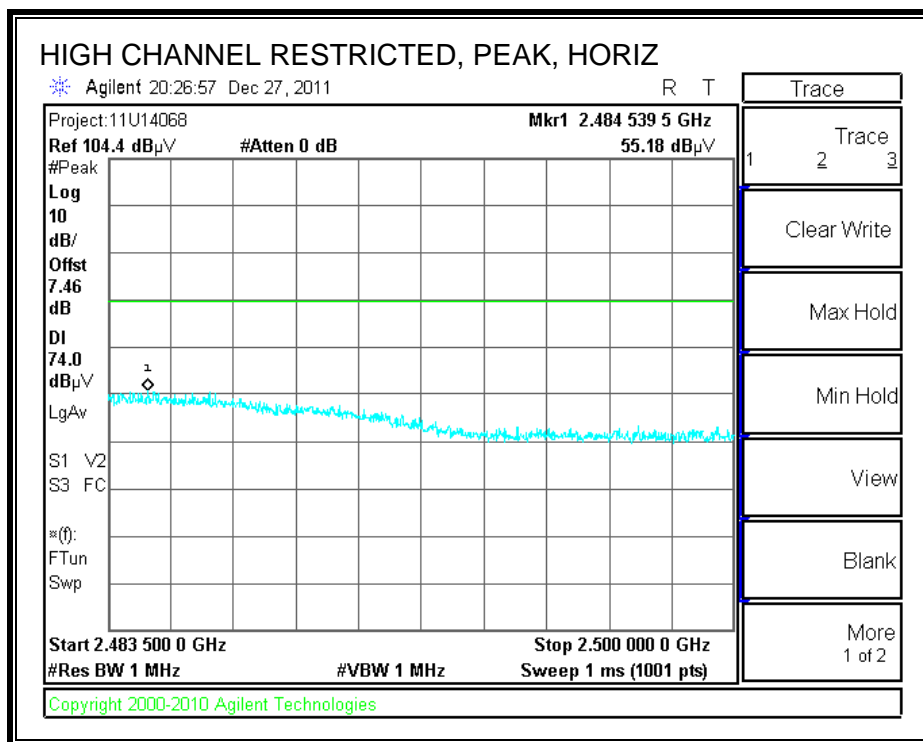


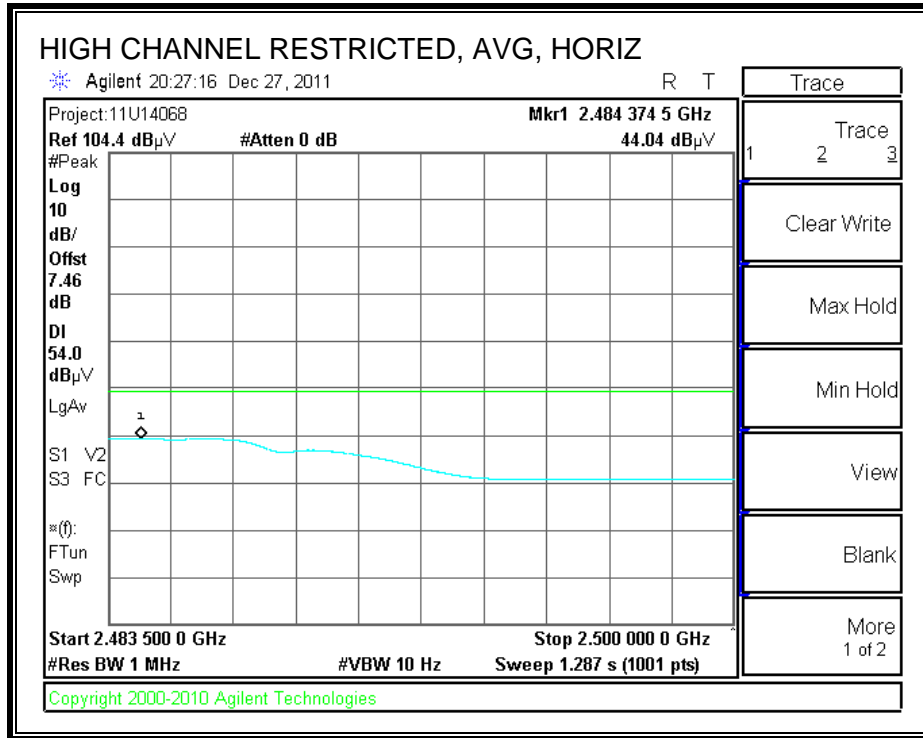
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



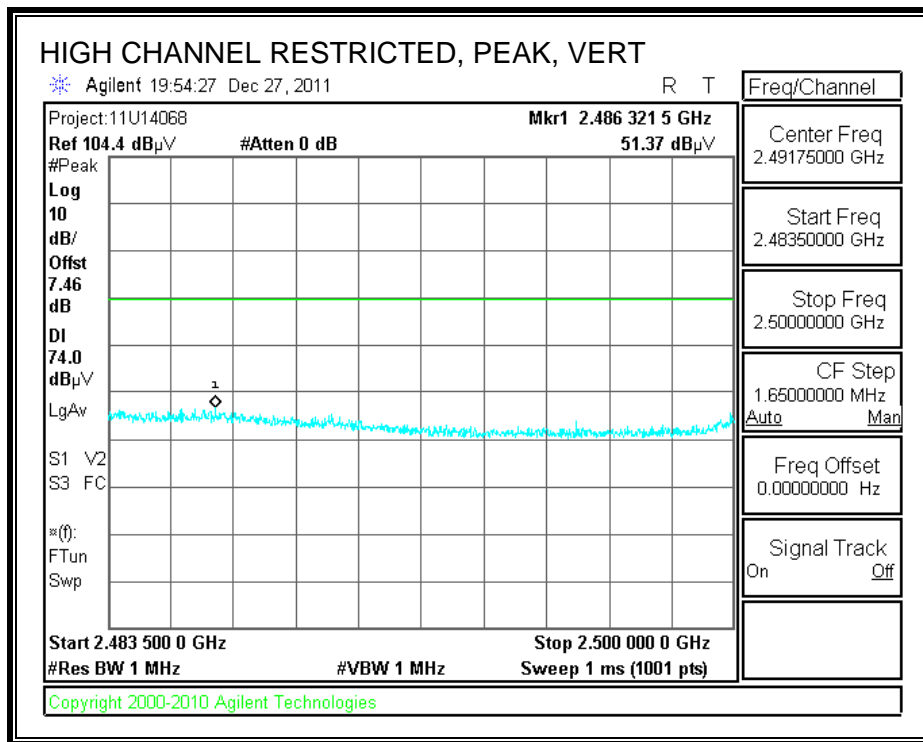


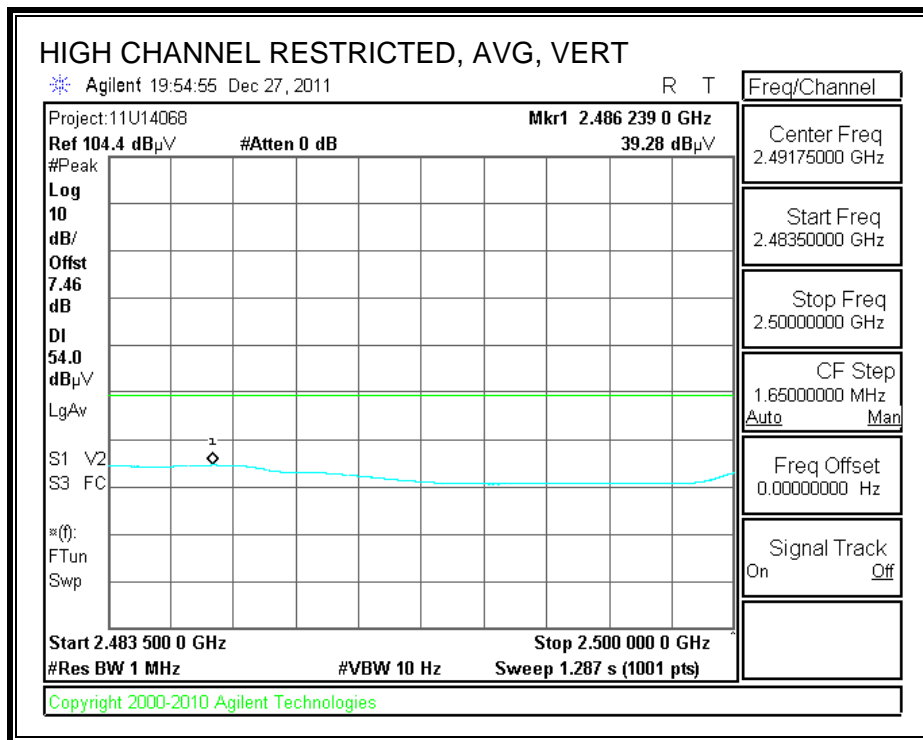
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

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

Company: SIERRA WIRELESS
Project #: 11U14068
Date: 22/27/2011
Test Engineer: MENGISTU MEKURIA
Configuration: EUT WITH AC ACAPTER
Mode: TX, b MODE

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T59; S/N: 3245 @3m	T145 Agilent 3008A0056			FCC 15.209

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

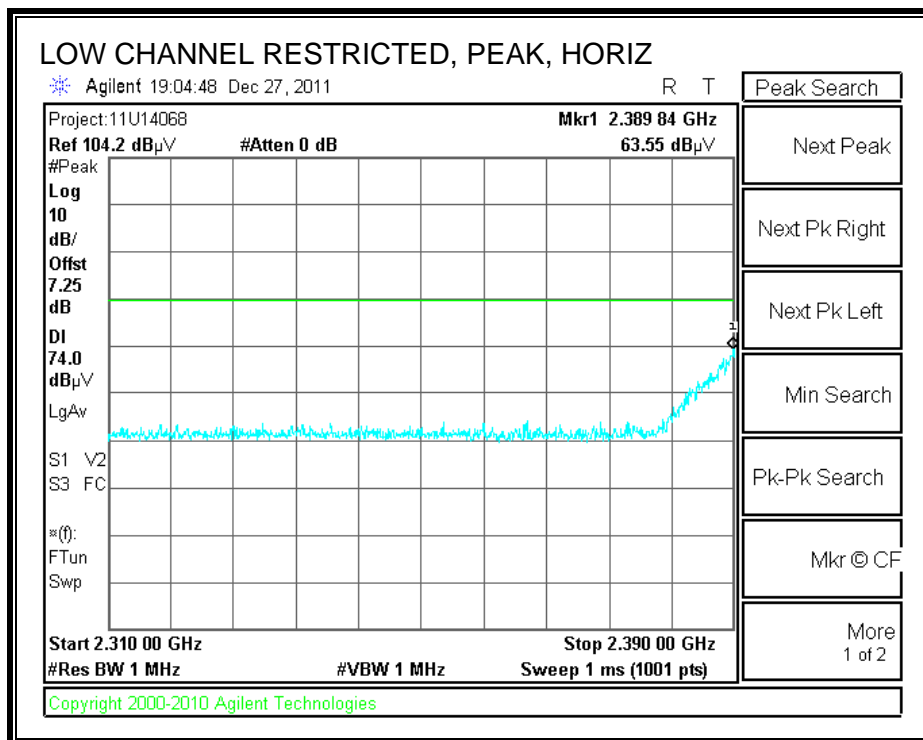
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Ftr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Channel (2412 MHz)															
4.824	3.0	46.0	41.3	33.2	6.3	-34.8	0.0	0.0	50.7	45.9	74	54	-23.3	-8.1	V
4.824	3.0	45.0	41.1	33.2	6.3	-34.8	0.0	0.0	49.6	45.8	74	54	-24.4	-8.2	H
Mid Channel (2437 MHz)															
4.874	3.0	41.8	34.8	33.2	6.3	-34.8	0.0	0.0	46.6	39.6	74	54	-27.4	-14.4	V
4.874	3.0	40.4	33.8	33.2	6.3	-34.8	0.0	0.0	45.2	38.5	74	54	-28.8	-15.5	H
Hi Channel (2462 MHz)															
4.924	3.0	41.5	34.7	33.3	6.3	-34.8	0.0	0.0	46.3	39.5	74	54	-27.7	-14.5	V
4.924	3.0	40.8	33.6	33.3	6.3	-34.8	0.0	0.0	45.6	38.4	74	54	-28.4	-15.6	H

