

FCC Part 15 Subpart C
EMI TEST REPORT
of

E.U.T. : Remote Controller

FCC ID. : Q8E-BETA-T1

MODEL : β -T1

Working Frequency : 26.995 MHz

for

APPLICANT: General Silicones Co., Ltd.

ADDRESS : 9-1,52nd Lane. Nan-kang St., Hsiang-shan,
Hsinchu City, Taiwan, R.O.C.

Test Performed by

ELECTRONICS TESTING CENTER, TAIWAN
NO. 8, LANE 29, WEN-MING RD.,
LO-SHAN TSUN, KUI-SHAN HSIANG,
TAOYUAN HSIEN 333, TAIWAN, R.O.C.

Tel: (03) 3276170-3276174

Fax: (03) 3276188

Report Number: ET92S-04-096-03

TEST REPORT CERTIFICATION

Applicant : General Silicones Co., Ltd.
9-1,52nd Lane. Nan-kang St., Hsiang-shan, Hsinchu City, Taiwan, R.O.C.

Manufacturer :General Silicones Co., Ltd.
9-1,52nd Lane. Nan-kang St., Hsiang-shan, Hsinchu City, Taiwan, R.O.C.

Description of EUT :

a) Type of EUT : Remote Controller
b) Model No. : β -T1
c) Serial No. : ----
d) FCC ID : Q8E-BETA-T1
e) Working Frequency : 26.995 MHz
f) Power Supply : Transmitter: 12VDC

Regulation Applied : FCC Rules and Regulations Part 15 Subpart C (2002)

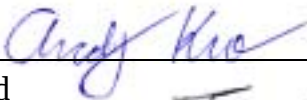
I HEREBY CERTIFY THAT; The data shown in this report were made in accordance with the procedures given in ANSI C63.4 and the energy emitted by the device was founded to be within the limits applicable. I assume full responsibility for accuracy and completeness of these data.

Note:1.The results of the testing report relate only to the items tested.

2.The testing report shall not be reproduced except in full, without the written approval of ETC.

3.The report must not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.

Issue Date : Jun 19,2003

Test Engineer : 

Approve & Authorized
Signer :


Signature

TSUNG-CHING LIN
Supervisor of EMC Dept.
ELECTRONICS TESTING CENTER, TAIWAN

Table of Contents

Page

1. GENERAL INFORMATION	1
1.1 PRODUCT DESCRIPTION	1
1.2 CHARACTERISTICS OF DEVICE:	1
1.3 TEST METHODOLOGY	1
1.4 TEST FACILITY.....	1
2. DEFINITION AND LIMITS	2
2.1 DEFINITION	2
2.2 RESTRICTED BANDS OF OPERATION	2
2.3 LIMITATION	3
2.4 LABELING REQUIREMENT	4
2.5 USER INFORMATION	4
3. RADIATED EMISSION MEASUREMENT	5
3.1 APPLICABLE STANDARD	5
3.2 MEASUREMENT PROCEDURE.....	5
3.3 TEST DATA	7
3.4 FIELD STRENGTH CALCULATION	9
3.5 RADIATED TEST EQUIPMENT	9
3.6 MEASURING INSTRUMENT SETUP	9
3.7 RADIATED MEASUREMENT PHOTOS.....	10
4. BAND EDGE OF EMISSION AND DUTY FACTOR.....	11
4.1 STANDARD APPLICABLE	11
4.2 MEASUREMENT PROCEDURE.....	11
4.3 MEASUREMENT EQUIPMENT	11
4.4 MEASUREMENT DATA	11
5. CONDUCTED EMISSION MEASUREMENT	18
5.1 STANDARD APPLICABLE	18

1. GENERAL INFORMATION

1.1 Product Description

- a) Type of EUT : Remote Controller
- b) Model No. : β -T1
- c) Serial No. : ----
- d) FCC ID : Q8E-BETA-T1
- e) Working Frequency : 26.995 MHz
- f) Power Supply : Transmitter: 12VDC

1.2 Characteristics of Device:

This product is a Remote Controller, it could control the motor-vehicle, boat moving, steering...etc.

1.3 Test Methodology

Radiated testing were performed according to the procedures in chapter 13 of ANSI C63.4. The Remote Controller under test was operated continuously in its normal operating mode for the purpose of the measurements. In order to secure the continuous operation of the device under test, rewiring in the circuit was done by the manufacturer so as to affect its intended operation.

The receiving antenna was varied from 1 to 4 meters and the wooden turntable was rotated through 360 degrees to obtain the highest reading on the field strength meter or on the display of the spectrum analyzer. And also, each emission was to be maximized by changing the orientation of the Remote Controller Transmitter under test.

1.4 Test Facility

The semi-anechoic chamber and conducted measurement facility used to collect the radiated and conducted data are located inside the Building at No.8, Lane 29, Wen-ming Road, Lo-shan Tsun, Kweishan Hsiang, Taoyuan, Taiwan, R.O.C.

This site has been accreditation as a FCC filing site.

2. DEFINITION AND LIMITS

2.1 Definition

Intentional radiator:

A device that intentionally generates and emits radio frequency energy by radiation or induction.

