FCC CFR47 PART 15 SUBPART C

CERTIFICATION TEST REPORT

FOR

CDMA+ WIMAX + WIFI MOBILE HOT SPOT

MODEL NUMBER: AirCard W802S

FCC ID: N7N-MHS802

REPORT NUMBER: 10U13412-4, Revision A

ISSUE DATE: OCTOBER 04, 2010

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Revision History

Rev.	Issue Date	Revisions	Revised By
---	10/04/10	Initial Issue	T. Chan
A	01/12/11	Changed model name	A. Zaffar

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SIERRA WIRELESS INC.
2290 COSMOS COURT, CARLSBAD
CALIFORNIA 92011, USA

EUT DESCRIPTION: CDMA+ WIMAX + WIFI MOBILE HOT SPOT

MODEL: AirCard W802S

SERIAL NUMBER: Primary Unit #3

DATE TESTED: OCTOBER 1-4, 2010

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	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:

THU CHAN
ENGINEERING MANAGER
UL CCS

Tested By:

CHIN PANG
EMC ENGINEER
UL CCS

2. TEST METHODOLOGY

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

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.
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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:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)
36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

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 CDMA + WiMax + WiFi mobile Hot Spot router

The WiMax radio module is manufactured by Sierra Wireless

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	18.30	67.61
2412 - 2462	802.11g	21.20	131.83
2412 - 2462	802.11n, HT20 SISO	21.60	144.54
2422 - 2452	802.11n, HT40 SISO	19.40	87.10

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PIFA antenna, with a maximum gain of -1 dBi.

5.4. SOFTWARE AND FIRMWARE

The test utility software used during testing was Labtool, rev 1.0.1.13

5.5. WORST-CASE CONFIGURATION AND MODE

The worst-case channel is determined as the channel with the highest output power.

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

All final tests in the 802.11b mode were made at 1 Mb/s.
All final tests in the 802.11g mode were made at 6 Mb/s.
All final tests in the 802.11n HT20 mode were made at MCS 0.
All final tests in the 802.11n HT40 mode were made at MCS 15

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

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	HP	Compaq 6515b	CNU82518TY	DoC
AC Adapter	HP	PA-1900-08H2	597920SLLUJOXZ	DoC

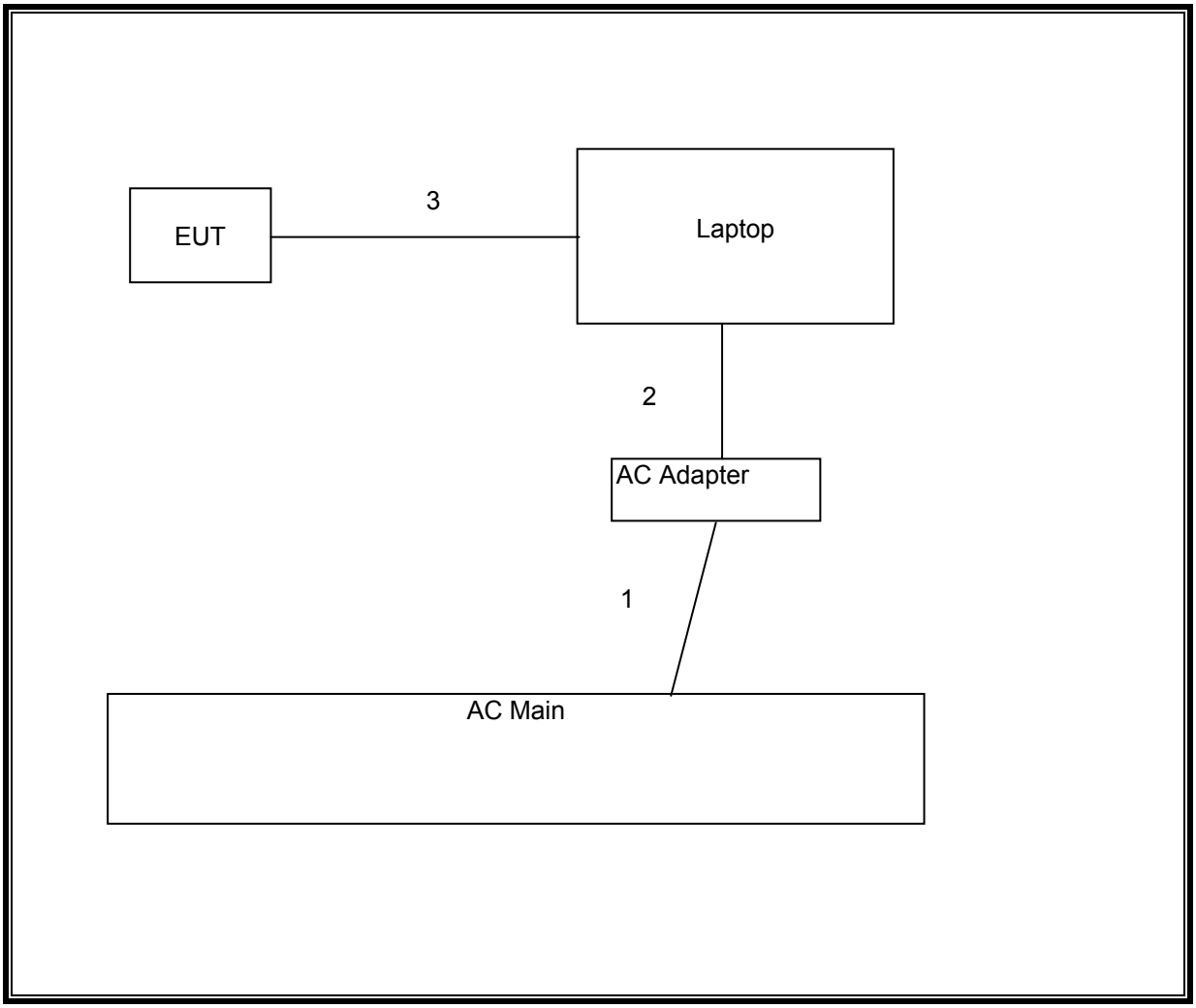
I/O CABLES

I/O CABLE LIST						
Cable No.	**Port**	**# of Identica Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	AC	1	AC	Unshielded	1.8 m	N/A
2	DC	1	DC	Unshielded	1.8 m	N/A
3	USB	1	USB	Unshielded	1.2 m	N/A

TEST SETUP

The EUT is connected to the host laptop computer via USB cable during the tests. Test software exercised the radio card.

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Asset**	**Cal Due**
Spectrum Analyzer, 26.5 GHz	Agilent / HP	E4440A	C01178	08/31/11
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01063	07/14/11
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00778	01/06/11
Antenna, Horn, 18 GHz	EMCO	3115	C00783	06/29/11
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01011	07/12/11
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	05/06/11
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	11/06/10
Reject Filter, 2.4-2.5 GHz	Micro-Tronics	BRM50702	N02685	CNR
Power Meter	Boonton	4541	C01186	03/01/11
Power Sensor, 18 GHz	Boonton	57006	C01203	02/24/11

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.

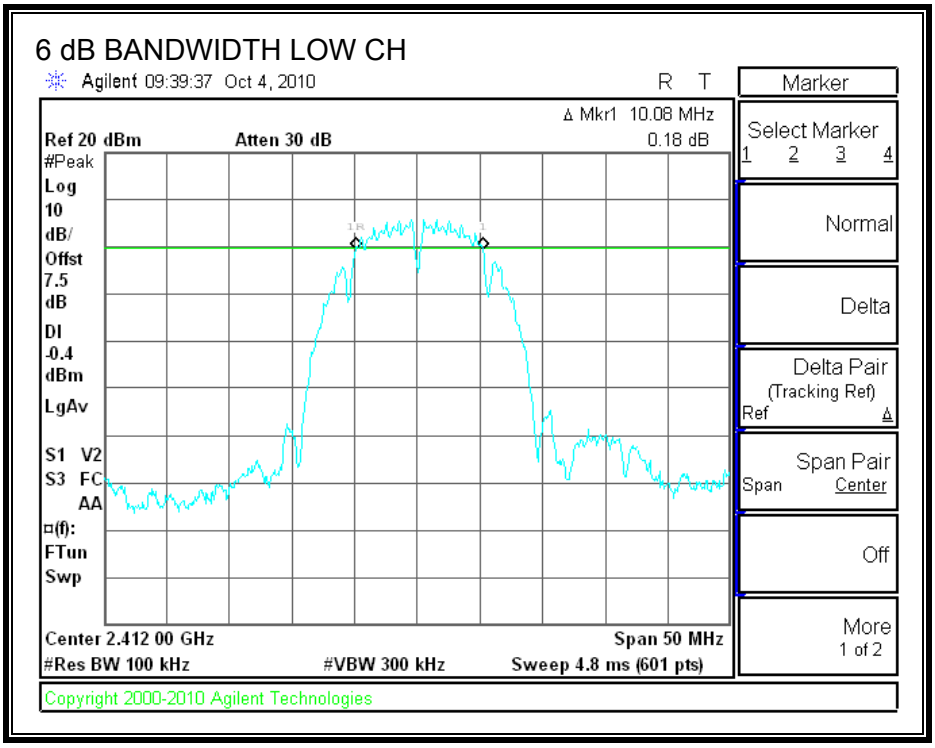
TEST PROCEDURE

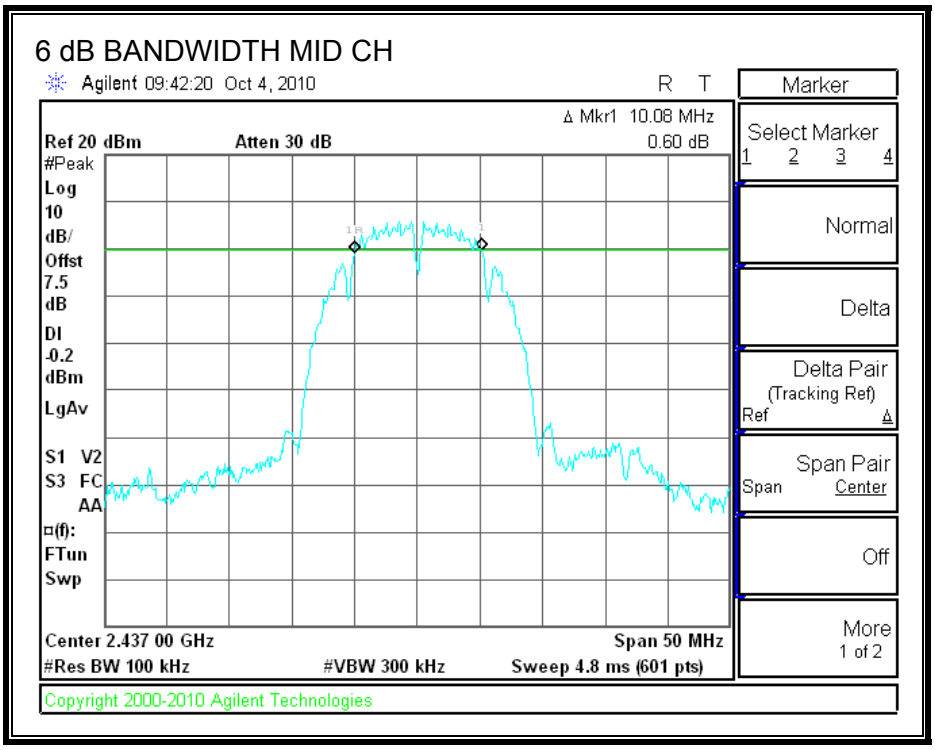
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

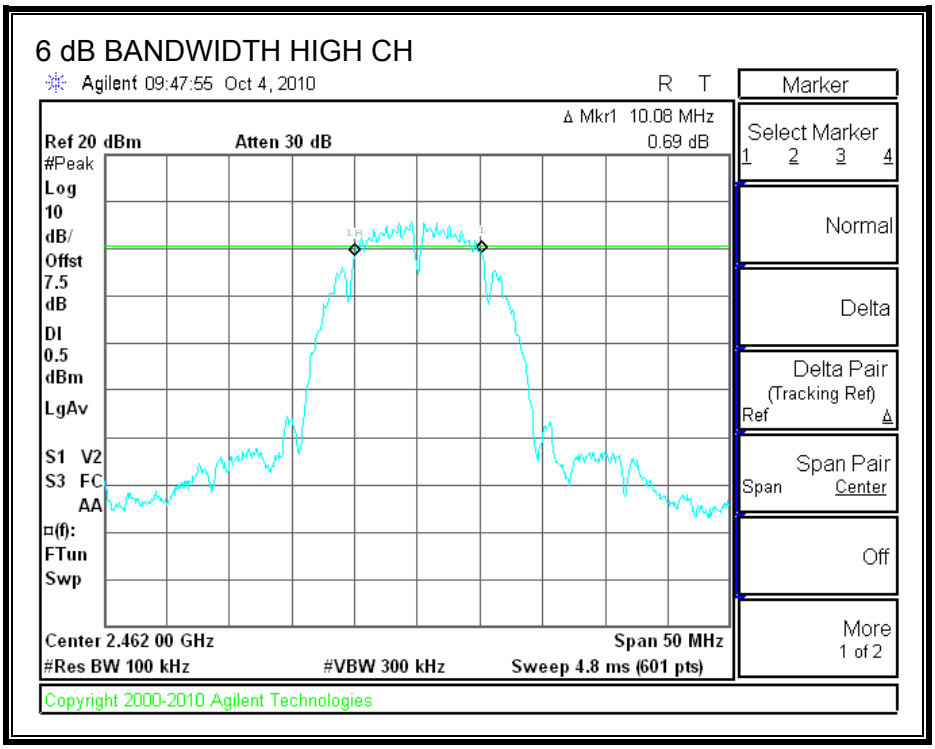
RESULTS

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

6 dB BANDWIDTH







7.1.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

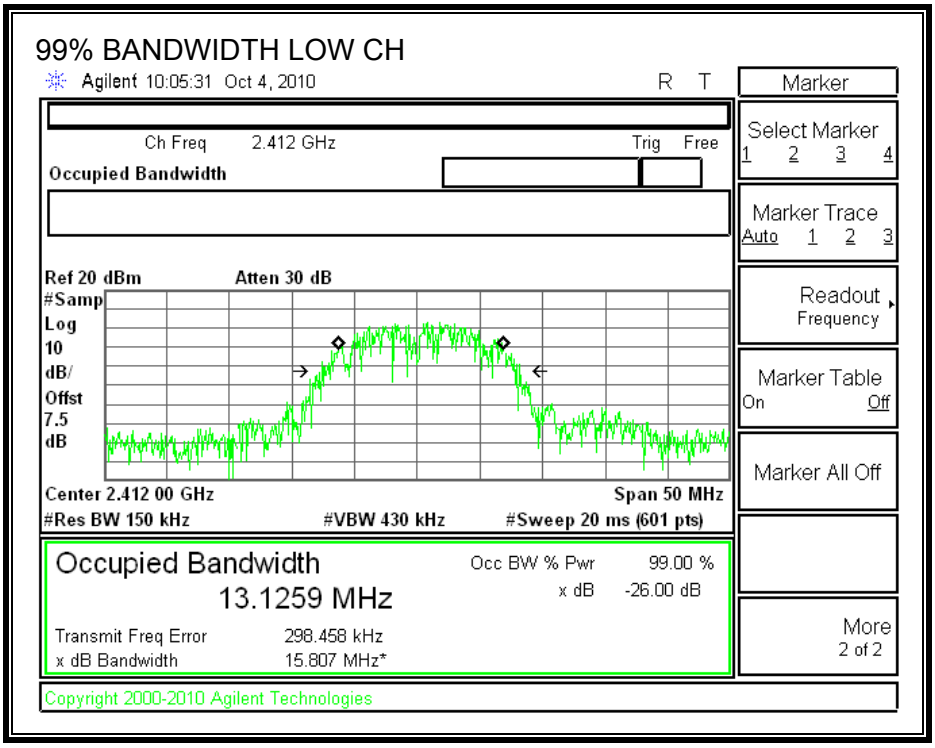
TEST PROCEDURE

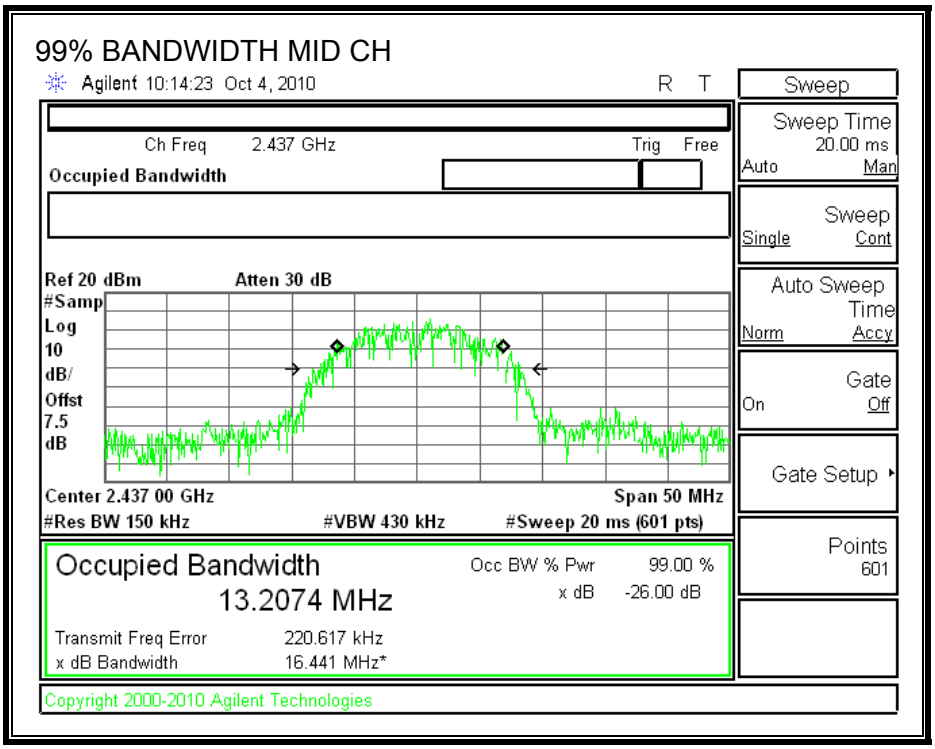
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

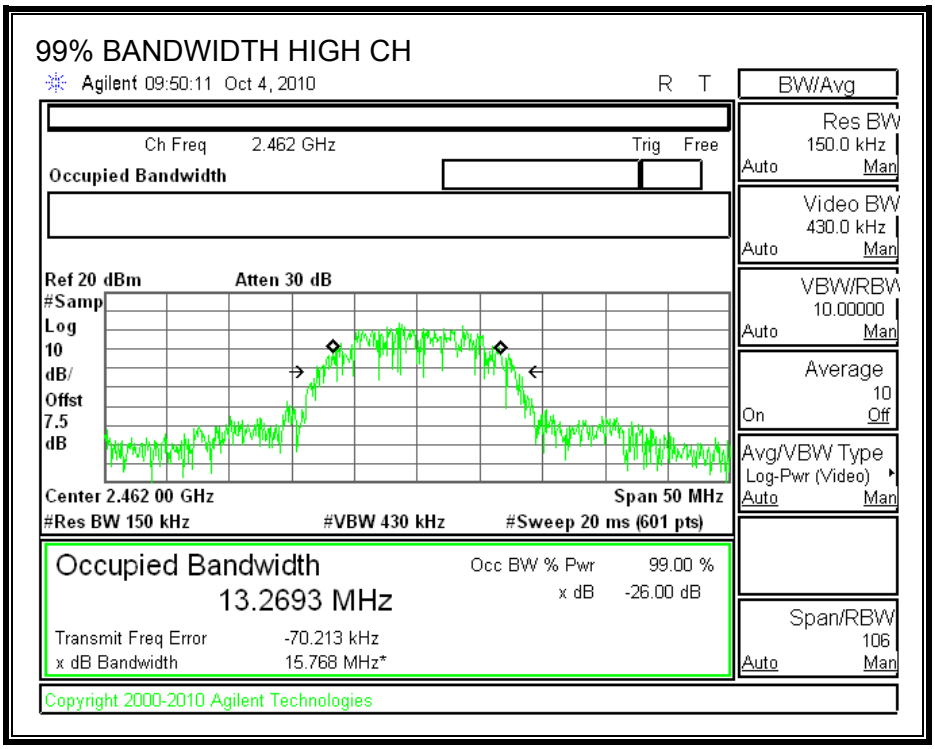
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	13.1259
Middle	2437	13.2074
High	2462	13.2693

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)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	18.40	30	-11.60
Middle	2437	18.30	30	-11.70
High	2462	18.30	30	-11.70

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 16.8 dB (including 10 dB pad and 6.8 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	15.6
Middle	2437	15.5
High	2462	15.5

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.

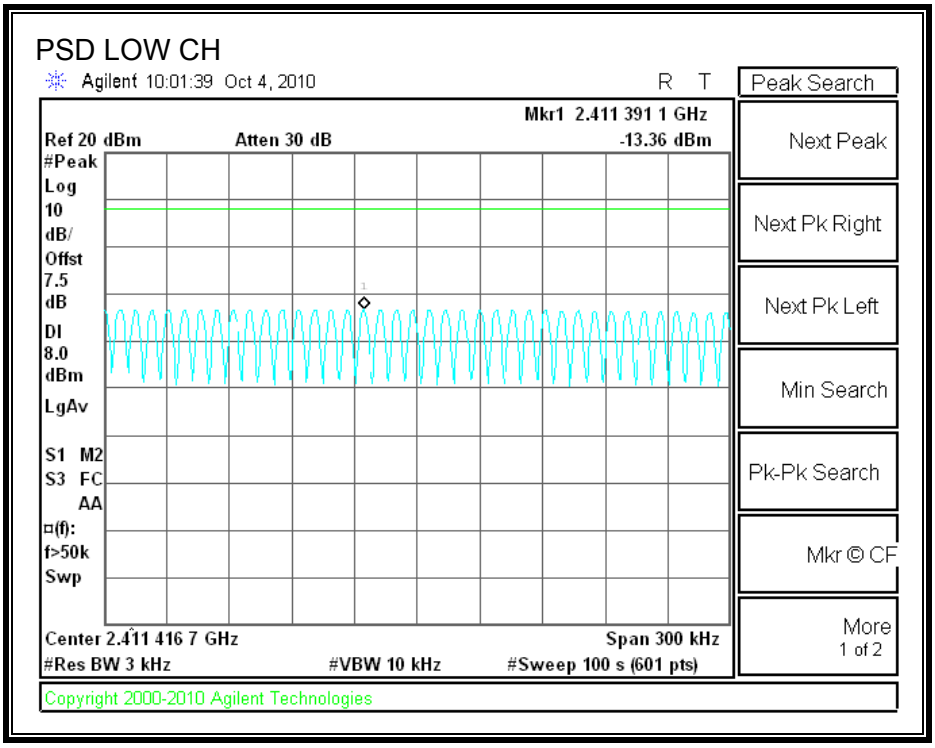
TEST PROCEDURE

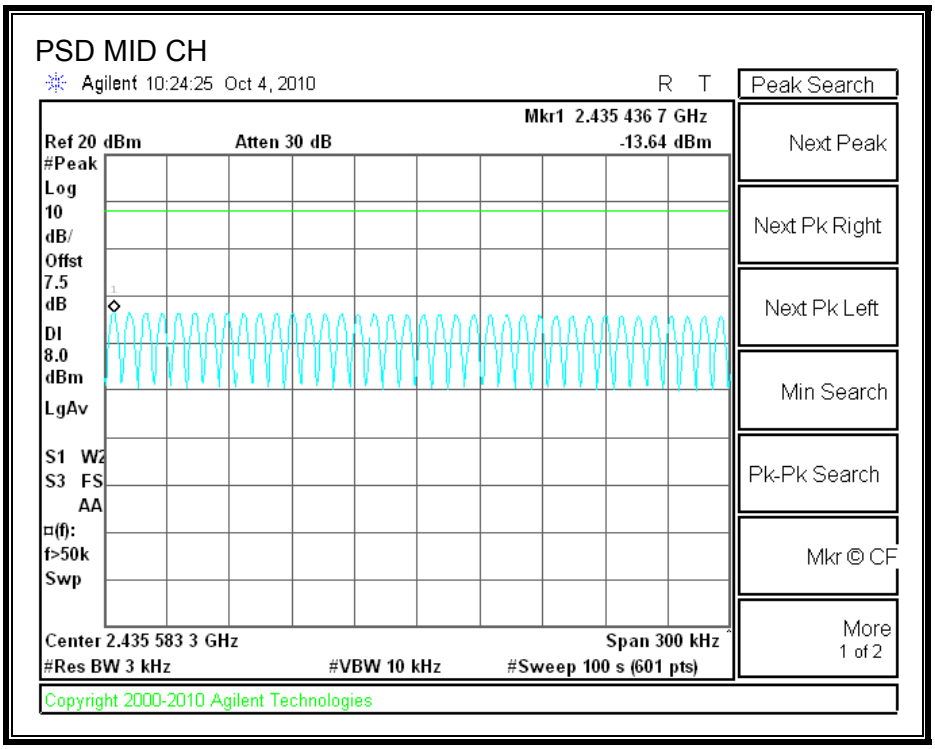
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

RESULTS

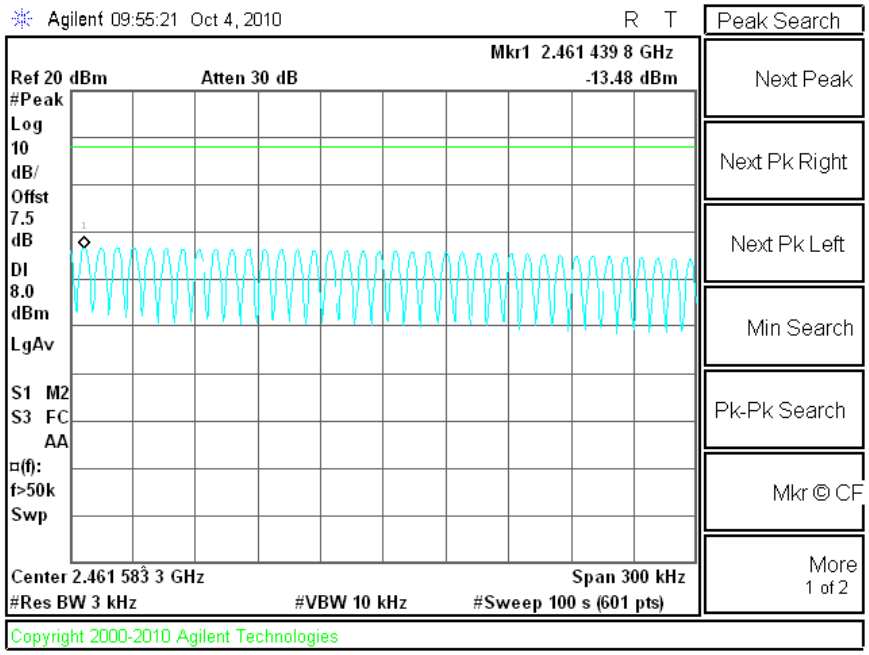
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-13.36	8	-21.36
Middle	2437	-13.64	8	-21.64
High	2462	-13.48	8	-21.48

POWER SPECTRAL DENSITY





PSD HIGH CH



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.

