

Marstech Limited

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Authorized by:
Professional Engineers
Ontario



Engineering &
Administrative



Testing For FCC
Submissions/Verifications



Approved Test Facility



TEST REPORT			
REPORT DATE:	8 November 2000		REPORT NO: 20396D
CONTENTS:	See Table of Contents		
SUBMITTOR:	ATLINKS USA, Inc. 101 West 103 rd Street Indianapolis, IN 46290-1102 USA		
SUBJECT:	Model No:	27600XXX-M	
	FCC ID:	G9H2-7600M	
TEST SPECIFICATION	FCC CFR 47 15.233 AND 2.989 Sections: 15.209 NOTE: Tests Conducted Are "Type" Tests.		
DATE SAMPLE RECEIVED:	19 October 2000	DATE TESTED:	20 October 2000
RESULTS:	Equipment tested complies with referenced specification.		
ALTERATIONS	None		
Tested by:	<i>Ed. Chang</i>	Approved by: <i>for</i>	<i>Ed. Chang</i>
	Edward Chang	Robert G. Marshall, P. Eng.	
		Date:	9 Nov. 2000.
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TECHNICAL REPORT - FCC 2.1033(b)

Applicant

ATLINKS USA, Inc.
101 West 103rd Street
Indianapolis, IN
46290-1102 USA

FCC Identifier

G9H2-7600M

Manufacturer

Sonus Telecom, Inc.
456-4, Geumgok-li, Iryu-myun
Choong-ju City, Choongcheongbuk-Do
KOREA

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EXHIBIT D

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

"Report of Measurements"

Exhibit D(1)-1 to D(1)-56 - Test Data for Model GH2400N (FCC ID: OU3GH2400N)

Exhibit D(2)-1 to D(2)-6 - Test Data for Model 27600XXX-M (FCC ID: G9H2-7600M)

Intertek Testing Services

Sonus Telecom, Inc., Cordless Telephone, FCC ID: OU3GH2400N

1365 Adams Court, Menlo Park, CA 94025

Date of Test: 3/30-31/00 & 4/6/00

FCC Part 15.249 Test Report

For

Sonus Telecom, Inc.

on the

Cordless Telephone

Model: GH2400N

FCC ID: OU3GH2400N

Test Report # J20006239

Date of Report: April 10, 2000



NVLAP Laboratory Code 200201-0
Accredited for testing to FCC Parts 15

Tested by:	<i>Xi-Ming Yang</i>	Xi-Ming Yang
Reviewer:	<i>David Chernomordik</i>	David Chernomordik

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Report # J20006239

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FCC Part 15.249 Certification

FCC ID: G9H2-7600M
Marstech Report No. 20396D
EXHIBIT D(1)-1

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Intertek Testing Services

Sonus Telecom, Inc., Cordless Telephone, FCC ID: OU3GH2400N

1365 Adams Court, Menlo Park, CA 94025

Date of Test: 3/30-31/00 & 4/6/00

1 JOB DESCRIPTION

1.1 Client Information

The EUT has been tested at the request of

Company: Sonus Telecom, Inc.
123 Bldg., 2-Dong, Suite 714, 75-1 Gochuck-Dong
Youngdungpo-Gu, Seoul
Korea

Name of contact: Bryan Lee
Telephone: (822) 6090-3000
Fax: (822) 6090-3002

1.2 Equipment under test (EUT)

Equipment type: Cordless Telephone system

Equipment class: Low Power transmitter

Model number(s): GH2400N

FCC ID: OU3GH2400N

Manufacturer: SAME as above.

Use of Product : Voice communications

Production is planned: ☒ Yes, ☐ No

Technical Specifications:

Type of Emission	
Modulation	Analog
Range of RF Output	0.5 W (Peak EIRP)
Means for variation of operating power	None
Frequency Range	to MHz
Max. number of Channels	
Antenna	Handset: Base Unit:
Detachable antenna ?	No
External input	• Audio Voice • PSTN

Intertek Testing Services

1365 Adams Court, Menlo Park, CA 94025

Sonus Telecom, Inc., Cordless Telephone, FCC ID: OU3GH2400N Date of Test: 3/30-31/00 & 4/6/00

EUT receive date: March 30, 2000
EUT received condition: Good condition prototype
Test start date: March 30, 2000
Test end date: April 6, 2000

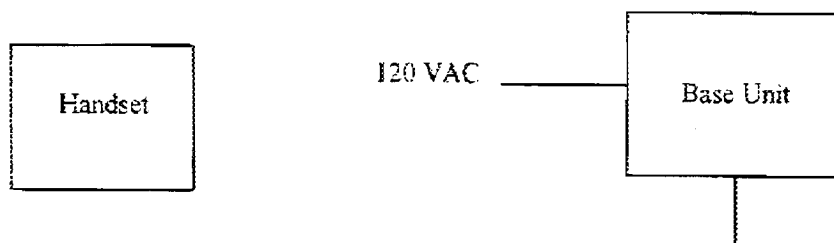
1.3 Test plan reference

FCC Part 2.1033, FCC Part 15.249

1.4 System test configuration

1.4.1 System block diagram & Support equipment

The diagrams shown below details the placement of the equipment under test on the turntable.



S:	Shielded	U:	Unshield	F:	With Ferrite Core
Support equipment					
Equip. #	Equipment	Manufacturer	Model #	S/N #	FCC ID
1	Telephone Simulator				NA

1.4.2 Justification

The system was configured for testing in a typical manner in accordance with ANSI C63.4 standard.

For emission testing, the equipment under test (EUT) was configured for testing in a typical fashion (as a customer would normally use it). During testing, all cables were manipulated to produce worst case emissions.

1.4.3 Mode(s) of operation

The handset and Base unit was powered from fully charged batteries and AC adapter. During tests, EUT was operating at continuous transmitting mode.

1.5 Modifications required for compliance

No modifications were implemented by Intertek Testing Services.

2 TEST SUMMARY

FCC RULE	DESCRIPTION OF TEST	RESULT	PAGE
Handset			
15.249a	Field Strength of Emissions	90.4 dB(μ V/m)	5
15.249c	Field Strength of Spurious Radiation	Worst case Freq.: MHz Margin: dB	6
15.203	Antenna requirement	Complies	8
15.205	Restricted bands of operation	Worst case Freq.: MHz Margin: dB	
15.207	Line Conducted Emissions	N/A	N/A
Base Unit			
15.249a	Field Strength of Emissions	DB(μ V/m)	5
15.249c	Field Strength of Spurious Radiation	Worst case Freq.: MHz Margin: dB	6
15.203	Antenna requirement	Complies	8
15.205	Restricted bands of operation	Worst case Freq.: MHz Margin: dB	
15.207	Line Conducted Emissions	Worst case Freq.: MHz Margin: dB	9

3 FIELD STRENGTH OF EMISSIONS

3.1 Test Description

Parameter:	FCC § 15.249a
Requirement:	FCC § 15.249a
Fundamental: Harmonics	

3.2 Test Procedure

For the measurements, the EUT is attached to a cardboard box (if necessary) and placed on the wooden turntable which is 0.8m above the ground plane on an open site. If the EUT attaches to peripherals, they are connected and operational (as typical as possible). The EUT is wired to transmit full power.

The signal is maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters. Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance. All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance.

Radiated emission measurements were performed from 30 MHz to the 10th harmonic of transmitter frequency. Analyzer resolution is 100 kHz or greater for 30 MHz to 1000 MHz, 1 MHz for >1000 MHz.

Measurements were performed for lowest and highest channels.

3.3 Test Results

See attached.

3.4 Modifications made during testing

None

3.5 Test Instrumentation

- ☒ Hewlett Packard HP8566B Spectrum Analyzer (S.A.)
- ☒ EMCO 3115 Horn Antenna
- ☐ HP Pre-amp

Radiated Emissions

Company:	Sonus	Model #:	GH 2400N	Standard	FCC § 15.249
EUT:	2.4 GHz Cordless Phone	S/N #:		Limit	12
Project #:	J20009278	Test Date:	Mar 30, 2000	Test Distance	3 meters
Test Mode:	Base low channel	Engineer:	Barry S.	Duty	0 dB
				Relaxation	

	Antenna Used			Pre-Amp Used			Cable Used			Transducer Used
Number:	8	3	19	8	10	13	12			0
Model:	EMCO 2115	CDXB100	6	CDL P100 0	AFT18855	ACO400	Gm_M+L	None	None	None

[illegible]

Notes:

- a) D.C.F.:Distance Correction Factor
b) Insert Loss (dB) = Cable A + Cable B + Cable C.
c) Net (dB) = Reading + Antenna Factor - Pre-amp + Insert Loss. - Transducer Loss - Duty Relaxation (transmitter only).
d) Negative signs (-) in Margin column signify levels below the limits.
e) All other emissions not reported are below the equipment noise floor which is at least 20 dB below the limits.

Radiated Emissions Test Data

Company:	Sonus	Model #:	GH 2400N	Standard:	FCC § 15.245
EUT:	2.4 GHz Cordless Phone	S/N #:		Limit:	12
Project #:	J20009278	Test Date:	Mar 30, 2009	Test Distance:	3 meters
Test Mode:	Hand low channel	Engineer:	Barry S.	Duty Relaxation:	0 dB

	Antenna Used			Pre-Amp Used			Cable Used			Transducer Used
Number	8	3	19	8	10	13	12			0
Model	EMCO 3116	CDI B300	5	CDI P100	AFT16365	ACO400	Gm_M+L	None	None	None

[illegible]

Notes

- a) D.C.F.: Distance Correction Factor
- b) Insert Loss (dB) = Cable A + Cable B + Cable C
- c) Net (dB) = Reading + Antenna Factor - Pre-amp + Insert. Loss. - Transducer Loss - Duty Relaxation (transmitter only)
- d) Negative signs (-) in Margin column signify levels below the limits.



Radiated Emissions Test Data

Company:	Sonus	Model #:	GH 2400N	Standard	FCC § 15.249
EUT:	2.4 GHz Cordless Phone	S/N #:		Limit	12
Project #:	J20009278	Test Date:	Mar 30, 2000	Test Distance	3 meters
Test Mode:	Hand hi channel	Engineer:	Barry S.	Duty Relaxation	0 dB

Antenna Used				Pre-Amp Used			Cable Used			Transducer Used
Number	8	3	19	8	10	13	12			0
Model	EMCO 3115	CDI B-20	0	CDL P-100 0	ART1500S	ACO-400	Gm_HRL	None	None	None

[illegible]

Notes

- a) D.C.F.: Distance Correction Factor
b) Insert. Loss (dB) = Cable A + Cable B + Cable C.
c) Net (dB) = Reading + Antenna Factor - Pre-amp + Insert. Loss. - Transducer Loss - Duty Relaxation (transmitter only).
d) Negative signs (-) in Margin column signify levels below the limits.
e) All other emissions not reported are below the equipment noise floor which is at least 20 dB below the limits.

Radiated Emissions

Company:	Sonus	Model #:	GH 2400N	Standard:	FCC § 15B
EUT:	Cordless 2.4 GHz Phone	S/N #:		Limits:	2
Project #:	J20009278	Test Date:	March 31, 2000	Test Distance:	3 meters
Test Mode:	On in Standby mode	Engineer:	Barry S.	Duty Relaxation:	0 dB

	Antenna Used			Pre-Amp Used			Cable Used			Transducer Used
Number	2	7	19	2	3	13	5			0
Model	EMCO 3-43	EM LPA 25	0	HP 8447D	MC 15542	A219400	5ft 3 10m	None	None	None

[illegible]**Notes:**

- a) D.C.F.:Distance Correction Factor
b) Insert. Loss (dB) = Cable A + Cable B + Cable C.
c) Net (dB) = Reading + Antenna Factor - Pre-amp + Insert. Loss. - Transducer Loss - Duty Relaxation (transmitter only).
d) Negative signs (-) in Margin column signify levels below the limits.
e) All other emissions not reported are below the equipment noise floor which is at least 20 dB below the limits.

4 SPURIOUS EMISSIONS (EXCEPT HARMONICS)

4.1 Test Description

Parameter:	FCC § 15.249c
Requirement:	FCC § 15.249c
Attenuation limits:	≤ 50 dB or FCC § 15.209

4.2 Test Procedure

For measurement below 1 GHz, the EUT was placed inside a TEM cell (stripline) connected to a spectrum analyzer from one side and to 50 ohm termination from one side and to 50 ohm termination from another. For measurement above 1 GHz, a horn antenna was placed at a distance of 10-15 cm from EUT and connected to a spectrum analyzer. Several plots were made to show emissions from 1 MHz up to 10th harmonic.

4.3 Test Results

See attached plots.

4.4 Modifications made during testing

None

4.5 Test Instrumentation

☒ Hewlett Packard HP8566B Spectrum Analyzer (S.A.)

