FCC CFR47 PART 15 SUBPART C
CLASS II PERMISSIVE CHANGE

TEST REPORT

FOR

BROADCOM 54g WLAN MINI PCI CARD
INSIDE HP MODEL HSTNN-Q09C

MODEL NUMBER: BCM94306MPSG

FCC ID: QDS-BRCM1005-H

REPORT NUMBER: 04U2729-1

ISSUE DATE: May 20, 2004

Prepared for
BROADCOM CORPORATION
190 MATHILDA PLACE
SUNNYVALE, CA 94086
USA

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: BROADCOM CORPORATION
190 MATHILDA PLACE
SUNNYVALE, CA 94086, USA

EUT DESCRIPTION: BROADCOM 54g WLAN MINI PCI CARD INSIDE HP MODEL HSTNN-Q09C

MODEL: BCM94306MPSG

DATE TESTED: MAY 17 – MAY 18, 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.

Approved & Released For CCS By:

NEELESH RAJ
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

Tested By:

BEN DU
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. EUT DESCRIPTION

The EUT is an 802.11g Mini PCI Card (transceiver) operating in the 2400-2483.5 MHz band.

3. CLASS II CHANGE DESCRIPTION

- The radio utilizes a lower gain antenna with a maximum peak gain of –0.24 dBi.
- New host system, EUT is installed inside HP laptop model HSTNN-Q09C

4. 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.

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.

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

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 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%.

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**	**Cal Due**
Antenna, Horn 1 ~ 18 GHz	**EMCO**	**3117**	**29310**	**12/26/2004**
Spectrum Analyzer	**HP**	**E4446A**	**US42510266**	**7/23/2004**
Amplifier 1-26GHz	**MITEQ**	**NSP2600-SP**	**924342**	**4/25/2004**
LISN, 10 kHz ~ 30 MHz	**FCC**	**50/250-25-2**	**114**	**10/13/2004**
LISN, 10 kHz ~ 30 MHz	**Solar**	**8012-50-R-24-BNC**	**8379443**	**10/13/2004**
Site A Line Stabilizer / Conditioner	**Tripplite**	**LC-1800a**	**A0051681**	**CNR**
EMI Test Receiver	**R & S**	**ESHS 20**	**827129/006**	**7/17/2004**
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**

7. SETUP OF EQUIPMENT UNDER TEST

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop PC	HP	HSTNN-Q09C	CNF4151HRG	Doc
AC Adapter	HP	PPP0009L	4301096604	n/a

