

4.4 Out of Band Conducted Emissions, FCC Rule 15.247(c):

In any 100 kHz bandwidth outside the EUT passband, the RF power produced by the modulation products of the spreading sequence, the information sequence, and the carrier frequency shall be at least 20 dB below that of the maximum in-band 100 kHz emission, or else shall meet the general limits for radiated emissions at frequencies outside the passband, whichever results in lower attenuation.

All other types of emissions from the EUT shall meet the general limits for radiated frequencies outside the passband.

Refer to the following plots for out of band conducted emissions data:

Plot B4a.1 - B4a.6: Low Channel Emissions
Plot B4b.1 - B4b.6: Middle Channel Emissions
Plot B4c.1 - B4c.8: High Channel Emissions

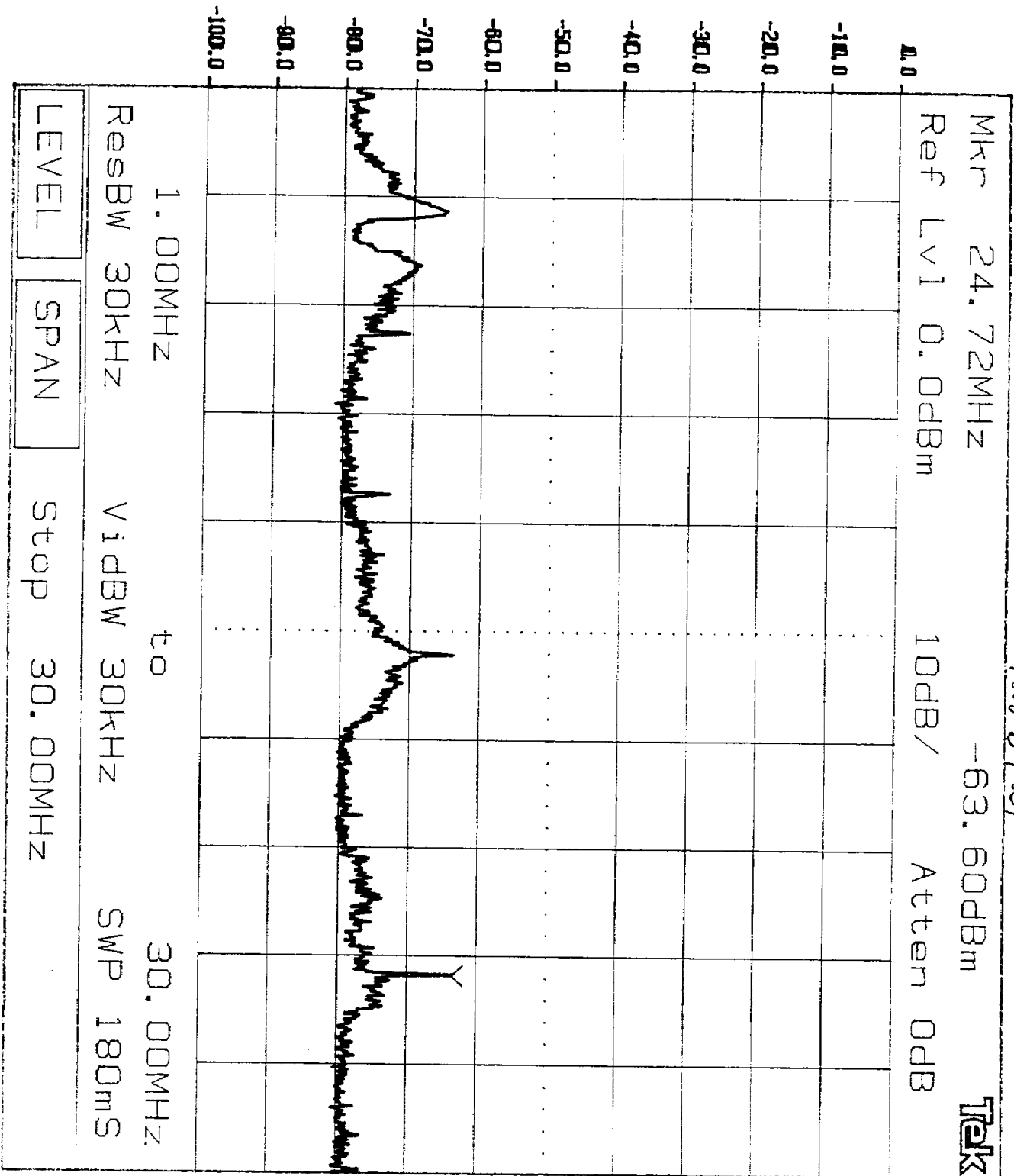
Plot H4a.1 - H4a.7: Low Channel Emissions
Plot H4b.1 - H4b.6: Middle Channel Emissions
Plot H4c.1 - H4c.6: High Channel Emissions

4.5 Out of Band Radiated Emissions (for emissions in 4. above that are less than 26 dB below carrier), FCC Rule 15.247(c):

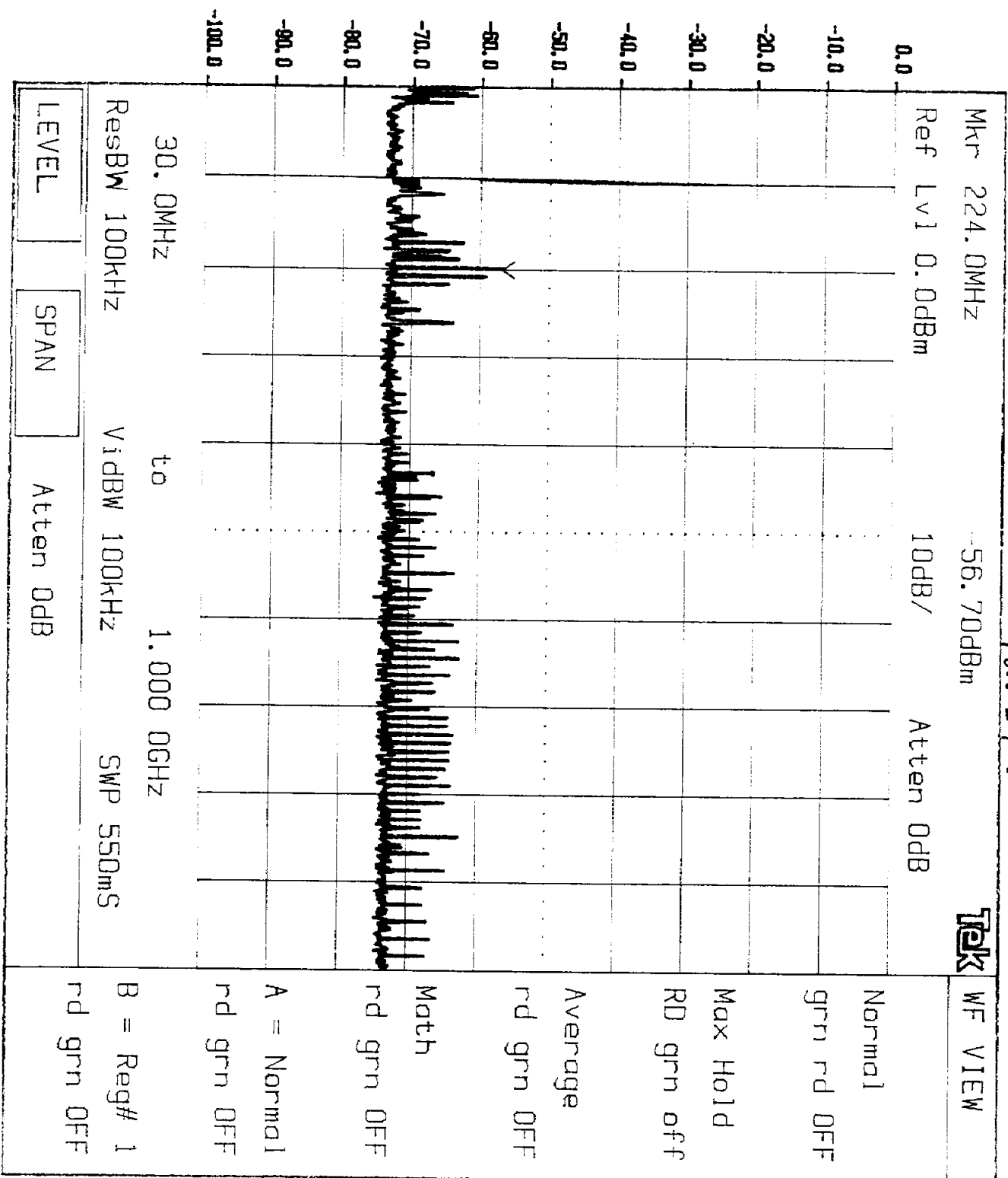
For out of band emissions that are close to or that exceed the 20 dB attenuation requirement described in the specification, radiated measurements were performed at a 3 m separation distance to determine whether these emissions complied with the general radiated emission requirement.