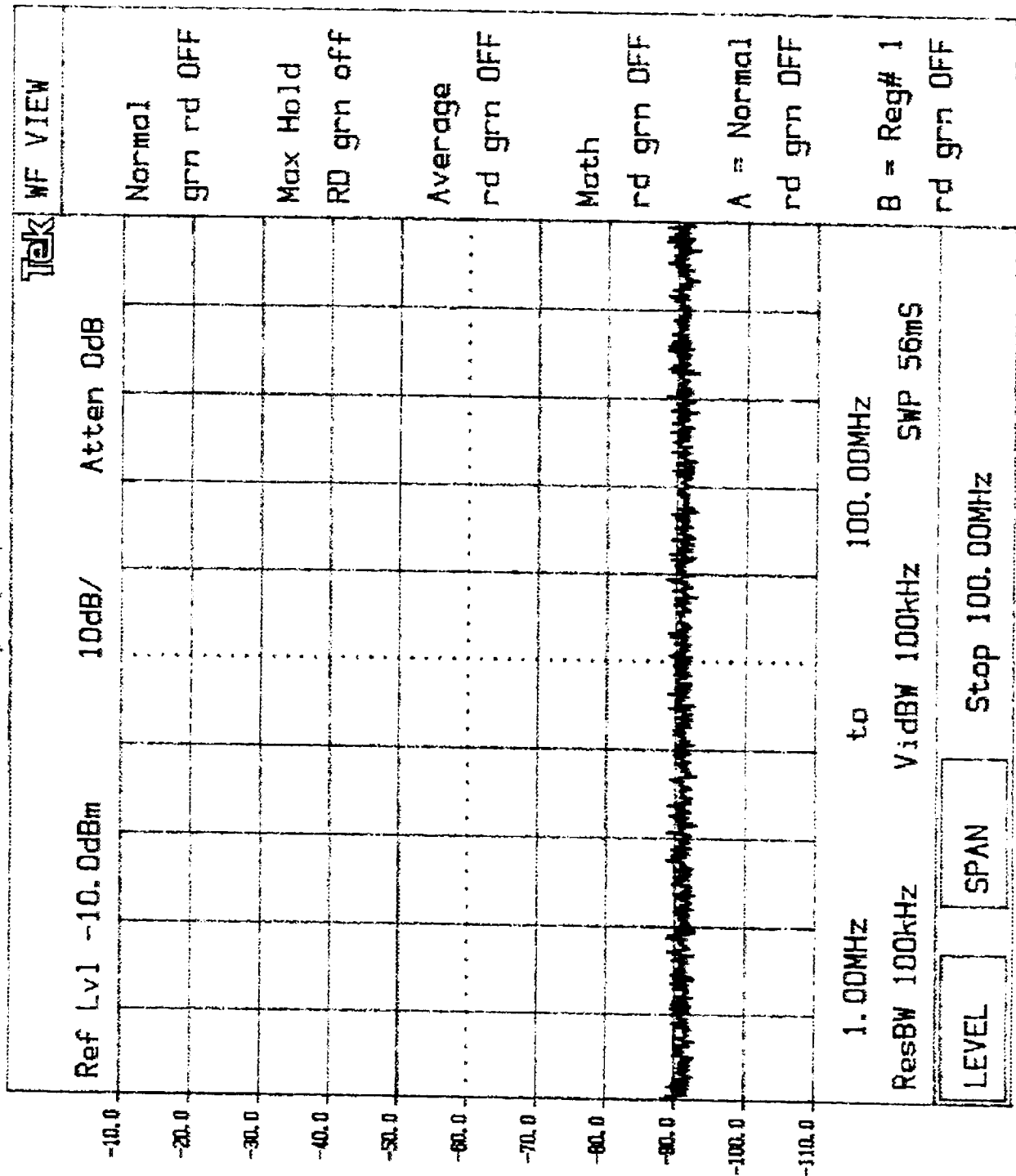
☒ EMCO 3115 Horn Antenna

☐ Pre-amplifiers

OUT OF BAND EMISSION PLOTS

Plot #	Description
4.1.a - 4.1.f	Base unit, Low channel
4.2.a - 4.2.f	Base unit, High channel
4.3.a - 4.3.f	Handset, Low channel
4.4.a - 4.4.f	Handset, High channel

