Exhibit C...............Measurement Report

FCC Part 15
EMI TEST REPORT

of

E.U.T. : 2.4GHz Frequecny Hopping Spread Spectrum Wireless LAN PCMCIA Card

MODEL : WL-1000

FCC ID. : LLM9908WL1000

for

APPLICANT : Eumitcom Technology Inc.

ADDRESS : 2F, No. 2, Li Hsin Rd., Science-Based Industrial Park, Hsinchu, Taiwan, R.O.C.

Test Performed by

ELECTRONICS TESTING CENTER, TAIWAN
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Report Number : ET88R-08-050-01

TEST REPORT CERTIFICATION

Applicant	: Eumitcom Technology Inc. 2F, No. 2, Li Hsin Rd., Science-Based Industrial Park, Hsinchu, Taiwan, R.O.C.
Manufacturer	: Eumitcom Technology Inc. 2F, No. 2, Li Hsin Rd., Science-Based Industrial Park, Hsinchu, Taiwan, R.O.C.
Description of EUT	:
a) Type of EUT	: 2.4GHz Frequecny Hopping Spread Spectrum Wireless LAN PCMCIA Card
b) Trade Name	: ----
c) Model No.	: WL-1000
d) Power Supply	: From Notebook PC (DC 5V)
Regulation Applied	: FCC Rules and Regulations Part 15 Subpart B & C (1997)

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 result of the testing report relates only to the item tested.
2. The testing report shall not be reproduced expect in full, without the written approval of ETC.

Issued Date : AUG. 27, 1999

Test Engineer : Tien Lu Liau
(Tien Lu Liau)

Approve & Authorized Signer : Will Yauo
Will Yauo, Supervisor
EMI Test Site of ELECTRONICS
TESTING CENTER, TAIWAN

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1 GENERAL INFORMATION

1.1 Product Description

a) Type of EUT	: 2.4GHz Frequecny Hopping Spread Spectrum Wireless LAN PCMCIA Card
b) Trade Name	: ----
c) Model No.	: WL-1000
d) Power Supply	: From Notebook PC (DC 5V)

1.2 Characteristics of Device

The device is a 2.4 GHz frequency hoppiing spread spectrum wireless LAN PCMCIA card, operating within 2402 to 2480 MHz, channel spacing is 1 MHz, there are 79 channels for hopping, physical data rate is 1 Mbps, typical output power is +18 dBm.

1.3 Test Methodology

For 2.4GHz Frequecny Hopping Spread Spectrum Wireless LAN PCMCIA Card, both conducted and radiated emissions were performed according to the procedures illustrated in ANSI C63.4(1992) and for processing gain measurement is according to FCC Public Notice. Other required measurements were illustrated in separate sections of this test report for details.

1.4 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located on the roof top of Building at No.34, Lin 5, Ding Fu Tsun, Linkou Hsiang, Taipei Hsien, Taiwan, R.O.C.
This site has been fully described in a report submitted to your office, and accepted in a letter dated Feb. 10 , 1997.

1.5 Modist List

There are two conductive copper tapes assembly between the metal card frame and the internal shielded cam (see the assembly part picture).

2 PROVISIONS APPLICABLE

2.1 Definition

Unintentional radiator:

A device that intentionally generates and radio frequency energy for use within the device, or that sends radio frequency signals by conduction to associated equipment via connecting wiring, but which is not intended to emit RF energy by radiation or induction.

Class A Digital Device:

A digital device which is marketed for use in commercial or business environment; exclusive of a device which is market for use by the general public, or which is intended to be used in the home.

Class B Digital Device :

A digital device which is marketed for use in a residential environment notwithstanding use in a commercial, business of industrial environment. Example of such devices that are marketed for the general public.

Note : A manufacturer may also qualify a device intended to be marketed in a commercial, business, or industrial environment as a Class B digital device, and in fact is encouraged to do so, provided the device complies with the technical specifications for a Class B Digital Device. In the event that a particular type of device has been found to repeatedly cause harmful interference to radio communications, the Commission may classify such a digital device as a Class B Digital Device, Regardless of its intended use.

Intentional radiator:

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

2.2 Requirement for Compliance

(1) Conducted Emission Requirement

For unintentional device, according to § 15.107(a) Line Conducted Emission Limits is as following:

Frequency MHz	Emissions μV	Emissions dBμV
0.45 - 30.0	250	48.0

For intentional device, according to § 15.207(a) Line Conducted Emission Limits is same as above table.

(2) Radiated Emission Requirement

For unintentional device, according to § 15.109(a), except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency MHz	Distance Meters	Radiated dBμV/m	Radiated μV/m
30 - 88	3	40.0	100
88 - 216	3	43.5	150
216 - 960	3	46.0	200
above 960	3	54.0	500

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the above table.

(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) Hopping Channel Separation

According to 15.247(a)(1), frequency hopping system shall have , hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

(5) Number of Hopping frequencies used

According to 15.247(a)(1)(ii), for frequency hopping system operating in the 2400-2483.5 MHz and 5725-5850 MHz bands shall use at least 75 hopping frequencies.

(6) Hopping Channel Bandwidth

According to 15.247(a)(1)(ii), for frequency hopping system operating in the 2400-2483.5 MHz and 5725-5850 MHz bands, the maximum 20 dB bandwidth of the hopping channel is 1MHz.

(7) Dwell Time of each frequency within a 30-second period

According to 15.247(a)(1)(ii), for frequency hopping system operating in the 2400-2483.5 MHz and 5725-5850 MHz bands, the average time of occupancy on any frequency shall not be greater than 0.4 second within a 30-second period.

(8) Output Power Requirement

For direct sequence system, according to 15.247(b), the maximum peak output power of the transmitter shall not exceed 1 Watt. If transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(9) 100 kHz Bandwidth of Frequency Band Edges Requirement

According to 15.247(c), if any 100 kHz bandwidth outside these frequency bands, the radio frequency power that is produced by the modulation products of the spreading sequence, the information sequence and the carrier frequency shall be either at least 20 dB below that in any 100 kHz bandwidth within the band that contains the highest level of the desired power or shall not exceed the general levels specified in § 15.209(a), whichever results in the lesser attenuation.

2.3 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	3360-4400	Above 38.6
13.36-13.41			

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

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.

For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual.

The Federal Communications Commission Radio Frequency Interference Statement includes the following paragraph.

This equipment has been tested and found to comply with the limits for a Class B Digital Device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction may cause harmful interference to radio communication. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-- Reorient or relocate the receiving antenna.

-- Increase the separation between the equipment and receiver.

-- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

-- Consult the dealer or an experienced radio / TV technician for help.

3. SYSTEM TEST CONFIGURATION

3.1 Justification

For both radiated and conducted emissions below 1 GHz, the system was configured for testing in a typical fashion as a customer would normally use it. The peripherals other than EUT were connected in normally standing by situation. Measurement was performed under the condition that a computer program was exercised to simulate data communication of EUT, and the transmission rate was set to maximum allowed by EUT. Three highest emissions were verified with varying placement of the transmitting antenna connected to EUT to maximize the emission from EUT.

For conducted emissions, only measured on TX and RX operation, for the digital circuits portion also function normally whenever TX or RX is operated. For radiated emissions, whichever RF channel is operated, the digital circuits' function identically. As the reason, measurement of radiated emissions from digital circuits is only performed with channel 11 by transmitting mode.

3.2 Devices for Tested System

Device	Manufacture	Model / FCC ID.	Cable Description
2.4GHz Frequecny Hopping Spread Spectrum Wireless LAN PCMCIA Card *	Eumitcom Technology Inc.	WL-1000 LLM9908WL1000	----
Notebook PC	Tatung	TNB-5900 BJMTNB5900	2.5m Unshielded AC Power Cord
Modem	Smar TEAM Co.	1200AT EF56A51200AT	2.0m Shielded Cable
Printer	Hewlett-Packard	2225C+	DSI6XU2225

Remark "*" means equipment under test.

4 RADIATED EMISSION MEASUREMENT

4.1 Applicable Standard

For unintentional radiator, the radiated emission shall comply with § 15.109(a).

For intentional radiators, according to § 15.247 (a), operation under this provision is limited to frequency hopping and direct sequence spread spectrum, and the out band emission shall be comply with § 15.247 (c)

4.2 Measurement Procedure

1. Setup the configuration per figure 5 and 6 for frequencies measured below and above 1 GHz respectively.
2. For emission frequencies measured below 1 GHz, a pre-scan is performed in a shielded chamber to determine the accurate frequencies of higher emissions will be checked on a open test site. As the same purpose, for emission frequencies measured above 1 GHz, a pre-scan also be performed with a 1 meter measuring distance before final test.
3. For emission frequencies measured below and above 1 GHz, set the spectrum analyzer on a 100 kHz and 1 MHz resolution 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.

   Note : A high pass filter was used to avoid pre-amplifier saturated when measure TX operation mode in frequency band above 1 GHz.
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. Check the three frequencies of highest emission with varying the placement of cables associated with EUT to obtain the worse case and record the result.

Figure 1 : Frequencies measured below 1 GHz configuration

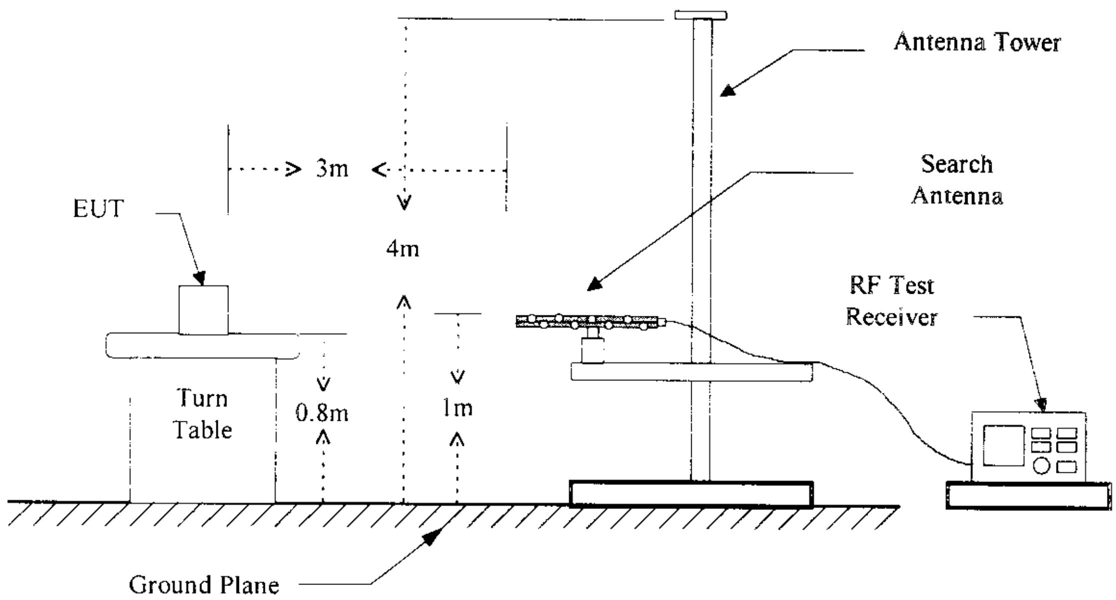
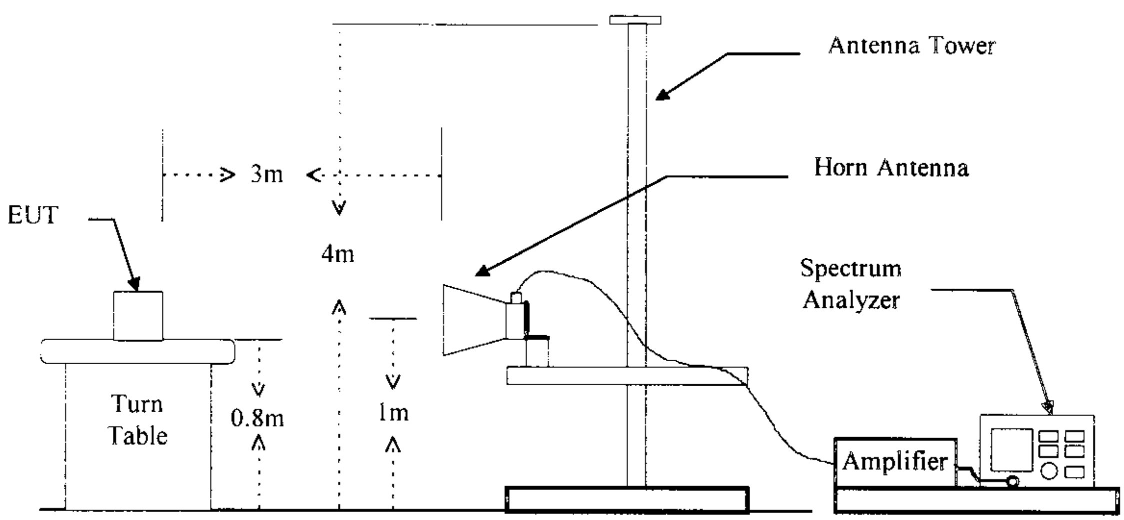


Figure 2 : Frequencies measured above 1 GHz configuration



4.3 Measuring Instrument

The following instrument are used for radiated emissions measurement :

Equipment	Manufacturer	Model No.	Next Cal. Due
Spectrum Analyzer	Hewlett-Packard	8568B	12/02/1999
Pre-selector	Hewlett-Packard	85685A	12/07/1999
Quasi Peak Detector	Hewlett-Packard	85650A	12/02/1999
RF Test Receiver	Rohde & Schwarz	ESVS 30	01/10/2000
RF Test Receiver	Rohde & Schwarz	ESBI	09/15/1999
Horn Antenna	EMCO	3115	05/11/2000
Horn Antenna	EMCO	3116	05/07/2000
Log periodic Antenna	EMCO	3146	09/15/1999
Biconical Antenna	EMCO	3110	09/15/1999
Preamplifier	Hewlett-Packard	8449B	06/20/2000
Preamplifier	Hewlett-Packard	8447D	11/30/1999
Micro Wave EMI Test System	Hewlett-Packard	84125C	01/24/2000

Measuring instrument setup in measured frequency band when specified detector function is used :

Frequency Band (MHz)	Instrument	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	RF Test Receiver	Quasi-Peak	120 kHz	N/A
	Spectrum Analyzer	Peak	100 kHz	100 kHz
Above 1000	Spectrum Analyzer	Peak	1 MHz	1 MHz
	Spectrum Analyzer	Average	1 MHz	300 Hz

4.4 Radiated Emission Data

4.4.1 RF Portion

a) Channel 02

Operation Mode : TX/RX

Local Frequency : 2359 MHz

Fundamental Frequency : 2402 MHz

Test Date : AUG. 25, 1999 Temperature : 27 ℃ Humidity : 59 %

Frequency (MHz)	Reading (dBuV) H Peak	H Ave	V Peak	V Ave	Factor (dB) Corr.	Result @3m (dBuV/m) Peak	Ave	Limit @3m (dBuV/m) Peak	Ave.	Margin (dB)	Table Deg. (Deg.)	Ant. High (m)
*4803.484	51.5	47.4	49.9	46.2	2.5	54.0	49.9	74.0	54.0	-4.1	180	1.50
*7205.226	48.0	41.2	50.6	44.8	5.7	56.3	50.5	74.0	54.0	-3.5	90	1.50
*9606.968	51.3	43.5	51.5	43.3	7.2	58.7	50.7	74.0	54.0	-3.3	90	1.50
*12008.710	---	---	---	---	9.2	---	---	74.0	54.0	---	---	---
*14410.452	---	---	---	---	11.5	---	---	74.0	54.0	---	---	---
2359.025	47.0	41.5	52.5	49.3	-3.2	49.3	46.1	74.0	54.0	-7.9	90	1.50
4718.050	44.1	35.6	46.3	38.6	2.4	48.7	41.0	74.0	54.0	-13.0	90	1.50
7077.075	47.9	42.4	49.9	45.8	5.5	55.4	51.3	74.0	54.0	-2.7	90	1.50
9436.100	---	---	---	---	7.2	---	---	74.0	54.0	---	---	---
11795.125	---	---	---	---	9.2	---	---	74.0	54.0	---	---	---

Note :

1. Remark "*" means that the emission frequency is produced from local oscillator.
2. Remark "---" means that the emission level is too low to be measured (a pre-amplifier of about 35 dB is used).
3. Margins are derived from Peak or Average whichever is lower. If there is only peak value in Result field, the Margin is also referred to average limits.

b) Channel 42

Operation Mode : TX/RX

Local Frequency : 2399 MHz

Fundamental Frequency : 2442 MHz

Test Date : AUG. 25, 1999 Temperature : 27 ℃ Humidity : 59 %

Frequency (MHz)	Reading (dBuV) H Peak	H Ave	V Peak	V Ave	Factor (dB) Corr.	Result @3m (dBuV/m) Peak	Ave	Limit @3m (dBuV/m) Peak	Ave.	Margin (dB)	Table Deg. (Deg.)	Ant. High (m)
*4883.200	50.3	46.6	49.0	43.8	2.7	53.0	49.3	74.0	54.0	-4.7	180	1.50
*7324.800	49.1	42.3	51.5	45.3	5.9	57.4	51.2	74.0	54.0	-2.8	90	1.50
*9766.400	45.1	33.5	45.3	33.8	7.3	52.6	41.1	74.0	54.0	-12.9	90	1.50
*12208.000	---	---	---	---	9.3	---	---	74.0	54.0	---	---	---
*14649.600	---	---	---	---	11.6	---	---	74.0	54.0	---	---	---
2339.150	48.6	42.7	53.7	50.8	-3.3	50.4	47.5	74.0	54.0	-6.5	90	1.50
4798.300	45.3	36.7	47.6	39.9	2.5	50.1	42.4	74.0	54.0	-11.6	90	1.50
7197.450	49.2	43.7	51.8	46.1	5.7	57.5	51.8	74.0	54.0	-2.2	90	1.50
9596.600	---	---	---	---	7.2	---	---	74.0	54.0	---	---	---
11995.750	---	---	---	---	9.2	---	---	74.0	54.0	---	---	---

Note :

1. Remark "*" means that the emission frequency is produced from local oscillator.
2. Remark "---" means that the emission level is too low to be measured (a pre-amplifier of about 35 dB is used).
3. Margins are derived from Peak or Average whichever is lower. If there is only peak value in Result field, the Margin is also referred to average limits.

c) Channel 80

Operation Mode : TX/RX

Local Frequency : 2437 MHz

Fundamental Frequency : 2480 MHz

Test Date : AUG. 25, 1999 Temperature : 27 ℃ Humidity : 59 %

Frequency (MHz)	Reading (dBuV) H Peak	H Ave	V Peak	V Ave	Factor (dB) Corr.	Result @3m (dBuV/m) Peak	Ave	Limit @3m (dBuV/m) Peak	Ave.	Margin (dB)	Table Deg. (Deg.)	Ant. High (m)
*4959.184	50.5	46.8	49.2	44.8	2.8	53.3	49.6	74.0	54.0	-4.4	180	1.50
*7438.776	47.3	44.5	49.8	43.1	6.1	55.9	50.6	74.0	54.0	-3.4	90	1.50
*9918.368	44.6	32.1	44.4	32.6	7.4	52.0	40.0	74.0	54.0	-14.0	180	1.50
*12397.960	---	---	---	---	9.4	---	---	74.0	54.0	---	---	---
*14877.552	---	---	---	---	11.5	---	---	74.0	54.0	---	---	---
2437.067	44.5	38.3	49.1	38.1	-2.9	46.2	35.4	74.0	54.0	-18.6	90	1.50
4874.134	44.9	35.9	46.8	38.9	2.7	49.5	41.6	74.0	54.0	-12.4	90	1.50
7311.201	48.3	39.8	50.0	43.1	5.9	55.9	49.0	74.0	54.0	-5.0	90	1.50
9748.268	---	---	---	---	7.3	---	---	74.0	54.0	---	---	---
12185.335	---	---	---	---	9.3	---	---	74.0	54.0	---	---	---

Note :

1. Remark "*" means that the emission frequency is produced from local oscillator.
2. Remark "--" means that the emission level is too low to be measured (a pre-amplifier of about 35 dB is used).
3. Margins are derived from Peak or Average whichever is lower. If there is only peak value in Result field, the Margin is also referred to average limits.