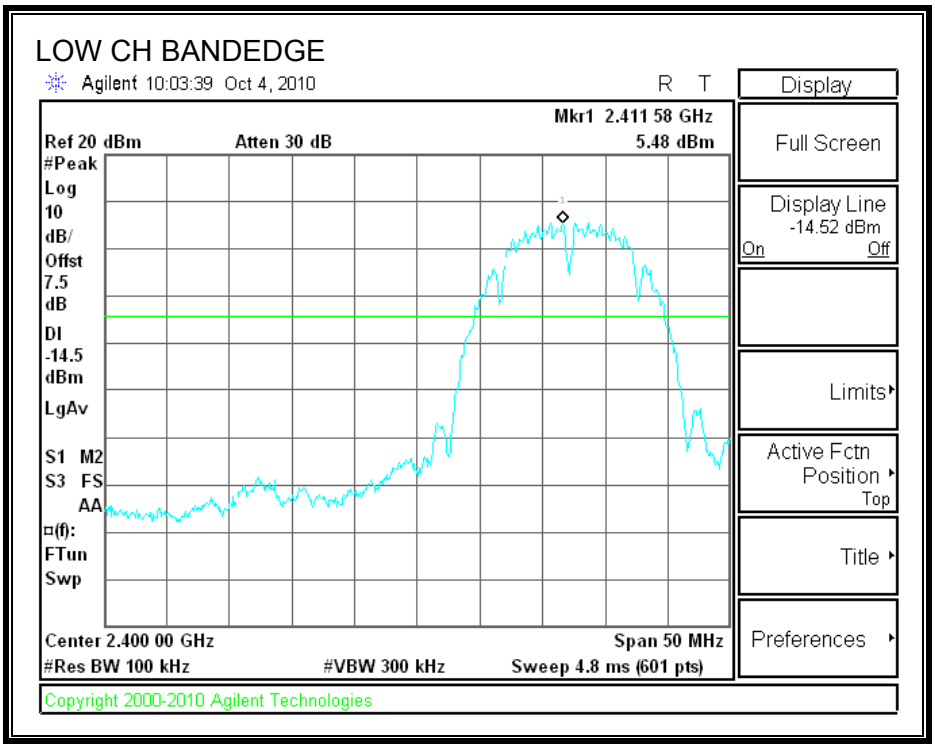
TEST PROCEDURE

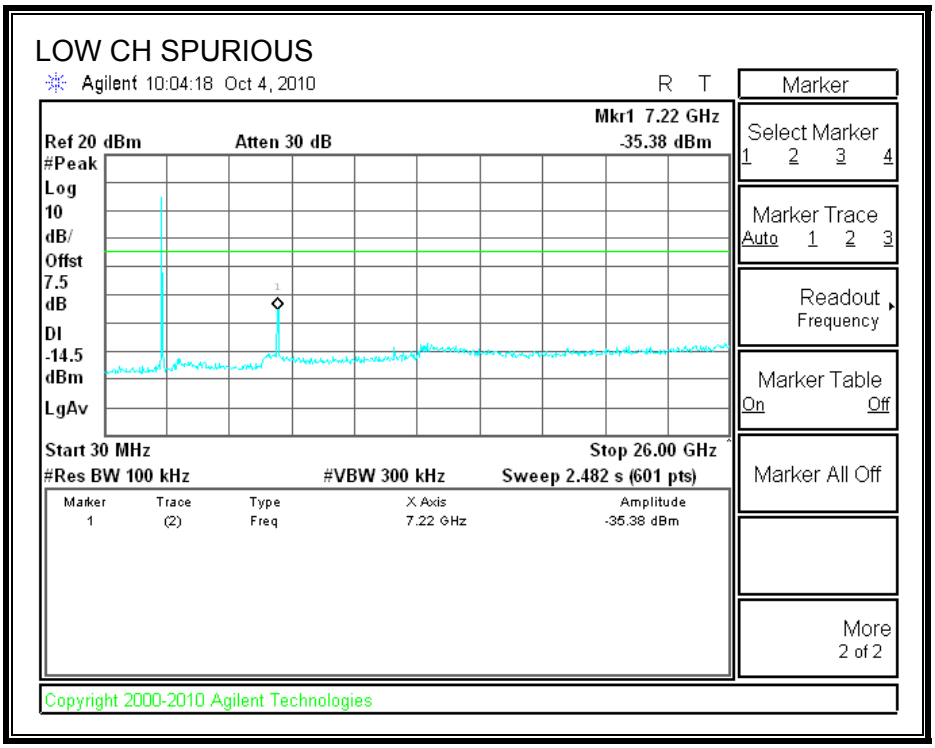
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

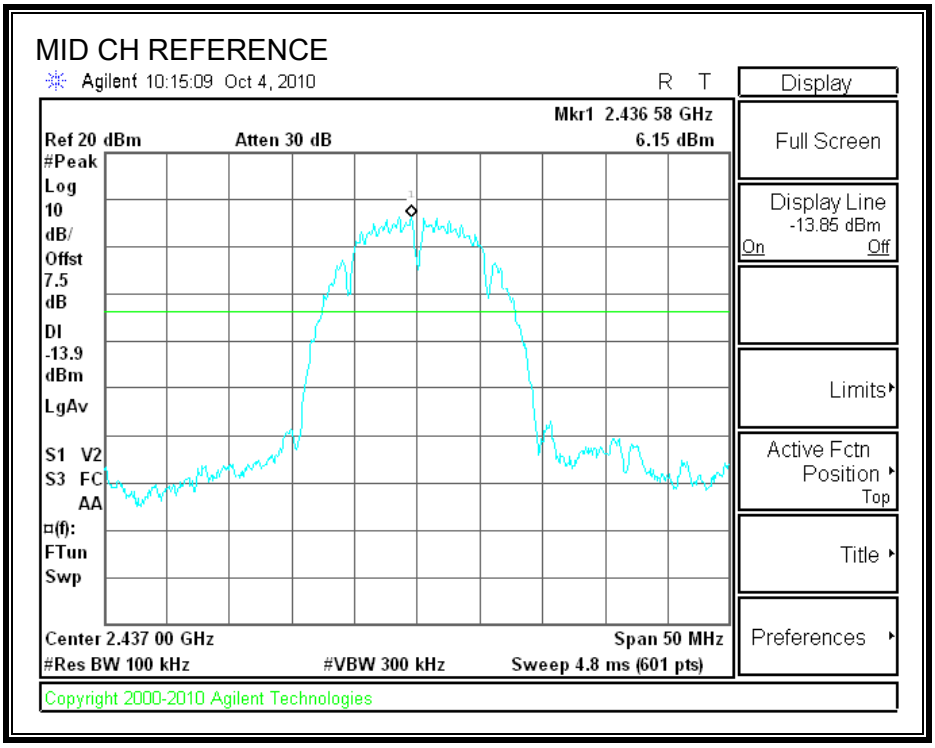
RESULTS

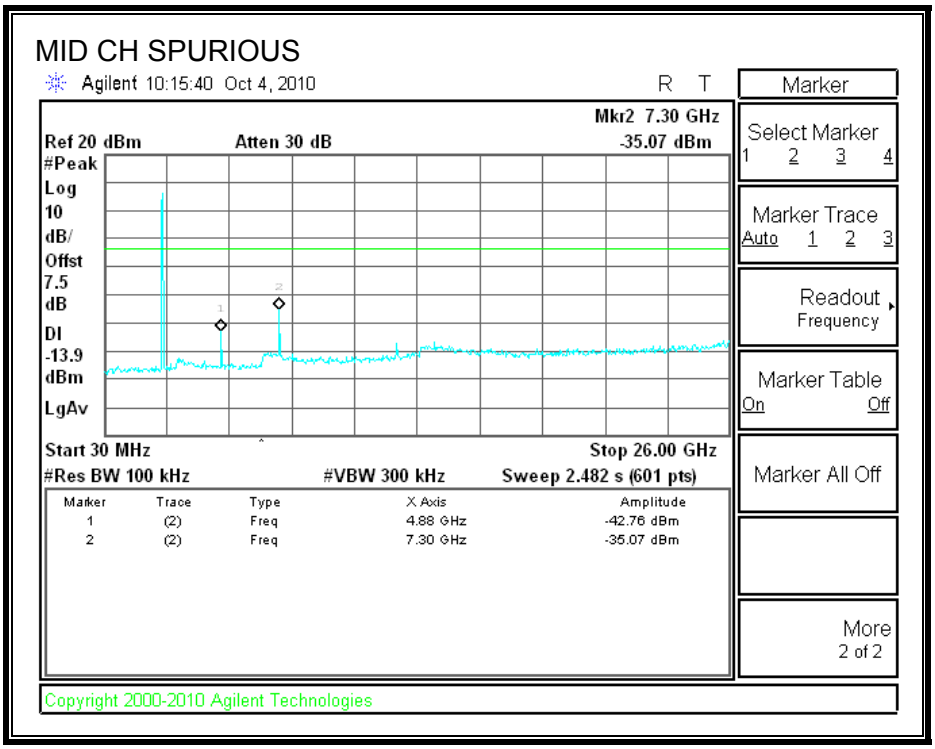
SPURIOUS EMISSIONS, LOW CHANNEL



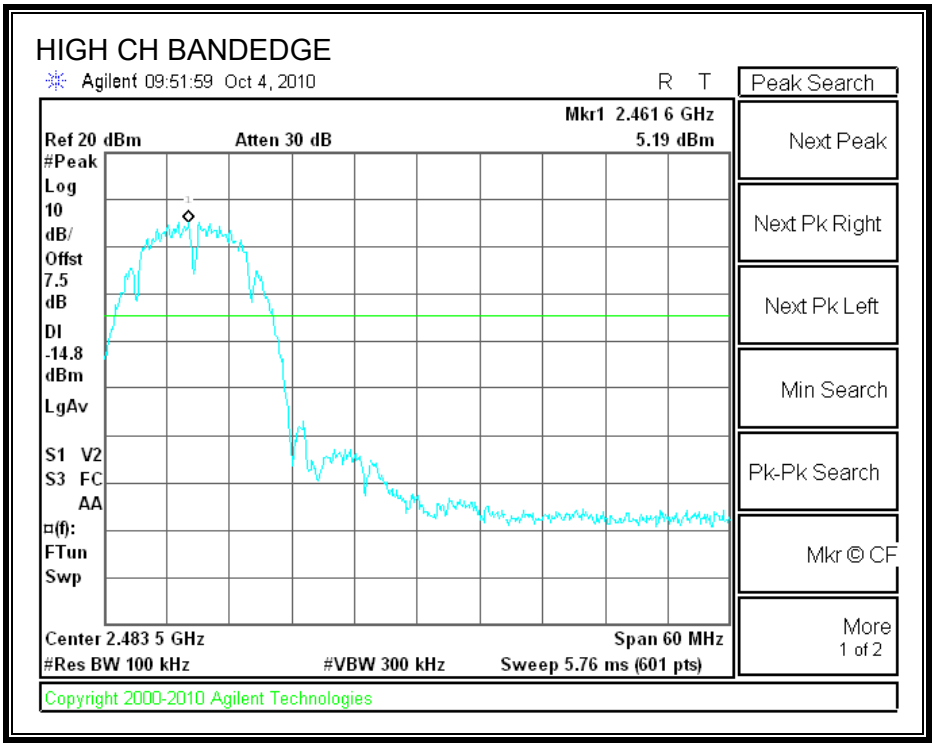


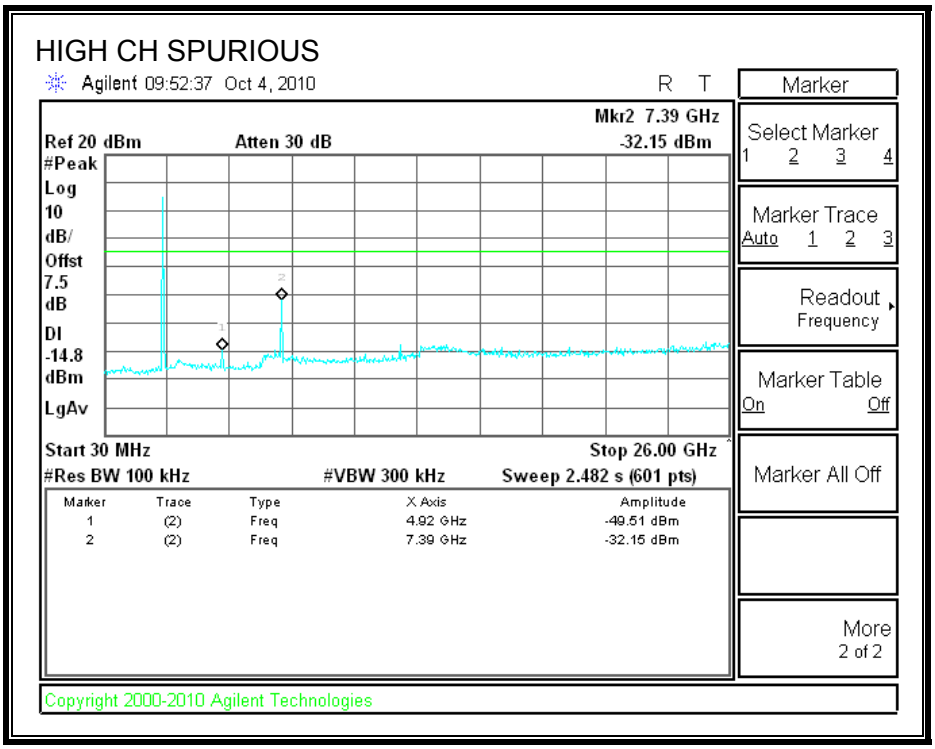
SPURIOUS EMISSIONS, MID CHANNEL





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.

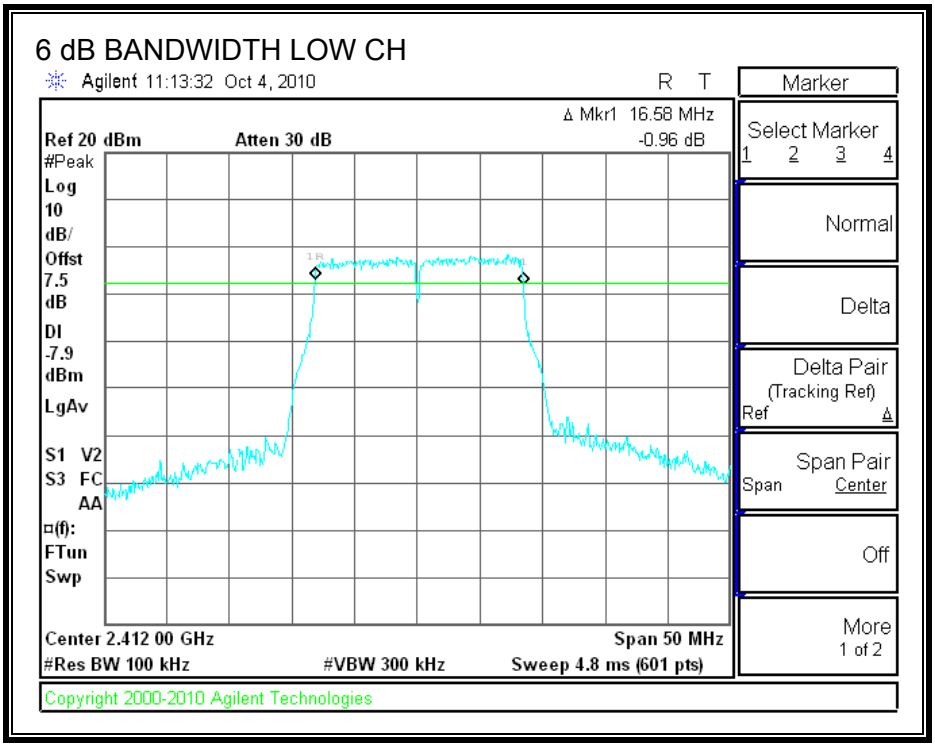
TEST PROCEDURE

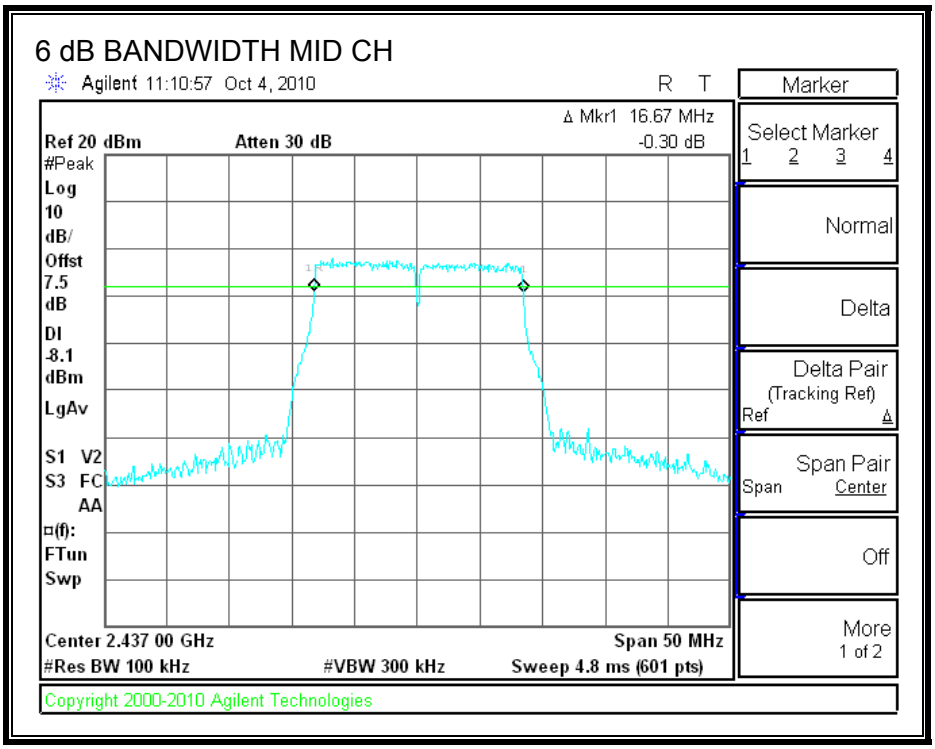
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

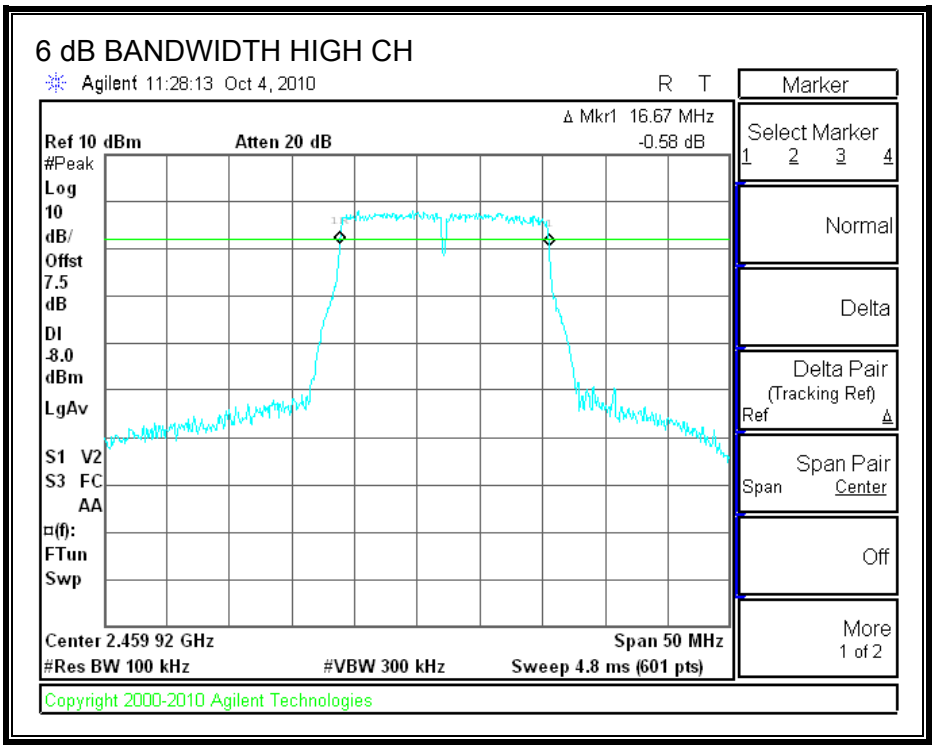
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	16.58	0.5
Middle	2437	16.67	0.5
High	2462	16.67	0.5

6 dB BANDWIDTH







7.2.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

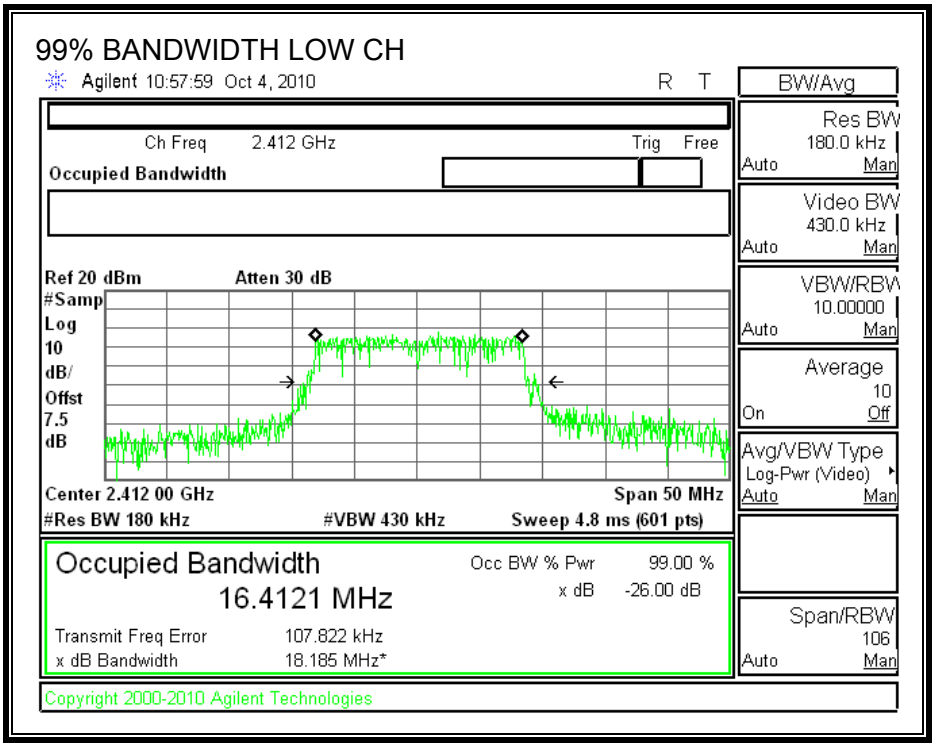
TEST PROCEDURE

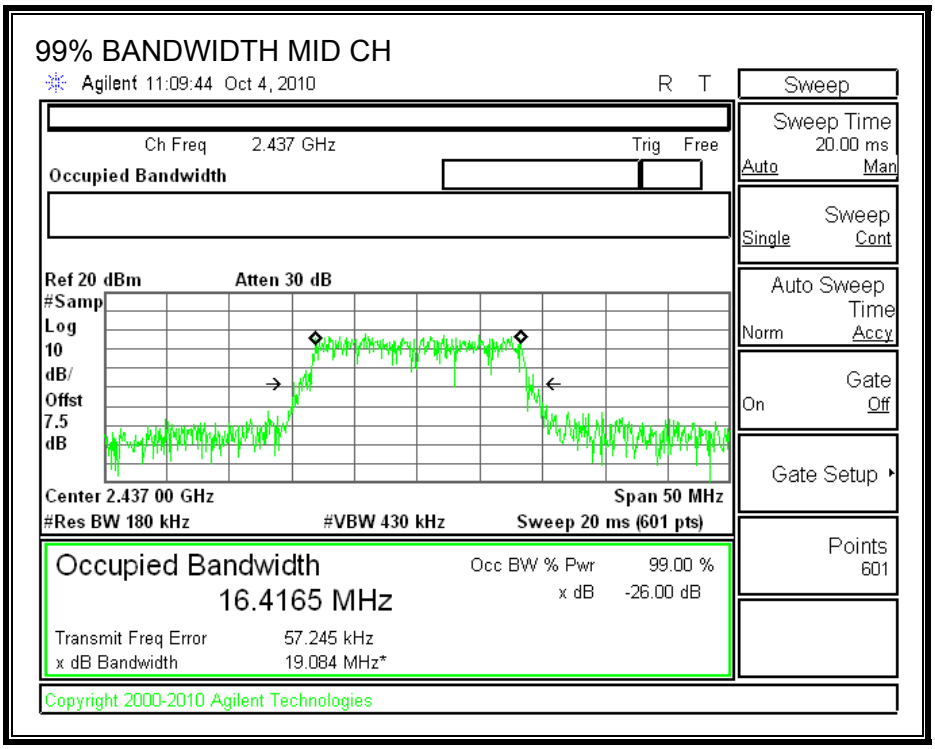
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

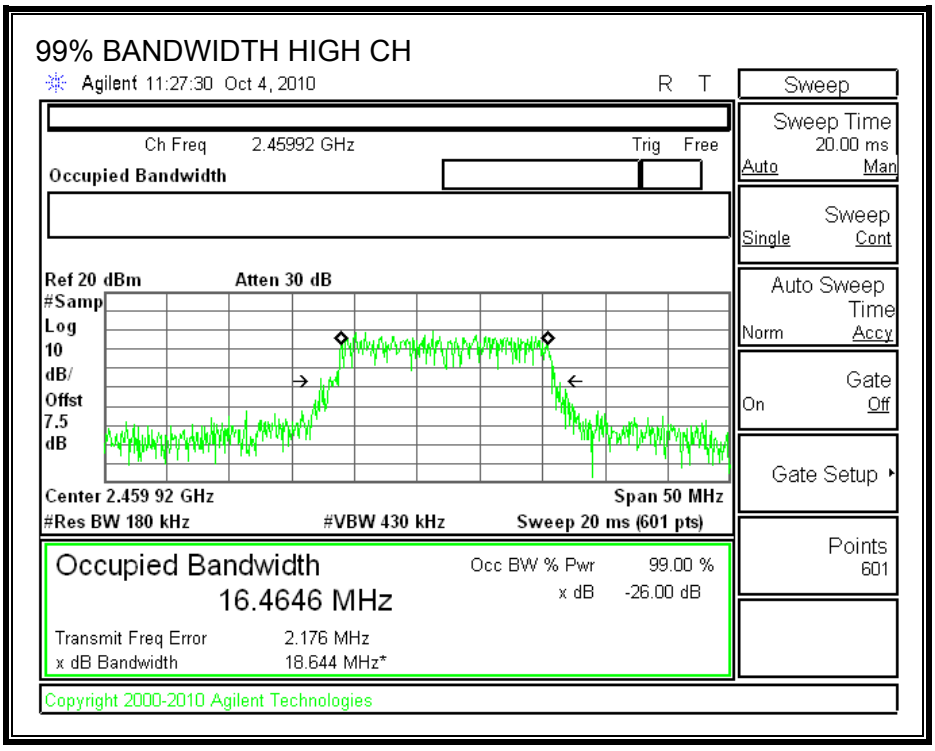
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	16.4121
Middle	2437	16.4165
High	2462	16.4646

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)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	20.80	30	-9.20
Middle	2437	20.90	30	-9.10
High	2462	21.20	30	-8.80

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 10.9 dB (including 10 dB pad and 0.9 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Power (dBm)
Low	2412	12
Middle	2437	12.1
High	2462	12.2

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.

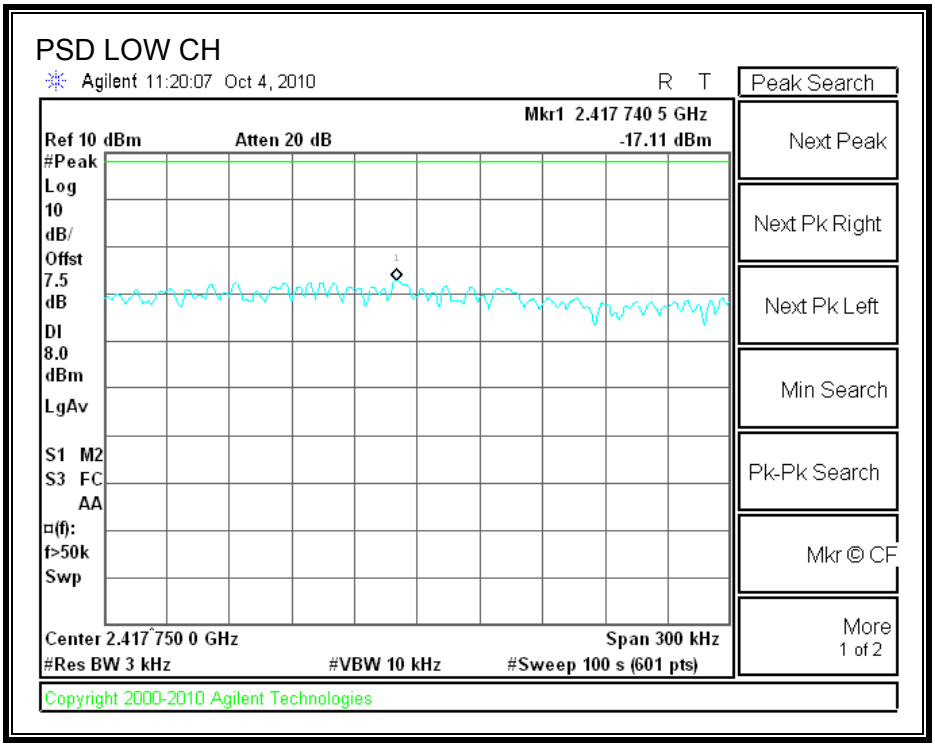
TEST PROCEDURE

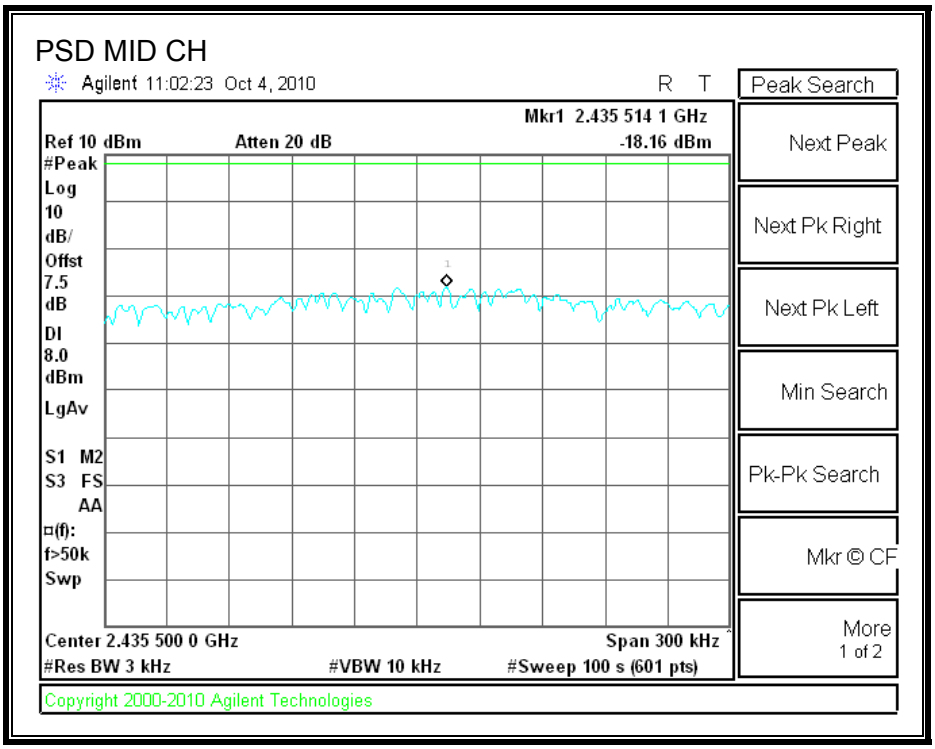
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

RESULTS

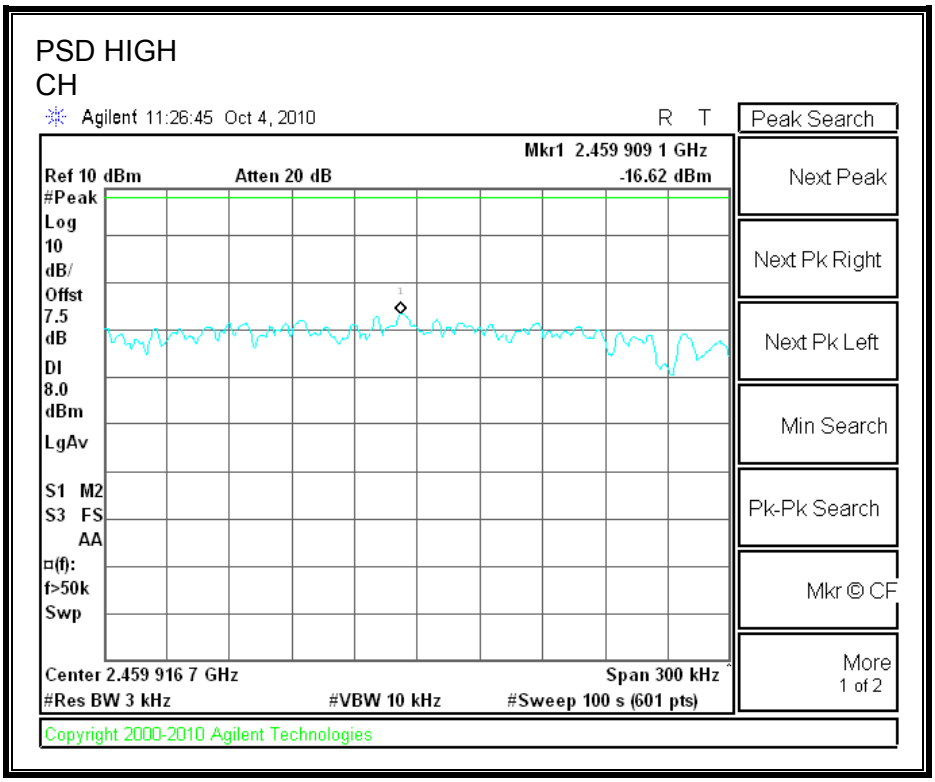
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-17.11	8	-25.11
Middle	2437	-18.16	8	-26.16
High	2462	-16.62	8	-24.62

POWER SPECTRAL DENSITY





PSD HIGH
CH



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.

