



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

**FOR
WIRELESS COMMUNICATION DEVICE**

MODEL NUMBER: BCM94319SDHMB

**FCC ID: QDS-BRCM1057
IC: 4324A- BRCM1057**

REPORT NUMBER: 11U13694-1

ISSUE DATE: MARCH 18, 2011

Prepared for

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NVLAP LAB CODE 200065-0

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: BROADCOM CORPORATION
190 MATHILDA PLACE
SUNNYVALE, CA 94086, U.S.A.

EUT DESCRIPTION: WIRELESS COMMUNICATION DEVICE

MODEL: BCM94319SDHMB

SERIAL NUMBER: 005

DATE TESTED: MARCH 14 to 18, 2011

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

Compliance Certification Services, Inc. (ULCCS) tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL CCS based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL CCS will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For UL CCS By:

Tested By:



THU CHAN
ENGINEERING MANAGER
UL CCS

DAVID GARCIA
EMC ENGINEER
UL CCS

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2009, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 3, and RSS-210 Issue 8.

3. FACILITIES AND ACCREDITATION

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

UL CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <http://www.ccsemc.com>.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) +
Cable Loss (dB) – Preamp Gain (dB)

36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	3.52 dB
Radiated Disturbance, 30 to 1000 MHz	4.94 dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a wireless communication device

.

The radio module is manufactured by Broadcom.

5.2. MAXIMUM OUTPUT POWER

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

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2412 - 2462	802.11b	24.87	306.90
2412 - 2462	802.11g	27.29	535.80
2412 - 2462	802.11n HT20 SISO	Covered by testing to 11g Legacy	
2422 - 2452	802.11n HT40 SISO	24.05	254.10

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an 802.11bgn WLAN antenna, with a maximum gain of 3.9dBi.

5.4. SOFTWARE AND FIRMWARE

The EUT driver software installed in the laptop during testing was BROADCOM, rev. 5.100.119.11.

The test utility software used during testing was wl tool BCM4319SDHMB, rev. 5.100.119.11

5.5. NUMBER OF TRANSMIT CHAINS

Selected measurements were performed only on the main chain for 802.11b, 11g & 11n HT40 SISO modes, with highest gain of 3.9dBi.

5.6. WORST-CASE CONFIGURATION AND MODE

Worst-Case data rates were utilized from preliminary testing of the Chipset, worst-case data rates used during the testing are as follows:

802.11b Mode (20 MHz BW operation): 1 Mbps, CCK.

802.11g Mode (20 MHz BW operation): 6 Mbps, OFDM.

802.11n HT40 SISO Mode (40 MHz BW operation): 13.5 Mbps (MCS 0), OFDM.

Worst-case mode and channel used for 30-1000 MHz radiated and power line conducted emissions was the mode and channel with the highest output power, that was determined to be 11g mode, mid channel.

For Radiated Band Edge measurements preliminary testing showed that the worst case was horizontal polarization, so final measurements were performed with horizontal polarization.

5.7. DESCRIPTION OF TEST SETUP

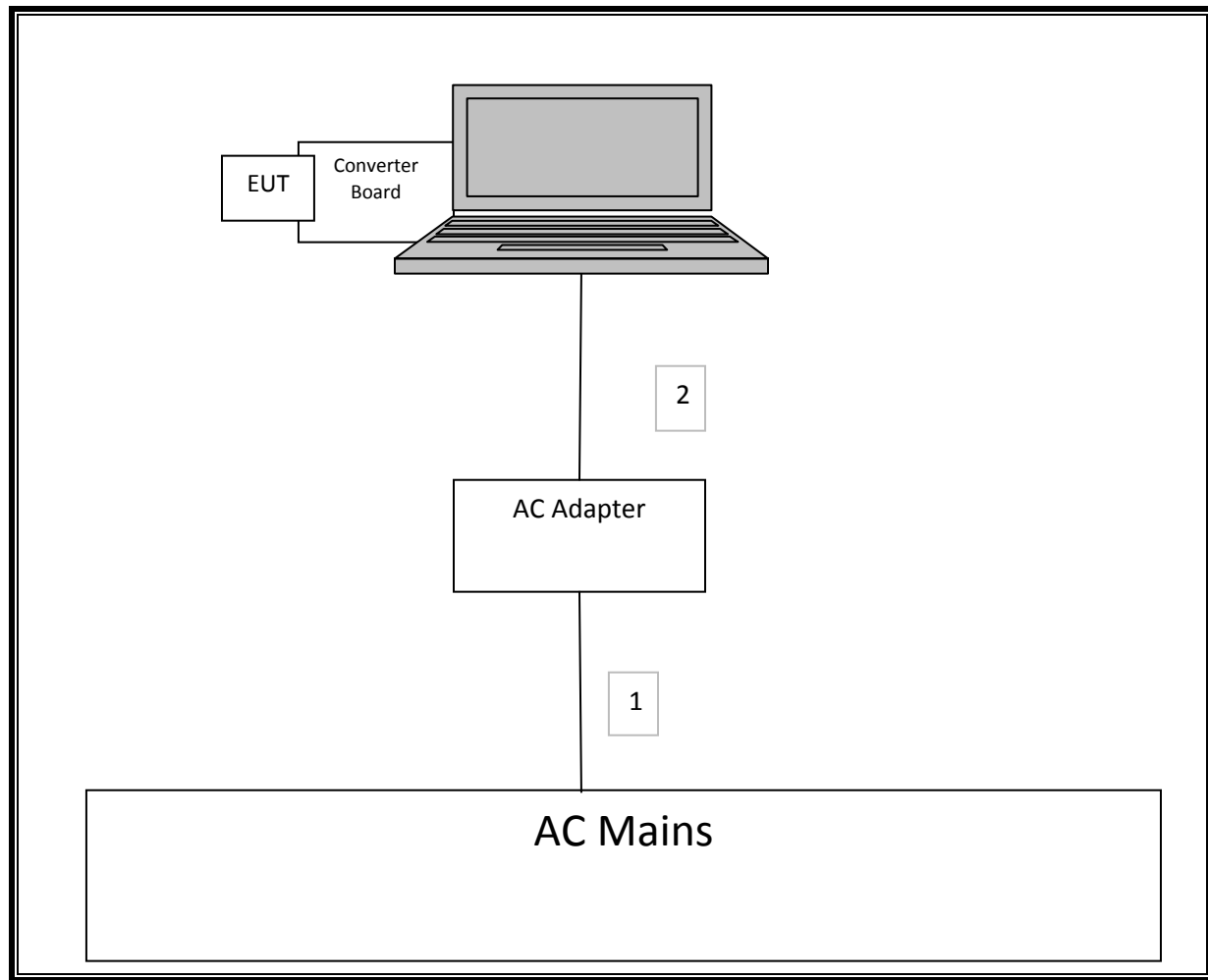
SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	Dell	PP27L	DP3L9K1	DoC
AC Adapter	Dell	SA90PE3-00	CN-0WTCOV-48661-07J-GT9B-A00	DoC
Adapter Board	AzureWave	1124 TEST BOARD I3	063EB	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	US 115V	Shielded	1.5m	NA
2	DC	1	DC	Un-shielded	1.5m	Ferrite at laptop's end

SETUP DIAGRAM



TEST SETUP

The EUT was tested as an external module that was installed in a converter board connected to the SD port of a host Laptop PC.

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	C00996	10/29/11
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01171	07/14/11
Antenna, Horn, 18 GHz	EMCO	3115	C00872	07/29/11
Antenna, Horn, 26.5 GHz	ARA	MWH-1826/B	C00980	07/29/11
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00778	01/26/12
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C00749	08/04/11
Peak Power Meter	Agilent / HP	E9327A	C00964	12/04/11
Peak Power Sensor	Agilent / HP	E4416A	C00963	12/04/11
EMI Receiver, 6.5 GHz	Agilent / HP	8546A	1963	08/19/11
Reject Filter, 2.4-2.5 GHz	Micro-Tronics	BRM50702	N02685	CNR
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	05/06/12
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	05/06/11

7. ANTENNA PORT TEST RESULTS

7.1. 802.11b MODE IN THE 2.4 GHz BAND

7.1.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

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

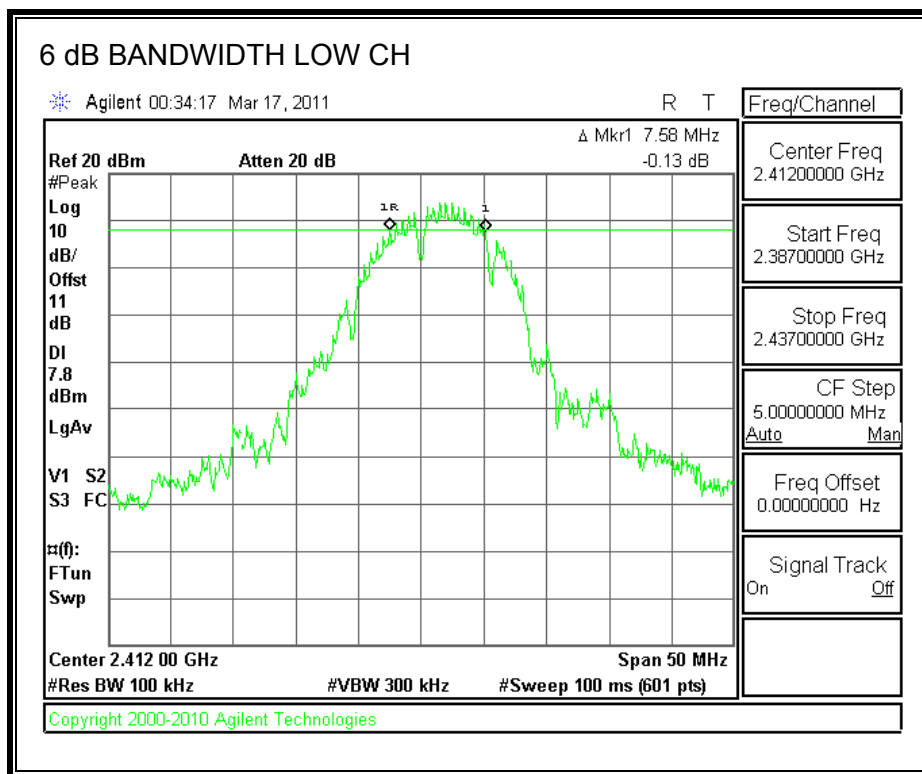
TEST PROCEDURE

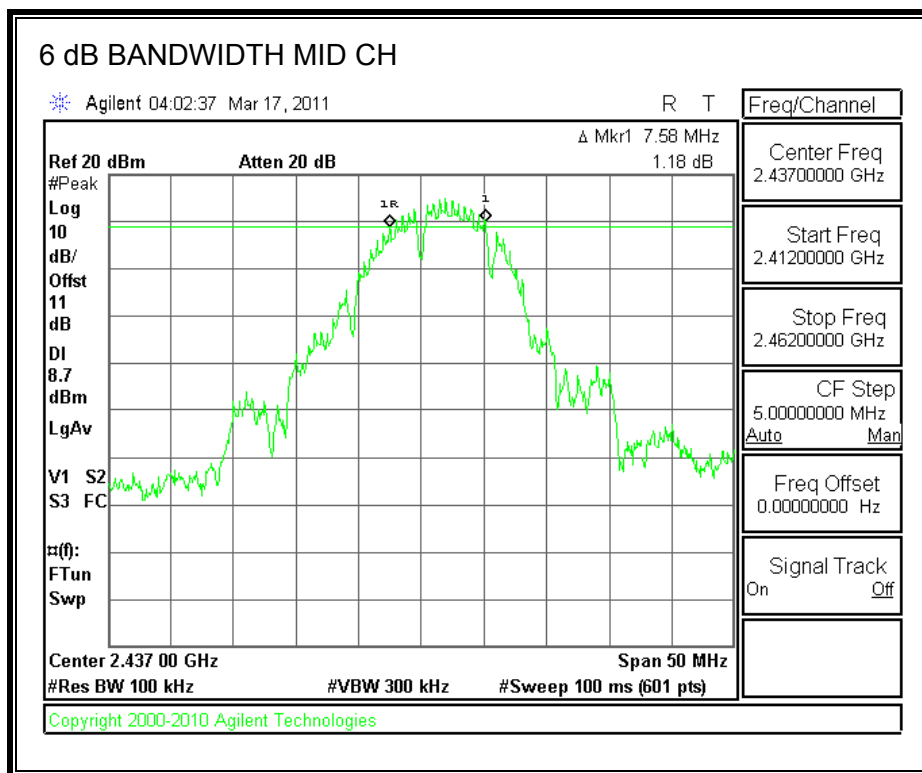
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

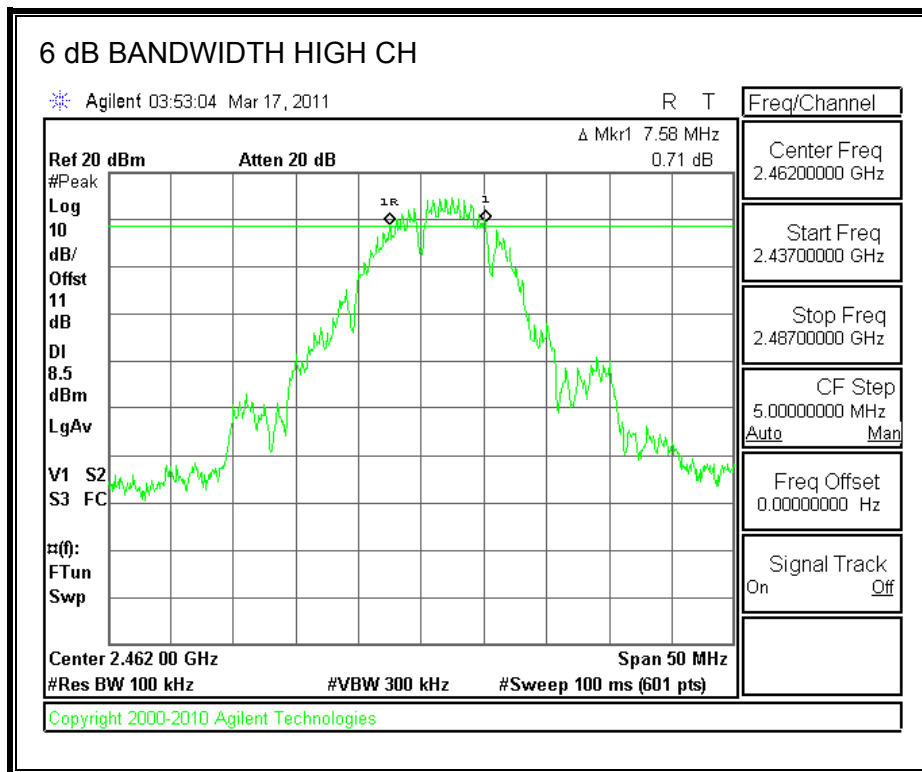
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	7.58	0.5
Middle	2437	7.58	0.5
High	2462	7.58	0.5

6 dB BANDWIDTH







7.1.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

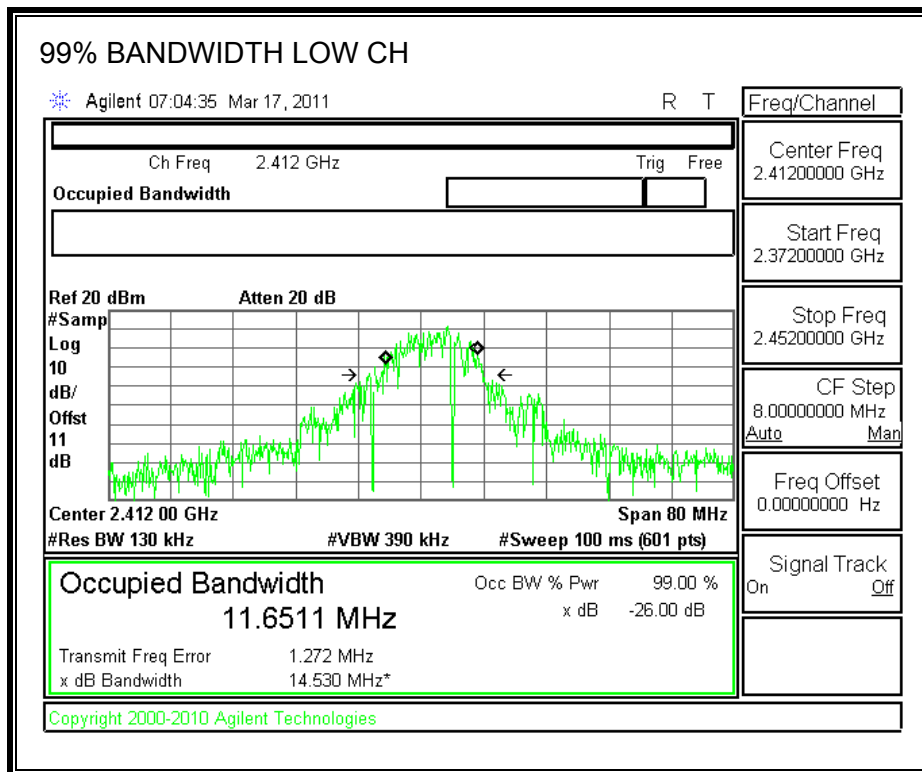
TEST PROCEDURE

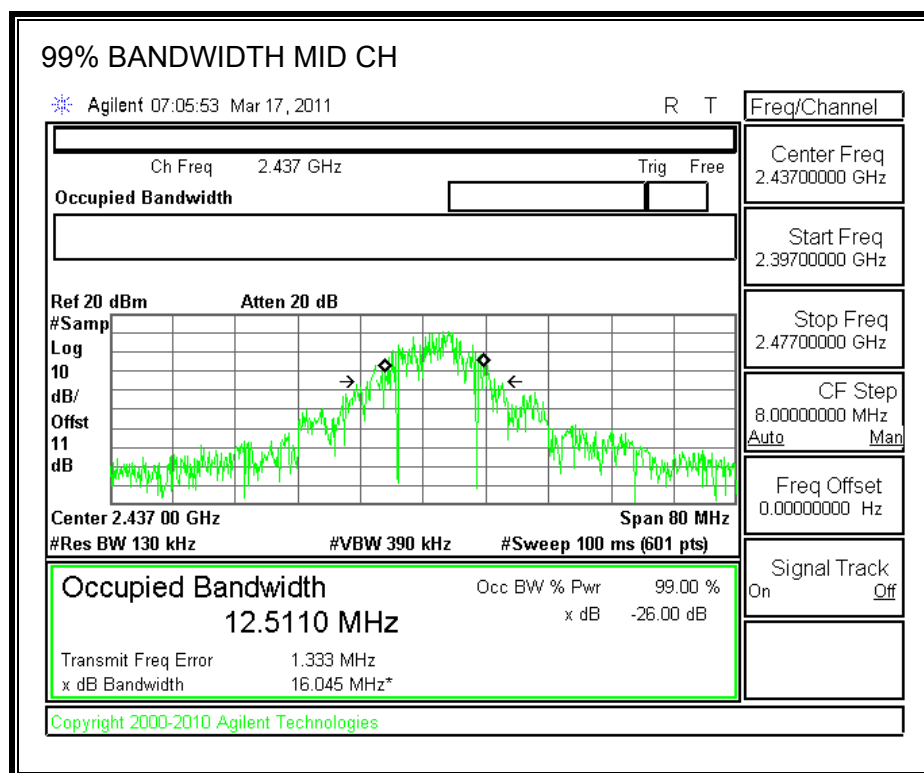
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

