

Client:	Proxim, Inc.	Date:	2/24/99	Test Engr:	Rudy Suy
Product:	4110-05	File:	T30505	Proj. Eng:	Mark Briggs
Objective:	Final Qualification	Site:	SVOATS#2	Contact:	Pete Garcia
Spec:	FCC Part 15	Page:	1 of 4	Approved:	
Revision	1.0				

Ambient Conditions
Temperature: 8.9 °C
Humidity: 73 %

Test Objective

The objective of this test session is to perform final qualification testing the EUT defined below relative to the specifications defined above.

Test Summary

Run #1 - Channel Separation and Utilization {15.247(a) (1)} see test data log.

Channel separation was measured and calculated to be 995.3KHz
(79 channels in 78.6 MHz)

The 20dB bandwidth was measured to be:

Low Channel	925 KHz
Central Channel	958 KHz
High Channel	942 KHz

Run #1 - Output Power {15.247(b)} see test data log.

Low Channel	19.7 dBm
Central Channel	19.8 dBm
High Channel	19.8 dBm

Maximum output power was 19.8 dBm (0.096 Watts), meeting maximum permitted of 1 Watt.

Run #3a - Maximized Radiated Emissions, 1-25 GHz , Channel #1 (Low Channel)

PASS Results: FCC B -3.4 dB Ave @ 1201.730 MHz Vertical

Run #3b - Maximized Radiated Emissions, 1-25 GHz , Channel #39 (Center Channel)

PASS Results: FCC B -7.3 dB Ave @ 1220.670 MHz Vertical

Run #3c - Maximized Radiated Emissions, 1-25 GHz , Channel #79 (High Channel)

PASS Results: FCC B -7.2 dB Ave @ 2486.960 MHz Vertical



EMC Test Log

Client:	Proxim, Inc.	Date:	2/24/99	Test Engr:	Rudy Suy
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Equipment Under Test (EUT) General Description

The EUT Symphony PCI 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. The Symphony PCI Card uses 79 channels, each 1 MHz wide. The system hops over one of 15 pseudo random sequences. On the average, each channel is used equally. Please refer to "RANGELAN2 Frequency Hopping Theory of Operation" attached to this submission. (Note that confidentiality has been requested for the Theory of Operation exhibit) Normally, the EUT would be placed on a table top during operation. The EUT was, therefore, placed in this position during emissions testing to simulate the end user environment. The electrical rating of the EUT is 120/240 V, 50/60 Hz.

Equipment Under Test (EUT)

Manufacturer/Model/Description	Serial Number	FCC ID Number
Proxim, Symphony PCI, Spread Spectrum Wireless LAN Adapter	A30392835	IMK-ILCPCI

Power Supply and Line Filters

Description	Manufacturer	Model
None	-	-

The EUT power was derived from the host computer power supply.

Printed Wiring Boards in EUT

Manufacturer/Description	Assembly #	Rev.	Serial Number	Crystals (MHz)
Proxim PCI Card	8400-0163	01	A30392835	8, 32

Subassemblies in EUT

Manufacturer/Description	Assembly Number	Rev.	Serial Number
None	-	-	-

EUT Enclosure(s)

The EUT does not have an enclosure as it is designed to be installed within the enclosure of a host computer.



EMC Test Log

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EMI Suppression Devices (filters, gaskets, etc.)

Description	Manufacturer	Part Number
None	-	-

Modifications

The following modifications were made to the EUT in order to comply with the requirements:

None

Local Support Equipment

Manufacturer/Model/Description	Serial Number	FCC ID Number
Dell, Dimension P133v, PC	8Q28F	E2JHANNIBAD
Dell, D1728D-LS, Monitor	04036A8M60	A3LCMG737
Dell, SK-1000REW, Keyboard	12741-71H-9024	GYUR26SK
Dell, M-S34, Mouse	LZA70606597	DZL210472
HP, 2225C+, Printer	3028S76892	DS16XU2225
Proxim, Antenna 1900.0051	-	-

Remote Support Equipment

Manufacturer/Model/Description	Serial Number	FCC ID Number
None	-	-

Interface Cabling

Cable Description	Length (m)	From Unit/Port	To Unit/Port
Shielded Parallel Cable	2.5	PC/ Parralel	Printer
Shielded Keyboard Cable	2.0	PC/ Keyboard Port	Keyboard
Shielded Mouse Cable	2.0	PC/ Mouse Port	Mouse
Shielded Video Cable	1.5	PC/ Video Port	Monitor
Shielded Antenna Cable	1.5	PC/EUT RF Port	Antenna

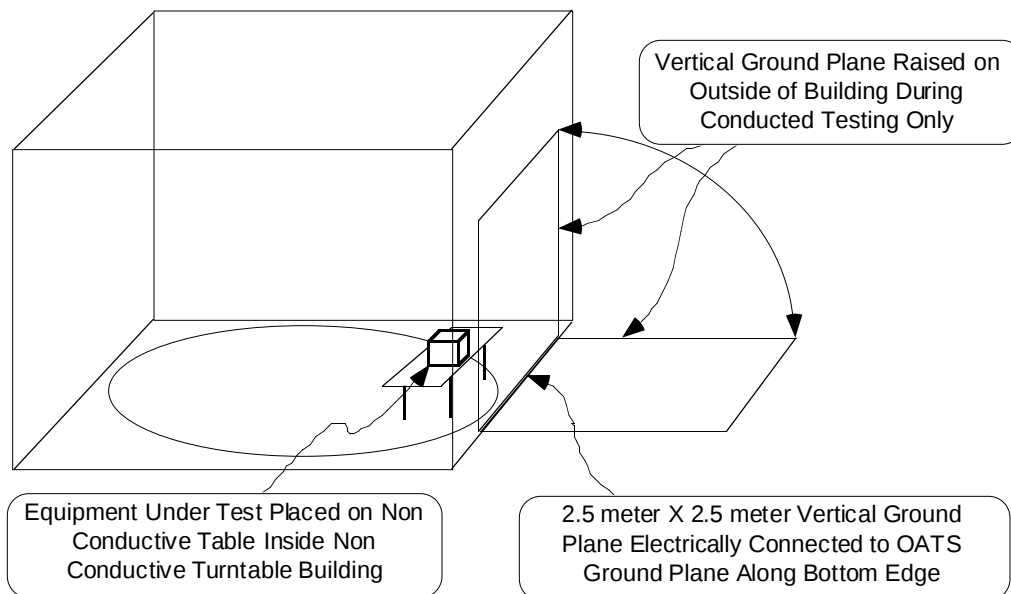
Test Software

The host PC contained test software running during testing which continuously exercised the EUT.

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Revision	1.0				

General Test Conditions

During radiated testing, the host PC was connected to 120V, 60Hz power input. The host PC and all local support equipment were located on the turntable for radiated testing and conducted testing.



Test Data Tables

See attached data



Emissions Test Data

Client:	Proxim, Inc.	Date:	2/24/99	Test Engr:	Rudy Suy
Product:	4110-05	File:	T30505	Proj. Engr:	Mark H & B
Objective	Final Qualification	Site:	SVOATS #2	Contact:	Jeff
Spec:	FCC Part 15	Distance:	3 m	Approved:	

Ambient Conditions
Temperature: 8 °C
Humidity: 87 %

Elliott Lab equipment: Analyzer #284, Horn #487, pre-amp #870 & High pass filter #247

Run #1: Channel Separation and Utilization {15.247(a) (1)}

Channel separation was measured and calculated to be 995.3KHz (79 channels in 78.6 MHz)

The 20dB bandwidth was measured to be:

Low Channel 925 KHz
Center Channel 958 KHz
High Channel 942 KHz

The 20dB bandwidth was measured using a 30kHz resolution bandwidth rather than 100 kHz bandwidth. Proxim have a waiver from the FCC allowing this deviation.

The channel separation exceeds the 20dB bandwidth and the 20dB bandwidth is less than 1MHz, therefore the unit complies.

Channel occupancy was 395 mSeconds with the unit transmitting a packet size of 1500 with a 0mS delay (worst case).

Each channel was used twice in a 60 second interval.

Unit meets the 0.4 Seconds per 30 second requirement.

Run #2: Output Power {15.247(b)}

Low Channel 19.7 dBm
Center Channel 19.8 dBm
High Channel 19.8 dBm

Maximum output power was 19.8dBm (0.096 Watts), meeting the maximum permitted of 1 Watt.

Run #3a: Maximized radiated emissions, 1-25 GHz, Channel #1 (low channel)

FCC B in restricted bands, Frequencies not in restricted must be -20dB below the Fundamental in 100KHz Bandwidth.

All Readings have included AF, Cable Loss and Pre-Amp. gain.

Frequency	Level	Pol	FCC B	FCC B	Detector	Azimuth	Height	Comments
MHz	dBuV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
12010.730	50.6	v	54.0	-3.4	Avg	210	1.0	Note 1
12010.730	48.5	h	54.0	-5.5	Avg	180	1.0	Note 1
7205.583	44.8	v	54.0	-9.2	Avg	210	1.0	Note 1
12010.730	63.2	v	74.0	-10.8	Peak	210	1.0	
4805.333	42.9	v	54.0	-11.1	Avg	240	1.1	Note 1
12010.730	61.9	h	74.0	-12.1	Peak	180	1.0	
7205.583	39.1	h	54.0	-14.9	Avg	260	1.0	Note 1
4805.333	36.9	h	54.0	-17.1	Avg	190	1.0	Note 1
7205.583	55.8	v	74.0	-18.2	Peak	210	1.0	
7205.583	52.6	h	74.0	-21.4	Peak	260	1.0	
4804.333	51.2	v	74.0	-22.8	Peak	240	1.1	
4804.333	48.8	h	74.0	-25.2	Peak	190	1.0	

Note1 4dB was subtracted from the average reading for duty cycle correction factor (information was give from the client).



Emissions Test Data

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Product:	4110-05	File:	T30505	Proj. Engr:	Mark H & B
Objective	Final Qualification	Site:	SVOATS #2	Contact:	Jeff
Spec:	FCC Part 15	Distance:	3 m	Approved:	

Run #3b: Maximized radiated emissions, 1-25 GHz, Channel #39 (center channel)

FCC B in restricted bands, Frequencies not in restricted must be -20dB below the Fundamental in 100KHz Bandwidth.

