

FEDERAL COMMUNICATIONS COMMISSION



CERTIFICATION

**2400-2483.5 MHz FHSS TRANSMITTER
FREQUENCY HOPPING SPREAD SPECTRUM RADIO FREQUENCY DEVICE**

CERTIFICATION COMPLIANCE REPORT
ON

SymphonyTM-HRF

Cordless PC Card...

MODEL 4430



**CFR 47. FCC PART 15. SUBPART C. INTENTIONAL RADIATORS
CFR 47. FCC PART 15. SUBPART C. CLASS B. DIGITAL DEVICES**

PREPARED FOR:

proxim INC.
510 DEGUIGNE DRIVE
SUNNYVALE, CA 94086

TESTING PERFORMED BY:

Electronic Compliance
LABORATORIES, INC.

Testing Date

Report Number

NOVEMBER 12-20 1999

9111501B

If this document is reproduced, it must be reproduced in its entirety.

ELECTRONIC COMPLIANCE LABORATORIES, INC.
1249 BIRCHWOOD DRIVE, SUNNYVALE, CALIFORNIA 94089
408/747-1490 www.eclabs.com 800/707-LABS

Table of Contents

FEDERAL COMMUNICATIONS COMMISSION 1

1.0 Verification of Compliance 4

2.0 General Information 5

 2.1 Radiated Emission Test: 5

 2.2 AC Line Conducted Test: 5

 2.2 15.247 Operation within the 2400-2483.5 MHz band: 5

3.0 Test Facility 6

4.0 Test Equipment Settings 7

 4.1 Test Equipment Settings 7

5.0 Antennas 7

 5.1 Antenna Table 7

6.0 Test Equipment 8

 6.1 Test Equipment Table 8

7.0 Data Reporting Format 9

8.0 Detector Functions 10

 8.1 Frequency Range of Investigation 10

9.0 FCC Class Types 11

 9.1 CLASS A DIGITAL DEVICE 11

 9.2 CLASS B DIGITAL DEVICE 11

10.0 FCC Limits 12

 10.1 Radiated Emission Limits 12

 10.2 Conducted Emission Limits 12

11.0 Test Methods 13

 11.1 Radiated Emissions Test Procedure 13

 11.2 Radiated Emissions Test Example 13

 11.3 Line Conducted Emissions Test Procedure 14

 11.4 Line Conducted Emissions Test Example 14

12.0 EUT 15

13.0 SUPPORT EQUIPMENT 15

14.0 EQUIPMENT CONFIGURATION 15

15.0 SUMMARY OF TESTS 16

 15.1 15.247(a)(1)(ii) CHANNEL UTILIZATION 16

 15.2 15.247(b) MAXIMUM PEAK OUTPUT POWER 16

 15.3 15.247(c) OUT OF BAND EMISSIONS 17

 15.4 15.203 ANTENNA REQUIREMENT 17

 15.5 15.205 RESTRICTED BAND RADIATION LIMITS 17

 15.6 15.207 AC LINE CONDUCTED EMISSIONS 17

 15.7 15.209 RADIATED EMISSIONS 18

APPENDIX A 19

Radiated Emissions Data 19

APPENDIX B	20
Conducted Emissions Data	20
APPENDIX C	21
Spread Spectrum Plots	21
APPENDIX D	43
Restricted Band Measurements	43
APPENDIX E	44
Antenna Information	44
APPENDIX F	45
Test Set-up Photos	45
APPENDIX G	46
Labeling Requirements	46
APPENDIX H	47
EUT Photographs	47
EXHIBIT A	48
Letters of Interest	48
EXHIBIT B	49
Proprietary Information	49
CONFIDENTIAL INFORMATION	49



1.0 Verification of Compliance

EUT Description: *Symphony™ HRF Cordless 1PC Card* is a wireless point to point home networking transmitter which is easily adaptable in the PCMCIA slot on any computers.

Model Number: 4430
Serial Number: A30589437
Applicant: Proxim Inc.

Type of Test: FCC Part 15 Class B ITE Certification Radiated /Conducted Emissions
FCC Part 15.247 Intentional Radiator

FCC ID Number: IMK-HRF1PC

Registration: NVLAP Code: 200089

Date of Test: 11/12-20/99

Tested By: Jook Lee, Suresh Kondapolli

The above equipment was tested by Electronic Compliance Laboratories, Inc. and found to be in compliance with the requirements set forth in the Federal Communications Commission for Information Technology Equipment. The equipment, in the configuration described in this report, shows that the maximum emission levels emanating from this equipment are within the compliance requirements.

A handwritten signature in blue ink, appearing to read 'Chip Matheny'.

Chip Matheny
Technical Officer

Date: 12/23/99

Date: 12/30/99

Altan Yazar
RF Engineer

2.0 General Information

Applicant: PROXIM INCORPORATED

Applicant Address: 510 Deguigne Drive
Sunnyvale, CA 94086

Contact Name: Altan Yazar
Contact Telephone: 408/731-2746
Contact Fax: 408/731-2701

EUT Description: *Symphony™ HRF Cordless 1PC Card* is a wireless point to point home networking transmitter which is easily adaptable in the PCMCIA slot on any computers.

Model Number: 4430
Serial Number: A30589437
Report Number: 9111501B
FCC ID Number: IMK-HRF1PC
Date of Test: 11/12-20/99

Manufacturer: Proxim, Inc.

Type of Test: FCC Part 15 Class B ITE Certification Radiated /Conducted Emissions
FCC Part 15.247 Radiated/Conducted Measurements

Frequency Range: Conducted Emissions-450 kHz to 30 MHz – Radiated Emissions 30 MHz to 1000 MHz – Conducted/Radiated Emissions 1000 MHz to 24.5 GHz – Part 15.247

Summary

Pass/Fail: **PASSED**

2.1 Radiated Emission Test:

The *Proxim Symphony™ Cordless 1PC Card* was placed on a 3-meter open field test site. All emissions observed were below the applicable limit. All emissions observed were below the FCC Class B limit. Test results are in **Appendix A**.

