FCC CFR47 PART 15 SUBPART C
CLASS II PERSIMIVE CHANGE
TEST REPORT

FOR

Broadcom 802.11 a/g Mini PCI Card

MODEL NUMBER: BCM94309MPC0

FCC ID: QDS-BRCM1014

REPORT NUMBER: 04U2882-3

ISSUE DATE: AUGUST 10, 2004

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

Prepared by
COMPLIANCE CERTIFICATION SERVICES
561F MONTEREY ROAD,
MORGAN HILL, CA 95037, U.S.A.
TEL: (408) 463-0885
FAX: (408) 463-0888

TABLE OF CONTENTS

1. TEST RESULT CERTIFICATION

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

EUT DESCRIPTION: Broadcom 802.11 a/g Mini PCI Card

MODEL: BCM94309MPC0

DATE TESTED: AUGUST 2-4, 2004

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.

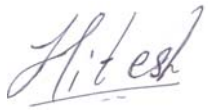
Note: This document reports conditions under which testing was conducted and results of tests performed. This document may not be altered or revised in any way unless done so by Compliance Certification Services and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification Services will constitute fraud and shall nullify the document.

Note: The 2.4 and 5.8 GHz bands are applicable to this report; another band of operation (5.2 GHz) is documented in a separate report.

Approved & Released For CCS By:

THU CHAN
SENIOR EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

Tested By:



HITESH SOLANKI
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. CLASS II PERMISSIVE CHANGE DESCRIPTION

Adding portable host, HP laptop (model: HSTNN-C02C)

This is to request a Class II permissive change for FCC ID: QDS-BRCM1014, originally granted 07/23/2004. The major change filed under this application is:

Change #1 Adding portable host, HP laptop model: HSTNN-C02C:

The EUT is a WLAN 802.11a/g Mini PCI transceiver module, operating in the 2400-2483.5 MHz, 5150-5350 MHz, and 5725-5825 MHz bands. The radio utilizes two PIFA antennas for diversity, the antennas information is as follows:

Manufacturer	Antenna Type	Maximum Antenna Gain (dBi)
WNC	Metal PIFA	2.4GHz band: 1.26 (H, Main) 5.2 & 5.8 GHz bands: 1.67 (H, Aux)
Foxconn	Metal PIFA	2.4GHz band: 2.51 (H, Main) 5.2 & 5.8 GHz bands: 1.06 (H, Main)

3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4/2001, FCC CFR 47 Part 2 and FCC CFR 47 Part 15.

4. 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.

NVLAP®

LAB CODE:200065-0

No part of this report may be used to claim or imply product endorsement by NVLAP or any agency of the US Government.

5. CALIBRATION AND UNCERTAINTY

5.1. 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.

5.2. 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%.

5.3. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**Cal Due**
Spectrum Analyzer 20 Hz ~ 44 GHz	Agilent	E4446A	US42070220	4/1/2005
Antenna, Horn 1 ~ 18 GHz	EMCO	3117	29301	12/26/2004
Antenna, Horn, 18 ~ 26 GHz	ARA	MWH-1826/B	1013	2/4/2005
Antenna, Horn 26 ~ 40 GHz	ARA	MWH-2640/B	1029	12/3/2004
Amplifier 1-26GHz	MITEQ	NSP2600-SP	924341	6/10/2005
PreAmplifier 26-40 GHz	Miteq	NSP4000-SP2	924343	6/10/2005
EMI Receiver, 9 kHz ~ 2.9 GHz	HP	8542E	3942A00286	11/21/2004
RF Filter Section	HP	85420E	3705A00256	11/21/2004
Bilog Antenna	Sunol Sciences	JB1	A121003	12/22/2004
LISN, 10 kHz ~ 30 MHz	FCC	50/250-25-2	114	10/13/2004
EMI Test Receiver	R & S	ESHS 20	827129/006	10/22/2005
Site A Line Stabilizer / Conditioner	Tripplite	LC-1800a	A0051681	CNR

6. SETUP OF EQUIPMENT UNDER TEST

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
HOST LAPTOP	HP	HSTNN-C02C	N/A	N/A
AC ADAPTER	HP	PPP009S	57BC30AU4Q204Y	N/A

I/O CABLES

I/O CABLE LIST						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	AC	1	AC	UNSHIELDED	1.86M	U.S (3 PRONG)
2	DC	1	DC	UNSHIELDED	1.86M	N/A

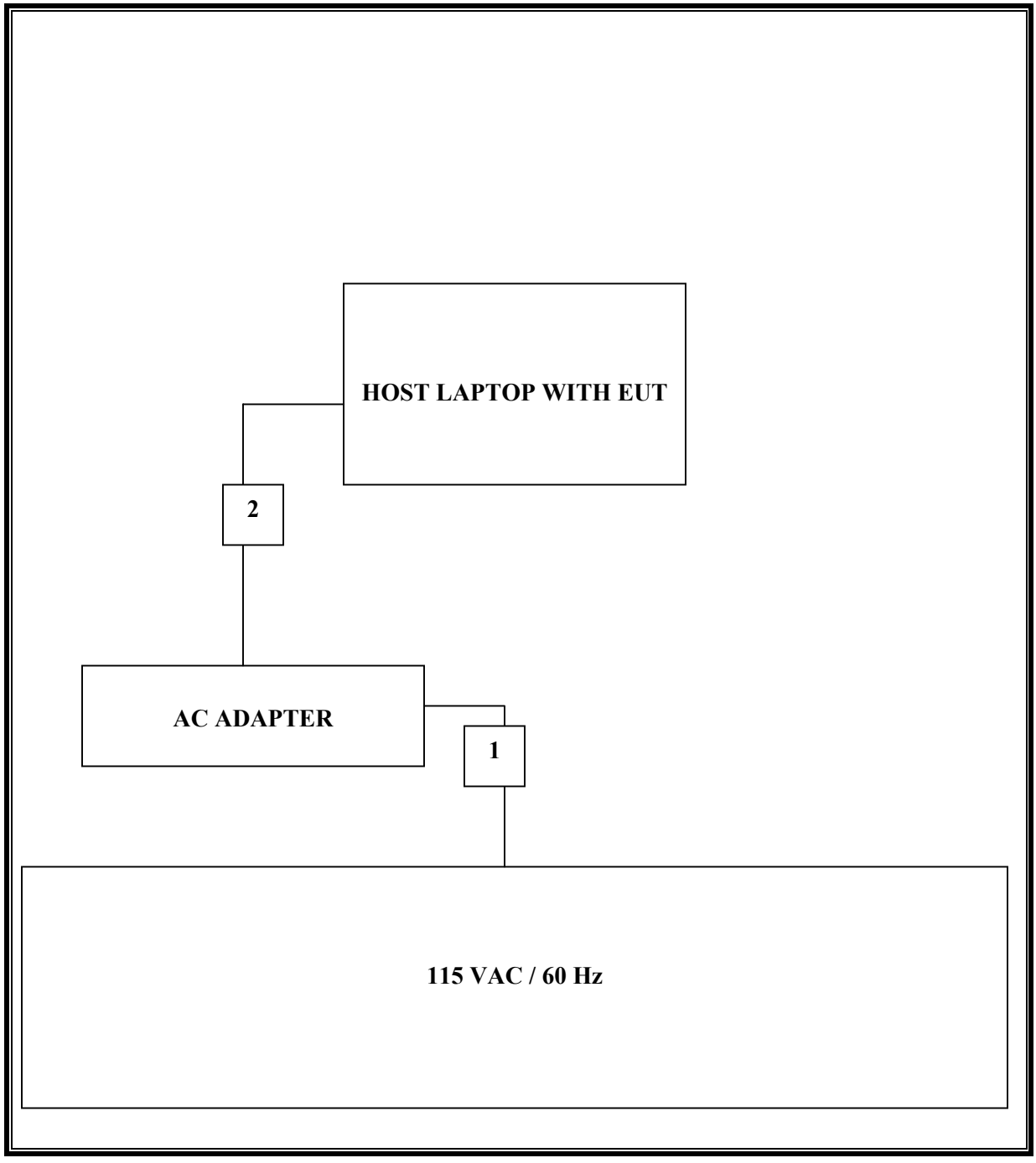
TEST SETUP

During the testing process the EUT was installed inside a host laptop computer and put in continuous transmit mode. 802.11b, 802.11g and 802.11a modes were investigated.

The EUT was tested as a potable device in the X, Y, and Z positions and as a mobile device. Worst-case was determined to be the high channel in the "Z" position yielding the highest EIRP in 802.11b mode.

The WLAN was Co-located with a Bluetooth transmitter.

SETUP DIAGRAM FOR TESTS



7. APPLICABLE LIMITS AND TEST RESULTS

7.1. RADIATED EMISSIONS

7.1.1. 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 of 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 of the 5.8 GHz band.

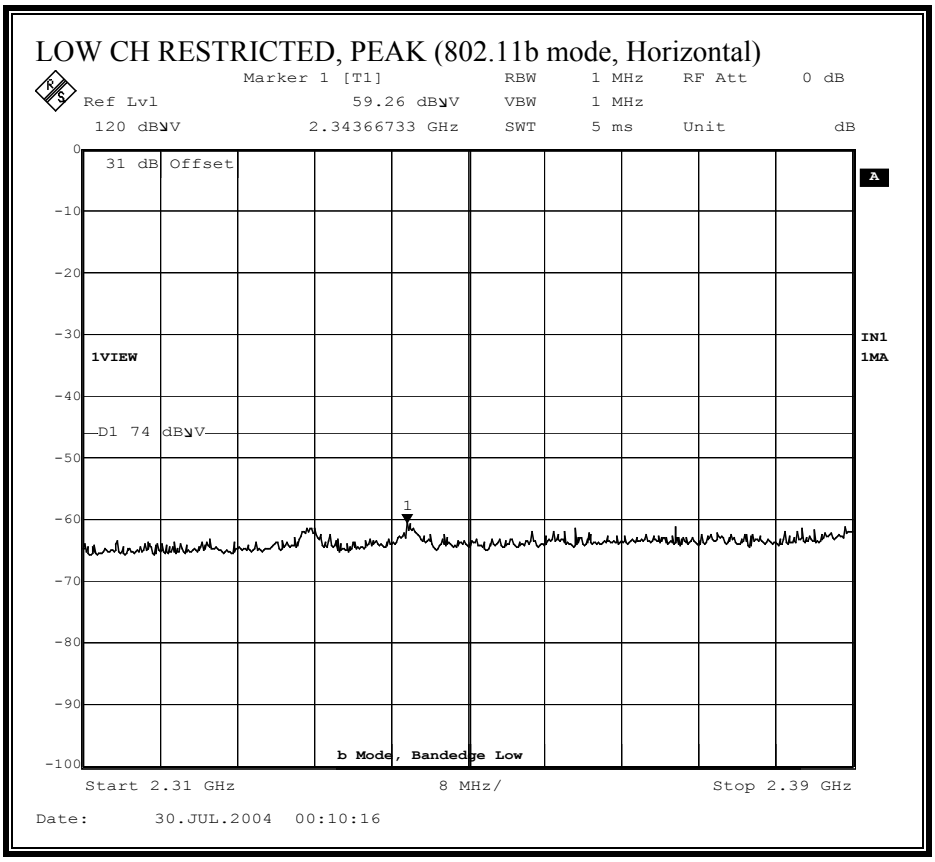
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