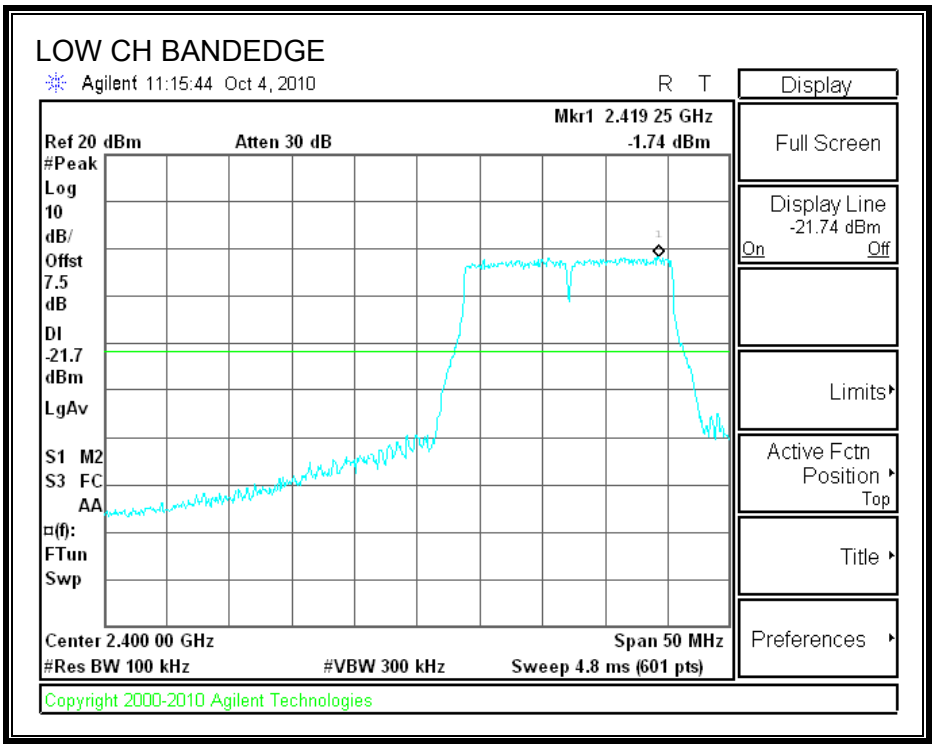
TEST PROCEDURE

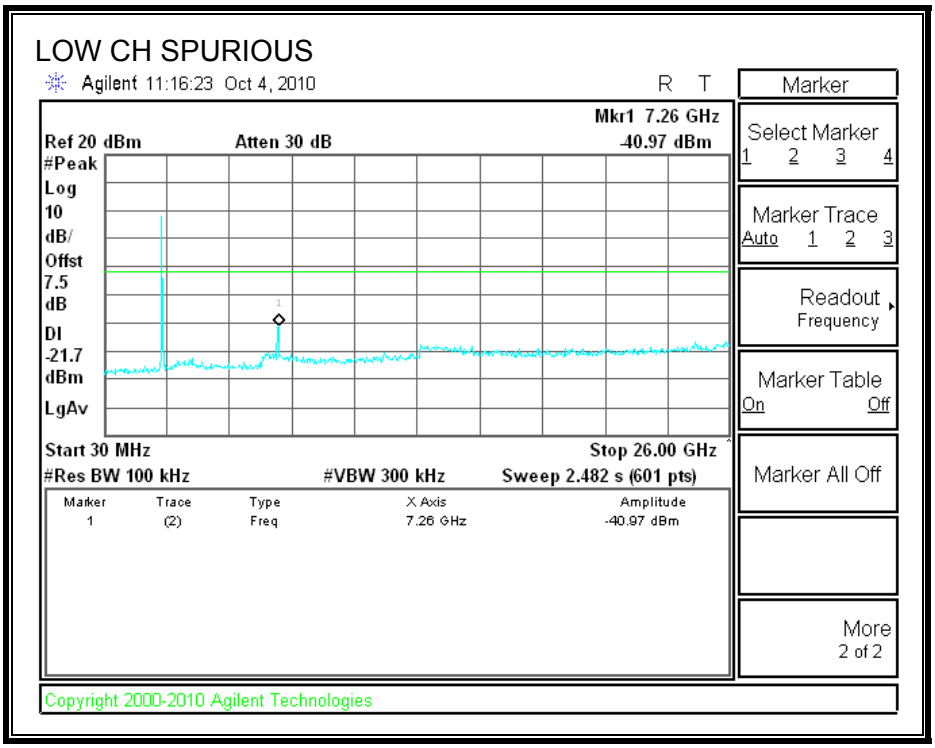
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

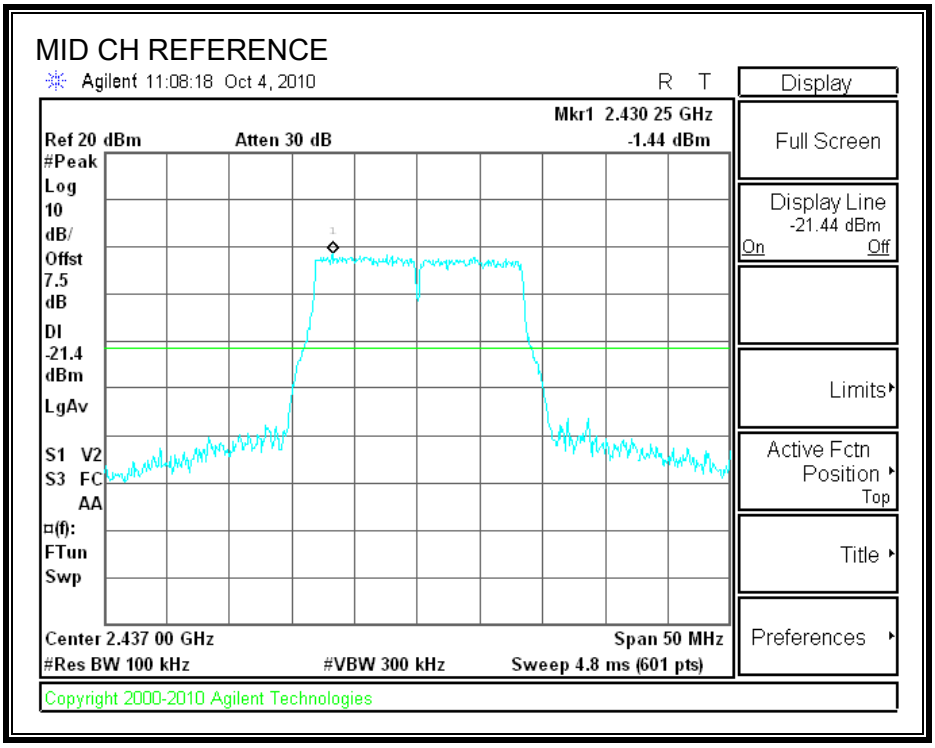
RESULTS

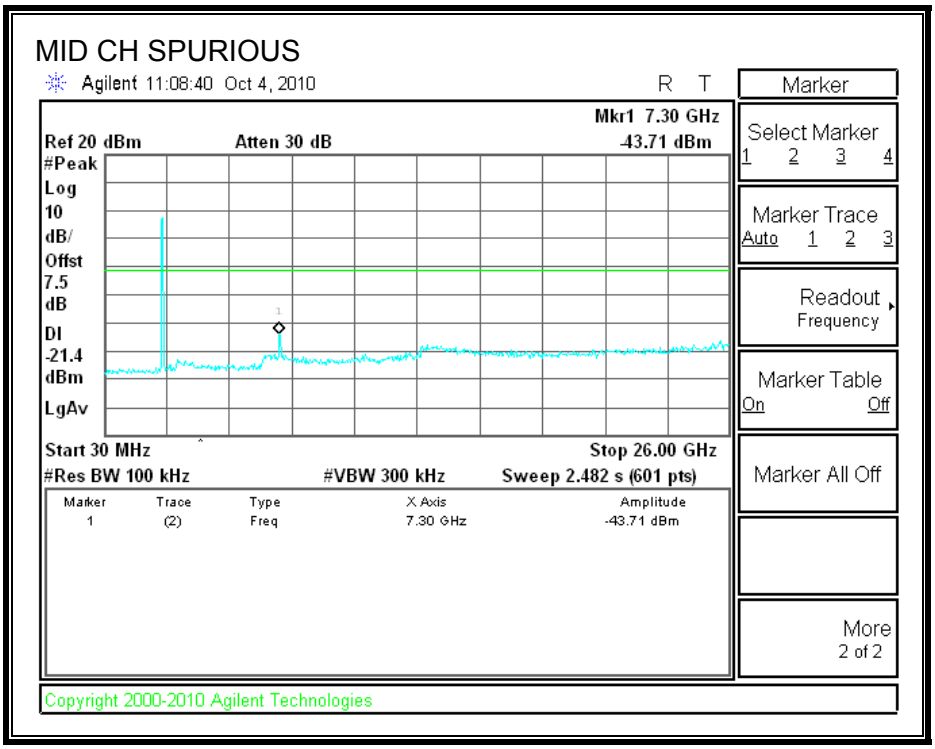
SPURIOUS EMISSIONS, LOW CHANNEL



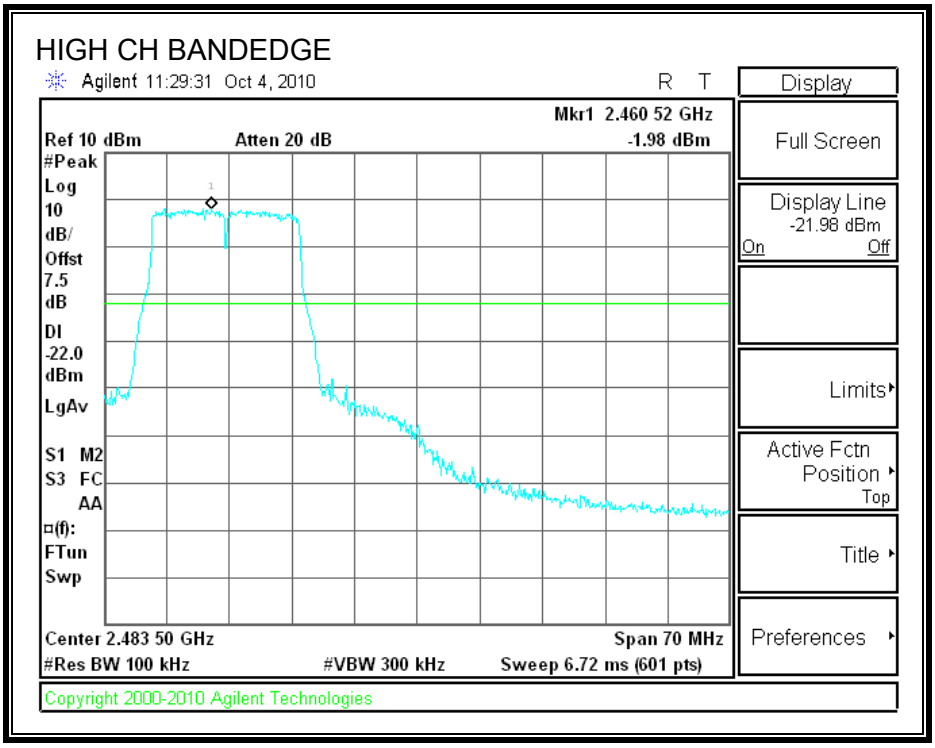


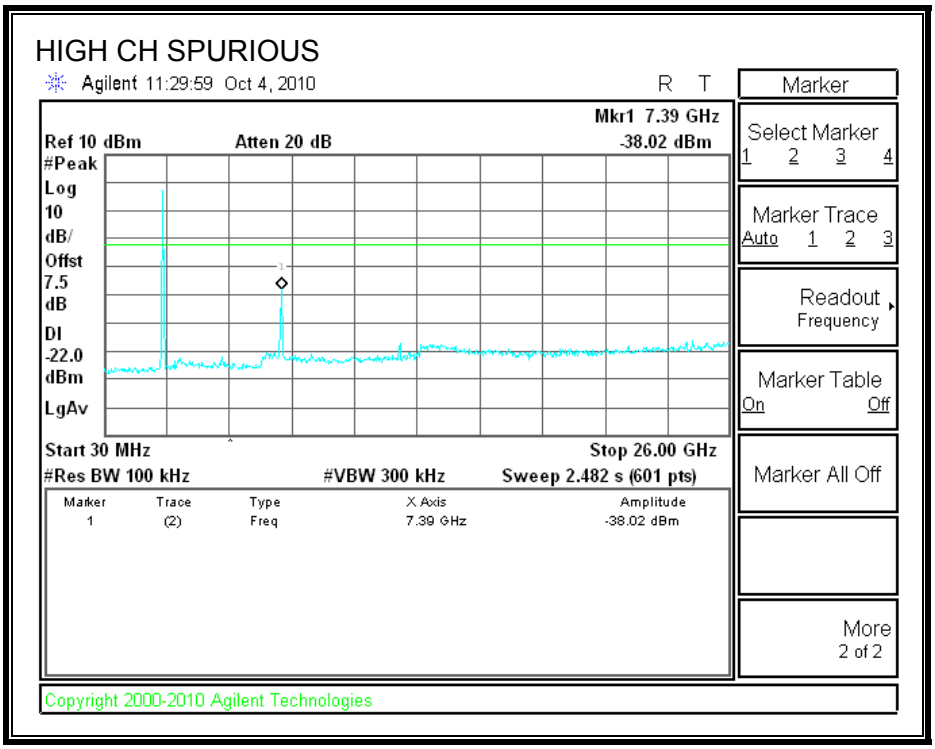
SPURIOUS EMISSIONS, MID CHANNEL





SPURIOUS EMISSIONS, HIGH CHANNEL





7.3. 802.11n HT20 SISO 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.

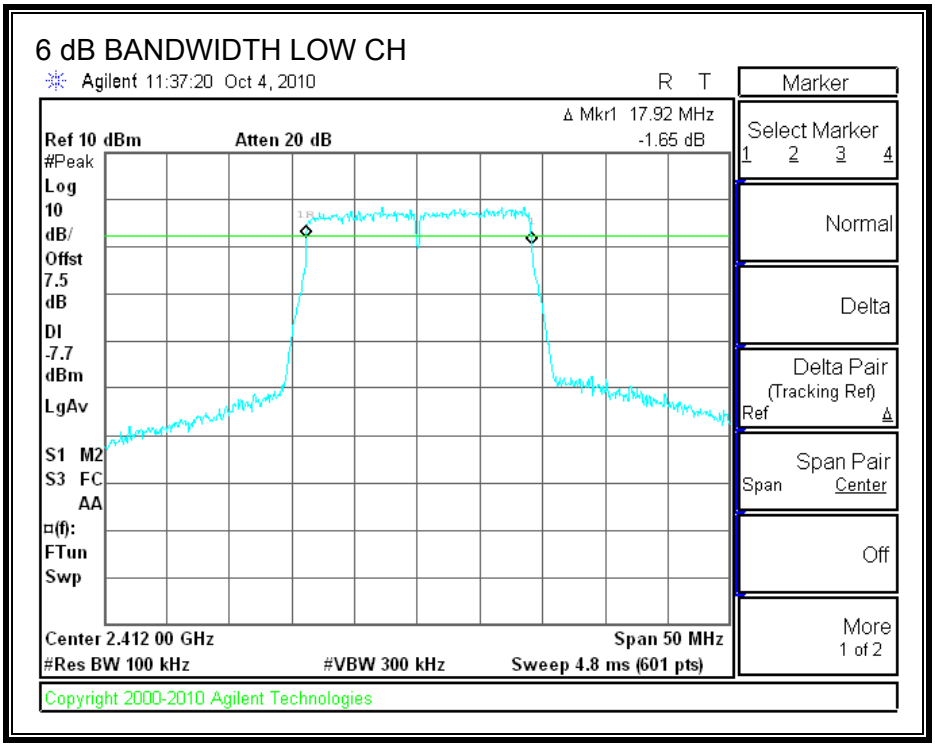
TEST PROCEDURE

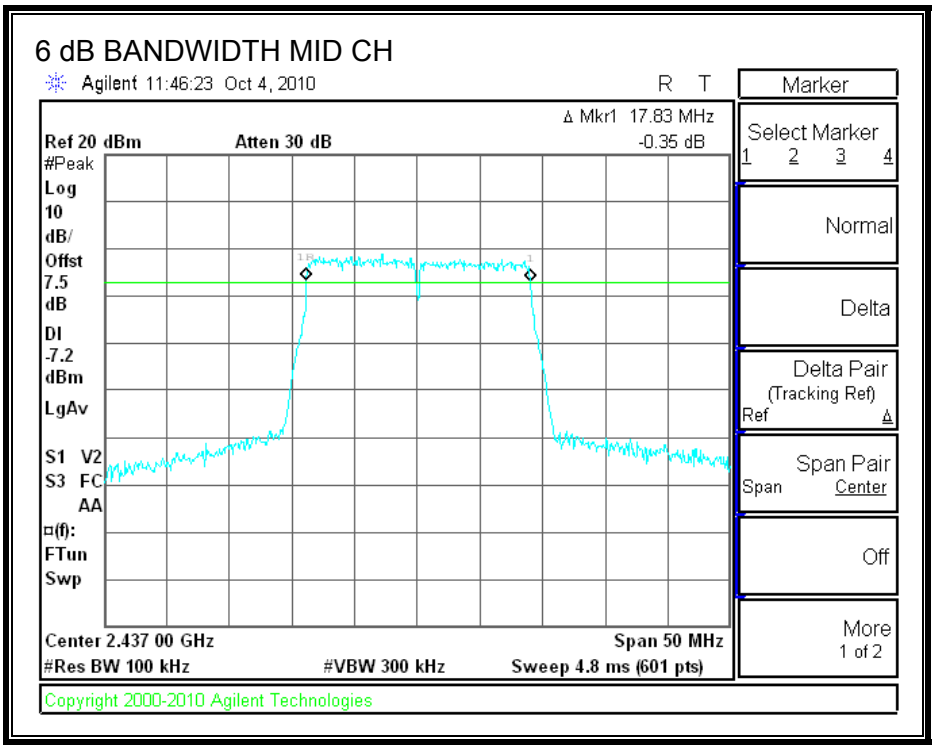
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

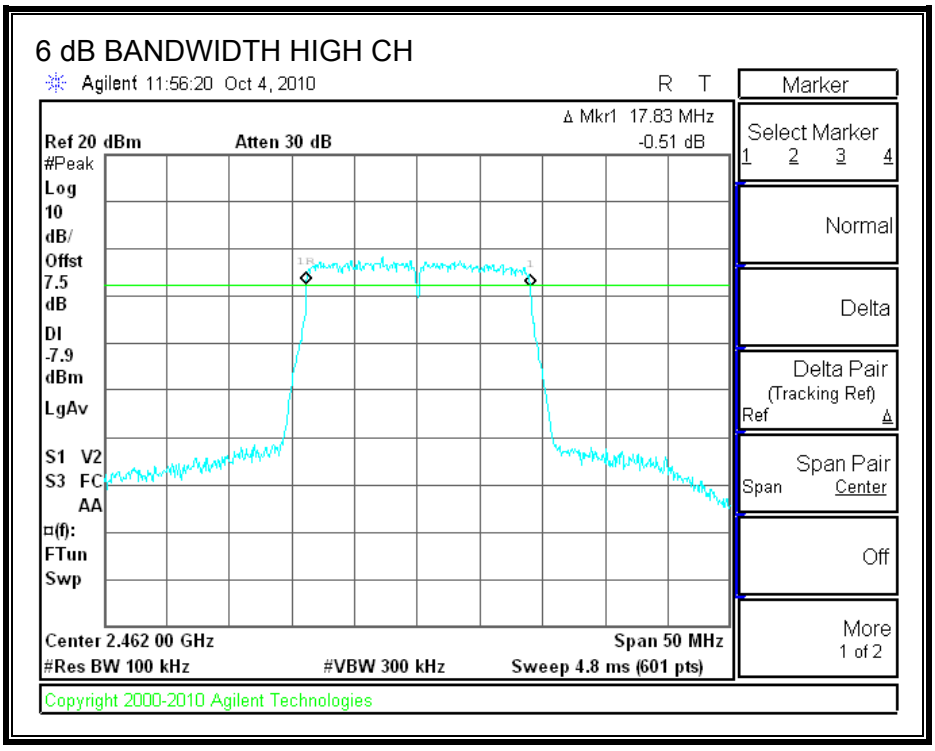
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	17.92	0.5
Middle	2437	17.83	0.5
High	2462	17.83	0.5

6 dB BANDWIDTH







7.3.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

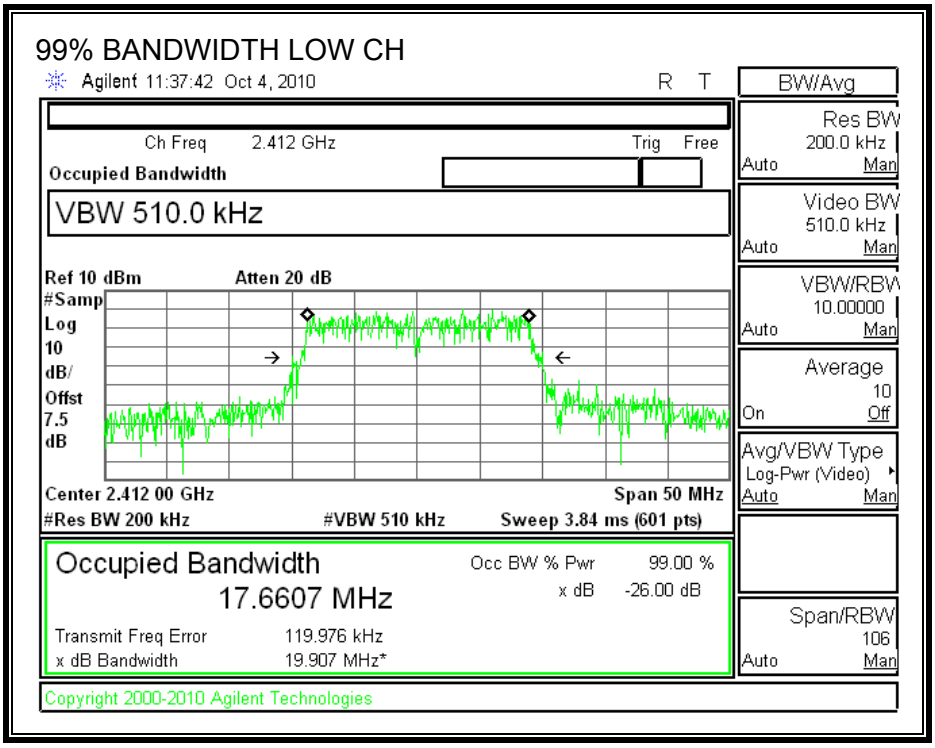
TEST PROCEDURE

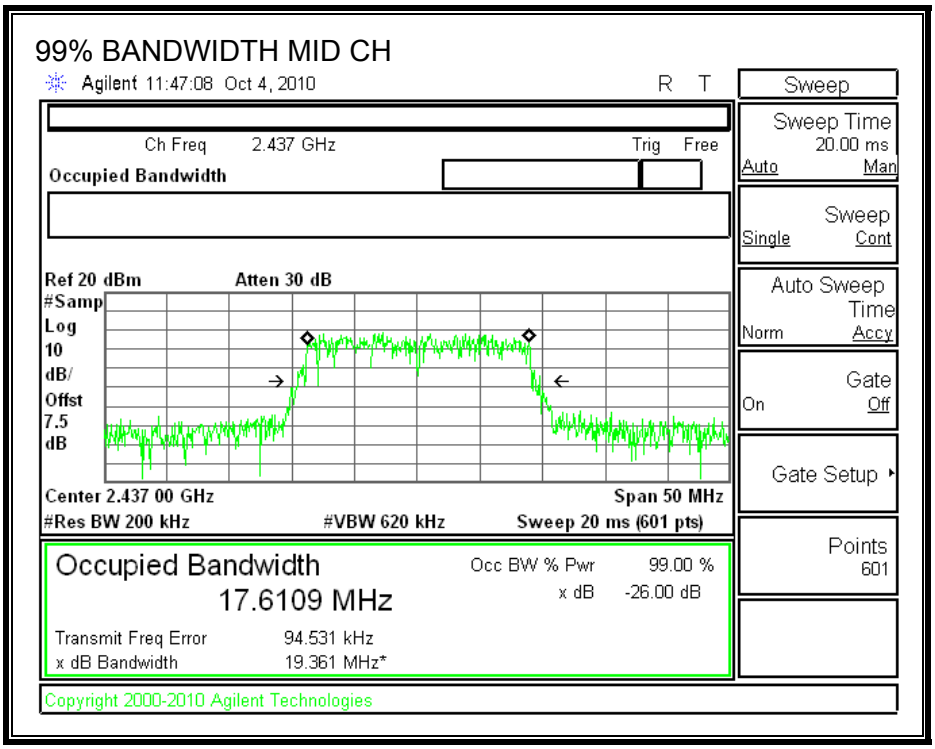
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

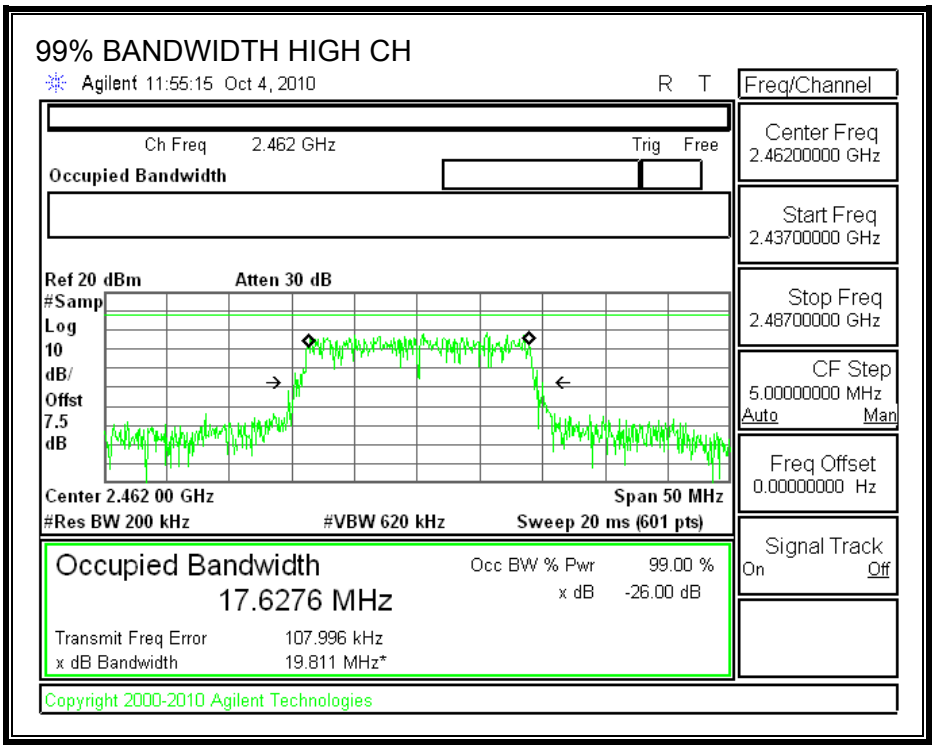
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	17.6607
Middle	2437	17.6109
High	2462	17.6276

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)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	21.00	30	-9.00
Middle	2437	21.20	30	-8.80
High	2462	21.60	30	-8.40

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 10.9dB (including 10 dB pad and 0.9 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	11.8
Middle	2437	12
High	2462	12

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.

