



**FCC CFR47 PART 15 SUBPART C
FCC CLASS II PERMISSIVE CHANGE
TEST REPORT**

FOR

Microsoft Broadband Networking Wireless Notebook Adapter

MODEL NUMBER: MN720

BRAND NAME: Microsoft

FCC ID: C3KMN720

REPORT NUMBER: 03U2049-1

ISSUE DATE: 6/16/2003

Prepared for

**Microsoft Corporation
One Microsoft Way
Redmond WA 98052-6399
U.S.A**

Prepared by

**COMPLIANCE CERTIFICATION SERVICES
561F MONTEREY ROAD,
MORGAN HILL, CA 95037, USA
TEL: (408) 463-0885
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1. TEST RESULT CERTIFICATION

COMPANY NAME: **Microsoft Corporation**
One Microsoft Way
Redmond WA 98052-6399 U.S.A

EUT DESCRIPTION: **Microsoft Broadband Networking Wireless Notebook Adapter**

MODEL: **MN720**

DATE TESTED: **6/6 – 6/12/2003**

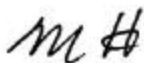
APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 15 SUBPART C	NO NON-COMPLIANCE NOTED

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:

Tested By:




MIKE HECKROTTE
 CHIEF ENGINEER
 COMPLIANCE CERTIFICATION SERVICES

CHIN PANG
 EMC ENGINEER
 COMPLIANCE CERTIFICATION SERVICES

2. DESCRIPTION OF CLASS II CHANGE

Microsoft Broadband Networking Wireless Notebook Adapter, MN720 is a PCMCIA Cardbus Card, with an operating frequency range of 2412 – 2462 MHz. The output power is 15dBm on conducted average reading from previous measurement. The EUT has a Centurion Chip antenna with 2dBi gain.

This report is for FCC Class II filing due to the EUT changes related to antenna orientation, LED position and ground plane differences.

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.






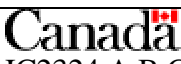
4. FACILITIES AND ACCREDITATION

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:

TEST AND MEASUREMENT EQUIPMENT LIST				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due Date
Bilog Antenna	AR	LPB-25201A	1185	3/28/2004
EMI Receiver	HP	8542A	3942A00280	11/20/2003
RF Filter Section	HP	85420E	3705A00256	11/20/2003
EMI Test Receiver	R & S	ESHS 20	827129/006	7/17/2004
LISN, 10 kHz ~ 30 MHz	FCC	50/250-25-2	114	9/6/2003
Line Filter	Lindgren	LMF-3489	497	CNR
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-BNC	837990	9/6/2003
Preamplifier, 1 ~ 26 GHz	Miteq	NSP10023988	646456	4/25/2004
Antenna, Horn 1 ~ 18 GHz	EMCO	3115	2238	2/4/2004
Spectrum Analyzer	HP	8593EM	3710A00205	6/11/2003
2.4-2.5GHz reject filter	Micro Tronic	BRM50702	2	N.C.R

6. SETUP OF EQUIPMENT UNDER TEST

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Device Type	Manufacturer	Model	Serial Number	FCC ID
Laptop	Dell	PP07L	NA	DoC
AC Adapter	Dell	PA-1900-05D	NA	NA

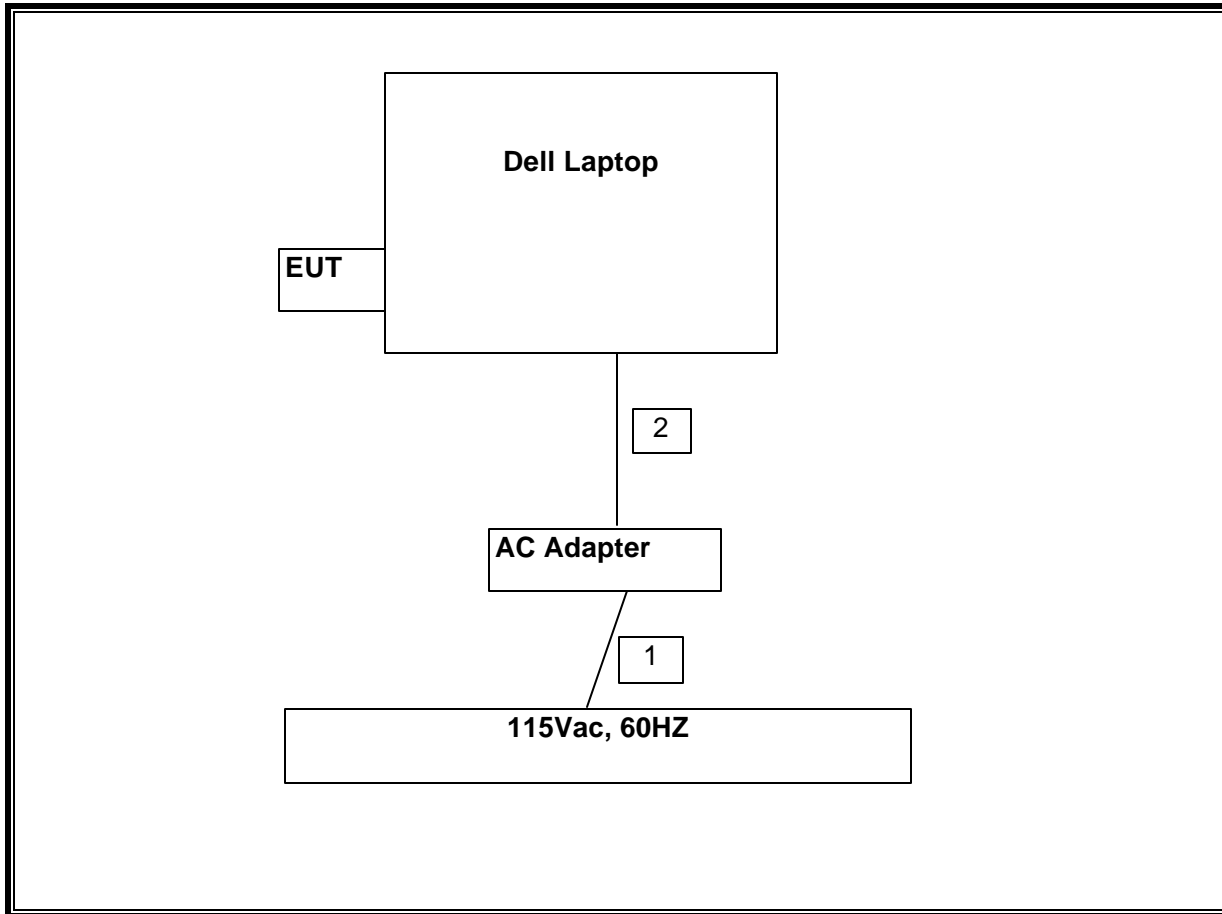
I/O CABLES

Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	1	US115	Unshielded	1.8m	No
2	DC	1	DC Jack	Unshielded	1.8m	No

TEST SETUP

The EUT was installed in a host computer.