2.2 Restricted Bands of Operation

Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42-16.423	399.9-410	4.5-5.25
0.495 - 0.505 **	16.69475 - 16.69525	608-614	5.35-5.46
2.1735 - 2.1905	16.80425 - 16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475 - 156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2655-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	Above 38.6
13.36-13.41			

Remark "***" : Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz

2.3 Limitation

(1) Conducted Emission Limits :

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the conducted limit is the following:

Frequency MHz	Quasi Peak dB μ V	Average dB μ V
0.15 - 0.5	66-56	56-46
0.5 - 5.0	56	46
5.0 - 30.0	60	50

(2) Radiated Emission Limits :

According to 15.227 the field strength of emissions from intentional radiators operated under these frequency bands shall not exceed the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental μ V/meter	dB μ V/meter
26.96-27.28	10000	80

Field strength limits are at the distance of 3 meters, emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209, as following table:

Other Frequencies (MHz)	Field Strength of Fundamental μ V/meter	dB μ V/meter
30 - 88	100	40.0
88 - 216	150	43.5
216 - 960	200	46.0
Above 960	500	54.0

As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20 dB under any condition of modulation.

(3) Antenna Requirement :

For intentional device, according to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

(4) Emissions Band Limits :

According to 15.227(b), the field strength of any emissions which appear outside of this band shall not exceed the general radiated emission limits in section 15.209.

2.4 Labeling Requirement

The device shall bear the following statement in a conspicuous location on the device :

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

2.5 User Information

The users manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

3. RADIATED EMISSION MEASUREMENT

3.1 Applicable Standard

1. The field strength of any emission within this band shall not exceed 10000 microvolts/meter at 3 meters. The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in Section 15.35 for limiting peak emissions apply.
2. The field strength of any emissions which appear outside of this band shall not exceed the general radiated emission limits in Section 15.209.

3.2 Measurement Procedure

1. Setup the configuration per figure 1 for frequencies measured below 1 GHz respectively.
2. For emission frequencies measured below 1 GHz, it is performed in a semi-anechoic chamber to determine the accurate frequencies of higher emissions.
3. For emission measured below 1GHz,set the spectrum analyzer on a 120kHz resolution bandwidth and 300kHz video bandwidth respectively for each frequency measured in step 2.
4. The search antenna is to be raised and lowered over a range from 1 to 4 meters in horizontally polarized orientation. Position the highness when the highest value is indicated on spectrum analyzer, then change the orientation of EUT on test table over a range from 0° to 360° with a speed as slow as possible, and keep the azimuth that highest emission is indicated on the spectrum analyzer. Vary the antenna position again and record the highest value as a final reading. A RF test receiver is also used to confirm emissions measured.
5. Repeat step 4 until all frequencies need to be measured were complete.
6. Repeat step 5 with search antenna in vertical polarized orientations.
7. Record the result.

Figure 1 : Frequencies measured below 1 GHz configuration

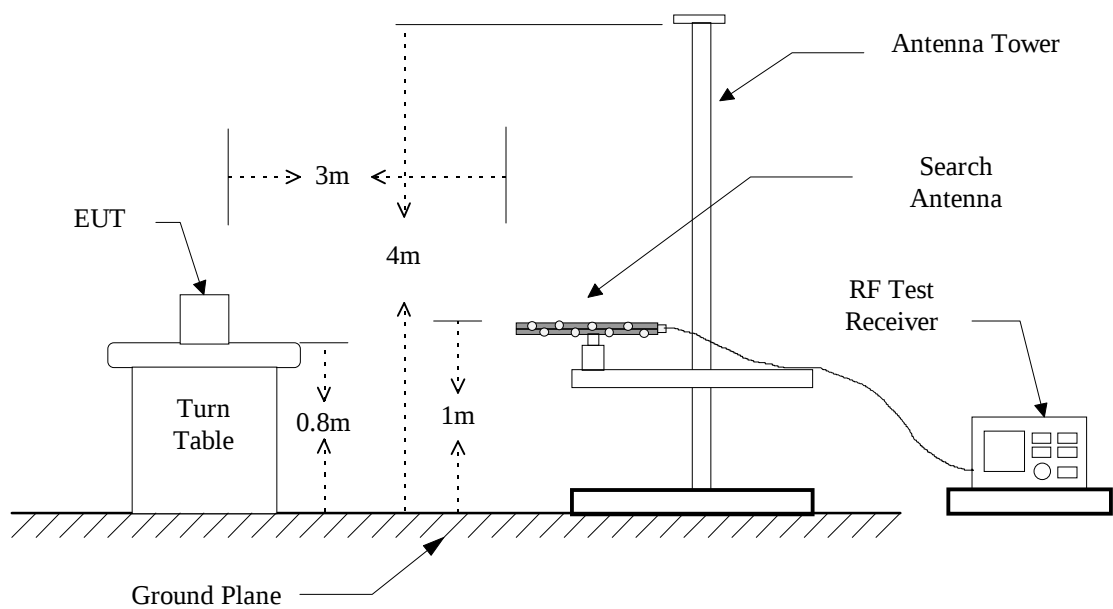
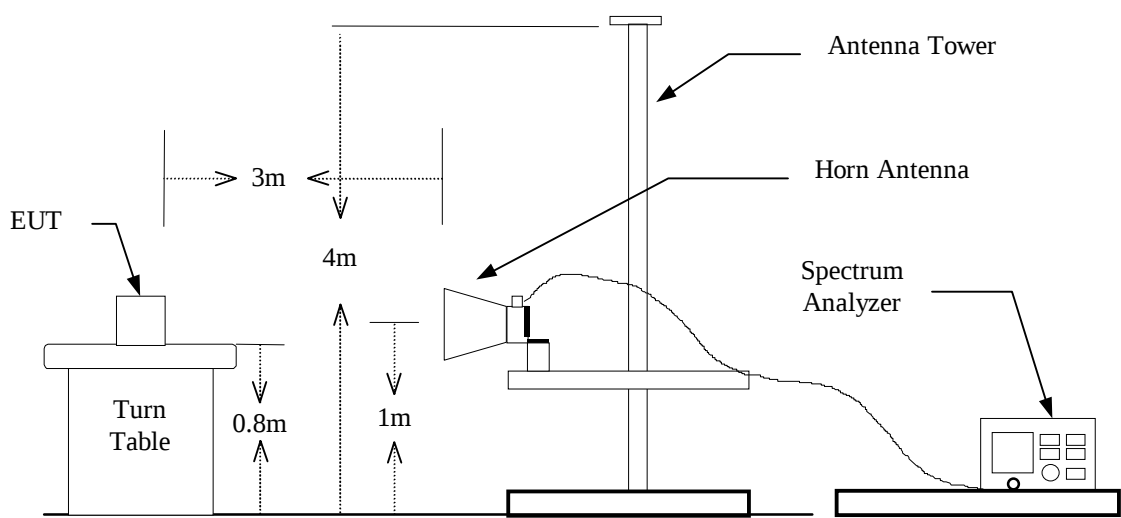


