CFR Title 47 Part 15.247
Class II Permissive Change to Application
FCC ID: IMKRL81PC

EMI TEST REPORT

On

RangeLAN802 PCMCIA

Prepared for

Proxim
295 N. Bernardo Ave
Mountain View, CA 94043
Tel: (650)960-1630
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Prepared by

Electronic Compliance Laboratories Inc.
1249 Birchwood Dr.
Sunnyvale, CA 94089
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Test Report Number: P808007
Date of Test: August 10, 1998

Table of Contents

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

RangeLAN802 PCMCIA CARD
M/N 84XX
S/N 0020A6324BC5
FCC ID: IMKRL1PC

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 RangeLAN802 PCMCIA 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

RangeLAN802 PCMCIA uses 79 channels, each 1 MHz wide. The system hops over one of 15 pseudorandom sequences. On average, each channel is used equally.

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 (.883 / .875 / .908 MHz) at the low/midband/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:
390 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 26.5 dBm or 250 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 = 26.5 dBm (peak reading) /
446 mW EIRP
Limit: +30 dBm / 1 W maximum power

1900.0021 Stub Antenna
EIRP = +26.5 (peak power) +0.0 (peak gain, dBi) = + 26.5
dBm / 446 mW EIRP
Limit: +36 dBm / 4 W maximum EIRP

1900.0001 Clip-on Antenna
EIRP = +26.5 (peak power) + 1.0 (peak gain, dBi) = + 27.5
dBm / 562mW 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.**

6.1.5 **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 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 C** 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.

Electronic Compliance Laboratories

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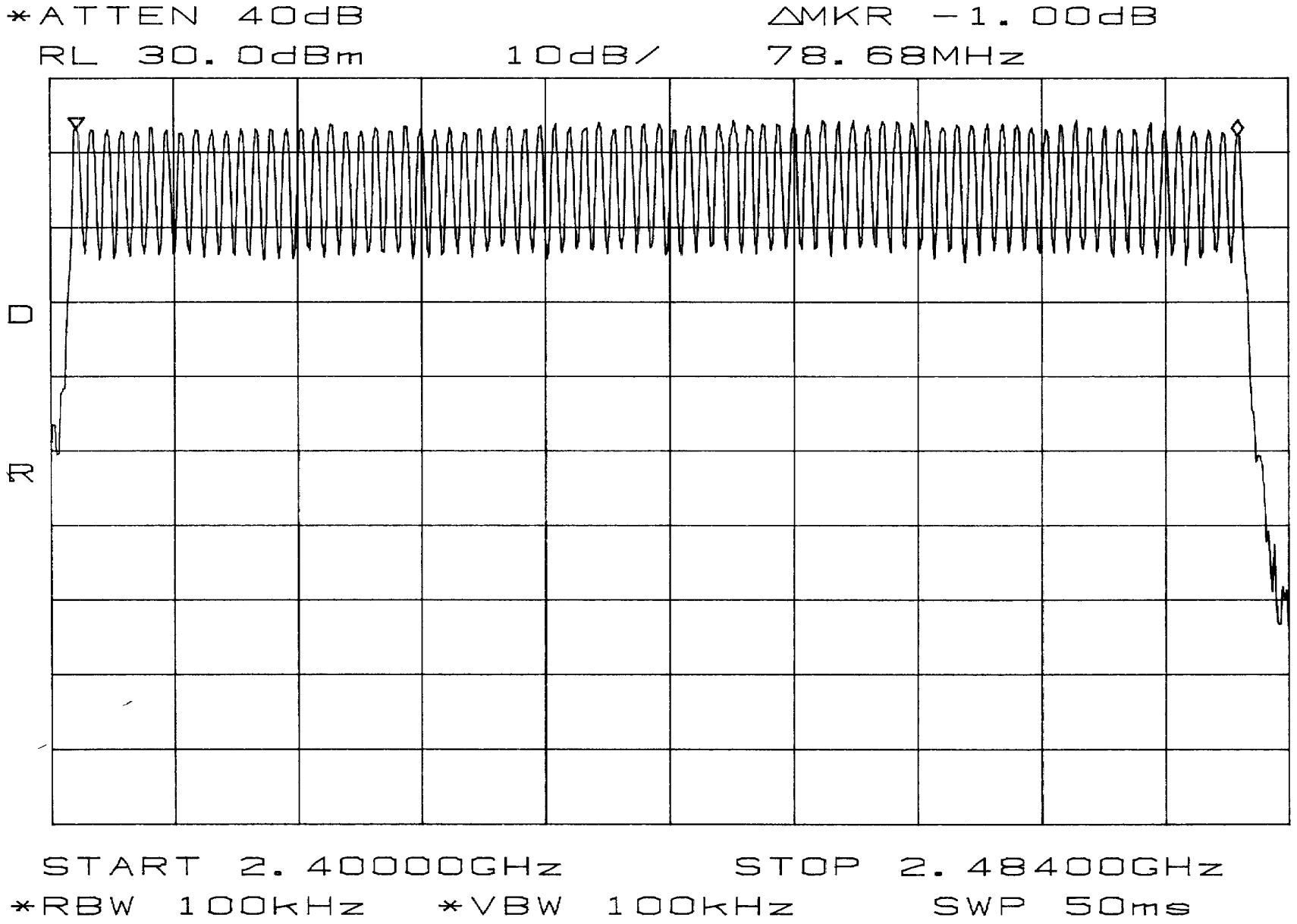
Chris Byleckie Date
Technical Director

