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

CERTIFICATION TEST REPORT

FOR

802.11g/Draft 802.11n Wireless LAN + Bluetooth
PCI-E Mini Card

MODEL NUMBER: BCM943225HMB

FCC ID: QDS-BRCM1048
IC: 4324A-BRCM1048

REPORT NUMBER: 09U12521-1

ISSUE DATE: APRIL 27, 2009

Prepared for
BROADCOM CORPORATION
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SUNNYVALE, CA 94086, U.S.A.

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	04/27/09	Initial Issue	T. Chan

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: BROADCOM CORPORATION
190 MATHILDA PLACE
SUNNYVALE, CA 94086, USA

EUT DESCRIPTION: 802.11g/Draft 802.11n Wireless LAN + Bluetooth PCI-E Mini Card

MODEL: BCM943225HMB

SERIAL NUMBER: P105

DATE TESTED: APRIL 15 ~ 22, 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

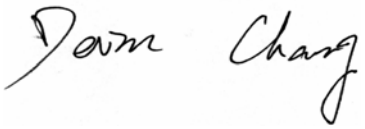
Compliance Certification Services, Inc. (CCS) tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by CCS based on interpretations and/or observations of test results. The test results show 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:

THU CHAN
EMC MANAGER
COMPLIANCE CERTIFICATION SERVICES

Tested By:



DEVIN CHANG
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. 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%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is an 802.11g/Draft 802.11n Wireless LAN + Bluetooth PCI-E Mini Card.

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	22.84	192.31
2412 - 2462	802.11g	26.33	429.54
2412 - 2462	802.11n HT20	28.14	651.63
2422 - 2452	802.11n HT40	26.72	469.89

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes 802.11bgn WLAN antennas, with the maximum gain of 3.9dBi, and both antennas of black cables connected to both main and aux ports.

Antennas combinations for 2x2 (CCD) modes test

Frequency Band	Antennas comnbination	Main Port Antenna Gain	Aux Port Antenna Gain	10^(Ant Main /10)	10^(Ant Aux/10)	10^(ant main/10)+ 10^(ant aux/10)	10*log[10^(ant main/10)+ 10^(ant aux/10)] (dBi)
2.4 GHz HT20 & HT40	802.11abgn WLAN Antenna	**3.90**	**3.90**	2.455	2.455	4.909	**6.91**

5.4. SOFTWARE AND FIRMWARE

The test utility software used during testing was wl_tool, rev. 5.1.2600.

5.5. WORST-CASE CONFIGURATION AND MODE

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

The worst-case data rate for each mode is determined to be as follows, based on input from the manufacturer of the radio.

All final tests in the 802.11b mode were made at 1 Mb/s.
All final tests in the 802.11g mode were made at 6 Mb/s.
All final tests in the 802.11n HT20 mode were made at Modulation Coding Schemes of MCS Index 0.
All final tests in the 802.11n HT40 mode were made at Modulation Coding Schemes of MCS Index 0.

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

Investigation that the Power Spectral Density and Conducted Spurious as measured through a combiner with both chains operating simultaneously is worst case.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop PC	Dell	Inspiron 630m	814C40100252200122KS00	DoC
AC Adapter	Dell	LA65NS0-00	CN-0DF263-71615-6B2-4ADF	DoC

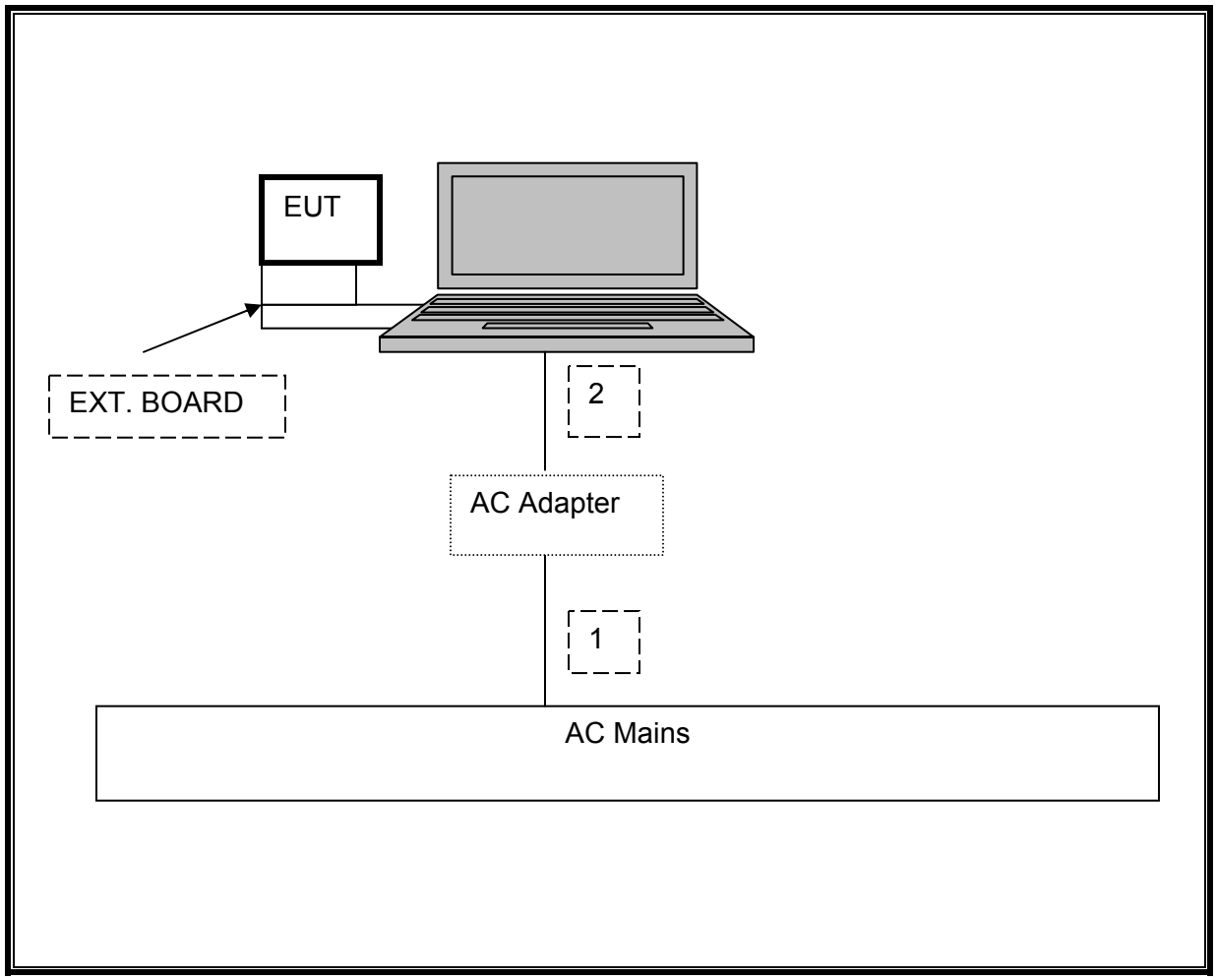
I/O CABLES

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

TEST SETUP

The EUT is connected to a host laptop computer via Express card to MiniPCI-E adapter board during the test. Test software exercised the radio card.

SETUP DIAGRAM



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**
Antenna, Horn, 18 GHz	EMCO	3115	C00945	04/22/10
Spectrum Analyzer, 26.5 GHz	Agilent / HP	E4440A	C01161	08/06/09
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C00996	11/14/09
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C00749	12/01/09
RF Filter Section, 2.9 GHz	Agilent / HP	85420E	C00958	09/19/09
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00885	12/16/09
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01011	02/11/10
Peak Power Meter	Boonton	4541	N/A	01/15/10
Peak / Average Power Sensor	Boonton	57318	N/A	02/02/10
Peak Power Meter	Agilent / HP	E4416A	C00963	12/04/09
Peak / Average Power Sensor	Agilent / HP	E9327A	C00964	12/07/09
2.4 - 2.5 Reject Filter	Micro Tronics	BRM50702	N/A	N/A
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	08/06/09
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	10/29/09
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-BNC	N02481	10/29/09

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.

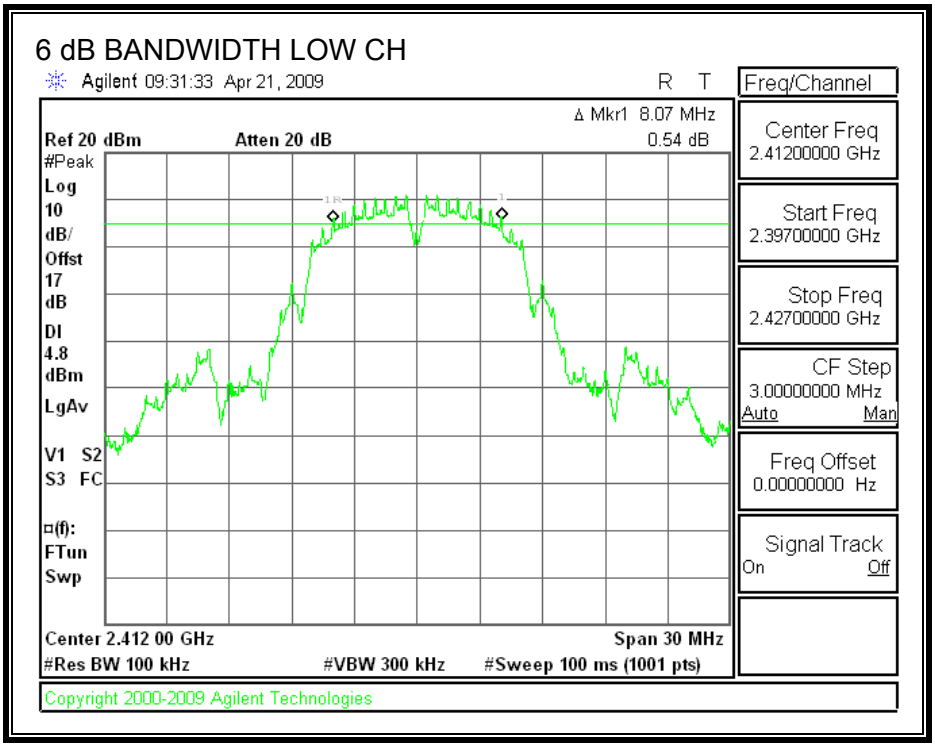
TEST PROCEDURE

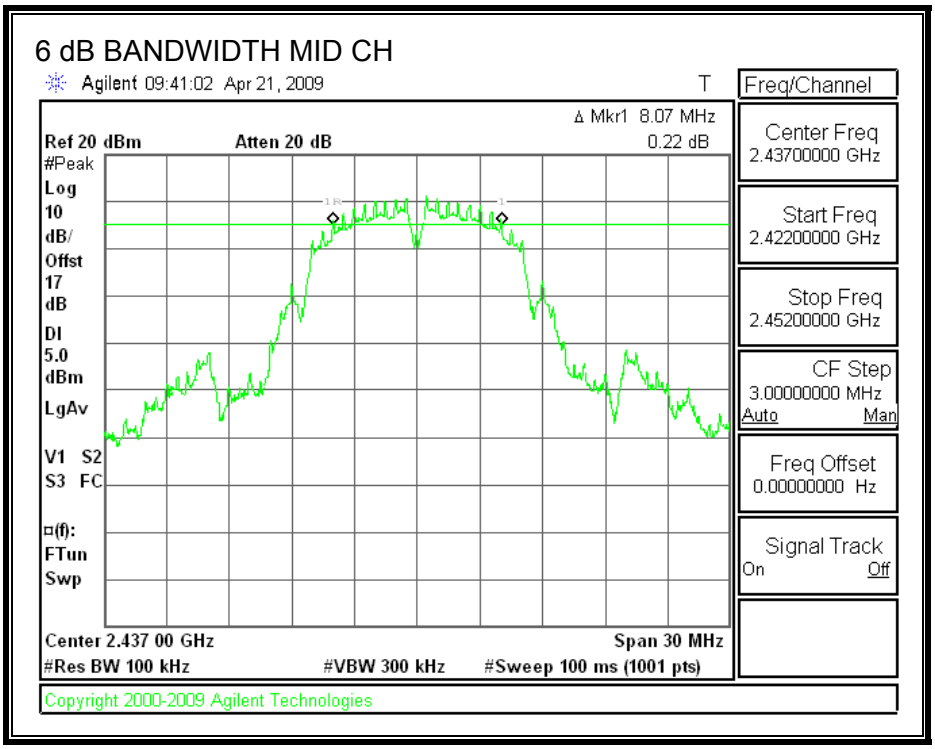
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

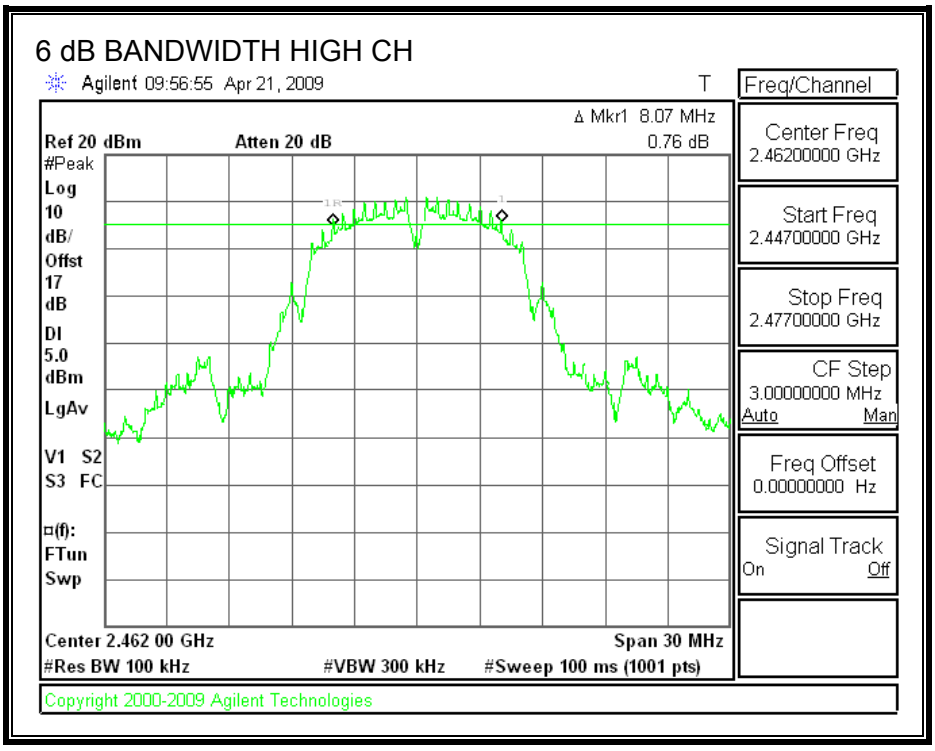
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	8.07	0.5
Middle	2437	8.07	0.5
High	2462	8.07	0.5

6 dB BANDWIDTH







7.1.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

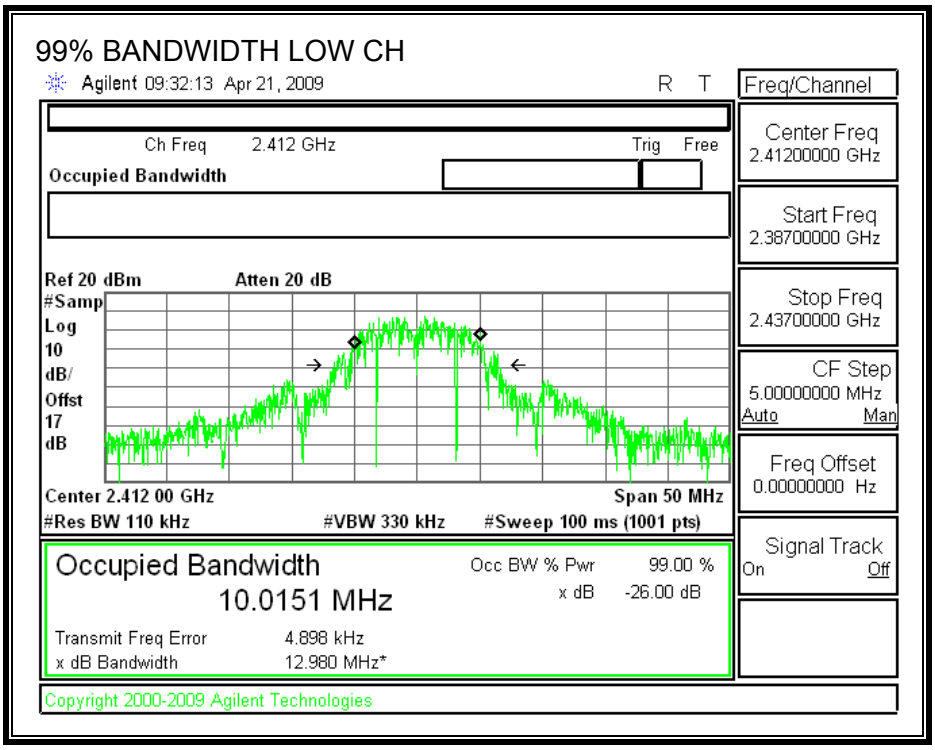
TEST PROCEDURE

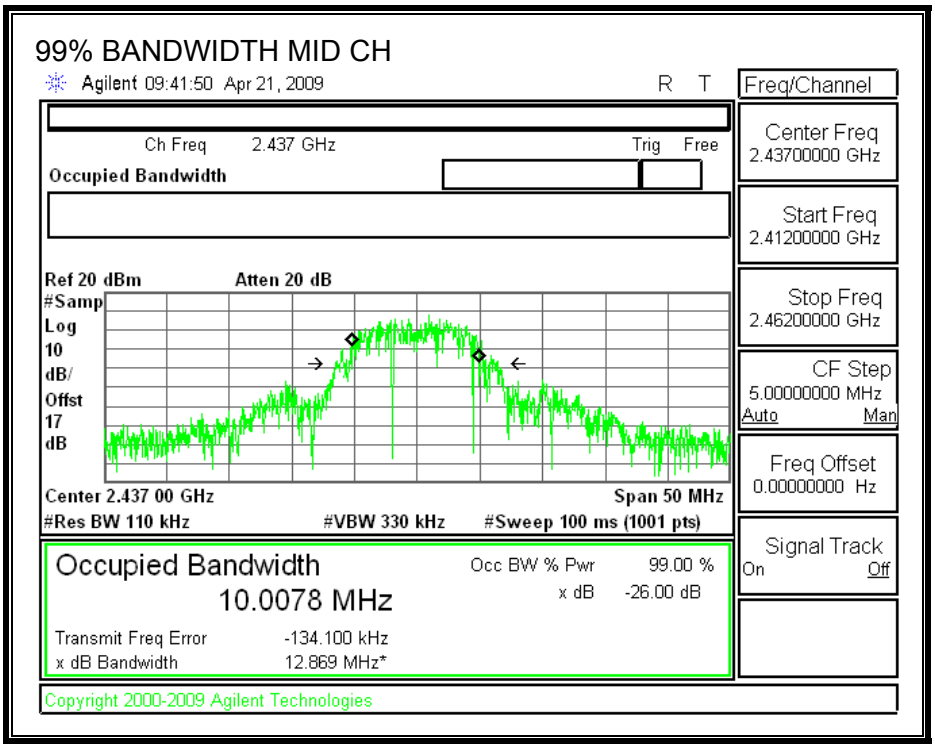
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

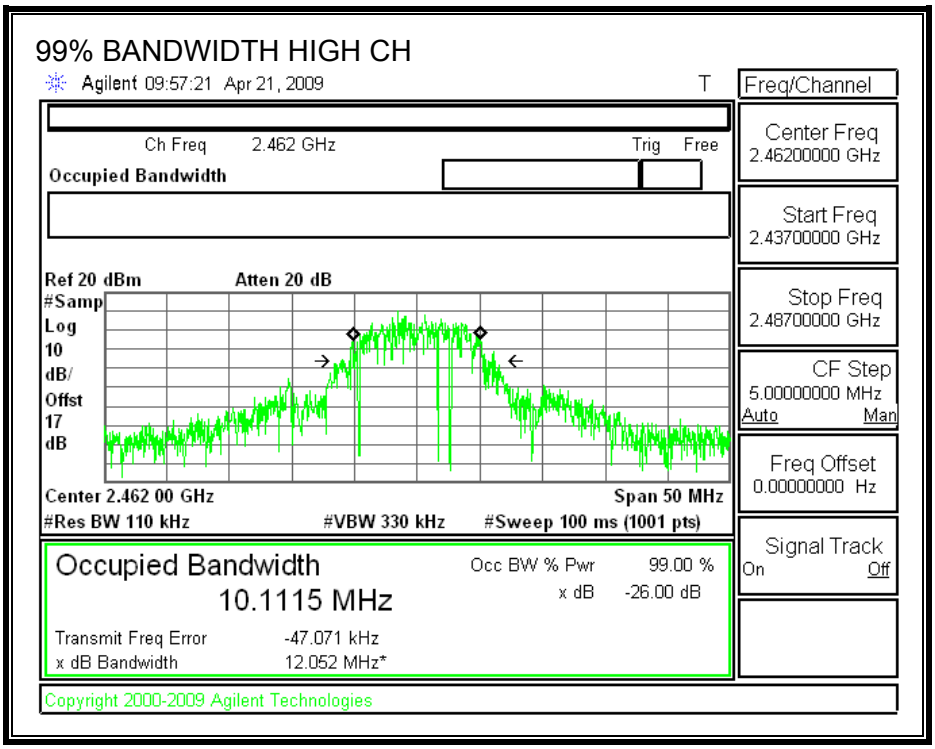
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	10.0151
Middle	2437	10.0078
High	2462	10.1115

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

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)	Peak Power Meter Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2412	22.73	30	-7.27
Middle	2437	22.84	30	-7.16
High	2462	22.74	30	-7.26

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.

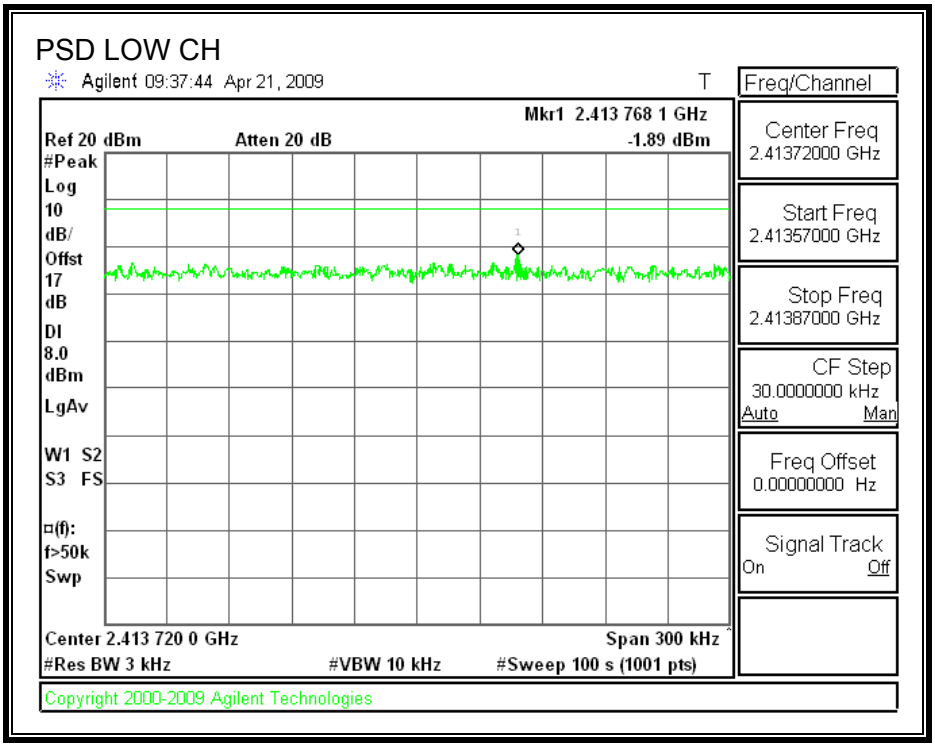
TEST PROCEDURE

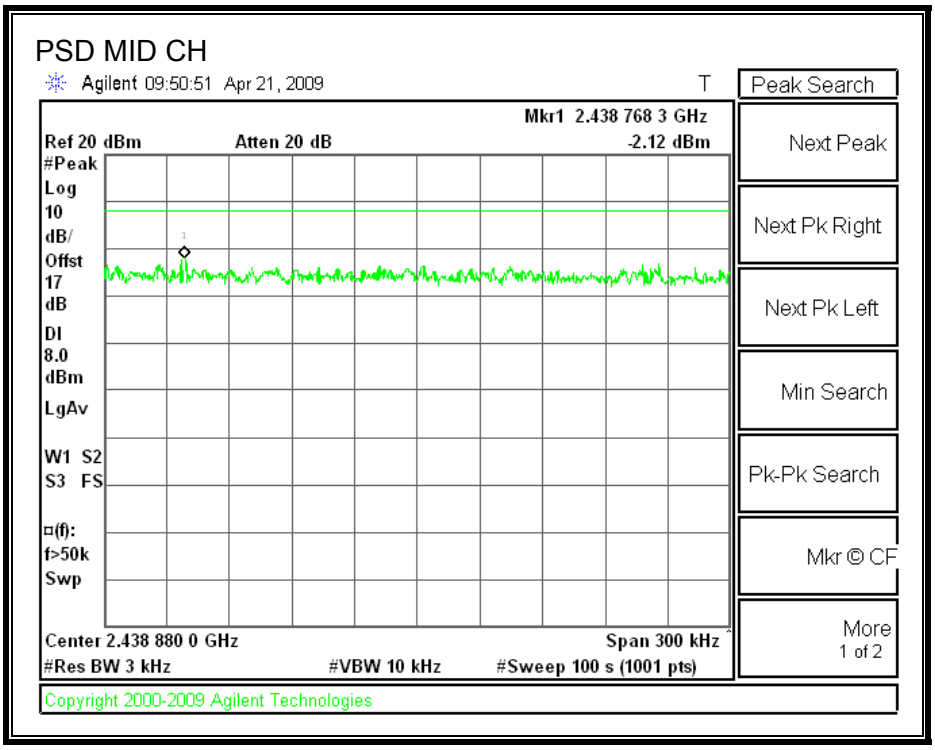
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

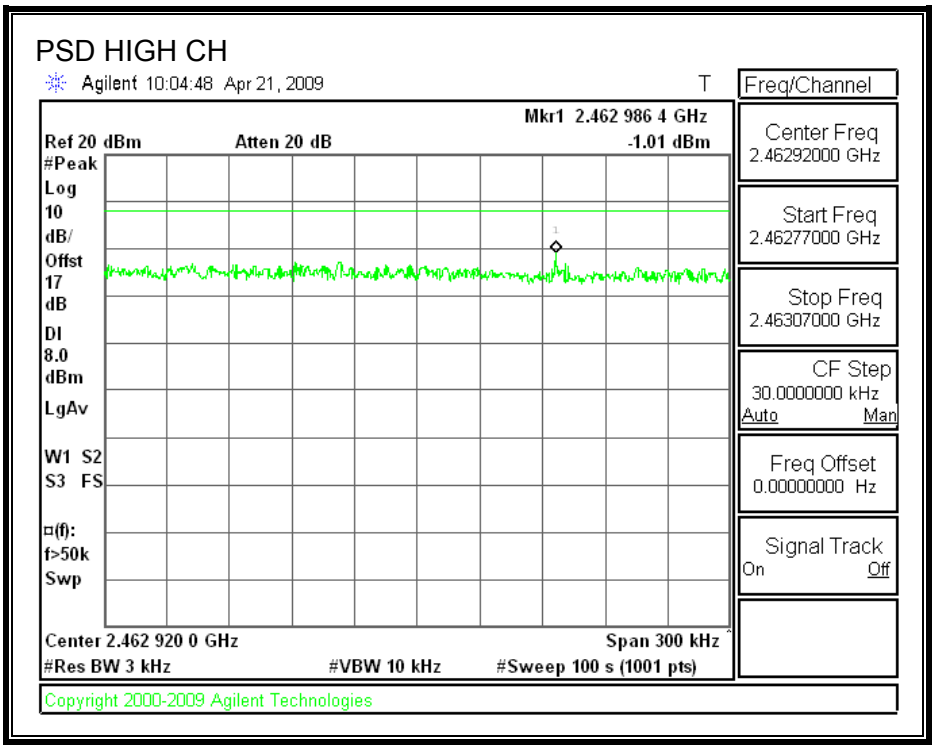
RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-1.89	8	-9.89
Middle	2437	-2.12	8	-10.12
High	2462	-1.01	8	-9.01

POWER SPECTRAL DENSITY







7.1.5. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

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

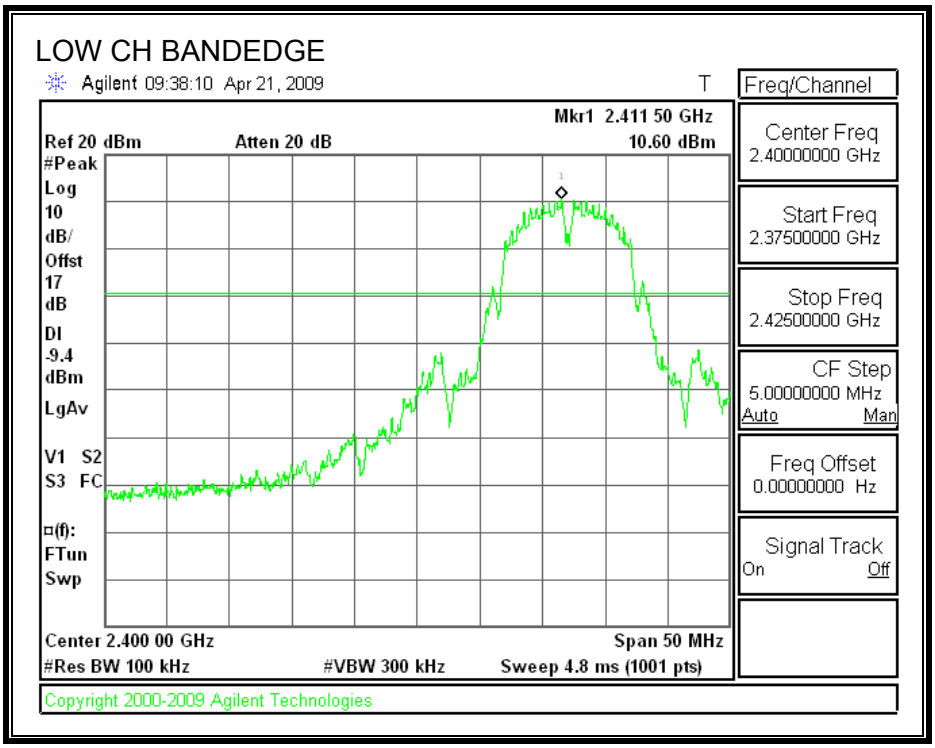
TEST PROCEDURE

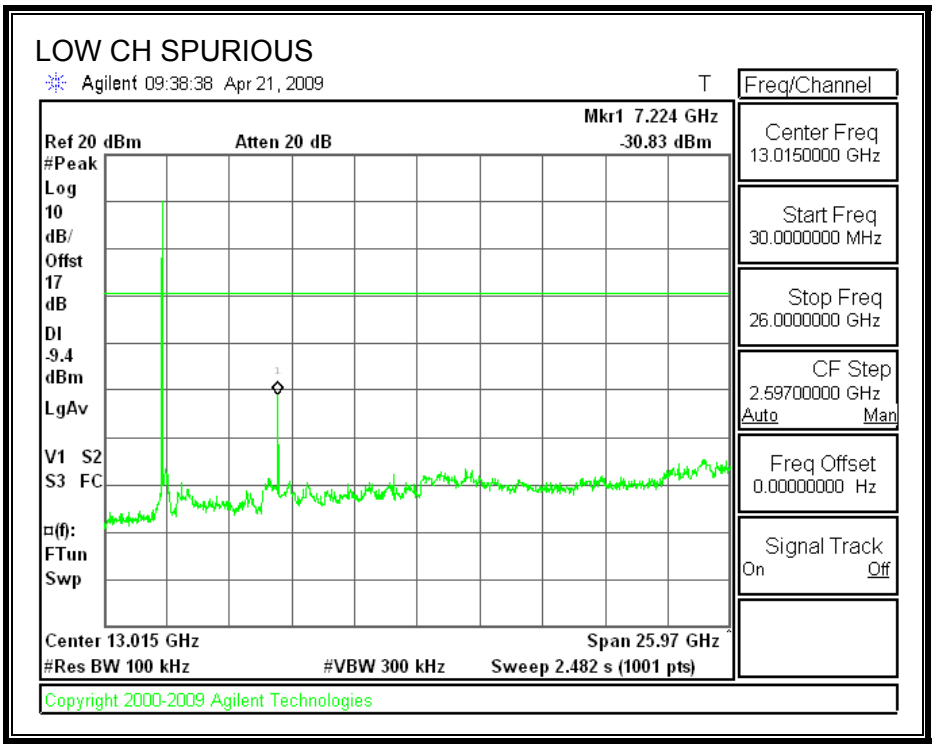
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