SETUP DIAGRAM



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.

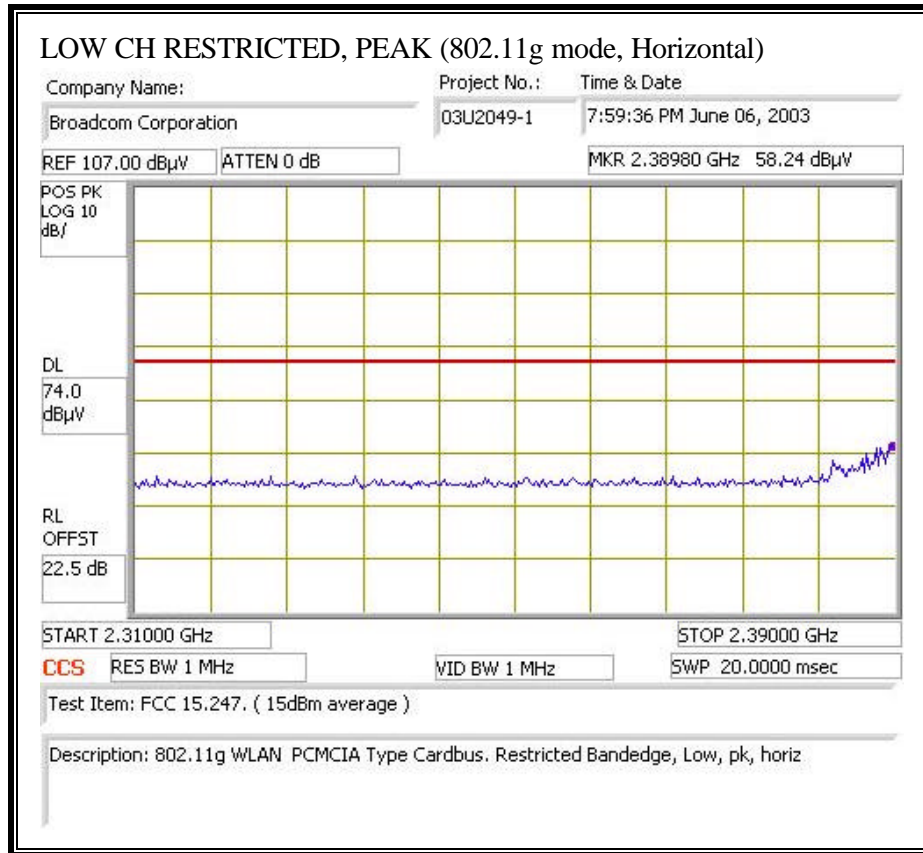
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

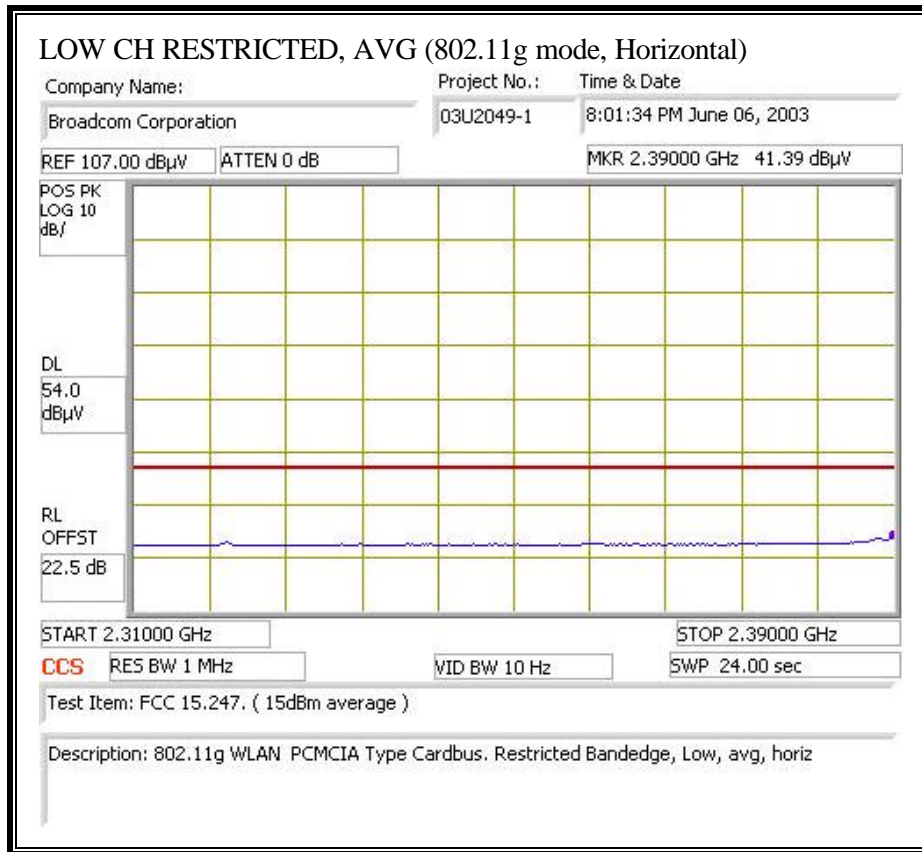
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

RESULTS

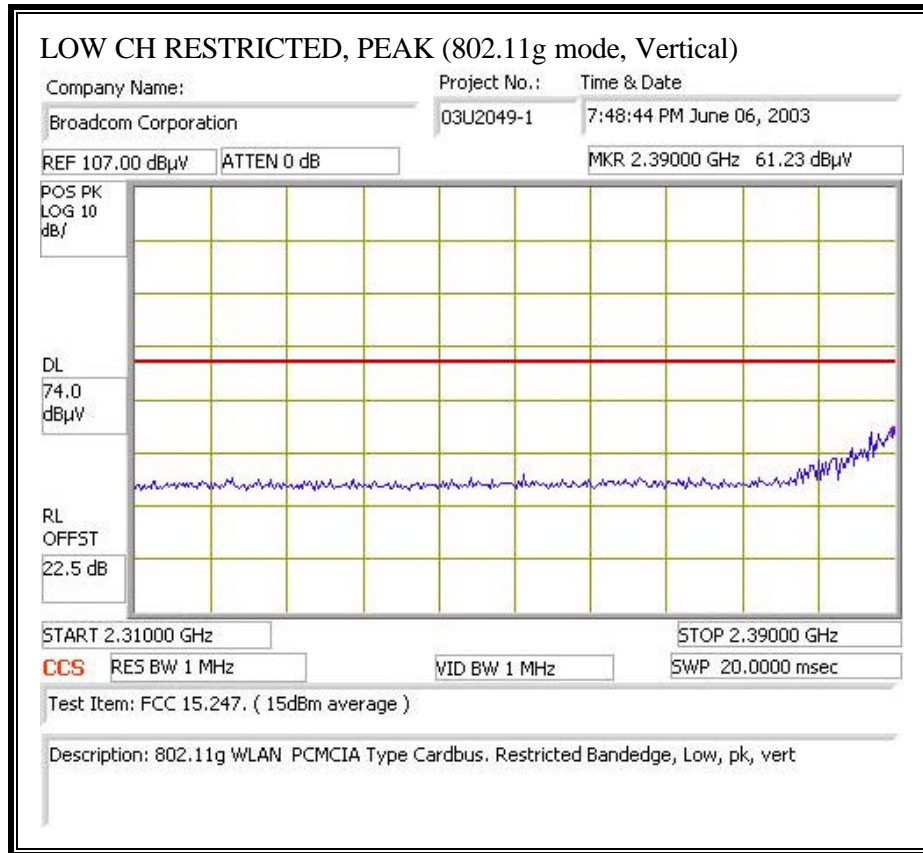
No non-compliance noted:

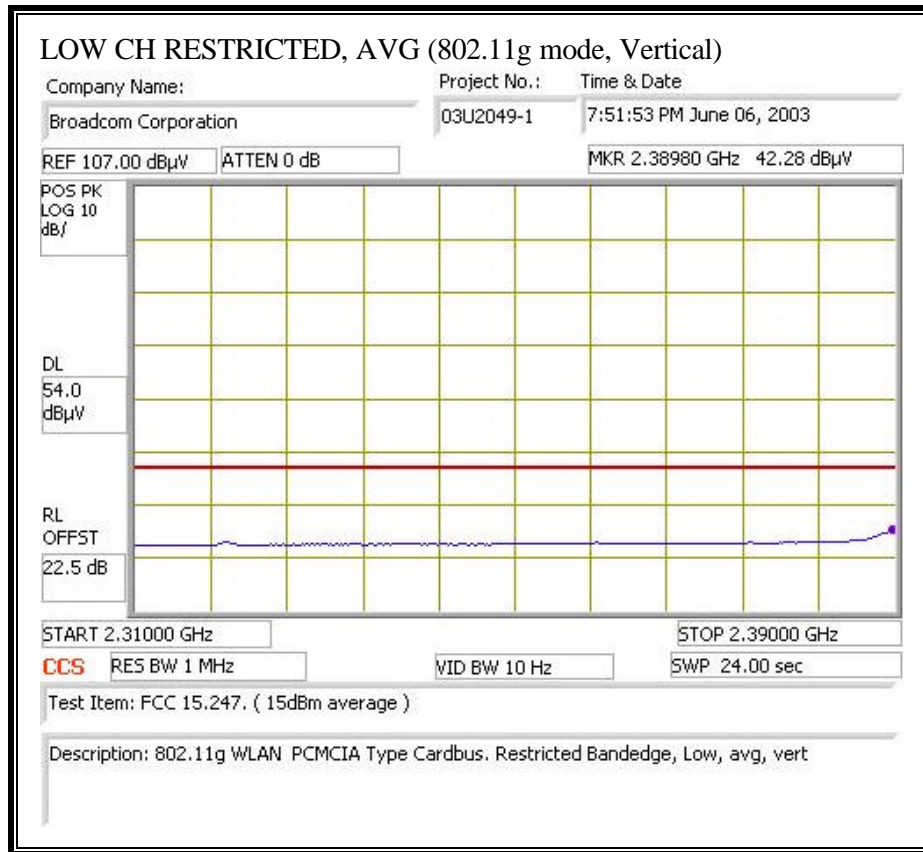
RESTRICTED BANDEDGE (g MODE, LOW CHANNEL, HORIZONTAL)



