



**FEDERAL COMMUNICATIONS COMMISSION**



*Certification*



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

**CERTIFICATION COMPLIANCE REPORT  
ON**

*Symphony™-HRF Cordless USB Adapter...*

**MODEL 4230**

**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.

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1249 Birchwood Drive, Sunnyvale, California 94089  
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## 1.0 VERIFICATION OF COMPLIANCE

**EUT Description:** *Symphony™ HRF Cordless USB Adapter* is a wireless point to point home networking transmitter which is easily adaptable in the USB Port on any computer.

**Model Number:** 4230  
**Serial Number:** 0020A638FE8D  
**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-HRFUSB

**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 CFR 47, FCC Rules and Regulations applicable to Radio Frequency Devices and 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.

**Chip Matheny**  
Technical Officer

**Date:** 12/20/99

**Altan Yazar**  
RF Engineer

**Date:** 12/30/99



## 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 USB Adapter* is a wireless point to point home networking transmitter adapter which is easily installed in the home environment

**Model Number:** 4230  
**Serial Number:** 0020A638FE8D  
**Report Number:** 9120202B  
**FCC ID Number:** IMK-HRFUSB  
**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 - Radiated Emissions 1000 MHz to 24.8 GHz – Part 15.247

## SUMMARY

Pass/Fail: **PASSED**

### 2.1 RADIATED EMISSION TEST:

The *Proxim Symphony-HRF™ Cordless USB Adapter* 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-HRF™ Cordless USB Adapter* 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**.

### 2.3 15.247 OPERATION WITHIN THE 2400-2483.5 MHZ BAND:

The *Proxim Symphony-HRF™ Cordless USB Adapter* met all the requirements. See data and plots in Appendices.



### 3.0 TEST FACILITY

**Name:** *Electronic Compliance Laboratories, Inc.*

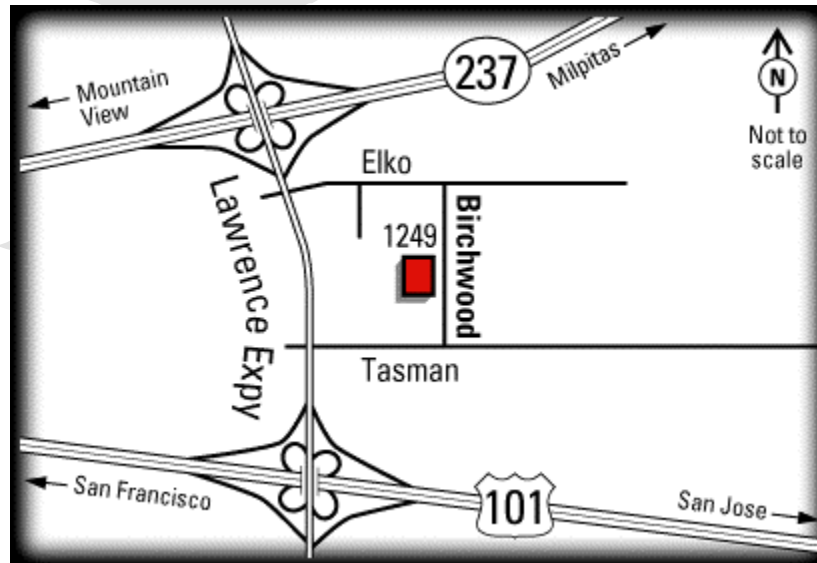
**Location:** 1249 Birchwood Drive  
Sunnyvale, CA 94089

**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](http://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, Sect.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 dBμV 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 (dBμV)	Class A (dBμV)	Class B (dBμV)	A (dB)	B (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)	<u>A</u> (dB)	<u>B</u> (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 USB is a point to point, point to multipoint *Wireless Home Network Adapter* operating in the 2.4- 2.5 GHz ISM Band. The unit has an integrated antenna, which operates in a full duplex mode.

## 13.0 SUPPORT EQUIPMENT

**Equipment Type:** Compaq Presario Laptop Computer  
**Model Number:** 1275  
**Serial Number:** 1V99CLR792YF  
**Manufacturer:** Compaq Computer Corporation  
**Comments:** [REDACTED]

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

## 14.0 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 manufacturers requirements and conditions for intended use.



## 15.0 SUMMARY OF TESTS

The EUT is a USB Cordless LAN Adapter with a low power frequency hopping spread spectrum (FHSS) radio operating in the 2400-2483.5 MHz ISM band. Tests were performed with the integral antenna. An internal test connector was fitted for the conducted measurements. Test firmware resident in the EUT and was used for the test.

### 15.1 15.247(A)(1) FREQUENCY HOPPING SYSTEMS

The EUT 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" (confidentiality requested) in **Appendix J** for more details.

### 15.2 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 (965 / 955 / 860 kHz) at the low/midband/high frequencies of 2.402 / 2.44 / 2.48 GHz. Test Plots are shown in **Appendix C**.

Zero span spectrum analyzer plot labeled "Channel Occupancy" shows worst case transmission time on a given channel:

Occupancy interval:	390ms, <100 % duty
Maximum allowed:	400 msec

Test Data in **Appendix C**.

### 15.3 15.247(B) MAXIMUM PEAK OUTPUT POWER

The three spectrum analyzer plots labeled "Power Out" show the maximum measured power of the hopping channel to be **20.17 dBm** or **104 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 internal MMS test connector, through 1 foot of RG 142 cable, to Spectrum Analyzer set on Max Hold with no additional attenuation.

**Power = 20.17 dBm** (peak reading) +0.3dB cable loss = **+20.47 dBm / 111 mW**

**Limit: +30 dBm / 1 W maximum power**

**Integral Antenna (part of PCB pattern)**

**EIRP = +20.47dBm** (peak power) +peak antenna gain (2dBii) = **+22.47 dBm / 177mW**

**EIRP Limit: +36 dBm / 4 W maximum EIRP**

**ELECTRONIC COMPLIANCE LABORATORIES, INC.**  
**1249 BIRCHWOOD DRIVE, SUNNYVALE, CALIFORNIA 94089**  
**408/747-1490\_www.eclabs.com\_800/707-LABS**





#### 15.4 15.247(c) OUT OF BAND EMISSIONS

The spectrum analyzer plots titled "Out of Band - Band Edges" show 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  $\geq 100$  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  $\geq 100$  kHz bandwidth outside of the 2400 - 2483.5 MHz band are more than 20 dB below the highest level of the desired power Test Plots are shown in *Appendix C*.

#### 15.5 15.203 ANTENNA REQUIREMENT

The antenna is an integral part of the EUT. It is part of the printed circuit pattern on the circuit board inside the plastic case of the EUT.

#### 15.6 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 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.

#### 15.7 15.207 AC LINE CONDUCTED EMISSIONS

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



## 15.8 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 are in **Appendix A**.

**ELECTRONIC COMPLIANCE LABORATORIES, INC.**

A handwritten signature in blue ink, appearing to read 'Chip', is positioned over a light gray silhouette of a globe.

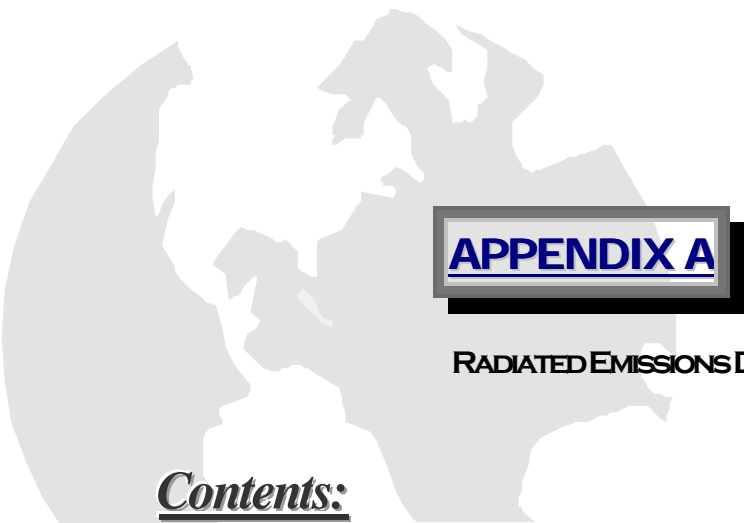
\_\_\_\_\_  
Chip Matheny  
Chief Technical Officer  
Electronic Compliance Laboratories, Inc.

12/30/99

\_\_\_\_\_  
Date:



# proxim *Symphony-HRF™* cordless Network USB... Adapter



## APPENDIX A

### RADIATED EMISSIONS DATA

#### Contents:

<u>Report Information</u>	
Product Name:	Symphony-HRF USB Adapter
Model Number:	4230
Report Number:	9120202B
File Name:	USBappendixA.pdf

#### Contact Info:

<b>PROXIM, Inc.</b>	510 DeGugne Drive	Sunnyvale, California 94086	408/731-2700 408/731-2701fax	Website <a href="http://www.proxim.com">www.proxim.com</a>
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.**  
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 408/747-1490 – [WWW.ECLABS.COM](http://WWW.ECLABS.COM)

**RADIATED EMISSIONS**      FCC PART 15 DIGITAL DEVICES  
**AGENCY/LIMITS:**        FCC CLASS B  
**FREQUENCY RANGE:**    30MHZ-1000MHZ

**EUT/CLIENT INFORMATION**

**Client Name:** Proxim, Inc.  
**E.U.T Name:** Symphony-HRF(4230) Cordless USB Adapter  
**Serial Number:** 0020A638FE8D  
**FCC ID:** IMK-HRFUSB

**TEST INFORMATION**

**Support Device(s):** Lap-Top      **Operator:** Jook  
**Serial Number(s):** 1V99CLR92YF      **Date:** 10:38:46  
**Exercise Program:** Internal      **Start Time:** 10:38:00  
**Modifications:** N/A      **Report File Name:** 9111201  
**Site:** 10 Meter Open Site  
**Site Cal Date:** March 1999

**ANTENNA:** Bi-con

**NOTES:** CHANGED TO LOG PERIODIC AFTER 200 MHZ

TEST FREQ	TEST dBuV	ACTUAL dBuV /M	CLASS B LIMIT	VERSUS B LIMIT	TABLE DEGREES	ANTENNA HEIGHT	POLARIZATION	DETECTOR TYPE*
64.000	32.7	15.8	40.0	-24.2	0	1.5	V	PK
126.750	37.8	27.5	43.5	-16.0	0	1.5	V	PK
192.950	32.3	23.9	43.5	-19.6	90	1.5	V	PK
224.000	29.7	22.0	46.0	-24.0	180	1.5	V	PK
256.000	30.1	22.7	46.0	-23.3	0	1.5	V	PK
288.000	27.9	23.8	46.0	-22.2	180	1.5	V	PK
144.000	33.7	24.1	43.5	-19.4	0	1.5	V	PK
192.000	32.3	23.9	43.5	-19.6	0	1.5	V	PK
240.000	34.6	27.1	46.0	-18.9	0	1.5	V	PK
288.000	28.2	24.0	46.0	-22.0	0	1.5	H	PK
32.000	24.6	17.5	40.0	-22.5	0	1.5	H	PK
48.000	27.0	13.9	40.0	-26.1	0	1.5	H	PK
320.000	31.4	22.3	46.0	-23.7	180	1.5	V	PK
368.000	52.9	44.6	46.0	-1.4	0	1.5	V	PK
336.000	35.5	26.5	46.0	-19.5	90	1.5	V	PK
432.000	33.9	26.8	46.0	-19.2	0	1.5	V	PK
480.000	38.7	33.0	46.0	-13.0	90	1.5	V	PK
528.000	32.9	28.1	46.0	-17.9	0	1.5	V	PK
576.000	33.5	29.5	46.0	-16.5	0	1.5	V	PK
624.000	30.5	27.2	46.0	-18.8	180	1.5	V	PK

**NOTES:**  
 \*QP= QUASI PEAK

P= PEAK



# proxim *Symphony-HRF™* cordless Network USB... Adapter



## CONDUCTED EMISSIONS DATA

### Contents:

<u>Report Information</u>	
Product Name:	Symphony-HRF USB Adapter
Model Number:	4230
Report Number:	9120202B
File Name:	USBappendixB.pdf

