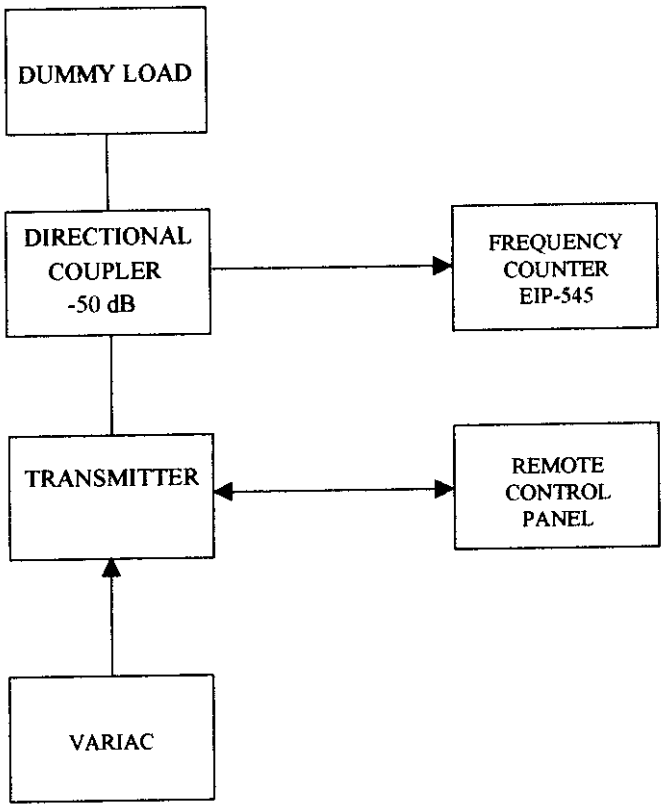
Temperature VS Frequency Stability Test and Voltage Variation

The attached data sheets show the frequency drift VS temperature from start up to stabilization at ambient temperature from -10°C to +50°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.

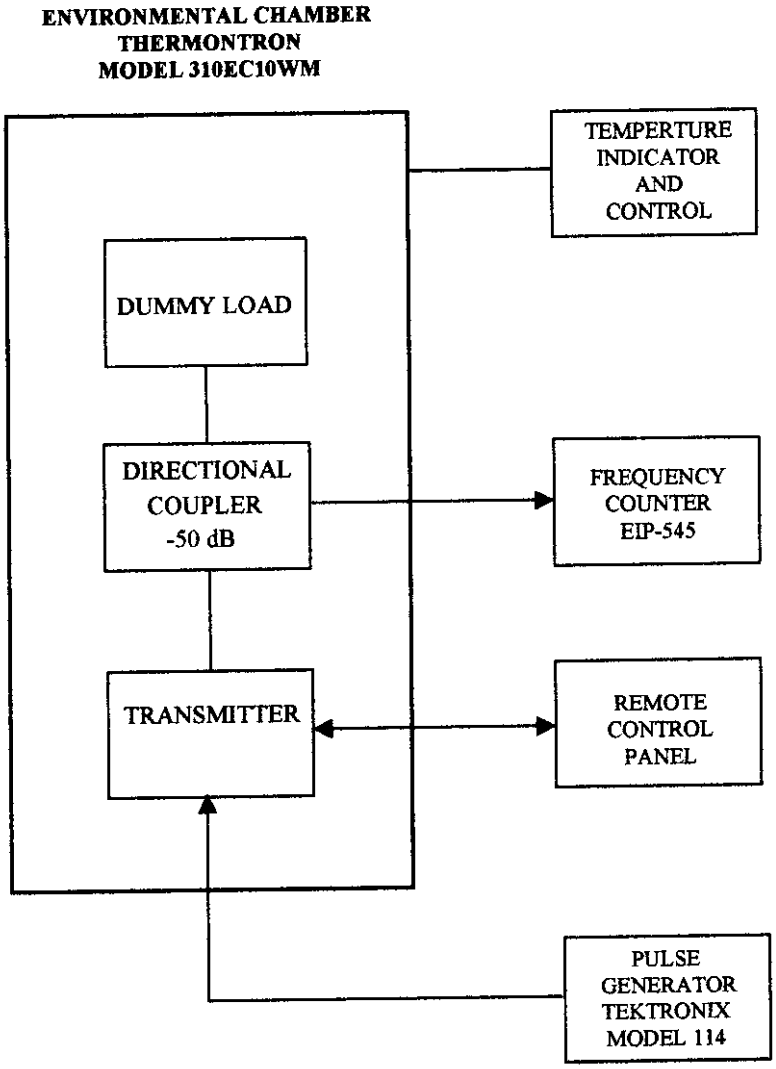
For the voltage variation test, a 220 VAC variac was inserted into the primary supply line and set to 220 VAC output. After the magnetron filament warmed 3 minutes, system was put in radiate mode and frequency measured. Primary power was then raised to 253 VAC and frequency measured. Primary power was 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



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

TEST SETUP FOR FREQUENCY STABILITY VS TEMPERATURE TEST

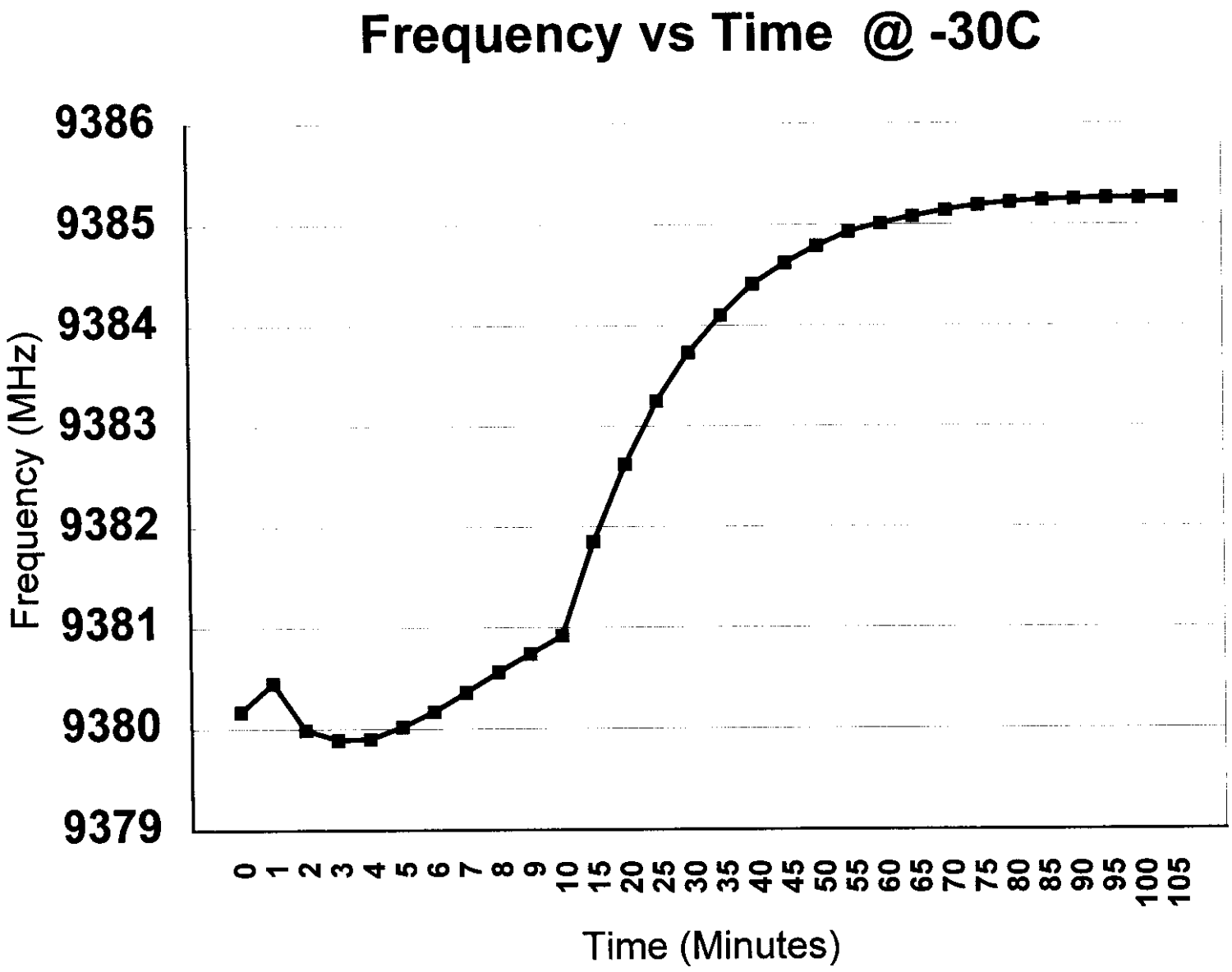


	SIZE	CODE IDENT NO.	DRAWING NO.
APPR./DATE	A		SK1874-11
	SCALE	52005	SHEET 1 OF 1

Frequency Stability VS Temperature

Temperature -30°C

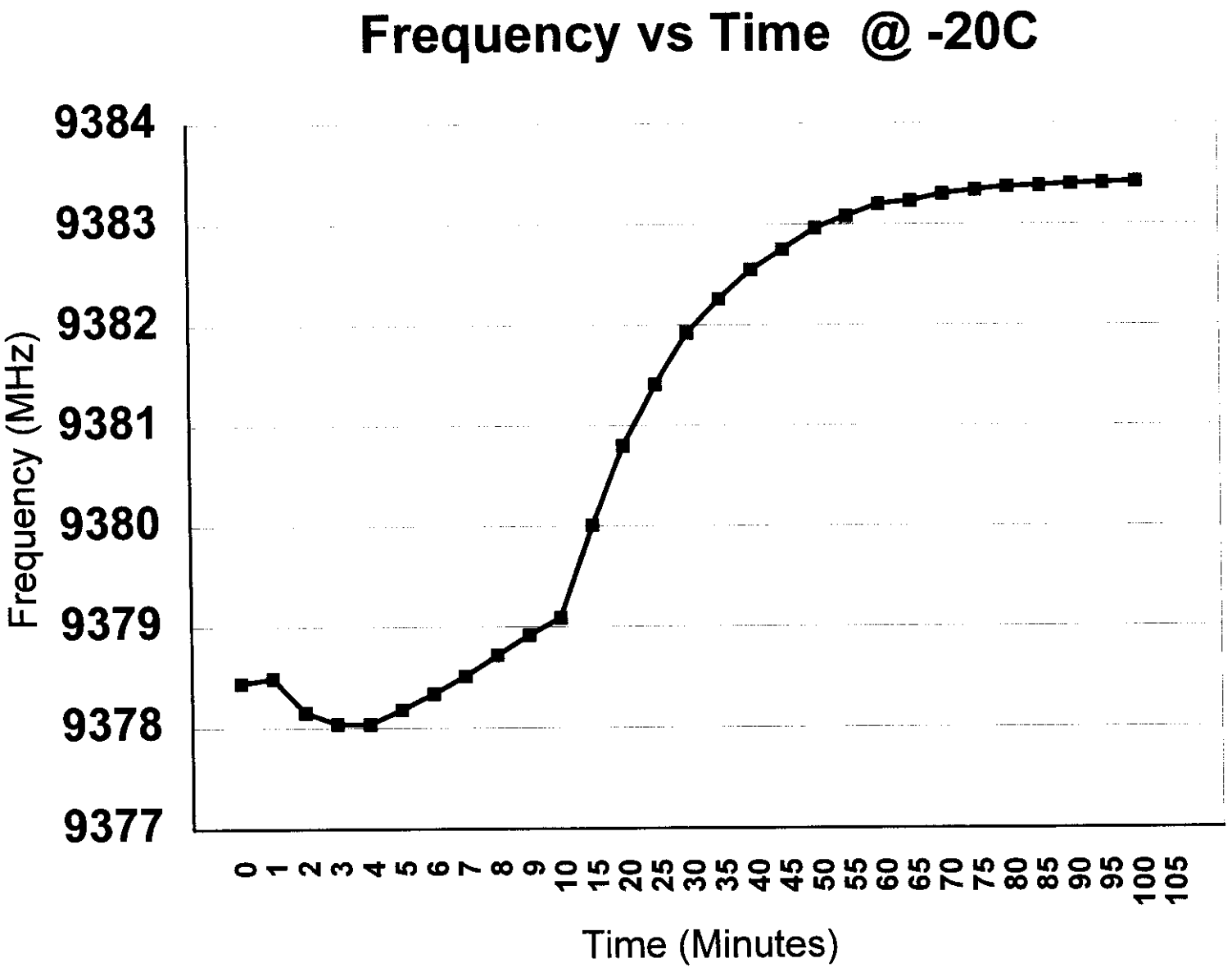
Time in minutes From Radiate On	Frequency(MHZ)
0	9380.17
1	9380.45
2	9379.99
3	9379.89
4	9379.90
5	9380.02
6	9380.17
7	9380.36
8	9380.56
9	9380.74
10	9380.92
15	9381.85
20	9382.62
25	9383.25
30	9383.73
35	9384.10
40	9384.41
45	9384.62
50	9384.79
55	9384.93
60	9385.01
65	9385.08
70	9385.14
75	9385.19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


Frequency vs Time @ -30C
9386
9385
9384
9383
9382
9381
9380
9379
Frequency (MHz)
0 1 2 3 4 5 6 7 8 9 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105
Time (Minutes)

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
9384
9383
9382
9381
9380
9379
9378
9377
Frequency (MHz)
0 1 2 3 4 5 6 7 8 9 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105
Time (Minutes)

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
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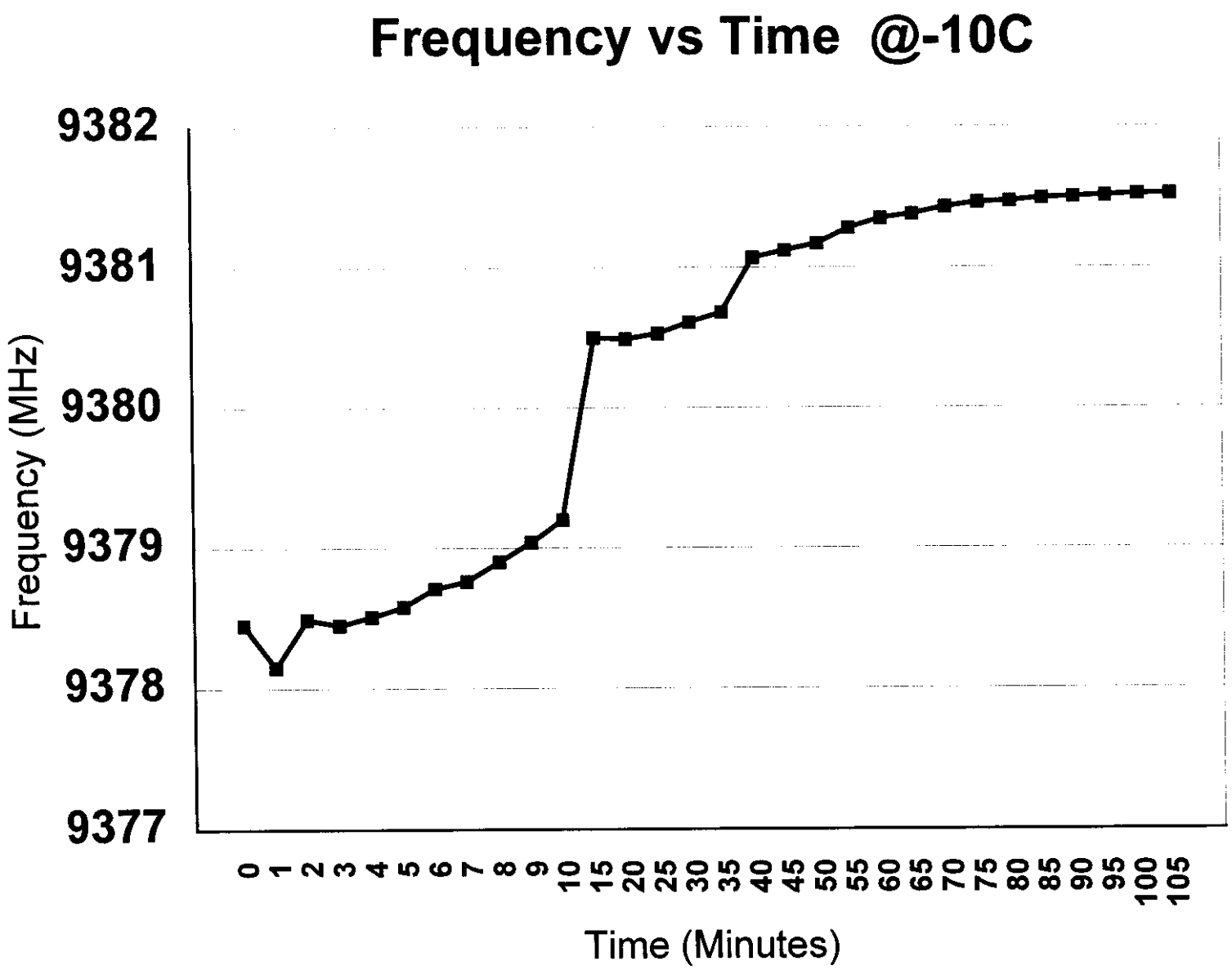
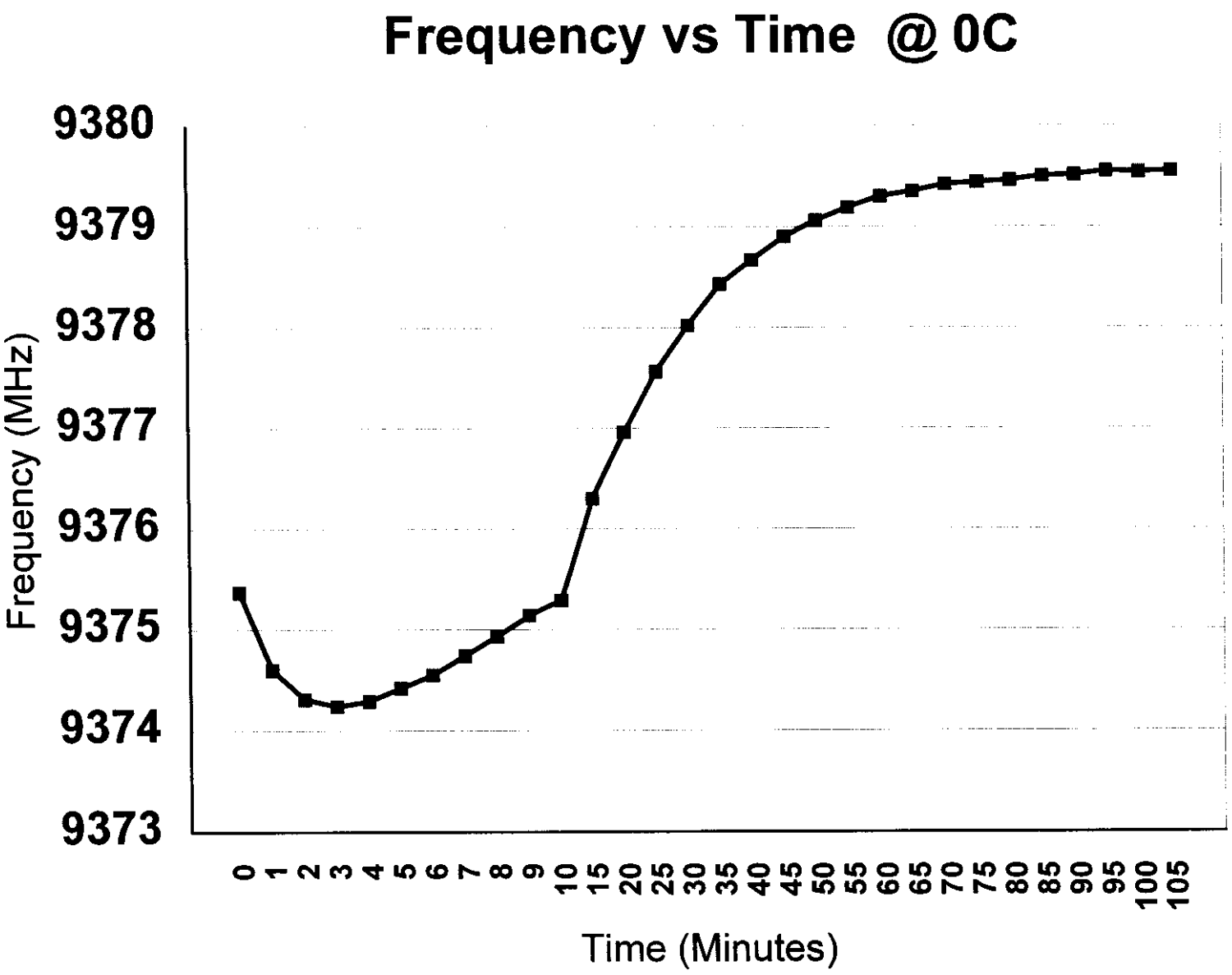
90	9381.50
95	9381.51
100	9381.52
105	9381.52


