15.247 Certification FCC ID: IMK-ILCISA

EMITEST REPORT

On

SYMPHONY ISA Card

Prepared for

Proxim
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Prepared by

Electronic Compliance Laboratories Inc. 1249 Birchwood Dr. Sunnyvale, CA 94089 Tel: (408) 747-1490 Fax: (408) 747-1495

> Test Report Number: A806003 Date of Test: June 6, 1998

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1.0 TEST FACILITY

Name: Electronic Compliance Laboratories

Location: 1249 Birchwood Dr.

Sunnyvale, CA 94089

Site Filing: A site description is on file at the Federal Communications

Commission

P.O. Box 429

Columbia, MD 21045

NVLAP LAB CODE: 200089

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.

2.0 TEST EQUIPMENT

Description	Manufacturer	Model	SN
EMI Receiver	HP	8546A	3325A00137
Spectrum Analyzer	HP	8563A	3137A01183
Preamp	HP	8447F	3113A05849
Preamp	HP	8449B	3008A00527
LISN	EM	ANS-25/2	2532
Biconical Antenna	EM	EM 6912	414
Log Periodic Ant	EM	EM 6950	311
Double Ridge Horn	EM	EM 6961	6231
Filter BP 1.2-45 GHz	FSY	HM 1160-1155	5 001
Filter BP 4-10 GHz	FSY	HM 2950-1565	5 001
Filter HP 10-18 GHz	FSY	HP 8601-7SS	001

3.0 EUT

SYMPHONY ISA CARD

M/N: 4100-05 **S/N**: A30253497 **FCC ID**: IMK-ILCISA

With Proxim 1900.0051 Dipole Antenna. Antennas were not serialized.

4.0 SUPPORT EQUIPMENT

<u>Manufacturer</u> <u>Model</u>

Host Computer Keyboard Mouse Monitor

DELL

Dimension P133

5.0 EQUIPMENT CONFIGURATION

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

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

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

6.0 SUMMARY OF TESTS

The SYMPHONY ISA CARD is a wireless LAN adapter with a low power frequency hopping spread spectrum (FHSS) radio system operating in the 2400-2483.5 MHz band. Tests were performed with one antenna. Test firmware resident in the Host PC was used to do the test.

6.1 15.247(a)(1) FREQUENCY HOPPING SYSTEMS

SYMPHONY ISA CARD uses 79 channels, each 1 MHz wide. The system hops over one of 15 pseudorandom sequences. On average, each channel is used equally. Please refer to "RangeLAN2 Frequency Hopping Theory of Operation" attached to this submission for more details.

6.1.1 **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 ""BANDWIDTH" show the 20 dB bandwidth of the hopping channel to be < 1 MHz (.940 / .930 / .875 MHz) at the low, mid, and high frequencies of 2.402/2.440/2.480 GHz. **Test Plots are shown in Appendix A.**

Zero span spectrum analyzer plot labeled "DWELL TIME" shows Worst case transmission time in a given slot: 400 ms elapsed time, <100 % duty

Maximum allowed: 400 msec.

Test Data in Appendix A.

6.1.2 **15.247(b) MAXIMUM PEAK OUTPUT POWER**

The three spectrum analyzer plots labeled "POWER OUT" show the maximum power of the hopping channel to be 20.0 dBm or 100 mW. The EUT was made to transmit uninterrupted random data on each of the low/mid/high channels. **Test Plots are shown in Appendix A.**

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

Power = 20 dBm (peak reading) +1.0dB cable loss = +21.0 dBm / 126 mW EIRP

Limit: +30 dBm / 1 W maximum power

Antenna

EIRP = +21.0 (peak power) +0 (peak gain, dBi) = +21.0

dBm / 126 mW EIRP

Limit: +36 dBm / 4 W maximum EIRP

6.1.3 **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 MHz- 2.46 GHz", "OUT OF BAND 2.4-2.75 GHz", and "OUT OF BAND 2.75-2.65 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 A.**

6.1.4 **15.203 ANTENNA REQUIREMENT**

This product has an polarized SMB connector to provide unique coupling to the antenna. The Manufacture's control drawings, and the antenna drawings are in **Appendix D.**

6.1.5 **15.205 RESTRICTED BAND RADIATION LIMITS**

The EUT was placed on a wooden table resting on a turntable. The wooden table was approximately 1 meter above the ground plane 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 B** 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 = 1Mhz. Average measurements were made with a RBW = 1 MHz and a VBW = 10 Hz.

6.1.6 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 C**.