2.2 AC Line Conducted Test:

The *Proxim Symphony™ Cordless 1PC Card* was placed in a screen room and connected to AC power through a LISN. All other associated peripherals and support equipment were connected to a separate power source. All emissions observed were below the FCC Class B limit. Test results are in **Appendix B**.

2.2 15.247 Operation within the 2400-2483.5 MHz band:

The *Proxim Symphony™ Cordless 1PC Card* met all the requirements. See data and plots in Appendices.

3.0 Test Facility

Name: *Electronic Compliance Laboratories, Inc.*

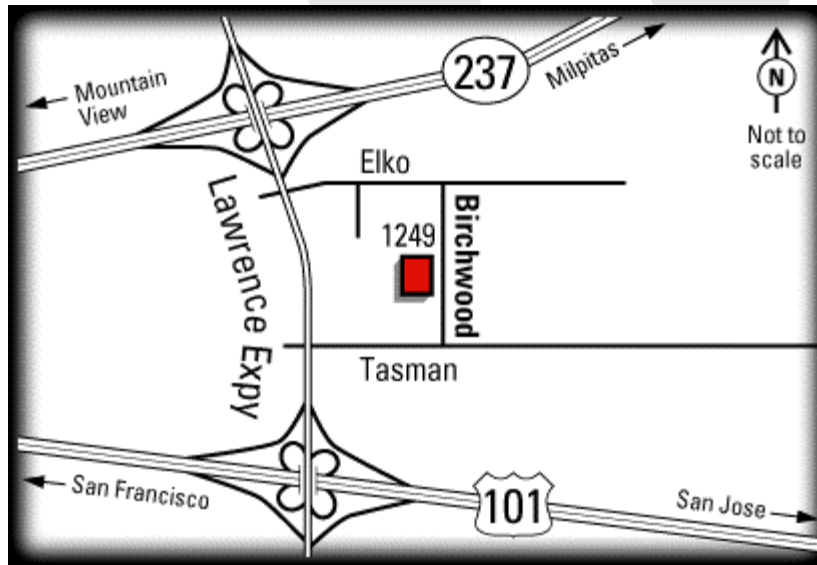
Location: 1249 Birchwood Drive
 Sunnyvale, CA 94089

Site Filing: A site description is on file at the;
 Federal Communications Commission
 P.O. Box 429
 Columbia, MD 21045

Types of Sites: Open Field Radiated and Indoor (Screen Room). Line Conducted: All sites are constructed and calibrated to meet ANSI C63.4-1994 requirements. Test facility is recognized by the National Voluntary Laboratory Accreditation Program for satisfactory compliance with criteria established in Title 15, Part 285 Code of Federal Regulations.

NVLAP Code: 20089 effective through: March 31, 2000

Location of the Sunnyvale Test Facility



www.eclabs.com

800/707-LABS

4.0 Test Equipment Settings

4.1 Test Equipment Settings

Parameter	Line Conducted Emissions	Radiated Emissions
Bandwidth	9 kHz	120kHz
*Detector Mode	Peak	Peak

*Unless otherwise specified

Units of Measurement

Measurements of radiated emissions are reported in terms of microvolts per meter or in dBuV/m at a specified distance. The indicated readings on the spectrum analyzer are converted to microvolts per meter or to dBuV/m by the use of appropriate conversion factors. Measurements of conducted interference are reported in units of microvolts or dBuV.

5.0 Antennas

5.1 Antenna Table

Antenna Type	Frequency Range
Biconical	25 to 300 MHz
Log Periodic	300 to 1000MHz
Horn Double Ridge	1 to 18GHz
Horn Parabolic	4.9 to 10GHz
Horn Polarad	4.7 to 7.74GHz
Horn Polarad	8.3 to 10GHz

Correction Factors: Programmed into the software
 Antenna Height: Varied from 1 to 4 meters above the ground plane
 Polarization: Vertical/Horizontal

Note: The antenna used at the time that the data was taken is indicated on each data page in the appendices. The correction factors and antenna polarization are also noted on each data page.

6.0 Test Equipment

The following list contains equipment used at EC Laboratories, Inc. for compliance testing. The equipment conforms to the American National Standard Specifications for Electromagnetic Interference and Field Strength Instrumentation from 10 kHz to 1000 MHz.

6.1 Test Equipment Table

Description	Manufacturer	Serial No.	Model No.
EMI Receiver	HP	3325A00137	8456A
Power Meter	HP	3125U13399	437B
Power Sensor	HP	3318A16275	8481
Spectrum Analyzer	HP	3137A01183	8563A
Pre-amp	HP	3113A05849	8447F
Pre-amp	HP	3008A00527	8449B
LISN	EM	2532	ANS-25/2
Biconical Antenna	EM	677	EM-6912
Log-Periodic Antenna	EM	858	EM-6950
Double Ridge Horn	EM	6231	EM 6961
Filter BP 1.2-4 GHz	FSY	001	HM1160-11SS
Filter BP 4-10 GHz	FSY	001	HM2950-15SS
Filter BP 10-18 GHz	FSY	001	HP8601-7SS

HP = Hewlett Packard
EM = Electro Metrics
FSY = FSY Microwave

Antennas used at the time the data was taken is indicated on each data page.
Antenna height and polarization are also noted on the data pages.

Calibration of the measuring instruments, including any accessories that may effect such calibration, are checked frequently to assure their accuracy. Adjustments are made and correction factors applied in accordance with instructions contained in the manual for the measuring instrument. All equipment is calibrated per EC Labs' Test Equipment Calibration Schedule as required per EN 45001 and NVLAP Accreditations.

