FCC CFR47 CERTIFICATION
CLASS II PERMISSIVE CHANGE
TEST REPORT

FOR

BROADCOM 802.11ag WIRELESS LAN PCI-E MINI CARD

MODEL NUMBER: BCM94311MCAG

FCC ID: QDS-BRCM1019

REPORT NUMBER: 05U3830-1

ISSUE DATE: NOVEMBER 29, 2005

Prepared for
BOARDCOM CORP.
190 MATHILDA PLACE
SUNNYVALE, CA 94086, USA

Prepared by
COMPLIANCE ENGINEERING SERVICES, INC.
d.b.a.
COMPLIANCE CERTIFICATION SERVICES
561F MONTEREY ROAD
MORGAN HILL, CA 95037, USA
TEL: (408) 463-0885
FAX: (408) 463-0888

LAB CODE:200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
A	11/29/05	Initial Issue	Thu

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	Broadcom Corp. 190 Mathilda Place Sunnyvale, CA 94086, USA
EUT DESCRIPTION:	Broadcom 802.11ag Wireless LAN PCI-E Mini Card
MODEL:	BCM94311MCAG
SERIAL NUMBER:	378
DATE OF TESTS:	November 09 to 15, 2005

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 15 SUBPART C	NO NON-COMPLIANCE NOTED

Compliance Certification Services, Inc. tested the above equipment in accordance with the requirements set forth in the above standards. 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 Compliance Certification Services and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification Services 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.

Note: The 802.11ag DTS Band is applicable to this report; another 5.2 GHz UNII band of operation is in separate report.

Approved & Released For CCS By: Tested By:

THU CHAN
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

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 561F Monterey Road, Morgan Hill, California, USA. The sites are constructed in conformance with the requirements of ANSI C63.4, ANSI C63.7 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

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
Radiated Emission, 30 to 200 MHz	+/- 3.3 dB
Radiated Emission, 200 to 1000 MHz	+4.5 / -2.9 dB
Radiated Emission, 1000 to 2000 MHz	+4.5 / -2.9 dB
Power Line Conducted Emission	+/- 2.9 dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is an 802.11a/b/g transceiver module, operating in the DTS 2400-2483.5 MHz and DTS 5725-5850MHz.

The radio module is manufactured by Broadcom Corp.

5.2. CLASS II PERMISSIVE CHANGE DESCRIPTION

The EUT was originally tested and reported under CCS project no.: 05U3487-1B and granted by TCB on August 03, 20052005, with a peak antenna gain of 3.24 dBi in frequency range 2400 - 24835 MHz and 5.7 dBi in frequency range 5725 – 5850 MHz. The major change filed under this application is:

1. Adding a PIFA Stamped metal antenna with a maximum gain of 3.9dBi in the 2400 – 2483.5 MHz frequency range and 6.2dBi in the 5725 – 5850 MHz frequency range.
2. Including channel 9 data for transmitting at 19dBm in g mode.
3. For antenna gain in the range 3.24dBi to 3.9dBi, the output power for g mode transmission was lowered as follows:
   _ Channel 10 from 19dBm to 18.5dBm
   _ Channel 11 from 17dBm to 16.5dBm
   _ Channels 12 and 13 from 12dBm to 11dBm

5.3. MODIFICATION

No modification was made during the testing.

5.4. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power same as previous project 05U3487-1B.

5.5. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PIFA Stamped metal antenna manufactured by Hitachi Cable, Ltd., which has a maximum gain of 3.9dBi at 2.4GHz band and 6.2dBi at 5GHz band.

5.6. SOFTWARE AND FIRMWARE

The EUT driver software installed in the host support equipment during testing was BCM94311, version. 3.100.53.0

The test utility software used during testing was wl_tools.

5.7. WORST-CASE CONFIGURATION AND MODE

The testing was performed at both 2.4 GHz and 5 GHz bands for worst-case configuration at each band.

The worst-case channel is determined as the channel with the highest output power. The highest measured output powers were at 2437 MHz for 11b mode, 2437 MHz for 11g mode and 5825 MHz for 11a.

The worst-case data rate for these channels are determined to be 1 Mb/s for 11b mode, 6 Mb/s for 11g mode, and 6 Mb/s for 11a mode based on previous experience with WLAN product design architectures.

WORSRT-CASE POWER AND BIT RATE SETTING

802.11b						
CHANNEL	1	6	11	13		
(MHz)	2412	2437	2462	2472		
Band Edge						
(dBm)	19	x	19	10		
Emission						
(dBm)	19	19	x	19*		
Bit Rate						
(Mbps)	11 Mbps for Peak reading & 1 Mbps for Average reading					
NOTE:	* For the rest of the RF Conducted and Radiated Emission tests, channel 13 is set					
	to 19dBm for worst case power to cover all high channels_Channel 11 (19dBm) &					
	Channel 13 (10dBm).					

05U3487 - 11abg

802.11g

CHANNEL	1	2	6	9	10	11	13
(MHz)	2412	2417	2437	2452	2457	2462	2472
Band Edge							
(dBm)	18	19	X	19	18.5	16.5	11
Emission							
(dBm)	19	x	19	x	x	x	19*
Bit Rate							
(Mbps)	54 Mbps for Peak reading & 6 Mbps for Average reading						

NOTE: * For the rest of the RF Conducted and Radiated Emission tests, channel 13 is set to 19dBm for worst case power to cover all high channels_Channel 9 (19dBm), Channel 10 (18.5dBm), Channel 11 (16.5dBm) & Channel 13 (11dBm)

802.11a - 5.8 GHz				
CHANNEL	149	157	165	
(MHz)	5745	5785	5825	
Band Edge				
(dBm)	17	17	17	
Emission				
(dBm)	17	17	17	
Bit Rate				
(Mbps)	54 Mbps for Peak reading & 6 Mbps for Average reading			
	Powers are the same for both Band Edge & Emission			

5.8. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	HP	Pavilion dv4030us	CNE52005T6	DoC
AC Adapter	HP	PPP0009S	CT 57BC30AU4RO0L0	DoC
Extended Card	ADEXELEC	PEX1-MINI	01/01/1900	N/A

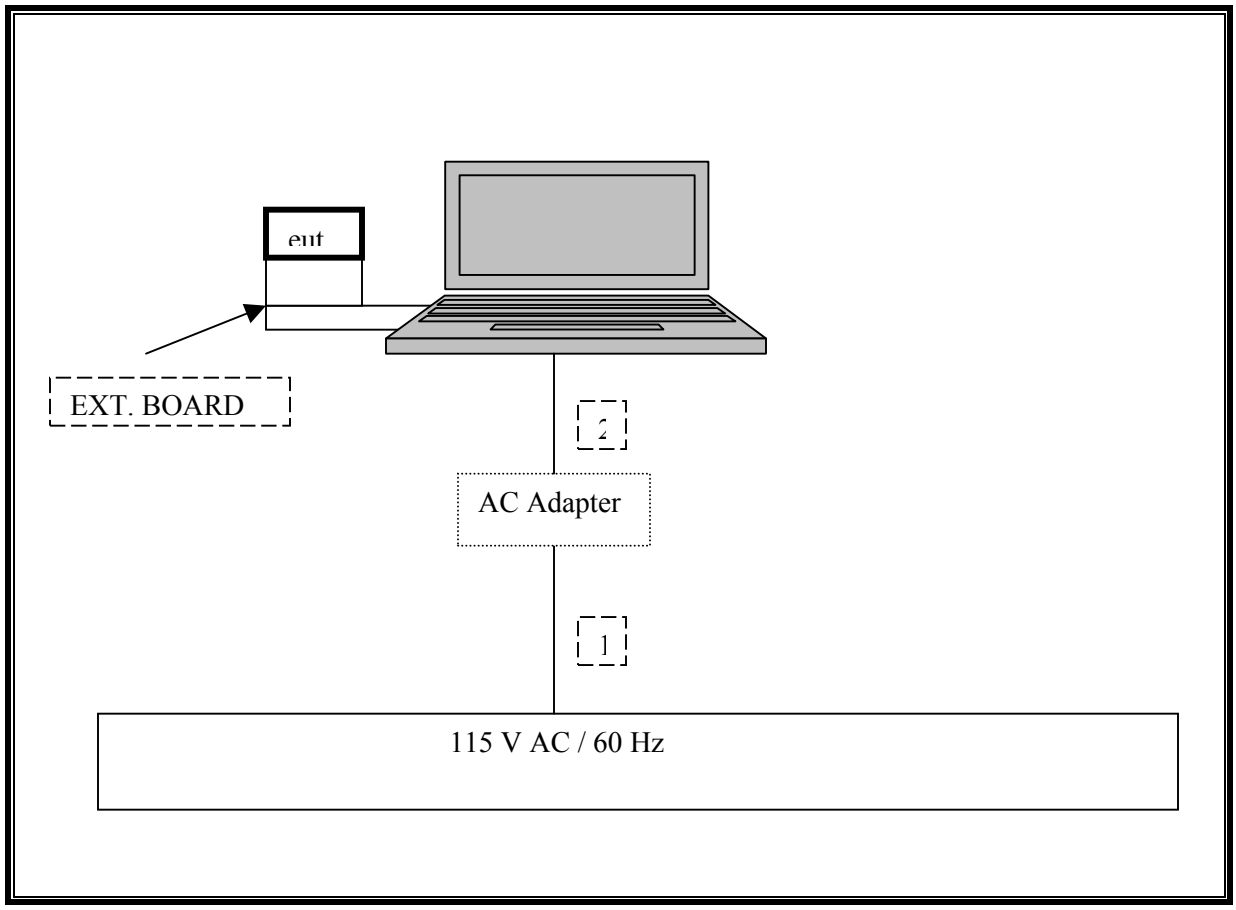
I/O CABLES

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

TEST SETUP

The EUT is installed in a host laptop computer via a card bus-to-mini PCI adapter / extension board 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**	**Serial Number**	**Cal Due**
EMI Test Receiver	R & S	ESHS 20	827129/006	10/22/2006
Site A Line Stabilizer / Conditioner	Tripplite	LC-1800a	A0051681	CNR
LISN, 10 kHz ~ 30 MHz	FCC	LISN-50/250-25-2	2023	08/30/2006
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-BNC	8379443	10/21/2006
Spectrum Analyzer	HP	E4446A	US42510266	08/25/2006
Antenna, Horn 1 ~ 18 GHz	EMCO	3117	29310	09/12/2006
Antenna, Horn 18 ~ 26 GHz	ARA	SWH-28	1007	06/02/2006
Antenna, Horn 26 ~ 40 GHz	ARA	MWH-2640/B	1029	12/03/2005
Preamplifier, 1 ~ 26.5 GHz	HP	8449B	3008A00369	08/17/2006
PreAmplifier 26-40 GHz	MITEQ	NSP4000-SP2	924343	06/01/2006
Peak Power Meter	Agilent	E4416A	GB41291160	11/07/2006
Peak / Average Power Sensor	Agilent	E9327A	US40440755	11/07/2006
RF Filter Section	HP	85420E	3705A00256	11/21/2005
EMI Receiver, 9 kHz ~ 2.9 GHz	HP	8542E	3942A00286	11/21/2005
Bilog Antenna 30MHz---- 2Ghz	Sunol Sciences	JB1 Antenna	A121003	12/22/2005
4.0 GHz High Pass Filter	Micro Tronics	HPM13351	3	N/A
2.4 - 2.5 Reject Filter	Micro Tronics	BRM50702	3	N/A
7.6 GHz High Pass Filter	Micro Tronics	HPM13350	1	N/A
5.75 - 5.8 Reject Filter	Micro Tronics	BRC13192	2	N/A

7. LIMIT AN TEST RESULTS

7.1. CHANNEL TESTS FOR 2400 – 2483.5 MHz BAND

7.1.1. MAXIMUM PERMISSIBLE EXPOSURE

LIMITS

§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.

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 and rearranging the terms to express the distance as a function of the remaining variables yields:

$d = \sqrt{((30 * P * G) / (3770 * S))}$

Changing to units of Power to mW and Distance to cm, using:

P (mW) = P (W) / 1000 and
d (cm) =100 * d (m)

yields

$d = 100 * \sqrt{((30 * (P / 1000) * G) / (3770 * S))}$
$d = 0.282 * \sqrt{(P * G / S)}$

where

d = distance in cm
P = Power in mW
G = Numeric antenna gain
S = Power Density in mW/cm^2

Substituting the logarithmic form of power and gain using:

P (mW) = 10 ^ (P (dBm) / 10) and
G (numeric) = 10 ^ (G (dBi) / 10)

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

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

LIMITS

From §1.1310 Table 1 (B), the maximum value of S = 1.0 mW/cm^2

RESULTS

No non-compliance noted.

Mode	MPE Distance (cm)	Output Power (dBm)	Antenna Gain (dBi)	Power Density (mW/cm^2)
802.11b	20.0	21.80	3.90	0.07
802.11g	20.0	26.36	3.90	0.21

NOTE: For mobile or fixed location transmitters, the minimum separation distance is 20 cm, even if calculations indicate that the MPE distance would be less.

7.1.2. AVERAGE POWER

AVERAGE POWER LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

No non-compliance noted:

The cable assembly insertion loss of 10.7 dB (including 10 dB pad and 0.7 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

802.11b Mode (Gate Average Power)

Channel	Frequency (MHz)	Power (dBm)
1	2412	18.65
6	2437	19.15
11	2462	19.13
13	2472	10.35

802.11g Mode (Gate Average Power)

Channel	Frequency (MHz)	Power (dBm)
1	2412	17.52
2	2417	19.18
6	2437	19.20
9	2452	19.15
10	2457	18.78
11	2462	16.64
13	2472	10.85

7.2. CHANNEL TESTS FOR THE 5725 TO 5850 MHz BAND

7.2.1. MAXIMUM PERMISSIBLE EXPOSURE

LIMITS

§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.

CALCULATIONS

Given

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

and

$S = E \wedge 2 / 3770$

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 and rearranging the terms to express the distance as a function of the remaining variables yields:

$d = \sqrt{((30 * P * G) / (3770 * S))}$

Changing to units of Power to mW and Distance to cm, using:

P (mW) = P (W) / 1000 and
d (cm) =100 * d (m)

yields

$d = 100 * \sqrt{((30 * (P / 1000) * G) / (3770 * S))}$
$d = 0.282 * \sqrt{(P * G / S)}$

where

d = distance in cm
P = Power in mW
G = Numeric antenna gain
S = Power Density in mW/cm^2

Substituting the logarithmic form of power and gain using:

P (mW) = 10 ^ (P (dBm) / 10) and
G (numeric) = 10 ^ (G (dBi) / 10)

yields

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

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

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

LIMITS

From §1.1310 Table 1 (B), the maximum value of S = 1.0 mW/cm^2

RESULTS

No non-compliance noted.

Mode	MPE Distance (cm)	Output Power (dBm)	Antenna Gain (dBi)	Power Density (mW/cm^2)
802.11a	20.0	23.67	6.20	0.19

NOTE: For mobile or fixed location transmitters, the minimum separation distance is 20 cm, even if calculations indicate that the MPE distance would be less.

7.2.2. AVERAGE POWER

AVERAGE POWER LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

No non-compliance noted:

The cable assembly insertion loss of 11.7 dB (including 10 dB pad and 1.7 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

READING OF POWER WAS TAKEN BY PEAK POWER METER WITH PACKET 45 Mbps

802.11a Mode (Gate Average Power)

Channel	Frequency (MHz)	Average Power (dBm)
Low	5745	16.91
Middle	5785	17.12
High	5825	16.95

7.3. RADIATED EMISSIONS

7.3.1. TRANSMITTER RADIATED SPURIOUS EMISSIONS

LIMITS

§15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	([2])
13.36 - 13.41			

[1] Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.
[2] Above 38.6

§15.205 (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

§15.209 (a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
30 - 88	100 **	3
88 - 216	150 **	3
216 - 960	200 **	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

§15.209 (b) In the emission table above, the tighter limit applies at the band edges.

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.

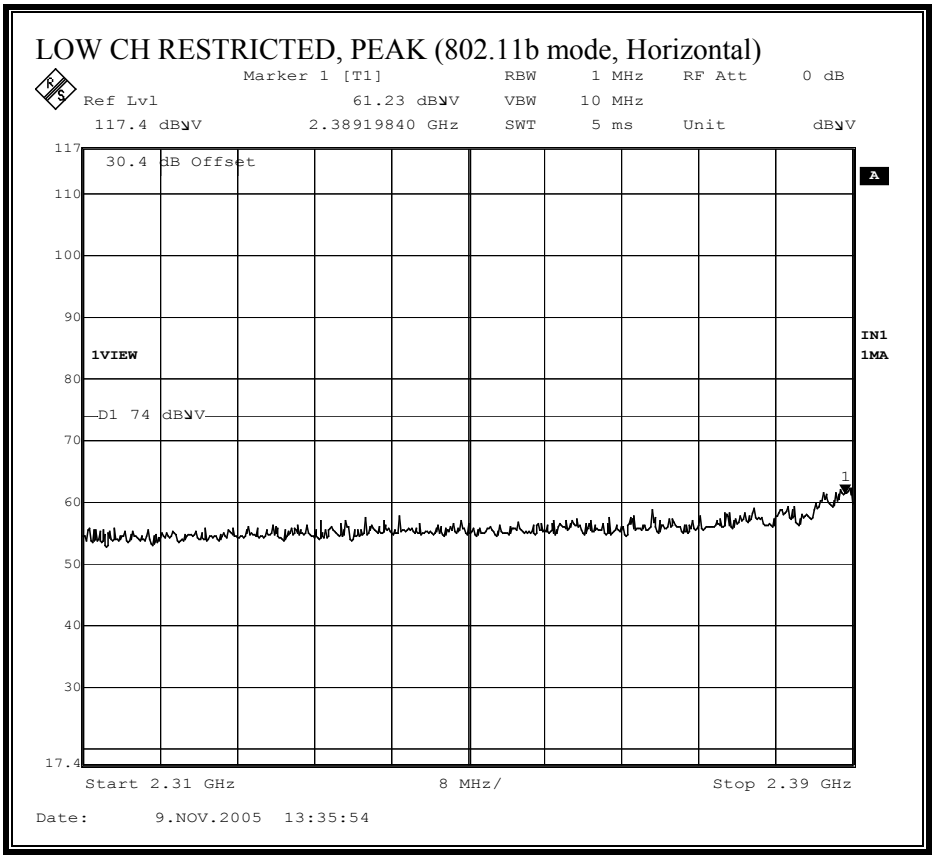
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each 5 GHz band.