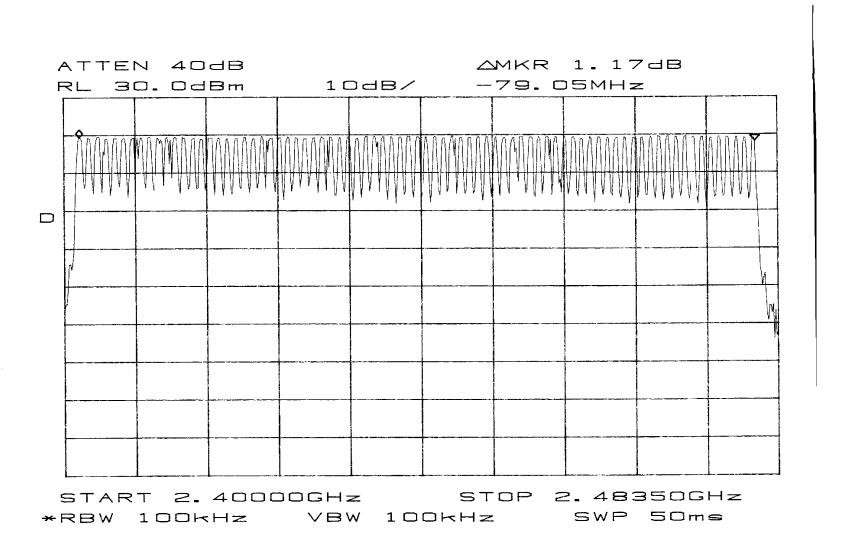
6.1.7 **15.209 RADIATED EMISSIONS**

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 ground plane 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 D.**

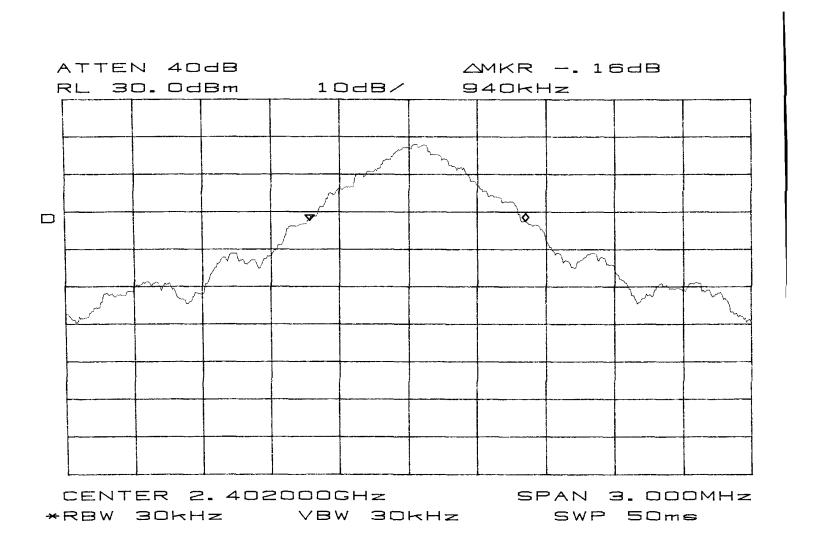
Electronic Compliance Laboratories						
Chris Byleckie	Date					
Technical Director						