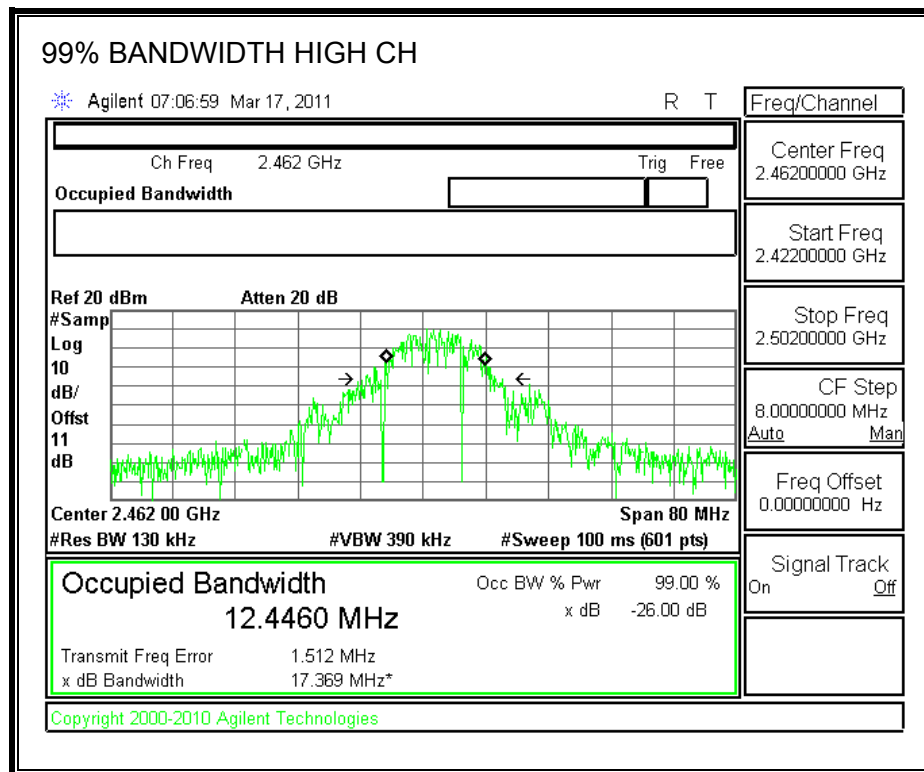
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	11.6511
Middle	2437	12.511
High	2462	12.446

99% BANDWIDTH







7.1.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

TEST PROCEDURE

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

RESULTS

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Attenuator and Cable Offset (dB)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	12.59	11	23.59	30	-6.41
Middle	2437	13.4	11	24.40	30	-5.60
High	2462	13.87	11	24.87	30	-5.13

7.1.4. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

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

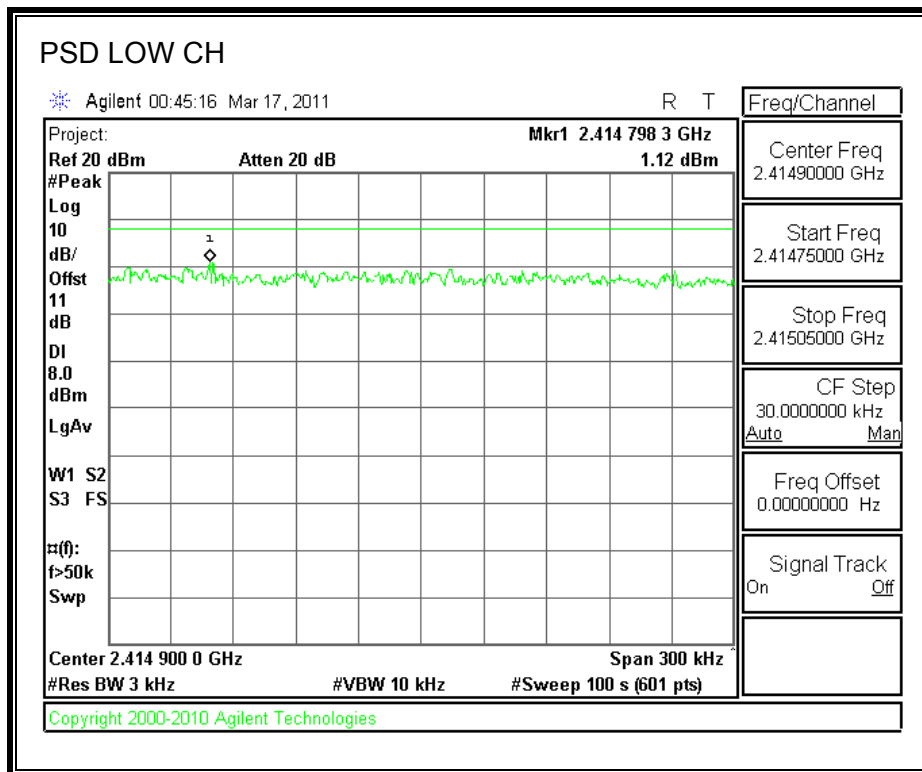
TEST PROCEDURE

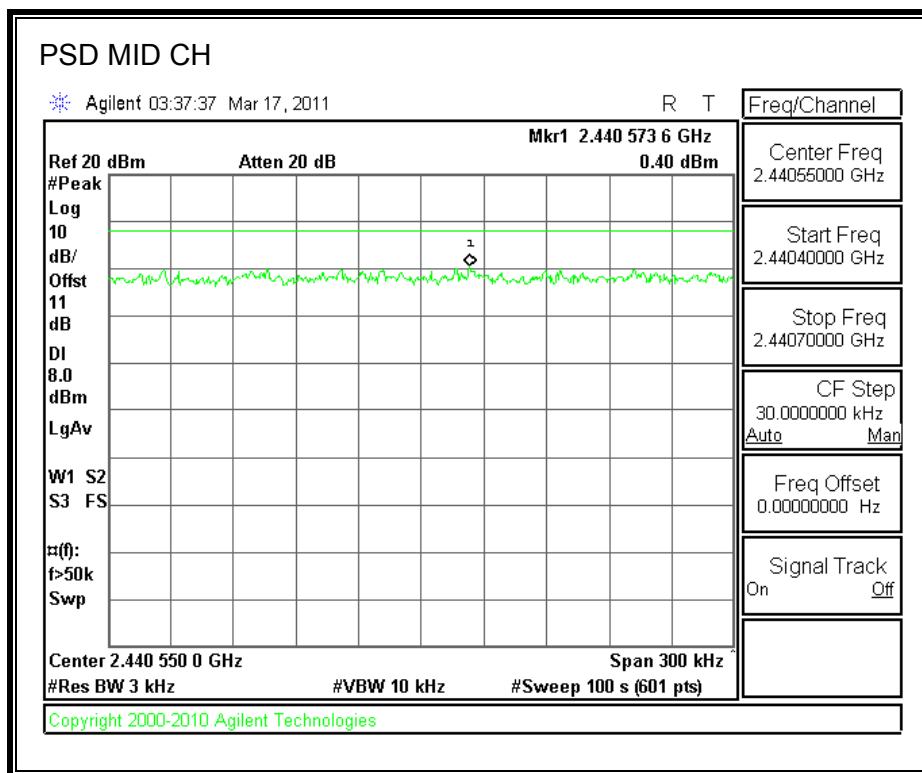
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

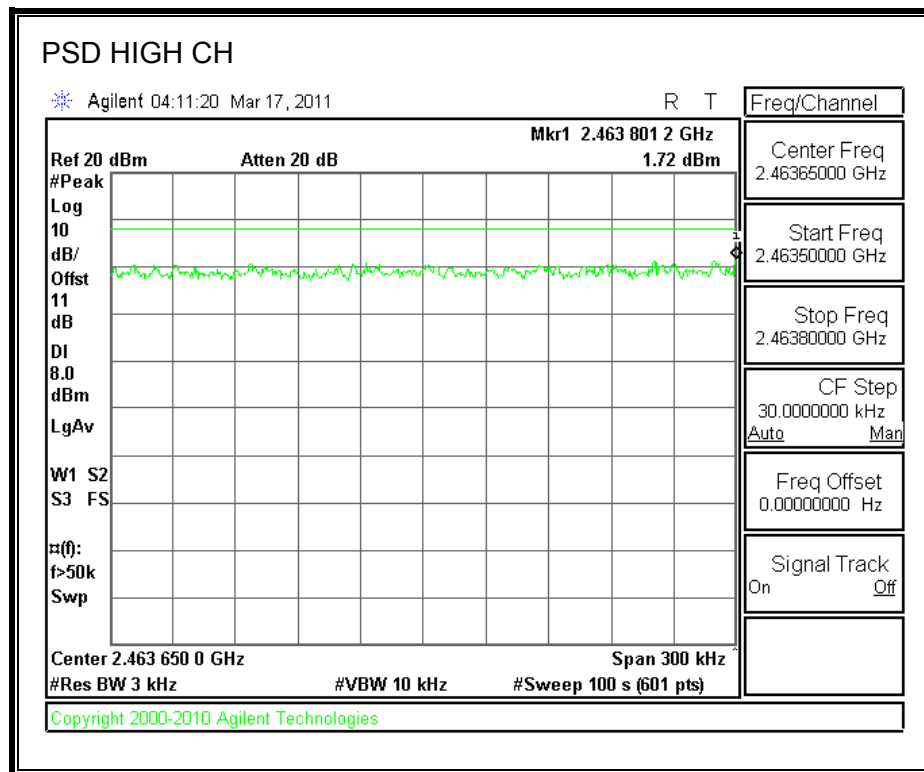
RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	1.12	8	-6.88
Middle	2437	0.40	8	-7.60
High	2462	1.72	8	-6.28

POWER SPECTRAL DENSITY







7.1.5. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

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

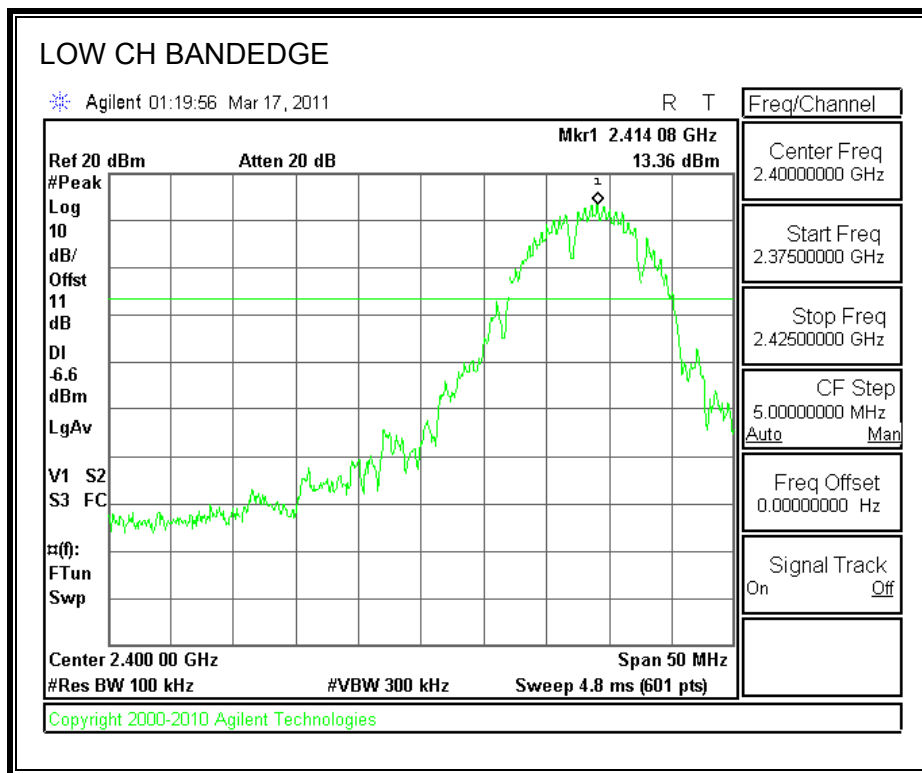
TEST PROCEDURE

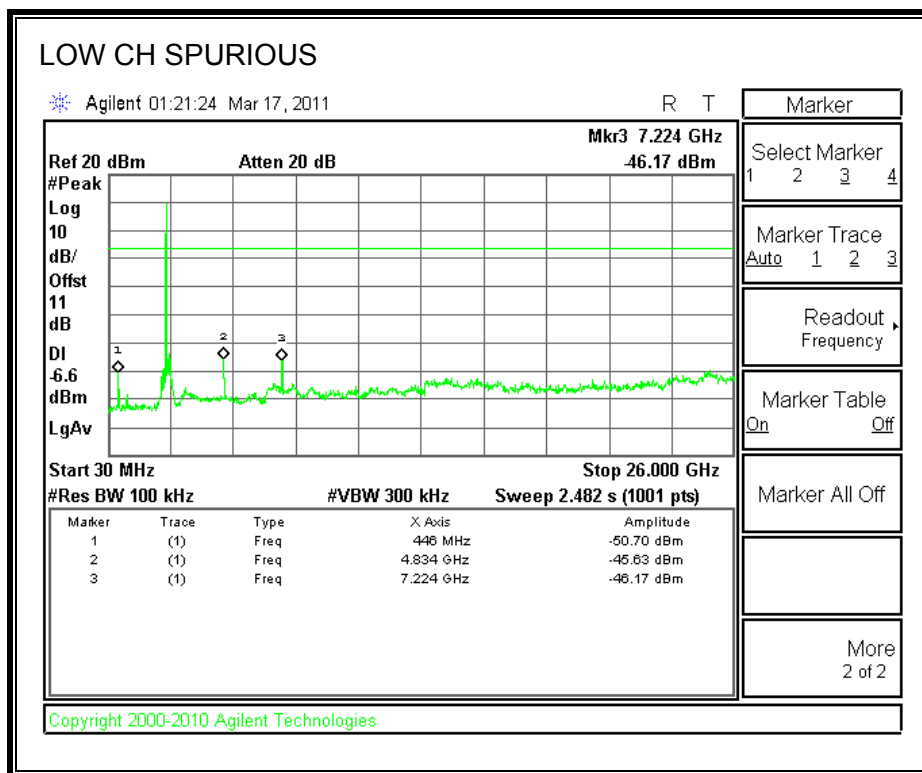
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

