FCC CFR47 PART 15 SUBPART C
CLASS II PERMISSIVE CHANGE

TEST REPORT

FOR

BROADCOM 802.11g Mini PCI CARD

MODEL NUMBER: BCM94306MPLNA

FCC ID: QDS-BRCM1013

REPORT NUMBER: 04U3068-1

ISSUE DATE: NOVEMBER 23, 2004

Prepared for
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1. TEST RESULT CERTIFICATION

COMPANY NAME: Broadcom Corp.
190 Mathilda Place
Sunnyvale, CA 94086, USA

EUT DESCRIPTION: Broadcom 802.11g Mini PCI Card

MODEL: BCM94306MPLNA

DATE OF ORIGINAL TEST: June 1-19 & September 9-10, 2004

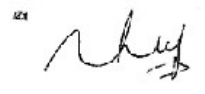
DATE OF ADDITIONAL TESTS: October 25 to November 28, 2004

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

Approved & Released For CCS By:



THU CHAN / EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

Original tests conducted By:

DAVID GARCIA / EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

Additional tests conducted By

CHIN PANG / EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. EUT DESCRIPTION

The EUT is an 802.11g Mini PCI transceiver module, operating in the 2400-2483.5 MHz band.

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

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2412 - 2462	802.11b	22.10	162.18
2412 - 2462	802.11g	21.80	151.36

The EUT does not co-locate with Bluetooth.

3. CLASS II PERMISSIVE CHANGE DESCRIPTION

The EUT was originally tested and reported under CCS project no.: 04U2779, and granted by TCB a Modular Approval on July 19, 2004. The major changes filed under this application are as follows:

- Adding additional platforms /antenna options:
  WNC PIFA antenna
  Model: 81.EBC15.002(main), 81.EBC15.001(aux)
  Peak gain: 2.97dBi

Same antenna is used and same antenna placement is employed across all 4 HP/Compaq platforms - PP2200, PP2210, HSTNN-C11C and HSTNN-W06C. The tests under this project were conducted with platform HSTNN-C11C as a representative, and our client Broadcom declares that the above four platforms are of the same product family.

4. 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.

5. 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.

6. CALIBRATION AND UNCERTAINTY

6.1. 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.

6.2. 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	+3.5 / -2.2 dB
Power Line Conducted Emission	+/- 2.9 dB

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

6.3. 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 Receiver, 9 kHz ~ 2.9 GHz	HP	8542E	3942A00286	11/21/2004
RF Filter Section	HP	85420E	3705A00256	11/21/2004
30MHz---- 2Ghz	Sunol Sciences	JB1 Antenna	A121003	12/22/2004
Antenna, Horn 1 ~ 18 GHz	EMCO	3117	29310	12/26/2004
Spectrum Analyzer 20 Hz ~ 44 GHz	Agilent	E4446A	US42070220	4/1/2005
Amplifier 1-26GHz	MITEQ	NSP2600-SP	924342	4/25/2005
EMI Test Receiver	R & S	ESHS 20	827129/006	7/17/2005
LISN, 10 kHz ~ 30 MHz	FCC	50/250-25-2	114	10/13/2005
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-BNC	8379443	10/13/2005
Site A Line Stabilizer / Conditioner	Tripplite	LC-1800a	A0051681	CNR
AC Power Source, 10KVA	ACS	AFC-10K-AFC-2	J1568	CNR
2.7GHz High pass Filter	Micro-Tronics	HPM13194	2	CNR
2.4-2.5GHz Reject filter	Micro-Tronics	BRM50702	2	CNR

7. SETUP OF EQUIPMENT UNDER TEST

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacture	Model	Serial Number	FCC ID
Laptop PC	HP/Compaq	HSTNN-C11C	8149Q0101643900BF0KS00	N/A
AC Adapter	HP	4905834505	N/A	N/A

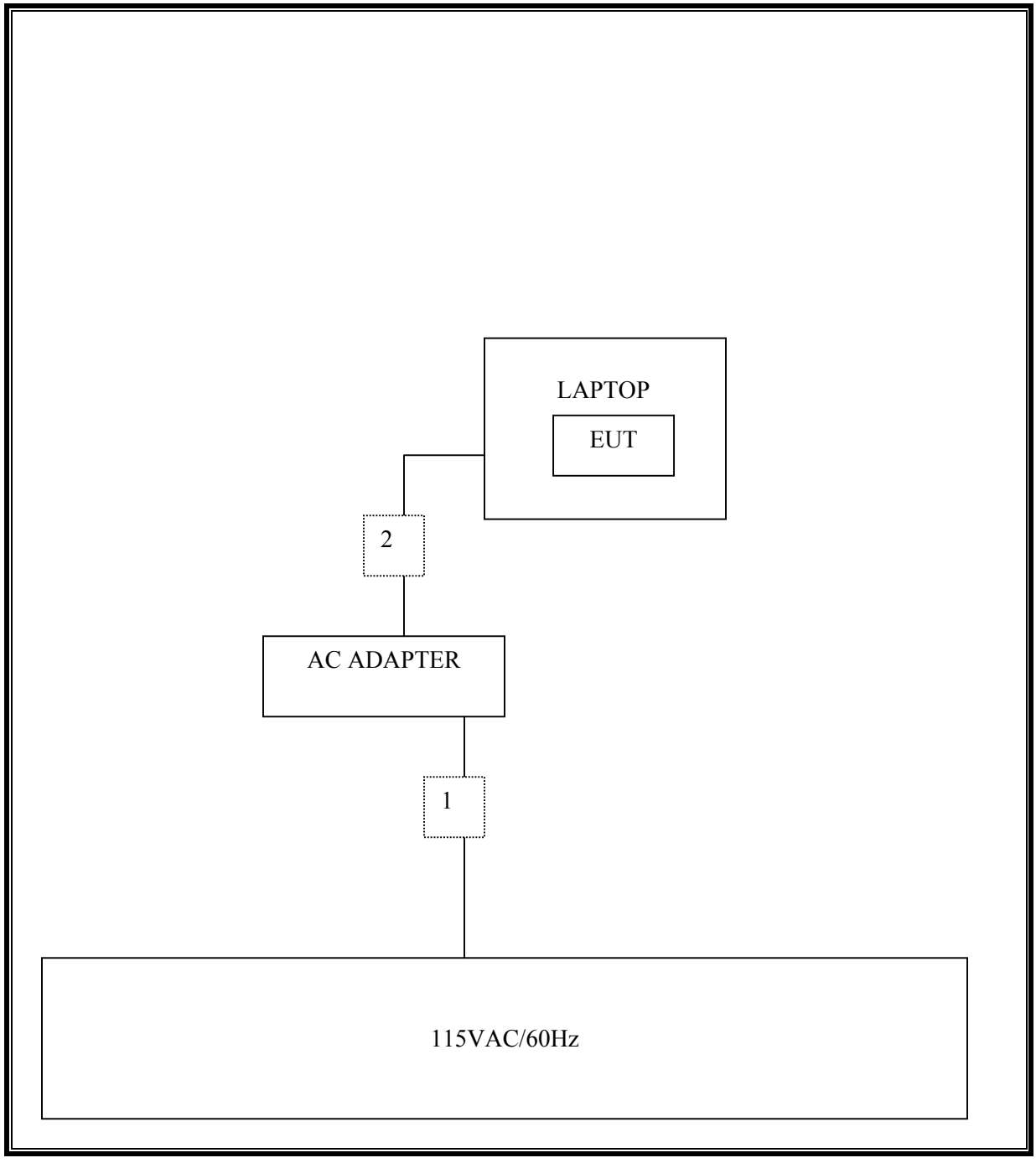
I/O CABLES

I/O CABLE LIST						
Cable No.	Port	# of Identic Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	1	US 115V	Un-shielded	1.8 m	AC to AC Adapter block cable
2	DC	1	1/8'	Un-shielded	1.8 m	No

TEST SETUP

The EUT is installed in a host laptop computer during the tests. Test software exercised the radio card.

SETUP DIAGRAM FOR TESTS



8. APPLICABLE LIMITS AND TEST RESULTS

8.1. CHANNEL TESTS FOR THE 2400 – 2483.5 MHz BAND

8.1.1. 6 dB BANDWIDTH

LIMIT

§15.247 (a) (2) For direct sequence systems, the minimum 6 dB bandwidth shall be at least 500 kHz.

TEST PROCEDURE

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

RESULTS

No non-compliance noted:

802.11b Mode

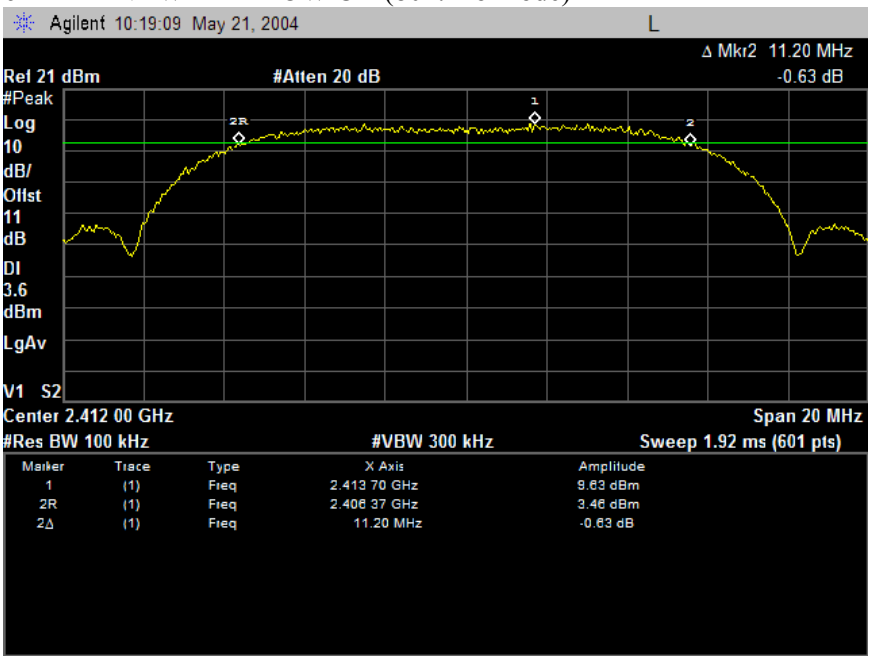
Channel	Frequency (MHz)	6 dB Bandwidth (kHz)	Minimum Limit (kHz)	Margin (kHz)
Low	2412	11200	500	10700
Middle	2437	10900	500	10400
High	2462	11400	500	10900

802.11g Mode

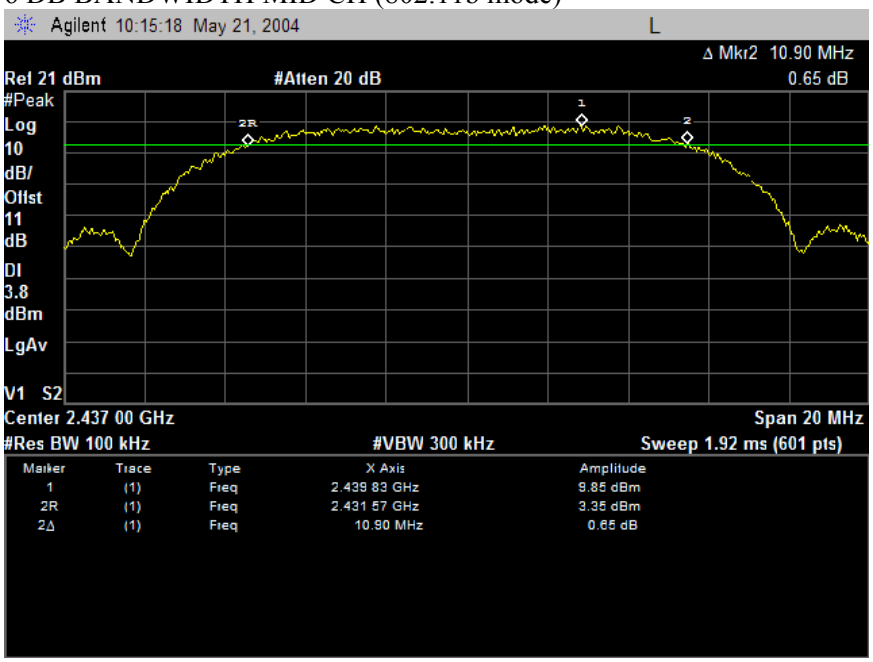
Channel	Frequency (MHz)	6 dB Bandwidth (kHz)	Minimum Limit (kHz)	Margin (kHz)
Low	2412	16560	500	16060
Middle	2437	16560	500	16060
High	2462	16500	500	16000

6 DB BANDWIDTH (802.11b MODE)

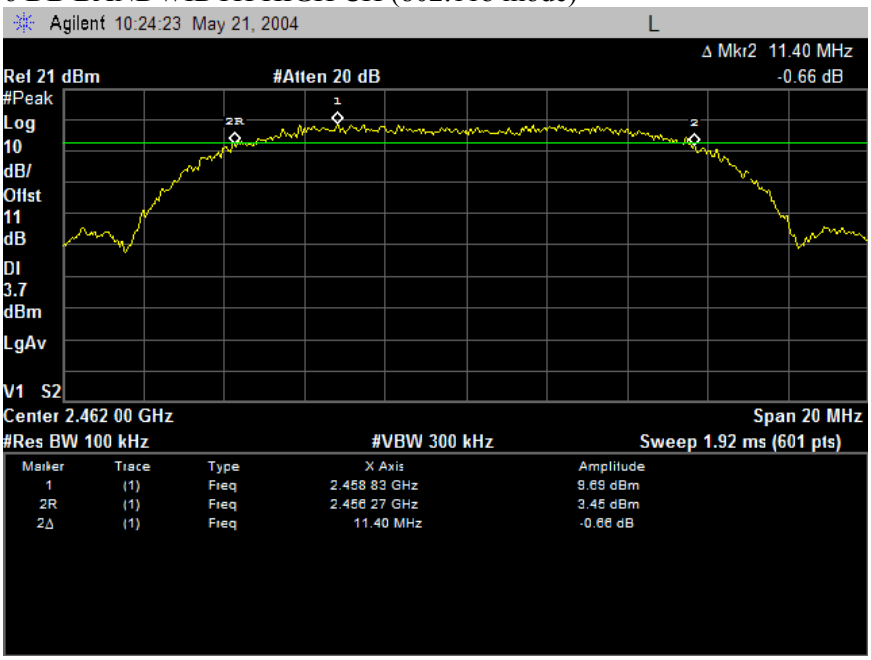
6 DB BANDWIDTH LOW CH (802.11b mode)



6 DB BANDWIDTH MID CH (802.11b mode)

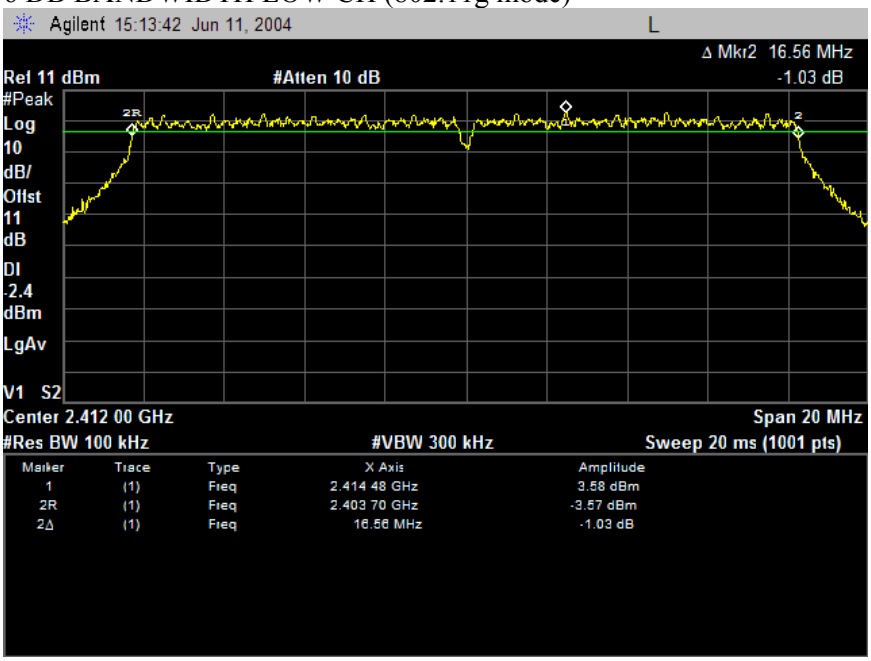


6 DB BANDWIDTH HIGH CH (802.11b mode)

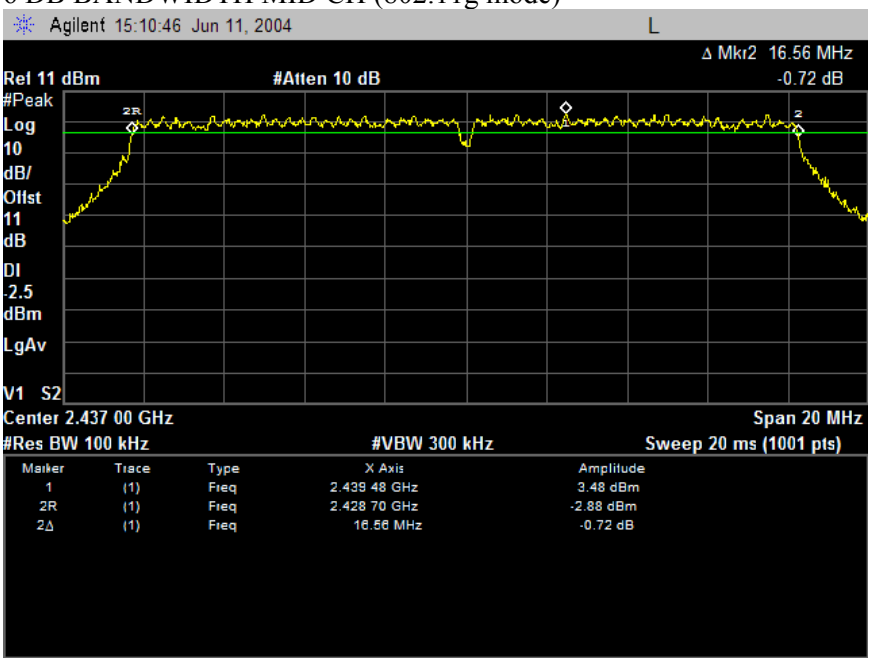


6 DB BANDWIDTH (802.11g MODE)

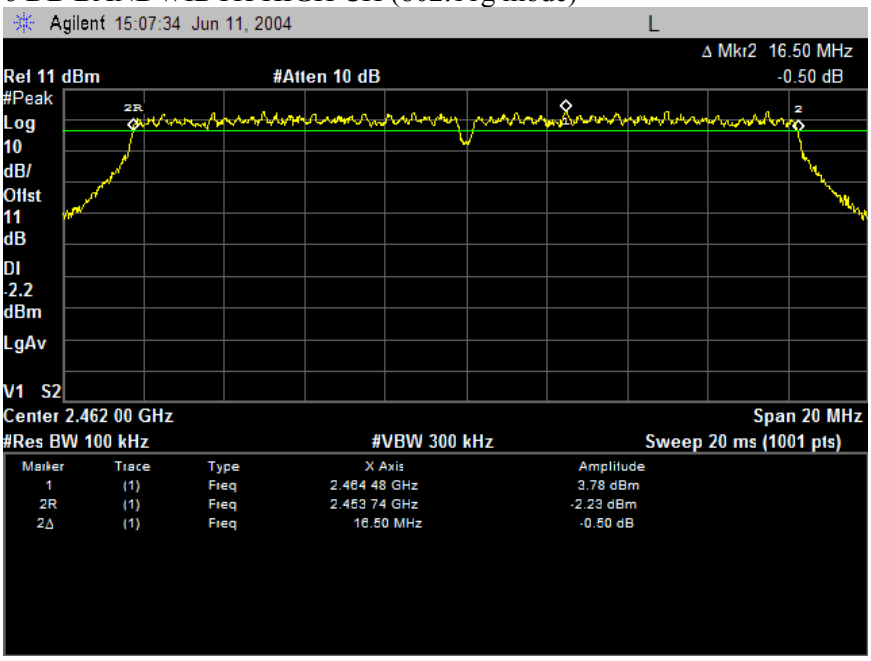
6 DB BANDWIDTH LOW CH (802.11g mode)



