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

FOR

802.11 a/b/g MINI PCI MODULE

MODEL NUMBER: PH1117-E & PH12127-E

BRAND NAME: PHILIPS

FCC ID: PUBWCM1010

REPORT NUMBER: 03U2040-5

ISSUE DATE: JULY 16, 2003

Prepared for
ACCTON AND PHILIPS WIRELESS NETWORKING
1962 ZANKER ROAD
SAN JOSE, CA 95122
U.S.A

Prepared by
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1. TEST RESULT CERTIFICATION

COMPANY NAME: ACCTON AND PHILIPS WIRELESS NETWORKING
1962 ZANKER ROAD
SAN JOSE, CALIFORNIA 95122 U.S.A

EUT DESCRIPTION: 802.11 a/b/g MINI PCI MODULE

MODEL: PH1117-E & PH12127-E

MODEL DIFFERENCE: The two models are identical. Two model names are for marketing Purposes only.

DATE TESTED: JULY 1 – JULY 16, 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.

Note: The 2.4 and 5.8 GHz bands are applicable to this report; another band of operation (5.2 GHz) is documented in a separate report.

Approved & Released For CCS By:

MIKE HECKROTTE
CHIEF ENGINEER
COMPLIANCE CERTIFICATION SERVICES

Tested By:

VIEN TRAN
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. DESCRIPTION OF CLASS II PERMISSIVE CHANGE

The Philips PH1117-E is a high performance 802.11 a/b/g WLAN client product intended for a laptop application. The difference between PH1117-E and PH12127 is model designation, which is for marketing purposes only.

The Class II Permissive change consists of adding a new antenna type.

The new antenna type consists of a pair of identical multiplayer ceramic chip antennas. This antenna has a maximum gain of 0 dBi.

The output power of the Low (2412 MHz) and High (2462 MHz) channels in g mode operation is reduced by 2 dB in order to comply with the adjacent band restricted limits. New channel port measurements are documented in this report, at the new operating power level.

The power level on the remaining channels and modes is unchanged from the original submission.

The peak output power is 20.58 dBm (114 mW) in the 2400 – 2483.5 MHz band and 20.47 dBm (111 mW) in the 5750 – 5825 MHz band.

For test purposes, the EUT is installed on a cardbus to Mini-PCI extender / adapter, which is subsequently installed in a laptop computer equipped with a cardbus slot and the appropriate radio testing software. The antennas are mounted on a separate printed circuit board.

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 EQUIPMENT LIST

Name of Equipment	Manufacturer	Model No.	Serial No.	Due Date
Antenna, Horn 1 ~ 18 GHz	EMCO	3115	2238	2/4/2004
Amplifier 1-26GHz	MITEQ	NSP2600-SP	924341	4/25/2004
Amplifier 1-26GHz	MITEQ	NSP2600-SP	924342	4/25/2004
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-BNC	837990	9/6/2003
Line Filter	Lindgren	LMF-3489	497	CNR
LISN, 10 kHz ~ 30 MHz	FCC	50/250-25-2	114	9/6/2003
EMI Test Receiver	R & S	ESHS 20	827129/006	7/17/2004
PSA	AGILENT	E4446A	US42070220	1/13/2004
Peak Power Meter	AGILENT	E4416A	6B41291160	8/9/2003
Power Sensor	AGILENT	E9327A	US40440755	8/9/2003
EMI Test Receiver	HP	8542E	3942A00286	11/20/2003
RF Filter Section	HP	85420E	3705A00256	11/20/2003
Bilog Antenna	ARA	LPB-25201A	1185	3/6/2004
10dB Pad	WEINSCHEL	56-10	K16148	N/A
2.4-2.5 GHz Reject Filter	MICROTRONICS	BRM50702	1	N/A
5.725-5.875 GHz Reject Filter	MICROTRONICS	BRC13192	1	N/A

6. SETUP OF EQUIPMENT UNDER TEST

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Device Type	Manufacturer	Model	Serial Number	FCC ID
LAPTOP	IBM	THINKPAD A-30	N/A	DoC
AC ADAPTER	IBM	02K6744	11302K67442S1	N/A
ANTENNA	N/A	N/A	N/A	N/A

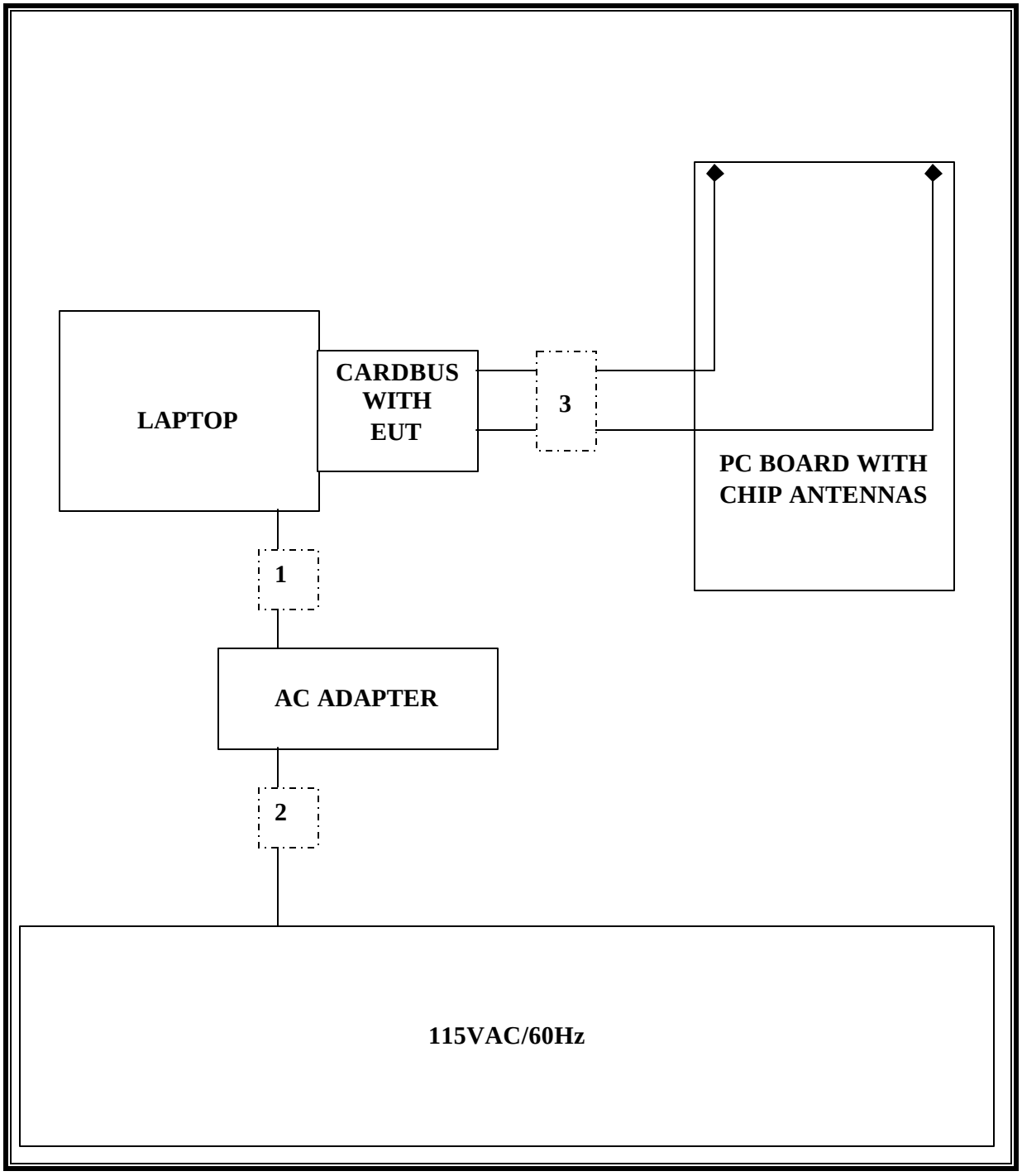
I/O CABLES

Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	PWR	1	DC PWR	UNSHIELDED	1.86M	N/A
2	PWR	1	AC PWR	UNSHIELDED	1.86M	N/A
3	ANTENNA	2	UFL	COAXIAL	0.1M	N/A

TEST SETUP

The EUT is connected to the laptop via a Cardbus-to-MiniPCI adapter / extender and the antennas are mounted within an external PC board.

SETUP DIAGRAM



7. APPLICABLE LIMITS AND TEST RESULTS

7.1. ANTENNA PORT TESTS FOR g MODE LOW AND HIGH CHANNELS AT NEW OPERATING POWER LEVEL

7.1.1. 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 100 kHz. The sweep time is coupled.

RESULTS

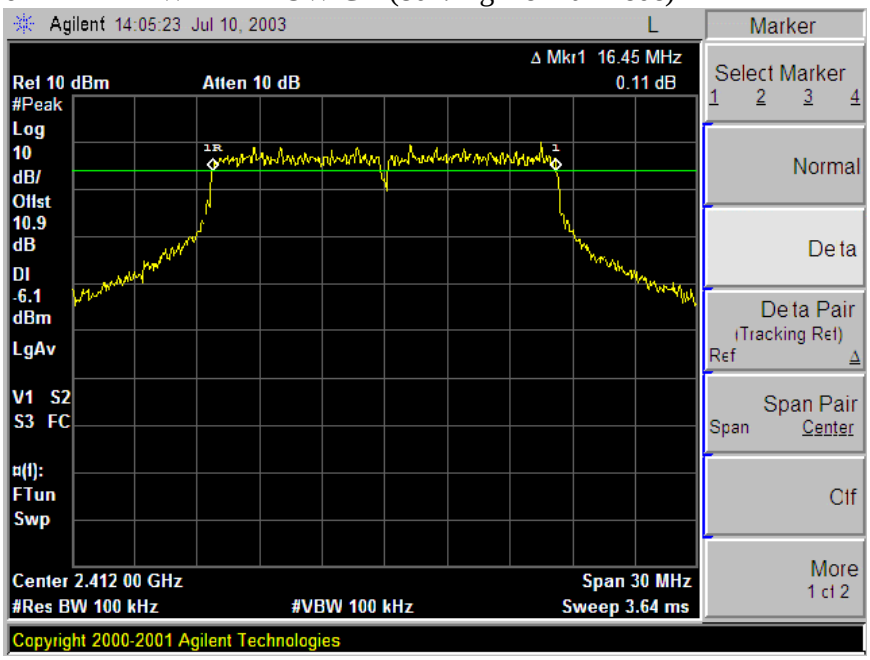
No non-compliance noted:

802.11g Normal Mode

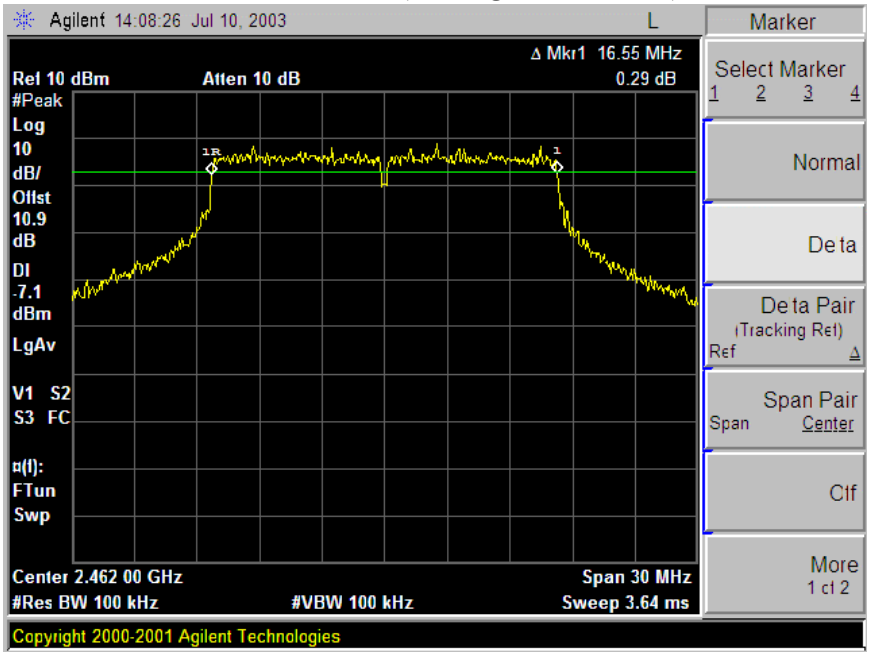
Channel	Frequency (MHz)	6 dB Bandwidth (kHz)	Minimum Limit (kHz)	Margin (kHz)
Low	2412	16450	500	15950
High	2462	16550	500	16050

6 DB BANDWIDTH (802.11g NORMAL MODE)

6 DB BANDWIDTH LOW CH (802.11g Normal mode)



6 DB BANDWIDTH HIGH CH (802.11g Normal mode)



7.1.2. 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

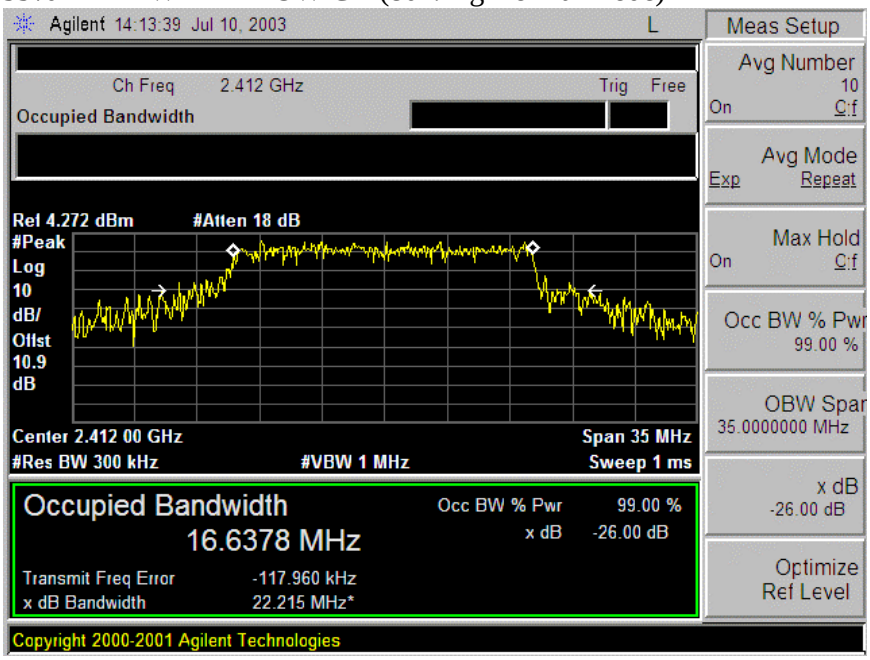
No non-compliance noted:

802.11g Normal Mode

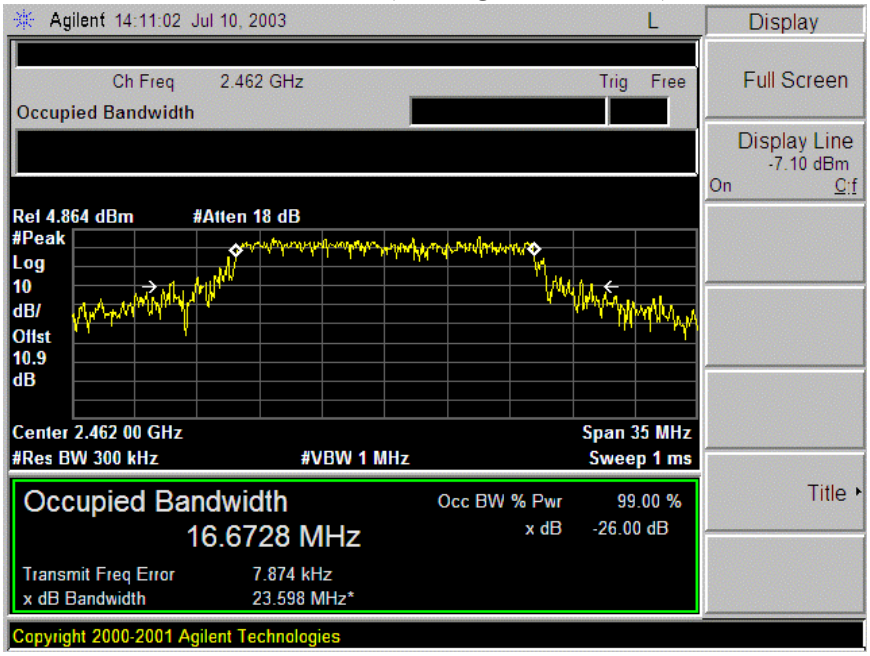
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	16.6378
High	2462	16.6728

99% BANDWIDTH (802.11g NORMAL MODE)

99% BANDWIDTH LOW CH (802.11g Normal mode)



99% BANDWIDTH HIGH CH (802.11g Normal mode)



7.1.3. 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 0 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.

RESULTS

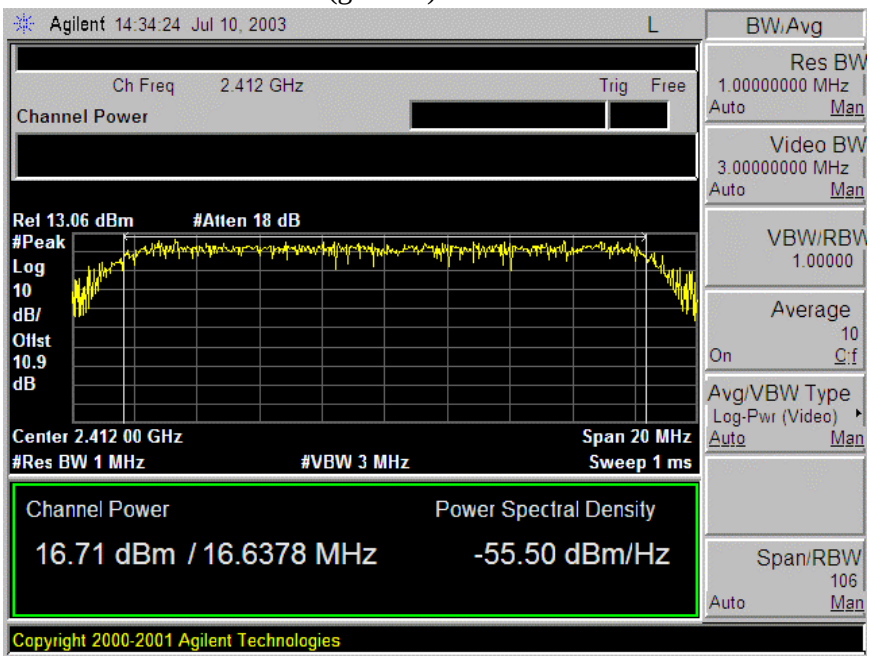
No non-compliance noted:

802.11g Normal Mode

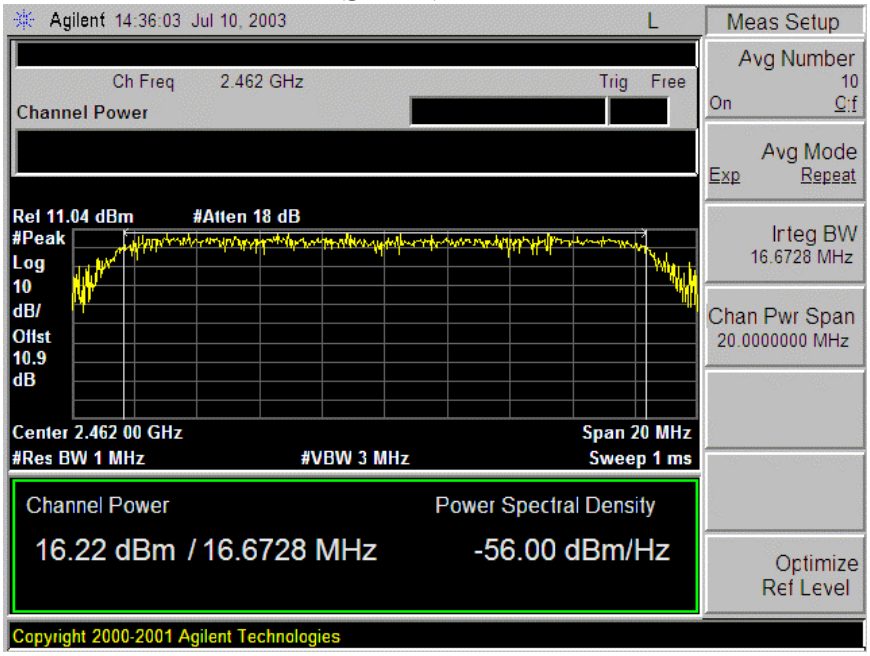
Channel	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	16.71	30	-13.29
High	2462	16.22	30	-13.78

OUTPUT POWER (802.11g NORMAL MODE)

PEAK POWER LOW CH (g mode)



PEAK POWER HIGH CH (g mode)



7.1.4. 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 10.9 dB (including 10 dB pad and 0.9 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

802.11g Normal Mode

Channel	Frequency (MHz)	Average Power (dBm)
Low	2412	12.22
High	2462	12.02

7.1.5. 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 >= 3KHz, 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