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.

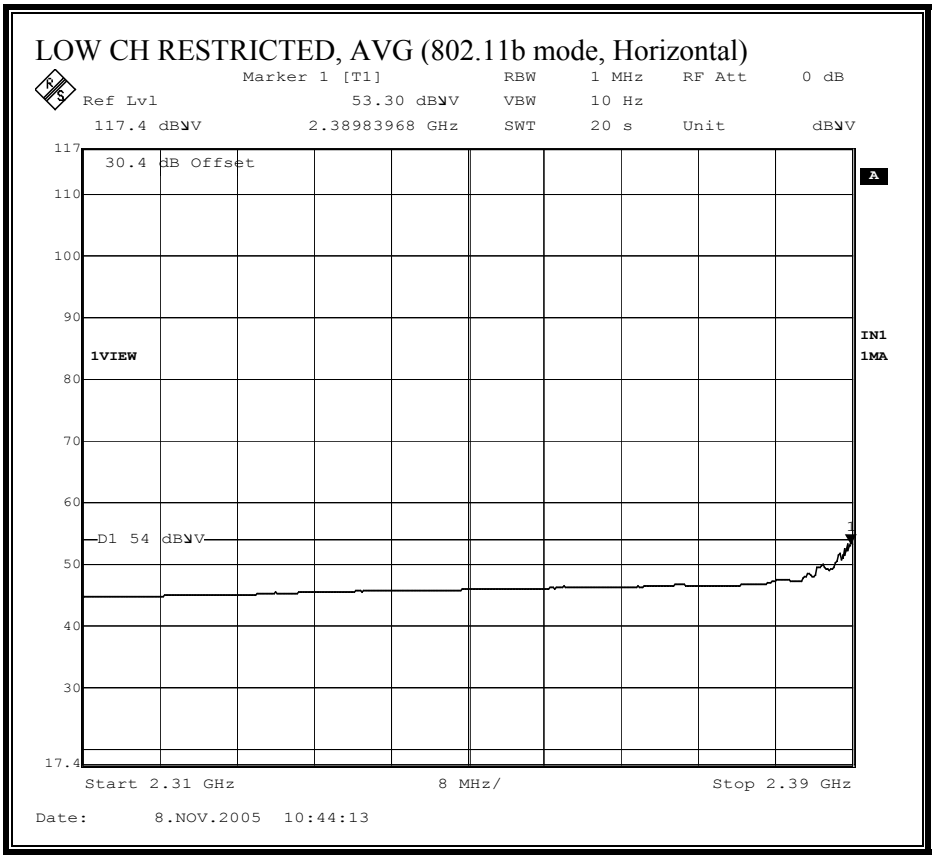
7.3.2. TRANSMITTER ABOVE 1 GHz FOR 2400 TO 2483.5 MHz BAND_b Mode

CHANNEL 1, 2412 MHz - TRANSMITTING POWER = 19 dBm

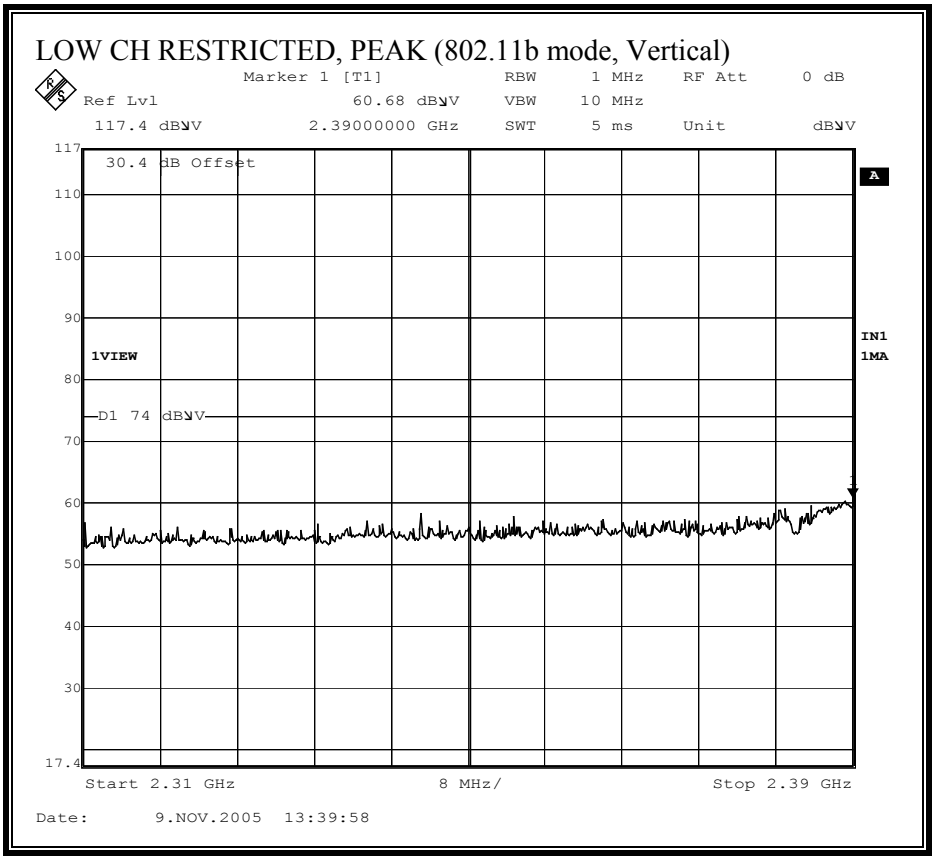
RESTRICTED BANDEDGE (b MODE, LOW CHANNEL, HORIZONTAL)



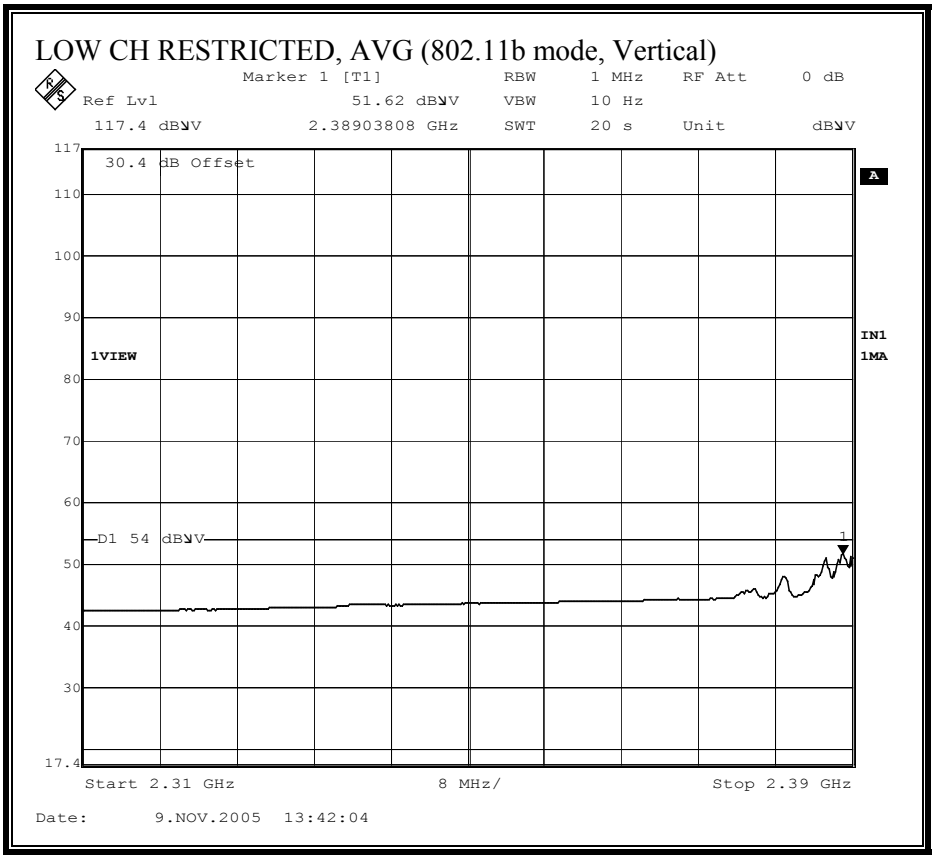
LOW CH RESTRICTED, AVG (802.11b mode, Horizontal)



RESTRICTED BANDEDGE (b MODE, LOW CHANNEL, VERTICAL)

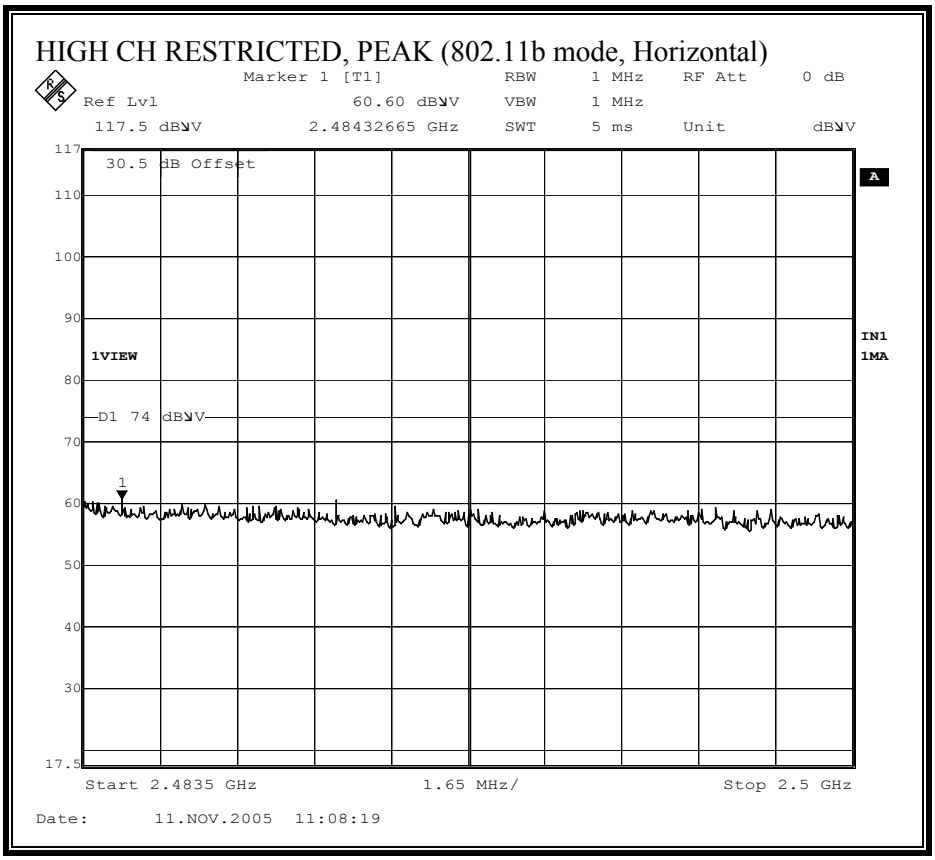


LOW CH RESTRICTED, AVG (802.11b mode, Vertical)

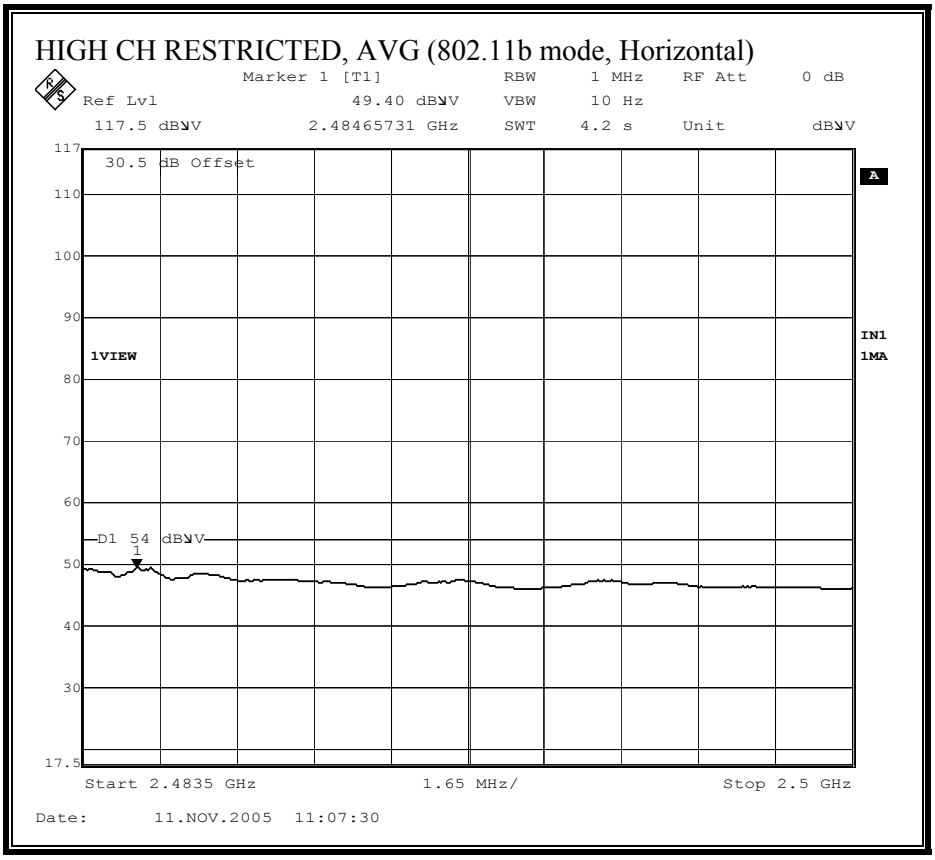


CHANNEL 11, TRANSMTTING = 19 dBm

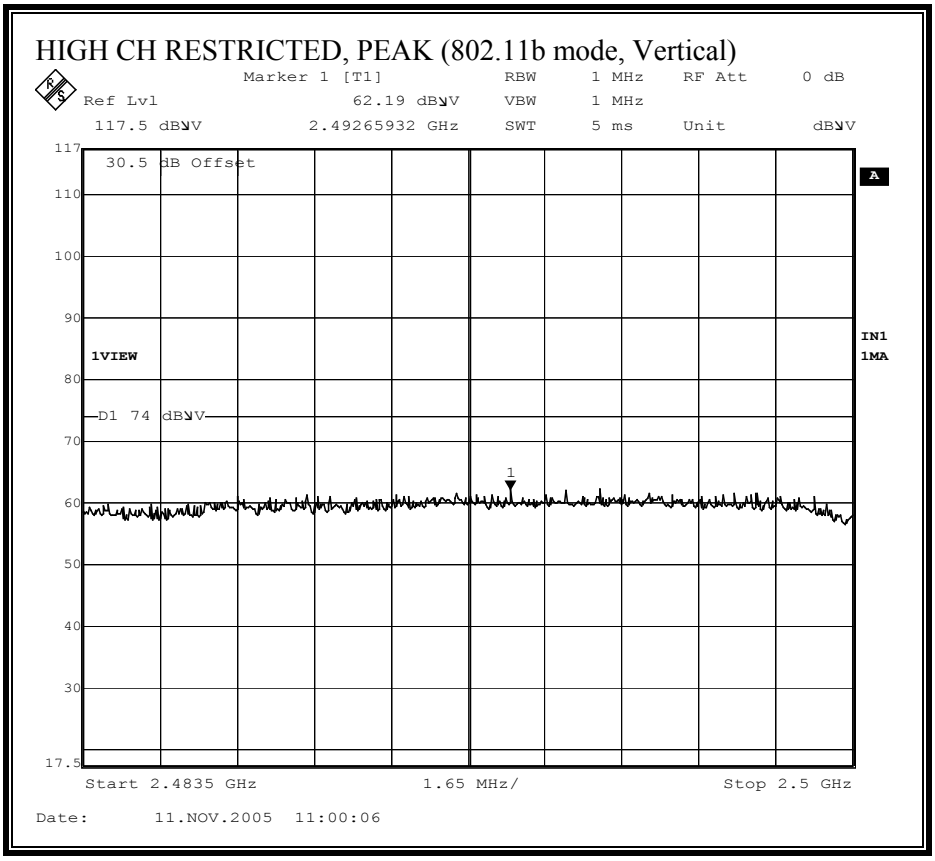
RESTRICTED BANDEDGE (b MODE, HIGH CHANNEL, HORIZONTAL)