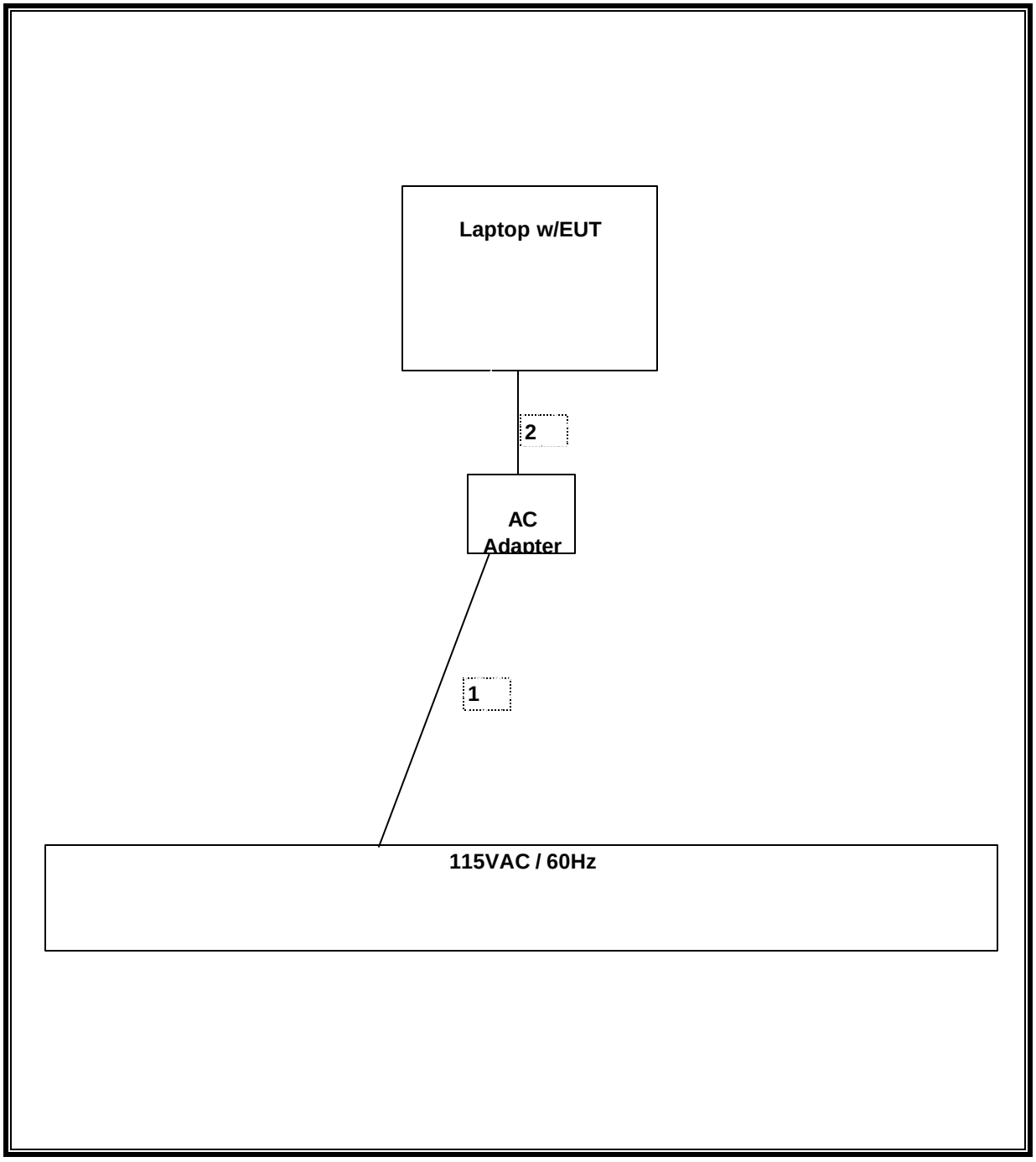
I/O CABLES

I/O CABLE LIST						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	AC	1	IEC	unshielded	1m	none
2	DC	1	DC	unshielded	1m	none

TEST SETUP

The EUT is installed in a host laptop computer. Test software exercised the radio card. EUT is set in continuous transmit mode.

SETUP DIAGRAM FOR TESTS



8. APPLICABLE LIMITS AND TEST RESULTS

8.1. RADIATED EMISSIONS

8.1.1. 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.

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.

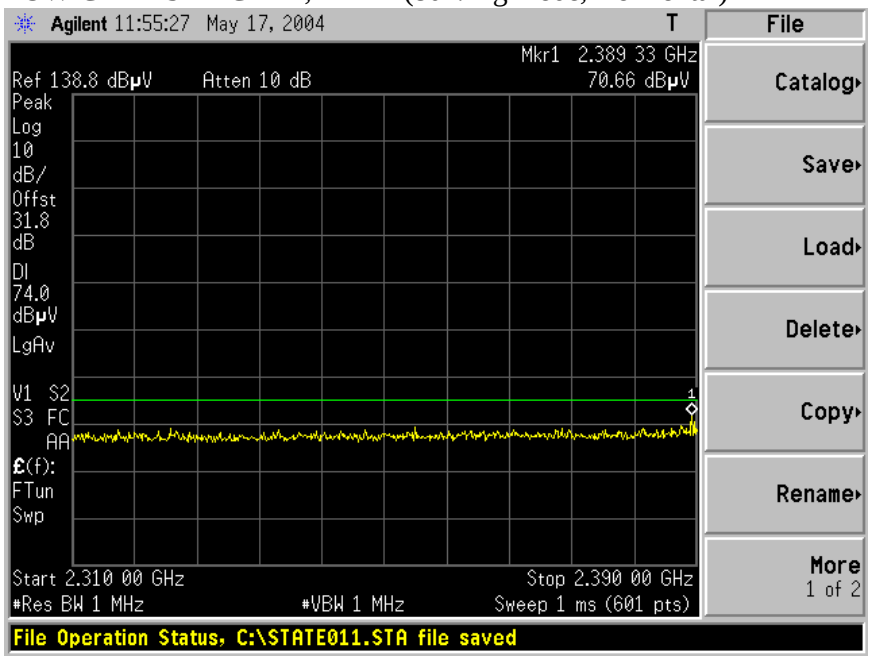
RESULTS

No non-compliance noted:

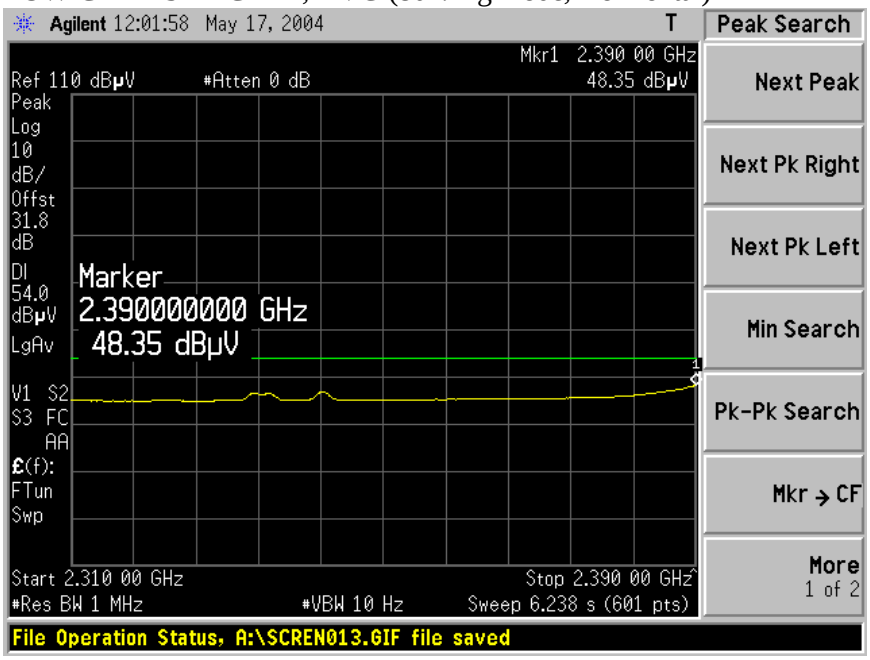
8.1.2. TRANSMITTER RADIATED EMISSIONS ABOVE 1 GHZ