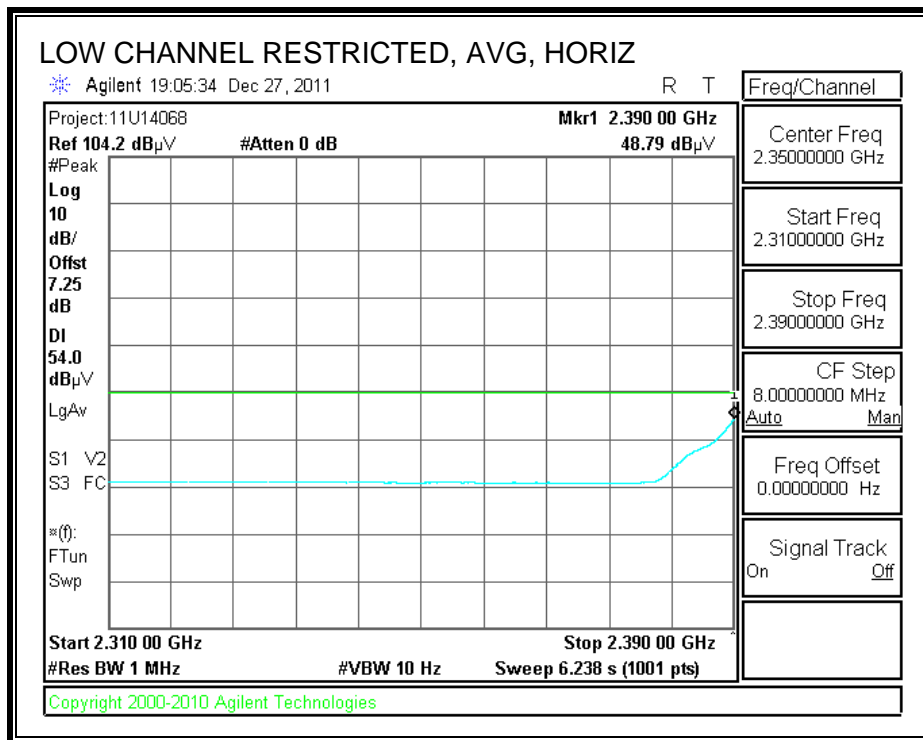
Rev. 07.08.11

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		

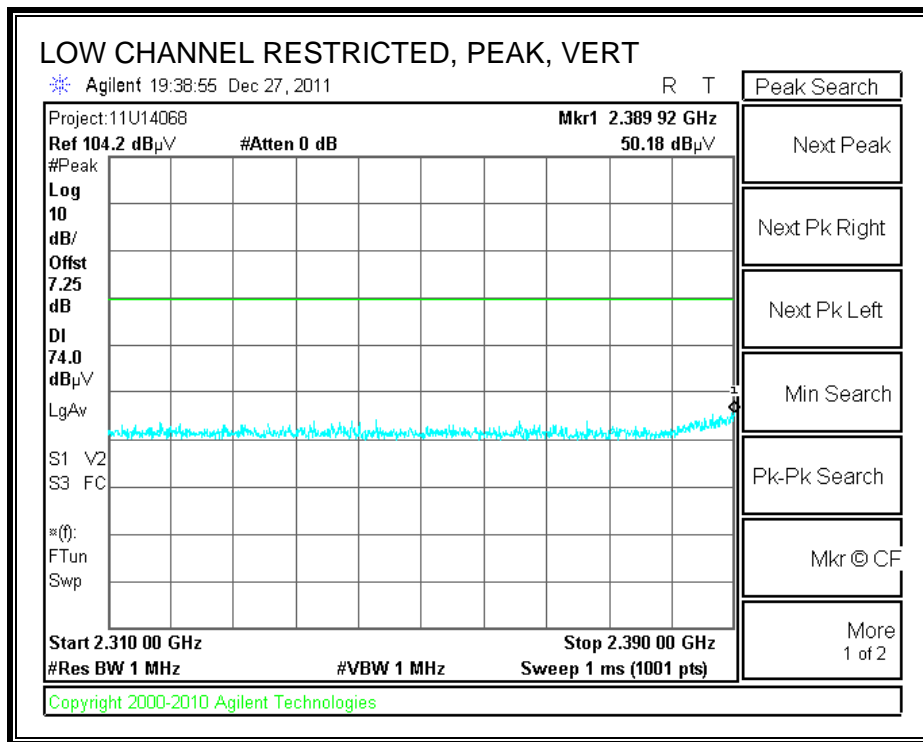
8.2.2. TX ABOVE 1 GHz FOR 802.11g 1TX MODE IN THE 2.4 GHz BAND

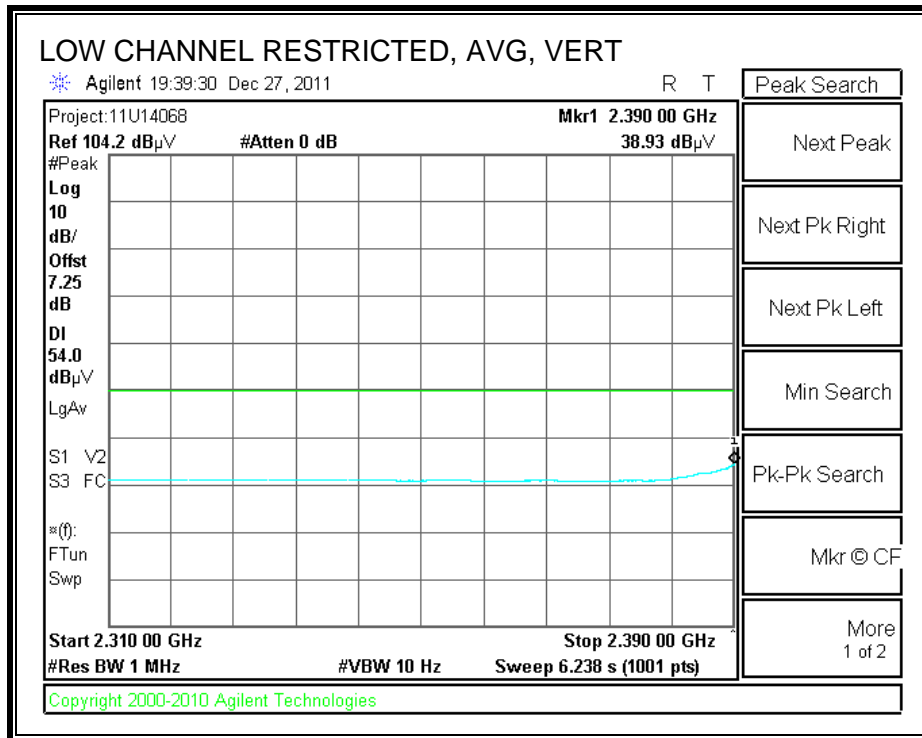
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



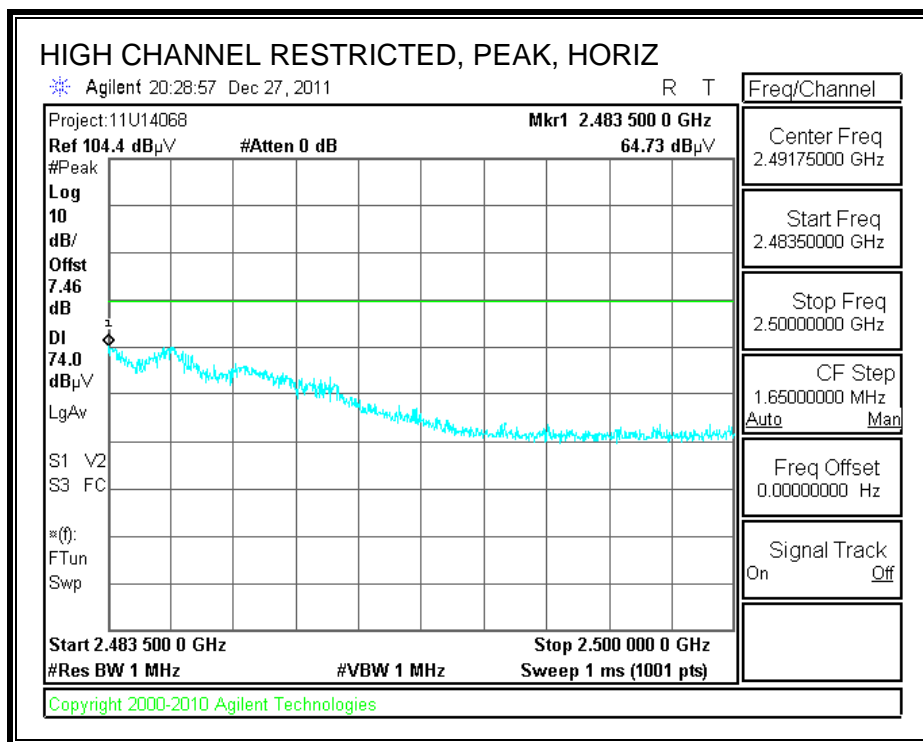


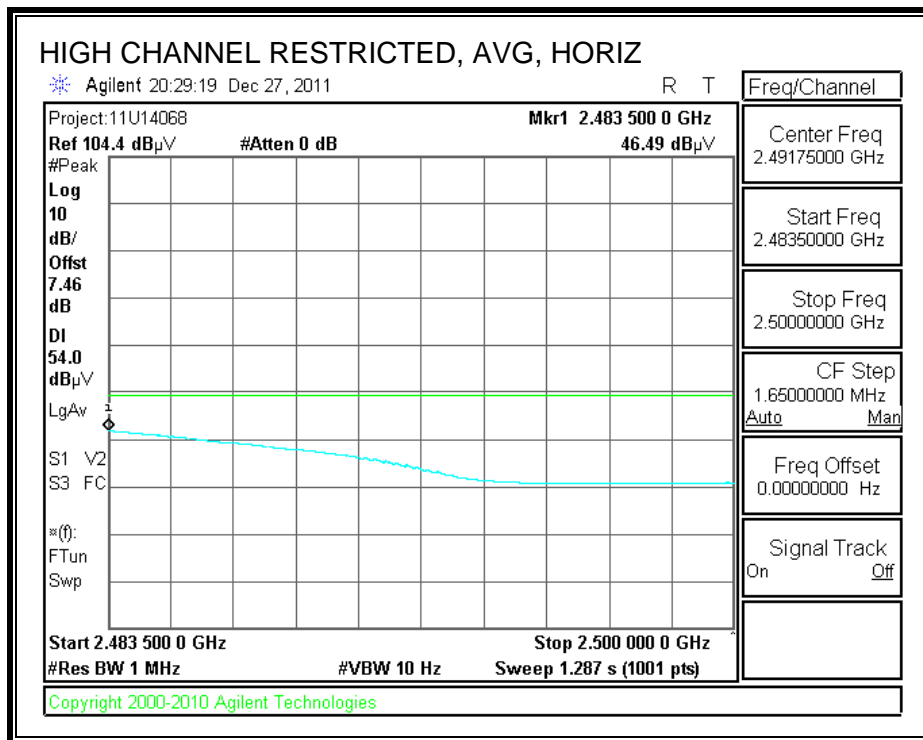
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