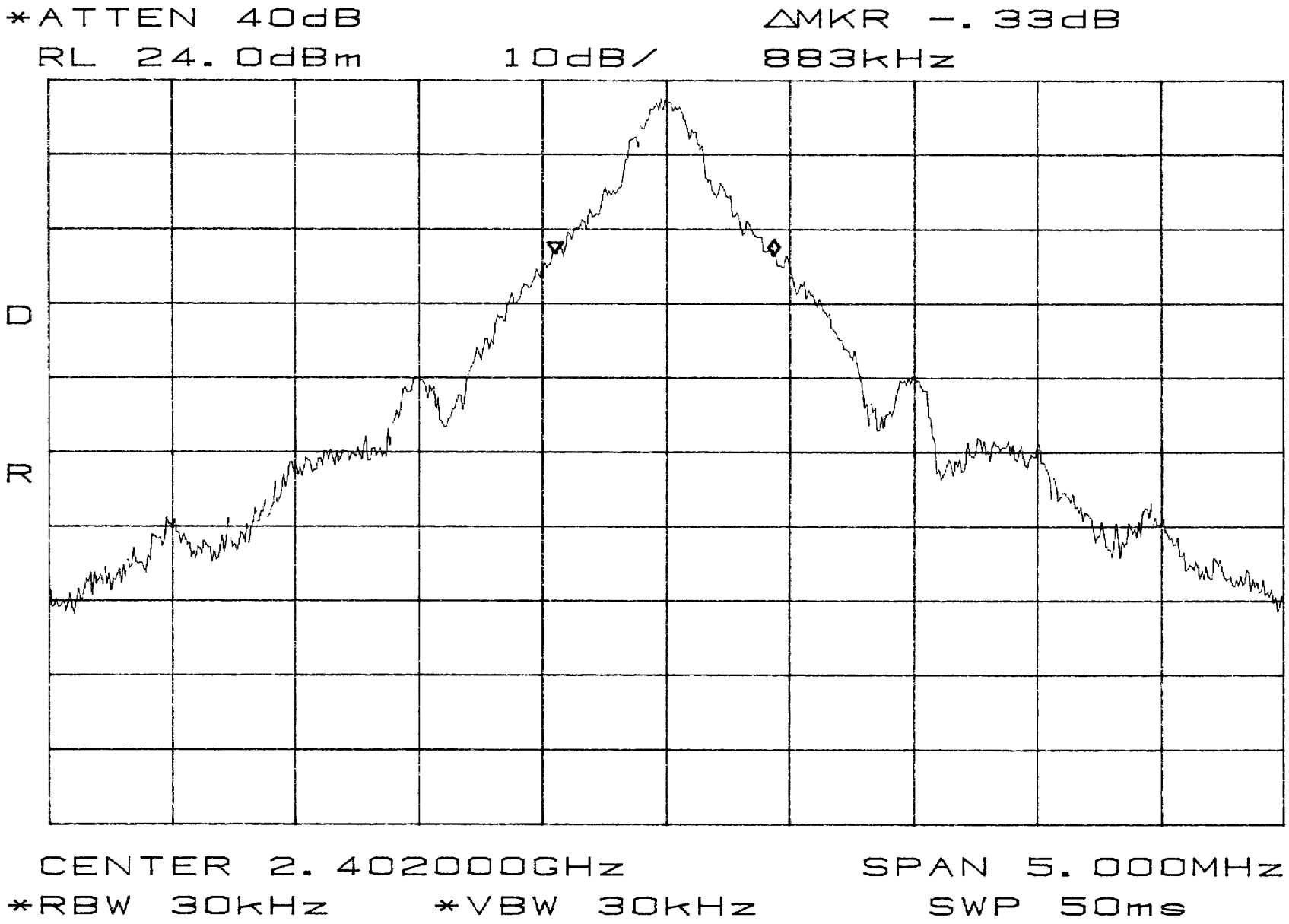
APPENDIX A

SPREAD SPECTRUM PLOTS

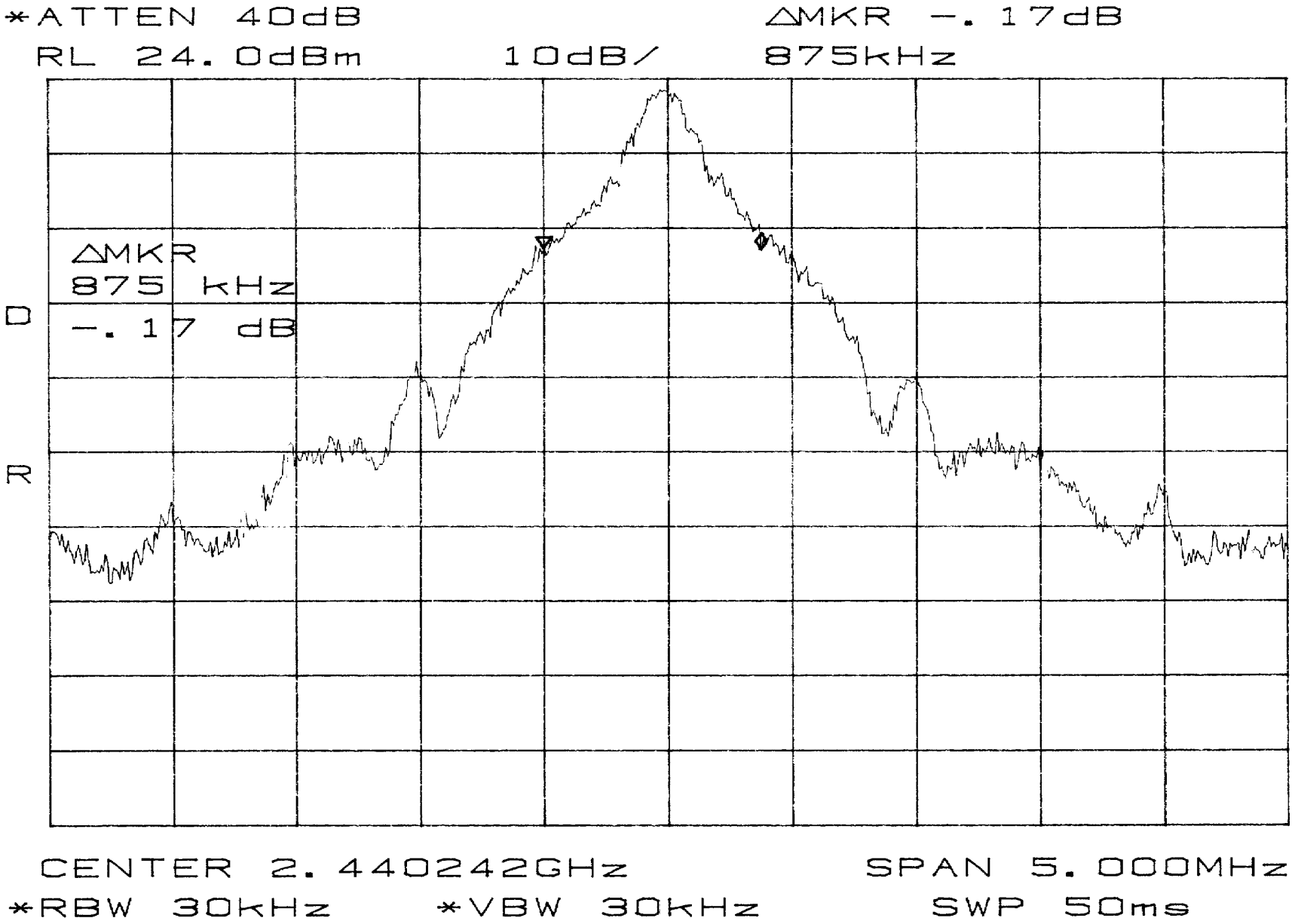
Channel Utilization



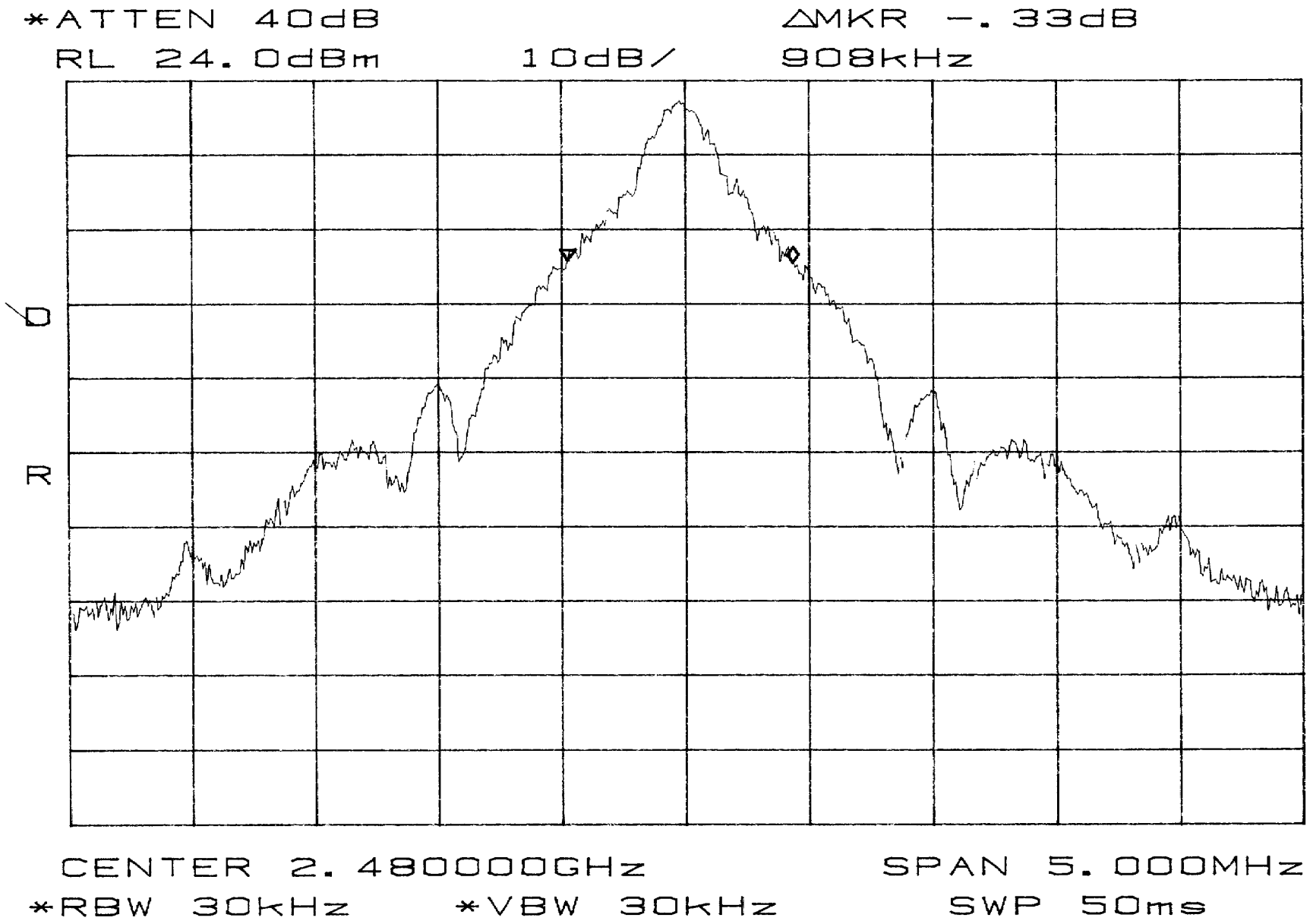
Bandwidth


*ATTEN 40dB
ΔMKR -.33dB
RL 24.0dBm
10dB/
883kHz
D
R