APPENDIX A SPREAD SPECTRUM PLOTS

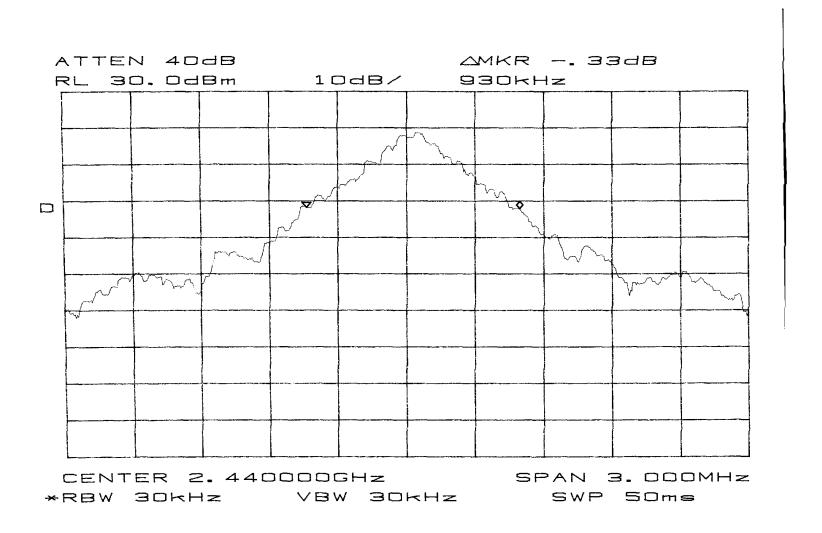
Channel Utilization



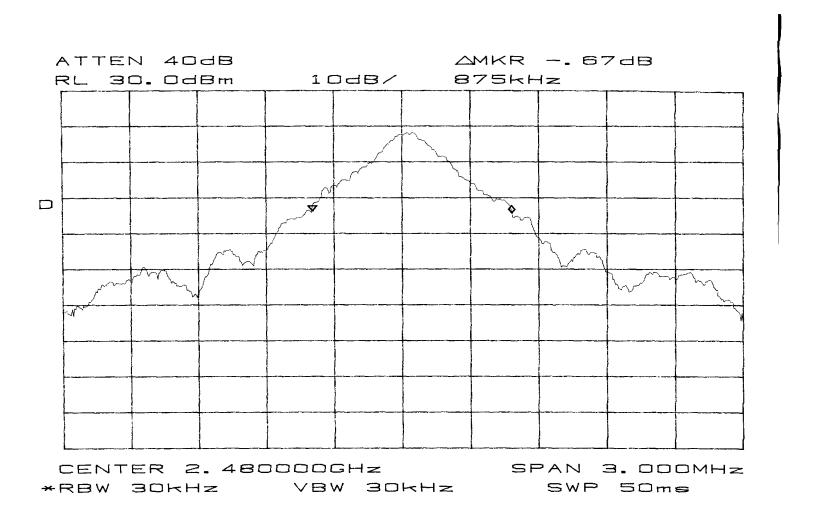
Bandwidth



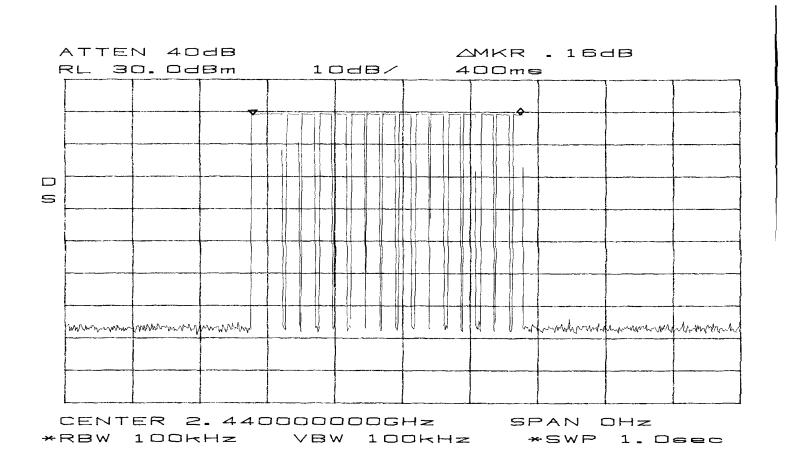
Bandwidth



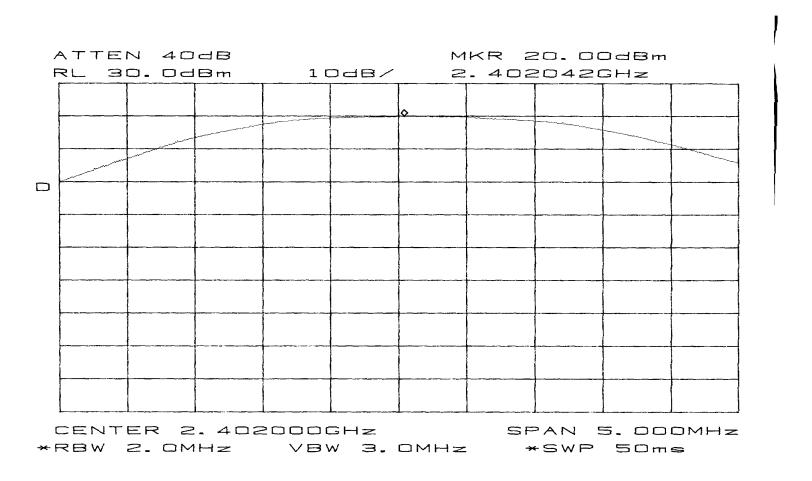
Bandwidth



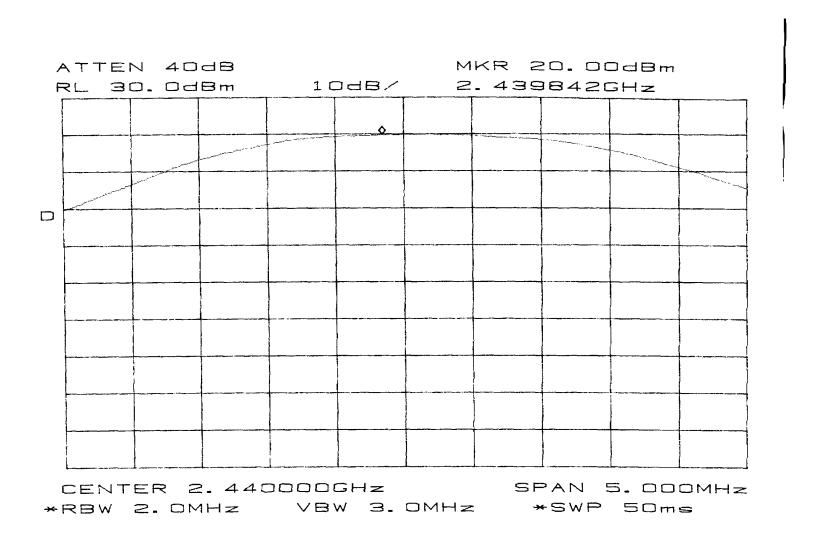