Frequency vs Time @-10C
9382
9381
9380
9379
9378
9377
Frequency (MHz)
0 1 2 3 4 5 6 7 8 9 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105
Time (Minutes)

Frequency Stability VS Temperature

Temperature 0°C

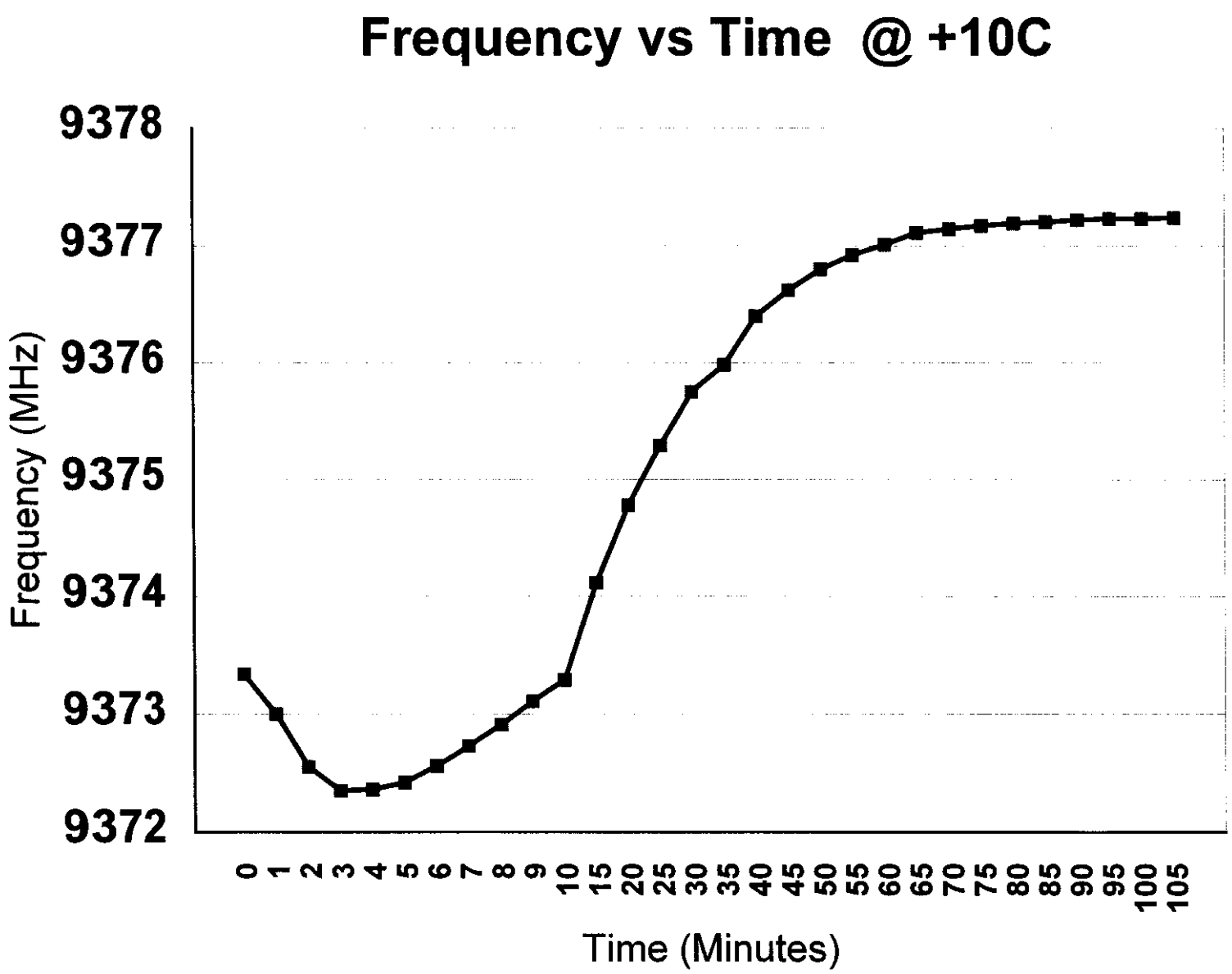
Time in minutes From Radiate On	Frequency(MHZ)
0	9375.37
1	9374.60
2	9374.31
3	9374.24
4	9374.29
5	9374.42
6	9374.55
7	9374.74
8	9374.93
9	9375.14
10	9375.29
15	9376.30
20	9376.96
25	9377.56
30	9378.02
35	9378.43
40	9378.67
45	9378.90
50	9379.06
55	9379.19
60	9379.30
65	9379.35
70	9379.42
75	9379.44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


Frequency vs Time @ 0C
9380
9379
9378
9377
9376
9375
9374
9373
Frequency (MHz)
0 1 2 3 4 5 6 7 8 9 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105
Time (Minutes)

Frequency Stability VS Temperature

Temperature 10°C

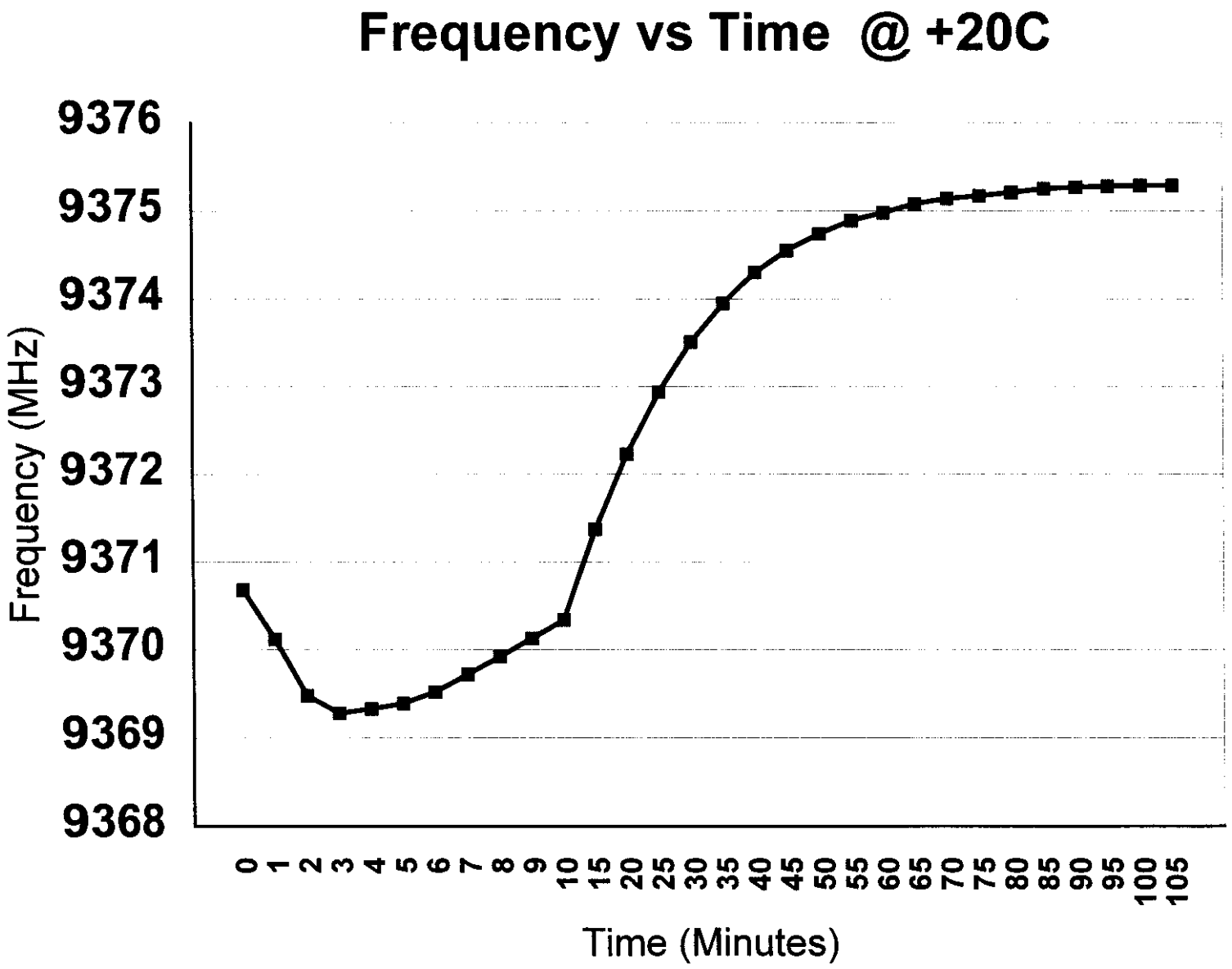
Time in minutes From Radiate On	Frequency(MHZ)
0	9373.34
1	9373.00
2	9372.55
3	9372.35
4	9372.36
5	9372.42
6	9372.56
7	9372.73
8	9372.91
9	9373.11
10	9373.29
15	9374.12
20	9374.78
25	9375.29
30	9375.75
35	9375.98
40	9376.40
45	9376.62
50	9376.80
55	9376.92
60	9377.01
65	9377.11
70	9377.14
75	9377.17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


Frequency vs Time @ +10C
9378
9377
9376
9375
9374
9373
9372
Frequency (MHz)
0 1 2 3 4 5 6 7 8 9 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105
Time (Minutes)

Frequency Stability VS Temperature

Temperature +20°C

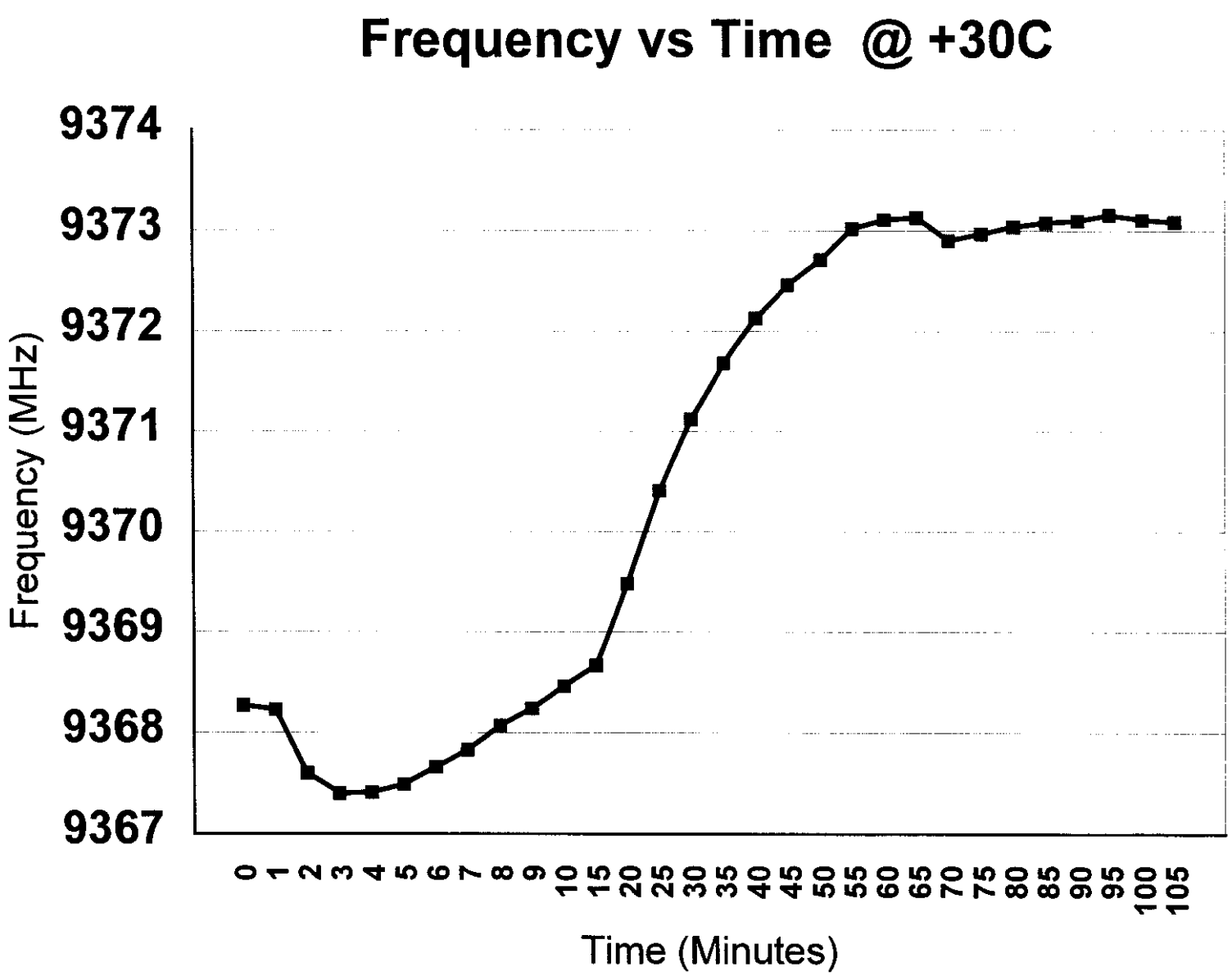
Time in minutes From Radiate On	Frequency(MHZ)
0	9370.68
1	9370.12
2	9369.48
3	9369.28
4	9369.33
5	9369.39
6	9369.52
7	9369.72
8	9369.92
9	9370.13
10	9370.34
15	9371.37
20	9372.23
25	9372.94
30	9373.51
35	9373.95
40	9374.30
45	9374.55
50	9374.74
55	9374.89
60	9374.98
65	9375.08
70	9375.14
75	9375.17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


Frequency vs Time @ +20C
9376
9375
9374
9373
9372
9371
9370
9369
9368
Frequency (MHz)
0 1 2 3 4 5 6 7 8 9 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105
Time (Minutes)

Frequency Stability VS Temperature

Temperature 30°C

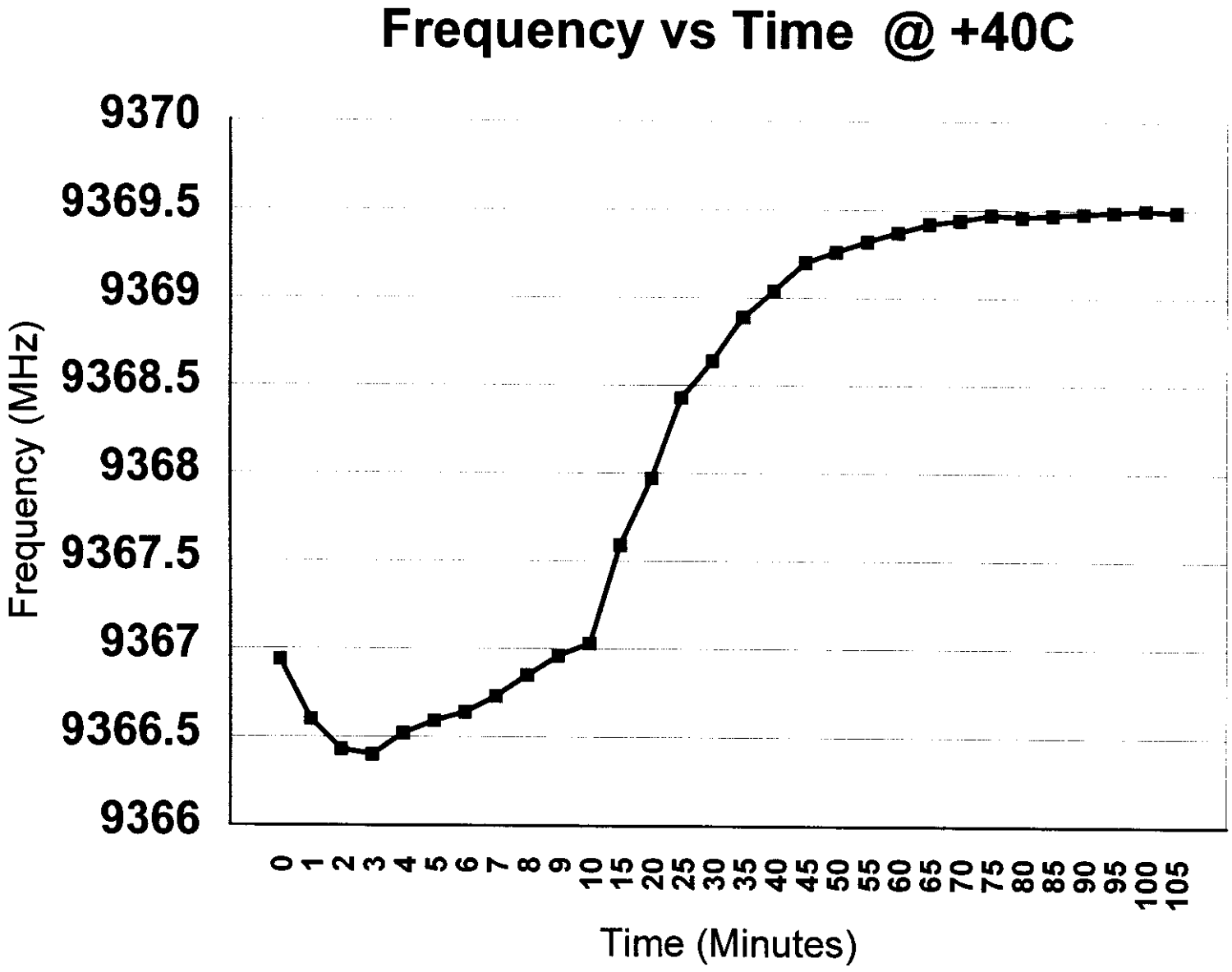
Time in minutes From Radiate On	Frequency(MHZ)
0	9368.27
1	9368.23
2	9367.60
3	9367.40
4	9367.41
5	9367.49
6	9367.66
7	9367.83
8	9368.07
9	9368.24
10	9368.46
15	9368.67
20	9369.48
25	9370.41
30	9371.12
35	9371.68
40	9372.13
45	9372.46
50	9372.71
55	9373.02
60	9373.11
65	9373.13
70	9372.90
75	9372.97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


Frequency vs Time @ +30C
9374
9373
9372
9371
9370
9369
9368
9367
Frequency (MHz)
0 1 2 3 4 5 6 7 8 9 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105
Time (Minutes)

Frequency Stability VS Temperature

Temperature 40°C

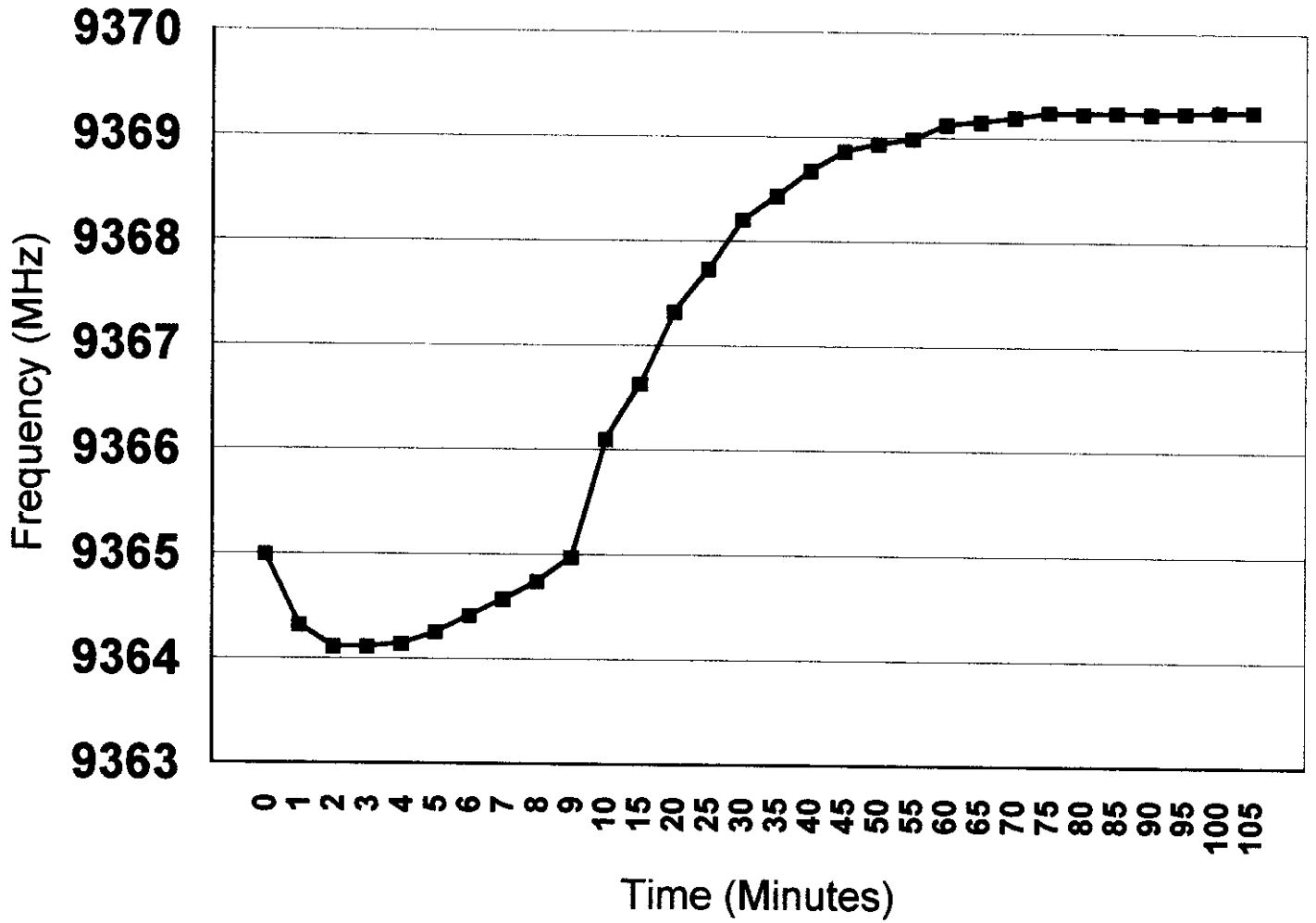
Time in minutes From Radiate On	Frequency(MHZ)
0	9366.94
1	9366.60
2	9366.43
3	9366.40
4	9366.52
5	9366.59
6	9366.64
7	9366.73
8	9366.85
9	9366.96
10	9367.03
15	9367.59
20	9367.97
25	9368.43
30	9368.64
35	9368.89
40	9369.04
45	9369.20
50	9369.26
55	9369.32
60	9369.37
65	9369.42
70	9369.44
75	9369.47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