Figure 2 : Frequencies measured above 1 GHz configuration



3.3 Test Data

A.Fundamental and Harmonics

Temperature : 25
 Humidity : 68 %
 Operated mode : Transmitting
 Test Date : May 28, 2003

Frequency (MHz)	Ant Pol H/V	Reading (dBuV) Peak	Correct Factor (dB)	Duty Factory	Result @3m (dBuV/m) Peak AVG		Limit @3m (dBuV/m) Peak AVG		Table Degree (Deg.)	Ant. High (m)
26.968	H	56.1	13.9	-1.8	70.0	68.2	100.0	80.0	0	1
26.968	V	65.5	13.9	-1.8	79.4	77.6	100.0	80.0	0	1.0

Frequency (MHz)	Ant Pol H/V	Reading (dBuV) Peak	Correct Factor (dB)	Result @3m (dBuV/m) Peak	Limit @3m (dBuV/m) Q.P.	Table Degree (Deg.)	Ant. High (m)
53.936	H	----	7.8	----	40.0	----	----
53.936	V	27.7	7.8	35.5	40.0	140	1.0
80.904	H	11.3	10.1	21.4	40.0	----	----
80.904	V	17.0	10.1	27.1	40.0	150	1.0
107.872	H	----	9.1	----	43.5	----	----
107.872	V	18.2	9.0	27.2	43.5	180	1.0
134.840	H	11.5	12.5	24.0	43.5	170	1.0
134.840	V	16.3	12.5	28.8	43.5	0	1.0
161.808	H	----	11.6	----	43.5	----	----
161.808	V	----	11.6	----	43.5	----	----
188.776	H	10.6	12.3	22.9	43.5	0	1.0
188.776	V	14.8	12.3	27.1	43.5	0	1.0
215.744	H	----	13.4	----	43.5	----	----
215.744	V	----	13.4	----	43.5	----	----
242.712	H	----	14.5	----	46.0	----	----
242.712	V	----	14.5	----	46.0	----	----
269.680	H	10.0	16.5	26.5	46.0	----	----
269.680	V	----	16.5	----	46.0	----	----

Note:1. "----" means the noise is too low to be measured.

2. Peak Result = Peak Reading + Correct Factor

3. AVG Result = Peak Result + Duty Factor

4. If the measured frequencies fall in the restricted frequency band, the limit employed is § 15.209 general requirement when frequencies are below or equal to 1 GHz. And the measuring instrument is set to quasi peak detector function, no duty factor applied.

5. "*" means the frequency is in the restricted bands.

$$20 \log (\text{duty time} / \text{duty cycle time}) = 20 \log \frac{0.9 \times 3 + 16}{23} = -1.8 \text{dB}$$

B. Superiors

Temperature : 25
 Humidity : 68 %
 Operated mode : Transmitting
 Test Date : May 28, 2003

Emission Frequency (MHz)	Meter Reading (dBuV)		CORR'd Factor (dB)	Results (dBuV/m)		Limit (dBuV/m)	Margins (dB)	Table Degree (deg)		Ant. High (m)	
	HOR.	VERT.		HOR.	VERT.			HOR.	VERT.	HOR.	VERT.
30.220	18.1	***	13.9	32.0	***	39.0	-7.0	144	***	1.0	***
30.220	***	24.5	9.4	***	33.9	39.0	-5.1	***	170	***	1.0
41.220	16.1	***	13.9	30.0	***	39.0	-9.0	93	***	1.0	***
41.220	***	23.7	10.6	***	34.3	39.0	-4.7	***	184	***	1.0
119.600	14.3	***	11.1	25.4	***	43.5	-18.1	176	***	1.0	***
119.600	***	16.9	12.5	***	29.4	43.5	-14.1	***	150	***	1.0
127.300	***	16.7	12.7	***	29.4	43.5	-14.1	***	190	***	1.0
135.550	***	16.3	12.5	***	28.8	43.5	-14.7	***	125	***	1.0
140.220	14.9	***	9.1	24.0	***	43.5	-19.5	154	***	1.0	***
149.850	12.7	***	11.1	23.8	***	43.5	-19.7	154	***	1.0	***
149.850	***	15.5	12.5	***	28.0	43.5	-15.5	***	160	***	1.0
155.350	15.1	***	9.1	24.2	***	43.5	-19.3	170	***	1.0	***

Note:

1. AH means antenna height, DRT means degrees of rotation of turntable.
2. If the data table appeared symbol of "****" means the value was too low to be measured.
3. The EUT is a hand-held product. In order to get the worse data, X, Y, Z direction were adjusted during the data.
4. The estimated measurement uncertainty of the result measurement is $\pm 3\text{dB}$.

