FCC CFR47 PART 15 SUBPART C
CLASS II PERMISSIVE CHANGE

CERTIFICATION TEST REPORT

FOR

802.11g / Draft 802.11n WLAN + BLUETOOTH PCI-E MINICARD
(Tested inside HP tablet PC HSTNN-I82C)

MODEL NUMBER: BCM94312HMGB

FCC ID: QDS-BRCM1044

REPORT NUMBER: 10U13027-1

ISSUE DATE: JANUARY 27, 2010

Prepared for

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

Prepared by

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
---	01/27/10	Initial Issue	T. Chan

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	BROADCOM CORPORATION 190 MATHILDA PLACE SUNNYVALE, CA 94086, U.S.A.
EUT DESCRIPTION:	802.11g/Draft 802.11n WLAN + Bluetooth PCI-E Minicard (Tested inside HP tablet PC HSTNN-I82C)
MODEL:	BCM94312HMGB
SERIAL NUMBER:	N/A
DATE TESTED:	JANUARY 25 - 26, 2010

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

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

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

Approved & Released For CCS By:

THU CHAN
EMC MANAGER
COMPLIANCE CERTIFICATION SERVICES

Tested By:

VIEN TRAN
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, and FCC CFR 47 Part 15.

3. FACILITIES AND ACCREDITATION

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

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 Broadcom 802.11g/Draft 802.11n WLAN + Bluetooth PCI-E Minicard and installed inside HP tablet laptop. The radio module is manufactured by Broadcom.

5.2. MAXIMUM OUTPUT POWER

The test measurement passed within ± 0.5dBm of the original output power.

5.3. DESCRIPTION OF CLASS II PERMISSIVE CHANGE

The major change filed under this application is adding tablet platform, HSTNN-I82C.

5.4. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes with the maximum gain @ 2.4GHz as table below:

Antenna	Peak gain (dBi)
802.11bg WLAN Antenna - TX1 (Main)	1.25
802.11bg WLAN Antenna - TX2 (Aux)	0.26

5.5. SOFTWARE AND FIRMWARE

The EUT driver software installed during testing was Broadcom, rev. 5.60.48.31
The test utility software used during testing was wl_tool, rev. 5.60.48.31.

5.6. NUMBER OF TRANSMIT CHAINS

Selected measurements were performed only on the main chain for both 802.11b & g modes, which is main antenna with highest gain of 1.25dBi.

5.7. 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.

For band edge, the test was performed on 11b & g modes with main antenna.

For harmonic and spurious, the test was performed only on 11b mode with main antenna as worst mode.

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

The tablet laptop was investigated under potable positions (X, Y, and Z) to determine the worst case and the X-axis position was the worse case to test.

5.8. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMEN

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	HP	PCMA0 ZAD000	79C20SI05Q	DoC
AC Adapter	HP	HSTNN-DA21	WBCNTX2ARYC04L	N/A

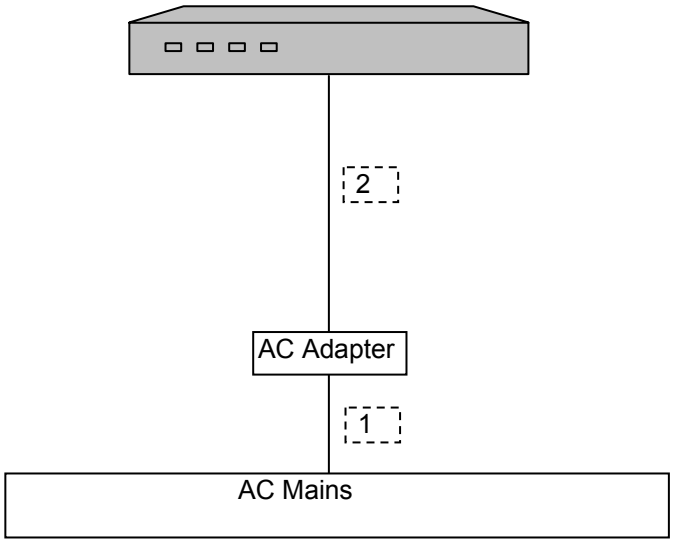
I/O CABLES

I/O CABLE LIST						
Cable No.	**Port**	**# of Identica Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	AC	1	US115V	Unshielded	1.5m	N/A
2	DC	1	DC	Unshielded	1.5m	N/A

TEST SETUP

The EUT is installed inside a host tablet PC during the tests. Test software exercised the radio card.

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Asset**	**Cal Due**
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01069	01/05/11
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01011	01/14/11
Antenna, Horn, 18 GHz	EMCO	3115	C00945	04/22/10
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00885	03/31/10
Preamplifier, 1-26GHz	Agilent / HP	8449B	C01052	07/05/10
Antenna, Horn, 26.5 GHz	ARA	MWH-1826/B	C00589	11/28/10

7. RADIATED TEST RESULTS

7.1. 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.

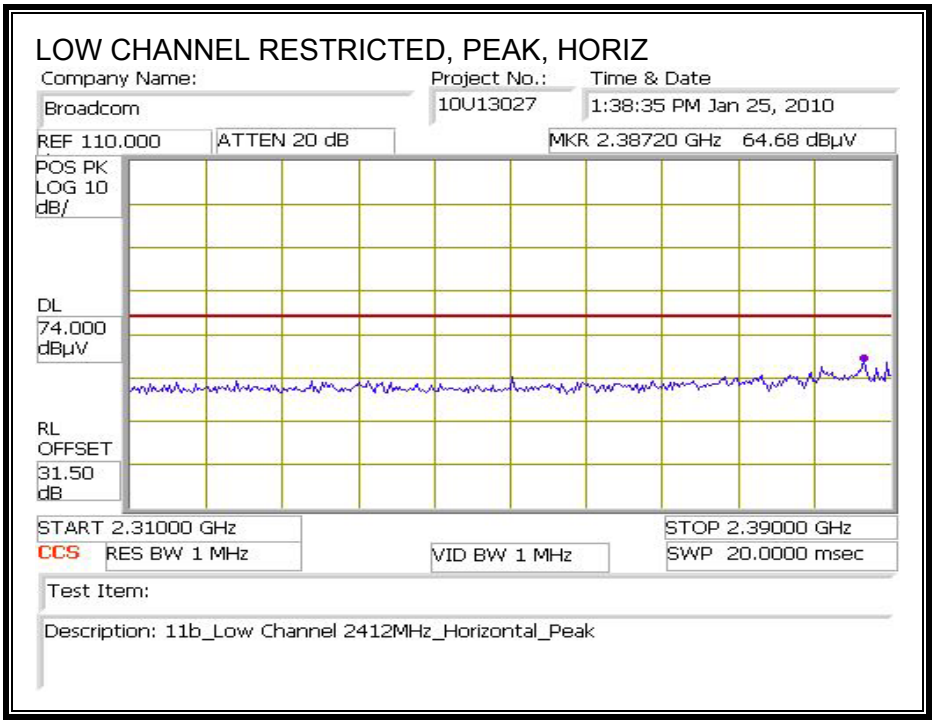
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

