FCC CFR47 PART 15 SUBPART E CERTIFICATION

UNII SUPPLEMENTAL TEST REPORT

FOR

PROXIM CORPORATION

802.11a/b/g CARDBUS WITH 2.7dBi ANTENNA @ 2.4GHz AND 2.6dBi ANTENNA @ 5GHz BAND

MODEL NUMBER: 8460

BRAND NAME: HARMONY / SKYLINE 802.11 a/b/g

FCC ID: HZB-8460

REPORT NUMBER: 02U1403

ISSUE DATE: AUGUST 7, 2002

Prepared for
PROXIM CORPORATION
510 DEGUINE DR
SUNNYVALE, CA 94085
USA

Prepared by
COMPLIANCE CERTIFICATION SERVICES
561F MONTEREY ROAD,
MORGAN HILL, CA 95037, USA
TEL: (408) 463-0885
FAX: (408) 463-0888

TABLE OF CONTENTS

1. TEST RESULT CERTIFICATION

COMPANY NAME: **PROXIM CORPORATION**
510 DEGUINE DR
SUNNYVALE, CA 94085 USA

CONTACT PERSON: **QUINN KUNZ**

TELPHONE NO: **(801) 492-4750 EXT 20**

EUT DESCRIPTION: **802.11a/b/g CARDBUS WITH 2.7dBi ANTENNA @ 2.4GHz AND 2.6dBi ANTENNA @ 5GHz BAND**

MODEL NUMBER: **8460**

BRAND NAME: **HARMONY / SKYLINE 802.11 a/b/g**

DATE TESTED: **AUGUST 3, 2002**

TYPE OF EQUIPMENT	INTENTIONAL RADIATOR
EQUIPMENT TYPE	5.15 – 5.35 GHz TRANSCEIVER *
MEASUREMENT PROCEDURE	ANSI 63.4 / 1992, TIA/EIA 603
PROCEDURE	CERTIFICATION
FCC RULE	CFR 47 PART 15.E

* The 5.2 GHz band is applicable to this report; other bands of operation (2.4 GHz and 5.8 GHz) are documented in a separate report

Compliance Certification Services, Inc. tested the above equipment for compliance with the requirements set forth in CFR 47, PART 15, Subpart E. The equipment in the configuration described in this report, shows the measured emission levels emanating from the equipment do not exceed the specified limit.

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:

STEVE CHENG
EMC ENGINEERING MANAGER
COMPLIANCE CERTIFICATION SERVICES

Tested By:

FRANK IBRAHIM
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. EUT DESCRIPTION

The Proxim 8460 is a high performance 802.11a/b/g WLAN client product intended for laptop applications. It operates in the 2.4 – 2.4835 GHz, 5.15 - 5.35 GHz and 5.725 - 5.850 GHz bands with a maximum average Tx output power of 100 mW. The product uses two symmetric integral antennas for diversity operation. Each has approximately 2.6 dBi peak gain.

The Proxim 8460 design is based on an Atheros AR5001X three chip solution. The three chips include:

AR5211: Multiprotocol MAC/baseband processor, and CardBus/PCI bus interface.

AR5111 Radio-on-a-Chip (RoC): An all-CMOS single-chip radio transceiver that includes a power amplifier, and integrated dual conversion filters to convert signals from 5 GHz to the baseband range for use by the AR5211. The AR5111 offers fully integrated transmitter, receiver, and frequency synthesizer functions; eliminating the need for external voltage controlled oscillators (VCOs) and surface acoustic wave (SAW) filters.

AR2111 Radio-on-a-Chip (RoC): An all-CMOS single-chip radio transceiver that, when combined with the AR5111,implements a 2.4 GHz 802.11 b/g solution. The AR2111 offers fully integrated transmitter, receiver, and frequency synthesizer functions. Like the AR5111, the AR2111 does not require external VCOs or SAW filters.

3. DESCRIPTION OF ALTERNATE ANTENNAS

The original antennas gain were 1.0dBi for both bands as documented in Test Report #02U1380.

The new antenna gain is 2.7dBi for 2.4GHz band, and 2.6dBi for 5GHz band as documented in Test Report #02U1403.

Due to the change of the antenna, an Engineering justification has been made to redo all the radiated portion of the test.

4. TEST METHODOLOGY

Conducted and radiated testing were performed according to the procedures documented on chapter 13 of ANSI C63.4 and FCC CFR 47 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057, and 15.407.

5. FACILITIES AND ACCREDITATION

5.1. 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.

Receiving equipment (i.e., receiver, analyzer, quasi-peak adapter, pre-selector) and LISNs conform to CISPR specifications for "Radio Interference Measuring Apparatus and Measurement Methods," Publication 16.

5.2. LABORATORY ACCREDITATIONS AND LISTINGS

The test facilities used to perform radiated and conducted emissions tests are accredited by National Voluntary Laboratory Accreditation Program for the specific scope of accreditation under Lab Code: 200065-0 to perform Electromagnetic Interference tests according to FCC PART 15 AND CISPR 22 requirements. No part of this report may be used to claim or imply product endorsement by NVLAP or any agency of the US Government. In addition, the test facilities are listed with Federal Communications Commission (reference no: 31040/SIT (1300B3) and 31040/SIT (1300F2)).