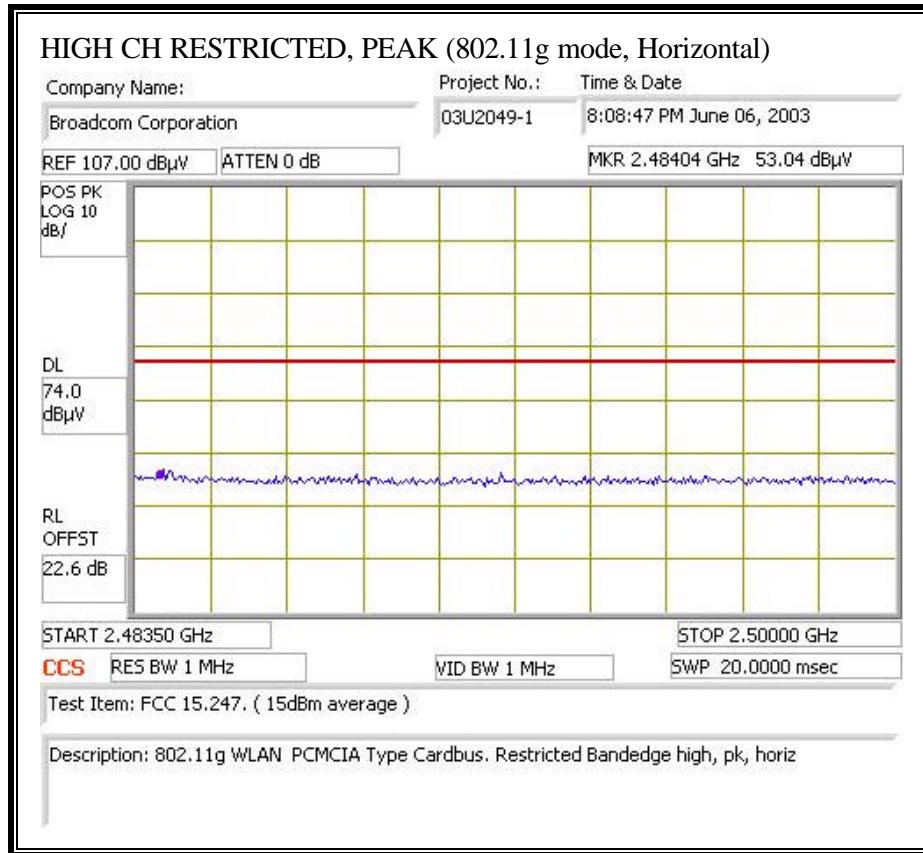


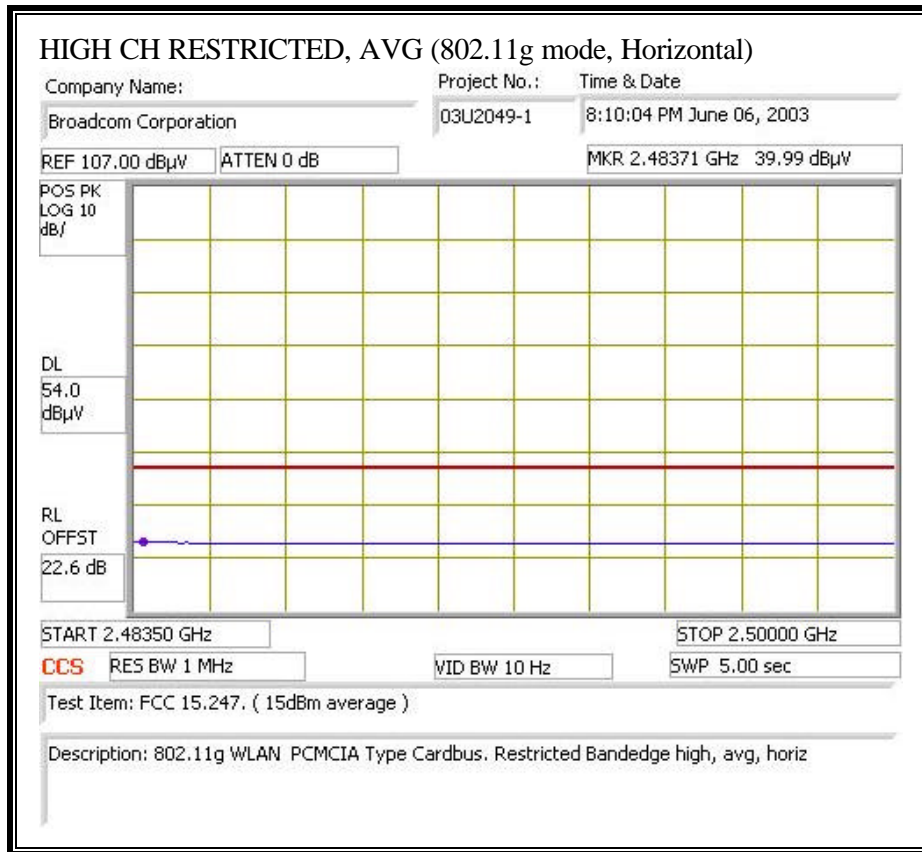
RESTRICTED BANDEDGE (g MODE, LOW CHANNEL, VERTICAL)



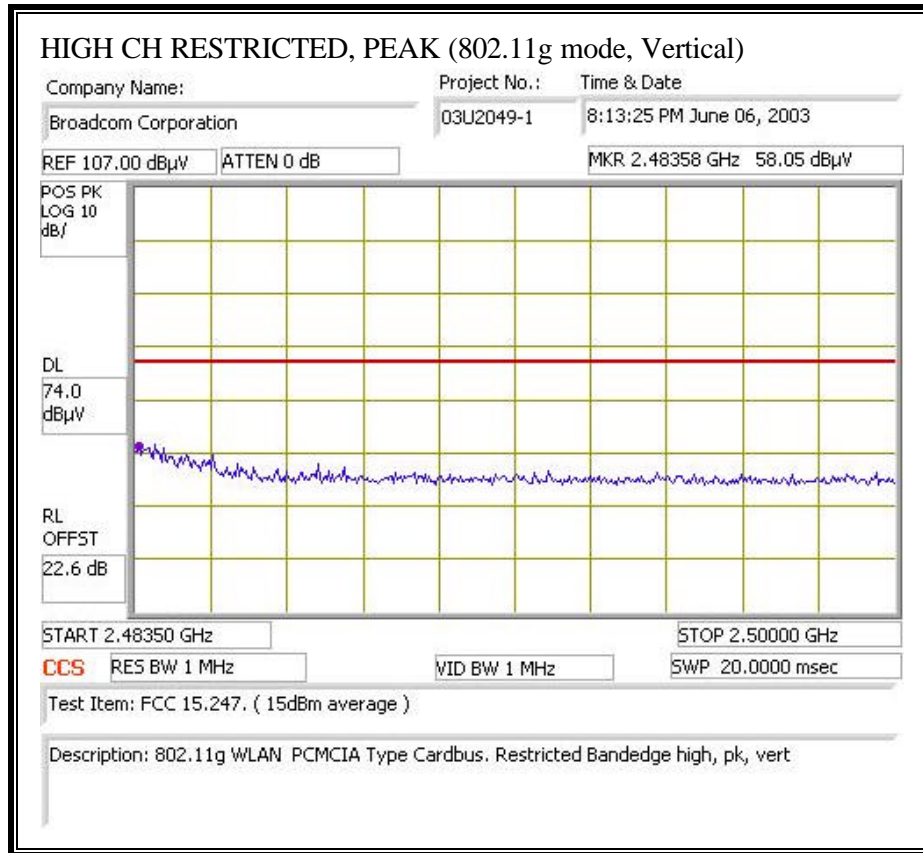


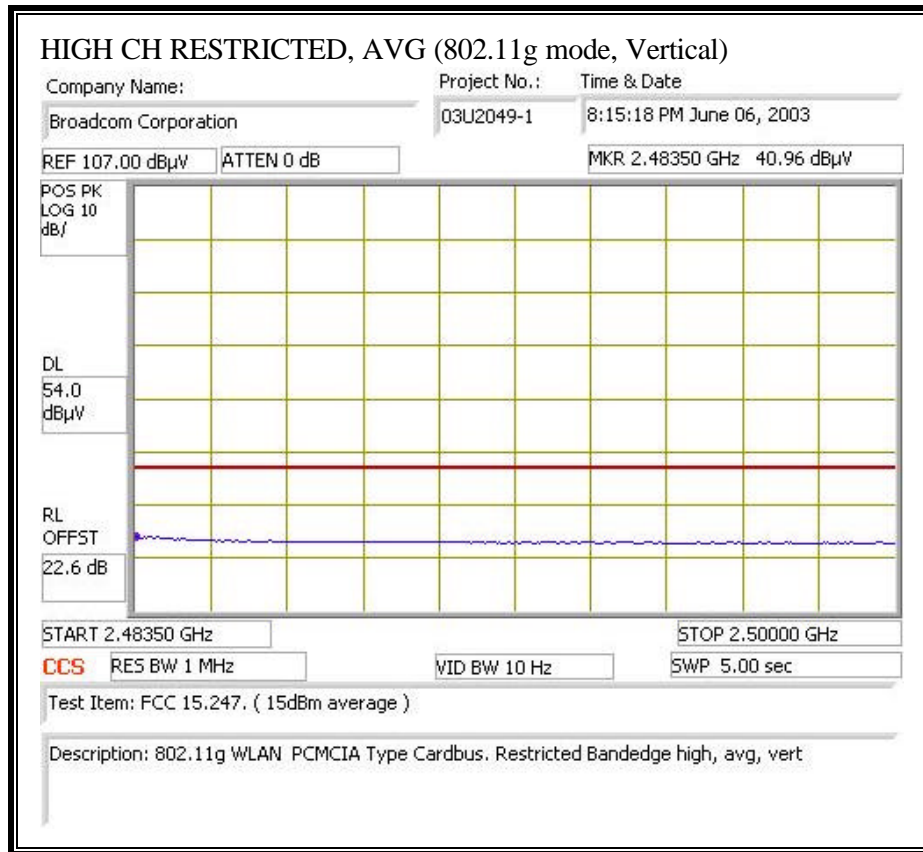
RESTRICTED BANDEDGE (g MODE, HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (g MODE, HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

