

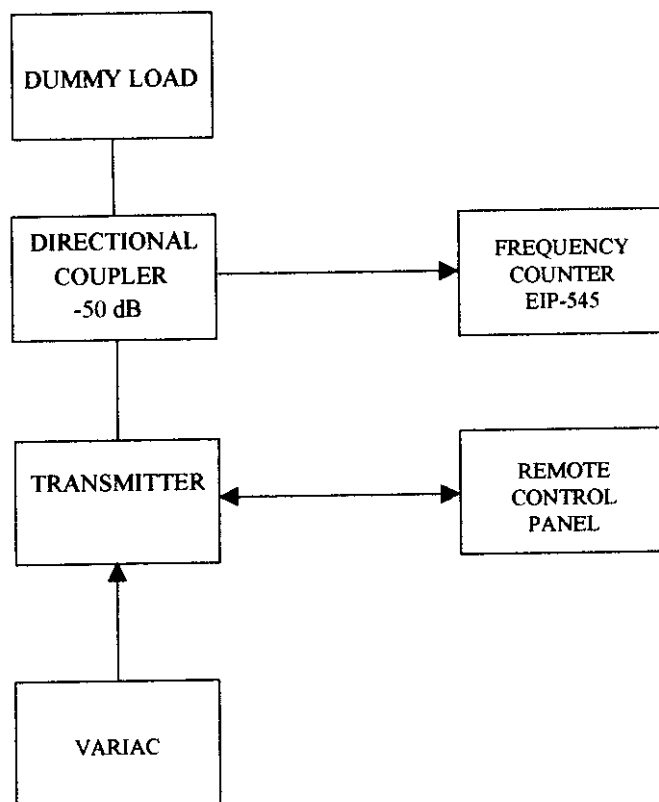
Temperature VS Frequency Stability Test and Voltage Variation

The attached data sheets show the frequency drift VS temperature from start up to stabilization at ambient temperature from -10°C to $+50^{\circ}\text{C}$.

For this test, the transmitter is set up in the temperature chamber ready to run. At that time the power is totally removed and chamber temperature set at -30°C . After the temperature stabilizes, and the magnetron is down to temperature, (A temperature probe was attached to the magnetron body to determine when temperature stabilized) primary power is applied and the magnetron filaments warmed for 3 minutes. The system is then placed into radiate (remotely from outside the chamber) and the frequency recorded immediately. The frequency is then recorded in increments shown in the attached data. A block diagram showing the test setup is attached.

For the voltage variation test, a 220 VAC variac was inserted into the primary supply line and set to 220 VAC output. After the magnetron filament warmed 3 minutes, system was put in radiate mode and frequency measured. Primary power was then raised to 253 VAC and frequency measured. Primary power was then lowered to 187 VAC and frequency measured. No change in frequency was noted as the power supplies are regulated.

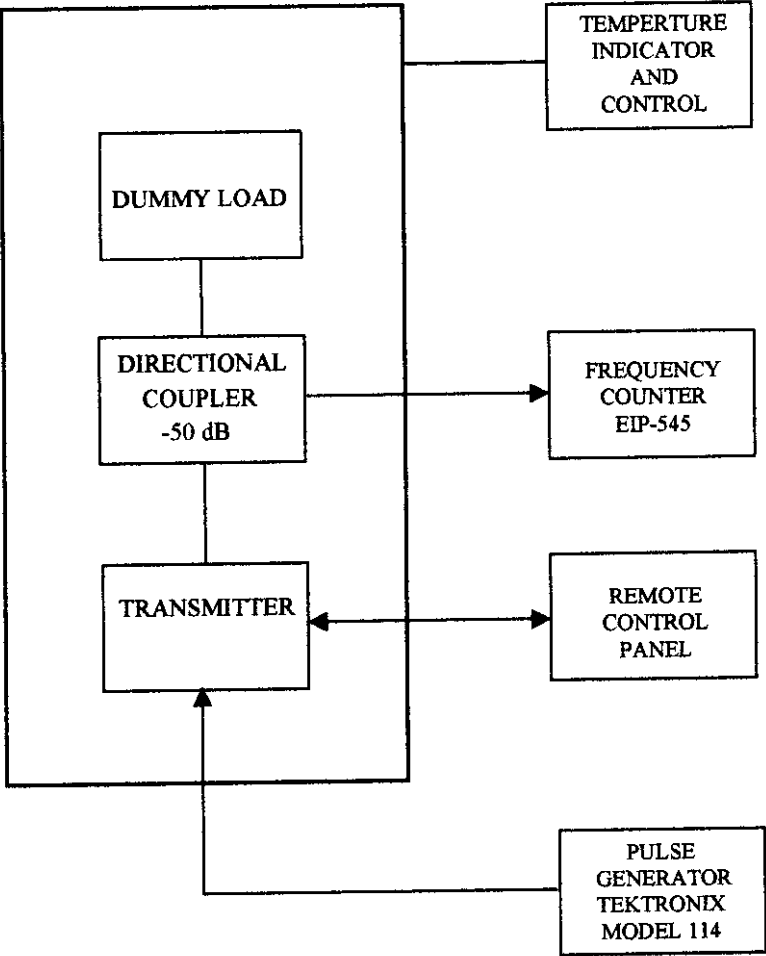
TEST SETUP FOR FREQUENCY VS VOLTAGE VARIATION TEST



APPR./DATE	SIZE A	CODE IDENT NO.	DRAWING NO. SK1874-12
	SCALE	52005	SHEET 1 OF 1

TEST SETUP FOR FREQUENCY STABILITY VS TEMPERATURE TEST

ENVIRONMENTAL CHAMBER
THERMONTRON
MODEL 310EC10WM



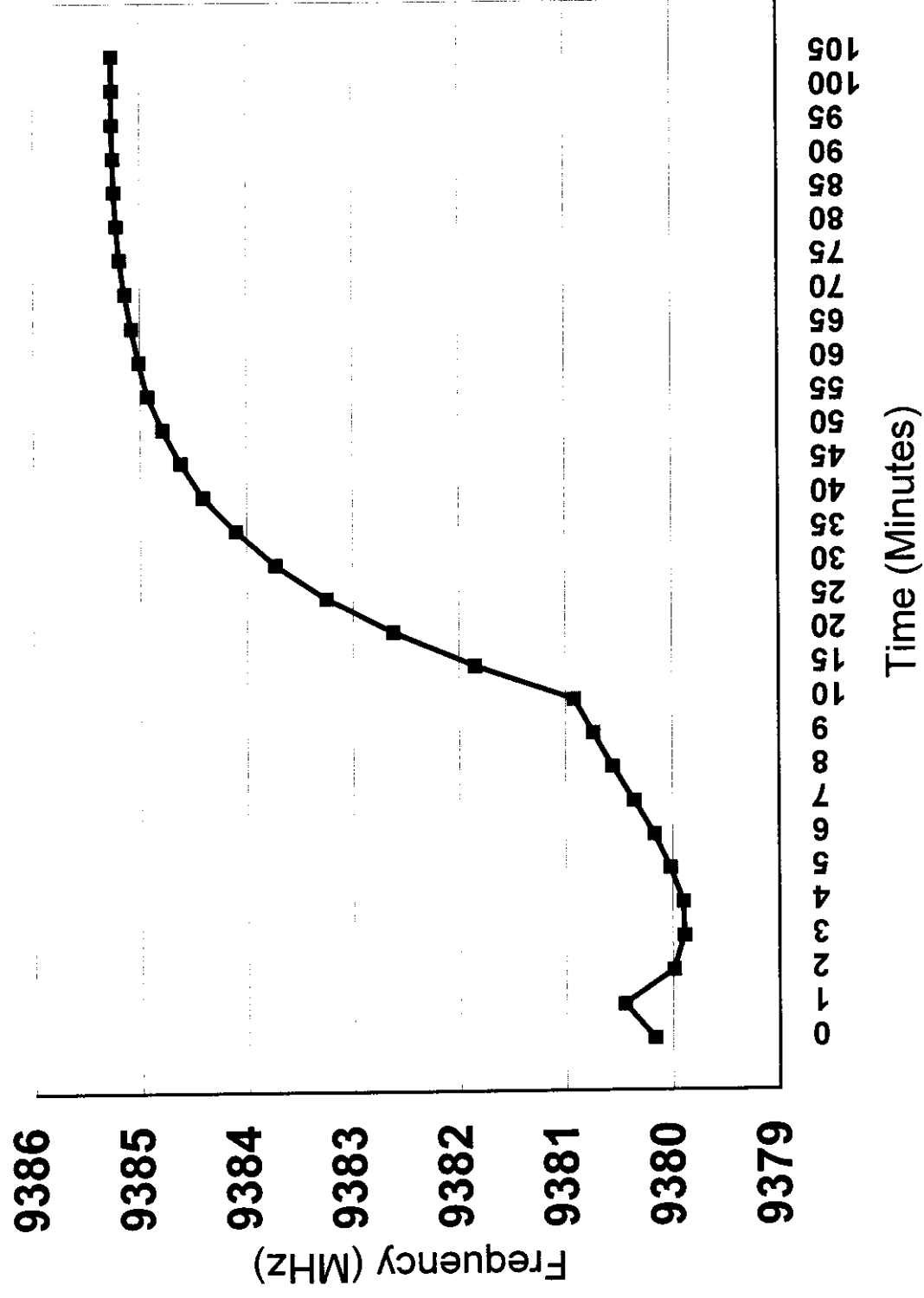
APPR/DATE	SIZE A	CODE IDENT NO.	DRAWING NO. SK1874-11
	SCALE	52005	SHEET 1 OF 1

Frequency Stability VS Temperature

Temperature -30°C

Time in minutes From Radiate On	Frequency(MHZ)
0	9380.17
1	9380.45
2	9379.99
3	9379.89
4	9379.90
5	9380.02
6	9380.17
7	9380.36
8	9380.56
9	9380.74
10	9380.92
15	9381.85
20	9382.62
25	9383.25
30	9383.73
35	9384.10
40	9384.41
45	9384.62
50	9384.79
55	9384.93
60	9385.01
65	9385.08
70	9385.14
75	9385.19
80	9385.22
85	9385.24
90	9385.25
95	9385.26
100	9385.26
105	9385.26

Frequency vs Time @ -30C

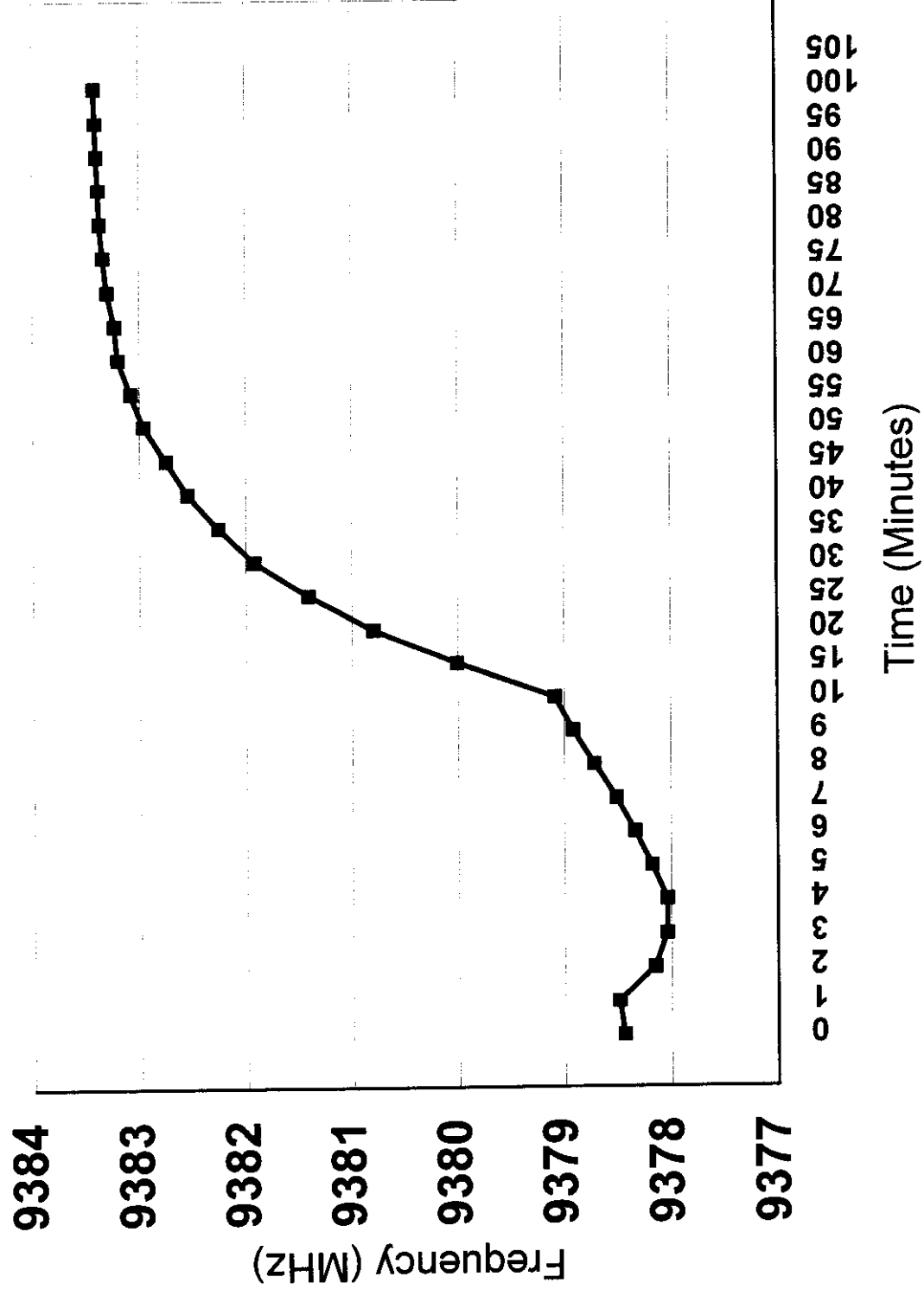


Frequency Stability VS Temperature

Temperature -20°C

Time in minutes From Radiate On	Frequency(MHZ)
0	9378.44
1	9378.49
2	9378.15
3	9378.04
4	9378.04
5	9378.18
6	9378.34
7	9378.51
8	9378.72
9	9378.92
10	9379.09
15	9380.01
20	9380.80
25	9381.41
30	9381.92
35	9382.26
40	9382.55
45	9382.75
50	9382.96
55	9383.08
60	9383.20
65	9383.23
70	9383.30
75	9383.34
80	9383.37
85	9383.38
90	9383.40
95	9383.41
100	9383.42
105	9383.44