RESULTS

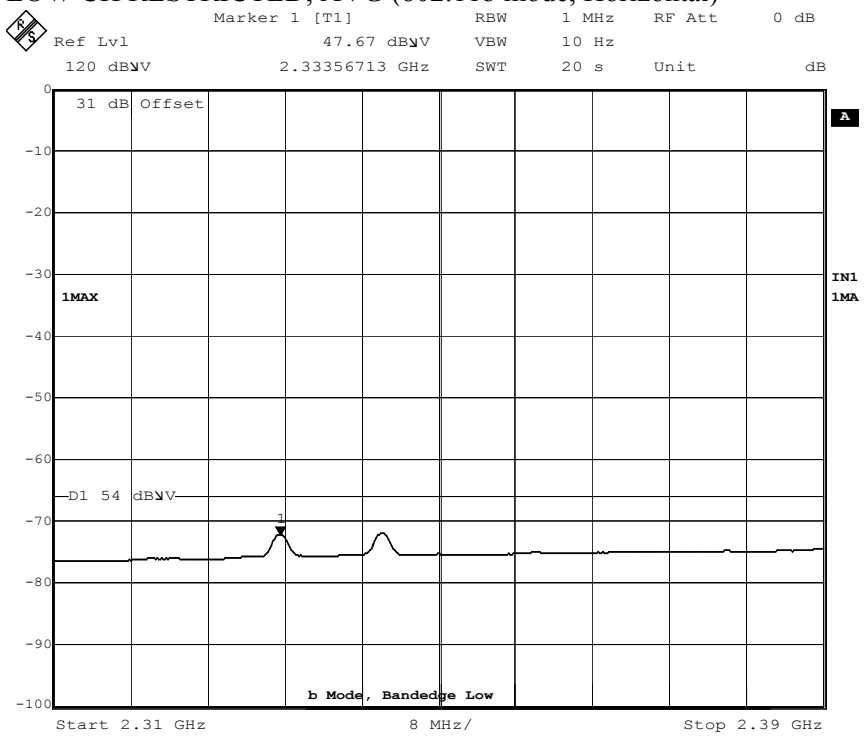
No non-compliance noted:

7.1.2. TRANSMITTER RADIATED EMISSIONS ABOVE 1 GHZ

RESTRICTED BANDEDGE (b MODE, LOW CHANNEL, HORIZONTAL)

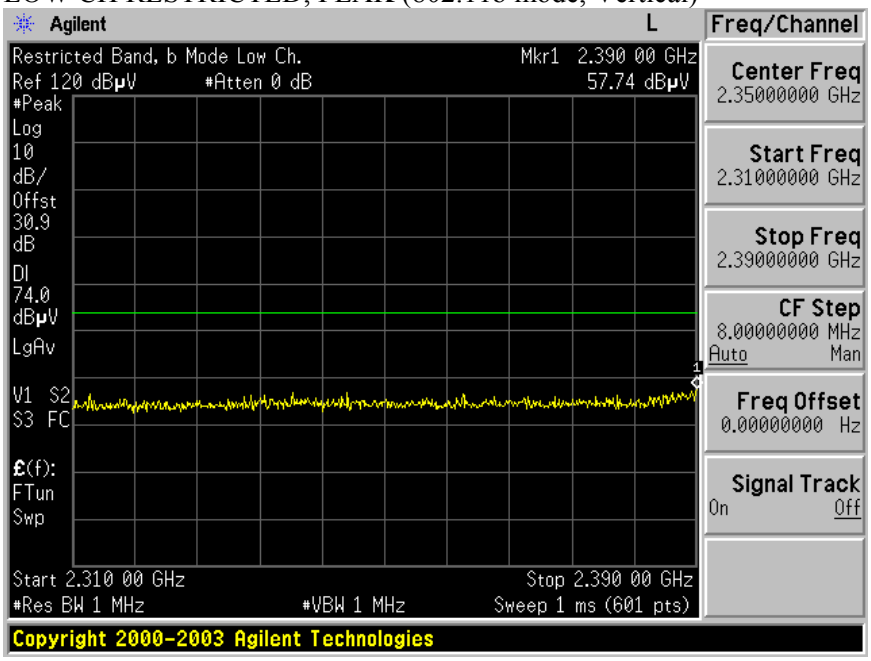


LOW CH RESTRICTED, AVG (802.11b mode, Horizontal)

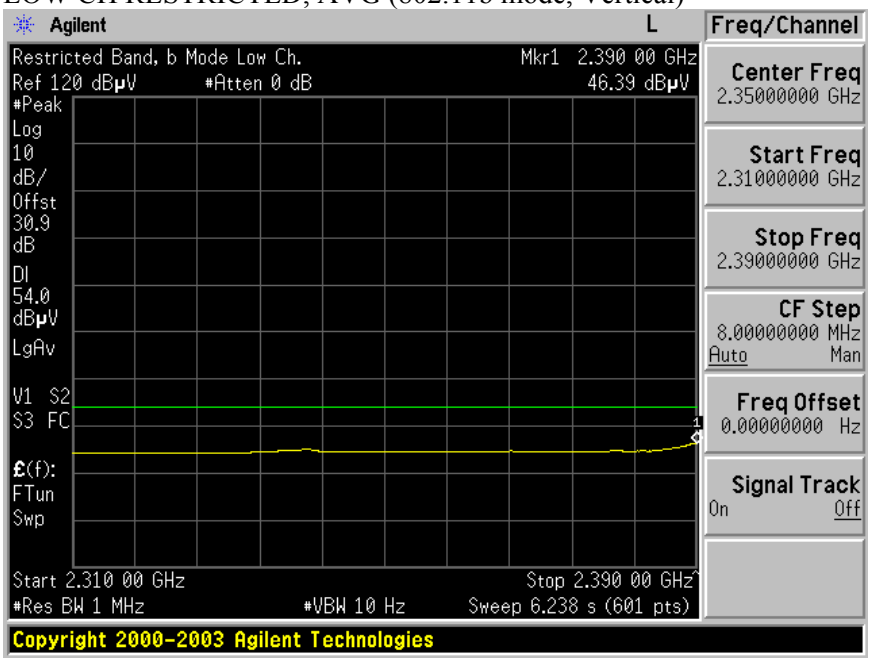


RESTRICTED BANDEDGE (b MODE, LOW CHANNEL, VERTICAL)

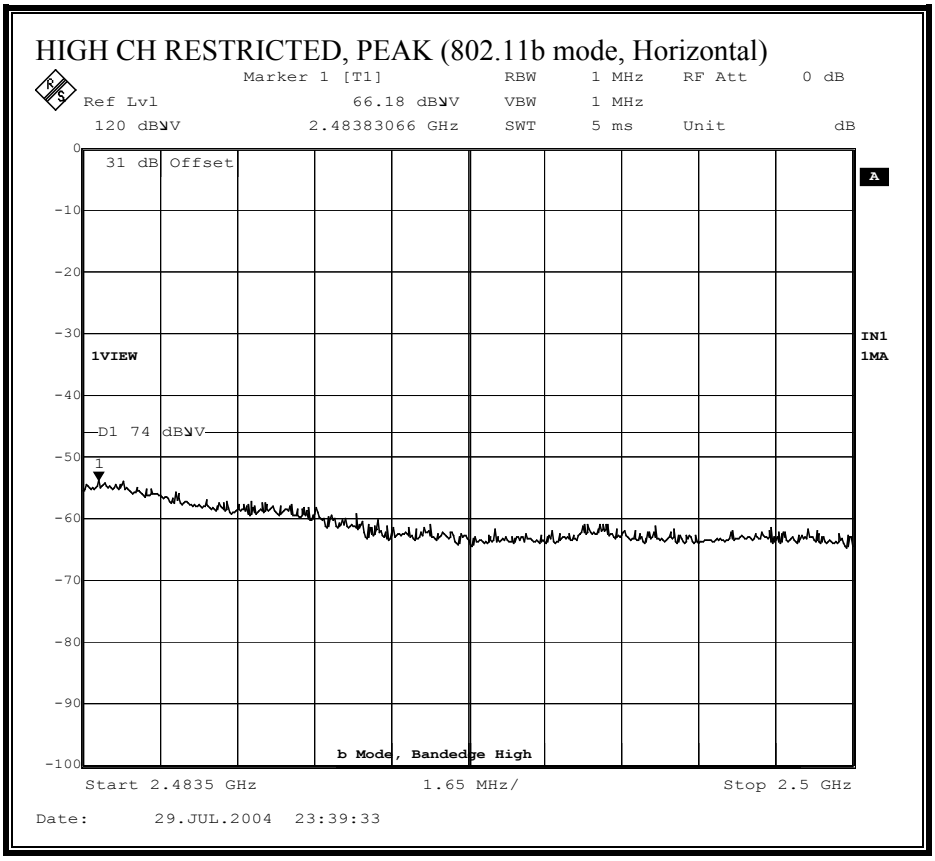
LOW CH RESTRICTED, PEAK (802.11b mode, Vertical)



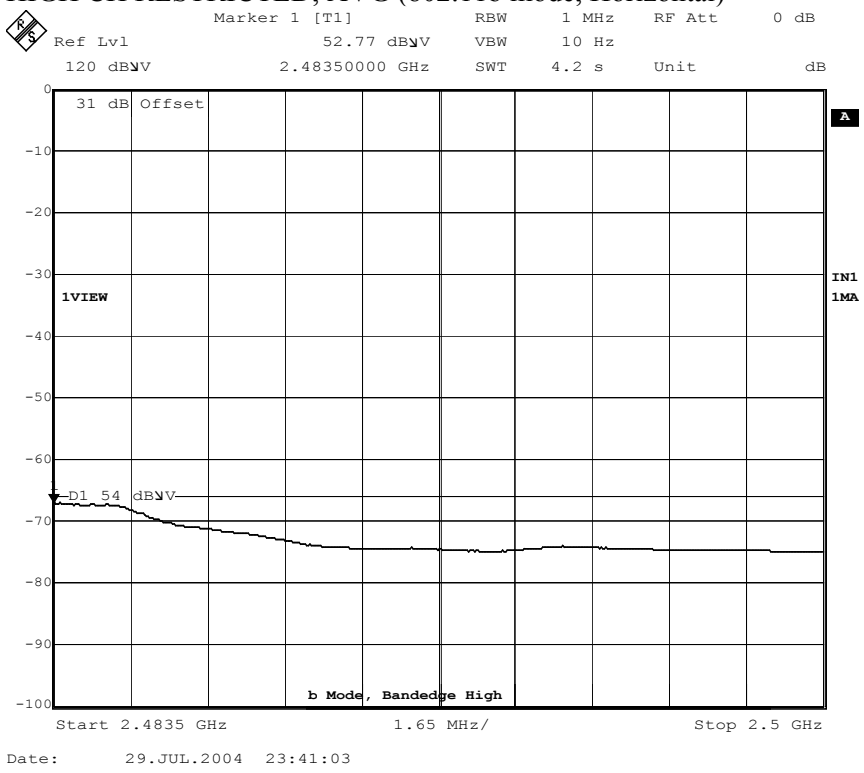
LOW CH RESTRICTED, AVG (802.11b mode, Vertical)



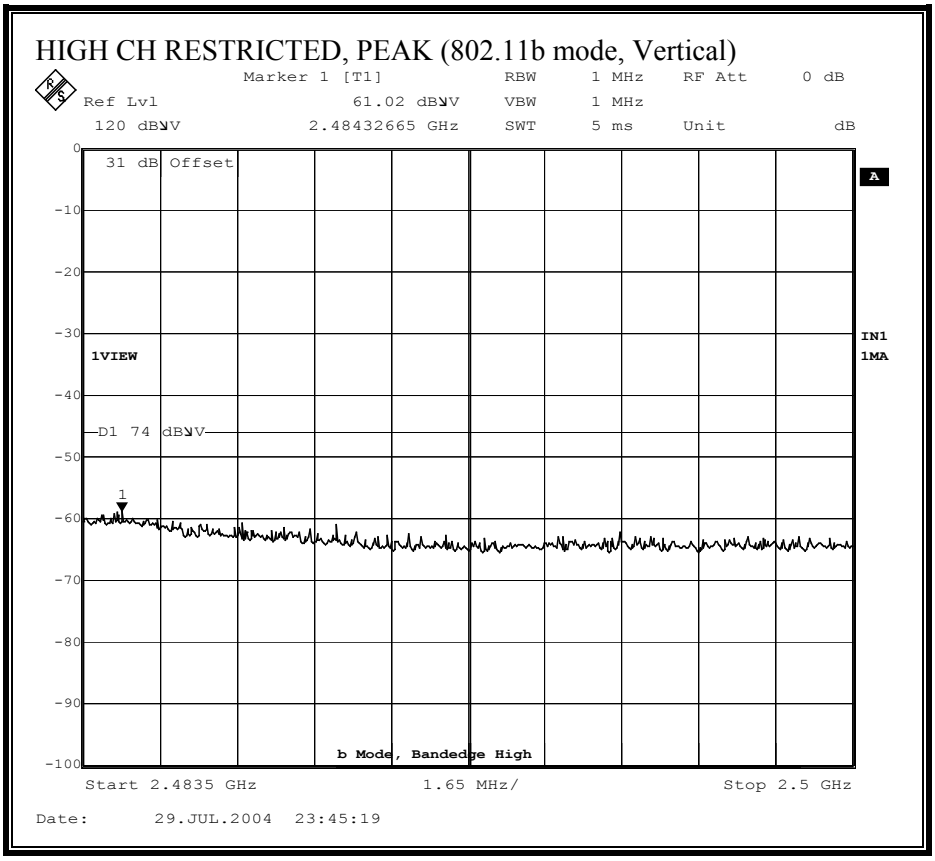
RESTRICTED BANDEDGE (b MODE, HIGH CHANNEL, HORIZONTAL)