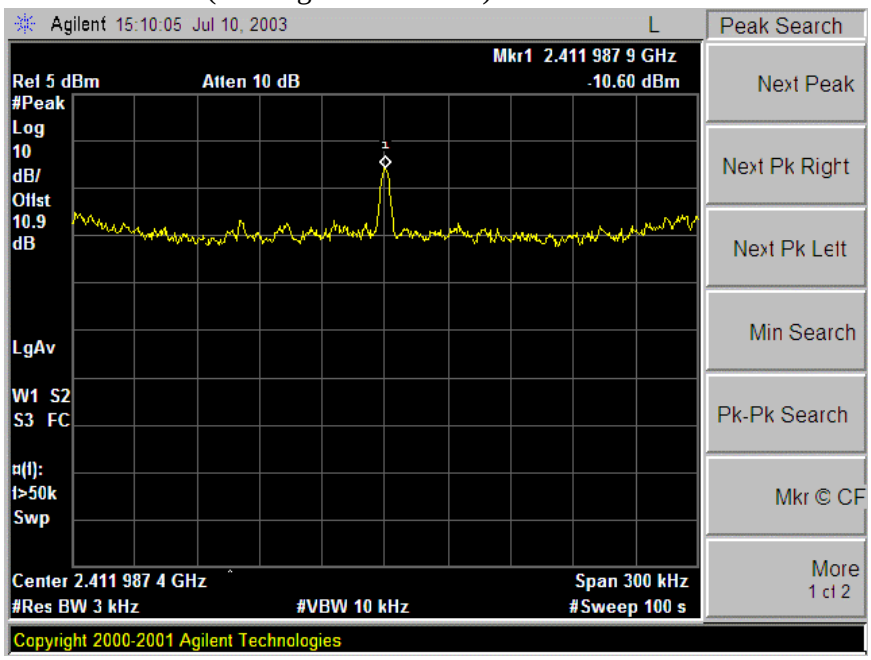
No non-compliance noted:

802.11g Normal Mode

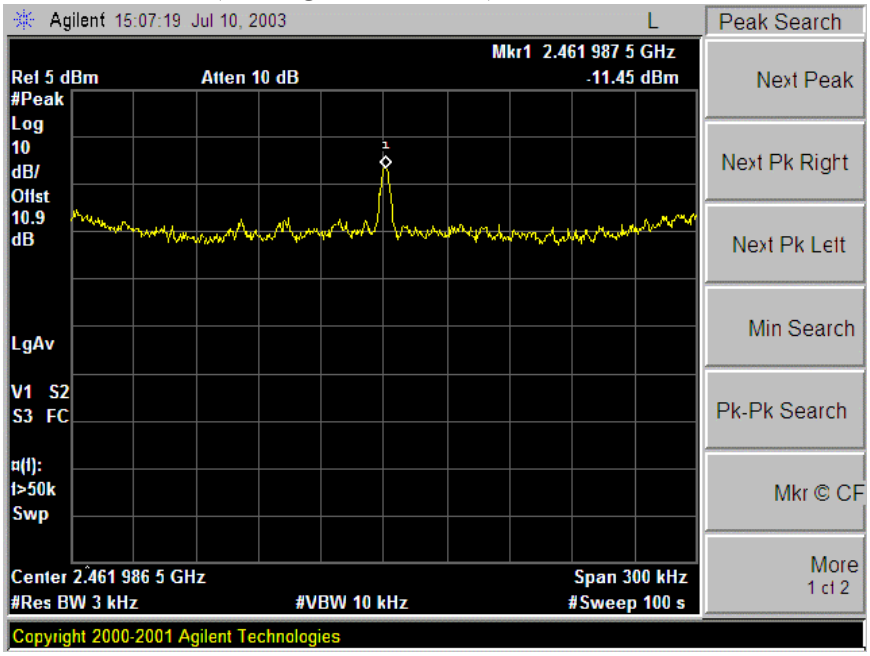
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-10.60	8	-18.60
High	2462	-11.45	8	-19.45

PEAK POWER SPECTRAL DENSITY (802.11g NORMAL MODE)

PPSD LOW CH (802.11g Normal mode)



PPSD HIGH CH (802.11g Normal mode)



7.1.6. 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 100 kHz.

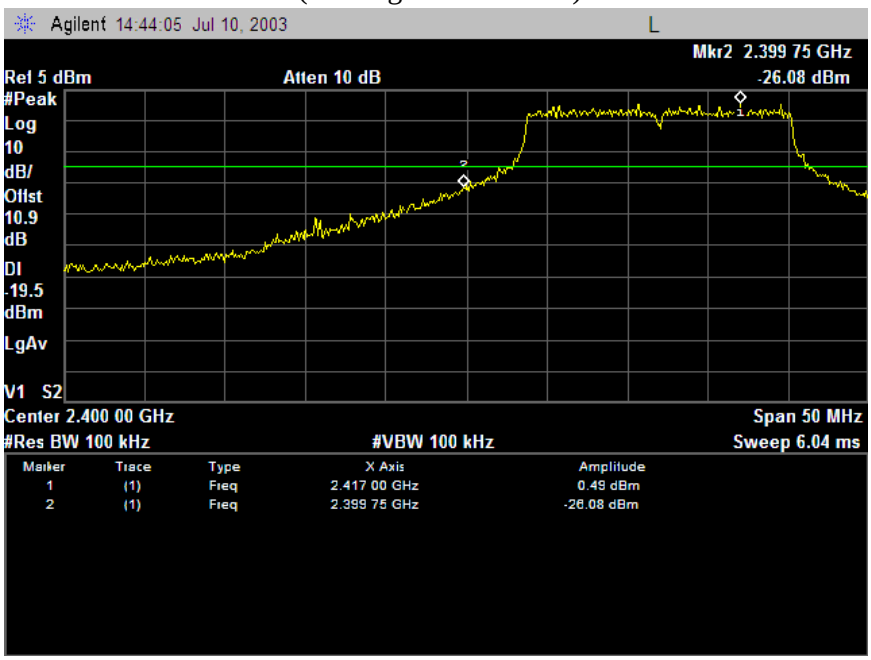
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

RESULTS

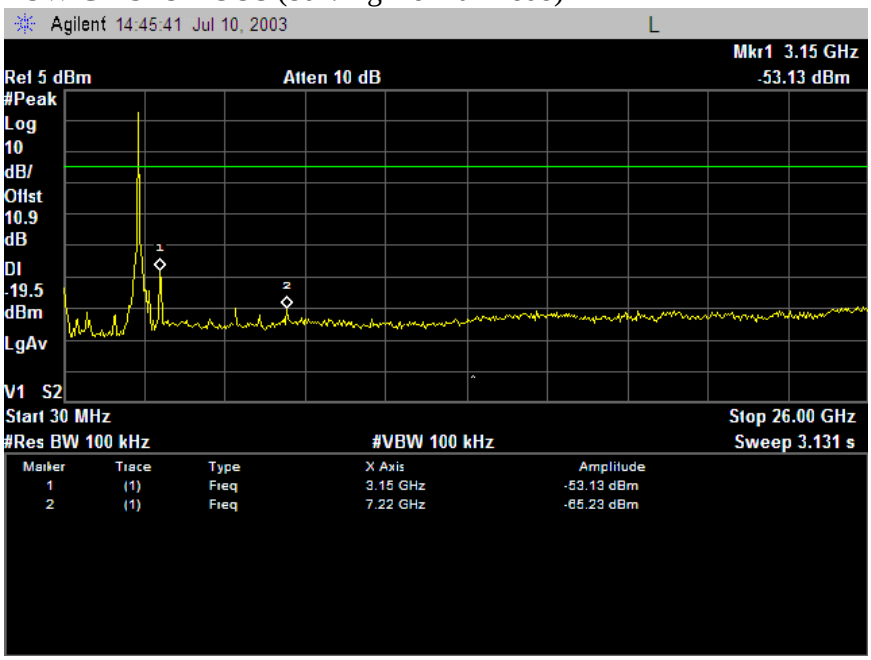
No non-compliance noted:

SPURIOUS EMISSIONS, LOW CHANNEL (802.11g NORMAL MODE)

LOW CH BANDEDGE (802.11g Normal mode)

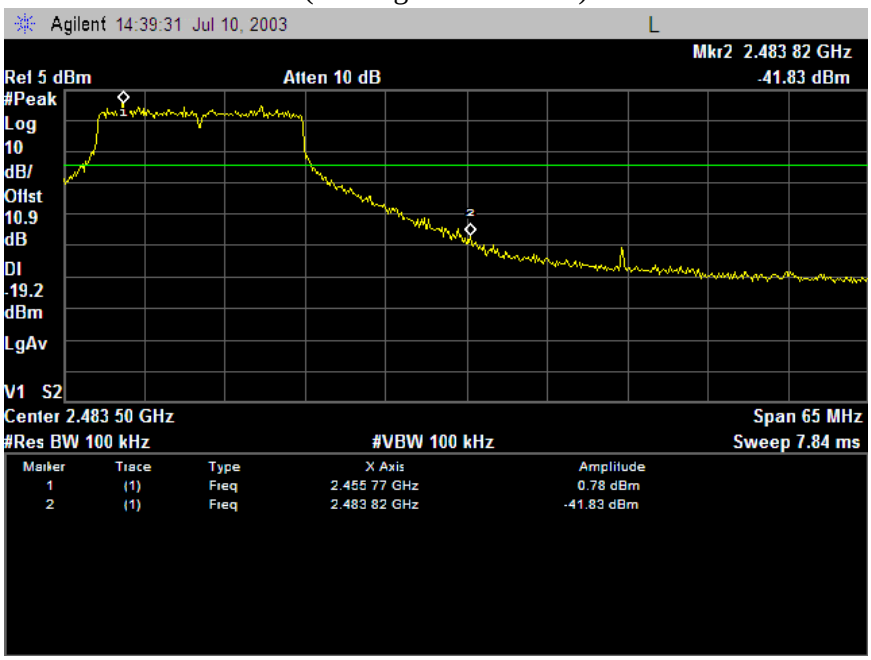


LOW CH SPURIOUS (802.11g Normal mode)

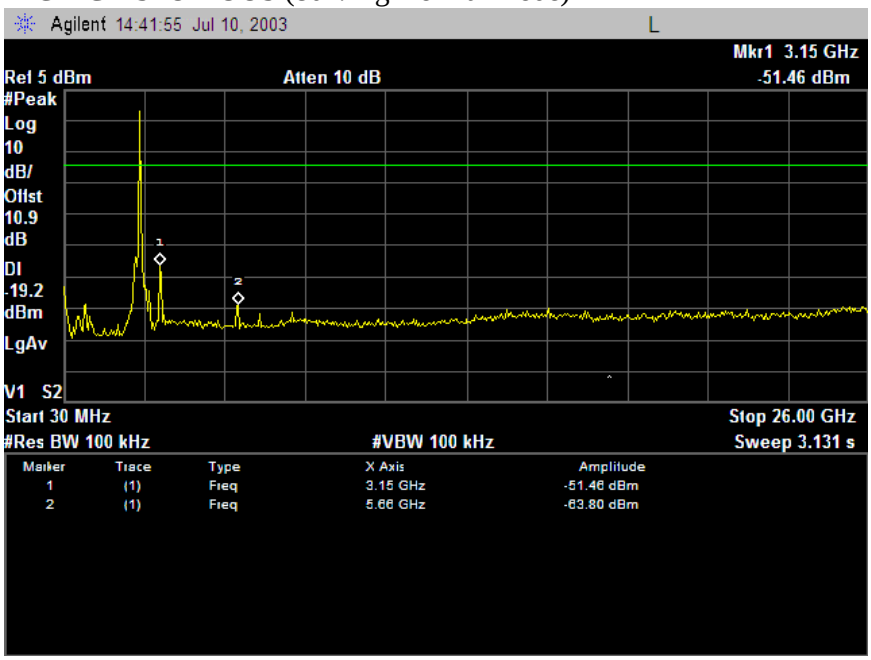


SPURIOUS EMISSIONS, HIGH CHANNEL (802.11g NORMAL MODE)

HIGH CH BANDEDGE (802.11g Normal mode)



HIGH CH SPURIOUS (802.11g Normal mode)



7.2. MAXIMUM PERMISSIBLE EXPOSURE WITH MLR100 ANTENNA

LIMITS

§15.247 (b) (5) Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. See §1.1307(b)(1) of this chapter.