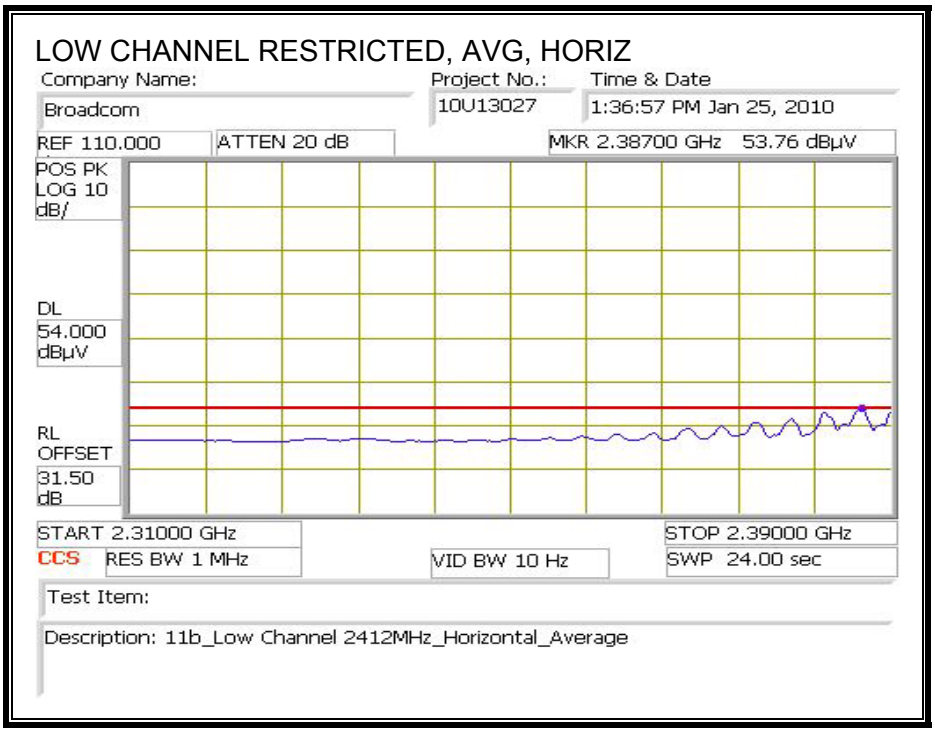
RESULTS

7.2. TRANSMITTER ABOVE 1 GHz

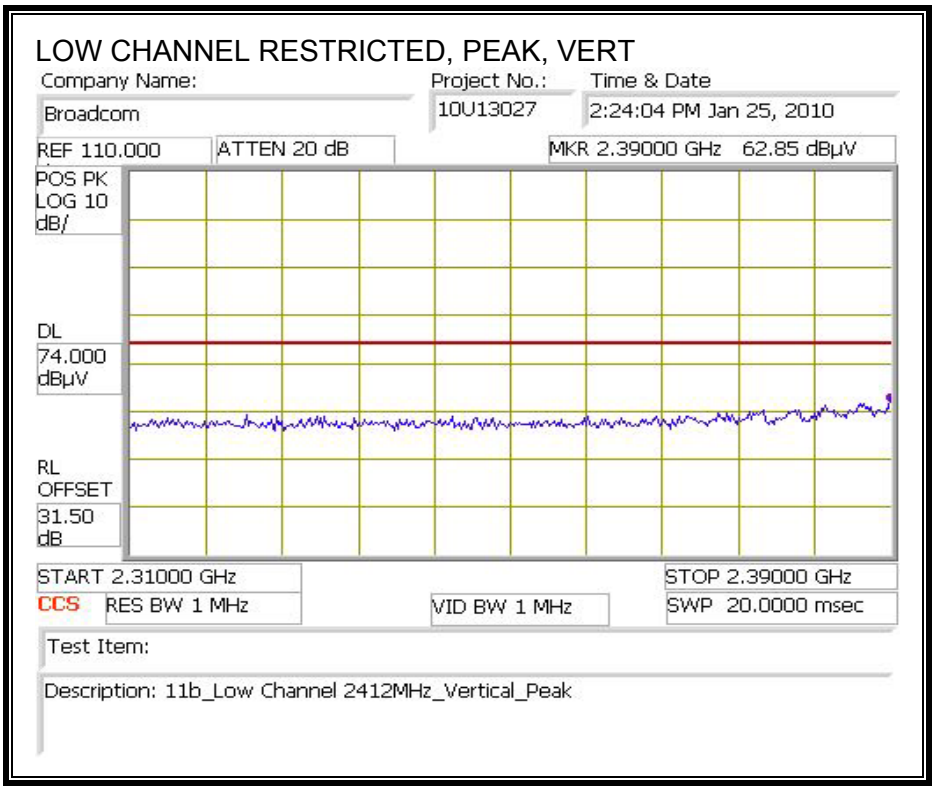
7.2.1. 802.11b MODE

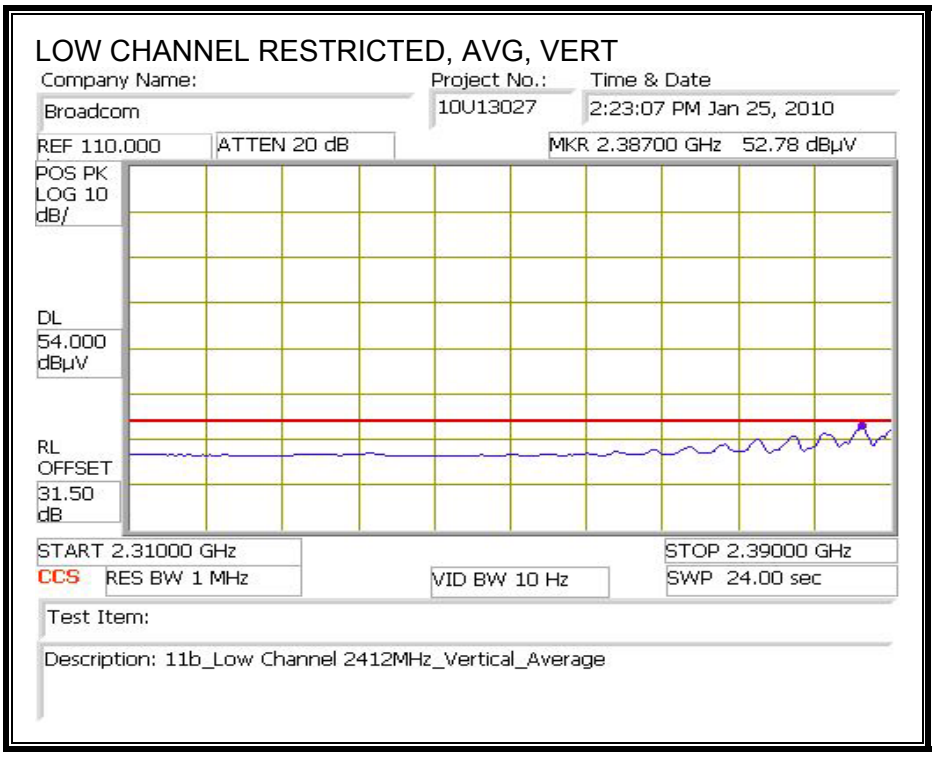
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