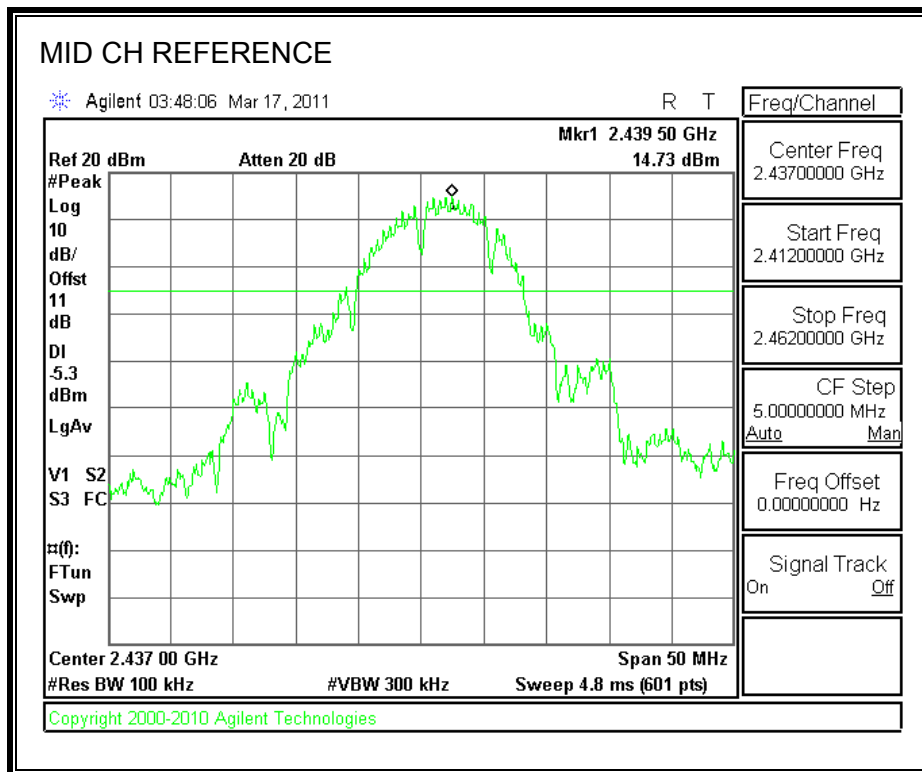
RESULTS

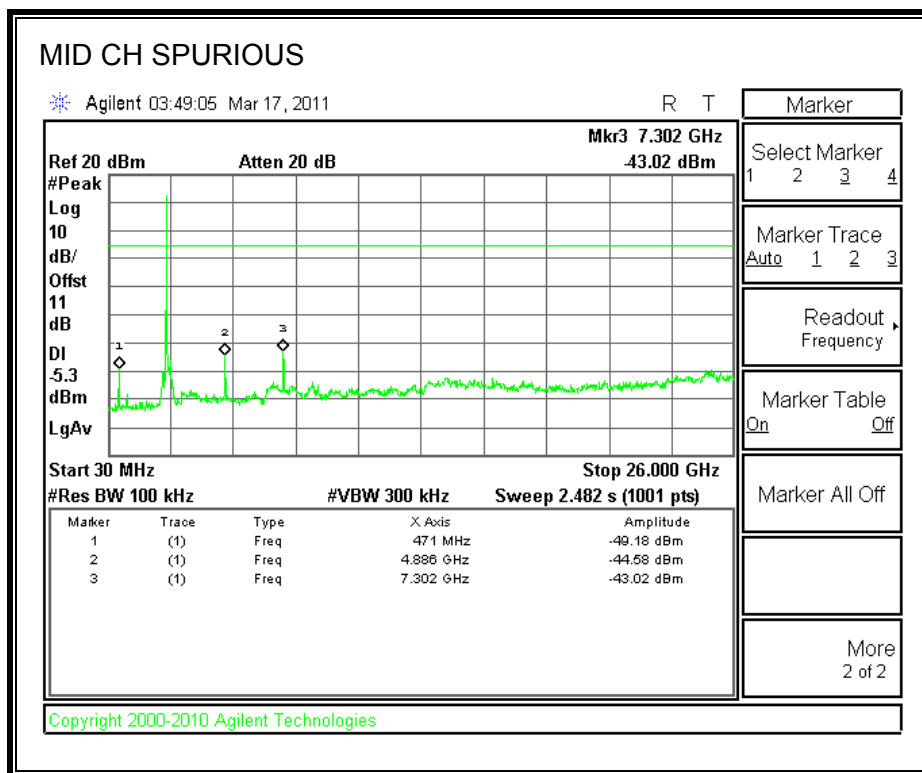
SPURIOUS EMISSIONS, LOW CHANNEL



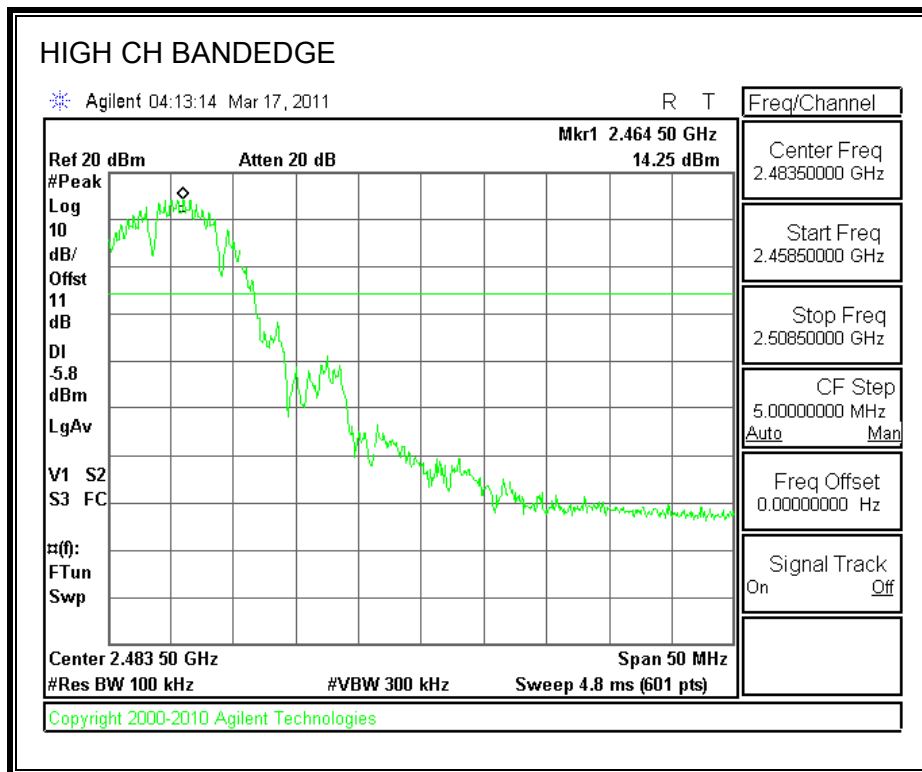


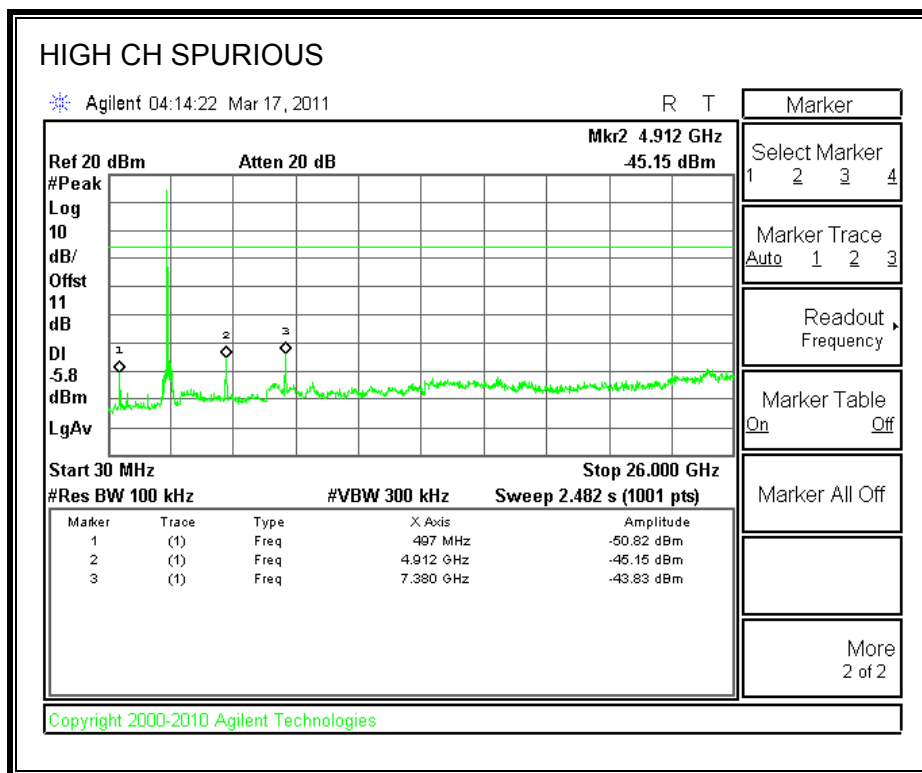
SPURIOUS EMISSIONS, MID CHANNEL





SPURIOUS EMISSIONS, HIGH CHANNEL





7.2. 802.11g MODE IN THE 2.4 GHz BAND

7.2.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

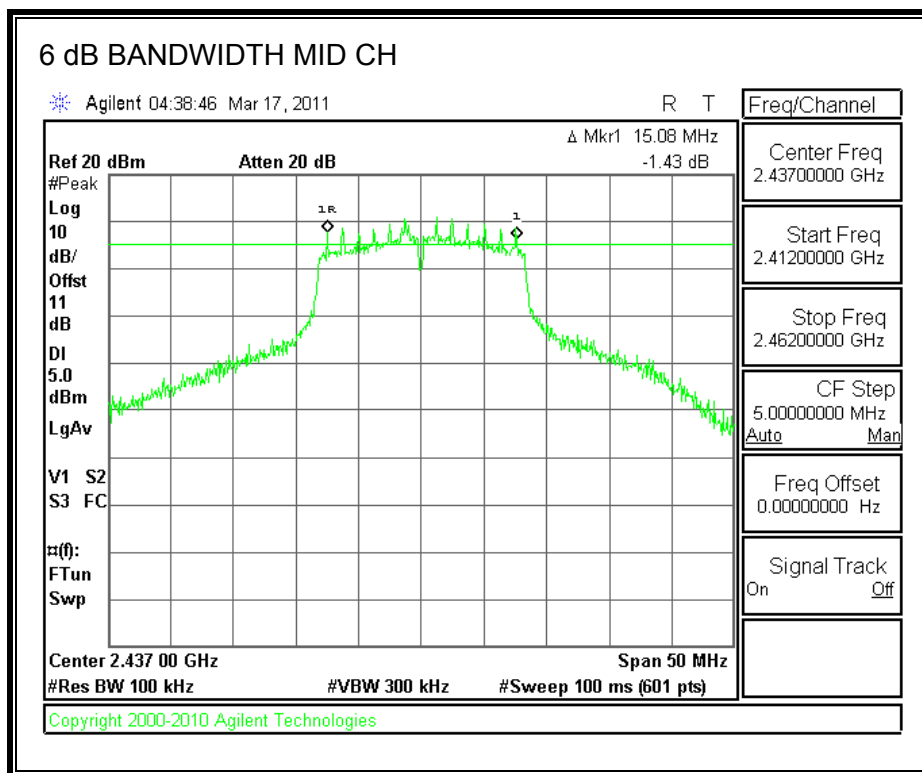
The minimum 6 dB bandwidth shall be at least 500 kHz.

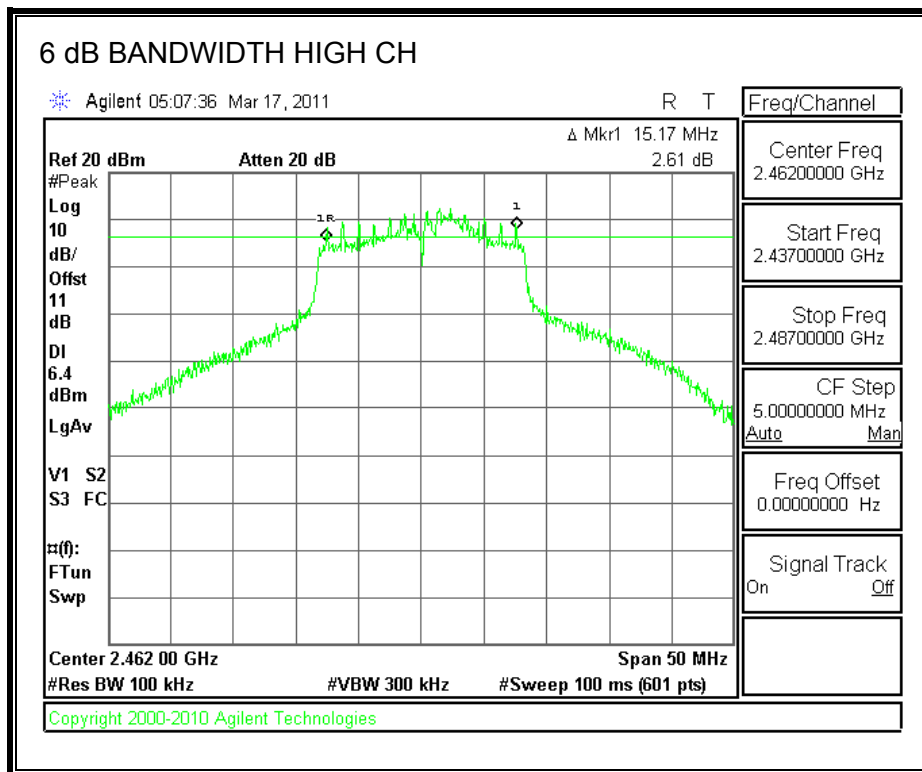
TEST PROCEDURE

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

RESULTS

Channel	Frequency (MHz)	Power (dBm)
Low	2412	14.50
Middle	2437	19.50
High	2462	16.00





7.2.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

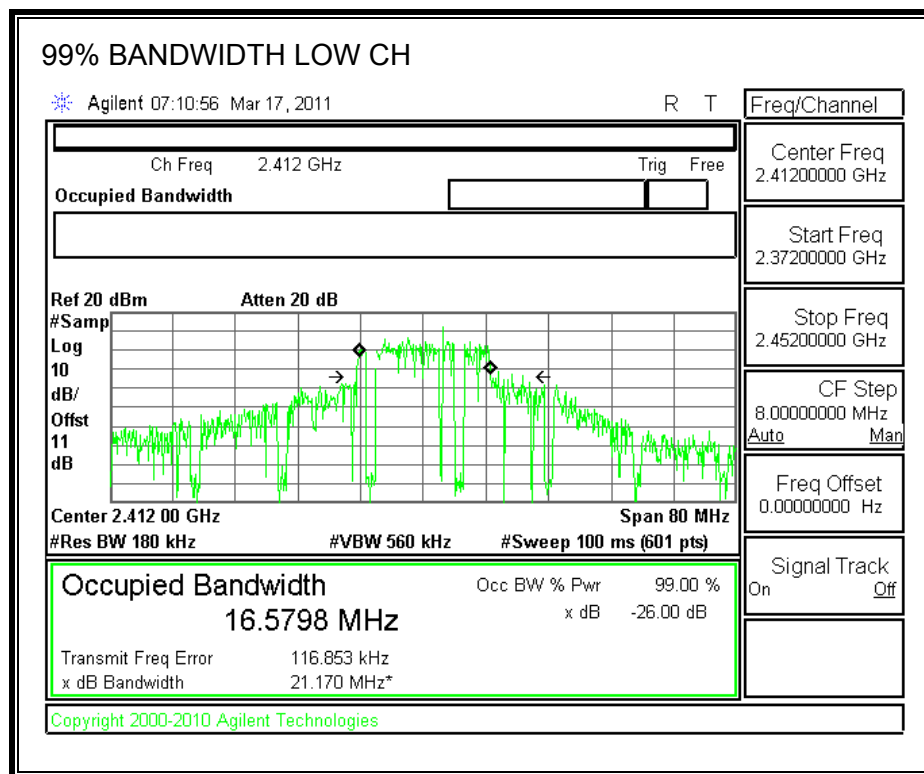
TEST PROCEDURE

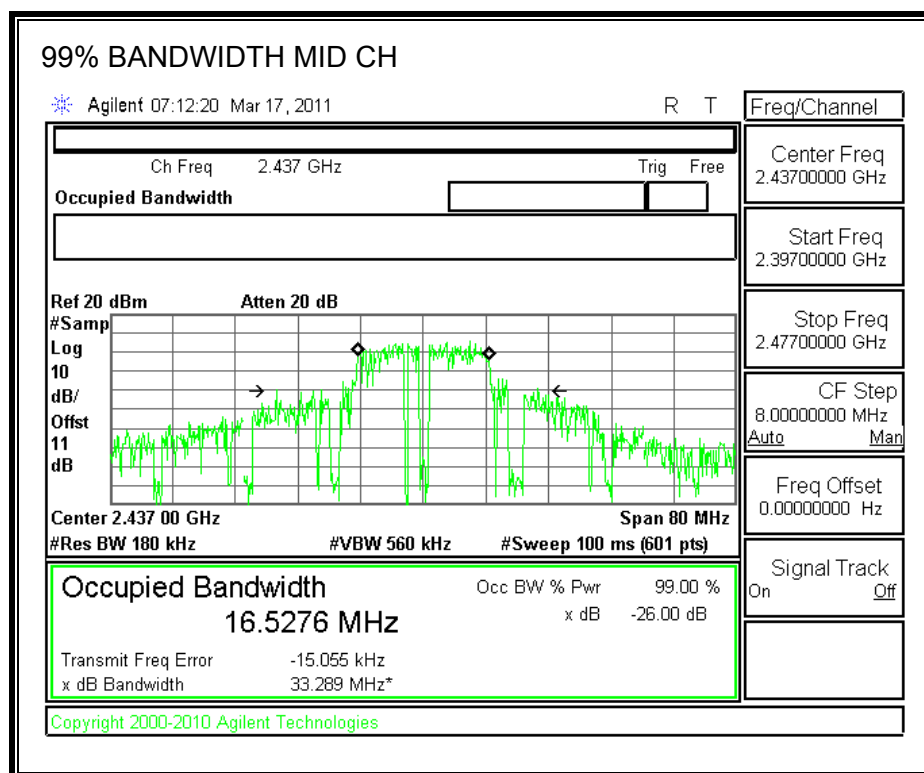
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

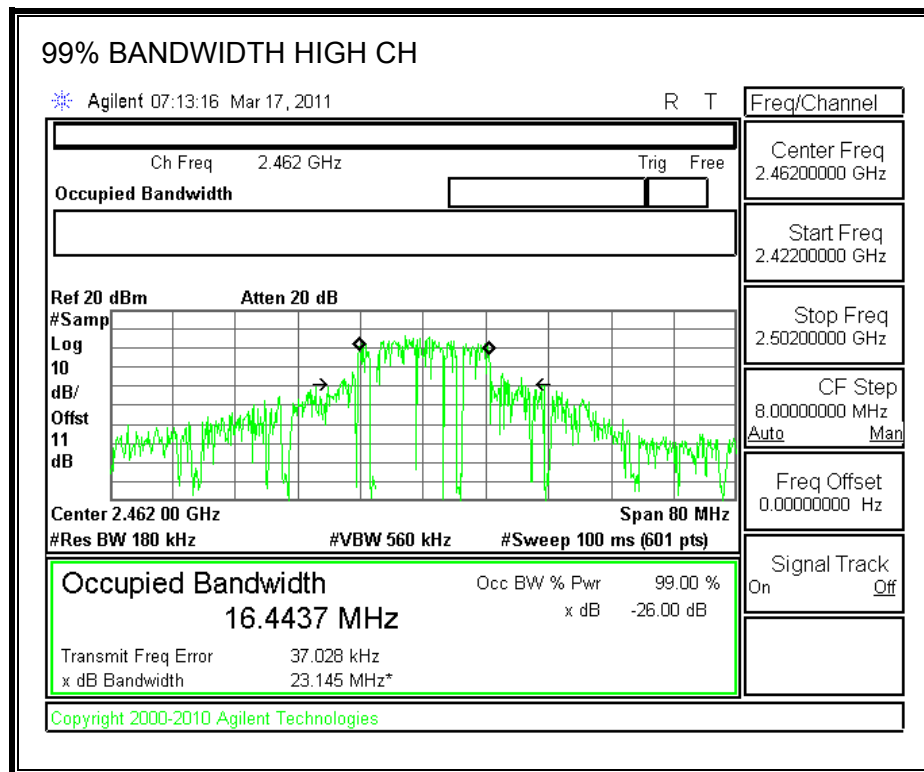
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	16.5798
Middle	2437	16.5276
High	2462	16.4437

99% BANDWIDTH







7.2.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

TEST PROCEDURE

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

RESULTS

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Attenuator and Cable Offset (dB)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	11.27	11	22.27	30	-7.73
Middle	2437	16.29	11	27.29	30	-2.71
High	2462	12.54	11	23.54	30	-6.46

7.2.4. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

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

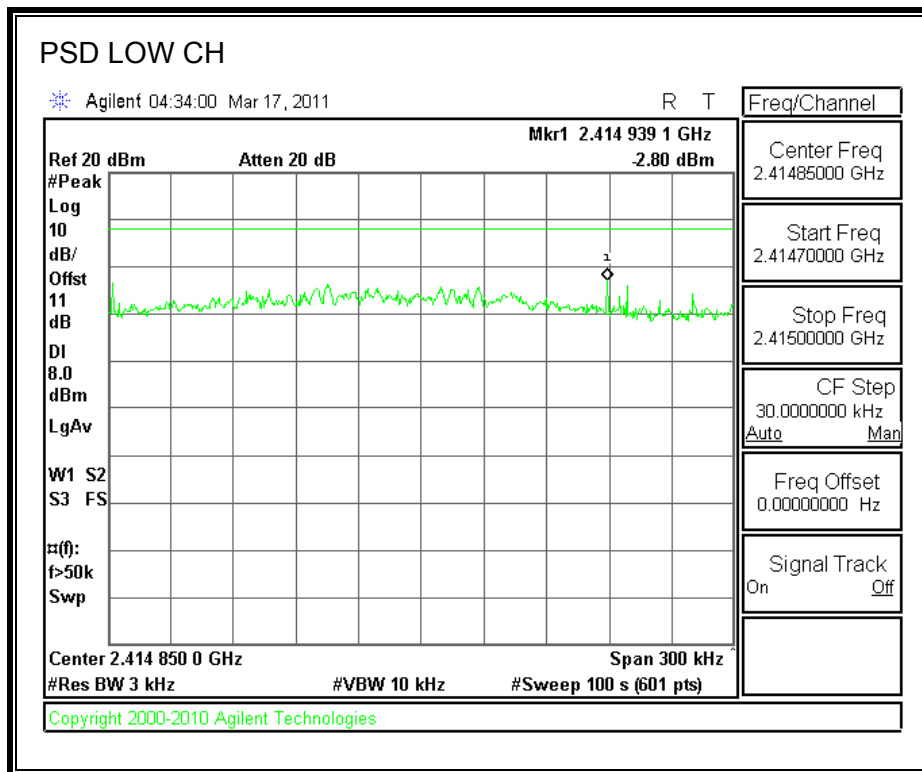
TEST PROCEDURE

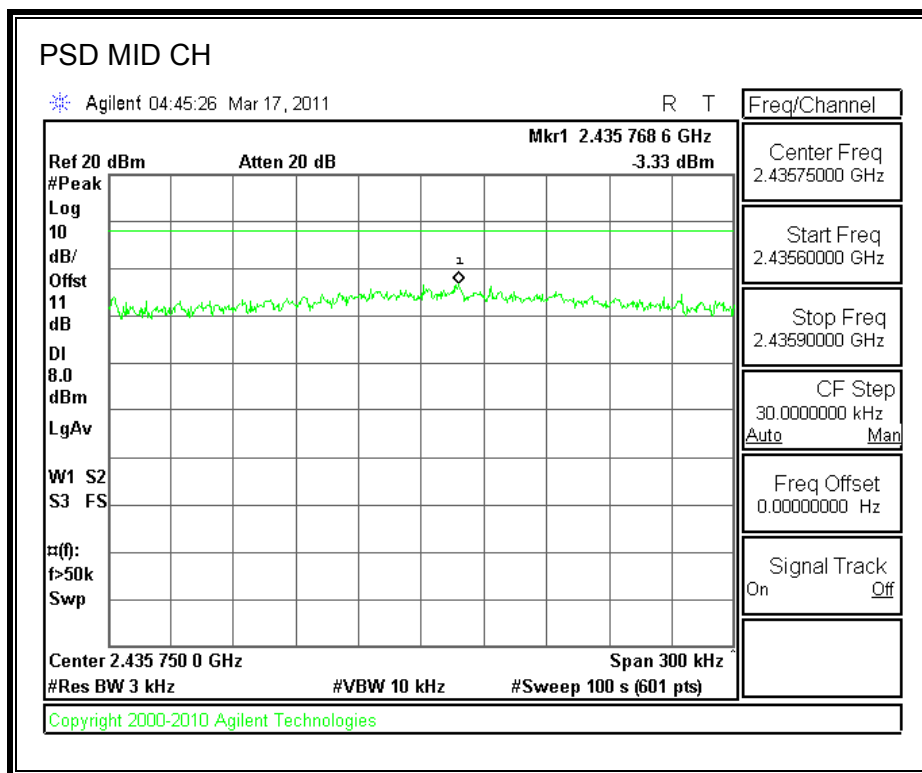
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

