

Intertek Testing Services

APPLICATION FOR FCC CERTIFICATION

Continental Conair Limited

DSSS Cordless Telephone

Model: GH2405

FCC ID: LBBGH2405

Job # J99030602

Report # J99030602C

Number of Pages: 15 + Supporting Data and Documents

Date of Report: January 27, 2000

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The results contained in this report were derived from measurements performed on the identified test samples. Any implied performance of other samples on this report is dependent on the representative of the samples tested.



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1.0 Summary of Tests**DSSS Cordless Telephone – Model: GH2405
FCC ID: LBBGH2405**

TEST	REFERENCE	RESULTS
Max. Output power	15.247(b)	Pass
6 dB Bandwidth	15.247(a)(2)	Pass
Max. Power Density	15.247(d)	Pass
Out of Band Antenna Conducted Emission	15.247(c)	Pass
Out of Band Radiated Emission	15.247(c)	N/A
Radiated Emission in Restricted Bands	15.35(b)(c)	Pass
AC Conducted Emission	15.207	N/A
Radiated Emission from Digital Part	15.109	Pass
Radiated Emission from Receiver L.O.	15.109	N/A
Processing Gain Measurements	15.247(e)	Pass
Antenna Requirement	15.203	Pass

Test Engineer: Xi-Ming Yang
Xi-Ming YangDate: January 27, 2000Telco Manager: David Chernomordik
David ChernomordikDate: January 27, 2000

2.0 General Description**2.1 Product Description**

The Model GH2405 is a DSSS cordless telephone. For more details, please refer to the attached page.

A production version of the sample was received on December 28, 1999 in good condition.

Overview of Model GH2405

Applicant	Continental Conair Limited
Trade Name & Model No.	Southwestern Bell Freedom Phone, GH2405
FCC Identifier	LBBGH2405
Use of Product	DSSS Cordless Telephone
Manufacturer & Model of Spread Spectrum Module	Continental Conair Limited
Type of Transmission	Direct Sequence
Rated RF Output (mW)	100 mW
Frequency Range (MHz)	2404.8 – 2475.0
Number of Channel(s)	40
Antenna(s) & Gain, dBi	0
Processing Gain Measurements	☒ Will be provided to ITS for submission with the application ☐ Will be provided directly to the FCC reviewing engineer by the client or manufacturer of the spread spectrum module
Antenna Requirement	☒ The EUT uses a permanently connected antenna. ☐ The antenna is affixed to the EUT using a unique connector which allows for replacement of a broken antenna, but DOES NOT use a standard antenna jack or electrical connector. ☐ The EUT requires professional installation (attach supporting documentation if using this option).
Manufacturer name & address	Giant Electronics Ltd. 1,2,5,6 & 11/F., Elite Building Nam Tau, Shen Zhen People's Republic of China

2.2 Related Submittal(s) Grants

None.

2.3 Test Methodology

Both AC mains line-conducted and radiated emissions measurements were performed according to the procedures in ANSI C63.4 (1992). Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "Data Sheet" of this Application. All other measurements were made in accordance with the procedures in part 2 of CFR 47.

2.4 Test Facility

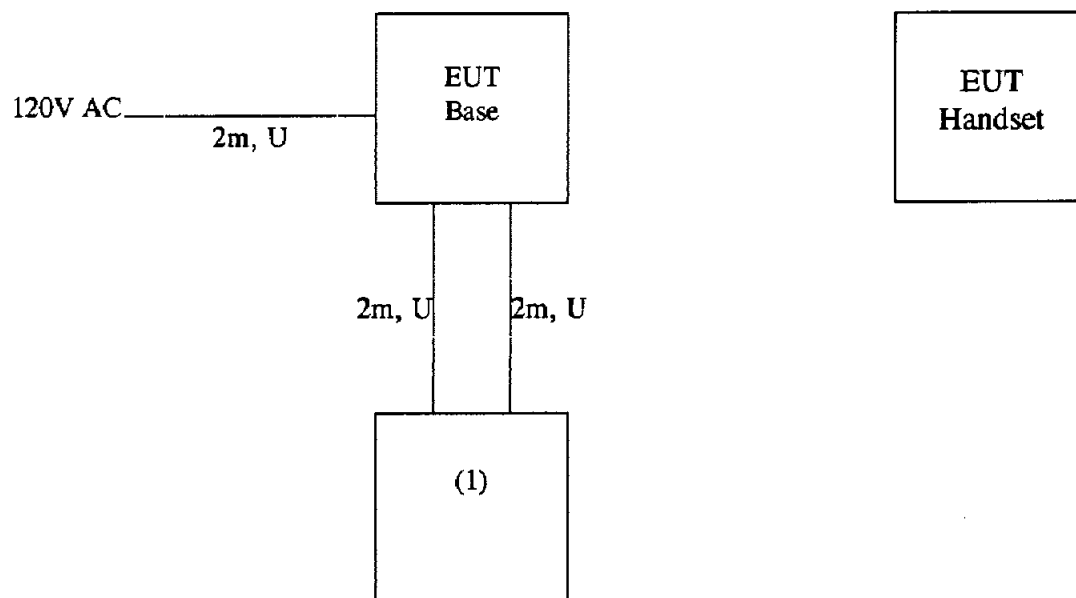
The open area test site and conducted measurement facility used to collect the radiated data is site . This test facility and site measurement data have been fully placed on file with the FCC and NVLAP accredited.

3.0 System Test Configuration

3.1 Support Equipment and description

Support equipment					
Qty	Equipment	Manufacturer	Model #	S/N #	FCC ID
1	Telephone Line Simulator	Telton	TLS-3	022733	N/A

3.2 Block Diagram of Test Setup



* = EUT

** = No ferrites on video cable

S = Shielded;

U = Unshielded

F = With Ferrite

3.3 Justification

For emission testing, the equipment under test (EUT) was configured for testing in a typical fashion (as a customer would normally use it). During testing, all cables were manipulated to produce worst case emissions.

For radiated emission measurements, the EUT is attached to a cardboard box (if necessary) and placed on the wooden turntable. If the EUT attaches to peripherals, they are connected and operational (as typical as possible). The EUT is wired to transmit full power.

The signal is maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters. Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance.

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance.

3.4 Software Exercise Program

The EUT exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use. For emissions testing, the units were setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing.

3.5 Mode of Operation During Test

The EUT was running in a transmitting mode.

3.6 Modifications Required for Compliance

The following modifications were installed during compliance testing in order to bring the product into compliance (Please note that this list does not include changes made specifically by prior to compliance testing):

No modifications were made to the EUT by Intertek Testing Services.

3.7 Additions, deviations and exclusions from standards

No additions, deviations or exclusion have been made from standard.

4.0 Measurement Results**4.1 Maximum Radiated Output Power, FCC RULES 15.247(b):****Test Procedure**

The EUT was positioned on a non-conductive turntable, 0.8m above the ground plane on an open test site.

The radiated emission at the fundamental frequency was measured at 3m distance with a test antenna and spectrum analyzer. During the measurement, the resolution and video bandwidth of the spectrum analyzer were set to 1 MHz. To maximize emissions, the system was rotated through 360°, the antenna height was varied from 1m to 4m, and the antenna polarization was changed.

The ERP was calculated using equation:

$$E = \frac{\sqrt{30 \cdot P \cdot G}}{D}$$

Where E = Field Strength (V/m),

D = Distance between two antennae(m)

G = Numeric Gain of Antenna (1 for isotropic antenna),

P = ERP (W) = EIRP (G=1)

Base		
Frequency (MHz)	Output in dBm	Output in mWatt
Low Channel: 1	19.2	84.6
Middle Channel: 20	19.4	88.7
High Channel: 40	19.7	94.8

Please refer to the following plots:

Plot B1a: Low Channel, Spectrum Analyzer Reading (Base)

Plot B1b: Middle Channel, Spectrum Analyzer Reading (Base)

Plot B1c: High Channel, Spectrum Analyzer Reading (Base)

Data Sheet – Radiated Emission (Output Power)

Handset		
Frequency (MHz)	Output in dBm	Output in mWatt
Low Channel: 1	18.2	67.2
Middle Channel: 20	18.6	73.6
High Channel: 40	19.4	88.6

Please refer to the following plots:

Plot H1a: Low Channel, Spectrum Analyzer Reading (Handset)

Plot H1b: Middle Channel Output Power Reading (Handset)

Plot H1c: High Channel Output Power Reading (Handset)

**Radiated Emissions Test
Data**

Company:	Continental Conair Ltd.	Model #:			Reg:	FCC 2.993
EUT:	Cordless Phone Base	S/N or FCC #:			Test Dist:	3 meters
Project #:	J9903060 2	Test Date:	December 28, 1999		TP:	0.04 Watts
Test Mode:	Tx Power for Low, Mid, Hing Ch	Engineer:	Xi Ming Y.		Min. Attn:	20.13 dBc

Antenna Used			Pre-Amp Used			Cable Used			Transducer Used	
Number:	2	14	21	0	8	13	0	0	12	0
Model:	EMCO 3143	EMCO 3115	3180-9	None	CDR P1000	AC04400	None	None	Omni-MPL	None

Frequency MHz	Reading dB(μV)	Detector P/A/Q	Ant #	Amp #	Ant. Pol. H/V	Ant. Factor dB(1m)	Pre-Amp dB	Insert. Loss dB	Net dB(μV/m)	ERP mW	EIRP mW	Margin dB
2404.76	82.1	Peak	14	0	V	30.1	0.0	2.3	114.5	5.16E+01	84.6	
2440.48	82.3	Peak	14	0	V	30.1	0.0	2.3	114.7	5.40E+01	88.7	
2475.00	82.6	Peak	14	0	V	30.1	0.0	2.3	115.0	5.78E+01	94.8	

Notes:	a) O.C.F.: Other Correction Factor
	b) Insert. Loss = Cable A + Cable B + Cable C + Transducer.
	c) Net = Reading + Antenna Factor - Pre-Amp + Insert. Loss.
	d) Attn. = Field Strength (Fundamental) - Field Strength (Harmonics).
	e) Negative signs (-) in Margin column signify levels below the limits.

Radiated Emissions Test Data

Company:	Continental Conair Ltd.	Model #:		Req.	FCC 15.247
EUT:	Cordless Phone Hand set	S/N or FCC #:		Test Dist.	3 meter
Project #:	J99030602	Test Date:	December 28, 1999	TP	Watt
Test Mode:	Tx Power for Low, Mid, High Ch.	Engineer:	Xi Ming Y.	Min. Attn	dBc

	Antenna Used			Pre-Amp Used			Cable Used			Transducer Used
Number:	2	14	21	0	8	13	0	0	12	0
Model:	EMCO 3143	EMCO 3115	3100-9	None	ODI_P1000	ACO400	None	None	Gm_MHL	None

[illegible]

Notes

- a) O.C.F.: Other Correction Factor
- b) Insert. Loss = Cable A + Cable B + Cable C + Transducer.
- c) Net = Reading + Antenna Factor - Pre-Amp + Insert. Loss.
- d) Attn. = Field Strength (Fundamental) - Field Strength (Harmonics).
- e) Negative signs (-) in Margin column signify levels below the limits.

