

**15.247 Certification
FCC ID: IMK-ILC1PC**

EMI TEST REPORT

On

SYMPHONY / PC Card

Prepared for

Proxim

**295 N. Bernardo Ave
Mountain View, CA 94043
Tel: (650)960-1630
Fax: (650)960-0332**

Prepared by

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

**Test Report Number: A806001
Date of Test: May 29, 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	001
Filter BP 4-10 GHz	FSY	HM 2950-1565	001
Filter HP 10-18 GHz	FSY	HP 8601-7SS	001

3.0 EUT

SYMPHONY / PC CARD
M/N 4401-05 Dipole 4402-05 Stub
S/N
FCC ID: IMK-ILC1PC

With one each Proxim P/N 1900.0020 Clip-on Antenna and P/N 1900.0021 Stub
Antenna. Antennas were not serialized.

4.0 SUPPORT EQUIPMENT

Toshiba Laptop Model No. T19005 S/N 11453067
110v/10Hz to 24Vac Transformer

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 / PC 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 two different antennas. Test firmware resident in the EUT was used to do the test.

6.1 15.247(a)(1) FREQUENCY HOPPING SYSTEMS

SYMPHONY / PC 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 " SYMPHONY / PC 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 (.980 / .940 / .925 MHz) at the low/midb and/high frequencies of 2.402/2.440/2.480 GHz. **Test Plots are shown in Appendix A.**

Zero span spectrum analyzer plot labeled "DWEELL 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 21.33 dBm or 135 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 3 feet of RG 142 cable, to Spectrum Analyzer set on Max Hold with no additional attenuation.

Power = 20.33 dBm (peak reading) +1.0dB cable loss = +21.33 dBm / 135 mW EIRP

Limit: +30 dBm / 1 W maximum power

1900.0021 Stub Antenna

EIRP = +21.33 (peak power) +0.0 (peak gain, dBi) = + 21.33 dBm / 135 mW EIRP

Limit: +36 dBm / 4 W maximum EIRP

1900.0001 Clip-on Antenna

EIRP = +21.33 (peak power) + 1.0 (peak gain, dBi) = + 22.33 dBm / 171mW 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 <1GHz GHz", " OUT OF BAND 1 -2.75 GHz", and "OUT OF BAND 2.75 - 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 A.**

6.1.4 15.203 ANTENNA REQUIREMENT

This product has an MMCX 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 15.209 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 C.**

