FCC CFR47 PART 15 SUBPART C
INDUSTRY CANADA RSS-210 ISSUE 7

CERTIFICATION TEST REPORT

FOR

802.11 b/g/n WLAN CLIENT

MODEL NUMBER: 1400

FCC ID: C3K1400
IC: 3048A-1400

REPORT NUMBER: 09U12915-1, Revision B

ISSUE DATE: DECEMBER 08, 2009

Prepared for
MICROSOFT CORPORATION
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	11/13/09	Initial Issue	F. Ibrahim
A	11/25/09	Revised FCC ID, IC ID, and Applicant information	A. Zaffar
B	12/08/09	Added tabulated Band edge data	F. Ibrahim

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: MICROSOFT CORPORATION
One Microsoft Way,
Redmond, WA 98052, U.S.A

EUT DESCRIPTION: 802.11 b/g/n 88W8786U WLAN Client

MODEL: 1400

SERIAL NUMBER: 0C607683A344

DATE TESTED: NOVEMBER 06-13, 2009

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-210 Issue 7 Annex 8	Pass
INDUSTRY CANADA RSS-GEN Issue 2	Pass

Compliance Certification Services, Inc. (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 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 CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by CCS will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For CCS By:

FRANK IBRAHIM
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

Tested By:

TOM CHEN
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2003, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 2, and RSS-210 Issue 7.

3. FACILITIES AND ACCREDITATION

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

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:

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 an 802.11b/g/n WLAN Client.

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	24.23	264.85
2412 - 2462	802.11g	24.36	272.90
2412 - 2462	802.11n HT20	25.40	346.74
2422 - 2452	802.11n HT40	25.79	379.31

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes the following antennas:
1) PIFA antenna, with a maximum gain of 4.02 dBi.
2) PWB antenna, with a maximum gain of 4.06 dBi.

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was Microsoft, rev. 12.0.3.09.

The EUT driver software installed during testing was Microsoft, rev. V1.0.0.16.

The test utility software used during testing was Microsoft, rev. V1.0.1.P13.

5.5. WORST-CASE CONFIGURATION AND MODE

For Radiated Emissions below 1 GHz, the channel with highest output power was selected, it was determined that mid channel in the HT40 mode was the channel with highest output power; therefore, radiated emissions below 1 GHz was conducted with the EUT set to mid channel in the HT40 mode, data rate was MCS7 based on input from the client. Separate data sheet for each antenna was provided.

For Power Line Conducted Emissions test, also the channel with highest output power was selected which was mid channel in the HT40 mode. PWB antenna was selected as worst-case antenna for LC test.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	Lenovo	889202U	L3-A4068	DoC
AC Adapter	Lenovo	92P1109	Z1ZBTZ7BR5U7	N/A
Adapter Board	Microsoft	N/A	N/A	N/A

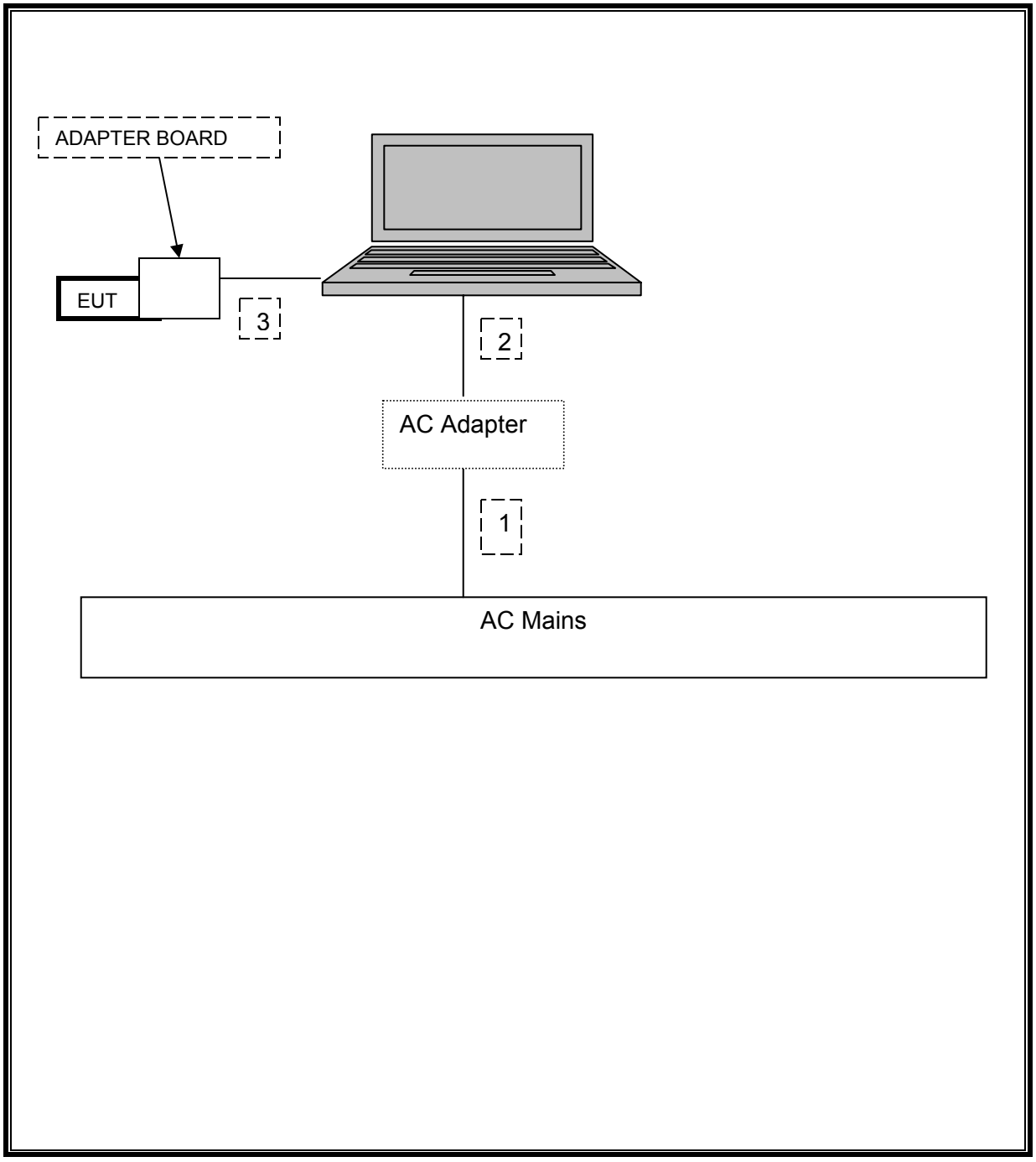
I/O CABLES

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	1	AC	Unshielded	1.8 m	N/A
2	DC	1	DC	Unshielded	1.8 m	Ferrite on laptop's end
3	USB	1	USB	Unshielded	0.6 m	N/A

TEST SETUP

The EUT is connected to 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, 44 GHz	Agilent / HP	E4446A	C01069	01/05/10
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01011	01/14/10
Antenna, Horn, 18 GHz	EMCO	3115	C00945	04/22/10
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00885	03/31/10
Preamplifier, 1-26GHz	Agilent / HP	8449B	C01052	07/05/10
Preamplifier, 1-26GHz	Agilent / HP	8449B	C01052	07/05/10
Power Meter	Agilent / HP	438A	C01068	12/16/09
Power Sensor, 18 GHz	Agilent / HP	8481A	N02784	07/28/11
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	10/29/10
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	02/06/10

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

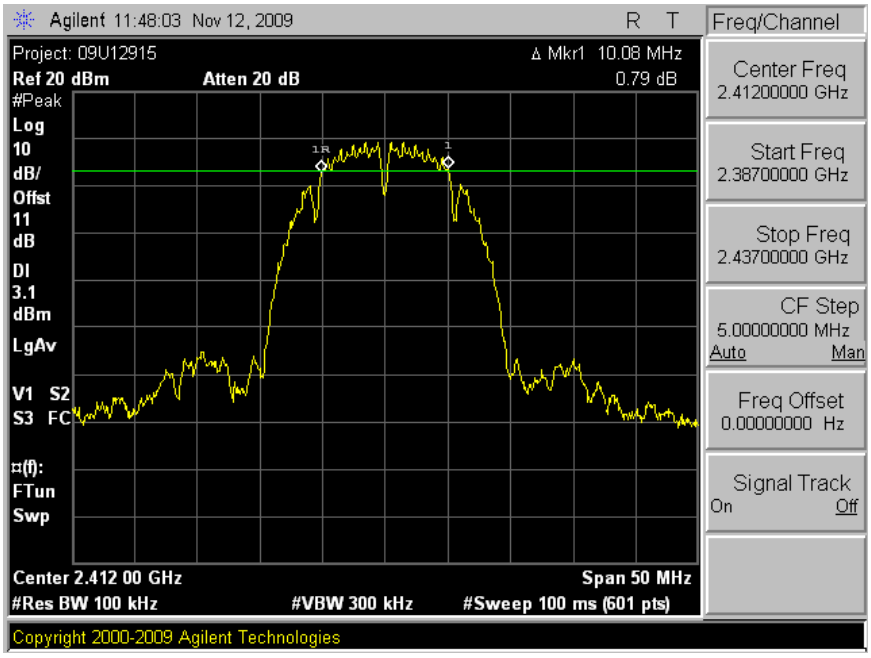
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

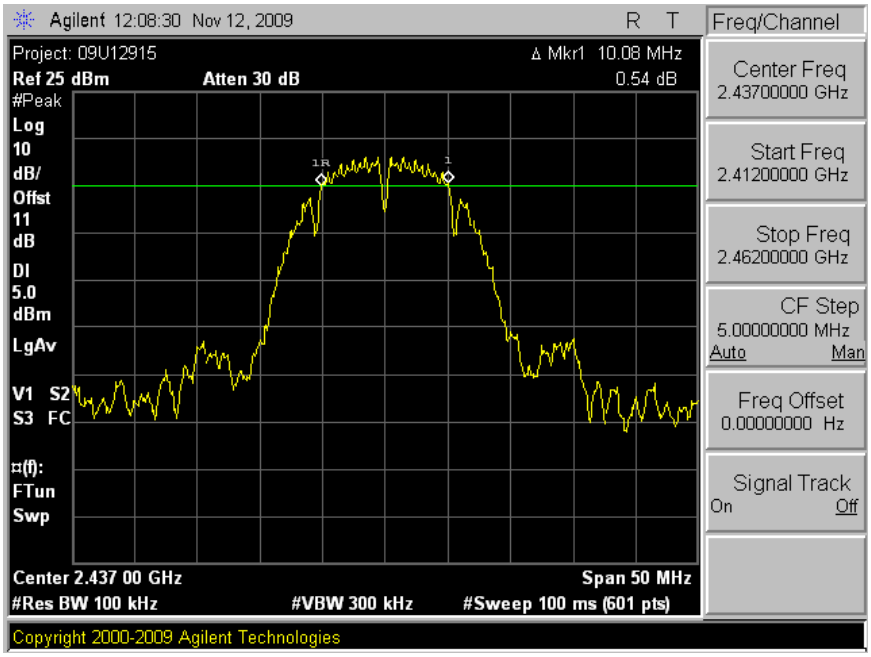
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	10.08	0.5
Middle	2437	10.08	0.5
High	2462	10.08	0.5

6 dB BANDWIDTH

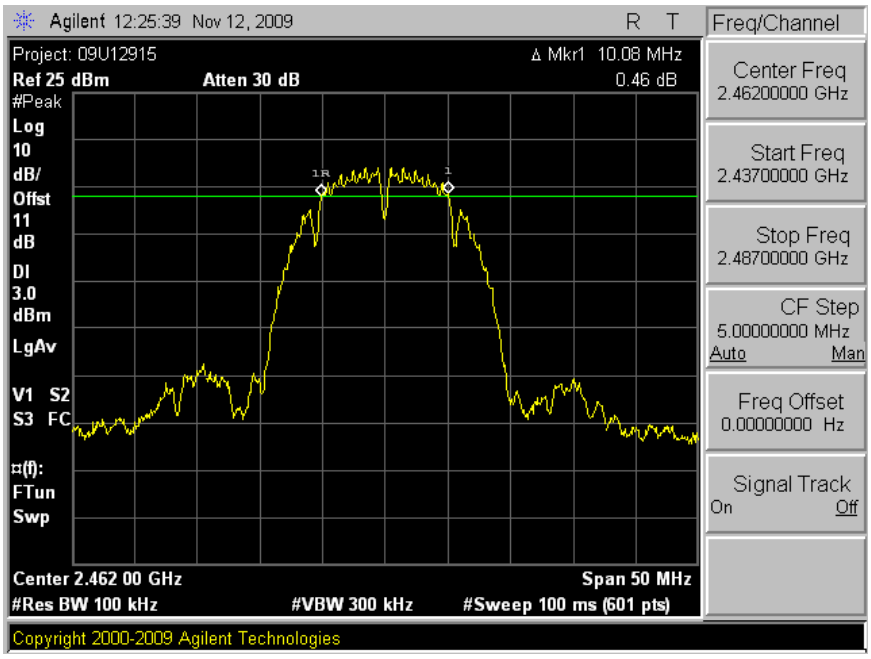
6 dB BANDWIDTH LOW CH



6 dB BANDWIDTH MID CH



6 dB BANDWIDTH HIGH CH



7.1.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

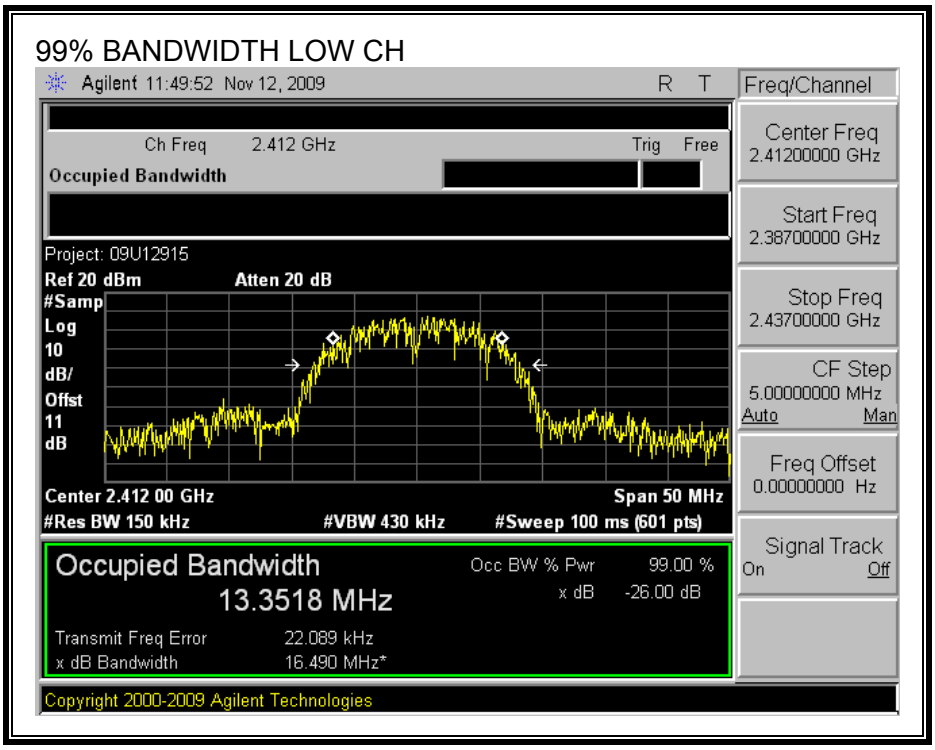
TEST PROCEDURE

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.

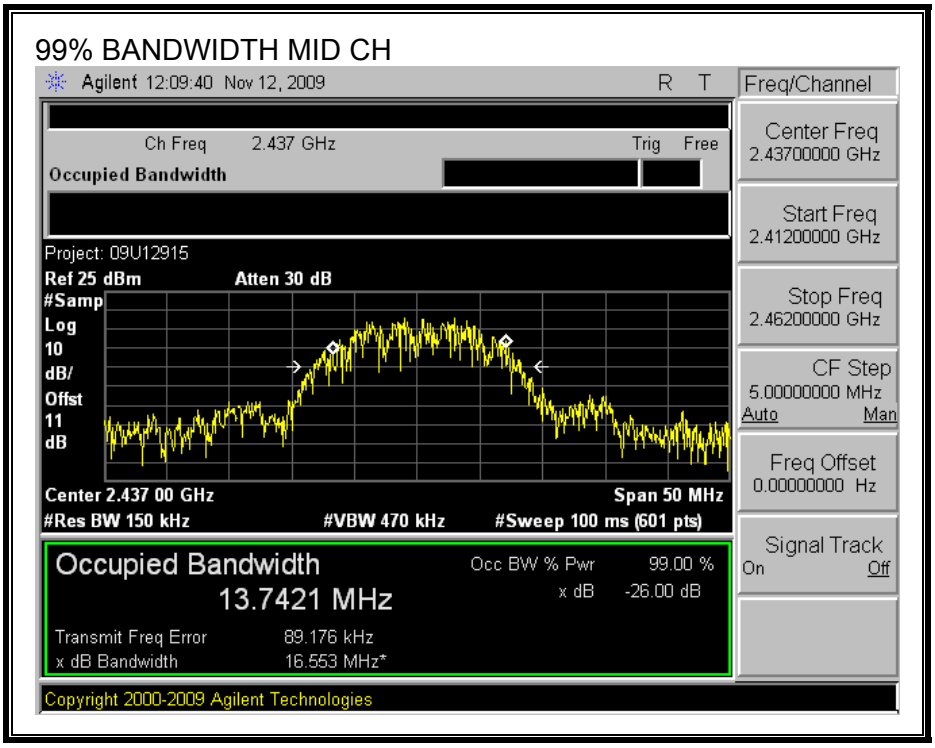
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	13.3518
Middle	2437	13.7421
High	2462	13.5779

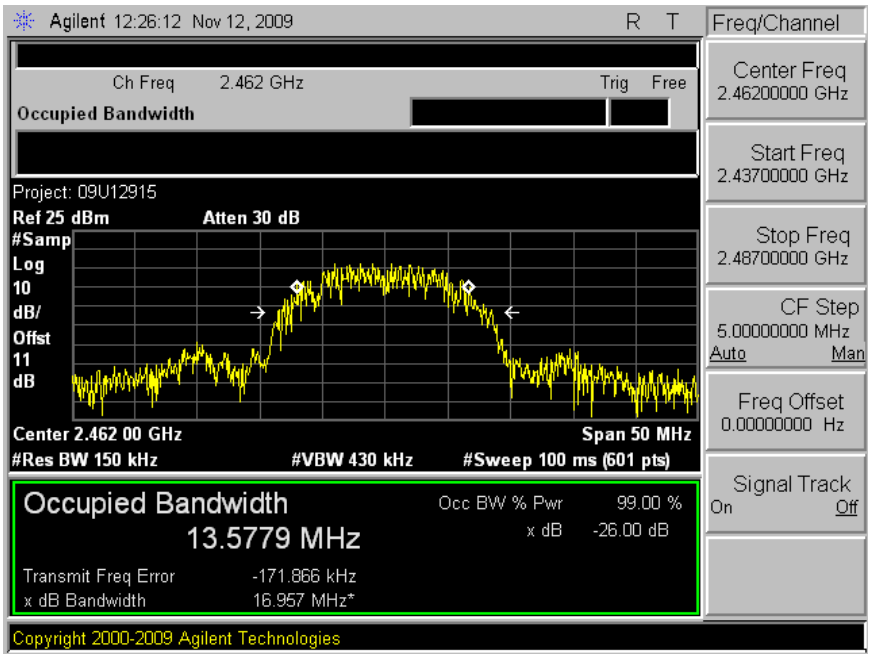
99% BANDWIDTH



99% BANDWIDTH MID CH



99% BANDWIDTH HIGH CH



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

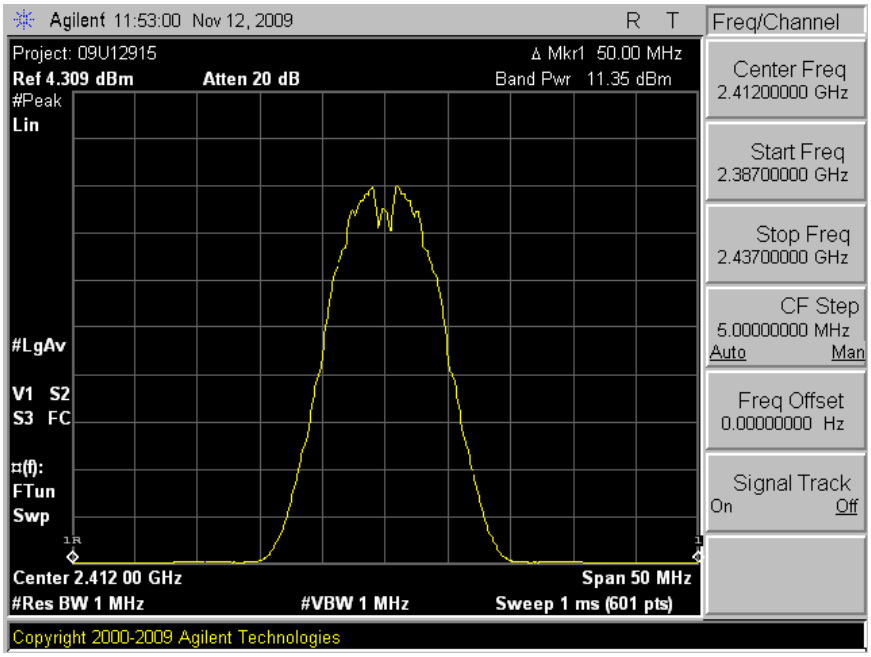
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

RESULTS

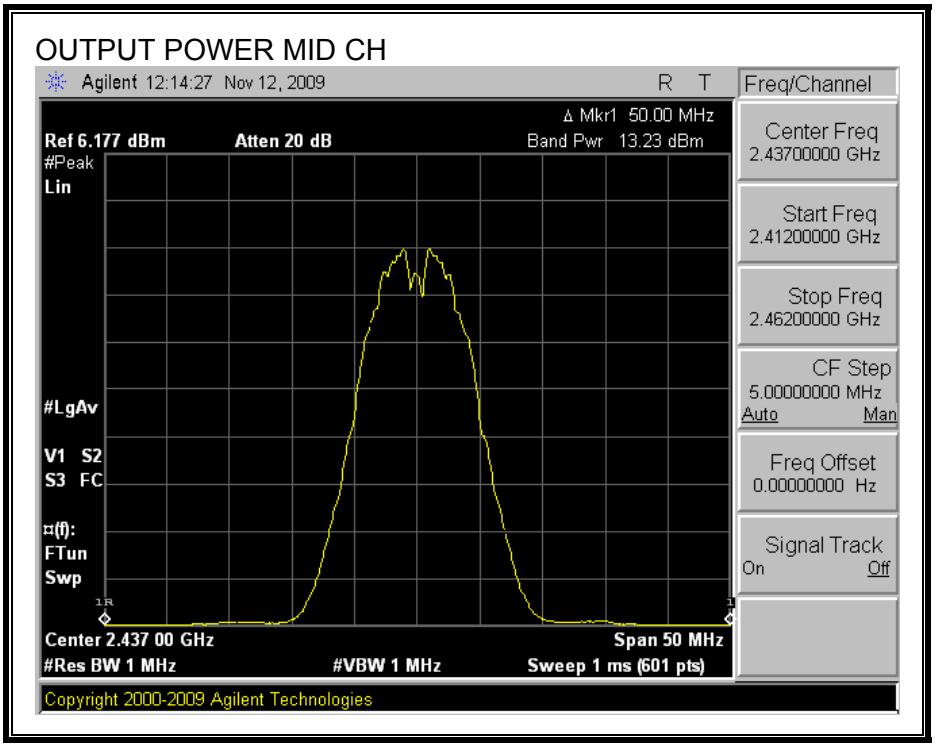
Channel	Frequency (MHz)	Spectrum Analyzer Reading (dBm)	Attenuator and Cable Offset (dB)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	11.35	11	22.35	30	-7.65
Middle	2437	13.23	11	24.23	30	-5.77
High	2462	11.24	11	22.24	30	-7.76

OUTPUT POWER

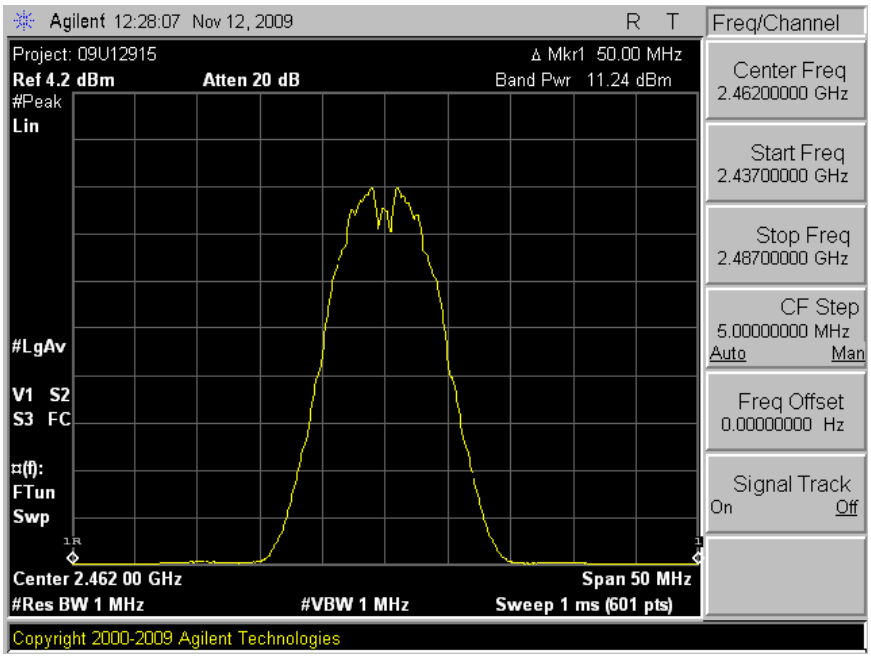
OUTPUT POWER LOW CH



OUTPUT POWER MID CH



OUTPUT POWER HIGH CH



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 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	2412	20.10
Middle	2437	22.13
High	2462	20.00

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

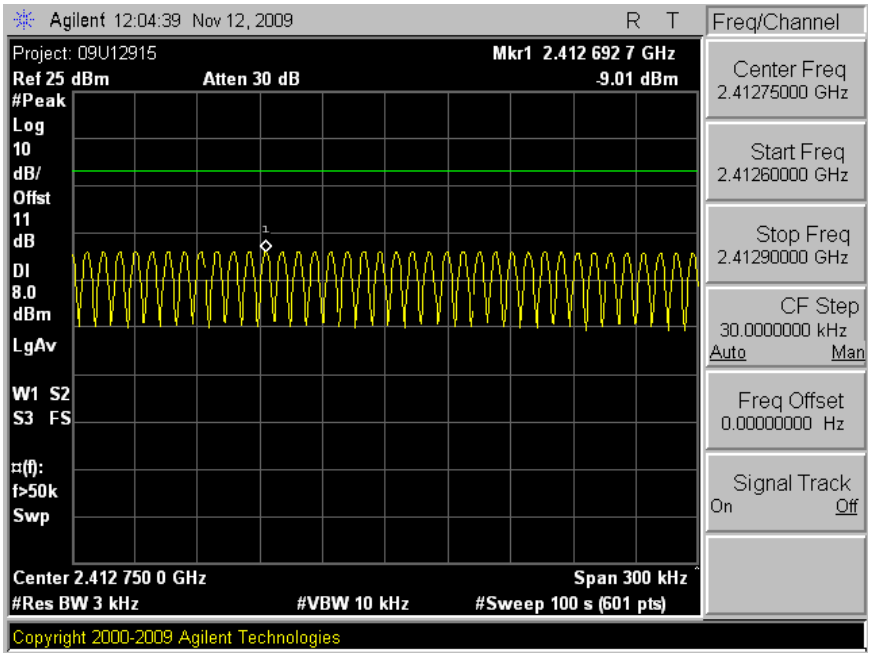
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

RESULTS

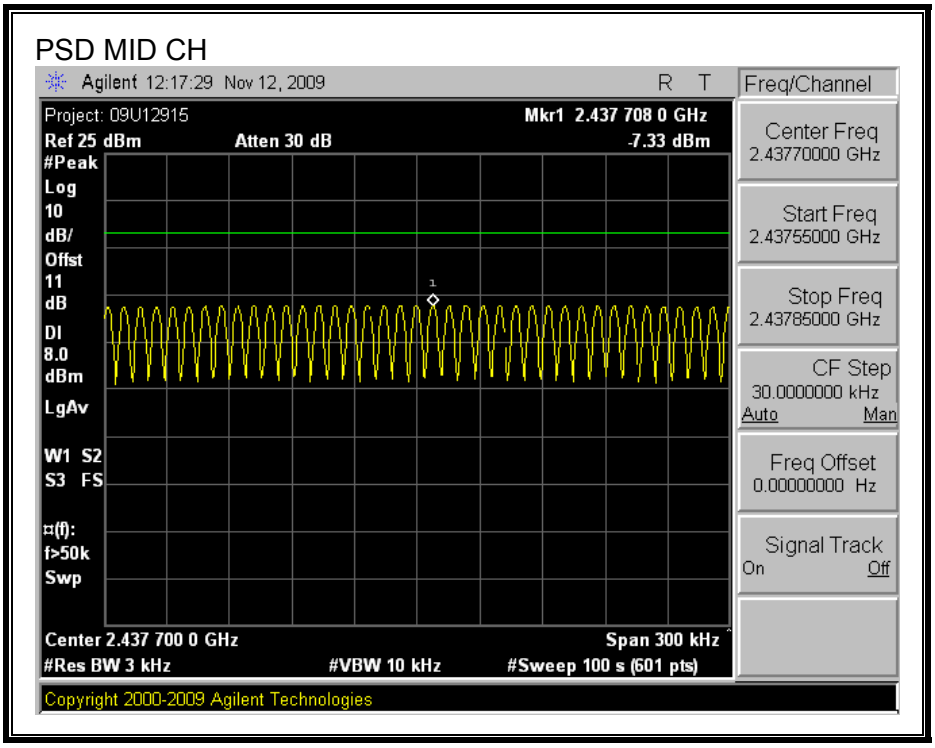
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-9.01	8	-17.01
Middle	2437	-7.33	8	-15.33
High	2462	-9.21	8	-17.21

POWER SPECTRAL DENSITY

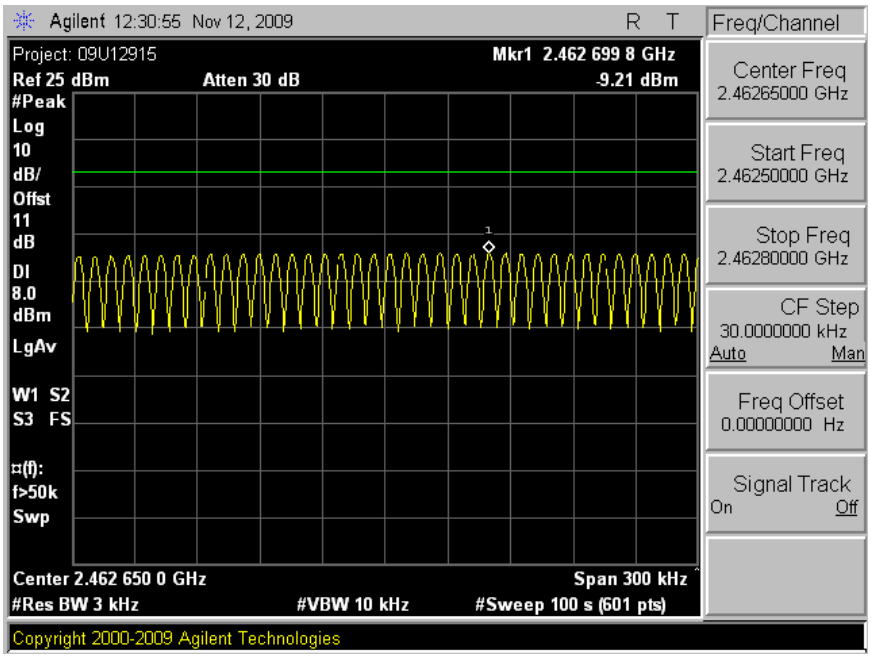
PSD LOW CH



PSD MID CH



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

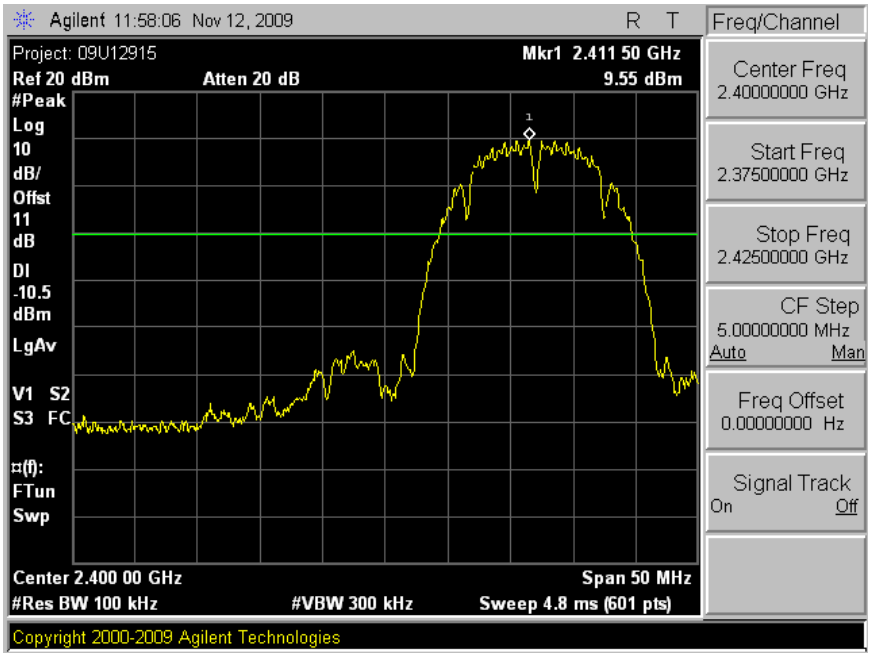
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

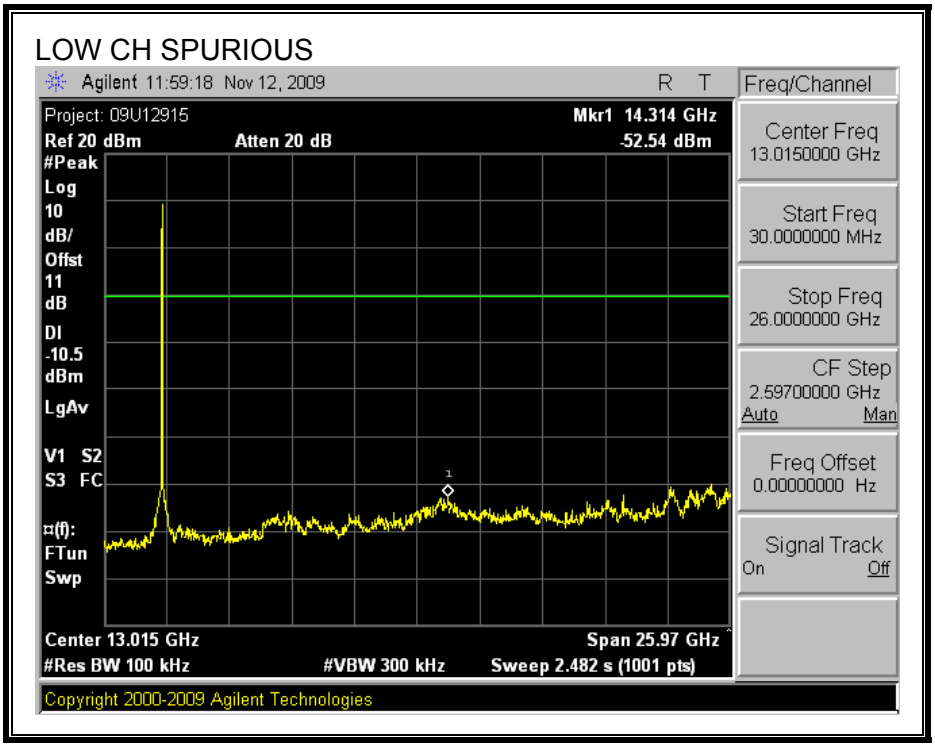
RESULTS

SPURIOUS EMISSIONS, LOW CHANNEL

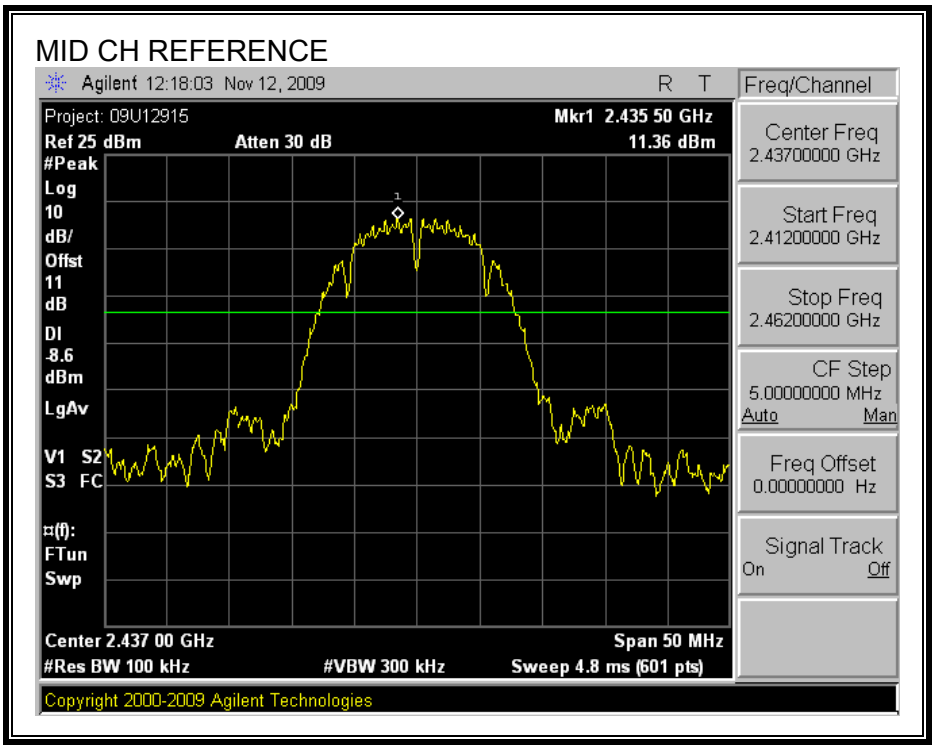
LOW CH BANDEDGE



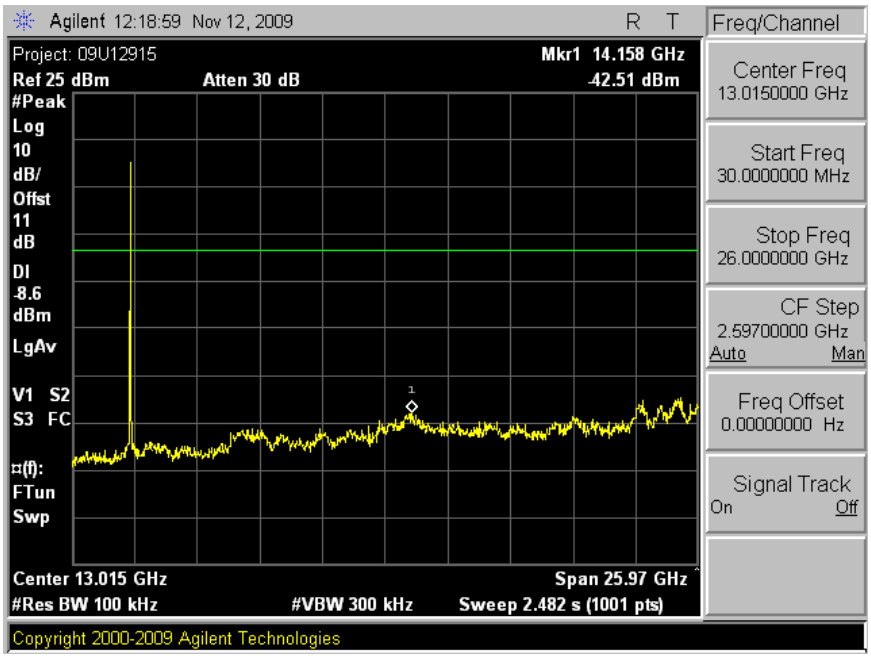
LOW CH SPURIOUS



SPURIOUS EMISSIONS, MID CHANNEL

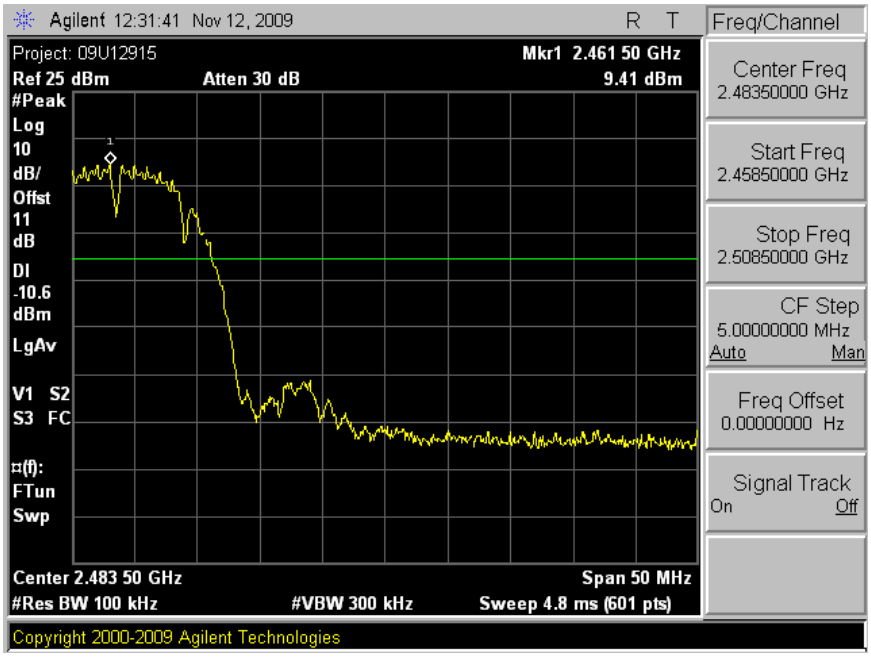


MID CH SPURIOUS

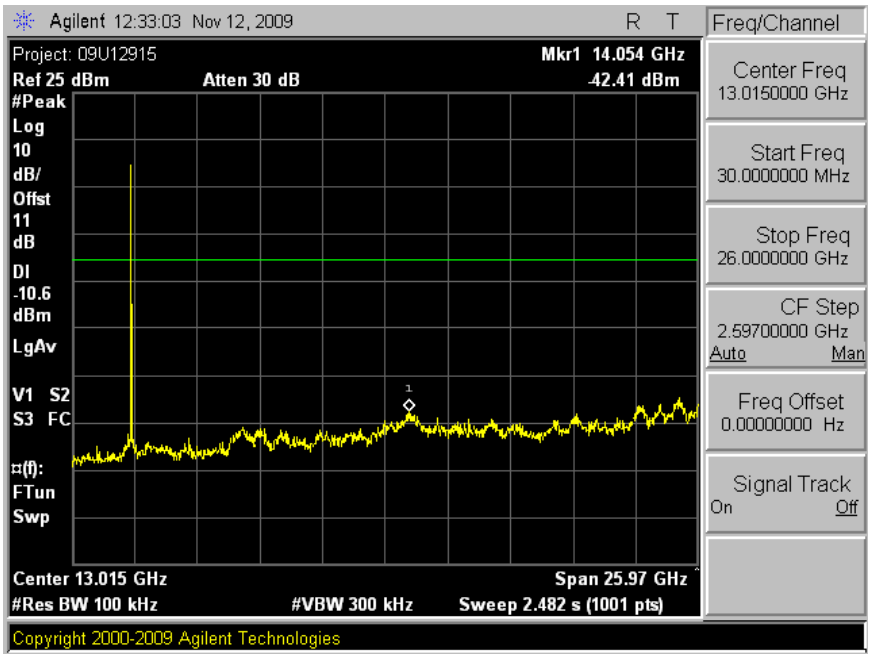


SPURIOUS EMISSIONS, HIGH CHANNEL

HIGH CH BANDEDGE



HIGH CH SPURIOUS



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

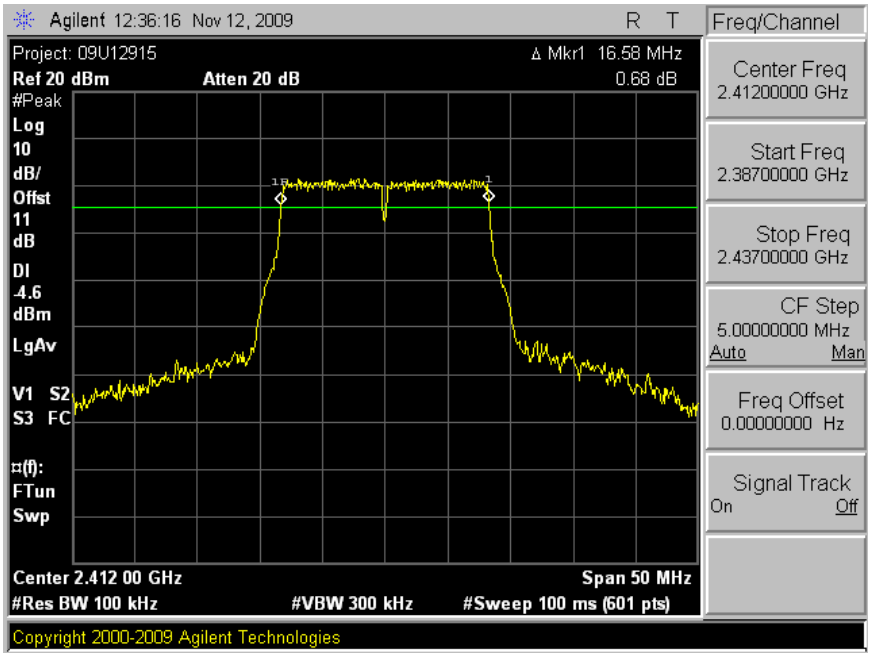
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