[x] Not required
[] See attached data sheet

Plot B4a1



Plot B4a2



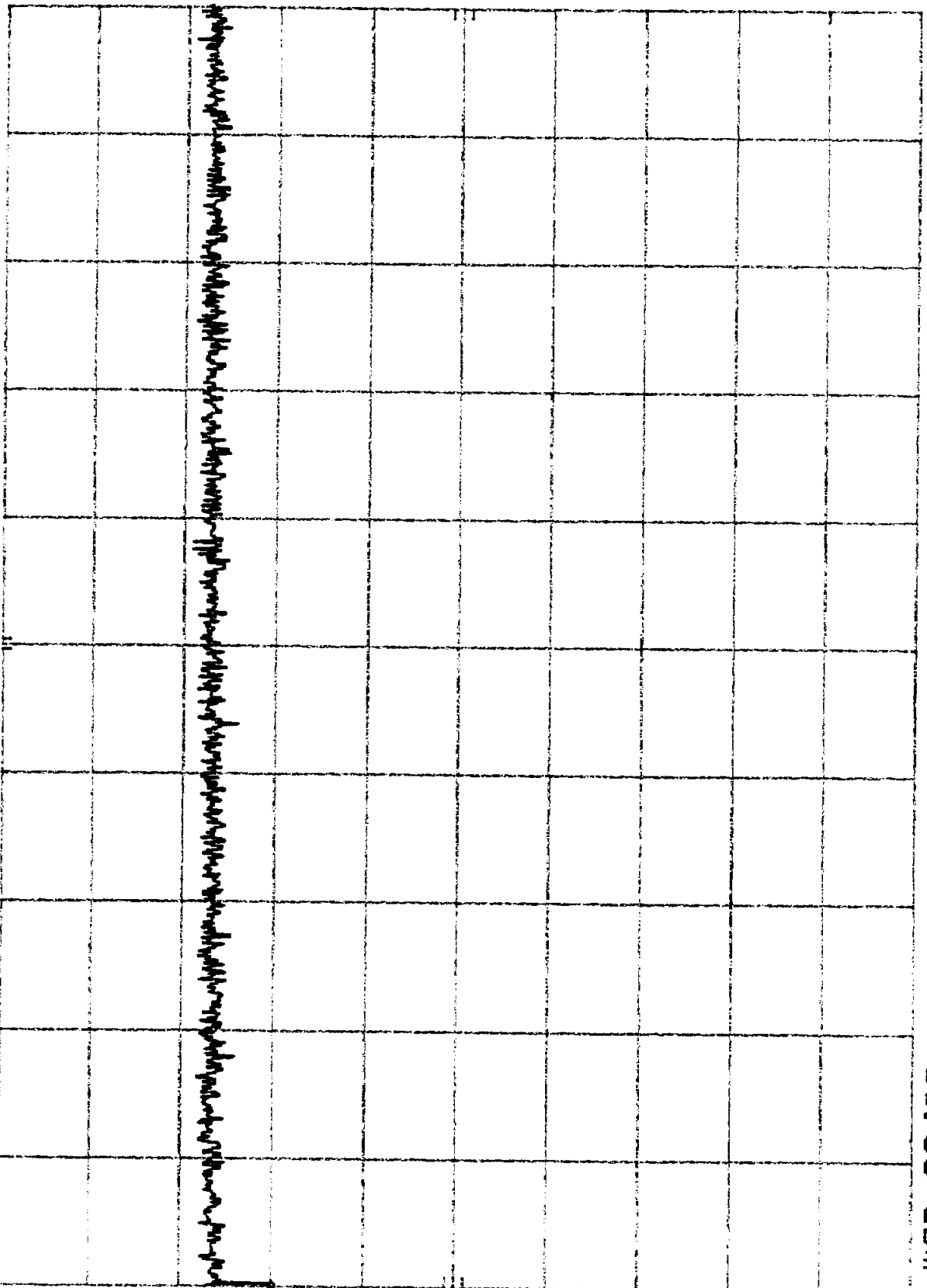
Plot B403

REF 0.0 dBm

ATTEN 10 dB

MKR 2.397 GHz
-89.90 dBm

10 dB/



START 1.00 GHz

RES BW 100 kHz

VBW 100 kHz

STOP 2.40 GHz
SWP 420 msec

HP

REF 0.0 dBm

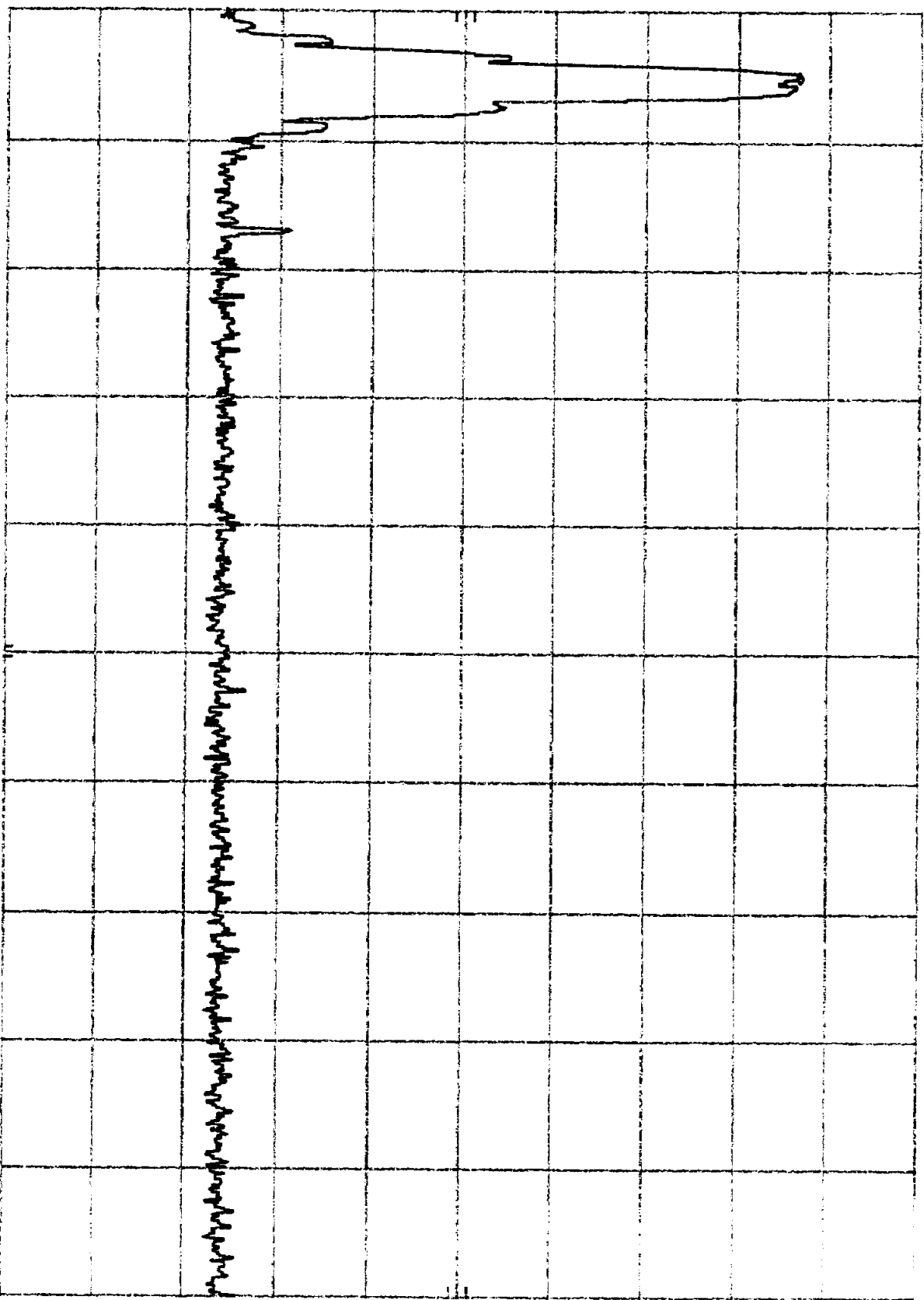
ATTEN 10 dB

Plot B4a4

MKR Δ-4.18 MHz

-62.60 dB

10 dB/



START 2.400 0 GHz

RES BW 100 kHz

VBW 100 kHz

STOP 2.483 5 GHz

SWP 25.1 msec

h₀

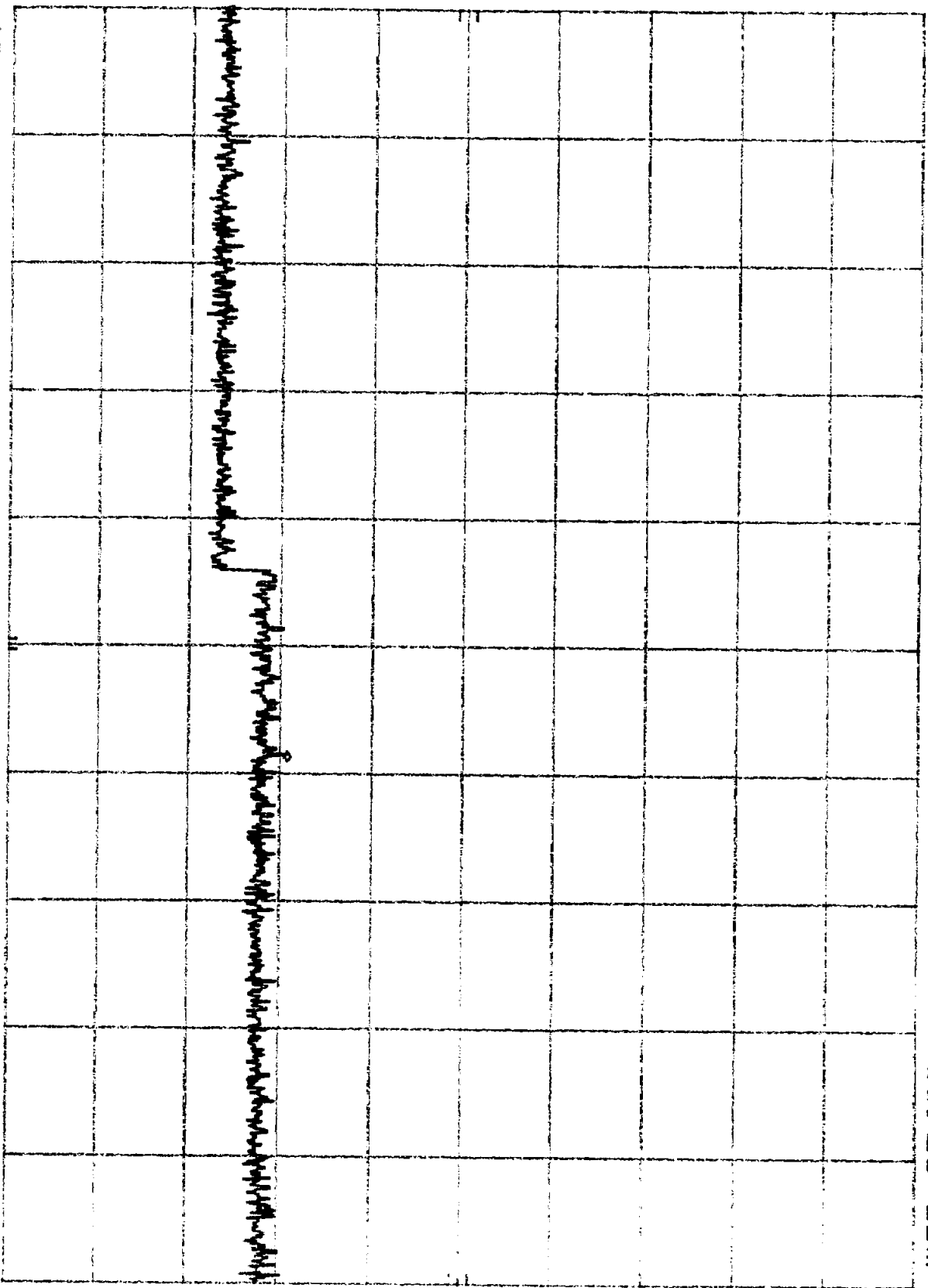
REF 0.0 dBm

ATTEN 10 dB

Plot B4a5

MKR 6.888 GHz
-69.20 dBm

10 dB/



START 2.48 GHz

RES BW 100 kHz

VBW 100 kHz

STOP 10.00 GHz
SWP 2.25 sec

HP

REF 0.0 dBm

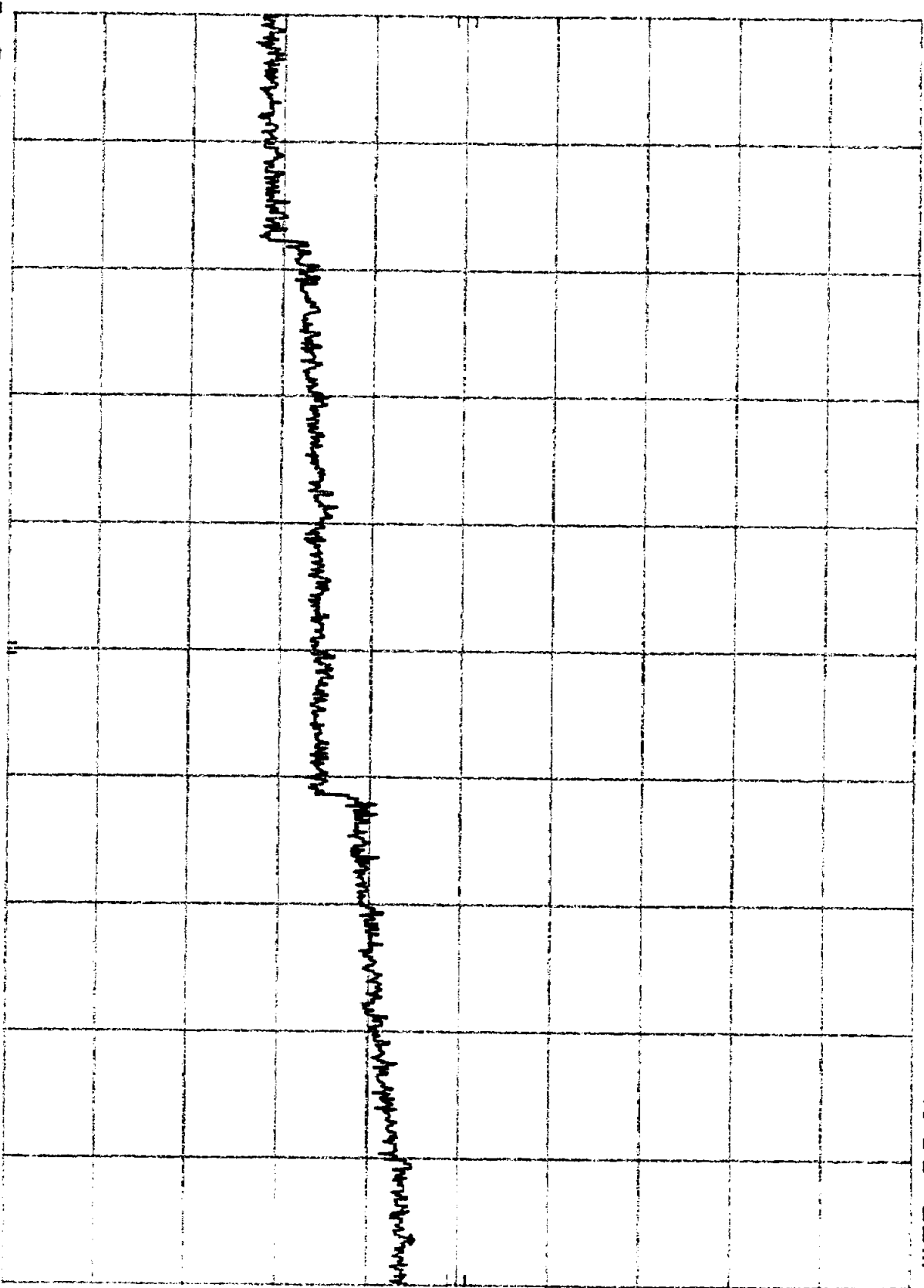
ATTEN 10 dB

Plot B4a6

MKR 23.48 GHz

-55.00 dBm

10 dB



START 10.0 GHz

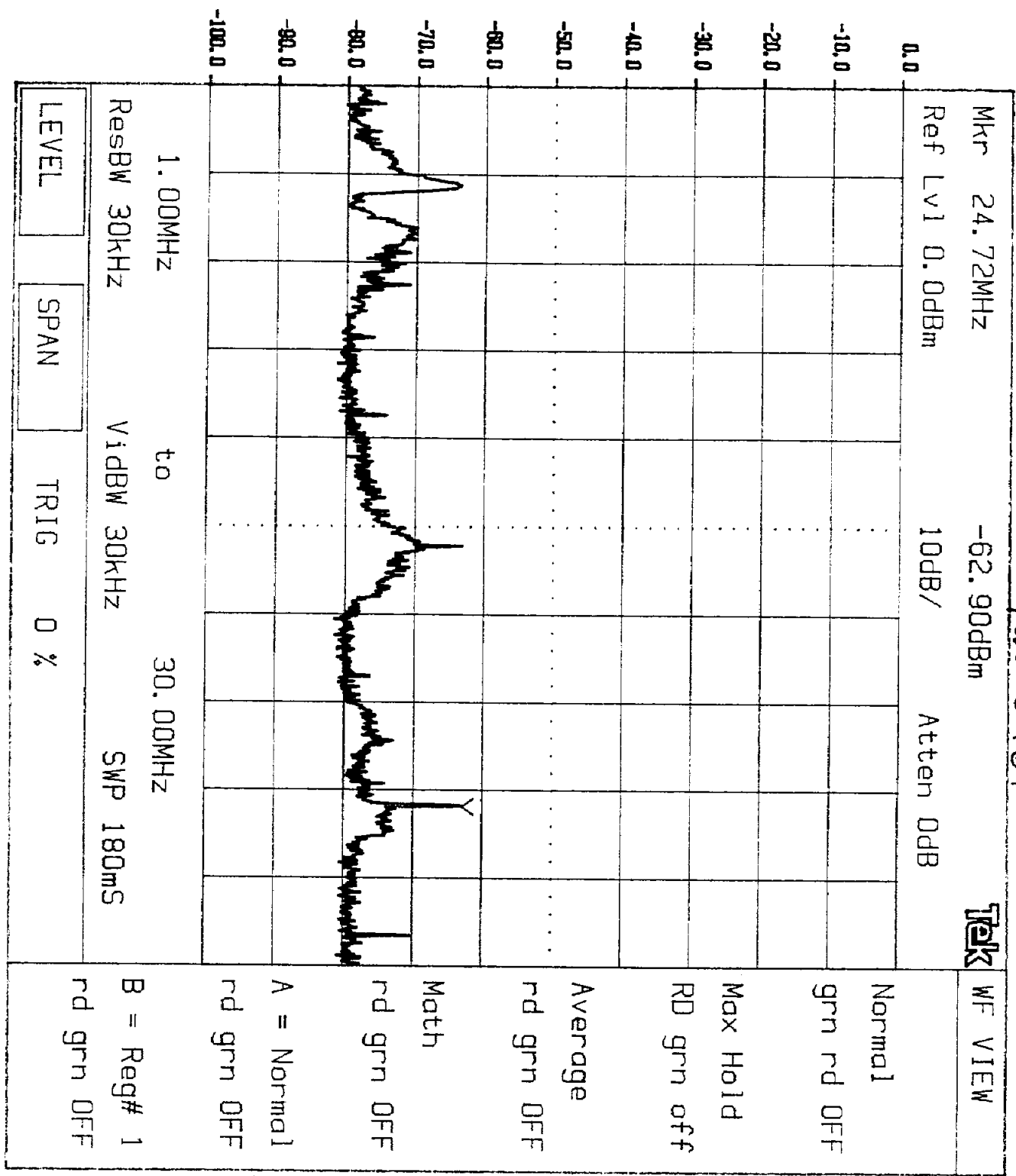
RES BW 100 kHz

VBW 100 kHz

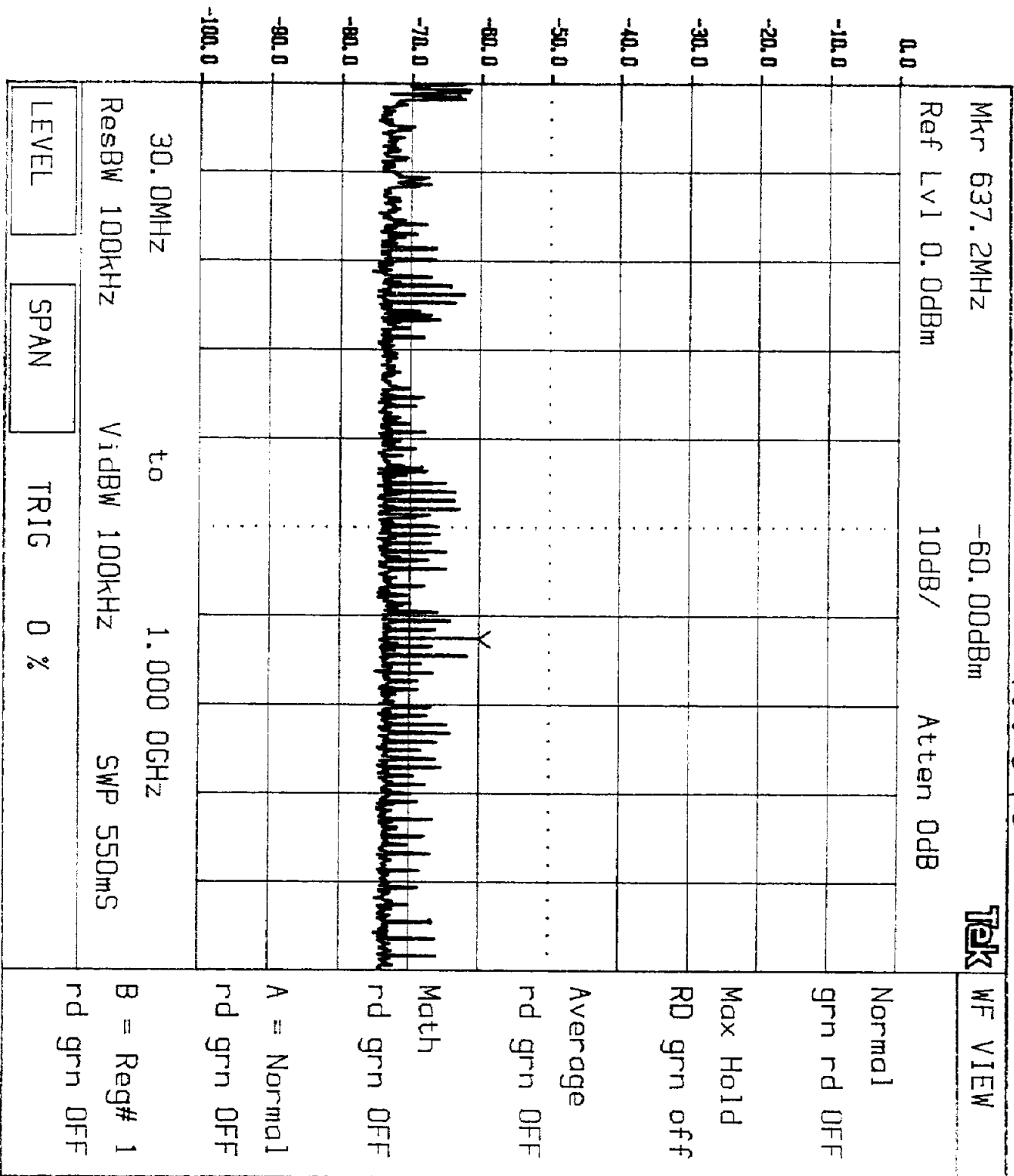
STOP 24.0 GHz

SWP 4.20 sec

Plot B461



Plot B4b2



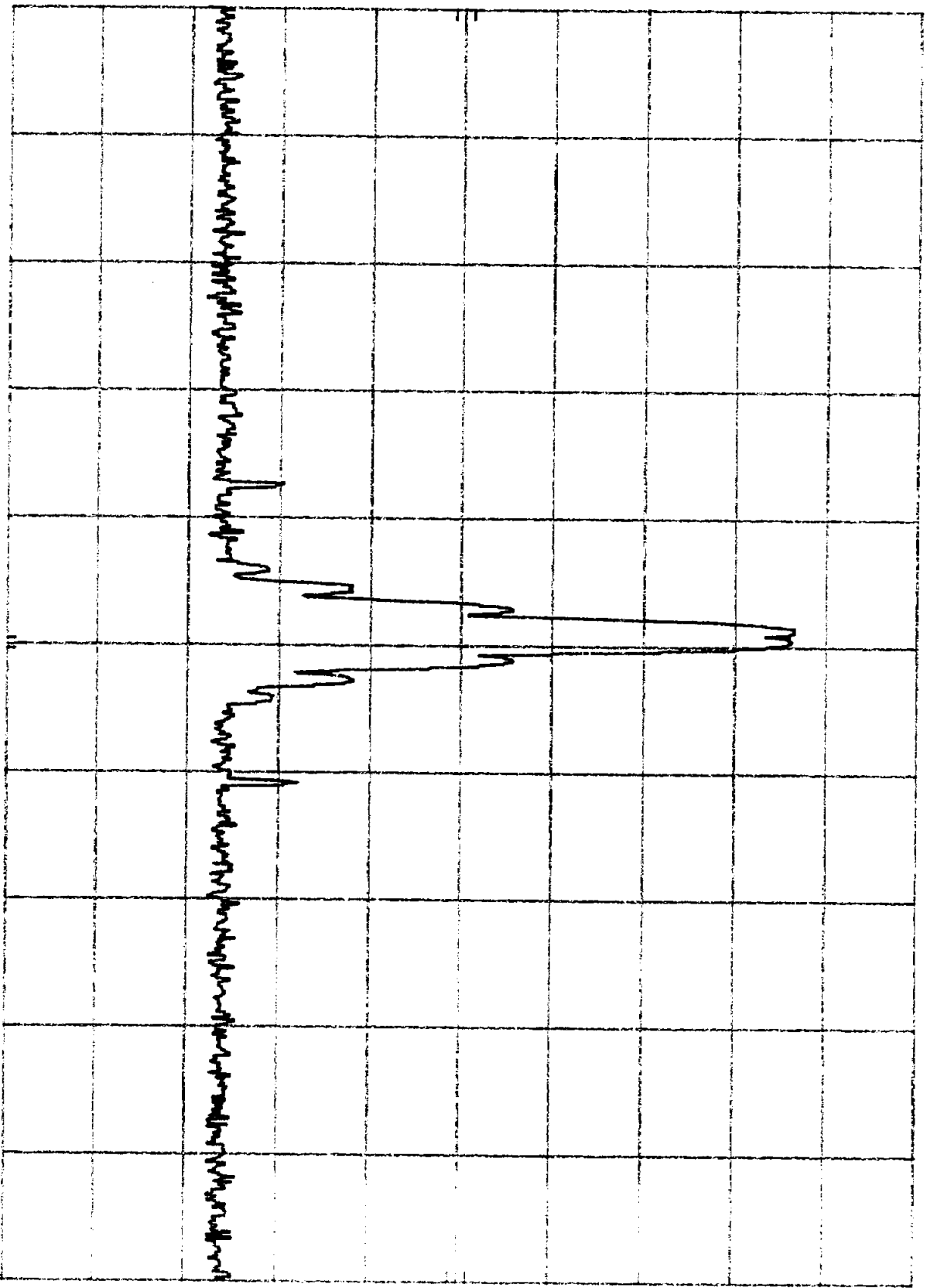
h₀

10 dB/

REF 0.0 dBm

ATTEN 10 dB

Plot B4b3



START 2.400 0 GHz

RES BW 100 kHz

VBW 100 kHz

STOP 2.483 5 GHz
SWP 25.1 msec

HP

REF 0.0 dBm

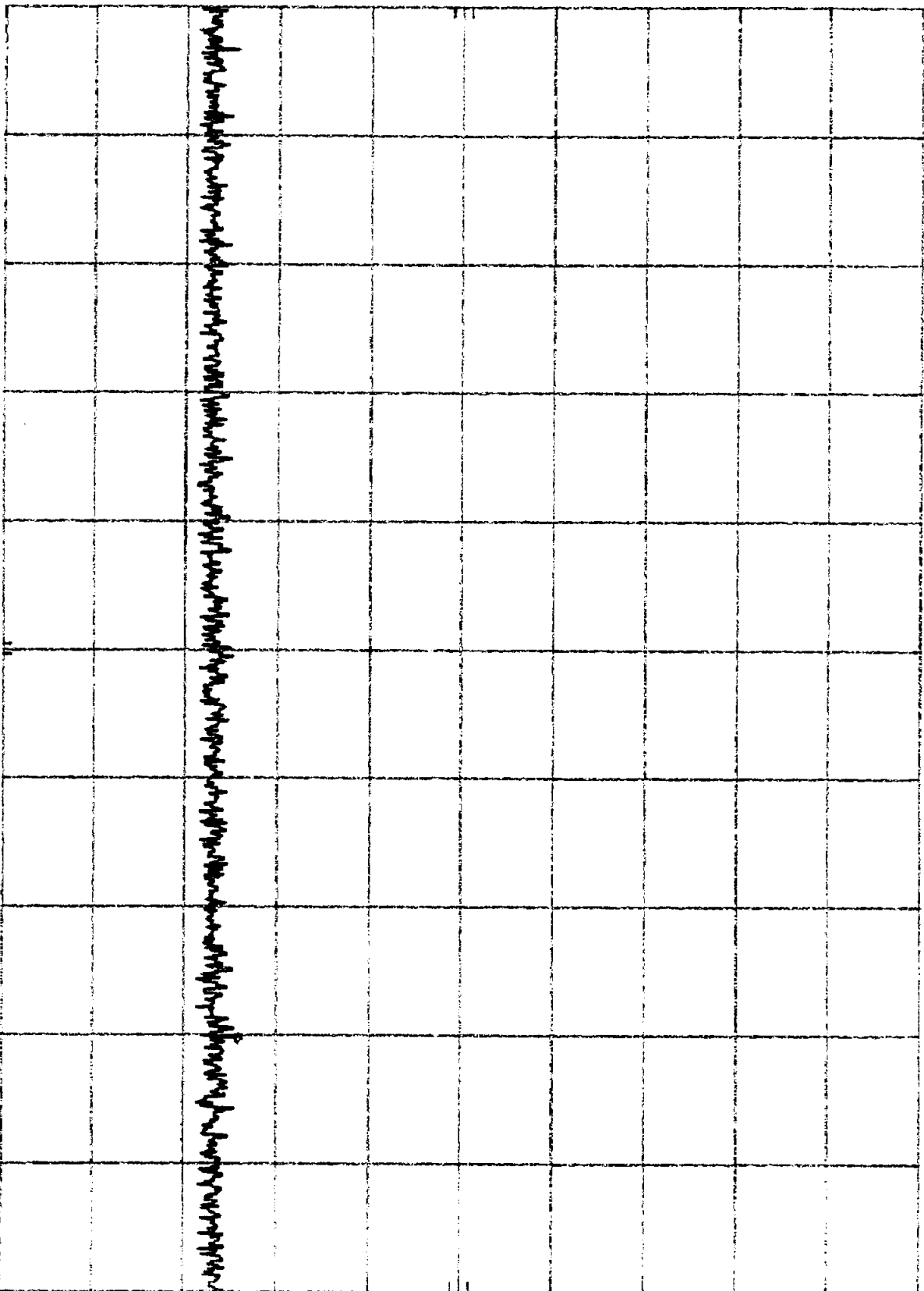
ATTEN 10 dB

Plot B464

MKR 2.123 GHz

-74.10 dBm

10 dB/



START 1.00 GHz

RES BW 100 kHz

VBW 100 kHz

STOP 2.40 GHz

SWP 420 msec

HP

REF 0.0 dBm

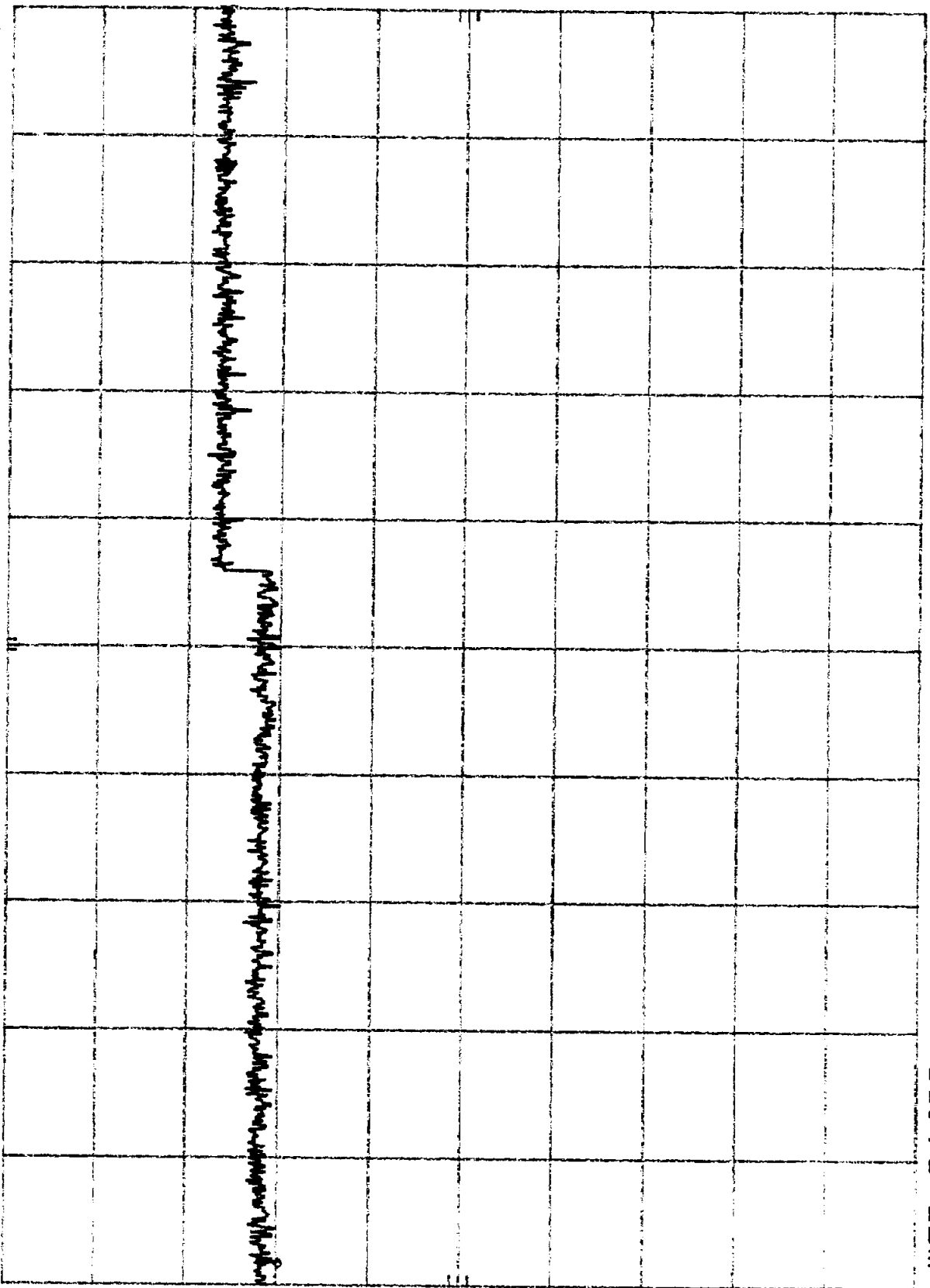
ATTEN 10 dB

Plot B4b5

MKR 9.864 GHz

-69.70 dBm

10 dB/



START 2.48 GHz

RES BW 100 KHz

VBW 100 KHz

STOP 10.00 GHz

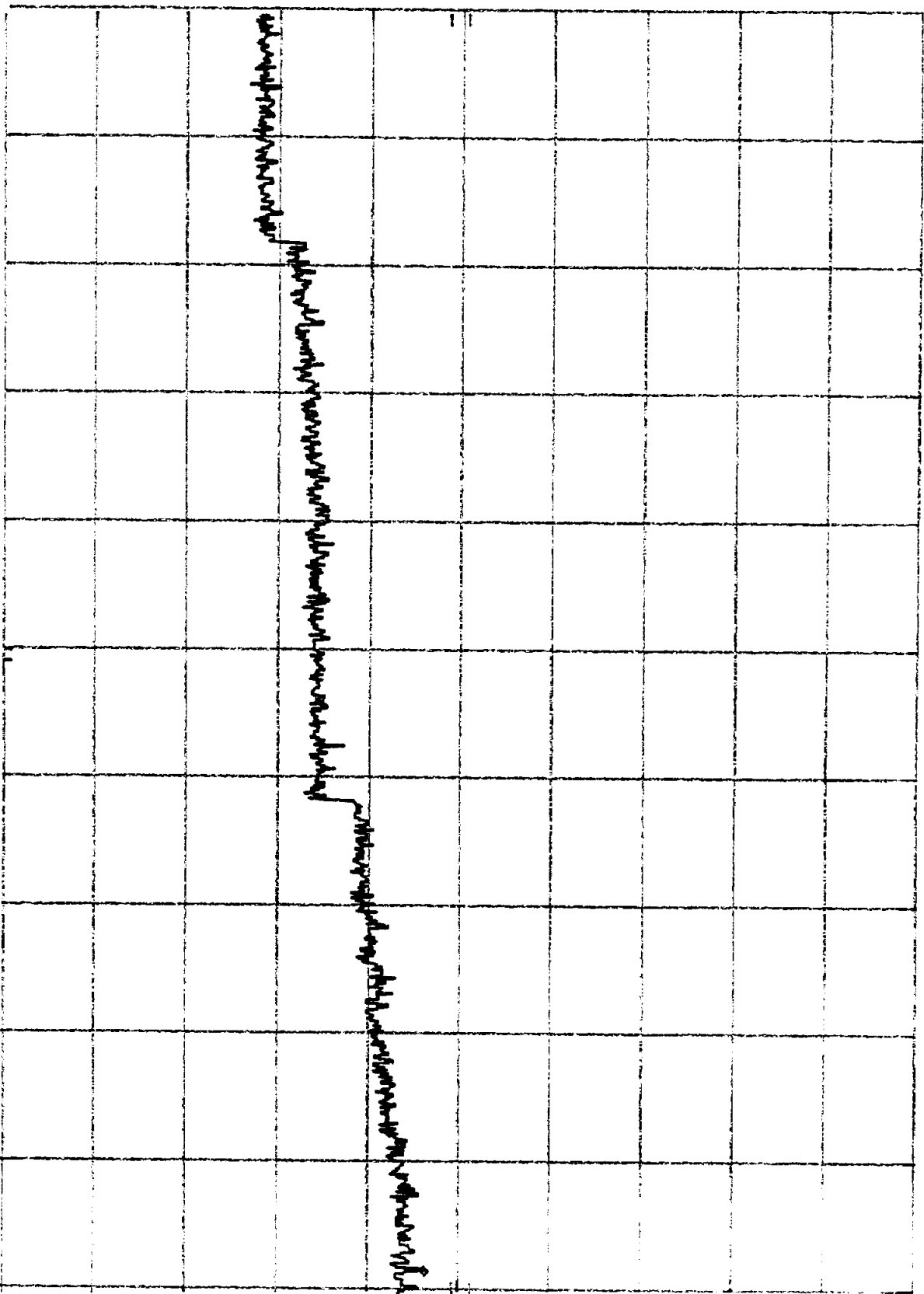
SWP 2.25 sec

h₂ REF 0.0 dBm 10 dB/

ATTEN 10 dB

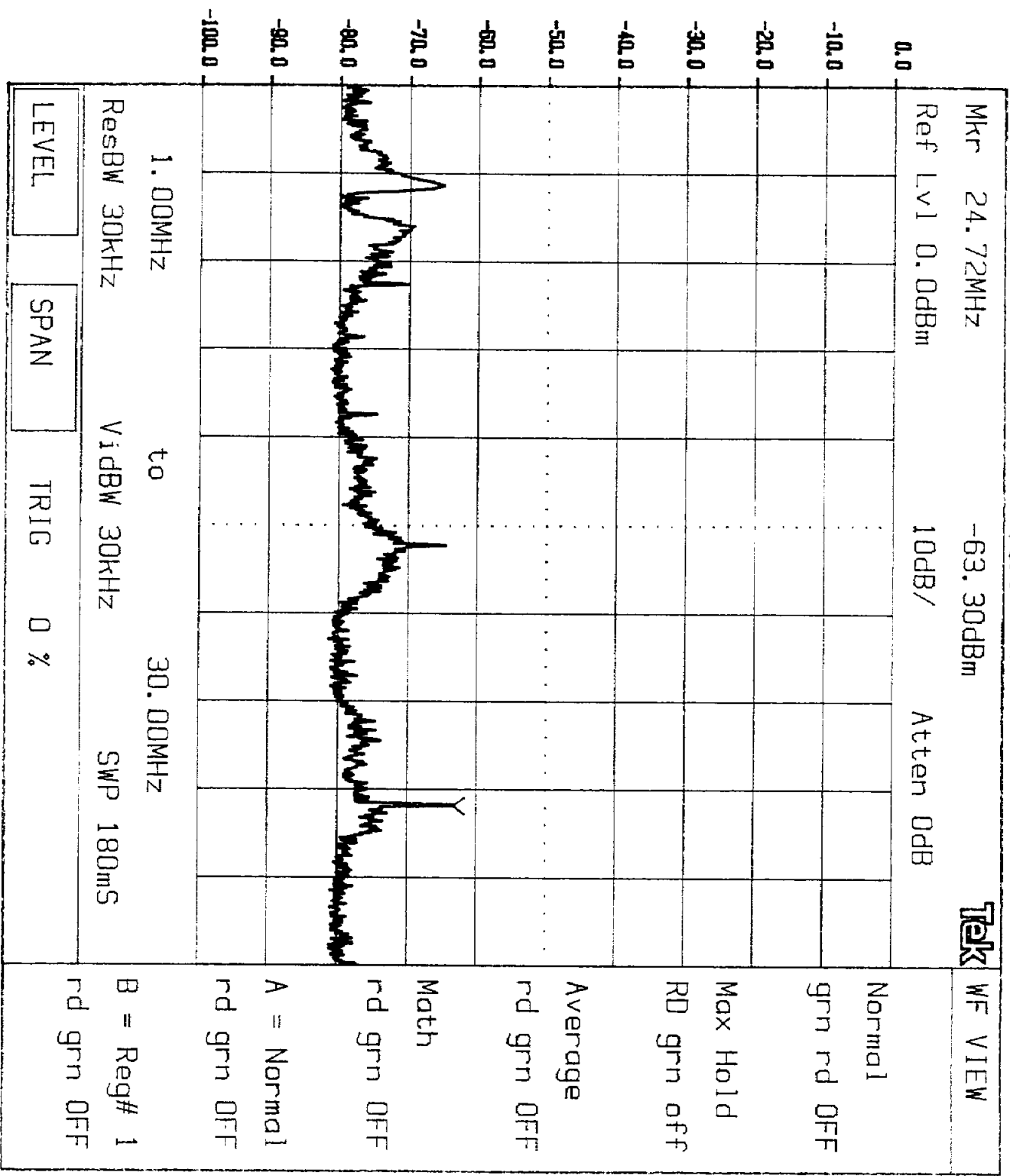
Plot B4b6

MKR 23.73 GHz
-54.00 dBm

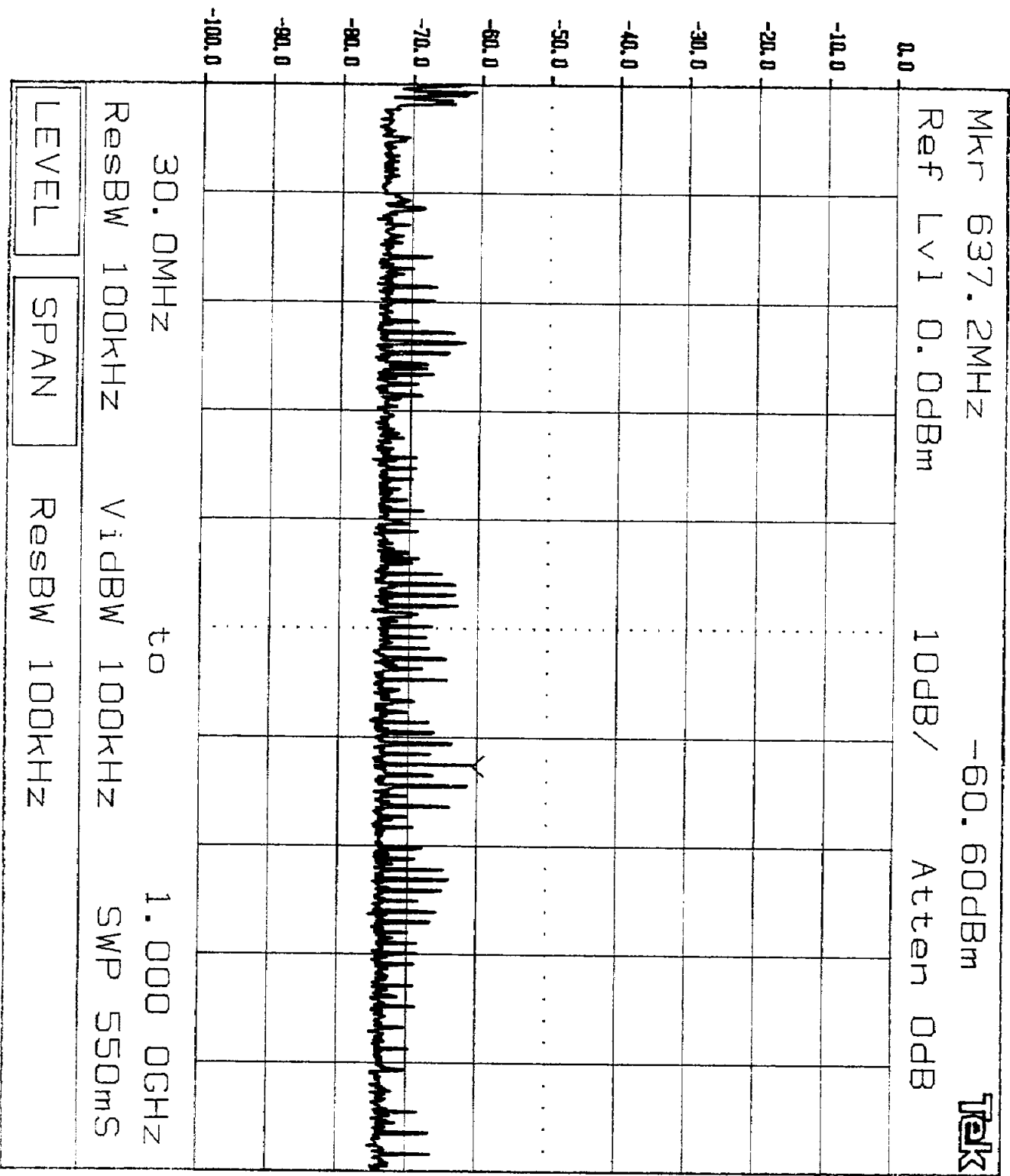


START 10.0 GHz RES BW 100 KHz VBW 100 KHz STOP 24.0 GHz SWP 4.20 sec

Plot B4C1



Plot B4C2



HP

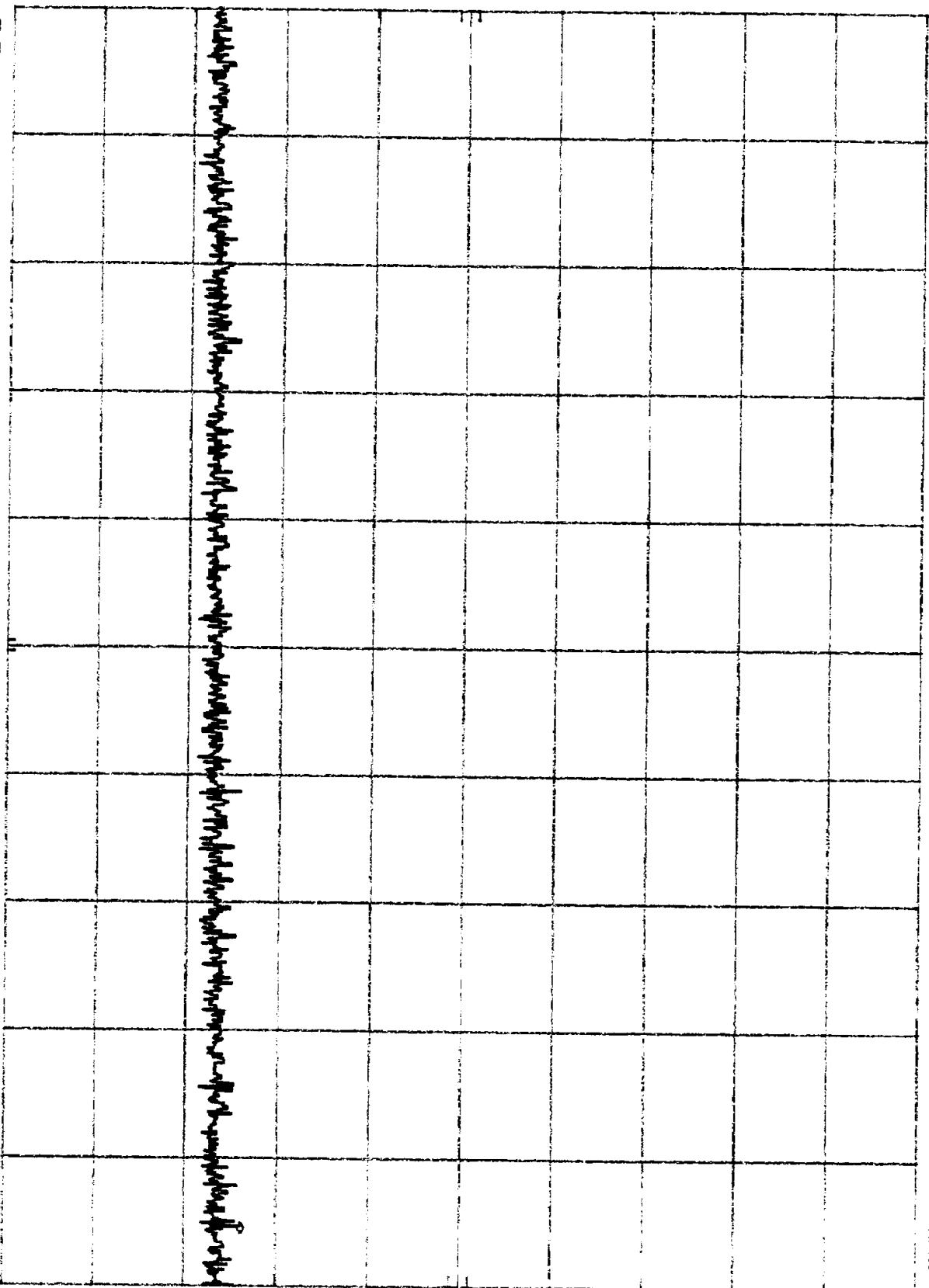
REF 0.0 dBm

ATTEN 10 dB

MR 2.336 GHz
-73.80 dBm

10 dB/

Plot B4C3



START 1.00 GHz

RES BW 100 kHz

VBW 100 kHz

STOP 2.40 GHz
SWP 420 msec

h_p

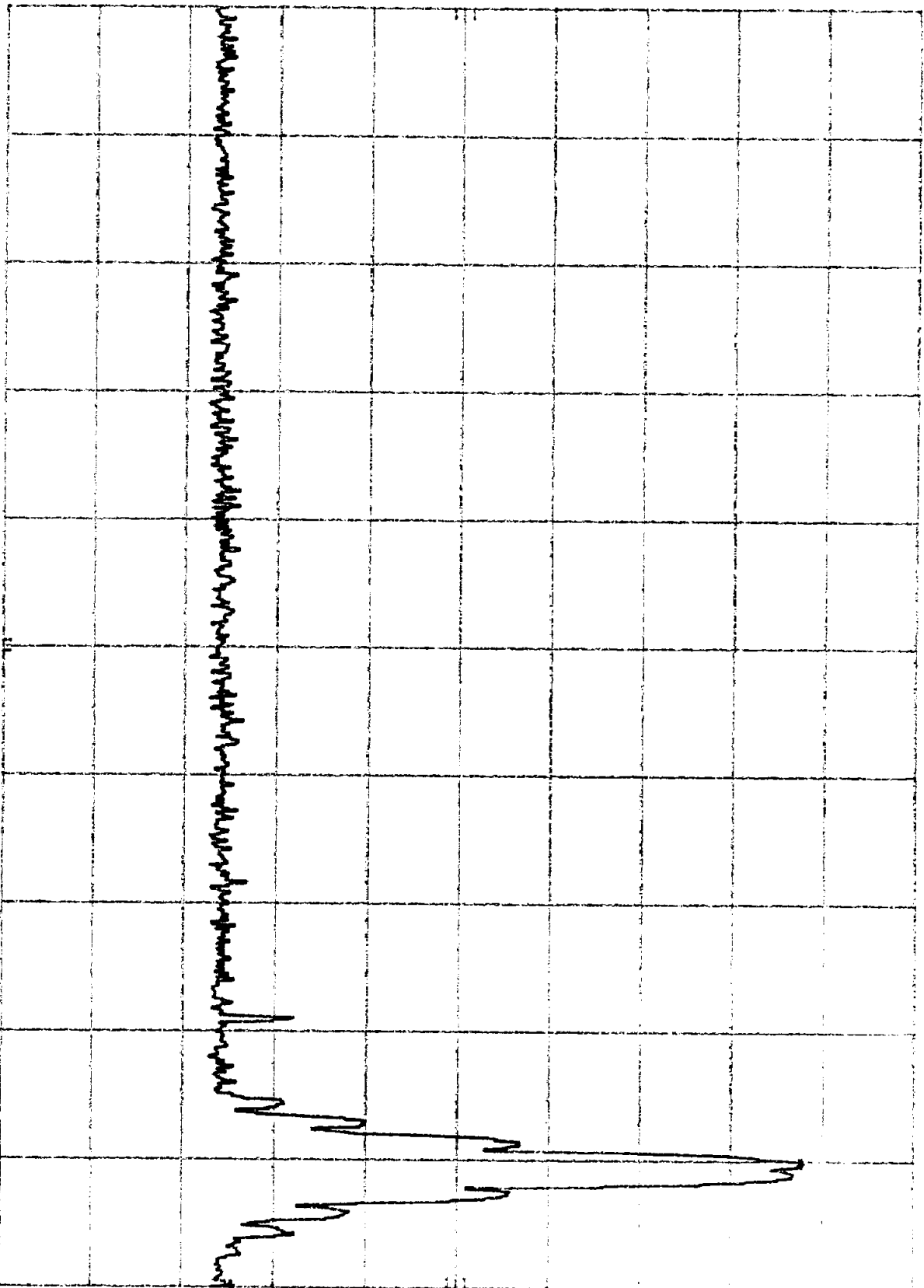
REF -10.0 dBm

ATTEN 0 dB

Plot B4C4

MKR Δ 8.10 MHz
-62.20 dB

10 dB/



START 2.400 0 GHz

RES BW 100 kHz

VBW 100 kHz

STOP 2.483 5 GHz

SWP 25.1 msec

h₇

REF -10.0 dBm

ATTEN 0 dB

Plot B4C5

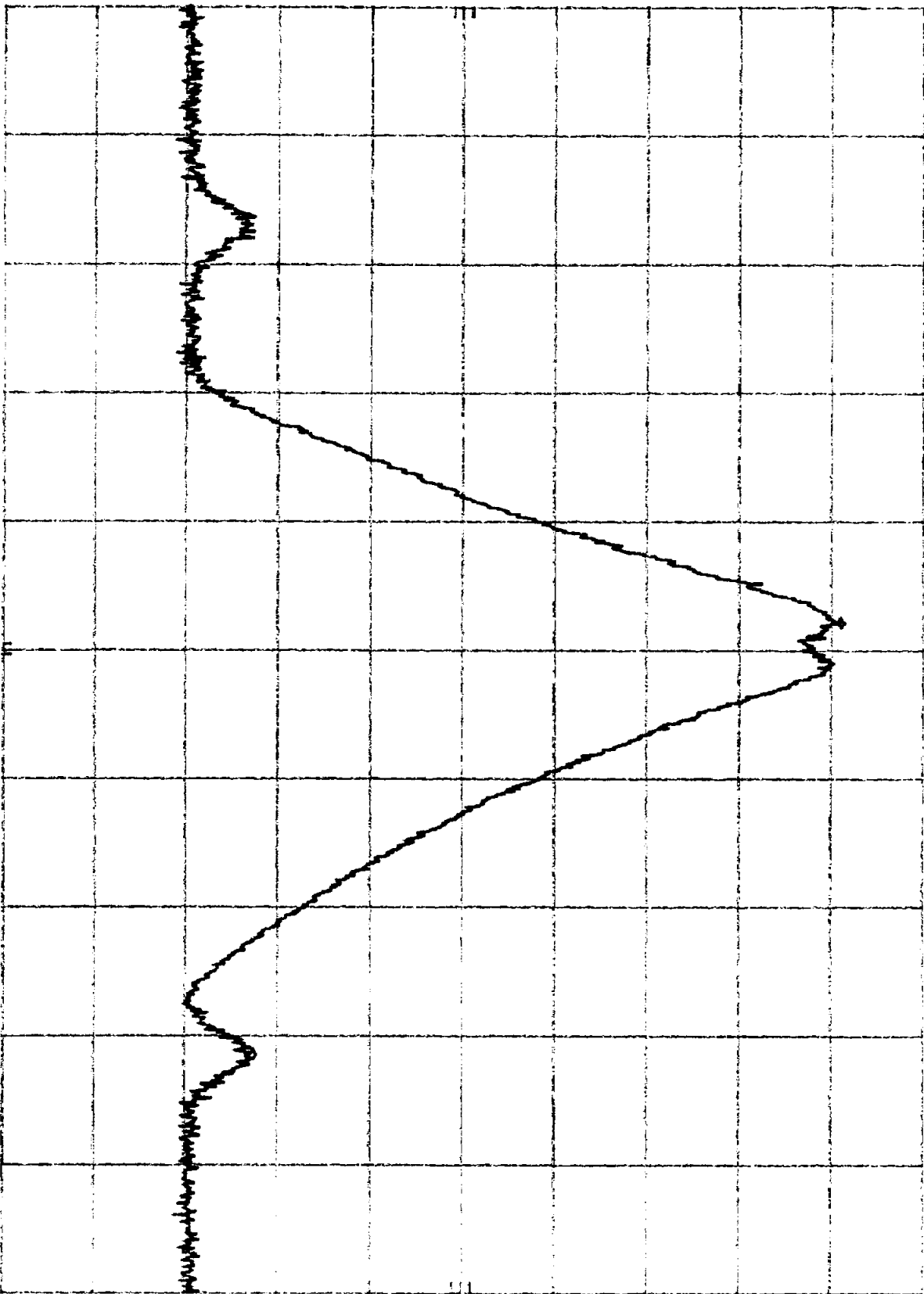
MKR Δ 10.13 MHz