Frequency vs Time @ -20C

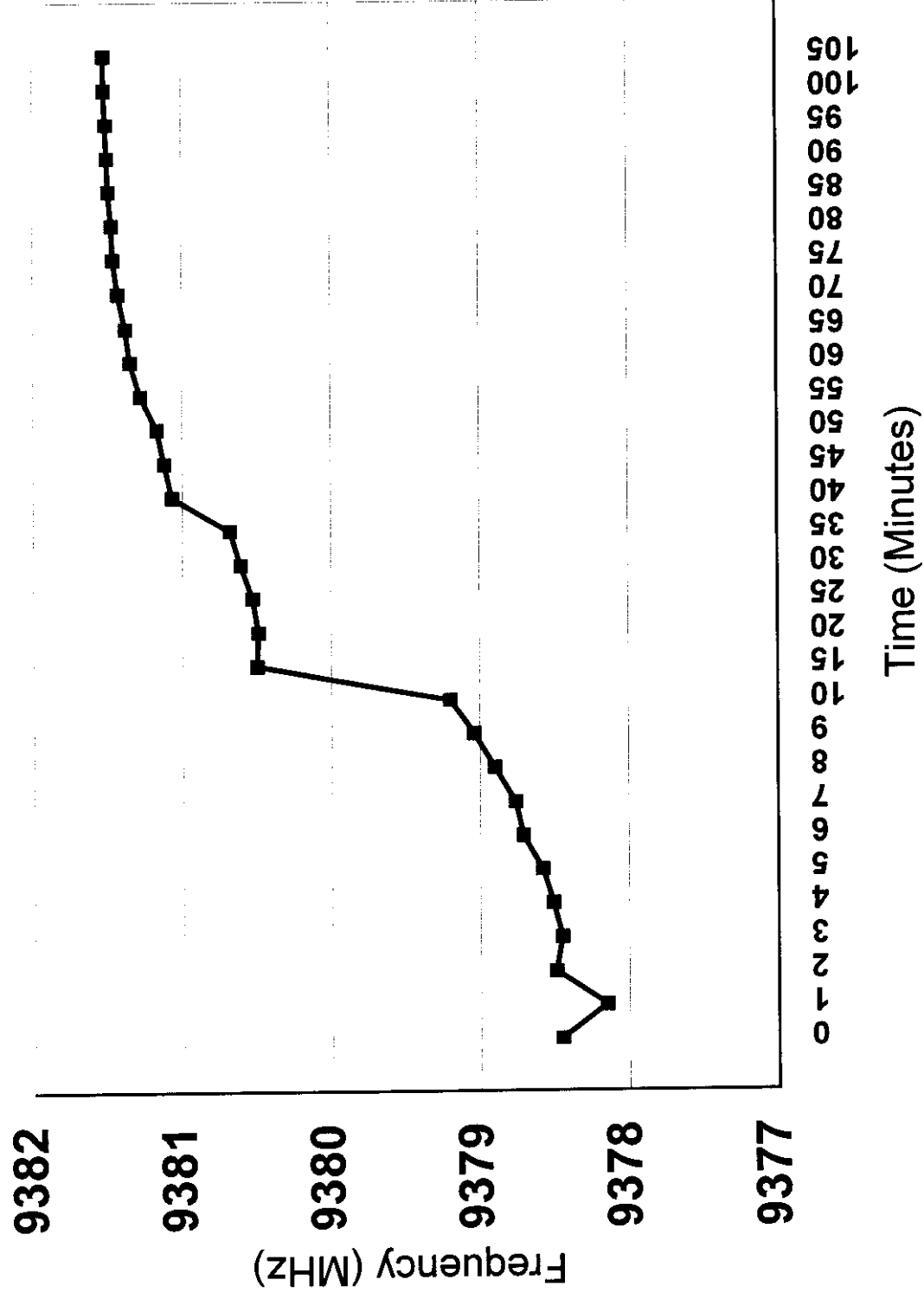


Frequency Stability VS Temperature

Temperature -10°C

Time in minutes From Radiate On	Frequency(MHZ)
0	9378.45
1	9378.15
2	9378.49
3	9378.45
4	9378.51
5	9378.58
6	9378.71
7	9378.76
8	9378.90
9	9379.04
10	9379.20
15	9380.50
20	9380.49
25	9380.53
30	9380.61
35	9380.68
40	9381.07
45	9381.12
50	9381.17
55	9381.28
60	9381.35
65	9381.38
70	9381.43
75	9381.46
80	9381.47
85	9381.49
90	9381.50
95	9381.51
100	9381.52
105	9381.52

Frequency vs Time @-10C

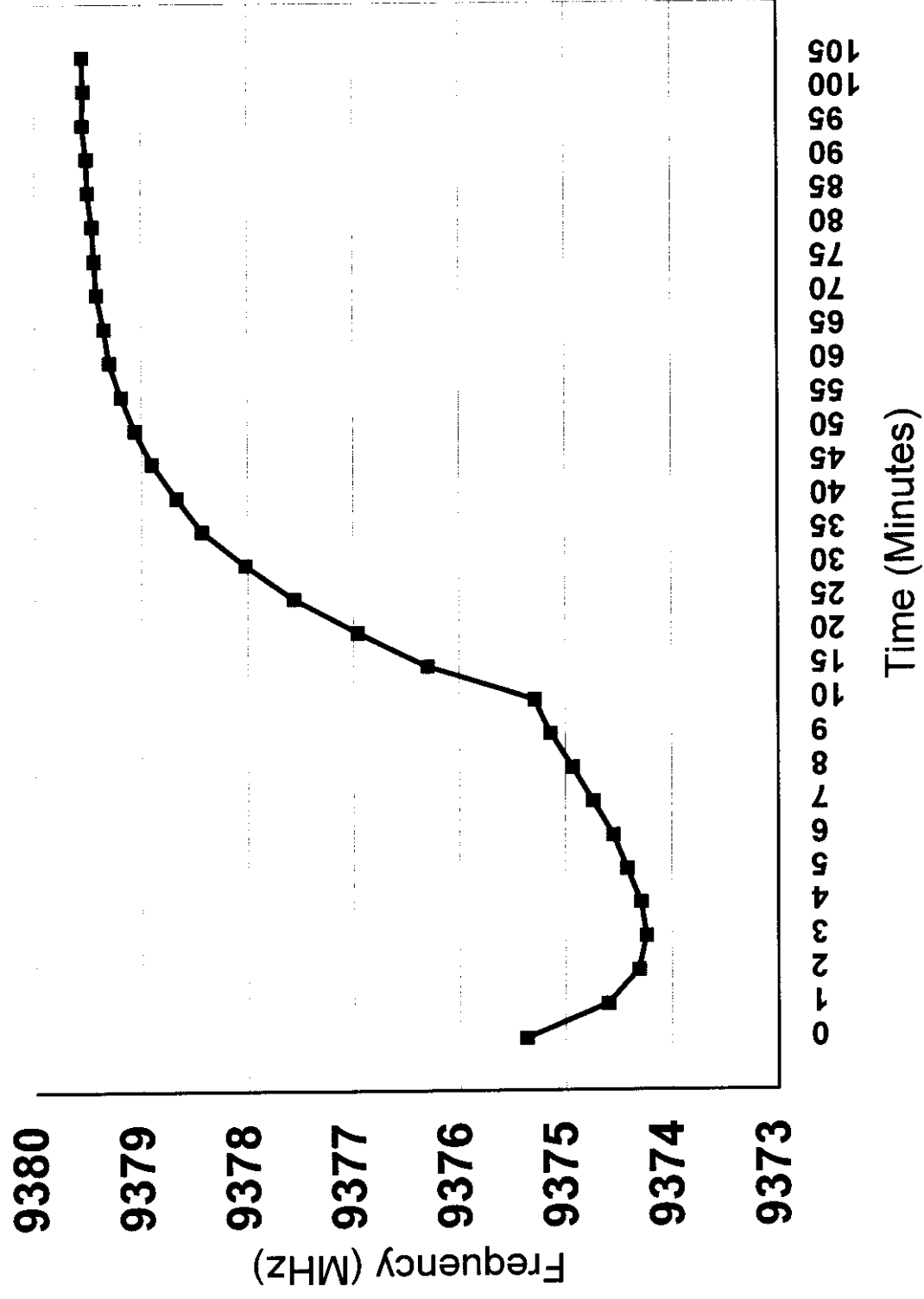


Frequency Stability VS Temperature

Temperature 0°C

Time in minutes From Radiate On	Frequency(MHZ)
0	9375.37
1	9374.60
2	9374.31
3	9374.24
4	9374.29
5	9374.42
6	9374.55
7	9374.74
8	9374.93
9	9375.14
10	9375.29
15	9376.30
20	9376.96
25	9377.56
30	9378.02
35	9378.43
40	9378.67
45	9378.90
50	9379.06
55	9379.19
60	9379.30
65	9379.35
70	9379.42
75	9379.44
80	9379.46
85	9379.50
90	9379.51
95	9379.55
100	9379.54
105	9379.55

Frequency vs Time @ 0C

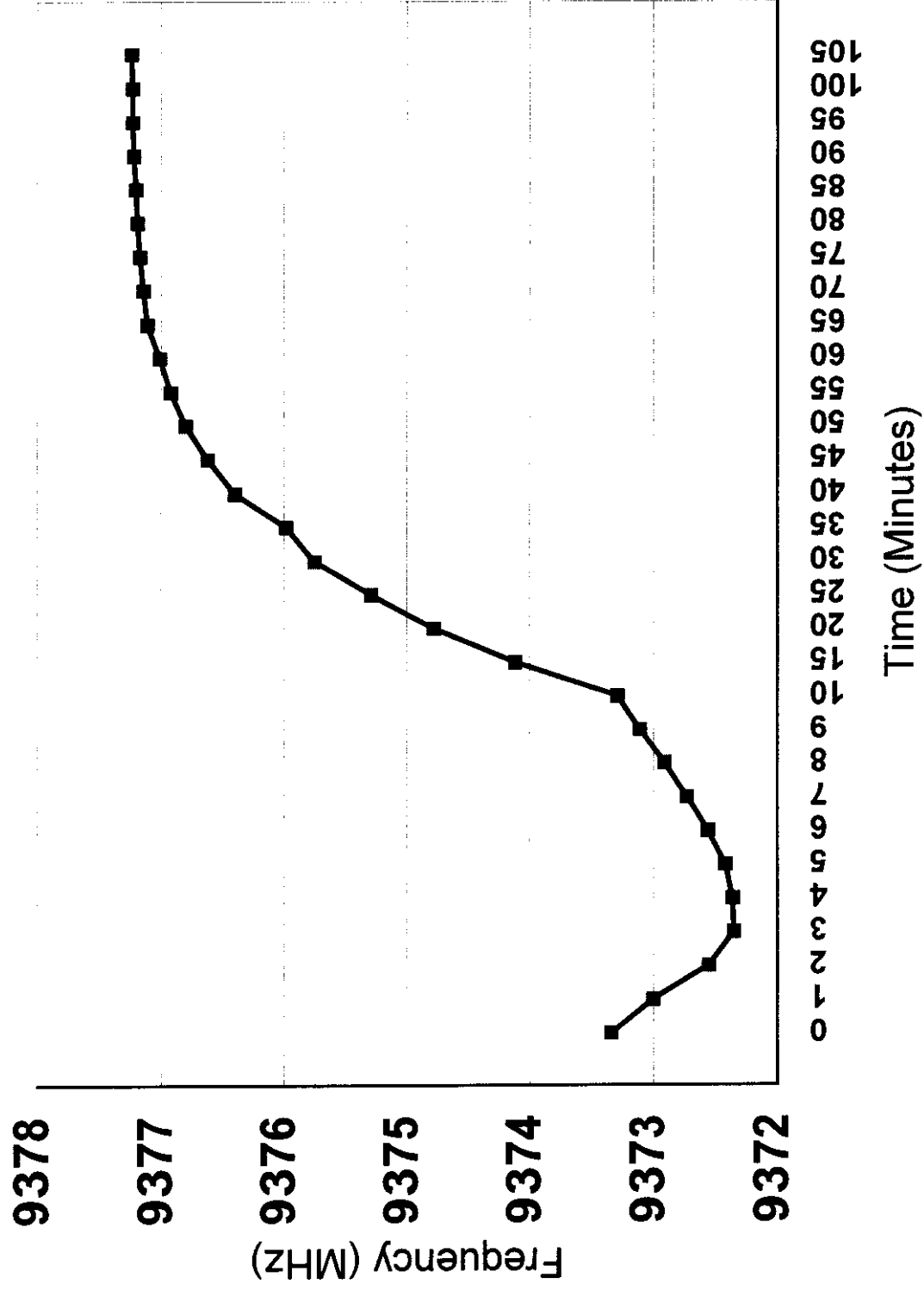


Frequency Stability VS Temperature

Temperature 10°C

Time in minutes From Radiate On	Frequency(MHZ)
0	9373.34
1	9373.00
2	9372.55
3	9372.35
4	9372.36
5	9372.42
6	9372.56
7	9372.73
8	9372.91
9	9373.11
10	9373.29
15	9374.12
20	9374.78
25	9375.29
30	9375.75
35	9375.98
40	9376.40
45	9376.62
50	9376.80
55	9376.92
60	9377.01
65	9377.11
70	9377.14
75	9377.17
80	9377.19
85	9377.20
90	9377.22
95	9377.23
100	9377.23
105	9377.24