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 mW and 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

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

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

S = 1.0 mW / cm^2 from 1.1310 Table 1

2.4 GHz BAND RESULTS

No non-compliance noted:

Mode	Power Density Limit (mW/cm^2)	Output Power (dBm)	Antenna Gain (dBi)	MPE Distance (cm)
802.11b	1.0	19.33	0.00	2.61
802.11g Normal	1.0	20.58	0.00	3.01

5.8 GHz BAND RESULTS

No non-compliance noted:

Mode	Power Density Limit (mW/cm^2)	Output Power (dBm)	Antenna Gain (dBi)	MPE Distance (cm)
802.11a Normal	1.0	20.47	0.00	2.98

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.

7.3. 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 of the 2.4 GHz band.

The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels of the 5.8 GHz band.

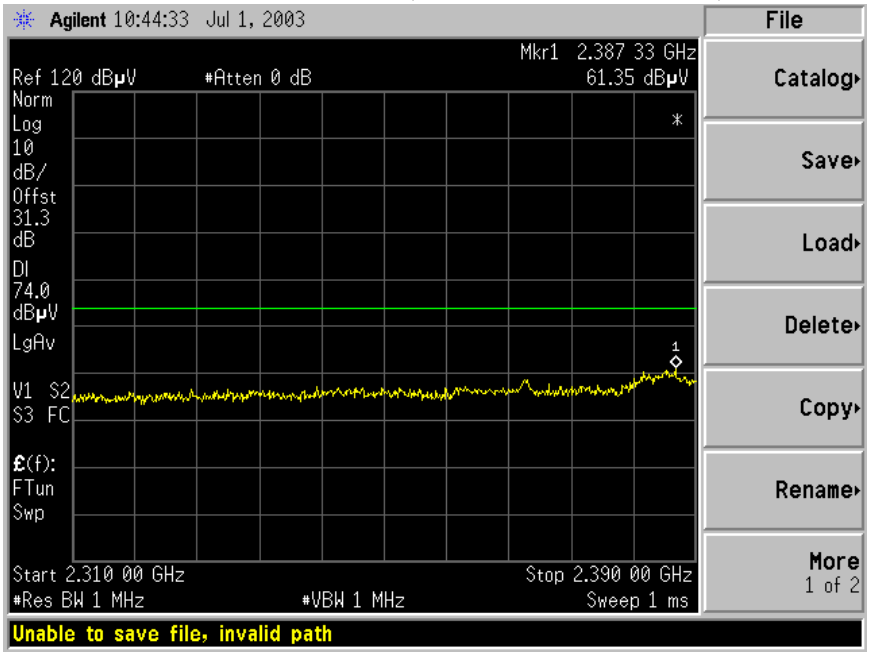
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

RESULTS

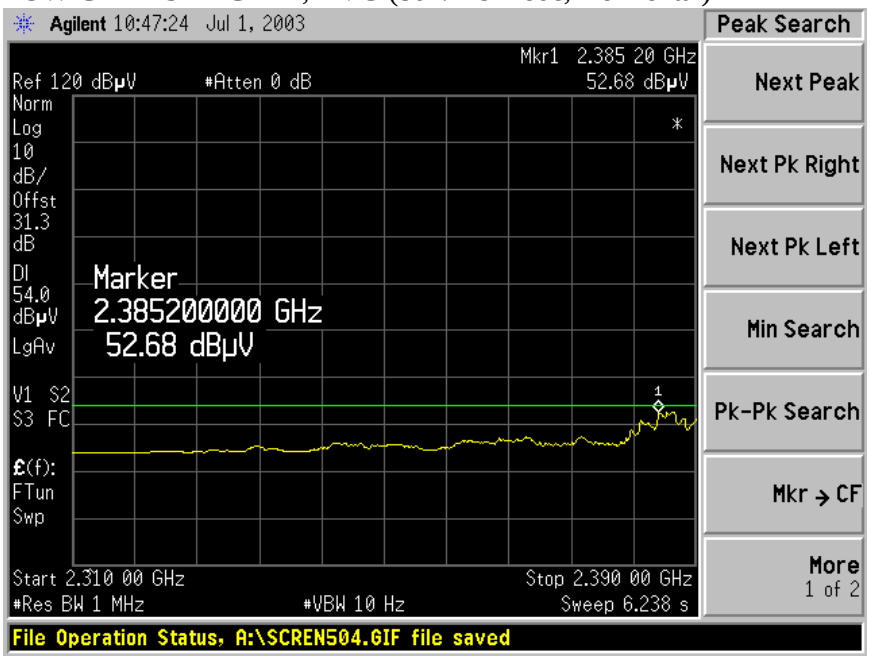
No non-compliance noted:

RESTRICTED BANDEDGE (b MODE, LOW CHANNEL, HORIZONTAL)

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

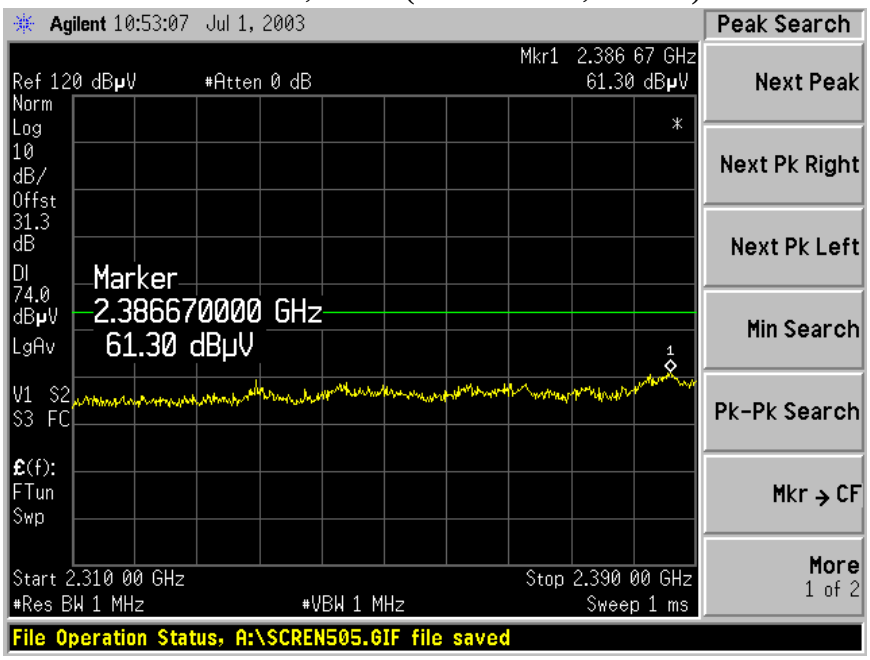


LOW CH RESTRICTED, AVG (802.11b mode, Horizontal)

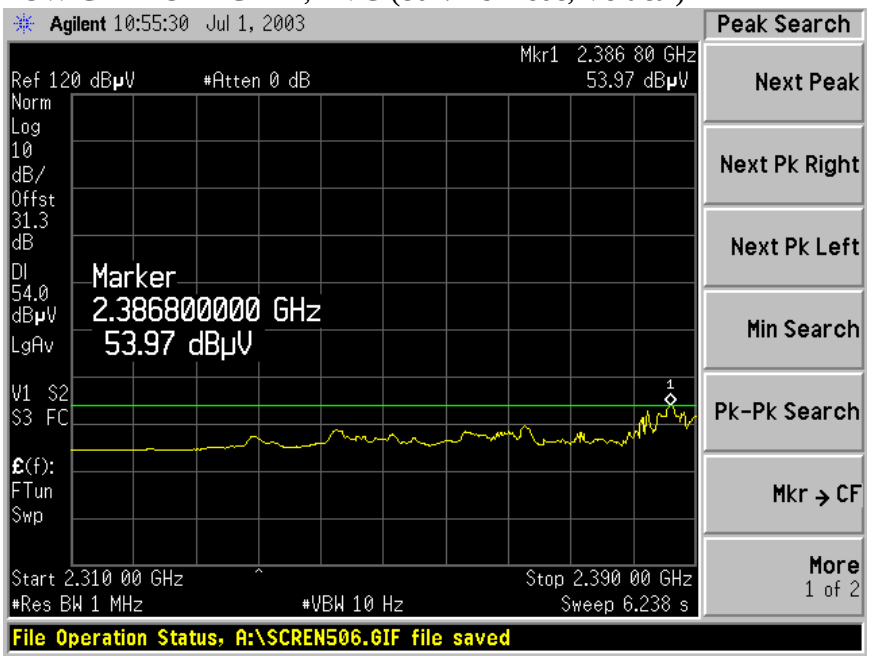


RESTRICTED BANDEDGE (b MODE, LOW CHANNEL, VERTICAL)

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

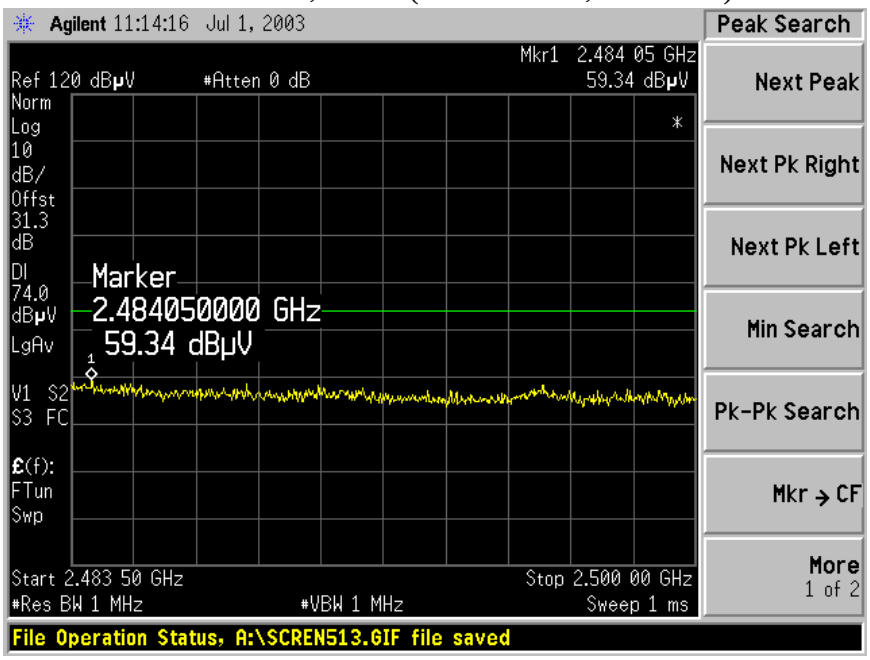


LOW CH RESTRICTED, AVG (802.11b mode, Vertical)