6 DB BANDWIDTH MID CH (802.11g mode)



6 DB BANDWIDTH HIGH CH (802.11g mode)



8.1.2. 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

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

RESULTS

No non-compliance noted:

802.11b Mode

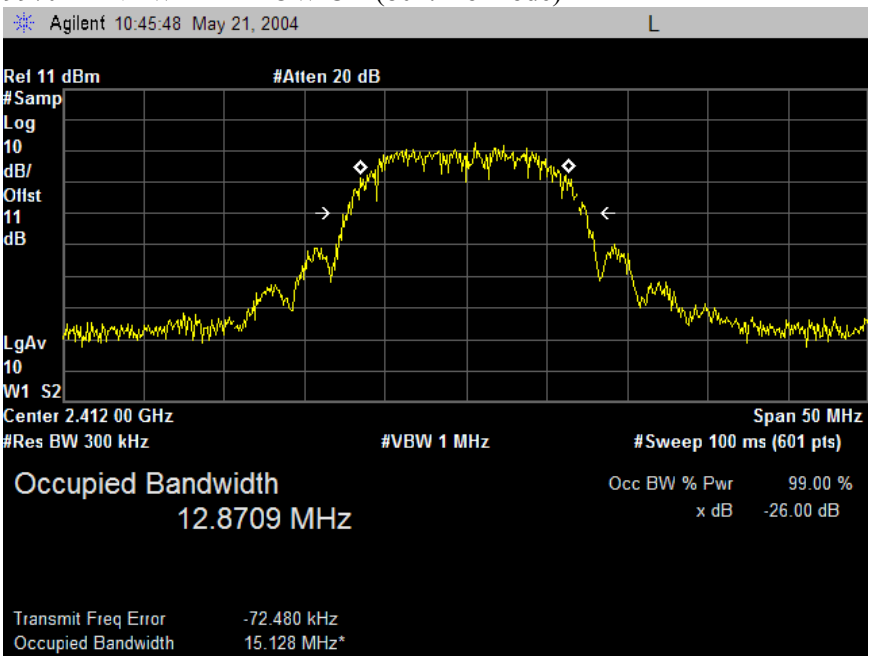
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	12.8709
Middle	2437	12.7115
High	2462	12.7475

802.11g Mode

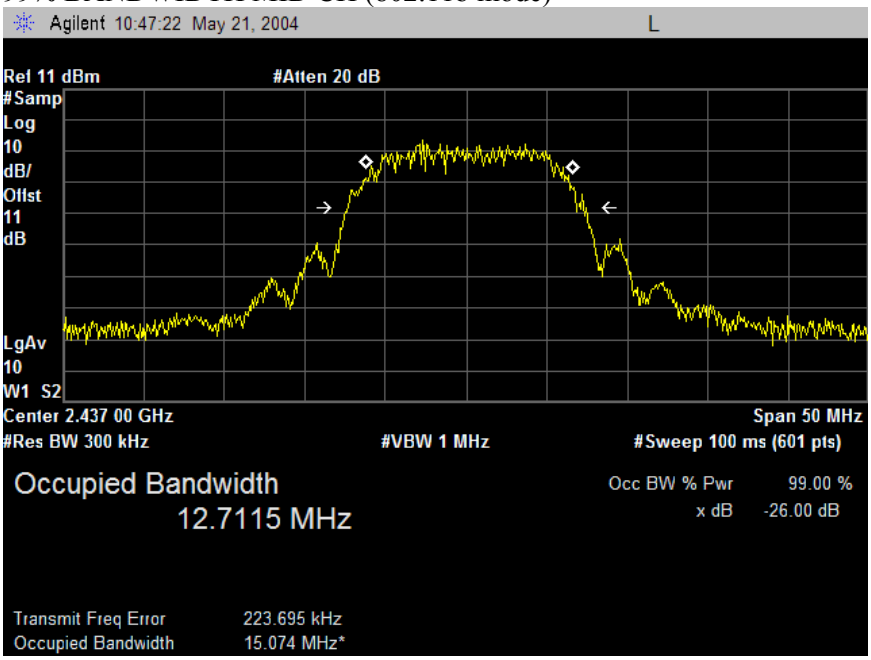
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	16.5092
Middle	2437	16.4249
High	2462	16.4857

99% BANDWIDTH (802.11b MODE)

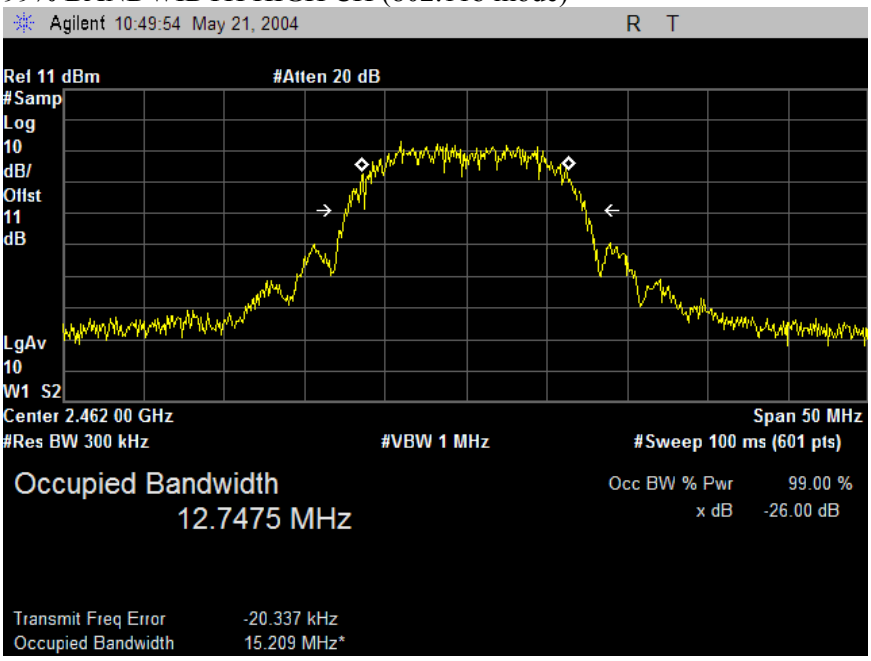
99% BANDWIDTH LOW CH (802.11b mode)



99% BANDWIDTH MID CH (802.11b mode)

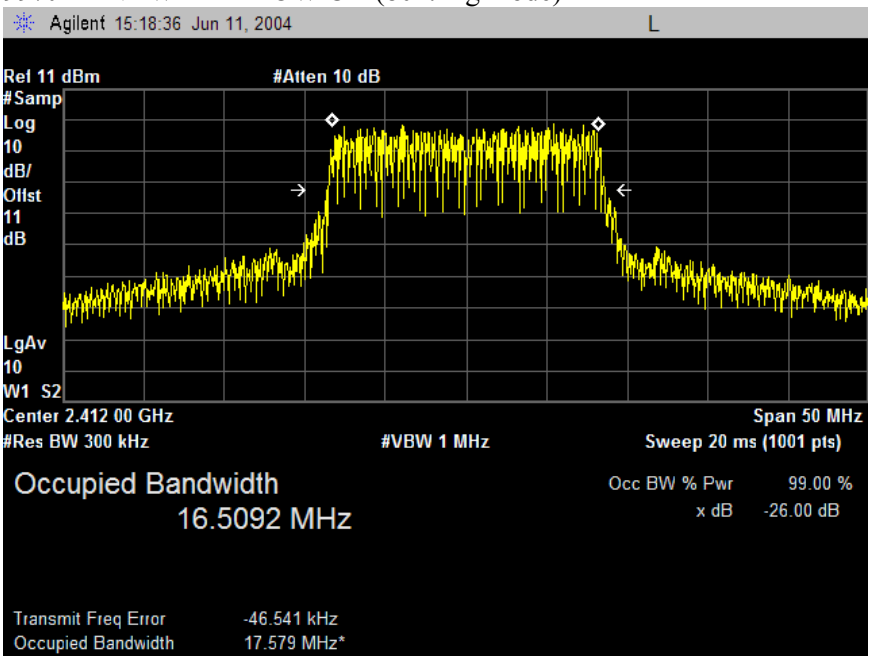


99% BANDWIDTH HIGH CH (802.11b mode)

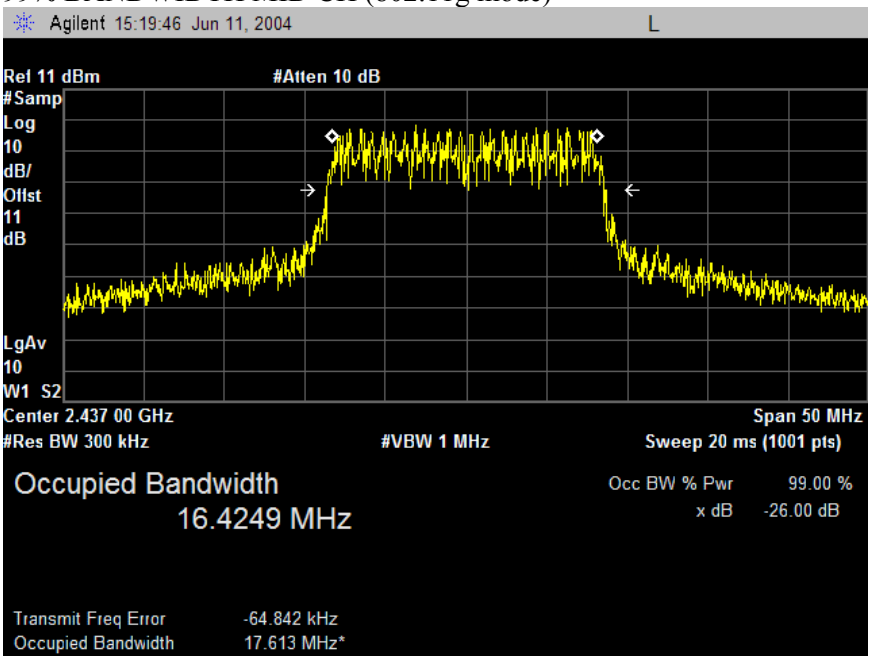


99% BANDWIDTH (802.11g MODE)

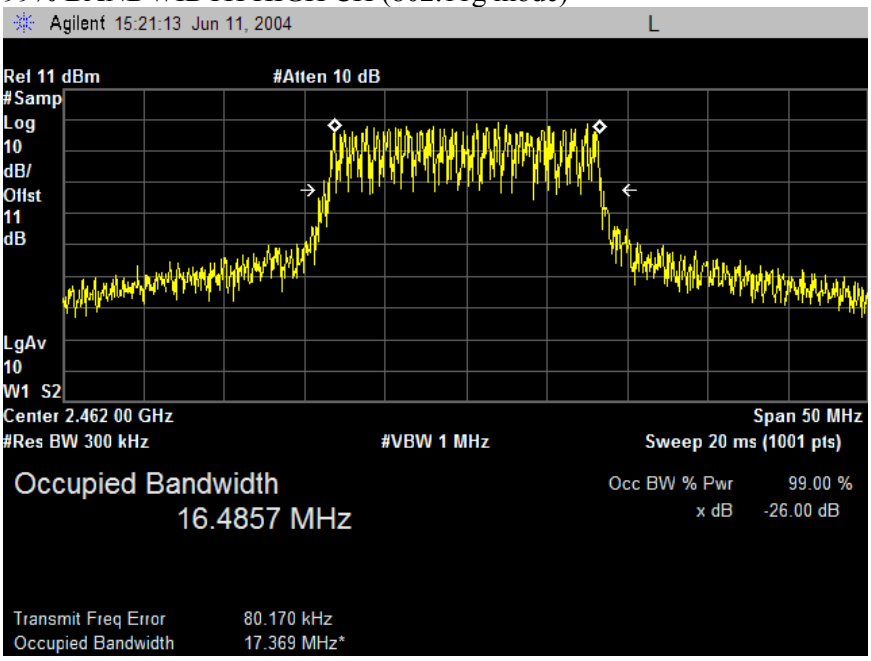
99% BANDWIDTH LOW CH (802.11g mode)



99% BANDWIDTH MID CH (802.11g mode)



99% BANDWIDTH HIGH CH (802.11g mode)



8.1.3. PEAK OUTPUT POWER

PEAK POWER LIMIT

§15.247 (b) The maximum peak output power of the intentional radiator shall not exceed the following:

§15.247 (b) (3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz , and 5725-5850 MHz bands: 1 watt.

§15.247 (b) (4) Except as shown in paragraphs (b)(3) (i), (ii) and (iii) of this section, if transmitting antennas of directional gain greater than 6 dBi are used the peak output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1) or (b)(2) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The maximum antenna gain is 2.97 dBi, therefore the limit is 30 dBm.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer and the analyzer's internal channel power integration function is used to integrate the power over a bandwidth greater than or equal to the 99% bandwidth.

RESULTS

No non-compliance noted:

802.11b Mode

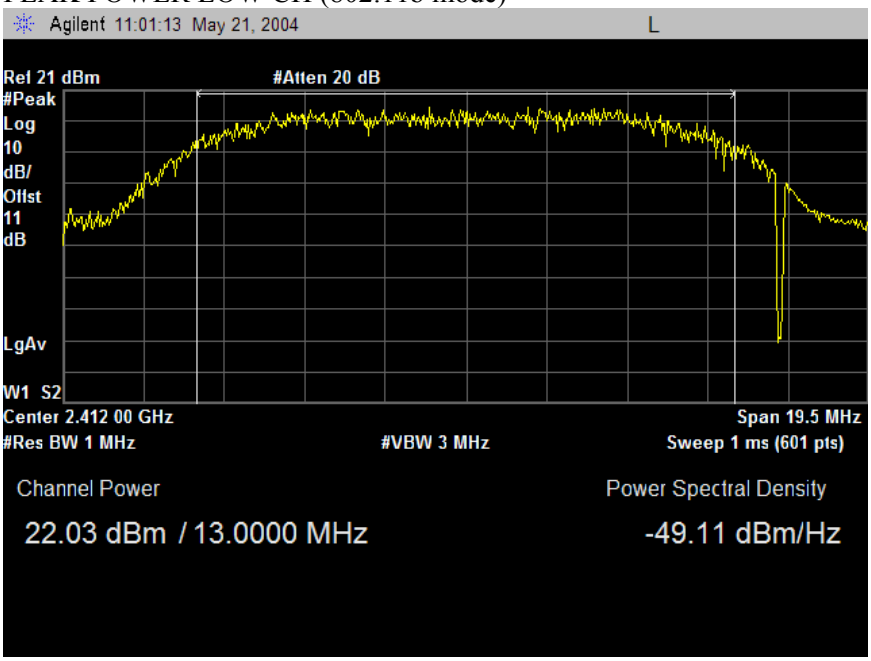
Channel	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	22.03	30	-7.97
Middle	2437	22.10	30	-7.90
High	2462	22.07	30	-7.93