5.3. TABLE OF ACCREDITATIONS AND LISTINGS

Country	Agency	Scope of Accreditation	Logo
USA	NVLAP*	FCC Part 15, CISPR 22, AS/NZS 3548,IEC 61000-4-2, IEC 61000-4-3, IEC 61000-4-4, IEC 61000-4-5, IEC 61000-4-6, IEC 61000-4-8, IEC 61000-4-11, CNS 13438	200065-0
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

* 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, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which 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:

Radiated Emission	
30MHz – 200 MHz	+/- 3.3dB
200MHz – 1000MHz	+4.5/-2.9dB
1000MHz – 2000MHz	+4.6/-2.2dB
Power Line Conducted Emission	
150kHz – 30MHz	+/-2.9

Any results falling within the above values are deemed to be marginal.

6.3. 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
Spectrum Analyzer	HP	8566B	3014A06685	6/1/03
Spectrum Display	HP	85662A	2152A03066	6/1/03
Quasi-Peak Detector	HP	85650A	3145A01654	6/1/03
Preamplifier	HP	8447D	2944A06833	8/10/02
Log Periodic Antenna	EMCO	3146	9107-3163	3/30/03
Biconical Antenna	Eaton	94455-1	1197	3/30/03
LISN	F.C.C.	LISN-50/250-25-2	114	4/23/03
EMI Test Receiver	Rohde & Schwarz	ESHS 20	827129/006	4/17/03
Spectrum Analyzer	HP	8593EM	3710A00205	6/11/03
Preamplifier (1 - 26.5GHz)	MITEQ	NSP2600-44	646456	4/26/03
Horn Antenna (1 - 18GHz)	EMCO	3115	6717	1/31/03
Horn Antenna (18 – 26.5GHz)	ARA	3115	6717	1/31/03
Signal Generator	HP	83732B	US34490599	3/29/03
High Pass Filter (4.57GHz)	FSY Microwave	FM-4570-9SS	003	N.C.R.
High Pass Filter (7.6GHz)	FSY Microwave	FM-7600-9SS	002	N.C.R.
Spectrum Analyzer	HP	8563E	3720A07066	3/18/04
Spectrum Analyzer	Agilent	E4404B	US40240772	3/25/03
External Mixer (26.5 – 40 GHz)	HP	11970A	3008A04190	9/22/02
Horn Antenna (26.5 – 40 GHz)	Dico	1149	2	N.C.R.

7. SETUP OF EQUIPMENT UNDER TEST

SUPPORT EQUIPMENT

Device Type	Manufacturer	Model	Serial Number	FCC ID
Laptop	IBM	2652-4CU	78-DPL47	DoC
AC Power Adapter	IBM	AA21131	02K6753	DoC
Printer	HP	2225C	2541S41679	DoC
MODEM	ACEEX	1414	9013537	IFAXDM1414
MOUSE	LOGITECH	M-UA34	LTC70500299	DZL211087
MOUSE	MICROSOFT	X03-46340	0070536-00000	DoC