Frequency vs Time @ +40C
Frequency (MHz)
9370
9369.5
9369
9368.5
9368
9367.5
9367
9366.5
9366
0 1 2 3 4 5 6 7 8 9 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105
Time (Minutes)

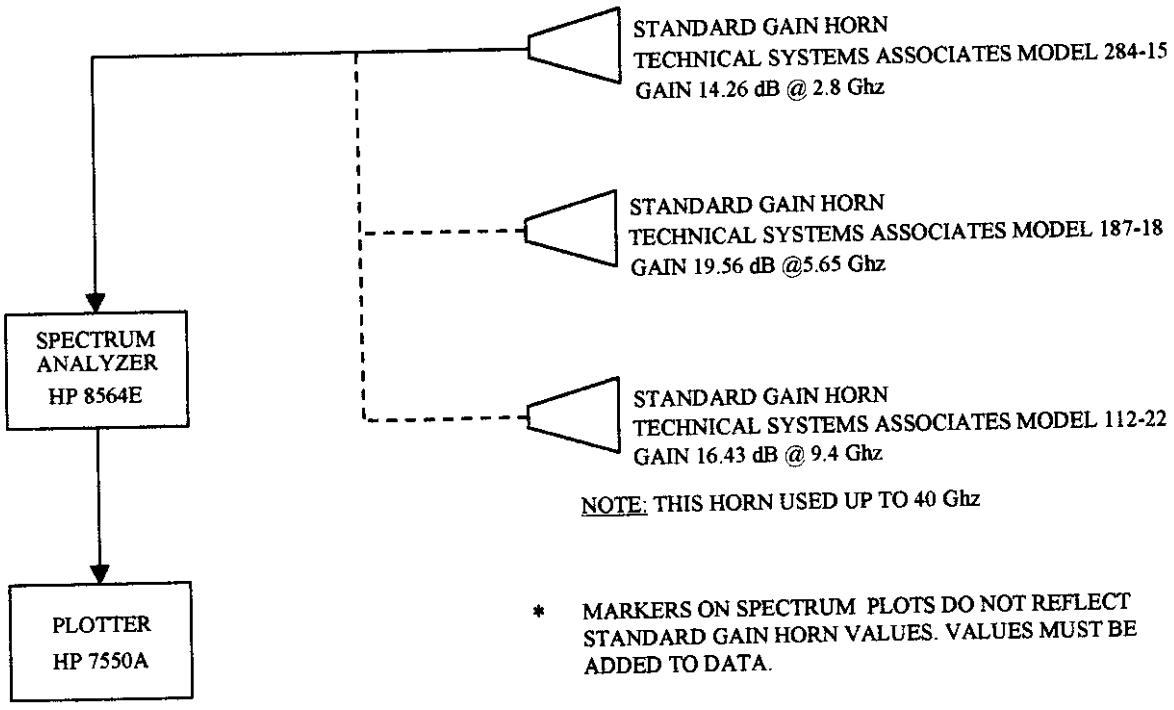
Frequency Stability VS Temperature

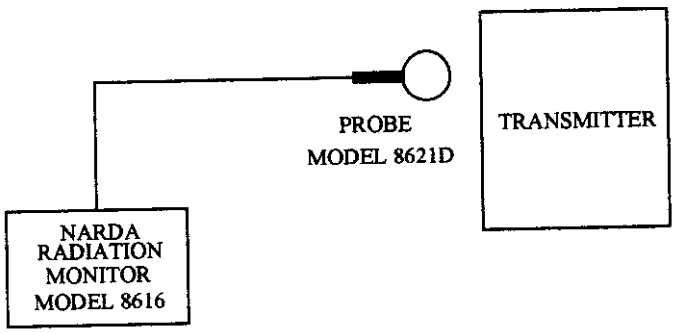
Temperature 50°C

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
9370
9369
9368
9367
9366
9365
9364
9363
Frequency (MHz)
0 1 2 3 4 5 6 7 8 9 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105
Time (Minutes)

TEST SETUP FOR SPURIOUS RADIATION FIELD STRENGH



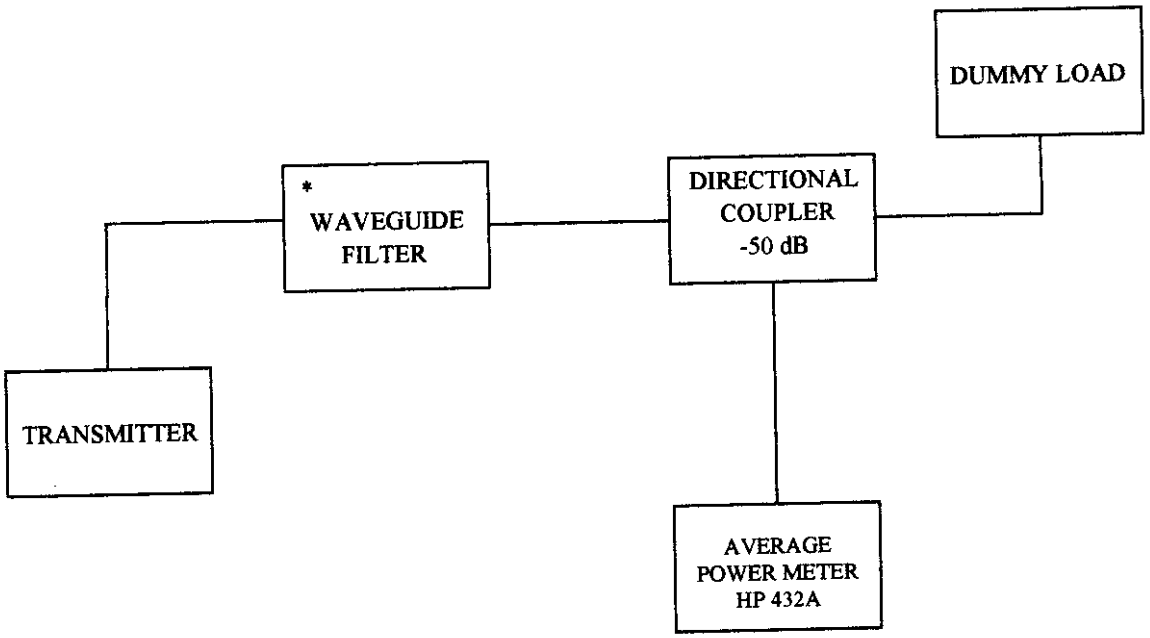


Measurements were made using each standard gain horn,as shown in the analyzer plot,probing around doors,panels and cables. Highest readings were obtained in front of the air filter. Measurements were taken with the transmitter at full power (295 kW peak) with the horn located 3 feet away in front of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

	SIZE	CODE IDENT NO.	DRAWING NO.
	A		SK1874-13
APPR./DATE	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 dBm

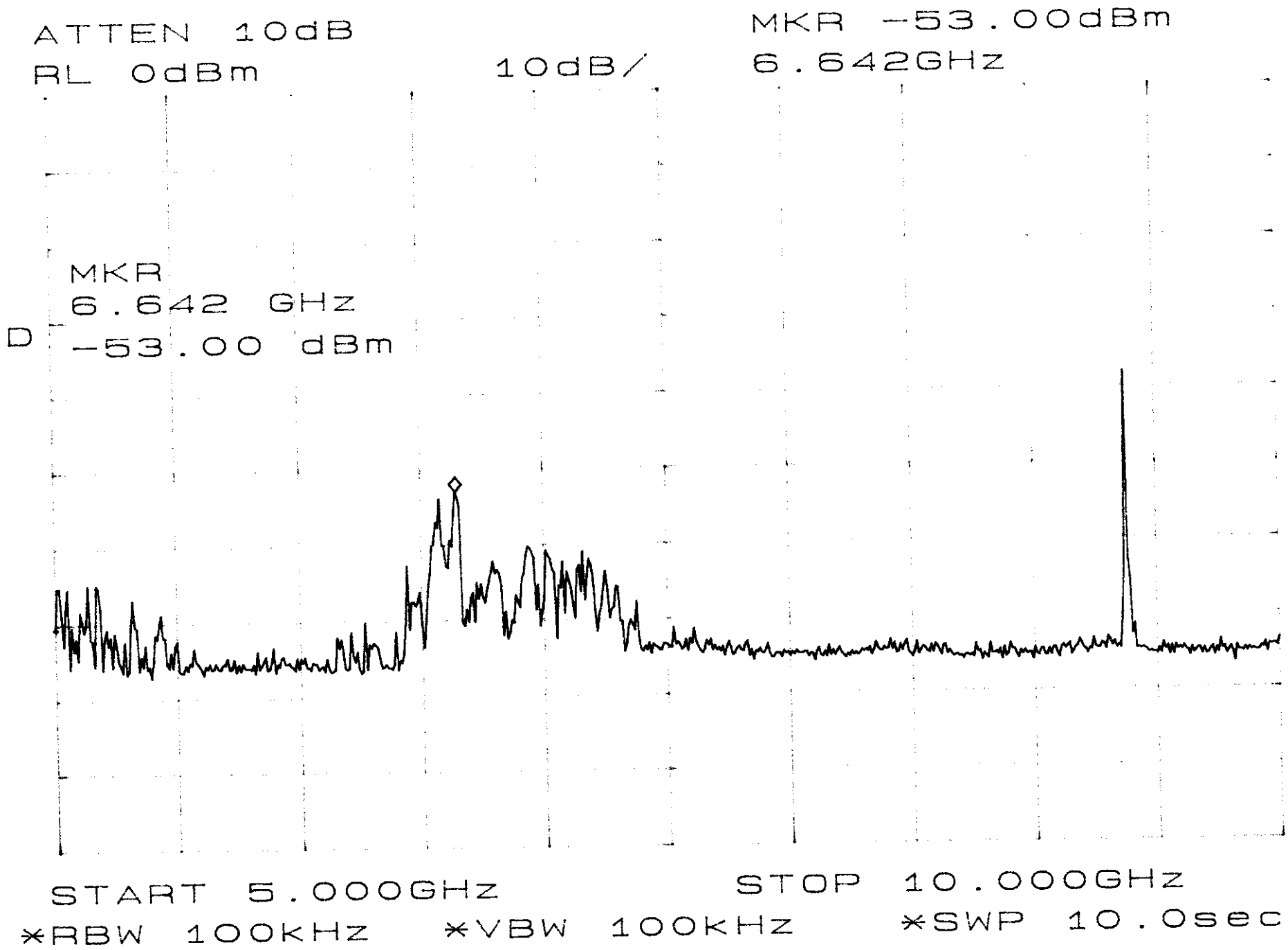
=295 kW

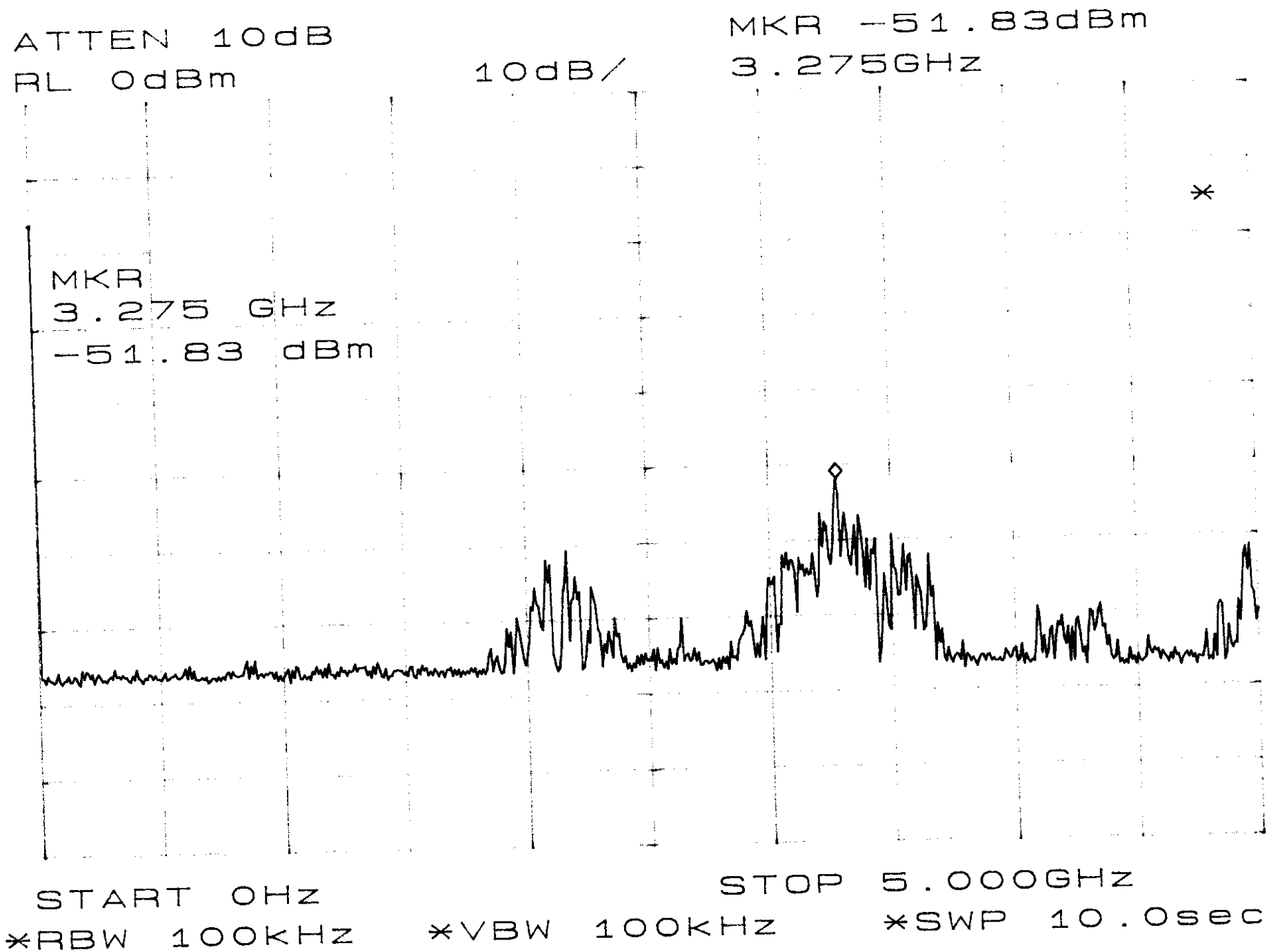
DUTY CYCLE CORRECTION FACTOR

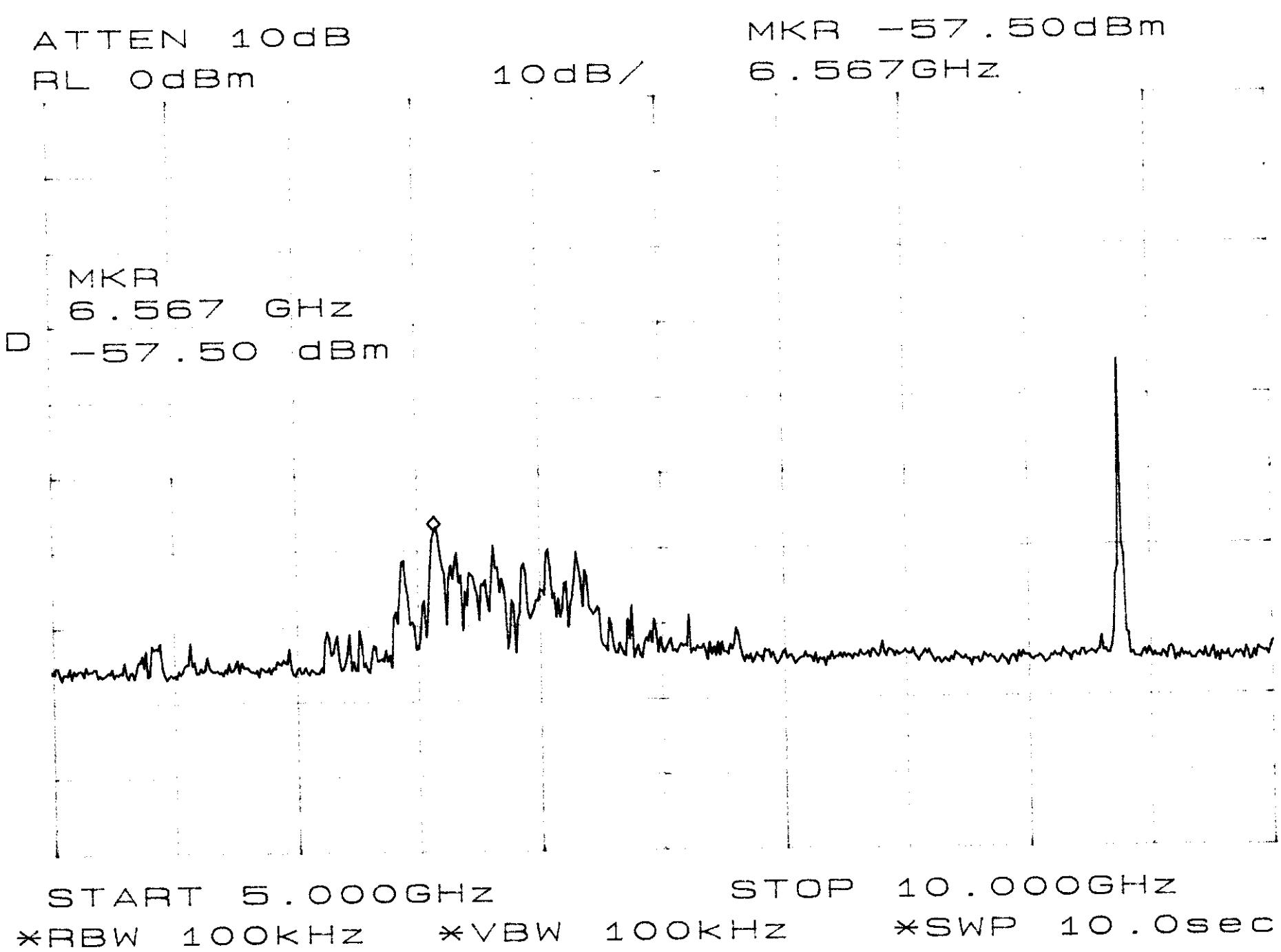
DC=10 LOG 1/PRF X PW
DC=10 LOG 1/250 X 2usec(10-6)
DC= 33.0

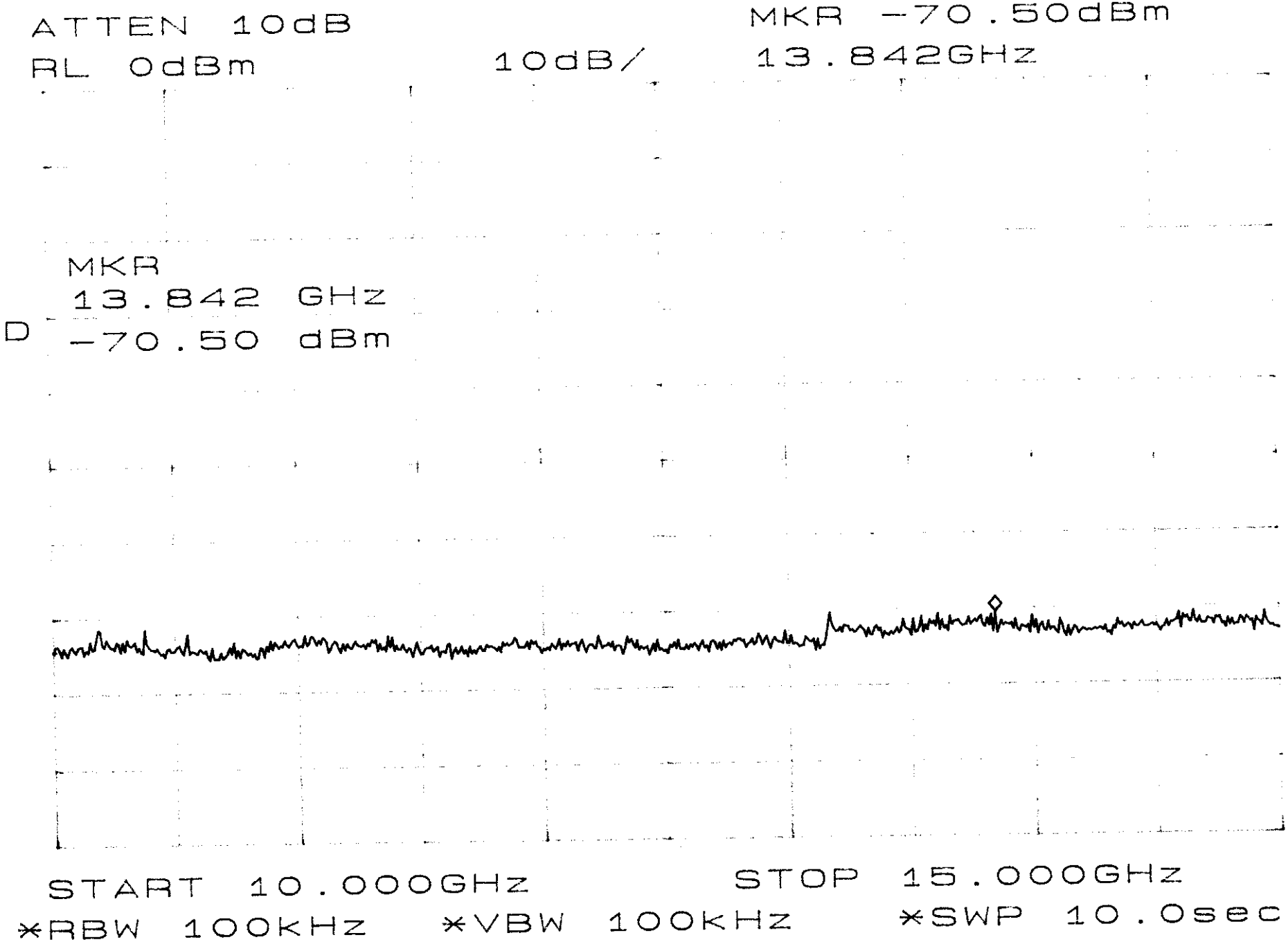
* WAVGUIDE FILTER INCLUDED IN TEST SETUP IS NORMALLY LOCATED IN THE WAVEGUIDE ASSEMBLY AT THE EQUIPMENT RACK. CENTER FREQUENCY IS 9375 MHz.