All Readings have included AF, Cable Loss and Pre-Amp. gain.

Frequency MHz	Level dBuV/m	Pol v/h	FCC B Limit	FCC B Margin	Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
12200.670	46.7	v	54.0	-7.3	Avg	240	1.0	Note 1
7319.700	45.4	v	54.0	-8.6	Avg	250	1.5	Note 1
4880.075	44.5	v	54.0	-9.5	Avg	280	1.0	Note 1
12200.670	43.6	h	54.0	-10.4	Avg	180	1.2	Note 1
7319.700	42.7	h	54.0	-11.3	Avg	250	1.2	Note 1
12200.670	60.2	v	74.0	-13.8	Peak	240	1.5	
4880.075	40.2	h	54.0	-13.8	Avg	230	1.2	Note 1
12200.670	58.6	h	74.0	-15.4	Peak	180	1.2	
7319.700	55.7	v	74.0	-18.3	Peak	250	1.5	
7319.700	54.6	h	74.0	-19.4	Peak	250	1.2	
4880.075	52.7	v	74.0	-21.3	Peak	280	1.0	
4880.075	49.7	h	74.0	-24.3	Peak	230	1.2	

Note1 4dB was subtracted from the average reading for duty cycle correction factor (information was give from the client).

Run #3c: Maximized radiated emissions, 1-25 GHz, Channel #79 (high channel)

FCC B in restricted bands, Frequencies not in restricted must be -20dB below the Fundamental in 100KHz Bandwidth.

All Readings have included AF, Cable Loss and Pre-Amp. gain.

Frequency MHz	Level dBuV/m	Pol v/h	FCC B Limit	FCC B Margin	Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
2486.960	46.8	v	54.0	-7.2	Avg	200	1.0	Band Edge, no signal only noise floor
4960.058	45.7	v	54.0	-8.3	Avg	220	1.1	Note 1
7439.933	45.6	v	54.0	-8.4	Avg	210	1.3	Note 1
2486.960	63.7	v	74.0	-10.4	Peak	200	1.0	Band Edge, no signal only noise floor
7439.933	43.4	h	54.0	-10.6	Avg	160	1.1	Note 1
1240.013	41.7	v	54.0	-12.3	Avg	210	1.6	Note 1
4960.058	41.5	h	54.0	-12.5	Avg	220	1.1	Note 1
1240.013	41.3	h	54.0	-12.7	Avg	210	1.1	Note 1
1240.013	58.3	v	74.0	-15.7	Peak	210	1.6	
1240.013	57.1	h	74.0	-16.9	Peak	210	1.1	
7439.933	55.2	v	74.0	-18.8	Peak	210	1.3	
7439.933	54.6	h	74.0	-19.4	Peak	160	1.1	
4960.058	54.0	v	74.0	-20.0	Peak	220	1.1	
4960.058	51.6	h	74.0	-22.4	Peak	220	1.1	

Note1 4dB was subtracted from the average reading for duty cycle correction factor (information was give from the client).

PROXIM
(Channel Occupancy)

