FCC CFR47 PART 15 SUBPART C
CERTIFICATION
TEST REPORT

FOR

802.11 b WLAN MINI PCI CARD

MODEL NUMBER: BCM94301MPL

BRAND NAME: BROADCOM

FCC ID: QDS-BRCM1002-H

REPORT NUMBER: 03U2139-1

ISSUE DATE: JULY 25, 2003

Prepared for
BROADCOM CORPORATION
190 MATHILDA PLACE
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USA

Prepared by
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1. TEST RESULT CERTIFICATION

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

EUT DESCRIPTION: **802.11 B WLAN MINI PCI CARD**

MODEL: **BCM94301MPL**

DATE TESTED: **JUL 22, 2003**

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.

Approved & Released For CCS By:

THU CHAN
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

Tested By:

CHIN PANG
EMC TECHNICIAN
COMPLIANCE CERTIFICATION SERVICES

2. FCC CLASS II PERMISIVE CHANGE

The EUT is an 802.11b WLAN Mini PCI Card operating in the 2400 – 2483.5 MHz band with a peak output power of 19.36 dBm (86.3 mW) has a peak antenna gain of –0.65dBi. The EUT is tested with a new host computer is a HP model CRVSA-02T1-90.

3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4/1992, FCC CFR 47 Part 2 and FCC CFR 47 Part 15.

4. FACILITIES AND ACCREDITATION

4.1. FACILITIES AND EQUIPMENT

The open area test sites and conducted measurement facilities used to collect the radiated data are located at 561F Monterey Road, Morgan Hill, California, USA. The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

4.2. TABLE OF ACCREDITATIONS AND LISTINGS

Country	Agency	Scope of Accreditation	Logo
USA	FCC	3/10 meter Open Area Test Sites to perform FCC Part 15/18 measurements	1300
Japan	VCCI	CISPR 22 Two OATS and one conducted Site	R-1014, R-619, C-640
Norway	NEMKO	EN50081-1, EN50081-2, EN50082-1, EN50082-2, IEC61000-6-1, IEC61000-6-2, EN50083-2, EN50091-2, EN50130-4, EN55011, EN55013, EN55014-1, EN55104, EN55015, EN61547, EN55022, EN55024, EN61000-3-2, EN61000-3-3, EN60945, EN61326-1	ELA 117
Norway	NEMKO	EN60601-1-2 and IEC 60601-1-2, the Collateral Standards for Electro-Medical Products. MDD, 93/42/EEC, AIMD 90/385/EEC	ELA-171
Taiwan	BSMI	CNS 13438	SL2-IN-E-1012
Canada	Industry Canada	RSS210 Low Power Transmitter and Receiver	IC2324 A,B,C, and F

5. CALIBRATION AND UNCERTAINTY

5.1. MEASURING INSTRUMENT CALIBRATION

The measurement instruments utilized to perform the tests documented in this report have been calibrated in accordance with the manufacturer's recommendations, and are traceable to national standards.

5.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

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 was utilized for the tests documented in this report:

Name of Equipment	Manufacturer	Model No.	Serial No.	Due Date
SA RF Section, 1.5 GHz	HP	85680B	2732A03661	5/22/2004
SA Display Section 2	HP	85662A	2816A16696	5/22/2004
Quasi-Peak Adaptor	HP	85650A	2811A01155	5/22/2004
Preamplifier, 1300 MHz	HP	8447D	2944A06589	8/22/2003
Antenna, Bilog	Chase	CBL6112B	2586	3/6/2004
LISN, 10 kHz ~ 30 MHz	FCC	50/250-25-2	114	9/6/2003
Line Filter	Lindgren	LMF-3489	497	NCR
LISN, 10 kHz ~ 30 MHz	Solar	012-50-R-24-BN(	837990	9/6/2003
EMI Test Receiver	R & S	ESHS 20	827129/006	4/18/2004
Preamplifier, 1 ~ 26 GHz	Miteq	NSP10023988	646456	6/14/2004
Antenna, Horn 1 ~ 18 GHz	EMCO	3115	6717	2/4/2004
PSA Spectrum Analyzer	Agilent	E4446A	NA	1/13/2004

6. SETUP OF EQUIPMENT UNDER TEST

SUPPORT EQUIPMENT

Device Type	Manufacturer	Model Number	Serial Number	FCC ID
LAPTOP	HP	CRVSA-02T1-90	N/A	DOC