-63.70 dB

10 dB/

SAMPLE

VID AVG
100



CENTER 2.475 2 GHz

RES BW 1 MHz

VBW 1 MHz

SPAN 30.2 MHz

SWP 20.0 msec

10 dB/

HP

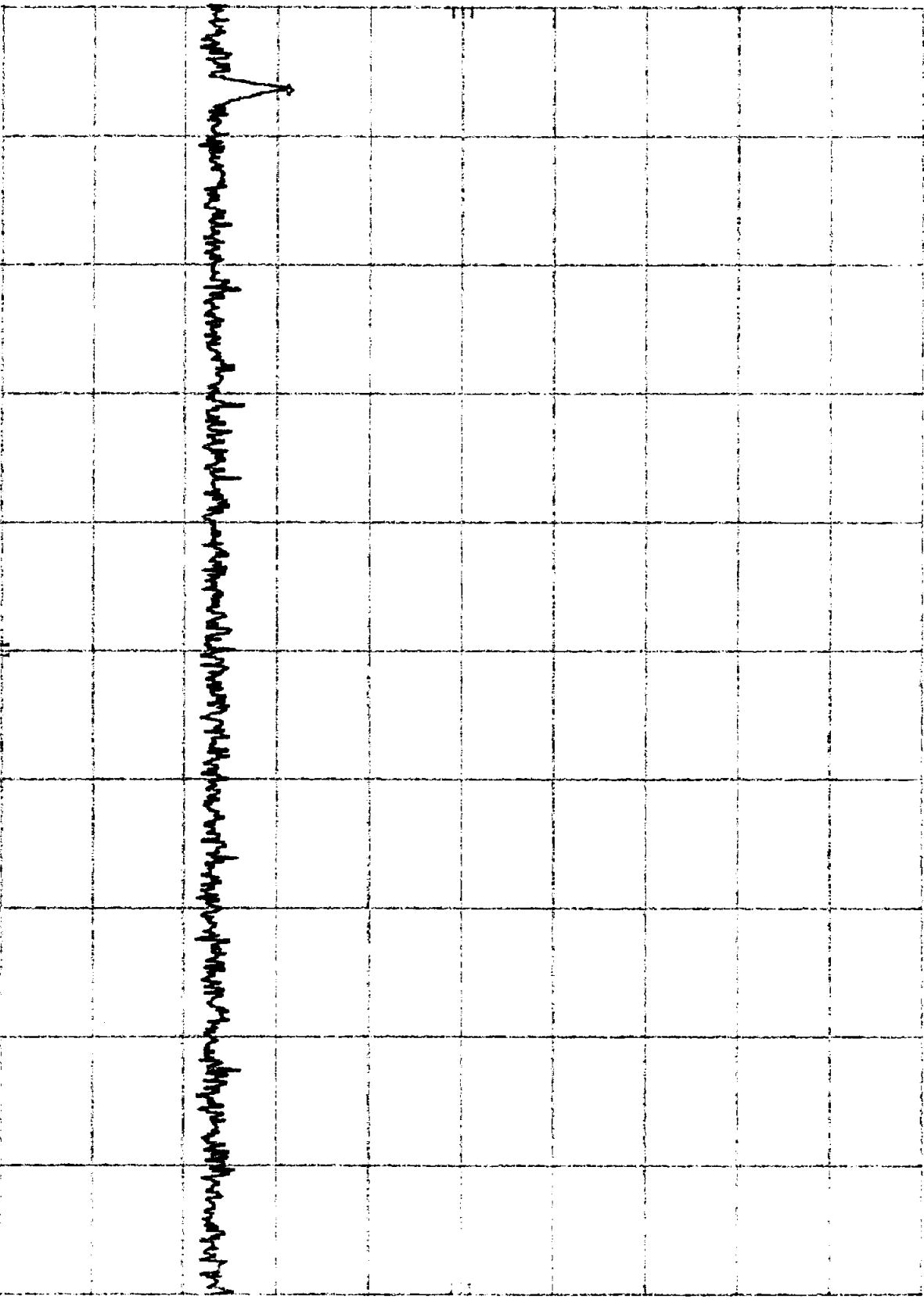
REF -10.0 dBm

ATTEN 0 dB

Plot B4C6

MKR 2.484 56 GHz

-78.80 dBm



START 2.483 5 GHz

RES BW 100 KHz

VBW 100 KHz

STOP 2.500 0 GHz

SWP 20.0 msec

10 dB/

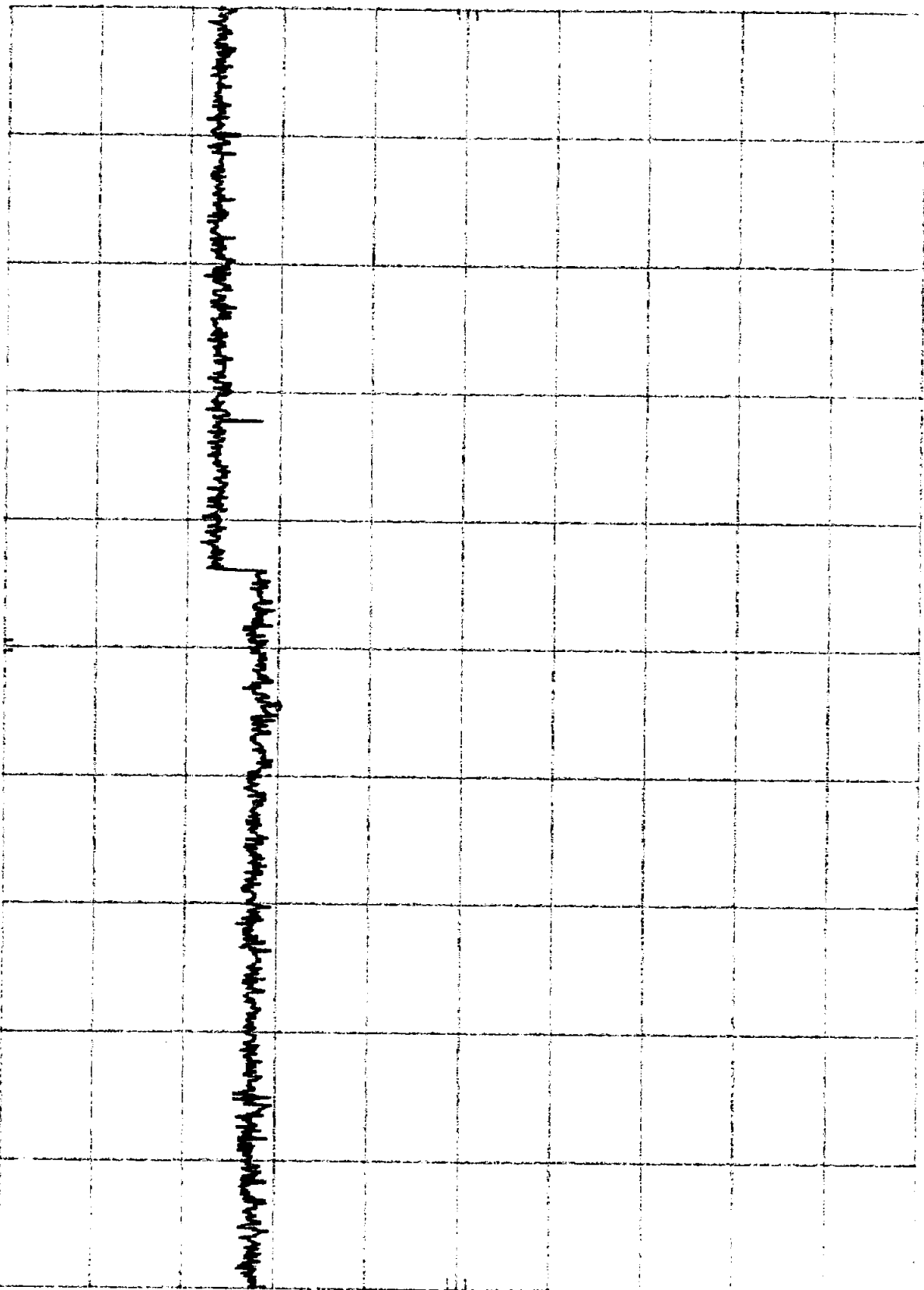
1/2

REF -10.0 dBm

ATTEN 0 dB

Plot B4C7

MKR 6.588 GHz
-80.00 dBm



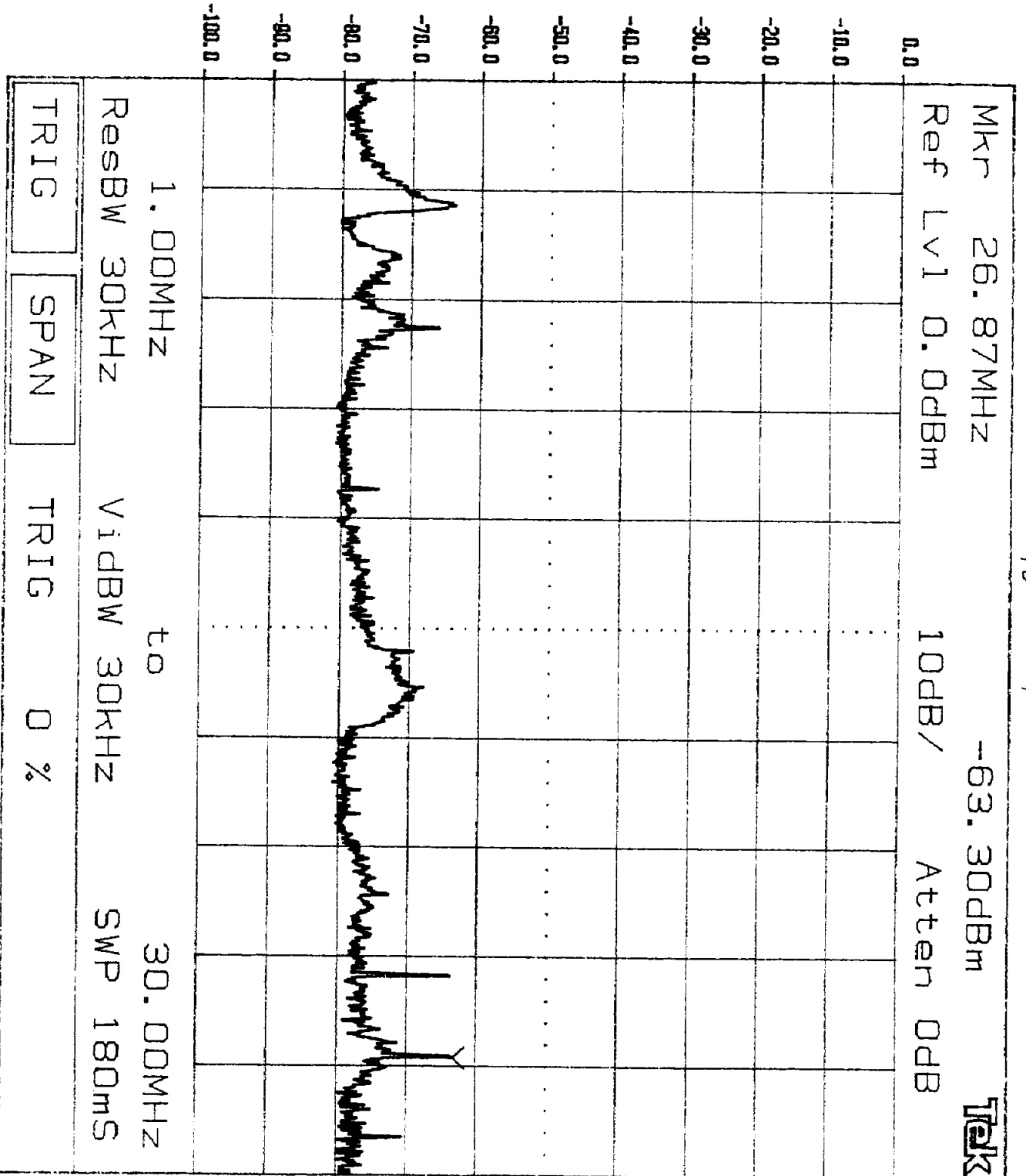
START 2.50 GHz

RES BW 100 kHz

VBW 100 kHz

STOP 10.00 GHz
SWP 2.25 sec

Plot H4a1



Knob 2

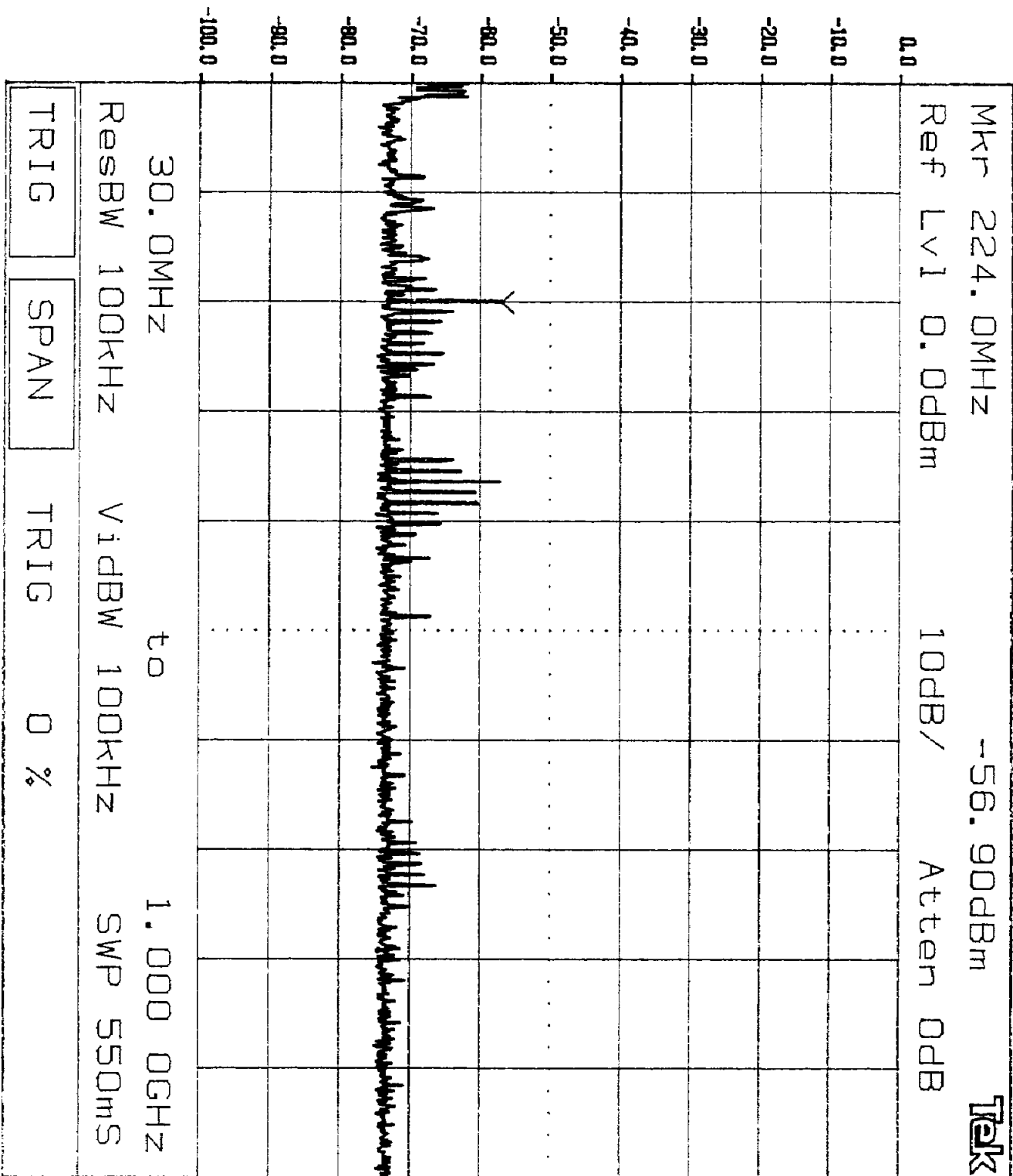
Knob 1

Keypad

Tektronix

2784

Plot H4A2



Knob 2

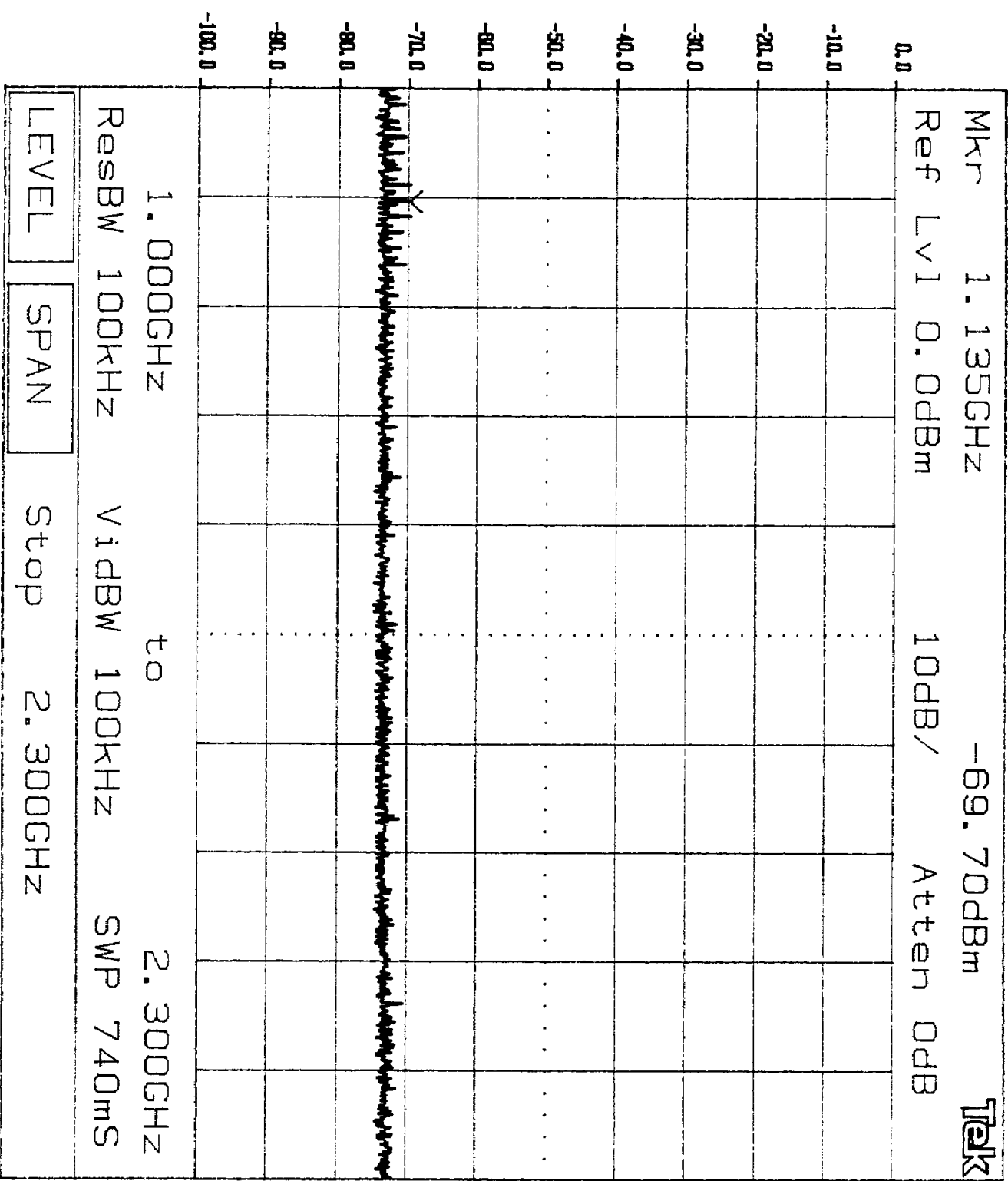
Knob 1

Keypad

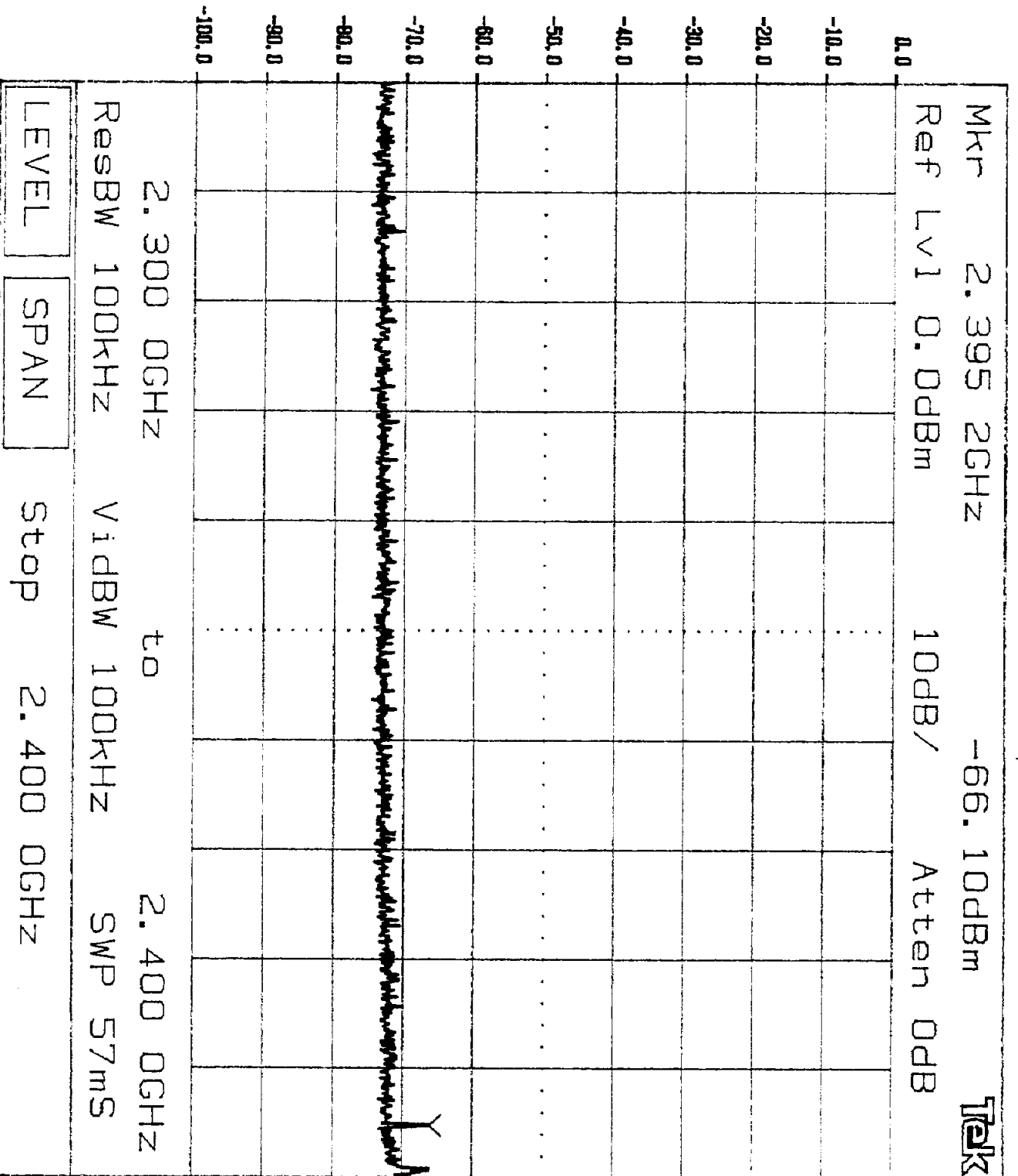
Tektronix

2784

Plot H4a3



Plot H4a4



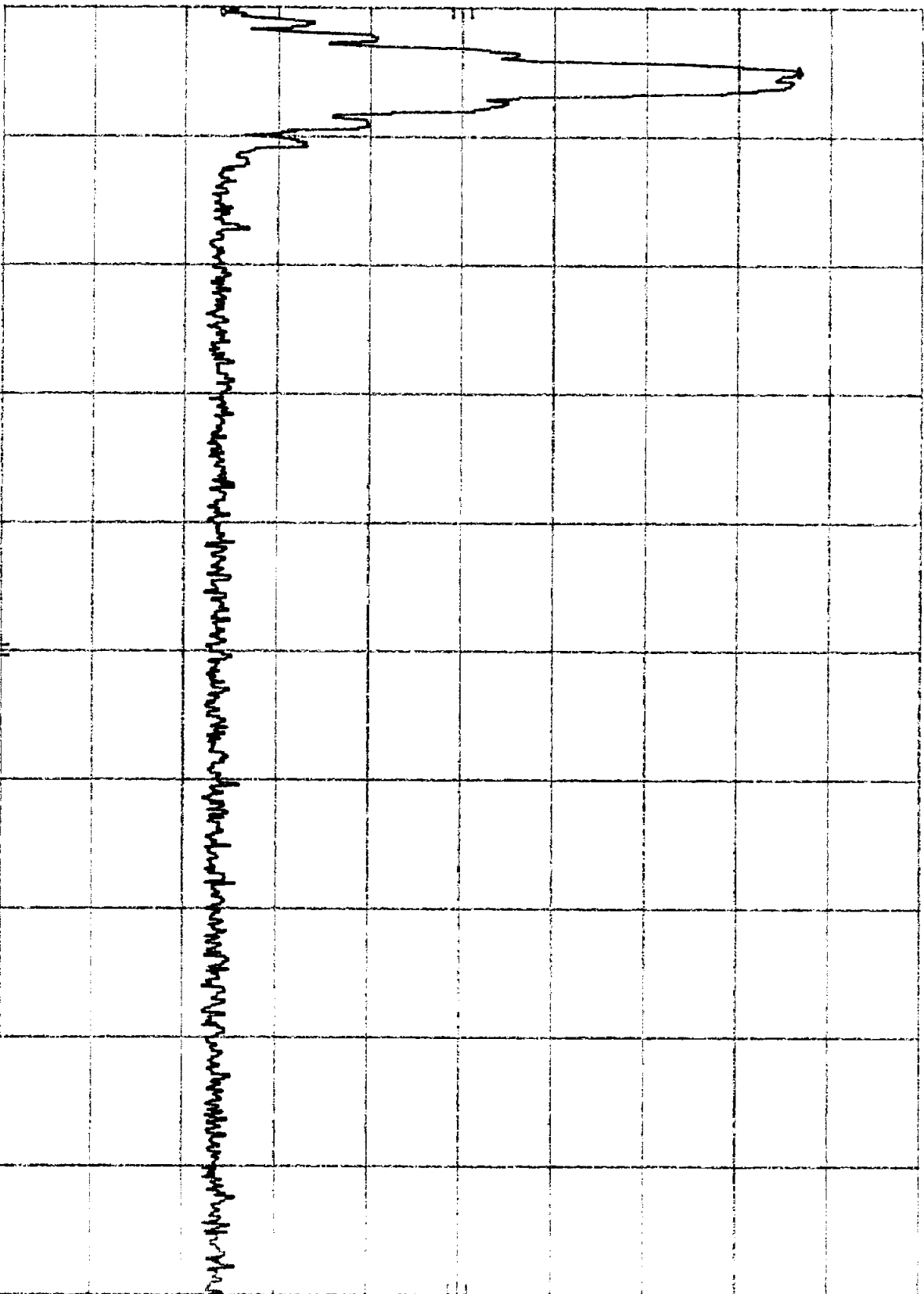
hp
10 dB

REF 0.0 dBm

ATTEN 10 dB

Plot H 4a5

MKR Δ -4.09 MHz
-62.60 dB



START 2.400 0 GHz
RES BW 100 kHz

VBW 100 kHz

STOP 2.483 5 GHz
SWP 25.1 msec

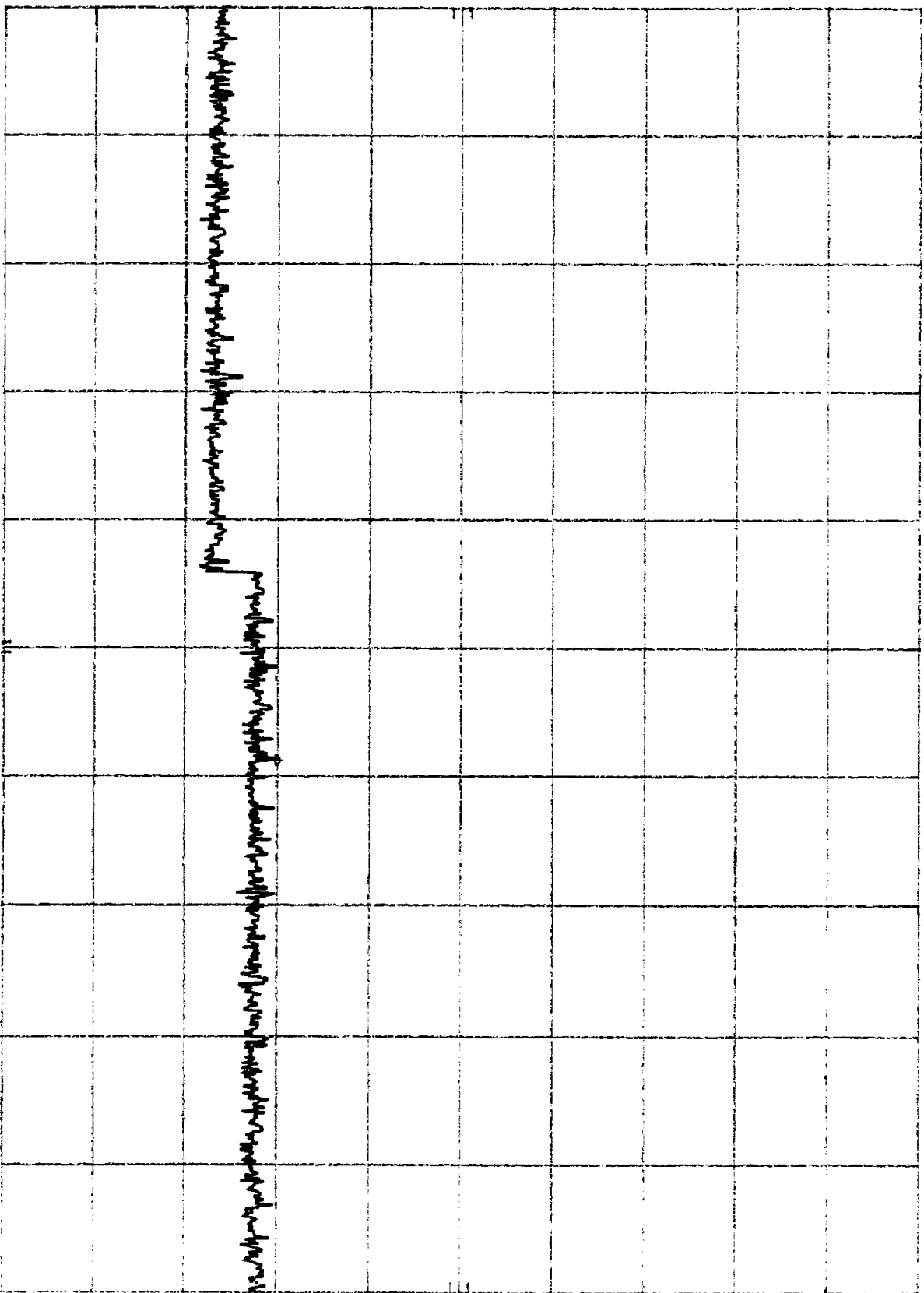
HP 10 dB/

REF 0.0 dBm

ATTEN 10 dB

Plot H4a6

MKR 8.895 GHz
-70.00 dBm



START 2.48 GHz
RES BW 100 kHz

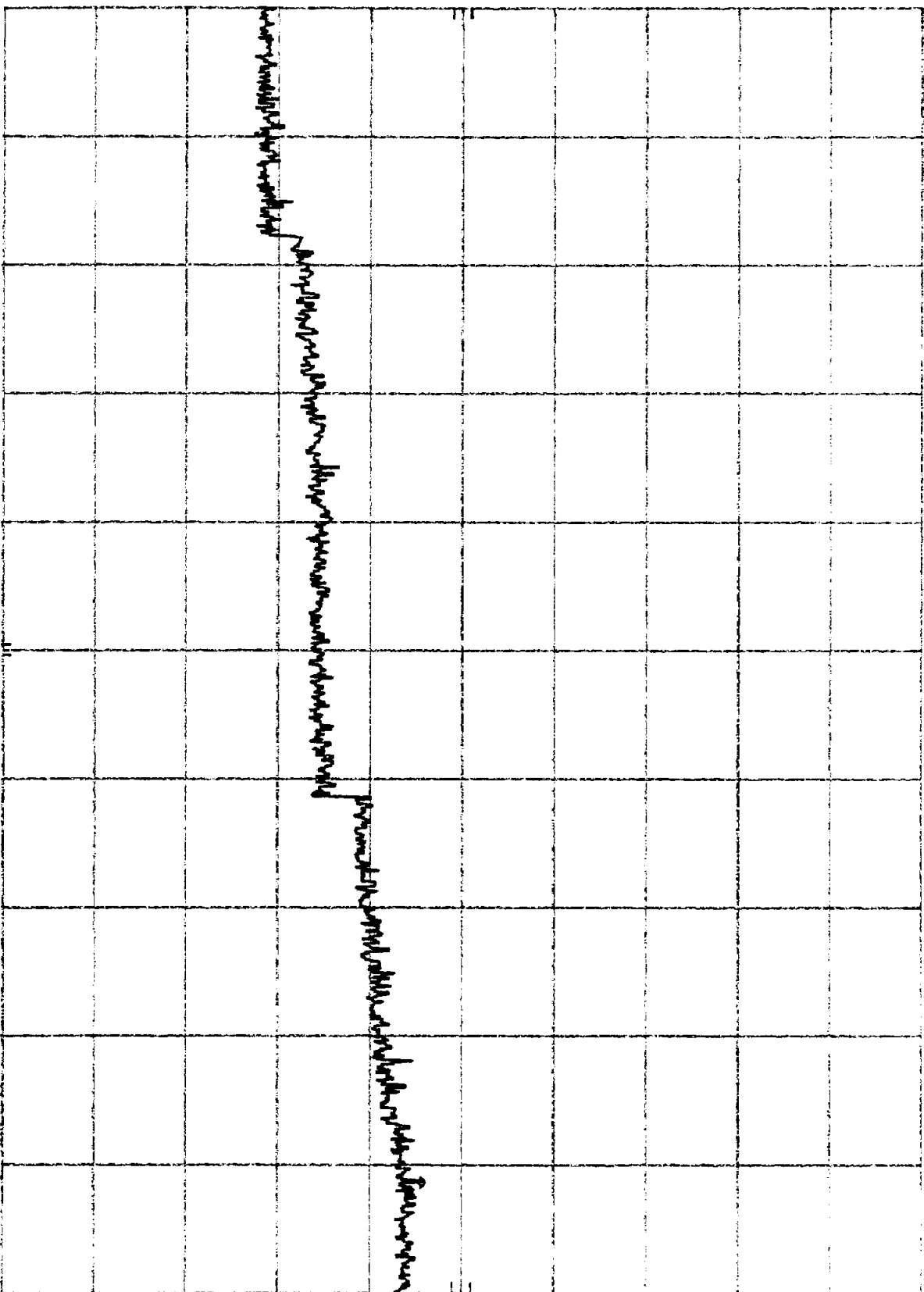
VBW 100 kHz

STOP 10.00 GHz
SWP 2.25 sec

h₂ REF 0.0 dBm
10 dB/

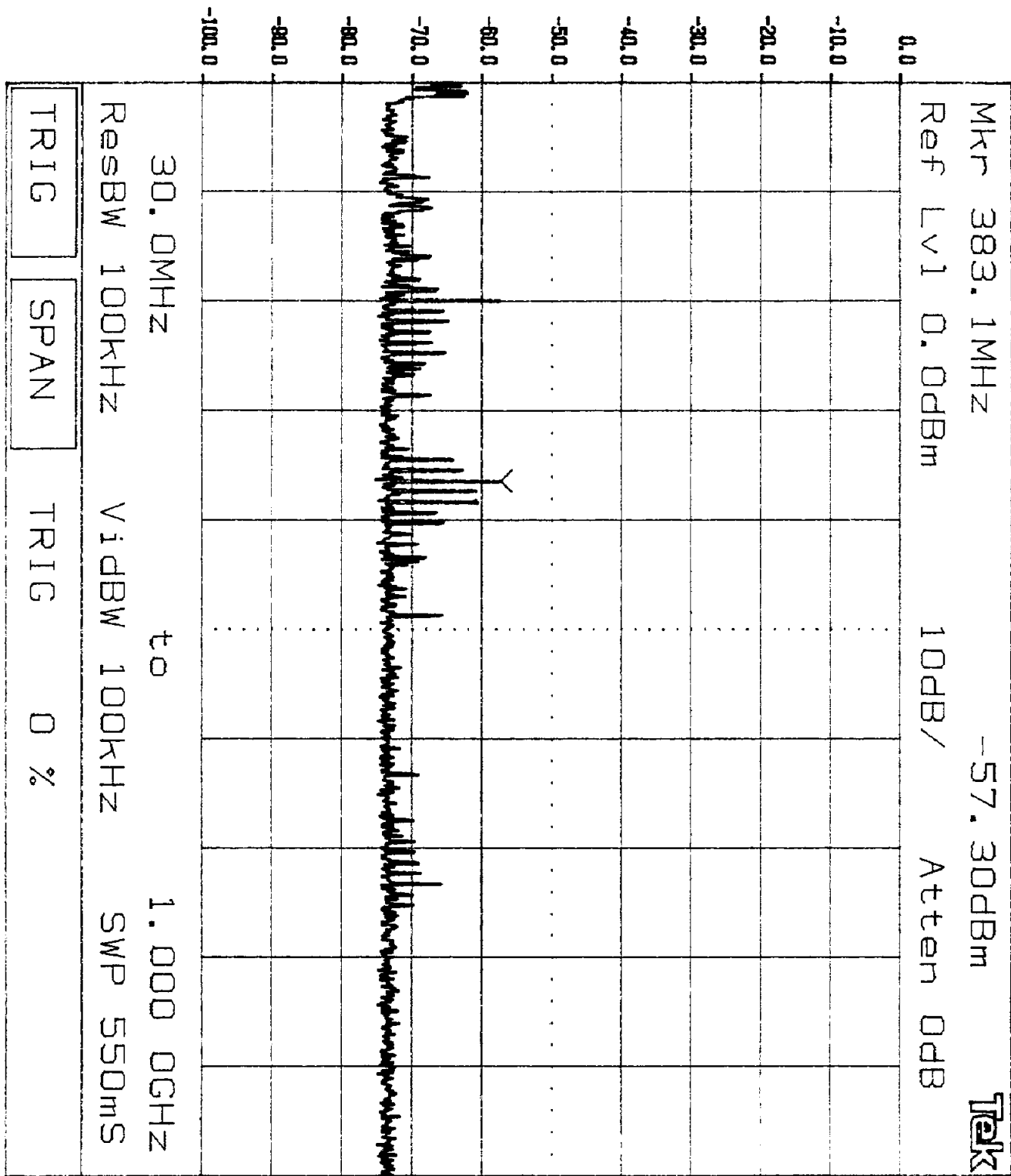
ATTEN 10 dB Plot H4a7

MKR 22.78 GHz
--54.40 dBm

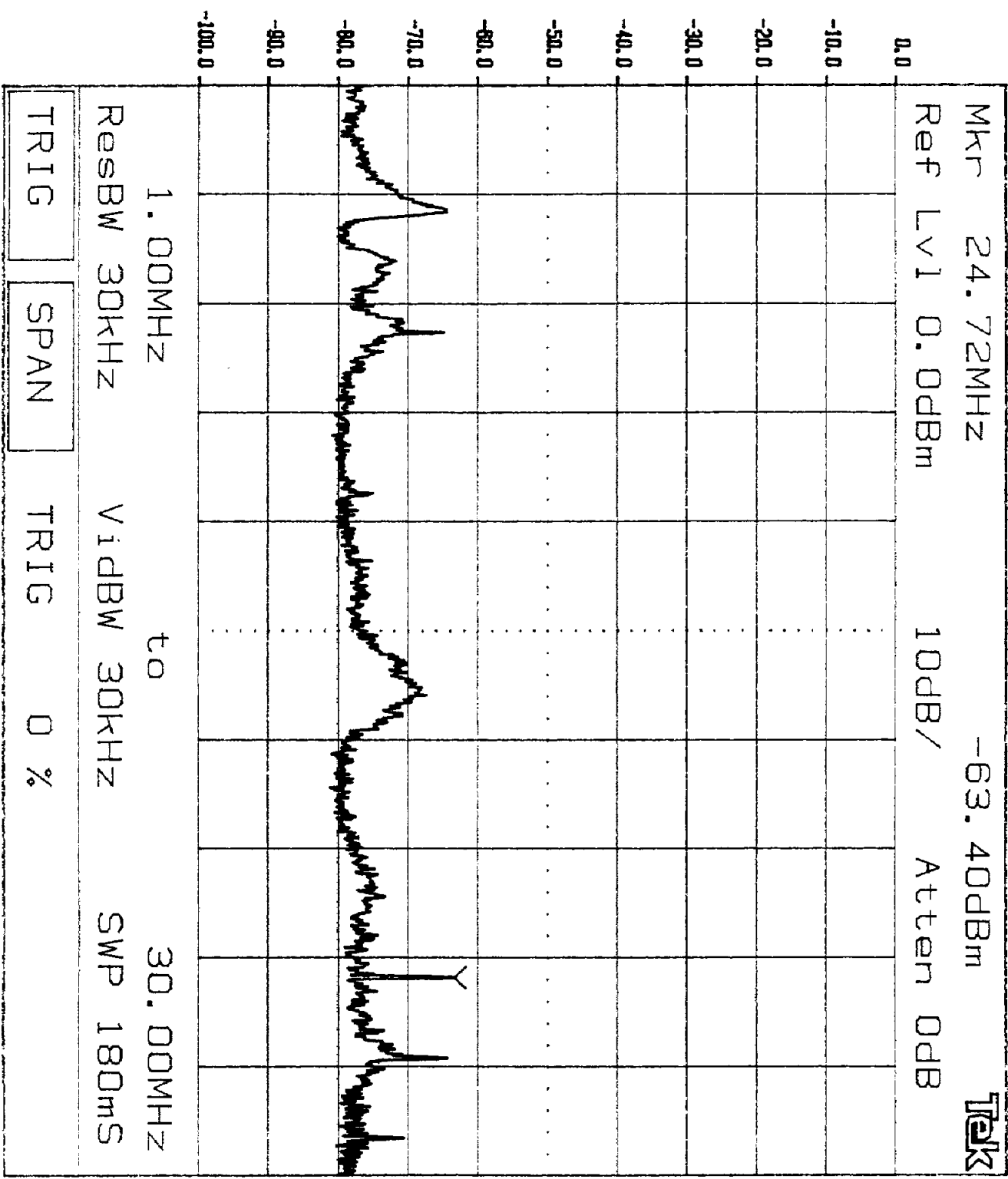


START 10.0 GHz RES BW 100 kHz VBW 100 kHz STOP 24.0 GHz
SWP 4.20 sec

Plot H461



Plot H4b2



Plot H463

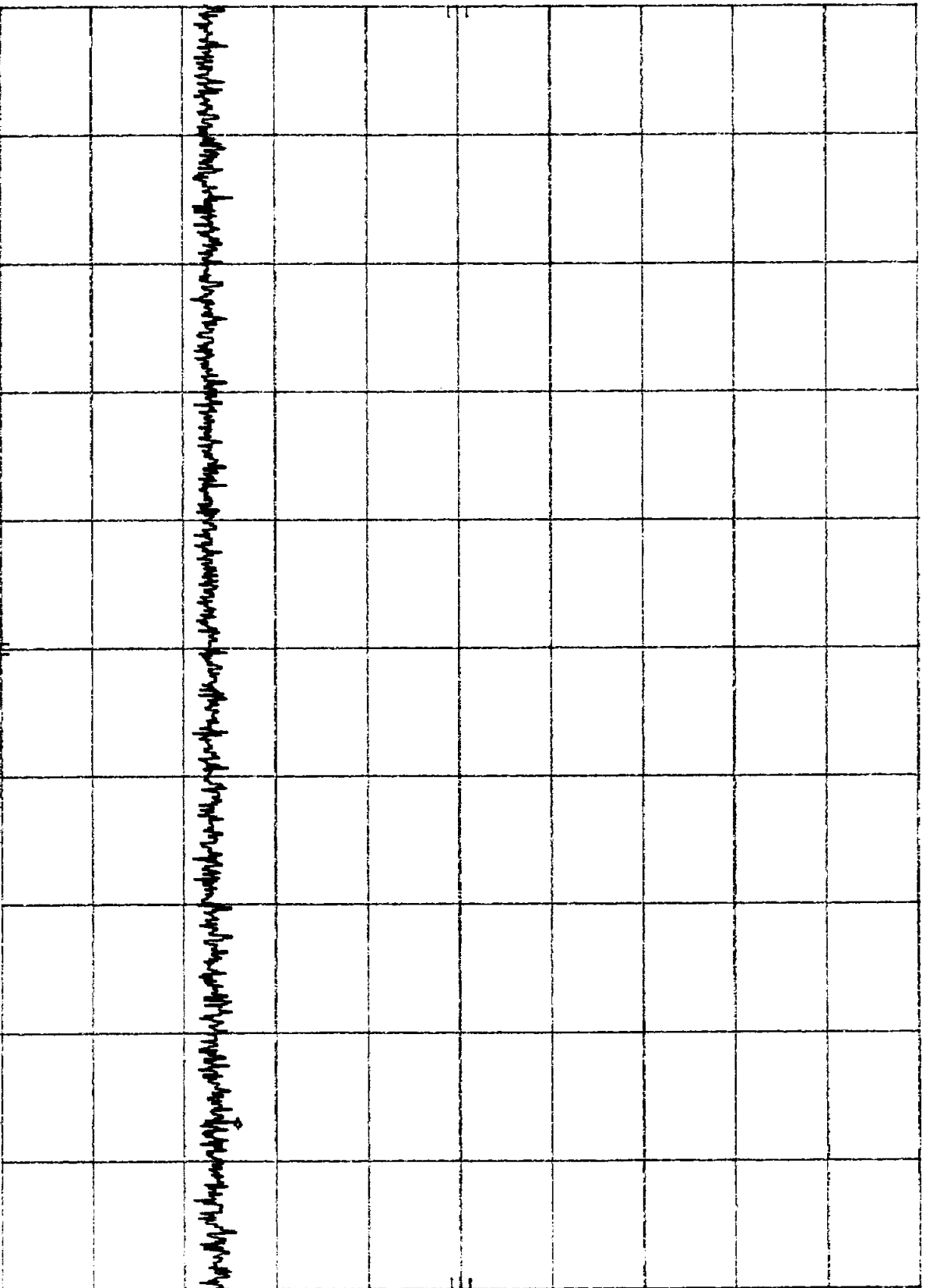
MKR 2.218 GHz
-74.20 dBm

HP

REF 0.0 dBm

ATTEN 10 dB

10 dB/



START 1.00 GHz

RES BW 100 KHz

VBW 100 KHz

SWP 420 msec

STOP 2.40 GHz

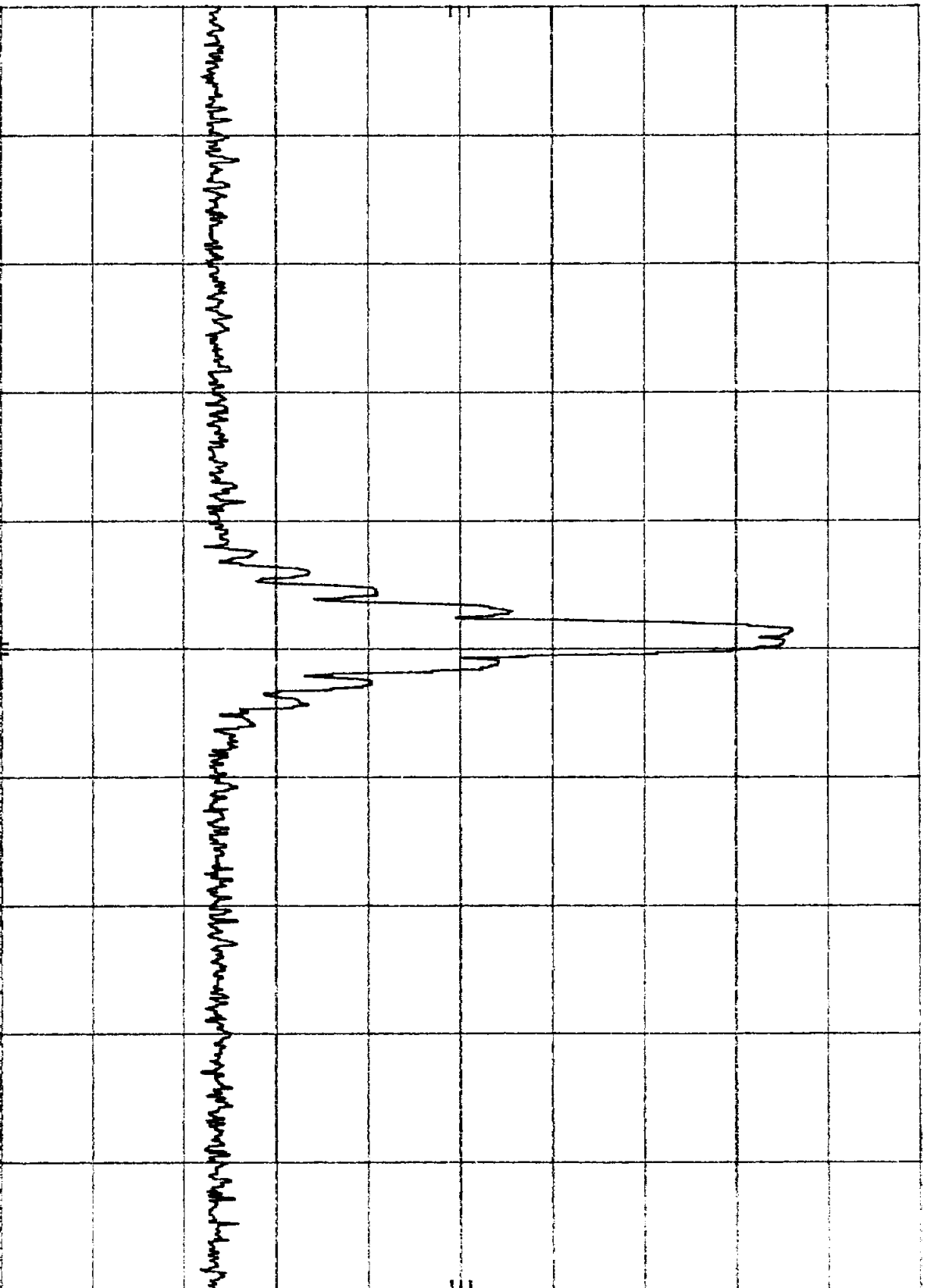
HP

REF 0.0 dBm

ATTEN 10 dB

Plot H4-b4

10 dB/



START 2.400 0 GHz

RES BW 100 KHz

VBW 100 KHz

STOP 2.483 5 GHz

SWP 25.1 msec

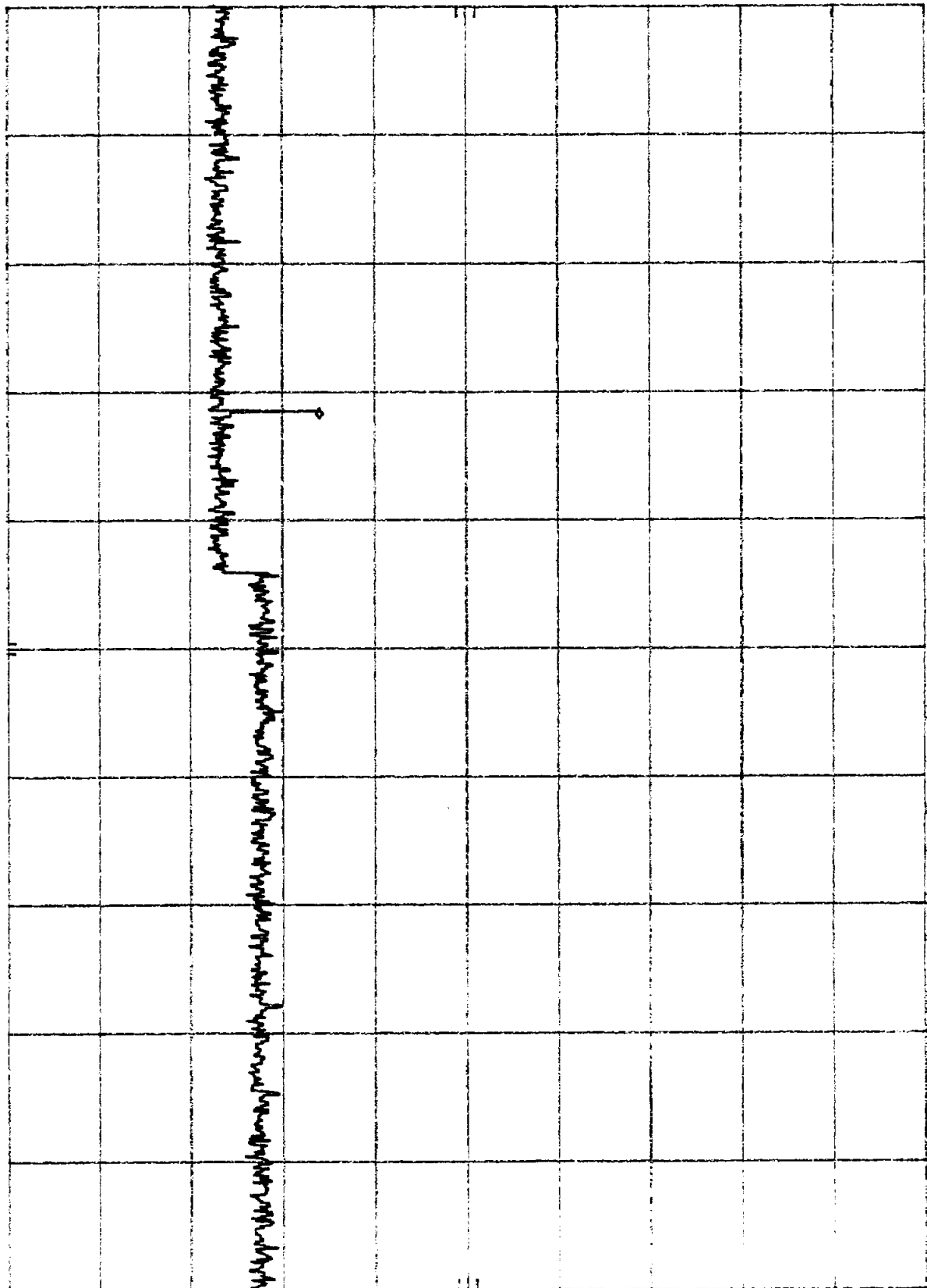
HP 10 dB/

REF 0.0 dBm

ATTEN 10 dB

MKR 4.859 GHz
-66.00 dBm

Plot H4b5



START 2.48 GHz STOP 10.00 GHz
RES BW 100 KHz VBW 100 KHz SWP 2.25 sec

HP 10 dB/

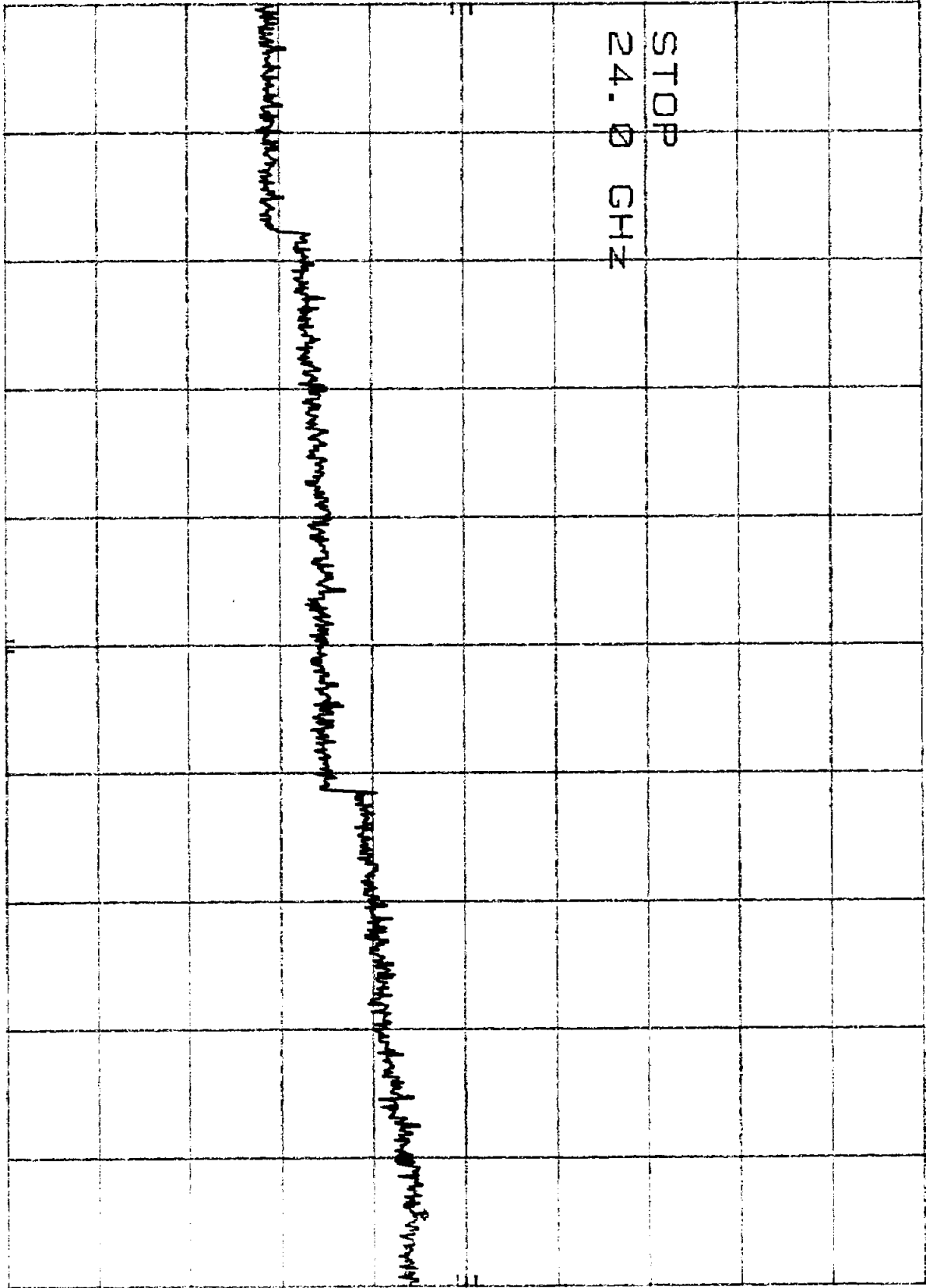
REF 0.0 dBm

ATTEN 10 dB

Plot H4b6

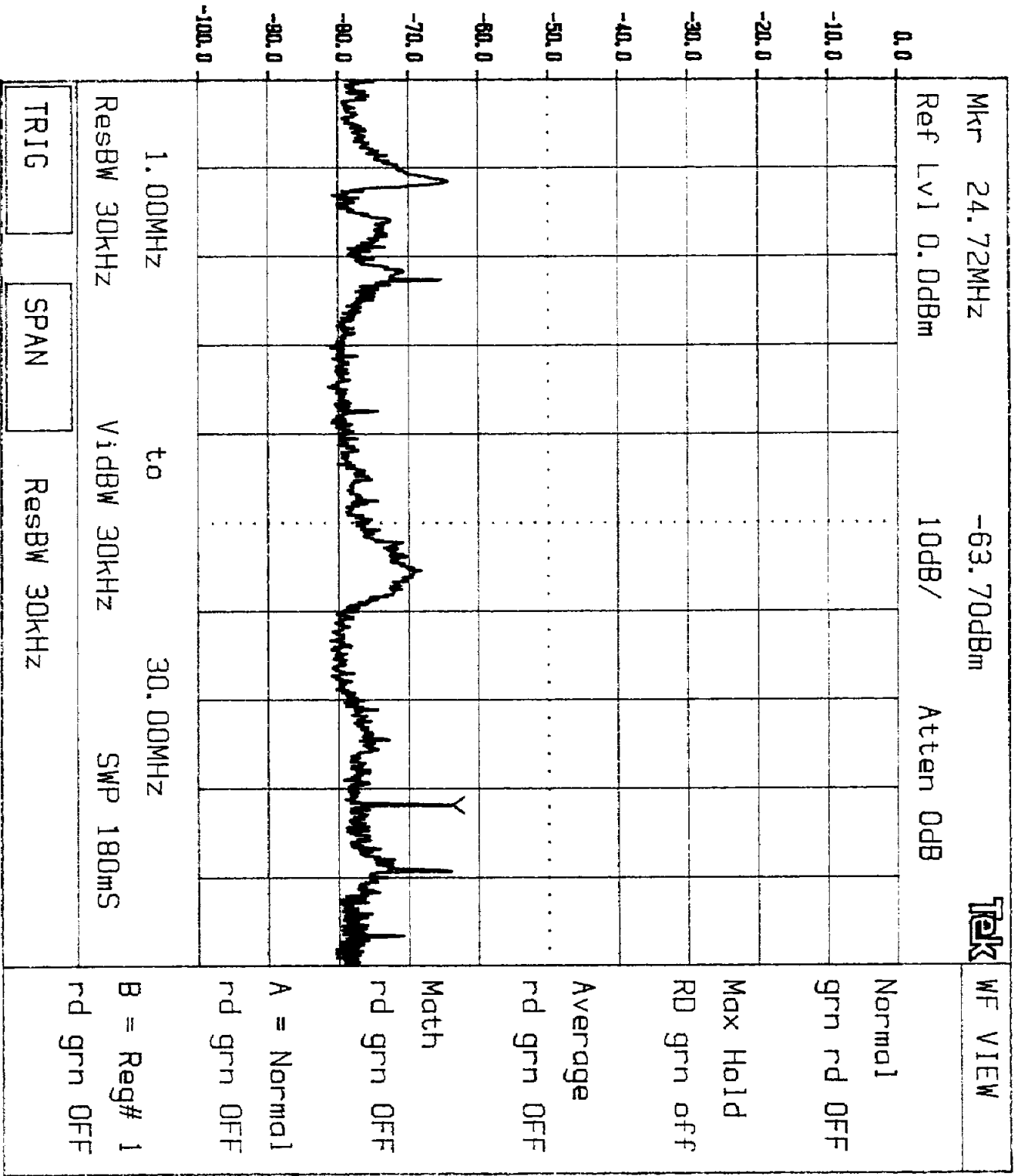
MKR 23.22 GHz
-54.60 dBm

STOP
24.0 GHz

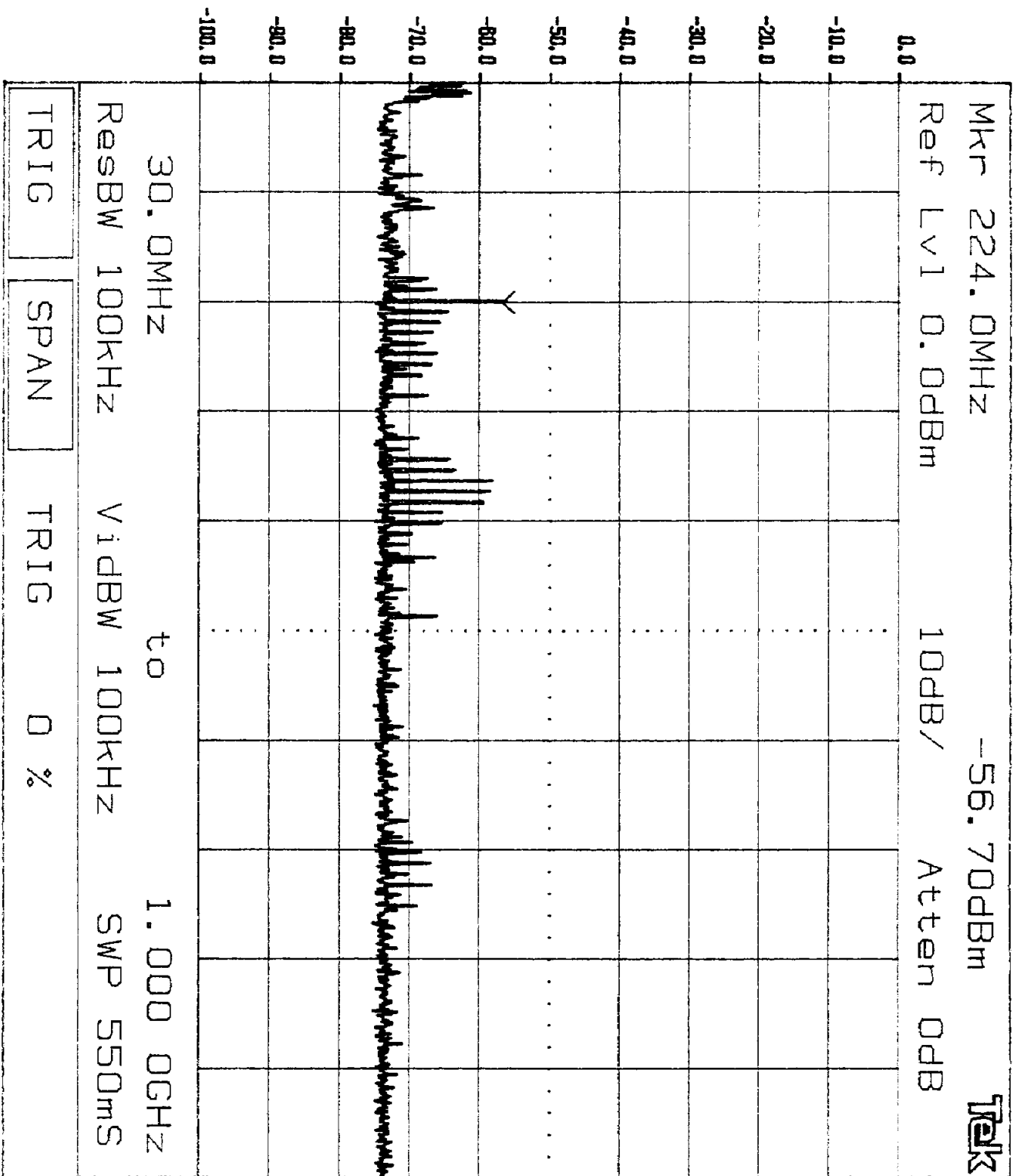


START 10.0 GHz
RES BW 100 kHz