7.0 Data Reporting Format

The measurement results are expressed in accordance with FCC Part 15 Subpart B Class B limits, where applicable, are presented in tabular or graphical form.

7.1 Operating Conditions

The EUT was operated at the specified load conditions (mechanical and/or electrical) for which it was designed.

7.2 Conditions of the EUT

The EUT was operated for a sufficient period of time to approximate normal operating conditions.

7.3 Test Configuration

The equipment under test was configured and operated in a manner that tends to maximize its emission characteristics in a typical application. Power and signal distribution, ground, interconnecting cabling and physical placement of equipment were simulating the typical application and usage in so far as practicable. The EUT was furnished with rated voltage as specified by the manufacturer in the individual equipment's power requirements.

7.4 Test Platform

The EUT was placed on a non-conductive table having a height of 1 meter above the test site ground.

7.5 Maximization of Emissions

The test platform was rotated 360 degrees along with the moving of cabling and/or equipment in order to determine the maximum level of emissions.

7.6 Temperature

The ambient temperature of the testing location was within the range of 10 to 40 degrees Centigrade (50 to 104 Degrees Fahrenheit).

8.0 Detector Functions

On any frequency or frequencies below or equal to 1000 MHz, the limits shown below are based on measuring equipment employing a CISPR quasi-peak detector function and related measurement bandwidths.

On any frequency or frequencies above 1000 MHz, the radiated limits shown below are based on the use of measuring equipment employing an average detector function.

EC Laboratories uses the Peak detection mode for normal testing and initial screening of the EUT. The Peak detection mode will produce a measurement value that is always greater than, or equal to, the quasi-peak or average detection mode. Whenever the measurement value is 6 dB below the applicable limit or greater, the appropriate detector function will be employed and recorded.

8.1 Frequency Range of Investigation

The spectrum was investigated up to the frequency specified in the following table according to the highest clock frequency generated in the device.

Highest Frequency Used (Clock)	Upper Limit of Range Measured
Below 1.705 MHz	30 MHz
1.705 to 108 MHz	1000 MHz
108 to 500 MHz	2000 MHz
500 to 1000 MHz	5000 MHz
Above 1000 MHz	10th Harmonic or 40 GHz (Whichever is Lower)

9.0 FCC Class Types

9.1 CLASS A DIGITAL DEVICE

A digital device that is marketed for use in a commercial, industrial or business environment, exclusive of a device which is marketed for use by the general public or is intended to be used in the home.

9.2 CLASS B DIGITAL DEVICE

A digital device that is marketed for use in a residential environment notwithstanding use in commercial, business and industrial environments. Examples of such devices include, but are not limited to, personal computers, calculators, and similar electronic devices that are marketed for use by the general public.

Note: The responsible party may also qualify a device intended to be marketed in a commercial, business, or industrial environment as a Class B device, and in fact is encouraged to do so, provided that the device complies with the technical specifications for a Class B digital device. In the event that a particular type of device has been found to repeatedly cause harmful interference to radio communications, the Commission may classify such a digital device as a Class B digital device, regardless of its intended use.

(Code of Federal Regulations, Part 15, Subpart A, Section H&I)
(CFR 47, Parts 0 to 19, Revised as of October 1, 1990)

10.0 FCC Limits

10.1 Radiated Emission Limits

The field strength of radiated emissions for a Class A Digital Device, when measured at a distance of 10 meters, shall not exceed the limits given in the table below. The lower limit applies at the band edge.

The field strength of radiated emissions for a Class B Digital Device, when measured at a distance of 3 meters, shall not exceed the limits given in the table below. The lower limit applies at the band edge.

<u>Frequency (MHz)</u>	<u>Class A (3m) Limit (μV/m)</u>	<u>Class A (3m) Limit (dBμV/m)</u>	<u>Class A (10m) Limit (μV/m)</u>	<u>Class A (10m) Limit (dBμV/m)</u>	<u>Class B (3m) Limit (μV/m)</u>	<u>Class B (3m) Limit (dBμV/m)</u>
30-88	300	49.6	90	39.1	100	40.0
88-216	500	54.0	150	43.5	150	43.5
216-960	700	56.0	210	46.4	200	46.0
Above 960	1000	60.0	300	49.5	500	54.0

10.2 Conducted Emission Limits

For a digital device that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back into the AC power line on any frequency or frequencies within the band 450kHz to 30MHz shall not exceed the limits in the following table for the appropriate class. Compliance shall be based on the measurement of the Radio Frequency voltage between each power line and ground at the power terminals. The lower limit applies at the band edges.

<u>Frequency (MHz)</u>	<u>Class A Limit (μV)</u>	<u>Class A Limit (dBμV)</u>	<u>Class B Limit (μV)</u>	<u>Class B Limit (dBμV)</u>
0.45 to 1.705	1000	60.0	250	48.0
1.705 to 30.0	3000	69.5	250	48.0

11.0 Test Methods

11.1 Radiated Emissions Test Procedure

- (1) EUT and any other equipment and cables used with the EUT are placed on a non-conductive table 1-meter above a ground plane.
- (2) The EUT receives the normal AC Power at the base of the table.
- (3) All equipment and cables are placed in a manner, which tends to maximize their emission characteristics in a typical application.
- (4) The table is rotated 360 degrees to determine the maximum radial emissions.
- (5) The antenna height is varied between 1 meter and 4 meters above the ground plane to determine the maximum emissions. Appropriate antennas are used during the test in both the vertical and horizontal polarization.
- (6) The Spectrum Analyzer is scanned from 30 MHz to 1000 MHz for emissions. The applicable spectrum analyzer settings are:
 - a). Resolution Bandwidth = 100 kHz,
 - b). Normal Detector Mode = Peak (The Quasi-Peak is used when the emissions are near, or over the limit).
- (7) When an emission is found and maximized, the following actions are performed:
 - a). The emission frequency is entered into the computer.
 - b). The emission level is read from the spectrum analyzer in dBm and entered into the computer.
 - c). The antenna polarization is entered into the computer.
 - d). The computer converts the level in dBm to dB μ V and uses lookup tables to determine the coax cable loss, antenna factor, and pre-amp gain. A site correction factor is calculated for that particular frequency, and the data is printed out in tabular form.