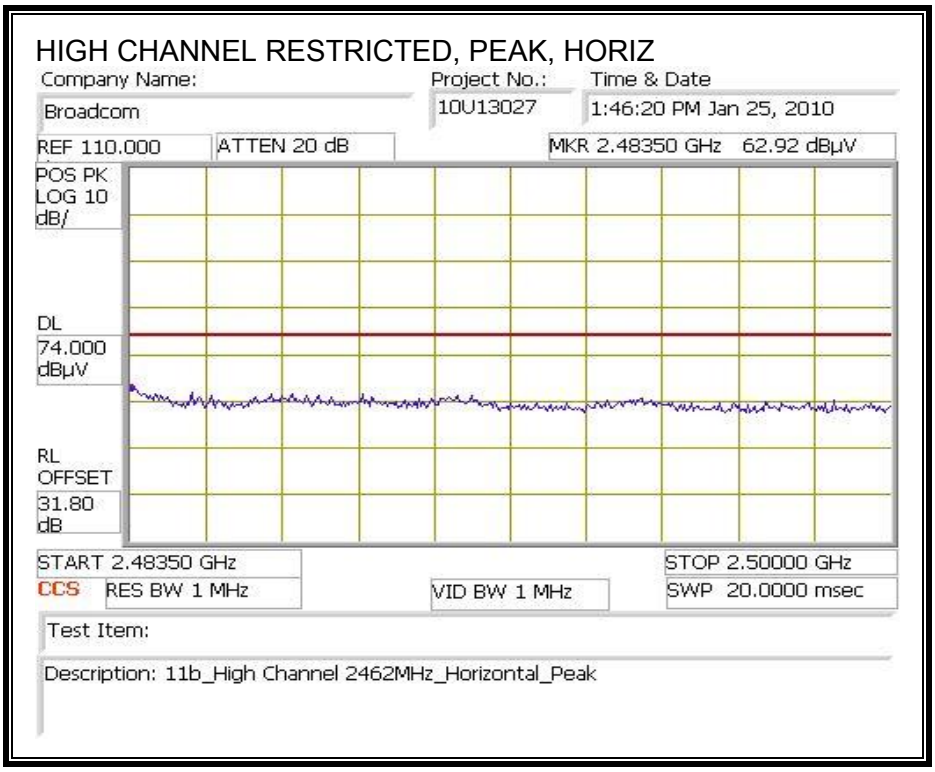


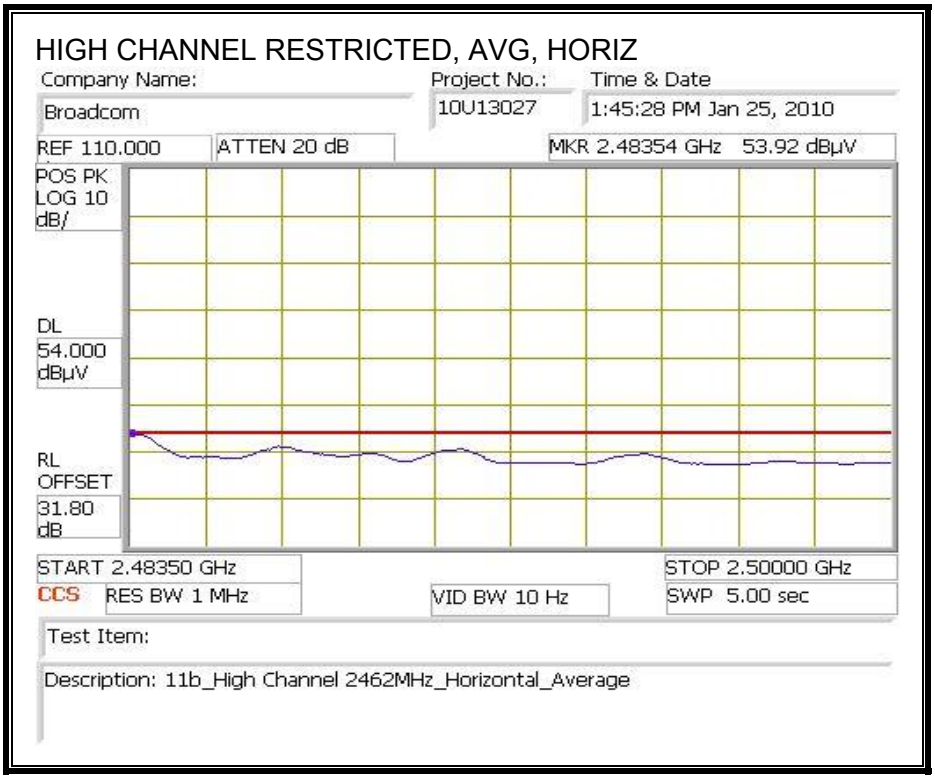
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