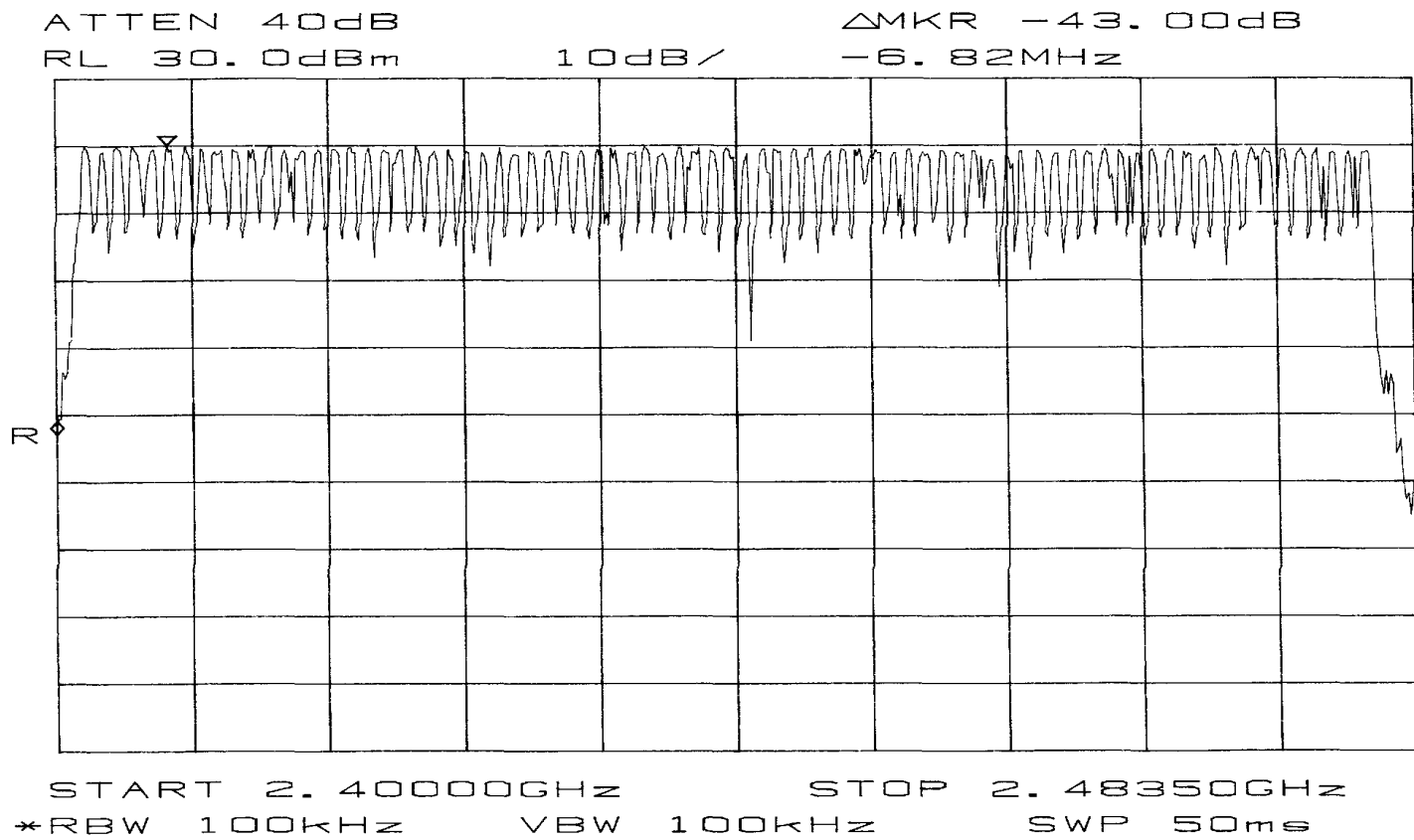
Electronic Compliance Laboratories

Chris Byleckie
Technical Director

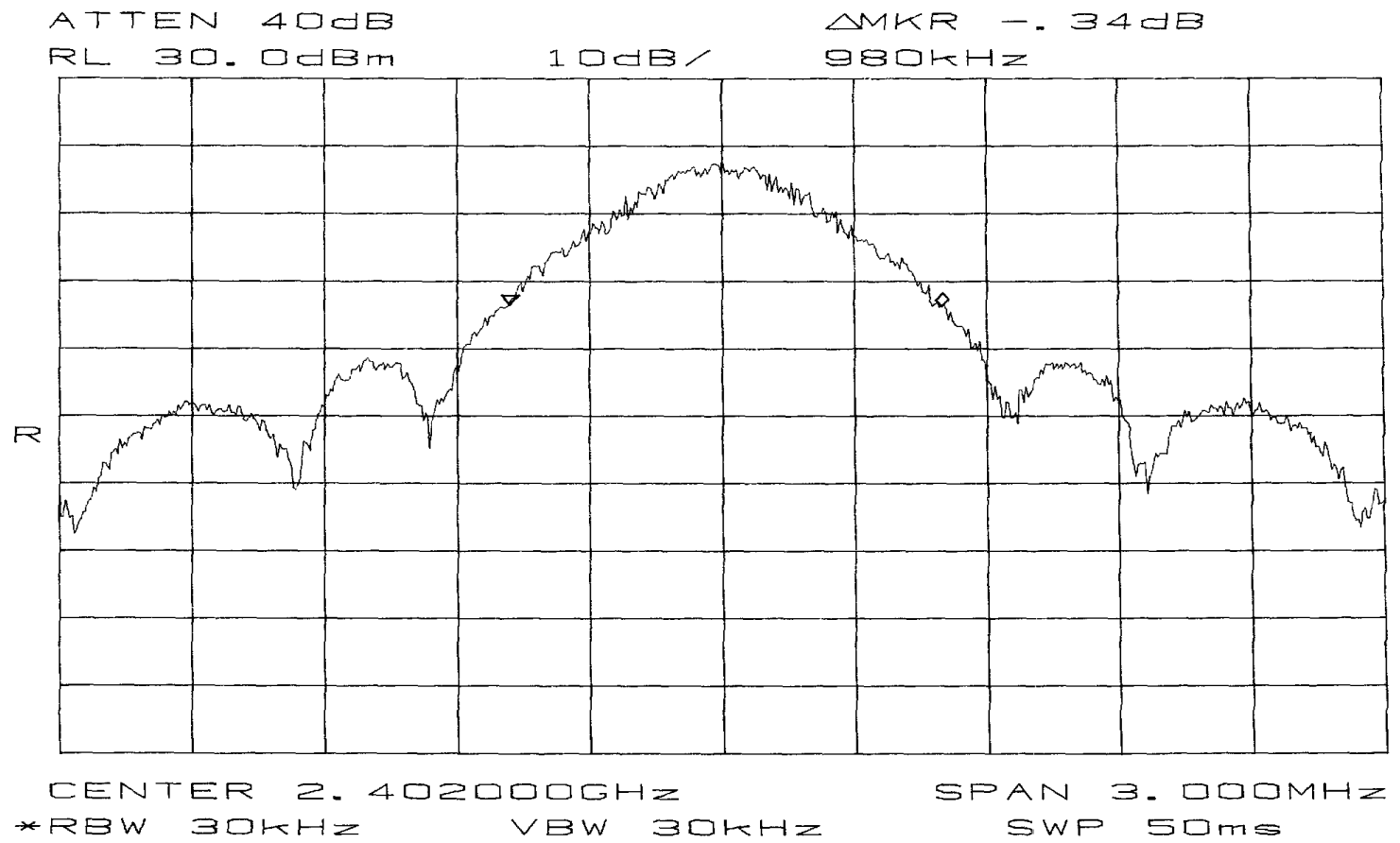
Date

APPENDIX A
SPREAD SPECTRUM PLOTS

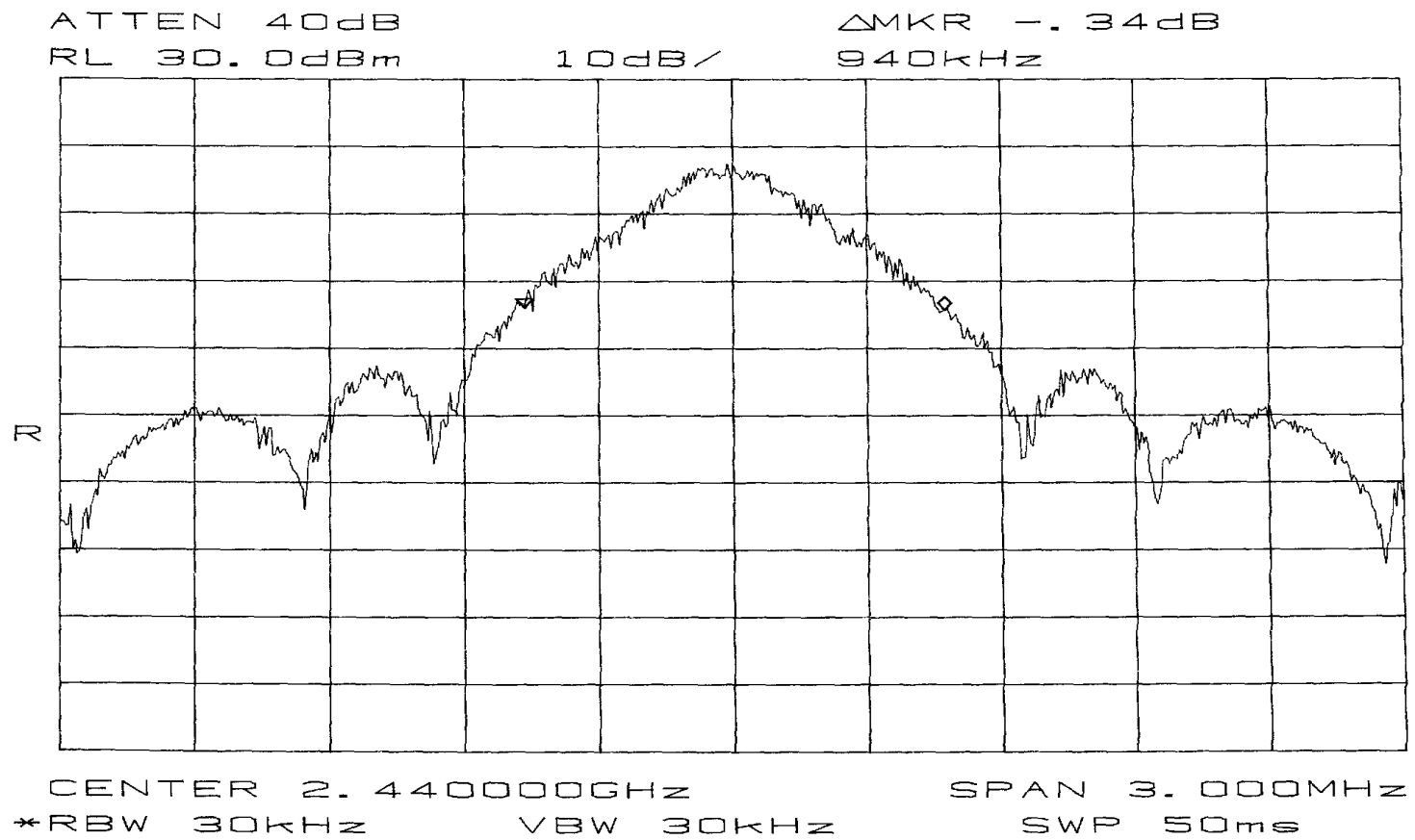
Channel Utilization



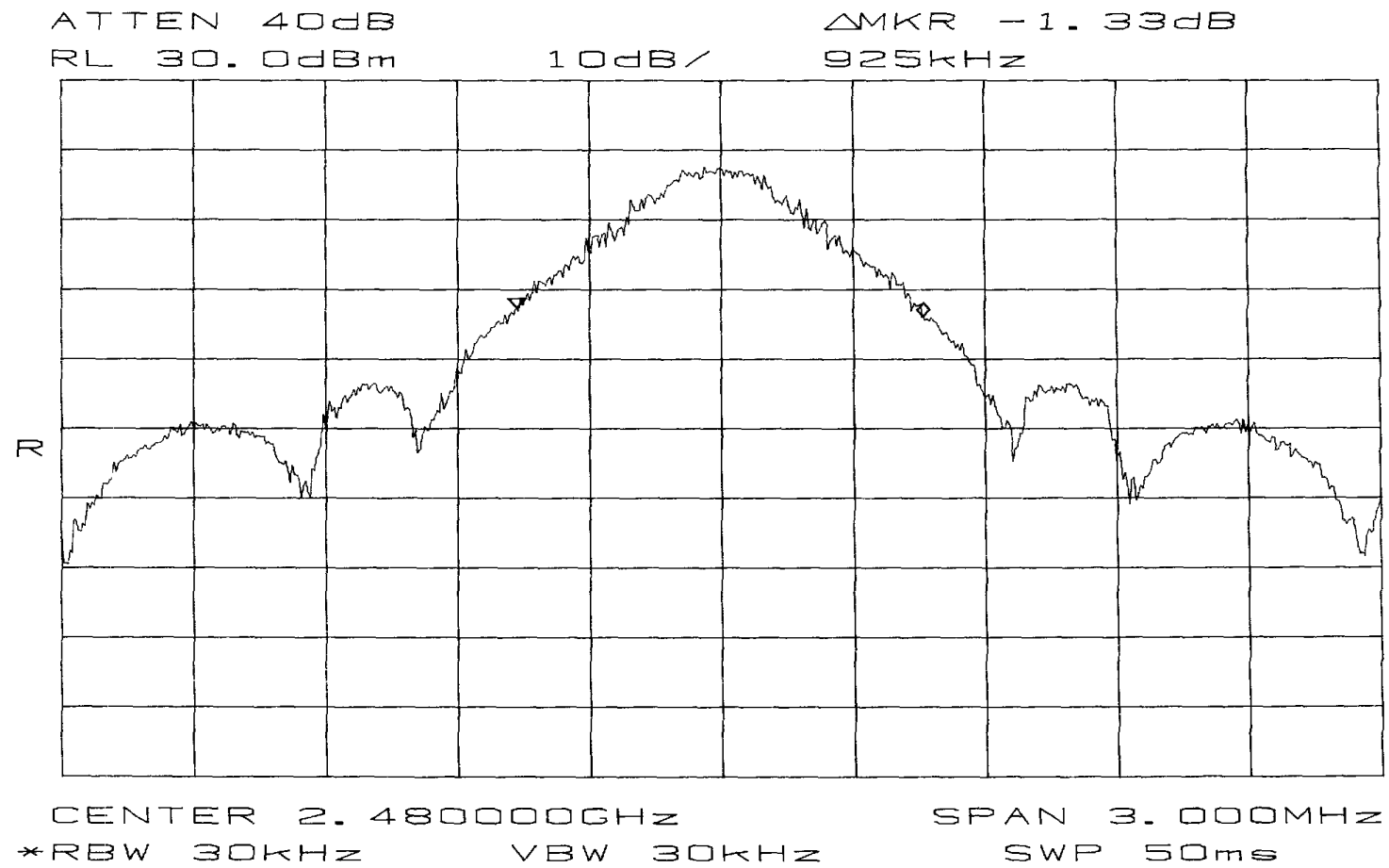
Bandwidth



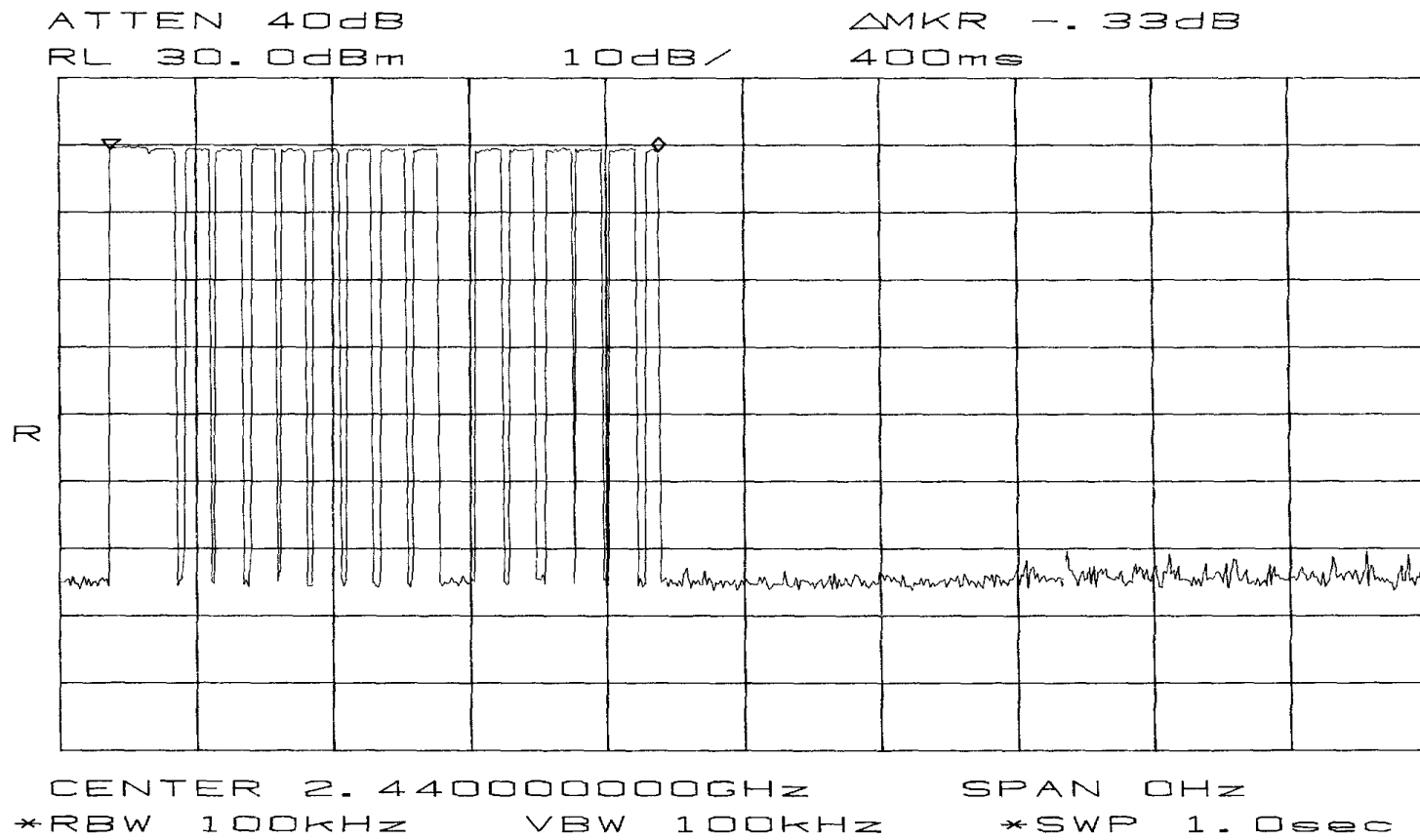
Bandwidth



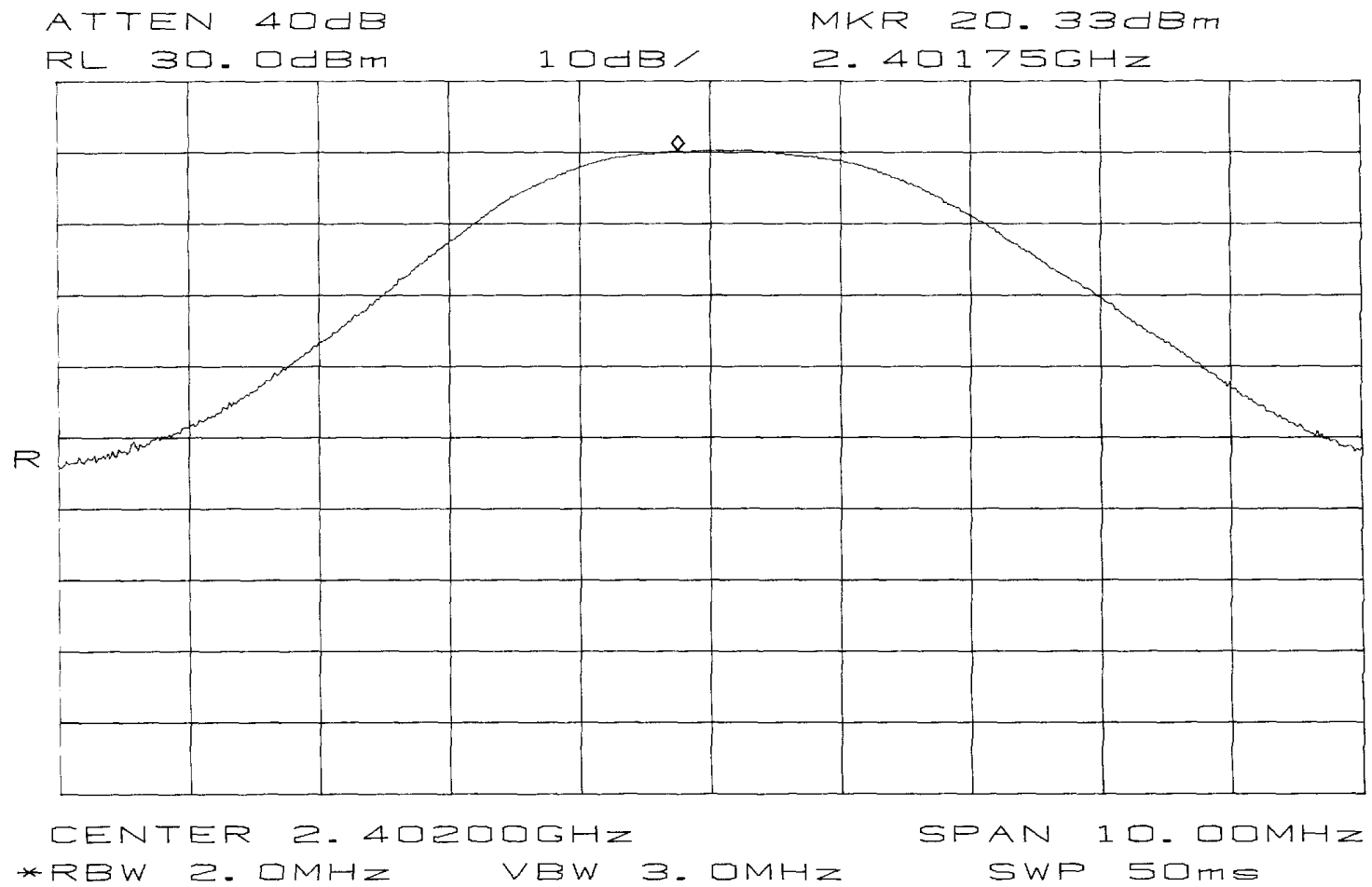
Bandwidth



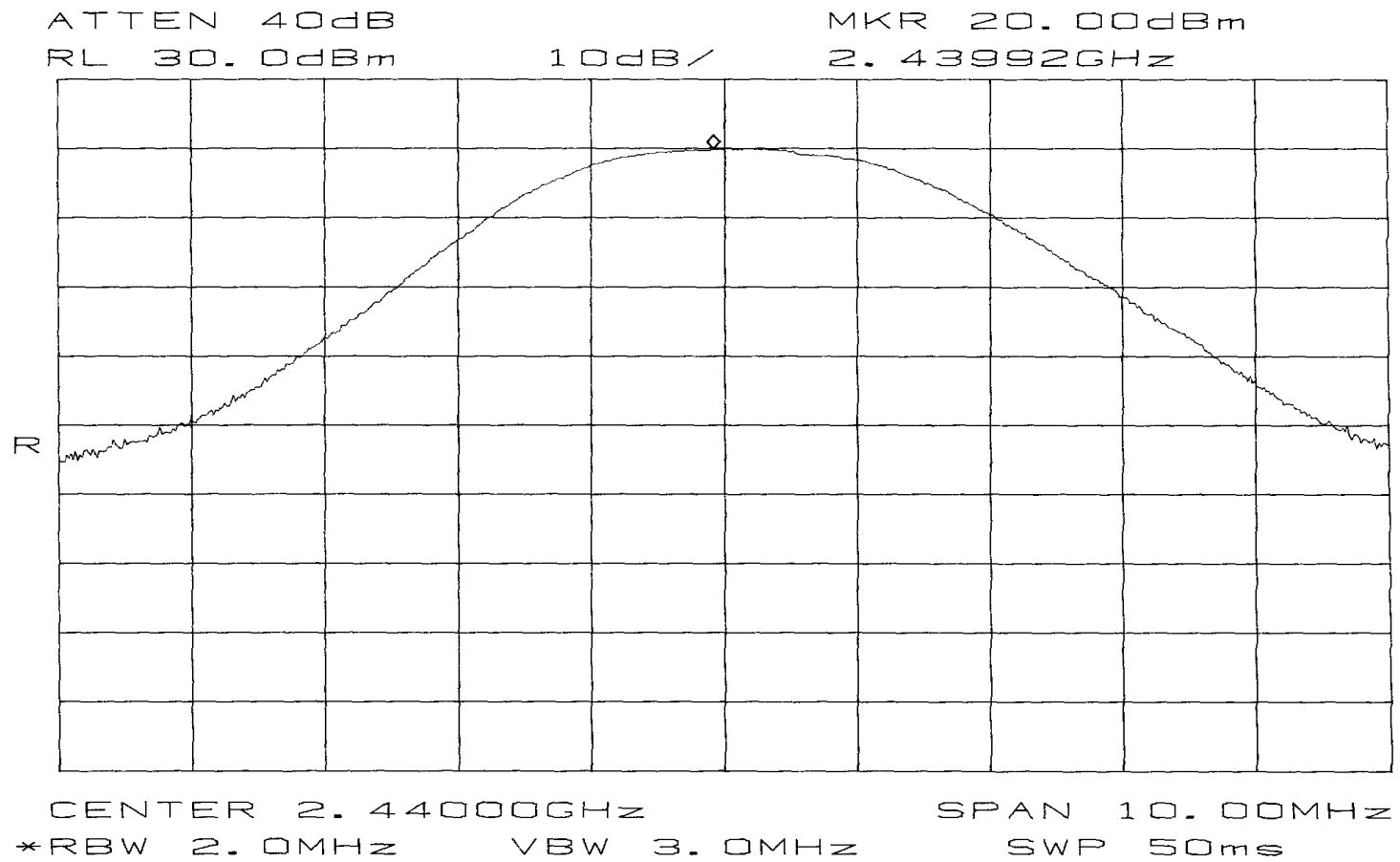
Dwell Time



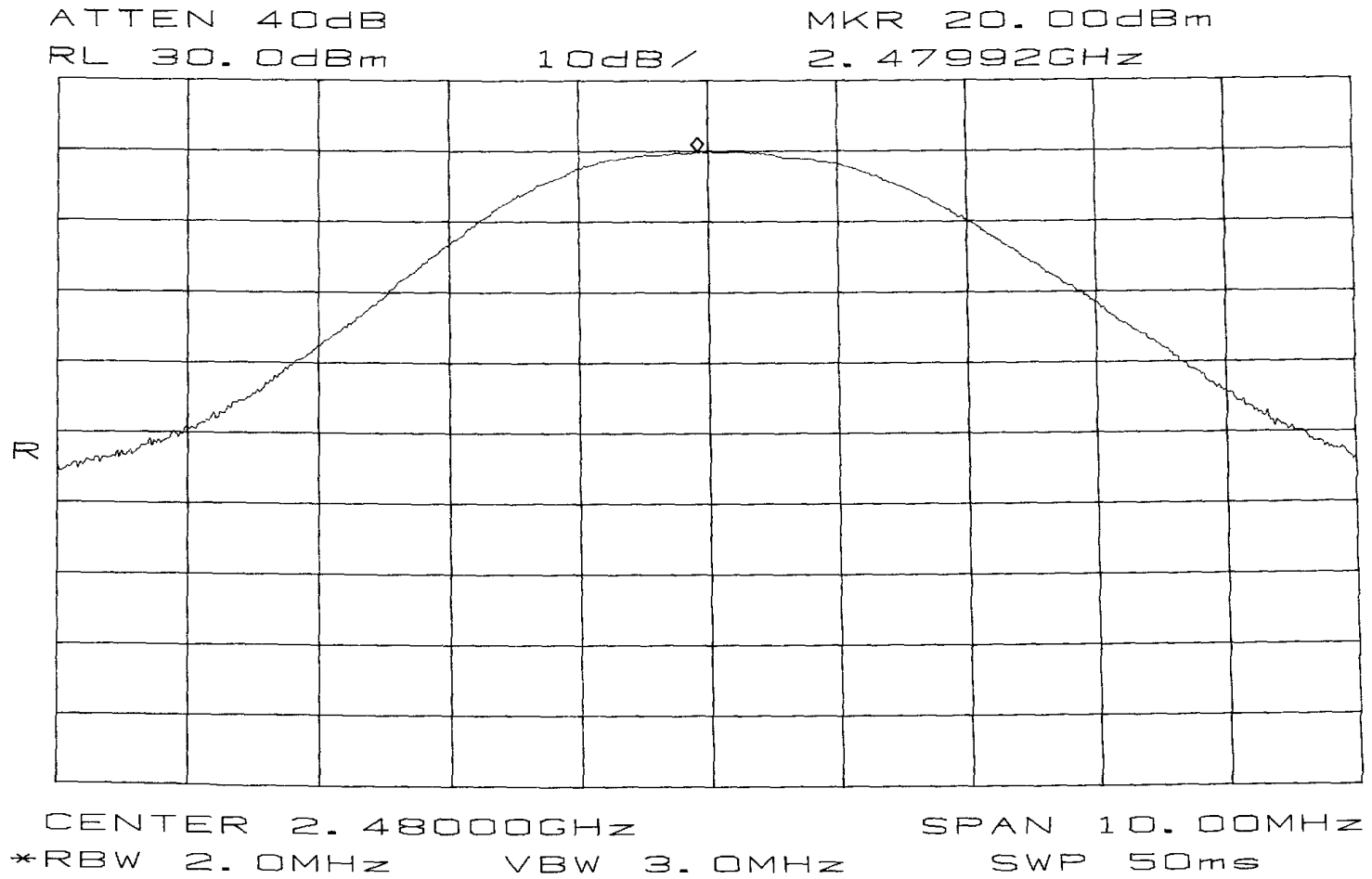
Power Out



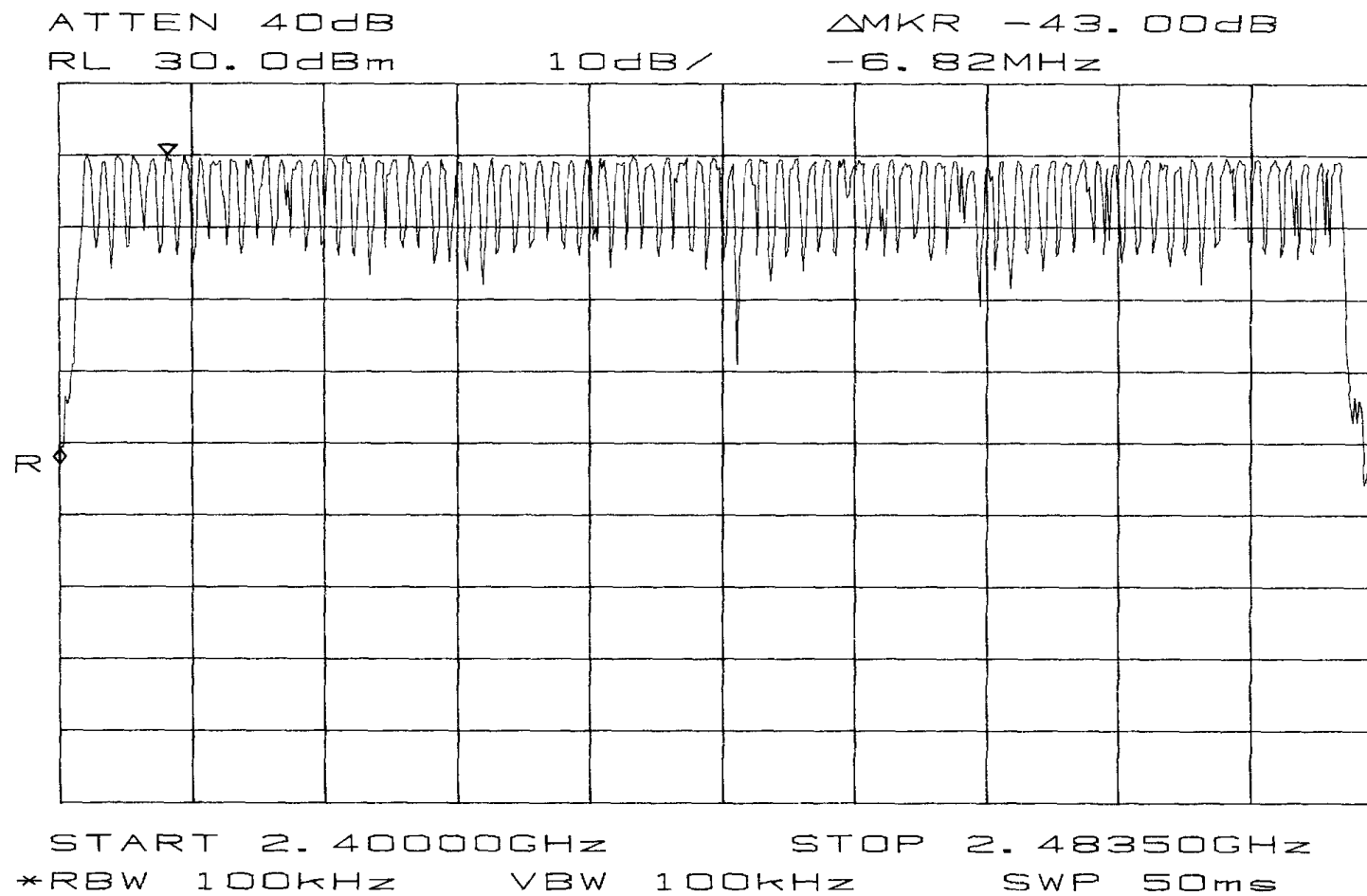
Power Out



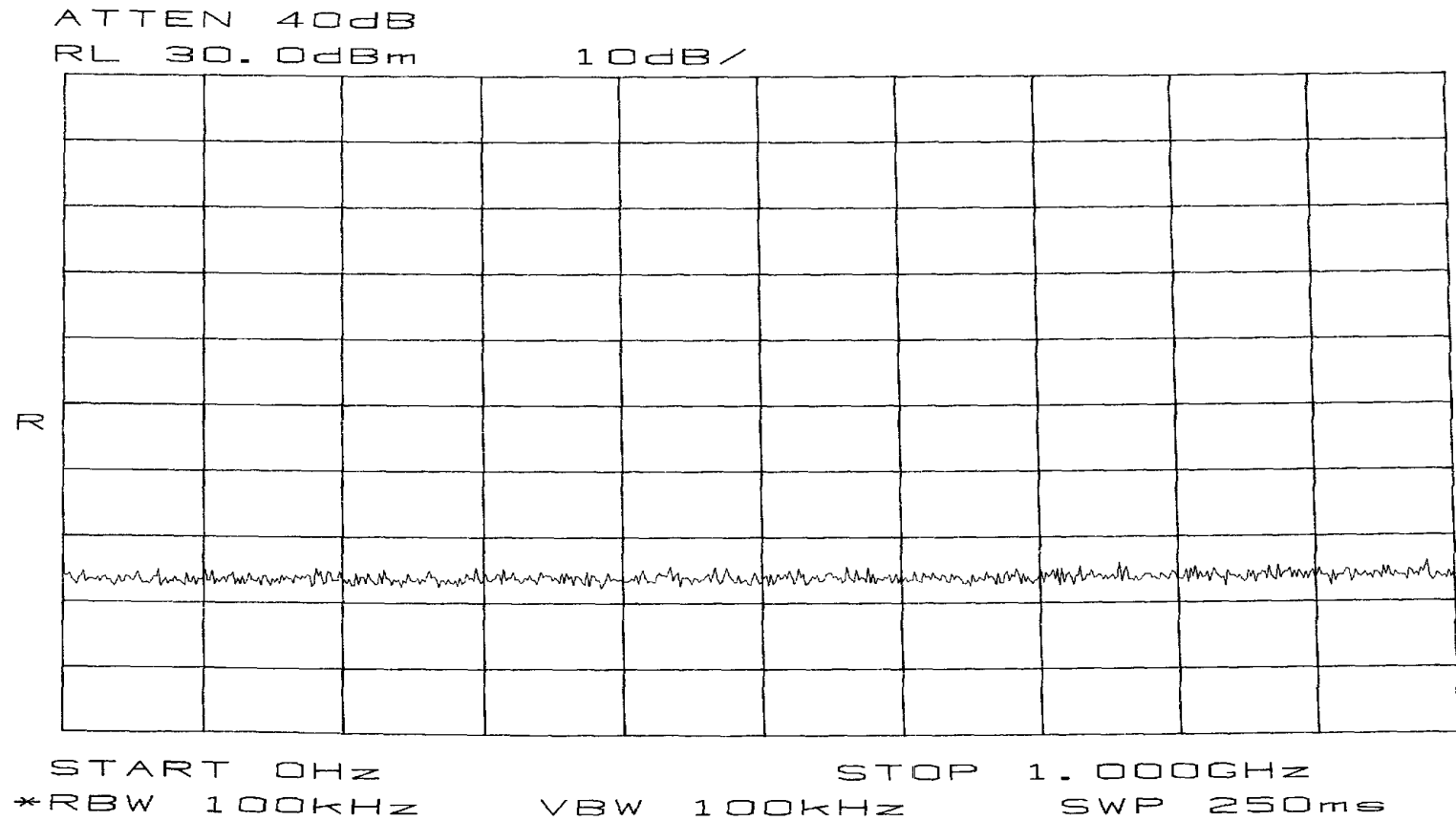
Power Out



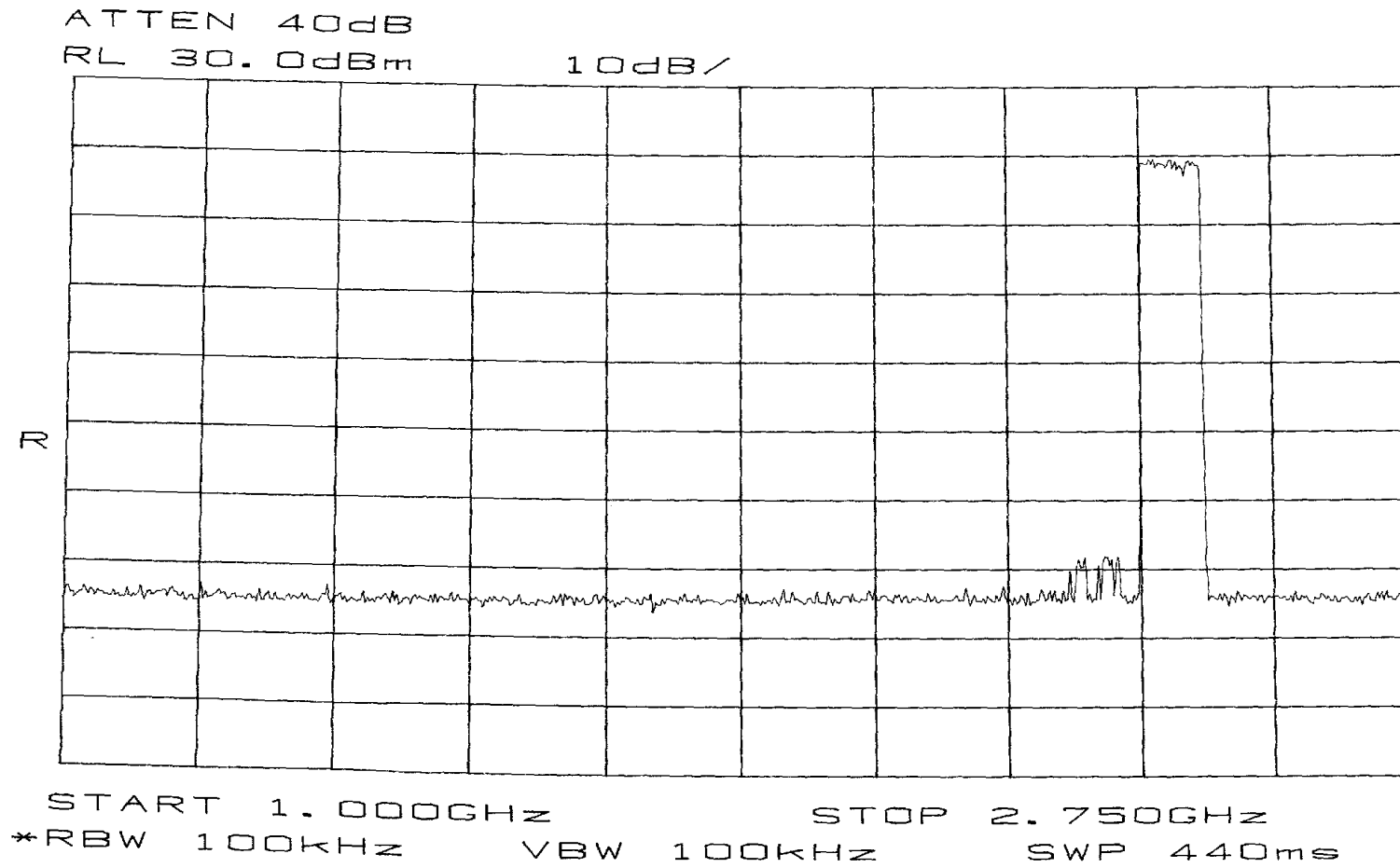
Out Of Band Emissions Band Edges



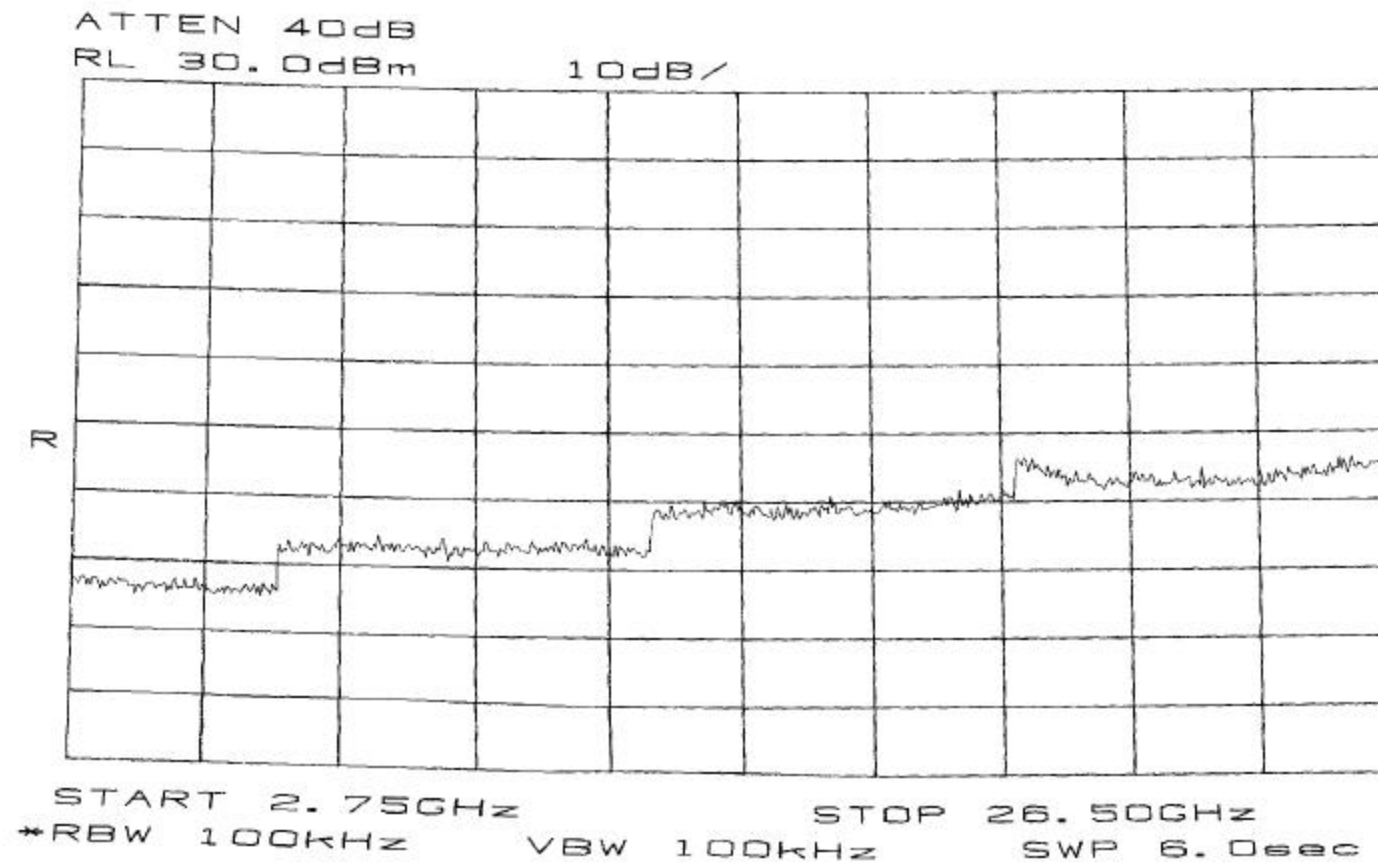