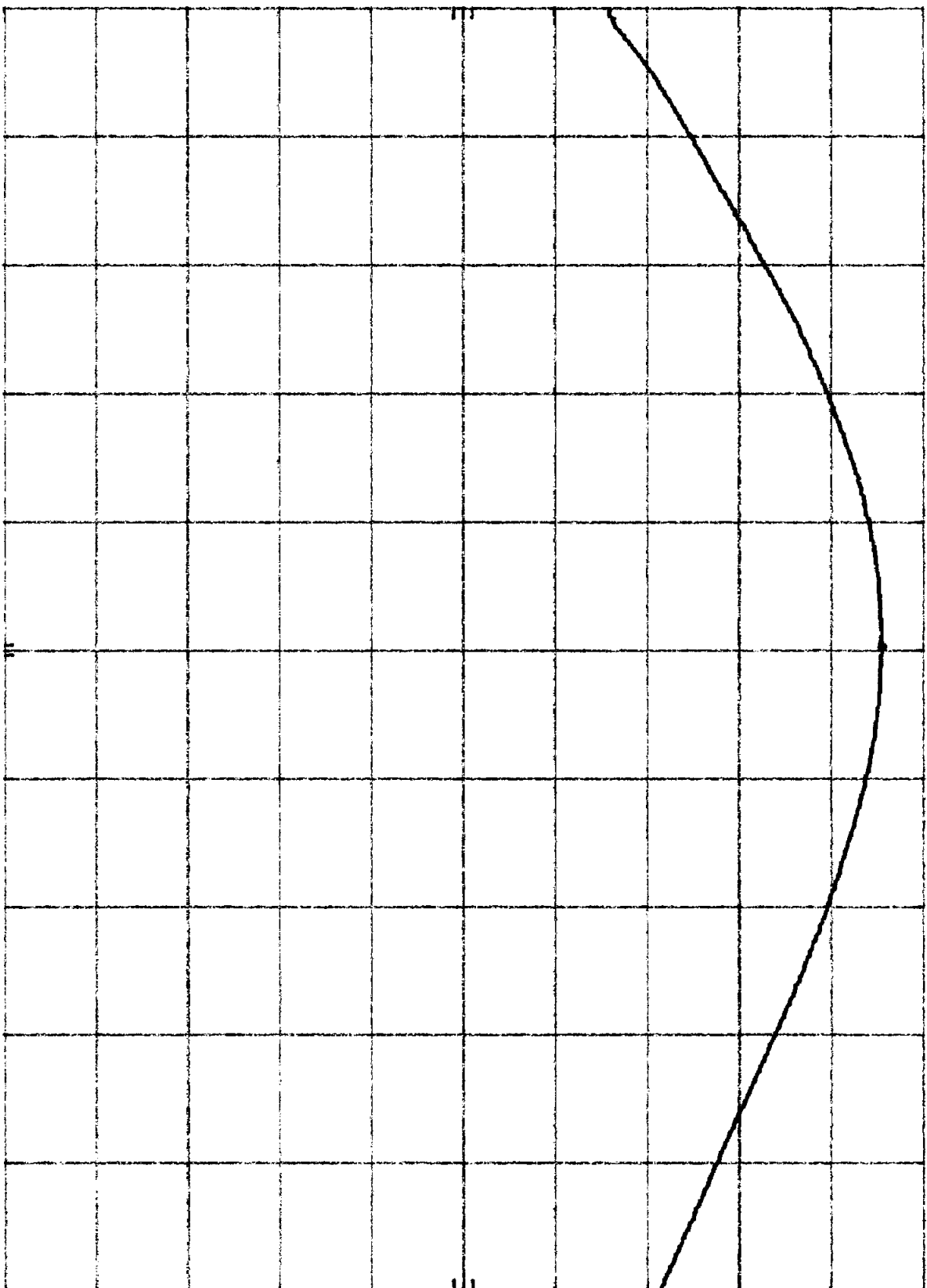
170

10 dB/

REF 86.6 DB μ V ATTEN 0 DB

Plot B1a

MR 2.40476 GHz
82.10 dBμV



CENTER 2. 404 B GHZ

RES BW 3 MHN

VBW 3 MHz

SPAN 10.0 MHz
SWP 20.0 msec

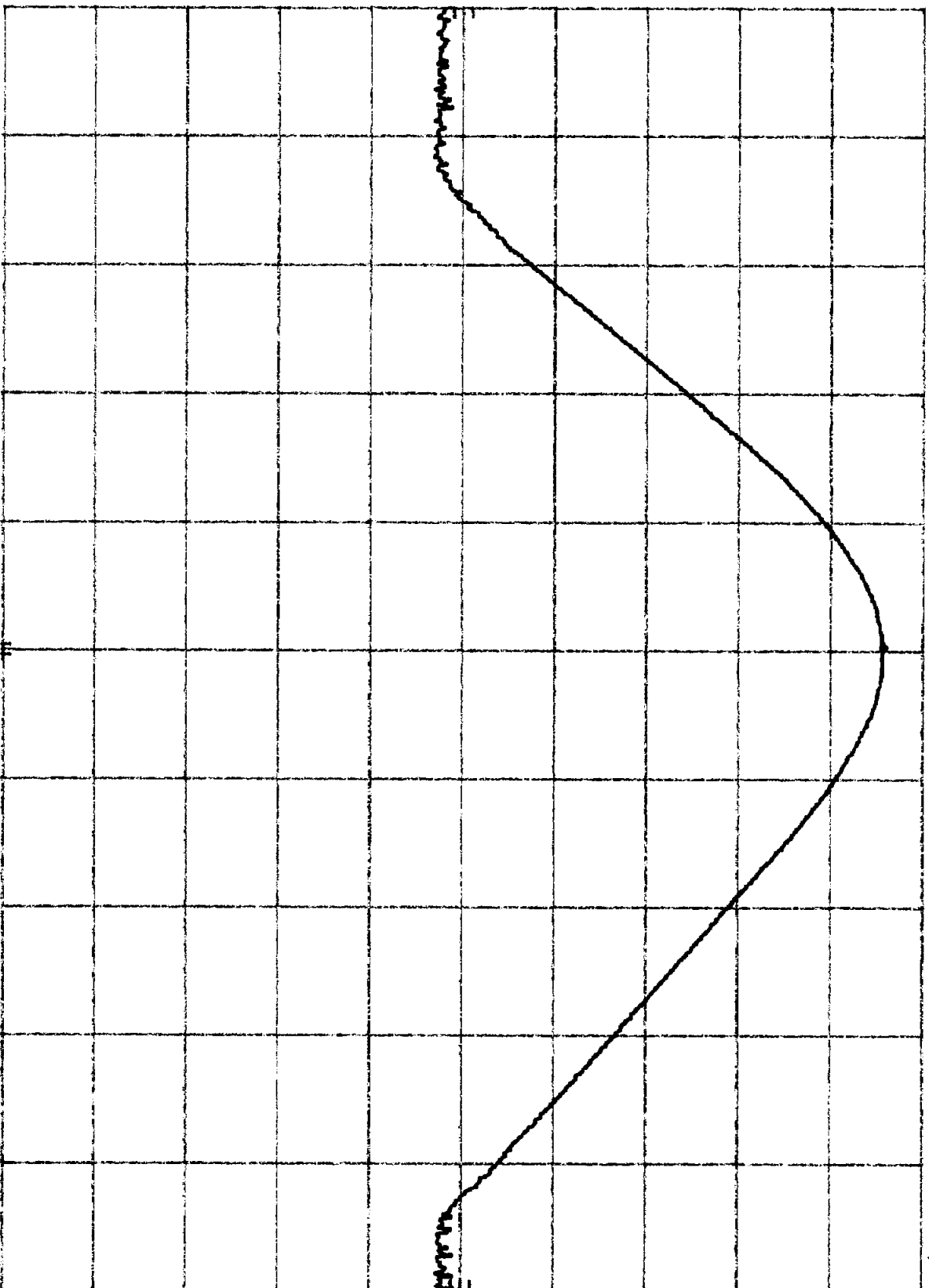
HP

REF 86.6 dBμV ATTEN 0 dB

W1 B1b

MKR 2.440 72 CHZ
02.30 dBμV

10 dB/



CENTER 2.440 8 CHZ

RES BW 3 MHZ

VBW 3 MHZ

SPAN 20.0 MHZ
SWP 20.0 msec

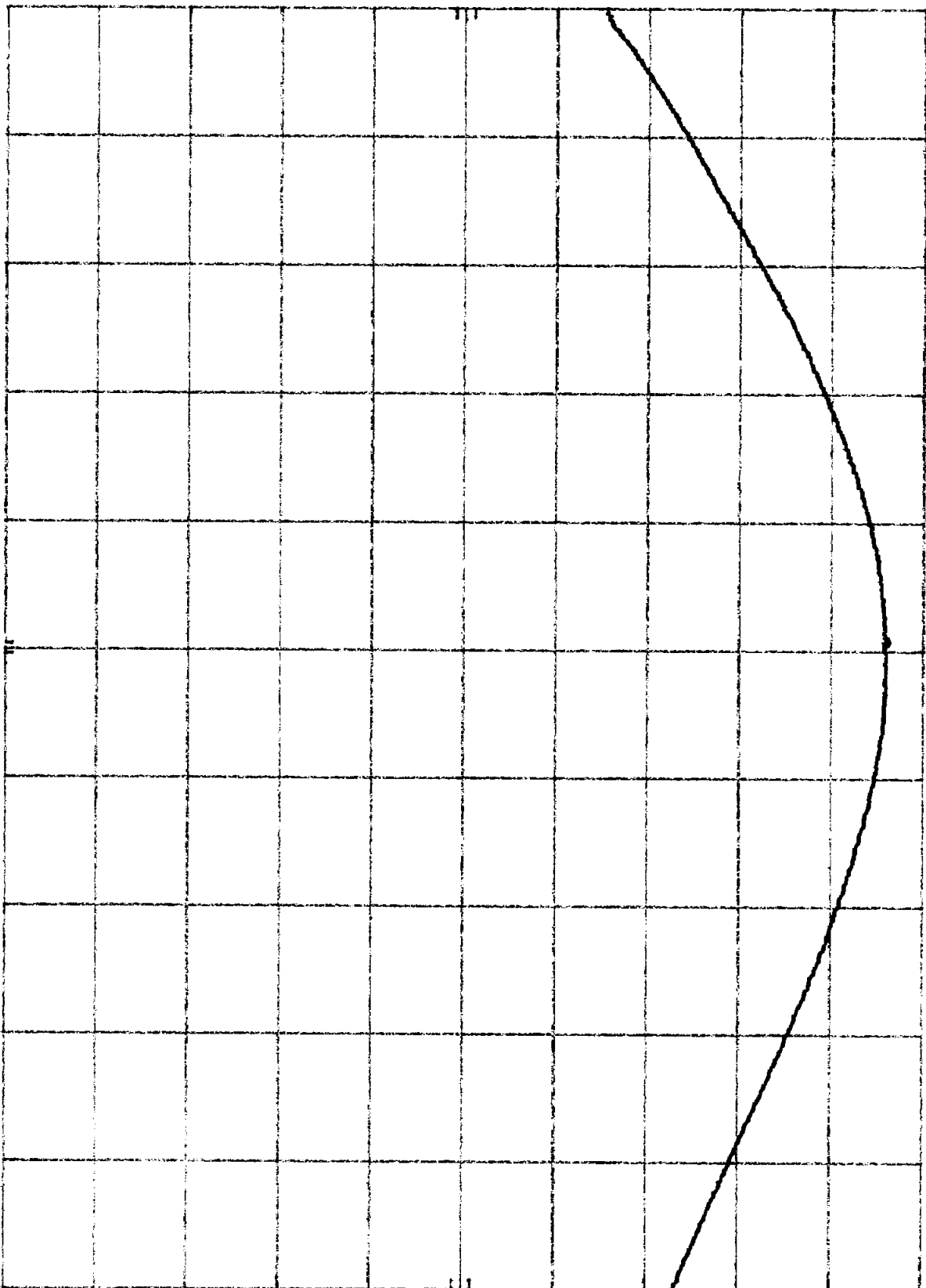
HP

REF 86.6 dBμV ATTEN 0 dB

not 510

MKR 2.474 82 GHz
82.60 dBμV

10 dB



CENTER 2.474 9 GHz

RES BW 3 MHz

VBW 3 MHz

SPAN 10.0 MHz
SWP 20.0 msec

Plot H1A

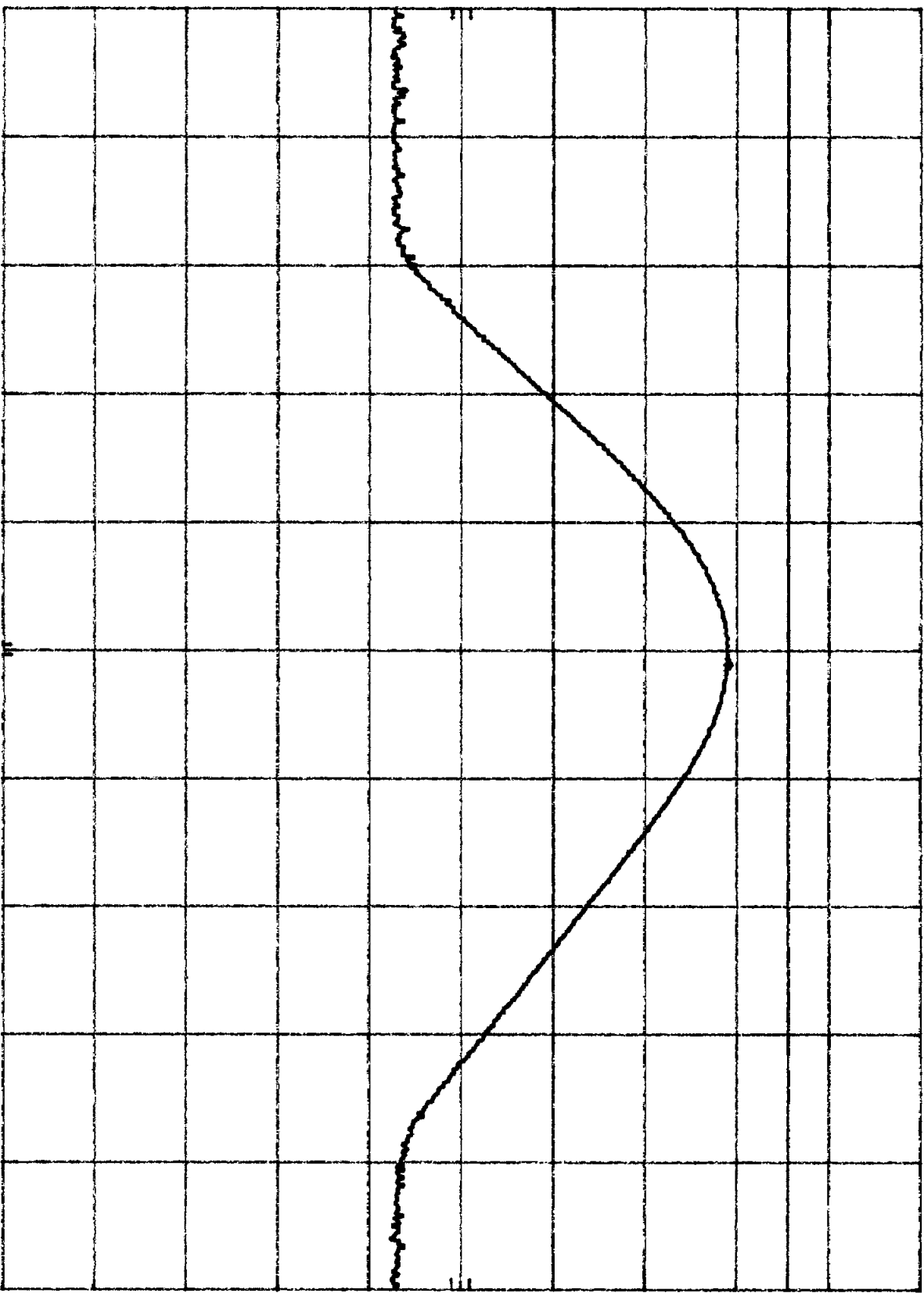
HP

REF 102.0 dBμV ATTEN 10 dB

MKR 2.404 84 GHz
81.10 dBμV

10 dB/

DL
87.6
dBμV



CENTER 2.404 6 GHz

RES BW 3 MHz

VBW 3 MHz

SPAN 20.0 MHz
SWP 20.0 msec

HP

REF 92.0 dBμV

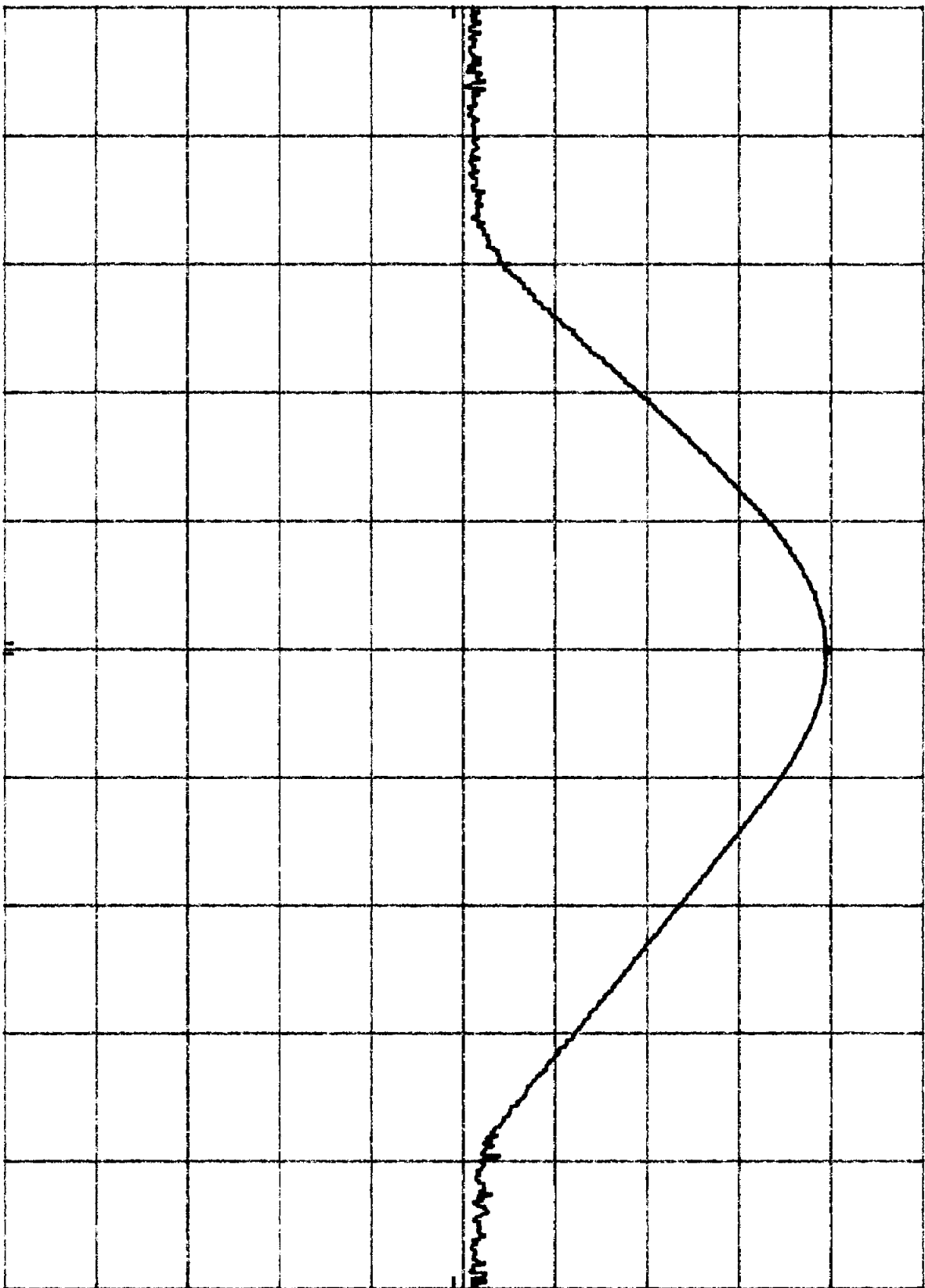
ATTEN 10 dB

Plot 41b

MKR 2.440 77 GHz

81.50 dBμV

10 dB/



CENTER 2.440 7 GHz

RES BW 3 MHz

VBW 3 MHz

SPAN 20.0 MHz