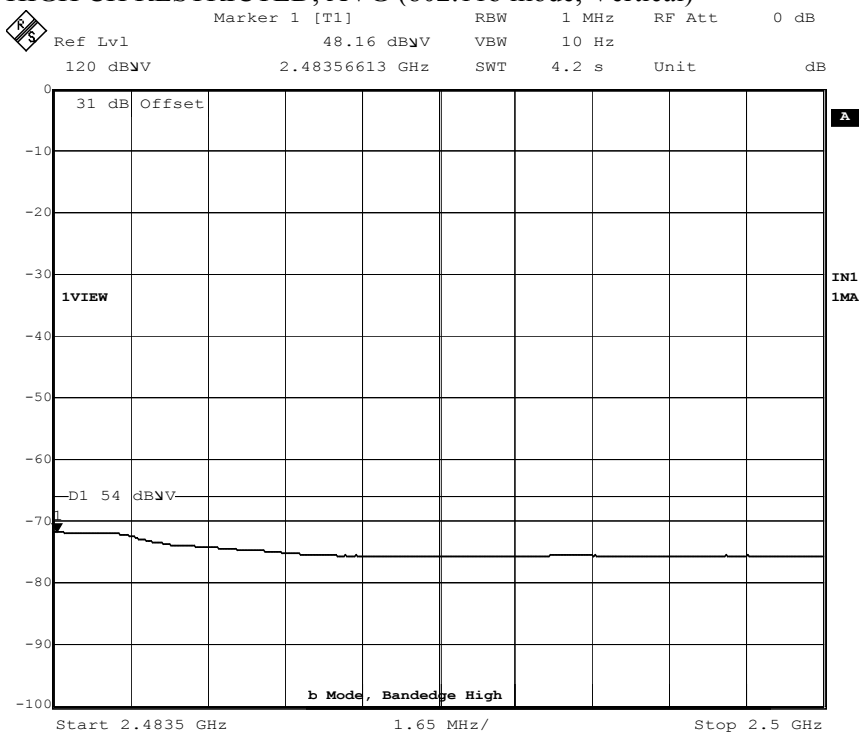
HIGH CH RESTRICTED, AVG (802.11b mode, Horizontal)



RESTRICTED BANDEDGE (b MODE, HIGH CHANNEL, VERTICAL)



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



HARMONICS AND SPURIOUS EMISSIONS (b MODE), LOW & MID CHANNELS

07/30/04 **High Frequency Measurement**
Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: Frank Irahim
Project #: 04U2882-3
Company: Broadcom
EUT Descrip.: 802.11 a/b/g Mini PCI Card
EUT M/N: BCM94309MPCO
Test Target: FCC 15.247
Mode Oper: TX ON (11b mode) @ worst position

Test Equipment:

EMCO Horn 1-18GHz	Spectrum Analyzer	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz
T73; S/N: 6717 @3m	Agilent E4446A Analyzer	T87 Miteq 924342		T117; ARA 18-26GHz; S/N:1013

Hi Frequency Cables: ☐ (2 ft) ☑ (2 ~ 3 ft) ☐ (4 ~ 6 ft) ☑ (12 ft)

Peak Measurements:
1 MHz Resolution Bandwidth
1MHz Video Bandwidth

Average Measurements:
1 MHz Resolution Bandwidth
10Hz Video Bandwidth

f GHz	Dist feet	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	HPF	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes
11b mode, low CH															
4.824	9.8	62.0	45.8	33.4	3.3	-44.7	0.0	1.0	55.0	38.8	74.0	54.0	-19.0	-15.2	V
2.900	9.8	52.4	35.2	30.4	2.4	-43.2	0.0	1.0	43.1	25.8	74.0	54.0	-30.9	-28.2	V
1.600	9.8	64.7	37.2	26.4	1.6	-43.3	0.0	1.0	50.3	22.8	74.0	54.0	-23.7	-31.2	V
4.824	9.8	53.9	39.8	33.4	3.3	-44.7	0.0	1.0	46.9	32.8	74.0	54.0	-27.1	-21.2	H
1.198	9.8	57.9	38.1	24.5	1.3	-43.4	0.0	1.0	41.2	21.5	74.0	54.0	-32.8	-32.5	H
11b mode, mid CH															
4.874	9.8	54.8	39.2	33.4	3.3	-44.7	0.0	1.0	47.8	32.2	74.0	54.0	-26.2	-21.8	V
1.596	9.8	64.1	36.8	26.3	1.6	-43.3	0.0	1.0	49.7	22.4	74.0	54.0	-24.3	-31.6	V
4.874	9.8	51.5	37.7	33.4	3.3	-44.7	0.0	1.0	44.5	30.7	74.0	54.0	-29.5	-23.3	H
1.596	9.8	53.9	35.5	26.3	1.6	-43.3	0.0	1.0	39.5	21.1	74.0	54.0	-34.5	-32.9	V
Note: EUT scanned from 1GHz to 26 GHz															

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		

HARMONICS AND SPURIOUS EMISSIONS (b MODE), HIGH CHANNEL

07/29/04 **High Frequency Measurement**
Compliance Certification Services, Morgan Hill Open Field Site

Test Engr:	William Zhuang
Project #:	04U2882-1
Company:	Broadcom
EUT Descrip.:	802.11 a/b/g Mini PCI Card
EUT M/N:	BCM94309MPC0
Test Target:	FCC 15.247
Mode Oper:Tx	TX ON (11b mode) @ worst position

Test Equipment:

EMCO Horn 1-18GHz	Spectrum Analyzer	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz
T73; S/N: 6717 @3m		T63 Miteq 646456		

Hi Frequency Cables: ☑ (2 ft) ☐ (2 ~ 3 ft) ☐ (4 ~ 6 ft) ☑ (12 ft)

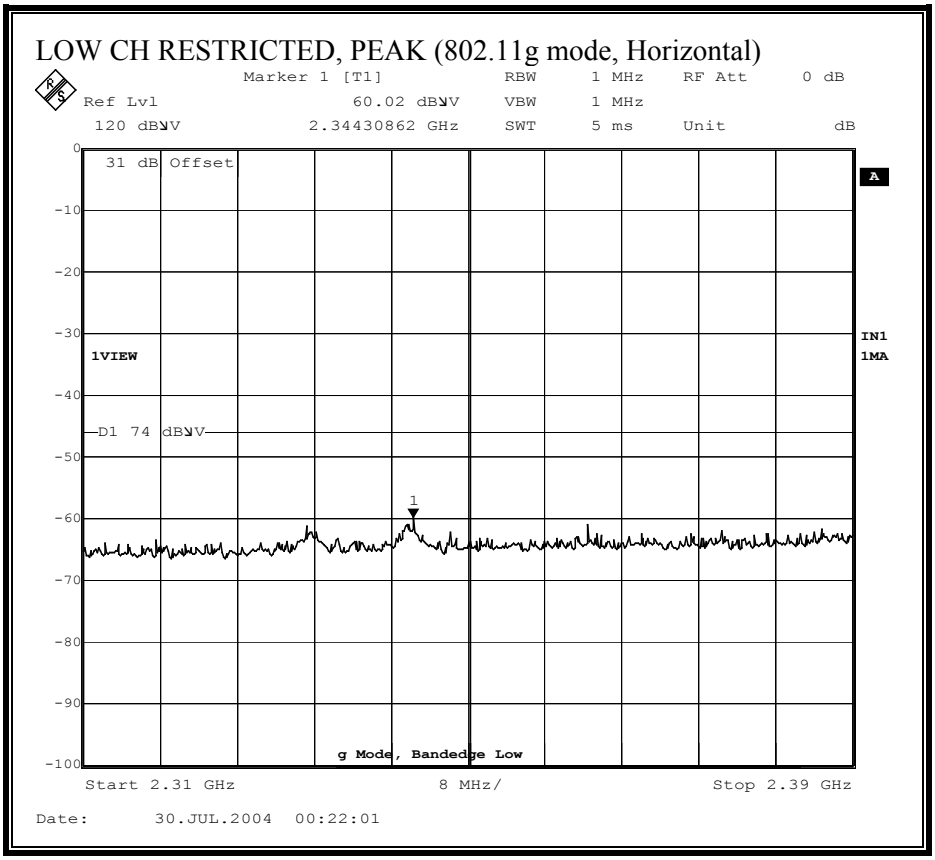
Peak Measurements:
1 MHz Resolution Bandwidth
1MHz Video Bandwidth

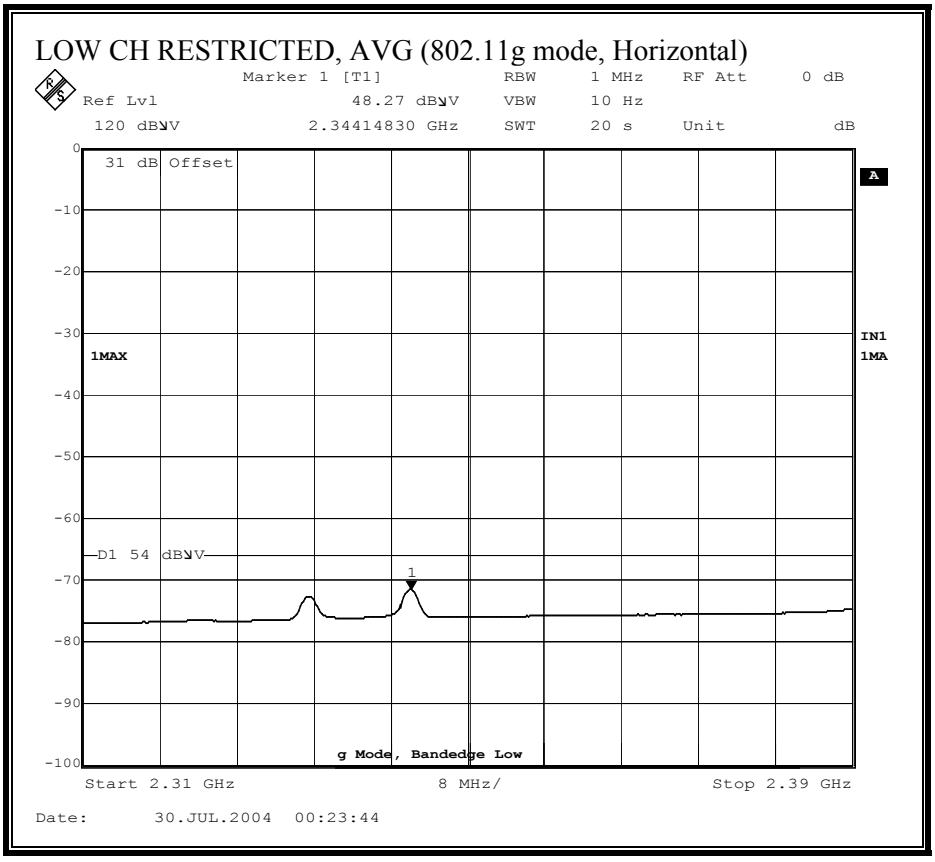
Average Measurements:
1 MHz Resolution Bandwidth
10Hz Video Bandwidth

f GHz	Dist feet	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	HPF	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes
b Mode, High Ch. 2462MHz															
4.924	9.8	48.2	34.1	33.5	3.0	-35.3	0.0	1.0	50.3	36.3	74.0	54.0	-23.7	-17.7	Z position, V
4.924	9.8	45.6	31.9	33.5	3.0	-35.3	0.0	1.0	47.8	34.1	74.0	54.0	-26.2	-19.9	Z position, H