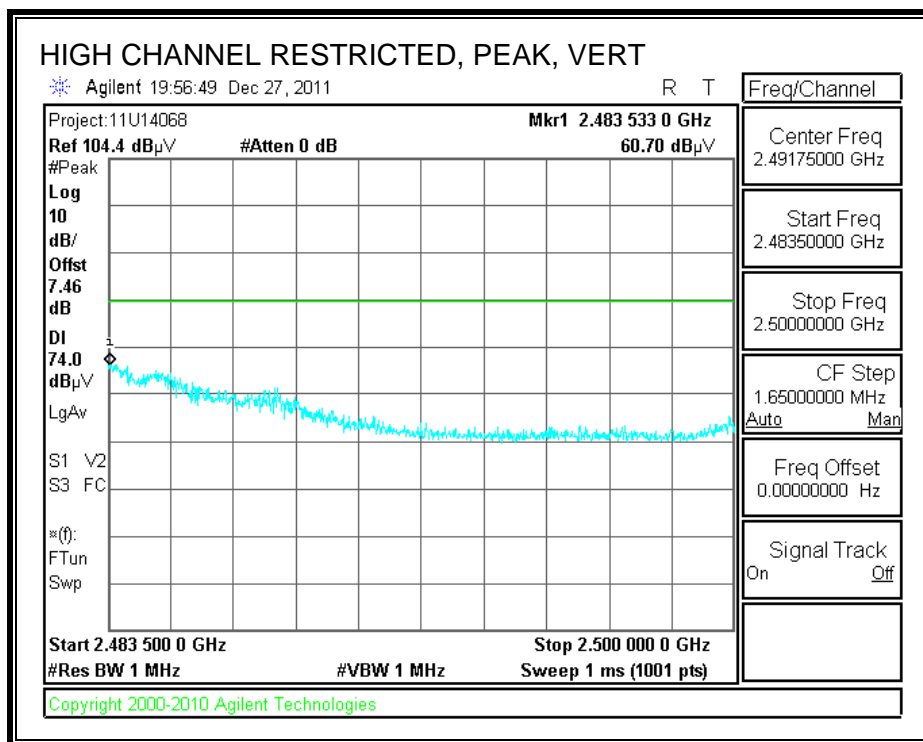


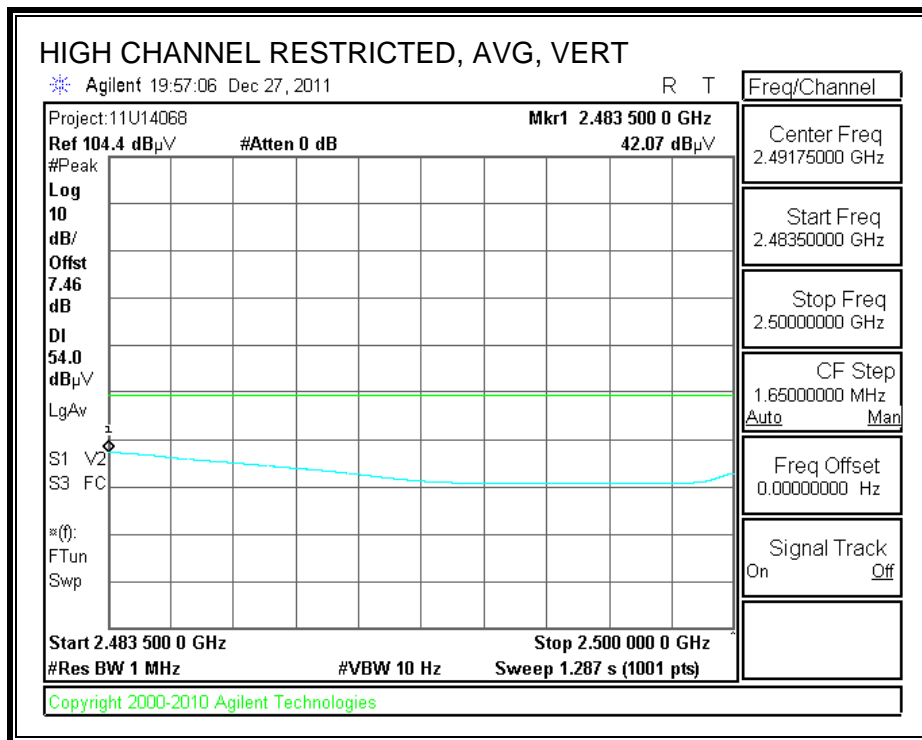
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



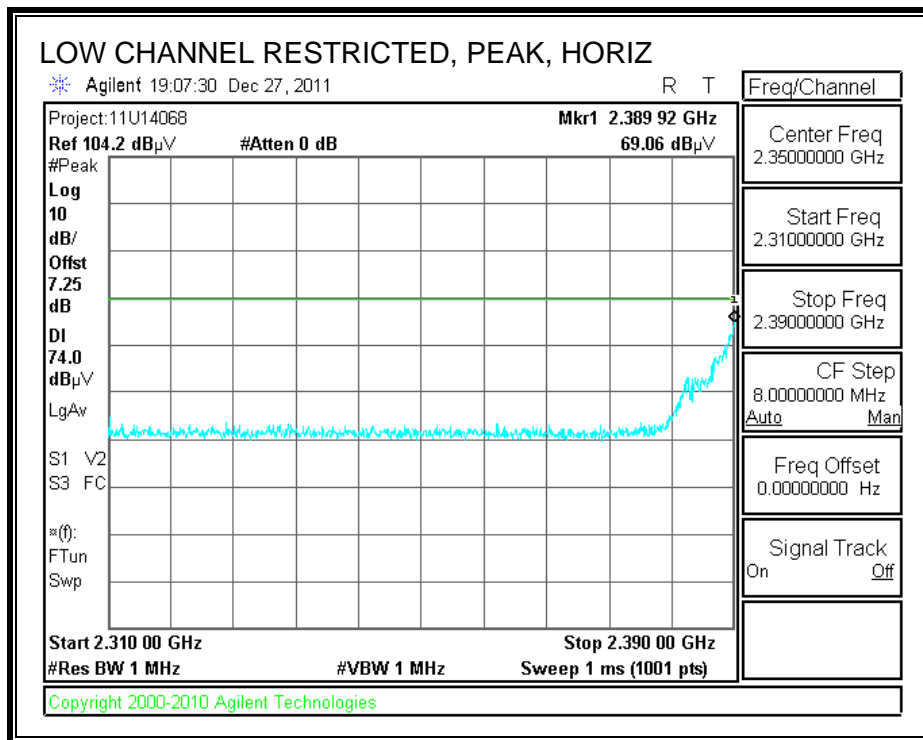


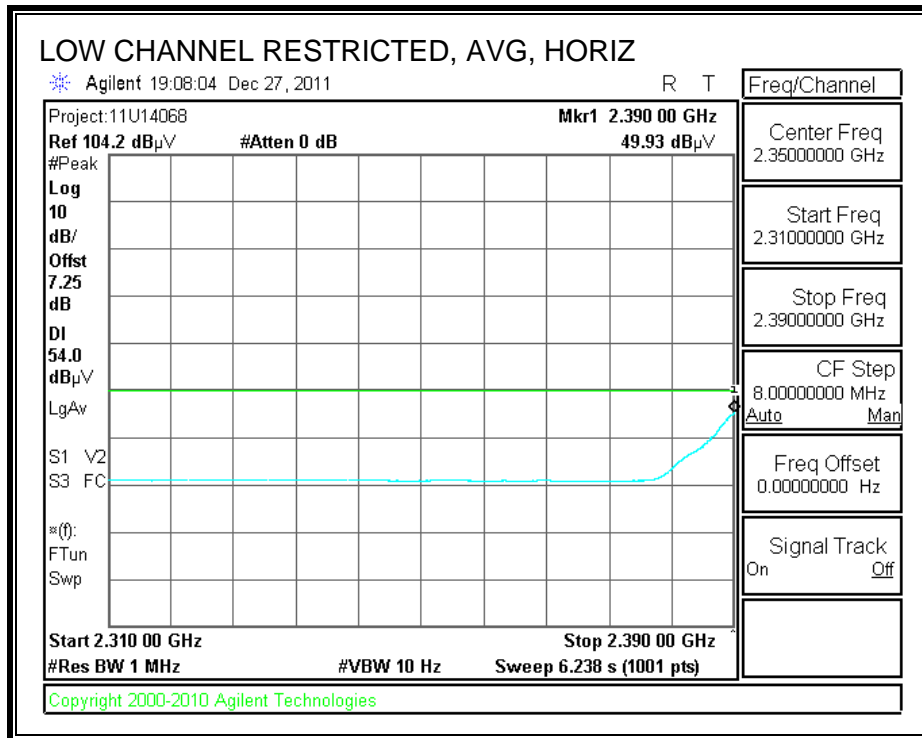
HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement																
Compliance Certification Services, Fremont 5m Chamber-B																
Company:		SIERRA WIRELESS														
Project #:		11U14068														
Date:		22/27/2011														
Test Engineer:		MENGISTU MEKURIA														
Configuration:		EUT WITH AC ACAPTER														
Mode:		TX, g MODE														
Test Equipment:																
Horn 1-18GHz			Pre-amplifer 1-26GHz			Pre-amplifer 26-40GHz			Horn > 18GHz			Limit				
T59; S/N: 3245 @3m			T145 Agilent 3008A0056									FCC 15.209				
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	Filtr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)	
Low Channel (2412 MHz)																
4.824	3.0	42.6	29.0	33.2	6.3	-34.8	0.0	0.0	47.2	33.7	74	54	-26.8	-20.3	V	
4.824	3.0	42.3	28.9	33.2	6.3	-34.8	0.0	0.0	46.9	33.5	74	54	-27.1	-20.5	H	
Mid Channel (2437 MHz)																
4.874	3.0	38.3	25.4	33.2	6.3	-34.8	0.0	0.0	43.0	30.1	74	54	-31.0	-23.9	V	
4.874	3.0	37.2	25.2	33.2	6.3	-34.8	0.0	0.0	41.9	29.9	74	54	-32.1	-24.1	H	
Hi Channel (2462 MHz)																
4.924	3.0	38.9	26.9	33.3	6.3	-34.8	0.0	0.0	43.7	31.8	74	54	-30.3	-22.2	V	
4.924	3.0	37.6	25.8	33.3	6.3	-34.8	0.0	0.0	42.5	30.7	74	54	-31.5	-23.3	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												