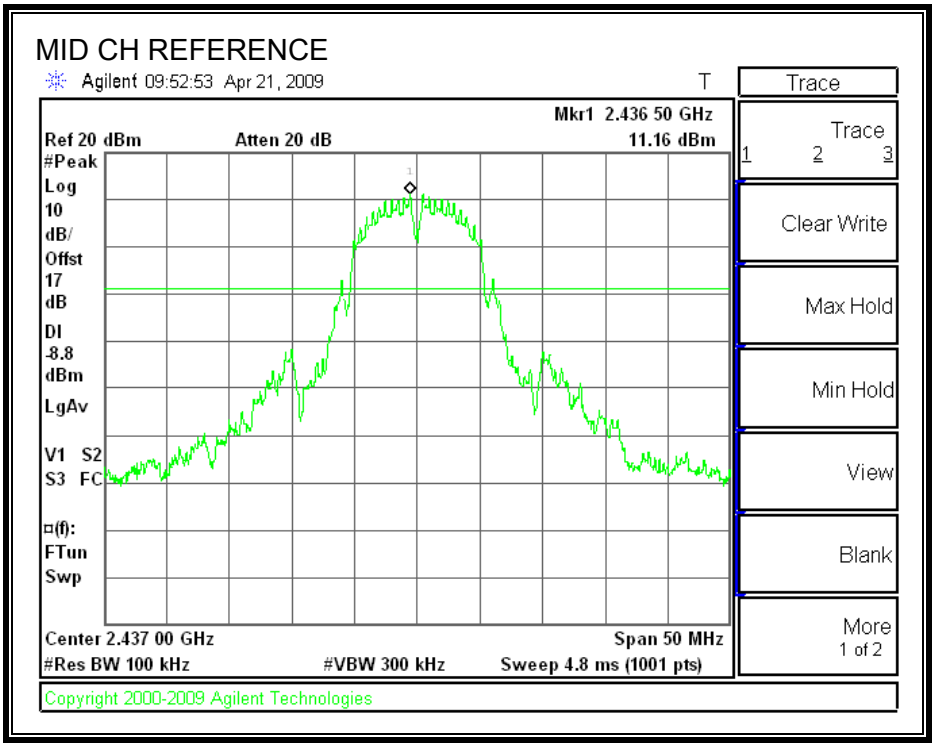
RESULTS

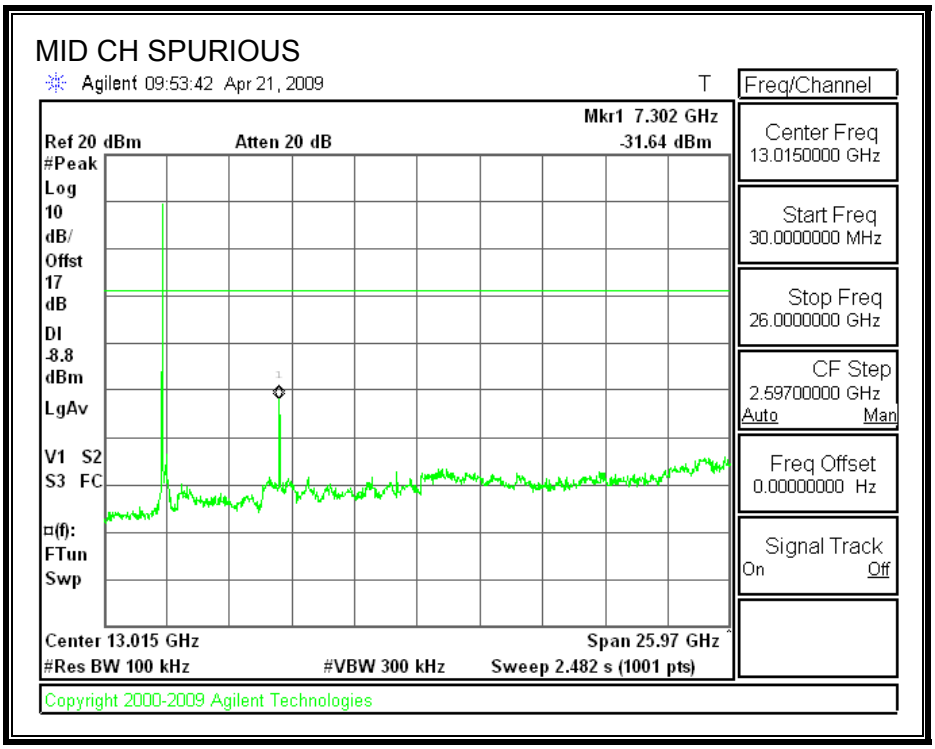
SPURIOUS EMISSIONS, LOW CHANNEL



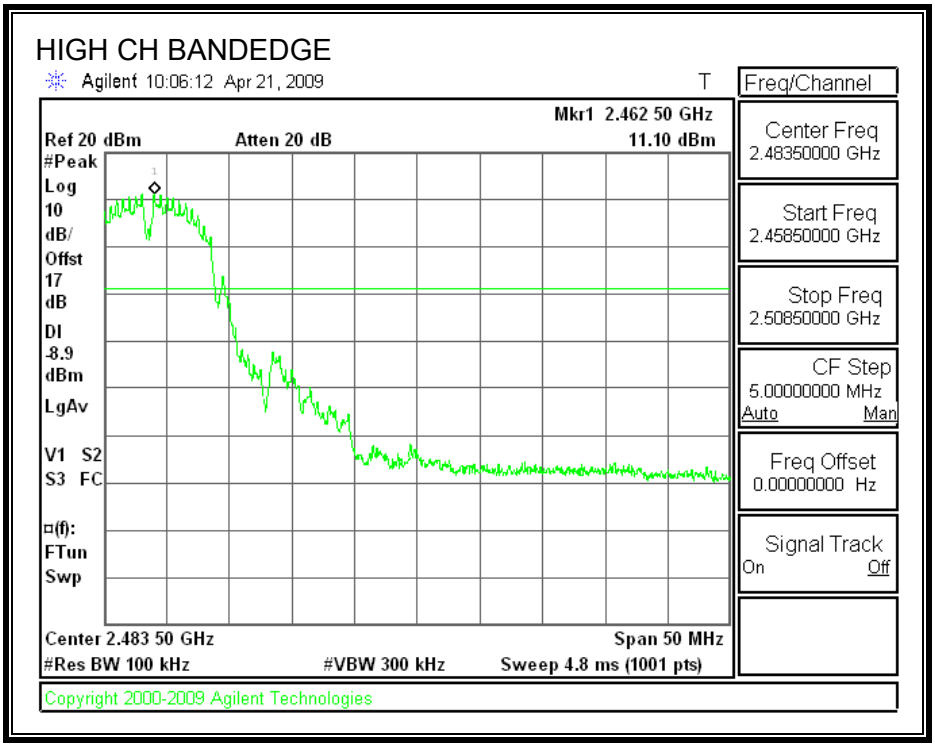


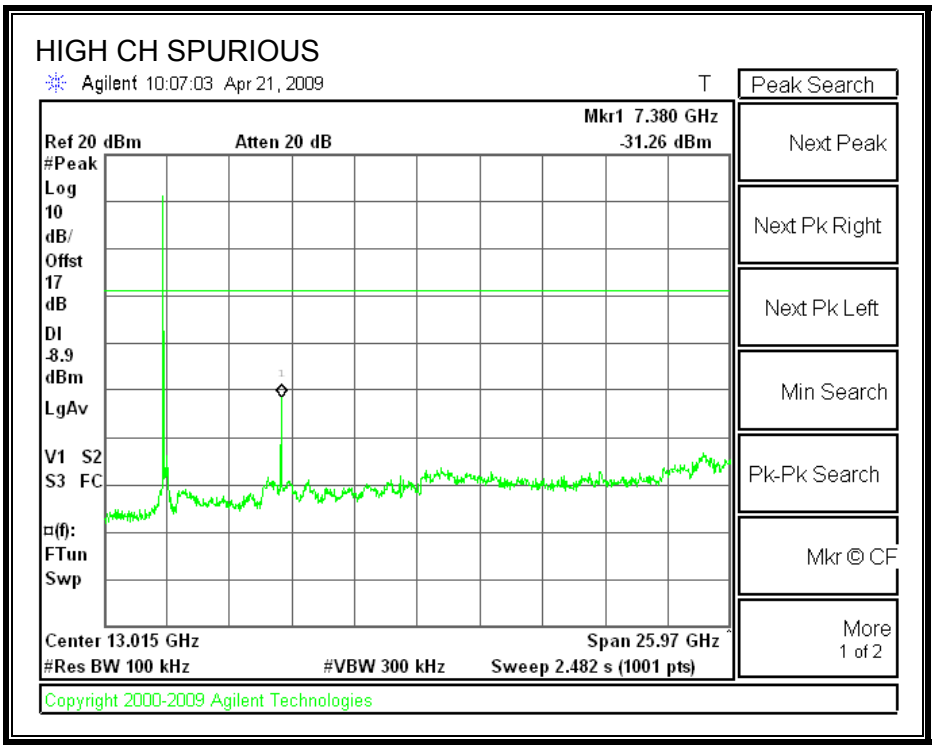
SPURIOUS EMISSIONS, MID CHANNEL





SPURIOUS EMISSIONS, HIGH CHANNEL





7.2. 802.11g MODE IN THE 2.4 GHz BAND

7.2.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

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

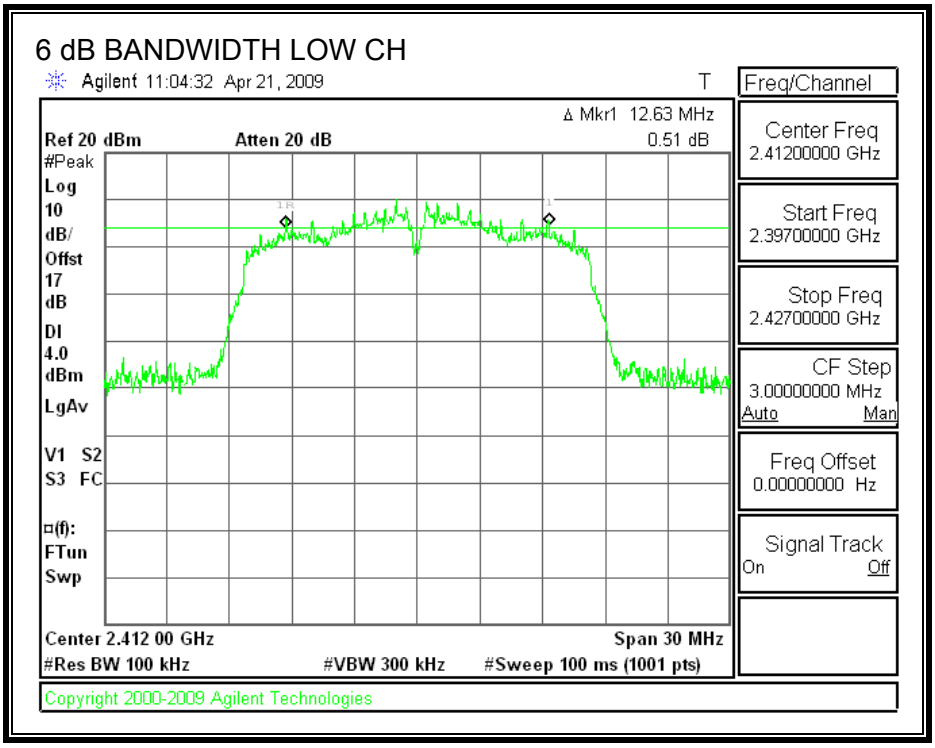
TEST PROCEDURE

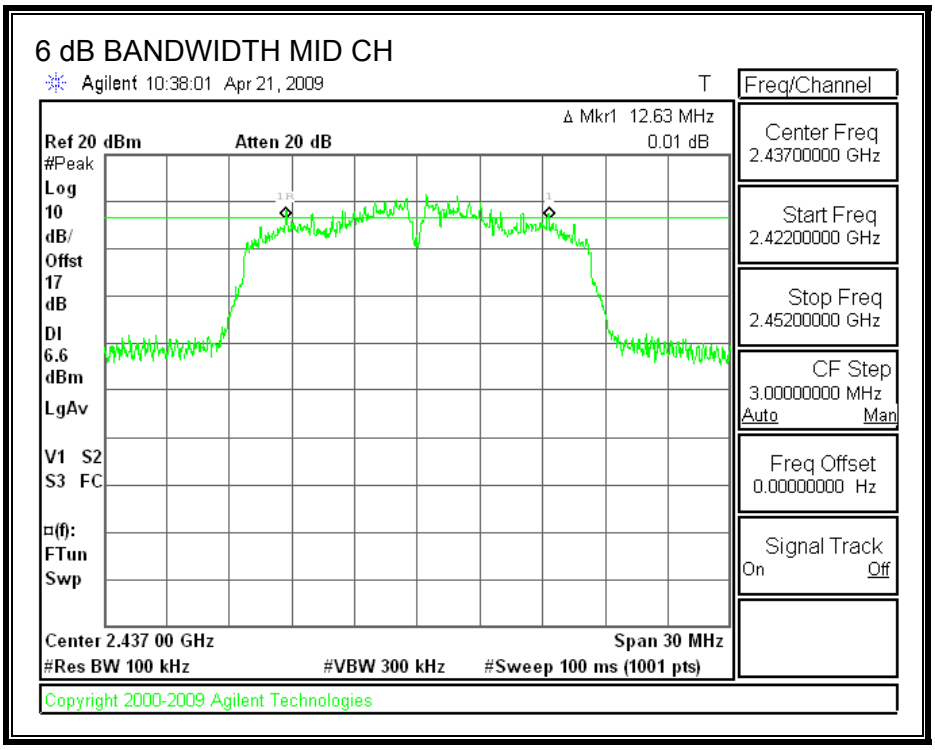
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

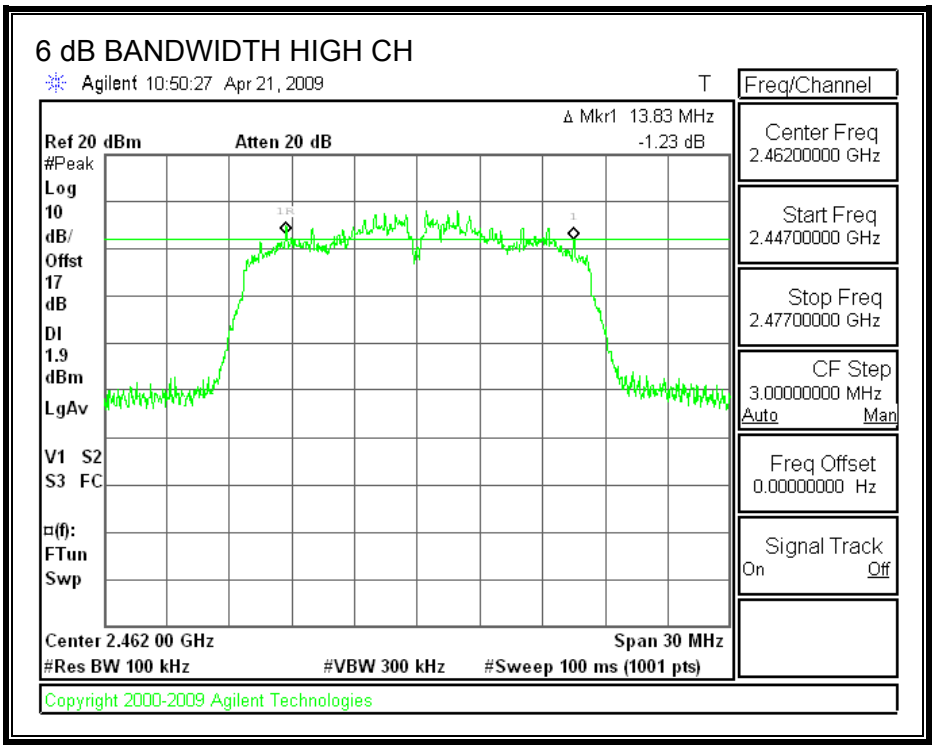
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	12.63	0.5
Middle	2437	12.63	0.5
High	2462	13.83	0.5

6 dB BANDWIDTH







7.2.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

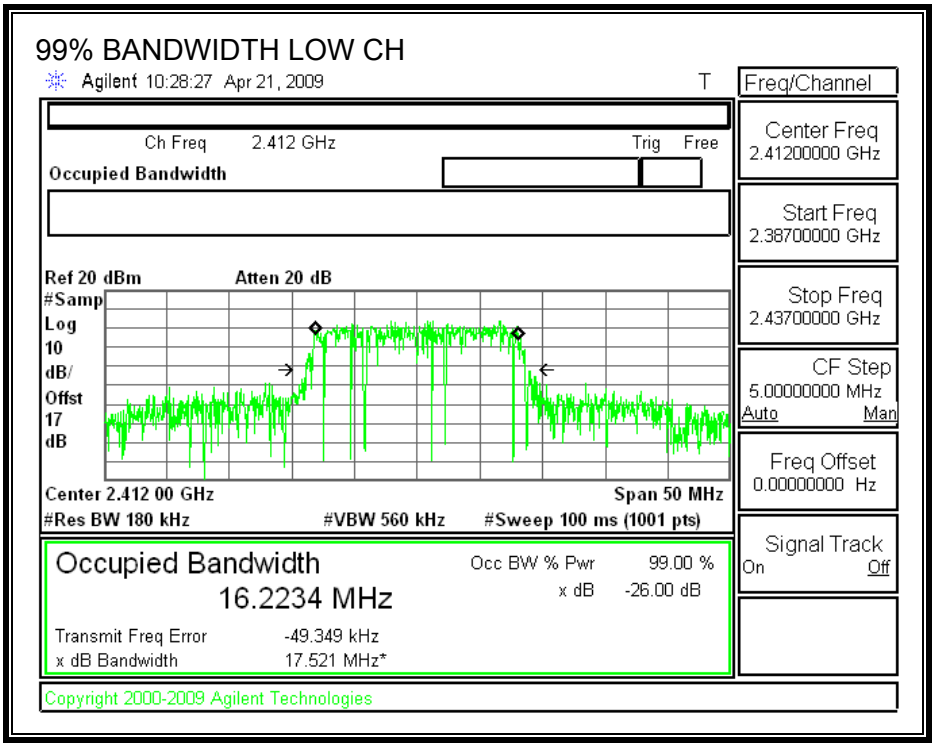
TEST PROCEDURE

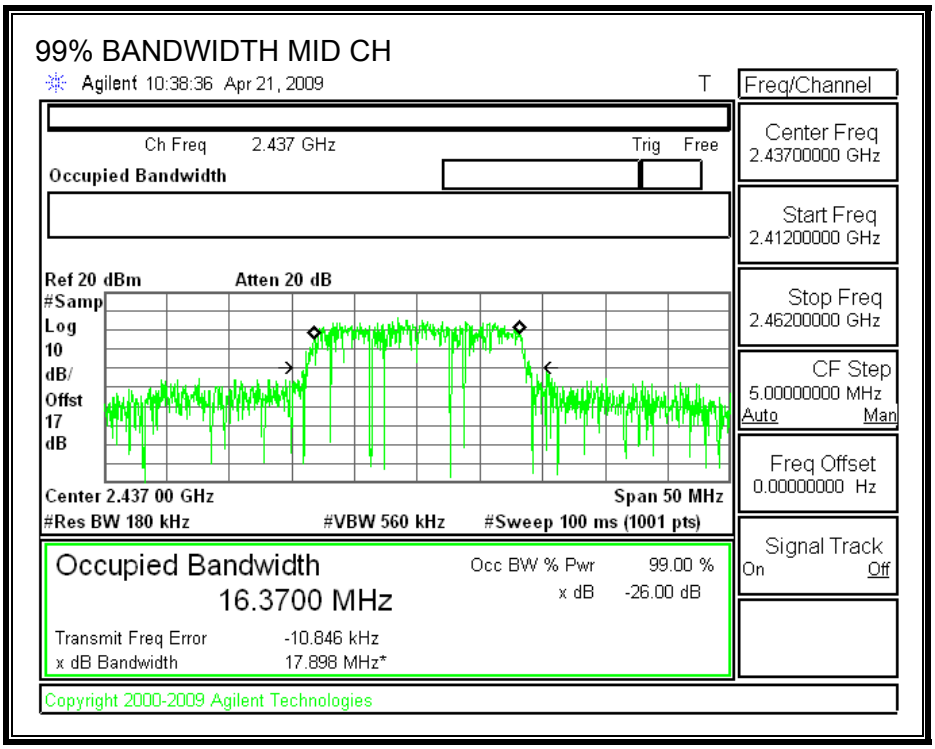
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

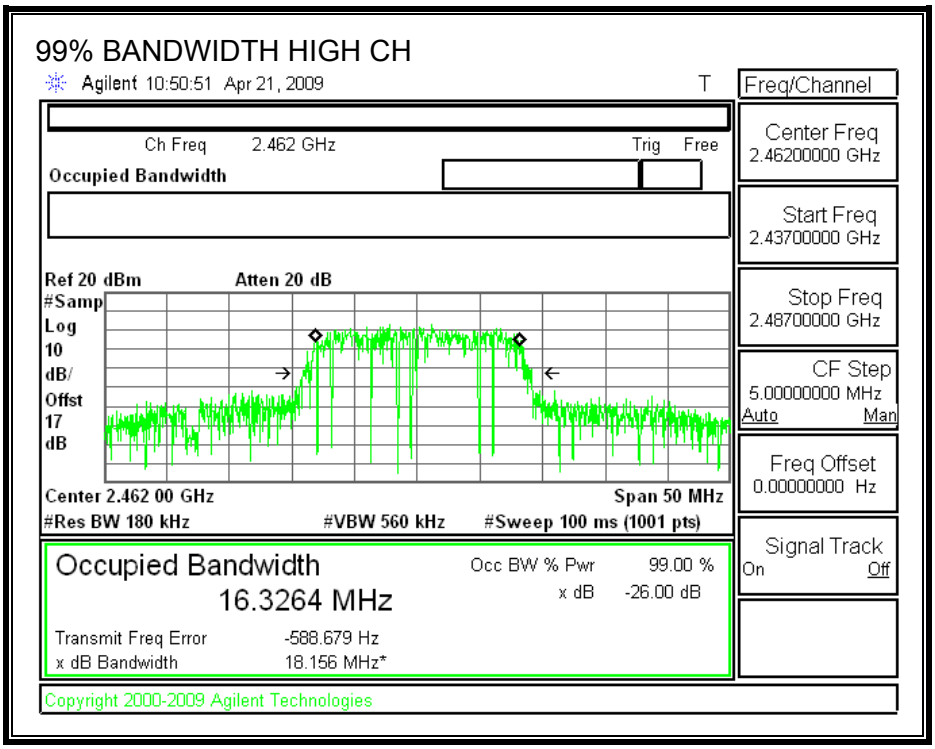
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	16.2234
Middle	2437	16.3700
High	2462	16.3264

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

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)	Peak Power Meter Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2412	25.81	30	-4.19
Low	2417	26.12	30	-3.88
Middle	2437	26.33	30	-3.67
High	2457	26.09	30	-3.91
High	2462	25.58	30	-4.42

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.

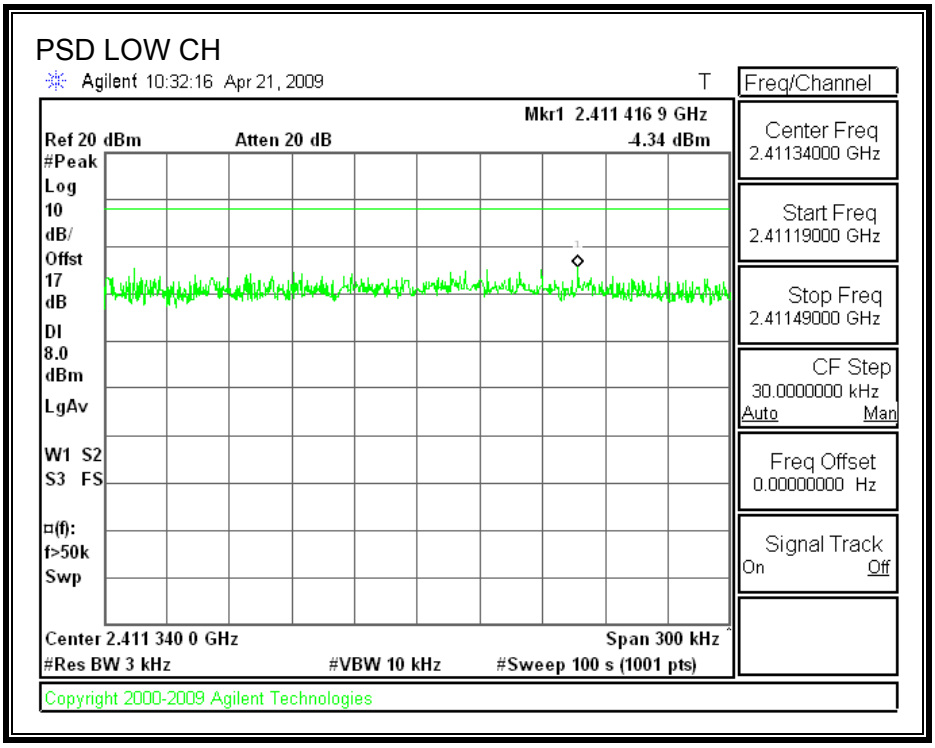
TEST PROCEDURE

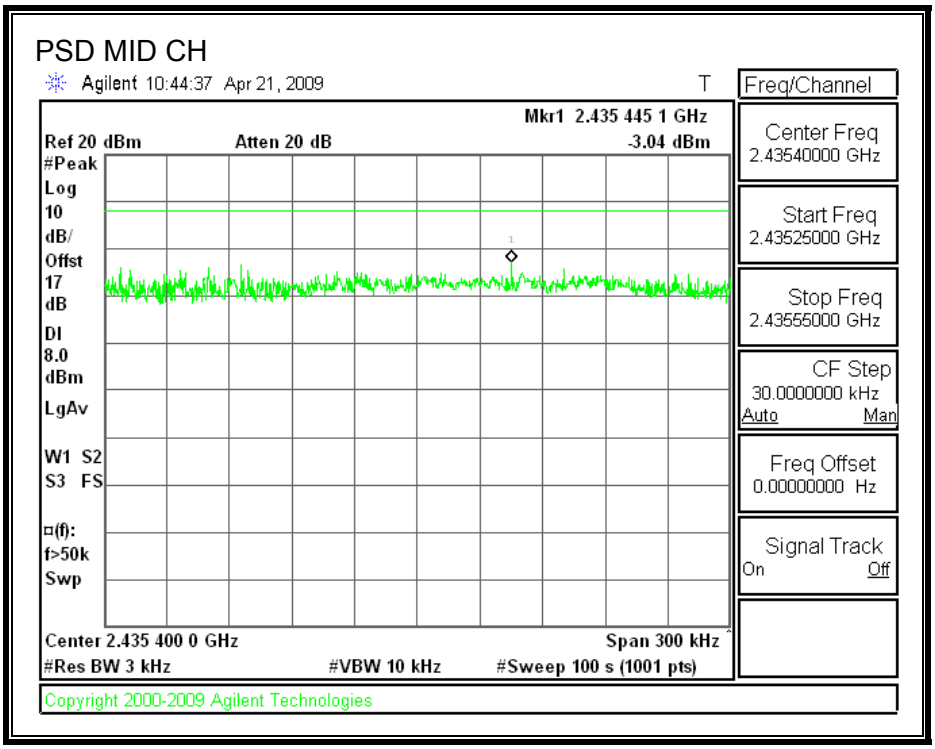
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

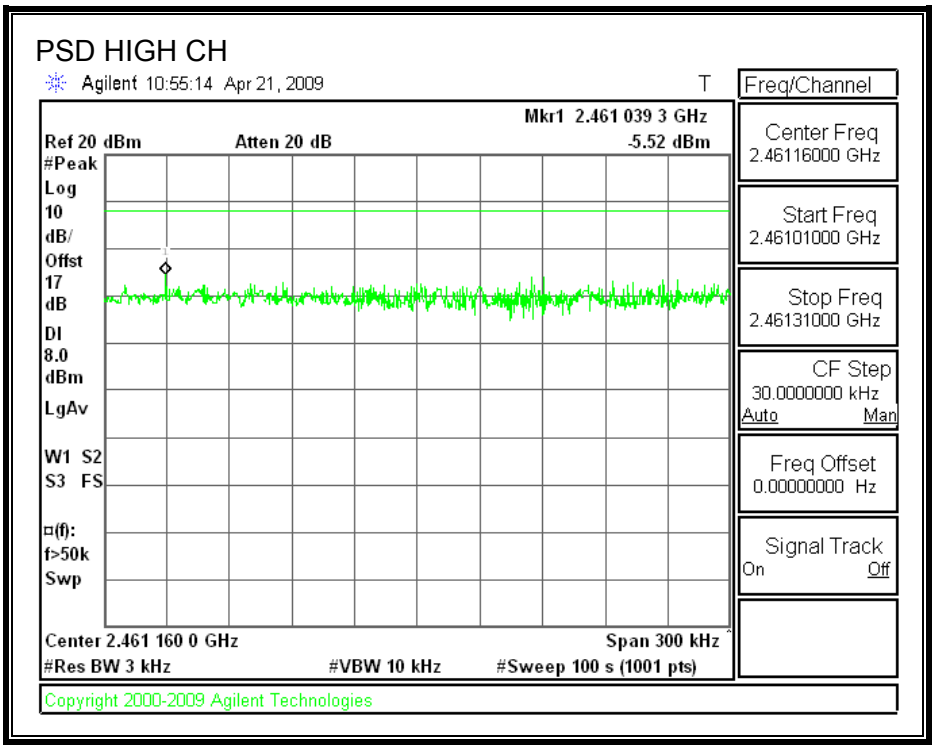
RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-4.34	8	-12.34
Middle	2437	-3.04	8	-11.04
High	2462	-5.52	8	-13.52

POWER SPECTRAL DENSITY







7.2.5. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

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

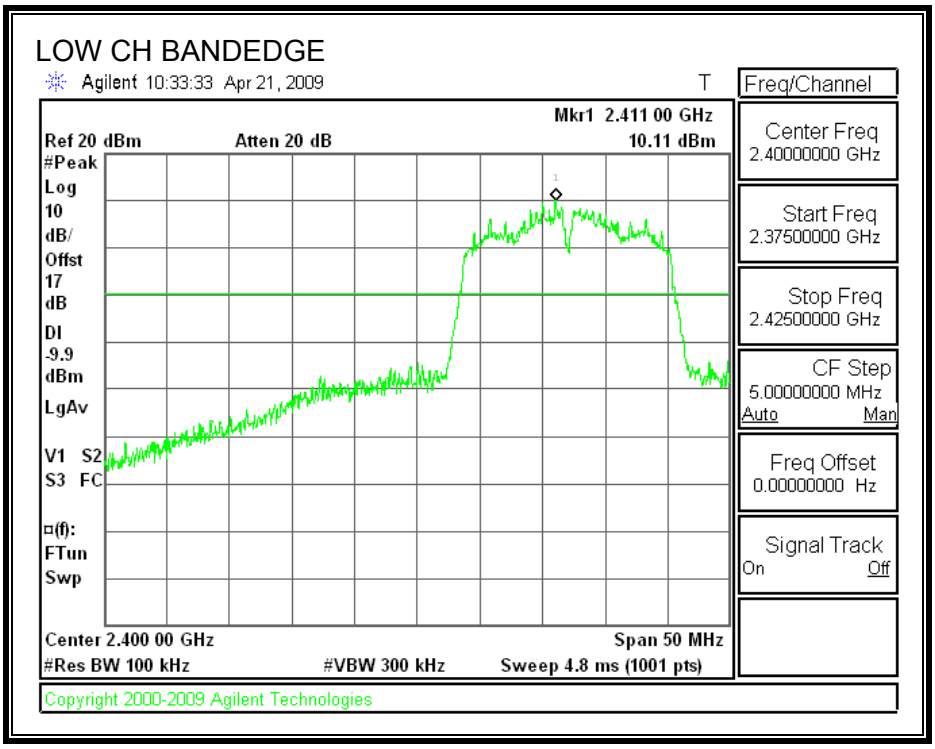
TEST PROCEDURE

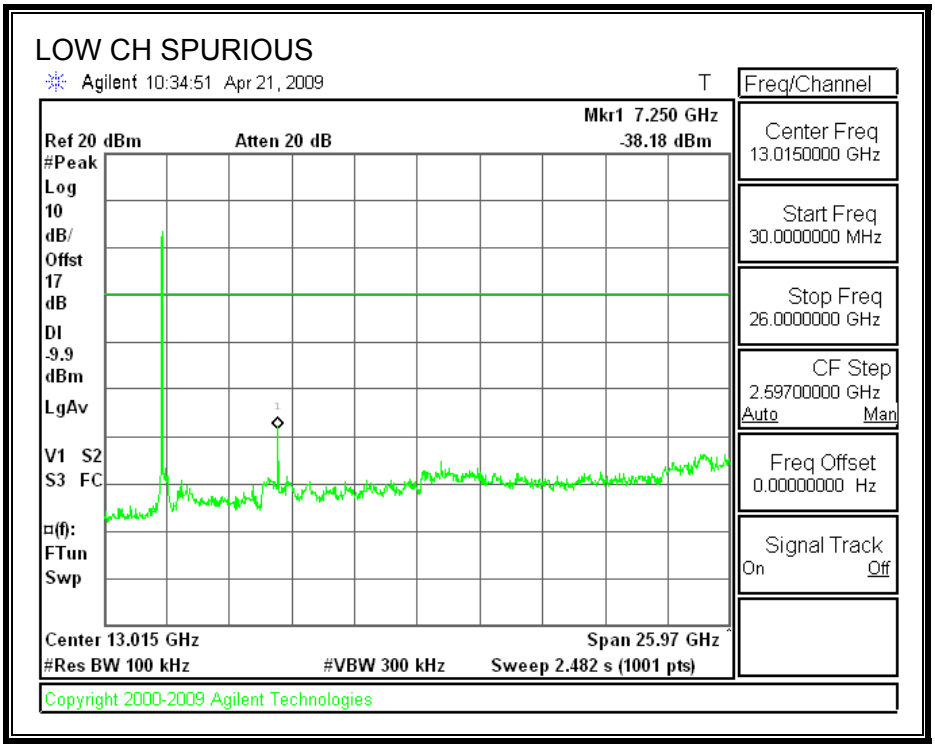
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

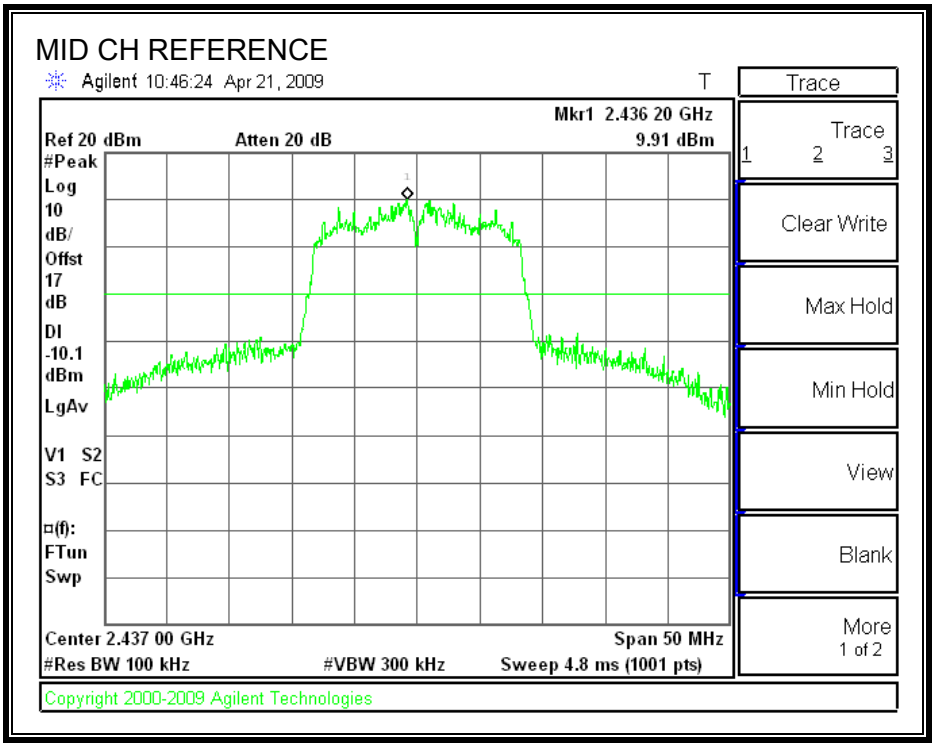
RESULTS

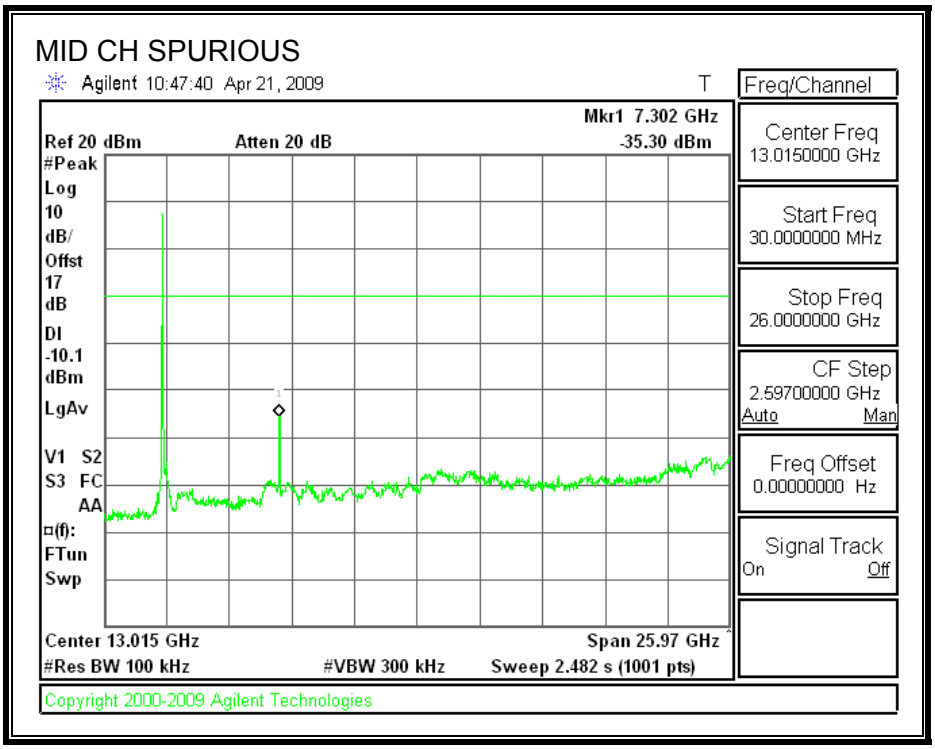
SPURIOUS EMISSIONS, LOW CHANNEL



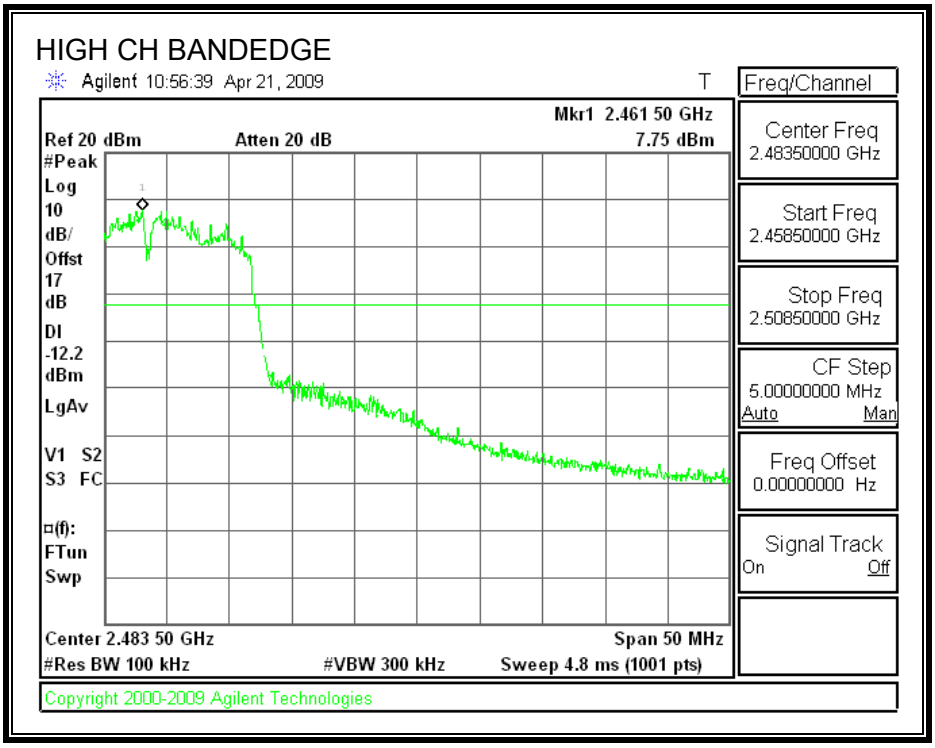


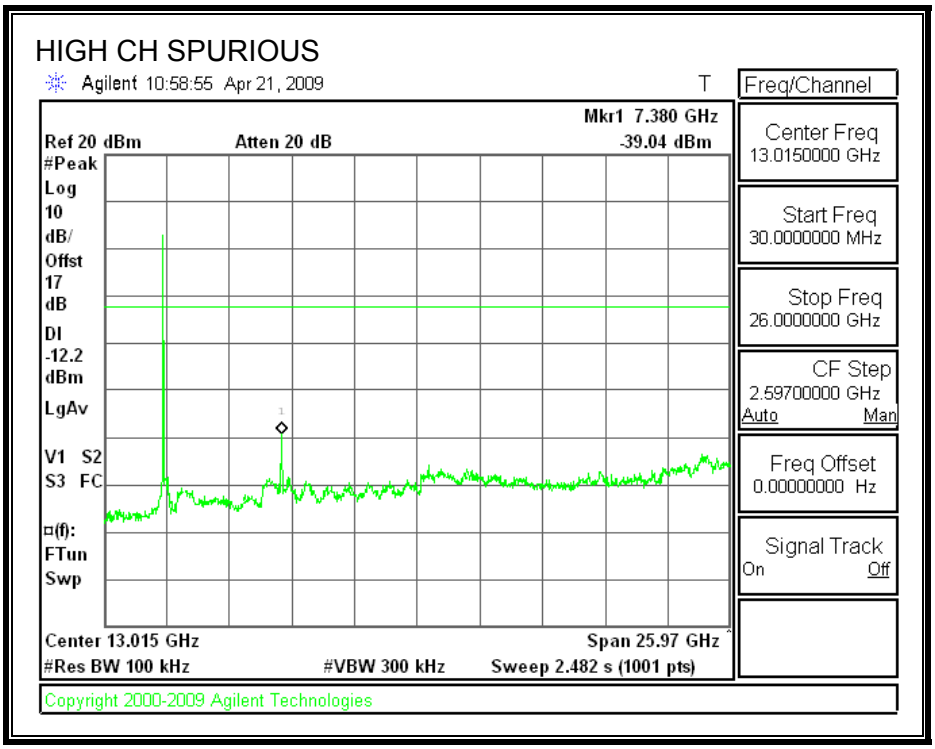
SPURIOUS EMISSIONS, MID CHANNEL





SPURIOUS EMISSIONS, HIGH CHANNEL





7.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND

7.3.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

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

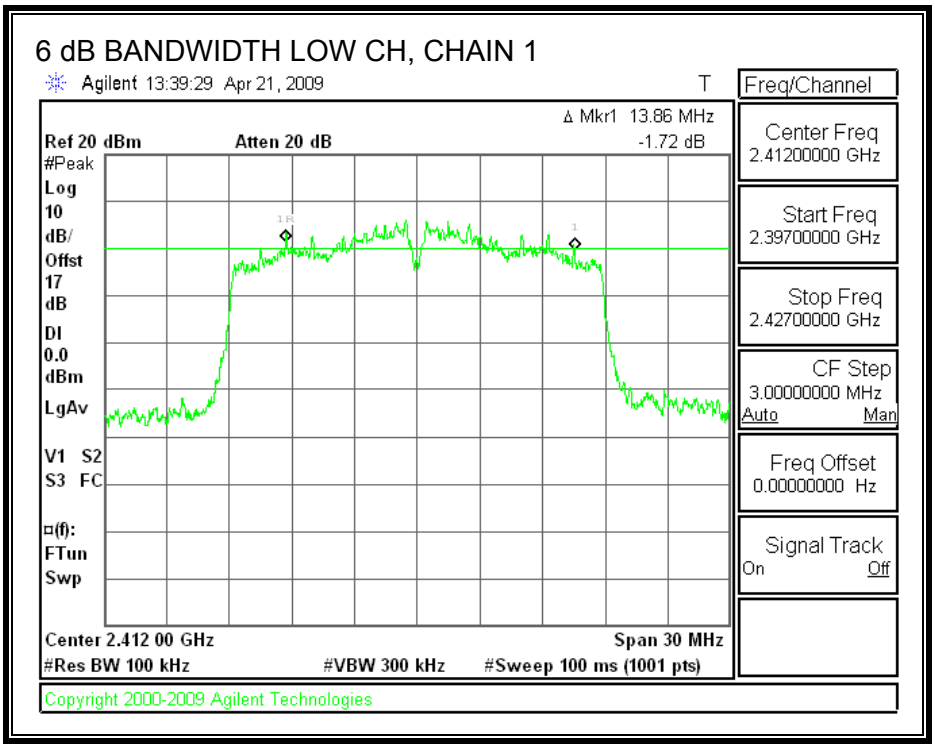
TEST PROCEDURE

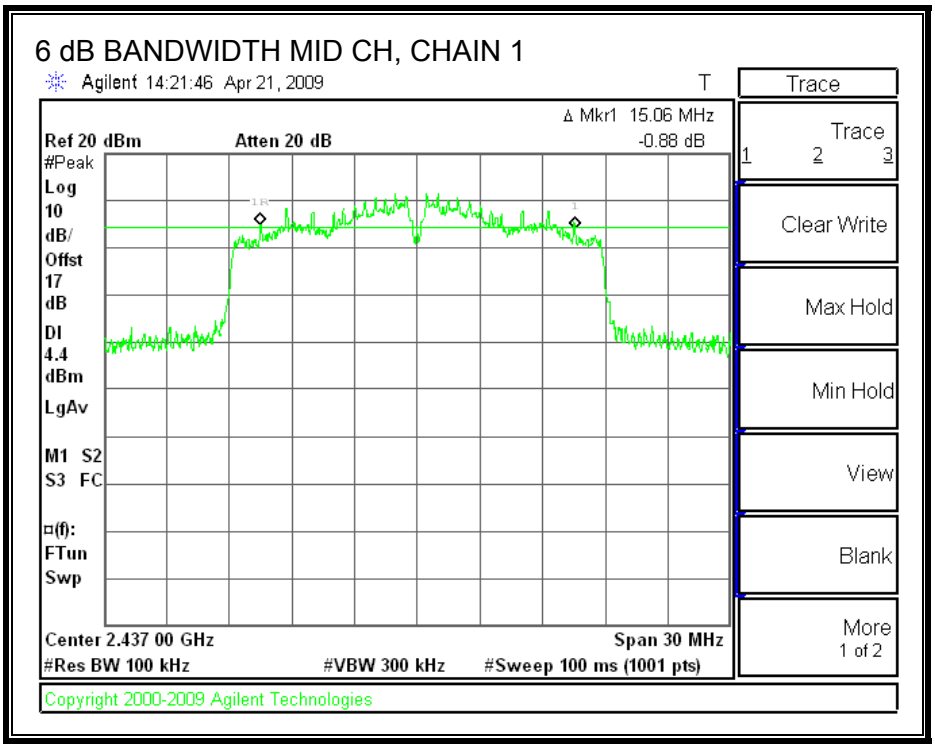
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