11.2 Radiated Emissions Test Example

FREQ	SITE			FCC Limit		EUT Level (L1)	
	MHz	Raw (dBm)	CF (dB)	Corr'd (dB μ V)	Class A (dB μ V)	Class B (dB μ V)	A (dB)
65.4	-58	-14.5	34.5	39.1	40.0	-4.6	-5.5

- Frequency = Frequency of emission in MHz
 Raw dBm = Reading at Spectrum Analyzer(uncorrected)
 Site CF = Correction Factor for coax/antenna/preamp for that frequency.
 Note that a negative CF is the result of the gain of the preamp.
 Corr'd dBuV = Corrected emission level in dBuV
 FCC Limit A / B = Limit as stated in Part-15, Subpart B
 EUT Level A* = Emission relative to the FCC Class A Limit.
 EUT Level B* = Emission relative to the FCC Class B Limit.

Note: V/H is the antenna polarization (Vertical or Horizontal)
 QP indicates the Quasi-Peak value.

*A negative value indicates that the emission is below (or meets) the limit and a positive value indicates that the emission is above (or exceeds) the limit.

11.3 Line Conducted Emissions Test Procedure

1. EUT and any other equipment and cables were placed on a non-conductive table one meter above a ground screen.
2. The EUT's Input Power line cord was connected to a Line Impedance Stabilization Network (LISN).
3. All other (Non-EUT) equipment received power from a separate AC Power Source. The LISN assembly has two monitoring points: Line 1 (AC-Hot) and Line 2 (AC-Neutral). Each monitoring point was scanned by the measuring equipment (the other point was terminated in 50 ohms) over the frequency range of 450kHz to 30MHz for conducted emissions.
4. When an emission is found, the following takes place:
 - a. The emission levels are maximized by equipment/cable placement.
 - b. Frequency and emission level data are entered into computer in dBm.
 - c. The monitoring point (Line 1 or 2) is entered into the computer.
 - d. The computer converts dBm to micro volts and uses a look-up table to find cable losses (in dB) at that frequency, calculates a corrected emission level, and compares the corrected emission level to the appropriate limit. The data is then printed out in tabular form.

An example of the printout and definitions follows:

11.4 Line Conducted Emissions Test Example

FREQ	SITE			FCC Limit		EUT Level (L1)	
MHz	Raw (dBm)	CF (dB)	Corr'd (dBµV)	Class A (dBµV)	Class B (dBµV)	A (dB)	B (dB)
1.85	-57	15.0	65.0	69.5	48.0	-4.5	+17

- Frequency = Frequency of emission in MHz
- Raw dBm = Reading at Spectrum Analyzer(uncorrected)
- Site CF = Correction Factor for cable loss
- Corr'd dBuV = Corrected emission level in dBuV
- FCC Limit A / B = Conducted Emission level limit in dBµV
- EUT Level 1* = Emission relative to the FCC Class A Limit
- EUT Level 2* = Emission relative to the FCC Class B Limit

Note: L1 is AC-Hot, L2 is AC-Neutral
 QP is a Quasi-Peak value
 AV is an Average value

*A negative value indicates that the emission is below (or meets) the limit and a positive value indicates that the emission is above (or exceeds) the limit.

12.0 EUT

The EUT is a Wireless Point to Multipoint data communications System with a low power frequency hopping spread spectrum (FHSS) radio system operating in the 2400-2483.5 MHz band. Tests were performed with two different antennas. Test firmware resident in the EUT and was used to do the test.

13.0 SUPPORT EQUIPMENT

Equipment Type: IBM Laptop Computer, I series
Model Number: 1412
Serial Number: AA-DT3F2
Manufacturer: International Business Machines
Comments: N/A

Equipment Type:
Model Number:
Serial Number:
Manufacturer:
Comments:

Equipment Type:
Model Number:
Serial Number:
Manufacturer:
Comments:

Equipment Type:
Model Number:
Serial Number:
Manufacturer:
Comments:

14.0 EQUIPMENT CONFIGURATION

All of the equipment and cables were placed in worstcase positions to maximize emissions.

Interconnecting cables were of the type and length specified in the individual equipment requirements.

Grounding was in accordance with the manufacturers requirements and conditions for intended use.

15.0 SUMMARY OF TESTS

The EUT is a Wireless Point to Multipoint data communications System with a low power frequency hopping spread spectrum (FHSS) radio system operating in the 2400-2483.5 MHz band. Tests were performed with two different antennas. Test firmware resident in the EUT and was used to do the test.

15.1 15.247(a)(1)(ii) CHANNEL UTILIZATION

A spectrum analyzer plots labeled "Channel Utilization". The total number of channels is 79. The channels used have nominal center frequencies of 2402 through 2480 MHz. Three spectrum analyzer MAX HOLD plots labeled "20 dB Bandwidth" show the 20 dB bandwidth of the hopping channel to be < 1 MHz (708 kHz / 808 kHz / 967 kHz) at the low/midband/high frequencies of 2.402 / 2.440 / 2.480 GHz. **Test Plots are shown in Appendix C.**

Zero span spectrum analyzer plot labeled "Channel Occupancy" shows the "Worst case" transmission time in a given slot:

Channel Occupancy elapsed 390 msec. <100 % duty

Maximum allowed: 400 msec

Test Data in Appendix C.