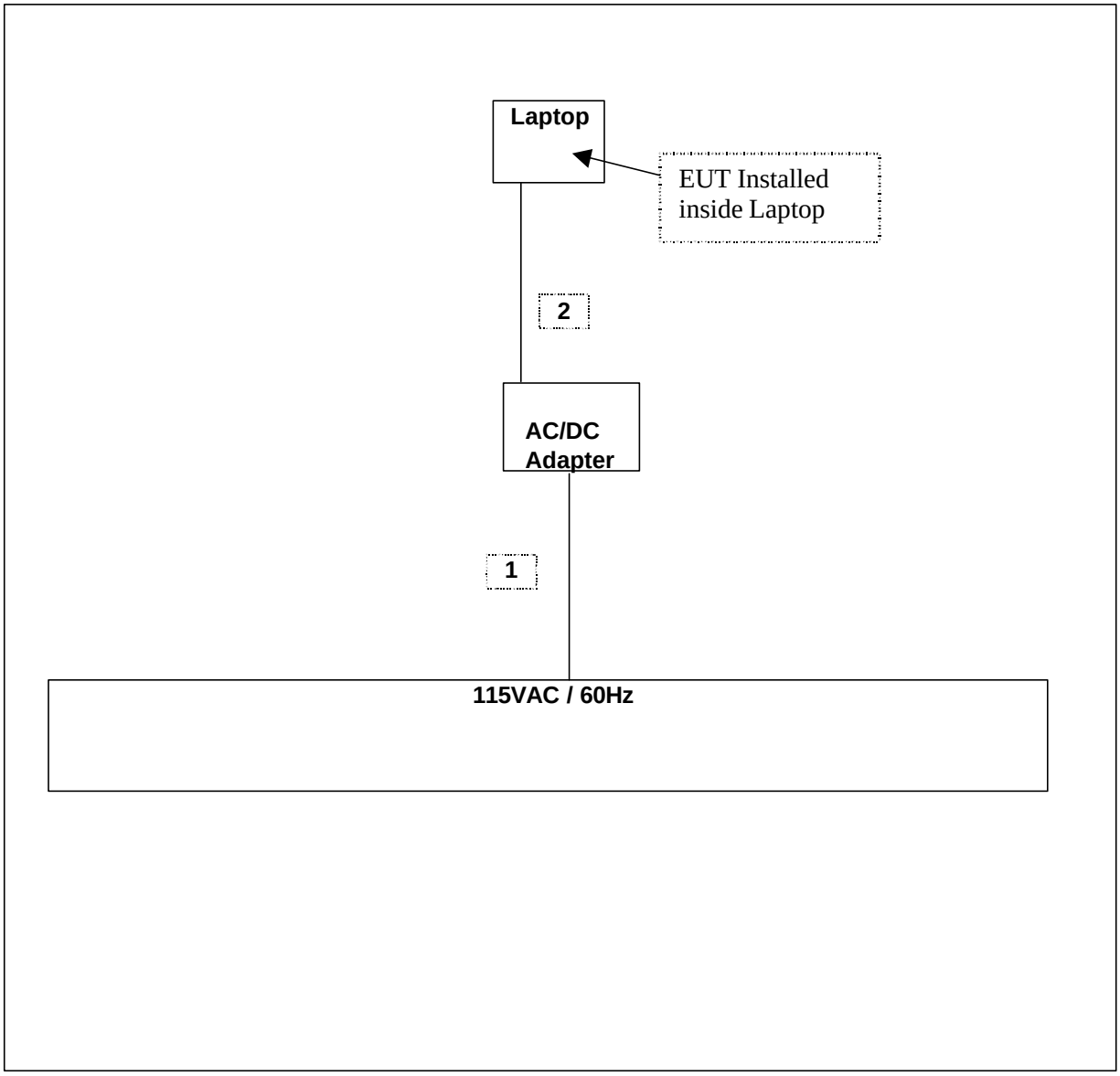
I/O CABLES

Cable No	I/O Port	# of I/O Port	Connector Type	Type of Cable	Cable Length	Data Traffic	Bundled	Remark
1	AC	1	US 115V	Un-shielded	2m	No	No	Bundled AC Cable for LC Test
2	DC	1	DC	Un-shielded	2m	No	No	N/A

TEST SETUP

The EUT was installed in the host computer and operated via a test program

SETUP DIAGRAM



SETUP FOR DIGITAL DEVICE TEST)

SUPPORT EQUIPMENT

Device Type	Manufacturer	Model Number	Serial Number	FCC ID
MONITOR	SAMSUNG	CSF9839	CCS # 01354	A3LCSF983
USB MOUSE	LOGITECH	M-UA34	LTC70500299	DZL211087
MICROPHONE	QUICKSHOT	Q5-5838	1410	N/A
KEYBOARD	ACER	6511-TA	NA	NA
SPEAKER	SONY	SRS-Z050V	NA	NA
USB MOUSE	Microsoft	Microsoft	NA	NA
PRINTER	HP	2225C	2930S52614	DSI6XU2225
AC Adapter	HP	ADP-75HB	MVT0236126269	DoC
USB MOUSE	LOGITECH	M-BE58	HCA24201816	NA