RESTRICTED BANDEDGE (g MODE, LOW CHANNEL, HORIZONTAL)

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

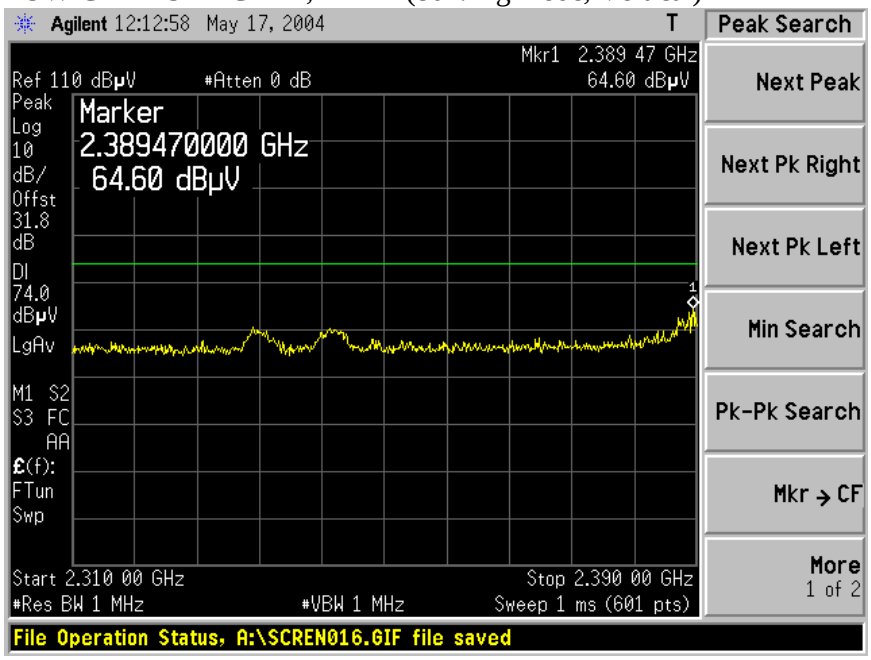


LOW CH RESTRICTED, AVG (802.11g mode, Horizontal)

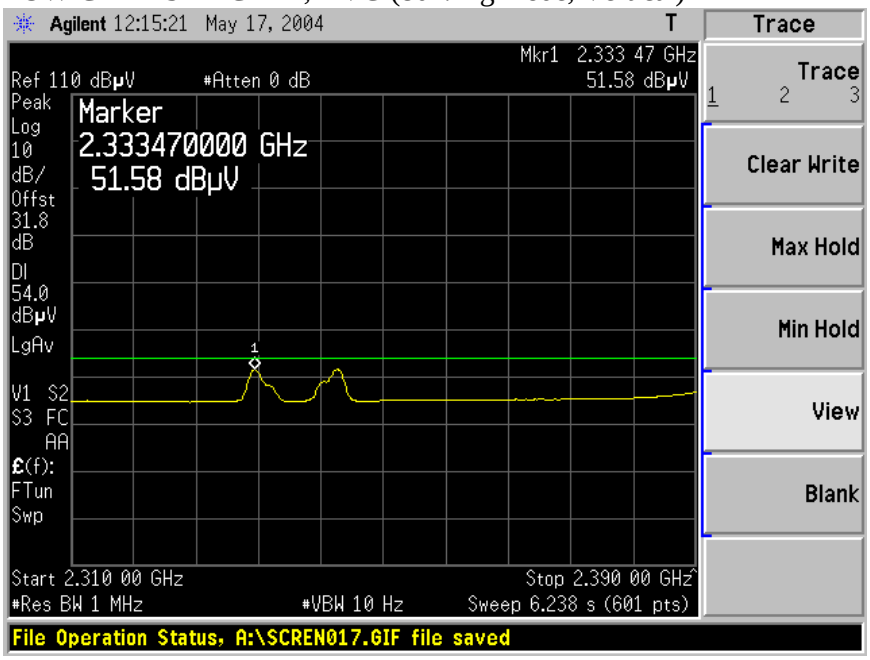


RESTRICTED BANDEDGE (g MODE, LOW CHANNEL, VERTICAL)