15.2 15.247(b) MAXIMUM PEAK OUTPUT POWER

The three spectrum analyzer plots labeled " Output Power" show the maximum power of the hopping channel to be Pout dBm or mW. The EUT was made to transmit uninterrupted random data on each of the low/mid/high channels.

Test Plots are shown in Appendix C

The output was taken from an MMCX connector, through 1 foot of RG 142 cable, to Spectrum Analyzer set on Max Hold with no additional attenuation.

Power = +18 dBm (peak reading) +0.3dB cable loss = +18.3 dBm / 67.6 mW EIRP
Limit: +30 dBm / 1 W maximum power

Antenna Name

Antenna 1: Snap-On, Proxim 1900.0049, 0 dBi

Antenna 2: Dipole, Proxim 1900.0020, 1 dBi

Antenna 1 EIRP = +18 dBm (peak power) +0 dBi (peak gain, dBi) = +Ptotal +18 dBm / 63.1 mW

Antenna 2 EIRP = 18 dBm + 1dBi = +19 dBm / 79 mW

EIRP Limit: +36 dBm / 4 W maximum EIRP

15.3 15.247(c) OUT OF BAND EMISSIONS

The spectrum analyzer plots titled "Out of Band - Band Edges" shows the output spectrum of the EUT while hopping one of the pseudorandom sequences and continuously transmitting packetized data. The analyzer was placed in MAX HOLD mode, and individual sweeps were recorded continually for 10 minutes with the same spectrum analyzer connection as was used for peak output power. The resultant plot shows that the EUT emissions remain inside the 2400 - 2483.5 MHz band when measured in = 100 kHz bandwidth during operation.

The spectrum analyzer plots labeled "Out of Band 30 to 1000 MHz", " Out of Band 1 to 2.75 GHz", and "Out of Band 2.75 to 26.5 GHz" show that emissions measured in = 100 kHz bandwidth are more than 20 dB below the highest level of the desired power outside of the 2400 - 2483.5 MHz band. **Test Plots are shown in Appendix C.**

15.4 15.203 ANTENNA REQUIREMENT

This product has a unique antenna connector to provide a coupling to the intentional radiator per 15.203. The Manufacturer's control drawings, and the antenna drawings are in **Appendix E.**

15.5 15.205 RESTRICTED BAND RADIATION LIMITS

The EUT was placed on a wooden table resting on a turntable. The wooden table was 1 meter above the groundplane of the 3 meter test site. The search antenna was moved in to 1 meter when necessary to improve the noise floor, and the appropriate range factor was applied. While the EUT was transmitting uninterrupted random data on each of the low/mid/high channels and with the spectrum analyzer on MAX HOLD, the turntable was rotated, and the search antenna raised and lowered in an attempt to maximize the received radiated emission level. **Test results are attached in Appendix D** in tabular form showing that no spurious signals were detected above the 74 dBuV/m peak/54dBuV/m average limits. Peak measurements were made with a RBW and VBW = 1 MHz. Average measurements were made with a RBW = 1 MHz and a VBW = 10 Hz.

15.6 15.207 AC LINE CONDUCTED EMISSIONS

The RF line conducted levels for emissions in the 0.45 - 30 MHz band must not exceed 250 μ V when measured with a LISN. Attached graphs and tabular data show that emissions are below the 250 μ V (48 dB μ V) maximum allowed level. **Test Data is in Appendix B.**

15.7 15.209 RADIATED EMISSIONS

The attached table shows that the Class B radiated limits from 30 - 1000 MHz are not exceeded by the EUT. The EUT was operating normally with a combination of transmission and reception and hopping one of the fifteen pseudorandom sequences during this test. The EUT was placed near one edge of a wooden table resting on a turntable. The wooden table was approximately 1 meter above the groundplane of the 3 meter test site. The search antennas were located at 3 meters. Measurements were made in accordance with ANSI C63.4-1994. **Test Data is in Appendix A.**

proxim- *Symphony™* -HRF 1 PC Card

APPENDIX A

Radiated Emissions Data

Contents:

<u>Report Information</u>	
Product Name:	Symphony 1PC <small>MODEL</small> 4430
Serial Number:	A30589437
Report Number:	9111501B
File Name:	1PCappendixA.pdf

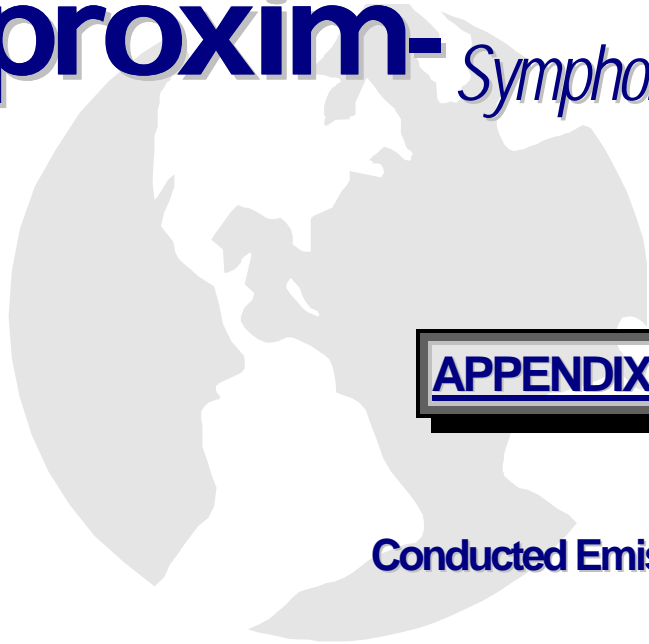
Contact Info:

Proxim Inc.	510 DeGuigne Drive	Sunnyvale, California 94086	408/731-2700 408/731-2701fax	Website e-mail
Proxim's Contact:	Altan Yazar	Design Engineer	408/731-2746	altan@proxim.com
EC Labs Contact:	Chip Matheny	Chief Technical Officer	408/747-1490	chip@eclabs.com