3.4 Field Strength Calculation

(a) Field Strength:

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$\text{RESULT} = \text{READING} + \text{CORR. FACTOR}$$

where CORR. FACTOR = Antenna FACTOR + Cable FACTOR

Assume a receiver reading of 62.4 dB μ V is obtained. The Antenna Factor of 14.1 and a Cable Factor of 3.4 is added. The total of field strength is 79.9 dB μ V/m.

$$\text{RESULT} = 62.4 + 14.1 + 3.4 = 79.9 \text{ dB } \mu \text{ V/m}$$

$$\text{Level in } \mu \text{ V/m} = \text{Common Antilogarithm}[(79.9 \text{ dB } \mu \text{ V/m})/20] = 9885.5 \text{ } \mu \text{ V/m}$$

3.5 Radiated Test Equipment

Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
EMI Test Receiver	Hewlett-Packard	8546A	13054404-001	Nov. 06, 2002
LogBicone Antenna	Schwarzbeck	VULB9160	13057310-001	Oct. 18, 2002

3.6 Measuring Instrument Setup

Explanation of measuring instrument setup in frequency band measured is as following :

Frequency Band (MHz)	Instrument	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	EMI Test Receiver	Quasi Peak	120 kHz	300 kHz
	EMI Test Receiver	Peak	120 kHz	300 kHz

3.7 Radiated Measurement Photos



4. BAND EDGE OF EMISSION AND DUTY FACTOR

4.1 Standard Applicable

According to 15.227(b), the field strength of any emissions appearing between the band edges and up to 10 kHz above and below the band edges shall be attenuated at least 26 dB below the level of the unmodulated carrier or to the general limits in § 15.209, whichever permits the higher emission levels

4.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in figure 1 and measurement the turn on the EUT. Then have the EUT activating in normal operation and make sure the instrument is operated in its linear range.
3. Adjust the measurement frequency range to contain the signal radiated from the Eut. Set both RBW and VBW of spectrum analyzer to 10 kHz and 100kHz respectively with a convenient frequency span including 200kHz bandwidth of the emission.
4. Mark the bandwidth of 26.29-27.28 MHz and plot the graph on spectrum analyzer.

4.3 Measurement Equipment

Equipment	Manufacturer	Model No.	Next Cal. Date
EMI Test Receiver	Hewlett-Packard	8564EC	07/27/2003
Plotter	Hewlett-Packard	7550A	N/A