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

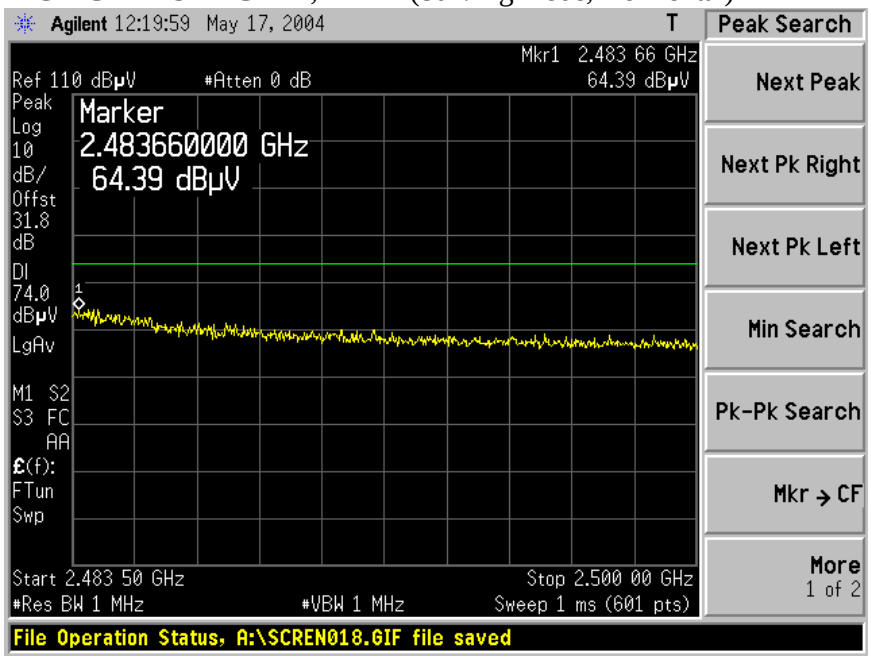


LOW CH RESTRICTED, AVG (802.11g mode, Vertical)

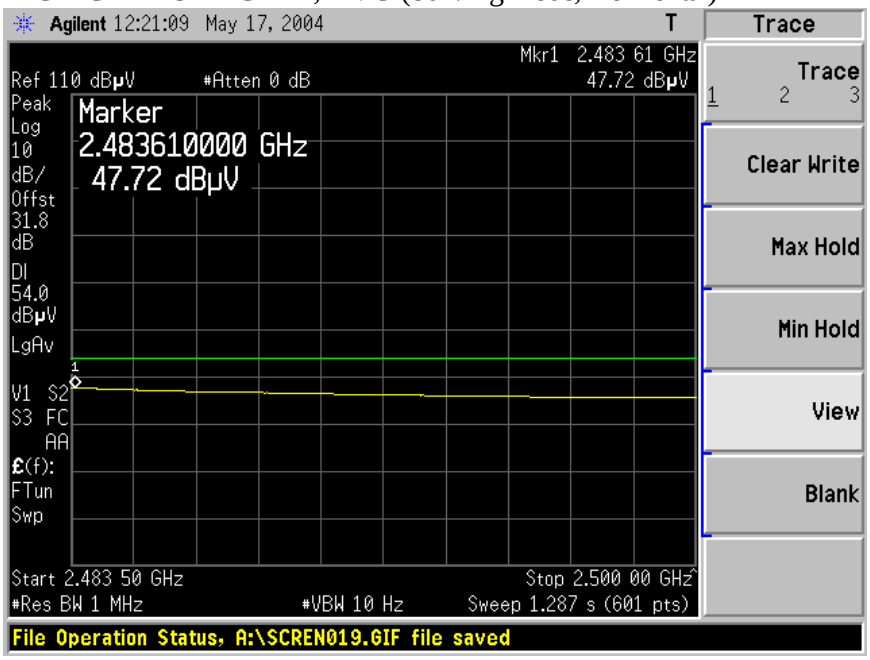


RESTRICTED BANDEDGE (g MODE, HIGH CHANNEL, HORIZONTAL)

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

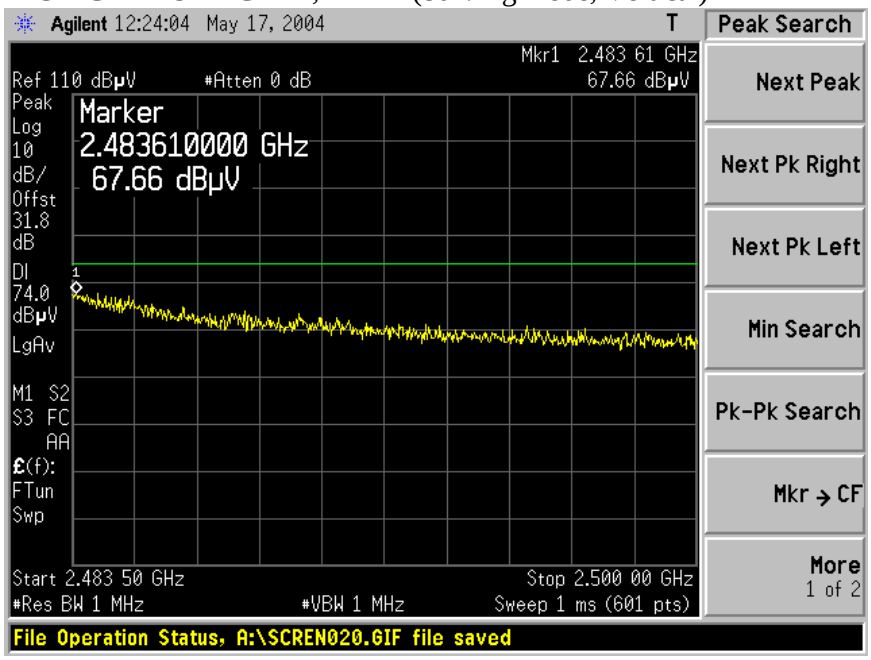


HIGH CH RESTRICTED, AVG (802.11g mode, Horizontal)