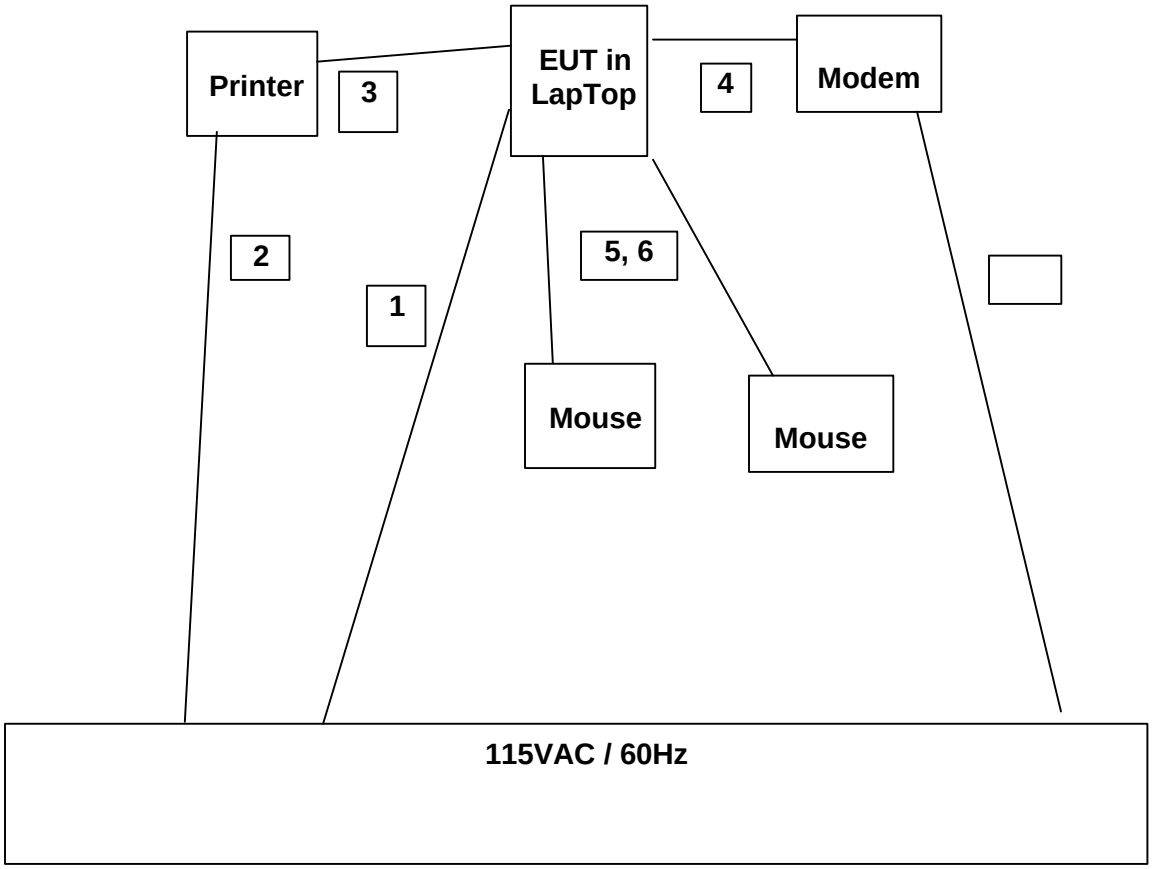
I/O CABLES

Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	1	US115	Unshielded	2 m	Integrated with AC Adapter
2	AC	2	US115	Unshielded	2 m	
3	Parallel	1	DB25	Shielded	2 m	
4	Serial	1	DB9	Shielded	1 m	
5	USB	1	USB	Unshielded	1 m	Integral with Mouse
6	USB	1	USB	Unshielded	1 m	Integral with Mouse

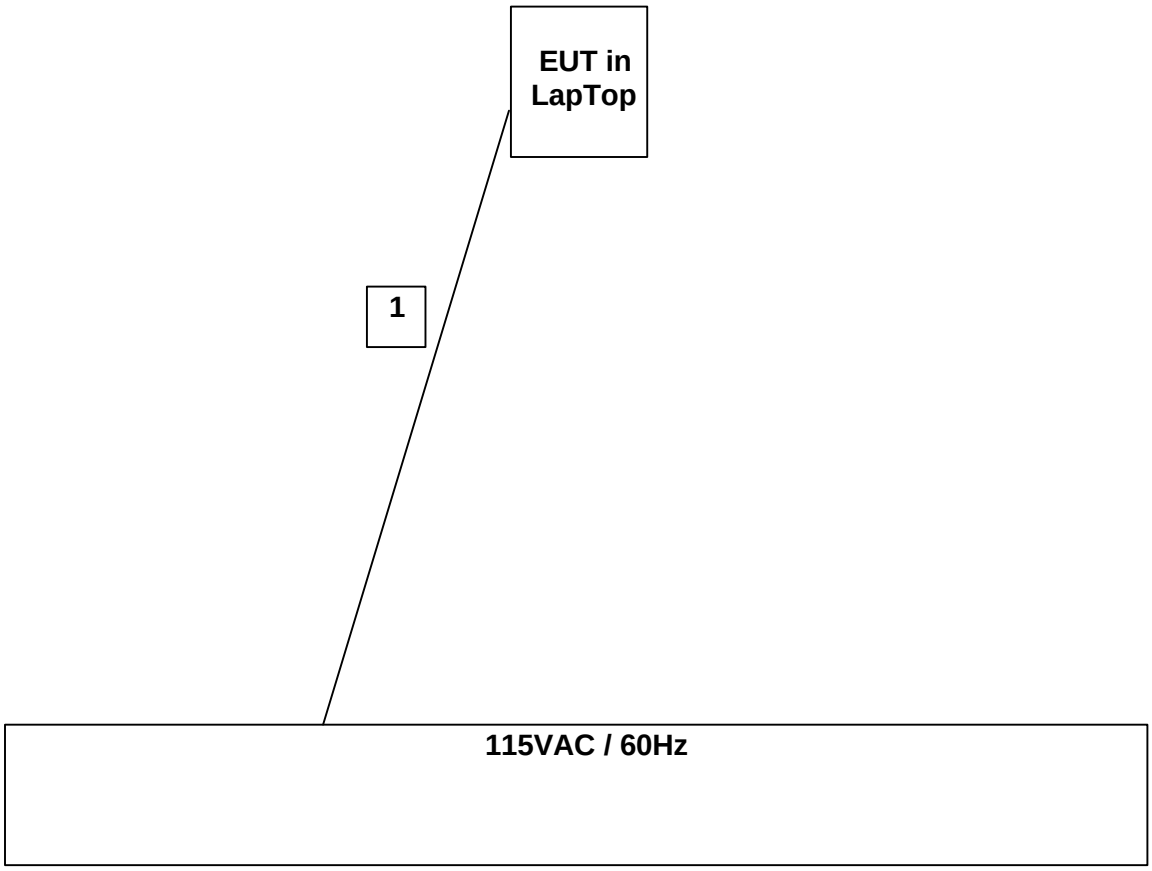
TEST SETUP

The EUT is installed into a laptop computer during the test.

SETUP DIAGRAM FOR DIGITAL DEVICE TESTS



SETUP DIAGRAM FOR TRANSMITTER TESTS



8. APPLICABLE RULES

§15.407(b)- UNDESIRABLE EMISSION LIMITS

(1 & 2) For transmitters operating in the 5.15-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27dBm / MHz.

(5) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.

(6) The provisions of §15.205 apply to intentional radiators operating under this section.