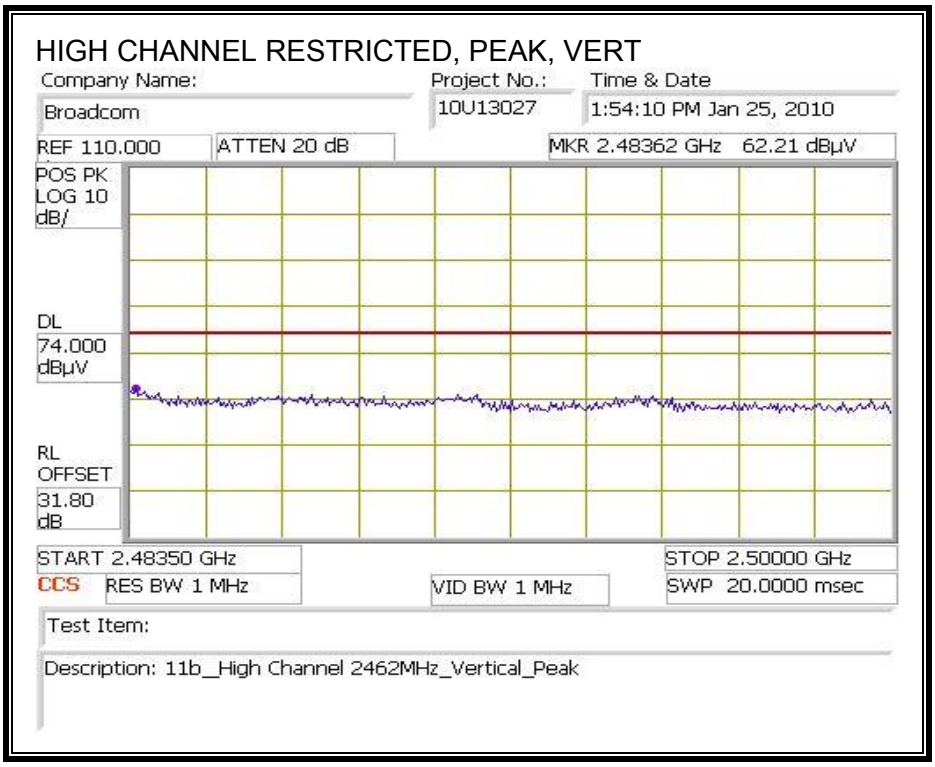


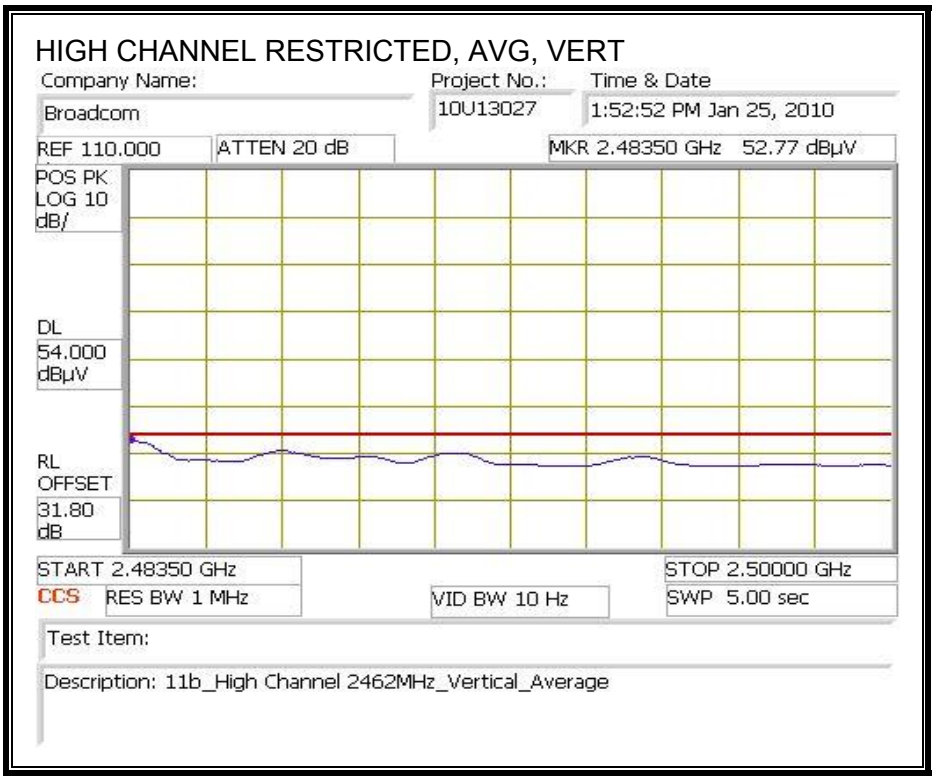
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

WORST-CASE: 11b Mode

High Frequency Measurement
Compliance Certification Services, Fremont 3m Chamber

Test Engr: Vien Tran
Date: 01/25/10
Project #: 10U13027
Company: Broadcom
EUT Description: 802.11g/Draft 802.11n WLAN PCI-E, tested inside portable tablet
EUT M/N: BCM94312HMGB
Test Target: FCC Class B
Mode Oper: Tx 11b Mode

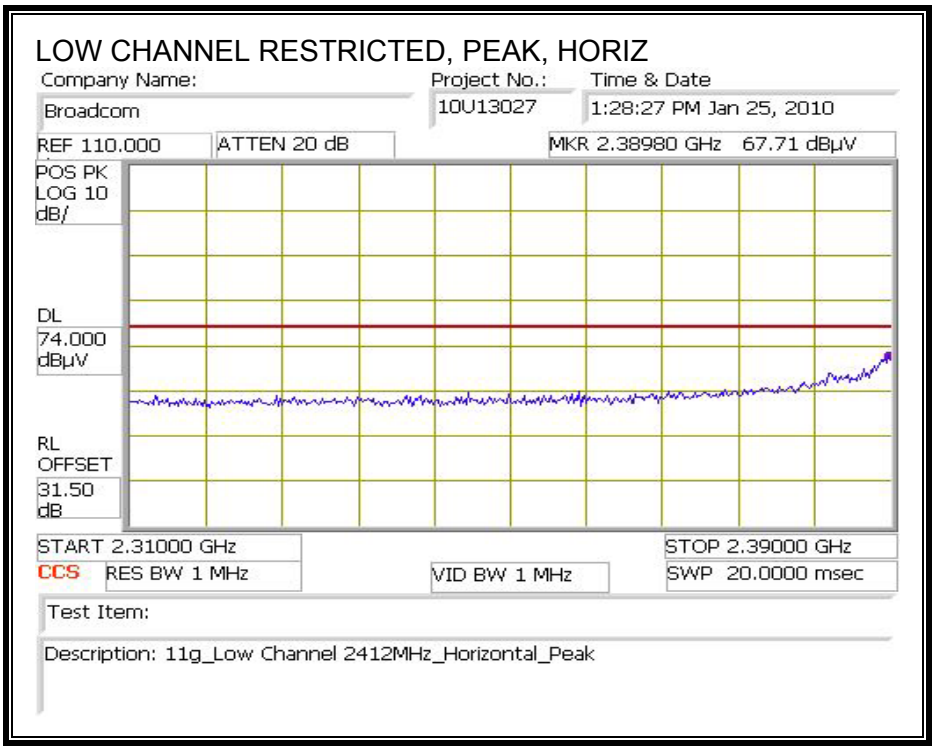
f	Measurement Frequency	Amp	Preamp Gain		Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters		Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m		Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength		Margin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