SWP 20.0 msec

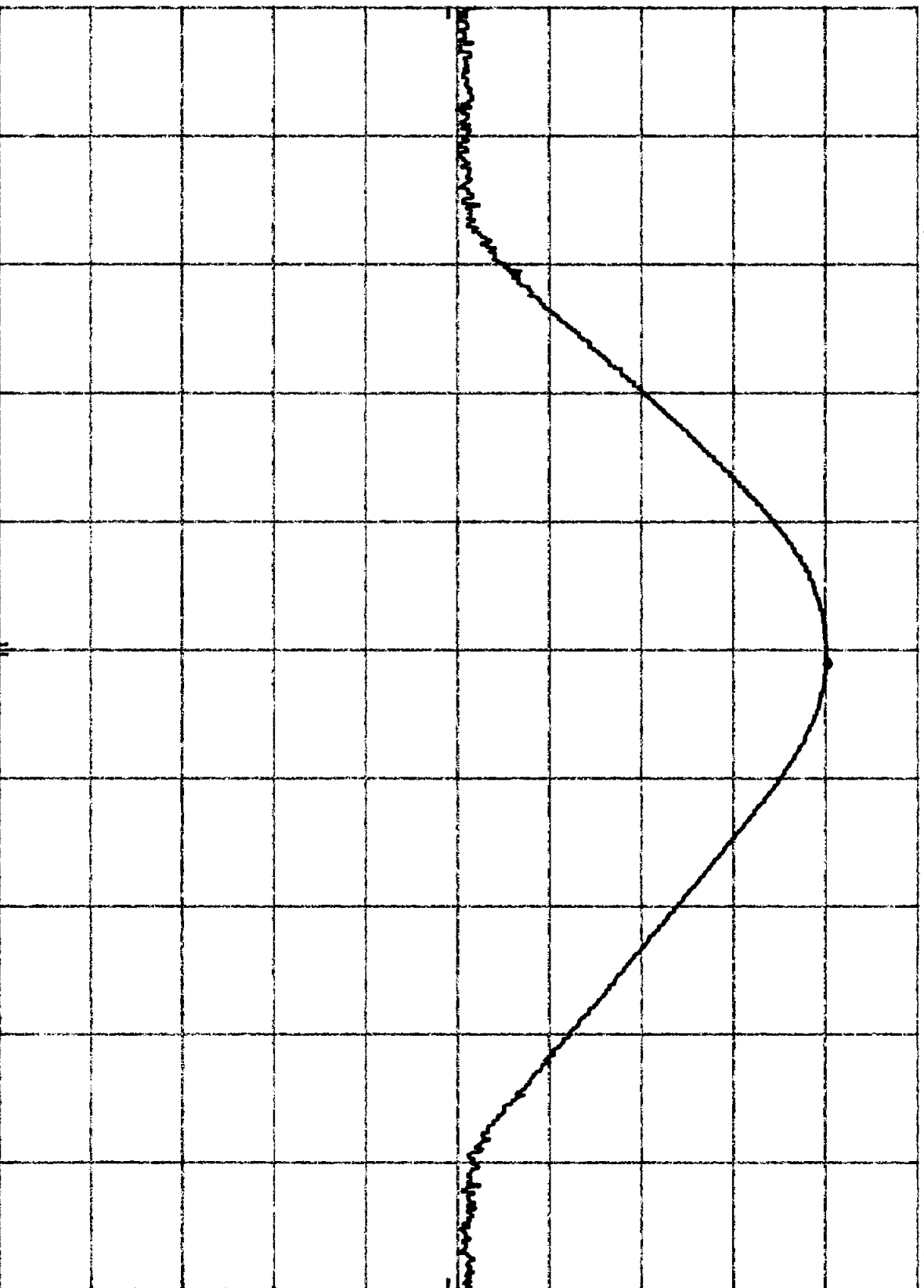
HP

REF 92.0 dBμV ATTEN 10 dB

Plot H1C

MKR 2.475 20 CHZ 82.30 dBμV

10 dB/



CENTER 2.475 0 CHZ RES BW 3 MHZ VBW 3 MHZ SWP 20.0 msec

4.2 Minimum 6 dB RF Bandwidth, FCC Rule 15.247(a)(2):

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer RES BW was set to 100 kHz. For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier. A PEAK output reading was taken, a DISPLAY line was drawn 6 dB lower than PEAK level. The 6 dB bandwidth was determined from where the channel output spectrum intersected the display line.

Base		
Frequency (MHz)	Min. 6 dB Bandwidth (kHz)	Limit (kHz)
2400.8	1442	500

Refer to the following plots for 6 dB bandwidth sharp:

Plot B2a: Low Channel 6 dB RF Bandwidth

Plot B2b: Middle Channel 6 dB RF Bandwidth

Plot B2c: High Channel 6 dB RF Bandwidth

Handset		
Frequency (MHz)	Min. 6 dB Bandwidth (kHz)	Limit (kHz)
2475	1434	500

Refer to the following plots for 6 dB bandwidth sharp:

Plot H2a: Low Channel 6 dB RF Bandwidth

Plot H2b: Middle Channel 6 dB RF Bandwidth

Plot H2c: High Channel 6 dB RF Bandwidth

HP

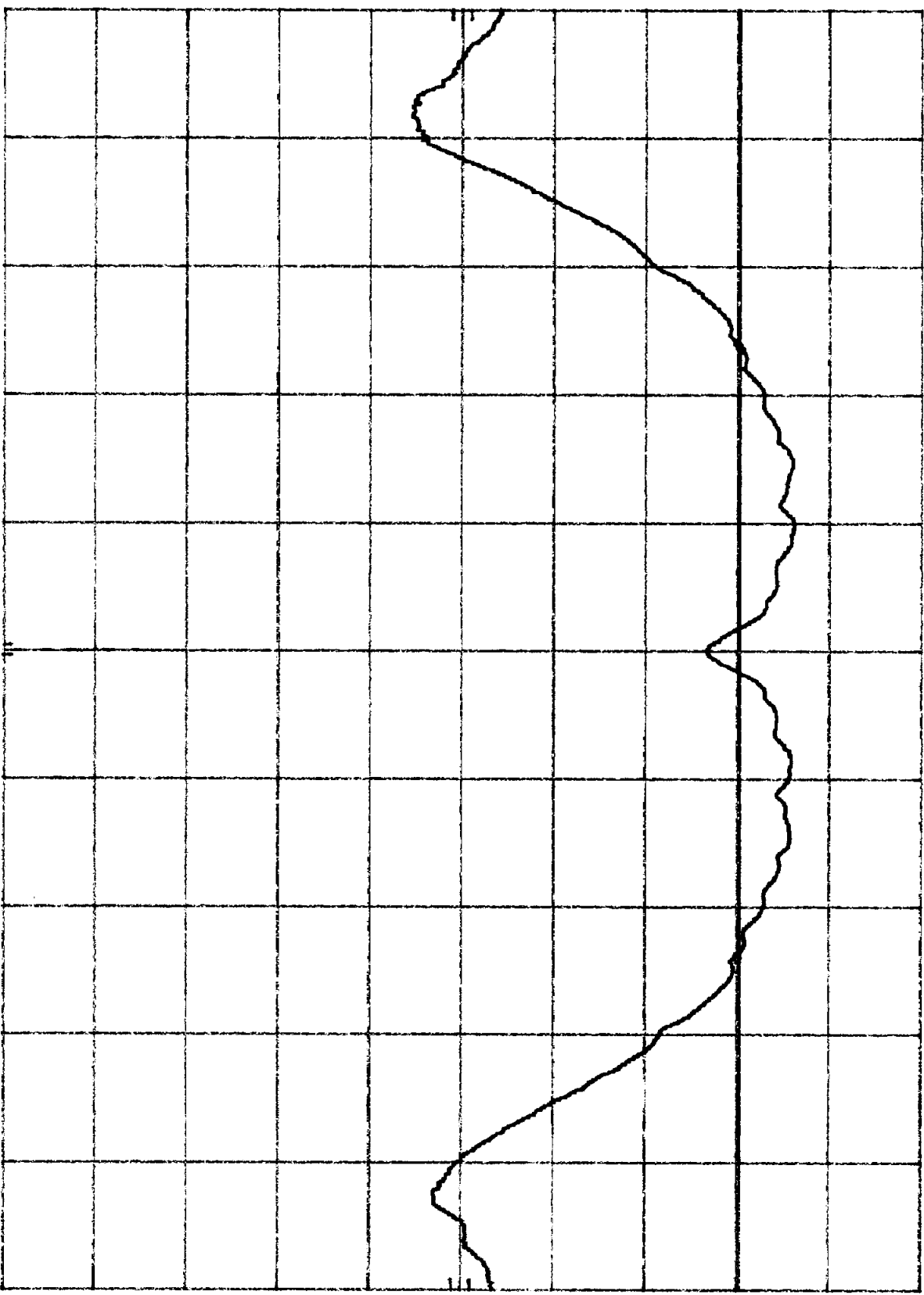
REF 86.6 dBμV ATTN 0 dB

Plot 8.2.3

MKR Δ 1.437 MHz
0.00 dB

10 dB/

DL
66.9
dBμV



CENTER 2.404 80 CHZ
RES BW 100 KHZ
VBW 100 KHZ
SPAN 3.00 MHZ
SWP 20.0 msec

h_p

REF 86.6 dBμV ATTEN 0 dB

MKR Δ 1.422 MHz

0.50 dB

10 dB/

P85 526

DL
67.2
dBμV



CENTER 2.440 80 CHz

RES BW 100 KHz

VBW 100 KHz

SPAN 3.00 MHz

SWP 20.0 msec

HP

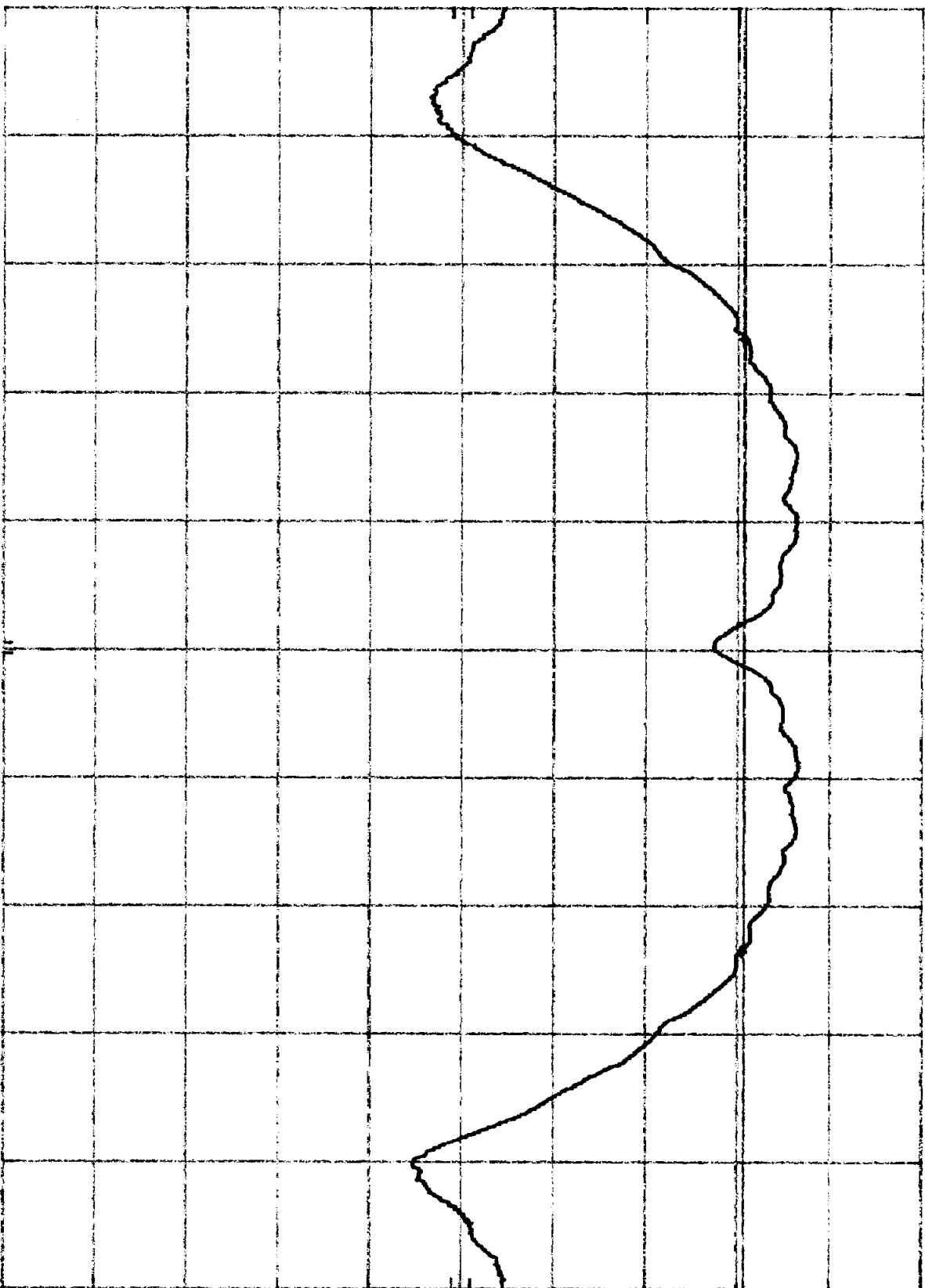
10 dB

REF 86.6 dBμV ATTEN 0 dB

Plot 820

MKR Δ 1.434 MHz
-0.20 dB

DL
67.3
dBμV



CENTER 2.475 01 GHz

RES BW 100 kHz

VBW 100 kHz

SPAN 3.00 MHz
SWP 20.0 msec

HP

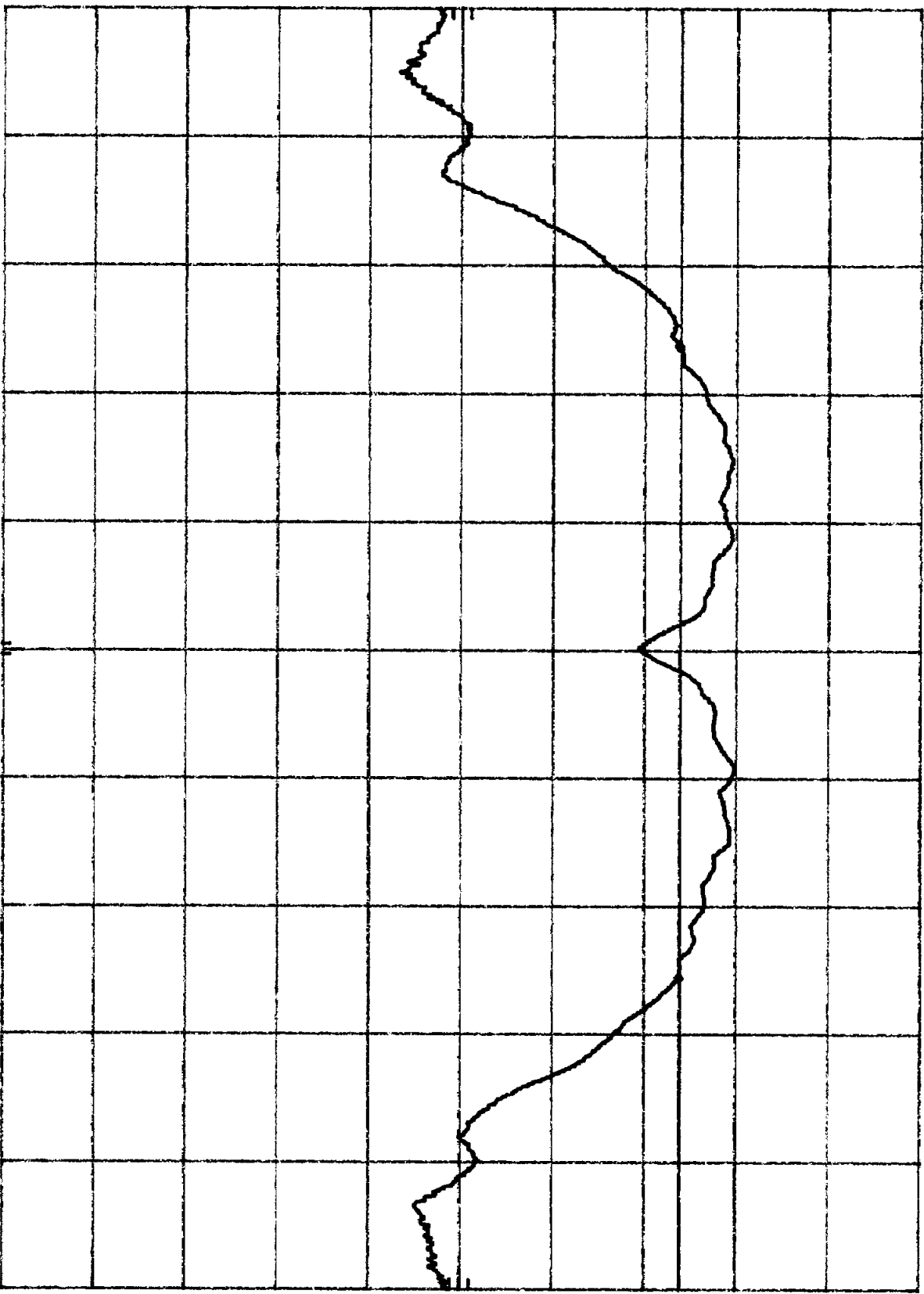
REF 92.0 dBμV ATTEN 10 dB

Plot H2a

MKR Δ 1.479 MHz
0.10 dB

10 dB/

DL
65.9
dBμV



CENTER 2.404 78 GHz

RES BW 100 kHz

VBW 100 kHz

SPAN 3.00 MHz
SWP 20.0 msec

hp

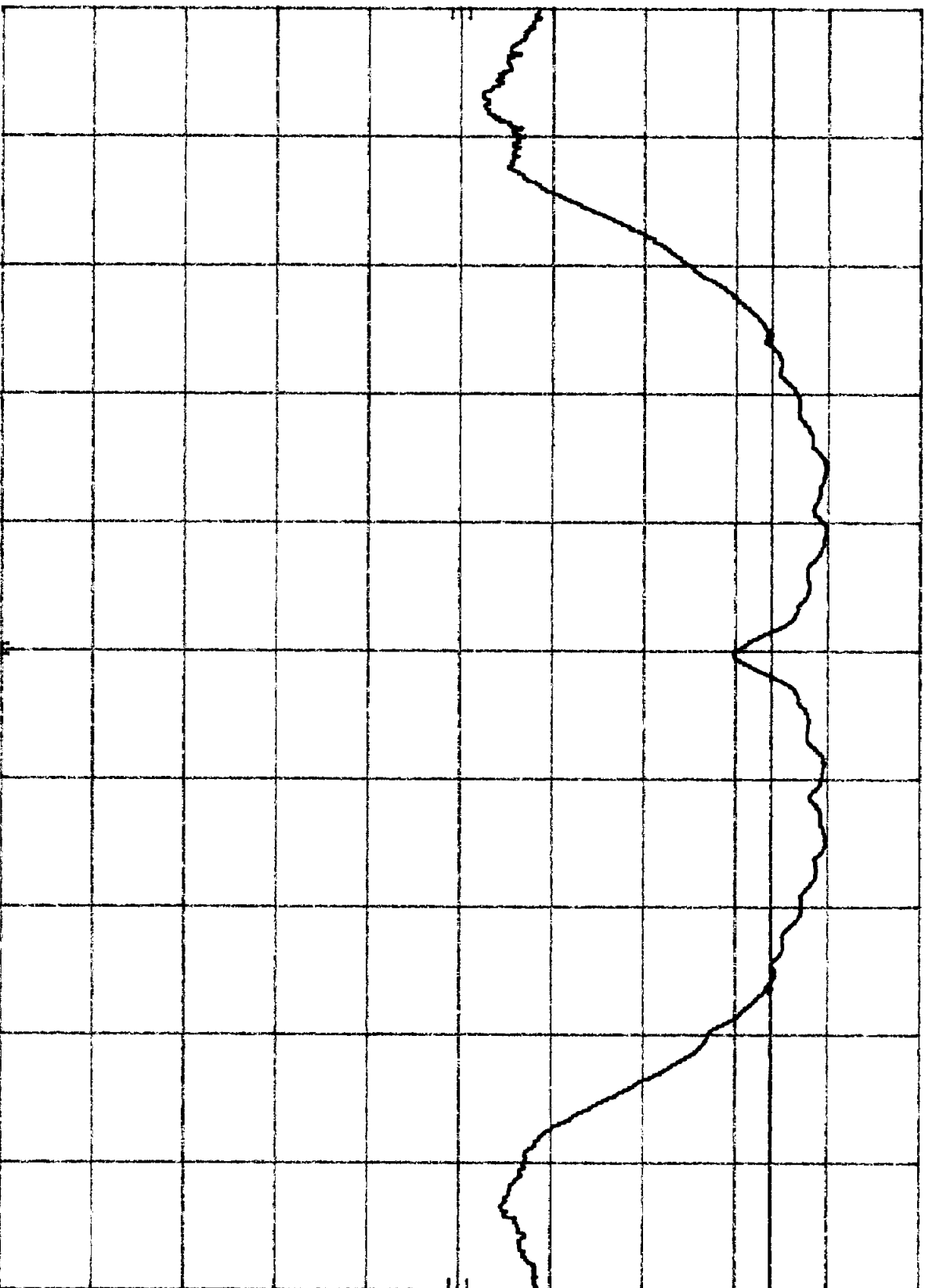
10 dB/

REF 82.0 dBμV ATTEN 10 dB

744 H26

MKR Δ 1.530 MHz
0.10 dB

DL
65.9
dBμV



CENTER 2.440 77 GHz

RES BW 100 kHz

VBW 100 kHz

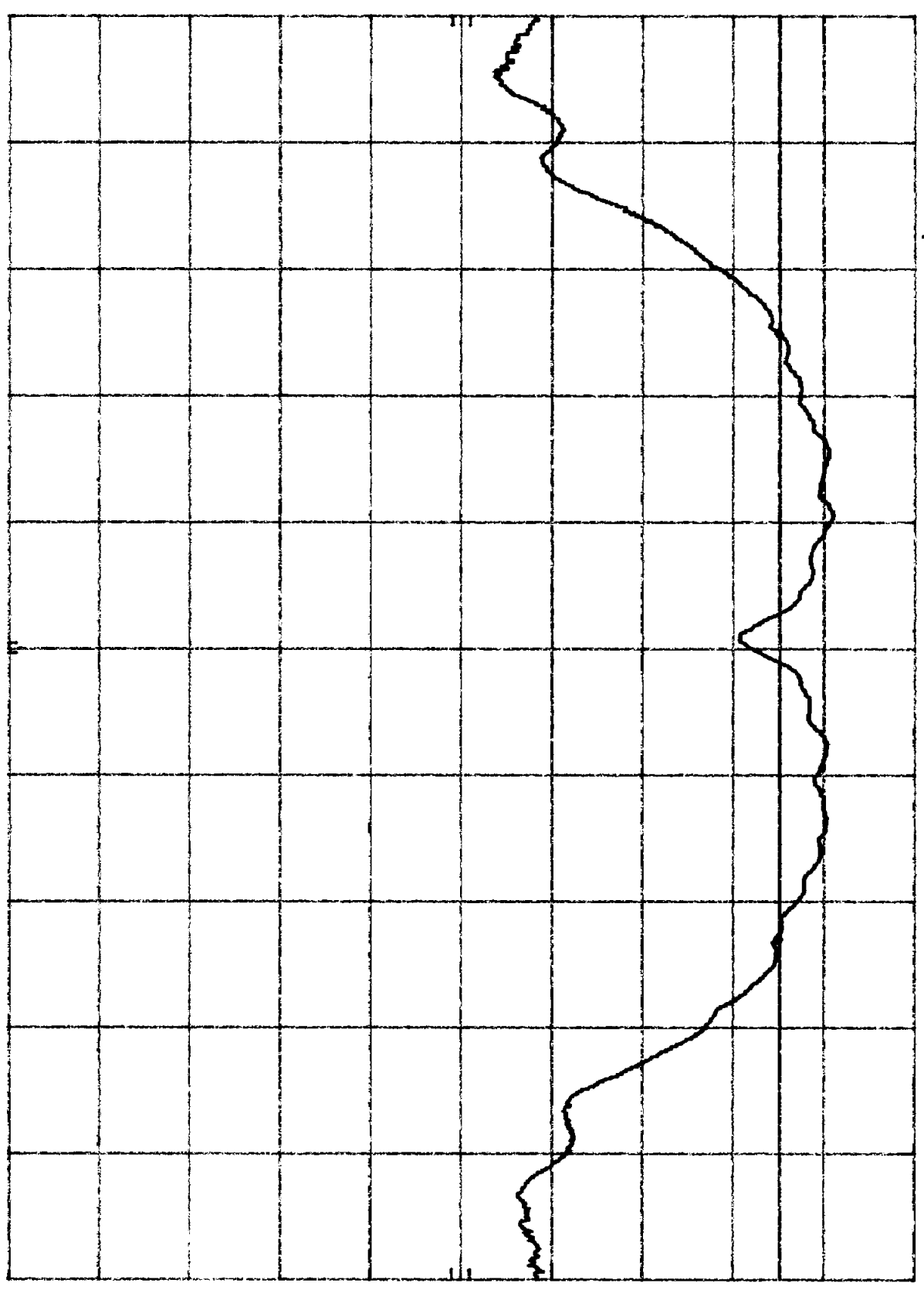
SPAN 3.00 MHz
SWP 20.0 msec

HP REF 82.0 dBμV ATTEN 10 dB *PLA H2C*

MKR Δ 1.434 MHz
-0.10 dB

10 dB/

DL
57.1
dBμV



CENTER 2.475 00 GHz
RES BW 100 kHz
VBW 100 kHz
SPAN 3.00 MHz
SWP 20.0 msec

4.3 Maximum Power Density Reading, FCC Rule 15.247(d):

The spectrum analyzer RES BW was set to 3 kHz. The START and STOP frequencies were set to the band edges of the maximum output passband. If there is no clear maximum amplitude in any given portion of the band, it may be necessary to make measurements at a number of bands defined by several START and STOP frequency pairs. The specification calls for a 1 second interval at each 3 kHz bandwidth; total SWEEP TIME is calculated as follows:

$$\text{SWEEP TIME (SEC)} = (\text{Fstop, kHz} - \text{Fstart, kHz}) / 3 \text{ kHz}$$

Radiated method was used; power density was calculated from field strength.

$$P = (ED)^2 / 30$$
$$G = 1$$

Base		
Frequency (MHz)	Power Density (dBm)	Limit (dBm)
2475.30	4.2	8.0

Handset		
Frequency (MHz)	Power Density (dBm)	Limit (dBm)