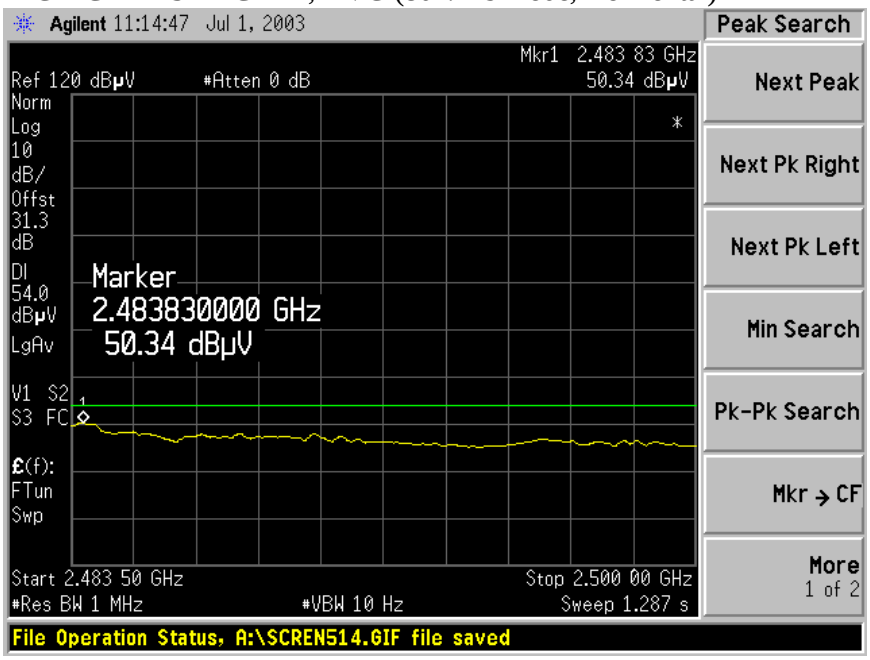


RESTRICTED BANDEDGE (b MODE, HIGH CHANNEL, HORIZONTAL)

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

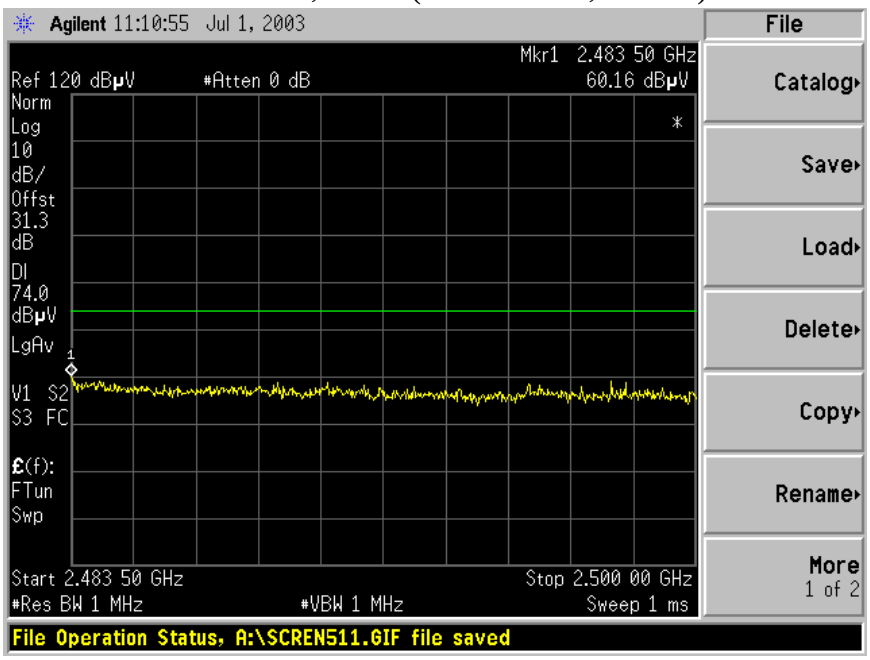


HIGH CH RESTRICTED, AVG (802.11b mode, Horizontal)

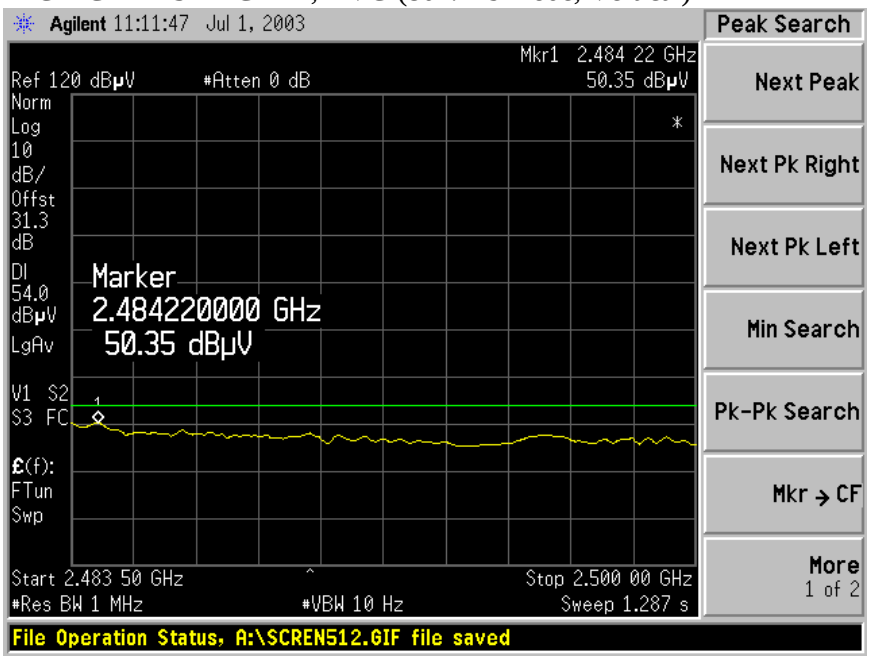


RESTRICTED BANDEDGE (b MODE, HIGH CHANNEL, VERTICAL)

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



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



HARMONICS AND SPURIOUS EMISSIONS (b MODE)

07/01/03 **High Frequency Measurement**

Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: VIEN TRAN
Project #: PHILIPS
Company: ACCTON/PHILIPS
EUT Descrip.: 802.11a/b/g MINI PCI MODULE
EUT M/N: PH11107-E & PH12127-E
Test Target: FCC 14.247/15.407
Mode Oper: Harmonic and Spur Tx at L/M/H Channels (2.4GHz)_b Mode_with MLR100 antenna

~~Test Equipment:~~

EMCO Horn 1-18GHz	Pre-amplifer 1-26GHz	Spectrum Analyzer	Horn > 18GHz
T59; S/N: 3245 @3m	T34 HP 8449B	Agilent E4446A Analyzer	

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

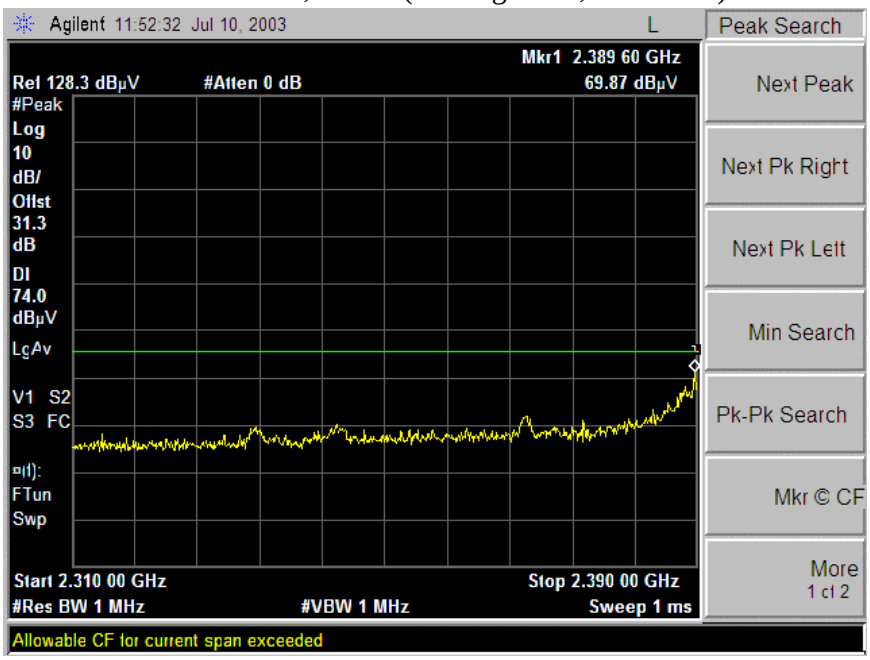
~~Peak Measurements:~~ 1 MHz Resolution Bandwidth, 1MHz Video Bandwidth
~~Average Measurements:~~ 1 MHz Resolution Bandwidth, 10Hz Video Bandwidth

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
LOW CH=2412MHz ART=14															
4.824	9.8	45.6	36.5	33.1	3.4	-34.6	0.0	1.0	48.5	39.4	74.0	54.0	-25.5	-14.6	V
4.824	9.8	42.1	30.0	33.1	3.4	-34.6	0.0	1.0	45.0	32.9	74.0	54.0	-29.0	-21.1	H
NO OTHER EMISSION FOUND AFTER 2rd HARMONIC															
															V
MID CH=2437MHz ART=17															
4.874	9.8	53.5	49.6	33.1	3.4	-34.6	0.0	1.0	56.4	52.5	74.0	54.0	-17.6	-1.5	V
7.311	9.8	46.0	36.0	36.0	4.4	-34.0	0.0	2.0	54.3	44.3	74.0	54.0	-19.7	-9.7	V
4.874	9.8	47.3	40.7	33.1	3.4	-34.6	0.0	1.0	50.2	43.6	74.0	54.0	-23.8	-10.4	H
7.311	9.8	42.5	30.0	36.0	4.4	-34.0	0.0	2.0	50.8	38.3	74.0	54.0	-23.2	-15.7	H
NO OTHER EMISSION FOUND AFTER 3rd HARMONIC.															
HI CH=2462MHz															
ART = 14															
4.924	9.8	51.2	46.8	33.1	3.5	-34.5	0.0	1.0	54.2	49.9	74.0	54.0	-19.8	-4.1	V
7.386	9.8	41.1	31.0	36.1	4.4	-34.1	0.0	1.0	48.5	38.4	74.0	54.0	-25.5	-15.6	V
4.924	9.8	39.6	29.3	33.1	3.5	-34.5	0.0	1.0	42.6	32.3	74.0	54.0	-31.4	-21.7	H
7.386	9.8	38.9	28.2	36.1	4.4	-34.1	0.0	1.0	46.3	35.6	74.0	54.0	-27.7	-18.4	H
NO OTHER EMISSION FOUND AFTER 3rd HARMONIC ART=14															