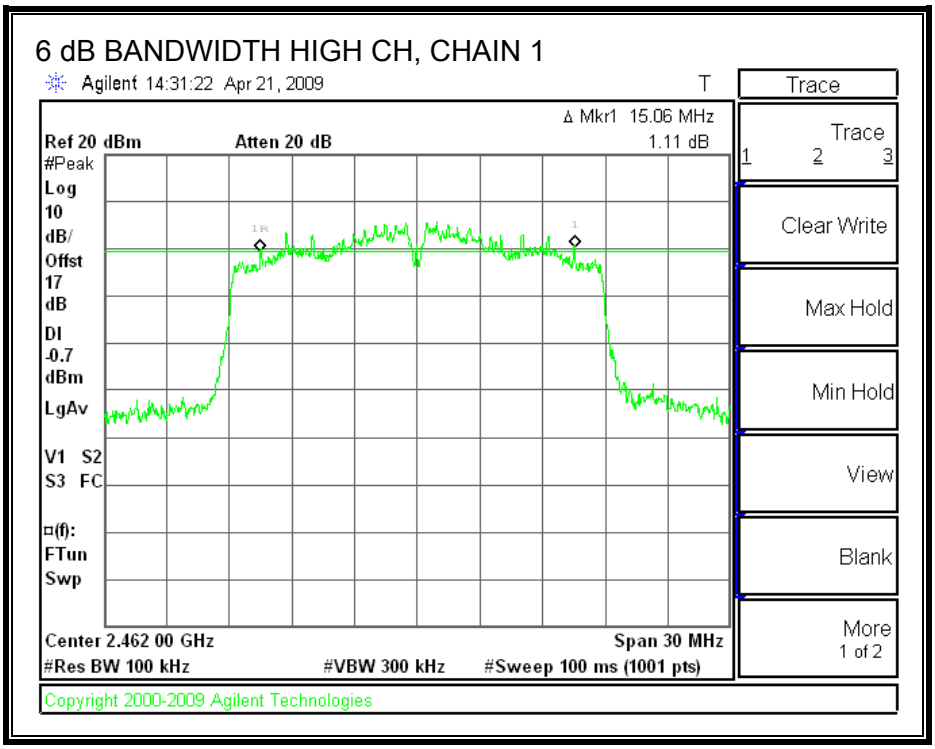
RESULTS

Channel	Frequency (MHz)	Chain 1 6 dB BW (MHz)	Chain 2 6 dB BW (MHz)	Minimum Limit (MHz)
Low	2412	13.86	12.6	0.5
Middle	2437	15.06	16.53	0.5
High	2462	15.06	16.56	0.5

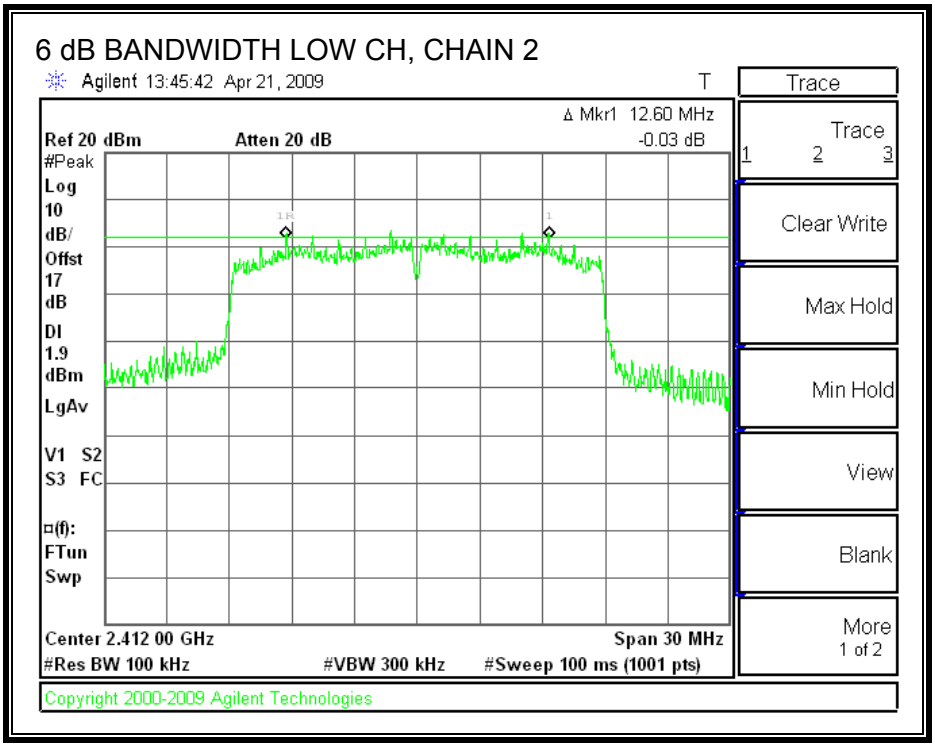
6 dB BANDWIDTH, CHAIN 1

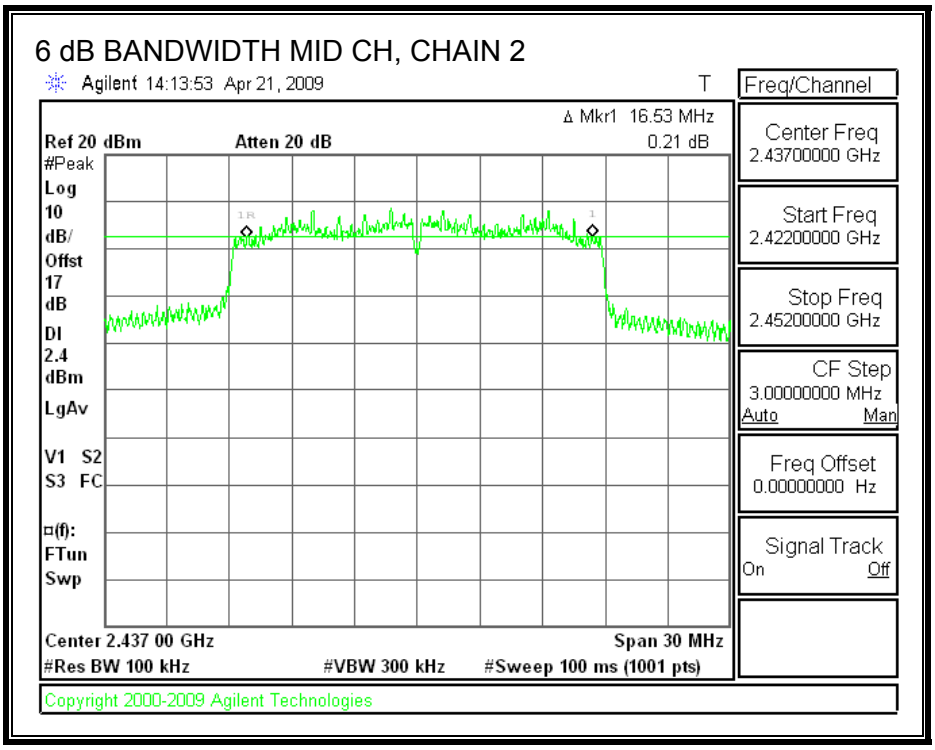


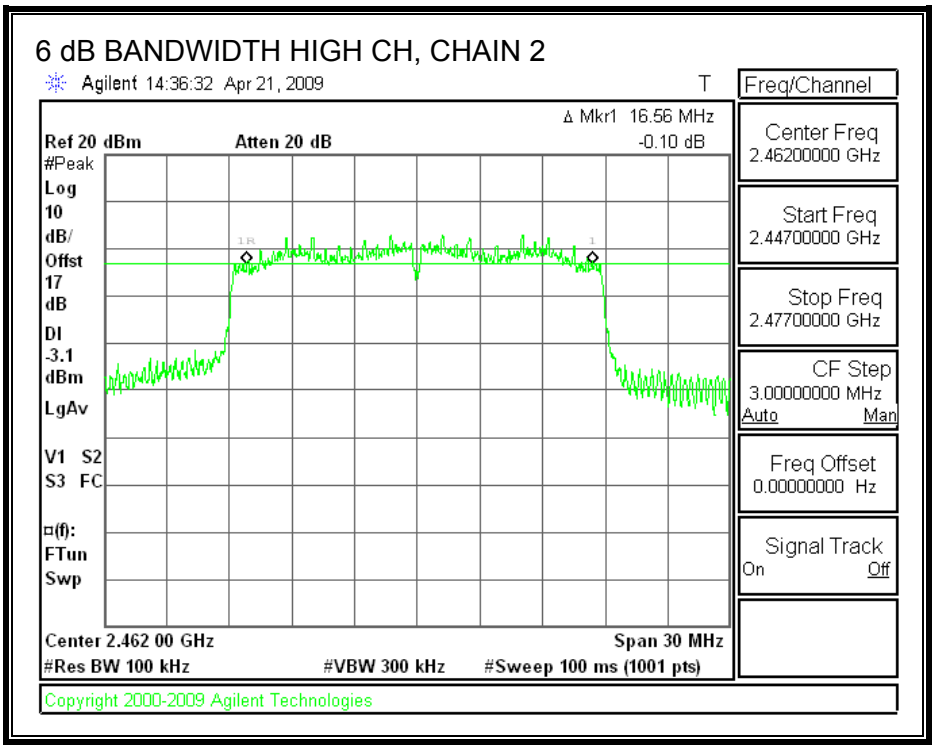




6 dB BANDWIDTH, CHAIN 2







7.3.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

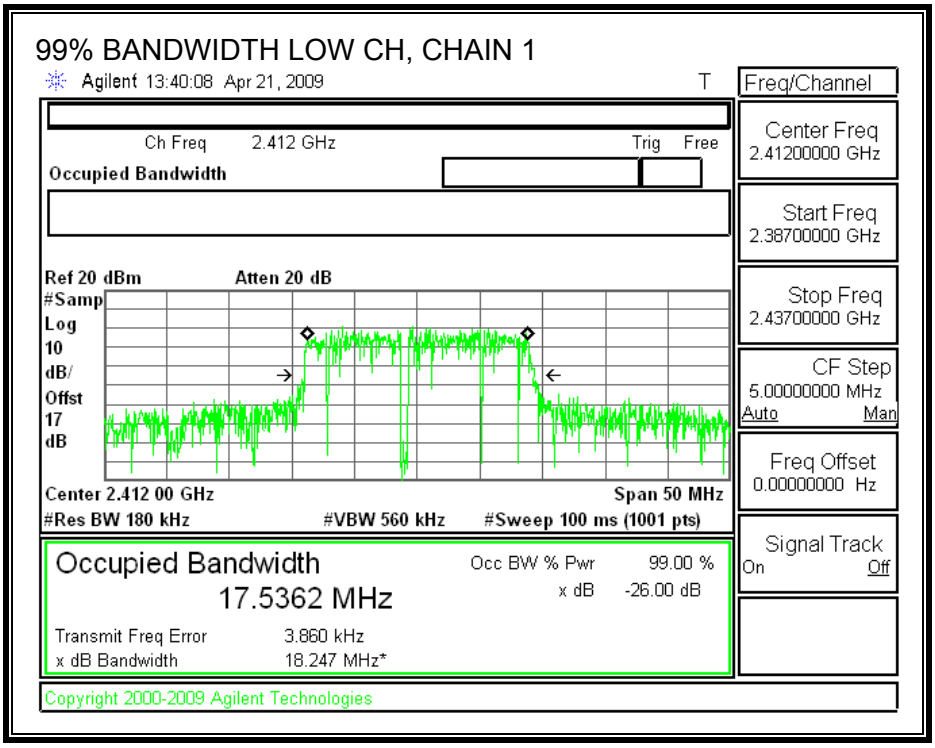
TEST PROCEDURE

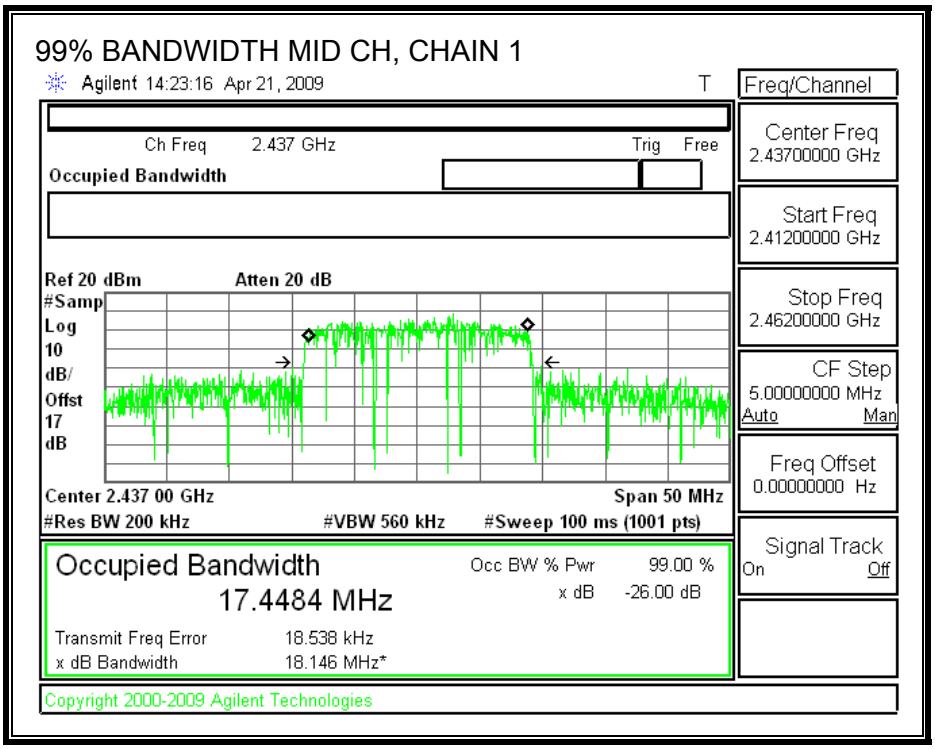
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

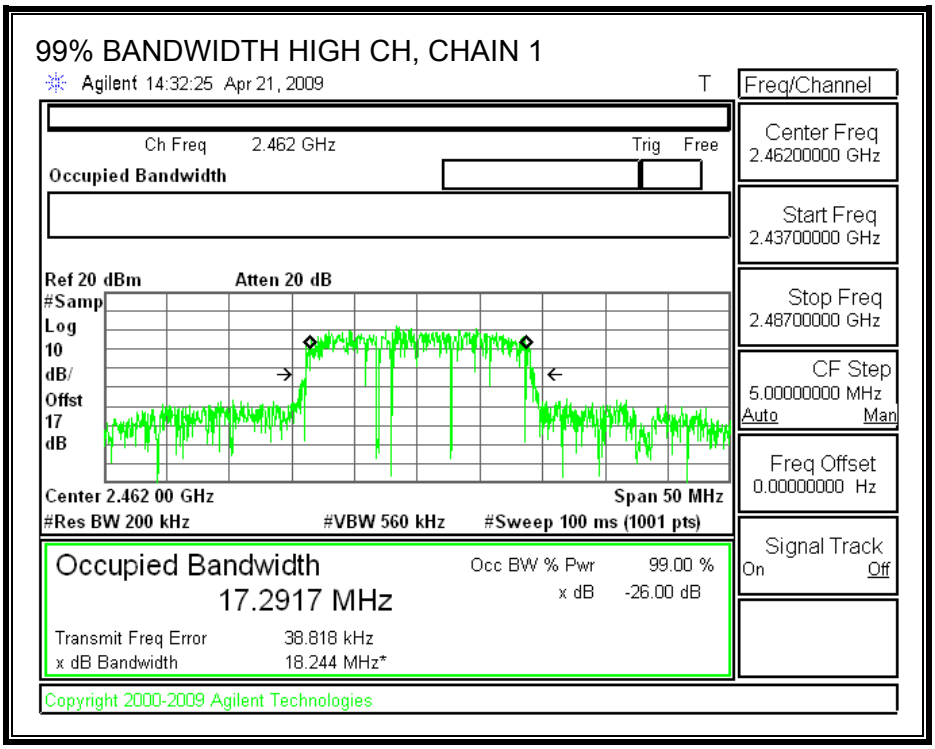
RESULTS

Channel	Frequency (MHz)	Chain 1 99% Bandwidth (MHz)	Chain 2 99% Bandwidth (MHz)
Low	2412	17.5362	17.5200
Middle	2437	17.4484	17.7235
High	2462	17.2917	17.3620

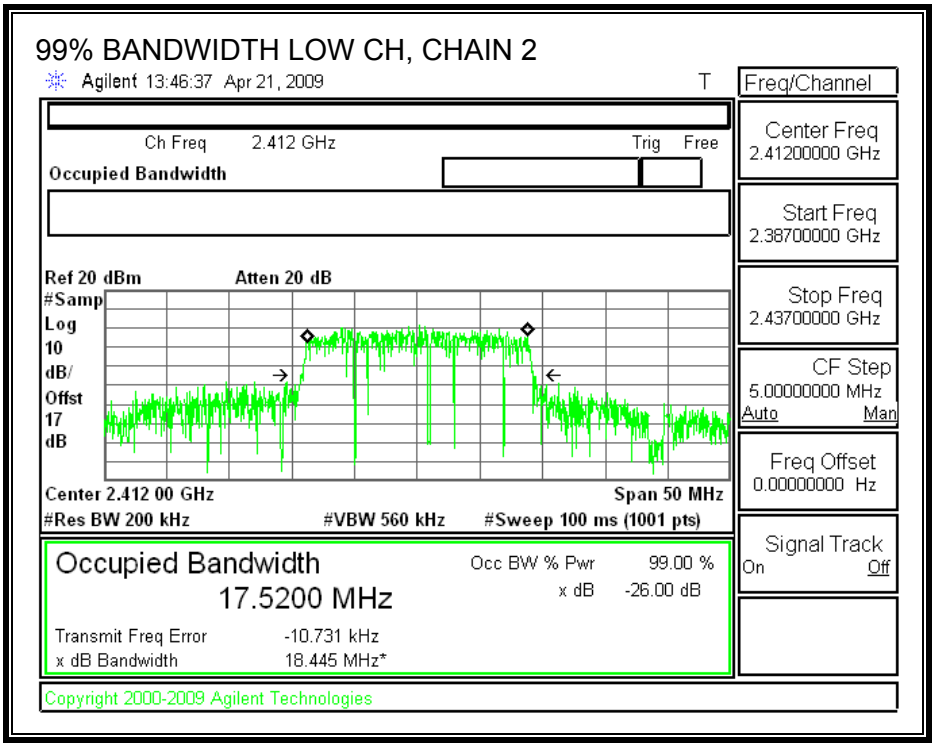
99% BANDWIDTH, CHAIN 1

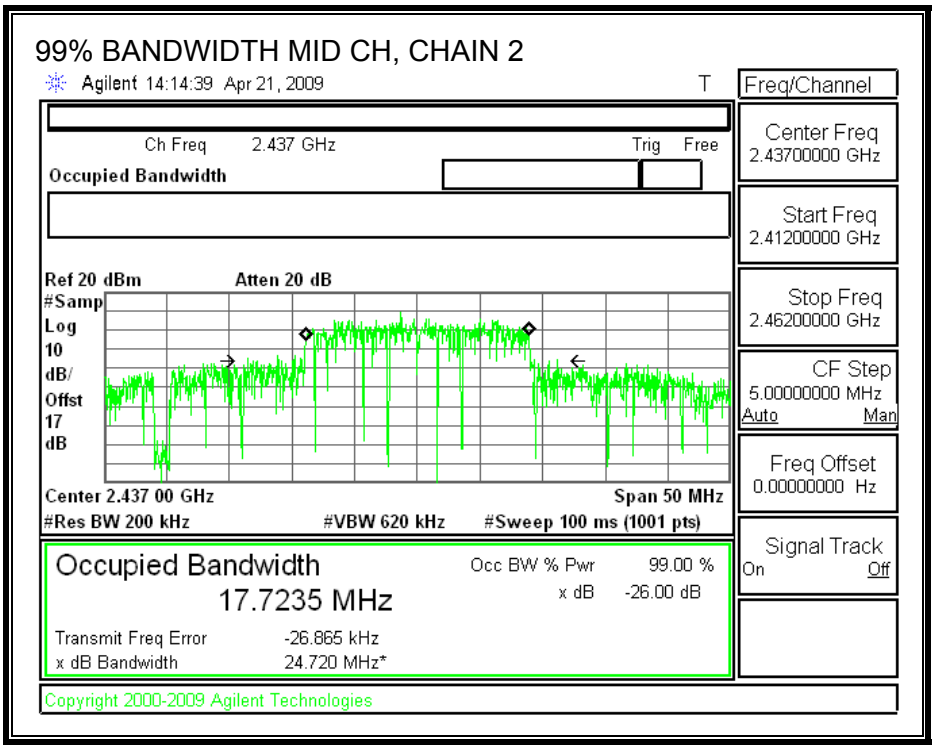


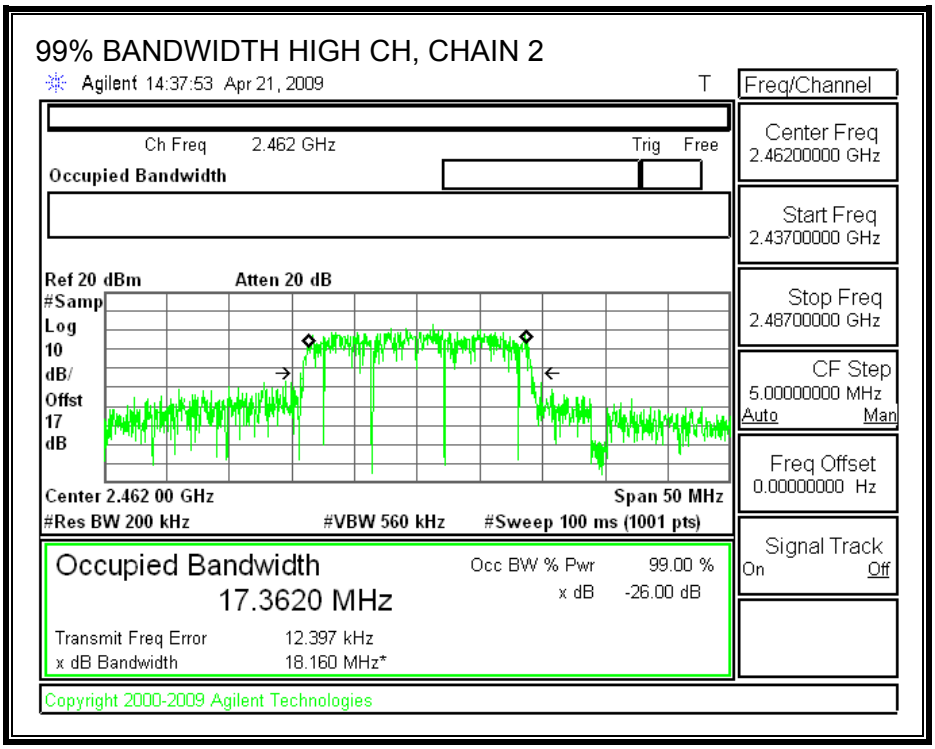




99% BANDWIDTH, CHAIN 2







7.3.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

The maximum antenna gain is equal to 6.91 dBi, therefore the limit is 29.09 dBm.

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)	Limit (dBm)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Total Power (dBm)	Margin (dB)
Low	2412	29.09	24.73	24.09	27.43	-1.66
Low	2417	29.09	25.09	24.53	27.83	-1.26
Mid	2437	29.09	25.44	24.80	28.14	-0.95
High	2457	29.09	25.12	24.37	27.77	-1.32
High	2462	29.09	24.64	24.04	27.36	-1.73

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.

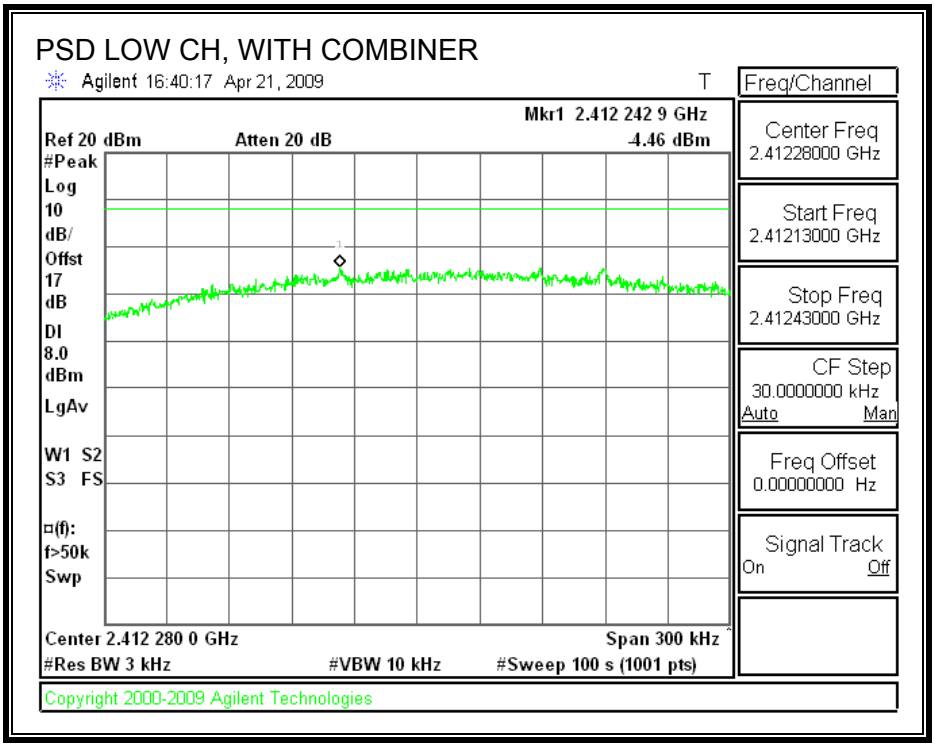
TEST PROCEDURE

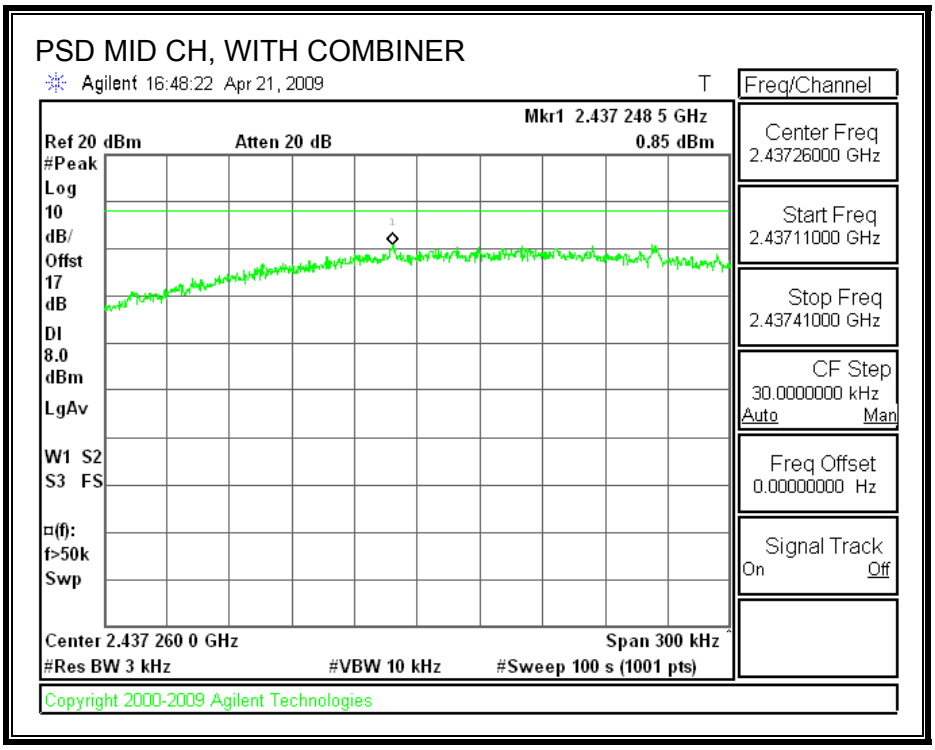
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

RESULTS

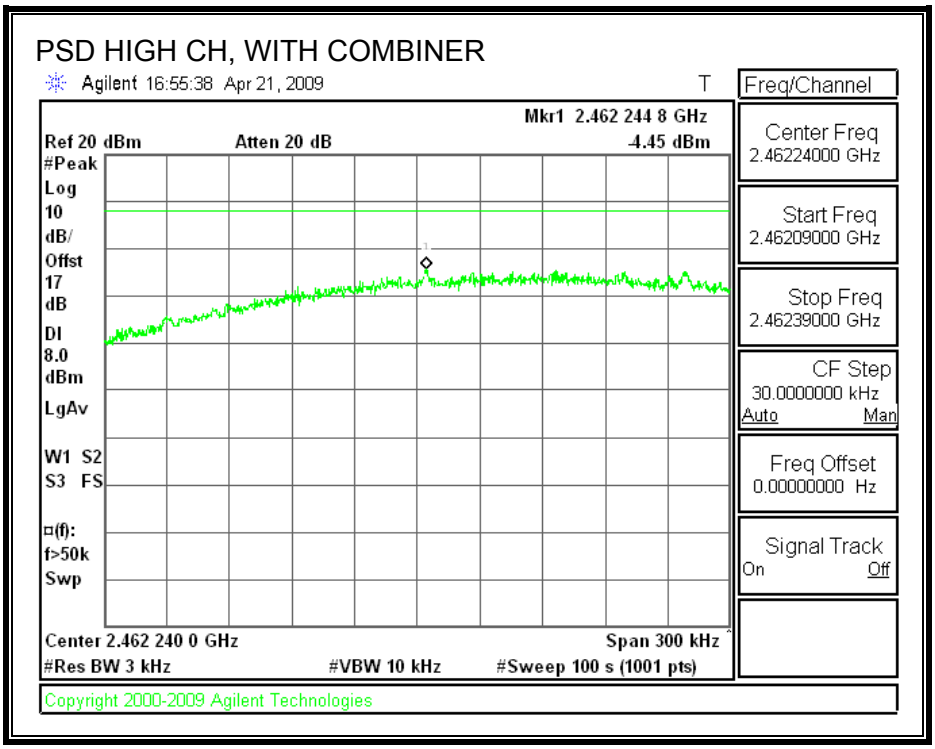
Channel	Frequency (MHz)	PSD with Combiner (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-4.46	8	-12.46
Middle	2437	0.85	8	-7.15
High	2462	-4.45	8	-12.45

POWER SPECTRAL DENSITY, WITH COMBINER





PSD HIGH CH, WITH COMBINER



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.

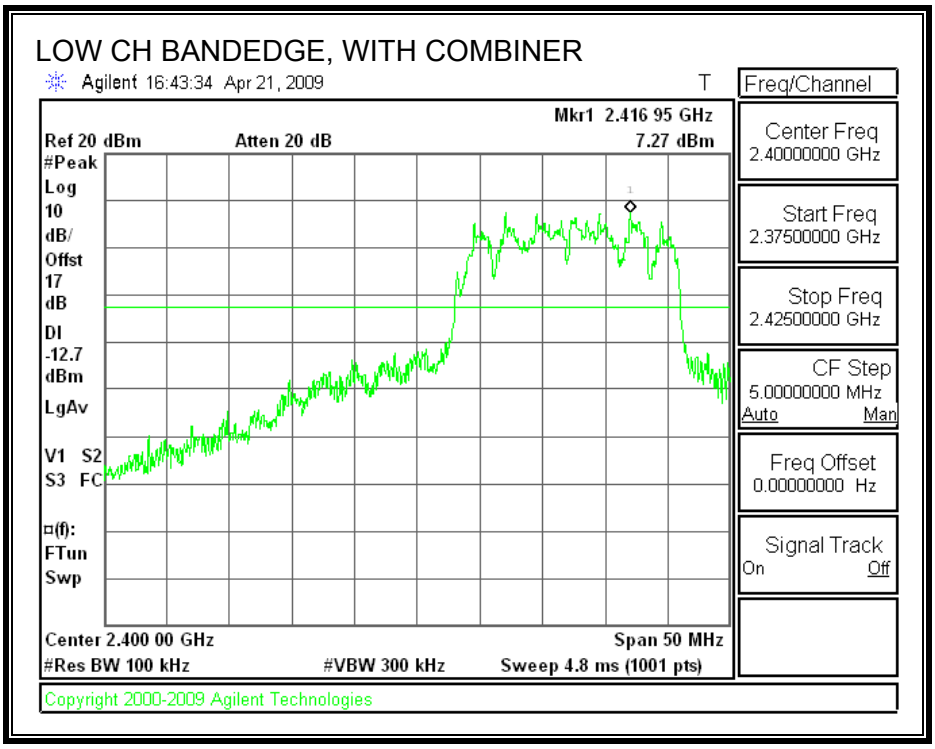
TEST PROCEDURE

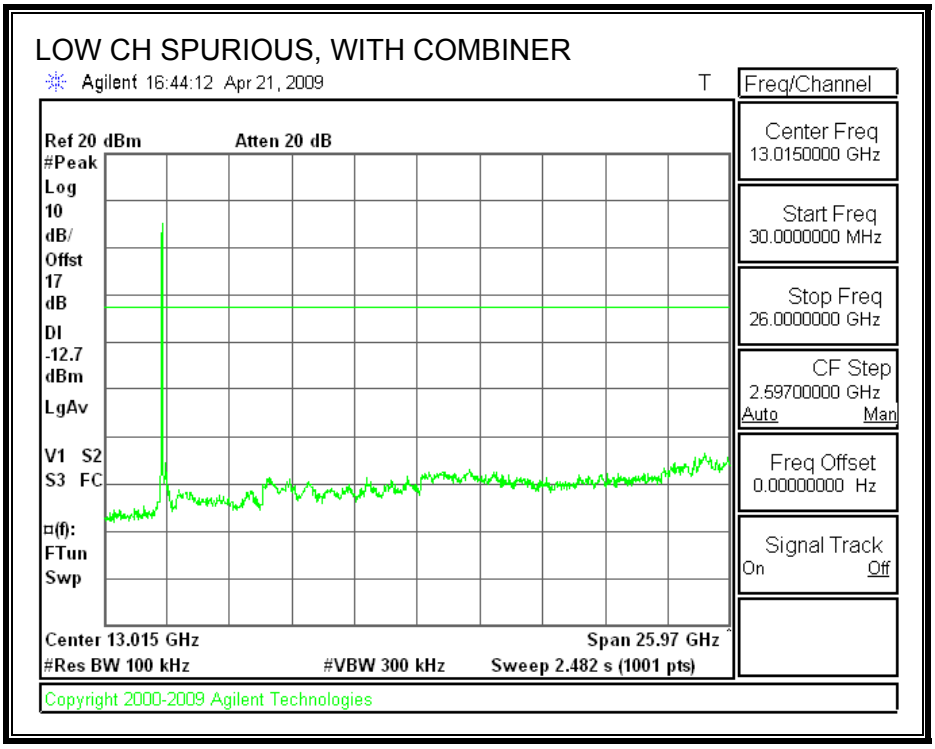
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

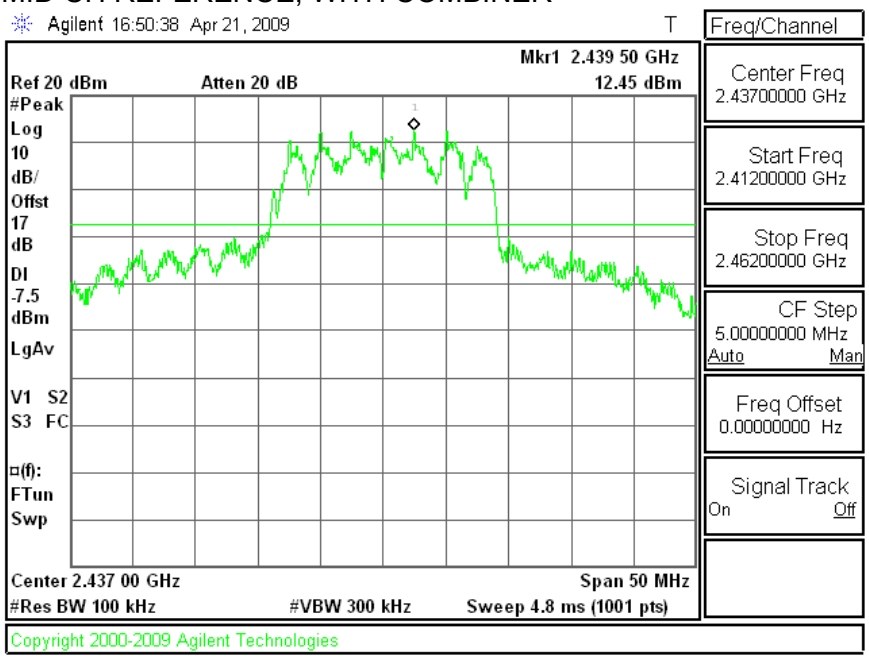
RESULTS

SPURIOUS EMISSIONS WITH COMBINER

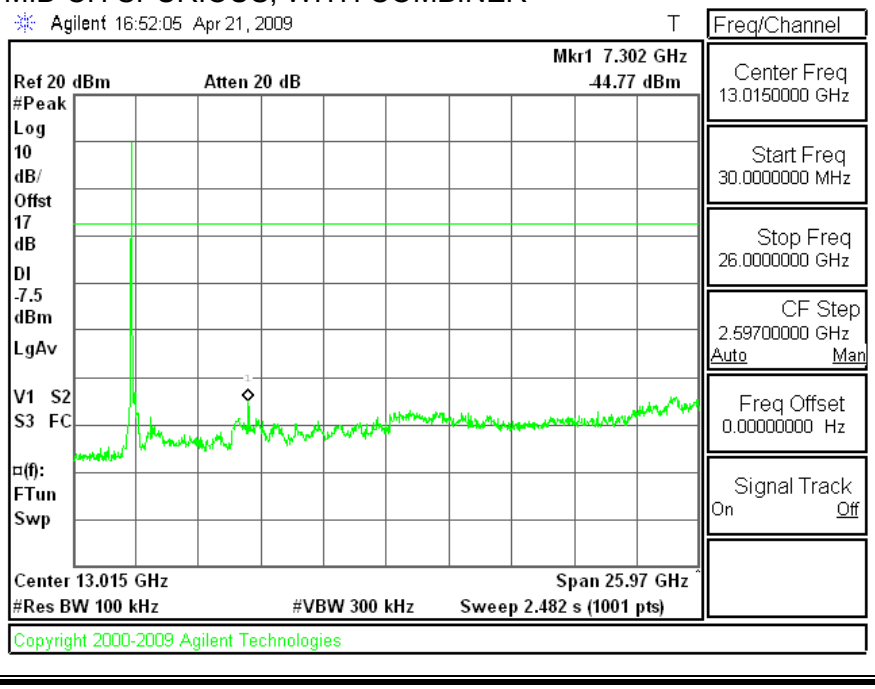




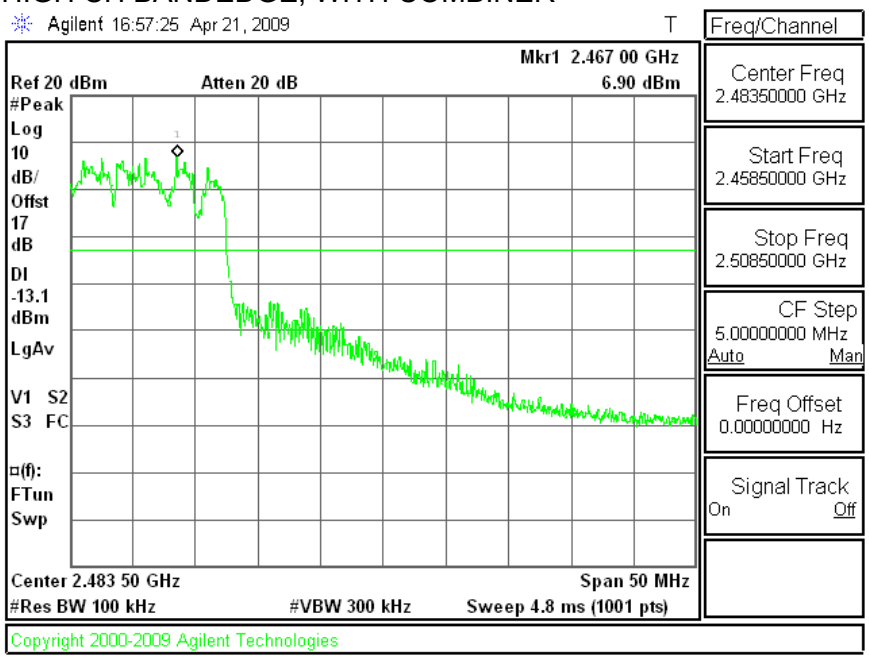
MID CH REFERENCE, WITH COMBINER



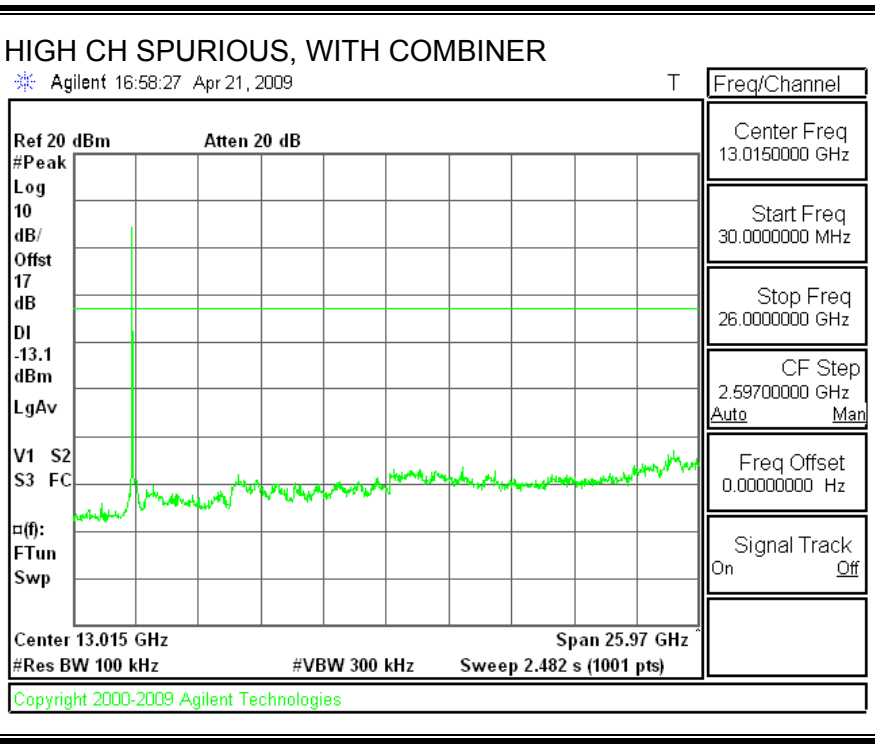
MID CH SPURIOUS, WITH COMBINER



HIGH CH BANDEDGE, WITH COMBINER



HIGH CH SPURIOUS, WITH COMBINER



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.