Frequency vs Time @ +10C

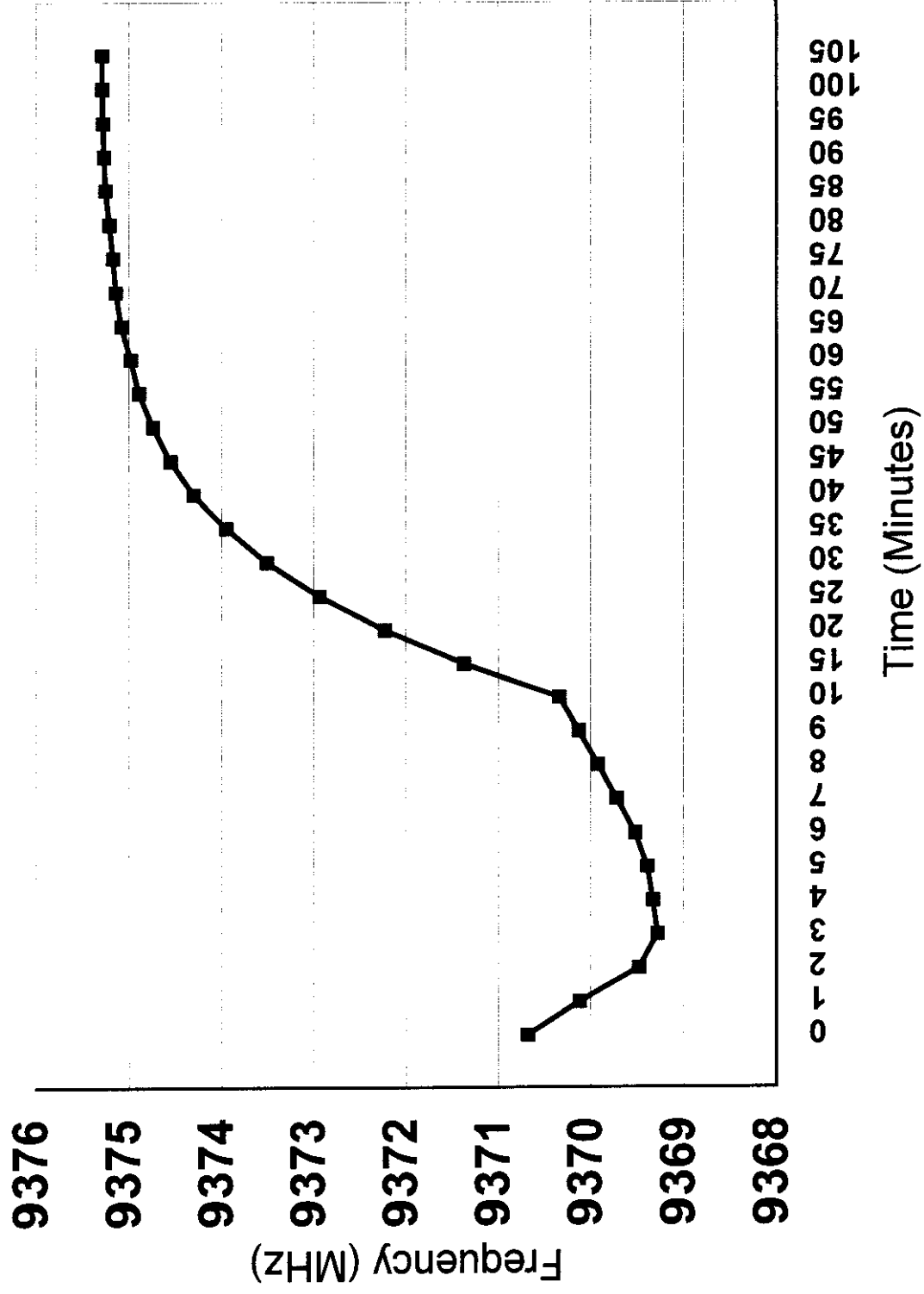


Frequency Stability VS Temperature

Temperature +20°C

Time in minutes From Radiate On	Frequency(MHZ)
0	9370.68
1	9370.12
2	9369.48
3	9369.28
4	9369.33
5	9369.39
6	9369.52
7	9369.72
8	9369.92
9	9370.13
10	9370.34
15	9371.37
20	9372.23
25	9372.94
30	9373.51
35	9373.95
40	9374.30
45	9374.55
50	9374.74
55	9374.89
60	9374.98
65	9375.08
70	9375.14
75	9375.17
80	9375.21
85	9375.25
90	9375.27
95	9375.28
100	9375.29
105	9375.29

Frequency vs Time @ +20C

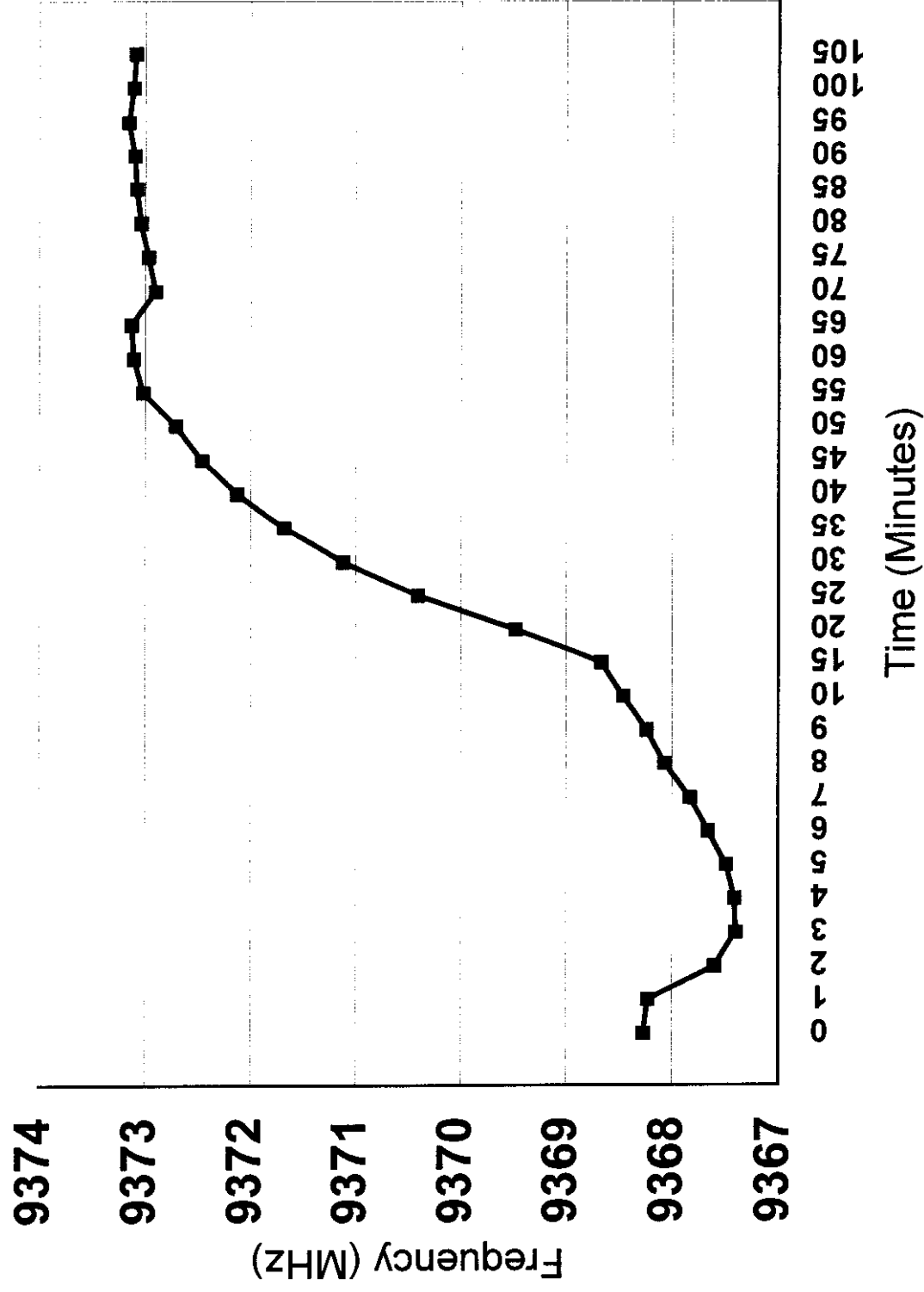


Frequency Stability VS Temperature

Temperature 30°C

Time in minutes From Radiate On	Frequency(MHZ)
0	9368.27
1	9368.23
2	9367.60
3	9367.40
4	9367.41
5	9367.49
6	9367.66
7	9367.83
8	9368.07
9	9368.24
10	9368.46
15	9368.67
20	9369.48
25	9370.41
30	9371.12
35	9371.68
40	9372.13
45	9372.46
50	9372.71
55	9373.02
60	9373.11
65	9373.13
70	9372.90
75	9372.97
80	9373.04
85	9373.08
90	9373.10
95	9373.16
100	9373.11
105	9373.09

Frequency vs Time @ +30C

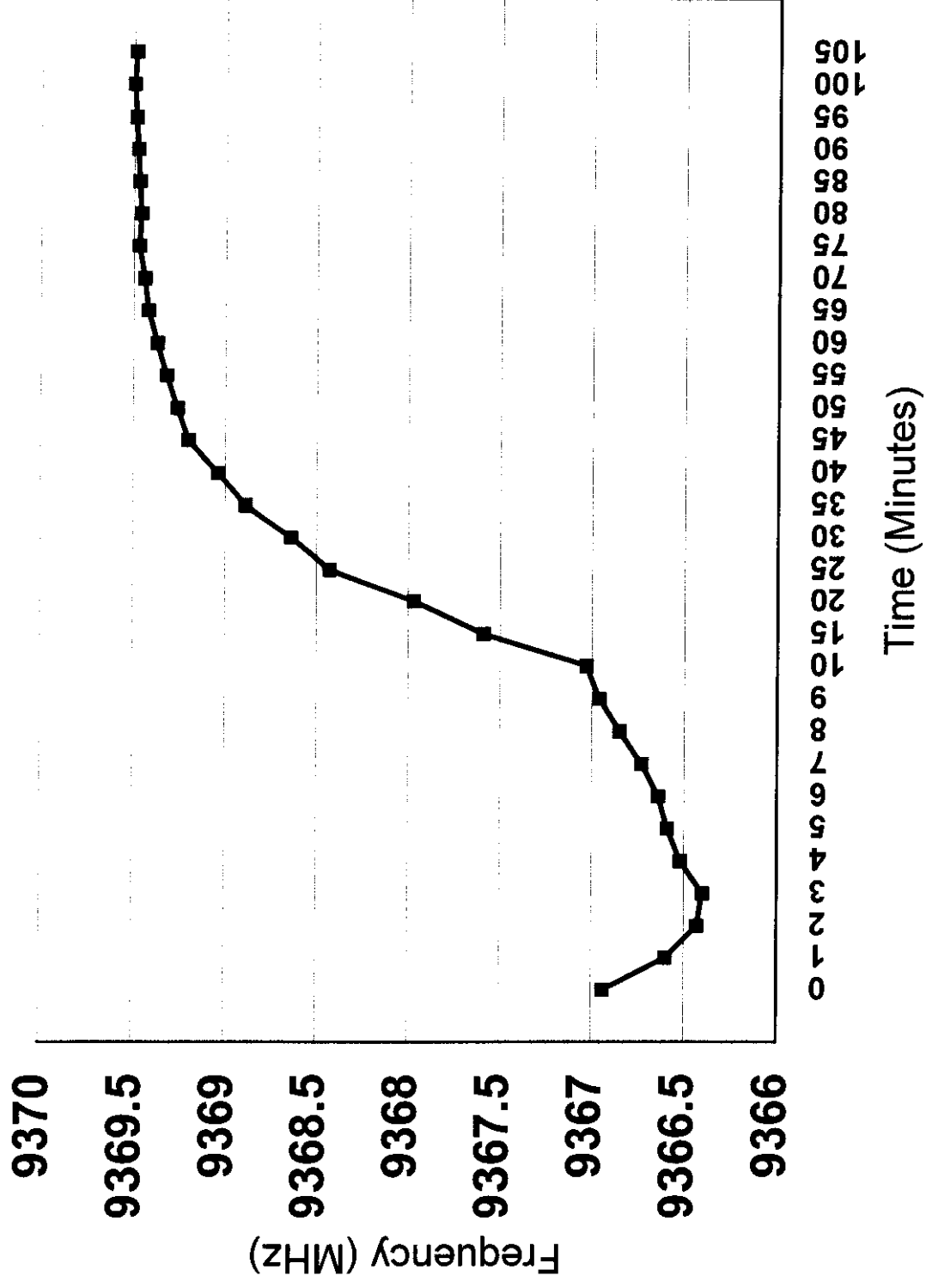


Frequency Stability VS Temperature

Temperature 40°C

Time in minutes From Radiate On	Frequency(MHZ)
0	9366.94
1	9366.60
2	9366.43
3	9366.40
4	9366.52
5	9366.59
6	9366.64
7	9366.73
8	9366.85
9	9366.96
10	9367.03
15	9367.59
20	9367.97
25	9368.43
30	9368.64
35	9368.89
40	9369.04
45	9369.20
50	9369.26
55	9369.32
60	9369.37
65	9369.42
70	9369.44
75	9369.47
80	9369.46
85	9369.47
90	9369.48
95	9369.49
100	9369.50
105	9369.49