06/06/03 **High Frequency Measurement**
Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: Chin Pang
 Project #: 03U2049-1
 Company: Broadcom Corporation
 EUT Descrio.: 802.11g WLAN PCMCIA Tvpe Cardbus (15dBm average)
 EUT M/N: BCM94306CB
 Test Target: FCC 15.247
 Mode Oper: Tx

Test Equipment:

EMCO Horn 1-18GHz	Pre-amplifier 1-26GHz	Spectrum Analyzer	Horn > 18GHz
T60; S/N: 2238 @1m	T63 Miteq 646456	HP 8593EM Analyzer	

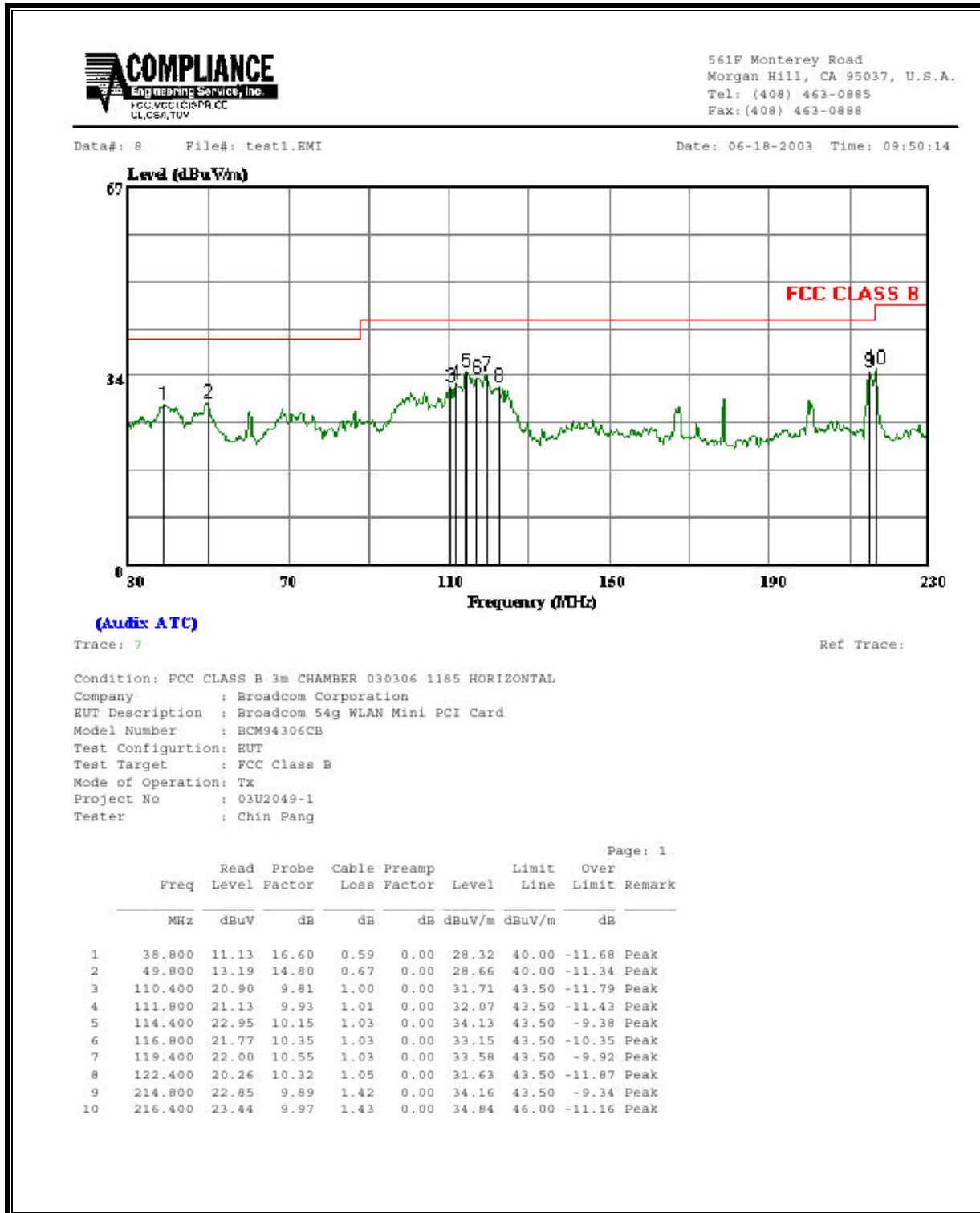
Hi Frequency Cables
 (2 ft) (2 ~ 3 ft) (4 ~ 6 ft) (12 ft)

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
Transmitting at low channel															
4.824	9.8	44.2	32.6	33.7	3.9	-35.3	0.0	1.0	47.5	35.9	74.0	54.0	-26.5	-18.1	V
4.824	9.8	43.5	32.2	33.7	3.9	-35.3	0.0	1.0	46.8	35.5	74.0	54.0	-27.2	-18.5	H
Transmitting at mid channel															
4.874	9.8	45.0	33.0	33.8	4.0	-35.3	0.0	1.0	48.4	36.4	74.0	54.0	-25.6	-17.6	V
4.874	9.8	42.0	30.2	33.8	4.0	-35.3	0.0	1.0	45.4	33.6	74.0	54.0	-28.6	-20.4	H
7.311	9.8	44.0	32.3	37.3	5.2	-34.6	0.0	1.0	52.8	41.1	74.0	54.0	-21.2	-12.9	V, noise floor
7.311	9.8	43.5	32.0	37.3	5.2	-34.6	0.0	1.0	52.3	40.8	74.0	54.0	-21.7	-13.2	H, noise floor
Transmitting at high channel															
4.924	9.8	43.8	32.0	33.8	4.0	-35.3	0.0	1.0	47.3	35.5	74.0	54.0	-26.7	-18.5	V
4.924	9.8	43.5	31.8	33.8	4.0	-35.3	0.0	1.0	47.0	35.3	74.0	54.0	-27.0	-18.7	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		

SPURIOUS EMISSIONS 30 TO 230 MHz HORIZONTAL (WORST-CASE CONFIGURATION)



(Auxiliary ATC)

