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1.4 Test Methodology

Purpose of Test: To demonstrate compliance with the ANSI C63.4 setup.

Test Performed:

- X 1. Conducted Emissions, FCC Part 2, Paragraphs 2.1051 and Part 24, Paragraph 24.238
- 2. Radiated Emissions EN55022: 1992 Class B limit, 30 - 1,000 MHz, 10 meters
- X 3. Radiated Emission per FCC Part 2, Paragraph 2.1053, & Part 24, Paragraph 24.238
- 4. Engineering evaluations
- 5. Frequency Stability, Part 2, Paragraph 2.995, and Part 87, Paragraph 87.133
- X 6. RF Output Power, 2.1046

Both Conducted and radiated testing were performed according to the procedures in FCC/ANSI C63.4 and CSA 108.8 - M1983. Radiated testing was performed at an antenna-to-EUT distance of 3 meters (1 - 10 GHz).

1.5 Test Facility

The open area test site and conducted measurement data were tested by:

TÜV PRODUCT SERVICE
10040 Mesa Rim Road
San Diego, CA 92121-2912
Phone: 858 546 3999
Fax: 858 546 0364

The Test Site Data and performance comply with ANSI 63.4 and are registered with the FCC, 7435 Oakland Mills Rd, Columbia Maryland 21046. All Measurement Data is acquired according to the content of FCC Measurement Procedure and ANSI C63.4, unless supplemented with additional requirements as noted in the test report.

Report No. 0258-03 (FCC ID: E675JS0054)

1.6 Part 2 Requirements

Type of Emission: F9W

Freq. Range: 1930 - 1945 MHz

Range of operating power values: 0 - 55 W

DC voltages: 27 V / 24 A

Equipment an AM broadcast stereophonic exciter-generator : N/A

2. SYSTEM TEST CONFIGURATION

2.1 Justification

The EUT was initially tested for FCC emission in the following configuration:

See Block Diagram.

2.2 EUT Exercise Software

None

2.3 Special Accessories

None

2.4 Modification

None

2.5 Configuration of Tested System

See Block Diagram.

3 RADIATED EMISSION DATA

The following data lists the significant emission frequencies, measured levels, correction factor (which includes cable and antenna corrections), the corrected reading, and the limit.

See following page(s).

Radiated Electromagnetic Emissions



Test Report #: **S0258 Run 01** 24.238 Test Area: Site 3 Roof
 Test Method: Spurious Emissions 2.1053 Test Date: 28-Aug-2000
 EUT Model #: RFFE TX Module w/MPA9505-55 HPA EUT Power: 208 Vac/60 Hz
 EUT Serial #:

Temperature: 25 °C
 Relative Humidity: 45 %
 Air Pressure: 100.1 kPa

Page: 1 of 2

Manufacturer: Powerwave
 EUT Description: 1.93 - 1.945 GHz CDMA amplifier

Notes: No average measurement taken because peak value found to be below average limit.
 RBW an VBW 1 MHz for all peak measurements. No emissions detected above third.

Level Key	
PK – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av – Average	

FREQ (MHz)	LEVEL (dBuV)	CABLE / ANT / PREAMP (dB) (dB \sqrt{m}) (dB)	FINAL (dBuV/m)	POL / HGT / AZ (m) (DEG)	DELTA1 (dB) FCC Part 24.238	DELTA2 (dB) N/A
Low						
1930.00	72.3 Pk	4.2 / 28.6 / -3.4	108.6	H / 1.0 / 0.0	N/A	N/A
3860.00	30.9 Pk	7.0 / 34.0 / -5.8	77.7	H / 1.0 / 0.0	-4.5	N/A
5790.00	25.3 Pk	7.6 / 36.6 / -6.2	75.6	H / 1.0 / 0.0	-6.6	N/A
High						
1945.00	73.3 Pk	4.2 / 28.7 / -3.4	109.7	H / 1.0 / 0.0	N/A	N/A
3890.00	32.3 Pk	7.1 / 34.1 / -5.8	79.2	V / 1.0 / 0.0	-3.0	N/A
5835.00	22.7 Pk	7.6 / 36.6 / -6.2	73.1	H / 1.0 / 0.0	-9.1	N/A
Mid						
1937.50	55.8 Pk	4.2 / 28.7 / -3.4	92.1	V / 1.0 / 0.0	N/A	N/A
3875.00	21.2 Pk	7.0 / 34.0 / -5.8	68.0	V / 1.0 / 0.0	-14.2	N/A

Tested by: J Owen
 Printed Signature

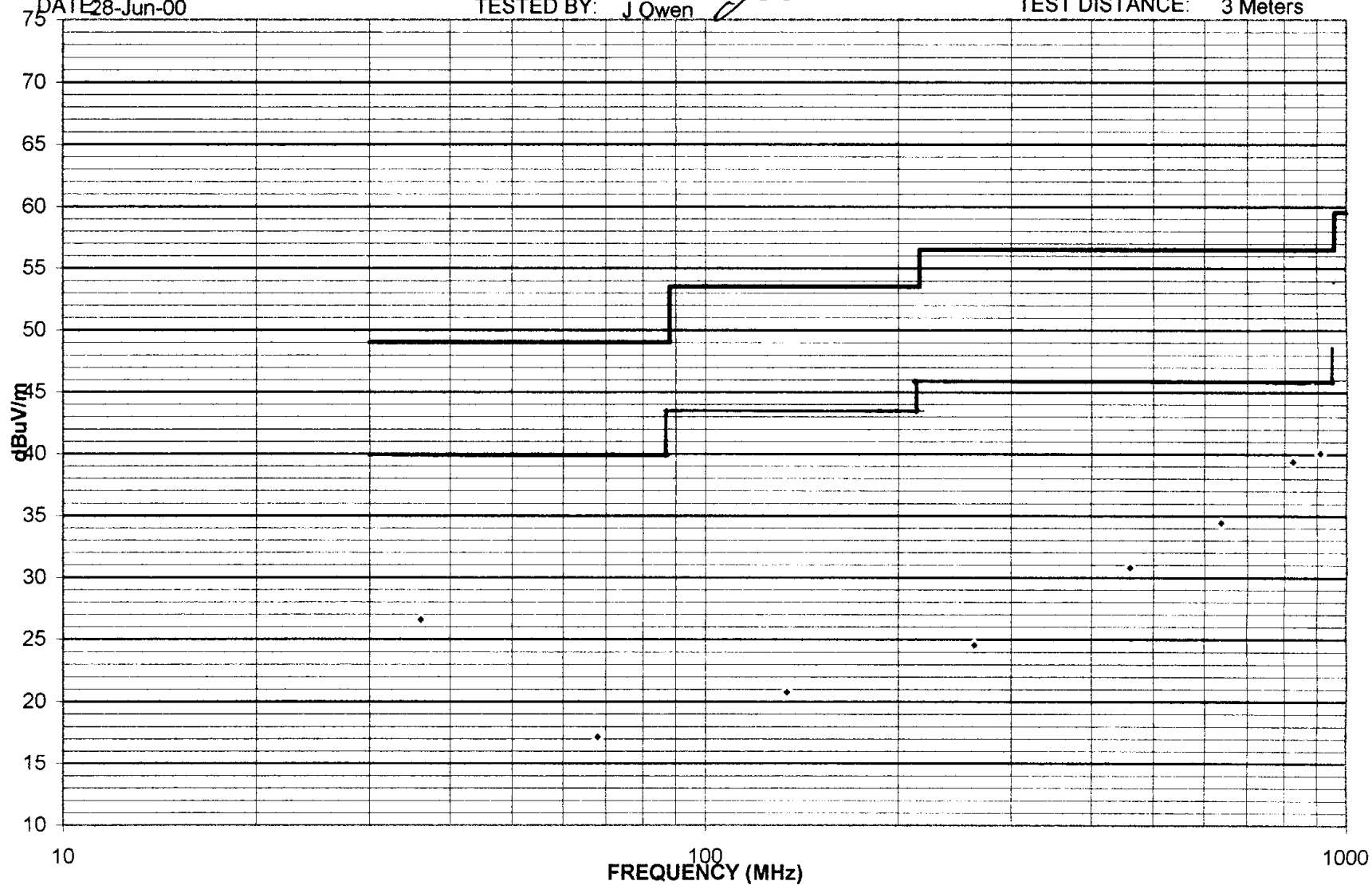
8

REPORT NOS0258
COMPANY: Powerwave
EUTRFFE Tx Module w/ MPA9505-55
EUT MODE: 47.4 dBm CW transmit power
DATE: 28-Jun-00

SPEC: FCC Part 15 para 15.109(a)

TESTED BY: J Owen

TEST DISTANCE: 3 Meters



SPEC: FCC Part 15 para 15.109(2)

TEST DIST: 3 Meters

TEST SITE: 1

BICONICAL: 738

LOG PERIODIC: 738

RCVR: 466

all levels are ambient measurements

Relative Humidity: _____

ver 1.8

[illegible]

Emissions Test Conditions: RADIATED EMISSIONS, FCC Part 2, Paragraph 2.1053 and Part 24, Paragraph 22.238

The *RADIATED EMISSIONS* measurements were performed at the following test location :

☐ - Test not applicable

■ - Roof (Small Open Area Test Site)

Testing was performed at a test distance of:

☐ - 1 meters

■ - 3 meters

☐ - 10 meters

Test Equipment Used :

Model No.	Prop. No.	Description	Manufacturer	Serial No.	Cal Date
LPB 2520/A	738	LPB	Antenna Research	1169	03/01
ESVS30	466	Test Receiver	Rohde & Schwarz	833825/003	02/02
8566B	720	Spectrum Analyzer	Hewlett Packard	211500842	03/01
8566B	721	Spectrum Analyzer Display	Hewlett Packard	2112A02185	03/01

Remarks: (*) Verified internally

Field Strength Calculation

If a preamplifier was used during the Radiated Emission Testing, it is required that the amplifier gain must be subtracted from the Spectrum Analyzer (Meter) Reading. In addition, a correction factor for the antenna, cable used and a distance factor, if any, must be applied to the Meter Reading before a true field strength reading can be obtained. In the automatic measurement, these considerations are automatically presented as a part of the print out. In the case of manual measurements and for greater efficiency and convenience, instead of using these correlation factors for each meter reading, the specification limit was modified to reflect these correlation factors at each frequency value so that the meter readings can be compared directly to the modified specification limit. This modified specification limit is referred to as the "Corrected Meter Reading Limit" or simply the CMRL, which is the actual field strength present at the antenna. The quantity can be derived in the following manner:

$$\text{Corrected Meter Reading Limit (CMRL)} = \text{SAR} + \text{AF} + \text{CL} - \text{AG} - \text{DC}$$

Where, SAR = Spectrum Analyzer Reading

AF = Antenna Factor

CL = Cable Loss

AG = Amplifier Gain (if any)

DC = Distance Correction (if any)

Assume the following situation: A meter reading of 29.4 dBuV was obtained from a Class A computing device measured at 83 MHz. Assume an antenna factor of 9.2 dB, a cable loss of 1.4 dB and amplifier gain of 20.0 dB at 83 MHz. The final field strength would be determined as follows:

$$\text{CMRL} = 29.4 \text{ dBuV} + 9.2 \text{ dB} - 1.4 \text{ dB} - 20 \text{ dB/M} - 0.0 \text{ dB}$$

$$\text{CMRL} = 20.0 \text{ dBuV/M}$$

This result is well below the FCC and CSA Class A limit of 29.5 dBuV/m at 83 MHz.