Out Of Band < 1 GHz



Out Of Band 1 - 2.75 GHz

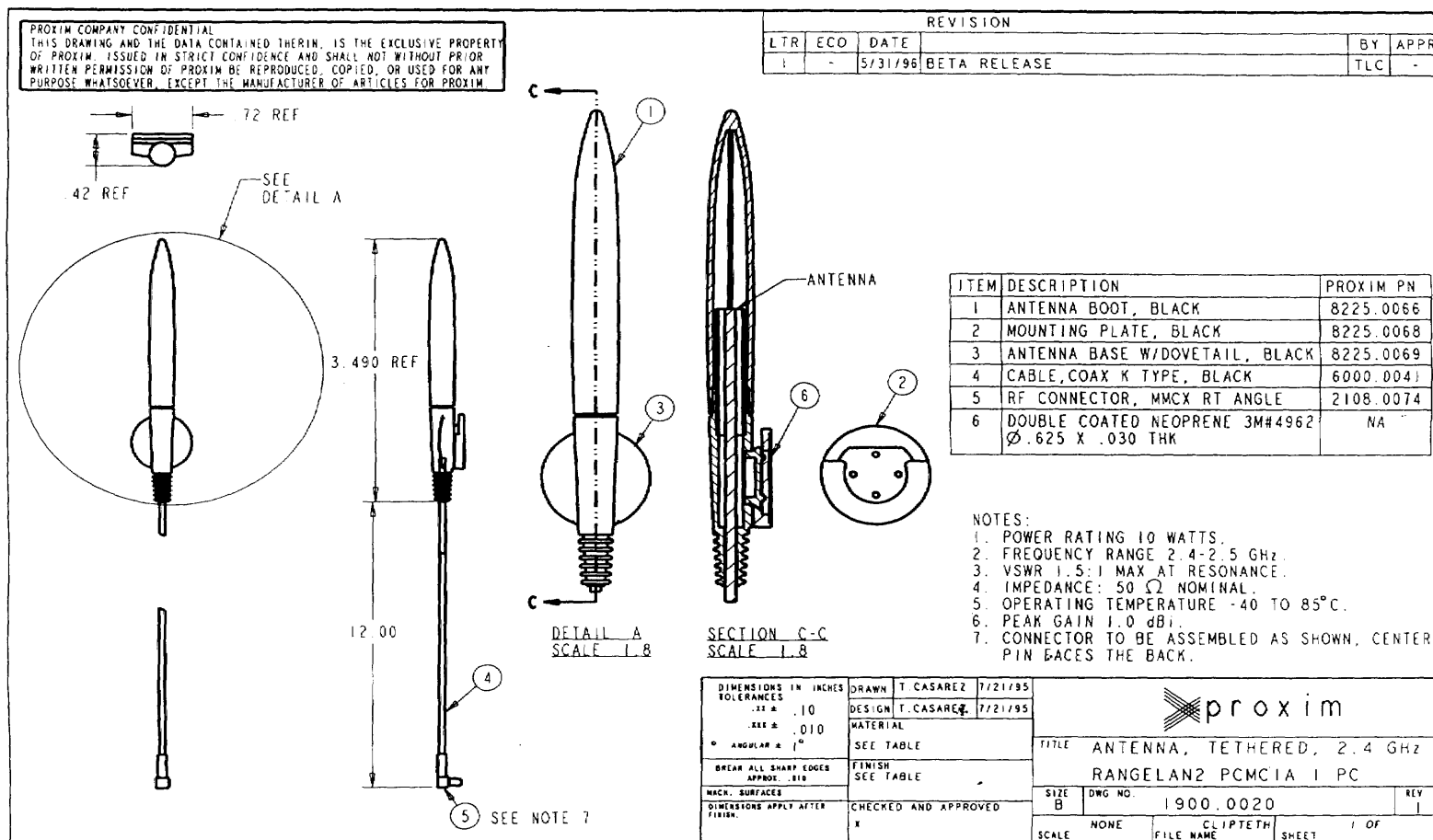


Out of Band 2.75 – 26.5 GHz



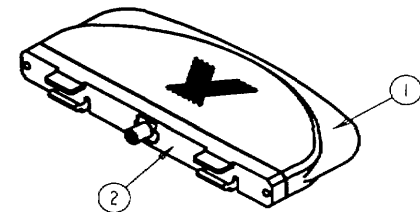
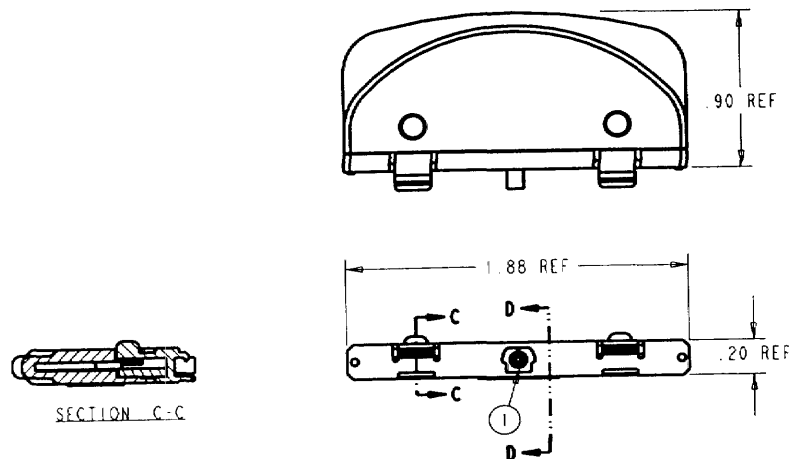
APPENDIX B

ANTENNA DRAWINGS



PROXIM COMPANY CONFIDENTIAL
THIS DRAWING AND THE DATA CONTAINED THEREIN, IS THE EXCLUSIVE PROPERTY
OF PROXIM. ISSUED IN STRICT CONFIDENCE AND SHALL NOT WITHOUT PRIOR
WRITTEN PERMISSION OF PROXIM BE REPRODUCED, COPIED, OR USED FOR ANY
PURPOSE WHATSOEVER, EXCEPT THE MANUFACTURE OF ARTICLES FOR PROXIM.

REVISION					BY	APPR
LTR	ECO	DATE				
01	-	6/5/95	RELEASE TO BETA		TLC	-



ITEM	DESCRIPTION	PROXIM PN
1	BOOT, STUB ANT	8225.0061
2	CLIP, STUB ANT	8225.0060
3	PCA, STUB ANT	8400.0134

- NOTES:
1. FREQUENCY RANGE 2.4-2.5 GHz
 2. IMPEDANCE 50 Ω NOMINAL
 3. OPERATING TEMPERATURE -40 TO 85°C.
 4. PEAK GAIN 0.0 dBi

DIMENSIONS IN INCHES		DRAWN	T. CASAREZ	7/21/95
TOLERANCES		DESIGN	T. CASAREZ	7/21/95
.XX ± .02		MATERIAL		
.XXX ± .010		SEE BOM		
ANGULAR ± 1°		FINISH		
BREAK ALL SHARP EDGES APPROX .010		CHECKED AND APPROVED		
MACH. SURFACES				
DIMENSIONS APPLY AFTER FINISH				

proxim	
TITLE ANTENNA, STUB, 2.4 GHz	
RANGELAN2 PCMCIA I PC	
SIZE B	DWG NO. 1900.0021
SCALE NONE	STUB_ANTN
FILE NAME	SHEET 1 OF 1

APPENDIX C
RESTRICTED BAND DATA

FCC RADIATED DATA SHEET									
EUT:		ILC 1PC				DATE:5/29/98			
S/N:						CUSTOMER NAME:		Proxim	
RULE PART:		15.247				WORK ORDER:		8052902	
						FILE:		8052902A	
ANTENNA:		Horn		OTHER CAL FACTOR:		ATTN dB:		0	