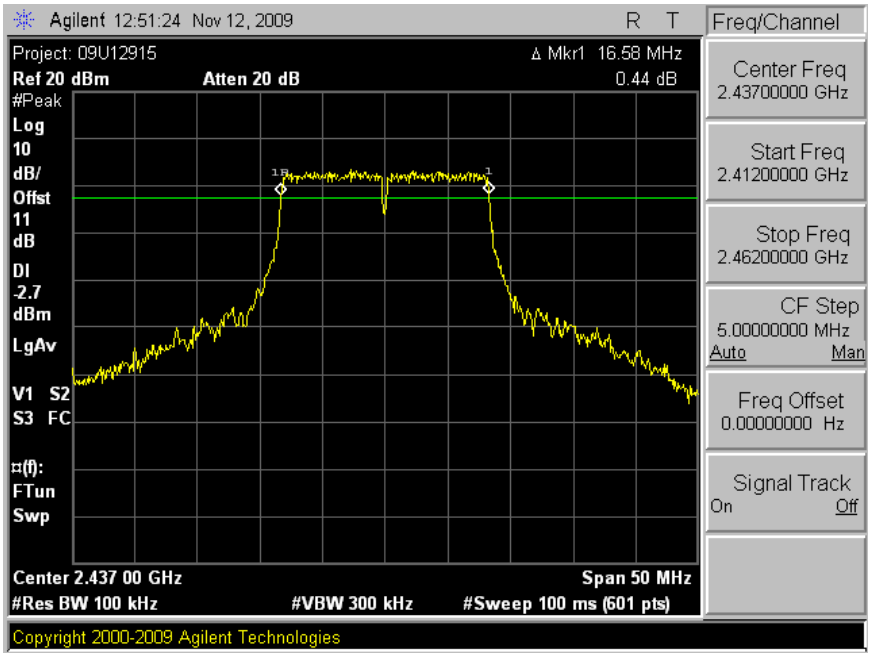
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	16.58	0.5
Middle	2437	16.58	0.5
High	2462	16.58	0.5

6 dB BANDWIDTH

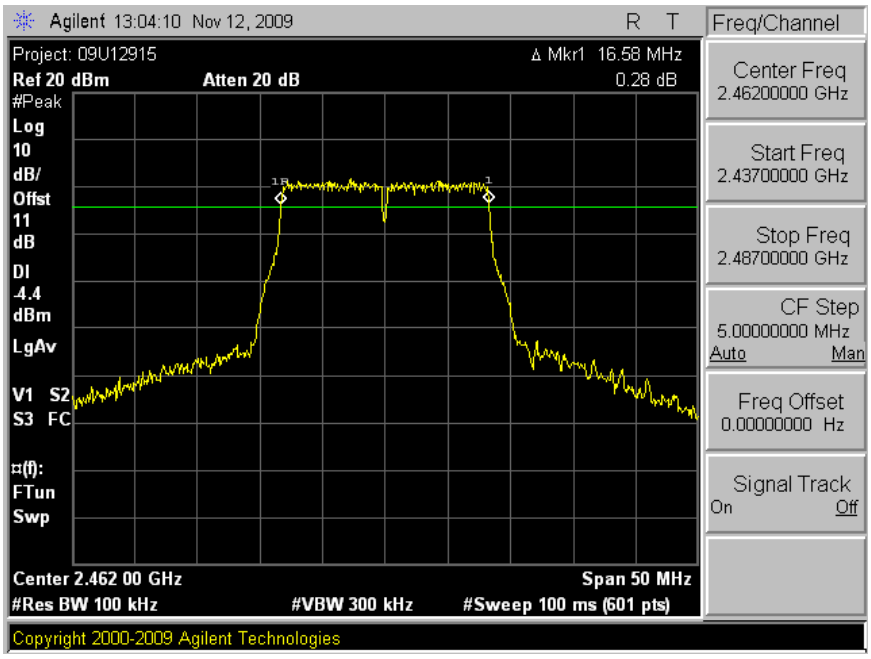
6 dB BANDWIDTH LOW CH



6 dB BANDWIDTH MID CH



6 dB BANDWIDTH HIGH CH



7.2.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

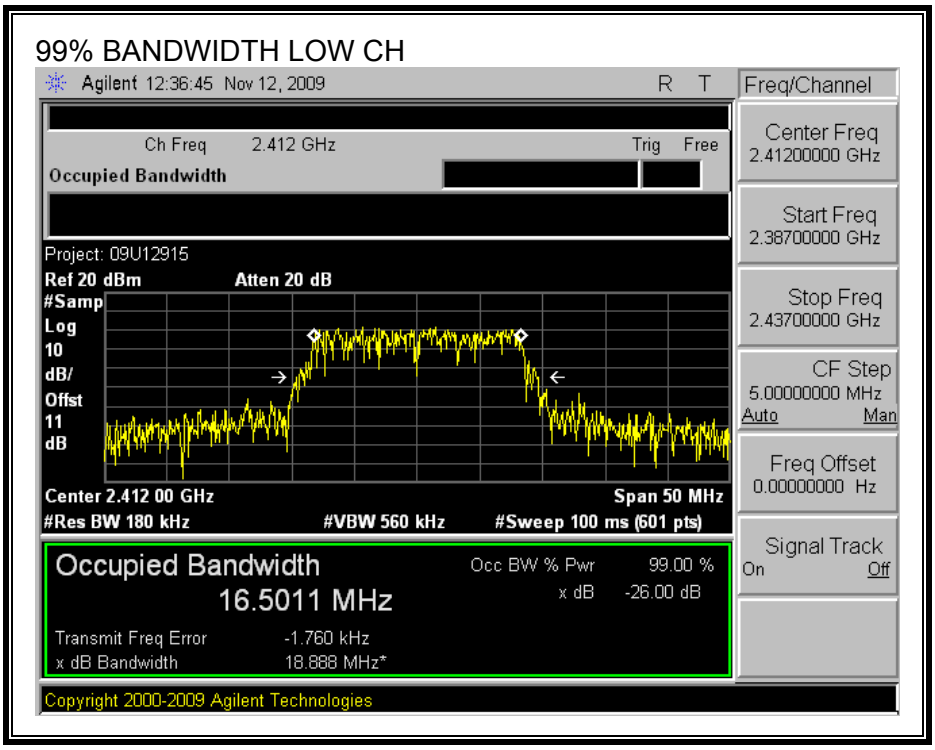
TEST PROCEDURE

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.

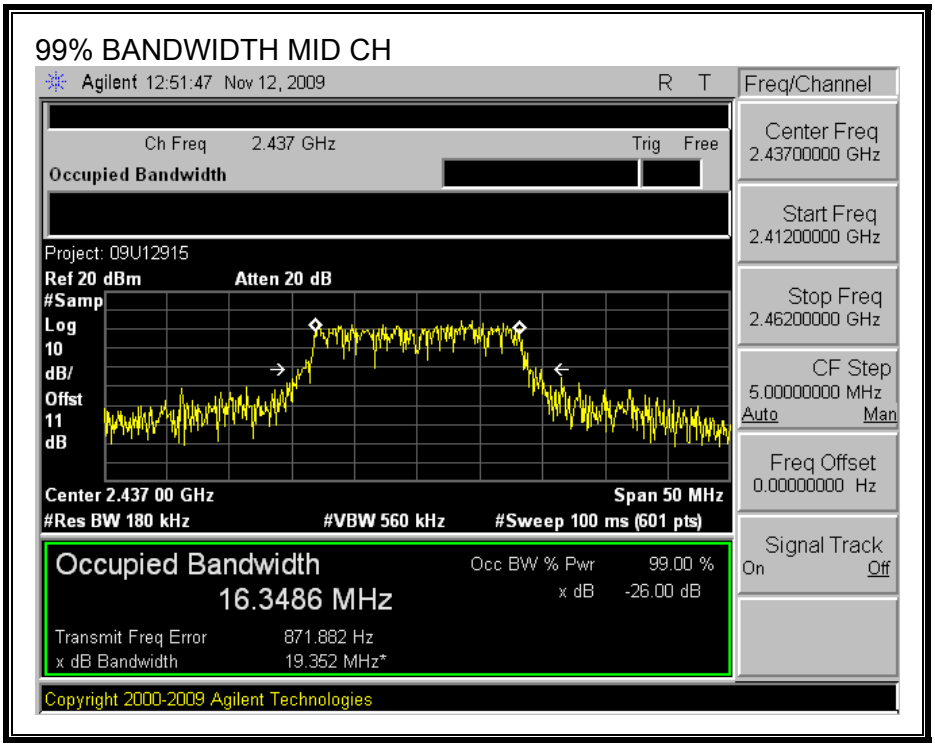
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	16.5011
Middle	2437	16.3486
High	2462	16.4701

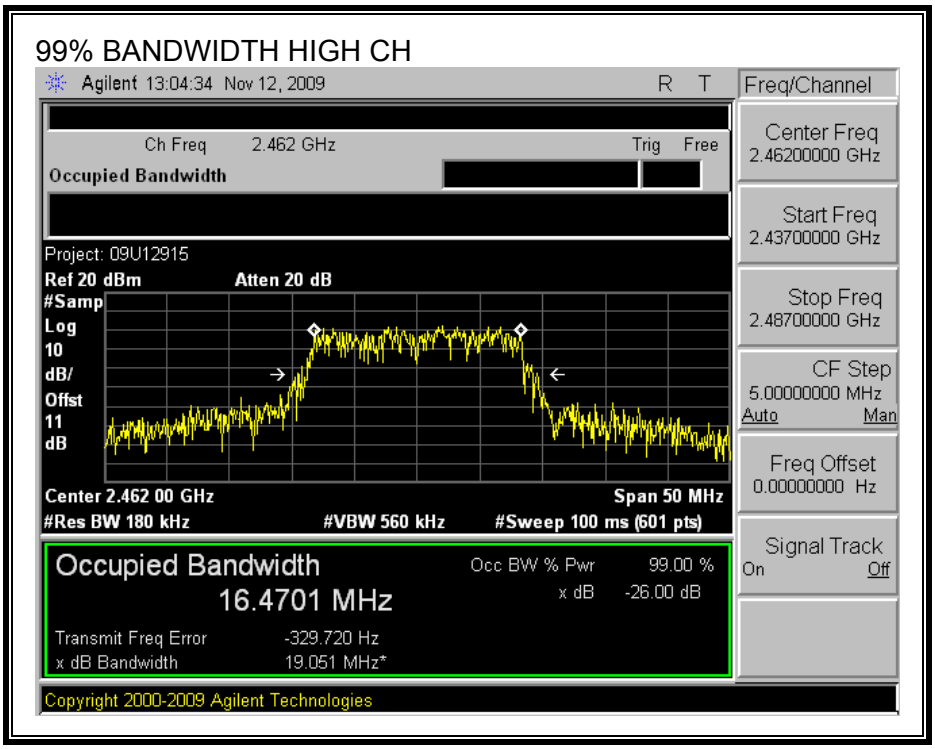
99% BANDWIDTH



99% BANDWIDTH MID CH



99% BANDWIDTH HIGH CH



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

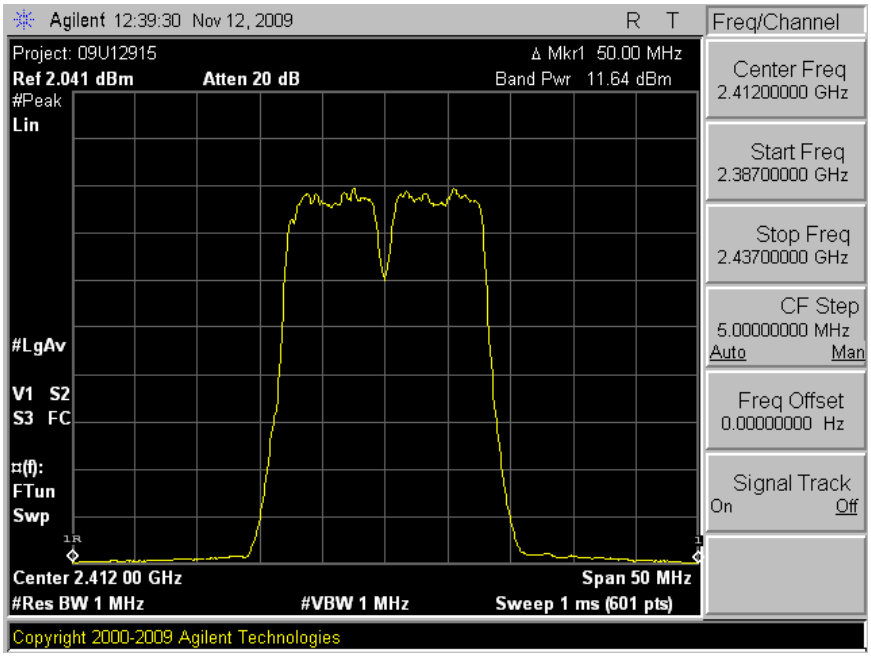
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

RESULTS

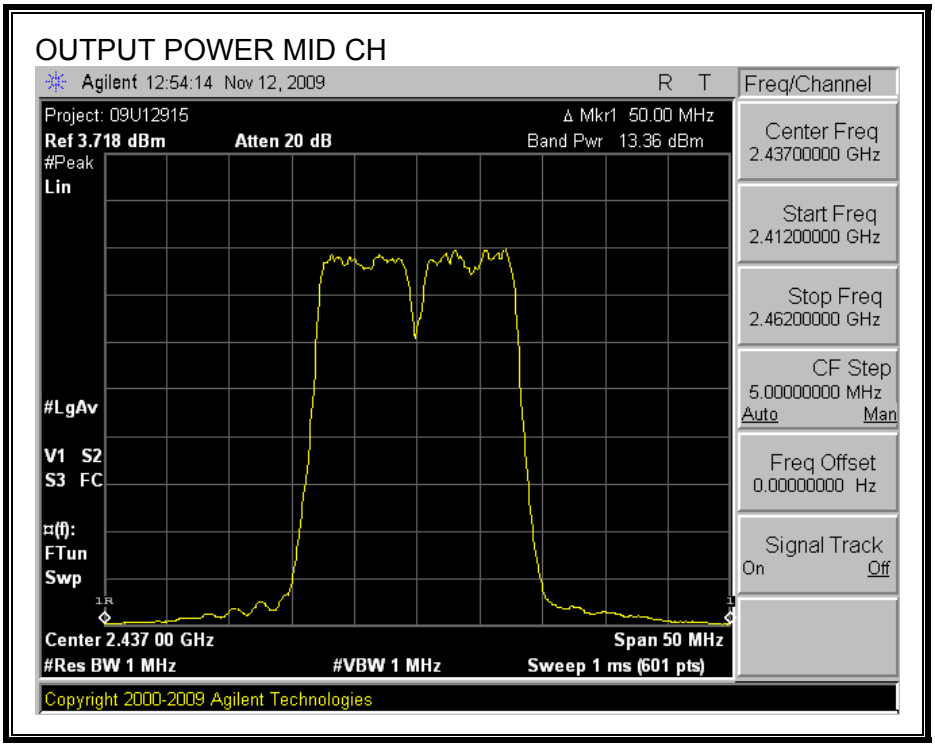
Channel	Frequency (MHz)	Spectrum Analyzer Reading (dBm)	Attenuator and Cable Offset (dB)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	11.64	11	22.64	30	-7.36
Middle	2437	13.36	11	24.36	30	-5.64
High	2462	11.57	11	22.57	30	-7.43

OUTPUT POWER

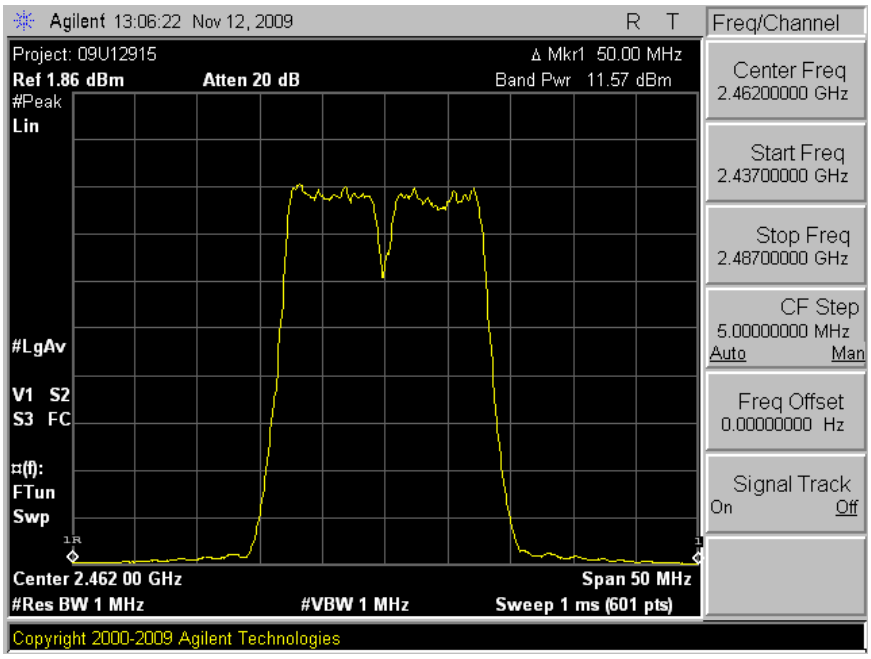
OUTPUT POWER LOW CH



OUTPUT POWER MID CH



OUTPUT POWER HIGH CH



7.2.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 11 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	2412	16.00
Middle	2437	18.97
High	2462	16.00

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

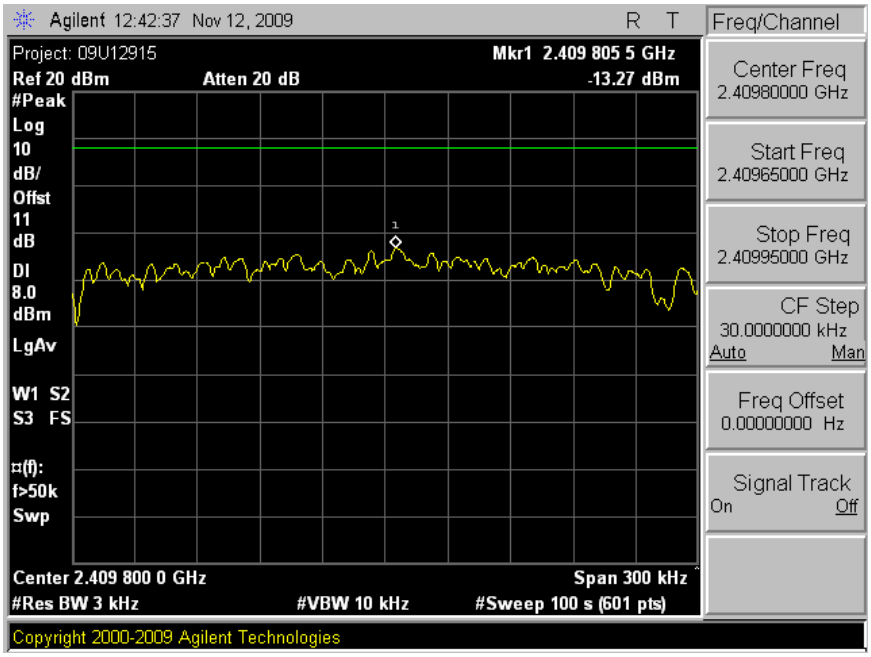
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

RESULTS

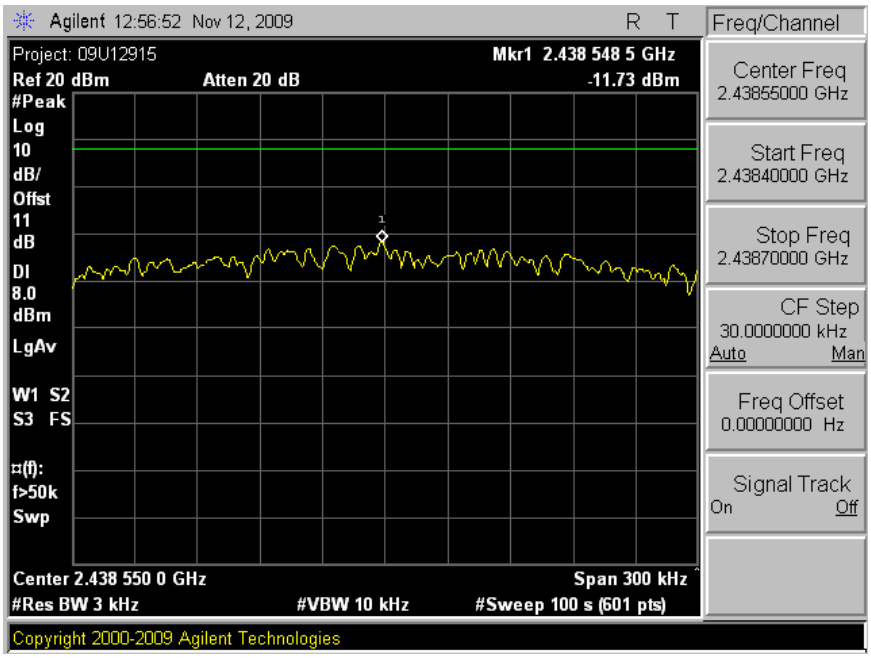
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-13.27	8	-21.27
Middle	2437	-11.73	8	-19.73
High	2462	-13.01	8	-21.01

POWER SPECTRAL DENSITY

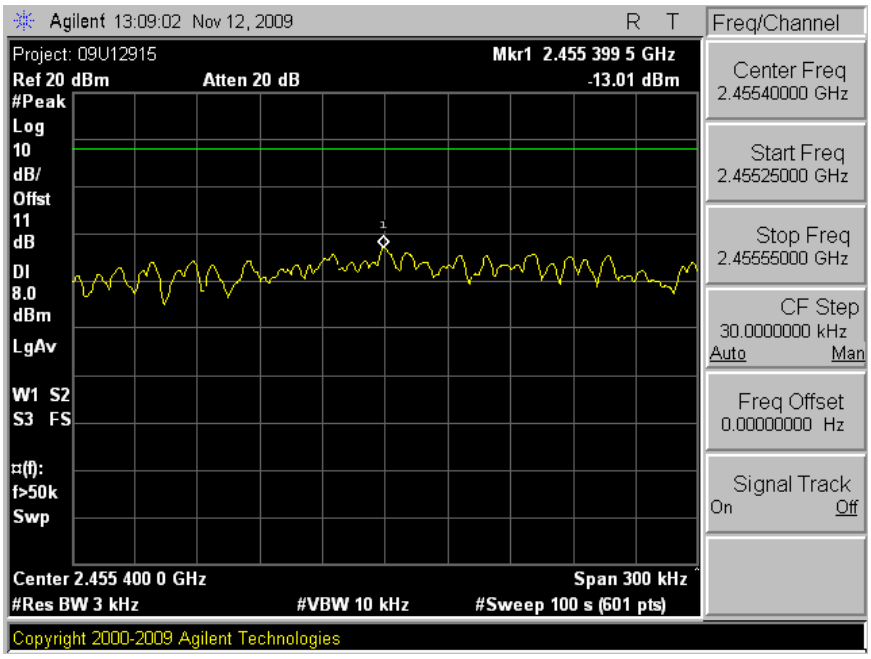
PSD LOW CH



PSD MID CH



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.

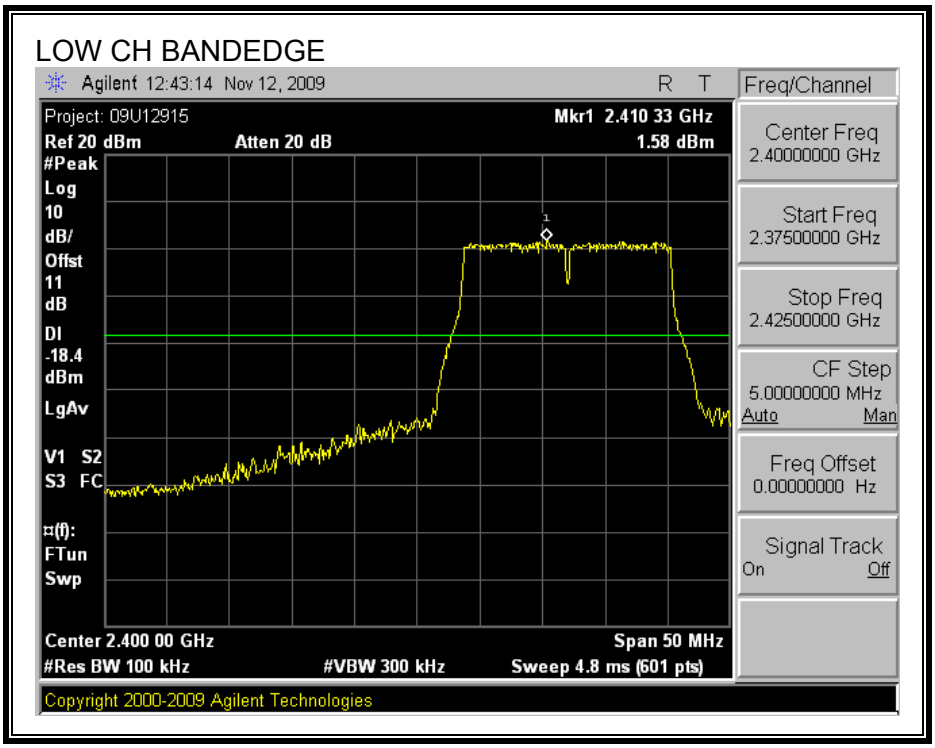
TEST PROCEDURE

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.

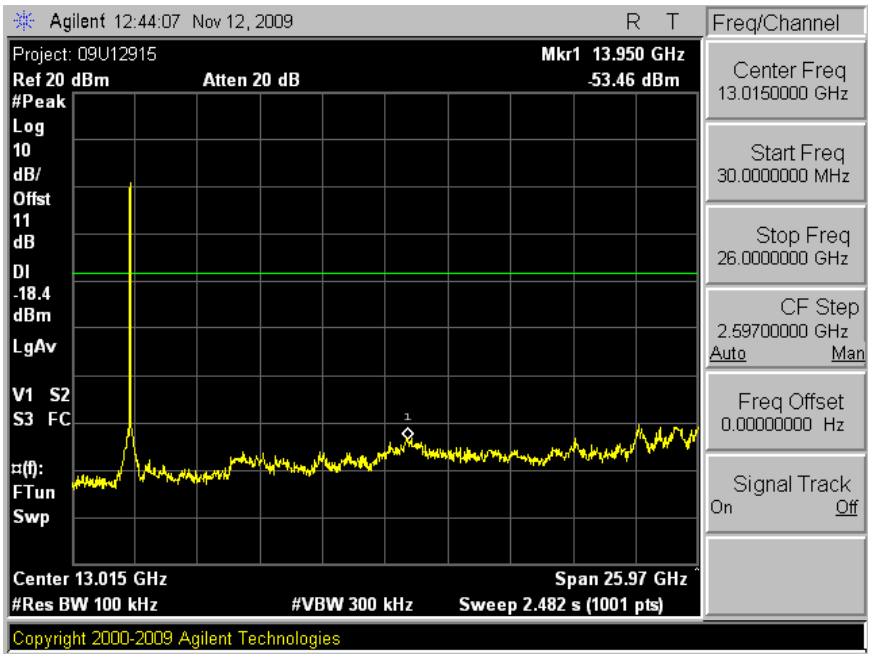
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

RESULTS

SPURIOUS EMISSIONS, LOW CHANNEL

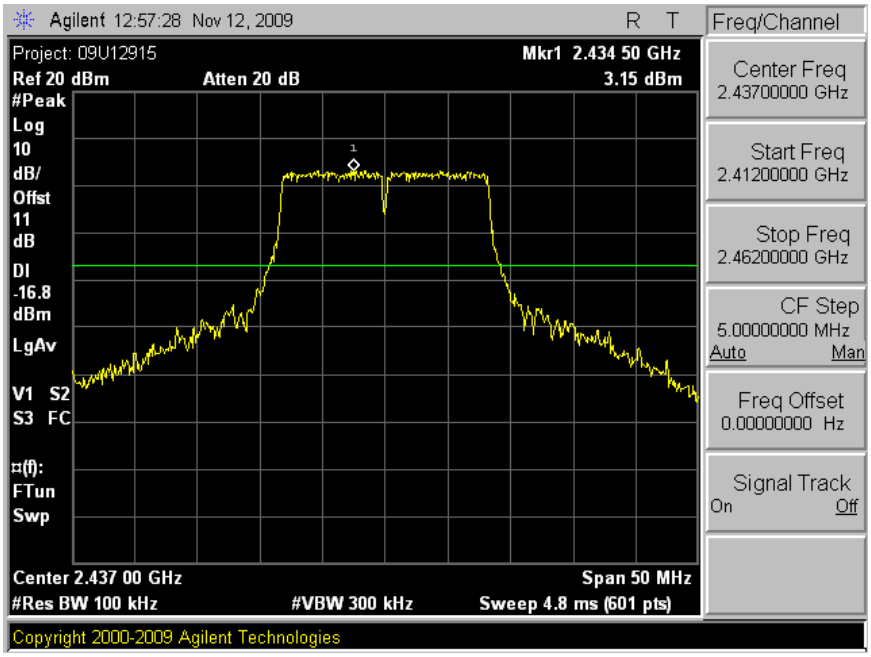


LOW CH SPURIOUS

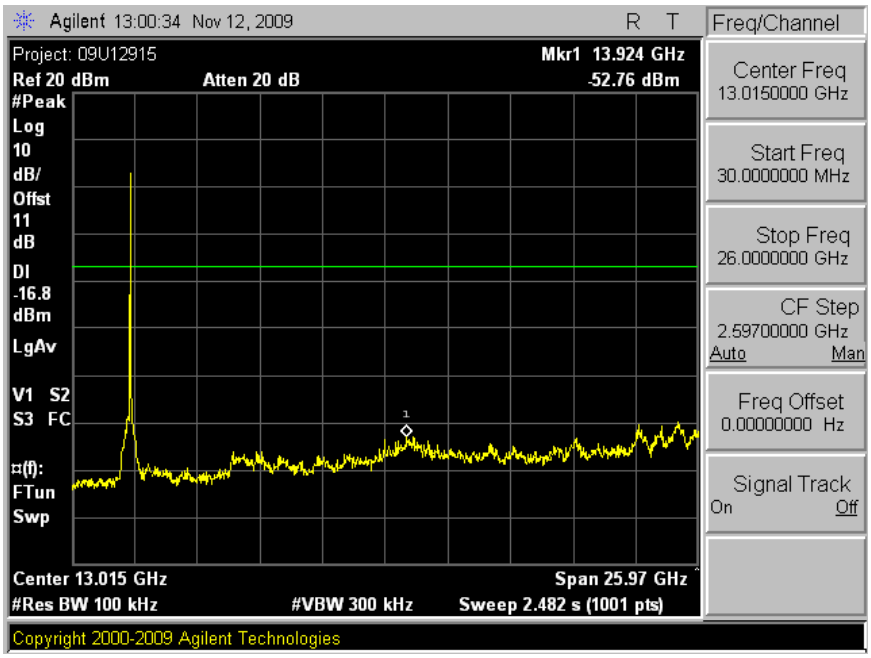


SPURIOUS EMISSIONS, MID CHANNEL

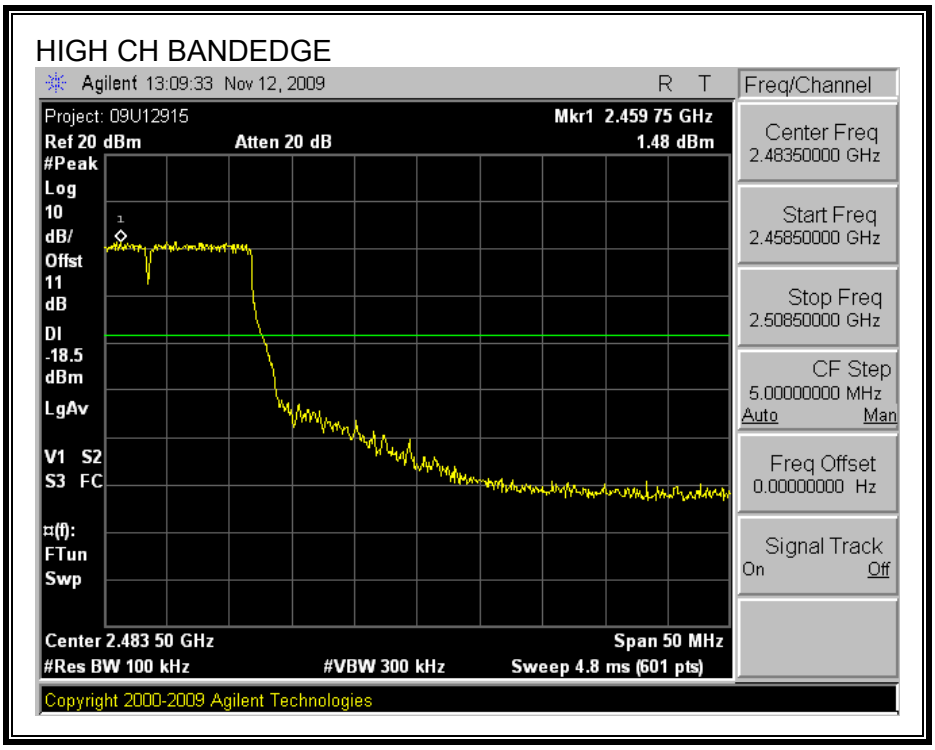
MID CH REFERENCE



MID CH SPURIOUS



SPURIOUS EMISSIONS, HIGH CHANNEL



HIGH CH SPURIOUS

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

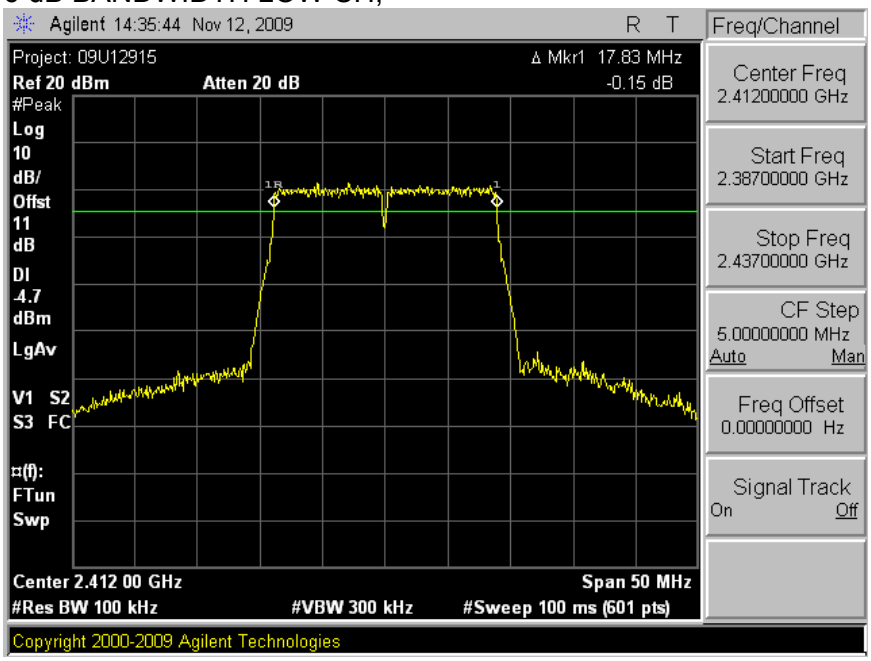
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

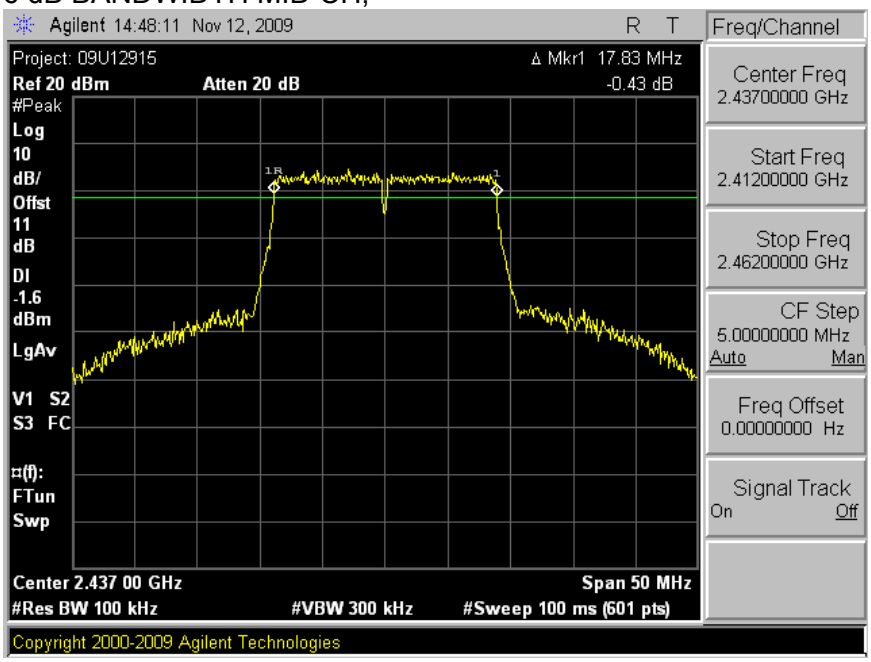
Channel	Frequency (MHz)	6 dB BW (MHz)	Minimum Limit (MHz)
Low	2412	17.83	0.5
Middle	2437	17.83	0.5
High	2462	17.83	0.5

6 dB BANDWIDTH, CHAIN 1

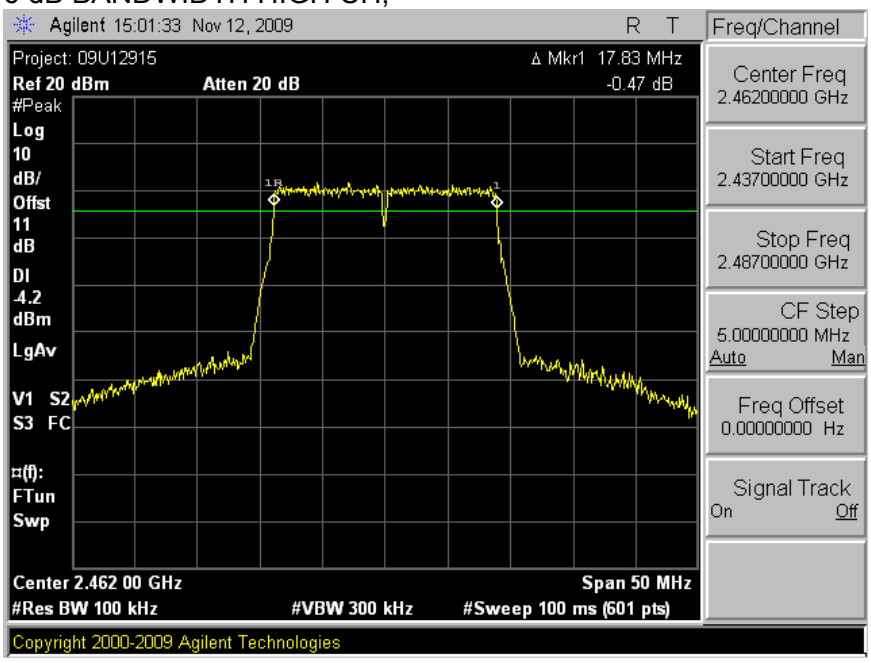
6 dB BANDWIDTH LOW CH,



6 dB BANDWIDTH MID CH,



6 dB BANDWIDTH HIGH CH,



7.3.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

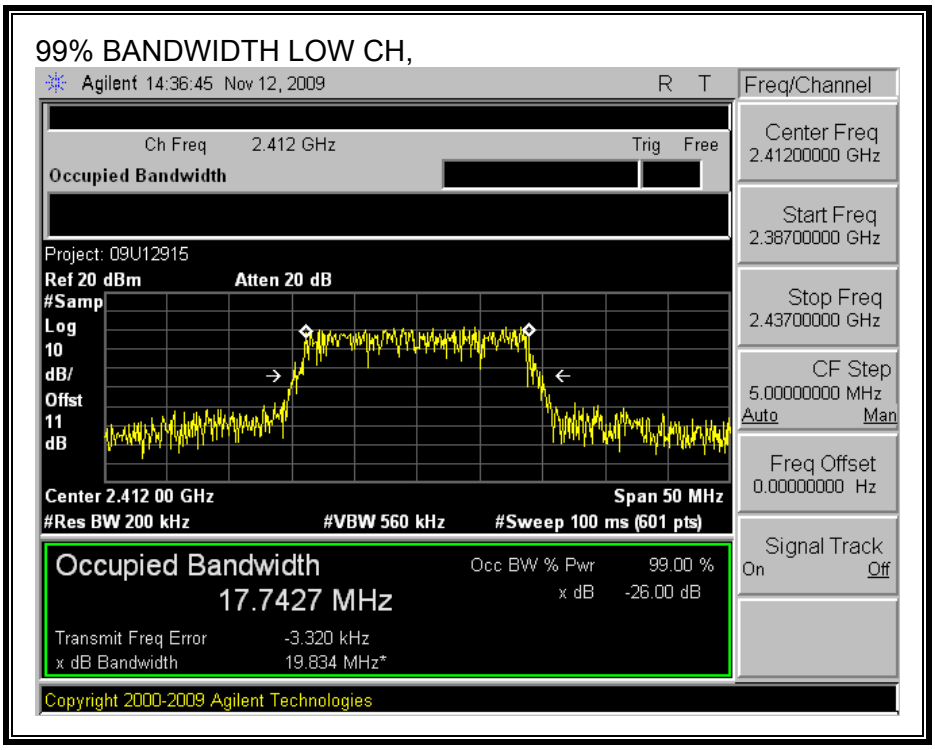
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

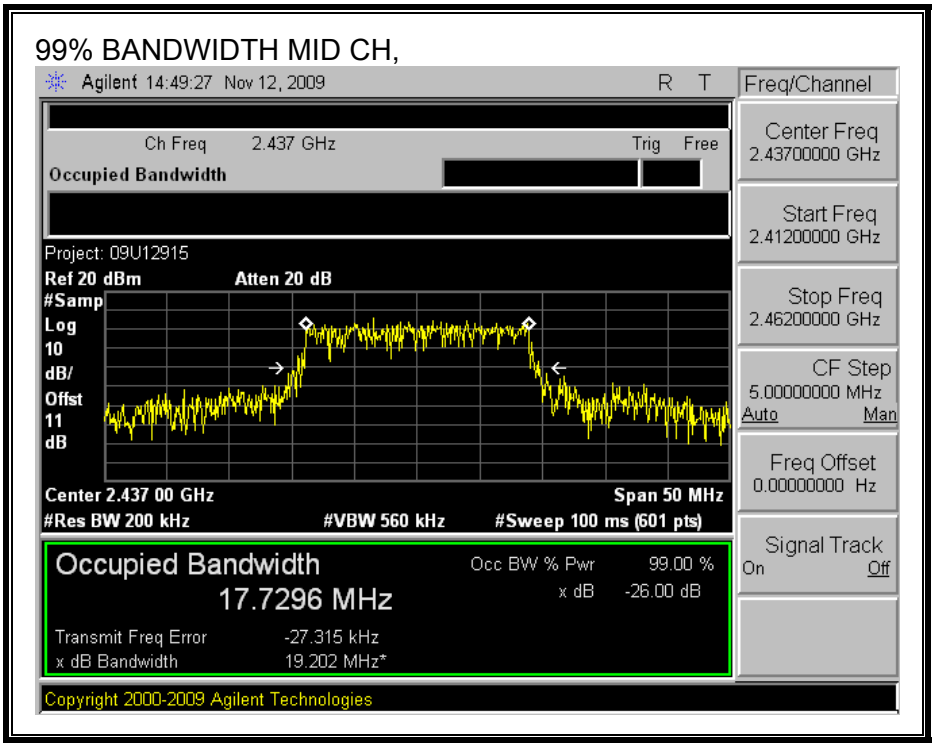
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	17.7427
Middle	2437	17.7296
High	2462	17.6586