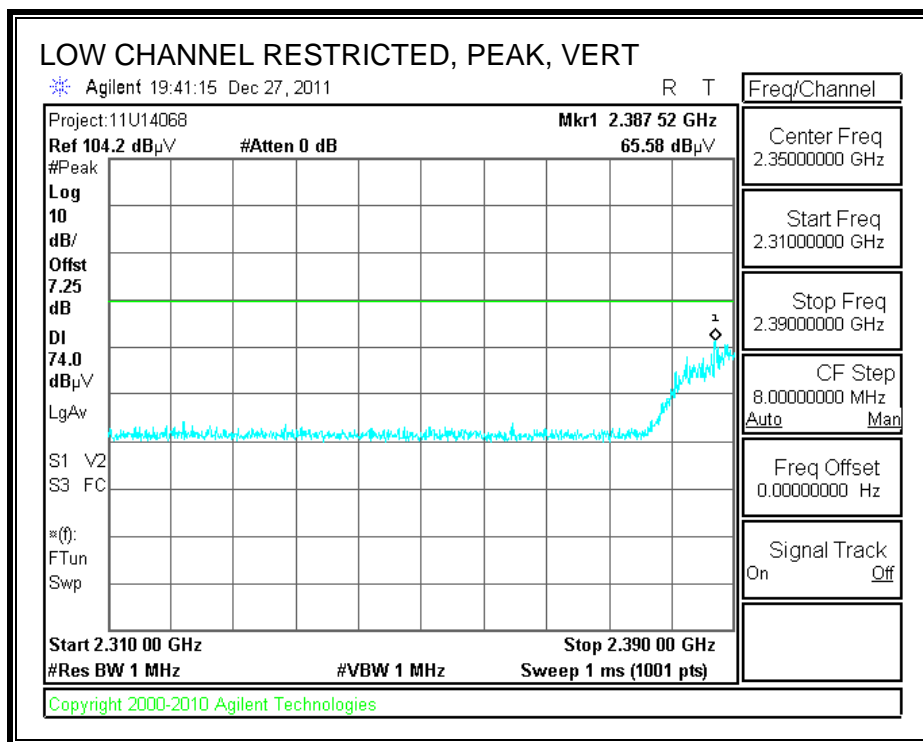
8.2.3. TX ABOVE 1 GHz FOR 802.11n HT20 1TX MODE IN THE 2.4 GHz BAND

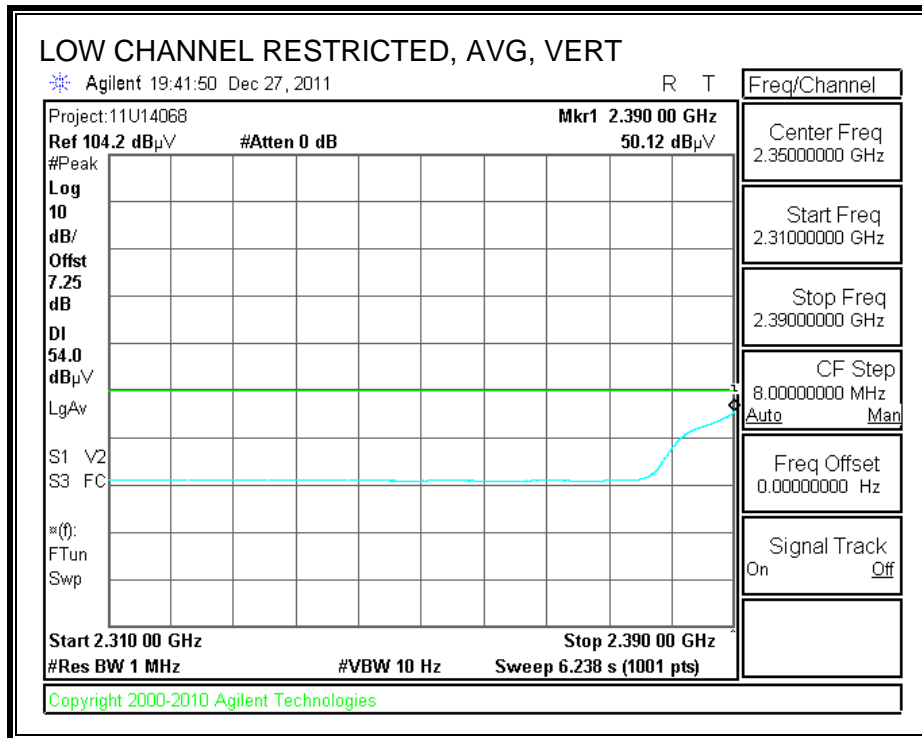
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



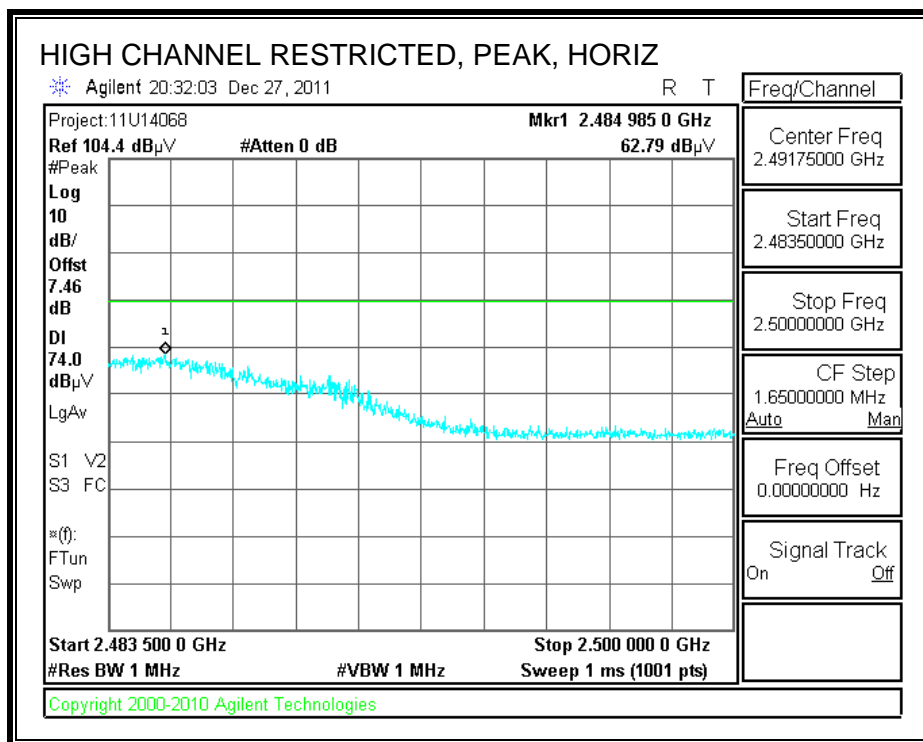


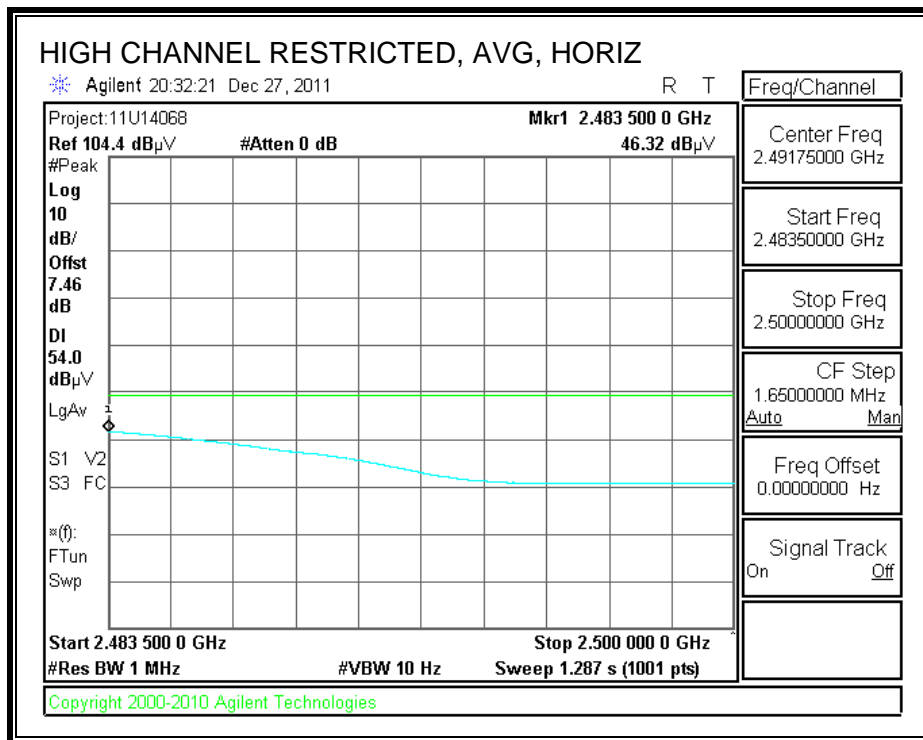
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