VBW 100 kHz
STOP 24.0 GHz
SWP 4.20 sec

Plot H4C1



Plot H4C2



Plot 4C3

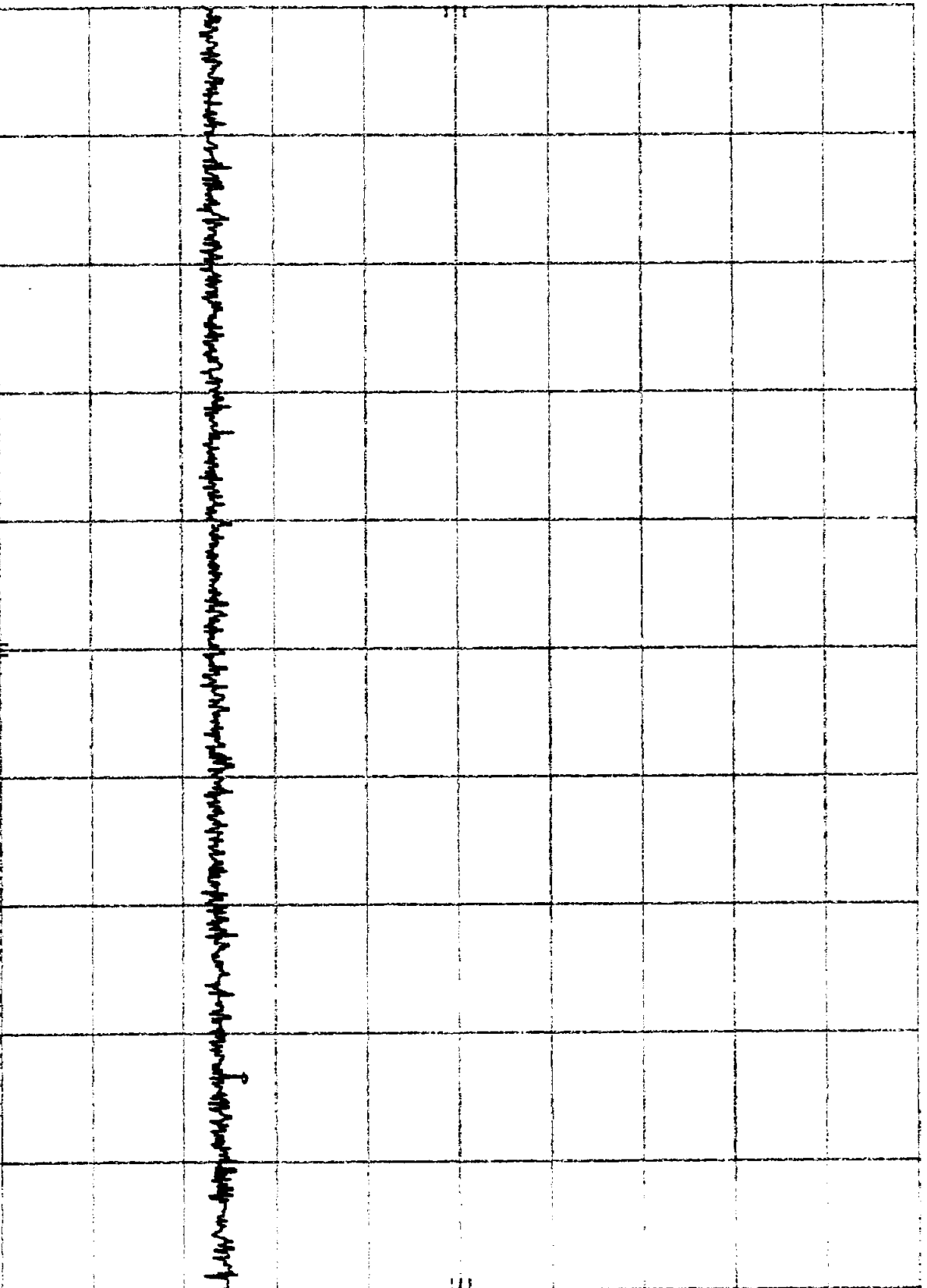
MKR 2.168 GHz
-73.50 dBm

40

10 dB/

REF 0.0 dBm

ATTEN 10 dB



START 1.00 GHz

RES BW 100 kHz

VBW 100 kHz

SWP 420 msec

STOP 2.40 GHz

h₂

10 dB/

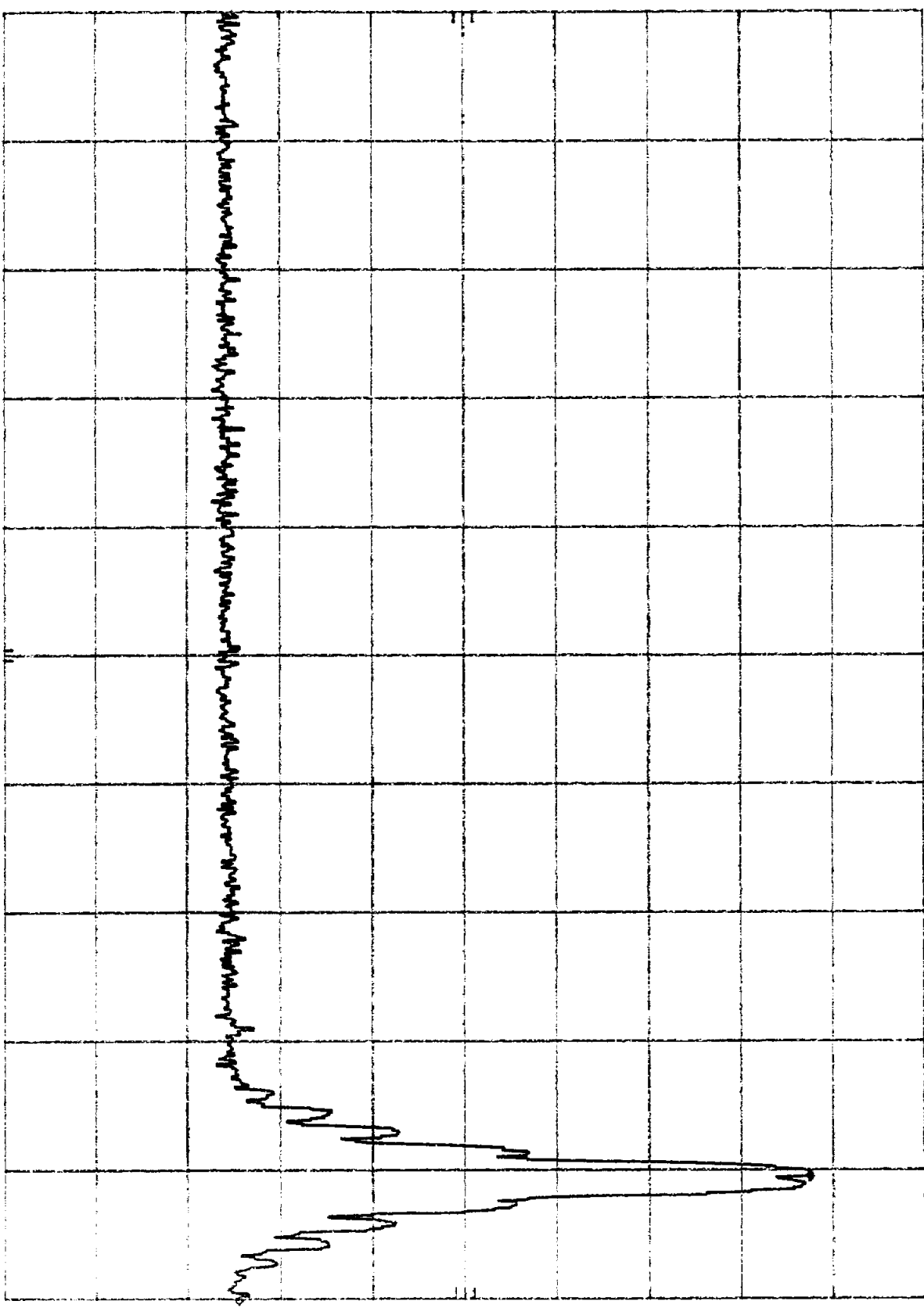
REF 0.0 dBm

ATTEN 10 dB

Plot#4

MKR Δ 8.02 MHz

-62.00 dB



START 2.400 0 GHz

RES BW 100 kHz

VBW 100 kHz

STOP 2.483 5 GHz

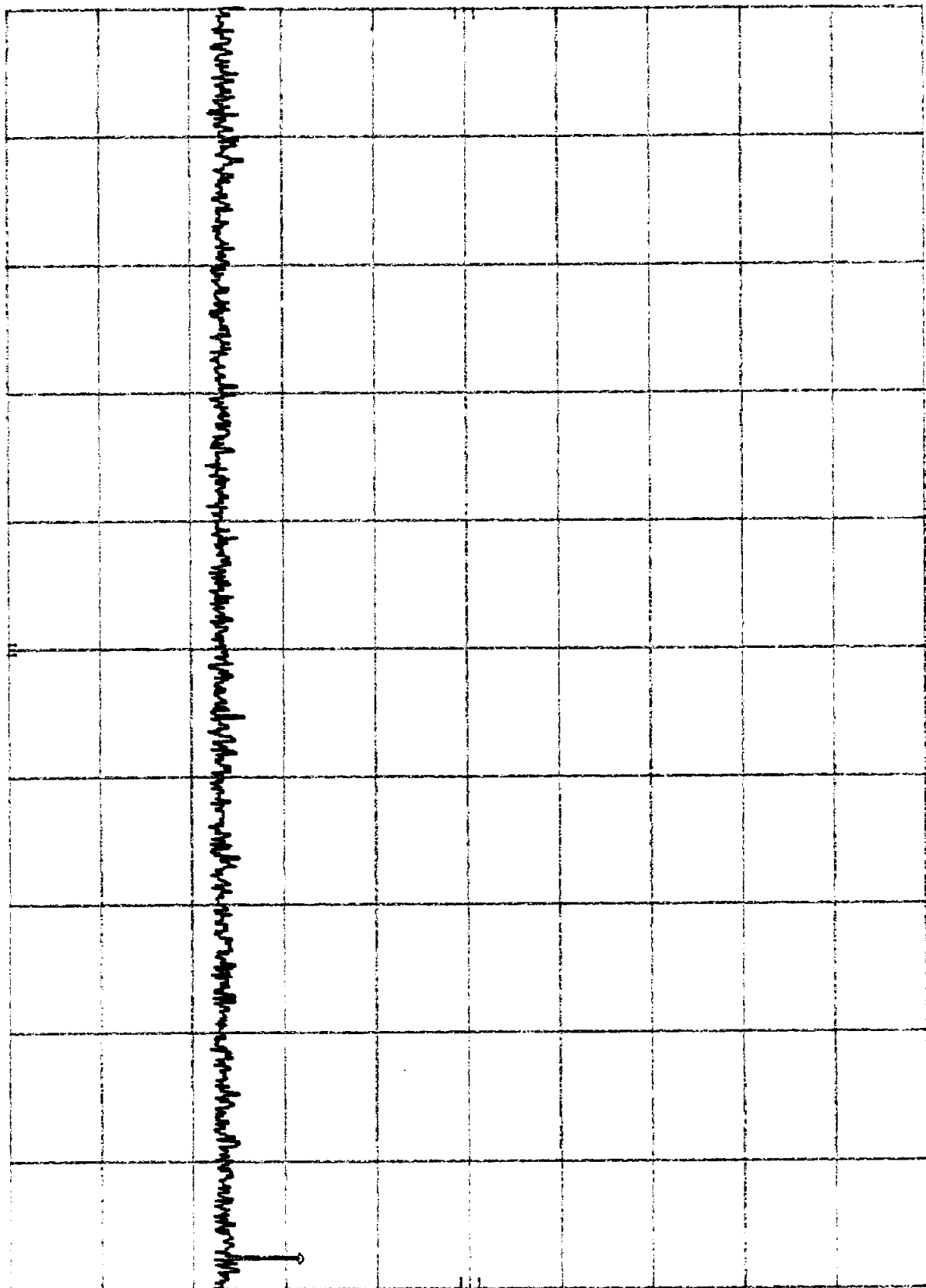
SWP 25.1 msec

HP 10 dB

REF 0.0 dBm

ATTEN 10 dB

Plot 4.937 GHz
-68.50 dBm



START 2.48 GHz

RES BW 100 kHz

VBW 100 kHz

STOP 5.00 GHz
SWP 755 msec

h₇₀

10 dB/

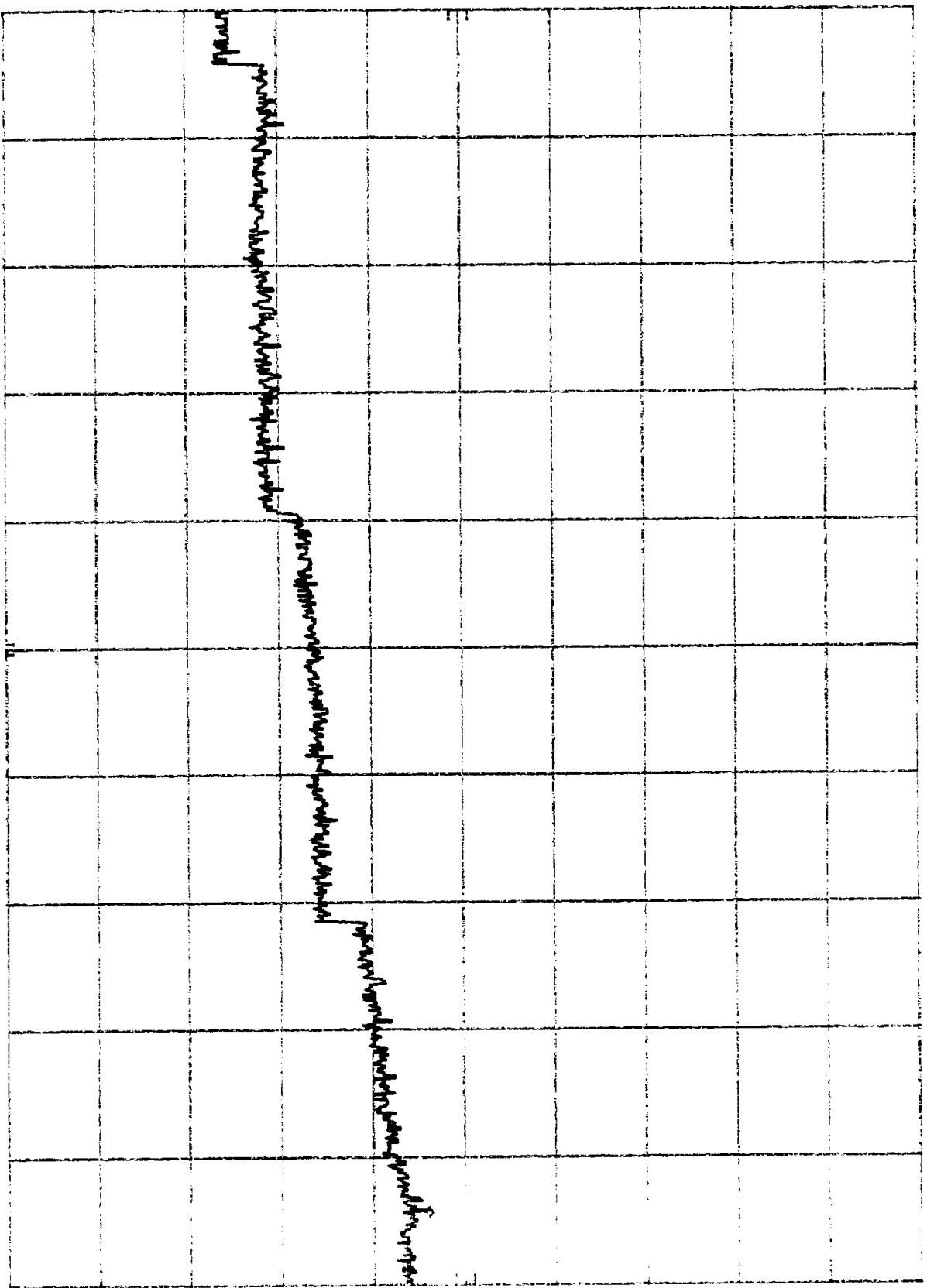
REF 0.0 dBm

ATTEN 10 dB

Plot # C 6

MKR 22.90 GHz

-53.90 dBm



START 5.0 GHz

RES BW 100 KHz

VBW 100 KHz

STOP 24.0 GHz

SWP 5.70 sec

4.6 Transmitter Radiated Emissions in Restricted Bands, FCC Rule 15.35(b), (c):

Radiated emission measurements were performed from 30 MHz to 2400 MHz. Analyzer resolution is 100 kHz or greater for 30 MHz to 1000 MHz, 1 MHz for >1000 MHz.

Data is included of the worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included. All measurements were performed with peak detection unless otherwise specified.

The data on the following pages list the significant emission frequencies, the limit and the margin of compliance.

In addition, the field strength at the band-edge frequency $f = 2483.5$ MHz was calculated as follows:

$$E_f = E_0 - \Delta$$

where E_0 is the field strength at the fundamental frequency (high channel)

Δ is "delta" from Plots B4c5 (for Base) and H4C4 (for handset)

The results are:

$$E_f = 114.7 - 62.0 = 52.7 \text{ dBuV/m (for handset)}$$

$$E_f = 115.0 - 63.7 = 51.7 \text{ dBuV/m (for base)}$$

which are below the limit (54 dBuV/m)

**Radiated Emissions
Test Data**

Company:	TT System LLC	Model #:	IBM-2.4GIG	Standard:	FCC § 15.247 (R.B.)
EUT:	Cordless Phone Hand set	S/N #:		Limits:	11
Project #:	J99030602	Test Date:	December 28, 1999	Test Distance:	3 meters
Test Mode:	Tx @ 2404.8MHz	Engineer:	Xi-Ming Y.	Duty Relaxation:	0 dB

	Antenna Used			Pre-Amp Used			Cable Used			Transducer Used
Number:	11	14	21	8	10	0	0	0	12	0
Model:	LPB: 2520A	EMCO 3115	3160-9	CDI P100 0	AFT18855	None	None	None	Gm M+ L	None