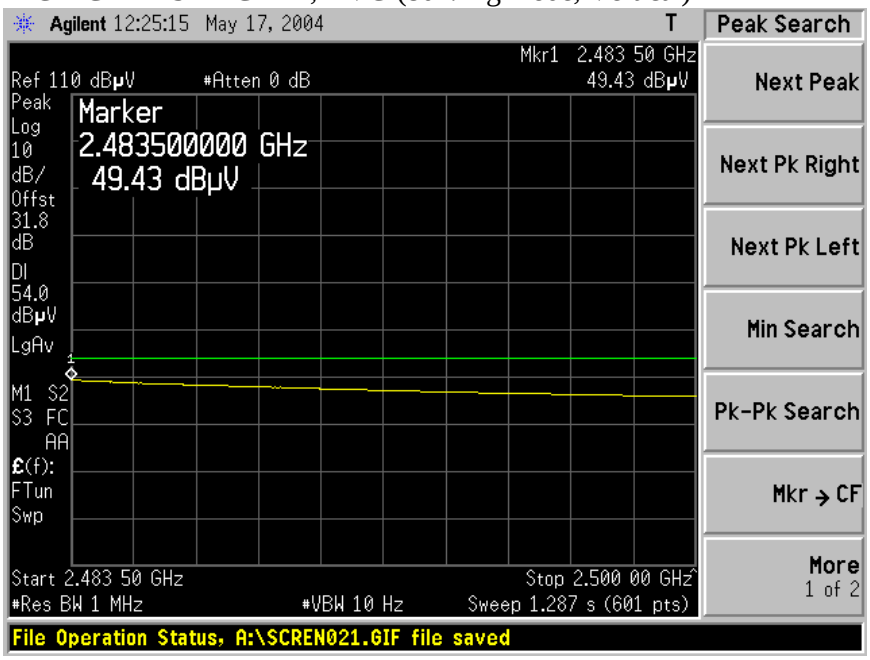


RESTRICTED BANDEDGE (g MODE, HIGH CHANNEL, VERTICAL)

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



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



HARMONICS AND SPURIOUS EMISSIONS (g MODE)

05/17/04 **High Frequency Measurement**
Compliance Certification Services, Morgan Hill 5m chamber

Test Engr: Ben
Project #: 04U2729-1
Company: BROADCOM
EUT Descrip.: HP Portable w/ K-2 Antenna
EUT M/N: HSTNN-Q09C
Test Target: FCC B
Mode Oper: TX 11g

Test Equipment:

EMCO Horn 1-18GHz	Spectrum Analyzer	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz
T120: S/N: 29310 @3m	Agilent E4446A Analyzer	T87 Miteq 924342		