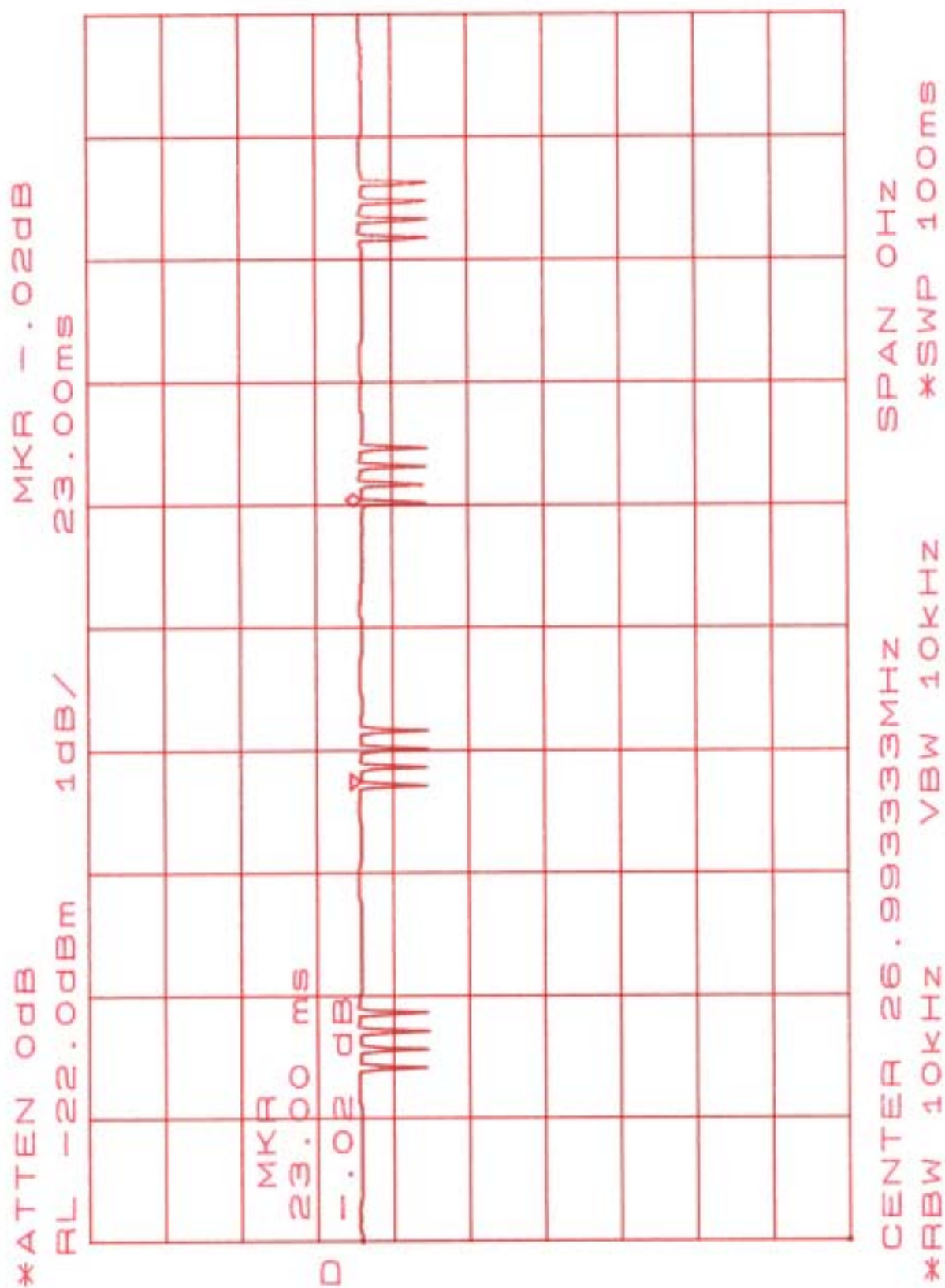
4.4 Measurement Data

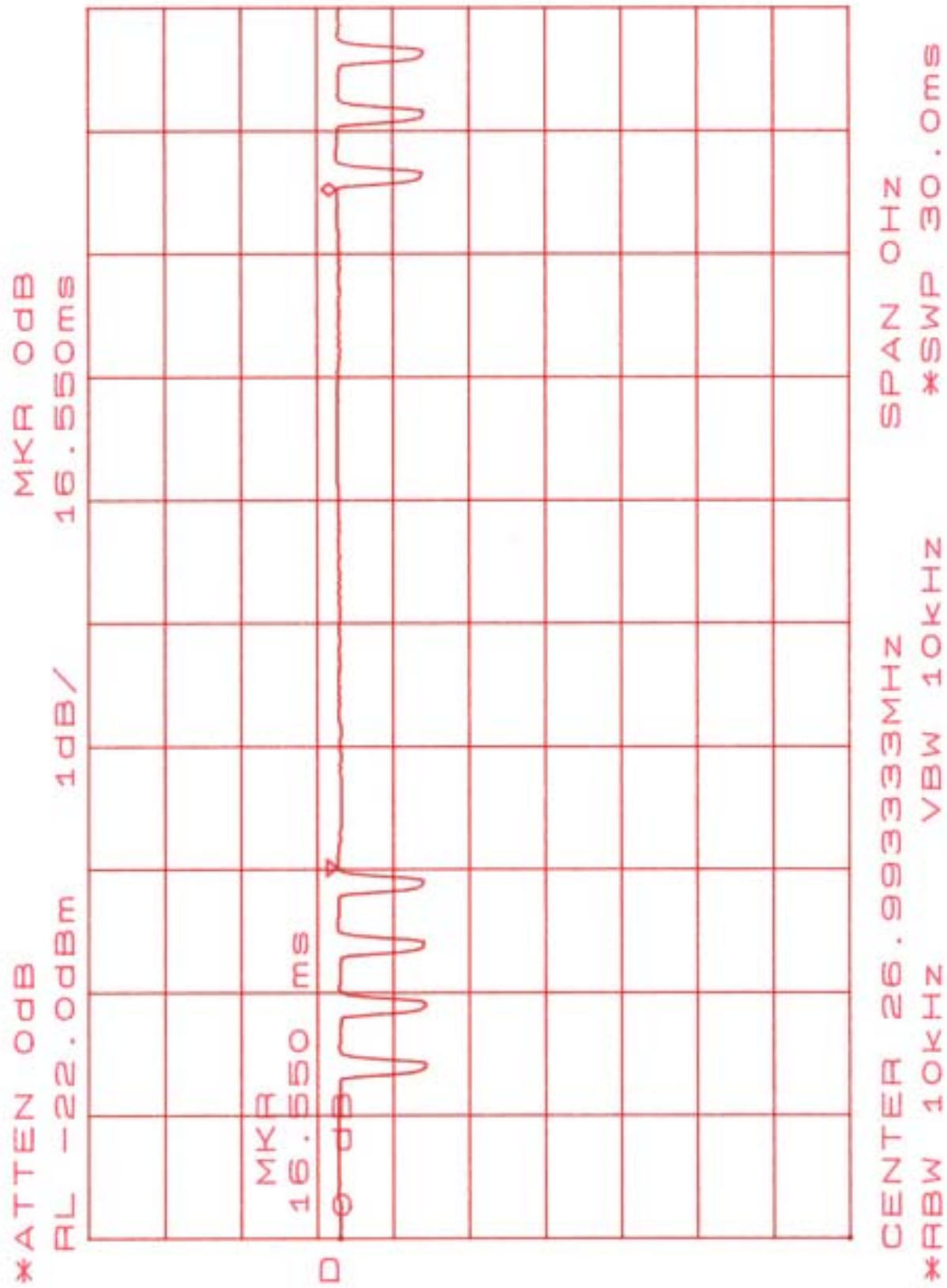