2474.68	4.2	8.0

Frequency Span = 600 kHz

Sweep Time = 600 Frequency Span / 3 kHz
= 200 seconds

Refer to Appendix C for the following plots:

Plot B3a.1 - B3a.2 Low Channel Power Density

Plot B3b.1 - B3b.2 Middle Channel Power Density

Plot B3c.1 - B3c.2: High Channel Power Density

Plot H3a.1 - H3a.2 Low Channel Power Density

Plot H3b.1 - H3b.2 Middle Channel Power Density

Plot H3c.1 - H3c.2: High Channel Power Density

Radiated Emission (Output Power Density) Handset and Base

Radiated Emissions Test Data

Company:	Continental Conair Ltd.	Model #:		Req.	FCC 15.247
EUT:	Cordless Phone Base	S/N or FCC #:		Test Dist.	3 meter
Project #:	J9903060 2	Test Date:	December 28, 1999	TP	Ward
Test Mode:	Tx Power Density for Low, Mid, Hing Ch	Engineer:	Xi Ming Y.	Min. Attn.	dBc

	Antenna Used			Pre-Amp Used			Cable Used			Transducer Used
Number:	2	14	21	0	8	13	0	0	12	0
Model:	EMCO 3143	EMCO 3115	3100-9	None	CDL_P1000	ACO400	None	None	Gm_M+L	None

[illegible]

Notes:	a) O.C.F.:Other Correction Factor
	b) Insert. Loss = Cable A + Cable B + Cable C + Transducer.
	c) Net = Reading + Antenna Factor - Pre-Amp + Insert. Loss.
	d) Attn. = Field Strength (Fundamental) - Field Strength (Harmonics).
	e) Negative signs (-) in Margin column signify levels below the limits.

Radiated Emissions Test Data

Company:	Continental Conair Ltd.	Model #:			Req.	FCC 15.247
EUT:	Cordless Phone Hand set	S/N or FCC #:			Test Dist	3 meter
Project #:	J99030602	Test Date:	December 28, 1999		TP	Watt
Test Mode:	Tx Power Density for Low, Mid, Hing Ch	Engineer:	Xi Ming Y.		Min. Attn	also

	Antenna Used			Pre-Amp Used			Cable Used			Transducer Used
Number:	2	14	21	0	8	13	0	0	12	0
Model:	EMCO 3143	EMCO 3115	3100-9	None	CDI_P1000	ACO400	None	None	Gm_M+L	None

[illegible]

- | | |
|---------------|---|
| Notes: | a) O.C.F.:Other Correction Factor |
| | b) Insert. Loss = Cable A + Cable B + Cable C + Transducer. |
| | c) Net = Reading + Antenna Factor - Pre-Amp + Insert. Loss. |
| | d) Attn. = Field Strength (Fundamental) - Field Strength (Harmonics). |
| | e) Negative signs (-) in Margin column signify levels below the limits. |