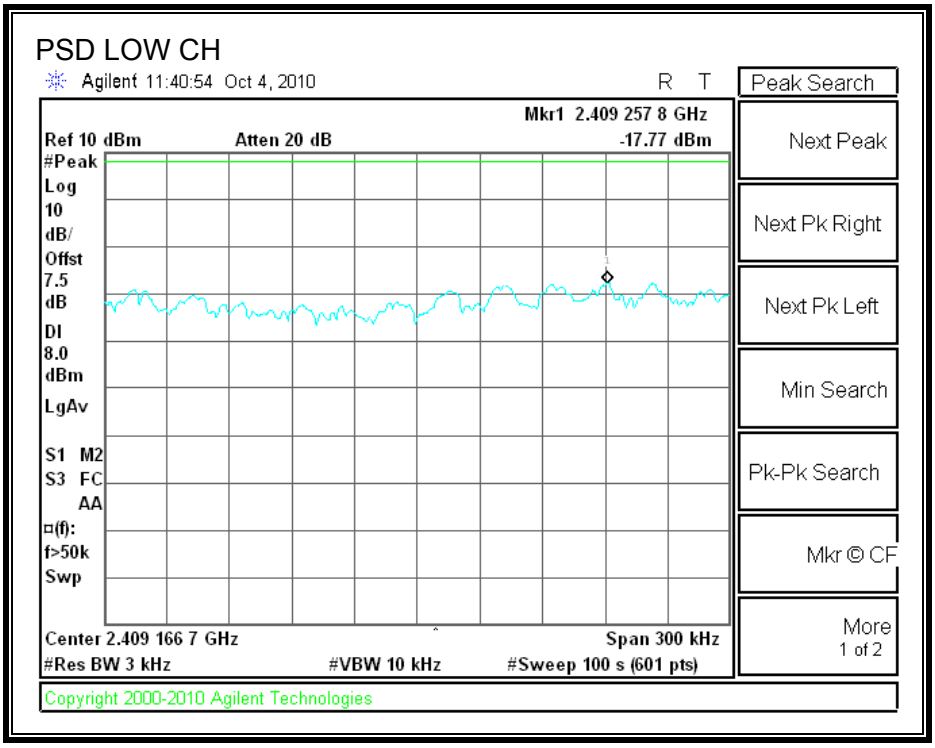
TEST PROCEDURE

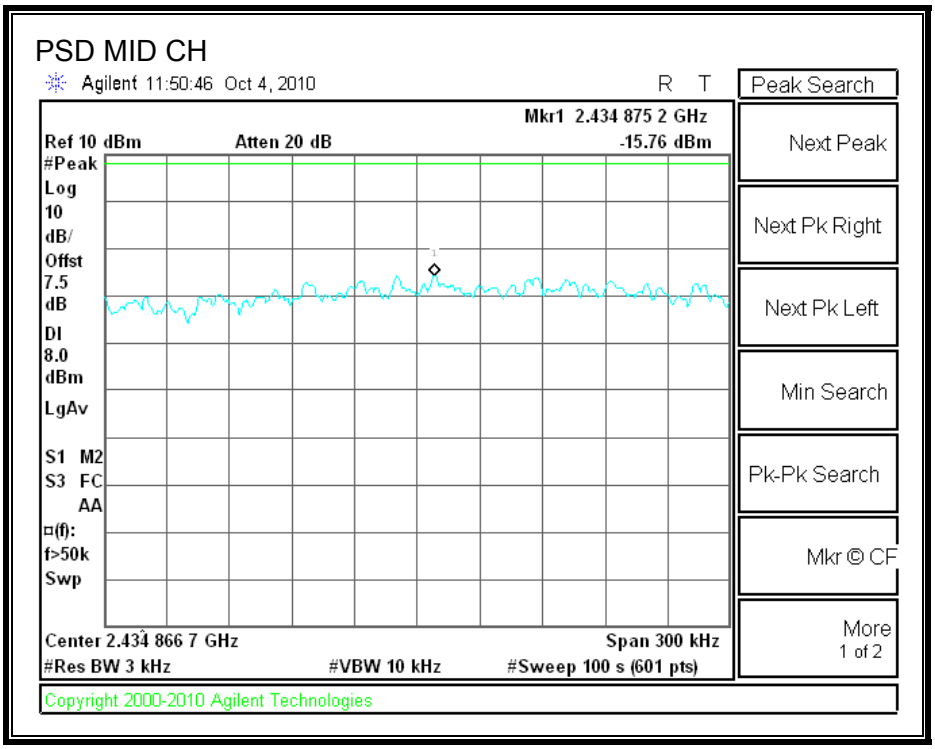
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

RESULTS

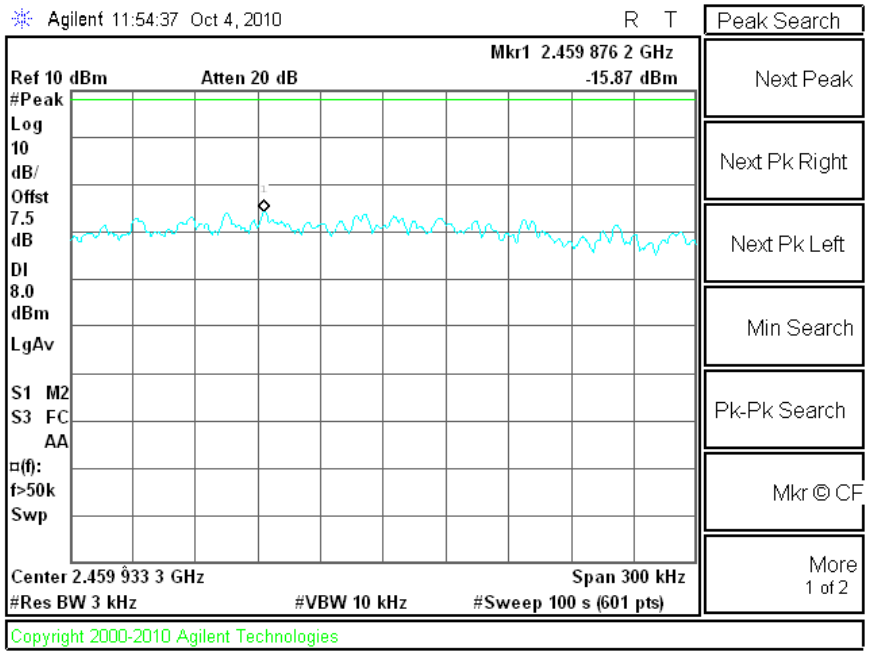
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-17.77	8	-25.77
Middle	2437	-15.76	8	-23.76
High	2462	-15.87	8	-23.87

POWER SPECTRAL DENSITY





PSD HIGH CH



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.

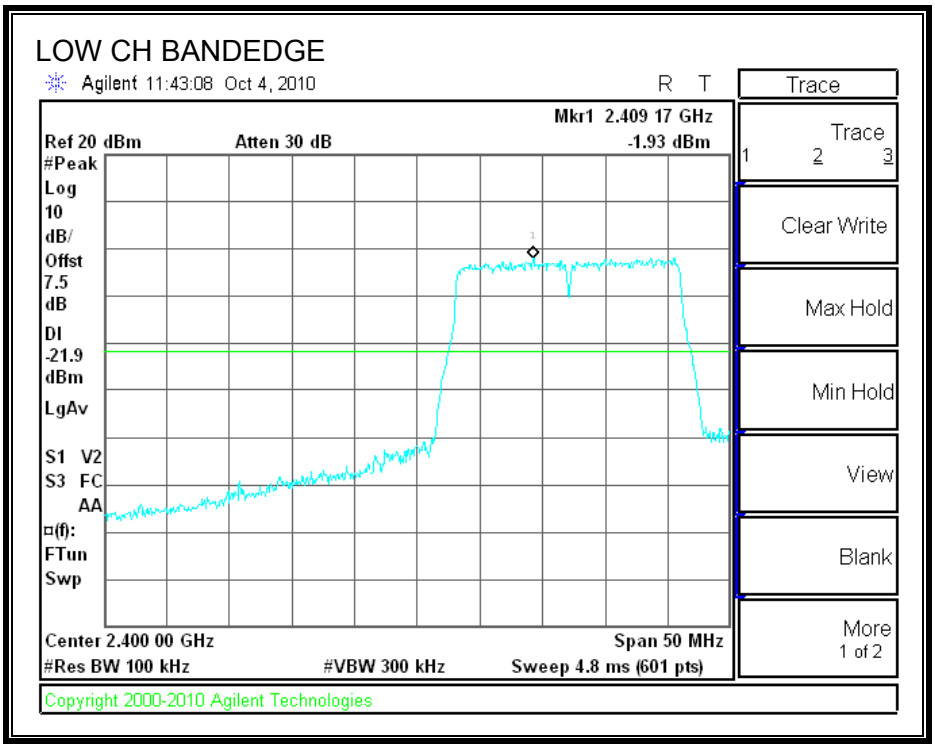
TEST PROCEDURE

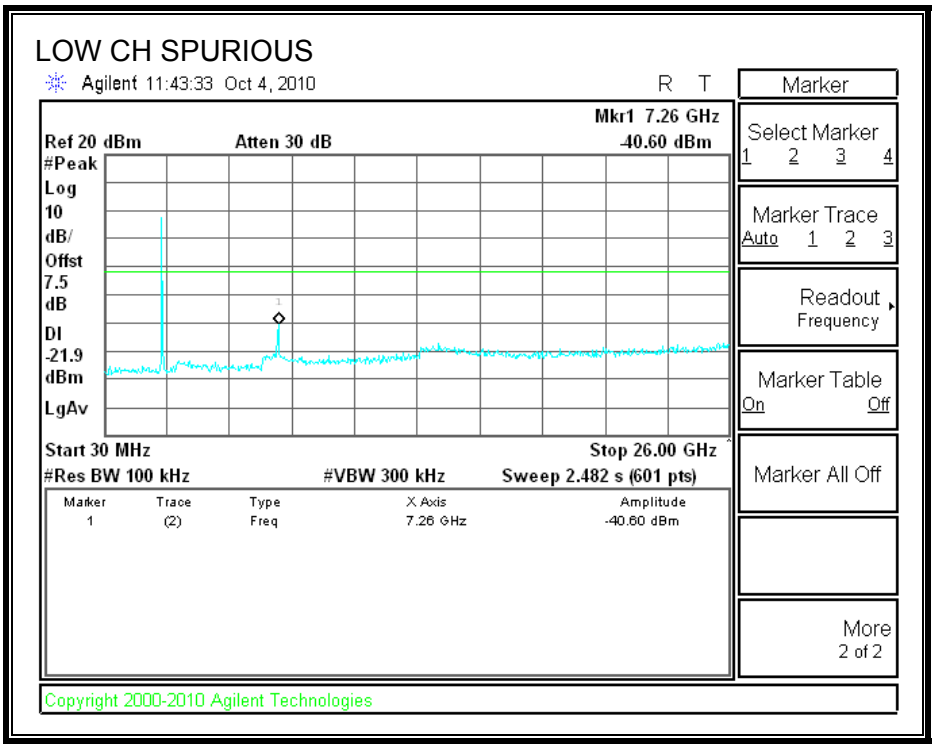
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

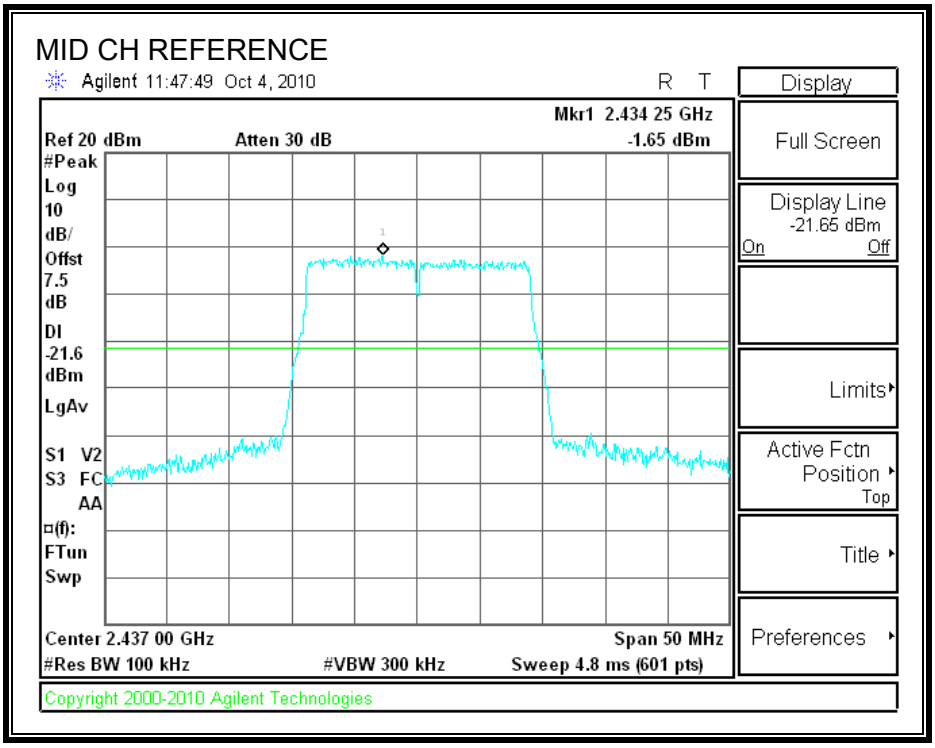
RESULTS

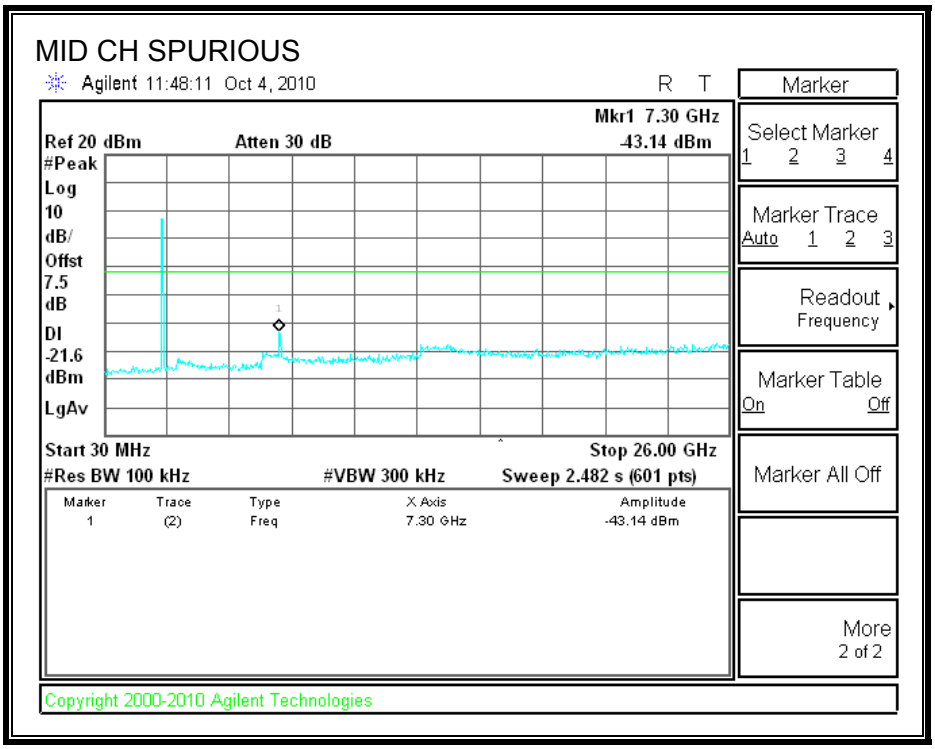
SPURIOUS EMISSIONS, LOW CHANNEL



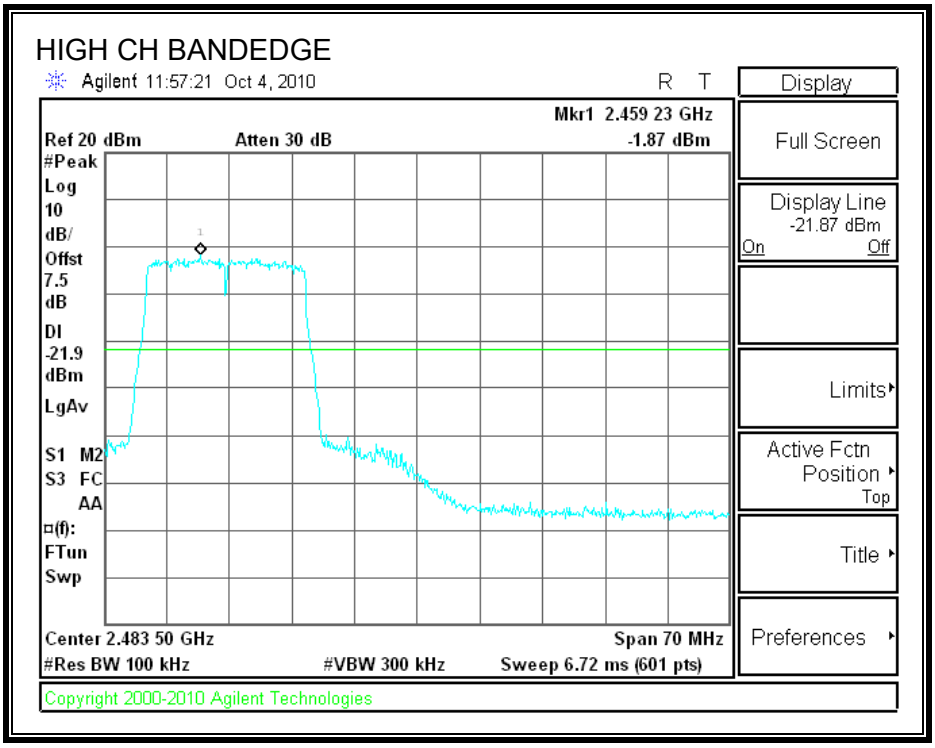


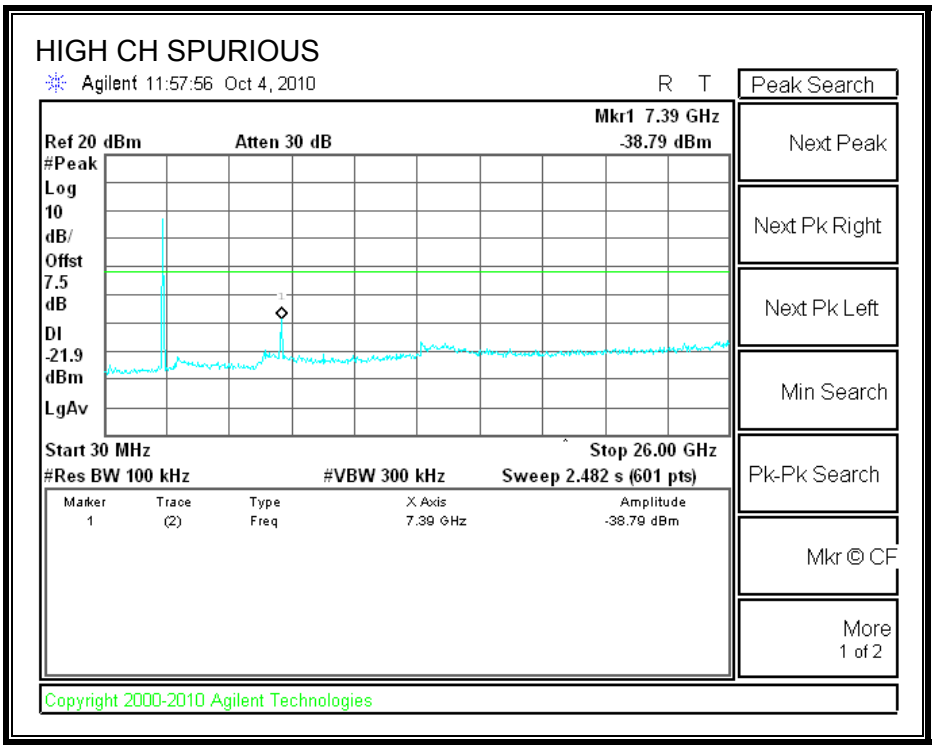
SPURIOUS EMISSIONS, MID CHANNEL





SPURIOUS EMISSIONS, HIGH CHANNEL





7.4. 802.11n HT40 SISO 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.

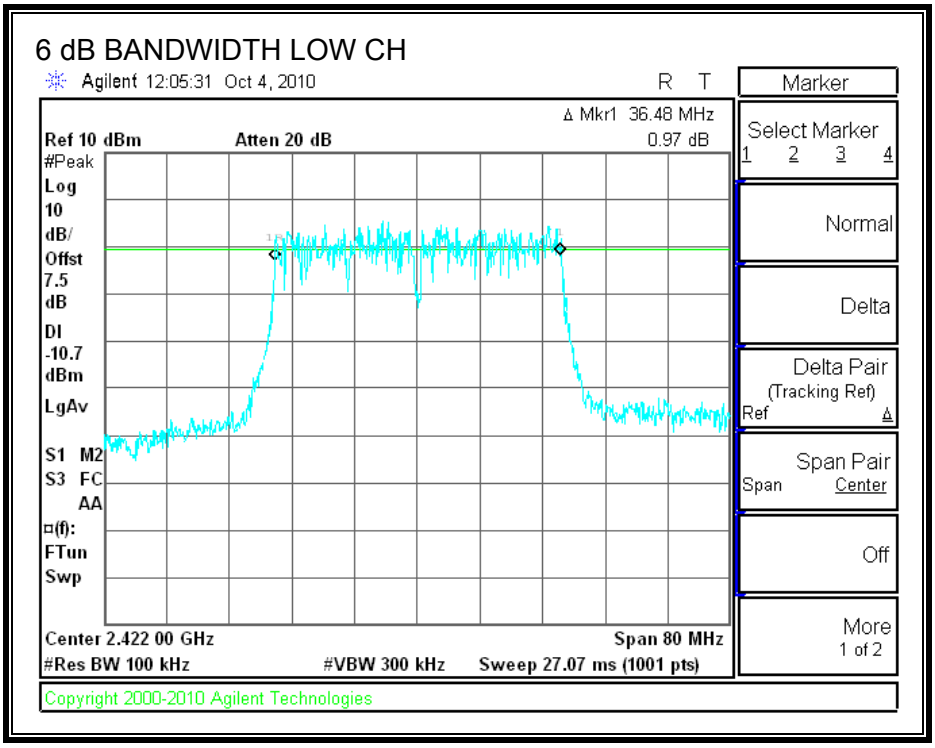
TEST PROCEDURE

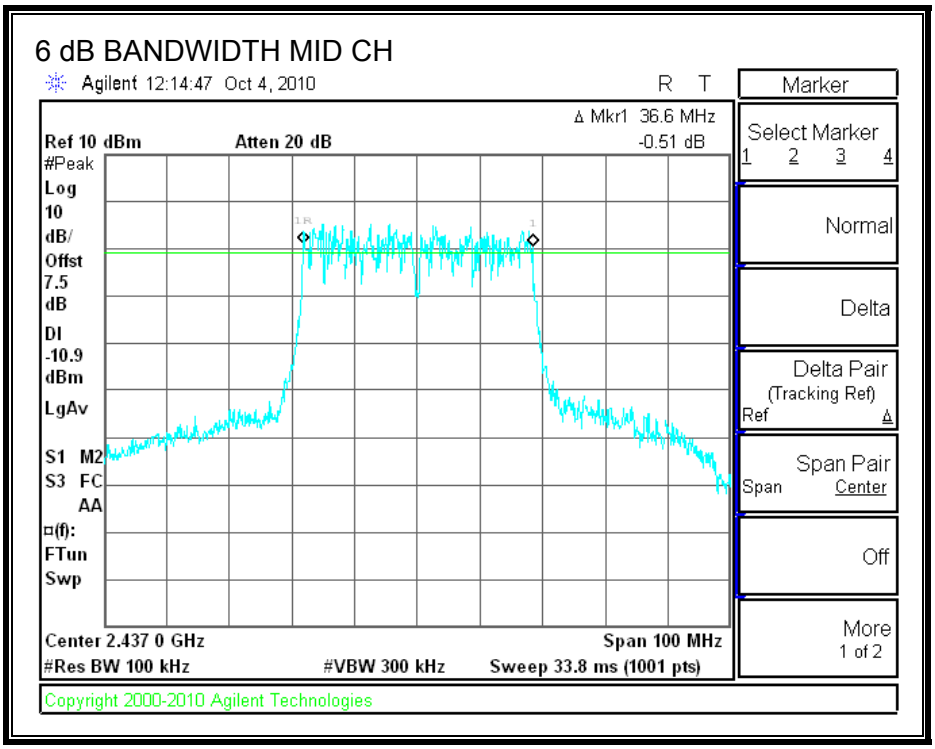
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

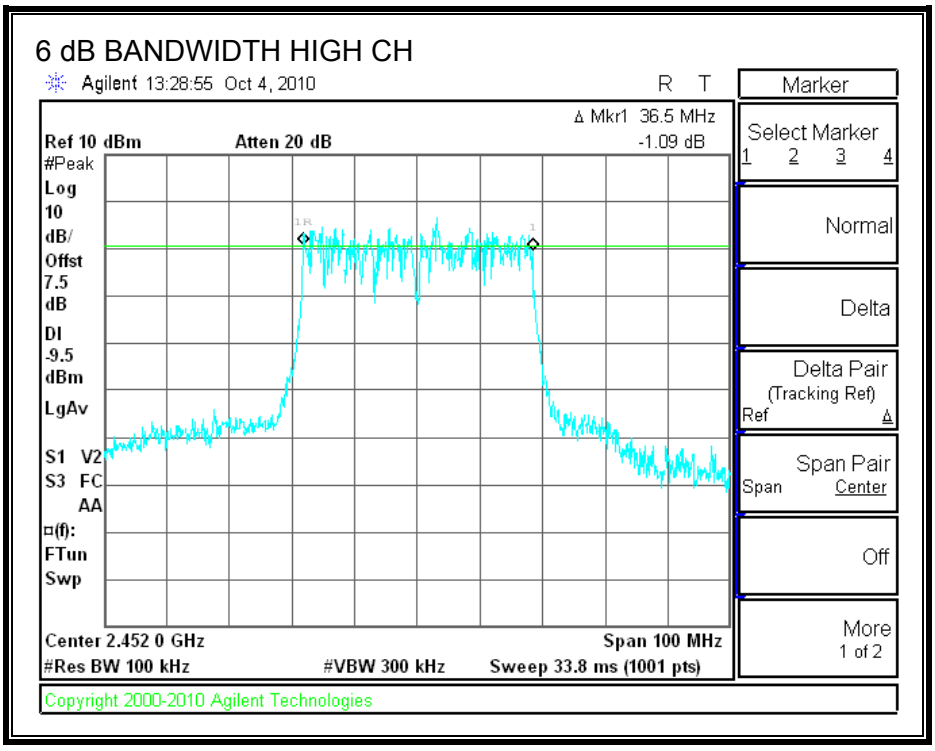
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2422	36.48	0.5
Middle	2437	36.6	0.5
High	2452	36.5	0.5

6 dB BANDWIDTH







7.4.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

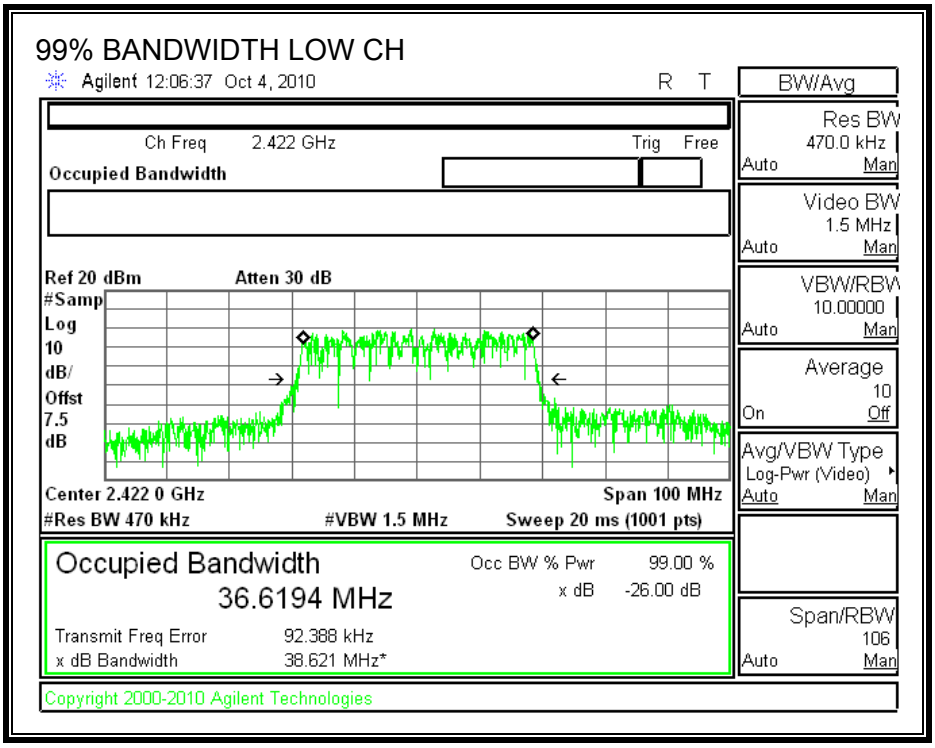
TEST PROCEDURE

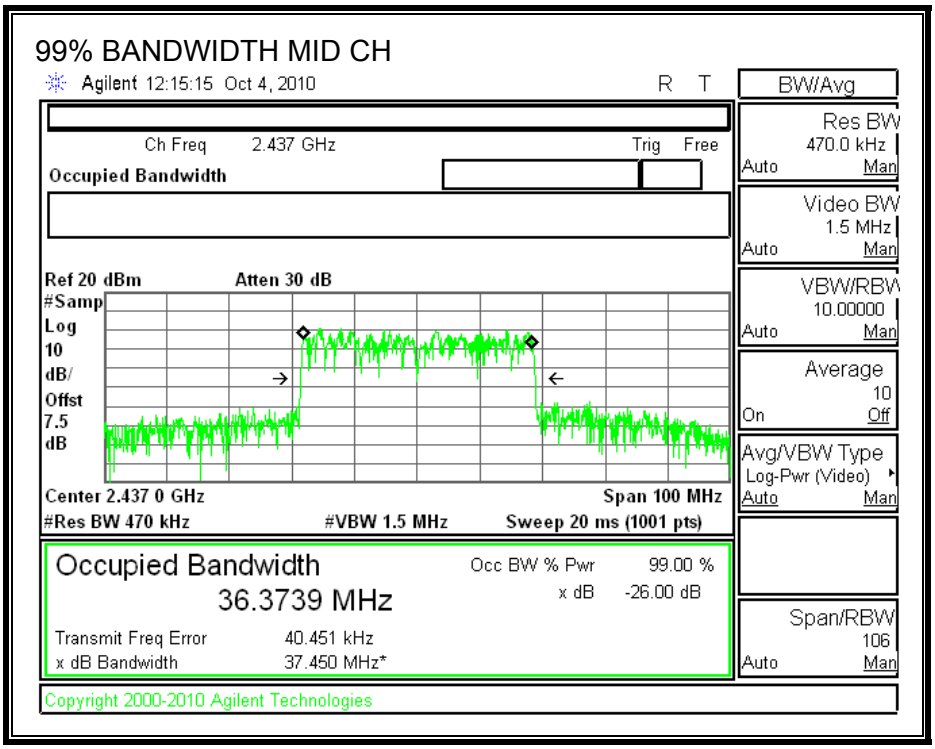
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

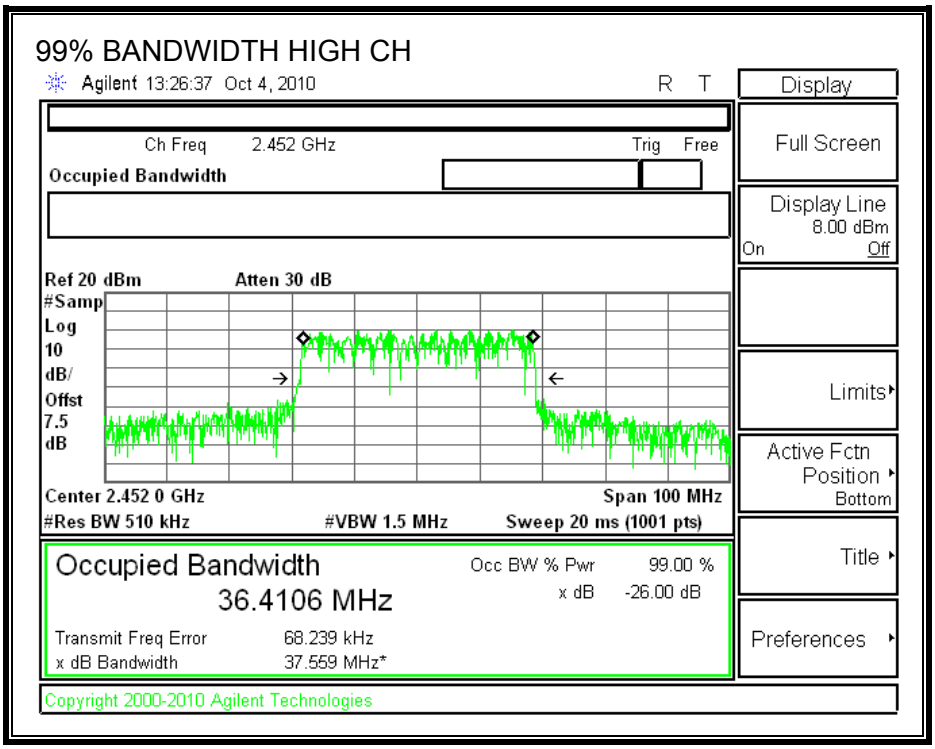
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2422	36.6194
Middle	2437	36.3739
High	2452	36.4106