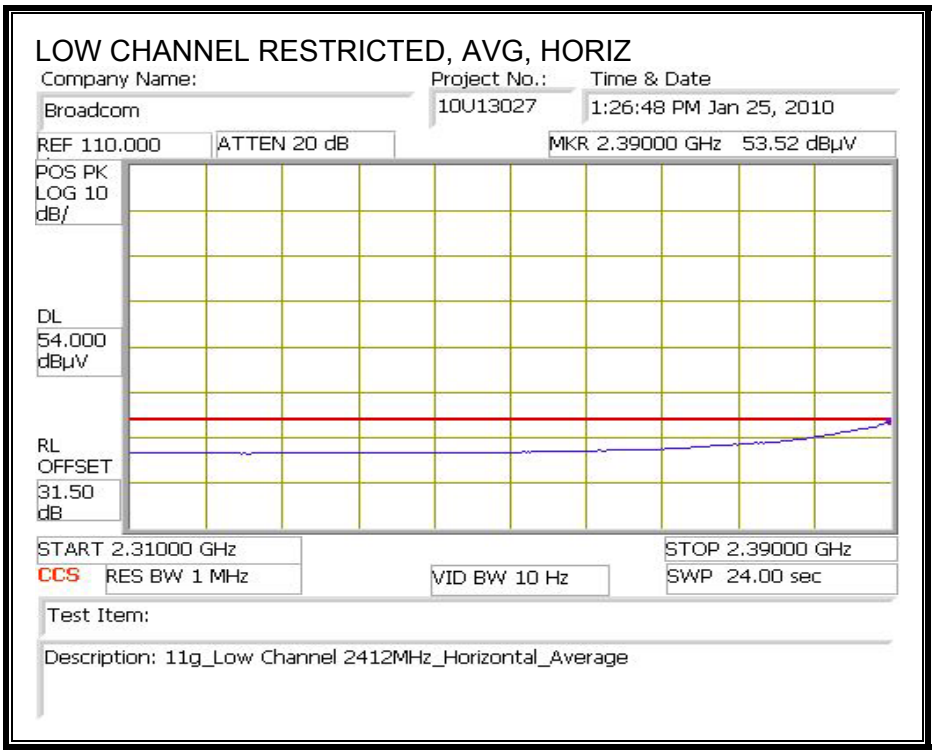
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
Low Channel, 2412MHz															
4.824	3.0	39.8	32.7	5.8	-34.8	0.0	0.0	43.4	74.0	-30.6	V	P	100.0	138.0	
4.824	3.0	35.8	32.7	5.8	-34.8	0.0	0.0	39.5	54.0	-14.5	V	A	100.0	138.0	
4.824	3.0	35.2	32.7	5.8	-34.8	0.0	0.0	38.9	74.0	-35.1	H	P	99.0	155.0	
4.824	3.0	27.2	32.7	5.8	-34.8	0.0	0.0	30.8	54.0	-23.2	H	A	99.0	155.0	
Mid Channel, 2437MHz															
4.874	3.0	38.3	32.7	5.8	-34.8	0.0	0.0	42.0	74.0	-32.0	V	P	100.0	140.0	
4.874	3.0	34.1	32.7	5.8	-34.8	0.0	0.0	37.8	54.0	-16.2	V	A	100.0	140.0	
7.311	3.0	39.9	35.5	7.3	-34.1	0.0	0.0	48.5	74.0	-25.5	V	P	100.0	148.0	
7.311	3.0	35.2	35.5	7.3	-34.1	0.0	0.0	43.9	54.0	-10.1	V	A	100.0	148.0	
4.874	3.0	34.2	32.7	5.8	-34.8	0.0	0.0	37.9	74.0	-36.1	H	P	101.0	93.0	
4.874	3.0	24.5	32.7	5.8	-34.8	0.0	0.0	28.3	54.0	-25.7	H	A	101.0	93.0	
7.311	3.0	34.9	35.5	7.3	-34.1	0.0	0.0	43.6	74.0	-30.4	H	P	134.0	207.0	
7.311	3.0	27.1	35.5	7.3	-34.1	0.0	0.0	35.7	54.0	-18.3	H	A	134.0	207.0	
High Channel, 2462MHz															
4.924	3.0	39.8	32.7	5.9	-34.8	0.0	0.0	43.6	74.0	-30.4	V	P	100.0	165.0	
4.924	3.0	35.6	32.7	5.9	-34.8	0.0	0.0	39.4	54.0	-14.6	V	A	100.0	165.0	
7.386	3.0	40.3	35.6	7.3	-34.1	0.0	0.0	49.0	74.0	-25.0	V	P	100.0	148.0	
7.386	3.0	35.0	35.6	7.3	-34.1	0.0	0.0	43.8	54.0	-10.2	V	A	100.0	148.0	
4.924	3.0	34.6	32.7	5.9	-34.8	0.0	0.0	38.4	74.0	-35.6	H	P	100.0	302.0	
4.924	3.0	26.5	32.7	5.9	-34.8	0.0	0.0	30.4	54.0	-23.6	H	A	100.0	302.0	
7.386	3.0	35.4	35.6	7.3	-34.1	0.0	0.0	44.2	74.0	-29.8	H	P	149.0	193.0	
7.386	3.0	26.6	35.6	7.3	-34.1	0.0	0.0	35.4	54.0	-18.6	H	A	149.0	193.0	