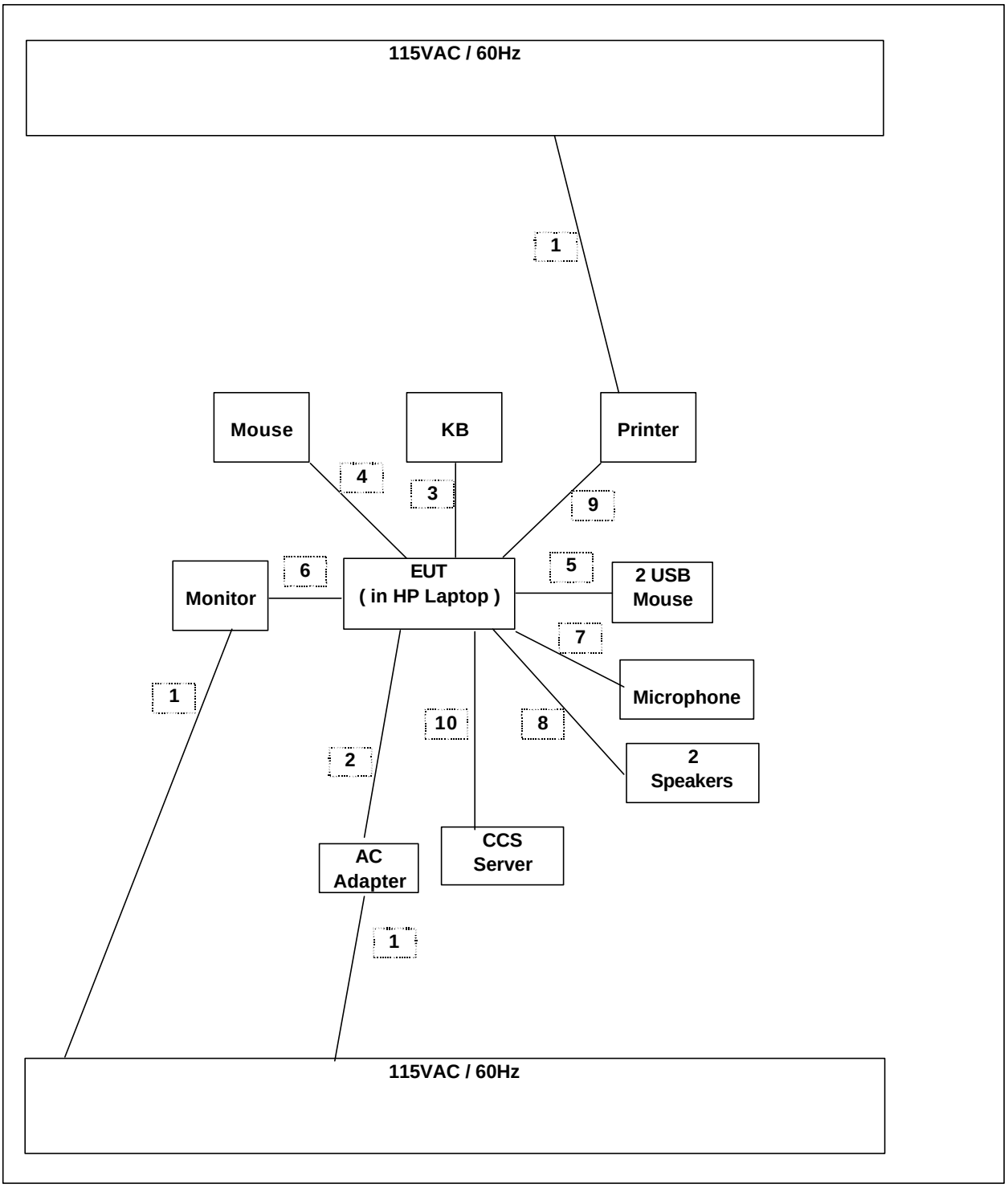
I/O CABLES

Cable No	I/O Port	# of I/O Port	Connector Type	Type of Cable	Cable Length	Data Traffic	Bundled	Remark
1	AC	1	US 115V	Un-shielded	2m	No	No	Bundled AC Cable for LC Test
2	DC	1	DC	Un-shielded	2m	No	No	N/A
3	KB	1	PS/2	Shielded	2m	Yes	No	N/A
4	Mouse	1	PS/2	Un-shielded	2m	Yes	No	N/A
5	Mouse	1	USB	Un-shielded	2m	Yes	No	N/A
6	Video	1	DB15	Shielded	2m	Yes	Yes	One Torroid on Each End
7	Mic	1	Din	Un-shielded	2m	Yes	No	N/A
8	Speaker	1	Din	Un-shielded	1m	Yes	No	N/A
9	Parallel	1	DB25	Shielded	2m	Yes	Yes	N/A
10	Ethernet	1	RJ45	Un-shielded	30m	No	No	N/A

TEST SETUP

The EUT was installed in the host computer and operated via a test program

SETUP DIAGRAM FOR DIGITAL DEVICE TESTS



7. APPLICABLE LIMITS AND TEST RESULTS

7.1. RADIATED 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.

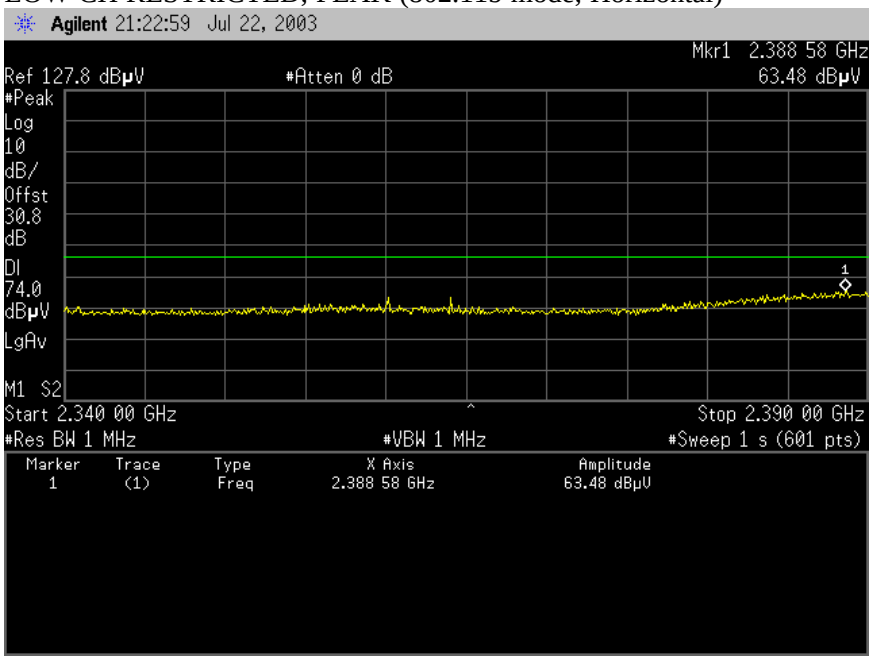
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