Dwell Time



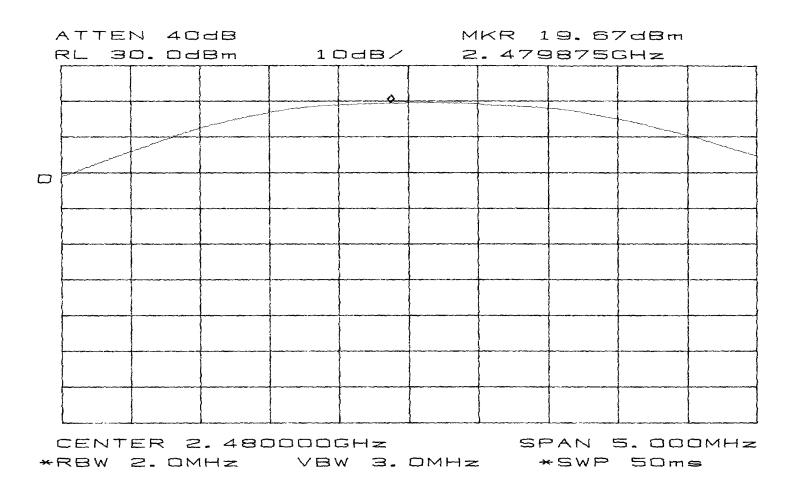
Power Out



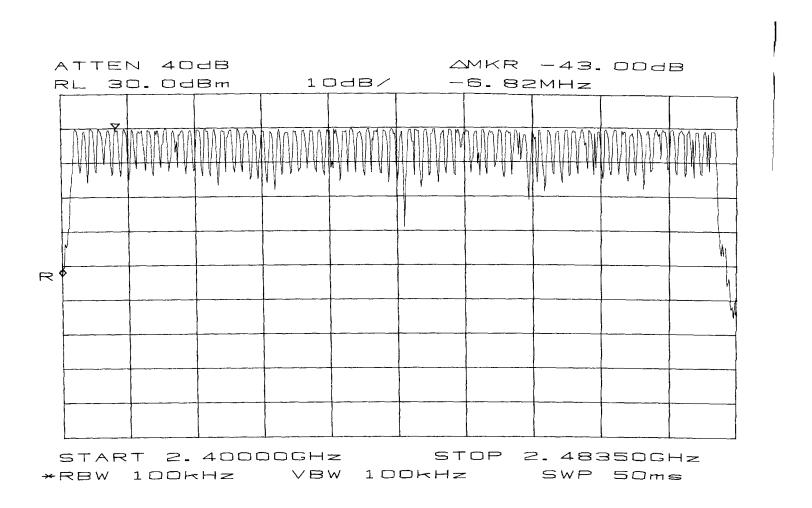
Power Out



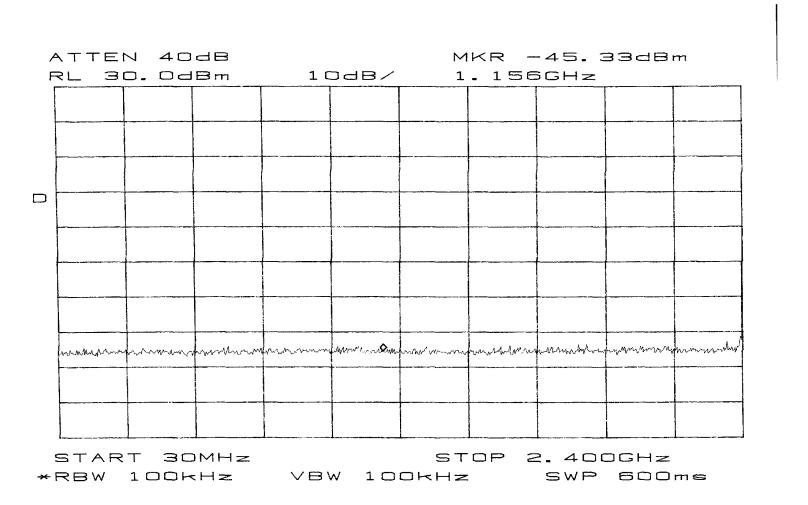
Power Out



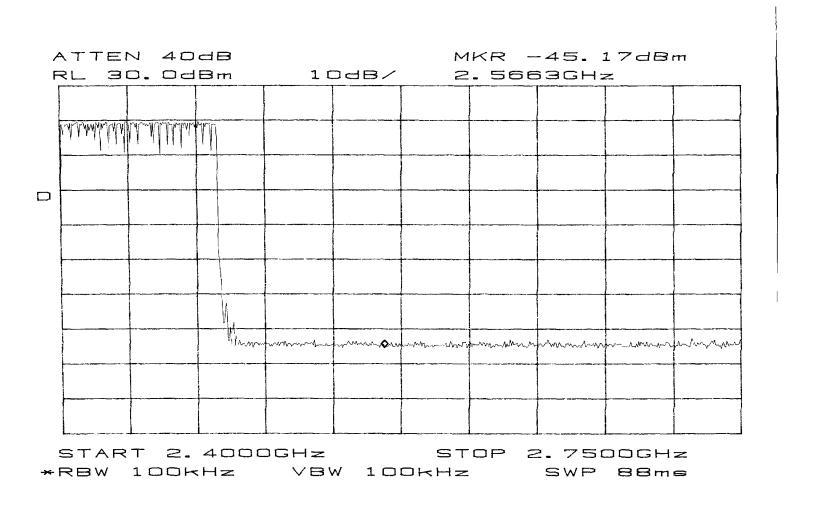
Out Of Band Emissions Band Edges



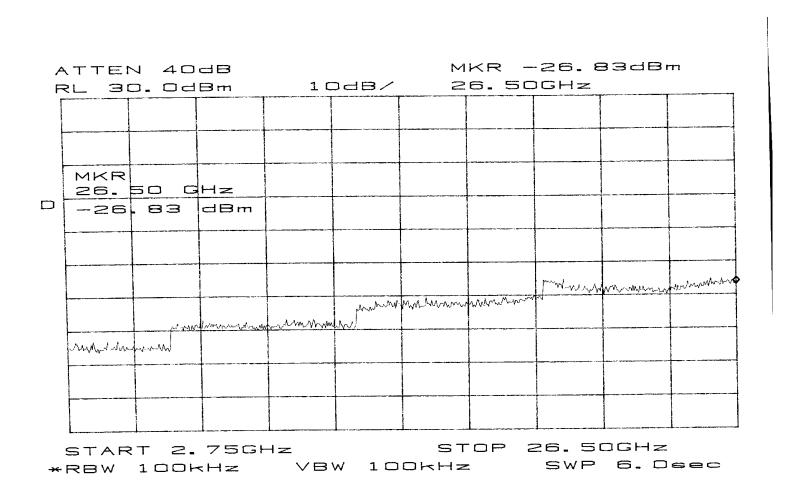
Out Of Band < 1 GHz