CENTER 2.402000GHz
SPAN 5.000MHz
*RBW 30kHz
*VBW 30kHz
SWP 50ms

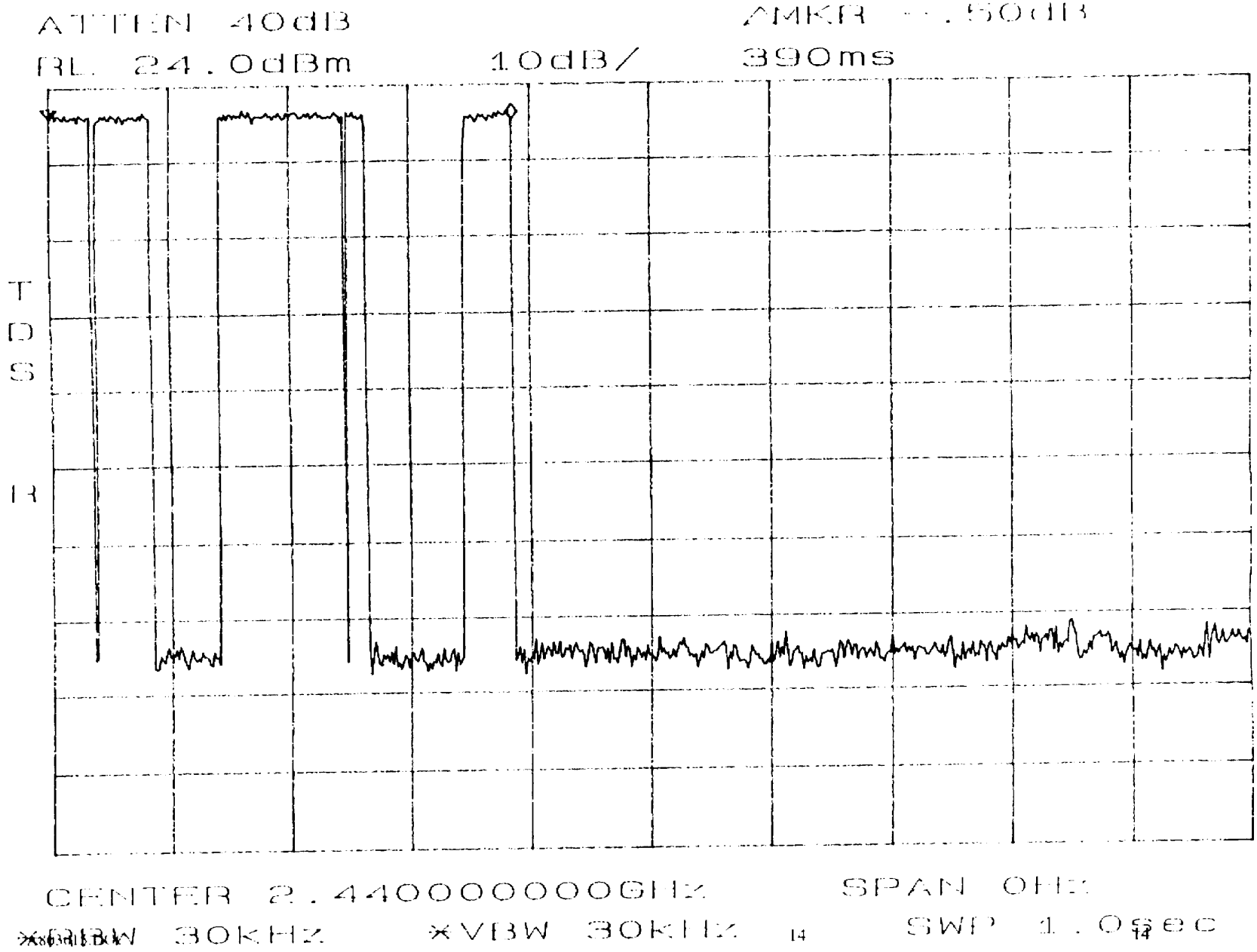
Bandwidth


*ATTEN 40dB
ΔMKR -.17dB
RL 24.0dBm
10dB/
875kHz
ΔMKR
875 kHz
-.17 dB
D
R
CENTER 2.440242GHz
SPAN 5.000MHz
*RBW 30kHz
*VBW 30kHz
SWP 50ms