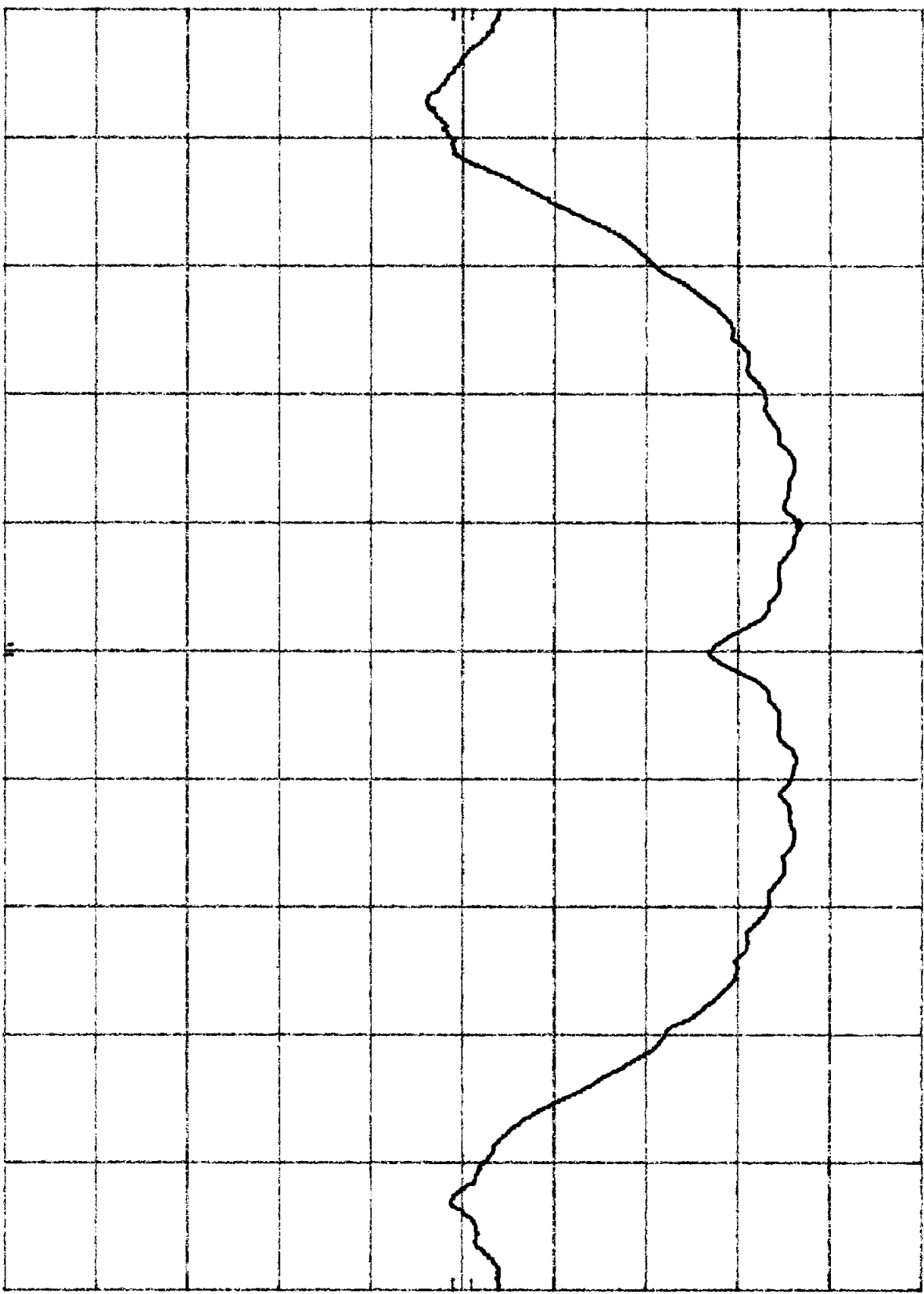
hp

10 dB/

REF 86.6 dBμV ATTN 0 dB

W2 B361

MKR 2.440 503 GHz
73.20 dBμV



CENTER 2.440 80 GHz

RES BW 100 kHz

VBW 100 kHz

SPAN 3.00 MHz
SWP 20.0 msec

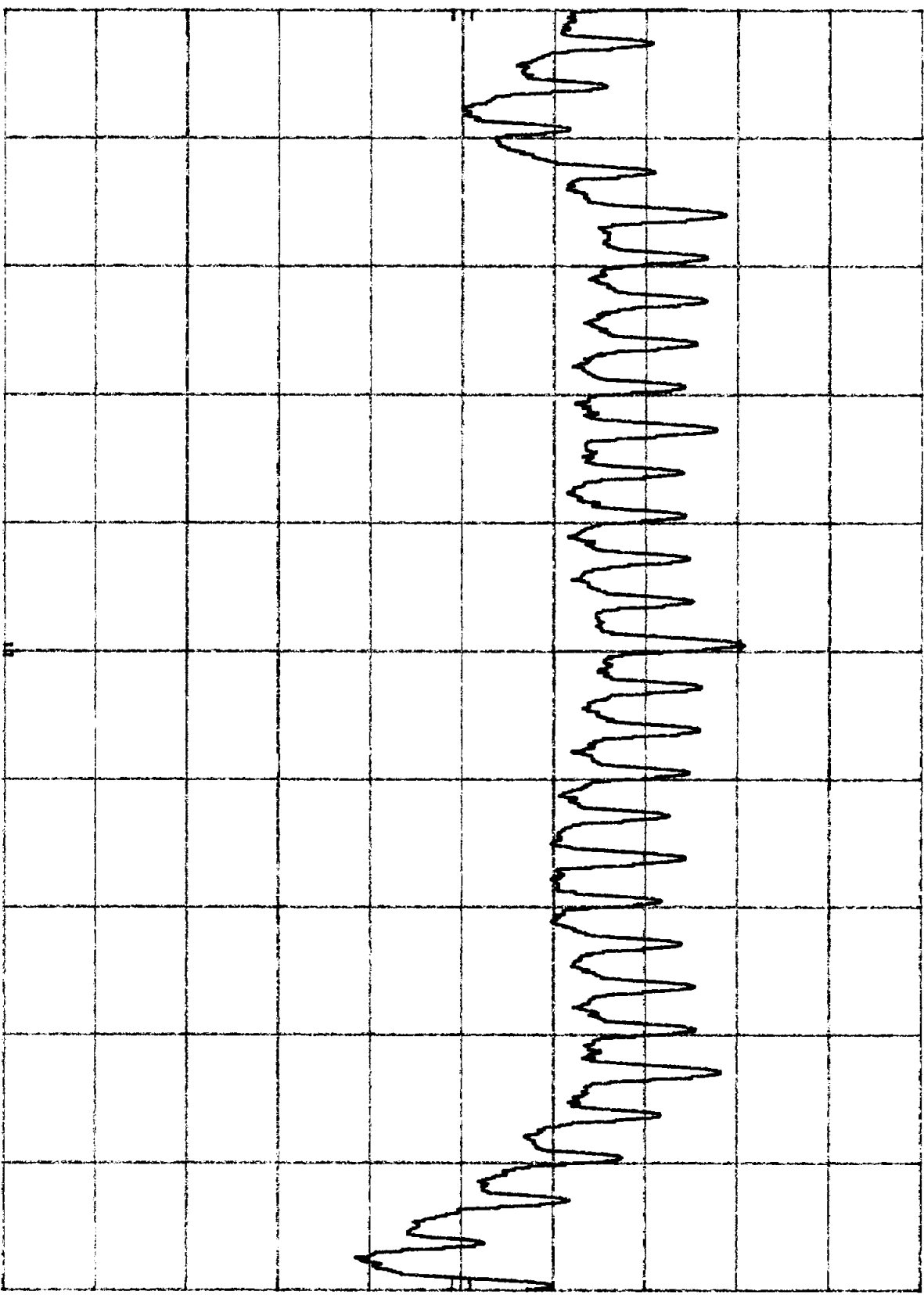
hp

REF 86.6 dBμV ATTN 0 dB

Plot 55.2

MKR 2.440 500 0 GHz
86.90 dBμV

10 dB/



CENTER 2.440 500 GHz
RES BW 3 KHz

VBW 3 KHz

SPAN 600 KHz
SWP 200 sec

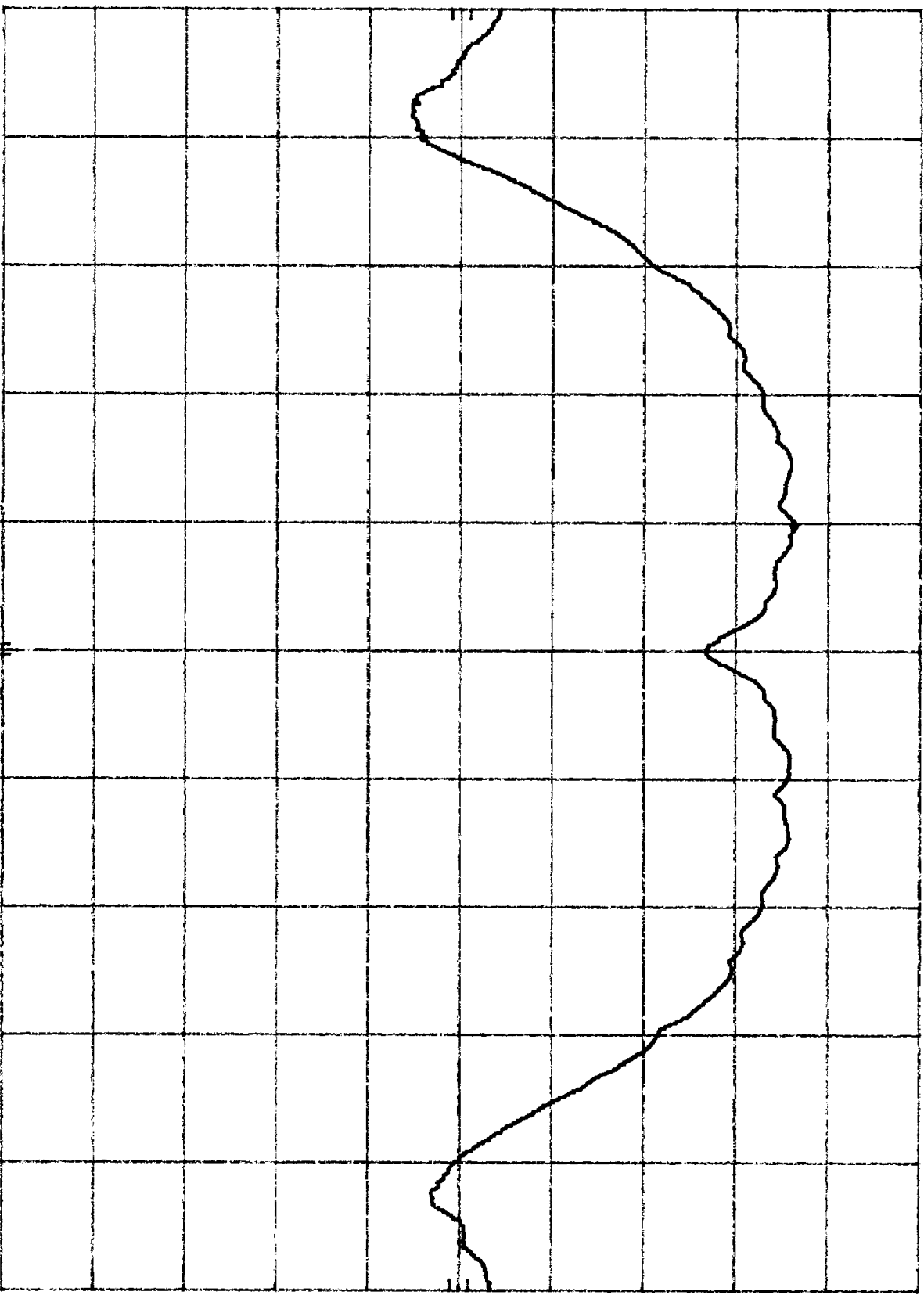
hp

10 dB/

REF 86.6 dBμV ATTN 0 dB

Plot B3a1

MKR 2.404 503 GHz 72.90 dBμV



CENTER 2.404 80 GHz

RES BW 100 kHz

VBW 100 kHz

SPAN 3.00 MHz SWP 20.0 msec

HP

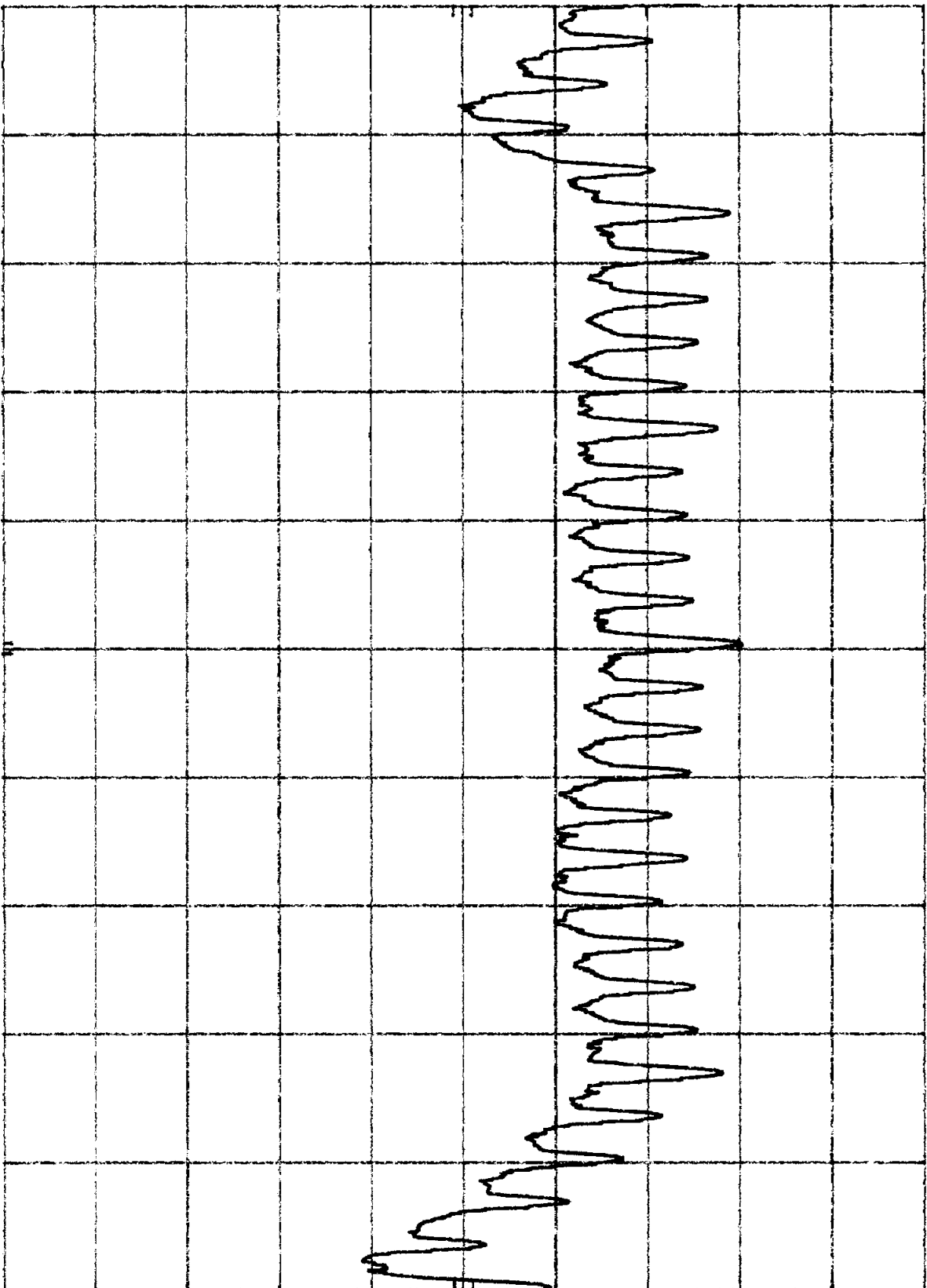
REF 86.6 dBμV ATTN 0 dB

Plot 1000

MR 2.404 500 6 GHz

86.50 dBμV

10 dB/



CENTER 2.404 500 GHz

RES BW 3 kHz

VBW 3 kHz

SWP 200 sec

SPAN 600 kHz