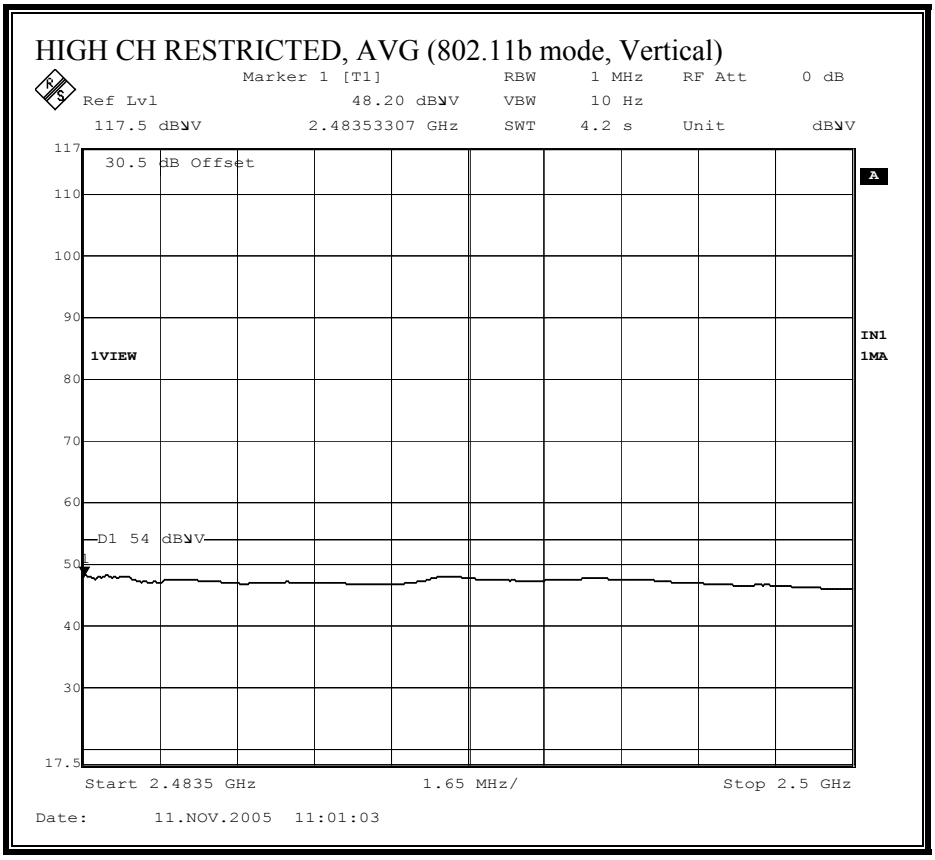
HIGH CH RESTRICTED, AVG (802.11b mode, Horizontal)



RESTRICTED BANDEDGE (b MODE, HIGH CHANNEL, VERTICAL)



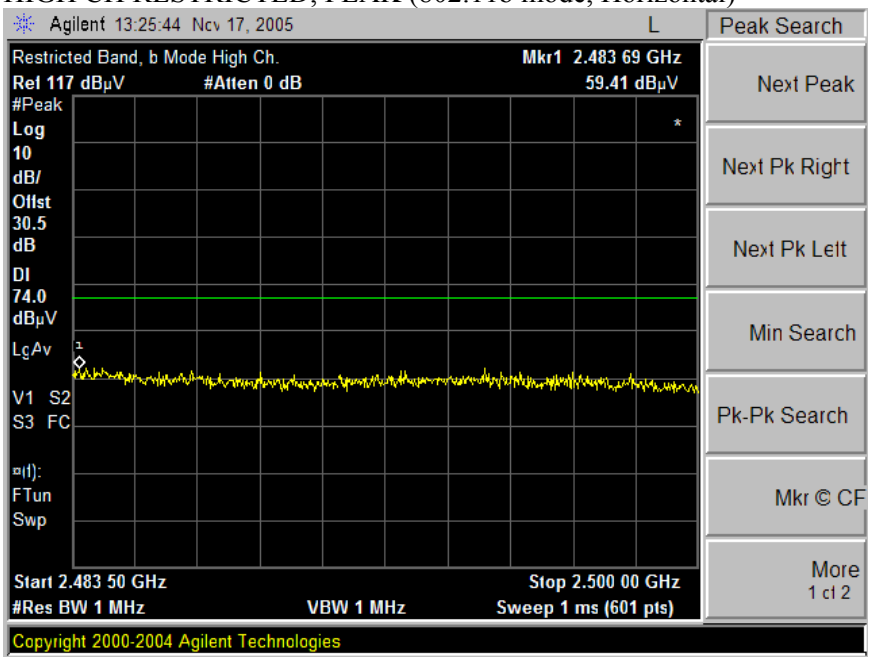
HIGH CH RESTRICTED, AVG (802.11b mode, Vertical)



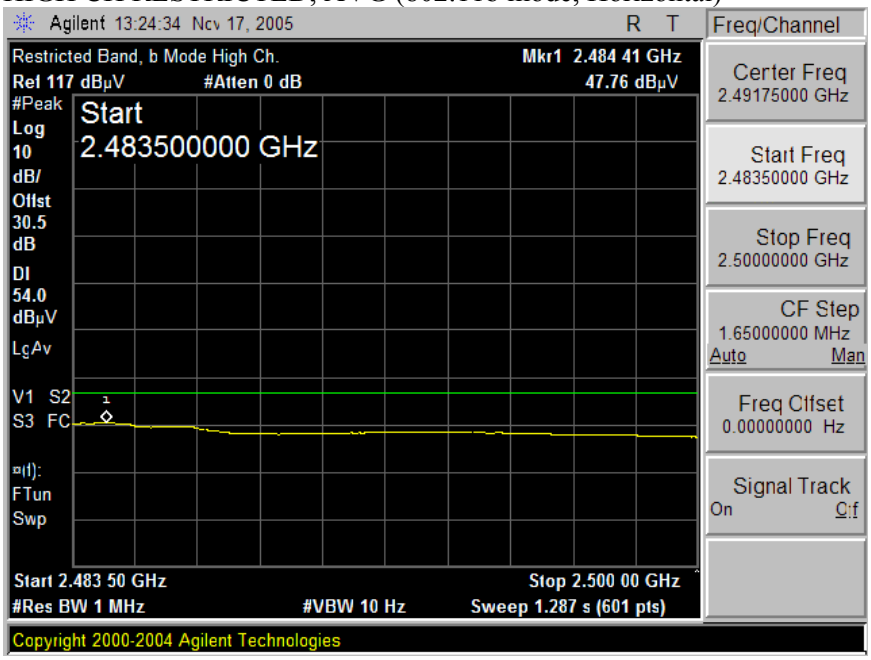
CHANNEL 13, TRANSMTTING = 10 dBm

RESTRICTED BANDEDGE (b MODE, HIGH CHANNEL, HORIZONTAL)

HIGH CH RESTRICTED, PEAK (802.11b mode, Horizontal)

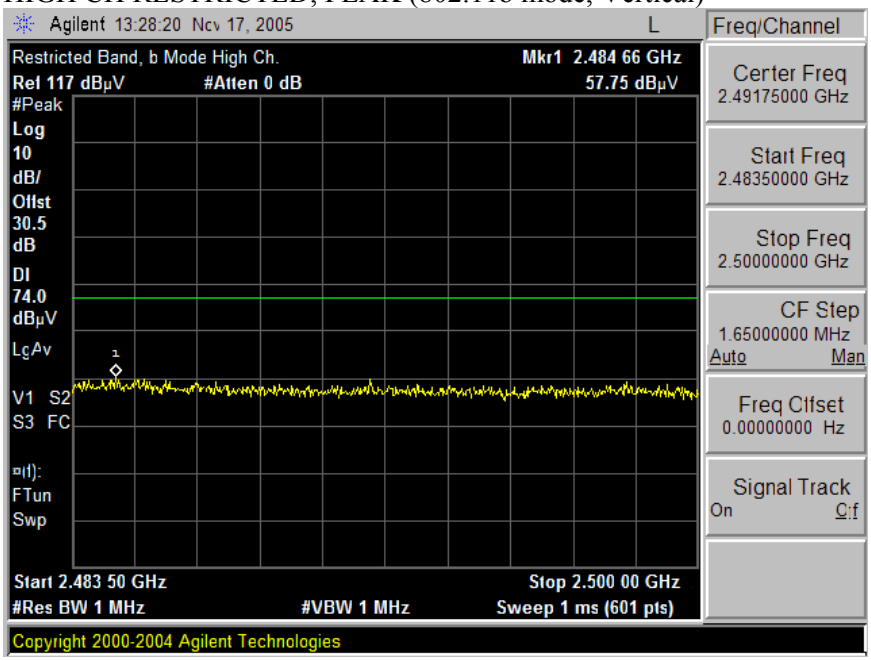


HIGH CH RESTRICTED, AVG (802.11b mode, Horizontal)

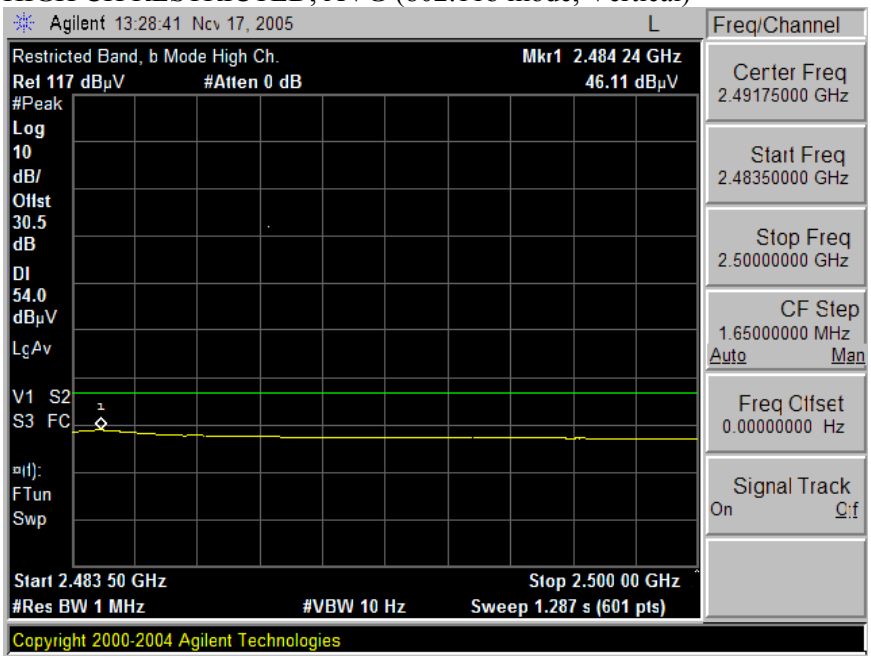


RESTRICTED BANDEDGE (b MODE, HIGH CHANNEL, VERTICAL)

HIGH CH RESTRICTED, PEAK (802.11b mode, Vertical)



HIGH CH RESTRICTED, AVG (802.11b mode, Vertical)



HARMONICS AND SPURIOUS EMISSIONS (802.11b MODE)

Power: Channel 1, 6, & 13 = 19dBm_Bit Rate: 11Mbps for Peak and 1Mbps for Average reading.

11/09/05 **High Frequency Measurement**
Compliance Certification Services, Morgan Hill Open Field Site

Test Engr:Thanh Nguyen
Project #:05U3830
Company:BroadCom Corporation
EUT Descrip.:802.11a/b/g WLAN PCI-E Mini Card
EUT M/N:BCM94311MCAG
Test Target:FCC Part 15.247
Mode Oper:Tx b Mode

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T119; S/N: 29301 @1m	T34 HP 8449B			FCC 15.209

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
Thanh 177079008		Thanh 208946003	HPF_4.0GHz	

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

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Tx Low Channel 2412MHz															
4.824	3.0	47.6	42.2	34.0	2.8	-34.8	0.0	0.6	50.2	44.8	74	54	-23.8	-9.2	V
7.236	3.0	43.1	29.9	35.6	3.3	-34.1	0.0	0.6	48.5	35.3	74	54	-25.5	-18.7	V
9.648	3.0	44.3	32.2	37.1	3.7	-33.6	0.0	0.8	52.4	40.3	74	54	-21.6	-13.7	V
4.824	3.0	49.8	44.9	34.0	2.8	-34.8	0.0	0.6	52.4	47.5	74	54	-21.6	-6.5	H
7.236	3.0	37.7	29.6	35.6	3.3	-34.1	0.0	0.6	43.1	35.0	74	54	-30.9	-19.0	Noise Floor
9.648	3.0	42.6	30.1	37.1	3.7	-33.6	0.0	0.8	50.7	38.2	74	54	-23.3	-15.8	H
Tx Mid Channel 2437MHz															
4.874	3.0	49.3	45.2	34.1	2.8	-34.8	0.0	0.6	52.0	47.9	74	54	-22.0	-6.1	V
7.311	3.0	40.9	31.3	35.6	3.3	-34.1	0.0	0.6	46.4	36.8	74	54	-27.6	-17.2	V
9.748	3.0	40.8	30.8	37.3	3.7	-33.3	0.0	0.8	49.4	39.4	74	54	-24.6	-14.6	Noise Floor
4.874	3.0	49.1	46.1	34.1	2.8	-34.8	0.0	0.6	51.7	48.8	74	54	-22.3	-5.2	H
7.311	3.0	40.2	29.8	35.6	3.3	-34.1	0.0	0.6	45.7	35.3	74	54	-28.3	-18.7	Noise Floor
9.748	3.0	40.8	30.4	37.3	3.7	-33.3	0.0	0.8	49.3	39.0	74	54	-24.7	-15.0	Noise Floor
Tx High Channel 2472MHz															
4.944	3.0	47.7	36.4	34.1	2.8	-34.8	0.0	0.6	50.5	39.2	74	54	-23.5	-14.8	V
7.416	3.0	40.3	30.4	35.7	3.3	-34.1	0.0	0.6	45.9	35.9	74	54	-28.1	-18.1	Noise Floor
4.944	3.0	45.6	38.2	34.1	2.8	-34.8	0.0	0.6	48.4	41.0	74	54	-25.6	-13.0	V
7.416	3.0	39.3	30.4	35.7	3.3	-34.1	0.0	0.6	44.8	36.0	74	54	-29.2	-18.0	Noise Floor
No other emissions were detected above 3rd harmonic.															

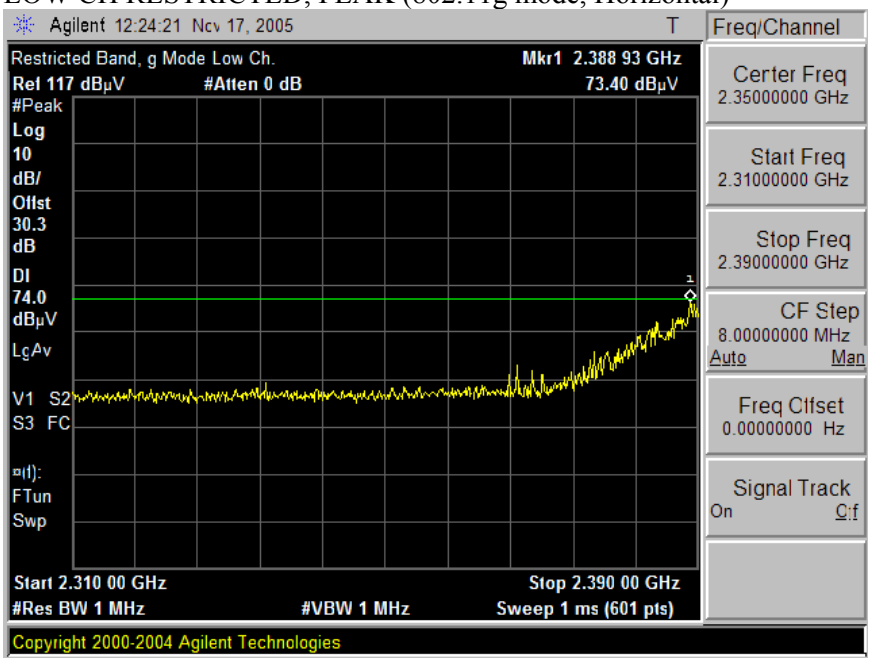
f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field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

7.3.3. TRANSMITTER ABOVE 1 GHz FOR 2400 TO 2483.5 MHz BAND_g Mode

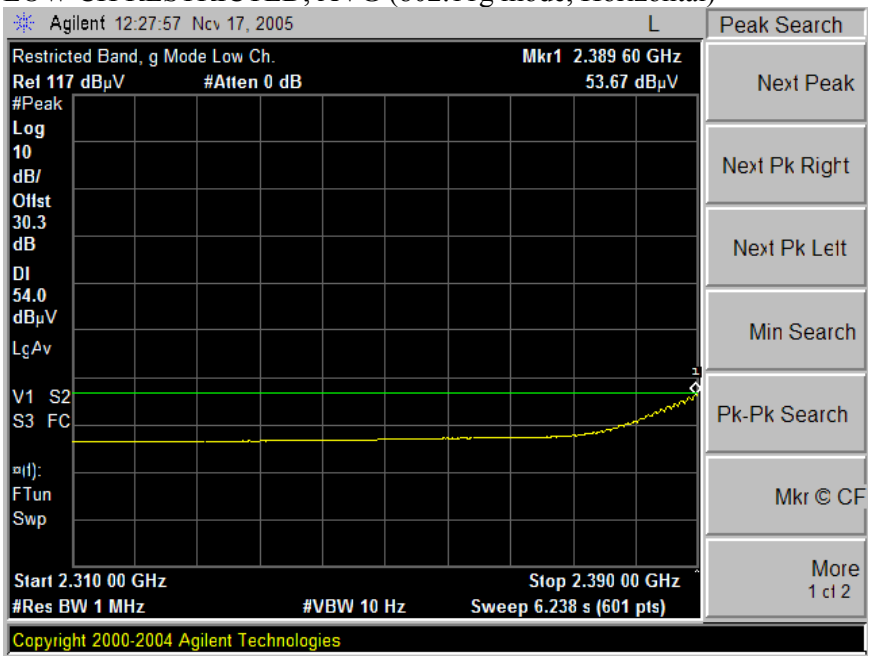
CHANNEL 1, 2412 MHz - TRANSMITTING POWER = 18 dBm

RESTRICTED BANDEDGE (g MODE, LOW CHANNEL, HORIZONTAL)

LOW CH RESTRICTED, PEAK (802.11g mode, Horizontal)

