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

CERTIFICATION TEST REPORT

FOR

CABIN WIRELESS ACCESS POINT

MODEL NUMBER: CWAP1120

FCC ID: WPX-CWAP
IC: 8014A-CWAP

REPORT NUMBER: 08U12179-1

ISSUE DATE: NOVEMBER 3, 2008

Prepared for
Aircell LLC
1250 NORTH ARLINGTON HEIGHTS RD.
ITASCA, IL 60143, U.S.A.

Prepared by
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	11/3/08	Initial Issue	F. Ibrahim

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Aircell LLC
1250 NORTH ARLINGTON HEIGHTS RD.
ITASCA, IL 60143, U.S.A.

EUT DESCRIPTION: CABIN WIRELESS ACCESS POINT

MODEL: CWAP1120

SERIAL NUMBER: 1295610098

DATE TESTED: OCTOBER 22-28, 2008

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. 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. No part of this report may be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any government agency.

Approved & Released For CCS By:

FRANK IBRAHIM
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

Tested By:

TOM CHEN
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

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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. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Power Line Conducted Emission	+/- 2.3 dB
Radiated Emission	+/- 3.4 dB

Uncertainty figures are valid to a confidence level of 95%.

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5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is an 802.11a/b/g transceiver

The radio module is manufactured by Cisco.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2412 - 2462	802.11b	19.31	85.31
2412 - 2462	802.11g	20.75	118.85

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a Patch antenna, with a maximum gain of 2.7 dBi in the 2.4 GHz band, the antenna has a cable loss of 0.4 dB in the 2.4 GHz band, therefore, the effective antenna gain is 2.7 dBi – 0.4 dB = **2.3 dBi**.

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was 12.3(8)JEA

5.5. WORST-CASE CONFIGURATION AND MODE

For Radiated Emissions below 1 GHz, the channel with highest conducted output power was selected. The channel with highest conducted output power was Low Channel (2412 MHz) in 11g mode.

The worst-case data rate was determined from previous experience with this radio module to be 1 Mbps for 11b and 6 Mbps for 11g.

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5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop PC	HP	CRVSA-O2T1-75	CN24600052	N/A
Adaptor	HP	PPP014S	56A570BU4PX6D7	N/A
Antenna	SUNNER	SWA2458/360/7/20/V_	717255	N/A

I/O CABLES

I/O CABLE LIST						
Cable No.	**Port**	**# of Identica Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	AC	1	AC	Un-Shielded	2.0 m	N/A
2	AC	1	AC	Un-Shielded	1.5m	N/A
3	DC	1	DC	Un-Shielded	2.0 m	N/A
4	RS232	1	DB9	Un-Shielded	1.0 m	N/A
5	Ethernet	1	RJ45	Shielded	6.5 m	N/A
6	Antenna	1	TNC-Type	Shielded	0.9m	N/A

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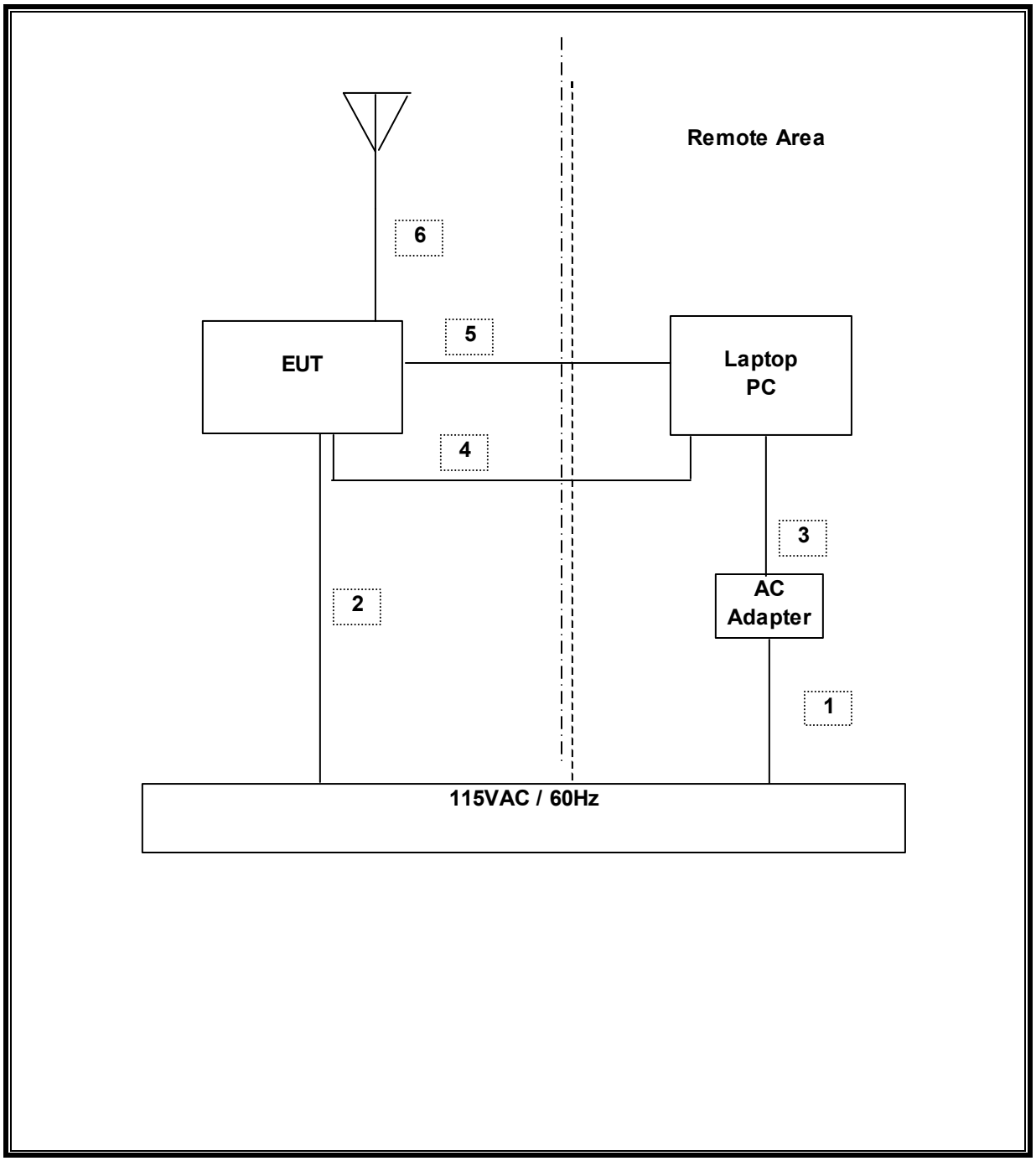
SETUP DIAGRAM FOR TESTS



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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 Date**	**Cal Due**
Preamplifier, 1300 MHz	Agilent / HP	8447D	N/A	03/31/08	03/31/09
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01069	04/08/08	10/08/09
EMI Receiver, 2.9 GHz	Agilent / HP	8542E	C00957	06/19/08	09/19/09
RF Filter Section, 2.9 GHz	Agilent / HP	85420E	C00958	06/19/08	09/19/09
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01016	02/11/08	02/11/09
Antenna, Horn, 18 GHz	EMCO	3115	C00872	04/22/08	04/22/09
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01052	08/05/08	08/05/09
Antenna, Horn, 26.5 GHz	ARA	MWH-1826/B	C00980	09/29/07	11/28/08

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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	9.08	0.5

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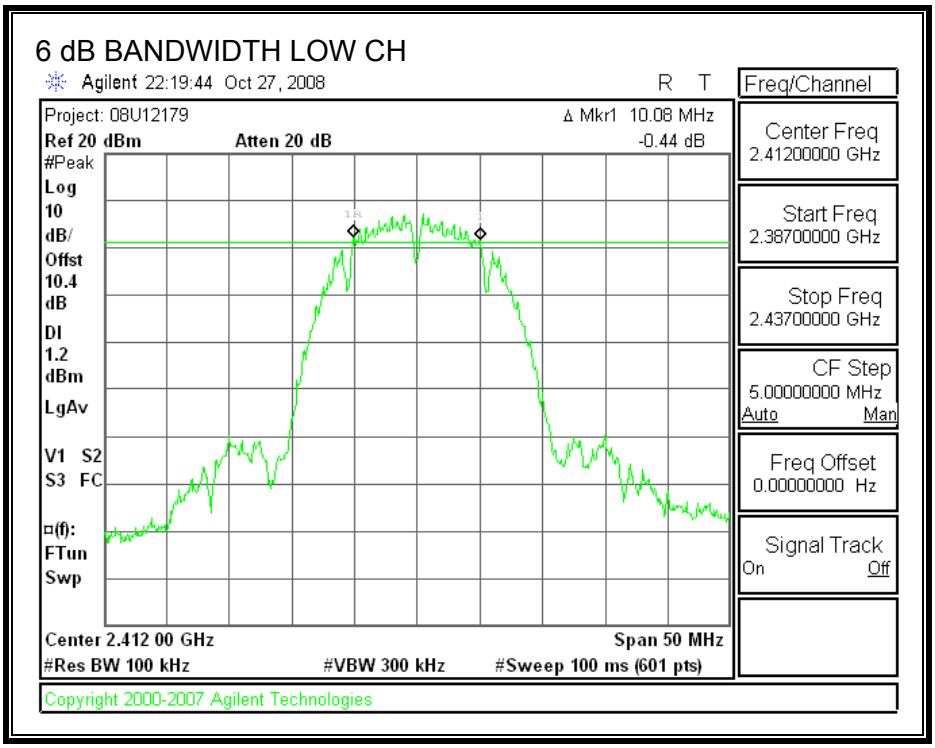
6 dB BANDWIDTH



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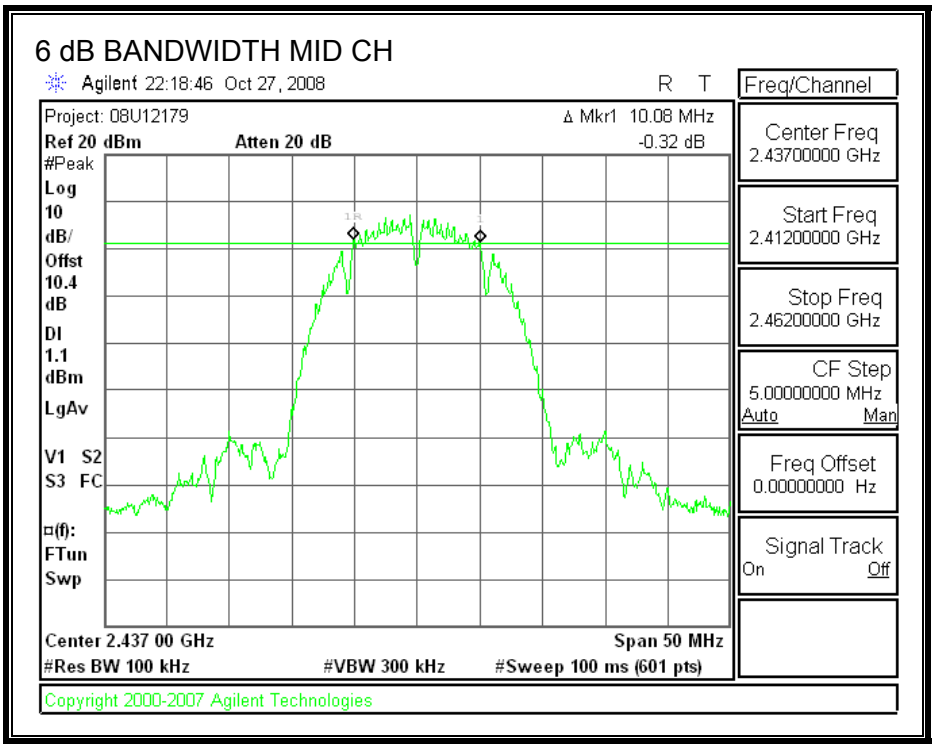

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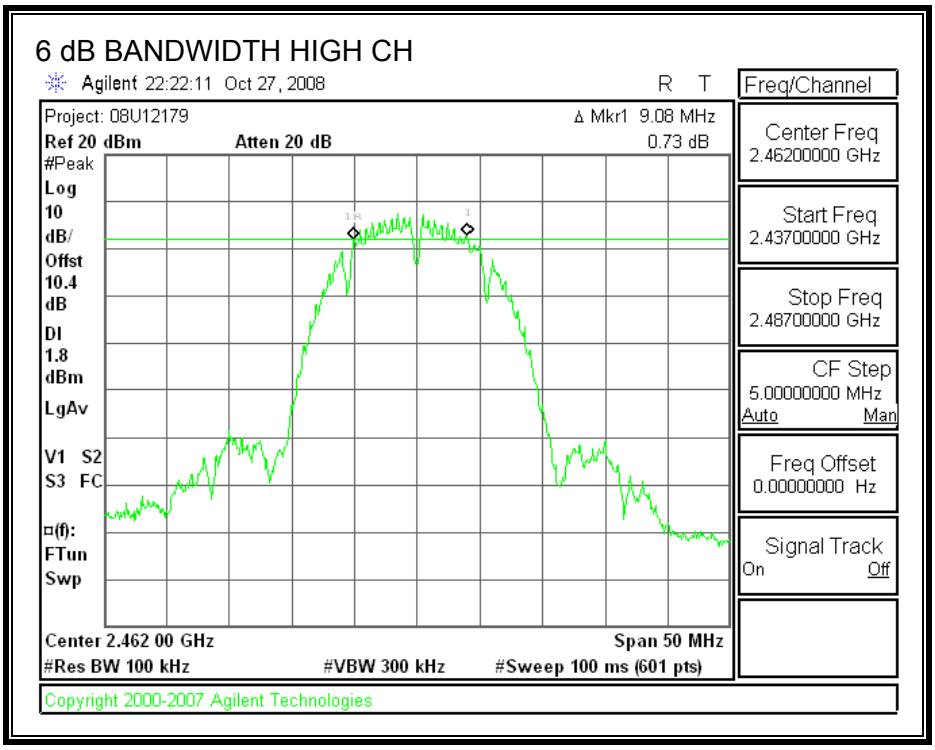

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7.1.2. 99% BANDWIDTH

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	14.1690
Middle	2437	14.3162
High	2462	13.8698

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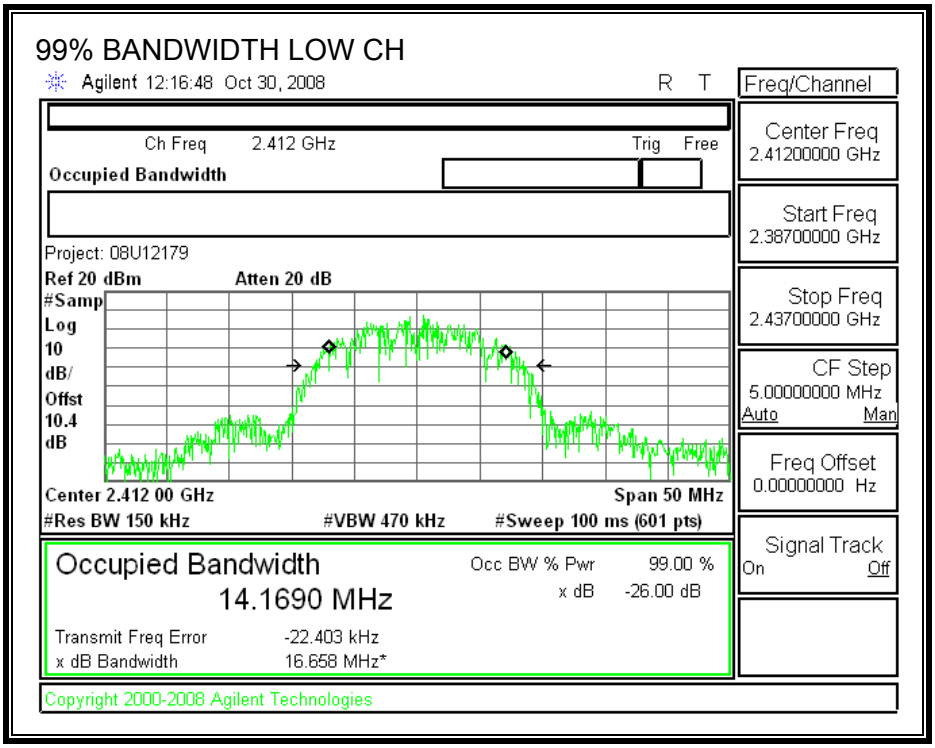
99% BANDWIDTH