Frequency	Reading	Detector	Ant	Amp.	Ant. Pol.	Ant. Factor	Pre-Amp	Insert. Loss	D. C. F.	Net	Limit @3m	Margin
MHz	dB(μV)	P/A/Q	#	#	H/V	dB(1/m)	dB	dB	dB	dB(μV/m)	dB(μV/m)	dB
4809.50	44.0	Peak	14	8	H	35.4	28.1	3.2	0.0	54.5	74.0	-19.5
4909.55	36.3	Ave.	14	8	H	35.4	28.1	3.2	0.0	46.8	54.0	-7.2
7214.35	39.0	Peak	14	8	H	37.8	28.0	4.3	0.0	53.1	74.0	-20.9
7214.35	29.4	Ave.	14	8	H	37.8	28.0	4.3	0.0	43.5	54.0	-10.5
12024.00	42.4	Peak	14	10	V	42.3	39.1	5.9	0.0	51.5	74.0	-22.6
12024.00	34.3	Ave.	14	10	V	42.3	39.1	5.9	0.0	43.4	54.0	-10.7
19238.40	40.5	Peak	21	13	V	40.2	23.3	7.7	-9.5	55.6	74.0	-18.4
19238.40	30.4	Ave.	21	13	V	40.2	23.3	7.7	-9.5	45.5	54.0	-8.5

Notes:	a) D.C.F.: Distance Correction Factor b) Insert Loss (dB) = Cable A + Cable B + Cable C c) Net (dB) = Reading + Antenna Factor - Pre-amp + Insert Loss - Transducer Loss - Duty Relaxation (transmitter only). d) Negative signs (-) in Margin column signify levels below the limits. e) All other emissions not reported are below the equipment noise floor which is at least 20 dB below the limits. f) Reading above 18 GHz was taking at 1m distance.
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Radiated Emissions Test Data

Company:	TT System LLC	Model #:	IBM-2.4GIG	Standard:	FCC § 15.247 (R.B.)
EUT:	Cordless Phone Hand set	S/N #:		Limits	11
Project #:	J99030602	Test Date:	December 28, 1999	Test Distance:	3 meters
Test Mode:	Tx @ 2440.8MHz	Engineer:	Xi-Ming Y.	Duty Relaxation	0 dB

	Antenna Used			Pre-Amp Used			Cable Used			Transducer Used
Number:	11	14	21	8	10	0	0	0	12	0
Model:	LPB: 2520A	EMCO 3115	3160-9	CDI_P100 0	AFT18855	None	None	None	Gm_M+ 1	None

[illegible]

Notes:

- a) D.C.F.: Distance Correction Factor
b) Insert. Loss (dB) = Cable A + Cable B + Cable C
c) Net (dB) = Reading + Antenna Factor - Pre-amp + Insert. Loss. - Transducer Loss - Duty Relaxation (transmitter only)
d) Negative signs (-) in Margin column signify levels below the limits.
e) All other emissions not reported are below the equipment noise floor which is at least 20 dB below the limits.
f) Reading above 18 GHz was taken at 1m distance.

**Radiated Emissions
Test Data**

Company:	TT System LLC	Model #:	IBM-2.4GIG	Standard:	FCC § 15.247 (R.B.)
EUT:	Cordless Phone Base	S/N #:		Limits:	11
Project #:	J99030602	Test Date:	December 28, 1999	Test Distance:	3 meters