RESULTS

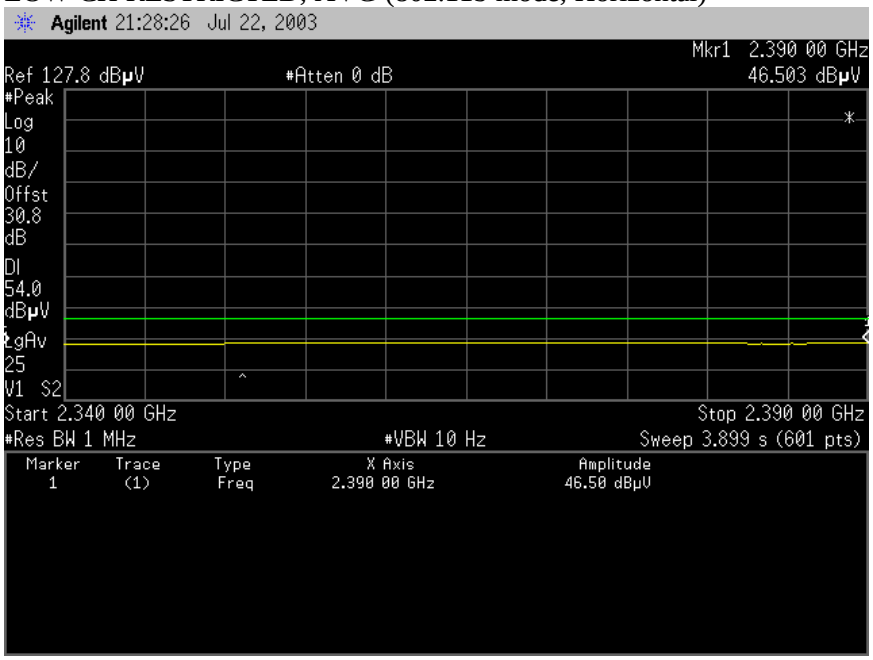
No non-compliance noted:

RESTRICTED BANDEDGE (b MODE, LOW CHANNEL, HORIZONTAL)

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

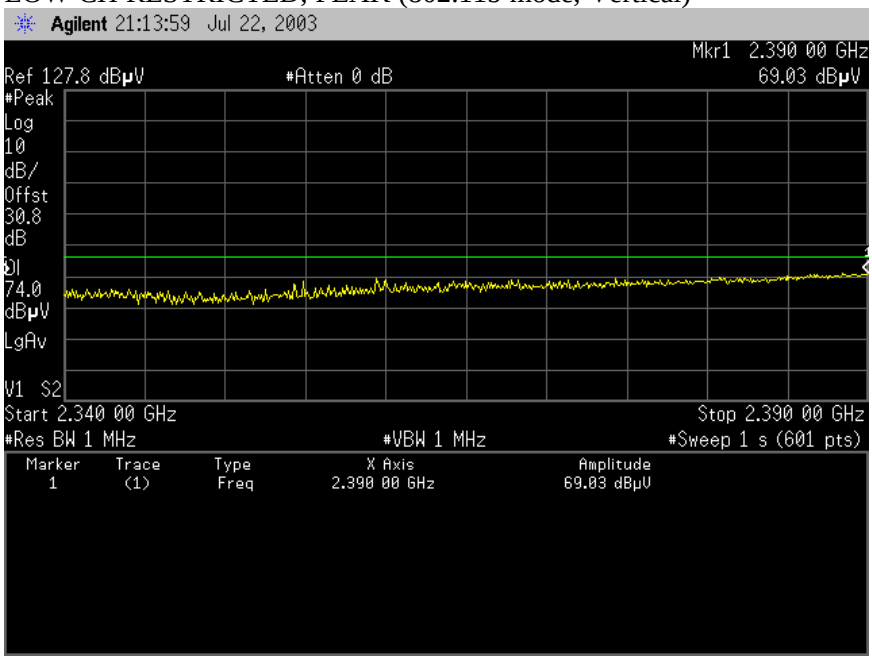


LOW CH RESTRICTED, AVG (802.11b mode, Horizontal)