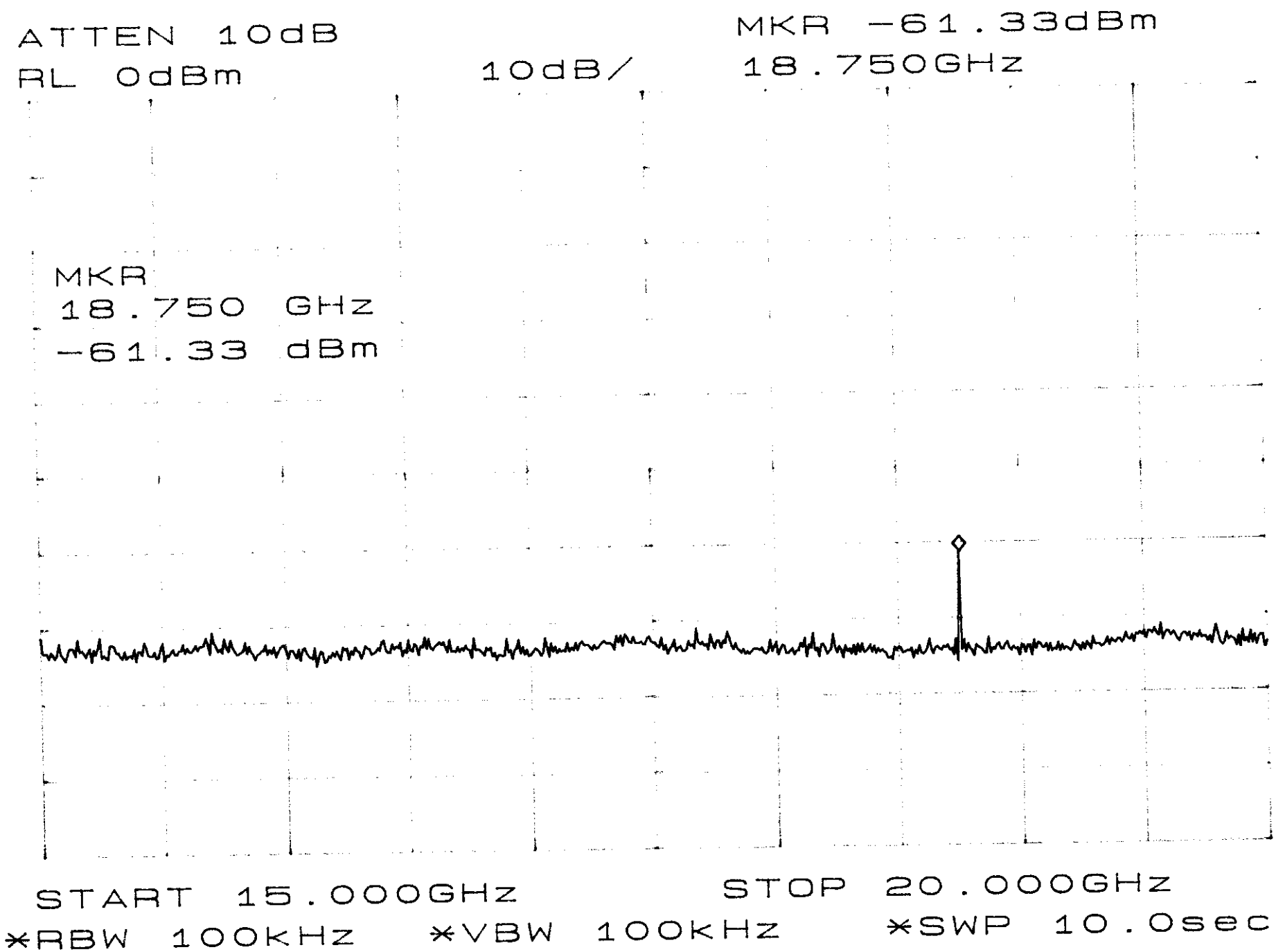
	SIZE	CODE IDENT NO.	DRAWING NO.
APPR./DATE	A		SK1874-10
	SCALE	52005	SHEET 1 OF 1

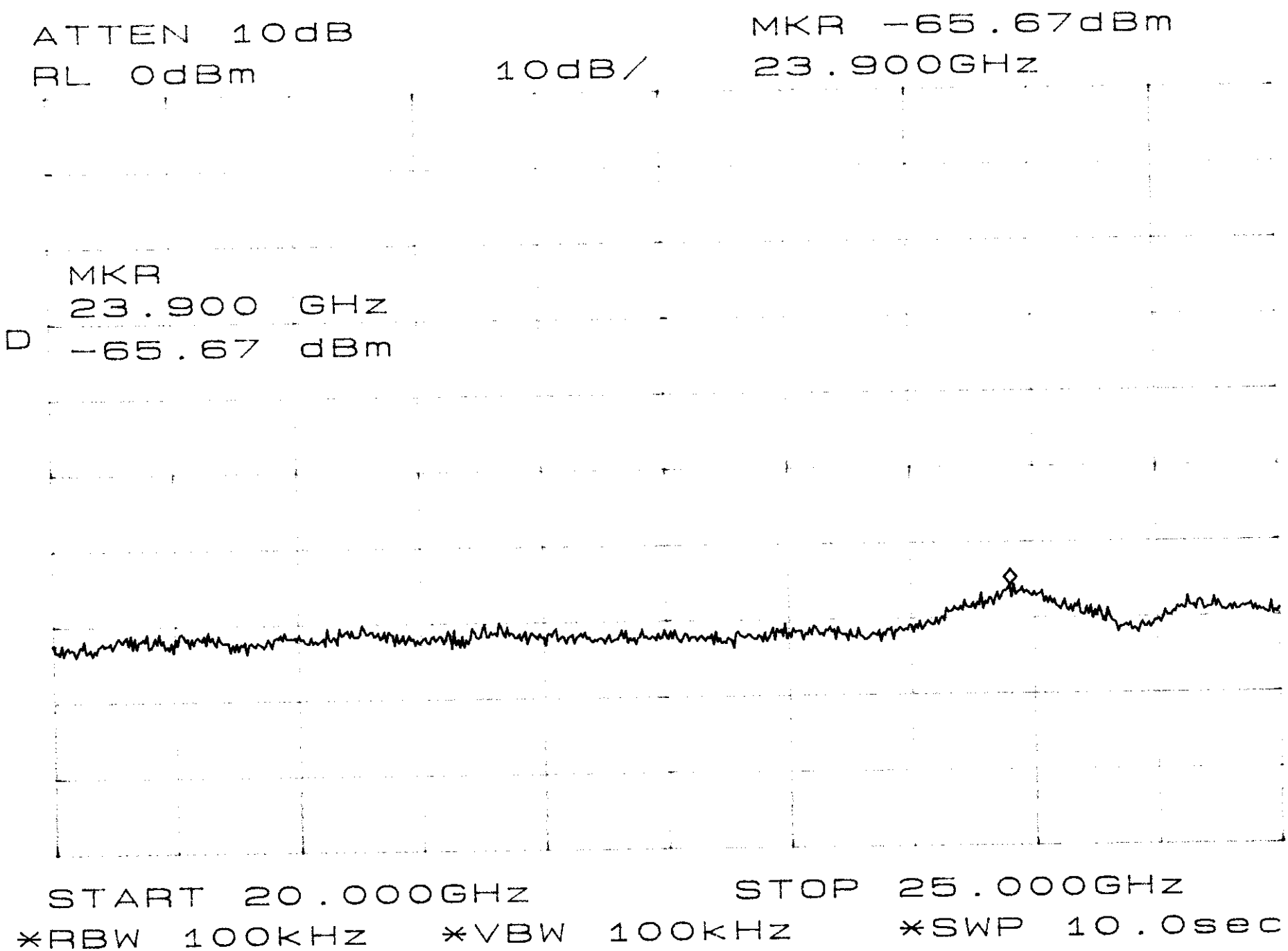

ATTEN 10dB
RL 0dBm
10dB/
MKR -53.00dBm
6.642GHz
MKR
6.642 GHz
D -53.00 dBm
START 5.000GHz
STOP 10.000GHz
*RBW 100KHz
*VBW 100KHz
*SWP 10.0sec

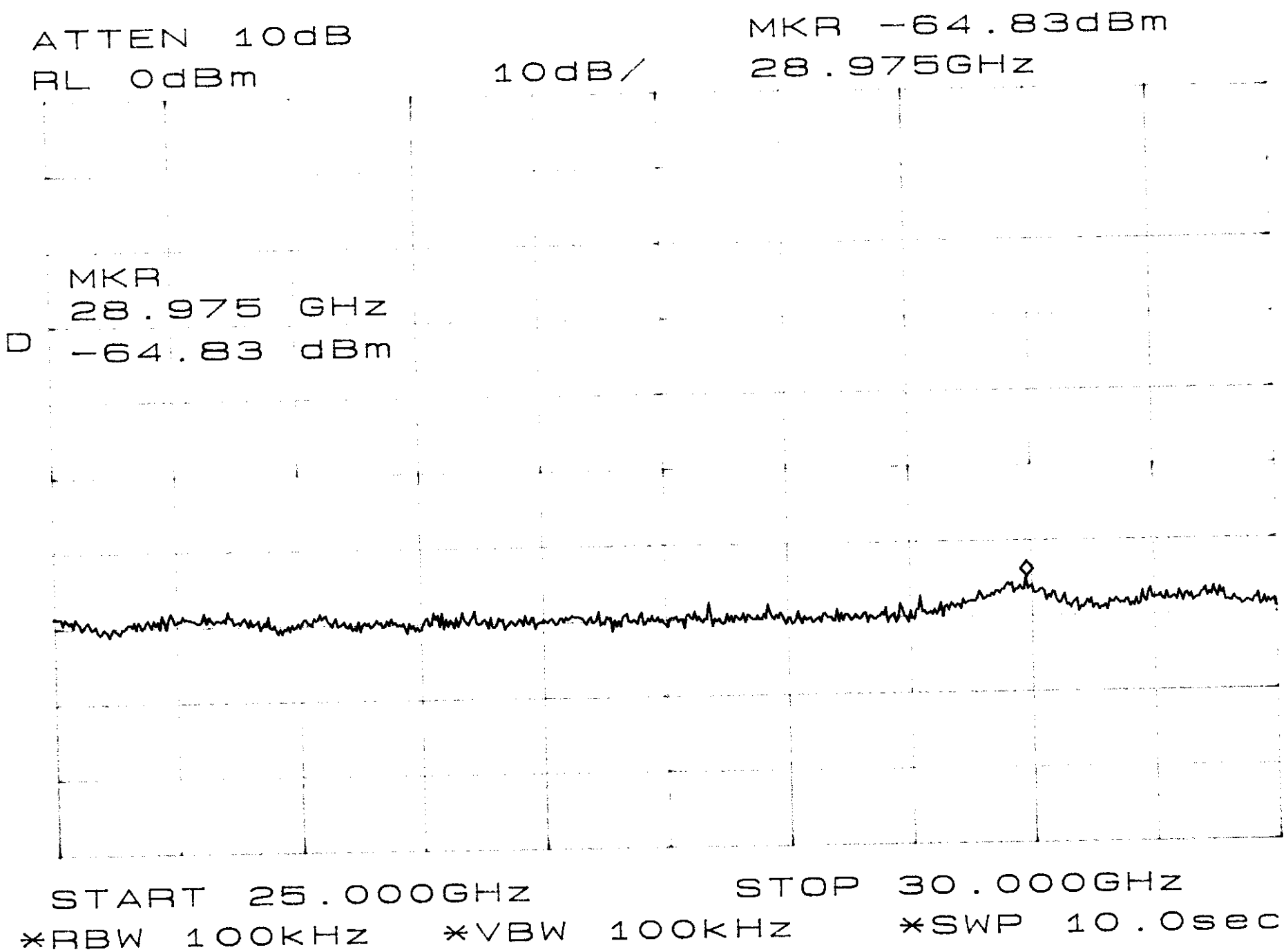

ATTEN 10dB
RL 0dBm
10dB/
MKR −51.83dBm
3.275GHz
MKR
3.275 GHz
−51.83 dBm
START 0Hz
*RBW 100KHz
*VBW 100KHz
STOP 5.000GHz
*SWP 10.0sec

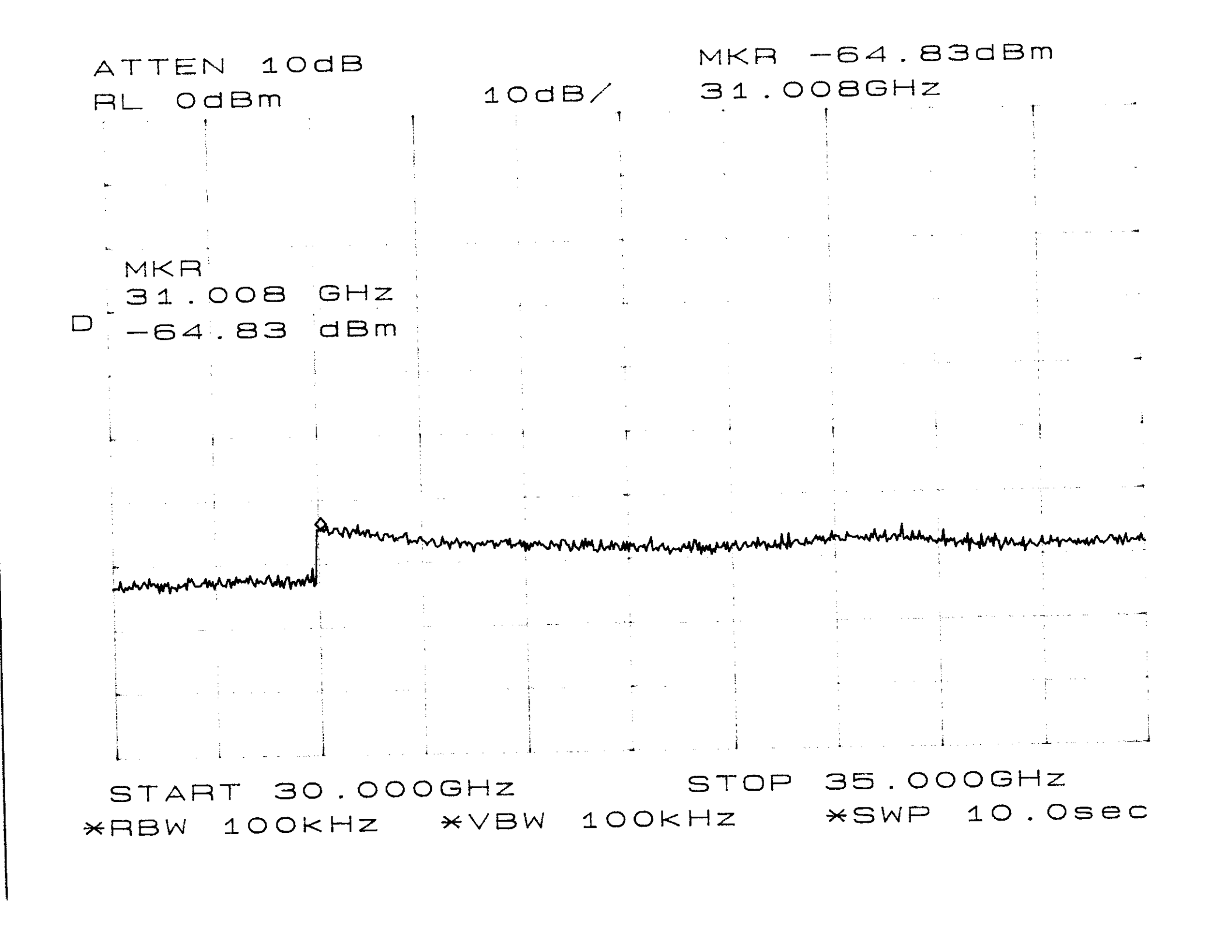

ATTEN 10dB
RL 0dBm
10dB/
MKR −57.50dBm
6.567GHz
MKR
6.567 GHz
D −57.50 dBm
START 5.000GHz
STOP 10.000GHz
*RBW 100kHz
*VBW 100kHz
*SWP 10.0sec