Frequency vs Time @ +40C

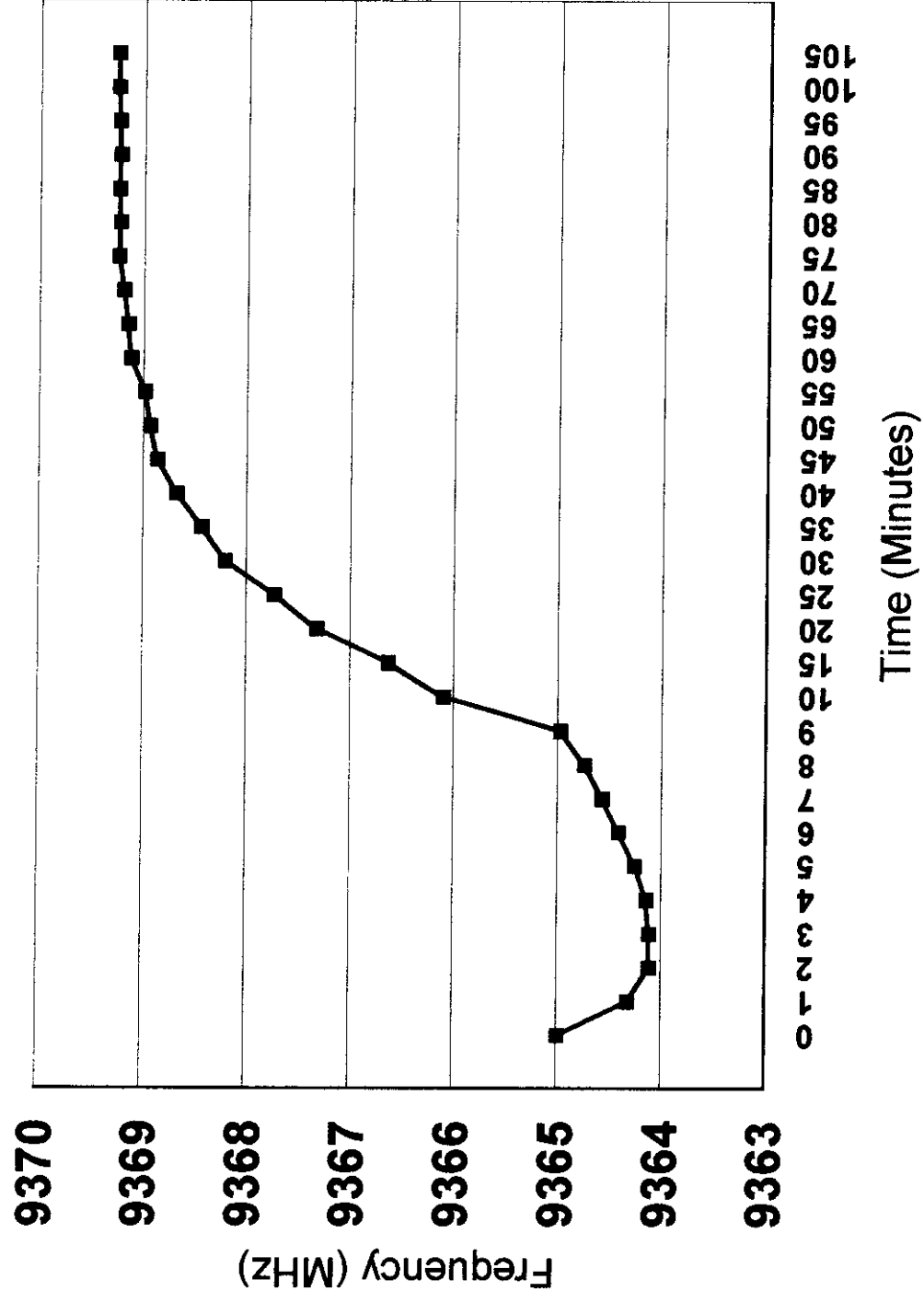


Frequency Stability VS Temperature

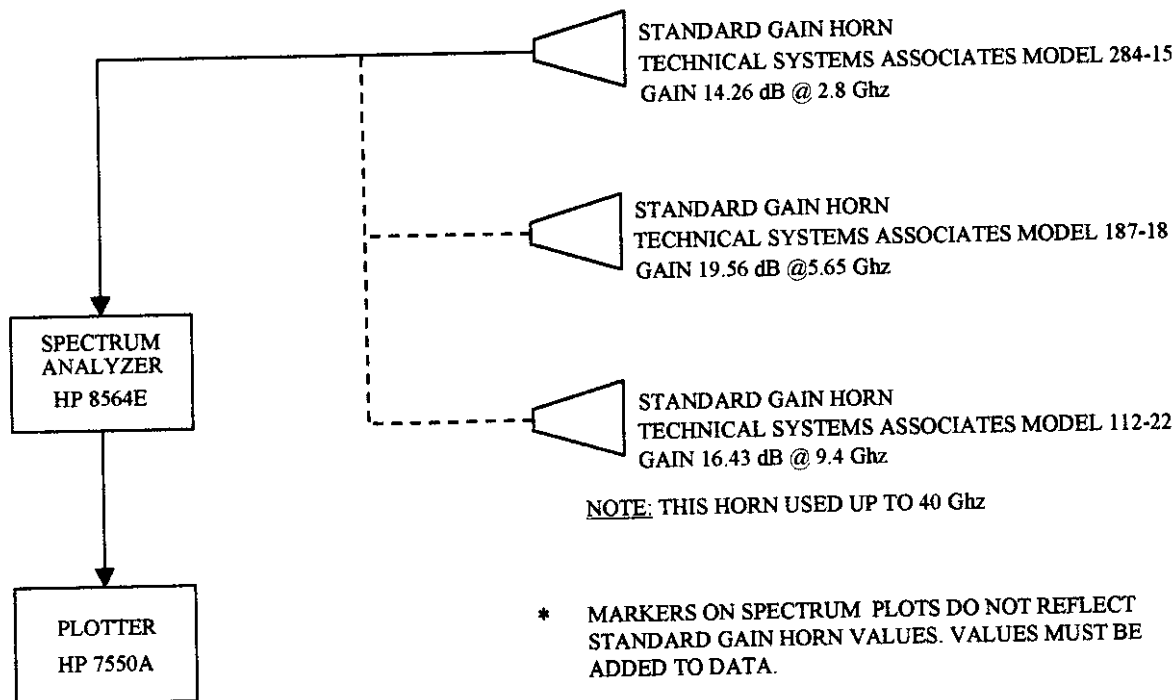
Temperature 50°C

Time in minutes From Radiate On	Frequency(MHZ)
0	9365.06
1	9364.99
2	9364.32
3	9364.11
4	9364.11
5	9364.14
6	9364.25
7	9364.41
8	9364.57
9	9364.74
10	9364.97
15	9366.10
20	9366.63
25	9367.32
30	9367.73
35	9368.20
40	9368.43
45	9368.67
50	9368.86
55	9368.93
60	9368.98
65	9369.12
70	9369.15
75	9369.19
80	9369.24
85	9369.23
90	9369.24
95	9369.23
100	9369.24
105	9369.25

Frequency vs Time @ +50C



TEST SETUP FOR SPURIOUS RADIATION FIELD STRENGTH

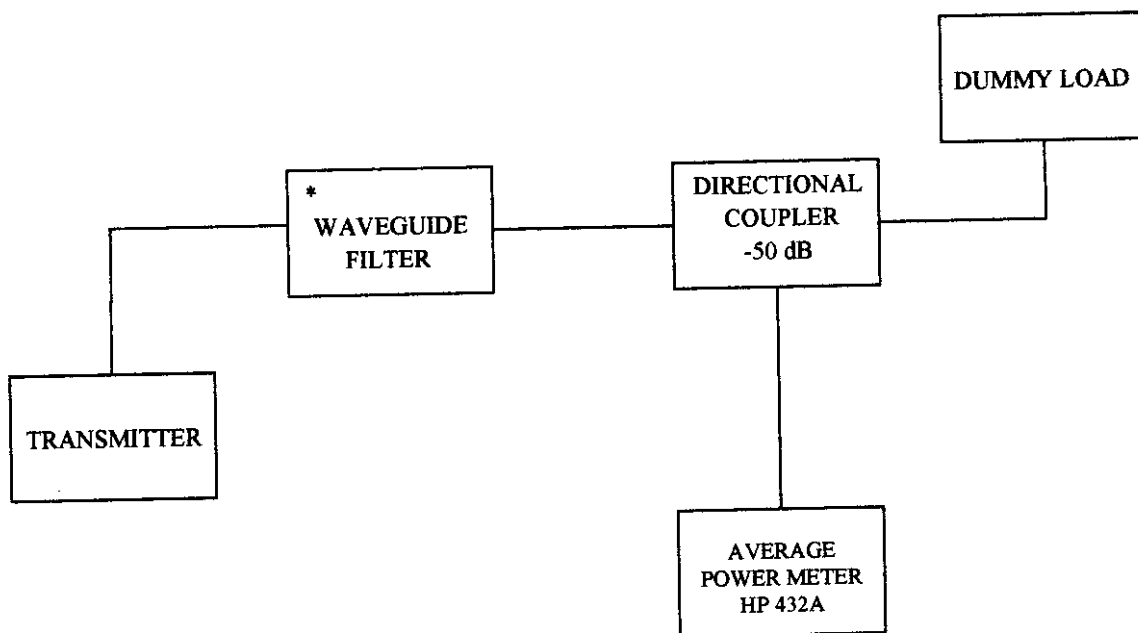


Measurements were made using each standard gain horn, as shown in the analyzer plot, probing around doors, panels and cables. Highest readings were obtained in front of the air filter. Measurements were taken with the transmitter at full power (295 kW peak) with the horn located 3 feet away in front of the air filter.

In addition a Narda Electromagnetic Radiation Monitor, Model 8616 and isotropic probe, Model 8621D were used to probe around the transmitter, cabinet doors, panels, etc. No readings were observed greater than 2 mw/cm^2 .

APPR / DATE	SIZE A	CODE IDENT NO.	DRAWING NO. SK1874-13
	SCALE	52005	SHEET 1 OF 1

TEST SETUP FOR POWER MEASUREMENTS



TRANSMITTER POWER OUTPUT=DIRECTIONAL COUPLER+DUTY CYCLE CORRECTION FACTOR+METER READING
 $=50.0+33.0+1.7$
 $=84.8 \text{ dBm}$
 $=295 \text{ kW}$

* WAVEGUIDE FILTER INCLUDED IN TEST SETUP IS NORMALLY LOCATED IN THE WAVEGUIDE ASSEMBLY AT THE EQUIPMENT RACK. CENTER FREQUENCY IS 9375 MHz.

DUTY CYCLE CORRECTION FACTOR

DC=10 LOG 1/PRF X PW
DC=10 LOG 1/250 X 2usec(10-6)
DC= 33.0

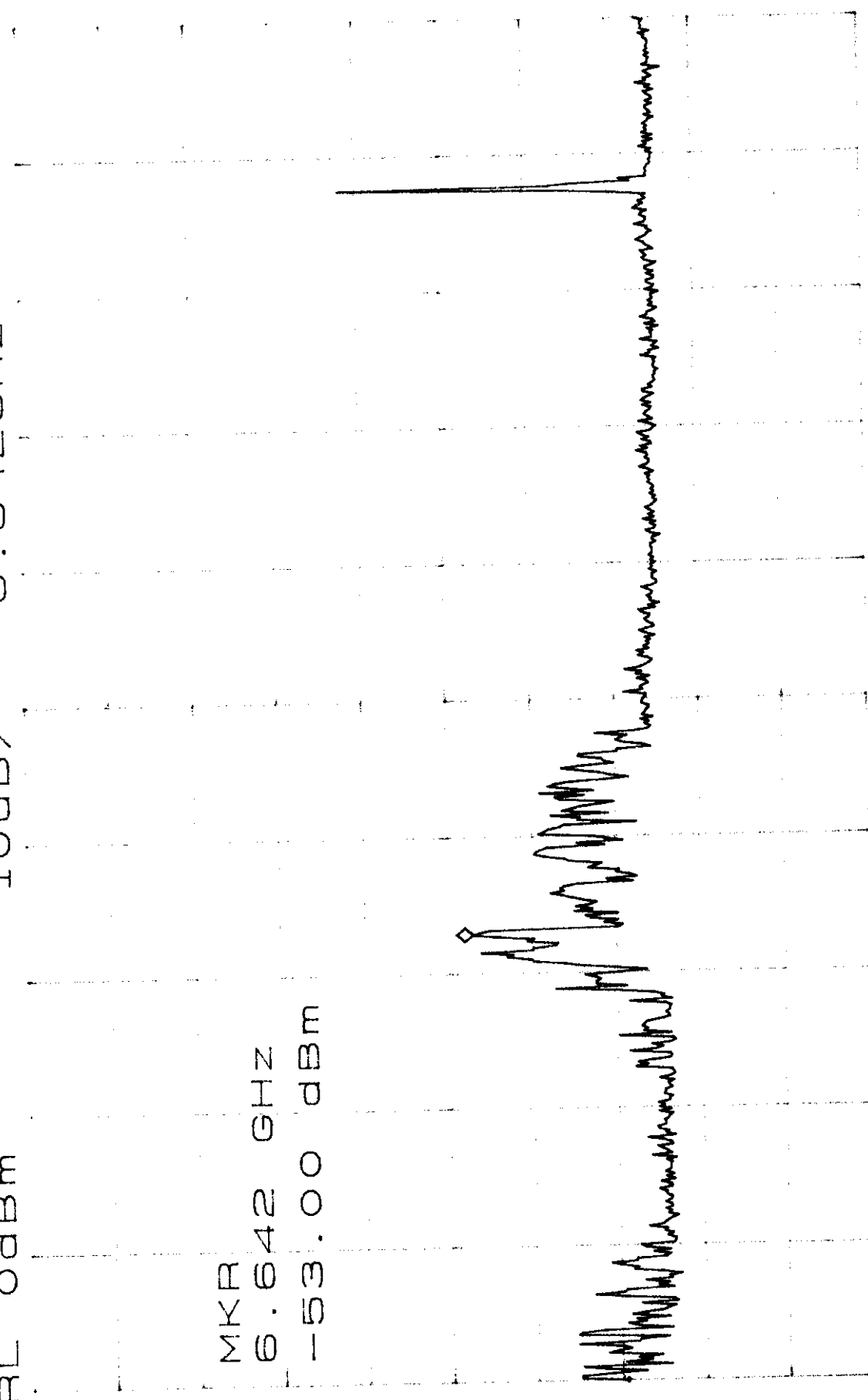
APPR./DATE	SIZE A	CODE IDENT NO.	DRAWING NO. SK1874-10
	SCALE	52005	SHEET 1 OF 1