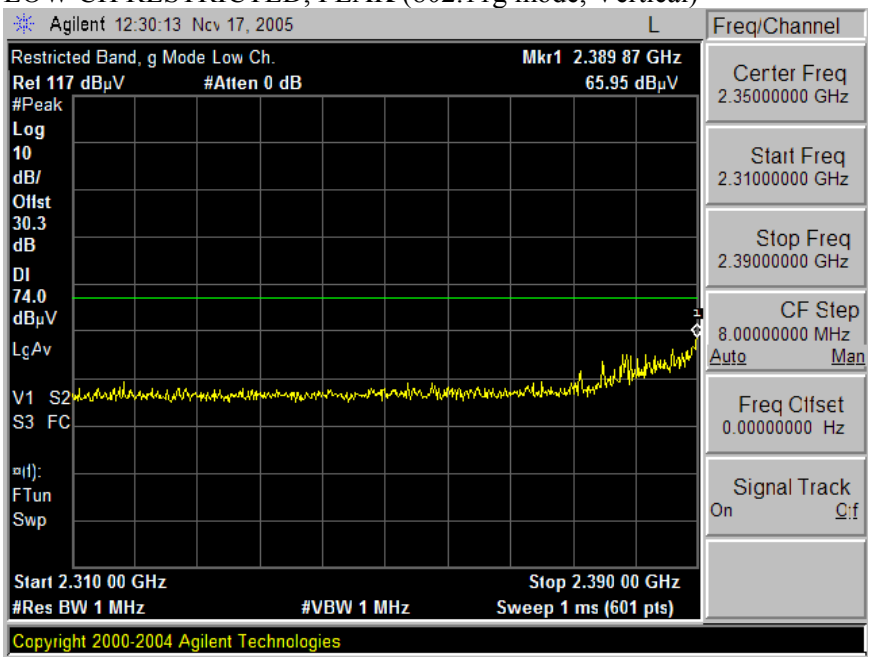


LOW CH RESTRICTED, AVG (802.11g mode, Horizontal)

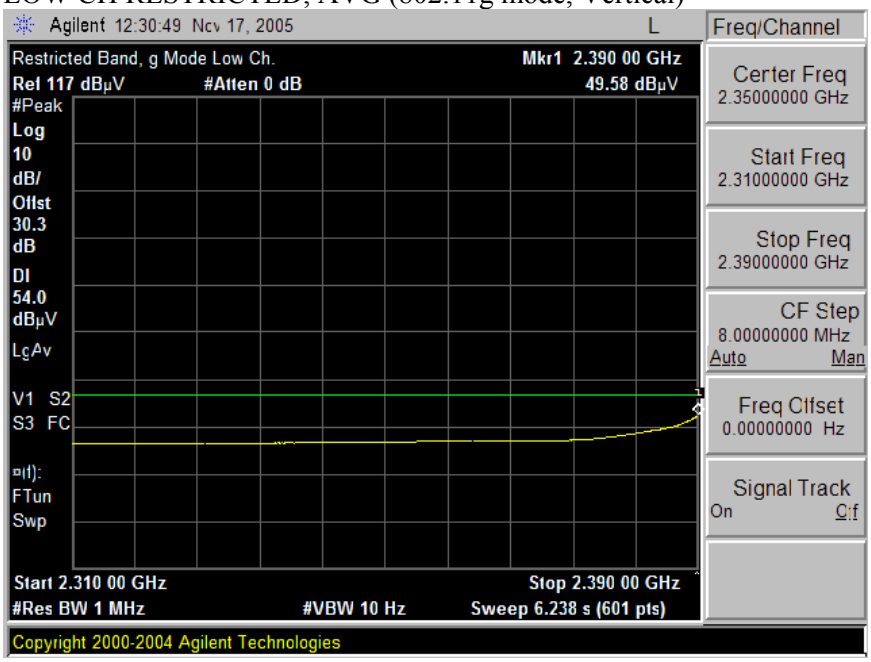


RESTRICTED BANDEDGE (g MODE, LOW CHANNEL, VERTICAL)

LOW CH RESTRICTED, PEAK (802.11g mode, Vertical)



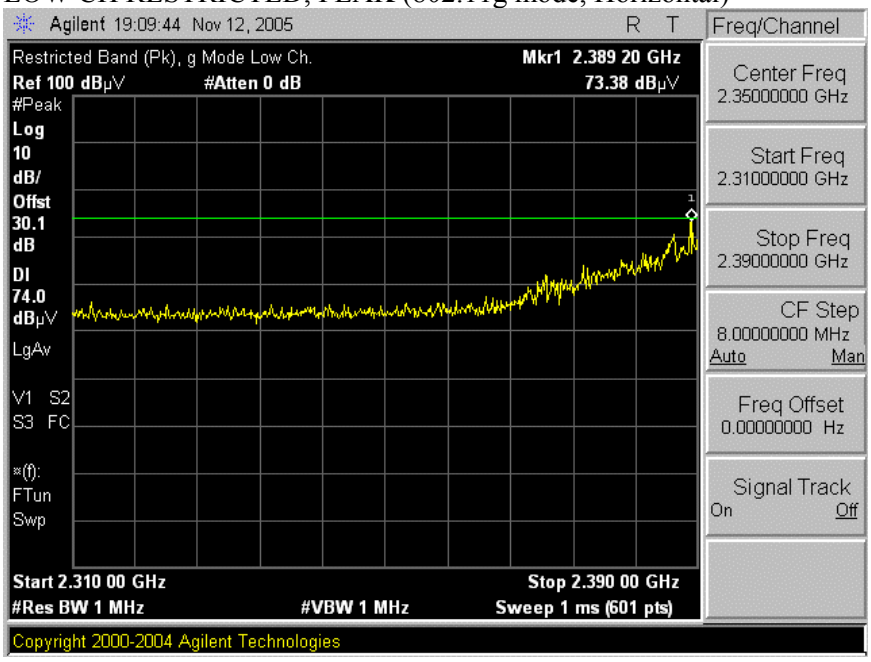
LOW CH RESTRICTED, AVG (802.11g mode, Vertical)



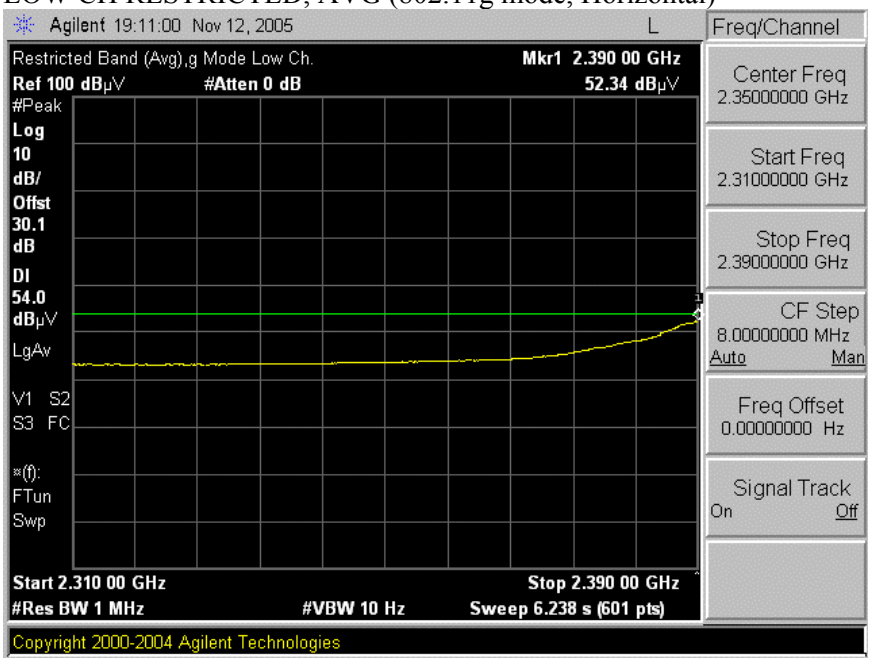
CHANNEL 2, 2417 MHZ - TRANSMITTING POWER = 19 dBm

RESTRICTED BANDEDGE (g MODE, LOW CHANNEL, HORIZONTAL)

LOW CH RESTRICTED, PEAK (802.11g mode, Horizontal)

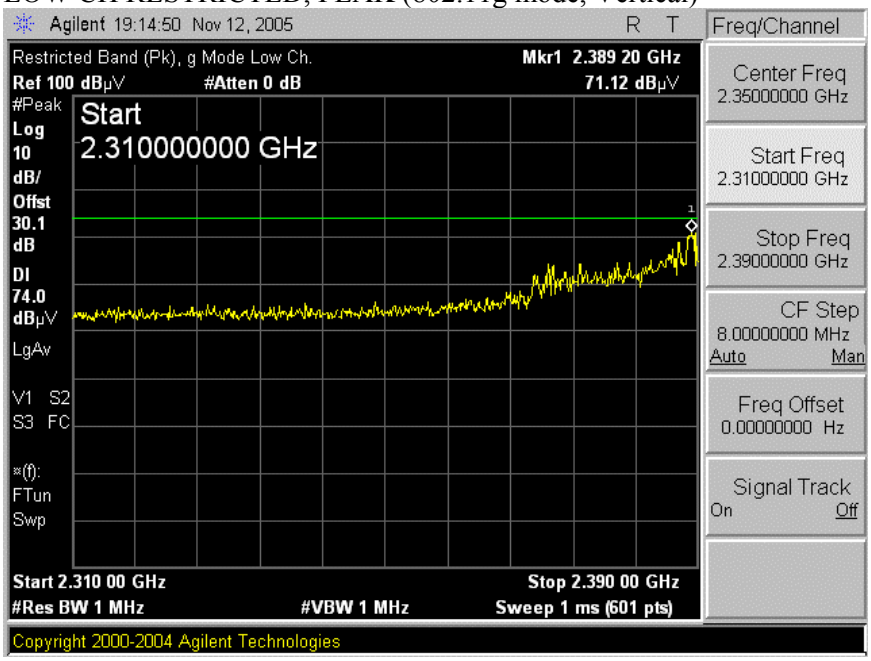


LOW CH RESTRICTED, AVG (802.11g mode, Horizontal)

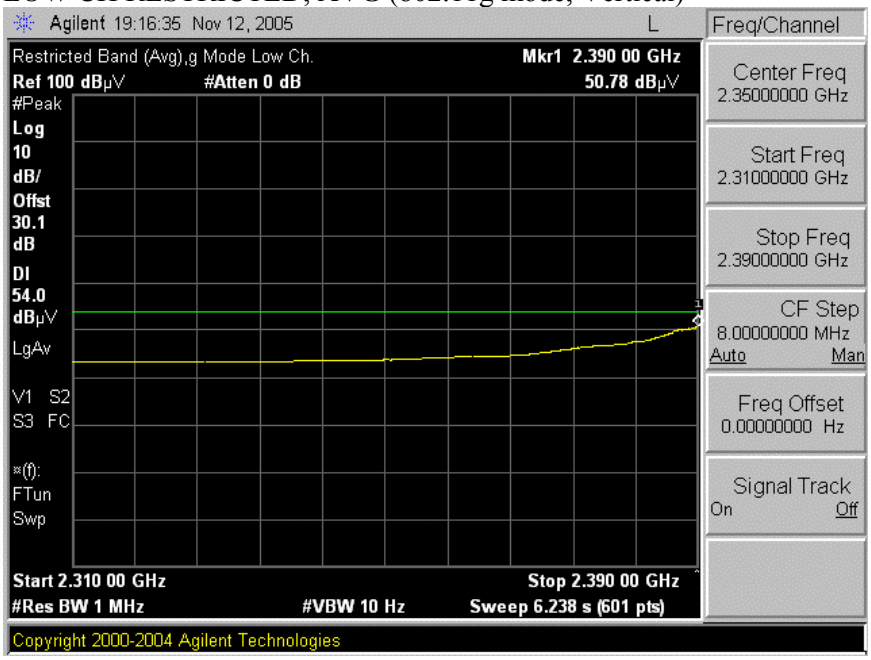


RESTRICTED BANDEDGE (g MODE, LOW CHANNEL, VERTICAL)

LOW CH RESTRICTED, PEAK (802.11g mode, Vertical)



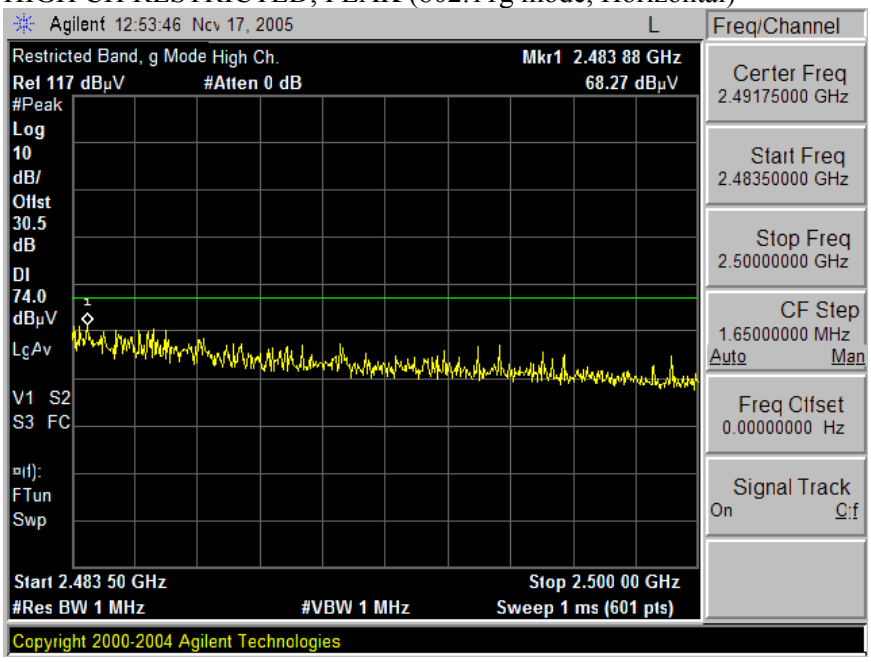
LOW CH RESTRICTED, AVG (802.11g mode, Vertical)



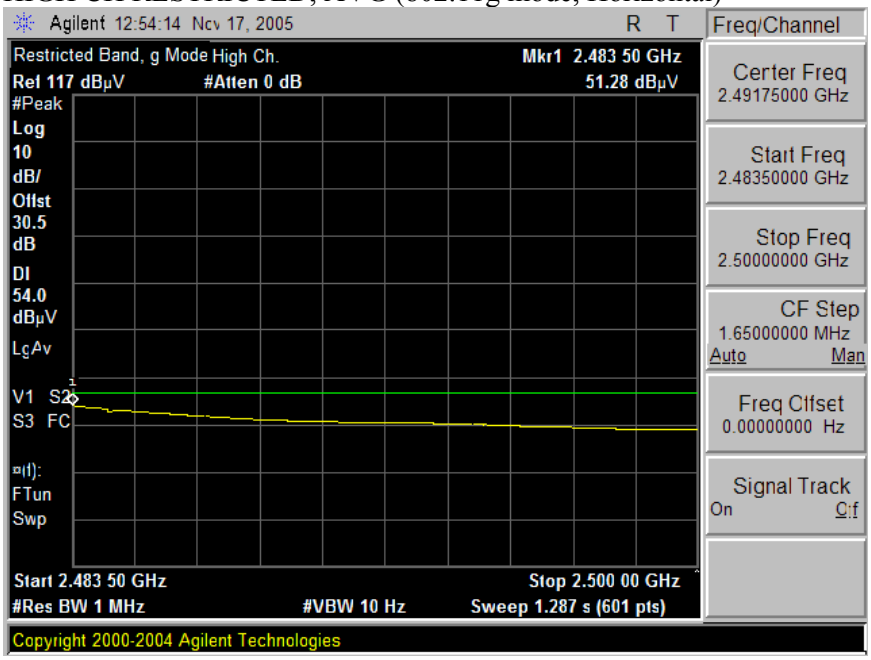
CHANNEL 9, 2452 MHz – TRANSMTTING POWER = 19 dBm

RESTRICTED BANDEDGE (g MODE, HIGH CHANNEL, HORIZONTAL)

HIGH CH RESTRICTED, PEAK (802.11g mode, Horizontal)

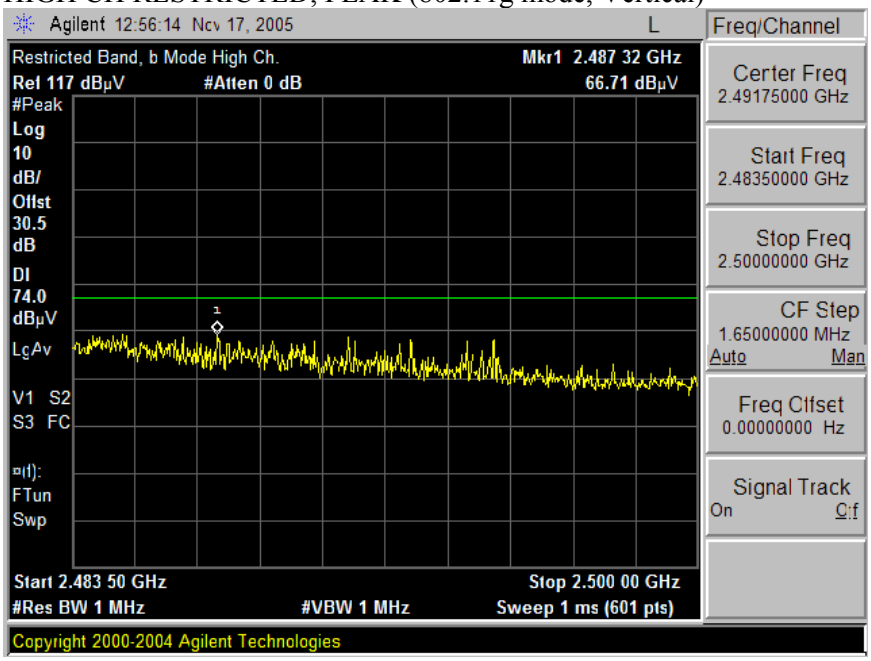


HIGH CH RESTRICTED, AVG (802.11g mode, Horizontal)