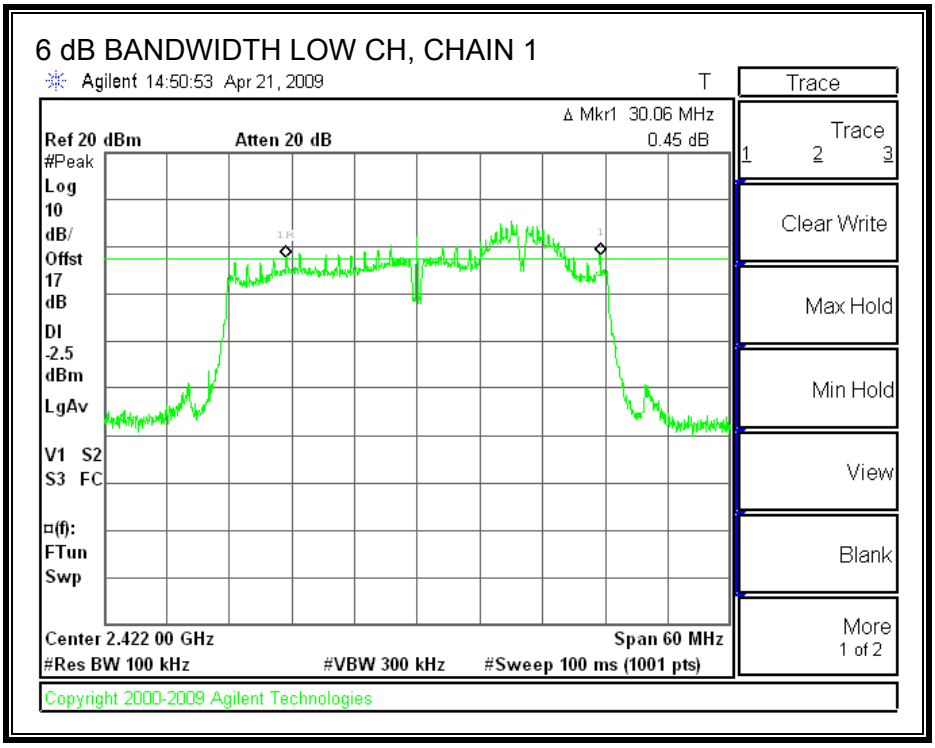
TEST PROCEDURE

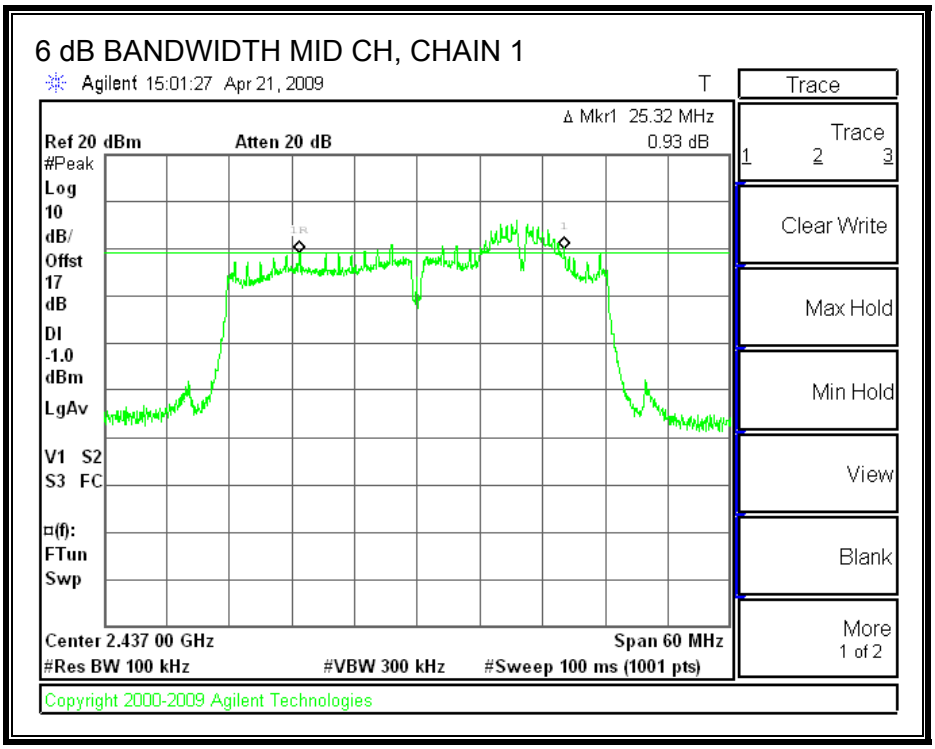
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

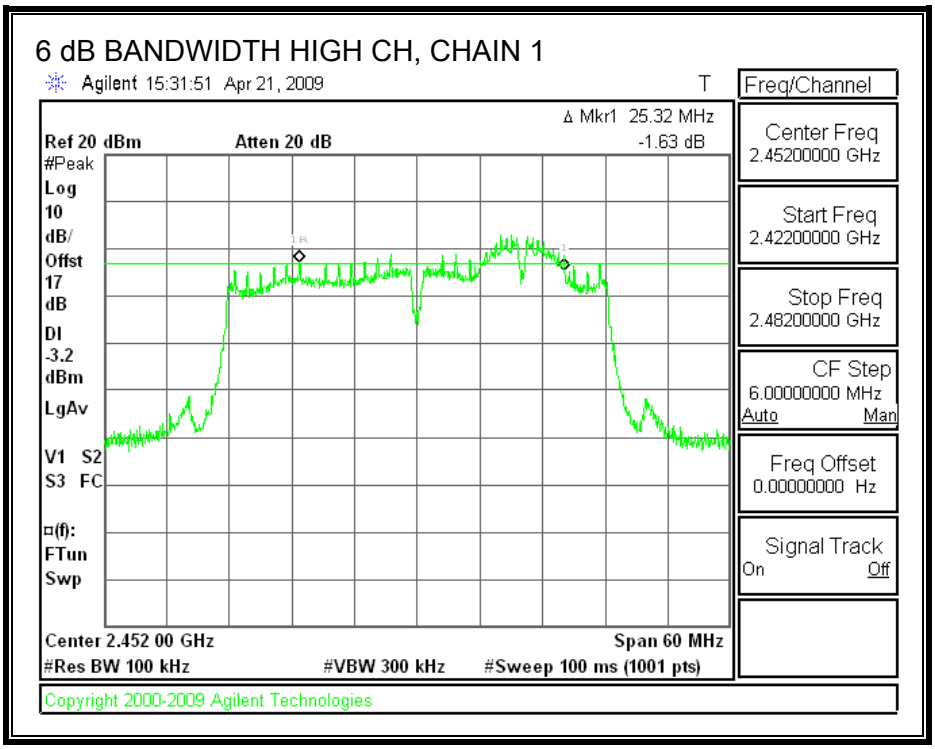
RESULTS

Channel	Frequency (MHz)	Chain 1 6 dB BW (MHz)	Chain 2 6 dB BW (MHz)	Minimum Limit (MHz)
Low	2422	30.06	36.3	0.5
Middle	2437	25.32	36.3	0.5
High	2452	25.32	36.3	0.5

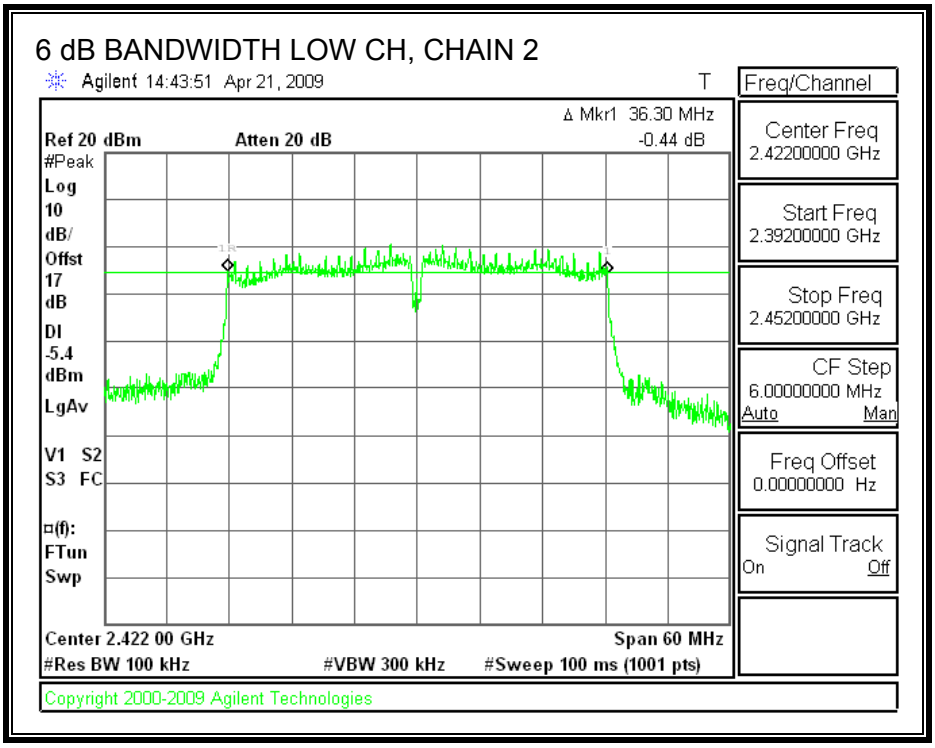
6 dB BANDWIDTH, CHAIN 1

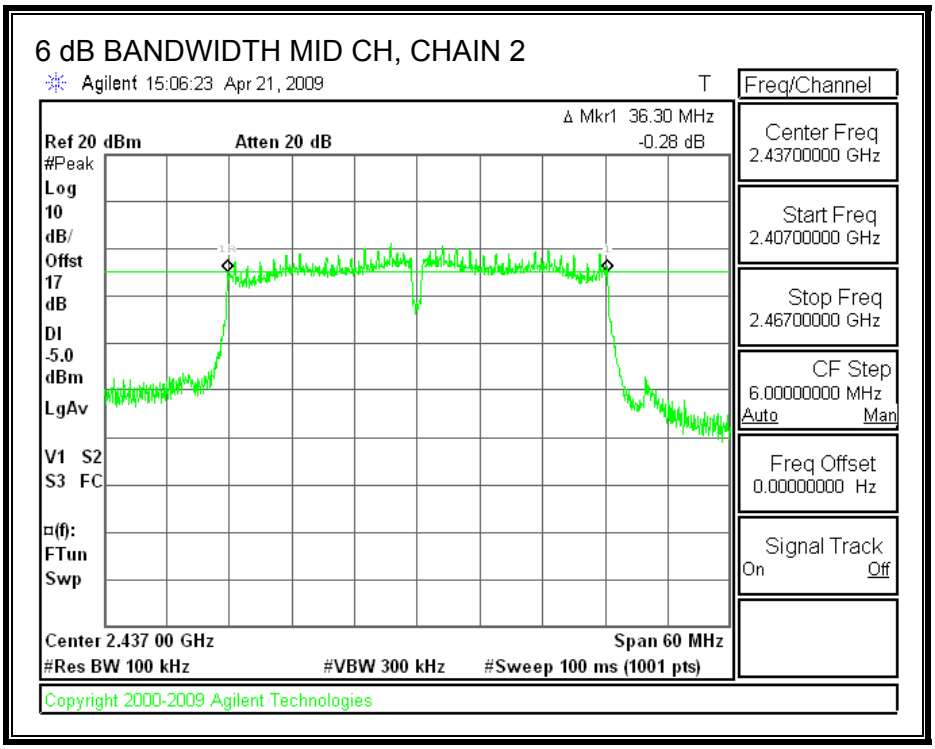


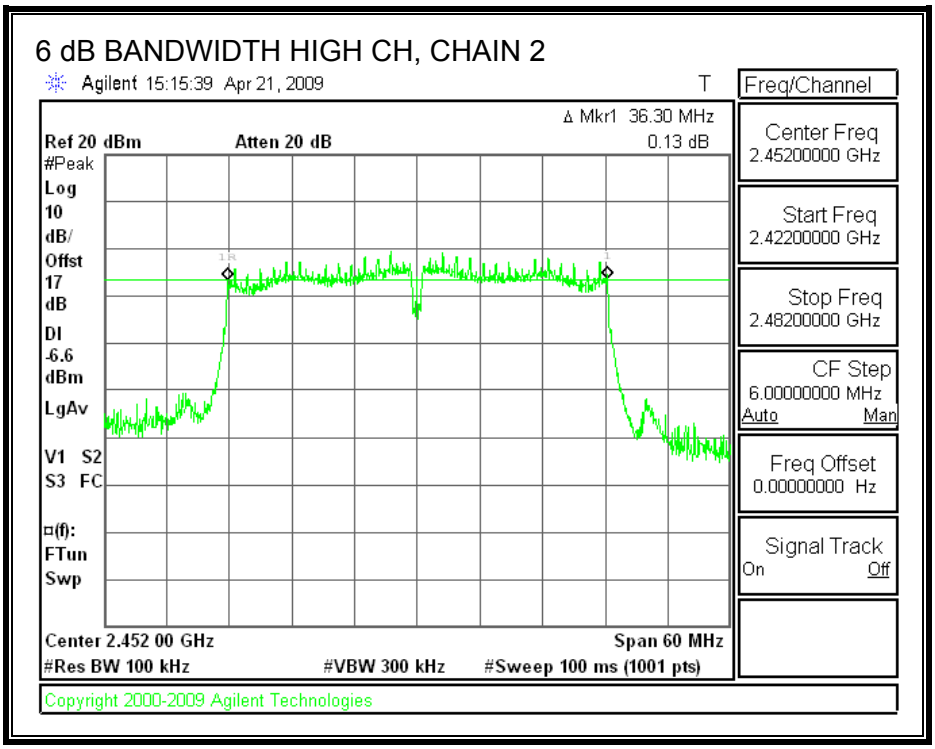




6 dB BANDWIDTH, CHAIN 2







7.4.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

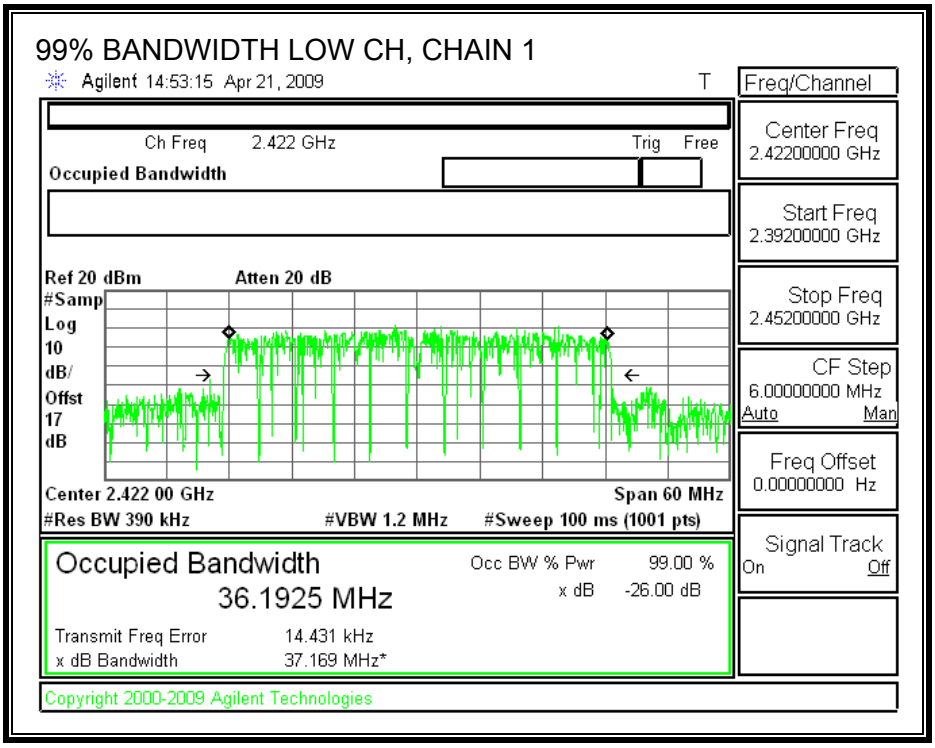
TEST PROCEDURE

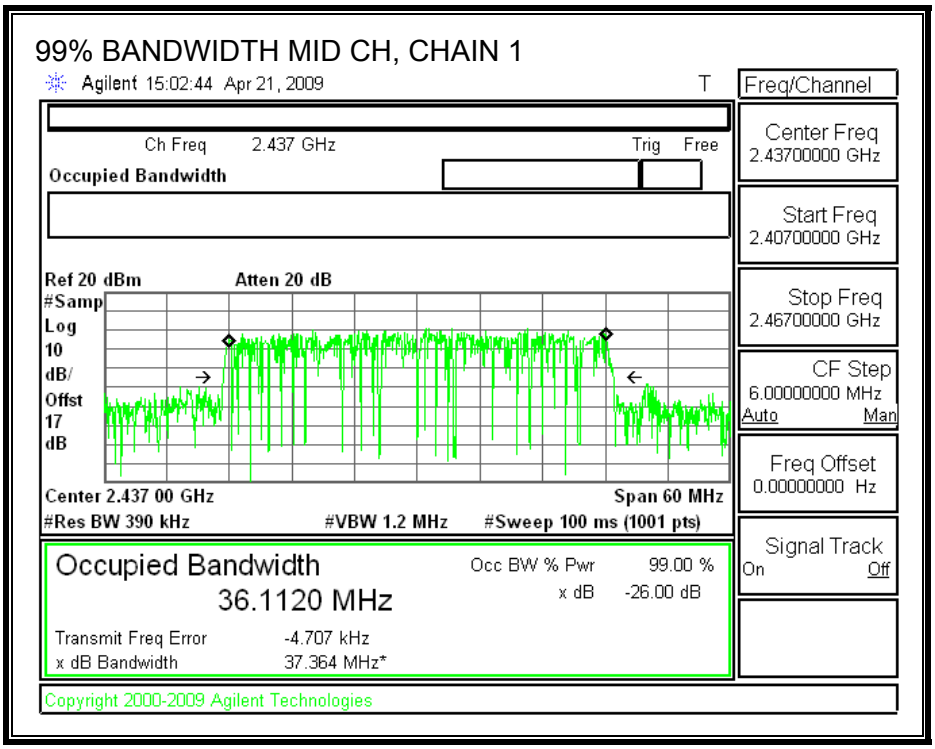
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

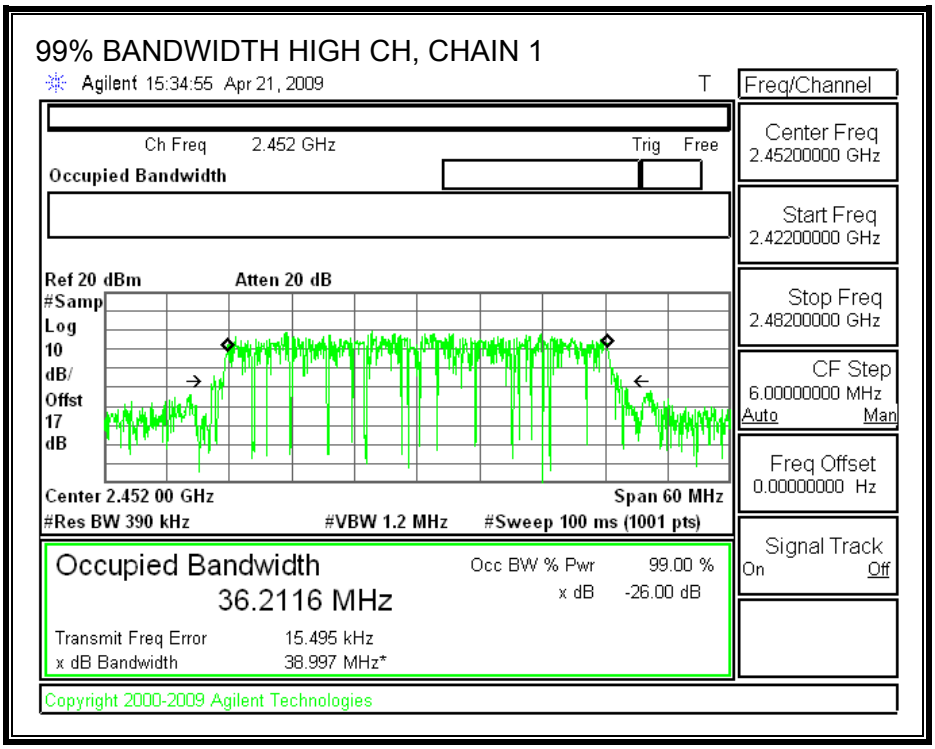
RESULTS

Channel	Frequency (MHz)	Chain 1 99% Bandwidth (MHz)	Chain 2 99% Bandwidth (MHz)
Low	2422	36.1925	36.1095
Middle	2437	36.1120	36.2025
High	2452	36.2116	36.0614

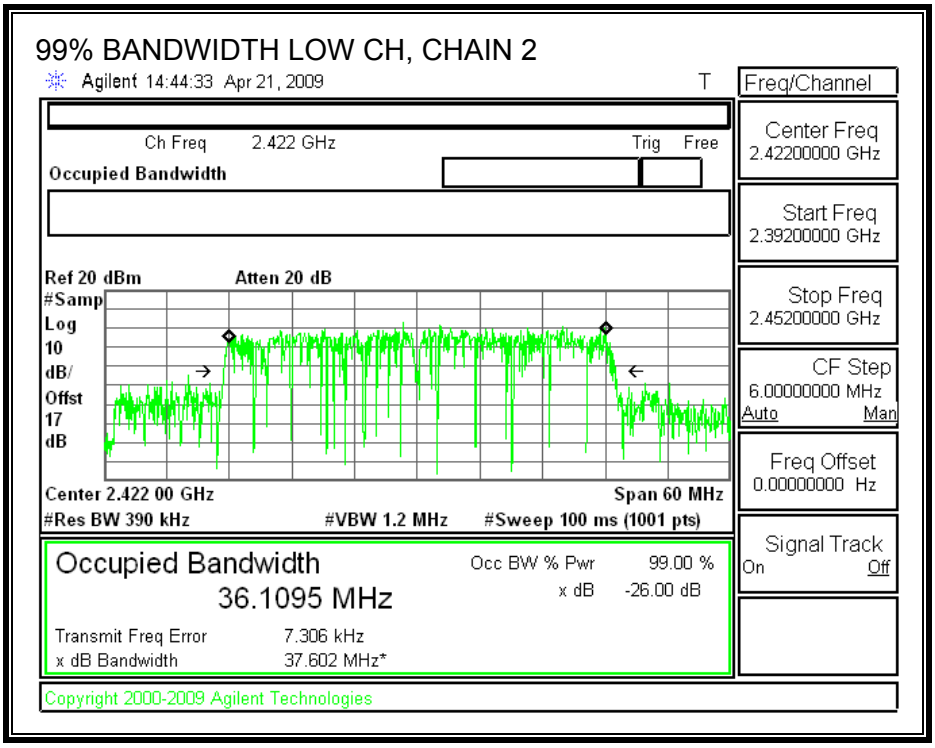
99% BANDWIDTH, CHAIN 1

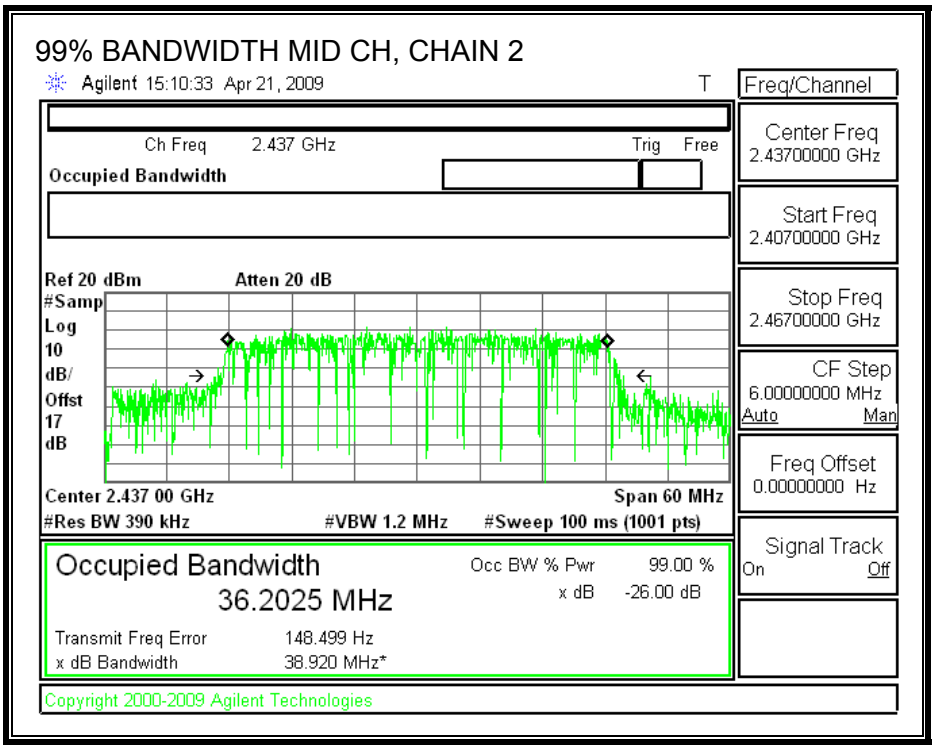


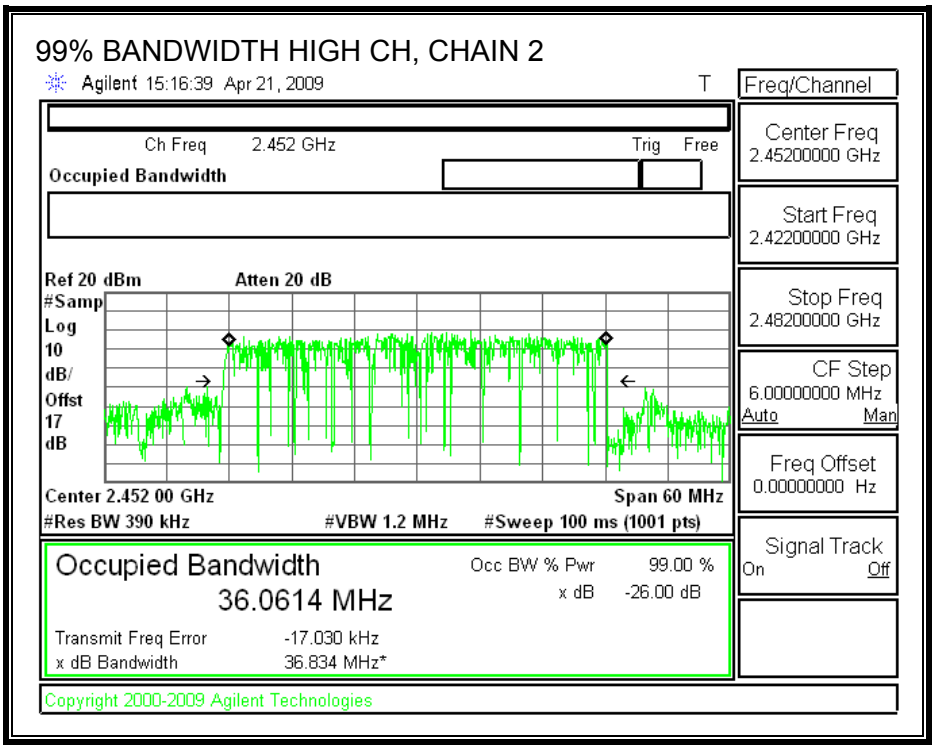




99% BANDWIDTH, CHAIN 2







7.4.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

The maximum antenna gain is equal to 6.91 dBi, therefore the limit is 29.09 dBm.

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)	Limit (dBm)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Total Power (dBm)	Margin (dB)
Low	2422	29.09	22.97	23.57	26.29	-2.80
Low	2427	29.09	23.26	23.89	26.60	-2.49
Mid	2437	29.09	23.39	24.01	26.72	-2.37
High	2447	29.09	23.01	23.76	26.41	-2.68
High	2452	29.09	21.80	22.13	24.98	-4.11

7.4.4. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

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

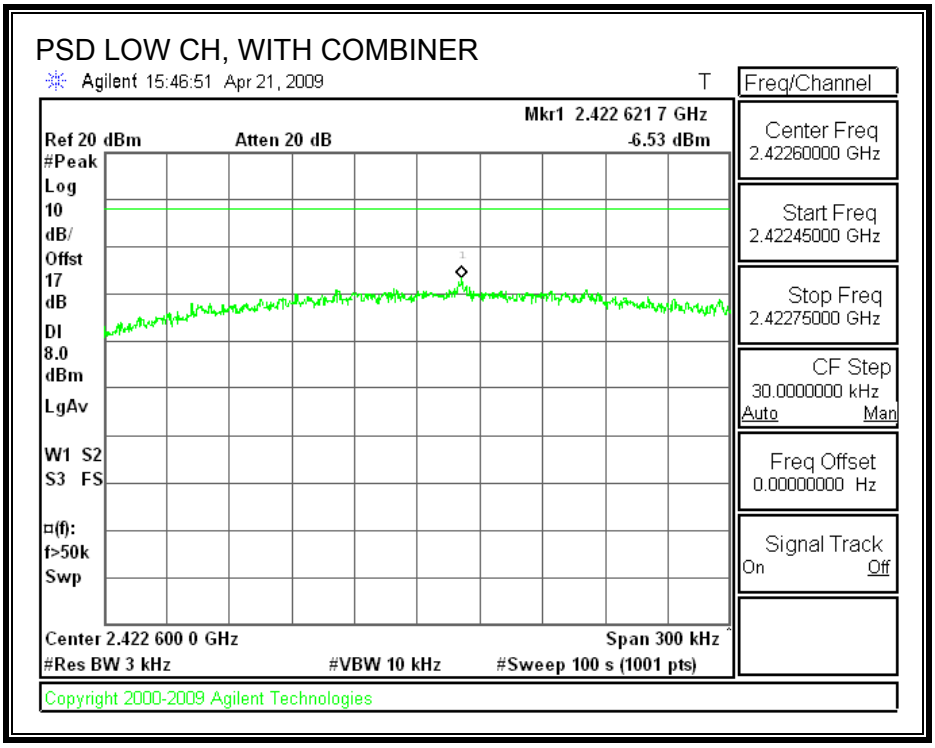
TEST PROCEDURE

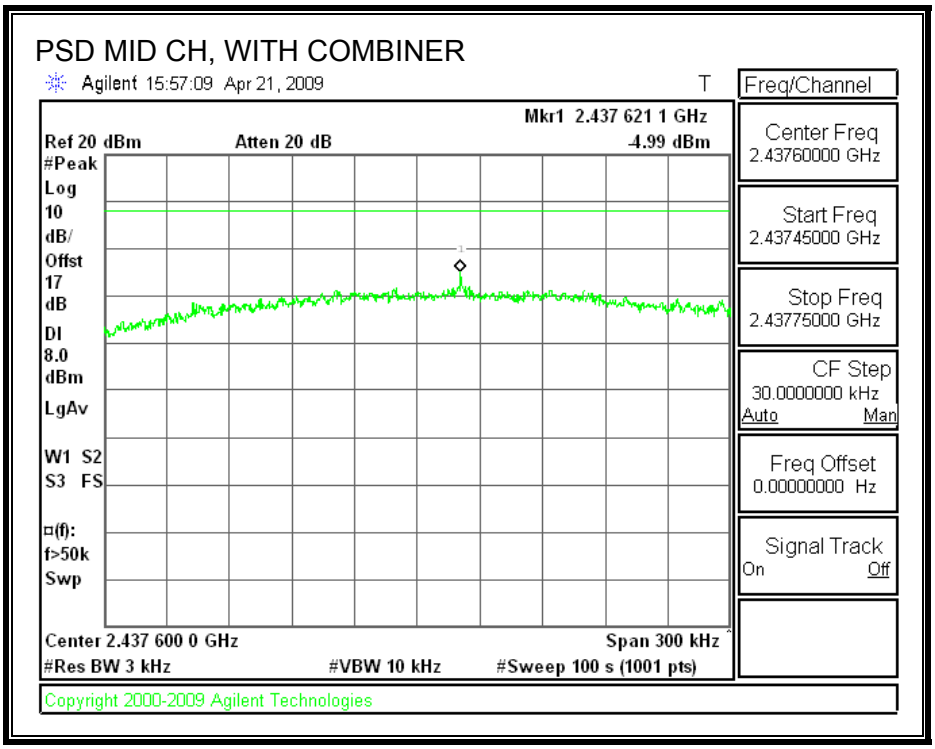
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

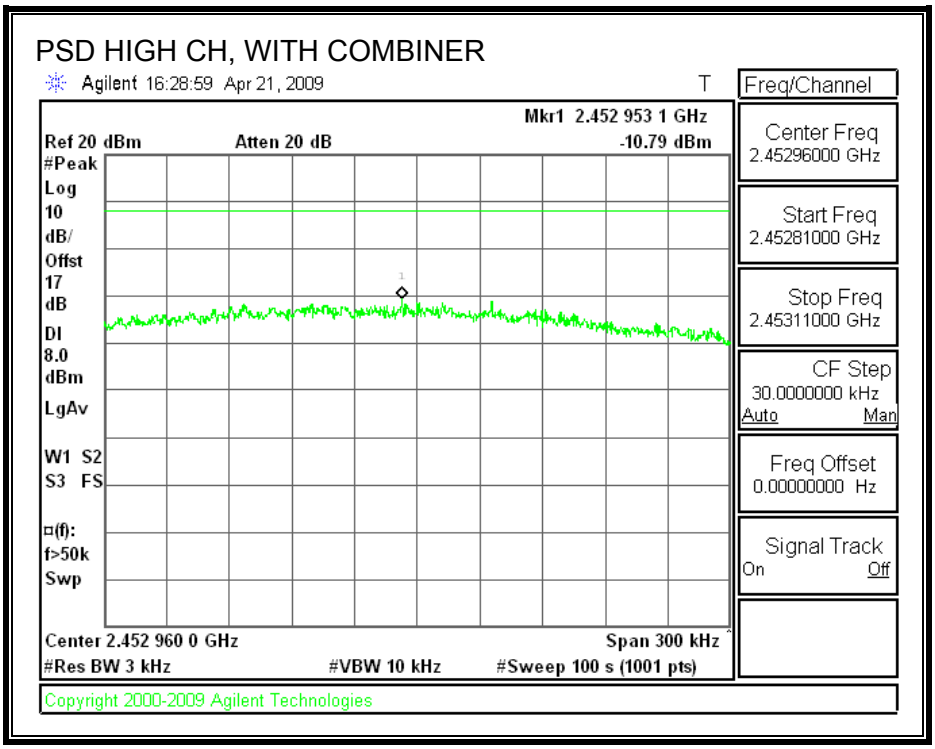
RESULTS

Channel	Frequency (MHz)	PSD with Combiner (dBm)	Limit (dBm)	Margin (dB)
Low	2422	-6.53	8	-14.53
Middle	2437	-4.99	8	-12.99
High	2452	-10.79	8	-18.79

POWER SPECTRAL DENSITY, WITH COMBINER







7.4.5. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

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

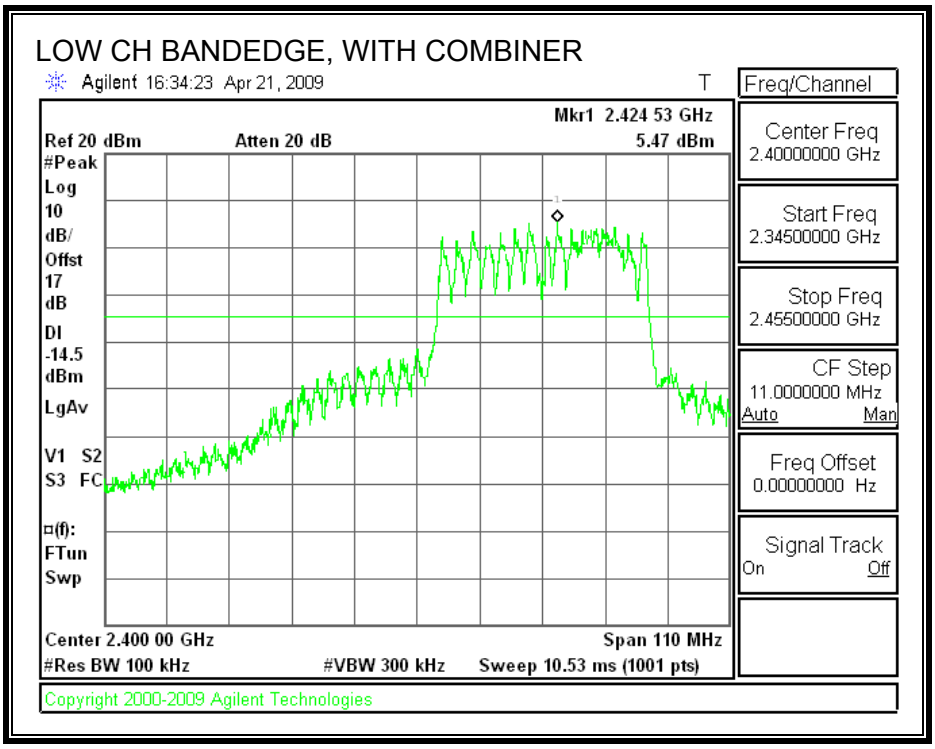
TEST PROCEDURE

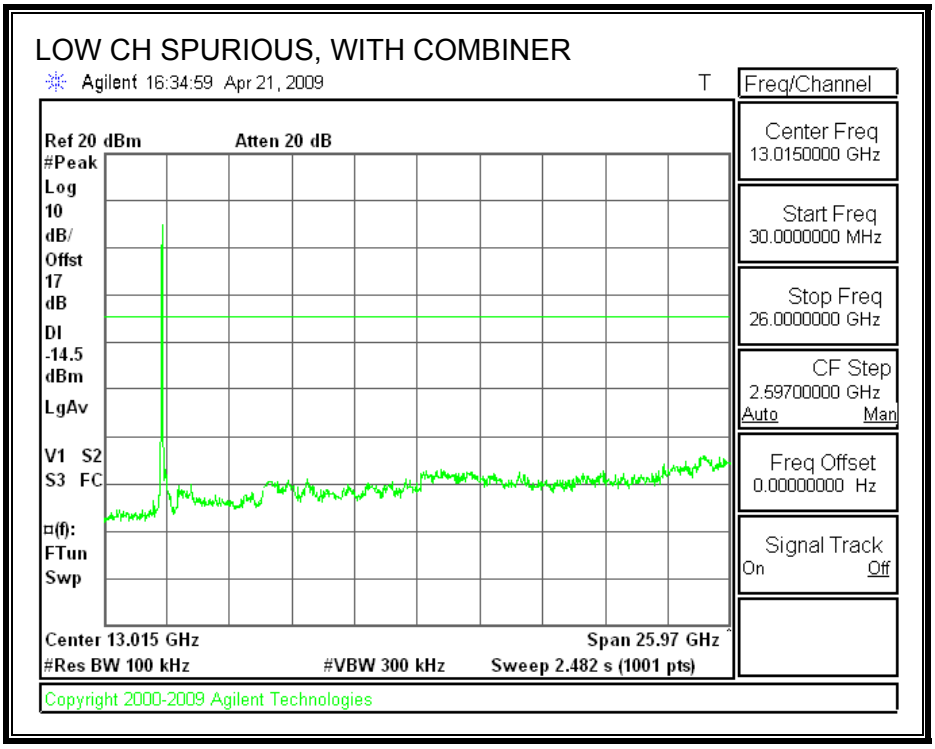
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