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

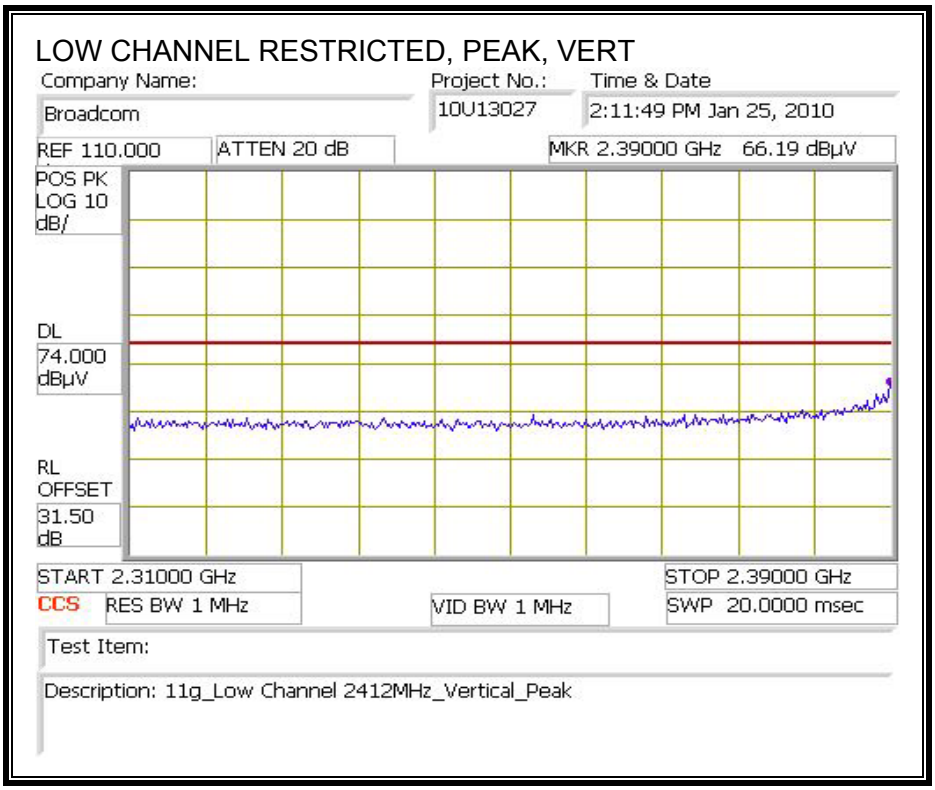
7.2.2. 802.11g MODE

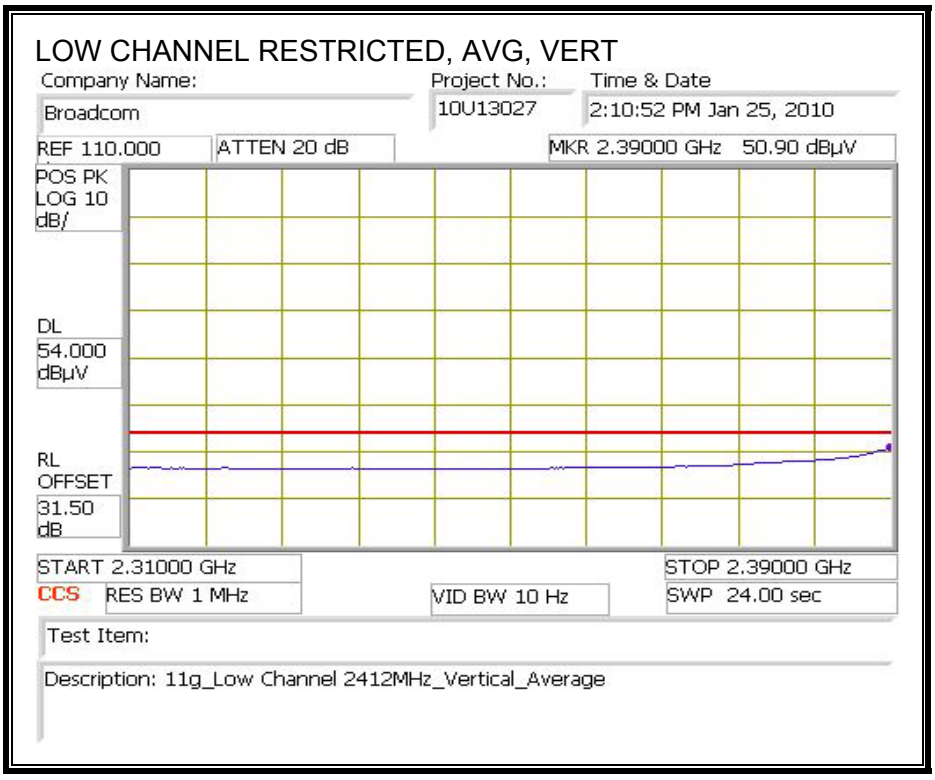
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



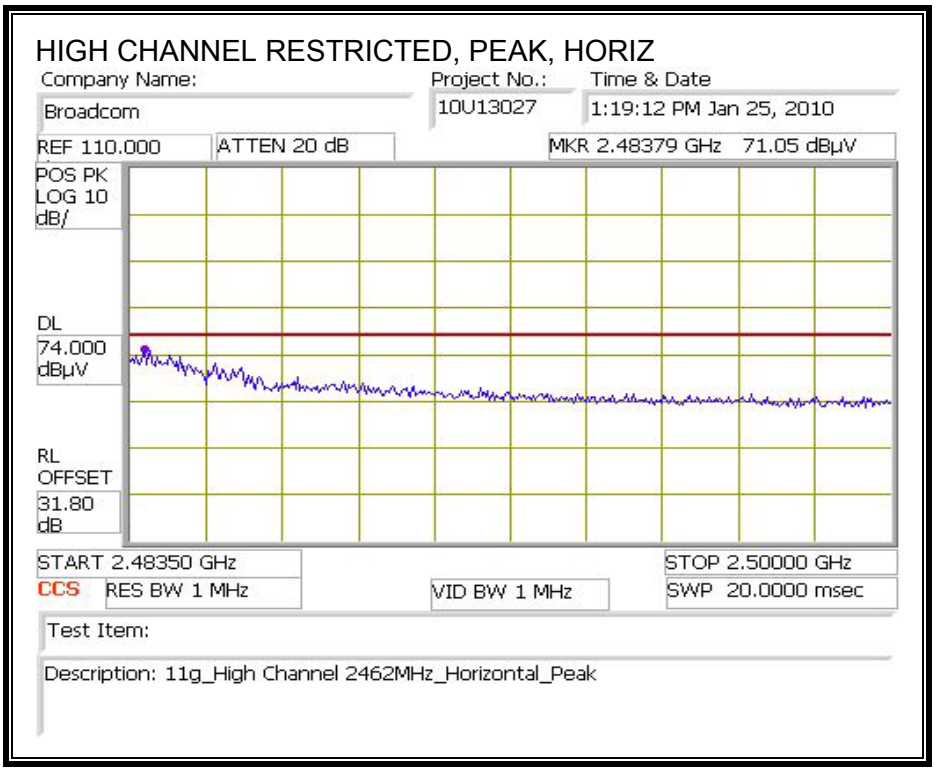


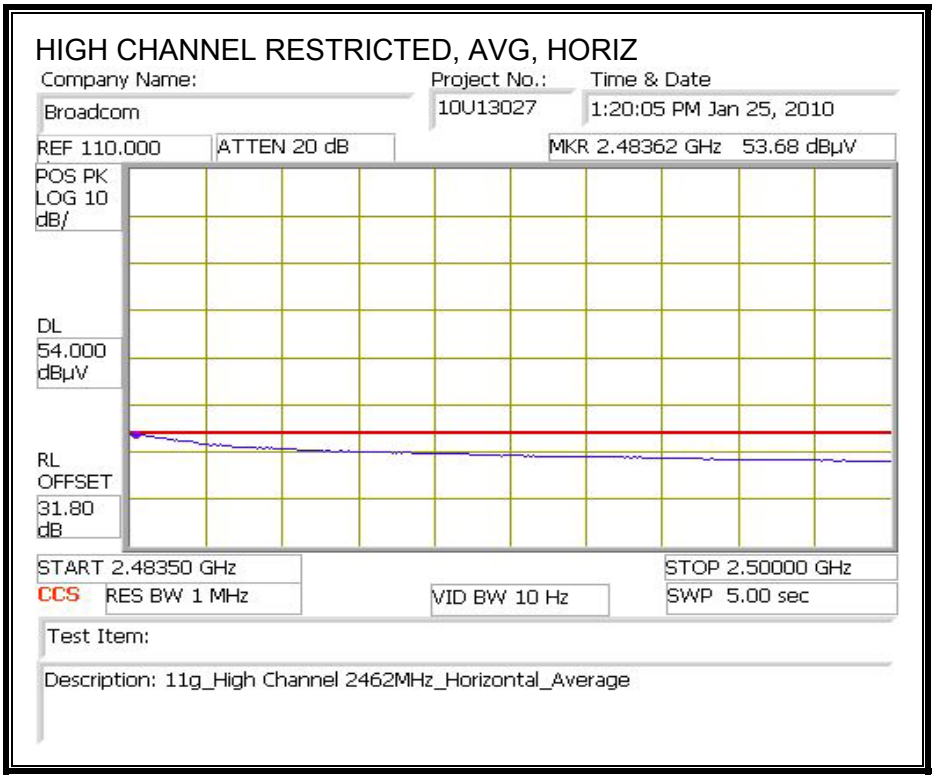
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