MKR -53.00dBm
6.642GHz

ATTEN 10dB
RL 0dBm

10dB/

MKR
6.642 GHz
D -53.00 dBm



START 5.000GHZ STOP 10.000GHZ
*RBW 100KHZ *VBW 100KHZ *SWP 10.0sec

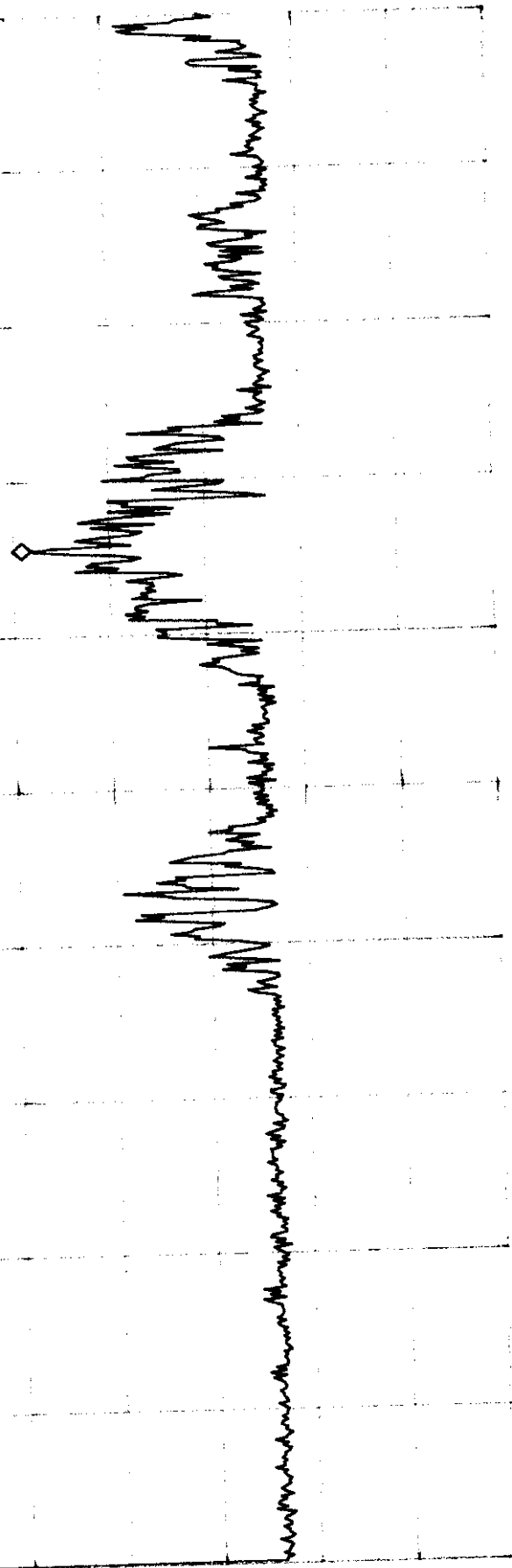
MKR -51.83dBm
3.275GHZ

ATTEN 10dB
RL 0dBm

10dB/

MKR
3.275 GHZ
-51.83 dBm

*



START 0HZ
*RBW 100KHZ

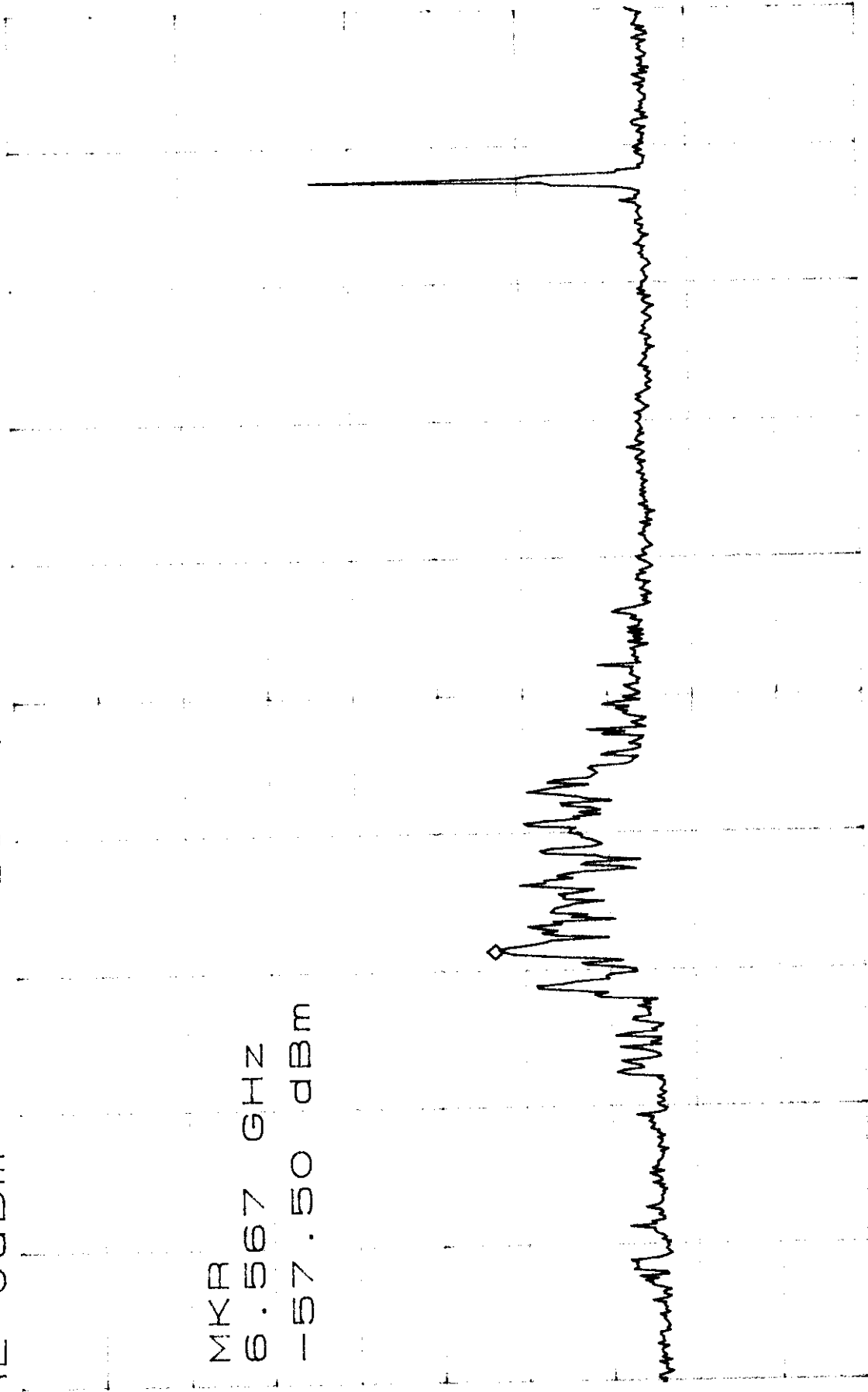
STOP 5.000GHZ
*VSW 10.0sec

ATTEN 10dB
RL 0dBm

MKR -57.50dBm
6.567GHz

D MKR
6.567 GHz
-57.50 dBm

10dB/



START 5.000GHz STOP 10.000GHz
*RBW 100KHZ *VBW 100KHZ *SWP 10.0sec

ATTEN 10dB
RL 0dBm

MKR -70.50dBm
13.842GHz

10dB/

MKR
13.842 GHz
D -70.50 dBm



START 10.000GHZ STOP 15.000GHZ
*RBW 100KHZ *VBW 100KHZ *SWP 10.0sec

ATTEEN 10dB
RL 0dBm

MKR -61.33dBm
18.750GHZ

10dB/

MKR
18.750 GHZ
-61.33 dBm



START 15.000GHZ STOP 20.000GHZ
*RBW 100KHZ *VBW 100KHZ *SWP 10.0sec

ATTEN 10dB

RL 0dBm

10dB/

MKR -65.67dBm

23.900GHz

MKR

23.900 GHz

D -65.67 dBm



START 20.000GHz

*RBW 100KHz

*VBW 100KHz

STOP 25.000GHz

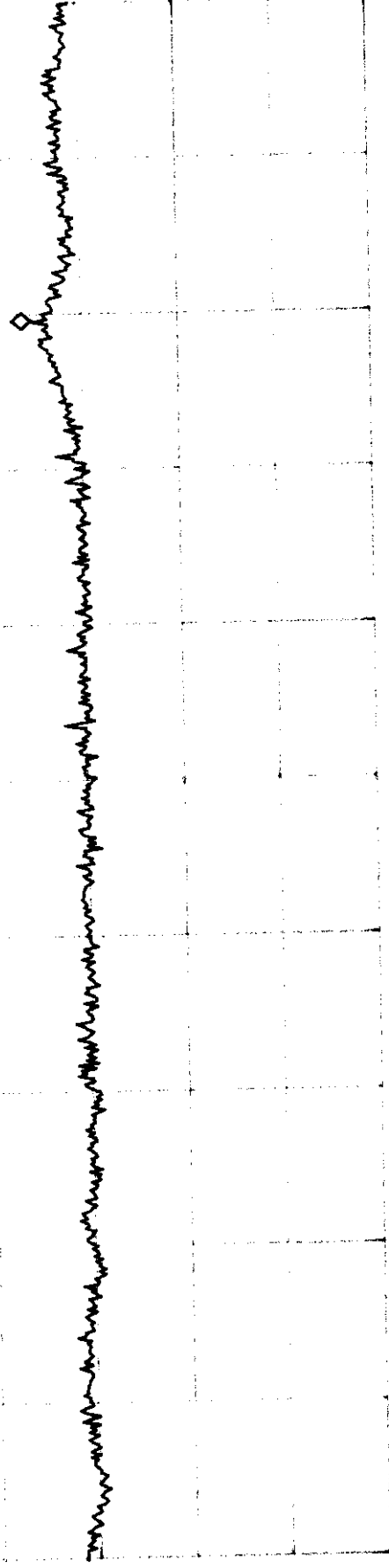
*SWP 10.0sec

ATTEEN 10dB
RL 0dBm

MKR -64.83dBm
28.975GHz

10dB/

D
MKR
28.975 GHz
-64.83 dBm



START 25.000GHZ STOP 30.000GHZ
*RBW 100KHZ *VBW 100KHZ *SWP 10.0sec

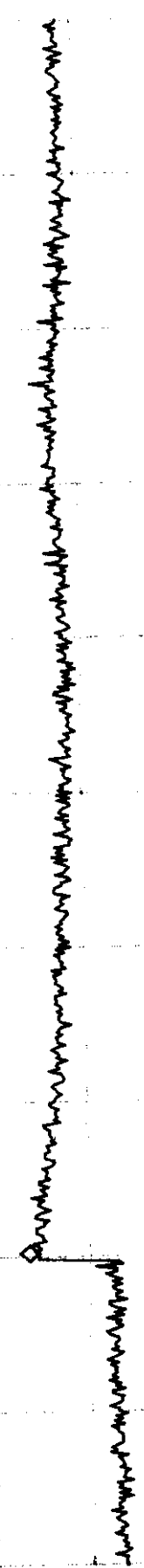
ATTEEN 10dB
RL 0dBm

MKR -64.83dBm
31.008GHz

10dB/

MKR
31.008 GHz
-64.83 dBm

D



START 30.000GHZ STOP 35.000GHZ
*RBW 100KHZ *VBW 100KHZ *SWP 10.0sec

ATTEN 10dB
RL 0dBm

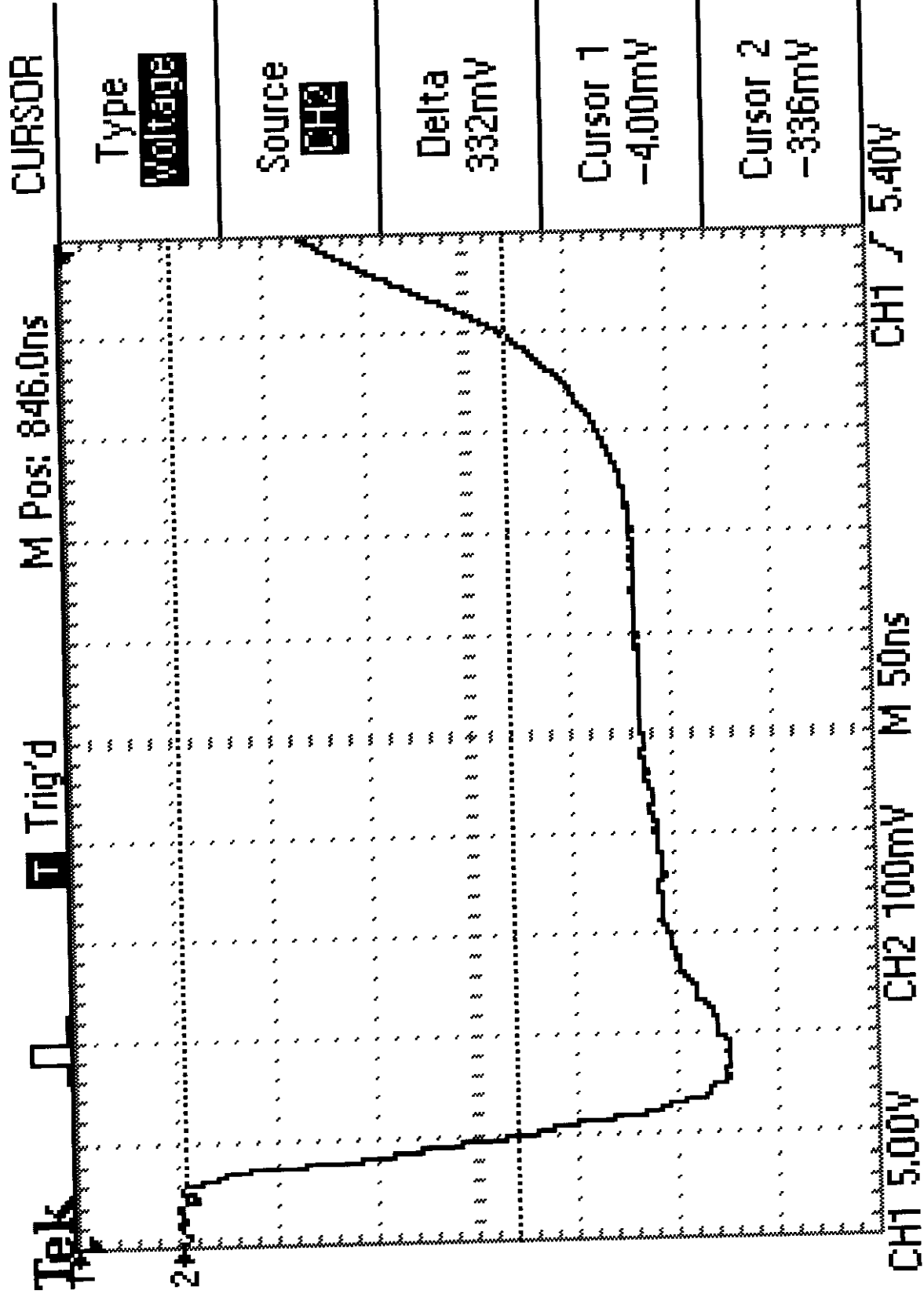
MKR -66.17dBm
38.192GHz

10dB/

MKR
38.192 GHz
D -66.17 dBm



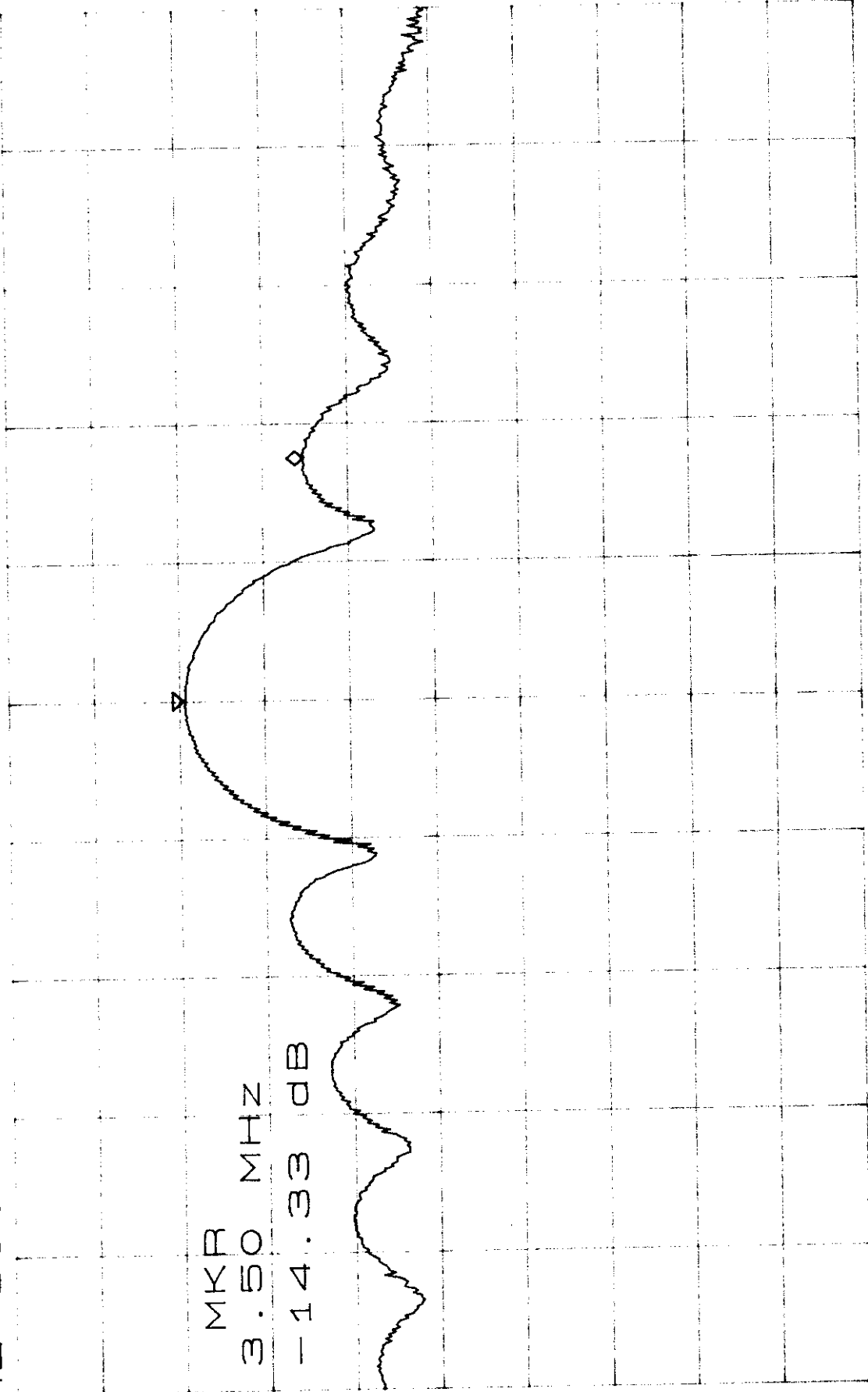
START 35.000GHZ STOP 40.000GHZ
*RBW 30KHZ *VBW 30KHZ *SWP 20.0sec