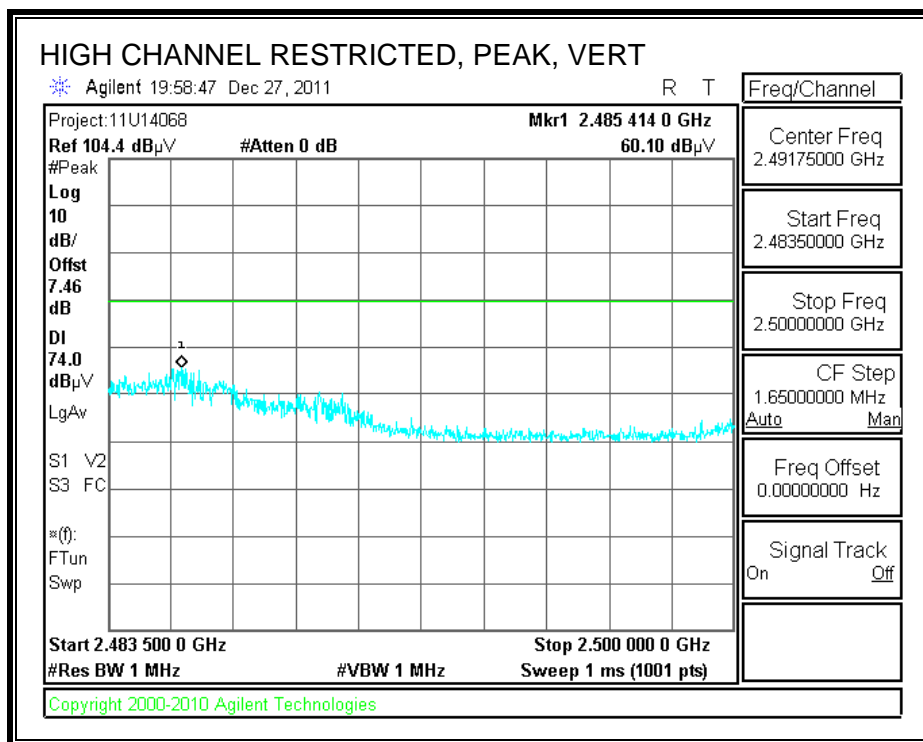


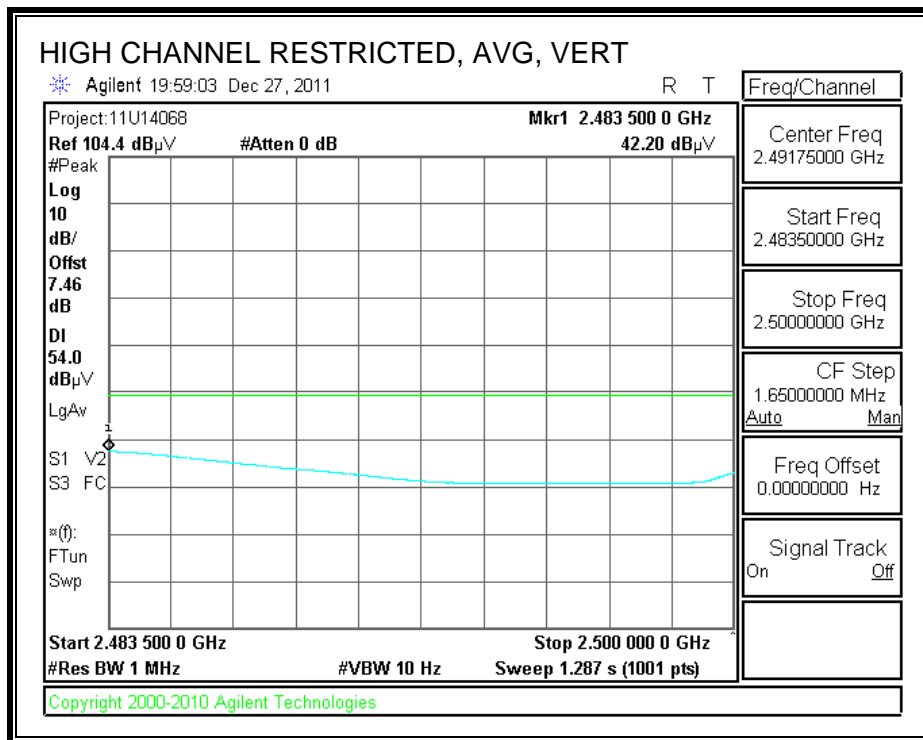
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

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

Company: SIERRA WIRELESS
Project #: 11U14068
Date: 22/27/2011
Test Engineer: MENGISTU MEKURIA
Configuration: EUT WITH AC ACAPTER
Mode: TX, HT20 MODE

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T59; S/N: 3245 @3m	T145 Agilent 3008A0056			FCC 15.209

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

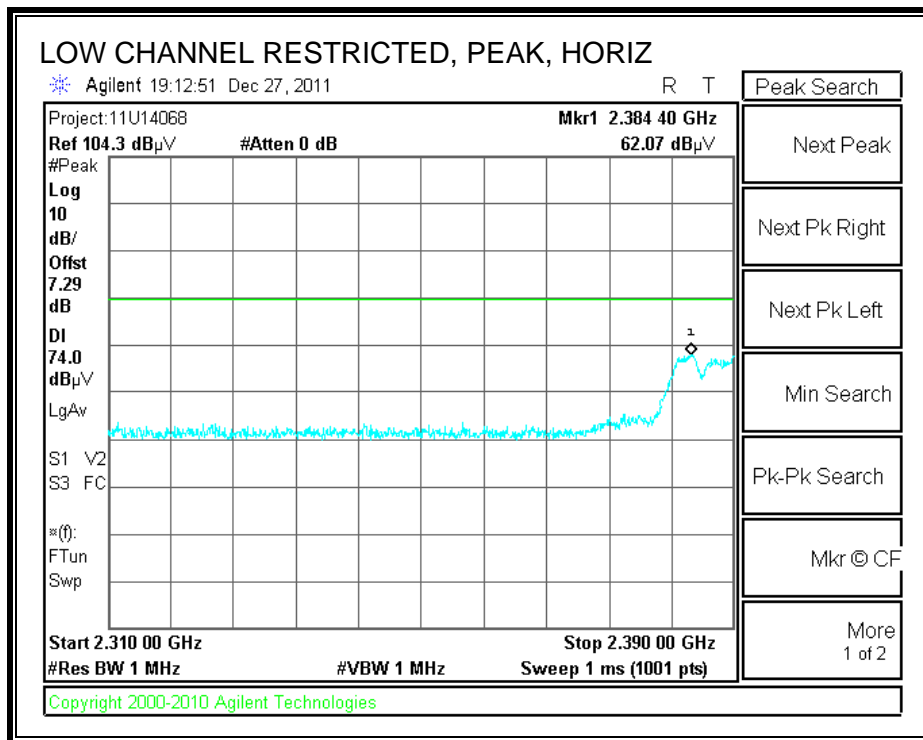
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filtr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Channel (2412 MHz)															
4.824	3.0	42.0	28.0	33.2	6.3	-34.8	0.0	0.0	46.6	32.6	74	54	-27.4	-21.4	V
4.824	3.0	42.7	28.3	33.2	6.3	-34.8	0.0	0.0	47.3	32.9	74	54	-26.7	-21.1	H
Mid Channel (2437 MHz)															
4.874	3.0	38.0	25.4	33.2	6.3	-34.8	0.0	0.0	42.7	30.1	74	54	-31.3	-23.9	V
4.874	3.0	38.2	25.7	33.2	6.3	-34.8	0.0	0.0	42.9	30.4	74	54	-31.1	-23.6	H
Hi Channel (2462 MHz)															
4.924	3.0	39.3	26.6	33.3	6.3	-34.8	0.0	0.0	44.1	31.4	74	54	-29.9	-22.6	V
4.924	3.0	38.3	25.8	33.3	6.3	-34.8	0.0	0.0	43.1	30.6	74	54	-30.9	-23.4	V

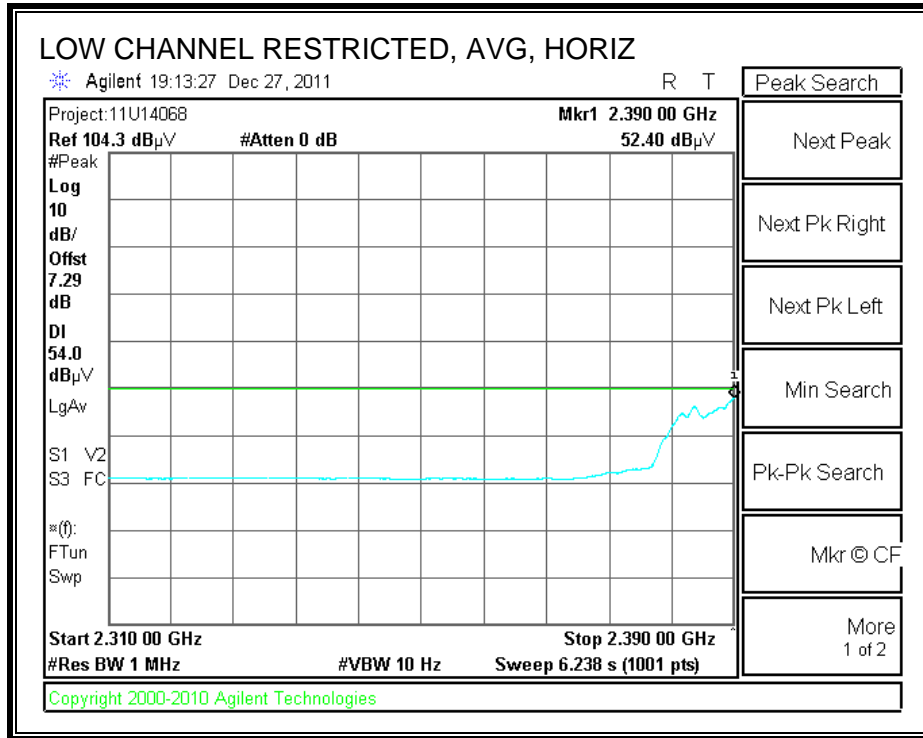
Rev. 07.08.11

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		

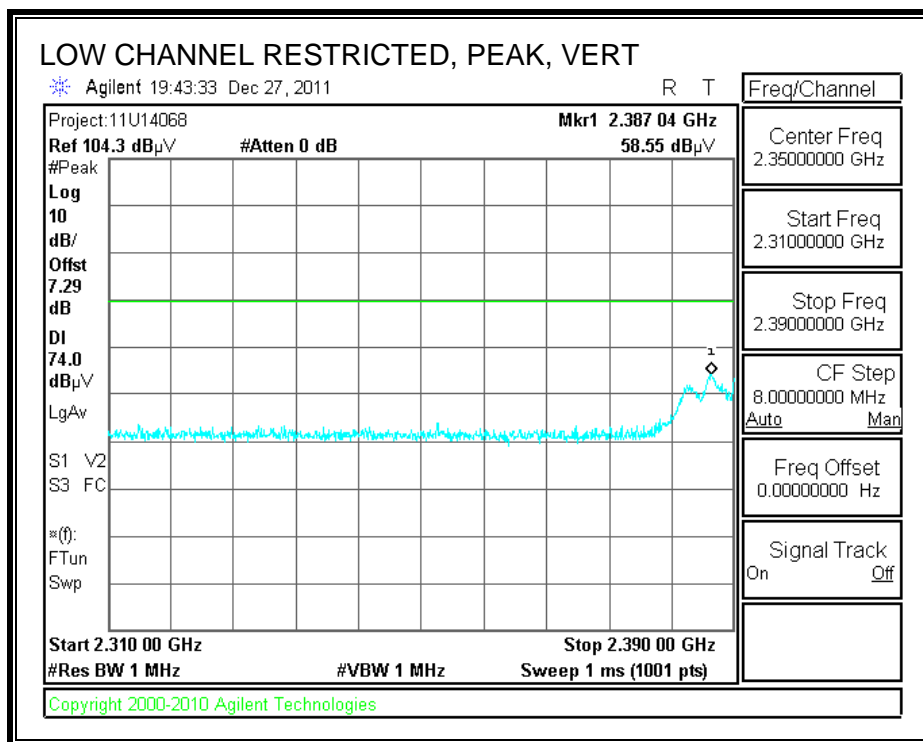
8.2.4. TX ABOVE 1 GHz FOR 802.11n HT40 1TX MODE IN THE 2.4 GHz BAND