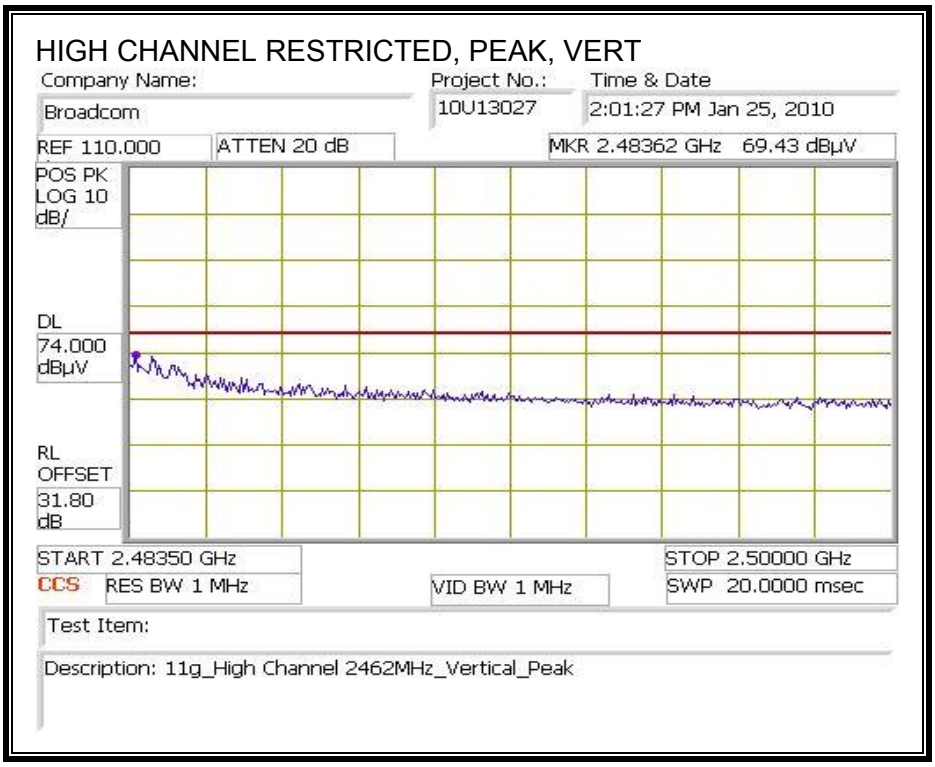


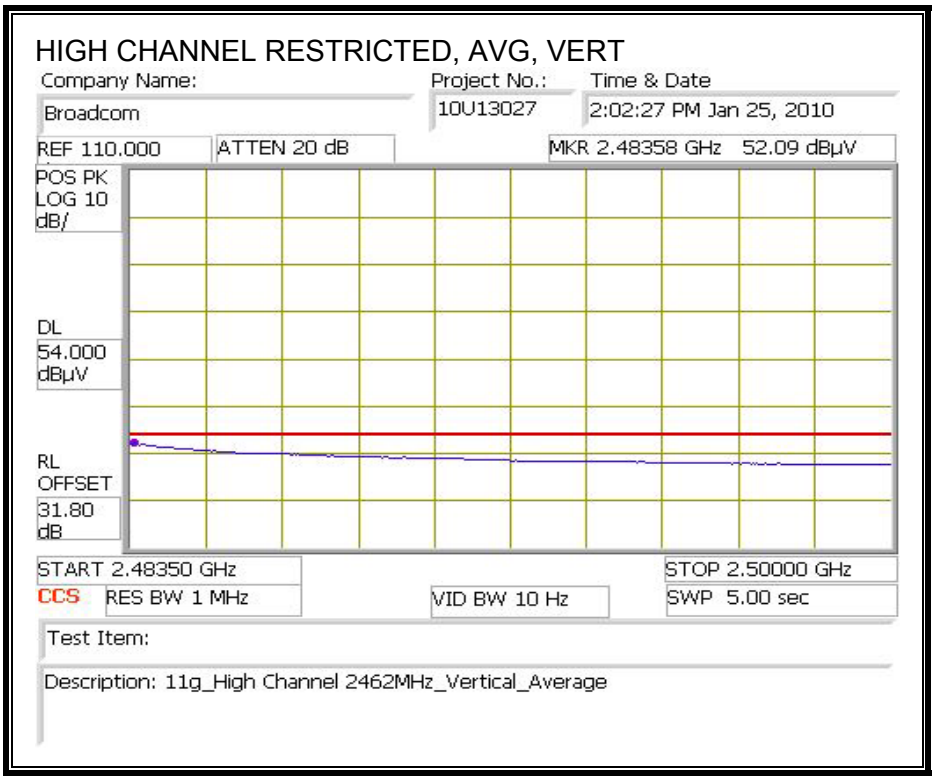
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