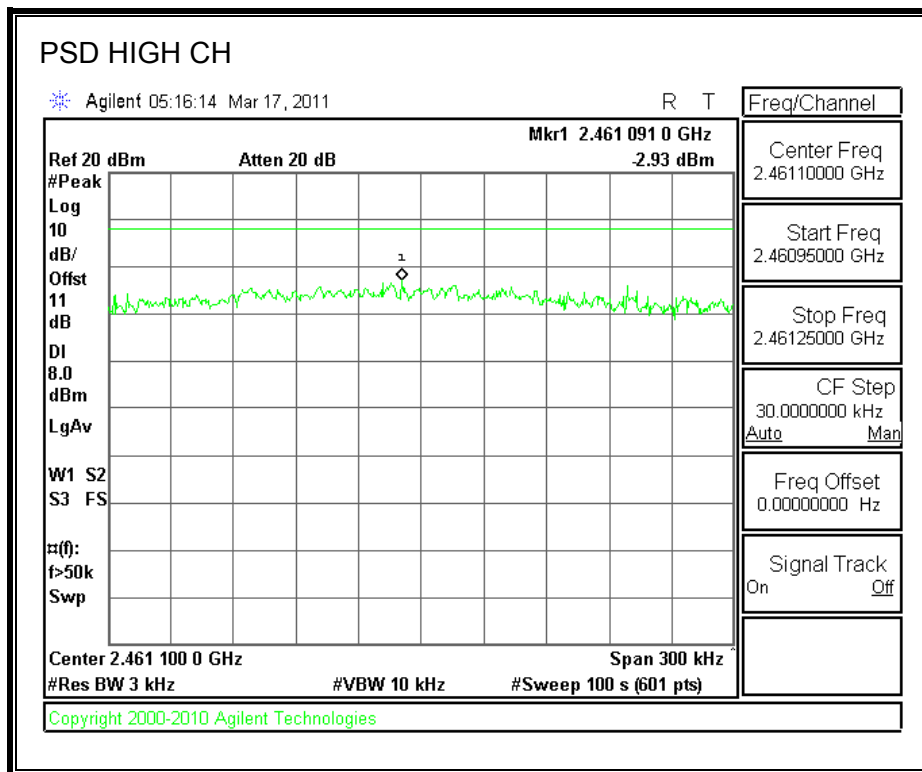
RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-2.80	8	-10.80
Middle	2437	-3.33	8	-11.33
High	2462	-2.93	8	-10.93

POWER SPECTRAL DENSITY







7.2.5. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

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

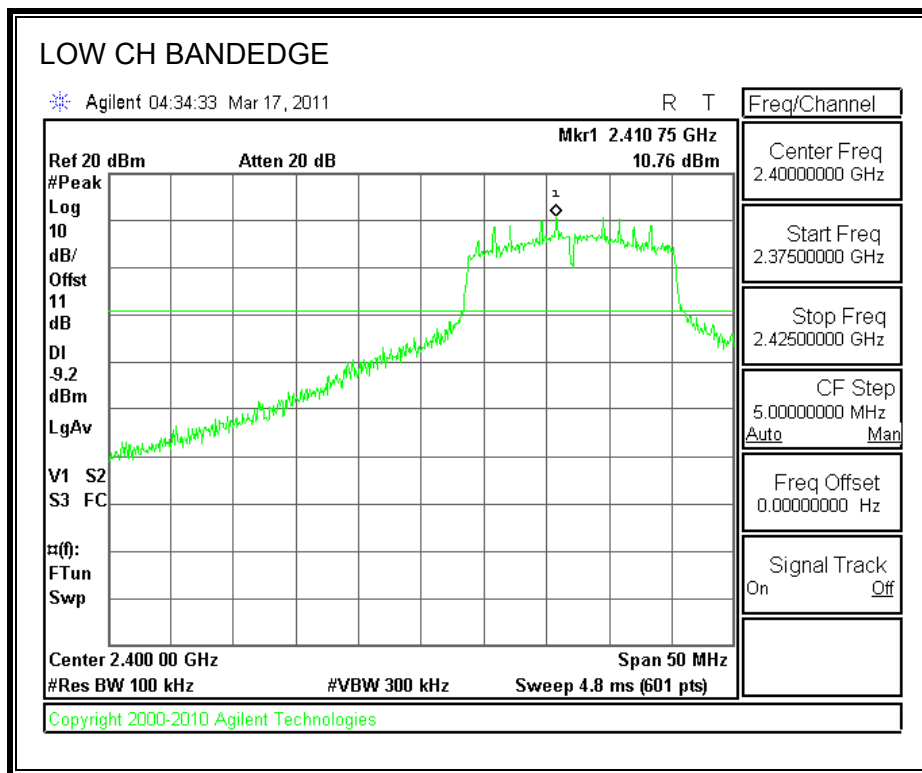
TEST PROCEDURE

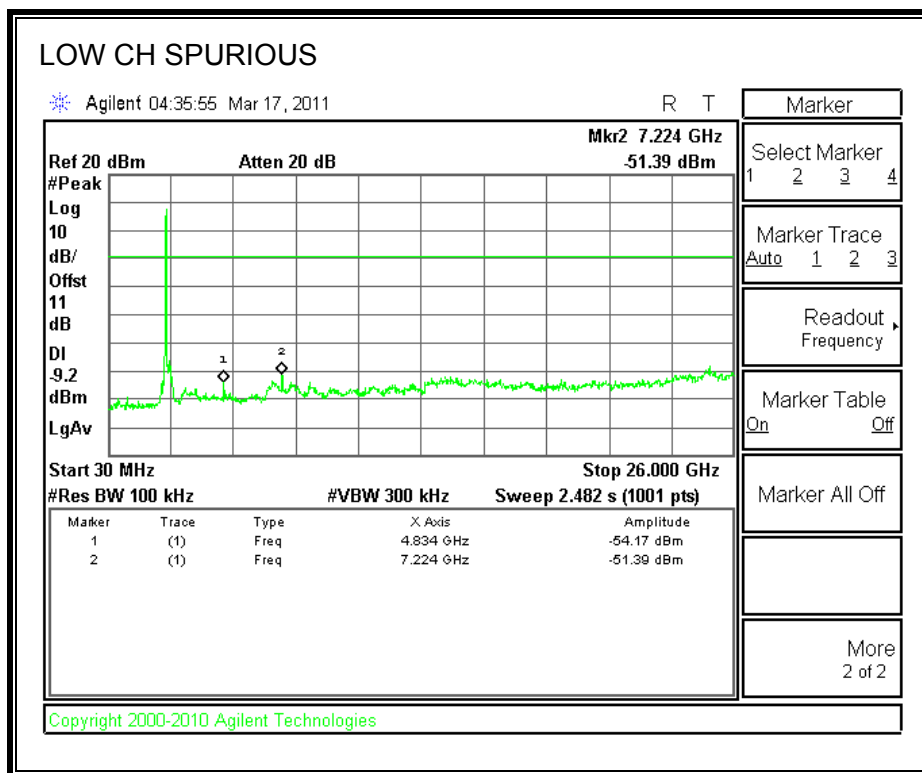
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

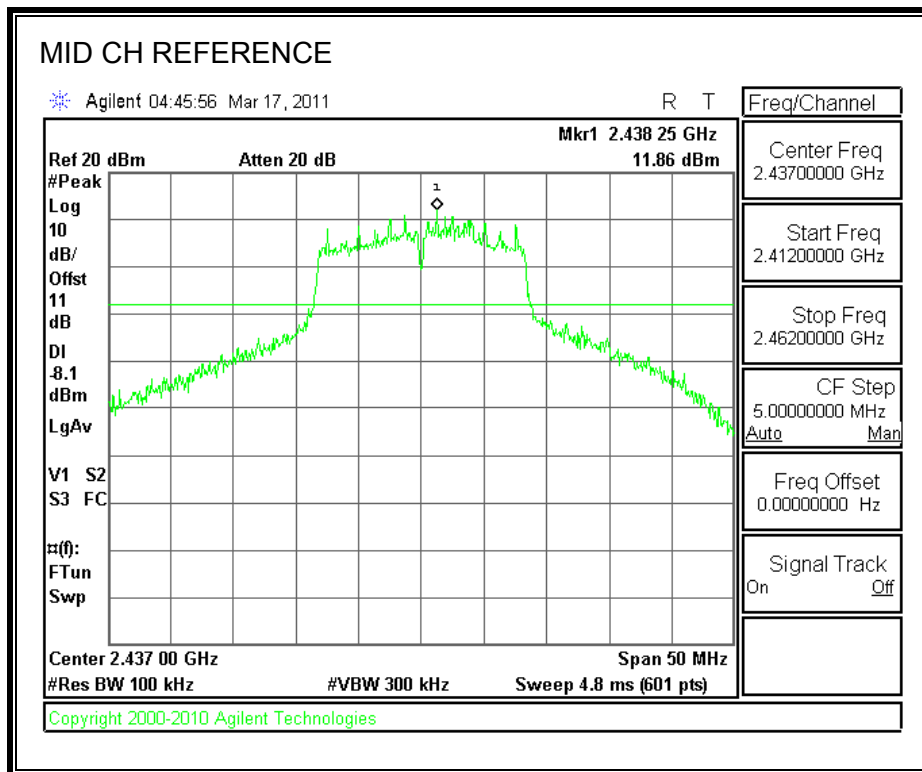
RESULTS

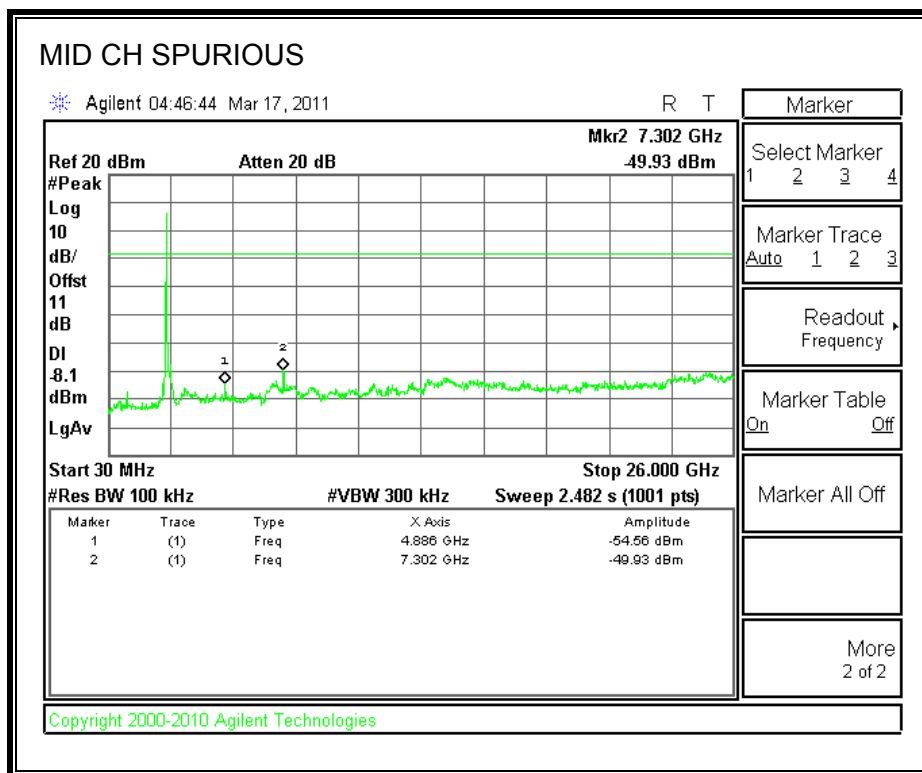
SPURIOUS EMISSIONS, LOW CHANNEL



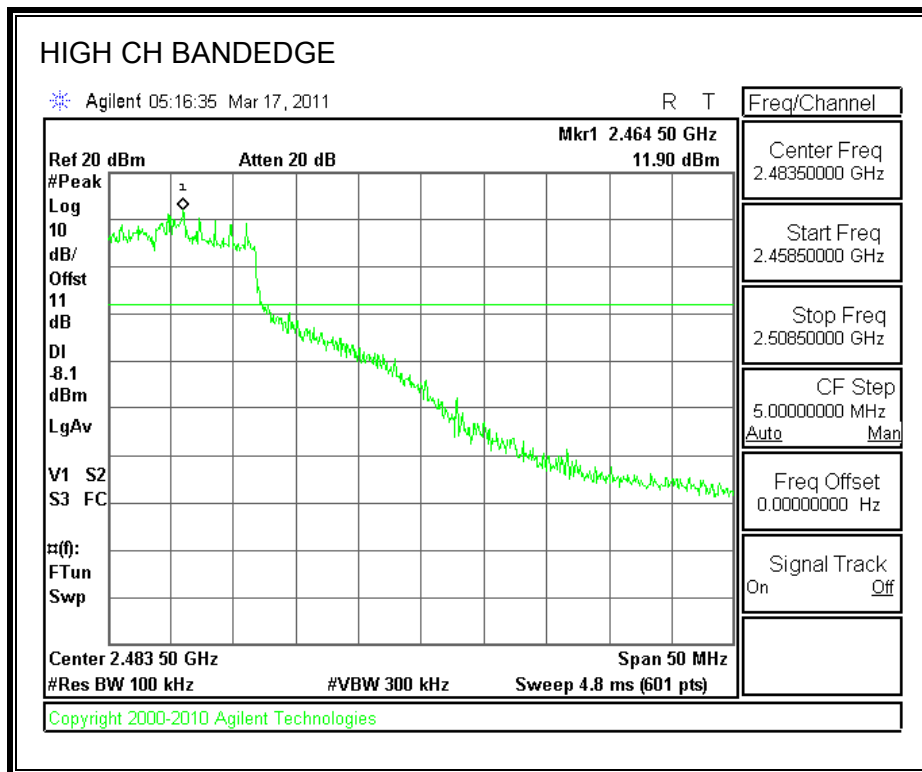


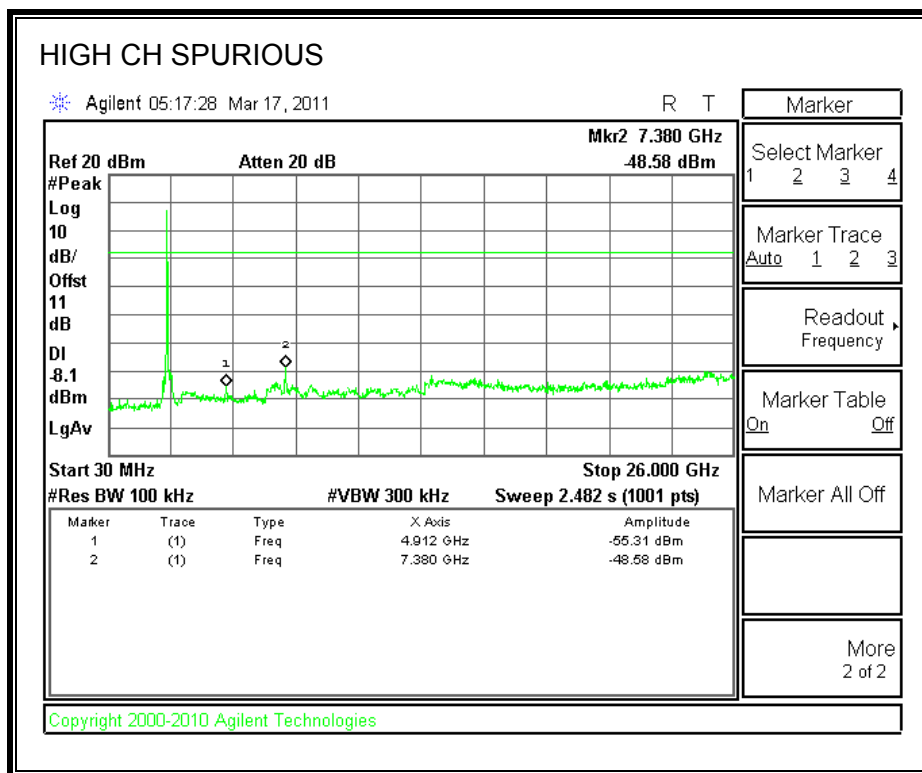
SPURIOUS EMISSIONS, MID CHANNEL





SPURIOUS EMISSIONS, HIGH CHANNEL





7.3. 802.11n HT40 SISO MODE IN THE 2.4 GHz BAND

7.3.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

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

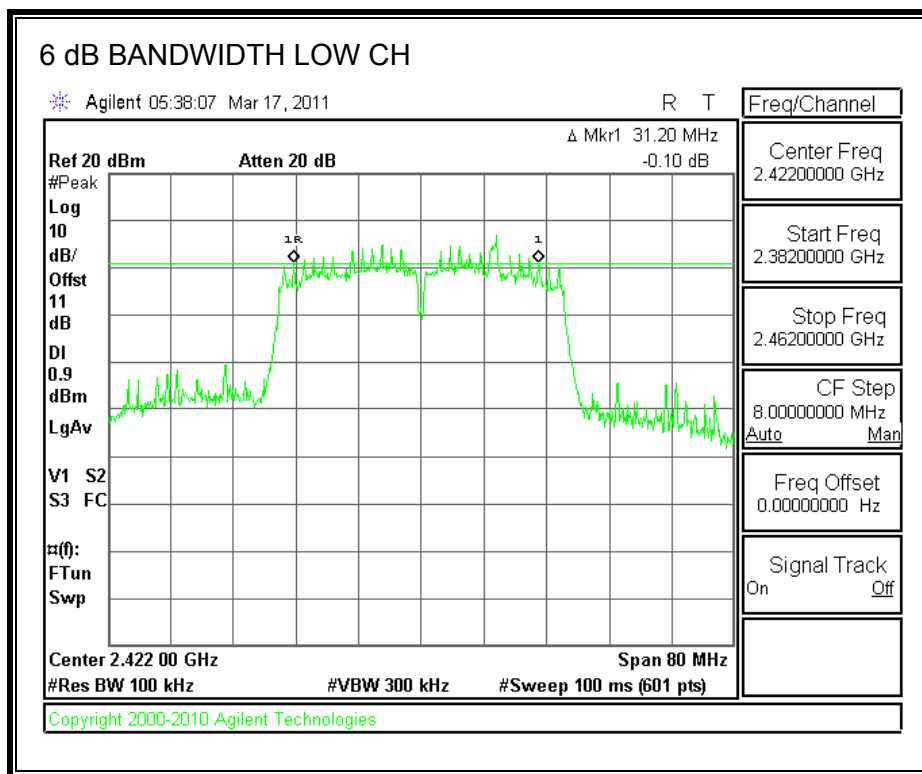
TEST PROCEDURE

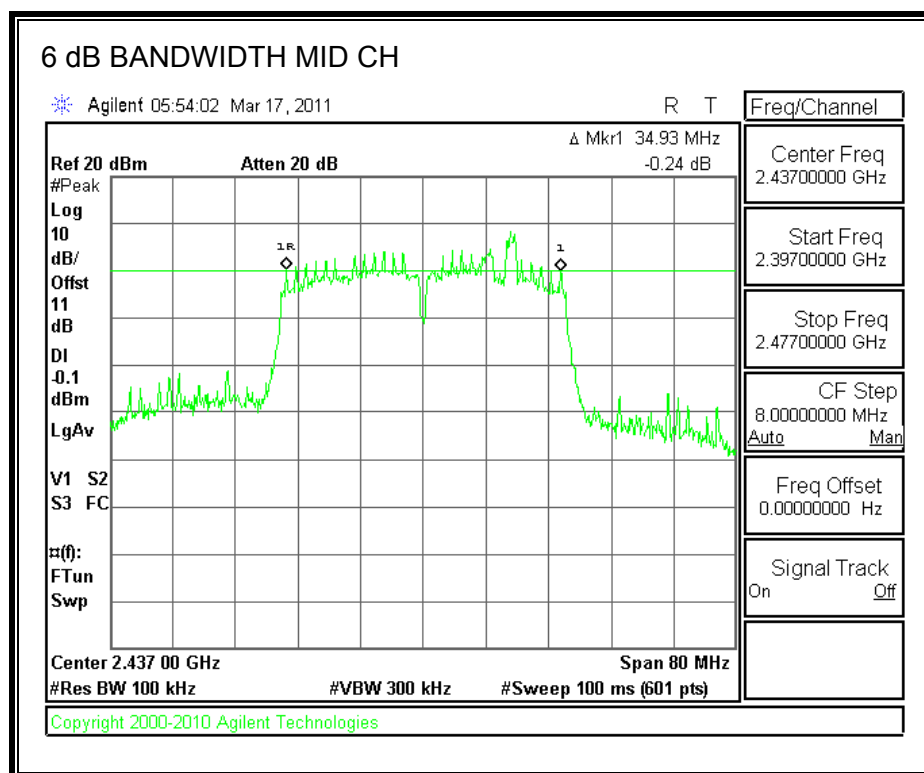
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