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

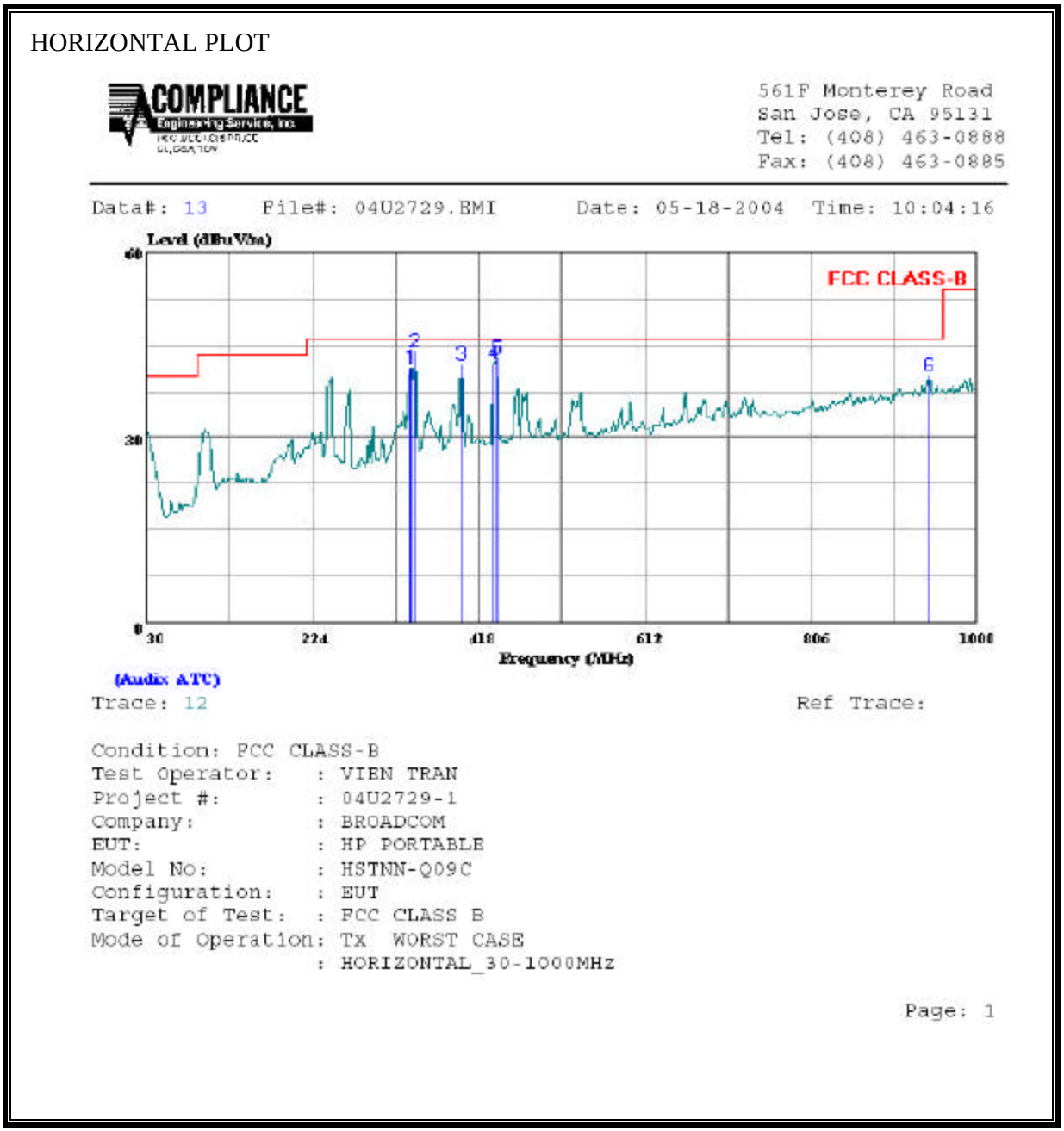
f GHz	Dist feet	Read Pk dBuV	Read Avg dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	HPF	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes
11g Low Ch. 2412 MHz															
4.824	9.8	51.9	40.1	34.5	3.1	-44.7	0.0	1.0	45.8	34.0	74.0	54.0	-28.2	-20.0	V
4.824	9.8	50.6	39.7	34.5	3.1	-44.7	0.0	1.0	44.5	33.6	74.0	54.0	-29.5	-20.4	H
11g Mid Ch. 2437 MHz															
4.874	9.8	51.6	39.8	34.6	3.2	-44.7	0.0	1.0	45.6	33.8	74.0	54.0	-28.4	-20.2	H
7.311	9.8	49.6	36.1	36.5	4.0	-44.5	0.0	1.0	46.5	33.0	74.0	54.0	-27.5	-21.0	H
4.874	9.8	48.9	35.9	34.6	3.2	-44.7	0.0	1.0	42.9	29.9	74.0	54.0	-31.1	-24.1	V
7.311	9.8	46.8	34.7	36.5	4.0	-44.5	0.0	1.0	43.7	31.6	74.0	54.0	-30.3	-22.4	V
11g High Ch. 2462 MHz															
4.924	9.8	50.0	38.1	34.6	3.2	-44.8	0.0	1.0	44.0	32.1	74.0	54.0	-30.0	-21.9	V
7.386	9.8	50.7	38.6	36.5	4.0	-44.5	0.0	1.0	47.7	35.6	74.0	54.0	-26.3	-18.4	V
4.924	9.8	51.3	38.1	34.6	3.2	-44.8	0.0	1.0	45.3	32.1	74.0	54.0	-28.7	-21.9	H
7.386	9.8	49.2	36.7	36.5	4.0	-44.5	0.0	1.0	46.2	33.7	74.0	54.0	-27.8	-20.3	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		

8.1.3. WORST-CASE RADIATED EMISSIONS BELOW 1 GHz

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

HORIZONTAL PLOT



HORIZONTAL DATA

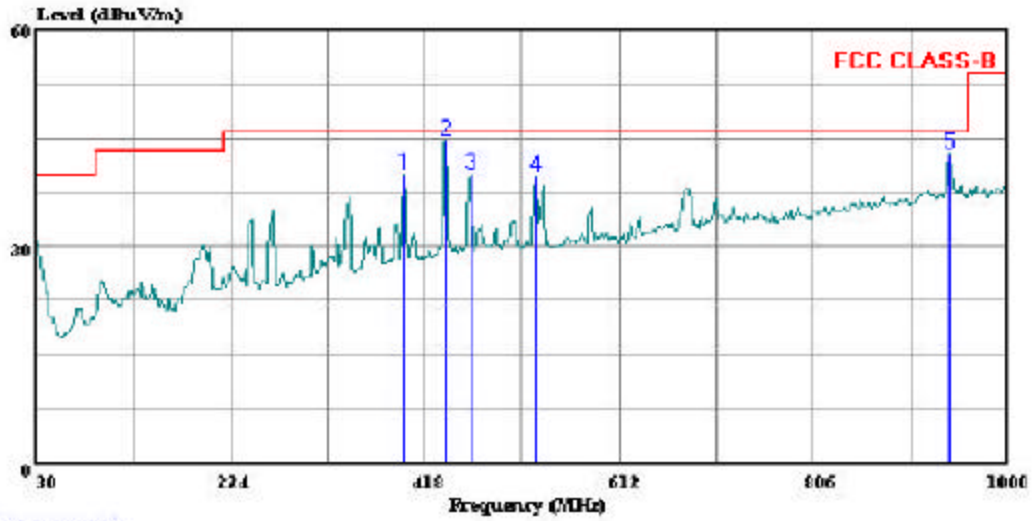
	Freq	Remark	Read Level	Factor	Level	Limit Line	Over Limit
	MHz		dBuV	dB	dBuV/m	dBuV/m	dB
1	337.490	Peak	24.57	16.61	41.18	46.00	-4.82
2	342.340	Peak	27.06	16.71	43.77	46.00	-2.23
3	397.630	Peak	23.57	18.15	41.72	46.00	-4.28
4	434.490	Peak	22.95	19.04	41.99	46.00	-4.01
5	439.340	Peak	23.64	19.20	42.84	46.00	-3.16
6	943.740	Peak	13.20	26.88	40.08	46.00	-5.92