Test Date : May 28, 2003

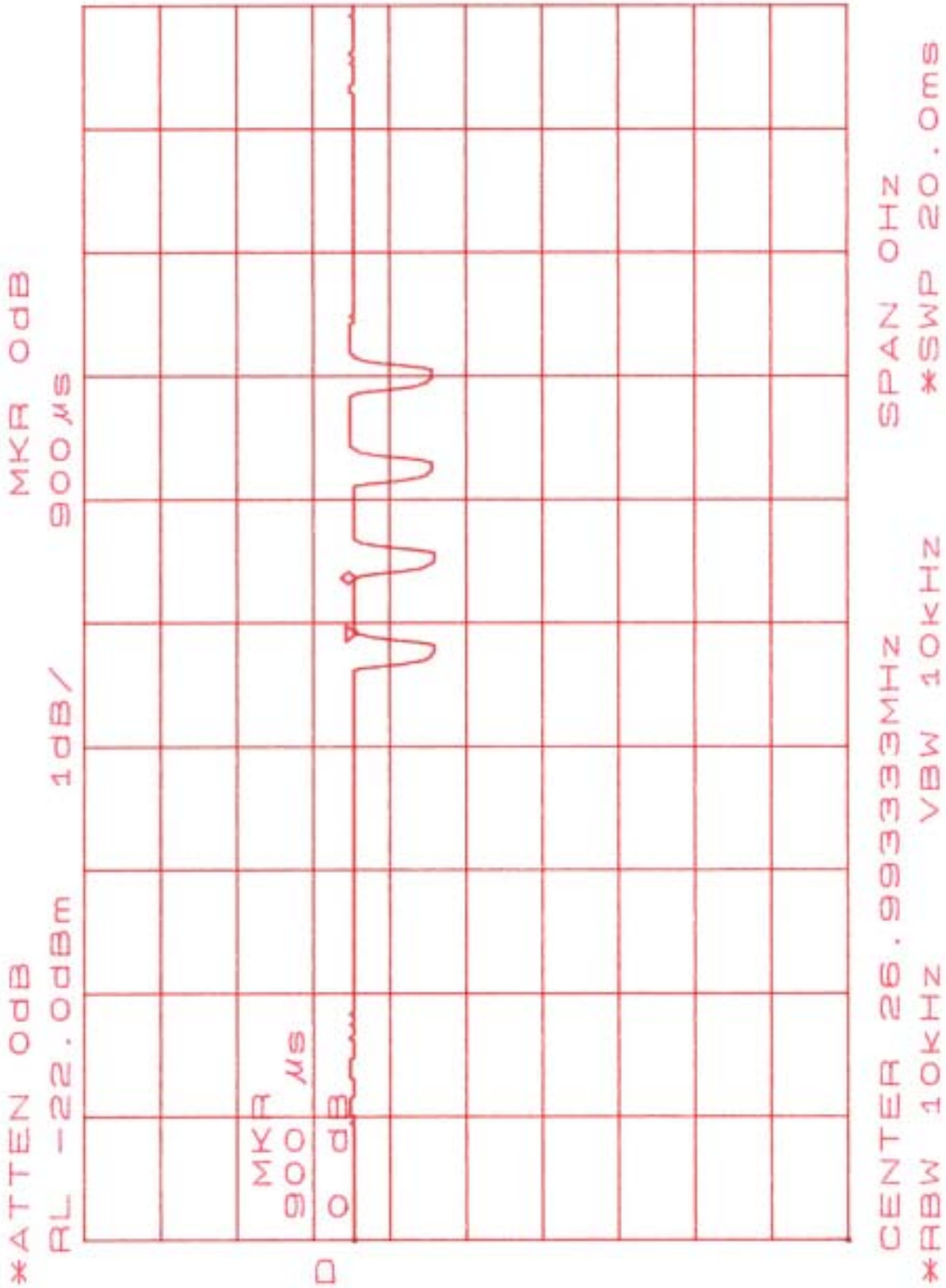
Temperature : 25

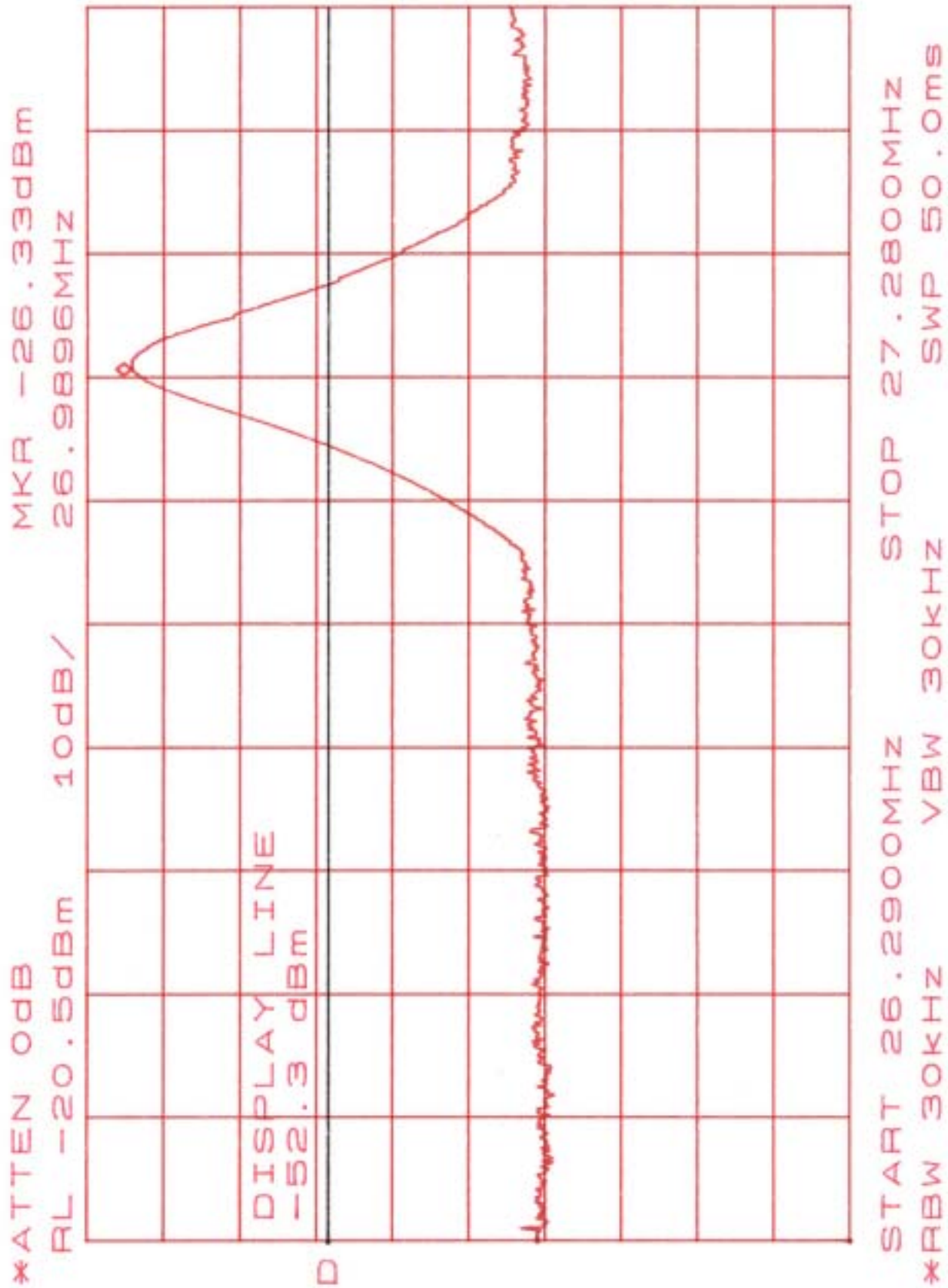