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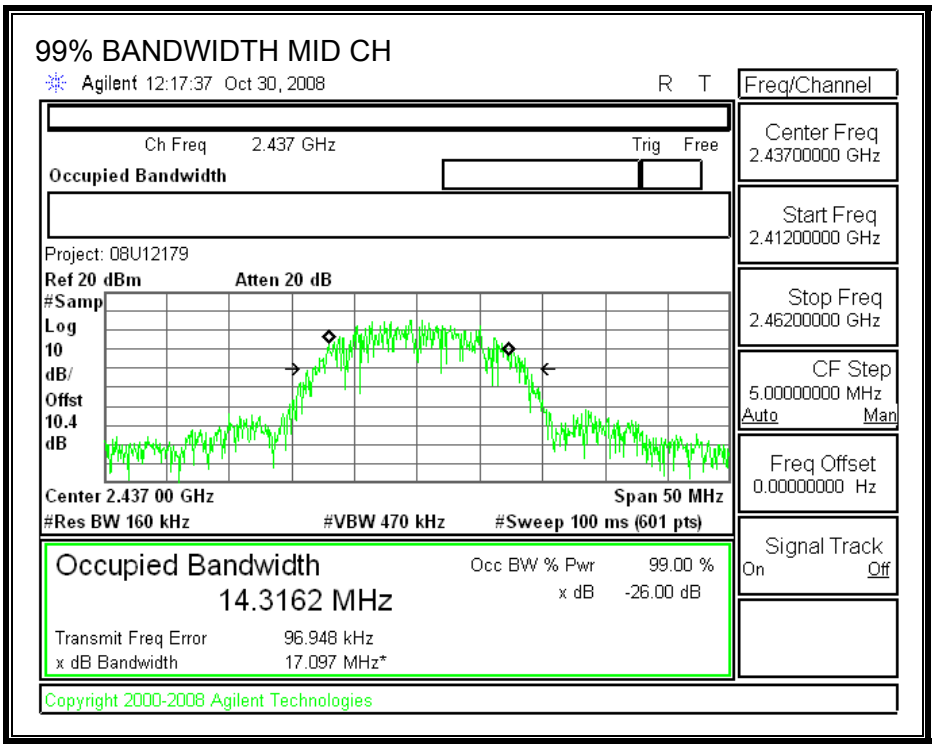

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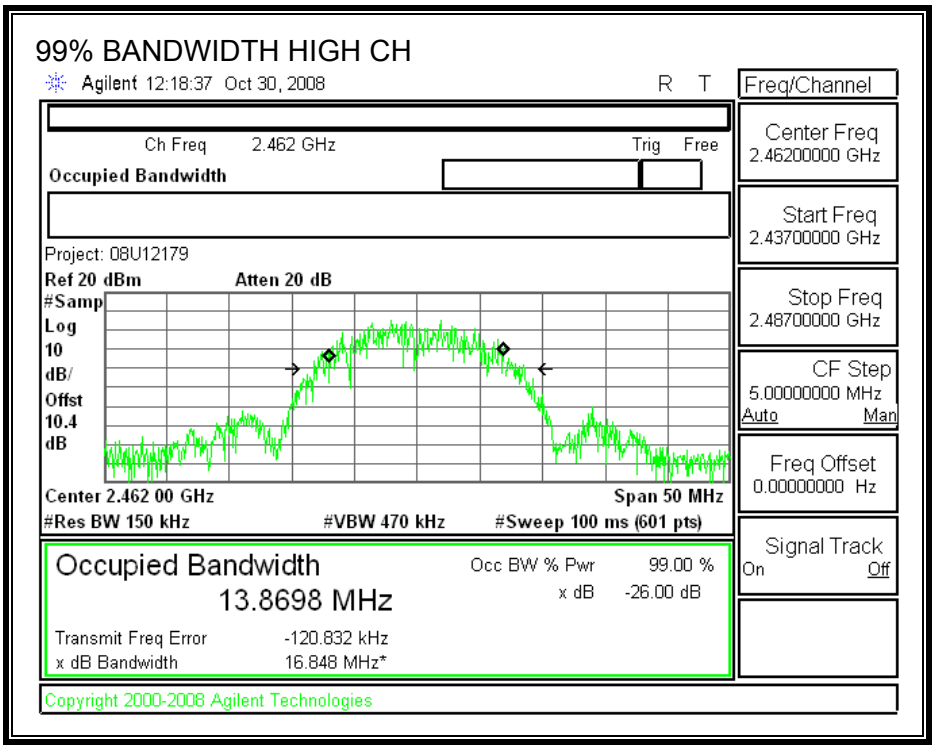

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7.1.3. OUTPUT POWER

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	8.91	10.4	19.31	30	-10.69
Middle	2437	8.55	10.4	18.95	30	-11.05
High	2462	8.56	10.4	18.96	30	-11.04

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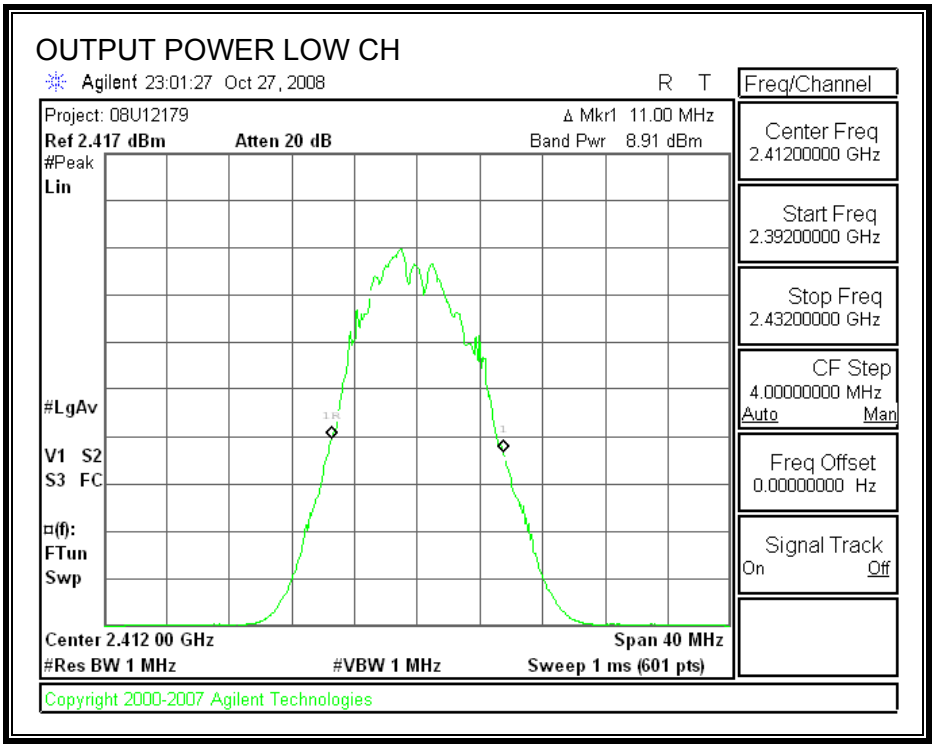
OUTPUT POWER



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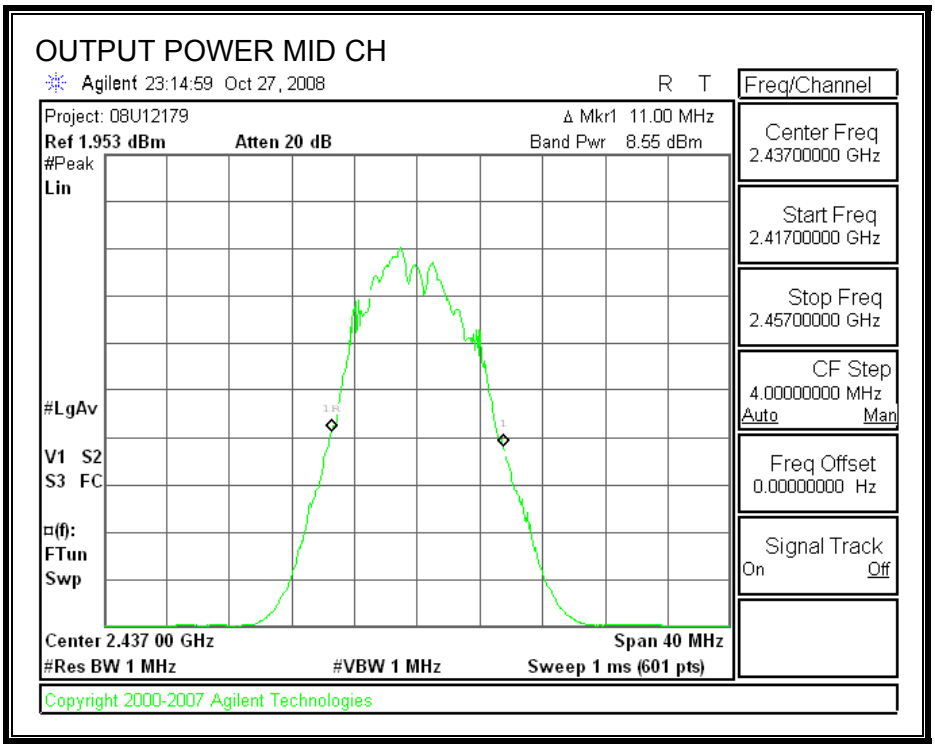

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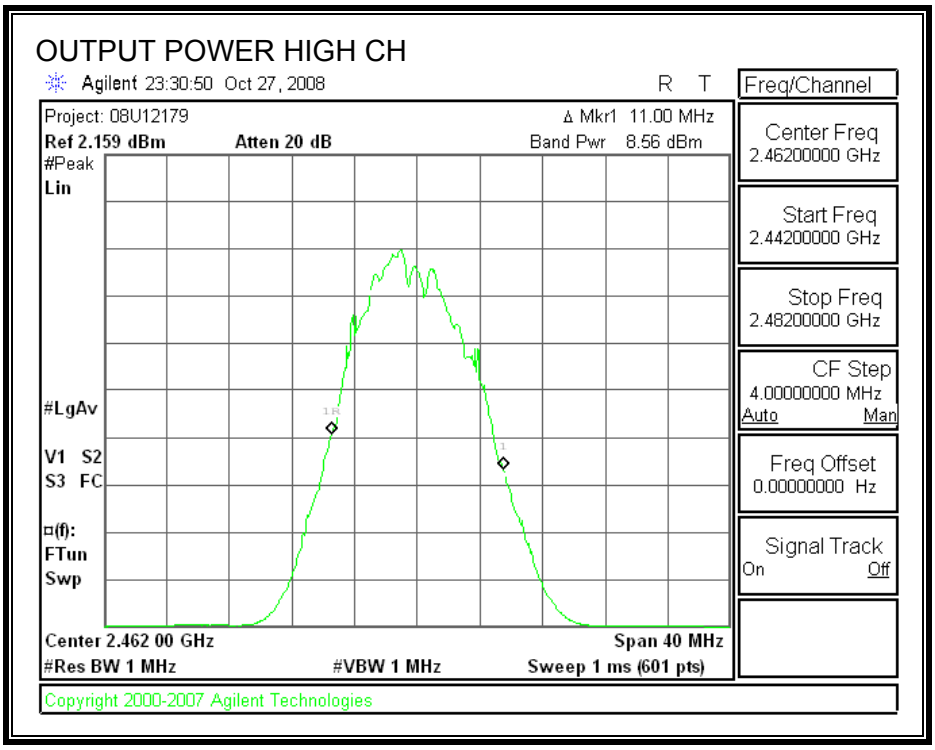

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7.1.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 10 dB (including 10 dB pad and 0.4 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Power (dBm)
Low	2412	16.70
Middle	2437	16.41
High	2462	16.36

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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	-9.22	8	-17.22
Middle	2437	-8.68	8	-16.68
High	2462	-8.34	8	-16.34

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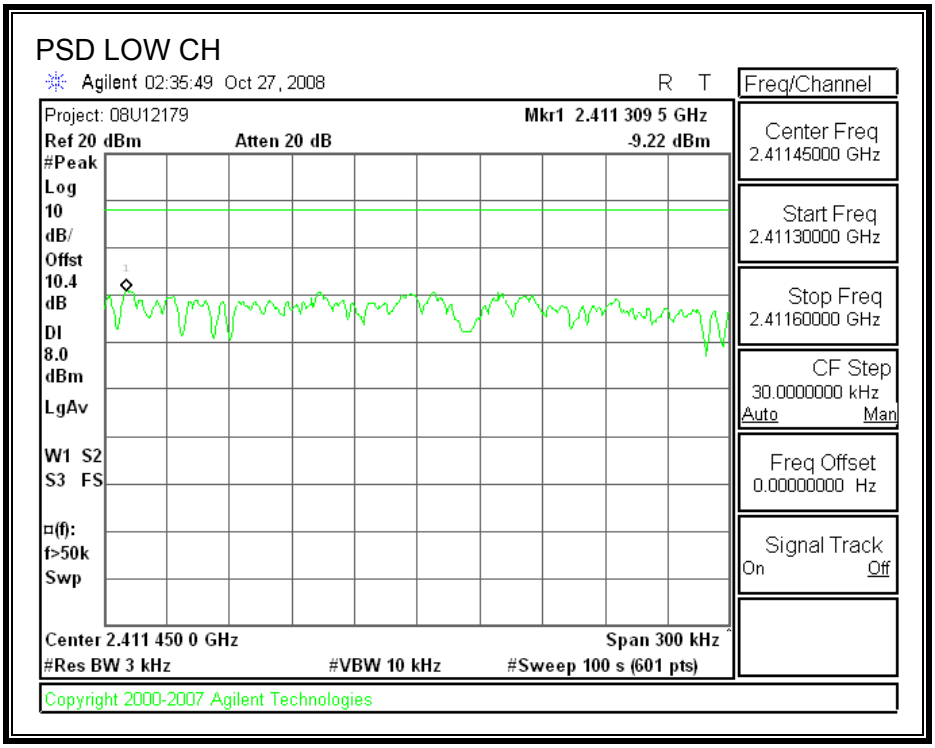
POWER SPECTRAL DENSITY



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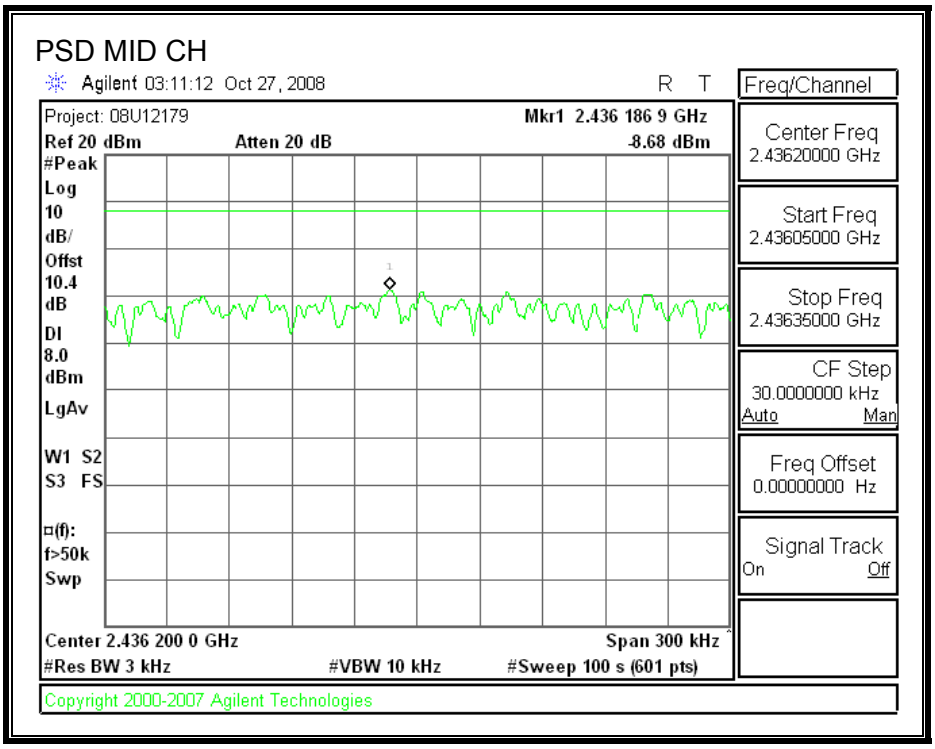

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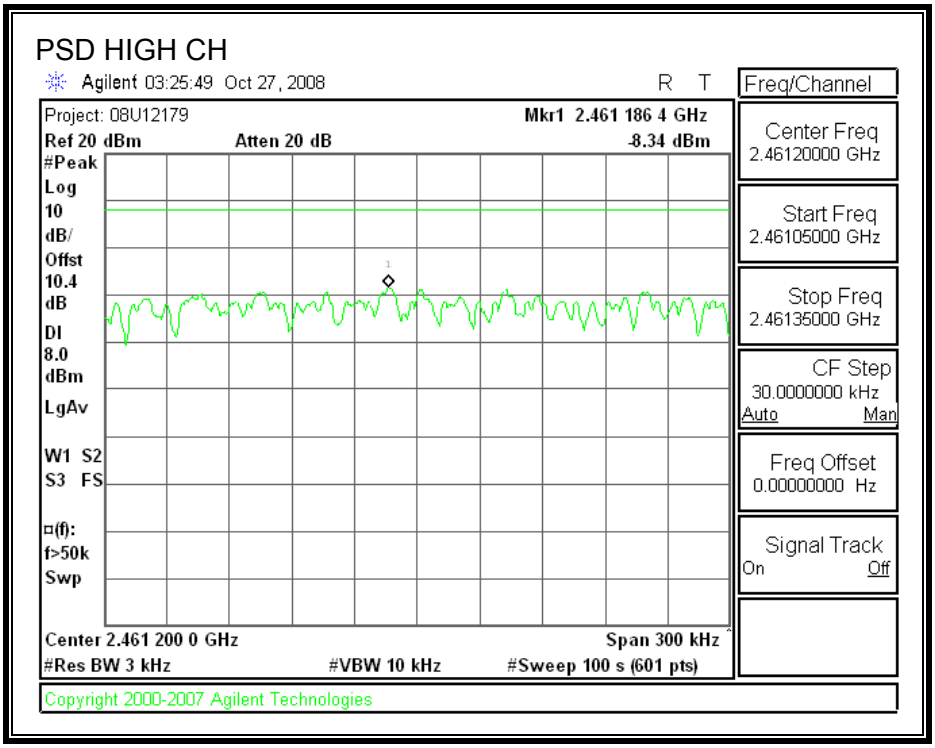
PSD HIGH CH



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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.