§15.407(c)- TRANSMISSION IN CASE OF ABSENCE OF INFORMATION

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signalling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization a description of how this requirement is met.

§15.407(d)- ANTENNA TYPE

Any U-NII device that operates in the 5.15-5.25 GHz band shall use a transmitting antenna that is an integral part of the device.

§15.407(f)- RADIO FREQUENCY EXPOSURE

U-NII devices are subject to the radio frequency radiation exposure requirements specified in §1.1307(b), §2.1091 and §2.1093 of this chapter, as appropriate. All equipment shall be considered to operate in a "general population/uncontrolled" environment. Applications for equipment authorization of devices operating under this section must contain a statement confirming compliance with these requirements for both fundamental emissions and unwanted emissions. Technical information showing the basis for this statement must be submitted to the Commission upon request.

§15.205- RESTRICTED BANDS OF OPERATIONS

(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

(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- RADIATED EMISSION LIMITS; GENERAL REQUIREMENTS

(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.

(b) In the emission table above, the tighter limit applies at the band edges.

FCC PART 15.209

MEASURING DISTANCE OF 3 METER		
FREQUENCY RANGE (MHz)	FIELD STRENGTH (Microvolts/m)	FIELD STRENGTH (dBuV/m)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

9. TEST SETUP, PROCEDURE AND RESULT

9.1. TYPE OF ANTENNA

RESULTS

No non-compliance noted:

The antenna is integral to the device.

9.2. UNDESIRABLE EMISSIONS – RADIATED MEASUREMENTS

TEST SETUP

For measurements of the EUT as a digital device, the EUT and all other support equipment were placed on a wooden table 80 cm above the ground plane. For measurements of the EUT as a transmitter , the EUT and the laptop were placed on the wooden table. The antenna to EUT distance is 3 meters for measurements below 1 GHz and 1 meter for measurements above 1 GHz. The EUT is configured in accordance with Section 8 of ANSI C63.4/1992.

The EUT is set to transmit in a continuous mode.

TEST PROCEDURE

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 40 GHz is investigated.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The frequency span is set small enough to easily differentiate between broadcast stations, intermittent ambient signals and EUT emissions. 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 suspected signal. Measurements were made with the antenna polarized in both the vertical and the horizontal positions.

SYSTEM NOISE FLOOR FOR HARMONIC AND SPURIOUS MEASUREMENTS

Compliance Certification Services

Worst Case Radiated Emissions System Noise Floor

Each band below corresponds to each horn antenna band
Uses the lowest gain preamplifier; actual preamp used may have higher gain
Uses the longest typical cable configuration; actual cables used may have less loss
Noise floor field strength results are compared to the FCC 15.205 Restricted Band limit

Specification Distance: 3 meters

Freq GHz	SA dBuV	AF dB/m	Distance m	Distance dB	Preamp dB	Cable dB	Field dBuV/m	Limit dBuV/m	Margin dB
1 to 18 GHz band									
RBW = 1 MHz, peak detection									
18	41.9	47.8	1	-9.5	32.6	13.5	61.06	74	-12.94
RBW = 1 MHz, average detection									
18	28.7	47.8	1	-9.5	32.6	13.5	47.86	54	-6.14
18 to 26 GHz band									
RBW = 1 MHz, peak detection									
26	44.6	33.4	1	-9.5	35.0	19.5	52.96	74	-21.04
RBW = 1 MHz, average detection									
26	32.4	33.4	1	-9.5	35.0	19.5	40.76	54	-13.24
26 to 40 GHz band									
External mixer is used for this band									
Preamplifier is internal to Spectrum Analyzer, with gain factor built into firmware									
Antenna is mounted directly on external mixer, therefore cable = 0 dB									
RBW = 1 MHz, peak detection									
40	39.2	44.5	0.3	-20.0	0.0	0	63.70	74	-10.30
RBW = 1 MHz, average detection									
40	27.2	44.5	0.3	-20.0	0.0	0	51.70	54	-2.30

SAMPLE CALCULATIONS

Given

$$E = \sqrt{(30 * P * G)} / d$$

where

E = Field Strength in Volts / meter
P = Power in watts
G = Numeric antenna gain
d = distance in meters

Rearranging terms yields:

$$P * G = (d * E) \wedge 2 / 30$$

Converting to the logarithmic form and changing to units of mW and uV/m, using:

$$P (mW) = P (W) / 1000 \text{ and}$$
$$E (uV/m) = E (V/m) / 1000000$$

yields

$$10 \log (P * G) = 10 \log (d \wedge 2) + 10 \log (E \wedge 2) - 10 \log (30) - 10 \log (10 \wedge 9)$$
$$= 20 \log (d) + 20 \log (E) - 104.77$$

In this logarithmic form

10 log (P * G) is PG in dBm and
20 log (E) is E in dBuV/m

Since EIRP = P * G, then at a specification distance of 3 meters, the EIRP in terms of field strength is:

$$EIRP (dBm) = P * G (dBm) = E (dBuV/m) - 95.2$$

TEST RESULTS

No non-compliance noted:

08/04/02 **FCC Measurement**

Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: Frank Ibrahim
Project #: 02U1403-2
Company: Proxim Corporation
EUT Descrip.: 802.11a LAN Cardbus
EUT M/N: Harmony/ Skyline 802.11a/b/g
Test Target: FCC 15.407
Mode Oper: 5.18GHz, Low Channel, .11a Base mode, Pout = 14dBm