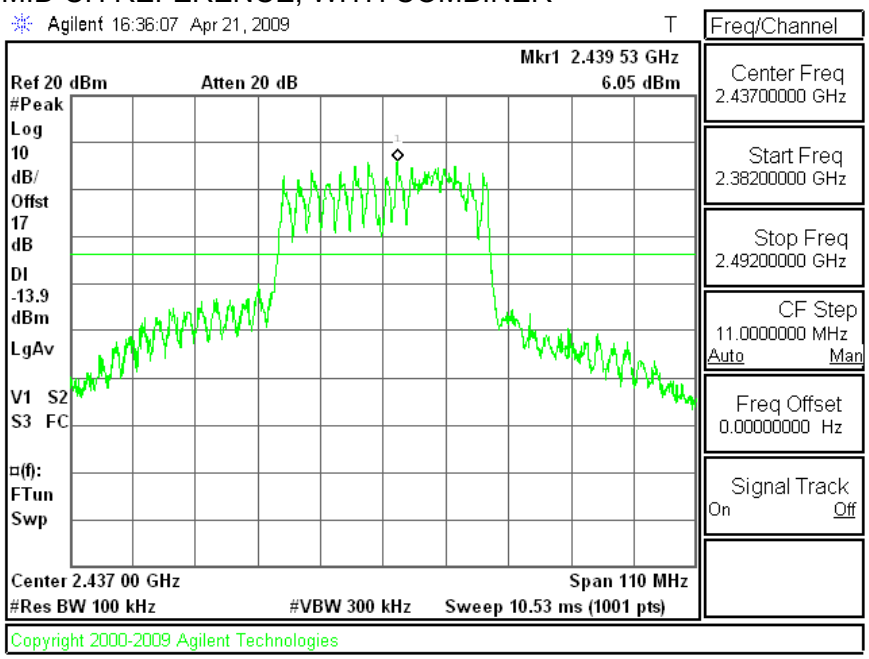
RESULTS

SPURIOUS EMISSIONS WITH COMBINER

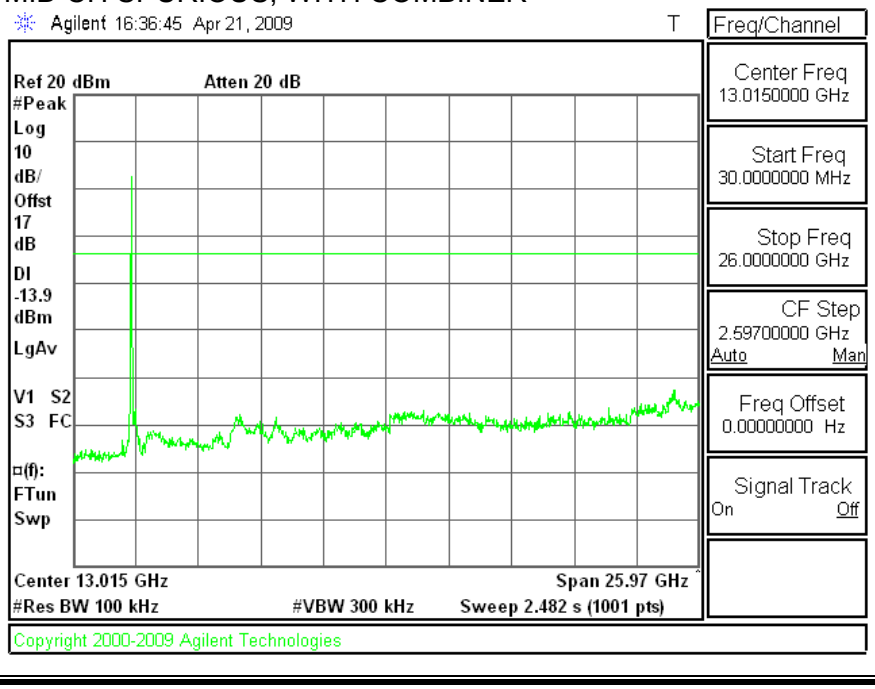




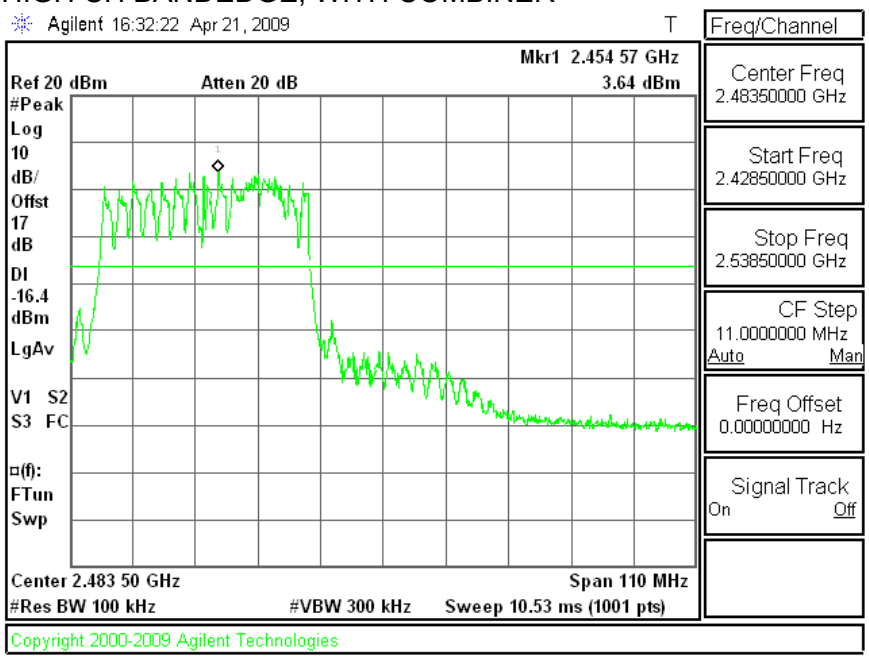
MID CH REFERENCE, WITH COMBINER



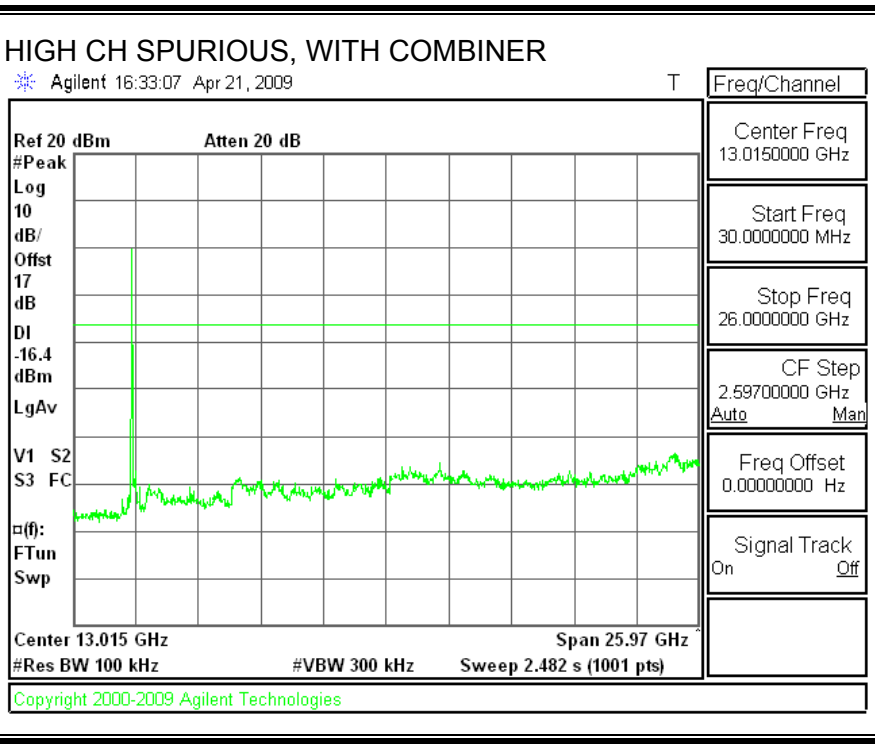
MID CH SPURIOUS, WITH COMBINER



HIGH CH BANDEDGE, WITH COMBINER



HIGH CH SPURIOUS, WITH COMBINER



8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-210 Clause 2.6 (Transmitter)

IC RSS-GEN Clause 6 (Receiver)

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

TEST PROCEDURE

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

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

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

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

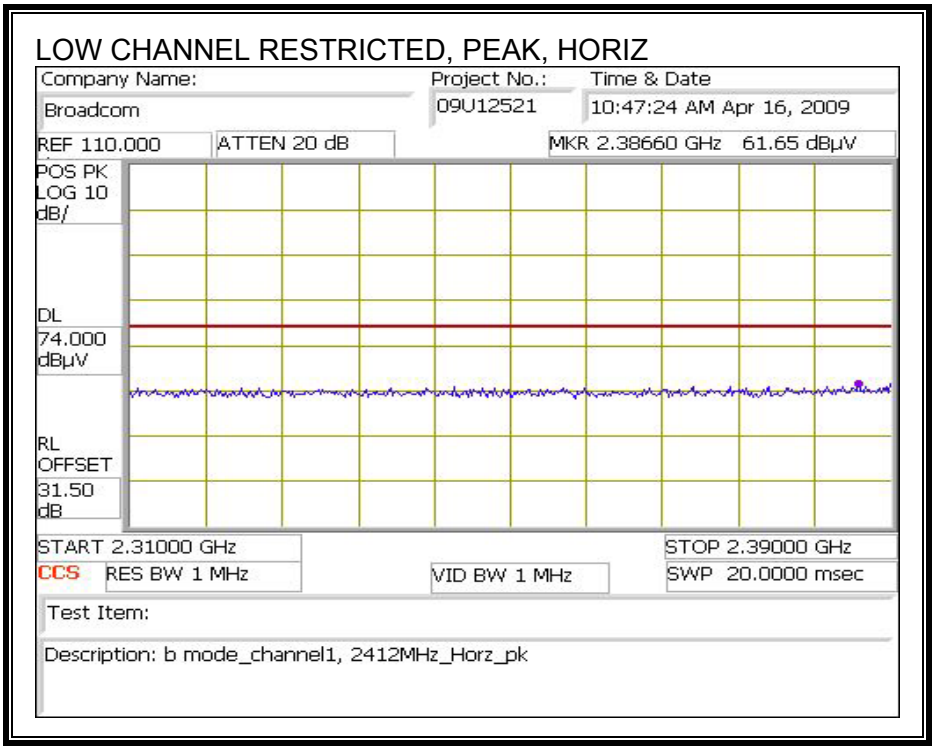
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each appplicable band.

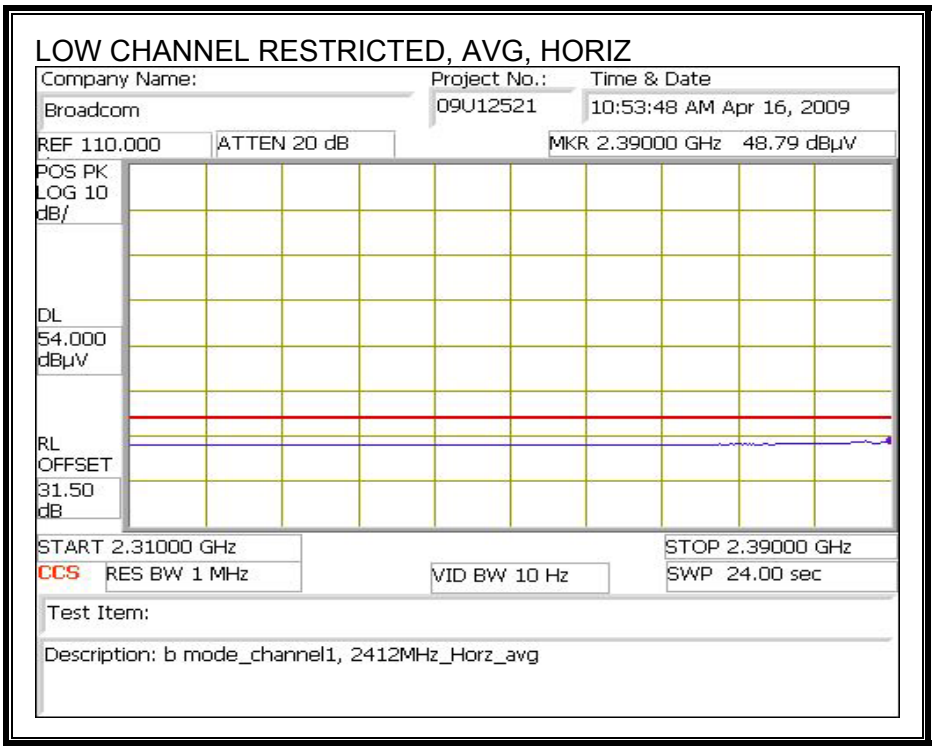
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

8.2. TRANSMITTER ABOVE 1 GHz

8.2.1. TRANSMITTER ABOVE 1 GHz FOR 802.11b MODE

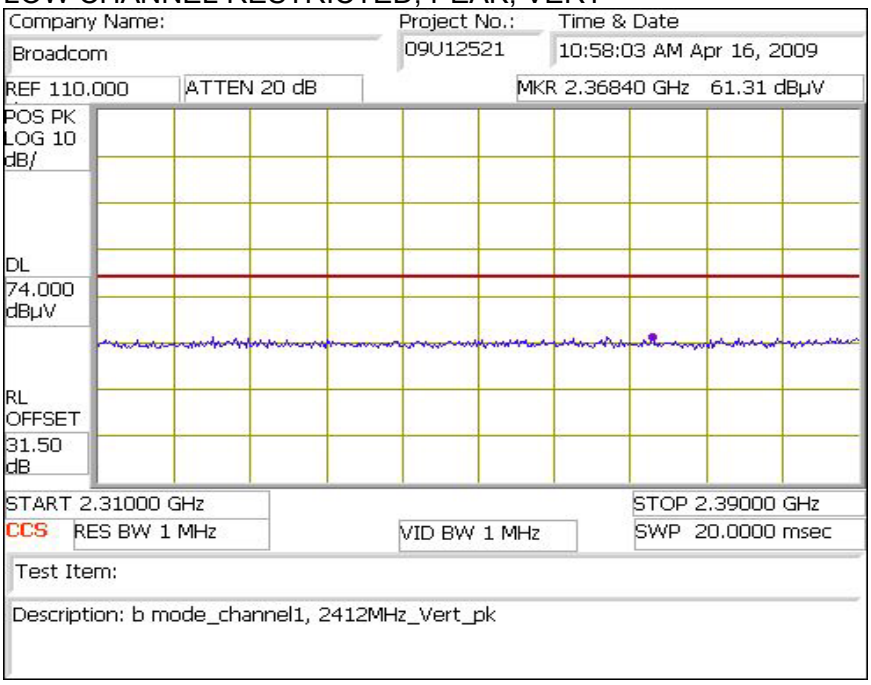
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



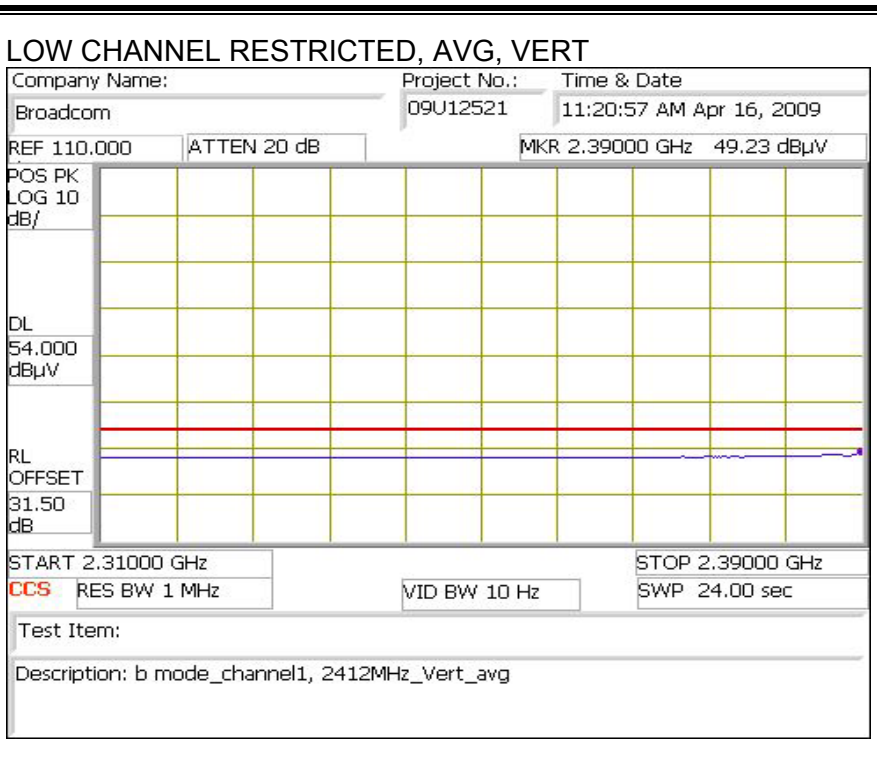


RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

LOW CHANNEL RESTRICTED, PEAK, VERT

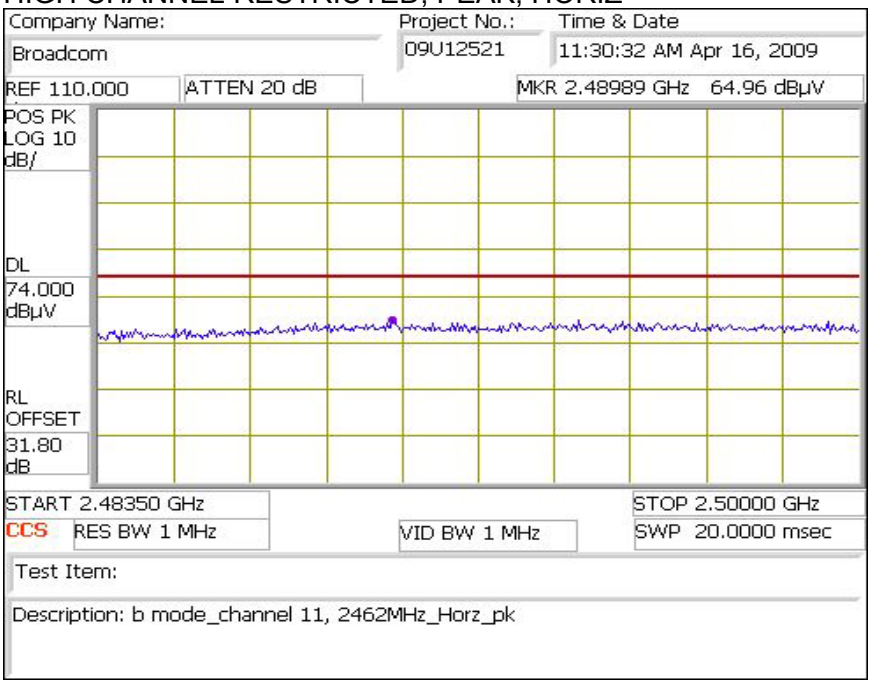


LOW CHANNEL RESTRICTED, AVG, VERT

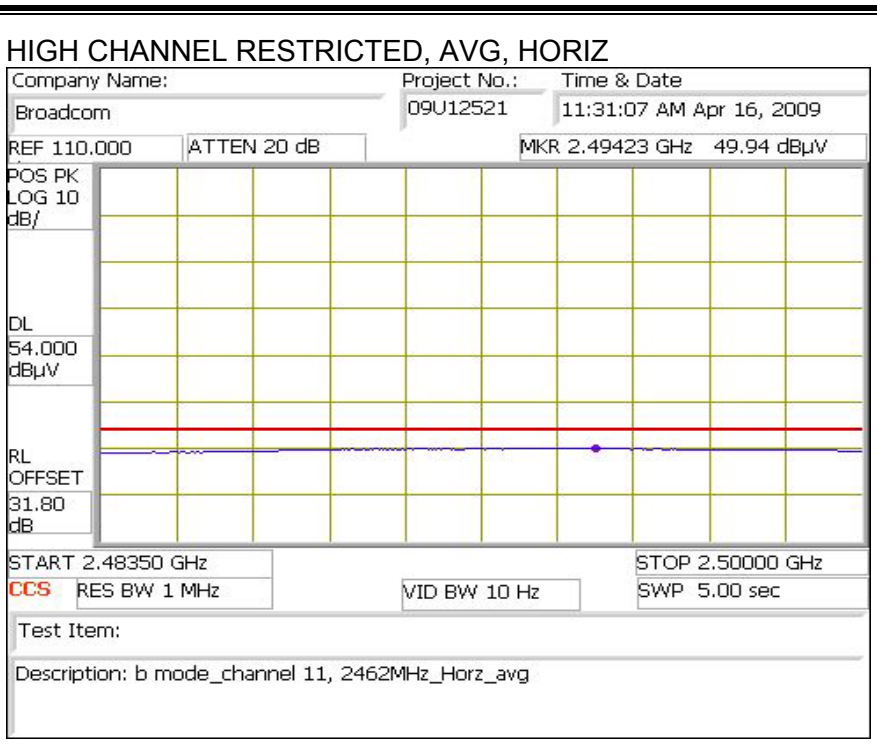


RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

HIGH CHANNEL RESTRICTED, PEAK, HORIZ

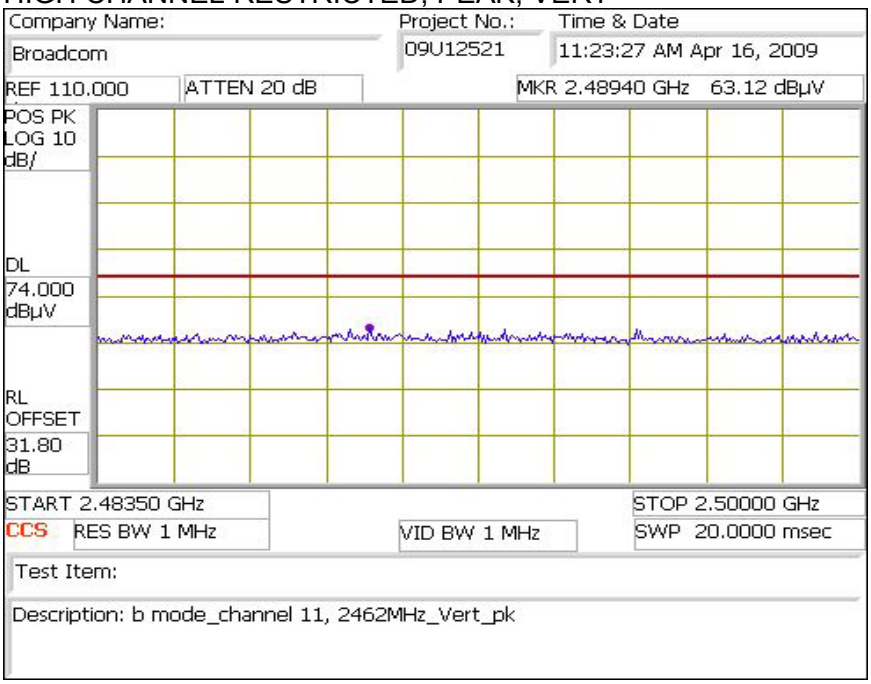


HIGH CHANNEL RESTRICTED, AVG, HORIZ

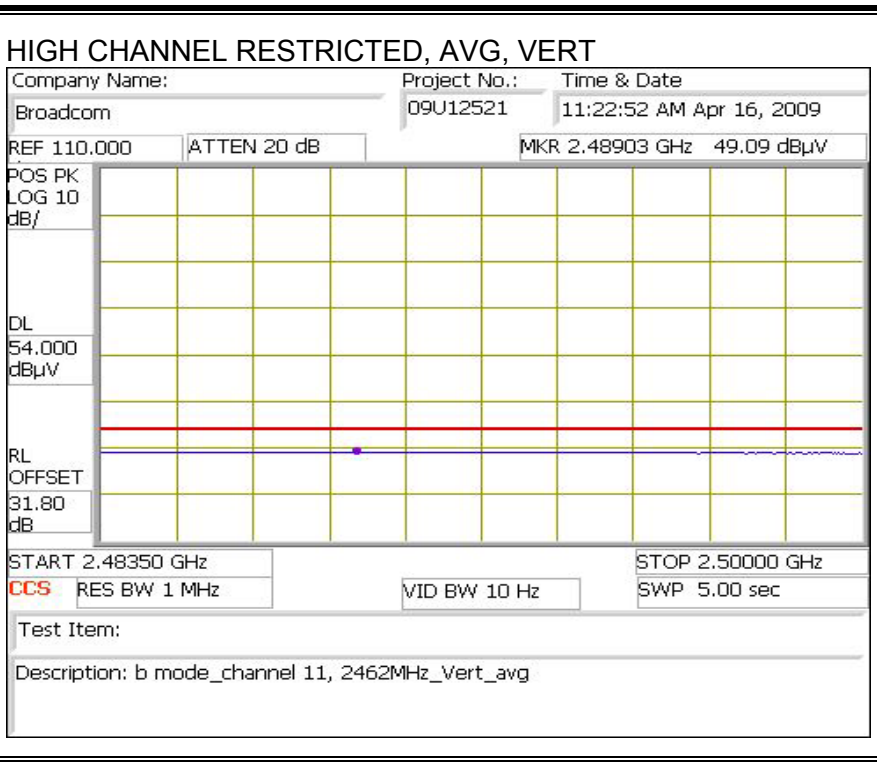


RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

HIGH CHANNEL RESTRICTED, PEAK, VERT



HIGH CHANNEL RESTRICTED, AVG, VERT



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Devin Chang
Date: 04/17/09
Project #: 09U12521
Company: Broadcom
EUT Description: EUT with Laptop
Mode Oper: TX_b mode

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

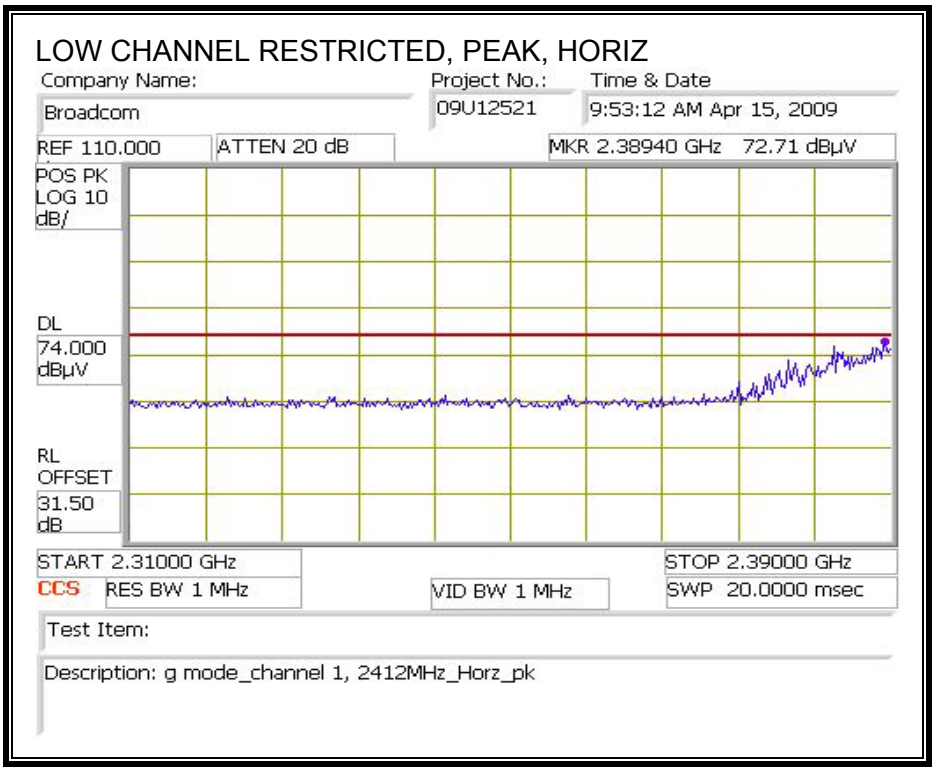
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
2412MHz															
4.824	3.0	47.8	32.8	5.8	-34.8	0.0	0.5	52.1	74.0	-21.9	V	P	172.4	71.7	
4.824	3.0	44.0	32.8	5.8	-34.8	0.0	0.5	48.3	54.0	-5.7	V	A	172.4	71.7	
4.824	3.0	46.5	32.8	5.8	-34.8	0.0	0.5	50.8	74.0	-23.2	H	P	149.1	96.7	
4.824	3.0	43.2	32.8	5.8	-34.8	0.0	0.5	47.5	54.0	-6.5	H	A	149.1	96.7	
2437MHz															
4.874	3.0	47.2	32.8	5.8	-34.9	0.0	0.5	51.5	74.0	-22.5	V	P	151.8	74.9	
4.874	3.0	43.7	32.8	5.8	-34.9	0.0	0.5	48.0	54.0	-6.0	V	A	151.8	74.9	
7.311	3.0	41.4	35.2	7.3	-34.7	0.0	0.5	49.7	74.0	-24.3	V	P	101.1	285.2	
7.311	3.0	31.2	35.2	7.3	-34.7	0.0	0.5	39.5	54.0	-14.5	V	A	101.1	285.2	
4.874	3.0	47.7	32.8	5.8	-34.9	0.0	0.5	52.0	74.0	-22.0	H	P	103.5	2.1	
4.874	3.0	44.4	32.8	5.8	-34.9	0.0	0.5	48.7	54.0	-5.3	H	A	103.5	2.1	
7.311	3.0	40.3	35.2	7.3	-34.7	0.0	0.5	48.6	74.0	-25.4	H	P	148.8	99.9	
7.311	3.0	31.7	35.2	7.3	-34.7	0.0	0.5	40.0	54.0	-14.0	H	A	148.8	99.9	
2462MHz															
4.924	3.0	47.1	32.8	5.9	-34.9	0.0	0.5	51.5	74.0	-22.5	V	P	100.3	256.3	
4.924	3.0	43.5	32.8	5.9	-34.9	0.0	0.5	47.9	54.0	-6.1	V	A	100.3	256.3	
7.386	3.0	40.6	35.3	7.3	-34.6	0.0	0.5	49.0	74.0	-25.0	V	P	100.6	286.3	
7.386	3.0	31.3	35.3	7.3	-34.6	0.0	0.5	39.8	54.0	-14.2	V	A	100.6	286.3	
4.924	3.0	51.0	32.8	5.9	-34.9	0.0	0.5	55.4	74.0	-18.6	H	P	129.6	196.0	
4.924	3.0	48.5	32.8	5.9	-34.9	0.0	0.5	52.9	54.0	-1.1	H	A	129.6	196.0	
7.386	3.0	40.4	35.3	7.3	-34.6	0.0	0.5	48.8	74.0	-25.2	H	P	115.5	98.4	
7.386	3.0	32.1	35.3	7.3	-34.6	0.0	0.5	40.6	54.0	-13.4	H	A	115.5	98.4	

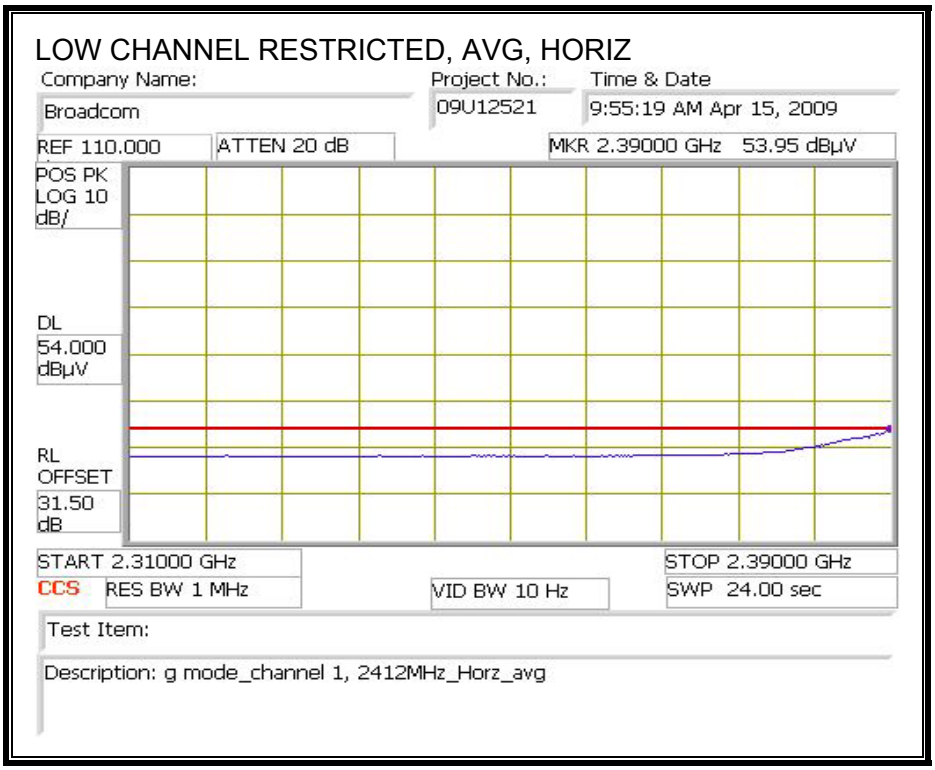
Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor.