802.11g Mode

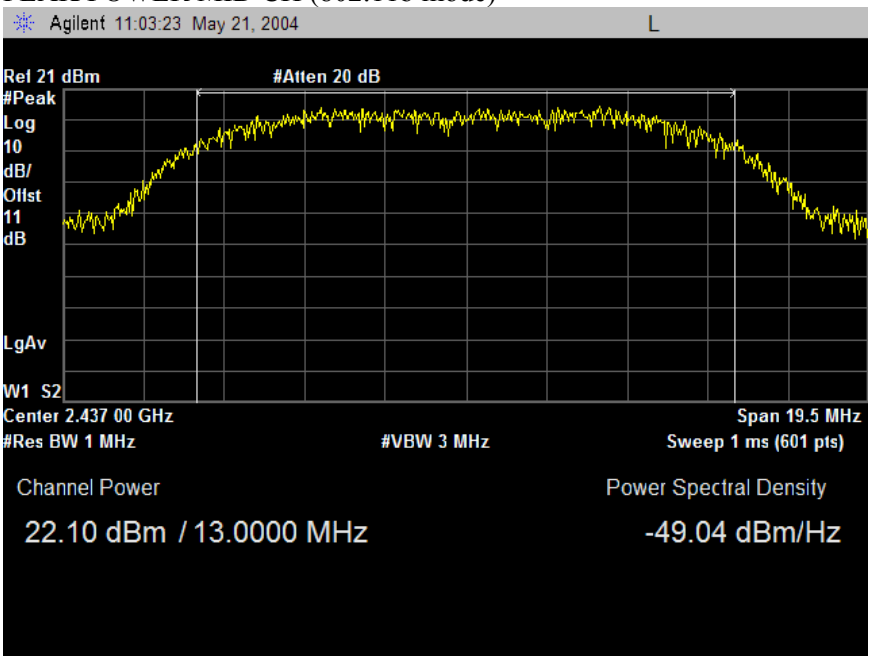
Channel	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	21.72	30	-8.28
Middle	2437	21.67	30	-8.33
High	2462	21.80	30	-8.20

OUTPUT POWER (802.11b MODE)

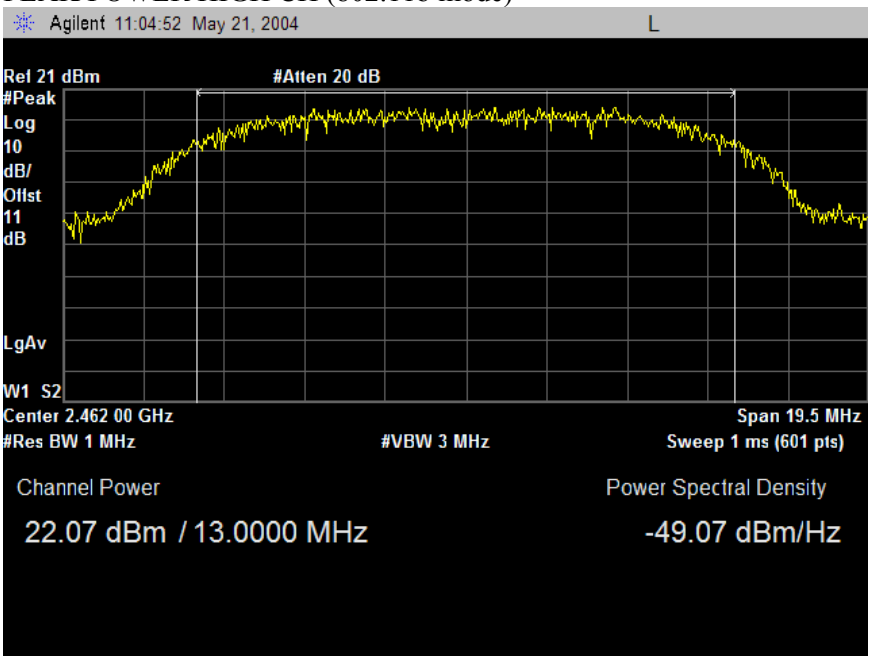
PEAK POWER LOW CH (802.11b mode)



PEAK POWER MID CH (802.11b mode)

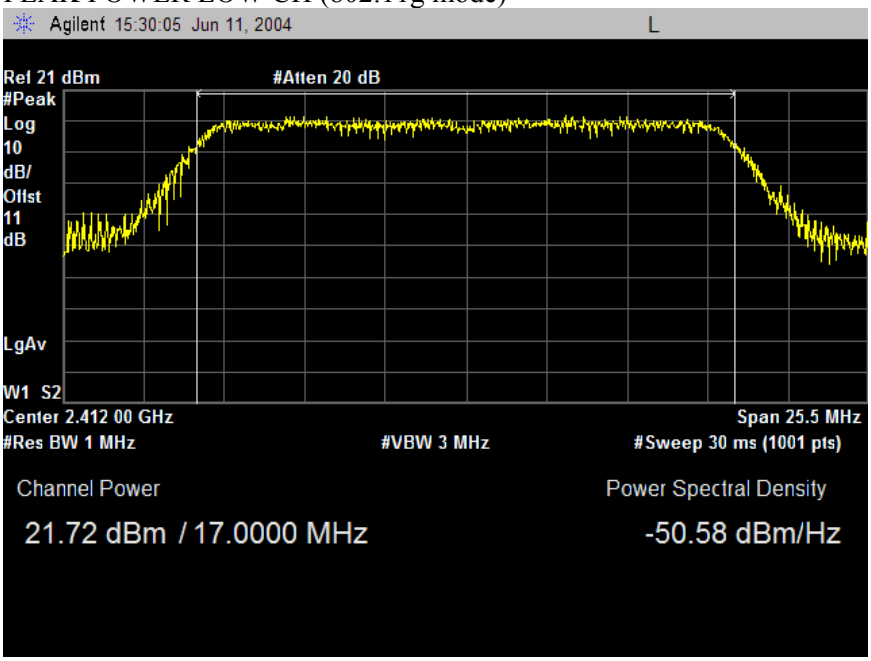


PEAK POWER HIGH CH (802.11b mode)

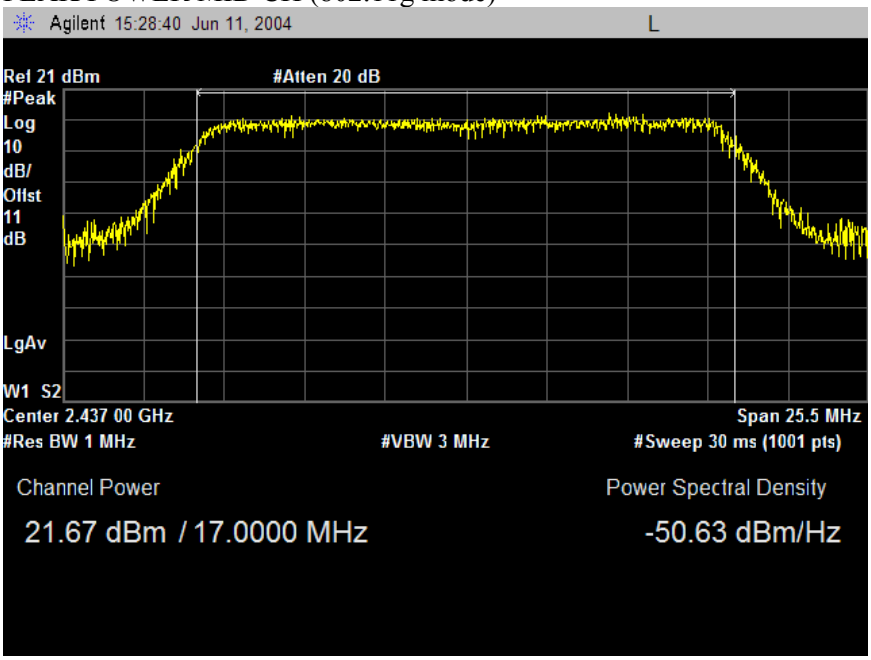


OUTPUT POWER (802.11g MODE)

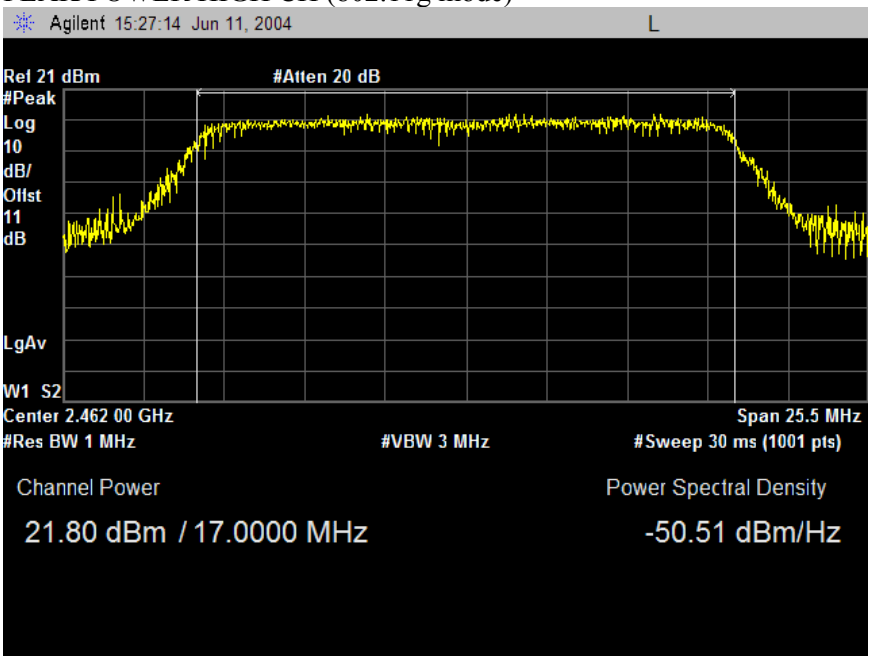
PEAK POWER LOW CH (802.11g mode)



PEAK POWER MID CH (802.11g mode)



PEAK POWER HIGH CH (802.11g mode)



8.1.4. 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

$d = 0.282 * 10 \wedge ((P + G) / 20) / \sqrt{S}$ Equation (1)

where

d = MPE distance in cm
P = Power in dBm
G = Antenna Gain in dBi
S = Power Density Limit in mW/cm^2

Equation (1) and the measured peak power is used to calculate the MPE distance.

LIMITS

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

RESULTS

No non-compliance noted:

	Limit (mW/cm^2)	Power (dBm)	Gain (dBi)	Distance (cm)
802.11b	1.0	22.10	2.97	5.06
802.11g	1.0	21.80	2.97	4.88

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.

8.1.5. 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 11dB (including 10 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

802.11b Mode

Channel	Frequency (MHz)	Average Power (dBm)
Low	2412	19.20
Middle	2437	19.10
High	2462	19.30

802.11g Mode

Channel	Frequency (MHz)	Average Power (dBm)
Low	2412	15.30
Middle	2437	15.10
High	2462	15.30

Note: above readings are packet power

8.1.6. PEAK POWER SPECTRAL DENSITY

LIMIT

§15.247 (d) For direct sequence systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer, the maximum level in a 3 kHz bandwidth is measured with the spectrum analyzer using RBW = 3 kHz and VBW > 3 kHz, sweep time = span / 3 kHz, and video averaging is turned off. The PPSD is the highest level found across the emission in any 3 kHz band.

RESULTS

No non-compliance noted:

802.11b Mode

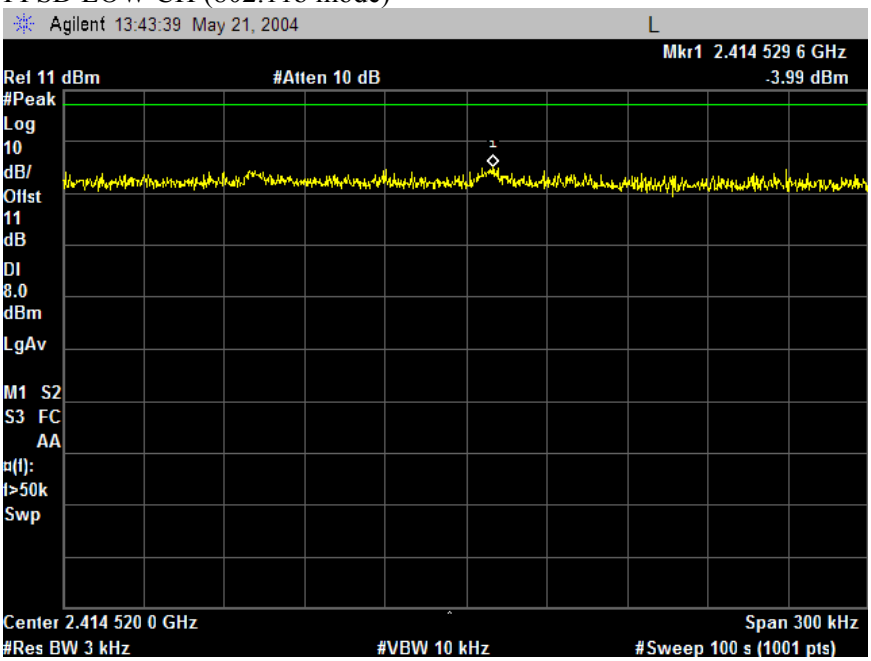
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-3.99	8	-11.99
Middle	2437	-4.25	8	-12.25
High	2462	-4.93	8	-12.93

802.11g Mode

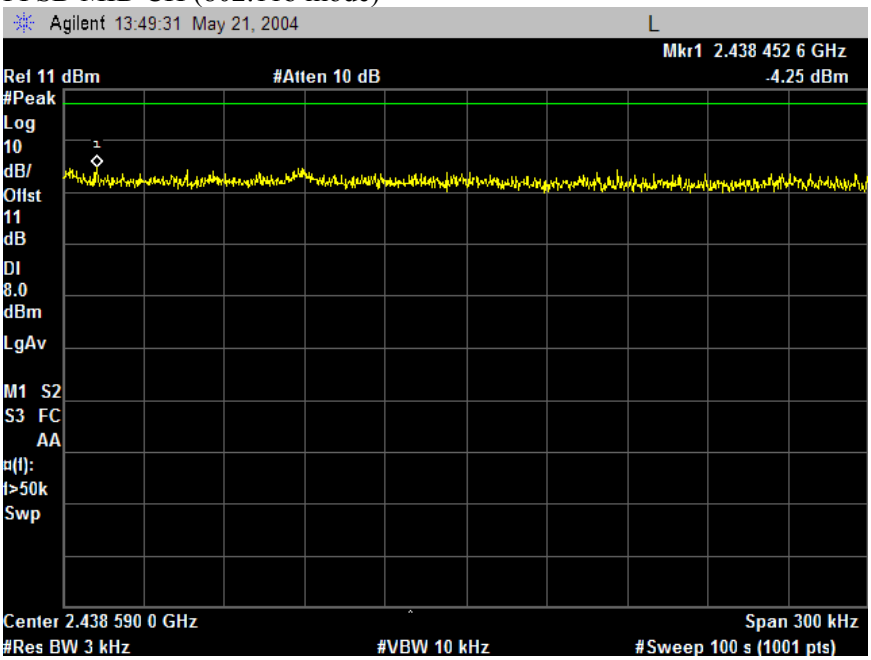
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-9.67	8	-17.67
Middle	2437	-9.51	8	-17.51
High	2462	-9.79	8	-17.79

PEAK POWER SPECTRAL DENSITY (802.11b MODE)

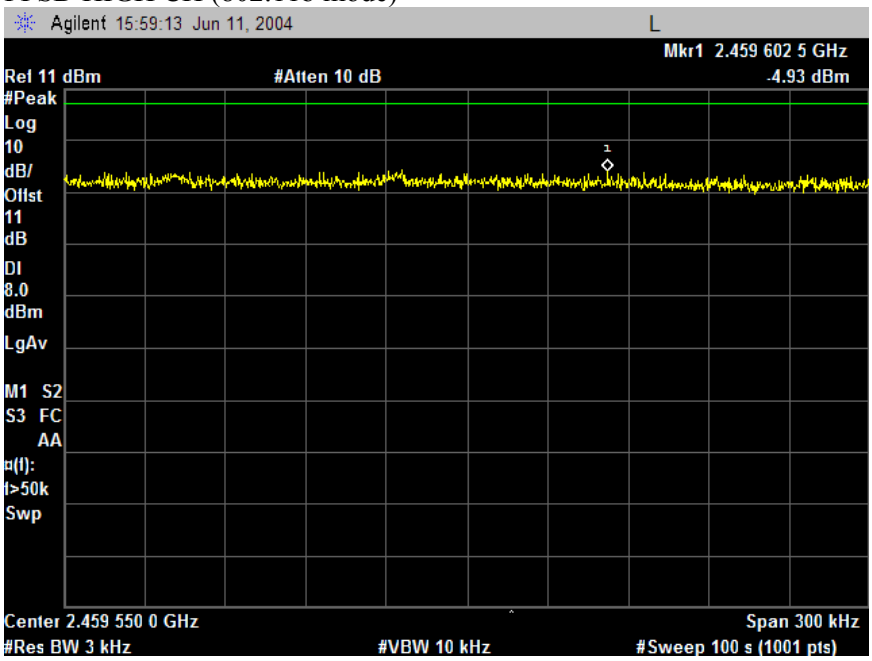
PPSD LOW CH (802.11b mode)



PPSD MID CH (802.11b mode)

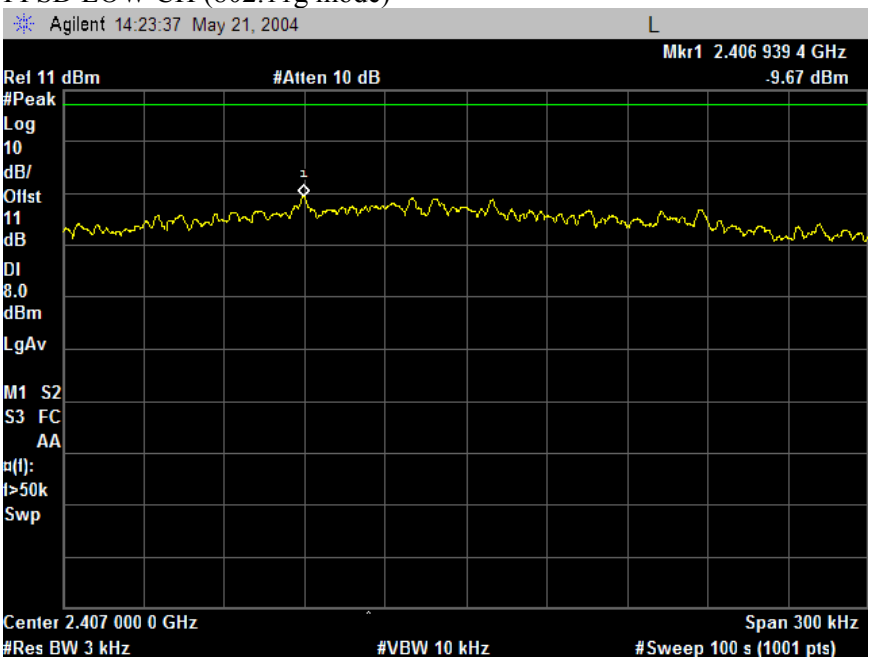


PPSD HIGH CH (802.11b mode)