Out Of Band 1 – 2.75 GHz

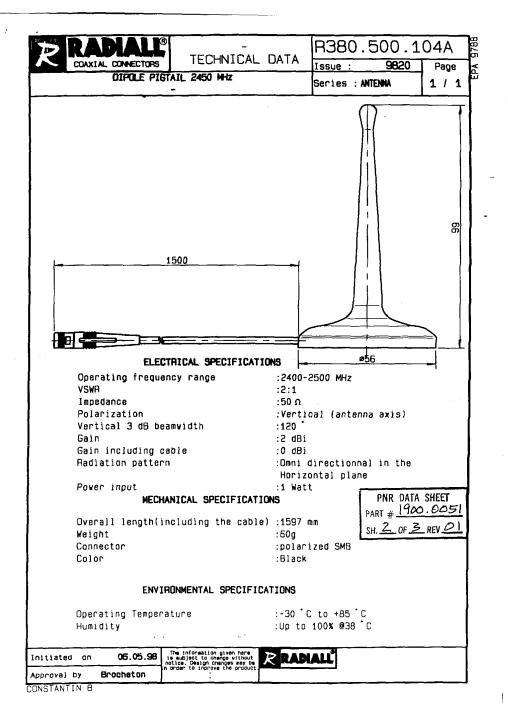


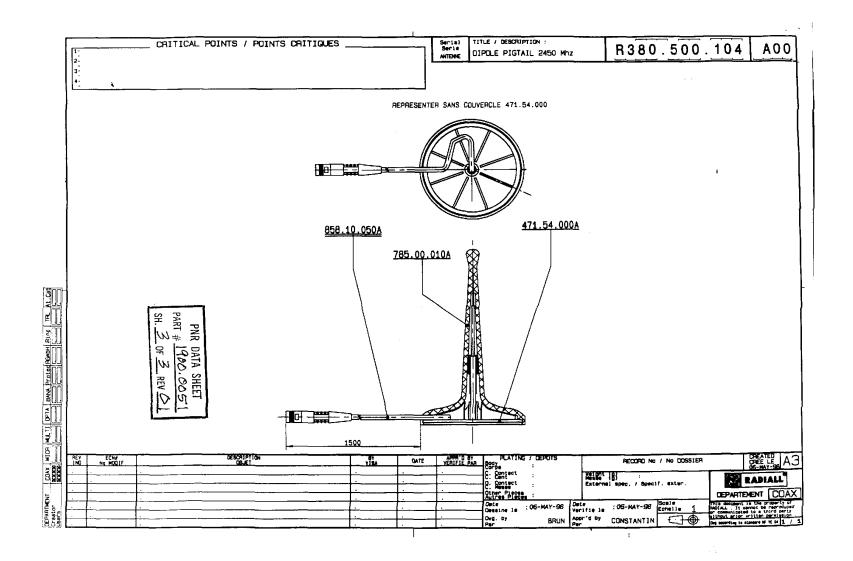
Out of Band 2.75 - 26.5 GHz



APPENDIX B

ANTENNA DRAWINGS





APPENDIX C RESTRICTED BAND DATA

FCC RADIATED DATA SHEET

DATE:6/5/98

EUT: ISA CARD CUSTOMER NAME:PR(S/N: WORK ORDER:806050)