Humidity: 68 %

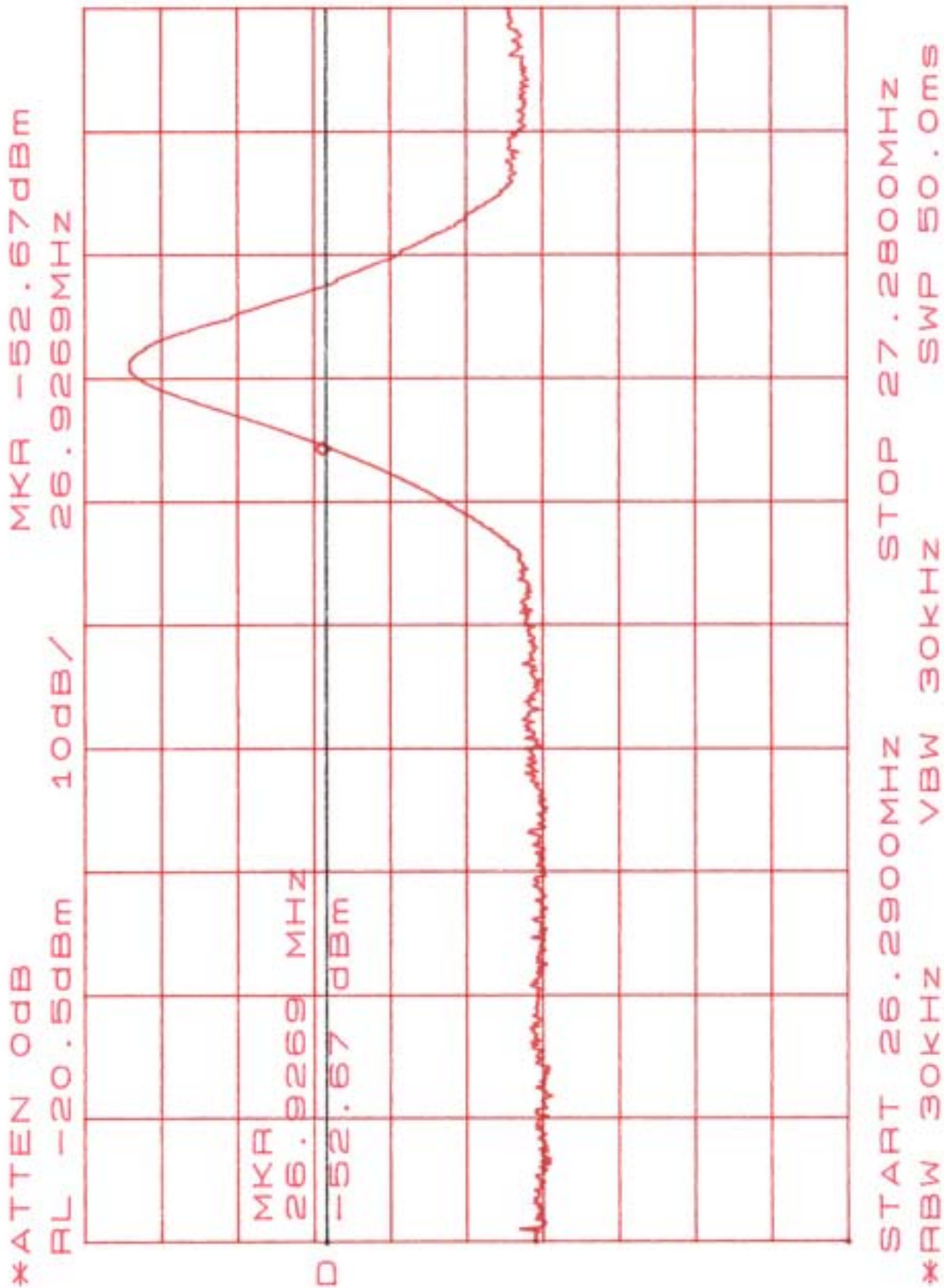
Note : Please see appendix 2 for Plotted Data