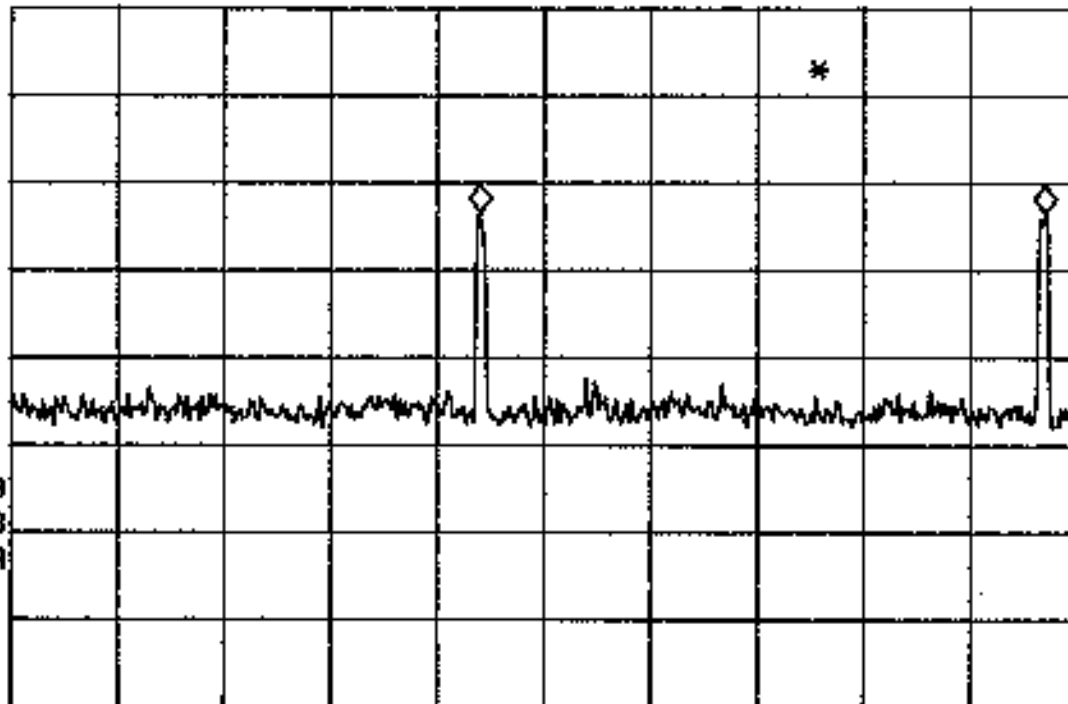
12: 47: 03 FEB 25, 1999

MKR 31.800 sec
.00 dB

REF 107.0 dBμV #AT 70 dB

PEAK
LOG
5
dB/

VA SB
SC FS
CORR



CENTER 2.4071261 GHz
#RES BW 30 KHz

#VBW 3 MHz

SPAN 0 Hz
#SWP 60.0 sec

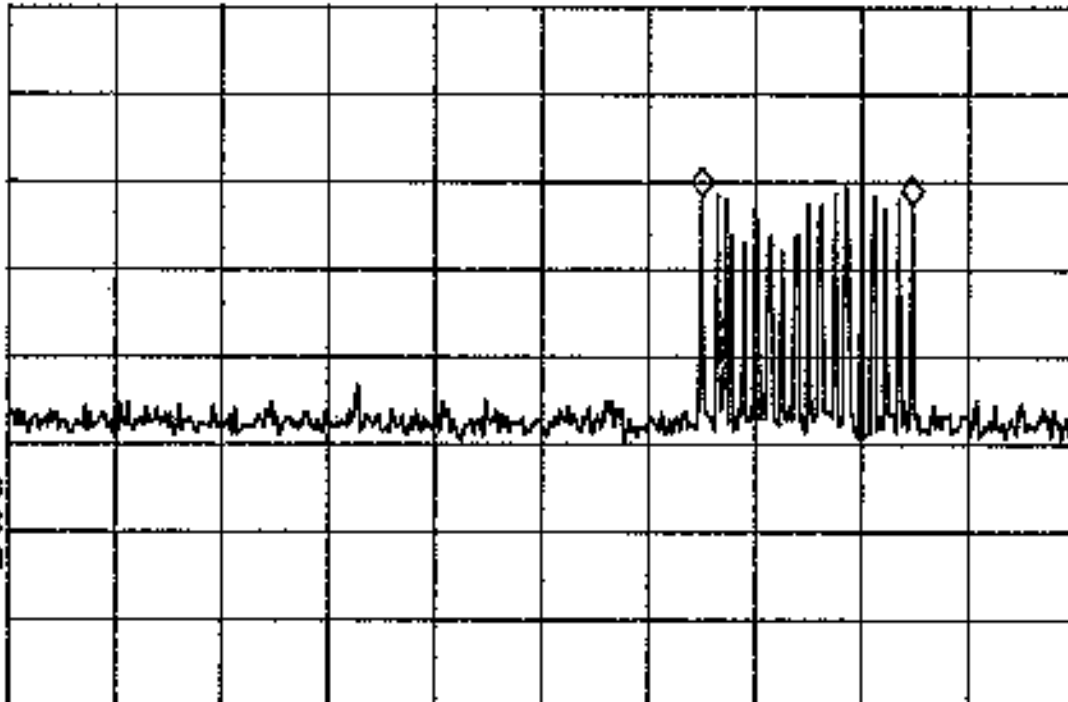
12: 55: 06 FEB 25, 1999

MKR 395.00 msec
-.49 dB

REF 107.0 dBμV #AT 60 dB

PEAK
LOG
5
dB/

VA SB
SC FC
CORR



CENTER 2.407126 GHz
#RES BW 300 KHz

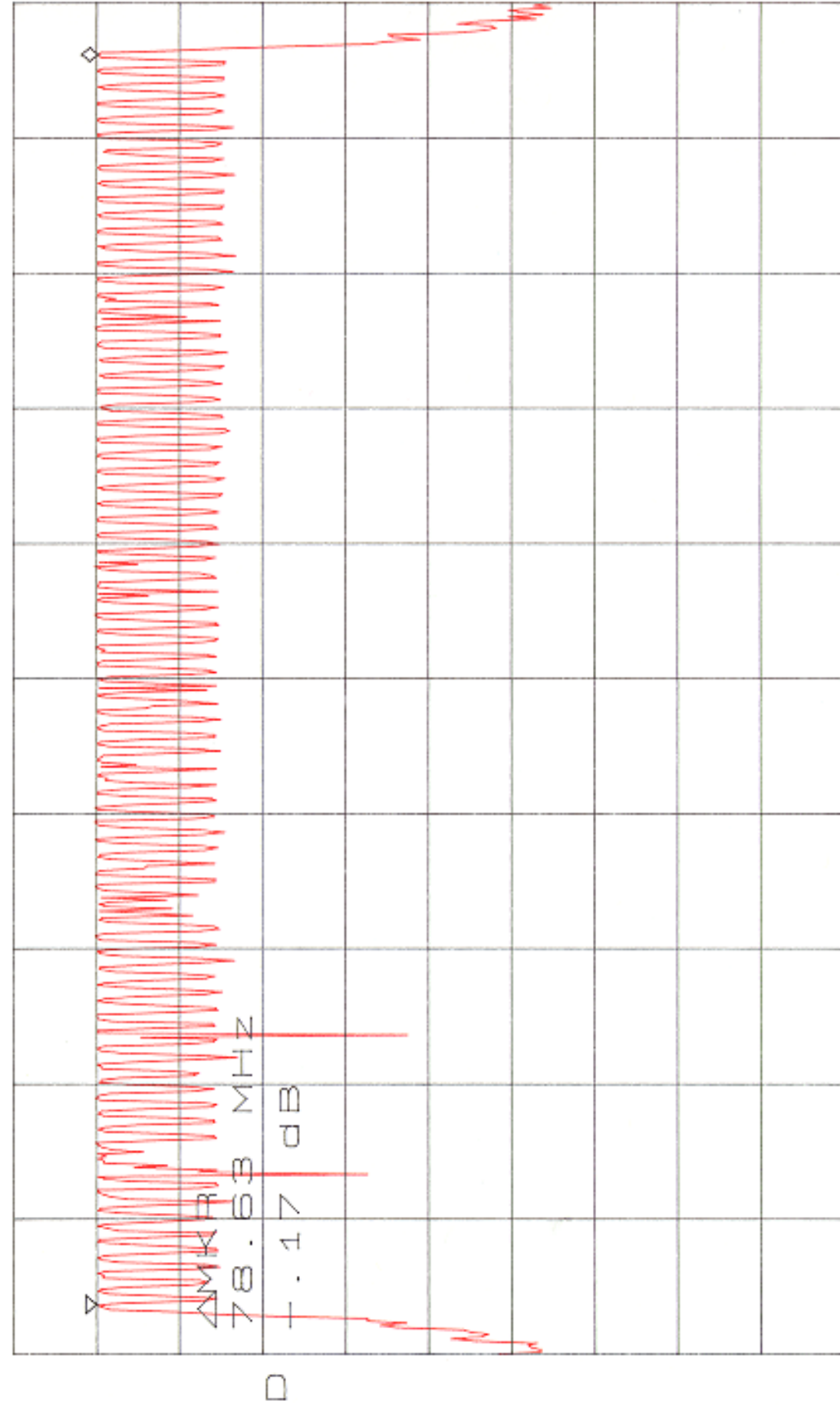
#VBW 3 MHz

SPAN 0 Hz
#SWP 2.00 sec

ATTEN 40dB
RL 30.0dBm

ΔMKR - .17dB