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		

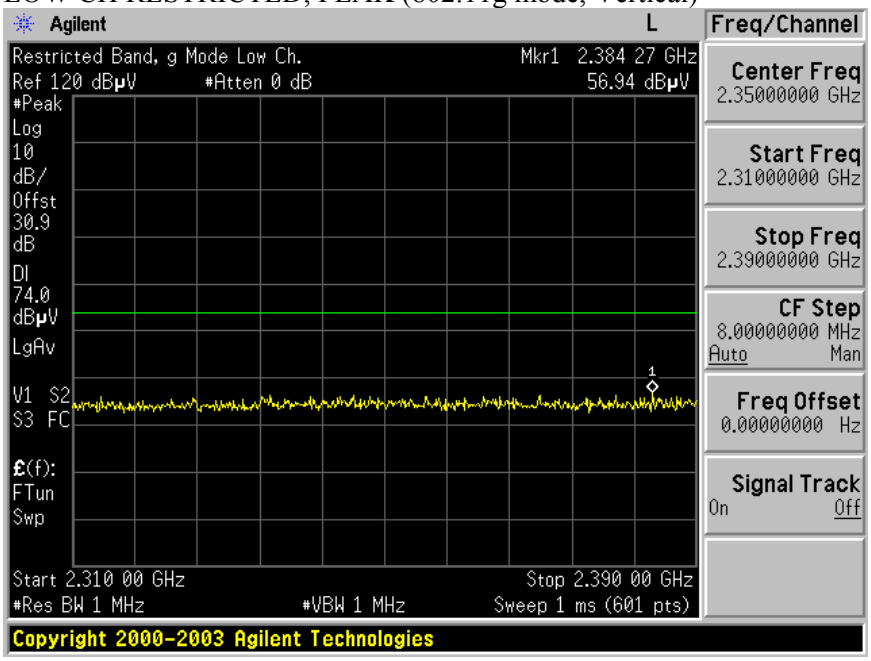
RESTRICTED BANDEDGE (g MODE, LOW CHANNEL, HORIZONTAL)



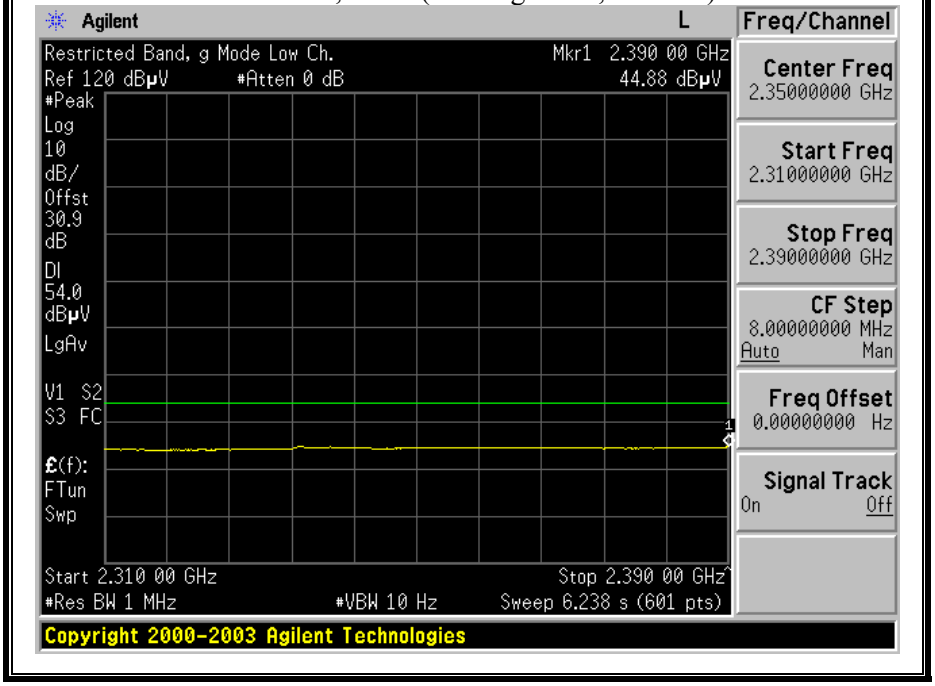


RESTRICTED BANDEDGE (g MODE, LOW CHANNEL, VERTICAL)

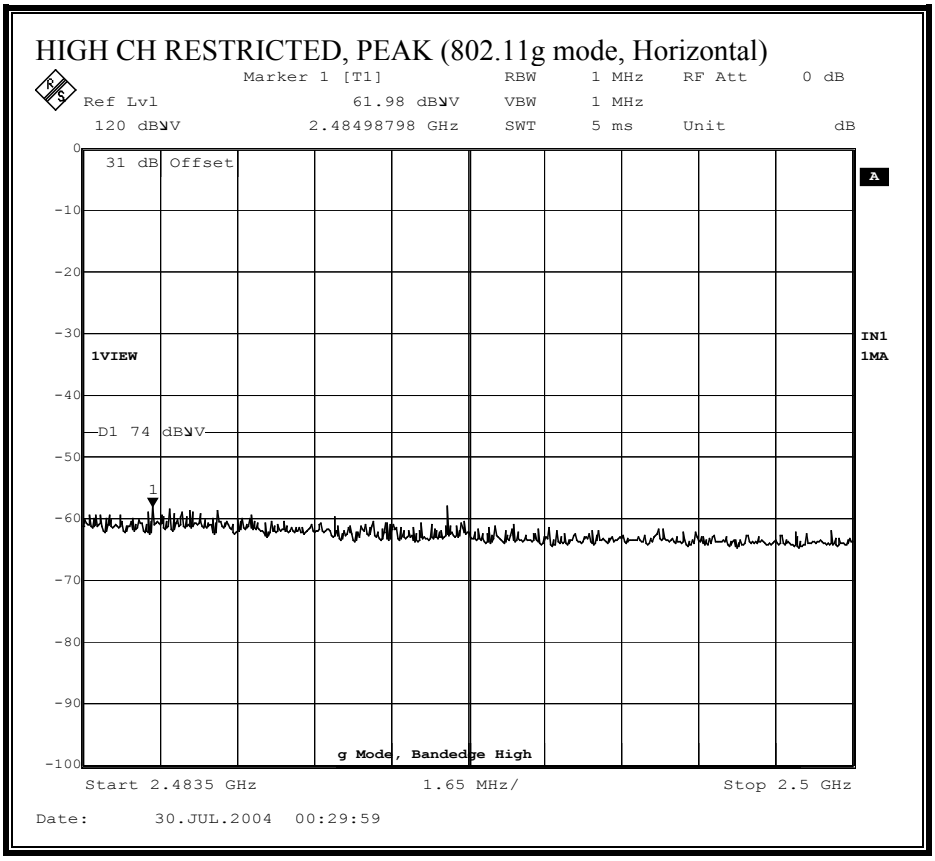
LOW CH RESTRICTED, PEAK (802.11g mode, Vertical)



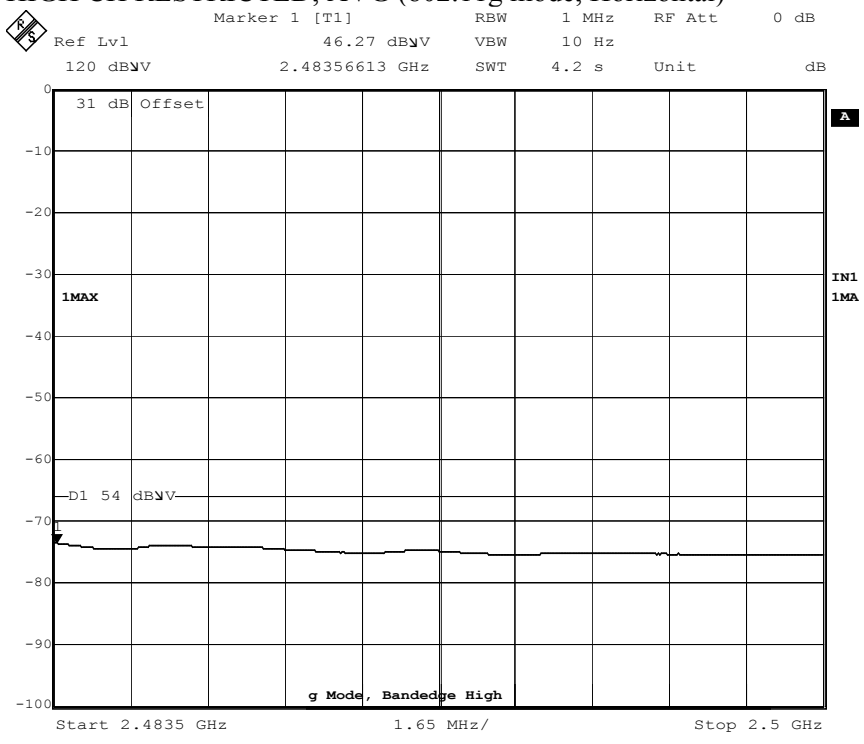
LOW CH RESTRICTED, AVG (802.11g mode, Vertical)



RESTRICTED BANDEDGE (g MODE, HIGH CHANNEL, HORIZONTAL)

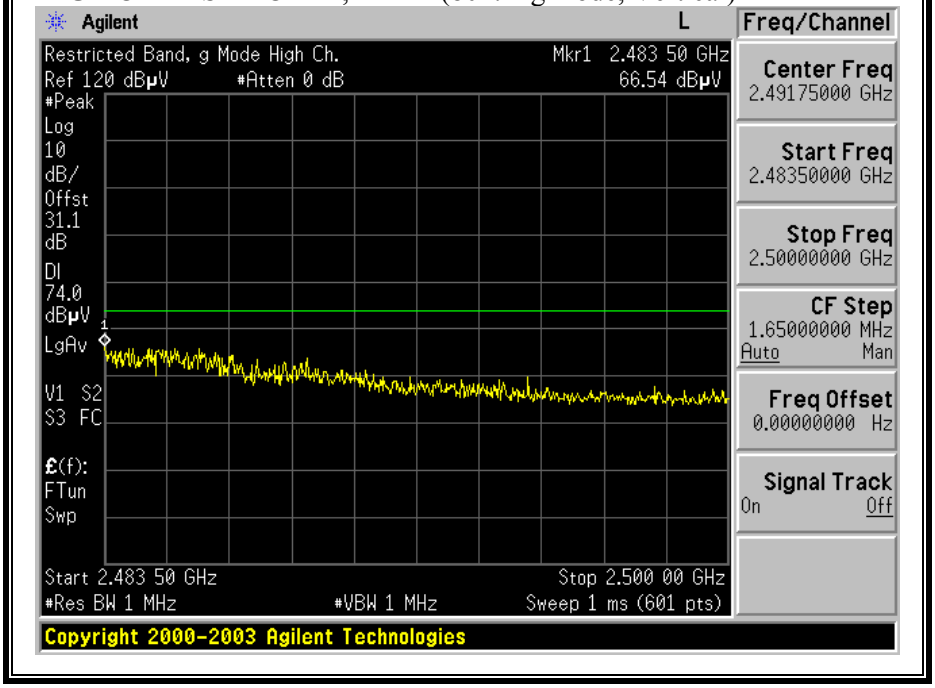


HIGH CH RESTRICTED, AVG (802.11g mode, Horizontal)