99% BANDWIDTH







7.4.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

TEST PROCEDURE

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)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2422	19.00	30	-11.00
Middle	2437	19.40	30	-10.60
High	2452	19.20	30	-10.80

7.4.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 10.9 dB (including 10 dB pad and 0.9 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	11.10
Middle	2437	11.00
High	2452	11.00

7.4.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

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

TEST PROCEDURE

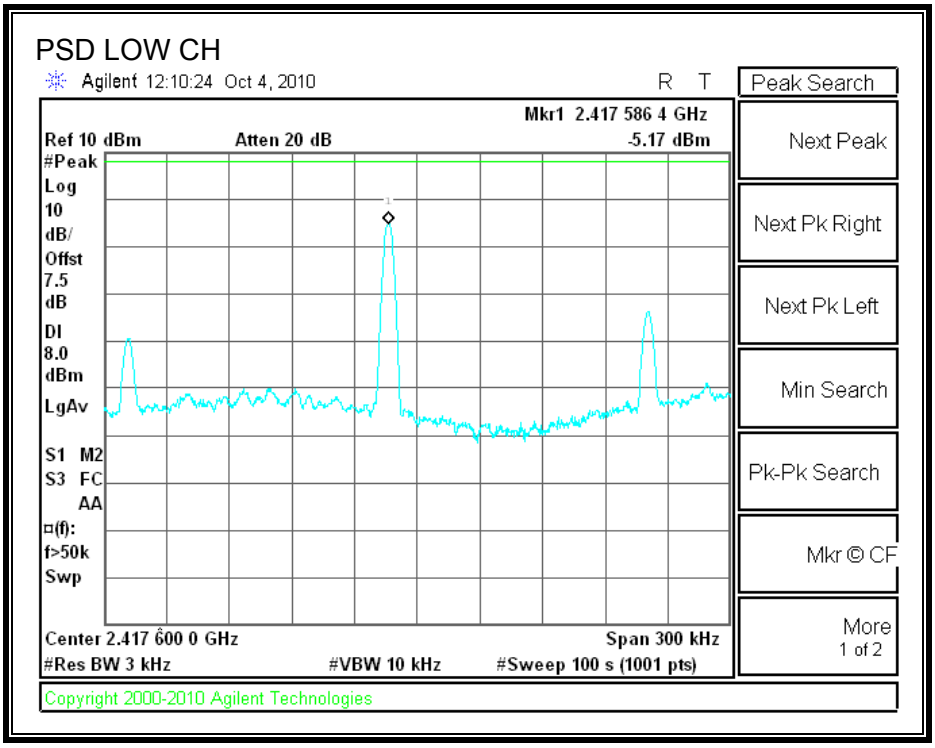
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

RESULTS

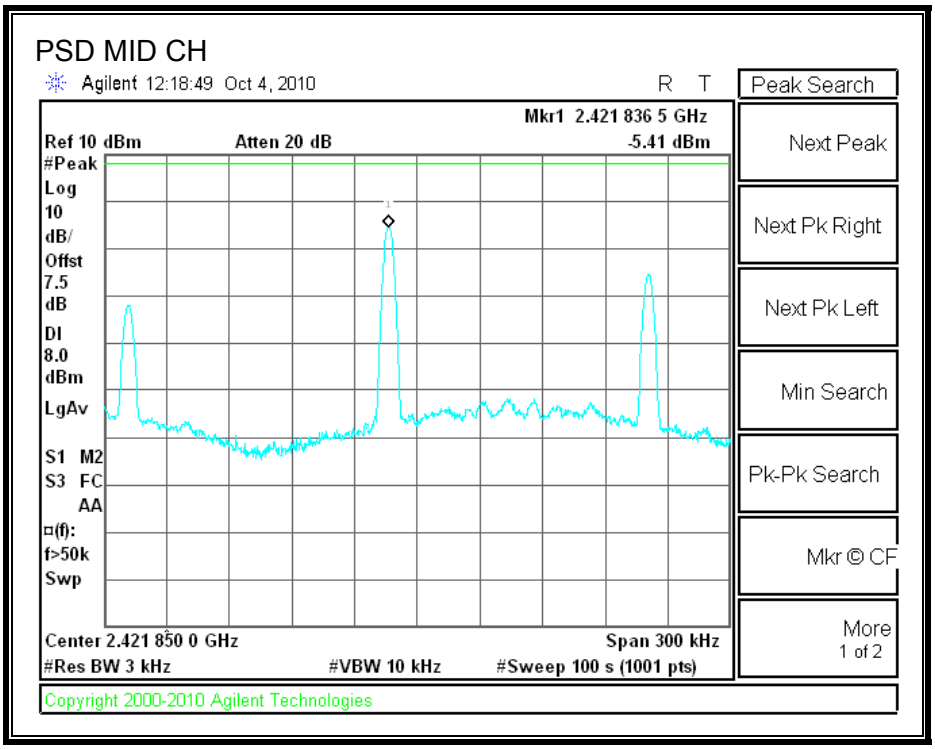
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2422	-5.17	8	-13.17
Middle	2437	-5.41	8	-13.41
High	2452	-3.92	8	-11.92

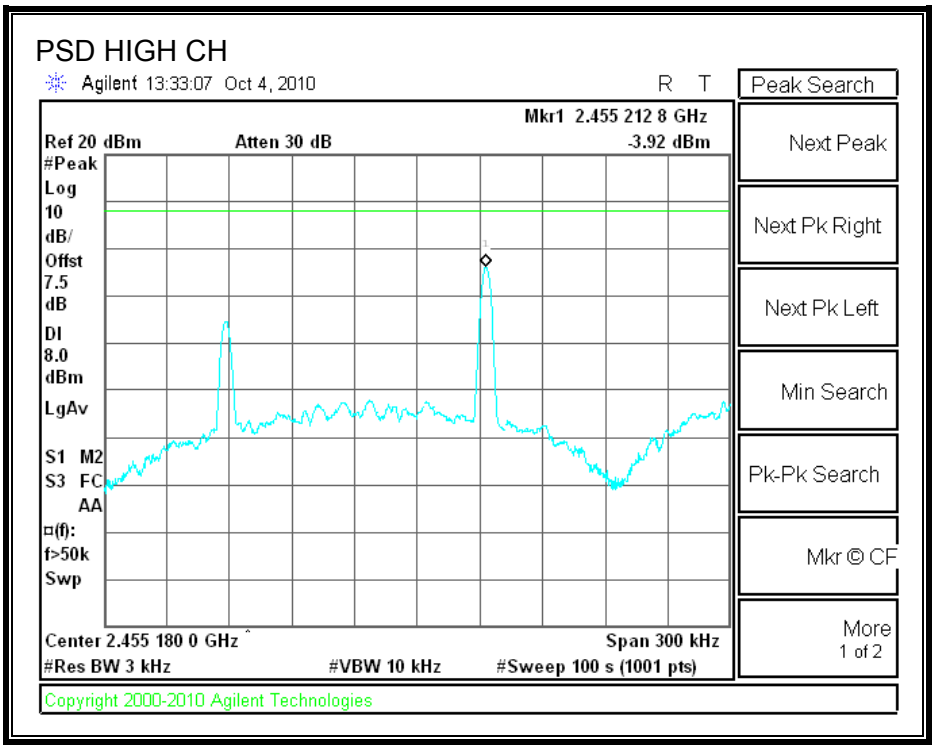
POWER SPECTRAL DENSITY

PSD LOW CH



PSD MID CH





7.4.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

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

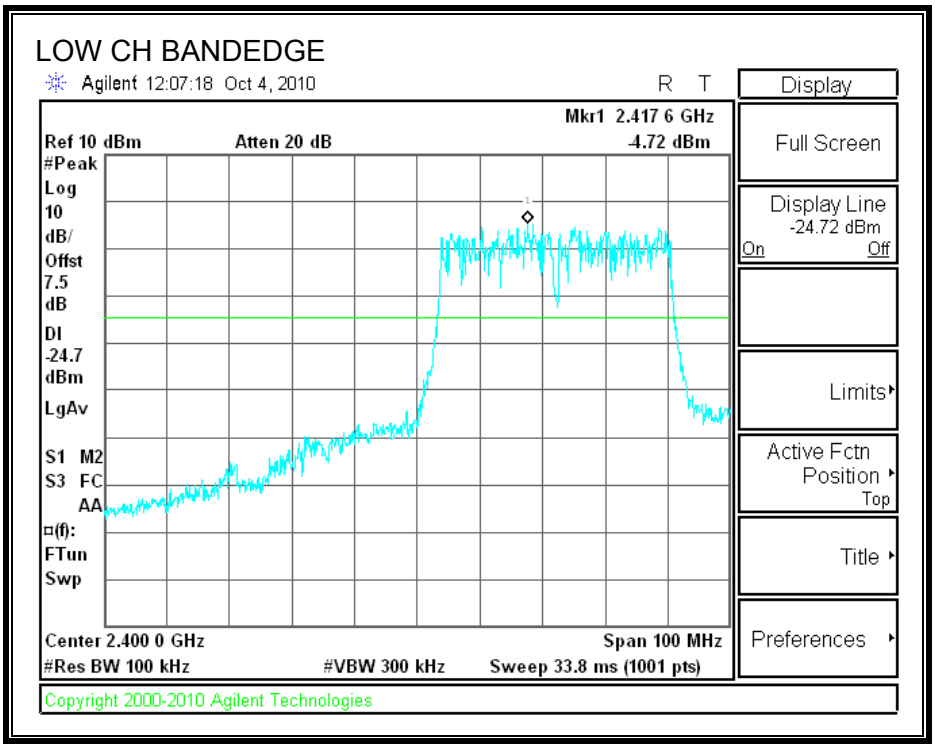
TEST PROCEDURE

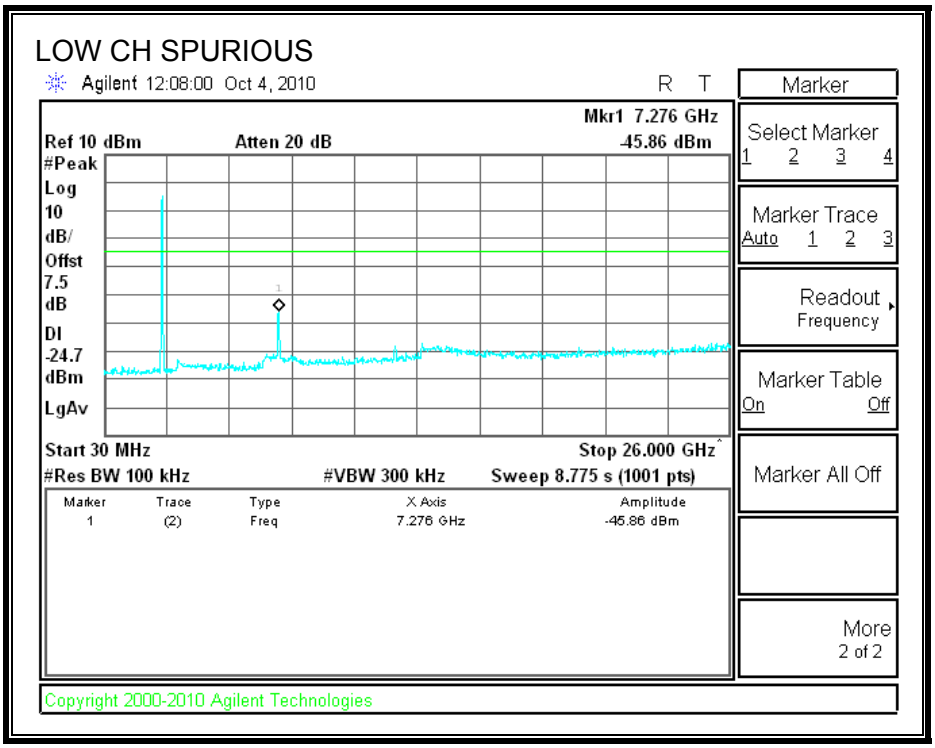
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

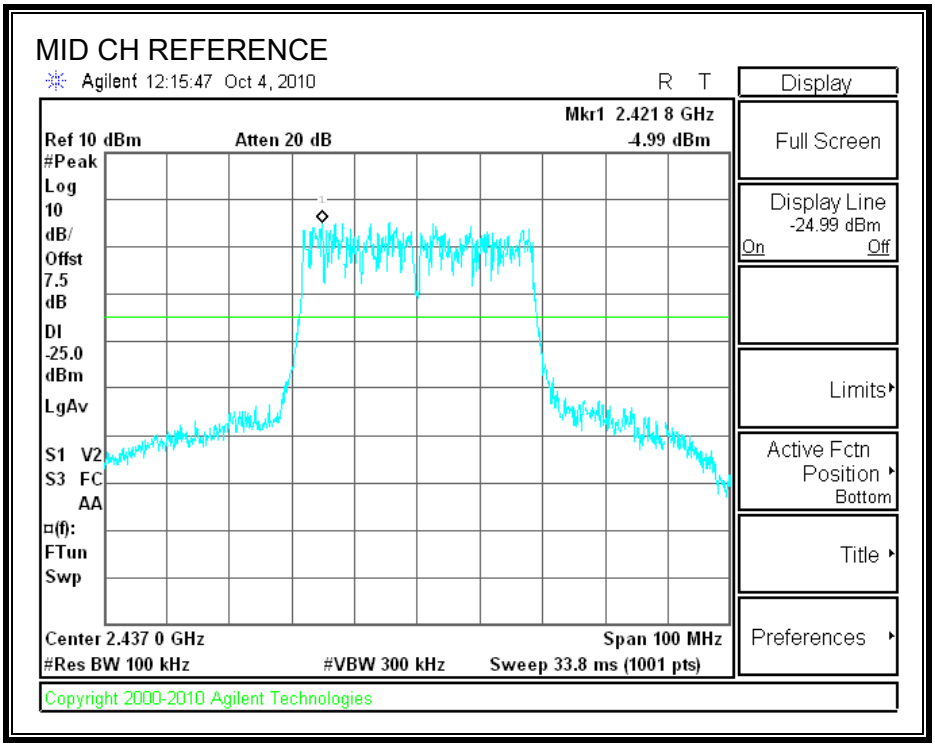
RESULTS

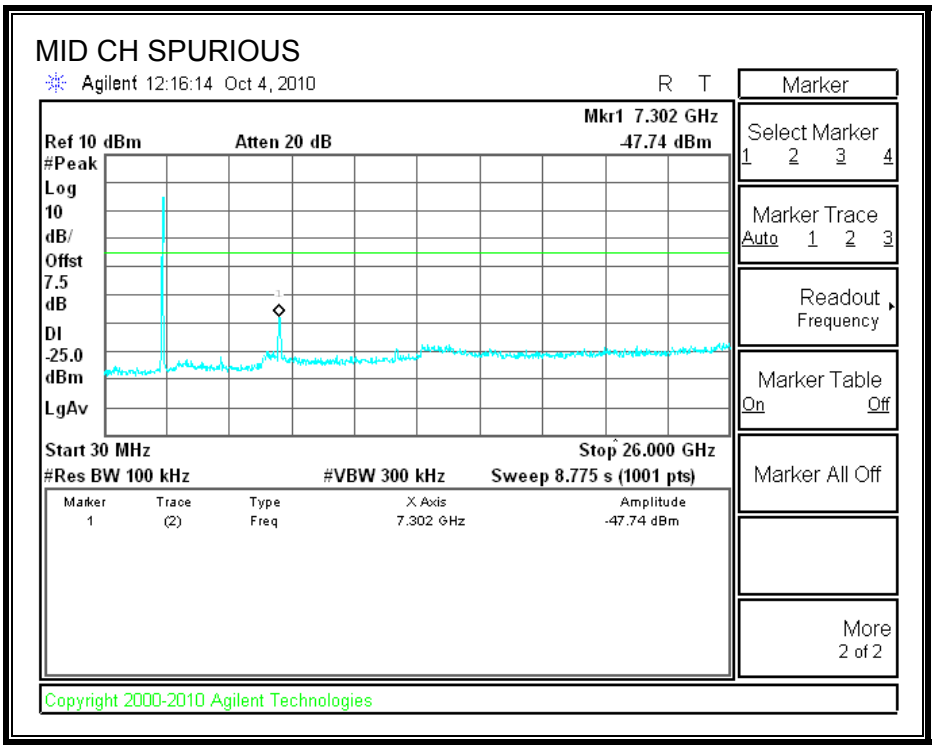
SPURIOUS EMISSIONS, LOW CHANNEL



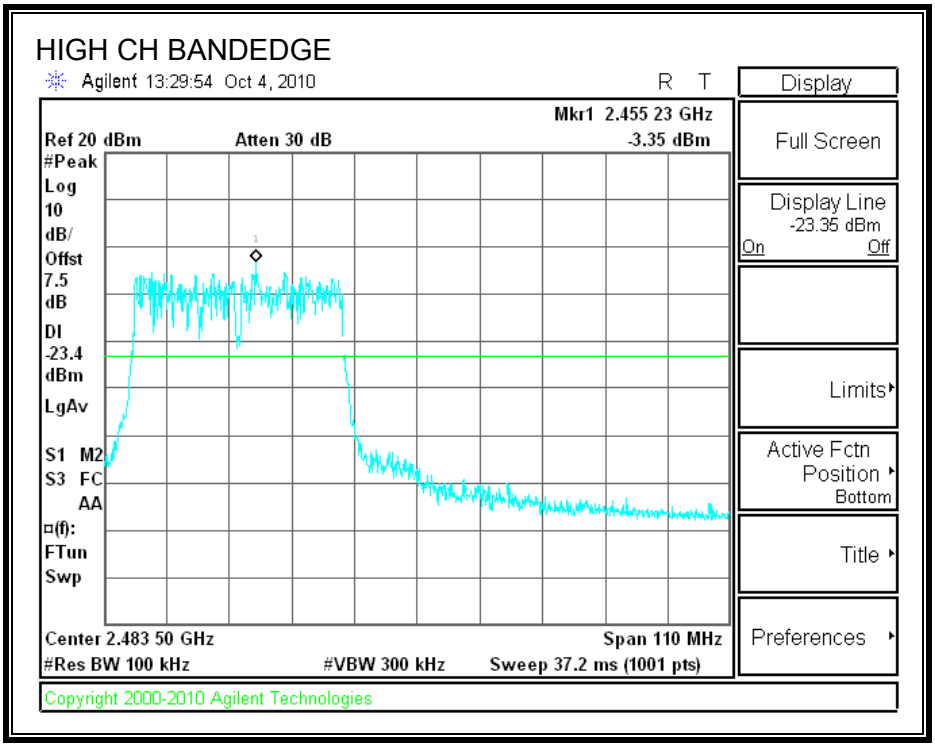


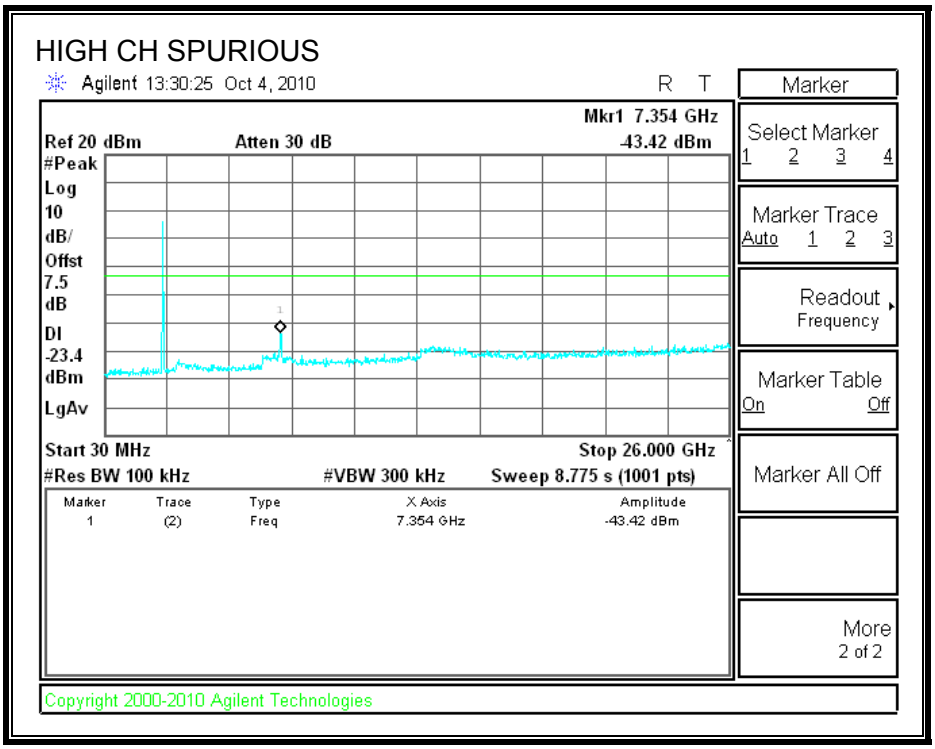
SPURIOUS EMISSIONS, MID CHANNEL





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.

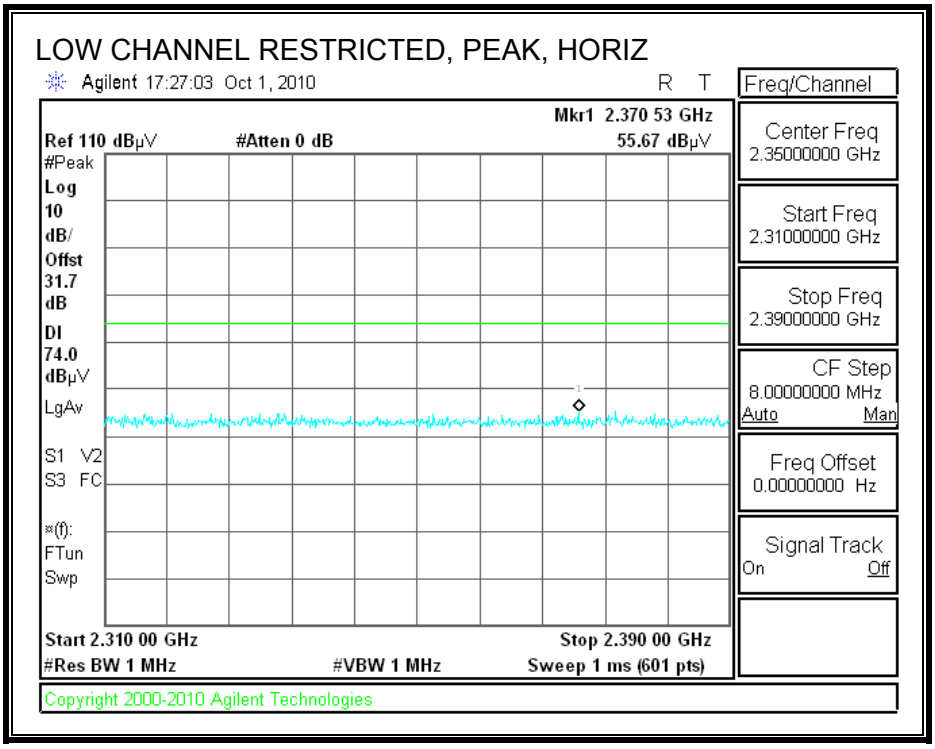
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each appplicable band.

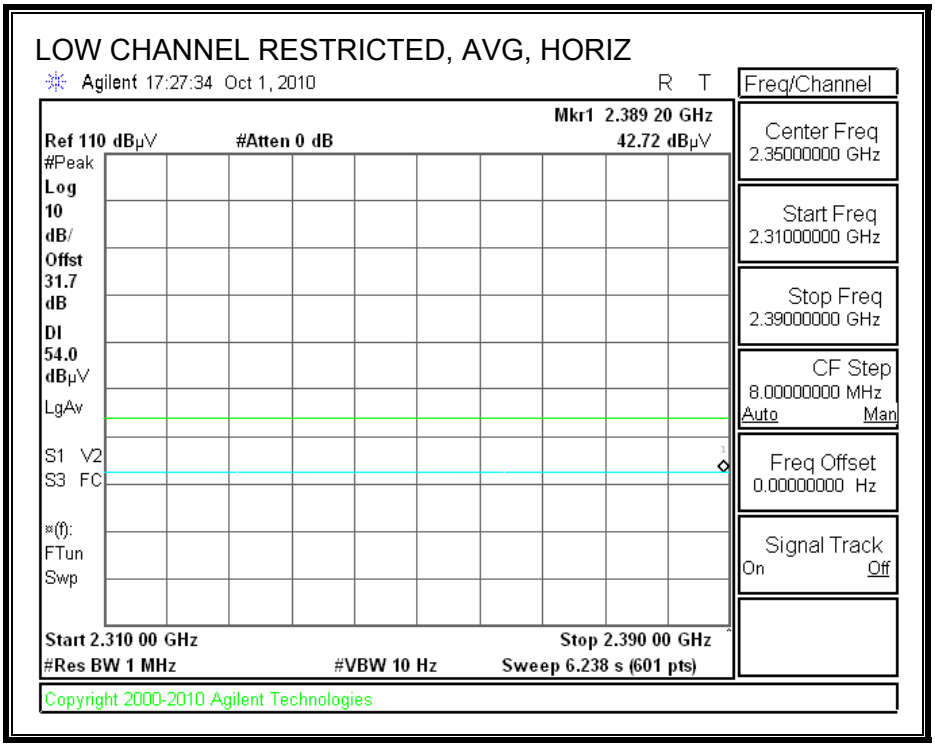
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

8.2.TRANSMITTER ABOVE 1 GHz

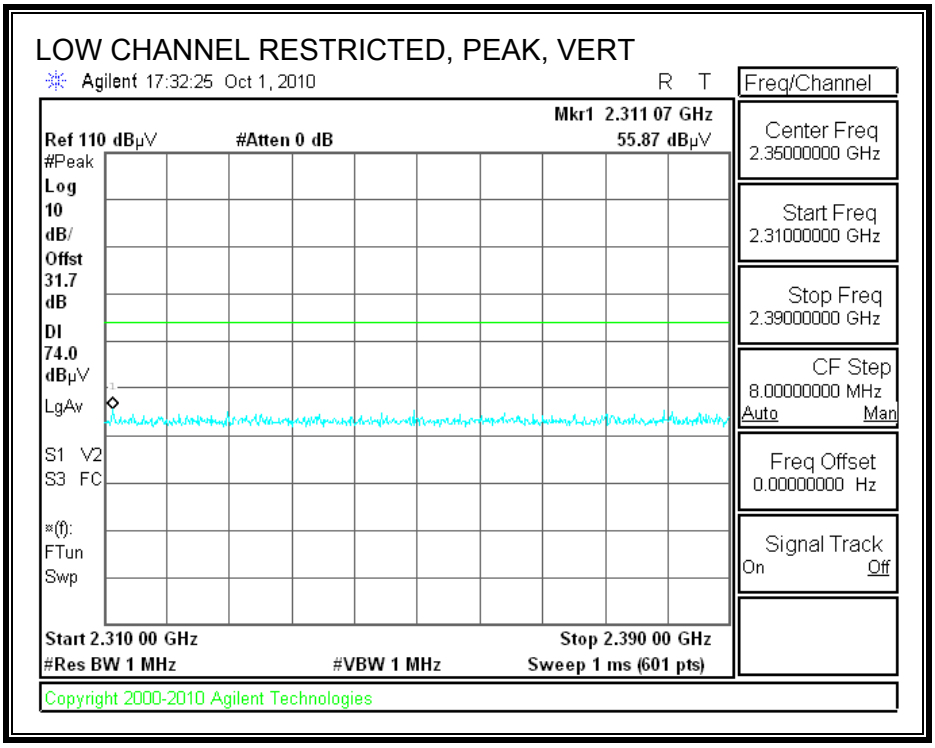
8.2.1. 802.11b MODE IN THE 2.4 GHz BAND

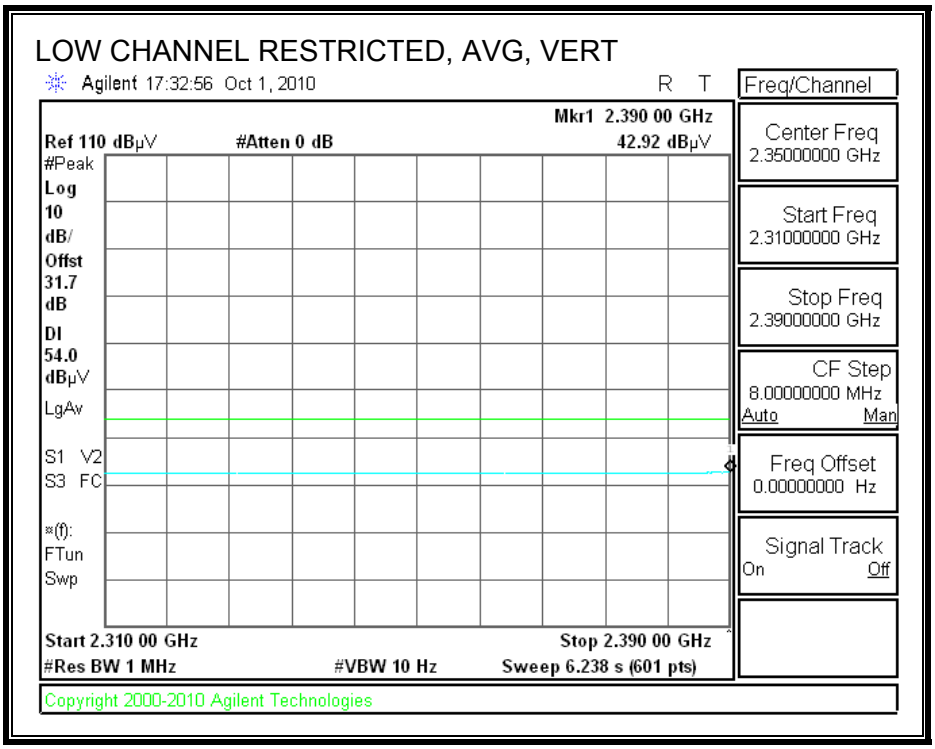
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