ATTEN 40dB
RL 30.0dBm

MKR -14.33dB
3.50MHz

MKR
3.50 MHz
-14.33 dB



CENTER 9.37225GHZ

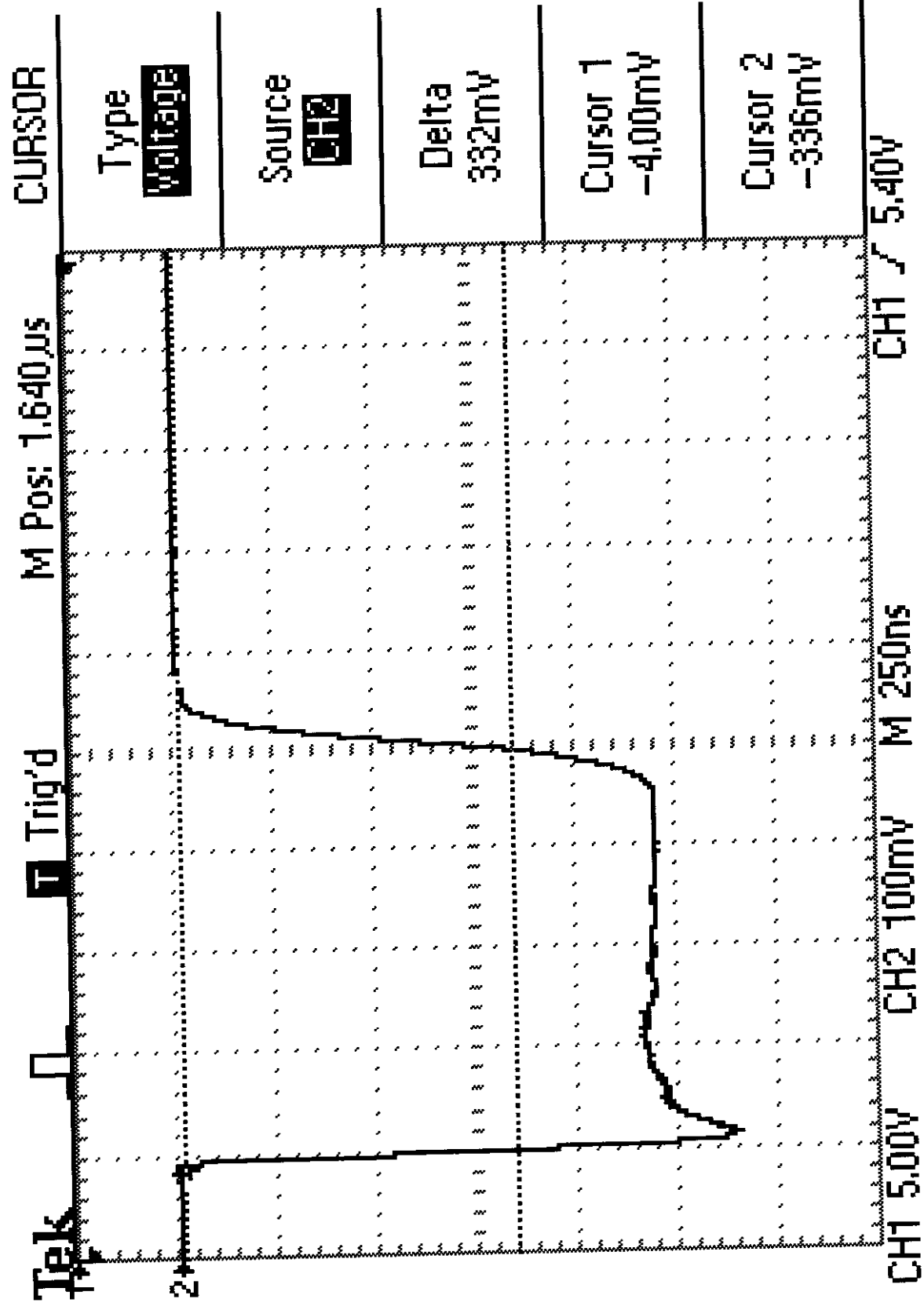
SPAN 20.00MHZ

RBW 300KHZ

VBW 300KHZ

*SWP 2.000sec

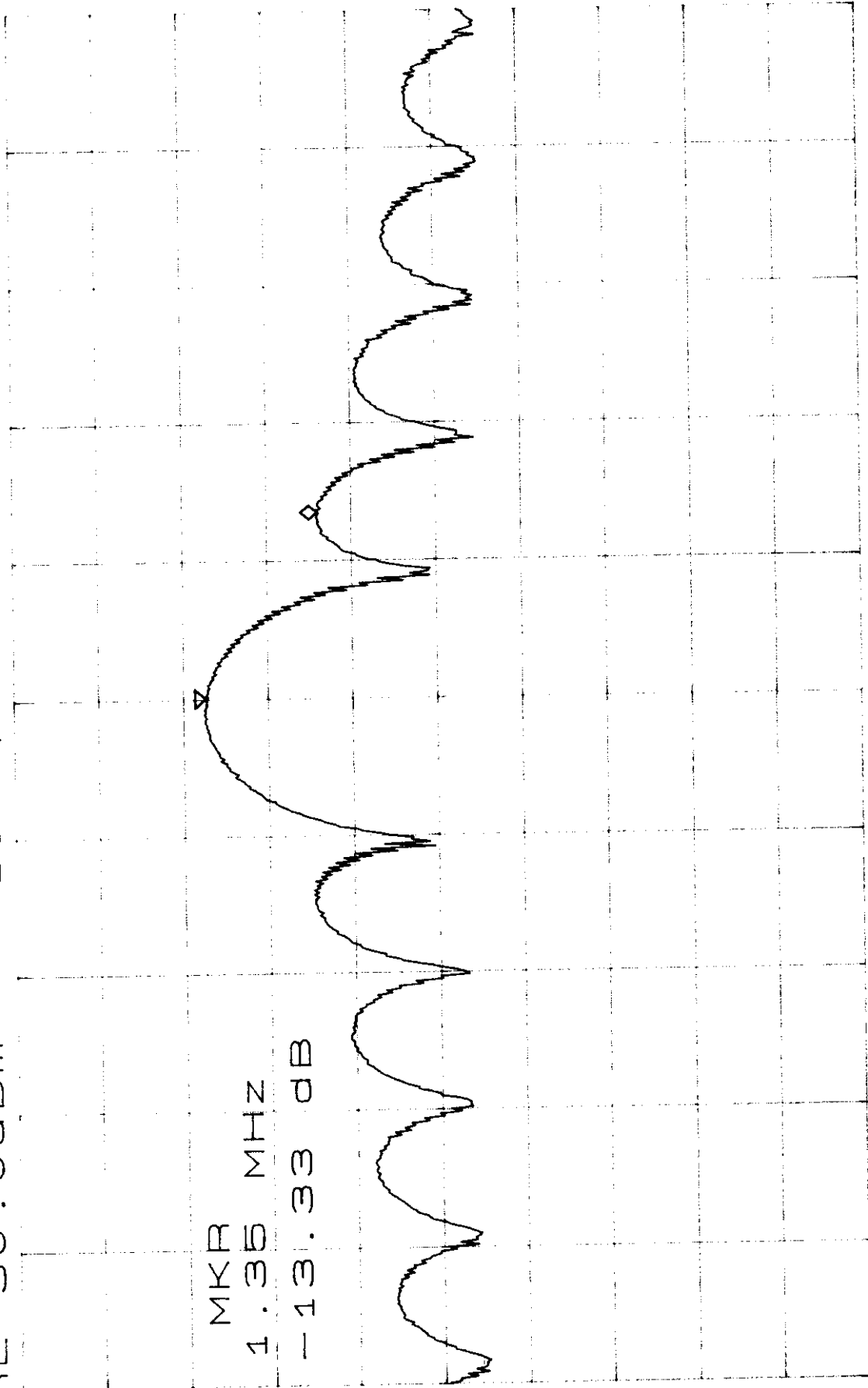
400 ns pulse width



ATTEN 40dB
RL 30.0dBm

MKR -13.33dB
1.35MHz

MKR
1.35 MHz
-13.33 dB



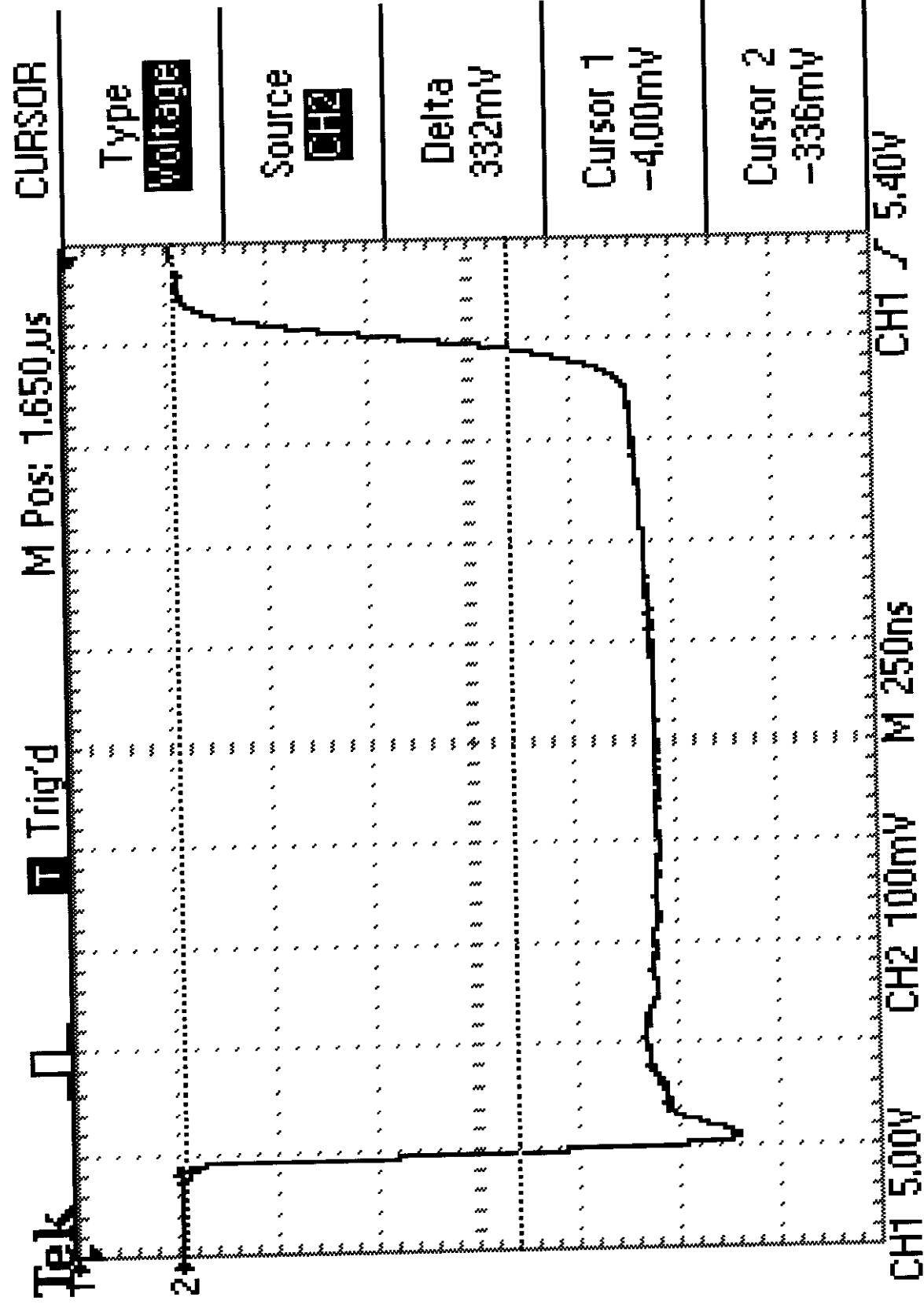
CENTER 9.37292GHz
RBW 100kHz

VBW 100kHz

SPAN 10.00MHz

*SWP 2.00sec

1 uSec pulse width

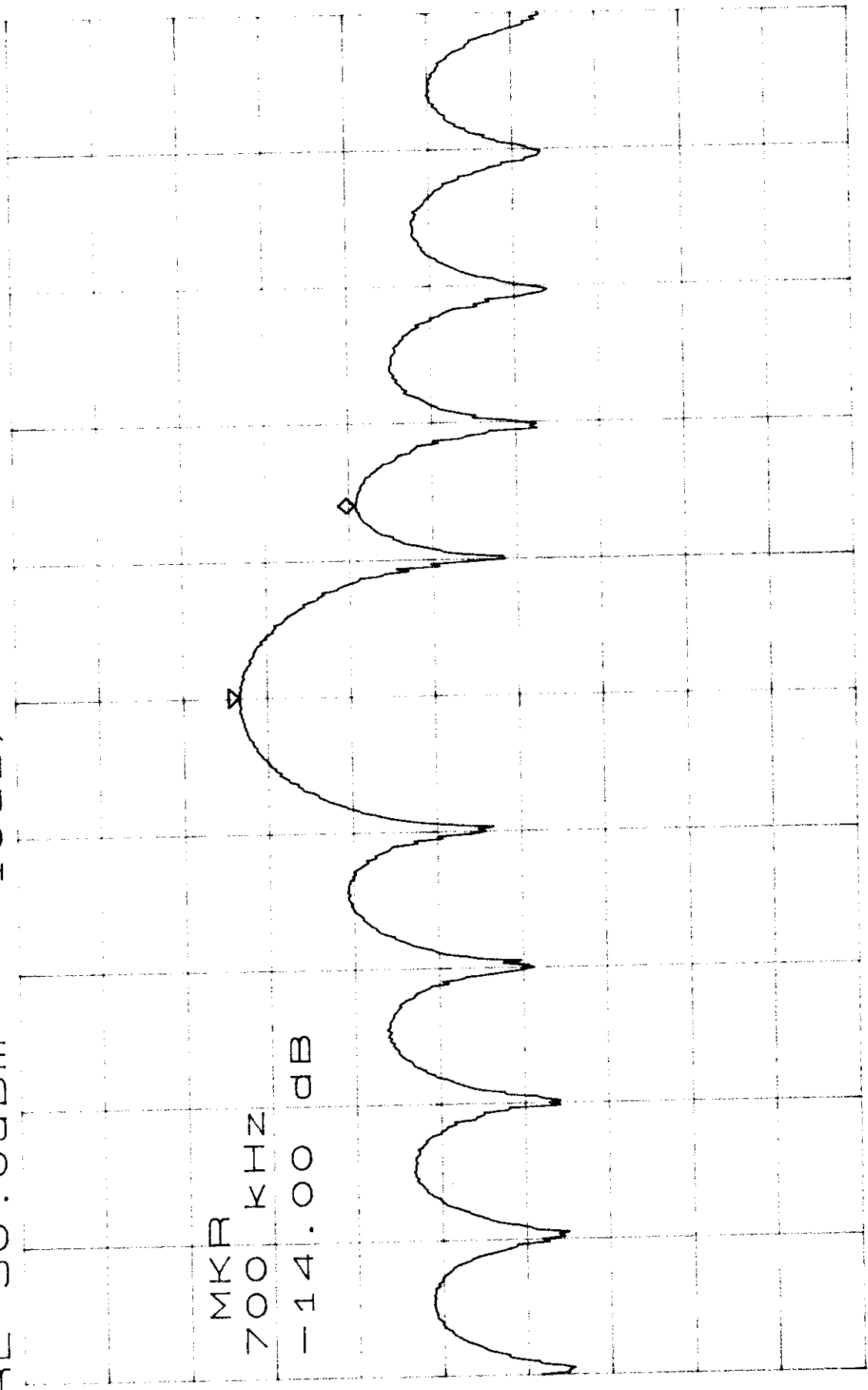


Use VERTICAL POSITION knobs to move cursors

ATTEN 40dB
RL 30.0dBm

MKR -14.00dB
700KHZ

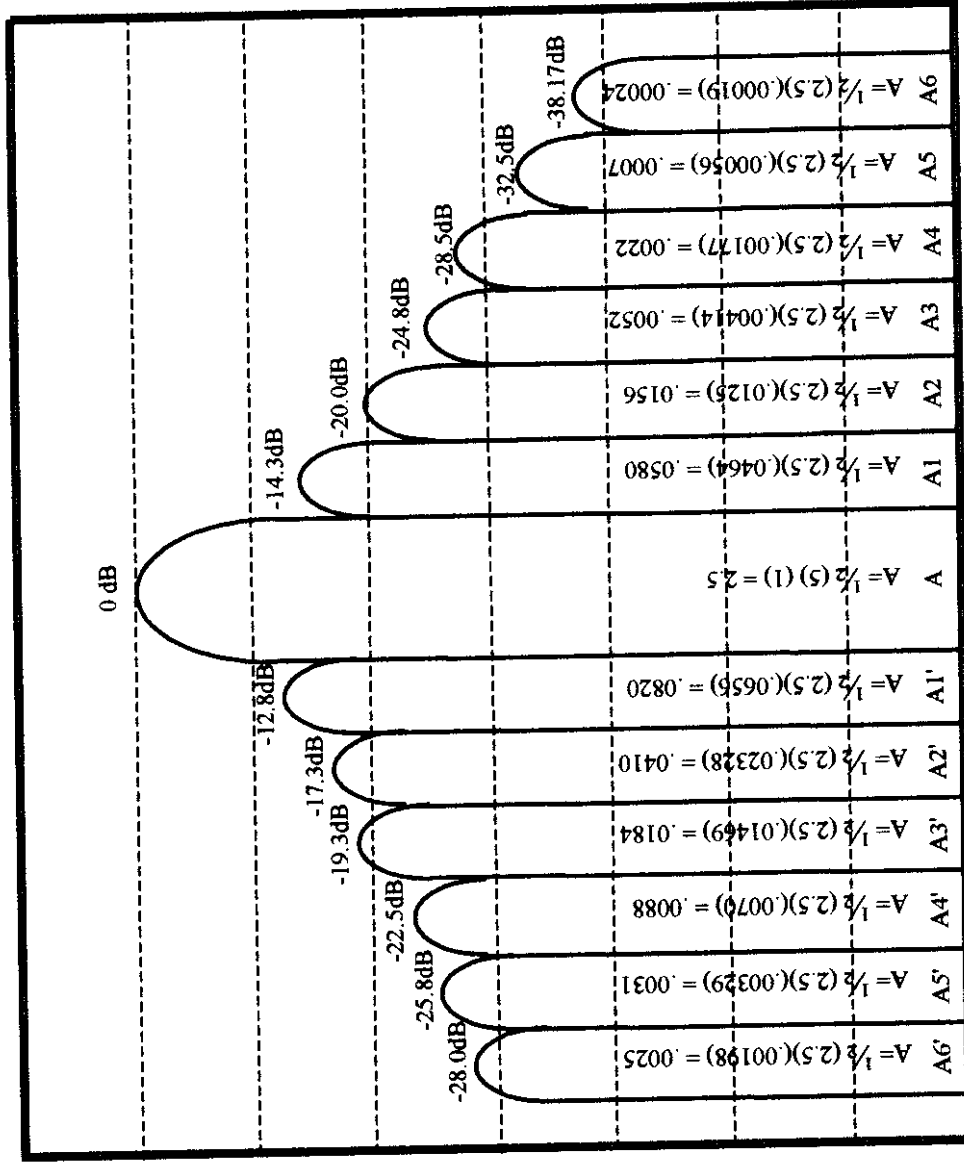
MKR
700 KHZ
-14.00 dB



CENTER 9.372283GHZ
RBW 30KHZ VBW 30KHZ

SPAN 5.000MHZ
*SWP 2.000sec
2 usec pulse width

XDD-300X SPECTRUM



FEDERAL REGULATION 2.989,
OCCUPIED BANDWIDTH FOR
XDD-300X METEOROLOGICAL
RADAR

PULSE WIDTH = 0.4 μ sec

PRF=1180

FREQUENCY=9375 MHz

MAJOR LOBE WIDTH=5.0 MHz

MINOR LOBE WIDTH=2.5 MHz

LOSE AREA = $\frac{1}{2}$ LOBE WIDTH $\left(\frac{1}{\log \frac{1}{10}} \right)$

A6 THROUGH A6' = 2.6814

MEAN RADIATED POWER = 2.6814 * .99 = 2.6545

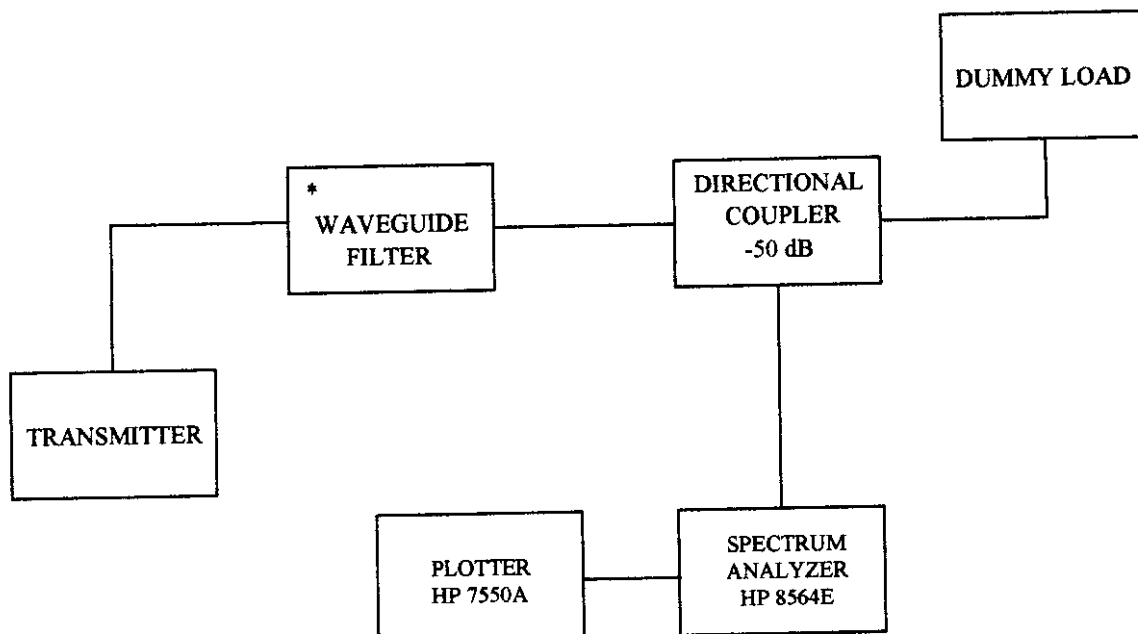
A3 THROUGH A3' = 2.6477

OCCUPIED BANDWIDTH = 17.5 MHz (worst case)

EMISSION DESIGNATOR, 11M25P0N

APPR./DATE	SIZE A	CODE IDENT NO.	DRAWING NO. SK1874-15
	SCALE	52005	SHEET 1 OF 1

TEST SETUP FOR SPECTRUM AND EMISSION MEASUREMENTS DATA MEASURED AT 9375 MHz



Spurious measurements data taken from transmitter directional coupler.

$$\begin{aligned}
 \text{Required emissions below carrier} &= 43 + 10 \log (P_m) = \\