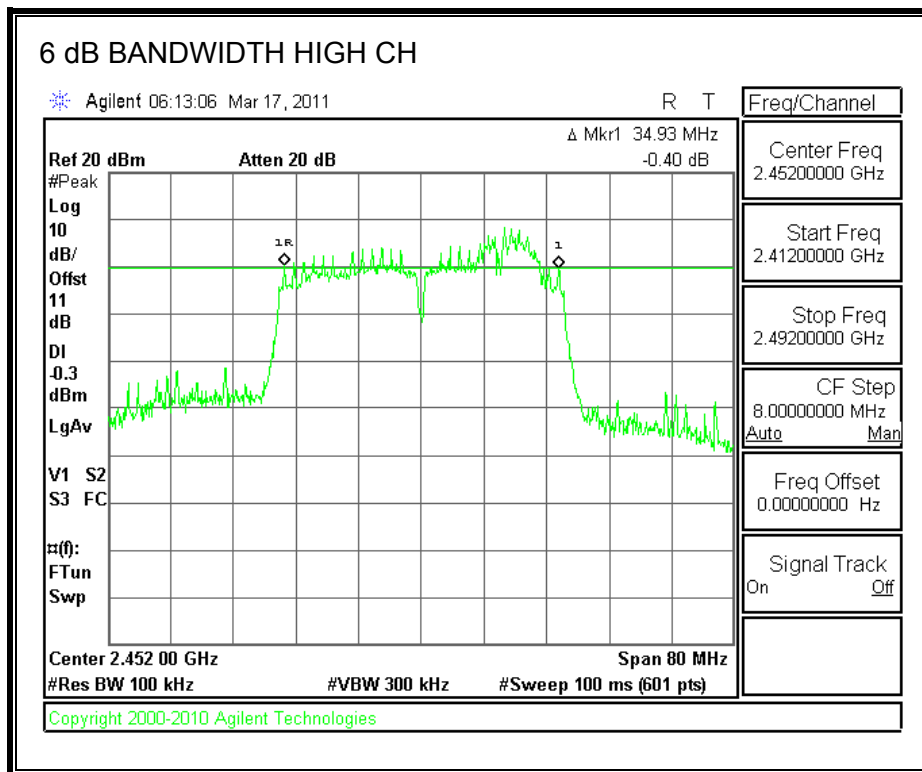
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2422	31.2	0.5
Middle	2437	34.93	0.5
High	2452	34.93	0.5

6 dB BANDWIDTH







7.3.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

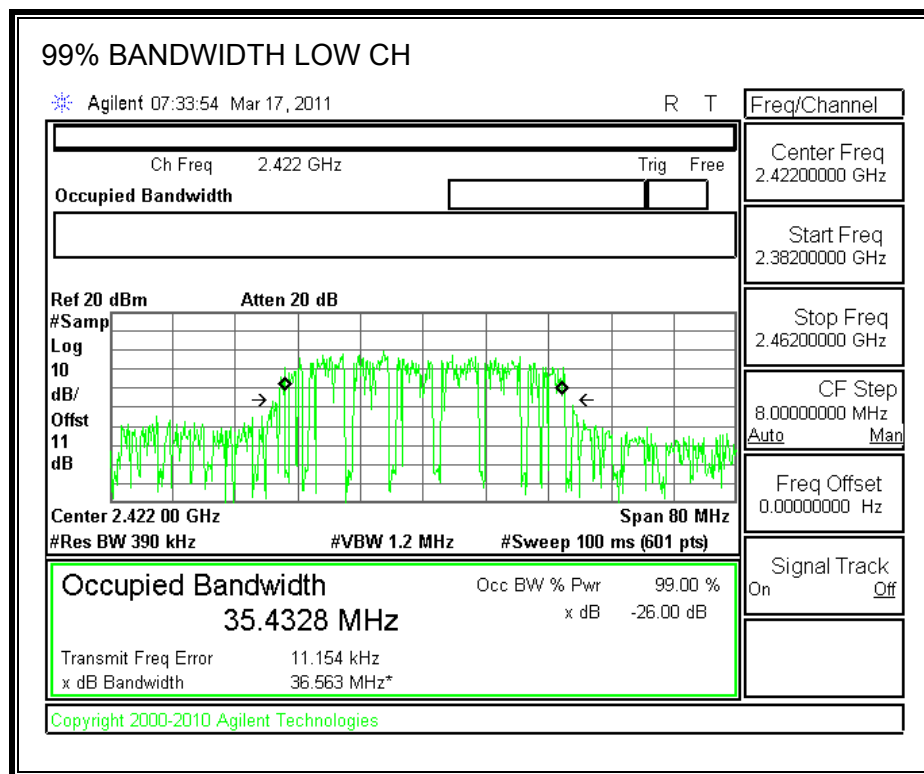
TEST PROCEDURE

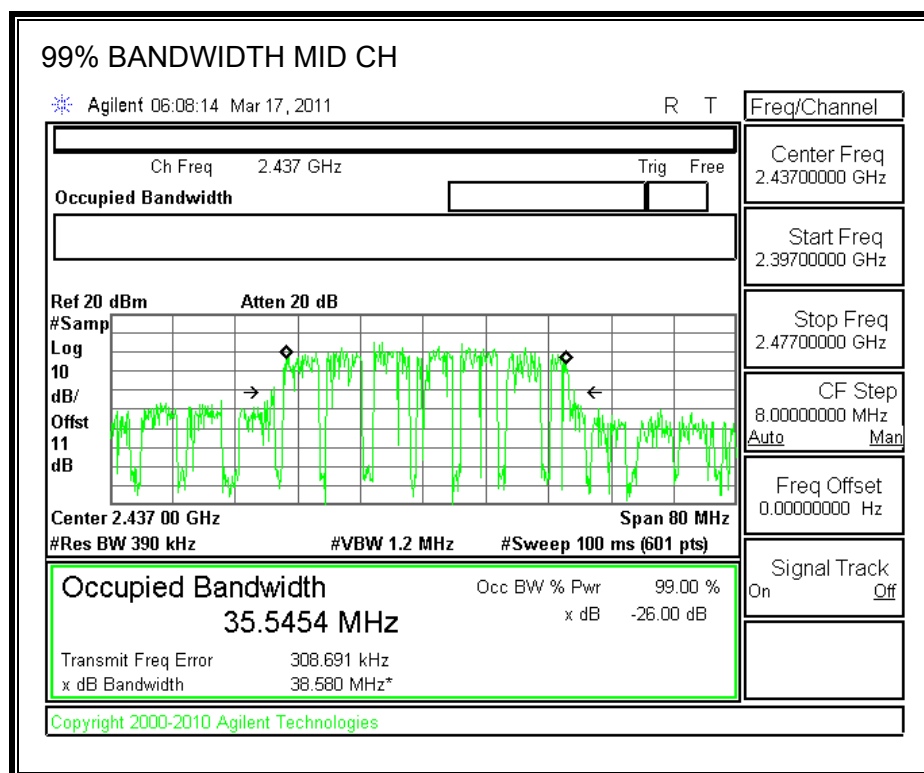
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

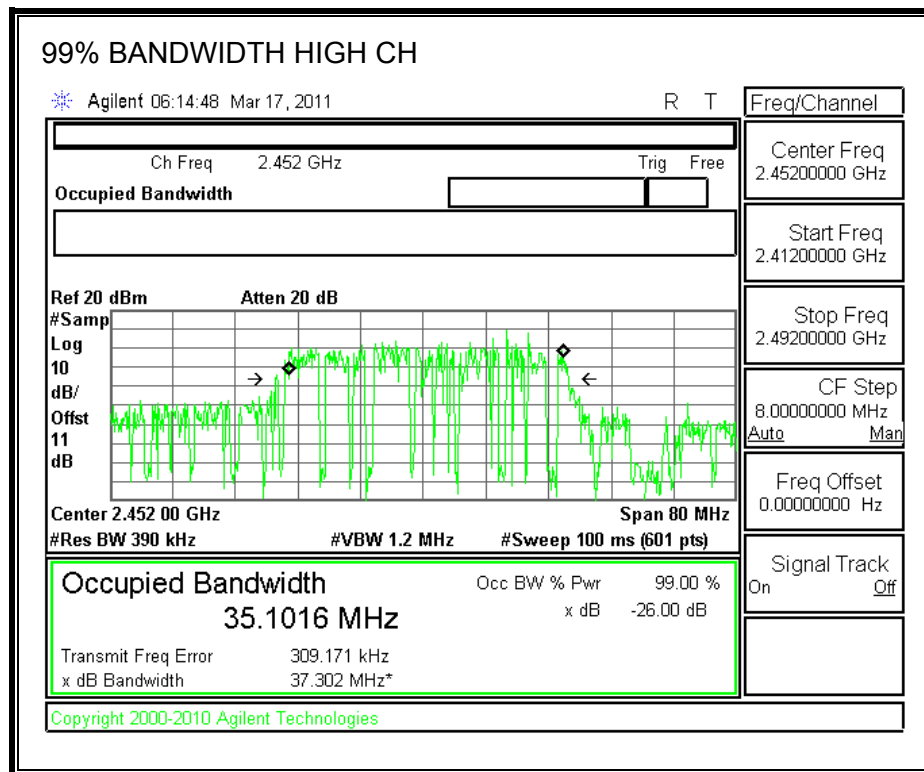
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2422	35.4328
Middle	2437	35.5454
High	2452	35.1016

99% BANDWIDTH







7.3.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

TEST PROCEDURE

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

RESULTS

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Attenuator and Cable Offset (dB)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2422	5.83	11	16.83	30	-13.17
Middle	2437	13.05	11	24.05	30	-5.95
High	2452	11.16	11	22.16	30	-7.84

7.3.4. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

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

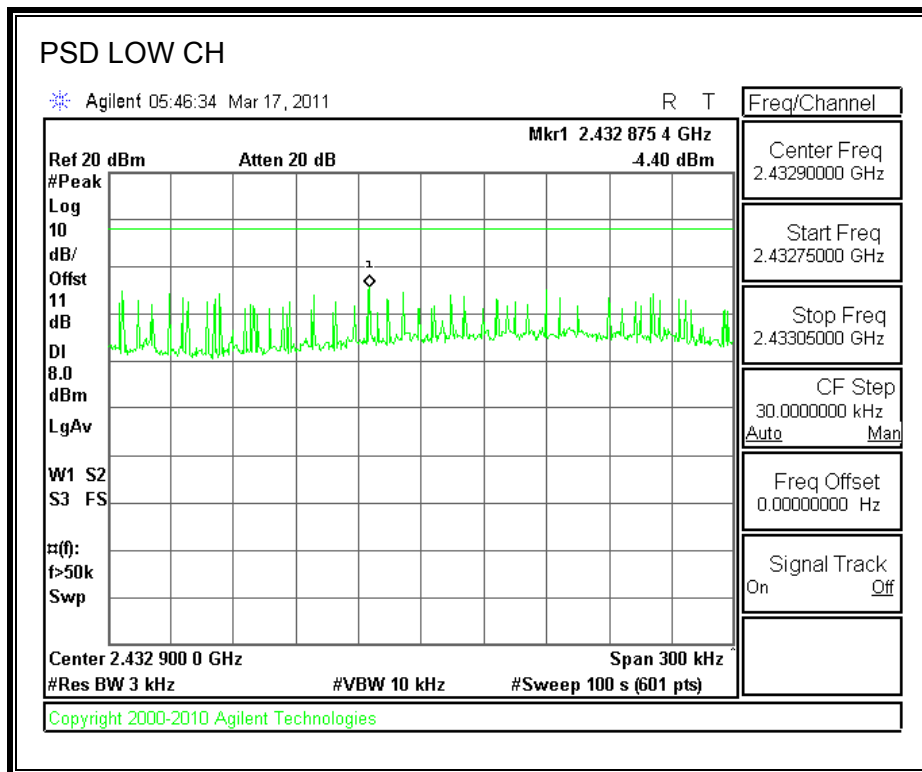
TEST PROCEDURE

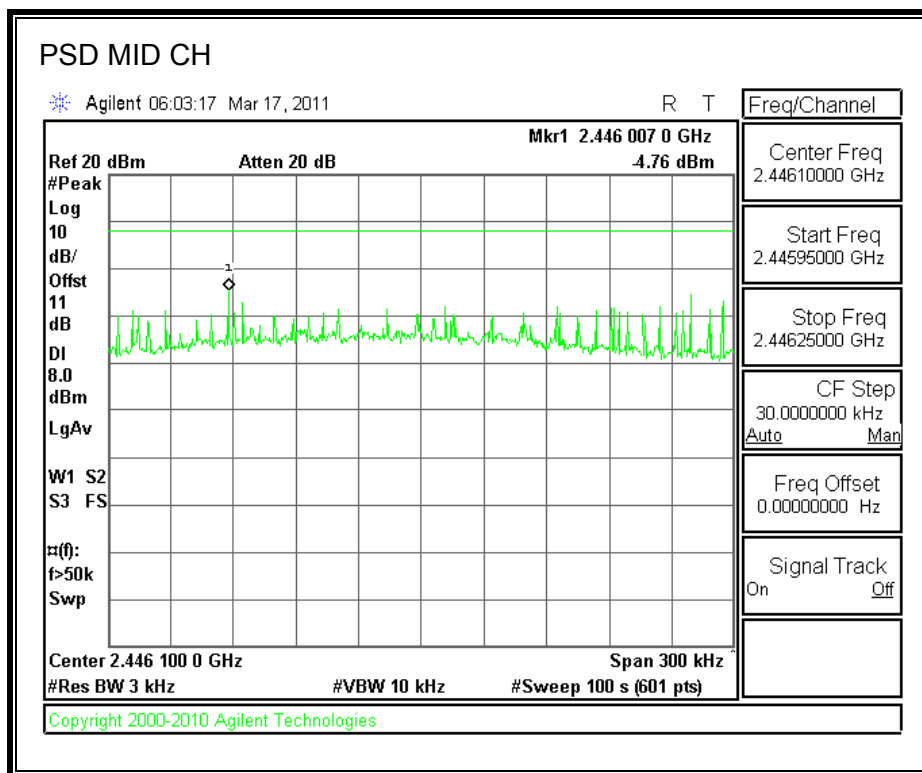
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

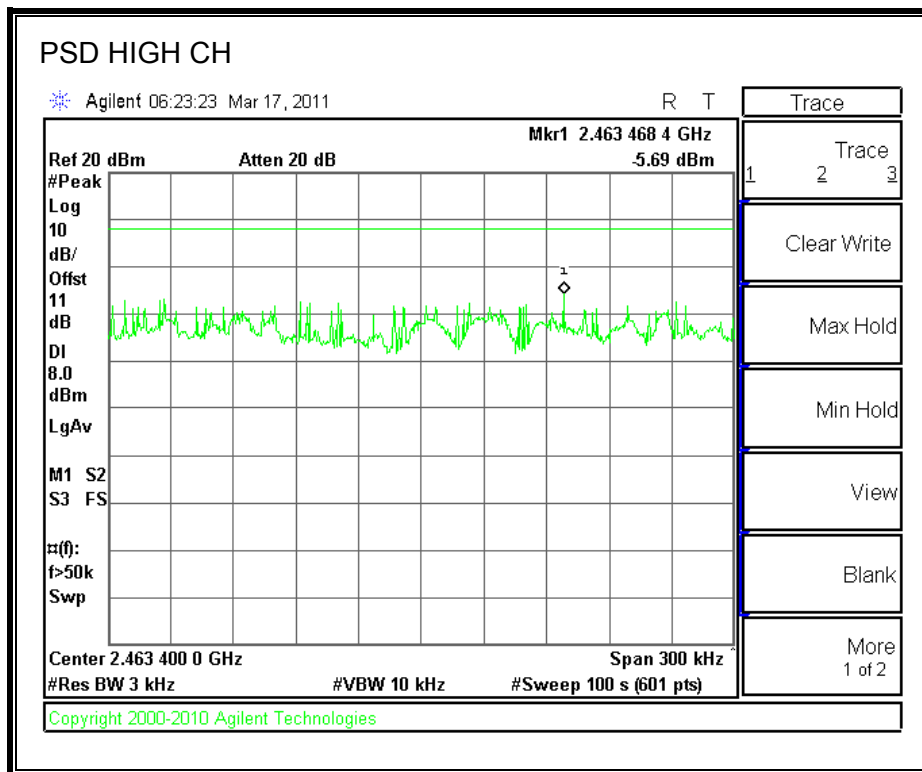
RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2422	-4.40	8	-12.40
Middle	2437	-4.76	8	-12.76
High	2452	-5.69	8	-13.69

POWER SPECTRAL DENSITY







7.3.5. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

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

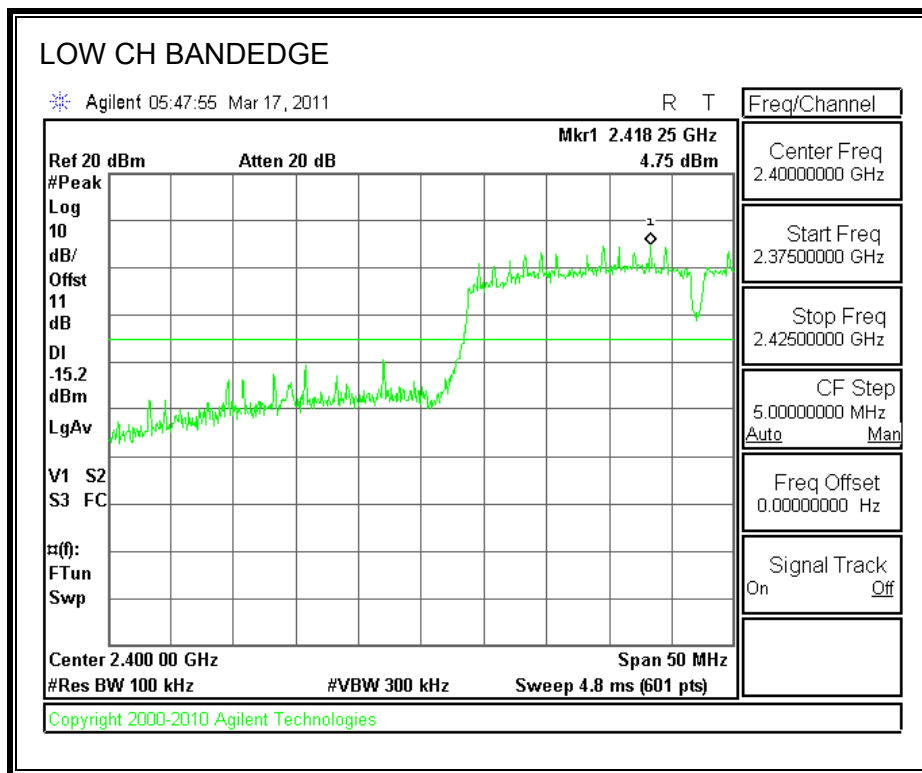
TEST PROCEDURE

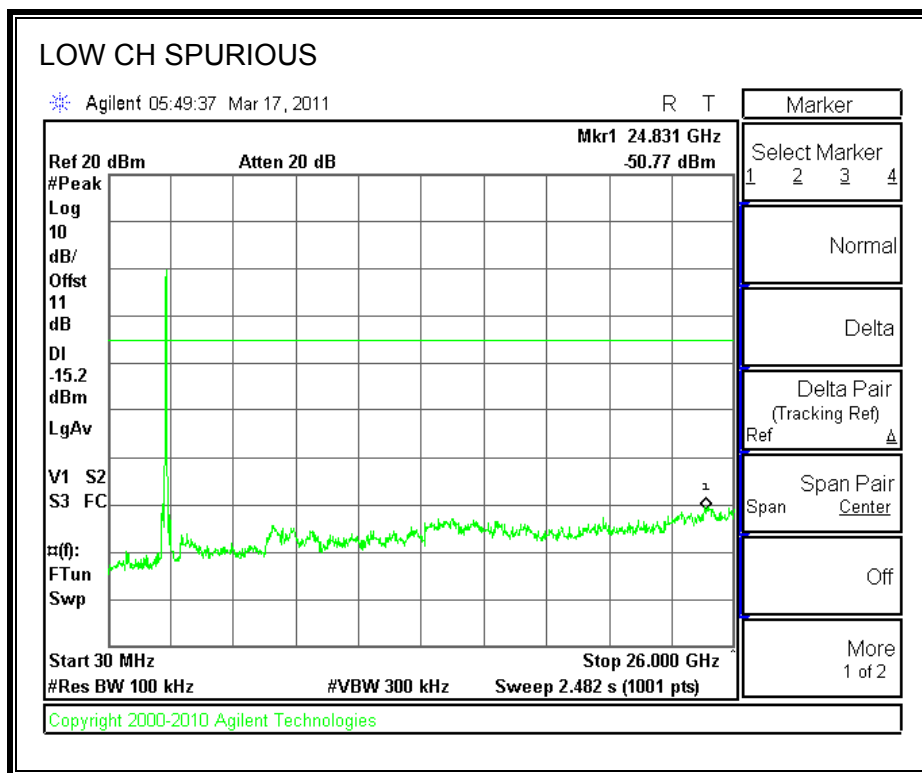
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