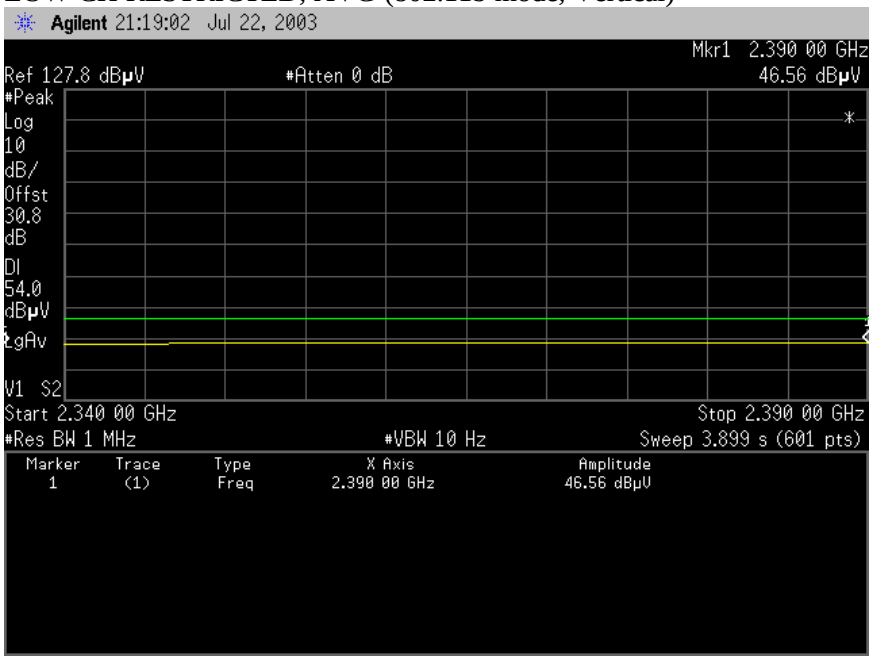


RESTRICTED BANDEDGE (b MODE, LOW CHANNEL, VERTICAL)

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

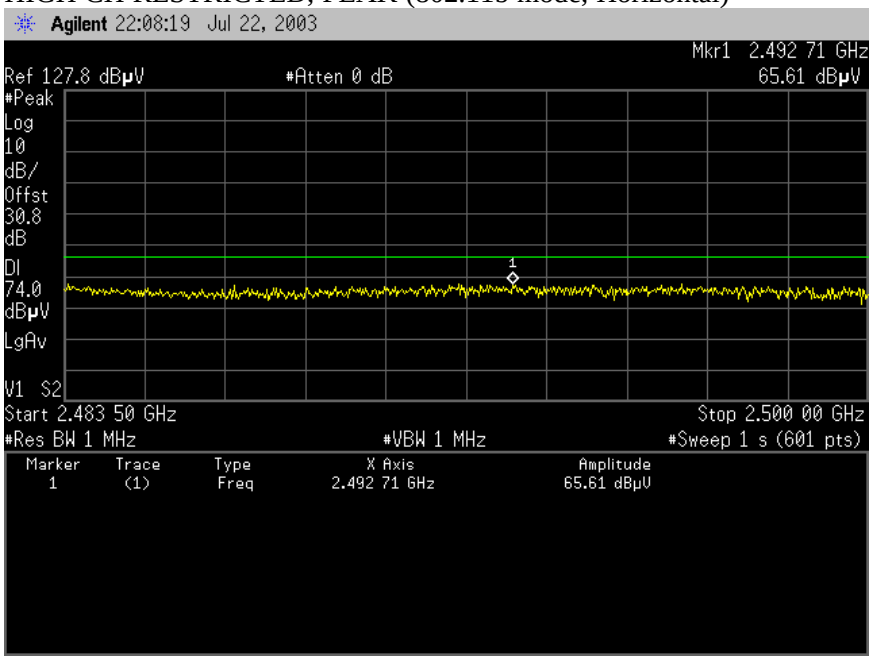


LOW CH RESTRICTED, AVG (802.11b mode, Vertical)

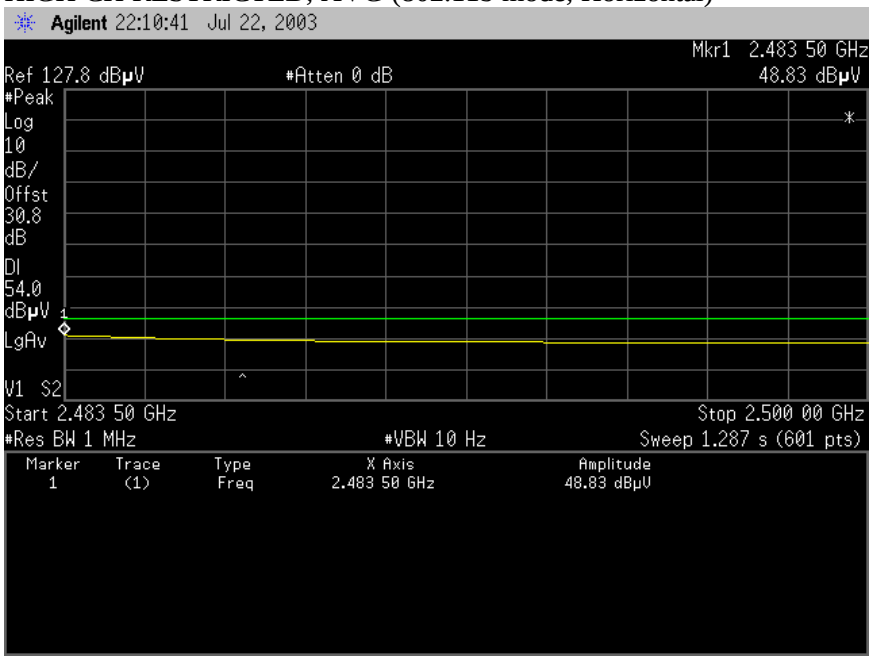


RESTRICTED BANDEDGE (b MODE, HIGH CHANNEL, HORIZONTAL)