Trace: 7

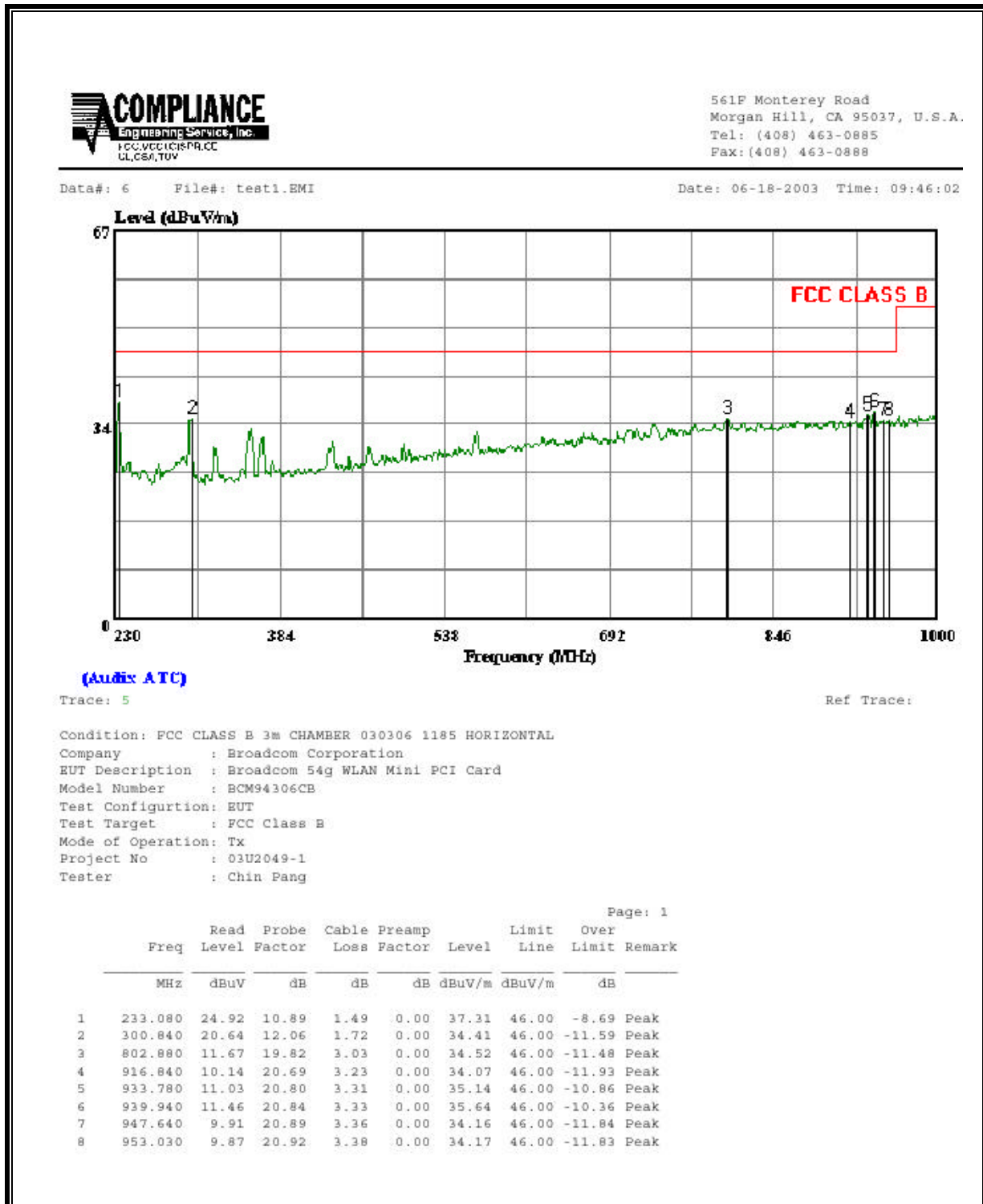
Ref Trace:

Condition: FCC CLASS B 3m CHAMBER 030306 1185 HORIZONTAL
 Company : Broadcom Corporation
 EUT Description : Broadcom 54g WLAN Mini PCI Card
 Model Number : BCM94306CB
 Test Configuration: EUT
 Test Target : FCC Class B
 Mode of Operation: Tx
 Project No : 03U2049-1
 Tester : Chin Pang

Page: 1

	Read Level	Probe Factor	Cable Loss	Preamp Loss	Limit Line	Over Limit	Remark	
Freq	dBuV	dB	dB	dB	dBuV/m	dBuV/m	dB	
MHz	dBuV	dB	dB	dB	dBuV/m	dBuV/m	dB	
1	38.800	11.13	16.60	0.59	0.00	28.32	40.00 -11.68	Peak
2	49.800	13.19	14.80	0.67	0.00	28.66	40.00 -11.34	Peak
3	110.400	20.90	9.81	1.00	0.00	31.71	43.50 -11.79	Peak
4	111.800	21.13	9.93	1.01	0.00	32.07	43.50 -11.43	Peak
5	114.400	22.95	10.15	1.03	0.00	34.13	43.50 -9.38	Peak
6	116.800	21.77	10.35	1.03	0.00	33.15	43.50 -10.35	Peak
7	119.400	22.00	10.55	1.03	0.00	33.58	43.50 -9.92	Peak
8	122.400	20.26	10.32	1.05	0.00	31.63	43.50 -11.87	Peak
9	214.800	22.85	9.89	1.42	0.00	34.16	43.50 -9.34	Peak
10	216.400	23.44	9.97	1.43	0.00	34.84	46.00 -11.16	Peak

SPURIOUS EMISSIONS 230 TO 1000 MHz HORIZONTAL (WORST-CASE CONFIGURATION)



Data#: 6 File#: test1.EMI Date: 06-18-2003 Time: 09:46:02



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

(Audix ATC)

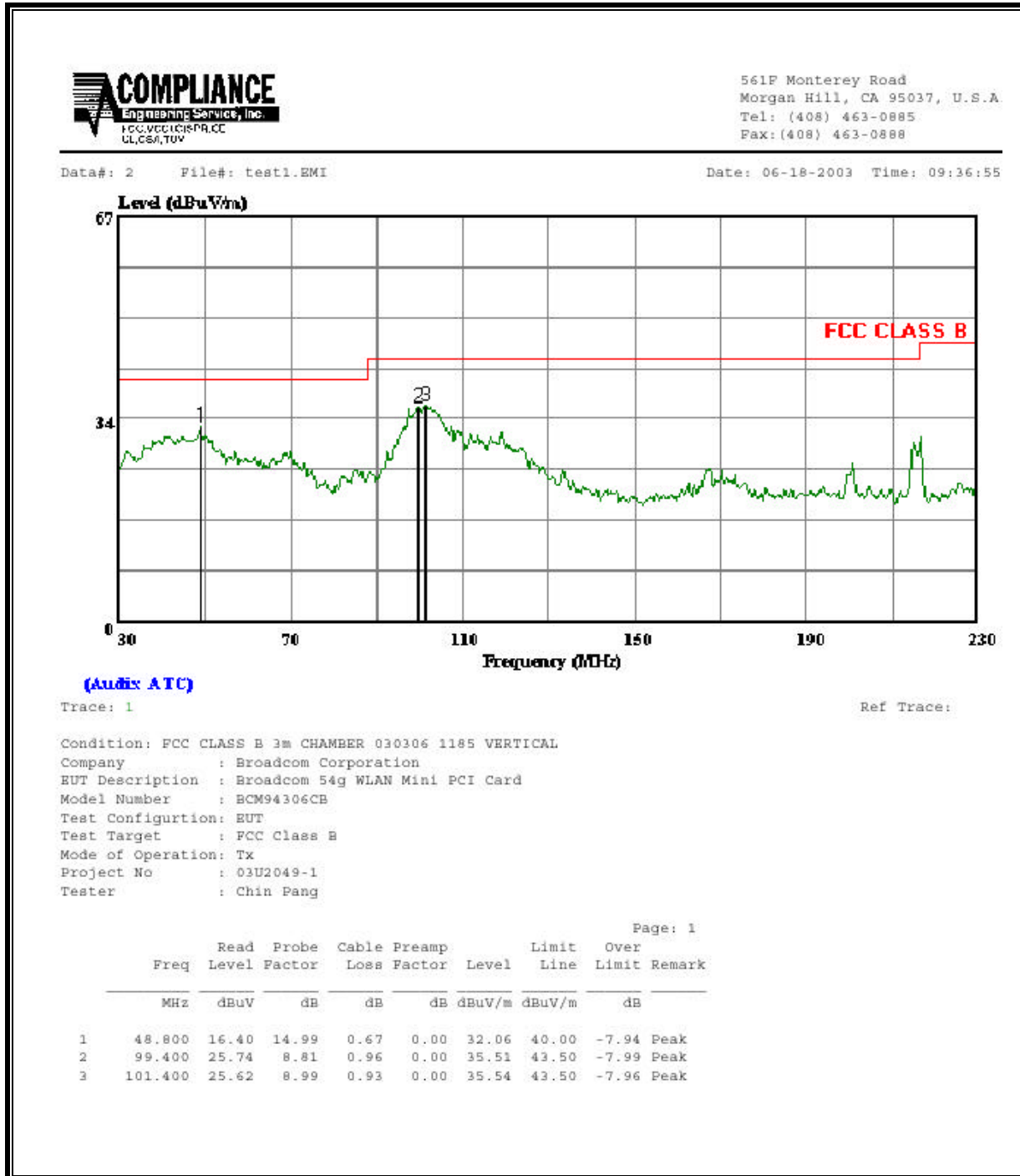
Trace: 5 Ref Trace:

Condition: FCC CLASS B 3m CHAMBER 030306 1185 HORIZONTAL
Company : Broadcom Corporation
EUT Description : Broadcom 54g WLAN Mini PCI Card
Model Number : BCM94306CB
Test Configuration: EUT
Test Target : FCC Class B
Mode of Operation: Tx
Project No : 03U2049-1
Tester : Chin Pang

Page: 1

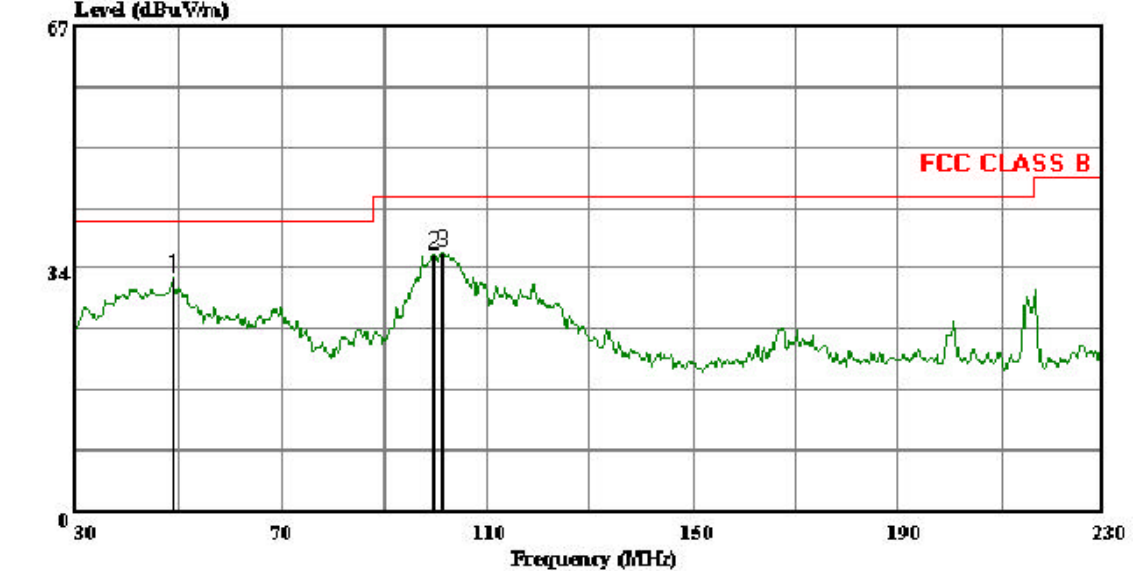
	Freq	Read Level	Probe Factor	Cable Loss	Preamp Factor	Level	Limit	Over Limit	Remark
	MHz	dBuV	dB	dB	dB	dBuV/m	dBuV/m	dB	
1	233.080	24.92	10.89	1.49	0.00	37.31	46.00	-8.69	Peak
2	300.840	20.64	12.06	1.72	0.00	34.41	46.00	-11.59	Peak
3	802.880	11.67	19.82	3.03	0.00	34.52	46.00	-11.48	Peak
4	916.840	10.14	20.69	3.23	0.00	34.07	46.00	-11.93	Peak
5	933.780	11.03	20.80	3.31	0.00	35.14	46.00	-10.86	Peak
6	939.940	11.46	20.84	3.33	0.00	35.64	46.00	-10.36	Peak
7	947.640	9.91	20.89	3.36	0.00	34.16	46.00	-11.84	Peak
8	953.030	9.87	20.92	3.38	0.00	34.17	46.00	-11.83	Peak

SPURIOUS EMISSIONS 30 TO 230 MHz VERTICAL (WORST-CASE CONFIGURATION)