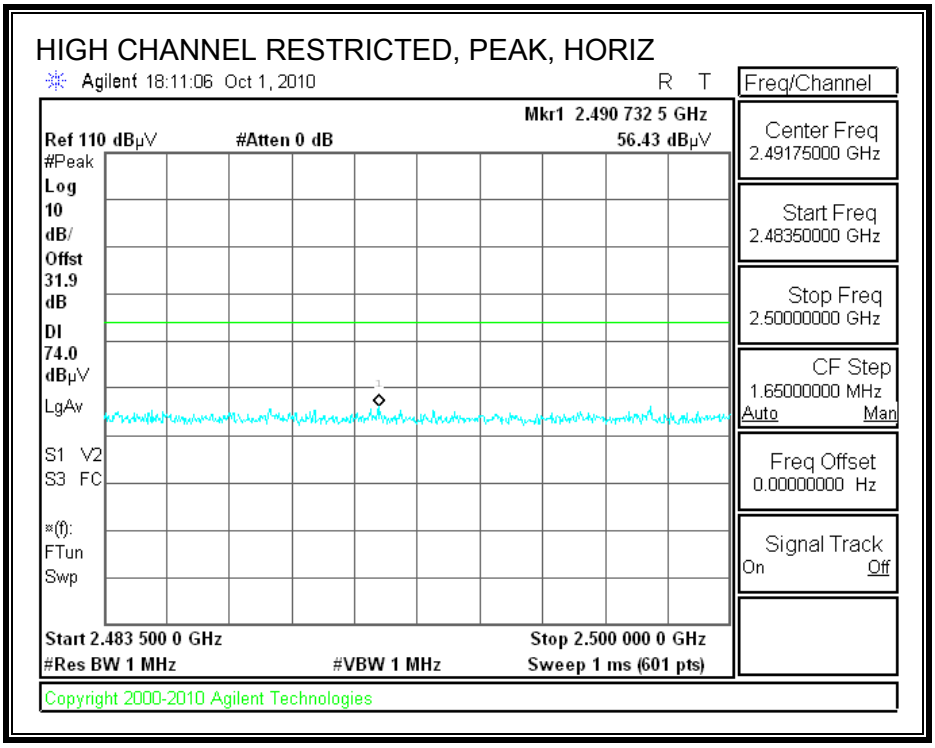


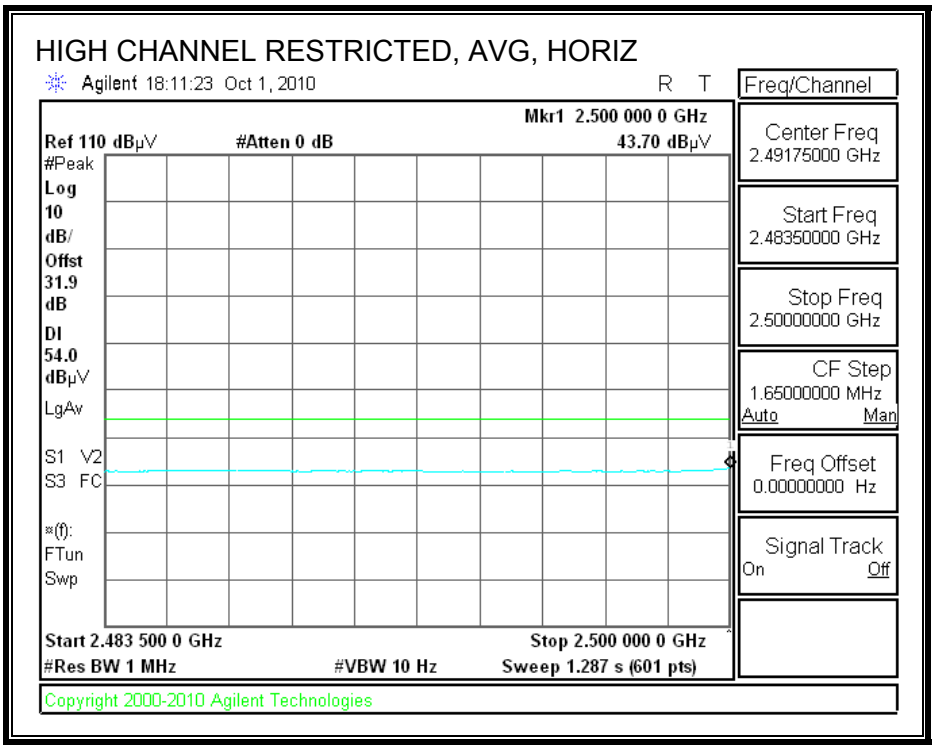
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



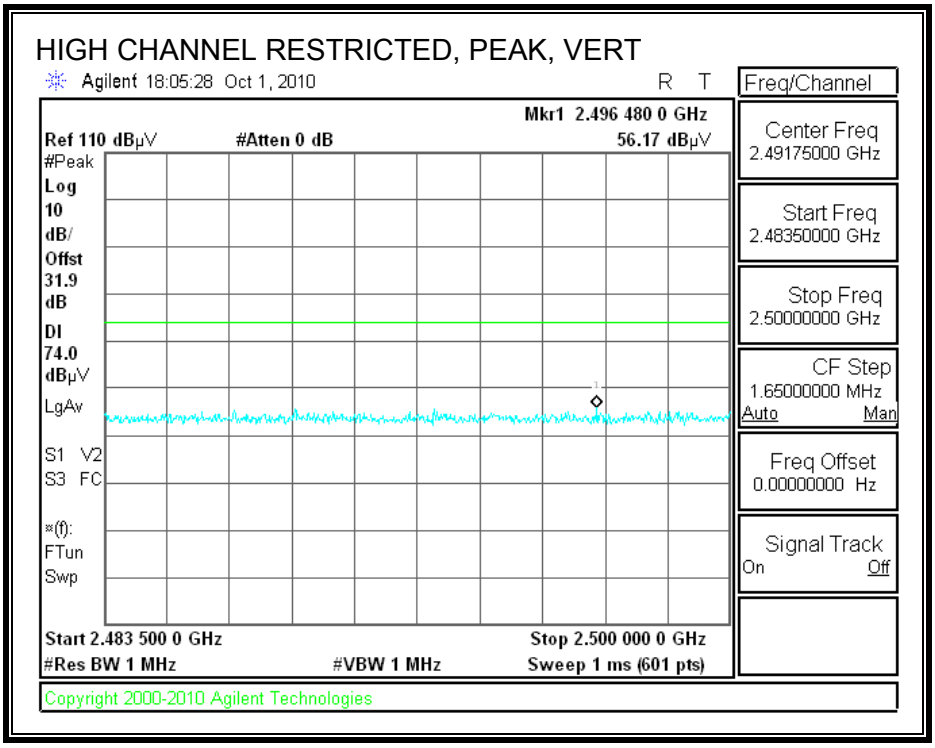


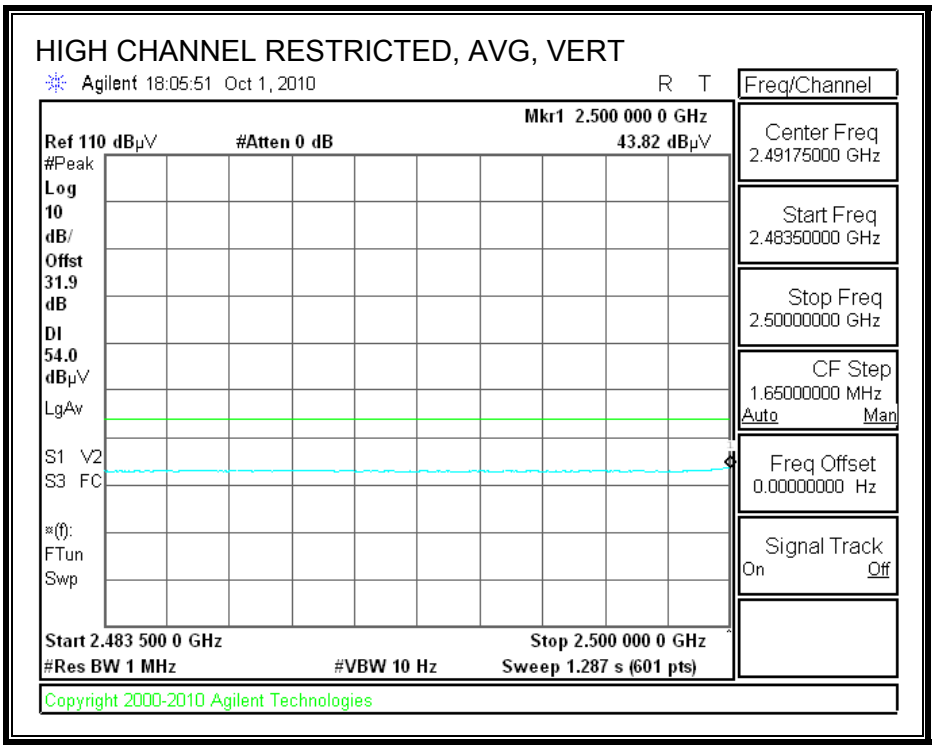
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Chin Pang
Date: 10/02/10
Project #: 10U13412
Company: Sierra Wireless Inc.
Test Target: FCc 15.247
Mode Oper: TX, b mode

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

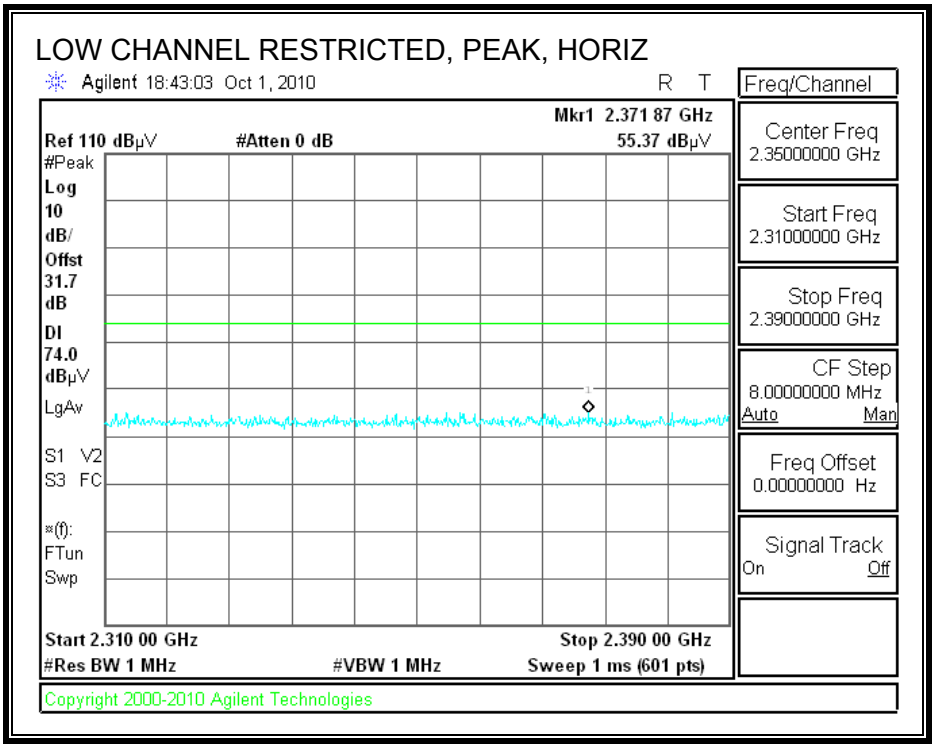
Average Field Strength Limit
Peak Field Strength Limit
Margin vs. Average Limit
Margin vs. Peak Limit

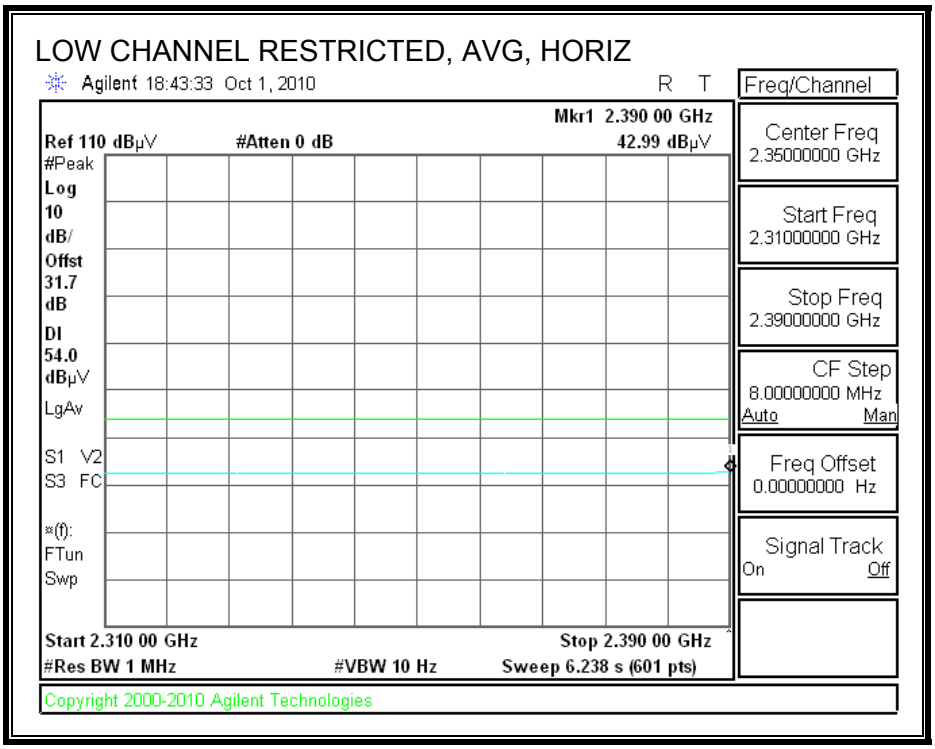
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
Low Ch, 2412MHz													
4.824	3.0	40.6	32.8	5.8	-34.8	0.0	0.0	44.3	74.0	-29.7	H	P	
4.824	3.0	33.3	32.8	5.8	-34.8	0.0	0.0	37.0	54.0	-17.0	H	A	
4.824	3.0	42.4	32.8	5.8	-34.8	0.0	0.0	46.1	74.0	-27.9	V	P	
4.824	3.0	37.7	32.8	5.8	-34.8	0.0	0.0	41.4	54.0	-12.6	V	A	
Mid Ch, 2437MHz													
4.874	3.0	41.1	32.8	5.8	-34.9	0.0	0.0	44.9	74.0	-29.1	V	P	
4.874	3.0	35.6	32.8	5.8	-34.9	0.0	0.0	39.3	54.0	-14.7	V	A	
7.311	3.0	37.0	35.2	7.3	-34.7	0.0	0.0	44.8	74.0	-29.2	V	P	
7.311	3.0	24.9	35.2	7.3	-34.7	0.0	0.0	32.7	54.0	-21.3	V	A	
4.874	3.0	39.5	32.8	5.8	-34.9	0.0	0.0	43.3	74.0	-30.7	H	P	
4.874	3.0	30.3	32.8	5.8	-34.9	0.0	0.0	34.1	54.0	-19.9	H	A	
7.311	3.0	37.2	35.2	7.3	-34.7	0.0	0.0	45.0	74.0	-29.0	H	P	
7.311	3.0	24.9	35.2	7.3	-34.7	0.0	0.0	32.7	54.0	-21.3	H	A	
High Ch, 2462MHz													
4.924	3.0	38.6	32.8	5.9	-34.9	0.0	0.0	42.4	74.0	-31.6	H	P	
4.924	3.0	27.2	32.8	5.9	-34.9	0.0	0.0	31.1	54.0	-22.9	H	A	
7.386	3.0	37.0	35.3	7.3	-34.6	0.0	0.0	45.0	74.0	-29.0	H	P	
7.386	3.0	24.7	35.3	7.3	-34.6	0.0	0.0	32.6	54.0	-21.4	H	A	
4.924	3.0	39.0	32.8	5.9	-34.9	0.0	0.0	42.9	74.0	-31.1	V	P	
4.924	3.0	29.6	32.8	5.9	-34.9	0.0	0.0	33.4	54.0	-20.6	V	A	
7.386	3.0	38.5	35.3	7.3	-34.6	0.0	0.0	46.4	74.0	-27.6	V	P	
7.386	3.0	24.6	35.3	7.3	-34.6	0.0	0.0	32.6	54.0	-21.5	V	A	

Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor.

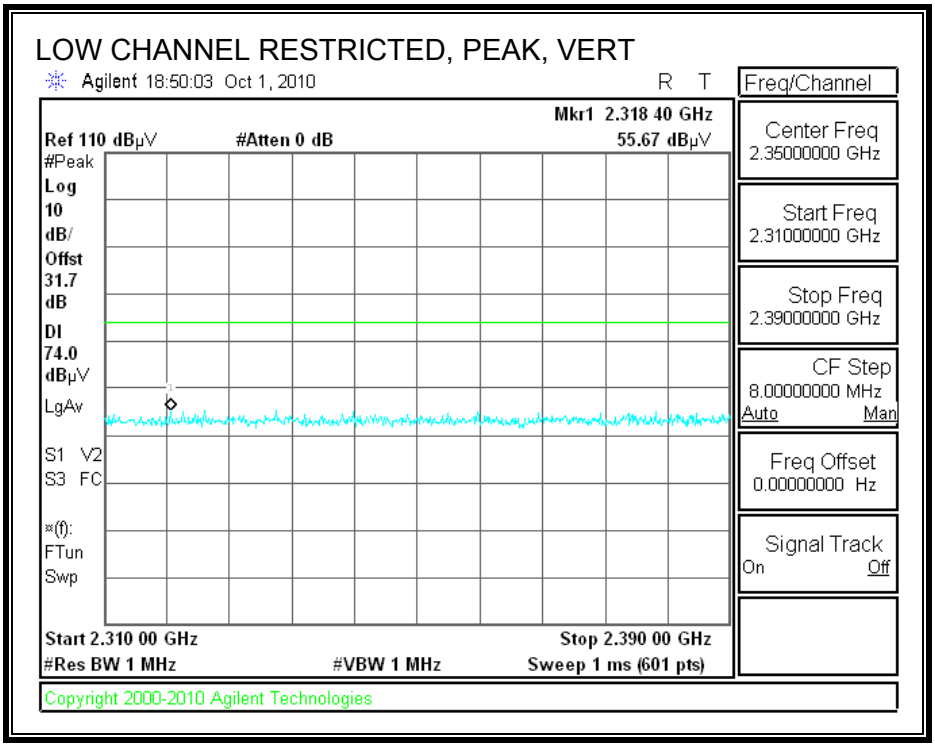
8.2.2. 802.11g MODE IN THE 2.4 GHz BAND

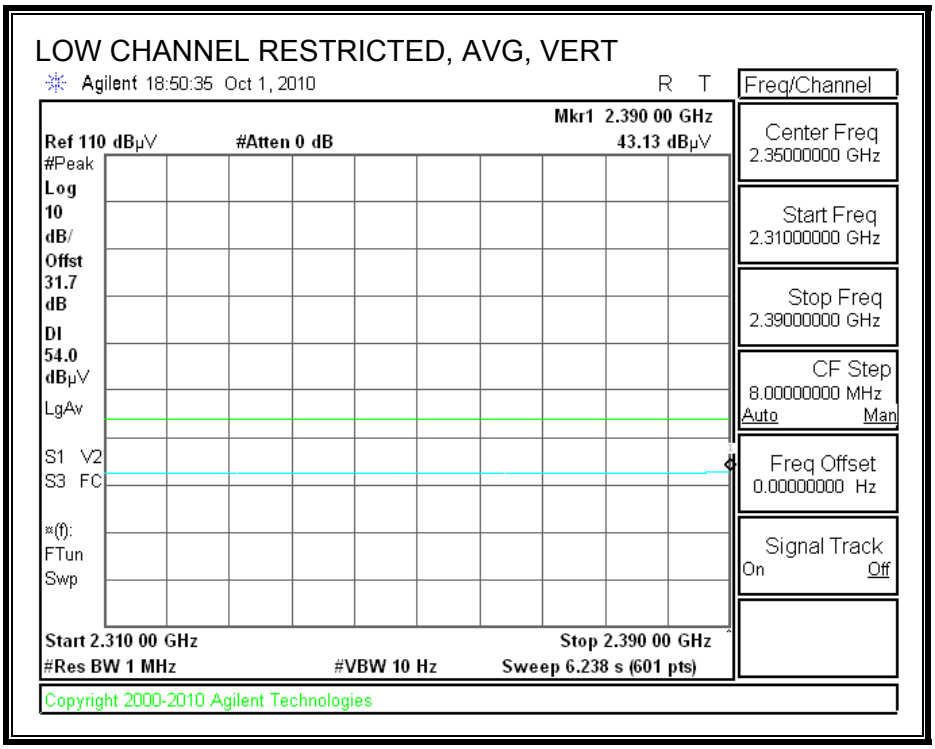
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



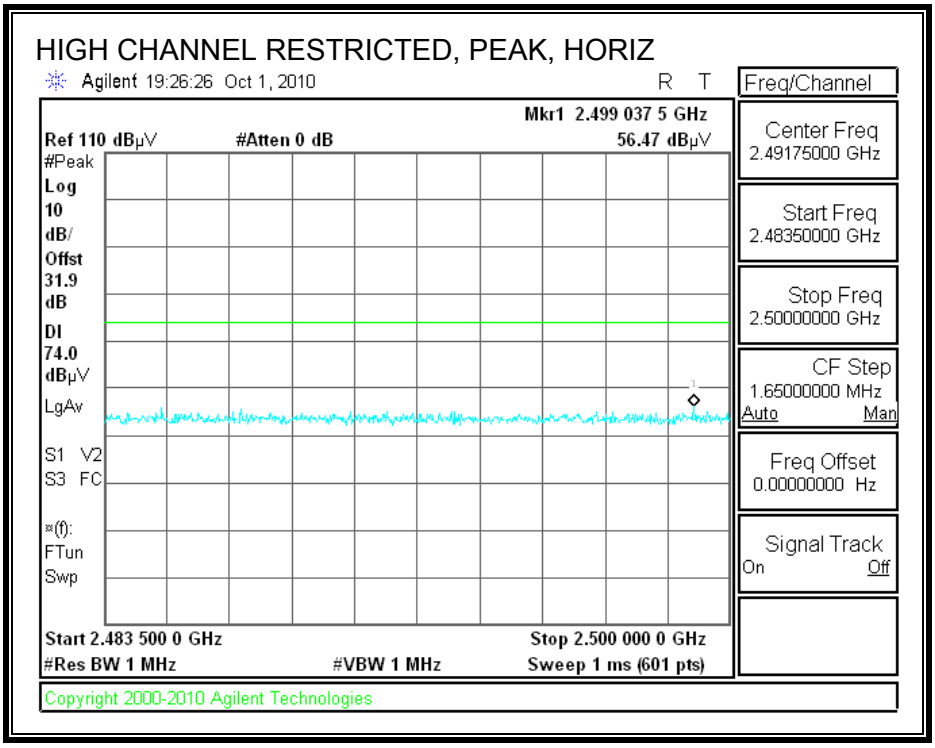


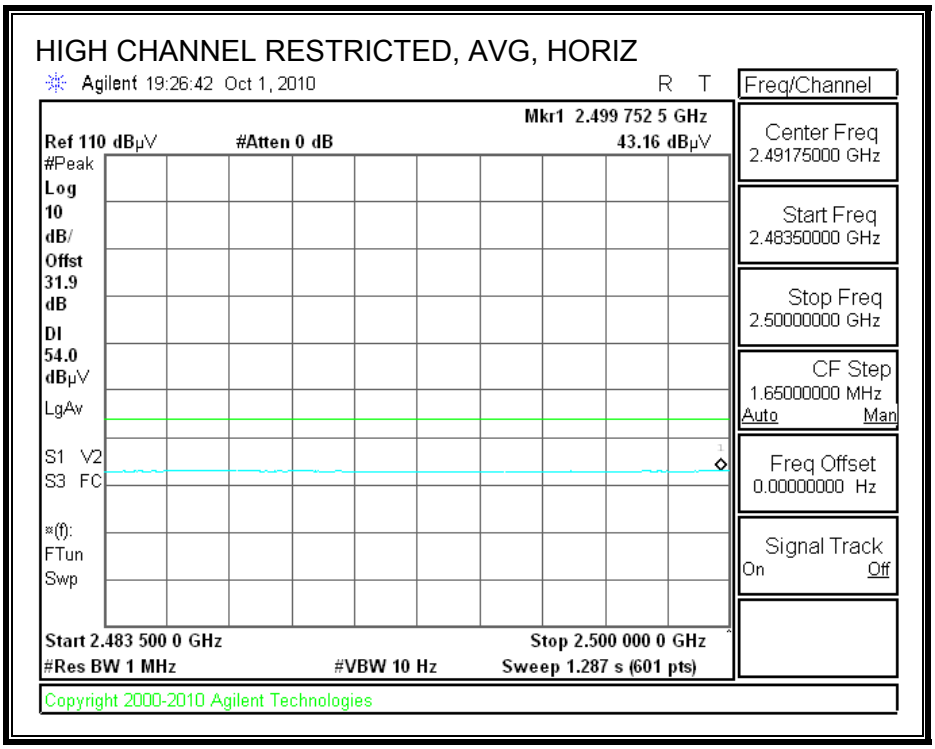
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



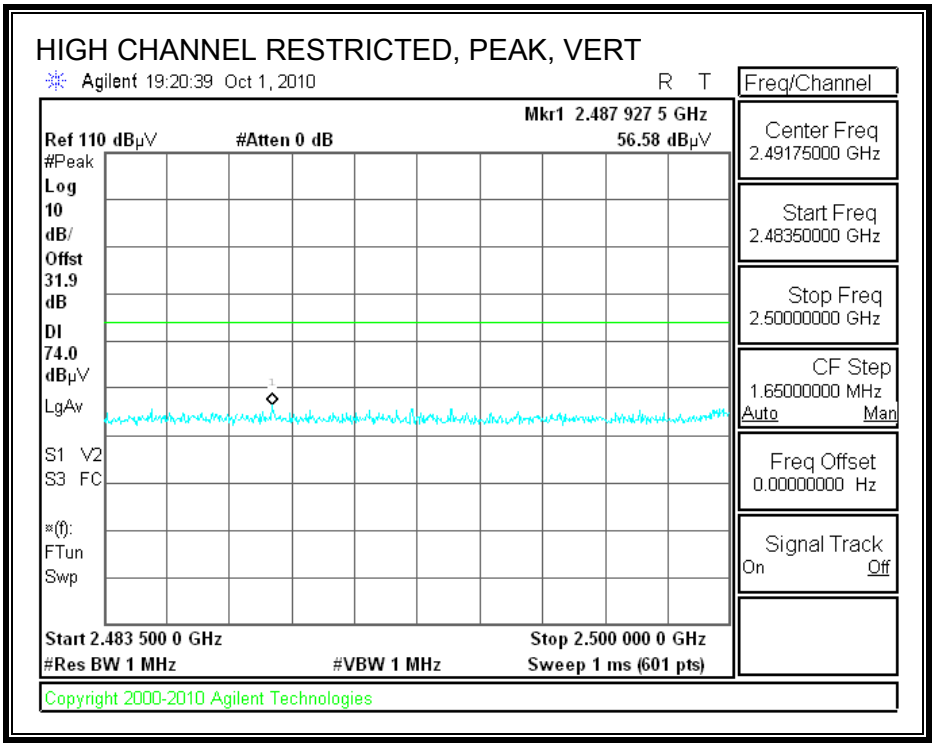


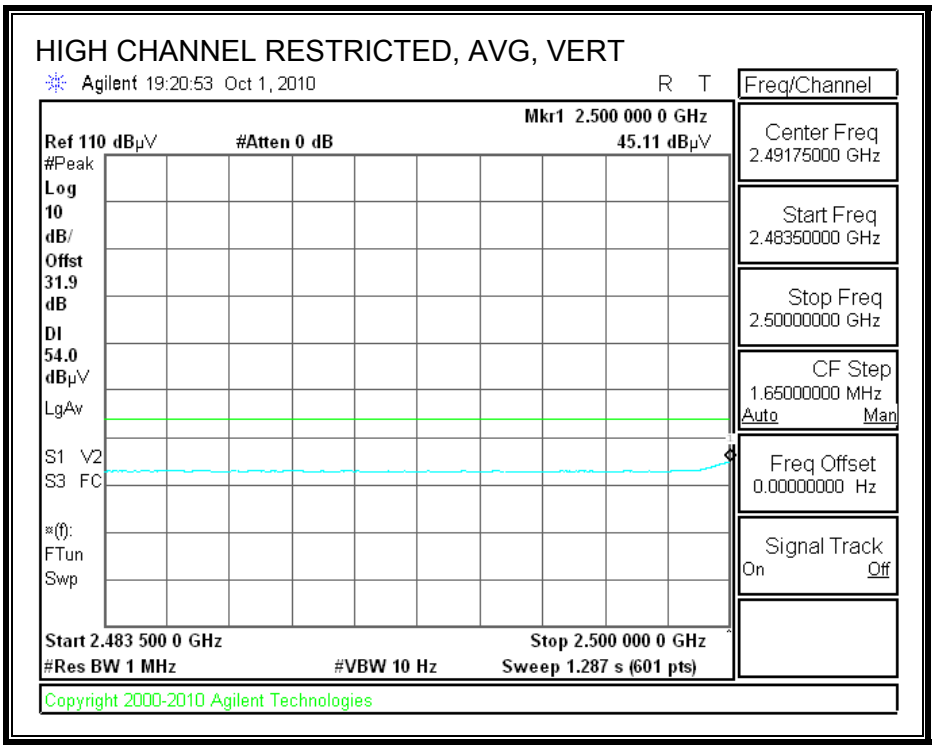
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Chin Pang
Date: 10/02/10
Project #: 10U13412
Company: Sierra Wireless, Inc.
Test Target: FCC 15.247
Mode Oper: TX, g mode