Equipment for 1-22 GHz:
HP8566B Analyzer
HP8449B Preamp
EMCO 3115 Antenna
Cable: 18.0 feet

Equipment for 22 - 58 GHz:
HP8566B Analyzer
HP 11975A Amplifier (LO)
HP 11970K External mixer/antenna
Cable: IF Only (321 MHz)

Peak Measurements:
1 MHz Resolution Bandwidth
1MHz Video Bandwidth

Average Measurements:
1MHz Resolution Bandwidth
10Hz Video Bandwidth

f GHz	Dist feet	Read dBuV	Pol, Det	AF dB/m	CL dB	Amp dB	D Corr dB	HPF	Field dBuV/m	EIRP dBm	Lim dBm or dBuV/m	Margin dB	Notes
Fundamental:													
5.180	3.3	68.5	V, PK	33.4	7.2	0.0	-9.5	0.0	99.6				V
5.180	3.3	60.5	V, AV	33.4	7.2	0.0	-9.5	0.0	91.6				V
5.180	3.3	70.0	H, PK	33.4	7.2	0.0	-9.5	0.0	101.1				H
5.180	3.3	62.2	H, AV	33.4	7.2	0.0	-9.5	0.0	93.3				H
												`	
Band Edge, Spurious, & Harmonics within restricted bands:													
5.150	3.3	32.6	V, PK	33.3	7.2	0.0	-9.5	1.0	64.6		74.0	-9.4	V
5.150	3.3	20.5	V, AV	33.3	7.2	0.0	-9.5	1.0	52.5		54.0	-1.5	V
15.540	3.3	46.4	V, PK	38.9	13.7	-38.6	-9.5	1.0	51.9		74.0	-22.1	V
15.540	3.3	35.9	V, AV	38.9	13.7	-38.6	-9.5	1.0	41.4		54.0	-12.6	V
5.150	3.3	35.6	H, PK	33.3	7.2	0.0	-9.5	1.0	67.6		74.0	-6.4	H
5.148	3.3	21.5	H, AV	33.3	7.2	0.0	-9.5	1.0	53.4		54.0	-0.6	H
15.540	3.3	43.3	H, PK	38.9	13.7	-38.6	-9.5	1.0	48.8		74.0	-25.2	H
15.540	3.3	33.7	H, AV	38.9	13.7	-38.6	-9.5	1.0	39.2		54.0	-14.8	H
Spurious & Harmonics outside restricted bands:													
10.360	3.3	50.3	V, PK	38.2	10.6	-35.6	-9.5	1.0	55.0	-40.2	-7.0	-47.2	V
10.360	3.3	40.6	V, AV	38.2	10.6	-35.6	-9.5	1.0	45.3	-49.9	-27.0	-22.9	V
10.360	3.3	50.6	H, PK	38.2	10.6	-35.6	-9.5	1.0	55.3	-39.9	-7.0	-32.9	H
10.360	3.3	40.6	H, AV	38.2	10.6	-35.6	-9.5	1.0	45.3	-49.9	-27.0	-22.9	H

Note: There are no other spurious or harmonic emissions found in the freq range of 1-40 GHz

f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Cor	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		

08/04/02 **FCC Measurement**

Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: Frank Ibrahim
Project #: 02U1403-2
Company: Proxim Corporation
EUT Descrip.: 802.11a LAN Cardbus
EUT M/N: Harmony/ Skyline 802.11a/b/g
Test Target: FCC 15.407
Mode Oper: 5.26GHz, Mid Channel, .11a Base mode, Pout = 17.7dBm

Equipment for 1-22 GHz:
HP8566B Analyzer
HP8449B Preamp
EMCO 3115 Antenna
Cable: 18.0 feet

Equipment for 22 - 58 GHz:
HP8566B Analyzer
HP 11975A Amplifier (LO)
HP 11970K External mixer/antenna
Cable: IF Only (321 MHz)

Peak Measurements:
1 MHz Resolution Bandwidth
1MHz Video Bandwidth

Average Measurements:
1MHz Resolution Bandwidth
10Hz Video Bandwidth

f GHz	Dist feet	Read dBuV	Pol, Det	AF dB/m	CL dB	Amp dB	D Corr dB	HPF	Field dBuV/m	EIRP dBm	Lim dBm or dBuV/m	Margin dB	Notes
Fundamental:													
5.260	3.3	68.5	V, PK	33.6	7.3	0.0	-9.5	0.0	99.8				V
5.260	3.3	61.0	V, AV	33.6	7.3	0.0	-9.5	0.0	92.3				V
5.260	3.3	69.3	H, PK	33.6	7.3	0.0	-9.5	0.0	100.6				H
5.260	3.3	62.2	H, AV	33.6	7.3	0.0	-9.5	0.0	93.5				H
Spurious & Harmonics outside restricted bands:													
10.520	3.3	51.7	V, PK	38.3	10.7	-35.6	-9.5	1.0	56.5	-38.7	-7.0	-31.7	V
10.520	3.3	42.3	V, AV	38.3	10.7	-35.6	-9.5	1.0	47.1	-48.1	-27.0	-21.1	V
10.520	3.3	51.2	H, PK	38.3	10.7	-35.6	-9.5	1.0	56.0	-39.2	-7.0	-32.2	H
10.520	3.3	40.3	H, AV	38.3	10.7	-35.6	-9.5	1.0	45.1	-50.1	-27.0	-23.1	H