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

Data#: 2 File#: test1.EMI Date: 06-18-2003 Time: 09:36:55



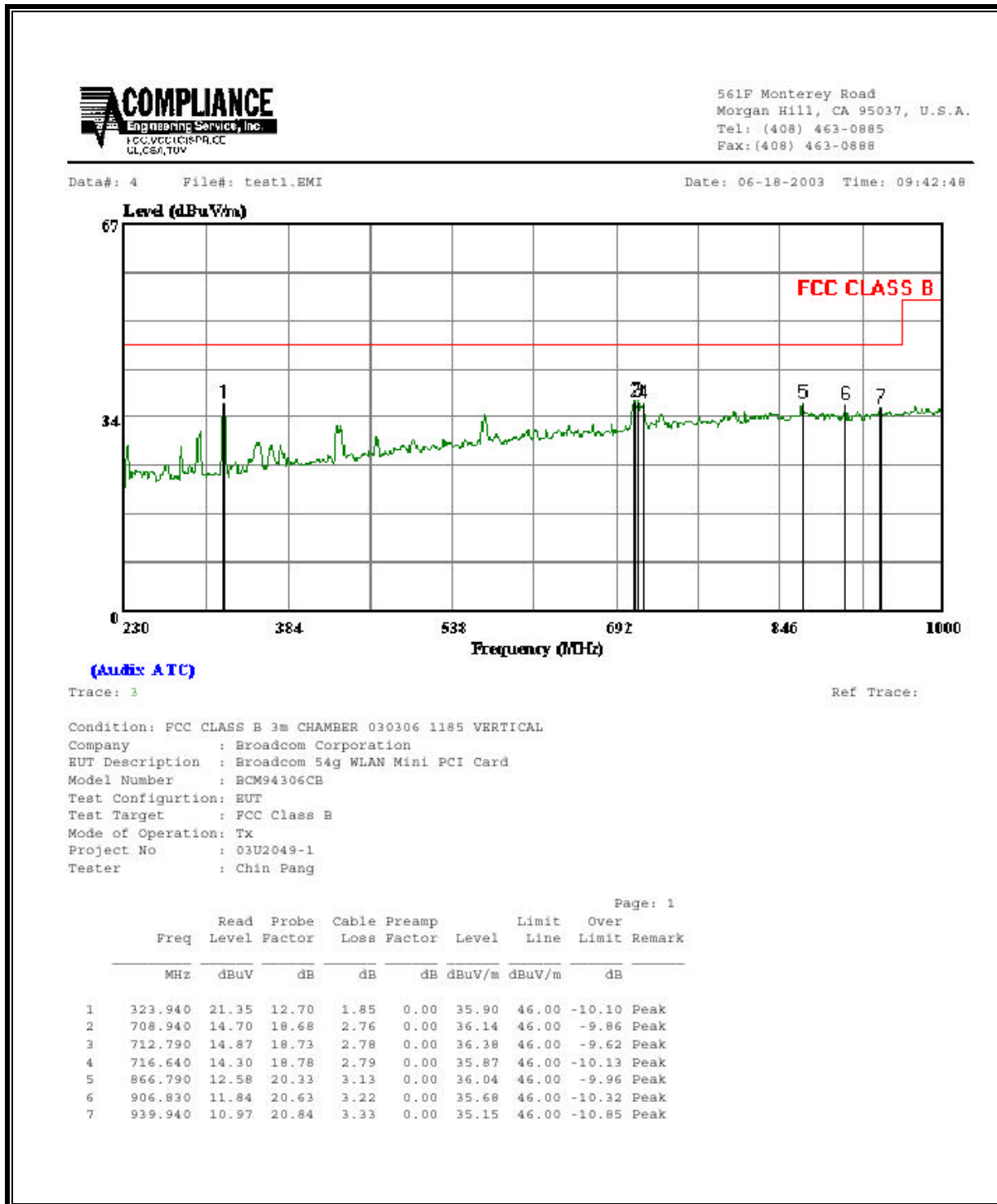
(Auxiliary ATC) Trace: 1 Ref Trace:

Condition: FCC CLASS B 3m CHAMBER 030306 1185 VERTICAL
Company : Broadcom Corporation
EUT Description : Broadcom 54g WLAN Mini PCI Card
Model Number : BCM94306CB
Test Configuration: EUT
Test Target : FCC Class B
Mode of Operation: Tx
Project No : 03U2049-1
Tester : Chin Pang

Page: 1

	Read Freq	Probe Level	Probe Factor	Cable Loss	Preamp Factor	Level	Limit	Over	Remark
	MHz	dBuV	dB	dB	dB	dBuV/m	dBuV/m	dB	
1	48.800	16.40	14.99	0.67	0.00	32.06	40.00	-7.94	Peak
2	99.400	25.74	8.81	0.96	0.00	35.51	43.50	-7.99	Peak
3	101.400	25.62	8.99	0.93	0.00	35.54	43.50	-7.96	Peak

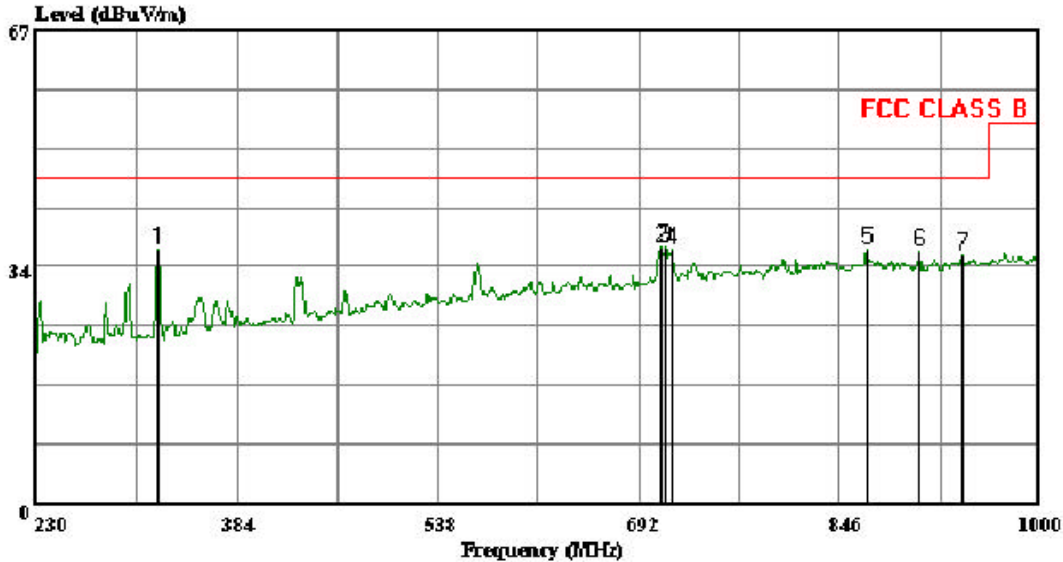
SPURIOUS EMISSIONS 230 TO 1000 MHz VERTICAL (WORST-CASE CONFIGURATION)



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

Data#: 4 File#: test1.EMI

Date: 06-18-2003 Time: 09:42:48



(Auxin: ATC)

Trace: 3

Ref Trace:

Condition: FCC CLASS B 3m CHAMBER 030306 1185 VERTICAL
Company : Broadcom Corporation
EUT Description : Broadcom 54g WLAN Mini PCI Card
Model Number : BCM94306CB
Test Configuration: EUT
Test Target : FCC Class B
Mode of Operation: Tx
Project No : 03U2049-1
Tester : Chin Pang

Page: 1

	Freq	Read Level	Probe Factor	Cable Loss	Preamp Factor	Level	Limit	Over	Remark
	MHz	dBuV	dB	dB	dB	dBuV/m	dBuV/m	dB	
1	323.940	21.35	12.70	1.85	0.00	35.90	46.00	-10.10	Peak
2	708.940	14.70	18.68	2.76	0.00	36.14	46.00	-9.86	Peak
3	712.790	14.87	18.73	2.78	0.00	36.38	46.00	-9.62	Peak
4	716.640	14.30	18.78	2.79	0.00	35.87	46.00	-10.13	Peak
5	866.790	12.58	20.33	3.13	0.00	36.04	46.00	-9.96	Peak
6	906.830	11.84	20.63	3.22	0.00	35.68	46.00	-10.32	Peak
7	939.940	10.97	20.84	3.33	0.00	35.15	46.00	-10.85	Peak

8. SETUP PHOTOS

RADIATED RF MEASUREMENT SETUP





END OF REPORT