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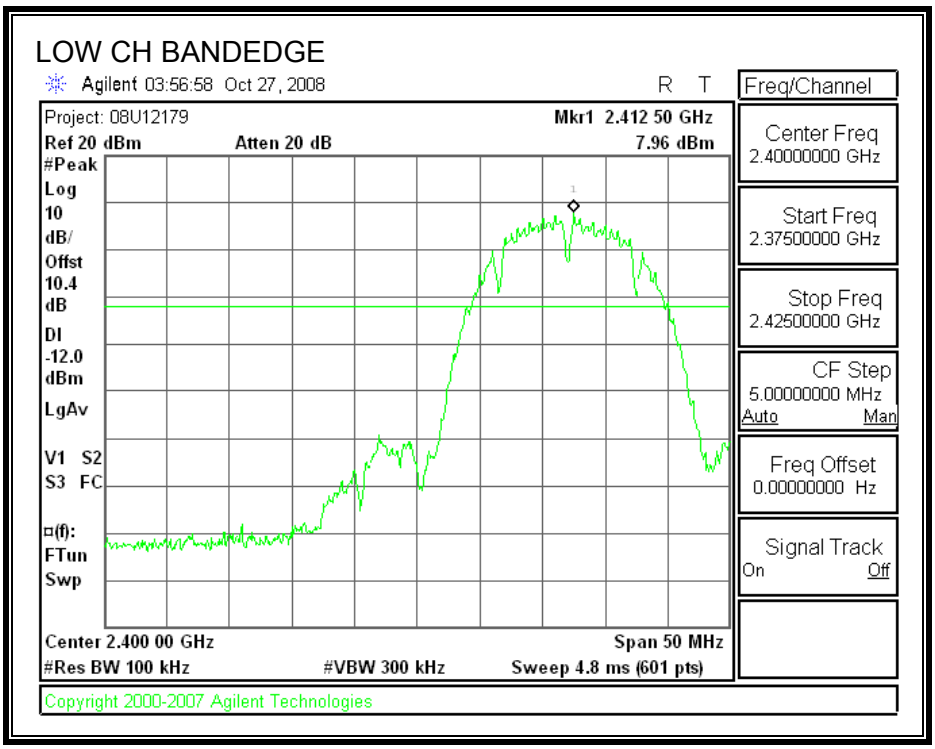
RESULTS

SPURIOUS EMISSIONS, LOW CHANNEL



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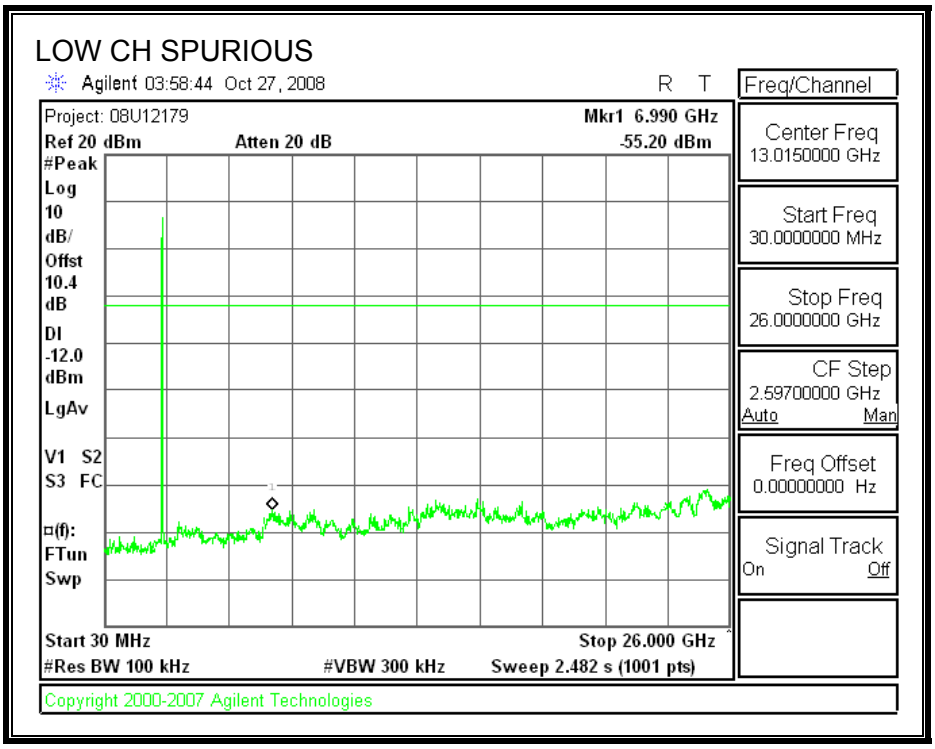

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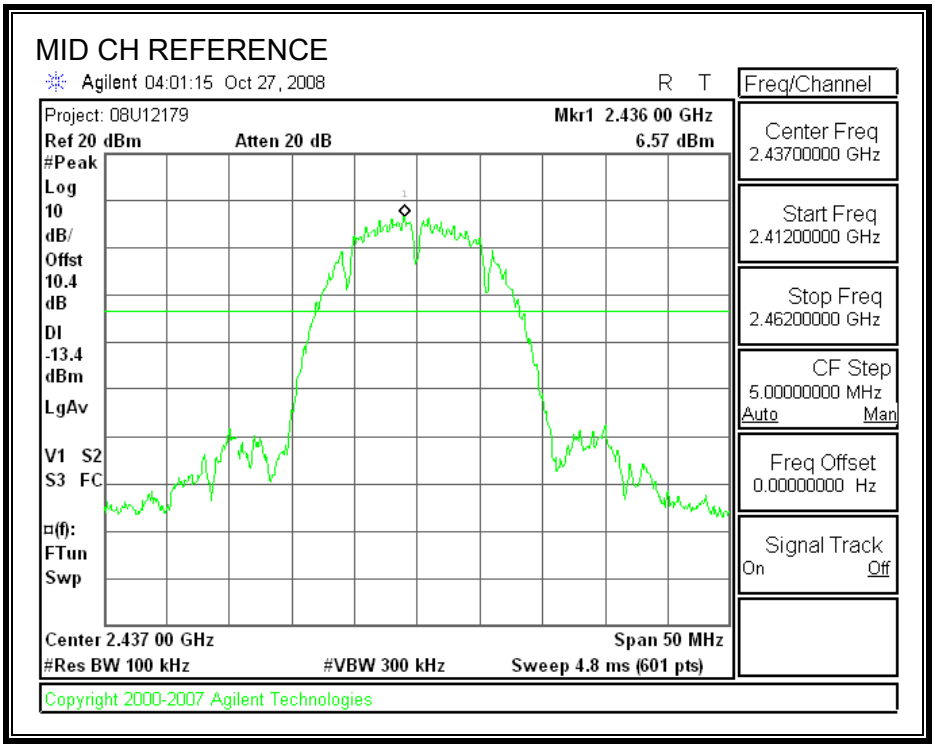
SPURIOUS EMISSIONS, MID CHANNEL



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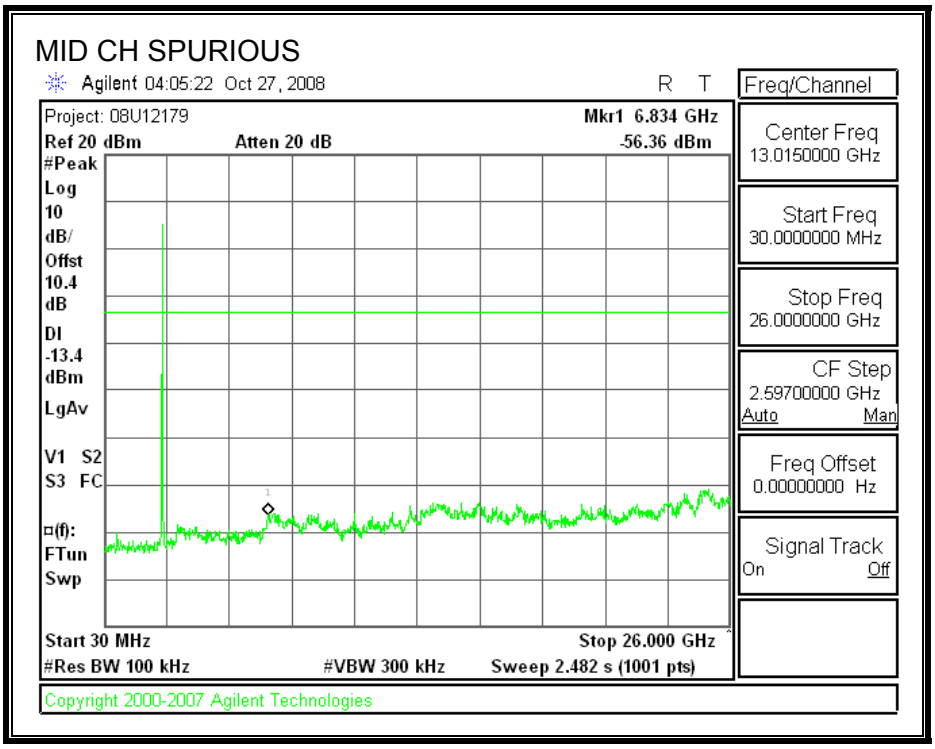

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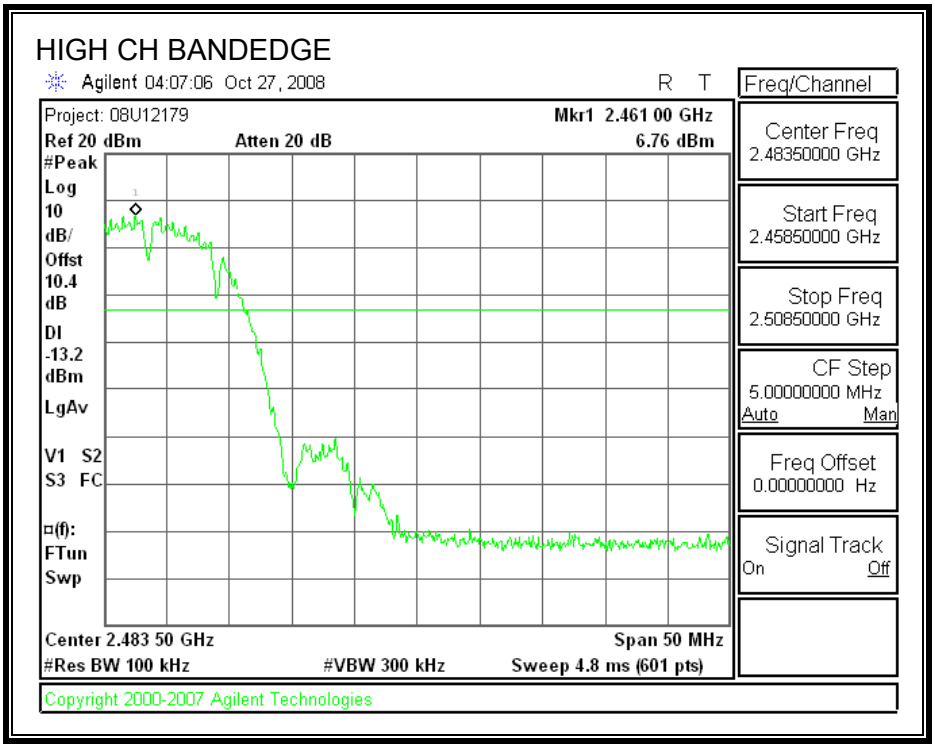
SPURIOUS EMISSIONS, HIGH CHANNEL



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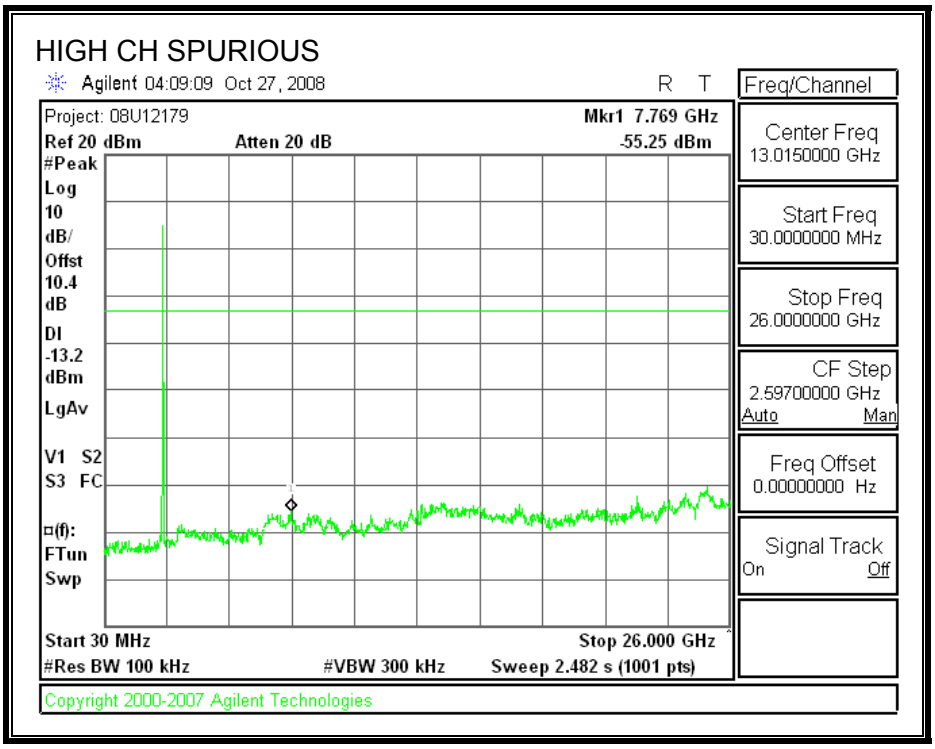
HIGH CH SPURIOUS



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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	16.08	0.5
Middle	2437	16.33	0.5
High	2462	15.58	0.5

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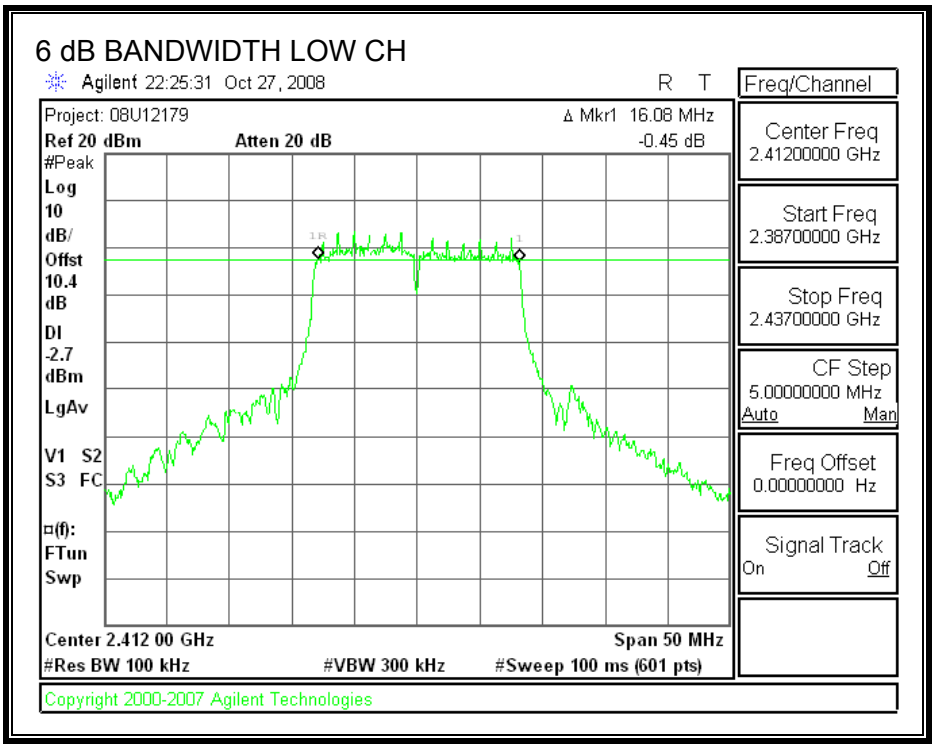
6 dB BANDWIDTH