8.2.2. TRANSMITTER ABOVE 1 GHz FOR 802.11g MODE

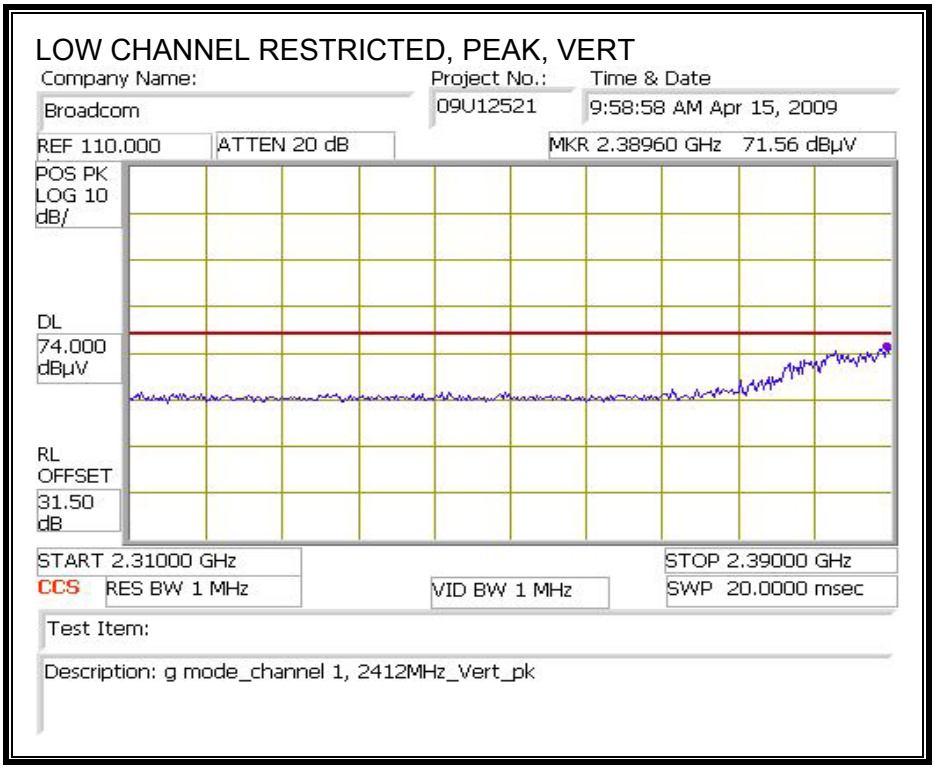
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

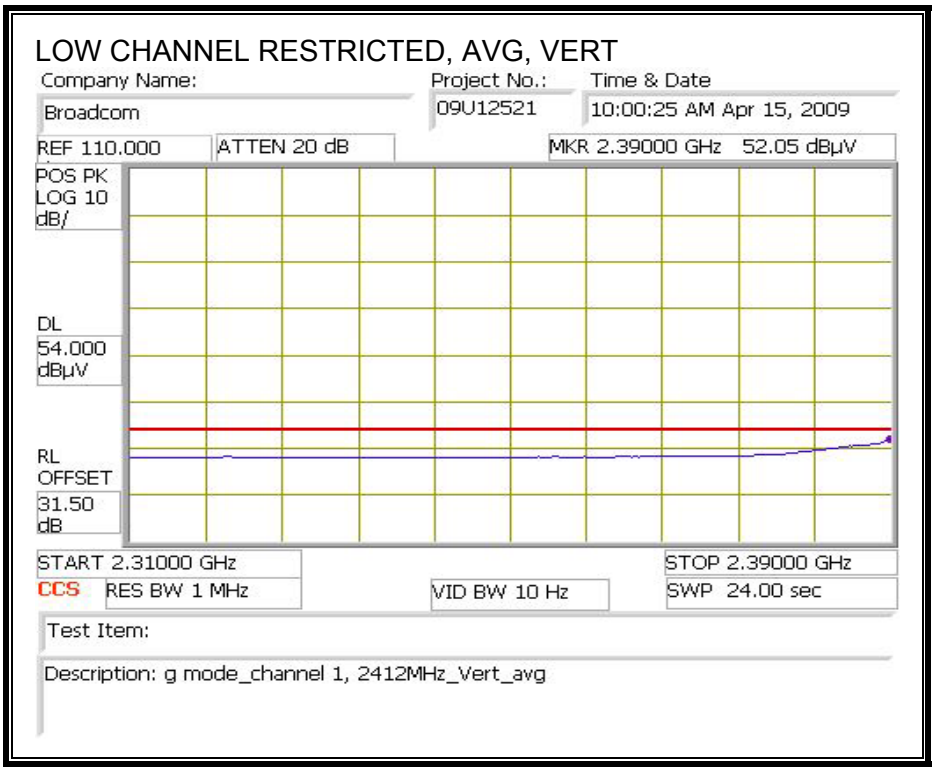
CHANNEL 2412MHz





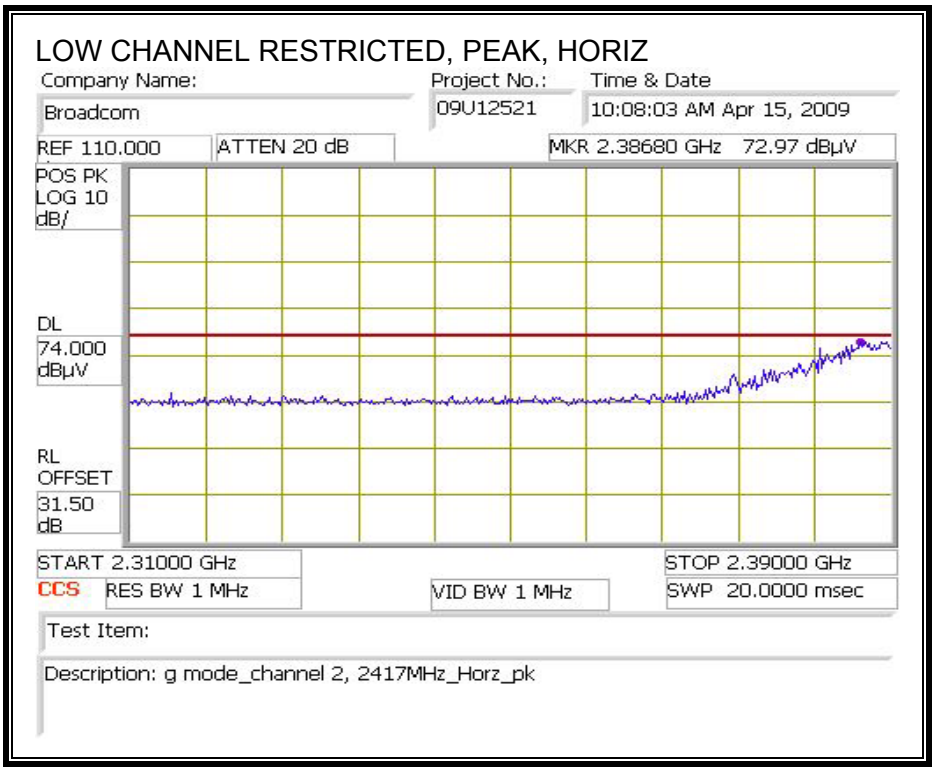
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

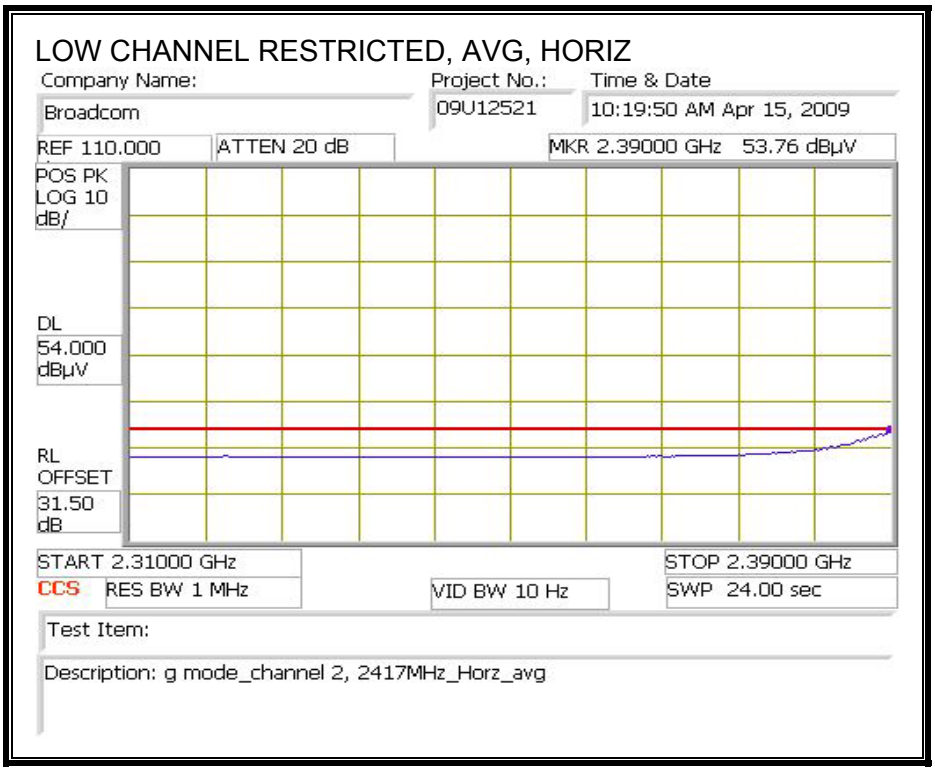




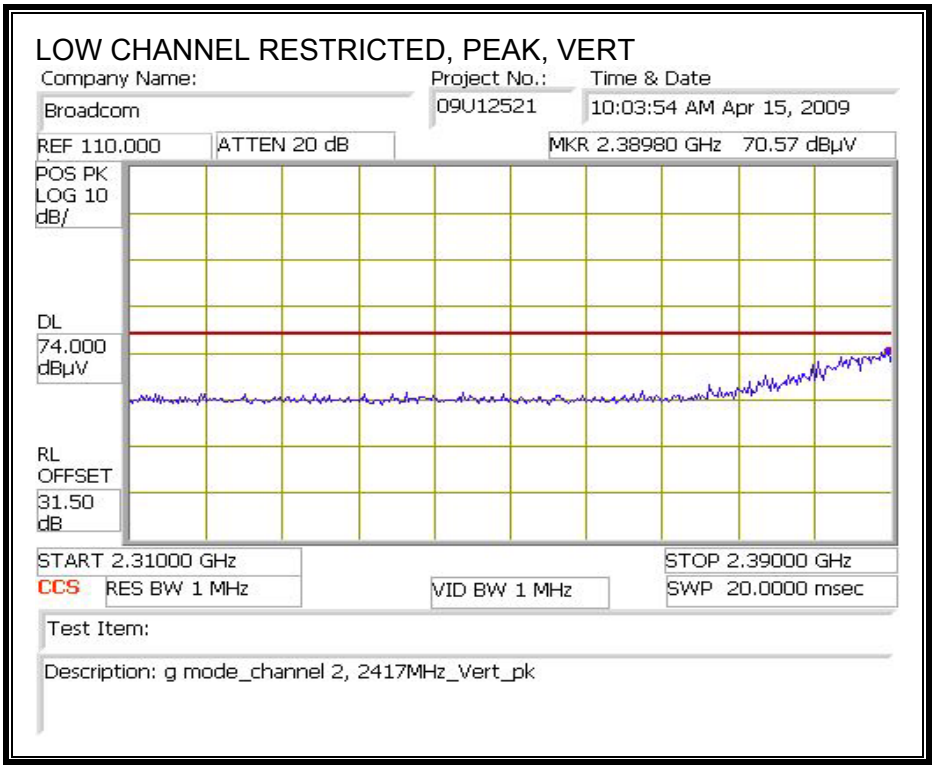
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

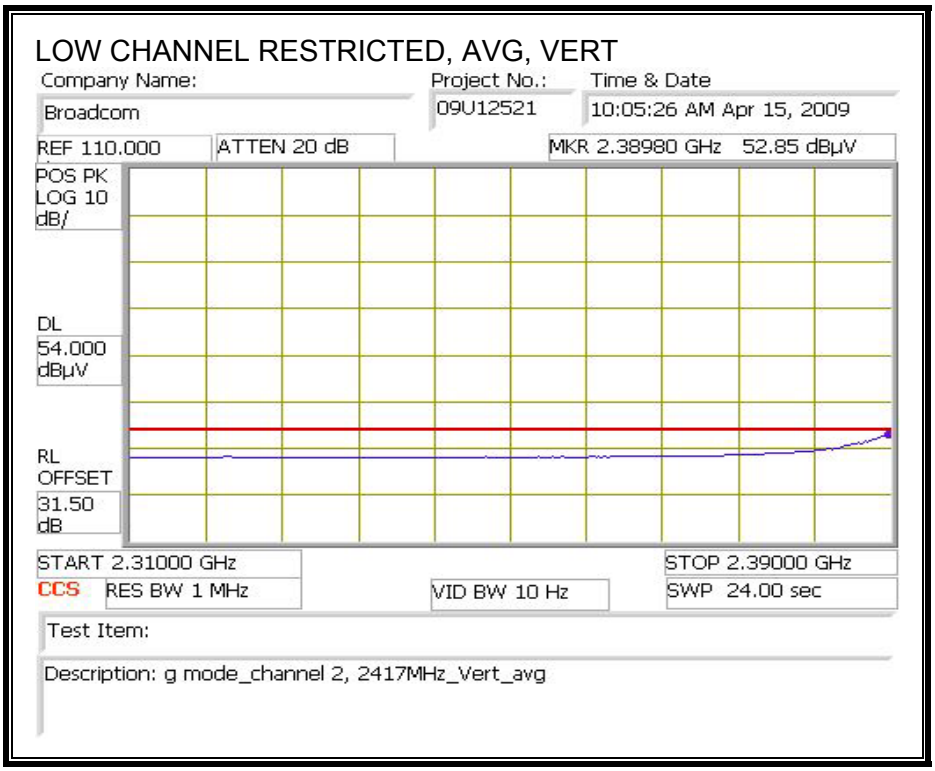
CHANNEL 2417Hz





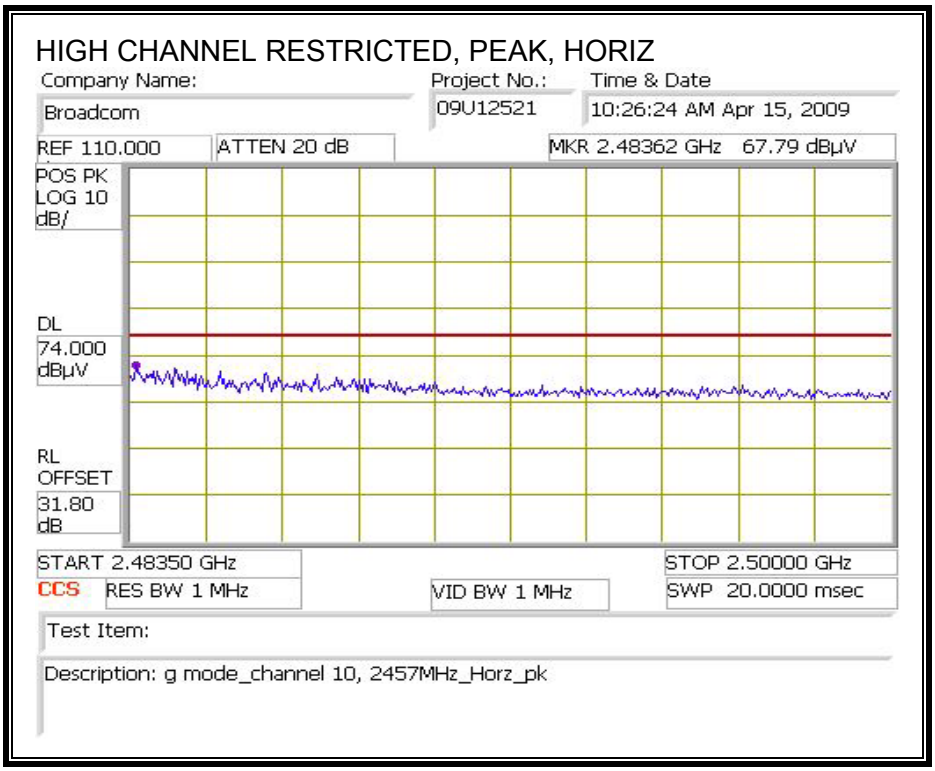
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

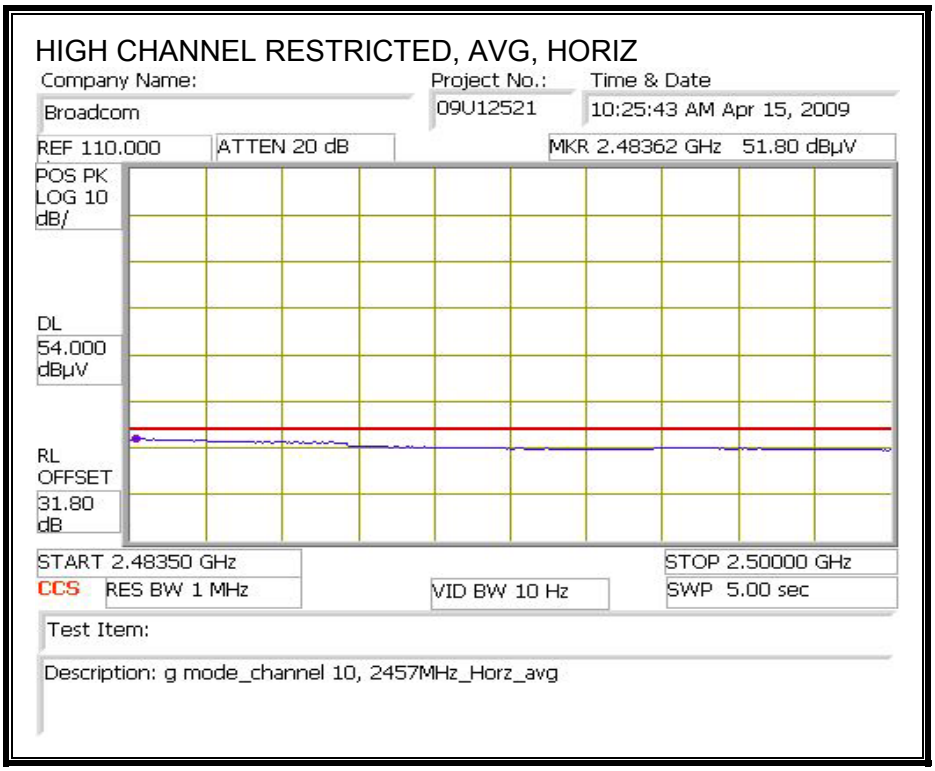




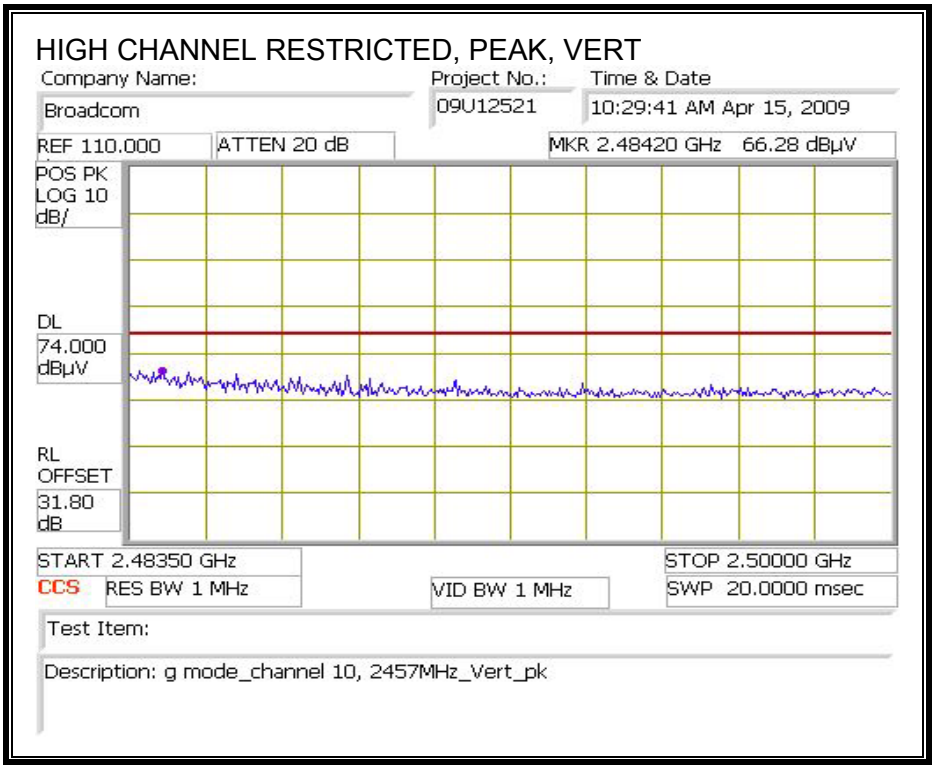
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

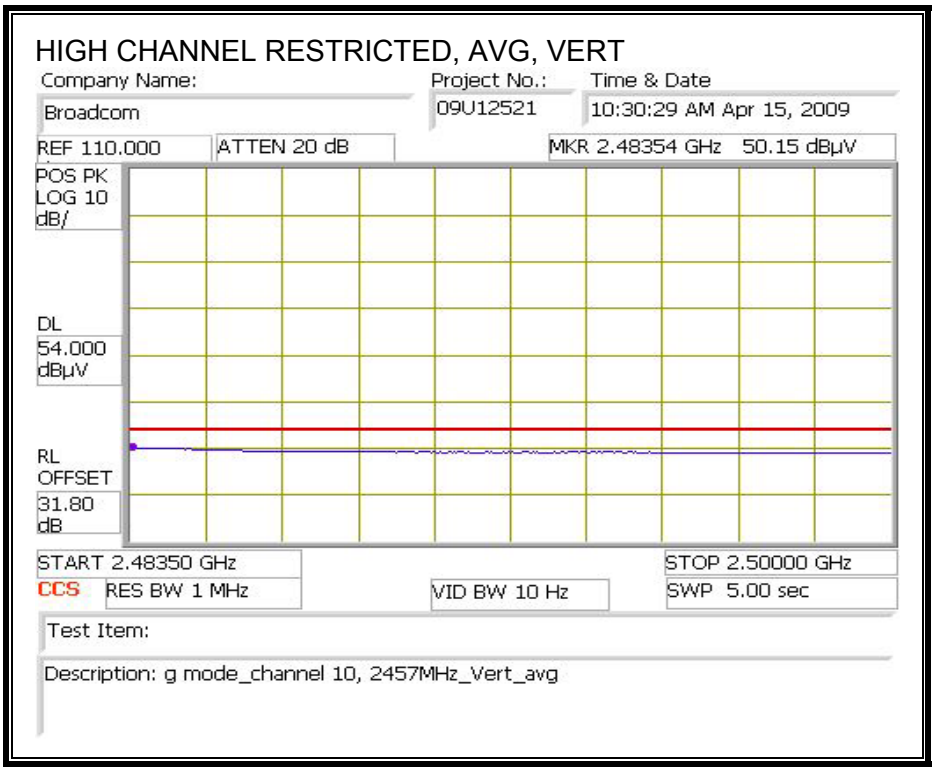
CHANNEL 2457MHZ





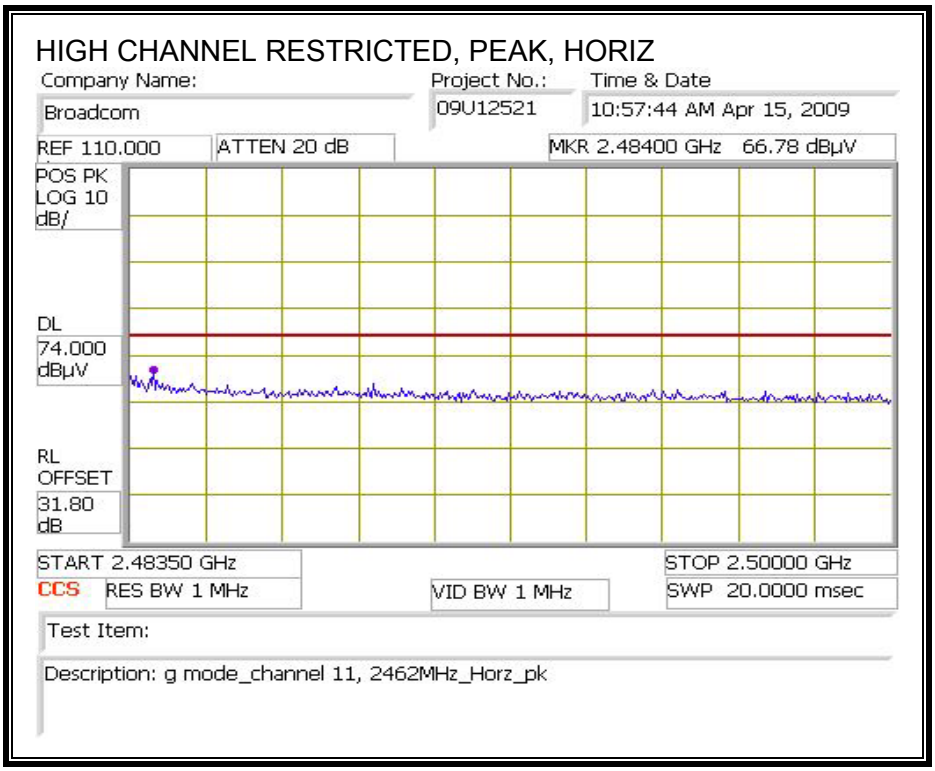
RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

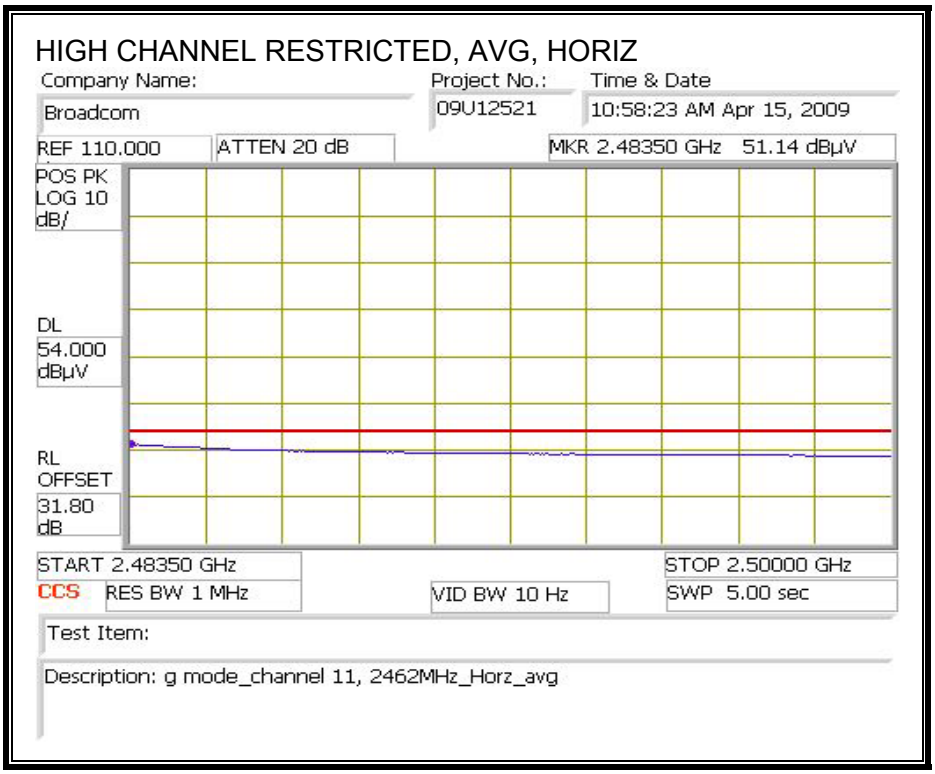




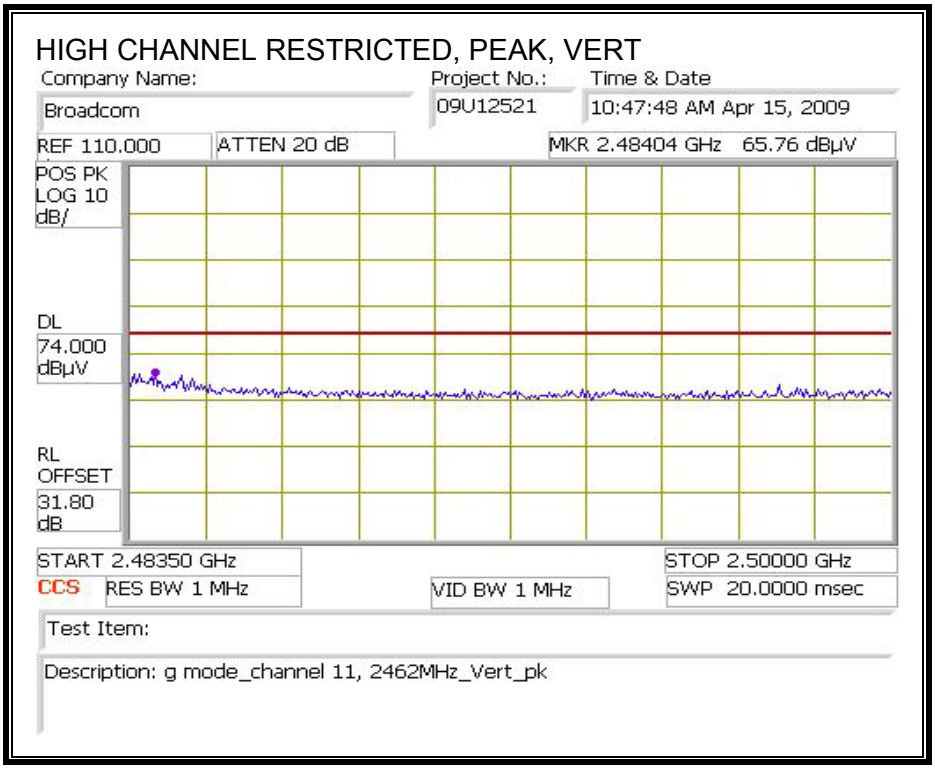
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

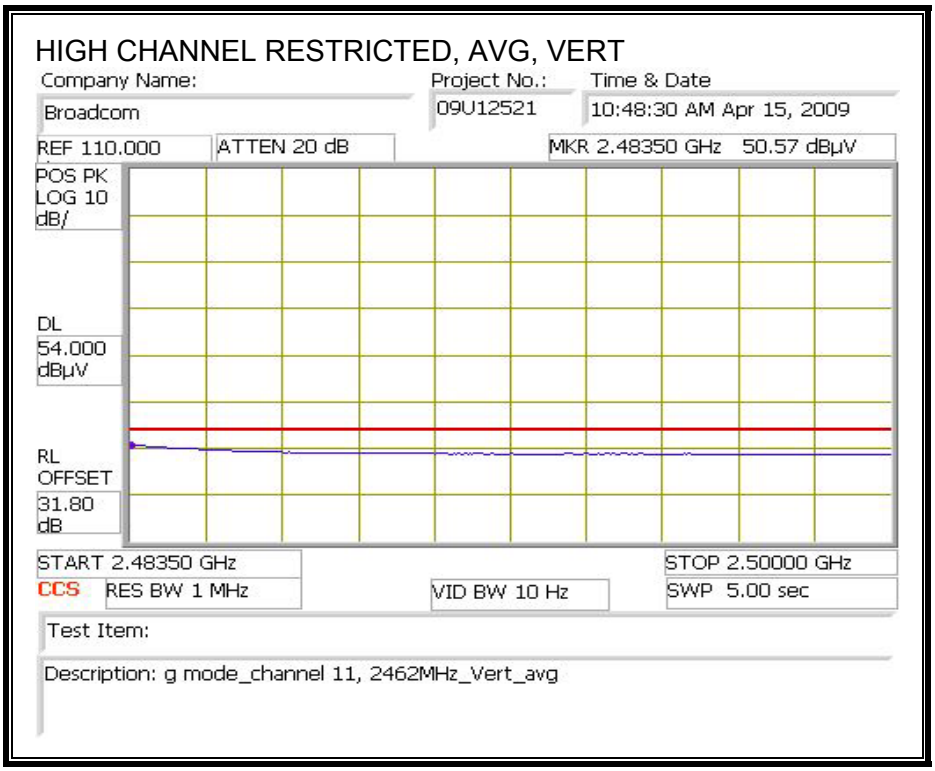
CHANNEL 2462MHz





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Devin Chang
Date: 04/17/09
Project #: 09U12521
Company: Broadcom
EUT Description: EUT with Laptop
Mode Oper: TX_g mode

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

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

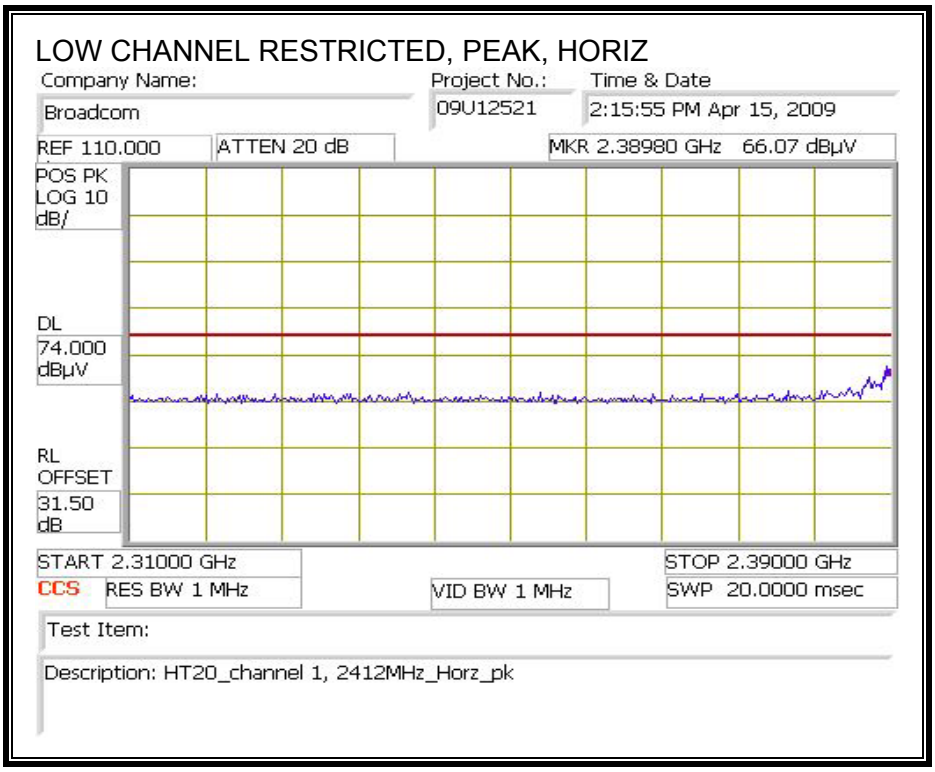
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
2412MHz															
4.824	3.0	43.9	32.8	5.8	-34.8	0.0	0.5	48.2	74.0	-25.8	V	P	120.5	355.9	
4.824	3.0	29.3	32.8	5.8	-34.8	0.0	0.5	33.5	54.0	-20.5	V	A	120.5	355.9	
4.824	3.0	42.7	32.8	5.8	-34.8	0.0	0.5	46.9	74.0	-27.1	H	P	188.4	100.7	
4.824	3.0	28.9	32.8	5.8	-34.8	0.0	0.5	33.2	54.0	-20.8	H	A	188.4	100.7	
2437MHz															
4.874	3.0	44.2	32.8	5.8	-34.9	0.0	0.5	48.5	74.0	-25.5	V	P	100.2	164.0	
4.874	3.0	29.0	32.8	5.8	-34.9	0.0	0.5	33.4	54.0	-20.6	V	A	100.2	164.0	
7.311	3.0	40.5	35.2	7.3	-34.7	0.0	0.5	48.9	74.0	-25.2	V	P	102.4	283.3	
7.311	3.0	26.3	35.2	7.3	-34.7	0.0	0.5	34.6	54.0	-19.4	V	A	102.4	283.3	
4.874	3.0	47.3	32.8	5.8	-34.9	0.0	0.5	51.6	74.0	-22.4	H	P	183.6	1.0	
4.874	3.0	30.1	32.8	5.8	-34.9	0.0	0.5	34.4	54.0	-19.6	H	A	183.6	1.0	
7.311	3.0	39.5	35.2	7.3	-34.7	0.0	0.5	47.8	74.0	-26.2	H	P	101.0	285.6	
7.311	3.0	27.6	35.2	7.3	-34.7	0.0	0.5	35.9	54.0	-18.1	H	A	101.0	285.6	
2462MHz															
4.924	3.0	42.5	32.8	5.9	-34.9	0.0	0.5	46.9	74.0	-27.1	V	P	198.8	43.5	
4.924	3.0	29.3	32.8	5.9	-34.9	0.0	0.5	33.7	54.0	-20.3	V	A	198.8	43.5	
7.386	3.0	37.0	35.3	7.3	-34.6	0.0	0.5	45.5	74.0	-28.5	V	P	168.6	360.0	
7.386	3.0	24.9	35.3	7.3	-34.6	0.0	0.5	33.4	54.0	-20.6	V	A	168.6	360.0	
4.924	3.0	42.3	32.8	5.9	-34.9	0.0	0.5	46.7	74.0	-27.3	V	P	176.0	54.8	
4.924	3.0	28.4	32.8	5.9	-34.9	0.0	0.5	32.8	54.0	-21.2	V	A	176.0	54.8	
7.386	3.0	38.5	35.3	7.3	-34.6	0.0	0.5	46.9	74.0	-27.1	V	P	141.2	286.3	
7.386	3.0	25.6	35.3	7.3	-34.6	0.0	0.5	34.1	54.0	-19.9	V	A	141.2	286.3	

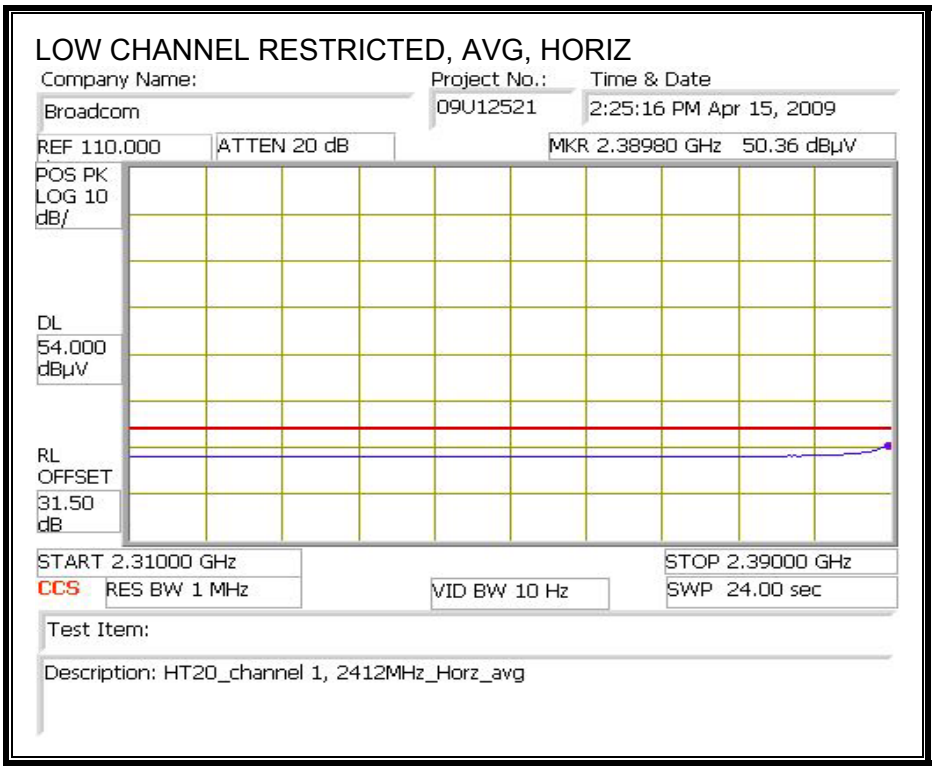
Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor.

8.2.3. TRANSMITTER ABOVE 1 GHz FOR 802.11n HT20 MODE

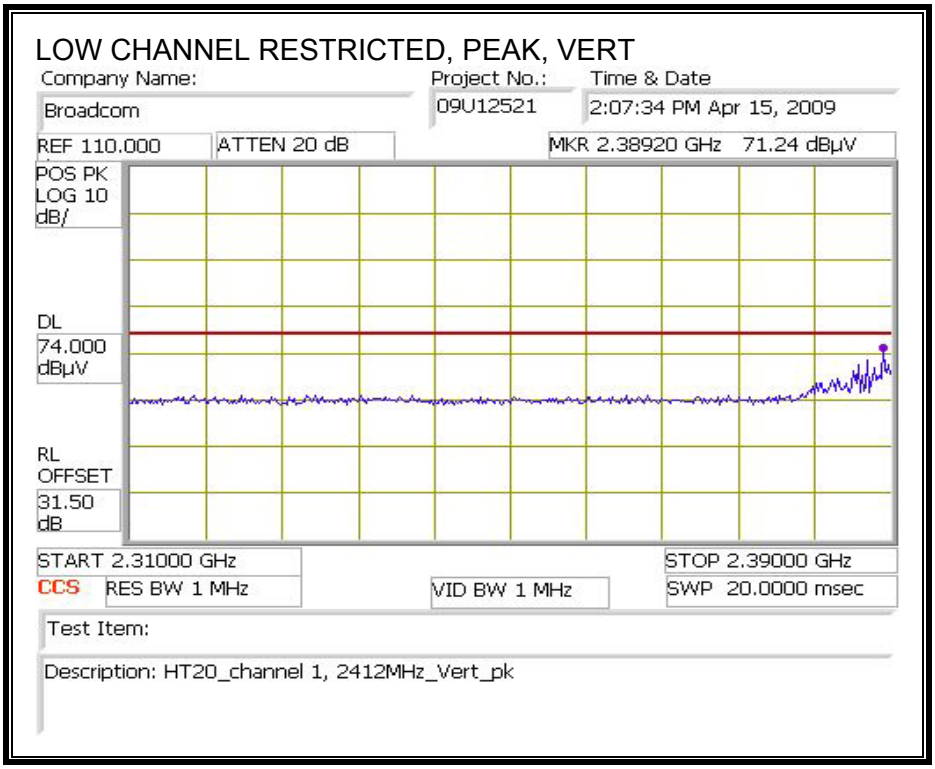
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

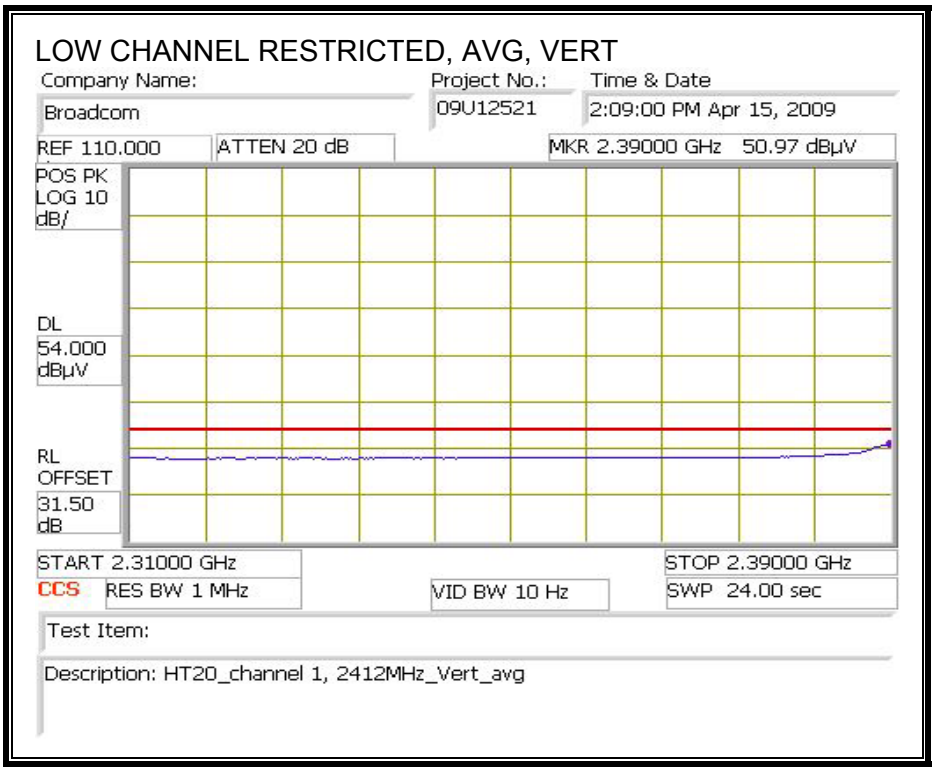
CHANNEL 2412MHz





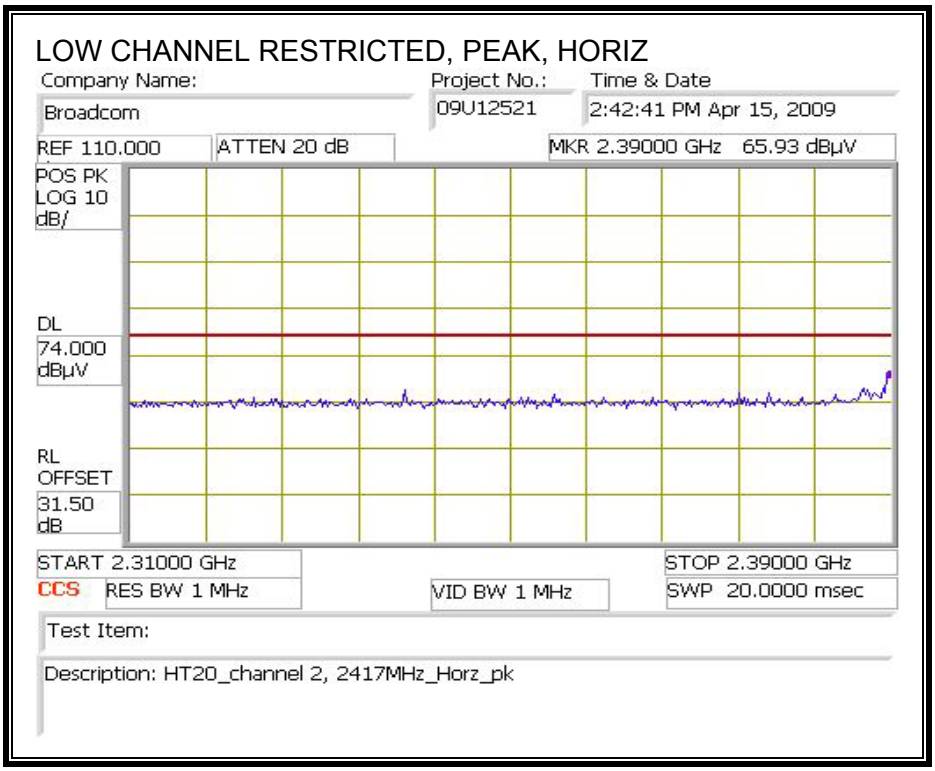
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