### Contact Info:

<b>PROXIM, Inc.</b>	<b>510</b>	<b>Sunnyvale,</b>	<b>408/731-2700</b>	<b>Website</b>
	<b>DeGuinge Drive</b>	<b>California 94086</b>	<b>408/731-2701fax</b>	<b><a href="http://www.proxim.com">www.proxim.com</a></b>
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**



**Conducted Emissions/15.209** 450kHz – 30 MHz Range

**ELECTRONIC COMPLIANCE LABORATORIES, INC.**  
**1249 BIRCHWOOD DRIVE, SUNNYVALE, CALIFORNIA 94089**  
**408/747-1490 - [WWW.ECLABS.COM](http://WWW.ECLABS.COM) - 800/707-1490**

**Conducted Emissions** FCC PART 15.207  
 Agency/Limits: FCC CLASS B  
 Frequency Range: 450KHZ-30MHZ

**EUT/CLIENT INFORMATION**

**Client Name:** Proxim, Inc.  
**E.U.T Name:** Symphony-HRF(4230) Cordless USB Adapter  
**Serial Number:** 0020A638FE8D  
**FCC ID:** IMK-HRFUSB  
**Notes:** N/A

**TEST INFORMATION**

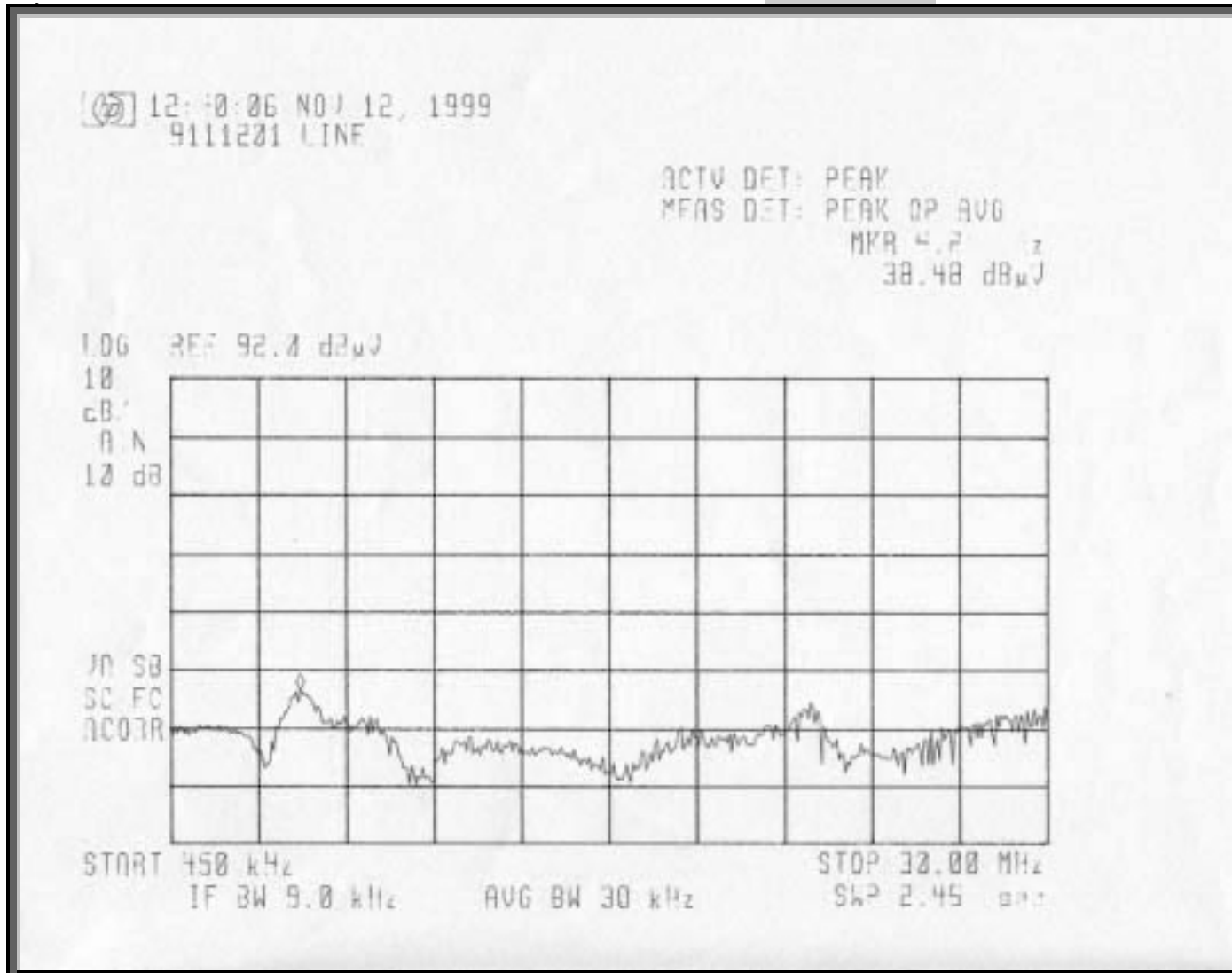
Support Device(s): Lap-Top Operator: Jook  
 Date: 11/12/99  
 Serial Number(s): 1V99CLR92YF Start Time: 12:07  
 Report File Name: 9111201  
 Site: Screen Room  
 Exercise Program: Internal Site Cal Date: **March 1999**  
 Modifications: N/A

**NOTES:**

TEST FREQ	TEST dBuV	CLASS B LIMIT	VERSUS B LIMIT	CONDUCTOR	DETECTOR TYPE*
4810.00	38.48	47.96	-9.48	Line	PK
10570.00	30.27	47.96	-17.69	Line	PK
22020.00	36.34	47.96	-11.62	Line	PK
29560.00	35.25	47.96	-12.71	Line	PK
26450.00	31.94	47.96	-16.02	Line	PK
17590.00	31.74	47.96	-16.22	Line	PK
4730.00	34.56	47.96	-13.40	Neutral	PK
11460.00	24.58	47.96	-23.38	Neutral	PK
18250.00	30.24	47.96	-17.72	Neutral	PK
21580.00	34.64	47.96	-13.32	Neutral	PK
26600.00	34.11	47.96	-13.85	Neutral	PK
29700.00	37.10	47.96	-10.86	Neutral	PK

\*QP= QUASI-

PEAK P= PEAK



**LINE CONDUCTED PLOT**

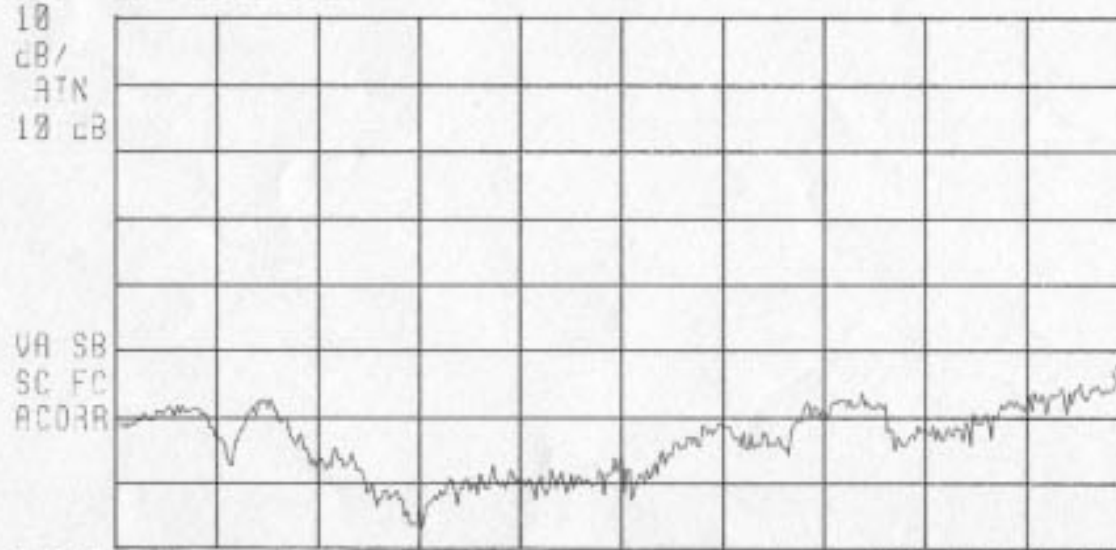
**ELECTRONIC COMPLIANCE LABORATORIES, INC.**  
1249 Birchwood Drive, Sunnyvale, California 94089  
408/747-1490 [www.eclabs.com](http://www.eclabs.com) 800/707-LABS