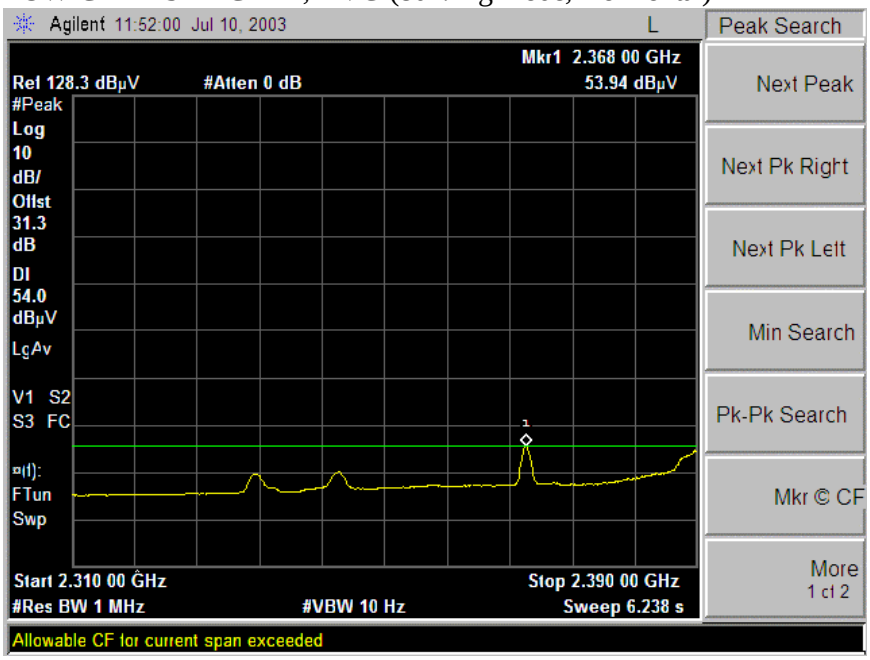
f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter		

RESTRICTED BANDEDGE (g MODE, LOW CHANNEL, HORIZONTAL)

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

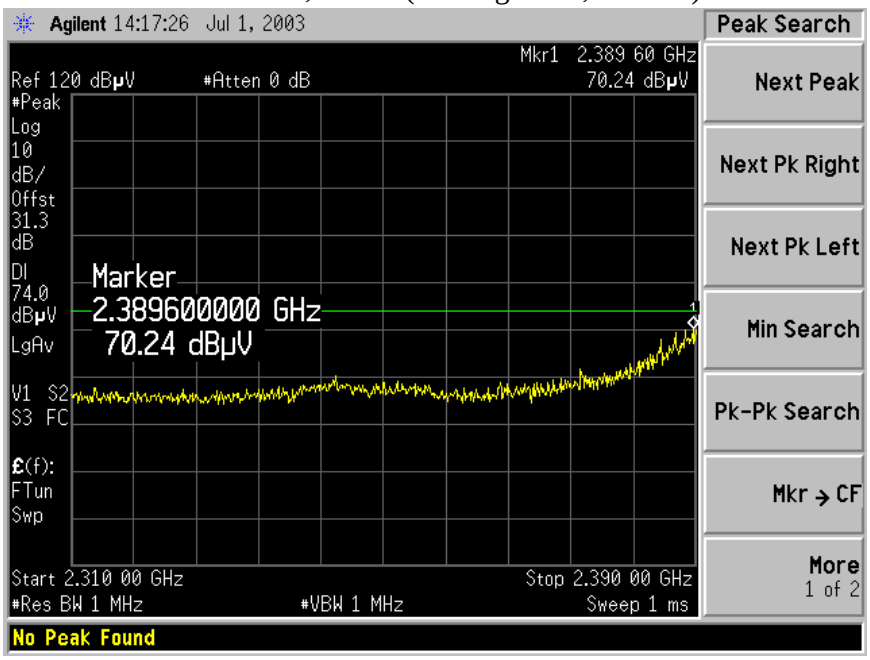


LOW CH RESTRICTED, AVG (802.11g mode, Horizontal)

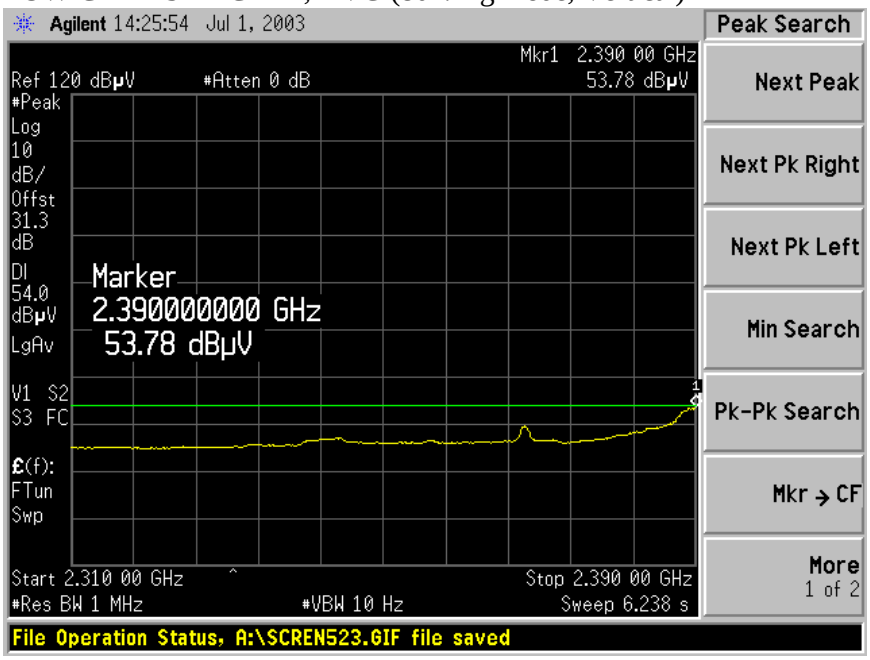


RESTRICTED BANDEDGE (g MODE, LOW CHANNEL, VERTICAL)

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

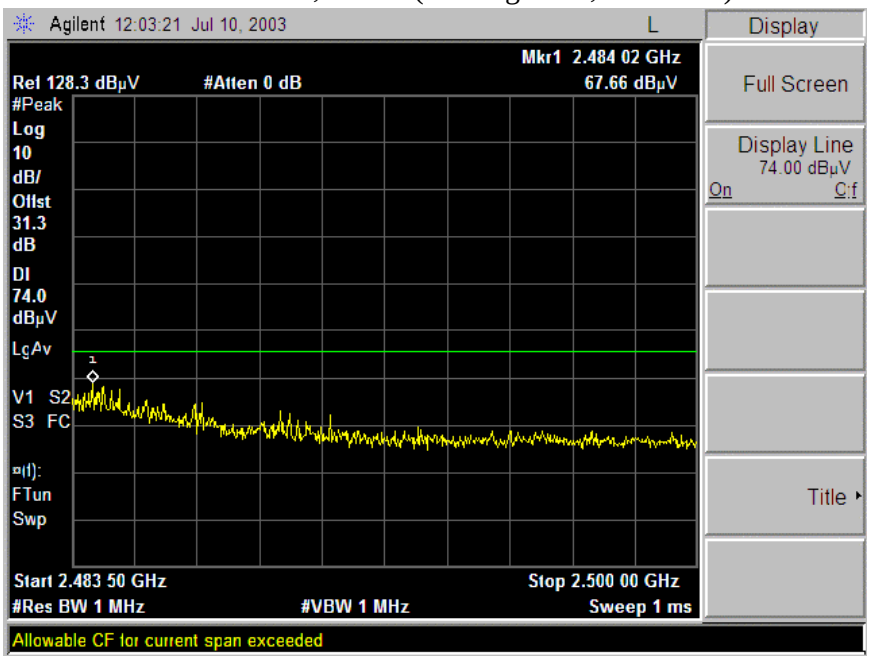


LOW CH RESTRICTED, AVG (802.11g mode, Vertical)

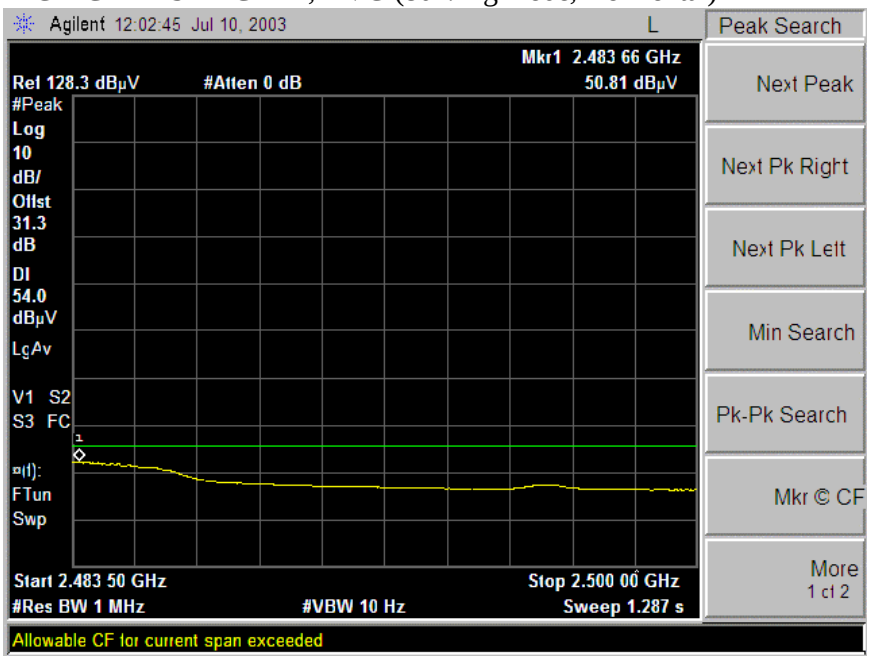


RESTRICTED BANDEDGE (g MODE, HIGH CHANNEL, HORIZONTAL)