MODULATION TYPE:						DUTY dB:		0	
TESTED BY:		Chris				HP IL dB:		0	
COMMENTS:		1 DB Dipole Antenna				DIST dB:		10	
FREQ.	READING	Pk, QP, or Av	A.F. dB	Cable loss dB	AMP dB	O.C.F. dB	TOTAL, dB(uV/m)	LIMIT dB(uV/m)	DELTA dB
Fund = 2402									
4804	46.2	Pk	32.8	7.0	35.0	10.0	41.0	74.0	-33.0
4804	39.3	Avg	32.8	7.0	35.0	10.0	34.1	54.0	-19.9
12010	48.5	Pk	39.3	13.6	35.0	10.0	56.4	74.0	-17.7
12010	35.2	Avg	39.3	13.6	35.0	10.0	43.1	54.0	-11.0
Fund = 2440									
4880	44.3	Pk	32.8	7.0	35.0	10.0	39.1	74.0	-34.9
4880	34.5	Avg	32.8	7.0	35.0	10.0	29.3	54.0	-24.7
7320	44.7	Pk	36.0	10.6	35.0	10.0	46.3	74.0	-27.7
7320	31.5	Avg	36.0	10.6	35.0	10.0	33.1	54.0	-20.9
12200	40.0	Pk	39.3	13.6	35.0	10.0	47.9	74.0	-26.2
12200	27.5	Avg	39.3	13.6	35.0	10.0	35.4	54.0	-18.7