Plot 4.1.2



2784

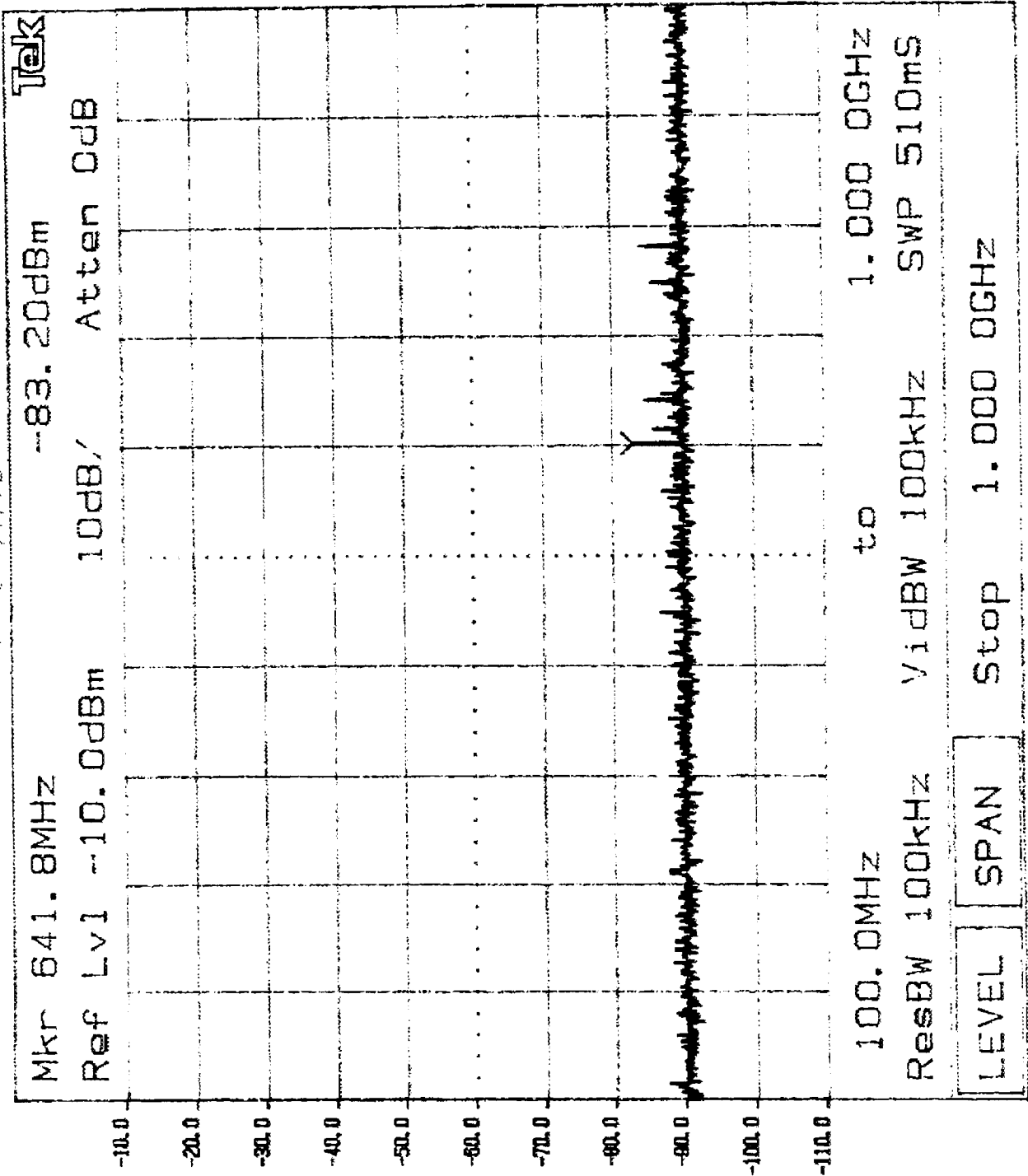
Tektronix

KEYPAD

Knob 1

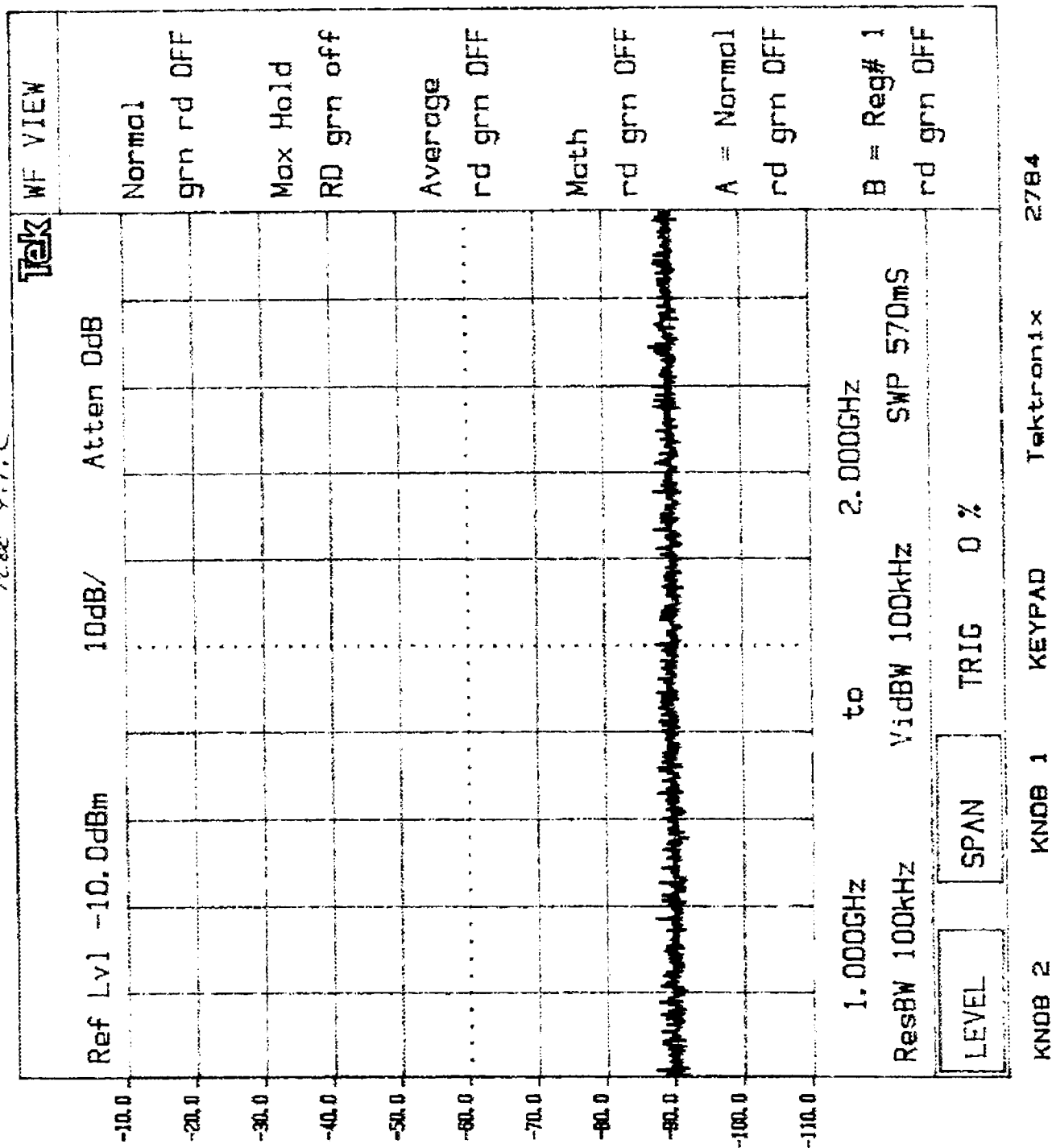
Knob 2

Plot 4.1.6

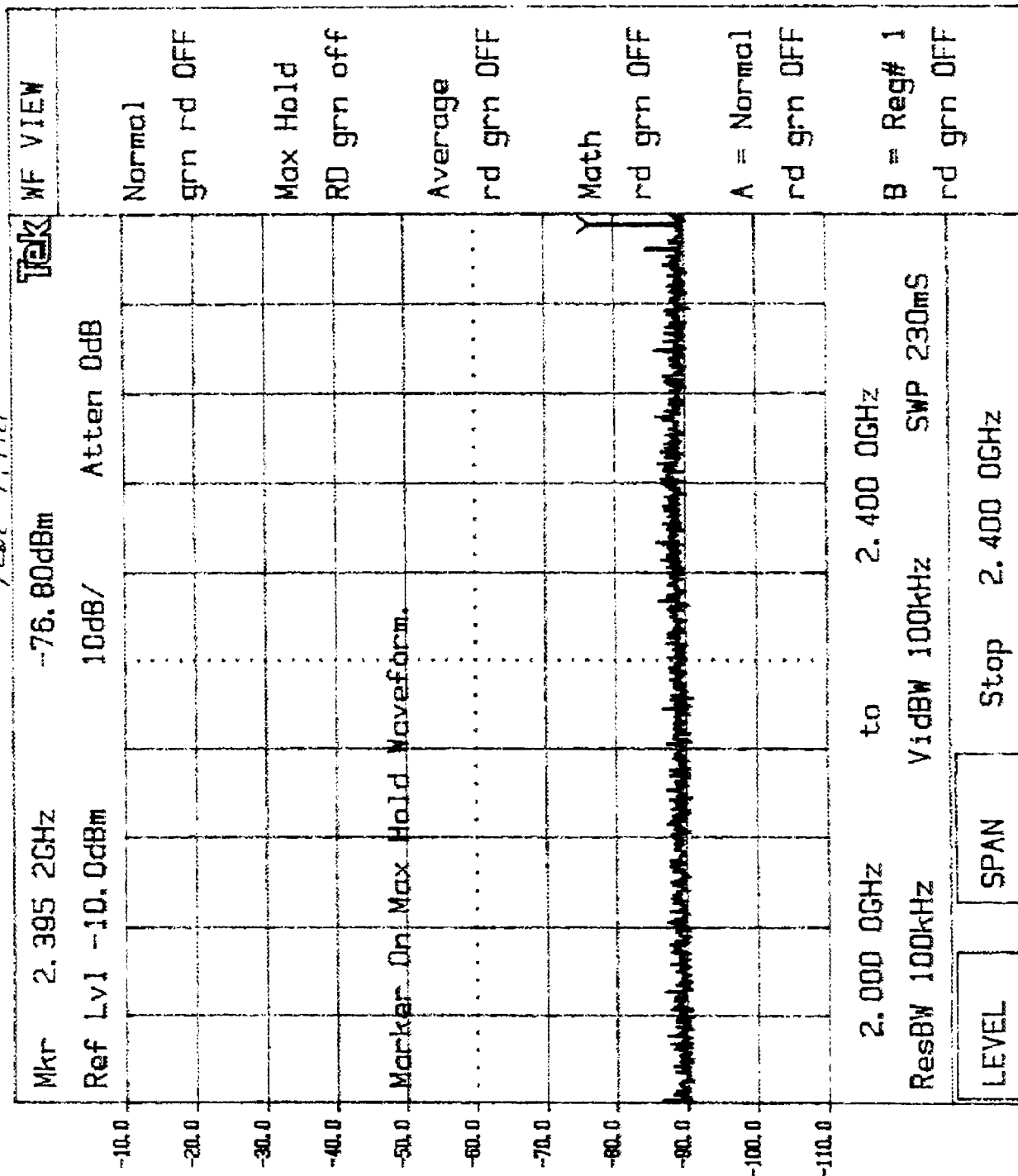


KN0B 2 KN0B 1 KEYPAD Tektronix 2784

Plot 4.1.2



Plot 4, 1, 1, d



2784

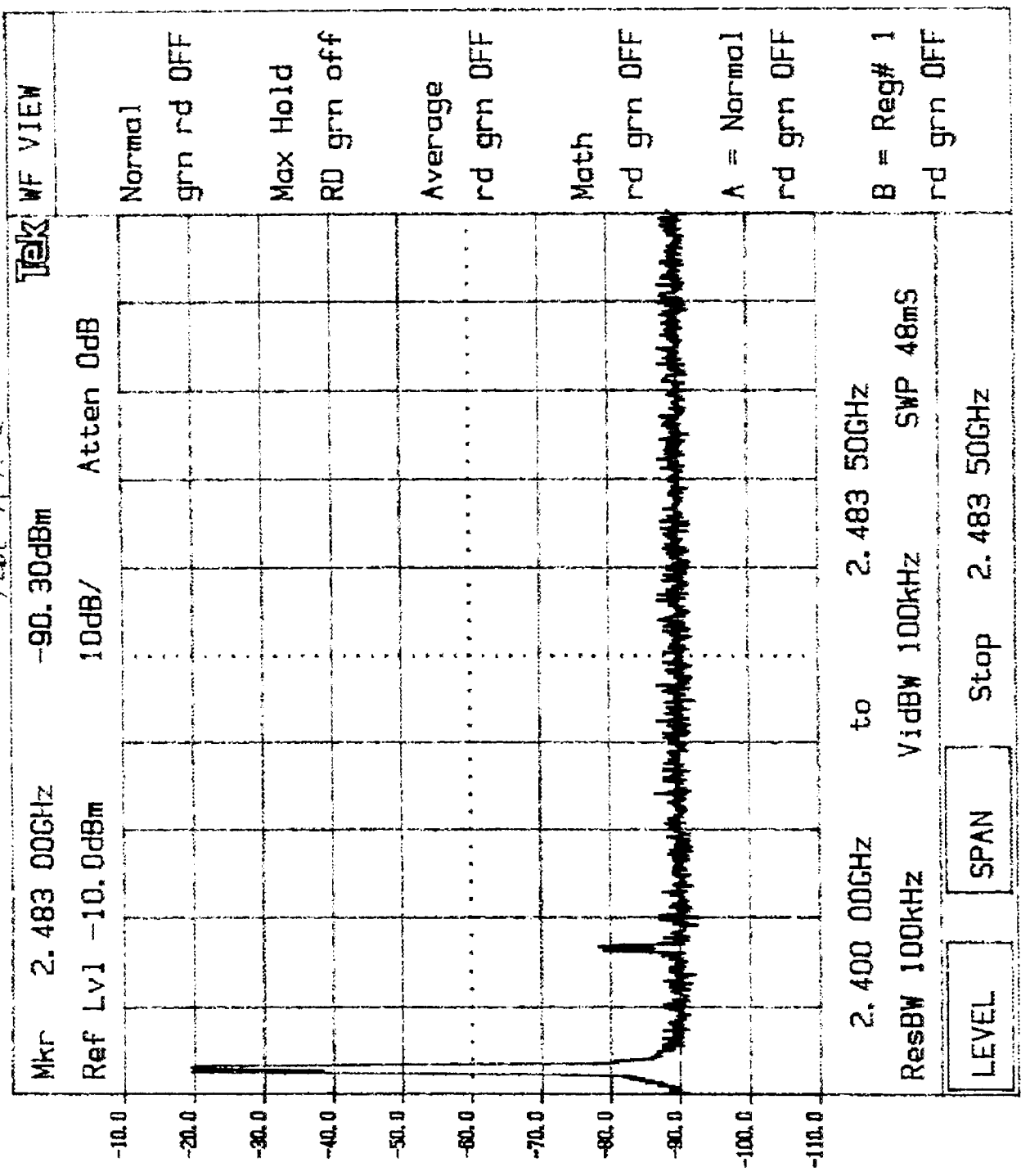
Tektronix

KEYPAD

KNOB 1

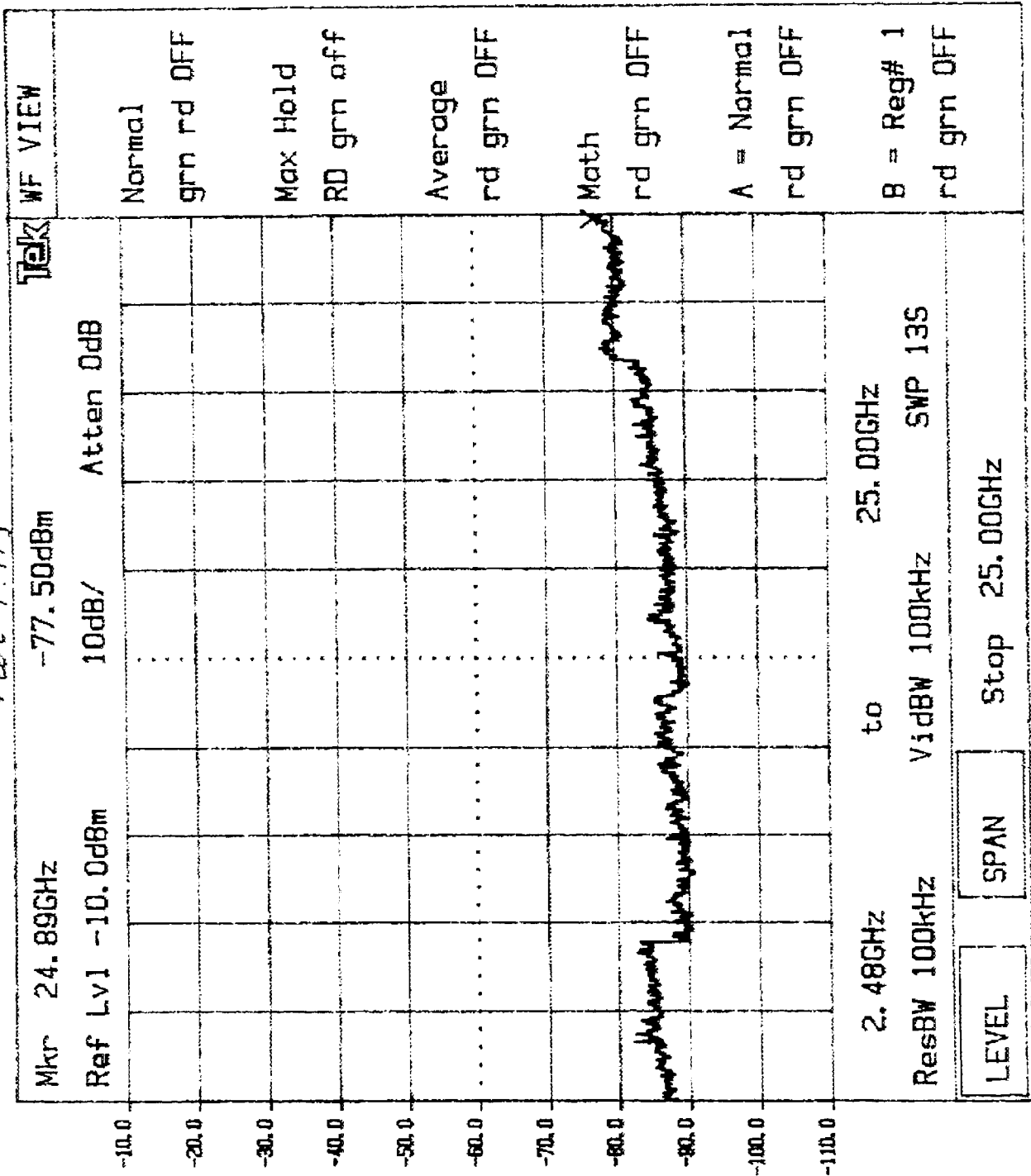
KNOB 2

Plot 4, 1, 2



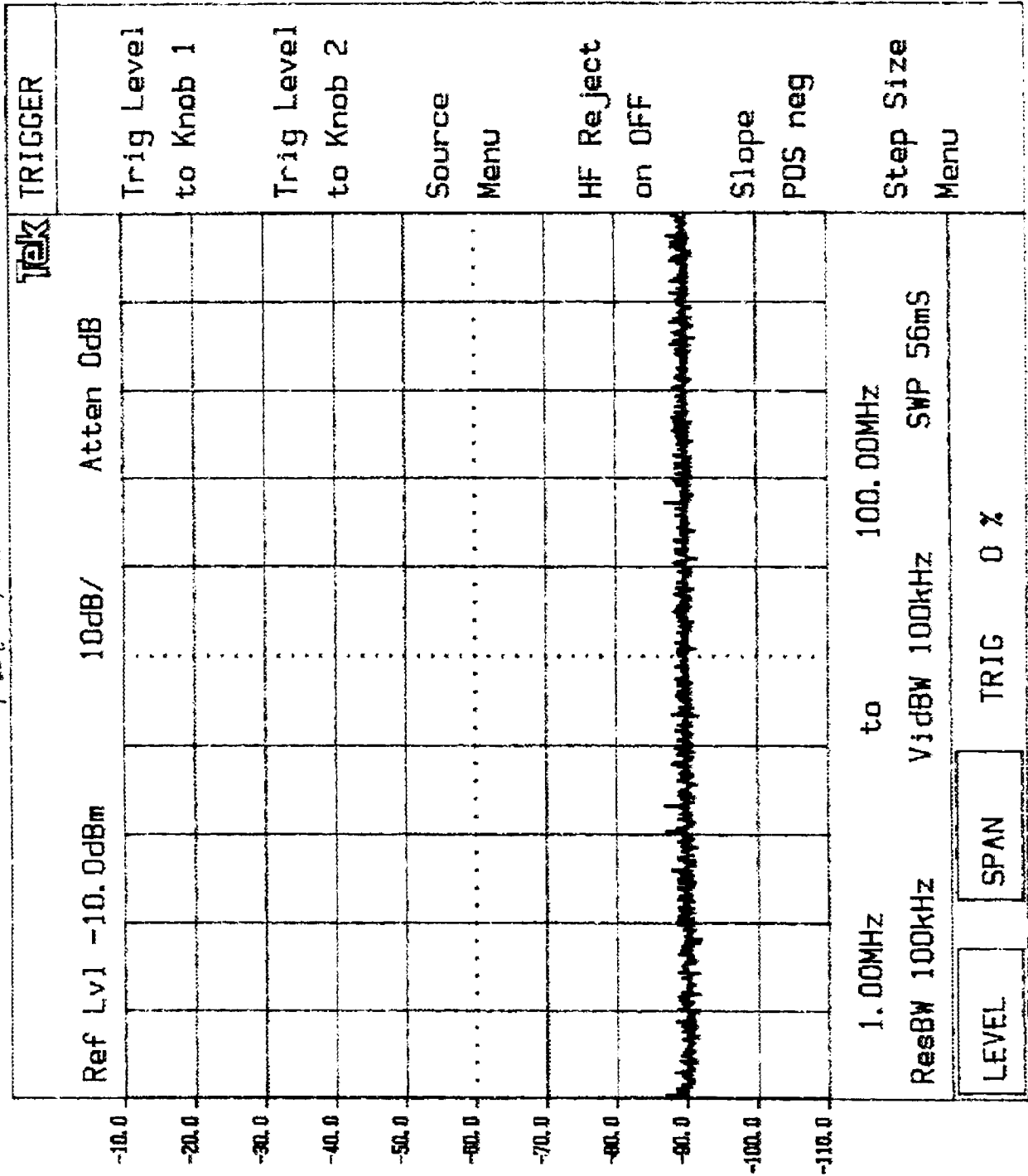
KNOB 2 KNOB 1 KEYPAD Tektronix 2784

Plot 4.1.f



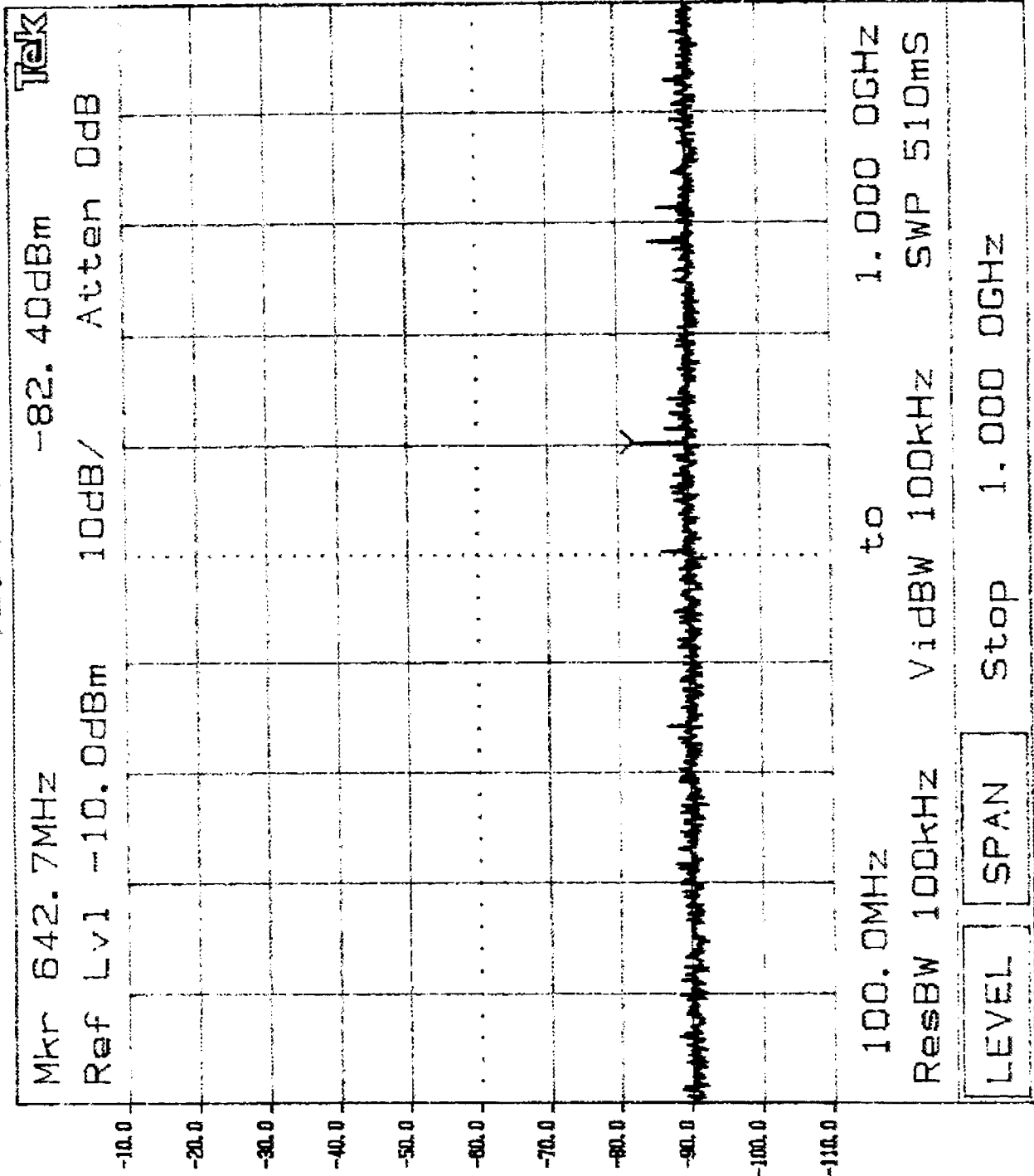
KNOB 2 KNOB 1 KEYPAD Tektronix 2784

Plot 4.2.a

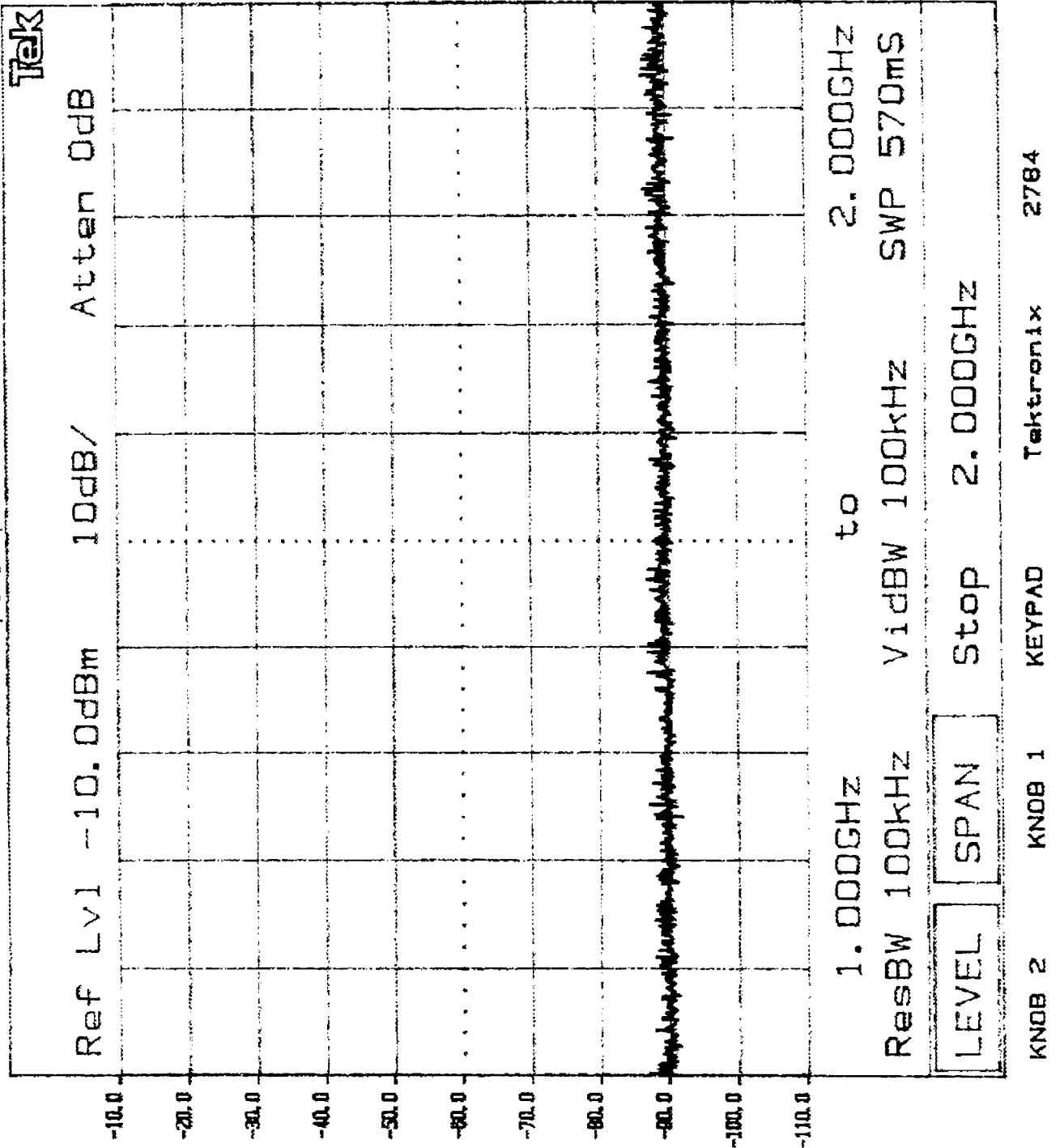