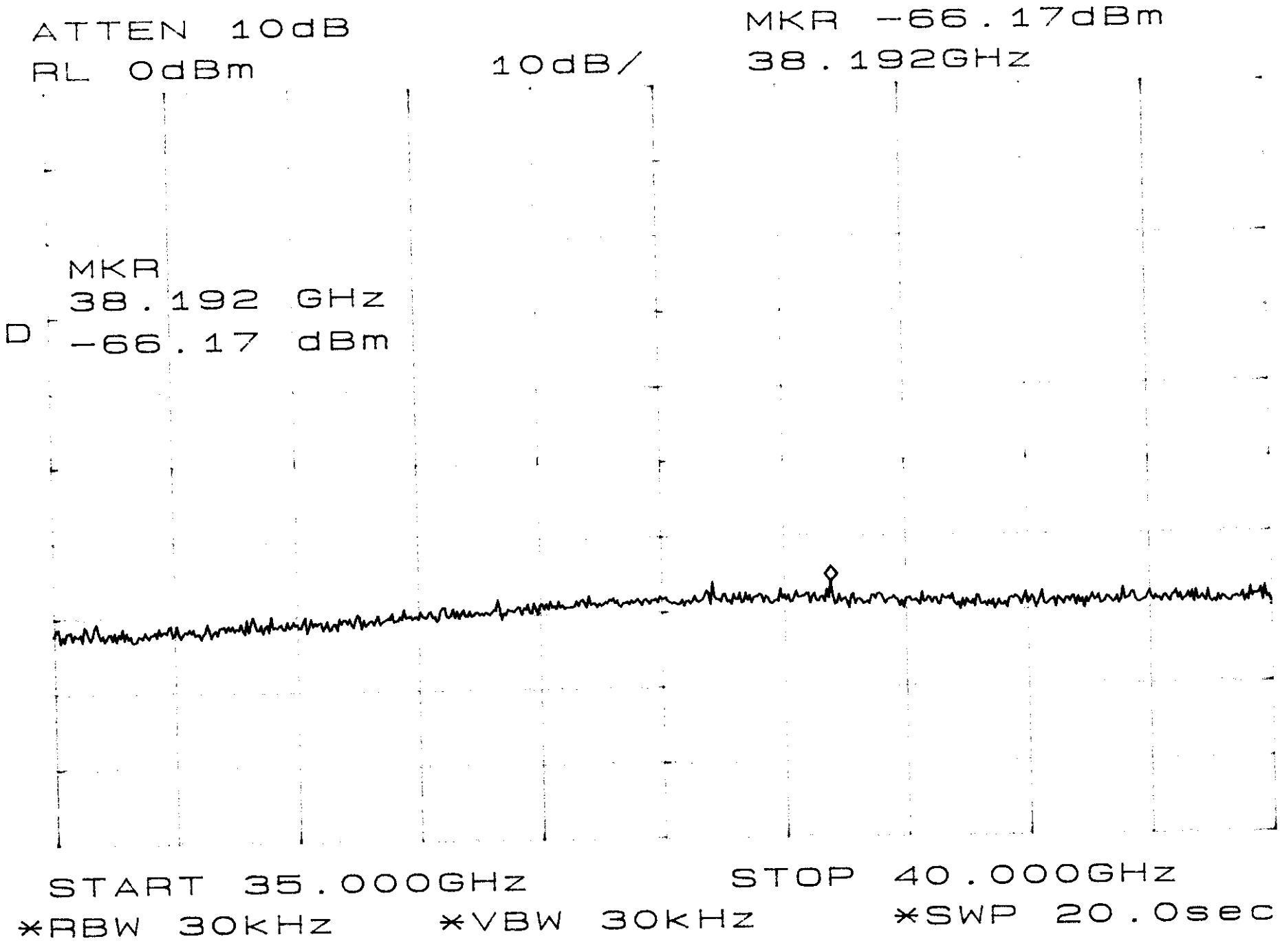

ATTEN 10dB
RL 0dBm
10dB/
MKR −70.50dBm
13.842GHz
MKR
13.842 GHz
D −70.50 dBm
START 10.000GHz
STOP 15.000GHz
*RBW 100kHz
*VBW 100kHz
*SWP 10.0sec

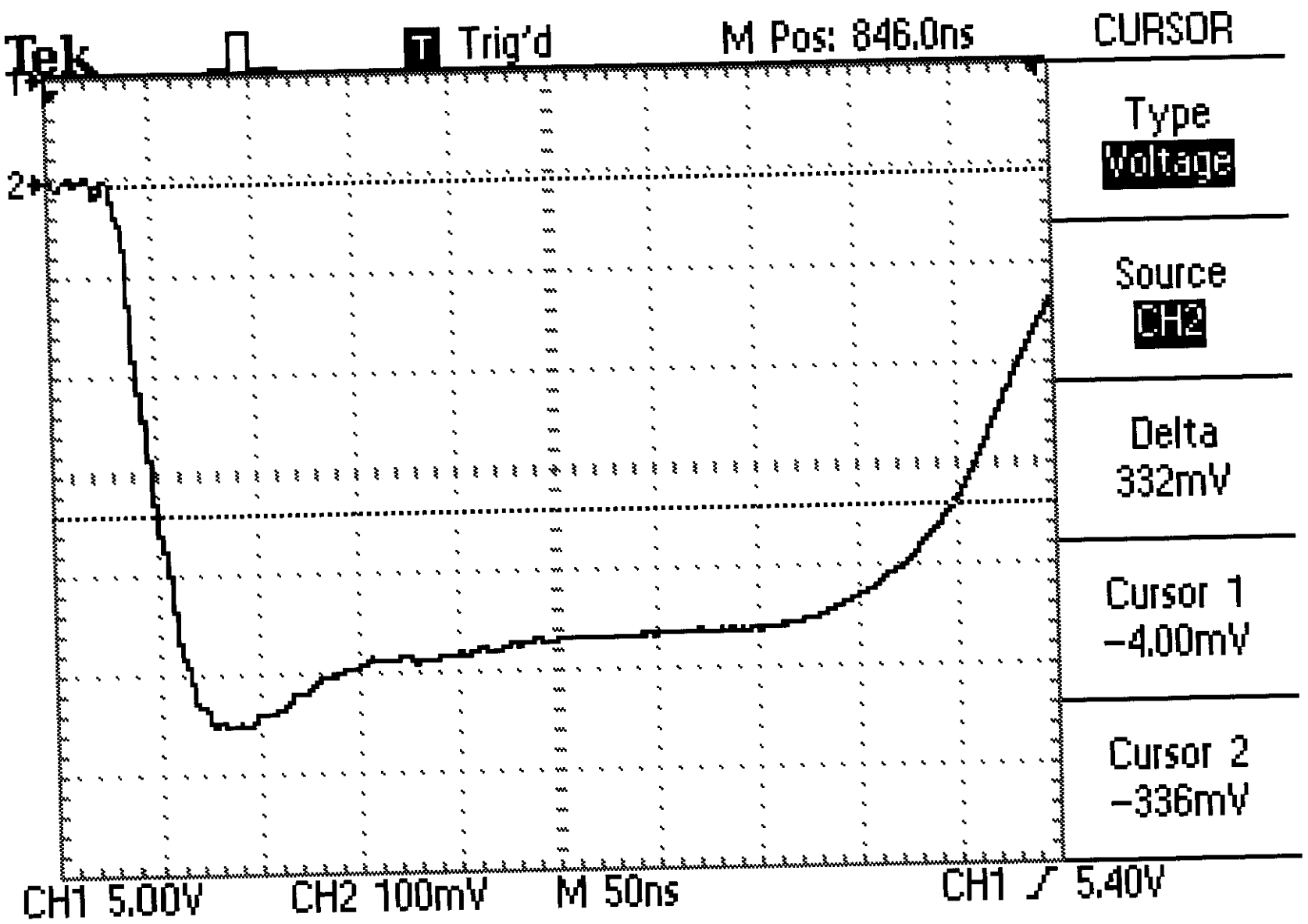

ATTEN 10dB
RL 0dBm
10dB/
MKR -61.33dBm
18.750GHz
MKR
18.750 GHz
-61.33 dBm
START 15.000GHz
STOP 20.000GHz
*RBW 100kHz
*VBW 100kHz
*SWP 10.0sec

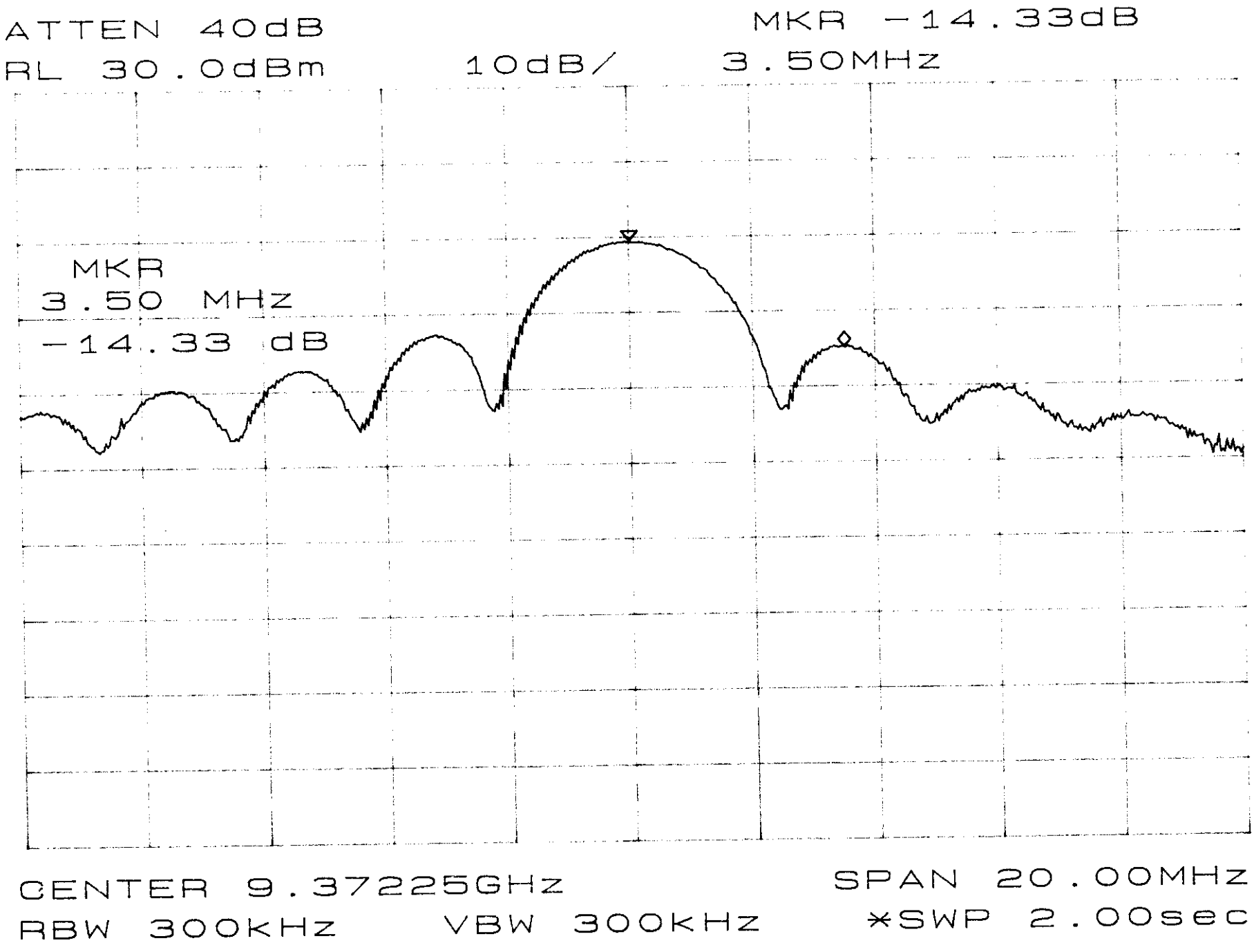

ATTEN 10dB
RL 0dBm
10dB/
MKR -65.67dBm
23.900GHz
MKR
23.900 GHz
D -65.67 dBm
START 20.000GHz
STOP 25.000GHz
*RBW 100kHz
*VBW 100kHz
*SWP 10.0sec


ATTEN 10dB
RL 0dBm
10dB/
MKR -64.83dBm
28.975GHz
MKR
28.975 GHz
D -64.83 dBm
START 25.000GHz
STOP 30.000GHz
*RBW 100KHz
*VBW 100KHz
*SWP 10.0sec

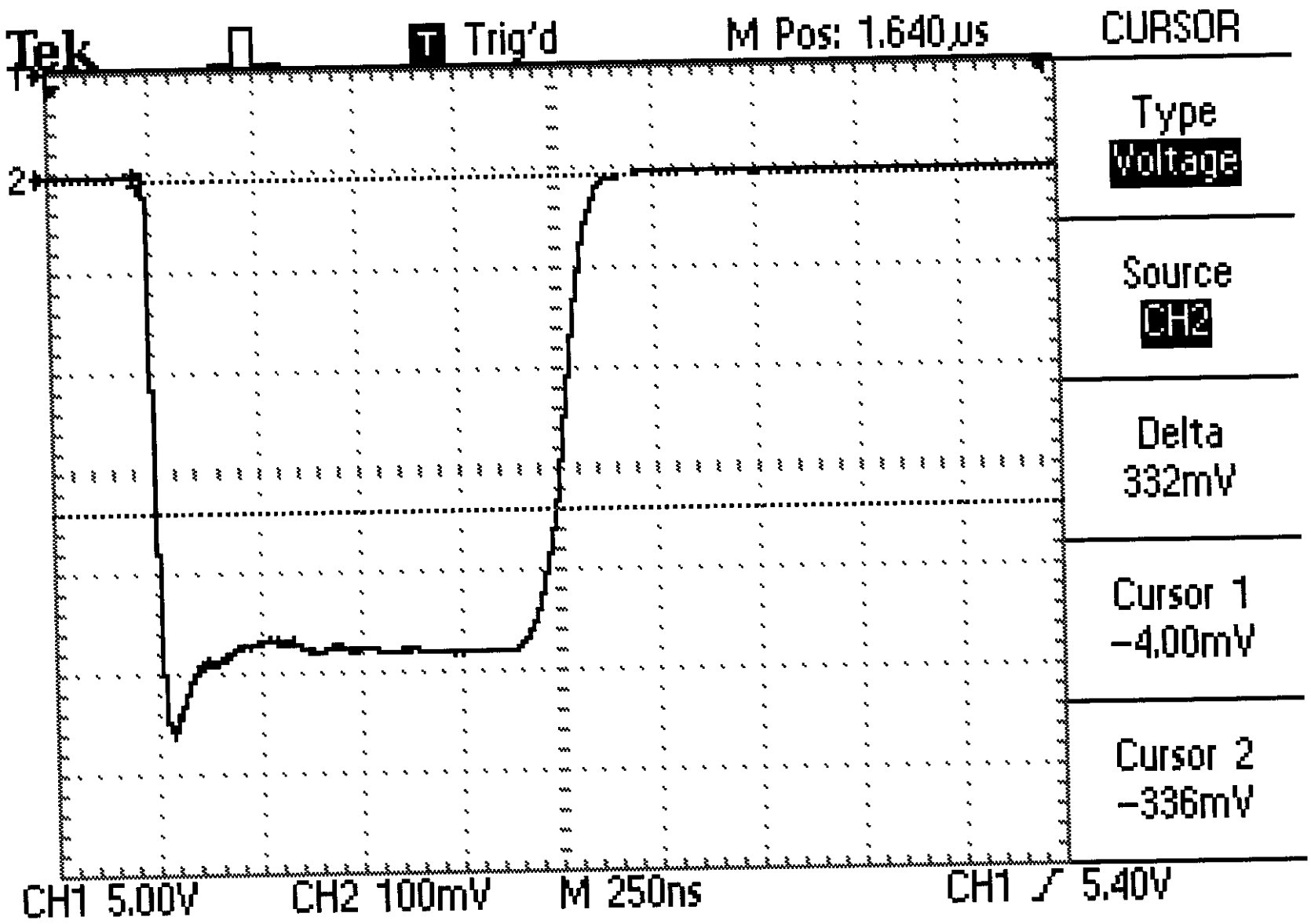

ATTEN 10dB
RL 0dBm
10dB/
MKR -64.83dBm
31.008GHz
MKR
31.008 GHz
D -64.83 dBm
START 30.000GHz
STOP 35.000GHz
*RBW 100KHz
*VBW 100KHz
*SWP 10.0sec

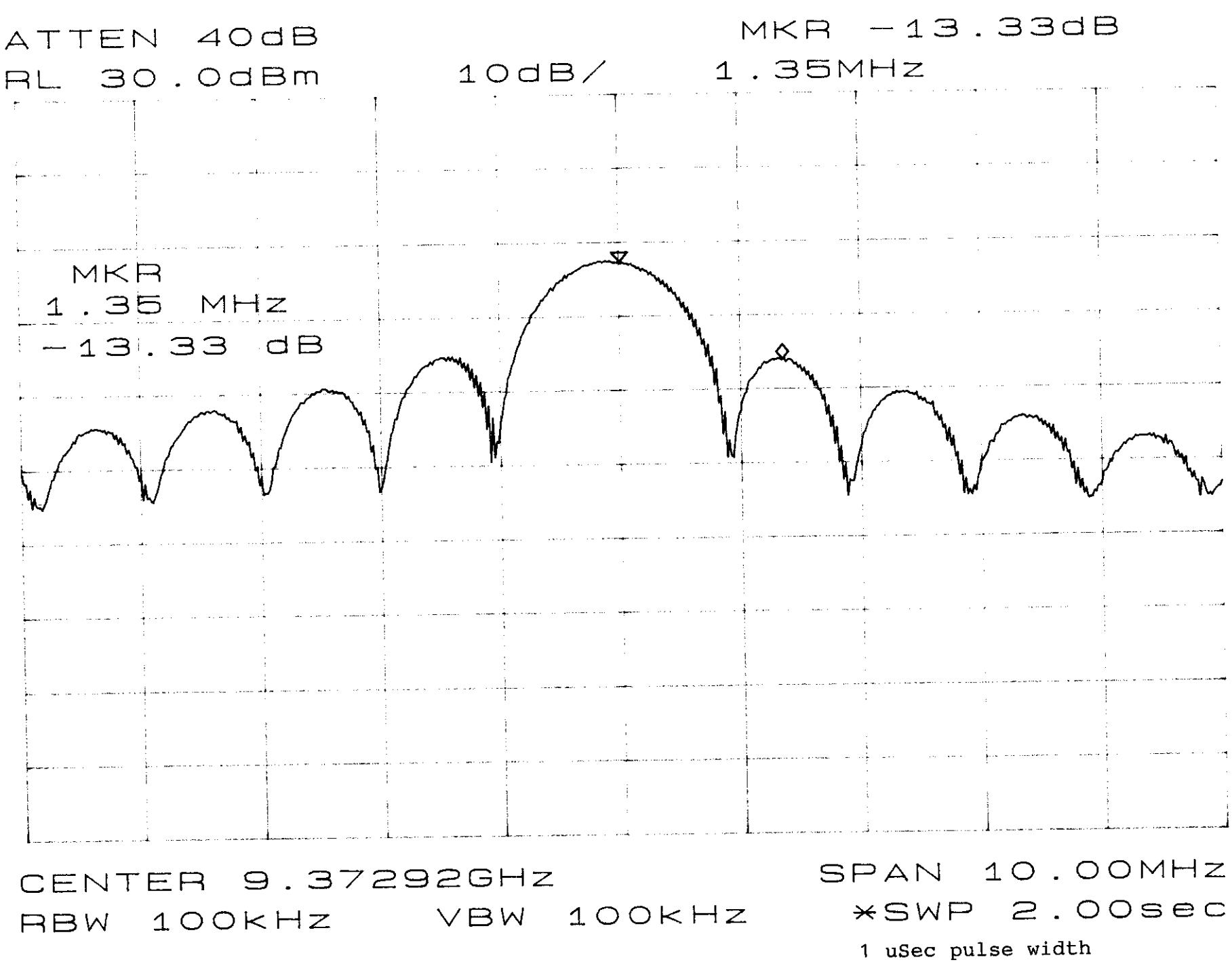

ATTEN 10dB
RL 0dBm
10dB/
MKR −66.17dBm
38.192GHz
MKR
38.192 GHz
D −66.17 dBm
START 35.000GHz
STOP 40.000GHz
*RBW 30kHz
*VBW 30kHz
*SWP 20.0sec

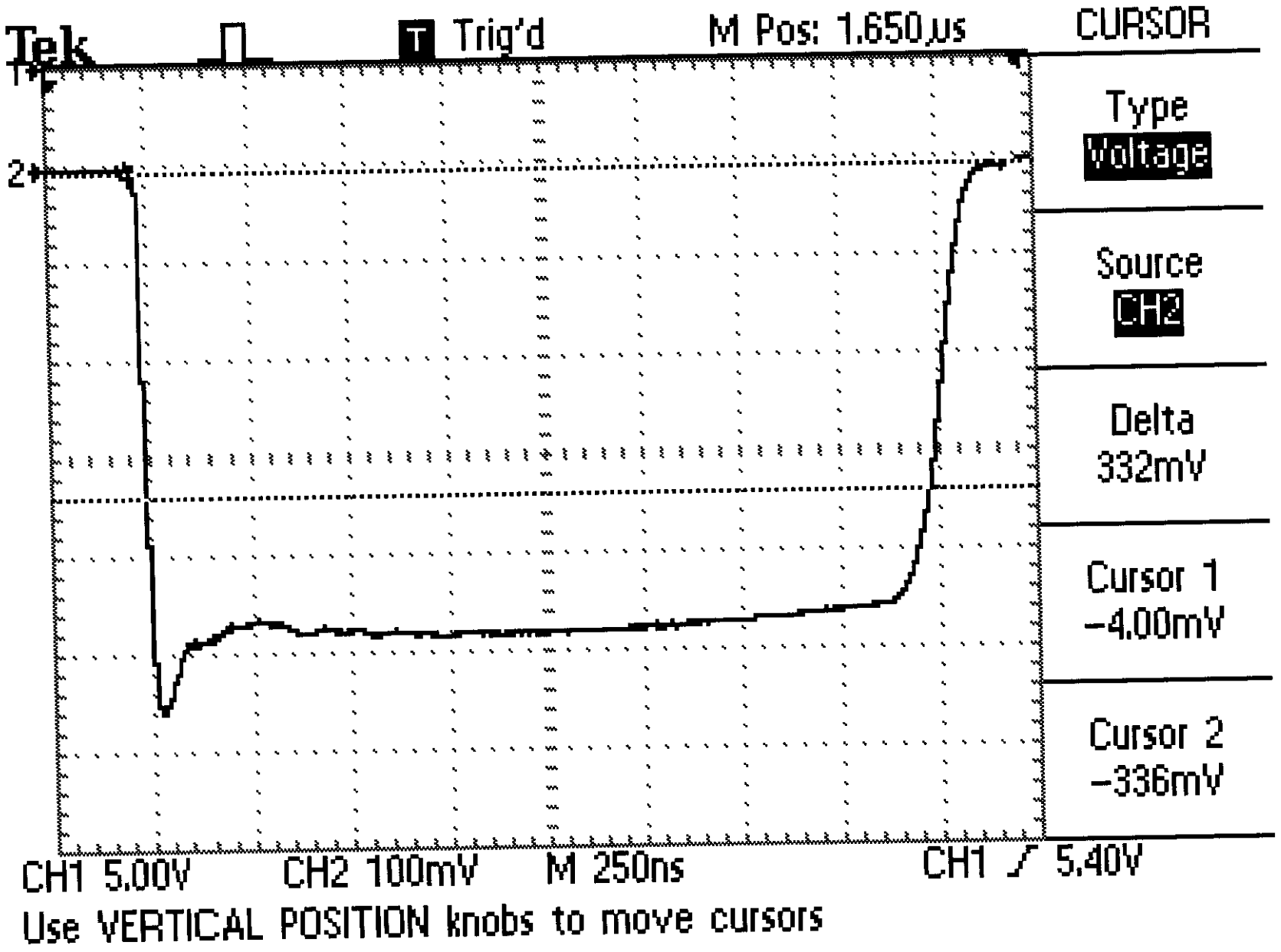

Tek
Trig'd
M Pos: 846.0ns
CURSOR
Type
Voltage
Source
CH2
Delta
332mV
Cursor 1
-4.00mV
Cursor 2
-336mV
CH1 5.00V
CH2 100mV
M 50ns
CH1 5.40V