**FREQUENCY HOPPING SPREAD SPECTRUM (FHSS) RF INTENTIONAL RADIATOR
FCC PART 15.247 SUBPART C, CLASS B CERTIFICATION**

ELECTRONIC COMPLIANCE LABORATORIES, INC.
1249 BIRCHWOOD DRIVE, SUNNYVALE, CALIFORNIA 94089
408/747-1490 www.eclabs.com 800/707-LABS

proxim- *Symphony™* -HRF 1 PC Card



APPENDIX B

Conducted Emissions Data

Contents:

<u>Report Information</u>	
Product Name:	Symphony 1PC <small>MODEL</small> 4430
Serial Number:	A30589437
Report Number:	9111501B
File Name:	1PCappendixB.pdf

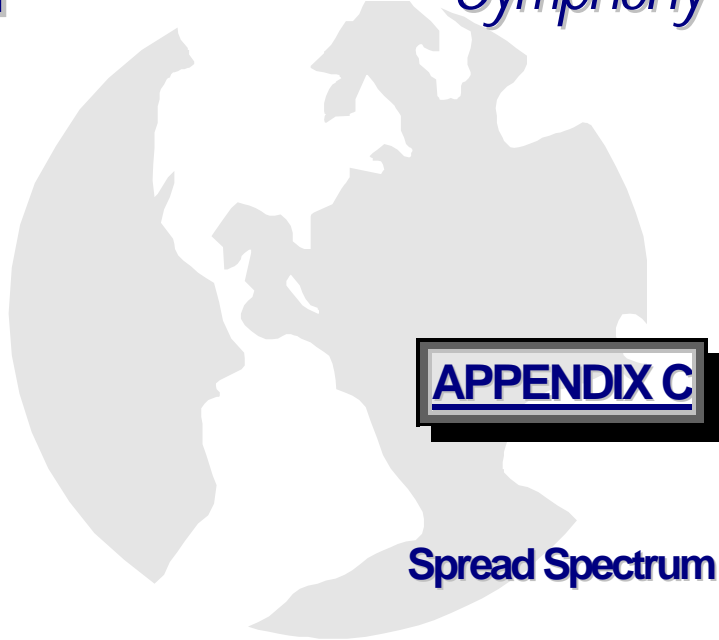
Contact Info:

Proxim Inc.	510 DeGuigne Drive	Sunnyvale, California 94086	408/731-2700 408/731-2701fax	Website e-mail
Proxim's Contact:	Altan Yazar	Design Engineer	408/731-2746	altan@proxim.com
EC Labs Contact:	Chip Matheny	Chief Technical Officer	408/747-1490	chip@eclabs.com

**FREQUENCY HOPPING SPREAD SPECTRUM (FHSS) RF INTENTIONAL RADIATOR
 FCC PART 15.247 SUBPART C, CLASS B CERTIFICATION**

ELECTRONIC COMPLIANCE LABORATORIES, INC.
 1249 BIRCHWOOD DRIVE, SUNNYVALE, CALIFORNIA 94089
 408/747-1490 www.eclabs.com 800/707-LABS

proxim- *Symphony™* -HRF 1 PC Card



Spread Spectrum Plots

Contents:

<u>Report Information</u>	
Product Name:	Symphony 1PC <small>MODEL</small> 4430
Serial Number:	A30589437
Report Number:	9111501B
File Name:	1PCappendixC.pdf

Contact Info:

Proxim Inc.	510 DeGuigne Drive	Sunnyvale, California 94086	408/731-2700 408/731-2701fax	Website e-mail
Proxim's Contact:	Altan Yazar	Design Engineer	408/731-2746	altan@proxim.com
EC Labs Contact:	Chip Matheny	Chief Technical Officer	408/747-1490	chip@eclabs.com

**FREQUENCY HOPPING SPREAD SPECTRUM (FHSS) RF INTENTIONAL RADIATOR
 FCC PART 15.247 SUBPART C, CLASS B CERTIFICATION**

ELECTRONIC COMPLIANCE LABORATORIES, INC.
 1249 BIRCHWOOD DRIVE, SUNNYVALE, CALIFORNIA 94089
 408/747-1490 www.eclabs.com 800/707-LABS

proxim- *Symphony™* -HRF 1 PC Card



Restricted Band Measurements

Contents:

<u>Report Information</u>	
Product Name:	Symphony 1PC <small>MODEL</small> 4430
Serial Number:	A30589437
Report Number:	9111501B
File Name:	1PCappendixD.pdf

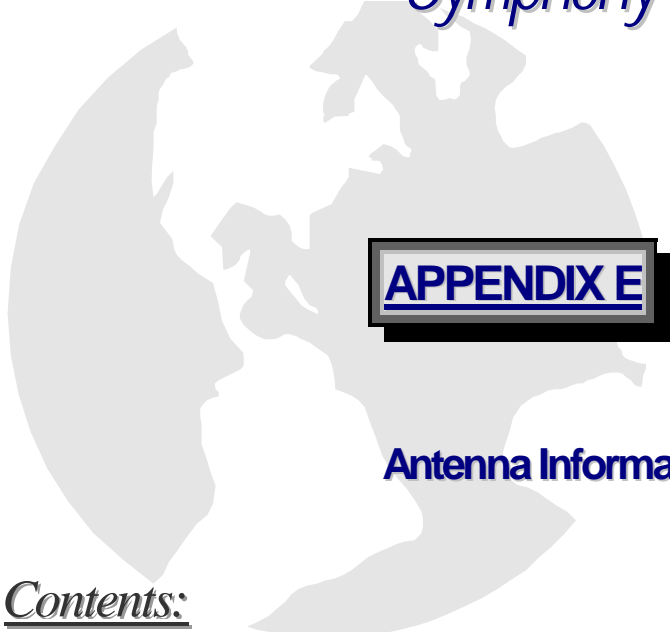
Contact Info:

Proxim Inc.	510 DeGuigne Drive	Sunnyvale, California 94086	408/731-2700 408/731-2701fax	Website e-mail
Proxim's Contact:	Altan Yazar	Design Engineer	408/731-2746	altan@proxim.com
EC Labs Contact:	Chip Matheny	Chief Technical Officer	408/747-1490	chip@eclabs.com

**FREQUENCY HOPPING SPREAD SPECTRUM (FHSS) RF INTENTIONAL RADIATOR
 FCC PART 15.247 SUBPART C, CLASS B CERTIFICATION**

ELECTRONIC COMPLIANCE LABORATORIES, INC.
 1249 BIRCHWOOD DRIVE, SUNNYVALE, CALIFORNIA 94089
 408/747-1490 www.eclabs.com 800/707-LABS

proxim- *Symphony™* -HRF 1 PC Card



APPENDIX E

Antenna Information

Contents:

<u>Report Information</u>	
Product Name:	Symphony 1PC <small>MODEL</small> 4430
Serial Number:	A30589437
Report Number:	9111501B
File Name:	1PCappendixE.pdf

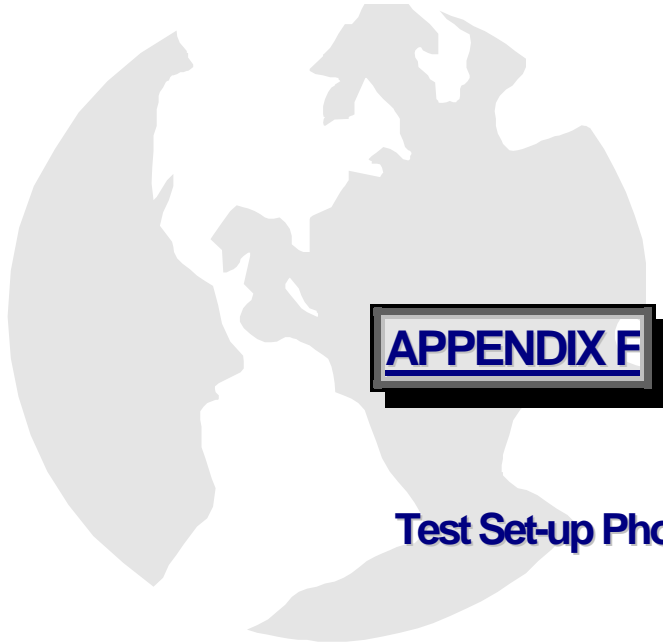
Contact Info:

Proxim Inc.	510 DeGuigne Drive	Sunnyvale, California 94086	408/731-2700 408/731-2701fax	Website e-mail
Proxim's Contact:	Altan Yazar	Design Engineer	408/731-2746	altan@proxim.com
EC Labs Contact:	Chip Matheny	Chief Technical Officer	408/747-1490	chip@eclabs.com

**FREQUENCY HOPPING SPREAD SPECTRUM (FHSS) RF INTENTIONAL RADIATOR
 FCC PART 15.247 SUBPART C, CLASS B CERTIFICATION**

**ELECTRONIC COMPLIANCE LABORATORIES, INC.
 1249 BIRCHWOOD DRIVE, SUNNYVALE, CALIFORNIA 94089
 408/747-1490 www.eclabs.com 800/707-LABS**

proxim- *Symphony™* -HRF 1 PC Card



Test Set-up Photos

Contents:

<u>Report Information</u>	
Product Name:	Symphony 1PC <small>MODEL</small> 4430
Serial Number:	A30589437
Report Number:	9111501B
File Name:	1PCappendixF.pdf

Contact Info:

Proxim Inc.	510 DeGuigne Drive	Sunnyvale, California 94086	408/731-2700 408/731-2701fax	Website e-mail
Proxim's Contact:	Altan Yazar	Design Engineer	408/731-2746	altan@proxim.com
EC Labs Contact:	Chip Matheny	Chief Technical Officer	408/747-1490	chip@eclabs.com

**FREQUENCY HOPPING SPREAD SPECTRUM (FHSS) RF INTENTIONAL RADIATOR
 FCC PART 15.247 SUBPART C, CLASS B CERTIFICATION**

ELECTRONIC COMPLIANCE LABORATORIES, INC.
 1249 BIRCHWOOD DRIVE, SUNNYVALE, CALIFORNIA 94089
 408/747-1490 www.eclabs.com 800/707-LABS

proxim- *Symphony™* -HRF 1 PC Card



APPENDIX G

Labeling Requirements

Contents:

<u>Report Information</u>	
Product Name:	Symphony 1PC <small>MODEL</small> 4430
Serial Number:	A30589437
Report Number:	9111501B
File Name:	1PCappendixG.pdf

Contact Info:

Proxim Inc.	510 DeGuigne Drive	Sunnyvale, California 94086	408/731-2700 408/731-2701fax	Website e-mail
Proxim's Contact:	Altan Yazar	Design Engineer	408/731-2746	altan@proxim.com
EC Labs Contact:	Chip Matheny	Chief Technical Officer	408/747-1490	chip@eclabs.com

**FREQUENCY HOPPING SPREAD SPECTRUM (FHSS) RF INTENTIONAL RADIATOR
 FCC PART 15.247 SUBPART C, CLASS B CERTIFICATION**

ELECTRONIC COMPLIANCE LABORATORIES, INC.
 1249 BIRCHWOOD DRIVE, SUNNYVALE, CALIFORNIA 94089
 408/747-1490 www.eclabs.com 800/707-LABS

proxim- *Symphony™* -HRF 1 PC Card



Report Information	
Product Name:	Symphony 1PC <small>MODEL</small> 4430
Serial Number:	A30589437
Report Number:	9111501B
File Name:	1PCappendixH.pdf