12:49:50 NOV 12, 1999  
9111201 NEUTRAL

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 29.70 MHz  
37.10 dBμV

LOG REF 92.0 dBμV



START 450 kHz IF BW 9.0 kHz AVG BW 30 kHz STOP 30.00 MHz  
SWP 2.46 sec

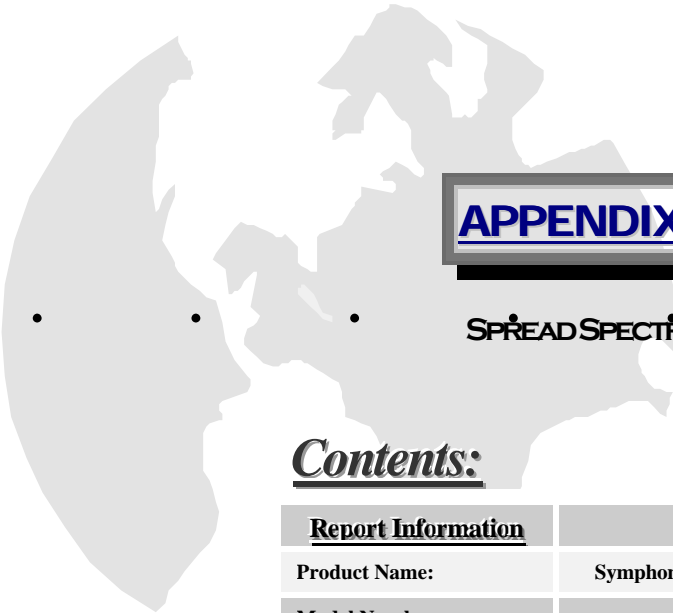
**NEUTRAL CONDUCTED PLOT**

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





# proxim *Symphony-HRF™* cordless Network USB... Adapter



## APPENDIX C

### SPREAD SPECTRUM PLOTS

#### Contents:

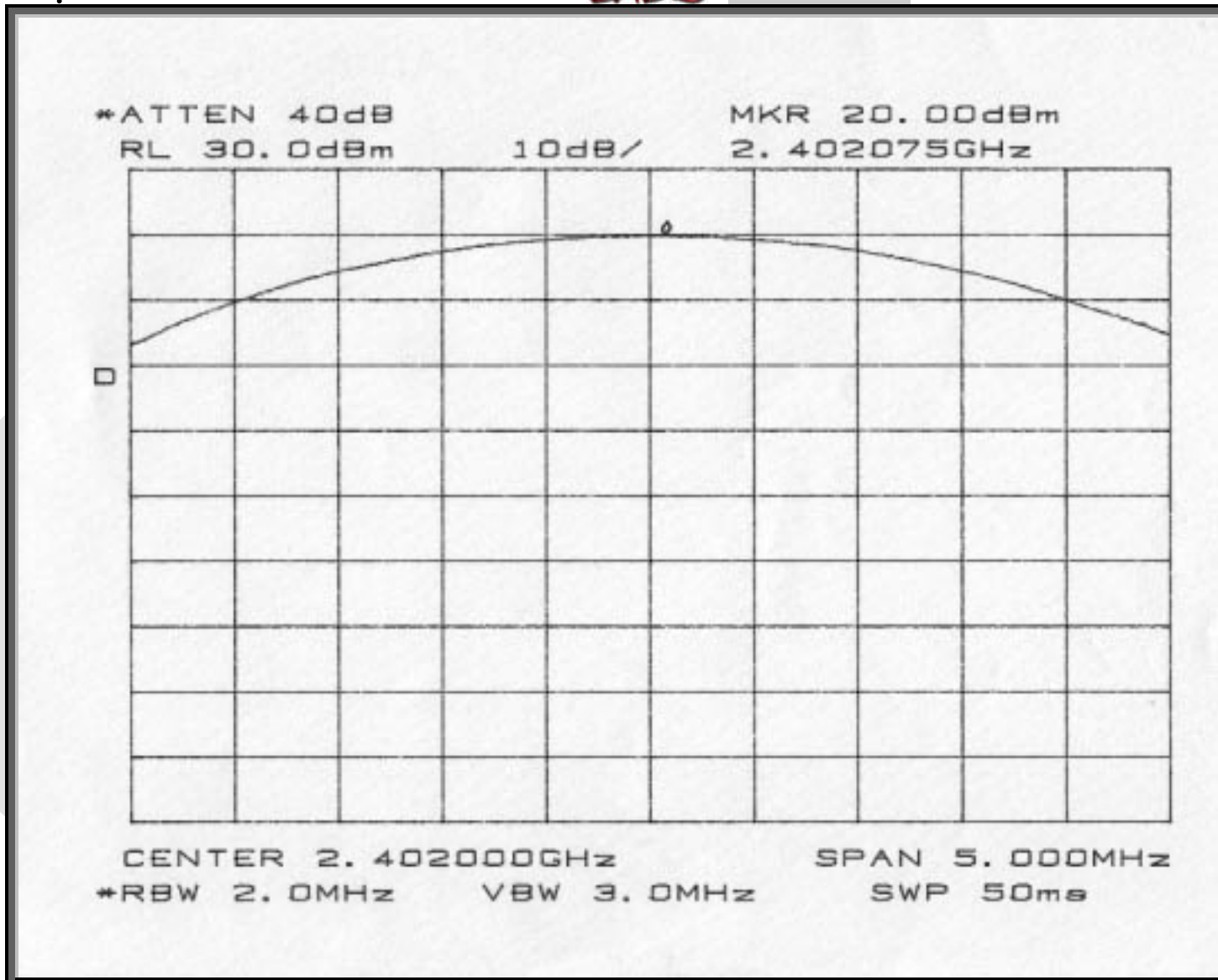
<u>Report Information</u>	
Product Name:	Symphony-HRF USB Adapter
Model Number:	4230
Report Number:	9120202B
File Name:	USBappendixC.pdf

#### Contact Info:

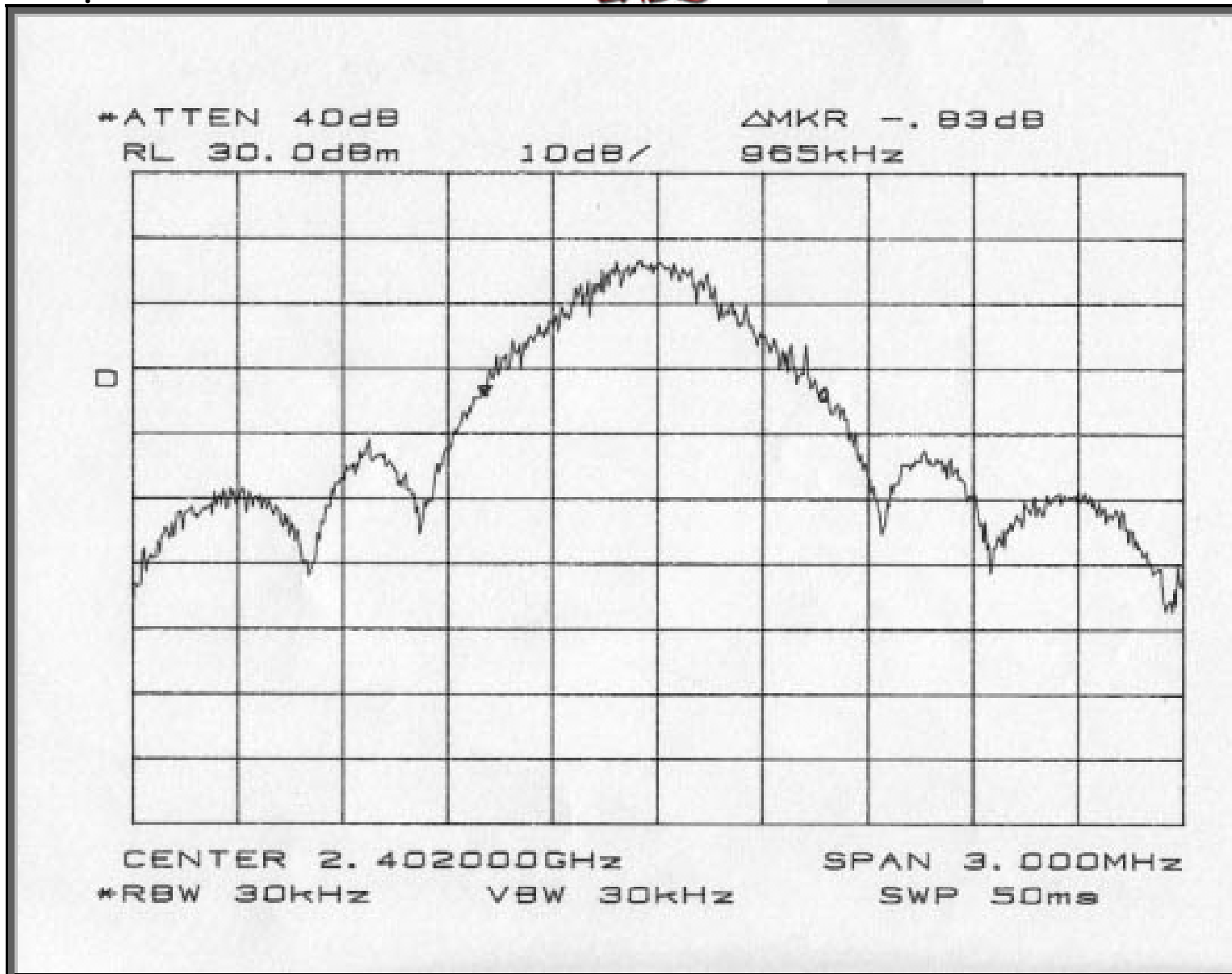
<b>PROXIM, Inc.</b>	510 DeGuigne Drive	Sunnyvale, California 94086	408/731-2700 408/731-2701fax	Website <a href="http://www.proxim.com">www.proxim.com</a>
Proxim's Contact:	Altan Yazar	Design Engineer	408/731-2746	<a href="mailto:altan@proxim.com">altan@proxim.com</a>
EC Labs Contact:	Chip Matheny	Chief Technical Officer	408/747-1490	<a href="mailto:chip@eclabs.com">chip@eclabs.com</a>

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

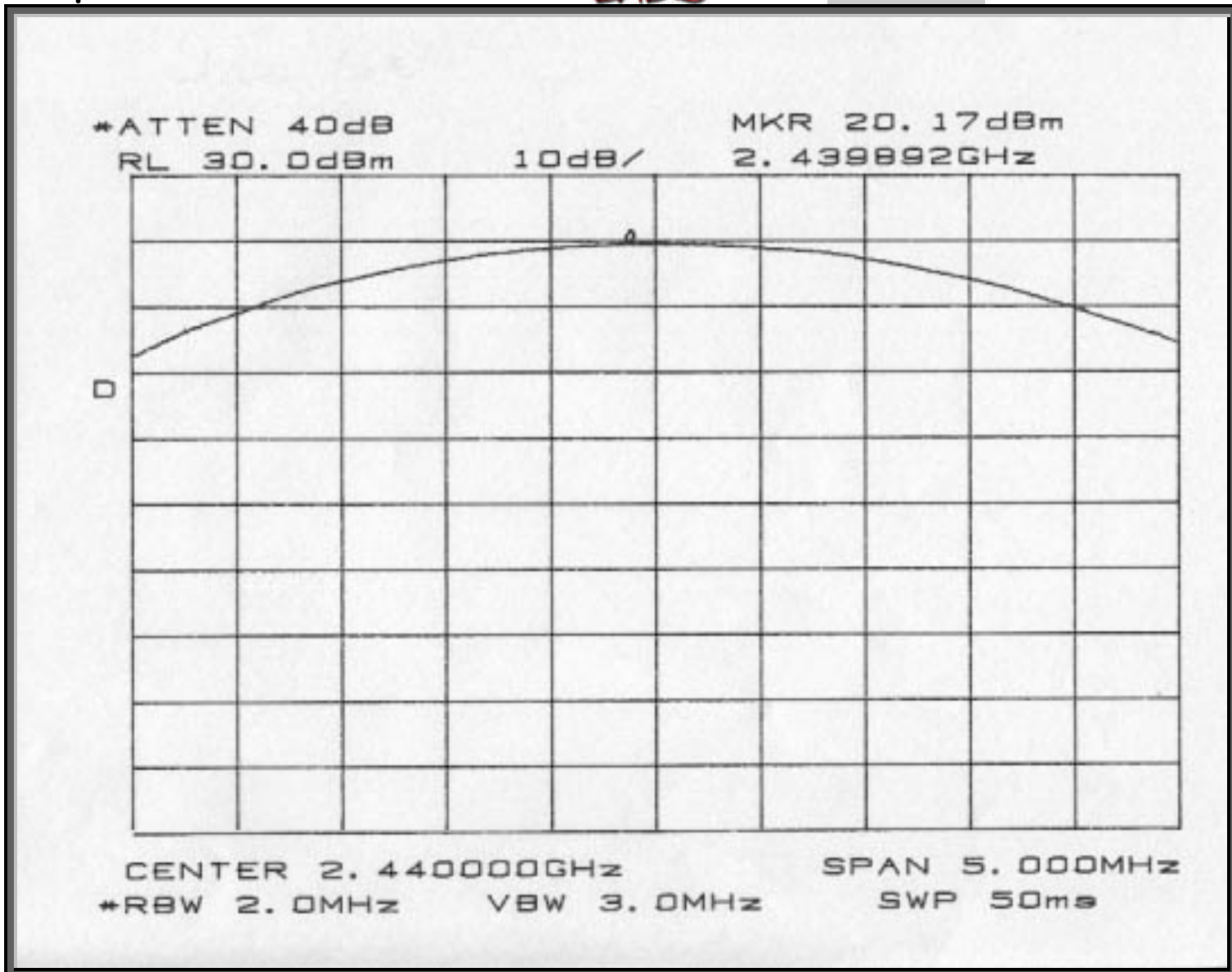
**ELECTRONIC COMPLIANCE LABORATORIES, INC.**  
1249 BIRCHWOOD DRIVE, SUNNYVALE, CALIFORNIA 94089  
408/747-1490 [www.eclabs.com](http://www.eclabs.com) 800/707-LABS