Fund = 2480									
4960	47.2	Pk	32.8	7.0	35.0	10.0	42.0	74.0	-32.0
4960	40.3	Avg	32.8	7.0	35.0	10.0	35.1	54.0	-18.9
7440	42.7	Pk	36.0	10.6	35.0	10.0	44.3	74.0	-29.7
7440	33.2	Avg	36.0	10.6	35.0	10.0	34.8	54.0	-19.2
12400	39.7	Pk	39.3	13.6	35.0	10.0	47.6	74.0	-26.5
12400	27.3	Avg	39.3	13.6	35.0	10.0	35.2	54.0	-18.9

FCC RADIATED DATA SHEET

EUT: ILC 1PC
S/N:
RULE PART: 15.247
DATE: 5/29/98
CUSTOMER NAME: Proxim
WORK ORDER: 8052902
FILE: 8052902B
ANTENNA: Horn
MODULATION TYPE:
TESTED BY: Donnie
COMMENTS: 1 DB STUB ANTENNA
OTHER CAL FACTORS: ATTN dB: 0
DUTY dB: 0
HP IL dB: 0
DIST dB: 10

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	45.0	Pk	32.8	7.0	35.0	10.0	39.8	74.0	-34.2
4804	37.2	Avg	32.8	7.0	35.0	10.0	32.0	54.0	-22.0
