



**ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT
UNLICENSED NATIONAL INFORMATION INFRASTRUCTURE
DEVICES CERTIFICATION TO
FCC PART 15 SUBPART E REQUIREMENT
TEST REPORT**

For

**UNLICENSED NATIONAL INFORMATION INFRASTRUCTURE
DEVICES TRANSCEIVER**

FCC ID: IMK-PCI5

MODEL NO: PROXIM HARMONY 8150 PCI CARD

REPORT NO: 01U0995-1

OCTOBER 15, 2001

Prepared for
**PROXIM, INC
510 DEGUIGNE DRIVE
SUNNYVALE, CA 94086 USA**

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

NVLAP[®]
LAB CODE:200065-0

TABLE OF CONTENTS	PAGE
1. VERIFICATION OF COMPLIANCE	3
2. DESCRIPTION OF EQUIPMENT UNDER TEST (EUT).....	4
3. TEST LOCATION	5
4. LABORATORY ACCREDITATIONS AND LISTINGS	6
5. SUPPORT/ TEST EQUIPMENT	7
<i>Support Equipment.....</i>	<i>7</i>
<i>Test Equipment.....</i>	<i>7</i>
<i>I/O Cable Configuration.....</i>	<i>8</i>
<i>Test Configuration Diagram.....</i>	<i>9</i>
6. TEST PROCEDURES AND TEST RESULTS	10
MODIFICATIONS	10
RADIATED EMISSIONS TEST REQUIREMENT: 15.209	11
AC LINE CONDUCTED EMISSIONS TEST REQUIREMENT: 15.207	13
RESTRICTED BAND TEST REQUIREMENT: 15.205	16
BANDEDGE	21
PEAK POWER FOR UNII TEST REQUIREMENT: 15.407(A)1-2	26
PEAK POWER SPECTRAL DENSITY TEST REQUIREMENT: 15.407(A)5	31
PEAK EXCURSION TO AVERAGE RATIO: 15.407(A)6.....	33
OUT OF BAND EMISSION 15.407 (B) 1-2.....	35
15.407 SUPPLEMENT TEST	43
15.407 SUPPLEMENT TEST	44
INTEGRAL ANTENNA (D)	45
RF EXPOSUER (F)	46
7. TEST SETUP PHOTO	48
RADIATED EMISSION SETUP PHOTOS.....	48
CONDUCTED EMISSION SETUP PHOTOS.....	49
HI FREQUENCY SETUP PHOTOS.....	50
ANTENNA PORT MEASUREMENT PHOTOS.....	51
 Attachments	
• Eut Photographs	
• Proposed FCC ID Label	
• Agent Authorization	
• Request for Confidentiality	
• Technical Description	
• User's Manual	
• Antenna Requirements	
• Confidential Package	

1. VERIFICATION OF COMPLIANCE

COMPANY NAME : PROXIM
510 DEGUIGNE DRIVE
SUNNYVALE, CA 94086
INFO CONTACT : KEITH GLOVER
TELEPHONE NO : 408-731-2711/408-731- 2706
TECHNICAL CONTACT: JEFFREY LIEW
TELEPHONE NO : 408-731-2734
EUT DESCRIPTION : 802.11a PCI ADAPTER
MODEL NAME : PROXIM HARMONY MODEL 8150 PCI
DATE TESTED : OCTOBER 15, 2001

LIMIT APPLY TO: FCC PART 15 SECTION 15.407	
TECHNICAL LIMITS	TEST RESULT
Peak Transmit Power @ 5.15-5.25GHz < 17dBm	Complies
Peak Transmit Power @ 5.25-5.35GHz < 24dBm	Complies
Power Density @ 5.15-5.25GHz < 4dBm / 1M	Complies
Power Density @ 5.25-5.35GHz < 11dBm / 1M	Complies
Peak Excursion to Average Ratio < 13dB	Complies
Out of Band EIRP < -27 dBm/MHz	Complies
LIMIT APPLY TO: FCC PART 15 SECTION 15.205	
Restricted Band of Operation	Complies
LIMIT APPLY TO: FCC PART 15 SECTION 15.209	
Radiated Emission Limits	Complies
LIMIT APPLY TO: FCC PART 15 SECTION 15.207	
AC Line Conducted Emission	Complies
The above equipment was tested by Compliance Engineering Services Inc. for compliance with the requirements set forth in CFR 47 PART 15 SUBPART E. This said equipment in the configuration described in this report show that maximum emission levels emanating from equipment are within the compliance requirements.	

Tested By:

Approved & Released By:

HUE LY VANG
ASSOCIATE EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

STEVE CHENG
EMC ENGINEERING MANAGER
COMPLIANCE CERTIFICATION SERVICES

2. DESCRIPTION OF EQUIPMENT UNDER TEST (EUT)

Frequency Range	5180-5320 MHz
Channel Spacing	20 MHz
Transmit Power	50mW(17dBm)
Modulation Technique	PSK , QAM
Number of Channels	8(802.11a mode), 3 (Turbo mode)
Air Data Rate	108 Mbps to 6 Mbps
Antennas	1 Permanently Attached Array Antenna (3dBi Gain) 1 Permanently Attached Dipole Antenna (1dBi Gain)

The Harmony 8150 802.11a PCI Card is a long range, high performance, wireless LAN adapter card that complies with the IEEE 802.11a standard. In addition, the PCI Card supports 2XTM mode, which provides data rates of up to 108 Mbps.

The Harmony 802.11a PCI Card supports Windows 2000, Windows Millennium Edition (ME), and Windows 98 Second Edition (SE). Computers with the Harmony 802.11a PCI Card installed “look” like standard network nodes to the operating system.

The harmony 8150 802.11a PCI Card complies with the IEEE 802.11a standard for wireless networking devices. This means that the PCI Card is interoperable with IEEE 802.11a equipment from any manufacturer when operating in 802.11a mode.

The Harmony 802.11a PCI Card can be used with other 802.11a devices to form a stand-alone wireless Ad Hoc network or used in conjunction with a Harmony infrastructure to provide mobile clients with wireless access to an Ethernet network.

Local clock and Oscillator

Board	Frequencies (MHz)
Processor ASIC	32
PCI Bus	33
RF Synthesizer	40, 80, 160 derived from a 32MHz Oscillator

3. TEST LOCATION

All emissions tests were performed at:

Compliance Engineering Services, Inc.
561F Monterey Road
Morgan Hill, CA 95037

CCS has site descriptions on file with the FCC for 10 and 3 meter site configurations. CCS is a NVLAP accredited facility.

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

4. LABORATORY 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	VCCI 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

5. SUPPORT/ TEST EQUIPMENT

Support Equipment

TEST PERIPHERALS				
Device Type	Manufacturer	Model Number	Serial Number	FCC ID
PC	Dell	MM6	DW2DQ	DoC
Monitor	Dell	D1025TM	5534A20PB8	DoC
Printer	HP	2225C	2930S52614	DSI6XU2225
MODEM	ACEEX	1414	9013537	IFAXDM1414
Mouse	Microsoft	58264	6979346	C3KA2B1
Keyboard	Acer	6511-TW	11434S00000	JVPKBS-WIN

Test Equipment

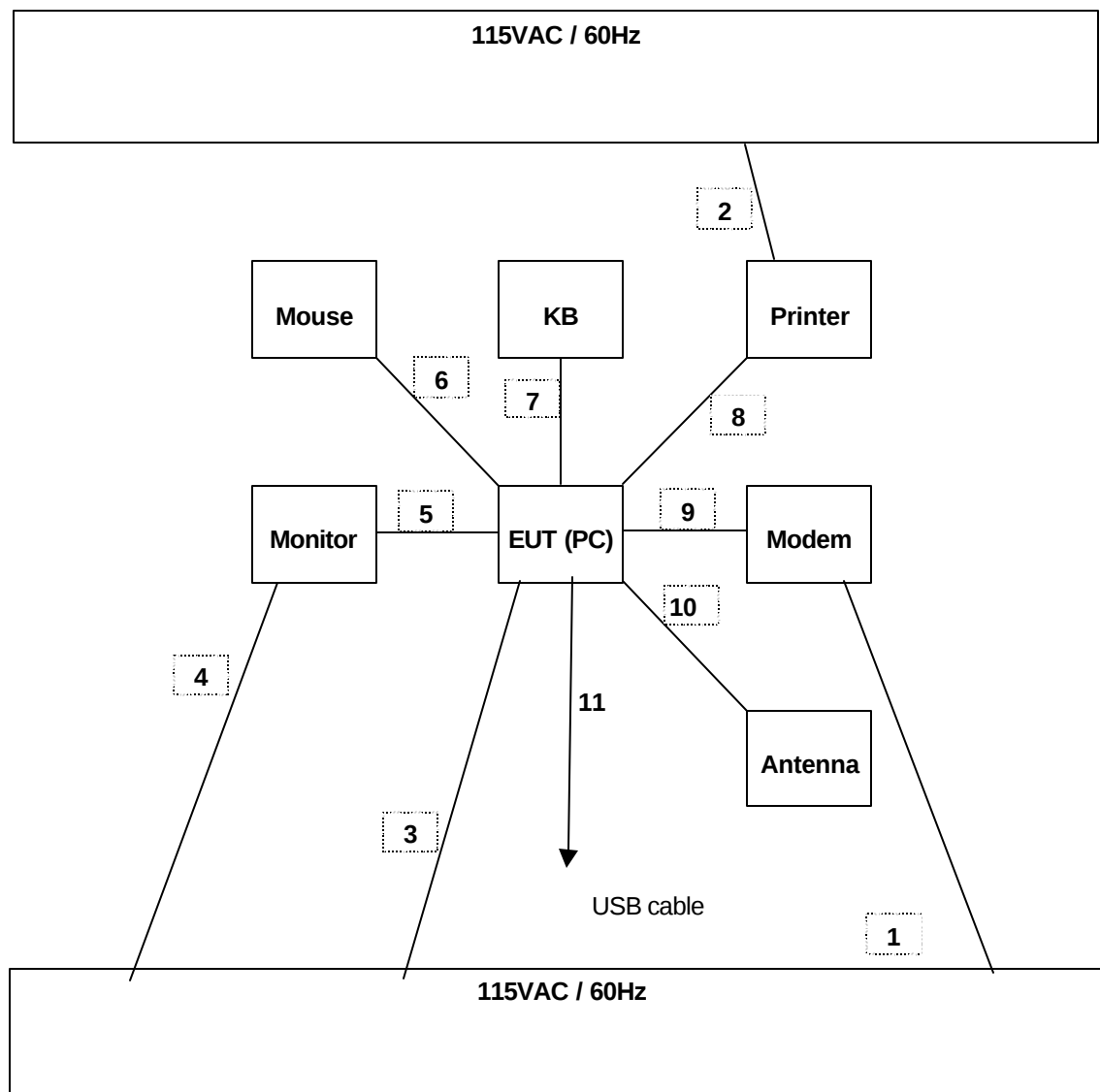
TEST EQUIPMENTS LIST				
Name of Equipment	Manufacturer	Model No.	Serial No.	Due Date
Spectrum Analyzer	HP100Hz - 22GHz	8566B	2140A01296	5/4/02
Spectrum Display	HP	85662A	2152A03066	5/10/02
Quasi-Peak Detector	HP9K - 1GHz	85650A	2811A01155	5/4/02
Pre-Amplifier, 25 dB	HP 0.1 - 1300MHz	8447D (P_1M)	2944A06833	11/21/01
Antenna, BiLog	Chase 30 - 2000MHz	CBL6112	2049	12/11/01
EMC Receiver (9K-26.5GHz)	HP	8593EM	3710A00205	6/20/02
Horn Antenna(1 - 18GHz)	EMCO	3115	2238	6/20/02
Horn Antenna,(18 - 26GHz)	Antenna Research Associate	MWH 1826/B	1013	7/26/02
Pre-Amplifier	MITEQ1-26GHz	NSP2600-44	646456	2/3/02
EMI Test Receiver	Rohde & Schwarz	ESHS 20	827129/006	2/28/02
LISN	Fischer 9k - 100MHz	50/250-25-2	114	8/5/02
Spectrum Analyzer	HP 30MHz - 50GHz	8565E	2162A23127	2/28/02
High Pass Filter	FSY Microwave	HP-7600-9SS	1	N.C.R.
Horn Antenna	EMCO (18-40GHz)	3116	2582	8/16/04

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.

I/O Cable Configuration

TEST I / O CABLES								
Cable No	I/O Port	# of I/O Port	Connector Type	Type of Cable	Cable Length	Data Traffic	Bundled	Remark
1	AC	1	US 115V	Un-shielded	2m	No	No	N/A
2	AC	1	US 115V	Un-shielded	2m	No	No	N/A
3	AC	1	US 115V	Un-shielded	2m	No	No	Yes, In LC test
4	AC	1	US 115V	Un-shielded	2m	No	No	N/A
5	Video	1	DB15	Shielded	2m	Yes	Yes	One Torroid on Each End
6	Mouse	1	PS/2	Un-shielded	2m	Yes	No	N/A
7	KB	1	PS/2	Shielded	2m	Yes	No	N/A
8	Parallel	1	DB25	Shielded	2m	Yes	Yes	N/A
9	Serial	1	DB9	Shielded	1m	Yes	No	N/A
10	RF	1	UMP	Shielded	1.5m	Yes	No	N/A
11	USB	1	USB	Un-shielded	2m	Yes	Yes	N/A

Test Configuration Diagram



6. TEST PROCEDURES AND TEST RESULTS

MODIFICATIONS

No modifications were made to the EUT to achieve compliance.

RADIATED EMISSIONS TEST REQUIREMENT: 15.209

Section 15.209 Radiated emission limits, general requirements.

(a) Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency Range (MHz)	Quasi-Peak limits (dBuV/m)
30-230	30
230-1000	37

Note: Limits apply to 10 meter

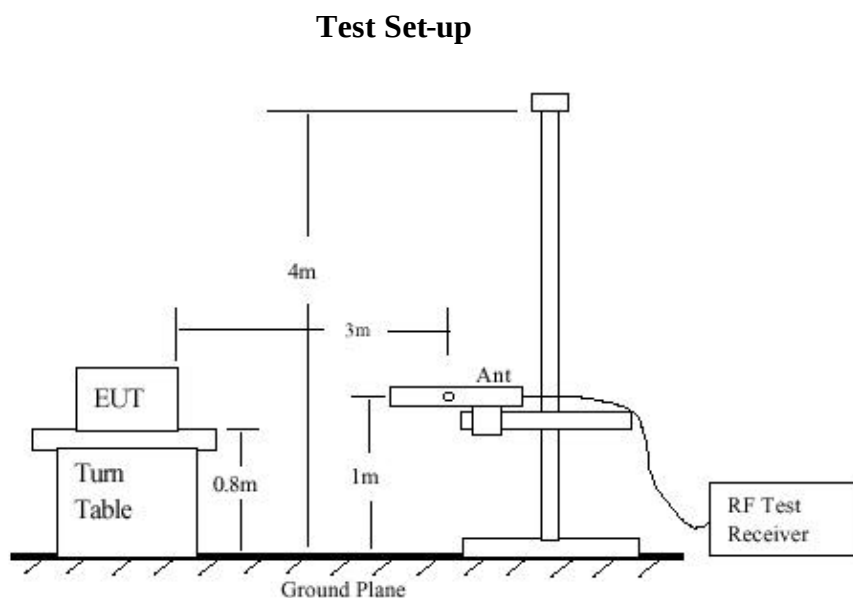


Fig 1: Radiated Emission Measurement 30 to 1000 MHz

The EUT was placed on a turntable at a distance of 10 meters from a BiLog search antenna. The antenna was raised and lowered, the EUT rotated on the turntable, until the EUT azimuth, antenna elevation, and antenna polarity were found which yielded maximum received emission levels on the spectrum analyzer.

Test Result: Refer to attached tabular data sheets.

						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 #: 01U0995-1 Report #: 011115b Date & Time: 10/16/01 11:50 AM Test Engr: Hue Ly Vang					
Company: Proxim Inc. EUT Description: Proxim Harmony 8150 PCI Test Configuration : EUT/PC/Monitor/KB/Mouse/Printer/Modem Type of Test: EN 55022 B / CISPR 22 B Mode of Operation: Continuously transmitting											
☐ 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 EN B	Margin (dB)	Pol (H/V)	Az (Deg)	Height (Meter)	Mark (P/Q/A)
256.00	44.20	12.52	3.60	28.91	31.41	37.00	-5.59	10mV	180.00	1.00	P
697.00	35.00	19.17	6.51	29.52	31.16	37.00	-5.84	10mV	90.00	1.00	P
50.00	40.00	7.96	1.99	29.68	20.27	30.00	-9.73	10mH	90.00	1.00	P
33.00	35.00	15.41	1.66	29.73	22.34	30.00	-7.66	10mH	90.00	1.00	P
66.00	40.00	6.37	2.16	29.63	18.89	30.00	-11.11	10mH	90.00	1.00	P
256.00	38.50	12.42	3.60	28.91	25.62	37.00	-11.38	10mH	90.00	1.00	P
Total data #: 6 V.2b											

Both Antenna's were used during the test. Each antenna was exercise with max transmit power.

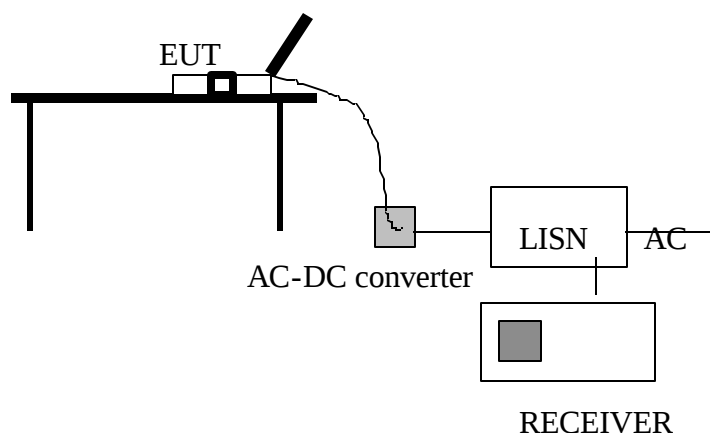
AC LINE CONDUCTED EMISSIONS TEST REQUIREMENT: 15.207

Section 15.207 Conducted limits.

(a) For an intentional radiator which 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 450 kHz to 30 MHz shall not exceed 250 microvolts. Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminals.

Conducted Emission Limits		
Frequency Range(MHz)	CISPR QP Limit (dBuV)	CISPR Average Limits (dBuV)
.15 to .5	66 to 56	56 to 46
.5-5	56	46
5-30	60	50

Test Set-up



Test Procedure

1. The EUT was placed on a wooden table 40 cm from a vertical ground plane and approximately 80 cm above the horizontal ground plane on the floor. The EUT was set to transmit in a normal mode.
2. Line conducted data was recorded for both NEUTRAL and HOT lines.

Test Results

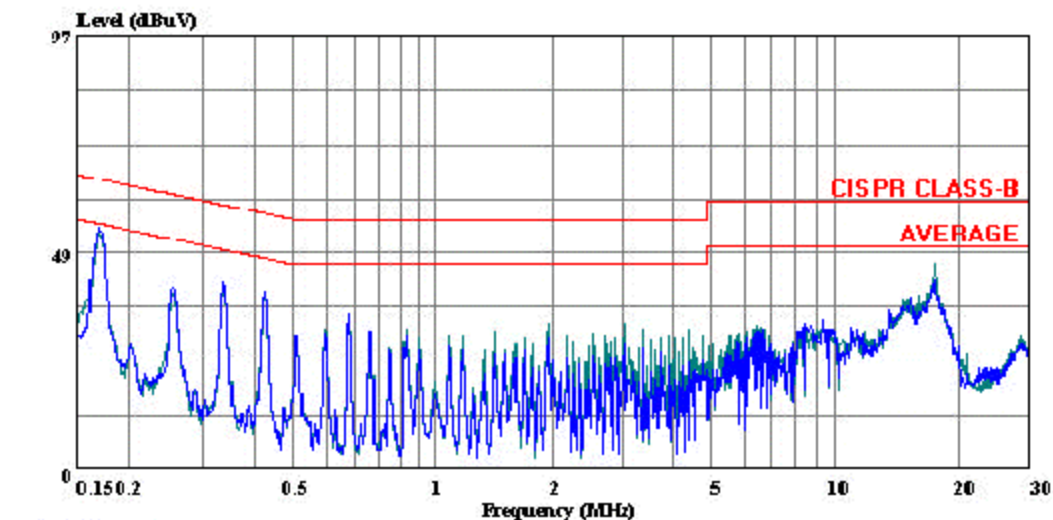
Refer to attached graph

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
0.17	52.19	--	--	0.00	65.43	55.43	-13.24	-3.24	L1
2.10	30.61	--	--	0.00	56.00	46.00	-25.39	-15.39	L1
17.75	46.13	--	--	0.00	60.00	50.00	-13.87	-3.87	L1
0.17	53.78	--	--	0.00	65.43	55.43	-11.65	-1.65	L2
2.10	27.39	--	--	0.00	56.00	46.00	-28.61	-18.61	L2
17.85	41.03	--	--	0.00	60.00	50.00	-18.97	-8.97	L2
6 Worst Data									



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

Data#: 15 File#: 01u0995.emi Date: 10-15-2001 Time: 18:18:16



(Auxiliary ATC)
Trace: 10

Ref Trace:

Report/Project # : 01U0995-1
Tested By : Jesse Saldivar
Manufacture : Proxim Inc.
EUT Description : Harmony Model: 8150
Test Config. : EUT/PC/Monitor/Keyboard/Mouse/Modem/
Printer
Test Target : EN55022 Class B
Mode of Operation: Continuous Transmit
Peak: L1 (Black) L2 (Green)
115VAC 60Hz

RESTRICTED BAND TEST REQUIREMENT: 15:205

Section 15.205 Restricted bands of operation

(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 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	(²)
13.36 - 13.41	322 - 335.4		

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.

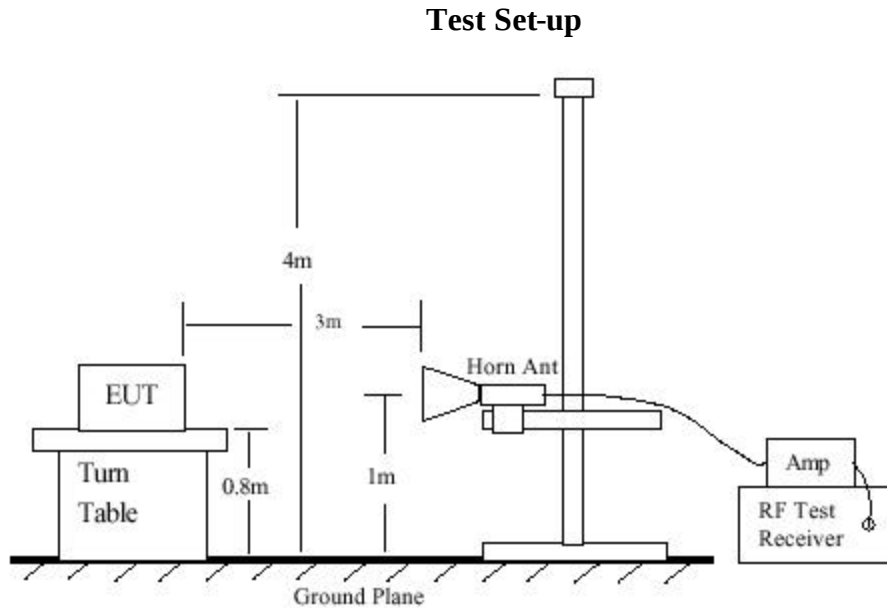


Fig 2: Radiated Emission Above 1000 MHz

Test Procedures

1. The EUT was placed on a wooden table on the outdoor ground plane. The search antenna was placed 3 ft from the EUT. The EUT antenna was mounted vertically as per normal installation.
2. The turntable was slowly rotated to locate the direction of maximum emission at each emission falling in the restricted bands of 15.205.
3. Once maximum direction was determined, the search antenna was raised and lowered in both vertical and horizontal polarizations. The maximum readings so obtained are recorded in the data listed below.

Radiated emissions from the transmitter were compared against the radiated field strength of the fundamental frequency. The only emissions detected up to the 10th harmonic of the operating frequency were harmonics of the fundamental. All harmonics were at levels less than 54 dBuV/m, as per measurements taken to show compliance with 15.205.

Test Results: Refer to attached tabular data sheets

COMPLIANCE ENGINEERING SERVICES, INC.																					
Harmonic Emissions																					
Proxim										10./15/01											
Channel 36 : 5.18GHz										Hue Vang											
										A site (1.0 Meter)											
F(MHz)	READING		AF	CL	AMP	DIST	HPF	TOTAL		LIMIT		MARGIN		POL							
	(dBuV)		(dB)	(dB)	(dB)	(dB)	(dB)	(dBuV/m)		(dBuV/m)		(dB)		(H/V)							
	Pk	Avg						Pk	Avg	Pk	Avg	Pk	Avg								
10360*		39	38.1	7.28	42.5	9.5	1	-5.62	33.38	68.9	68.9		-35.5	H							
15540	49	38.3	38.2	10.2	42.5	9.5	1	46.4	35.7	74	54	-27.6	-18.3	H							
20720	60.17	49.83	32.3	12.75	41.5	9.5	1	55.22	44.88	74	54	-18.8	-9.12	H							
25900	64.5	52.83	33.1	14.62	42.5	9.5	1	61.22	49.55	74	54	-12.8	-4.45	H							
31080	20	13	47	13.5	20	9.5	0	51	44	74	54	-23	-10	H							
36260	21	14.2	46.5	13.5	20	9.5	0	51.5	44.7	74	54	-22.5	-9.3	H							
10360*		38.1	38.1	7.28	42.5	9.5	1	-5.62	32.48	68.9	68.9		-36.4	V							
15540	48.6	38.2	38.2	10.2	42.5	9.5	1	46	35.6	74	54	-28	-18.4	V							
20720	58.67	46.1	32.3	12.75	41.5	9.5	1	53.72	41.15	74	54	-20.3	-12.9	V							
25900	57.33	50.5	33.1	14.62	42.5	9.5	1	54.05	47.22	74	54	-20	-6.78	V							
31080	21	14.2	47	13.5	20	9.5	0	52	45.2	74	54	-22	-8.8	V							
36260	22	15.5	46.5	13.5	20	9.5	0	52.5	46	74	54	-21.5	-8	V							
NOTE: ALL READINGS MEASURED AT 1 METER.																					
DIST: Correction to extrapolate reading to 3m specification distance																					
										ANALYZER SETTINGS											
AF: Antenna Factor								PEAK(Pk):		Res bw		Avg. bw									
AMP: Pre-amp gain										1MHz		1MHz									
CL: Cable loss								AVG(Pk):		Res bw		Avg. bw									
HPF: High pass filter insertion loss										1MHz		10Hz									
* : Not in restricted bands																					

COMPLIANCE ENGINEERING SERVICES, INC.																
Harmonic Emissions																
Proxim										10/15/01						
Channel 48 : 5.24 GHz										Hue Vang						
										A site (1.0 Meter)						
F(MHz)	READING		AF	CL	AMP	DIST	HPF	TOTAL		LIMIT		MARGIN		POL		
	(dBuV)		(dB)	(dB)	(dB)	(dB)	(dB)	(dBuV/m)		(dBuV/m)		(dB)		(H/V)		
	Pk	Avg						Pk	Avg	Pk	Avg	Pk	Avg			
10480*		39	38.1	7.28	42.5	9.5	1	-5.62	33.38	68.9	68.9			-35.5	H	
15720	48.5	38	38.2	10.2	42.5	9.5	1	45.9	35.4	74	54	-28.1	-18.6	H		
20960	52.2	42.5	32.3	12.75	41.5	9.5	1	47.25	37.55	74	54	-26.8	-16.5	H		
26200	53.7	44.83	33.1	14.62	42.5	9.5	1	50.42	41.55	74	54	-23.6	-12.5	H		
31440	20	14.9	47	13.5	20	9.5	0	51	45.9	74	54	-23	-8.1	H		
36680	21	15.2	46.5	13.5	20	9.5	0	51.5	45.7	74	54	-22.5	-8.3	H		
10480*		40	38.1	7.28	42.5	9.5	1	-5.62	34.38	68.9	68.9			-34.5	V	
15720	48.2	38.1	38.2	10.2	42.5	9.5	1	45.6	35.5	74	54	-28.4	-18.5	V		
20960	51.7	42.3	32.3	12.75	41.5	9.5	1	46.75	37.35	74	54	-27.3	-16.7	V		
26200	53.5	44.8	33.1	14.62	42.5	9.5	1	50.22	41.52	74	54	-23.8	-12.5	V		
31440	22	15	47	13.5	20	9.5	0	53	46	74	54	-21	-8	V		
36680	21	17	46.5	13.5	20	9.5	0	51.5	47.5	74	54	-22.5	-6.5	V		
NOTE: ALL READINGS MEASURED AT 1 METER.																
DIST: Correction to extrapolate reading to 3m specification distance																
										ANALYZER SETTINGS						
AF: Antenna Factor									PEAK(PK):		Res bw		Avg. bw			
AMP: Pre-amp gain										1MHz		1MHz				
CL: Cable loss									AVG(Pk):		Res bw		Avg. bw			
HPF: High pass filter insertion loss										1MHz		10Hz				
* : Not in restricted bands																

COMPLIANCE ENGINEERING SERVICES, INC.														
Harmonic Emissions														
proxim													10/15/01	
Channel 64 : 5.32 GHz										Hue Vang				
										A site (1.0 Meter)				
F(MHz)	READING		AF	CL	AMP	DIST	HPF	TOTAL		LIMIT		MARGIN		POL
	(dBuV)		(dB)	(dB)	(dB)	(dB)	(dB)	(dBuV/m)		(dBuV/m)		(dB)		(H/V)
	Pk	Avg						Pk	Avg	Pk	Avg	Pk	Avg	
10640	52	38.7	38.1	7.28	42.5	9.5	1	46.38	33.08	74	54	-27.6	-20.9	H
15960	48.8	37.9	38.2	10.2	42.5	9.5	1	46.2	35.3	74	54	-27.8	-18.7	H
21280	54.8	41.2	32.3	12.75	41.5	9.5	1	49.85	36.25	74	54	-24.2	-17.8	H
26600	55	45.2	33.1	14.62	42.5	9.5	1	51.72	41.92	74	54	-22.3	-12.1	H
31920	22	17	47	13.5	20	9.5	0	53	48	74	54	-21	-6	H
37240	21	13	46.5	13.5	20	9.5	0	51.5	43.5	74	54	-22.5	-10.5	H
10640	49	36.1	38.1	7.28	42.5	9.5	1	43.38	30.48	74	54	-30.6	-23.5	V
15960	49.3	37.9	38.2	10.2	42.5	9.5	1	46.7	35.3	74	54	-27.3	-18.7	V
21280	50.7	42	32.3	12.75	41.5	9.5	1	45.75	37.05	74	54	-28.3	-17	V
26600	56	45.8	33.1	14.62	42.5	9.5	1	52.72	42.52	74	54	-21.3	-11.5	V
31920	21	15	47	13.5	20	9.5	0	52	46	74	54	-22	-8	V
37240	20	14.5	46.5	13.5	20	9.5	0	50.5	45	74	54	-23.5	-9	V
NOTE: ALL READINGS MEASURED AT 1 METER.														
DIST: Correction to extrapolate reading to 3m specification distance														
										ANALYZER SETTINGS				
AF: Antenna Factor										PEAK(Pk):		Res bw		Avg. bw
AMP: Pre-amp gain												1MHz		1MHz
CL: Cable loss										AVG(Pk):		Res bw		Avg. bw
HPF: High pass filter insertion loss												1MHz		10Hz

BANDEGE

The band edge emission plot on the following pages shows carrier frequency maximum emission in restrict band 4.5-5.15GHz(lower band edge) and 5.35-5.46GHz(upper band edge).

This method is exactly like the marker delta method. But the delta value will be collected from a conducted measurement to obtain better dynamic range.

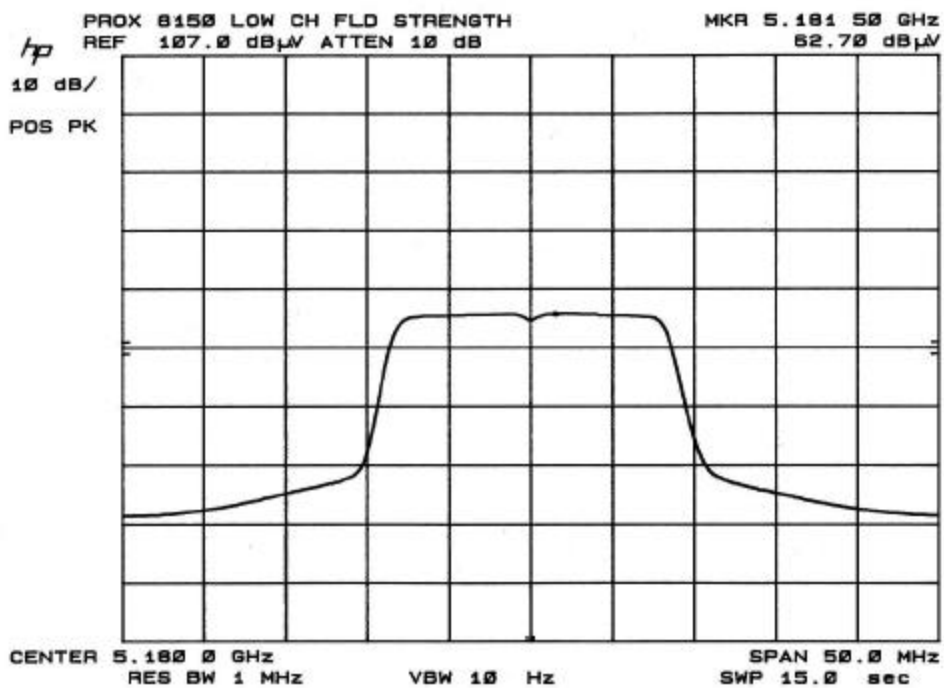
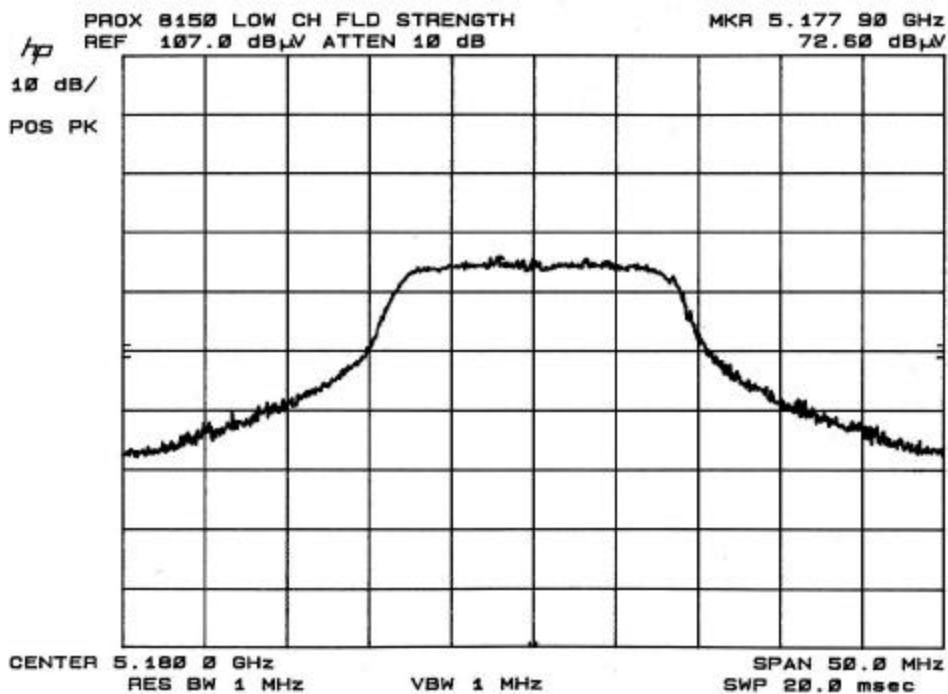
For this method measure the field strength of the fundamental frequencies in dBuV. Once that value is measured, another conducted measurement is made between the highest peak in the nearby restricted band and the fundamental peak in dBc. Then use that delta to subtract from the fundamental reading.

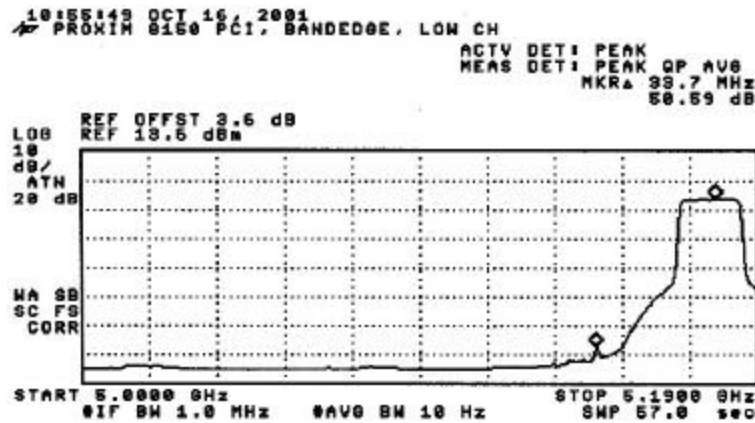
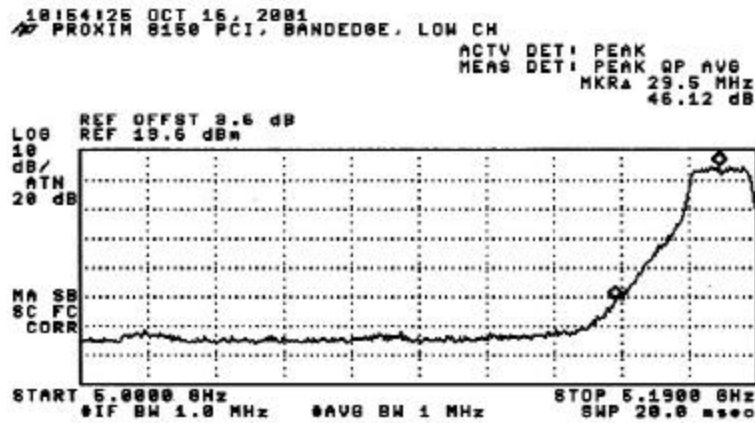
Band	Peak(dBuV)	AVG(dBuV)	Delta. Peak(dBc)	Delta Avg(dBc)	True Peak	True Avg.
Low	72.6	62.7	46.12	50.59	26.48	12.11
High	71.9	61.7	48.72	51.72	23.18	9.98

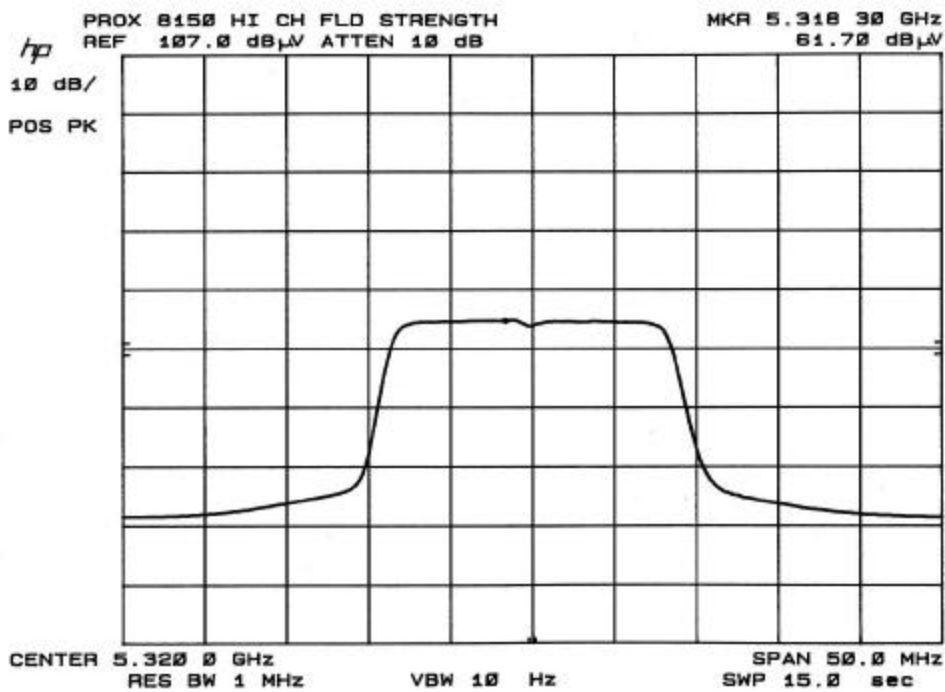
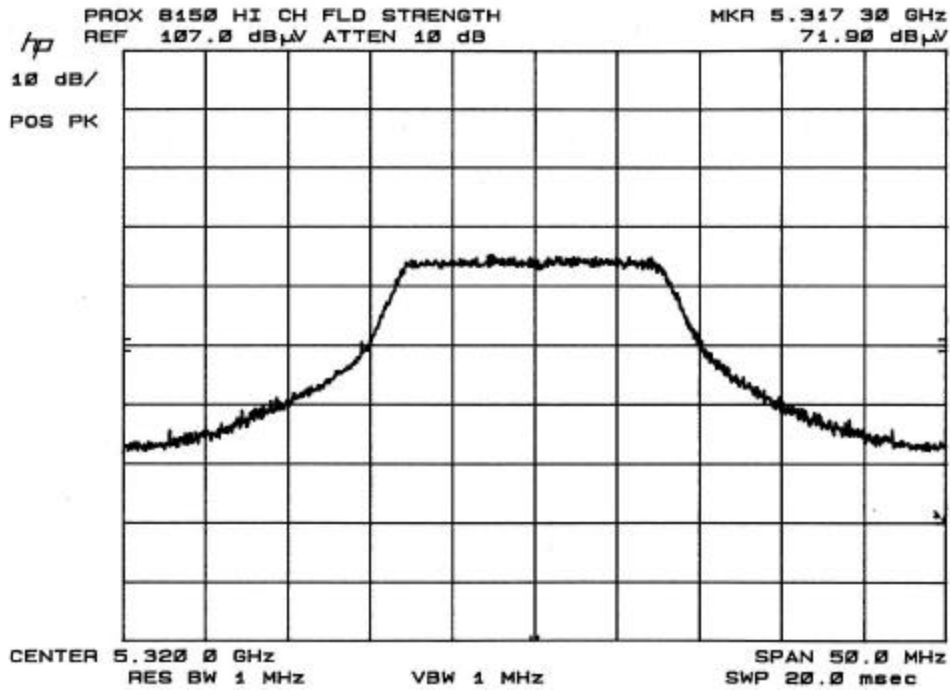
Band edge readings:

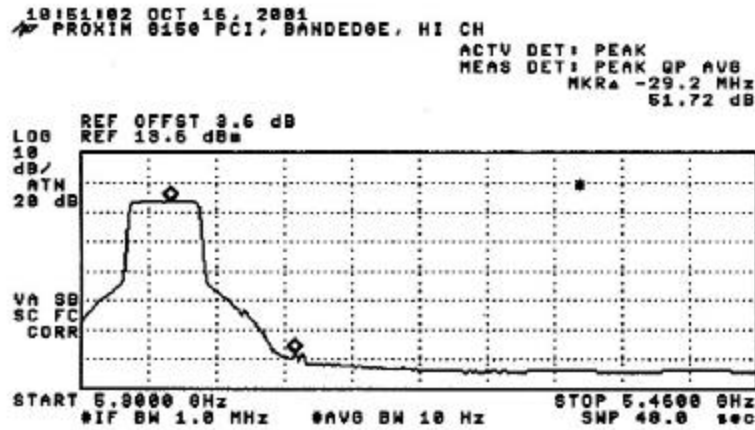
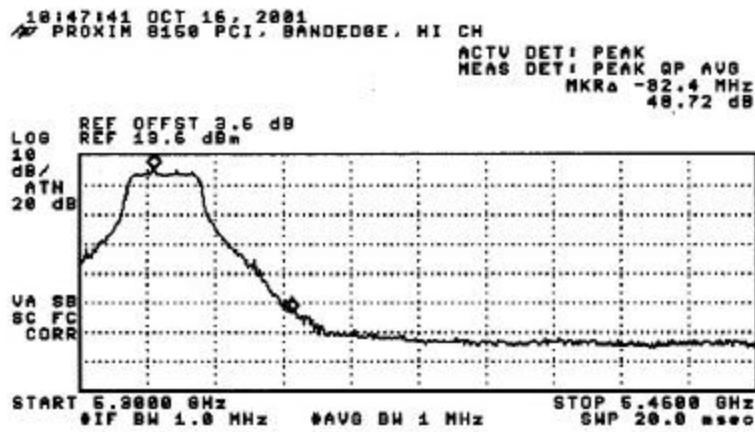
Freq. (MHz)	Reading (dBuV)	AF (dB)	Closs (dB)	Pre-amp (dB)	Dist dB	Other dB	Level (dBuV/m)	Limit FCC_B	Margin (dB)	Pol (P/A)
5180	26.48	34.20	4.80	0.00	9.50	0.00	55.98	74.0	-18.02	P
5180	12.11	34.20	4.80	0.00	9.50	0.00	41.61	54.0	-12.39	A
5320	23.18	34.60	4.80	0.00	9.50	0.00	53.08	74.0	-20.92	P
5320	9.98	34.60	4.80	0.00	9.50	0.00	39.88	54.0	-14.12	A

Remark: Measurements were made by using 802.11a mode of operation. There are three channels used by Turbo mode. They are channel [42@5210](#) MHz, channel [50@5250](#) MHz and channel [58@5290](#) MHz. Since during 802.11a mode, the channel usages and closer to restricted band, bandedge compliance measurements only performed at 802.11a mode.







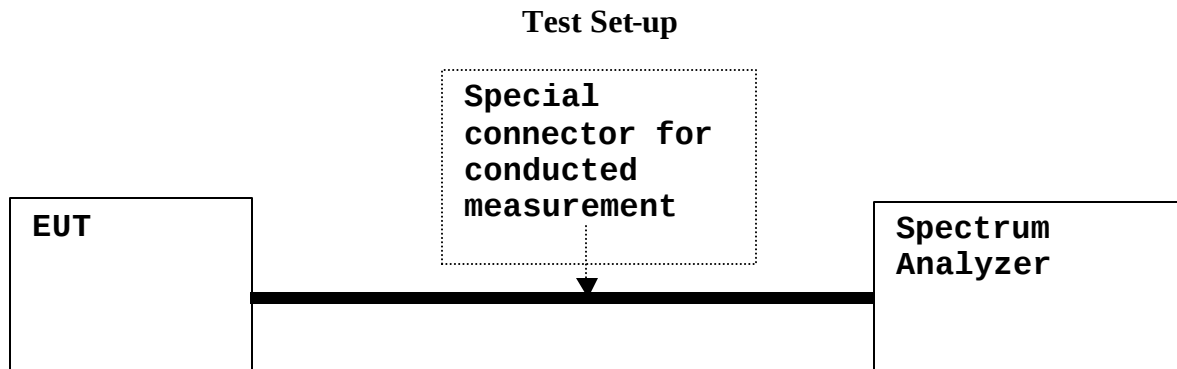


PEAK POWER FOR UNII TEST REQUIREMENT: 15.407(A)1-2

(a) Power limits:

(1) For the band 5.15-5.25 GHz, the peak transmit power over the frequency band of operation shall not exceed the lesser of 50 mW or $4 \text{ dBm} + 10\log B$, where B is the 26-dB emission bandwidth in MHz. If transmitting antennas of directional gain greater than 6 dBi are used, the peak transmit power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(2) For the band 5.25-5.35 GHz, the peak transmit power over the frequency band of operation shall not exceed the lesser of 250 mW or $11 \text{ dBm} + 10\log B$, where B is the 26-dB emission bandwidth in MHz. If transmitting antennas of directional gain greater than 6 dBi are used, the peak transmit power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.



Test Procedure

For this test, the EUT's antenna was removed and replaced with a SMA jack to UMP3.0 plug test cable, so output power levels were calculated from conducted emission levels

The analyzer center frequency was set to the EUT carrier frequency. The resolution bandwidth were set to 1MHz and the video bandwidth were set to 30khz. Use the MAX HOLD function capture the display. Use PEAK SEARCH to take the signal.

Because the Spectrum Analyzer bandwidth were less then the Emission bandwidth. The 26 dB Emission bandwidth correction factor was used.

To take the emission bandwidth set the resolution bandwidth to 1% of the emission bandwidth. The video band must be greater then the resolution bandwidth.

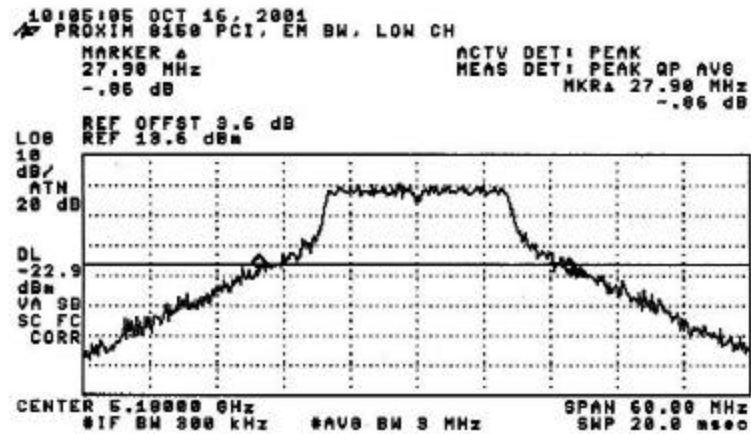
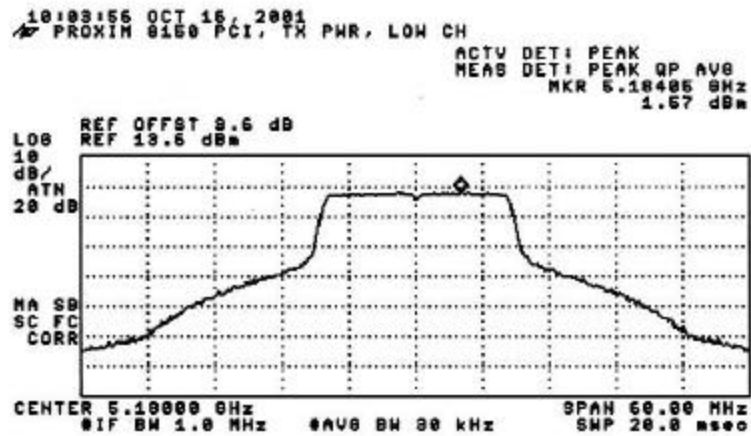
26dB Correction Factor : $10 \log (\text{emission bandwidth} / \text{resolution bandwidth unit})$

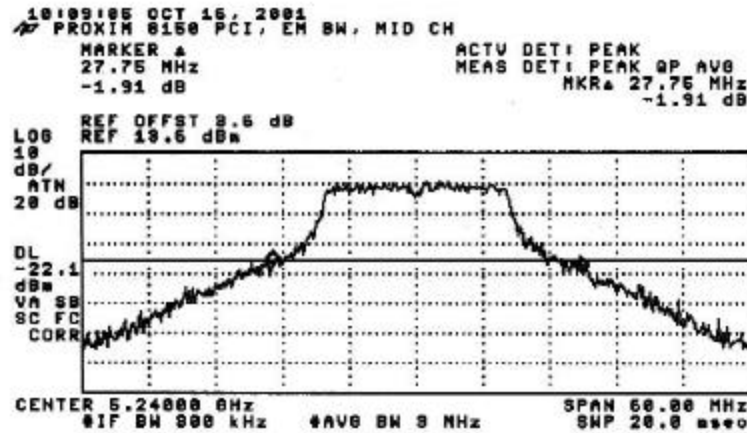
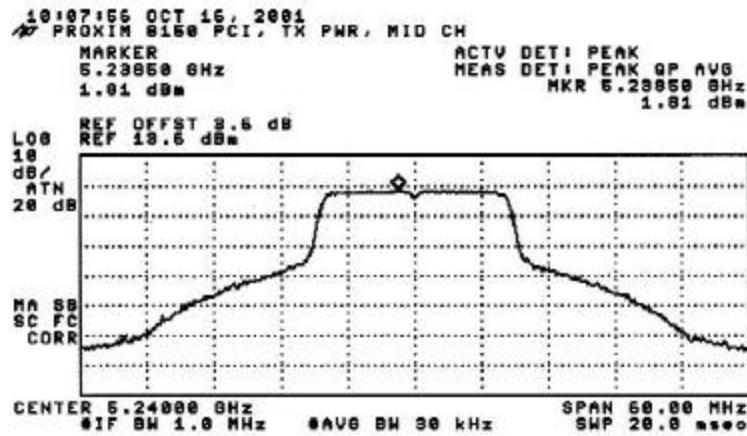
Once the 26 dB correction factor is attained add that number to the peak output power reading from the spectrum analyzer.

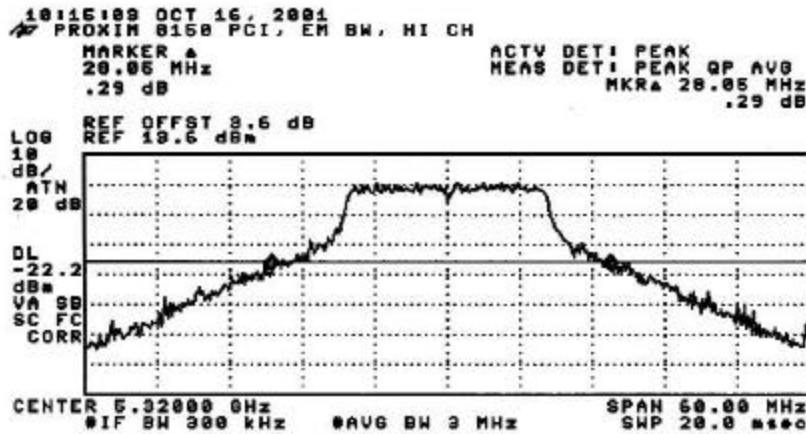
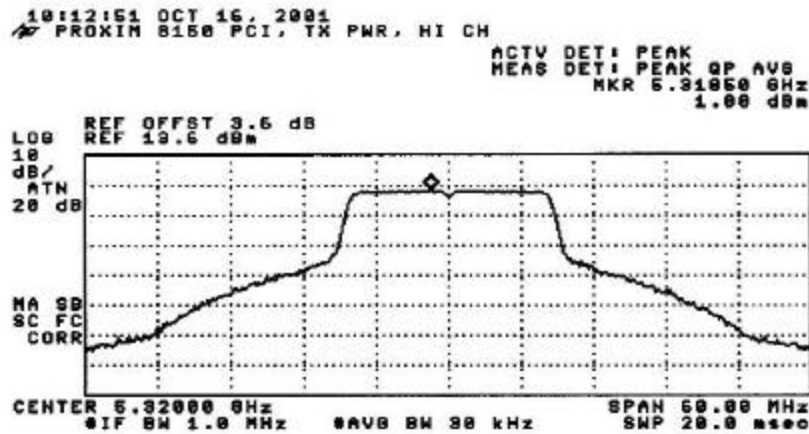
Channel	Frequency (MHz)	Peak Power (dBm)	Emission Bandwidth (MHz)	True Power (dBm)	Limit (dBm)
36	5180	1.57	27.9	16.03	17
48	5240	1.81	27.75	16.24	17
64	5320	1.88	28.05	16.36	24

Test Results: Refer to attached spectrum analyzer data chart.

Measurements were made by using 802.11a mode of operation. Unit produces the highest power during Lower data rate.

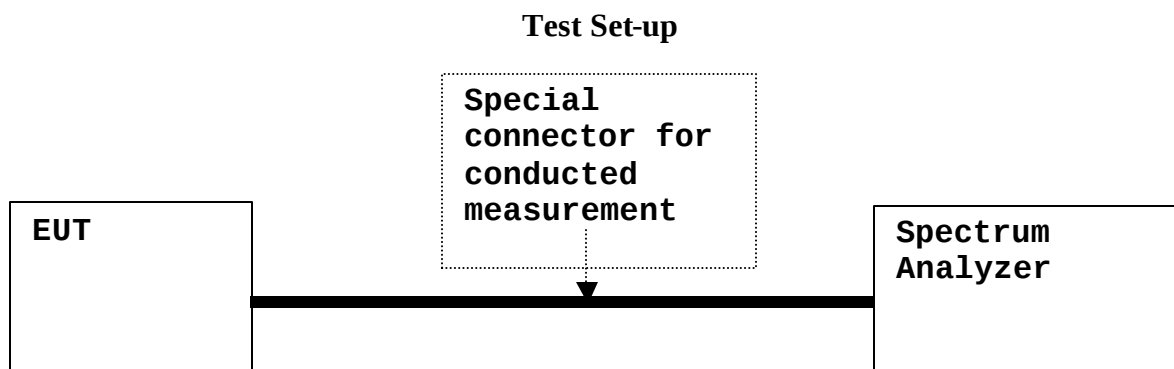






PEAK POWER SPECTRAL DENSITY TEST REQUIREMENT: 15.407(A)5

- (1) For the band 5.15-5.25 GHz, the peak power spectral density shall not exceed 4 dBm in any 1-MHz band.
- (2) For the band 5.25-5.35 GHz, the peak power spectral density shall not exceed 11 dBm in any 1-MHz band.
- (5) The peak power spectral density is measured as a conducted emission by direct connection of a calibrated test instrument to the equipment under test. If the device cannot be connected directly, alternative techniques acceptable to the Commission may be used. Measurements are made over a bandwidth of 1 MHz or the 26 dB emission bandwidth of the device, whichever is less. A resolution bandwidth less than the measurement bandwidth can be used, provided that the measured power is integrated to show total power over the measurement bandwidth. If the resolution bandwidth is approximately equal to the measurement bandwidth, and much less than the emission bandwidth of the equipment under test, the measured results shall be corrected to account for any difference between the resolution bandwidth of the test instrument and its actual noise bandwidth.

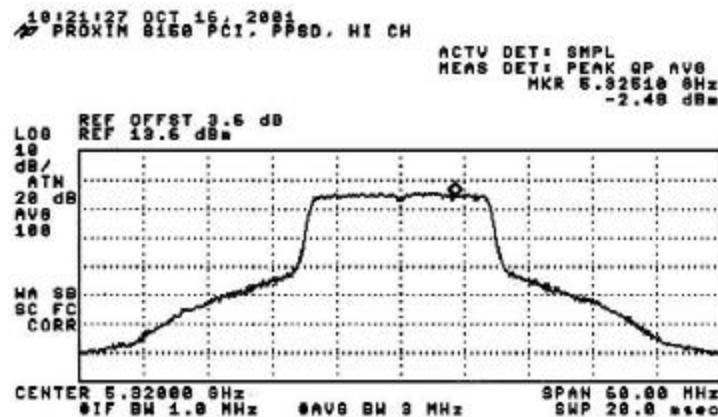
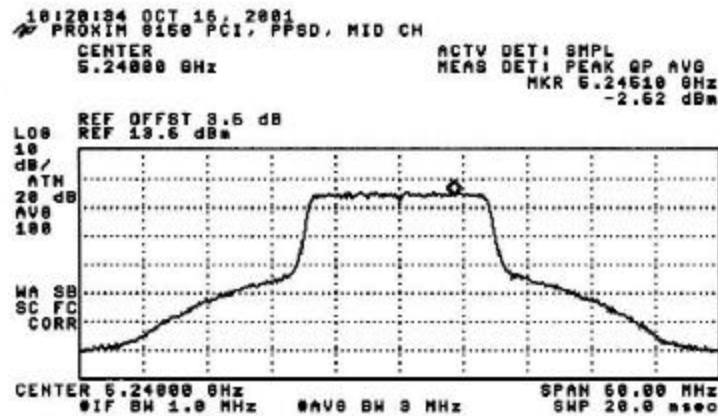
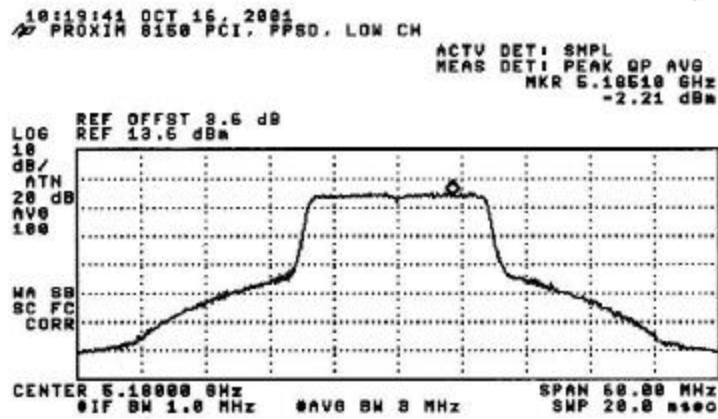


Test Procedure

For this test, the EUT's antenna was removed and replaced with a SMA jack to UMP3.0 plug test cable, so output power levels were calculated from conducted emission levels.

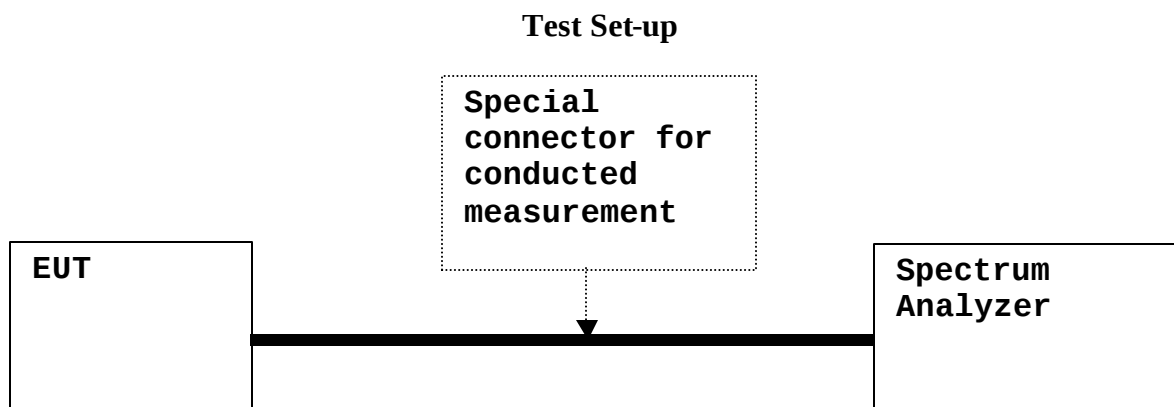
The analyzer center frequency was set to the EUT carrier frequency. The analyzer resolution bandwidth was set to 1MHz and the video bandwidth was set to 3MHz. After 100 sweep of video averaging, PEAK SEARCH for the wanted signal.

Channel(MHZ)	Reading(dBm)	Margin(dBm)
36	-2.21	-4.21
48	-2.62	-13.62
64	-2.48	-13.48



PEAK EXCURSION TO AVERAGE RATIO: 15.407(A)6

(6) The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.



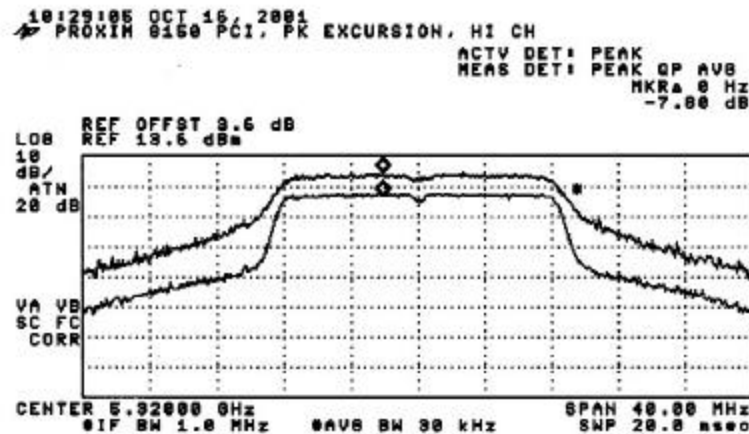
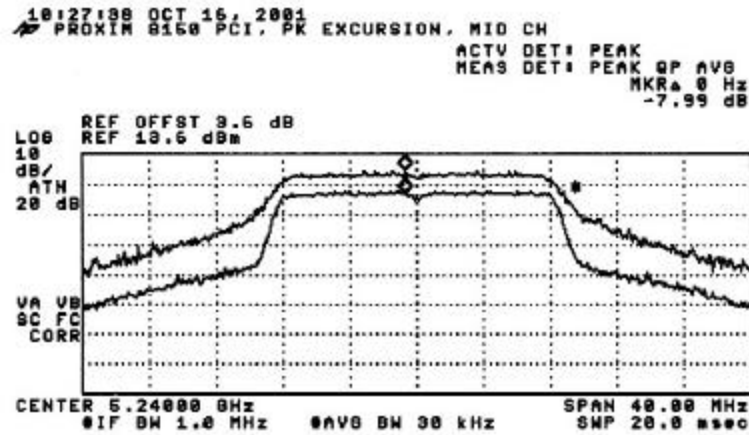
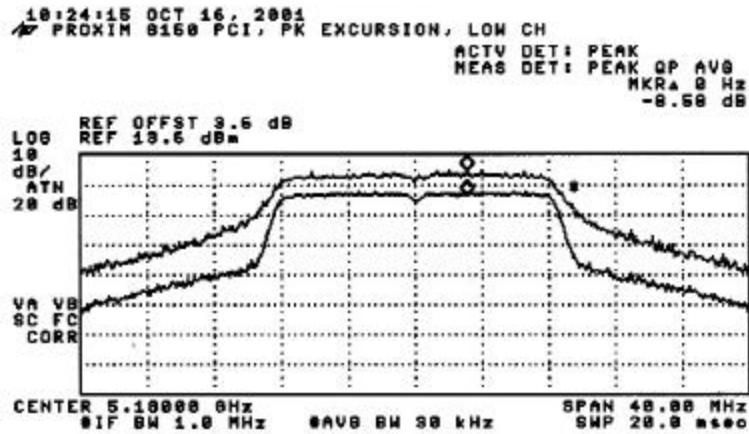
Test Procedure

For this test, the EUT's antenna was removed and replaced with a SMA jack to UMP3.0 plug test cable, so output power levels were calculated from conducted emission levels.

The analyzer center frequency was set to the EUT carrier frequency. For the peak value trace A, the analyzer resolution and video bandwidth were set to 1MHz. Do a MAX HOLD, then VIEW. For the average value trace B, the analyzer resolution bandwidth was set to 1MHz, the video bandwidth was set to 30kHz. MAX HOLD then VIEW trace B also.

The delta from the peak value trace and the Average should not exceed 13dBm across any 1MHz bandwidth.

Channel	Reading (dBm)	Margin (dBm)
36	8.58	-4.42
48	7.99	-5.01
64	7.8	-5.2

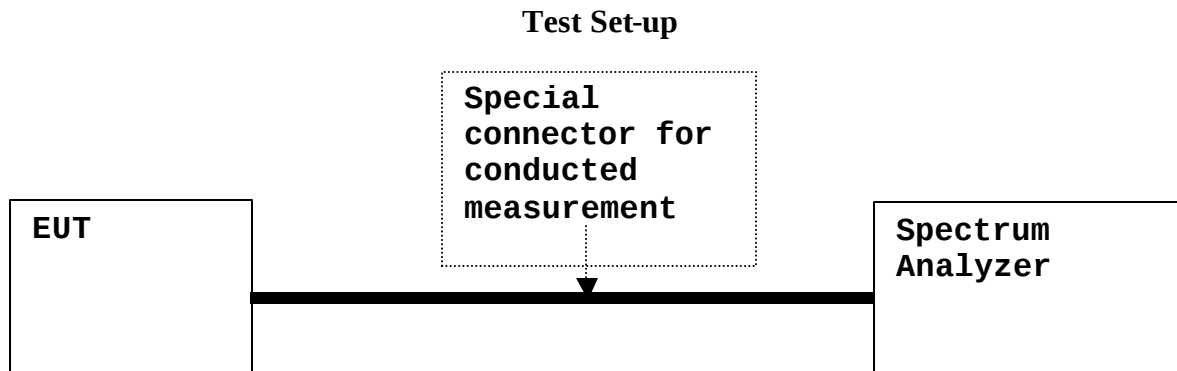


OUT OF BAND EMISSION 15.407 (B) 1-2

(b) Undesirable Emission Limits: Except as shown in Paragraph (b)(6) of this Section, the peak emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz (68.3 dBuV/M@3meter).

(2) For transmitters operating in the 5.25-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz. Devices operating in the 5.25-5.35 GHz band that generate emissions in the 5.15-5.25 GHz band must meet all applicable technical requirements for operation in the 5.15-5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5.15-5.25 GHz band.



Test Procedure

For this test, the EUT's antenna was removed and replaced with a SMA jack to UMP3.0 plug test cable, so output power levels were calculated from conducted emission levels.

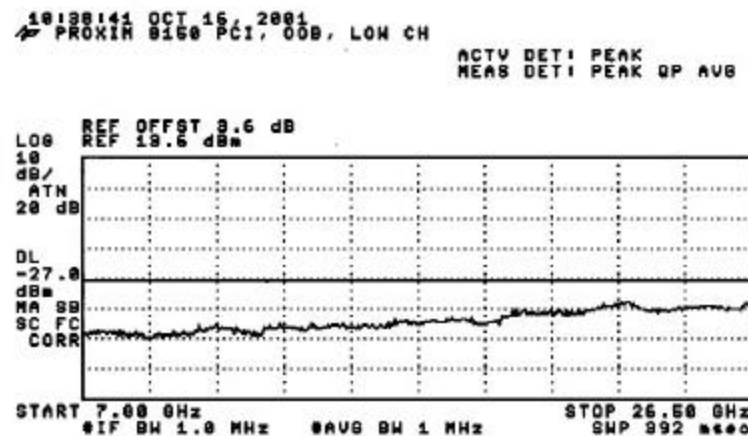
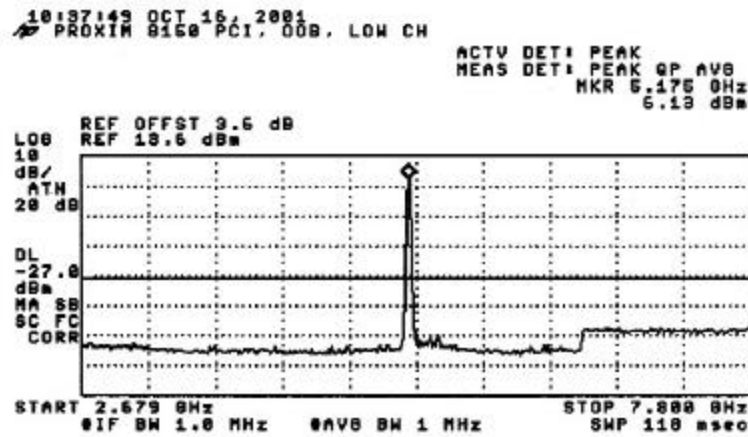
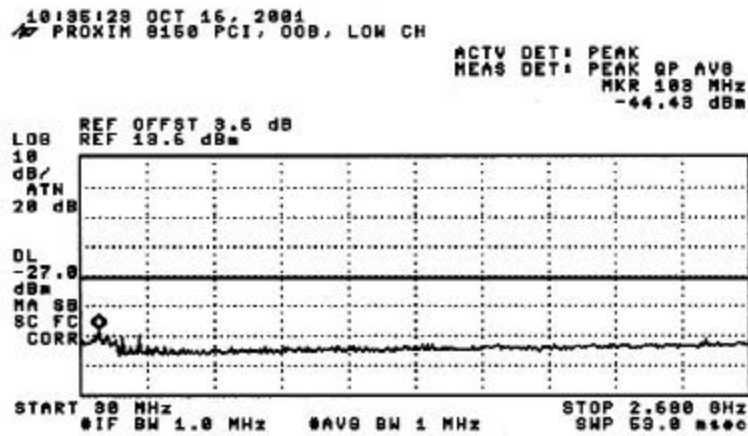
The analyzer center frequency was set to the EUT carrier frequency. The analyzer resolution and video bandwidth were set to 1MHz. The entire band from 30MHz to 40GHz was investigated.

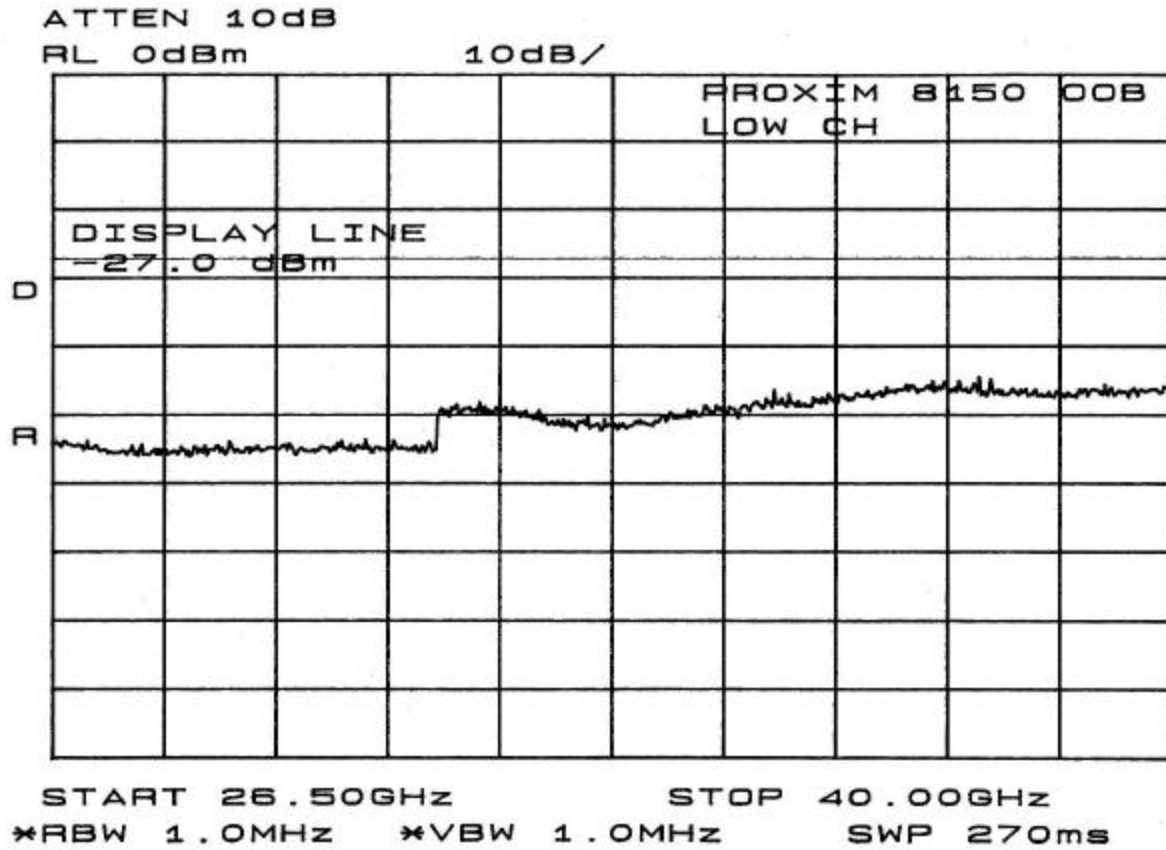
Every suspected signal was also investigated through radiated emission, refer to section 15.205 Restricted bands of operation for test setup.

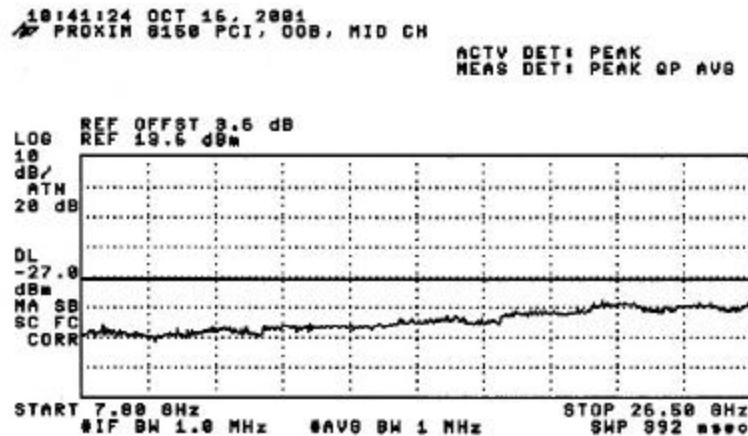
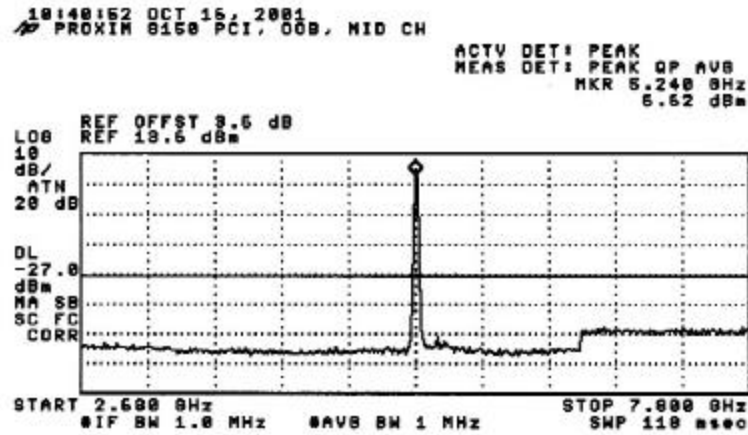
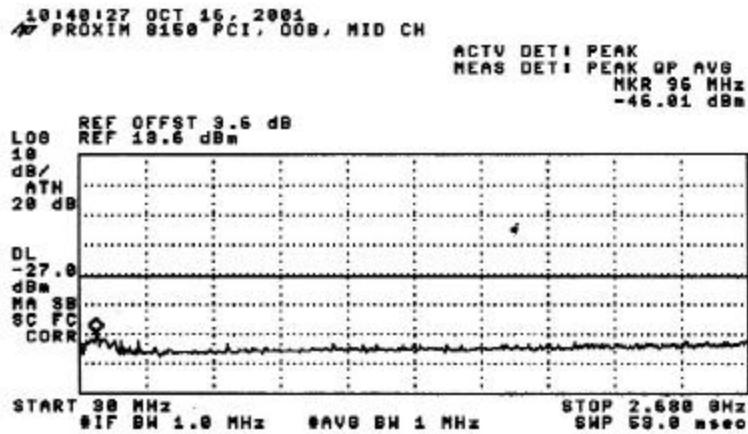
		Project #: 01U0995 Report #: 011026B Date & Time: 10/22/01 6:00 PM Test Engr: Hue Ly Vang	
FCC, VCCI, CISPR, CE, AUSTEL, NZ UL, CSA, TUV, BSMI, DHHS, NVLAP 561 F MONTEREY ROAD, MORGAN HILL CA 95037 PHONE: (408) 463-0885 FAX: (408) 463-0888			
Company: Proxim EUT Description: PCI Card Test Configuration : Eut/PC/Monitor/Mouse/KB/Printer/modem Type of Test: FCC 15.407, above 1GHz Mode of Operation: Continous transmit			
<< Main Sheet			

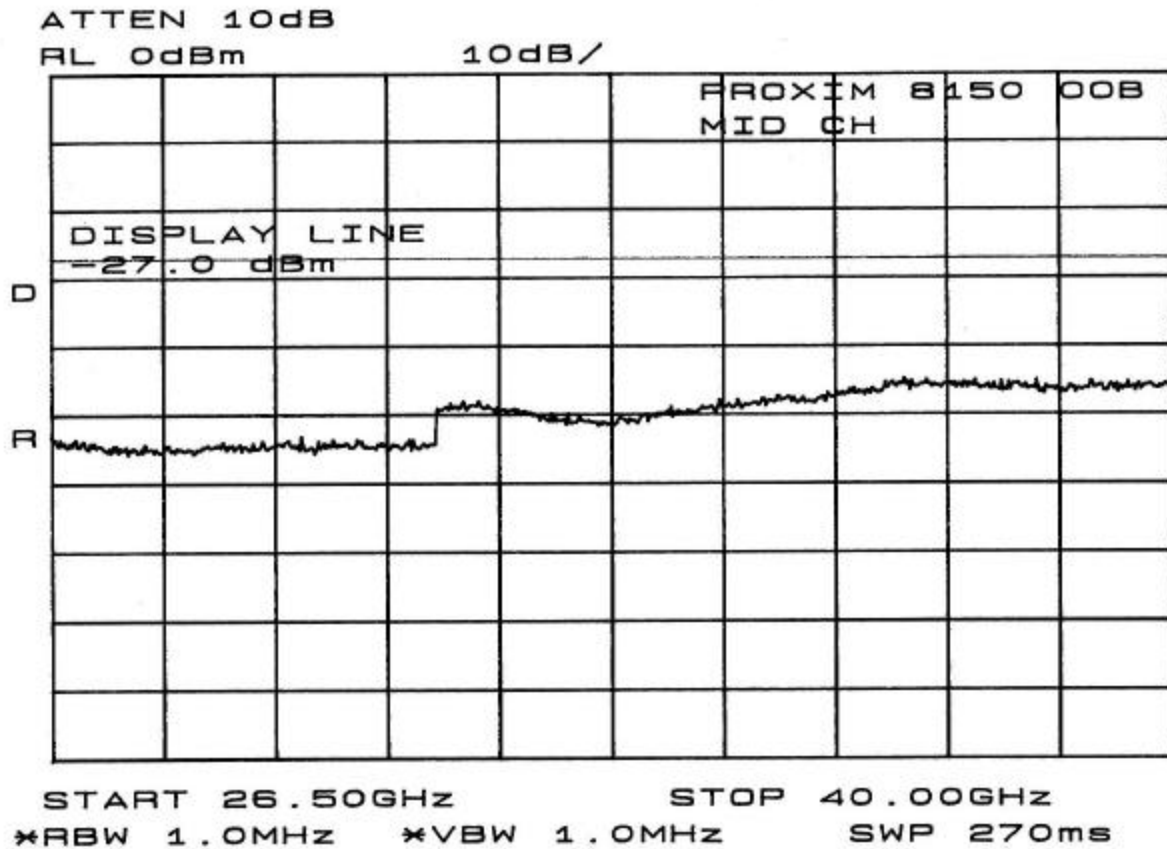
Freq. (MHz)	Reading (dBuV)	AF (dB)	Closs (dB)	Pre-amp (dB)	Dist (dB)	Other (dB)	Level (dBuV/m)	Limit FCC	Margin (dB)	Pol (H/V)
6360*	36.00	34.10	4.95	0.00	9.50	0.00	65.55	68.30	-2.75	V
6230*	35.50	34.20	4.95	0.00	9.50	0.00	65.15	68.30	-3.15	H
6180*	34.00	34.40	4.95	0.00	9.50	0.00	63.85	68.30	-4.45	H
8480	15.00	37.40	6.22	0.00	9.50	0.00	49.12	54.00	-4.88	H
8350	15.00	37.10	6.22	0.00	9.50	0.00	48.82	54.00	-5.18	V
4149	19.10	32.50	4.35	0.00	9.50	0.00	46.45	54.00	-7.55	V
6 Worst Data										

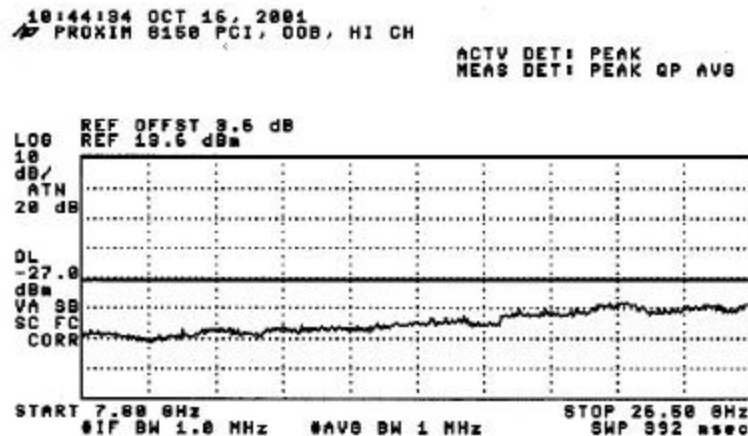
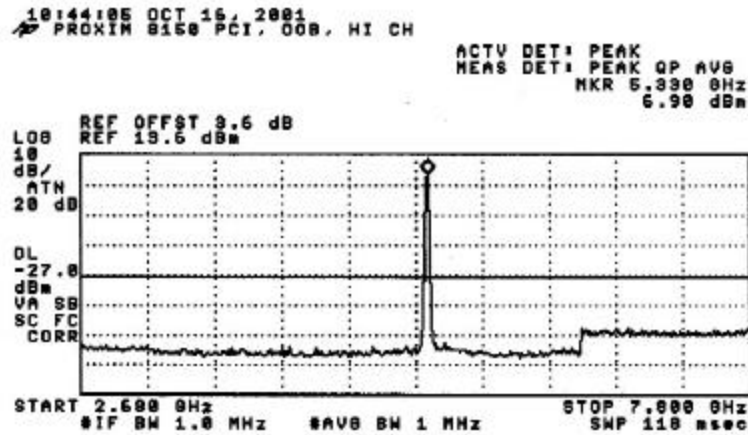
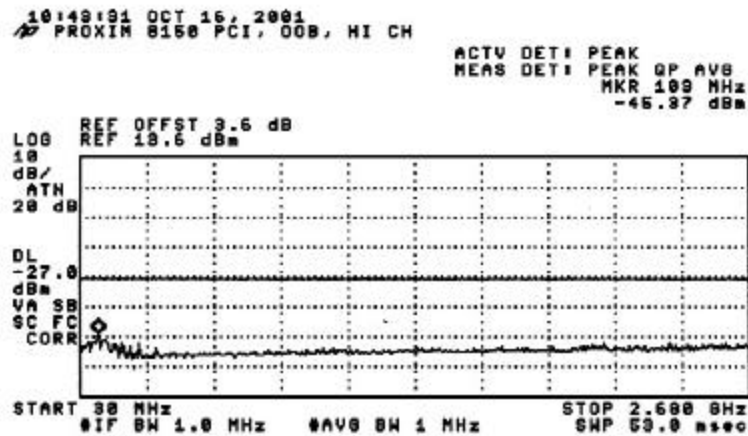
* = Not in the Restricted band Data taken with Spectrum Analyzer RBW = 1MHz ,
VBW = 3MHz, Video Avg = 100.

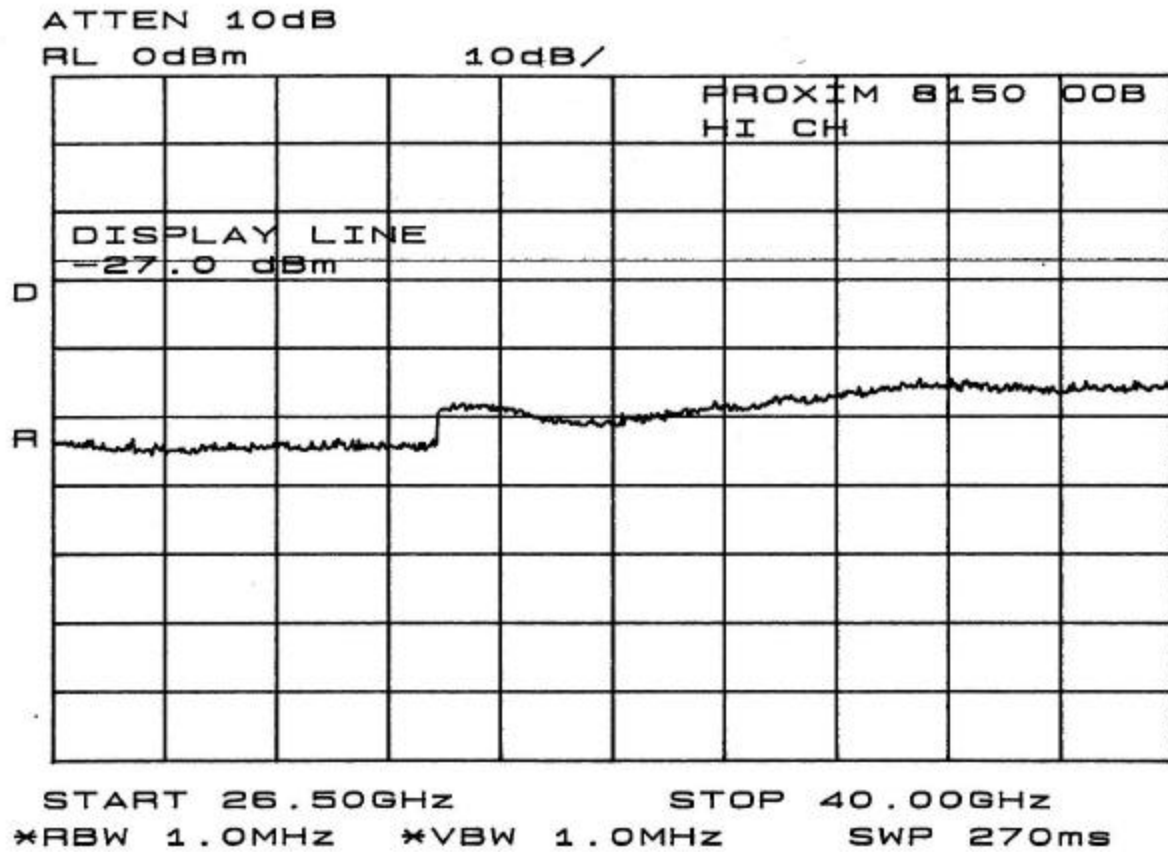












15.407 SUPPLEMENT TEST

FREQUENCY STABILITY 15.407(g)

(g) Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the users manual.

Refer to Theory of Operations for compliance.

Theory of Operations

The Proxim Harmony 8150 PCI device uses 8 channels between 5.18 GHz and 5.32 GHz. The carrier is 20 MHz wide centered at these frequencies. IE: Channel 36 (5.18 GHz) would have the Fc centered at 5.18 GHz with a band width of 20 MHz or 5.17 to 5.19 GHz.

The Proxim Harmony 8150 PCI device also requires a +/- 20 ppm XTAL over temperature and with aging. This is required per the 802.11a specification. Based on the tolerance of the XTAL and the 20 MHz guard band between 5.15 GHz and 5.35 GHz the device will maintain emissions within the UNII 1 and 2 bands under normal operating conditions specified in the user manual.

DISCONTINUE TRANSMITTING WITH ABSENCE OF DATA OR OPERATIONAL FAILURE 15.407 (C)

(c) 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.

Refer to Theory of Operations for compliance.

Theory of Operations

Data transmission is always initiated by software, which is then passed down through the MAC, through the digital and analog baseband, and finally to the RF chip. Several special packets (ACKs, CTS, PSpoll, etc...) are initiated by the MAC. These are the only ways the digital baseband portion will turn on the RF transmitter, which it then turns off at the end of the packet. Therefore, the transmitter will be on only while one of the aforementioned packets is being transmitted.

15.407 SUPPLEMENT TEST

INSURING INDOOR USE IN 5.15-5.25 GHZ BAND 15.407 (E)

(e) Within the 5.15-5.25 GHz band, U-NII devices will be restricted to indoor operations to reduce any potential for harmful interference to co-channel MSS operations.

The Proxim Harmony 8150 user manual includes the following statement:

"The Harmony 802.11a PCI Card Model 8150 operates in the frequency range of 5.15 to 5.35 GHz; it is restricted to indoor use due to its operation in the 5.15 to 5.25 GHz frequency range. FCC 15.407(e) requires that the device be used indoors in the frequency range of 5.15 to 5.25 GHz to reduce the potential or harmful interference to co-channel Mobile Satellite systems. Therefore the device should be used indoor only for channel 36, 40, 44, and 48 and when 2X mode is enabled, channel 42 and 50. High power radars are allocated as primary users of the 5.25 to 5.35 GHz and 5.65 to 5.85 GHz band. These radar stations can cause interference with and/or damage the Harmony 802.11a PCI Card."

INTEGRAL ANTENNA (D)

(d) 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.

Refer to statement below for compliance

"As the device is intended to operate in the 5.15 - 5.35 GHz band an integral antenna as detailed in 15.407 (d) is required. The antennas for the device are integral antennas that the end user cannot access. Further, the device is restricted to indoor-use only as detailed in the User's Manual and Theory of Operations, which are included with this application."

RF EXPOSURE (F)

(f) 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.

§ 1.1310 Radio Frequency Radiation Exposure

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range Averaging time (MHz) (minutes)	Electric field Strength (V/m)	Magnetic field Strength (A/m)	Power density (mW/cm ²)
(B) Limits for General Population/Uncontrolled Exposure			
0.3–1.34	614	1.63	*(100)
1.34–30	824/f	2.19/f	*(180/f ²)
30–300	27.5	0.073	0.2
300–1500			f/1500
1500–100,000			1.0

Test result:

TABLE 1 (B) LIMITS FOR GENERAL POPULATION/UNCONTROLLED EXPOSURE

F(MHz) (POWER DENSITY (mW/cm²))

1500 - 100,000 1

Transmitter Output power is **0.044 Watts** and will be used with a **3 dBi (1.995 numerically)** antenna

Computation method:

$$P = E^2 / 3770$$

$$\sqrt{E^2} = \sqrt{1 \text{ mW/cm}^2 * 3770}$$

$$E = 61.4 \text{ V/m}$$

$$E = \frac{\sqrt{30 * P * G}}{D}$$

$$D = \frac{\sqrt{30 * 0.049 * 3.98}}{61.4 \text{ V/m}}$$

$$D = 2.64 \text{ cm}$$

$$3.93 / 2.54 = 1.04 \text{ inch}$$

MPE DISTANCE REQUIREMENT IS 1.04 INCH. A WARNING STATEMENT WITH A MPE DISTANCE REQUIREMENT OF 20CM IS PLACED IN THE MANUAL.