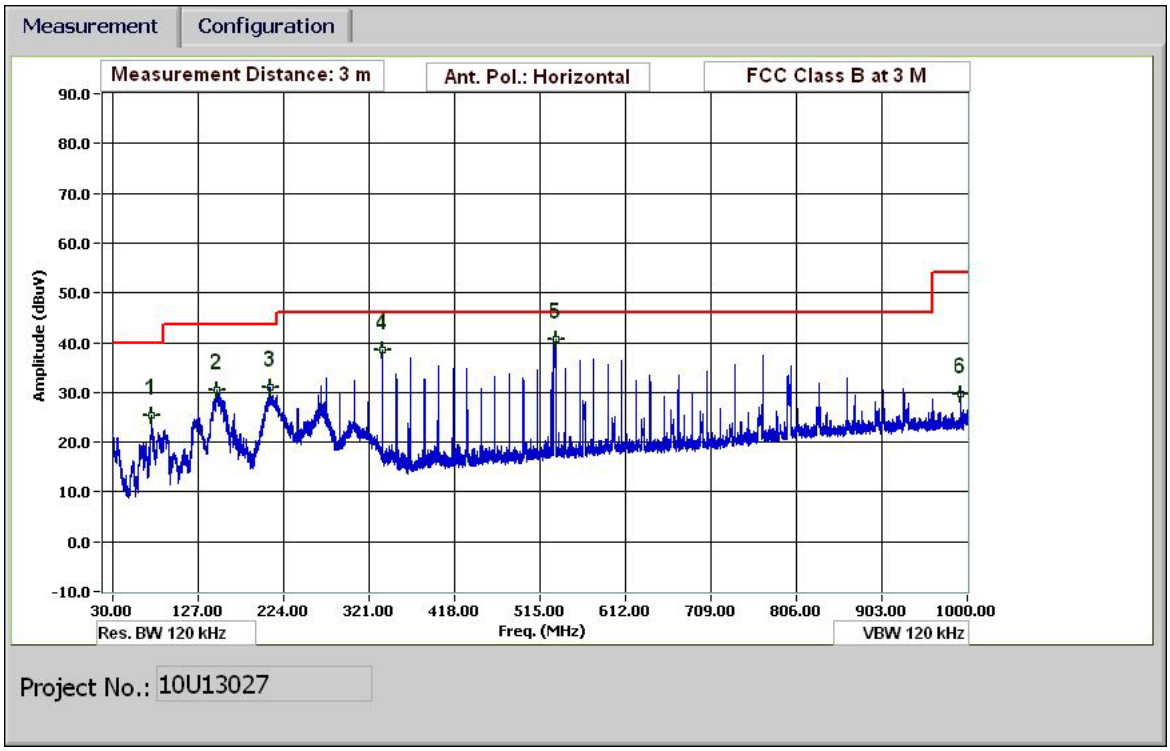




7.3. WORST-CASE BELOW 1 GHz

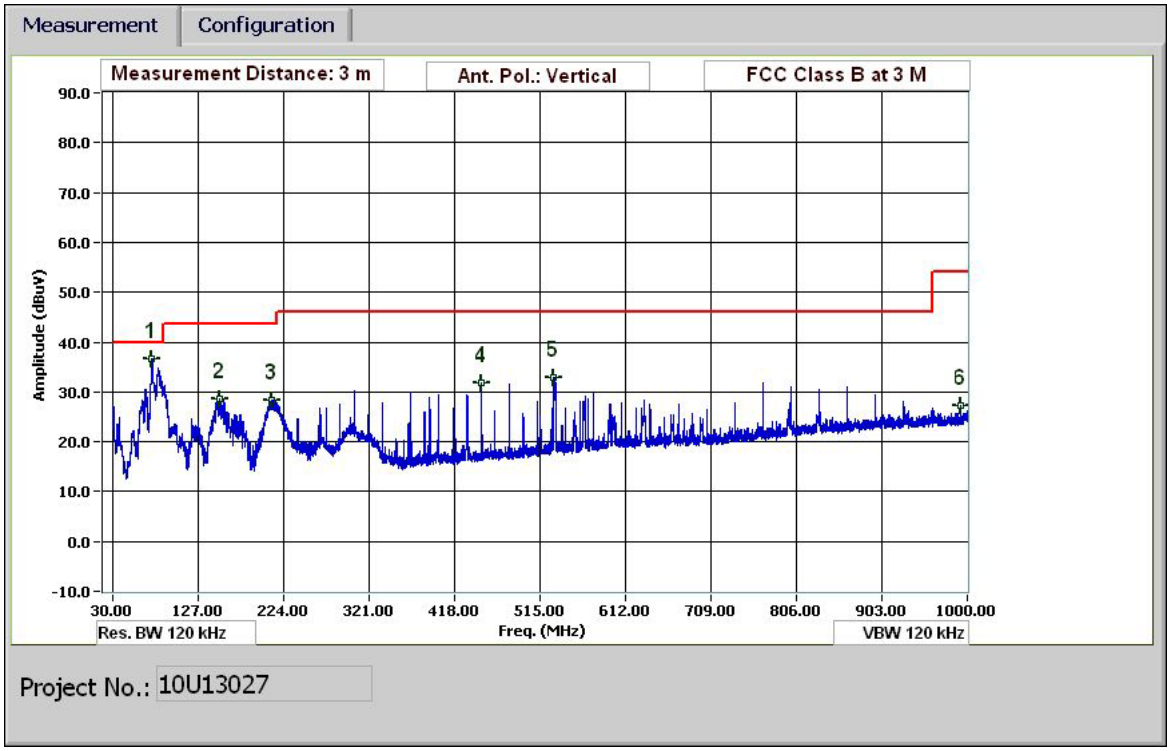
2.4GHz BAND SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

HORIZONTAL PLOT



2.4GHz BAND SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)

VERTICAL PLOT



HORIZONTAL & VERTICAL DATA

30-1000MHz Frequency Measurement
Compliance Certification Services, Fremont 3m Chamber

Test Engr: Vien Tran
Date: 01/26/10
Project #: 10U13027
Company: Broadcom
EUT Description: 802.11g/Draft 802.11n WLAN PCI-E, tested inside portable tablet
EUT M/N: BCM94312HMGB
Test Target: FCC Class B
Mode Oper: Tx Below 1GHz_Worst-Case

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

f MHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filter dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
Vertical													
74.162	3.0	56.0	8.1	0.7	28.3	0.0	0.0	36.5	40.0	-3.5	V	P	
74.162	3.0	52.5	8.1	0.7	28.3	0.0	0.0	33.0	40.0	-7.0	V	QP	
151.805	3.0	42.6	12.8	1.0	27.8	0.0	0.0	28.6	43.5	-14.9	V	P	
210.247	3.0	42.6	11.9	1.2	27.4	0.0	0.0	28.3	43.5	-15.2	V	P	
447.977	3.0	42.4	15.9	1.9	28.3	0.0	0.0	31.8	46.0	-14.2	V	P	
530.901	3.0	42.1	17.3	2.0	28.6	0.0	0.0	32.8	46.0	-13.2	V	P	
992.080	3.0	29.3	22.7	2.9	27.6	0.0	0.0	27.2	54.0	-26.8	V	P	
Horizontal													
74.282	3.0	44.7	8.1	0.7	28.3	0.0	0.0	25.3	40.0	-14.7	H	P	
148.805	3.0	44.5	12.7	1.0	27.8	0.0	0.0	30.4	43.5	-13.1	H	P	
208.087	3.0	45.4	11.9	1.2	27.4	0.0	0.0	31.1	43.5	-12.4	H	P	
336.013	3.0	50.4	14.0	1.6	27.6	0.0	0.0	38.4	46.0	-7.6	H	P	
532.941	3.0	49.9	17.4	2.0	28.6	0.0	0.0	40.7	46.0	-5.3	H	P	
991.960	3.0	31.6	22.7	2.9	27.6	0.0	0.0	29.6	54.0	-24.4	H	P	

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