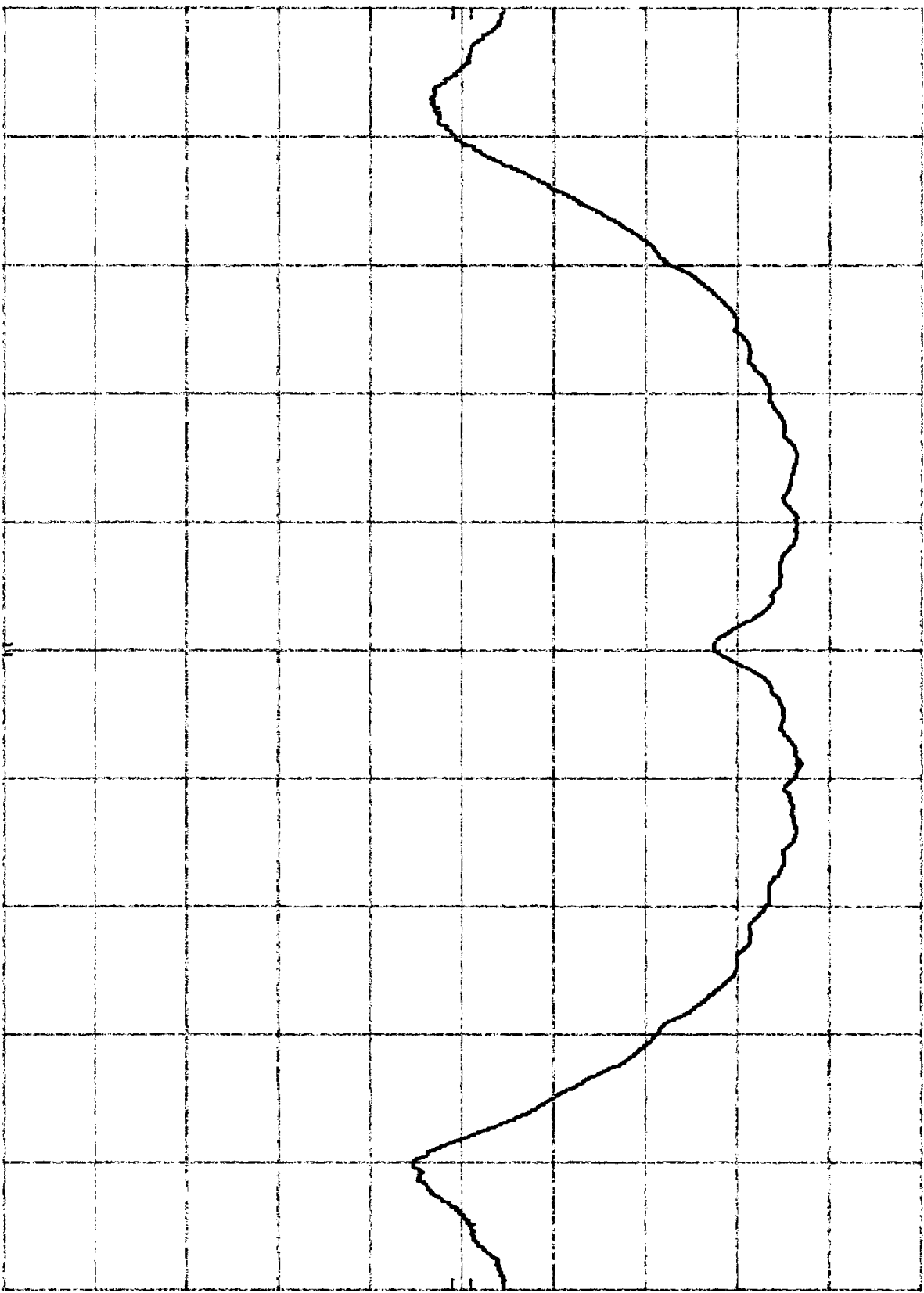
HP

10 dB

REF 86.6 dBμV ATTN 0 dB

Plot B.3.0.1

MKR 2.475 275 GHz 73.30 dBμV



CENTER 2.475 01 GHz

RES BW 100 kHz

VBW 100 kHz

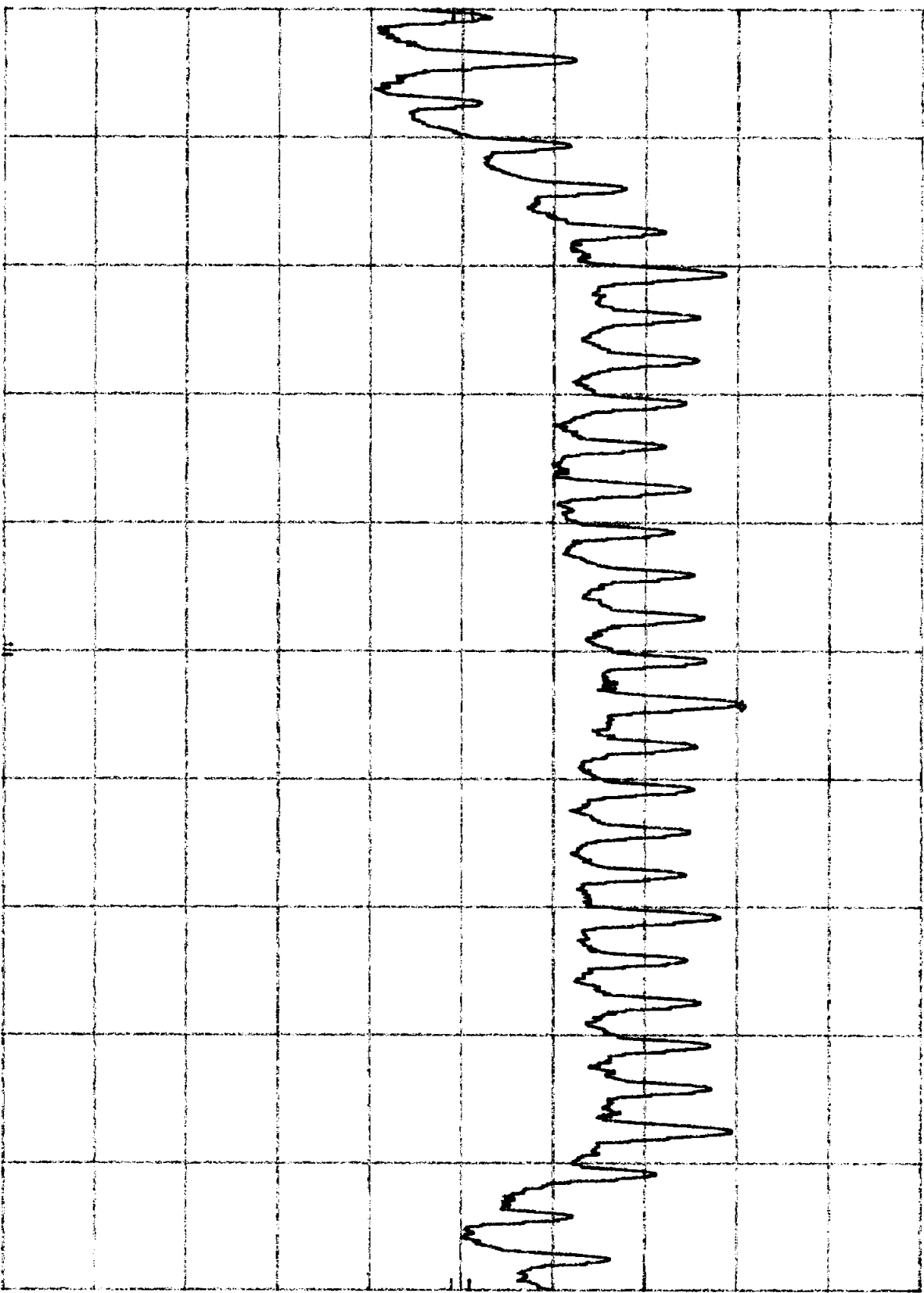
SPAN 3.00 MHz

SWP 20.0 msec

HP REF 86.5 dBμV
ATTEN 0 dB
10 dB/

W6-1000

MKR 2.475 300 2 GHz
67.10 dBμV



CENTER 2.475 275 GHz
RES BW 3 KHZ

VBW 3 KHZ

SPAN 600 KHZ
SWP 200 sec

HP

REF 92.0 DB μ V

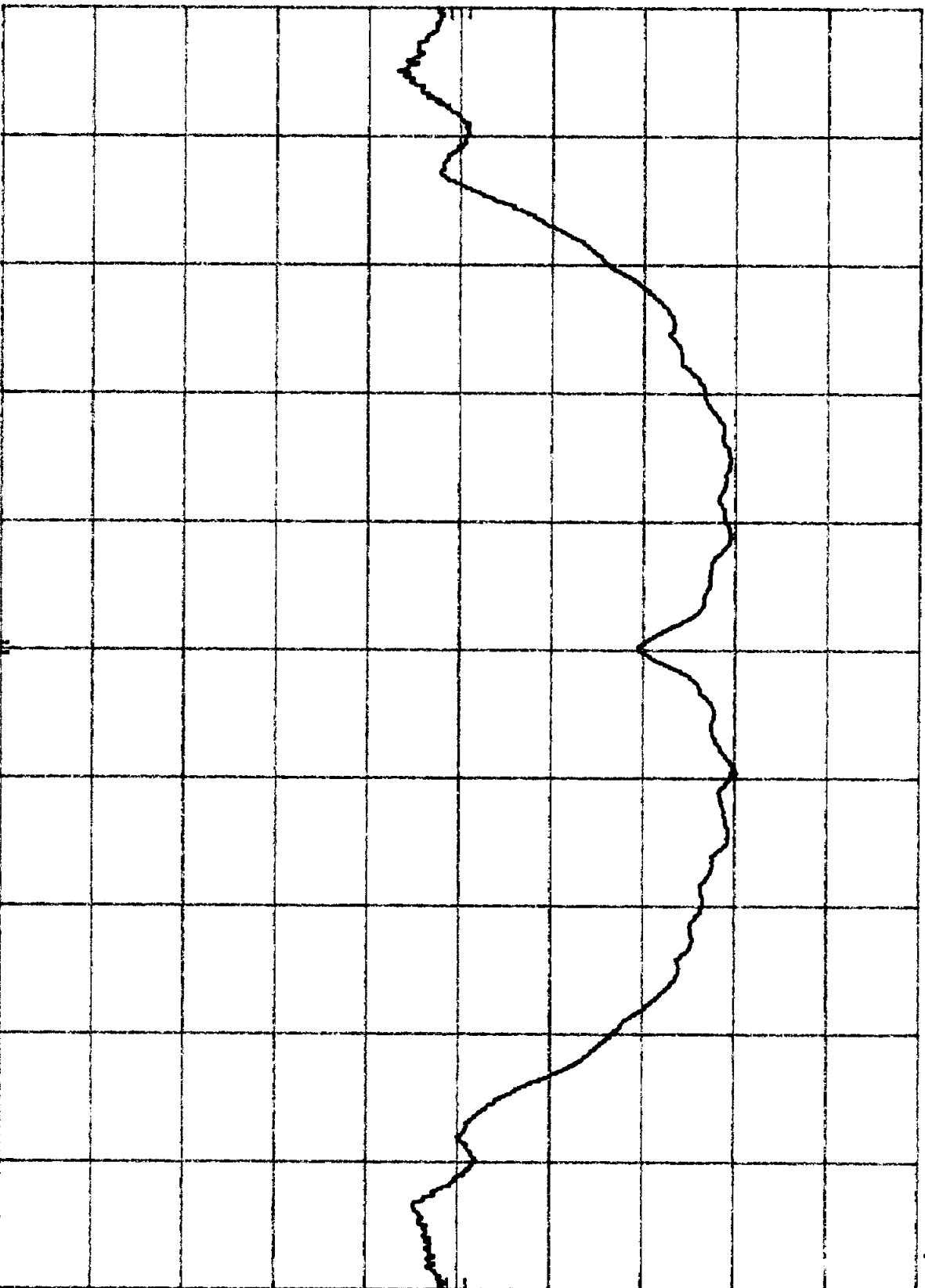
ATTEN 10 DB

Plot H301

MKR 2.405 066 GHz

71.90 DB μ V

10 DB/



CENTER 2.404 78 GHz

RES BW 100 KHz

VBW 100 KHz

SPAN 3.00 MHz
SWP 20.0 msec

HP

REF 92.0 dBμV

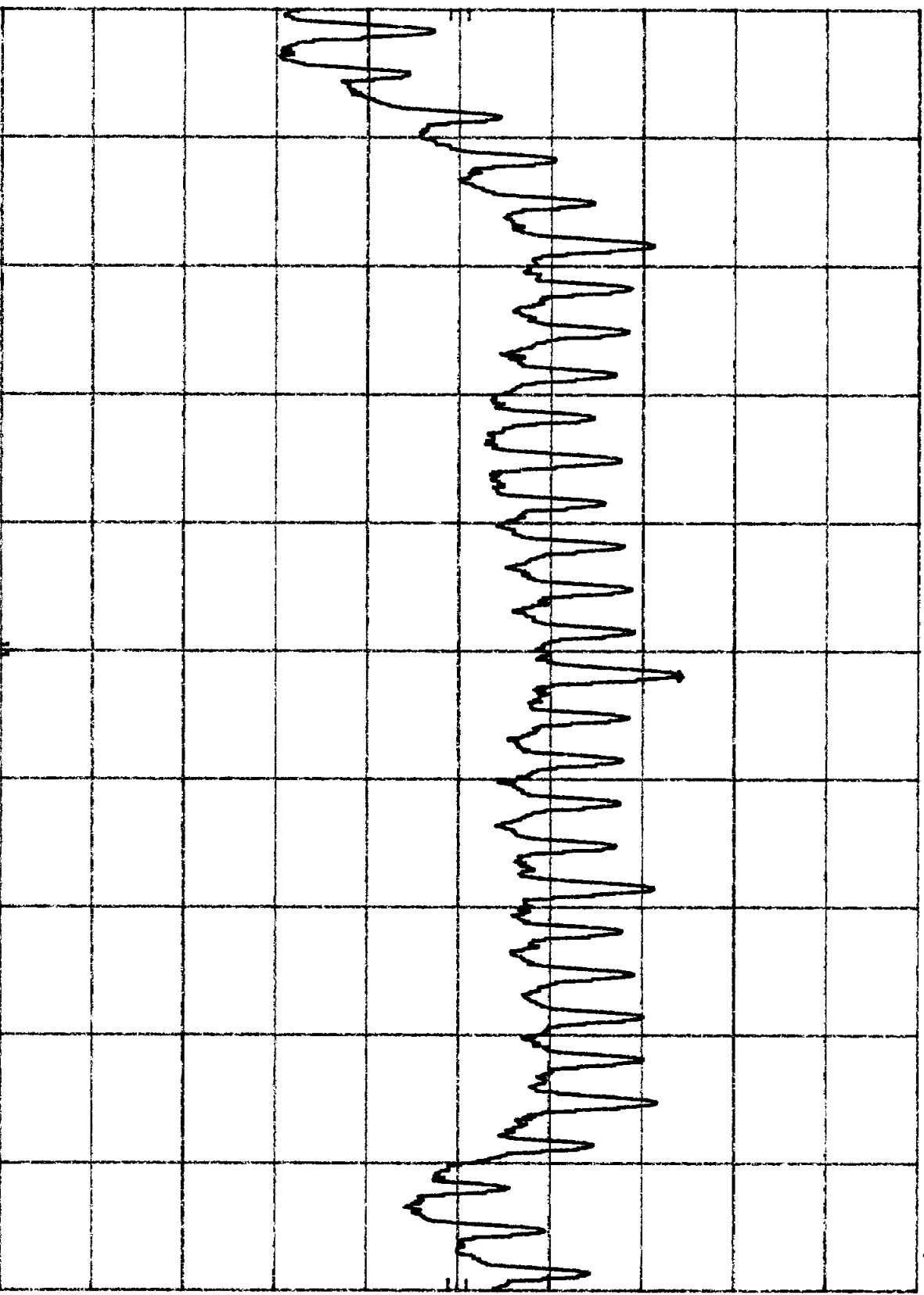
ATTEN 10 dB

Plot H32.2

MKR 2.405 077 8 GHz

66.00 dBμV

10 dB/



CENTER 2.405 066 GHz

RES BW 3 KHz

VBW 3 KHz

SPAN 501 KHz

SWP 200 sec