4.4.2 Digital Portion

a) Emission frequencies below 1 GHz

Operation Mode : TX/RX
Test Date : JUN. 29, 1999 Temperature : 20 ℃ Humidity : 50 %

Frequency (MHz)	Ant-Pol H/V	Meter Reading (dBuV)	Corrected Factor (dB)	Result @3m (dBuV/m)	Limit @3m (dBuV/m)	Margin (dB)	Table Degree (Deg.)	Ant. High (m)
80.671	V	50.3	-14.9	35.4	40.0	-4.6	90	1.60
128.036	V	45.6	-11.4	34.2	43.5	-9.3	90	1.00
192.036	H	44.7	-8.1	36.6	43.5	-6.9	180	4.00
200.471	H	48.4	-7.1	41.3	43.5	-2.2	180	4.00
233.893	H	43.1	-4.9	38.2	46.0	-7.8	180	4.00
280.214	H	43.7	-2.7	41.0	46.0	-5.0	180	4.00
334.057	H	50.5	-8.1	42.4	46.0	-3.6	180	3.20
360.279	H	47.7	-8.6	39.1	46.0	-6.9	180	3.00
520.336	V	40.0	-4.9	35.1	46.0	-10.9	90	1.70

b) Emission frequencies above 1 GHz

Radiated emission frequencies above 1 GHz to 5 GHz were too low to be measured with a pre-amplifier of 35 dB.

4.5 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor, High Pass Filter Loss(if used) and Cable Loss, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation calculation is as follows:

Result = Reading + Corrected Factor

where

Corrected Factor = Antenna FACTOR + Cable Loss + High Pass Filter Loss - Amplifier Gain

5 CONDUCTED EMISSION MEASUREMENT

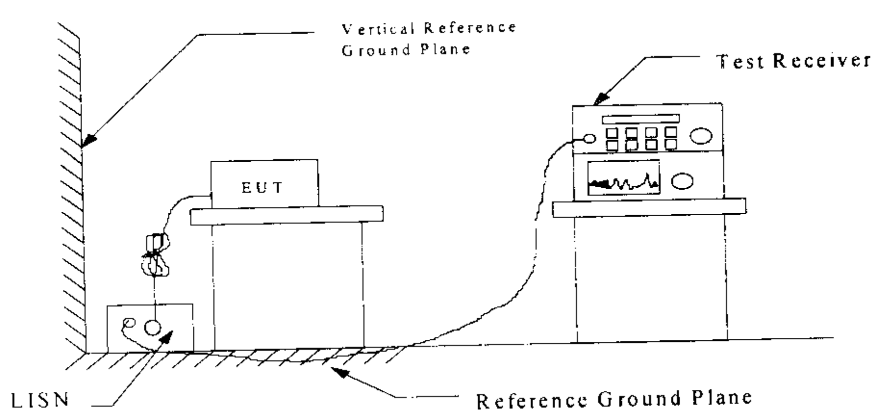
5.1 Standard Applicable

For unintentional and intentional device, Line Conducted Emission Limits are in accordance to § 15.107(a) and § 15.207(a) respectively. Both Limits are identical specification.

5.2 Measurement Procedure

1. Setup the configuration per figure 3.
2. A preliminary scan with a spectrum monitor is performed to identify the frequency of emission that has the highest amplitude relative to the limit by operating the EUT in selected modes of operation, typical cable positions, and with a typical system configuration.
3. Record the 6 or 8 highest emissions relative to the limit.
4. Measure each frequency obtained from step 3 by a test receiver set on quasi peak detector function, and then record the accuracy frequency and emission level. If all emissions measured in the specified band are attenuated more than 20 dB from the limit, this step would be ignored, and the peak detector function would be used.
5. Confirm the highest three emissions with variation of the EUT cable configuration and record the final data.
6. Repeat all above procedures on measuring each operation mode of EUT.

Figure 3 : Conducted emissions measurement configuration



5.3 Conducted Emission Data

a) Channel 02

Operation Mode : TX/RX
Test Date : AUG. 24, 1999 Temperature : 29 ℃ Humidity: 51 %

Frequency (MHz)	Reading (dBuV)		Factor (dB)	Result (dBuV)		Limit (dBuV)	Margin (dB)
	N	L1		N	L1		
0.468	29.8	29.9	0.2	30.0	30.1	48.0	-17.9
0.546	29.9	29.6	0.2	30.1	29.8	48.0	-17.9
0.626	19.6	24.8	0.2	19.8	25.0	48.0	-23.0
1.877	19.2	25.9	0.3	19.5	26.2	48.0	-21.8
3.516	25.7	24.0	0.3	26.0	24.3	48.0	-22.0
20.175	23.2	26.2	0.9	24.1	27.1	48.0	-20.9
22.634	15.4	31.0	1.0	16.4	32.0	48.0	-16.0
22.700	23.0	30.0	1.0	24.0	31.0	48.0	-17.0

b) Channel 42

Operation Mode : TX/RX
Test Date : AUG. 24, 1999 Temperature : 29 ℃ Humidity: 51 %

Frequency (MHz)	Reading (dBuV)		Factor (dB)	Result (dBuV)		Limit (dBuV)	Margin (dB)
	N	L1		N	L1		
0.468	30.0	30.0	0.2	30.2	30.2	48.0	-17.8
0.546	31.1	29.7	0.2	31.3	29.9	48.0	-16.7
0.626	19.7	25.0	0.2	19.9	25.2	48.0	-22.8
1.877	19.4	26.1	0.3	19.7	26.4	48.0	-21.6
3.516	25.9	24.1	0.3	26.2	24.4	48.0	-21.8
20.175	23.3	26.4	0.9	24.2	27.3	48.0	-20.7
22.634	15.5	31.1	1.0	16.5	32.1	48.0	-15.9
22.700	23.1	30.2	1.0	24.1	31.2	48.0	-16.8

Note : Please see appendix 1 for Plotted Data

c) Channel 80

Operation Mode : TX/RX
Test Date : AUG. 24, 1999 Temperature : 29 ℃ Humidity: 51 %

Frequency (MHz)	Reading (dBuV)		Factor (dB)	Result (dBuV)		Limit (dBuV)	Margin (dB)
	N	L1		N	L1		
0.468	30.1	30.2	0.2	30.3	30.4	48.0	-17.6
0.546	31.3	29.8	0.2	31.5	30.0	48.0	-16.5
0.626	19.8	25.2	0.2	20.0	25.4	48.0	-22.6
1.877	19.6	26.2	0.3	19.9	26.5	48.0	-21.5
3.516	26.1	24.2	0.3	26.4	24.5	48.0	-21.6
20.175	23.4	26.6	0.9	24.3	27.5	48.0	-20.5
22.634	15.7	31.2	1.0	16.7	32.2	48.0	-15.8
22.700	23.3	30.3	1.0	24.3	31.3	48.0	-16.7

Note : Please see appendix 1 for Plotted Data

5.4 Result Data Calculation

The result data is calculated by adding the Factor (including LISN insertion loss and cable loss) to the measured reading. The basic equation with a sample calculation is as follows:

RESULT = READING + FACTOR

5.5 Conducted Measurement Equipment

The following test equipment are used during the conducted test .

Equipment	Manufacturer	Model No.	Next Cal. Due
RF Test Receiver	Rohde and Schwarz	ESH3	01/10/2000
Spectrum Monitor	Rohde and Schwarz	EZM	N.C.R.
Line Impedance Stabilization network	Kyoritsu	KNW-407	11/30/1999
Plotter	Hewlett-Packard	7440A	N/A
Shielded Room	Riken		N.C.R.

6 ANTENNA REQUIREMENT

6.1 Standard Applicable

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.
And according to § 15.247 (b), if transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

6.2 Antenna Connected Construction

There are two kinds of antenna for WL-1000 product, and is configuration by Eumitcom while manufacturing, one is PCB antenna with 2.7 dBi gain, the other is Dippole antenna with 3 dBi gain, this two antenna's specifications was attached.

The antenna connector is designed with permanent attachment (embeded by the case, the user can't dettach the Antenna without open the case) and no consideration of replacement. The antenna of this device is connected with a reversed type of SMA Connector, that is the male type with a whole and the femle type with a pin.

Note: Please see Appendix 2 for Plotted Data

7 HOPPING CHANNEL SEPARATION

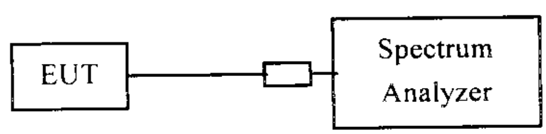
7.1 Standard Applicable

According to 15.247(a)(1), frequency hopping system shall have, hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

7.2 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 4 without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range.
3. By using the MaxHold function record the separation of two adjacent channels.
4. Measure the frequency difference of these two adjacent channels by SA MARK function. And then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.

Figure 4 : Emission bandwidth measurement configuration.



7.3 Measurement Equipment

Equipment	Manufacturer	Model No.	Next Cal. Due
Micro Wave EMI Test System	Hewlett-Packard	84125C	01/24/2000
Plotter	Hewlett-Packard	7440A	N/A

7.4 Measurement Data

Test Date : <u>AUG. 25, 1999</u> Temperature : <u>27 ℃</u> Humidity: <u>59 %</u>

a) Channel 02 : Adjacent Hopping Channel Separation is 1000kHz
b) Channel 42 : Adjacent Hopping Channel Separation is 1000kHz
c) Channel 80 : Adjacent Hopping Channel Separation is 1000kHz

Note: Please see Appendix 3 for Plotted Data

8 NUMBER OF HOPPING FREQUENCY USED

8.1 Standard Applicable

According to 15.247(a)(1)(ii), for frequency hopping system operating in the 2400-2483.5 MHz and 5725-5850 MHz bands shall use at least 75 hopping frequencies.

8.2 Measurement Procedure

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in figure 4 without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
3. Set the SA on MaxHold Mode, and then keep the EUT in hoppping mode. Record all the siganls from each channel until each one has been recorded.
4. Set the SA on View mode and then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.

8.3 Measurement Equipment

Equipment	Manufacturer	Model No.	Next Cal. Due
Micro Wave EMI Test System	Hewlett-Packard	84125C	01/24/2000
Attenuator	Weinschel Engineering	1	N/A

8.4 Measurement Data

Test Date : AUG. 25, 1999 Temperature : 27 ℃ Humidity: 59 %

There are 79 hopping frequencies in a hopping sequence.

Note: Please see Appendix 4 for Plotted Data

9 CHANNEL BANDWIDTH

9.1 Standard Applicable

According to 15.247(a)(1)(ii), for frequency hopping system operating in the 2400-2483.5 MHz and 5725-5850 MHz bands, the maximum 20dB bandwidth of the hopping channel is 1MHz.

9.2 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 4 without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

9.3 Measurement Equipment

Equipment	Manufacturer	Model No.	Next Cal. Due
Micro Wave EMI Test System	Hewlett-Packard	84125C	01/24/2000
Attenuator	Weinschel Engineering	1	N/A

9.4 Measurement Data

Test Date : AUG. 25, 1999 Temperature : 27 ℃ Humidity: 59 %

a) Channel 02 : Channel Bandwidth is 873 kHz
b) Channel 42 : Channel Bandwidth is 883 kHz
c) Channel 80 : Channel Bandwidth is 877 kHz

Note: Please see Appendix 5 for Plotted Data

10 DWELL TIME ON EACH CHANNEL

10.1 Standard Applicable

According to 15.247(a)(1)(ii), for frequency hopping system operating in the 2400-2483.5 MHz and 5725-5850 MHz bands, the average time of occupancy on any frequency shall not be greater than 0.4 second within a 30-second period.

10.2 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 4 without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
3. Adjust the center frequency of SA on any frequency be measured and set SA to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
4. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
5. Repeat above procedures until all frequencies measured were complete.

10.3 Measurement Equipment

Equipment	Manufacturer	Model No.	Next Cal. Due
Micro Wave EMI Test System	Hewlett-Packard	84125C	01/24/2000
Attenuator	Weinschel Engineering	1	N/A

10.4 Measurement Data

Test Date : AUG. 25, 1999 Temperature : 27 ℃ Humidity: 59 %

a) Channel 02 : the dwell time is $76.7 \times 5 = 383.5$ ms
b) Channel 42 : the dwell time is $76.7 \times 5 = 383.5$ ms
c) Channel 80 : the dwell time is $76.7 \times 5 = 383.5$ ms

In normal operation, for there is a empty cycle time of 3.3 ms, therefore the total hopping duration time between two transmission for each channel is $80 \times 79 = 6.32$ s. And there are only five transmissions in a 30-second period.

Note: Please see Appendix 6 for plotted data

11 OUTPUT POWER MEASUREMENT

11.1 Standard Applicable

For direct sequence system, according to 15.247(b), the maximum peak output power of the transmitter shall not exceed 1 Watt. If transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

11.2 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 4 without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
3. Set RBW of spectrum analyzer to 1 MHz and VBW to 1 MHz.
4. Measure the highest amplitude appearing on spectral display and record the level to calculate result data.
5. Repeat above procedures until all frequencies measured were complete.

11.3 Measurement Equipment

Equipment	Manufacturer	Model No.	Next Cal. Due
Micro Wave EMI Test System	Hewlett-Packard	84125C	01/24/2000
Attenuator	Weinschel Engineering	1	N/A

11.4 Measurement Data

Test Date : AUG. 25, 1999   Temperature : 27 ℃   Humidity: 59 %

a) Channel 02 : Output Peak Power is 17.33 dBm = **54.08** mW
b) Channel 42 : Output Peak Power is 18.00 dBm = **63.10** mW
c) Channel 80 : Output Peak Power is 17.17 dBm = **52.12** mW

Note: Please see Appendix 7 for Plotted Data

12 100 kHz BANDWIDTH OF BAND EDGES MEASUREMENT

12.1 Standard Applicable

According to 15.247(c), if any 100 kHz bandwidth outside these frequency bands, the radio frequency power that is produced by the modulation products of the spreading sequence, the information sequence and the carrier frequency shall be either at least 20 dB below that in any 100 kHz bandwidth within the band that contains the highest level of the desired power or shall not exceed the general levels specified in § 15.209(a), whichever results in the lesser attenuation.

12.2 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 4 without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
3. Set both RBW and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

12.3 Measurement Equipment

Equipment	Manufacturer	Model No.	Next Cal. Due
Micro Wave EMI Test System	Hewlett-Packard	84125C	01/24/2000
Plotter	Hewlett-Packard	7440A	N/A

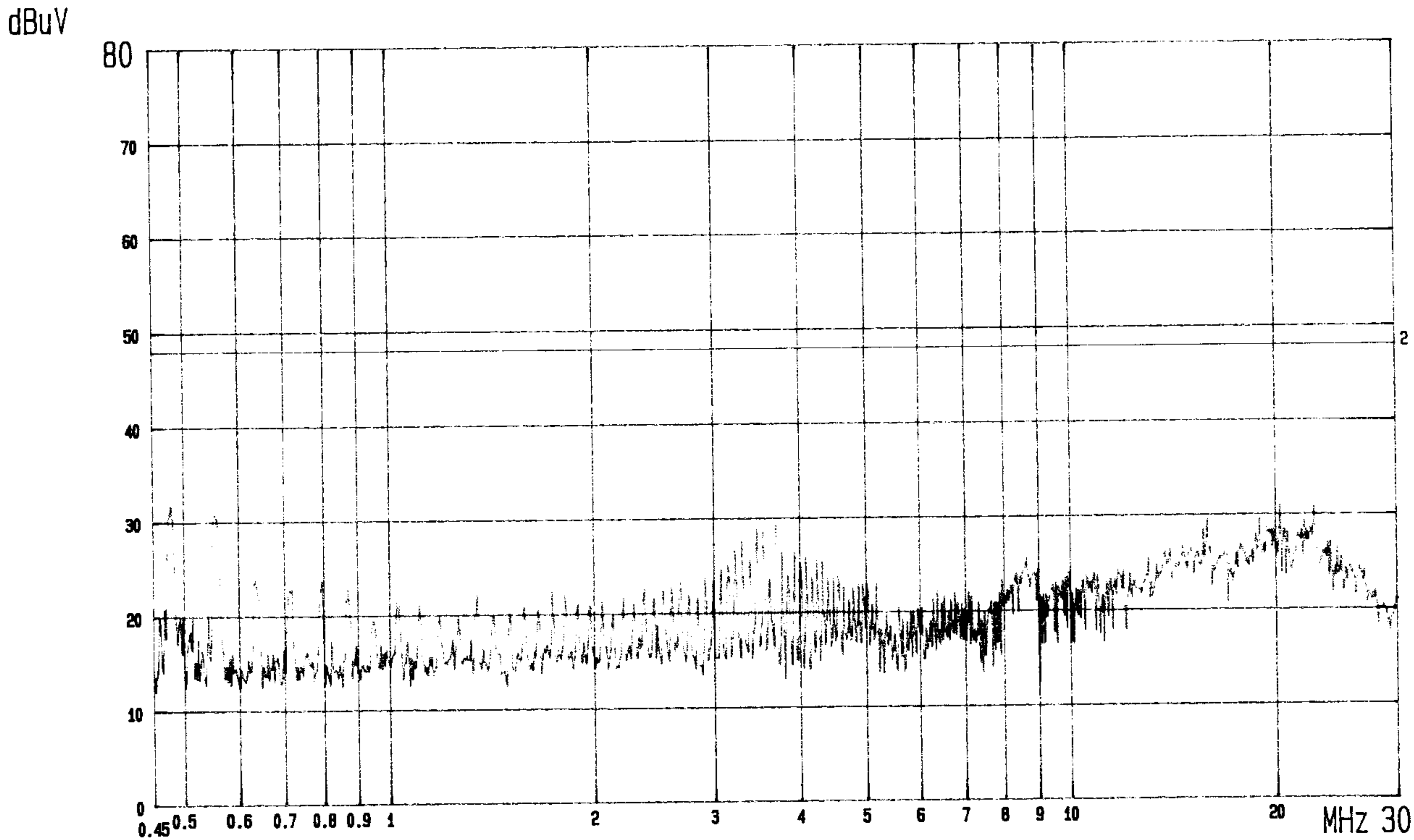
12.4 Measurement Data

Test Date : AUG. 25, 1999 Temperature : 27 ℃ Humidity: 59 %

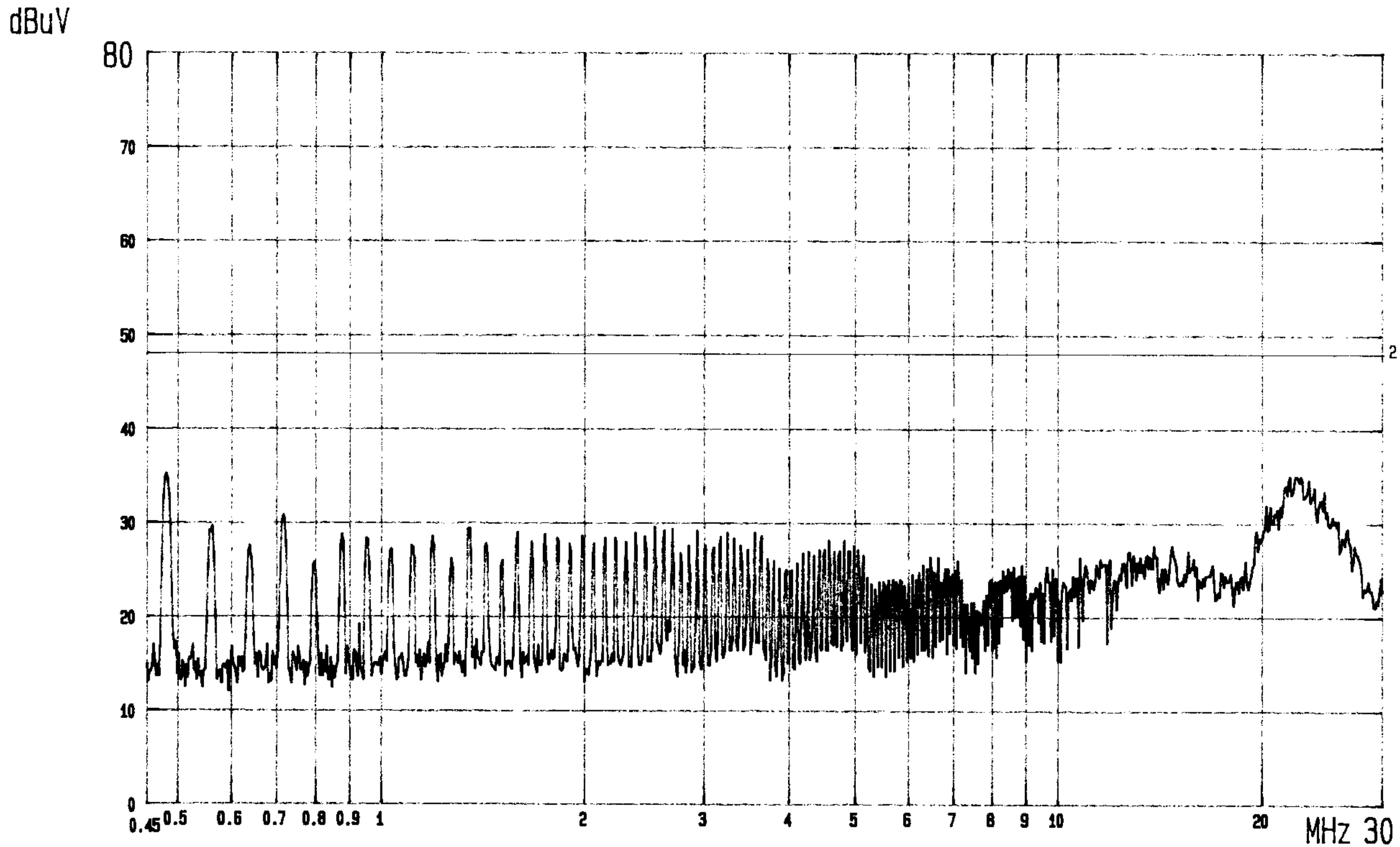
a) Lower Band Edge : All emissions in this 100kHz bandwidth are attenuated more than 50dB from the carrier.
b) Upper Band Edge : All emissions in this 100kHz bandwidth are attenuated more than 50dB from the carrier.