99% BANDWIDTH,

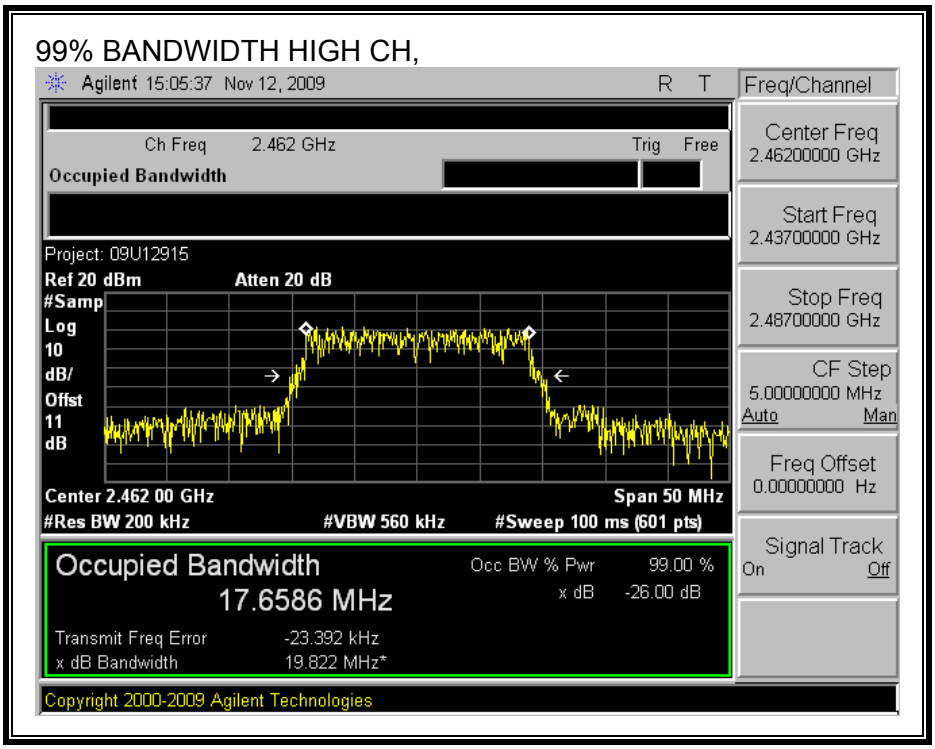
99% BANDWIDTH LOW CH,



99% BANDWIDTH MID CH,



99% BANDWIDTH HIGH CH,



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

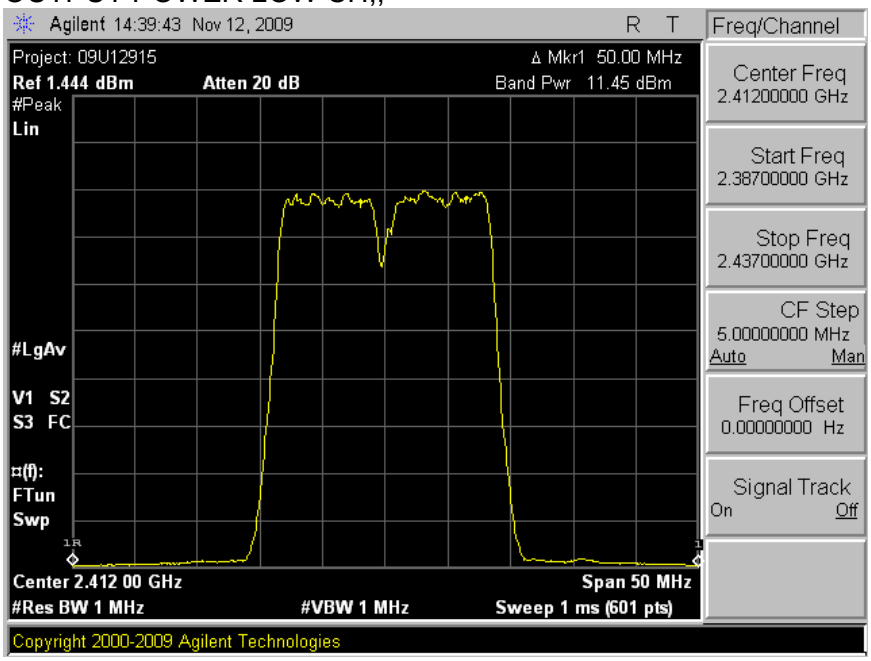
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

RESULTS

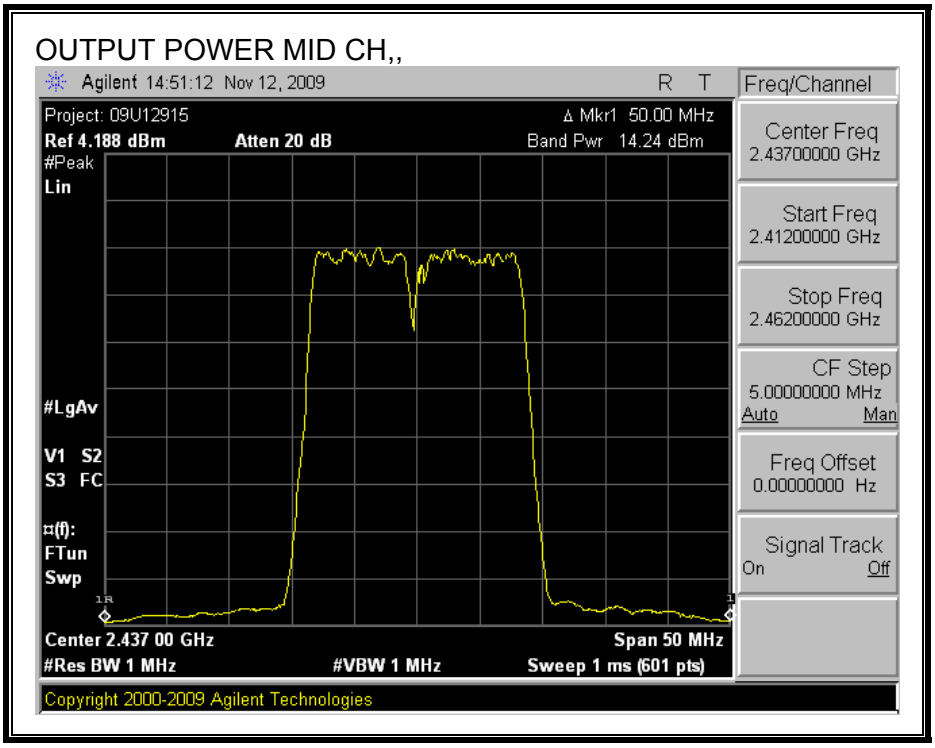
Channel	Frequency (MHz)	Limit (dBm)	Power (dBm)	Attenuator + Cable Offset (dB)	Total Power (dBm)	Margin (dB)
Low	2412	30.00	11.45	11.00	22.75	-7.25
Mid	2437	30.00	14.24	11.00	25.40	-4.60
High	2462	30.00	11.82	11.00	23.10	-6.90

OUTPUT POWER

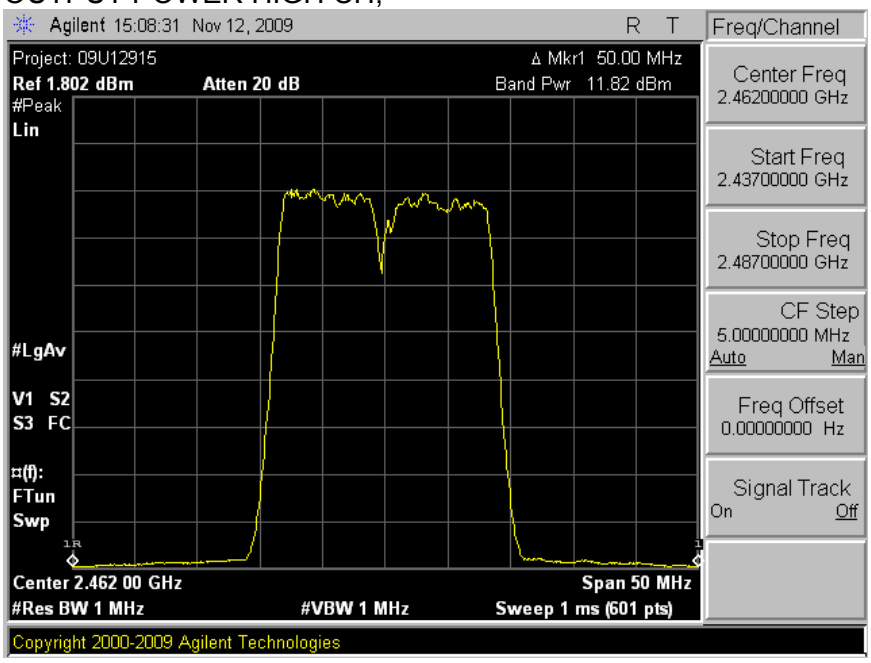
OUTPUT POWER LOW CH,,



OUTPUT POWER MID CH,,



OUTPUT POWER HIGH CH,



7.3.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 11 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)	Chain 1 Power (dBm)	Total Power (dBm)
Low	2412	15.50	15.62
Middle	2437	18.35	18.41
High	2462	15.80	15.91

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

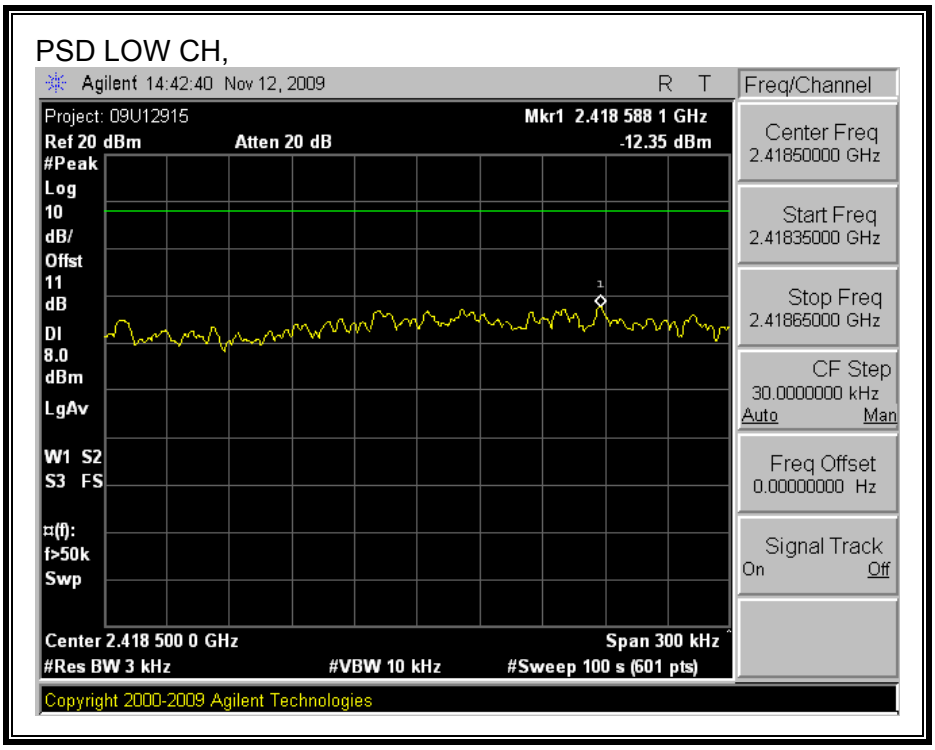
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

RESULTS

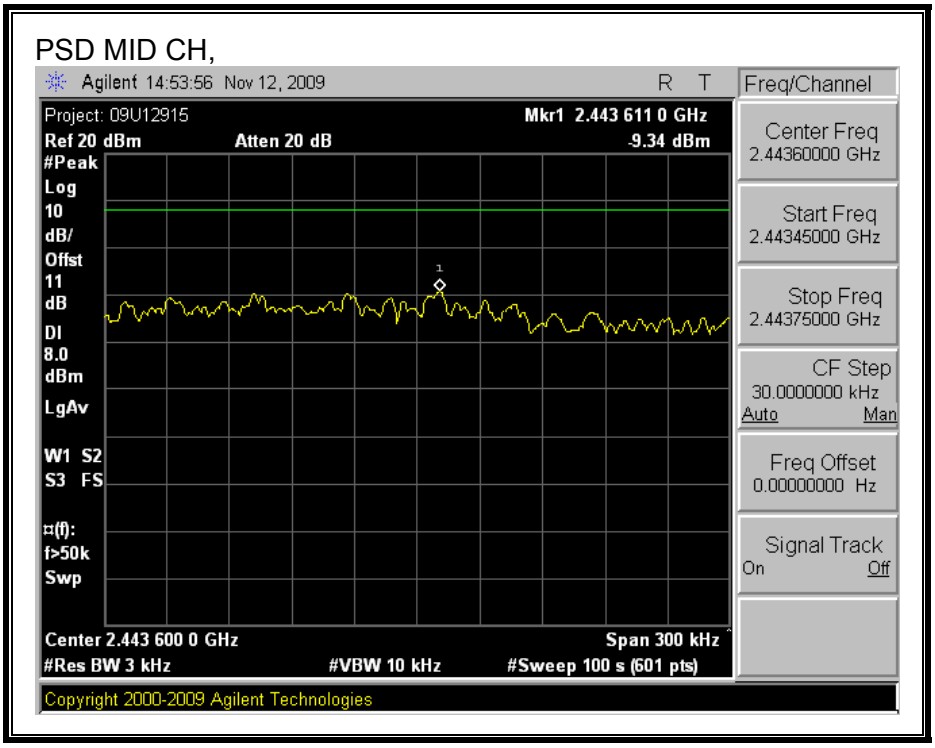
Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-12.35	8	-20.35
Middle	2437	-9.34	8	-17.34
High	2462	-12.21	8	-20.21

POWER SPECTRAL DENSITY,

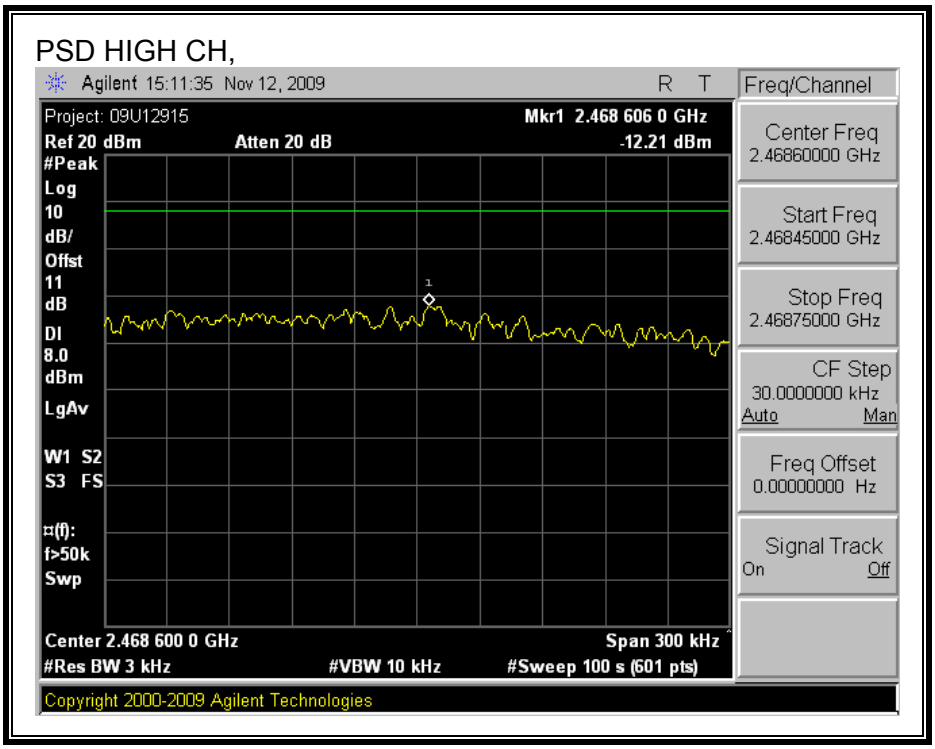
PSD LOW CH,



PSD MID CH,



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

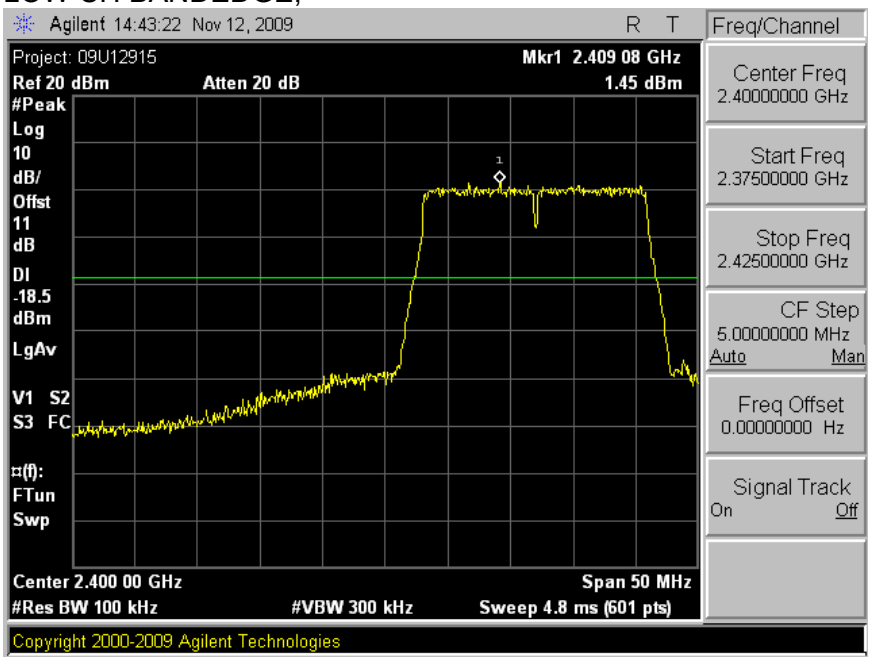
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

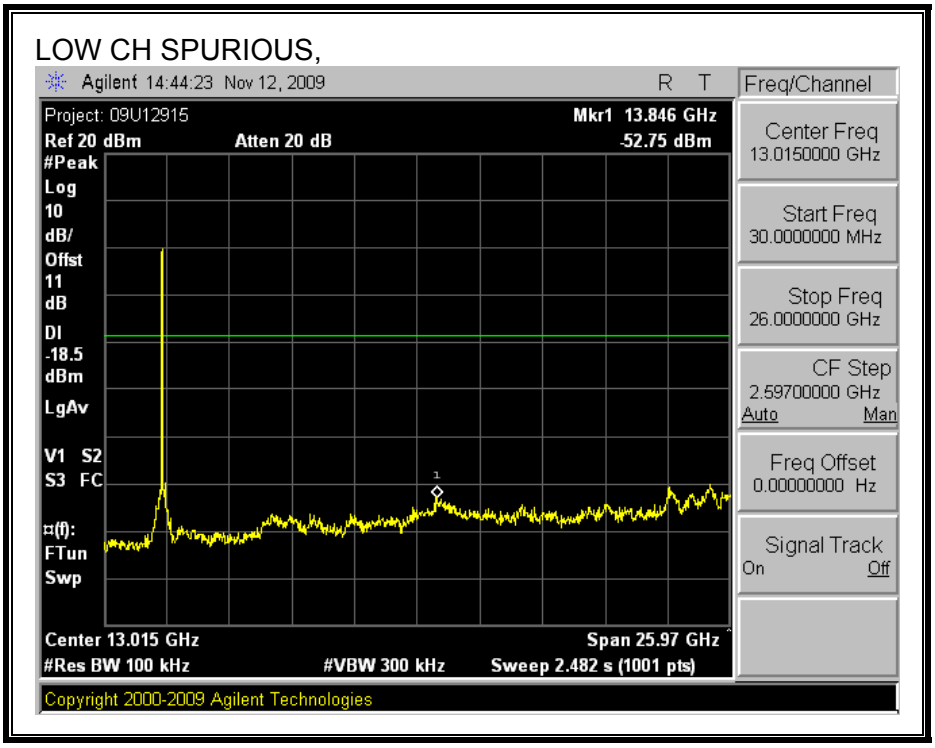
RESULTS

SPURIOUS EMISSIONS

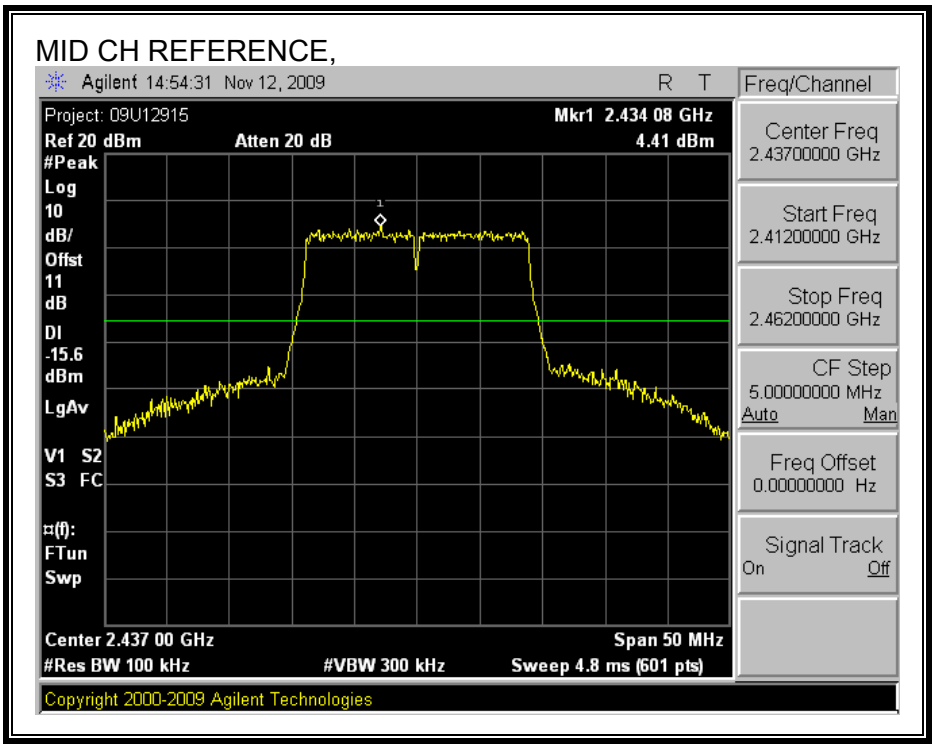
LOW CH BANDEDGE,



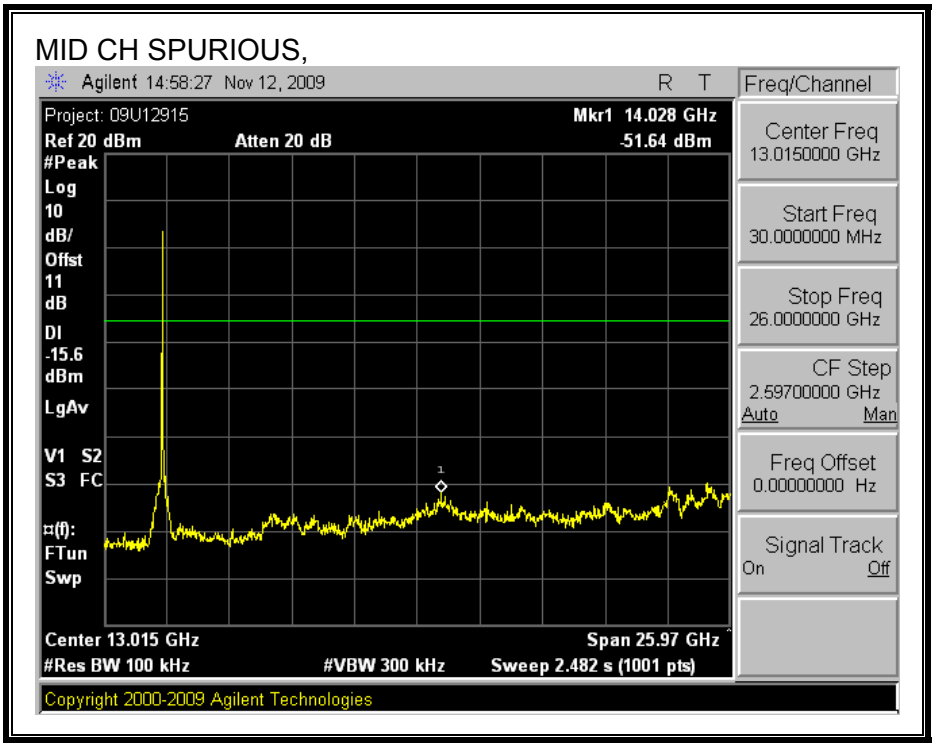
LOW CH SPURIOUS,



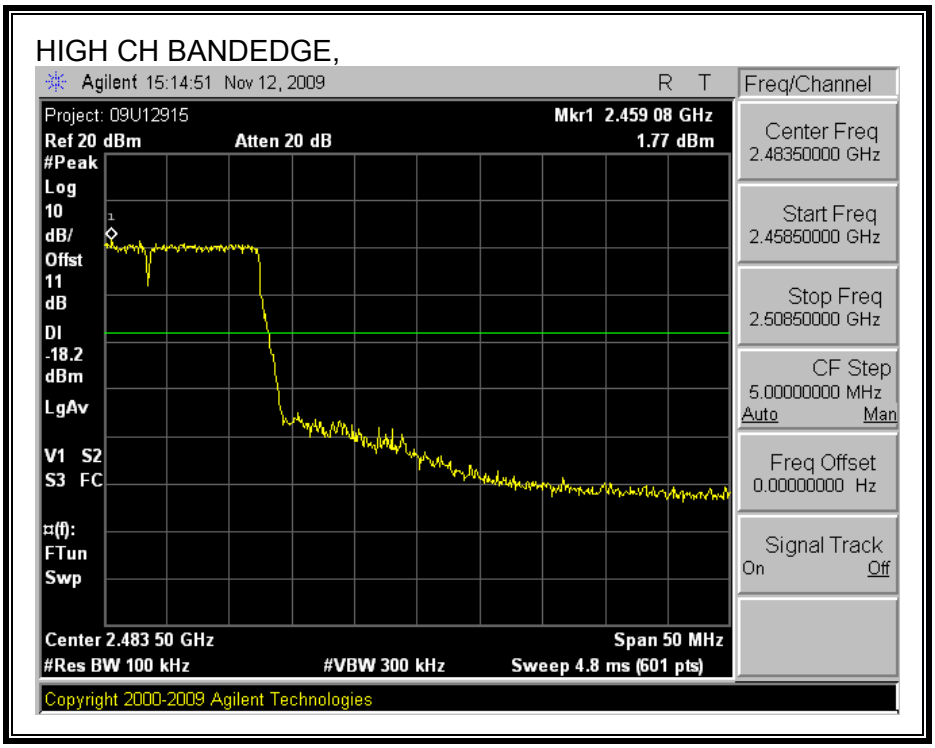
MID CH REFERENCE,



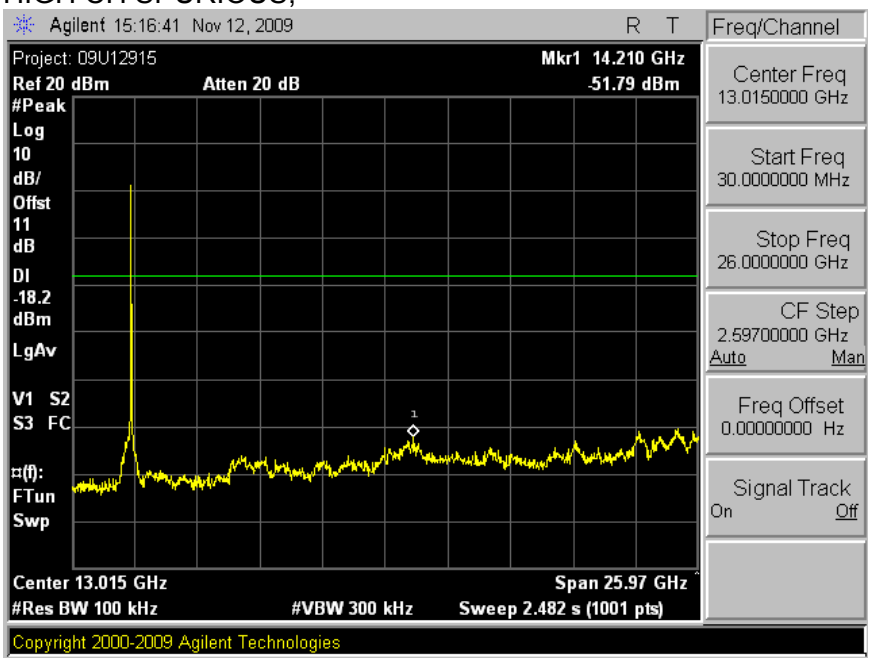
MID CH SPURIOUS,



HIGH CH BANDEDGE,



HIGH CH SPURIOUS,



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

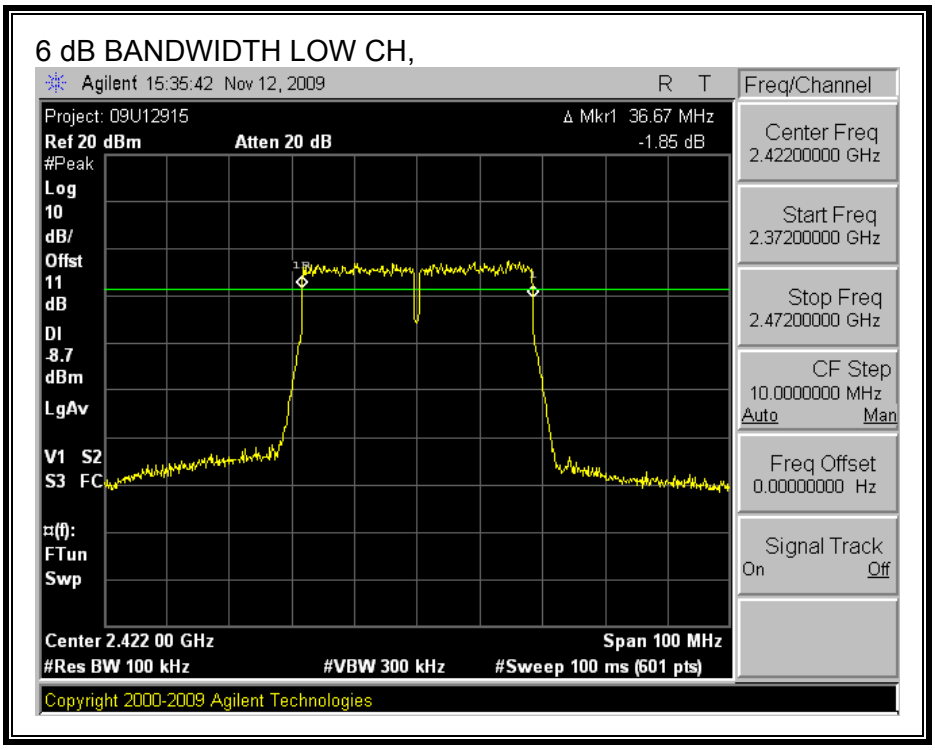
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

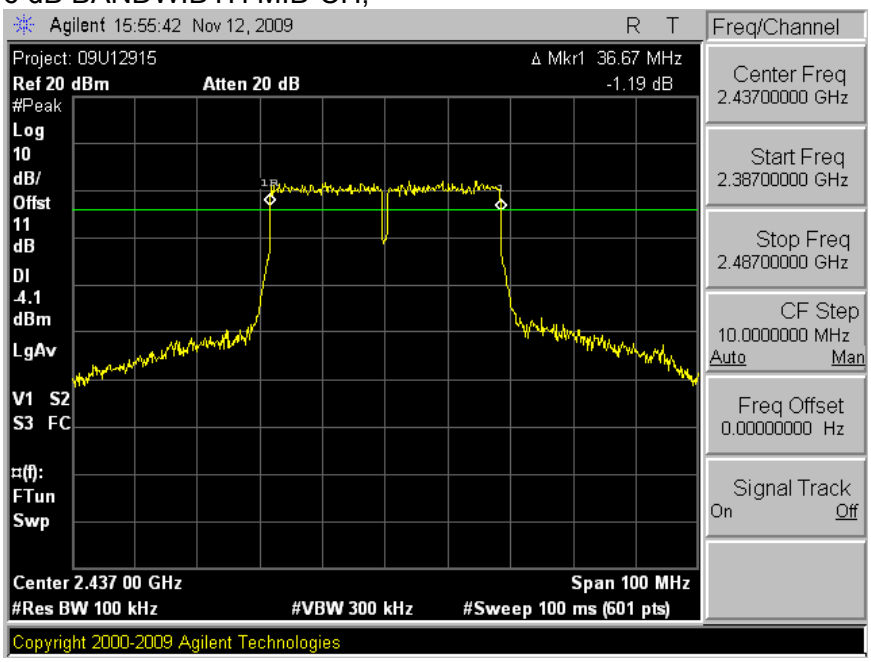
Channel	Frequency (MHz)	6 dB BW (MHz)	Minimum Limit (MHz)
Low	2422	36.67	0.5
Middle	2437	36.67	0.5
High	2452	36.67	0.5

6 dB BANDWIDTH,

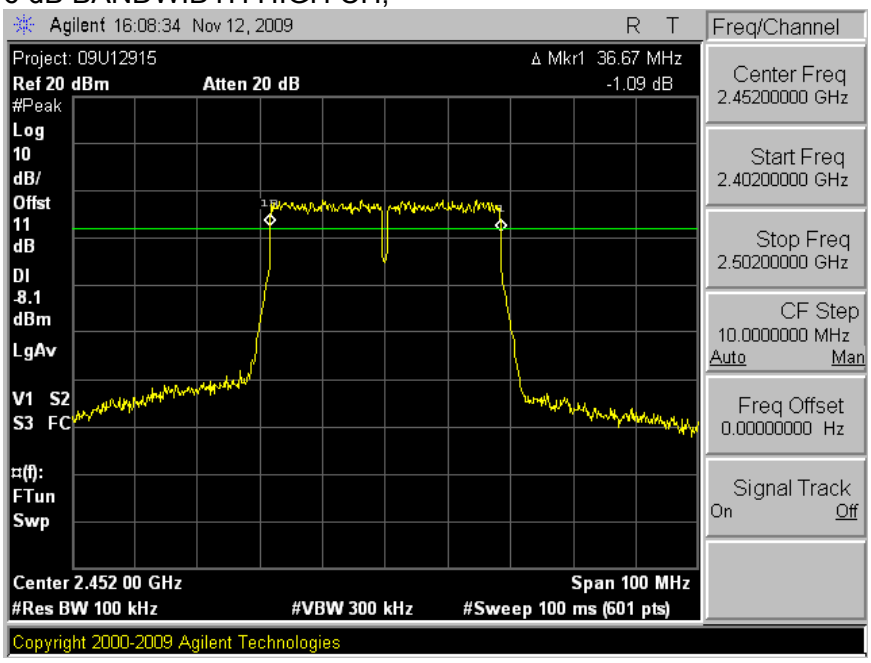
6 dB BANDWIDTH LOW CH,



6 dB BANDWIDTH MID CH,



6 dB BANDWIDTH HIGH CH,



7.4.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

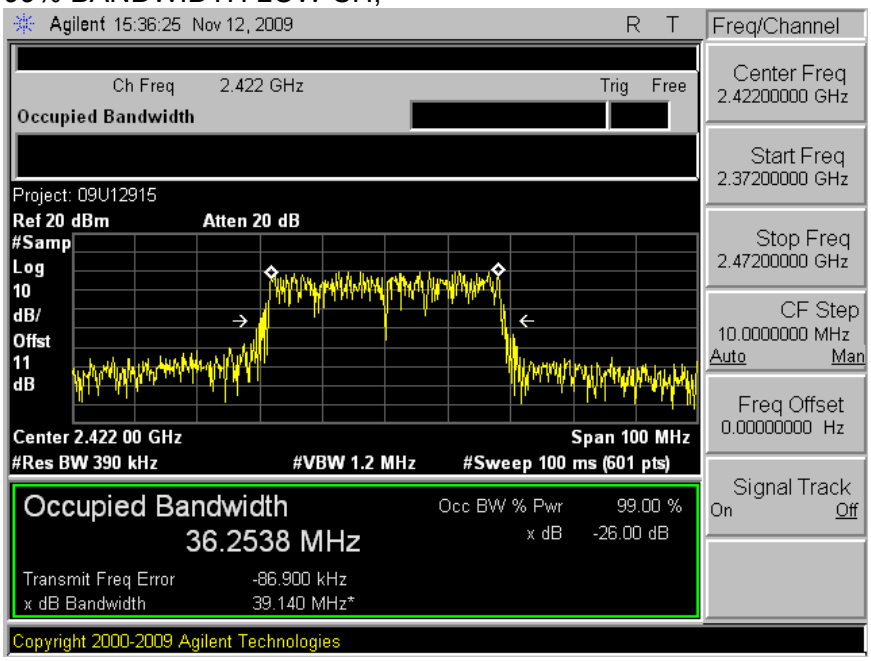
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

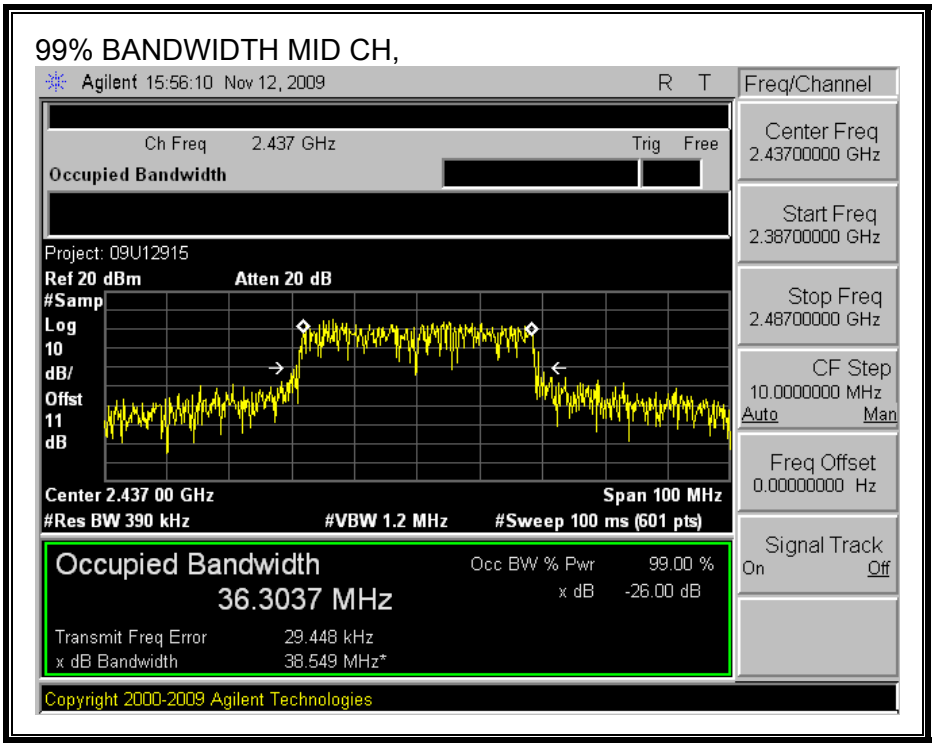
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2422	36.2538
Middle	2437	36.3037
High	2452	36.2766

99% BANDWIDTH,

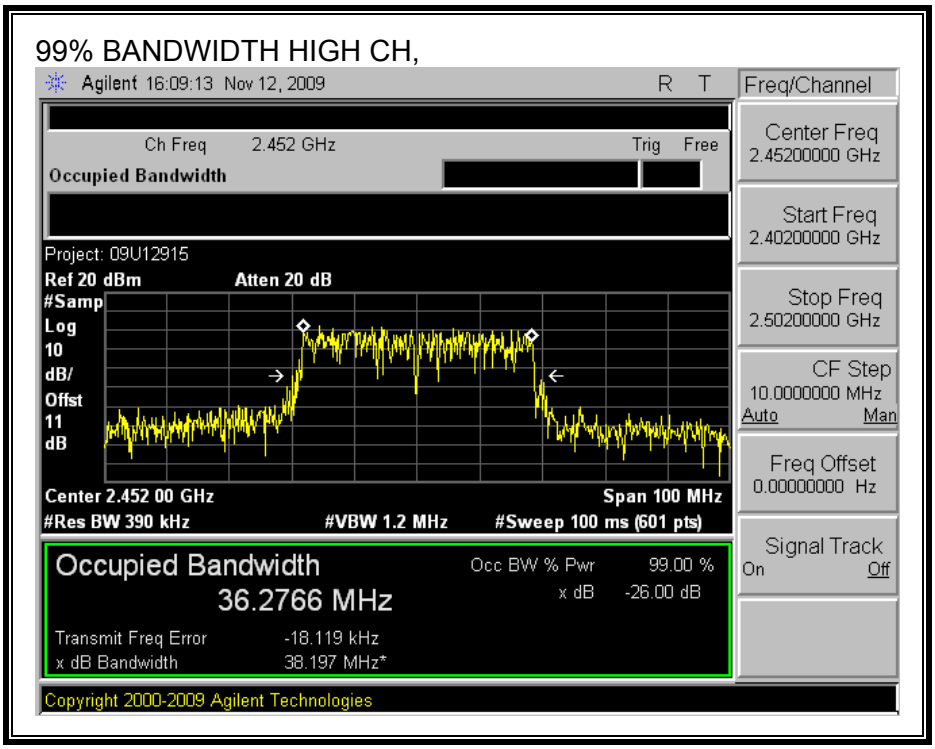
99% BANDWIDTH LOW CH,



99% BANDWIDTH MID CH,



99% BANDWIDTH HIGH CH,



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

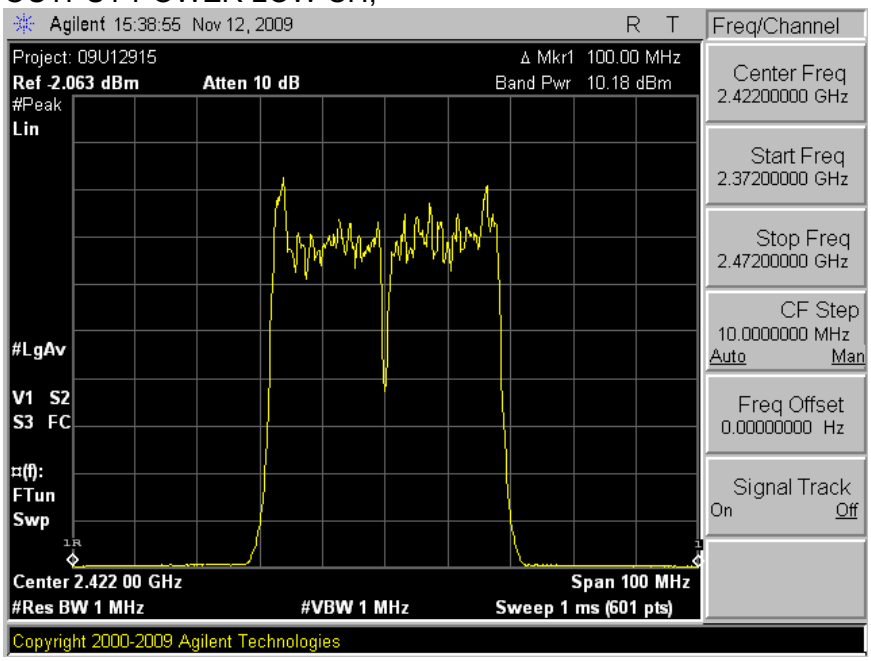
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

RESULTS

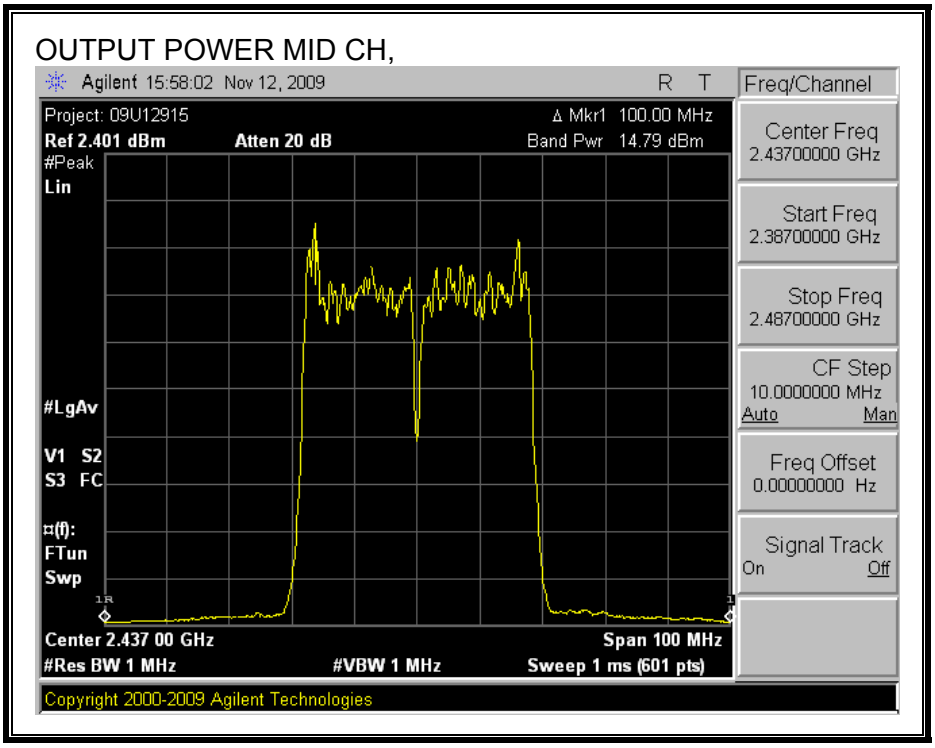
Channel	Frequency (MHz)	Limit (dBm)	Power (dBm)	Attenuator + Cable Offset (dB)	Total Power (dBm)	Margin (dB)
Low	2422	30.00	10.18	11.00	21.18	-8.82
Mid	2437	30.00	14.79	11.00	25.79	-4.21
High	2452	30.00	11.18	11.00	22.18	-7.82