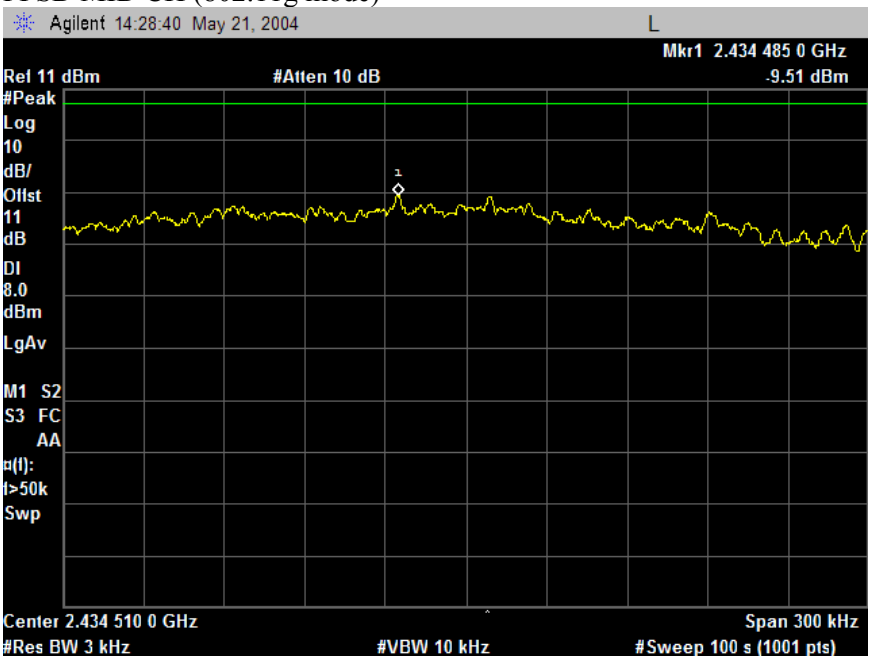


PEAK POWER SPECTRAL DENSITY (802.11g MODE)

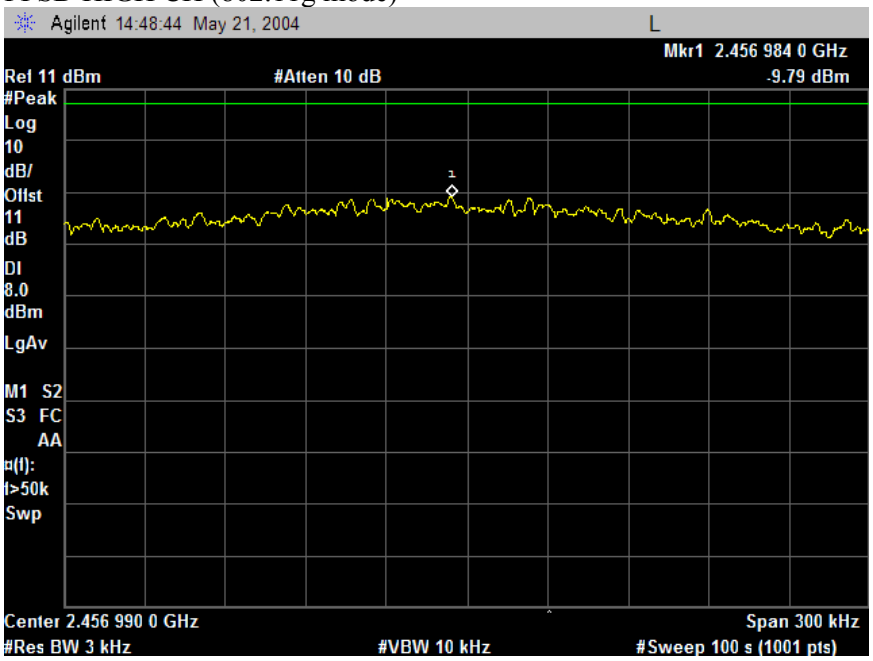
PPSD LOW CH (802.11g mode)



PPSD MID CH (802.11g mode)



PPSD HIGH CH (802.11g mode)



8.1.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

§15.247 (c) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in§15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

TEST PROCEDURE

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

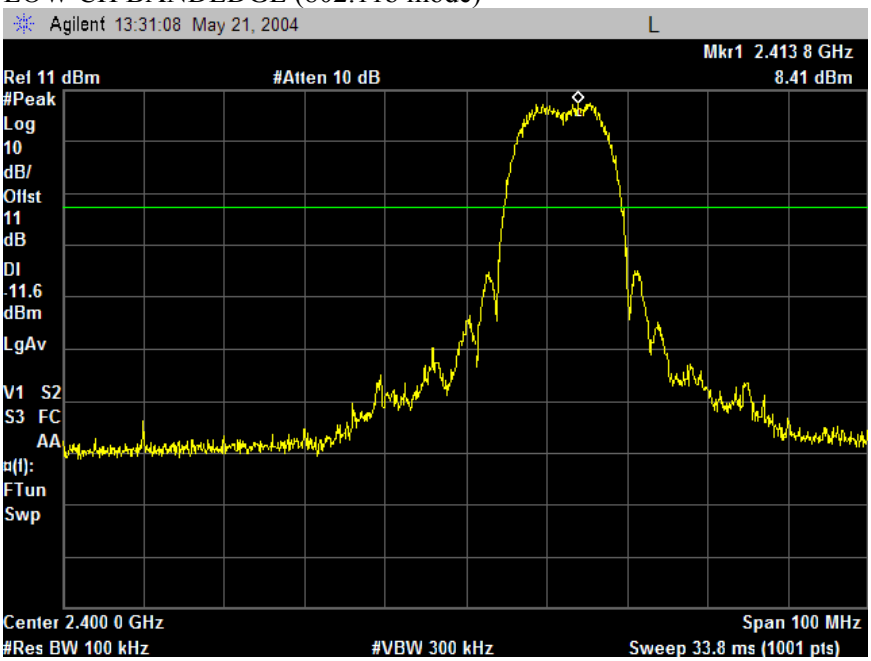
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

RESULTS

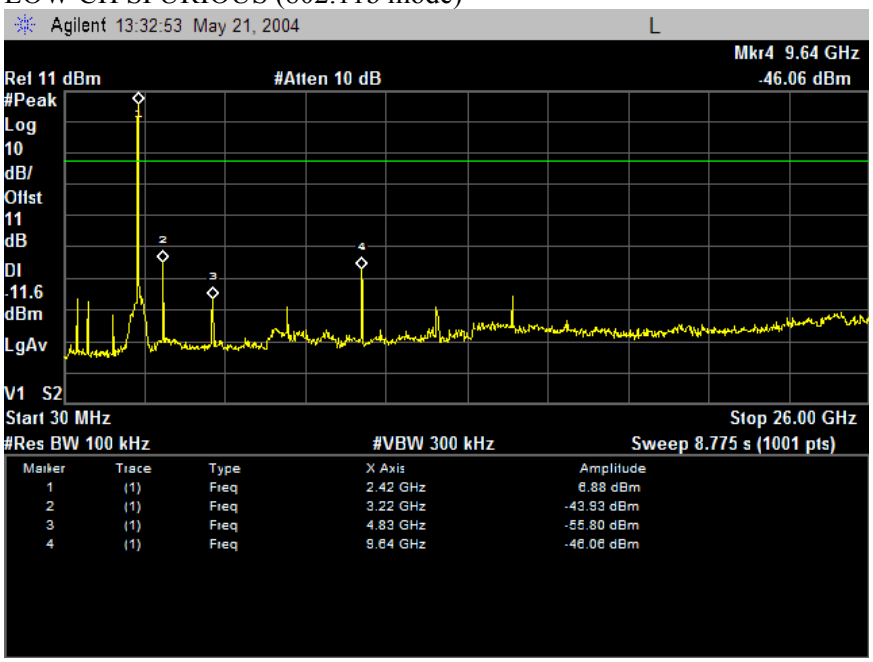
No non-compliance noted:

SPURIOUS EMISSIONS, LOW CHANNEL (802.11b MODE)

LOW CH BANDEDGE (802.11b mode)

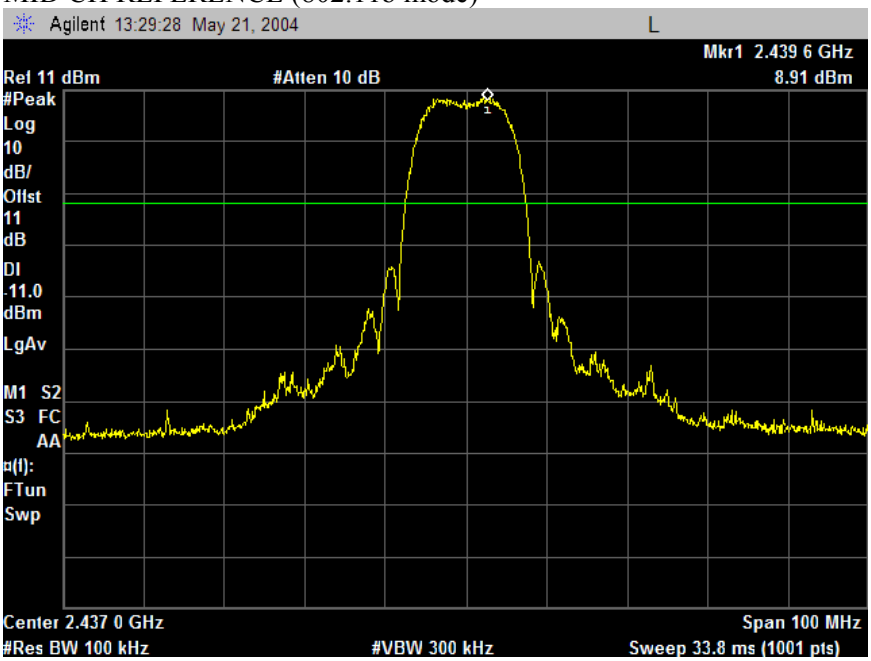


LOW CH SPURIOUS (802.11b mode)

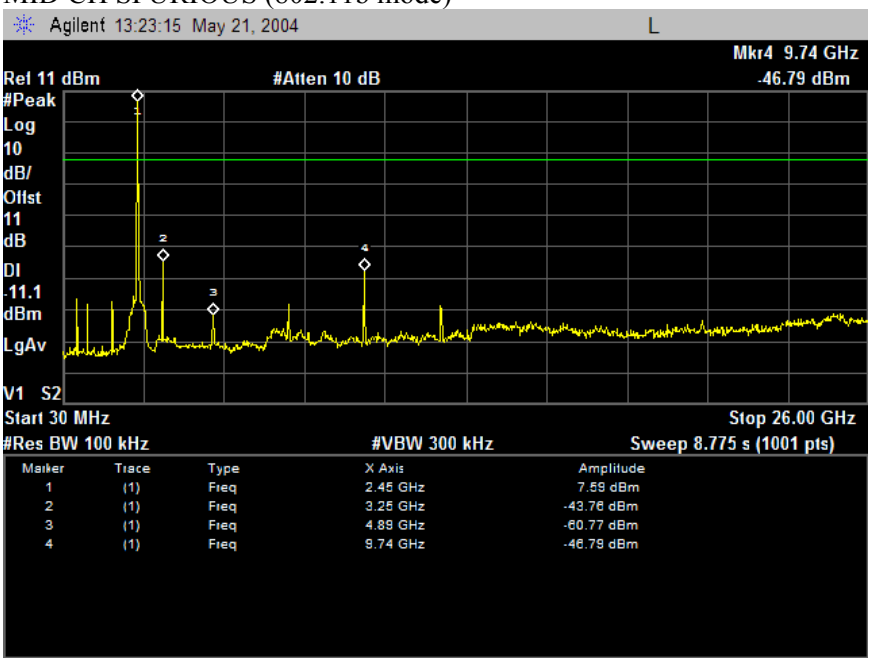


SPURIOUS EMISSIONS, MID CHANNEL (802.11b MODE)

MID CH REFERENCE (802.11b mode)

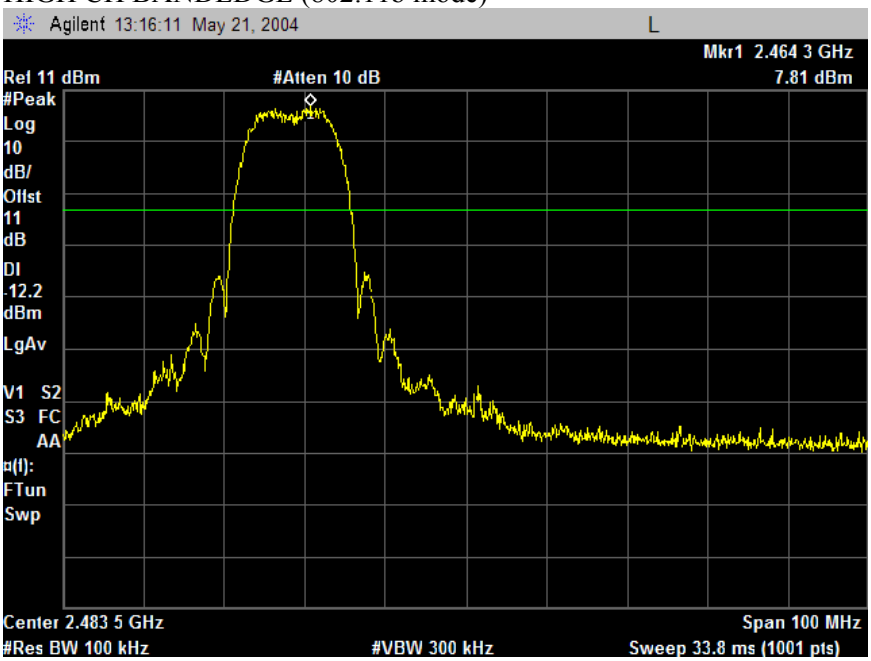


MID CH SPURIOUS (802.11b mode)

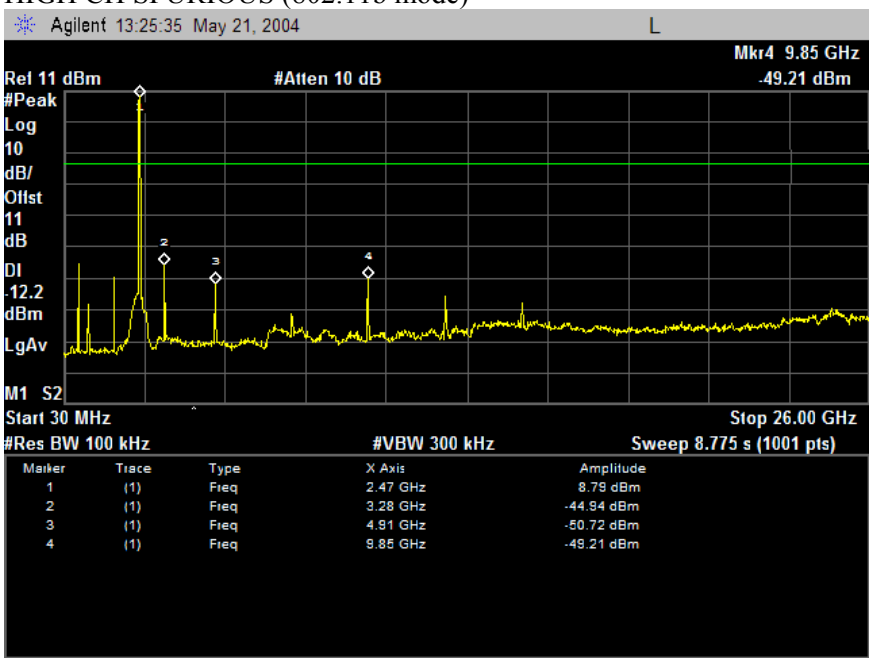


SPURIOUS EMISSIONS, HIGH CHANNEL (802.11b MODE)

HIGH CH BANDEDGE (802.11b mode)

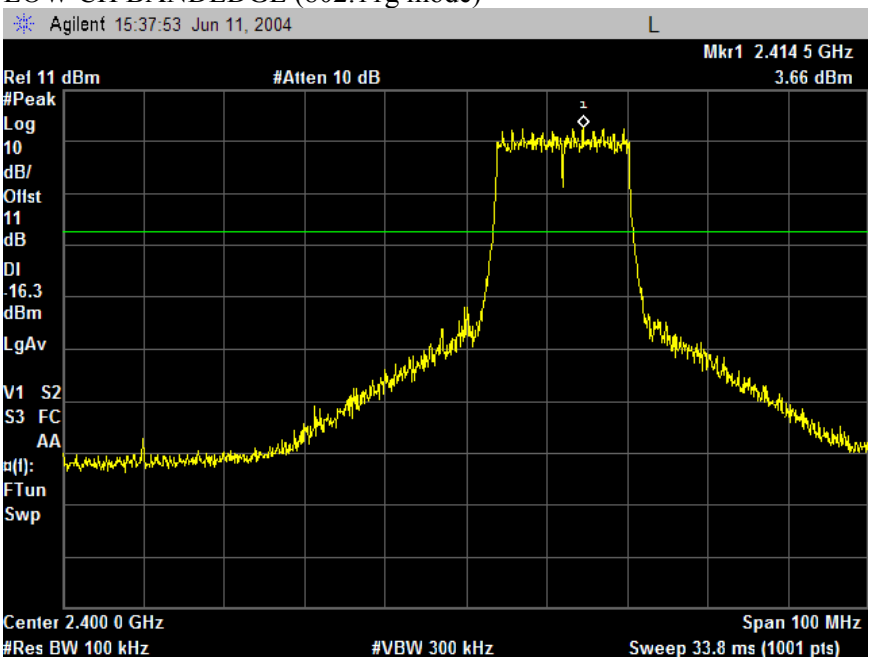


HIGH CH SPURIOUS (802.11b mode)