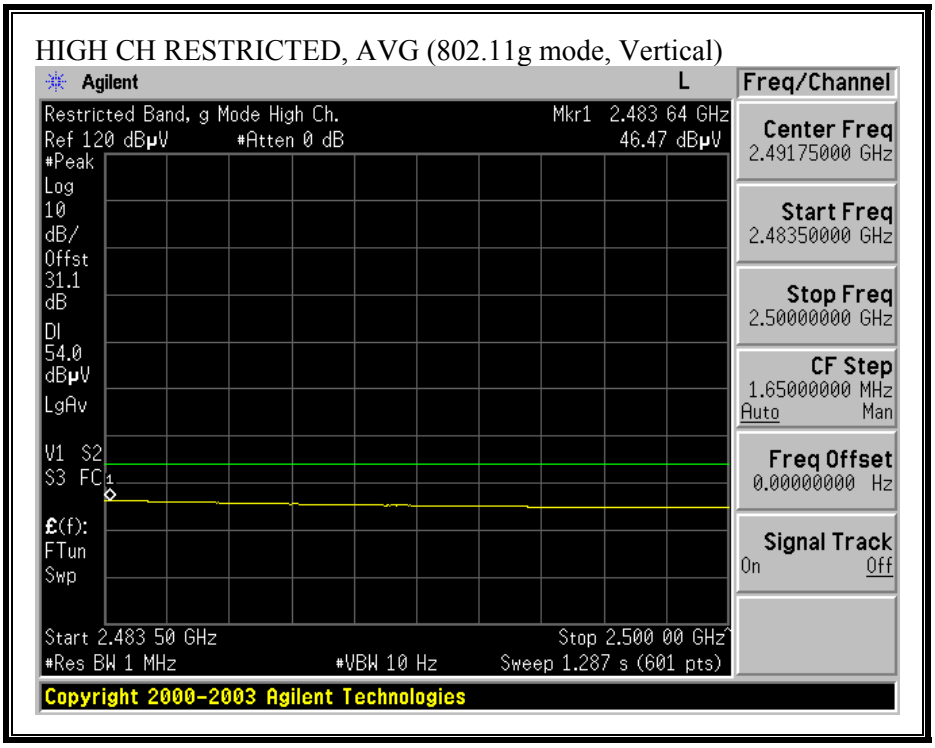


RESTRICTED BANDEDGE (g MODE, HIGH CHANNEL, VERTICAL)

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



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



HARMONICS AND SPURIOUS EMISSIONS (g MODE)

07/30/04 **High Frequency Measurement**
Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: Frank Irahim
Project #: 04U2882-3
Company: Broadcom
EUT Descrip.: 802.11 a/b/g Mini PCI Card
EUT M/N: BCM94309MPCO
Test Target: FCC 15.247
Mode Oper: TX ON (11g mode), @ worst position

Test Equipment:

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T73; S/N: 6717 @3m	Agilent E4446A Analyzer	T87 Miteq 924342		T117; ARA 18-26GHz; S/N:1013

Hi Frequency Cables
☐ (2 ft) ☑ (2 ~ 3 ft) ☐ (4 ~ 6 ft) ☑ (12 ft)

Peak Measurements:
1 MHz Resolution Bandwidth
1MHz Video Bandwidth

Average Measurements:
1 MHz Resolution Bandwidth
10Hz Video Bandwidth

f GHz	Dist feet	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	HPF	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes
11g mode, low CH															
1.600	9.8	63.1	36.3	26.4	1.6	-43.3	0.0	1.0	48.7	21.9	74.0	54.0	-25.3	-32.1	V
1.600	9.8	61.1	35.7	26.4	1.6	-43.3	0.0	1.0	46.7	21.3	74.0	54.0	-27.3	-32.7	H
11g mode, mid CH															
1.600	9.8	63.1	37.5	26.4	1.6	-43.3	0.0	1.0	48.7	23.1	74.0	54.0	-25.3	-30.9	V
1.600	9.8	61.4	35.7	26.4	1.6	-43.3	0.0	1.0	47.0	21.3	74.0	54.0	-27.0	-32.7	H
11g mode, high CH															
1.600	9.8	63.7	36.8	26.4	1.6	-43.3	0.0	1.0	49.3	22.4	74.0	54.0	-24.7	-31.6	V
1.600	9.8	61.4	35.8	26.4	1.6	-43.3	0.0	1.0	47.0	21.4	74.0	54.0	-27.0	-32.6	H
Note: EUT scanned from 1GHz to 26 GHz															

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		

HARMONICS AND SPURIOUS EMISSIONS (a MODE)

08/02/04 **High Frequency Measurement**

Compliance Certification Services, Morgan Hill Open Field Site

Test Engr:	Frank Ibrahim
Project #:	04U2882-3
Company:	BROADCOM CORP.
EUT Descrip.:	802.11 a/b/g Mini PCI Card
EUT M/N:	BCM94309MPCO
Test Target:	FCC 15.247
Mode Oper:	TX ON (11a mode) @ worst position

Test Equipment:

EMCO Horn 1-18GHz	Spectrum Analyzer	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz
T119; S/N: 29301 @3m	Agilent E4446A Analyzer	T86 Miteq 924341	T88 Miteq 16-40GHz	T87; ARA 18-26GHz; S/N:1049

Hi Frequency Cables: ☐ (2 ft) ☑ (2 ~ 3 ft) ☐ (4 ~ 6 ft) ☑ (12 ft)

Peak Measurements:
1 MHz Resolution Bandwidth
1MHz Video Bandwidth

Average Measurements:
1 MHz Resolution Bandwidth
10Hz Video Bandwidth

f GHz	Dist feet	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	HPF	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes
Low Channel (5745 MHz)															
11.490	9.8	53.7	37.2	39.1	5.7	-43.2	0.0	1.0	56.3	39.8	74.0	54.0	-17.7	-14.2	V
Mid Channel (5785 MHz)															
11.570	9.8	54.7	38.5	39.2	5.7	-43.3	0.0	1.0	57.4	41.2	74.0	54.0	-16.6	-12.8	V
High Channel (5825 MHz)															
11.650	9.8	54.2	38.0	39.3	5.8	-43.3	0.0	1.0	56.9	40.7	74.0	54.0	-17.1	-13.3	V
Note: EUT scanned up to 40 GHz, no other harmonics or spurious found above system noise floor															

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

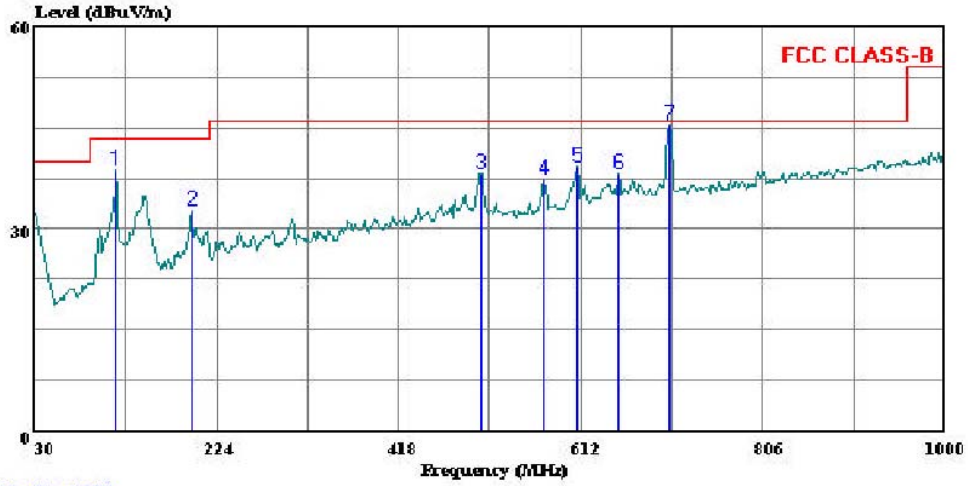
7.1.3. WORST-CASE RADIATED EMISSIONS BELOW 1 GHz

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

HORIZONTAL PLOT

COMPLIANCE Engineering Service, Inc.
561F Monterey Road
San Jose, CA 95131
Tel: (408) 463-0888
Fax: (408) 463-0885

Data#: 13 File#: Broadcom.emi Date: 08-03-2004 Time: 11:15:37



(Audix ATC)

Trace: 3 Ref Trace:

Condition: FCC CLASS-B 3m SUNOL BILOG 12/22/04 HORIZONTAL
Test Operator: : HITESH SOLANKI
Project #: : 04U2882-3
Company: : BROADCOM
EUT: : LAPTOP(TABLET)
Model No: : BCM94309MPCO
Configuration: : EUT ONLY
Target of Test: : FCC CLASS B
Mode of Operation: TX (WORST CASE) @ 2.4G BANDS

Page: 1

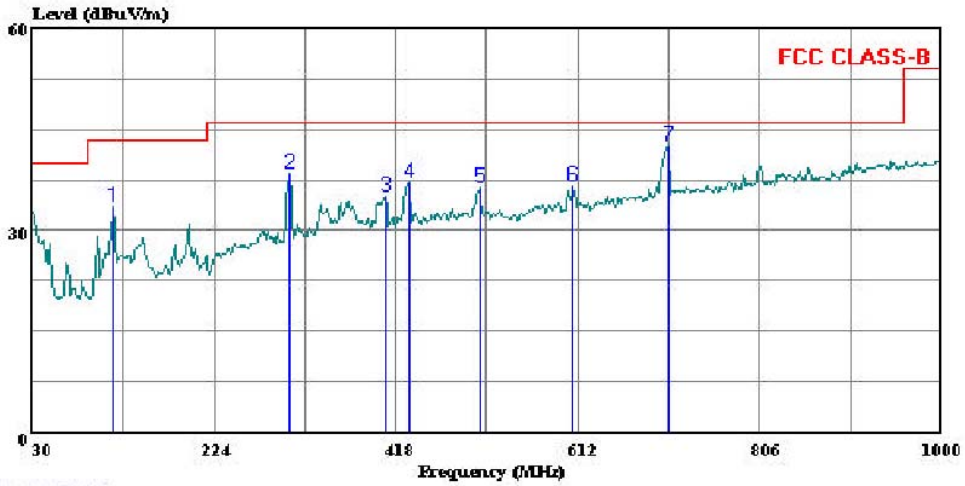
	Freq	Remark	Read Level	Factor	Level	Limit Line	Over Limit
	MHz		dBuV	dB	dBuV/m	dBuV/m	dB
1	116.330	Peak	24.31	14.51	38.82	43.50	-4.68
2	196.840	Peak	19.37	13.36	32.73	43.50	-10.77
3	506.270	Peak	17.46	20.69	38.15	46.00	-7.86
4	572.230	Peak	15.68	21.75	37.43	46.00	-8.57
5	609.090	Peak	17.20	22.04	39.24	46.00	-6.76
6	652.740	Peak	15.22	22.95	38.17	46.00	-7.83
7	706.090	Peak	21.73	23.65	45.38	46.00	-0.62

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

VERTICAL PLOT

COMPLIANCE Engineering Services, Inc.
561F Monterey Road
San Jose, CA 95131
Tel: (408) 463-0888
Fax: (408) 463-0885

Data#: 14 File#: Broadcom.emi Date: 08-03-2004 Time: 11:19:13



(Audix ATC)

Trace: 5 Ref Trace:

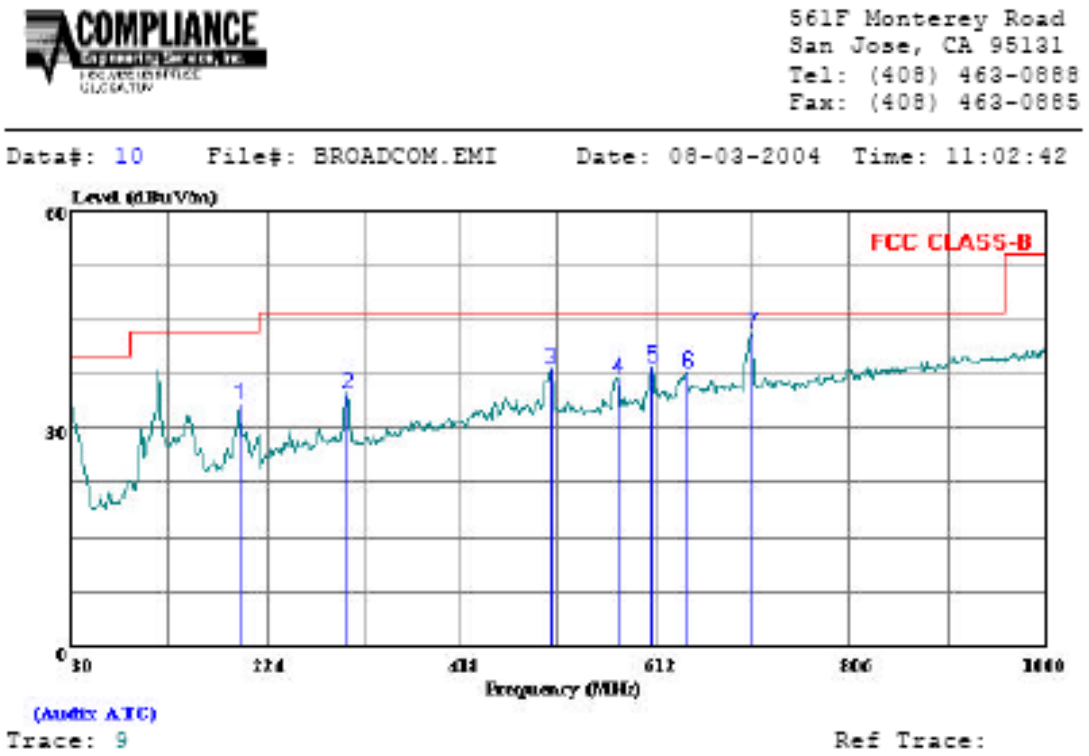
Condition: FCC CLASS-B 3m SUNOL BILOG 12/22/04 VERTICAL
Test Operator: : HITESH SOLANKI
Project #: : 04U2882-3
Company: : BROADCOM
EUT: : LAPTOP(TABLET)
Model No: : BCM94309MPCO
Configuration: : EUT ONLY
Target of Test: : FCC CLASS B
Mode of Operation: TX (WORST CASE) @ 2.4G BANDS

Page: 1

	Freq	Remark	Read Level	Factor	Level	Limit Line	Over Limit
	MHz		dBuV	dB	dBuV/m	dBuV/m	dB
1	116.330	Peak	19.02	14.51	33.53	43.50	-9.97
2	305.480	Peak	22.29	16.03	38.32	46.00	-7.68
3	407.330	Peak	16.56	18.39	34.95	46.00	-11.05
4	431.580	Peak	18.06	19.01	37.07	46.00	-8.93
5	507.240	Peak	15.63	20.70	36.33	46.00	-9.67
6	606.180	Peak	14.70	21.99	36.69	46.00	-9.31
7	708.030	Peak	18.94	23.71	42.65	46.00	-3.35

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL) – 5.8 GHz BAND

HORIZONTAL PLOT

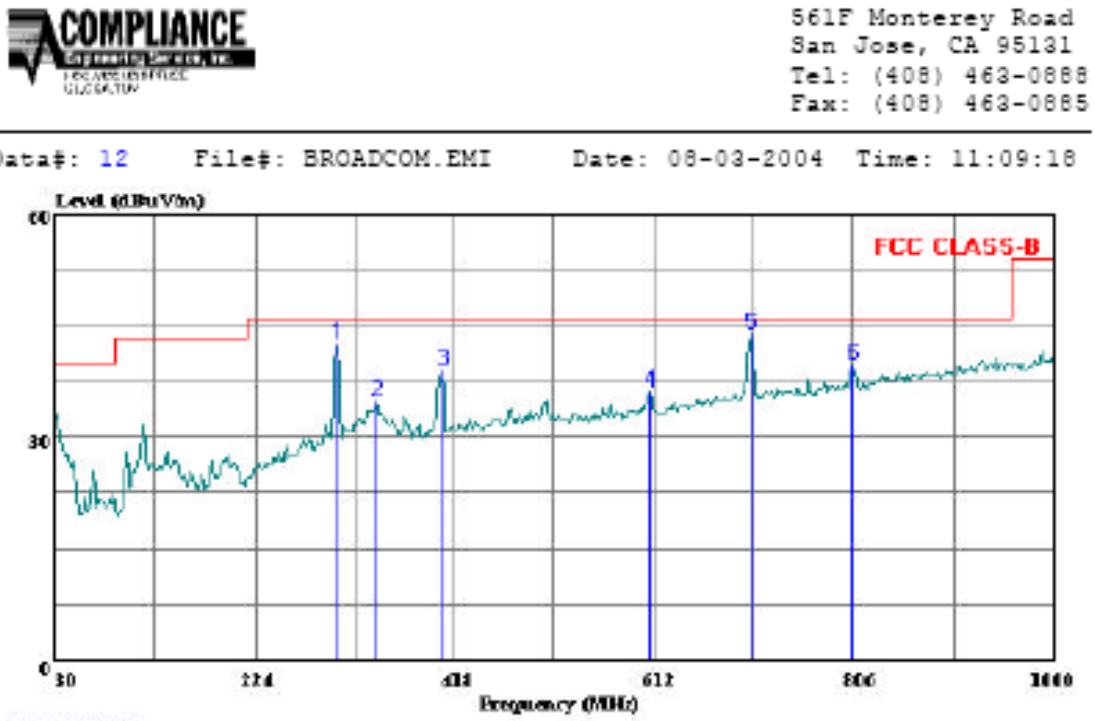


HORIZONTAL DATA

	Freq	Remark	Read Level	Factor	Level	Limit Line	Over Limit
	MHz		dBuV	dB	dBuV/m	dBuV/m	dB
1	196.840	Peak	19.79	13.36	33.15	43.50	-10.35
2	303.540	Peak	18.69	15.99	34.68	46.00	-11.32
3	507.240	Peak	17.47	20.70	38.17	46.00	-7.83
4	574.170	Peak	15.02	21.82	36.84	46.00	-9.16
5	609.090	Peak	16.50	22.04	38.54	46.00	-7.46
6	643.040	Peak	15.01	22.78	37.79	46.00	-8.21
7	708.030	Peak	19.39	23.71	43.10	46.00	-2.90

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL) – 5.8 GHz BAND

VERTICAL PLOT



VERTICAL DATA

	Freq	Remark	Read Level	Factor	Level	Limit Line	Over Limit
	MHz		dBuV	dB	dBuV/m	dBuV/m	dB
1	303.540	Peak	26.63	15.99	42.62	46.00	-3.38
2	342.340	Peak	18.21	16.71	34.92	46.00	-11.08
3	407.330	Peak	20.48	18.39	38.87	46.00	-7.13
4	609.090	Peak	14.03	22.04	36.07	46.00	-9.93
5	706.090	Peak	20.12	23.65	43.77	46.00	-2.23
6	805.030	Peak	14.68	25.06	39.74	46.00	-6.26

7.1.4. CO-LOCATED TRANSMITTER RADIATED EMISSIONS

SUPPLEMENTAL TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna The dominant transmitter is set to the worst case channel. The spurious emissions performance of the dominant transmitter is investigated as the settings of the non-dominant transmitter are varied. Worst case results are reported.

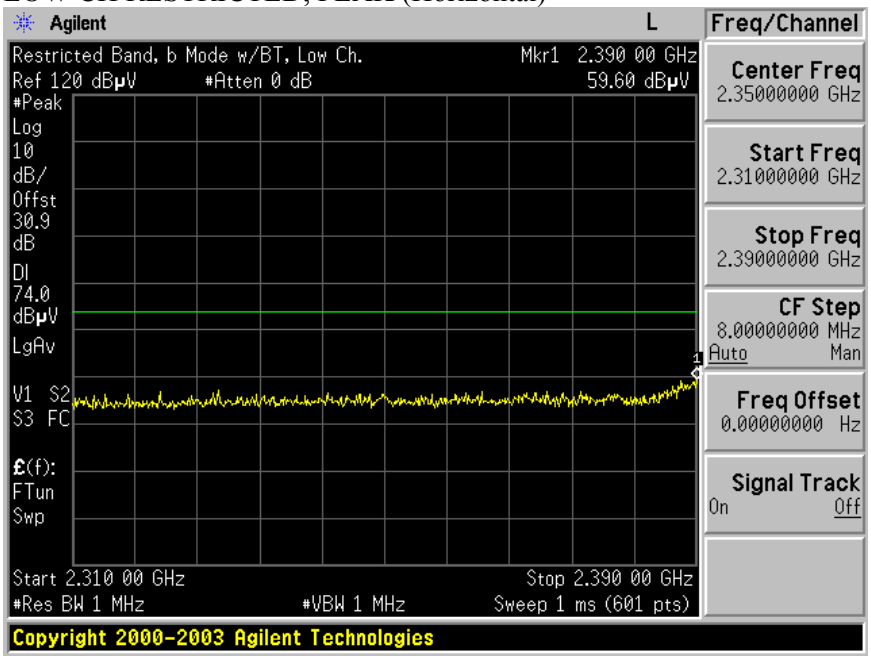
RESULTS

No non-compliance noted:

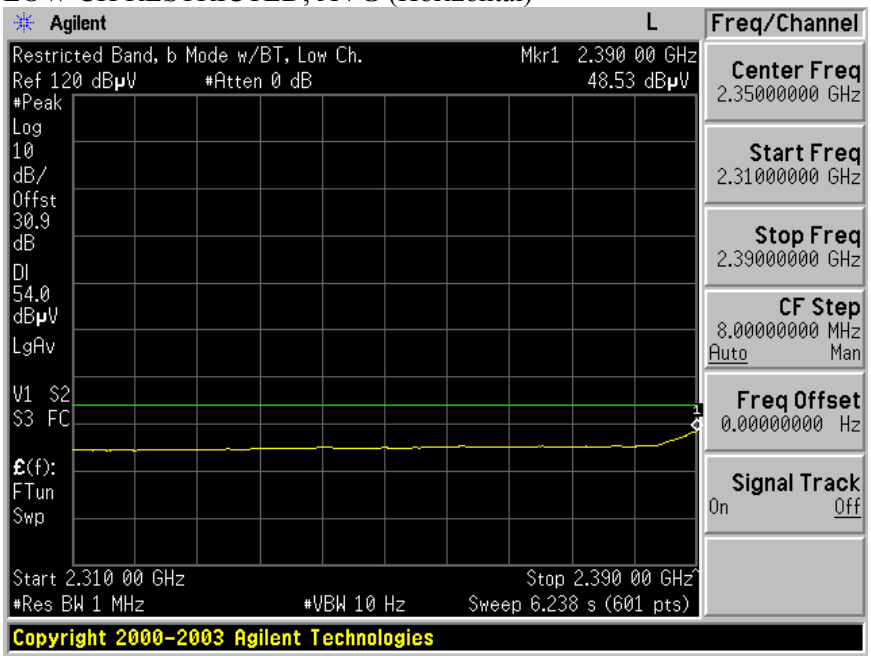
Dominant transmitter was the WLAN operating the 802.11b mode in the portable "Z" configuration on the low channel and the non-dominant transmitter was the bluetooth operating on the low channel for the lower bandedge, WLAN 802.11b on the high channel with the bluetooth on the high channel for upper bandedge, and WLAN 802.11b on the highest power of mid channel with the bluetooth on the mid channel for the spurious harmonics.