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

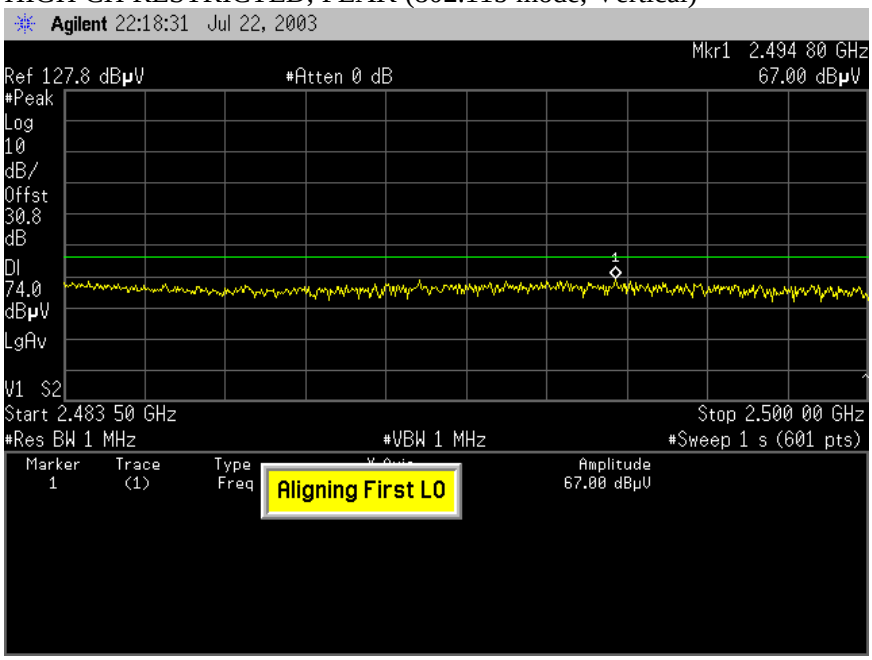


HIGH CH RESTRICTED, AVG (802.11b mode, Horizontal)

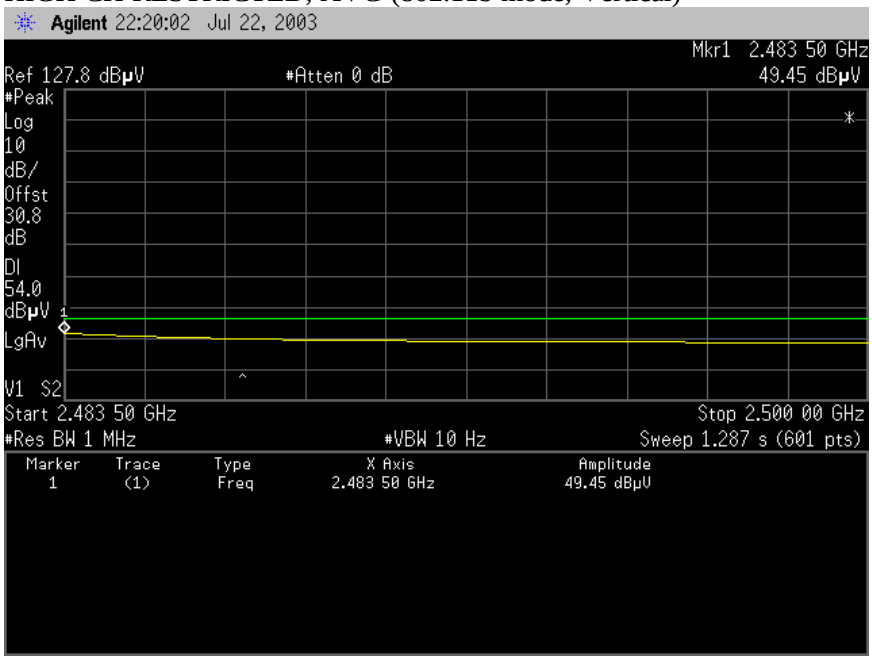


RESTRICTED BANDEDGE (b MODE, HIGH CHANNEL, VERTICAL)

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



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



HARMONICS AND SPURIOUS EMISSIONS (b MODE, LOW/MID/HI CHANNEL)

07/22/03 **High Frequency Measurement**
Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: James Lee
Project #: 03U2139
Company: Broadcom
EUT Descrip.: 802.11 b
EUT M/N: BCM94301MPL
Test Target: b mode
Mode Oper: Transmit

Test Equipment:

EMCO Horn 1-18GHz	Pre-amplifier 1-26GHz	Spectrum Analyzer	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T87 Miteq 924342	Agilent E4446A Analyzer	T117; ARA 18-26GHz; S/N:1013	FCC 15.205