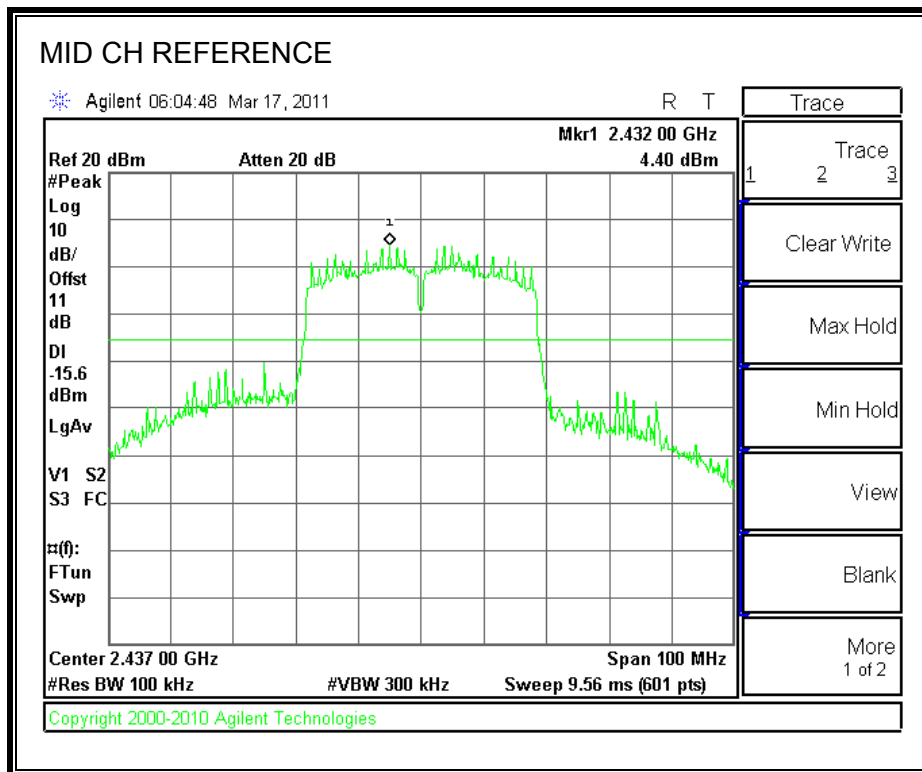
RESULTS

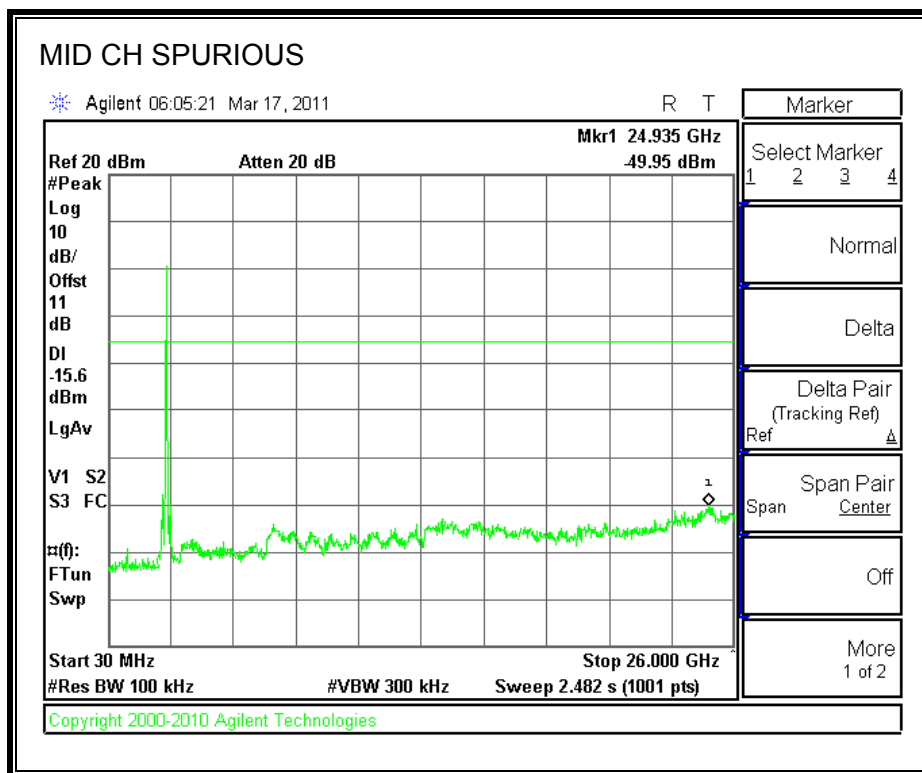
SPURIOUS EMISSIONS, LOW CHANNEL



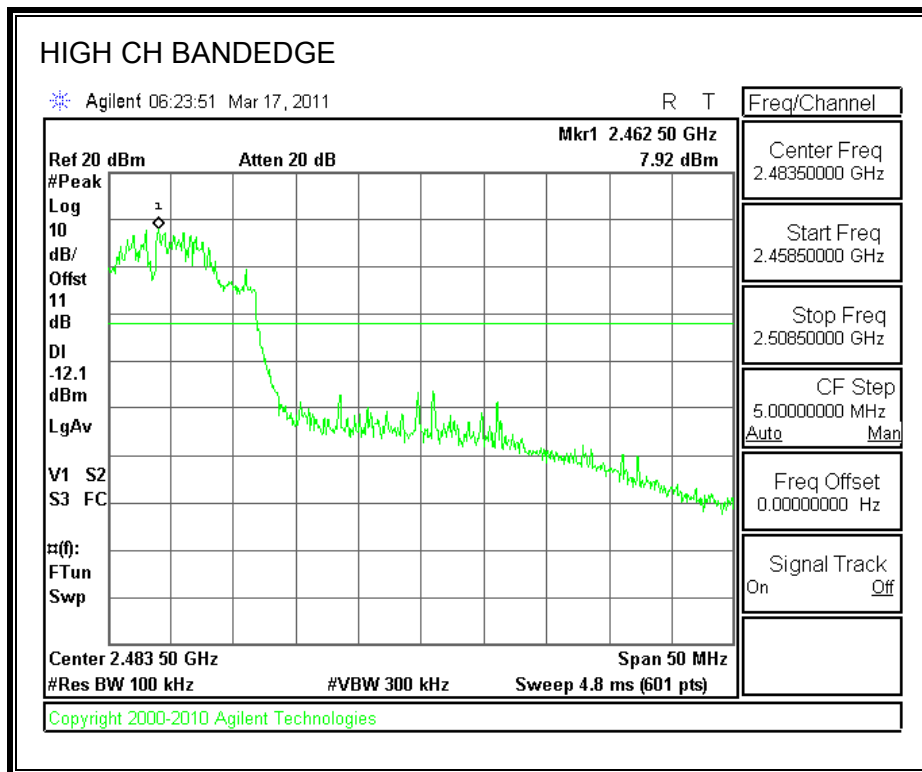


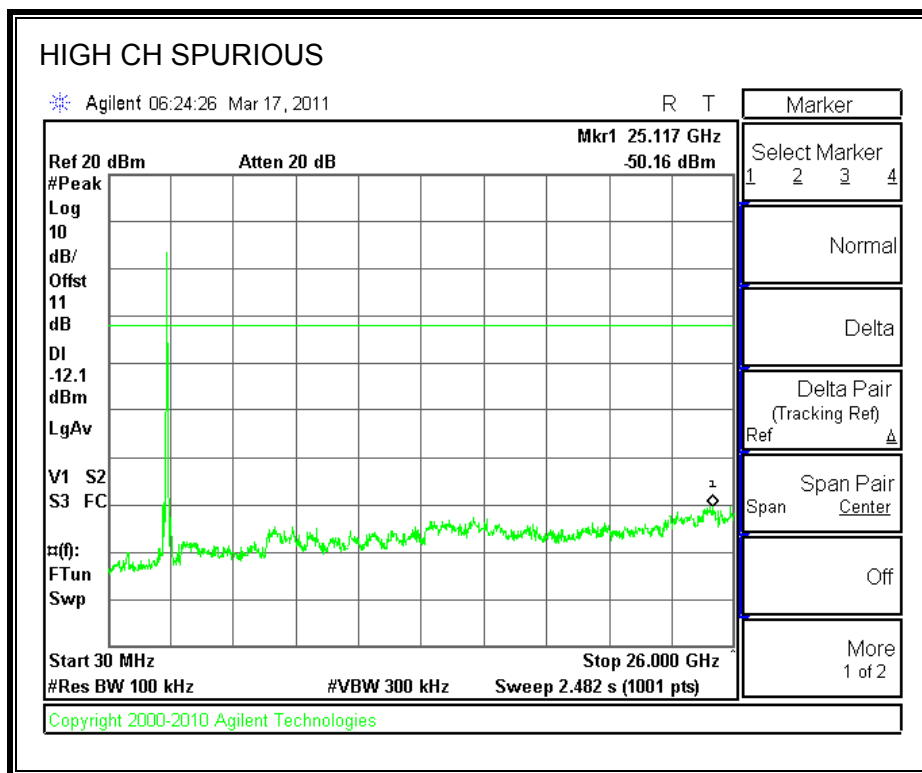
SPURIOUS EMISSIONS, MID CHANNEL





SPURIOUS EMISSIONS, HIGH CHANNEL





8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

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, and 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.

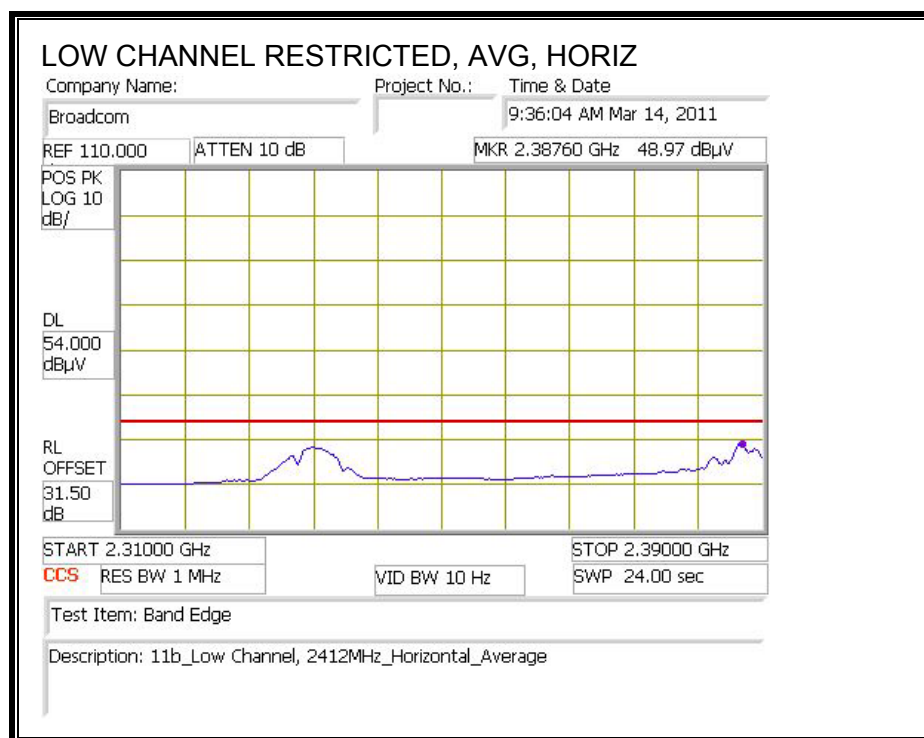
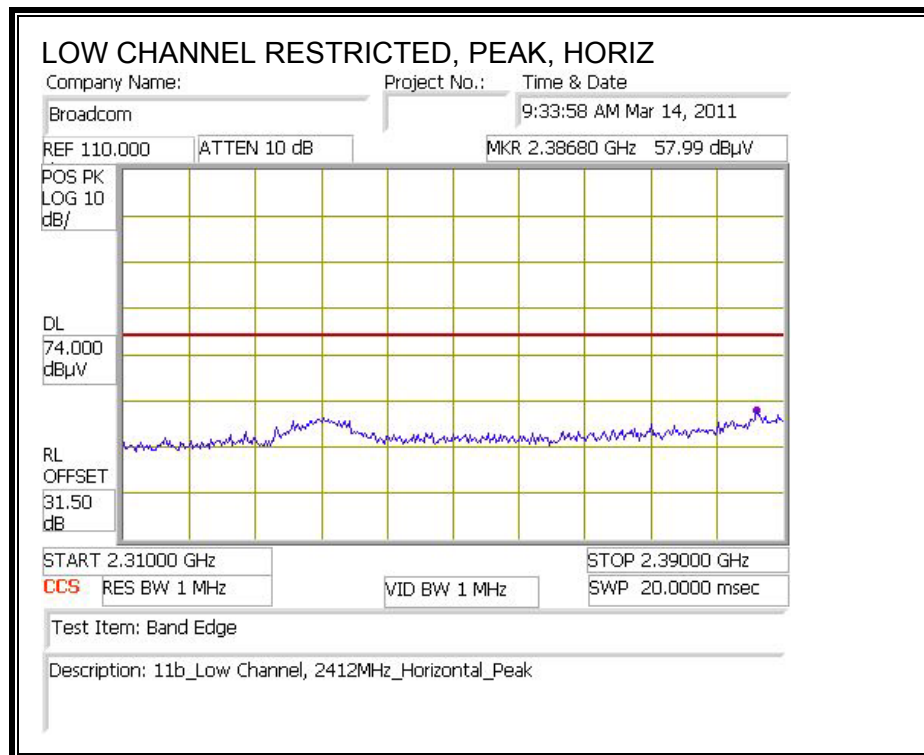
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

RESULTS

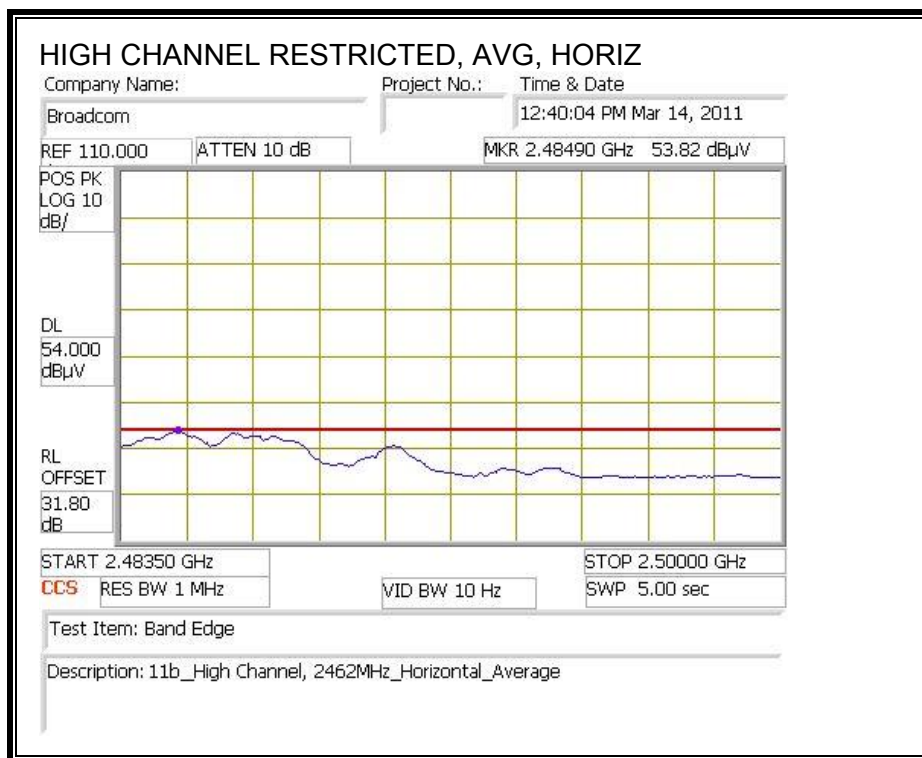
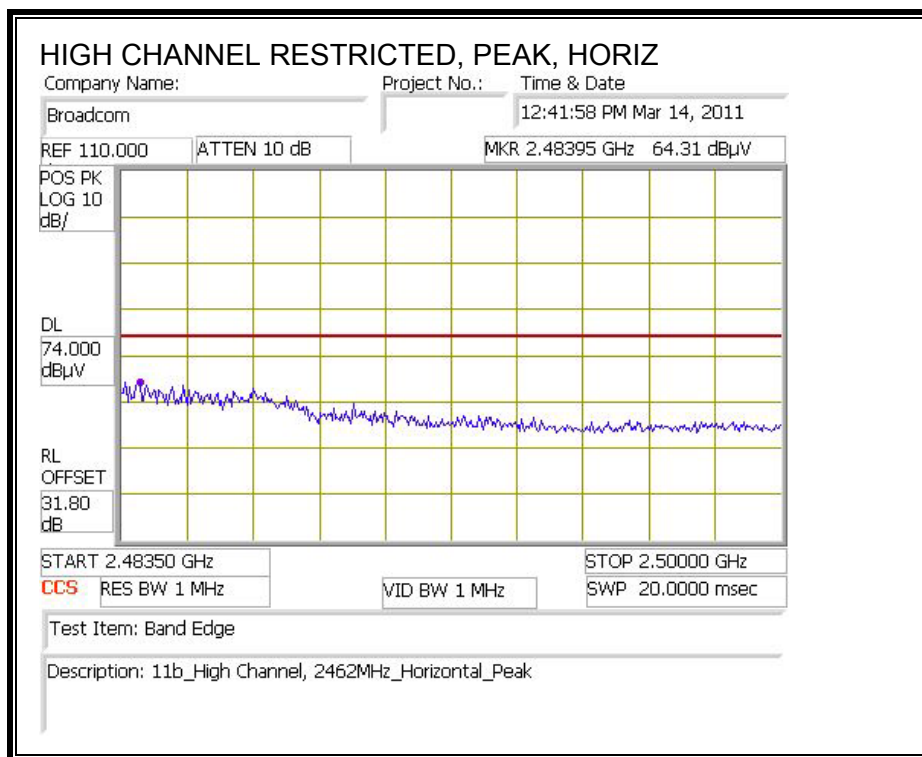
8.2. TRANSMITTER ABOVE 1 GHz

8.2.1. 802.11b MODE

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement **Compliance Certification Services, Fremont 3m Chamber**

Test Engr: Vien Tran
Date: 03/14/11
Project #: 11U13694
Company: Broadcom
Test Target: FCC Class B
Mode Oper: Tx 11b Mode