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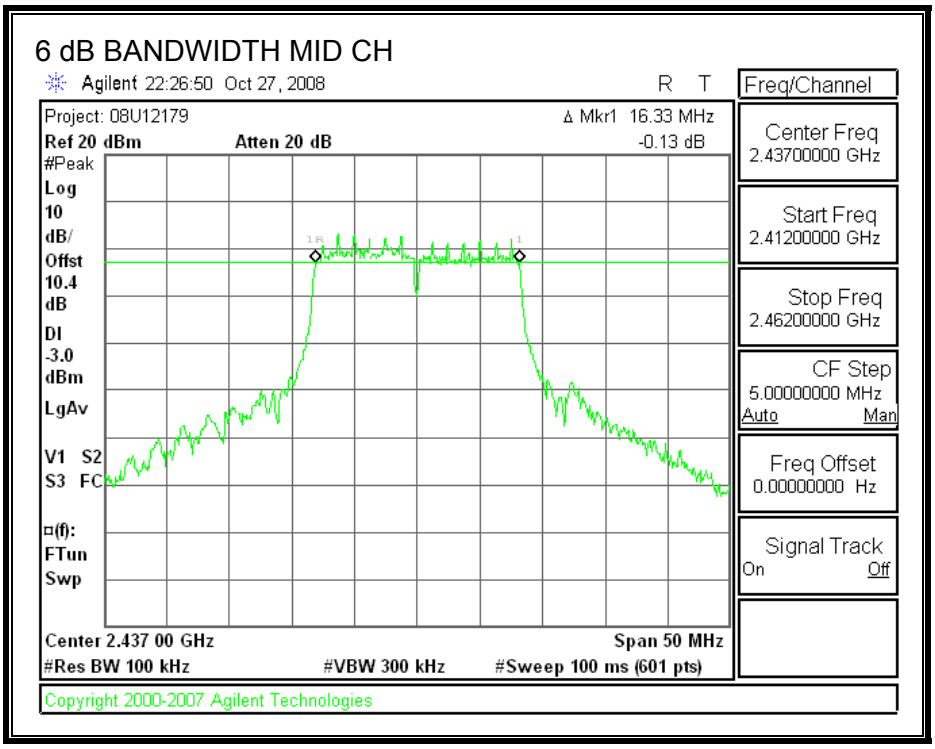

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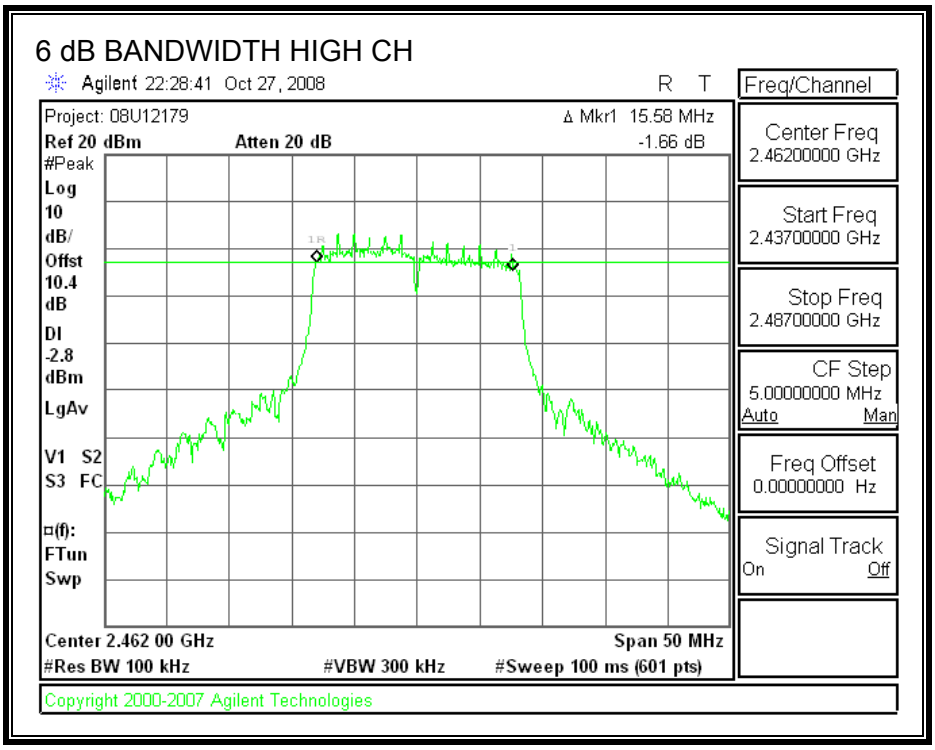

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7.2.2. 99% BANDWIDTH

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	16.3278
Middle	2437	16.4035
High	2462	16.2961

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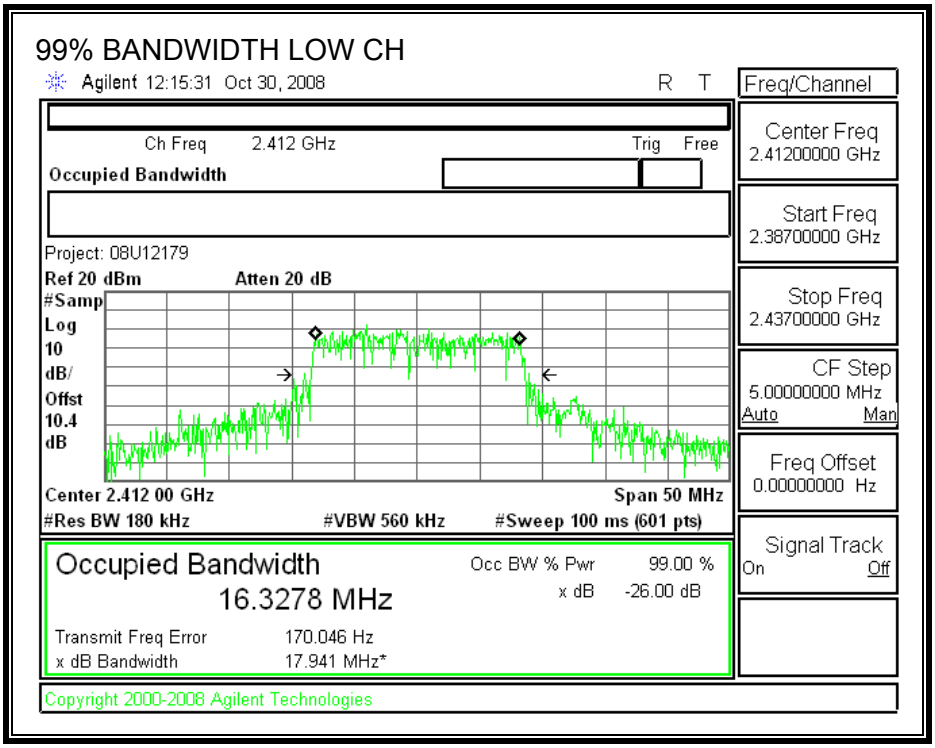
99% BANDWIDTH



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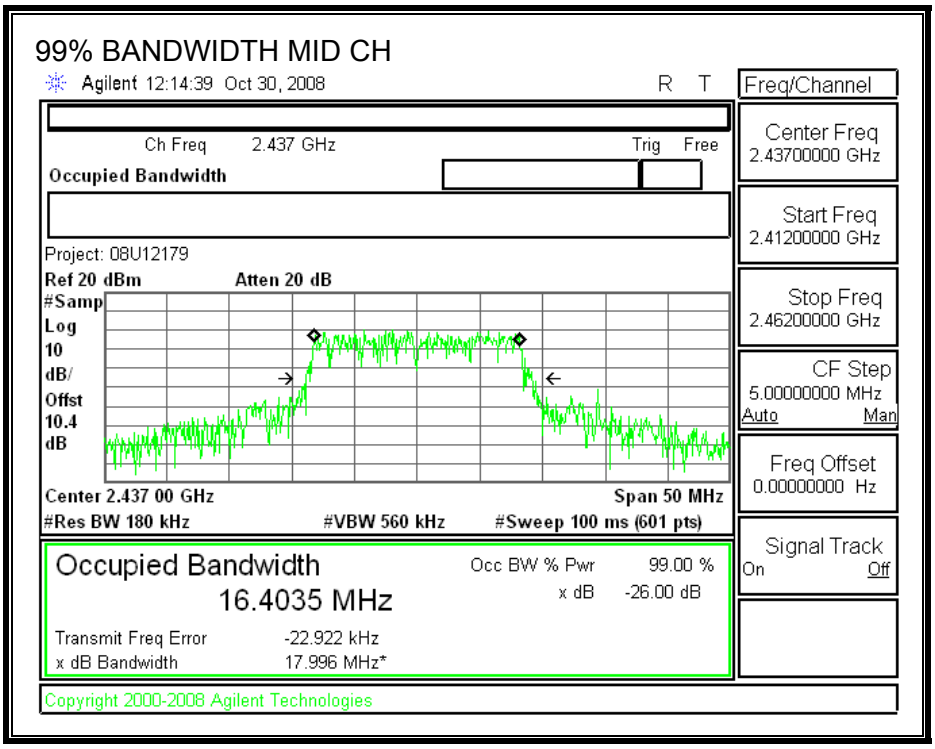

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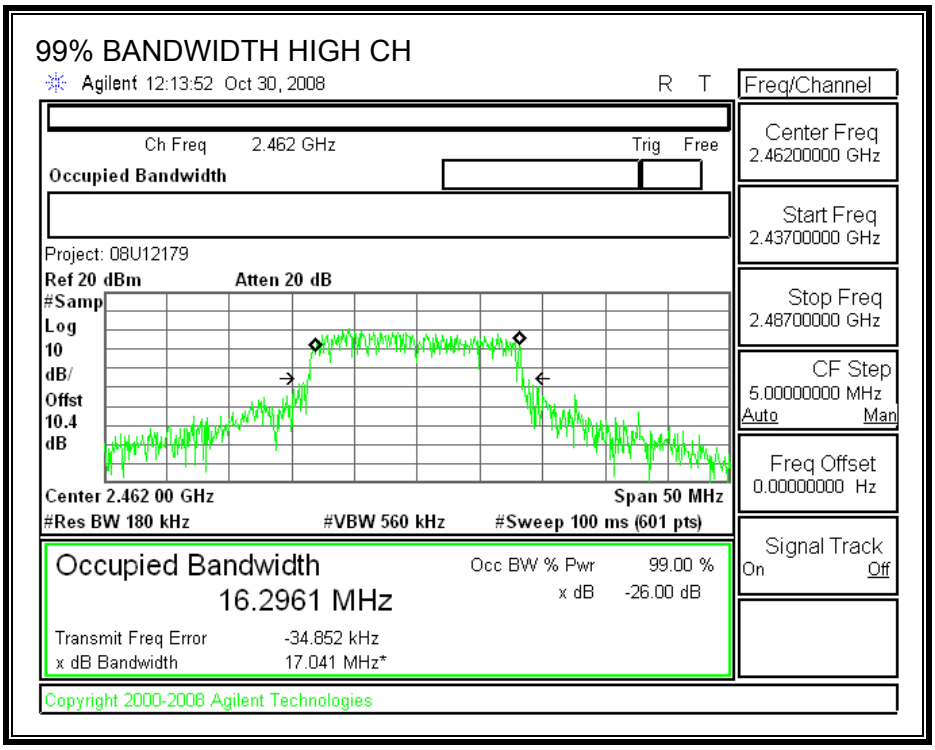

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7.2.3. OUTPUT POWER

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	10.35	10.4	20.75	30	-9.25
Middle	2437	10.11	10.4	20.51	30	-9.49
High	2462	9.86	10.4	20.26	30	-9.74

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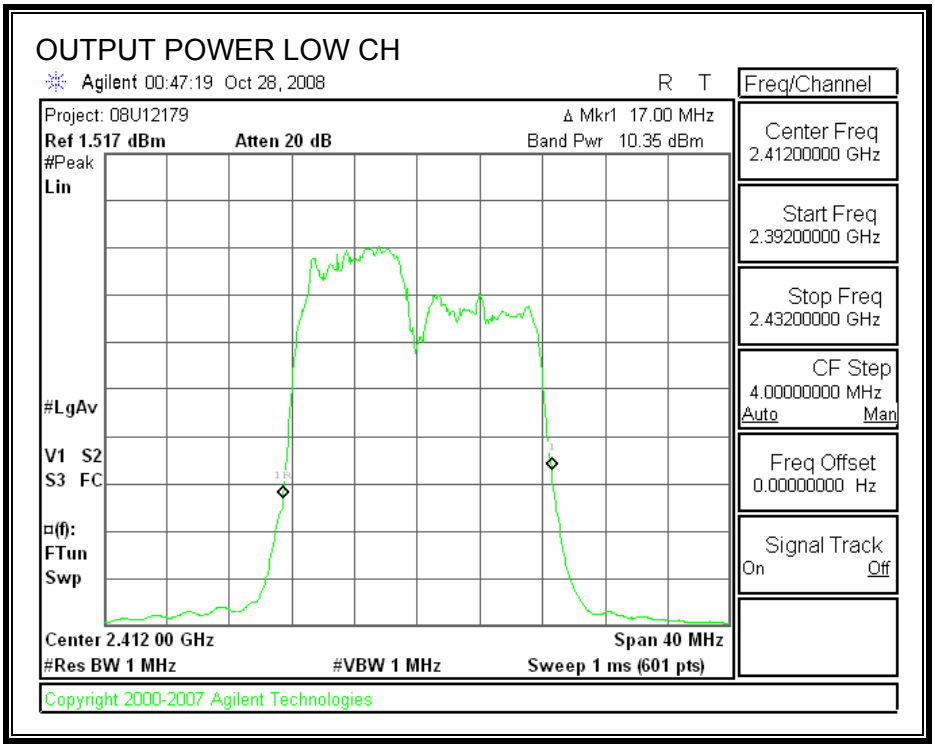
OUTPUT POWER



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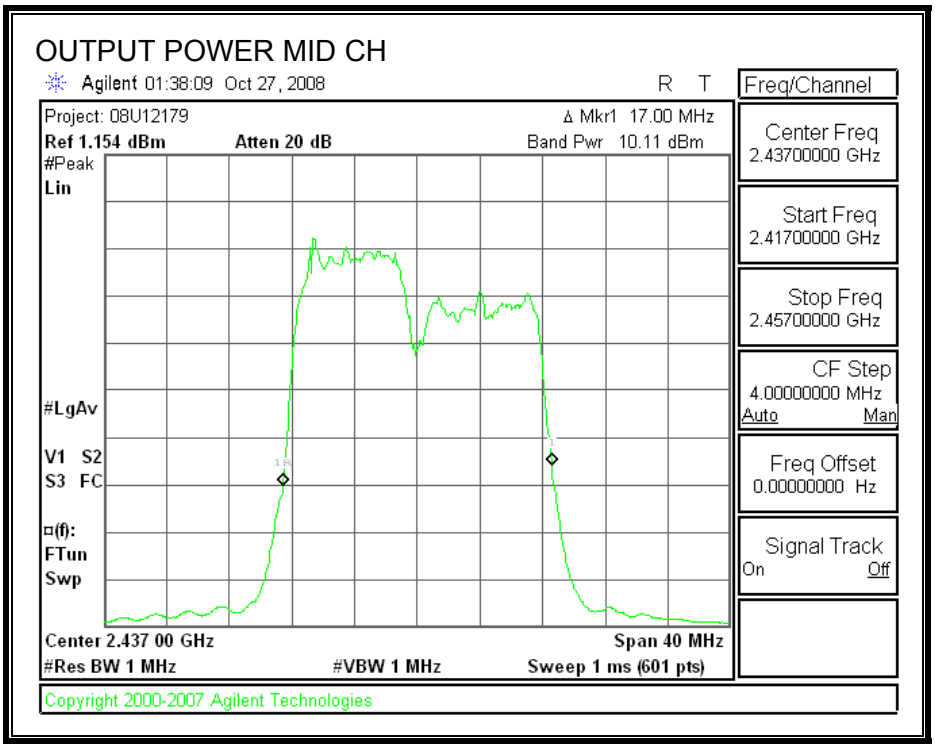