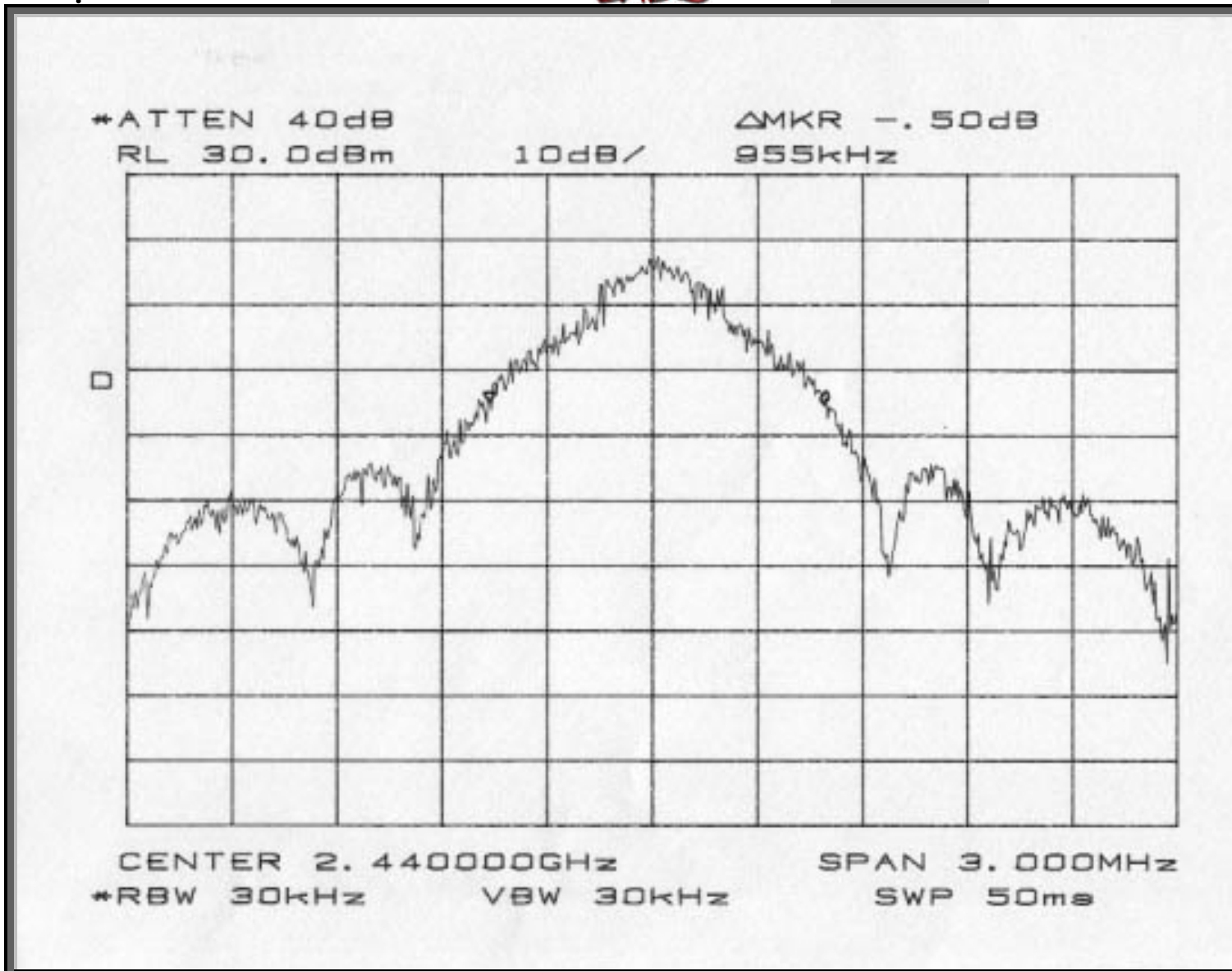
Power Out Channel 1



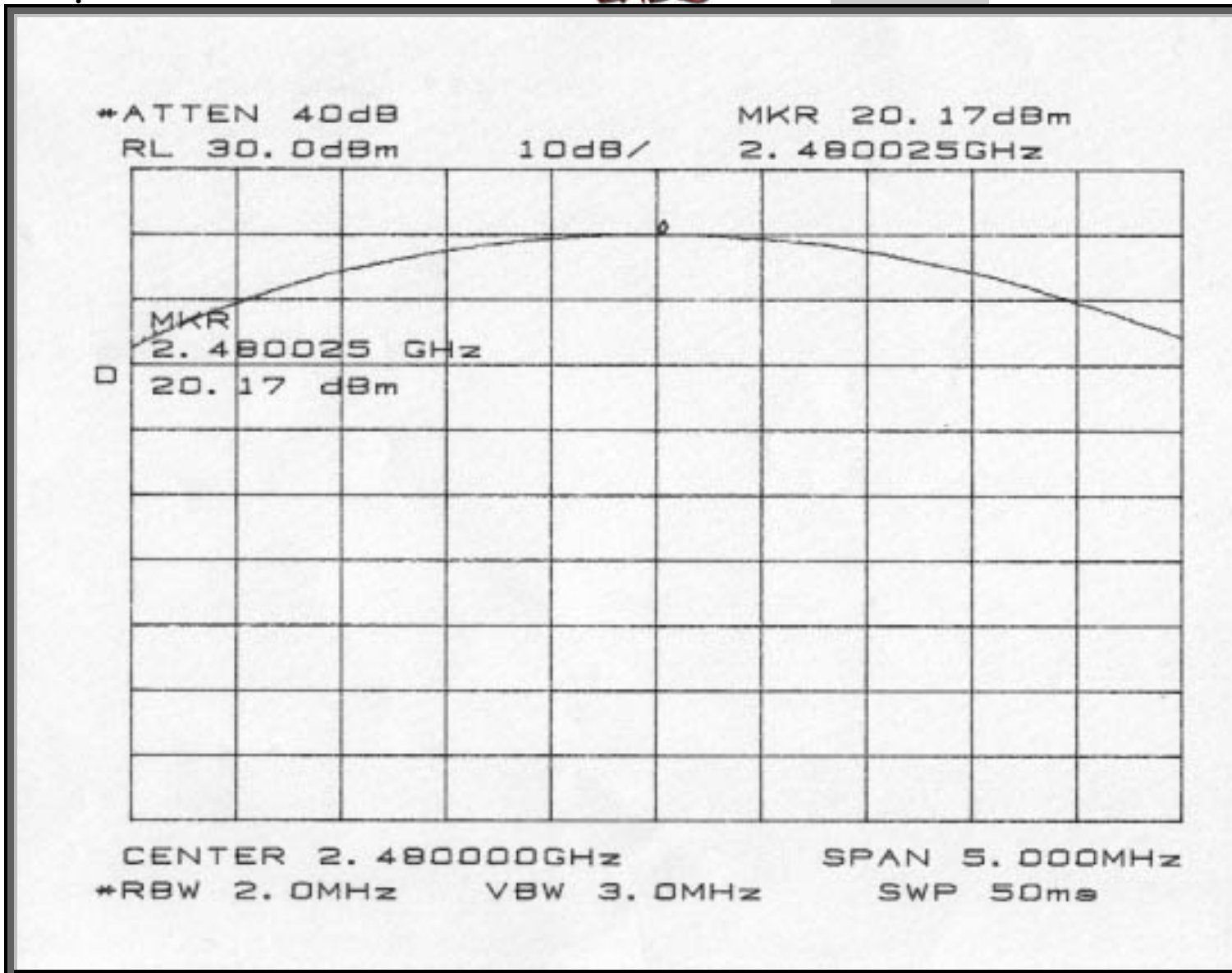
20dB Band Width Channel 1



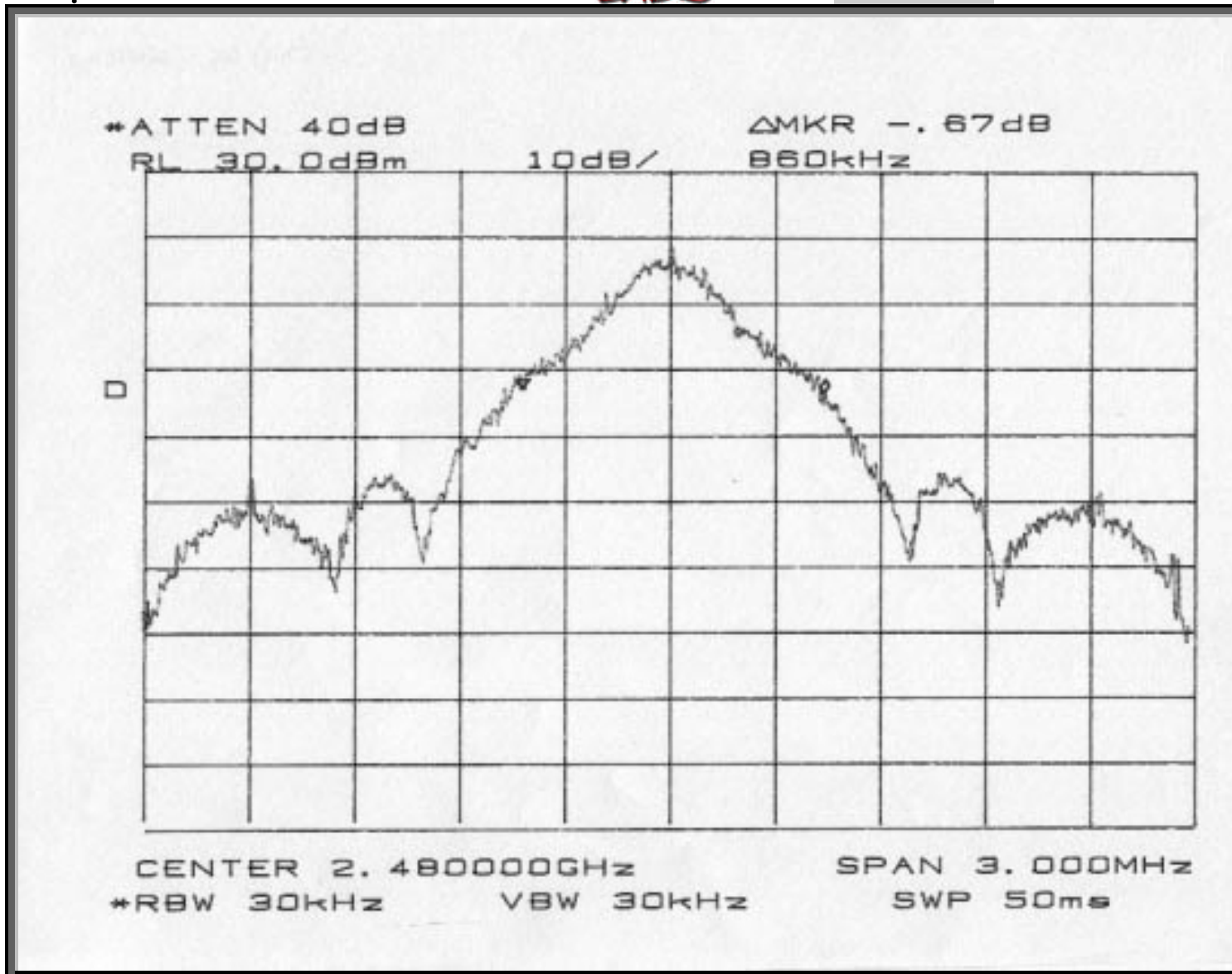
Power Out Channel 39



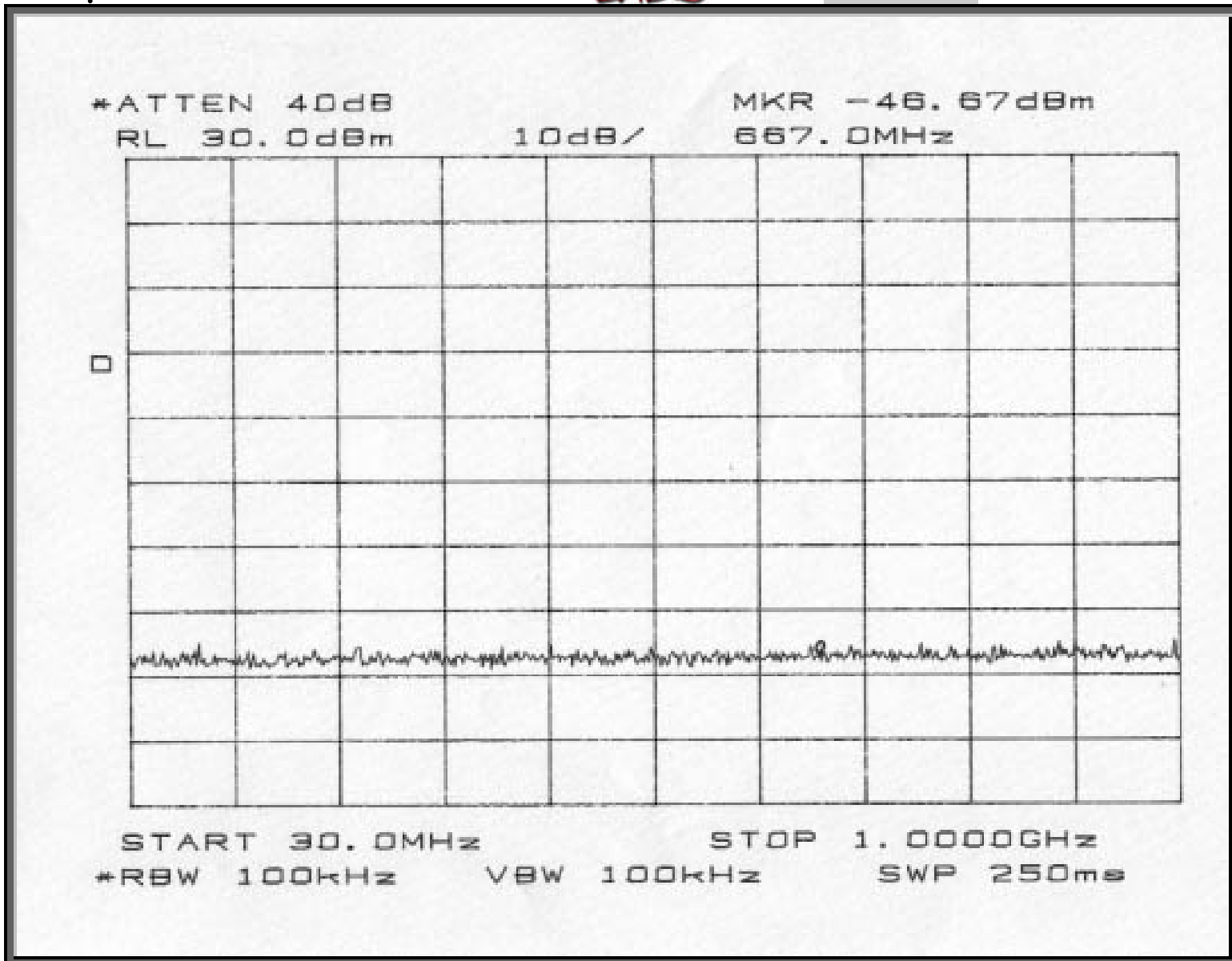
20 dB Bandwidth Channel 39



Power Out Channel 79

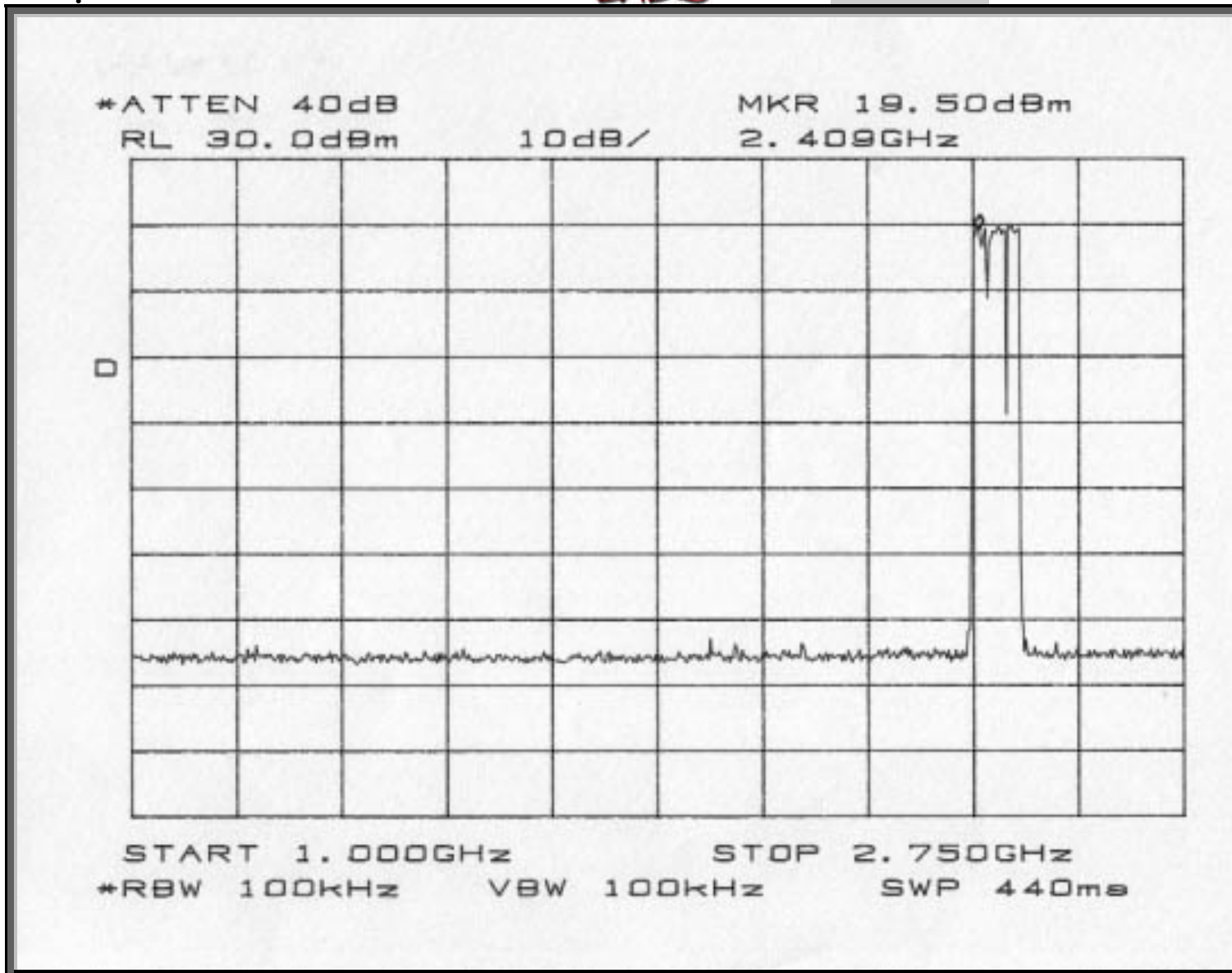


20dB Band Width Channel 79

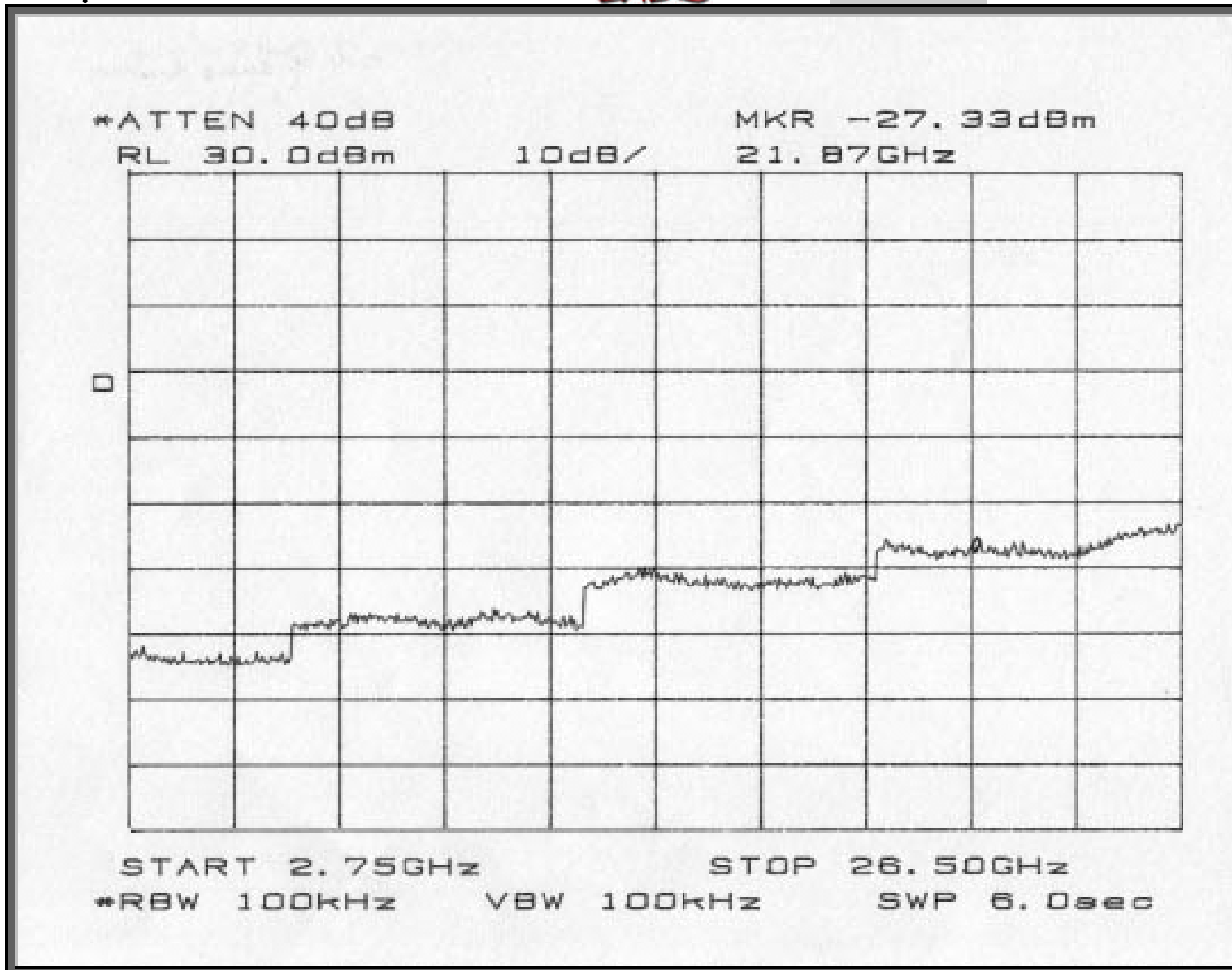


Out of Band (1)

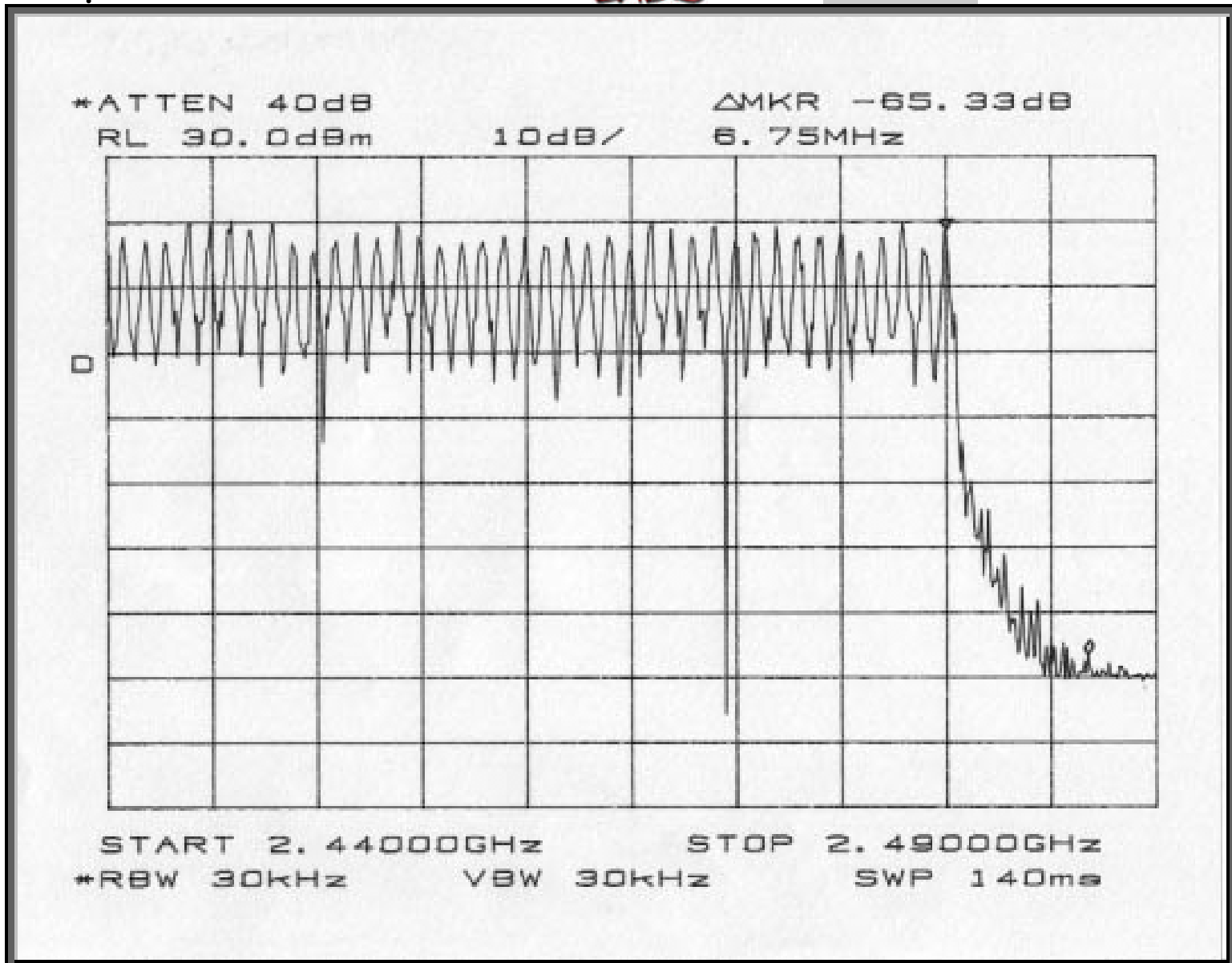




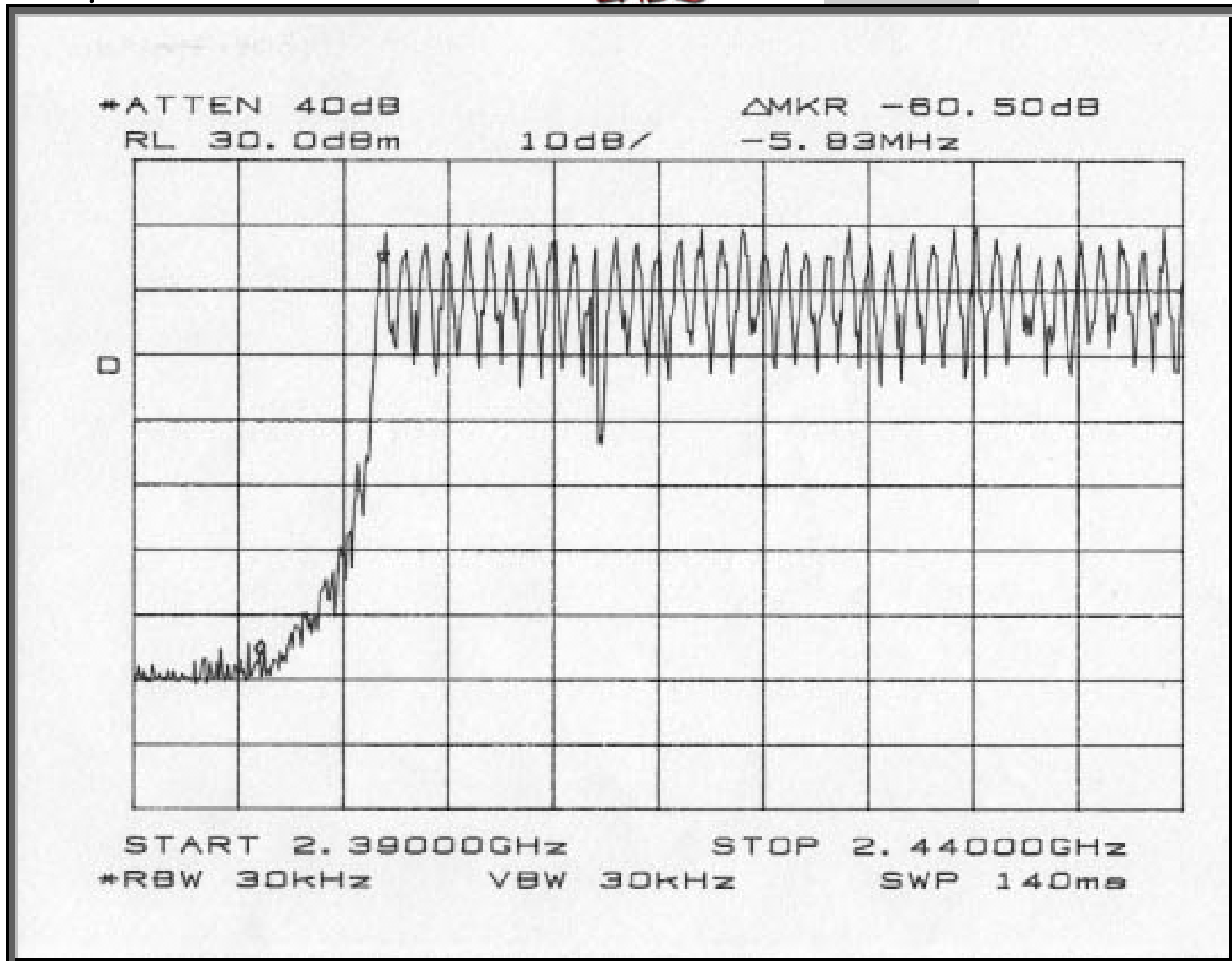
Out of Band (2)



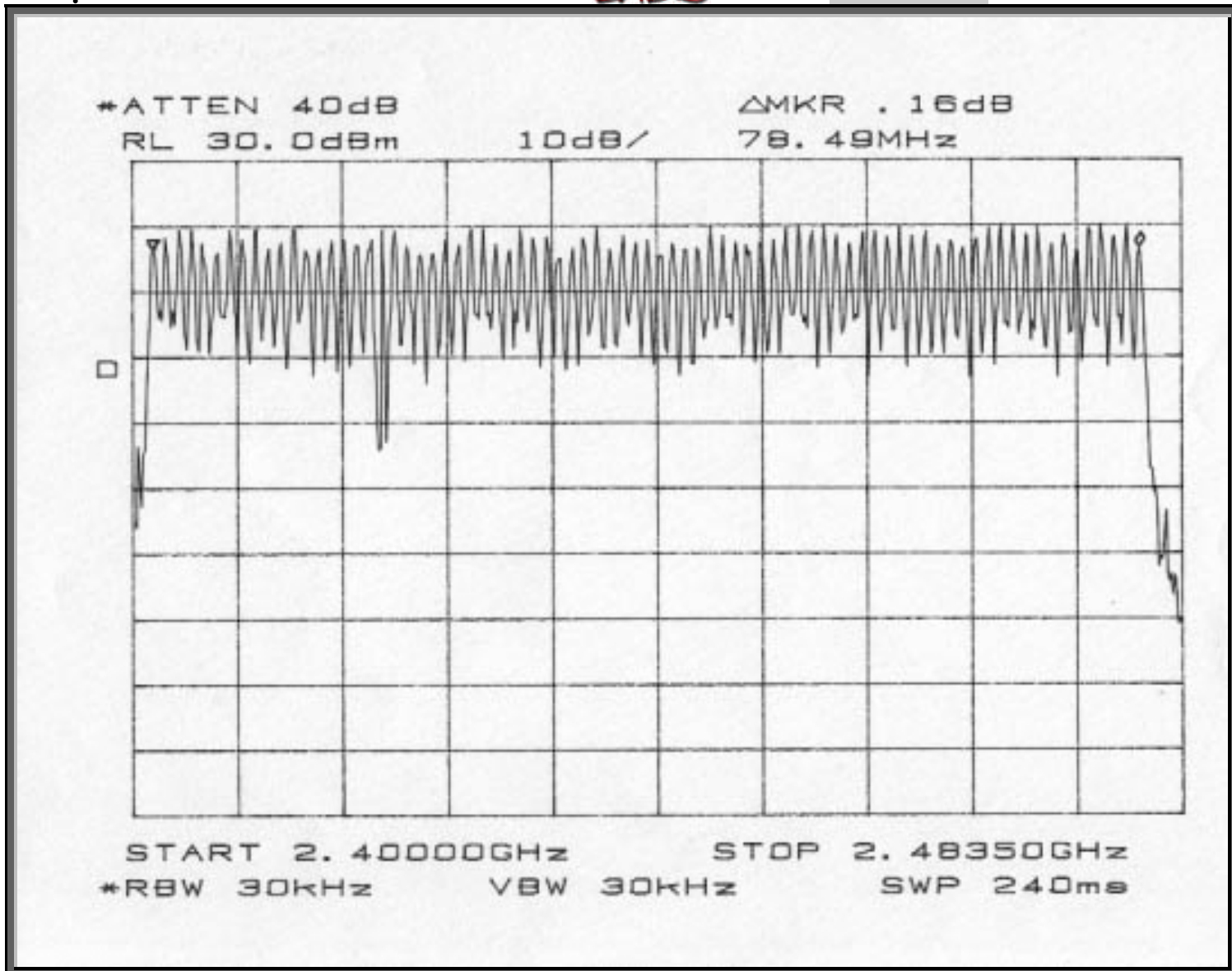
Out of Band (3)



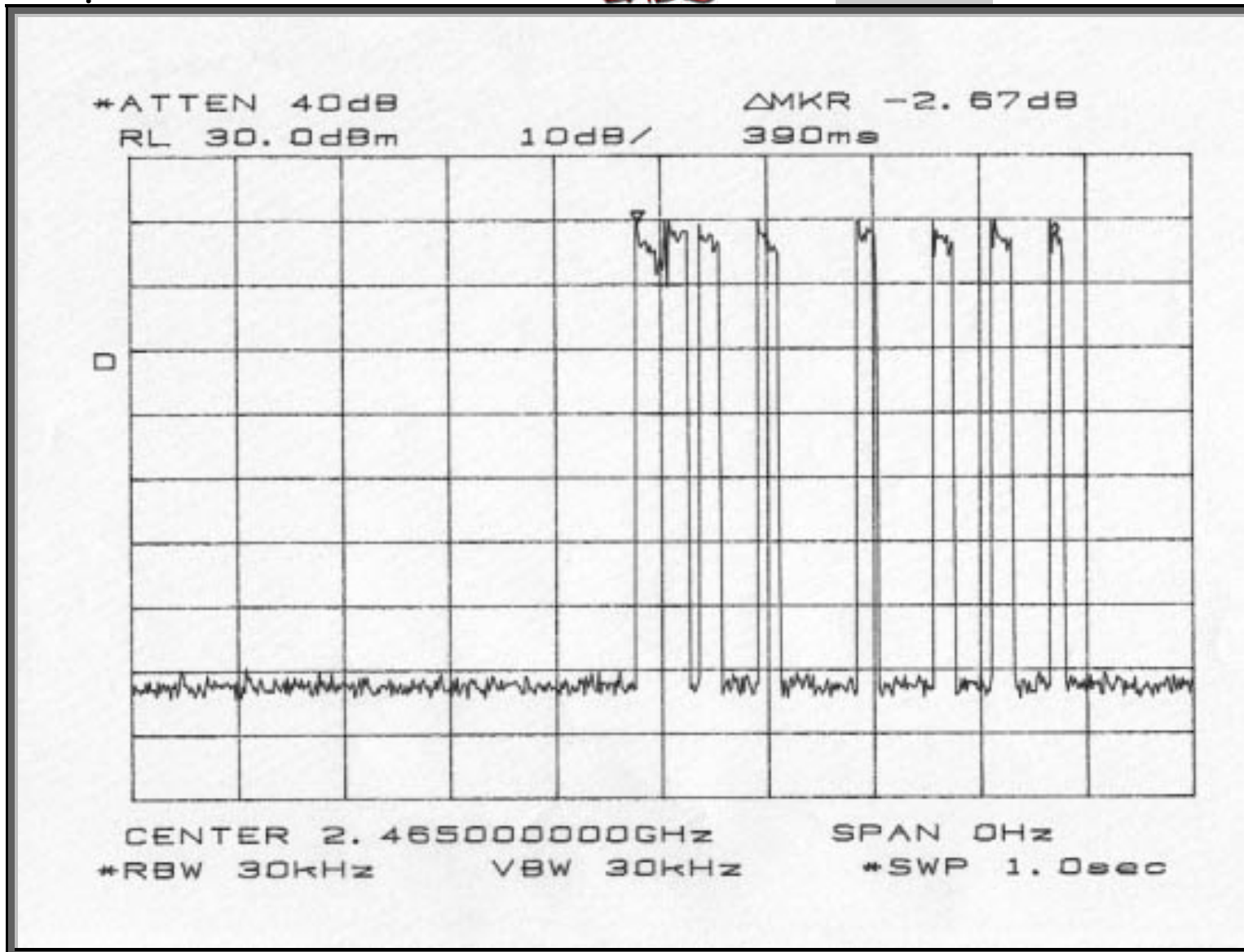
Upper Band Edge



Lower Band Edge



Channel Utilization

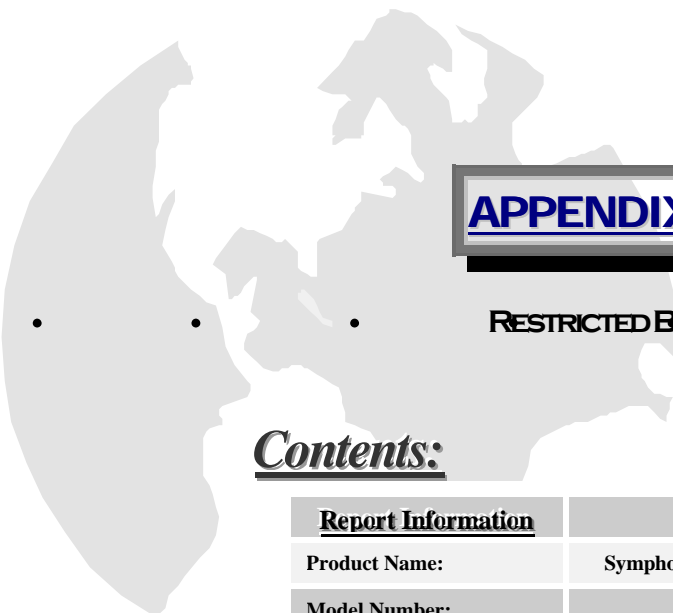


Channel Occupancy



# proxim *Symphony-HRF™* cordless

## Network USB... Adapter



### APPENDIX D

#### RESTRICTED BAND DATA

#### Contents:

<u>Report Information</u>	
Product Name:	Symphony-HRF USB Adapter
Model Number:	4230
Report Number:	9120202B
File Name:	USBappendixD.pdf

#### Contact Info:

<b>PROXIM, Inc.</b>	<b>510 DeGuigne Drive</b>	<b>Sunnyvale, California 94086</b>	<b>408/731-2700 408/731-2701fax</b>	<b>Website www.proxim.com</b>
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

FCC ID: IMK-HRFUSB  
REPORT: 9120202B



1249 BIRCHWOOD DRIVE  
SUNNYVALE, CA 94089  
408/747-1490  
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**ELECTRONIC COMPLIANCE LABORATORIES, INC.**  
1249 BIRCHWOOD DRIVE, SUNNYVALE, CALIFORNIA 94089  
408/747-1490 – [WWW.ECLABS.COM](http://WWW.ECLABS.COM)

**RADIATED EMISSIONS** RESTRICTED BAND MEASUREMENTS  
**AGENCY/LIMITS:** FCC PART 15.205  
**FREQUENCY RANGE:** 1000MHZ-24GHZ

**EUT/CLIENT INFORMATION**

**CLIENT NAME:** PROXIM, INC.  
**E.U.T NAME:** SYMPHONY-HRF (APRW1USB) CORDLESS USB ADAPTER  
**SERIAL NUMBER:** A30589437  
**FCC ID:** IMK-HRFUSB  
**NOTES:** N/A

**TEST INFORMATION**

**SUPPORT DEVICE(S):** LAP-TOP  
**OPERATOR:** JOOK  
**DATE:** 11/12/99  
**SERIAL NUMBER(S):** 1V99CLR92YF  
**START TIME:** N/A  
**REPORT FILE NAME:** 9111201  
**EXERCISE PROGRAM:** INTERNAL  
**SITE:** 10 METER OATS  
**MODIFICATIONS:** N/A  
**SITE CAL DATE:** MARCH 1999  
**NOTES:** BOTH POLARIZATIONS WERE TESTED THE FOLLOWING DATA WAS RECORDED IN THE VERTICAL POSITION (WORST CASE)

FREQ MHZ	READING dBuV	PK. or AVG.	A.F dB	CABLE dB	FILTER dB	AMP dB	TOTAL dBuV/m	LIMIT dBuV/m	DELTA dB
----------	--------------	-------------	--------	----------	-----------	--------	--------------	--------------	----------

Fund = 2402.0

4804	53.2	Pk	34.2	11.8	35.0	10.0	54.1	74.0	-19.9
4804	39.2	Avg	34.2	11.8	35.0	10.0	40.1	54.0	-13.9
7206	51.0	Pk	36.8	16.9	35.0	10.0	59.7	74.0	-14.3
7206	38.2	Avg	36.8	16.9	35.0	10.0	46.9	54.0	-7.1
9608	38.3	Pk	38.0	20.0	35.0	10.0	51.3	74.0	-22.7
9608	26.5	Avg	38.0	20.0	35.0	10.0	39.5	54.0	-14.5
12010	31.3	Pk	42.6	25.7	35.0	10.0	54.6	74.0	-19.4
12010	21.7	Avg	42.6	25.7	35.0	10.0	44.9	54.0	-9.1
14412	38.5	Pk	40.9	29.6	35.0	10.0	64.0	74.0	-10.0
14412	23.2	Avg	40.9	29.6	35.0	10.0	48.7	54.0	-5.3

Fund = 2440.0

4880	49.5	Pk	34.2	12.0	35.0	10.0	50.7	74.0	-23.3
4880	41.7	Avg	34.2	12.0	35.0	10.0	42.9	54.0	-11.1
7320	49.5	Pk	36.8	17.3	35.0	10.0	58.6	74.0	-15.4
7320	37.2	Avg	36.8	17.3	35.0	10.0	46.2	54.0	-7.8

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FREQ MHZ	READING dBuV	PK. or AVG.	A.F dB	CABLE dB	FILTER dB	AMP dB	TOTAL dBuV/m	LIMIT dBuV/m	DELTA dB
9760	37.7	Pk	38.0	20.3	35.0	10.0	50.9	74.0	-23.1
9760	21.0	Avg	38.0	20.3	35.0	10.0	34.3	54.0	-19.8
12200	26.0	Pk	42.6	26.2	35.0	10.0	49.8	74.0	-24.2
12200	16.7	Avg	42.6	26.2	35.0	10.0	40.5	54.0	-13.5
14640	33.5	Pk	41.3	29.7	35.0	10.0	59.5	74.0	-14.5
14640	22.8	Avg	41.3	29.7	35.0	10.0	48.8	54.0	-5.2

Fund = 2480.0

4960	51.5	Pk	34.2	11.8	35.0	10.0	52.5	74.0	-21.5
4960	39.2	Avg	34.2	11.8	35.0	10.0	40.2	54.0	-13.8
7440	41.7	Pk	36.8	17.2	35.0	10.0	50.7	74.0	-23.3
7440	28.3	Avg	36.8	17.2	35.0	10.0	37.3	54.0	-16.7
9920	39.5	Pk	38.0	20.4	35.0	10.0	52.9	74.0	-21.1
9920	26.2	Avg	38.0	20.4	35.0	10.0	29.6	54.0	-14.4
12400	38.5	Pk	42.6	26.8	35.0	10.0	62.9	74.0	-11.1
12400	25.8	Avg	42.6	26.8	35.0	10.0	50.2	54.0	-3.8
14880	30.8	Pk	41.3	30.9	35.0	10.0	58.0	74.0	-16.0
14880	21.3	Avg	41.3	30.9	35.0	10.0	48.5	54.0	-5.5



# proxim *Symphony-HRF™* cordless Network USB... Adapter

## APPENDIX E

### TEST SET UP CONFIGURATIONS

### Contents:

<u>Report Information</u>	
Product Name:	Symphony-HRF USB Adapter
Model Number:	4230
Report Number:	9120202B
File Name:	USBappendixE.pdf

### Contact Info:

<b>PROXIM, Inc.</b>	510 DeGuigne Drive	Sunnyvale, California 94086	408/731-2700 408/731-2701fax	Website <a href="http://www.proxim.com">www.proxim.com</a>
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



# proxim *Symphony-HRF™* cordless Network USB... Adapter



**FCC PART 15.209  
RADIATED EMISSIONS**



**FCC PART 15.207  
CONDUCTED EMISSIONS**



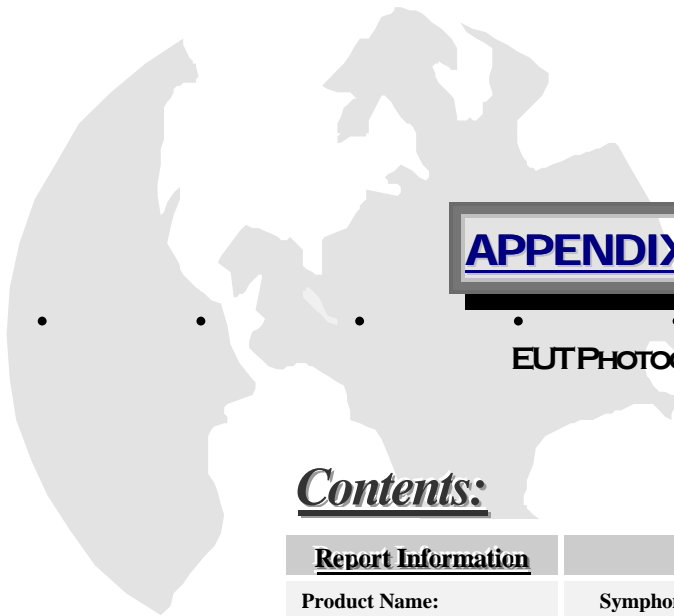
**RESTRICTED BAND MEASUREMENTS**



**FCC PART 15.247  
CONDUCTED RF AT ANTENNA TERMINALS**



# proxim *Symphony-HRF™* cordless Network USB... Adapter



## APPENDIX F

### EUT PHOTOGRAPHS

### Contents:

<u>Report Information</u>	
Product Name:	Symphony-HRF USB Adapter
Model Number:	4230
Report Number:	9120202B
File Name:	USBappendixF.pdf

### Contact Info:

<b>PROXIM, Inc.</b>	510 DeGuigne Drive	Sunnyvale, California 94086	408/731-2700 408/731-2701fax	Website <a href="http://www.proxim.com">www.proxim.com</a>
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

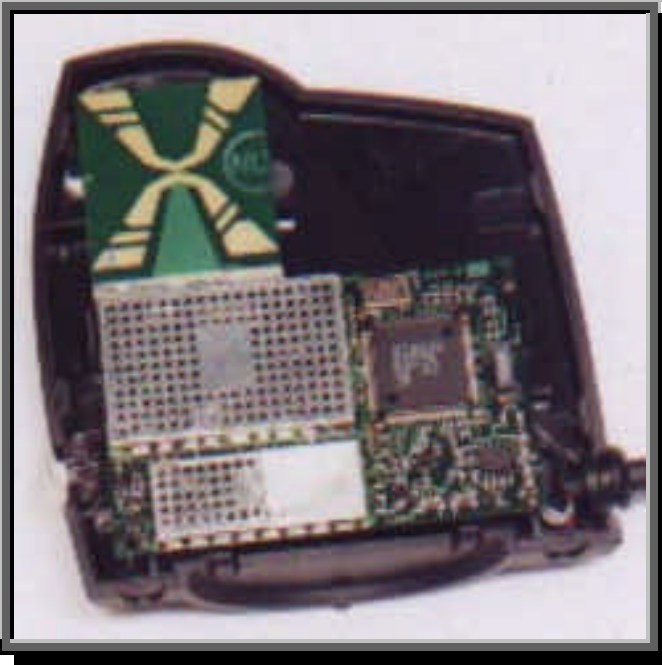
### FREQUENCY HOPPING SPREAD SPECTRUM (FHSS) RF INTENTIONAL RADIATOR FCC PART 15.247 SUBPART C, CLASS B CERTIFICATION



*USB* COVER AND CABLES

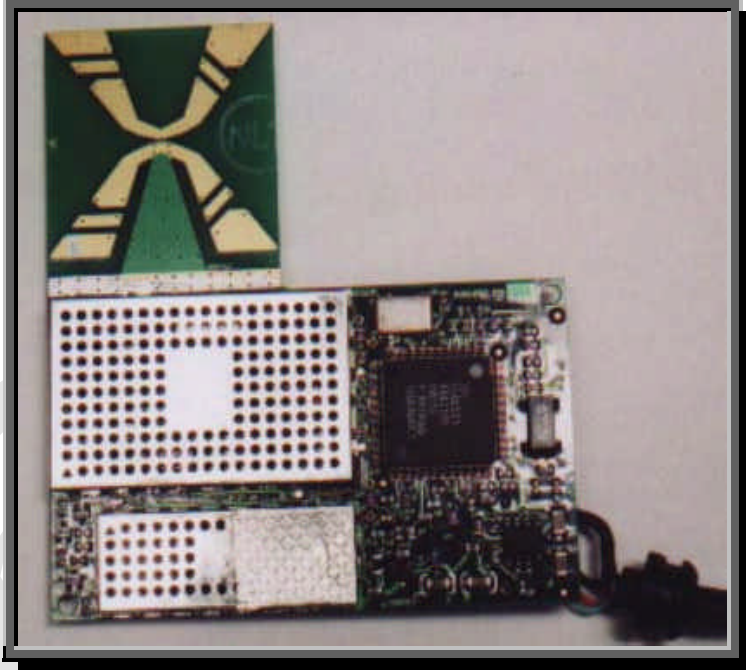


*USB* Side View with Light Indicator

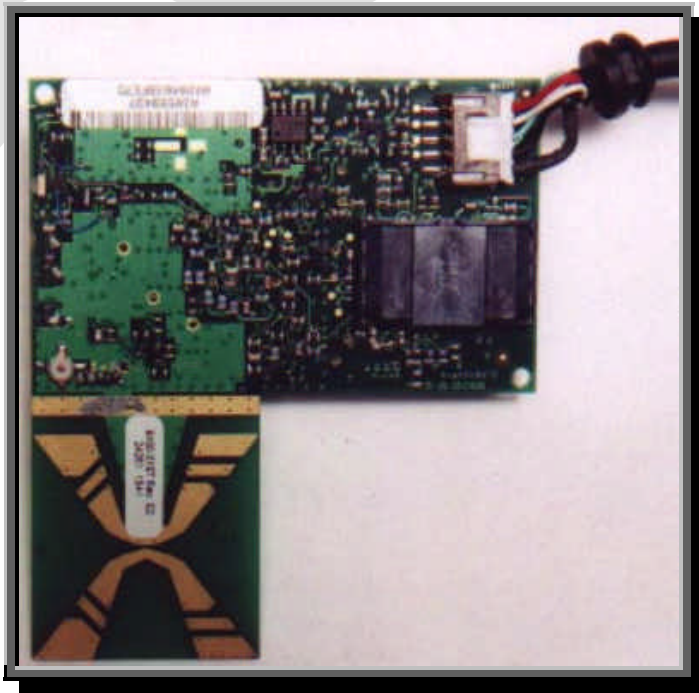


*USB* PC Board Installed

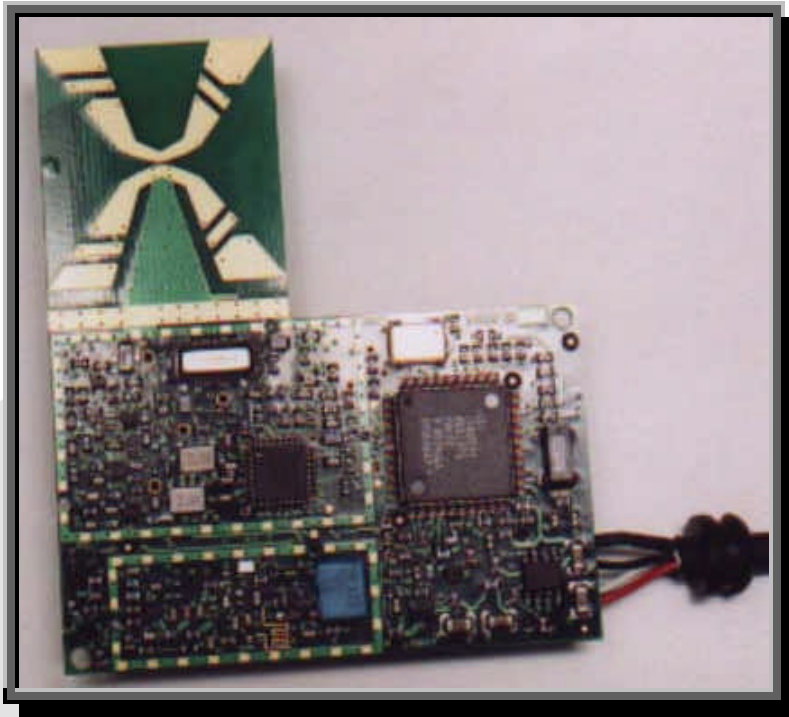




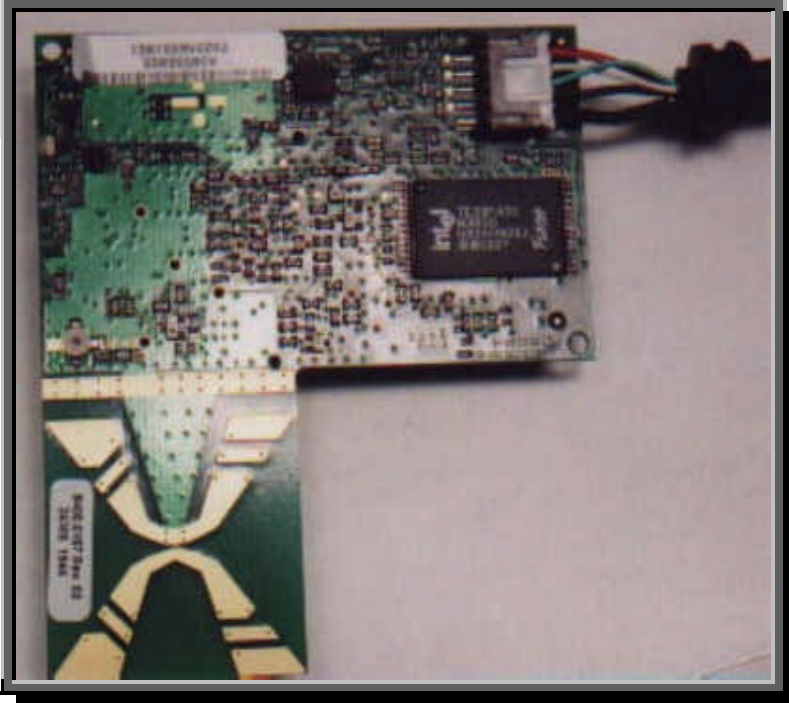
*USB* Module Close up (FRONT)



*USB* Module Close-up (BACK)



*USB* Module Front Without Shield (FRONT)



Module Backside Without Shield (BACK)



# proxim *Symphony-HRF™* cordless Network USB... Adapter

## APPENDIX G

### LABELING REQUIREMENTS

#### Contents:

<u>Report Information</u>	
Product Name:	Symphony-HRF USB Adapter
Model Number:	4230
Report Number:	9120202B
File Name:	USBappendixG.pdf

#### Contact Info:

<b>PROXIM, Inc.</b>	<b>510</b>	<b>Sunnyvale,</b>	<b>408/731-2700</b>	<b>Website</b>
	<b>DeGuigne Drive</b>	<b>California 94086</b>	<b>408/731-2701fax</b>	<b><a href="http://www.proxim.com">www.proxim.com</a></b>
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](http://www.eclabs.com) 800/707-LABS



## **LABELING REQUIREMENTS**

LABEL REQUIREMENTS, Class B Certified Digital Device

A CLASS B Digital Device subject to Certification by the FCC shall bear the following statement in conspicuous location on the device.

(Name of Grantee)

FCC ID:

The device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

The label is to be located in a "conspicuous location". This is any location readily visible to the user of the device without the use of tools.

The label is to be permanently attached to the equipment in such a manner that the label can normally be expected to remain fastened and legible during the equipment's expected useful life.

Where the device is constructed in two or more sections connected by wires and marketed together, the statement specified in this section is required to be affixed only to the main control unit.

When the device is so small or for such use that it is not practicable to place the statement specified above on it, this required information shall be placed in a prominent location in the instruction manual or pamphlet supplied to the user or, alternatively, shall be placed on the container in which the device is marketed. However, the FCC identifier must be displayed on the device.

## **USER INFORMATION**

For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statements, placed in a prominent location in the user's operation manual.

NOTE: This equipment has been tested and found to comply with the limits for Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection

**ELECTRONIC COMPLIANCE LABORATORIES, INC.**  
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against harmful interference when the equipment is operated 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 and 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:

- ◆ •Re-orient or relocate the receiving antenna.
- ◆ •Increase the separation between the equipment and 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.
- ◆ •For systems incorporating several digital devices, the statement shown above, needs to be contained only in the instruction manual for the main control unit.
- ◆ •Where special accessories, such as shielded cables, are required in order to meet FCC emission limits, appropriate instructions regarding the need to use such accessories must be contained in the operator's manual.
- ◆ •The operators manual must caution the user that changes or modifications not expressly approved by the manufacturer could void their right to operate the equipment.

The above radio interference statement is to be bound in the same manner as the operators manual. A loose-leaf insert page in a bound manual would not meet this requirement.



THIS DRAWING CONTAINS PROPRIETARY INFORMATION OF PROXIM AND MAY NOT, IN WHOLE OR IN PART, BE REPLICATED, DISCLOSED OR USED FOR MANUFACTURE OF ANY PART DESCRIBED HEREIN WITHOUT THE PRIOR WRITTEN PERMISSION OF PROXIM AND IS NOT INTENDED FOR USE AS AN EXTERNAL DESIGN SPECIFICATION.

REVISION					
LTR	ECO	DATE		BY	APPD
01	P1726	--	INITIAL RELEASE	WF	

NOTES: UNLESS OTHERWISE SPECIFIED

- MATERIAL: 2 MIL MATTE WHITE COMPUTER IMPRINTABLE POLYESTER WITH PERMANENT ADHESIVE BACK.
- BLACK TEXT ON WHITE BACKGROUND.

<p>NOTES UNLESS SPECIFIED</p> <p>TOLERANCES        .XX +/- .01 ANGULAR        .XXX +/- .005 +/- 1/2°</p> <p>BREAK ALL SHARP EDGES APPROX. .XX</p> <p>MACH. SURFACES        DIMENSIONS APPLY AFTER FINISH.</p>	<p>DRAWN Wm FOSTER 11/8/99</p> <p>DESIGN</p> <p>MATERIAL        SEE NOTES</p> <p>FINISH        SEE NOTES</p> <p>CHECKED AND APPROVED</p>	<p>TITLE LABEL, SYMPHONY-HRF (4230)        CORDLESS USB ADAPTER</p> <p>SIZE B DWG NO. 2460.0902 REV. 01</p> <p>SCALE 2:1 FILE NAME 24600902 SHEET 1 OF 1</p>
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# proxim *Symphony-HRF™* cordless Network USB... Adapter

2.4 GHZ TRANSMITTER

FREQUENCY HOPPING SPREAD SPECTRUM

INTENTIONAL RADIATOR...

RF DEVICE...

## EXHIBIT A

### 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-

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EC LABS, INC.	CHIP MATHENY	408/747-1490	chip@eclabs.com



4777035.pgs



# proxim *Symphony-HRF™* cordless Network USB... Adapter

## 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	RL2Fthop5.pdf

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### CONFIDENTIAL INFORMATION