OUTPUT POWER

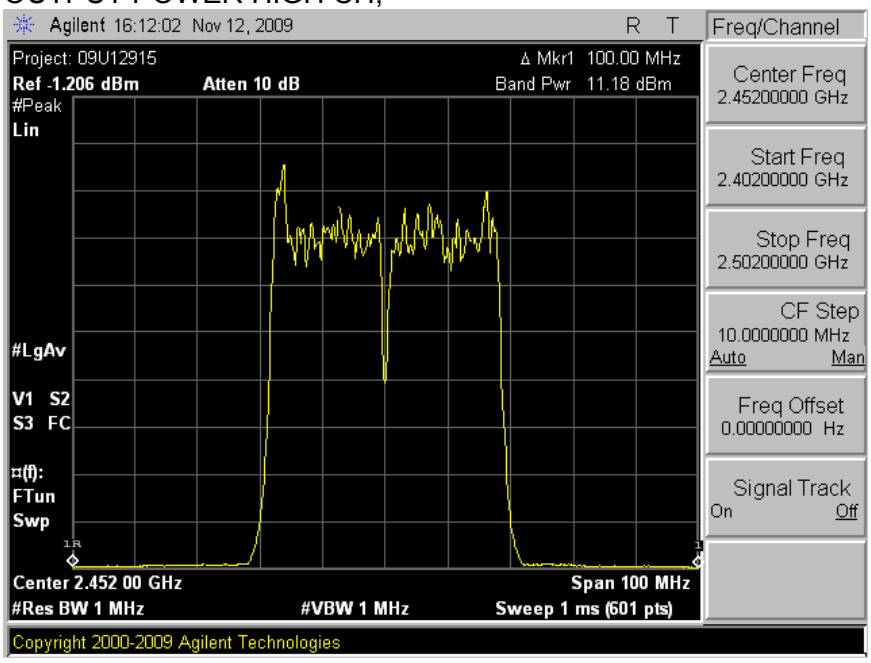
OUTPUT POWER LOW CH,



OUTPUT POWER MID CH,



OUTPUT POWER HIGH CH,



7.4.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 11 dB (including 10 dB pad and 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	13.77
Middle	2437	18.50
High	2452	14.70

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

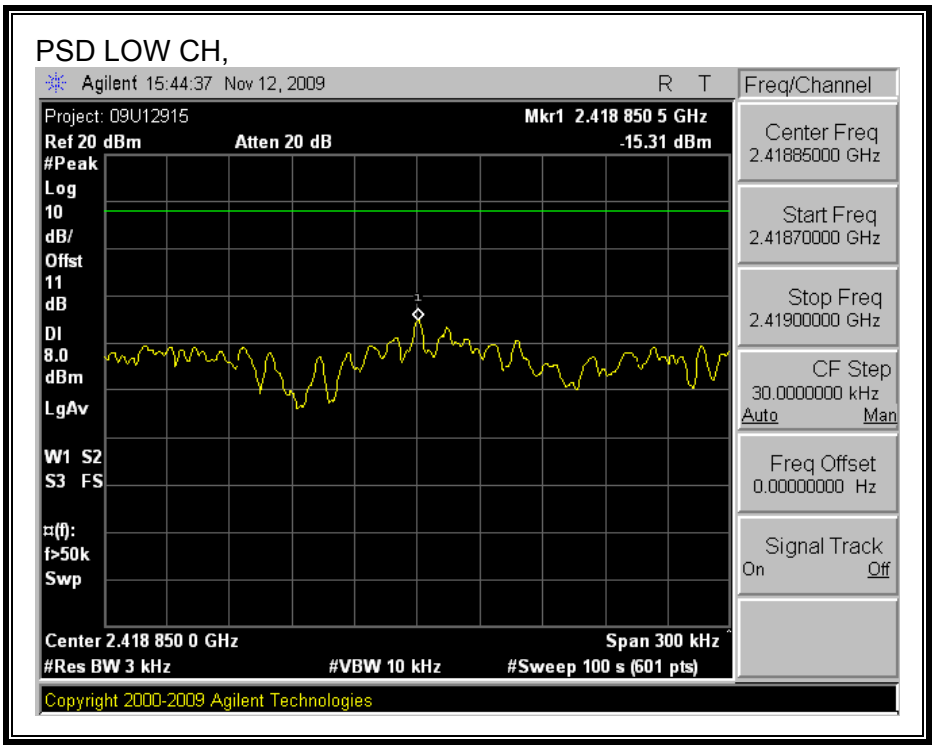
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

RESULTS

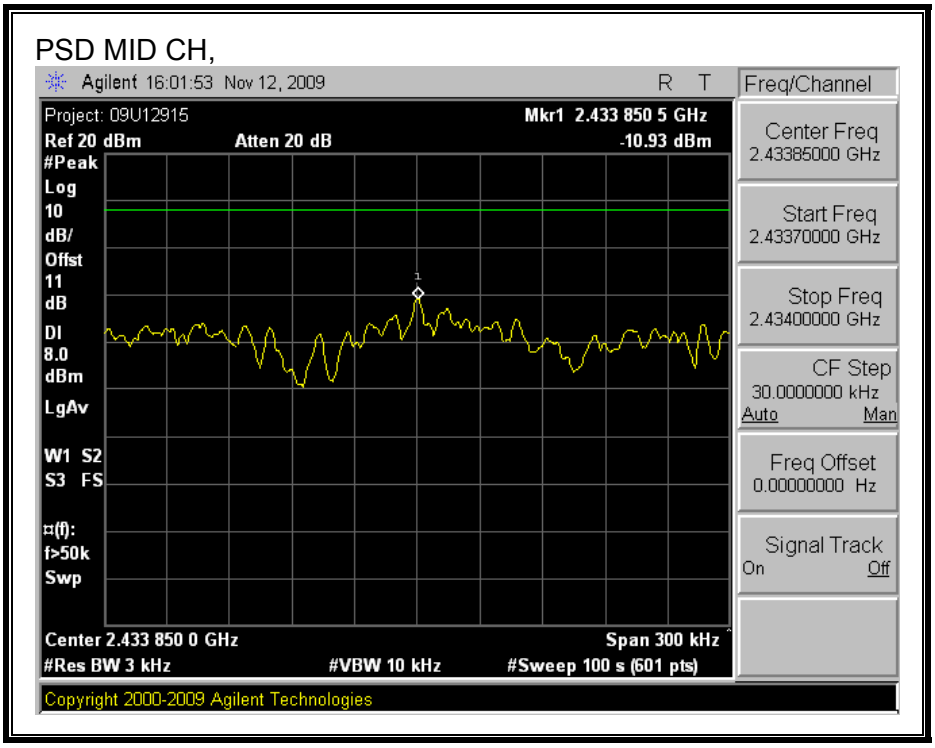
Channel	Frequency (MHz)	Chain 1 PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2422	-15.31	8	-23.31
Middle	2437	-10.93	8	-18.93
High	2452	-14.39	8	-22.39

POWER SPECTRAL DENSITY,

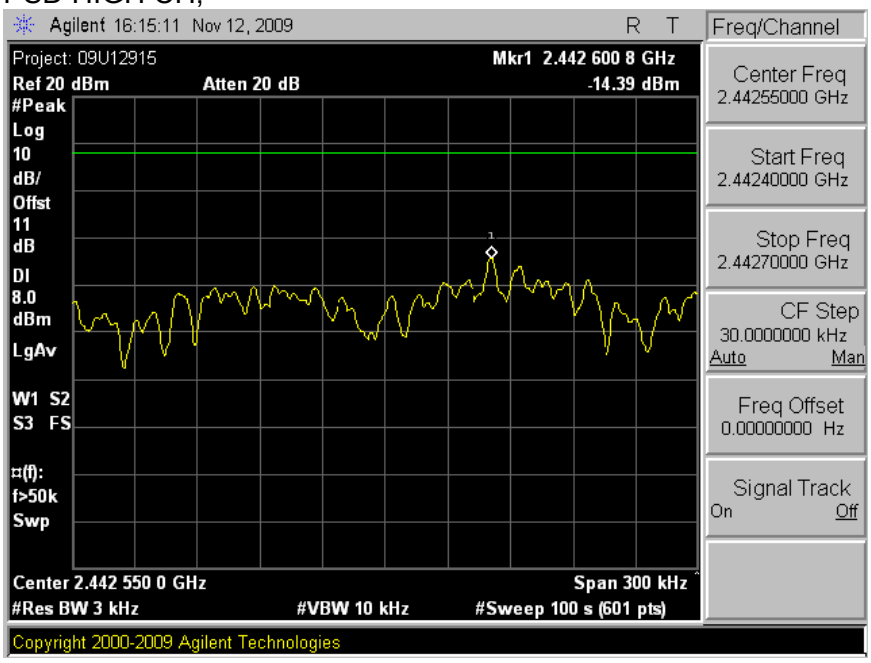
PSD LOW CH,



PSD MID CH,



PSD HIGH 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

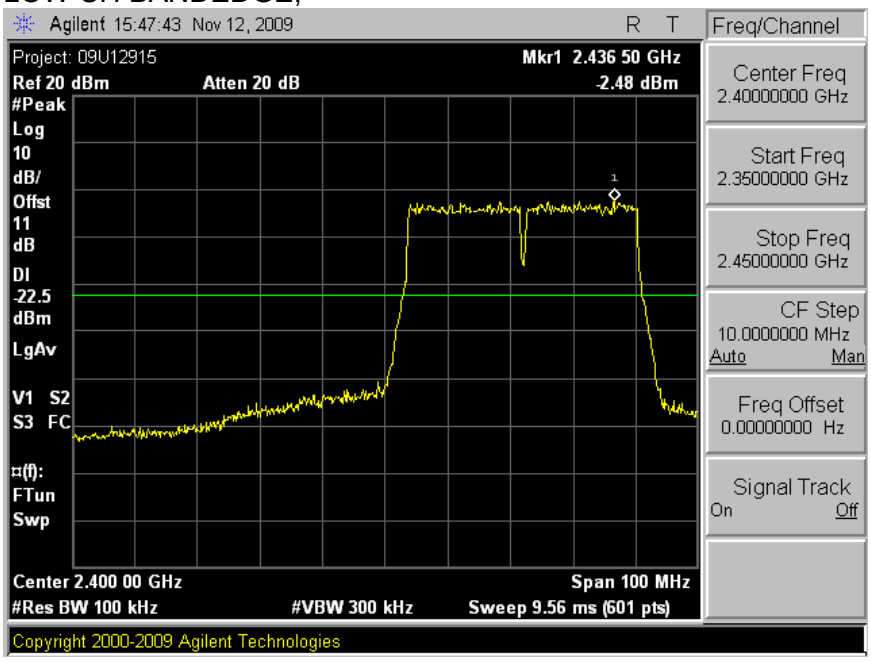
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

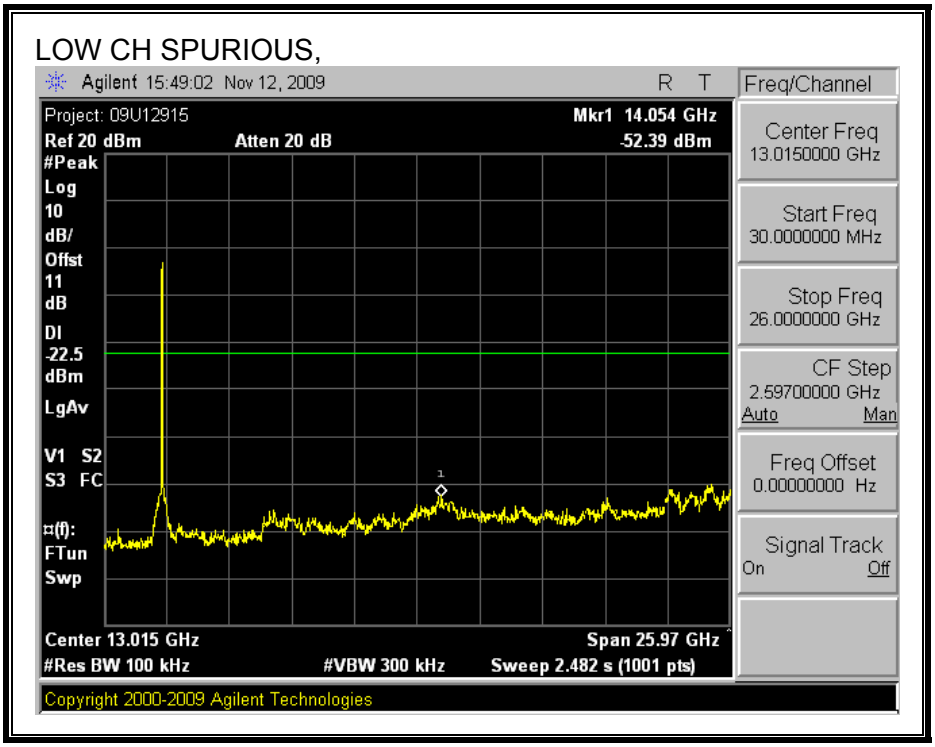
RESULTS

SPURIOUS EMISSIONS

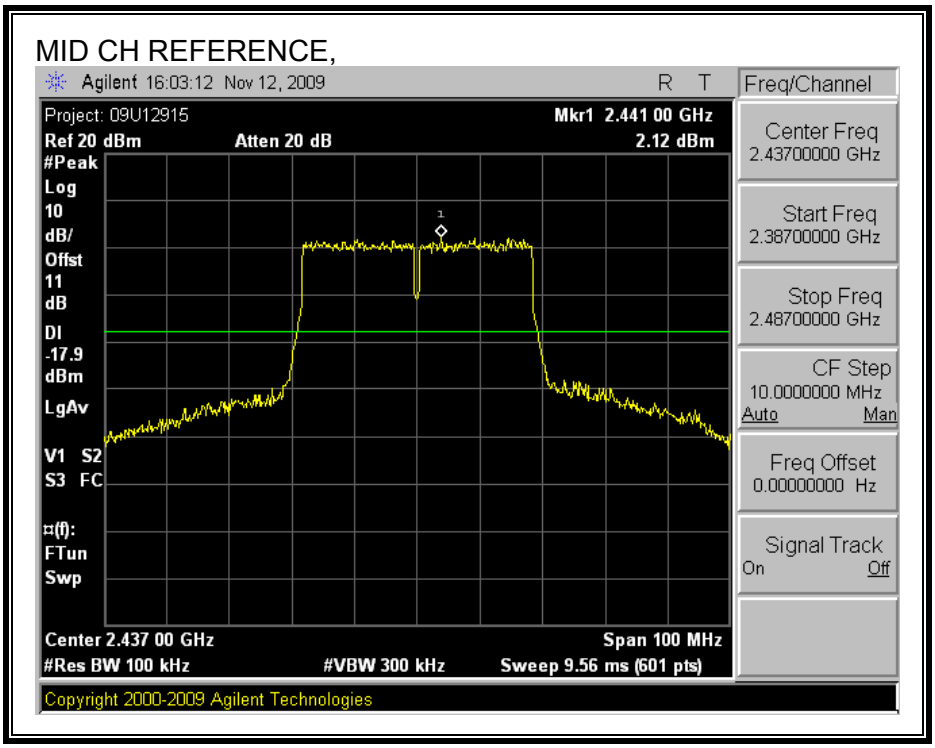
LOW CH BANDEDGE,



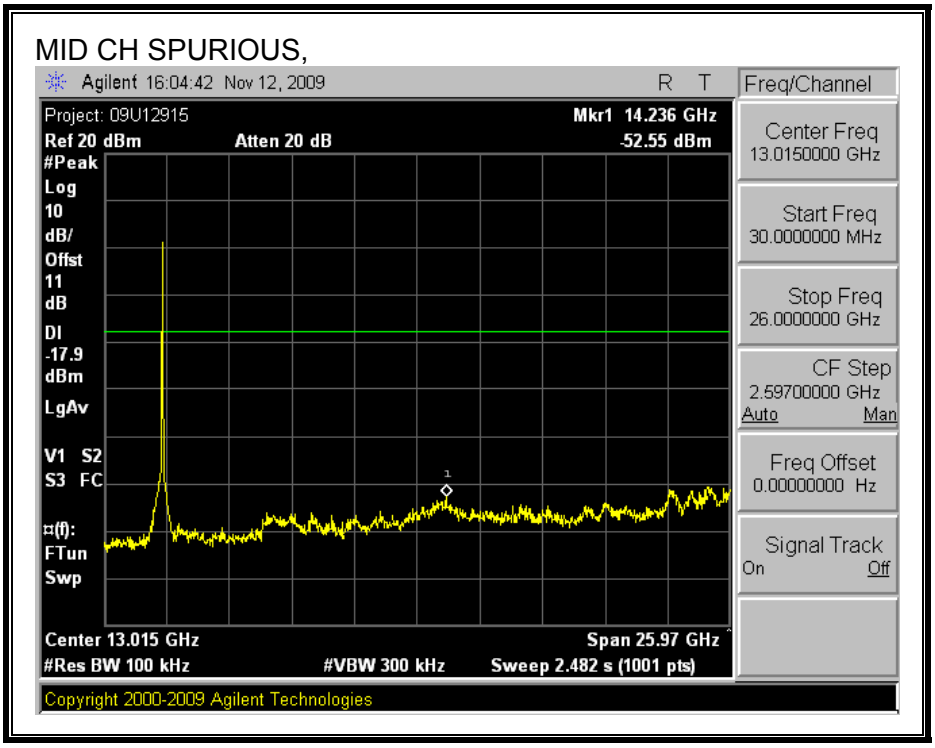
LOW CH SPURIOUS,



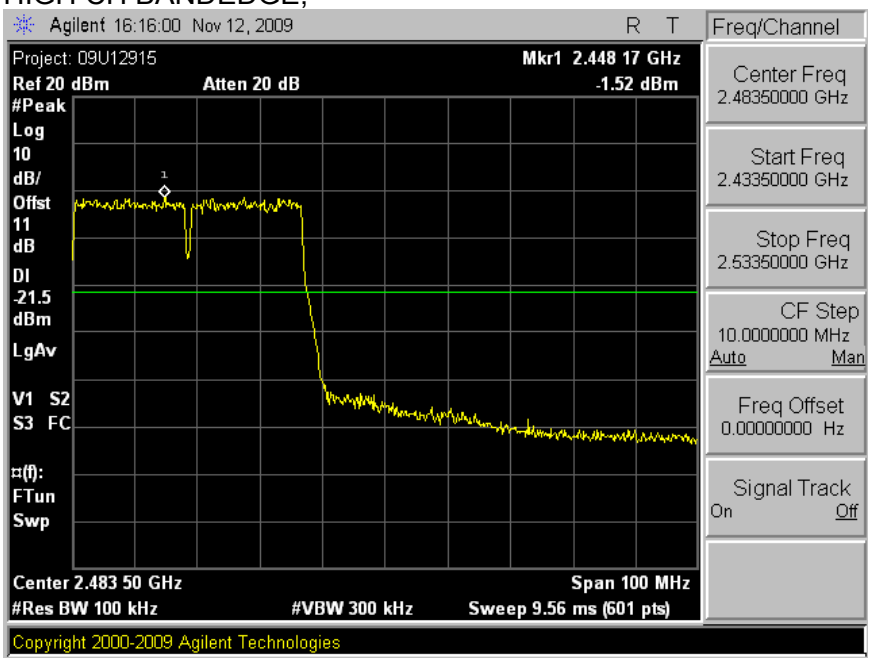
MID CH REFERENCE,



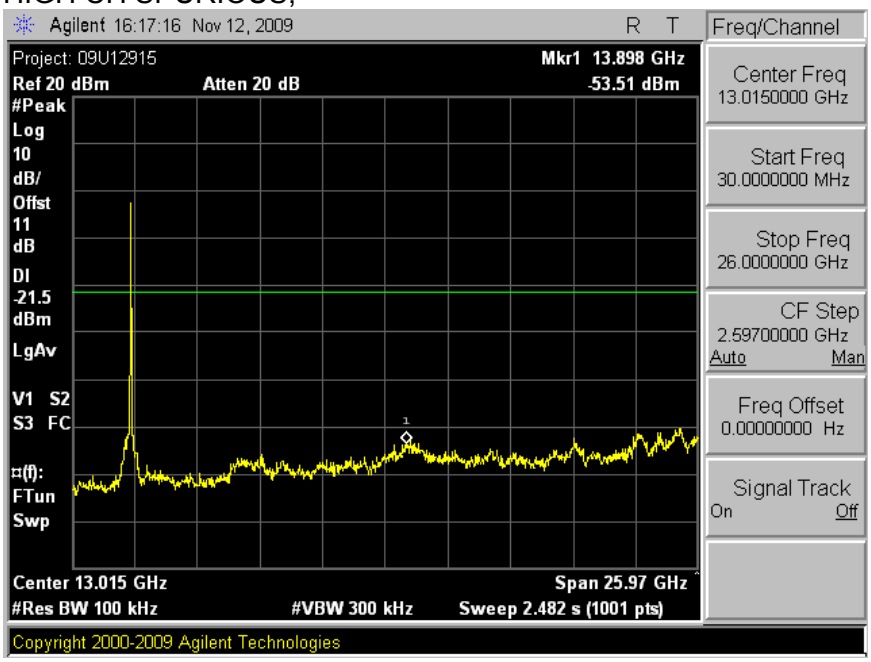
MID CH SPURIOUS,



HIGH CH BANDEDGE,



HIGH CH SPURIOUS,



8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-210 Clause 2.6 (Transmitter)

IC RSS-GEN Clause 6 (Receiver)

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

TEST PROCEDURE

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

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

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, 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.

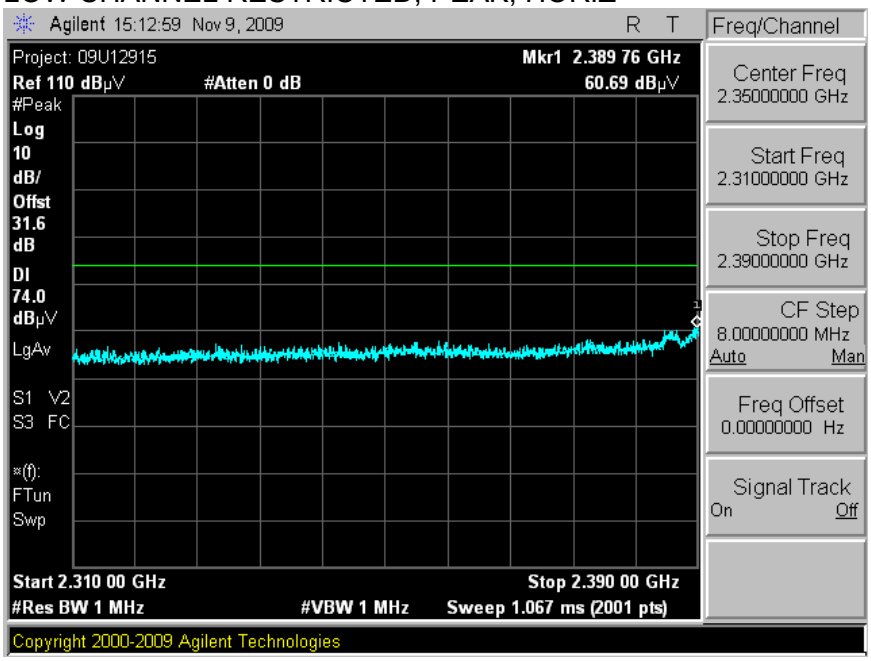
8.2. TRANSMITTER ABOVE 1 GHz

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

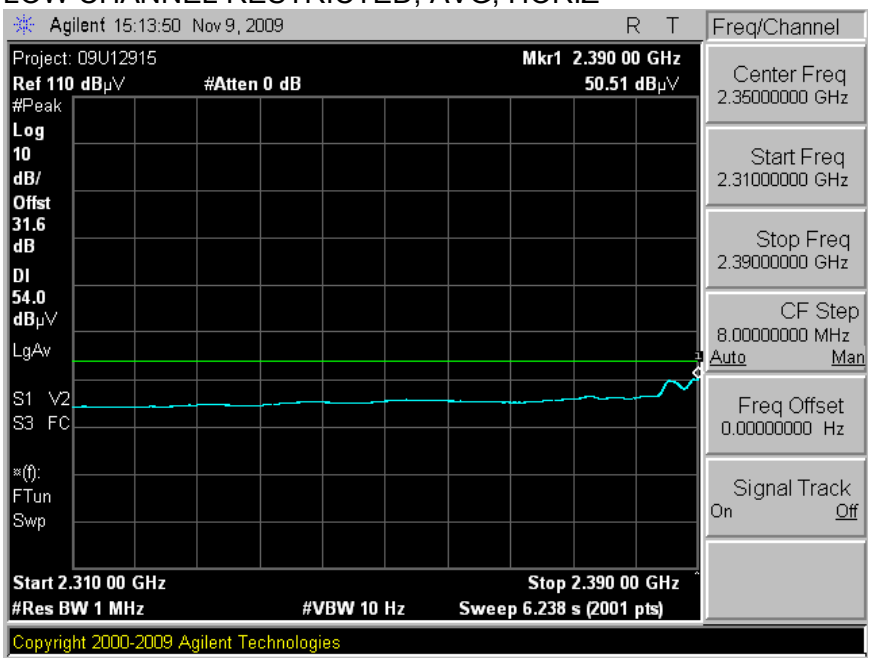
WITH PIFA ANTENNA

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

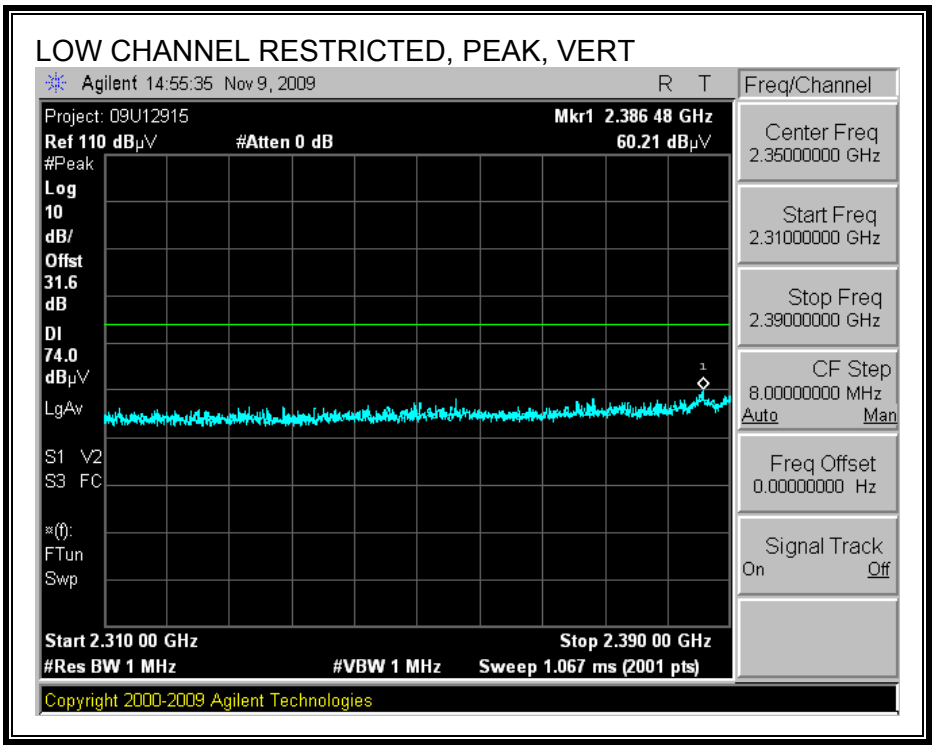
LOW CHANNEL RESTRICTED, PEAK, HORIZ



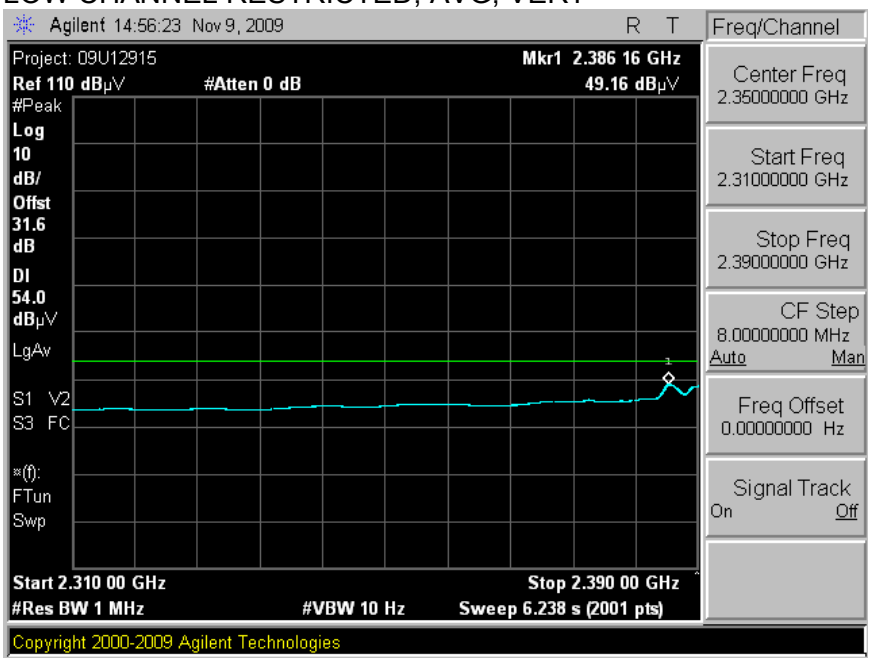
LOW CHANNEL RESTRICTED, AVG, HORIZ



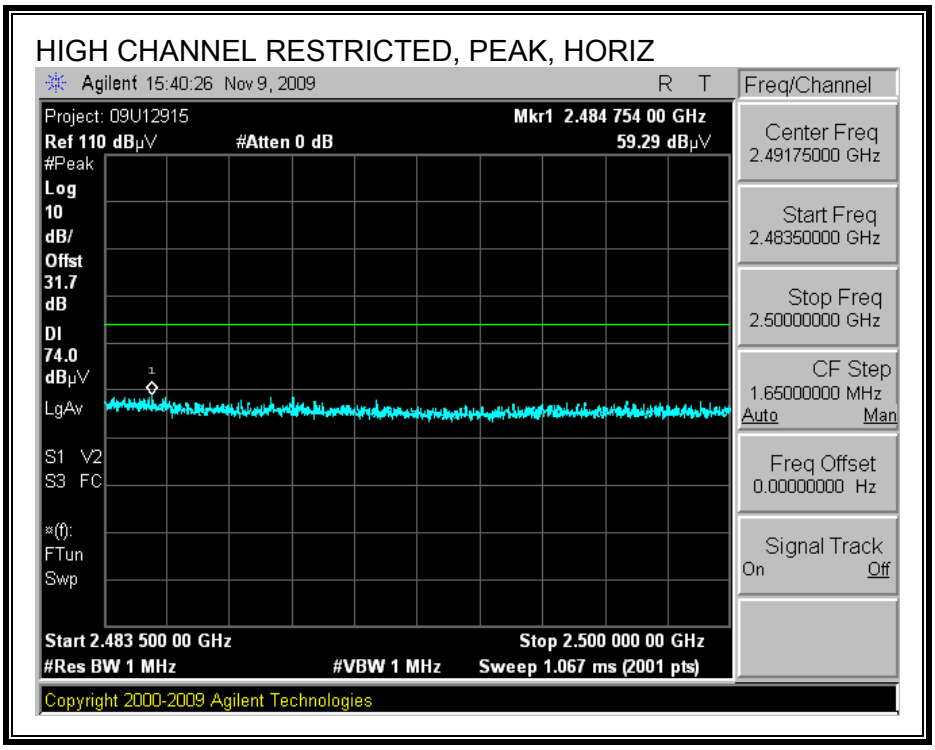
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



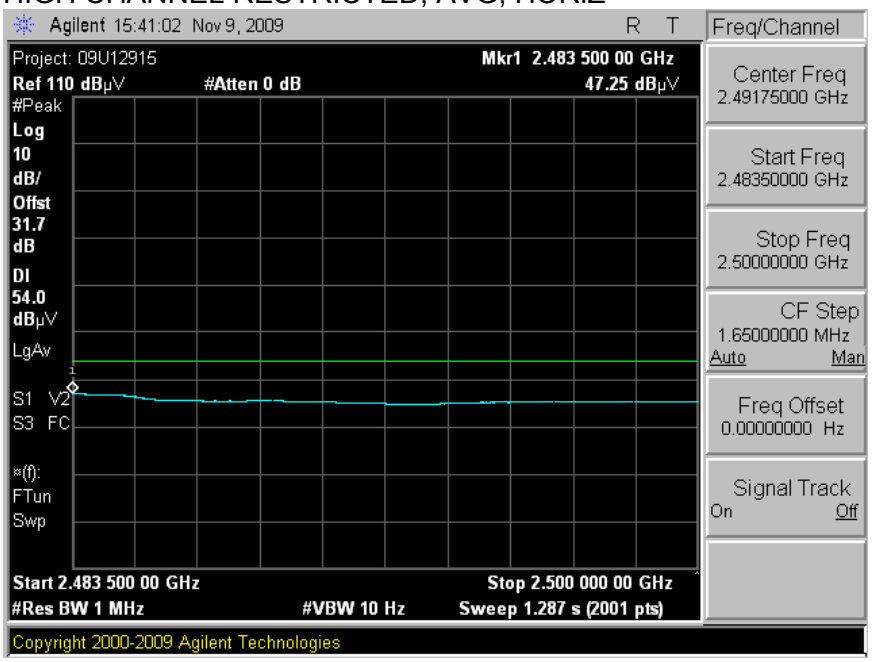
LOW CHANNEL RESTRICTED, AVG, VERT



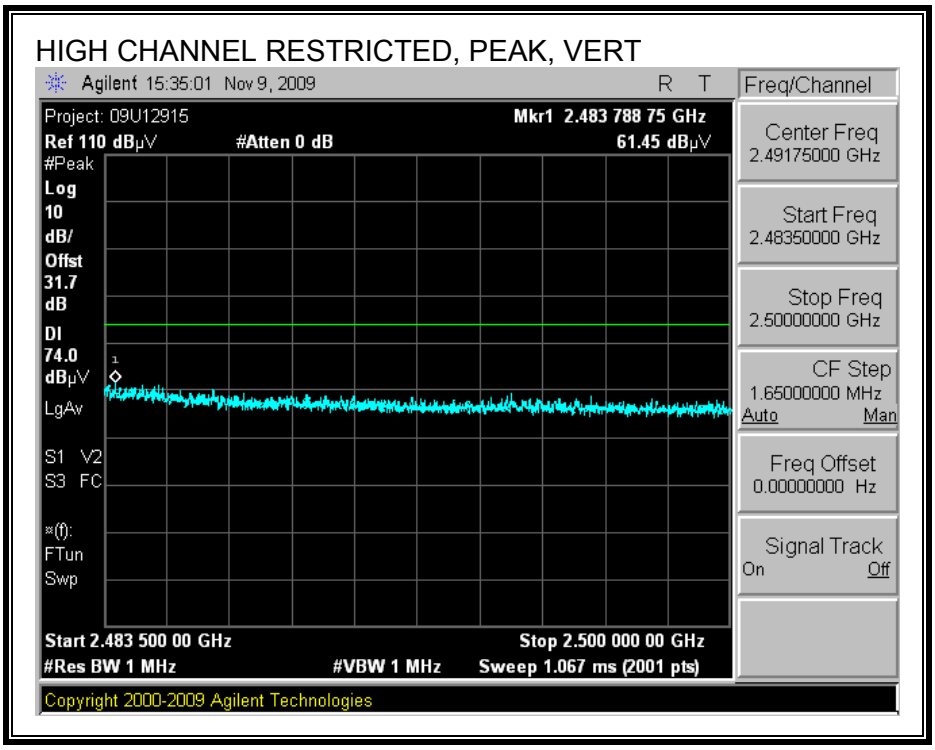
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



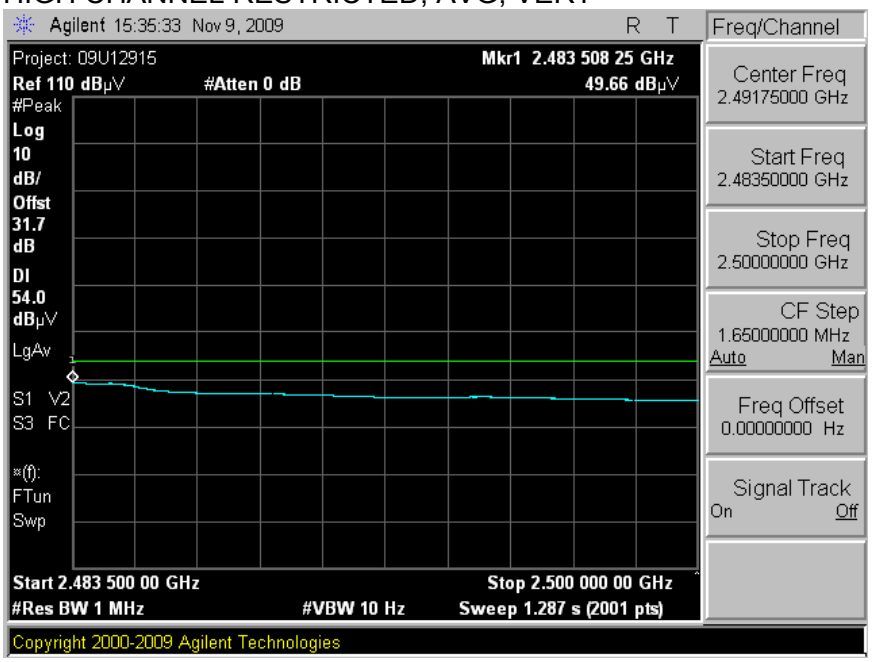
HIGH CHANNEL RESTRICTED, AVG, HORIZ



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



HIGH CHANNEL RESTRICTED, AVG, VERT



BANDEDGE TABULATED DATA for EUT with PIFA antenna

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Tom Chen
Date: 11/09/09
Project #: 09U12915
EUT Description: 802.11 bgn WLAN Client
EUT M/N: 1400
Test Target: FCC 15.247
Mode Oper: 802.11b 1MB, TX

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

f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
b Mode 1MB Low CH, Power setting 18,20.2dBm															
2.390	3.0	29.1	28.1	3.5	0.0	0.0	0.0	60.7	74.0	-13.3	H	P	106.0	237.0	
2.390	3.0	19.0	28.1	3.5	0.0	0.0	0.0	50.5	54.0	-3.5	H	A	106.0	237.0	
b Mode 1MB Low CH, Power setting 18,20.2dBm															
2.386	3.0	28.7	28.1	3.5	0.0	0.0	0.0	60.2	74.0	-13.8	V	P	99.0	348.0	
2.386	3.0	17.6	28.1	3.5	0.0	0.0	0.0	49.2	54.0	-4.8	V	A	99.0	348.0	
b Mode 1MB High CH, Power setting 18,19.95dBm															
2.485	3.0	27.6	28.2	3.5	0.0	0.0	0.0	59.3	74.0	-14.7	H	P	142.0	17.0	
2.483	3.0	15.5	28.2	3.5	0.0	0.0	0.0	47.2	54.0	-6.8	H	A	142.0	17.0	
b Mode 1MB High CH, Power setting 18,19.95dBm															
2.484	3.0	29.7	28.2	3.5	0.0	0.0	0.0	61.4	74.0	-12.6	V	P	118.0	306.0	
2.484	3.0	17.9	28.2	3.5	0.0	0.0	0.0	49.7	54.0	-4.3	V	A	118.0	306.0	
b Mode 1MB Low CH, Power setting 14,18.4dBm															
2.387	3.0	26.9	28.1	3.5	0.0	0.0	0.0	58.4	74.0	-15.6	V	P	99.0	348.0	
2.386	3.0	14.3	28.1	3.5	0.0	0.0	0.0	45.9	54.0	-8.1	V	A	99.0	348.0	
b Mode 1MB Low CH, Power setting 19, 20.7dBm															
2.387	3.0	30.7	28.1	3.5	0.0	0.0	0.0	62.2	74.0	-11.8	H	P	107.0	237.0	
2.386	3.0	21.1	28.1	3.5	0.0	0.0	0.0	52.6	54.0	-1.4	H	A	107.0	237.0	
b Mode 1MB Low CH, Power setting 19,20.7dBm															
2.386	3.0	29.7	28.1	3.5	0.0	0.0	0.0	61.2	74.0	-12.8	V	P	99.0	348.0	
2.386	3.0	20.2	28.1	3.5	0.0	0.0	0.0	51.7	54.0	-2.3	V	A	99.0	348.0	
b Mode 1MB High CH, Power setting 1a,20.72dBm															
2.484	3.0	29.2	28.2	3.5	0.0	0.0	0.0	60.9	74.0	-13.1	H	P	142.0	15.0	
2.483	3.0	20.2	28.2	3.5	0.0	0.0	0.0	51.9	54.0	-2.1	H	A	142.0	15.0	
b Mode 1MB High CH, Power setting 19,20.25dBm															
2.484	3.0	28.5	28.2	3.5	0.0	0.0	0.0	60.2	74.0	-13.8	H	P	142.0	17.0	
2.483	3.0	18.0	28.2	3.5	0.0	0.0	0.0	49.7	54.0	-4.3	H	A	142.0	17.0	
b Mode 1MB High CH, Power setting 19,20.25dBm															
2.484	3.0	30.6	28.2	3.5	0.0	0.0	0.0	62.3	74.0	-11.7	V	P	118.0	306.0	
2.483	3.0	20.0	28.2	3.5	0.0	0.0	0.0	51.7	54.0	-2.3	V	A	118.0	306.0	

Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor. (EUT with PIFA antenna)

HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Tom Chen
Date: 11/10/09
Project #: 09U12915
EUT Description: 802.11 bgn WLAN Client
EUT M/N: 1400
Test Target: FCC 15.247
Mode Oper: 802.11b 1MB, TX

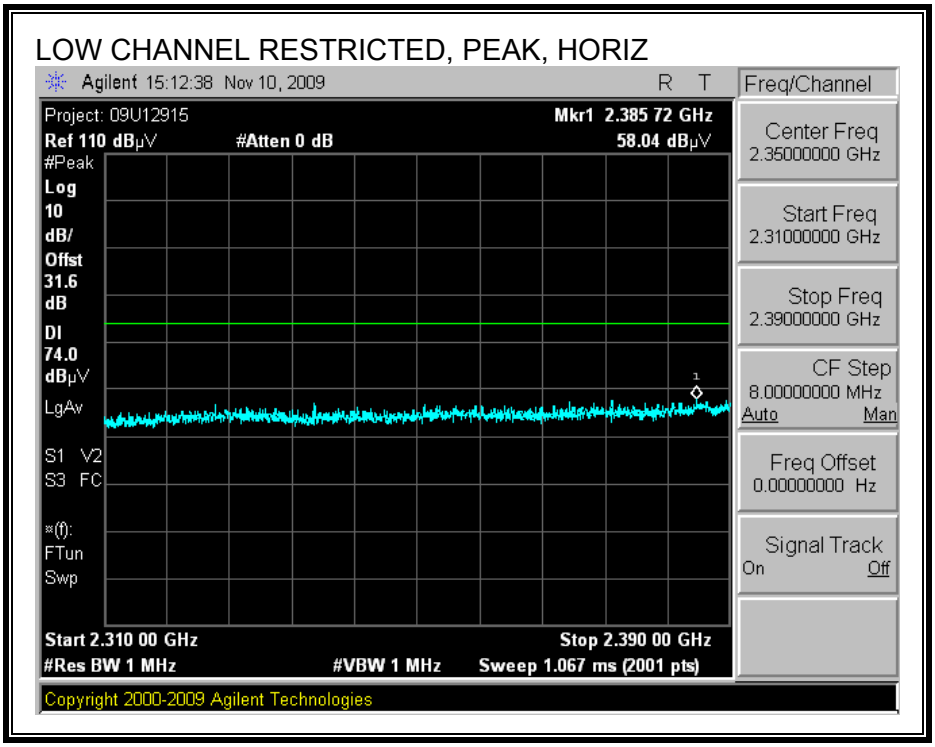
f	Measurement Frequency	Amp	Preamp Gain		Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters		Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m		Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength		Margin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

f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
2412 MHz Low CH, b mode pwr 18, 20.1dBm													
4.824	3.0	42.5	32.7	5.8	-34.8	0.0	0.0	46.1	74.0	-27.9	V	P	
7.236	3.0	38.9	35.4	7.2	-34.1	0.0	0.0	47.4	74.0	-26.6	V	P	
4.824	3.0	39.1	32.7	5.8	-34.8	0.0	0.0	42.7	54.0	-11.3	V	A	
7.236	3.0	32.0	35.4	7.2	-34.1	0.0	0.0	40.5	54.0	-13.5	V	A	
4.824	3.0	40.8	32.7	5.8	-34.8	0.0	0.0	44.4	74.0	-29.6	H	P	
7.236	3.0	38.6	35.4	7.2	-34.1	0.0	0.0	47.1	74.0	-26.9	H	P	
4.824	3.0	36.7	32.7	5.8	-34.8	0.0	0.0	40.3	54.0	-13.7	H	A	
7.236	3.0	31.7	35.4	7.2	-34.1	0.0	0.0	40.2	54.0	-13.8	H	A	
2437 MHz Mid CH, b mode pwr 1C, 22.13dBm													
4.874	3.0	45.0	32.7	5.8	-34.8	0.0	0.0	48.8	74.0	-25.2	H	P	
7.311	3.0	39.4	35.5	7.3	-34.1	0.0	0.0	48.1	74.0	-25.9	H	P	
4.874	3.0	42.1	32.7	5.8	-34.8	0.0	0.0	45.8	54.0	-8.2	H	A	
7.311	3.0	33.7	35.5	7.3	-34.1	0.0	0.0	42.4	54.0	-11.6	H	A	
4.874	3.0	44.7	32.7	5.8	-34.8	0.0	0.0	48.4	74.0	-25.6	V	P	
7.311	3.0	40.2	35.5	7.3	-34.1	0.0	0.0	48.9	74.0	-25.1	V	P	
4.874	3.0	42.2	32.7	5.8	-34.8	0.0	0.0	45.9	54.0	-8.1	V	A	
7.311	3.0	34.4	35.5	7.3	-34.1	0.0	0.0	43.0	54.0	-11.0	V	A	
2462 MHz Mid CH, b mode pwr 18, 20.0dBm													
4.924	3.0	37.8	32.7	5.9	-34.8	0.0	0.0	41.6	74.0	-32.4	V	P	
7.386	3.0	35.6	35.6	7.3	-34.1	0.0	0.0	44.4	74.0	-29.6	V	P	
4.924	3.0	29.8	32.7	5.9	-34.8	0.0	0.0	33.7	54.0	-20.3	V	A	
7.386	3.0	26.8	35.6	7.3	-34.1	0.0	0.0	35.6	54.0	-18.4	V	A	
4.924	3.0	36.5	32.7	5.9	-34.8	0.0	0.0	40.3	74.0	-33.7	H	P	
7.386	3.0	36.4	35.6	7.3	-34.1	0.0	0.0	45.2	74.0	-28.8	H	P	
4.924	3.0	26.1	32.7	5.9	-34.8	0.0	0.0	29.9	54.0	-24.1	H	A	
7.386	3.0	27.3	35.6	7.3	-34.1	0.0	0.0	36.1	54.0	-17.9	H	A	

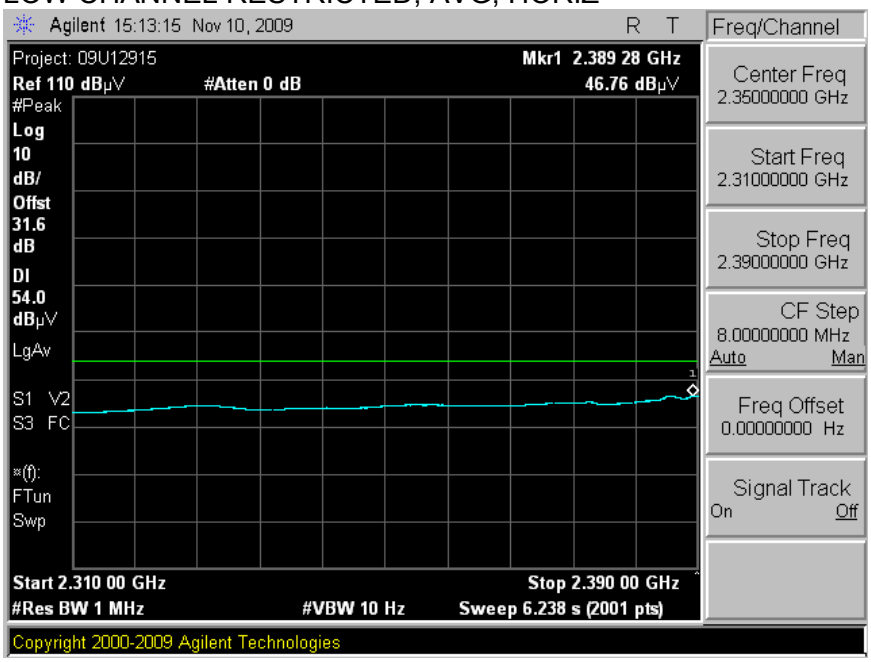
Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor.