12010	45.0	Pk	39.3	13.6	35.0	10.0	52.9	74.0	-21.2
12010	33.5	Avg	39.3	13.6	35.0	10.0	41.4	54.0	-12.7
Fund = 2440									
4880	44.7	Pk	32.8	7.0	35.0	10.0	39.5	74.0	-34.5
4880	44.0	Avg	32.8	7.0	35.0	10.0	38.8	54.0	-15.2
7320	47.8	Pk	36.0	10.6	35.0	10.0	49.4	74.0	-24.6
7320	39.8	Avg	36.0	10.6	35.0	10.0	41.4	54.0	-12.6
12200	39.3	Pk	39.3	13.6	35.0	10.0	47.2	74.0	-26.9
12200	27.3	Avg	39.3	13.6	35.0	10.0	35.2	54.0	-18.9
Fund = 2480									
4960	50.8	Pk	32.8	7.0	35.0	10.0	45.6	74.0	-28.4
4960	47.0	Avg	32.8	7.0	35.0	10.0	41.8	54.0	-12.2
7440	45.7	Pk	36.0	10.6	35.0	10.0	47.3	74.0	-26.7
7440	35.5	Avg	36.0	10.6	35.0	10.0	37.1	54.0	-16.9
12400	39.5	Pk	39.3	13.6	35.0	10.0	47.4	74.0	-26.7
12400	27.3	Avg	39.3	13.6	35.0	10.0	35.2	54.0	-18.9