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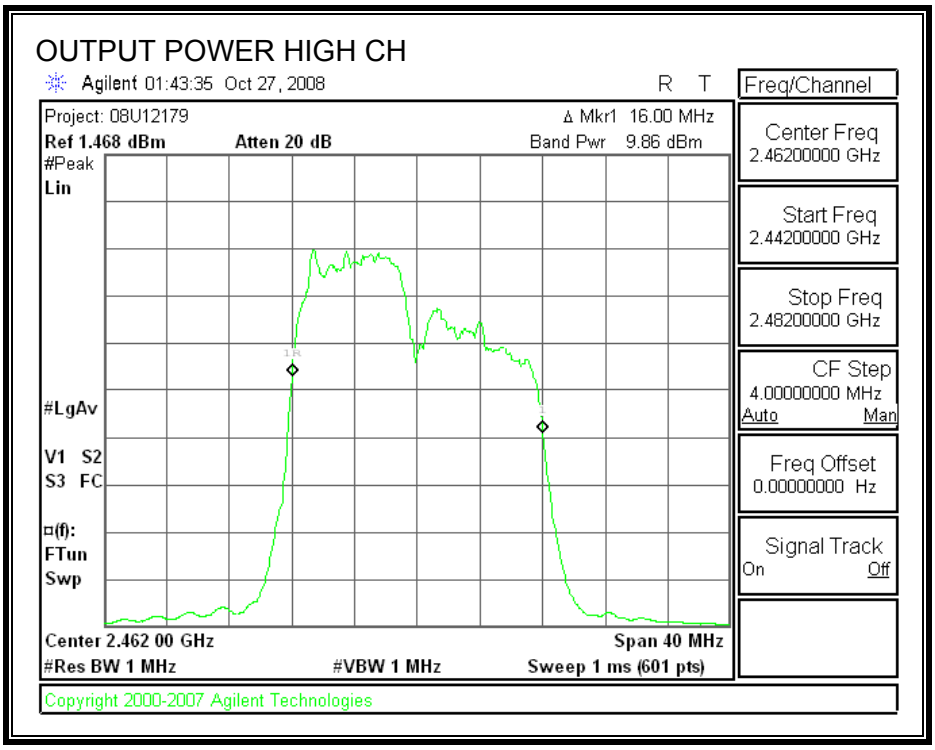

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7.2.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 10 dB (including 10 dB pad and 0.4 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Power (dBm)
Low	2412	13.45
Middle	2437	13.33
High	2462	13.10

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7.2.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

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

TEST PROCEDURE

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

RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-11.88	8	-19.88
Middle	2437	-11.95	8	-19.95
High	2462	-11.71	8	-19.71

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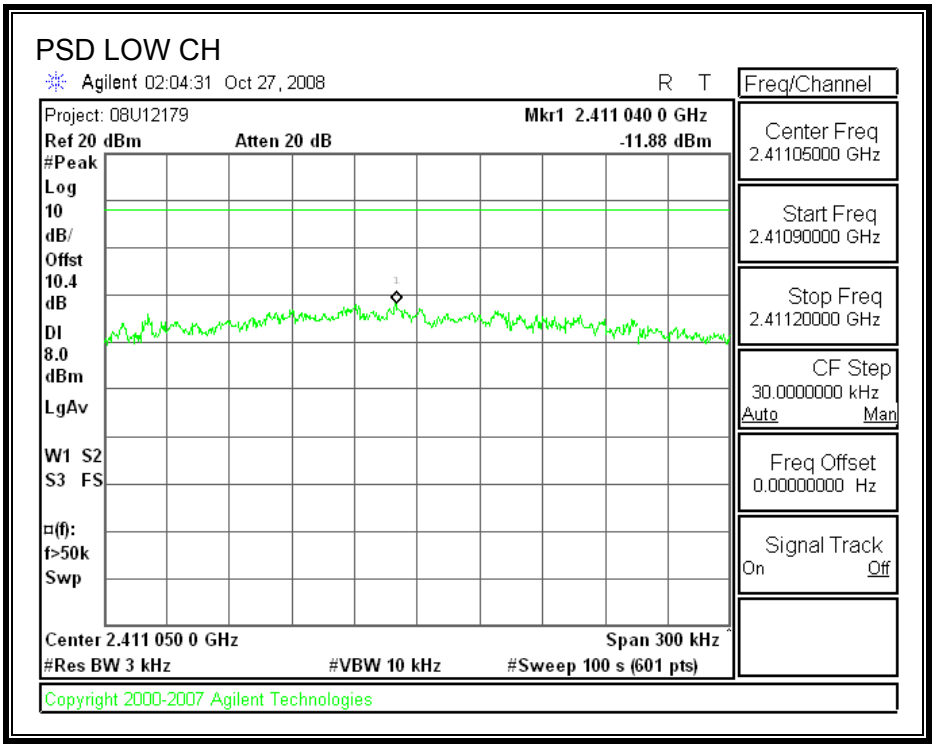
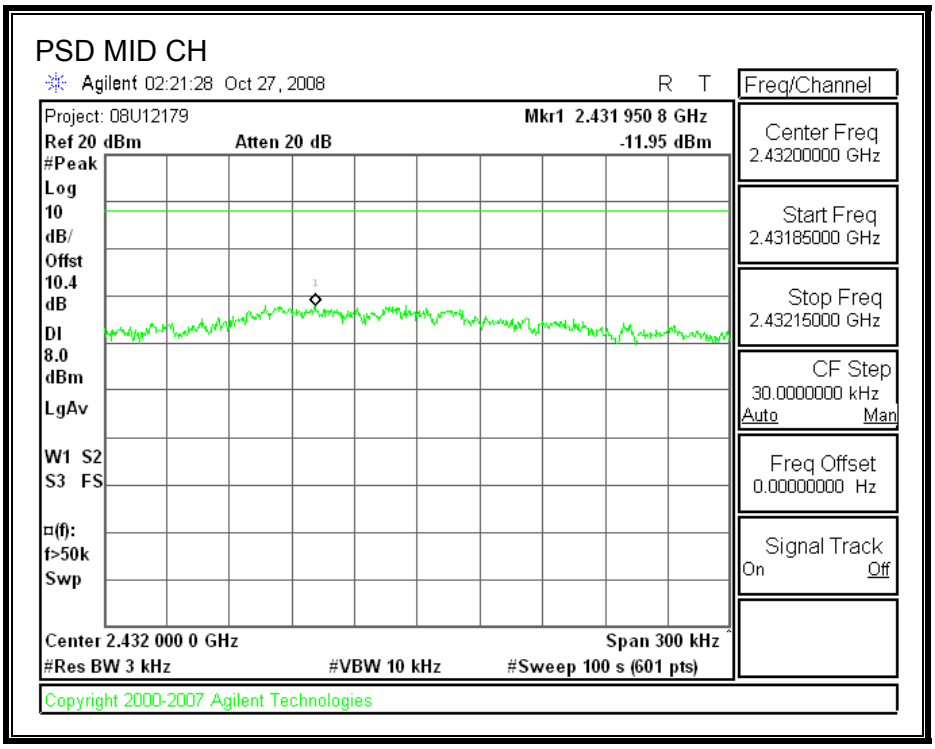
POWER SPECTRAL DENSITY



This report shall not be reproduced except in full, without the written approval of CCS.



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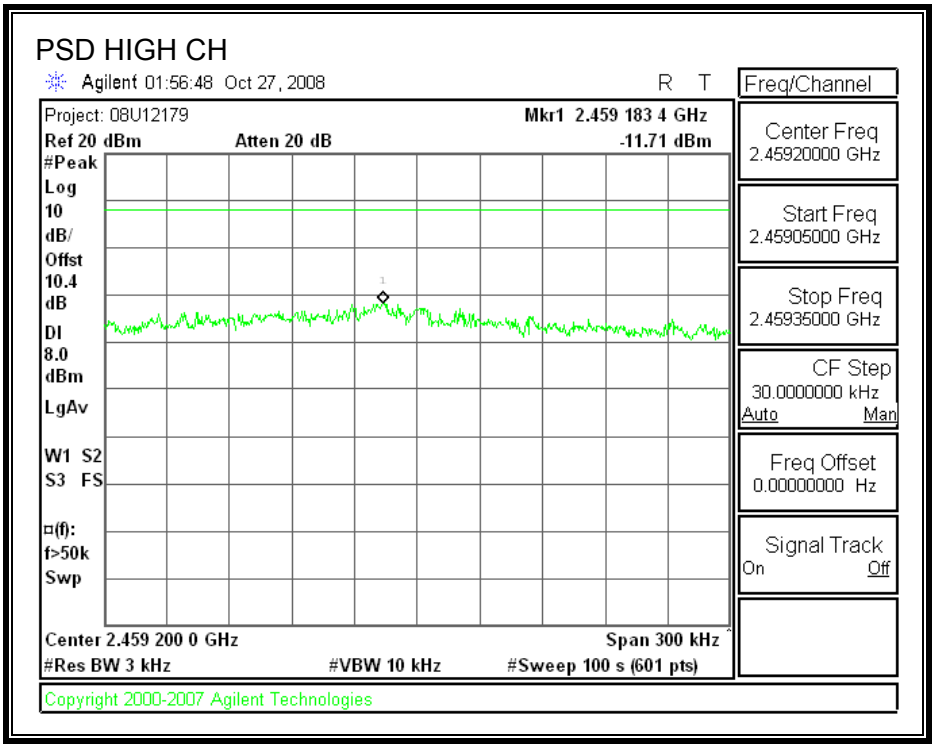
PSD HIGH CH



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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.

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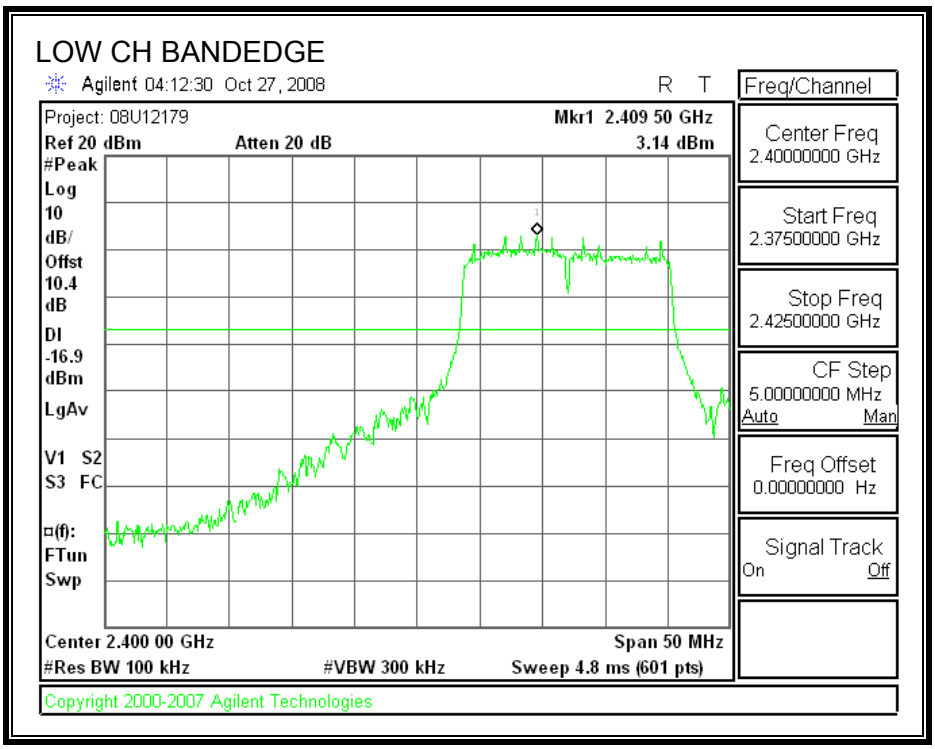
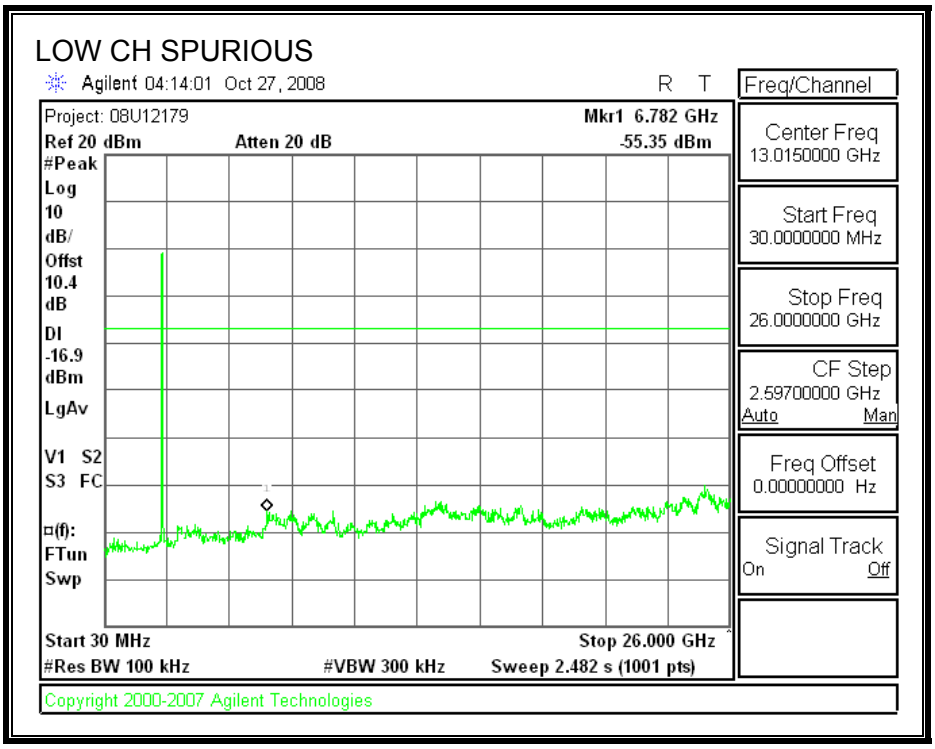
RESULTS

SPURIOUS EMISSIONS, LOW CHANNEL



This report shall not be reproduced except in full, without the written approval of CCS.



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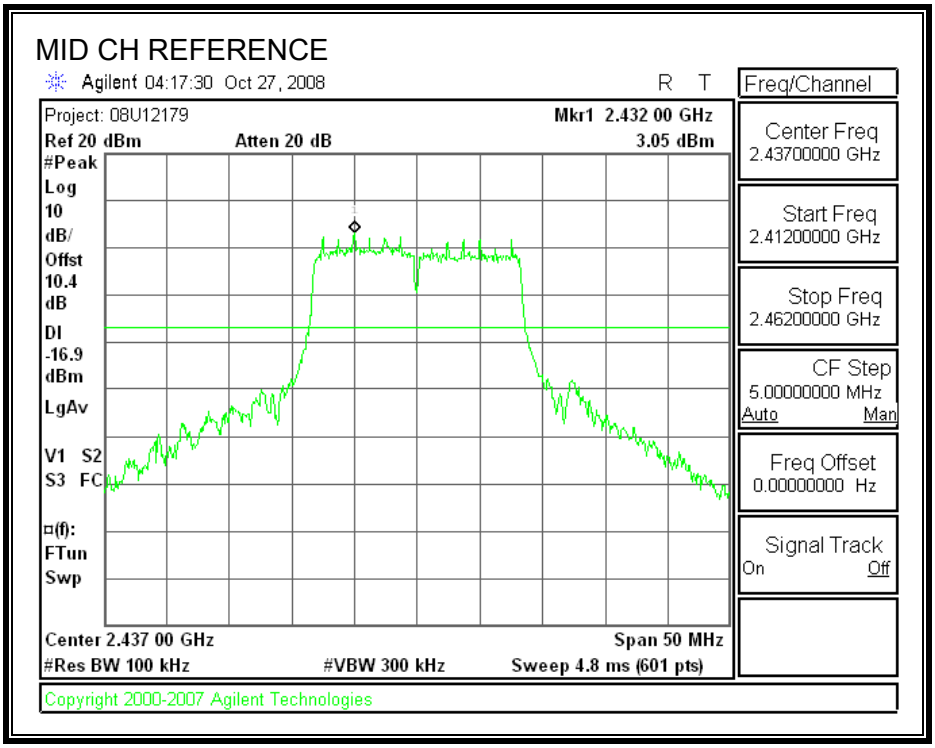
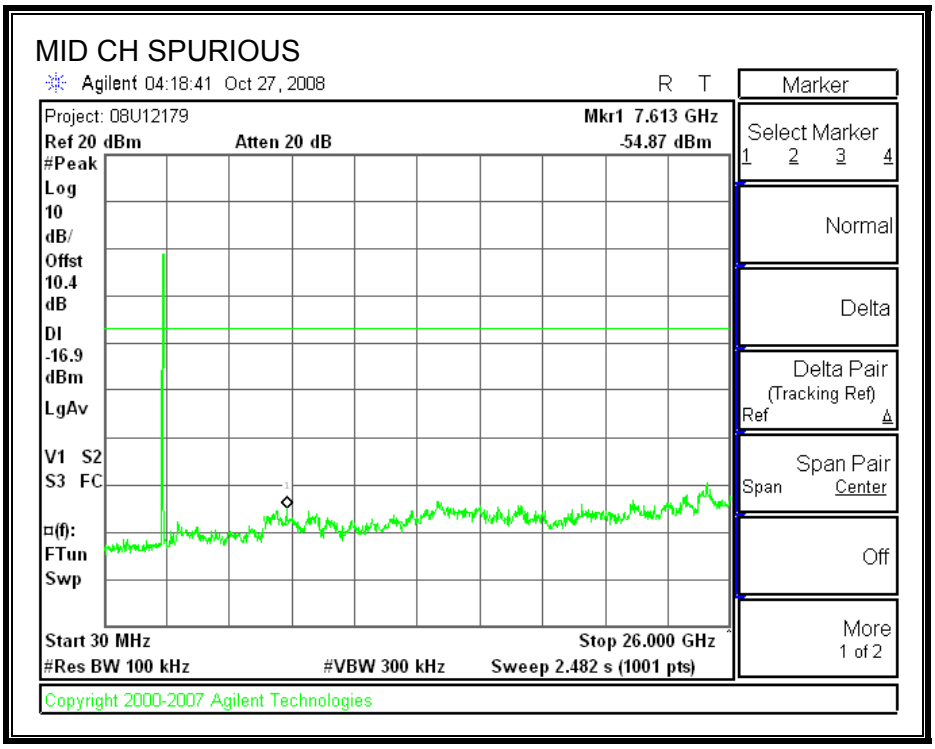
SPURIOUS EMISSIONS, MID CHANNEL



This report shall not be reproduced except in full, without the written approval of CCS.