WITH PWB ANTENNA

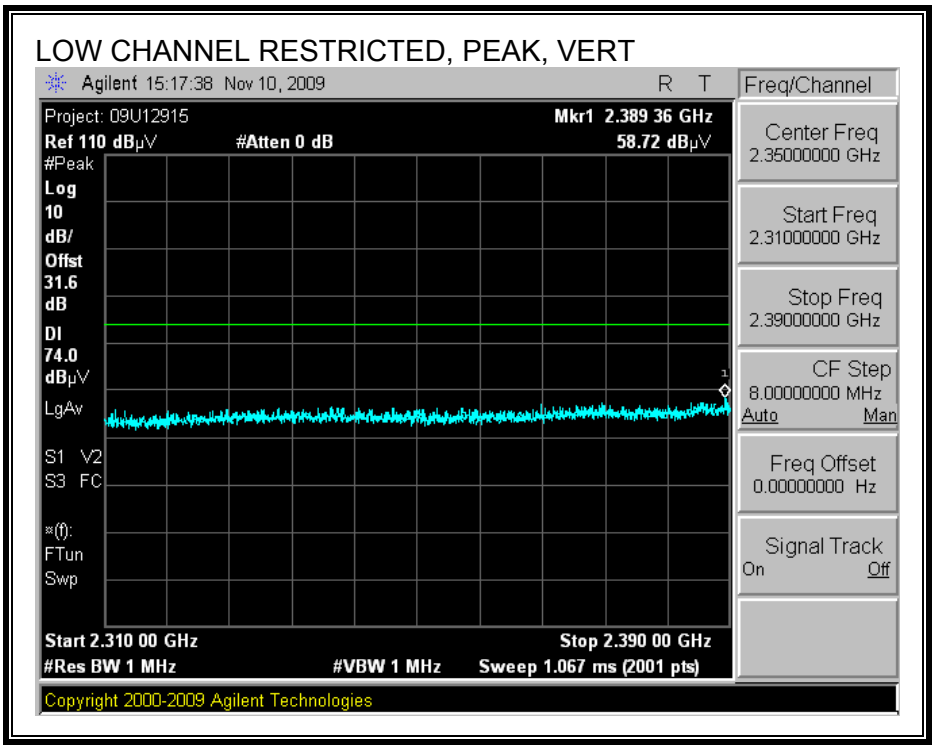
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



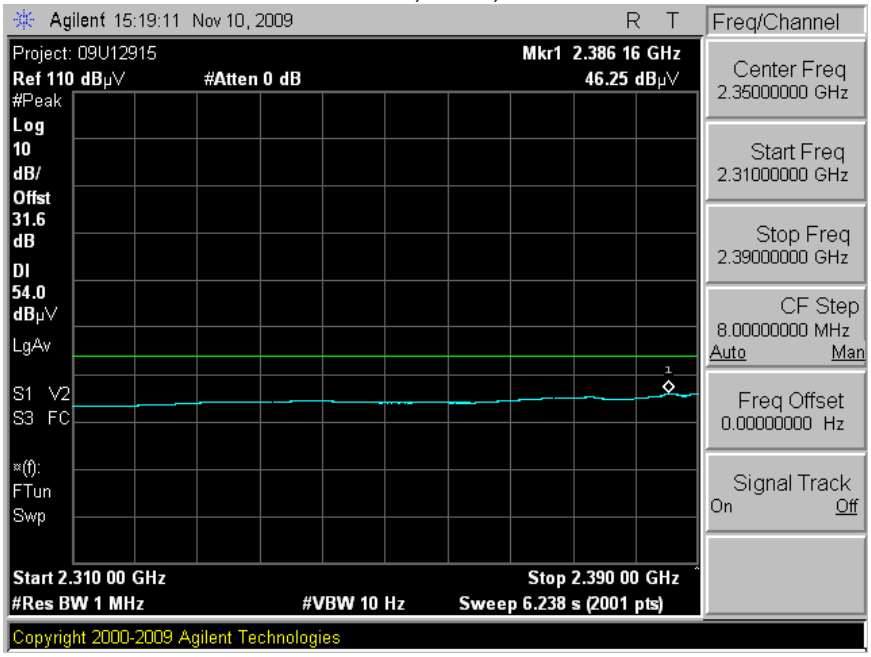
LOW CHANNEL RESTRICTED, AVG, HORIZ



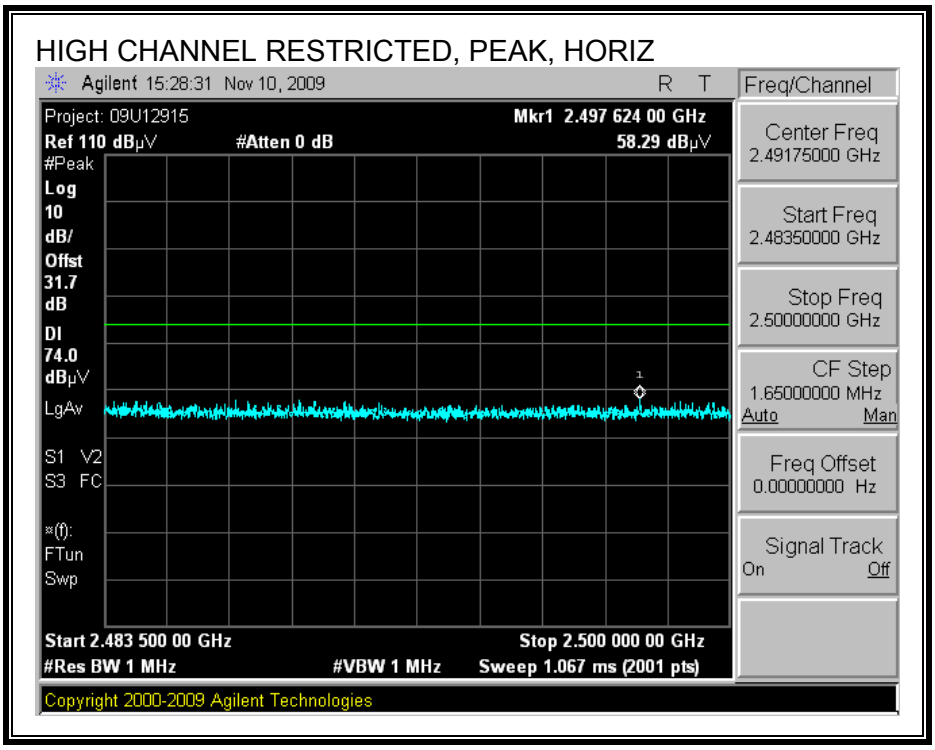
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



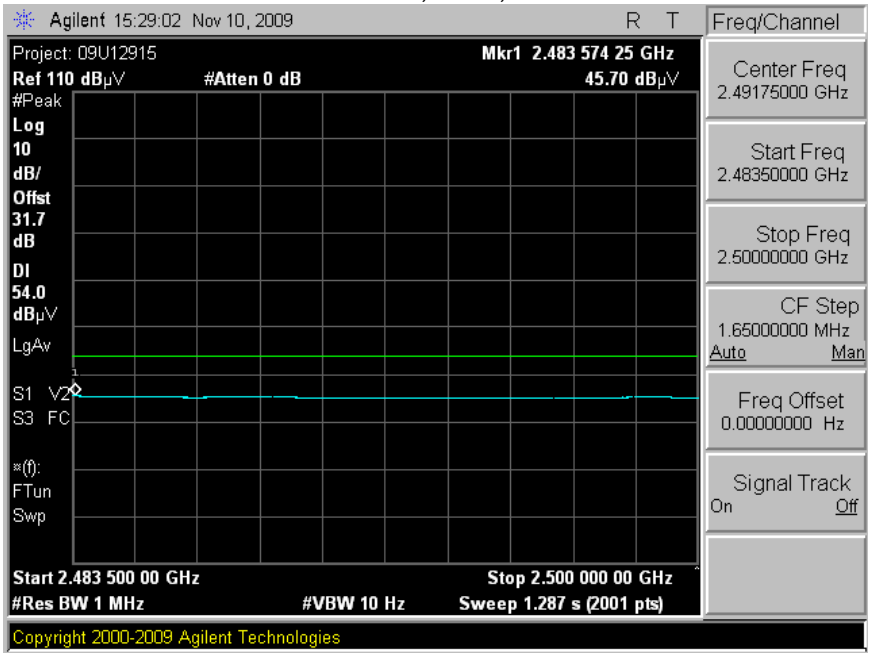
LOW CHANNEL RESTRICTED, AVG, VERT



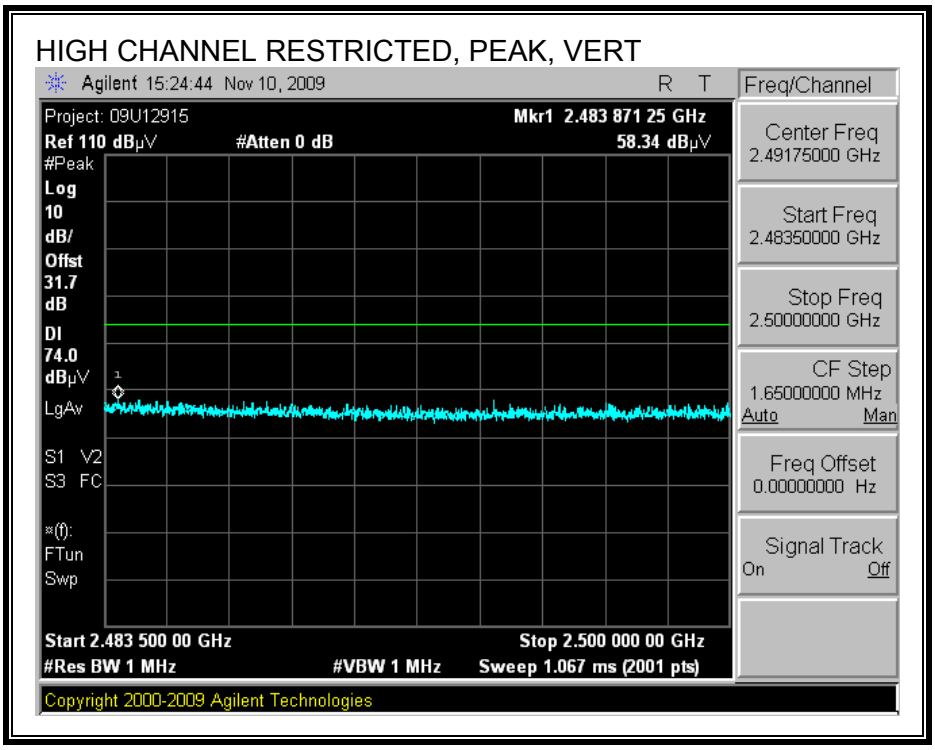
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



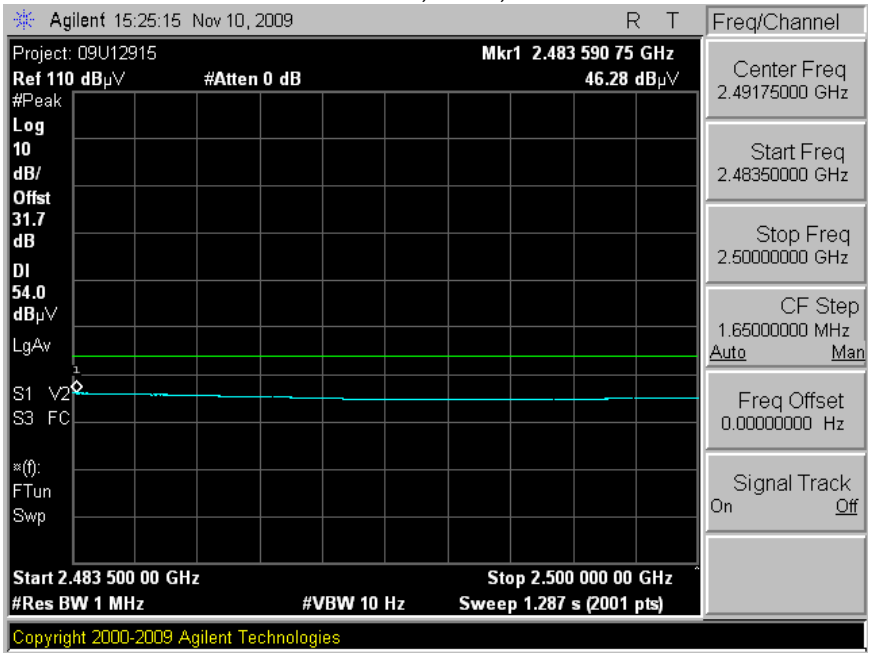
HIGH CHANNEL RESTRICTED, AVG, HORIZ



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



HIGH CHANNEL RESTRICTED, AVG, VERT



BANDEDGE TABULATED DATA for EUT with PWB antenna

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Tom Chen
Date: 11/10/09
Project #: 09U12915
EUT Description: 802.11 bgn WLAN Client
EUT M/N: 1400
Test Target: FCC 247
Mode Oper: 802.11b , TX with PWB Antenna

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

f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
2412 MHz Low CH, b mode pwr 18															
2.386	3.0	26.5	28.1	3.5	0.0	0.0	0.0	58.0	74.0	-16.0	H	P	100.0	355.0	PWB ANT
2.389	3.0	15.2	28.1	3.5	0.0	0.0	0.0	46.8	54.0	-7.2	H	A	100.0	355.0	PWB ANT
2412 MHz Low CH, b mode pwr 18															
2.389	3.0	27.2	28.1	3.5	0.0	0.0	0.0	58.7	74.0	-15.3	V	P	123.0	160.0	PWB ANT
2.386	3.0	14.7	28.1	3.5	0.0	0.0	0.0	46.2	54.0	-7.8	V	A	123.0	160.0	PWB ANT
2462 MHz High CH, b mode pwr 18															
2.484	3.0	26.6	28.2	3.5	0.0	0.0	0.0	58.3	74.0	-15.7	V	P	109.0	351.0	PWB ANT
2.484	3.0	14.6	28.2	3.5	0.0	0.0	0.0	46.3	54.0	-7.7	V	A	109.0	351.0	PWB ANT
2462 MHz High CH, b mode pwr 18															
2.498	3.0	26.6	28.2	3.5	0.0	0.0	0.0	58.3	74.0	-15.7	H	P	100.0	345.0	PWB ANT
2.484	3.0	14.0	28.2	3.5	0.0	0.0	0.0	45.7	54.0	-8.3	H	A	100.0	345.0	PWB ANT

Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor. (EUT with PWB antenna)

HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Tom Chen
Date: 11/11/09
Project #: 09U12915
EUT Description: 802.11 bgn WLAN Client
EUT M/N: 1400
Test Target: FCC 15.247
Mode Oper: 802.11b 1MB, TX

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

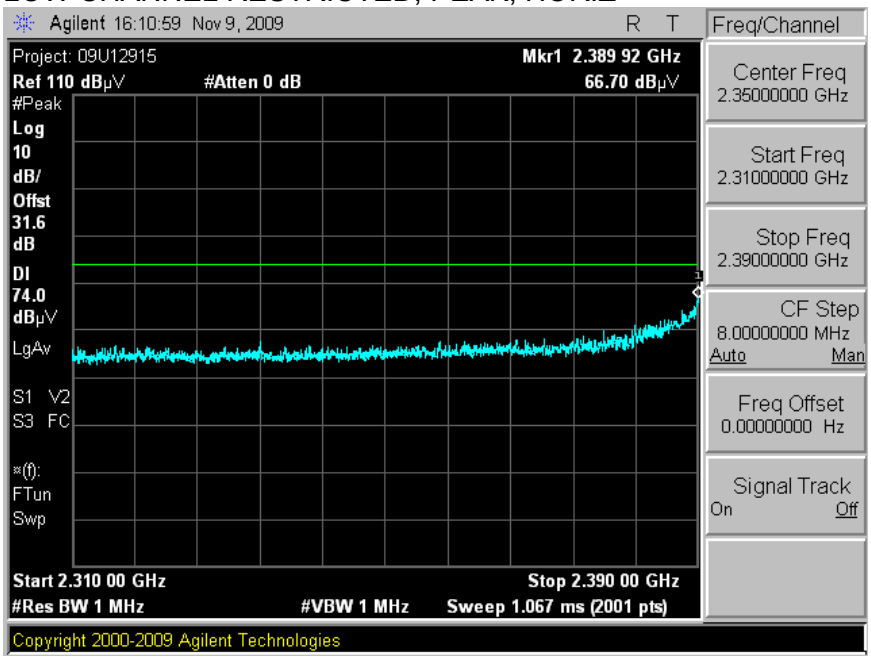
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
2412 MHz Low CH, b mode pwr 18													
4.824	3.0	42.2	32.7	5.8	-34.8	0.0	0.0	45.8	74.0	-28.2	H	P	
7.236	3.0	35.3	35.4	7.2	-34.1	0.0	0.0	43.8	74.0	-30.2	H	P	
4.824	3.0	39.0	32.7	5.8	-34.8	0.0	0.0	42.6	54.0	-11.4	H	A	
7.236	3.0	25.0	35.4	7.2	-34.1	0.0	0.0	33.5	54.0	-20.5	H	A	
4.824	3.0	42.1	32.7	5.8	-34.8	0.0	0.0	45.8	74.0	-28.2	V	P	
7.236	3.0	35.5	35.4	7.2	-34.1	0.0	0.0	44.0	74.0	-30.0	V	P	
4.824	3.0	38.1	32.7	5.8	-34.8	0.0	0.0	41.8	54.0	-12.2	V	A	
7.236	3.0	26.7	35.4	7.2	-34.1	0.0	0.0	35.2	54.0	-18.8	V	A	
2437 MHz Mid CH, b mode pwr 1C													
4.874	3.0	45.7	32.7	5.8	-34.8	0.0	0.0	49.4	74.0	-24.6	V	P	
7.311	3.0	37.1	35.5	7.3	-34.1	0.0	0.0	45.7	74.0	-28.3	V	P	
4.874	3.0	43.6	32.7	5.8	-34.8	0.0	0.0	47.4	54.0	-6.7	V	A	
7.311	3.0	28.1	35.5	7.3	-34.1	0.0	0.0	36.7	54.0	-17.3	V	A	
4.874	3.0	45.4	32.7	5.8	-34.8	0.0	0.0	49.1	74.0	-24.9	H	P	
7.311	3.0	38.9	35.5	7.3	-34.1	0.0	0.0	47.6	74.0	-26.4	H	P	
4.874	3.0	42.9	32.7	5.8	-34.8	0.0	0.0	46.6	54.0	-7.4	H	A	
7.311	3.0	32.8	35.5	7.3	-34.1	0.0	0.0	41.4	54.0	-12.6	H	A	
2462 MHz High CH, b mode pwr 18													
4.924	3.0	39.2	32.7	5.9	-34.8	0.0	0.0	43.0	74.0	-31.0	H	P	
7.386	3.0	37.2	35.6	7.3	-34.1	0.0	0.0	45.9	74.0	-28.1	H	P	
4.924	3.0	34.2	32.7	5.9	-34.8	0.0	0.0	38.0	54.0	-16.0	H	A	
7.386	3.0	28.7	35.6	7.3	-34.1	0.0	0.0	37.5	54.0	-16.5	H	A	
4.924	3.0	38.9	32.7	5.9	-34.8	0.0	0.0	42.8	74.0	-31.2	V	P	
7.386	3.0	34.6	35.6	7.3	-34.1	0.0	0.0	43.4	74.0	-30.6	V	P	
4.924	3.0	32.8	32.7	5.9	-34.8	0.0	0.0	36.6	54.0	-17.4	V	A	
7.386	3.0	23.8	35.6	7.3	-34.1	0.0	0.0	32.5	54.0	-21.5	V	A	

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

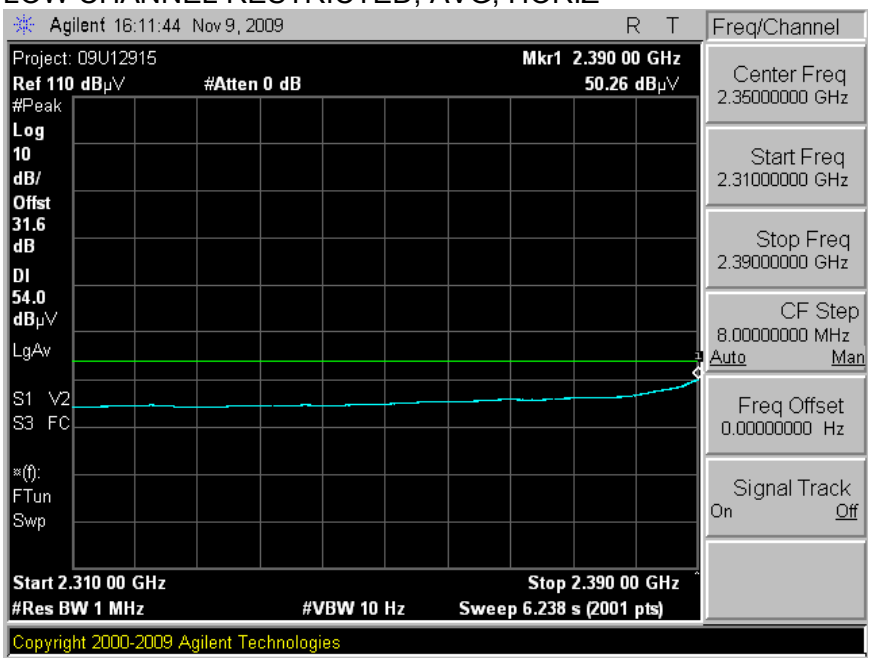
8.2.2. TX ABOVE 1 GHz FOR 802.11g MODE IN THE 2.4 GHz BAND WITH PIFA ANTENNA

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

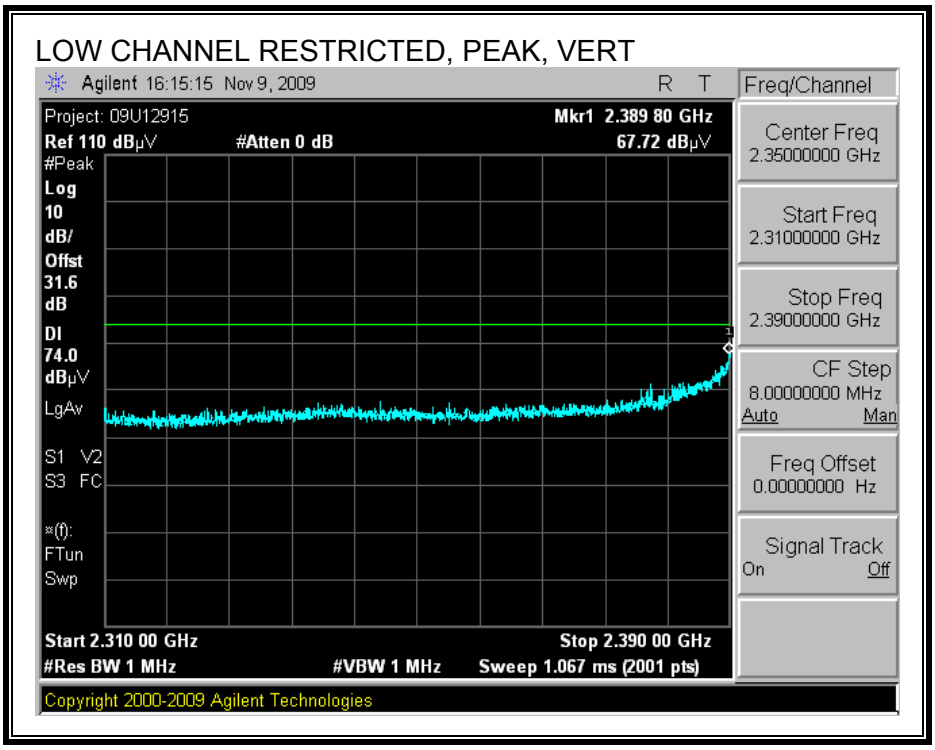
LOW CHANNEL RESTRICTED, PEAK, HORIZ



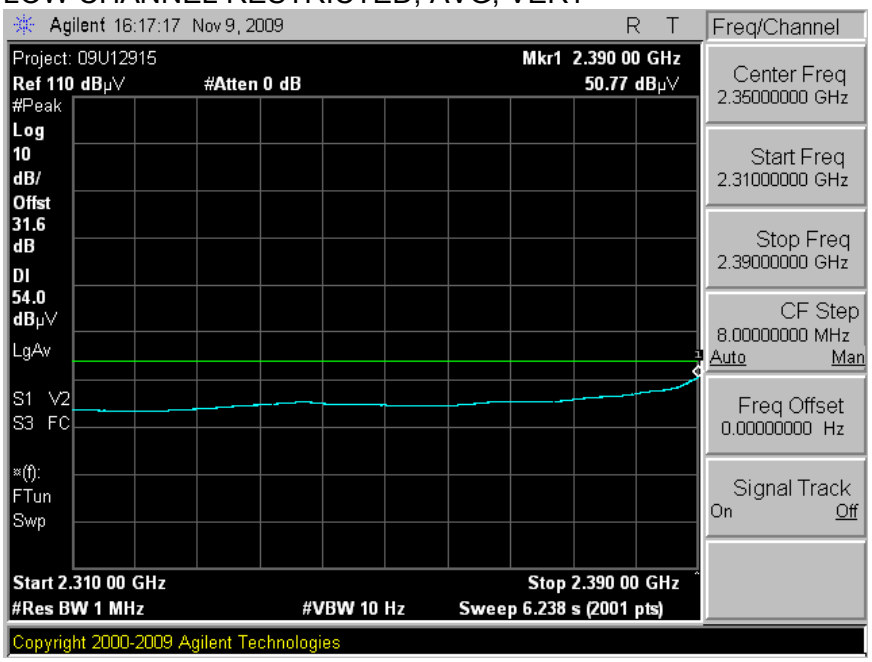
LOW CHANNEL RESTRICTED, AVG, HORIZ



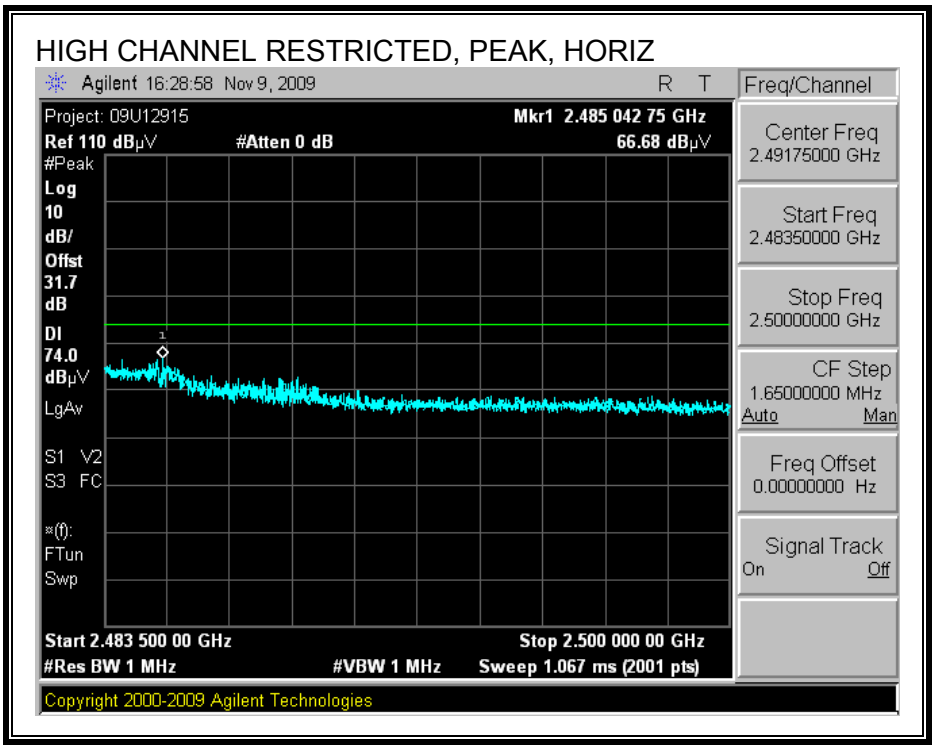
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



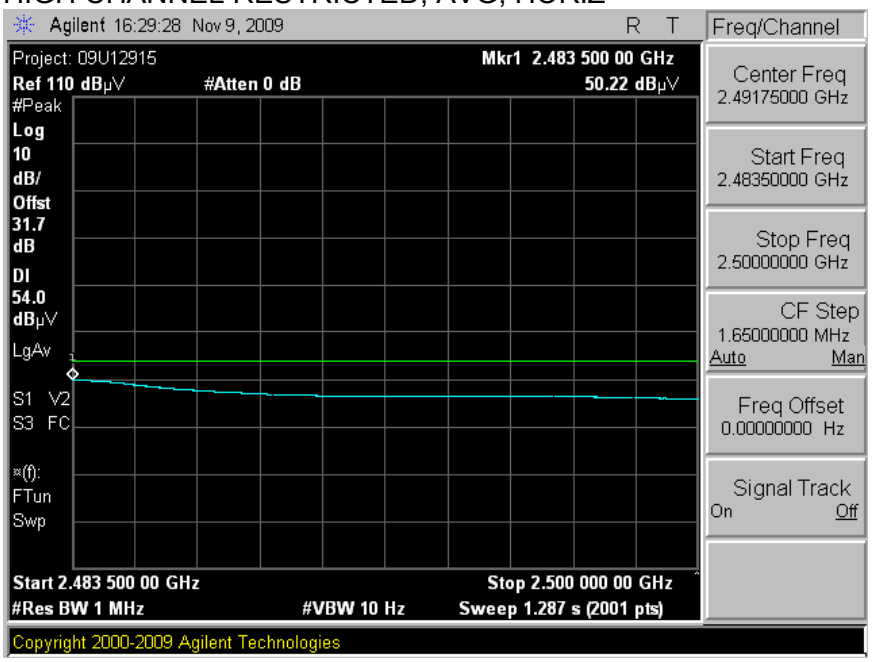
LOW CHANNEL RESTRICTED, AVG, VERT



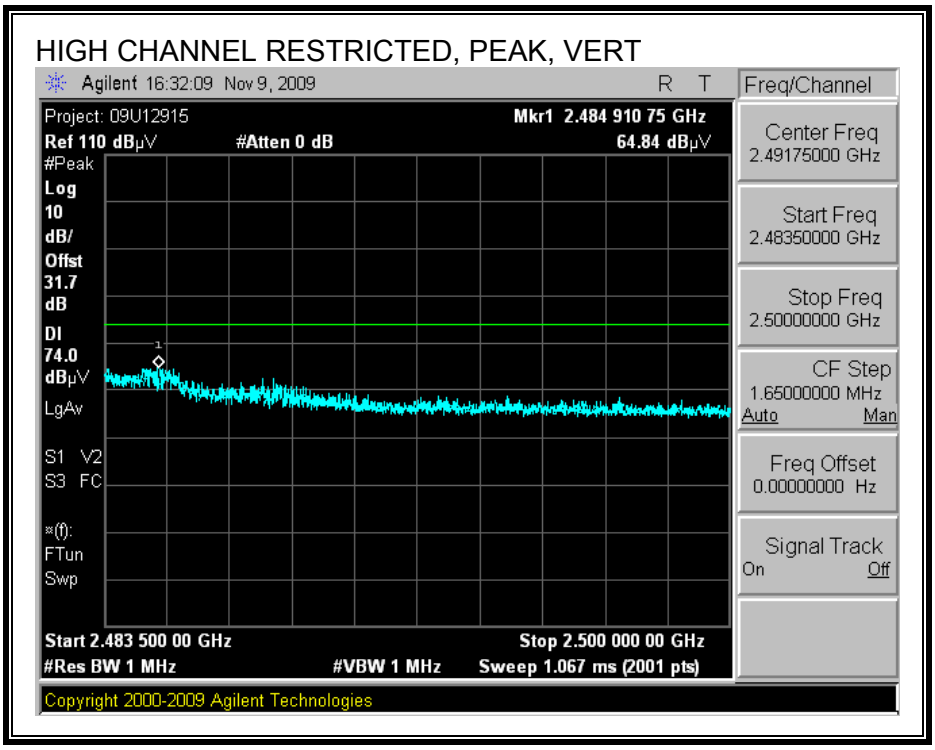
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



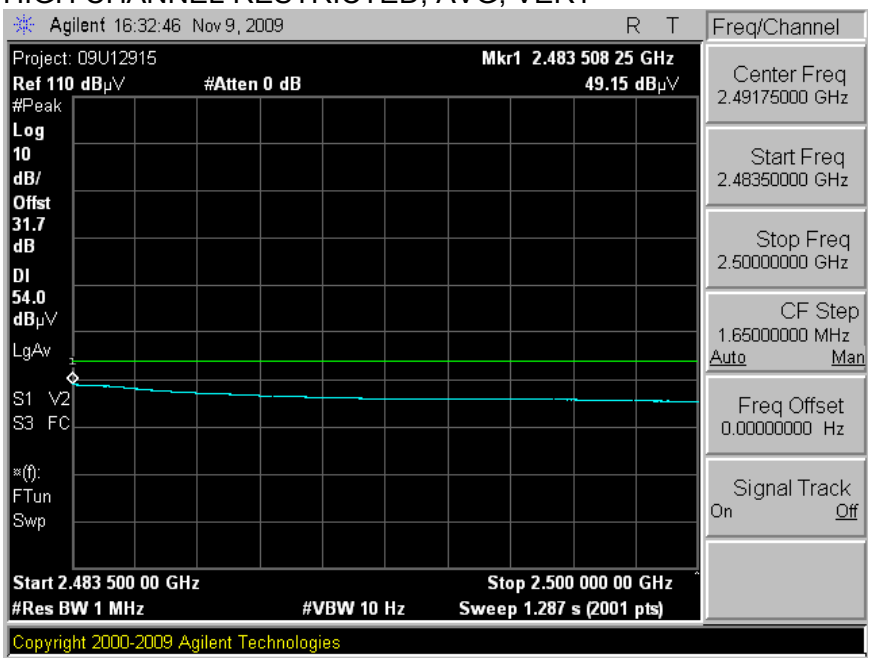
HIGH CHANNEL RESTRICTED, AVG, HORIZ



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



HIGH CHANNEL RESTRICTED, AVG, VERT



BANDEDGE TABULATED DATA for EUT with PIFA antenna

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Tom Chen
Date: 11/09/09
Project #: 09U12915
EUT Description: 802.11 bgn WLAN Client
EUT M/N: 1400
Test Target: FCC 15.247
Mode Oper: 802.11gb 6MB, TX

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

f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
g Mode 6MB Low CH, Power setting 23,16.57dBm															
2.390	3.0	36.3	28.1	3.5	0.0	0.0	0.0	67.8	74.0	-6.2	H	P	131.0	237.0	
2.390	3.0	19.7	28.1	3.5	0.0	0.0	0.0	51.2	54.0	-2.8	H	A	131.0	237.0	
g Mode 6MB Low CH, Power setting 22,15.9dBm															
2.390	3.0	35.1	28.1	3.5	0.0	0.0	0.0	66.7	74.0	-7.3	H	P	131.0	237.0	
2.390	3.0	18.7	28.1	3.5	0.0	0.0	0.0	50.3	54.0	-3.7	H	A	131.0	237.0	
g Mode 6MB Low CH, Power setting 22,15.9dBm															
2.390	3.0	36.2	28.1	3.5	0.0	0.0	0.0	67.7	74.0	-6.3	V	P	121.0	298.0	
2.390	3.0	19.2	28.1	3.5	0.0	0.0	0.0	50.8	54.0	-3.2	V	A	121.0	298.0	
g Mode 6MB High CH, Power setting 22,15.9dBm															
2.485	3.0	35.0	28.2	3.5	0.0	0.0	0.0	66.7	74.0	-7.3	H	P	136.0	16.0	
2.483	3.0	18.5	28.2	3.5	0.0	0.0	0.0	50.2	54.0	-3.8	H	A	136.0	16.0	
g Mode 6MB High CH, Power setting 22,15.9dBm															
2.485	3.0	33.1	28.2	3.5	0.0	0.0	0.0	64.8	74.0	-9.2	V	P	120.0	295.0	
2.484	3.0	17.4	28.2	3.5	0.0	0.0	0.0	49.2	54.0	-4.8	V	A	120.0	295.0	

Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor. (EUT with PIFA antenna)

HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Tom Chen
Date: 11/10/09
Project #: 09U12915
EUT Description: 802.11 bgn WLAN Client
EUT M/N: 1400
Test Target: FCC 15.247
Mode Oper: 802.11g 6MB, TX

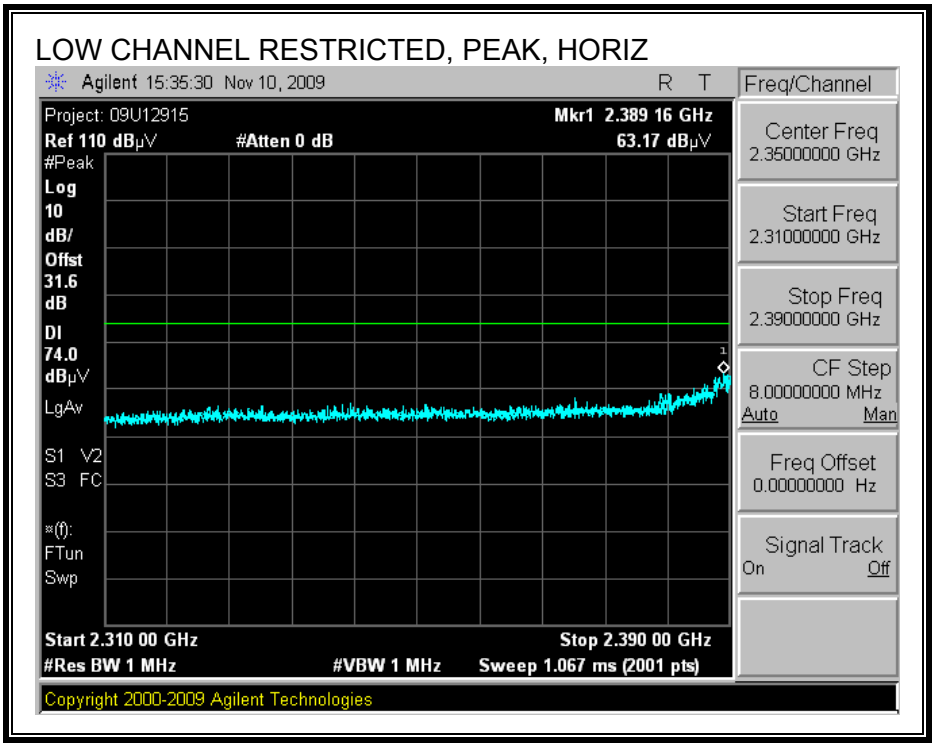
f	Measurement Frequency	Amp	Preamp Gain	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Margin vs.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

f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
2412 MHz Low CH, g mode pwr 22,16.0dBm													
4.824	3.0	39.9	32.7	5.8	-34.8	0.0	0.0	43.6	74.0	-30.4	H	P	
7.236	3.0	34.0	35.4	7.2	-34.1	0.0	0.0	42.4	74.0	-31.6	H	P	
4.824	3.0	27.1	32.7	5.8	-34.8	0.0	0.0	30.7	54.0	-23.3	H	A	
7.236	3.0	21.5	35.4	7.2	-34.1	0.0	0.0	30.0	54.0	-24.0	H	A	
4.824	3.0	39.6	32.7	5.8	-34.8	0.0	0.0	43.3	74.0	-30.7	V	P	
7.236	3.0	34.6	35.4	7.2	-34.1	0.0	0.0	43.0	74.0	-31.0	V	P	
4.824	3.0	26.1	32.7	5.8	-34.8	0.0	0.0	29.7	54.0	-24.3	V	A	
7.236	3.0	22.2	35.4	7.2	-34.1	0.0	0.0	30.7	54.0	-23.3	V	A	
2437 MHz Mid CH, g mode pwr 25,18.97dBm													
4.874	3.0	40.8	32.7	5.8	-34.8	0.0	0.0	44.5	74.0	-29.5	H	P	
7.311	3.0	37.8	35.5	7.3	-34.1	0.0	0.0	46.4	74.0	-27.6	H	P	
4.874	3.0	26.9	32.7	5.8	-34.8	0.0	0.0	30.7	54.0	-23.3	H	A	
7.311	3.0	23.9	35.5	7.3	-34.1	0.0	0.0	32.6	54.0	-21.4	H	A	
4.874	3.0	39.5	32.7	5.8	-34.8	0.0	0.0	43.2	74.0	-30.8	V	P	
7.311	3.0	41.1	35.5	7.3	-34.1	0.0	0.0	49.7	74.0	-24.3	V	P	
4.874	3.0	25.5	32.7	5.8	-34.8	0.0	0.0	29.3	54.0	-24.7	V	A	
7.311	3.0	24.8	35.5	7.3	-34.1	0.0	0.0	33.4	54.0	-20.6	V	A	
2462 MHz High CH, g mode pwr 22,16.0dBm													
4.924	3.0	35.1	32.7	5.9	-34.8	0.0	0.0	38.9	74.0	-35.1	H	P	
7.386	3.0	34.9	35.6	7.3	-34.1	0.0	0.0	43.7	74.0	-30.3	H	P	
4.924	3.0	24.3	32.7	5.9	-34.8	0.0	0.0	28.1	54.0	-25.9	H	A	
7.386	3.0	22.4	35.6	7.3	-34.1	0.0	0.0	31.1	54.0	-22.9	H	A	
4.924	3.0	35.4	32.7	5.9	-34.8	0.0	0.0	39.2	74.0	-34.8	V	P	
7.386	3.0	35.5	35.6	7.3	-34.1	0.0	0.0	44.2	74.0	-29.8	V	P	
4.924	3.0	23.0	32.7	5.9	-34.8	0.0	0.0	26.9	54.0	-27.2	V	A	
7.386	3.0	22.8	35.6	7.3	-34.1	0.0	0.0	31.5	54.0	-22.5	V	A	

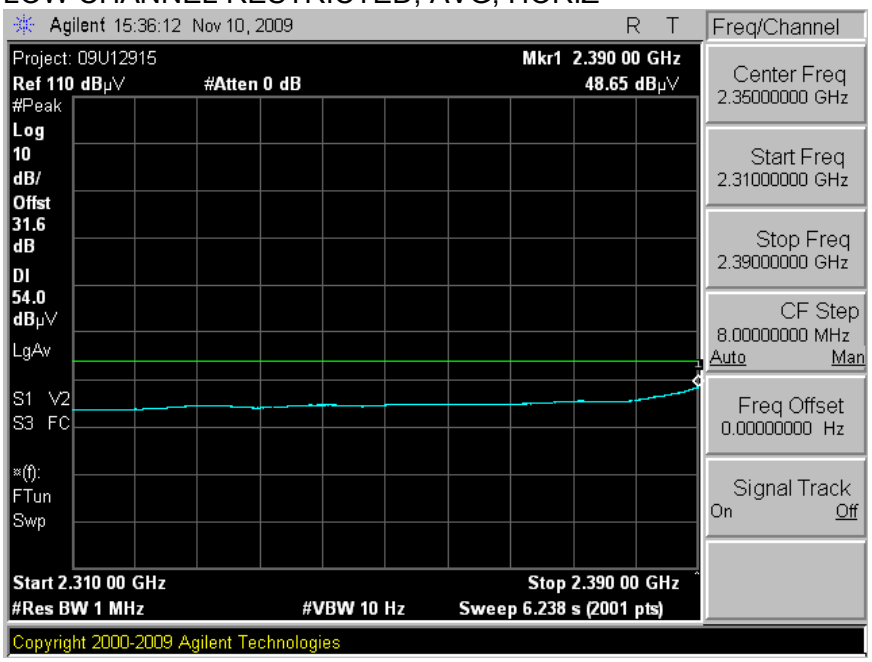
Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor.