Note: There are no other spurious or harmonic emissions found in the freq range of 1-40 GHz

f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Cor	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		

08/04/02 **FCC Measurement**

Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: Frank Ibrahim
Project #: 02U1403-2
Company: Proxim Corporation
EUT Descrip.: 802.11a LAN Cardbus
EUT M/N: Harmony/ Skyline 802.11a/b/g
Test Target: FCC 15.407
Mode Oper: 5.32GHz, High Channel, .11a Base mode, Pout = 12.5dBm

Equipment for 1-22 GHz:
HP8566B Analyzer
HP8449B Preamp
EMCO 3115 Antenna
Cable: 18.0 feet

Equipment for 22 - 58 GHz:
HP8566B Analyzer
HP 11975A Amplifier (LO)
HP 11970K External mixer/antenna
Cable: IF Only (321 MHz)

Peak Measurements:
1 MHz Resolution Bandwidth
1MHz Video Bandwidth

Average Measurements:
1MHz Resolution Bandwidth
10Hz Video Bandwidth

f GHz	Dist feet	Read dBuV	Pol, Det	AF dB/m	CL dB	Amp dB	D Corr dB	HPF	Field dBuV/m	EIRP dBm	Lim dBm or dBuV/m	Margin dB	Notes
Fundamental:													
5.320	3.3	65.9	V, PK	33.7	7.3	0.0	-9.5	0.0	97.4				V
5.320	3.3	58.5	V, AV	33.7	7.3	0.0	-9.5	0.0	90.0				V
5.320	3.3	70.9	H, PK	33.7	7.3	0.0	-9.5	0.0	102.4				H
5.320	3.3	62.2	H, AV	33.7	7.3	0.0	-9.5	0.0	93.7				H
Band Edge, Spurious, & Harmonics within restricted bands:													
5.352	3.3	36.8	V, PK	33.8	7.3	0.0	-9.5	0.0	68.5		74.0	-5.5	V
5.352	3.3	21.8	V, AV	33.8	7.3	0.0	-9.5	0.0	53.5		54.0	-0.5	V
5.352	3.3	32.0	H, PK	33.8	7.3	0.0	-9.5	0.0	63.7		74.0	-10.3	H
5.352	3.3	20.1	H, AV	33.8	7.3	0.0	-9.5	0.0	51.8		54.0	-2.2	H
10.640	3.3	51.3	V, PK	38.2	10.7	-35.7	-9.5	1.0	56.1		74.0	-17.9	V
10.640	3.3	42.5	V, AV	38.2	10.7	-35.7	-9.5	1.0	47.3		54.0	-6.7	V
10.640	3.3	47.5	H, PK	38.2	10.7	-35.7	-9.5	1.0	52.3		74.0	-21.7	H
10.640	3.3	37.0	H, AV	38.2	10.7	-35.7	-9.5	1.0	41.8		54.0	-12.2	H
Spurious & Harmonics outside restricted bands:													
8.512	3.3	42.8	V, PK	37.4	9.5	-35.6	-9.5	1.0	45.7	-49.5	-7.0	-42.5	V
8.512	3.3	37.0	V, AV	37.4	9.5	-35.6	-9.5	1.0	39.9	-55.3	-27.0	-28.3	V
8.512	3.3	42.1	H, PK	37.4	9.5	-35.6	-9.5	1.0	45.0	-50.2	-7.0	-43.2	H
8.512	3.3	34.3	H, AV	37.4	9.5	-35.6	-9.5	1.0	37.2	-58.0	-27.0	-31.0	H

Note: There are no other spurious or harmonic emissions found in the freq range of 1-40 GHz

f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Cor	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		

08/04/02 **FCC Measurement**

Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: Frank Ibrahim
Project #: 02U1403-2
Company: Proxim Corporation
EUT Descrip.: 802.11a LAN Cardbus
EUT M/N: Harmony/ Skyline 802.11a/b/g
Test Target: FCC 15.407
Mode Oper: 5.21GHz, Low Channel, .11a Turbo mode, Pout = 15dBm

Equipment for 1-22 GHz:
HP8566B Analyzer
HP8449B Preamp
EMCO 3115 Antenna
Cable: 18.0 feet

Equipment for 22 - 58 GHz:
HP8566B Analyzer
HP 11975A Amplifier (LO)
HP 11970K External mixer/antenna
Cable: IF Only (321 MHz)