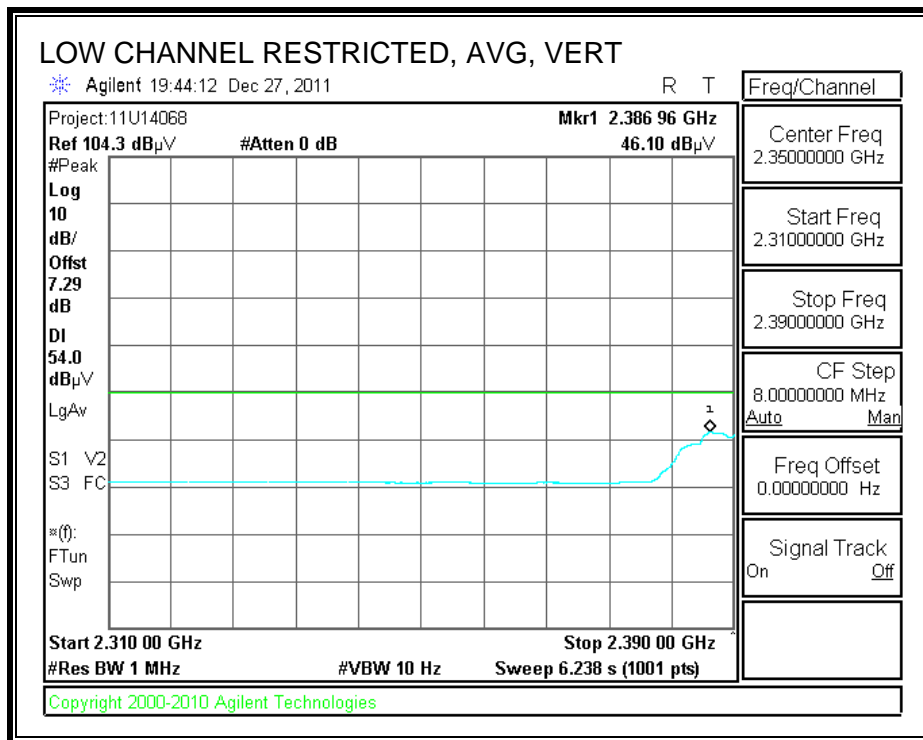
RESTRICTED BANEDGE (LOW CHANNEL, HORIZONTAL)



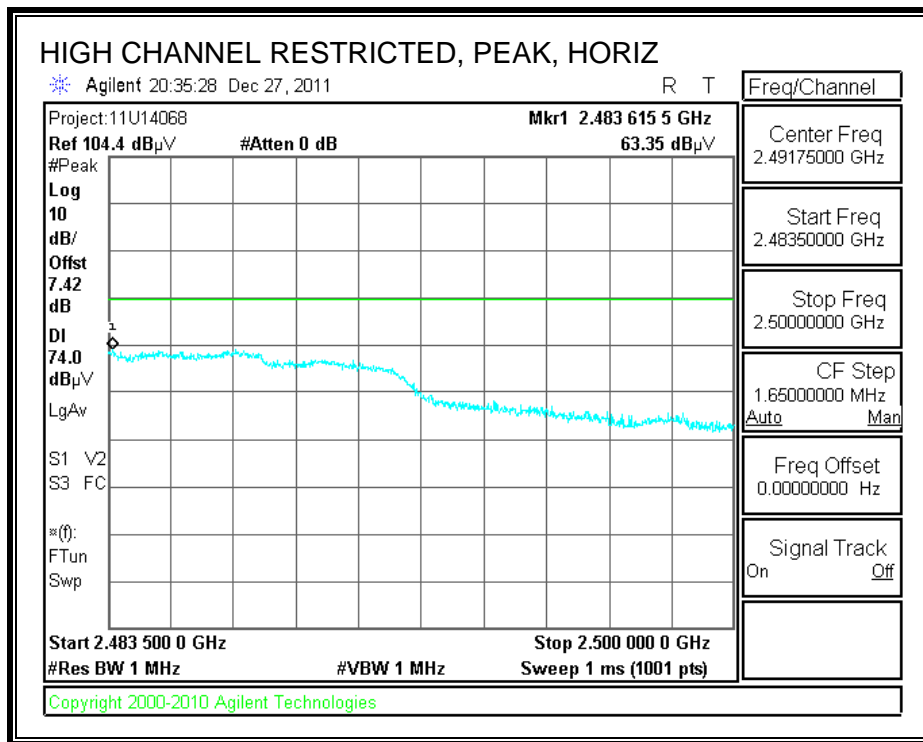


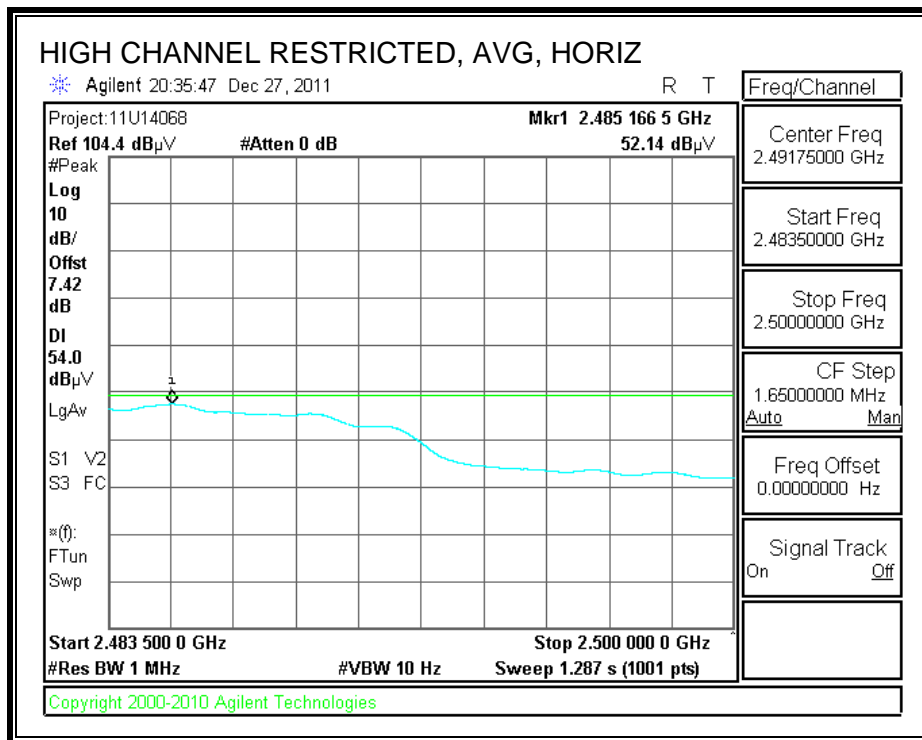
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



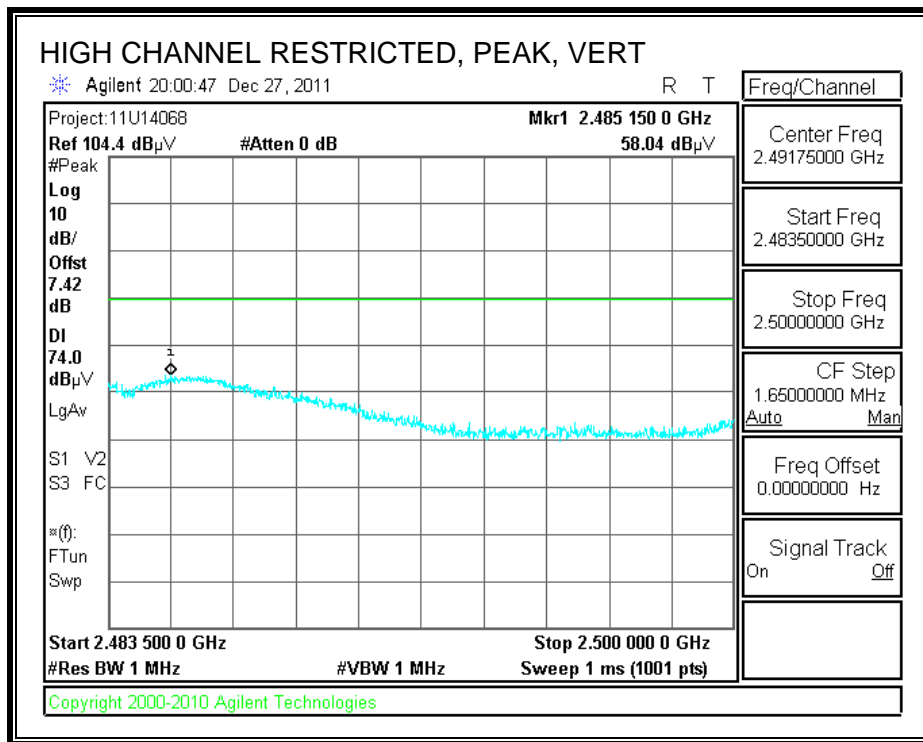


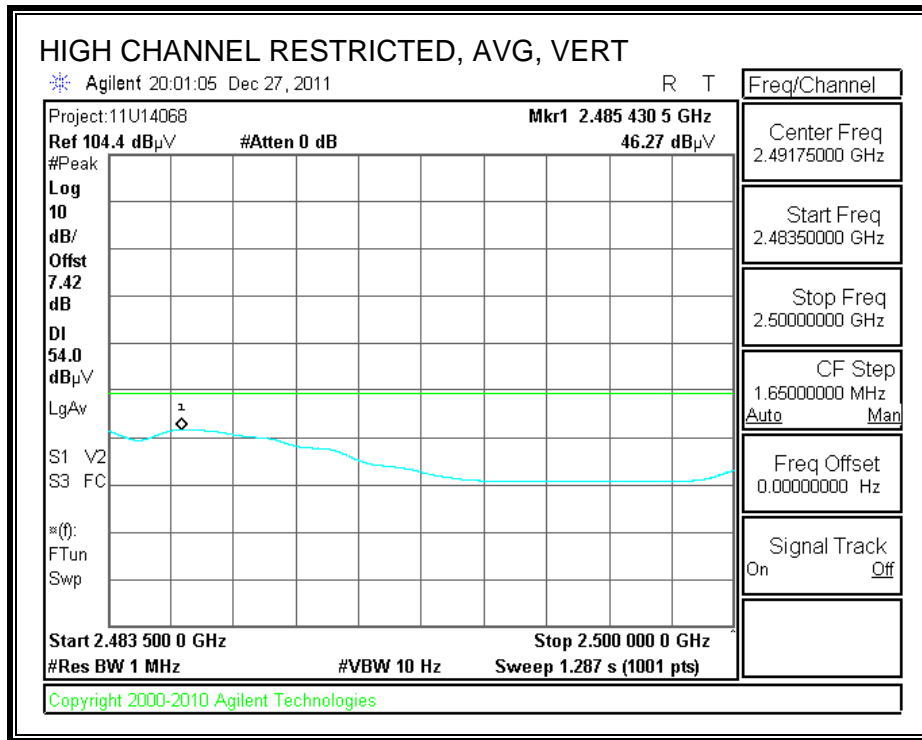
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