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

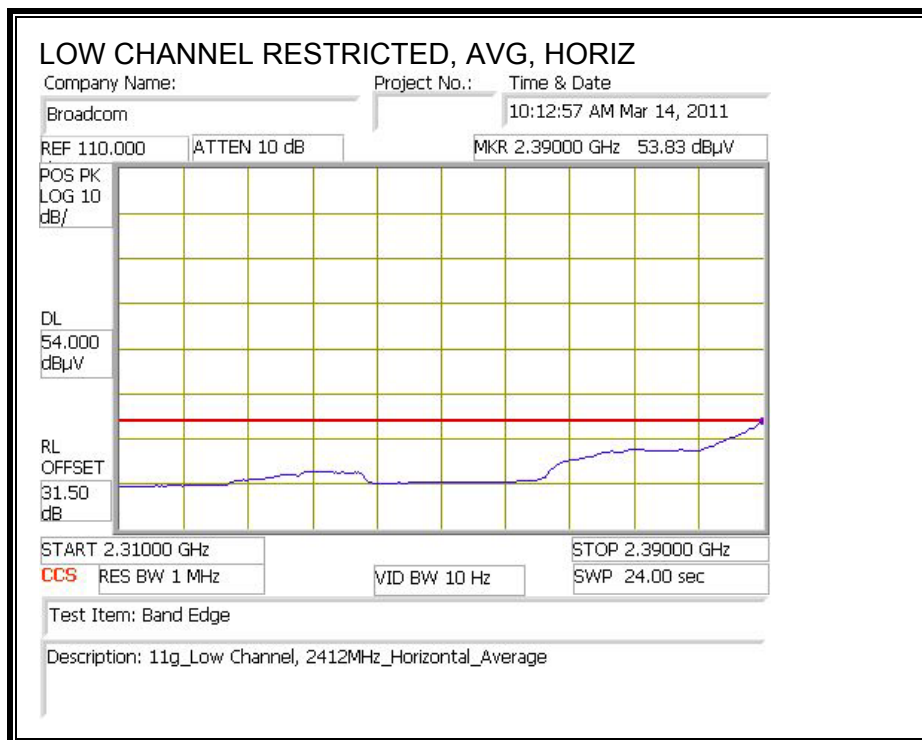
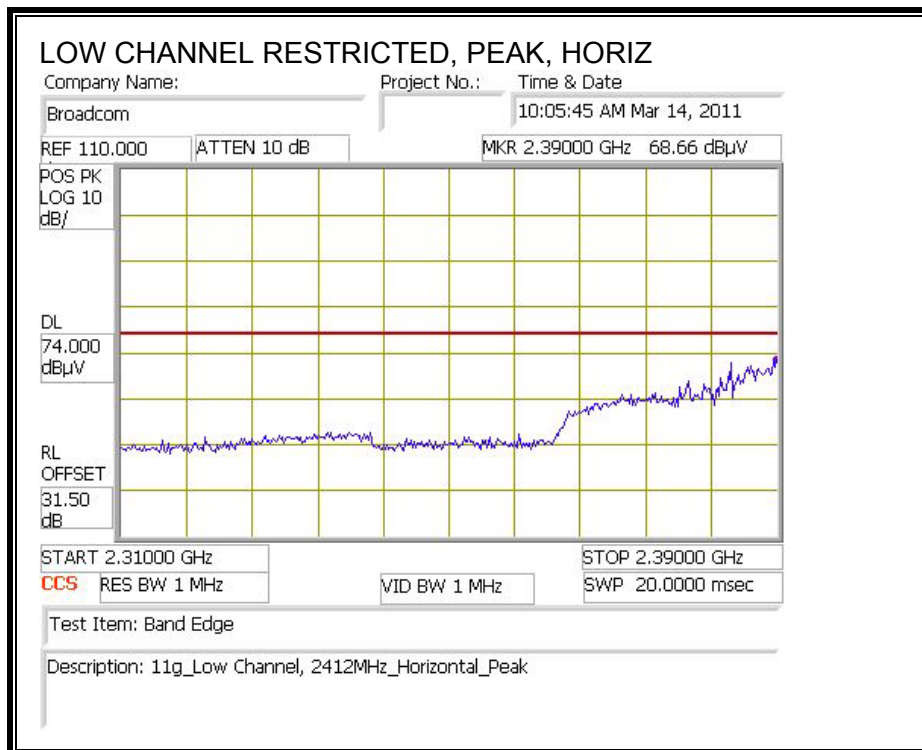
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fldr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
LOW CHANNEL, 2412MHz													
4.824	3.0	52.2	32.7	5.8	-34.8	0.0	0.0	55.9	74.0	-18.1	V	P	
4.824	3.0	50.1	32.7	5.8	-34.8	0.0	0.0	53.7	54.0	-0.3	V	A	
7.236	3.0	49.1	35.4	7.2	-34.1	0.0	0.0	57.6	74.0	-16.4	V	P	
7.236	3.0	45.1	35.4	7.2	-34.1	0.0	0.0	53.5	54.0	-0.5	V	A	
9.648	3.0	34.9	37.5	8.5	-33.6	0.0	0.0	47.4	74.0	-26.6	V	P	
9.648	3.0	22.6	37.5	8.5	-33.6	0.0	0.0	35.1	54.0	-18.9	V	A	
4.824	3.0	50.2	32.7	5.8	-34.8	0.0	0.0	53.9	74.0	-20.1	H	P	
4.824	3.0	47.9	32.7	5.8	-34.8	0.0	0.0	51.5	54.0	-2.5	H	A	
7.236	3.0	48.1	35.4	7.2	-34.1	0.0	0.0	56.6	74.0	-17.4	H	P	
7.236	3.0	43.5	35.4	7.2	-34.1	0.0	0.0	52.0	54.0	-2.0	H	A	
MID CHANNEL, 2437MHz													
4.874	3.0	48.9	32.7	5.8	-34.8	0.0	0.0	52.6	74.0	-21.4	V	P	
4.874	3.0	46.6	32.7	5.8	-34.8	0.0	0.0	50.3	54.0	-3.7	V	A	
7.311	3.0	49.2	35.5	7.3	-34.1	0.0	0.0	57.9	74.0	-16.1	V	P	
7.311	3.0	45.2	35.5	7.3	-34.1	0.0	0.0	53.8	54.0	-0.2	V	A	
4.874	3.0	44.7	32.7	5.8	-34.8	0.0	0.0	48.5	74.0	-25.5	H	P	
4.874	3.0	41.4	32.7	5.8	-34.8	0.0	0.0	45.1	54.0	-8.9	H	A	
7.311	3.0	45.3	35.5	7.3	-34.1	0.0	0.0	54.0	74.0	-20.0	H	P	
7.311	3.0	40.5	35.5	7.3	-34.1	0.0	0.0	49.1	54.0	-4.9	H	A	
HIGH CHANNEL, 2462MHz													
4.924	3.0	46.6	32.7	5.9	-34.8	0.0	0.0	50.4	74.0	-23.6	V	P	
4.924	3.0	43.8	32.7	5.9	-34.8	0.0	0.0	47.6	54.0	-6.4	V	A	
7.386	3.0	49.0	35.6	7.3	-34.1	0.0	0.0	57.8	74.0	-16.2	V	P	
7.386	3.0	45.0	35.6	7.3	-34.1	0.0	0.0	53.8	54.0	-0.2	V	A	
4.924	3.0	44.5	32.7	5.9	-34.8	0.0	0.0	48.3	74.0	-25.7	H	P	
4.924	3.0	41.4	32.7	5.9	-34.8	0.0	0.0	45.2	54.0	-8.8	H	A	
7.386	3.0	47.0	35.6	7.3	-34.1	0.0	0.0	55.8	74.0	-18.2	H	P	
7.386	3.0	42.5	35.6	7.3	-34.1	0.0	0.0	51.3	54.0	-2.7	H	A	

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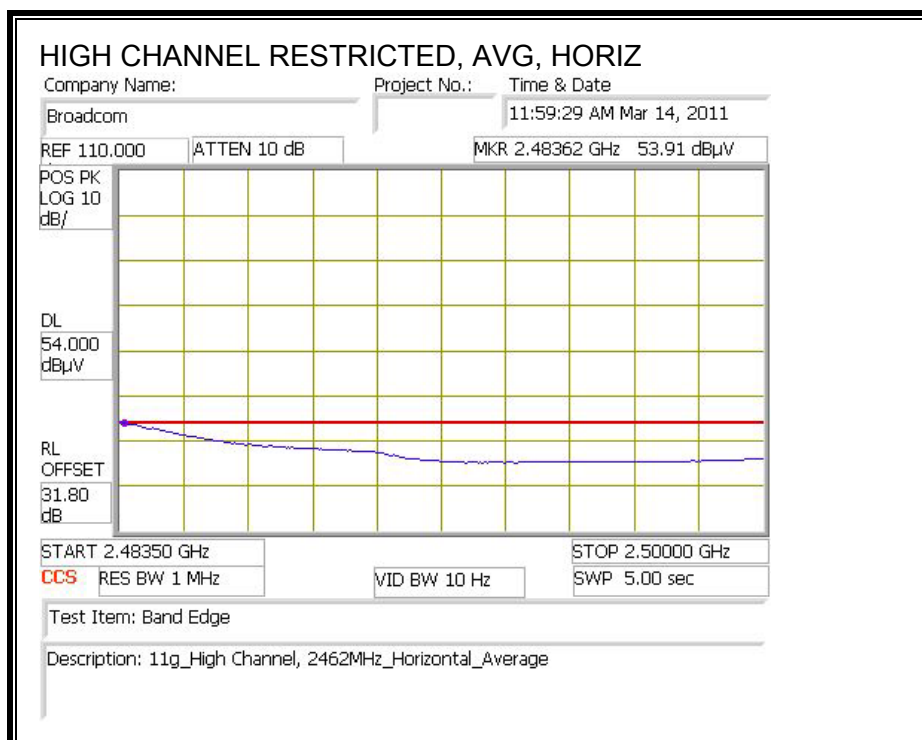
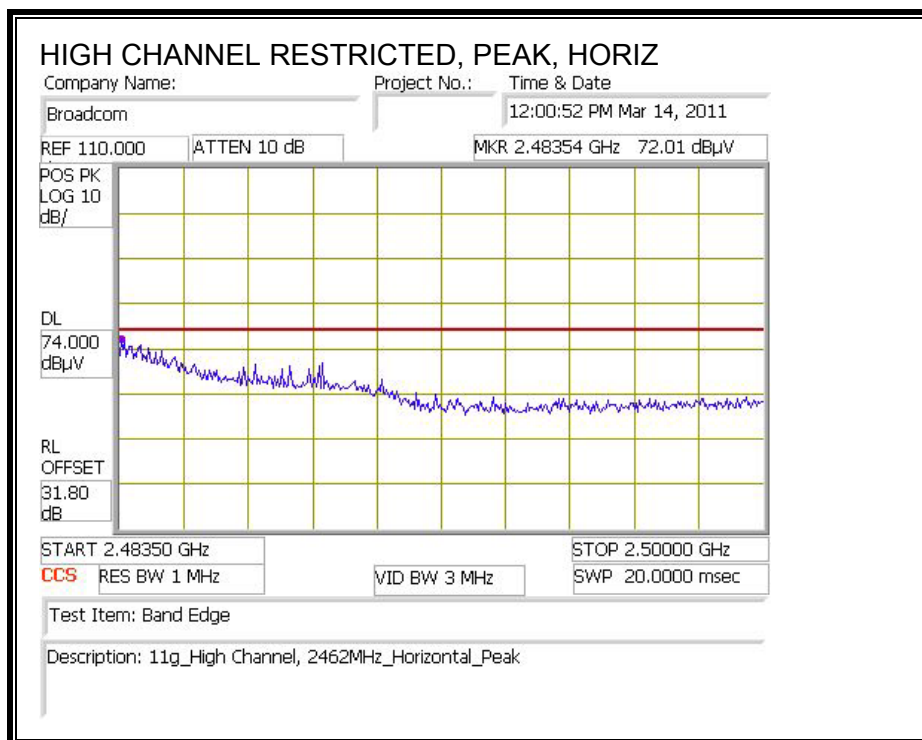
Note: No other emissions were detected above the system noise floor.

8.2.2. 802.11g MODE

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement Compliance Certification Services, Fremont 3m Chamber

Test Engr: Vien Tran
Date: 03/14/11
Project #: 11U13694
Company: Broadcom
Test Target: FCC Class B
Mode Oper: Tx 11g Mode

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

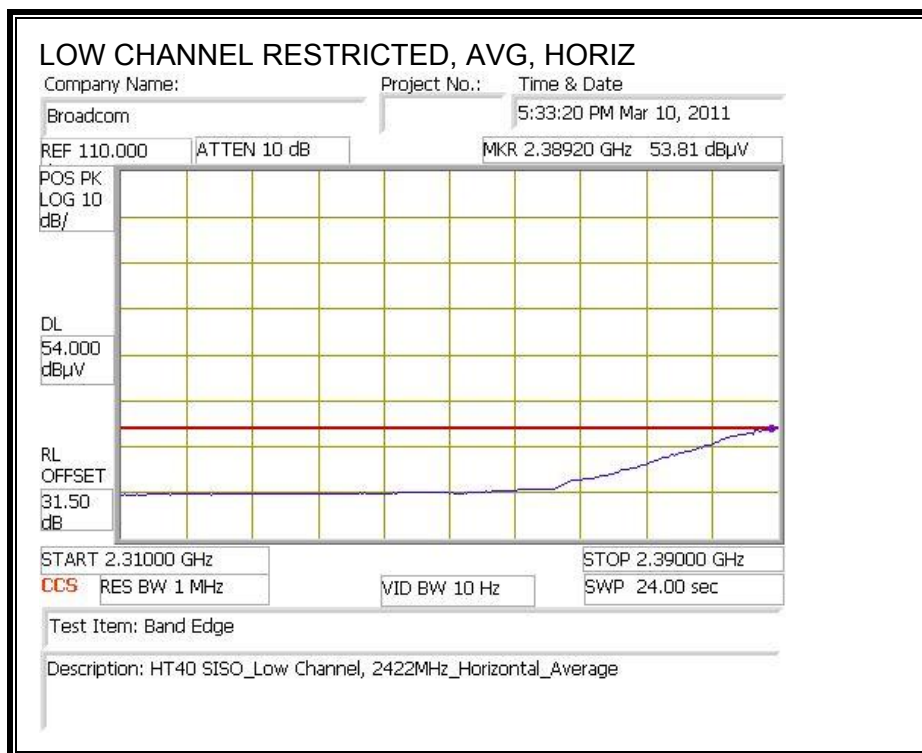
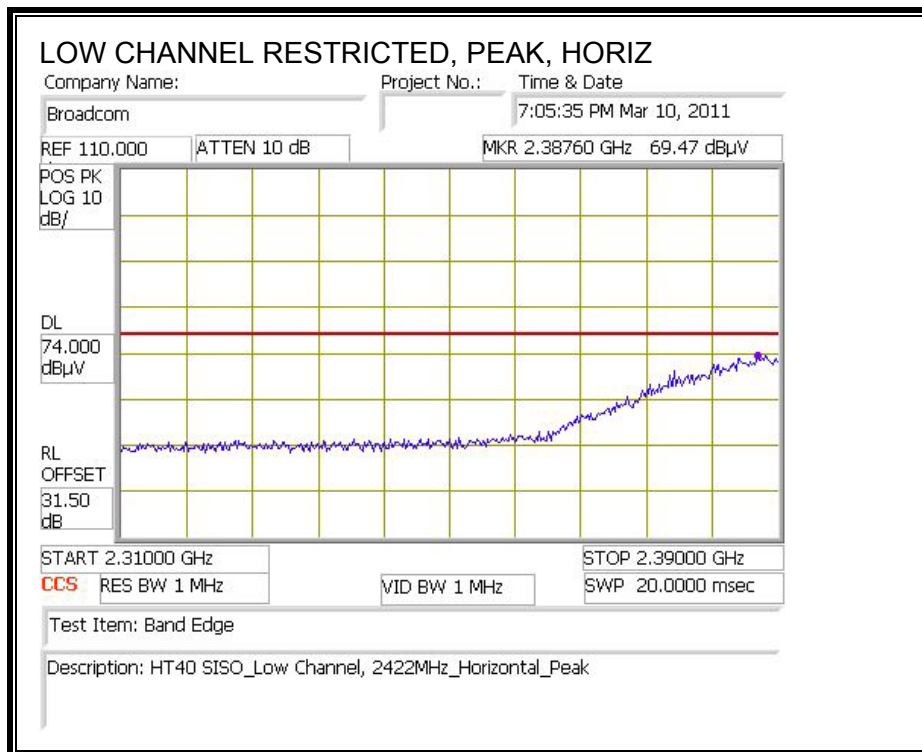
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
LOW CHANNEL, 2412MHz													
4.824	3.0	52.2	32.7	5.8	-34.8	0.0	0.0	55.8	74.0	-18.2	V	P	
4.824	3.0	39.2	32.7	5.8	-34.8	0.0	0.0	42.8	54.0	-11.2	V	A	
4.824	3.0	48.5	32.7	5.8	-34.8	0.0	0.0	52.1	74.0	-21.9	H	P	
4.824	3.0	35.1	32.7	5.8	-34.8	0.0	0.0	38.7	54.0	-15.3	H	A	
MID CHANNEL, 2437MHz													
4.874	3.0	49.2	32.7	5.8	-34.8	0.0	0.0	52.9	74.0	-21.1	V	P	
4.874	3.0	35.0	32.7	5.8	-34.8	0.0	0.0	38.7	54.0	-15.3	V	A	
7.311	3.0	51.3	35.5	7.3	-34.1	0.0	0.0	59.9	74.0	-14.1	V	P	
7.311	3.0	35.9	35.5	7.3	-34.1	0.0	0.0	44.6	54.0	-9.4	V	A	
4.874	3.0	45.2	32.7	5.8	-34.8	0.0	0.0	49.0	74.0	-25.0	H	P	
4.874	3.0	31.2	32.7	5.8	-34.8	0.0	0.0	34.9	54.0	-19.1	H	A	
7.311	3.0	49.2	35.5	7.3	-34.1	0.0	0.0	57.8	74.0	-16.2	H	P	
7.311	3.0	34.4	35.5	7.3	-34.1	0.0	0.0	43.0	54.0	-11.0	H	A	
HIGH CHANNEL, 2462MHz													
4.924	3.0	46.1	32.7	5.9	-34.8	0.0	0.0	49.9	74.0	-24.1	V	P	
4.924	3.0	32.4	32.7	5.9	-34.8	0.0	0.0	36.2	54.0	-17.8	V	A	
7.386	3.0	47.8	35.6	7.3	-34.1	0.0	0.0	56.5	74.0	-17.5	V	P	
7.386	3.0	33.7	35.6	7.3	-34.1	0.0	0.0	42.5	54.0	-11.5	V	A	
4.924	3.0	41.9	32.7	5.9	-34.8	0.0	0.0	45.7	74.0	-28.3	H	P	
4.924	3.0	29.0	32.7	5.9	-34.8	0.0	0.0	32.8	54.0	-21.2	H	A	
7.386	3.0	48.4	35.6	7.3	-34.1	0.0	0.0	57.2	74.0	-16.8	H	P	
7.386	3.0	33.5	35.6	7.3	-34.1	0.0	0.0	42.3	54.0	-11.7	H	A	

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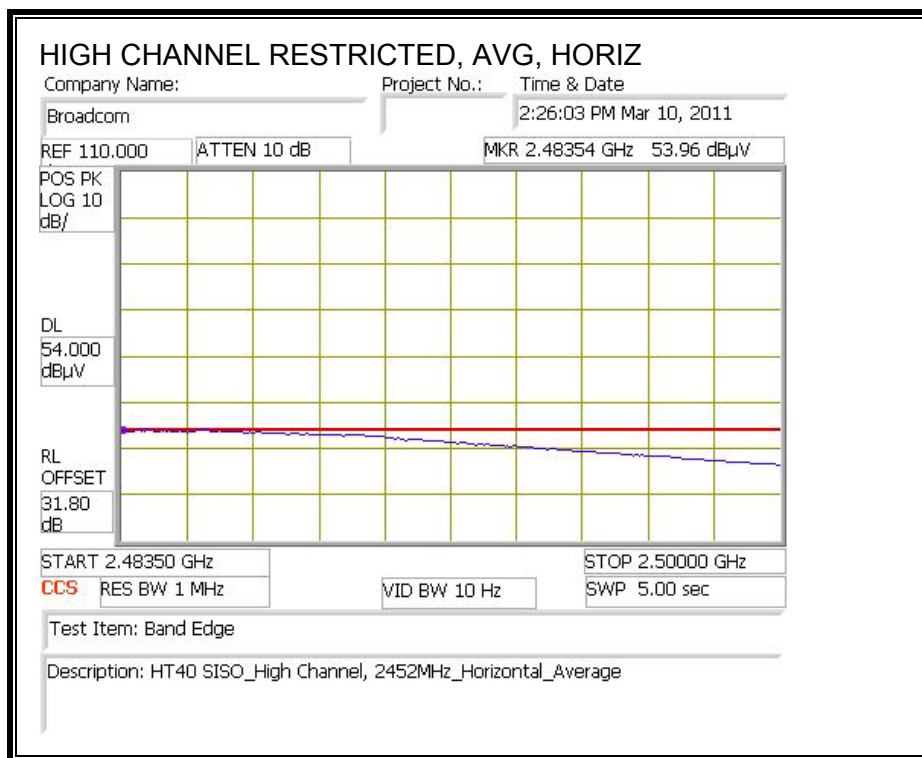
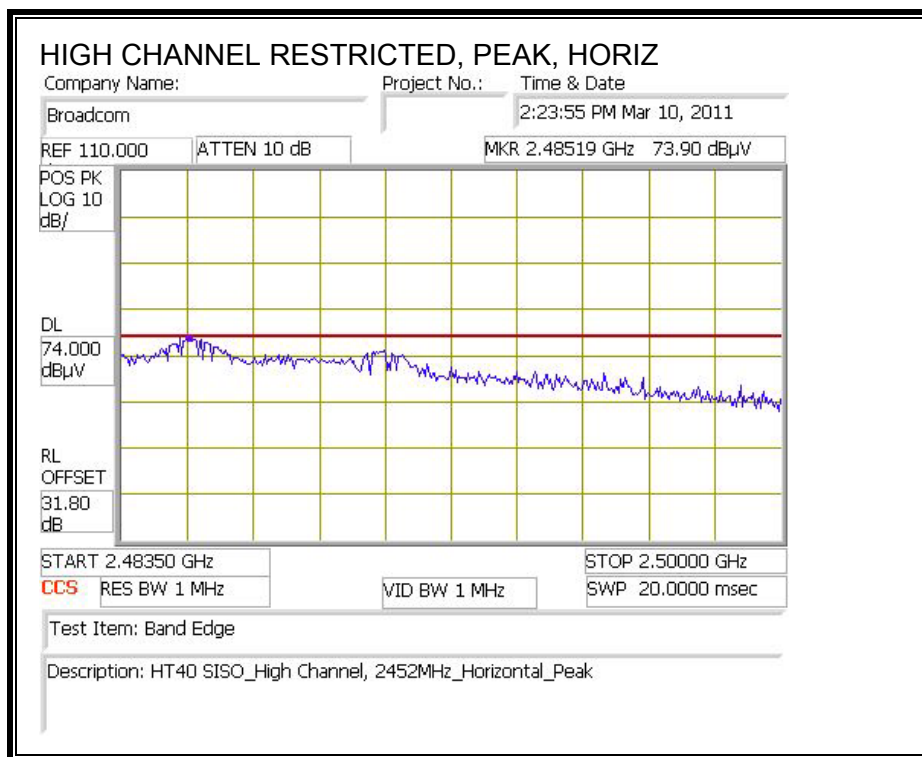
Note: No other emissions were detected above the system noise floor.