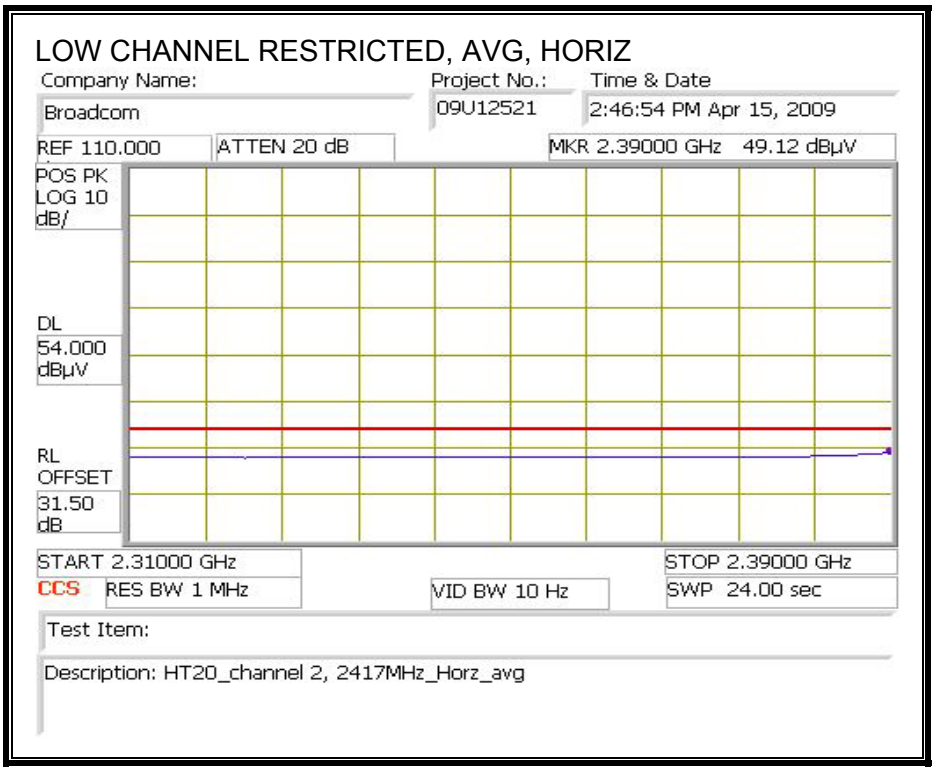




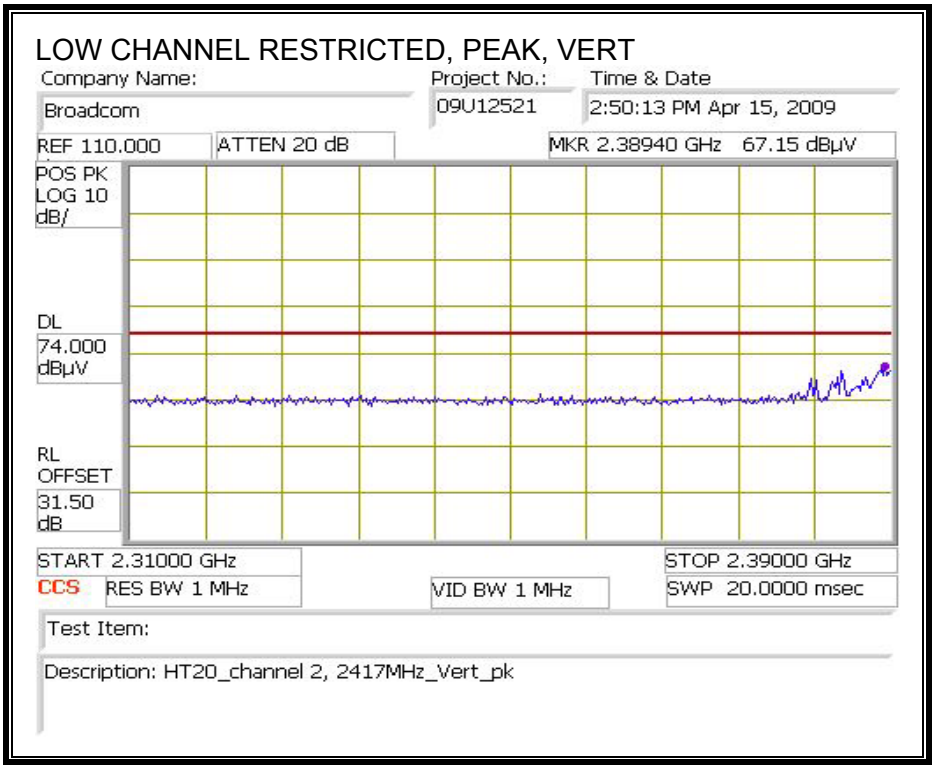
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

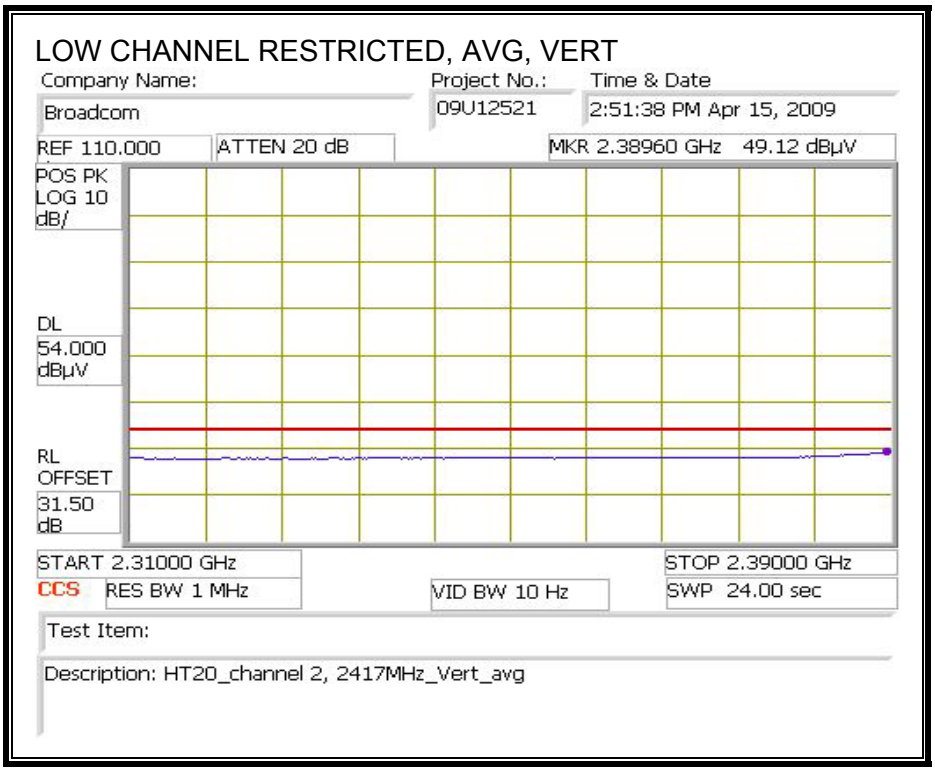
CHANNEL 2417MHz





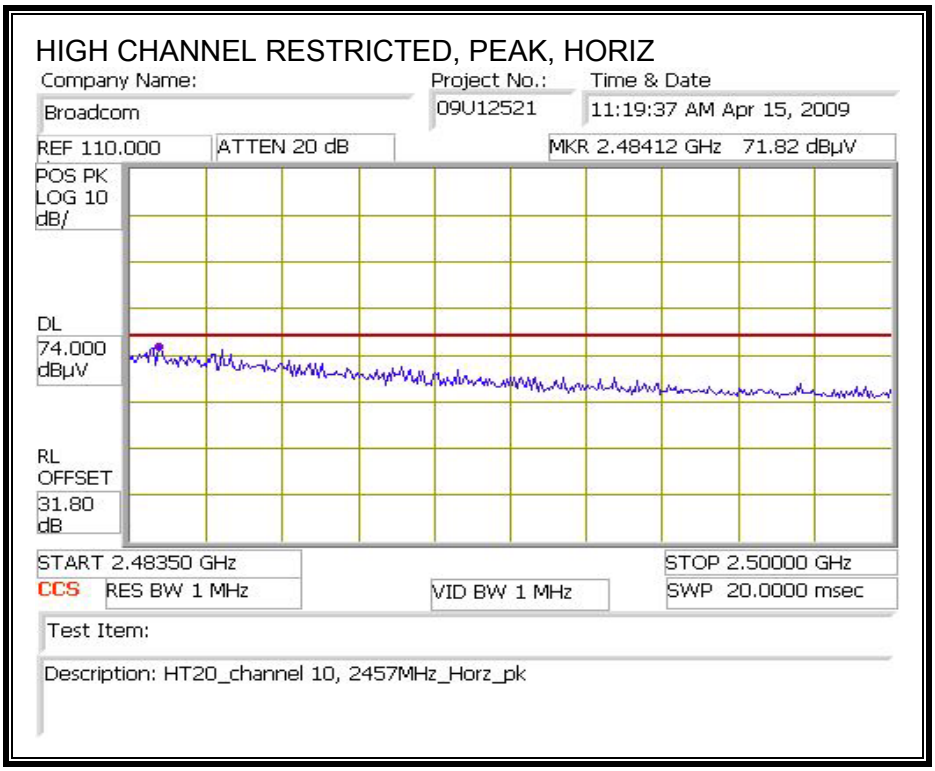
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

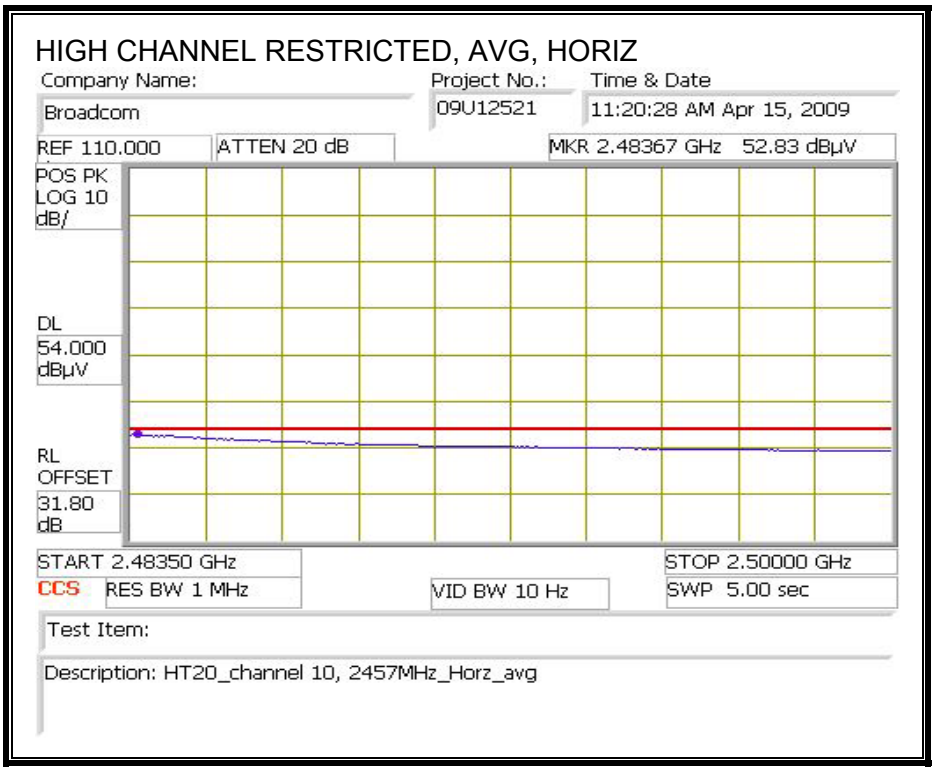




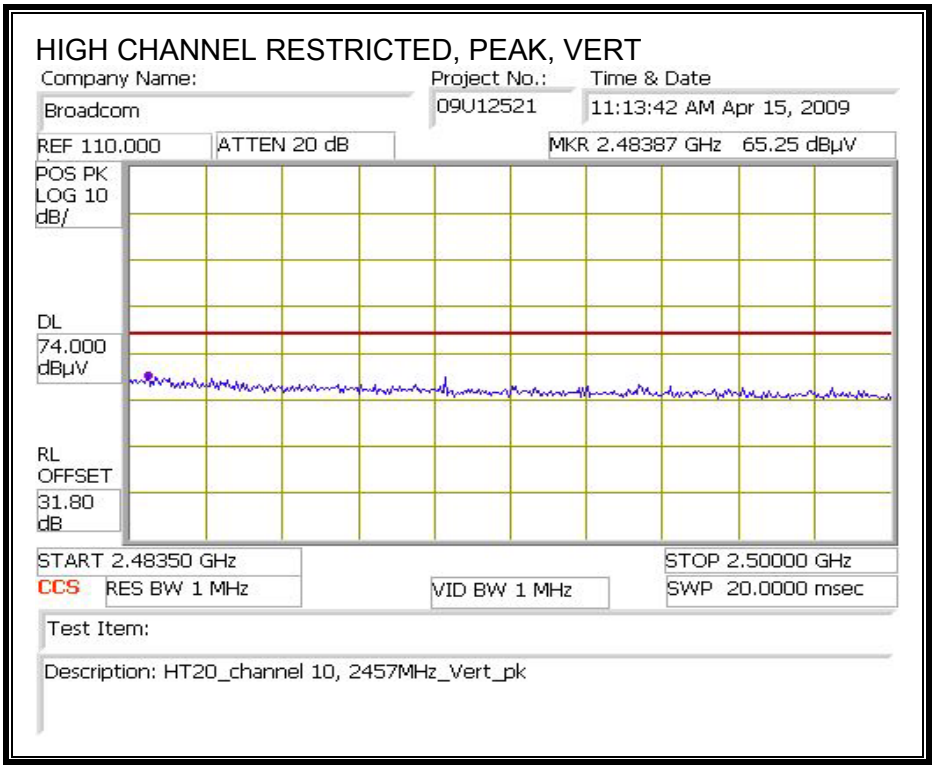
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

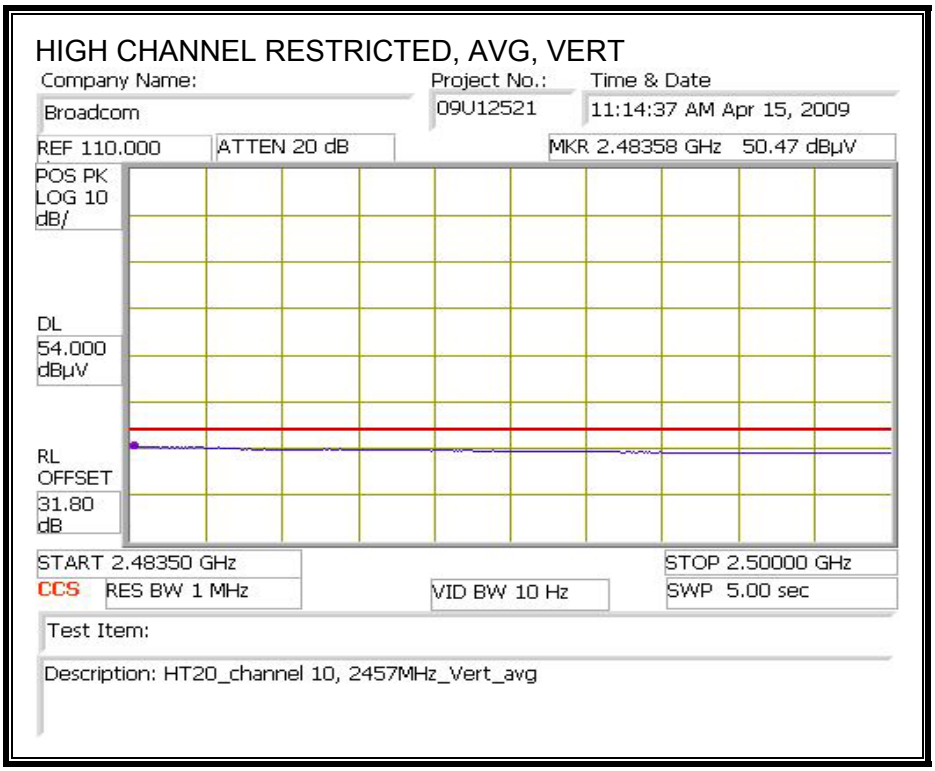
CHANNEL 2457MHz





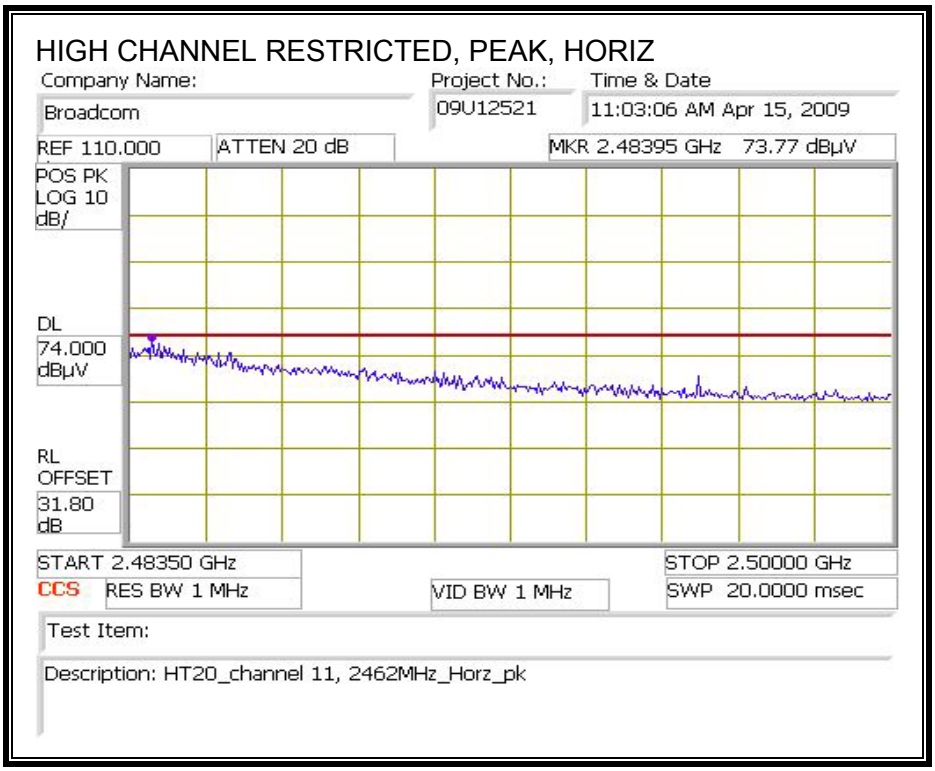
RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

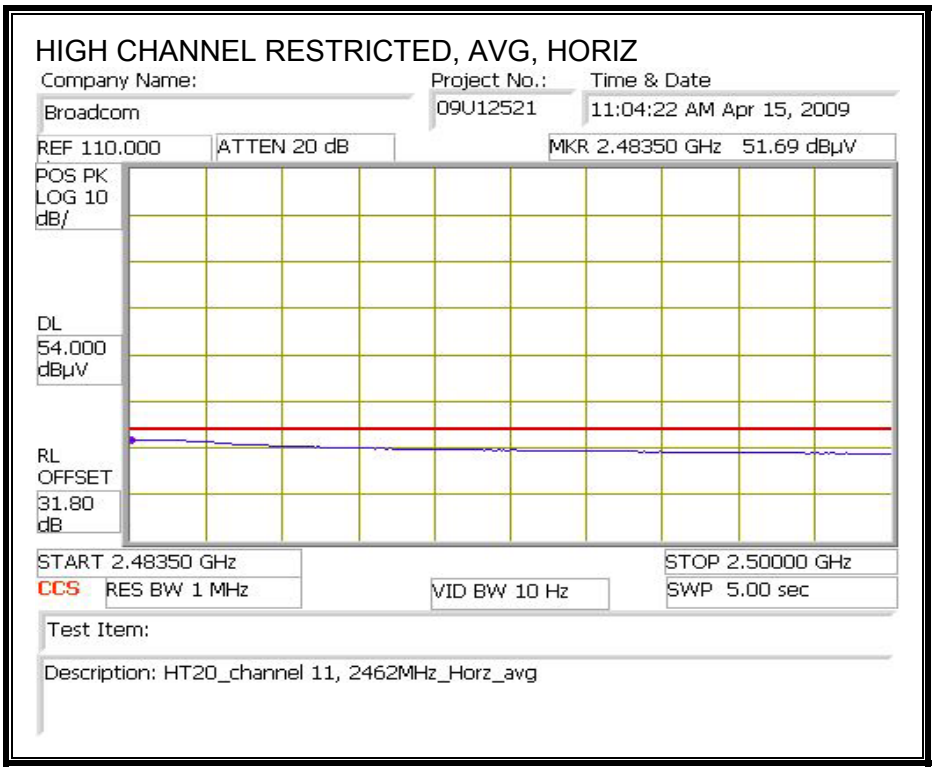




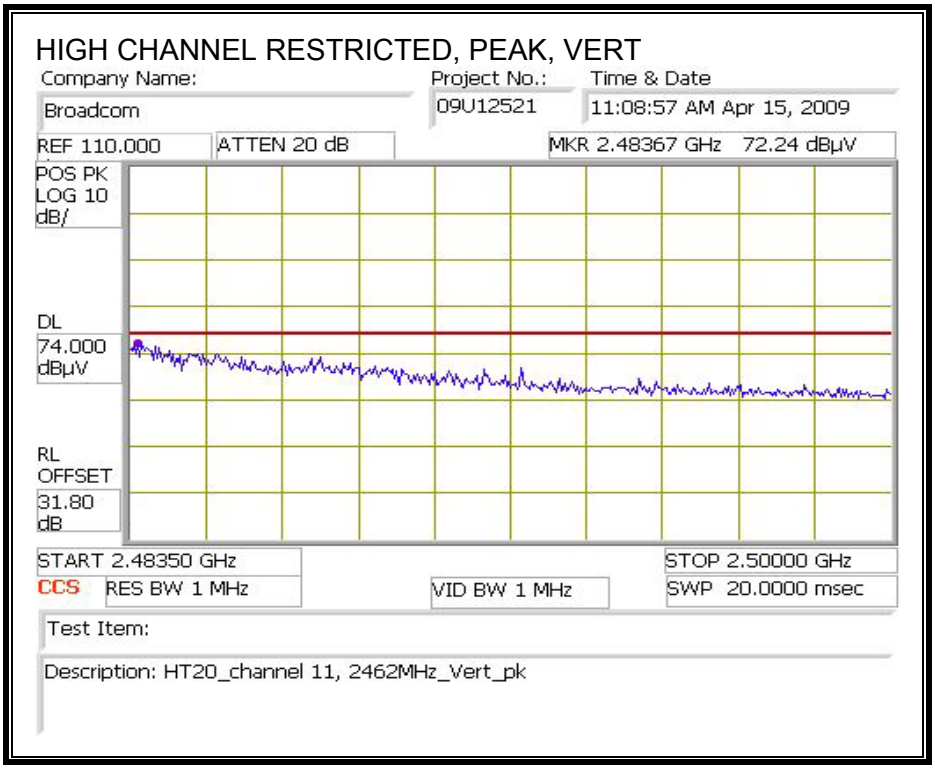
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

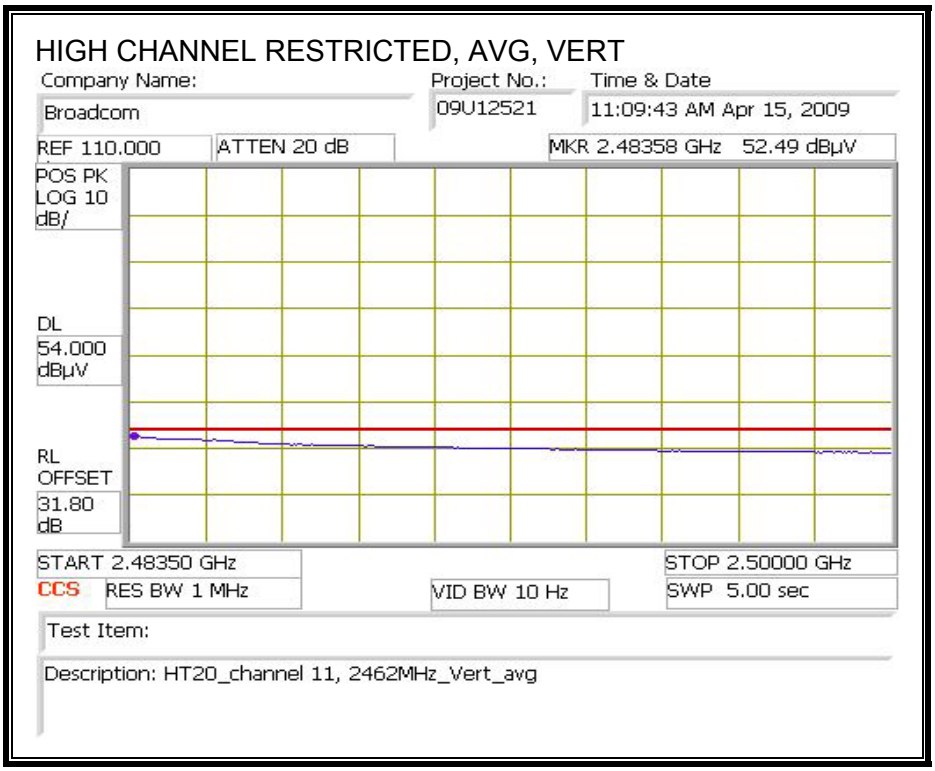
CHANNEL 2462MHz





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Devin Chang
Date: 04/17/09
Project #: 09U12521
Company: Broadcom
EUT Description: EUT with Laptop
Mode Oper: TX_HT20 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	

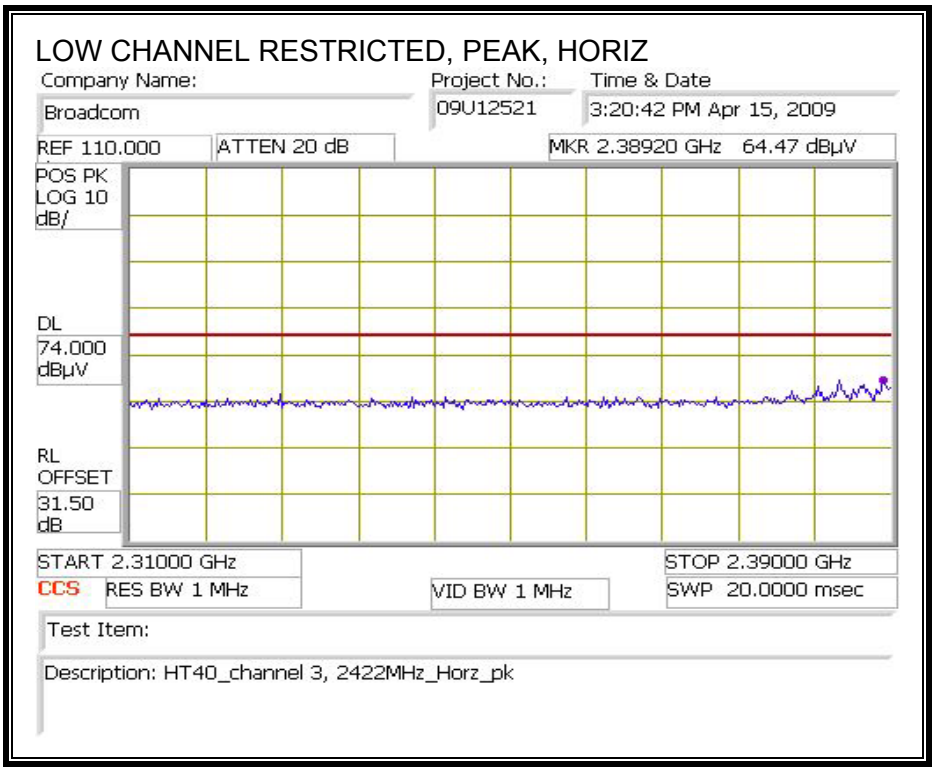
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
2412MHz															
4.824	3.0	40.8	32.8	5.8	-34.8	0.0	0.5	45.0	74.0	-29.0	V	P	146.9	77.0	
4.824	3.0	28.3	32.8	5.8	-34.8	0.0	0.5	32.5	54.0	-21.5	V	A	146.9	77.0	
4.824	3.0	39.6	32.8	5.8	-34.8	0.0	0.5	43.9	74.0	-30.1	H	P	116.7	0.7	
4.824	3.0	27.8	32.8	5.8	-34.8	0.0	0.5	32.1	54.0	-21.9	H	A	116.7	0.7	
2437MHz															
4.874	3.0	44.9	32.8	5.8	-34.9	0.0	0.5	49.3	74.0	-24.7	V	P	100.8	73.9	
4.874	3.0	32.2	32.8	5.8	-34.9	0.0	0.5	36.5	54.0	-17.5	V	A	100.8	73.9	
7.311	3.0	63.0	35.2	7.3	-34.7	0.0	0.5	71.4	74.0	-2.7	V	P	100.7	285.1	
7.311	3.0	43.0	35.2	7.3	-34.7	0.0	0.5	51.3	54.0	-2.7	V	A	100.7	285.1	
4.874	3.0	48.0	32.8	5.8	-34.9	0.0	0.5	52.3	74.0	-21.7	H	P	130.9	358.3	
4.874	3.0	35.9	32.8	5.8	-34.9	0.0	0.5	40.2	54.0	-13.8	H	A	130.9	358.3	
7.311	3.0	63.2	35.2	7.3	-34.7	0.0	0.5	71.5	74.0	-2.5	H	P	100.0	283.5	
7.311	3.0	42.7	35.2	7.3	-34.7	0.0	0.5	51.0	54.0	-3.0	H	A	100.0	283.5	
2462MHz															
4.924	3.0	40.8	32.8	5.9	-34.9	0.0	0.5	45.2	74.0	-28.8	V	P	100.8	98.3	
4.924	3.0	28.1	32.8	5.9	-34.9	0.0	0.5	32.5	54.0	-21.5	V	A	100.8	98.3	
7.386	3.0	59.6	35.3	7.3	-34.6	0.0	0.5	68.1	74.0	-5.9	V	P	100.7	285.6	
7.386	3.0	30.5	35.3	7.3	-34.6	0.0	0.5	39.0	54.0	-15.0	V	A	100.7	285.6	
4.924	3.0	41.4	32.8	5.9	-34.9	0.0	0.5	45.8	74.0	-28.2	V	P	100.6	98.0	
4.924	3.0	27.9	32.8	5.9	-34.9	0.0	0.5	32.3	54.0	-21.7	V	A	100.6	98.0	
7.386	3.0	59.5	35.3	7.3	-34.6	0.0	0.5	68.0	74.0	-6.0	V	P	100.0	284.6	
7.386	3.0	30.3	35.3	7.3	-34.6	0.0	0.5	38.8	54.0	-15.2	V	A	100.0	284.6	

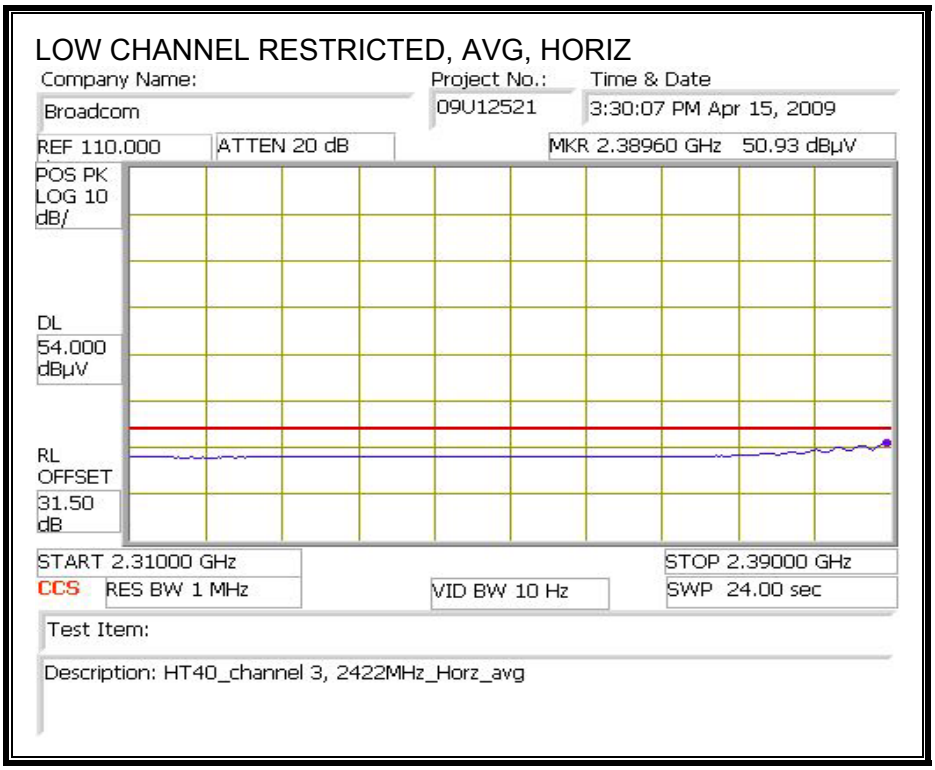
Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor.

8.2.4. TRANSMITTER ABOVE 1 GHz FOR 802.11n HT40 MODE

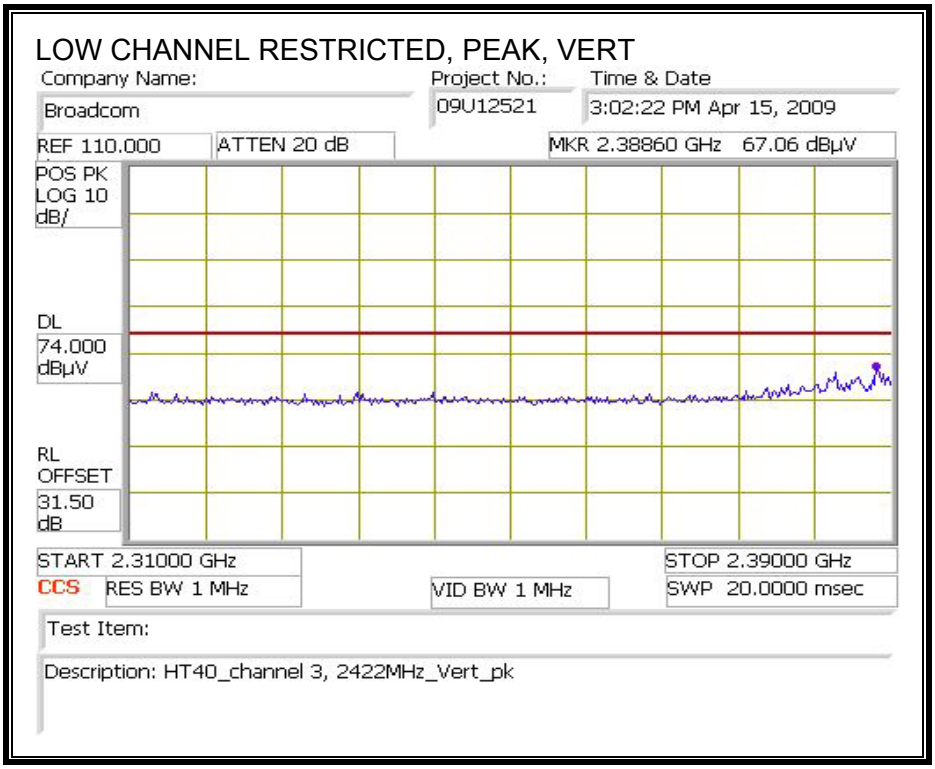
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

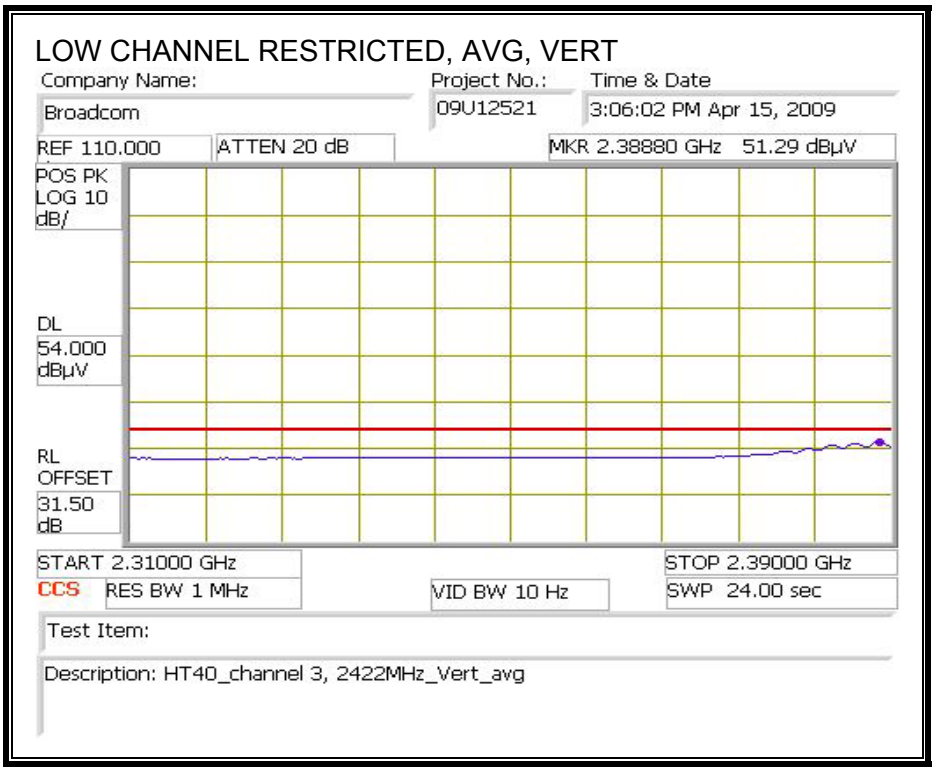
CHANNEL 2422MHz





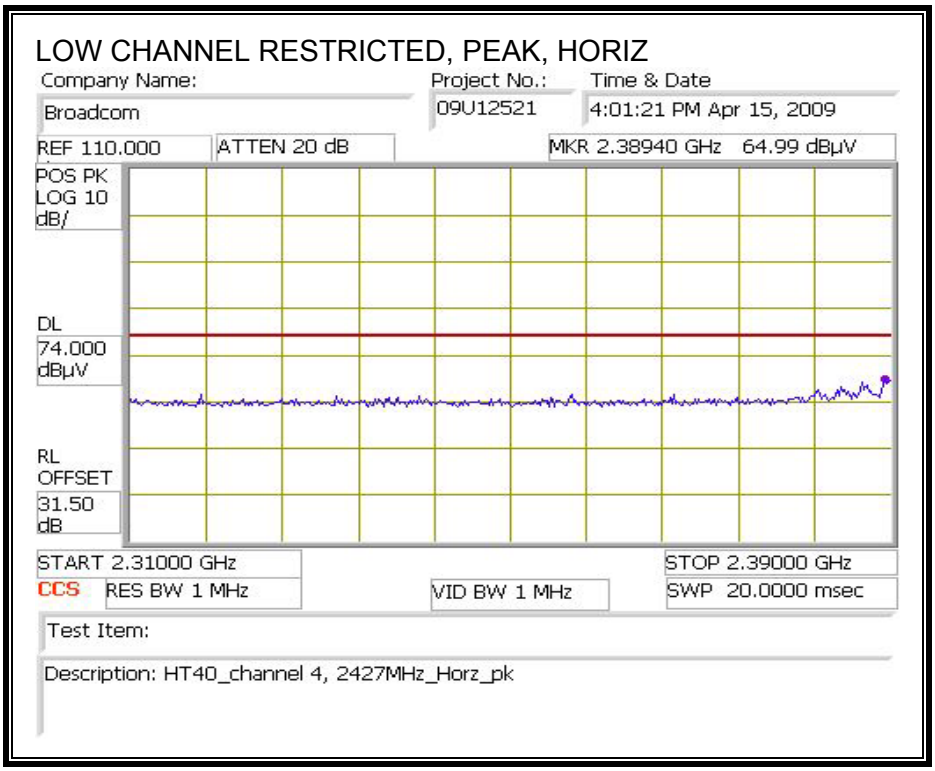
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