78.63MHz

10dB/



START 2.39900GHz STOP 2.48400GHz
*RBW 100kHz *VBW 100kHz SWP 50ms

CHANNEL 2

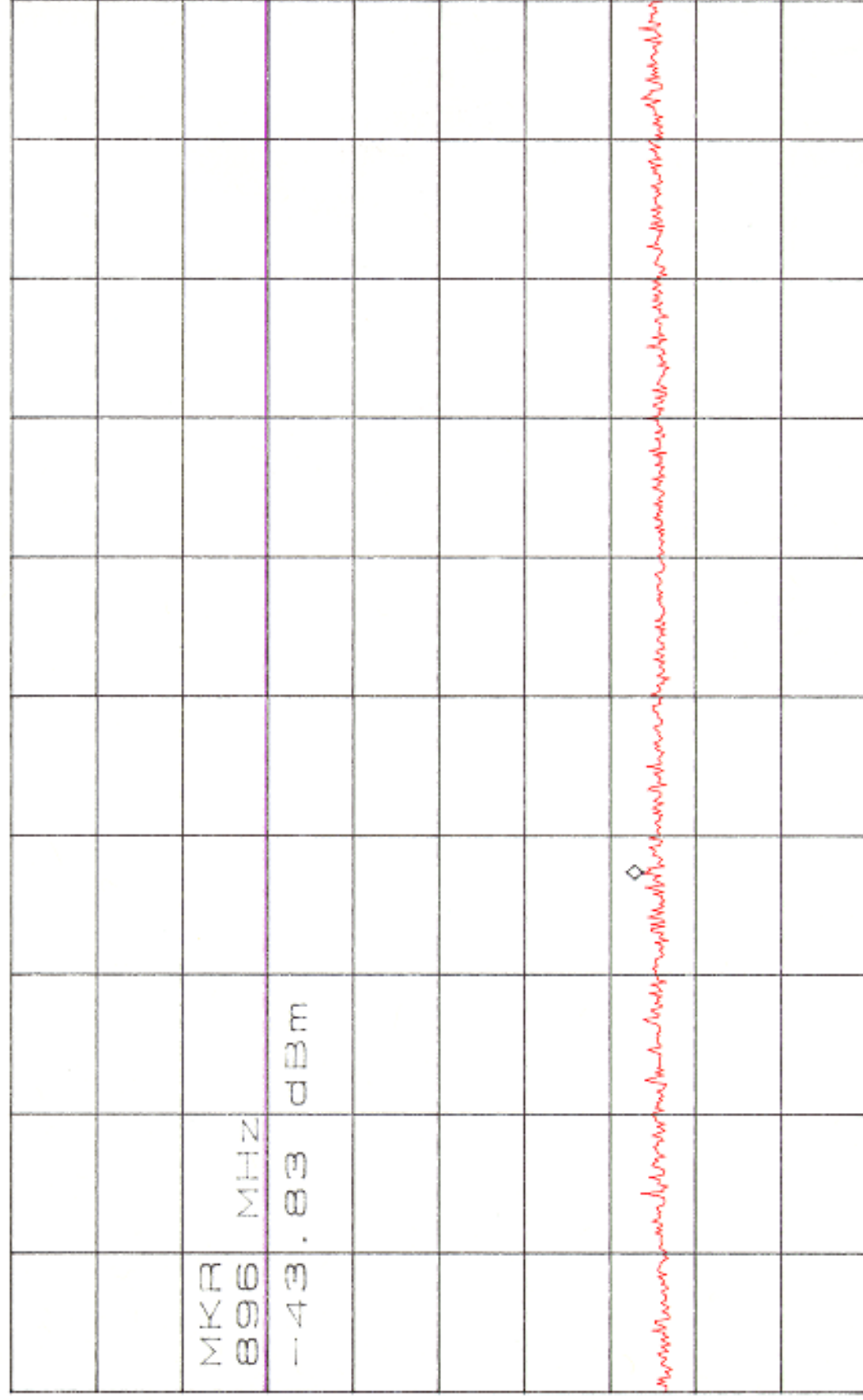
ATTEN 40dB

MKR -43.83dBm

RL 30.0dBm

10dB/

896MHz



START 30MHz

STOP 2.350GHz

*RBW 100kHz

*VBW 100kHz

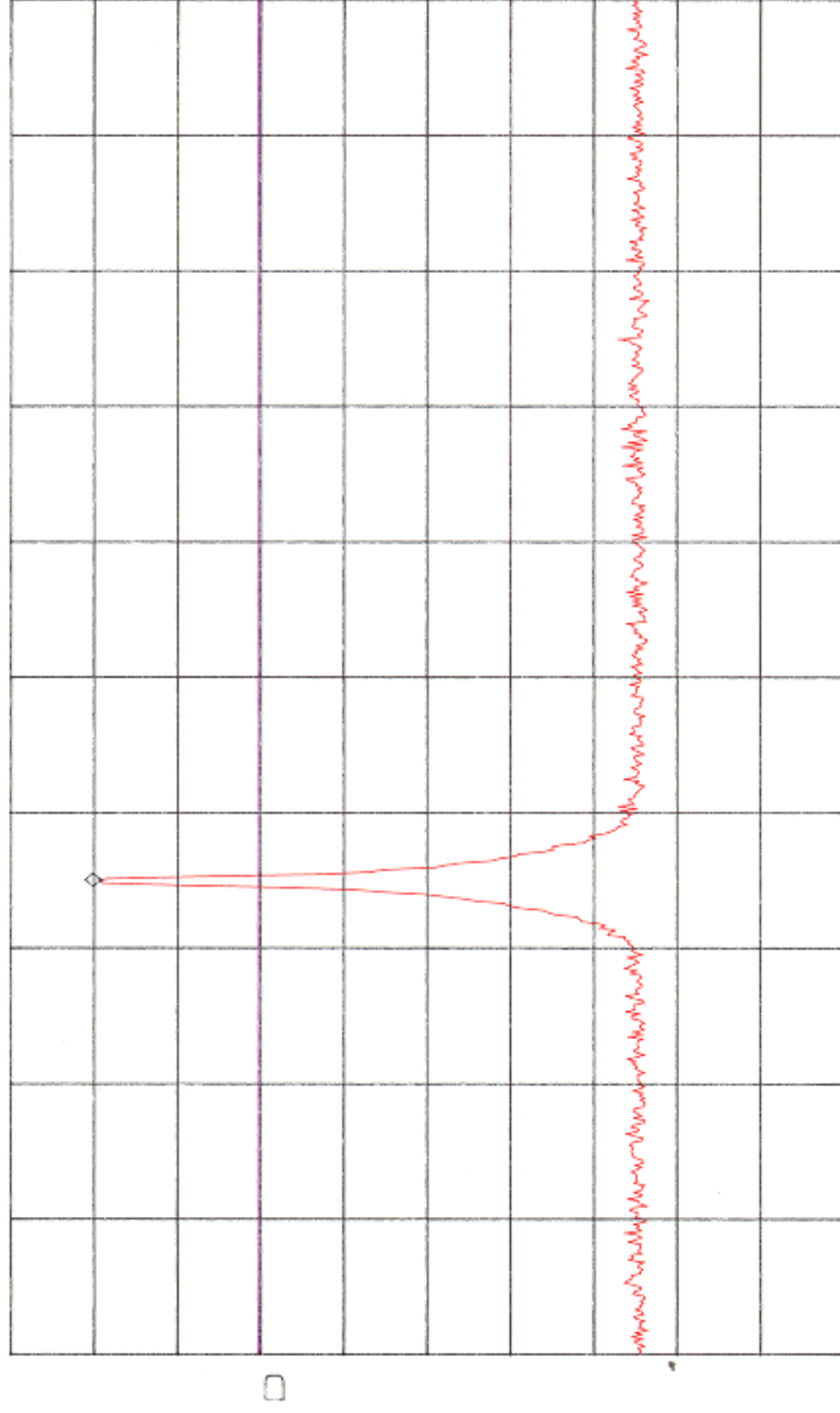
SWP 580ms

CHANNEL 1

ATTEN 40dB
RL 30.0dBm

MKR 19.17dBm
2.4025GHz

10dB/

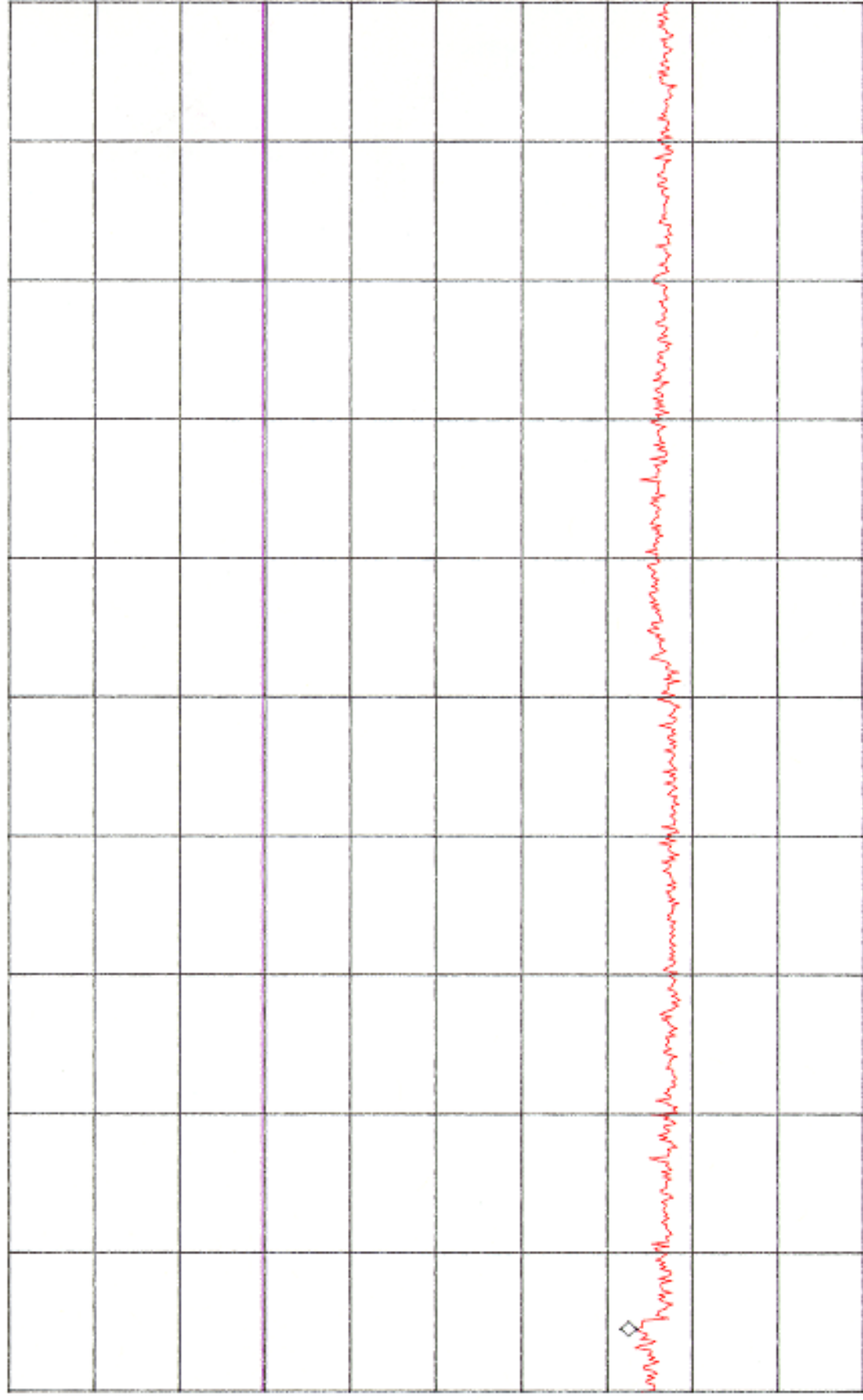


START 2.3500GHz STOP 2.5000GHz
*FEBW 100kHz *VBW 100kHz SWP 50ms

CHANNEL 1

ATTEN 40dB
RL 30.0dBm

MKR -43.50dBm