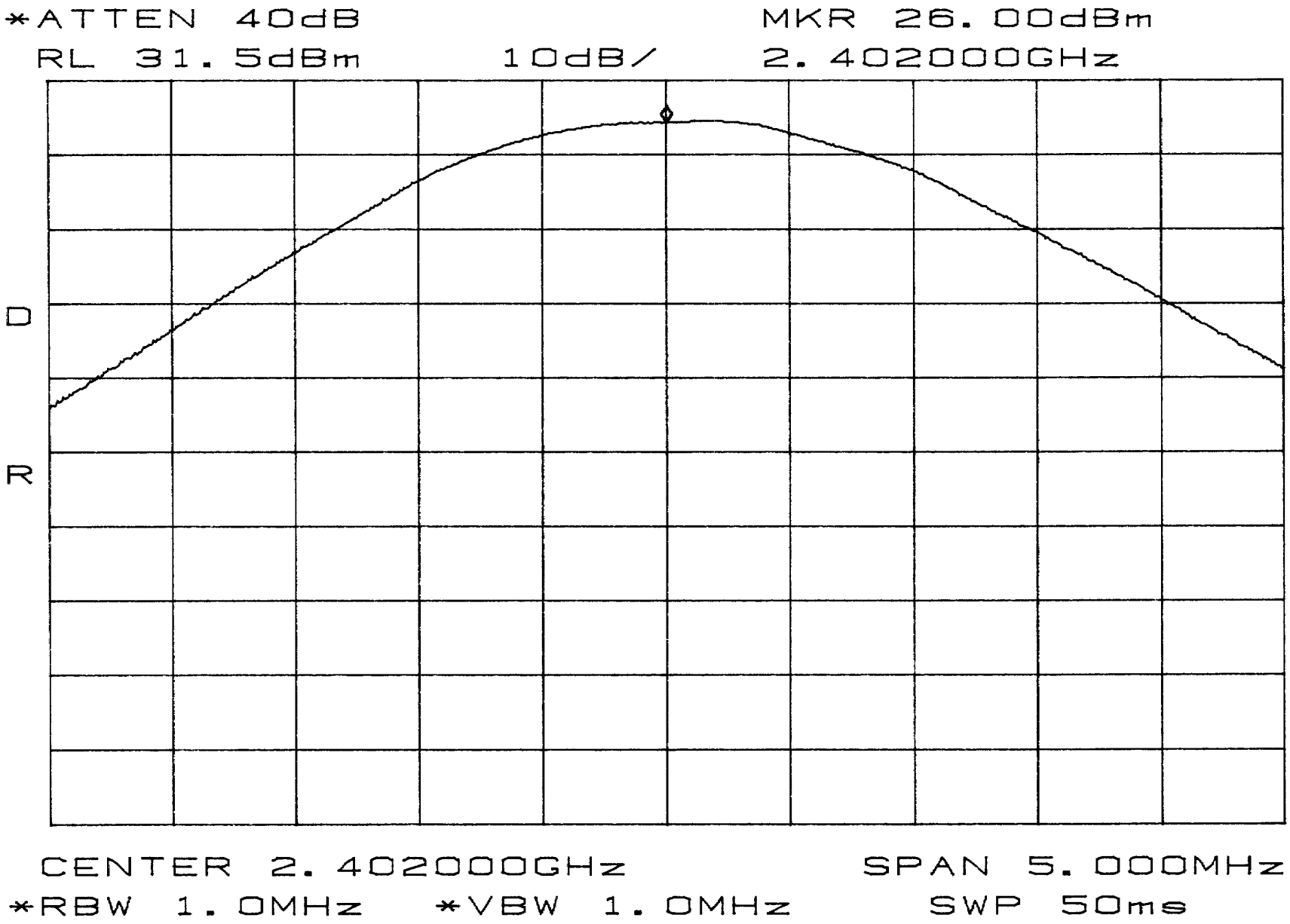
Bandwidth


*ATTEN 40dB
ΔMKR -.33dB
RL 24.0dBm
10dB/
908kHz
dB
R
CENTER 2.480000GHz
SPAN 5.000MHz
*RBW 30kHz
*VBW 30kHz
SWP 50ms