Note: Please see Appendix 8 for Plotted Data

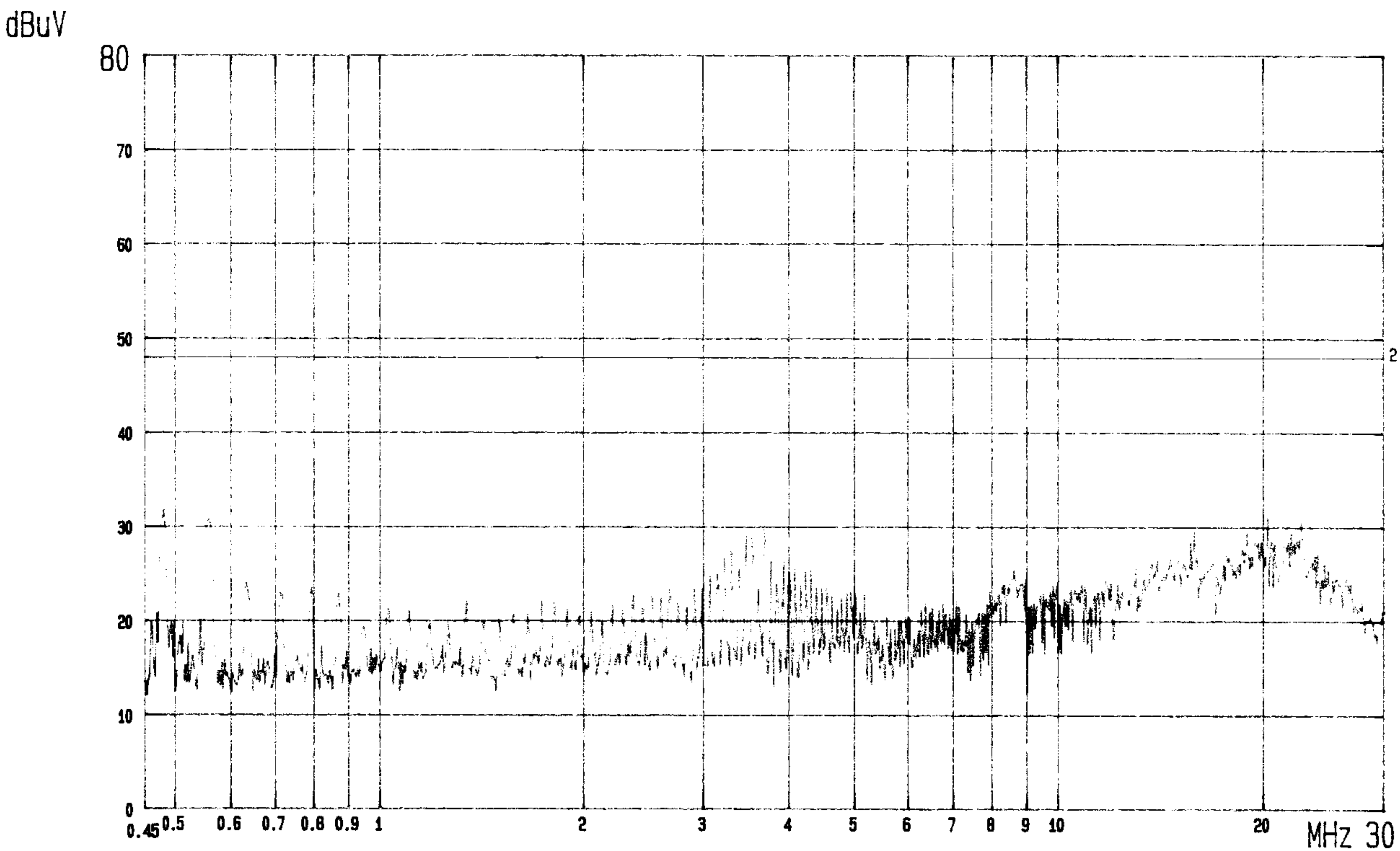
Appendix 1 : Plotted Data of Power Line Conducted Emissions



FCC CONDUCTED TEST   EUT: Wireless PCMCIA Card   LISN: N   2: Q.P., CLASS B LIMIT
MODEL: WL-1000   MODE: 2402MHZ (TX/RX)   POWER: FROM NOTEBOOK PC   ETC EMI LAB.

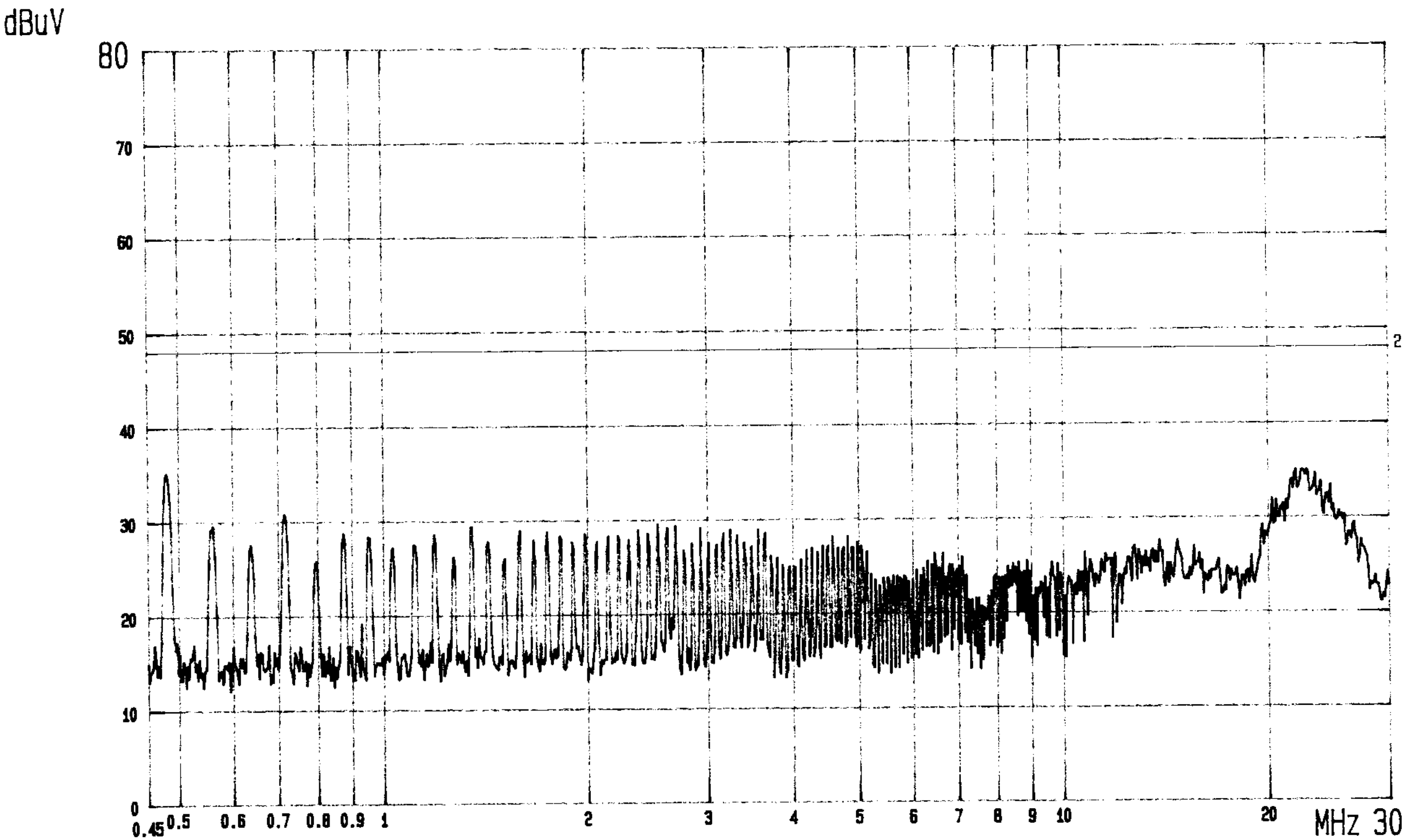


FCC CONDUCTED TEST   EUT: Wireless PCMCIA Card   LISN: L1   2: Q.P., CLASS B LIMIT
MODEL: WL-1000   MODE: 2402MHZ (TX/RX)   POWER: FROM NOTEBOOK PC   ETC EMI LAB.

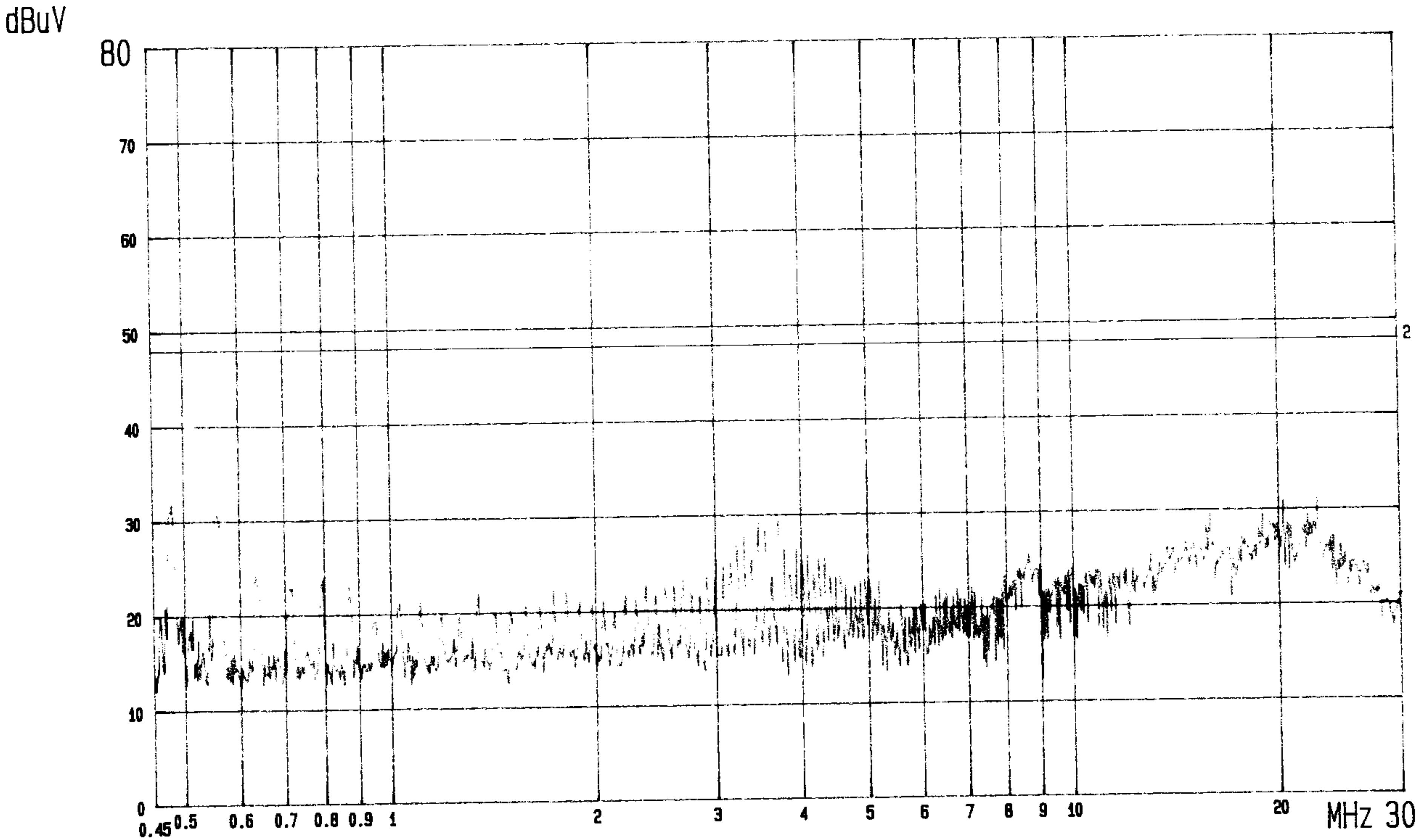


|---

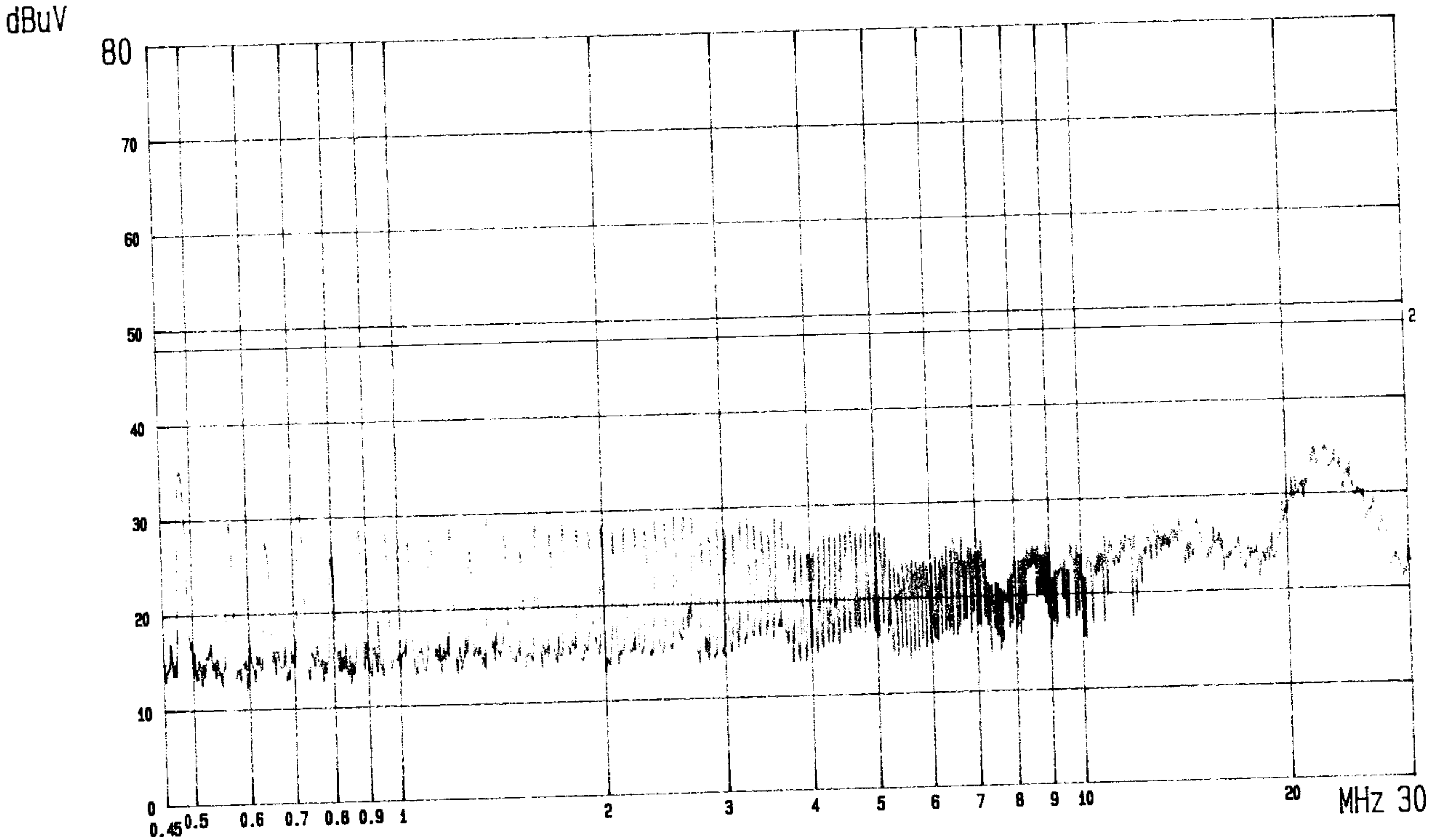
FCC CONDUCTED TEST   EUT: Wireless PCMCIA Card   LISN: N   2: Q.P., CLASS B LIMIT
MODEL: WL-1000   MODE: 2442MHZ (TX/RX)   POWER: FROM NOTEBOOK PC   ETC EMI LAB.



FCC CONDUCTED TEST EUT: Wireless PCMCIA Card LISN: L1 2: Q.P., CLASS B LIMIT
MODEL: WL-1000 MODE: 2442MHZ (TX/RX) POWER: FROM NOTEBOOK PC ETC EMI LAB.



FCC CONDUCTED TEST EUT: Wireless PCMCIA Card LISN: N 2: Q.P., CLASS B LIMIT
MODEL: WL-1000 MODE: 2480MHZ (TX/RX) POWER: FROM NOTEBOOK PC ETC EMI LAB.



|---
FCC CONDUCTED TEST   EUT: Wireless PCMCIA Card   LISN: L1   2: Q.P., CLASS B LIMIT
MODEL: WL-1000   MODE: 2480MHZ (TX/RX)   POWER: FROM NOTEBOOK PC   ETC EMI LAB.