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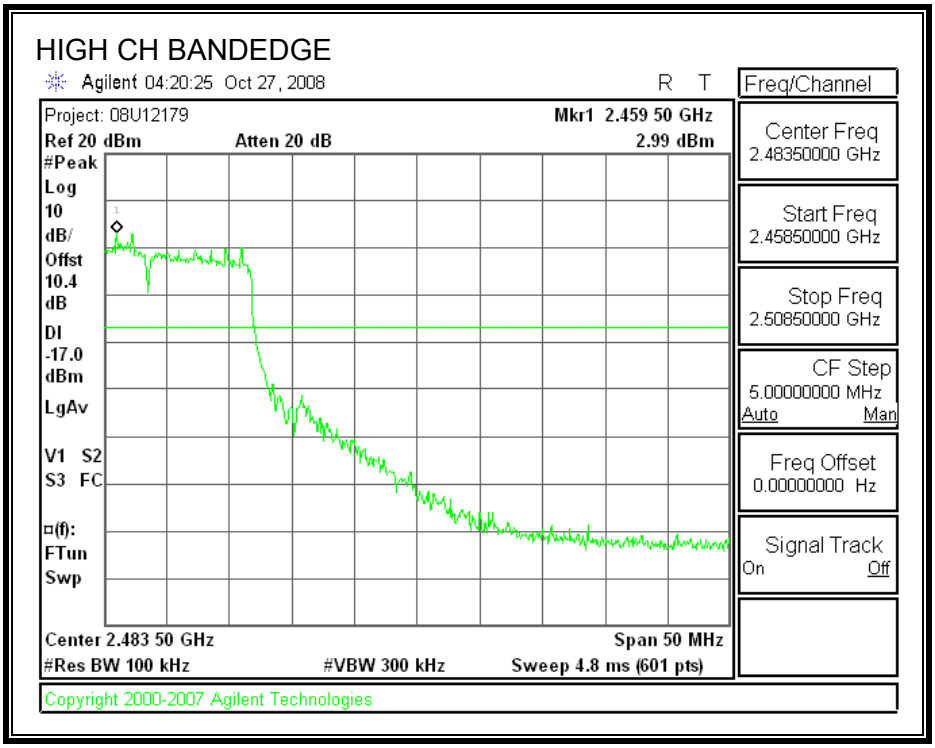
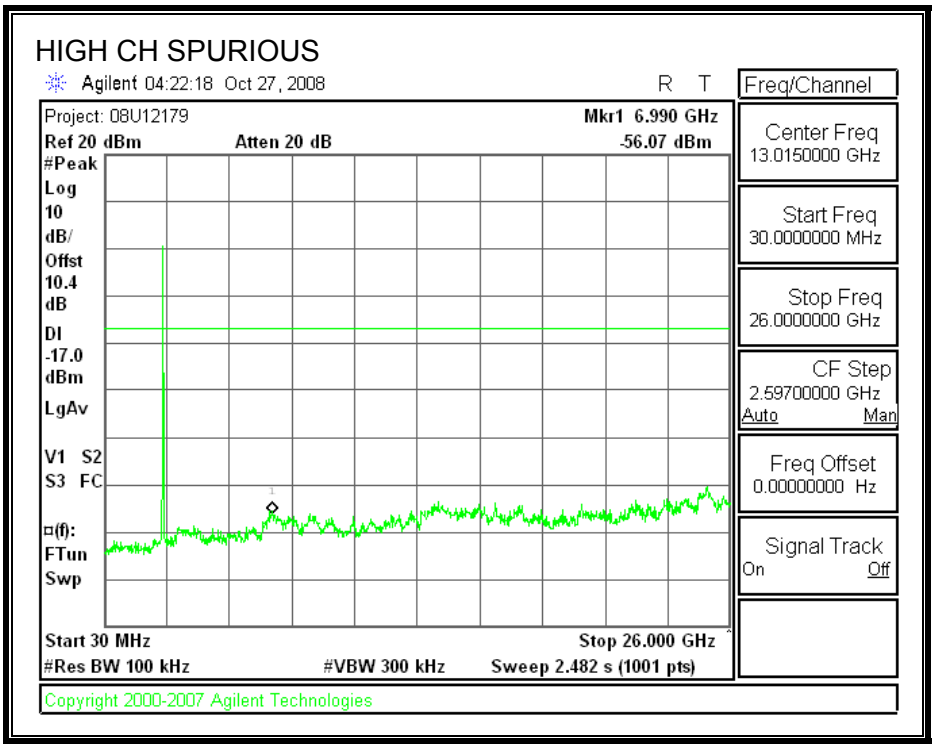
SPURIOUS EMISSIONS, HIGH CHANNEL



This report shall not be reproduced except in full, without the written approval of CCS.



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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.

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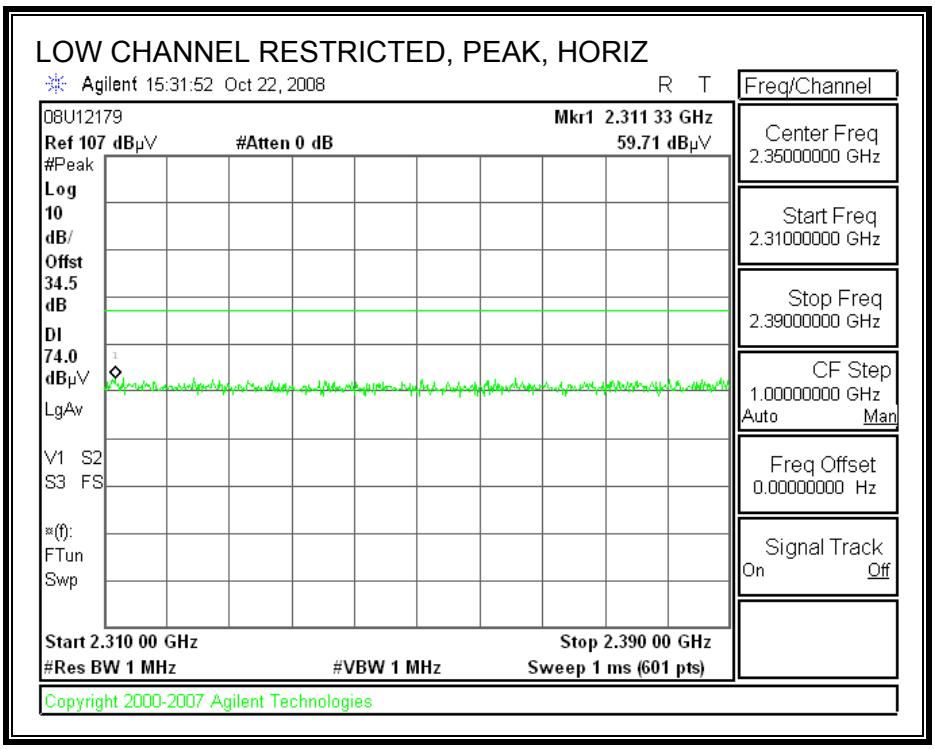
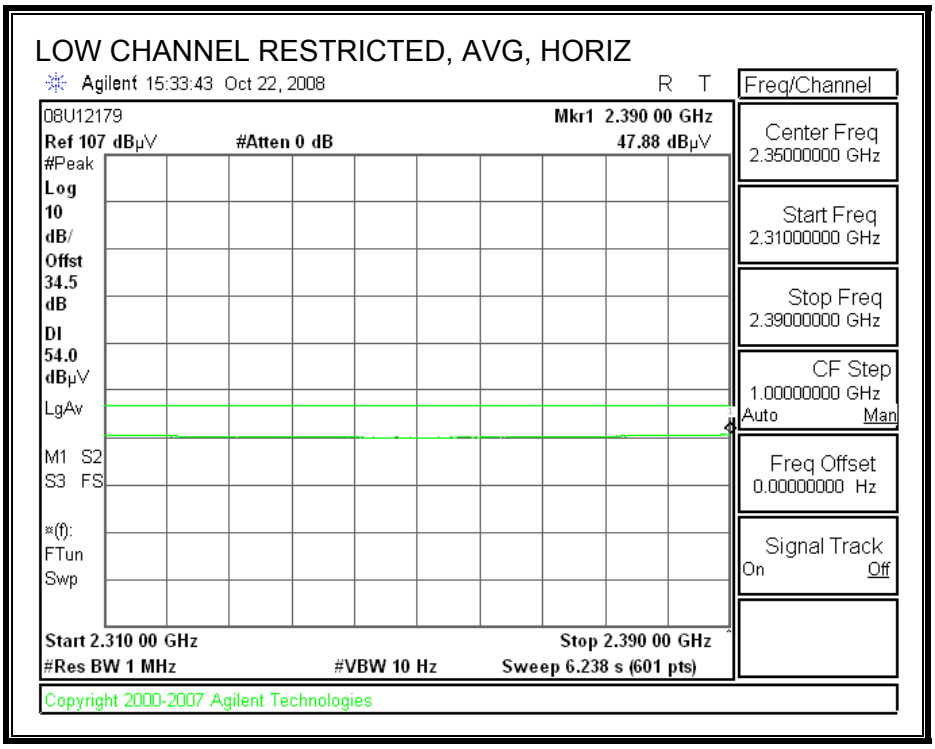
8.2. TRANSMITTER ABOVE 1 GHz

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

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



This report shall not be reproduced except in full, without the written approval of CCS.



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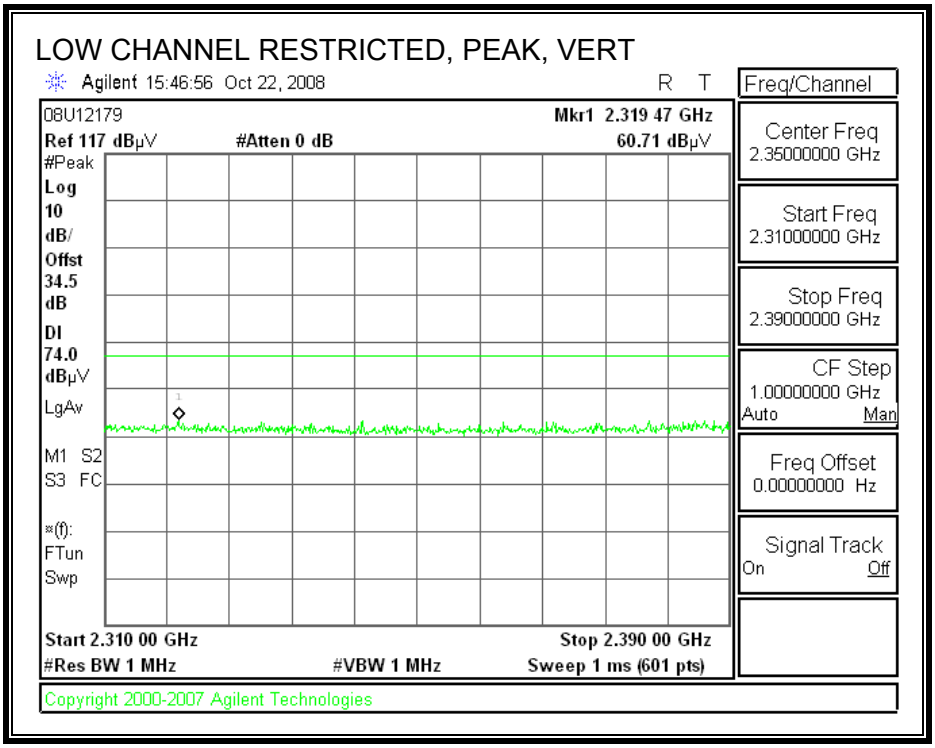
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



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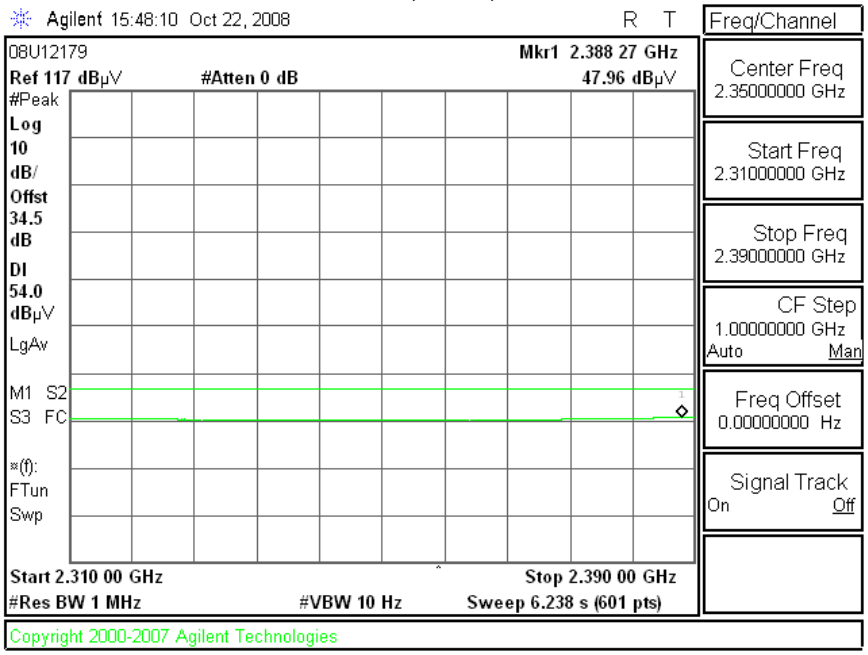
LOW CHANNEL RESTRICTED, AVG, VERT



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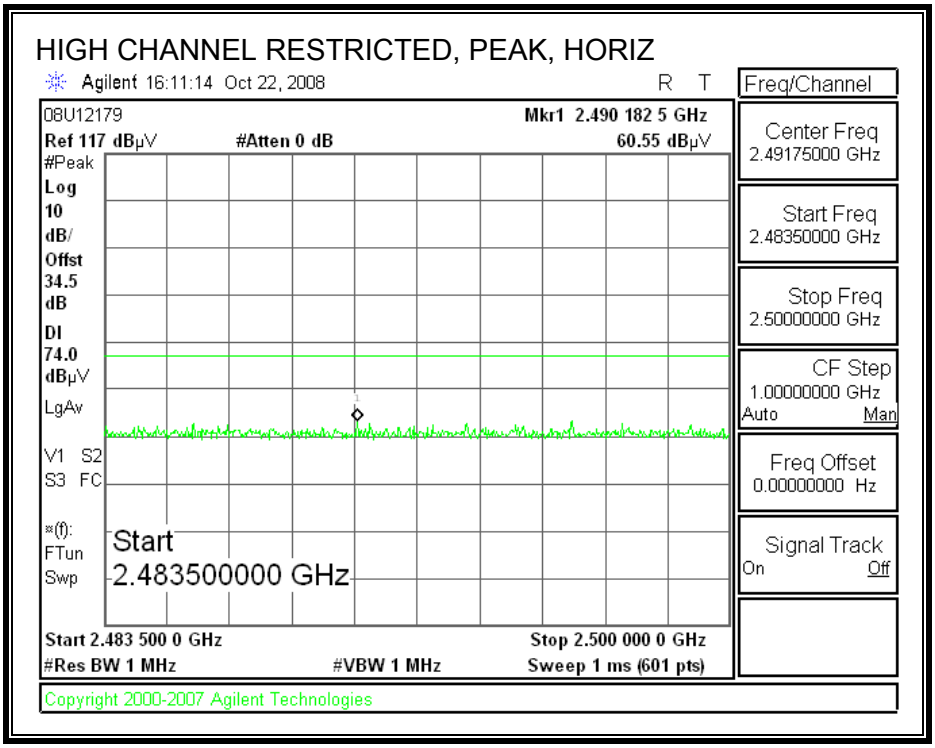
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