10dB/ 2.838GHz



D

START 2.500GHz STOP 10.000GHz
*RBW 100kHz *VBW 100kHz SWP 1.9sec

CHANNEL 1

ATTEN 40dB

MKR -40.83dBm

PL 30.0dBm

10dB/ 22.78GHz



START 10.00GHz

STOP 25.00GHz

*RBW 100kHz

*VBW 100kHz

SWP 3.8sec

CHANNEL 1

ATTEN 40dB
RL 30.0dBm

MKR 19.67dBm
2.40197GHz

10dB/



CENTER 2.40185GHz

SPAN 10.00MHz

*RBW 2.0MHz

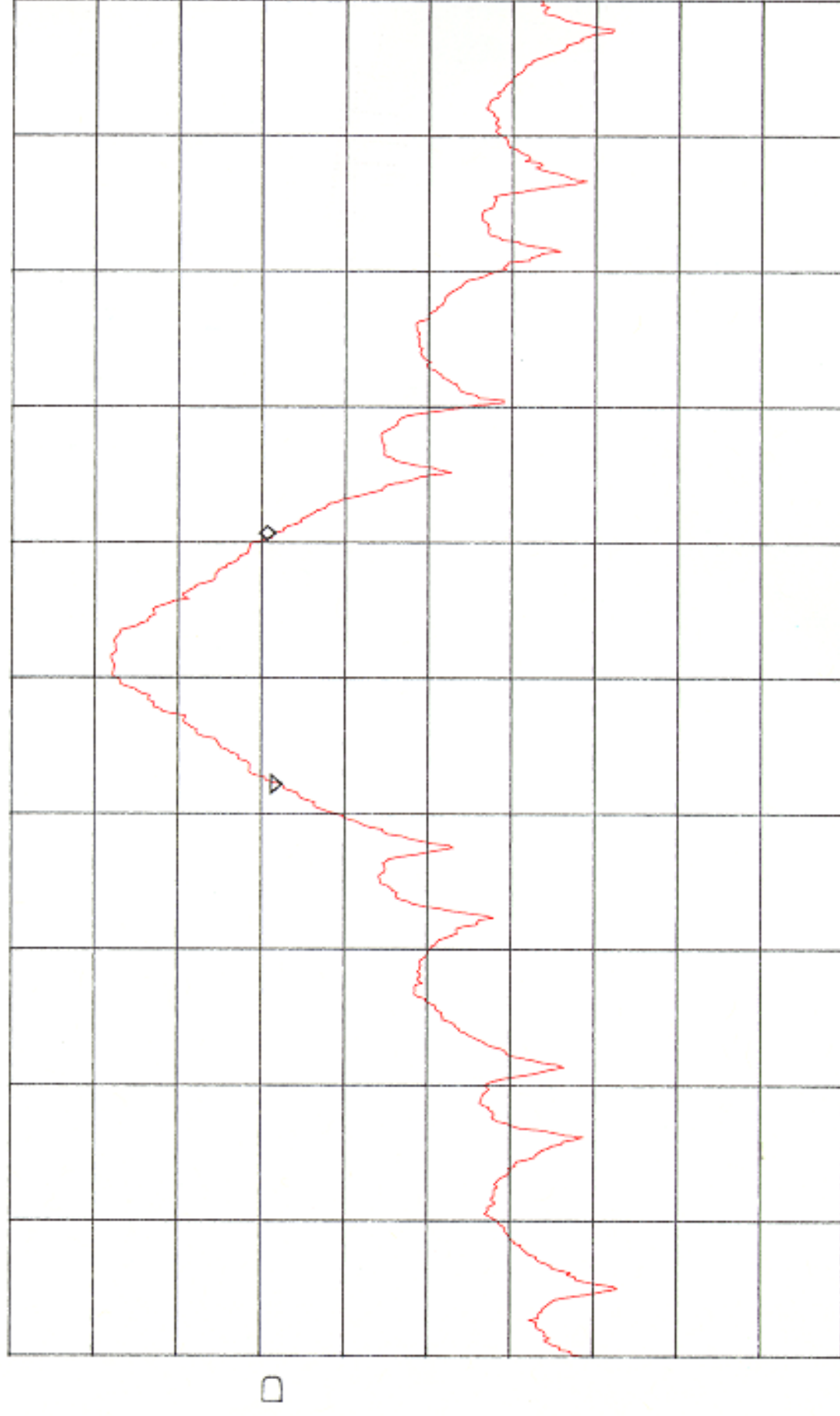
*VBW 3.0MHz

SWP 50ms

CHANNEL 1

ATTEN 4000
PL 30.0000

10dB / 925KHz ΔMKR . 83dB



CENTER 2.402000GHZ

SPANISH. OOOHHN

НИКОМ
РБМ*

*VBW 100KHZ

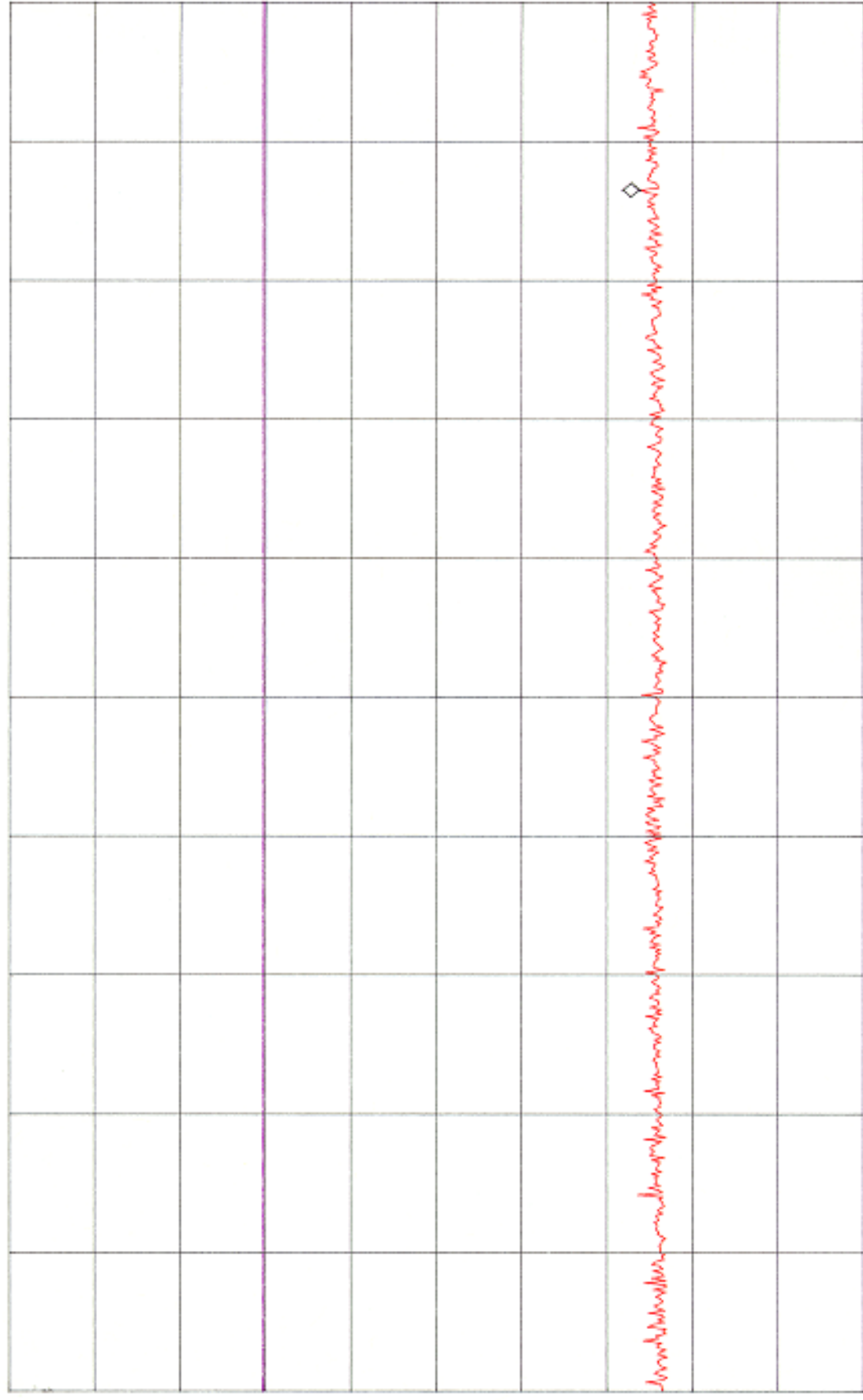
SEMS

CHANNEL 39

ATTEN 40dB
RL 30.0dBm

10dB/

MKR -43.67dBm
2.037GHz



D

START 30MHz
*RBW 100kHz

*VBW 100kHz

STOP 2.350GHz
SWP 580ms

CHANNEL 39

ATTEN 40dB
RL 30.0dBm

MKR 19.33dBm
2.4408GHz

10dB/



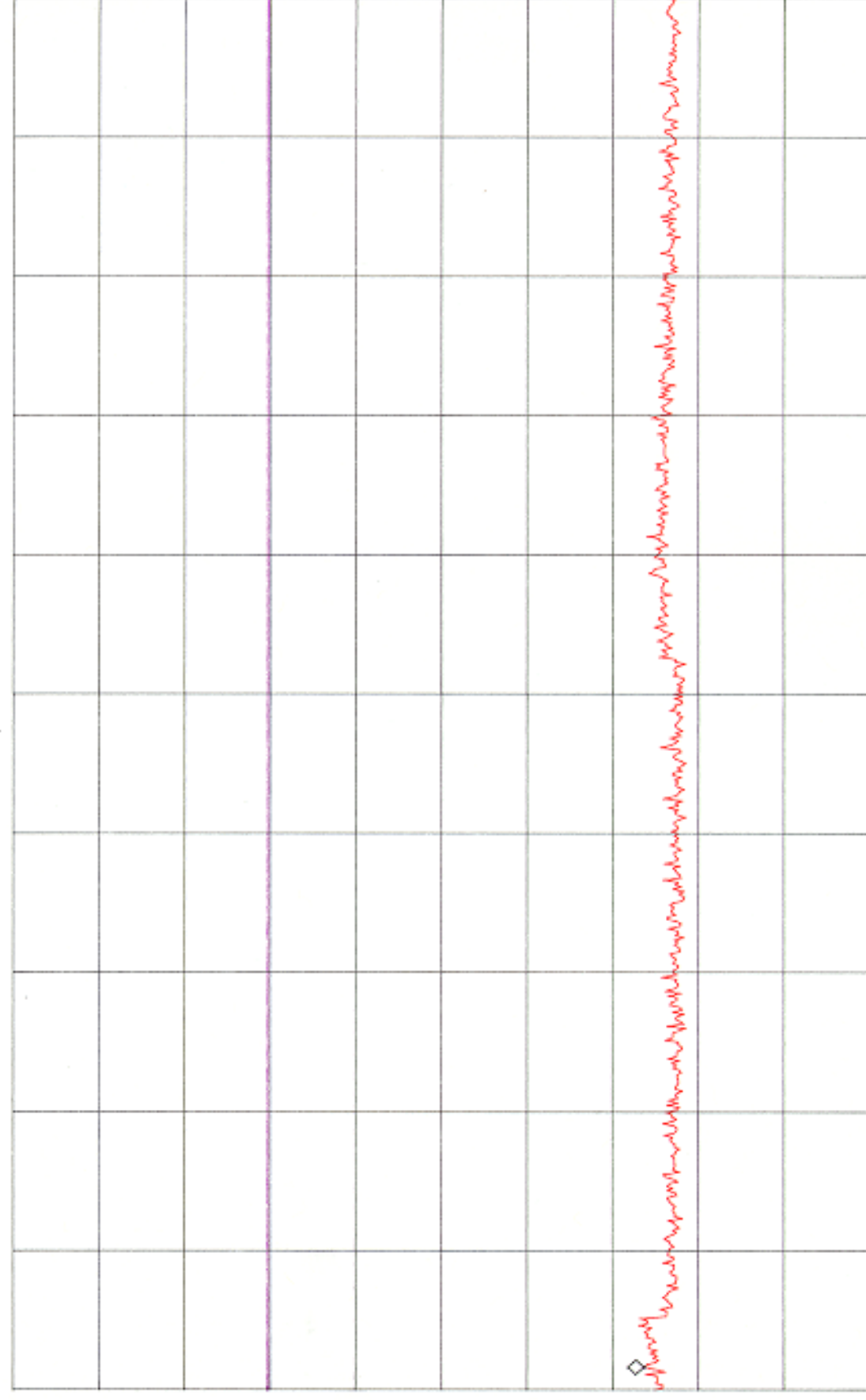
START 2.3500GHz STOP 2.5000GHz
*RBW 100kHz *VBW 100kHz SWP 50ms

CHANNEL 39

ATTEN 40dB
RL 30.0dBm

MKR -43.67dBm
2.625GHz

10dB/



D

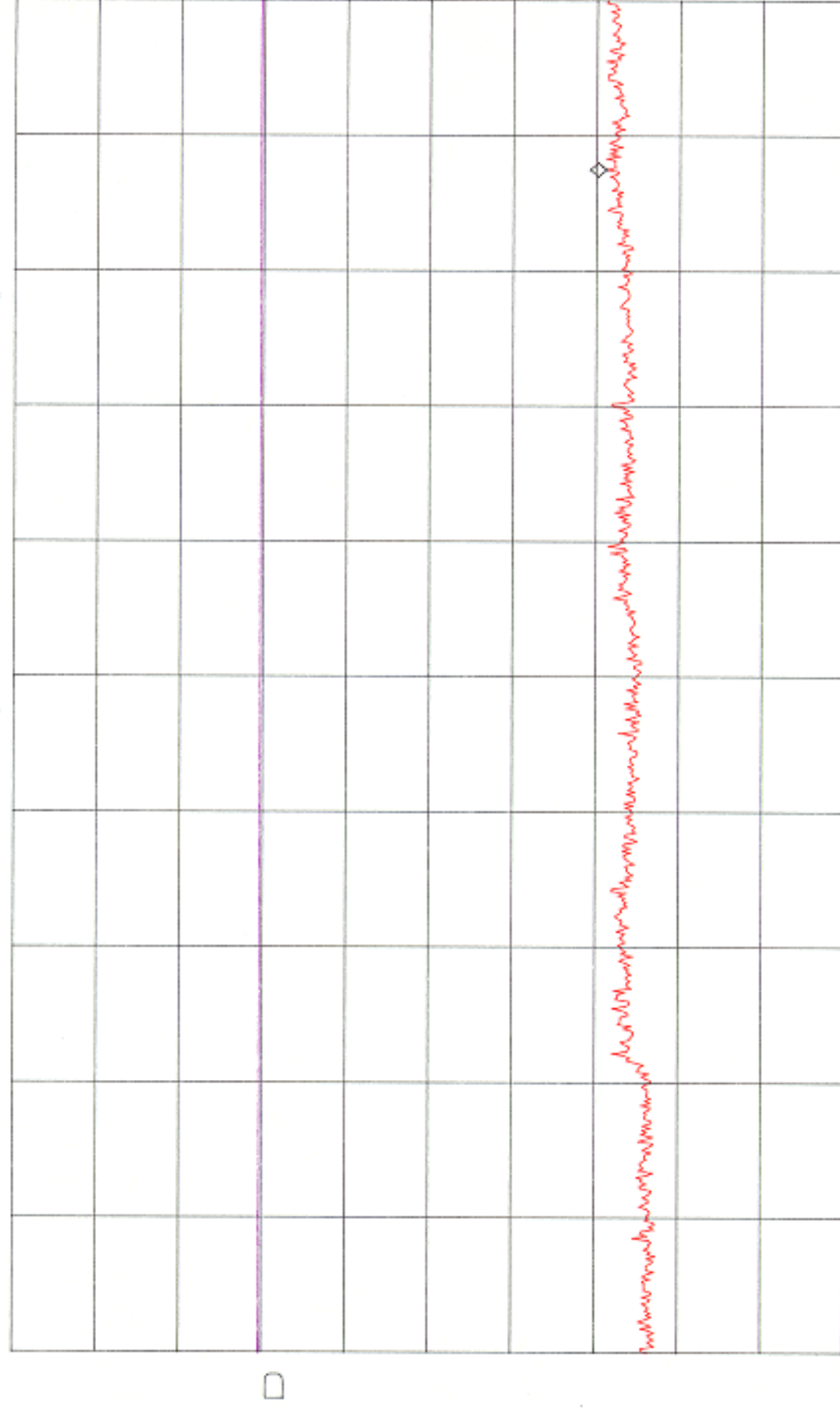
START 2.500GHz STOP 10.000GHz
*RBW 100kHz *VBW 100kHz SWP 1.9sec