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

Company: SIERRA WIRELESS
Project #: 11U14068
Date: 22/27/2011
Test Engineer: MENGISTU MEKURIA
Configuration: EUT WITH AC ACAPTER
Mode: TX, HT40 MODE

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T59; S/N: 3245 @3m	T145 Agilent 3008A0056			FCC 15.209

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

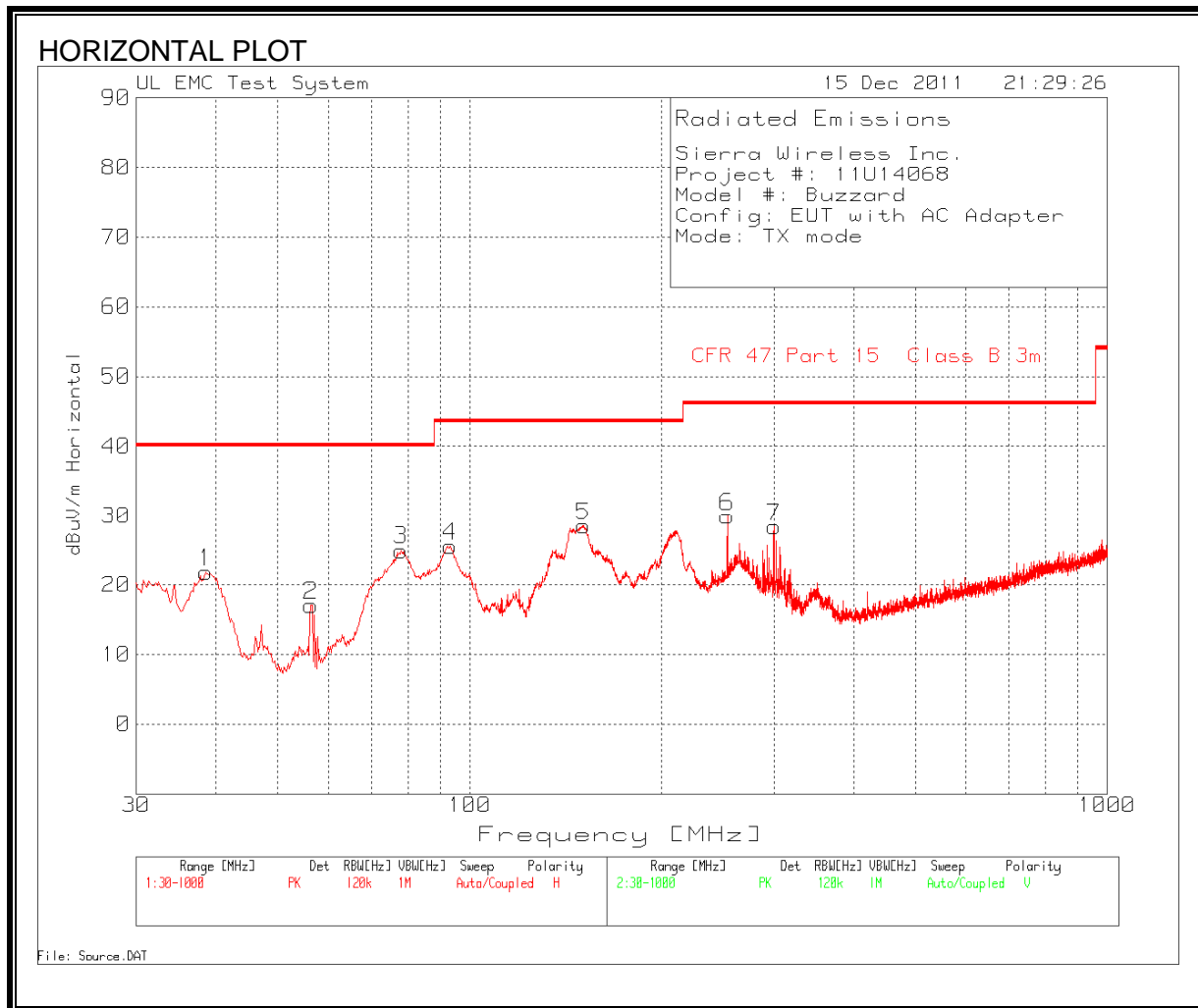
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filtr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Channel (2422 MHz)															
4.844	3.0	40.1	28.4	33.2	6.3	-34.8	0.0	0.0	44.8	33.1	74	54	-29.2	-20.9	V
4.824	3.0	39.8	28.2	33.2	6.3	-34.8	0.0	0.0	44.4	32.8	74	54	-29.6	-21.2	H
Mid Channel (2437 MHz)															
4.874	3.0	39.1	26.6	33.2	6.3	-34.8	0.0	0.0	43.8	31.4	74	54	-30.2	-22.6	V
4.874	3.0	38.4	26.1	33.2	6.3	-34.8	0.0	0.0	43.2	30.9	74	54	-30.8	-23.1	H
Hi Channel (2452 MHz)															
4.904	3.0	38.6	26.5	33.3	6.3	-34.8	0.0	0.0	43.4	31.3	74	54	-30.6	-22.7	V
4.904	3.0	37.8	25.4	33.3	6.3	-34.8	0.0	0.0	42.6	30.2	74	54	-31.4	-23.8	H

Rev. 07.08.11

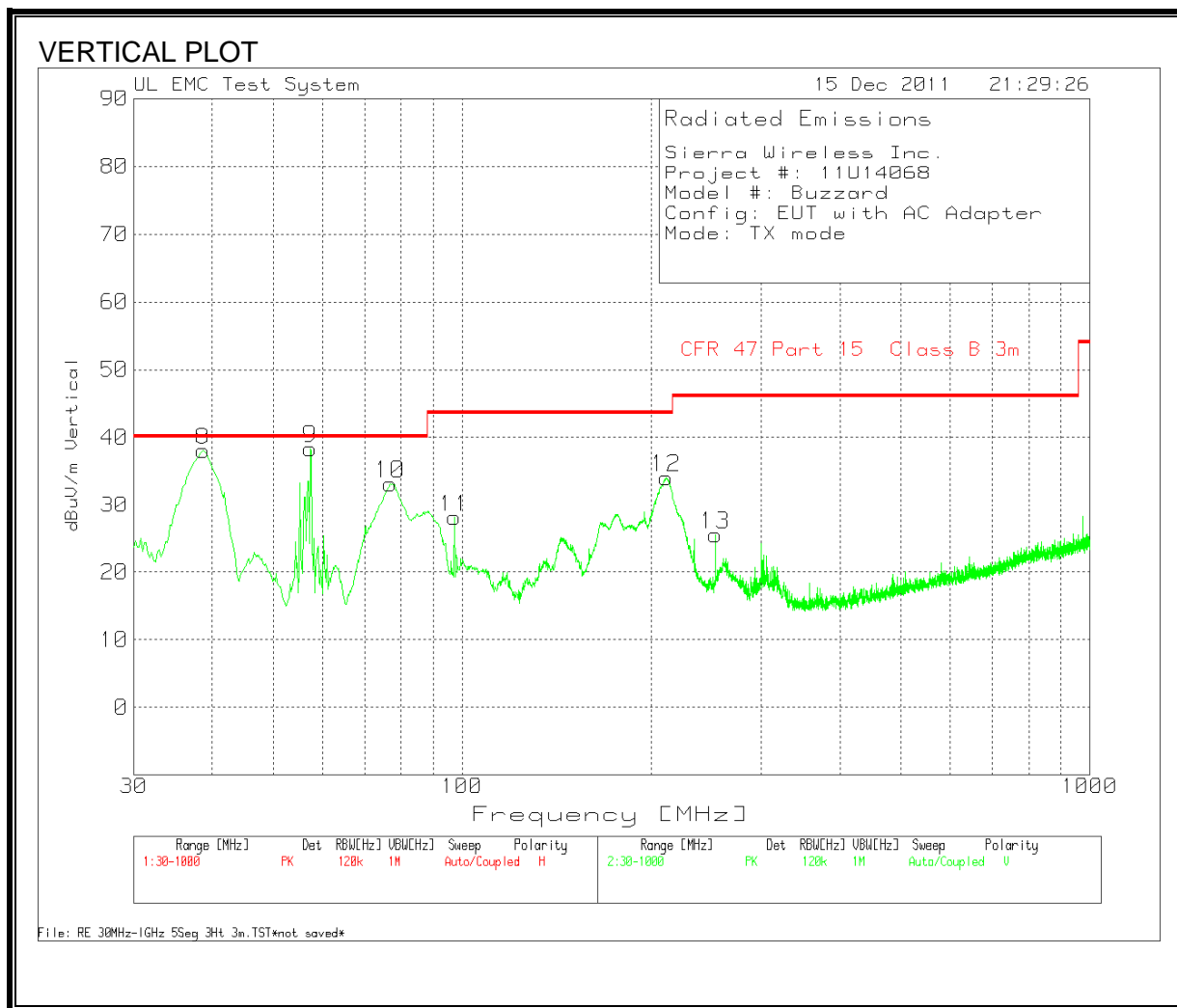
f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field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

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

Sierra Wireless Inc.									
Project #: 11U14068									
Model #: Buzzard									
Config: EUT with AC Adapter									
Mode: TX mode									
Range 1 30 - 1000MHz									
Test Frequency	Meter Reading	Detector	25MHz-1Ghz ChmbrB Amp [dB]	T130 Bilog Factors.TXT [dB]	dBuV/m	CFR 47 Part 15 Class B 3m	Margin	Height [cm]	Polarity
38.5292	35.77	PK	-29.2	15.2	21.77	40	-18.23	300	Horz
56.3629	38.2	PK	-29	7.9	17.1	40	-22.9	300	Horz
78.0735	46.05	PK	-28.8	7.7	24.95	40	-15.05	200	Horz
93.1934	45.88	PK	-28.6	8.3	25.58	43.5	-17.92	200	Horz
150.9592	44.1	PK	-28	12.4	28.5	43.5	-15	200	Horz
253.5032	45.08	PK	-27.1	11.9	29.88	46	-16.12	100	Horz
300.026	41.9	PK	-26.9	13.3	28.3	46	-17.7	100	Horz
Range 2 30 - 1000MHz									
Test Frequency	Meter Reading	Detector	25MHz-1Ghz ChmbrB Amp [dB]	T130 Bilog Factors.TXT [dB]	dBuV/m	CFR 47 Part 15 Class B 3m	Margin	Height [cm]	Polarity
38.774	52.16	PK	-29.2	15.1	38.06	40	-1.94	100	Vert
57.3321	59.52	PK	-29	7.9	38.42	40	-1.58	100	Vert
76.9105	54.2	PK	-28.8	7.8	33.2	40	-6.8	100	Vert
97.2642	47.3	PK	-28.6	9.4	28.1	43.5	-15.4	100	Vert
211.245	49.6	PK	-27.5	12	34.1	43.5	-9.4	100	Vert
253.5032	40.74	PK	-27.1	11.9	25.54	46	-20.46	100	Vert
Range 2 30 - 1000MHz									
Test Frequency	Meter Reading	Detector	25MHz-1Ghz ChmbrB Amp [dB]	T130 Bilog Factors.TXT [dB]	dBuV/m	CFR 47 Part 15 Class B 3m	Margin	Height [cm]	Polarity
38.774	49.45	QP	-29.2	15	35.25	40	-4.75	101	Vert
57.3321	26.37	QP	-29	7.9	5.27	40	-34.73	123	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