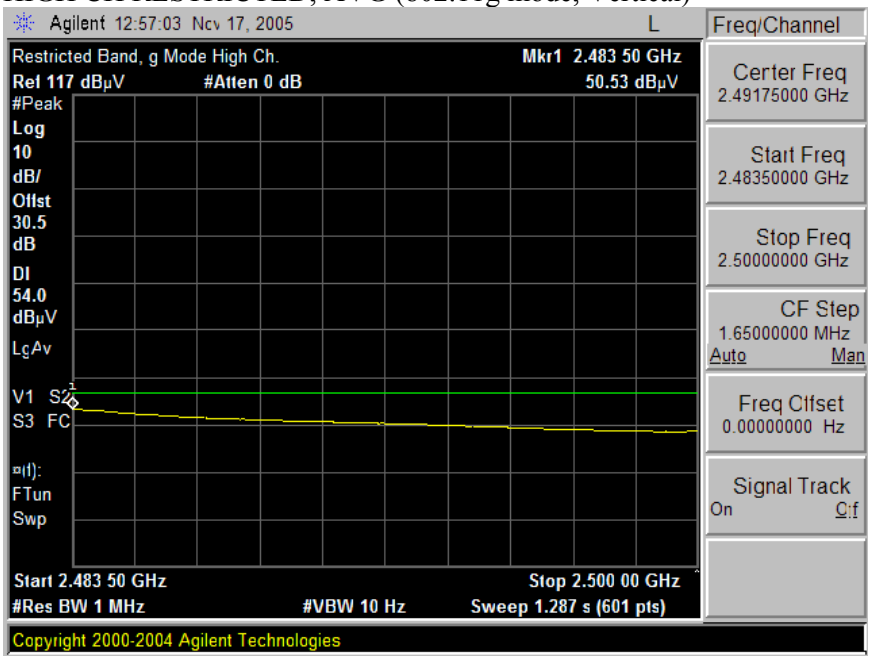


RESTRICTED BANDEDGE (g MODE, HIGH CHANNEL, VERTICAL)

HIGH CH RESTRICTED, PEAK (802.11g mode, Vertical)



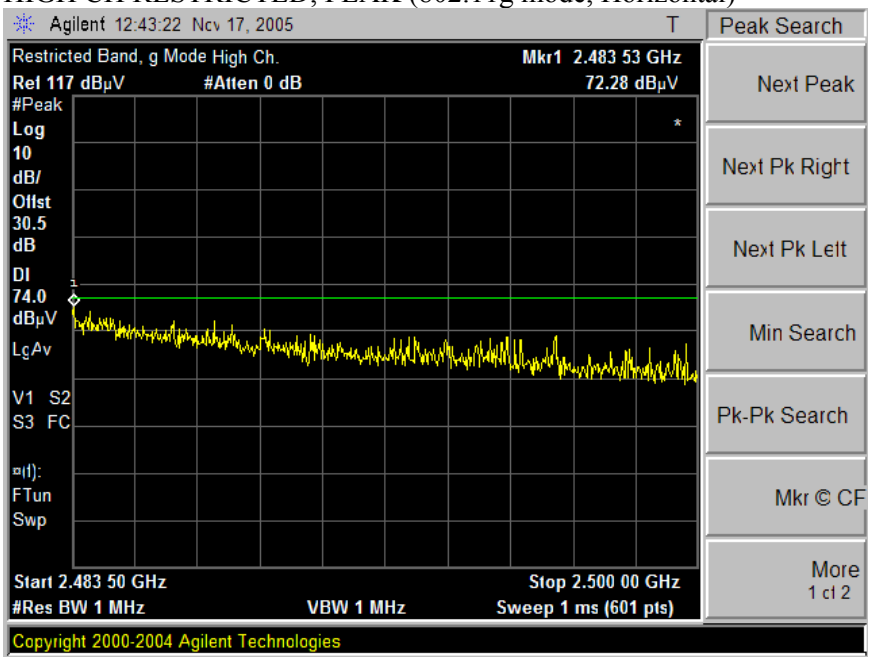
HIGH CH RESTRICTED, AVG (802.11g mode, Vertical)



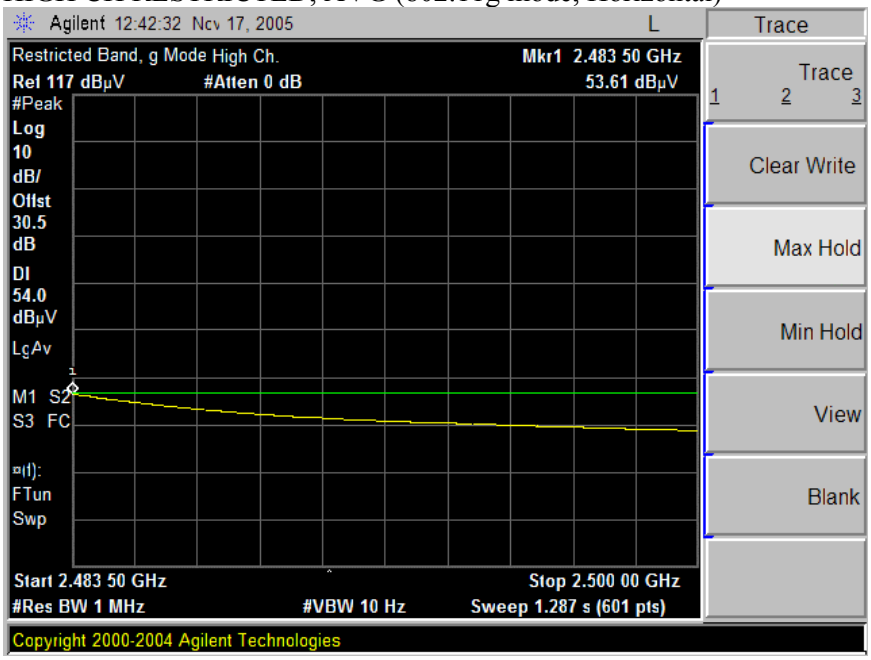
CHANNEL 10, 2457 MHz – TRANSMTTING POWER = 18.5 dBm

RESTRICTED BANDEDGE (g MODE, HIGH CHANNEL, HORIZONTAL)

HIGH CH RESTRICTED, PEAK (802.11g mode, Horizontal)

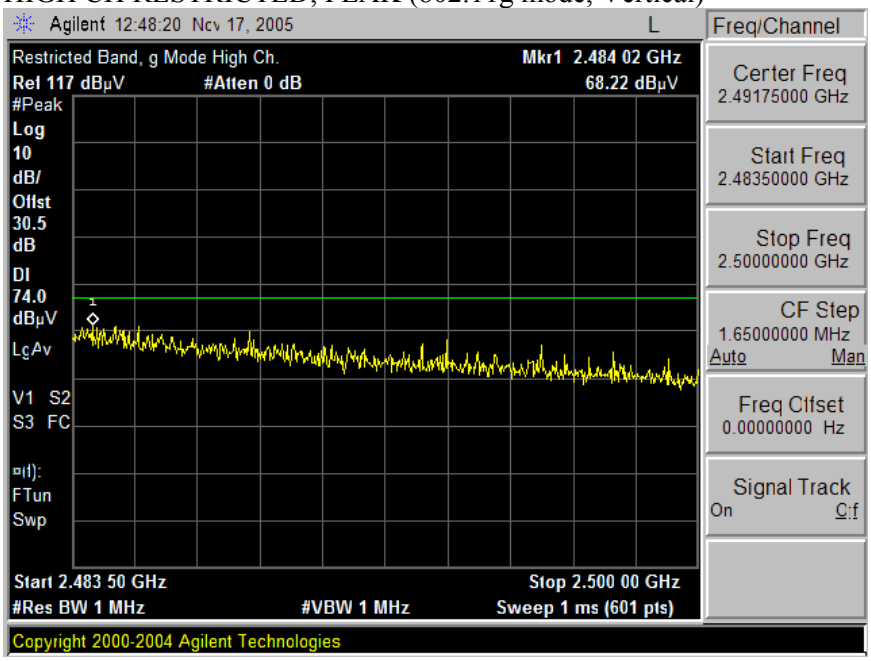


HIGH CH RESTRICTED, AVG (802.11g mode, Horizontal)

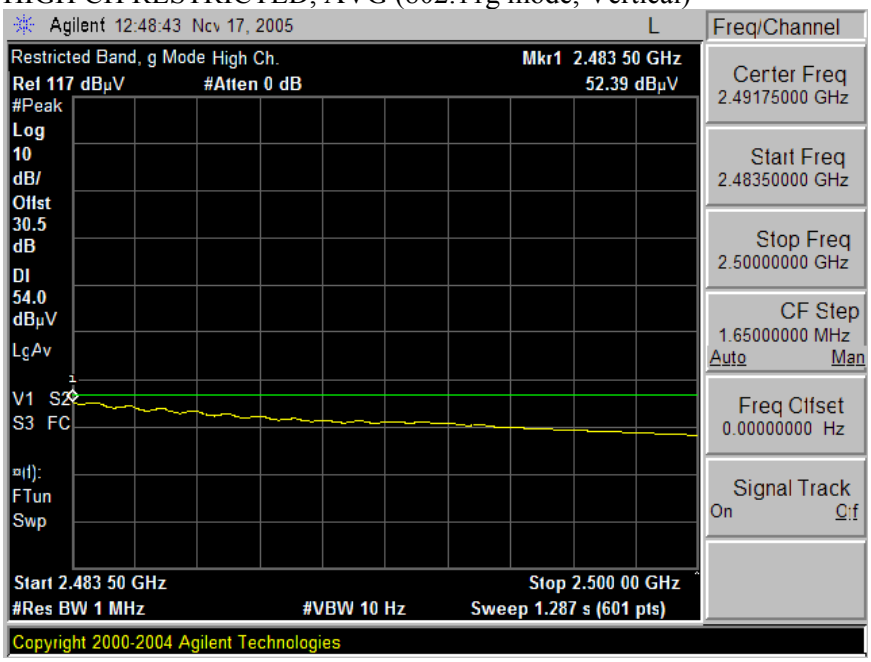


RESTRICTED BANDEDGE (g MODE, HIGH CHANNEL, VERTICAL)

HIGH CH RESTRICTED, PEAK (802.11g mode, Vertical)



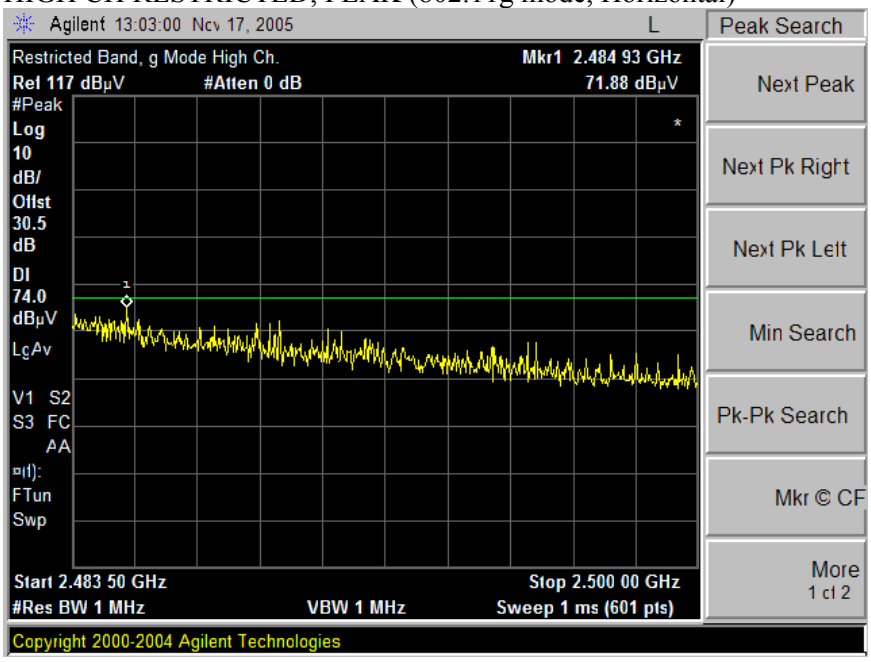
HIGH CH RESTRICTED, AVG (802.11g mode, Vertical)



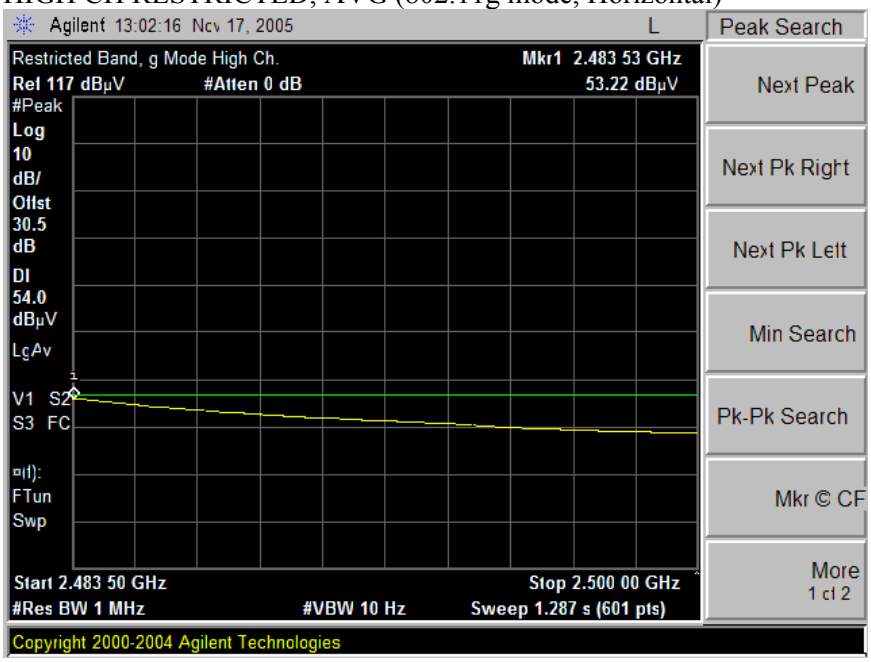
CHANNEL 11, 2462 MHz - TRANSMTTING = 16.5 dBM

RESTRICTED BANDEDGE (g MODE, HIGH CHANNEL, HORIZONTAL)

HIGH CH RESTRICTED, PEAK (802.11g mode, Horizontal)

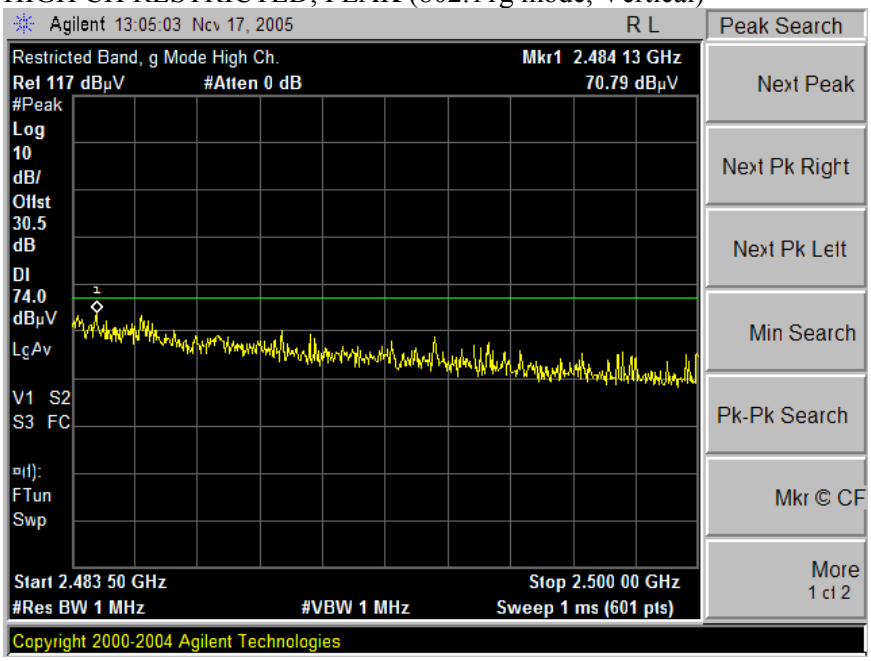


HIGH CH RESTRICTED, AVG (802.11g mode, Horizontal)

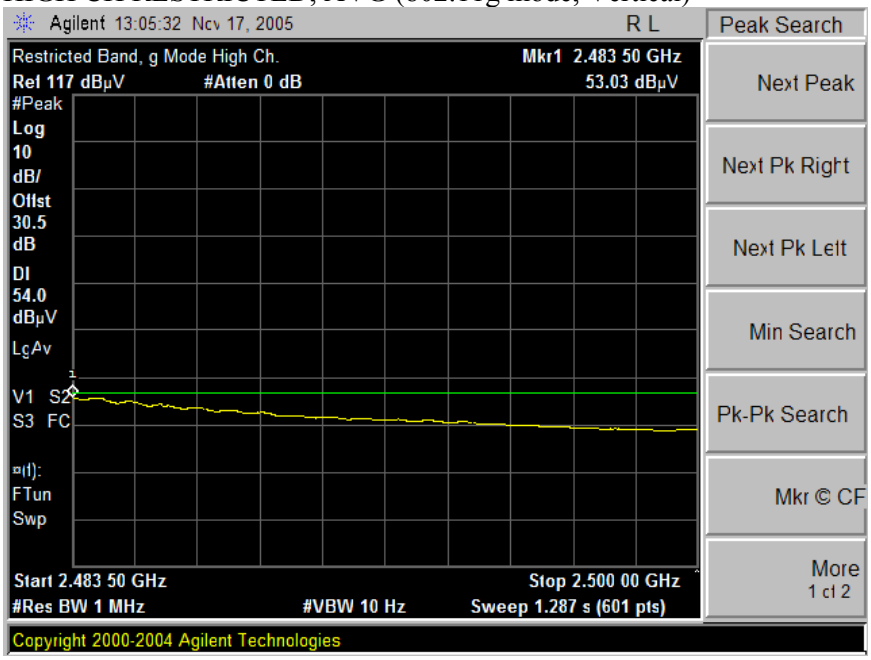


RESTRICTED BANDEDGE (g MODE, HIGH CHANNEL, VERTICAL)