WITH PWB ANTENNA

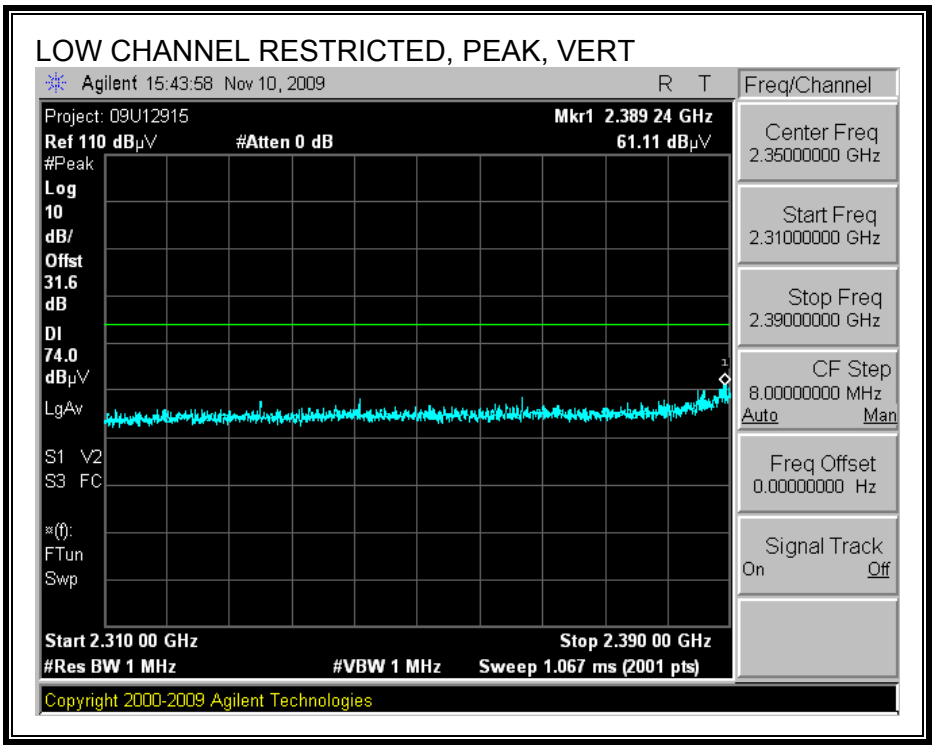
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



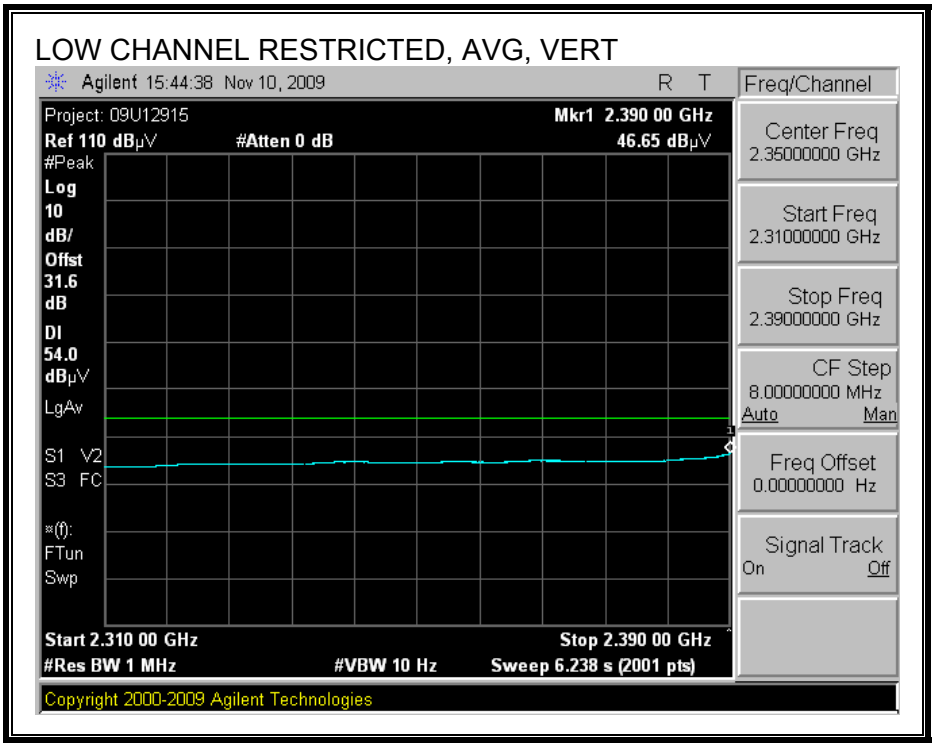
LOW CHANNEL RESTRICTED, AVG, HORIZ



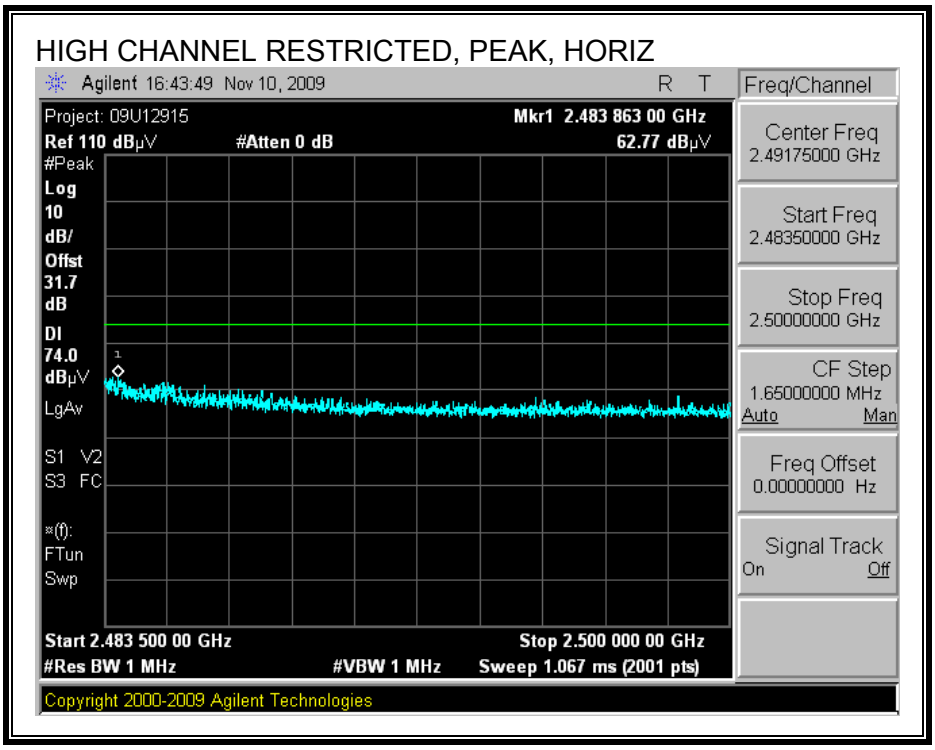
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



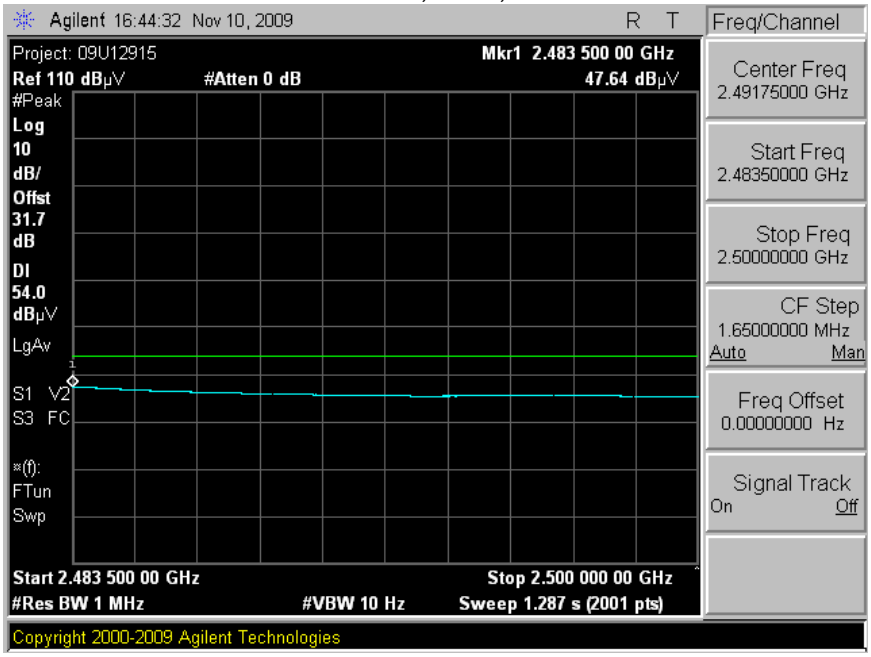
LOW CHANNEL RESTRICTED, AVG, VERT



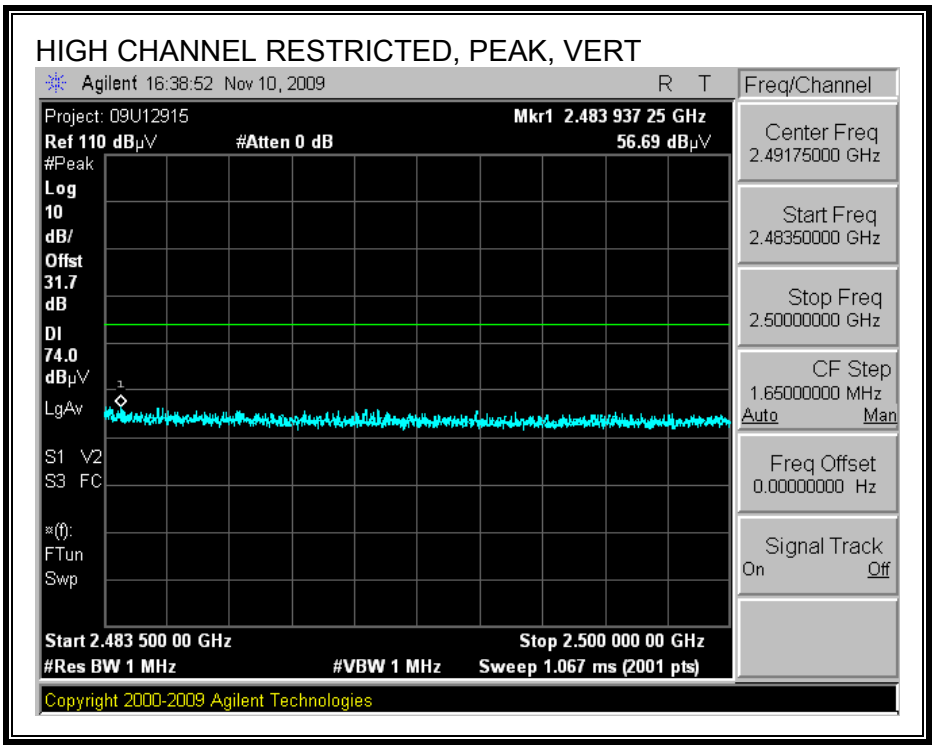
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



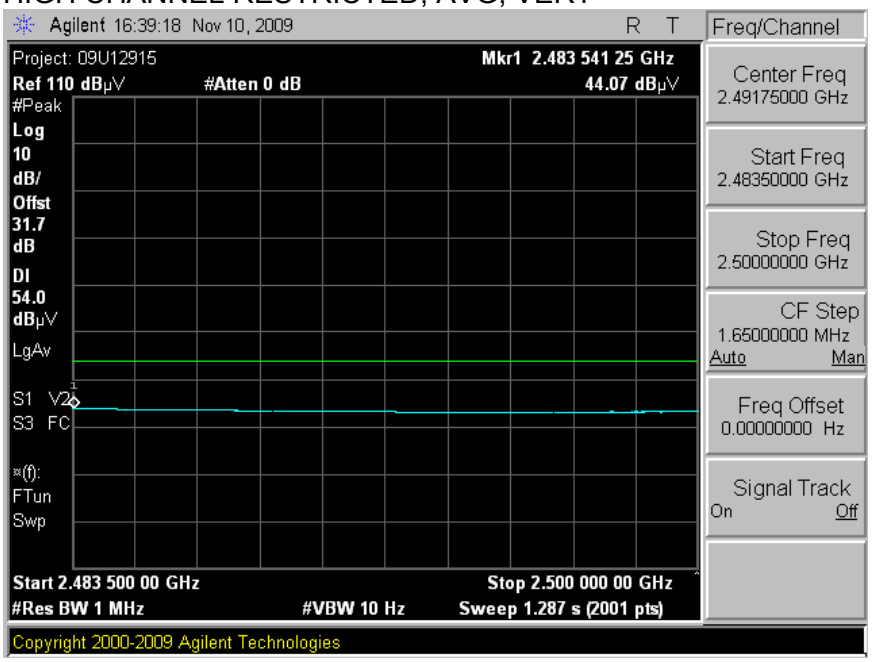
HIGH CHANNEL RESTRICTED, AVG, HORIZ



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



HIGH CHANNEL RESTRICTED, AVG, VERT



BANDEDGE TABULATED DATA for EUT with PWB antenna

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Tom Chen
Date: 11/10/09
Project #: 09U12915
EUT Description: 802.11 bgn WLAN Client
EUT M/N: 1400
Test Target: FCC 247
Mode Oper: 802.11g , TX with PWB Antenna

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

f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
Fundamental 2412 MHz Low CH, g mode pwr 22															Y Pos
2.389	3.0	31.6	28.1	3.5	0.0	0.0	0.0	63.2	74.0	-10.8	H	P	102.0	354.0	PWB ANT
2.390	3.0	17.1	28.1	3.5	0.0	0.0	0.0	48.7	54.0	-5.3	H	A	102.0	354.0	PWB ANT
2412 MHz Low CH, g mode pwr 22															
2.389	3.0	29.6	28.1	3.5	0.0	0.0	0.0	61.1	74.0	-12.9	V	P	119.0	180.0	PWB ANT
2.390	3.0	15.1	28.1	3.5	0.0	0.0	0.0	46.7	54.0	-7.3	V	A	119.0	180.0	PWB ANT
2462 MHz High CH, g mode pwr 22															
2.484	3.0	25.0	28.2	3.5	0.0	0.0	0.0	56.7	74.0	-17.3	V	P	98.0	114.0	PWB ANT
2.484	3.0	12.3	28.2	3.5	0.0	0.0	0.0	44.1	54.0	-9.9	V	A	98.0	114.0	PWB ANT
2462 MHz High CH, g mode pwr 22															
2.484	3.0	31.0	28.2	3.5	0.0	0.0	0.0	62.8	74.0	-11.2	H	P	128.0	330.0	PWB ANT
2.483	3.0	15.9	28.2	3.5	0.0	0.0	0.0	47.6	54.0	-6.4	H	A	128.0	330.0	PWB ANT

Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor. (EUT with PWB antenna)

HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Tom Chen
Date: 11/11/09
Project #: 09U12915
EUT Description: 802.11 bgn WLAN Client
EUT M/N: 1400
Test Target: FCC 247
Mode Oper: 802.11g , TX with PWB Antenna

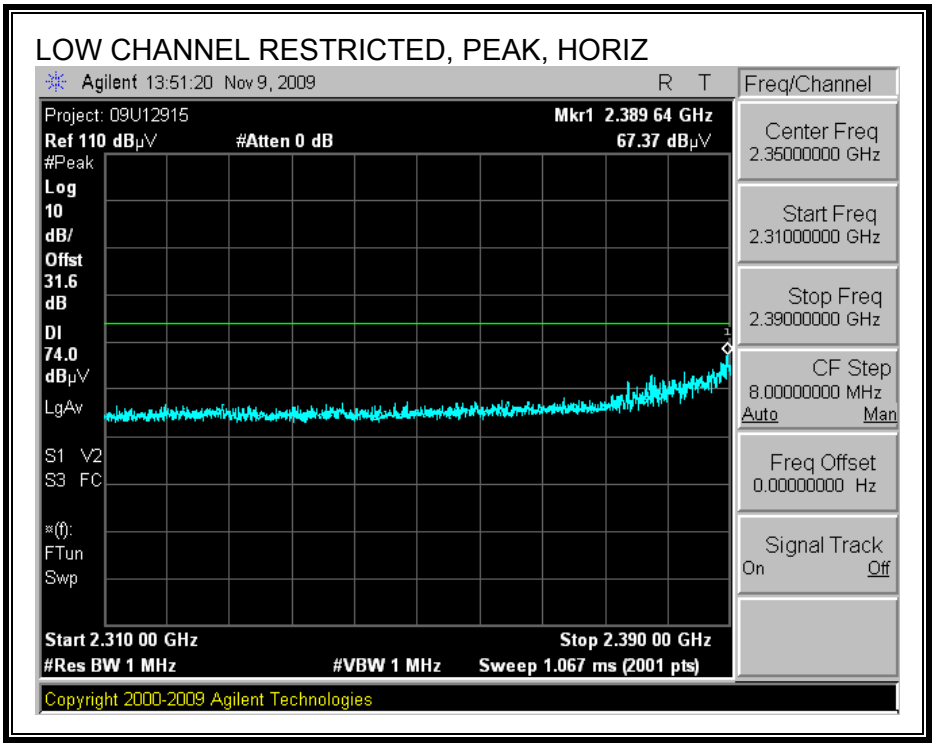
	f	Measurement Frequency	Amp	Preamp Gain	Average Field Strength Limit
	Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Peak Field Strength Limit
	Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Margin vs. Average Limit
	AF	Antenna Factor	Peak	Calculated Peak Field Strength	Margin vs.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

f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
2412MHz Low CH, Power 22													
4.824	3.0	41.5	32.8	5.8	-34.8	0.0	0.0	45.3	74.0	-28.7	V	P	PWB ANT
7.236	3.0	37.4	35.1	7.2	-34.7	0.0	0.0	45.0	74.0	-29.0	V	P	PWB ANT
4.824	3.0	29.4	32.8	5.8	-34.8	0.0	0.0	33.1	54.0	-20.9	V	A	PWB ANT
7.236	3.0	25.3	35.1	7.2	-34.7	0.0	0.0	33.0	54.0	-21.0	V	A	PWB ANT
4.824	3.0	42.2	32.8	5.8	-34.8	0.0	0.0	45.9	74.0	-28.1	H	P	PWB ANT
7.236	3.0	37.9	35.1	7.2	-34.7	0.0	0.0	45.5	74.0	-28.5	H	P	PWB ANT
4.824	3.0	28.9	32.8	5.8	-34.8	0.0	0.0	32.6	54.0	-21.4	H	A	PWB ANT
7.236	3.0	25.1	35.1	7.2	-34.7	0.0	0.0	32.8	54.0	-21.2	H	A	PWB ANT
2437MHz Mid CH, Power 25													
4.874	3.0	42.1	32.8	5.8	-34.9	0.0	0.0	45.9	74.0	-28.1	H	P	PWB ANT
7.311	3.0	40.9	35.2	7.3	-34.7	0.0	0.0	48.7	74.0	-25.3	H	P	PWB ANT
4.874	3.0	29.1	32.8	5.8	-34.9	0.0	0.0	32.9	54.0	-21.1	H	A	PWB ANT
7.311	3.0	25.8	35.2	7.3	-34.7	0.0	0.0	33.6	54.0	-20.4	H	A	PWB ANT
4.874	3.0	41.8	32.8	5.8	-34.9	0.0	0.0	45.5	74.0	-28.5	V	P	PWB ANT
7.311	3.0	39.3	35.2	7.3	-34.7	0.0	0.0	47.1	74.0	-26.9	V	P	PWB ANT
4.874	3.0	29.1	32.8	5.8	-34.9	0.0	0.0	32.9	54.0	-21.1	V	A	PWB ANT
7.311	3.0	25.8	35.2	7.3	-34.7	0.0	0.0	33.6	54.0	-20.4	V	A	PWB ANT
2462MHz High CH, Power 22													
4.924	3.0	38.1	32.8	5.9	-34.9	0.0	0.0	41.9	74.0	-32.1	V	P	PWB ANT
7.386	3.0	38.0	35.3	7.3	-34.6	0.0	0.0	45.9	74.0	-28.1	V	P	PWB ANT
4.924	3.0	25.9	32.8	5.9	-34.9	0.0	0.0	29.8	54.0	-24.2	V	A	PWB ANT
7.386	3.0	25.1	35.3	7.3	-34.6	0.0	0.0	33.1	54.0	-20.9	V	A	PWB ANT
4.924	3.0	38.9	32.8	5.9	-34.9	0.0	0.0	42.8	74.0	-31.2	H	P	PWB ANT
7.386	3.0	38.9	35.3	7.3	-34.6	0.0	0.0	46.9	74.0	-27.1	H	P	PWB ANT
4.924	3.0	27.3	32.8	5.9	-34.9	0.0	0.0	31.2	54.0	-22.8	H	A	PWB ANT
7.386	3.0	25.5	35.3	7.3	-34.6	0.0	0.0	33.4	54.0	-20.6	H	A	PWB ANT

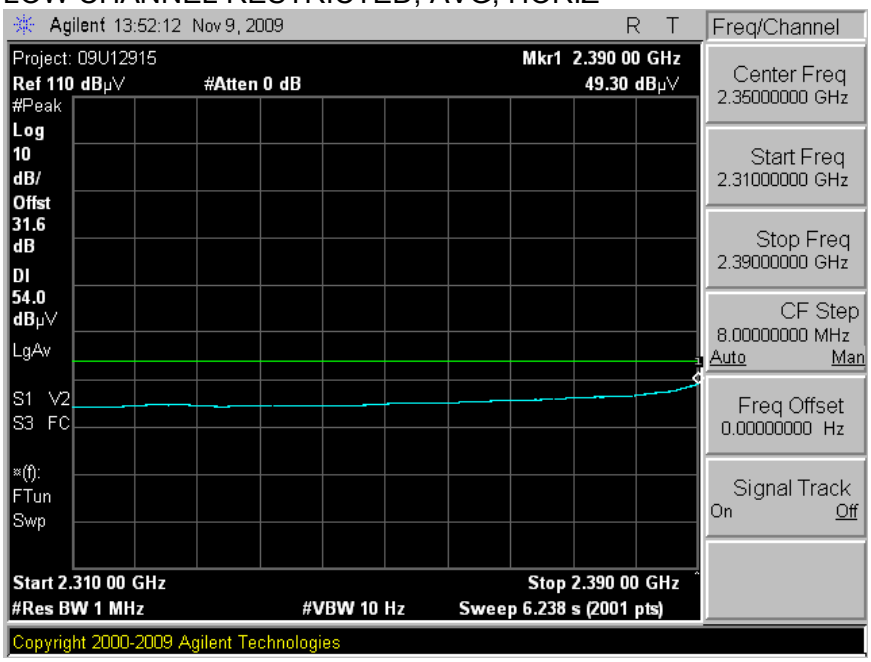
Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor.

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

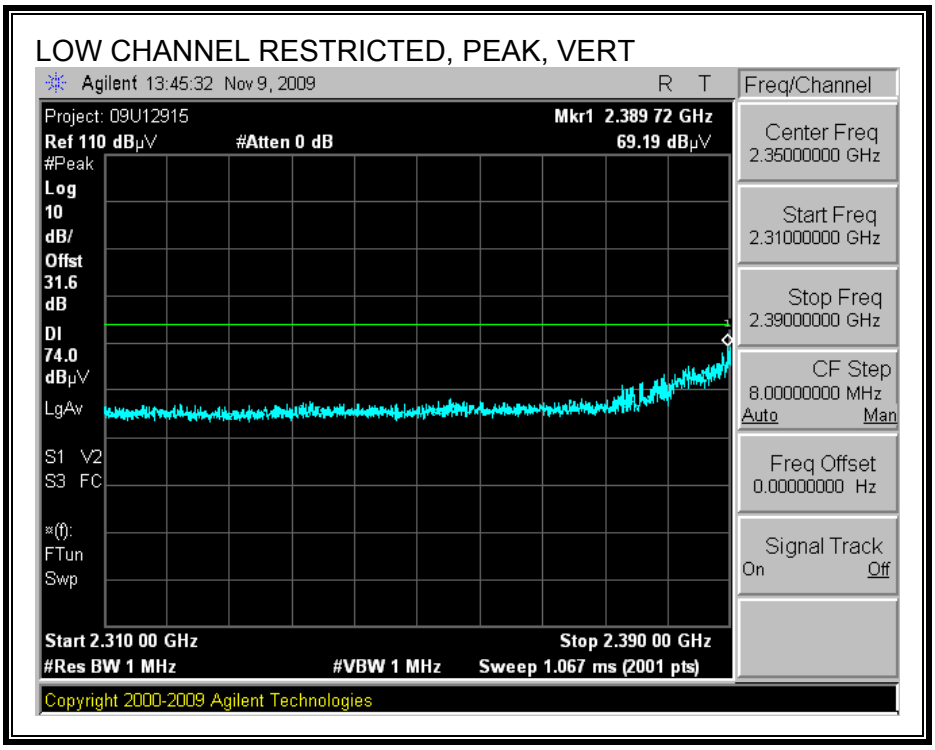
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



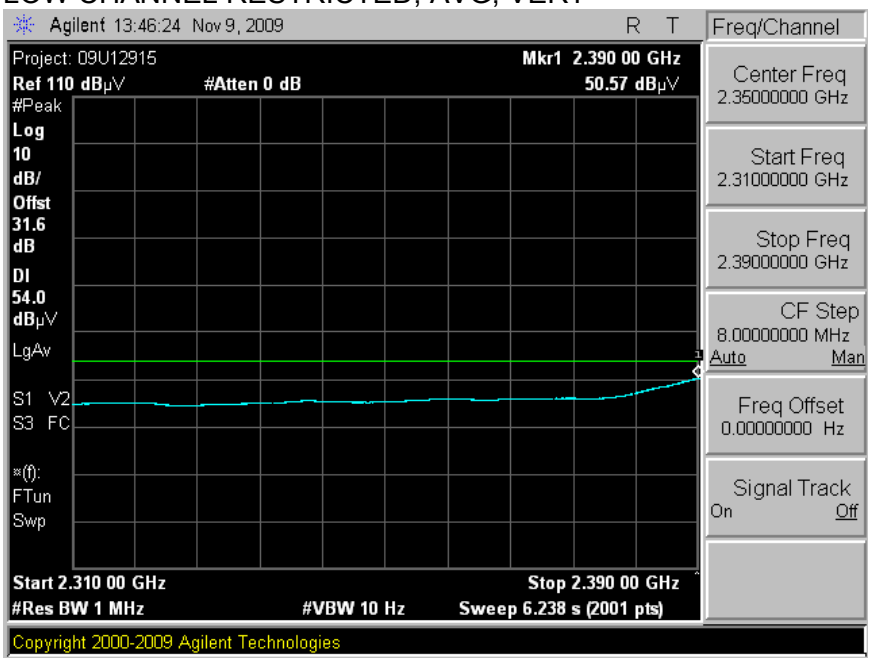
LOW CHANNEL RESTRICTED, AVG, HORIZ



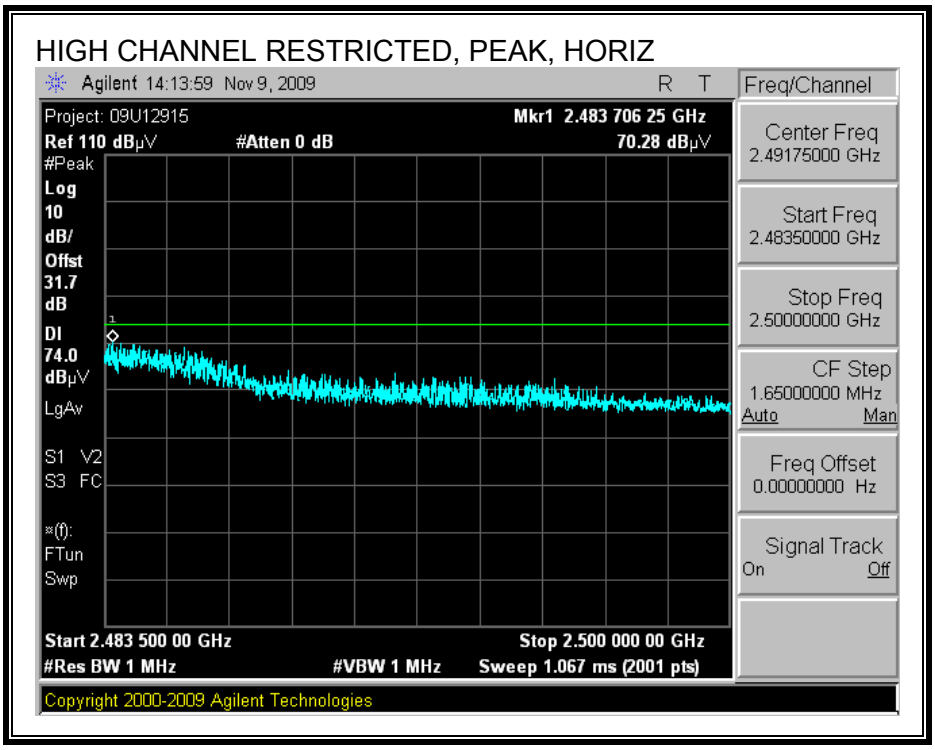
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



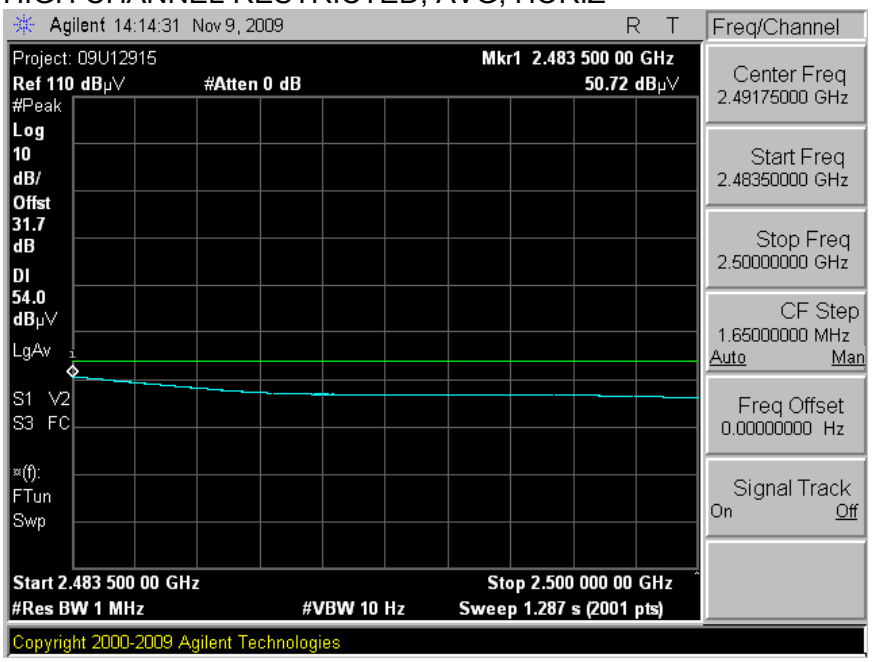
LOW CHANNEL RESTRICTED, AVG, VERT



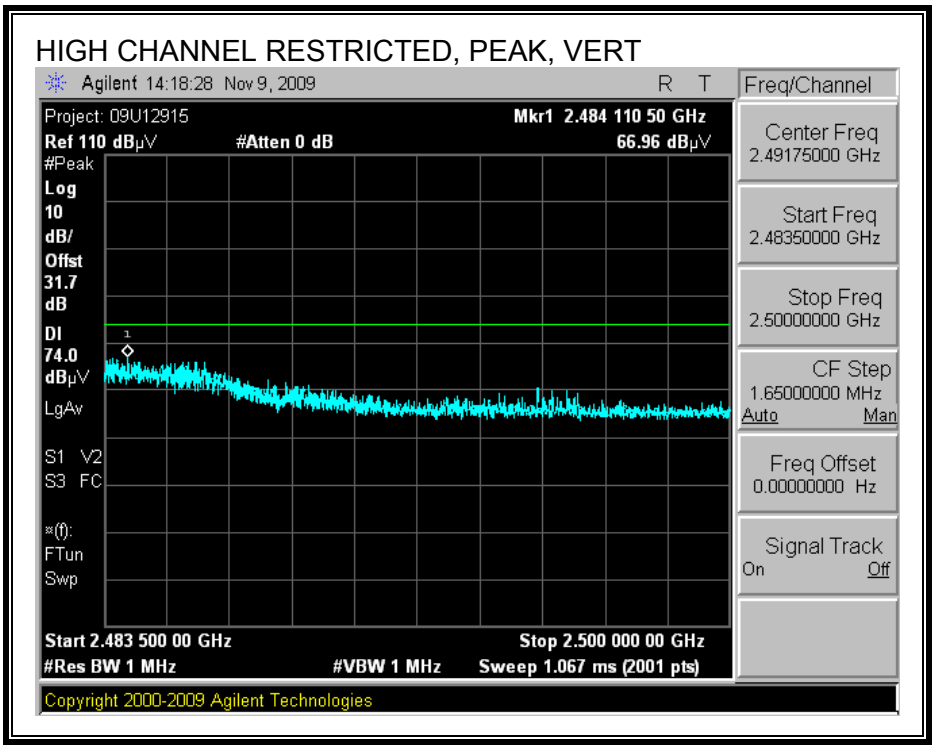
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



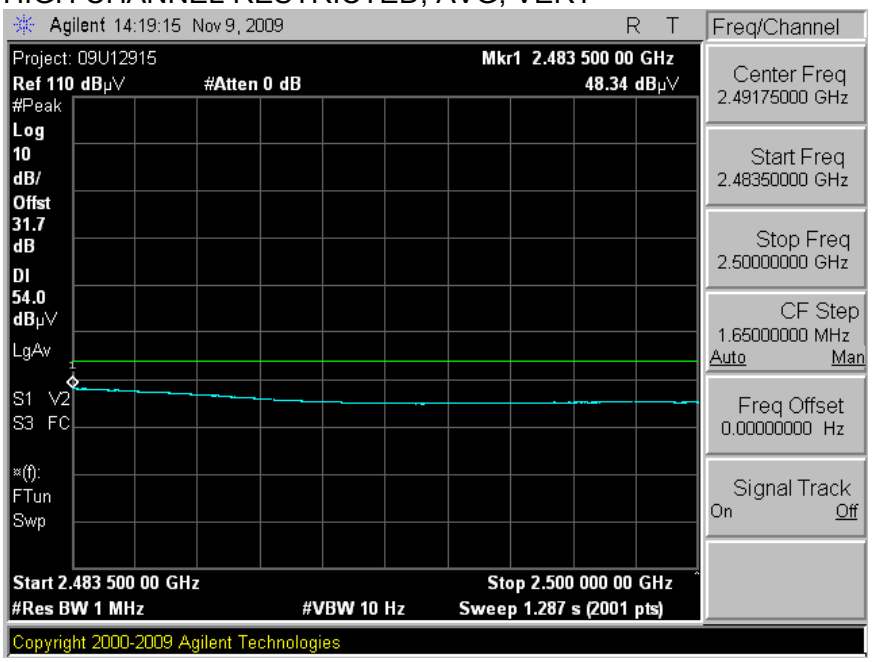
HIGH CHANNEL RESTRICTED, AVG, HORIZ



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



HIGH CHANNEL RESTRICTED, AVG, VERT



BANDEDGE TABULATED DATA for EUT with PIFA antenna

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Tom Chen
Date: 11/09/09
Project #: 09U12915
EUT Description: 802.11 bgn WLAN Client
EUT M/N: 1400
Test Target: FCC 247
Mode Oper: 802.11n HT20, TX

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

f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
HT20 MCS7 Low CH, Power setting 20, 15.5dBm															
2.390	3.0	37.6	28.1	3.5	0.0	0.0	0.0	69.2	74.0	-4.8	V	P	100.0	297.0	
2.390	3.0	19.0	28.1	3.5	0.0	0.0	0.0	50.6	54.0	-3.4	V	A	100.0	297.0	
HT20 MCS7 Low CH, Power setting 20, 15.5dBm															
2.390	3.0	35.8	28.1	3.5	0.0	0.0	0.0	67.4	74.0	-6.6	H	P	133.0	238.0	
2.390	3.0	17.7	28.1	3.5	0.0	0.0	0.0	49.3	54.0	-4.7	H	A	133.0	238.0	
HT20 MCS7 High CH, Power setting 21,15.8dBm															
2.484	3.0	38.5	28.2	3.5	0.0	0.0	0.0	70.3	74.0	-3.7	H	P	136.0	21.0	
2.483	3.0	19.0	28.2	3.5	0.0	0.0	0.0	50.7	54.0	-3.3	H	A	136.0	21.0	
HT20 MCS7 High CH, Power setting 21,15.8dBm															
2.484	3.0	35.2	28.2	3.5	0.0	0.0	0.0	67.0	74.0	-7.0	V	P	100.0	298.0	
2.483	3.0	16.6	28.2	3.5	0.0	0.0	0.0	48.3	54.0	-5.7	V	A	100.0	298.0	
HT20 MCS7 Low CH, Power setting 22,16.2dBm															
2.390	3.0	41.2	28.1	3.5	0.0	0.0	0.0	72.7	74.0	-1.3	V	P	100.0	297.0	
2.390	3.0	20.7	28.1	3.5	0.0	0.0	0.0	52.3	54.0	-1.7	V	A	100.0	297.0	
HT20 MCS7 High CH, Power setting 22,16.2dBm															
2.484	3.0	38.2	28.2	3.5	0.0	0.0	0.0	69.9	74.0	-4.1	V	P	121.0	296.0	
2.484	3.0	18.5	28.2	3.5	0.0	0.0	0.0	50.2	54.0	-3.8	V	A	121.0	296.0	
HT20 MCS7 High CH, Power setting 22,16.2dBm															
2.484	3.0	39.2	28.2	3.5	0.0	0.0	0.0	70.9	74.0	-3.1	H	P	137.0	19.0	
2.484	3.0	19.4	28.2	3.5	0.0	0.0	0.0	51.1	54.0	-2.9	H	A	137.0	19.0	

Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor. (EUT with PIFA antenna)

HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Tom Chen
Date: 11/10/09
Project #: 09U12915
EUT Description: 802.11 bgn WLAN Client
EUT M/N: 1400
Test Target: FCC 247
Mode Oper: 802.11n HT20, TX

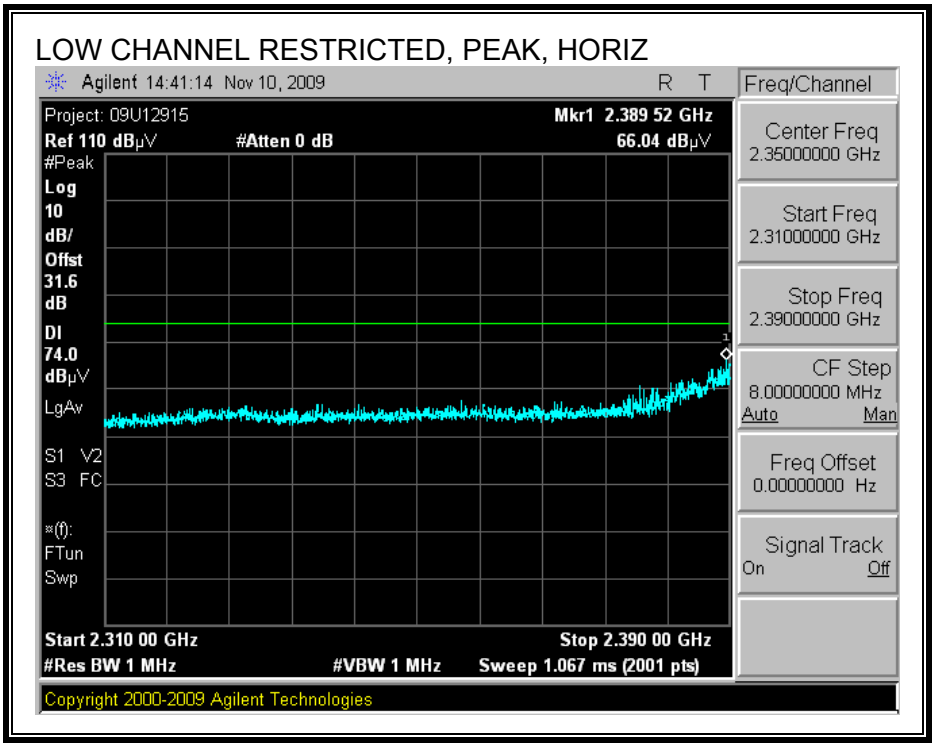
f	Measurement Frequency	Amp	Preamp Gain		Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters		Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m		Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength		Margin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

f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
2412 MHz Low CH, HT20 pwr 20,15.6dBm													
4.824	3.0	38.7	32.7	5.8	-34.8	0.0	0.0	42.4	74.0	-31.6	V	P	
7.236	3.0	34.8	35.4	7.2	-34.1	0.0	0.0	43.2	74.0	-30.8	V	P	
4.824	3.0	25.8	32.7	5.8	-34.8	0.0	0.0	29.4	54.0	-24.6	V	A	
7.236	3.0	21.0	35.4	7.2	-34.1	0.0	0.0	29.5	54.0	-24.5	V	A	
4.824	3.0	40.0	32.7	5.8	-34.8	0.0	0.0	43.6	74.0	-30.4	H	P	
7.236	3.0	34.3	35.4	7.2	-34.1	0.0	0.0	42.8	74.0	-31.2	H	P	
4.824	3.0	26.4	32.7	5.8	-34.8	0.0	0.0	30.1	54.0	-23.9	H	A	
7.236	3.0	21.6	35.4	7.2	-34.1	0.0	0.0	30.1	54.0	-23.9	H	A	
2437 MHz Mid CH, HT20 pwr 26,18.35dBm													
4.874	3.0	41.8	32.7	5.8	-34.8	0.0	0.0	45.5	74.0	-28.5	H	P	
7.311	3.0	39.7	35.5	7.3	-34.1	0.0	0.0	48.3	74.0	-25.7	H	P	
4.874	3.0	27.7	32.7	5.8	-34.8	0.0	0.0	31.5	54.0	-22.5	H	A	
7.311	3.0	24.4	35.5	7.3	-34.1	0.0	0.0	33.1	54.0	-20.9	H	A	
4.874	3.0	43.4	32.7	5.8	-34.8	0.0	0.0	47.1	74.0	-26.9	V	P	
7.311	3.0	38.0	35.5	7.3	-34.1	0.0	0.0	46.6	74.0	-27.4	V	P	
4.874	3.0	25.9	32.7	5.8	-34.8	0.0	0.0	29.7	54.0	-24.3	V	A	
7.311	3.0	23.5	35.5	7.3	-34.1	0.0	0.0	32.1	54.0	-21.9	V	A	
2462 MHz High CH, HT20 pwr 21,16.0dBm													
4.924	3.0	36.9	32.7	5.9	-34.8	0.0	0.0	40.7	74.0	-33.3	V	P	
7.386	3.0	33.8	35.6	7.3	-34.1	0.0	0.0	42.6	74.0	-31.4	V	P	
4.924	3.0	24.0	32.7	5.9	-34.8	0.0	0.0	27.8	54.0	-26.2	V	A	
7.386	3.0	21.6	35.6	7.3	-34.1	0.0	0.0	30.4	54.0	-23.6	V	A	
4.924	3.0	36.3	32.7	5.9	-34.8	0.0	0.0	40.1	74.0	-33.9	H	P	
7.386	3.0	35.0	35.6	7.3	-34.1	0.0	0.0	43.8	74.0	-30.2	H	P	
4.924	3.0	24.2	32.7	5.9	-34.8	0.0	0.0	28.0	54.0	-26.0	H	A	
7.386	3.0	22.0	35.6	7.3	-34.1	0.0	0.0	30.8	54.0	-23.2	H	A	

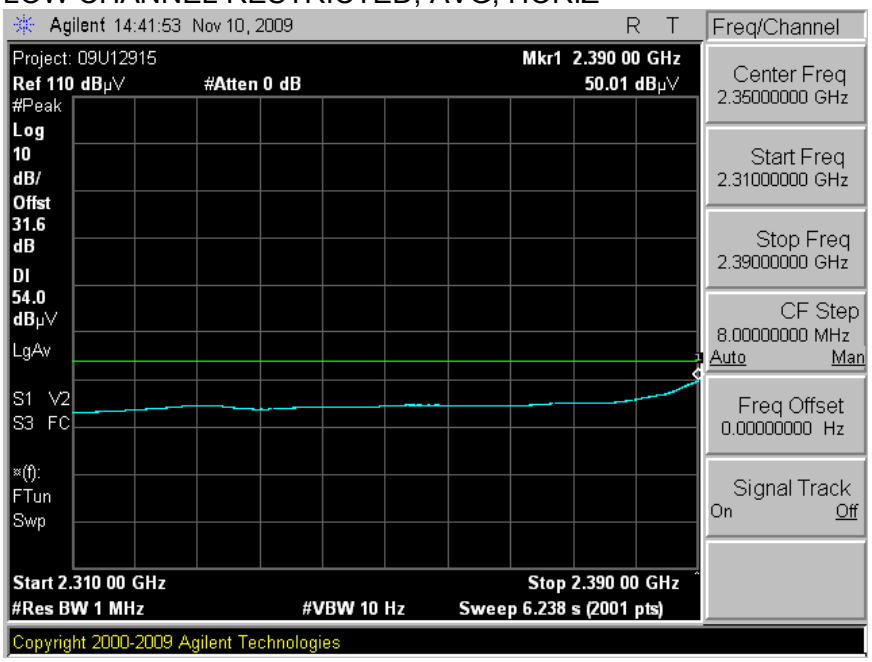
Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor.