RULE PART: 15.247 **FILE:8060502**

ANTENNA: HORN VER

MODULATION TYPE:

TESTED BY:DONNIE

COMMENTS:

OTHER CAL FACTORS ATTN dB: 10

DUTY dB: 0

HP IL dB: 0

DIST dB: 0

FREQ.	READING	Pk, QP,	A.F.	Cable loss	AMP	O.C.F.	TOTAL,	LIMIT	DELTA
MHz	dB(uV)	or Av	dB	dB	dB	dB	dB(uV/m)	dB(uV/m)	dB
Fund = 2402									
4804	48.8	Pk	34.3	7.0	35.0	10.0	45.1	74.0	-28.9
4804	36.0	Avg	34.3	7.0	35.0	10.0	32.3	54.0	-21.7
12010	38.8	Pk	40.5	13.6	35.0	10.0	47.9	74.0	-26.1
12010	27.8	Avg	40.5	13.6	35.0	10.0	36.9	54.0	-17.1
14412	44.2	Pk	40.5	14.5	35.0	10.0	54.2	74.0	-19.8
14412	33.3	Avg	40.5	14.5	35.0	10.0	43.3	54.0	-10.7
Fund = 24	140								
4880	46.0	Pk	34.3	7.0	35.0	10.0	42.3	74.0	-31.7
4880	36.3	Avg	34.3	7.0	35.0	10.0	32.6	54.0	-21.4
7320	48.8	Pk	37.4	10.6	35.0	10.0	51.8	74.0	-22.2
7320	37.8	Avg	37.4	10.6	35.0	10.0	40.8	54.0	-13.2
12200	38.5	Pk	40.5	13.6	35.0	10.0	47.6	74.0	-26.4
12200	28.0	Avg	40.5	13.6	35.0	10.0	37.1	54.0	-16.9
Fund = 24	180								
4960	46.7	Pk	34.3	7.0	35.0	10.0	43.0	74.0	-31.0
4960	37.2	Avg	34.3	7.0	35.0	10.0	33.5	54.0	-20.5
7440	49.8	Pk	37.4	10.6	35.0	10.0	52.8	74.0	-21.2
7440	39.0	Avg	37.4	10.6	35.0	10.0	42.0	54.0	-12.0
12400	38.7	Pk	40.5	13.6	35.0	10.0	47.8	74.0	-26.2
12400	27.5	Avg	40.5	13.6	35.0	10.0	36.6	54.0	-17.4

APPENDIX C 15.207 CONDUCTED EMISSIONS

Electronic Compliance Laboratories, Inc. 1249 Birchwood Ave. Sunnyvale, CA Conducted Emissions

Frequency range: 450KHz-30MHz

Government Agency and Limit: FCC Class B _____

QP = Quasi-Peak Note: Ignore peak readings when Quasi-Peak reading exists

PK = Peak

PROXIM 06-05-1 Operator: DONNIE Time: 11:56:3 Customer: Customer: PROXIM Operator: DON Date: 06-05-1998 Time: 11: Temperature Range: 70 Deg F Percent Humidity: 50 11:56:37

E.U.T.:

SYMPHONY ISA CARD

Serial Number: Support Devices: Serial Number:

FCC ID:

Exercise Program:

Modifications: None Report File Name: F:\TESTDATA\8060502.F

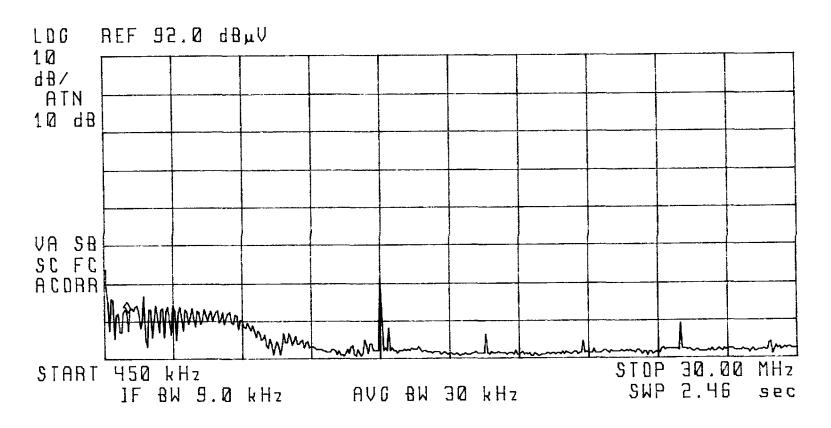
TEST	TEST	CLASS B	VERSUS		
FREQ	dBuV	LIMIT	B LIMIT	CONDUCTOR	TYPE
======	======	=======	======	=======	=======
0.450	35.5	48.0	-12.5	LINE	PK
0.820	27.5	48.0	-20.5	LINE	PK
1.850	26.2	48.0	-21.8	LINE	PK
2.150	28.6	48.0	-19.4	LINE	PK
3.410	25.9	48.0	-22.1	LINE	PK
12.270	33.1	48.0	-14.9	LINE	PK
0.450	36.6	48.0	-11.4	NEUTRAL	PK
1.670	28.6	48.0	-19.4	NEUTRAL	PK
7.540	27.3	48.0	-20.7	NEUTRAL	PK
9.130	31.0	48.0	-17.0	NEUTRAL	PK
10.140	32.3	48.0	-15.7	NEUTRAL	PK
24.040	29.6	48.0	-18.4	NEUTRAL	PK