Test Mode:	Tx @ 2475.0MHz	Engineer:	Xi-Ming Y.	Duty Relaxation:	0 dB

	Antenna Used			Pre-Amp Used			Cable Used			Transducer Used
Number:	11	14	21	8	10	0	0	0	12	0
Model:	LPB-2520A	EMCO 3115	3180-9	CDI P100 0	AFT18855	None	None	None	Grn M+ L	None

Frequency	Reading	Detector	Ant	Amp	Ant. Pol.	Ant. Factor	Pre-Amp	Insert. Loss	D. C. F.	Net	Limit @3m	Margin
MHz	dB(μV)	P/A/Q	#	#	H/V	dB(1/m)	dB	dB	dB	dB(μV/m)	dB(μV/m)	dB
4949.96	42.0	Peak	14	8	V	33.9	28.1	3.2	0.0	51.0	74.0	-23.0
4949.96	36.4	Ave.	14	8	V	33.9	28.1	3.2	0.0	45.4	54.0	-8.6
7425.00	44.6	Peak	14	8	V	38.0	28.0	4.3	0.0	58.9	74.0	-15.1
7425.00	37.4	Ave.	14	8	V	38.0	28.0	4.3	0.0	51.7	54.0	-2.3
12375.00	42.0	Peak	14	10	V	42.3	39.1	5.9	0.0	51.1	74.0	-23.0
12375.00	34.0	Ave.	14	10	V	42.3	39.1	5.9	0.0	43.1	54.0	-11.0
19800.00	40.0	Peak	21	13	V	40.3	23.3	7.7	-9.5	55.2	74.0	-18.8
19800.00	30.0	Ave.	21	13	V	40.3	23.3	7.7	-9.5	45.2	54.0	-8.8
22275.00	42.0	Peak	21	13	V	40.3	23.3	7.9	-9.5	57.4	74.0	-16.6
22275.00	32.0	Ave.	21	13	V	40.3	23.3	7.9	-9.5	47.4	54.0	-6.6

Notes:

- D.C.F.: Distance Correction Factor
- Insert. Loss (dB) = Cable A + Cable B + Cable C
- Net (dB) = Reading + Antenna Factor - Pre-amp + Insert. Loss - Transducer Loss - Duty Relaxation (transmitter only)
- Negative signs (-) in Margin column signify levels below the limits
- All other emissions not reported are below the equipment noise floor which is at least 20 dB below the limits
- Reading above 18 GHz was taking at 1m distance.

Radiated Emissions Test Data

Company:	TT System LLC	Model #:	IBM-2.4GIG	Standard	FCC § 15.247 (R.B.)
EUT:	Cordless Phone Base	S/N #:		Limits	11
Project #:	J99030602	Test Date:	December 28, 1999	Test Distance	3 meters
Test Mode:	Tx @ 2404.8MHz	Engineer:	Xi-Ming Y.	Duty Relaxation	0 dB

	Antenna Used			Pre-Amp Used			Cable Used			Transducer Used
Number:	11	14	21	8	10	0	0	0	12	0
Model:	LPB-2520A	EMCO 3115	3160-9	CDI_P100 0	AFT18855	None	None	None	Gm_M+L	None

[illegible]

Notes:

- a) D.C.F. Distance Correction Factor
b) Insert. Loss (dB) = Cable A + Cable B + Cable C.
c) Net (dB) = Reading + Antenna Factor - Pre-amp + Insert. Loss. - Transducer Loss - Duty Relaxation (transmitter only).
d) Negative signs (-) in Margin column signify levels below the limits