KNOB 2 KNOB 1 KEYPAD Tektronix 2784

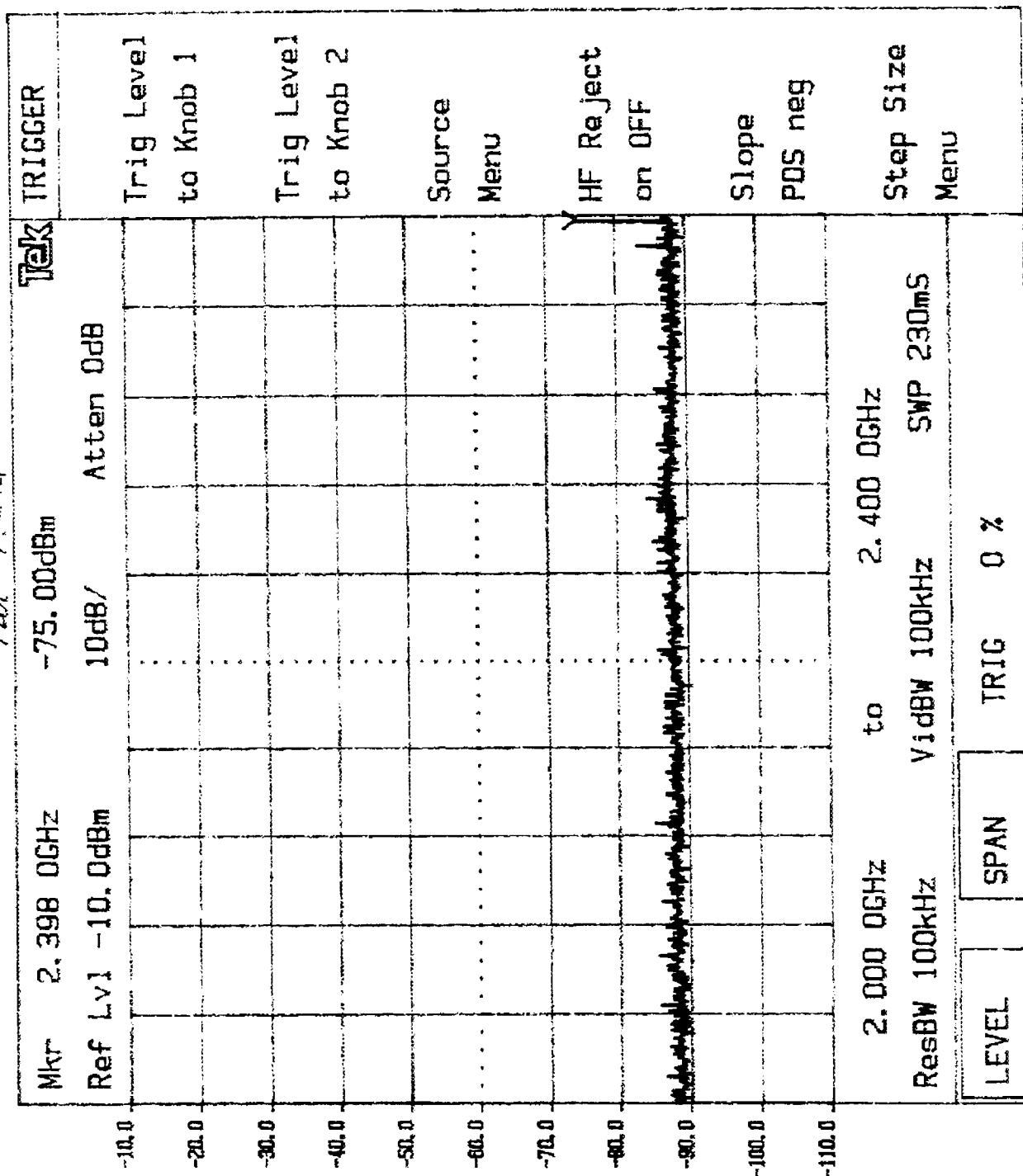
Plot 4.2.b



Plot 4.2.c



Plot 4.2.d



2784

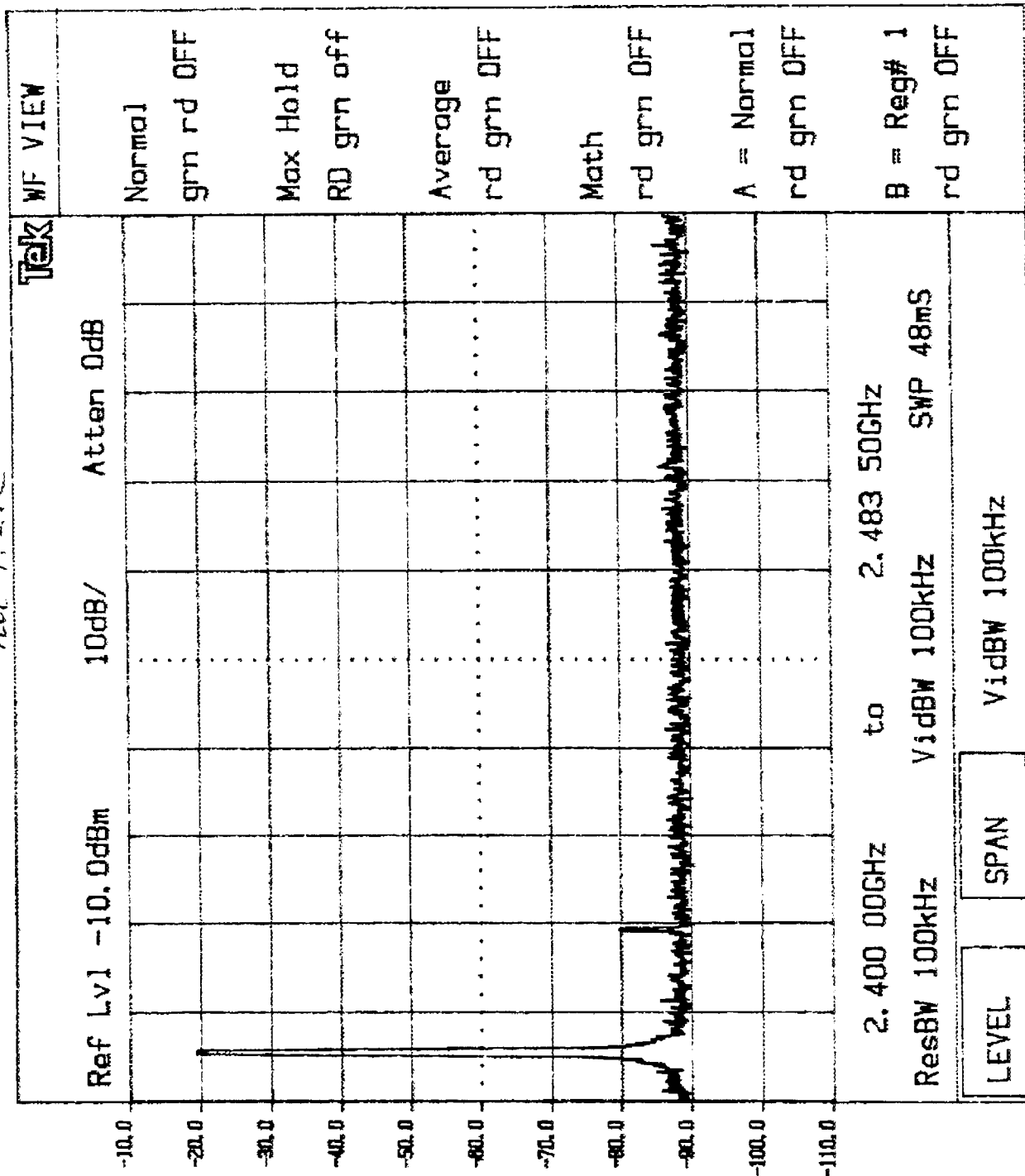
Tektronix

KEYPAD

Knob 1

Knob 2

Plot 4.2.e



2784

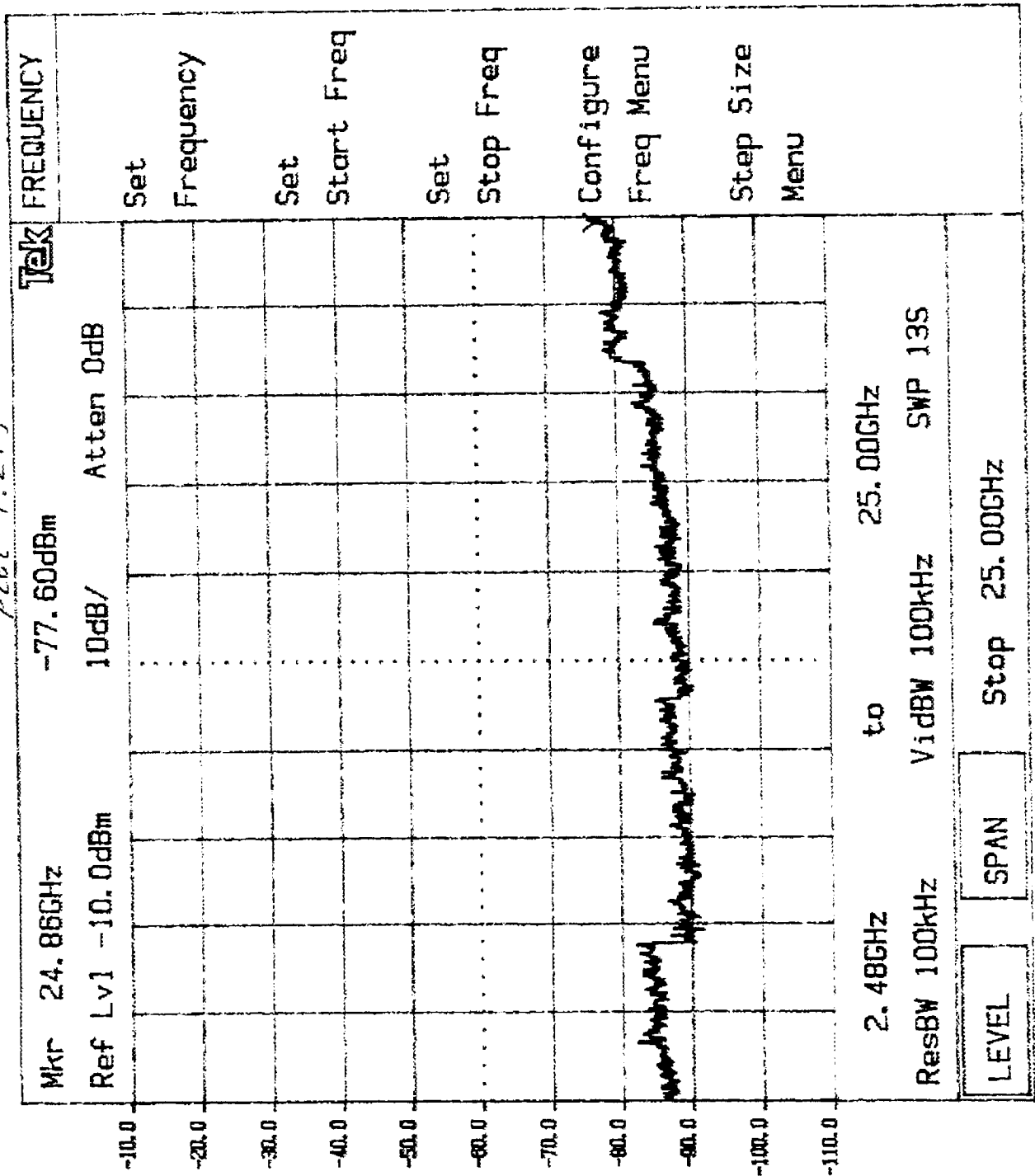
Tektronix

KEYPAD

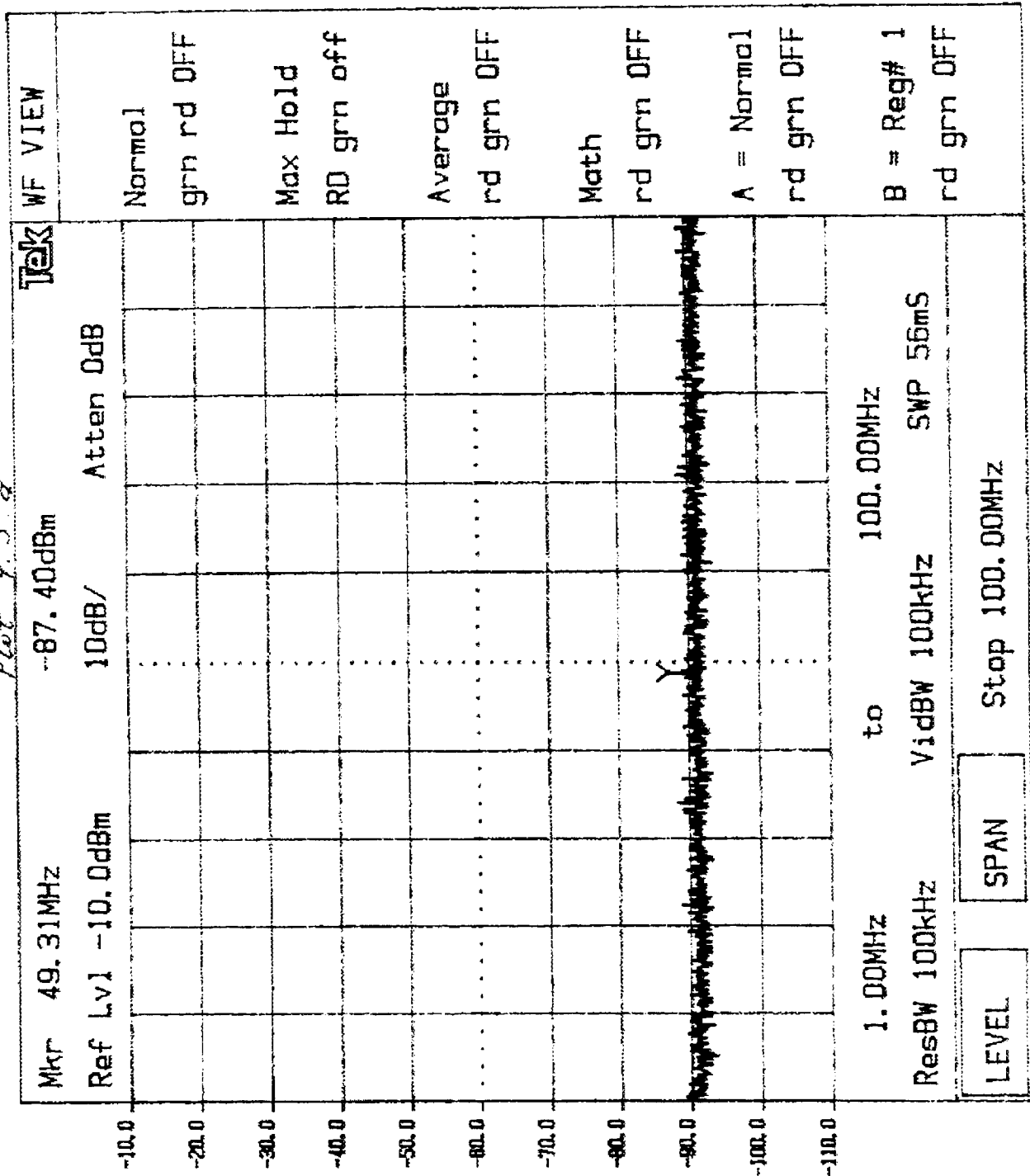
KNOB 1

KNOB 2

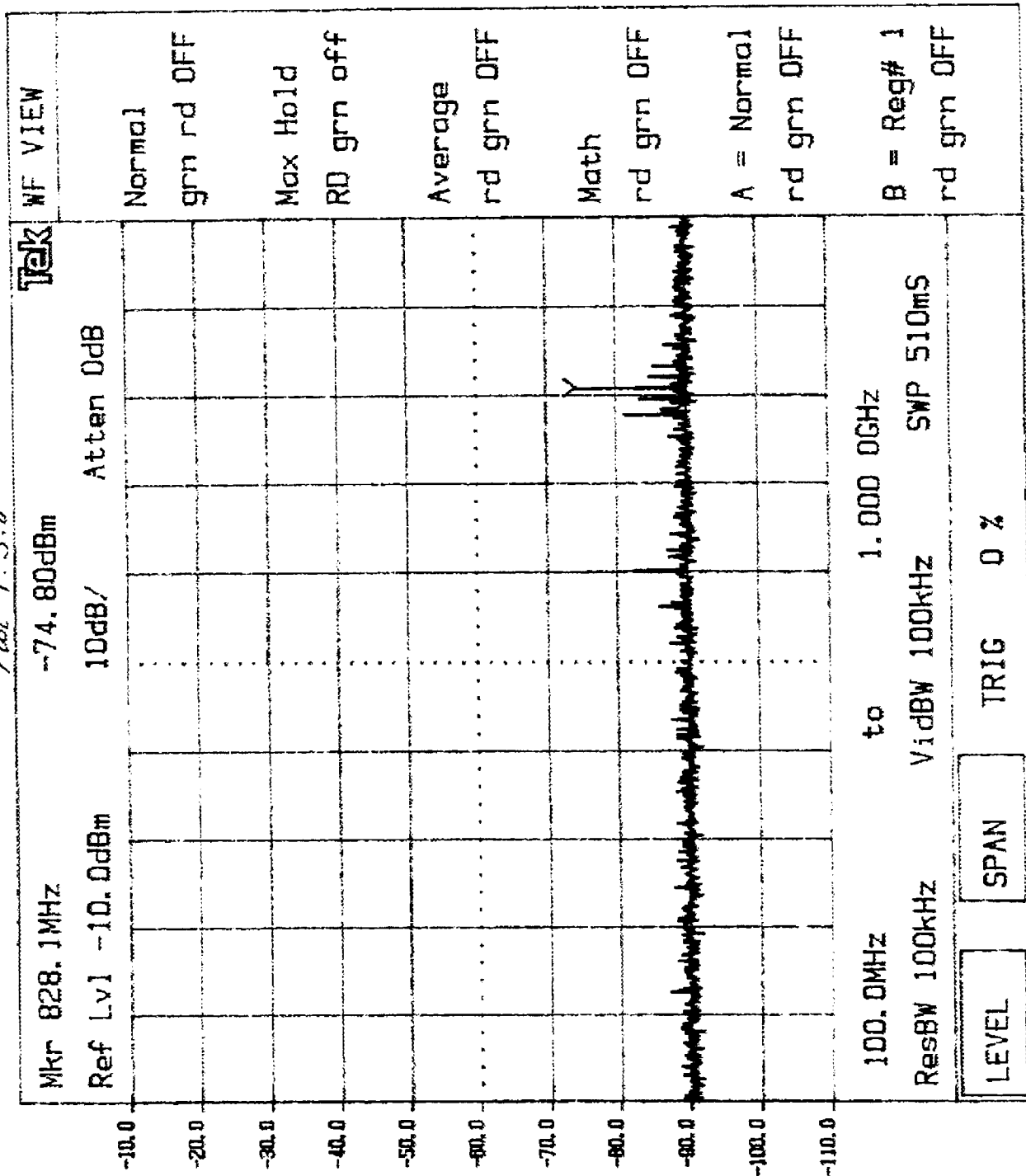
Plot 4.2.f



Plot 4.3 a



Plot 4.3.6



2784

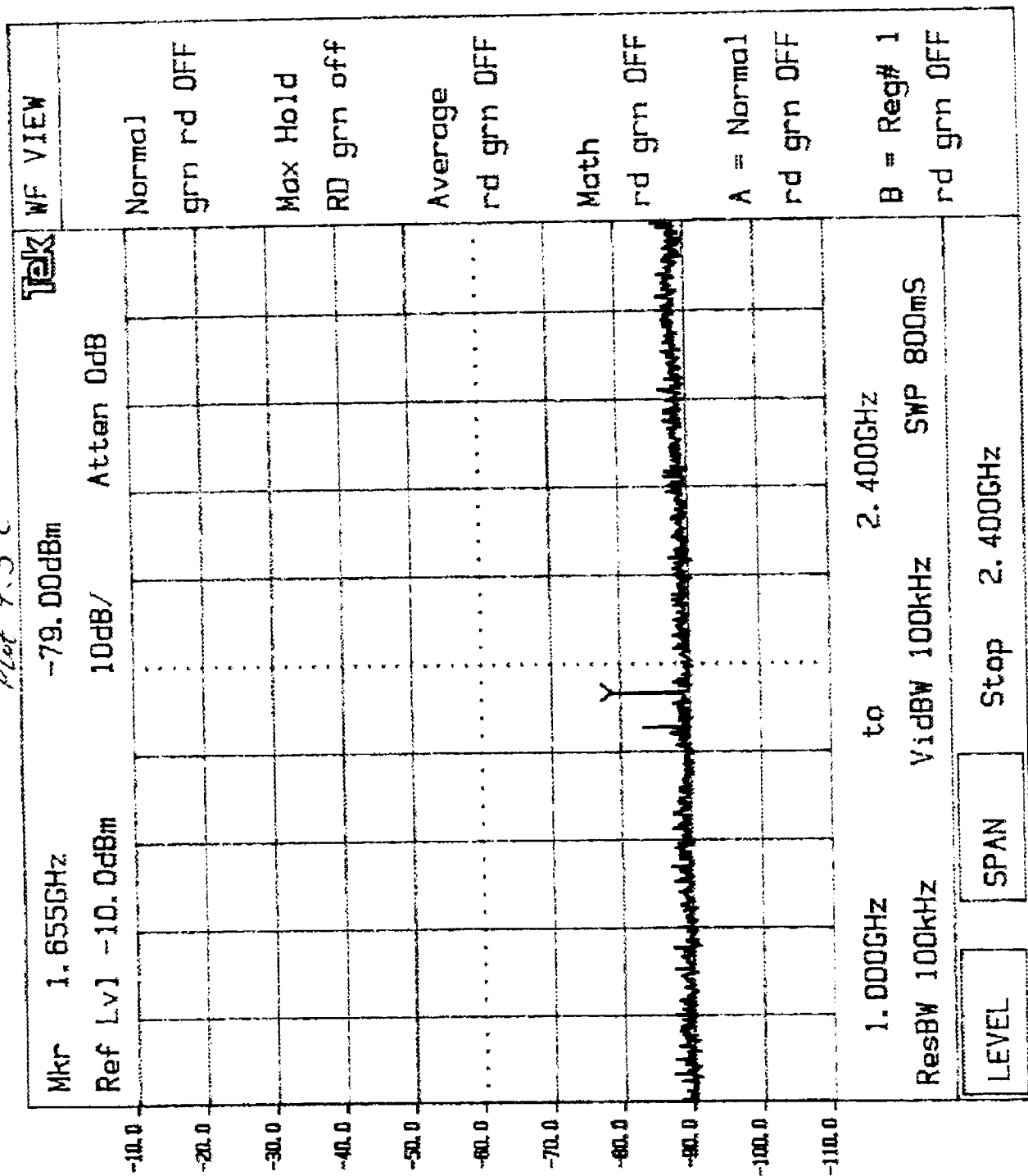
Tektronix

KEYPAD

KNOB 1

KNOB 2

Plot 4.3 c



2784

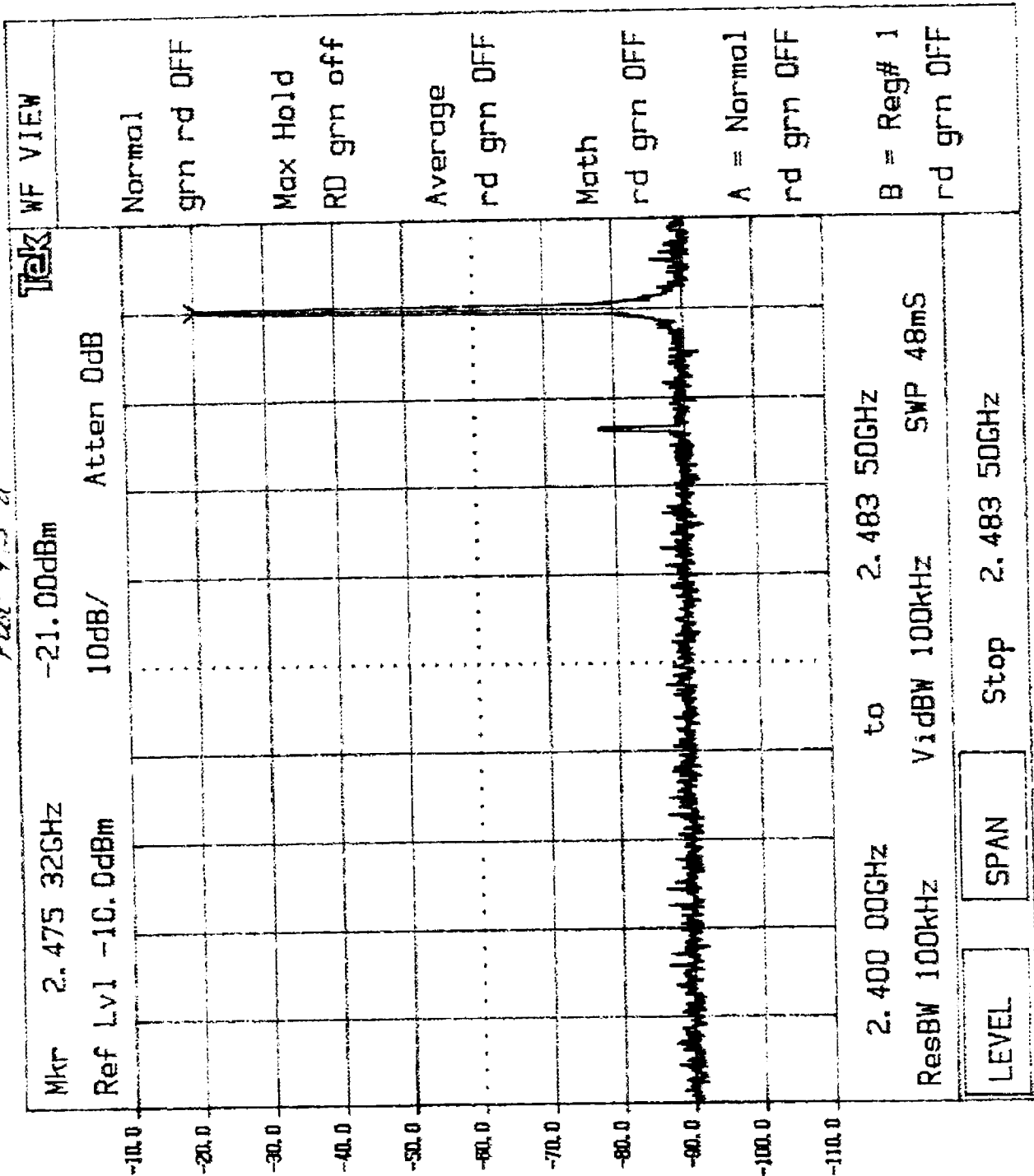
Taktronix

KEYPAD

KNOB 1