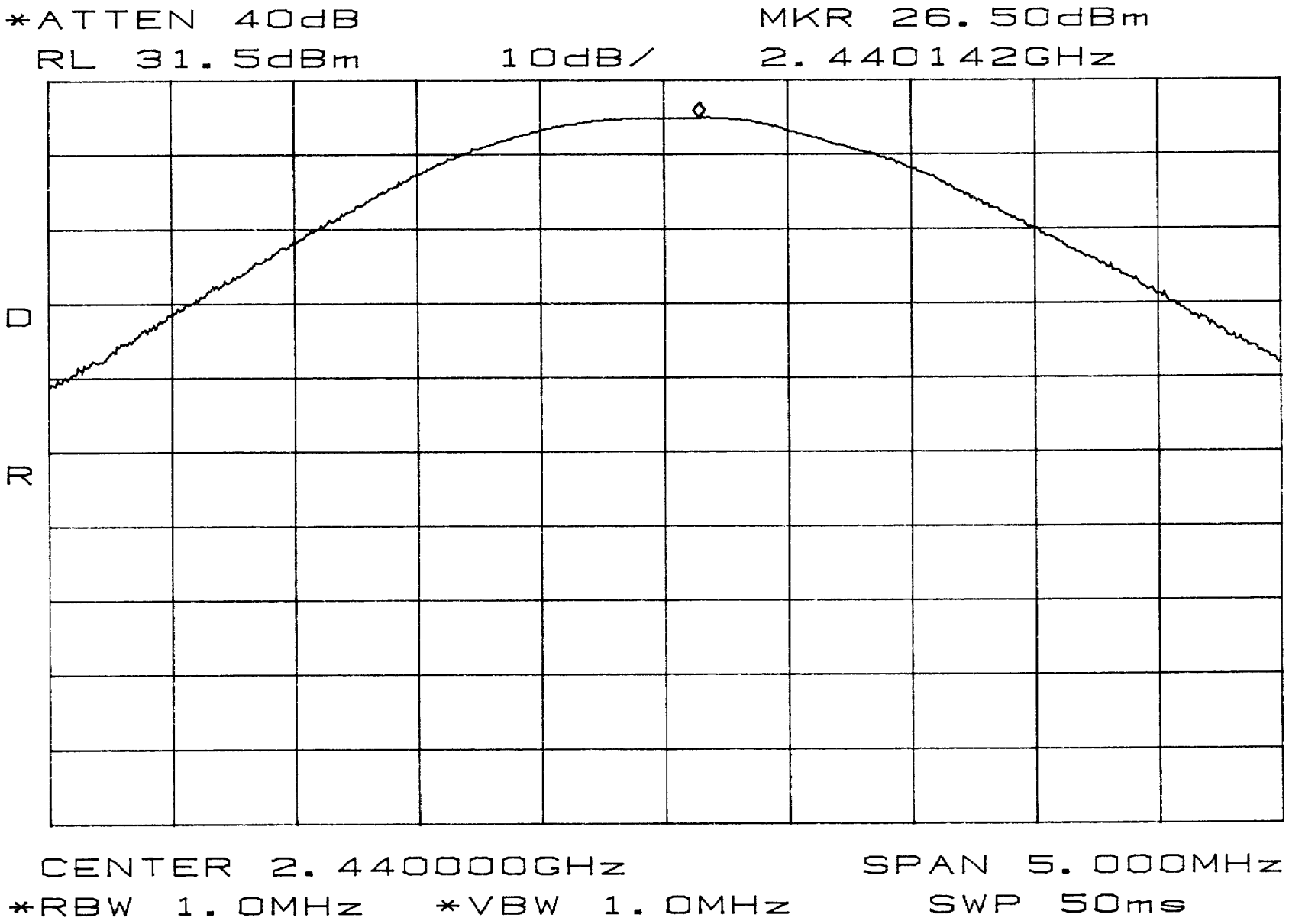
Dwell Time


ATTEN 40dB
RL 24.0dBm
10dB/
MKR
390ms
TDS
CENTER 2.440000000GHz
SPAN 0Hz
*RBW 30KHz
*VBW 30KHz
SWP 1.0sec

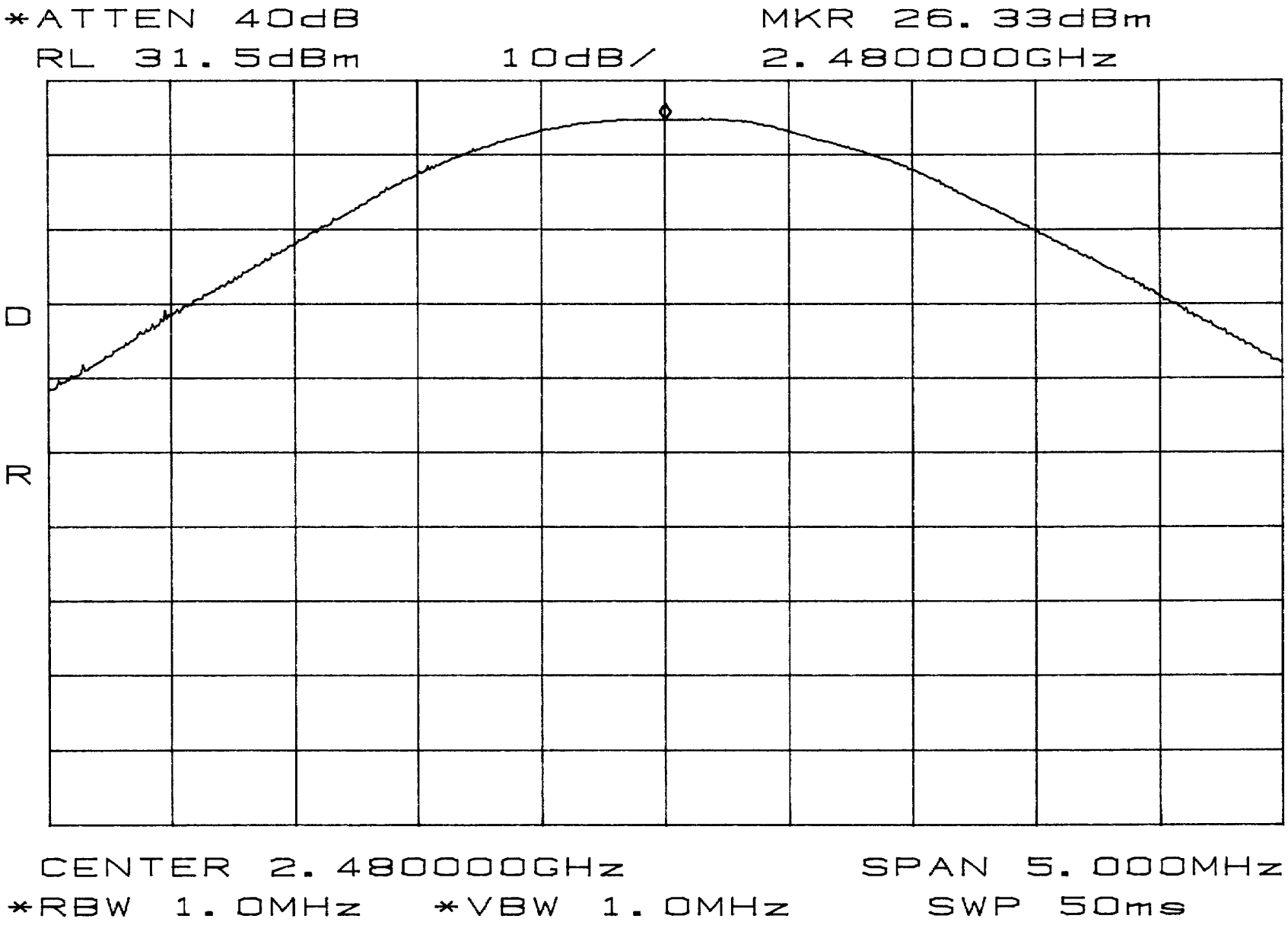
Power Out


*ATTEN 40dB
MKR 26.00dBm
RL 31.5dBm
10dB/
2.402000GHz
D
R
CENTER 2.402000GHz
SPAN 5.000MHz
*RBW 1.0MHz
*VBW 1.0MHz
SWP 50ms

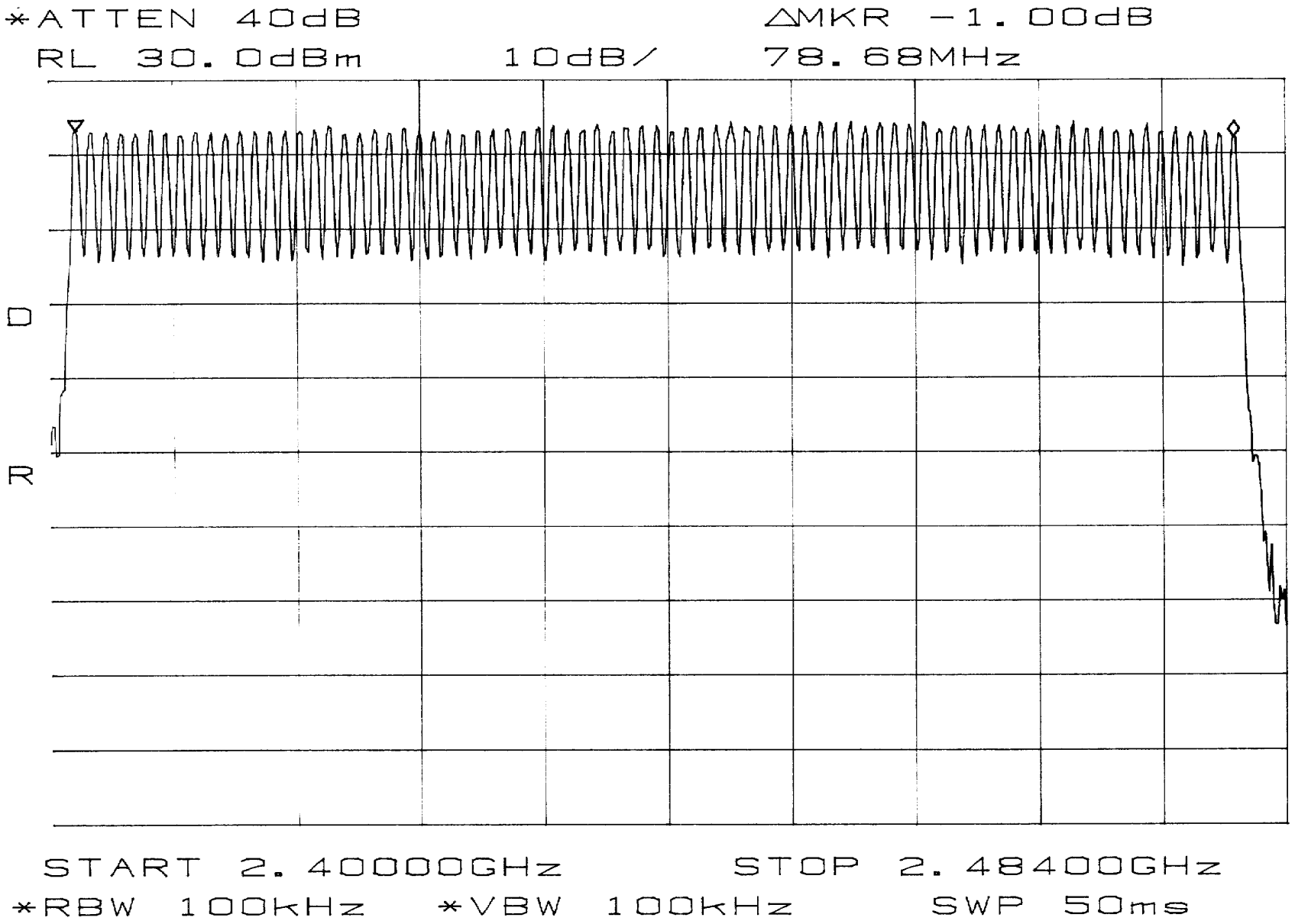
Power Out


*ATTEN 40dB
MKR 26.50dBm
RL 31.5dBm
10dB/
2.440142GHz
D
R
CENTER 2.440000GHz
SPAN 5.000MHz
*RBW 1.0MHz
*VBW 1.0MHz
SWP 50ms

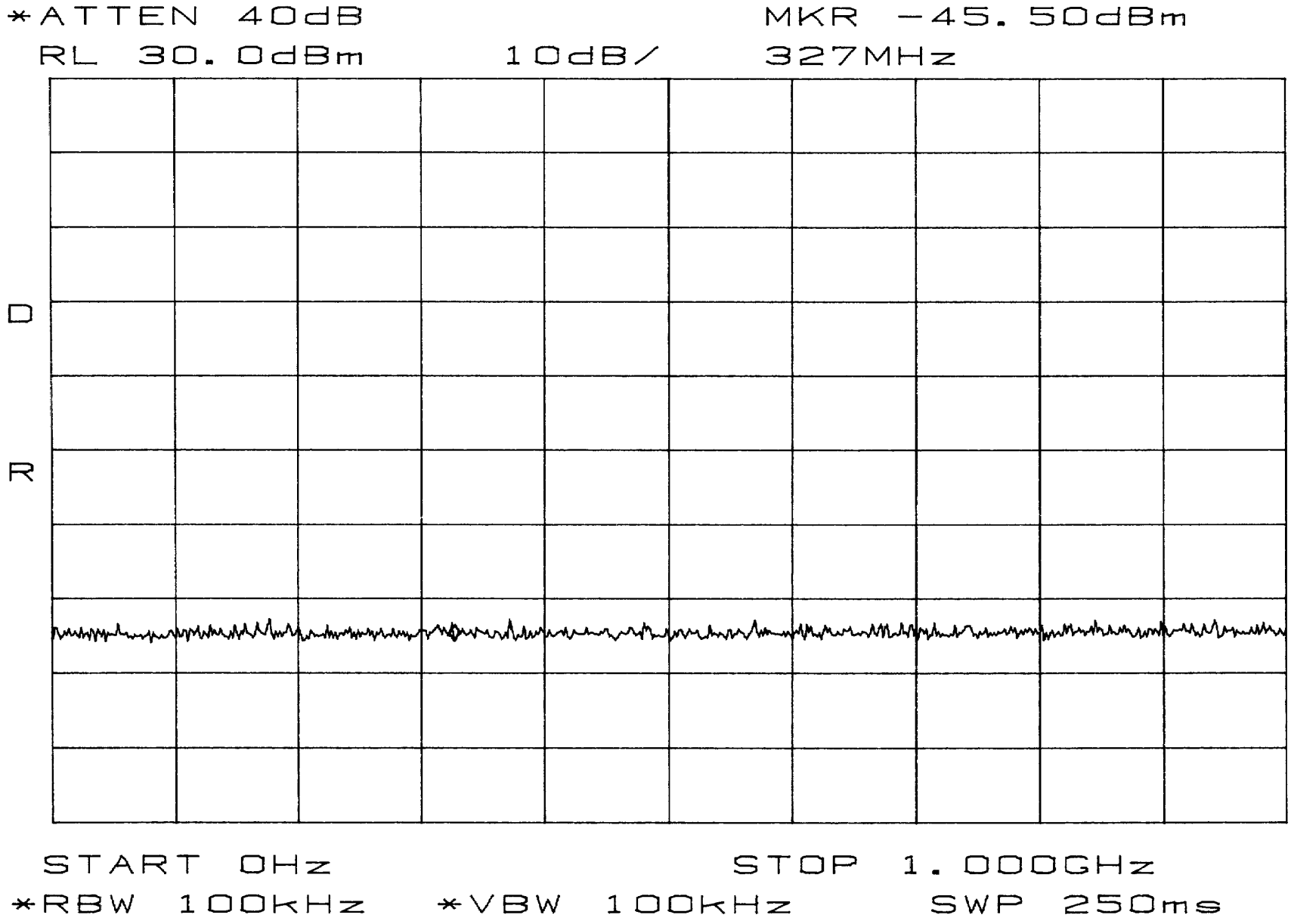
Power Out


*ATTEN 40dB
MKR 26.33dBm
RL 31.5dBm
10dB/
2.480000GHz
D
R
CENTER 2.480000GHz
SPAN 5.000MHz
*RBW 1.0MHz
*VBW 1.0MHz
SWP 50ms

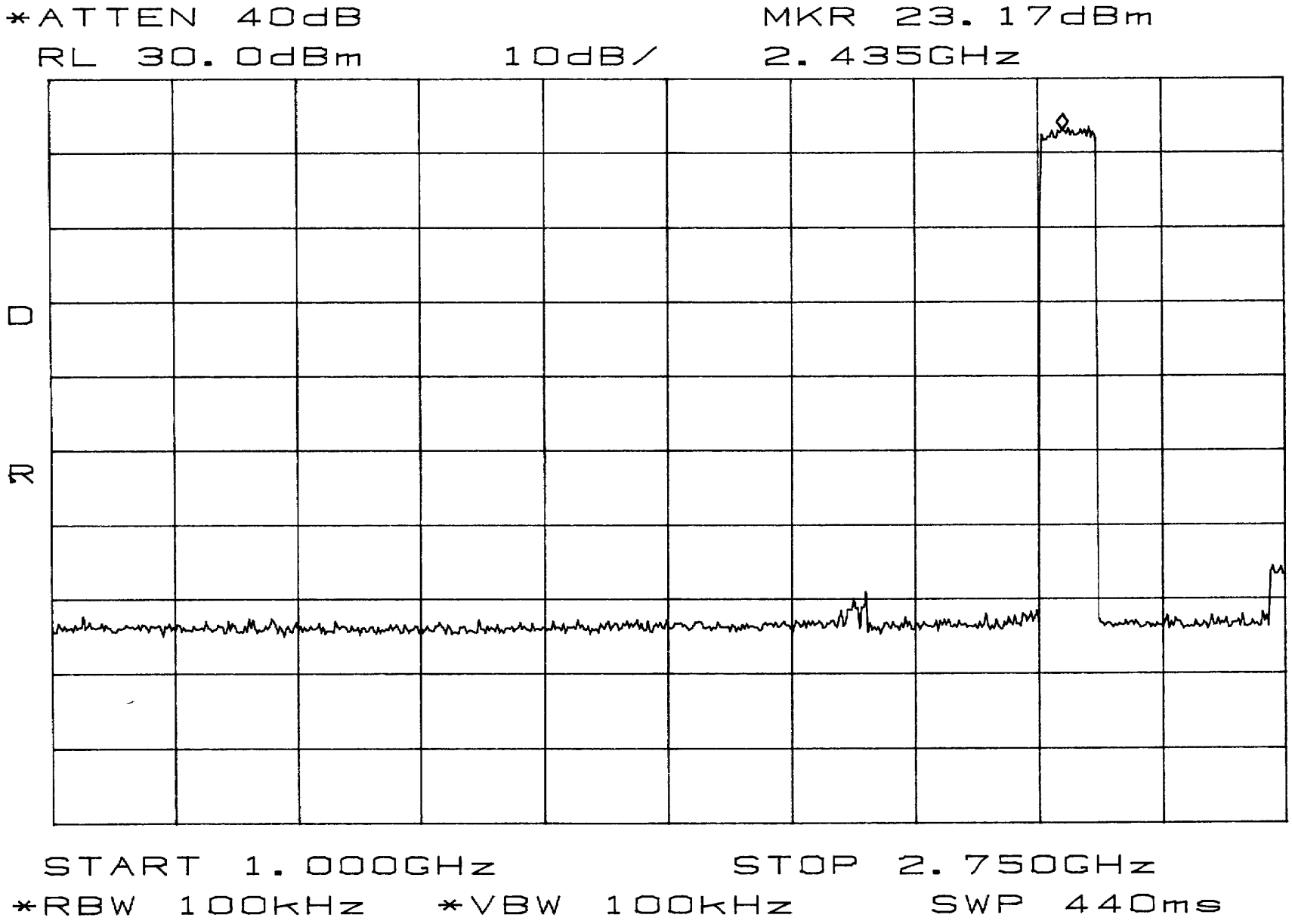
Out Of Band Emissions Band Edges



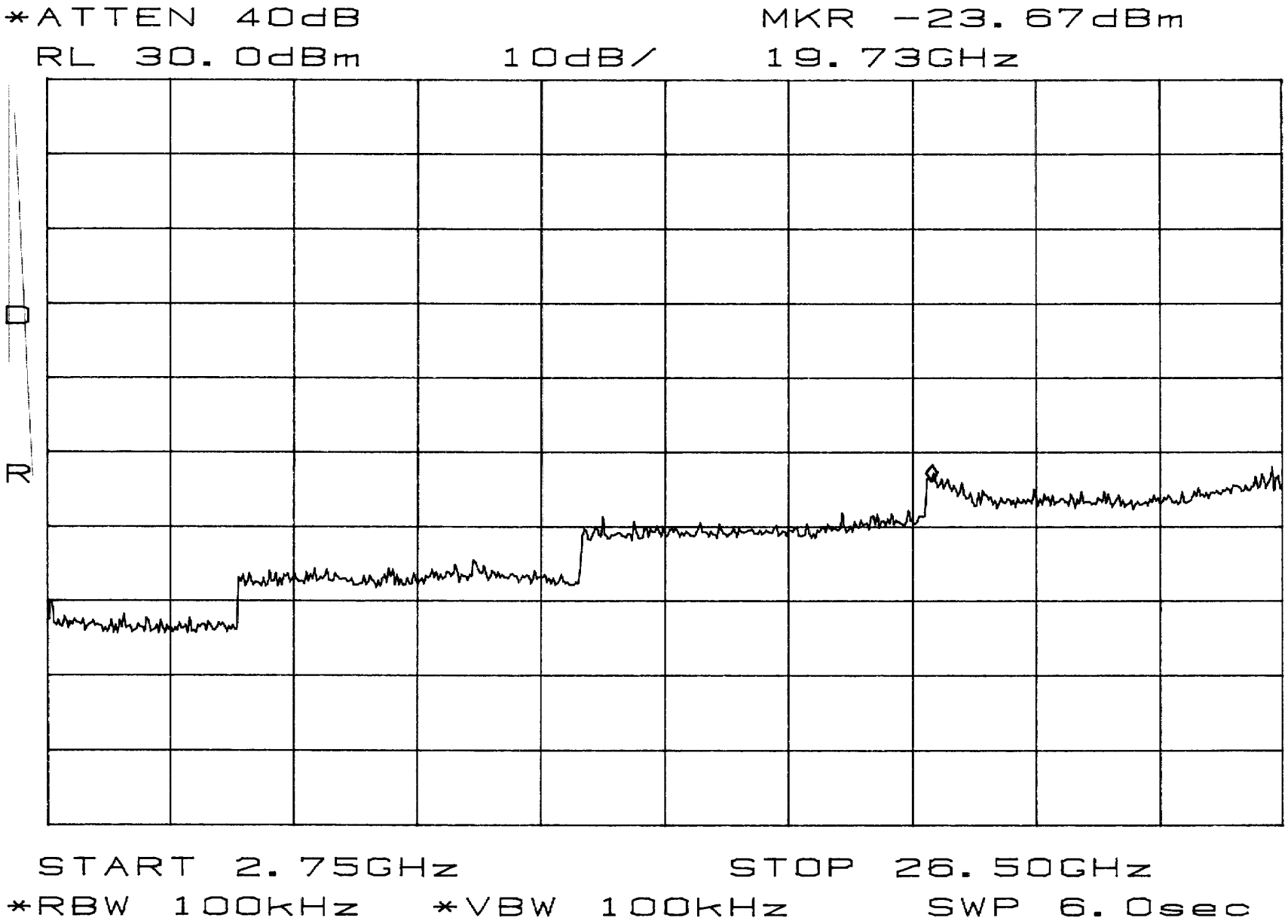
Out Of Band < 1 GHz



Out Of Band 1 – 2.75 GHz



Out of Band 2.75 – 26.5 GHz



APPENDIX C

RESTRICTED BAND DATA

FCC RADIATED DATA SHEET

		DATE:	Aug. 10, 1998
EUT:	RangeLAN802 PCMCIA	**CUSTOMER NAME:**	Proxim
S/N:		**WORK ORDER:**	8081001
RULE PART:	15.247	**FILE:**	8081001a
ANTENNA:	Horn	**OTHER CAL FACTORS**	**ATTN dB:** 0
MODULATION TYPE:			**DUTY dB:** 0
TESTED BY:	SHAWN		**HP IL dB:** 0
COMMENTS:	Tethered antenna		**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	33.5	Avg	32.8	7.0	35.0	10.0	28.3	54.0	-25.7
12010	40.3	Pk	39.3	13.6	35.0	10.0	48.2	74.0	-25.9
12010	27.7	Avg	39.3	13.6	35.0	10.0	35.6	54.0	-18.5
Fund = 2440									
4880	45.2	Pk	32.8	7.0	35.0	10.0	40.0	74.0	-34.0
4880	33.2	Avg	32.8	7.0	35.0	10.0	28.0	54.0	-26.0
7320	46.8	Pk	36.0	10.6	35.0	10.0	48.4	74.0	-25.6
7320	28.5	Avg	36.0	10.6	35.0	10.0	30.1	54.0	-23.9
12200	37.8	Pk	39.3	13.6	35.0	10.0	45.7	74.0	-28.4
12200	27.5	Avg	39.3	13.6	35.0	10.0	35.4	54.0	-18.7
Fund = 2480									
4960	43.5	Pk	32.8	7.0	35.0	10.0	38.3	74.0	-35.7
4960	33.3	Avg	32.8	7.0	35.0	10.0	28.1	54.0	-25.9
7440	48.0	Pk	36.0	10.6	35.0	10.0	49.6	74.0	-24.4
7440	27.8	Avg	36.0	10.6	35.0	10.0	29.4	54.0	-24.6
12400	37.0	Pk	39.3	13.6	35.0	10.0	44.9	74.0	-29.2
12400	27.5	Avg	39.3	13.6	35.0	10.0	35.4	54.0	-18.7