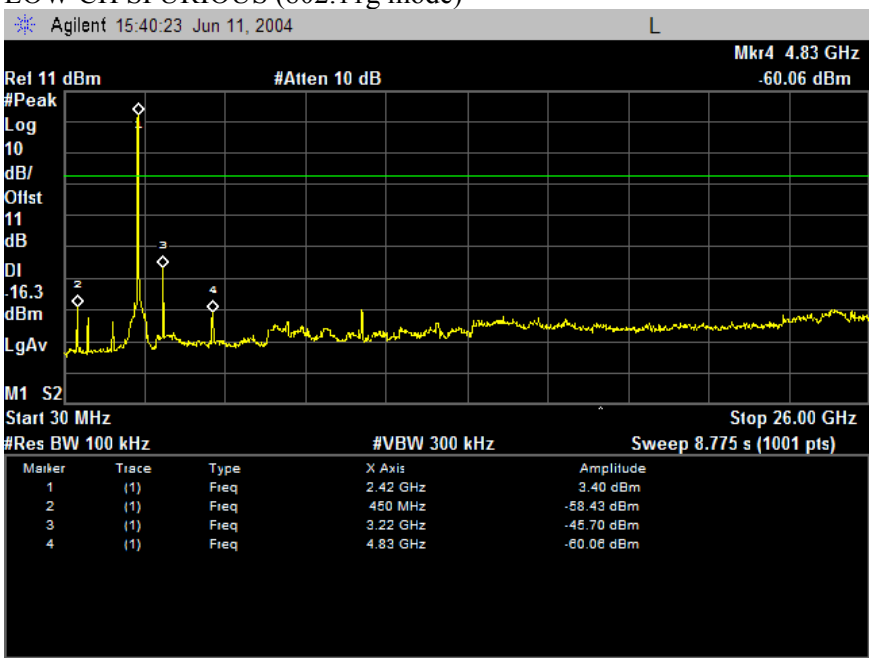


SPURIOUS EMISSIONS, LOW CHANNEL (802.11g MODE)

LOW CH BANDEDGE (802.11g mode)

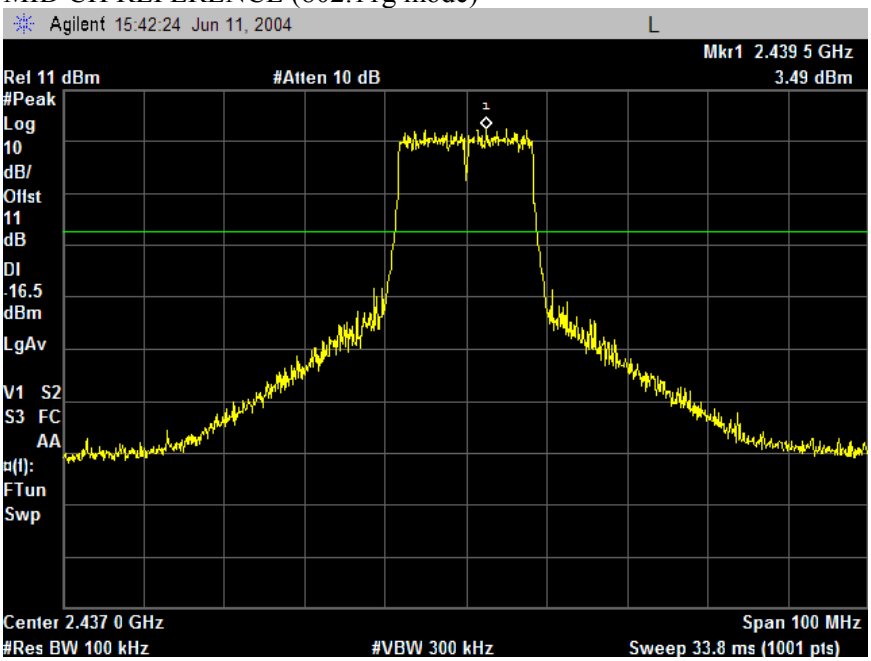


LOW CH SPURIOUS (802.11g mode)

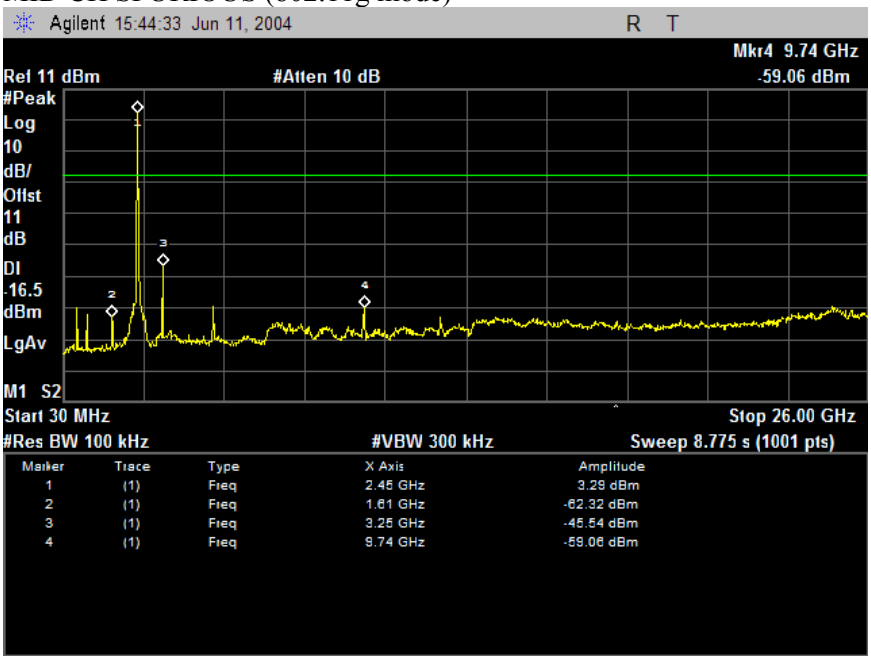


SPURIOUS EMISSIONS, MID CHANNEL (802.11g MODE)

MID CH REFERENCE (802.11g mode)

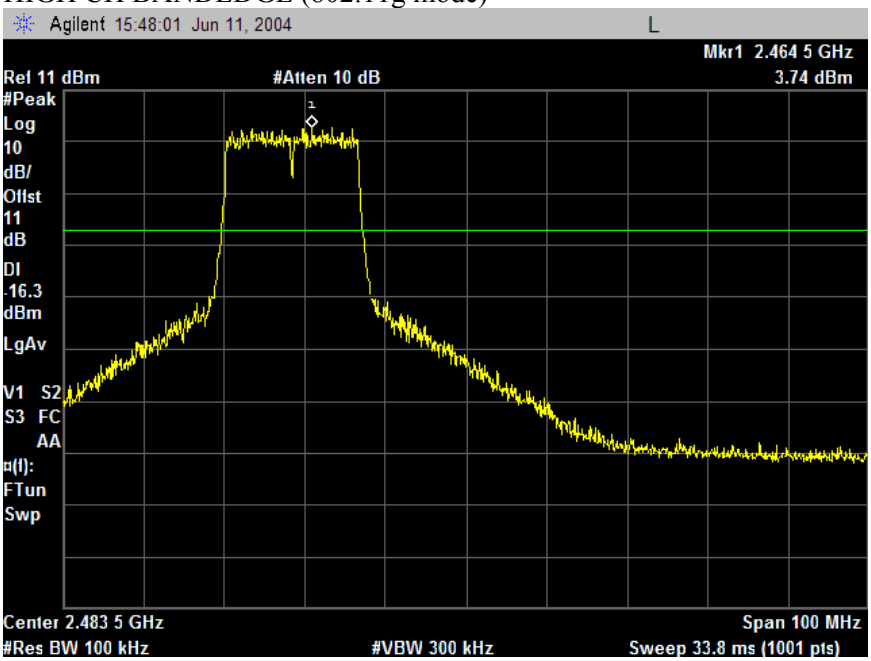


MID CH SPURIOUS (802.11g mode)

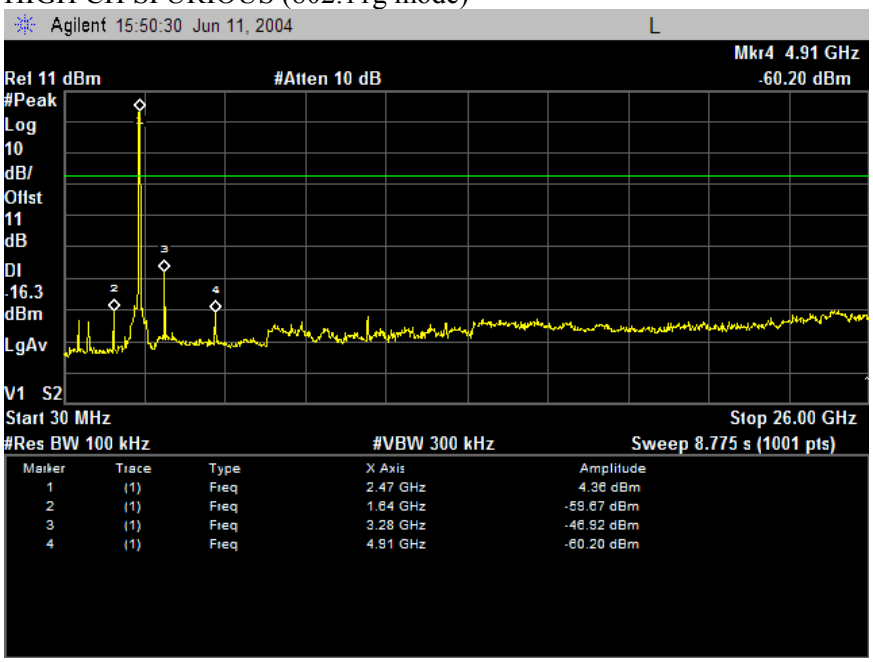


SPURIOUS EMISSIONS, HIGH CHANNEL (802.11g MODE)

HIGH CH BANDEDGE (802.11g mode)



HIGH CH SPURIOUS (802.11g mode)



8.2. RADIATED EMISSIONS

8.2.1. 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.

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

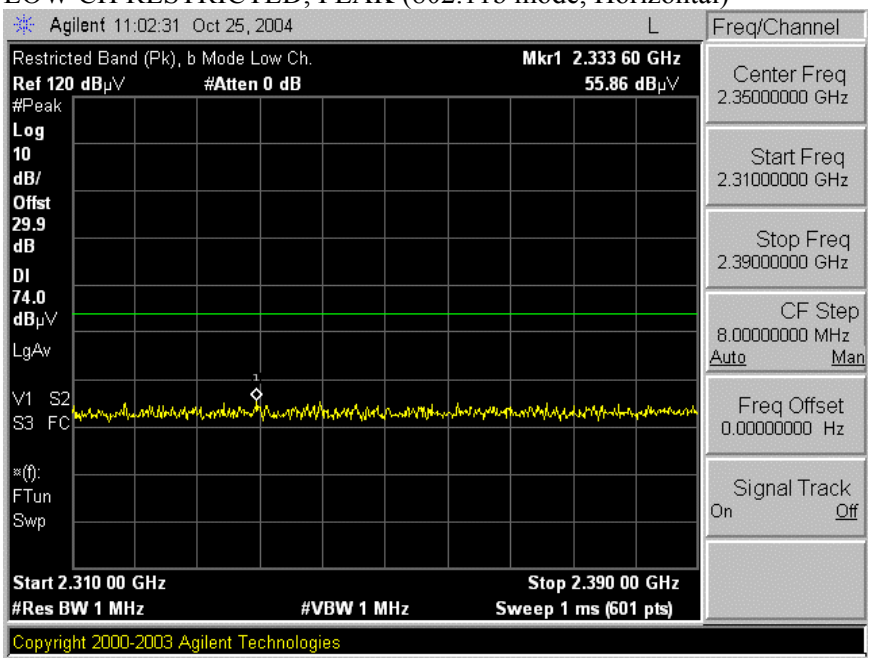
No non-compliance noted:

8.2.2. RADIATED EMISSIONS ABOVE 1 GHZ

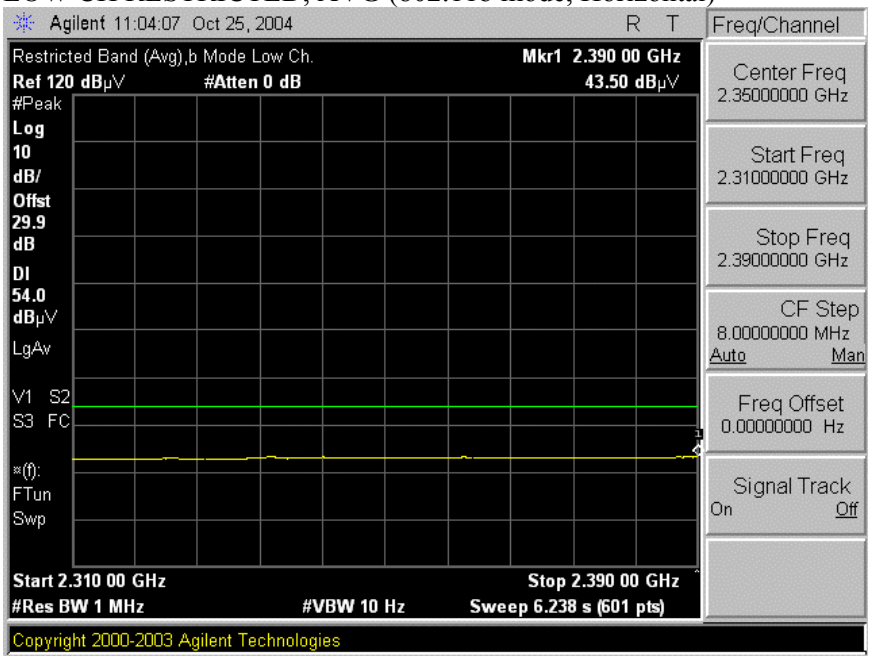
RESTRICTED BANDEDGE

b MODE, LOW CH

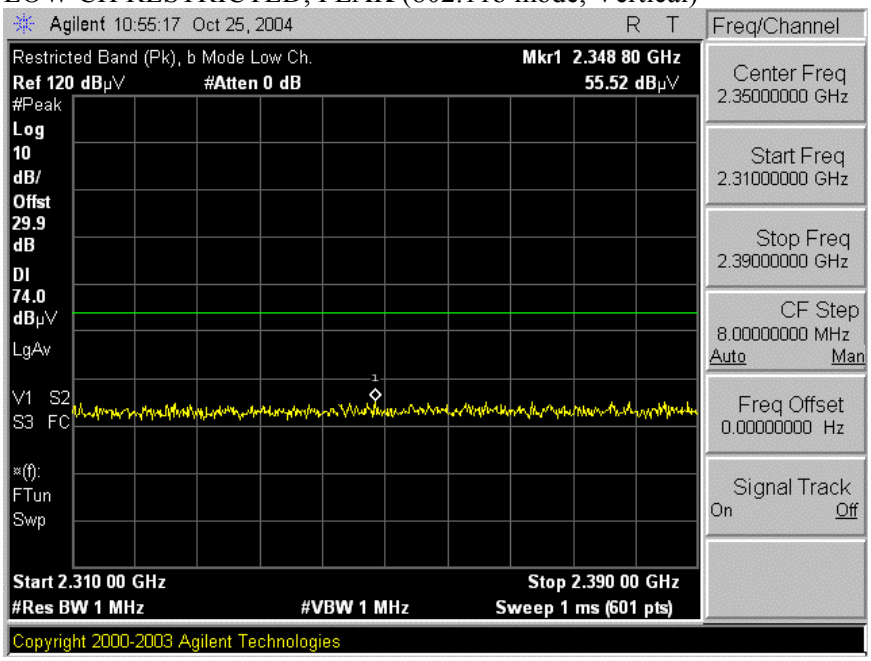
LOW CH RESTRICTED, PEAK (802.11b mode, Horizontal)



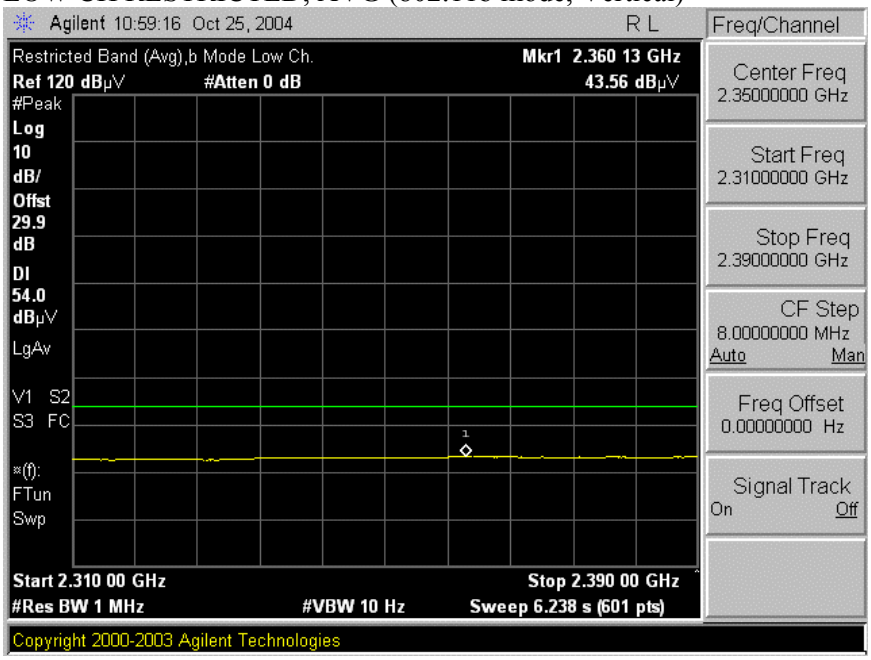
LOW CH RESTRICTED, AVG (802.11b mode, Horizontal)



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

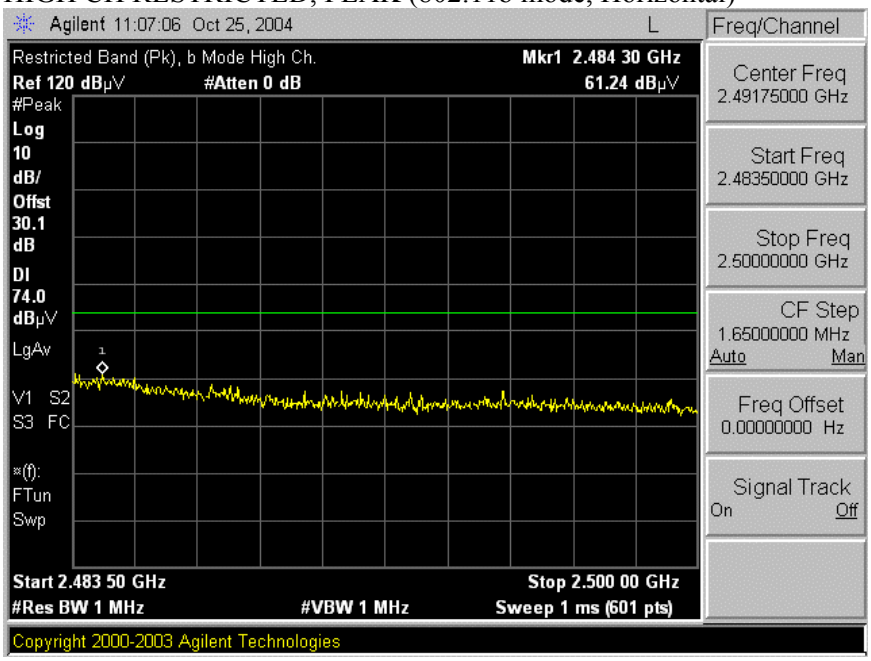


LOW CH RESTRICTED, AVG (802.11b mode, Vertical)

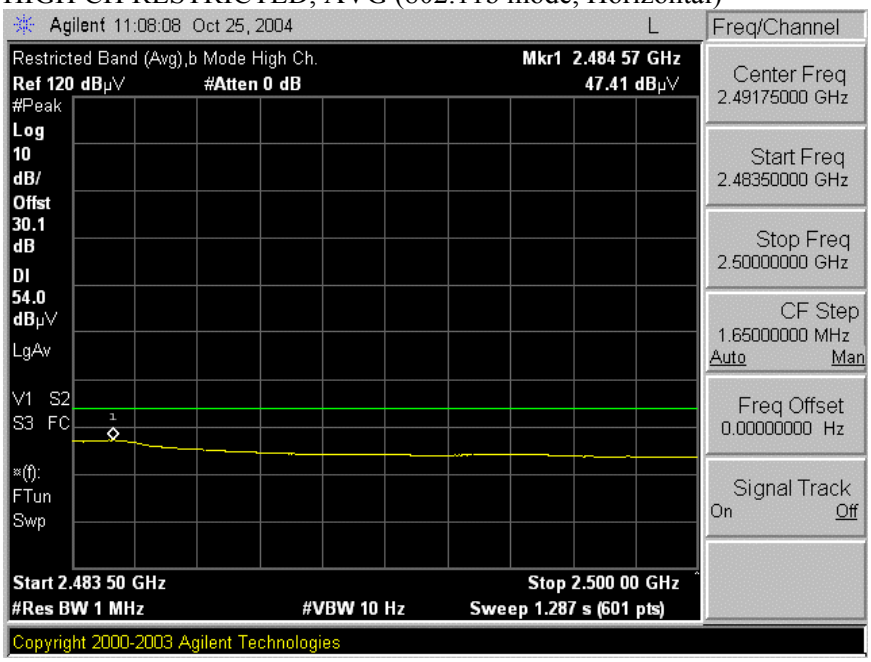


b MODE, HIGH CH

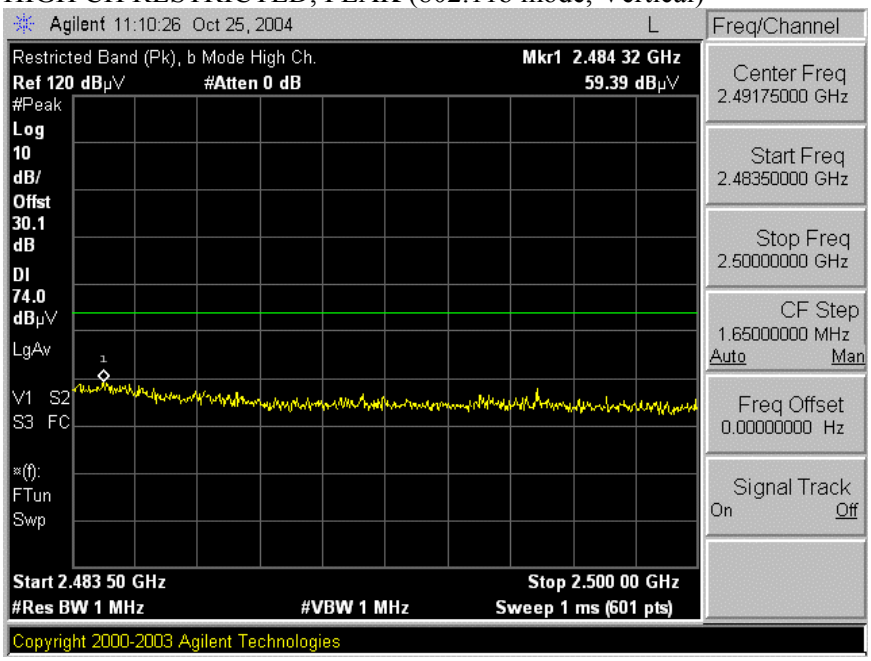
HIGH CH RESTRICTED, PEAK (802.11b mode, Horizontal)



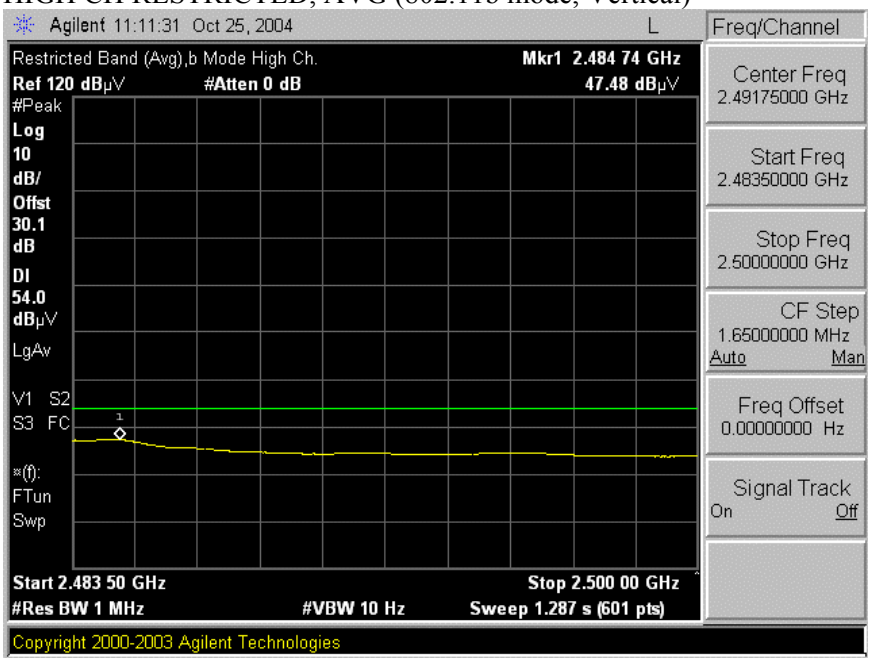
HIGH CH RESTRICTED, AVG (802.11b mode, Horizontal)



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

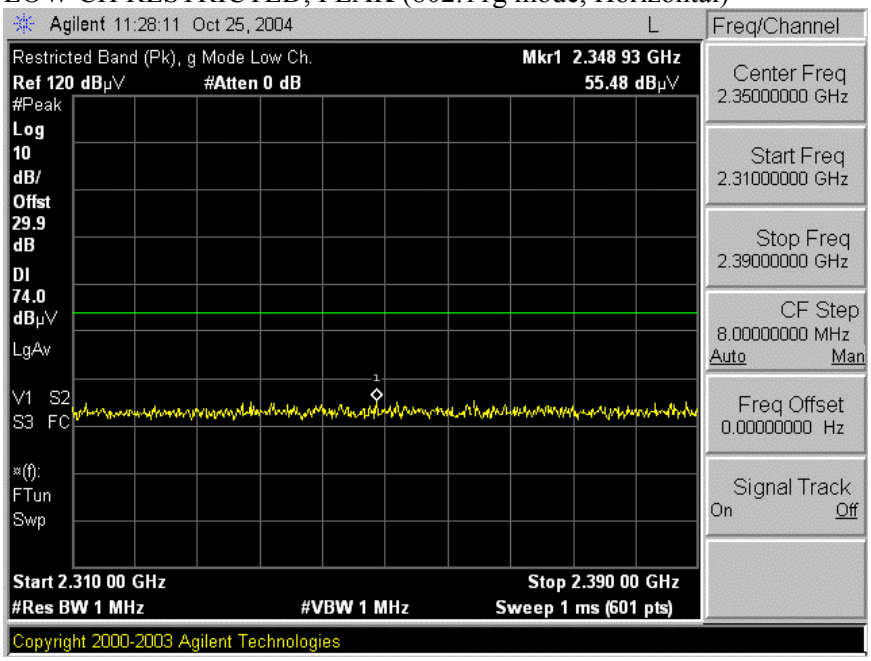


HIGH CH RESTRICTED, AVG (802.11b mode, Vertical)

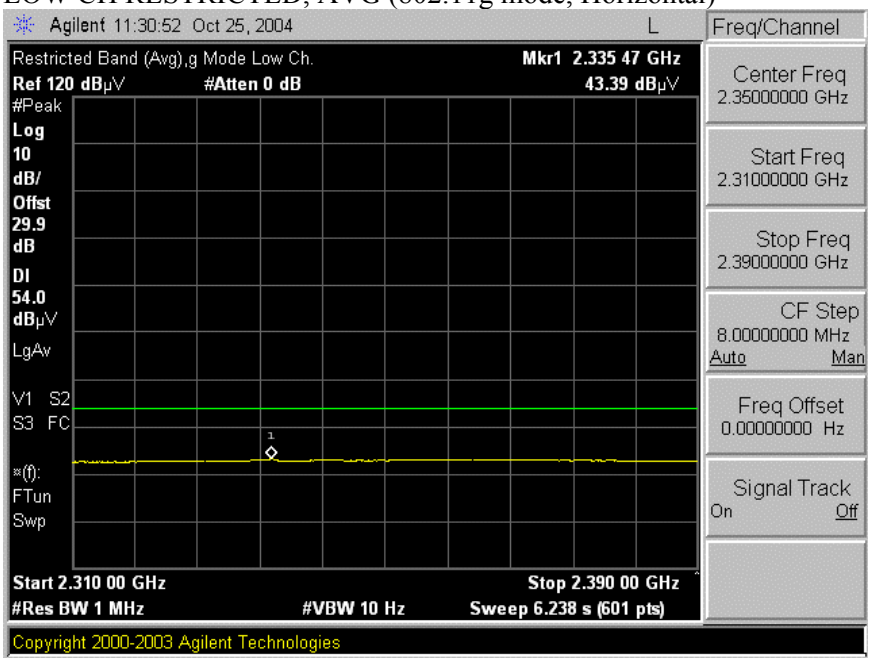


g MODE, LOW CH

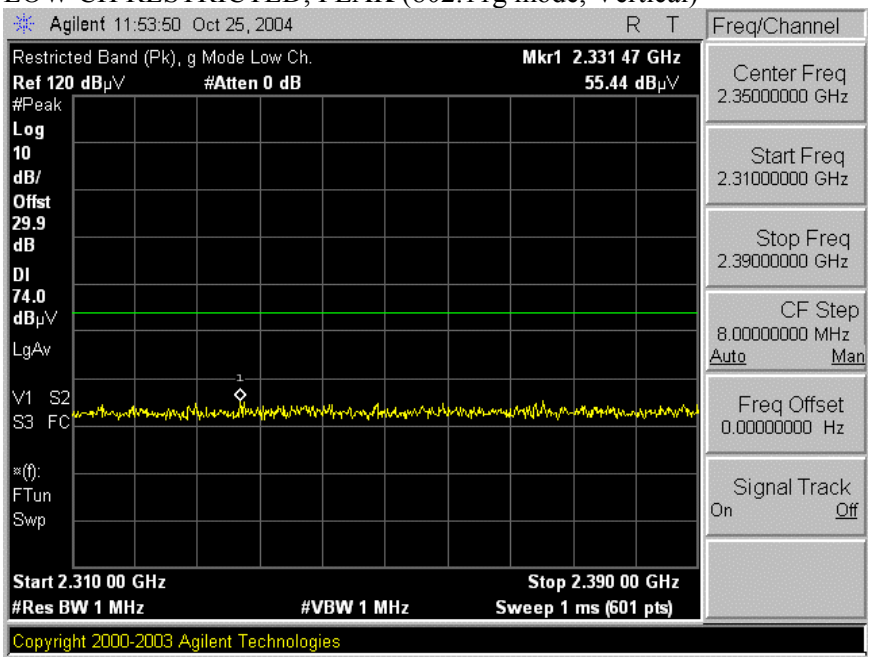
LOW CH RESTRICTED, PEAK (802.11g mode, Horizontal)



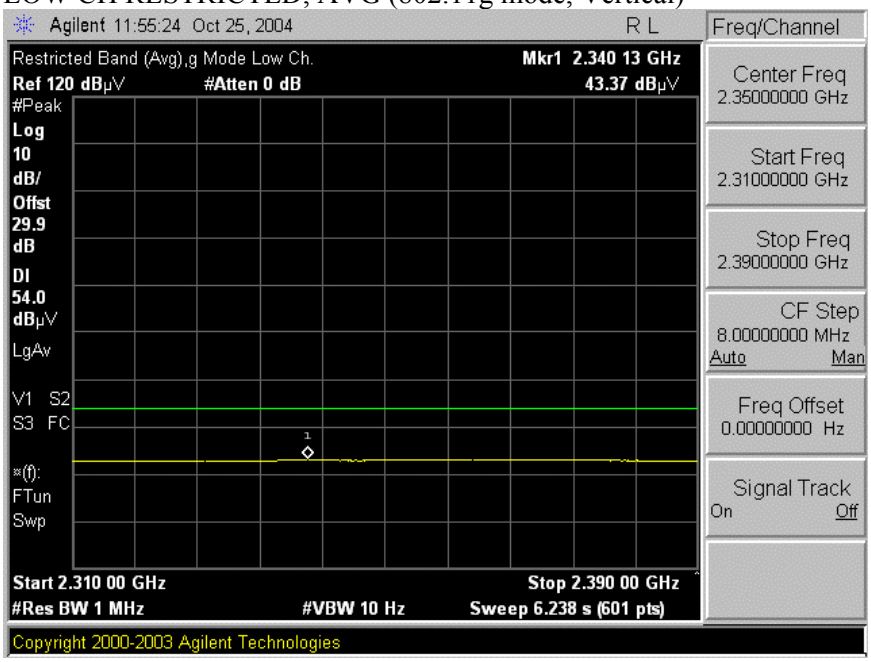
LOW CH RESTRICTED, AVG (802.11g mode, Horizontal)



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

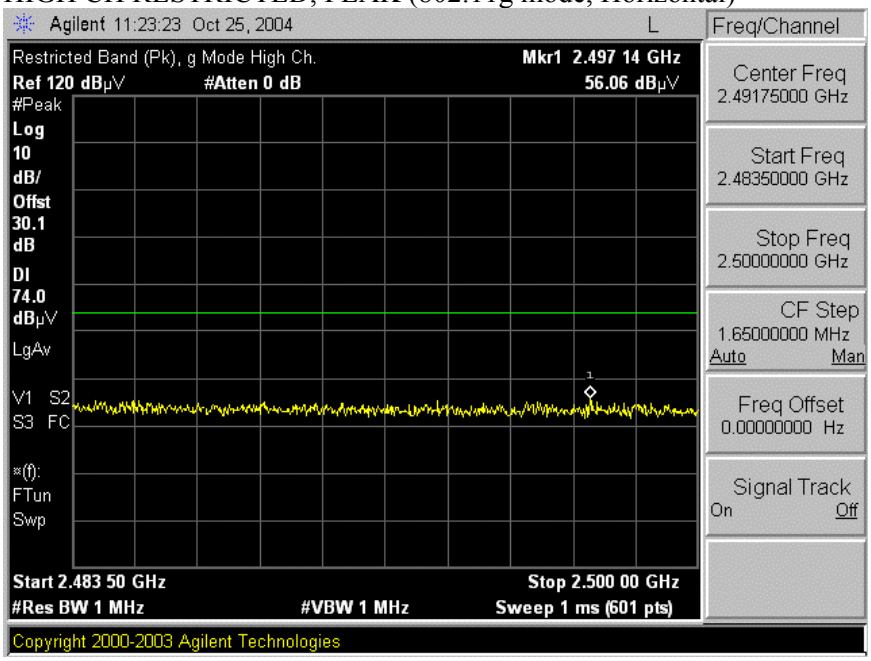


LOW CH RESTRICTED, AVG (802.11g mode, Vertical)