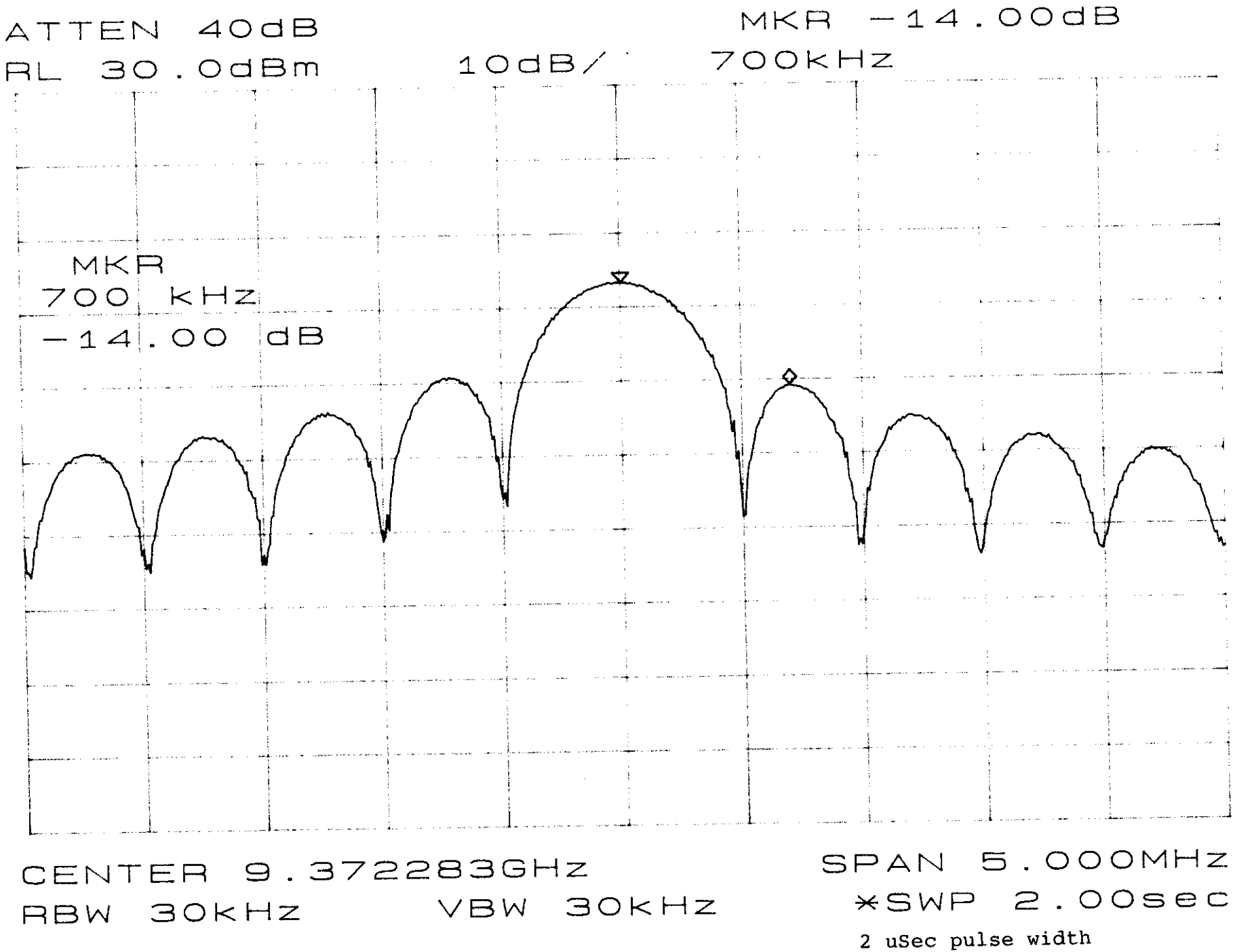


400 ns pulse width

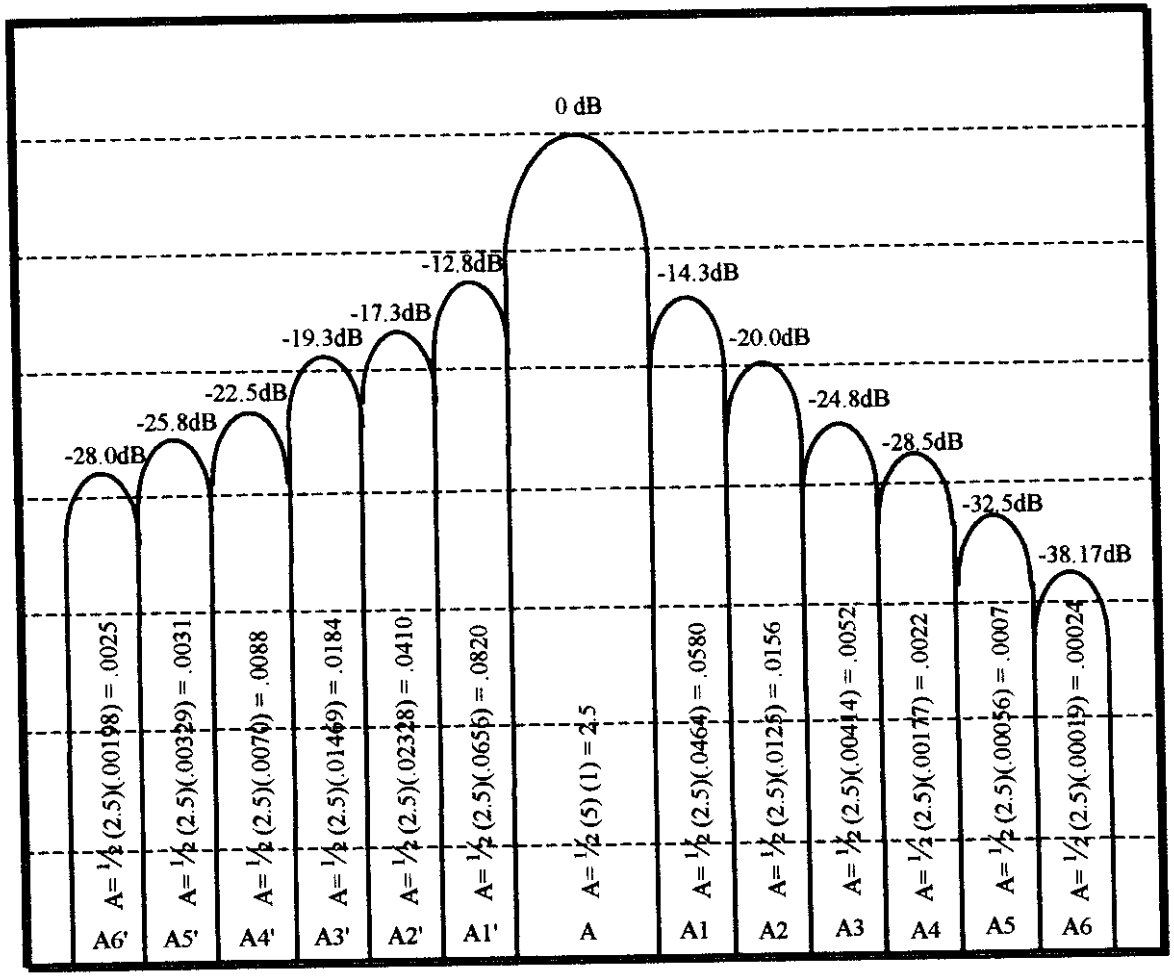

Tek
Trig'd
M Pos: 1.640µs
CURSOR
Type
Voltage
Source
CH2
Delta
332mV
Cursor 1
-4.00mV
Cursor 2
-336mV
CH1 5.00V
CH2 100mV
M 250ns
CH1 ∕ 5.40V


ATTEN 40dB
RL 30.0dBm
10dB/
MKR -13.33dB
1.35MHz
MKR
1.35 MHz
-13.33 dB
CENTER 9.37292GHz
SPAN 10.00MHz
RBW 100kHz
VBW 100kHz
*SWP 2.00sec
1 uSec pulse width


Tek
Trig'd
M Pos: 1.650µs
CURSOR
Type
Voltage
Source
CH2
Delta
332mV
Cursor 1
-4.00mV
Cursor 2
-336mV
CH1 5.00V
CH2 100mV
M 250ns
CH1 ∕ 5.40V
Use VERTICAL POSITION knobs to move cursors


ATTEN 40dB
RL 30.0dBm
10dB/
MKR -14.00dB
700kHz
MKR
700 kHz
-14.00 dB
CENTER 9.372283GHz
SPAN 5.000MHz
RBW 30kHz
VBW 30kHz
*SWP 2.00sec
2 uSec pulse width

XDD-300X SPECTRUM



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

PULSE WIDTH =0.4 µsec
PRF=1180
FREQUENCY=9375 MHz

MAJOR LOBE WIDTH=5.0 MHz
MINOR LOBE WIDTH=2.5 MHz

LOSE AREA = ½ LOBE WIDTH $\left(\frac{1}{\text{LOG}^{-1}\frac{\text{dB}}{10}}\right)$

A6 THROUGH A6' = 2.6814

MEAN RADIATED POWER =2.6814 *.99 = 2.6545

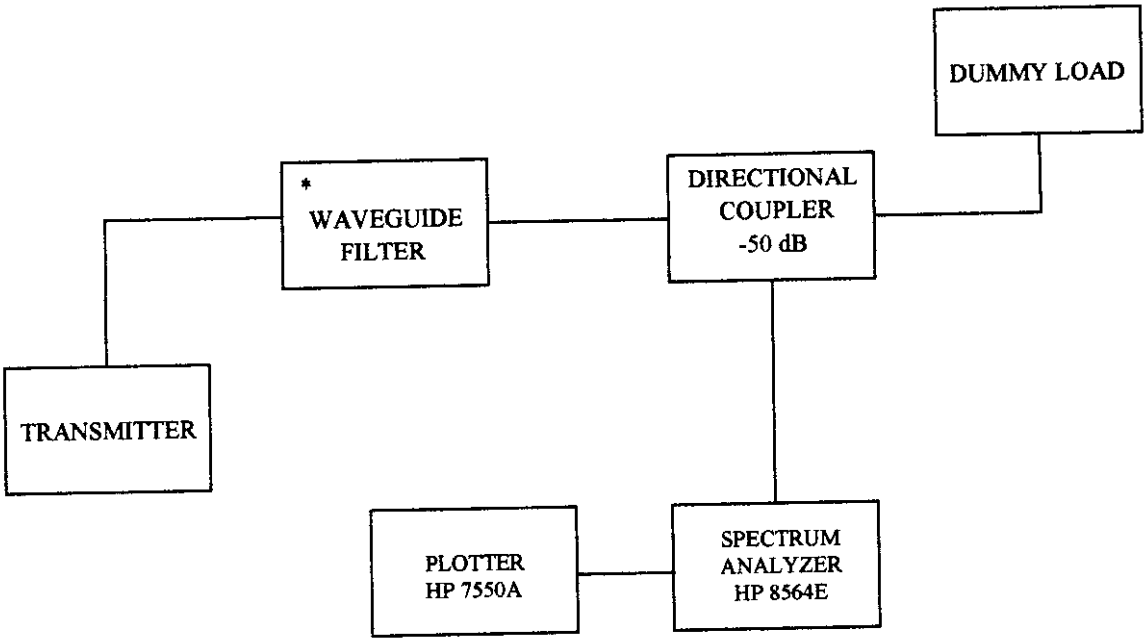
A3 THROUGH A3' = 2.6477

OCCUPIED BANDWIDTH = 17.5 MHz (worst case)

EMISSION DESIGNATOR, 11M25PON

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

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



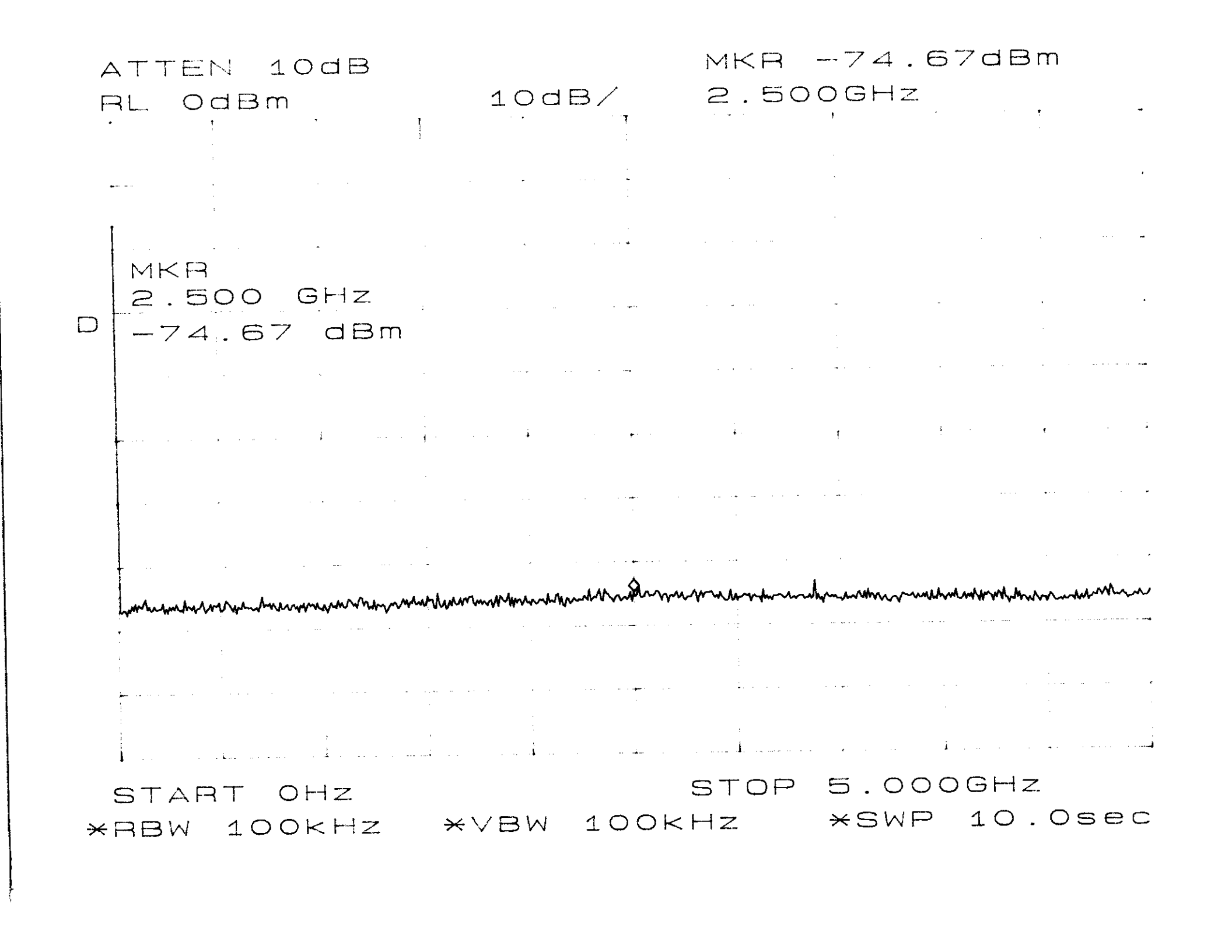
Spurious measurements data taken from transmitter directional coupler.

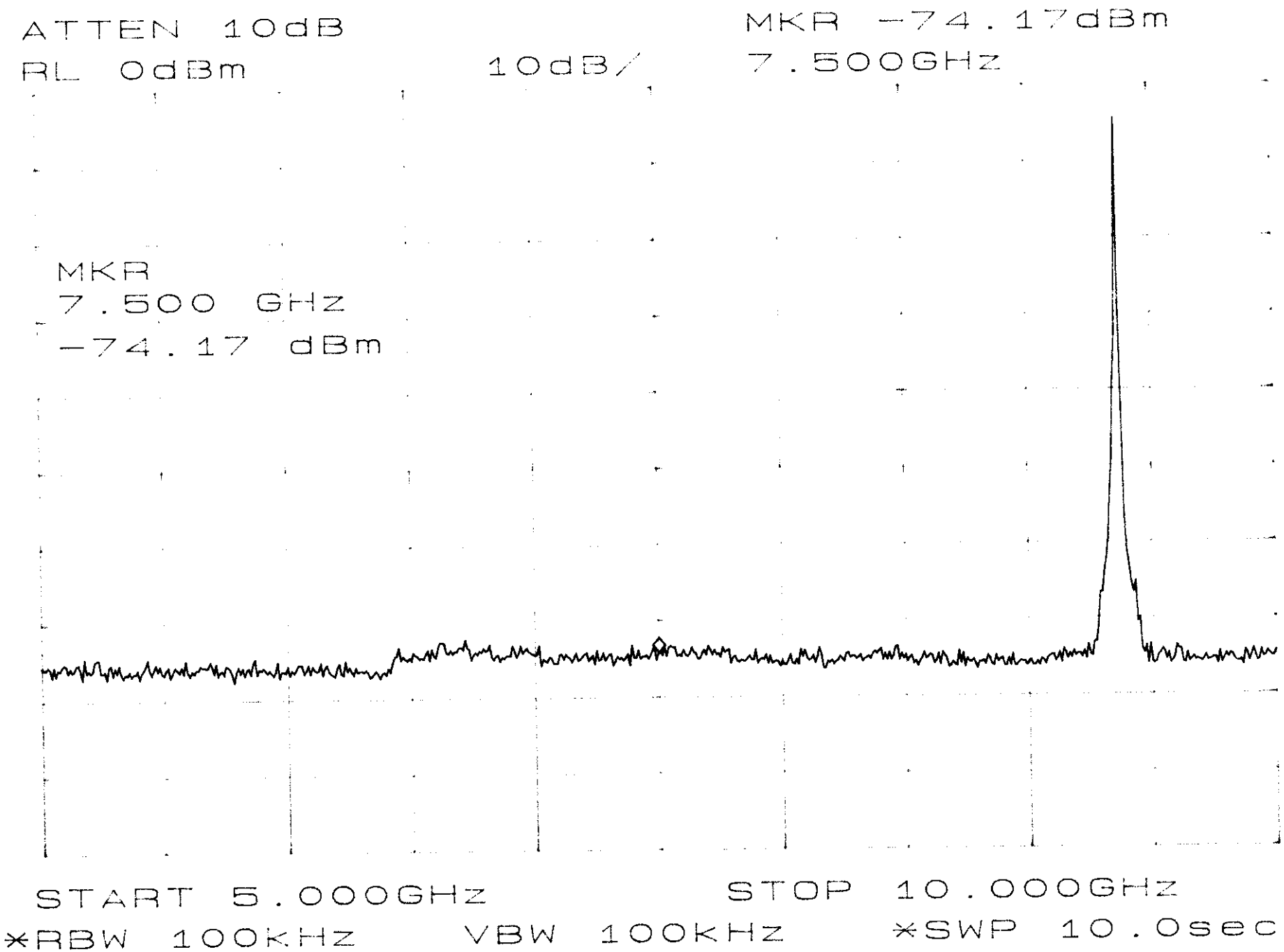
Required emissions below carrier = 43 + 10 log (Pm) =
43+ 10log(295)=
43 + 24 = 67.7 dB below carrier.