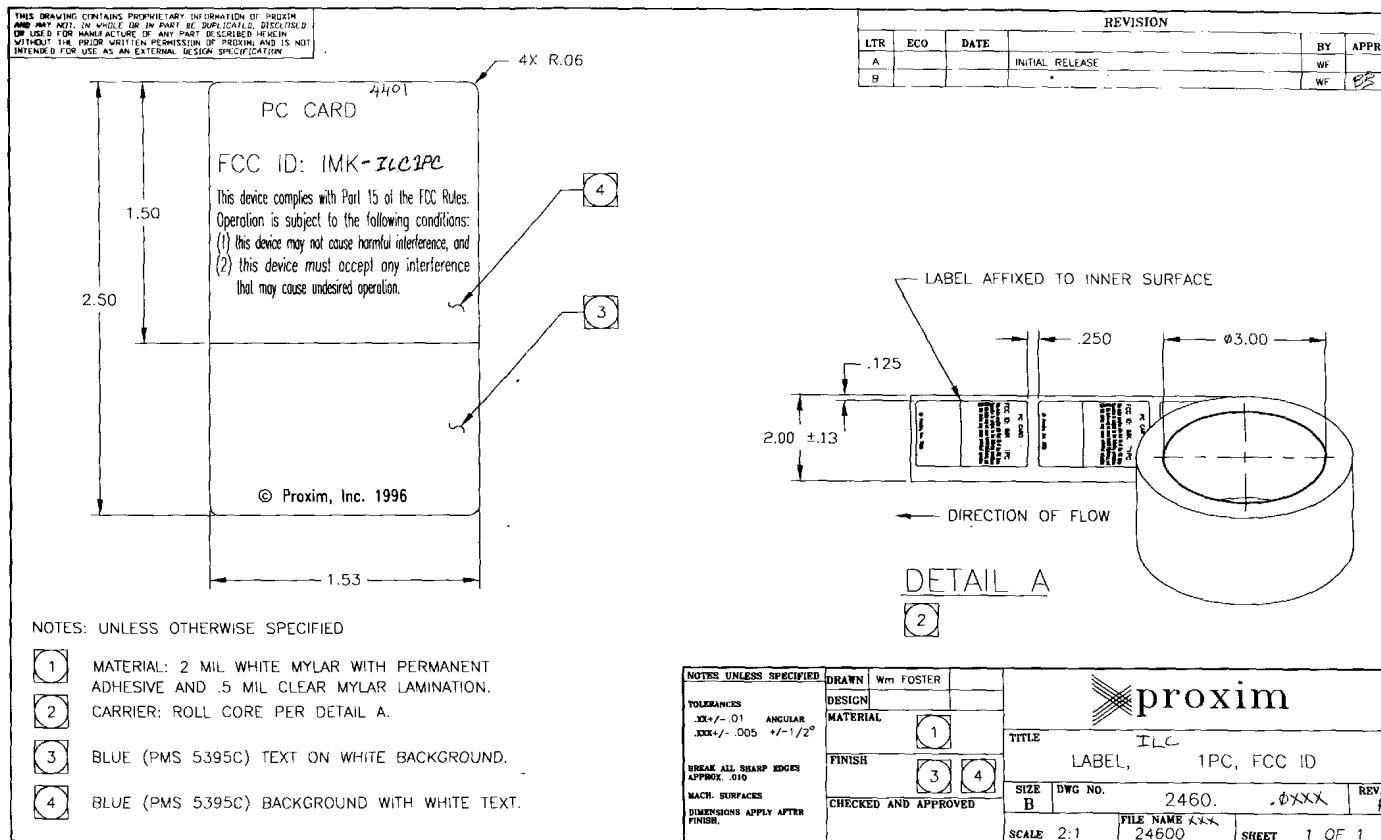
APPENDIX D
15.209
RADIATED EMISSIONS

Government Agency and Limit: FCC Class B

Customer:	PROXIM	Operator:	DONNIE
Date:	05-29-1998	Time:	08:51:25
Temperature Range:	60	Deg F	Percent Humidity: 60
E.U.T.:	ILC 1PC		
Serial Number:	A30267530		
Support Devices:	LAPTOP		
Serial Number:			
FCC ID:			
Exercise Program:			
Modifications:	None		
Report File Name:	F:\TESTDATA\8052902.RF		

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APPENDIX E
SAMPLE LABEL



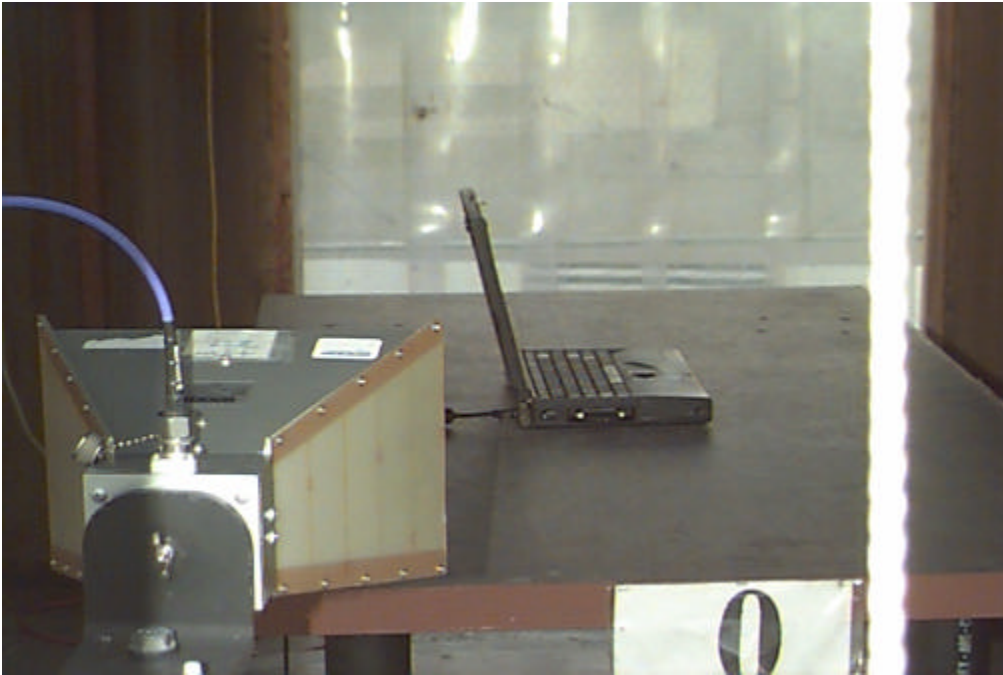
APPENDIX F
SET-UP PHOTOS



**FCC 15.209 Class B
Radiated Emissions**



**FCC 15.205 Restricted Band
Stub Antenna**



**FCC 15.205 Restricted Band
Clip-on Antenna**



FCC 15.247 Conducted RF

APPENDIX G
EUT PHOTOS

APPENDIX H
OWNERS MANUAL

Warranty Return Policy

If you have a problem with your RangeLAN2 product, please call Proxim Technical Support at 650/526-3640. 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 Materials 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.

FCC 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 FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- ☐ Reorient or relocate the receiving antenna.
- ☐ Increase the separation between the equipment and the receiver.
- ☐ Connect the equipment into an outlet on a circuit different from that which the receiver is connected.
- ☐ Consult the dealer or an experienced radio/TV technician for help.

EUROPEAN TELECOMMUNICATIONS STANDARDS INSTITUTE

Statement of Compliance Information to User

This equipment has been tested and found to comply with the European Telecommunication Standard ETS 300.328. This standard covers Wideband Data Transmission Systems referred to in the CEPT recommendation T/R 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 can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

1. Introduction

The RangeLAN
Extension Point
System Requires
The Product Pa

2. Quick Instal

3. Physical Ins

Antenna Option
Outdoor Packag
Indoor Mounting

4. Wireless Top

Planning and M
One Hop
Multiple Linear
Tree
Building-to-Buil
Roaming
Roaming scena
How to Configur
Extension Points

5. Configuration

Locally (Out-of-t
Remotely (In-ban
Main Menu
SNMP Managem
Modem Support ..

6. Configuration

TCP/IP Configur
Bridge Configur
BSA Radio Conf

E. U.S. Specifications

The following technical specification is for reference purposes only. Actual product's performance 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 Band	2.4-2.5 GHz 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 antennas, 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 that the product is operated in accordance with the RF Guidelines for Human Exposure which have been adopted by the Federal Communications Commission.

APPENDIX I

CLIENT CONFIDENTIAL MATERIAL