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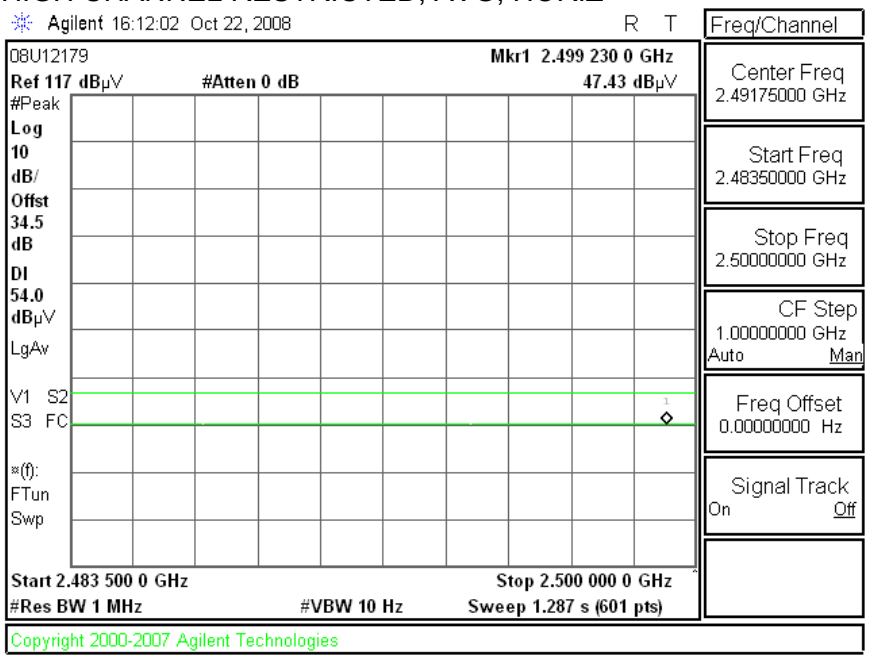
HIGH CHANNEL RESTRICTED, AVG, HORIZ



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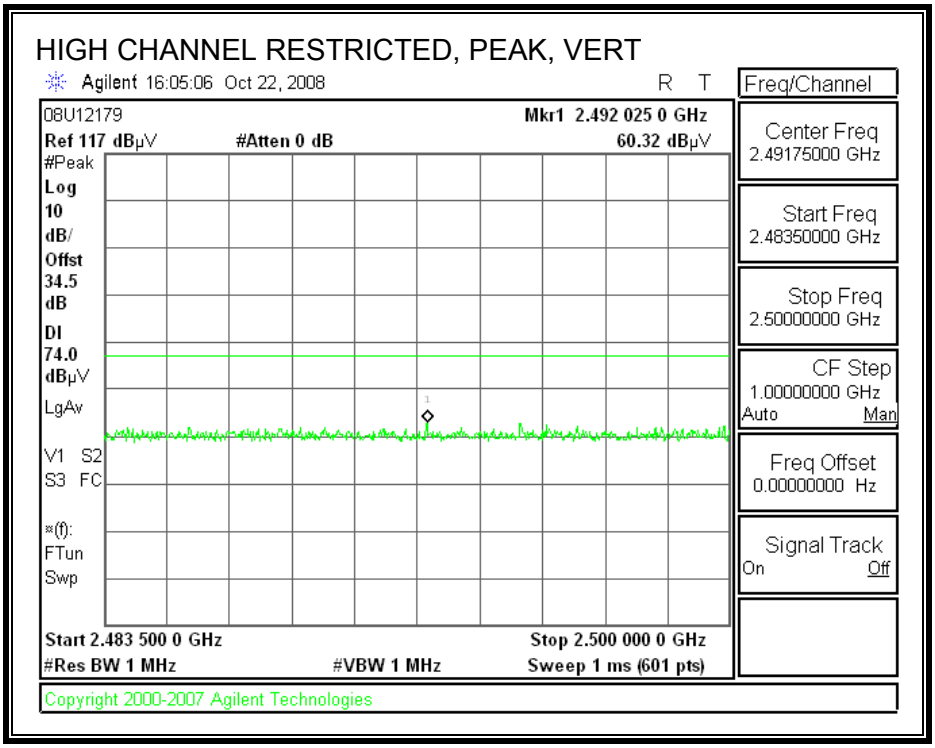
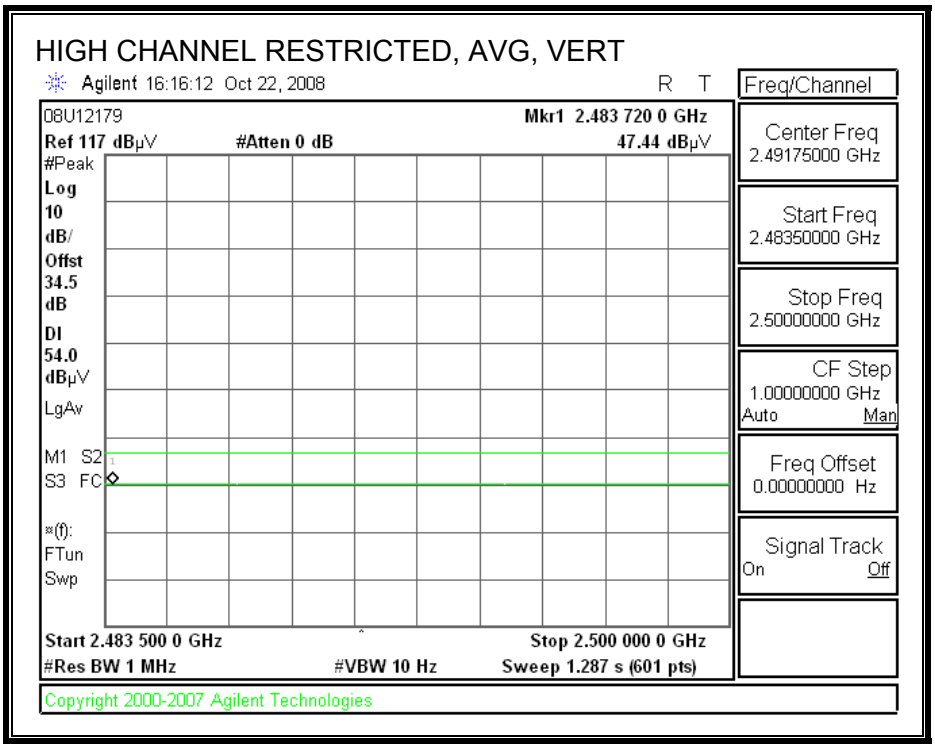
RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



This report shall not be reproduced except in full, without the written approval of CCS.



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HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Aircell
Project #: 08U12179
Date: 10/23/2008
Test Engineer: Tom Chen
Configuration: EUT with laptop PC
Mode: TX

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T60; S/N: 2238 @3m	T144 Miteq 3008A00931		T39; ARA 18-26GHz; S/N:1013	FCC 15.205

Hi Frequency Cables

2 foot cable	3 foot cable	Chamber Cables	HPF	Reject Filter
		A-5m Chamber		R_001

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)
Low Ch, 2412 MHz															
4.824	3.0	38.8	29.7	33.7	6.9	-36.5	0.0	0.0	42.9	33.8	74	54	-31.1	-20.2	V
4.824	3.0	41.7	29.6	33.7	6.9	-36.5	0.0	0.0	45.8	33.7	74	54	-28.2	-20.3	H
Mid Ch, 2437 MHz															V
4.874	3.0	40.4	30.2	33.7	6.9	-36.5	0.0	0.0	44.6	34.4	74	54	-29.4	-19.6	V
7.311	3.0	40.8	30.5	36.7	8.4	-36.2	0.0	0.0	49.7	39.4	74	54	-24.3	-14.6	V
4.874	3.0	40.7	29.9	33.7	6.9	-36.5	0.0	0.0	44.9	34.1	74	54	-29.1	-19.9	H
7.311	3.0	41.2	30.7	36.7	8.4	-36.2	0.0	0.0	50.1	39.6	74	54	-23.9	-14.4	H
High Ch, 2462 MHz															V
4.924	3.0	40.7	28.7	33.8	7.0	-36.5	0.0	0.0	45.0	33.0	74	54	-29.0	-21.0	V
7.386	3.0	41.4	29.4	36.8	8.4	-36.2	0.0	0.0	50.4	38.4	74	54	-23.6	-15.6	V
4.924	3.0	41.5	28.9	33.8	7.0	-36.5	0.0	0.0	45.8	33.2	74	54	-28.2	-20.8	H
7.386	3.0	41.1	29.2	36.8	8.4	-36.2	0.0	0.0	50.1	38.2	74	54	-23.9	-15.8	H

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

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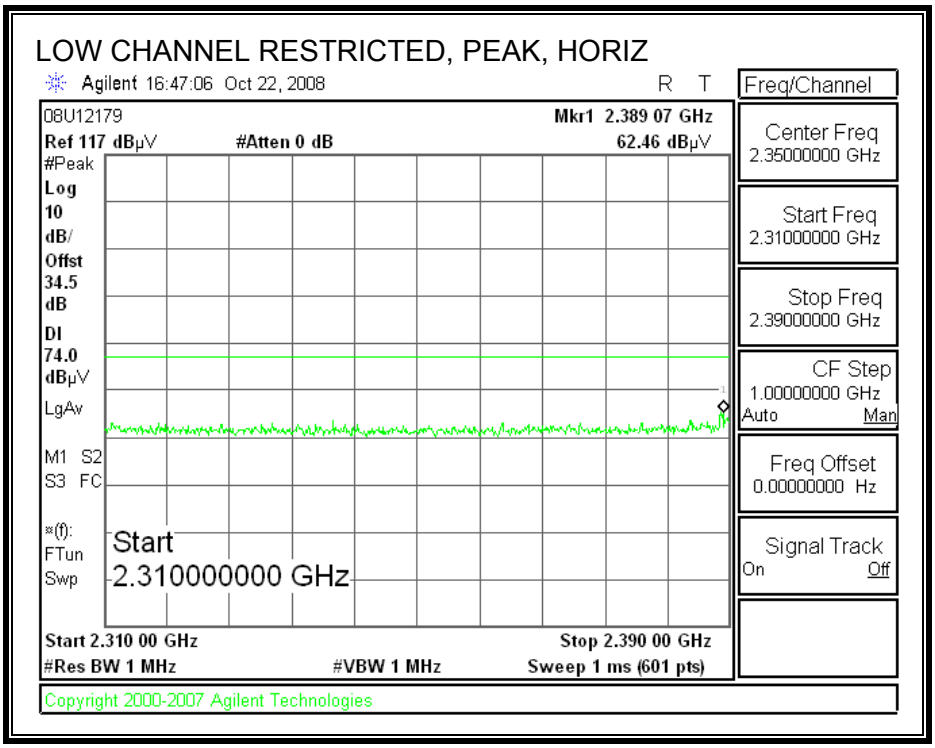
8.2.2. TX ABOVE 1 GHz FOR 802.11g MODE IN THE 2.4 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



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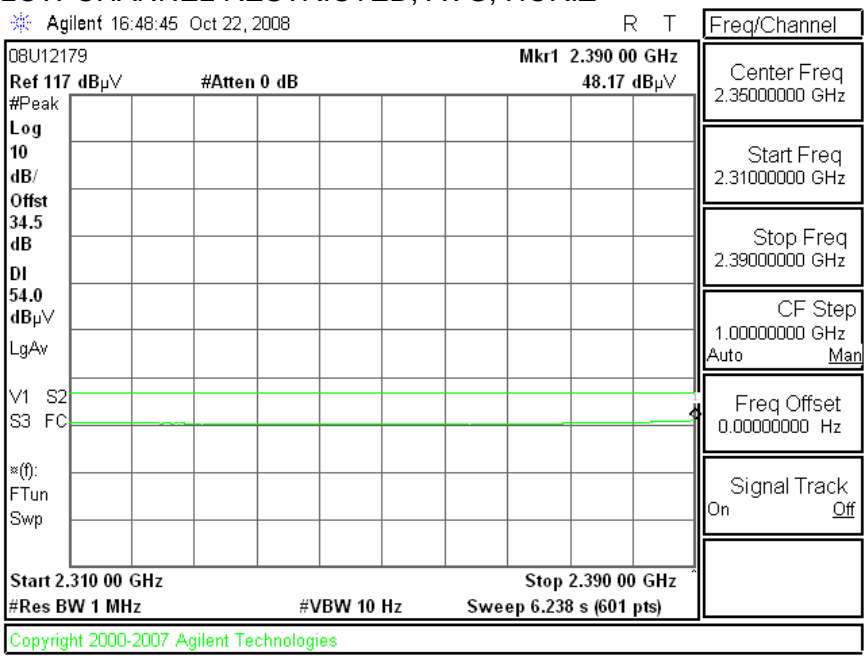
LOW CHANNEL RESTRICTED, AVG, HORIZ



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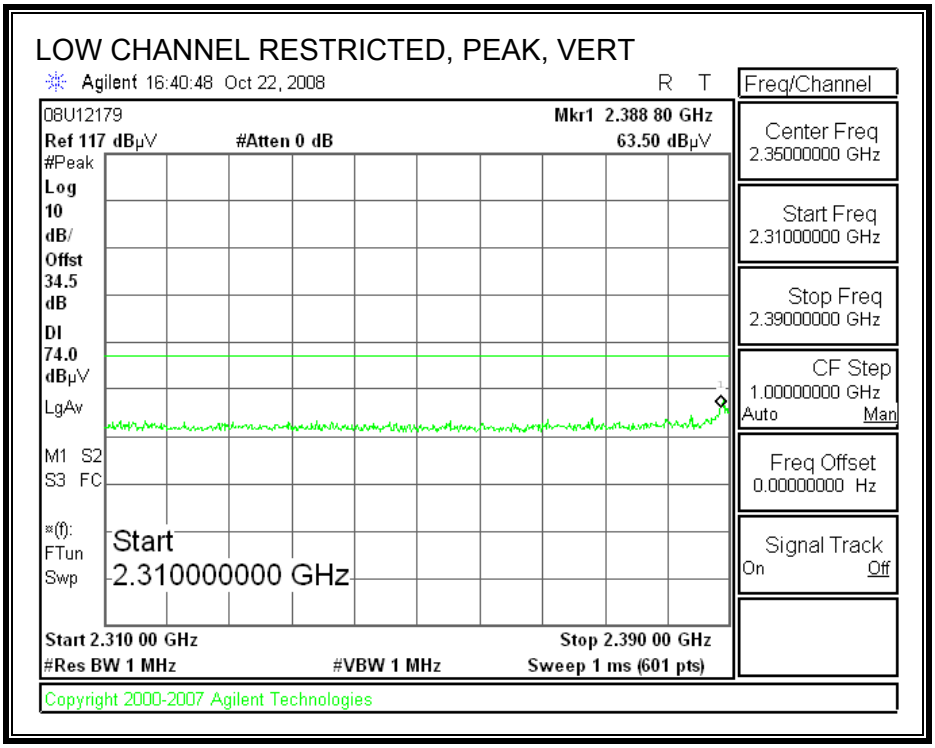
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



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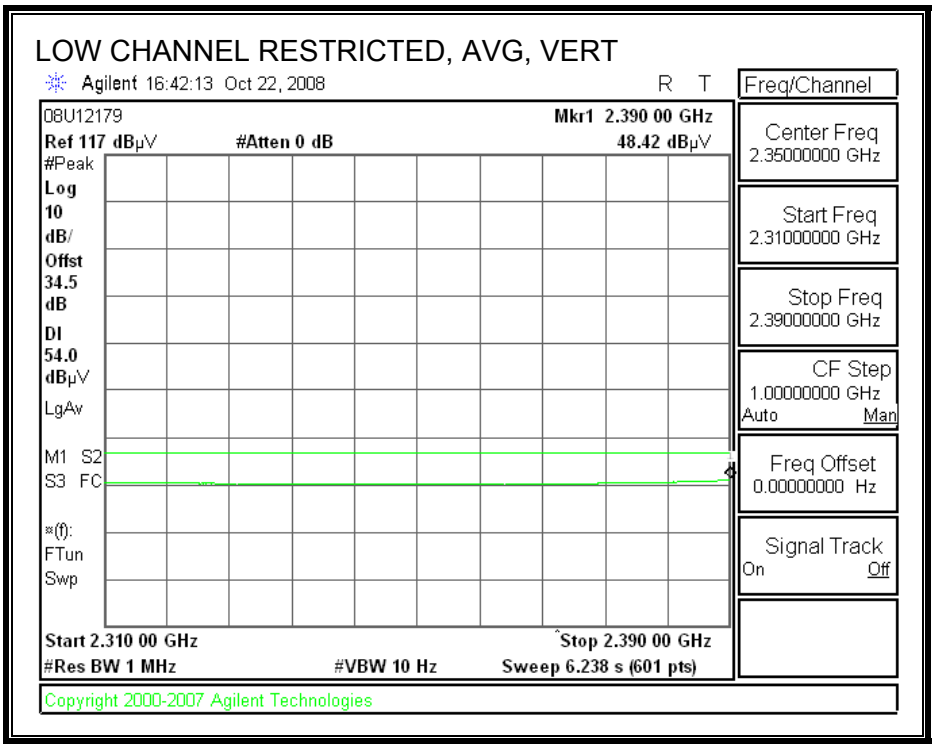