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

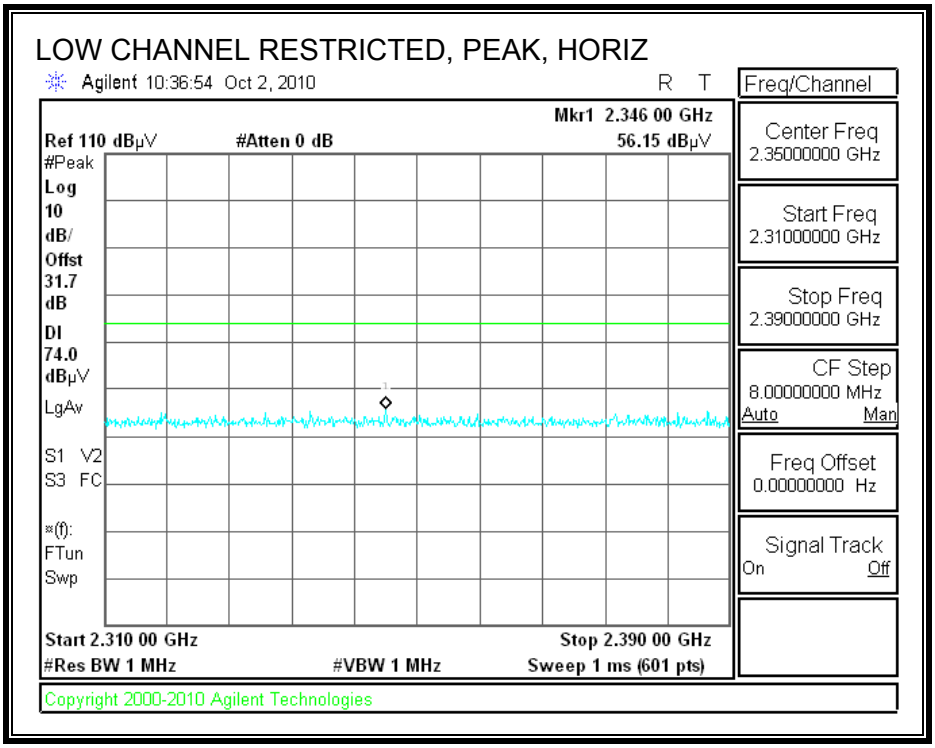
Average Field Strength Limit
Peak Field Strength Limit
Margin vs. Average Limit
Margin vs. Peak Limit

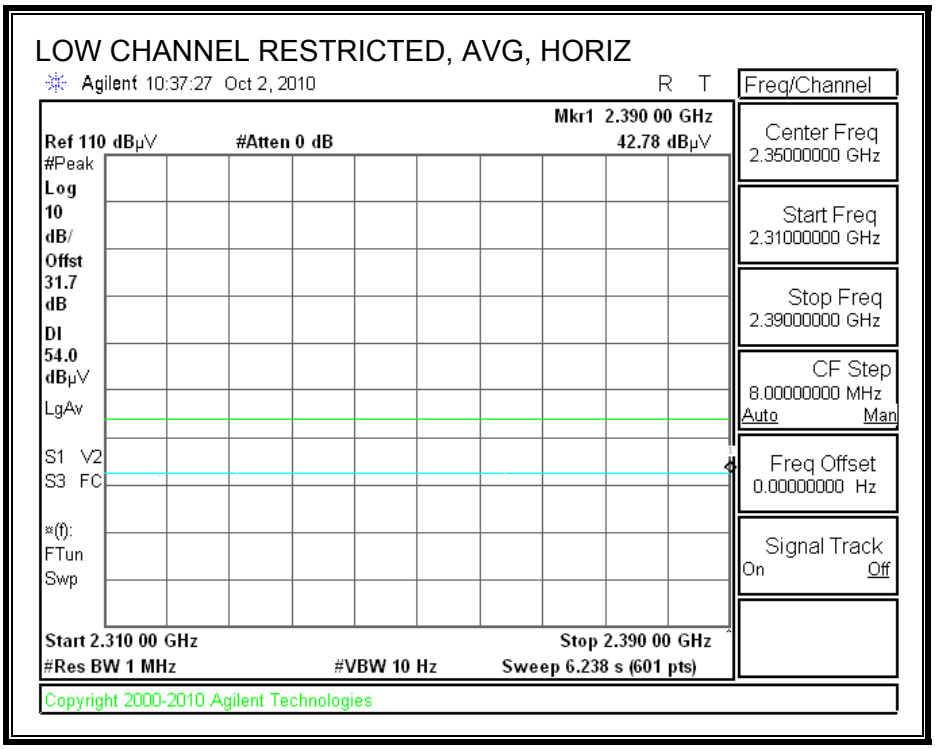
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
Low Ch, 2412MHz													
4.824	3.0	41.6	32.8	5.8	-34.8	0.0	0.0	45.3	74.0	-28.7	V	P	
4.824	3.0	29.3	32.8	5.8	-34.8	0.0	0.0	33.0	54.0	-21.0	V	A	
4.824	3.0	38.8	32.8	5.8	-34.8	0.0	0.0	42.5	74.0	-31.5	H	P	
4.824	3.0	27.0	32.8	5.8	-34.8	0.0	0.0	30.7	54.0	-23.3	H	A	
Mid Ch, 2437MHz													
4.874	3.0	38.0	32.8	5.8	-34.9	0.0	0.0	41.8	74.0	-32.2	V	P	
4.874	3.0	25.3	32.8	5.8	-34.9	0.0	0.0	29.1	54.0	-24.9	V	A	
7.311	3.0	36.8	35.2	7.3	-34.7	0.0	0.0	44.6	74.0	-29.4	V	P	
7.311	3.0	24.7	35.2	7.3	-34.7	0.0	0.0	32.5	54.0	-21.5	V	A	
4.874	3.0	38.2	32.8	5.8	-34.9	0.0	0.0	42.0	74.0	-32.0	H	P	
4.874	3.0	25.3	32.8	5.8	-34.9	0.0	0.0	29.1	54.0	-24.9	H	A	
7.311	3.0	37.7	35.2	7.3	-34.7	0.0	0.0	45.5	74.0	-28.5	H	P	
7.311	3.0	24.8	35.2	7.3	-34.7	0.0	0.0	32.6	54.0	-21.4	H	A	
High Ch, 2462MHz													
4.924	3.0	38.0	32.8	5.9	-34.9	0.0	0.0	41.9	74.0	-32.1	V	P	
4.924	3.0	25.6	32.8	5.9	-34.9	0.0	0.0	29.4	54.0	-24.6	V	A	
7.386	3.0	36.7	35.3	7.3	-34.6	0.0	0.0	44.6	74.0	-29.4	V	P	
7.386	3.0	24.5	35.3	7.3	-34.6	0.0	0.0	32.5	54.0	-21.5	V	A	
4.924	3.0	38.2	32.8	5.9	-34.9	0.0	0.0	42.1	74.0	-31.9	H	P	
4.924	3.0	25.5	32.8	5.9	-34.9	0.0	0.0	29.4	54.0	-24.6	H	A	
7.386	3.0	37.2	35.3	7.3	-34.6	0.0	0.0	45.2	74.0	-28.8	H	P	
7.386	3.0	24.5	35.3	7.3	-34.6	0.0	0.0	32.5	54.0	-21.5	H	A	

Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor.

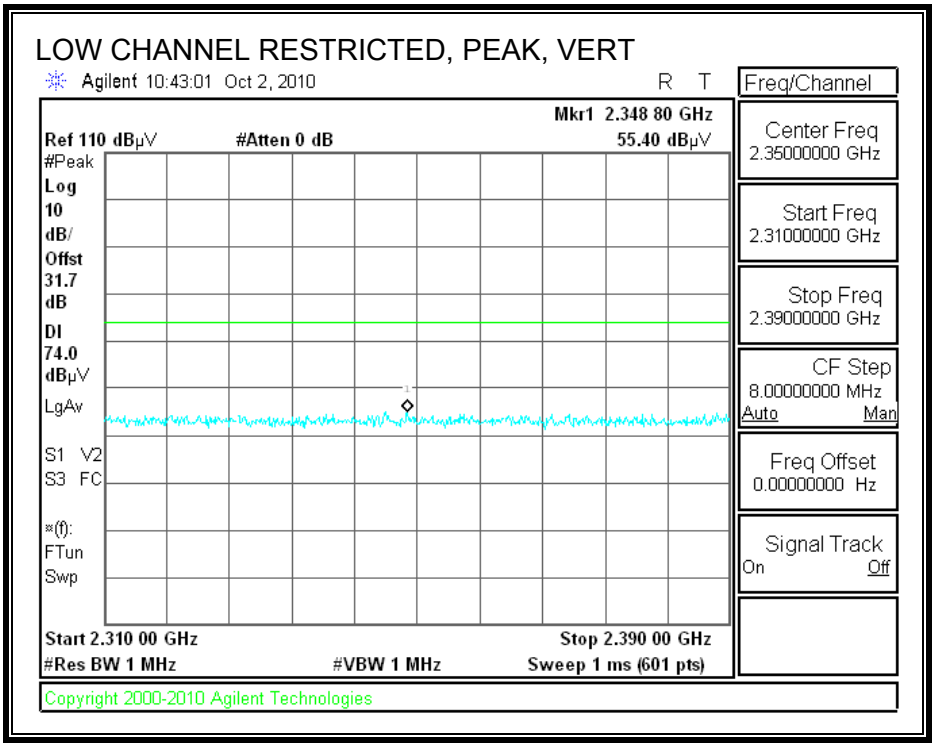
8.2.3. 802.11n HT20 SISO MODE IN THE 2.4 GHz BAND

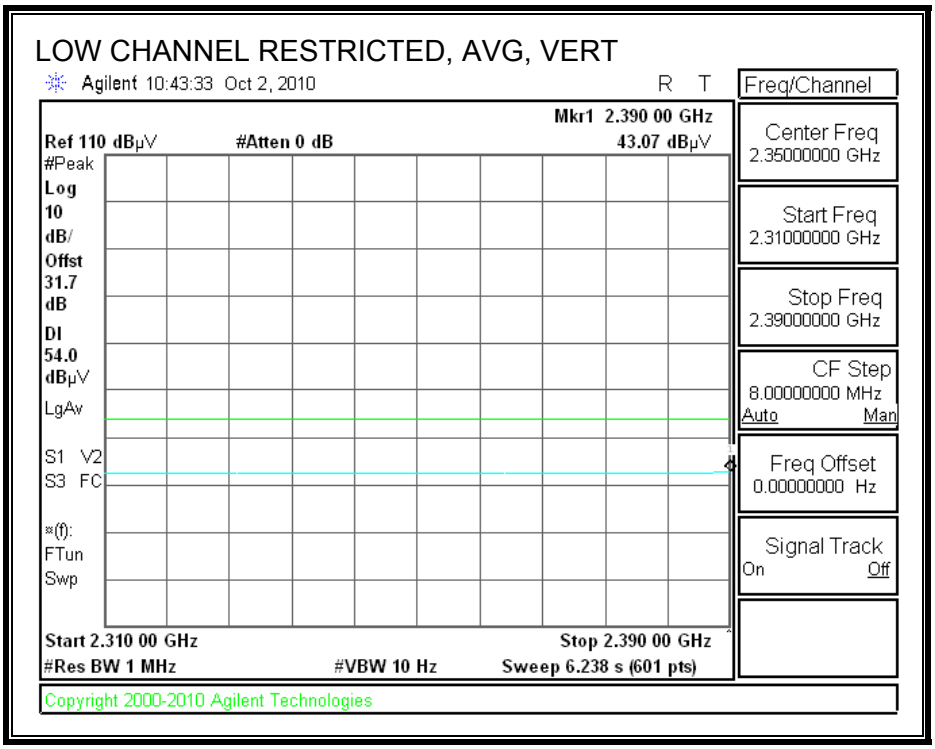
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



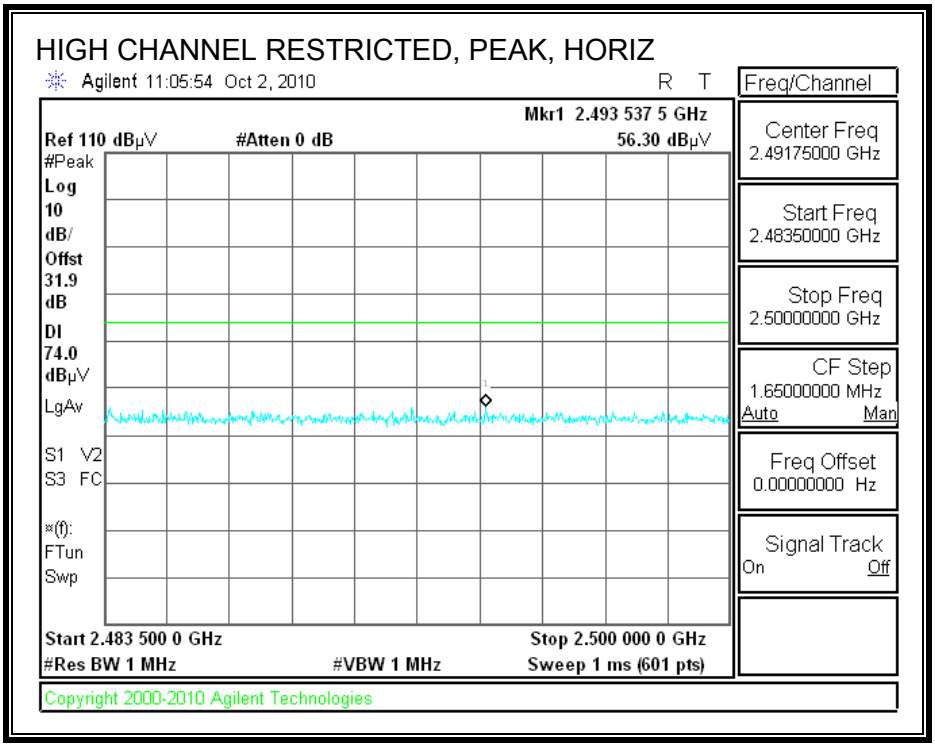


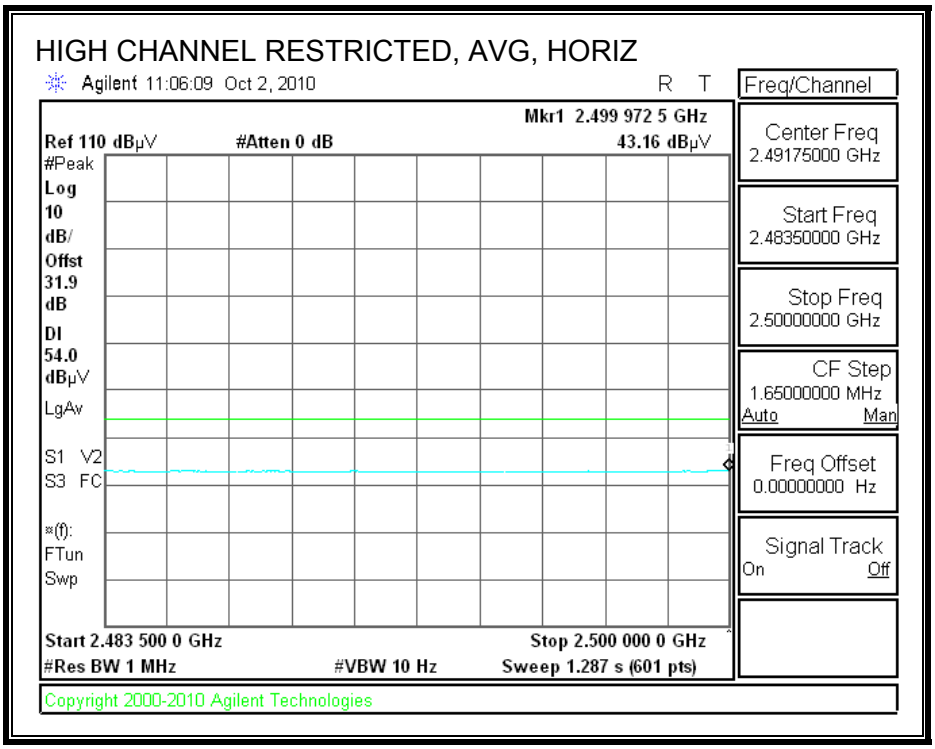
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



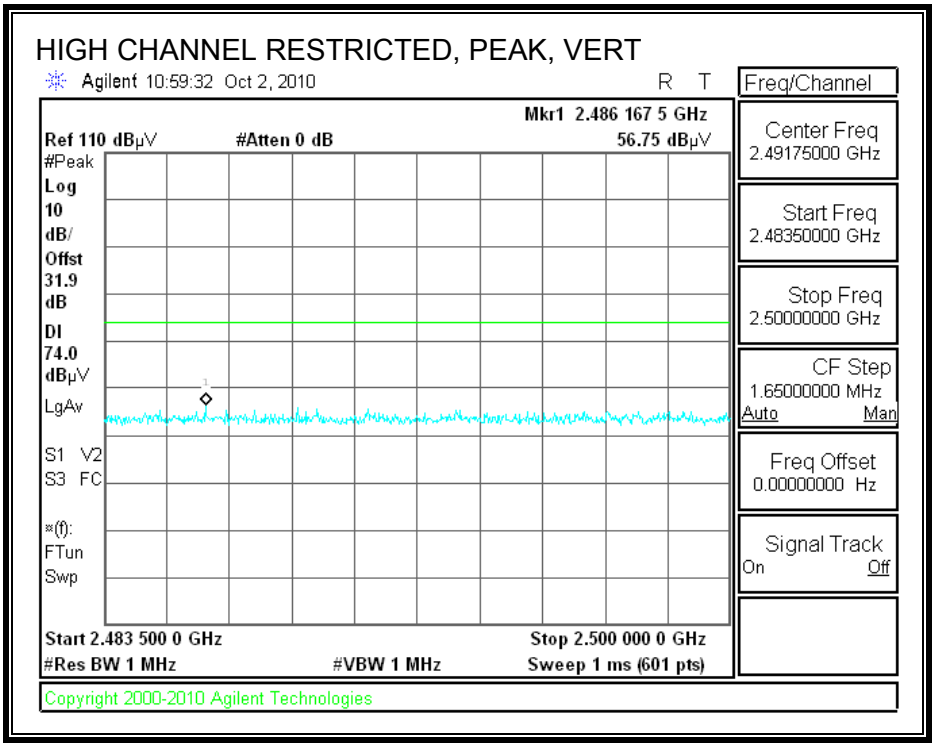


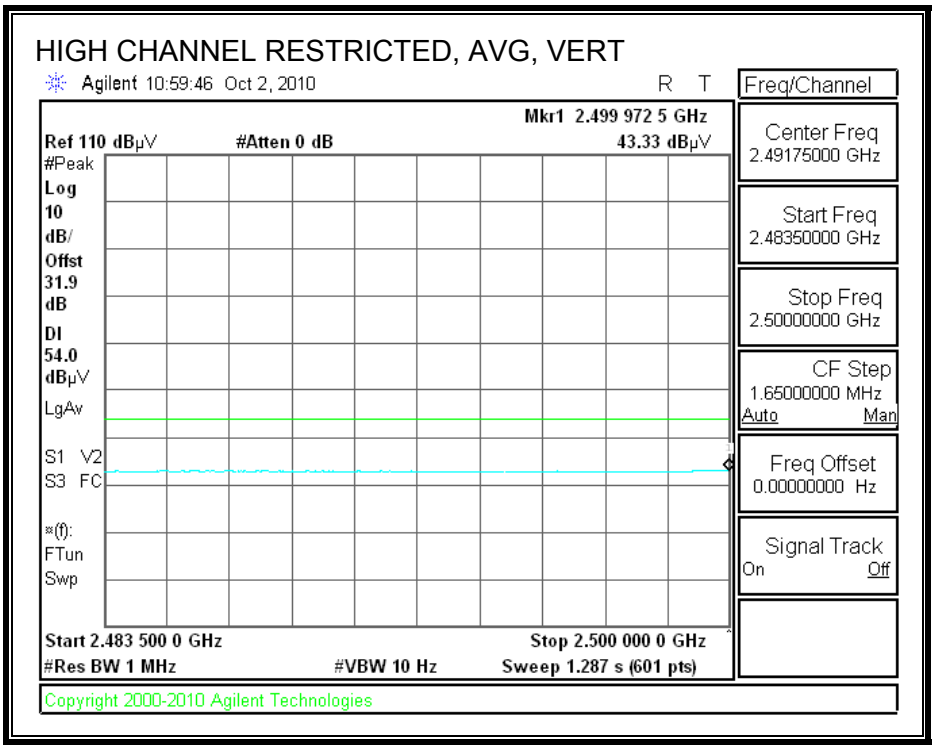
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Chin Pang
Date: 10/02/10
Project #: 10U13412
Company: Sierra Wireless, Inc.
Test Target: FCC 15.247
Mode Oper: TX, 802.11n, HT20

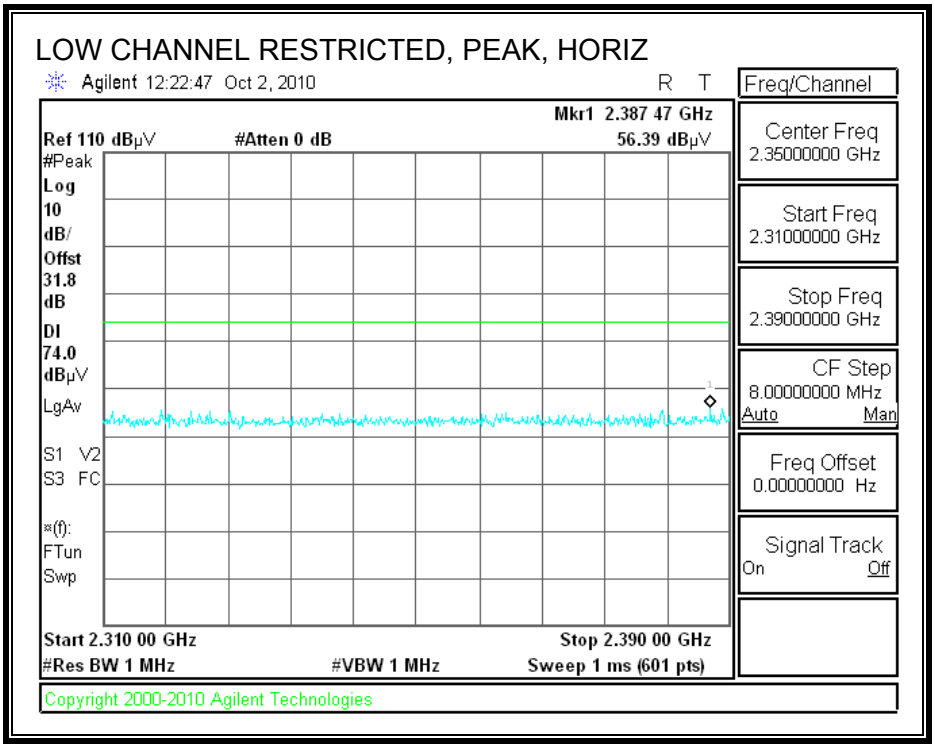
f	Measurement Frequency	Amp	Preamp Gain
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m
AF	Antenna Factor	Peak	Calculated Peak Field Strength
CL	Cable Loss	HPF	High Pass Filter

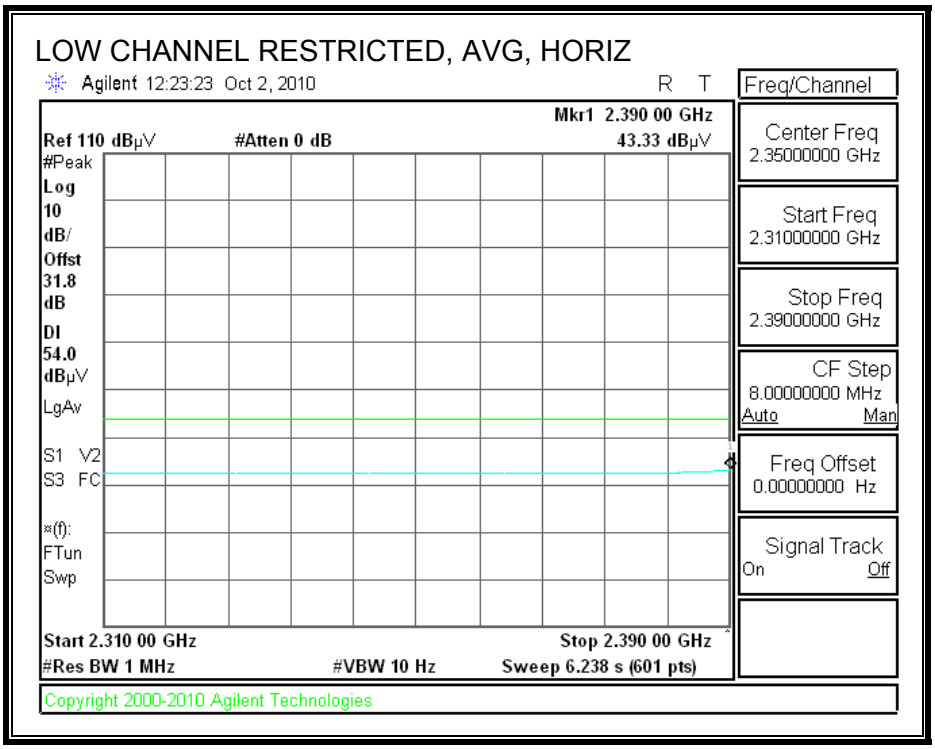
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
Low Ch, 2412MHz													
4.824	3.0	38.1	32.8	5.8	-34.8	0.0	0.0	41.8	74.0	-32.2	H	P	
4.824	3.0	25.6	32.8	5.8	-34.8	0.0	0.0	29.4	54.0	-24.6	H	A	
4.824	3.0	38.1	32.8	5.8	-34.8	0.0	0.0	41.9	74.0	-32.1	V	P	
4.824	3.0	25.6	32.8	5.8	-34.8	0.0	0.0	29.3	54.0	-24.7	V	A	
Mid Ch, 2437MHz													
4.874	3.0	39.0	32.8	5.8	-34.9	0.0	0.0	42.8	74.0	-31.2	H	P	
4.874	3.0	25.3	32.8	5.8	-34.9	0.0	0.0	29.1	54.0	-24.9	H	A	
7.311	3.0	36.9	35.2	7.3	-34.7	0.0	0.0	44.7	74.0	-29.3	H	P	
7.311	3.0	24.7	35.2	7.3	-34.7	0.0	0.0	32.5	54.0	-21.5	H	A	
4.874	3.0	37.5	32.8	5.8	-34.9	0.0	0.0	41.3	74.0	-32.7	V	P	
4.874	3.0	25.3	32.8	5.8	-34.9	0.0	0.0	29.0	54.0	-25.0	V	A	
7.311	3.0	37.0	35.2	7.3	-34.7	0.0	0.0	44.8	74.0	-29.2	V	P	
7.311	3.0	24.7	35.2	7.3	-34.7	0.0	0.0	32.5	54.0	-21.5	V	A	
High Ch, 2462MHz													
4.924	3.0	38.3	32.8	5.9	-34.9	0.0	0.0	42.2	74.0	-31.8	H	P	
4.924	3.0	25.5	32.8	5.9	-34.9	0.0	0.0	29.4	54.0	-24.6	H	A	
7.386	3.0	37.0	35.3	7.3	-34.6	0.0	0.0	45.0	74.0	-29.0	H	P	
7.386	3.0	24.5	35.3	7.3	-34.6	0.0	0.0	32.4	54.0	-21.6	H	A	
4.924	3.0	38.1	32.8	5.9	-34.9	0.0	0.0	42.0	74.0	-32.0	V	P	
4.924	3.0	25.5	32.8	5.9	-34.9	0.0	0.0	29.4	54.0	-24.6	V	A	
7.386	3.0	36.8	35.3	7.3	-34.6	0.0	0.0	44.8	74.0	-29.2	V	P	
7.386	3.0	24.5	35.3	7.3	-34.6	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.