e) All other emissions not reported are below the equipment noise floor which is at least 20 dB below the limits.
f) Reading above 18 GHz was taken at 1m distance.



Radiated Emissions Test Data

Company:	TT System LLC	Model #:	IBM-2.4GIG	Standard	FCC § 15.247 (R.B.)
EUT:	Cordless Phone Base	S/N #:		Limits	11
Project #:	J99030602	Test Date:	December 28, 1999	Test Distance	3 meters
Test Mode:	Tx @ 2440.8MHz	Engineer:	Xi-Ming Y.	Duty Relaxation	0 dB

	Antenna Used			Pre-Amp Used			Cable Used			Transducer Used
Number:	11	14	21	8	10	0	0	0	12	0
Model:	LPB-2520A	EMCO 3115	3180-S	CD_P100 D	AFT18855	None	None	None	Grn_M-L	None

[illegible]

Notes:

- a) D.C.F.: Distance Correction Factor
b) Insert. Loss (dB) = Cable A + Cable B + Cable C
c) Net (dB) = Reading + Antenna Factor - Pre-amp + Insert. Loss - Transducer Loss - Duty Relaxation (transmitter only).
d) Negative signs (-) in Margin column signify levels below the limits
e) All other emissions not reported are below the equipment noise floor which is at least 20 dB below the limits.
f) Reading above 18 GHz was taken at 1m distance.

Radiated Emissions Test Data

Company:	TT System LLC	Model #:	IBM-2.4GIG	Standard:	FCC § 15.247 (R.B.)
EUT:	Cordless Phone Hand set	S/N #:		Limits:	11
Project #:	J99030602	Test Date:	December 28, 1999	Test Distance:	3 meters
Test Mode:	Tx @ 2475.0MHz	Engineer:	Xi-Ming Y.	Duty Relaxation:	0 dB

Antenna Used			Pre-Amp Used			Cable Used			Transducer Used	
Number:	11	14	21	8	10	0	0	0	12	0
Model:	LPB-2520A	EMCO-3115	3160-9	CDI-P100-0	AFT18855	None	None	None	Gm M+L	None

Frequency	Reading	Detector	Ant. Amp.	Ant. Pol.	Ant. Factor	Pre-Amp	Insert. Loss	D. C. F.	Net	Limit @3m	Margin	
MHz	dB(μV)	P/A/Q	#	#	H/V	dB(1/m)	dB	dB	dB	dB(μV/m)	dB	
4949.96	47.4	Peak	14	8	H	35.4	28.1	3.2	0.0	57.9	74.0	-16.1
4949.96	40.7	Ave.	14	8	V	33.9	28.1	3.2	0.0	49.7	54.0	-4.3
7425.00	42.0	Peak	14	8	H	37.8	28.0	4.3	0.0	56.1	74.0	-17.9
7425.00	33.7	Ave.	14	8	H	37.8	28.0	4.3	0.0	47.8	54.0	-6.2
12375.00	42.3	Peak	14	10	V	42.3	39.1	5.9	0.0	51.4	74.0	-22.7
12375.00	34.2	Ave.	14	10	V	42.3	39.1	5.9	0.0	43.3	54.0	-10.8
19800.00	40.5	Peak	21	13	V	40.3	23.3	7.7	-9.5	55.7	74.0	-18.3
19800.00	30.3	Ave.	21	13	V	40.3	23.3	7.7	-9.5	45.5	54.0	-8.5
22275.00	42.2	Peak	21	13	V	40.3	23.3	7.9	-9.5	57.6	74.0	-16.4
22275.00	32.1	Ave.	21	13	V	40.3	23.3	7.9	-9.5	47.5	54.0	-6.5