WITH PWB ANTENNA

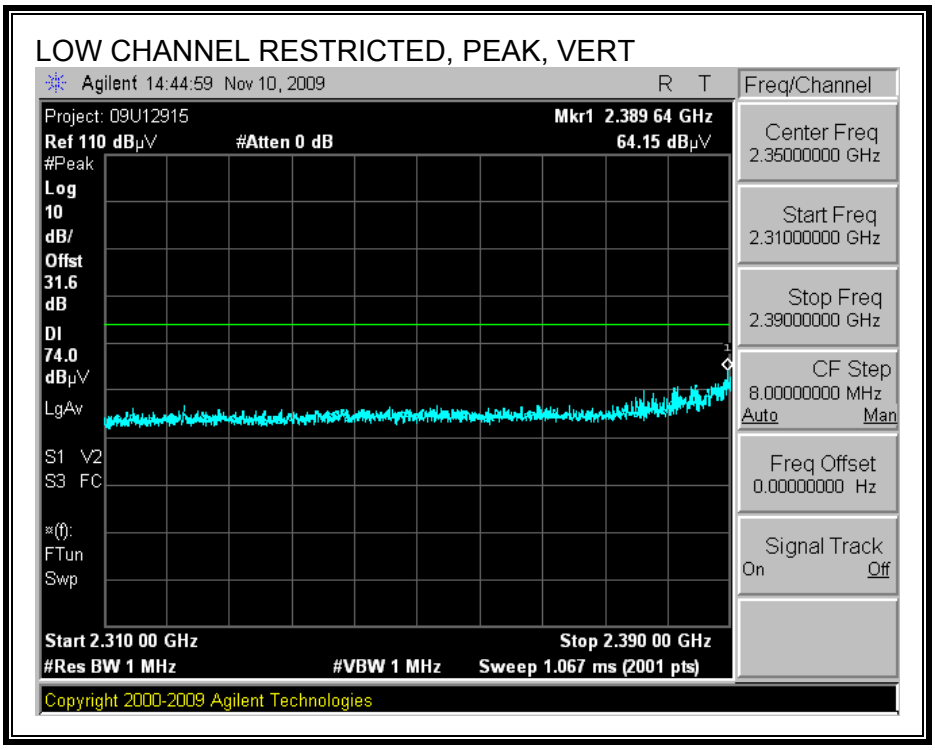
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



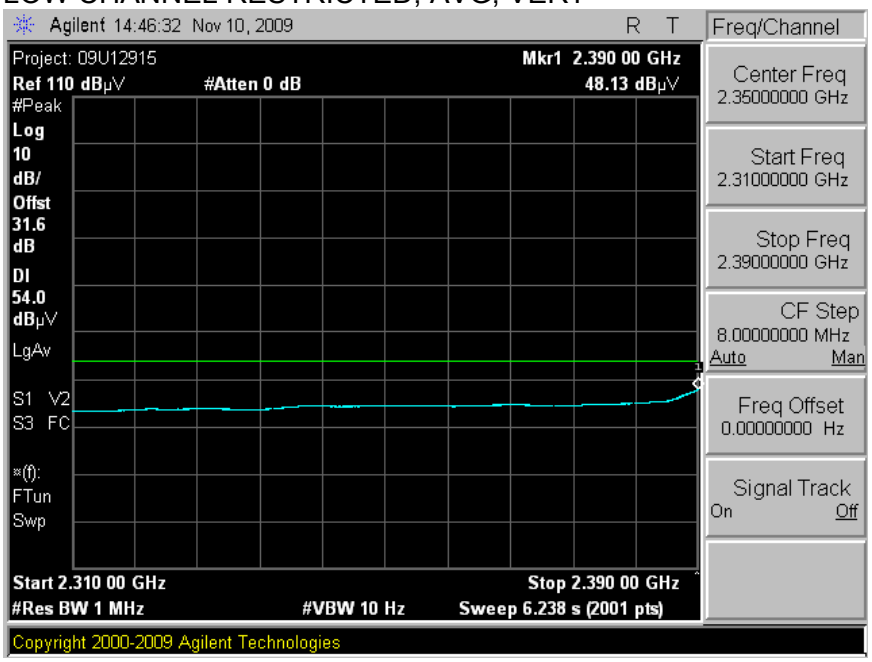
LOW CHANNEL RESTRICTED, AVG, HORIZ



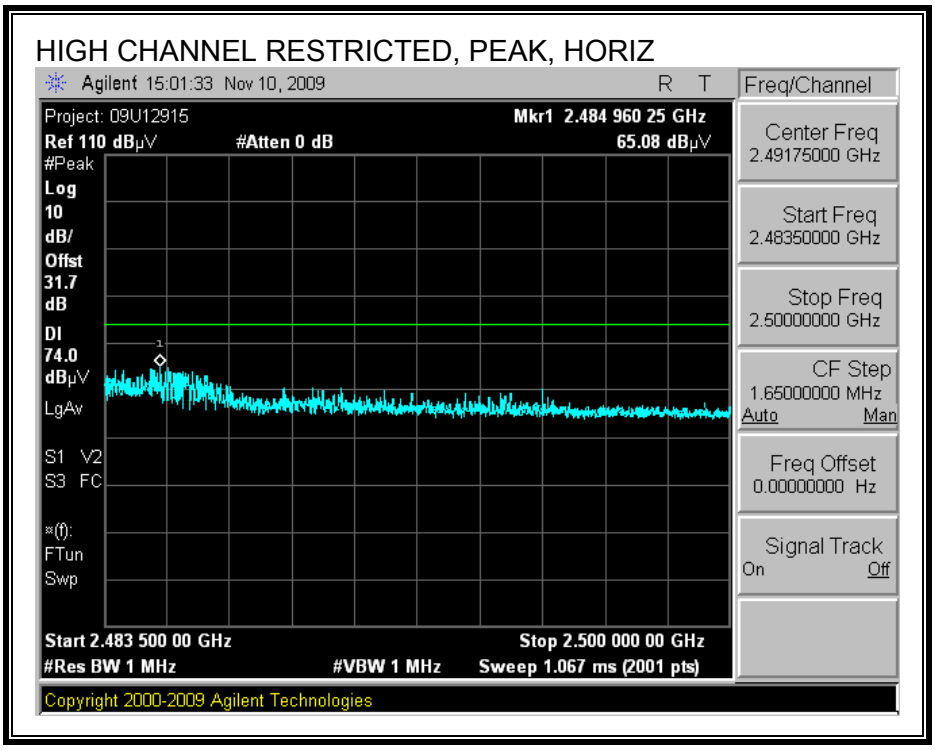
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



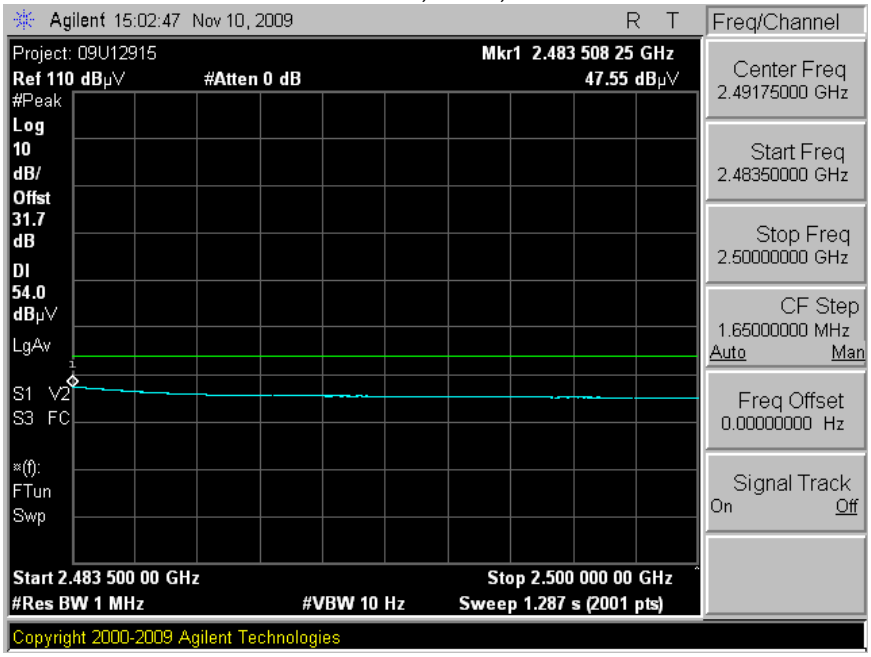
LOW CHANNEL RESTRICTED, AVG, VERT



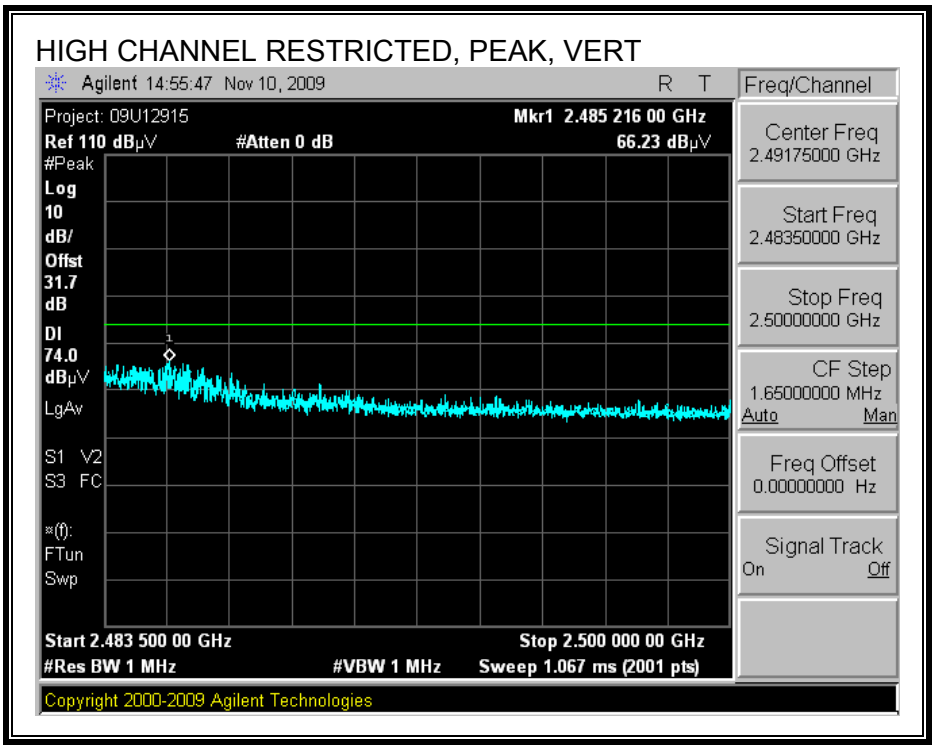
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



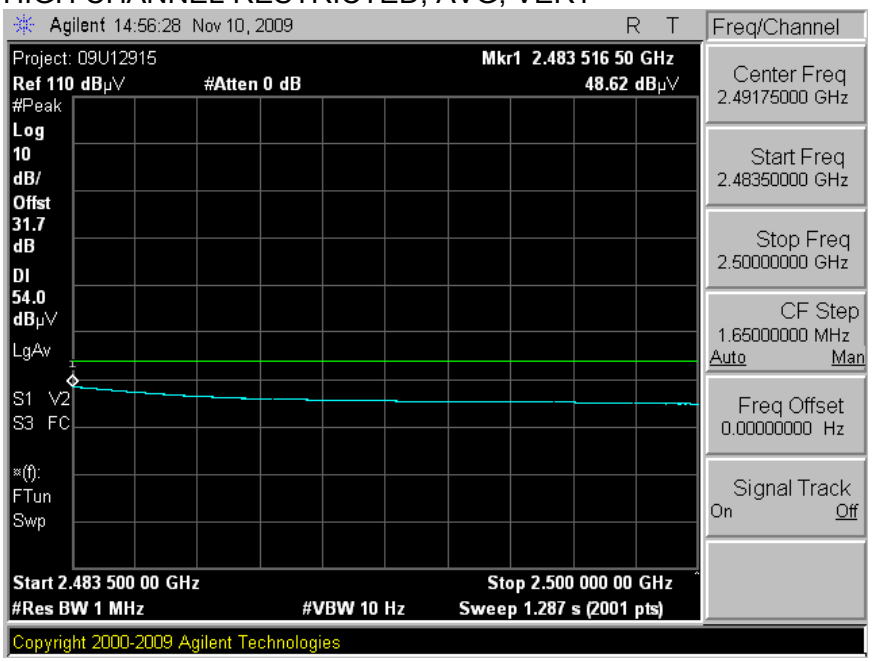
HIGH CHANNEL RESTRICTED, AVG, HORIZ



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



HIGH CHANNEL RESTRICTED, AVG, VERT



BANDEDGE TABULATED DATA for EUT with PWB antenna

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Tom Chen
Date: 11/10/09
Project #: 09U12915
EUT Description: 802.11 bgn WLAN Client
EUT M/N: 1400
Test Target: FCC 247
Mode Oper: 802.11n HT20, TX with PWB Antenna

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

f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
2412 MHz Low CH, HT20 pwr 20,15.6dBm															
2.390	3.0	34.5	28.1	3.5	0.0	0.0	0.0	66.0	74.0	-8.0	H	P	100.0	354.0	PWB ANT
2.390	3.0	18.5	28.1	3.5	0.0	0.0	0.0	50.0	54.0	-4.0	H	A	100.0	354.0	PWB ANT
2412 MHz Low CH, HT20 pwr 20,15.6dBm															
2.390	3.0	32.6	28.1	3.5	0.0	0.0	0.0	64.1	74.0	-9.9	V	P	117.0	179.0	PWB ANT
2.390	3.0	16.6	28.1	3.5	0.0	0.0	0.0	48.1	54.0	-5.9	V	A	117.0	179.0	PWB ANT
2462 MHz High CH, HT20 pwr 21,15.6dBm															
2.485	3.0	34.5	28.2	3.5	0.0	0.0	0.0	66.2	74.0	-7.8	V	P	100.0	347.0	PWB ANT
2.484	3.0	16.9	28.2	3.5	0.0	0.0	0.0	48.6	54.0	-5.4	V	A	100.0	347.0	PWB ANT
2462 MHz High CH, HT20 pwr 21,15.8dBm															
2.485	3.0	33.4	28.2	3.5	0.0	0.0	0.0	65.1	74.0	-8.9	H	P	99.0	347.0	PWB ANT
2.484	3.0	15.8	28.2	3.5	0.0	0.0	0.0	47.5	54.0	-6.5	H	A	99.0	347.0	PWB ANT

Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor. (EUT with PWB antenna)

HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Tom Chen
Date: 11/11/09
Project #: 09U12915
EUT Description: 802.11 bgn WLAN Client
EUT M/N: 1400
Test Target: FCC 247
Mode Oper: 802.11n HT20, TX with PWB Antenna

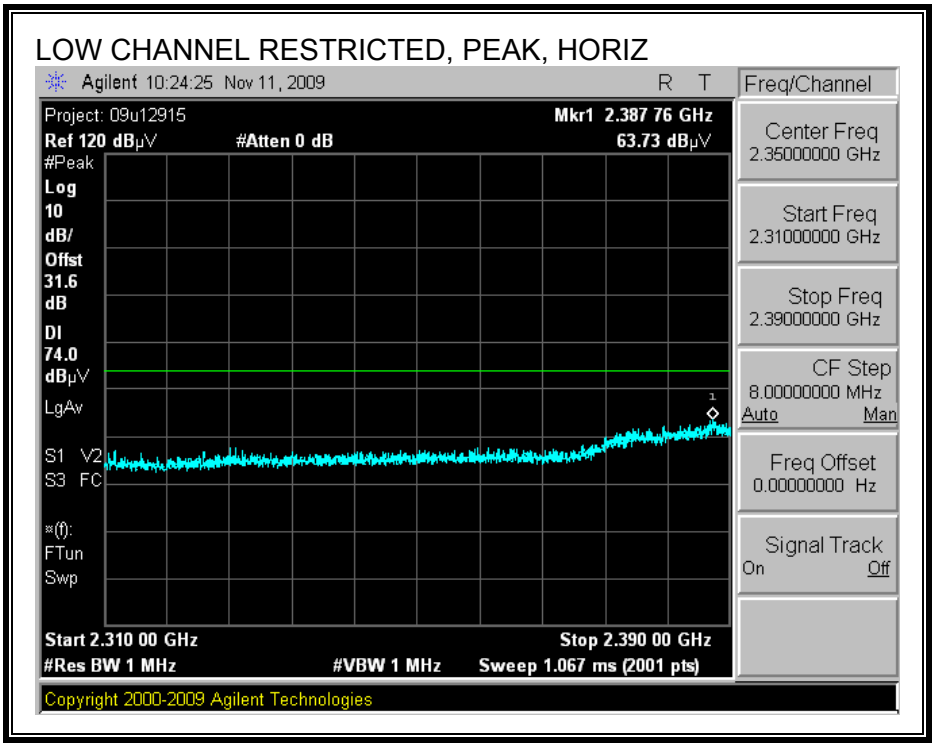
f	Measurement Frequency	Amp	Preamp Gain		Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters		Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m		Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength		Margin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

f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
2412MHz Low CH, Power 20													
4.824	3.0	41.5	32.8	5.8	-34.8	0.0	0.0	45.2	74.0	-28.8	H	P	PWB ANT
7.236	3.0	37.3	35.1	7.2	-34.7	0.0	0.0	44.9	74.0	-29.1	H	P	PWB ANT
4.824	3.0	28.6	32.8	5.8	-34.8	0.0	0.0	32.3	54.0	-21.7	H	A	PWB ANT
7.236	3.0	24.9	35.1	7.2	-34.7	0.0	0.0	32.5	54.0	-21.5	H	A	PWB ANT
4.824	3.0	40.6	32.8	5.8	-34.8	0.0	0.0	44.3	74.0	-29.7	V	P	PWB ANT
7.236	3.0	37.5	35.1	7.2	-34.7	0.0	0.0	45.1	74.0	-28.9	V	P	PWB ANT
4.824	3.0	28.7	32.8	5.8	-34.8	0.0	0.0	32.4	54.0	-21.6	V	A	PWB ANT
7.236	3.0	25.0	35.1	7.2	-34.7	0.0	0.0	32.7	54.0	-21.3	V	A	PWB ANT
2437MHz Mid CH, Power 26													
4.874	3.0	41.9	32.8	5.8	-34.9	0.0	0.0	45.7	74.0	-28.3	V	P	PWB ANT
7.311	3.0	37.5	35.2	7.3	-34.7	0.0	0.0	45.4	74.0	-28.7	V	P	PWB ANT
4.874	3.0	27.8	32.8	5.8	-34.9	0.0	0.0	31.6	54.0	-22.4	V	A	PWB ANT
7.311	3.0	25.3	35.2	7.3	-34.7	0.0	0.0	33.1	54.0	-20.9	V	A	PWB ANT
4.874	3.0	42.8	32.8	5.8	-34.9	0.0	0.0	46.5	74.0	-27.5	H	P	PWB ANT
7.311	3.0	42.2	35.2	7.3	-34.7	0.0	0.0	50.0	74.0	-24.0	H	P	PWB ANT
4.874	3.0	29.5	32.8	5.8	-34.9	0.0	0.0	33.3	54.0	-20.7	H	A	PWB ANT
7.311	3.0	26.1	35.2	7.3	-34.7	0.0	0.0	33.9	54.0	-20.1	H	A	PWB ANT
2462MHz High CH, Power 21													
4.924	3.0	38.7	32.8	5.9	-34.9	0.0	0.0	42.5	74.0	-31.5	H	P	PWB ANT
7.386	3.0	39.9	35.3	7.3	-34.6	0.0	0.0	47.9	74.0	-26.1	H	P	PWB ANT
4.924	3.0	28.1	32.8	5.9	-34.9	0.0	0.0	32.0	54.0	-22.0	H	A	PWB ANT
7.386	3.0	25.6	35.3	7.3	-34.6	0.0	0.0	33.6	54.0	-20.4	H	A	PWB ANT
4.924	3.0	39.3	32.8	5.9	-34.9	0.0	0.0	43.1	74.0	-30.9	V	P	PWB ANT
7.386	3.0	38.1	35.3	7.3	-34.6	0.0	0.0	46.1	74.0	-27.9	V	P	PWB ANT
4.924	3.0	26.7	32.8	5.9	-34.9	0.0	0.0	30.6	54.0	-23.4	V	A	PWB ANT
7.386	3.0	25.2	35.3	7.3	-34.6	0.0	0.0	33.1	54.0	-20.9	V	A	PWB ANT

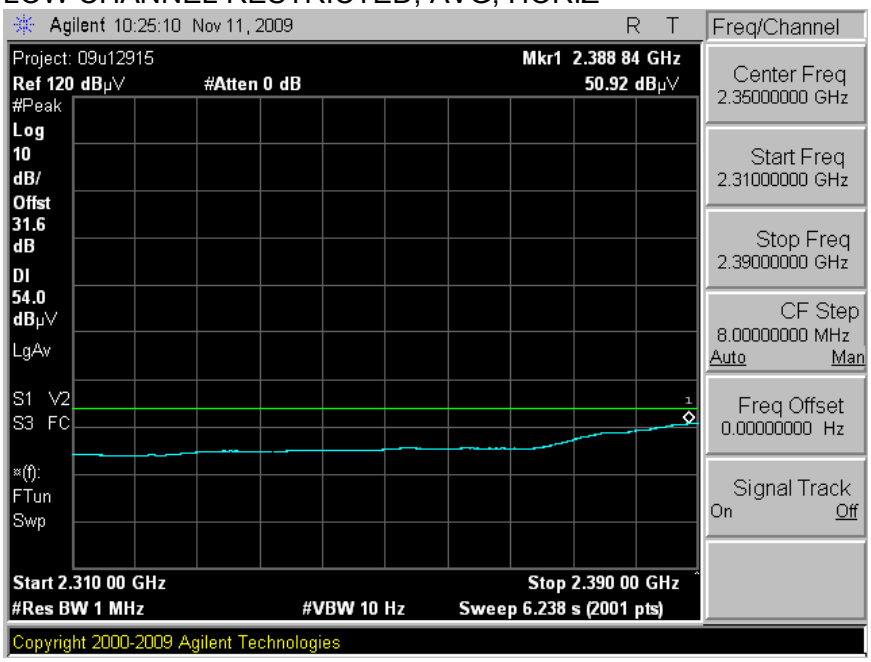
Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor.

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

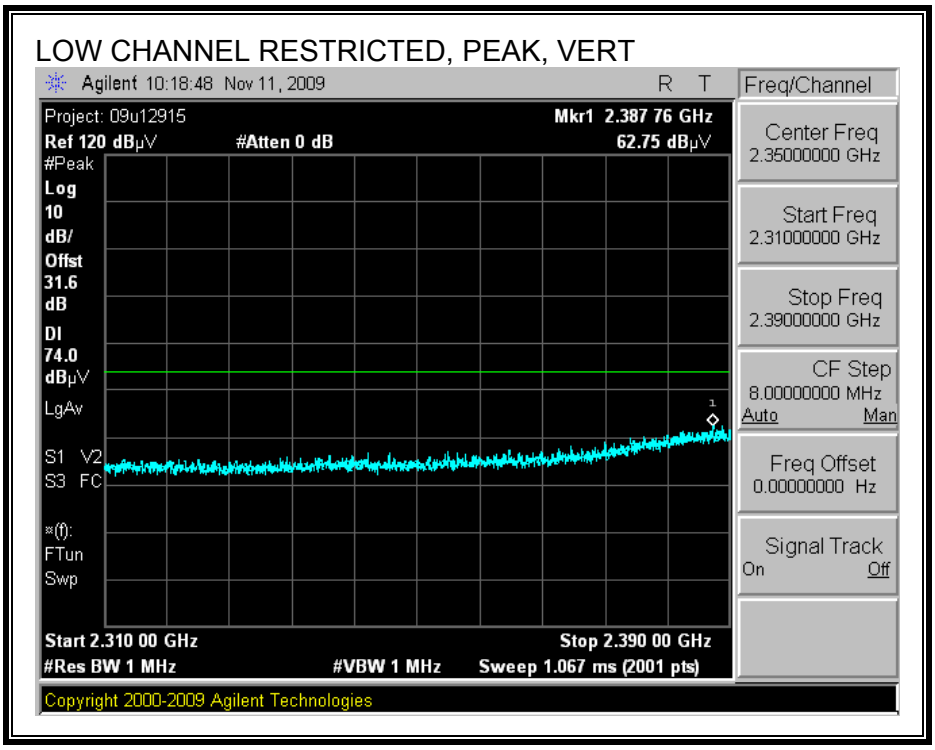
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



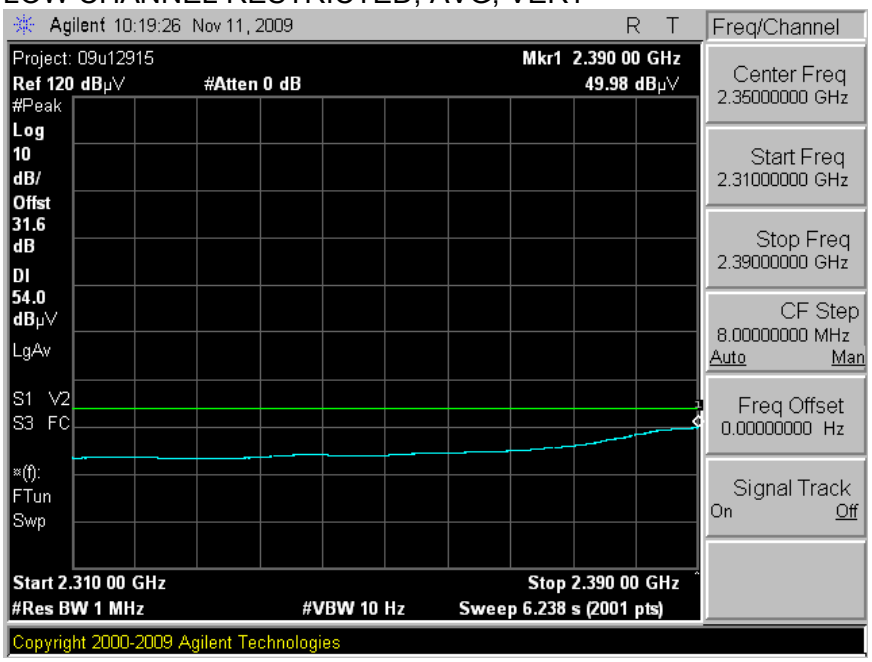
LOW CHANNEL RESTRICTED, AVG, HORIZ



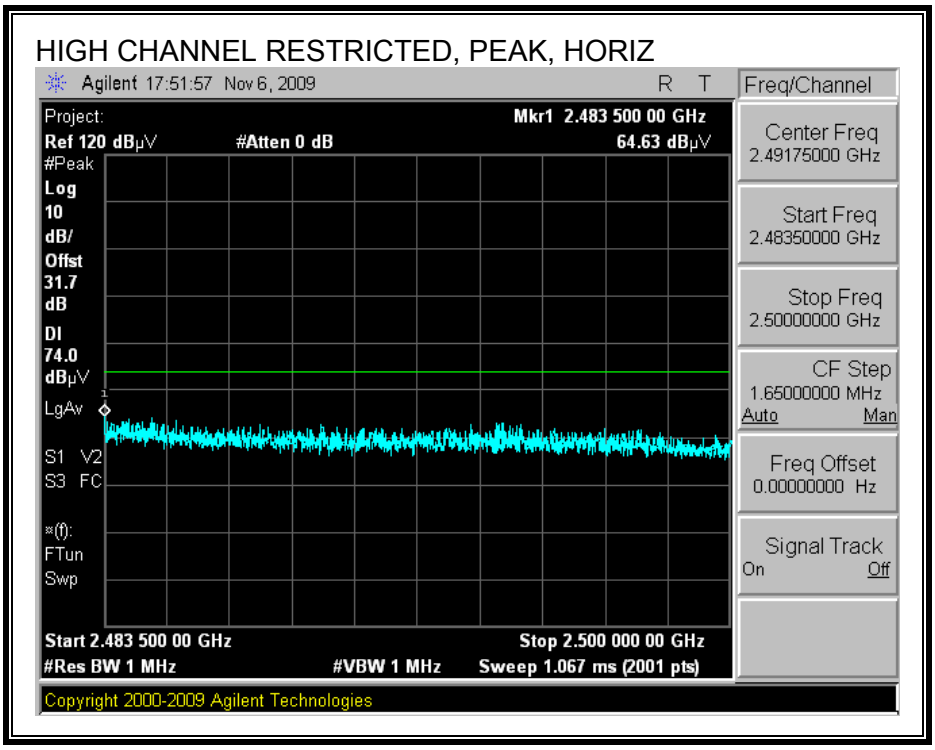
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



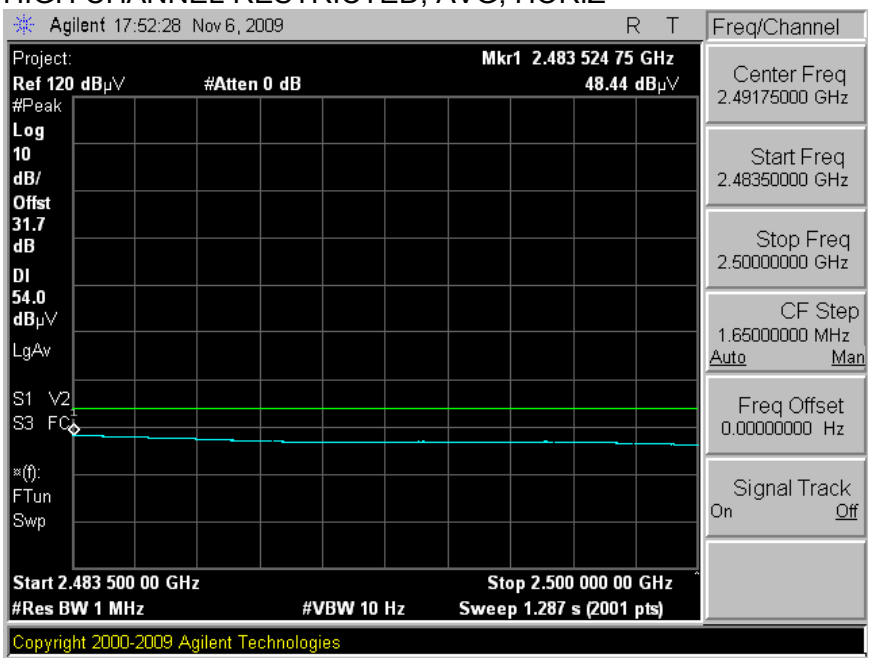
LOW CHANNEL RESTRICTED, AVG, VERT



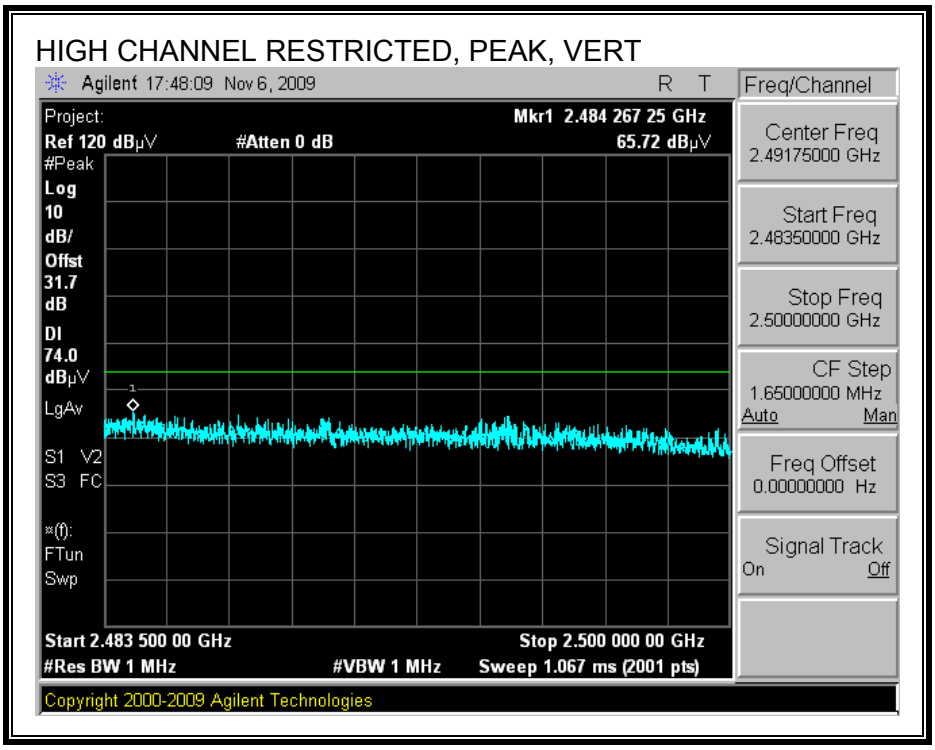
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



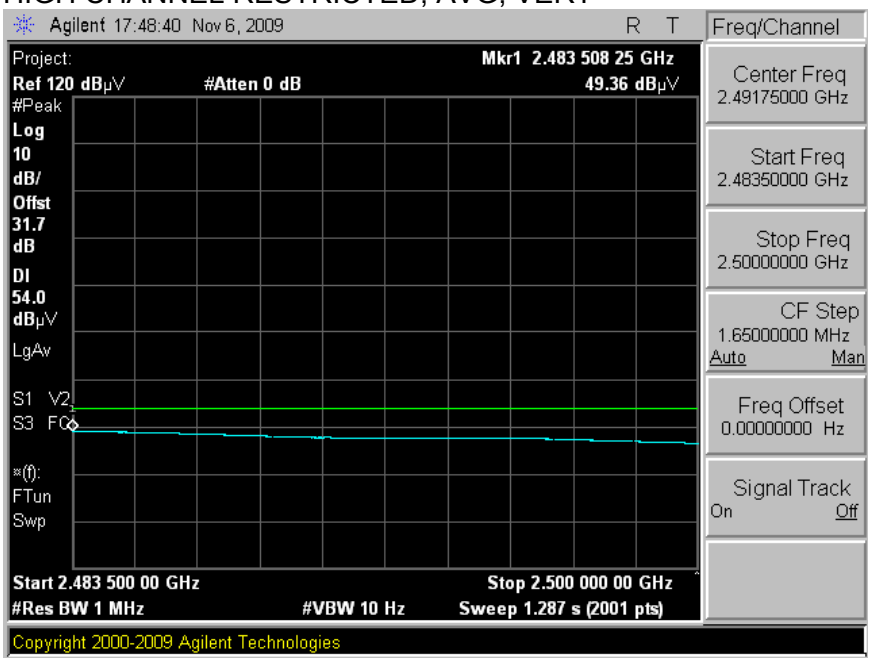
HIGH CHANNEL RESTRICTED, AVG, HORIZ



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



HIGH CHANNEL RESTRICTED, AVG, VERT



BANDEDGE TABULATED DATA for EUT with PIFA antenna

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Thanh Nguyen
Date: 11/06/09
Project #: 09U12915
EUT Description: 802.11 bgn WLAN Client
EUT M/N: 1400
Test Target: FCC 247
Mode Oper: Tx

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

f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
Module A344, Y position Upward															
HT 40, high ch, set 1f 14.45dbm															
2.485	3.0	38.2	28.2	3.5	0.0	0.0	0.0	69.9	74.0	-4.1	H	P	187.0	149.0	PIFA Antenna
2.484	3.0	18.9	28.2	3.5	0.0	0.0	0.0	50.6	54.0	-3.4	H	A	187.0	149.0	PIFA Antenna
2.485	3.0	30.0	28.2	3.5	0.0	0.0	0.0	61.7	74.0	-12.3	V	P	172.0	345.0	PIFA Antenna
2.484	3.0	13.6	28.2	3.5	0.0	0.0	0.0	45.3	54.0	-8.7	V	A	172.0	345.0	PIFA Antenna
Module A344, X position Side															
2422MHz Low CH, Power 1D, 13.77dBm															
2.388	3.0	31.2	28.1	3.5	0.0	0.0	0.0	62.8	74.0	-11.2	V	P	118.0	343.0	PIFA Antenna
2.390	3.0	18.4	28.1	3.5	0.0	0.0	0.0	50.0	54.0	-4.0	V	A	118.0	343.0	PIFA Antenna
2422MHz Low CH, Power 1D, 13.77 dBm															
2.388	3.0	32.1	28.1	3.5	0.0	0.0	0.0	63.7	74.0	-10.3	H	P	100.0	14.0	PIFA Antenna
2.389	3.0	19.3	28.1	3.5	0.0	0.0	0.0	50.9	54.0	-3.1	H	A	100.0	14.0	PIFA Antenna

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

HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Tom Chen
Date: 11/09/09
Project #: 09U12915
EUT Description: 802.11 bgn WLAN Client
EUT M/N: 1400
Test Target: FCC 247
Mode Oper: 802.11n HT40, TX

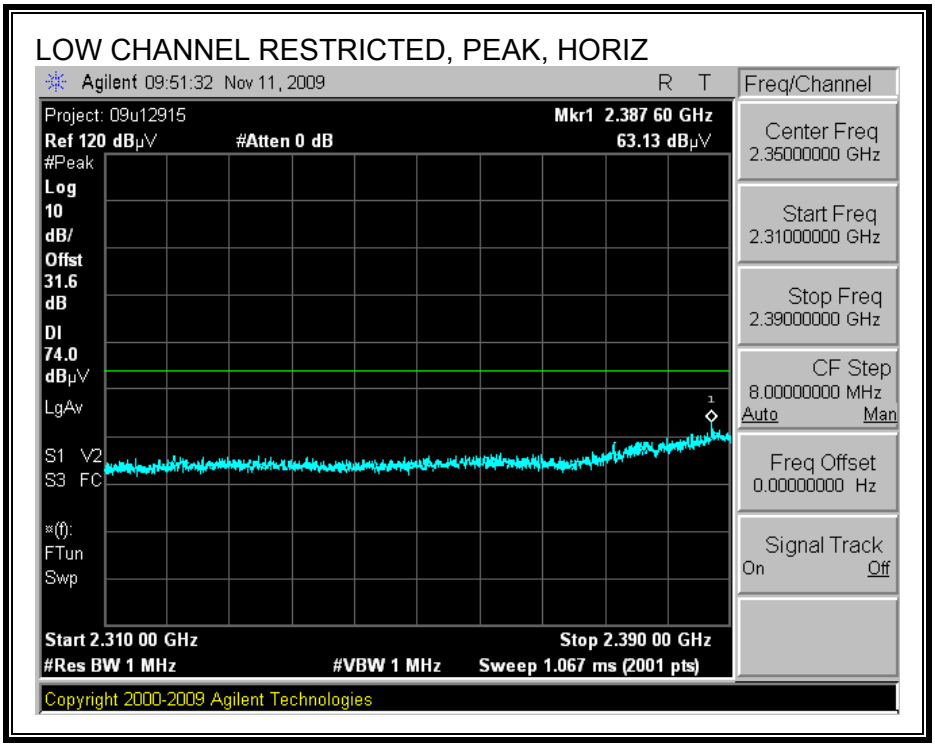
f	Measurement Frequency	Amp	Preamp Gain	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Margin vs.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

f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
HT40 Low CH, Power setting 1E, 14.07dBm													
4.844	3.0	36.1	32.7	5.8	-34.8	0.0	0.0	39.8	74.0	-34.2	V	P	
7.266	3.0	34.2	35.4	7.2	-34.1	0.0	0.0	42.7	74.0	-31.3	V	P	
4.844	3.0	23.4	32.7	5.8	-34.8	0.0	0.0	27.0	54.0	-27.0	V	A	
7.266	3.0	22.1	35.4	7.2	-34.1	0.0	0.0	30.6	54.0	-23.4	V	A	
4.844	3.0	36.2	32.7	5.8	-34.8	0.0	0.0	39.8	74.0	-34.2	H	P	
7.266	3.0	34.6	35.4	7.2	-34.1	0.0	0.0	43.1	74.0	-30.9	H	P	
4.844	3.0	24.1	32.7	5.8	-34.8	0.0	0.0	27.8	54.0	-26.2	H	A	
7.266	3.0	21.8	35.4	7.2	-34.1	0.0	0.0	30.4	54.0	-23.6	H	A	
HT40 Mid CH, Power setting 26, 18.15dBm													
4.874	3.0	37.9	32.7	5.8	-34.8	0.0	0.0	41.6	74.0	-32.4	V	P	
7.311	3.0	34.0	35.5	7.3	-34.1	0.0	0.0	42.6	74.0	-31.4	V	P	
4.874	3.0	25.1	32.7	5.8	-34.8	0.0	0.0	28.9	54.0	-25.1	V	A	
7.311	3.0	21.8	35.5	7.3	-34.1	0.0	0.0	30.4	54.0	-23.6	V	A	
4.874	3.0	36.1	32.7	5.8	-34.8	0.0	0.0	39.9	74.0	-34.1	H	P	
7.311	3.0	34.9	35.5	7.3	-34.1	0.0	0.0	43.5	74.0	-30.5	H	P	
4.874	3.0	23.9	32.7	5.8	-34.8	0.0	0.0	27.6	54.0	-26.4	H	A	
7.311	3.0	22.1	35.5	7.3	-34.1	0.0	0.0	30.7	54.0	-23.3	H	A	
HT40 High CH, Power setting 1F, 14.7dBm													
4.904	3.0	35.1	32.7	5.9	-34.8	0.0	0.0	38.9	74.0	-35.1	H	P	
7.356	3.0	33.9	35.5	7.3	-34.1	0.0	0.0	42.6	74.0	-31.4	H	P	
4.904	3.0	24.4	32.7	5.9	-34.8	0.0	0.0	28.2	54.0	-25.8	H	A	
7.356	3.0	22.0	35.5	7.3	-34.1	0.0	0.0	30.7	54.0	-23.3	H	A	
4.904	3.0	36.0	32.7	5.9	-34.8	0.0	0.0	39.8	74.0	-34.2	V	P	
7.356	3.0	34.1	35.5	7.3	-34.1	0.0	0.0	42.9	74.0	-31.1	V	P	
4.904	3.0	23.0	32.7	5.9	-34.8	0.0	0.0	26.7	54.0	-27.3	V	A	
7.356	3.0	21.8	35.5	7.3	-34.1	0.0	0.0	30.6	54.0	-23.4	V	A	

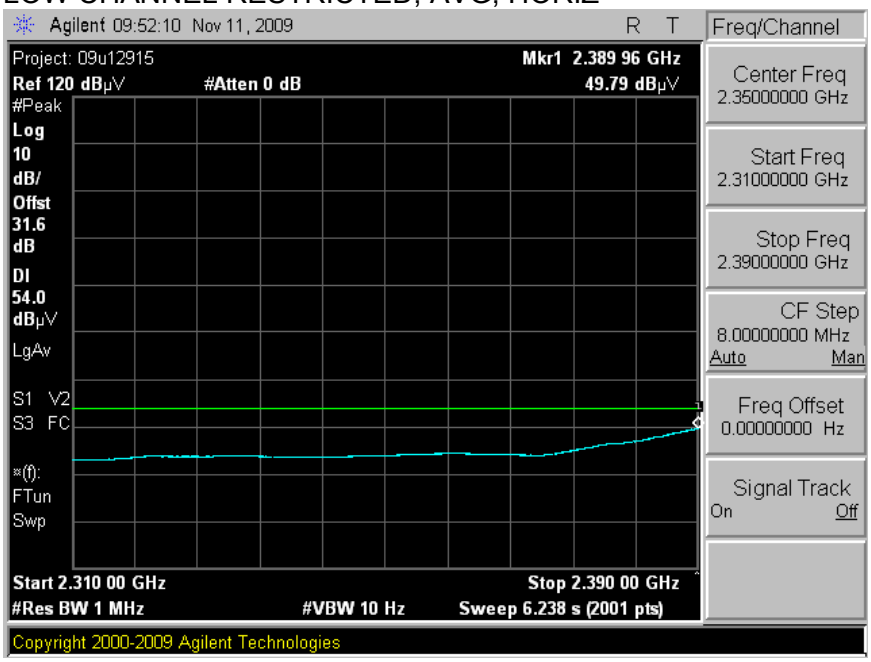
Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor.