 &= 43 + 10 \log (295) = \\
 &= 43 + 24 = 67.7 \text{ dB below carrier.}
 \end{aligned}$$

Note that from 0 Hz to 40 Ghz no spurious signals shown are greater than approximately -70 dBc.

* WAVGUIDE FILTER INCLUDED IN TEST SETUP IS NORMALLY LOCATED IN THE WAVEGUIDE ASSEMBLY AT THE EQUIPMENT RACK. CENTER FREQUENCY IS 9375 MHz.

APPR./DATE	SIZE A	CODE IDENT NO.	DRAWING NO. SK1874-09
	SCALE	52005	SHEET 1 OF 1

ATTEN 10dB
RL 0dBm

MKR -74.67dBm
2.500GHz

10dB/

MKR
2.500 GHz
-74.67 dBm

D



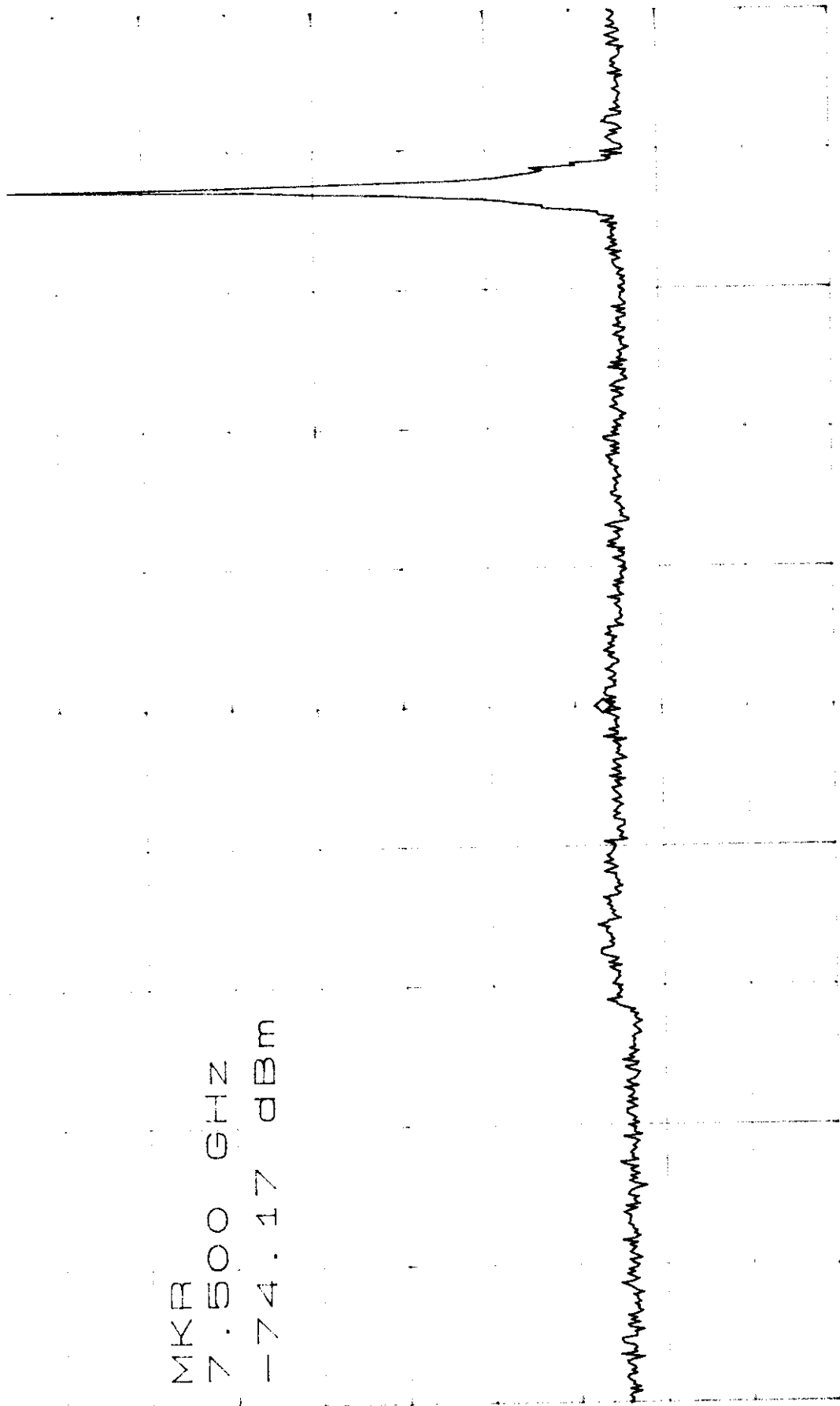
START 0HZ STOP 5.000GHz
*RBW 100kHz *VBW 100kHz *SWP 10.0sec

ATTEN 10dB
RL 0dBm

MKR -74.17dBm
7.500GHZ

10dB/

MKR
7.500 GHZ
-74.17 dBm



START 5.000GHZ STOP 10.000GHZ
*RBW 100KHZ VBW 100KHZ *SWP 10.0sec

ATTEN 10dB

RL 0dBm

10dB/

MKR -74.17dBm

12.500GHz

MYR

12.500 GHz

-74.17 dBm

D



START 10.000GHz

STOP 15.000GHz

*RBW 100kHz

VBW 100kHz

*SWP 10.0sec

ATTEN 10dB

RL 0dBm

10dB/

MKR -72.33dBm

17.500GHZ

MKR

17.500 GHZ

D -72.33 dBm



START 15.000GHZ

STOP 20.000GHZ

*RBW 100KHZ

VBW 100KHZ

*SWP 10.0sec

ATTEN 10dB

RL 0dBm

10dB/

MARK -71.83dBm

22.500GHZ

D
MARK
22.500 GHZ
-71.83 dBm



START 20.000GHZ

STOP

25.000GHZ

*RBW 100KHZ

VBW 100KHZ

*SWP

10.0SEC

ATTEN 10dB

RL 0dBm

10dB/

MKR -72.83dBm

27.500GHZ

MKR

27.500 GHZ

D -72.83 dBm

Handwritten note: The spectrum shows a very narrow band of activity at 27.500 GHz, which is consistent with the MKR signal. The signal is centered at 27.500 GHz and has a bandwidth of approximately 100 kHz. The power level is approximately -72.83 dBm.