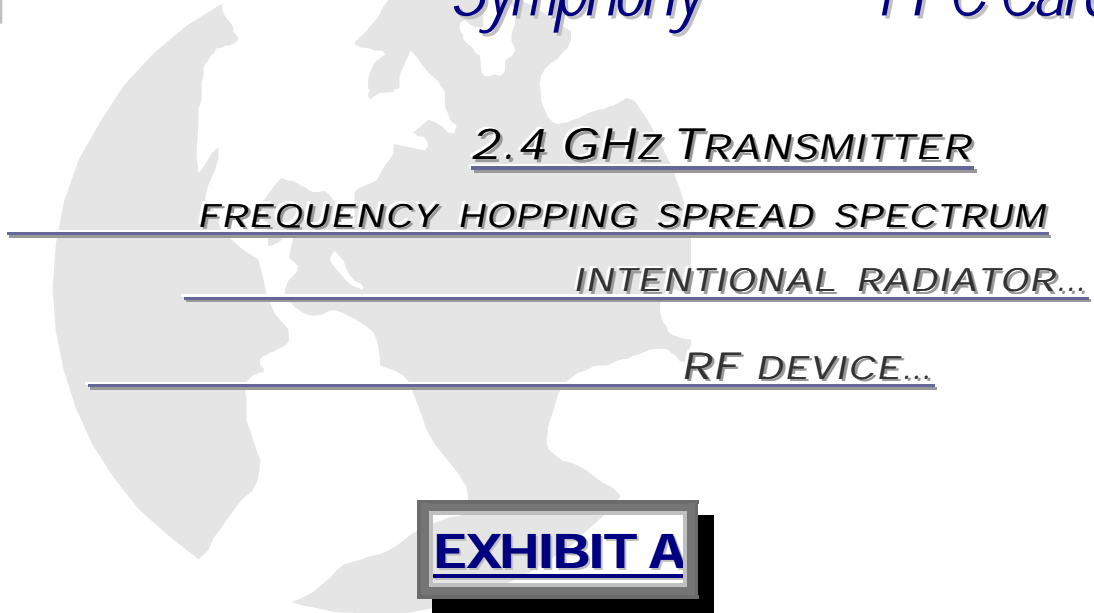
Contact Info:

Proxim Inc.	510 DeGuigne Drive	Sunnyvale, California 94086	408/731-2700 408/731-2701fax	Website e-mail
Proxim's Contact:	Altan Yazar	Design Engineer	408/731-2746	altan@proxim.com
EC Labs Contact:	Chip Matheny	Chief Technical Officer	408/747-1490	chip@eclabs.com

**FREQUENCY HOPPING SPREAD SPECTRUM (FHSS) RF INTENTIONAL RADIATOR
 FCC PART 15.247 SUBPART C, CLASS B CERTIFICATION**

ELECTRONIC COMPLIANCE LABORATORIES, INC.
1249 BIRCHWOOD DRIVE, SUNNYVALE, CALIFORNIA 94089
408/747-1490 www.eclabs.com 800/707-LABS

proxim- *Symphony™* -HRF 1 PC Card



Letters of Interest

LETTER TYPE	WORD FILE	ACROBAT FILE
Intro Letter	SubmittalLET.doc	IntroLET.pdf
Agent Authorization	AgentAuth.doc	Agentautho.pdf
Confidential Request	ConfidLET.doc	Confidential.pdf
Change of Address	Addresschange.doc	changeaddress.pdf
Form731 change Letter	IDchangeLET.doc	IDchangeLET.pdf

CONTACT INFORMATION-

PROXIM, INC.	ALTAN YAZAR	408/731-2746	aitan@proxim.com
EC LABS, INC.	CHIP MATHENY	408/747-1490	chip@eclabs.com



ELECTRONIC COMPLIANCE LABORATORIES, INC.
 1249 BIRCHWOOD DRIVE, SUNNYVALE, CALIFORNIA 94089
 408/747-1490 www.eclabs.com 800/707-LABS

proxim- *Symphony™-HRF 1 PC Card*

2.4 GHZ TRANSMITTER
FREQUENCY HOPPING SPREAD SPECTRUM
INTENTIONAL RADIATOR...
RF DEVICE...

EXHIBIT B

Proprietary Information

CONFIDENTIAL INFORMATION

	DESCRIPTION	CONTENTS	FILE NAME
PROTOCOL DESCRIPTION	Duty Cycle Analysis	PROTOCOL	Duty Cycle1.pdf
	Cycle Timing Conditions	PROTOCOL	Duty Cycle1.pdf
	Duty Cycle Plots	PROTOCOL	Duty Cycle1.pdf
THEORY OF OPERATION	RangeLAN2 Description	PROTOCOL	TheoryOpp1.pdf
	RangeLAN2 Description	PROTOCOL	TheoryOpp2.pdf
	RangeLAN2 Description	PROTOCOL	TheoryOpp3.pdf
	RangeLAN2 Description	PROTOCOL	TheoryOpp4.pdf
	Hopping Pattern	PROTOCOL	RL2Fhthop5.pdf

-CONTACT INFORMATION-

PROXIM, INC.	ALTAN YAZAR	408/731-2746	aitan@proxim.com
EC LABS, INC.	CHIP MATHENY	408/747-1490	chip@eclabs.com

CONFIDENTIAL INFORMATION

ELECTRONIC COMPLIANCE LABORATORIES, INC.
 1249 BIRCHWOOD DRIVE, SUNNYVALE, CALIFORNIA 94089
 408/747-1490 www.eclabs.com 800/707-LABS