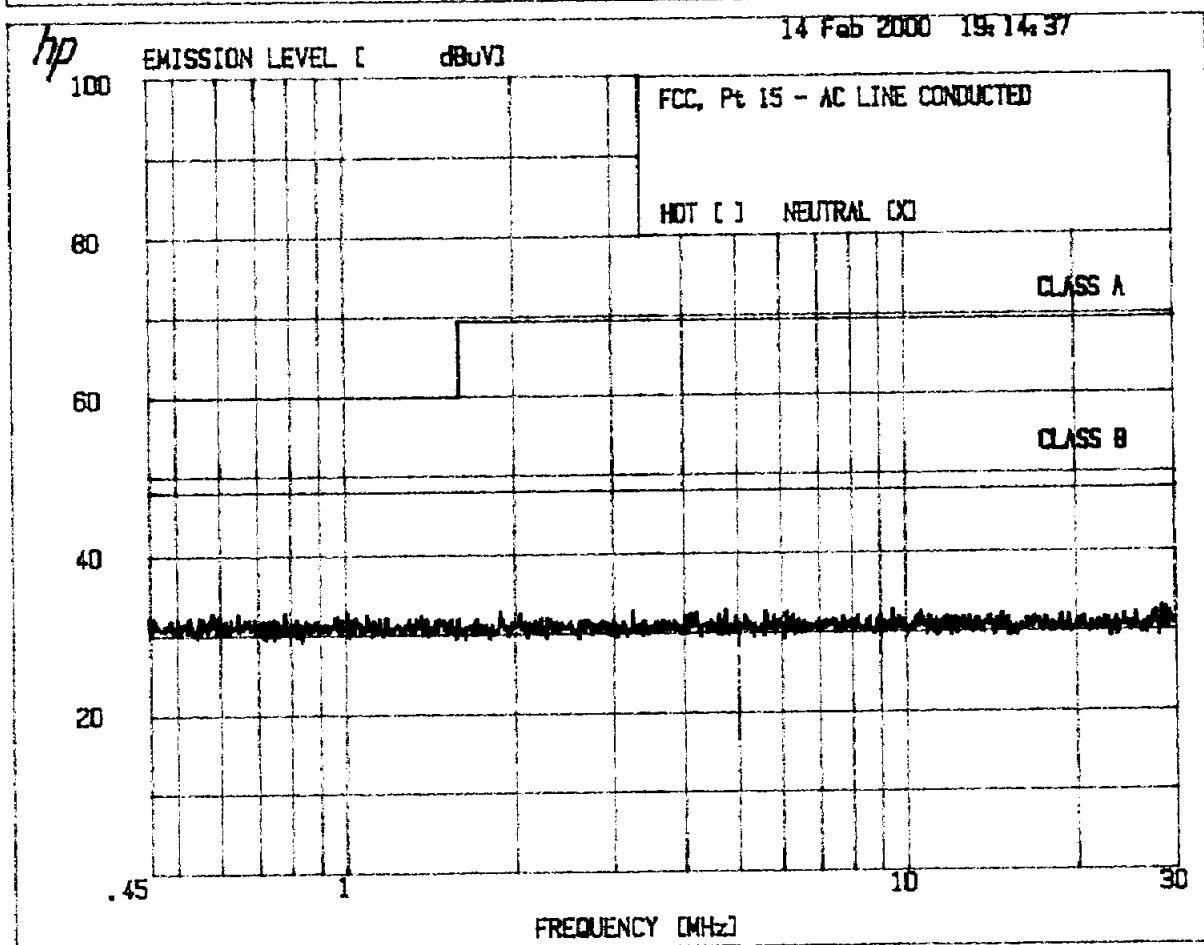
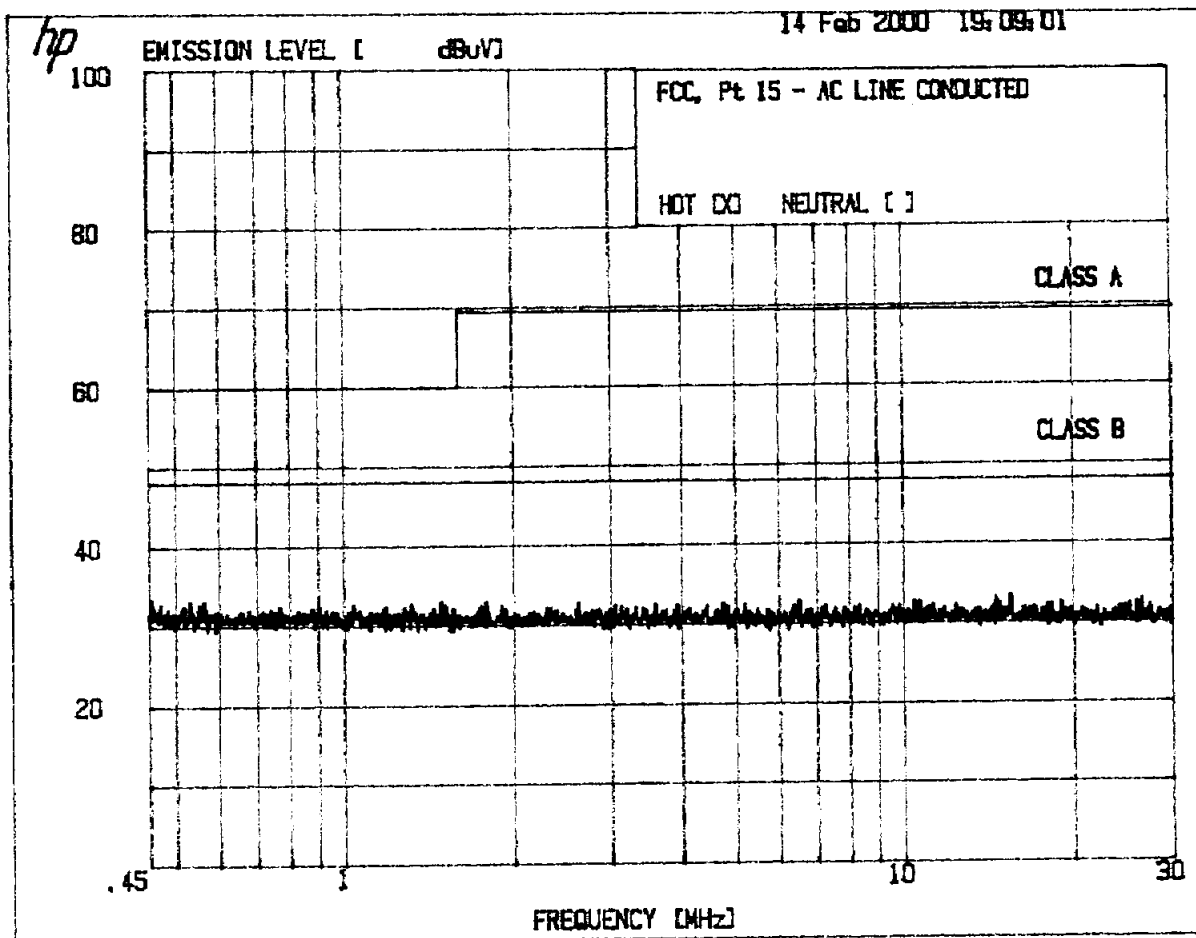
Notes:

- D.C.F. Distance Correction Factor
- Insert. Loss (dB) = Cable A + Cable B + Cable C
- Net (dB) = Reading + Antenna Factor - Pre-amp + Insert. Loss - Transducer Loss - Duty Relaxation (transmitter only)
- Negative signs (-) in Margin column signify levels below the limits.
- All other emissions not reported are below the equipment noise floor which is at least 20 dB below the limits.
- Reading above 18 GHz was taking at 1m distance.

4.7 AC Line Conducted Emission, FCC Rule 15.207:

☐ Not required; battery operation only

☒ Refer to the attached test data.



4.8 Radiated Emissions from Digital Section of Transceiver (Transmitter), FCC Ref: 15.109

- ☐ Not required - No digital part
- ☒ Test results are attached
- ☐ Included in the separate DOC report.

4.9 Radiated Emissions from Receiver Section of Transceiver (L.O. Radiation), FCC Ref: 15.109, 15.111

- ☒ Not required - EUT operation above 960 MHz only
- ☐ Not required - EUT is transmitter only
- ☐ Not performed; exempt until June 1999
- ☐ Test results are attached

Radiated Emissions Test Data

Company:	TT System LLC	Model #:	IBM-2.4GIG	Standard	FCC § 15.209
EUT:	Cordless Phone Base	S/N #:		Limits	3
Project #:	J99030602	Test Date:	December 28, 1999	Test Distance	3 meters
Test Mode:	Rx	Engineer:	Xi-Ming Y.	Duty Relaxation	0 dB

	Antenna Used			Pre-Amp Used			Cable Used			Transducer Used
Number:	11	14	21	5	10	13	0	0	1	0
Model:	LFB-2520A	EMCO 3115	3100-9	CDL P950	AFT18855	ACO/400	None	None	Site 1	None

Frequency	Reading	Detector	Ant	Amp.	Ant. Pol.	Ant. Factor	Pre-Amp	Insert. Loss	D. C. F.	Net	Limit @3m	Margin
MHz	dB(μV)	P/A/Q	#	#	H/V	dB(1/m)	dB	dB	dB	dB(μV/m)	dB(μV/m)	dB
38.12	30.0	Peak	11	5	V	16.8	18.6	0.3	0.0	28.5	40.0	-11.5
47.92	32.0	Peak	11	5	V	14.2	18.7	0.7	0.0	28.2	40.0	-11.8
153.50	41.7	Peak	11	5	V	9.1	18.9	1.2	0.0	33.1	43.5	-10.4
182.40	44.6	Peak	11	5	V	9.9	18.9	1.2	0.0	36.8	43.5	-6.7
192.00	38.7	Peak	11	5	V	10.1	18.7	1.3	0.0	31.4	43.5	-12.1
441.60	34.0	Peak	11	5	H	16.4	16.9	2.1	0.0	35.6	46.0	-10.4
460.80	32.4	Peak	11	5	H	16.9	16.5	2.0	0.0	34.8	46.0	-11.2
480.00	33.0	Peak	11	5	H	17.6	16.5	2.0	0.0	36.1	46.0	-9.9
537.60	33.3	Peak	11	5	H	19.2	16.6	2.2	0.0	38.1	46.0	-7.9
556.80	33.0	Peak	11	5	H	18.4	15.8	2.7	0.0	38.3	46.0	-7.7
614.40	32.0	Peak	11	5	H	18.8	15.7	2.2	0.0	37.3	46.0	-8.7
672.00	32.1	Peak	11	5	H	20.2	15.3	2.8	0.0	39.8	46.0	-6.2
710.40	29.0	Peak	11	5	H	20.7	14.7	2.5	0.0	37.5	46.0	-8.5
748.80	28.0	Peak	11	5	H	21.1	14.7	2.5	0.0	36.9	46.0	-9.1

Notes:

- D.C.F.: Distance Correction Factor
- Insert. Loss (dB) = Cable A + Cable B + Cable C
- Net (dB) = Reading + Antenna Factor - Pre-amp + Insert. Loss - Transducer Loss - Duty Relaxation (transmitter only)
- Negative signs (-) in Margin column signify levels below the limits.
- All other emissions not reported are below the equipment noise floor which is at least 20 dB below the limits.

4.10 Processing Gain Measurements, FCC Rule 15.247(e)

The processing gain shall be determined from the ratio in dB of the signal to noise ratio with the system spreading code turned OFF, to the signal to noise ratio with the system spreading code turned ON, as measured at the demodulated output of the receiver. The processing gain shall be at least 10 dB for a direct sequence spread spectrum system.

X	Refer to attached test procedure and data sheets.
	Refer to circuit analysis and processing gain calculations provided by manufacturer.

4.11 Transmitter Duty Cycle Calculation and Measurements, FCC Rule 15.35(b), (c)

The EUT antenna output port was connected to the input of the spectrum analyzer. The analyzer center frequency was set to EUT RF channel carrier. The SWEEP function on the analyzer was set to ZERO SPAN. The transmitter ON time was determined from the resultant time-amplitude display:

Duty cycle = Maximum ON time in 100 msec/100

Duty cycle correction, dB = $20 * \log(\text{DC})$

	See attached spectrum analyzer chart(s) for transmitter timing
X	Not applicable, duty cycle was not used.

Processing Gain Test for WDC-9000

Test Setup Description:

The processing gain was measured using the CW jamming margin method described by FCC recommended test procedure, as described FCC-97-114. The specific test diagram is illustrated below.

All test equipment and the EUT were allowed to warm up for one hour prior to start of test to minimize drift over time. All test equipment had valid calibration. Calibration of carrier and interferer levels was performed several times during testing with no observed changes.

The measurements were performed at the mid center channel at 2440.8 MHz, over a range of 2441.8-2439.8 MHz. The measurements made across the center (+/-) 1 MHz should be used for calculation of Gp since that bandwidth represents the receiver passband. The computer set signal was (+/-) 1 MHz to handset and receive the signal from base.

A signal level 20 dB above threshold was chosen so that thermal noise would not effect the processing gain measurements. The measured threshold of the radio was -92 dBm at BER = 1×10^6 , therefore the signal was -72 dBm. The measured signal level at the output of the 6 dB splitter was -42 dBm (PSA), used for calculating Gp.

For the jammer signal, -44 dBm at the generator corresponds to -70 dBm (Pj) at the input of base phone. This figure was also used for calculating Gp.

Test Equipment:

HP Signal Generator, Model No. 8672A
HP Spectrum Analyzer, Model No.: 8566B

Explanation of Results:

The following notations are used on the spreadsheet data:

- Pg: Power at Generator in dBm (as indicated by generator display)
- Pj: Power of interferer
- Ps: Power of carrier at power meter test report (initial calibration)
- J/S: Jammer to Signal ratio, Pj-Ps (dB) (calculated in spreadsheet)
- Gp: Processing Gain = $(S/N)_o + L_{sys} + J/S$
Where $L_{sys} = 1$ dB (system loss);
 $(S/N)_o = 14.0$ dB for GMSK at BT = 0.5;
 $Gp = 11.0 + 1 + J/S = 12 + J/S$

All measurements inside the (+/-)1 MHz passband of the receiver give Gp results that exceed the minimum required value of 10 dB. Elimination of the worst 20% measurements was therefore not needed in order to meet the requirements (see spreadsheet and plotted results).

ITS Intertek Testing Services

Company: TT system LLC
Project #: J99030602
Model: IBM-2.4GIG
Engineer: Xi-Ming Yang
Date of test: December 29, 1999

Processing Gain

Frequency MHz	Pg dBm	Pj dBm	Psa(handset) dBm	Ps(handset) dBm	J/S dB	Gp dB
2441.80	-37.0	-63.0	-40.2	-70.2	7.2	19.2
2441.75	-37.0	-63.0	-40.2	-70.2	7.2	19.2
2441.70	-37.0	-63.0	-40.2	-70.2	7.2	19.2
2441.65	-37.0	-63.0	-40.2	-70.2	7.2	19.2
2441.60	-36.5	-62.5	-40.2	-70.2	7.7	19.7
2441.55	-42.0	-68.0	-40.2	-70.2	2.2	14.2
2441.50	-41.5	-67.5	-40.2	-70.2	2.7	14.7
2441.45	-41.0	-67.0	-40.2	-70.2	3.2	15.2
2441.40	-41.5	-67.5	-40.2	-70.2	2.7	14.7
2441.35	-37.0	-63.0	-40.2	-70.2	7.2	19.2
2441.30	-44.5	-70.5	-40.2	-70.2	-0.3	11.7
2441.25	-45.5	-71.5	-40.2	-70.2	-1.3	10.7
2441.20	-45.0	-71.0	-40.2	-70.2	-0.8	11.2
2441.15	-43.5	-69.5	-40.2	-70.2	0.7	12.7
2441.10	-43.0	-69.0	-40.2	-70.2	1.2	13.2
2441.05	-42.8	-68.8	-40.2	-70.2	1.4	13.4
2441.00	-38.0	-64.0	-40.2	-70.2	6.2	18.2

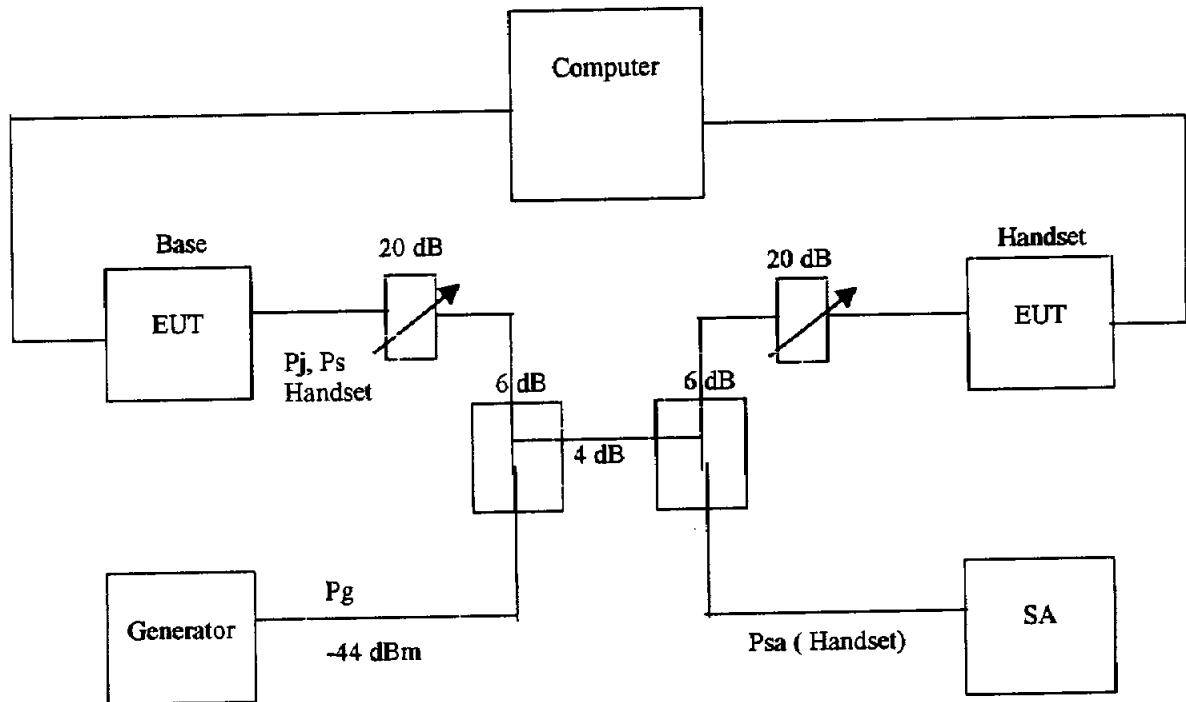
ITS Intertek Testing Services

Company: TT system LLC
Project #: J99030602
Model: IBM-2.4GIG
Engineer: Xi-Ming Yang
Date of test: December 29, 1999

Processing Gain

Frequency MHz	Pg dBm	Pj dBm	Psa(handset) dBm	Ps(handset) dBm	J/S dB	Gp dB
2440.95	-43.0	-69.0	-40.2	-70.2	1.2	13.2
2440.90	-41.0	-67.0	-40.2	-70.2	3.2	15.2
2440.85	-37.0	-63.0	-40.2	-70.2	7.2	19.2
2440.80	-39.0	-65.0	-40.2	-70.2	5.2	17.2
2440.75	-38.0	-64.0	-40.2	-70.2	6.2	18.2
2440.70	-42.5	-68.5	-40.2	-70.2	1.7	13.7
2440.65	-42.0	-68.0	-40.2	-70.2	2.2	14.2
2440.60	-38.5	-64.5	-40.2	-70.2	5.7	17.7
2440.55	-43.0	-69.0	-40.2	-70.2	1.2	13.2
2440.50	-42.0	-68.0	-40.2	-70.2	2.2	14.2
2440.45	-43.0	-69.0	-40.2	-70.2	1.2	13.2
2440.40	-42.0	-68.0	-40.2	-70.2	2.2	14.2
2440.35	-43.5	-69.5	-40.2	-70.2	0.7	12.7
2440.30	-43.5	-69.5	-40.2	-70.2	0.7	12.7
2440.25	-40.5	-66.5	-40.2	-70.2	3.7	15.7
2440.20	-39.5	-65.5	-40.2	-70.2	4.7	16.7
2440.15	-37.0	-63.0	-40.2	-70.2	7.2	19.2
2440.10	-42.0	-68.0	-40.2	-70.2	2.2	14.2
2440.05	-41.0	-67.0	-40.2	-70.2	3.2	15.2
2440.00	-38.0	-64.0	-40.2	-70.2	6.2	18.2
2439.95	-37.0	-63.0	-40.2	-70.2	7.2	19.2
2439.90	-37.0	-63.0	-40.2	-70.2	7.2	19.2
2439.85	-37.0	-63.0	-40.2	-70.2	7.2	19.2
2439.80	-37.0	-63.0	-40.2	-70.2	7.2	19.2

Test Setup Diagram



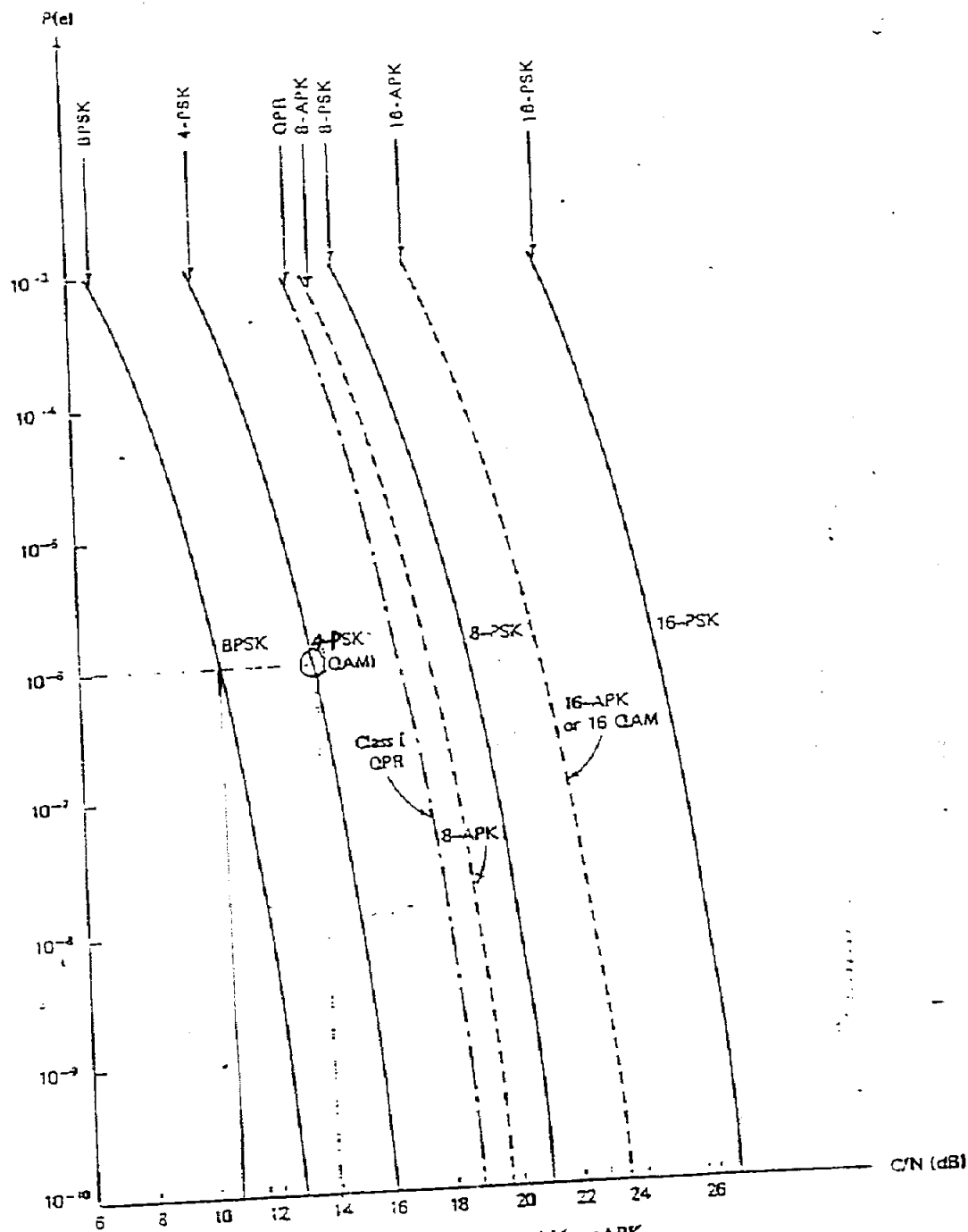


Fig. 3.11. $P(e)$ performance of M -ary PSK, QAM, QPR, and M -ary APK coherent systems. The rms C/N is specified in the double-sided Nyquist bandwidth.

Figure showing offset for QPSK (4-PSK) modulation C/N offset (14 dB).
 (Obtained from DIGITAL COMMUNICATIONS: Microwave Applications, by
 Kamilo Feher, Prentice-Hall Inc., 1981)

5.0 Miscellaneous Information or Other Comments

None.