START 25.000GHZ

*RBW 100kHz

VBW 100kHz

STOP

30.000GHZ

*SWP 10.0sec

ATTEN 10dB

RL 0dBm

10dB/

MKT 168.000dBm

32.500GHz

MKT

32.500 GHz

D 168.00 dBm



START 30.000GHz

*RBW 100KHz

VBW 100KHz

STOP

35.000GHz

*SWP 10.0Sec

ATTEN 10dB

MKR -67.83dBm

PL 0dBm

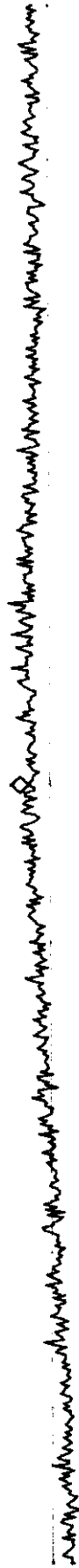
10dB/

37.500GHZ

MKR

37.500 GHZ

D -67.83 dBm



START 35.000GHZ

STOP 40.000GHZ

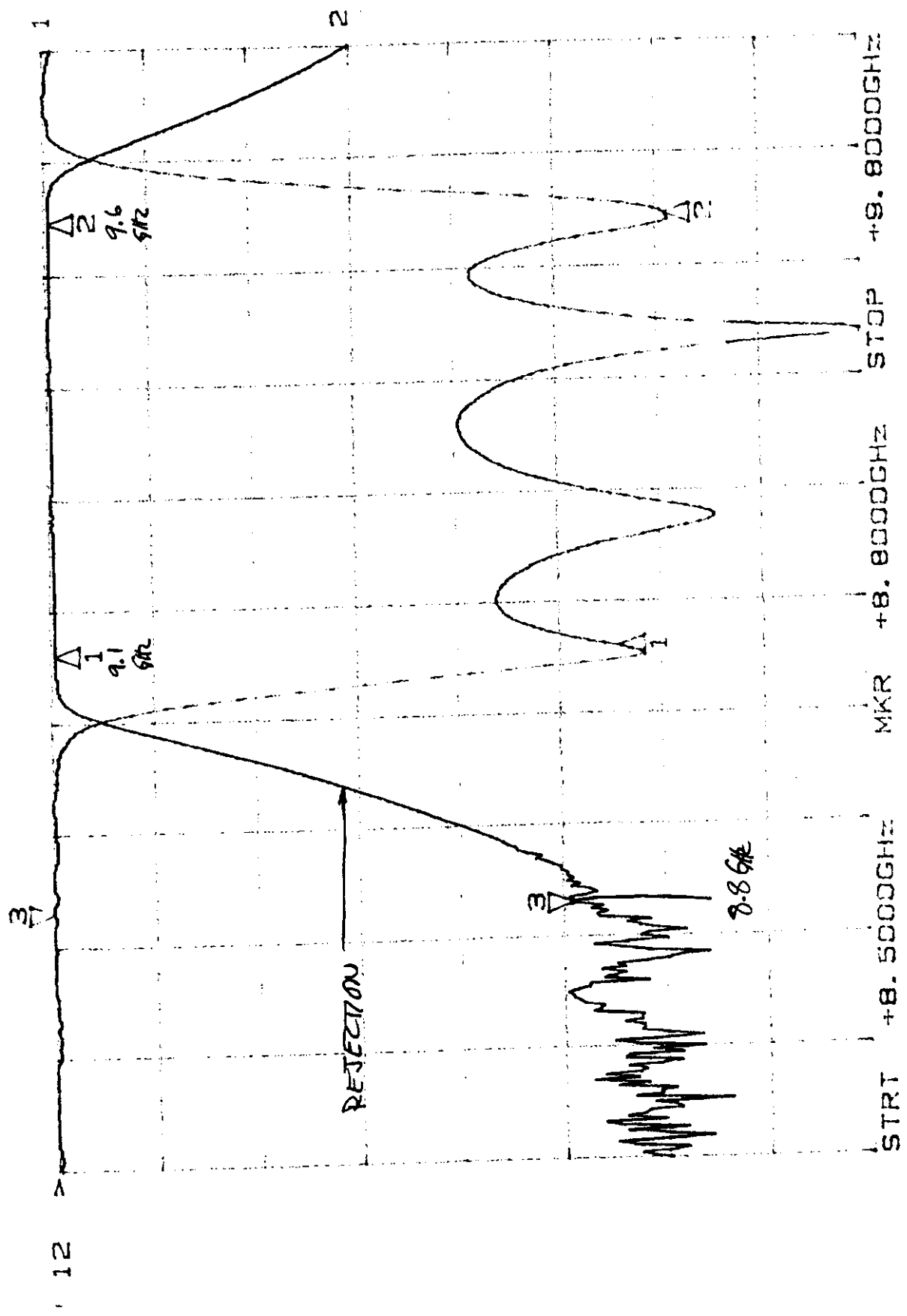
*RBW 30KHZ

*VBW 100KHZ

*SWP 20.0sec

1/18 10162

CH1: A/R-M REF 5.0 dB + :00 dB
CH2: B/R-M REF 10.0 dB - 50.87 dB

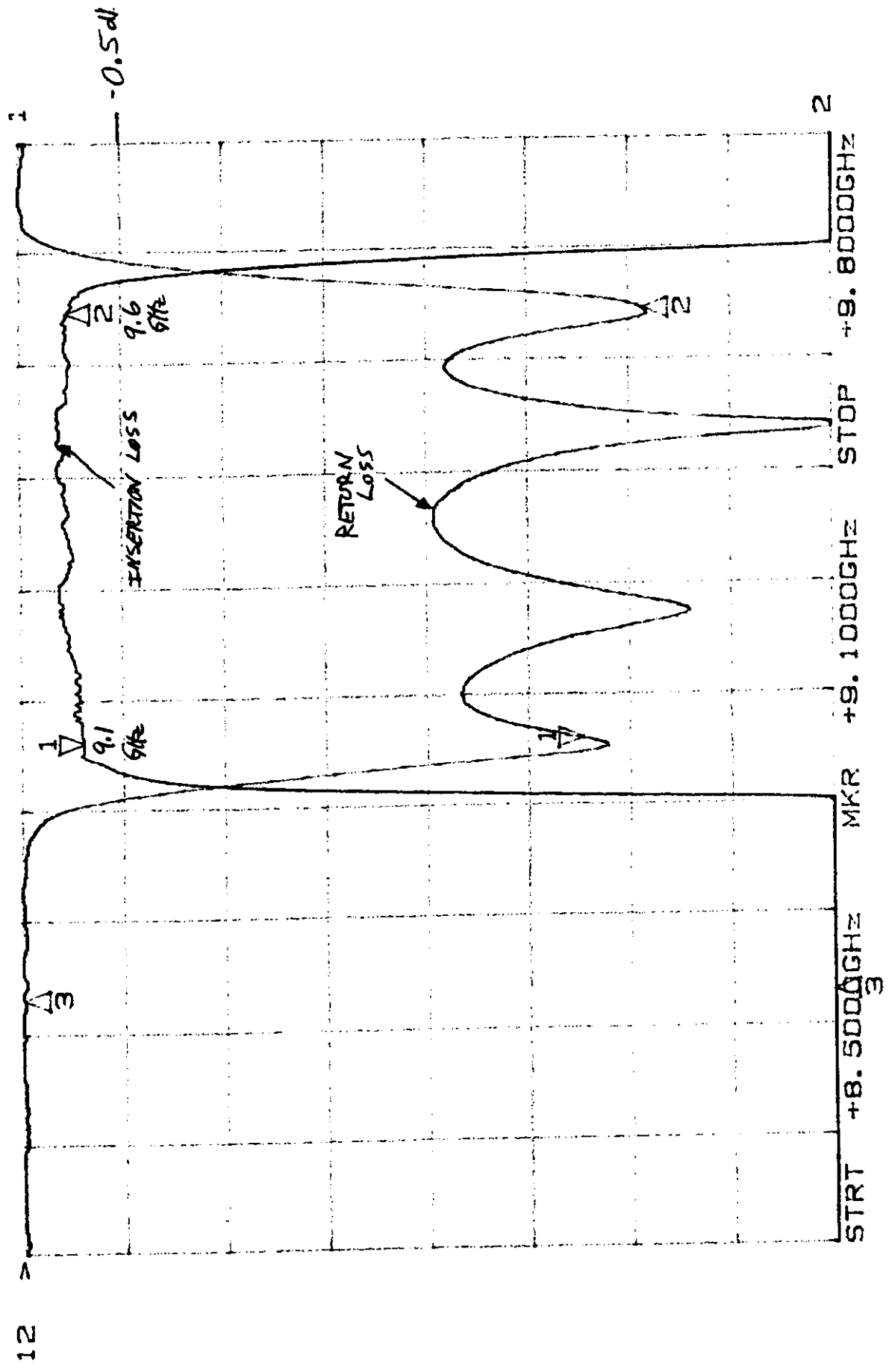


16 m

1/11 10:10

CH1: A/R-M REF - 27.64 dB
5.0 dB/

CH2: B/R-M REF - 31 dB
.5 dB/

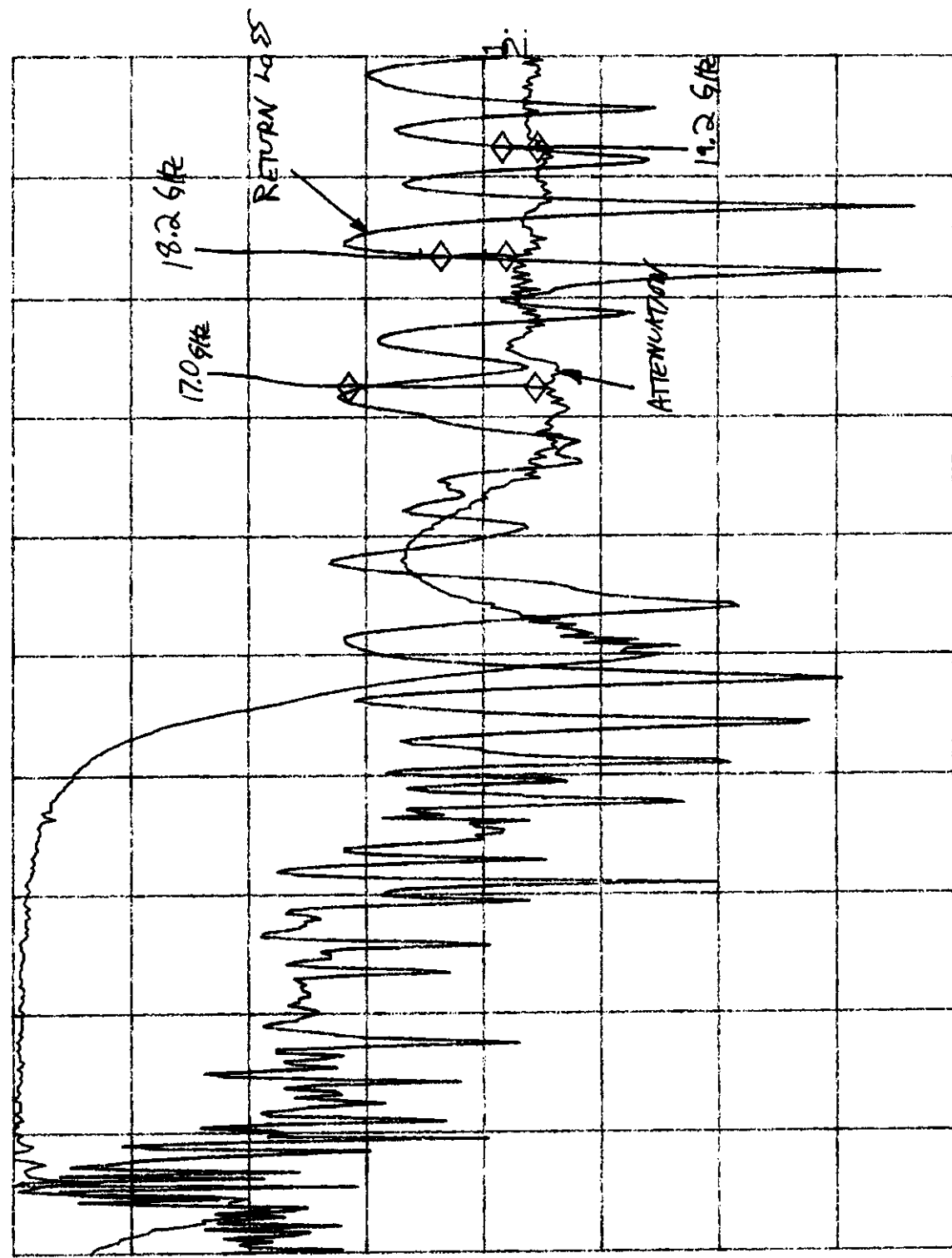


ch 1

ATTENUATION

S/N 46376

CH1: A/R - 18.60 dB CH2: B/R - 42.67 dB
5.0dB/ REF - .00 dB 10.0dB/ REF - .00 dB
REF12



STRT +9.0000GHz MKR +18.200GHz STOP +20.000GHz

S/N 46376

ASSEMBLY

CH1: A/R - 27.49 dB REF - .00 dB CH2: B/R - .21 dB REF - .00 dB
REF12