WITH PWB ANTENNA

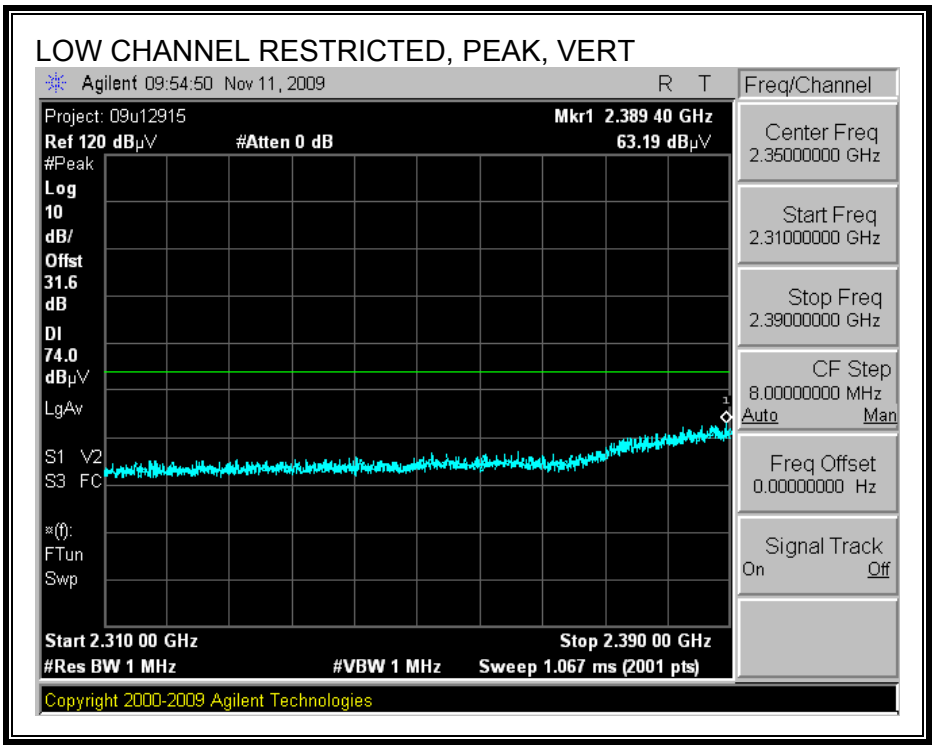
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



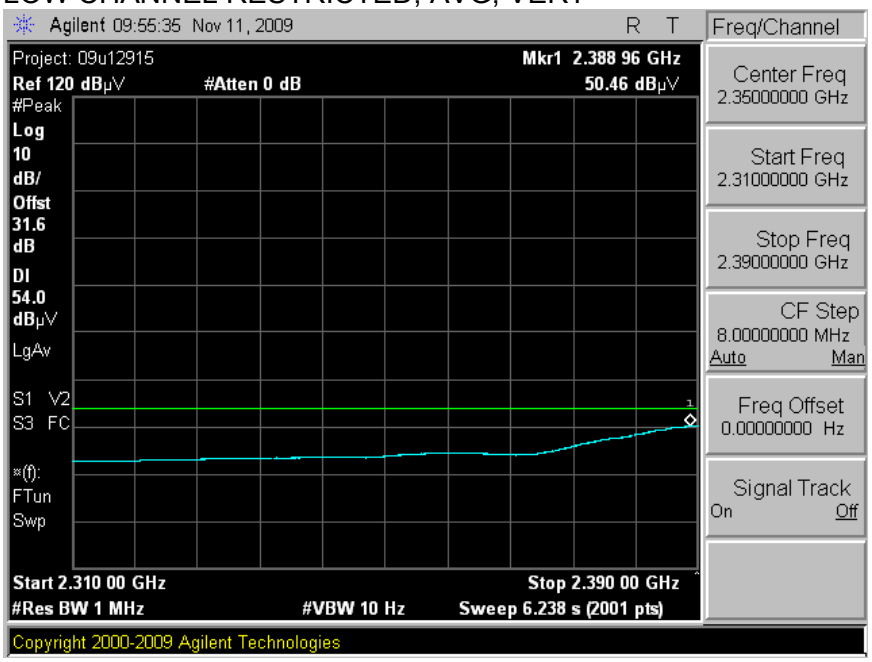
LOW CHANNEL RESTRICTED, AVG, HORIZ



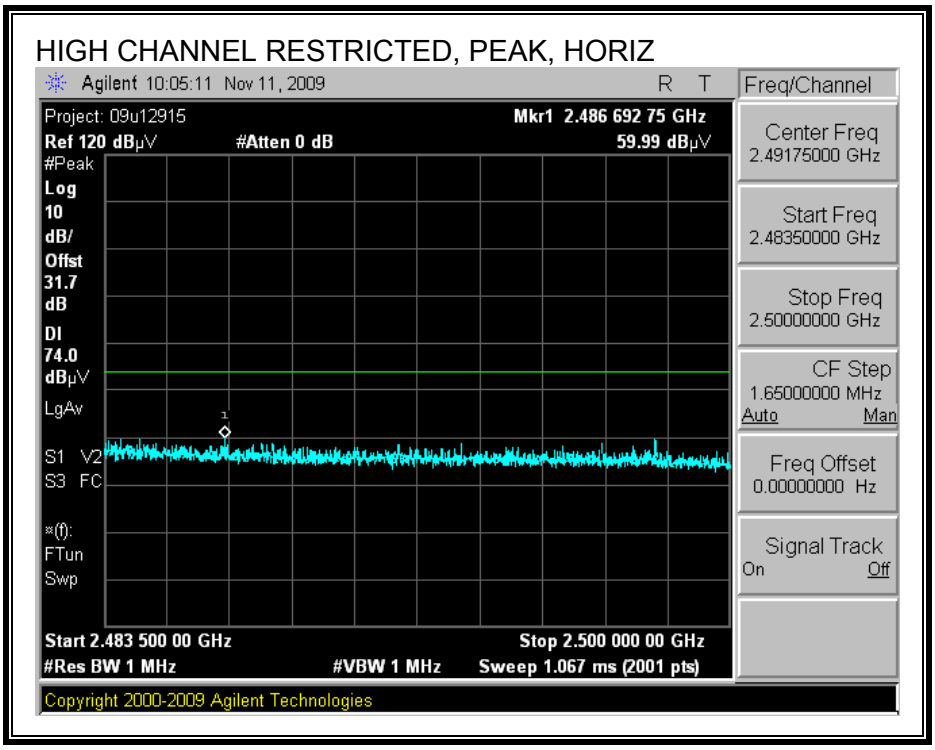
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



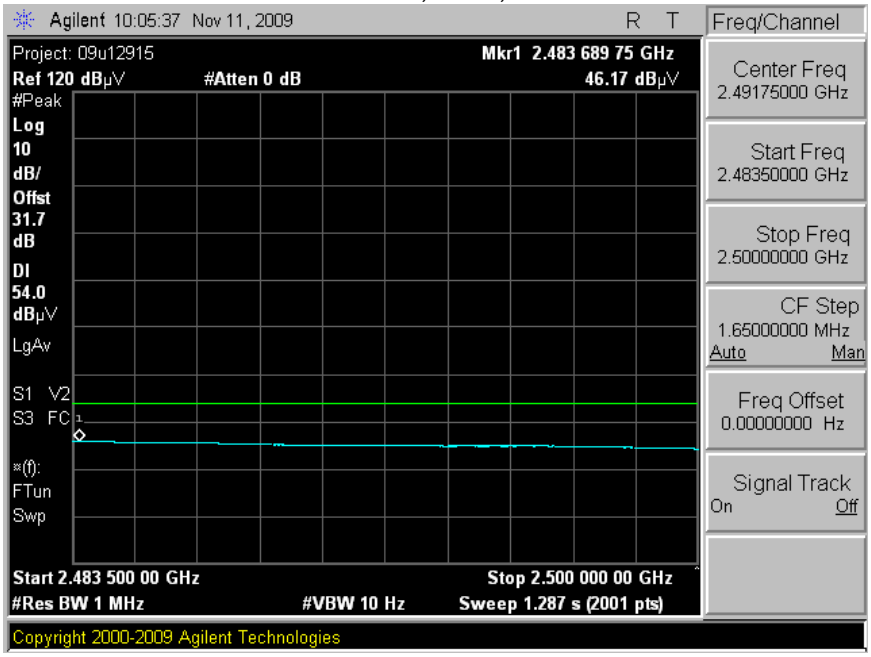
LOW CHANNEL RESTRICTED, AVG, VERT



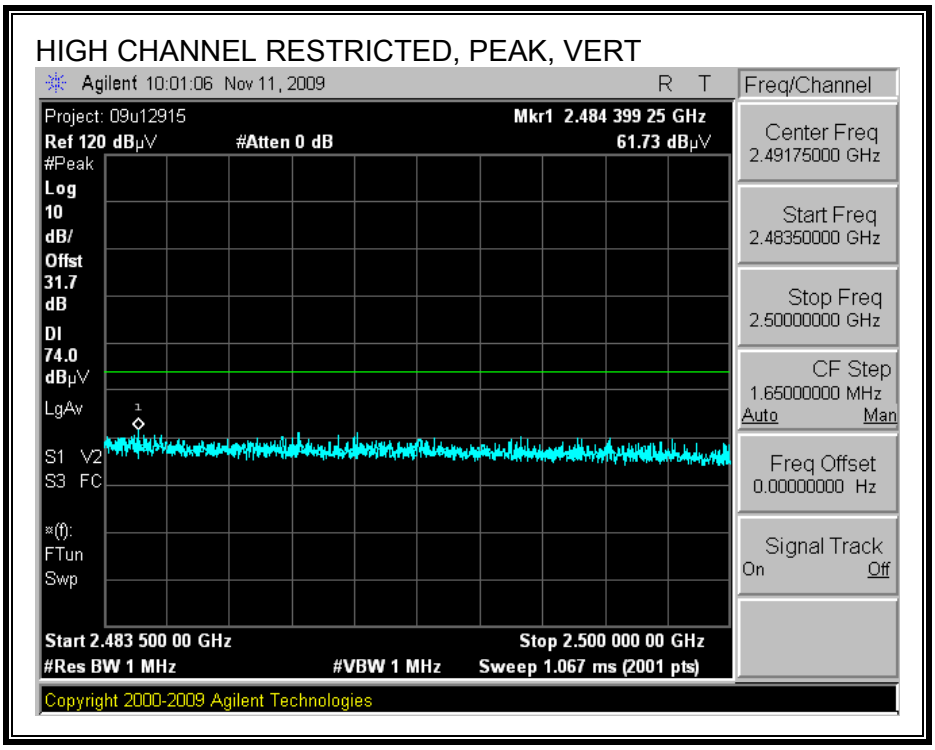
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



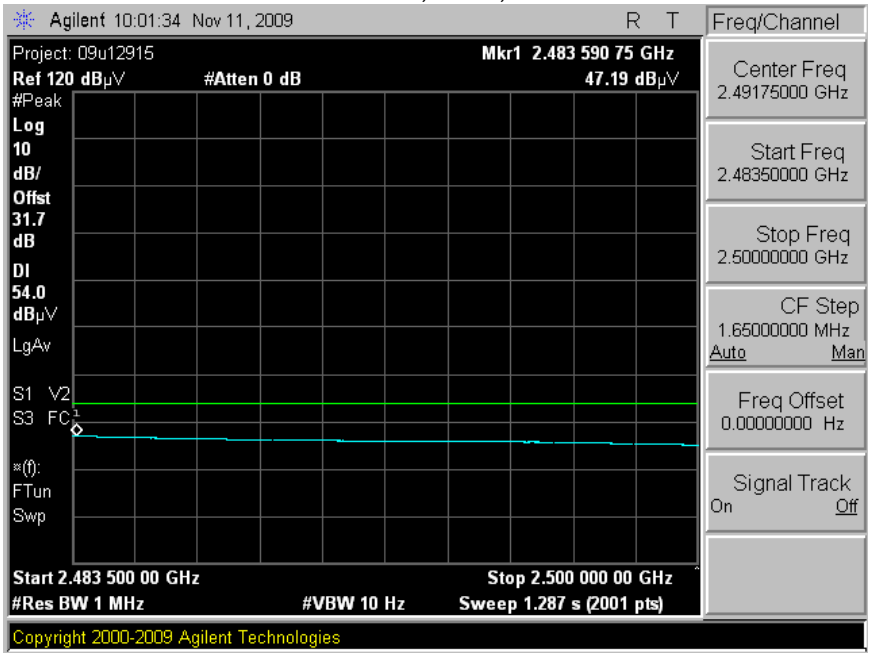
HIGH CHANNEL RESTRICTED, AVG, HORIZ



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



HIGH CHANNEL RESTRICTED, AVG, VERT



BANDEDGE TABULATED DATA for EUT with PWB antenna

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Tom Chen
Date: 11/11/09
Project #: 09U12915
EUT Description: 802.11 bgn WLAN Client
EUT M/N: 1400
Test Target: FCC 247
Mode Oper: 802.11n HT40, TX with PWB Antenna

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

f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
2422MHz Low CH, Power 1D															
2.388	3.0	31.5	28.1	3.5	0.0	0.0	0.0	63.1	74.0	-10.9	H	P	99.0	189.0	PWB ANT
2.390	3.0	18.2	28.1	3.5	0.0	0.0	0.0	49.8	54.0	-4.2	H	A	99.0	189.0	PWB ANT
2422MHz Low CH, Power 1D															
2.389	3.0	31.6	28.1	3.5	0.0	0.0	0.0	63.2	74.0	-10.8	V	P	99.0	273.0	PWB ANT
2.389	3.0	18.9	28.1	3.5	0.0	0.0	0.0	50.5	54.0	-3.5	V	A	99.0	273.0	PWB ANT
2452MHz High CH, Power 1F															
2.484	3.0	30.0	28.2	3.5	0.0	0.0	0.0	61.7	74.0	-12.3	V	P	130.0	262.0	PWB ANT
2.484	3.0	15.5	28.2	3.5	0.0	0.0	0.0	47.2	54.0	-6.8	V	A	130.0	262.0	PWB ANT
2452MHz High CH, Power 1F															
2.487	3.0	28.3	28.2	3.5	0.0	0.0	0.0	60.0	74.0	-14.0	H	P	100.0	186.0	PWB ANT
2.484	3.0	14.5	28.2	3.5	0.0	0.0	0.0	46.2	54.0	-7.8	H	A	100.0	186.0	PWB ANT
2422MHz Low CH, Power 1E															
2.388	3.0	33.3	28.1	3.5	0.0	0.0	0.0	64.9	74.0	-9.1	V	P	99.0	273.0	PWB ANT
2.390	3.0	20.2	28.1	3.5	0.0	0.0	0.0	51.8	54.0	-2.2	V	A	99.0	273.0	PWB ANT
2422MHz Low CH, Power 1E															
2.390	3.0	30.7	28.1	3.5	0.0	0.0	0.0	62.3	74.0	-11.7	H	P	100.0	189.0	PWB ANT
2.390	3.0	18.8	28.1	3.5	0.0	0.0	0.0	50.4	54.0	-3.6	H	A	100.0	189.0	PWB ANT

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

HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Tom Chen
Date: 11/11/09
Project #: 09U12915
EUT Description: 802.11 bgn WLAN Client
EUT M/N: 1400
Test Target: FCC 247
Mode Oper: 802.11n HT40, TX with PWB Antenna

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

f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
2422MHz Low CH, Power 1D													
4.844	3.0	38.7	32.8	5.8	-34.8	0.0	0.0	42.5	74.0	-31.5	V	P	PWB ANT
7.266	3.0	37.5	35.1	7.2	-34.7	0.0	0.0	45.2	74.0	-28.8	V	P	PWB ANT
4.844	3.0	26.4	32.8	5.8	-34.8	0.0	0.0	30.1	54.0	-23.9	V	A	PWB ANT
7.266	3.0	25.1	35.1	7.2	-34.7	0.0	0.0	32.8	54.0	-21.2	V	A	PWB ANT
4.844	3.0	39.5	32.8	5.8	-34.8	0.0	0.0	43.3	74.0	-30.7	H	P	PWB ANT
7.266	3.0	37.5	35.1	7.2	-34.7	0.0	0.0	45.2	74.0	-28.8	H	P	PWB ANT
4.844	3.0	27.1	32.8	5.8	-34.8	0.0	0.0	30.9	54.0	-23.1	H	A	PWB ANT
7.266	3.0	25.2	35.1	7.2	-34.7	0.0	0.0	32.9	54.0	-21.1	H	A	PWB ANT
2437MHz Mid CH, Power 26													
4.874	3.0	38.6	32.8	5.8	-34.9	0.0	0.0	42.4	74.0	-31.6	H	P	PWB ANT
7.311	3.0	38.0	35.2	7.3	-34.7	0.0	0.0	45.8	74.0	-28.2	H	P	PWB ANT
4.874	3.0	27.5	32.8	5.8	-34.9	0.0	0.0	31.3	54.0	-22.7	H	A	PWB ANT
7.311	3.0	25.7	35.2	7.3	-34.7	0.0	0.0	33.5	54.0	-20.5	H	A	PWB ANT
4.874	3.0	39.4	32.8	5.8	-34.9	0.0	0.0	43.1	74.0	-30.9	V	P	PWB ANT
7.311	3.0	37.8	35.2	7.3	-34.7	0.0	0.0	45.6	74.0	-28.4	V	P	PWB ANT
4.874	3.0	26.7	32.8	5.8	-34.9	0.0	0.0	30.5	54.0	-23.5	V	A	PWB ANT
7.311	3.0	25.6	35.2	7.3	-34.7	0.0	0.0	33.4	54.0	-20.6	V	A	PWB ANT
2452MHz High CH, Power 1F													
4.904	3.0	38.8	32.8	5.9	-34.9	0.0	0.0	42.6	74.0	-31.4	V	P	PWB ANT
7.356	3.0	37.2	35.3	7.3	-34.6	0.0	0.0	45.1	74.0	-28.9	V	P	PWB ANT
4.904	3.0	26.6	32.8	5.9	-34.9	0.0	0.0	30.4	54.0	-23.6	V	A	PWB ANT
7.356	3.0	24.8	35.3	7.3	-34.6	0.0	0.0	32.7	54.0	-21.4	V	A	PWB ANT
4.904	3.0	38.4	32.8	5.9	-34.9	0.0	0.0	42.3	74.0	-31.7	H	P	PWB ANT
7.356	3.0	37.5	35.3	7.3	-34.6	0.0	0.0	45.4	74.0	-28.6	H	P	PWB ANT
4.904	3.0	27.1	32.8	5.9	-34.9	0.0	0.0	30.9	54.0	-23.1	H	A	PWB ANT
7.356	3.0	24.7	35.3	7.3	-34.6	0.0	0.0	32.6	54.0	-21.4	H	A	PWB ANT

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

8.3. RECEIVER ABOVE 1 GHz

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

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company:
Project #: 09U12915
Date: 11/11/2009
Test Engineer: Tom Chen
Configuration: EUT with Support Laptop
Mode: HT20, Rx Mode

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T59; S/N: 3245 @3m	T145 Agilent 3008A005(		T125; ARA 18-26GHz; S/N:1007	RX RSS 210

Hi Frequency Cables

3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF	Reject Filter
3' cable 22807700	12' cable 22807600	20' cable 22807500		

Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
1.680	3.0	47.5	37.2	27.8	3.1	-35.6	0.0	0.0	42.8	32.6	74	54	-31.2	-21.4	V
2.392	3.0	45.4	34.6	29.5	3.8	-35.1	0.0	0.0	43.6	32.9	74	54	-30.4	-21.1	V
2.868	3.0	43.5	32.3	30.5	4.2	-35.2	0.0	0.0	43.0	31.8	74	54	-31.0	-22.2	V
1.676	3.0	46.1	32.6	27.8	3.1	-35.6	0.0	0.0	41.4	27.9	74	54	-32.6	-26.1	H
3.468	3.0	42.4	29.0	31.9	4.7	-35.0	0.0	0.0	43.9	30.6	74	54	-30.1	-23.4	H
4.464	3.0	41.2	28.3	33.6	5.5	-34.8	0.0	0.0	45.5	32.6	74	54	-28.5	-21.4	H

No other Emissions were detected above system noise floor.

Rev. 10.15.08

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

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

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company:
Project #: 09U12915
Date: 11/11/2009
Test Engineer: Tom Chen
Configuration: EUT with Support Laptop
Mode: HT40, Rx Mode

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T59; S/N: 3245 @3m	T145 Agilent 3008A005(		T125; ARA 18-26GHz; S/N:1007	RX RSS 210

Hi Frequency Cables

3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF	Reject Filter
3' cable 22807700	12' cable 22807600	20' cable 22807500		

Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
1.548	3.0	46.9	35.4	27.4	3.0	-35.7	0.0	0.0	41.6	30.1	74	54	-32.4	-23.9	V
2.400	3.0	45.4	33.7	29.5	3.8	-35.1	0.0	0.0	43.7	32.0	74	54	-30.3	-22.0	V
3.144	3.0	43.0	31.3	31.1	4.5	-35.2	0.0	0.0	43.4	31.6	74	54	-30.6	-22.4	V
1.684	3.0	48.4	32.6	27.9	3.1	-35.6	0.0	0.0	43.8	27.9	74	54	-30.2	-26.1	H
4.248	3.0	42.5	29.0	33.4	5.4	-34.8	0.0	0.0	46.5	32.9	74	54	-27.5	-21.1	H
6.792	3.0	39.9	28.3	35.6	7.0	-34.7	0.0	0.0	47.7	36.2	74	54	-26.3	-17.8	H
No other Emissions were detected above system noise floor.															

Rev. 10.15.08

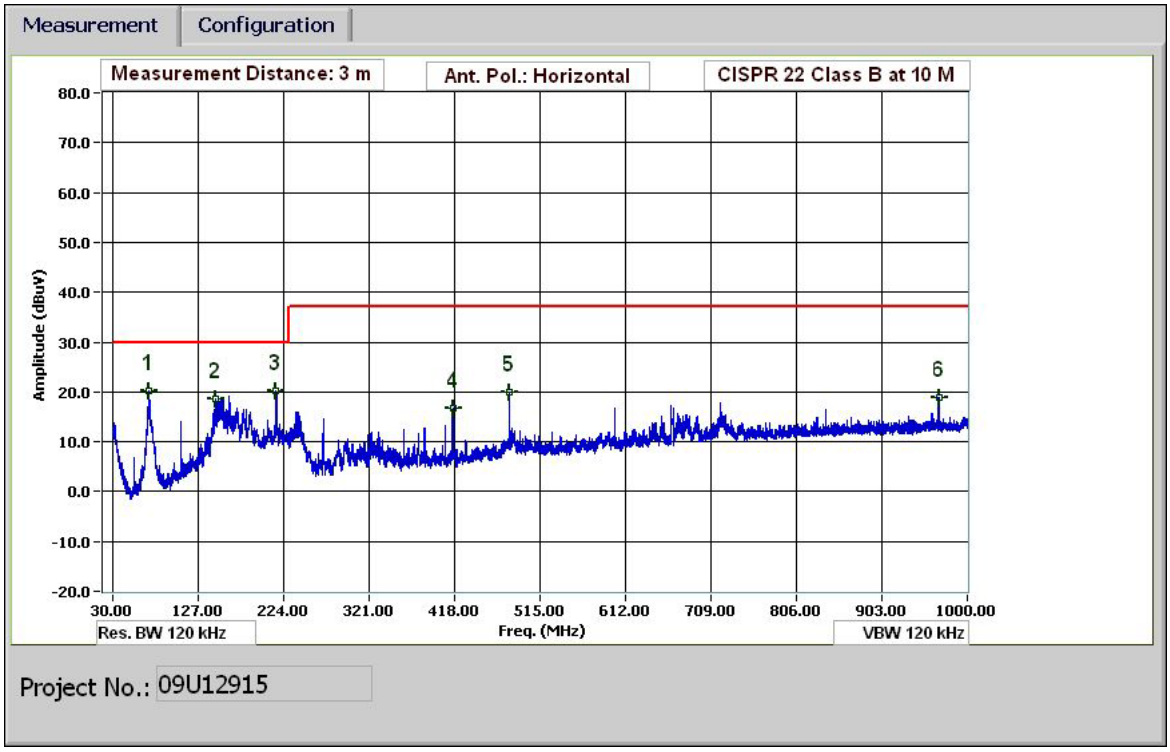
f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field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

8.4. WORST-CASE BELOW 1 GHz

PIFA Antenna

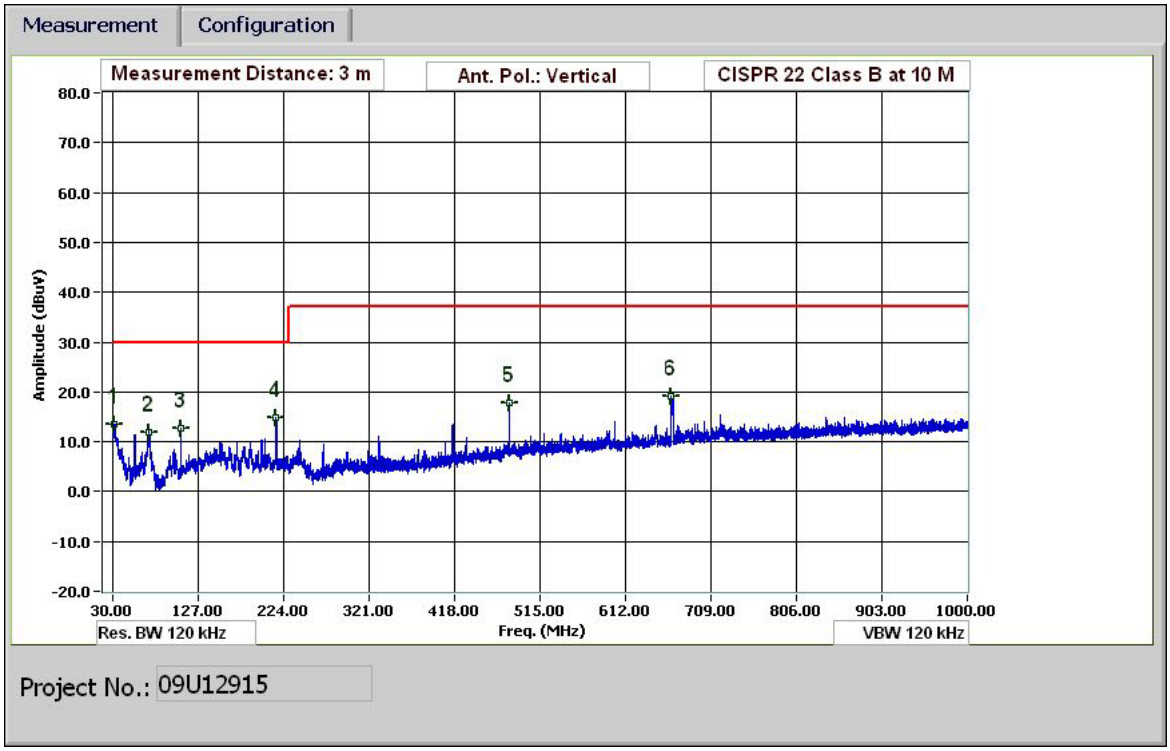
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

HORIZONTAL PLOT



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

VERTICAL PLOT



HORIZONTAL AND VERTICAL DATA

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

Test Engr: Tom Chen
Date: 11/13/09
Project #: 09U12915
EUT Description: 802.11 bgn WLAN Client
EUT M/N: 1400 with PIFA Antenna
Test Target: FCC 247
Mode Oper: TX Worst case

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

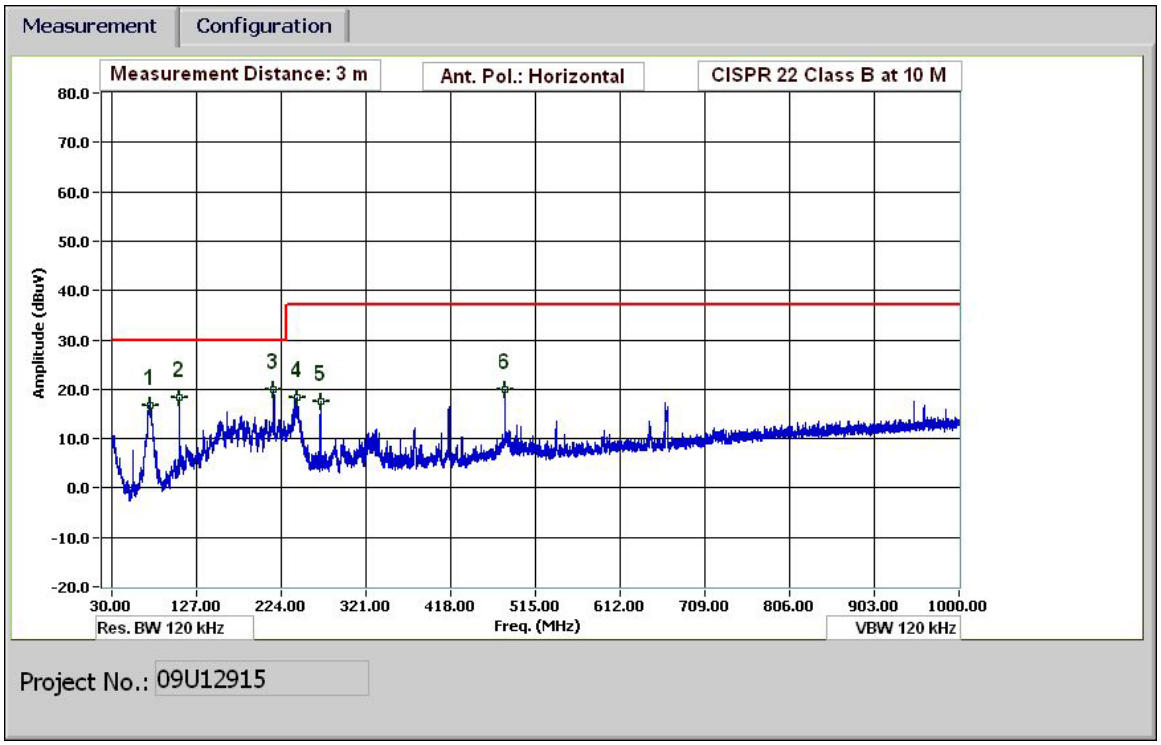
f MHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filter dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
Horizontal													
71.522	3.0	50.4	7.9	0.7	28.3	-10.5	0.0	20.2	30.0	-9.8	H	P	
146.765	3.0	43.3	12.8	1.1	28.3	-10.5	0.0	18.5	30.0	-11.5	H	P	
215.648	3.0	45.7	11.9	1.3	28.2	-10.5	0.0	20.2	30.0	-9.8	H	P	
416.296	3.0	38.3	15.2	1.8	28.1	-10.5	0.0	16.9	37.0	-20.1	H	P	
480.019	3.0	39.8	16.4	2.0	27.9	-10.5	0.0	19.8	37.0	-17.2	H	P	
967.479	3.0	32.1	22.3	2.9	27.9	-10.5	0.0	19.0	37.0	-18.0	H	P	
Vertical													
32.160	3.0	32.8	19.2	0.5	28.4	-10.5	0.0	13.6	30.0	-16.4	V	P	
71.042	3.0	42.0	8.0	0.7	28.3	-10.5	0.0	11.9	30.0	-18.1	V	P	
107.883	3.0	39.2	11.4	1.0	28.3	-10.5	0.0	12.8	30.0	-17.2	V	P	
215.048	3.0	40.2	11.9	1.3	28.2	-10.5	0.0	14.7	30.0	-15.3	V	P	
480.019	3.0	37.9	16.4	2.0	27.9	-10.5	0.0	17.9	37.0	-19.1	V	P	
663.866	3.0	35.3	19.2	2.4	27.3	-10.5	0.0	19.0	37.0	-18.0	V	P	

Rev. 1.27.09
Note: No other emissions were detected above the system noise floor.

PWB Antenna

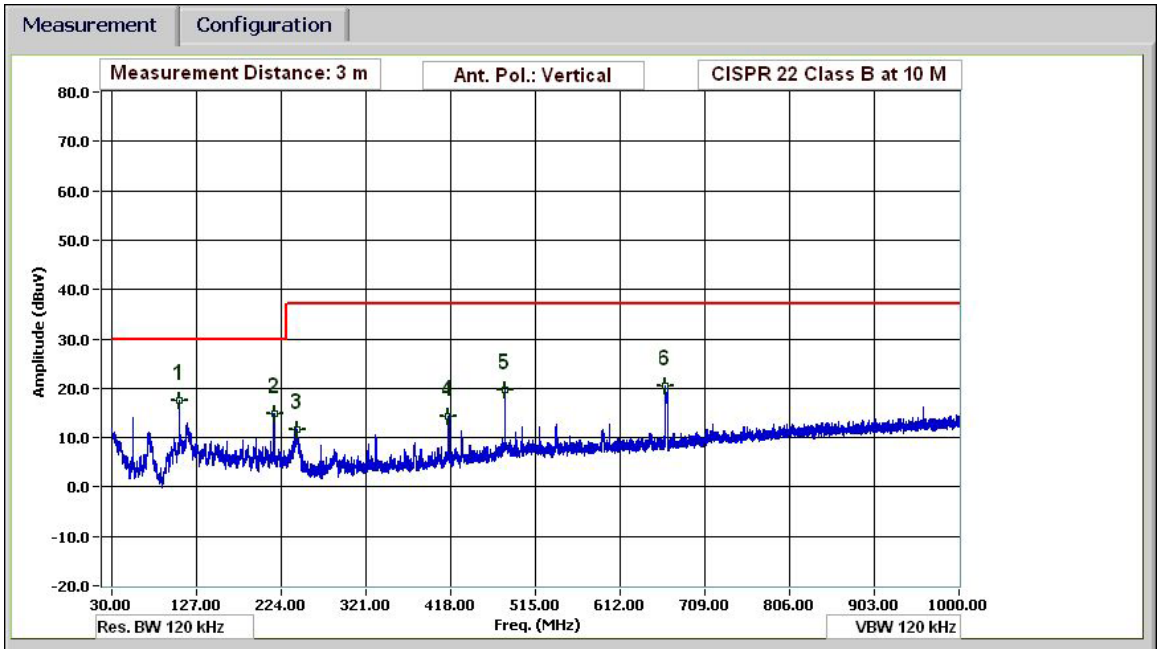
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

HORIZONTAL PLOT



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

VERTICAL PLOT



HORIZONTAL AND VERTICAL DATA

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

Test Engr: Tom Chen
Date: 11/09/09
Project #: 09U12915
EUT Description: 802.11 bgn WLAN Client
EUT M/N: 1400
Test Target: FCC 247
Mode Oper: TX Worst case

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

f MHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filter dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
Horizontal													
73.682	3.0	48.1	8.0	0.8	29.6	-10.5	0.0	16.8	30.0	-13.2	H	P	
107.883	3.0	45.8	11.5	0.9	29.5	-10.5	0.0	18.3	30.0	-11.7	H	P	
215.528	3.0	45.9	11.9	1.3	28.9	-10.5	0.0	19.8	30.0	-10.2	H	P	
241.809	3.0	44.5	11.8	1.4	28.8	-10.5	0.0	18.5	37.0	-18.5	H	P	
269.290	3.0	42.9	12.4	1.5	28.8	-10.5	0.0	17.5	37.0	-19.5	H	P	
480.019	3.0	41.6	16.4	2.1	29.6	-10.5	0.0	20.0	37.0	-17.0	H	P	
Vertical													
107.643	3.0	45.1	11.5	0.9	29.5	-10.5	0.0	17.5	30.0	-12.5	V	P	
215.768	3.0	41.0	11.9	1.3	28.9	-10.5	0.0	14.9	30.0	-15.1	V	P	
241.689	3.0	37.6	11.8	1.4	28.8	-10.5	0.0	11.6	37.0	-25.4	V	P	
414.976	3.0	36.8	15.3	1.9	29.4	-10.5	0.0	14.2	37.0	-22.8	V	P	
480.019	3.0	41.1	16.4	2.1	29.6	-10.5	0.0	19.6	37.0	-17.4	V	P	
663.986	3.0	39.1	18.9	2.5	29.6	-10.5	0.0	20.5	37.0	-16.5	V	P	

Rev. 1.27.09
Note: No other emissions were detected above the system noise floor.

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

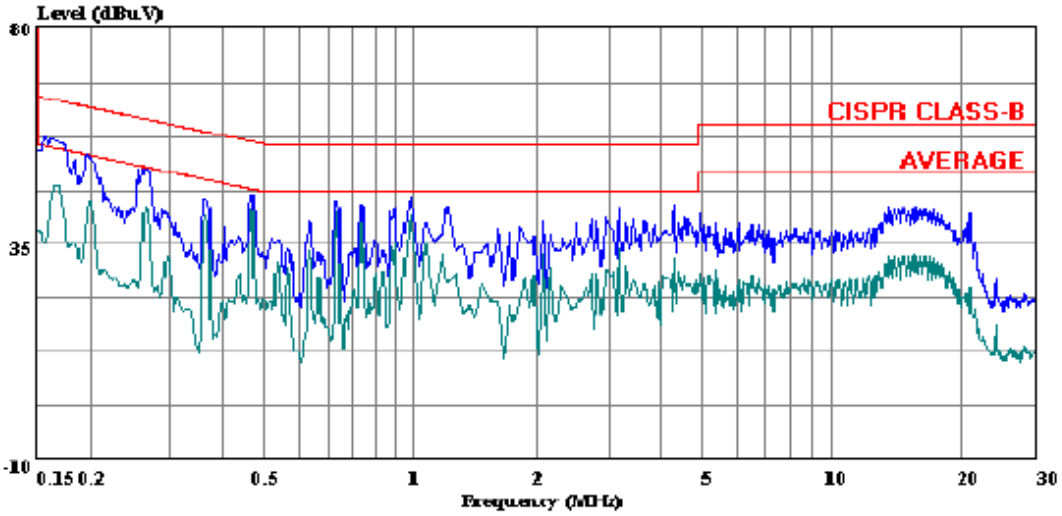
6 WORST EMISSIONS

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
0.16	57.41	--	35.67	0.00	65.62	55.62	-8.21	-19.95	L1
0.20	53.80	--	43.00	0.00	63.82	53.82	-10.02	-10.82	L1
0.26	50.93	--	41.09	0.00	61.34	51.34	-10.41	-10.25	L1
0.16	56.71	--	37.51	0.00	65.73	55.73	-9.02	-18.22	L2
0.20	51.79	--	41.31	0.00	63.69	53.69	-11.90	-12.38	L2
0.26	49.46	--	37.79	0.00	61.43	51.43	-11.97	-13.64	L2
6 Worst Data									

LINE 1 RESULTS

Compliance Certification Services
47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1000
Fax: (510) 661-0888

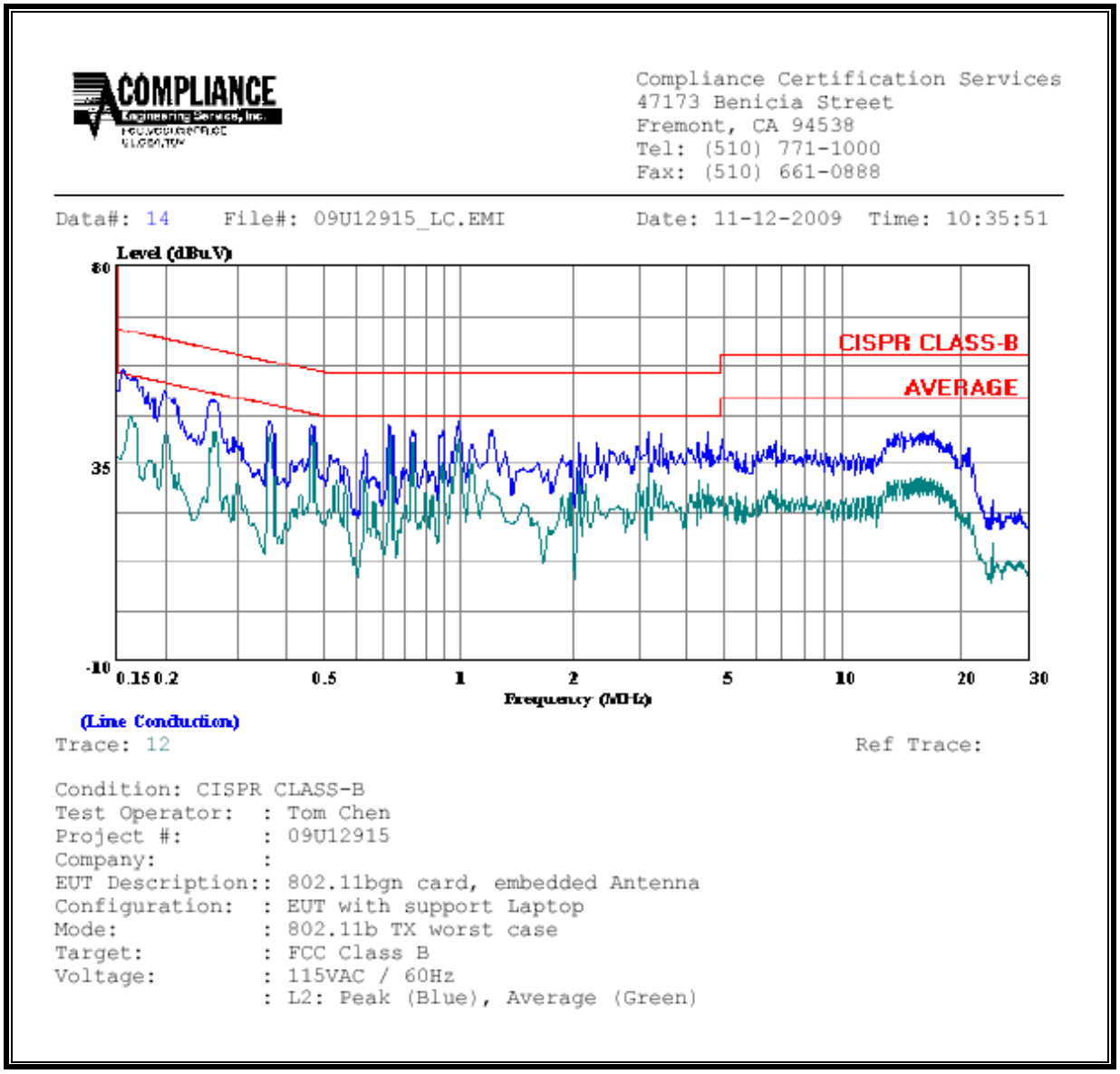
Data#: 7 File#: 09U12915_LC.EMI Date: 11-12-2009 Time: 10:13:32



(Line Conduction)
Trace: 5 Ref Trace:

Condition: CISPR CLASS-B
Test Operator: : Tom Chen
Project #: : 09U12915
Company: :
EUT Description:: 802.11bgn card, embedded Antenna
Configuration: : EUT with support Laptop
Mode: : 802.11b TX worst case
Target: : FCC Class B
Voltage: : 115VAC / 60Hz
: L1: Peak (Blue), Average (Green)

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	$280/f$	$2.19/f$		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).

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

Power density in units of W/m^2 is converted to units of mWc/m^2 by dividing by 10.

Distance is given by:

D = SQRT (EIRP / (4 * Pi * S))

where

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

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

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/cm^2

From IC Safety Code 6, Section 2.2 Table 5 Column 4, S = 10 W/m^2

RESULTS

Band	Mode	Separation Distance (m)	Output Power (dBm)	Antenna Gain (dBi)	IC Power Density (W/m^2)	FCC Power Density (mW/cm^2)
2.4 GHz	WLAN	0.20	25.79	4.06	1.92	0.192