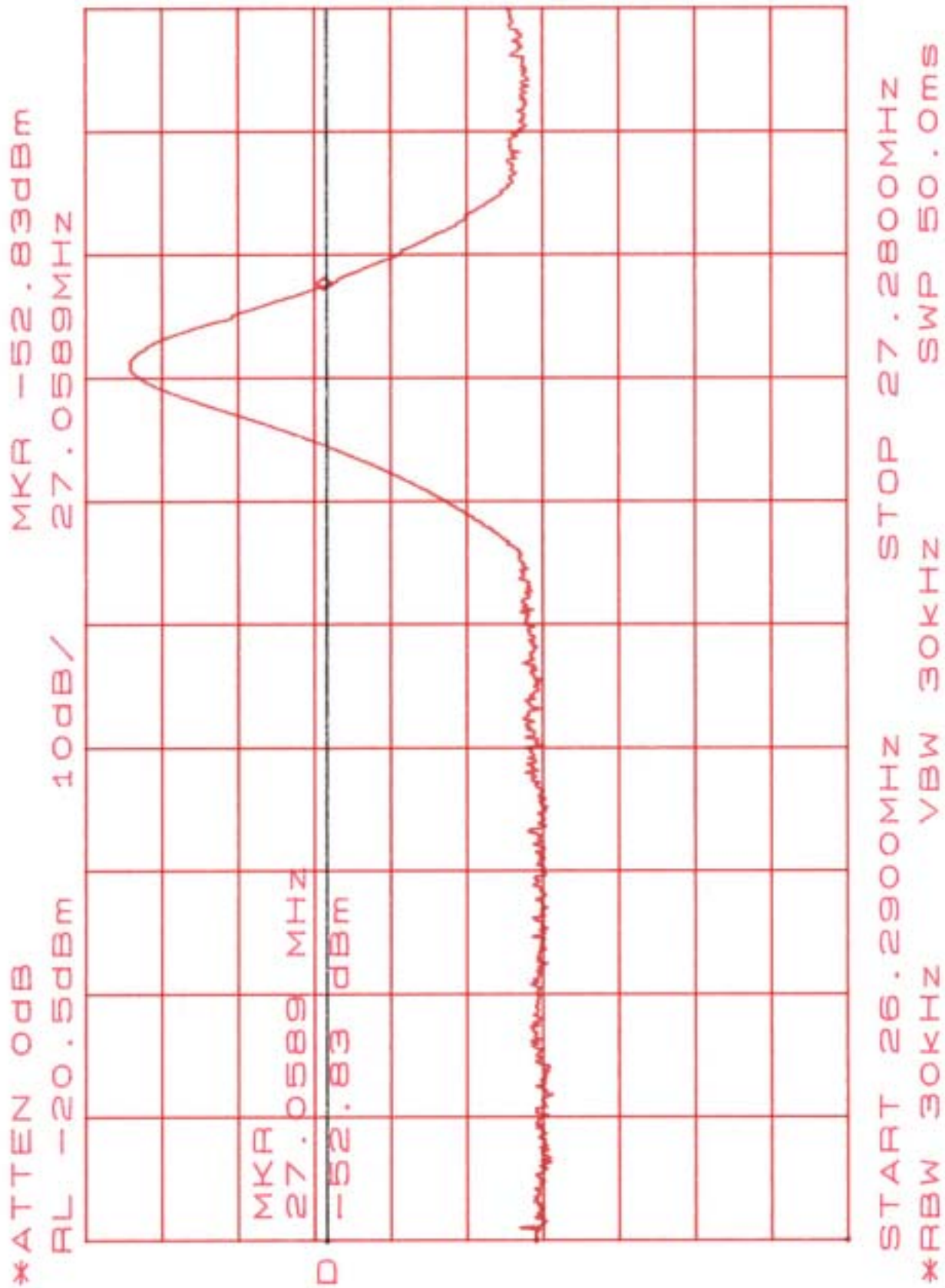












5. CONDUCTED EMISSION MEASUREMENT

5.1 Standard Applicable

This EUT is excused from investigation of conducted emission, for it is powered by battery only. According to § 15.207 (d), measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines.