

Marstech Limited

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TEST REPORT

REPORT DATE:	30 July 2002	REPORT NO:	22201D
CONTENTS:	See Table of Contents		
SUBMITTOR:	Thomson Multimedia Inc. 10330 North Meridian Street Indianapolis, IN 46290 USA		
SUBJECT:	Model No:	RD900W	
	FCC ID:	G95-RD900WA	
TEST SPECIFICATION	47 CFR FCC Part 15 NOTE: Tests Conducted Are "Type" Tests.		
DATE SAMPLE RECEIVED:	21 June 2002	DATE TESTED:	8 & 17 July 2002
RESULTS:	Equipment tested complies with referenced specification.		
ALTERATIONS	None		
	<i>Ed. Chang</i>	Approved by: <i>for</i>	<i>Ed. Chang</i>
Tested by:	Edward Chang	Date:	22 AUG. 2002

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Authorized by:
Professional Engineer
Ontario

Engineering &
Administrative



Testing For FCC
Submissions/Verifications

Approved Test Facility



TECHNICAL REPORT - FCC 2.1033(b)

Applicant

Thomson Multimedia Inc.
10330 North Meridian Street
Indianapolis, IN
46290 USA

FCC Identifier

G95-RD900WA

Manufacturer

Huiyang CCT Telecommunication Products Co. Ltd.
CCT Technology Park, San He Developmental Zone
HuiYang City, Guangdong Province, PRC

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EXHIBIT D

[FCC Ref. 2.1033(b)(6)]

"Report of Measurements"

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PRODUCT DESCRIPTION

The Model RD900W is a wide band 900MHz transmitter using a proprietary digital modulation, that operates at 905MHz, 911MHz, 923MHz and 927MHz.

TEST FACILITY AND EQUIPMENT LIST

FACILITIES

- Radiated ANSI C63.4 (FCC OET/55) open field 3 metre test range. This test range is protected from the cold and moisture by a non-conductive enclosure.
- Conducted 2.5m Anechoic Chamber

EQUIPMENT

Anritsu 2601A Spectrum Analyzer
Advantest R3261A Spectrum Analyzer
Hewlett-Packard RF generator # 8640 B with an 002 doubler
A.H. Systems biconical antenna; 20 MHz to 330 MHz
A.H. Systems log periodic antenna; 300 MHz to 1.8 GHz
Compliance Design P950 Preamp (16 dB) ... 25 MHz to 1.0 GHz

NOTE:

The Anritsu 2601A Spectrum Analyzer and the Advantest R3261A Spectrum Analyzer are calibrated annually, and that calibration is directly traceable to the National Research Council of Canada. (NRC) This equipment is only used by qualified technicians and only for the purpose of EMI measurements. The three metre test range has been carefully evaluated to the ANSI document C63.4 and will be remeasured for reflections and losses every three years.

ADDITIONAL TEST EQUIPMENT LIST

1. Spectrum Analyzer: HP 8591EM, S/N 3639A00995, Calibrated April 2002
2. Spectrum Analyzer: ANRITSU 2601A, S/N MT64544, Calibrated May 2002
3. Spectrum Analyzer: IFR AN940, S/N 635001039, Calibrated March 2002
4. Preamp: HP 8449B, S/N 3008A00378, Calibrated August 2001
5. Horn Antenna: Q-PAR 6878/24, S/N 1721, 1.5-18GHz
6. Line Impedance Stabilization Network.: Marstech, Cal. July 2002

15.107 (a) POWER LINE CONDUCTED INTERFERENCE

Requirements:

0.45 - 30MHz 250 μ V or 47.96dB μ V

Test Procedure:

ANSI STANDARD C63.4-1992. using a 50uH LISN. Both lines were observed with the EUT transmitting. The bandwidth of the spectrum analyzer was 9KHz QP with an appropriate sweep speed. The ambient temperature of the EUT was 24°C with a humidity of 60%.

The spectrum was scanned from 0.45 to 30MHz.

Test Data:

The highest emission read for LINE was 21.45 dB μ V@ 7.14 MHz.

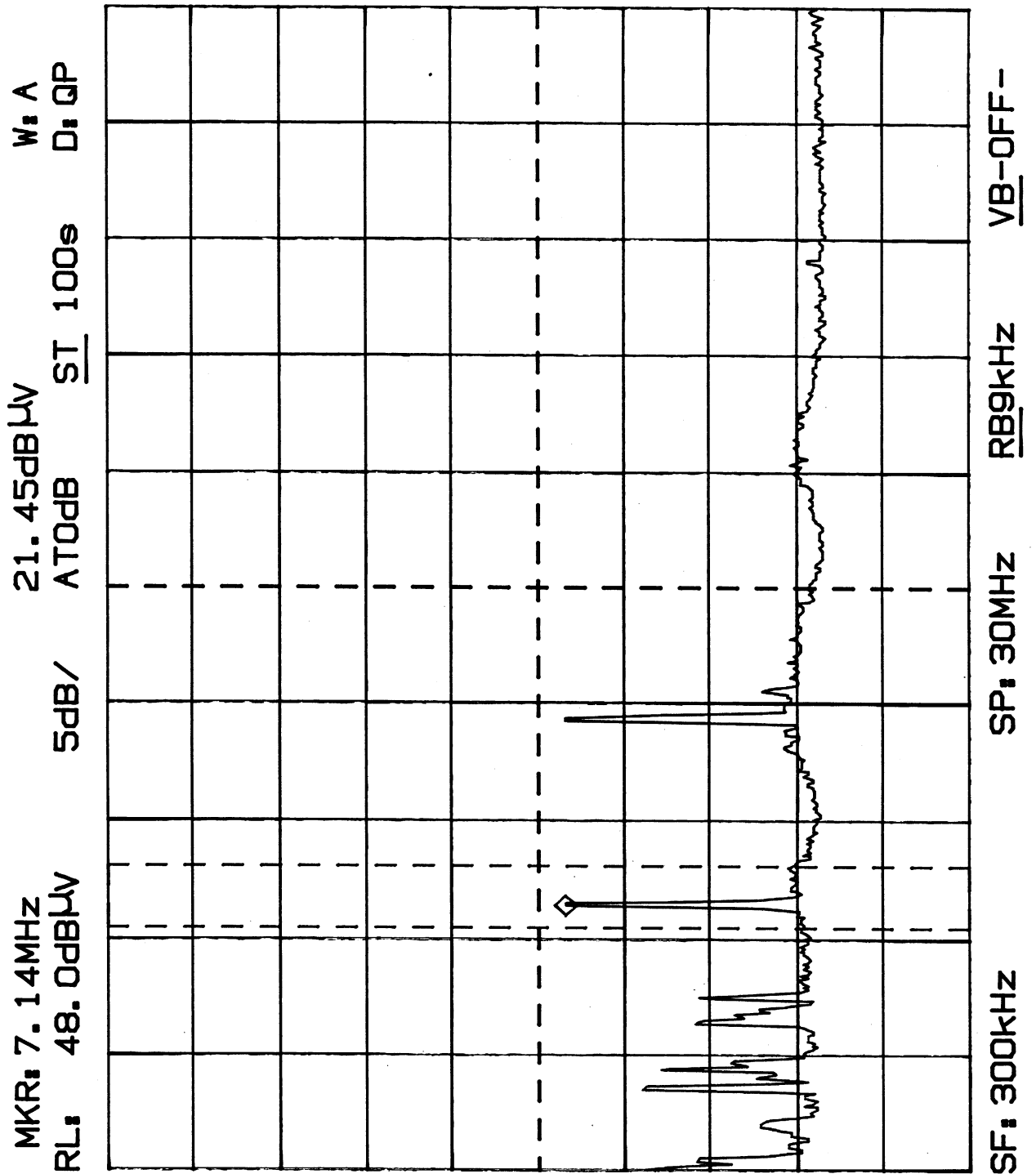
The highest emission read for NEUTRAL was 22.50 dB μ V@ 7.20 MHz.

The graphs on Exhibit D(1)-6 and -7 represent the emissions taken for this device.

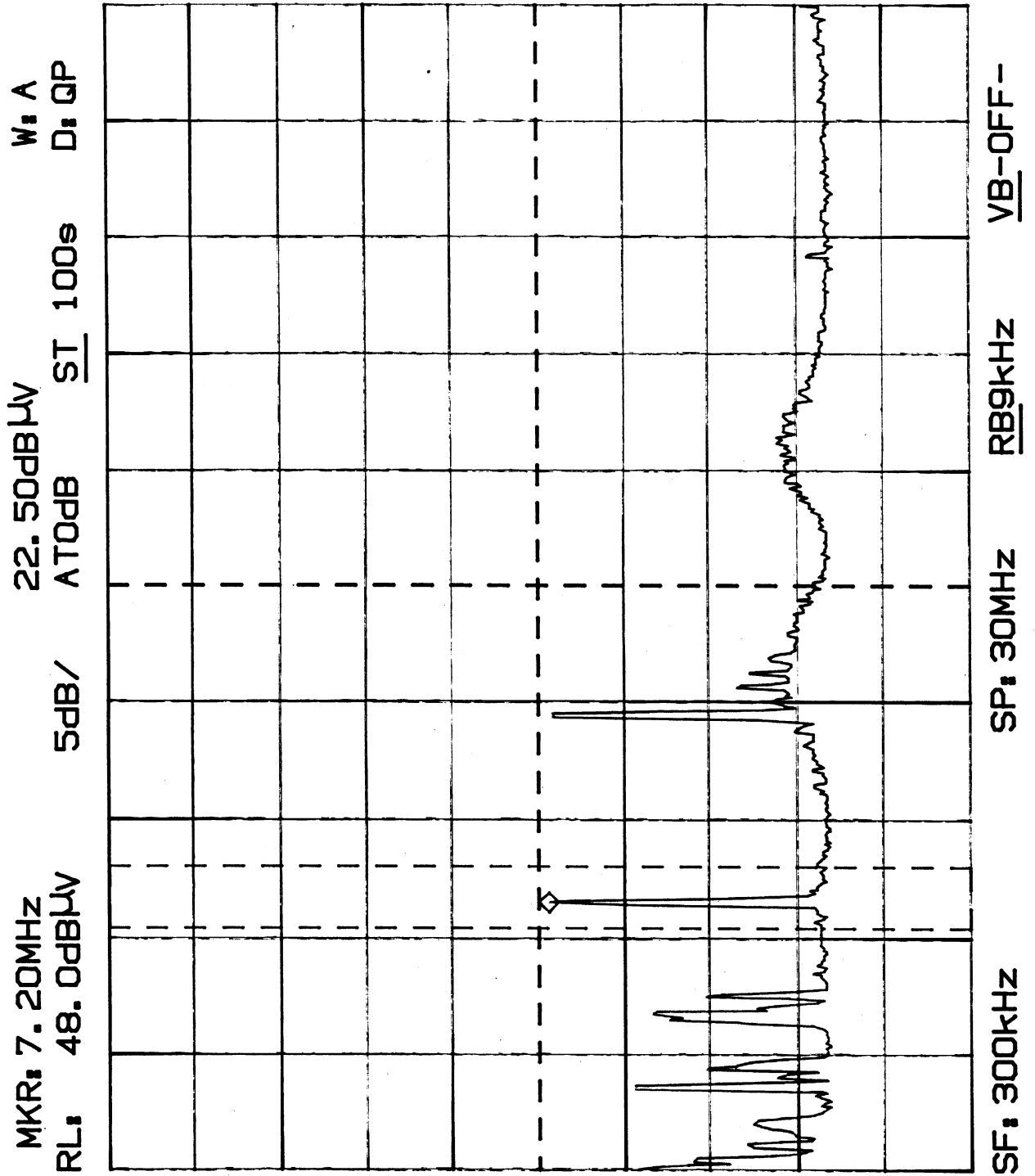
Test Results:

Both lines were observed. The measurements indicate that the unit DOES appear to meet the FCC requirements for this class of equipment.

POWER LINE CONDUCTED EMISSIONS
MODEL RD900W; LINE



POWER LINE CONDUCTED EMISSIONS
MODEL RD900W; NEUTRAL



15.247(a) 6 dB BANDWIDTH

Requirements:

The minimum 6 dB bandwidth shall be at least 500KHz.

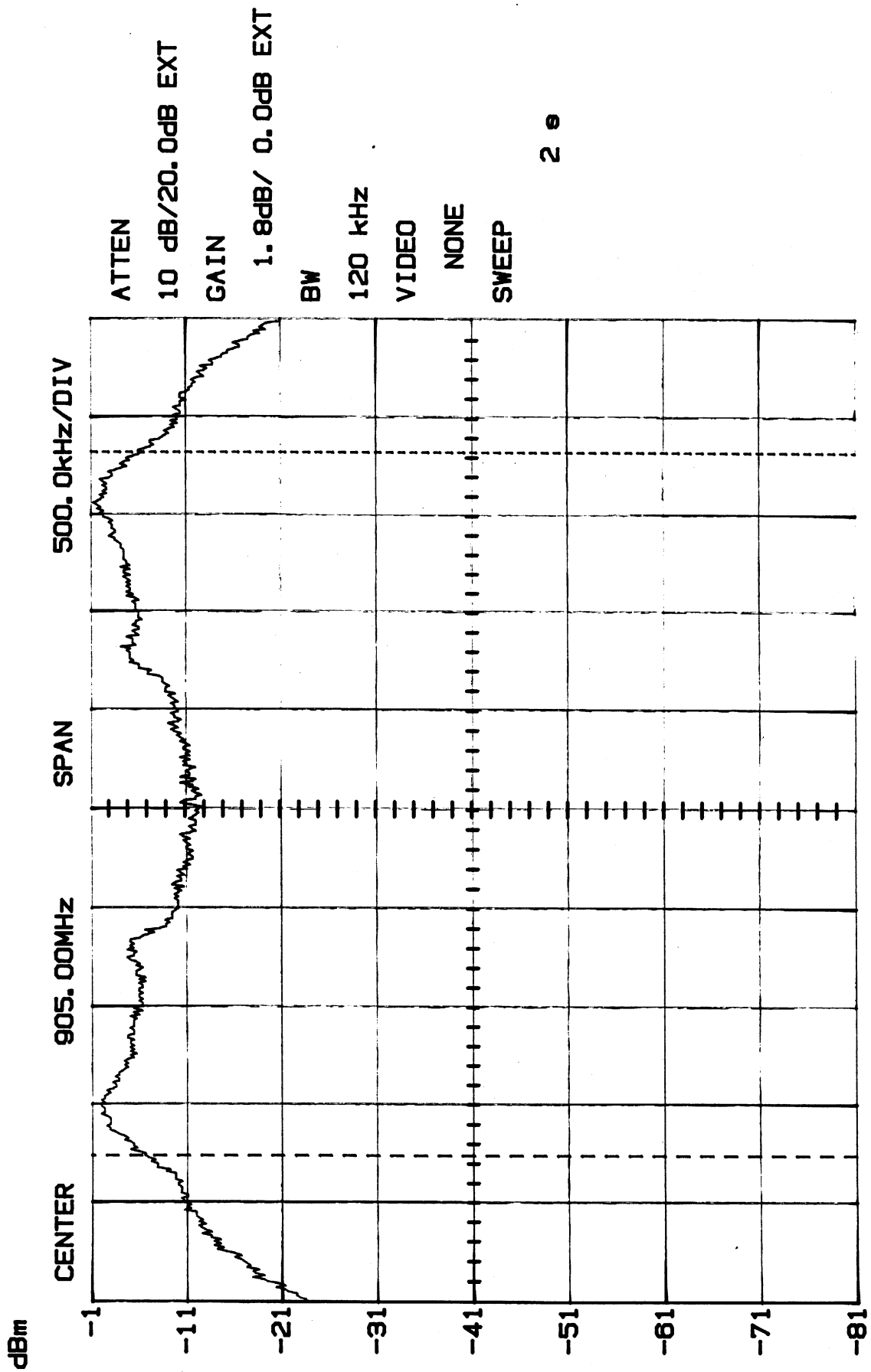
Measurement Procedure:

1. Position the EUT without connection to Spectrum Analyzer (SA). Turn on the EUT and connect its antenna terminal to SA via a low loss cable and set it to any one measured frequency within its operating range and ensure that the SA is operated in its linear range.
2. Set RBW of SA to 100KHz and VBW to 1 MHz.
3. Capture the total emission using appropriate SA settings and then set the markers to measure the 6 dB total band using delta markers.
4. Print the bandwidth measurement.

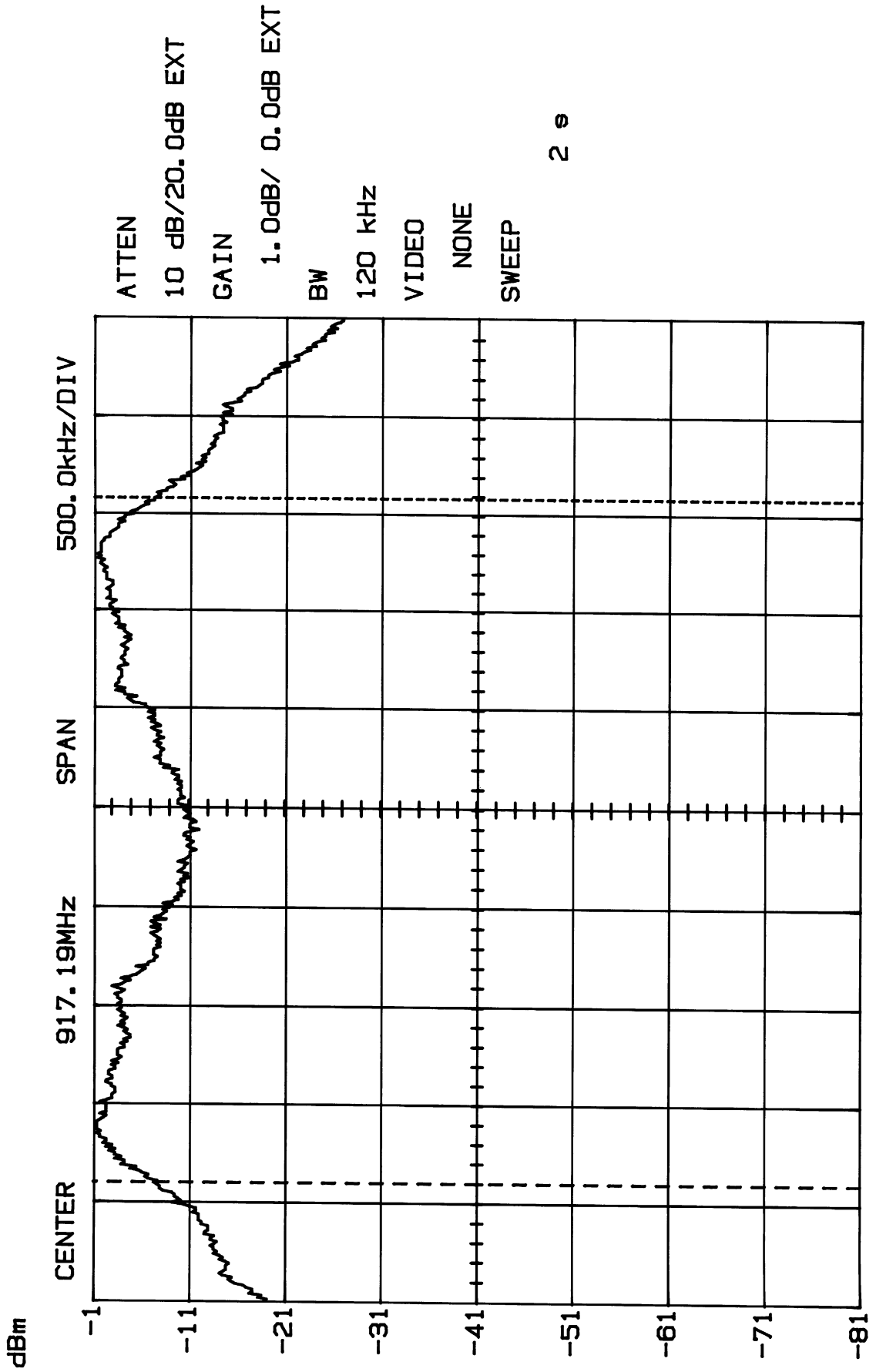
Measurement Data:

Channel 1: Bandwidth is 3.58 MHz [Refer to Exhibit D(1)-9]
Channel 3: Bandwidth is 3.48 MHz [Refer to Exhibit D(1)-10]
Channel 4: Bandwidth is 3.36 MHz [Refer to Exhibit D(1)-11]

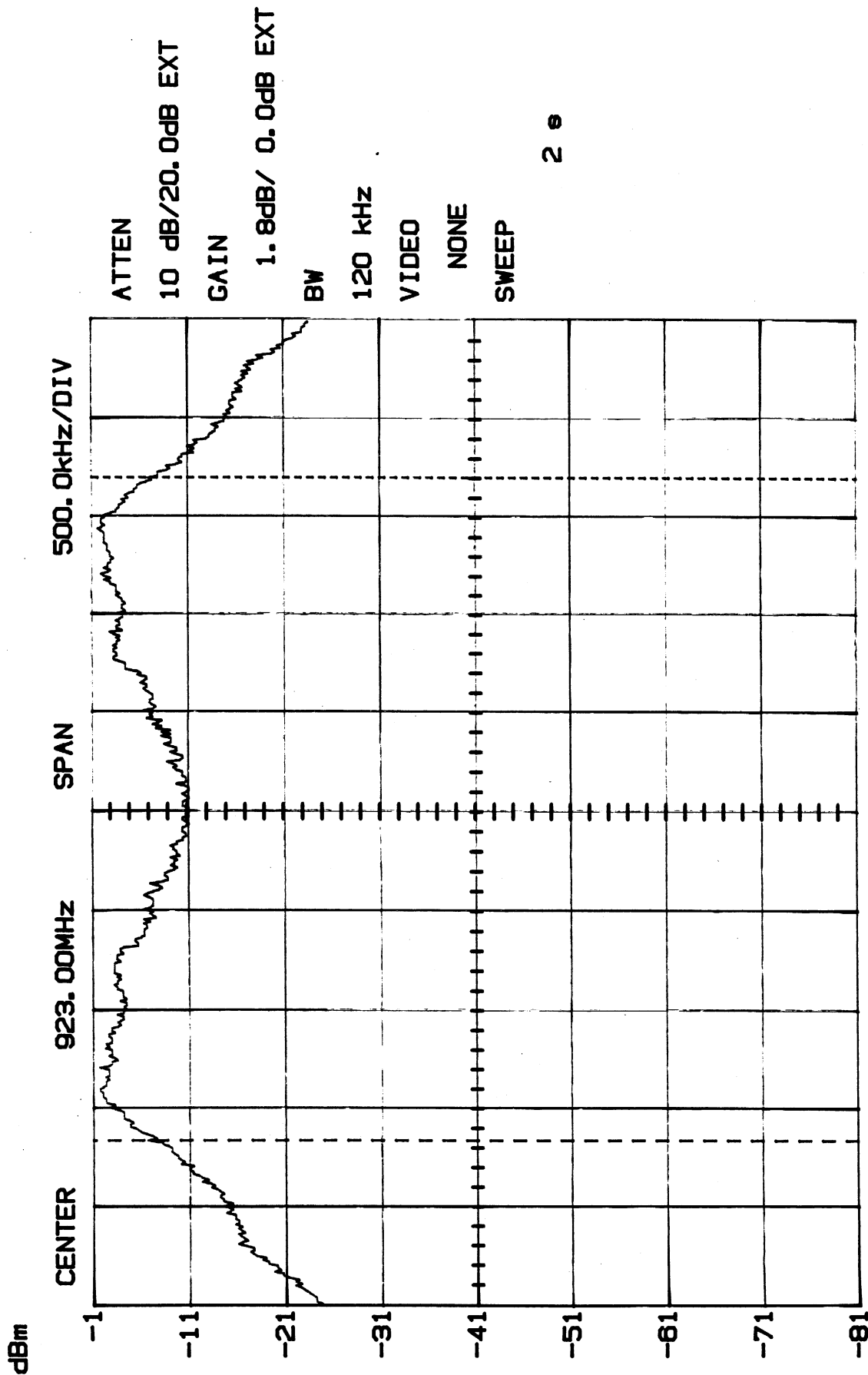
6dB BANDWIDTH; CH 1
MODEL RD900W



6dB BANDWIDTH; CH 3
MODEL RD900W



6dB BANDWIDTH; CH 4
MODEL RD900W



15.247(b) MAXIMUM PEAK OUTPUT POWER**Requirements:**

The maximum peak output power of direct sequence systems 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.

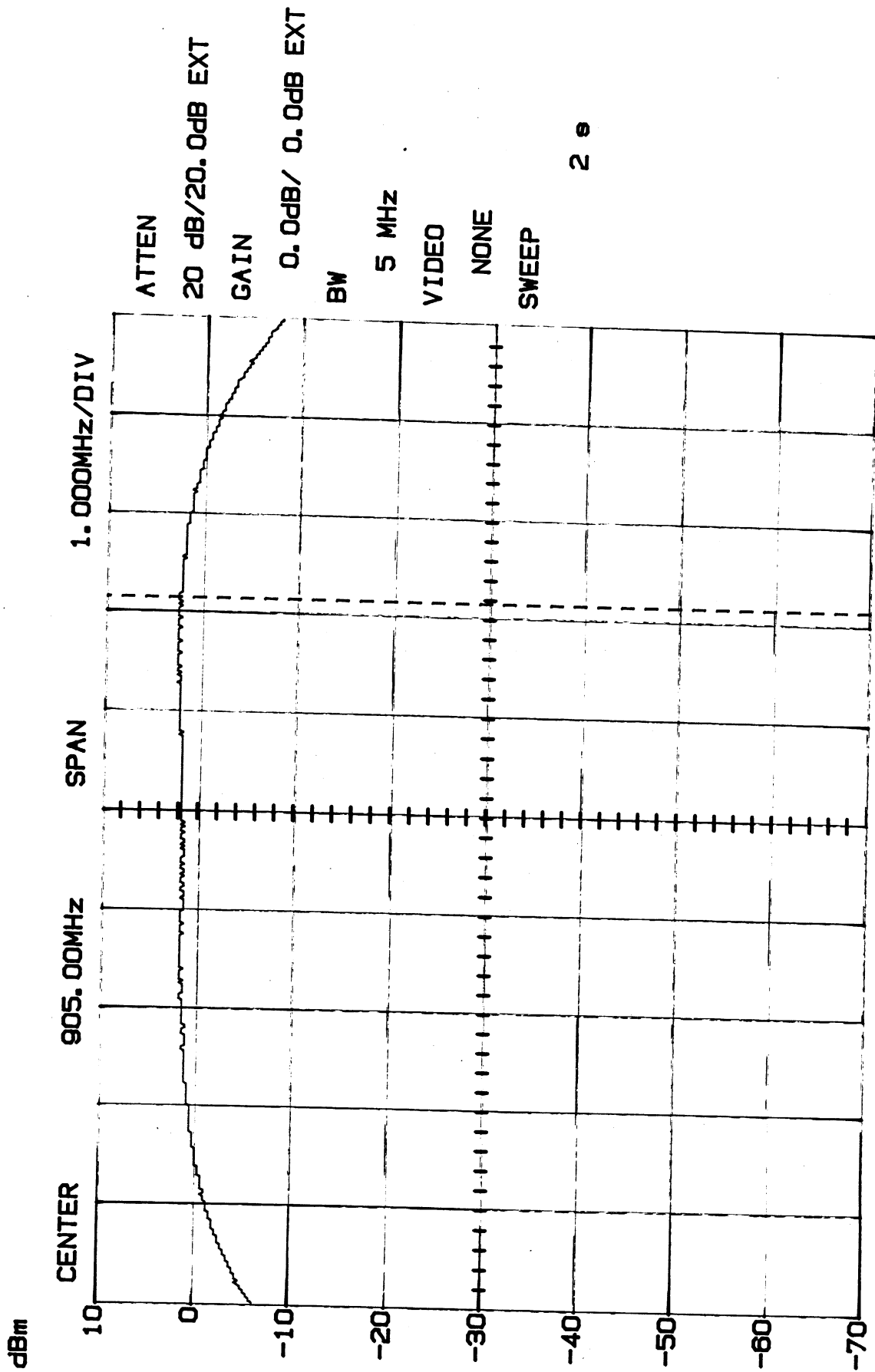
Measurement Procedure

1. Position the EUT without connection to Spectrum Analyzer (SA). Turn on the EUT and connect its antenna terminal to SA via a low loss cable and set it to any one measured frequency within its operating range and ensure that the SA is operated in its linear range.
2. Set RBW of SA to 1MHz and VBW to 1MHz.
3. Measure the highest amplitude appearing on spectral display and record the level to calculate result data.
4. Repeat the above procedures until all frequencies measured were complete.

Measurement Data - Refer Exhibit D(1)-12 to -15 for plotted data

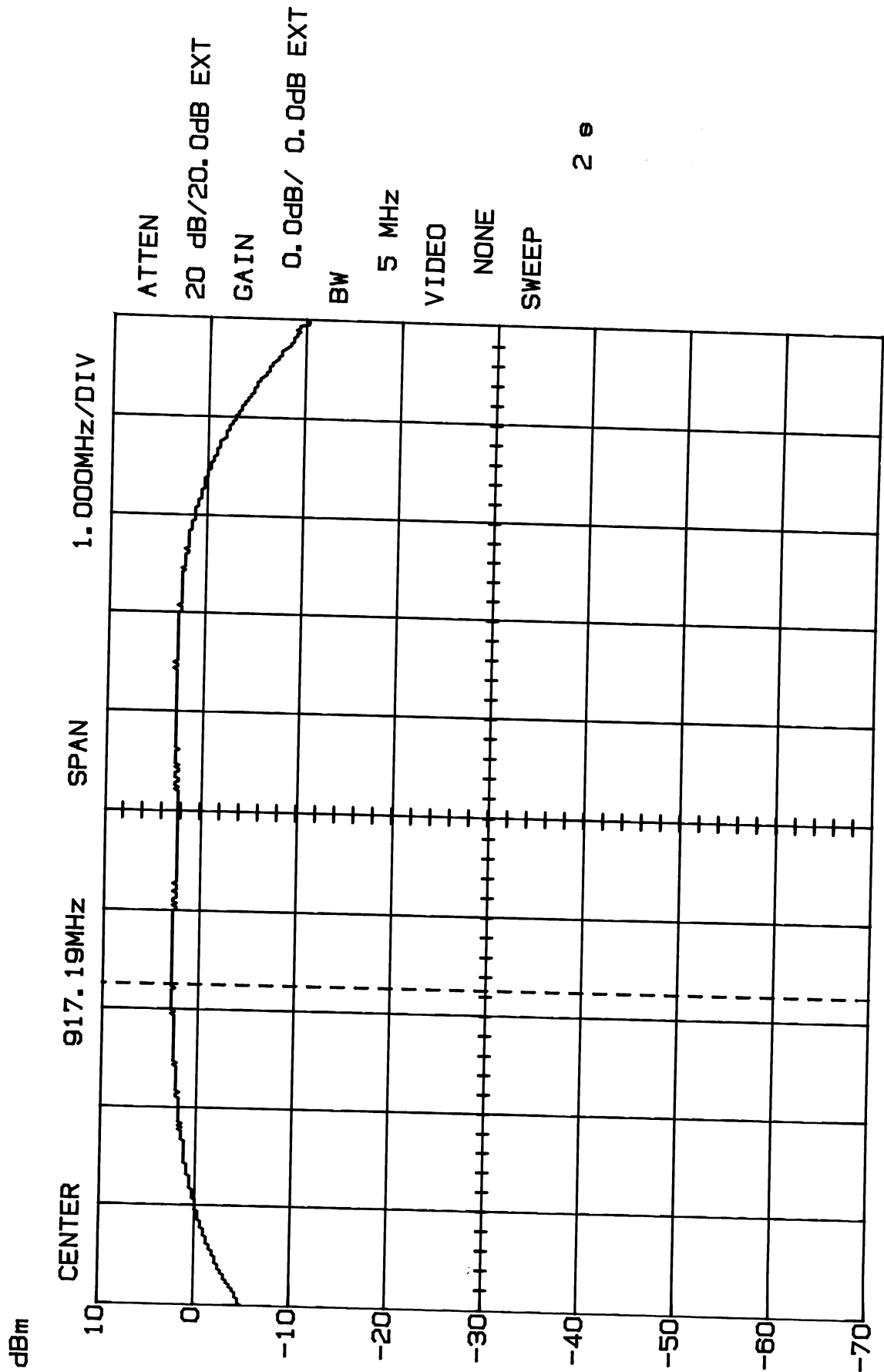
Channel 1:	Output Peak Power is 2.5 dBm =	0.0018 mW
Channel 3:	Output Peak Power is 2.81 dBm =	0.0019 mW
Channel 4:	Output Peak Power is 2.81 dBm =	0.0019 mW

PEAK POWER; CH 1
MODEL RD900W



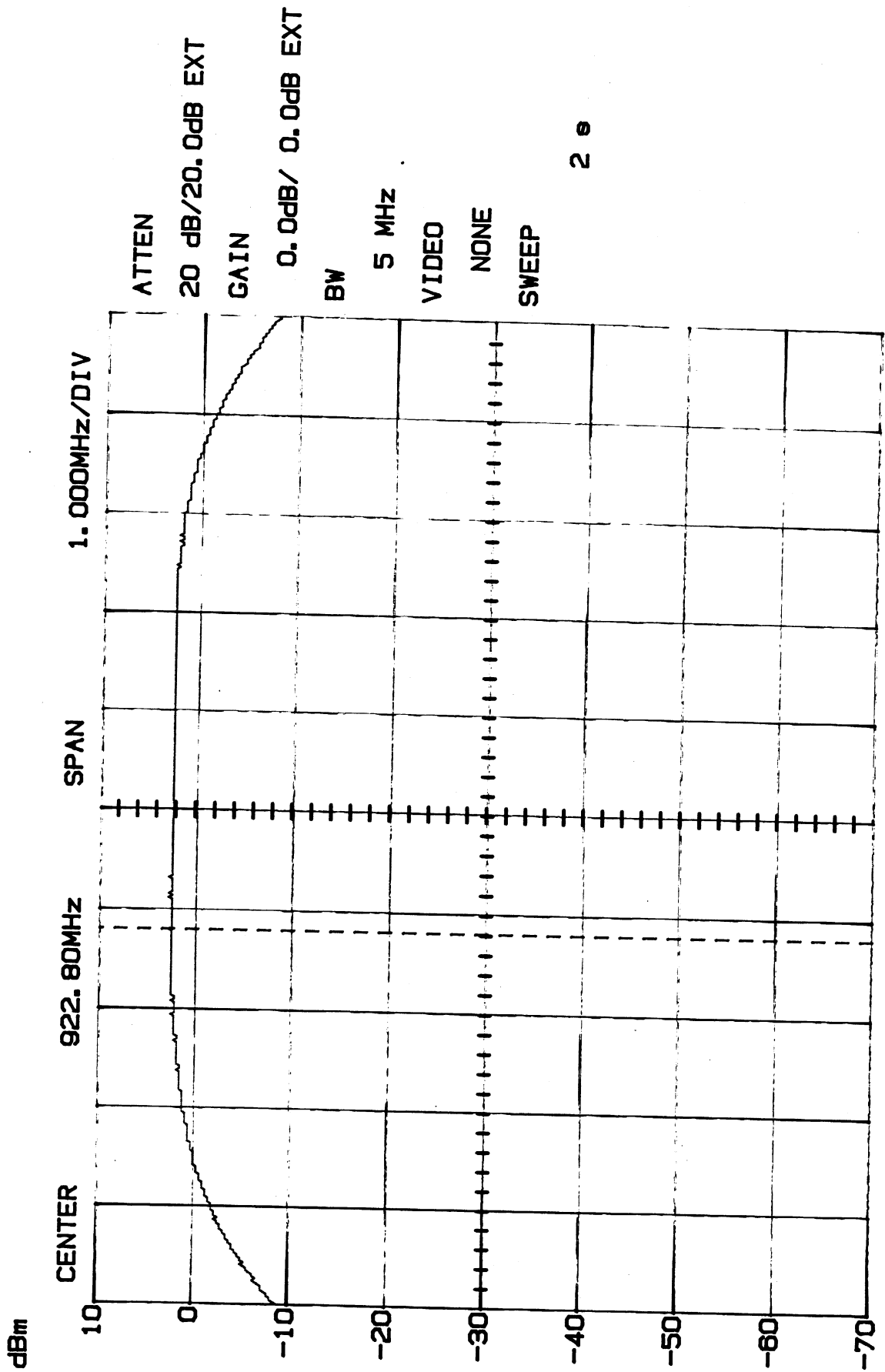
M1 2.50dB/ 907.15MHz

PEAK POWER; CH 3
MODEL RD900W



M1 2.81dB/ 915.45MHz

PEAK POWER; CH 4
MODEL RD900W



M1 2.81dB/ 921.60MHz

15.247(d) PEAK POWER SPECTRAL DENSITY

Requirements:

For direct sequence systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

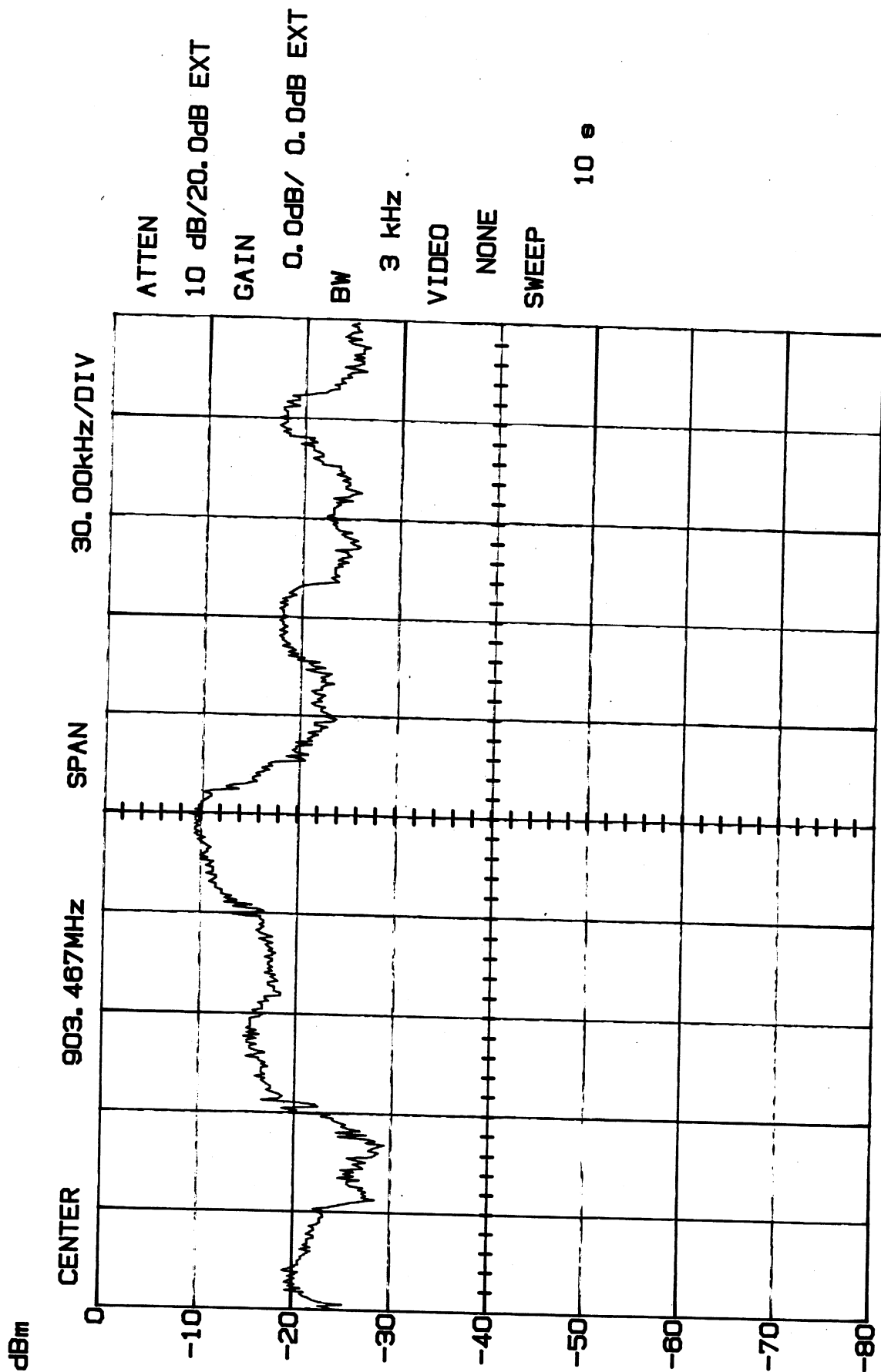
Measurement Procedure:

1. Position the EUT without connection to Spectrum Analyzer (SA). Turn on the EUT and connect its antenna terminal to SA via a low loss cable and set it to any one measured frequency within its operating range and ensure that the SA is operated in its linear range.
2. Set RBW = 3 kHz, SPAN = 30 kHz, VBW = OFF.
3. Measure the highest amplitude for channels 1, 3 and 4.
4. Plot graph.

Measurement Data: Refer to Exhibit D(1)-17 to -22 for plotted data

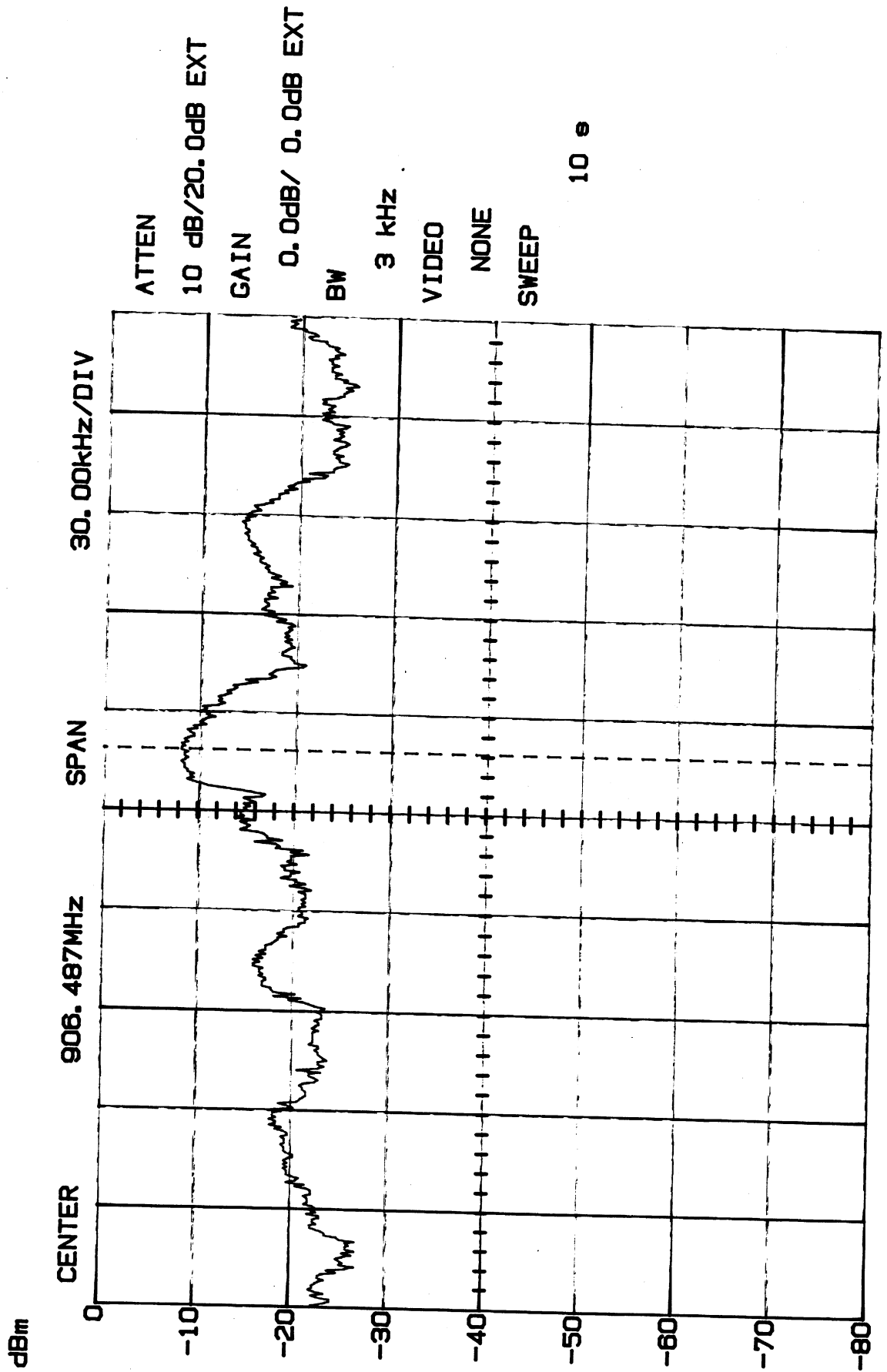
Channel 1: Maximum Peak Power Spectral Density is -8.12 dBm.
Channel 3: Maximum Peak Power Spectral Density is -8.74 dBm.
Channel 4: Maximum Peak Power Spectral Density is -9.68 dBm.

PEAK POWER SPECTRAL DENSITY; CH 1
MODEL RD900W



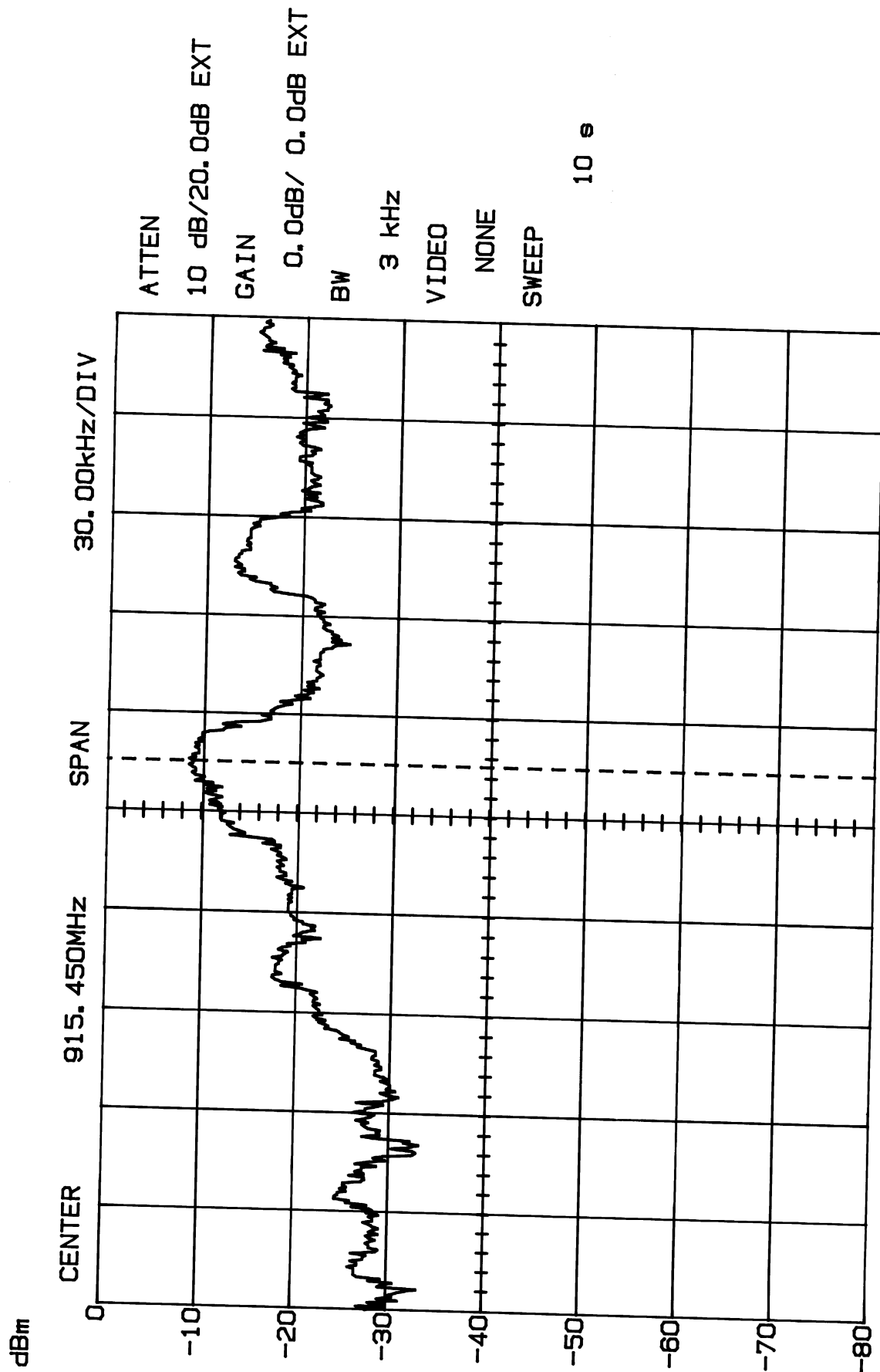
M1 -8.74dB/ 903.467MHz

PEAK POWER SPECTRAL DENSITY; CH 1
MODEL RD900W



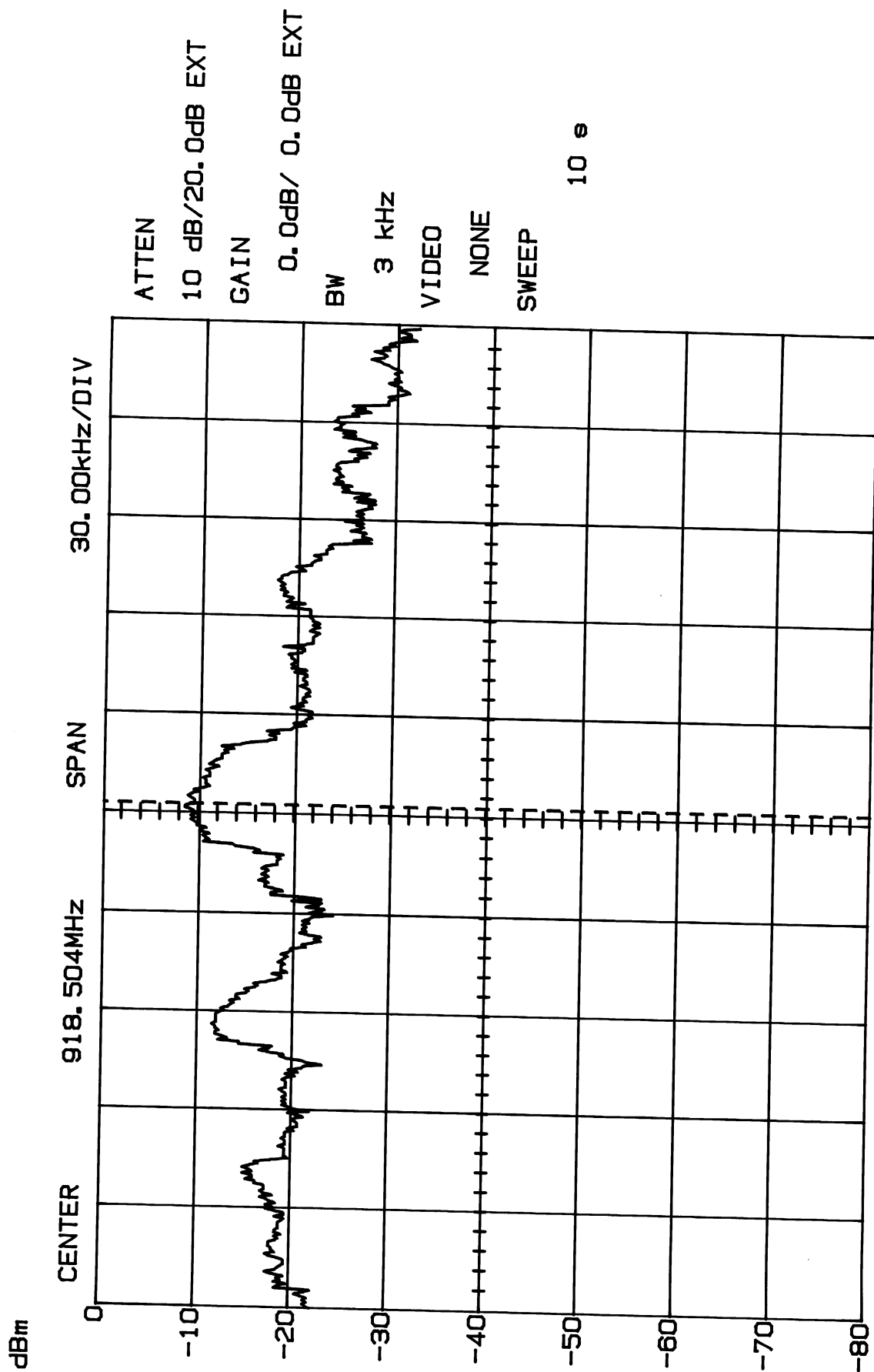
M1 -8.12dB/ 906.506MHz

PEAK POWER SPECTRAL DENSITY; CH 3
MODEL RD900W



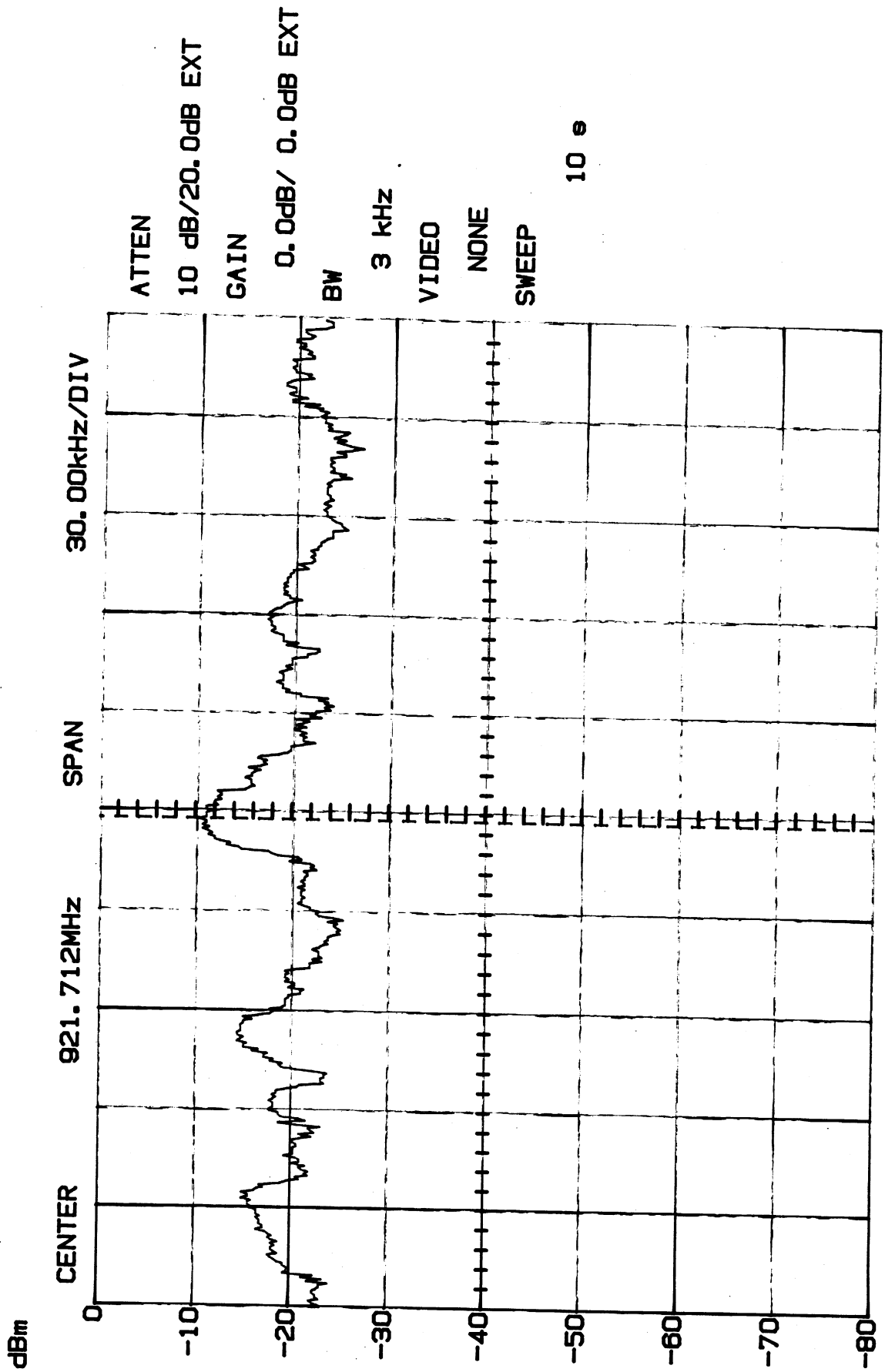
M1 -8.74dB/ 915.466MHz

PEAK POWER SPECTRAL DENSITY; CH 3
MODEL RD900W



M1 -9.37dB/ 918.507MHz

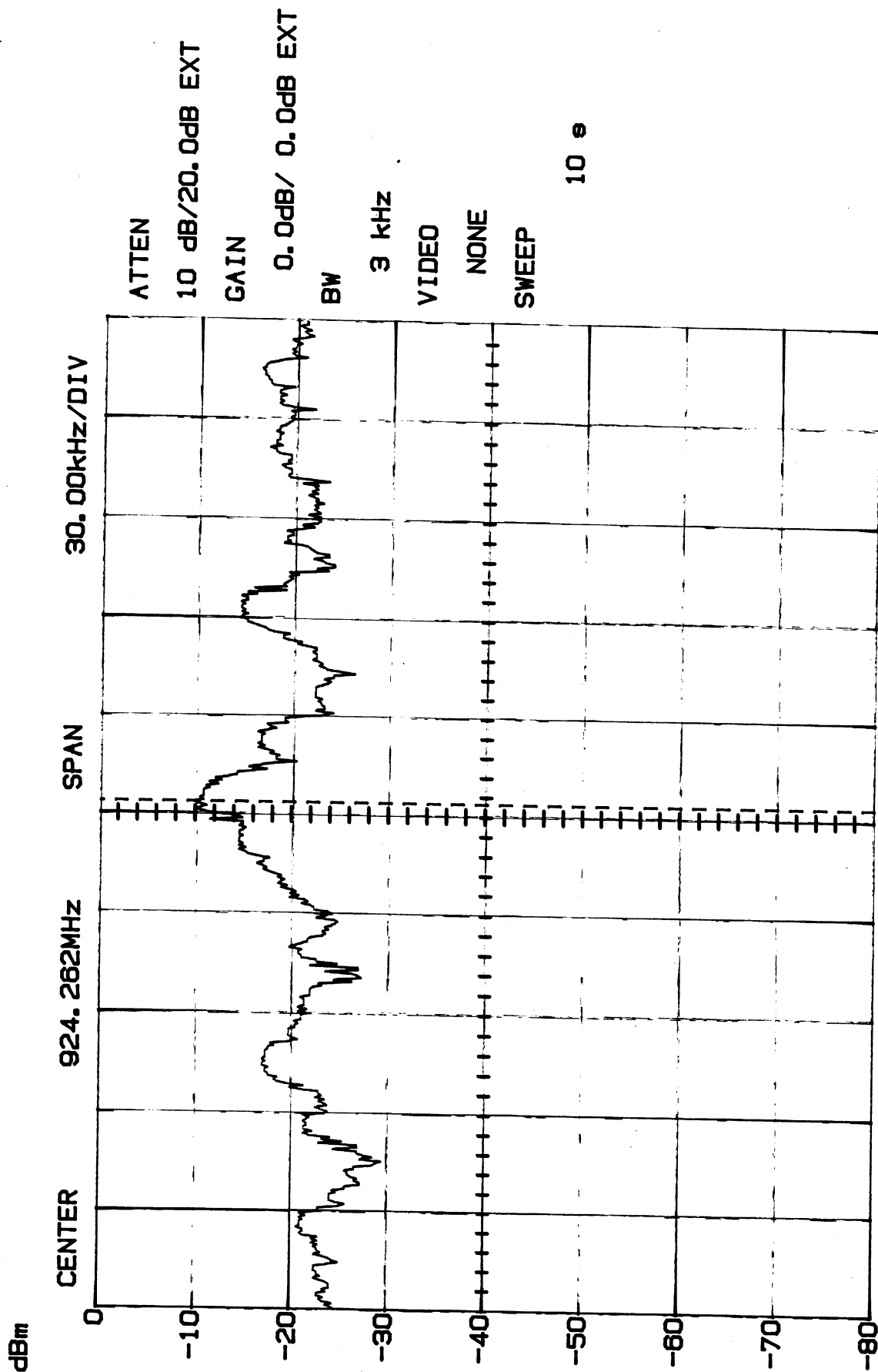
PEAK POWER SPECTRAL DENSITY; CH 4
MODEL RD900W



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M1 -10.31dB/ 921.710MHz

PEAK POWER SPECTRAL DENSITY; CH 4
MODEL RD900W



M1 -9.68dB/ 924.266MHz

15.247(c) BANDWIDTH OF BAND EDGE MEASUREMENT

Requirements:

In any 100 kHz bandwidth outside these frequency bands, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

Measurement Procedure

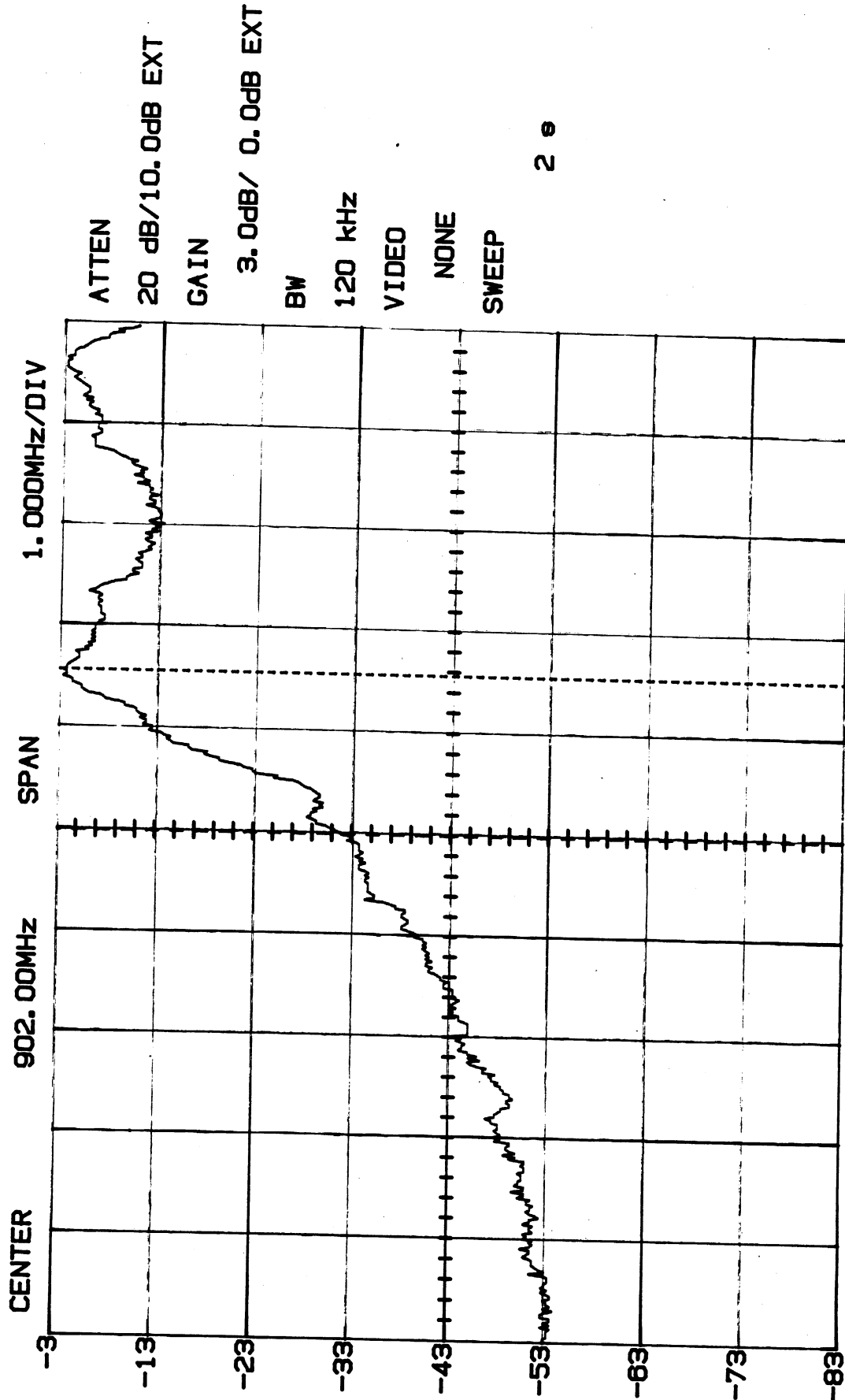
1. Position the EUT without connection to Spectrum Analyzer (SA). Turn on the EUT and connect its antenna terminal to SA via a low loss cable and set it to any one measured frequency within its operating range and ensure that the SA is operated in its linear range.
2. Set RBW to 120 kHz and frequency span to 1000 kHz; VBW = none.
3. 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
4. Repeat the above procedures until all frequencies measured were complete.

Measurement Data - Refer Exhibit D(1)-24 to -25 for plotted data

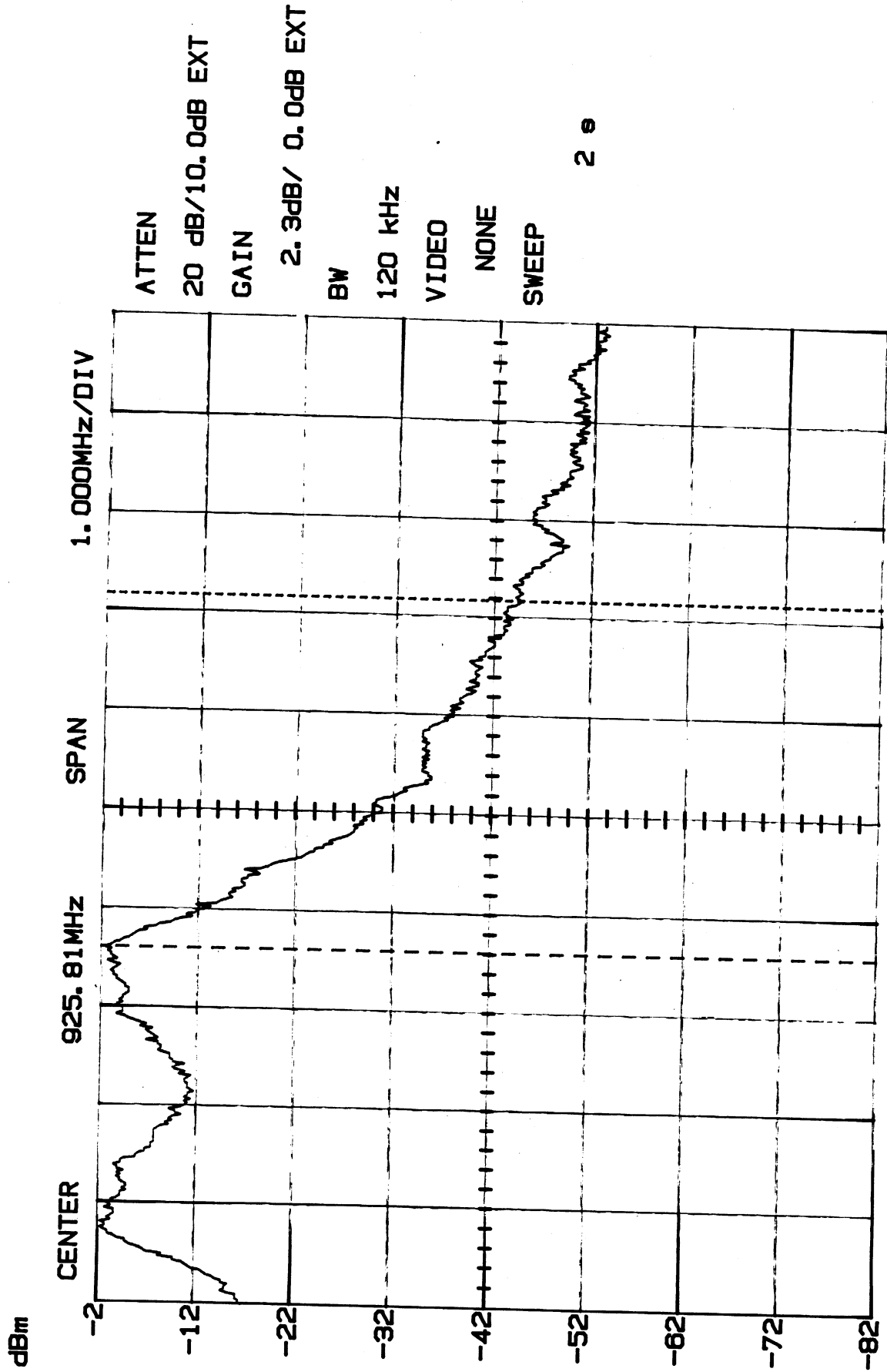
- Channel 1: All emissions in this 100 kHz bandwidth are attenuated more than 28 dB from the carrier.
- Channel 4: All emissions in this 100 kHz bandwidth are attenuated more than 43 dB from the carrier.

BAND EDGE; CH 1
MODEL RD900W

dBm



BAND EDGE; CH 4
MODEL RD900W



M2 -45.11dB/ 928.00MHz

Δ 43.11dB/ 3.56MHz

15.247(c) SPURIOUS RF CONDUCTED EMISSIONS**ANTENNA CONDUCTED SPURIOUS EMISSIONS**

Frequency MHz		dBc	
<u>Transmitter</u>			
<u>Channel 1</u>			
906.630		0	
1813.260		-42	
2719.890		---	
<u>Channel 3</u>			
915.900		0	
1831.800		-42	
2747.700		---	
<u>Channel 4</u>			
924.450		0	
1848.900		-42	
2773.350		---	
3697.800		---	

15.105 and 15.247(c) SPURIOUS RF RADIATED EMISSIONS

Requirements:

In any 100 kHz bandwidth outside these frequency bands, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

Measurement Procedure:

1. The EUT was placed on a wooden table mounted on a turntable and was operating normally.
2. The search antenna was located 3 metres from the EUT.
3. The search antenna height (1-4 metres) and turntable (360°) were adjusted to all possible positions until the emission at each frequency was maximized.
4. The readings were noted and correction factor was added.

Measurement Data:

The highest spurious emission found was 39 dB μ V @ 48.03 MHz [refer to Exhibit D(1)-28]

RADIATED EMISSION RESULTS**Thomson Multimedia, Model RD900W (Transmitter)**

Emission Frequency MHz	Meter Reading @3m dB μ V	Antenna	Cable and ACF dB	Field Strength dB μ V/M	FCC Limit dB μ V/M	Margin dB	Detector & BW Khz
48.03	27.40	BC V	11.60	39.00	40	-1.00	QP 120
67.75	37.00	BC V	12.50	49.50	70	-20.50	QP 120
120.00	14.00	BC H	14.20	28.20	43.5	-15.30	QP 120
135.49	24.00	BC H	15.30	39.30	43.5	-4.20	QP 120
144.07	22.50	BC H	15.80	38.30	43.5	-5.20	QP 120
192.06	20.00	BC H	17.30	37.30	43.5	-6.2	QP 120
452.00	25.00	LP H	19.10	44.10	46	-1.9	QP 120
609.66	16.00	LP H	23.00	39.00	46	-7	QP 120
Reference Data:							
Channel 1							
906.57	56.67	RT4 V	33.25	89.92			PK 100
1813.14	21.00	Horn H	33.18	54.18	69.92	-15.74	PK 1000
Channel 3							
915.90	56.60	RT4 V	33.34	89.94			PK 100
1831.80	21.00	Horn H	33.18	54.18	69.94	-15.76	PK 1000
Channel 4							
921.68	57.27	RT4 V	33.40	90.67			PK 100
1848.77	22.00	Horn H	33.18	55.18	70.67	-15.49	PK 1000

NOTE: The emission at 67.75 MHz is from the transmitter modulator circuit.

FCC RF EXPOSURE REQUIREMENTS

NOTE: PLEASE ADVISE IF THIS SECTION IS APPLICABLE

General Information

FCC ID: G95-RD900WA

Device Category:

EUT: Mobile per Part 2.1091

Environment: General Population/Uncontrolled Exposure

Operating Configurations and Exposure Conditions:

The EUT is normally operated at least 20 cm away from the human body. ????

Maximum Permissible Exposure Calculation: EUT

The minimum separation distance, for compliance with the limit, is calculated as follows:

$$E(V/m) = \frac{\sqrt{30 \times P \times G}}{d} \quad \text{Power density: } P_d(mW/cm^2) = \frac{E^2}{3770}$$

The limit for general population/uncontrolled exposure environment above _____ MHz is 1mW/cm2

Separation Distance	Antenna Gain (dBi)	
	Integral	
Power EIRP (mW)	(in)	(cm)
EUT	0.35	0.9

Conclusion:

The device complies with the MPE requirements by providing a safe separation distance between the antenna, including any radiating structure, and any persons (human body excluding hands, wrists, ankles, and feet).

Proposed RF Exposure Safety Information to Include in User's Manual:

WARNING: For compliance with the RF exposure requirements regulated by the FCC (Federal Communications Commission), the transmitter's antennae are contained within the EUT enclosure, and an additional separation distance of more than eight inches (20 cm) shall be maintained between the transmitter base enclosure and any part of the user's body.