HIGH CH RESTRICTED, PEAK (802.11g mode, Vertical)



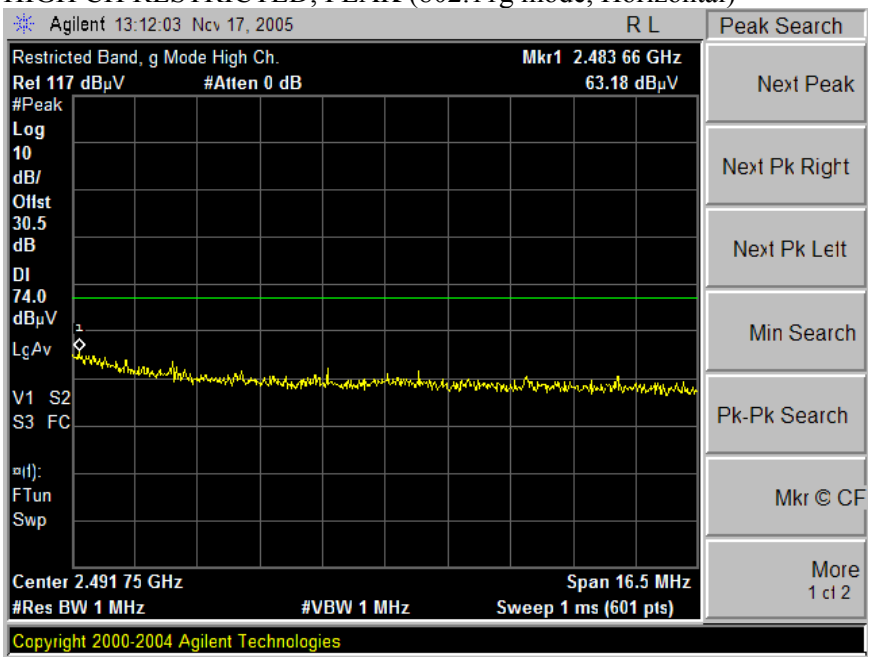
HIGH CH RESTRICTED, AVG (802.11g mode, Vertical)



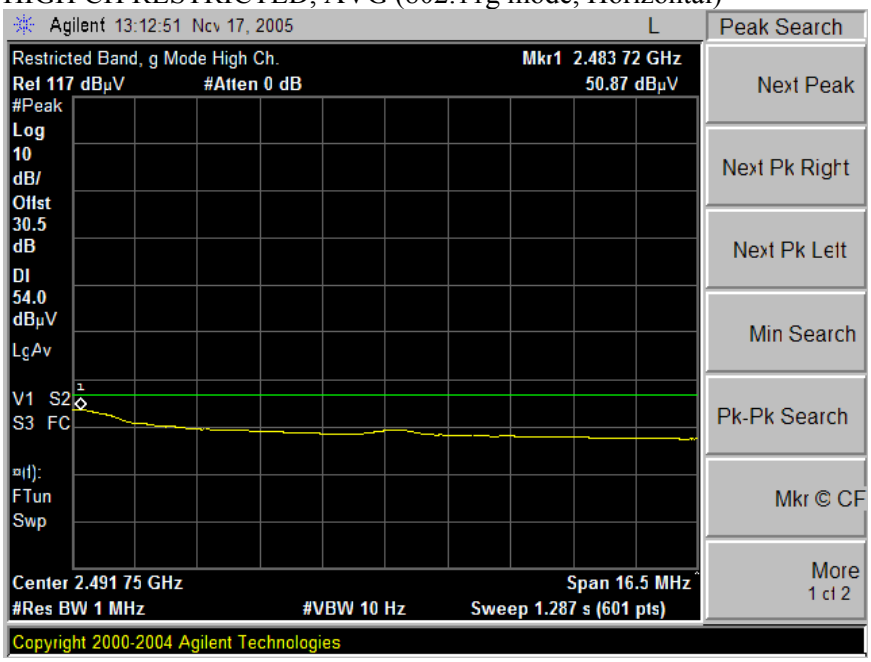
CHANNEL 13, 2472 MHz - TRANSMTTING = 11 dBm

RESTRICTED BANDEDGE (g MODE, HIGH CHANNEL, HORIZONTAL)

HIGH CH RESTRICTED, PEAK (802.11g mode, Horizontal)

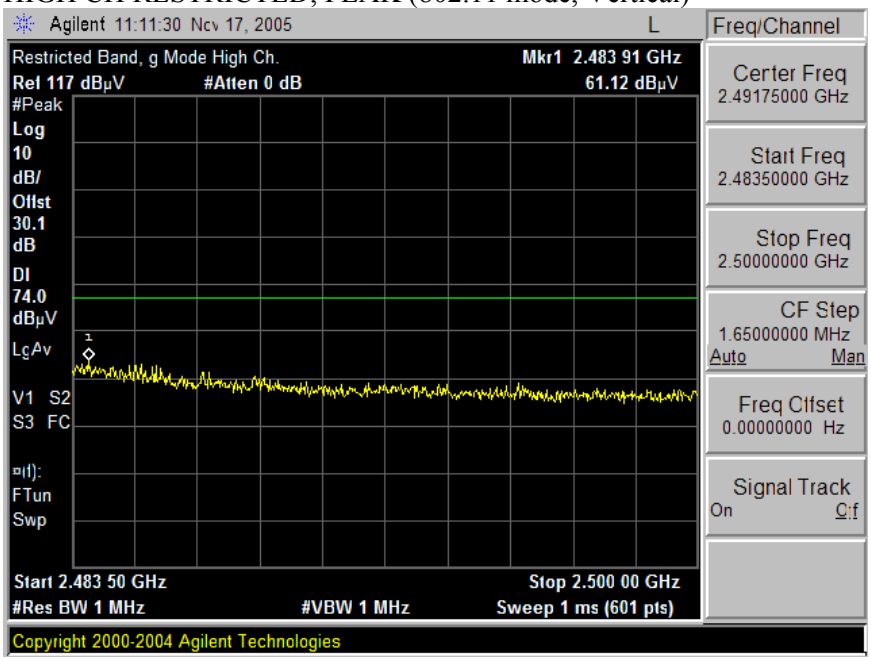


HIGH CH RESTRICTED, AVG (802.11g mode, Horizontal)

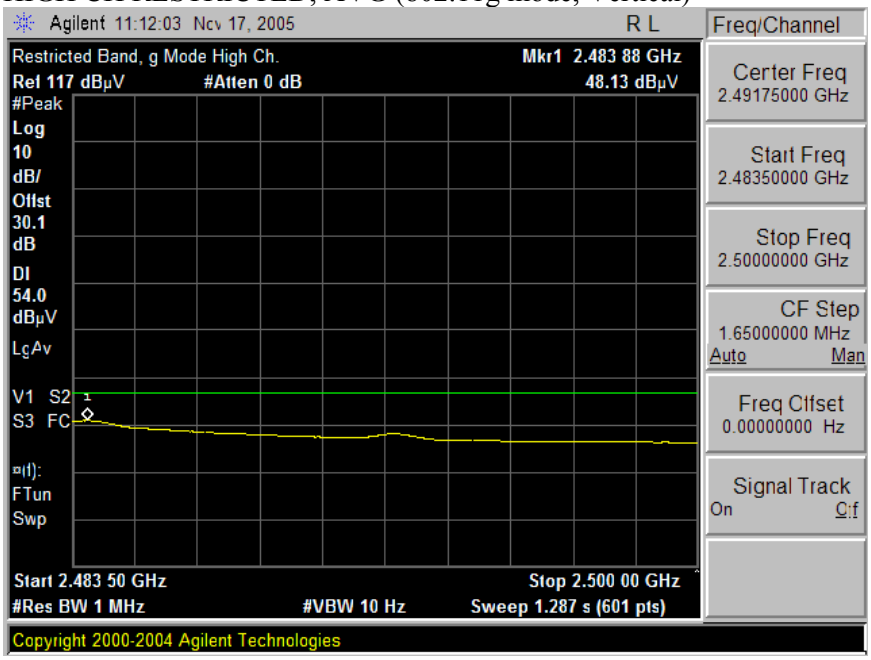


RESTRICTED BANDEDGE (g MODE, HIGH CHANNEL, VERTICAL)

HIGH CH RESTRICTED, PEAK (802.11 mode, Vertical)



HIGH CH RESTRICTED, AVG (802.11g mode, Vertical)



HARMONICS AND SPURIOUS EMISSIONS (802.11g MODE)

Power: Channel 1, 6, & 13 = 19dBm_Bit Rate: 54Mbps for Peak and 6Mbps for Average reading.

11/09/05 **High Frequency Measurement**
Compliance Certification Services, Morgan Hill Open Field Site

Test Engr:Thanh Nguyen
Project #:05U3830
Company:BroadCom Corporation
EUT Descrip.:802.11a/b/g WLAN PCI-E Mini Card
EUT M/N:BCM94311MCAG
Test Target:FCC Part 15.247
Mode Oper:Tx g Mode

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T119; S/N: 29301 @1m	T34 HP 8449B			FCC 15.209

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
Thanh 177079008		Thanh 208946003	HPF_4.0GHz	

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

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Tx Low Channel 2412MHz															
4.824	3.0	52.4	35.8	34.0	2.8	-34.8	0.0	0.6	55.0	38.4	74	54	-19.0	-15.6	V
7.236	3.0	41.9	29.9	35.6	3.3	-34.1	0.0	0.6	47.4	35.3	74	54	-26.6	-18.7	Noise Floor
4.824	3.0	51.2	37.2	34.0	2.8	-34.8	0.0	0.6	53.8	39.8	74	54	-20.2	-14.2	H
7.236	3.0	40.2	29.9	35.6	3.3	-34.1	0.0	0.6	45.7	35.3	74	54	-28.3	-18.7	Noise Floor
Tx Mid Channel 2437MHz															
4.874	3.0	45.3	31.8	34.1	2.8	-34.8	0.0	0.6	47.9	34.4	74	54	-26.1	-19.6	V
7.311	3.0	37.2	30.1	35.6	3.3	-34.1	0.0	0.6	42.7	35.6	74	54	-31.3	-18.4	Noise Floor
4.874	3.0	48.7	35.8	34.1	2.8	-34.8	0.0	0.6	51.4	38.5	74	54	-22.6	-15.5	H
7.311	3.0	38.5	29.9	35.6	3.3	-34.1	0.0	0.6	44.0	35.4	74	54	-30.0	-18.6	Noise Floor
Tx High Channel 2472MHz															
4.944	3.0	46.2	34.1	34.1	2.8	-34.8	0.0	0.6	48.9	36.9	74	54	-25.1	-17.1	V
7.416	3.0	38.6	30.5	35.7	3.3	-34.1	0.0	0.6	44.2	36.0	74	54	-29.8	-18.0	Noise Floor
4.944	3.0	48.4	37.4	34.1	2.8	-34.8	0.0	0.6	51.2	40.2	74	54	-22.8	-13.8	V
7.416	3.0	38.8	30.0	35.7	3.3	-34.1	0.0	0.6	44.4	35.6	74	54	-29.6	-18.4	Noise Floor
No other emissions were detected above 3rd harmonic.															

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

7.3.4. TRANSMITTER ABOVE 1 GHz FOR 5725 TO 5850 MHz BAND_a Mode

HARMONICS AND SPURIOUS EMISSIONS (802.11a MODE)

Power: Channel 36, 52, & 64 = 17dBm_Bit Rate: 54Mbps for Peak and 6Mbps for Average reading.

11/11/05 **High Frequency Measurement**
Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: Thanh Nguyen
Project #: 05U3830
Company: BROADCOM
EUT Descrip.:802.11ag Wireless LAN PCI-E Mini Card
EUT M/N:BCM94311MCAG
Test Target:FCC 15.247
Mode Oper:11a_5745 - 5825 MHz_TX LOW, MID, HI CHANNEL _ HARMONIC & SPUR

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T120; S/N: 29310 @1m	T34 HP 8449B			FCC 15.209

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
Thanh 177079008		Thanh 208946003	HPF_7.6GHz	

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

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Tx Ch 149, 5745MHz															
11.490	3.0	49.5	35.9	38.5	4.2	-32.5	0.0	0.7	60.3	46.7	74	54	-13.7	-7.3	V
17.235	3.0	43.4	32.6	42.0	5.2	-32.0	0.0	0.6	59.2	48.4	74	54	-14.8	-5.6	Noise floor
11.490	3.0	48.4	34.3	38.5	4.2	-32.5	0.0	0.7	59.2	45.1	74	54	-14.8	-8.9	H
17.235	3.0	43.7	32.6	42.0	5.2	-32.0	0.0	0.6	59.5	48.4	74	54	-14.5	-5.6	Noise floor
Tx Ch 157, 5785MHz															
11.570	3.0	49.7	36.4	38.5	4.2	-32.5	0.0	0.7	60.6	47.2	74	54	-13.4	-6.8	V
17.355	3.0	41.2	32.3	42.1	5.2	-32.1	0.0	0.6	57.1	48.2	74	54	-16.9	-5.8	Noise floor
11.570	3.0	44.9	34.8	38.5	4.2	-32.5	0.0	0.7	55.8	45.6	74	54	-18.2	-8.4	H
17.355	3.0	41.9	32.3	42.1	5.2	-32.1	0.0	0.6	57.7	48.1	74	54	-16.3	-5.9	Noise floor
Tx Ch 165, 5825MHz															
11.650	3.0	50.2	35.2	38.5	4.2	-32.5	0.0	0.7	61.1	46.1	74	54	-12.9	-7.9	V
17.475	3.0	41.9	32.5	42.2	5.3	-32.1	0.0	0.6	57.8	48.5	74	54	-16.2	-5.5	Noise floor
11.650	3.0	46.8	33.5	38.5	4.2	-32.5	0.0	0.7	57.7	44.4	74	54	-16.3	-9.6	H
17.475	3.0	42.2	31.8	42.2	5.3	-32.1	0.0	0.6	58.2	47.7	74	54	-15.8	-6.3	Noise floor
No other emissions were detected above 2nd Harmonic.															

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

7.3.5. TRANSMITTER BELOW 1 GHz FOR 2400 TO 2483.5 MHz BAND_b Mode

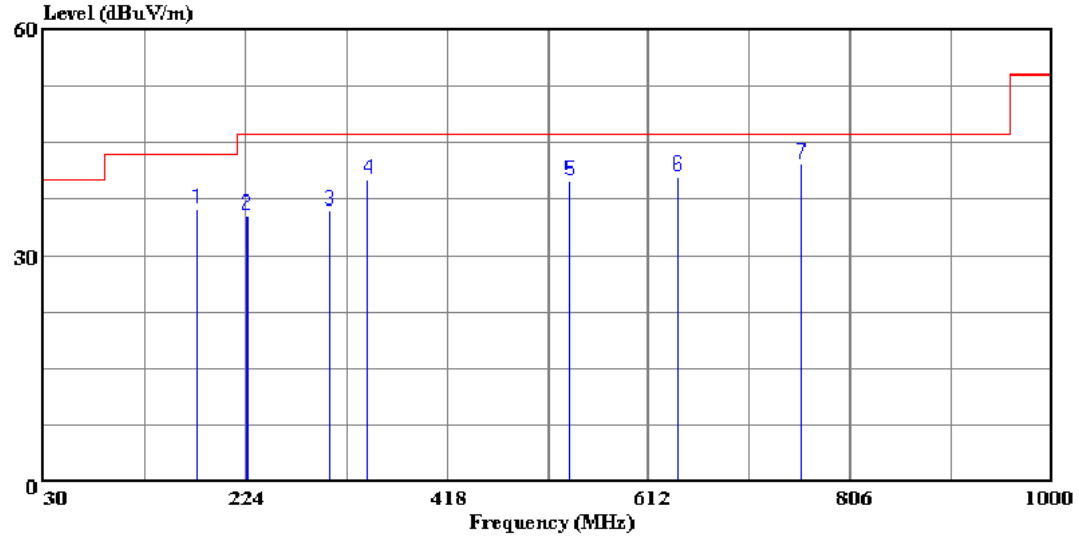
11b Mode

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

HORIZONTAL PLOT

561F Monterey Road
Morgan Hill, CA 95037
Tel: (408) 463-0888
Fax: (408) 463-0885

Data#: 2 File#: emissions.EMI Date: 11-10-2005 Time: 20:28:29



(Audix ATC)

Trace: Ref Trace:

Condition: FCC CLASS-B HORIZONTAL
Test Operator: : Thanh Nguyen
Project #: : 05U3830
Company: : BroadCom Corporation
EUT: : 802.11 a/b/g WLAN PCI-E Mini Card
Model No. : BCM94311MCAG
Configuration : EUT Plug in the Extended card, HP Laptop
Target of Test : FCC Class B
Mode of Operation: Tx b Mode, worst channel