WORST-CASE RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

LOW CH RESTRICTED, PEAK (Horizontal)

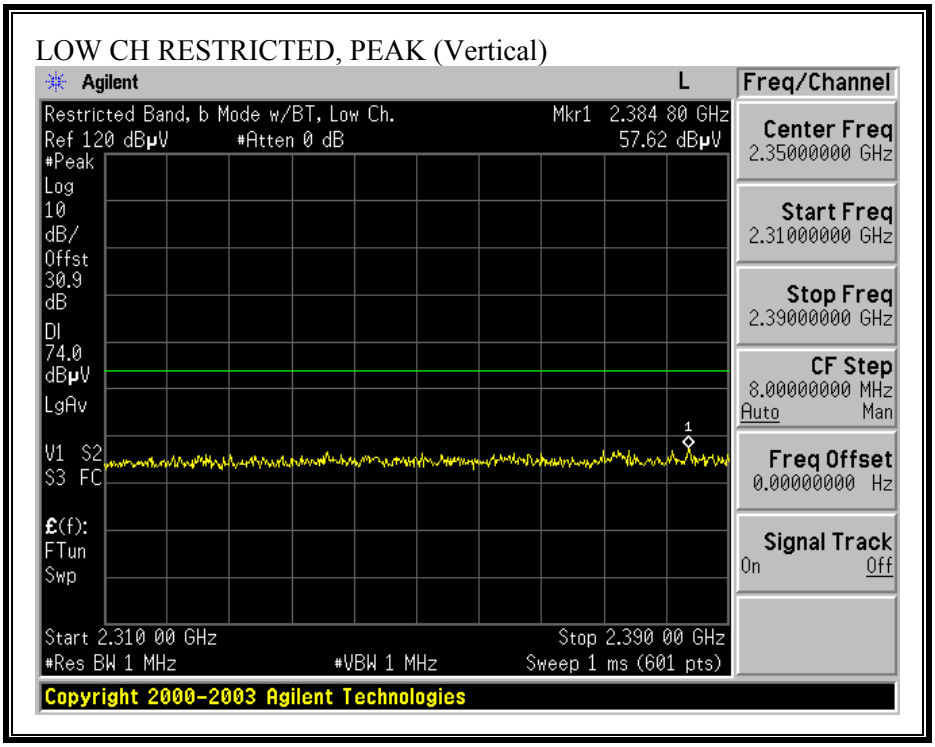


LOW CH RESTRICTED, AVG (Horizontal)

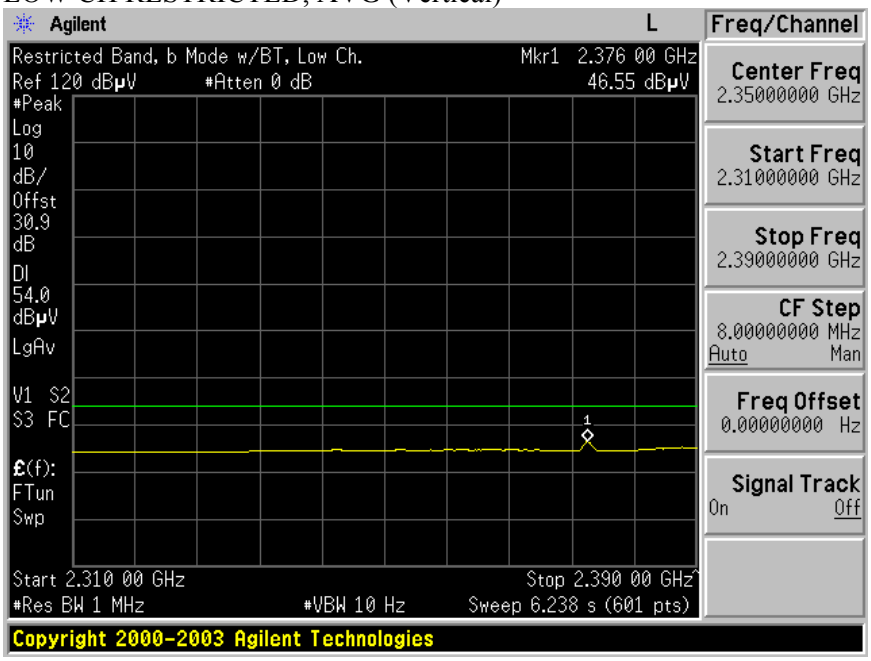


WORST-CASE RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

LOW CH RESTRICTED, PEAK (Vertical)

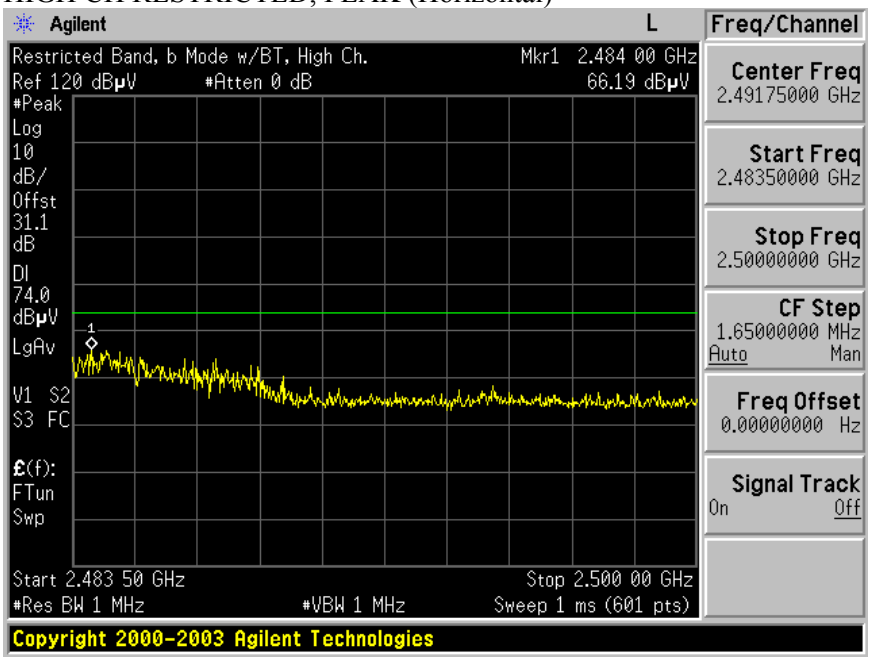


LOW CH RESTRICTED, AVG (Vertical)

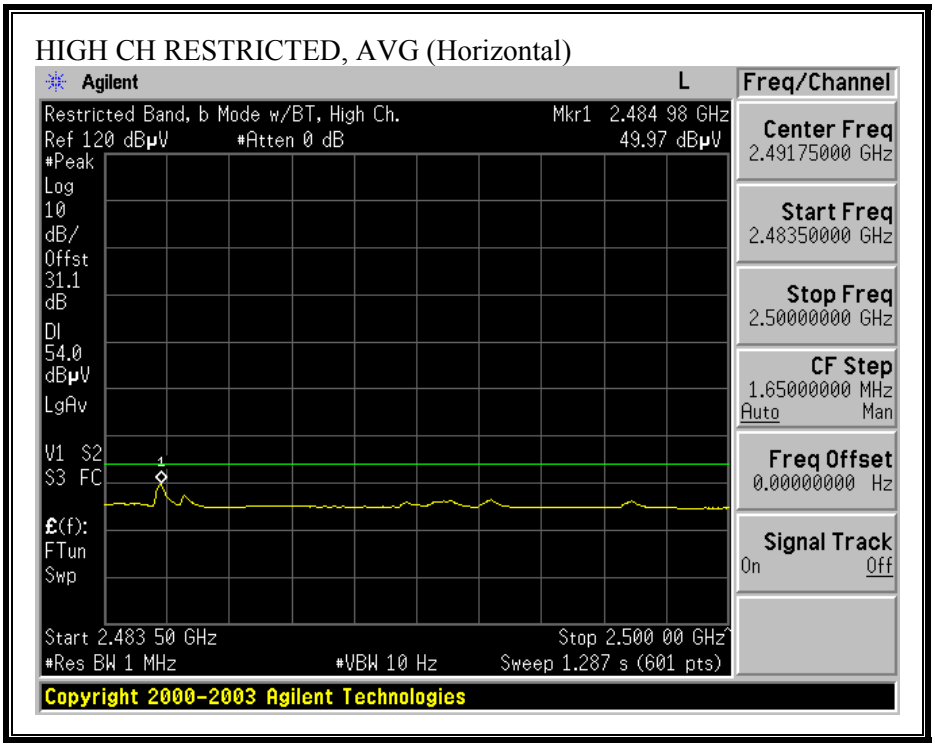


WORST-CASE RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

HIGH CH RESTRICTED, PEAK (Horizontal)

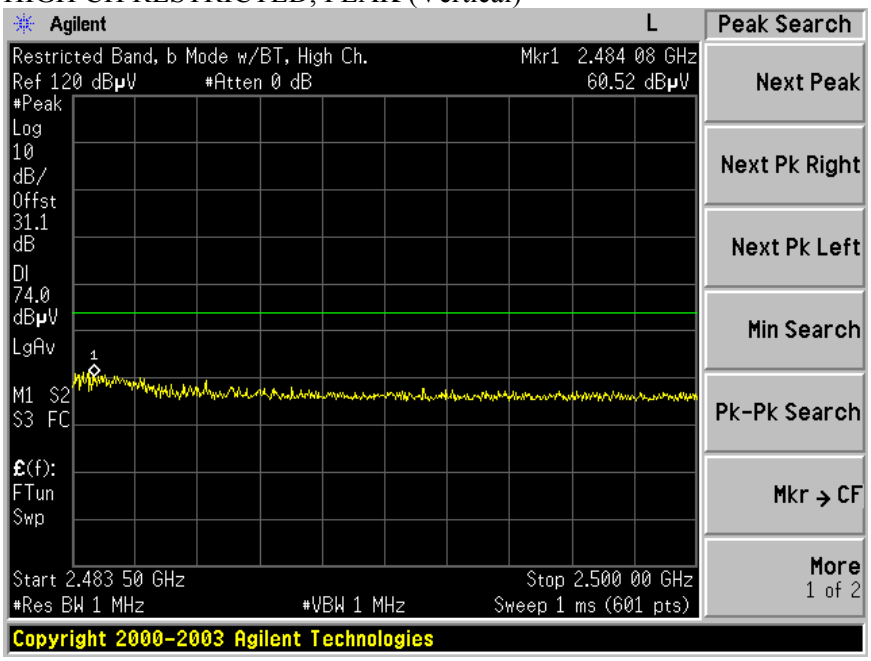


HIGH CH RESTRICTED, AVG (Horizontal)

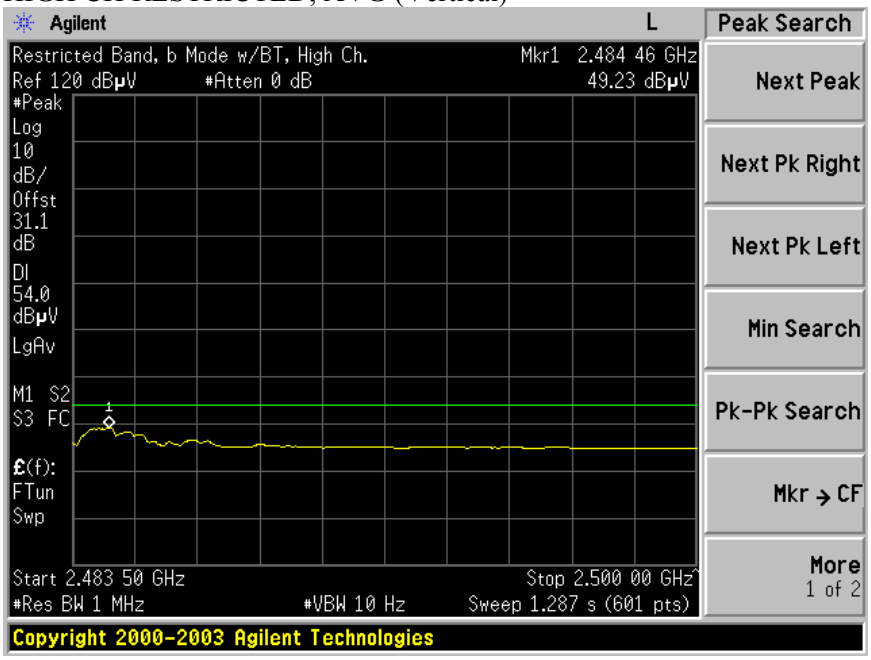


WORST-CASE RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

HIGH CH RESTRICTED, PEAK (Vertical)