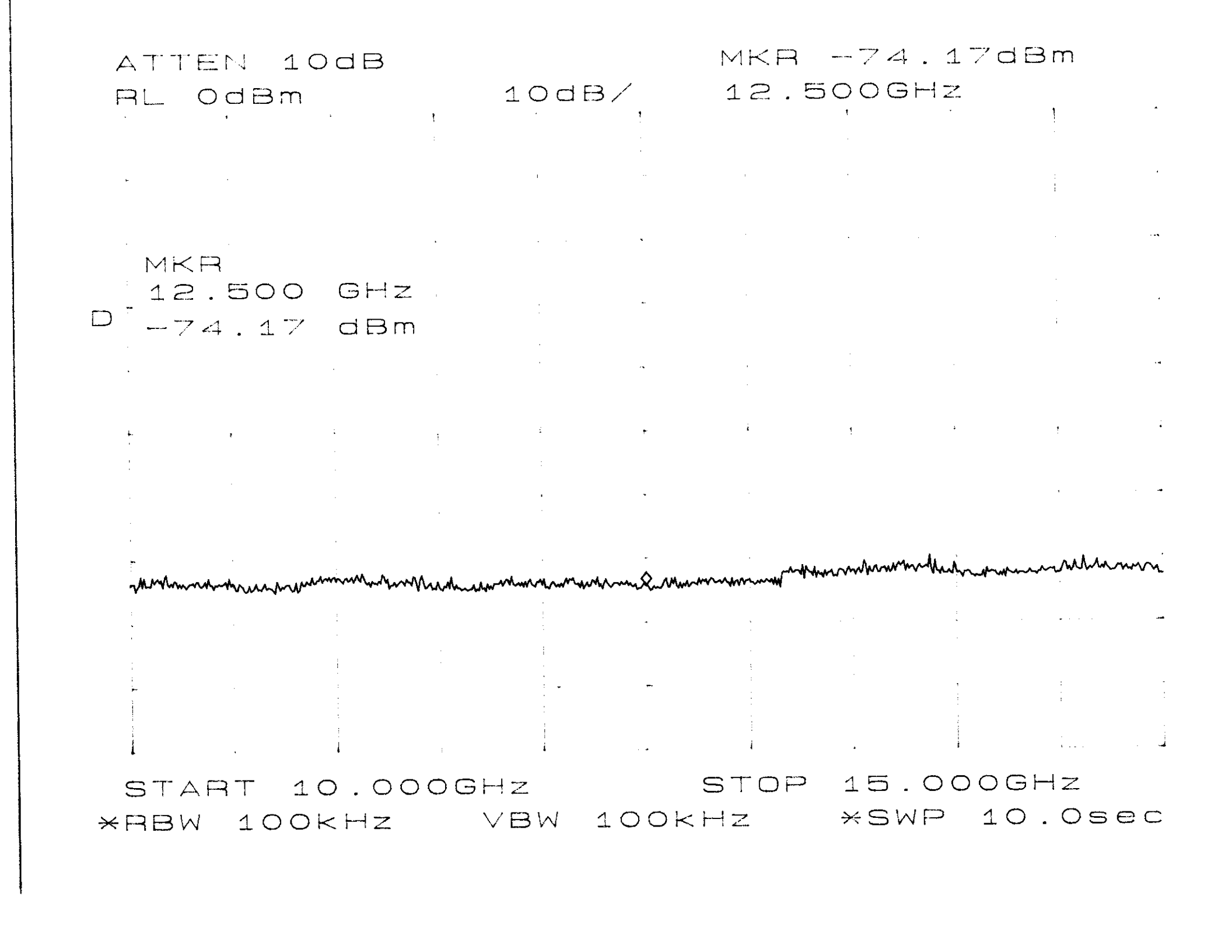
Note that from 0 Hz to 40 Ghz no spurious signals shown are greater than approximately -70 dBc.

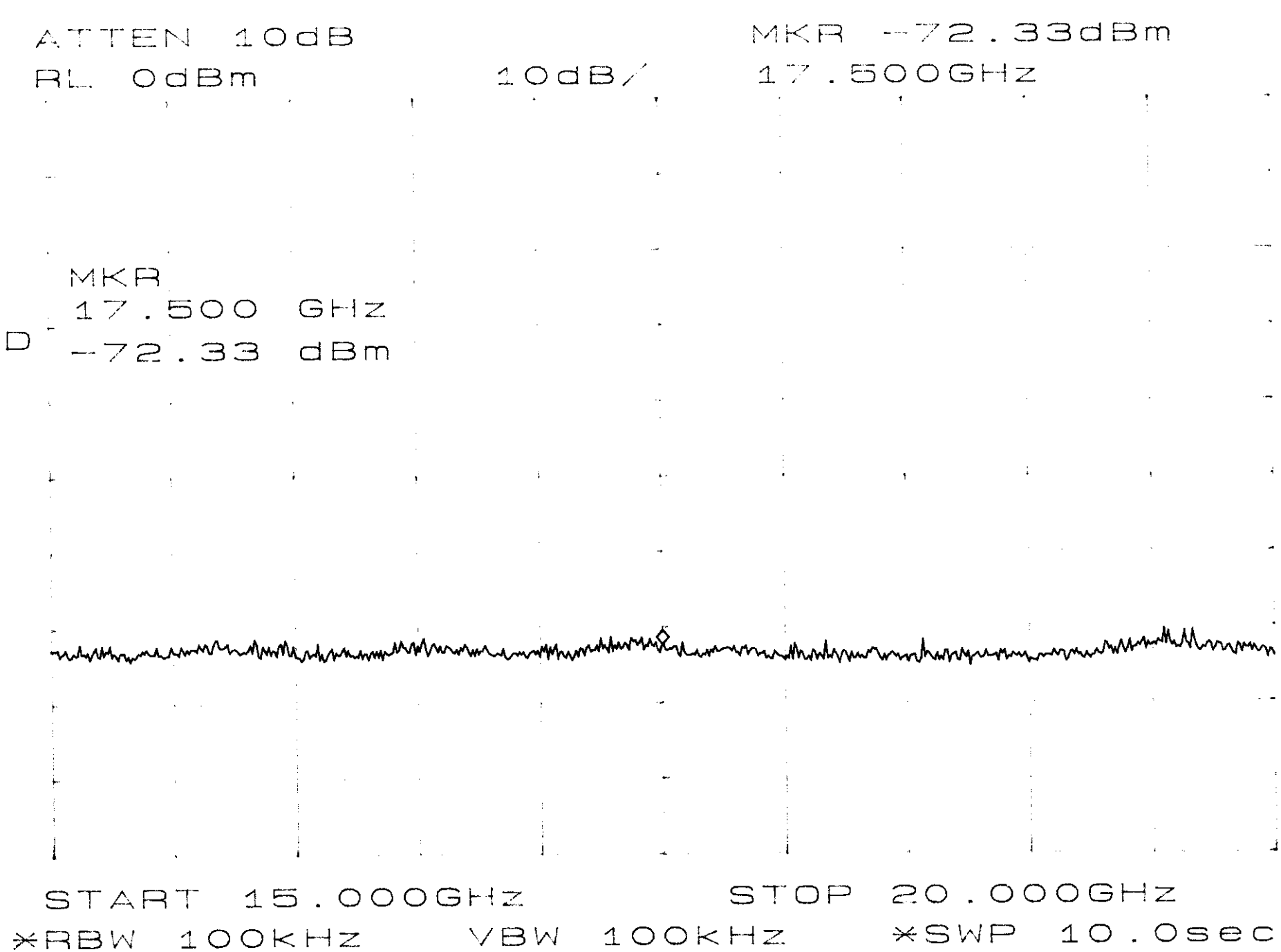
* WAVGUIDE FILTER INCLUDED IN TEST SETUP IS NORMALLY LOCATED IN THE WAVEGUIDE ASSEMBLY AT THE EQUIPMENT RACK. CENTER FREQUENCY IS 9375 MHz.

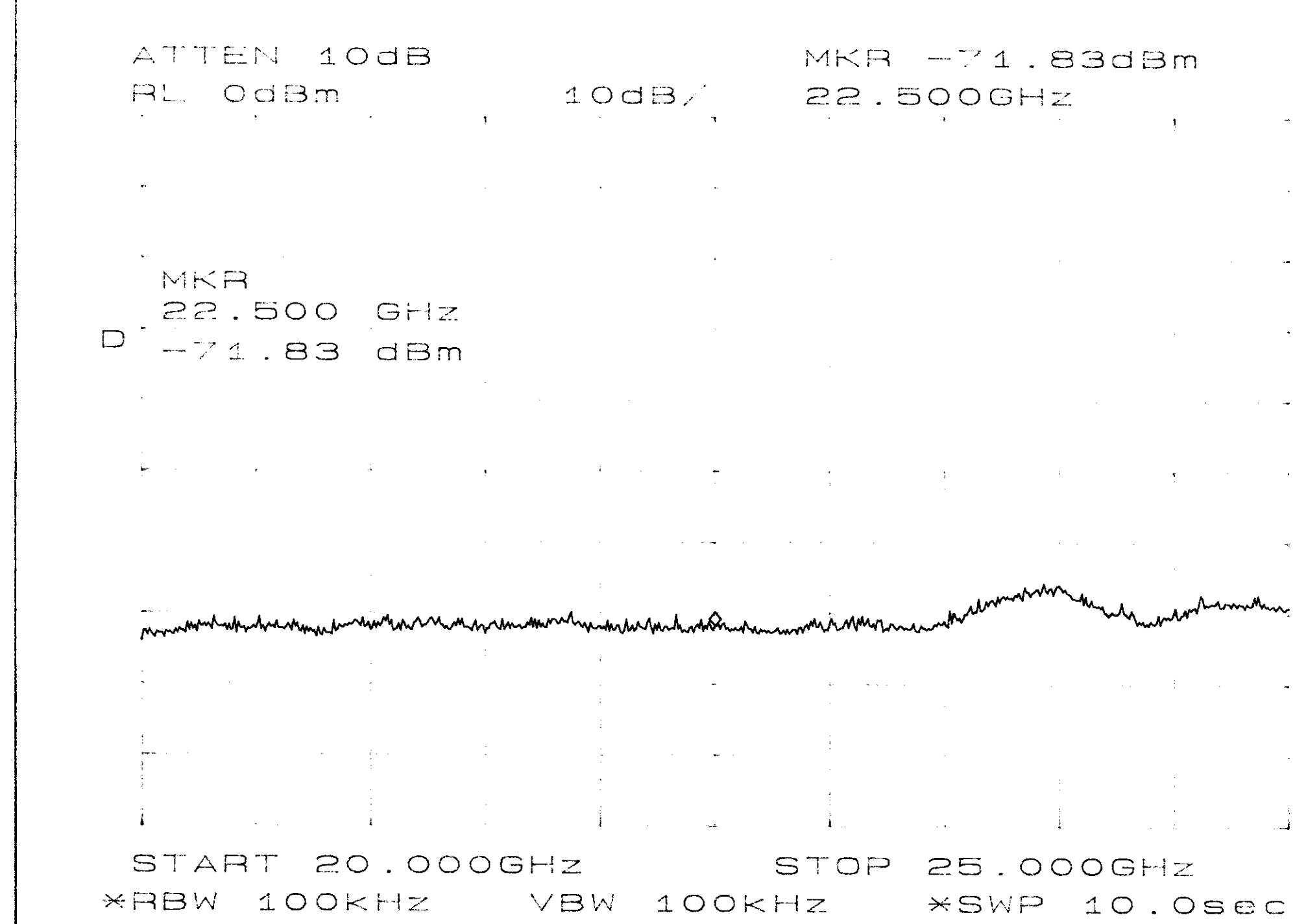
	SIZE	CODE IDENT NO.	DRAWING NO.
APPR./DATE	A		SK1874-09
	SCALE	52005	SHEET 1 OF 1

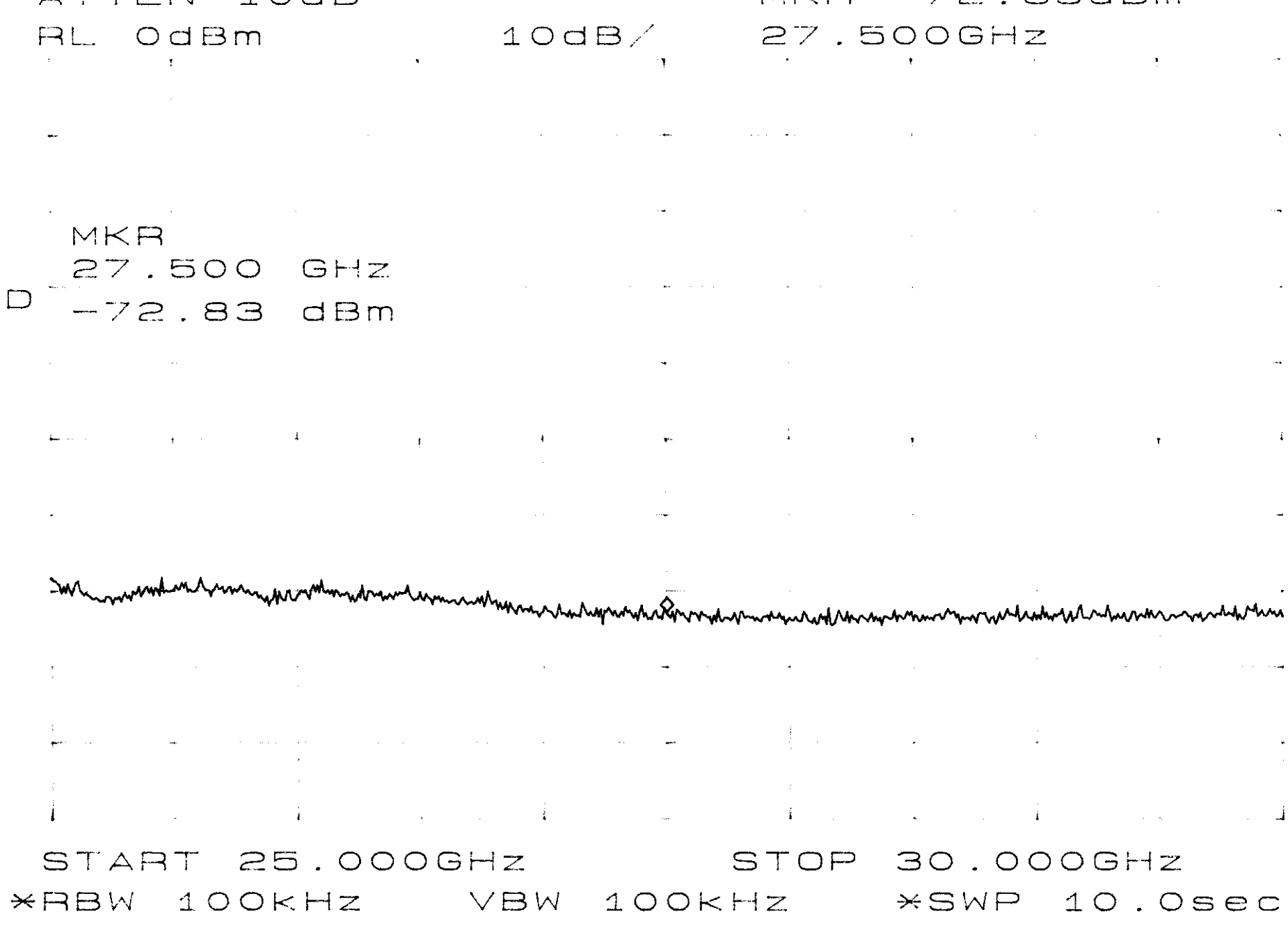

ATTEN 10dB
RL 0dBm
10dB/
MKR -74.67dBm
2.500GHz
MKR
2.500 GHz
-74.67 dBm
D
START 0Hz
STOP 5.000GHz
*RBW 100KHz
*VBW 100KHz
*SWP 10.0sec

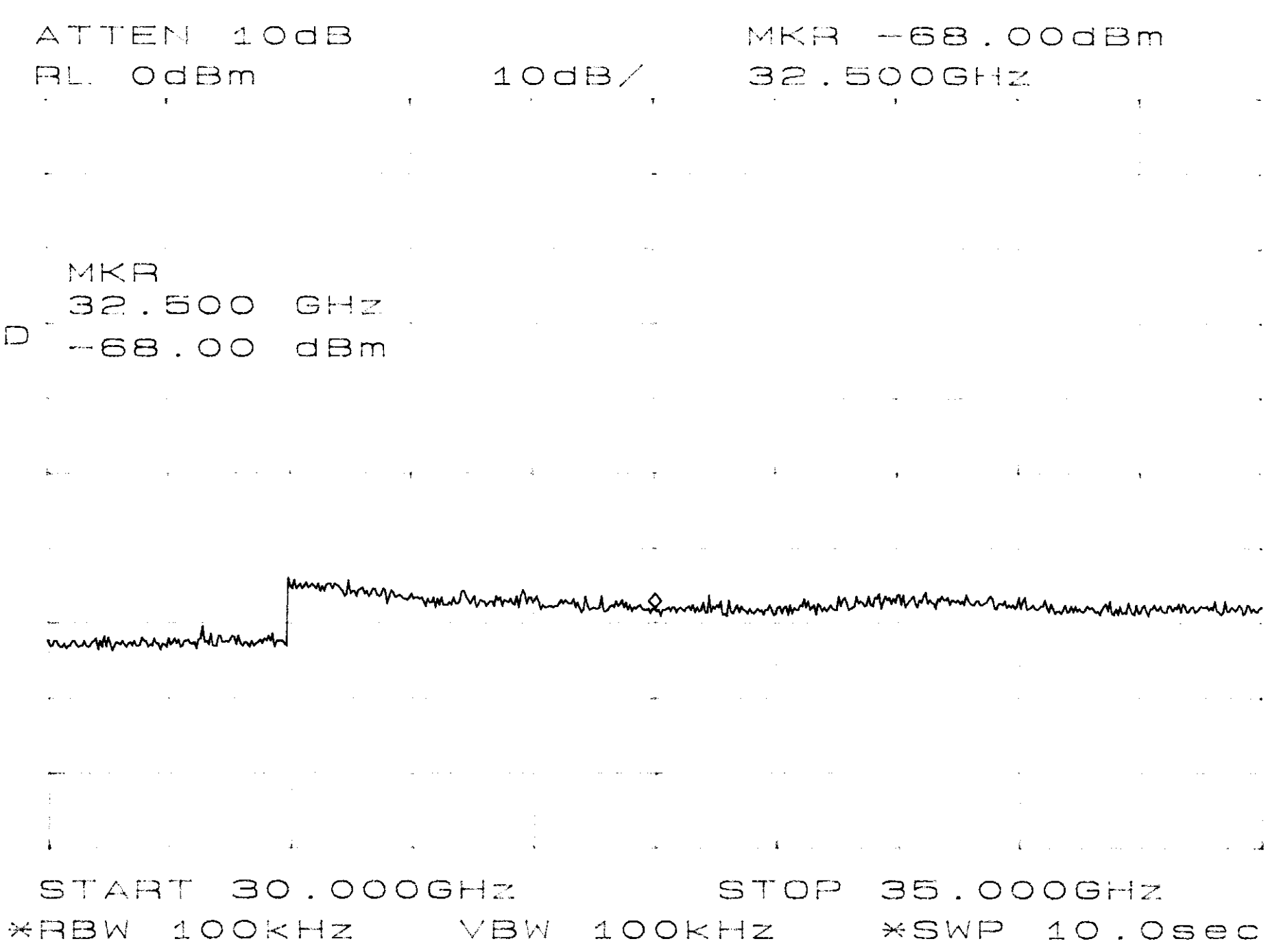

ATTEN 10dB
RL 0dBm
10dB/
MKR −74.17dBm
7.500GHz
MKR
7.500 GHz
−74.17 dBm
START 5.000GHz
STOP 10.000GHz
*RBW 100kHz
VBW 100kHz
*SWP 10.0sec