Appendix 2 : Plotted Data for Antenna Connected Construction

Antenna configuration:

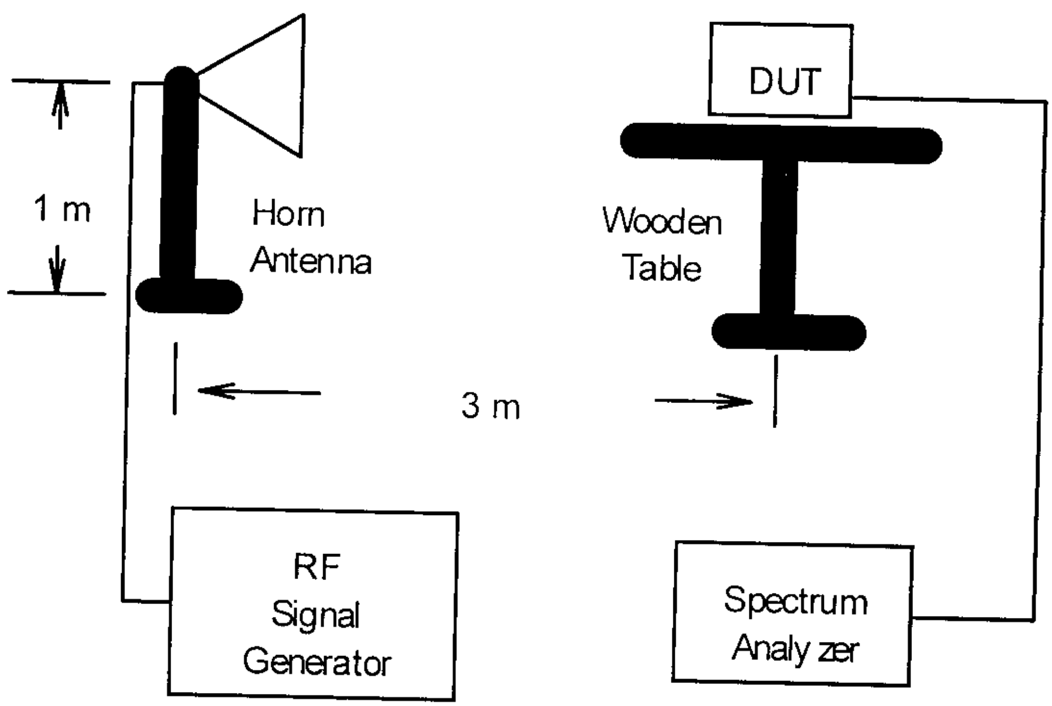
There are two kinds of antenna for WL-1000 product, and is configuration by Eumitcom while manufacturing , one is PCB antenna with 2.7 dBi gain, the other is Dipole antenna with 3 dBi gain, this two antenna's specifications was attached below.

To: Fm: Steven Chang	WLAN-RF-FH-ant-990827 Date: 1999/8/27 Total: 5 page(s)
Subj: The PCB antenna pattern of WLAN FH Product WL-1000	

I. Description:

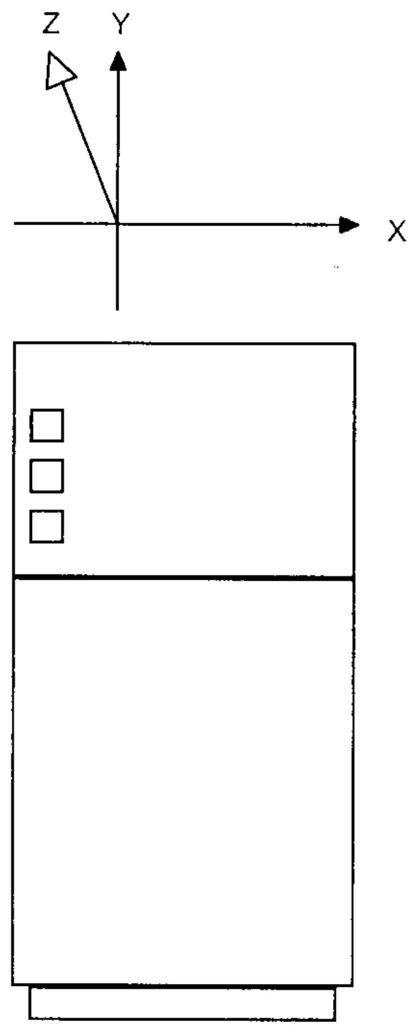
Here provides the PCB antenna pattern of WLAN FH Product WL-1000.

2.Test setup:



3. Test result:

There were 3 plots of the result figures: figure WL-1000 (X-Y) , figure WL-1000 (X-Z), figure WL-1000 (Y-Z). The figure WL-1000 (X-Y) means the measure was done by rotated the D.U.T in the X-Y plane. The definition about X, Y, Z, plane was below:

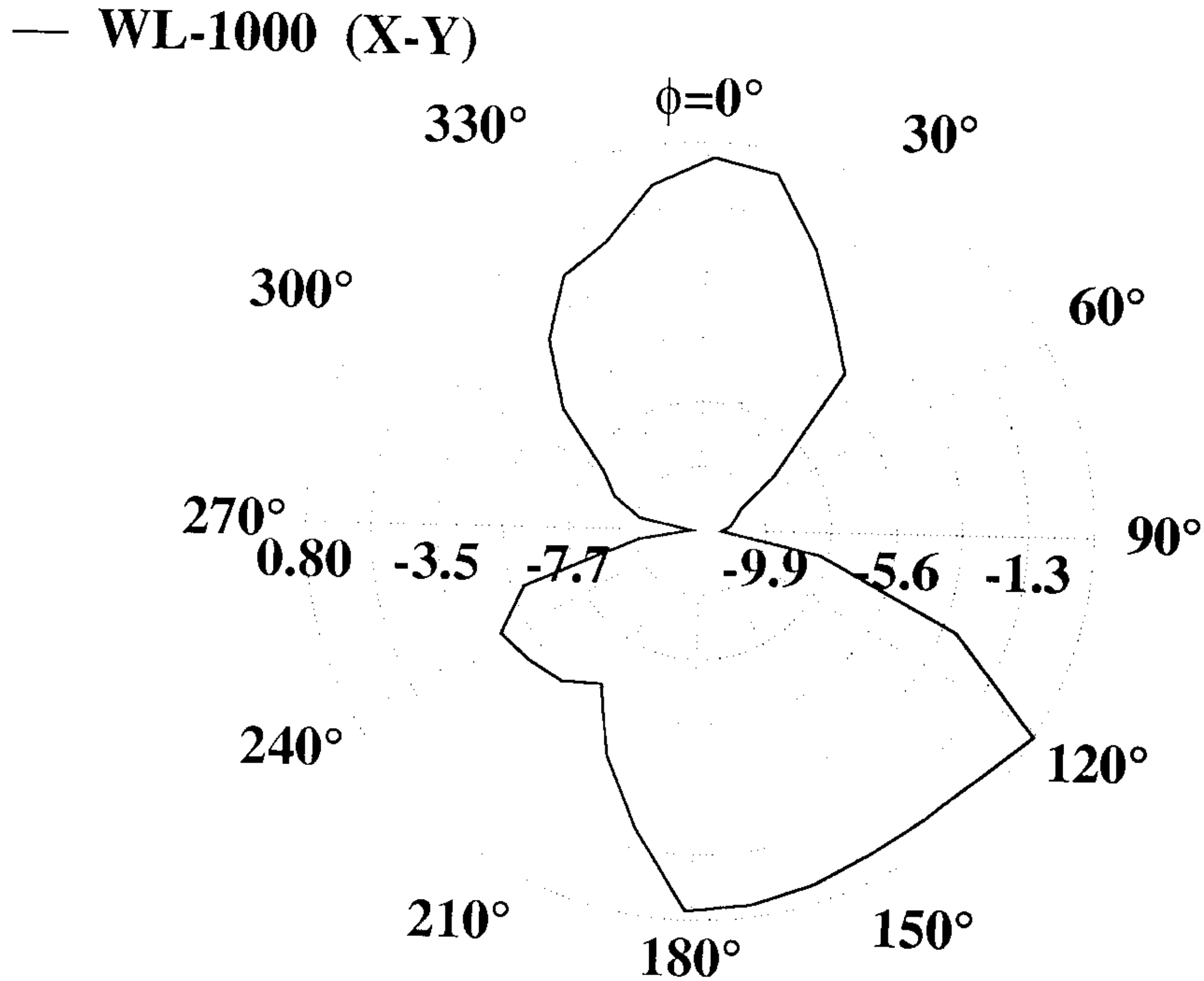


Top view

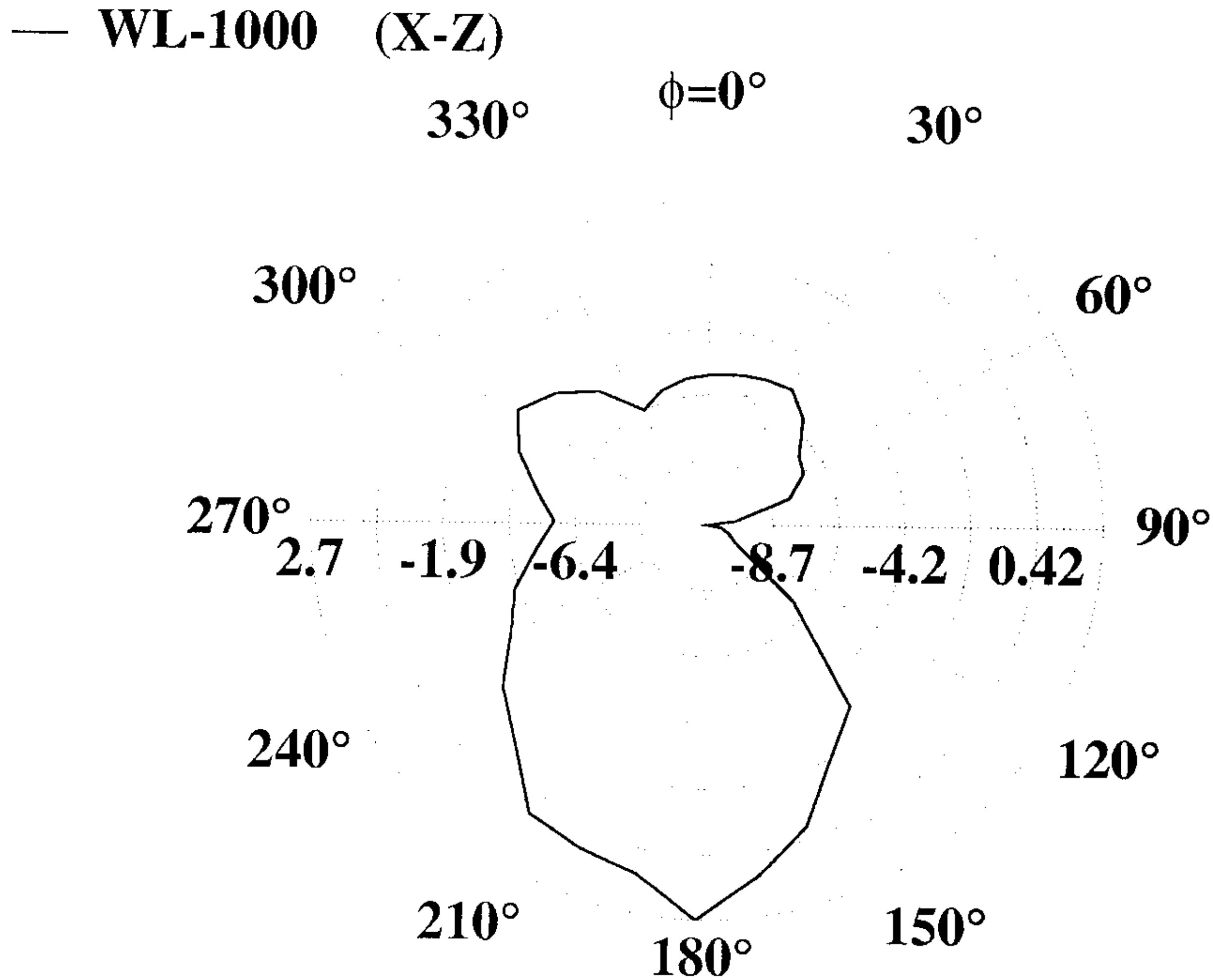
3.1 Antenna Gain:

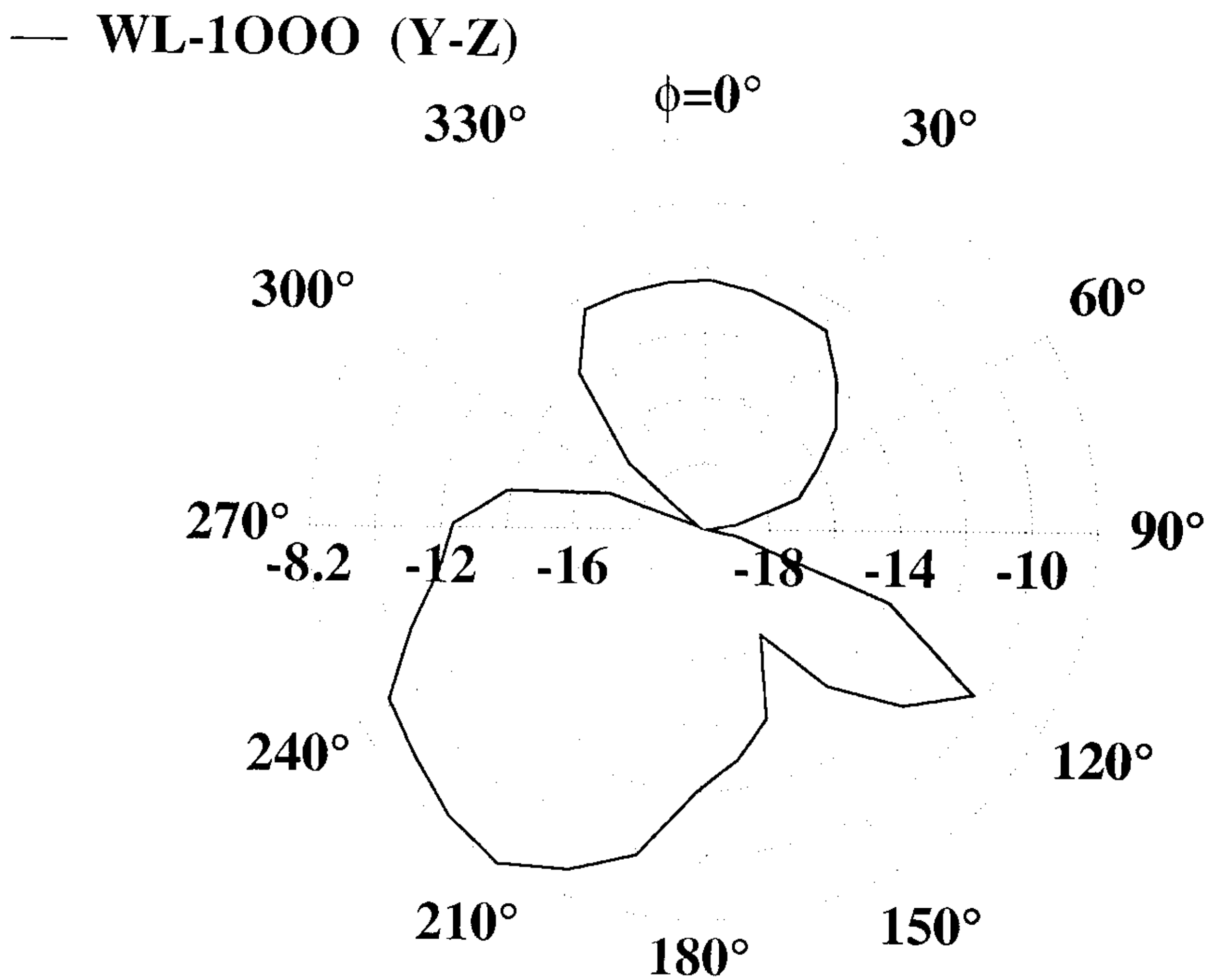
The results shown the PCB antenna has the maximum gain 2.7dBi in the figure WL-1000 (X-Z).

4.Antenna pattern:



— WL-1000 (X-Y)
φ=0°
30°
60°
90°
120°
150°
180°
210°
240°
270°
300°
330°
0.80
-3.5
-7.7
-9.9
-5.6
-1.3


— WL-1000 (X-Z)
φ=0°
330°
30°
300°
60°
270°
90°
2.7
-1.9
-6.4
-8.7
-4.2
0.42
240°
120°
210°
150°
180°



— WL-1OOO (Y-Z)
φ=0°
330°
30°
300°
60°
270°
90°
-8.2
-12
-16
-18
-14
-10
240°
120°
210°
180°
150°

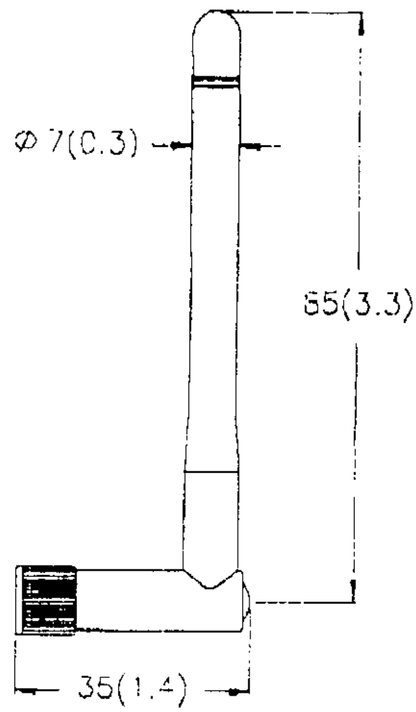
To:	WLAN-RF-FH-ant-990831
Fm: Steven Chang	Date: 1999/8/31
	Total: 4 page(s)
Subj: The Dipole antenna of WLAN FH Product WL-1000	

I. Description:

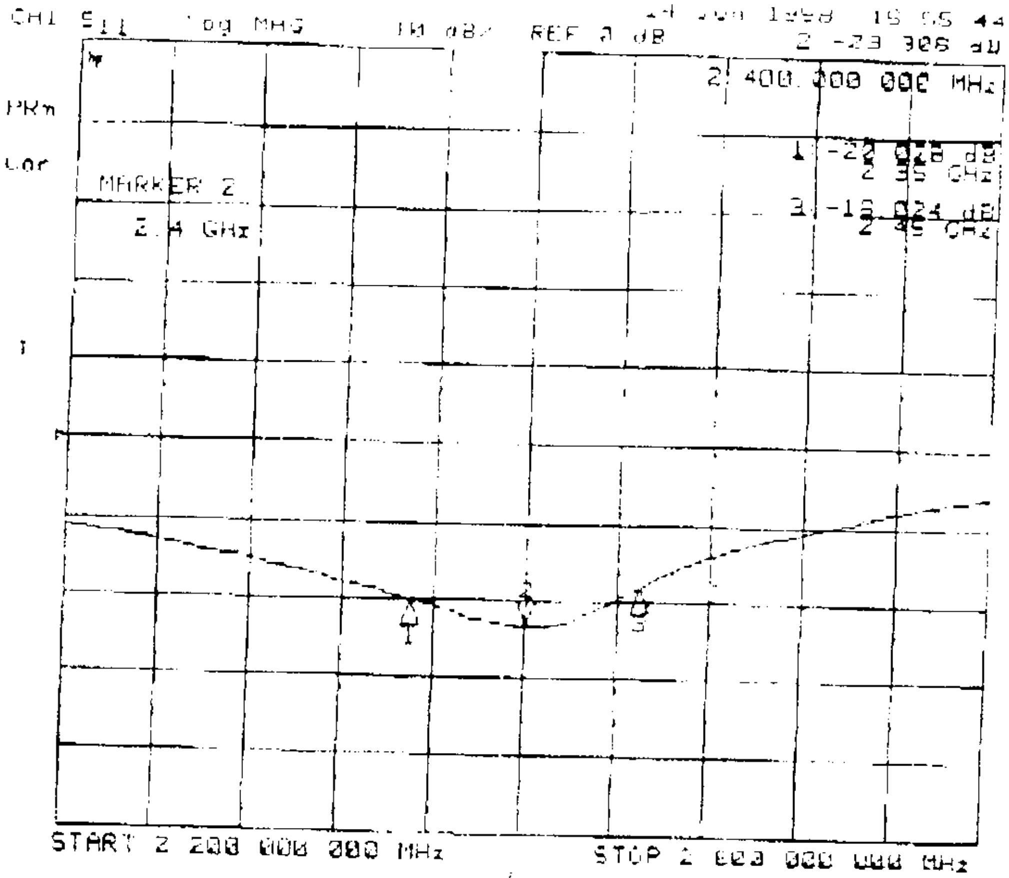
Here provides the Dipole antenna specification of WLAN FH Product WL-1000.