CHANNEL 39

ATTEN 40dB
RL 30.0dBm

MKR -41.17dBm
23.13GHz

10dB/



START 10.00GHz

STOP 25.00GHz

*RBW 100kHz

*VBW 100kHz

SWP 3.8sec

CHANNEL 39

ATTEN 40dB
RL 30.0dBm

10dB/
MKR 19.83dBm
2.43987GHz

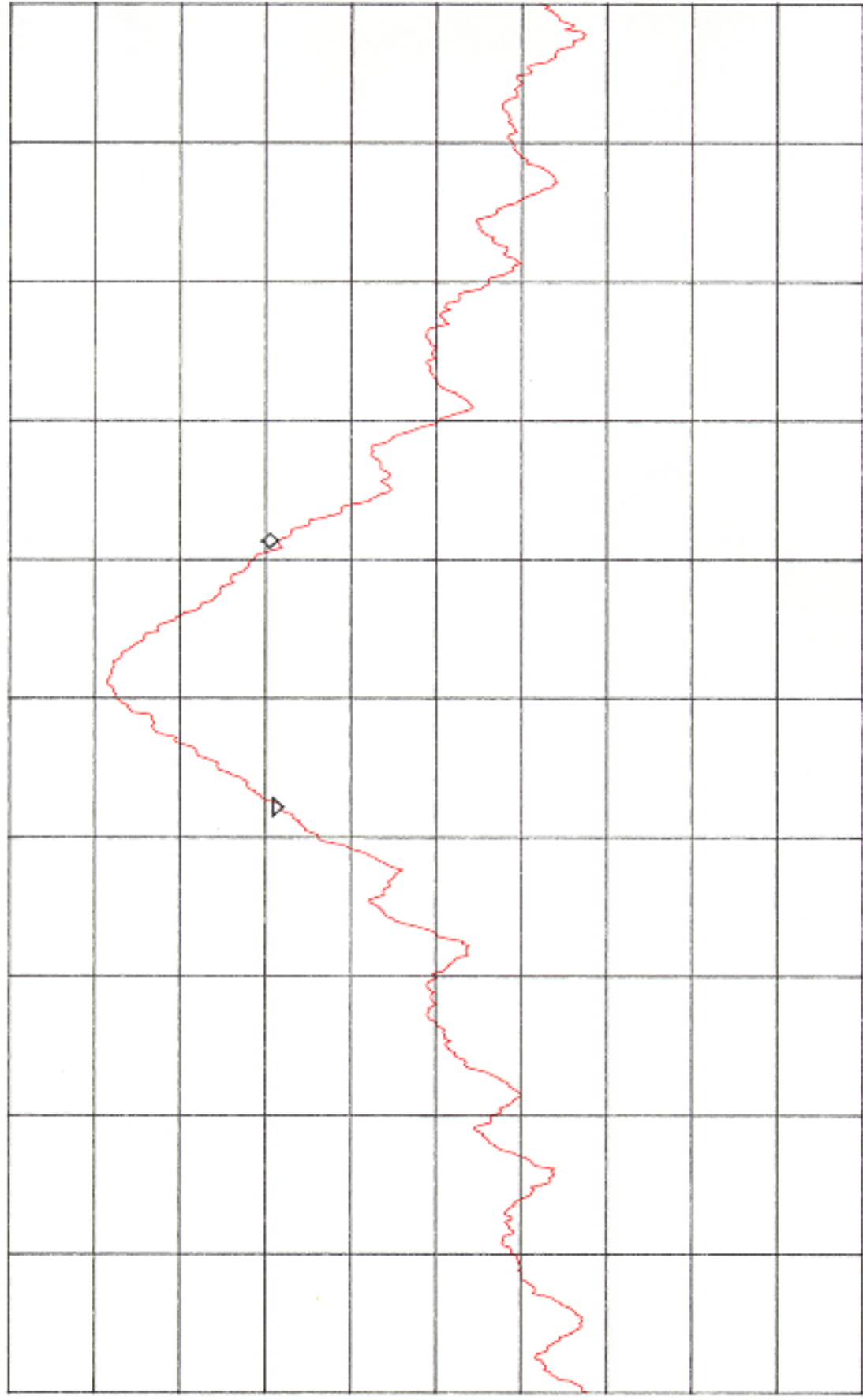


CENTER 2.44000GHz
*RBW 2.0MHz *VBW 3.0MHz

CHANNEL 39

ATTEN 40dB
RL 30.0dBm

Δ MKR .67dB
10dB/
958kHz



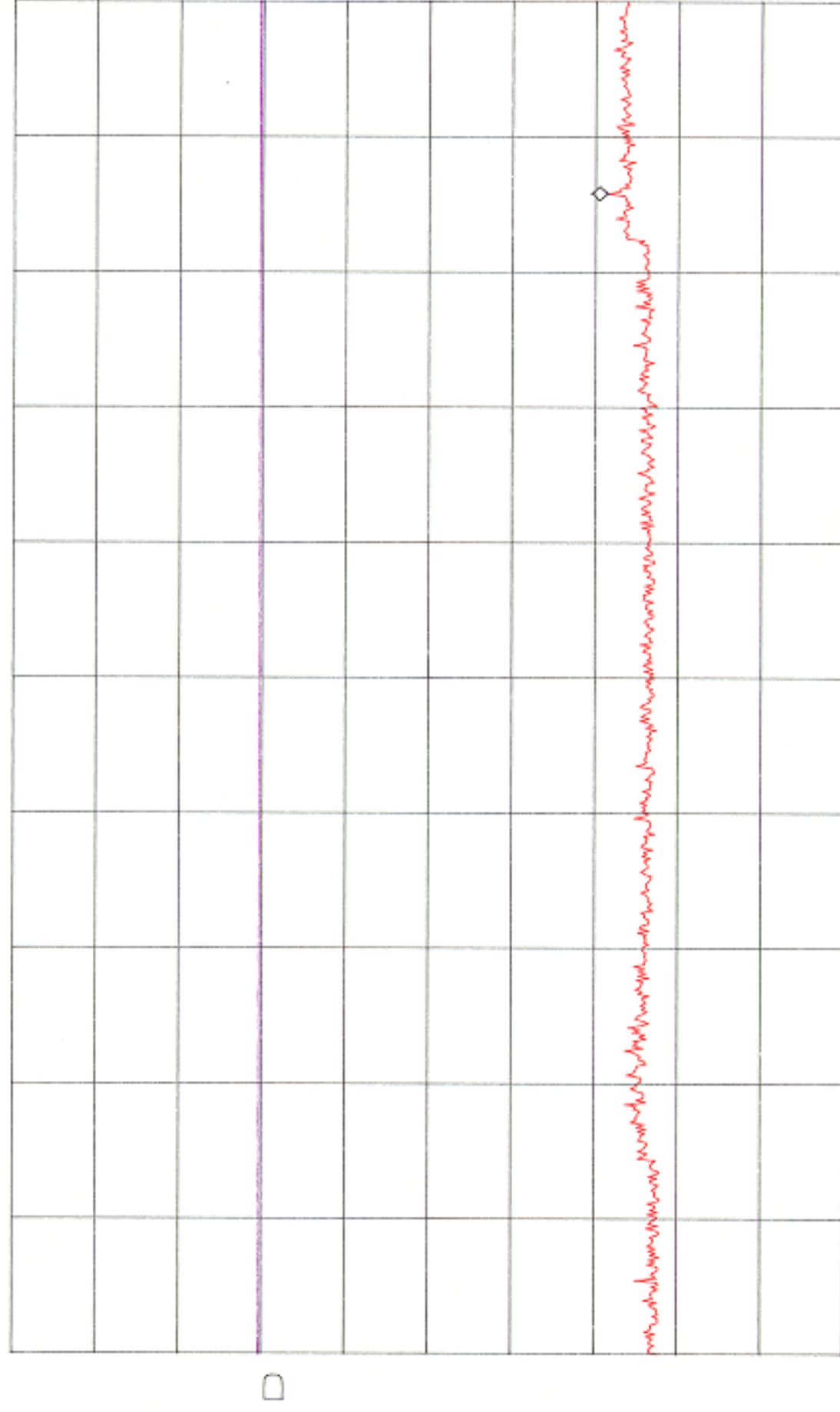
D

CENTER 2.440000GHZ
*RBW 30kHz
SPAN 5.000MHZ
*VBW 100kHz
SWP 50ms

CHANNEL 79

ATTEN 40dB
RL 30.0dBm

MKR -41.50dBm
13.58GHz
10dB/



START 5.00GHz

STOP 15.00GHz

*RBW 100kHz

*VBW 100kHz

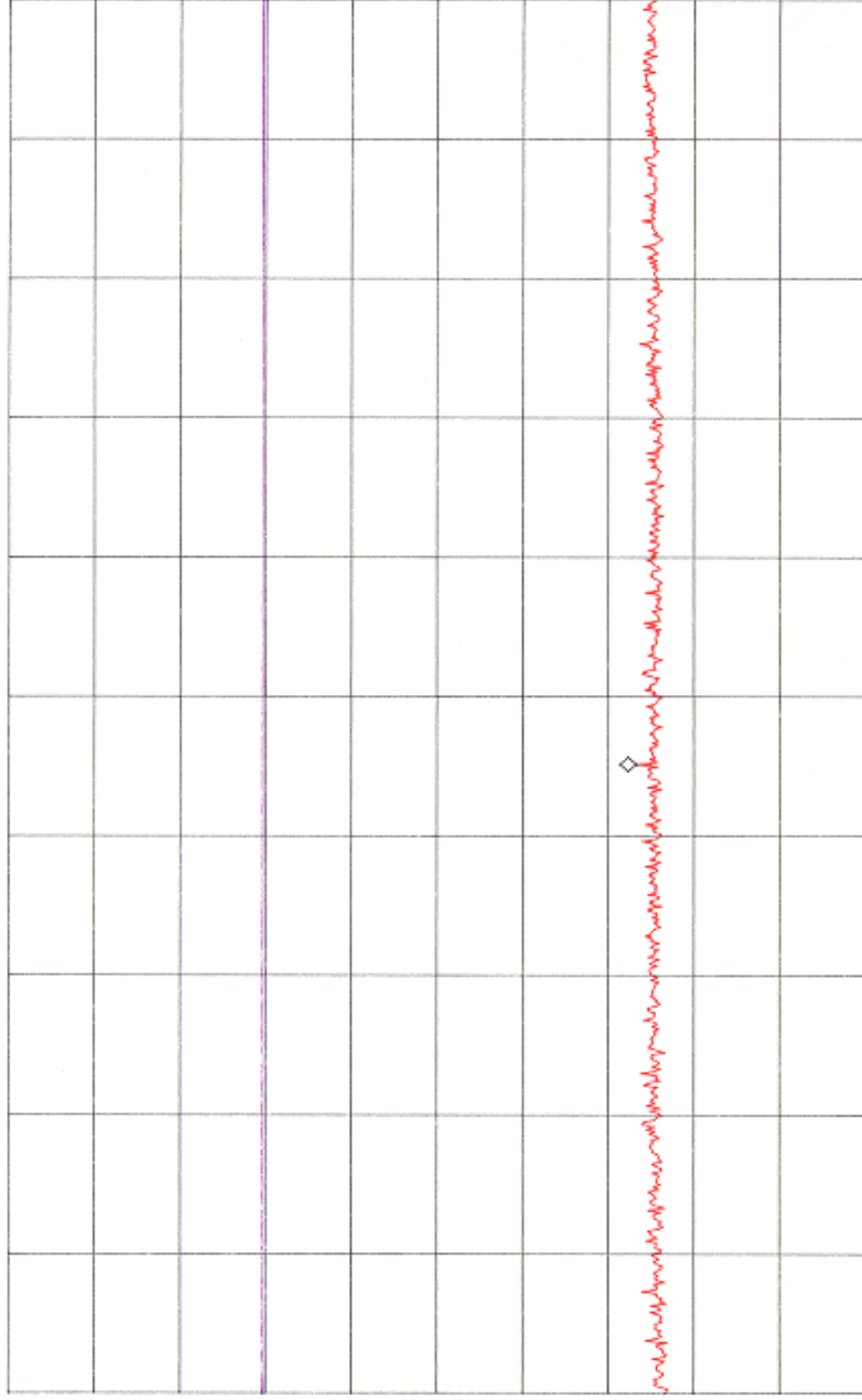
SWP 2.5sec

CHANNEL 79

ATTEN 40dB
RL 30.0dBm

MKR -43.33dBm
1.078GHz

10dB/



D

START 30MHz
*RBW 100kHz

STOP 2.350GHz
*VBW 100kHz SWP 580ms

CHANNEL 79

ATTEN 40dB
RL 30.0dBm

MKR -42.67dBm
10dB/
2.892GHz



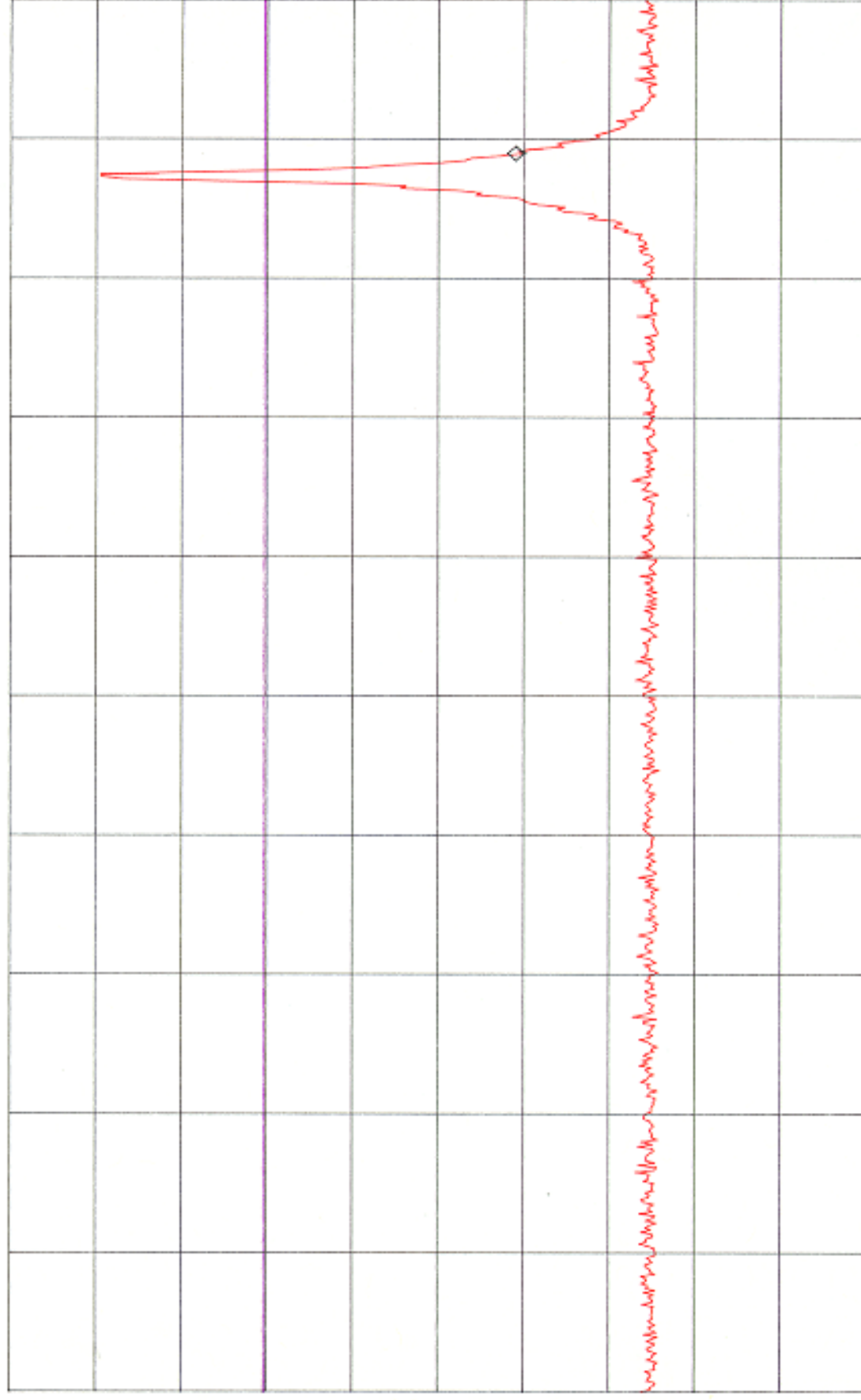
START 2.500GHz STOP 5.000GHz
*RBW 100kHz *VBW 100kHz SWP 630ms