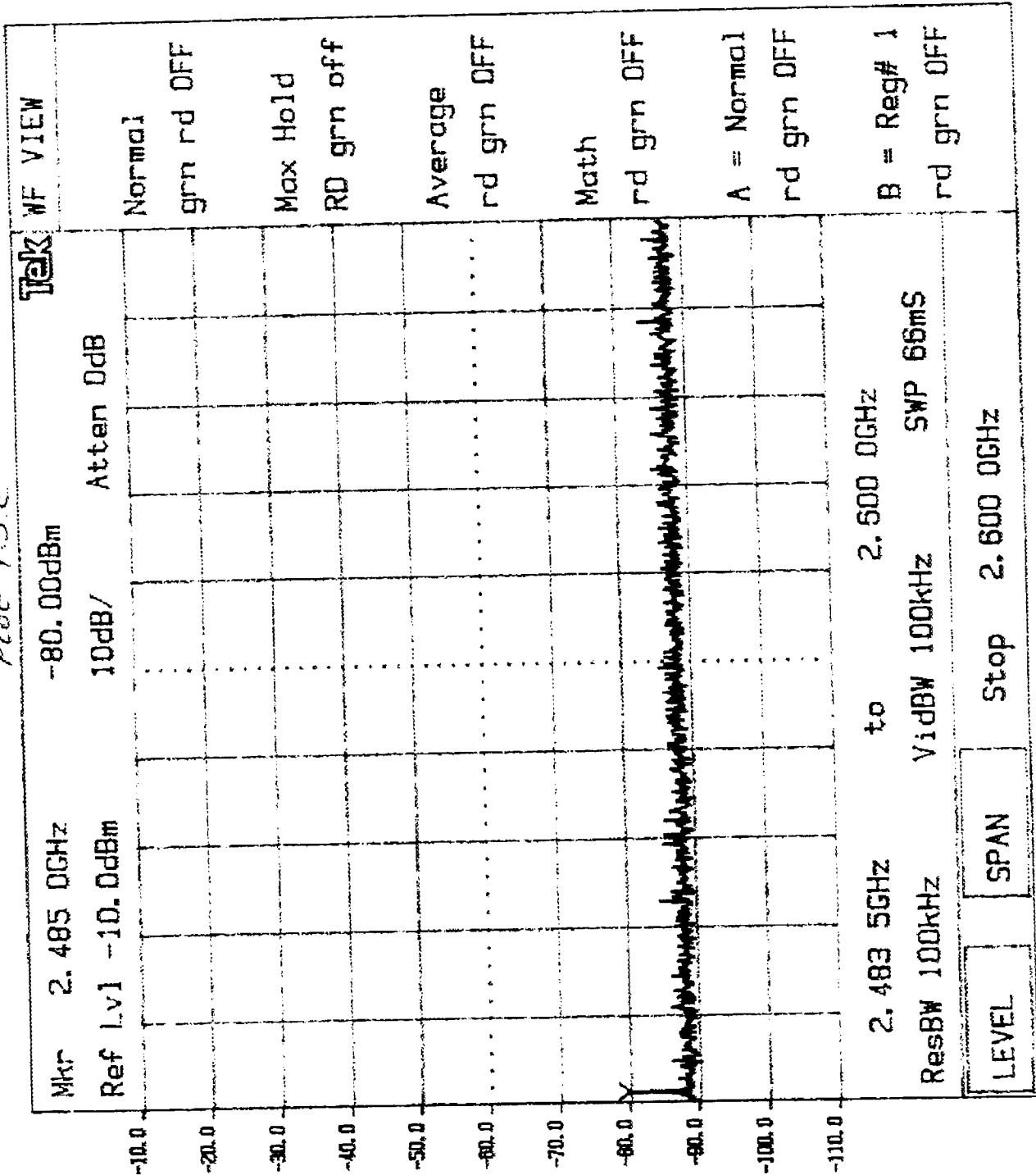
KNOB 2

Plot 43 d



KNOB 2 KNOB 1 KEYPAD Tektronix 2784

Plot 4.3e



2784

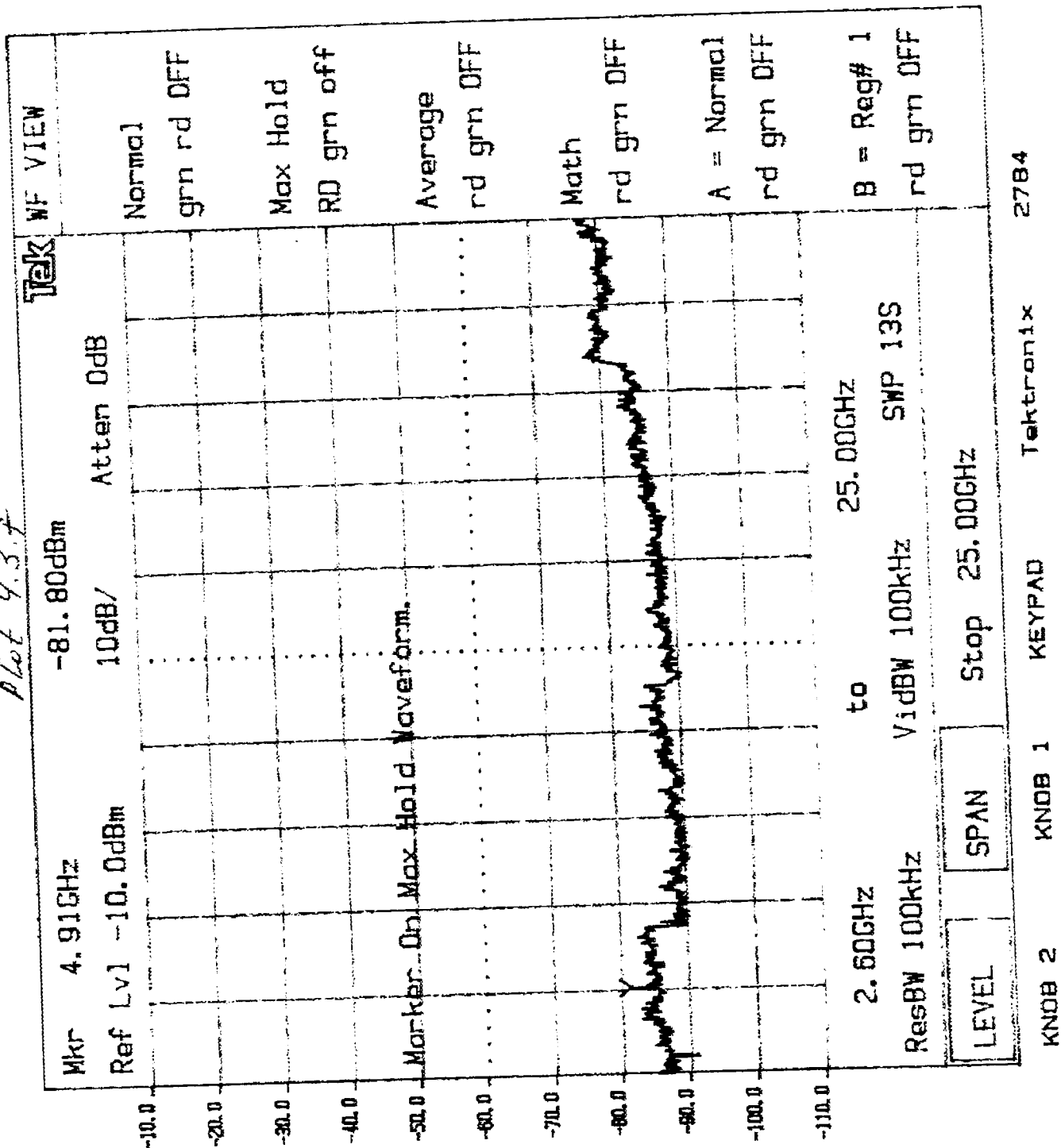
Tektronix

KEYPAD

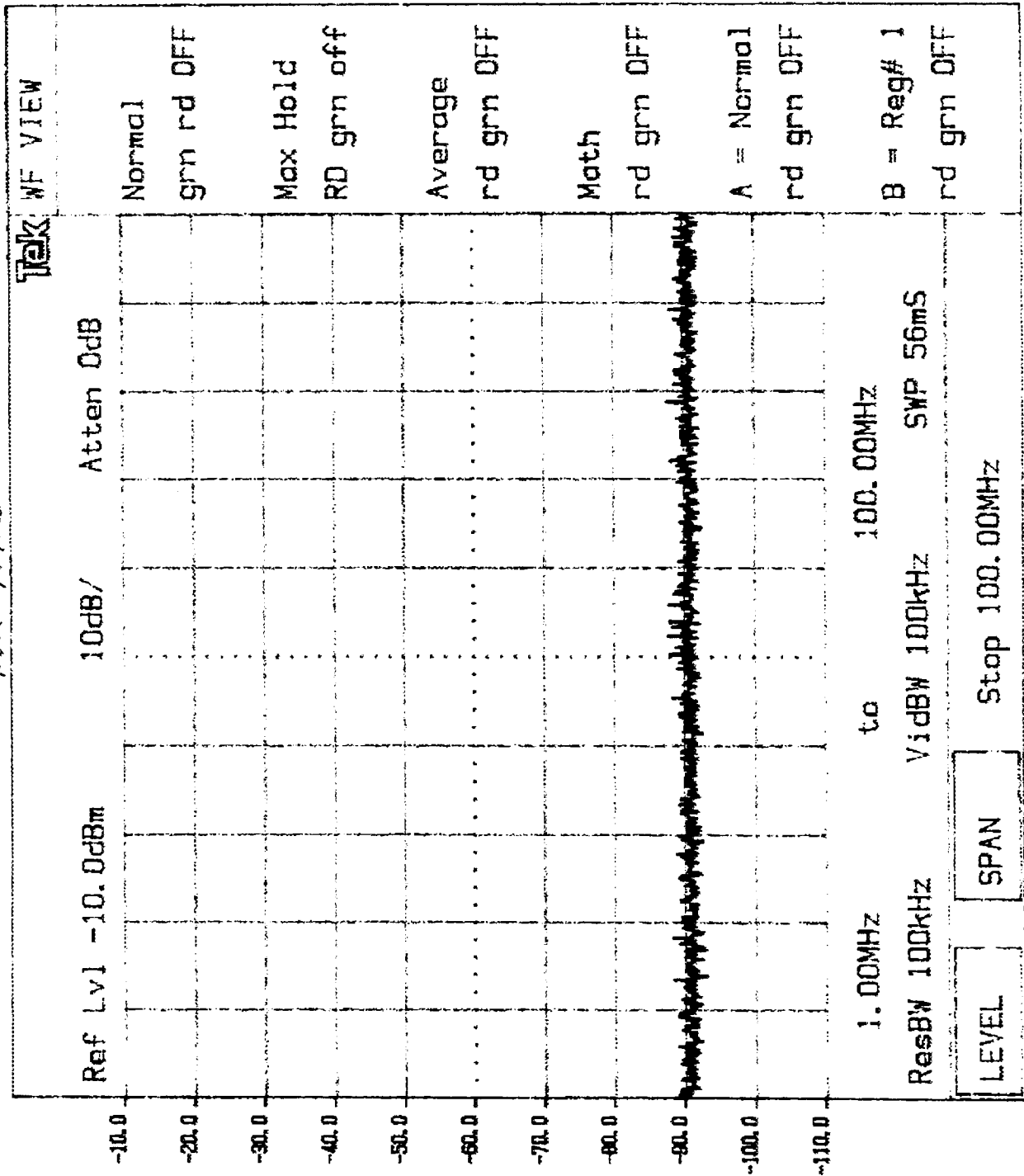
KNOB 1

KNOB 2

Plot 4.3.f



Plot Y.Y.2



2784

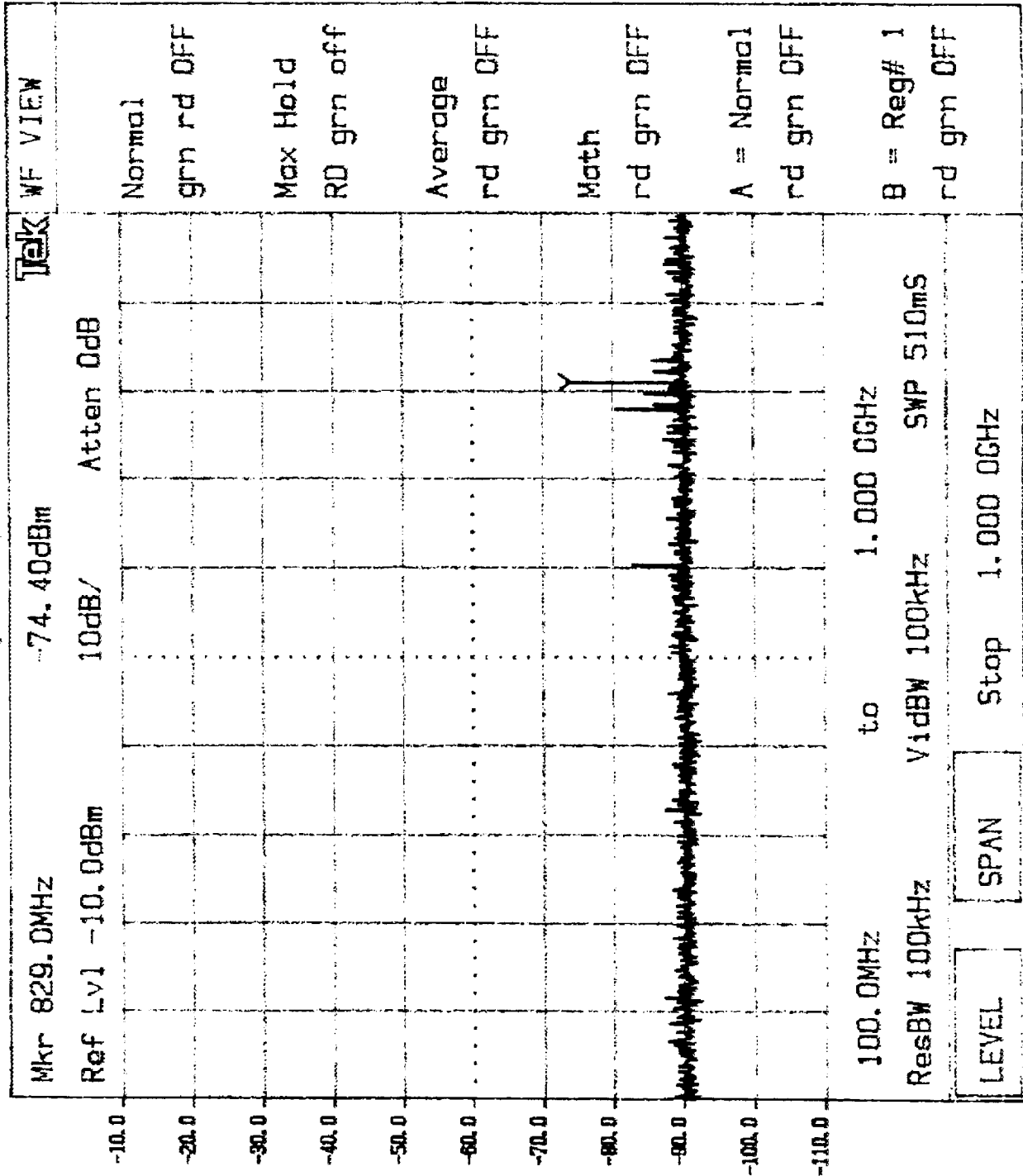
Tektronix

KEYPAD

KNOB 1

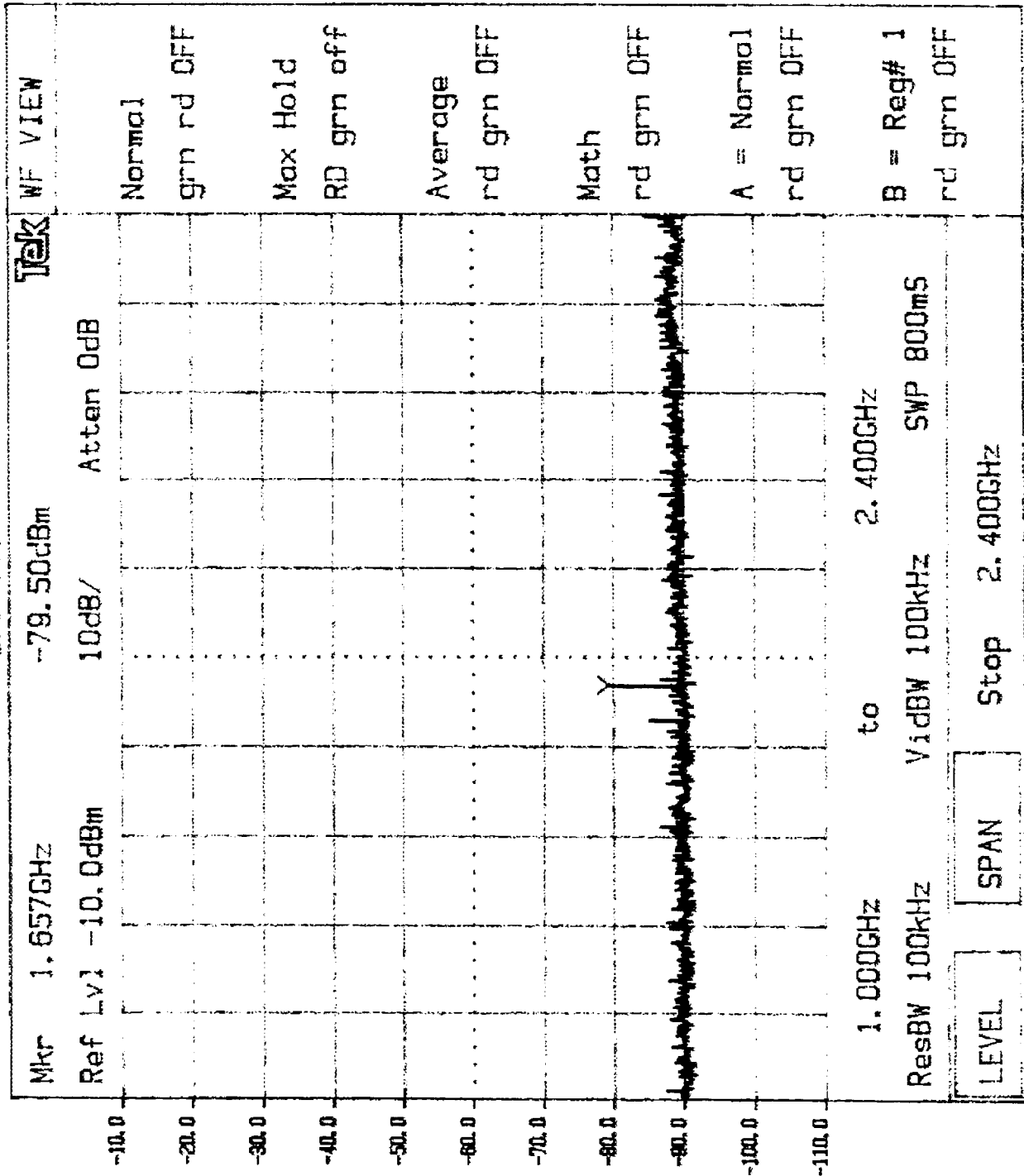
KNOB 2

Plot 4.4.b



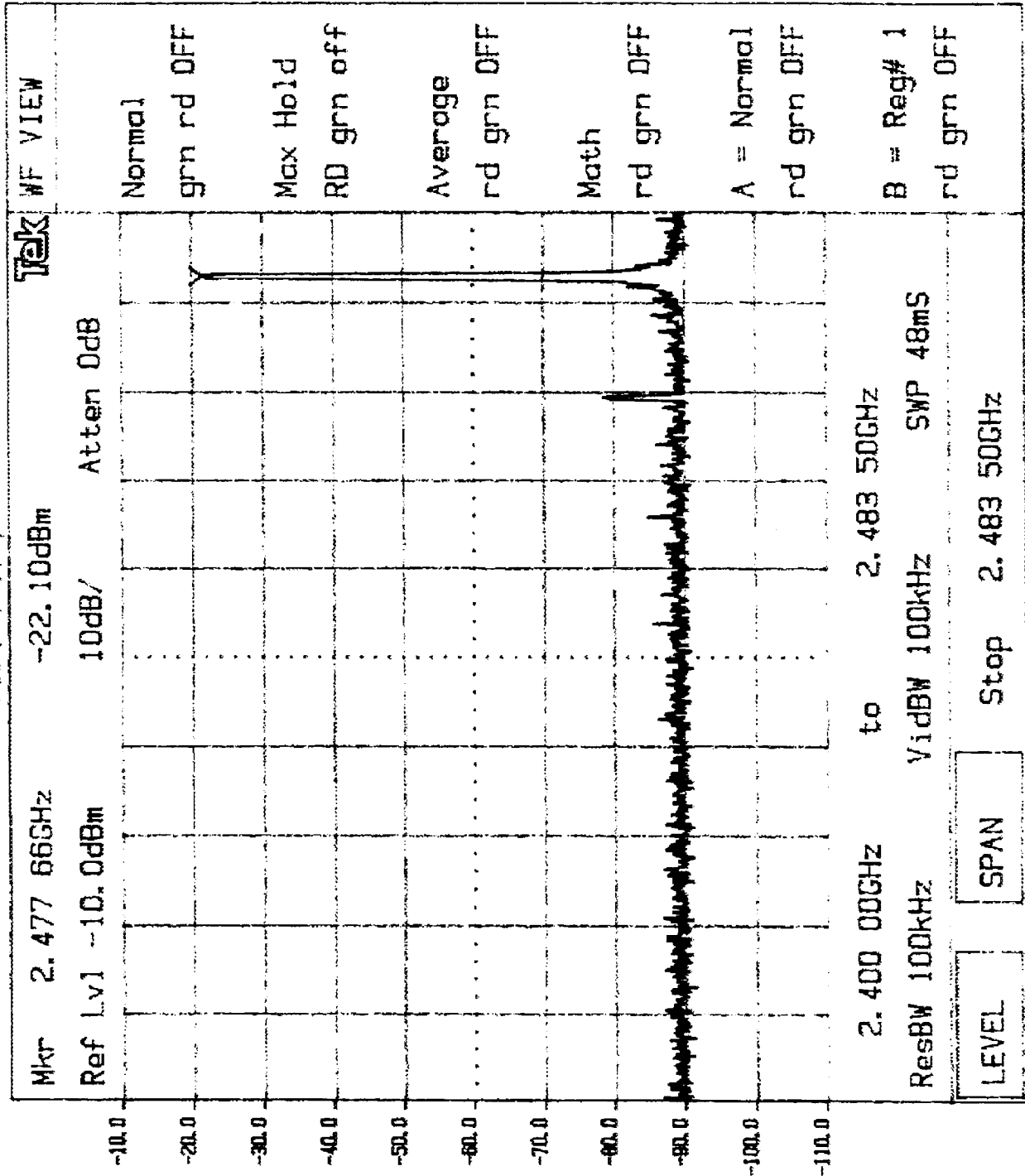
KNDB 2 KNDB 1 KEYPAD Tektronix 2784

Plot 4.4.c



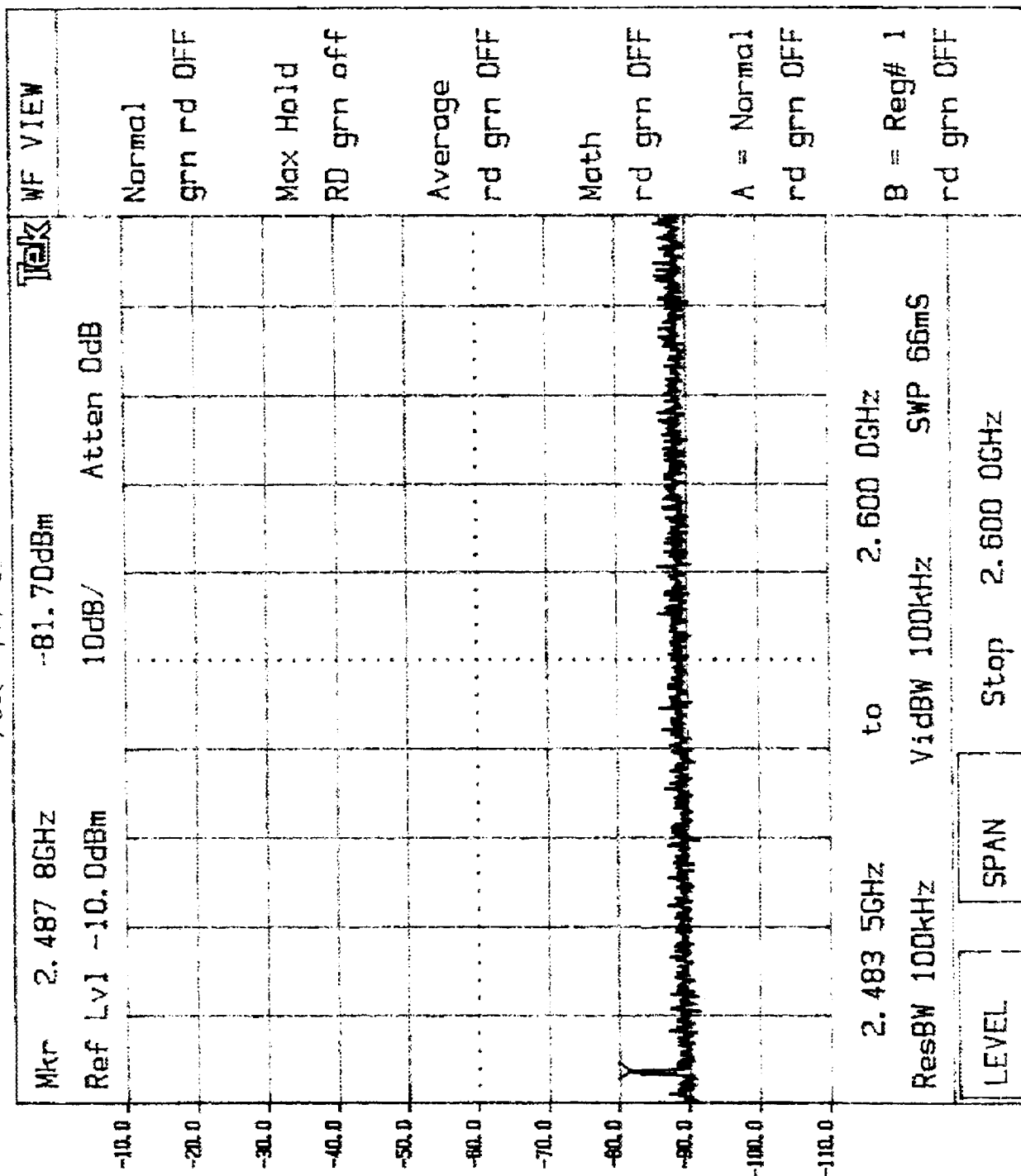
Knob 2 Knob 1 Keypad Tektronix 2784

Plot 4.4. d



KNOB 2 KNOB 1 KEYPAD Tektronix 2784

Plot 4.4.e



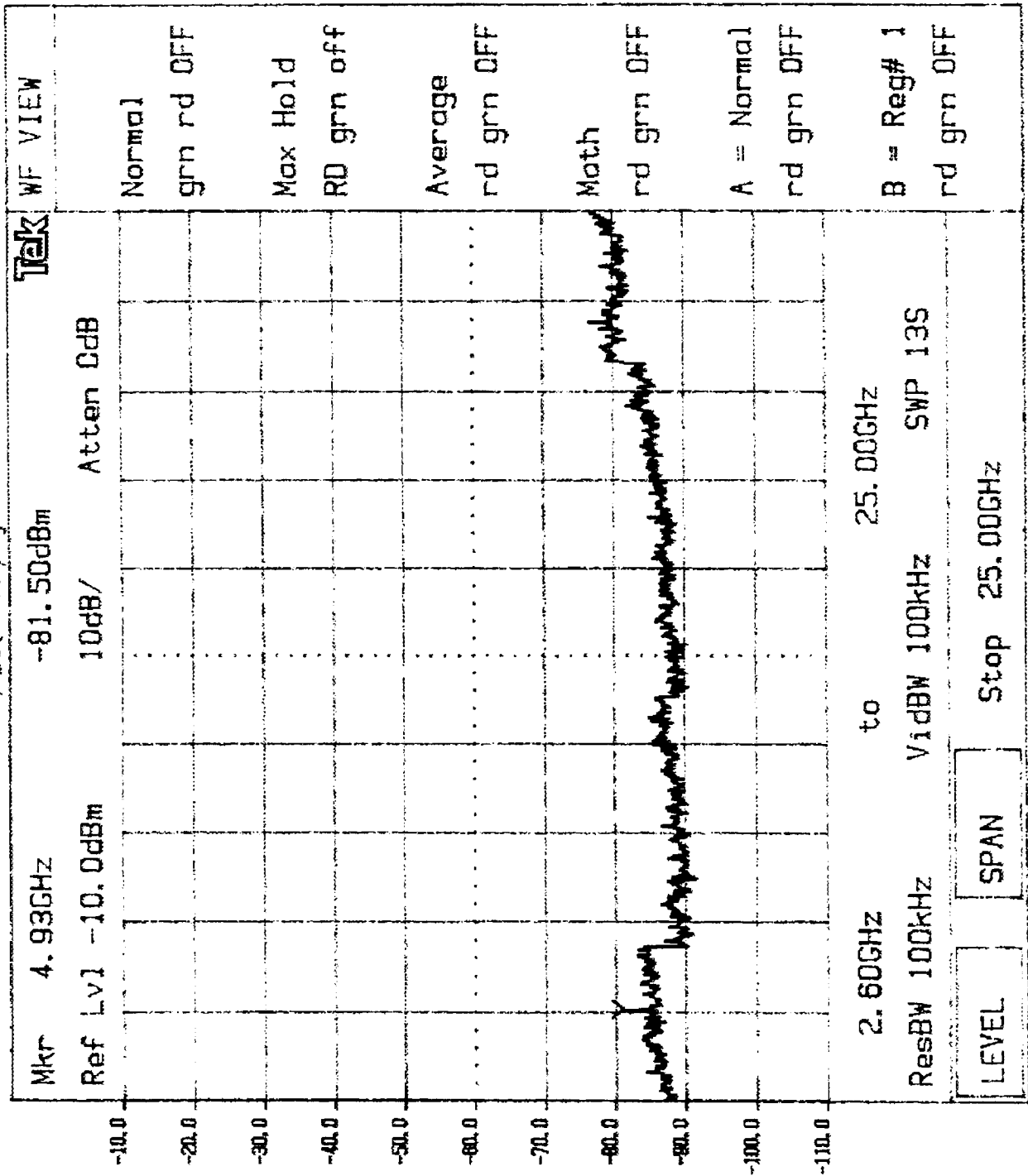
2784

Tektronix

KEYPAD

Knob 1 Knob 2

Plot 4.4.f



5 ANTENNA REQUIREMENTS**5.1 Test description**

Parameter:	FCC § 15.203
Requirement:	FCC § 15.203
Descriptions:	No antenna other than furnished by the responsible party shall be used with the device.

5.2 Test Procedure

None

5.3 Test Results

The device is considered to comply with the requirements by

	Description
X	Permanently attached antenna
	Using an antenna with a unique coupling connector

5.4 Modifications made during testing

None

5.5 Test instrumentation

None

6 AC LINE CONDUCTED EMISSIONS

6.1 Test description

Parameter:	ANSI C63.4
Requirement:	FCC § 15.207
Limits:	$\leq 250 \mu\text{V}$ within the band 450 kHz to 30 MHz

6.2 Test Procedure

The EUT was connected to the DC power supply, that was connected to the AC line through the LISNs. Both HOT and NEUTRAL leads were tested.

AC line conducted emission measurements were performed from 0.45 MHz to 30 MHz. Analyzer resolution is 10 kHz or greater.

6.3 Test Results

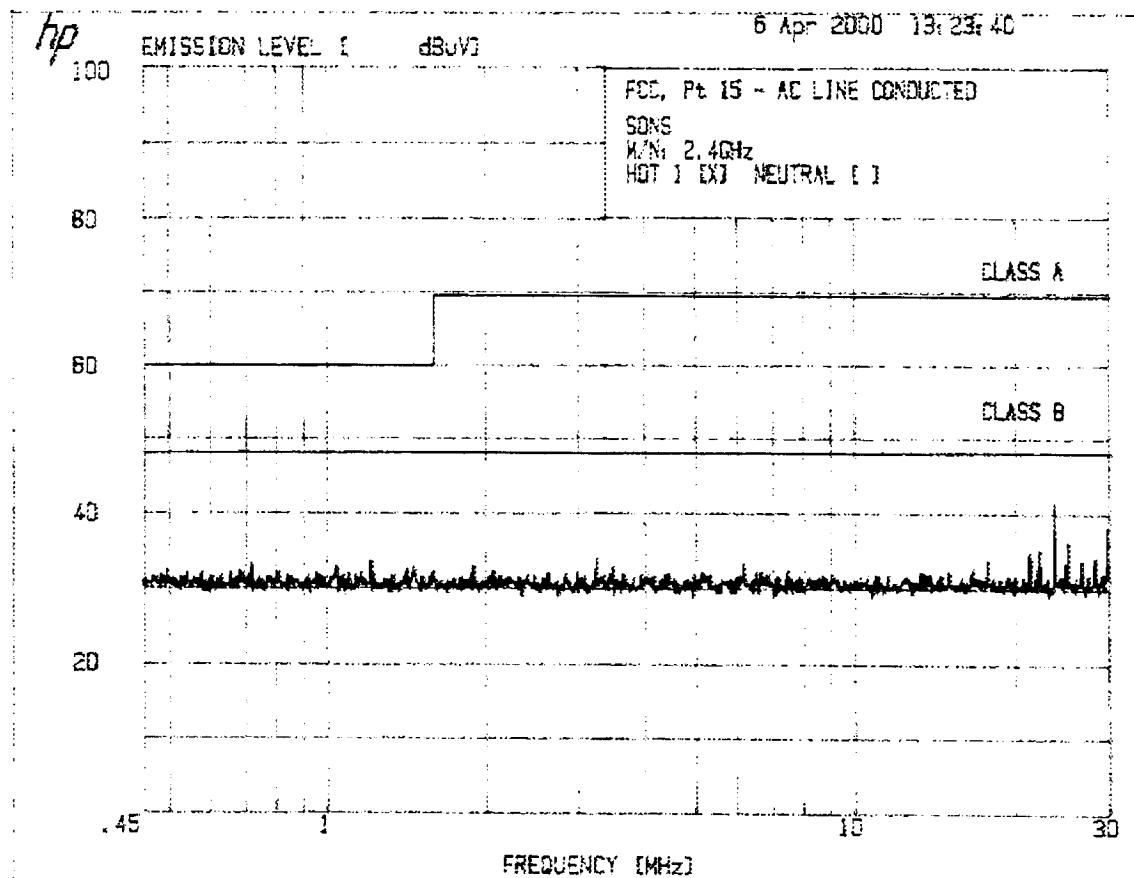
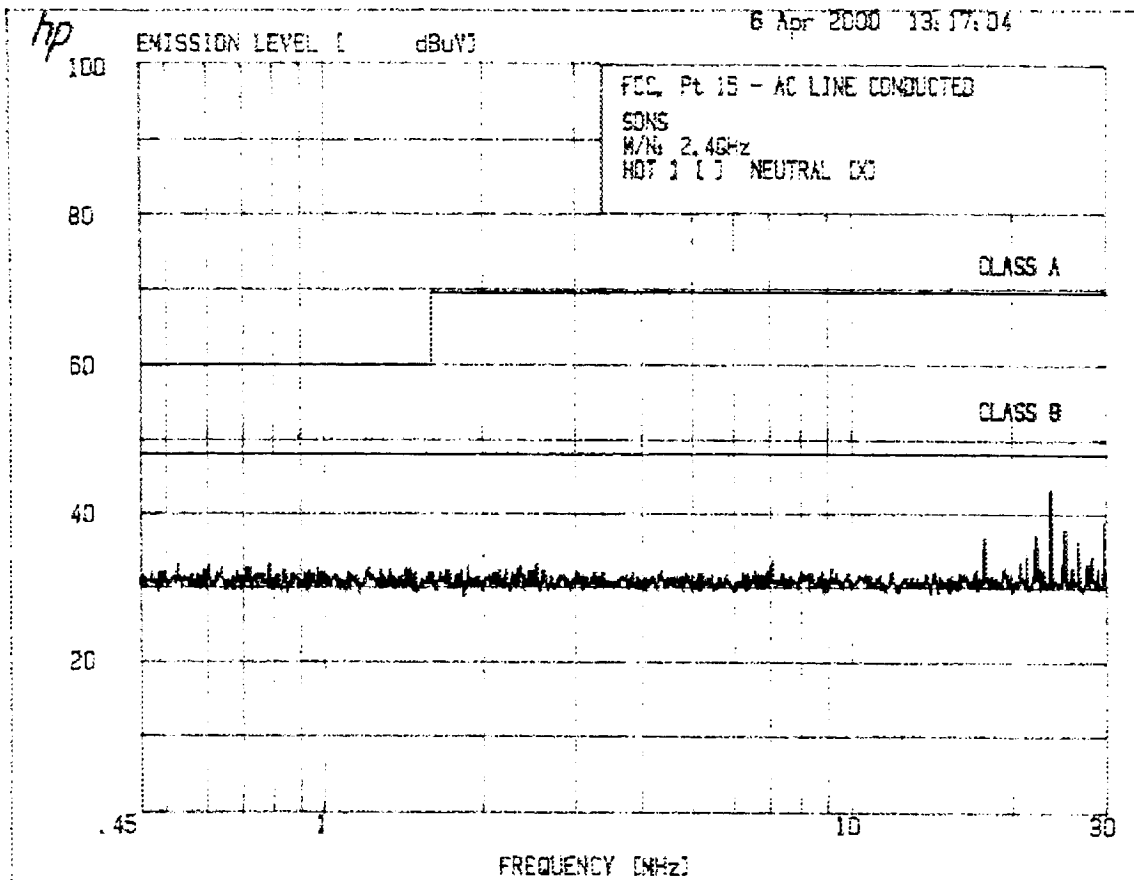
Handset	Base Unit
Not applicable, EUT is battery powered only	See attached. Passed by 4.7 dB

6.4 Modifications made during testing

None

6.5 Test instrumentation

- ☐ HP 8566B Spectrum Analyzer
- ☐ LISN



=====

8 Apr 2000 13:17:04

=====

3. FCC CFR 47, Pt 15

3.1 FCC, Pt 15 - AC LINE CONDUCTED

=====

CONS

M/N: 2.4GHz

HOT [] NEUTRAL [X]

PEAKS FOUND ABOVE 3E dBuV

PEAK#	FREQ (MHz)	AMPL (dBuV)
1	17.81	36.8
2	22.37	37.1
3	23.82	43.3
4	25.26	37.6
5	26.79	36.4
6	28.97	38.9

6 Apr 2000 13:23:40

3. FCC CFR 47, Pt 15

3.1 FCC, Pt 15 - AC LINE CONDUCTED

SONE

M/N: 2.40Hz

HOT [X] NEUTRAL []

PEAKS FOUND ABOVE 35 dBV

PEAK#	FREQ (MHz)	AMPL (dBV)
1	22.37	35.3
2	23.82	41.4
3	25.26	33.3
4	23.97	38.2