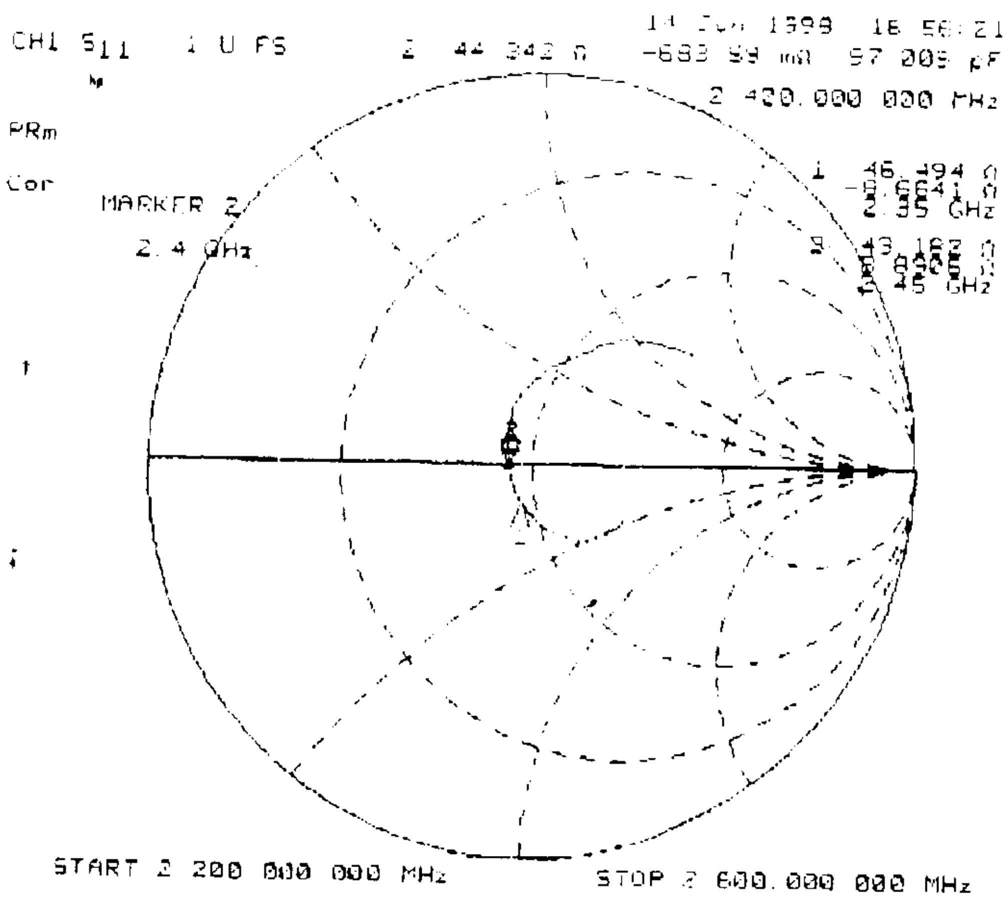
Technical Data

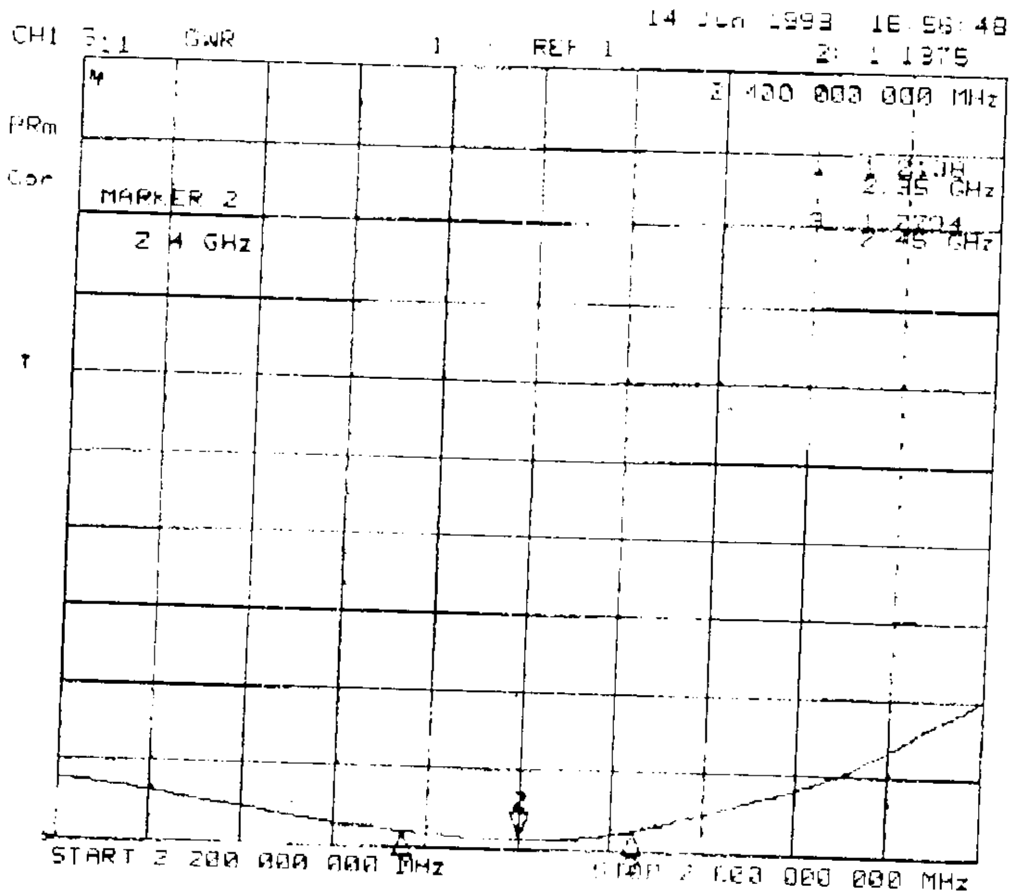
Electrical Properties	
Frequency Range	2.4 - 2.5 GHz
Impedance	50 ohms nominal
Gain	3 dBi
Pattern	Omni
VSWR	≤ 2.0
R.F. Power Handling	1 W(CW) @25° C, min.
Polarization	Vertical
Connector	Reverse SMA-male



Unit: mm (inch)

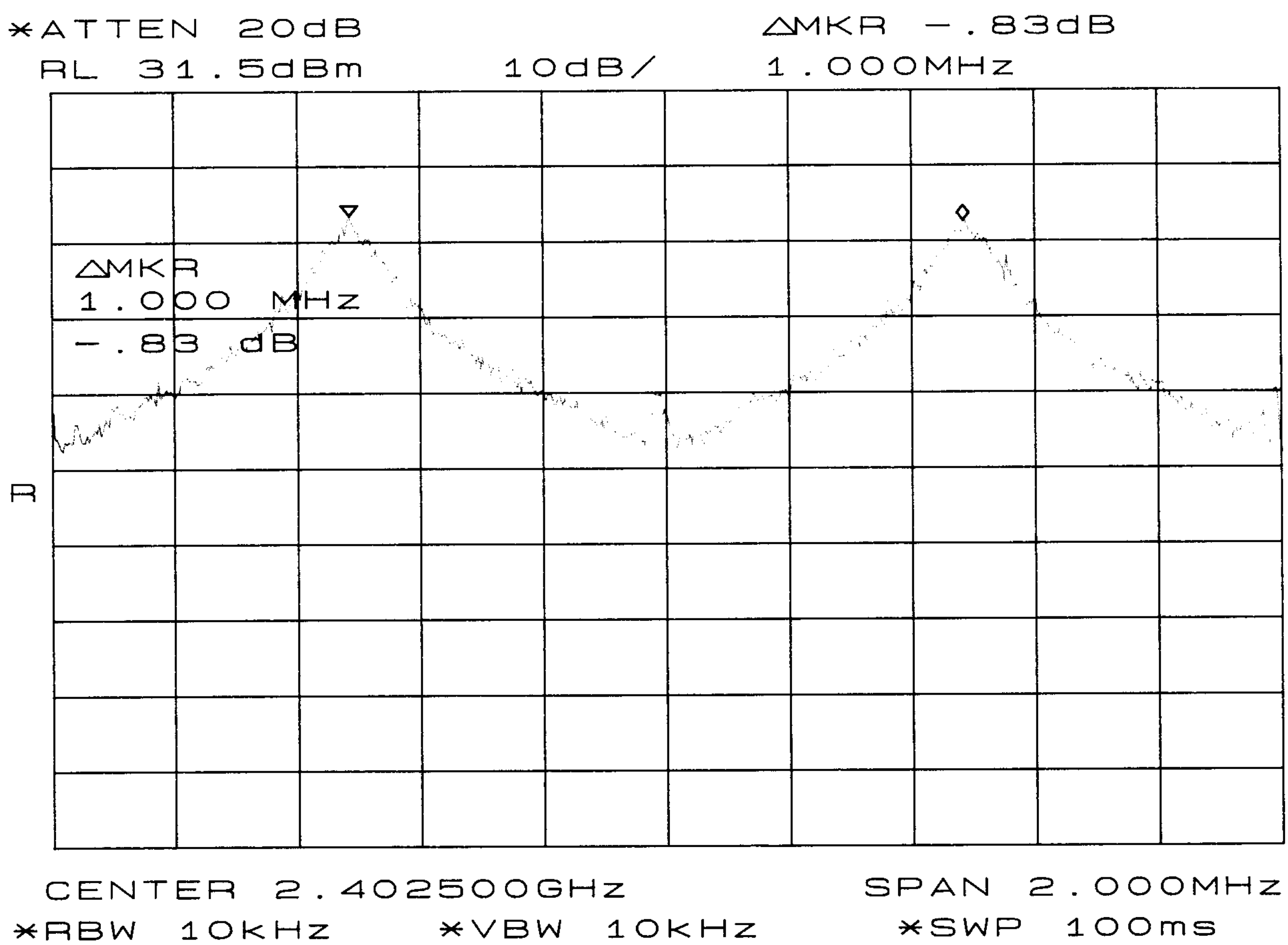

CH1 S11 log MAG 10 dB/ REF 0 dB
2 -23.306 dB
2 400.000 000 MHz
PRm
Cor
MARKER 2
2.4 GHz
START 2 200.000 000 MHz
STOP 2 600.000 000 MHz


CH1 S11 1 U FS 2 44.342 Ω -683.59 mΩ 97.005 pF
14 Jun 1998 16:56:21
2 420.000 000 MHz
PRm
Cor
MARKER 2
2.4 GHz
1 46.494 Ω
2.35 GHz
START 2 200.000 000 MHz
STOP 2 600.000 000 MHz

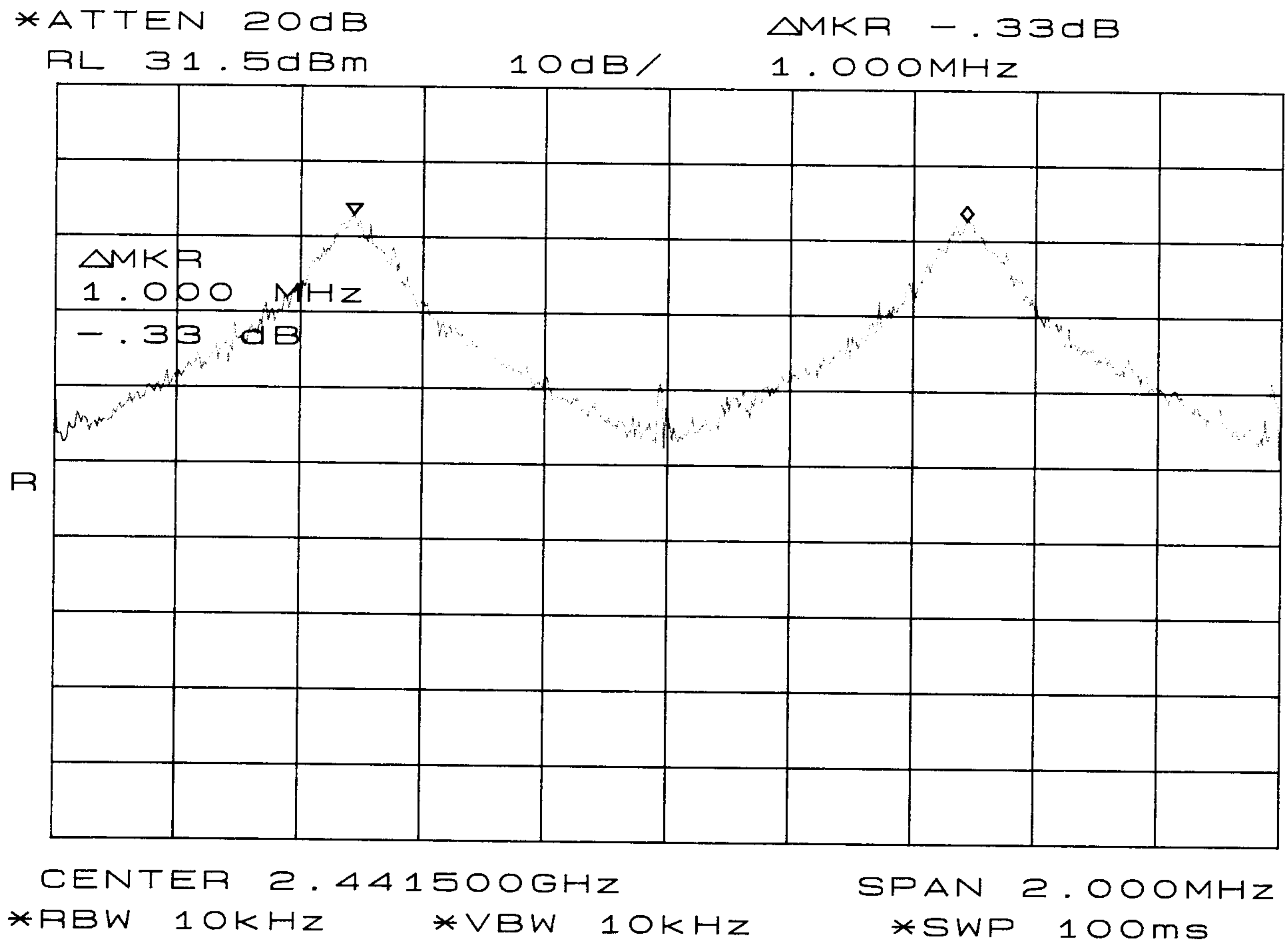


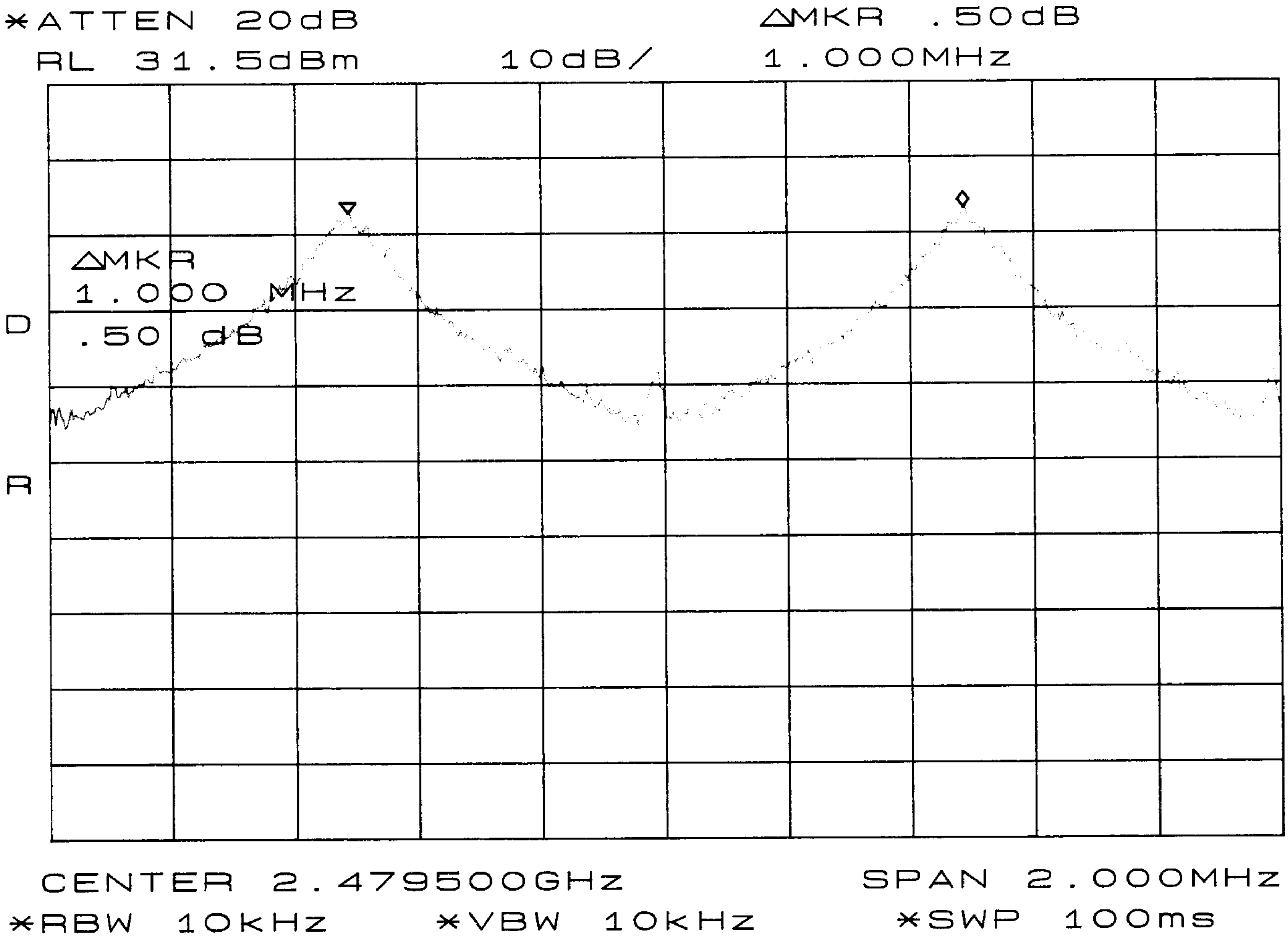
14 Jun 1993 16:56:48
CH1
REF 1
400 000 000 MHz
PRm
MARKER 2
2.4 GHz
2.35 GHz
START 2 200 000 000 MHz
000 000 MHz

Appendix 3 : Plotted Data for Separation of Adjacent Channel



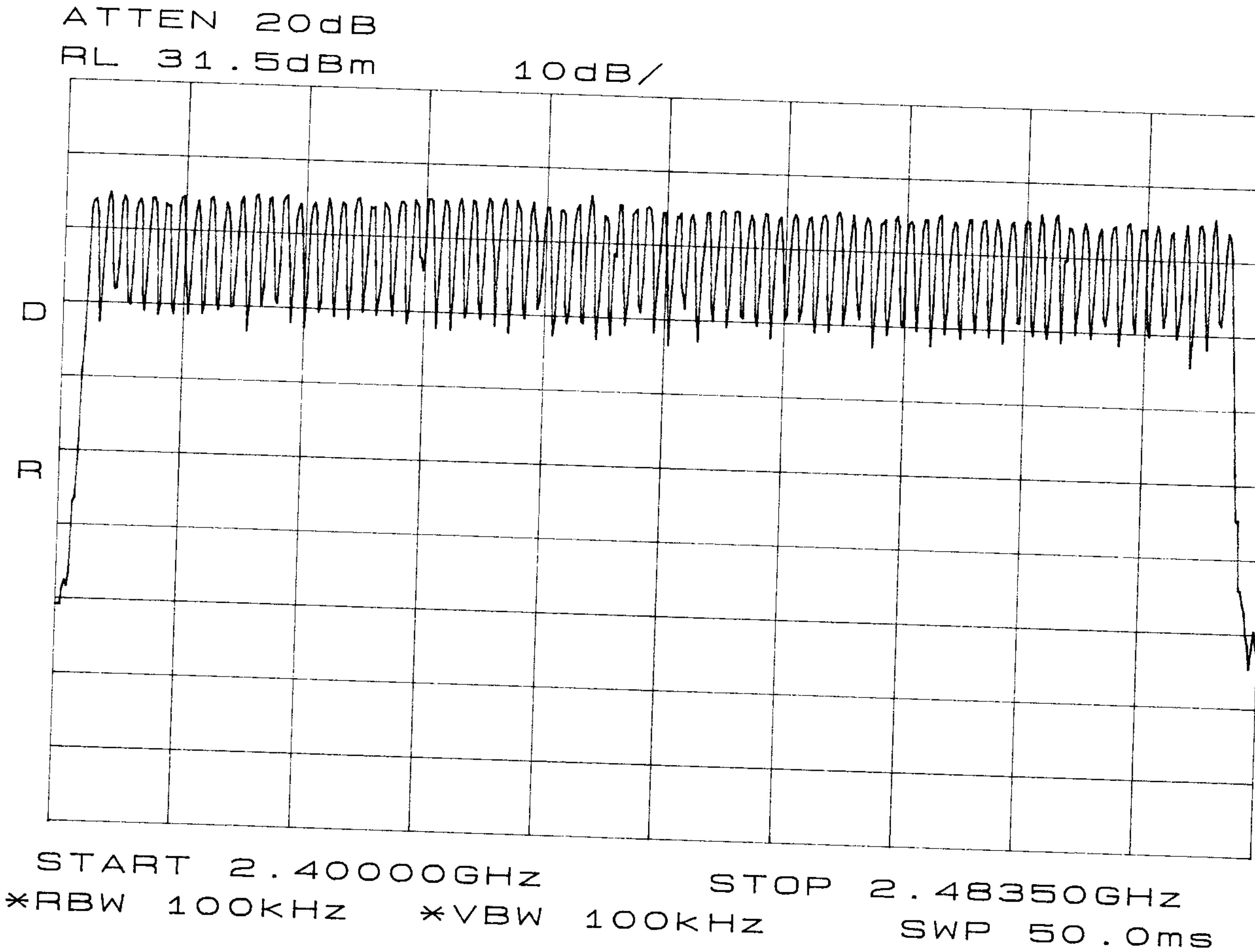
*ATTEN 20dB
RL 31.5dBm
10dB/
ΔMKR -.83dB
1.000MHz
ΔMKR
1.000 MHz
-.83 dB
R
CENTER 2.402500GHz
SPAN 2.000MHz
*RBW 10kHz
*VBW 10kHz
*SWP 100ms