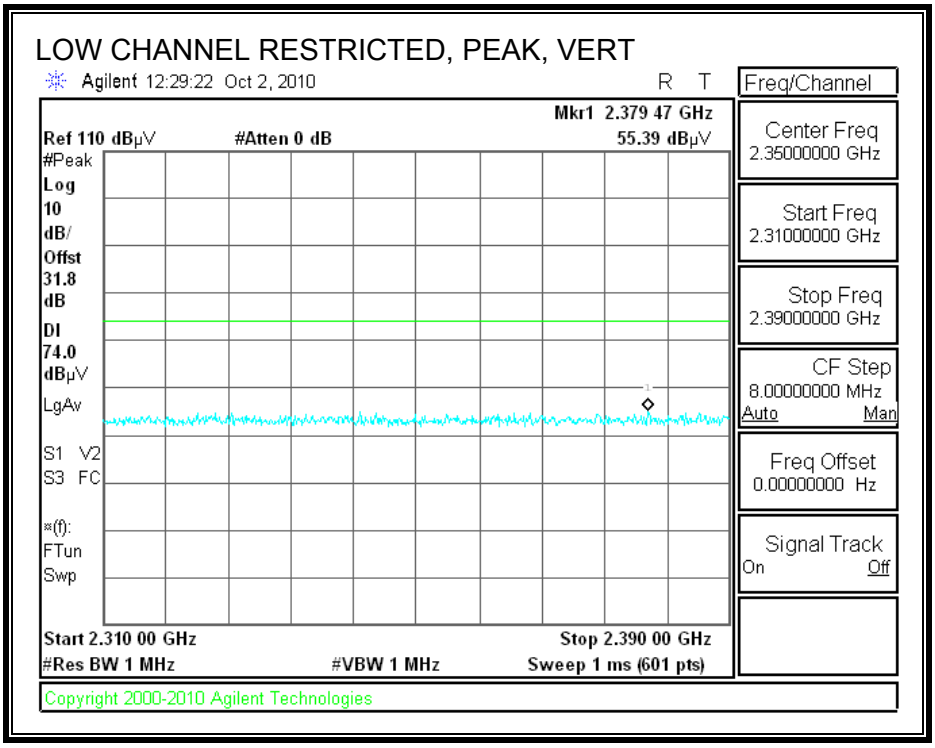
8.2.4. 802.11n HT40 SISO MODE IN THE 2.4 GHz BAND

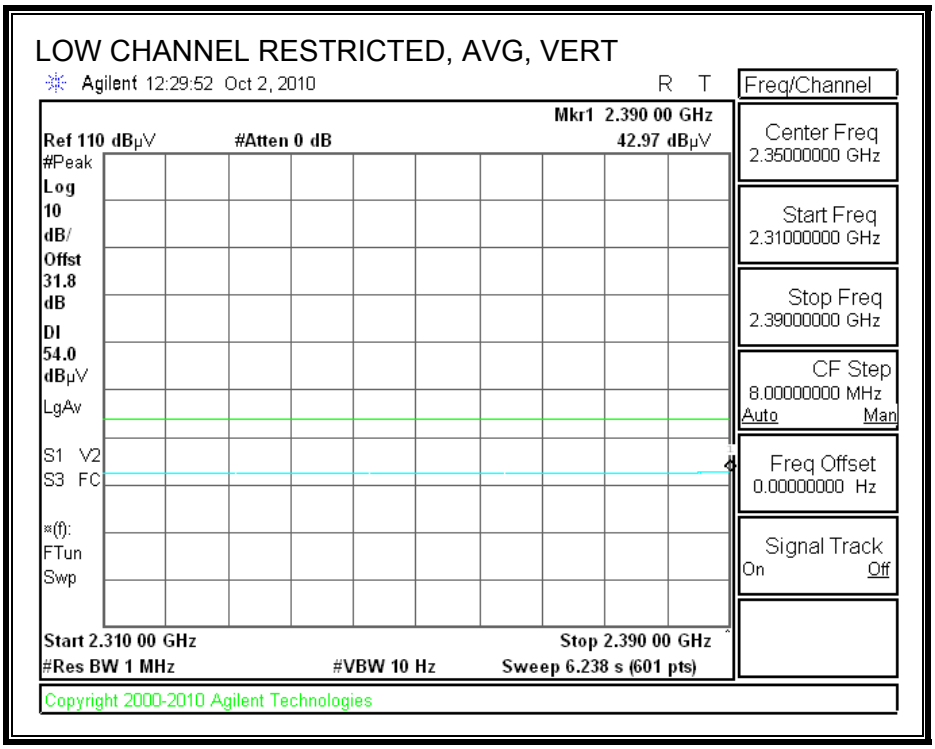
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



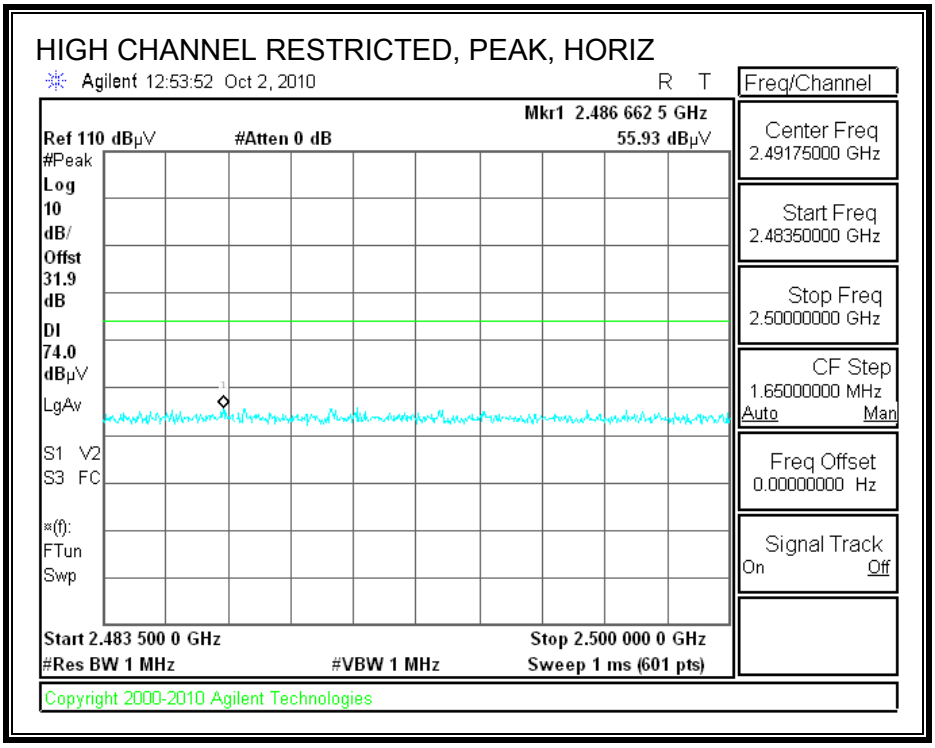


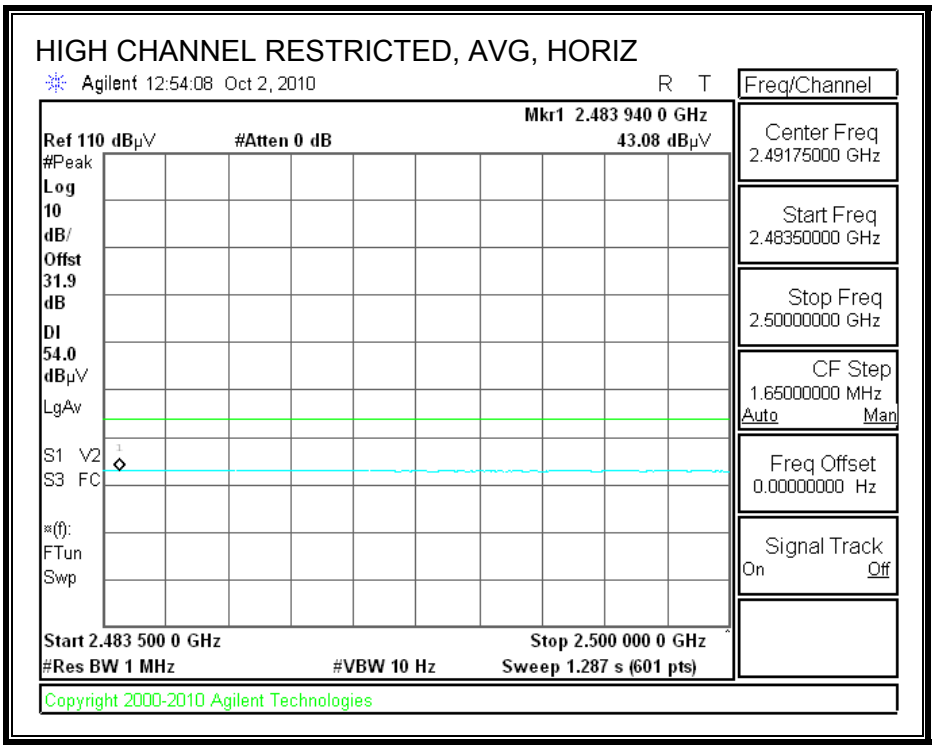
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



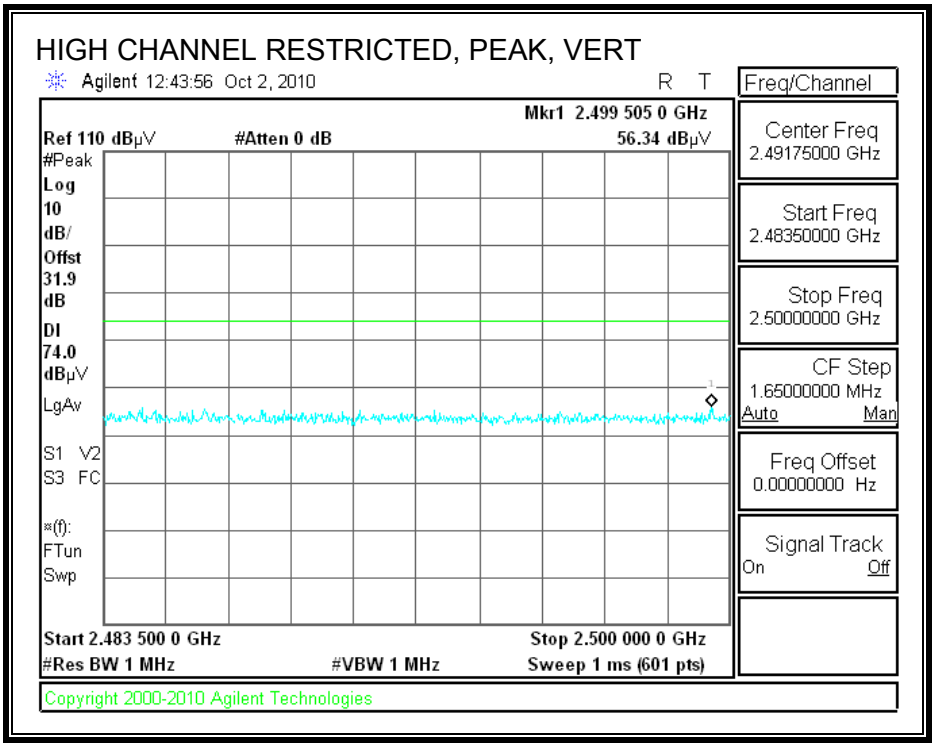


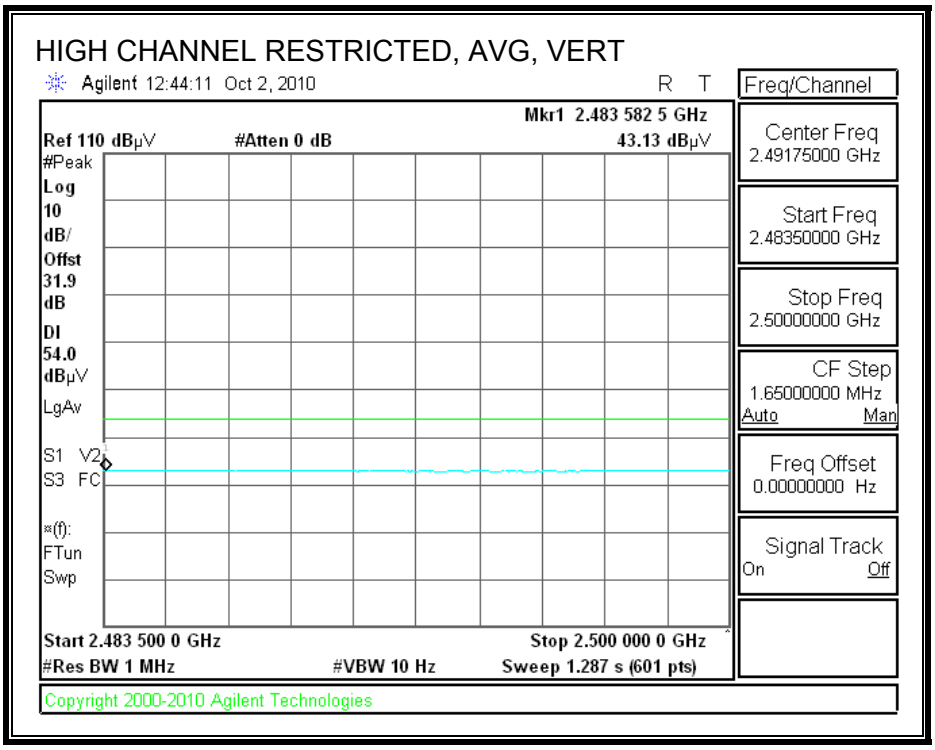
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Chin Pang
Date: 10/02/10
Project #: 10U13412
Company: Sierra Wireless, Inc.
Test Target: FCC 15.247
Mode Oper: TX, 802.11n, 40MHz

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

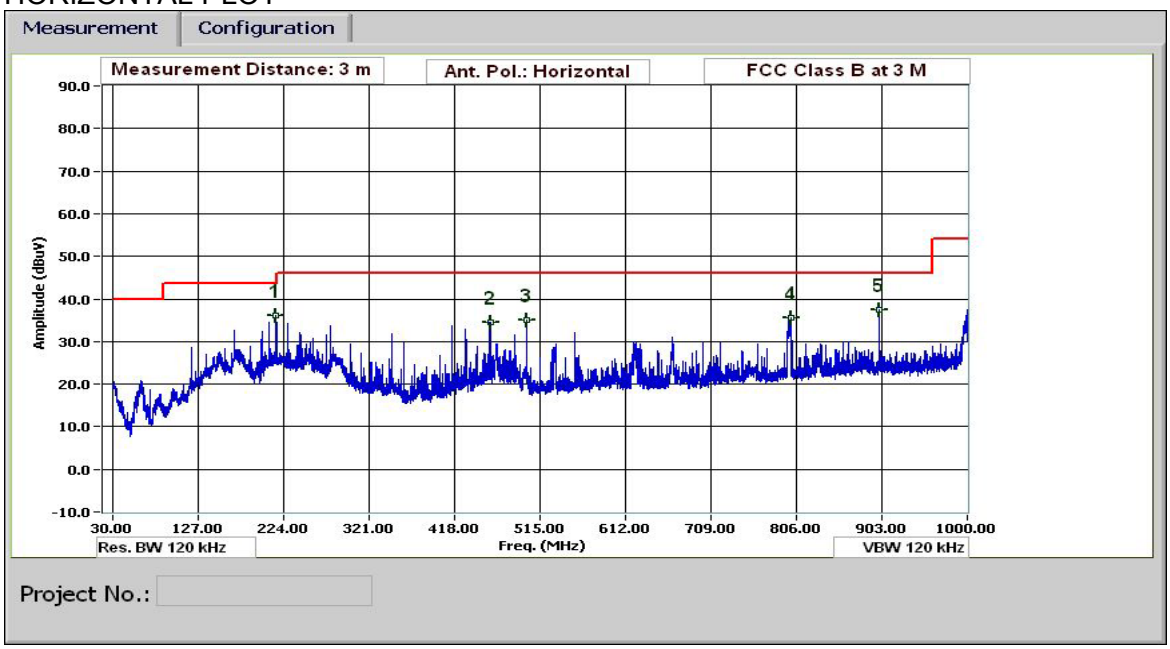
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
Low Ch, 2422MHz													
4.844	3.0	37.4	32.8	5.8	-34.8	0.0	0.0	41.1	74.0	-32.9	V	P	
4.844	3.0	25.5	32.8	5.8	-34.8	0.0	0.0	29.3	54.0	-24.7	V	A	
4.844	3.0	38.0	32.8	5.8	-34.8	0.0	0.0	41.8	74.0	-32.2	H	P	
4.844	3.0	25.3	32.8	5.8	-34.8	0.0	0.0	29.1	54.0	-24.9	H	A	
Mid Ch, 2437MHz													
4.874	3.0	37.8	32.8	5.8	-34.9	0.0	0.0	41.6	74.0	-32.4	V	P	
4.874	3.0	25.3	32.8	5.8	-34.9	0.0	0.0	29.1	54.0	-24.9	V	A	
7.311	3.0	37.5	35.2	7.3	-34.7	0.0	0.0	45.3	74.0	-28.7	V	P	
7.311	3.0	24.8	35.2	7.3	-34.7	0.0	0.0	32.6	54.0	-21.4	V	A	
4.874	3.0	38.3	32.8	5.8	-34.9	0.0	0.0	42.1	74.0	-31.9	H	P	
4.874	3.0	25.3	32.8	5.8	-34.9	0.0	0.0	29.1	54.0	-24.9	H	A	
7.311	3.0	38.4	35.2	7.3	-34.7	0.0	0.0	46.2	74.0	-27.8	H	P	
7.311	3.0	24.8	35.2	7.3	-34.7	0.0	0.0	32.6	54.0	-21.4	H	A	
High Ch, 2452MHz													
4.904	3.0	38.3	32.8	5.9	-34.9	0.0	0.0	42.1	74.0	-31.9	V	P	
4.904	3.0	25.5	32.8	5.9	-34.9	0.0	0.0	29.4	54.0	-24.6	V	A	
7.356	3.0	37.5	35.3	7.3	-34.6	0.0	0.0	45.4	74.0	-28.6	V	P	
7.356	3.0	24.5	35.3	7.3	-34.6	0.0	0.0	32.4	54.0	-21.6	V	A	
4.904	3.0	38.2	32.8	5.9	-34.9	0.0	0.0	42.0	74.0	-32.0	H	P	
4.904	3.0	25.5	32.8	5.9	-34.9	0.0	0.0	29.3	54.0	-24.7	H	A	
7.356	3.0	37.2	35.3	7.3	-34.6	0.0	0.0	45.1	74.0	-28.9	H	P	
7.356	3.0	24.4	35.3	7.3	-34.6	0.0	0.0	32.3	54.0	-21.7	H	A	

Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor.

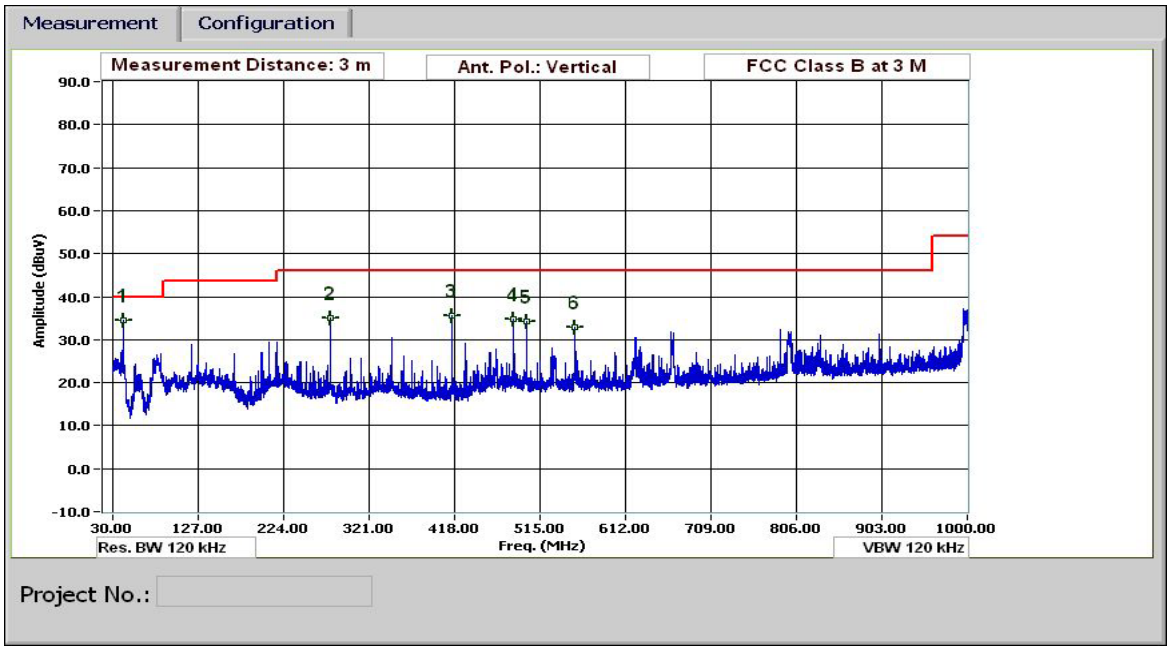
8.3. WORST-CASE BELOW 1 GHz

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

HORIZONTAL PLOT



VERTICAL PLOT



DATA

30-1000MHz Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Chin Pang
Date: 10/04/10
Project #: 10U13412
Company: Sierra Wireless, Inc.
Test Target: FCC 15.247
Mode Oper: TX (Worst Case)

f	Measurement Frequency	Amp	Preamp Gain
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters
Read	Analyzer Reading	Filter	Filter Insert Loss
AF	Antenna Factor	Corr.	Calculated Field Strength
CL	Cable Loss	Limit	Field Strength Limit

Margin Margin vs. Limit

f MHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Pad dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
214.808	3.0	51.6	11.9	1.3	28.9	0.0	0.0	36.0	43.5	-7.5	H	P	
458.178	3.0	45.9	16.1	2.0	29.6	0.0	0.0	34.5	46.0	-11.5	H	P	
499.939	3.0	45.9	16.8	2.1	29.7	0.0	0.0	35.2	46.0	-10.8	H	P	
799.592	3.0	41.0	21.0	2.8	29.2	0.0	0.0	35.7	46.0	-10.3	H	P	
900.036	3.0	41.5	21.5	3.0	28.6	0.0	0.0	37.4	46.0	-8.6	H	P	
41.64	3.0	50.4	13.1	0.6	29.6	0.0	0.0	34.4	40.0	-5.6	V	P	
277.09	3.0	49.6	12.6	1.5	28.8	0.0	0.0	35.0	46.0	-11.0	V	P	
415.576	3.0	47.6	15.3	1.9	29.4	0.0	0.0	35.5	46.0	-10.5	V	P	
484.819	3.0	45.9	16.5	2.1	29.7	0.0	0.0	34.9	46.0	-11.1	V	P	
499.939	3.0	45.1	16.8	2.1	29.7	0.0	0.0	34.3	46.0	-11.7	V	P	
554.062	3.0	42.7	17.6	2.3	29.7	0.0	0.0	32.9	46.0	-13.1	V	P	

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

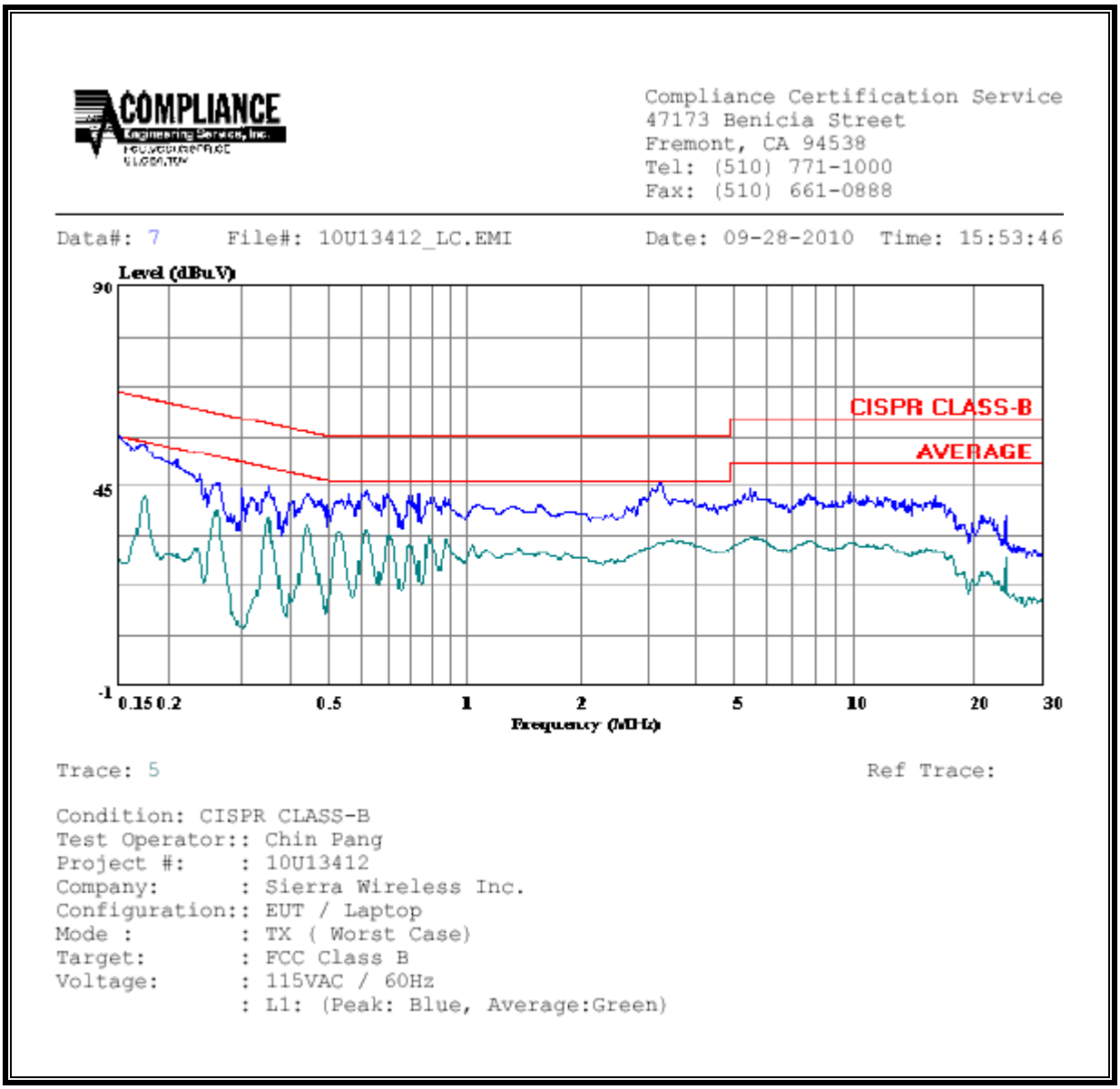
ANSI C63.4

RESULTS

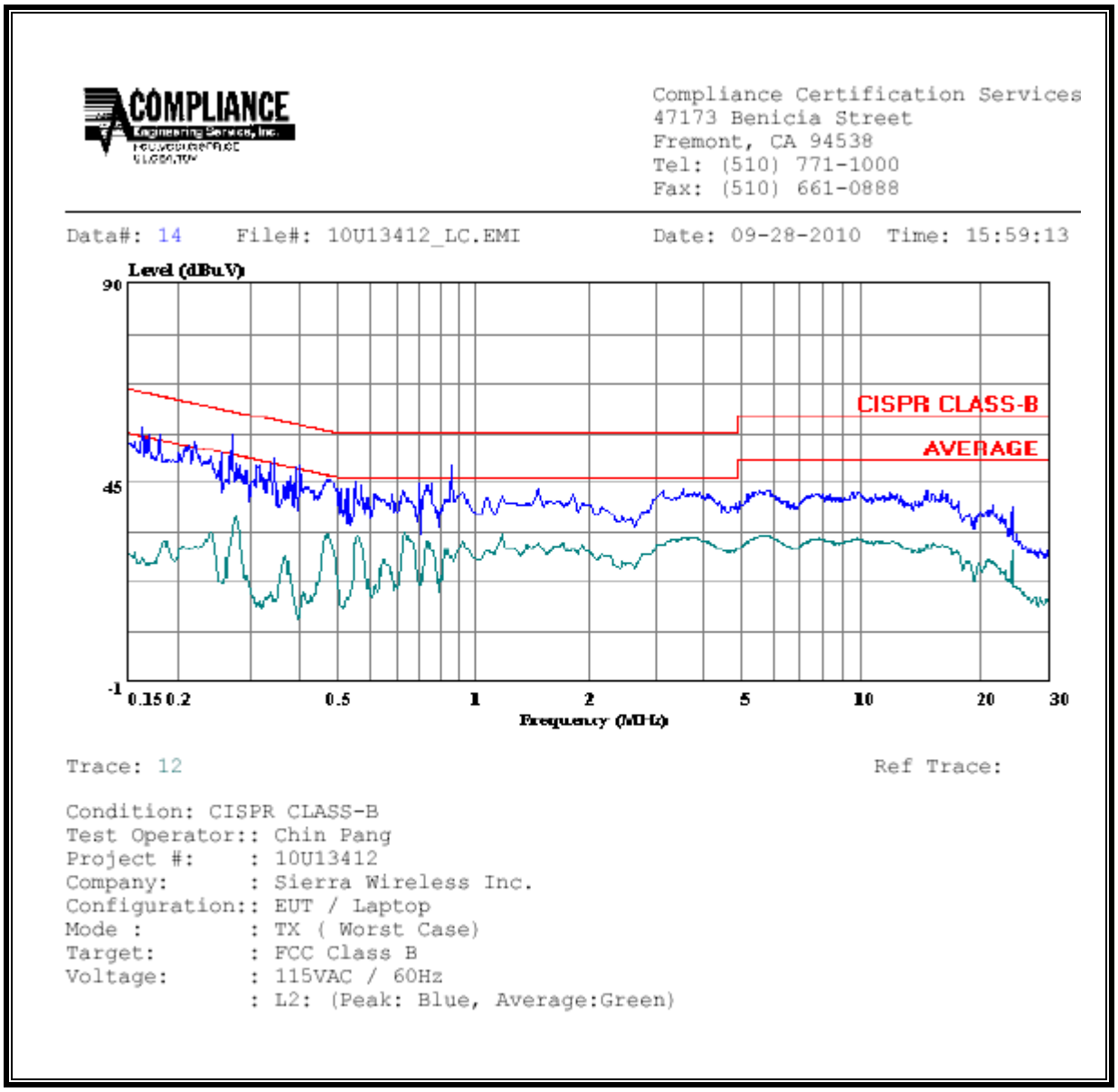
6 WORST EMISSIONS

CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	EN_B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.17	54.05	--	42.02	0.00	64.86	54.86	-10.81	-12.84	L1
0.35	44.60	--	37.02	0.00	58.96	48.96	-14.36	-11.94	L1
3.53	44.30	--	31.99	0.00	56.00	46.00	-11.70	-14.01	L1
0.28	55.63	--	36.48	0.00	60.85	50.85	-5.22	-14.37	L2
0.95	48.64	--	31.43	0.00	56.00	46.00	-7.36	-14.57	L2
3.78	42.61	--	31.90	0.00	56.00	46.00	-13.39	-14.10	L2
6 Worst Data									

LINE 1 RESULTS



LINE 2 RESULTS



10. MAXIMUM PERMISSIBLE EXPOSURE

10.1. Limits

10.1.1. 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.

10.1.2. 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	$280/f$	$2.19/f$		6
10–30	28	$2.19/f$		6
30–300	28	0.073	2*	6
300–1 500	$1.585f^{0.5}$	$0.0042f^{0.5}$	$f/150$	6
1 500–15 000	61.4	0.163	10	6
15 000–150 000	61.4	0.163	10	$616\,000/f^{1.2}$
150 000–300 000	$0.158f^{0.5}$	$4.21 \times 10^{-4}f^{0.5}$	$6.67 \times 10^{-5}f$	$616\,000/f^{1.2}$

* 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/m^2 is equivalent to 1 mW/cm^2.
3. A magnetic field strength of 1 A/m corresponds to 1.257 microtesla (μT) or 12.57 milligauss (mG).

10.1.3. LIMITS APPLICABLE TO THE EUT

For mobile radio equipment operating in the cellular phone band, the lowest power density limit is calculated using the lowest frequency, as 824 MHz / 1500 = 0.55 mW/cm^2 (FCC) and 824 MHz / 150 = 5.5 W/m^2 (IC).

For operation in the PCS band, the 2.4 GHz band and the 5 GHz bands, from FCC §1.1310 Table 1 (B), the maximum value of S = 1.0 mW/cm^2 and from IC Safety Code 6, Section 2.2 Table 5 Column 4, S = 10 W/m^2.

10.2. EQUATIONS

Power density is given by:

S = EIRP / (4 * Pi * D^2)

where

S = Power density in W/m^2
EIRP = Equivalent Isotropic Radiated Power in W
D = Separation distance in m

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.

Total EIRP = (P1 * G1) + (P2 * G2) + ... + (Pn * Pn)

where

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

For multiple colocated transmitters operating simultaneously in frequency bands where different limits apply, either the lowest limit applicable to the operating frequency ranges of the co-located transmitters can be applied or a fraction of the exposure limit is established for each band, such that the sum of the fractions is less than or equal to one.

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.

10.3. RESULTS

10.3.1. SINGLE TRANSMITTER (WLAN)

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 - b mode	WLAN	0.20	18.30	-1.00	0.11	0.011
2.4 GHz - g mode	WLAN	0.20	21.20	-1.00	0.21	0.021
2.4 GHz - HT20 mode	WLAN	0.20	21.60	-1.00	0.23	0.023
2.4 GHz - HT40 mode	WLAN	0.20	19.40	-1.00	0.14	0.014

Each Power Density is less than 10 W/m^2 or 1 mW/cm^2, which is the limit for these operating frequency ranges.