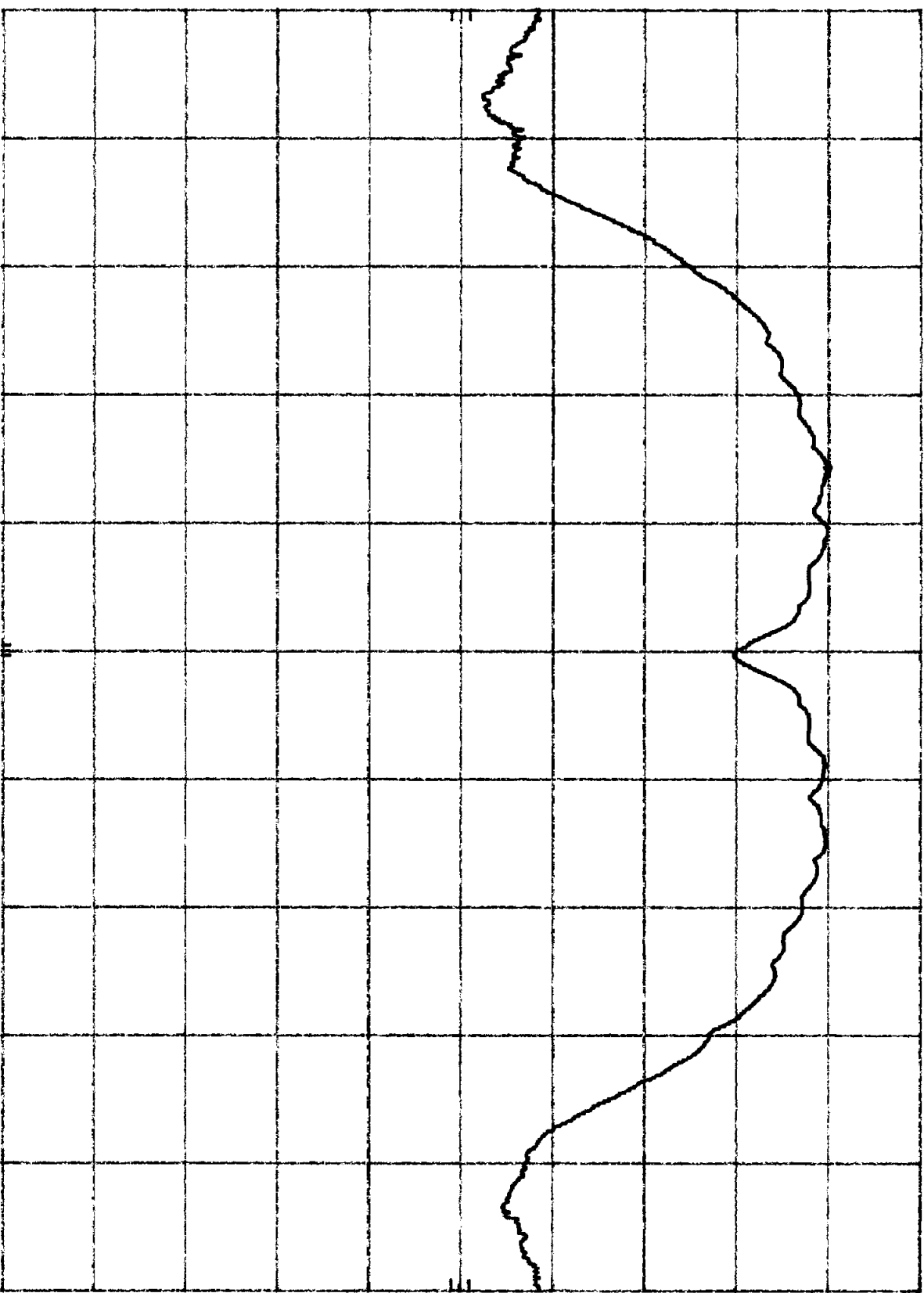
hp

10 dB/

REF 82.0 dBμV ATTEN 10 dB

Plot H3b1

MKR 2.440 338 GHz 71.90 dBμV



CENTER 2.440 77 GHz
RES BW 100 kHz
VBW 100 kHz
SPAN 3.00 MHz
SWP 20.0 msec

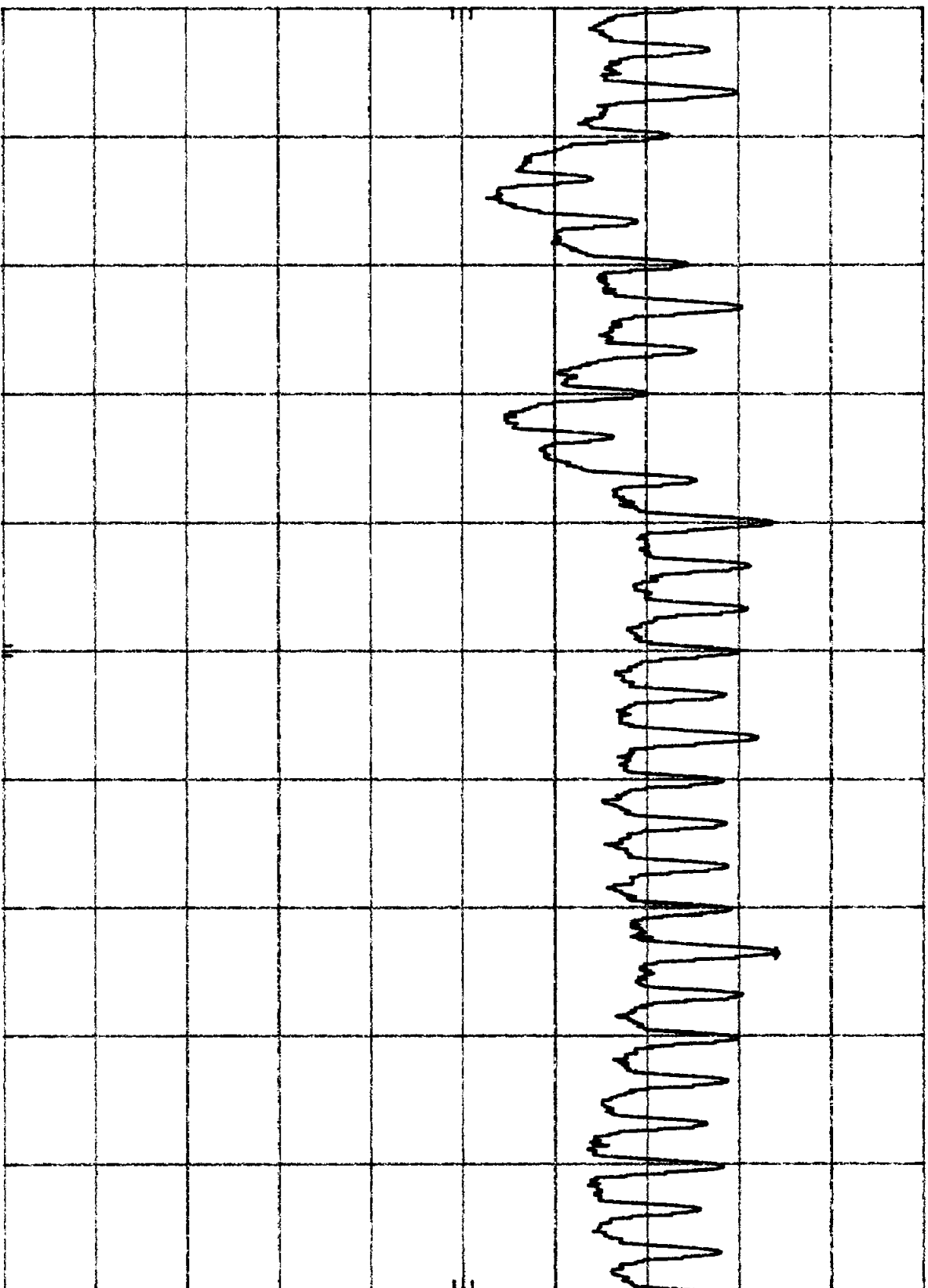
by

REF	82.0 dBμV	ATTEN 10 dB
10 dB/		

Plot 1170-1

MKR 2.440 479 0 GHz
66.00 dBμV

10-081



CENTER 2.440 338 GHz

RES BW 3 KIN

V B W 3 K I N

SPAN 500 KHZ
SWP 200 sec

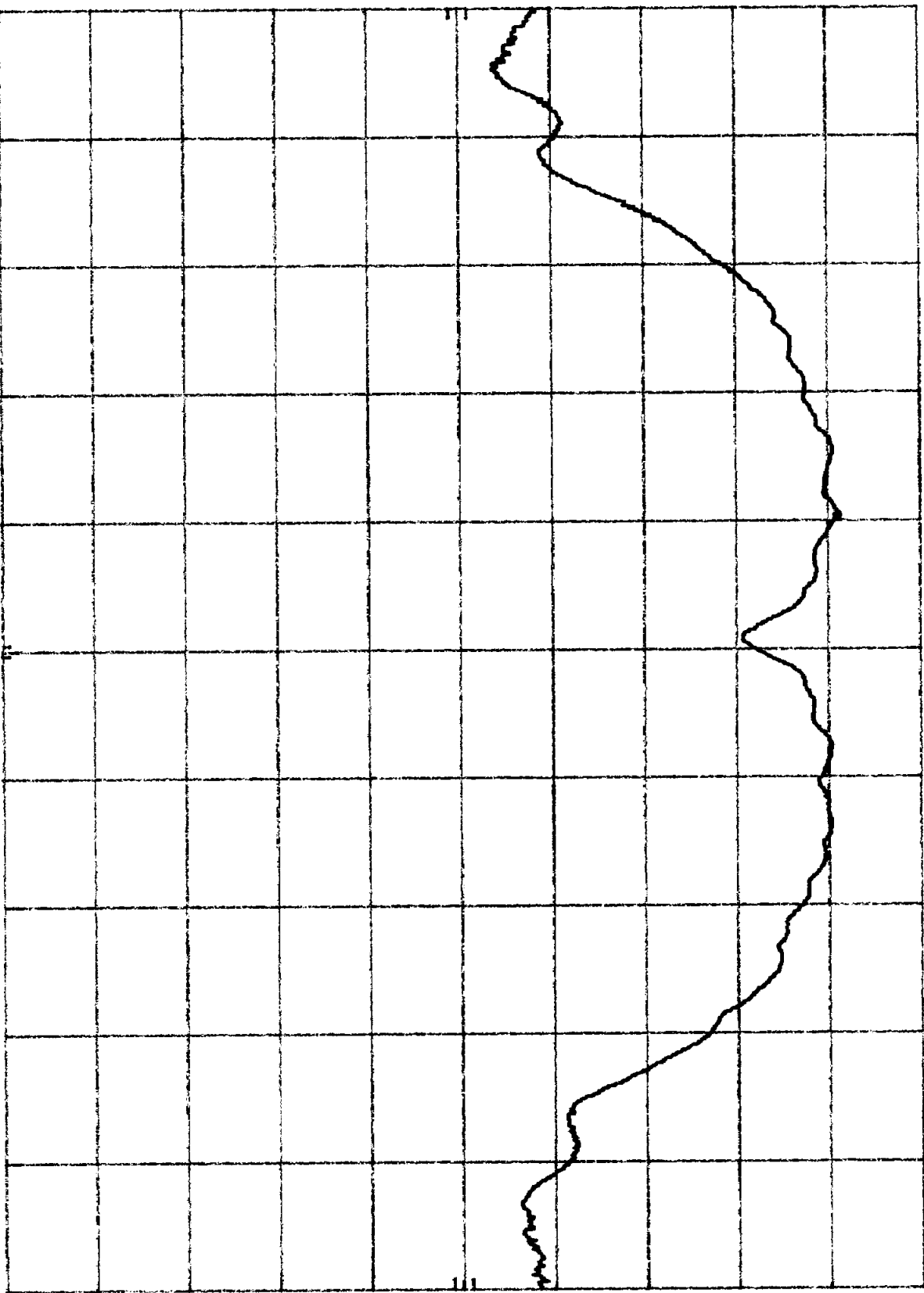
hp

10 dB/

REF 82.0 dBμV ATTEN 10 dB

Plot 2301

MKR 2.474 685 CHz 73.10 dBμV



CENTER 2.475 00 CHz

RES BW 100 KHz

VBW 100 KHz

SPAN 3.00 MHz
SWP 20.0 msc

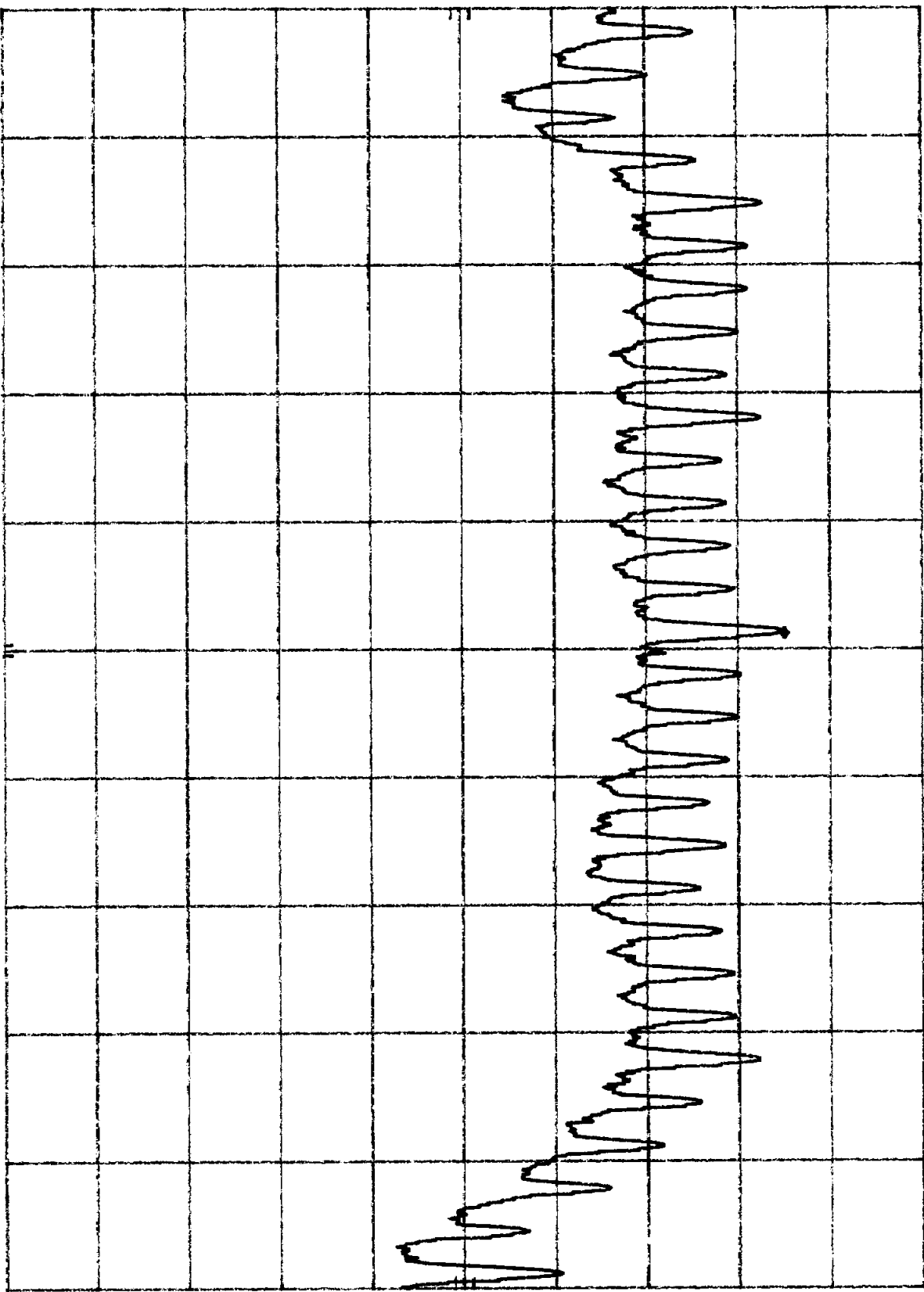
HP

REF 02.0 DBμV ATTEN 10 DB

Plot 302

MKR 2.474 677 2 GHz 67.10 DBμV

10 DB/



CENTER 2.474 685 GHz
RES BW 3 KHz

VBW 3 KHz

SPAN 600 KHz
SWP 200 sec