*ATTEN 20dB
RL 31.5dBm
10dB/
ΔMKR -.33dB
1.000MHz
ΔMKR
1.000 MHz
-.33 dB
R
CENTER 2.441500GHz
SPAN 2.000MHz
*RBW 10kHz
*VBW 10kHz
*SWP 100ms

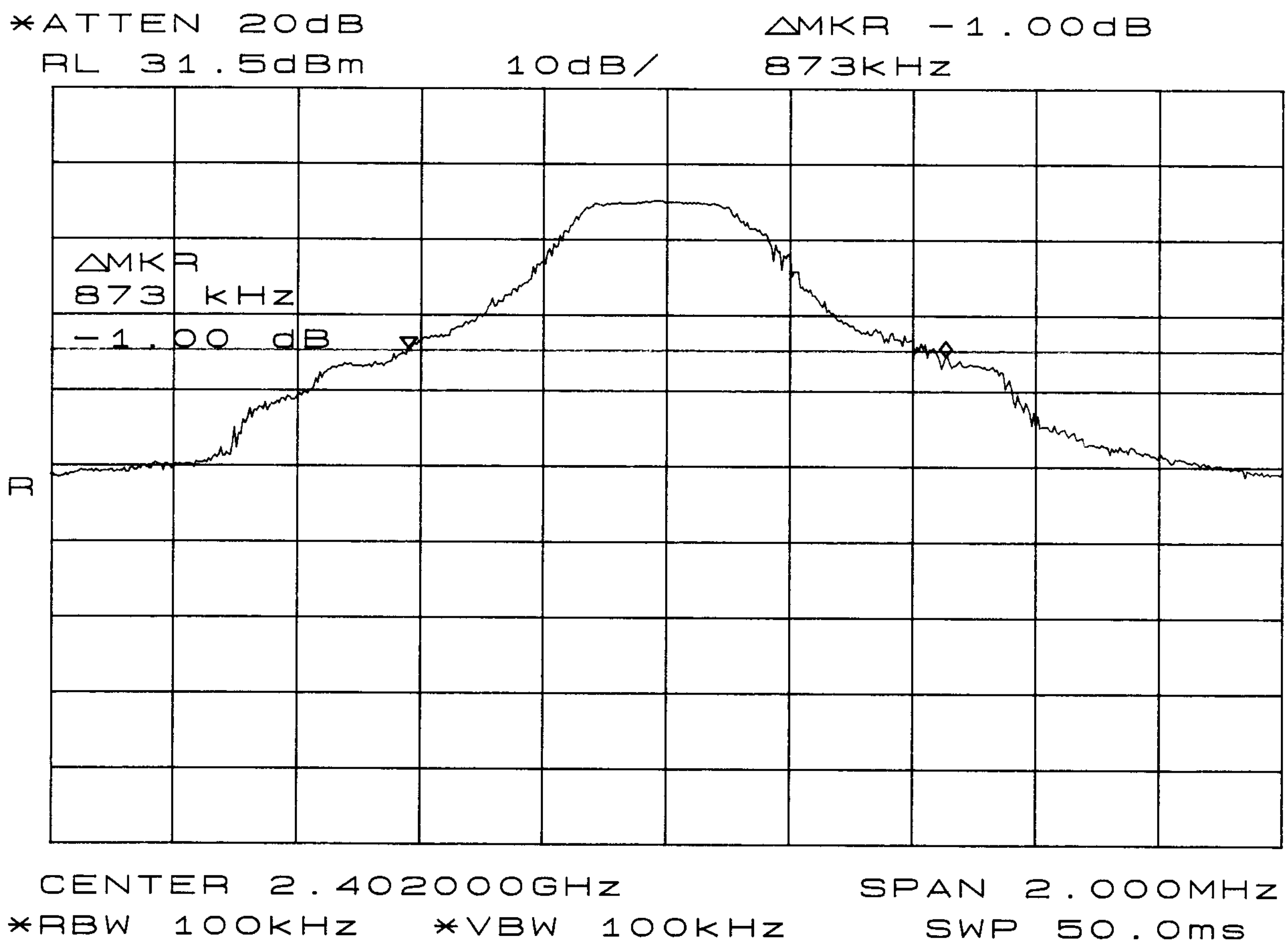


*ATTEN 20dB
RL 31.5dBm
10dB/
ΔMKR .50dB
1.000MHz
ΔMKR
1.000 MHz
.50 dB
D
R
CENTER 2.479500GHz
*RBW 10kHz
*VBW 10kHz
SPAN 2.000MHz
*SWP 100ms

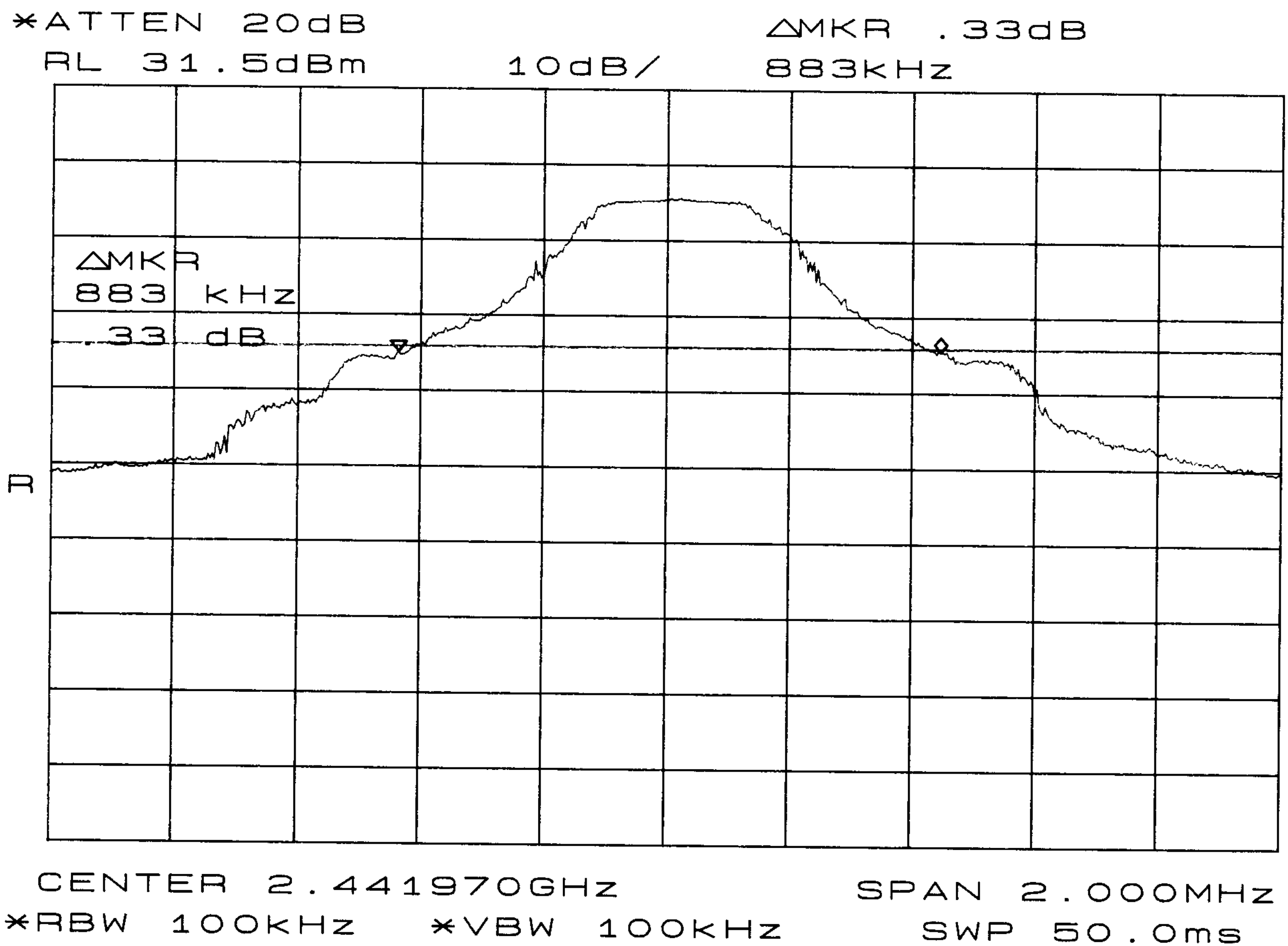
Appendix 4 : Plotted Data for Total Used Hopping Frequencies

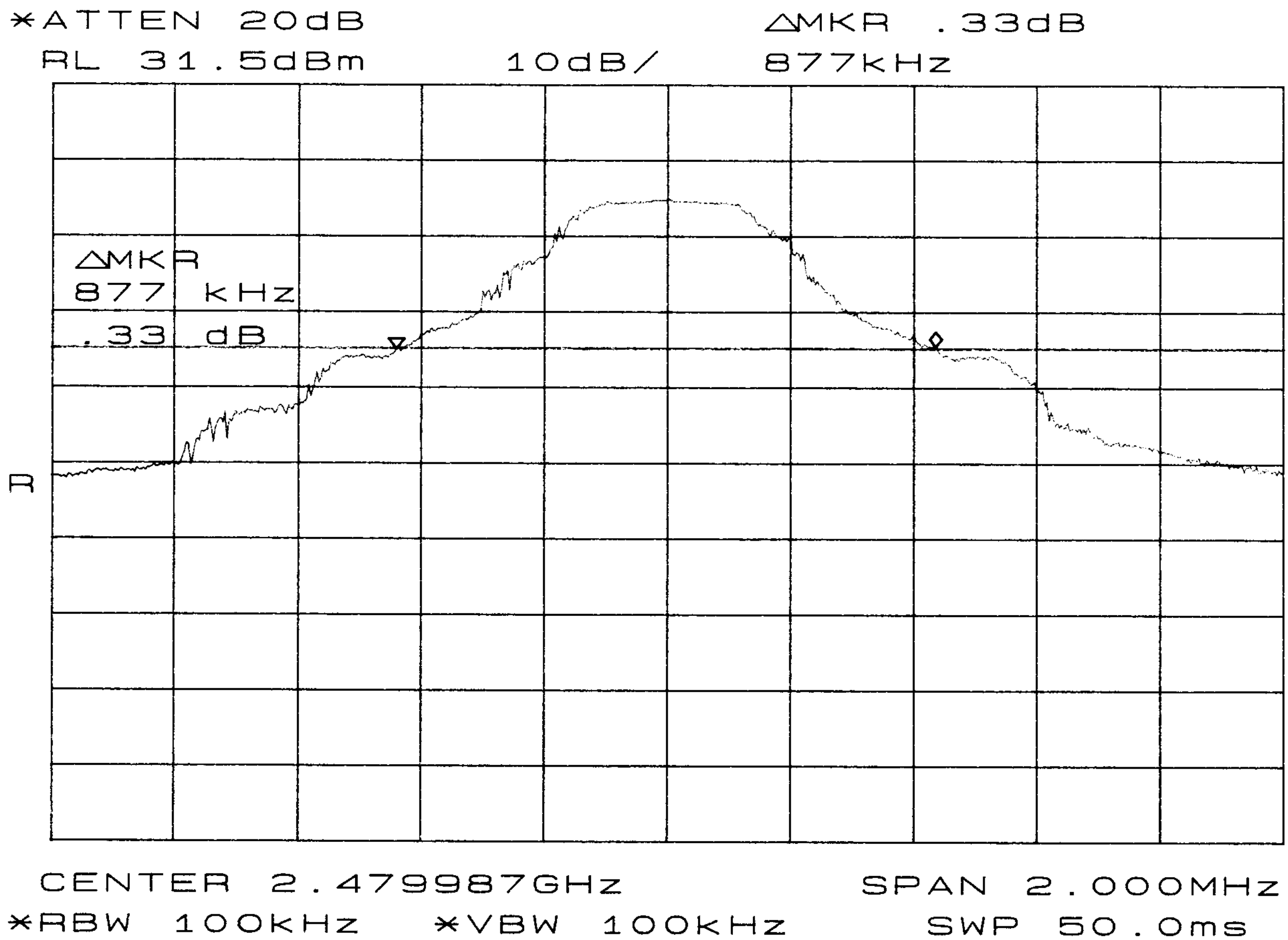

ATTEN 20dB
RL 31.5dBm
10dB/
D
R
START 2.40000GHz
STOP 2.48350GHz
*RBW 100kHz
*VBW 100kHz
SWP 50.0ms

Appendix 5 : Plotted Data for Channel Bandwidth



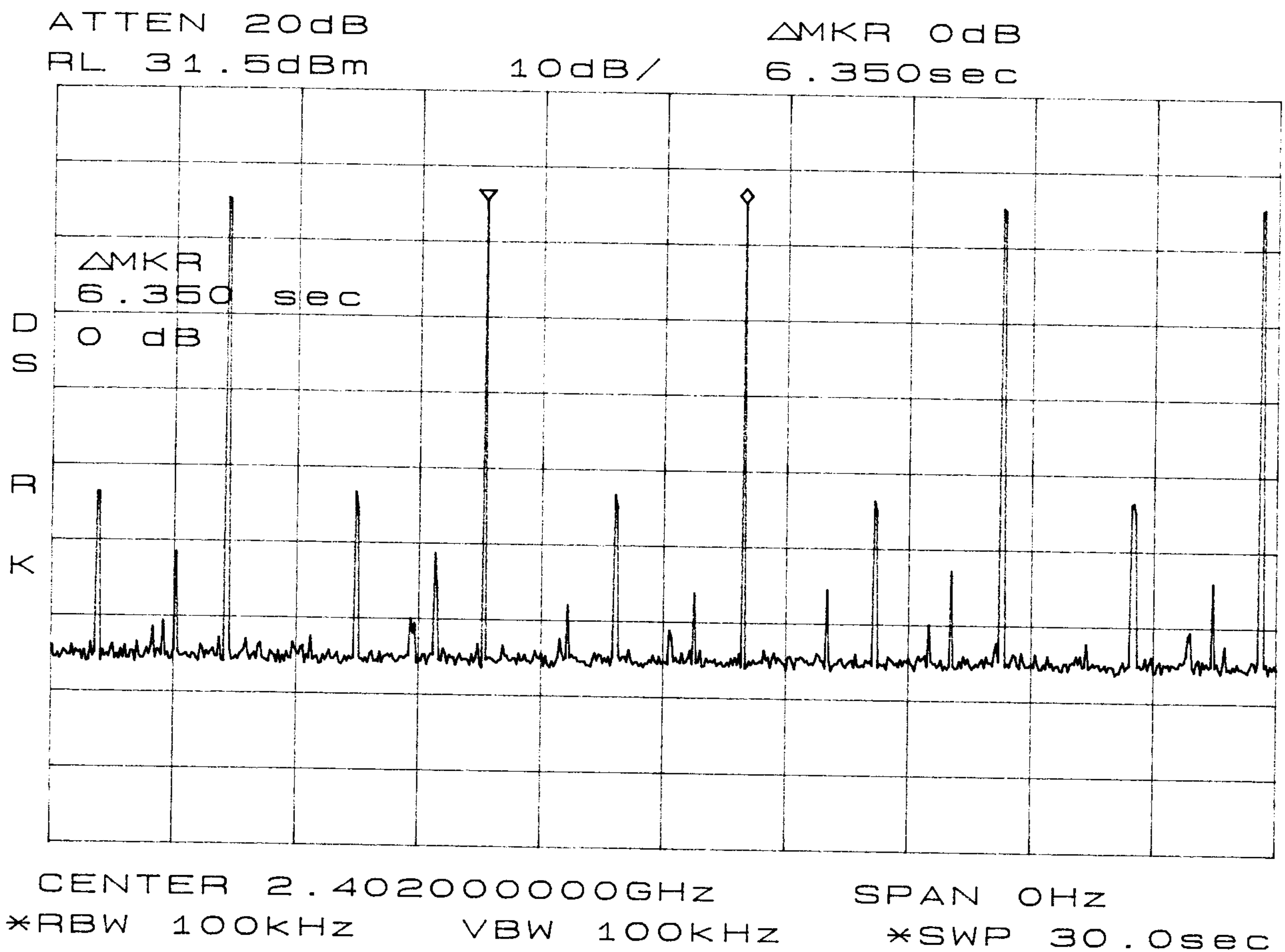
*ATTEN 20dB
RL 31.5dBm
10dB/
ΔMKR -1.00dB
873kHz
ΔMKR
873 kHz
-1.00 dB
R
CENTER 2.402000GHz
SPAN 2.000MHz
*RBW 100kHz
*VBW 100kHz
SWP 50.0ms