Peak Measurements:
1 MHz Resolution Bandwidth
1MHz Video Bandwidth

Average Measurements:
1MHz Resolution Bandwidth
10Hz Video Bandwidth

f GHz	Dist feet	Read dBuV	Pol, Det	AF dB/m	CL dB	Amp dB	D Corr dB	HPF	Field dBuV/m	EIRP dBm	Lim dBm or dBuV/m	Margin dB	Notes
Fundamental:													
5.210	3.3	63.8	V, PK	33.4	7.2	0.0	-9.5	0.0	95.0				V
5.210	3.3	55.7	V, AV	33.4	7.2	0.0	-9.5	0.0	86.8				V
5.210	3.3	68.3	H, PK	33.4	7.2	0.0	-9.5	0.0	99.5				H
5.210	3.3	60.5	H, AV	33.4	7.2	0.0	-9.5	0.0	91.7				H
Band Edge, Spurious, & Harmonics within restricted bands:													
5.150	3.3	30.0	V, PK	33.3	7.2	0.0	-9.5	0.0	61.0		74.0	-13.0	V
5.150	3.3	19.9	V, AV	33.3	7.2	0.0	-9.5	0.0	50.9		54.0	-3.1	V
5.210	3.3	31.9	H, PK	33.4	7.2	0.0	-9.5	0.0	63.1		74.0	-10.9	H
5.150	3.3	19.5	H, AV	33.3	7.2	0.0	-9.5	0.0	50.5		54.0	-3.5	H
Spurious, & Harmonics outside restricted bands:													
10.420	3.3	44.3	V, PK	38.2	10.6	-35.6	-9.5	1.0	49.1	-46.1	-7.0	-39.1	V, Noise Floor
10.420	3.3	33.7	V, AV	38.2	10.6	-35.6	-9.5	1.0	38.5	-56.7	-27.0	-29.7	V, Noise Floor
15.630	3.3	47.0	V, PK	38.8	13.8	-38.6	-9.5	1.0	52.5	-42.7	-7.0	-35.7	V, Noise Floor
15.630	3.3	36.0	V, AV	38.8	13.8	-38.6	-9.5	1.0	41.5	-41.4	-27.0	-14.4	V, Noise Floor
10.420	3.3	43.2	H, PK	38.2	10.6	-35.6	-9.5	1.0	47.9	-47.3	-7.0	-40.3	H, Noise Floor
10.420	3.3	33.5	H, AV	38.2	10.6	-35.6	-9.5	1.0	38.3	-56.9	-27.0	-29.9	H, Noise Floor
15.630	3.3	45.5	H, PK	38.8	13.8	-38.6	-9.5	1.0	51.0	-44.2	74.0	-23.0	H, Noise Floor
15.630	3.3	34.8	H, AV	38.8	13.8	-38.6	-9.5	1.0	40.3	-54.9	54.0	-13.7	H, Noise Floor

Note: There are no other spurious or harmonic emissions found in the freq range of 1-40 GHz

f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Cor	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		

08/04/02 **FCC Measurement**

Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: Frank Ibrahim
Project #: 02U1403-2
Company: Proxim Corporation
EUT Descrip.: 802.11a LAN Cardbus
EUT M/N: Harmony/ Skyline 802.11a/b/g
Test Target: FCC 15.407
Mode Oper: 5.25GHz, Mid Channel, .11a Turbo mode, Pout = 14dBm

Equipment for 1-22 GHz:
HP8566B Analyzer
HP8449B Preamp
EMCO 3115 Antenna
Cable: 18.0 feet

Equipment for 22 - 58 GHz:
HP8566B Analyzer
HP 11975A Amplifier (LO)
HP 11970K External mixer/antenna
Cable: IF Only (321 MHz)

Peak Measurements:
1 MHz Resolution Bandwidth
1MHz Video Bandwidth

Average Measurements:
1MHz Resolution Bandwidth
10Hz Video Bandwidth

f GHz	Dist feet	Read dBuV	Pol, Det	AF dB/m	CL dB	Amp dB	D Corr dB	HPF	Field dBuV/m	EIRP dBm	Lim dBm or dBuV/m	Margin dB	Notes
Fundamental:													
5.250	3.3	65.3	V, PK	33.6	7.2	0.0	-9.5	0.0	96.6				V
5.250	3.3	56.2	V, AV	33.6	7.2	0.0	-9.5	0.0	87.5				V
5.250	3.3	70.3	H, PK	33.6	7.2	0.0	-9.5	0.0	101.6				H
5.250	3.3	61.7	H, AV	33.6	7.2	0.0	-9.5	0.0	93.0				H
Spurious & Harmonics within restricted bands:													
15.750	3.3	51.2	V, PK	38.8	13.9	-38.6	-9.5	1.0	56.7		74.0	-17.3	V
15.750	3.3	38.8	V, AV	38.8	13.9	-38.6	-9.5	1.0	44.3		54.0	-9.7	V
15.750	3.3	50.0	H, PK	38.8	13.9	-38.6	-9.5	1.0	55.5		74.0	-18.5	H
15.750	3.3	37.8	H, AV	38.8	13.9	-38.6	-9.5	1.0	43.3		54.0	-10.7	H
Spurious & Harmonics outside restricted bands:													
10.500	3.3	50.0	V, PK	38.3	10.7	-35.6	-9.5	1.0	54.9	-40.3	-7.0	-33.3	V
10.500	3.3	38.0	V, AV	38.3	10.7	-35.6	-9.5	1.0	42.9	-52.3	-27.0	-25.3	V
10.500	3.3	47.3	H, PK	38.3	10.7	-35.6	-9.5	1.0	52.2	-43.0	-7.0	-36.0	H
10.500	3.3	35.2	H, AV	38.3	10.7	-35.6	-9.5	1.0	40.0	-55.2	-27.0	-28.2	H

Note: There are no other spurious or harmonic emissions found in the freq range of 1-40 GHz

f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Cor	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		