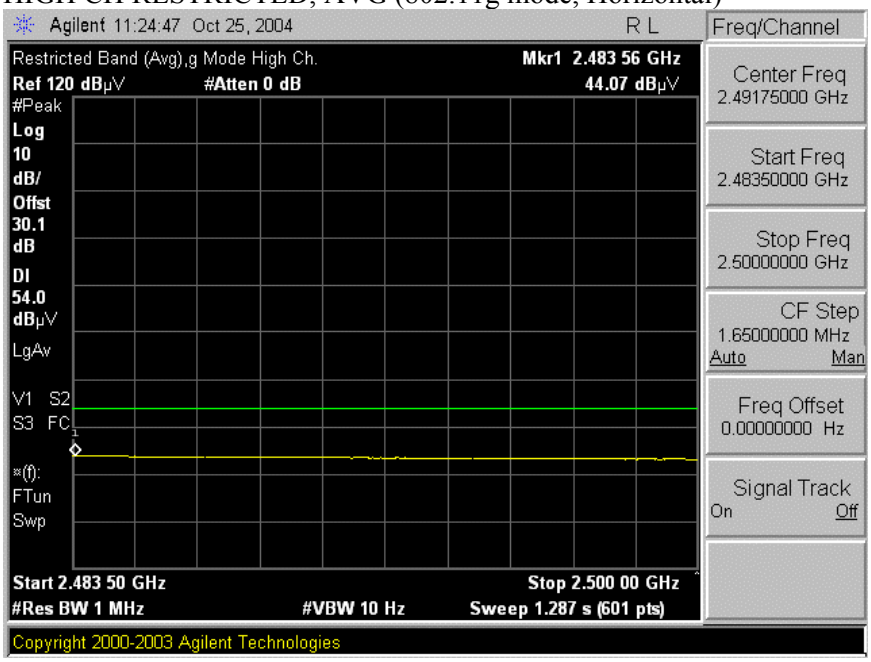


g MODE, HIGH CH

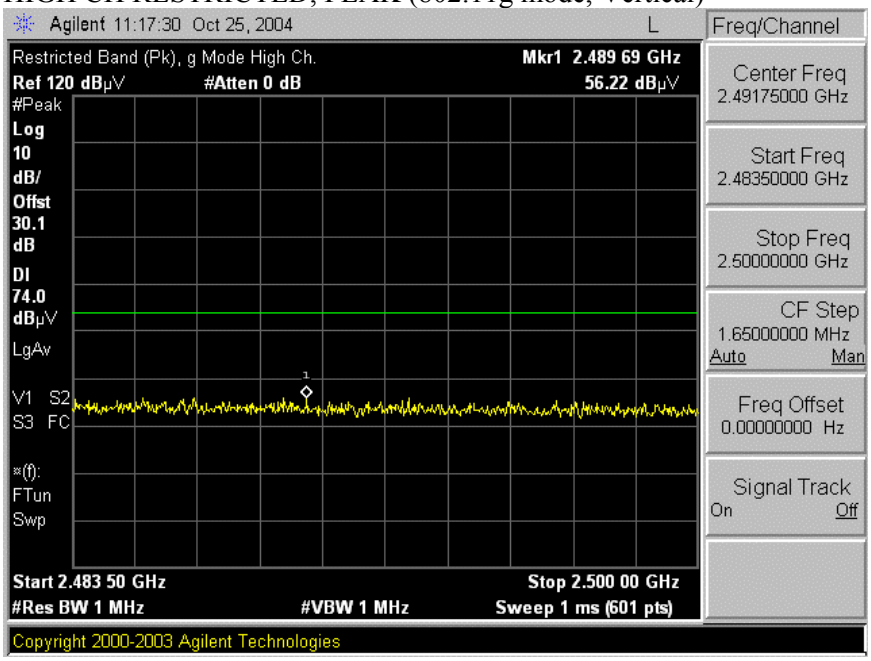
HIGH CH RESTRICTED, PEAK (802.11g mode, Horizontal)



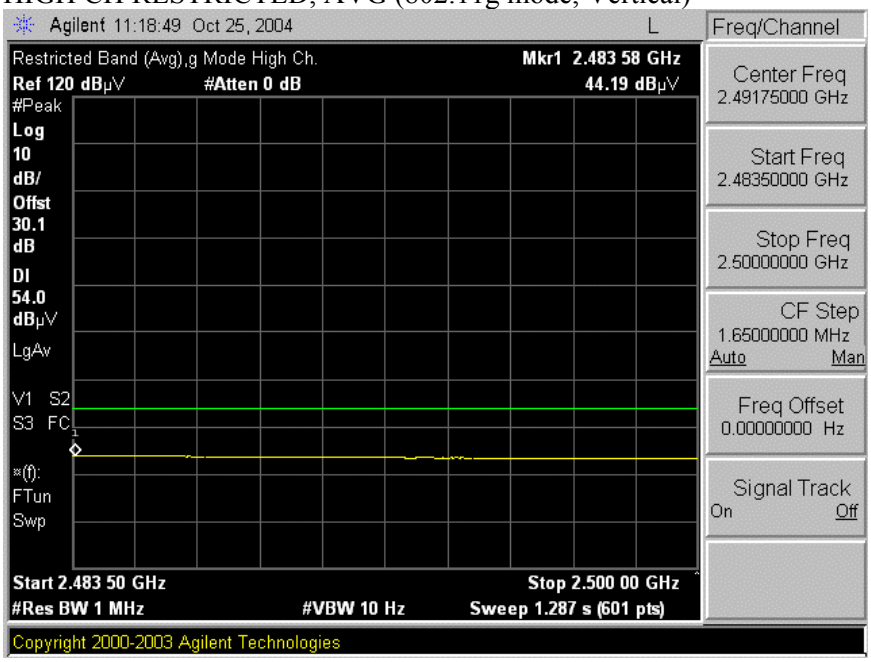
HIGH CH RESTRICTED, AVG (802.11g mode, Horizontal)



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



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



HARMONICS AND SPURIOUS EMISSIONS

b mode

10/25/04 High Frequency Measurement
Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: Thanh Nguyen
Project #: 04U3068-1
Company: Broadcom Corporation
EUT Descrip.:802.11g Mini PCI Card
EUT M/N: BCM94306MPLNA
Test Target:FCC Class B
Mode Oper: TX_b Mode

Test Equipment:

EMCO Horn 1-18GHz	Spectrum Analyzer	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz
T59; S/N: 3245 @3m	Agilent E4446A Analyzer	T63 Miteq 646456		

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

Limit: FCC 15.209

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 Low Ch. 19 dBm Setup															
1.860	9.8	54.3	46.8	27.7	1.8	-36.4	0.0	0.0	47.4	39.9	74.0	54.0	-26.6	-14.1	V
2.503	9.8	55.7	44.5	29.6	2.2	-36.1	0.0	0.0	51.4	40.2	74.0	54.0	-22.6	-13.8	V
4.824	9.8	57.7	40.9	33.1	3.1	-35.3	0.0	1.0	59.5	42.7	74.0	54.0	-14.5	-11.3	V
7.236	9.8	39.2	37.8	35.9	3.9	-34.6	0.0	1.0	45.4	43.9	74.0	54.0	-28.6	-10.1	V
9.645	9.8	49.4	33.8	37.9	4.8	-33.3	0.0	1.0	59.7	44.1	74.0	54.0	-14.3	-9.9	H
1.863	9.8	52.1	44.3	27.7	1.8	-36.4	0.0	0.0	45.2	37.4	74.0	54.0	-28.8	-16.6	H
2.503	9.8	54.8	45.1	29.6	2.2	-36.1	0.0	0.0	50.5	40.8	74.0	54.0	-23.5	-13.2	H
4.825	9.8	48.3	40.5	33.1	3.1	-35.3	0.0	1.0	50.1	42.4	74.0	54.0	-23.9	-11.6	H
7.236	9.8	46.9	36.2	35.9	3.9	-34.6	0.0	1.0	53.1	42.3	74.0	54.0	-20.9	-11.7	H
9.648	9.8	47.8	34.6	37.9	4.8	-33.3	0.0	1.0	58.1	44.9	74.0	54.0	-15.9	-9.1	H
B Mode Mid Ch. 19 dBm Setup															
1.852	9.8	49.5	33.6	27.7	1.8	-36.4	0.0	0.0	42.6	26.6	74.0	54.0	-31.4	-27.4	V
2.511	9.8	58.4	44.2	29.6	2.2	-36.1	0.0	0.0	54.1	39.9	74.0	54.0	-19.9	-14.1	V
2.658	9.8	50.5	42.4	30.0	2.3	-36.0	0.0	0.0	46.7	38.6	74.0	54.0	-27.3	-15.4	V
4.874	9.8	57.7	42.9	33.1	3.2	-35.3	0.0	1.0	59.6	44.8	74.0	54.0	-14.4	-9.2	V
7.311	9.8	47.3	33.7	36.0	4.0	-34.6	0.0	1.0	53.7	40.1	74.0	54.0	-20.3	-13.9	V
9.747	9.8	47.0	33.4	37.8	4.8	-33.4	0.0	1.0	57.2	43.6	74.0	54.0	-16.8	-10.4	V
12.185	9.8	45.2	33.0	39.4	5.5	-35.1	0.0	1.0	55.9	43.8	74.0	54.0	-18.1	-10.2	V
1.849	9.8	52.4	43.2	27.7	1.8	-36.4	0.0	0.0	45.4	36.2	74.0	54.0	-28.6	-17.8	H
2.514	9.8	58.3	44.6	29.6	2.2	-36.1	0.0	0.0	54.0	40.3	74.0	54.0	-20.0	-13.7	H
2.655	9.8	51.2	46.1	29.9	2.3	-36.0	0.0	0.0	47.4	42.3	74.0	54.0	-26.6	-11.7	H
4.873	9.8	53.5	36.7	33.1	3.2	-35.3	0.0	1.0	55.4	38.6	74.0	54.0	-18.6	-15.4	H
7.311	9.8	44.6	32.5	36.0	4.0	-34.6	0.0	1.0	51.0	38.8	74.0	54.0	-23.0	-15.2	H
9.747	9.8	46.2	36.4	37.8	4.8	-33.4	0.0	1.0	56.4	46.6	74.0	54.0	-17.6	-7.4	H
12.168	9.8	45.2	33.1	39.4	5.5	-35.1	0.0	1.0	55.9	43.8	74.0	54.0	-18.1	-10.2	H
B Mode High Ch. 19 dBm Setup															
1.845	9.8	52.4	34.1	27.7	1.8	-36.4	0.0	0.0	45.4	27.1	74.0	54.0	-28.6	-26.9	V
2.505	9.8	59.6	42.2	29.6	2.2	-36.1	0.0	0.0	55.3	37.9	74.0	54.0	-18.7	-16.1	V
4.924	9.8	55.6	42.3	33.1	3.2	-35.3	0.0	1.0	57.6	44.3	74.0	54.0	-16.4	-9.7	V
7.386	9.8	44.7	32.5	36.1	4.0	-34.5	0.0	1.0	51.2	39.0	74.0	54.0	-22.8	-15.0	V
9.848	9.8	42.3	30.7	37.7	4.8	-33.4	0.0	1.0	52.5	40.9	74.0	54.0	-21.5	-13.1	V
1.847	9.8	53.4	33.2	27.7	1.8	-36.4	0.0	0.0	46.4	26.2	74.0	54.0	-27.6	-27.8	H
2.508	9.8	58.7	34.2	29.6	2.2	-36.1	0.0	0.0	54.4	29.9	74.0	54.0	-19.6	-24.1	H
4.924	9.8	55.6	42.5	33.1	3.2	-35.3	0.0	1.0	57.6	44.5	74.0	54.0	-16.4	-9.5	H
7.386	9.8	44.0	32.5	36.1	4.0	-34.5	0.0	1.0	50.5	39.1	74.0	54.0	-23.5	-14.9	H
9.848	9.8	40.4	31.5	37.7	4.8	-33.4	0.0	1.0	50.6	41.7	74.0	54.0	-23.4	-12.3	H
No other emissions were detected above noise floor up to 26GHz															

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		

g mode

10/25/04 **High Frequency Measurement**
Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: Thanh Nguyen
Project #: 04U3068-1
Company: Broadcom Corporation
EUT Descrip.: 802.11g Mini PCI Card
EUT M/N: BCM94306MPLNA
Test Target: FCC B
Mode Oper: Tx_g Mode.

Test Equipment:

EMCO Horn 1-18GHz	Spectrum Analyzer	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz
T59; S/N: 3245 @3m	Agilent E4446A Analyzer	T63 Miteq 646456		

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

Limit: FCC 15.209

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
g Mode Low Ch.															
1.860	9.8	54.3	46.8	27.7	1.8	-36.4	0.0	0.0	47.4	39.9	74.0	54.0	-26.6	-14.1	V
2.503	9.8	55.7	44.5	29.6	2.2	-36.1	0.0	0.0	51.4	40.2	74.0	54.0	-22.6	-13.8	V
4.824	9.8	47.0	34.1	33.1	3.1	-35.3	0.0	1.0	48.9	36.0	74.0	54.0	-25.1	-18.0	V
7.236	9.8	47.7	34.1	35.9	3.9	-34.6	0.0	1.0	53.9	40.2	74.0	54.0	-20.1	-13.8	V
1.863	9.8	52.1	44.3	27.7	1.8	-36.4	0.0	0.0	45.2	37.4	74.0	54.0	-28.8	-16.6	H
2.503	9.8	54.8	45.1	29.6	2.2	-36.1	0.0	0.0	50.5	40.8	74.0	54.0	-23.5	-13.2	H
4.824	9.8	47.1	34.2	33.1	3.1	-35.3	0.0	1.0	49.0	36.0	74.0	54.0	-25.0	-18.0	H
g Mode Mid Ch.															
1.852	9.8	49.5	33.6	27.7	1.8	-36.4	0.0	0.0	42.6	26.6	74.0	54.0	-31.4	-27.4	V
2.511	9.8	58.4	44.2	29.6	2.2	-36.1	0.0	0.0	54.1	39.9	74.0	54.0	-19.9	-14.1	V
2.658	9.8	50.5	42.4	30.0	2.3	-36.0	0.0	0.0	46.7	38.6	74.0	54.0	-27.3	-15.4	V
4.874	9.8	51.2	45.2	33.1	3.2	-35.3	0.0	1.0	53.1	47.1	74.0	54.0	-20.9	-6.9	V
1.849	9.8	52.4	43.2	27.7	1.8	-36.4	0.0	0.0	45.4	36.2	74.0	54.0	-28.6	-17.8	H
2.514	9.8	58.3	44.6	29.6	2.2	-36.1	0.0	0.0	54.0	40.3	74.0	54.0	-20.0	-13.7	H
2.655	9.8	51.2	46.1	29.9	2.3	-36.0	0.0	0.0	47.4	42.3	74.0	54.0	-26.6	-11.7	H
4.874	9.8	48.7	36.5	33.1	3.2	-35.3	0.0	1.0	50.6	38.4	74.0	54.0	-23.4	-15.6	H
g Mode High Ch.															
1.845	9.8	52.4	34.1	27.7	1.8	-36.4	0.0	0.0	45.4	27.1	74.0	54.0	-28.6	-26.9	V
2.505	9.8	59.6	42.2	29.6	2.2	-36.1	0.0	0.0	55.3	37.9	74.0	54.0	-18.7	-16.1	V
4.924	9.8	46.7	33.3	33.1	3.2	-35.3	0.0	1.0	48.7	35.3	74.0	54.0	-25.3	-18.7	V
7.350	9.8	46.9	35.5	36.0	4.0	-34.5	0.0	1.0	53.3	41.9	74.0	54.0	-20.7	-12.1	V
1.847	9.8	53.4	33.2	27.7	1.8	-36.4	0.0	0.0	46.4	26.2	74.0	54.0	-27.6	-27.8	H
2.508	9.8	58.7	34.2	29.6	2.2	-36.1	0.0	0.0	54.4	29.9	74.0	54.0	-19.6	-24.1	H
4.920	9.8	45.0	32.8	33.1	3.2	-35.3	0.0	1.0	47.0	34.8	74.0	54.0	-27.0	-19.2	H
No other emissions were detected above system noise floor up 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		

8.2.3. RADIATED EMISSIONS BELOW 1 GHz

Worst case channel data was tested and documented here in this section which was determined by the following method:

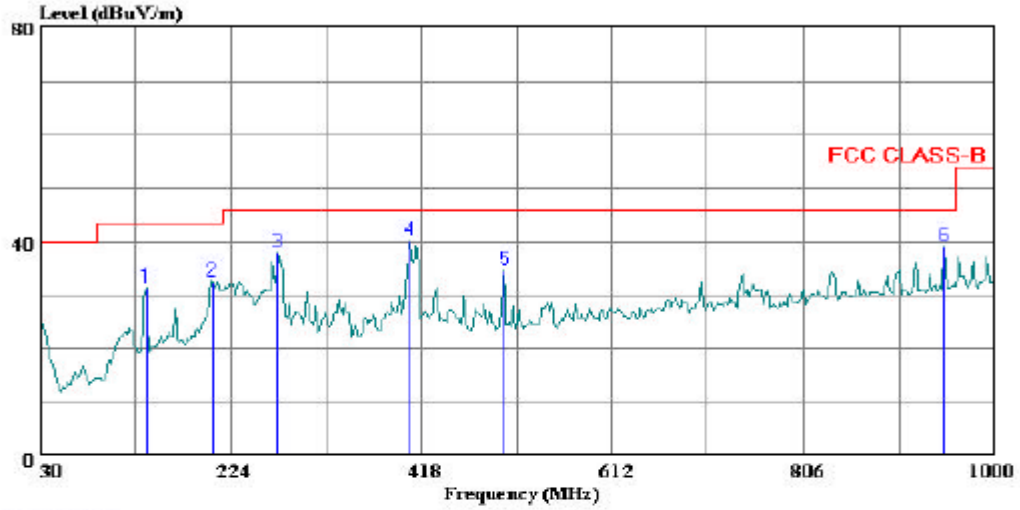
1. Scan on one channel, and mark the worst spot.
2. Stick on this spot, maximize it, then switch between the channels and determine the worst channel which is the channel that gives the highest reading)

b Mode –Worst Case Channel

HORIZONTAL

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

Data#: 12 File#: 3068 broadcom.EMI Date: 11-16-2004 Time: 16:10:55



(Audix ATC)
Trace: 11 Ref Trace:

Condition: FCC CLASS-B HORIZONTAL
Test Operator: : Chin Pang
Project #: : 04U3068-4
Company: : Broadcom Corporation
EUT: : 802.11g Mini PCI Card
Model No: : BCM94306MPLNA
Configuration: : EUT/HP Laptop
Target of Test: : FCC Class B
Mode of Operation: TX (Worst Case , Low Ch)
: b mode