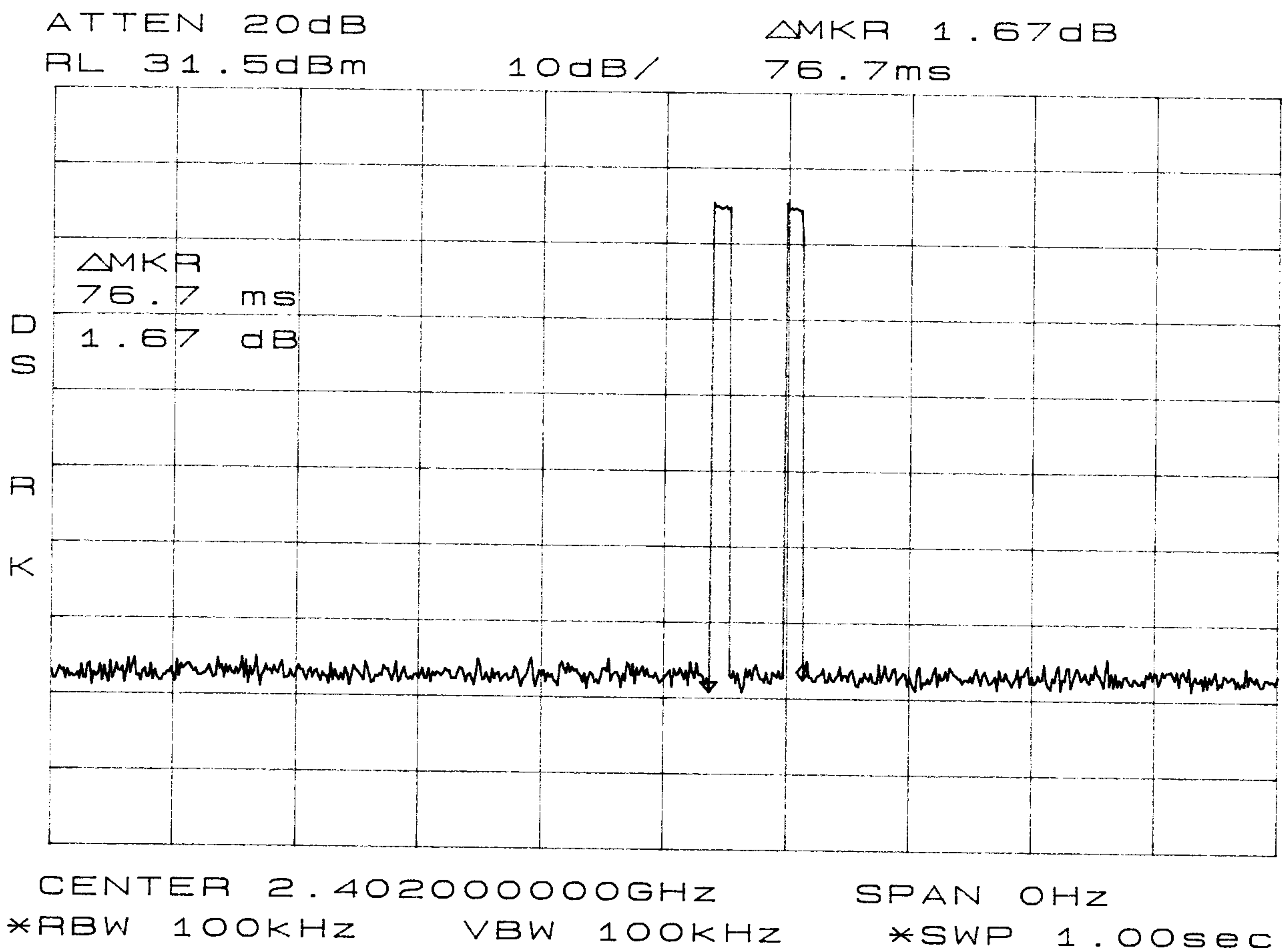

*ATTEN 20dB
RL 31.5dBm
10dB/
ΔMKR .33dB
883kHz
ΔMKR
883 kHz
.33 dB
R
CENTER 2.441970GHz
*RBW 100kHz
*VBW 100kHz
SPAN 2.000MHz
SWP 50.0ms



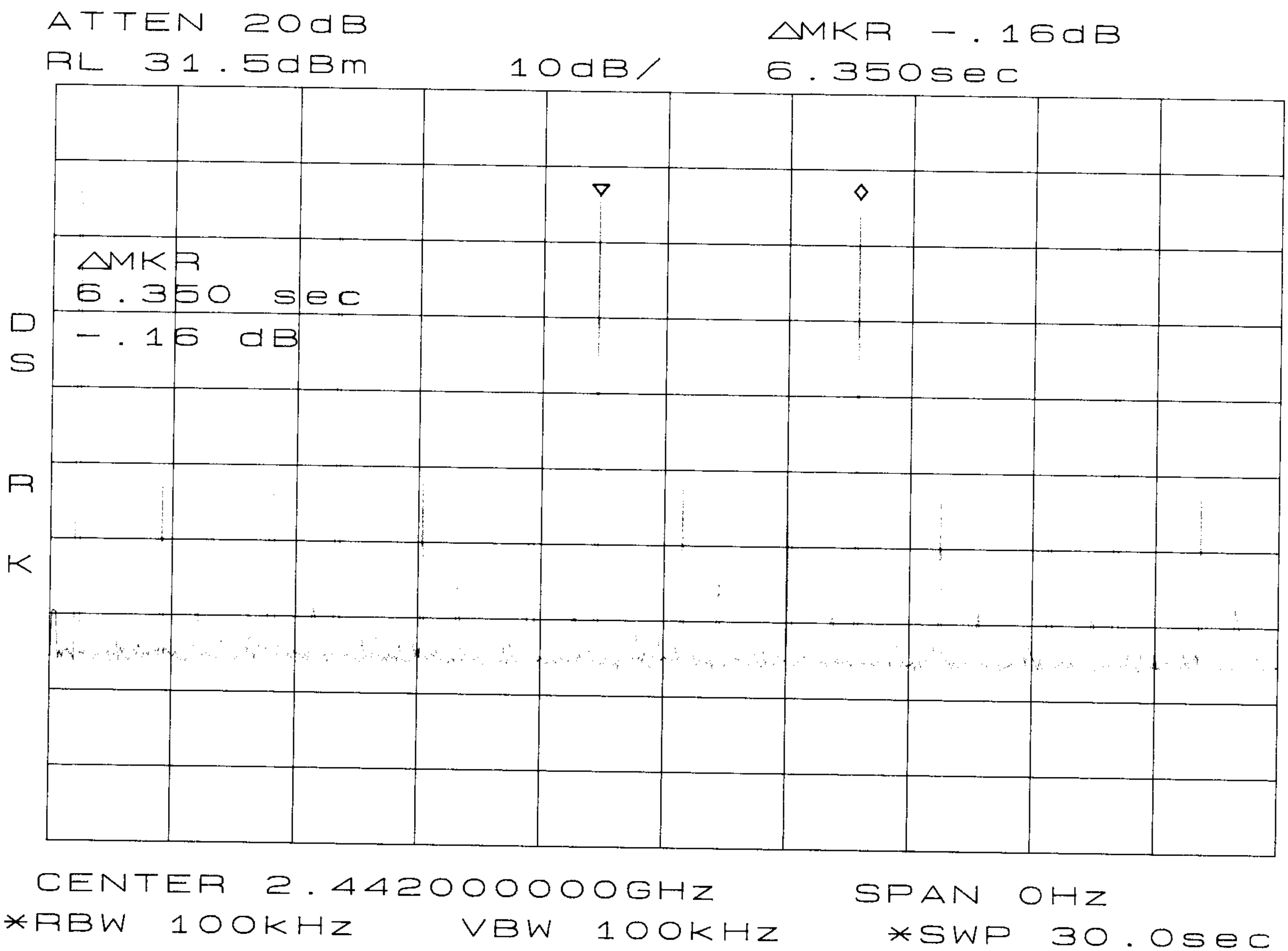
*ATTEN 20dB
RL 31.5dBm
10dB/
ΔMKR .33dB
877kHz
ΔMKR
877 kHz
.33 dB
R
CENTER 2.479987GHz
*RBW 100kHz
*VBW 100kHz
SPAN 2.000MHz
SWP 50.0ms

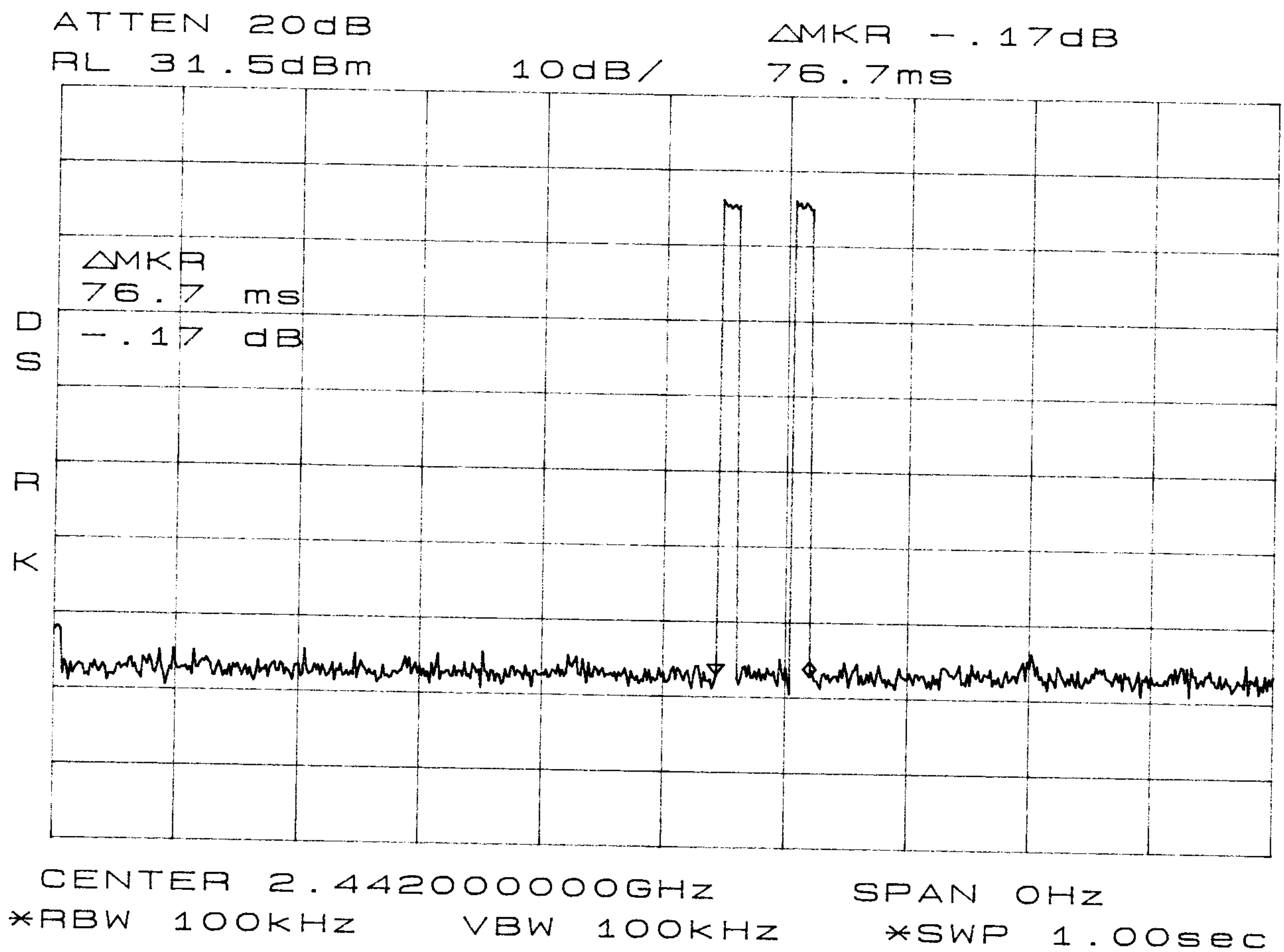
Appendix 6 : Plotted Data for Channel Dwell Time

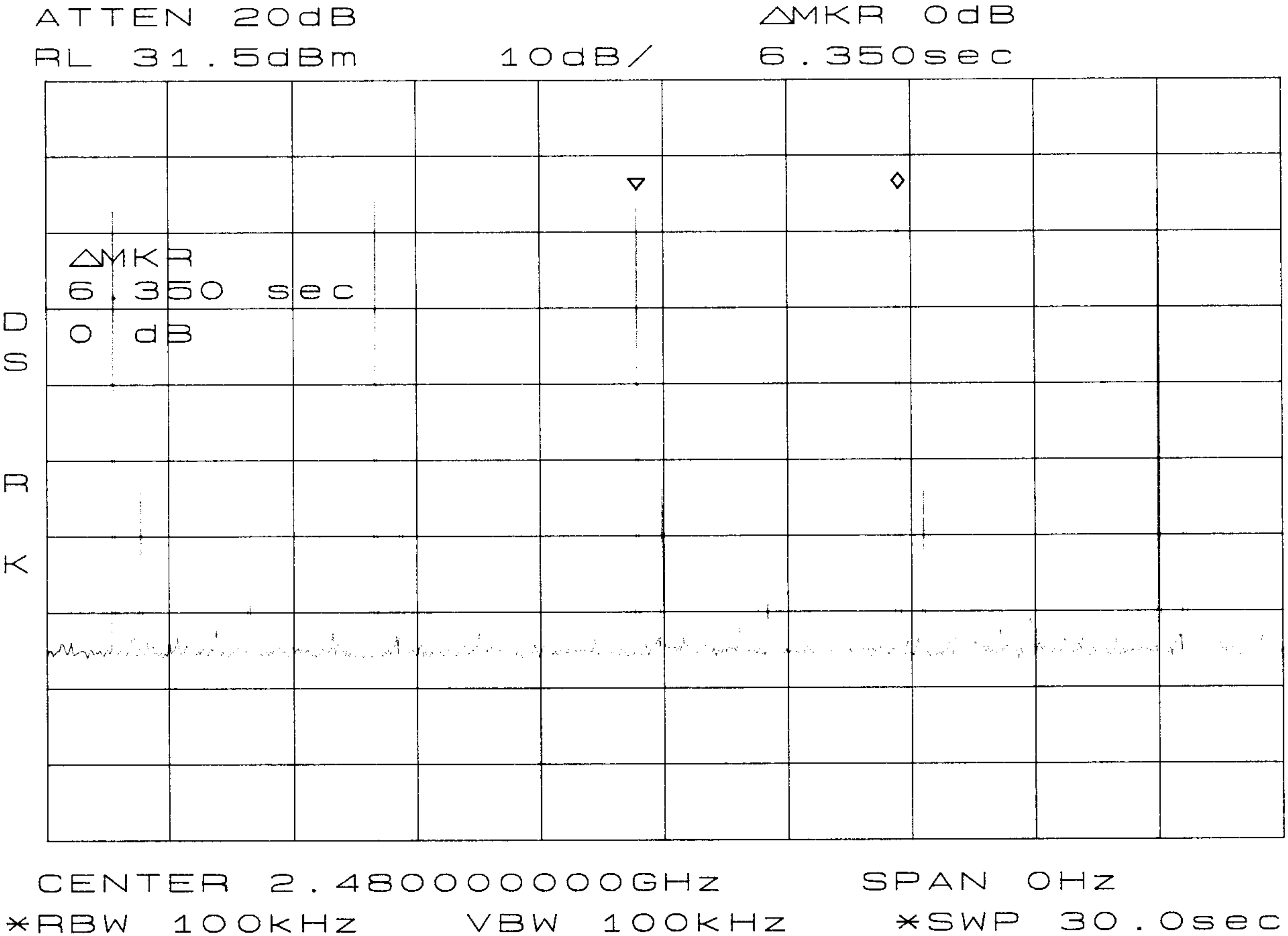

ATTEN 20dB
RL 31.5dBm
10dB/
ΔMKR 0dB
6.350sec
ΔMKR
6.350 sec
0 dB
D
S
R
K
CENTER 2.402000000GHz
SPAN 0Hz
*RBW 100kHz
VBW 100kHz
*SWP 30.0sec



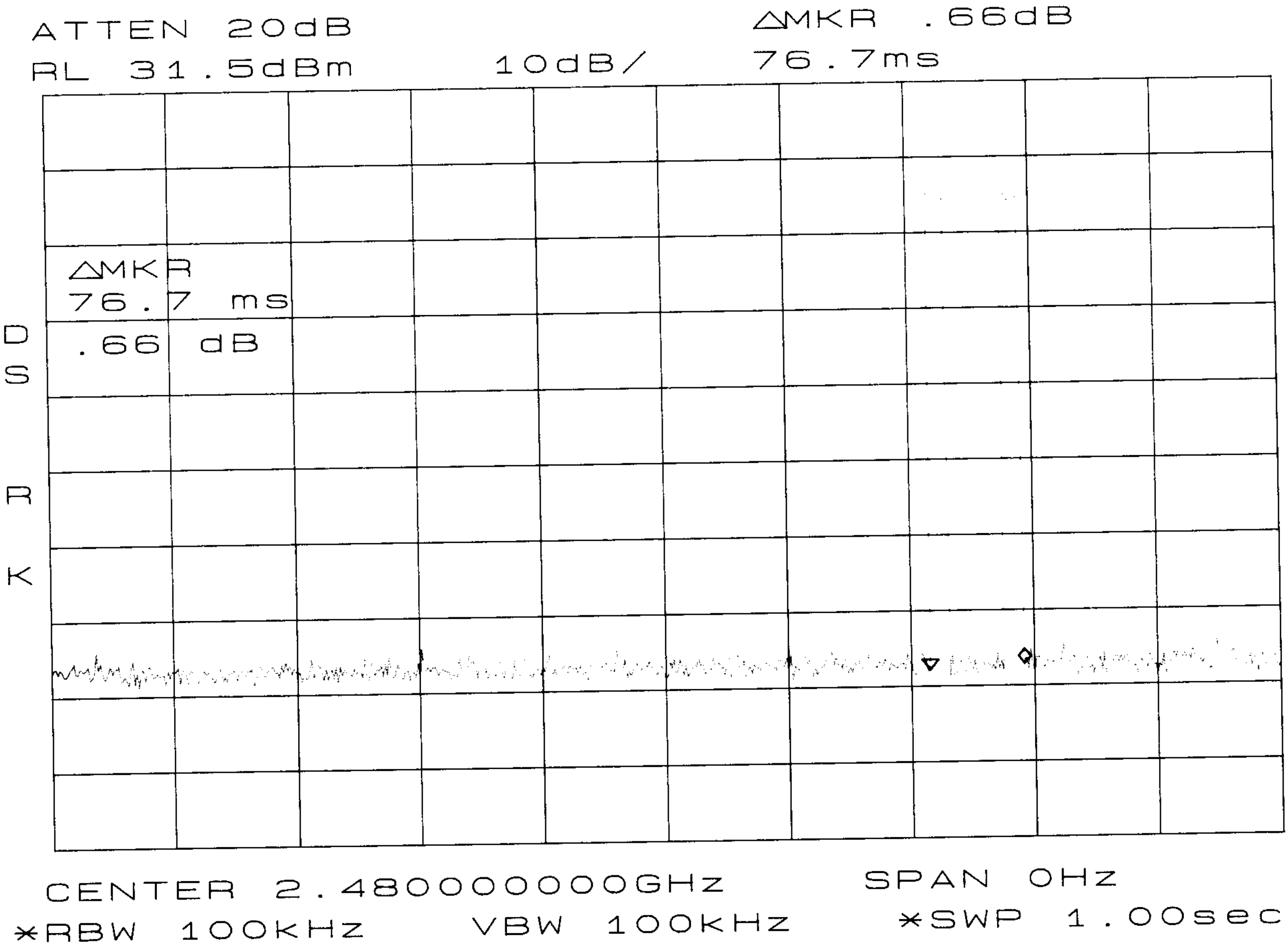
ATTEN 20dB
RL 31.5dBm
10dB/
ΔMKR 1.67dB
76.7ms
ΔMKR
76.7 ms
1.67 dB
D
S
R
K
CENTER 2.402000000GHz
SPAN 0Hz
*RBW 100kHz
VBW 100kHz
*SWP 1.00sec


ATTEN 20dB
RL 31.5dBm
10dB/
ΔMKR -.16dB
6.350sec
ΔMKR
6.350 sec
-.16 dB
D
S
R
K
CENTER 2.442000000GHz
SPAN 0Hz
*RBW 100kHz
VBW 100kHz
*SWP 30.0sec