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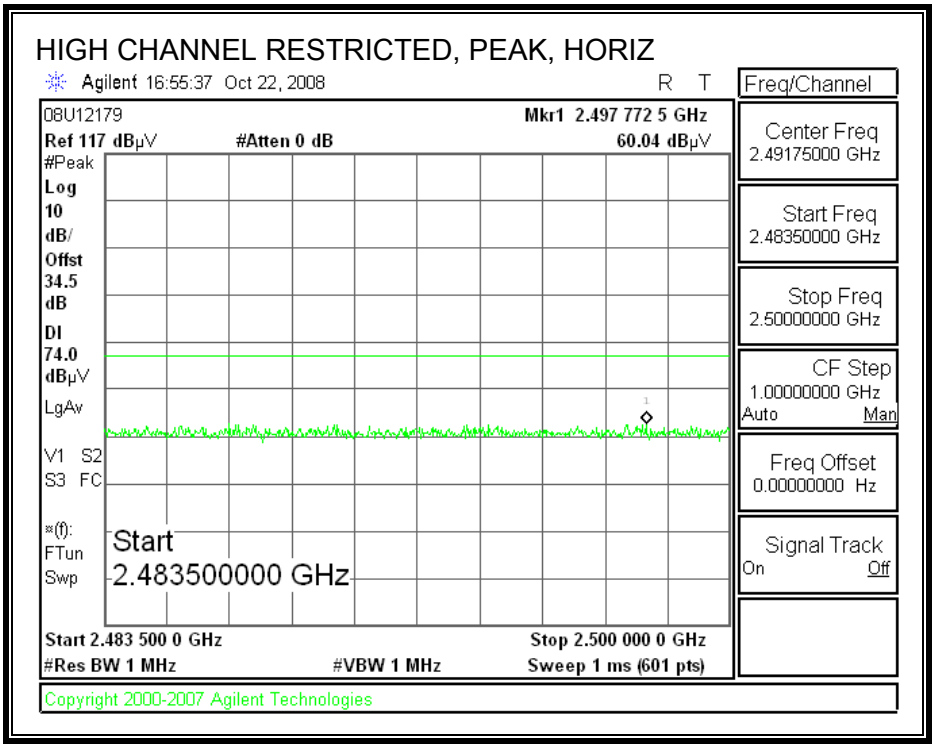
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



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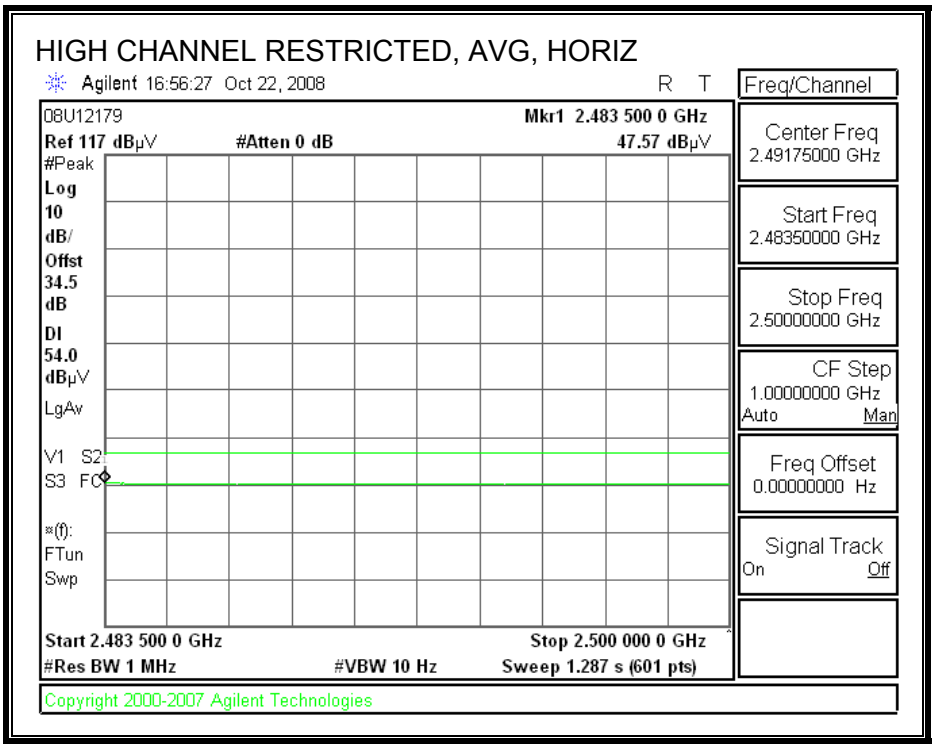

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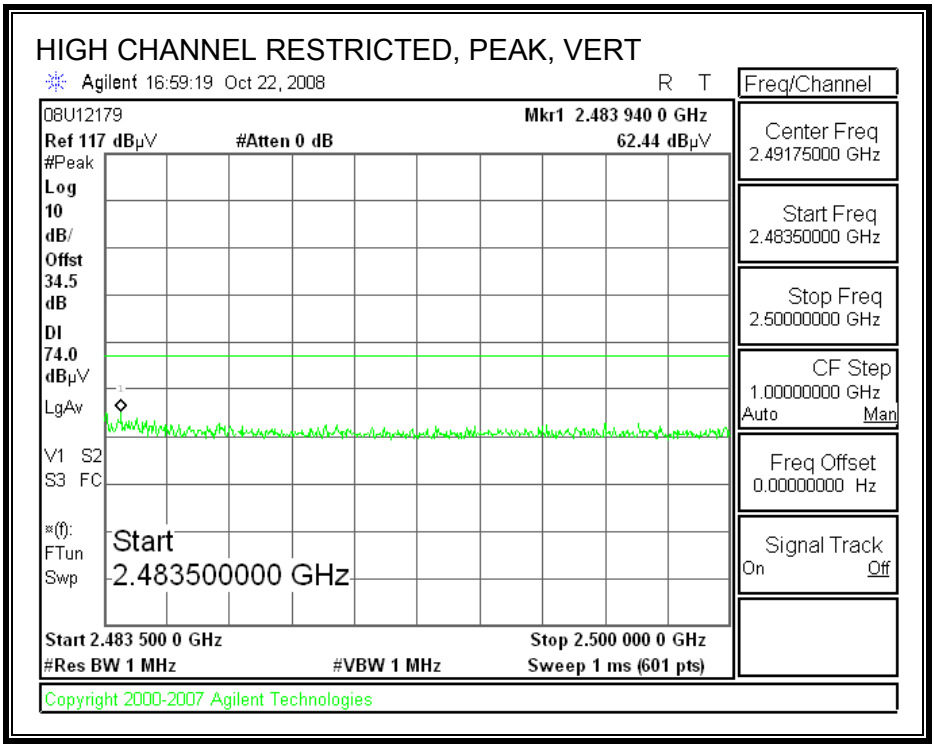
RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



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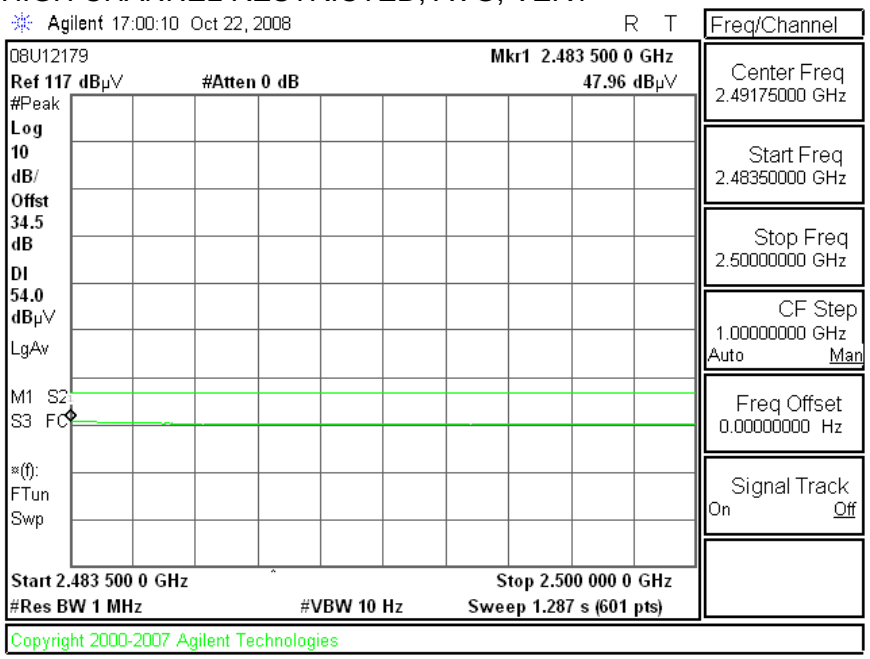
HIGH CHANNEL RESTRICTED, AVG, VERT



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HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Aircell
Project #: 08U12179
Date: 10/24/2008
Test Engineer: Tom Chen
Configuration: EUT with laptop PC
Mode: 802.11g, TX

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T136; M/N: 3117 @3m	T34 HP 8449B		T39; ARA 18-26GHz; S/N:1013	FCC 15.205

Hi Frequency Cables

2 foot cable	3 foot cable	Chamber Cables	HPF	Reject Filter
		C-5m Chamber		R_001

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)
Low Ch, 2412 MHz															
4.824	3.0	42.1	31.3	32.6	5.3	-34.8	0.0	0.0	45.2	34.4	74	54	-28.8	-19.6	V
4.824	3.0	41.5	29.6	32.6	5.3	-34.8	0.0	0.0	44.6	32.7	74	54	-29.4	-21.3	H
Mid Ch, 2437 MHz															
4.874	3.0	41.0	30.2	32.6	5.4	-34.8	0.0	0.0	44.2	33.4	74	54	-29.8	-20.6	V
7.311	3.0	40.2	30.5	34.6	7.5	-34.1	0.0	0.0	48.2	38.5	74	54	-25.8	-15.5	V
4.874	3.0	40.0	29.9	32.6	5.4	-34.8	0.0	0.0	43.2	33.1	74	54	-30.8	-20.9	H
7.311	3.0	42.8	30.7	34.6	7.5	-34.1	0.0	0.0	50.8	38.7	74	54	-23.2	-15.3	H
High Ch, 2462 MHz															
4.924	3.0	41.5	28.7	32.6	5.5	-34.8	0.0	0.0	44.8	32.0	74	54	-29.2	-22.0	V
7.386	3.0	40.8	29.4	34.6	7.6	-34.1	0.0	0.0	48.9	37.5	74	54	-25.1	-16.5	V
4.924	3.0	41.7	29.7	32.6	5.5	-34.8	0.0	0.0	45.0	33.0	74	54	-29.0	-21.0	H
7.386	3.0	42.0	30.2	34.6	7.6	-34.1	0.0	0.0	50.1	38.3	74	54	-23.9	-15.7	H

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		

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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: Aircell
Project #: 08U12179
Date: 10/23/2008
Test Engineer: Tom Chen
Configuration: EUT with laptop PC
Mode: RX

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T60; S/N: 2238 @3m	T144 Miteq 3008A00931		T89; ARA 18-26GHz; S/N:1049	RX RSS 210

Hi Frequency Cables

2 foot cable	3 foot cable	Chamber Cables	HPF	Reject Filter
		A-5m Chamber		

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)
Mid Ch, 2437 MHz															
1.170	3.0	47.1	30.3	26.9	3.2	-39.2	0.0	0.0	37.9	21.1	74	54	-36.1	-32.9	V
1.490	3.0	45.3	29.4	27.7	3.6	-38.8	0.0	0.0	37.9	22.0	74	54	-36.1	-32.0	V
1.770	3.0	45.4	28.1	28.5	4.0	-38.4	0.0	0.0	39.5	22.2	74	54	-34.5	-31.8	V
2.393	3.0	42.5	28.5	29.5	4.8	-37.5	0.0	0.0	39.3	25.3	74	54	-34.7	-28.7	V
1.180	3.0	47.4	30.3	26.9	3.2	-39.2	0.0	0.0	38.3	21.2	74	54	-35.7	-32.8	H
2.350	3.0	43.3	29.4	29.4	4.8	-37.6	0.0	0.0	39.9	26.0	74	54	-34.1	-28.0	H
3.130	3.0	43.3	28.1	31.1	5.4	-37.3	0.0	0.0	42.6	27.4	74	54	-31.4	-26.6	H
4.810	3.0	41.7	28.5	33.7	6.9	-36.5	0.0	0.0	45.8	32.6	74	54	-28.2	-21.4	H

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

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8.4. WORST-CASE BELOW 1 GHz

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

HORIZONTAL DATA

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

Data#: 18 File#: 08u12179.emi Date: 10-31-2008 Time: 08:13:45

Condition: FCC CLASS-B HORIZONTAL
Test Operator:: Tom Chen
Project #: : 08U12179
Company: : Aircell
Configuration:: EUT with Peripheral laptop PC
Mode : : TX
Target: : FCC Class B

Page: 1

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	77.530	47.56	-19.19	28.37	40.00	-11.63	Peak
2	256.010	52.21	-13.00	39.21	46.00	-6.79	Peak
3	269.590	55.99	-12.42	43.57	46.00	-2.43	Peak
4	352.040	42.81	-9.55	33.26	46.00	-12.74	Peak
5	402.480	39.91	-8.12	31.79	46.00	-14.21	Peak
6	701.240	38.77	-0.44	38.33	46.00	-7.67	Peak

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

VERTICAL DATA

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

Data#: 19 File#: 08u12179.emi Date: 10-31-2008 Time: 08:21:48

Condition: FCC CLASS-B VERTICAL
Test Operator:: Tom Chen
Project #: : 08U12179
Company: : Aircell
Configuration:: EUT with Peripheral laptop PC
Mode : : TX
Target: : FCC Class B

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	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	77.530	50.93	-19.19	31.74	40.00	-8.26	Peak
2	252.130	53.32	-13.20	40.12	46.00	-5.88	Peak
3	269.590	53.14	-12.42	40.72	46.00	-5.28	Peak
4	352.040	46.72	-9.55	37.17	46.00	-8.83	Peak
5	402.480	45.63	-8.12	37.51	46.00	-8.49	Peak
6	751.680	38.27	0.23	38.50	46.00	-7.50	Peak

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9. 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.

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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).

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CALCULATIONS

Given

$E = \sqrt{(30 * P * G)} / d$

and

$S = E ^ 2 / 3770$

where

E = Field Strength in Volts/meter
P = Power in Watts
G = Numeric antenna gain
d = Distance in meters
S = Power Density in milliwatts/square centimeter

Combining equations, rearranging the terms to express the distance as a function of the remaining variables, changing to units of Power to mW and Distance to cm, and substituting the logarithmic form of power and gain yields:

$d = 0.282 * 10 ^ ((P + G) / 20) / \sqrt{S}$

where

d = MPE distance in cm
P = Power in dBm
G = Antenna Gain in dBi
S = Power Density Limit in mW/cm^2

Rearranging terms to calculate the power density at a specific distance yields

$S = 0.0795 * 10 ^ ((P + G) / 10) / (d^2)$

The power density in units of mW/cm^2 is converted to units of W/m^2 by multiplying by a factor of 10.

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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

Mode	Band	MPE Distance (cm)	Output Power (dBm)	Antenna Gain (dBi)	FCC Power Density (mW/cm^2)	IC Power Density (W/m^2)
WLAN	2.4 GHz	20.0	19.31	2.30	0.03	0.29

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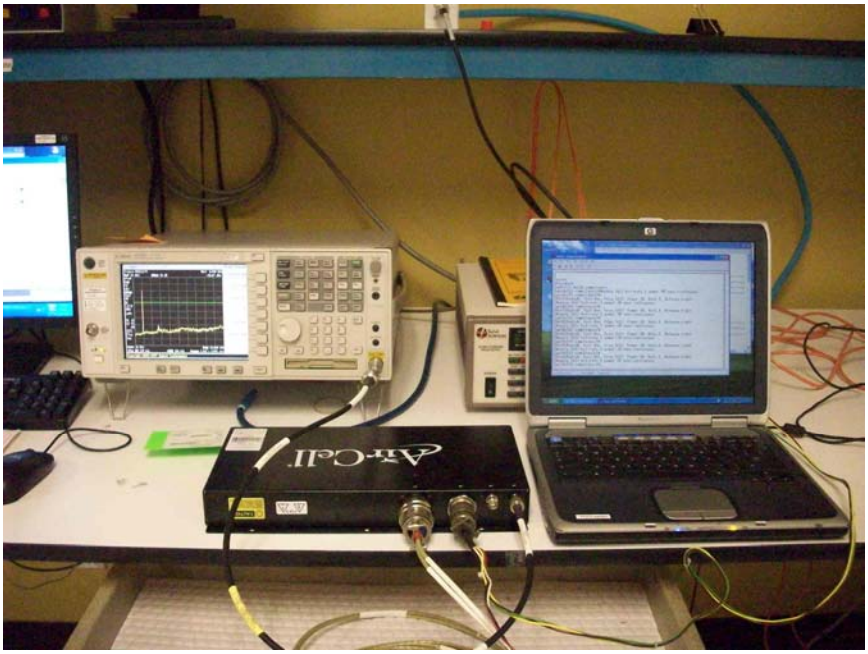
10. SETUP PHOTOS

ANTENNA PORT CONDUCTED RF MEASUREMENT SETUP

ANTENNA PORT CONDUCTED PHOTO



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RADIATED RF MEASUREMENT SETUP

RADIATED FRONT PHOTO

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RADIATED BACK PHOTO

END OF REPORT

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