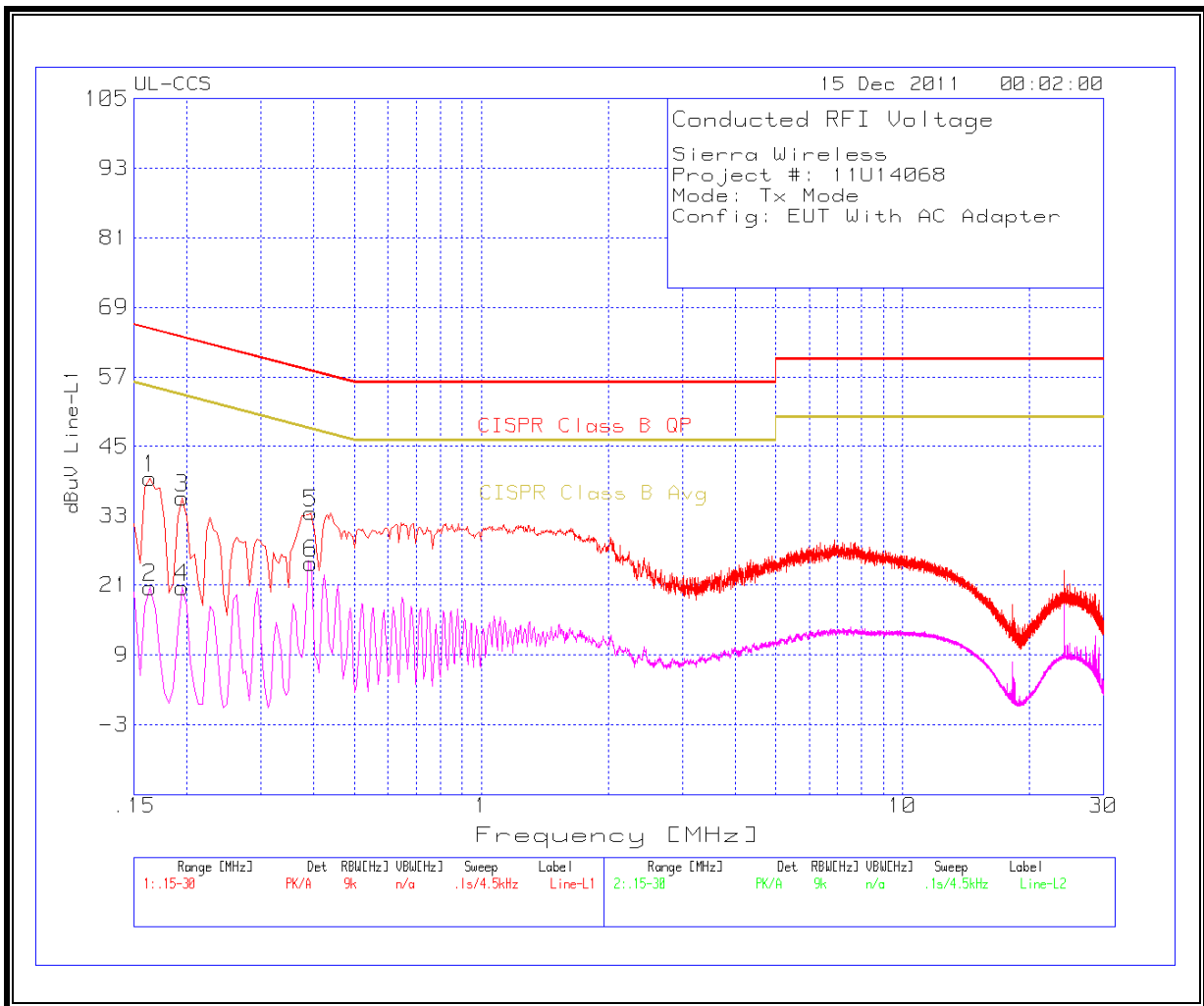
ANSI C63.4

RESULTS

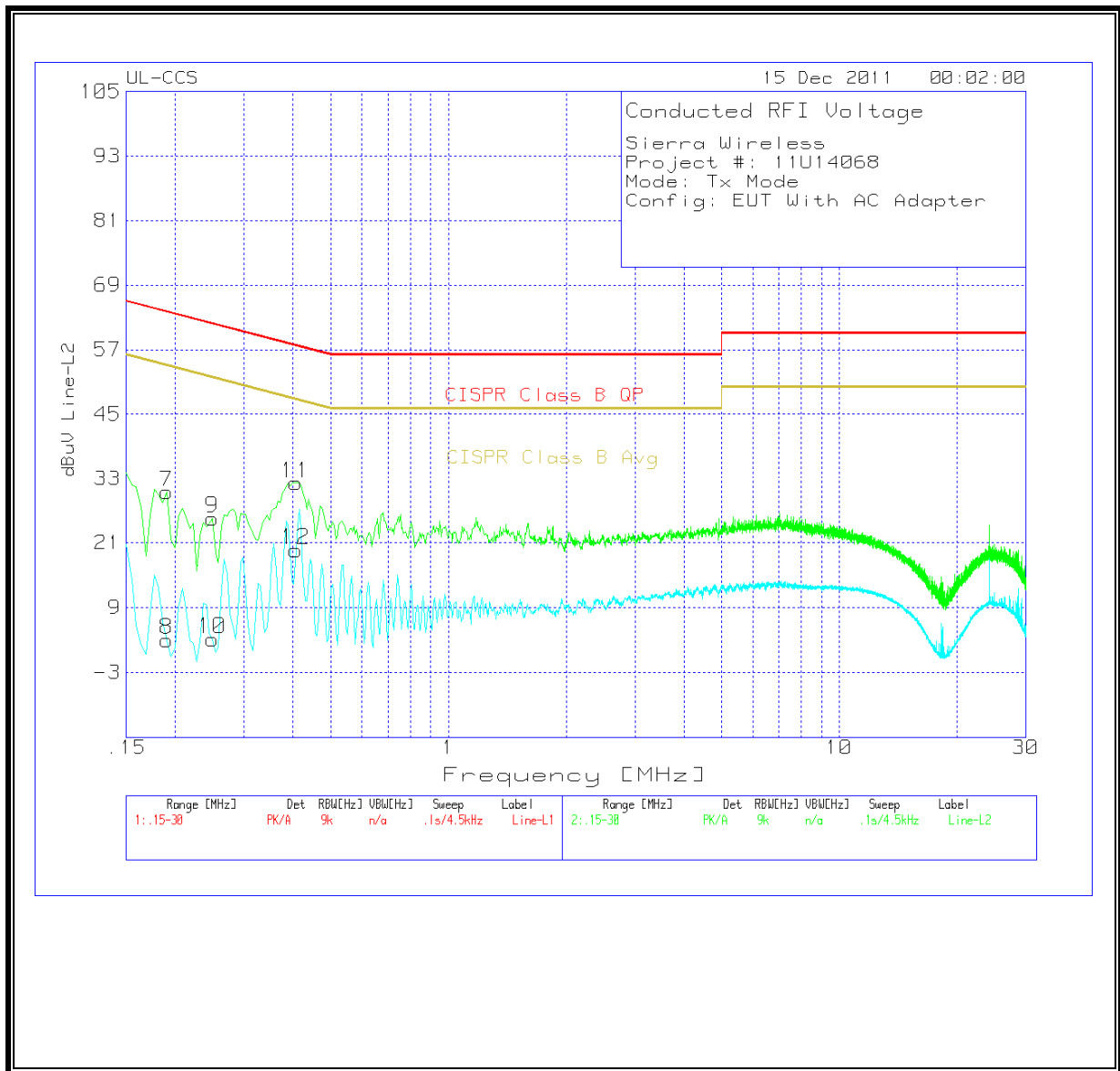
6 WORST EMISSIONS

Sierra Wireless									
Project #: 11U14068									
Mode: Tx Mode									
Config: EUT With AC Adapter									
Line-L1 .15 - 30MHz									
Test Frequency	Meter Reading	Detector	T24 IL L1.TXT [dB]	LC Cables 1&3.TXT [dB]	dBuV	CISPR Class B QP	Margin	CISPR Class B Avg	Margin
0.1635	39.36	PK	0.1	0	39.46	65.3	-25.84	-	-
0.1635	20.49	Av	0.1	0	20.59	-	-	55.3	-34.71
0.195	35.98	PK	0.1	0	36.08	63.8	-27.72	-	-
0.195	20.43	Av	0.1	0	20.53	-	-	53.8	-33.27
0.393	33.42	PK	0.1	0	33.52	58	-24.48	-	-
0.393	24.55	Av	0.1	0	24.65	-	-	48	-23.35
Line-L2 .15 - 30MHz									
Test Frequency	Meter Reading	Detector	T24 IL L2.TXT [dB]	LC Cables 2&3.TXT [dB]	dBuV	CISPR Class B QP	Margin	CISPR Class B Avg	Margin
0.1905	30.37	PK	0.1	0	30.47	64	-33.53	-	-
0.1905	2.91	Av	0.1	0	3.01	-	-	54	-50.99
0.249	25.42	PK	0.1	0	25.52	61.8	-36.28	-	-
0.249	2.98	Av	0.1	0	3.08	-	-	51.8	-48.72
0.4065	32.04	PK	0.1	0	32.14	57.7	-25.56	-	-
0.4065	19.55	Av	0.1	0	19.65	-	-	47.7	-28.05

LINE 1 RESULTS



LINE 2 RESULTS



10. MAXIMUM PERMISSIBLE EXPOSURE

FCC RULES

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

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

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

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

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
30–300	27.5	0.073	0.2	30
300–1500 .....	.....	.....	f/1500	30
1500–100,000 .....	.....	.....	1.0	30

f = frequency in MHz

* = Plane-wave equivalent power density

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

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

IC RULES

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

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

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

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

- Notes:**
1. Frequency, *f*, is in MHz.
 2. A power density of 10 W/m² is equivalent to 1 mW/cm².
 3. A magnetic field strength of 1 A/m corresponds to 1.257 microtesla (μT) or 12.57 milligauss (mG).

EQUATIONS

Power density is given by:

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

where

S = Power density in W/m²

EIRP = Equivalent Isotropic Radiated Power in W

D = Separation distance in m

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

Distance is given by:

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

where

D = Separation distance in m

EIRP = Equivalent Isotropic Radiated Power in W

S = Power density in W/m²

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

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

where

Px = Power of transmitter x

Gx = Numeric gain of antenna x

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

LIMITS

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

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

RESULTS

Band	Mode	Separation Distance (m)	Output AV Power (dBm)	Antenna Gain (dBi)	IC Power Density (W/m²)	FCC Power Density (mW/cm²)
2.4 GHz	WLAN	0.20	14.60	2.00	0.09	0.009