FCC RADIATED DATA SHEET

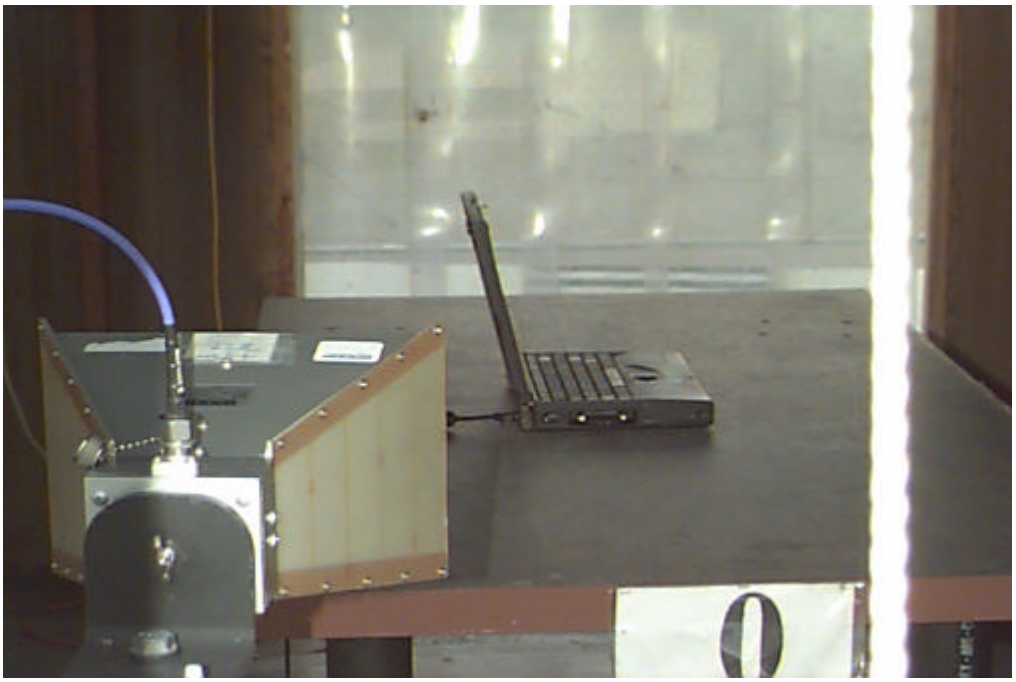
		DATE:	Aug. 10, 1998
EUT:	RangeLAN802 PCMCIA	**CUSTOMER NAME:**	Proxim
S/N:		**WORK ORDER:**	8081001
RULE PART:	15.247	**FILE:**	8081001b
ANTENNA:	Horn	**OTHER CAL FACTORS**	**ATTN dB:** 0
MODULATION TYPE:			**DUTY dB:** 0
TESTED BY:	SHAWN		**HP IL dB:** 0
COMMENTS:	snap-on antenna		**DIST dB:** 10

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	43.8	Pk	32.8	7.0	35.0	10.0	38.6	74.0	-35.4
4804	33.2	Avg	32.8	7.0	35.0	10.0	28.0	54.0	-26.0
12010	38.7	Pk	39.3	13.6	35.0	10.0	46.6	74.0	-27.5
12010	28.2	Avg	39.3	13.6	35.0	10.0	36.1	54.0	-18.0
Fund = 2440									
4880	43.2	Pk	32.8	7.0	35.0	10.0	38.0	74.0	-36.0
4880	33.2	Avg	32.8	7.0	35.0	10.0	28.0	54.0	-26.0
7320	47.3	Pk	36.0	10.6	35.0	10.0	48.9	74.0	-25.1
7320	37.0	Avg	36.0	10.6	35.0	10.0	38.6	54.0	-15.4
12200	36.2	Pk	39.3	13.6	35.0	10.0	44.1	74.0	-30.0
12200	27.6	Avg	39.3	13.6	35.0	10.0	35.5	54.0	-18.6
Fund = 2480									
4960	43.3	Pk	32.8	7.0	35.0	10.0	38.1	74.0	-35.9
4960	33.2	Avg	32.8	7.0	35.0	10.0	28.0	54.0	-26.0
7440	48.0	Pk	36.0	10.6	35.0	10.0	49.6	74.0	-24.4
7440	37.0	Avg	36.0	10.6	35.0	10.0	38.6	54.0	-15.4
12400	37.0	Pk	39.3	13.6	35.0	10.0	44.9	74.0	-29.2
12400	27.7	Avg	39.3	13.6	35.0	10.0	35.6	54.0	-18.5

APPENDIX C

SET-UP PHOTOS

FCC 15.205 Restricted Band
Stub Antenna



FCC 15.205 Restricted Band
Clip-on Antenna

FCC 15.247 Conducted RF