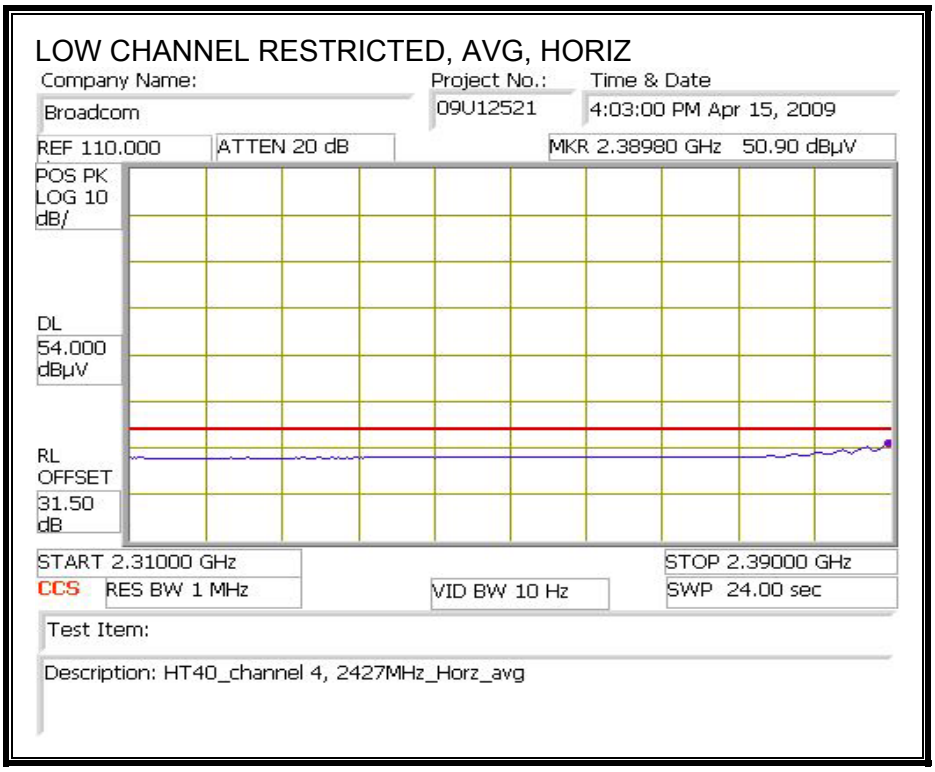




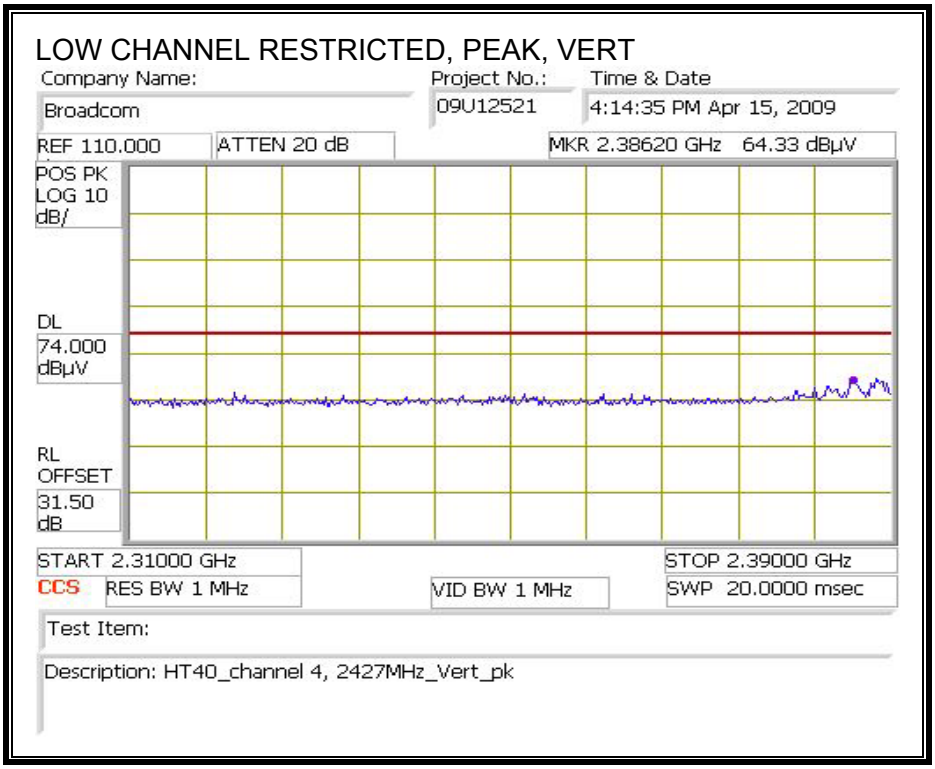
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

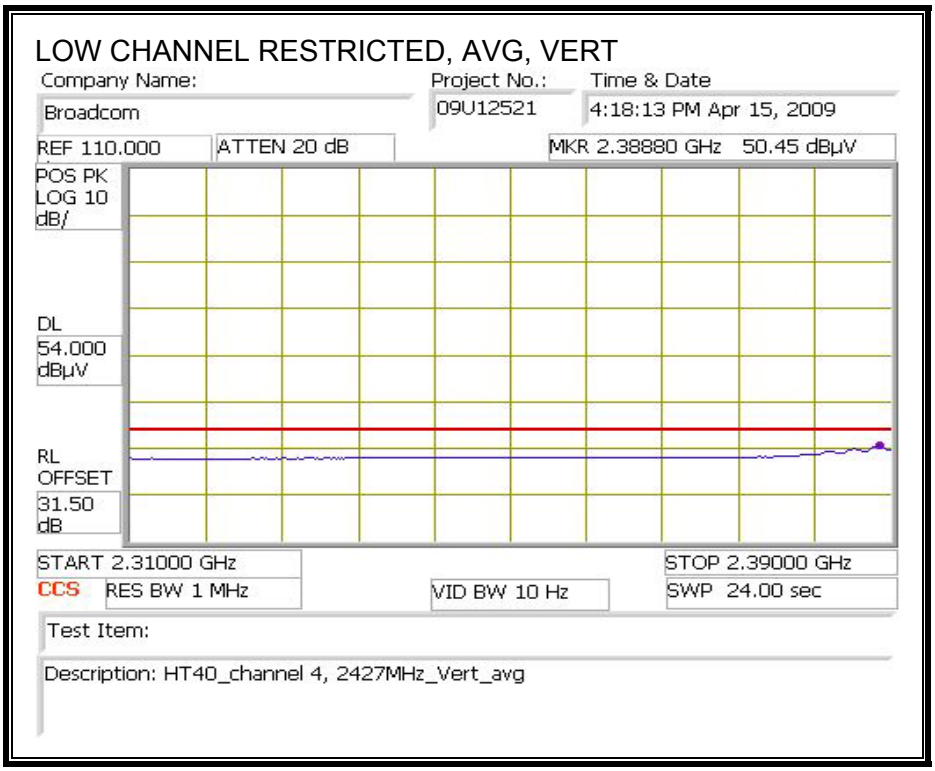
CHANNEL 2427MHz





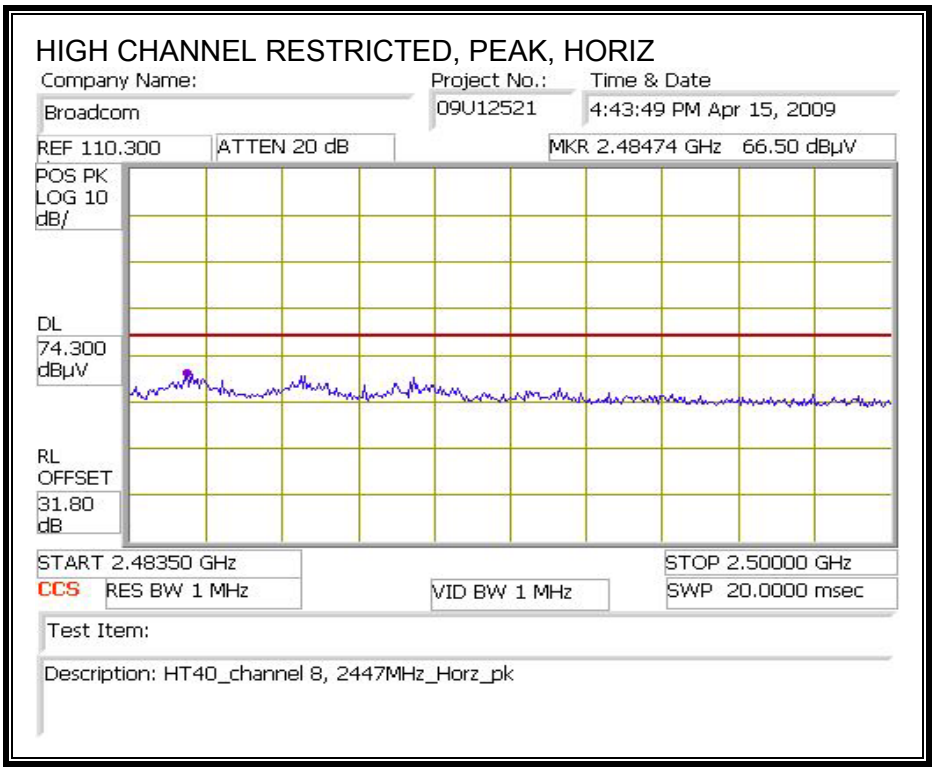
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

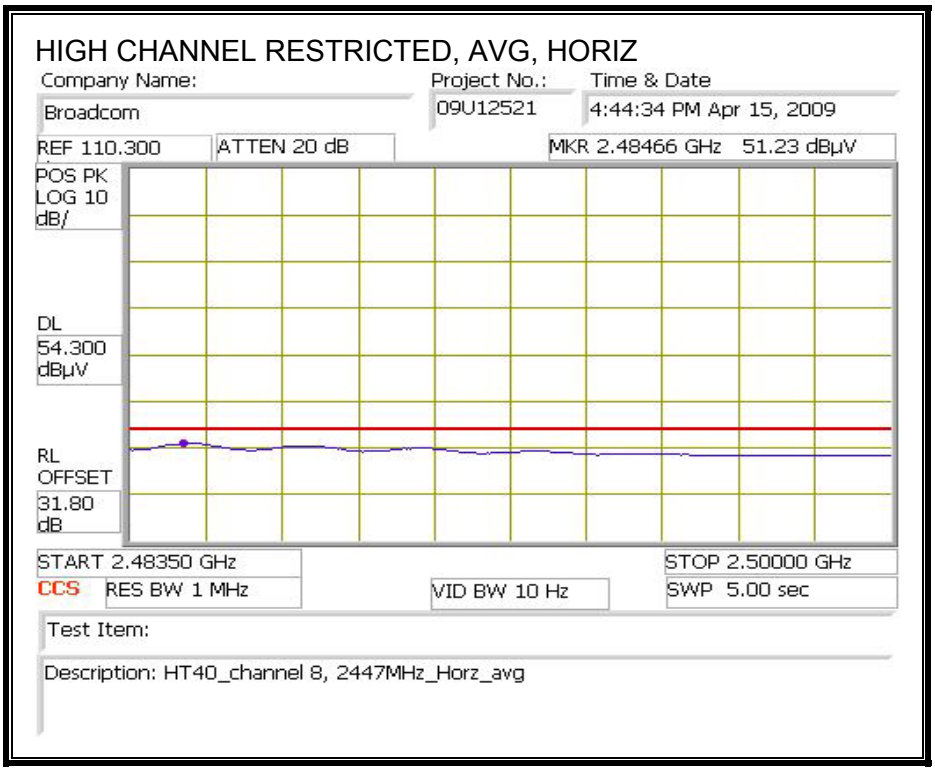




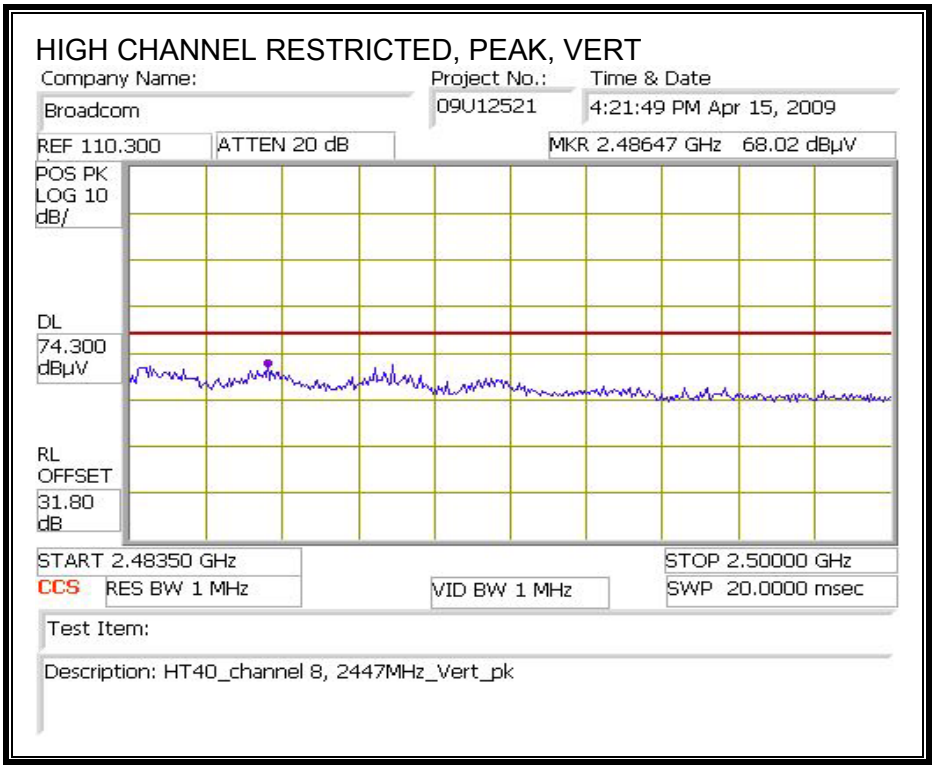
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

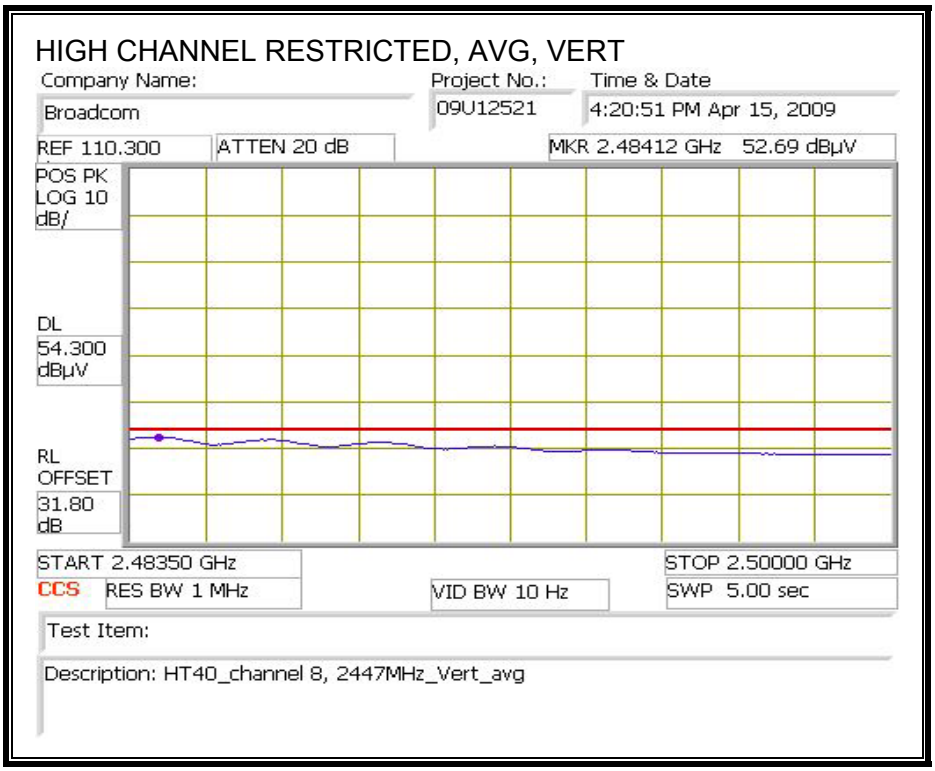
CHANNEL 2447MHz





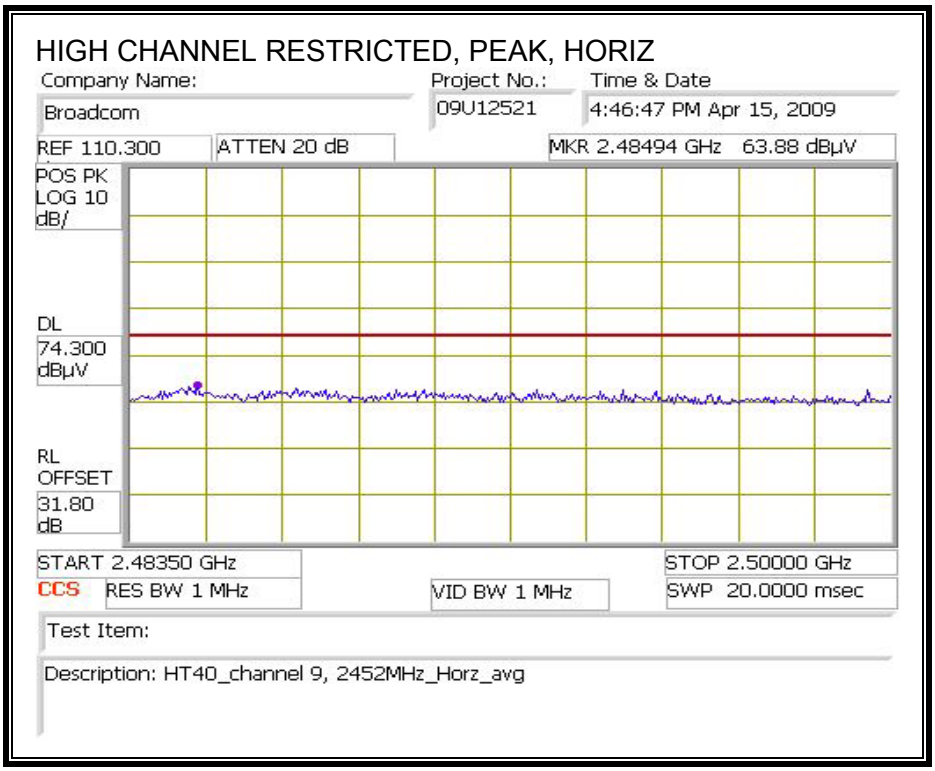
RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

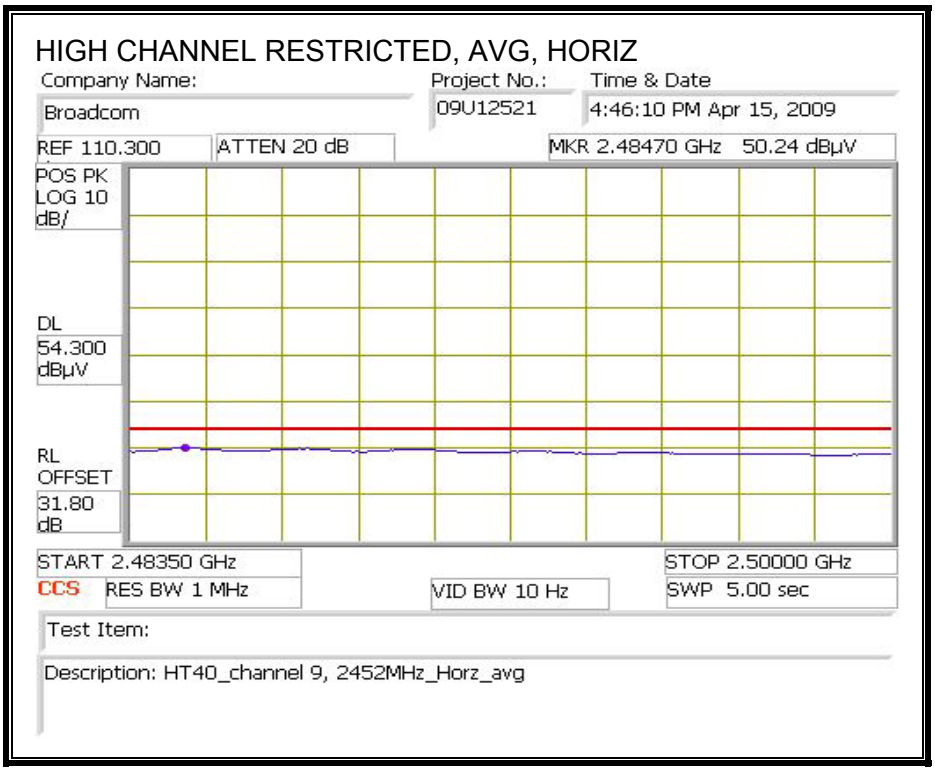




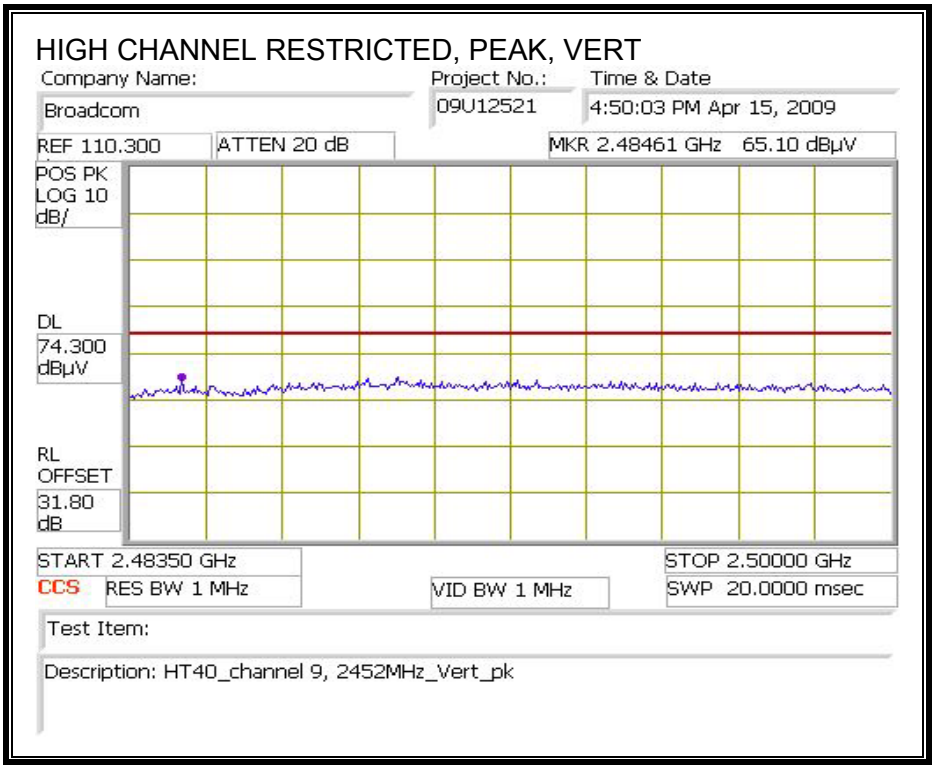
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

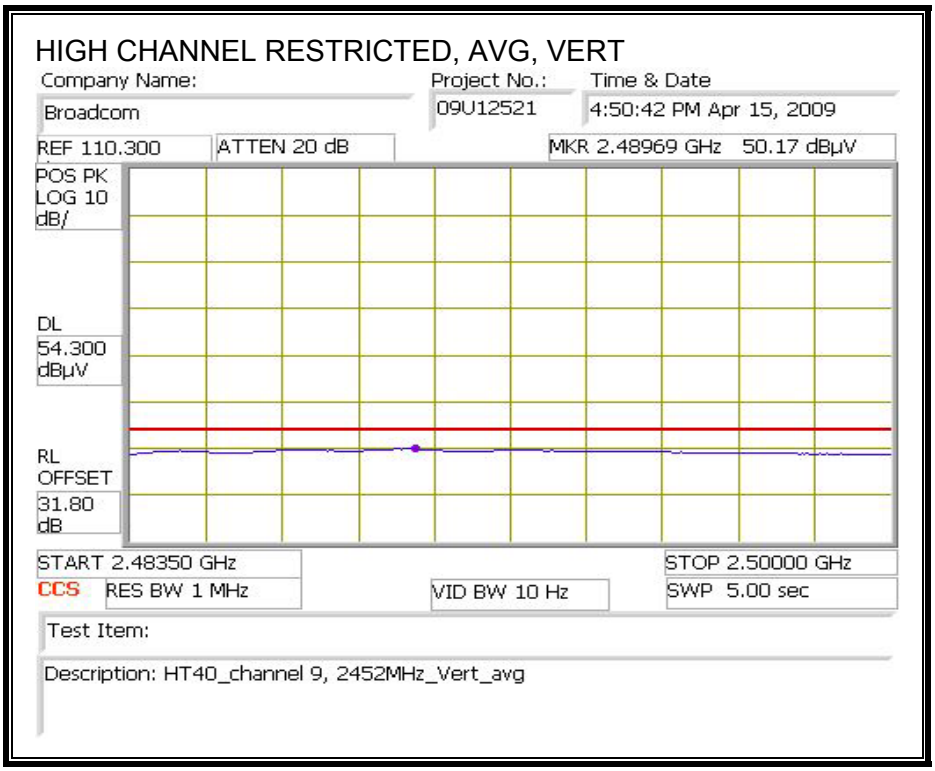
CHANNEL 2452MHz





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Devin Chang
Date: 04/17/09
Project #: 09U12521
Company: Broadcom
EUT Description: EUT with Laptop
Mode Oper: TX_HT40 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	Ant.High cm	Table Angle Degree	Notes
2422MHz															
4.844	3.0	38.1	32.8	5.8	-34.8	0.0	0.5	42.4	74.0	-31.6	V	P	119.6	13.0	
4.844	3.0	26.3	32.8	5.8	-34.8	0.0	0.5	30.5	54.0	-23.5	V	A	119.6	13.0	
7.266	3.0	37.7	35.1	7.2	-34.7	0.0	0.5	45.9	74.0	-28.1	V	P	110.8	173.5	
7.266	3.0	25.5	35.1	7.2	-34.7	0.0	0.5	33.8	54.0	-20.2	V	A	110.8	173.5	
4.844	3.0	39.0	32.8	5.8	-34.8	0.0	0.5	43.3	74.0	-30.7	H	P	143.5	42.2	
4.844	3.0	26.5	32.8	5.8	-34.8	0.0	0.5	30.8	54.0	-23.2	H	A	143.5	42.2	
7.266	3.0	38.5	35.1	7.2	-34.7	0.0	0.5	46.8	74.0	-27.2	H	P	109.3	0.4	
7.266	3.0	25.2	35.1	7.2	-34.7	0.0	0.5	33.5	54.0	-20.5	H	A	109.3	0.4	
2437MHz															
4.874	3.0	39.5	32.8	5.8	-34.9	0.0	0.5	43.8	74.0	-30.2	V	P	167.7	32.2	
4.874	3.0	26.6	32.8	5.8	-34.9	0.0	0.5	30.9	54.0	-23.1	V	A	167.7	32.2	
7.311	3.0	37.6	35.2	7.3	-34.7	0.0	0.5	45.9	74.0	-28.1	V	P	172.6	56.7	
7.311	3.0	25.1	35.2	7.3	-34.7	0.0	0.5	33.4	54.0	-20.6	V	A	172.6	56.7	
4.874	3.0	38.9	32.8	5.8	-34.9	0.0	0.5	43.3	74.0	-30.7	H	P	182.9	67.1	
4.874	3.0	26.3	32.8	5.8	-34.9	0.0	0.5	30.6	54.0	-23.4	H	A	182.9	67.1	
7.311	3.0	37.9	35.2	7.3	-34.7	0.0	0.5	46.2	74.0	-27.8	H	P	144.7	104.5	
7.311	3.0	24.9	35.2	7.3	-34.7	0.0	0.5	33.3	54.0	-20.7	H	A	144.7	104.5	
2452MHz															
4.904	3.0	37.9	32.8	5.9	-34.9	0.0	0.5	42.3	74.0	-31.7	V	P	183.4	251.8	
4.904	3.0	25.5	32.8	5.9	-34.9	0.0	0.5	29.9	54.0	-24.1	V	A	183.4	251.8	
7.356	3.0	36.9	35.3	7.3	-34.6	0.0	0.5	45.3	74.0	-28.7	V	P	113.0	99.1	
7.356	3.0	24.5	35.3	7.3	-34.6	0.0	0.5	32.9	54.0	-21.1	V	A	113.0	99.1	
4.904	3.0	39.3	32.8	5.9	-34.9	0.0	0.5	43.7	74.0	-30.3	H	P	183.7	287.2	
4.904	3.0	26.3	32.8	5.9	-34.9	0.0	0.5	30.7	54.0	-23.3	H	A	183.7	287.2	
7.356	3.0	38.4	35.3	7.3	-34.6	0.0	0.5	46.8	74.0	-27.2	H	P	100.1	296.7	
7.356	3.0	24.7	35.3	7.3	-34.6	0.0	0.5	33.1	54.0	-20.9	H	A	100.1	296.7	

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. RECEIVER ABOVE 1 GHz FOR 20 MHz BANDWIDTH

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Devin Chang
Date: 04/17/09
Project #: 09U12521
Company: Broadcom
EUT Description: EUT with Laptop
Mode Oper: RX mode_20MHz

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
1.294	3.0	62.4	25.0	2.7	-35.9	0.0	0.0	54.2	74.0	-19.8	V	P	158.9	237.1	
1.294	3.0	47.8	25.0	2.7	-35.9	0.0	0.0	39.6	54.0	-14.4	V	A	158.9	237.1	
2.489	3.0	70.5	28.5	3.9	-35.1	0.0	0.0	67.9	74.0	-6.1	V	P	101.3	297.1	
2.489	3.0	47.0	28.5	3.9	-35.1	0.0	0.0	44.3	54.0	-9.7	V	A	101.3	297.1	
4.987	3.0	49.9	32.9	5.9	-34.9	0.0	0.6	54.4	74.0	-19.6	V	P	113.2	228.4	
4.987	3.0	29.7	32.9	5.9	-34.9	0.0	0.6	34.2	54.0	-19.8	V	A	113.2	228.4	
1.294	3.0	60.7	25.0	2.7	-35.9	0.0	0.0	52.5	74.0	-21.5	H	P	140.0	46.3	
1.294	3.0	46.4	25.0	2.7	-35.9	0.0	0.0	38.2	54.0	-15.8	H	A	140.0	46.3	
2.489	3.0	62.3	28.5	3.9	-35.1	0.0	0.0	59.6	74.0	-14.4	H	P	101.3	108.6	
2.489	3.0	40.1	28.5	3.9	-35.1	0.0	0.0	37.4	54.0	-16.6	H	A	101.3	108.6	
4.987	3.0	45.7	32.9	5.9	-34.9	0.0	0.6	50.2	74.0	-23.8	H	P	100.2	216.7	
4.987	3.0	28.1	32.9	5.9	-34.9	0.0	0.6	32.6	54.0	-21.4	H	A	100.2	216.7	

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

8.3.2. RECEIVER ABOVE 1 GHz FOR 40 MHz BANDWIDTH

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Devin Chang
Date: 04/17/09
Project #: 09U12521
Company: Broadcom
EUT Description: EUT with Laptop
Mode Oper: RX mode_40MHz

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
1.294	3.0	63.2	25.0	2.7	-35.9	0.0	0.0	55.0	74.0	-19.0	V	P	198.8	43.5	
1.294	3.0	47.3	25.0	2.7	-35.9	0.0	0.0	39.1	54.0	-14.9	V	A	198.8	43.5	
2.489	3.0	69.5	28.5	3.9	-35.1	0.0	0.0	66.8	74.0	-7.2	V	P	168.6	360.0	
2.489	3.0	46.5	28.5	3.9	-35.1	0.0	0.0	44.3	54.0	-9.7	V	A	168.6	360.0	
4.987	3.0	50.1	32.9	5.9	-34.9	0.0	0.6	54.6	74.0	-19.4	V	P	176.0	54.8	
4.987	3.0	30.3	32.9	5.9	-34.9	0.0	0.6	34.3	54.0	-19.8	V	A	176.0	54.8	
1.294	3.0	60.7	25.0	2.7	-35.9	0.0	0.0	52.5	74.0	-21.5	H	P	141.2	286.3	
1.294	3.0	46.0	25.0	2.7	-35.9	0.0	0.0	37.8	54.0	-16.2	H	A	141.2	286.3	
2.489	3.0	63.2	28.5	3.9	-35.1	0.0	0.0	60.5	74.0	-13.5	H	P	120.5	355.9	
2.489	3.0	41.1	28.5	3.9	-35.1	0.0	0.0	38.9	54.0	-15.1	H	A	120.5	355.9	
4.987	3.0	46.0	32.9	5.9	-34.9	0.0	0.6	50.5	74.0	-23.5	H	P	188.4	100.7	
4.987	3.0	29.3	32.9	5.9	-34.9	0.0	0.6	33.3	54.0	-20.8	H	A	188.4	100.7	

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

8.4. WORST-CASE BELOW 1 GHz

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

HORIZONTAL PLOT

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

Test Engr: Devin Chang
Date: 04/23/09
Project #: 09U12521
Company: Broadcom
EUT Description: EUT with Laptop
Mode Oper: TX mode

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
222.368	3.0	57.3	11.9	1.4	28.9	0.0	0.0	41.7	46.0	-4.3	H	P	
326.412	3.0	54.4	13.7	1.7	28.9	0.0	0.0	40.9	46.0	-5.1	H	P	
399.855	3.0	54.0	15.0	1.9	29.3	0.0	0.0	41.7	46.0	-4.3	H	P	
432.017	3.0	53.2	15.6	2.0	29.4	0.0	0.0	41.4	46.0	-4.6	H	P	
718.828	3.0	49.1	19.6	2.6	29.5	0.0	0.0	41.8	46.0	-4.2	H	P	

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

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

VERTICAL PLOT

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

Test Engr: Devin Chang
Date: 04/23/09
Project #: 09U12521
Company: Broadcom
EUT Description: EUT with Laptop
Mode Oper: TX mode

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

Margin Margin vs. Limit

f MHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filter dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
165.846	3.0	56.8	10.4	1.2	29.3	0.0	0.0	39.2	43.5	-4.3	V	P	
211.087	3.0	55.0	12.0	1.3	28.9	0.0	0.0	39.4	43.5	-4.1	V	P	
432.017	3.0	52.8	15.6	2.0	29.4	0.0	0.0	41.0	46.0	-5.0	V	P	
731.189	3.0	47.0	19.8	2.7	29.4	0.0	0.0	40.0	46.0	-6.0	V	P	
762.030	3.0	47.4	20.3	2.7	29.3	0.0	0.0	41.2	46.0	-4.8	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

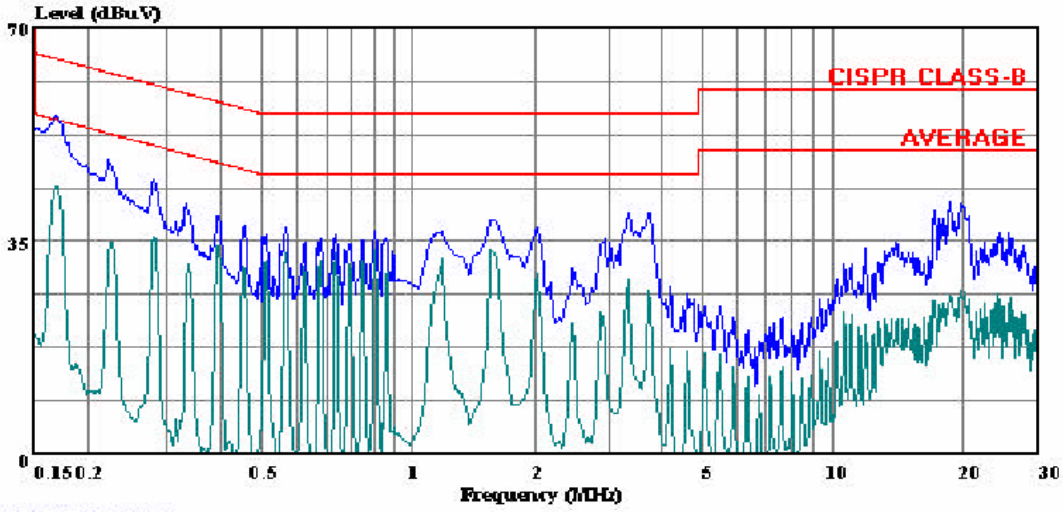
6 WORST EMISSIONS

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
0.17	55.60	--	43.95	0.00	65.01	55.01	-9.41	-11.06	L1
0.28	45.10	--	35.66	0.00	60.76	50.76	-15.66	-15.10	L1
1.66	38.46	--	33.67	0.00	56.00	46.00	-17.54	-12.33	L1
0.17	54.40	--	40.97	0.00	65.01	55.01	-10.61	-14.04	L2
0.22	47.97	--	38.07	0.00	62.71	52.71	-14.74	-14.64	L2
1.73	38.98	--	33.22	0.00	56.00	46.00	-17.02	-12.78	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#: 09U12521.EMI Date: 04-20-2009 Time: 09:26:31



(Line Conduction)

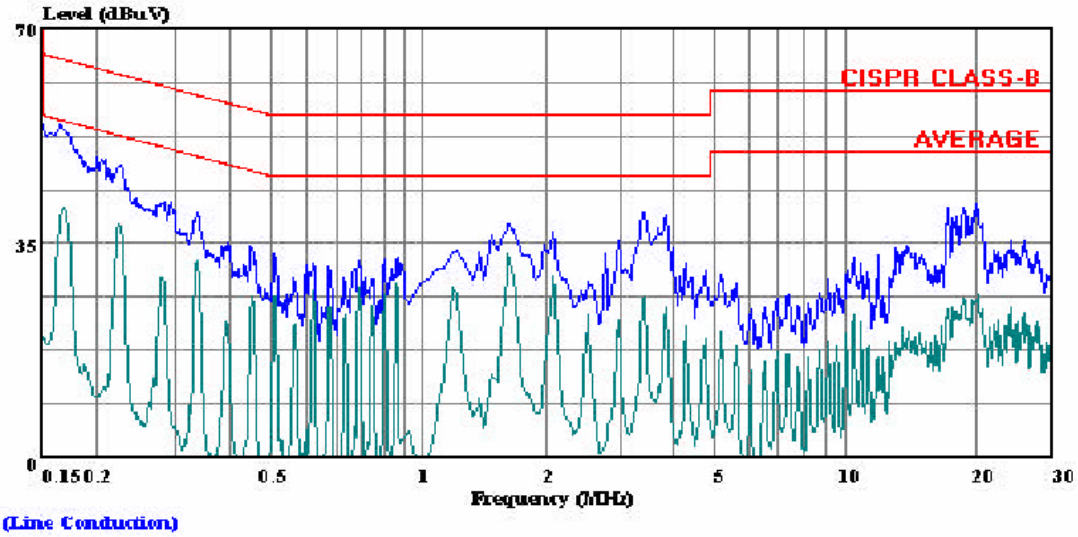
Trace: 5 Ref Trace:

Condition: CISPR CLASS-B
Test Operator:: Devin Chang
Project #: : 09U12521
Company: : Broadcom
Configuration:: EUT With AC Adapter
Mode: : Normal
Target: : FCC Class B
Voltage: : 115VAC / 60Hz
: L1: Peak (Blue), Average (Green)

LINE 2 RESULTS

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

Data#: 14 File#: 09u12521.emi Date: 04-20-2009 Time: 10:01:14



(Line Conduction)

Trace: 12 Ref Trace:

Condition: CISPR CLASS-B
Test Operator:: Devin Chang
Project #: : 09U12521
Company: : Broadcom
Configuration:: EUT With AC Adapter
Mode: : Normal
Target: : FCC Class B
Voltage: : 115VAC / 60Hz
: L2: Peak (Blue), Average (Green)

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).

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.

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	28.14	6.91	0.64	6.36