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

VERTICAL PLOT

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

Data#: 10 File#: 04U2729.EMI Date: 05-18-2004 Time: 10:35:58



(Audix & TC)
Trace: 9 Ref Trace:

Condition: FCC CLASS-B
Test Operator: : VIEN TRAN
Project #: : 04U2729-1
Company: : BROADCOM
EUT: : HP PORTABLE
Model No: : HSTNN-Q09C
Configuration: : EUT
Target of Test: : FCC CLASS B
Mode of Operation: Tx WORST CASE
: VERTICAL_30-1000MHz

Page: 1

VERTICAL DATA

	Freq	Remark	Read Level	Factor	Level	Limit Line	Over Limit
	MHz		dBuV	dB	dBuV/m	dBuV/m	dB
1	397.630	Peak	21.95	18.15	40.10	46.00	-5.90
2	439.340	Peak	25.42	19.20	44.62	46.00	-1.38
3	463.590	Peak	20.19	19.78	39.97	46.00	-6.03
4	528.580	Peak	18.76	20.98	39.74	46.00	-6.26
5	940.830	Peak	16.07	26.83	42.90	46.00	-3.10

8.2. 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

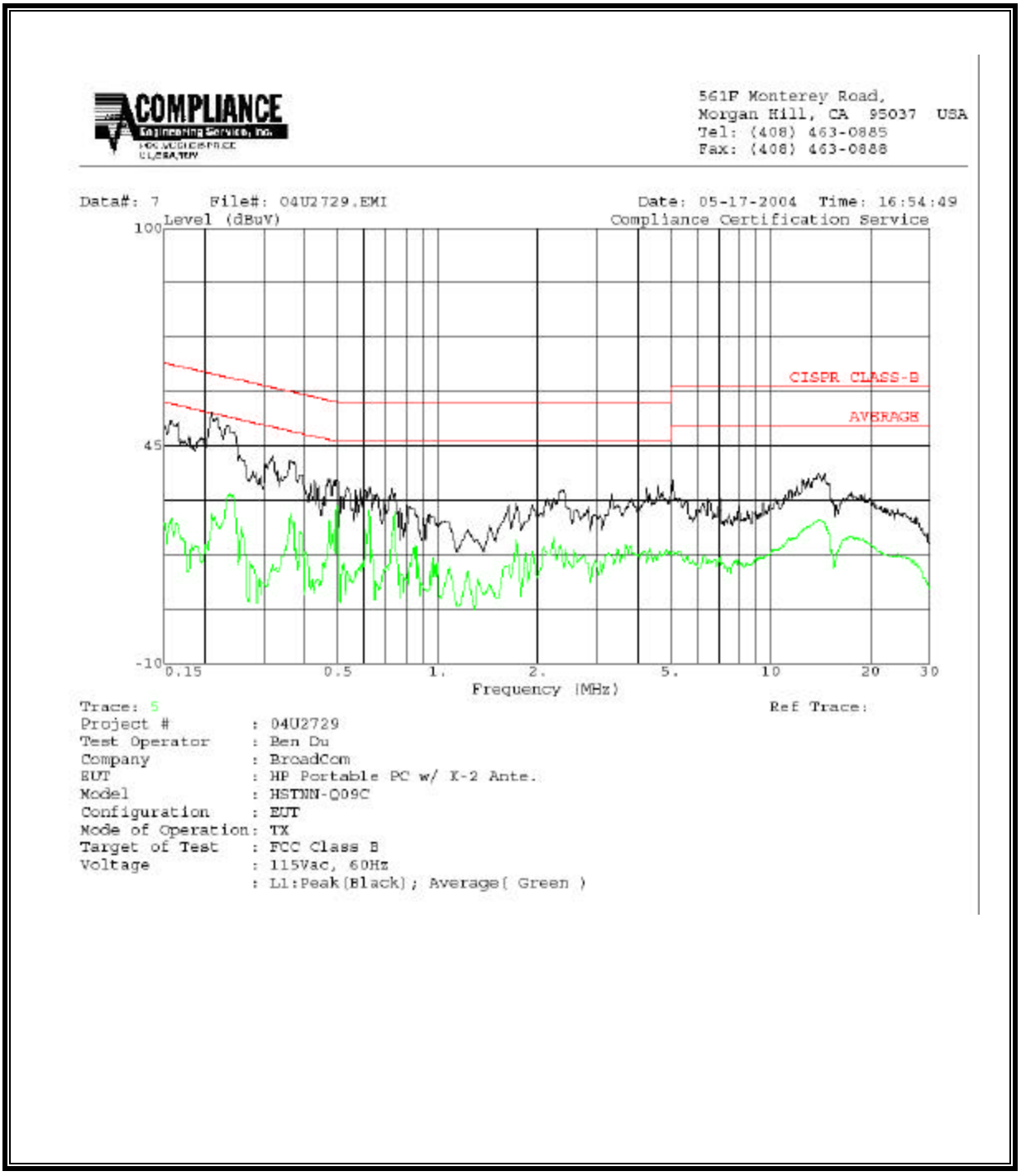
No non-compliance noted:

6 WORST EMISSIONS

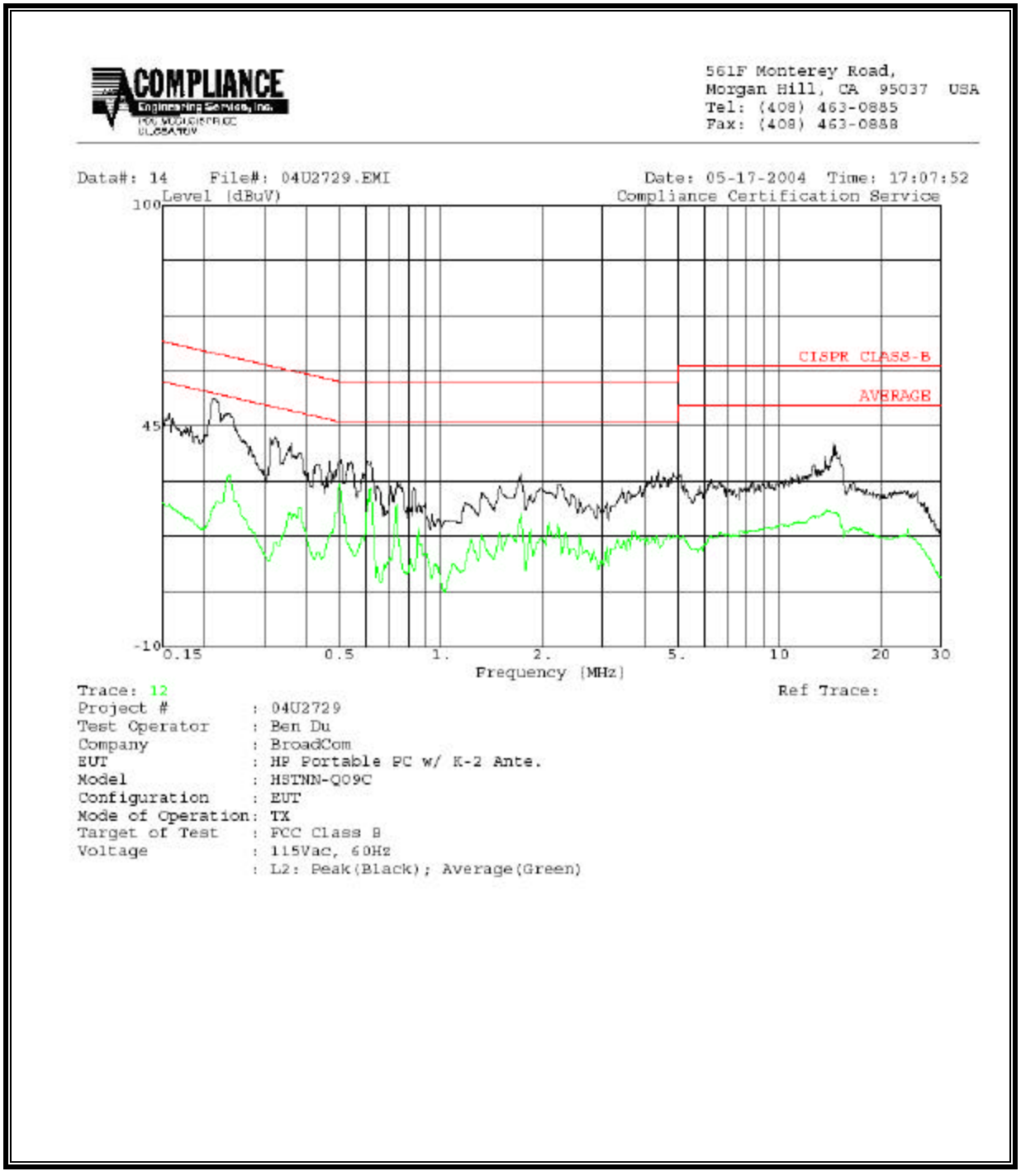
CONDUCTED EMISSIONS DATA (115VAC 60Hz)

Freq.	Reading			Closs	Limit	EN_B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.21	53.56	--	28.29	0.00	64.31	54.31	-10.75	-26.02	L1
0.24	49.86	--	32.65	0.00	63.51	53.51	-13.65	-20.86	L1
4.57	35.22	--	28.87	0.00	56.00	46.00	-20.78	-17.13	L1
0.21	51.78	--	32.69	0.00	64.17	54.17	-12.39	-21.48	L2
0.32	41.60	--	30.51	0.00	61.14	51.14	-19.54	-20.63	L2
14.41	40.54	--	23.75	0.00	60.00	50.00	-19.46	-26.25	L2
6 Worst Data									

LINE 1 RESULTS



LINE 2 RESULTS



9. SETUP PHOTOS

RADIATED RF MEASUREMENT SETUP

RADIATED FRONT PHOTO

RADIATED BACK PHOTO

RADIATED 30-1000 MHz FRONT

30-1000MHz FRONT PHOTO

30-1000MHz FRONT PHOTO

POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP

LINE CONDUCTED FRONT PHOTO

LINE CONDUCTED BACK PHOTO

END OF REPORT