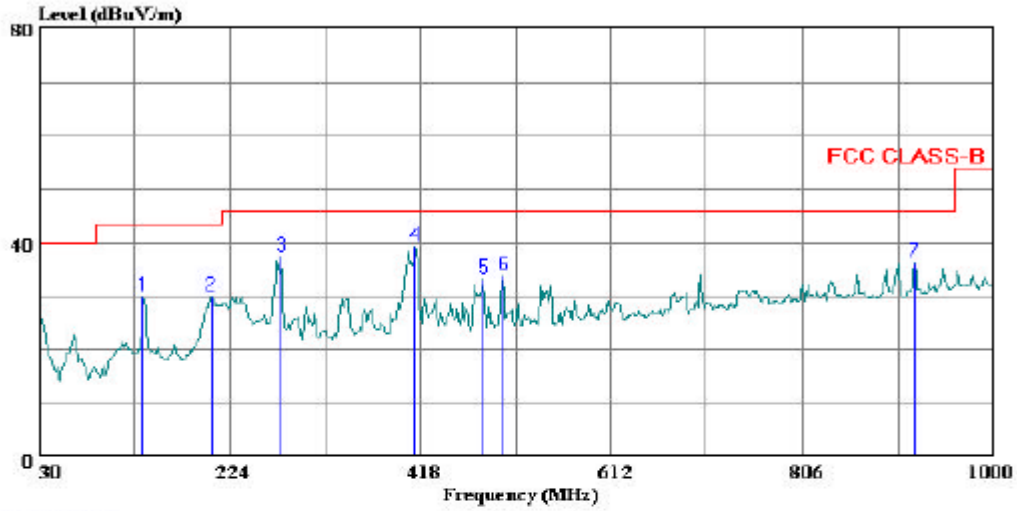
Page: 1

	Freq	Remark	Read Level	Factor	Level	Limit Line	Over Limit
	MHz		dBuV	dB	dBuV/m	dBuV/m	dB
1	138.640	Peak	42.63	-11.46	31.17	43.50	-12.33
2	205.570	Peak	45.22	-12.69	32.53	43.50	-10.97
3	271.530	Peak	48.82	-11.00	37.82	46.00	-8.18
4	405.390	Peak	48.79	-8.64	40.15	46.00	-5.85
5	502.390	Peak	41.58	-6.85	34.73	46.00	-11.27
6	948.590	Peak	38.86	0.05	38.91	46.00	-7.09

VERTICAL

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

Data#: 14 File#: 3068 broadcom.EMI Date: 11-16-2004 Time: 16:16:05



(Audix ATC)

Trace: 13 Ref Trace:

Condition: FCC CLASS-B VERTICAL
Test Operator: : Chin Pang
Project #: : 04U3068-4
Company: : Broadcom Corporation
EUT: : 802.11g Mini PCI Card
Model No: : BCM94306MPLNA
Configuration: : EUT/HP Laptop
Target of Test: : FCC Class B
Mode of Operation: TX (Worst Case , Low Ch)
: b mode

Page: 1

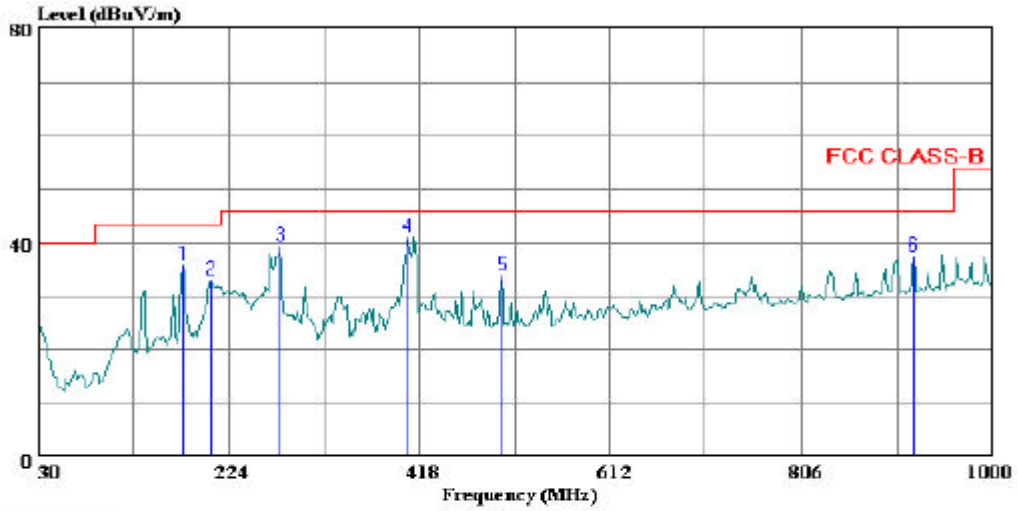
	Freq	Remark	Read Level	Factor	Level	Limit Line	Over Limit
	MHz		dBuV	dB	dBuV/m	dBuV/m	dB
1	135.730	Peak	41.30	-11.38	29.92	43.50	-13.58
2	205.570	Peak	42.54	-12.69	29.86	43.50	-13.65
3	276.380	Peak	48.20	-10.83	37.38	46.00	-8.63
4	412.180	Peak	47.71	-8.52	39.19	46.00	-6.81
5	482.990	Peak	40.46	-7.14	33.32	46.00	-12.68
6	502.390	Peak	40.57	-6.85	33.72	46.00	-12.28
7	919.490	Peak	36.53	-0.30	36.23	46.00	-9.77

g Mode –Worst Case Channel

HORIZONTAL

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

Data#: 10 File#: 3068 broadcom.EMI Date: 11-16-2004 Time: 16:01:38



(Audix ATC)

Trace: 9 Ref Trace:

Condition: FCC CLASS-B HORIZONTAL
Test Operator: : Chin Pang
Project #: : 04U3068-4
Company: : Broadcom Corporation
EUT: : 802.11g Mini PCI Card
Model No: : BCM94306MPLNA
Configuration: : EUT/HP Laptop
Target of Test: : FCC Class B
Mode of Operation: g mode, TX (Worst Case , Mid Ch)

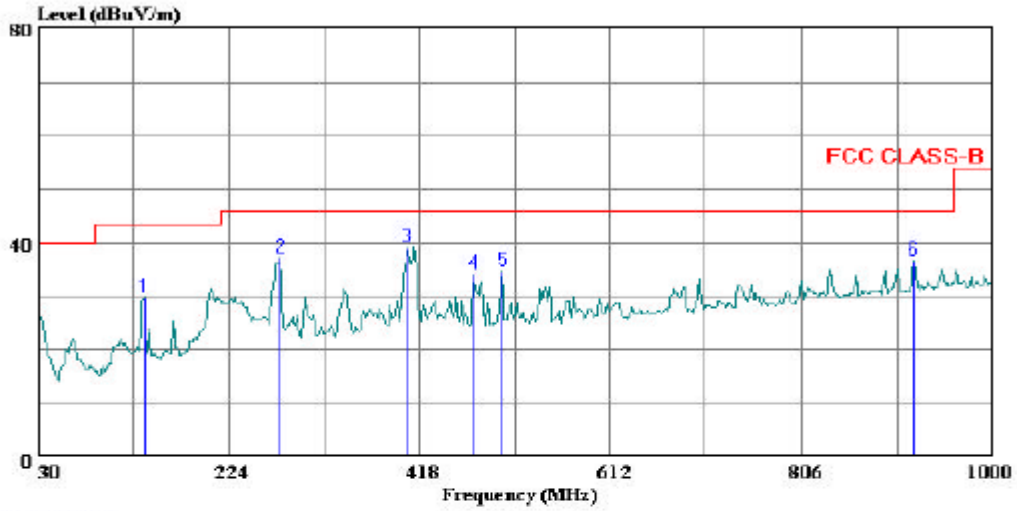
Page: 1

	Freq	Remark	Read Level	Factor	Level	Limit Line	Over Limit
	MHz		dBuV	dB	dBuV/m	dBuV/m	dB
1	177.440	Peak	49.34	-13.58	35.76	43.50	-7.74
2	206.540	Peak	45.94	-12.87	33.07	43.50	-10.43
3	276.380	Peak	50.25	-10.83	39.43	46.00	-6.58
4	405.390	Peak	49.63	-8.64	40.99	46.00	-5.01
5	502.390	Peak	40.69	-6.85	33.84	46.00	-12.16
6	919.490	Peak	37.72	-0.30	37.43	46.00	-8.58

VERTICAL

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

Data#: 8 File#: 3068 broadcom.EMI Date: 11-16-2004 Time: 15:55:20



(Audix ATC)
Trace: 7 Ref Trace:

Condition: FCC CLASS-B VERTICAL
Test Operator: : Chin Pang
Project #: : 04U3068-4
Company: : Broadcom Corporation
EUT: : 802.11g Mini PCI Card
Model No: : BCM94306MPLNA
Configuration: : EUT/HP Laptop
Target of Test: : FCC Class B
Mode of Operation: g mode, TX (Worst Case , Mid Ch)

Page: 1

	Freq	Remark	Read Level	Factor	Level	Limit Line	Over Limit
	MHz		dBuV	dB	dBuV/m	dBuV/m	dB
1	138.640	Peak	41.01	-11.46	29.55	43.50	-13.95
2	276.380	Peak	48.00	-10.83	37.18	46.00	-8.83
3	405.390	Peak	47.75	-8.64	39.11	46.00	-6.89
4	473.290	Peak	41.49	-7.38	34.11	46.00	-11.89
5	502.390	Peak	41.46	-6.85	34.61	46.00	-11.39
6	919.490	Peak	36.72	-0.30	36.43	46.00	-9.58

8.3. 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.

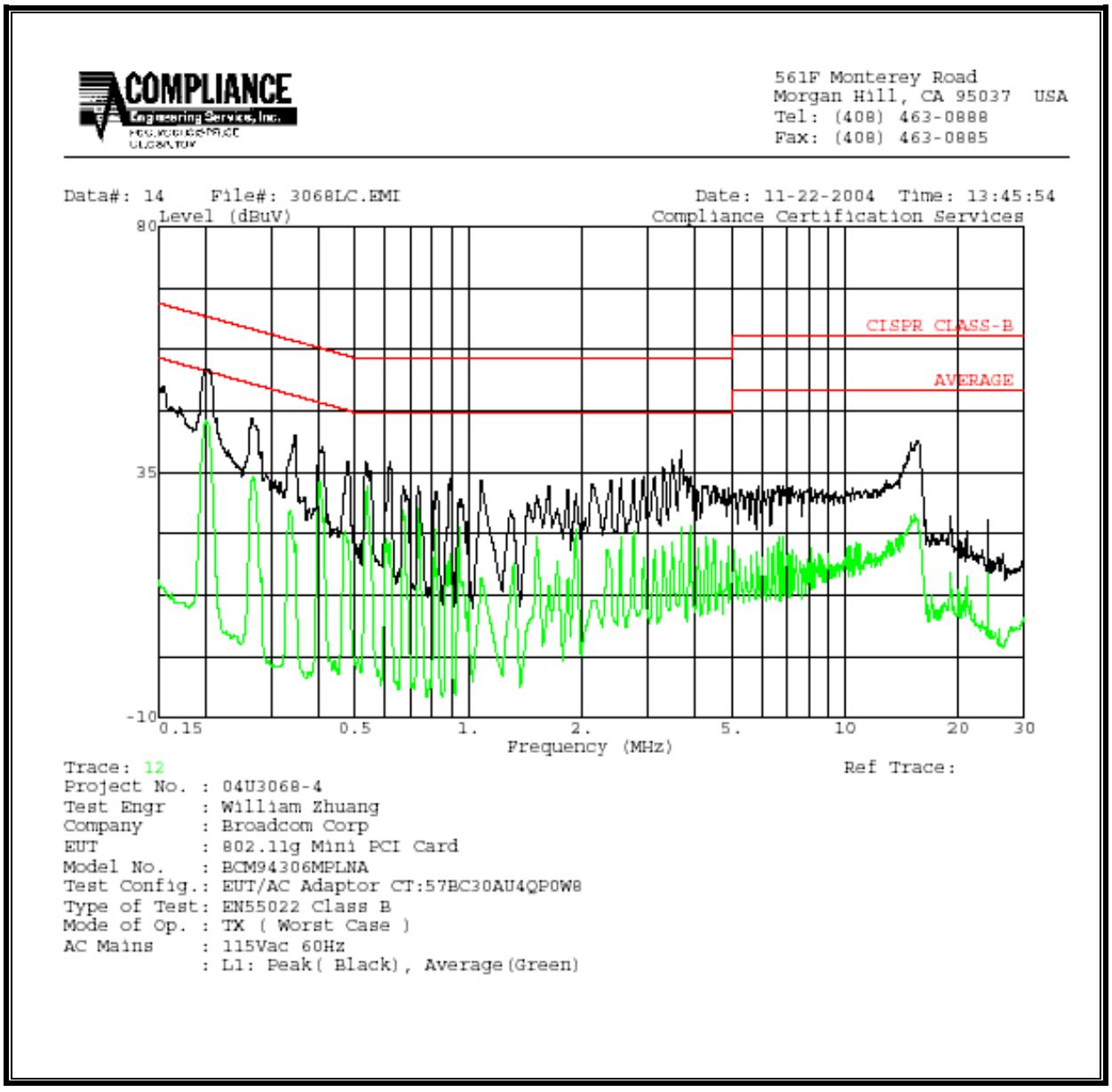
RESULTS

No non-compliance noted:

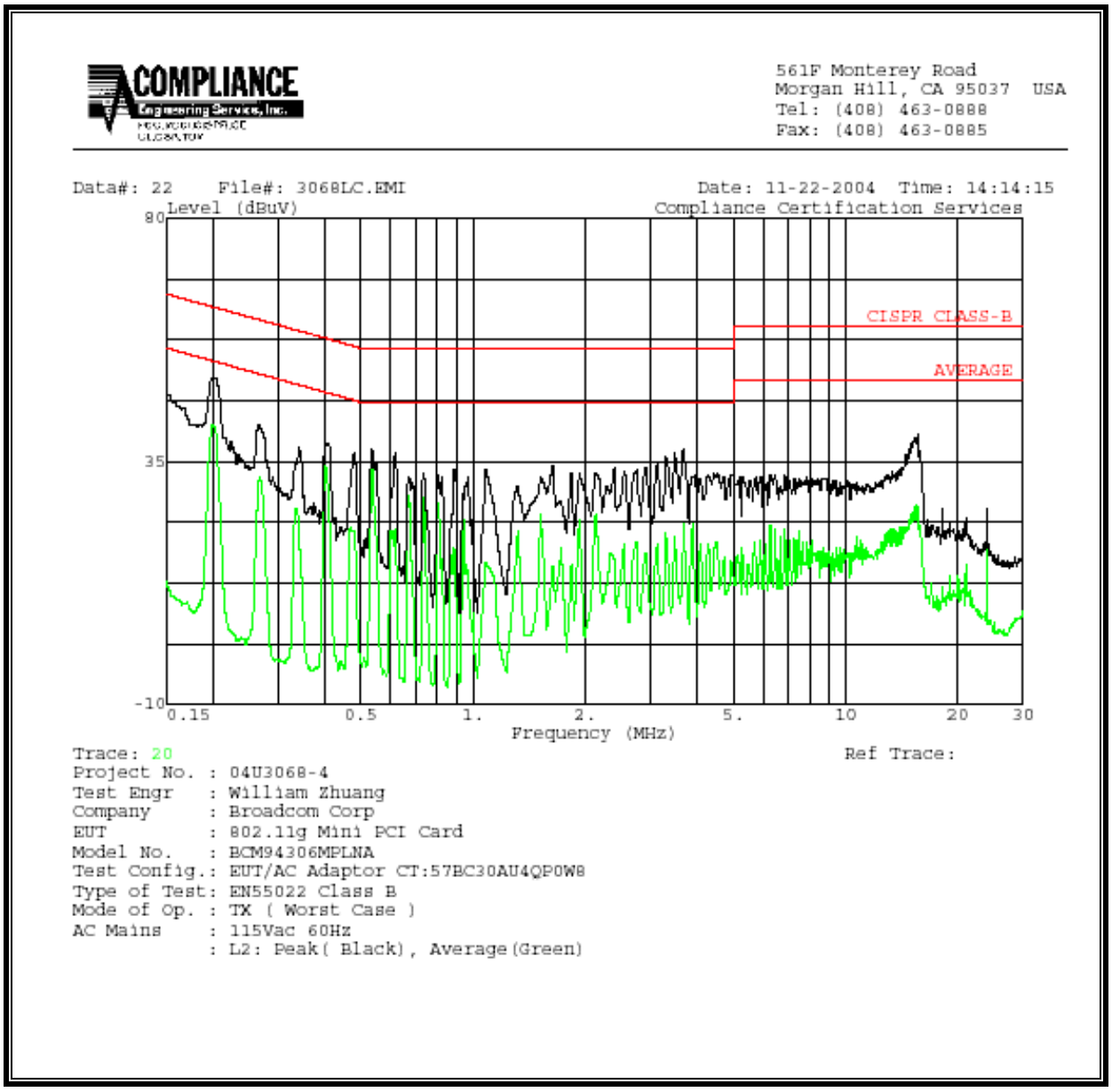
6 WORST EMISSIONS

CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	FCC_B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.20	53.78	--	43.68	0.00	63.45	53.45	-9.67	-9.77	L1
0.15	50.80	--	15.18	0.00	66.00	56.00	-15.20	-40.82	L1
0.27	44.80	--	33.56	0.00	61.24	51.24	-16.44	-17.68	L1
0.20	50.52	--	40.32	0.00	63.45	53.45	-12.93	-13.13	L2
0.15	47.78	--	12.70	0.00	66.00	56.00	-18.22	-43.30	L2
0.27	41.90	--	31.41	0.00	61.24	51.24	-19.34	-19.83	L2
6 Worst Data									

LINE 1 RESULT



LINE 2 RESULT



9. SETUP PHOTOS

RADIATED RF MEASUREMENT SETUP

RADIATED FRONT PHOTO

RADIATED BACK PHOTO

POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP

LINE CONDUCTED FRONT PHOTO

LINE CONDUCTED BACK PHOTO

END OF REPORT