8.2.3. 802.11n HT40 SISO MODE

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement

Compliance Certification Services, Fremont 3m Chamber

Test Engr: Vien Tran
Date: 03/14/11
Project #: 11U13694
Company: Broadcom
Test Target: FCC Class B
Mode Oper: Tx 11n HT40 SISO Mode

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

f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
LOW CHANNEL, 2422MHz													
4.844	3.0	48.5	32.7	5.8	-34.8	0.0	0.0	52.1	74.0	-21.9	V	P	
4.844	3.0	29.4	32.7	5.8	-34.8	0.0	0.0	33.1	54.0	-20.9	V	A	
7.266	3.0	38.7	35.4	7.2	-34.1	0.0	0.0	47.2	74.0	-26.8	V	P	
7.266	3.0	25.8	35.4	7.2	-34.1	0.0	0.0	34.3	54.0	-19.7	V	A	
4.844	3.0	42.5	32.7	5.8	-34.8	0.0	0.0	46.2	74.0	-27.8	H	P	
4.844	3.0	28.7	32.7	5.8	-34.8	0.0	0.0	32.4	54.0	-21.6	H	A	
7.266	3.0	38.2	35.4	7.2	-34.1	0.0	0.0	46.8	74.0	-27.3	H	P	
7.266	3.0	25.4	35.4	7.2	-34.1	0.0	0.0	33.9	54.0	-20.1	H	A	
MID CHANNEL, 2437MHz													
4.874	3.0	41.2	32.7	5.8	-34.8	0.0	0.0	44.9	74.0	-29.1	V	P	
4.874	3.0	28.3	32.7	5.8	-34.8	0.0	0.0	32.0	54.0	-22.0	V	A	
7.311	3.0	42.5	35.5	7.3	-34.1	0.0	0.0	51.1	74.0	-22.9	V	P	
7.311	3.0	28.0	35.5	7.3	-34.1	0.0	0.0	36.6	54.0	-17.4	V	A	
4.874	3.0	38.6	32.7	5.8	-34.8	0.0	0.0	42.3	74.0	-31.7	H	P	
4.874	3.0	26.9	32.7	5.8	-34.8	0.0	0.0	30.6	54.0	-23.4	H	A	
7.311	3.0	37.4	35.5	7.3	-34.1	0.0	0.0	46.0	74.0	-28.0	H	P	
7.311	3.0	24.9	35.5	7.3	-34.1	0.0	0.0	33.5	54.0	-20.5	H	A	
HIGH CHANNEL, 2452MHz													
4.904	3.0	39.6	32.7	5.9	-34.8	0.0	0.0	43.4	74.0	-30.6	V	P	
4.904	3.0	26.2	32.7	5.9	-34.8	0.0	0.0	30.0	54.0	-24.0	V	A	
7.356	3.0	38.3	35.5	7.3	-34.1	0.0	0.0	47.1	74.0	-26.9	V	P	
7.356	3.0	25.4	35.5	7.3	-34.1	0.0	0.0	34.1	54.0	-19.9	V	A	
4.904	3.0	38.1	32.7	5.9	-34.8	0.0	0.0	41.9	74.0	-32.1	H	P	
4.904	3.0	25.8	32.7	5.9	-34.8	0.0	0.0	29.5	54.0	-24.5	H	A	
7.356	3.0	36.8	35.5	7.3	-34.1	0.0	0.0	45.6	74.0	-28.4	H	P	
7.356	3.0	23.9	35.5	7.3	-34.1	0.0	0.0	32.7	54.0	-21.3	H	A	

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

8.3. RECEIVER ABOVE 1 GHz

8.3.1. FOR 20 MHz BANDWIDTH

High Frequency Measurement															
Compliance Certification Services, Fremont 3m Chamber															
Company:		Vien Tran													
Project #:		03/14/11													
Date:		11U13694													
Test Engineer:		Broadcom													
Configuration:		FCC Class B													
Mode:		Rx 20MHz Bandwidth													
Test Equipment:															
Horn 1-18GHz			Pre-amplifier 1-26GHz			Pre-amplifier 26-40GHz			Horn > 18GHz			Limit			
T60; S/N: 2238 @3m			T34 HP 8449B									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									
<div> <div>Peak Measurements</div> <div>RBW=VBW=1MHz</div> <div>Average Measurements</div> <div>RBW=1MHz ; VBW=10Hz</div> </div>															
f	Dist	Read Pk	Read Avg.	AF	CL	Amp	D Corr	Filtr	Peak	Avg	Pk Lim	Avg Lim	Pk Mar	Avg Mar	Notes
GHz	(m)	dBuV	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	dB	(V/B)
1.198	3.0	61.6	34.9	25.1	2.6	-38.0	0.0	0.0	51.3	24.6	74	54	-22.7	-29.4	H
2.437	3.0	53.8	51.9	28.1	3.9	-36.3	0.0	0.0	49.5	47.6	74	54	-24.5	-6.4	H
1.198	3.0	58.5	33.5	25.1	2.6	-38.0	0.0	0.0	48.2	23.2	74	54	-25.8	-30.8	V
2.437	3.0	48.9	43.2	28.1	3.9	-36.3	0.0	0.0	44.6	38.9	74	54	-29.4	-15.1	V
No other emissions were detected above system noise floor															
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. FOR 40 MHz BANDWIDTH

High Frequency Measurement																	
Compliance Certification Services, Fremont 3m Chamber																	
Company:		Vien Tran															
Project #:		03/14/11															
Date:		11U13694															
Test Engineer:		Broadcom															
Configuration:		FCC Class B															
Mode:		Rx 40MHz Bandwidth															
Test Equipment:																	
Horn 1-18GHz			Pre-amplifier 1-26GHz			Pre-amplifier 26-40GHz			Horn > 18GHz			Limit					
T60; S/N: 2238 @3m			T34 HP 8449B									RX RSS 210					
Hi Frequency Cables																	
3' cable 22807700			12' cable 22807600			20' cable 22807500			HPF			Reject Filter			Peak Measurements RBW=VBW=1MHz Average Measurements RBW=1MHz ; VBW=10Hz		
3' cable 22807700			12' cable 22807600			20' cable 22807500											
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filtr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)		
1.198	3.0	61.9	35.6	25.1	2.6	-38.0	0.0	0.0	51.6	25.3	74	54	-22.4	-28.7	H		
2.437	3.0	53.7	50.3	28.1	3.9	-36.3	0.0	0.0	49.4	46.0	74	54	-24.6	-8.0	H		
1.198	3.0	57.3	33.1	25.1	2.6	-38.0	0.0	0.0	47.0	22.8	74	54	-27.0	-31.2	V		
2.437	3.0	48.3	42.9	28.1	3.9	-36.3	0.0	0.0	44.0	38.6	74	54	-30.0	-15.4	V		
No other emissions were detected above system noise floor																	
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

HORIZONTAL & VERTICAL DATA

30-1000MHz Frequency Measurement

Compliance Certification Services, Fremont 3m Chamber

Test Engr: Vien Tran
Date: 03/16/11
Project #: 11U13694
Company: Broadcom
Test Target: FCC Class B
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	Pad dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
Horizontal													
30.72	3.0	42.2	19.6	0.5	28.4	0.0	0.0	33.9	40.0	-6.1	H	P	
287.651	3.0	53.8	13.1	1.4	27.4	0.0	0.0	40.9	46.0	-5.1	H	P	
354.853	3.0	53.3	14.3	1.6	27.7	0.0	0.0	41.5	46.0	-4.5	H	P	
588.743	3.0	48.1	18.3	2.2	28.6	0.0	0.0	39.9	46.0	-6.1	H	P	
Vertical													
74.762	3.0	50.5	8.1	0.7	28.3	0.0	0.0	31.1	40.0	-8.9	V	P	
99.483	3.0	52.8	9.2	0.8	28.2	0.0	0.0	34.7	43.5	-8.8	V	P	
210.967	3.0	52.6	11.9	1.2	27.4	0.0	0.0	38.3	43.5	-5.2	V	P	
369.614	3.0	47.2	14.6	1.7	27.8	0.0	0.0	35.6	46.0	-10.4	V	P	

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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

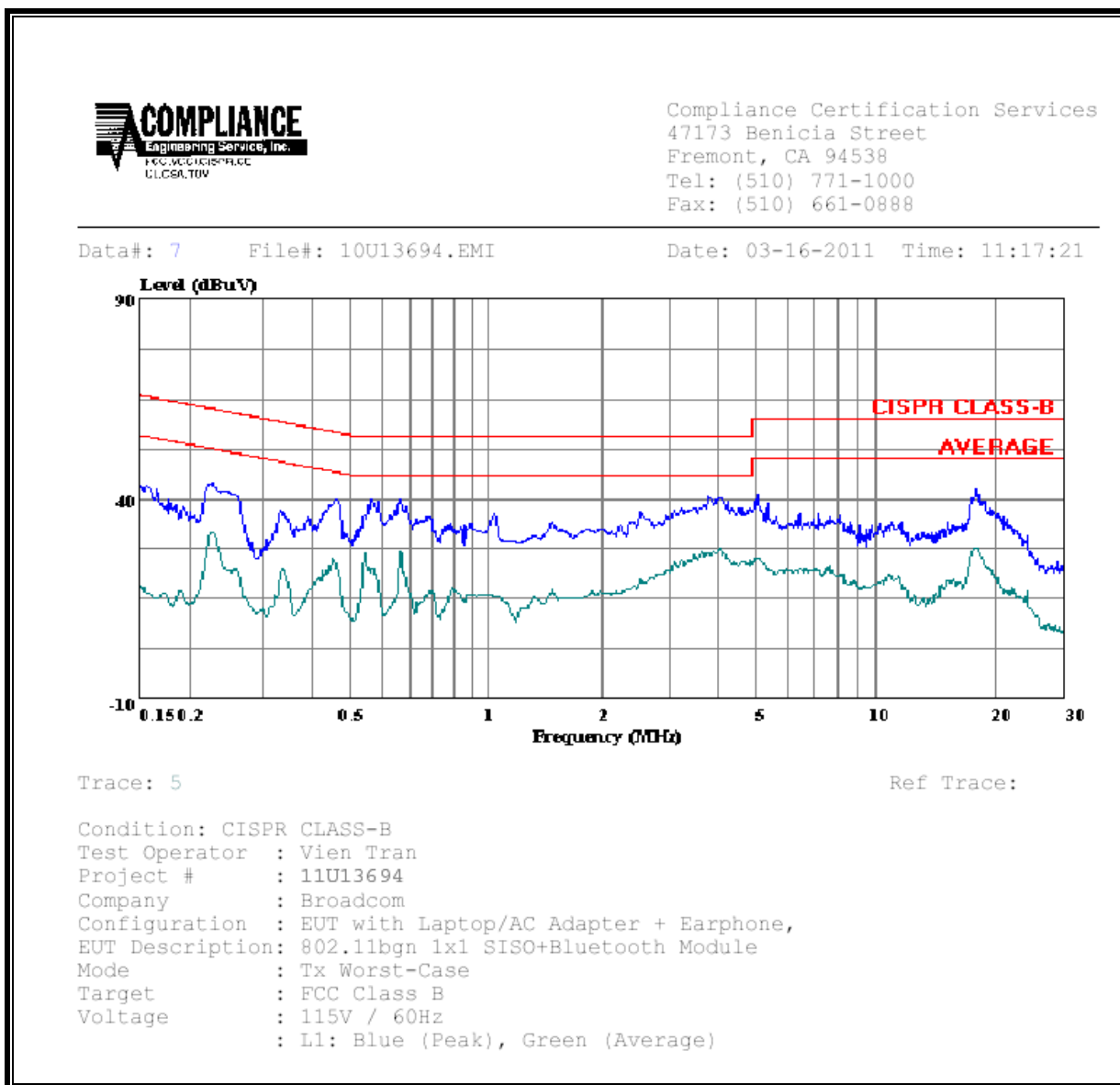
ANSI C63.4

RESULTS

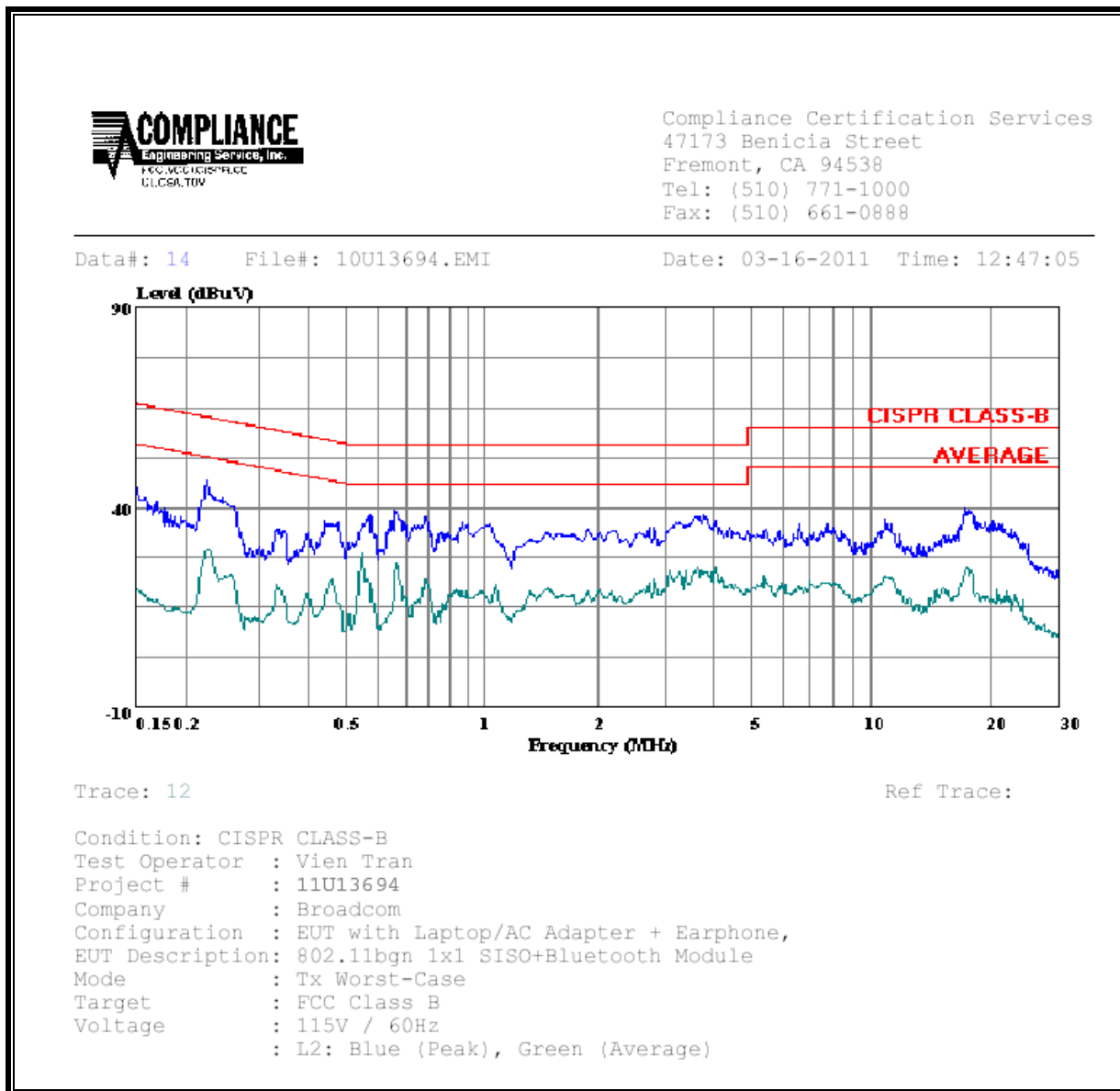
6 WORST EMISSIONS

CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	FCC_B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.16	43.06	--	16.53	0.00	65.67	55.67	-22.61	-39.14	L1
0.23	42.96	--	31.15	0.00	62.52	52.52	-19.56	-21.37	L1
17.94	42.43	--	27.84	0.00	60.00	50.00	-17.57	-22.16	L1
0.15	44.91	--	19.58	0.00	66.00	56.00	-21.09	-36.42	L2
0.22	46.80	--	29.23	0.00	62.71	52.71	-15.91	-23.48	L2
0.66	39.26	--	24.34	0.00	56.00	46.00	-16.74	-21.66	L2
6 Worst Data									

LINE 1 RESULTS



LINE 2 RESULTS



10. MAXIMUM PERMISSIBLE EXPOSURE

FCC RULES

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

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

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

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 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.

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/m² is equivalent to 1 mW/cm².
 3. A magnetic field strength of 1 A/m corresponds to 1.257 microtesla (μT) or 12.57 milligauss (mG).

EQUATIONS

Power density is given by:

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

where

S = Power density in W/m²

EIRP = Equivalent Isotropic Radiated Power in W

D = Separation distance in m

Power density in units of W/m² is converted to units of mW/cm² by dividing by 10.

Distance is given by:

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

where

D = Separation distance in m

EIRP = Equivalent Isotropic Radiated Power in W

S = Power density in W/m²

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

$$\text{Total EIRP} = (P_1 * G_1) + (P_2 * G_2) + \dots + (P_n * G_n)$$

where

P_x = Power of transmitter x

G_x = Numeric gain of antenna x

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

LIMITS

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

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

RESULTS

Band	Mode	Separation Distance (m)	Output Power (dBm)	Antenna Gain (dBi)	IC Power Density (W/m ²)	FCC Power Density (mW/cm ²)
2.4 GHz	WLAN	0.20	27.29	3.90	2.62	0.262