HIGH CH RESTRICTED, AVG (Vertical)



WORST-CASE HARMONICS AND SPURIOUS EMISSIONS

08/04/04 **High Frequency Measurement**
Compliance Certification Services, Morgan Hill Open Field Site

Test Engr:William Zhuang
Project #:04U2882
Company:Broadcom
EUT Descrip.:Laptop (Tablet)
EUT M/N: BCM94309MPCO
Test Target: FCC 15.407
Mode Oper:Tx, b Mode, Mid Ch. 2437MHz WLAN&Co-Location w/Bluetooth

Test Equipment:

EMCO Horn 1-18GHz	Spectrum Analyzer	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz
T73; S/N: 6717 @3m	Agilent E4446A Analyzer	T87 Miteq 924342		

Hi Frequency Cables: ☑ (2 ft) ☐ (2 ~ 3 ft) ☐ (4 ~ 6 ft) ☑ (12 ft)

Limit: FCC 15.205

Peak Measurements:
1 MHz Resolution Bandwidth
1MHz Video Bandwidth

Average Measurements:
1 MHz Resolution Bandwidth
10Hz Video Bandwidth

f GHz	Dist feet	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	HPF	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes
WLAN, Worst case at Z position															
4.874	9.8	54.3	40.1	33.4	3.0	-44.7	0.0	1.0	47.0	32.8	74.0	54.0	-27.0	-21.2	V
4.874	9.8	56.5	40.3	33.4	3.0	-44.7	0.0	1.0	49.2	32.9	74.0	54.0	-24.8	-21.1	H
7.311	9.8	46.5	35.1	35.8	3.9	-44.5	0.0	1.0	42.7	31.3	74.0	54.0	-31.3	-22.7	V
7.311	9.8	45.7	34.7	35.8	3.9	-44.5	0.0	1.0	41.9	30.8	74.0	54.0	-32.1	-23.2	H
Co-location w/Bluetooth, Worst case at Z position															
4.874	9.8	52.2	49.3	33.4	3.0	-44.7	0.0	1.0	44.9	42.0	74.0	54.0	-29.1	-12.0	V
4.874	9.8	54.0	51.4	33.4	3.0	-44.7	0.0	1.0	46.6	44.1	74.0	54.0	-27.4	-9.9	H
7.311	9.8	45.0	33.9	35.8	3.9	-44.5	0.0	1.0	41.1	30.0	74.0	54.0	-32.9	-24.0	V
7.311	9.8	45.5	34.0	35.8	3.9	-44.5	0.0	1.0	41.7	30.2	74.0	54.0	-32.3	-23.8	H

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		

7.2. 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:

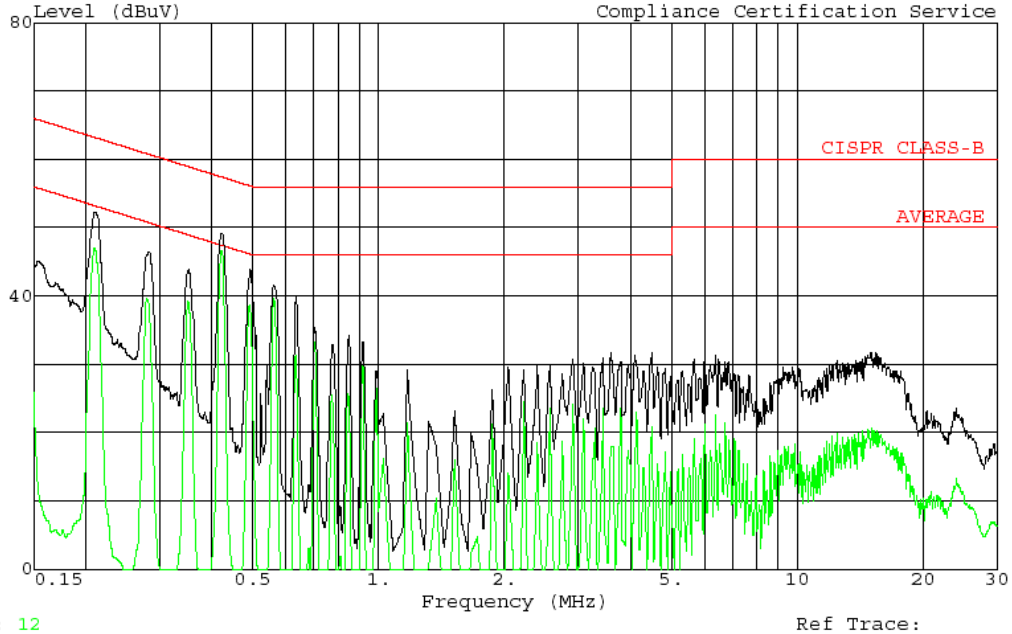
6 WORST EMISSIONS

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
0.42	48.34	--	46.34	0.00	58.26	48.26	-9.92	-1.92	L1
0.56	40.70	--	38.60	0.00	56.00	46.00	-15.30	-7.40	L1
15.80	32.34	--	21.14	0.00	60.00	50.00	-27.66	-28.86	L1
0.20	52.23	--	46.68	0.00	64.57	54.57	-12.34	-7.89	L2
0.56	41.56		39.64	0.00	56.00	46.00	-56.00	-6.36	L2
15.07	31.68	--	20.69	0.00	60.00	50.00	-28.32	-29.31	L2
6 Worst Data									

LINE 1 RESULTS

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

Data#: 14 File#: BROADCOM.EMI Date: 08-03-2004 Time: 15:32:30

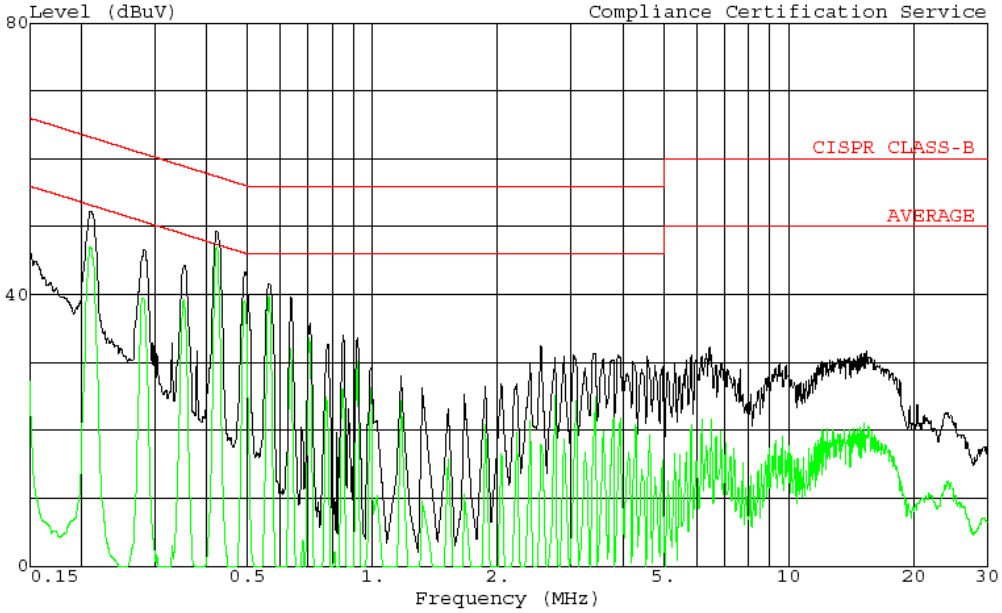


Trace: 12 Ref Trace:
Project # : 04u2882-3
Test Operator : HITESH SOLANKI
Company : BROADCOM CORP
EUT : 802.11 a/b/g Mini PCI Card
Model : BCM94309MPC0
Configuration : EUT/AC ADAPTER
Mode of Operation: TX WORST CASE
Target of Test : 115VAC/ 60Hz
: LINE 1(PEAK;BLACK AVG;GREEN)

LINE 2 RESULTS

COMPLIANCE Engineering Services, Inc.
561F Monterey Road,
Morgan Hill, CA 95037 USA
Tel: (408) 463-0885
Fax: (408) 463-0888

Data#: 21 File#: BROADCOM.EMI Date: 08-03-2004 Time: 15:57:40



Trace: 19 Ref Trace:

Project #	: 04u2882-3
Test Operator	: HITESH SOLANKI
Company	: BROADCOM CORP
EUT	: 802.11 a/b/g Mini PCI Card
Model	: BCM94309MPC0
Configuration	: EUT/AC ADAPTER
Mode of Operation	: TX WORST CASE
Target of Test	: 115VAC/ 60Hz
	: LINE 2(PEAK;BLACK AVG;GREEN)

8. SETUP PHOTOS

RADIATED RF MEASUREMENT SETUP – Laptop Configuration

RADIATED FRONT PHOTO

RADIATED BACK PHOTO

RADIATED RF MEASUREMENT SETUP – X Configuration

RADIATED FRONT PHOTO

RADIATED BACK PHOTO

RADIATED RF MEASUREMENT SETUP – Y Configuration

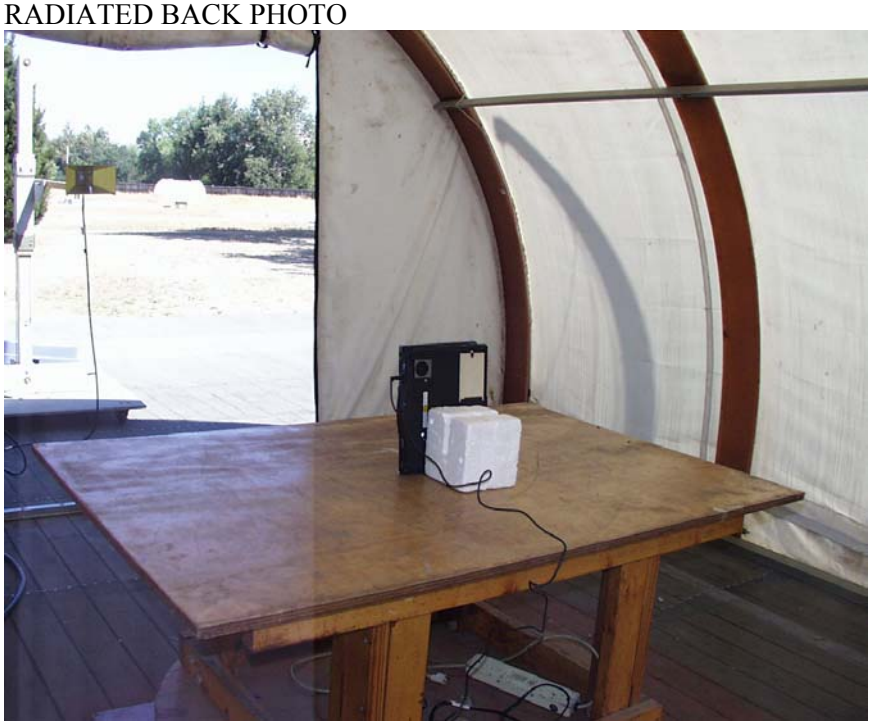
RADIATED FRONT PHOTO

RADIATED BACK PHOTO

RADIATED RF MEASUREMENT SETUP – Z Configuration

RADIATED FRONT PHOTO

RADIATED BACK PHOTO



POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP

LINE CONDUCTED FRONT PHOTO

LINE CONDUCTED BACK PHOTO

END OF REPORT