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
Channel 1 (2412MHz)															
4.824	9.8	55.2	43.0	33.4	3.1	-44.7	0.0	1.0	48.0	35.8	74.0	54.0	-26.0	-18.2	H
4.824	9.8	55.0	42.8	33.4	3.1	-44.7	0.0	1.0	47.8	35.6	74.0	54.0	-26.2	-18.4	V
7.236	9.8	52.3	40.0	35.7	4.1	-44.6	0.0	1.0	48.5	36.2	84.1	71.1	-35.6	-34.9	H
7.236	9.8	53.0	41.0	35.7	4.1	-44.6	0.0	1.0	49.2	37.2	84.1	71.1	-34.9	-33.9	V
9.648	9.8	49.3	38.0	38.6	5.3	-42.4	0.0	1.0	51.8	40.5	84.1	71.1	-32.3	-30.6	H
9.648	9.8	51.0	39.1	38.6	5.3	-42.4	0.0	1.0	53.5	41.6	84.1	71.1	-30.6	-29.5	V
Channel 6 (2437MHz)															
4.874	9.8	53.6	41.0	33.4	3.2	-44.7	0.0	1.0	46.4	33.8	74.0	54.0	-27.6	-20.2	H
4.874	9.8	51.8	40.0	33.4	3.2	-44.7	0.0	1.0	44.7	32.8	74.0	54.0	-29.3	-21.2	V
7.311	9.8	52.0	39.8	35.8	4.1	-44.5	0.0	1.0	48.4	36.2	74.0	54.0	-25.6	-17.8	H
7.311	9.8	54.7	41.7	35.8	4.1	-44.5	0.0	1.0	51.1	38.1	74.0	54.0	-22.9	-15.9	V
9.748	9.8	48.6	37.5	38.5	5.4	-42.3	0.0	1.0	51.1	40.1	87.9	74.2	-36.8	-34.1	H
9.748	9.8	50.2	38.1	38.5	5.4	-42.3	0.0	1.0	52.8	40.7	87.9	74.2	-35.1	-33.5	V
Channel 11 (2462MHz)															
4.874	9.8	54.3	42.3	33.4	3.2	-44.7	0.0	1.0	47.1	35.1	74.0	54.0	-26.9	-18.9	H
4.874	9.8	52.1	41.2	33.4	3.2	-44.7	0.0	1.0	44.9	34.0	74.0	54.0	-29.1	-20.0	V
7.386	9.8	52.7	40.4	36.0	4.1	-44.5	0.0	1.0	49.3	37.0	74.0	54.0	-24.7	-17.0	H
7.386	9.8	56.8	45.0	36.0	4.1	-44.5	0.0	1.0	53.4	41.6	74.0	54.0	-20.6	-12.4	V
9.848	9.8	50.1	38.3	38.4	5.5	-42.2	0.0	1.0	52.8	41.0	88.6	70.6	-35.7	-29.5	H
9.848	9.8	51.1	39.4	38.4	5.6	-42.2	0.0	1.0	53.8	42.0	88.6	70.6	-34.7	-28.5	V

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		

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION) WITH A MINUMUM CONFIGURATION

COMPLIANCE Certification Services

FCC, VCCI, CISPR, CE, AUSTEL, NZ
UL, CSA, TUV, BSMI, DHHS, NVLAP

561F MONTEREY ROAD, SAN JOSE, CA 95037-9001
PHONE: (408) 463-0885 FAX: (408) 463-0888

Project #:	03U2139-1
Report #:	030722B1
Date& Time:	07/22/03 9:48 AM
Test Engr:	Chin Pang
Company:	Broadcom Corporation
EUT Description:	802.11b WLAN Mini PCI Card (w/HP Laptop, CRVSA-02T1-90)
Test Configuration :	EUT/Support Equipment
Type of Test:	FCC Class B
Mode of Operation:	Tx

<< Main Sheet

Freq. (MHz)	Reading (dBuV)	AF (dB)	Closs (dB)	Pre-amp (dB)	Level (dBuV/m)	Limit FCC B	Margin (dB)	Pol (H/V)	Az (Deg)	Height (Meter)	Mark (P/Q/A)
120.00	52.40	12.48	2.71	28.40	39.19	43.50	-4.31	3mV	0.00	1.00	P
120.00	51.90	12.48	2.71	28.40	38.69	43.50	-4.81	3mH	0.00	1.50	P
421.05	48.70	15.92	5.10	28.59	41.12	46.00	-4.88	3mH	0.00	1.50	P
38.52	46.30	14.92	1.64	28.51	34.34	40.00	-5.66	3mV	0.00	1.00	P
446.10	46.90	16.51	5.27	28.67	40.01	46.00	-5.99	3mV	0.00	1.00	P
54.00	52.60	7.54	1.89	28.49	33.54	40.00	-6.46	3mH	0.00	1.50	P
6 Worst Data											