HORIZONTAL DATA

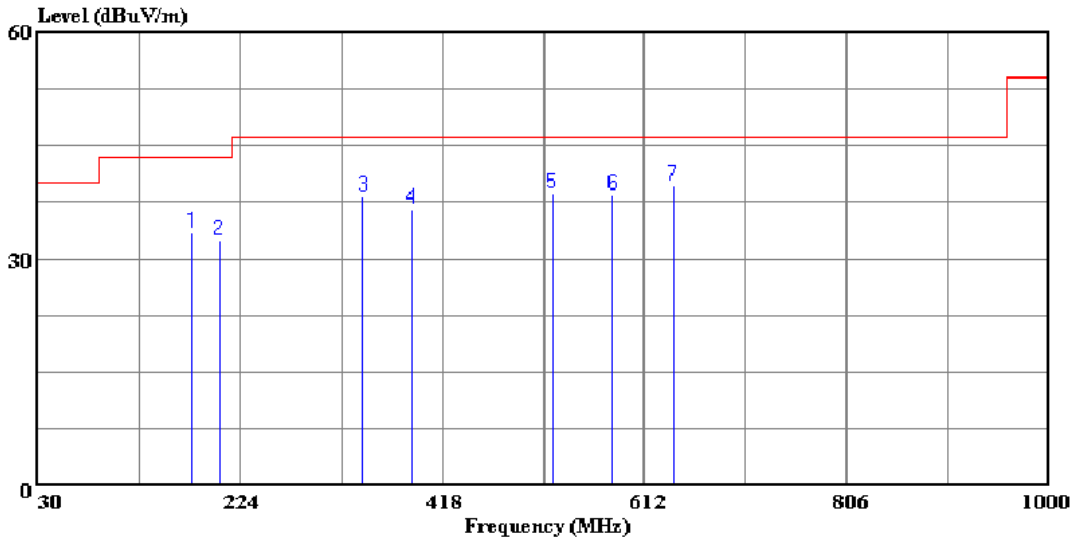
	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	177.440	23.06	13.11	36.17	43.50	-7.33	Peak
2	225.940	22.42	12.91	35.33	46.00	-10.67	Peak
3	305.480	20.10	15.80	35.90	46.00	-10.10	Peak
4	342.340	23.43	16.68	40.11	46.00	-5.89	Peak
5	536.340	19.06	20.73	39.79	46.00	-6.21	Peak
6	640.130	18.30	22.18	40.48	46.00	-5.52	Peak
7	759.440	18.28	23.97	42.25	46.00	-3.75	Peak

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

VERTICAL PLOT

561F Monterey Road
Morgan Hill, CA 95037
Tel: (408) 463-0888
Fax: (408) 463-0885

Data#: 4 File#: emissions.EMI Date: 11-10-2005 Time: 20:37:09



(Audix ATC)

Trace: Ref Trace:

Condition: FCC CLASS-B VERTICAL
Test Operator: : Thanh Nguyen
Project #: : 05U3830
Company: : BroadCom Corporation
EUT: : 802.11 a/b/g WLAN PCI-E Mini Card
Model No. : BCM94311MCAG
Configuration : EUT Plug in the Extended card, HP Laptop
Target of Test : FCC Class B
Mode of Operation: Tx b Mode, worst channel

VERTICAL DATA

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	177.440	20.23	13.11	33.34	43.50	-10.16	Peak
2	203.630	18.28	14.01	32.29	43.50	-11.21	Peak
3	342.340	21.54	16.68	38.22	46.00	-7.78	Peak
4	387.930	18.72	17.77	36.49	46.00	-9.51	Peak
5	523.730	17.98	20.62	38.60	46.00	-7.40	Peak
6	581.930	17.11	21.31	38.42	46.00	-7.58	Peak
7	639.160	17.54	22.16	39.70	46.00	-6.30	Peak

7.3.6. TRANSMITTER BELOW 1 GHz FOR 2400 TO 2483.5 MHz BAND_g Mode

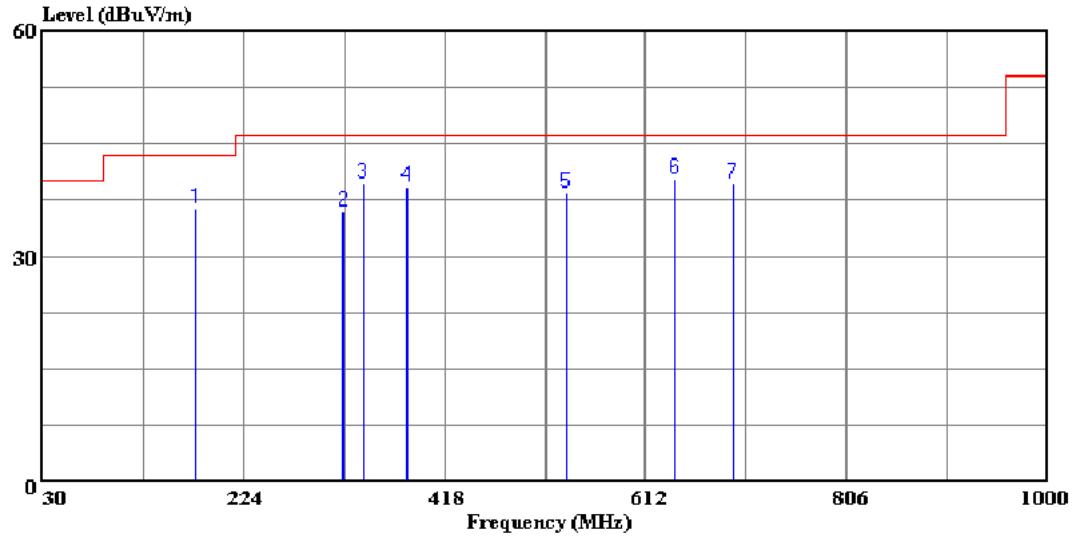
11g Mode

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

HORIZONTAL PLOT

561F Monterey Road
Morgan Hill, CA 95037
Tel: (408) 463-0888
Fax: (408) 463-0885

Data#: 8 File#: emissions.EMI Date: 11-10-2005 Time: 20:57:45



(Audix ATC)

Trace: Ref Trace:

Condition: FCC CLASS-B HORIZONTAL
Test Operator: : Thanh Nguyen
Project #: : 05U3830
Company: : BroadCom Corporation
EUT: : 802.11 a/b/g WLAN PCI-E Mini Card
Model No. : BCM94311MCAG
Configuration : EUT Plug in the Extended card, HP Laptop
Target of Test : FCC Class B
Mode of Operation: Tx g Mode, worst channel

HORIZONTAL DATA

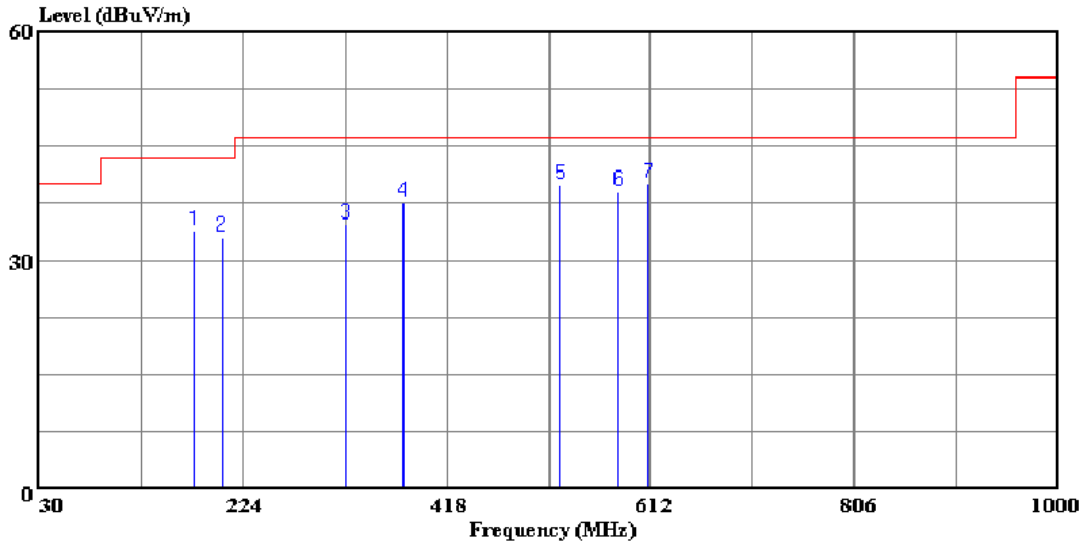
	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	177.440	23.26	13.11	36.37	43.50	-7.13	Peak
2	320.030	19.83	16.14	35.97	46.00	-10.03	Peak
3	339.430	23.10	16.61	39.71	46.00	-6.29	Peak
4	381.140	21.72	17.62	39.34	46.00	-6.66	Peak
5	535.370	17.74	20.71	38.45	46.00	-7.55	Peak
6	640.130	18.15	22.18	40.33	46.00	-5.67	Peak
7	696.390	16.68	23.03	39.71	46.00	-6.29	Peak

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

VERTICAL PLOT

561F Monterey Road
Morgan Hill, CA 95037
Tel: (408) 463-0888
Fax: (408) 463-0885

Data#: 6 File#: emissions.EMI Date: 11-10-2005 Time: 20:46:51



(Audix ATC)

Trace: Ref Trace:

Condition: FCC CLASS-B VERTICAL
Test Operator: : Thanh Nguyen
Project #: : 05U3830
Company: : BroadCom Corporation
EUT: : 802.11 a/b/g WLAN PCI-E Mini Card
Model No. : BCM94311MCAG
Configuration : EUT Plug in the Extended card, HP Laptop
Target of Test : FCC Class B
Mode of Operation: Tx g Mode, worst channel

VERTICAL DATA

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	177.440	20.73	13.11	33.84	43.50	-9.66	Peak
2	203.630	18.95	14.01	32.96	43.50	-10.54	Peak
3	321.970	18.45	16.23	34.68	46.00	-11.32	Peak
4	376.290	20.12	17.53	37.65	46.00	-8.35	Peak
5	526.640	19.24	20.63	39.87	46.00	-6.13	Peak
6	581.930	17.74	21.31	39.05	46.00	-6.95	Peak
7	610.060	18.37	21.67	40.03	46.00	-5.97	Peak

7.3.7. TRANSMITTER BELOW 1 GHz FOR 5725 TO 5850 MHz BAND_a Mode

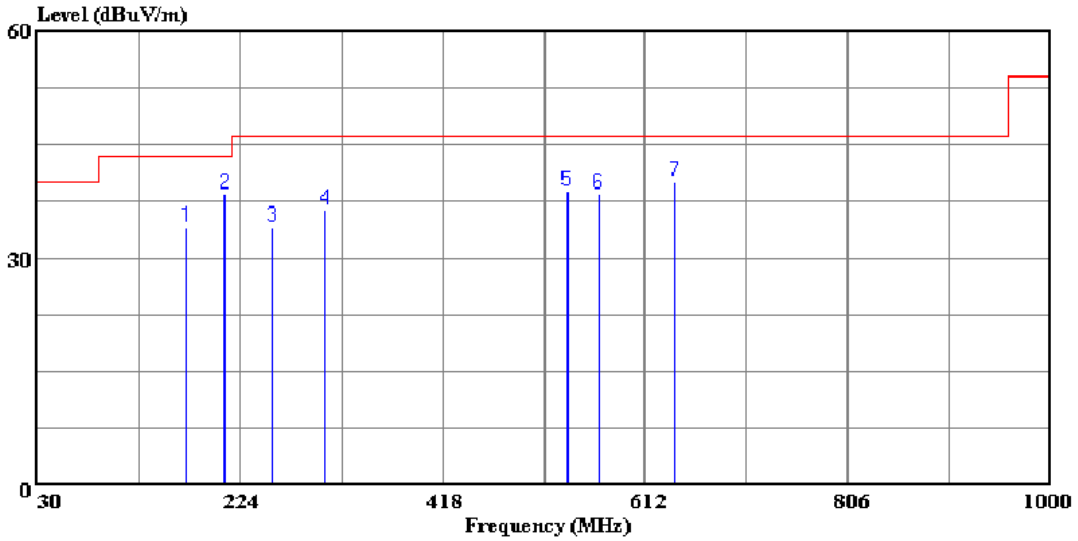
11a Mode

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

HORIZONTAL PLOT

561F Monterey Road
Morgan Hill, CA 95037
Tel: (408) 463-0888
Fax: (408) 463-0885

Data#: 10 File#: emissions.EMI Date: 11-10-2005 Time: 21:09:26



(Audix ATC)

Trace: Ref Trace:

Condition: FCC CLASS-B HORIZONTAL
Test Operator: : Thanh Nguyen
Project #: : 05U3830
Company: : BroadCom Corporation
EUT: : 802.11 a/b/g WLAN PCI-E Mini Card
Model No. : BCM94311MCAG
Configuration : EUT Plug in the Extended card, HP Laptop
Target of Test : FCC Class B
Mode of Operation: Tx a Mode upper band, worst channel

HORIZONTAL DATA

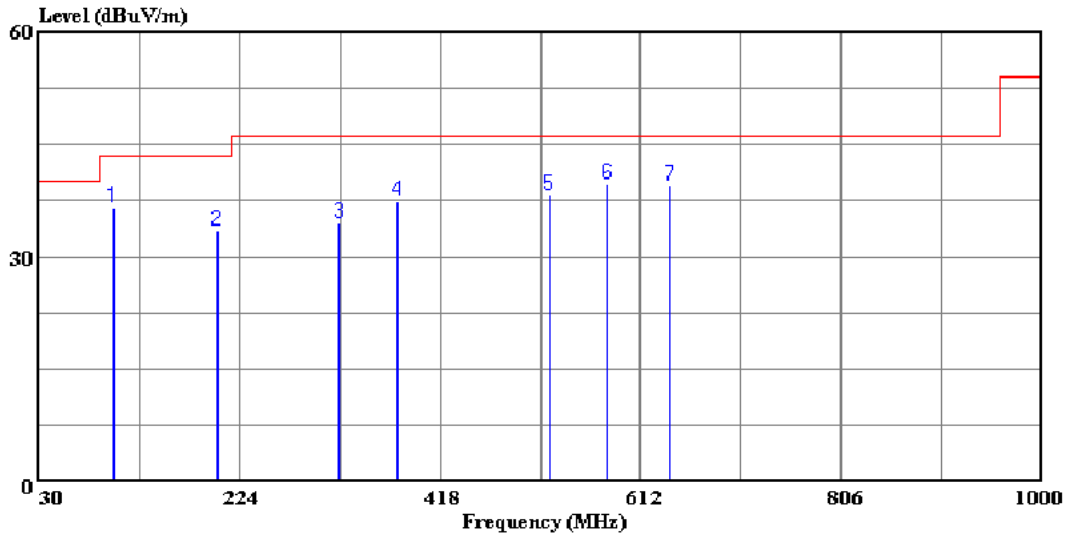
	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	172.590	20.81	13.31	34.12	43.50	-9.38	Peak
2	209.450	25.23	13.21	38.43	43.50	-5.07	Peak
3	255.040	19.97	14.09	34.06	46.00	-11.94	Peak
4	305.480	20.48	15.80	36.28	46.00	-9.72	Peak
5	537.310	18.06	20.72	38.77	46.00	-7.23	Peak
6	567.380	17.23	21.12	38.35	46.00	-7.65	Peak
7	640.130	17.98	22.18	40.16	46.00	-5.84	Peak

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

VERTICAL PLOT

561F Monterey Road
Morgan Hill, CA 95037
Tel: (408) 463-0888
Fax: (408) 463-0885

Data#: 12 File#: emissions.EMI Date: 11-10-2005 Time: 21:18:10



(Audix ATC)

Trace: Ref Trace:

Condition: FCC CLASS-B VERTICAL
Test Operator: : Thanh Nguyen
Project #: : 05U3830
Company: : BroadCom Corporation
EUT: : 802.11 a/b/g WLAN PCI-E Mini Card
Model No. : BCM94311MCAG
Configuration : EUT Plug in the Extended card, HP Laptop
Target of Test : FCC Class B
Mode of Operation: Tx a Mode upper band, worst channel

VERTICAL DATA

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	101.780	24.68	11.77	36.45	43.50	-7.05	Peak
2	201.690	19.13	14.32	33.45	43.50	-10.05	Peak
3	320.030	18.41	16.14	34.55	46.00	-11.45	Peak
4	376.290	19.84	17.53	37.37	46.00	-8.63	Peak
5	523.730	17.63	20.62	38.25	46.00	-7.75	Peak
6	579.990	18.30	21.30	39.60	46.00	-6.40	Peak
7	640.130	17.30	22.18	39.48	46.00	-6.52	Peak

7.4. POWERLINE CONDUCTED EMISSIONS

LIMIT

§15.207 (a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 µH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal.

The lower limit applies at the boundary between the frequency ranges.

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

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.4.