CHANNEL 79

ATTEN 40dB
RL 30.0dBm

MKR -30.00dBm
2.4835GHz

10dB/



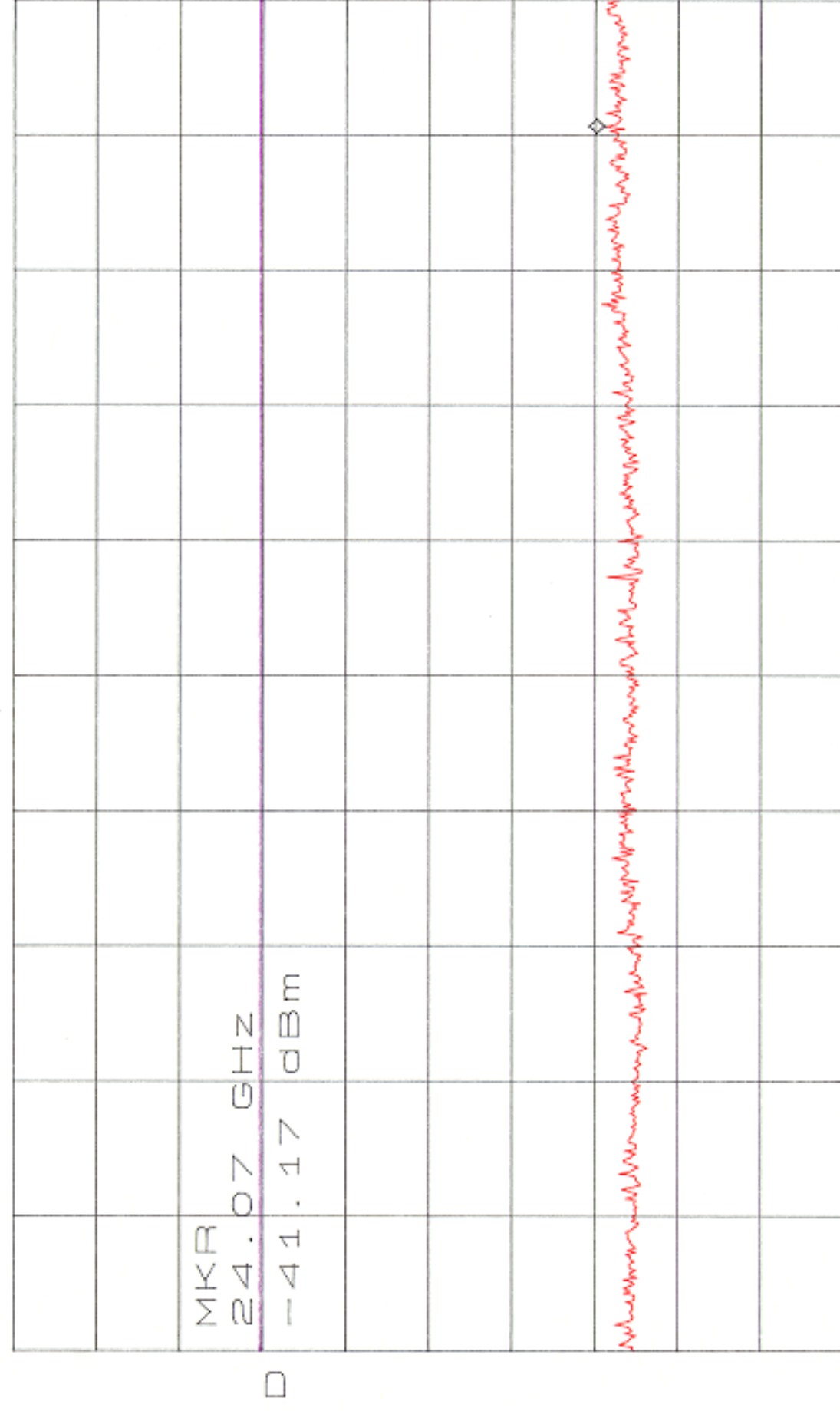
D

START 2.3500GHz STOP 2.5000GHz
*RBW 100kHz *VBW 100kHz SWP 50ms

CHANNEL 79

ATTEN 40dB
RL 30.0dBm

MKR -41.17dBm
24.07GHz



START 15.00GHz

STOP 25.00GHz

*RBW 100kHz

*VBW 100kHz

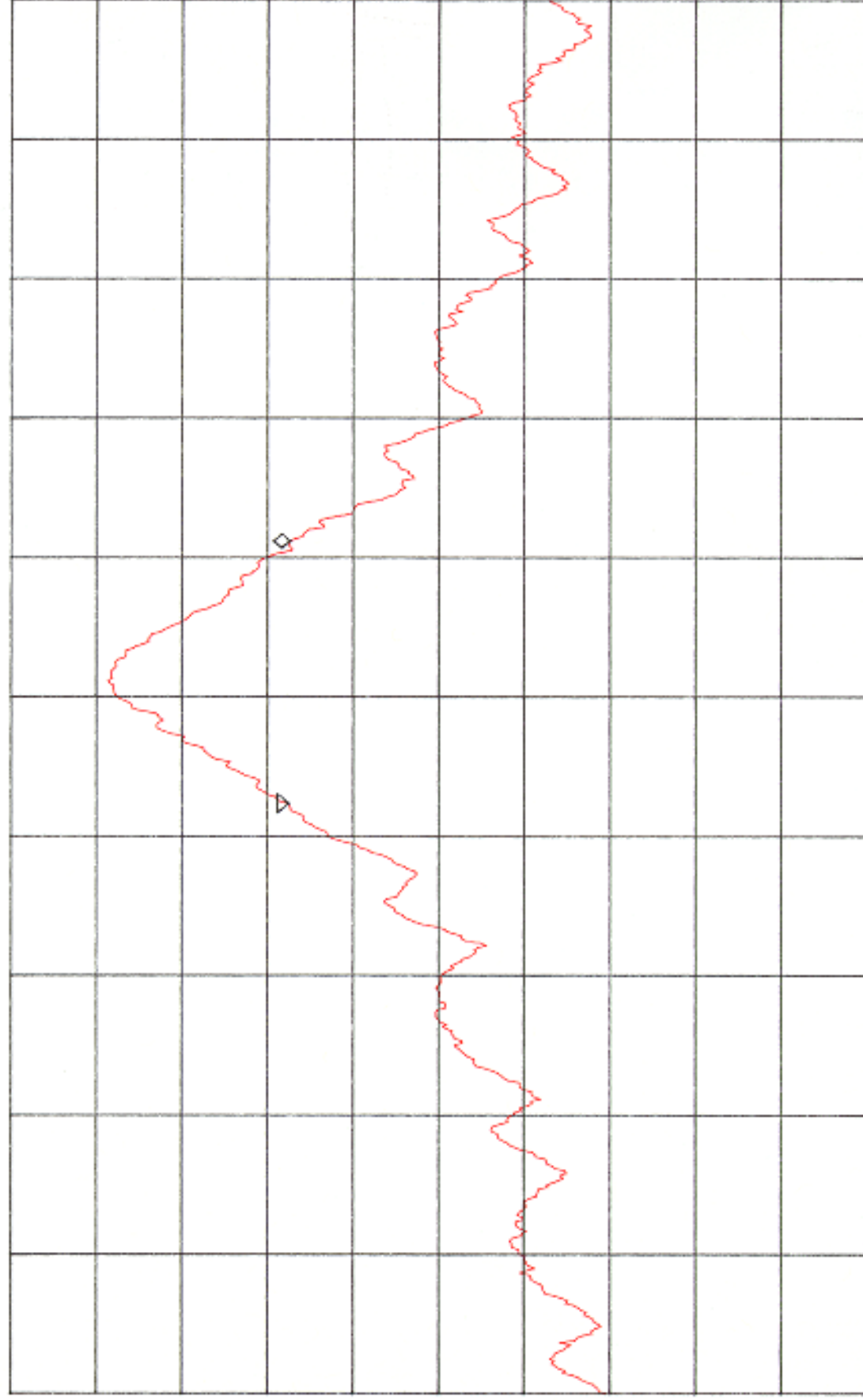
SWP 2.5sec

CHANNEL 79

ATTEN 40dB
RL 30.0dBm

Δ MKR 10dB/
942kHz

Δ MKR - .17dB



D

CENTER 2.480000GHz
*RBW 30kHz

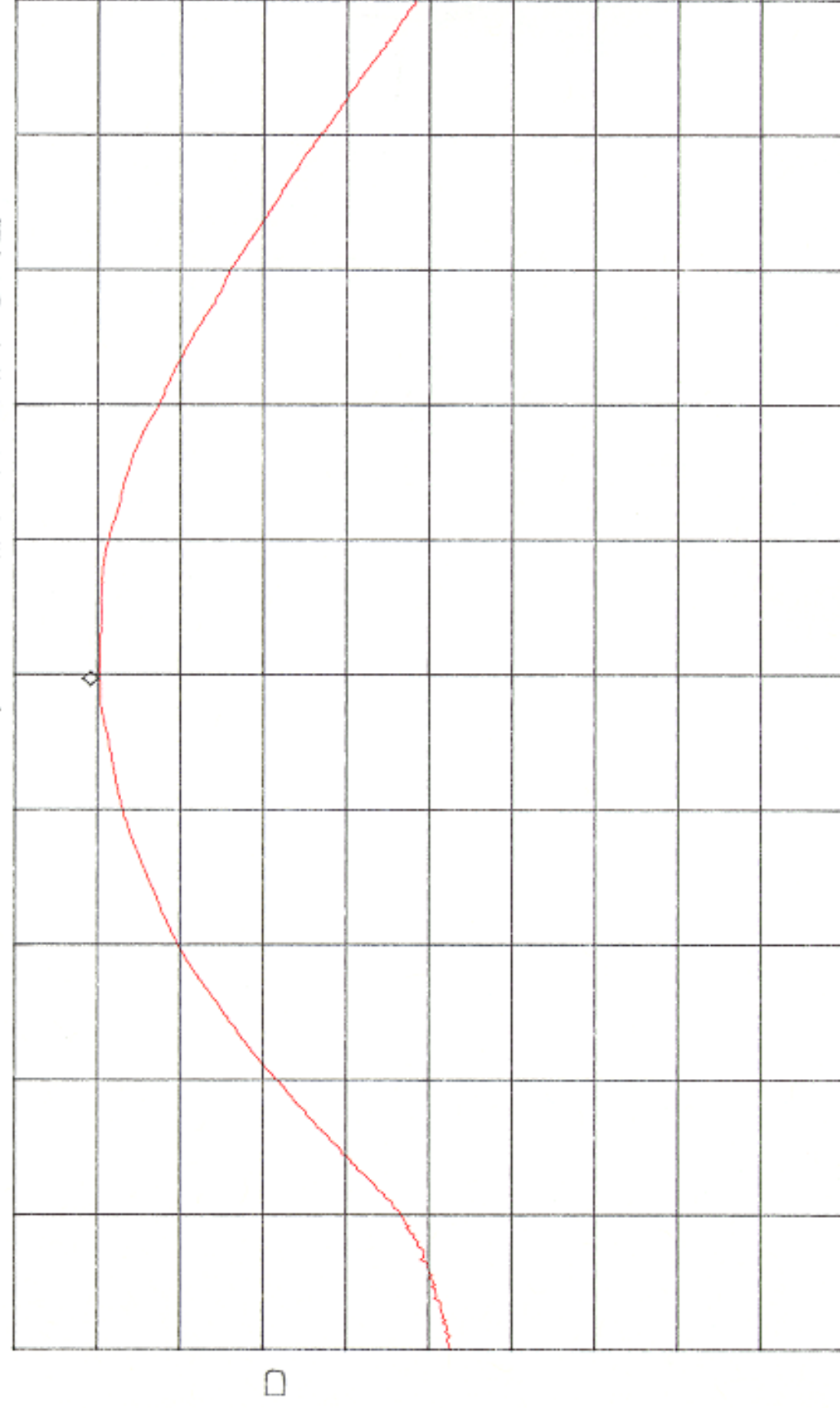
*VBW 100kHz

SPAN 5.000MHz
SWP 50ms

CHANNEL 79

ATTEN 40dB
RL 30.0dBm

MKR 19.83dBm
10dB/
2.47997GHz



CENTER 2.480000GHz
*RBW 2.0MHz *VBW 3.0MHz
SPAN 10.00MHz SWP 50ms