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

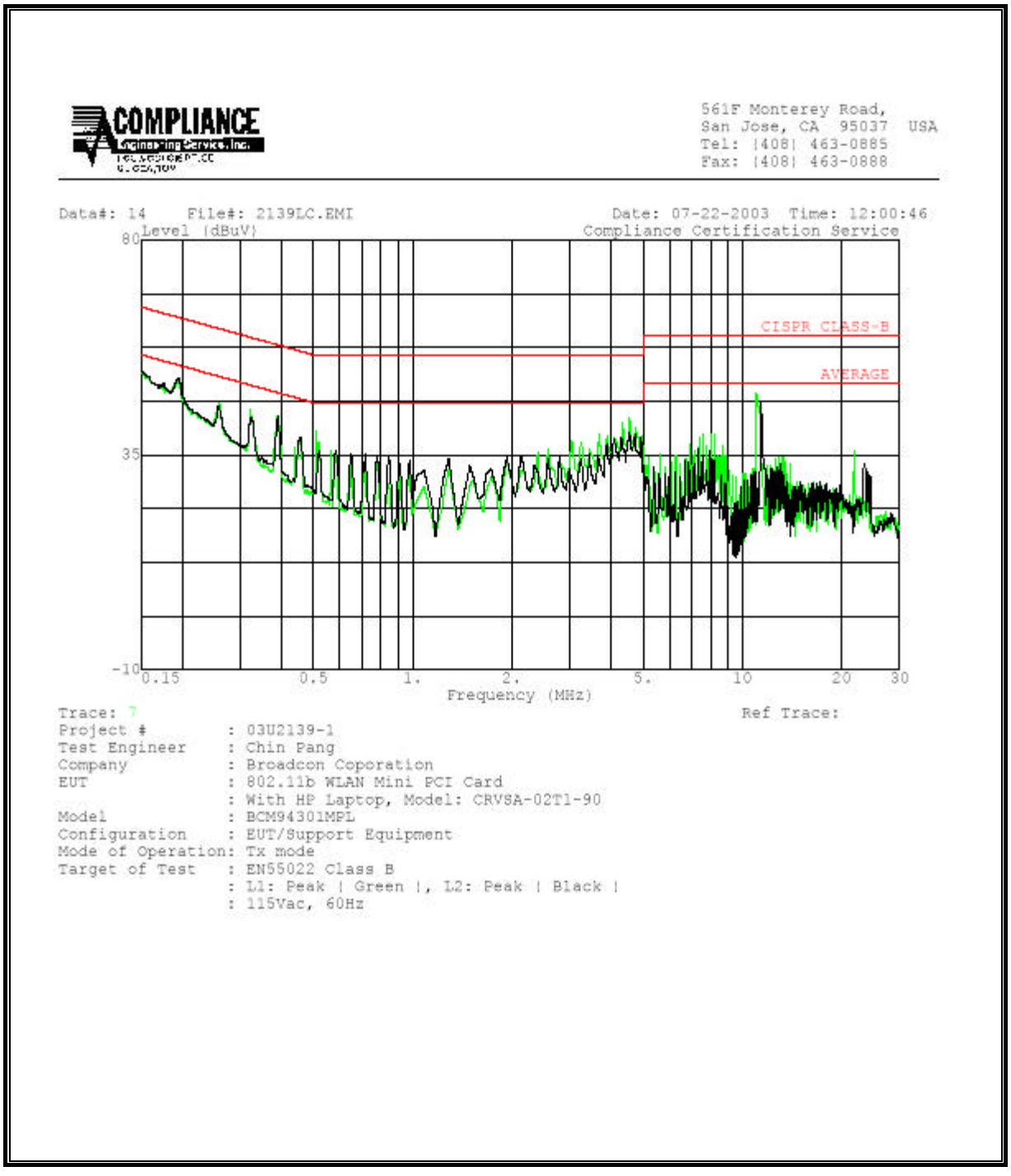
No non-compliance noted:

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
0.19	50.24	--	--	0.00	64.77	54.77	-14.53	-4.53	L1
4.55	42.68	--	--	0.00	56.00	46.00	-13.32	-3.32	L1
11.02	48.10	--	--	0.00	60.00	50.00	-11.90	-1.90	L1
0.20	51.96	--	--	0.00	64.71	54.71	-12.75	-2.75	L2
4.72	40.22	--	--	0.00	56.00	46.00	-15.78	-5.78	L2
11.44	46.18	--	--	0.00	60.00	50.00	-13.82	-3.82	L2
6 Worst Data									

LINE 1 AND LINE 2 RESULTS

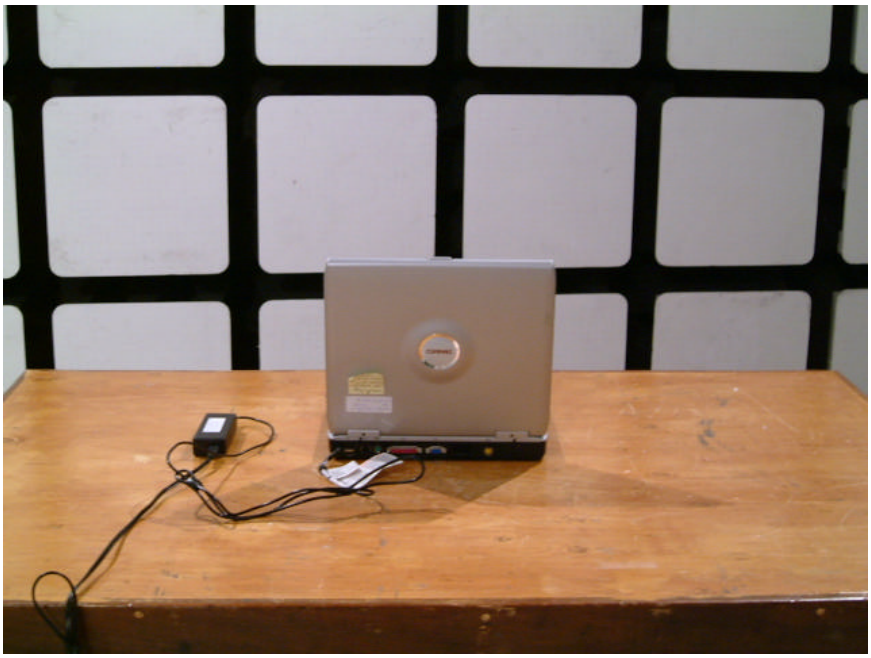


8. SETUP PHOTOS

RADIATED RF MEASUREMENT SETUP

RADIATED FRONT PHOTO

RADIATED BACK PHOTO



DIGITAL DEVICE RADIATED EMISSIONS SETUP

DIGITAL DEVICE FRONT PHOTO

DIGITAL DEVICE BACK PHOTO

POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP

LINE CONDUCTED FRONT PHOTO

LINE CONDUCTED BACK PHOTO

END OF REPORT