



**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
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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: BCM94306MP5G

DATE TESTED: MAY 17 – MAY 18, 2004

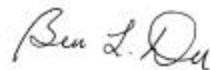
APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 15 SUBPART C	NO NON-COMPLIANCE NOTED

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:

Tested By:



NEELESH RAJ
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

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

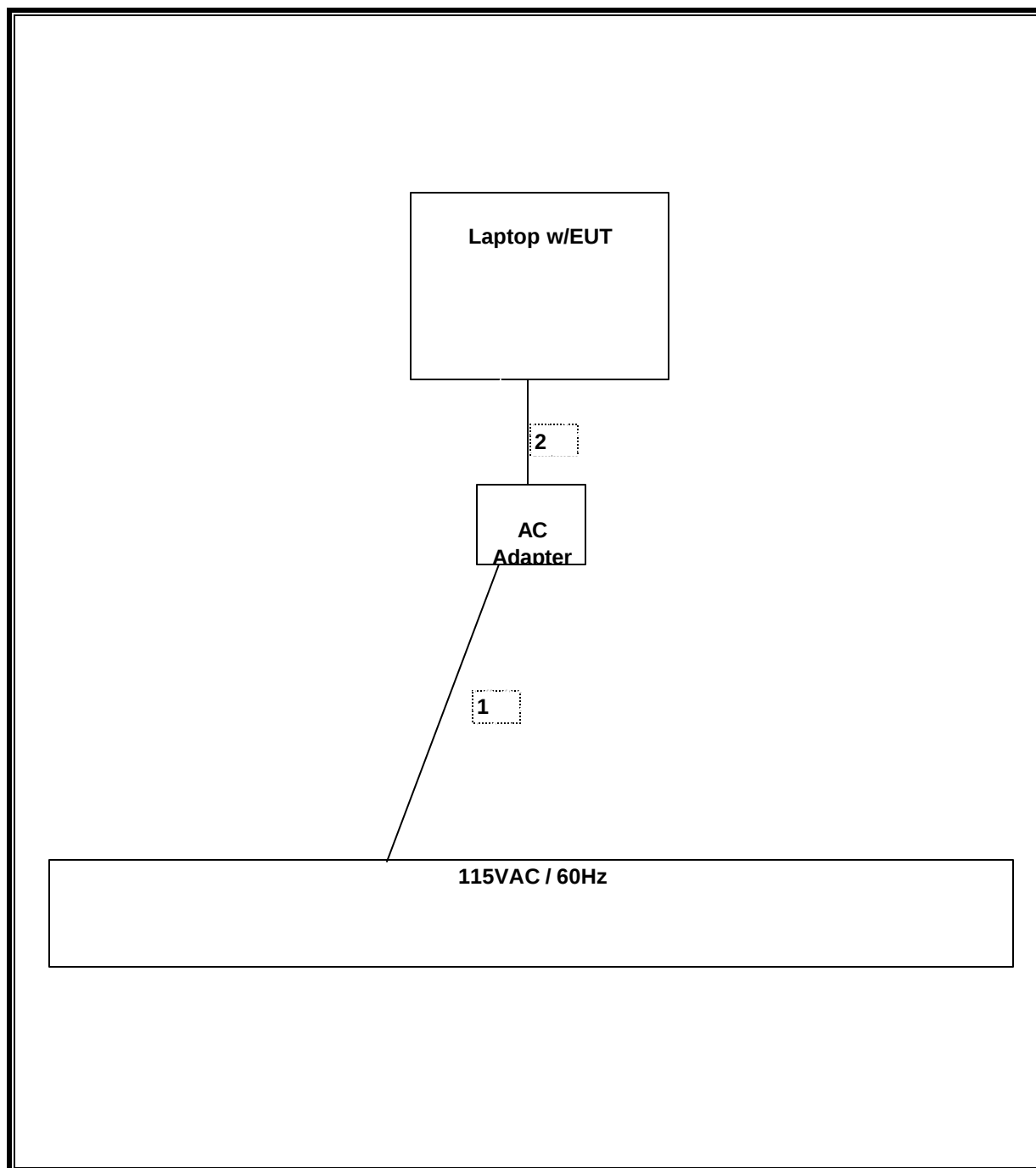
PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop PC AC Adapter	HP HP	HSTNN-Q09C PPP0009L	CNF4151HRG 4301096604	Doc n/a

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.

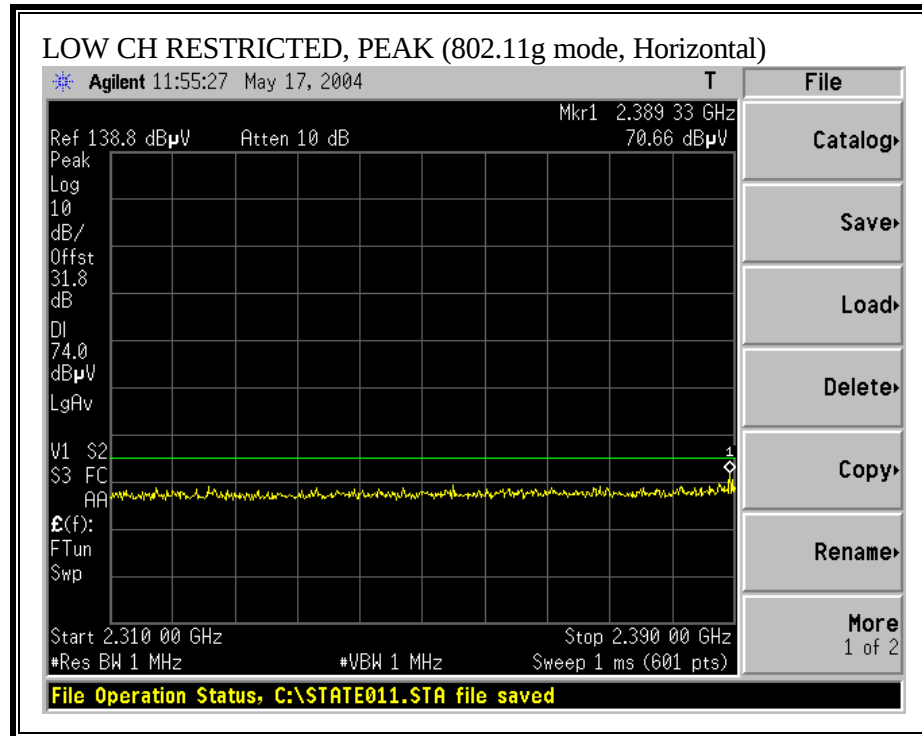
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

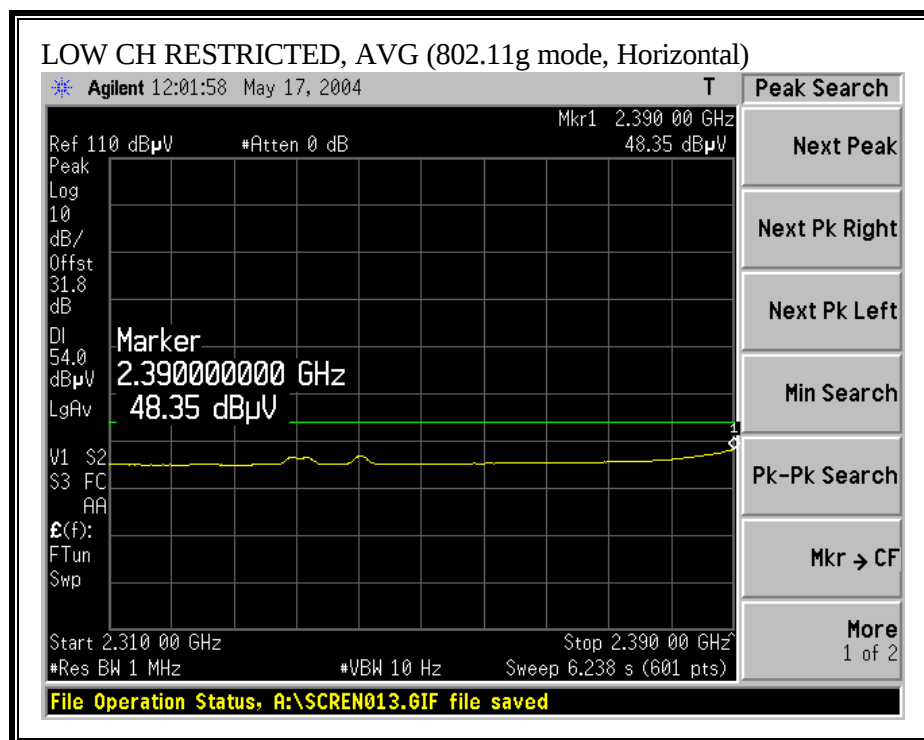
RESULTS

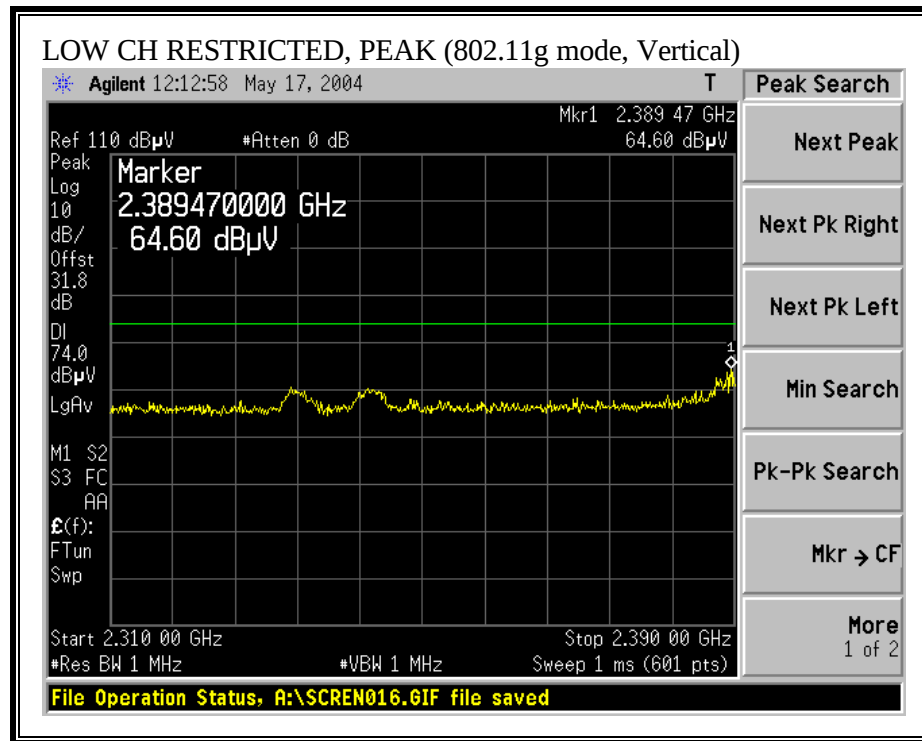
No non-compliance noted:

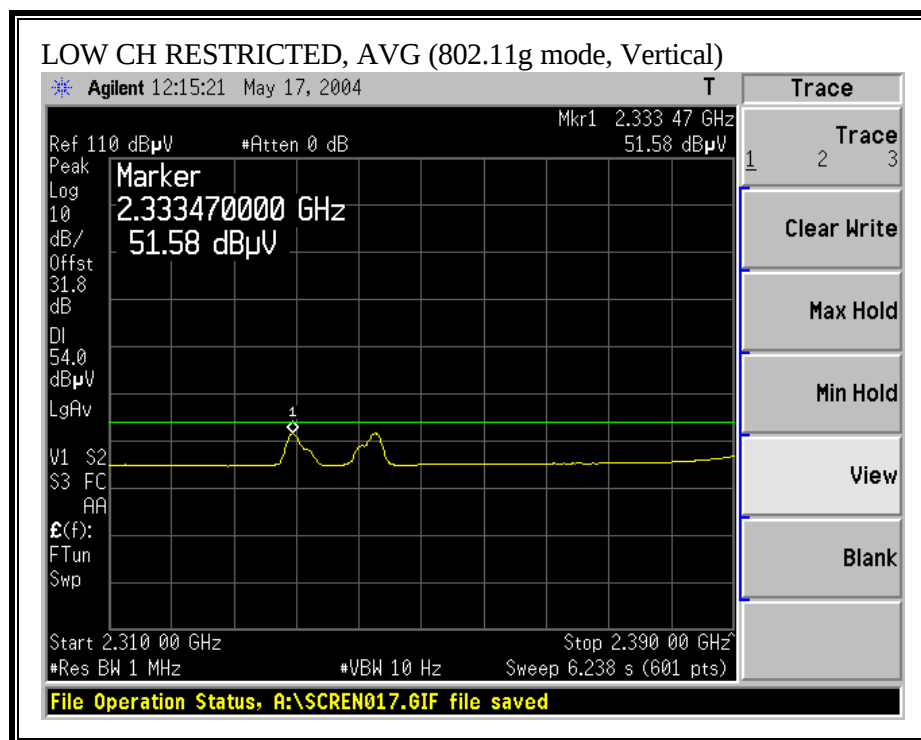
8.1.2. TRANSMITTER RADIATED EMISSIONS ABOVE 1 GHZ

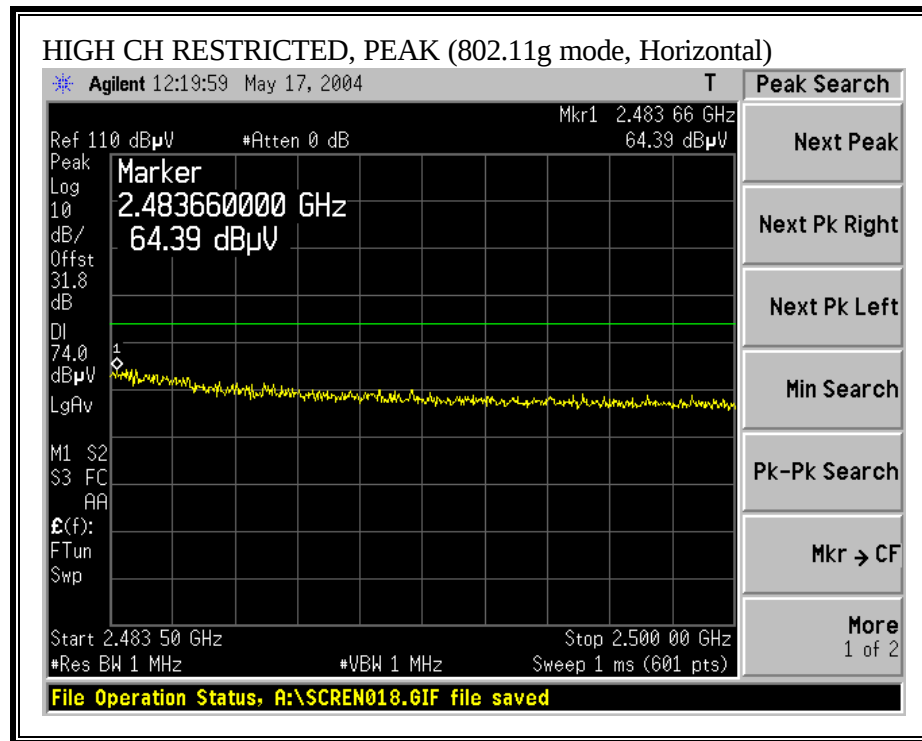
RESTRICTED BANDEDGE (g MODE, LOW CHANNEL, HORIZONTAL)

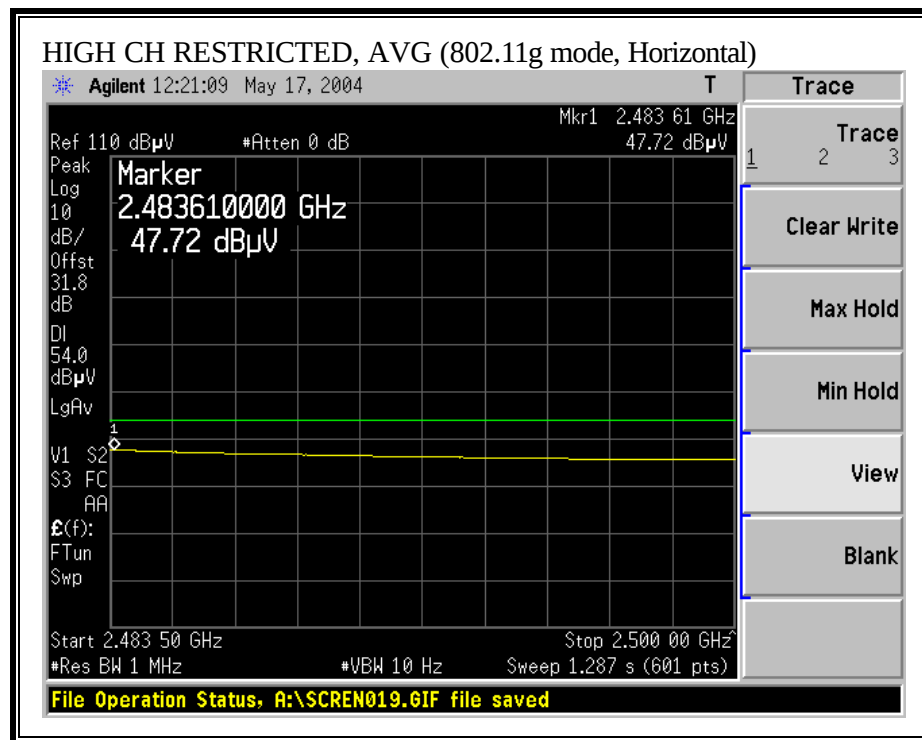


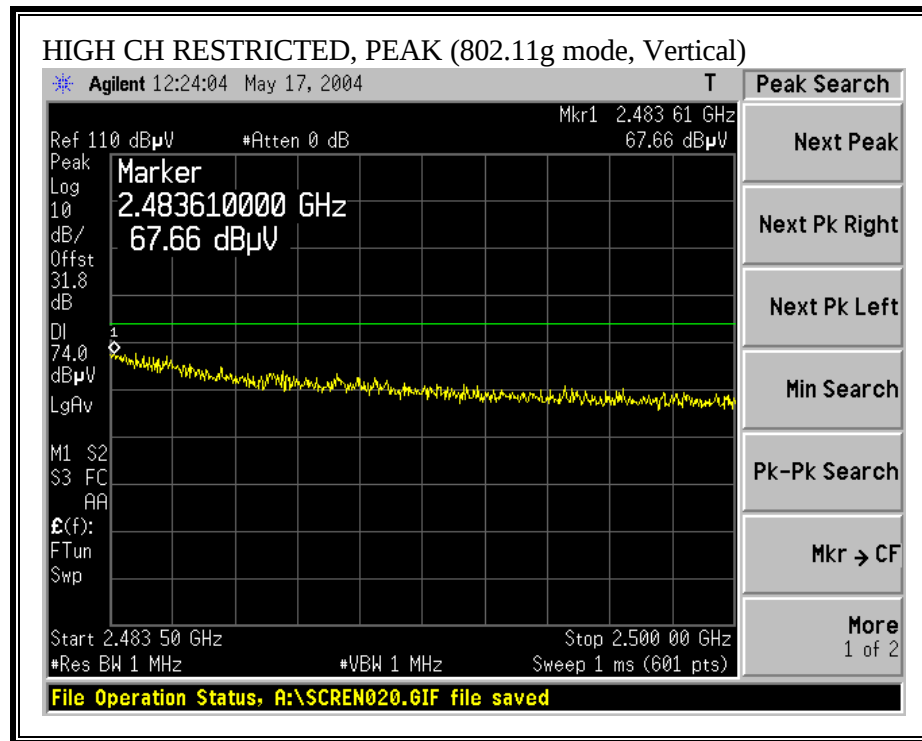


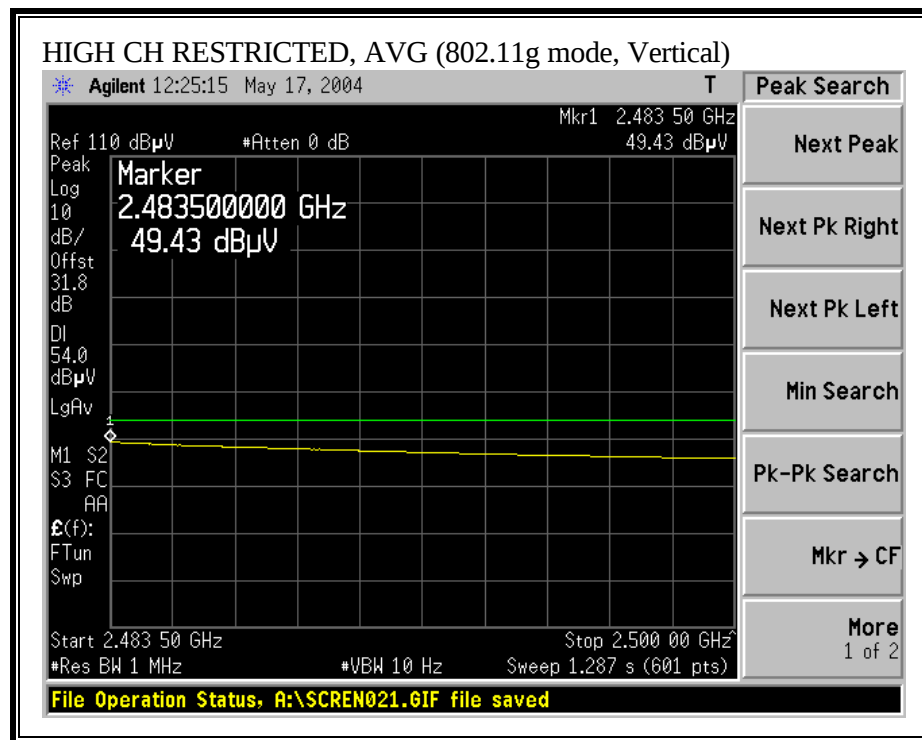
RESTRICTED BANDEDGE (g MODE, LOW CHANNEL, VERTICAL)



RESTRICTED BANDEDGE (g MODE, HIGH CHANNEL, HORIZONTAL)



RESTRICTED BANDEDGE (g MODE, HIGH CHANNEL, VERTICAL)

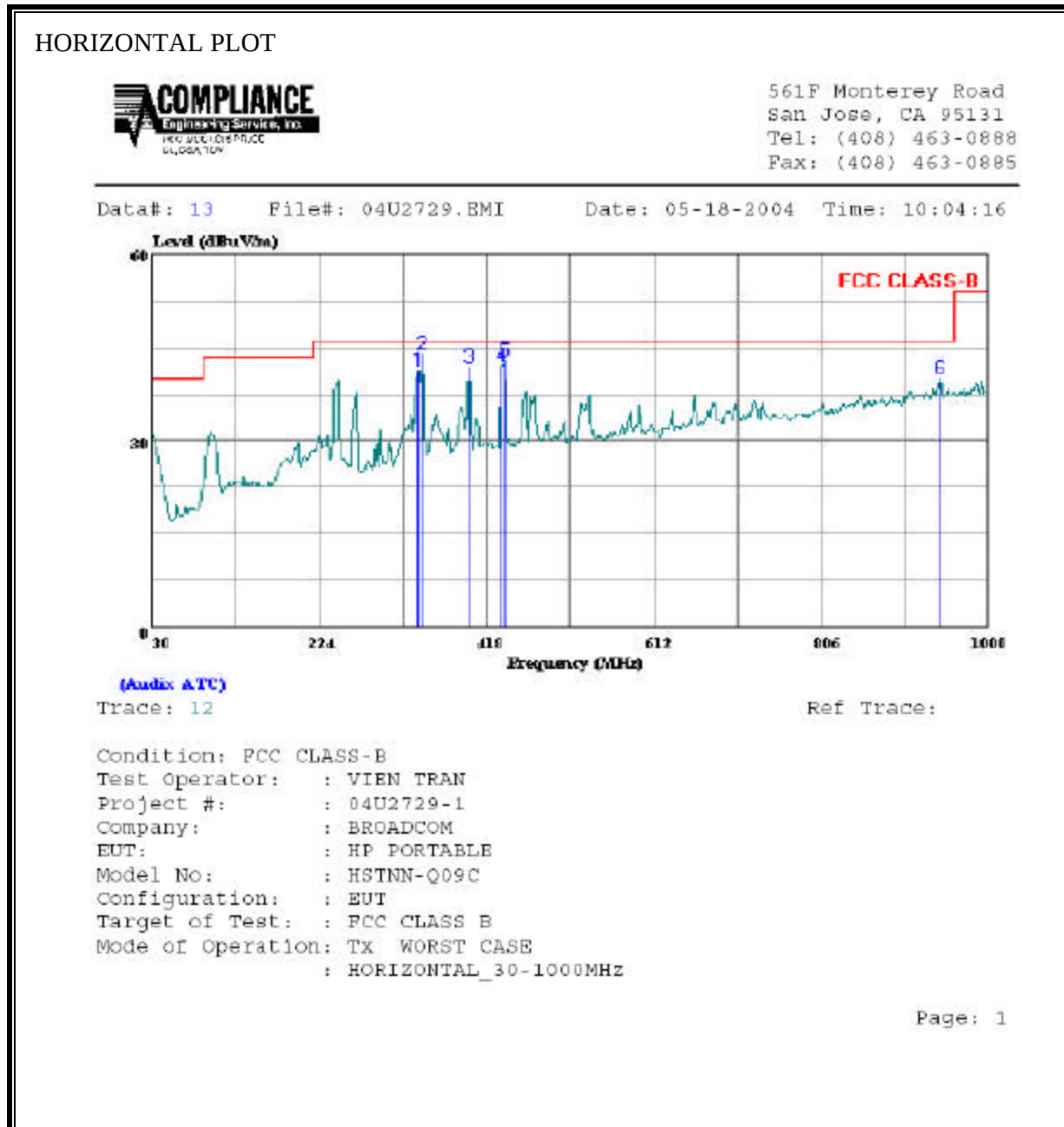


HARMONICS AND SPURIOUS EMISSIONS (g MODE)

05/17/04 High Frequency Measurement Compliance Certification Services, Morgan Hill 5m chamber Test Engr: Ben Project #: 04U2729-1 Company: BROADCOM EUT Descr: HP Portable w/ K-2 Antenna EUT MN: HSTNN-Q09C Test Target: FCC B Mode Oper: TX 11g															
Test Equipment:															
EMCO Horn 118GHz T120; SN: 29310 @3m		Spectrum Analyzer Agilent E4446A Analyzer		Pre-amplifier 1-26GHz T87 Mitco 924342		Pre-amplifier 26-40GHz		Horn > 18GHz							
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															
4824	9.8	519	401	345	31	-447	00	1.0	458	340	740	540	-282	-20.0	V
4824	9.8	506	397	345	31	-447	00	1.0	445	336	740	540	-295	-20.4	H
11g Mid Ch 2437 MHz															
4874	9.8	516	398	346	32	-447	00	1.0	456	338	740	540	-284	-20.2	H
7311	9.8	496	361	365	40	-445	00	1.0	465	330	740	540	-275	-21.0	H
4874	9.8	489	359	346	32	-447	00	1.0	429	299	740	540	-311	-24.1	V
7311	9.8	468	347	365	40	-445	00	1.0	437	316	740	540	-303	-22.4	V
11g High Ch 2462 MHz															
4924	9.8	500	381	346	32	-448	00	1.0	440	321	740	540	-300	-21.9	V
7386	9.8	507	386	365	40	-445	00	1.0	477	356	740	540	-263	-18.4	V
4924	9.8	513	381	346	32	-448	00	1.0	453	321	740	540	-287	-21.9	H
7386	9.8	492	367	365	40	-445	00	1.0	462	337	740	540	-278	-20.3	H
f Measurement Frequency Dist Distance to Antenna Read Analyzer Reading AF Antenna Factor CL Cable Loss Amp Preamp Gain D Corr Distance Correct to 3 meters Avg Average Field Strength @ 3 m Peak Calculated Peak Field Strength HPF High Pass Filter Avg Lim Average Field Strength Limit Pk Lim Peak Field Strength Limit Avg Mar Margin vs. Average Limit Pk Mar Margin vs. Peak Limit															

8.1.3. WORST-CASE RADIATED EMISSIONS BELOW 1 GHz

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



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

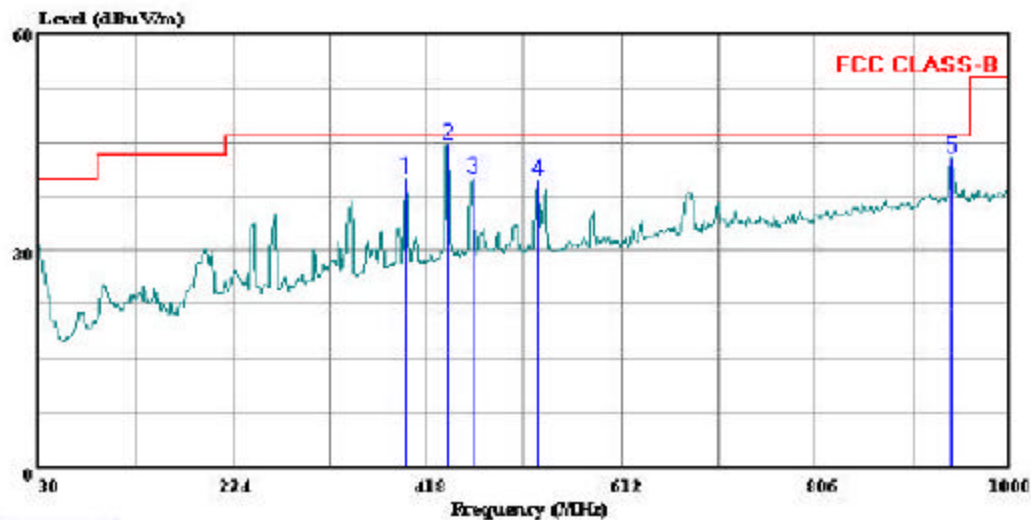
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)

VERTICAL PLOT



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



(Auxiliary ATC)

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 μ H/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.

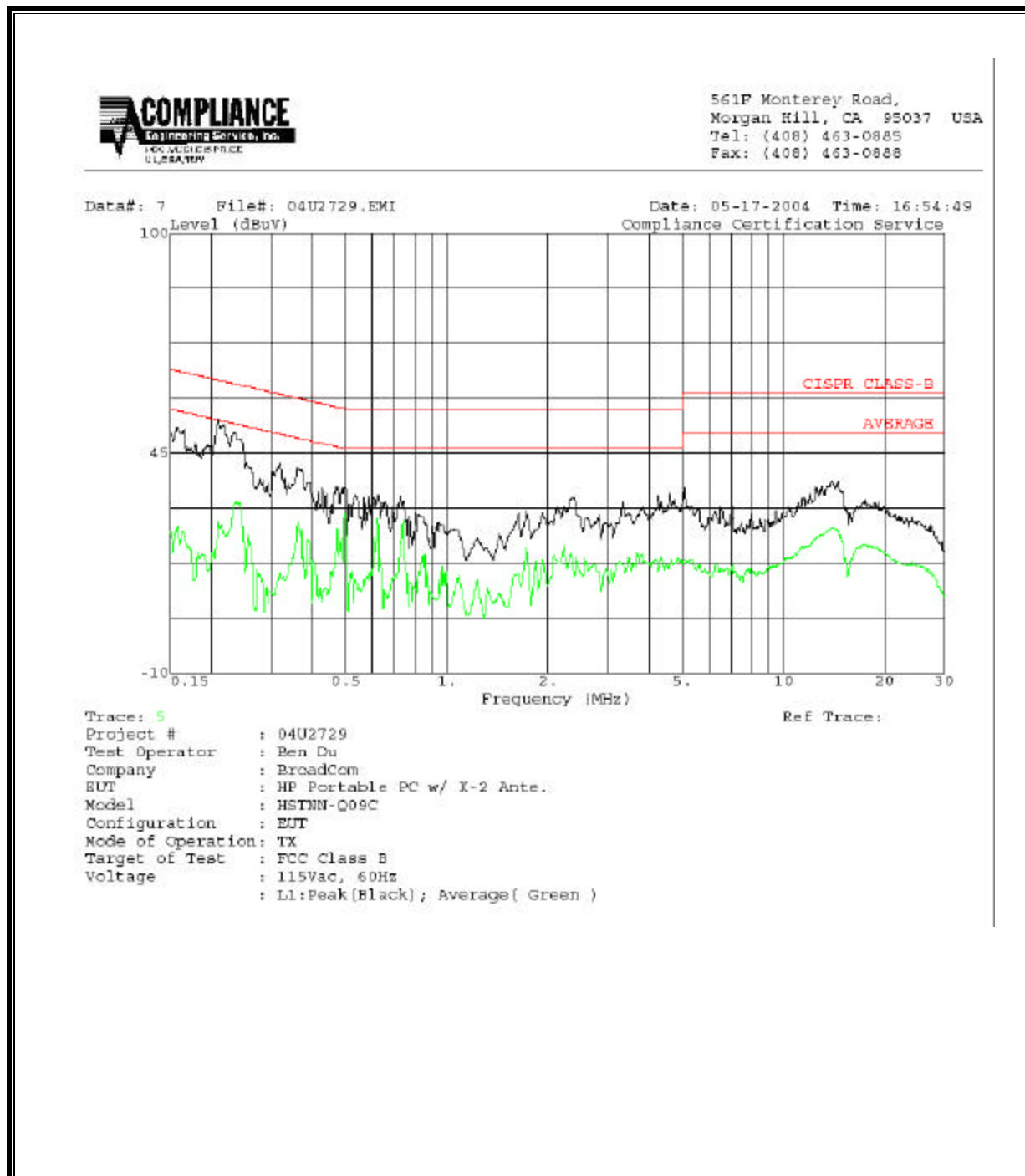
Line conducted data is recorded for both NEUTRAL and HOT lines.

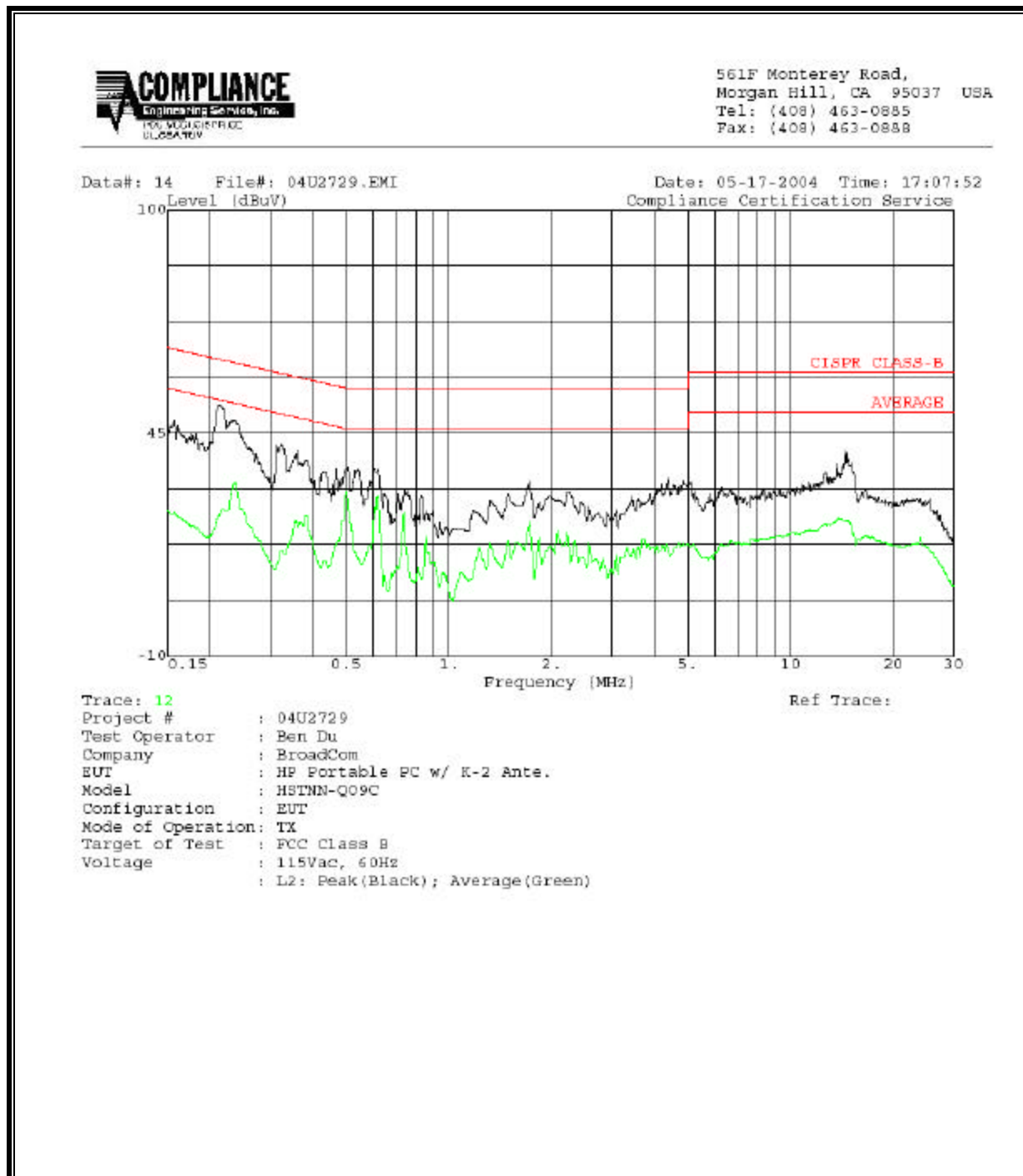
RESULTS

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 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