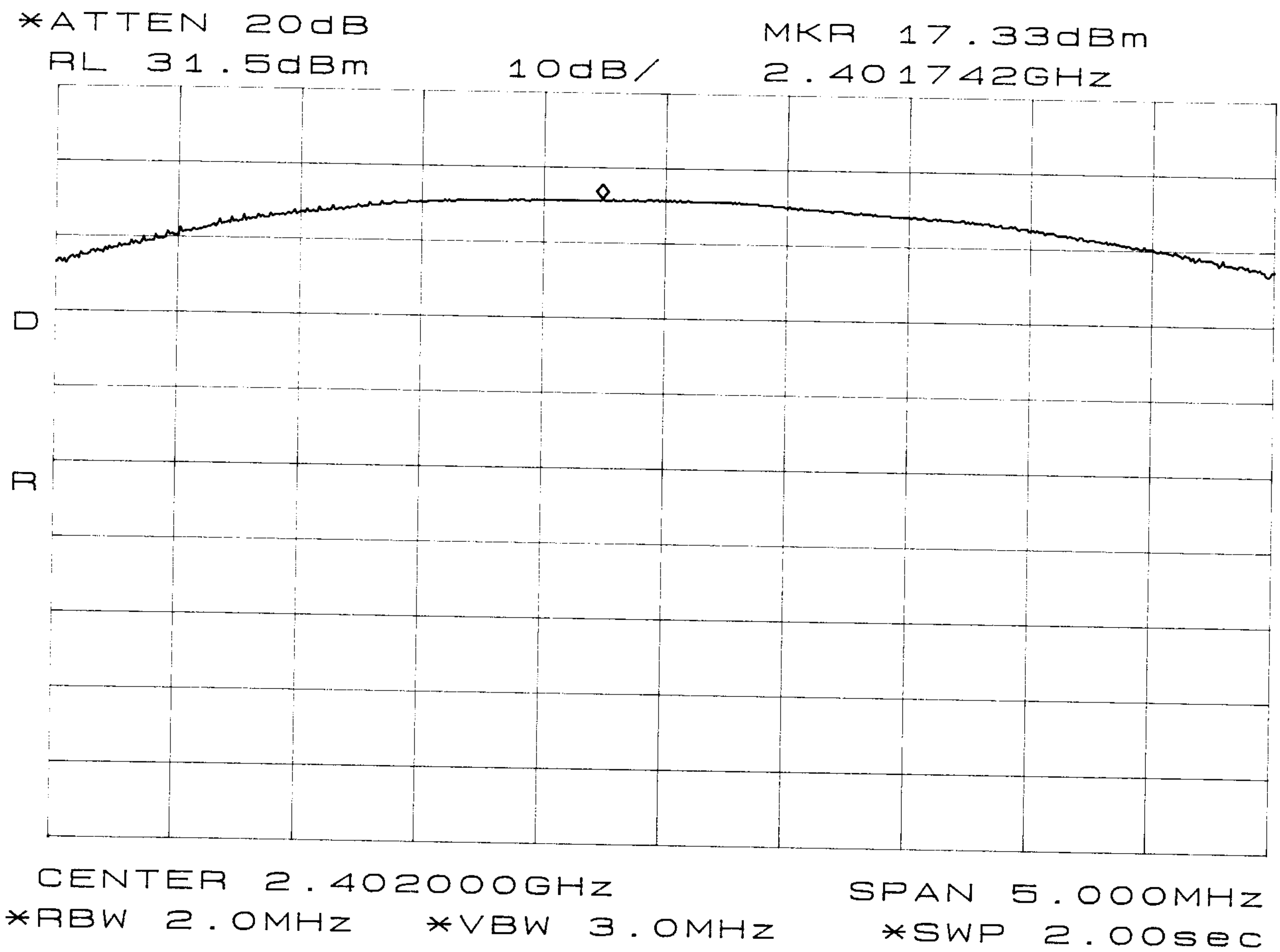

ATTEN 20dB
RL 31.5dBm
10dB/
ΔMKR −.17dB
76.7ms
ΔMKR
76.7 ms
−.17 dB
D
S
R
K
CENTER 2.442000000GHz
SPAN 0Hz
*RBW 100kHz
VBW 100kHz
*SWP 1.00sec

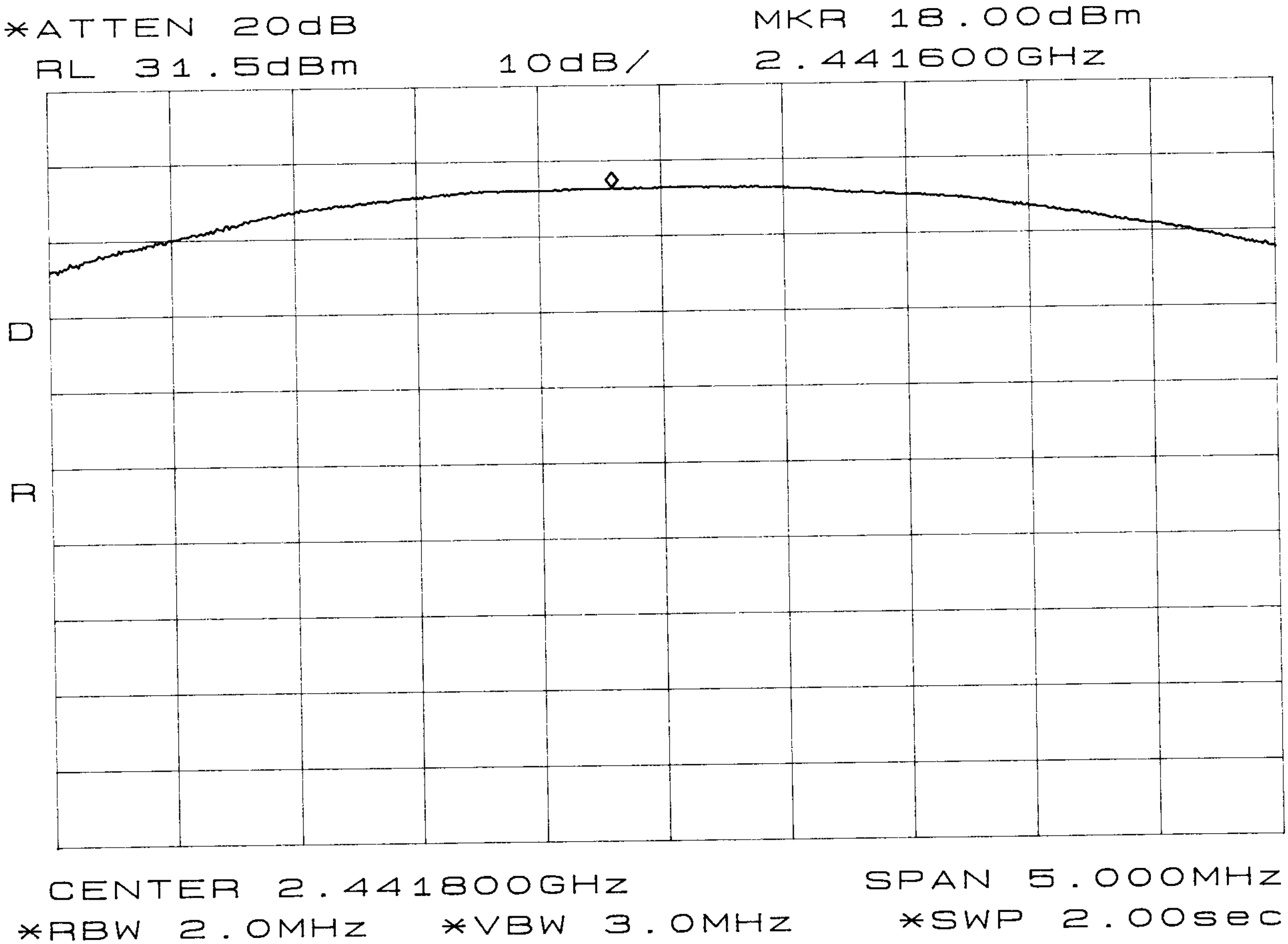


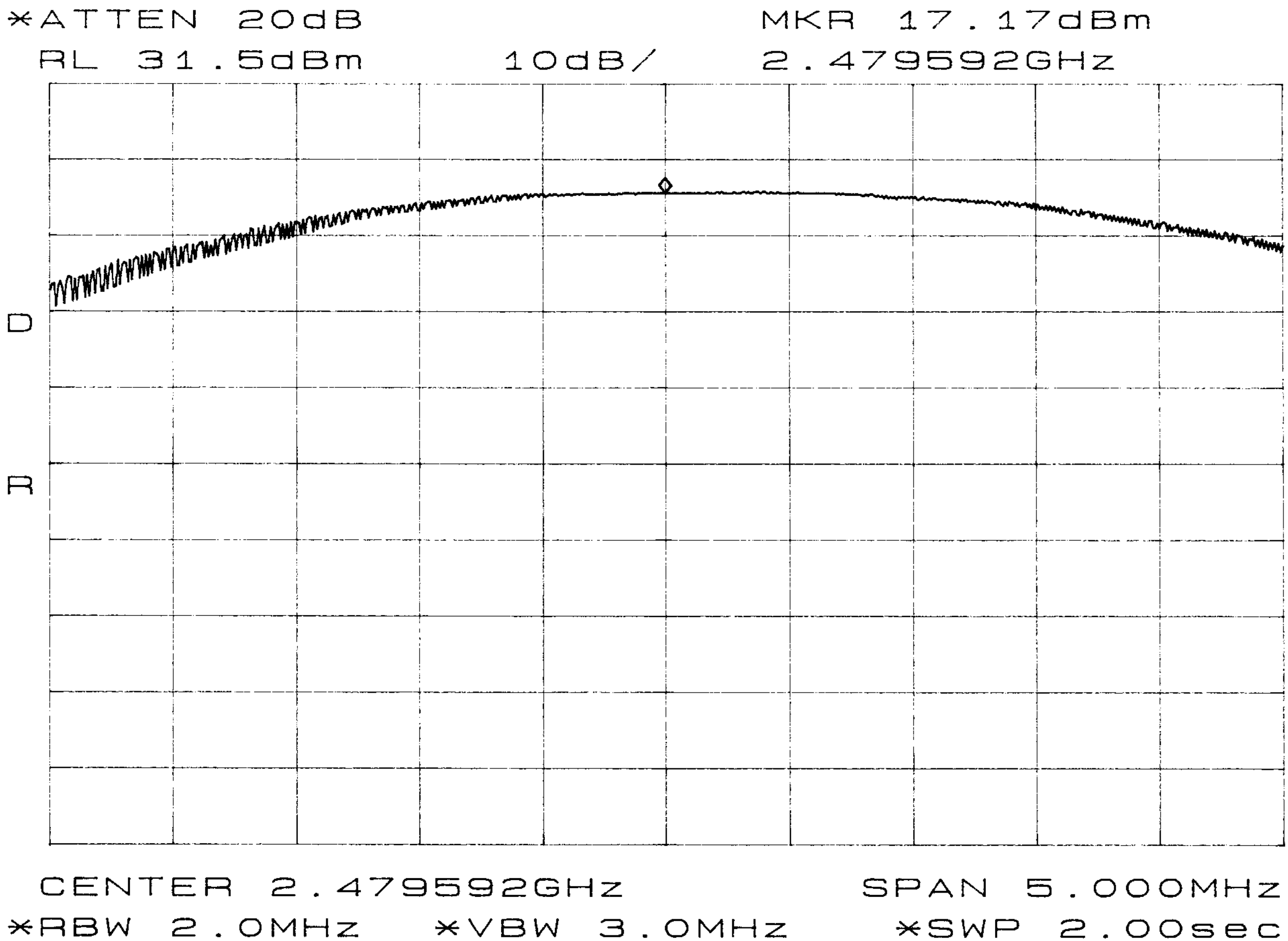
ATTEN 20dB
RL 31.5dBm
10dB/
ΔMKR 0dB
6.350sec
ΔMKR
6.350 sec
0 dB
D
S
R
K
CENTER 2.480000000GHz
SPAN 0Hz
*RBW 100kHz
VBW 100kHz
*SWP 30.0sec


ATTEN 20dB
RL 31.5dBm
10dB/
ΔMKR .66dB
76.7ms
ΔMKR
76.7 ms
.66 dB
D
S
R
K
CENTER 2.480000000GHz
SPAN 0Hz
*RBW 100kHz
VBW 100kHz
*SWP 1.00sec

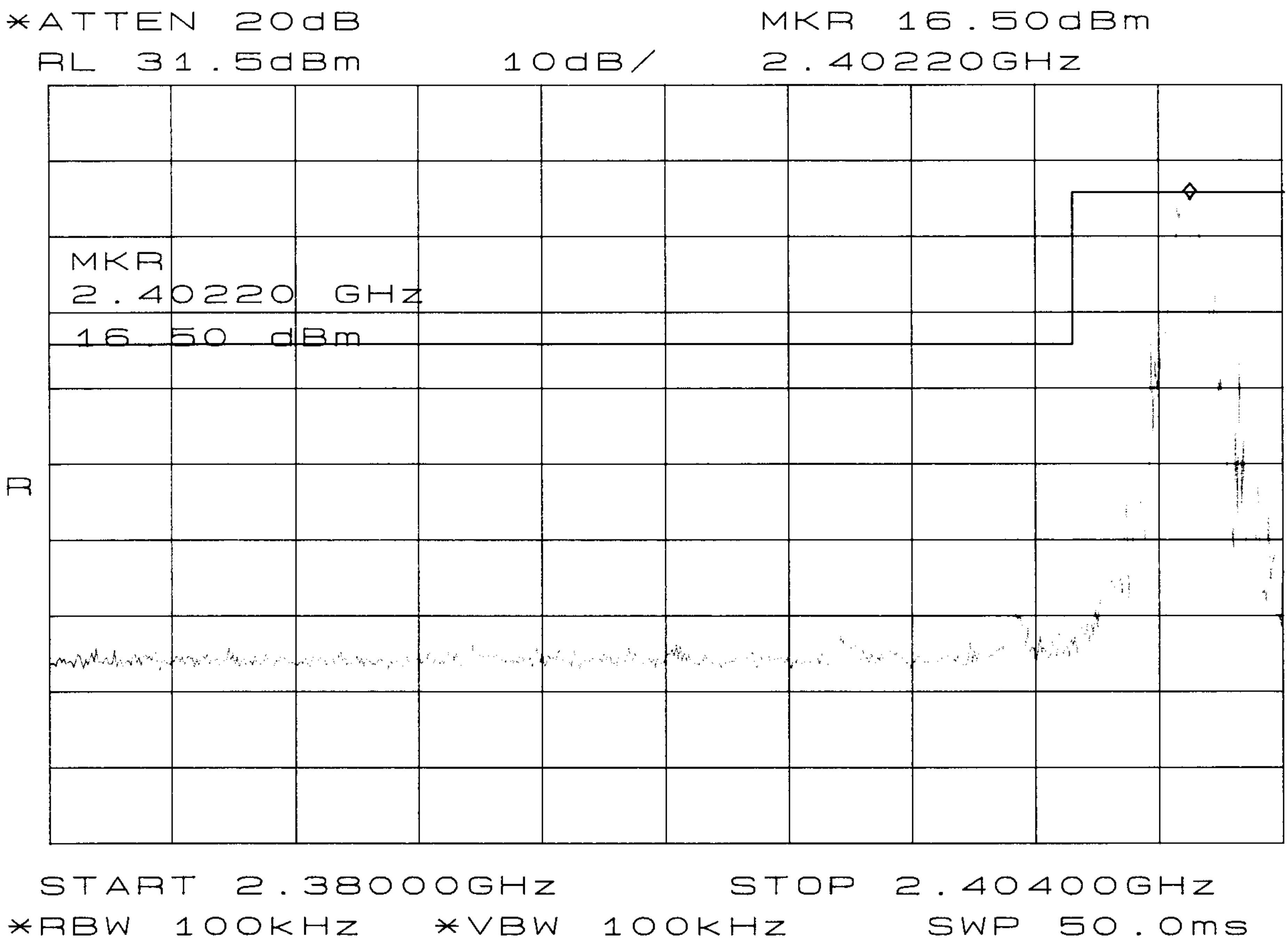
Appendix 7 : Plotted Data for Output Peak Power

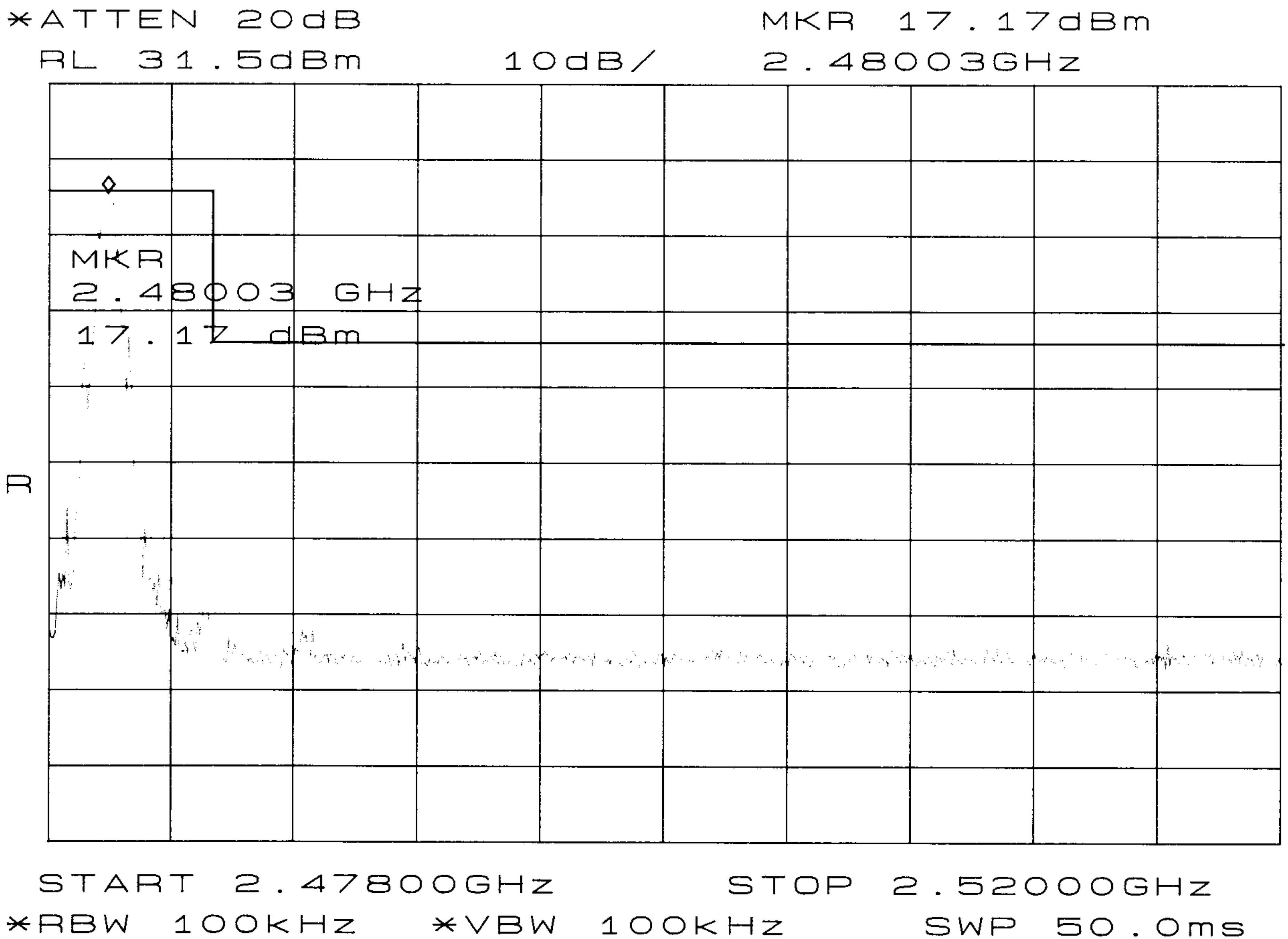

*ATTEN 20dB
RL 31.5dBm
10dB/
MKR 17.33dBm
2.401742GHz
D
R
CENTER 2.402000GHz
SPAN 5.000MHz
*RBW 2.0MHz
*VBW 3.0MHz
*SWP 2.00sec


*ATTEN 20dB
RL 31.5dBm
10dB/
MKR 18.00dBm
2.441600GHz
D
R
CENTER 2.441800GHz
SPAN 5.000MHz
*RBW 2.0MHz
*VBW 3.0MHz
*SWP 2.00sec


*ATTEN 20dB
RL 31.5dBm
10dB/
MKR 17.17dBm
2.479592GHz
D
R
CENTER 2.479592GHz
SPAN 5.000MHz
*RBW 2.0MHz
*VBW 3.0MHz
*SWP 2.00sec

Appendix 8 : Plotted Data for 100 kHz Bandwidth from Band Edge


*ATTEN 20dB
RL 31.5dBm
10dB/
MKR 16.50dBm
2.40220GHz
MKR
2.40220 GHz
16.50 dBm
R
START 2.38000GHz
STOP 2.40400GHz
*RBW 100kHz
*VBW 100kHz
SWP 50.0ms


*ATTEN 20dB
RL 31.5dBm
10dB/
MKR 17.17dBm
2.48003GHz
MKR
2.48003 GHz
17.17 dBm
R
START 2.47800GHz
STOP 2.52000GHz
*RBW 100kHz
*VBW 100kHz
SWP 50.0ms