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

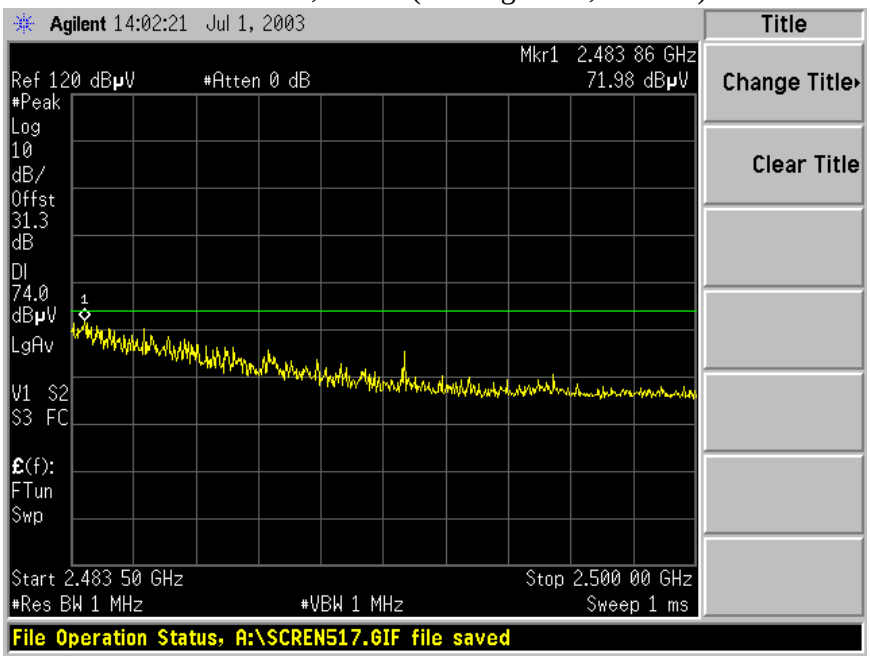


HIGH CH RESTRICTED, AVG (802.11g mode, Horizontal)

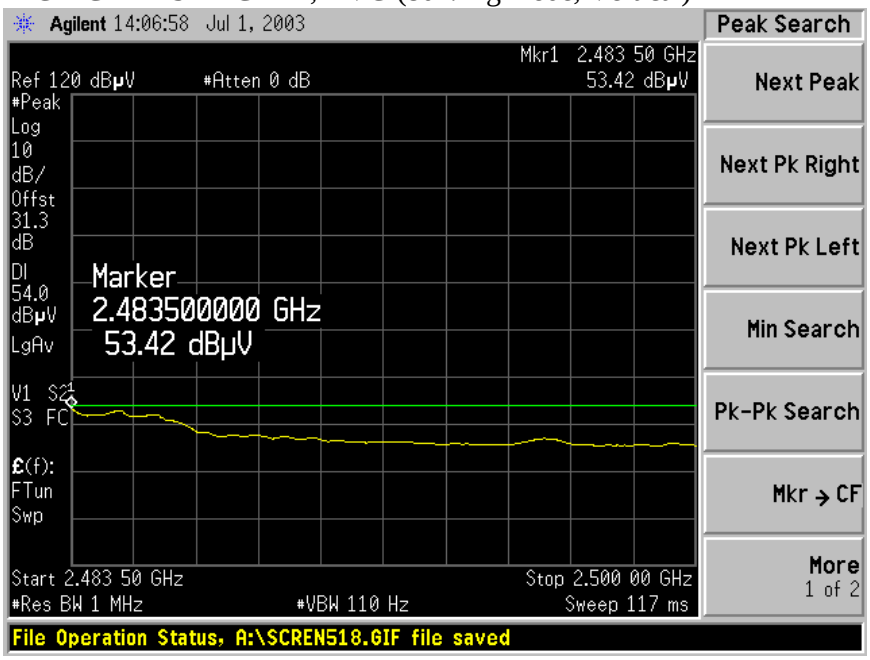


RESTRICTED BANDEDGE (g MODE, HIGH CHANNEL, VERTICAL)

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



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



HARMONICS AND SPURIOUS EMISSIONS (g NORMAL MODE)

07/10/03 **High Frequency Measurement**

Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: NEELESH RAJ
Project #: 03U2040
Company: ACCTON AND PHILIPS WIRELESS NETWORKING
EUT Descrip.: 802.11 ABG MINI PCI MODULE(RADON)
EUT M/N: PH11107-E PH12127-E
Test Target: FCC
Mode Oper: TX

Test Equipment:

EMCO Horn 1-18GHz	Pre-amplifer 1-26GHz	Spectrum Analyzer	Horn > 18GHz
T60; S/N: 2238 @3m	T86 Miteq 924341	psa	T87; ARA 18-26GHz; S/N:1049

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
		LOW CHANNEL 2412MHz G													
4.824	9.8	53.9	41.1	33.1	2.9	-45.6	0.0	2.0	46.4	33.6	74.0	54.0	-27.6	-20.4	V (FLOOR NOISE)
12.060	9.8	51.1	39.6	39.3	5.1	-45.4	0.0	2.0	52.1	40.6	74.0	54.0	-21.9	-13.4	V (FLOOR NOISE)
4.824	9.8	52.9	40.9	33.1	2.9	-45.6	0.0	2.0	45.3	33.3	74.0	54.0	-28.7	-20.7	H (FLOOR NOISE)
12.060	9.8	51.0	39.6	39.3	5.1	-45.4	0.0	2.0	52.0	40.6	74.0	54.0	-22.0	-13.4	H (FLOOR NOISE)
		MIDDLE CHANNEL 2437MHz G													
4.874	9.8	63.4	50.7	33.1	3.0	-45.6	0.0	2.0	55.8	43.2	74.0	54.0	-18.2	-10.8	V
7.311	9.8	60.6	46.7	36.2	3.8	-46.6	0.0	2.0	56.0	42.1	74.0	54.0	-18.0	-11.9	V
12.185	9.8	48.9	37.8	39.4	5.2	-45.6	0.0	2.0	49.8	38.7	74.0	54.0	-24.2	-15.3	V (FLOOR NOISE)
4.874	9.8	53.7	42.5	33.1	3.0	-45.6	0.0	2.0	46.1	35.0	74.0	54.0	-27.9	-19.0	H
7.311	9.8	56.0	43.9	36.2	3.8	-46.6	0.0	2.0	51.4	39.3	74.0	54.0	-22.6	-14.7	H
12.185	9.8	48.7	37.9	39.4	5.2	-45.6	0.0	2.0	49.6	38.8	74.0	54.0	-24.4	-15.2	H (FLOOR NOISE)
		HIGH CHANNEL 2462MHz G													
4.924	9.8	58.2	45.6	33.2	3.0	-45.7	0.0	2.0	50.6	38.0	74.0	54.0	-23.4	-16.0	V
7.386	9.8	51.8	39.3	36.3	3.8	-46.5	0.0	2.0	47.4	34.8	74.0	54.0	-26.6	-19.2	V (FLOOR NOISE)
12.310	9.8	49.6	38.5	39.4	5.2	-45.7	0.0	2.0	50.4	39.3	74.0	54.0	-23.6	-14.7	V (FLOOR NOISE)
4.924	9.8	49.7	38.2	33.2	3.0	-45.7	0.0	2.0	42.1	30.7	74.0	54.0	-31.9	-23.3	H (FLOOR NOISE)
7.386	9.8	50.8	39.2	36.3	3.8	-46.5	0.0	2.0	46.4	34.8	74.0	54.0	-27.6	-19.2	H (FLOOR NOISE)
12.310	9.8	49.3	38.6	39.4	5.2	-45.7	0.0	2.0	50.1	39.4	74.0	54.0	-23.9	-14.6	H (FLOOR NOISE)
	NO OTHER SPURIOUS EMISSIONS SEEN ABOVE THE NOISE FLOOR UPTO 10TH HARMONIC														

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		

HARMONICS AND SPURIOUS EMISSIONS (a NORMAL MODE)

07/08/03 **High Frequency Measurement**

Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: VIEN TRAN
Project #: PHILIPS
Company: ACCTON/PHILIPS
EUT Descrip.: 802.11a/b/g MINI PCI MODULE
EUT M/N: PH11107-E & PH12127-E
Test Target: FCC 14.247/15.407
Mode Oper: Harmonic and Spur Tx at L/M/H Channels (5.8GHz)_with MLR100 antenna

~~Test Equipment:~~

EMCO Horn 1-18GHz	Pre-amplifer 1-26GHz	Spectrum Analyzer	Horn > 18GHz
T60; S/N: 2238 @3m	T87 Miteq 924342	Agilent E4446A 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
LOW CH=5.745GHz ART=17															
11.490	9.8	52.0	39.4	38.7	5.8	-41.5	0.0	1.0	56.0	43.4	74.0	54.0	-18.0	-10.6	V
11.490	9.8	48.9	36.7	38.7	5.8	-41.5	0.0	1.0	52.9	40.7	74.0	54.0	-21.1	-13.3	H
NO OTHER EMISSION FOUND AFTER 2rd HARMONIC															
															V
MID CH=5.785MHz ART=17															
11.570	9.8	53.5	41.2	38.8	5.8	-41.6	0.0	1.0	57.5	45.2	74.0	54.0	-16.5	-8.8	V
11.570	9.8	48.4	36.5	38.8	5.8	-41.6	0.0	2.0	53.4	41.5	74.0	54.0	-20.6	-12.5	H
NO OTHER EMISSION FOUND AFTER 3rd HARMONIC.															
HI CH=5.825MHz ART=17															
11.650	9.8	52.7	36.8	38.9	5.9	-41.7	0.0	1.0	56.7	40.8	74.0	54.0	-17.3	-13.2	V
11.650	9.8	47.7	35.8	38.9	5.9	-41.7	0.0	1.0	51.7	39.8	74.0	54.0	-22.3	-14.2	H
NO OTHER EMISSION FOUND AFTER 2nd HARMONIC															

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)

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 #: 03u2040-3
Report #: 71103
Date& Time: 07/11/03 4:07 PM
Test Engr: NEELESH RAJ

Company: ACCTON AND PHILIPS WIRELESS NETWORKING
EUT Description: 802.11ABG MINI PCI MODULE (RADON)
Test Configuration : LAPTOP/EUT/ANTENNA
Type of Test: FCC-B
Mode of Operation: TX (WORST CASE)

○ A-Site ○ B-Site ◉ C-Site ○ F-Site 6 Worst Data Descending

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)
166.45	47.33	16.39	2.20	26.78	39.14	43.50	-4.36	3mV	180.00	1.00	P
233.50	55.29	11.29	2.61	26.49	42.70	46.00	-3.30	3mV	45.00	1.00	P
266.60	52.11	12.57	2.81	26.42	41.07	46.00	-4.93	3mV	0.00	1.50	P
333.21	52.40	14.80	3.19	26.63	43.76	46.00	-2.24	3mH	45.00	1.00	P
366.60	51.45	15.08	3.37	26.88	43.03	46.00	-2.97	3mH	215.00	2.00	P
466.50	49.32	16.90	3.88	27.41	42.69	46.00	-3.31	3mH	180.00	2.50	P

Total data #: 6
V.2c

7.4. 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:

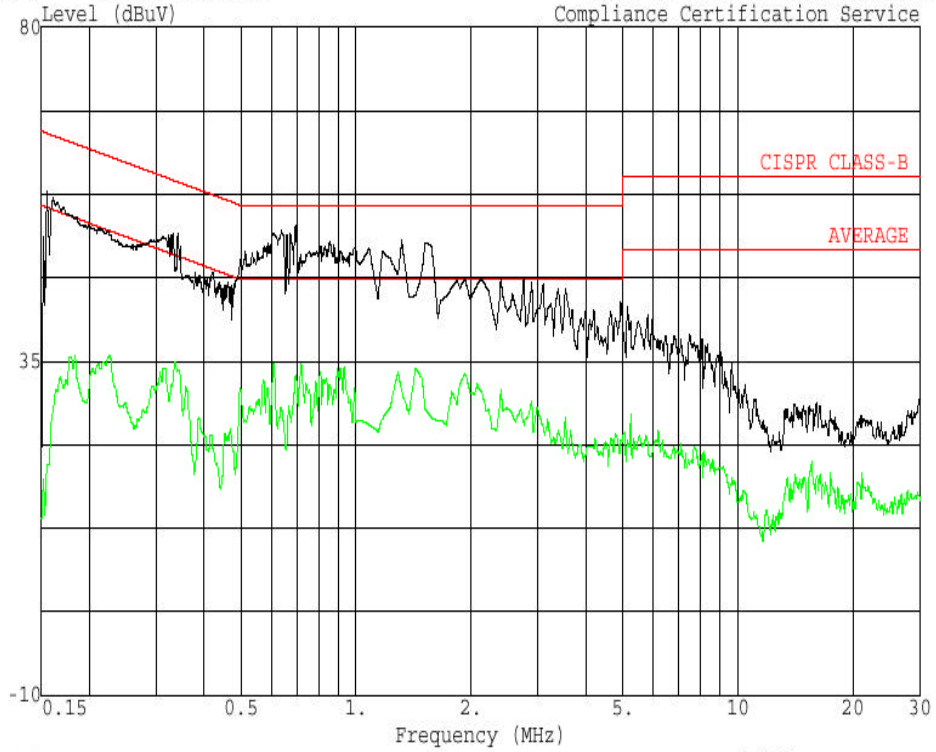
6 WORST EMISSIONS

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
0.69	53.24	--	33.10	0.00	56.00	46.00	-2.76	-12.90	L1
0.64	52.68	--	28.58	0.00	56.00	46.00	-3.32	-17.42	L1
1.32	51.32	--	30.89	0.00	56.00	46.00	-4.68	-15.11	L1
0.65	46.82	--	24.25	0.00	56.00	46.00	-9.18	-21.75	L2
0.61	46.92	--	25.20	0.00	56.00	46.00	-9.08	-20.80	L2
0.15	55.16	--	23.42	0.00	66.00	56.00	-10.84	-32.58	L2
6 Worst Data									

LINE 1 (LINE) RESULTS

561F Monterey Road,
San Jose, CA 95037 USA
Tel: (408) 463-0885
Fax: (408) 463-0888

Data#: 7 File#: ACC9.EMI Date: 07-11-2003 Time: 15:51:04

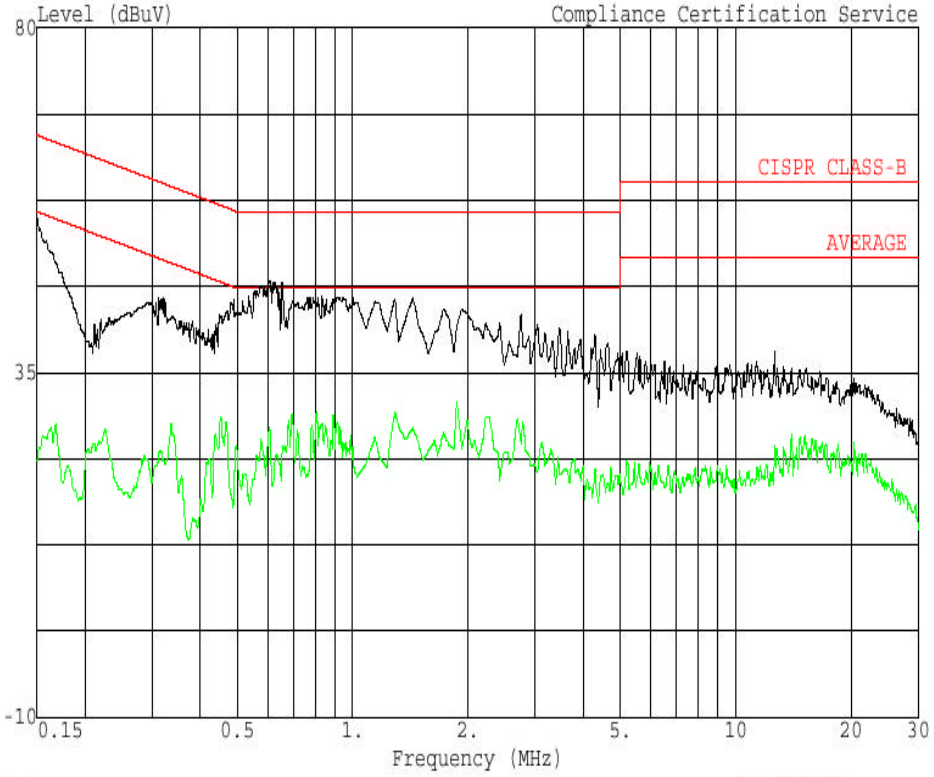


Trace: 5 Ref Trace:
Project # : 03u2040-3
Test Engineer : NEELESH RAJ
Company : ACCTON AND PHILIPS WIRELESS
EUT : 802.11 ABG MINI PCI MODULE (RADON)
Model : PH11107-E AND PH12127-E
Configuration : LAPTOP/AC ADAPTER/EUT/ANTENNA
Mode of Operation: TX (WORST CASE)
Target of Test : FCC-B 115VAC/60Hz
: LINE 1 (PEAK;BLACK AVG;GREEN)

LINE 2 (NEUTRAL) RESULTS

COMPLIANCE Engineering Service, Inc.
561F Monterey Road,
San Jose, CA 95037 USA
Tel: (408) 463-0885
Fax: (408) 463-0888

Data#: 7 File#: ACC8.EMI Date: 07-11-2003 Time: 15:39:05



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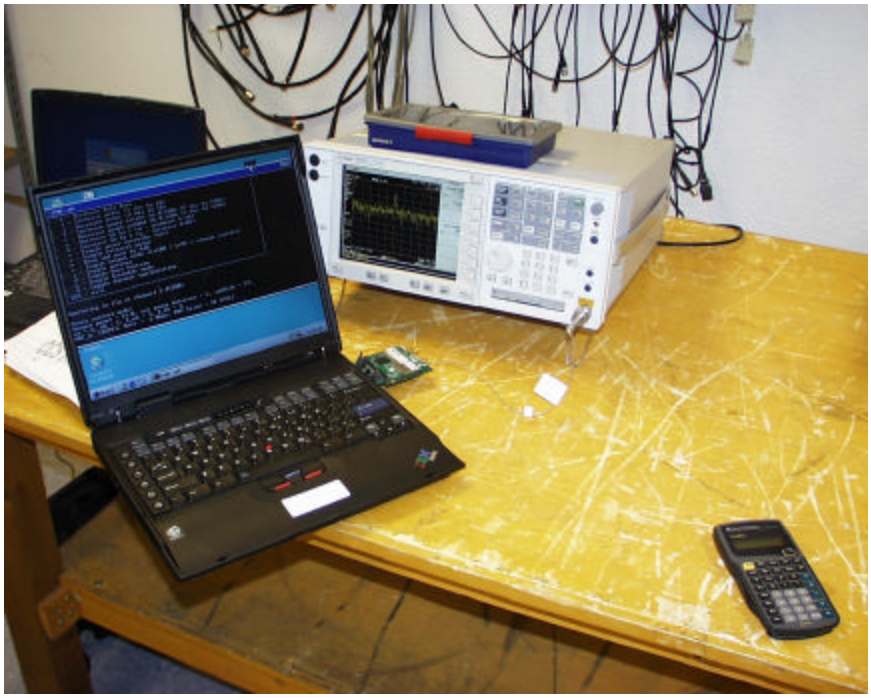
Project # : 03u2040-3
Test Engineer : NEELESH RAJ
Company : ACCTON AND PHILIPS WIRELESS
EUT : 802.11 ABG MINI PCI MODULE (RADON)
Model : PH11107-E AND PH12127-E
Configuration : LAPTOP/AC ADAPTER/EUT/ANTENNA
Mode of Operation: TX (WORST CASE)
Target of Test : FCC-B 115VAC/60Hz
: LINE 2 (PEAK;BLACK AVG;GREEN)

8. SETUP PHOTOS

ANTENNA PORT CONDUCTED RF MEASUREMENT SETUP

ANTENNA PORT CONDUCTED PHOTO



RADIATED RF MEASUREMENT SETUP

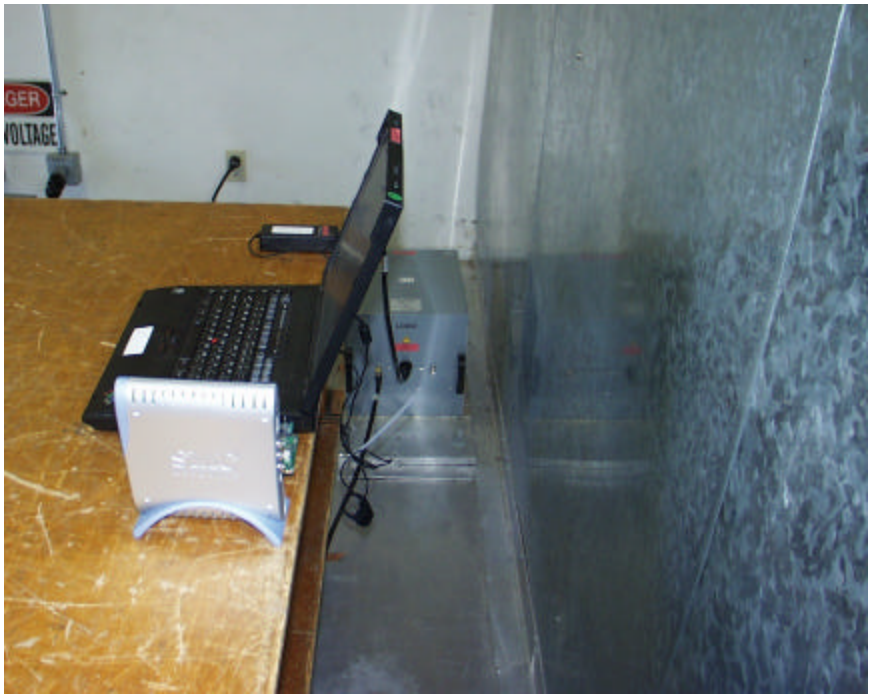
RADIATED FRONT PHOTO

RADIATED BACK SIDE PHOTO

POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP

LINE CONDUCTED FRONT PHOTO

LINE CONDUCTED BACK PHOTO



END OF REPORT