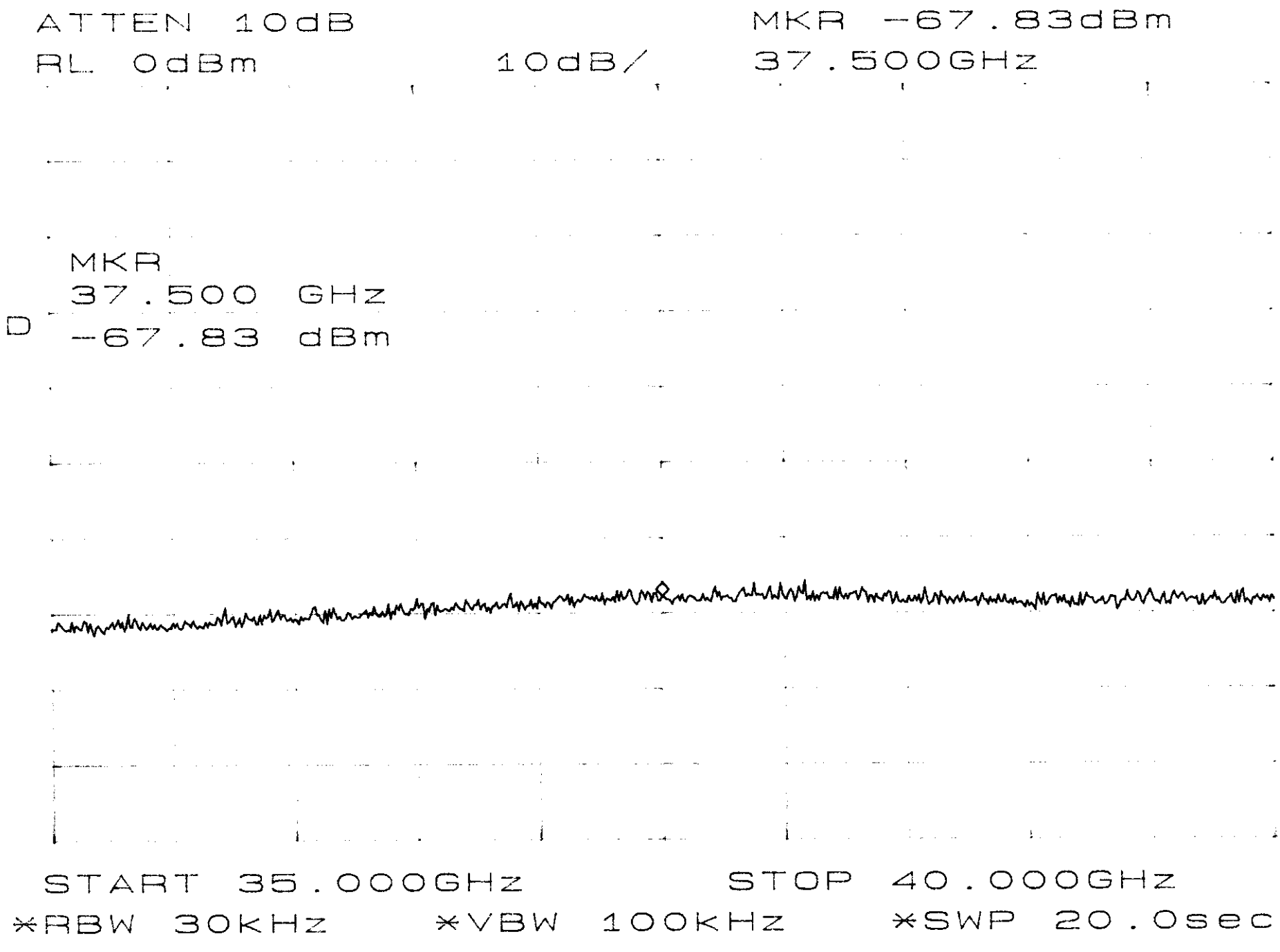

ATTEN 10dB
RL 0dBm
10dB/
MKR -74.17dBm
12.500GHz
MKR
12.500 GHz
-74.17 dBm
START 10.000GHz
STOP 15.000GHz
*RBW 100kHz
VBW 100kHz
*SWP 10.0sec

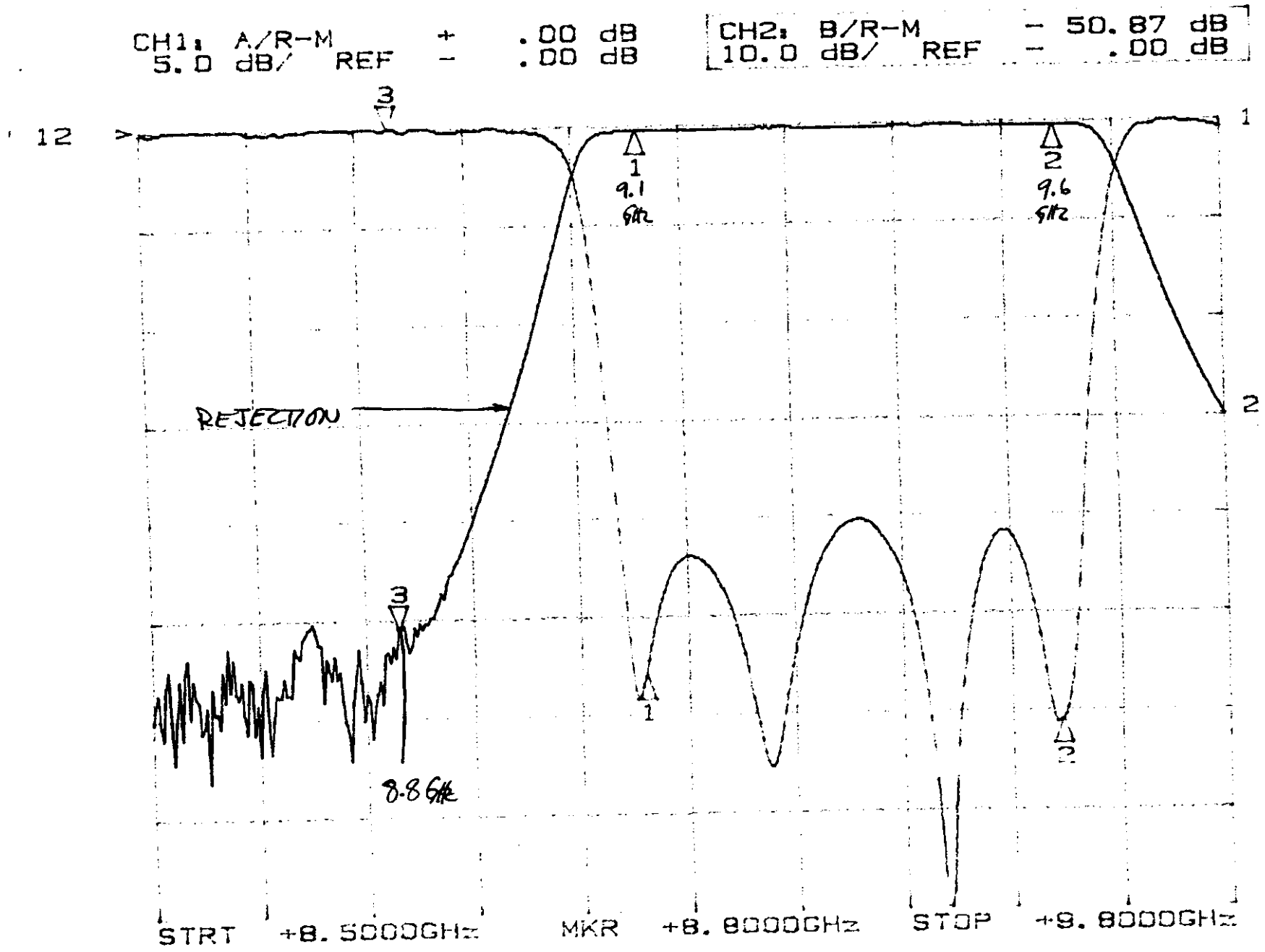

ATTEN 10dB
RL 0dBm
10dB/
MKR -72.33dBm
17.500GHz
MKR
17.500 GHz
D -72.33 dBm
START 15.000GHz
STOP 20.000GHz
*RBW 100KHz
VBW 100KHz
*SWP 10.0sec

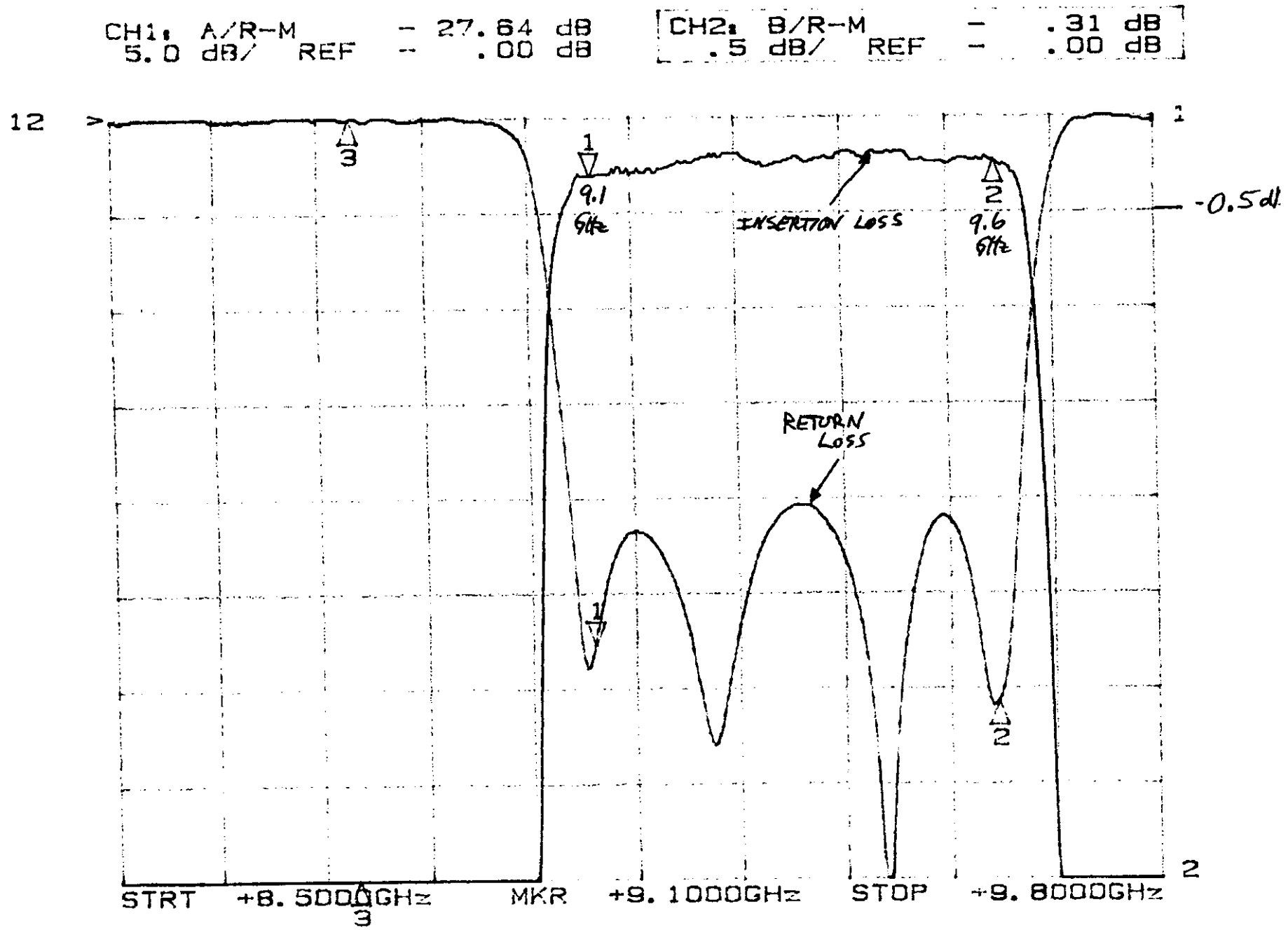

ATTEN 10dB
RL 0dBm
10dB/
MKR -71.83dBm
22.500GHz
MKR
22.500 GHz
D -71.83 dBm
START 20.000GHz
STOP 25.000GHz
*RBW 100kHz
VBW 100kHz
*SWP 10.0sec


ATTEN 10dB
RL 0dBm
10dB/
MKR -72.83dBm
27.500GHz
MKR
27.500 GHz
D -72.83 dBm
START 25.000GHz
STOP 30.000GHz
*RBW 100KHz
VBW 100KHz
*SWP 10.0sec


ATTEN 10dB
RL 0dBm
10dB/
MKR -68.00dBm
32.500GHz
MKR
32.500 GHz
-68.00 dBm
START 30.000GHz
STOP 35.000GHz
*RBW 100kHz
VBW 100kHz
*SWP 10.0sec

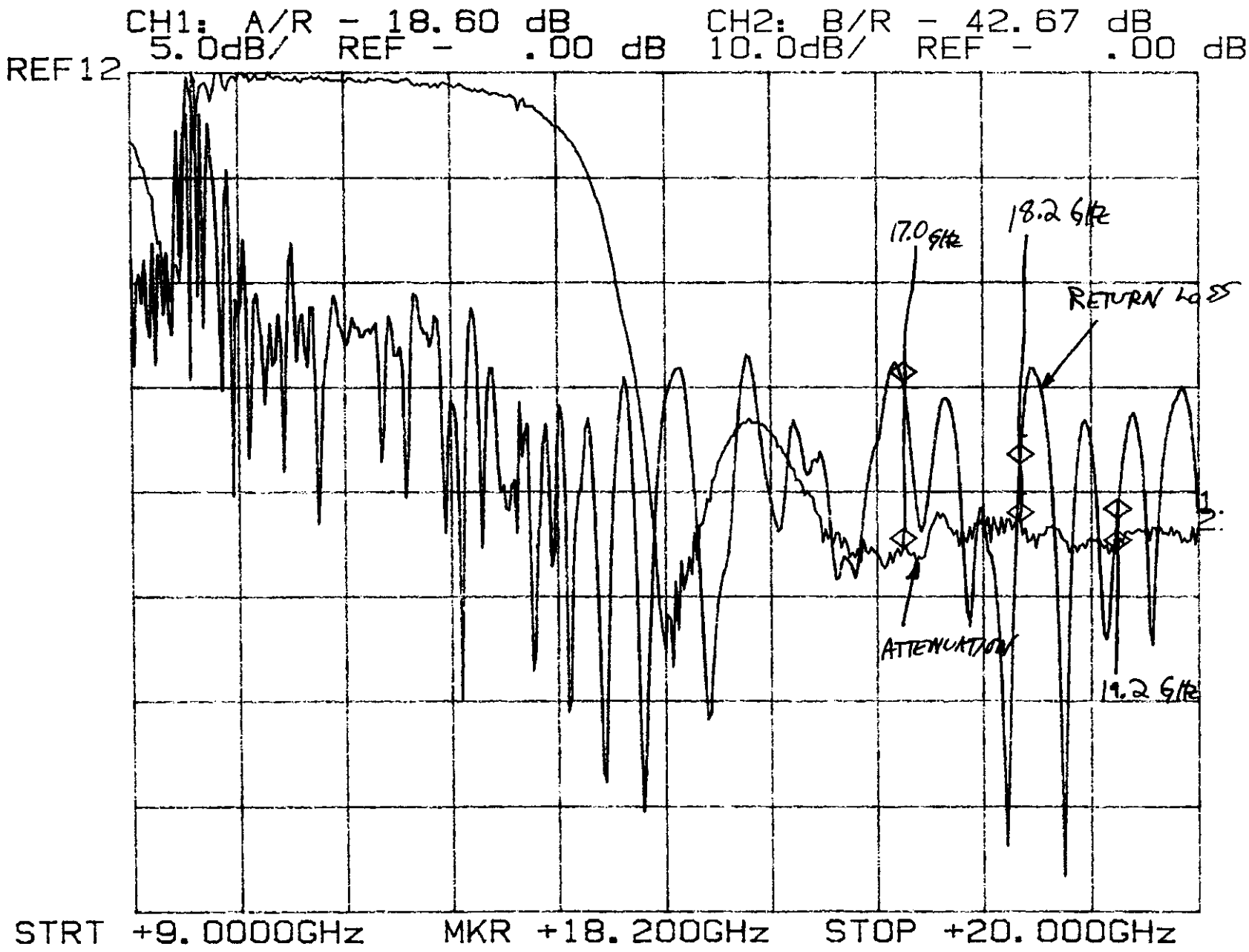

ATTEN 10dB
RL 0dBm
10dB/
MKR -67.83dBm
37.500GHz
MKR
37.500 GHz
D -67.83 dBm
START 35.000GHz
STOP 40.000GHz
*RBW 30kHz
*VBW 100kHz
*SWP 20.0sec


CH1: A/R-M + .00 dB
5.0 dB/ REF - .00 dB
CH2: B/R-M - 50.87 dB
10.0 dB/ REF - .00 dB
12
1
2
3
1
9.1 GHz
2
9.6 GHz
REJECTION
3
8.8 GHz
1
2
STRT +8.5000GHz
MKR +8.8000GHz
STOP +9.8000GHz

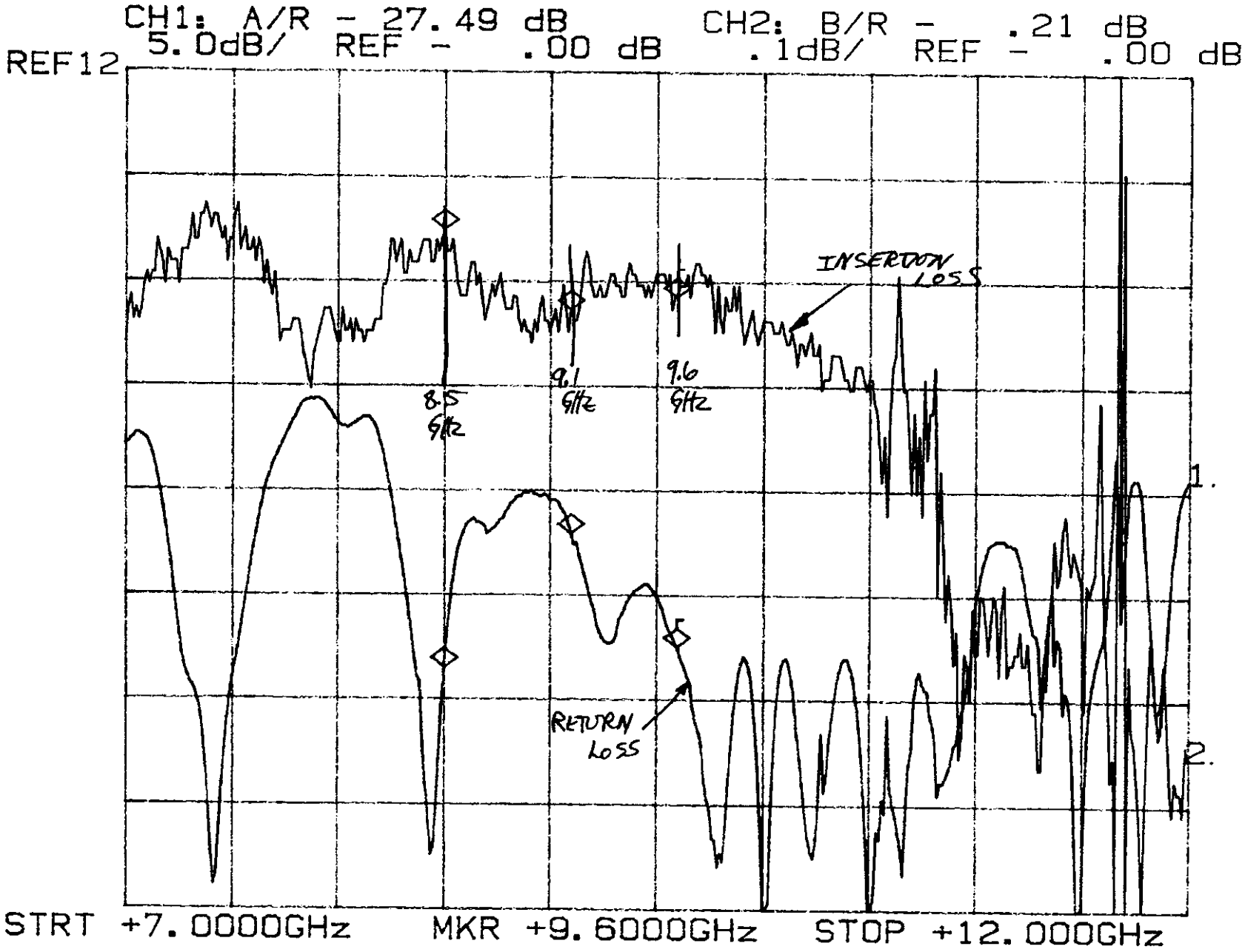

CH1: A/R-M -27.64 dB
5.0 dB/ REF .00 dB
CH2: B/R-M -.31 dB
.5 dB/ REF .00 dB
12
1
-0.5dB
2
3
1
9.1 GHz
INSERTION LOSS
2
9.6 GHz
RETURN LOSS
1
2
STRT +8.5000GHz
MKR +9.1000GHz
STOP +9.8000GHz

S/N 46376

ATTENUATION



S/N 46376


CH1: A/R - 27.49 dB
5.0dB/ REF - .00 dB
CH2: B/R - .21 dB
.1dB/ REF - .00 dB
REF 12
INSERTION LOSS
8.5 GHz
9.1 GHz
9.6 GHz
RETURN LOSS
1.
2.
STRT +7.0000GHz
MKR +9.6000GHz
STOP +12.000GHz