The resolution bandwidth is set to 9 kHz for both peak detection and quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

No non-compliance noted:

11g Mode

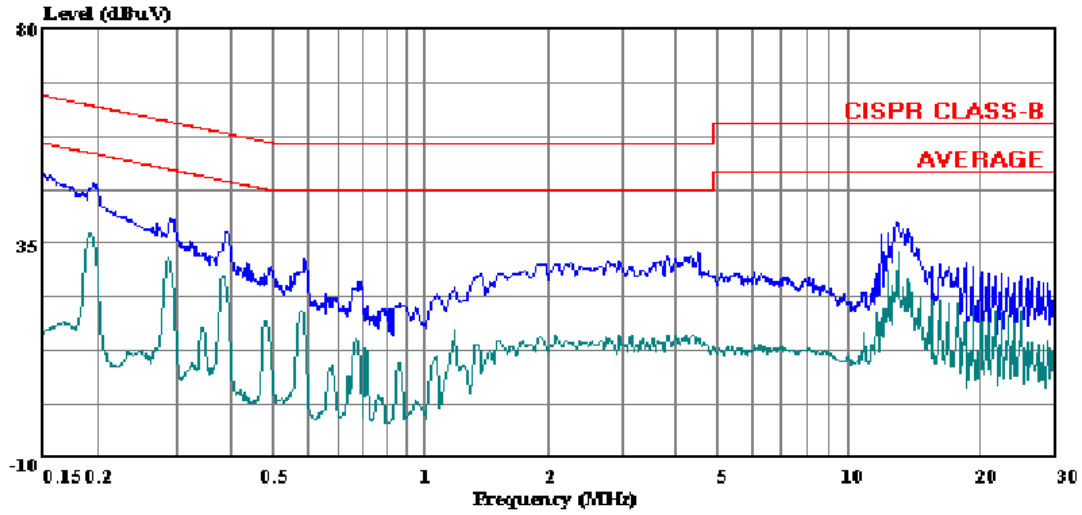
6 WORST EMISSIONS

CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	FCC_B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.15	49.30	--	--	0.00	66.00	56.00	-16.70	-6.70	L1
0.20	47.30	--	--	0.00	63.69	53.69	-16.39	-6.39	L1
13.13	38.82	--	--	0.00	60.00	50.00	-21.18	-11.18	L1
0.15	48.18	--	--	0.00	66.00	56.00	-17.82	-7.82	L2
0.20	47.10	--	--	0.00	63.69	53.69	-16.59	-6.59	L2
13.13	38.18	--	--	0.00	60.00	50.00	-21.82	-11.82	L2
6 Worst Data									

LINE 1 RESULTS

Compliance Certification Services
561F Monterey Road
Morgan Hill, CA 95037
Tel: (408) 463-0885
Fax: (408) 463-0888

Data#: 21 File#: 3830.emi Date: 11-14-2005 Time: 17:02:19



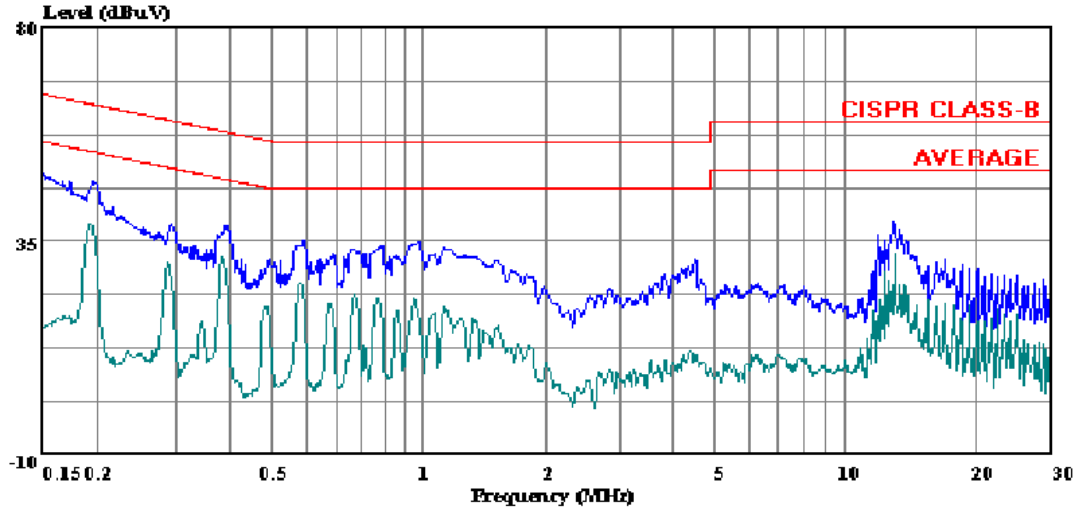
Trace: 19 Ref Trace:

Condition: CISPR CLASS-B
Project # : 05U3830
Company : Broadcom
EUT Descrip : 802.11ag WLAN PCI-E Mini Card
Model : BCM94311MCAG
EUT Config : EUT/Laptop
Mode Of Oper : 2.4 GHz_TX Worst Case
Target of Test: FCC Class B
Power Source: : 115VAC, 60Hz
: L1: Peak (Black), Avg (Green)
Test Operator : Vien Tran

LINE 2 RESULTS

Compliance Certification Services
561F Monterey Road
Morgan Hill, CA 95037
Tel: (408) 463-0885
Fax: (408) 463-0888

Data#: 14 File#: 3830.emi Date: 11-14-2005 Time: 16:42:52



Trace: 12 Ref Trace:

Condition: CISPR CLASS-B
Project # : 05U3830
Company : Broadcom
EUT Descrip : 802.11ag WLAN PCI-E Mini Card
Model : BCM94311MCAG
EUT Config : EUT/Laptop
Mode Of Oper : 2.4 GHz_TX Worst Case
Target of Test: FCC Class B
Power Source: : 115VAC, 60Hz
: L2: Peak (Black), Avg (Green)
Test Operator : Vien Tran

11a Mode

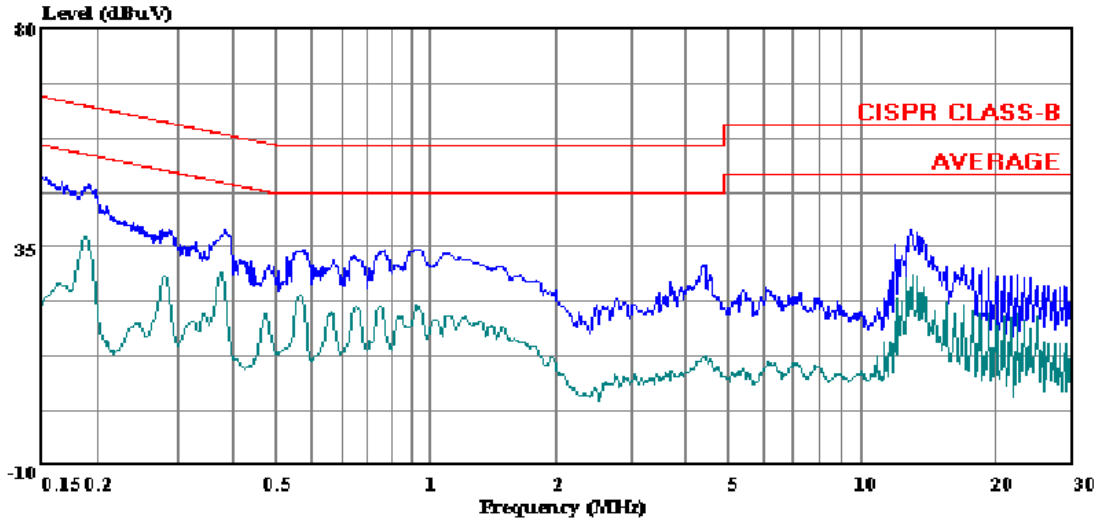
6 WORST EMISSIONS

CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	FCC_B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.15	48.84	--	--	0.00	66.00	56.00	-17.16	-7.16	L1
0.19	47.52	--	--	0.00	64.04	54.04	-16.52	-6.52	L1
13.13	39.80	--	--	0.00	60.00	50.00	-20.20	-10.20	L1
0.15	49.10	--	--	0.00	66.00	56.00	-16.90	-6.90	L2
0.19	47.50	--	--	0.00	64.04	54.04	-16.54	-6.54	L2
13.13	38.72	--	--	0.00	60.00	50.00	-21.28	-11.28	L2
6 Worst Data									

LINE 1 RESULTS

Compliance Certification Services
561F Monterey Road
Morgan Hill, CA 95037
Tel: (408) 463-0885
Fax: (408) 463-0888

Data#: 35 File#: 3830.emi Date: 11-14-2005 Time: 17:52:17



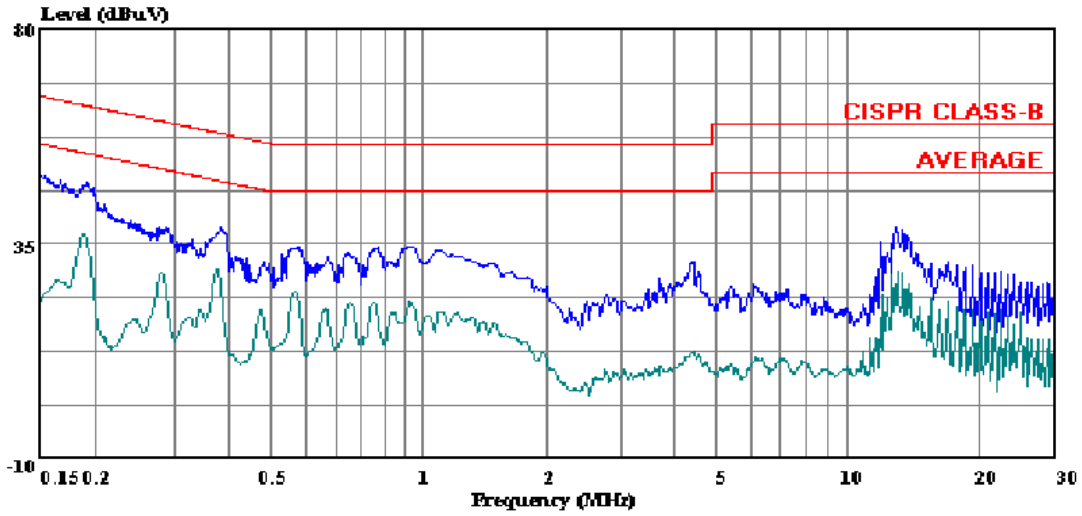
Trace: 33 Ref Trace:

Condition: CISPR CLASS-B
Project # : 05U3830
Company : Broadcom
EUT Descrip : 802.11ag WLAN PCI-E Mini Card
Model : BCM94311MCAG
EUT Config : EUT/Laptop
Mode Of Oper : 5 GHz Band _ TX Worst Case
Target of Test: FCC Class B
Power Source: : 115VAC, 60Hz
: L2: Peak (Black), Avg (Green)
Test Operator : Vien Tran

LINE 2 RESULTS

Compliance Certification Services
561F Monterey Road
Morgan Hill, CA 95037
Tel: (408) 463-0885
Fax: (408) 463-0888

Data#: 35 File#: 3830.emi Date: 11-14-2005 Time: 17:52:17



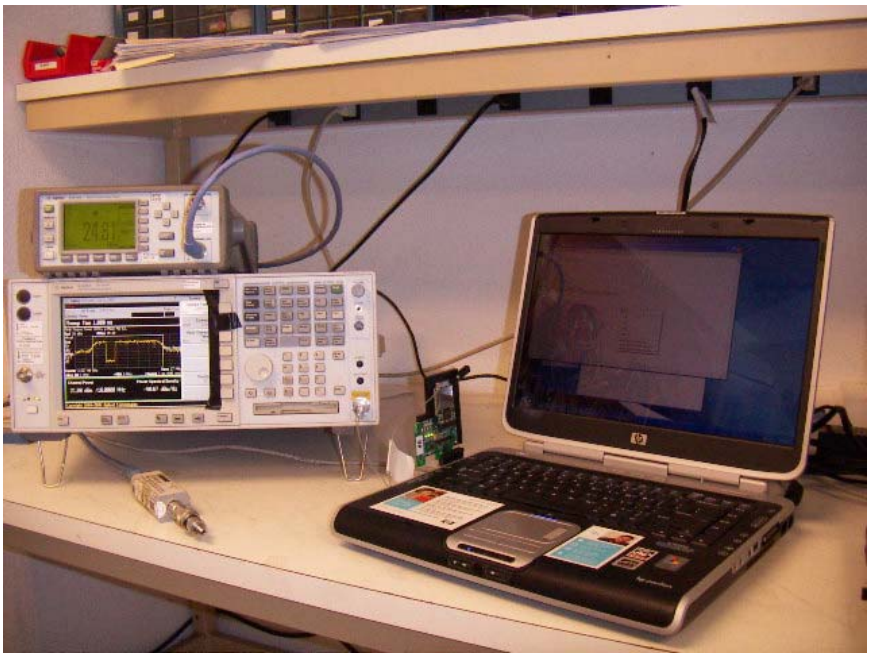
Trace: 33 Ref Trace:

Condition: CISPR CLASS-B
Project # : 05U3830
Company : Broadcom
EUT Descrip : 802.11ag WLAN PCI-E Mini Card
Model : BCM94311MCAG
EUT Config : EUT/Laptop
Mode Of Oper : 5 GHz Band _ TX Worst Case
Target of Test: FCC Class B
Power Source: : 115VAC, 60Hz
: L2: Peak (Black), Avg (Green)
Test Operator : Vien Tran

8. SETUP PHOTOS

RF CONDUCTED SETUP

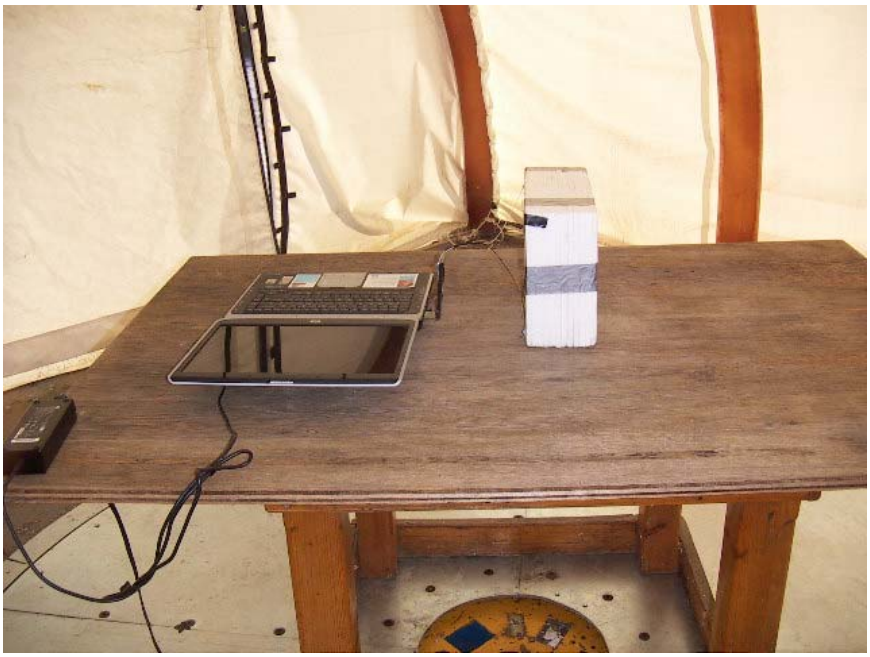
ANTENNA PORT CONDUCTED PHOTO



RADIATED RF MEASUREMENT SETUP

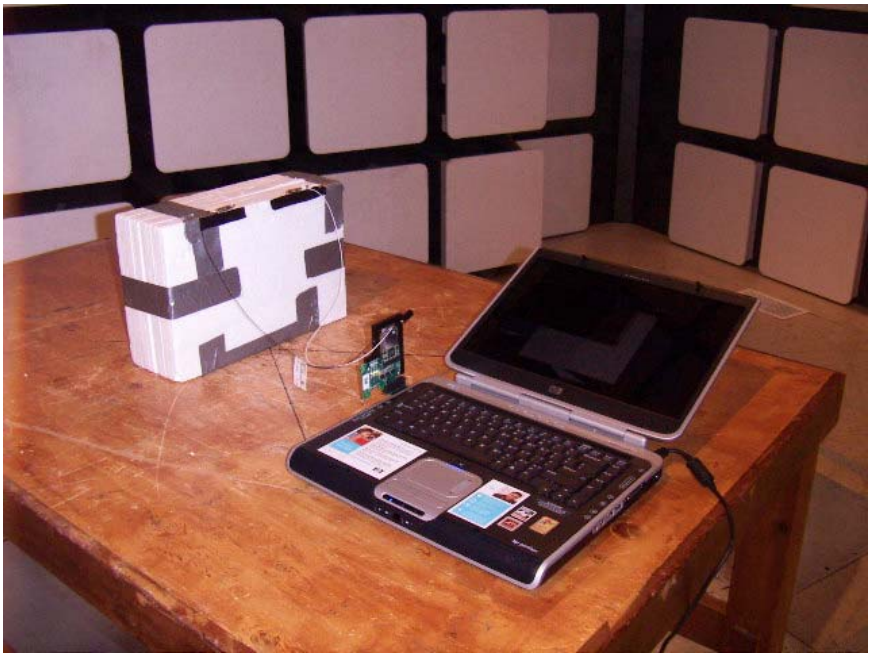
RADIATED FRONT PHOTO – FOR ABOVE 1GHZ TEST

RADIATED BACK PHOTO – FOR ABOVE 1GHZ TEST



RADIATED SIDE PHOTO – FOR ABOVE 1GHZ TEST

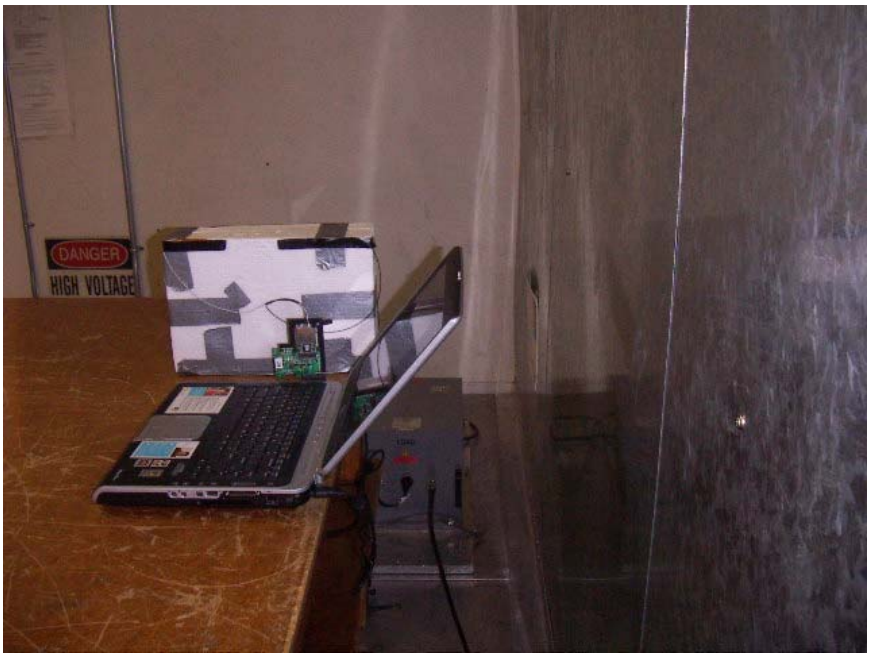
RADIATED PHOTO – FOR BELOW 1GHZ TEST



POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP

LINE CONDUCTED FRONT PHOTO

LINE CONDUCTED BACK PHOTO



END OF REPORT