08/04/02 **FCC Measurement**

Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: Frank Ibrahim
Project #: 02U1403-2
Company: Proxim Corporation
EUT Descrip.: 802.11a LAN Cardbus
EUT M/N: Harmony/ Skyline 802.11a/b/g
Test Target: FCC 15.407
Mode Oper: 5.29GHz, High Channel, .11a Turbo mode, Pout = 15dBm

Equipment for 1-22 GHz:
HP8566B Analyzer
HP8449B Preamp
EMCO 3115 Antenna
Cable: 18.0 feet

Equipment for 22 - 58 GHz:
HP8566B Analyzer
HP 11975A Amplifier (LO)
HP 11970K External mixer/antenna
Cable: IF Only (321 MHz)

Peak Measurements:
1 MHz Resolution Bandwidth
1MHz Video Bandwidth

Average Measurements:
1MHz Resolution Bandwidth
10Hz Video Bandwidth

f GHz	Dist feet	Read dBuV	Pol, Det	AF dB/m	CL dB	Amp dB	D Corr dB	HPF	Field dBuV/m	EIRP dBm	Lim dBm or dBuV/m	Margin dB	Notes
Fundamental:													
5.290	3.3	65.7	V, PK	33.7	7.3	0.0	-9.5	0.0	97.1				V
5.290	3.3	57.3	V, AV	33.7	7.3	0.0	-9.5	0.0	88.8				V
5.290	3.3	72.2	H, PK	33.7	7.3	0.0	-9.5	0.0	103.6				H
5.290	3.3	62.5	H, AV	33.7	7.3	0.0	-9.5	0.0	93.9				H
Band Edge, Spurious, & Harmonics within restricted bands:													
5.350	3.3	33.2	V, PK	33.8	7.3	0.0	-9.5	0.0	64.9		74.0	-9.1	V
5.350	3.3	20.0	V, AV	33.8	7.3	0.0	-9.5	0.0	51.7		54.0	-2.3	V
15.870	3.3	51.3	V, PK	38.7	13.9	-38.6	-9.5	1.0	56.8		74.0	-17.2	V
15.870	3.3	39.2	V, AV	38.7	13.9	-38.6	-9.5	1.0	44.7		54.0	-9.3	V
5.350	3.3	34.9	H, PK	33.8	7.3	0.0	-9.5	0.0	66.6		74.0	-7.4	H
5.350	3.3	21.5	H, AV	33.8	7.3	0.0	-9.5	0.0	53.2		54.0	-0.8	H
15.870	3.3	49.7	H, PK	38.7	13.9	-38.6	-9.5	1.0	55.2		74.0	-18.8	H
15.870	3.3	37.5	H, AV	38.7	13.9	-38.6	-9.5	1.0	43.0		54.0	-11.0	H
Spurious & Harmonics outside restricted bands:													
10.580	3.3	51.5	V, PK	38.3	10.7	-35.6	-9.5	1.0	56.3	-38.9	-7.0	-31.9	V
10.580	3.3	38.3	V, AV	38.3	10.7	-35.6	-9.5	1.0	43.2	-52.0	-27.0	-25.0	V
10.580	3.3	48.3	H, PK	38.3	10.7	-35.6	-9.5	1.0	53.2	-42.0	-7.0	-35.0	H
10.580	3.3	36.2	H, AV	38.3	10.7	-35.6	-9.5	1.0	41.0	-54.0	-27.0	-28.2	H

Note: There are no other spurious or harmonic emissions found in the freq range of 1-40 GHz

f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Cor	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		

DIGITAL DEVICE RADIATED EMISSIONS

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 #:	02U1403-2
Report #:	020710C1
Date& Time:	07/10/02 10:33 AM
Test Engr:	Thu Chan

Company:	Proxim Corporation QK
EUT Description:	802.11a Cardbus (M/N: Harmony / Skyline 802.11a/b/g
Test Configuration :	EUT/Printer/USB-Mouse/Laptop IBM R31
Type of Test:	FCC Class B
Mode of Operation:	TX @ 5.745GHz

<< Main Sheet

Freq. (MHz)	Reading (dBuV)	AF (dB)	Closs (dB)	Pre-amp (dB)	Level (dBuV/m)	Limit FCC_B	Margin (dB)	Pol (H/V)	Az (Deg)	Height (Meter)	Mark (P/Q/A)
396.00	53.00	15.45	2.97	27.32	44.10	46.00	-1.90	3mV	180.00	1.00	P
312.39	53.00	14.76	2.63	26.73	43.66	46.00	-2.34	3mH	180.00	2.00	P
396.00	52.00	15.45	2.97	27.32	43.10	46.00	-2.90	3mH	90.00	2.00	QP
159.62	47.00	17.03	1.66	27.09	38.59	43.50	-4.91	3mH	90.00	2.00	P
159.62	47.00	17.03	1.66	27.09	38.59	43.50	-4.91	3mV	90.00	1.00	P
280.08	50.70	13.65	2.43	26.65	40.13	46.00	-5.87	3mH	180.00	2.00	P
6 Worst Data											

Note: Changing the transmitter band, mode or channel does not affect these emissions.

9.3 SETUP PHOTOS

TRANSMITTER RADIATED RF MEASUREMENT SETUP

DIGITAL DEVICE RADIATED EMISSIONS MEASUREMENT SETUP

POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP

END OF REPORT