(A) 11:45:59 JUN 05, 1998 16:09:17 JUN 29, 1994 16:36:52 JUN 29, 1994

ACTV DET: PEAK

MEAS DET: PEAK QP AVG

MKR 1.41 MHz 24.50 dB_uV



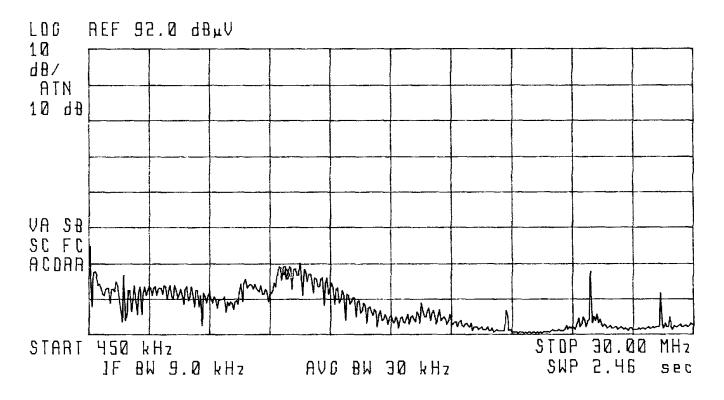
(6) 11:51:01 JUN 05, 1998 16:09:17 JUN 29, 1994 16:36:52 JUN 29, 1994

ACTV DET: PEAK

MEAS DET: PEAK QP AVG

MKR 10.13 MHz

27.48 dB₄V



APPENDIX D 15.209 RADIATED EMISSIONS

Electronic Compliance Laboratories, Inc.

1249 Birchwood Ave.

Sunnyvale, CA

Radiated Emissions

Frequency range: 30MHz-1000MHz

3 Meter Open Site

Site Calibrated: June 1997

Government Agency and Limit: FCC Class B

QP = Quasi-Peak Note: Ignore peak readings when Quasi-Peak reading exists

PK = Peak

Customer: PROXIM Operator: DONNIE Date: 06-05-1998 Time: 09:57:53

Temperature Range: 68 Deg F Percent Humidity: 55

E.U.T.:

SYMPHAONY ISA CARD

Serial Number: Support Devices: Serial Number:

FCC ID:

Exercise Program:

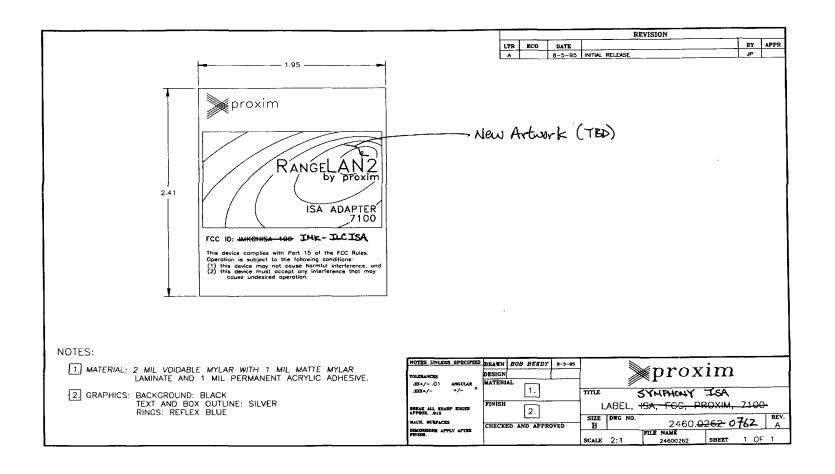
Modifications: None

Report File Name: F:\TESTDATA\8060502.RF

Antenna Type: BICONICAL

TEST	TEST	ACTUAL	CLASS B	VERSUS	TABLE	ANTENNA	POLAR-	DETECTOR
FREQ	dBuV	dBuV/m	LIMIT	B LIMIT	DEGREES	HEIGHT	IZATION	I Type
=====	======	======	======	======	======	======	======	=====
264.00	32.9	26.0	46.0	-20.0	225	1.0	V	PK
32.00	41.2	34.1	40.0	-5.9	0	1.0	V	PK
32.00	40.4	33.3	40.0	-6.7	0	1.0	V	QP
48.00	40.8	27.7	40.0	-12.3	330	1.0	V	PK
128.04	39.1	28.9	43.5	-14.6	270	2.3	V	PK
144.00	39.6	30.0	43.5	-13.5	330	2.0	V	PK
32.00	38.9	31.8	40.0	-8.2	180	4.0	H	PK
48.00	36.3	23.2	40.0	-16.8	180	4.0	H	PK
128.04	40.2	30.0	43.5	-13.5	330	4.0	H	PK
264.07	30.4	23.5	46.0	-22.5	330	3.5	H	PK
		CHZ	ANGED ANT	ENNA TO LO	G PERIOD	IC		
365.64	38.7	30.3	46.0	-15.7	135	1.0	V	PK
398.89	36.4	28.9	46.0	-17.1	290	1.0	V	PK
464.00	32.5	26.3	46.0	-19.7	180	1.0	V	PK
365.64	38.4	30.0	46.0	-16.0	90	1.0	H	PK
398.89	38.9	31.4	46.0	-14.6	180	1.0	H	PK
429.55	36.3	29.2	46.0	-16.8	225	1.0	H	PK
498.00	41.3	36.1	46.0	-9.9	45	1.0	H	PK
575.69	35.5	31.5	46.0	-14.5	270	1.1	H	PK

APPENDIX E SAMPLE LABEL



APPENDIX F SET-UP PHOTOS



FCC 15.207 Class B Conducted Emissions



FCC 15.209 Class B Radiated Emissions



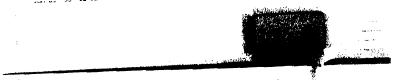
FCC 15.205 Restricted Band Antenna

APPENDIX G

EUT PHOTOS

APPENDIX H

OWNERS MANUAL



If you have a problem with your RangeLAN2 product, please call Proxim Technical Support at 650/525-3640. Proxim Technical Support will assist with resolving any technical difficulties you may have with your Proxim product.

After calling Proxim Technical Support, if your product is found to be defective, you may return the product to Proxim after obtaining an RMA (Return Marteriale Authorization) number from Proxim Technical Support. The product must be returned in its original packaging. The RMA number should be clearly marked on the outside of the box. Proxim cannot be held responsible for any product returned without an RMA number, and no product will be accepted without an RMA number.

PCO WARNING

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the PCO Rules. These limits are designed to provide reasonable proteotion against harmful to Part 15 of the PCO Rules. These limits are designed to provide reasonable proteotion against harmful interference in a residential installation. This equipment designed necessary and, if not resided and used in accordance with the instructions, may cause harmful interference to radio communications. However, there are no guarantee that interference with or to cour in a particular to radio communications. However, there are no guarantee that interference will necessary the providence of the providence

- Recrient or relocate the receiving entenne.
 Increase the separation between the equipment and the receiver.
 Connect the explorment into an outlet on a circuit different from that which the receiver is connected the explorment into an outlet on a circuit different from that which the receiver is connected.
 Consult the dealer or an experienced redictTV technician for help.

EUROPEAN TELECOMMUNICATIONS STANDARDS INSTITUTE Bistement of Compliance information to User

This equiciment has been tested and found to compty with the European Telecommunication Standard ET8 300.208. This standard covers Widebard Data Transmission Systems referred to in the OEPT recommendation 17R 10.01. This type of accepted equipment is designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and care radiate radio frequency energy and, if not installed and used in accordance with the instruction menual, may cause harmful interference to radio communications.

1. Introduction The Rangel AN Extension Point System Require The Product Pag

- 2. Quick Install
- 3. Physical ins Antenna Option Outdoor Packag Indoor Mounting
- 4. Wireless Top Planning and Ma One Hop .. Multiple Linear. Building-to-Buile Roaming Rosming Scena How to Configur
- 5. Configuration Remotely (In-ben Main Menu SNMP Managama Modem Support..
- 6. Configuration TCP/IP Configure Bridge Configurat BSA Radio Confi

F. U.S. Specifications

The following technical specification is for reference purposes only. Actual product's performence and compliance with local telecommunications regulations may vary from country to country. Proxim, Inc. will only ship products that are type approved in the destination country.

Data Rate (per port)

1.6 Mbps

Media Access Protocol

RangeLAN2 CSMA/CA

Frequency Hand

2.4-2.5 (it is Worldwide (Depends on country) (spread spectrum frequency hopping)

Independent Channels

15

Output Power

100 mW or 500 mW (Depends on country and model)

ETSI Testing

For purposes of ETS 300 328 type testing, the Extension Point was tested over a temperature range of -20 C to +55 C.

Operating Temperature

-20 C to +60 C

UL Listed Power Supply

The Extension Point requires an external power supply. If you have elected not to purchase the external power supply from Proxim or need a replacement, you must use only a UL listed, Class 2 power supply, rated min. 1A at 12VDC.

FCC Notice

Warning! It is the responsibility of the installer of these antennss, as well as the responsibility of the user of this product, to guarantee that each antenna is operated at least 20 cm (8 inches) from any person. This is necessary to ensure it 8 incheduct is operated in accordance with the RF Guidelines for Haman Exposure which have been adopted by the Federal Communications Commission.

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A806003.DOC

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APPENDIX I

CLIENT CONFIDENTIAL MATERIAL