For the manual mode of measurement, a table of corrected meter reading limit was used to permit immediate comparison of the meter reading to determine if the measure emission amplitude exceeded the specification limit at that specific frequency.

4 CONDUCTED EMISSION DATA

POWERWAVE TECHNOLOGIES

See following page(s).

Emissions Test Conditions: CONDUCTED EMISSIONS, EMISSION BANDWIDTH; RF POWER OUTPUT; FCC Part 2, Paragraphs 2.1046, 2.1051, and Part 24, Paragraph 24.238

The *RADIATED EMISSIONS* measurements were performed at the following test location :

☐ - Test not applicable

■ - SR-3, Shielded Room, 12' x 20' x 8', Metal Chamber

Test Equipment Used :

Signal Generator, Hewlett Packard, E4436B, S/N US39260103, Cal: 09/01
Directional Coupler, Hewlett Packard, P/N 504*
Attenuator, P/N Weinschel, 47-30-34, S/N BG3119, P/N 766*
Power Divider, Weinschel Engineering, 1506A, S/N M5134*
Variable Attenuator, Weinschel, Model 904-114-33, S/N A3171*
Power Sensor, Hewlett Packard, 84811A, S/N 3318A05185, Cal: 04/01
Coaxial Directional Coupler, Narda, 3043B-30, S/N 10494, P/N 684*
Load Attenuator, Hewlett Packard, 8493A*
Isolator, Ocean Microwave, LS193199-T-14*
Driver, Powerwave, 42.0 dB gain
Variable Attenuator, Weinschel, 940-114-33, S/N A3172
Power Meter, Hewlett Packard, 8900D, S/N 3607U00653, P/N 802, Cal: 04/01
Power Sensor, Hewlett Packard, 8481A, S/N US37296059, Cal: 06/01
Power Meter, Hewlett Packard, E4418B, S/N US39251424, Cal: 08/01
Attenuator, Narda, 02806, P/N 633*
Spectrum Analyzer, Hewlett Packard, HP-8566B, S/N 2618A02913, P/N 744; Cal: 10/01
Attenuator, Hewlett Packard, 20 dB, P/N 636, Model 8491A*
Variable Attenuator, ARRA, Inc. P3844-20, S/N 3426*

(*) Verified

08/16/00

SPEC: Fcc Part 2, Para. 2.1051

NOTES:

1. SG = -1.0 dBm

2. Low channel, 1930 MHz

3. CDMA

24.238

MKR 118.9 MHz

-16.50 dBm

hp

REF

60.7

dBm

ATTEN

10

dB

Mary Washington

10 dB/

SAMPLE

OFFSET

60.7

dB

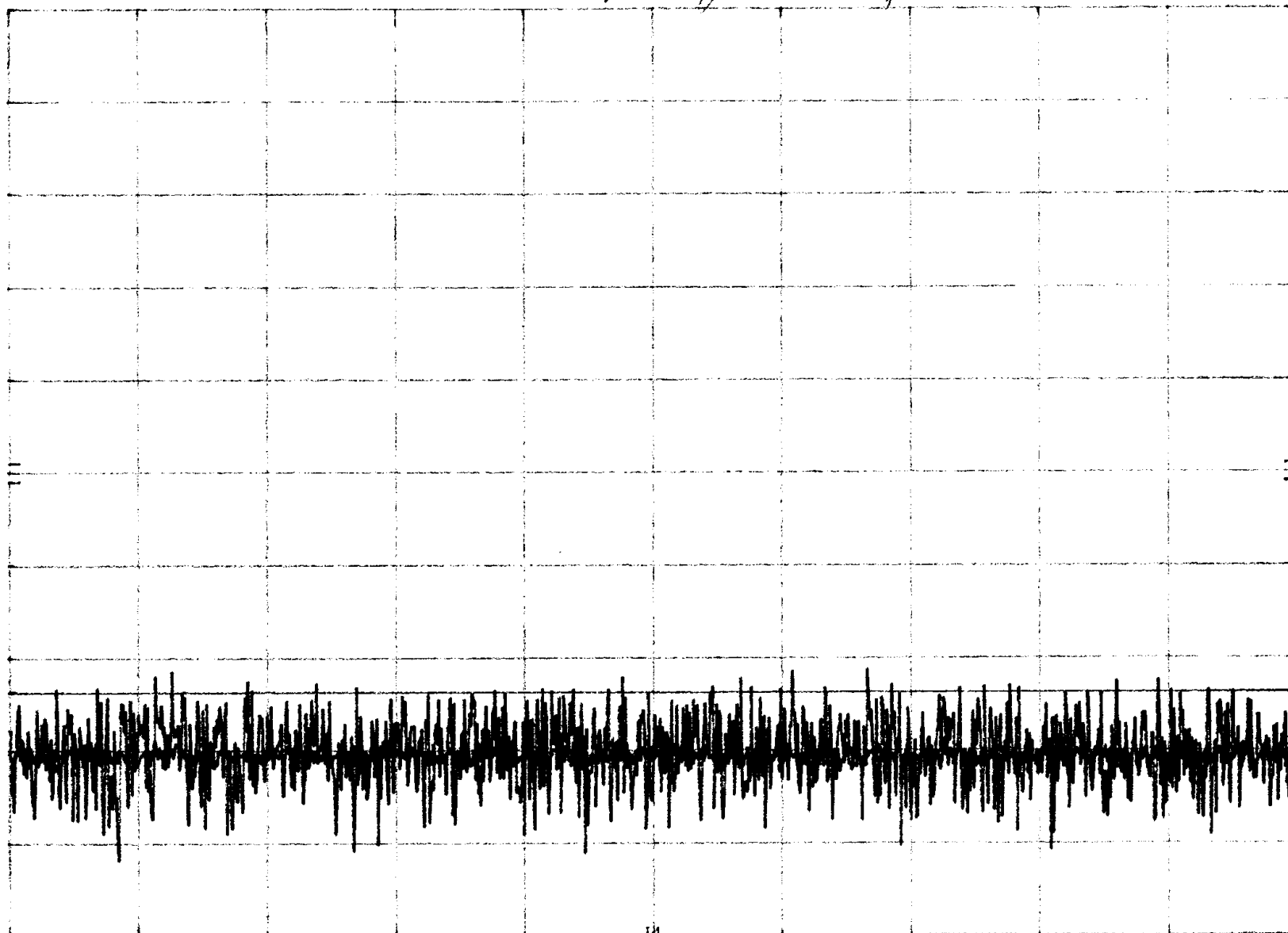
DL

-13.0

dBm

VID AVG

30



START 30 MHz

RES BW 1 MHz

VBW 1 MHz

STOP 250 MHz

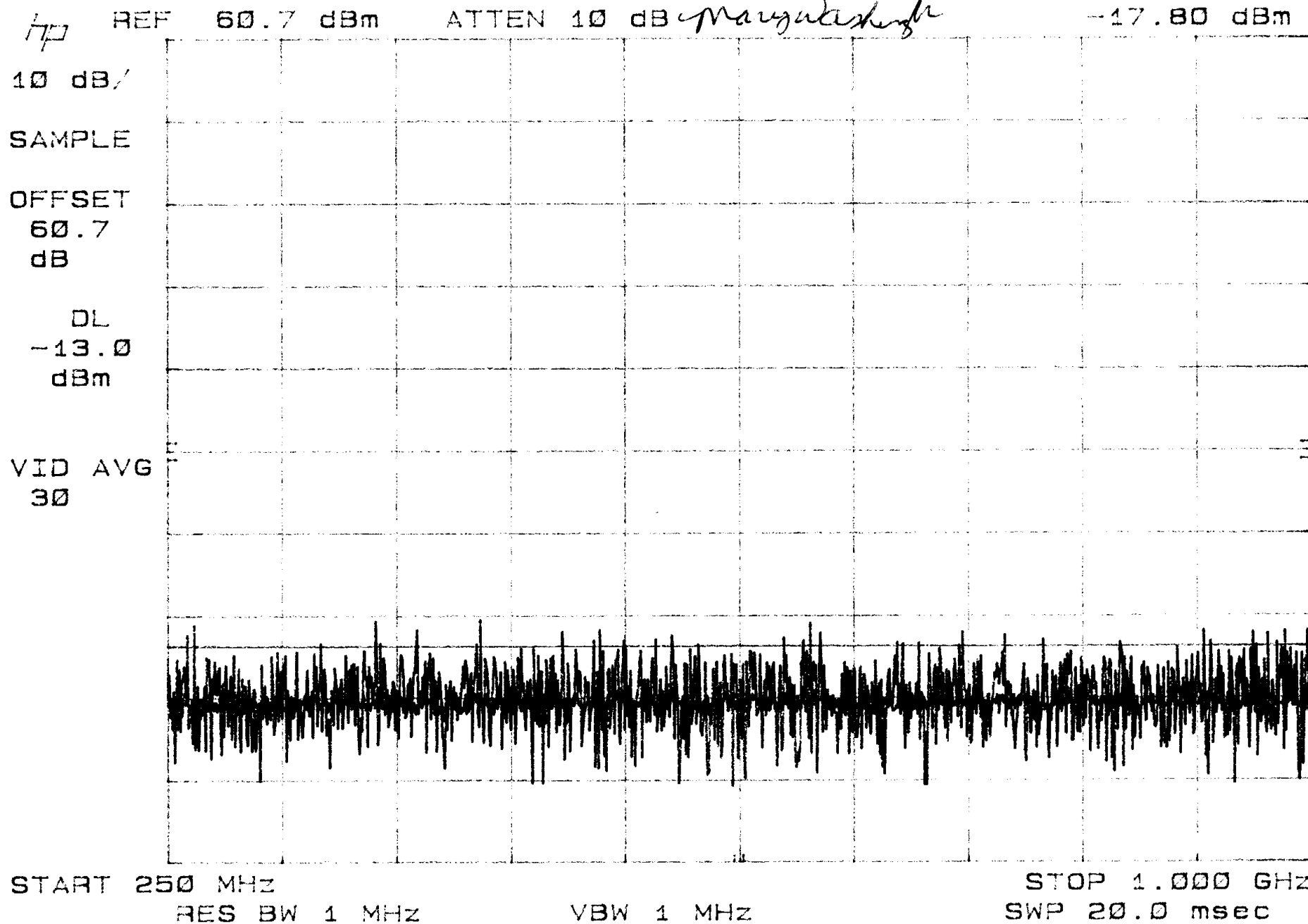
SWP 20.0 msec

15

08/16/00 SPEC: Fcc Part 2, Para. 2.1051

- NOTES:
1. SG = -1.0 dBm
 2. Low channel, 1930 MHz
 3. CDMA

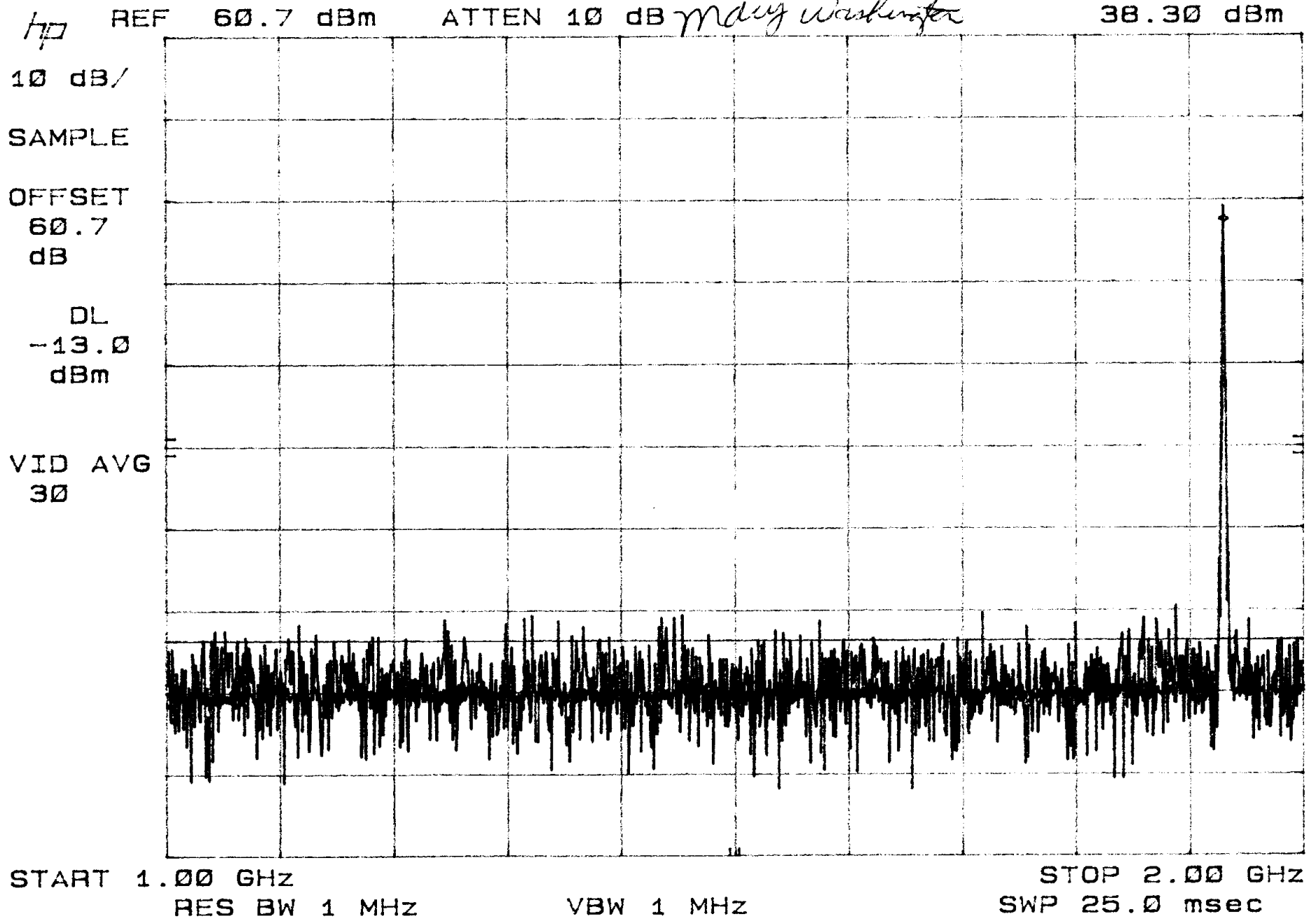
MKR 580.8 MHz
-17.80 dBm



08/16/00 SPEC: Fcc Part 2, Para. 2.1051

- NOTES:
1. SG = -1.0 dBm
 2. Low channel, 1930 MHz
 3. CDMA

MKR 1.930 GHz
38.30 dBm



08/16/00 SPEC: Fcc Part 2, Para. 2.1051

- NOTES:
1. SG = -1.0 dBm
 2. Low channel, 1930 MHz
 3. CDMA

MKR 1.928 8 GHz

hp REF 62.7 dBm

ATTEN 10 dB

Mary Washburn

33.20 dBm

10 dB/

SAMPLE

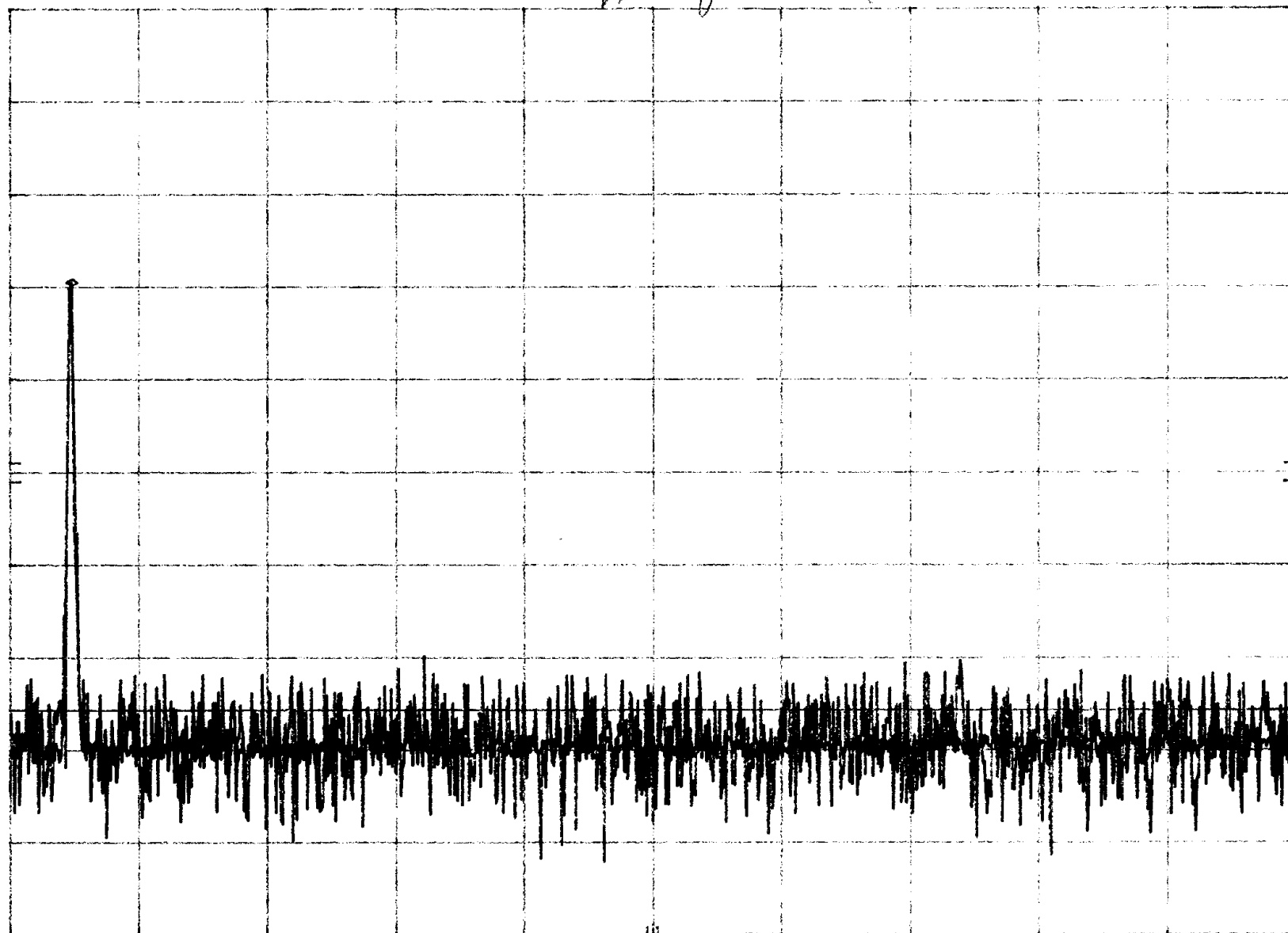
OFFSET

62.7
dB

DL

-13.0
dBm

VID AVG
30



START 1.900 GHz

RES BW 1 MHz

VBW 1 MHz

STOP 2.500 GHz

SWP 20.0 msec

08/16/00

SPEC: Fcc Part 2, Para. 2.1051

NOTES:

1. SG = -1.0 dBm

2. Low channel, 1930 MHz

3. CDMA

MKR 4.516 GHz

hp REF 62.7 dBm

ATTEN 10 dB

Mary Washington

-15.30 dBm

10 dB/

SAMPLE

OFFSET

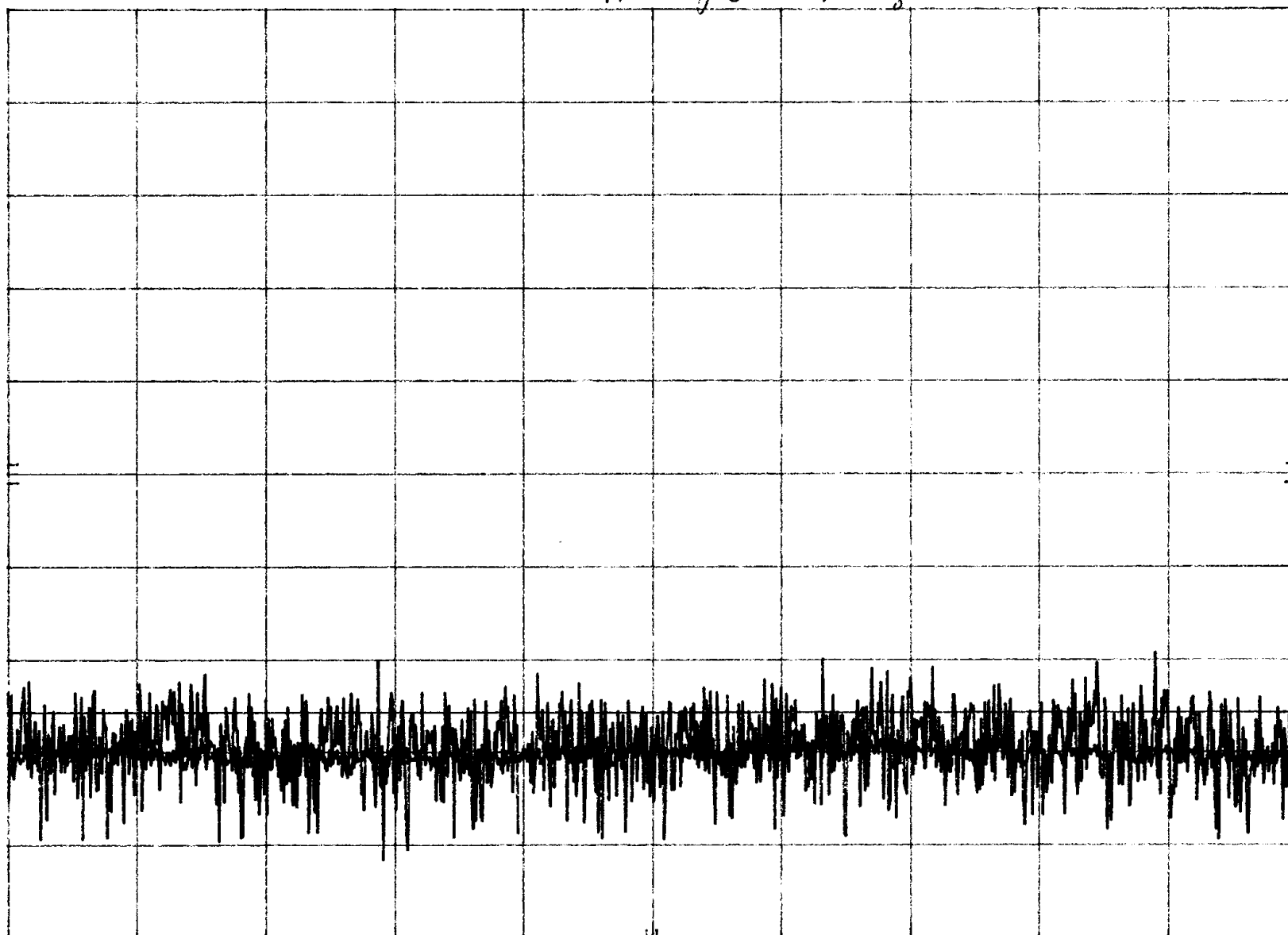
62.7
dB

DL

-13.0
dBm

VID AVG

30



START 2.50 GHz

RES BW 1 MHz

VBW 1 MHz

STOP 5.80 GHz

SWP 82.5 msec

08/16/00

SPEC: Fcc Part 2, Para. 2.1051

NOTES:

1. SG = -1.0 dBm

2. Low channel, 1930 MHz

3. CDMA

MKR 12.604 GHz

-15.70 dBm

hp

REF 52.7 dBm

ATTEN 0 dB

Mary Washington

10 dB/

SAMPLE

OFFSET

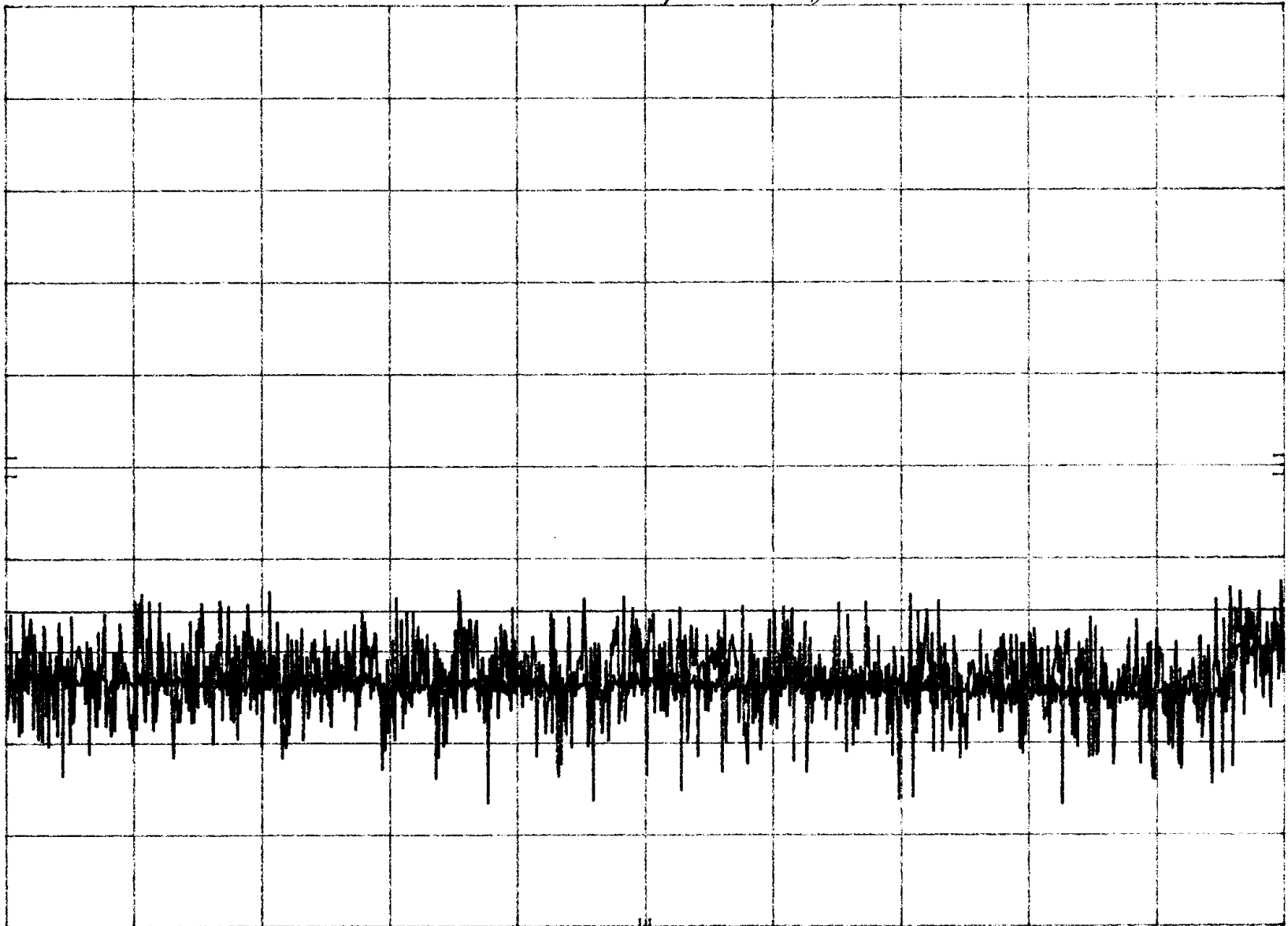
62.7
dB

DL

-13.0
dBm

VID AVG

30



START 5.80 GHz

RES BW 1 MHz

VBW 1 MHz

STOP 12.80 GHz

SWP 175 msec

20

08/16/00

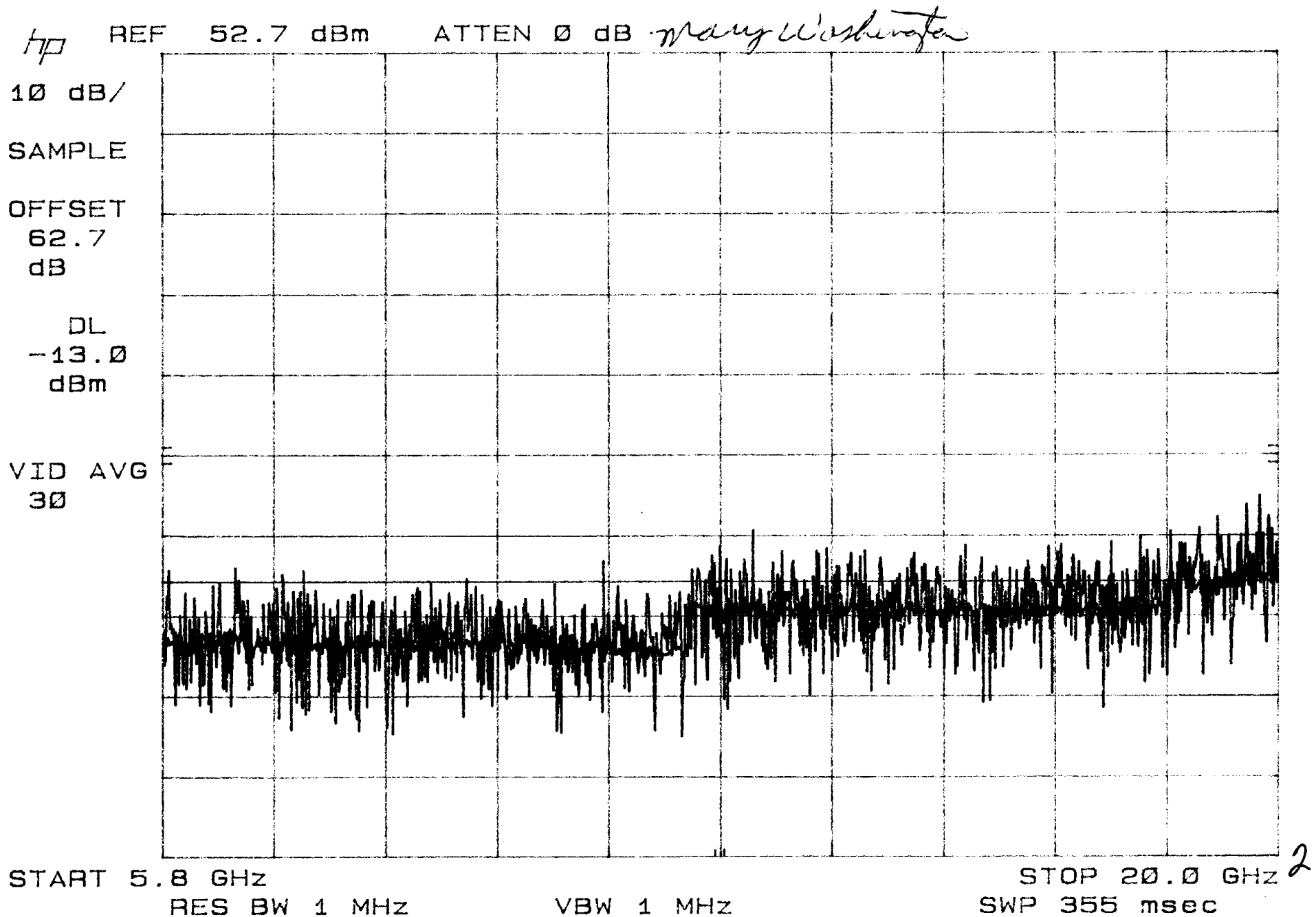
SPEC: Fcc Part 2, Para. 2.1051

NOTES:

1. SG = -1.0 dBm

2. Low channel, 1930 MHz

3. CDMA



08/16/00 SPEC: Fcc Part 2, Para. 2.1051

- NOTES:
1. SG = -1.3 dBm
 2. Mid channel, 1937 MHz
 3. CDMA

MKR 151.9 MHz

hp REF 60.7 dBm ATTN 10 dB *many Washington* -18.30 dBm

10 dB/

SAMPLE

OFFSET

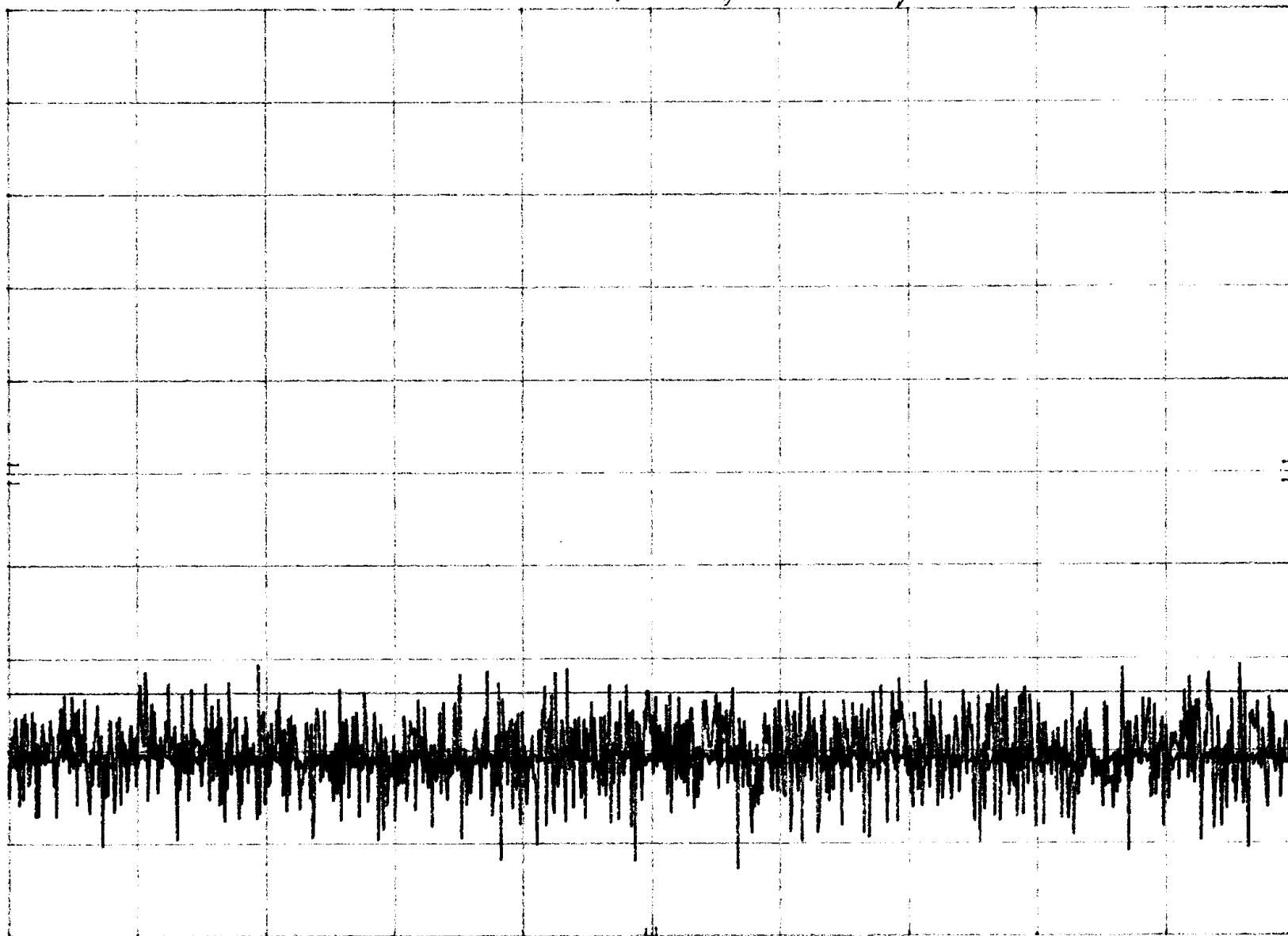
60.7
dB

DL

-13.0
dBm

VID AVG

30



START 30 MHz

RES BW 1 MHz

VBW 1 MHz

STOP 250 MHz

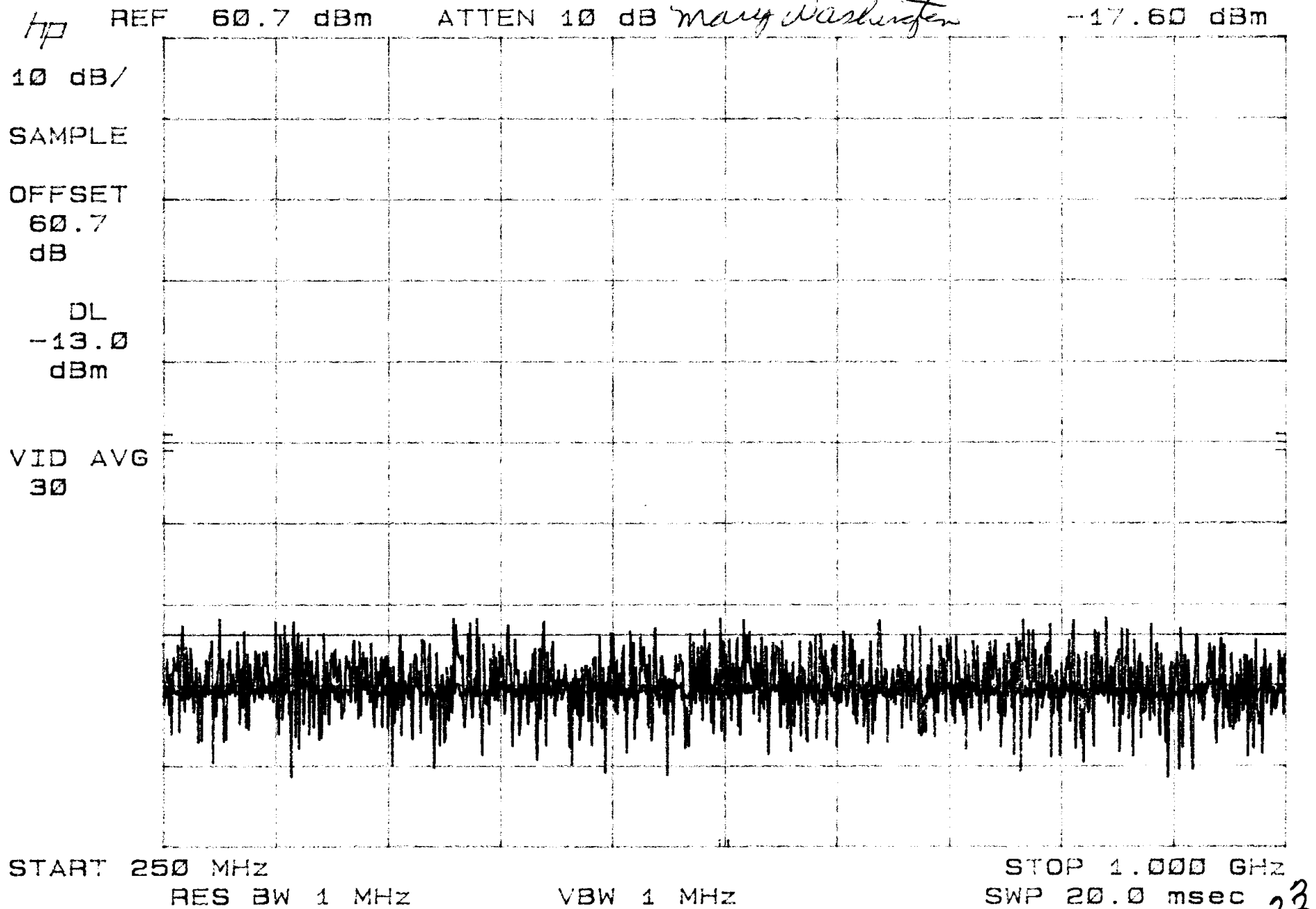
SWP 20.0 msec

22

08/16/00 SPEC: Fcc Part 2, Para. 2.1051

- NOTES:
1. SG = -1.3 dBm
 2. Mid channel, 1937 MHz
 3. CDMA

MKR 334.0 MHz
-17.60 dBm



08/16/00

SPEC: Fcc Part 2, Para. 2.1051

NOTES:

1. SG = -1.3 dBm

2. Mid channel, 1937 MHz

3. CDMA

MKR 1.937 GHz

37.00 dBm

hp

REF 60.7 dBm

ATTEN 10 dB

mary washington

10 dB/

SAMPLE

OFFSET

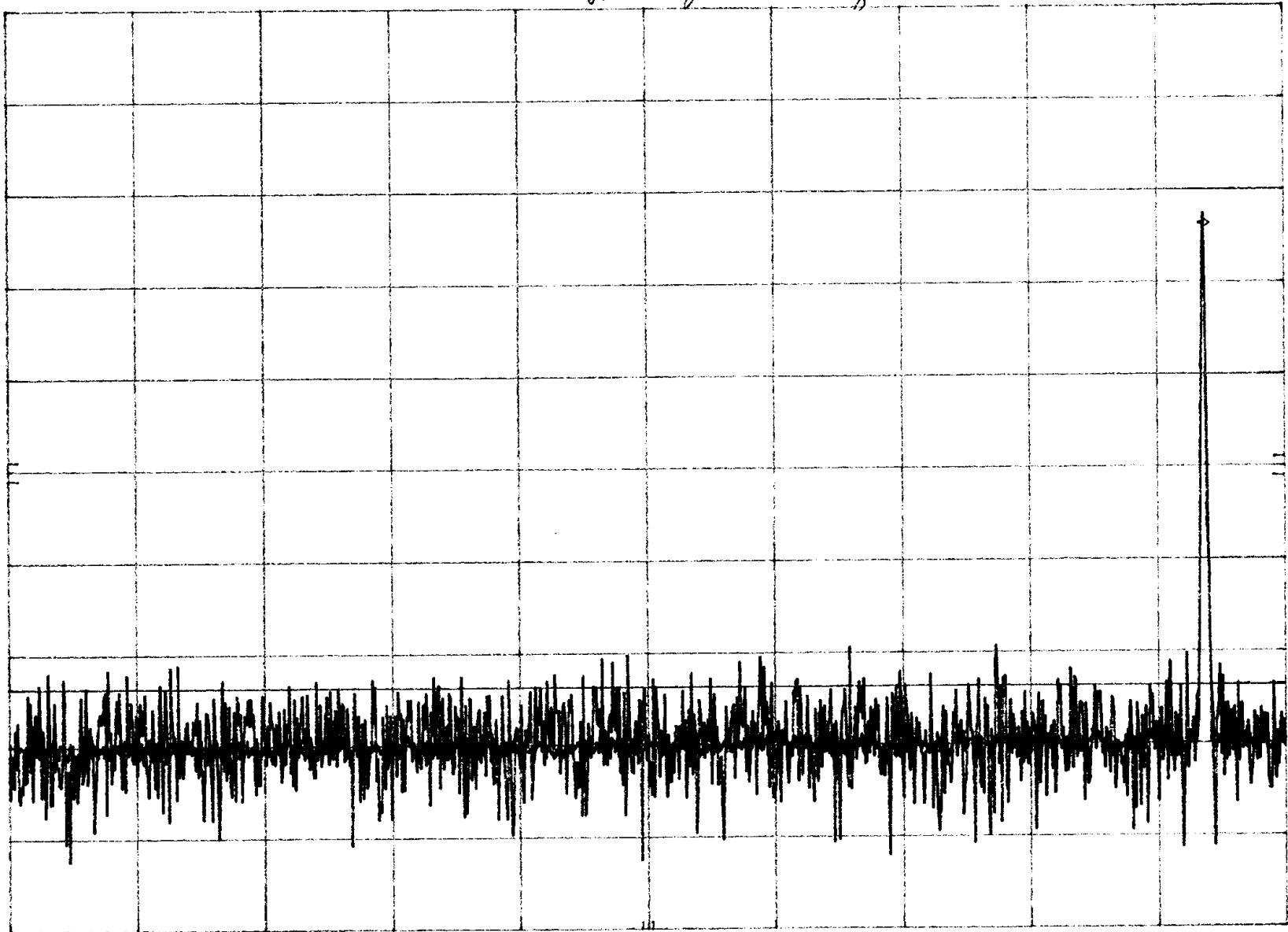
60.7
dB

DL

-13.0
dBm

VID AVG

30



START 1.00 GHz

RES BW 1 MHz

VBW 1 MHz

STOP 2.00 GHz
SWP 25.0 msec

24

08/16/00

SPEC: Fcc Part 2, Para. 2.1051

NOTES:

1. SG = -1.3 dBm

2. Mid channel, 1937 MHz

3. CDMA

MKR 1.934 8 GHz

33.80 dBm

hp REF 62.7 dBm

ATTEN 10 dB

Mary Washington

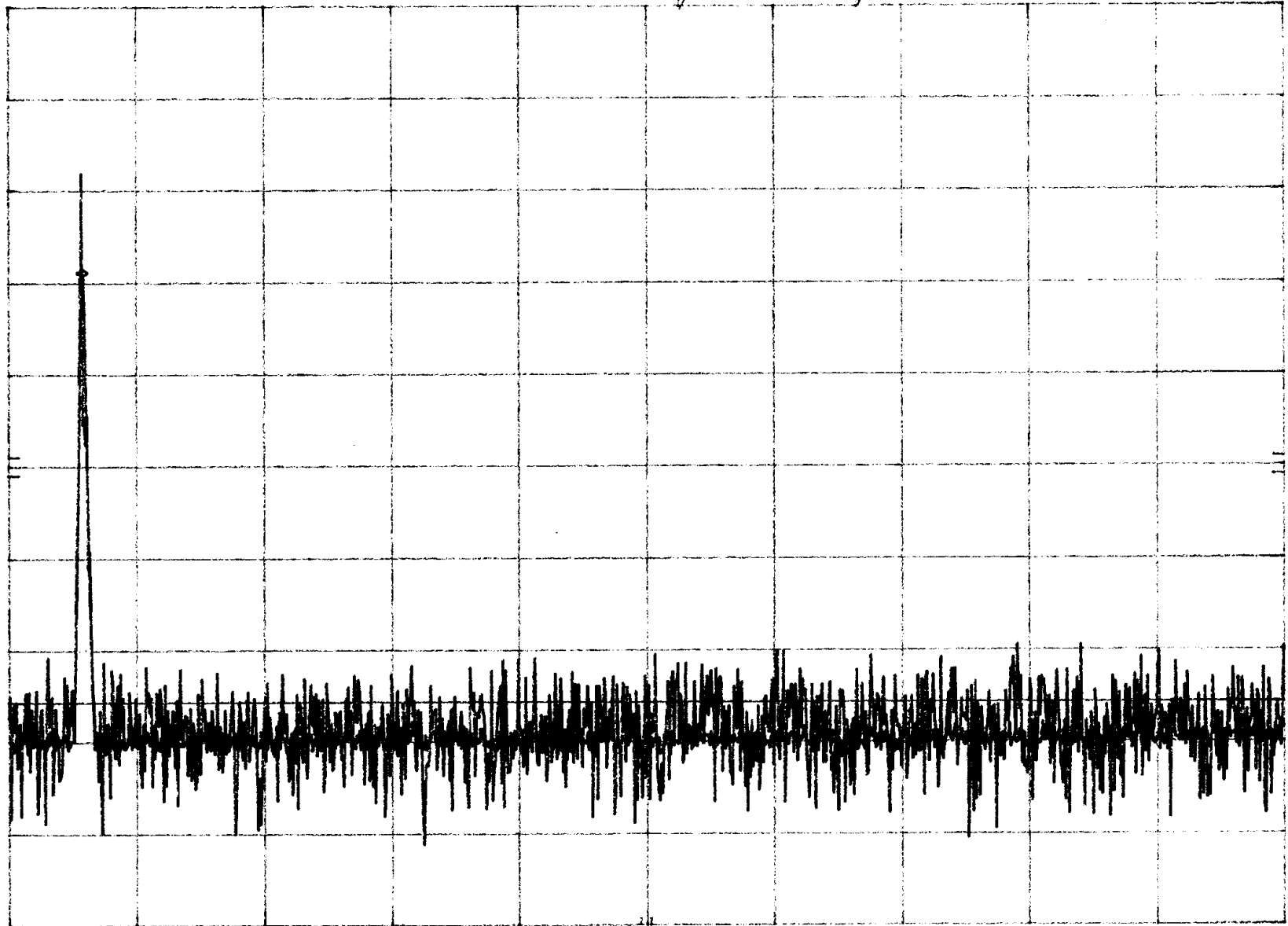
10 dB/

SAMPLE

OFFSET
62.7
dB

DL
-13.0
dBm

VID AVG
30



START 1.900 GHz

RES BW 1 MHz

VBW 1 MHz

STOP 2.500 GHz

SWP 20.0 msec

25

08/16/00

SPEC: Fcc Part 2, Para. 2.1051

NOTES:

1. SG = -1.3 dBm

2. Mid channel, 1937 MHz

3. CDMA

MR 3.962 GHz

-14.90 dBm

hp

REF 62.7 dBm

ATTEN 10 dB

mary washington

10 dB/

SAMPLE

OFFSET

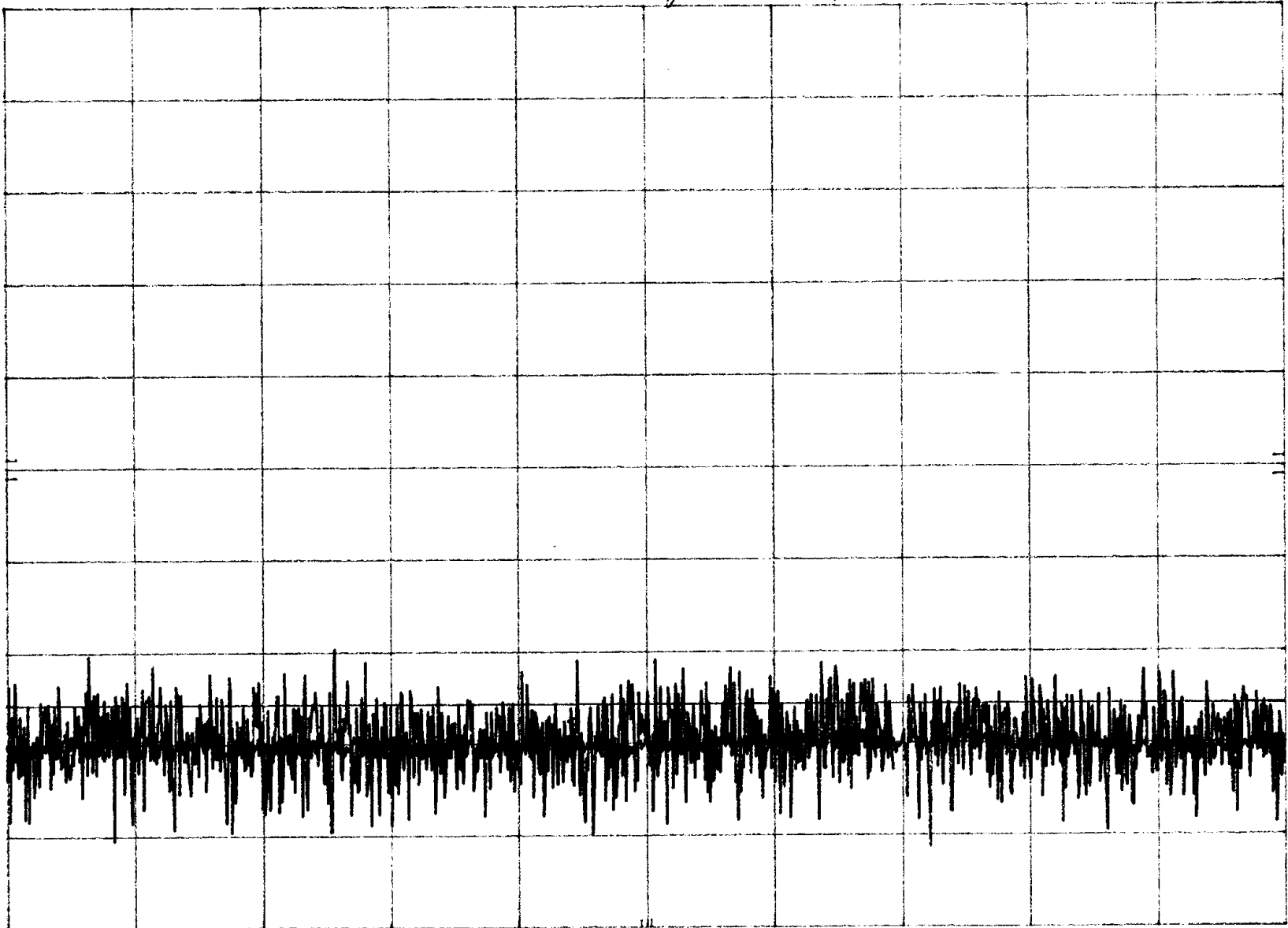
62.7
dB

DL

-13.0
dBm

VID AVG

30



START 2.50 GHz

RES BW 1 MHz

VBW 1 MHz

STOP 5.80 GHz

SWP 82.5 msec

26

08/16/00

SPEC: Fcc Part 2, Para. 2.1051

NOTES:

1. SG = -1.3 dBm

2. Mid channel, 1937 MHz

3. CDMA

MKR 12.723 GHz

-15.40 dBm

hp

REF 52.7 dBm

ATTEN 0 dB

mary washington

10 dB/

SAMPLE

OFFSET

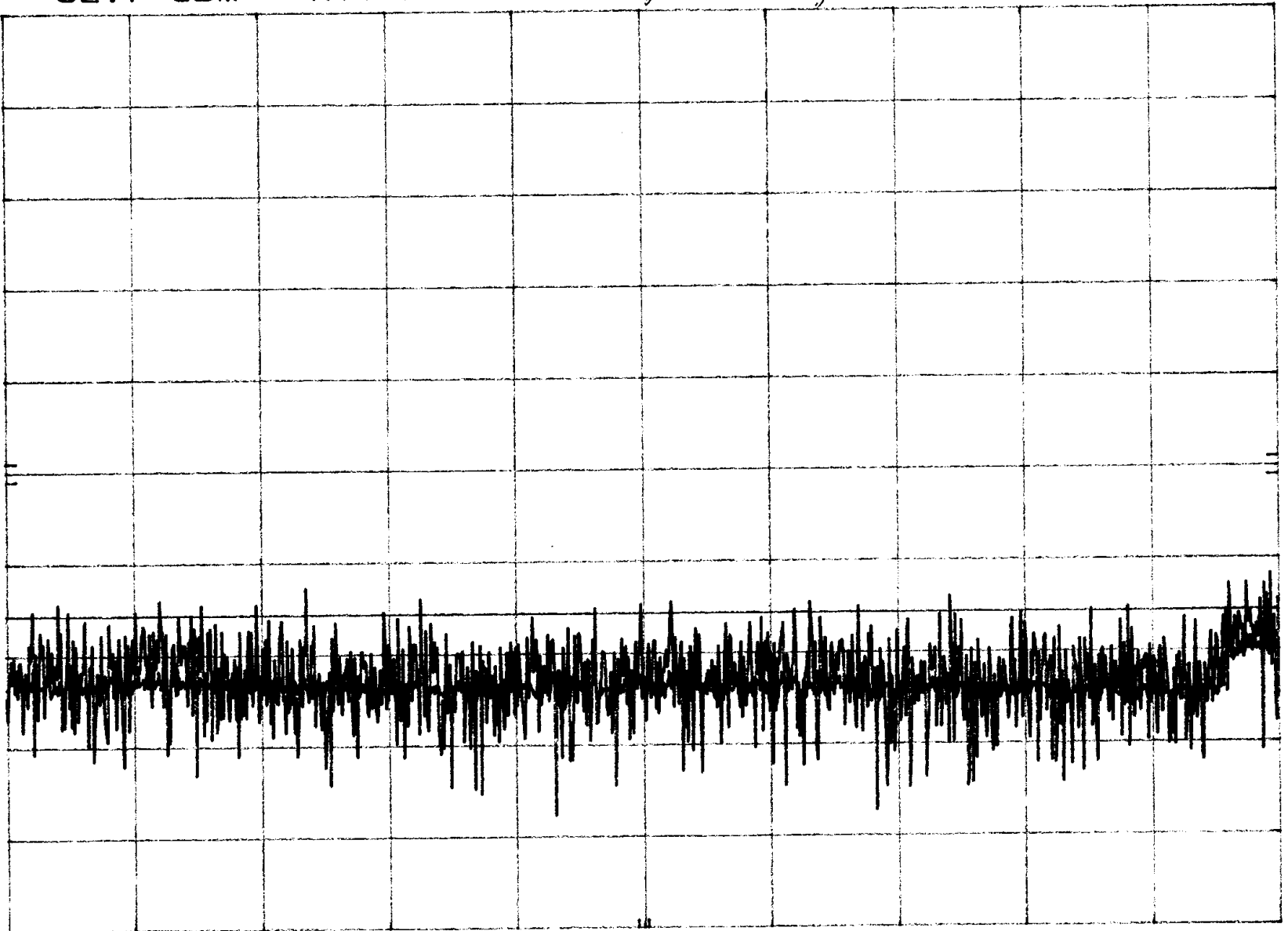
62.7
dB

DL

-13.0
dBm

VID AVG

30



START 5.80 GHz

RES BW 1 MHz

VBW 1 MHz

STOP 12.80 GHz 27

SWP 175 msec

08/16/00

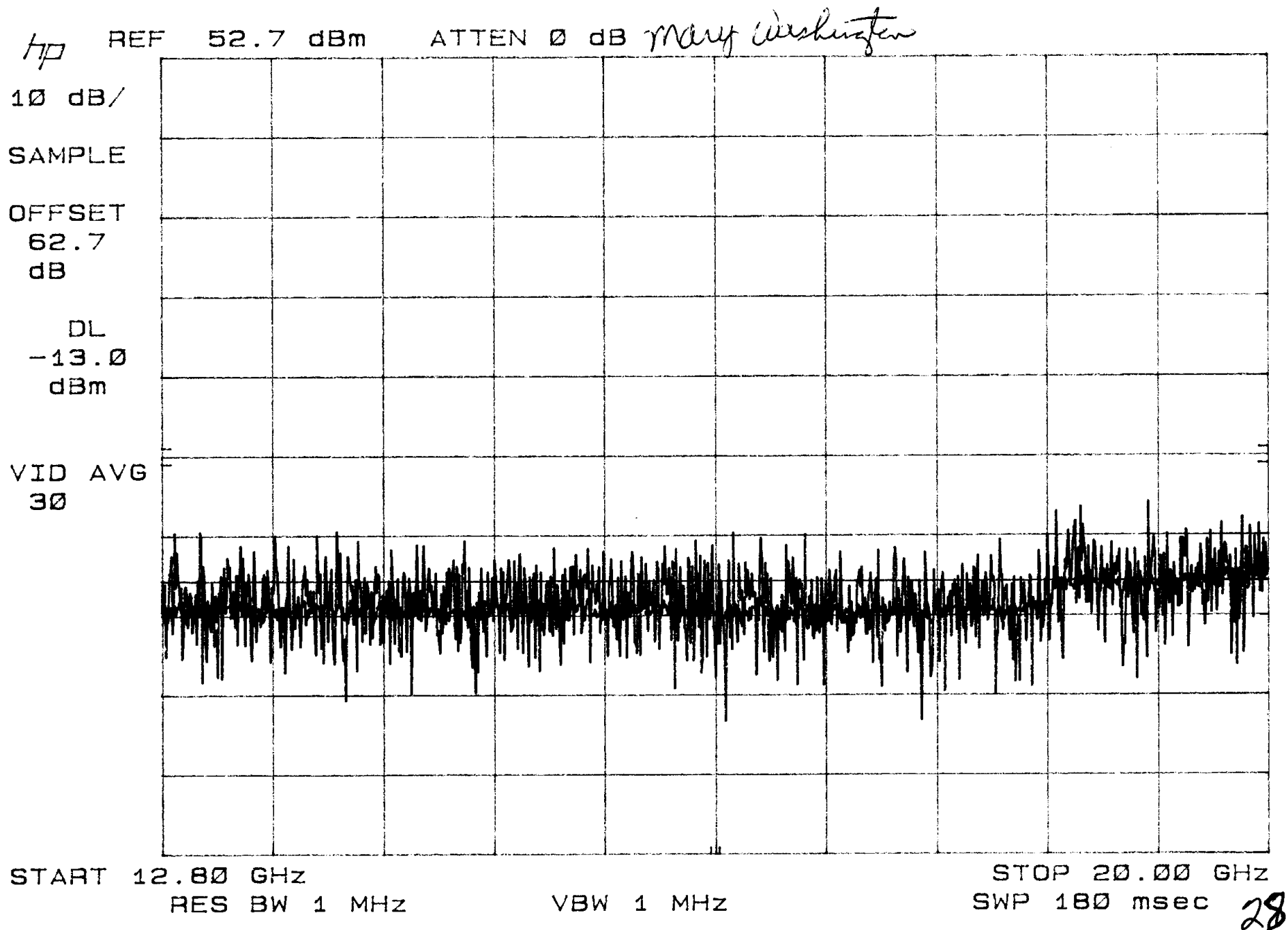
SPEC: Fcc Part 2, Para. 2.1051

NOTES:

1. SG = -1.3 dBm

2. Mid channel, 1937 MHz

3. CDMA



08/16/00

SPEC: Fcc Part 2, Para. 2.1051

NOTES:

1. SG = -1.6 dBm

2. High channel, 1945 MHz

3. CDMA

MKR 134.1 MHz

-17.80 dBm

hp REF 60.7 dBm ATTEN 10 dB

10 dB/

SAMPLE

OFFSET

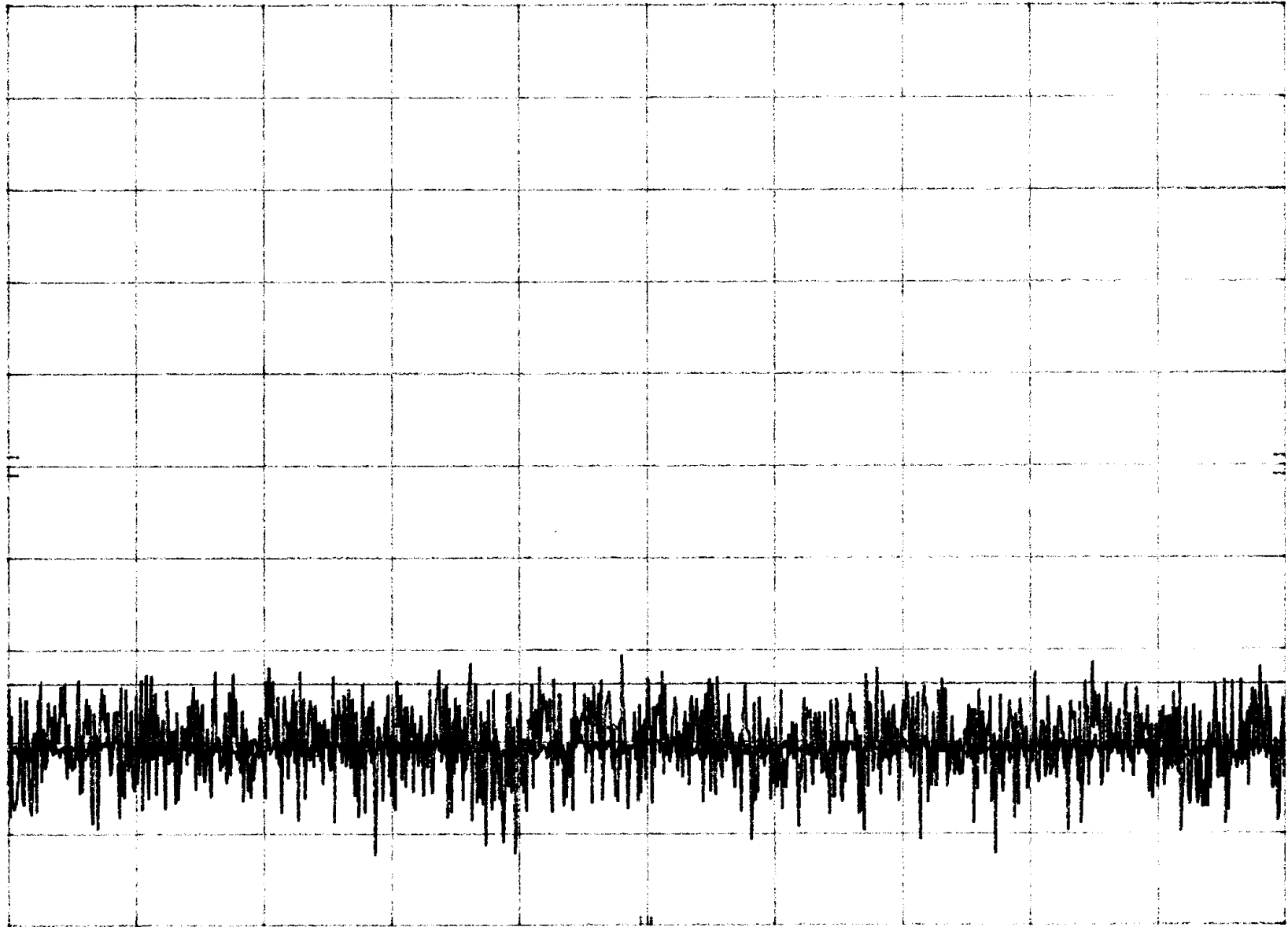
60.7
dB

DL

-13.0
dBm

VID AVG

30



START 30 MHz

RES BW 1 MHz

VBW 1 MHz

STOP 250 MHz

SWP 20.0 msec

08/16/00

SPEC: Fcc Part 2, Para. 2.1051

NOTES:

1. SG = -1.6 dBm

2. High channel, 1945 MHz

3. CDMA

MKR 522.3 MHz

hp

REF

60.7 dBm

ATTEN 10 dB

Mary Washington

-17.40 dBm

10 dB/

SAMPLE

OFFSET

60.7

dB

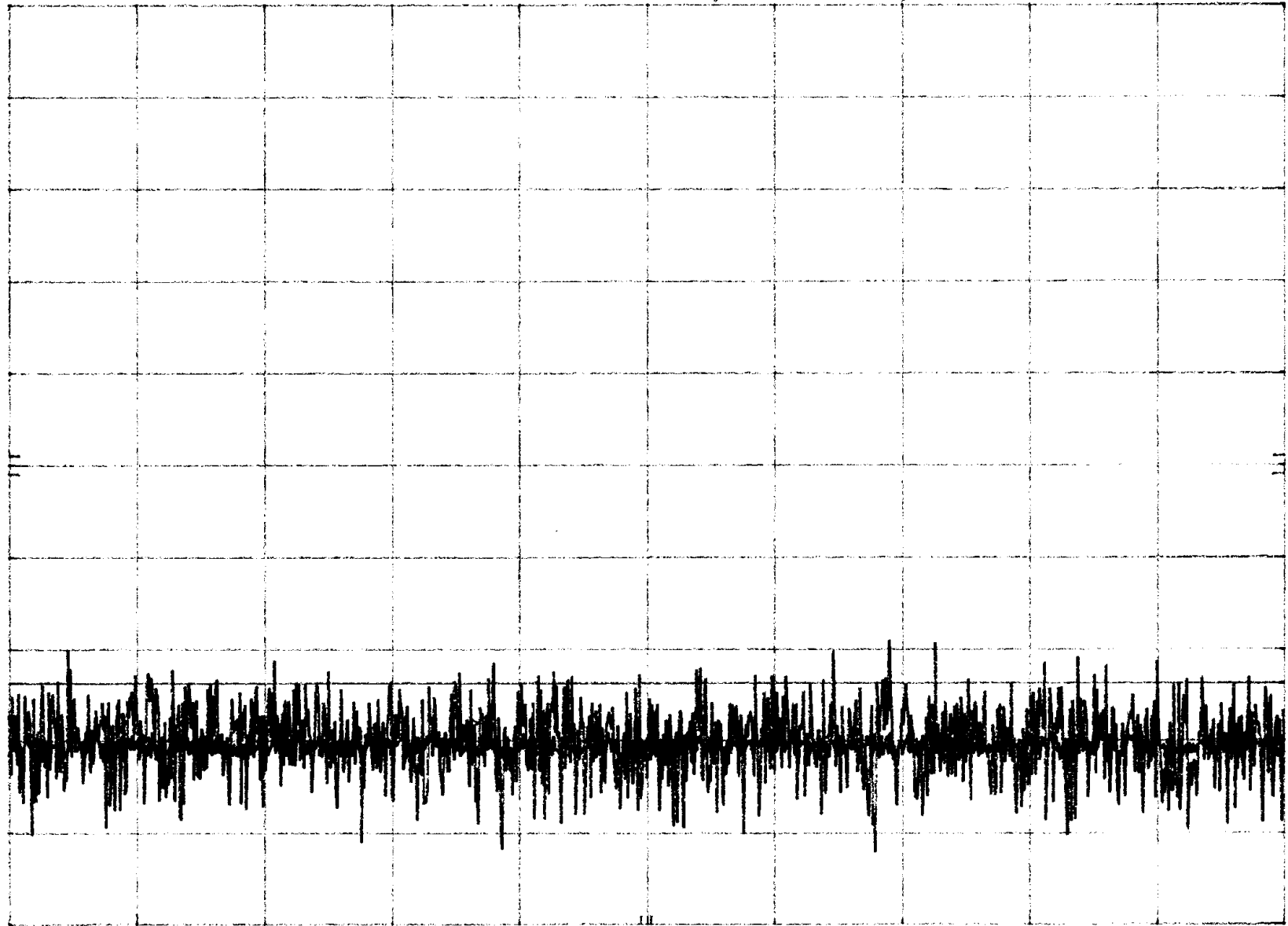
DL

-13.0

dBm

VID AVG

30



START 250 MHz

RES BW 1 MHz

VBW 1 MHz

STOP 1.000 GHz

SWP 20.0 msec

30

08/16/00

SPEC: Fcc Part 2, Para. 2.1051

NOTES:

1. SG = -1.6 dBm

2. High channel, 1945 MHz

3. CDMA

MKR 1.945 GHz

37.50 dBm

hp

REF

60.7 dBm

ATTEN 10 dB

Mary W. Schurfer

10 dB/

SAMPLE

OFFSET

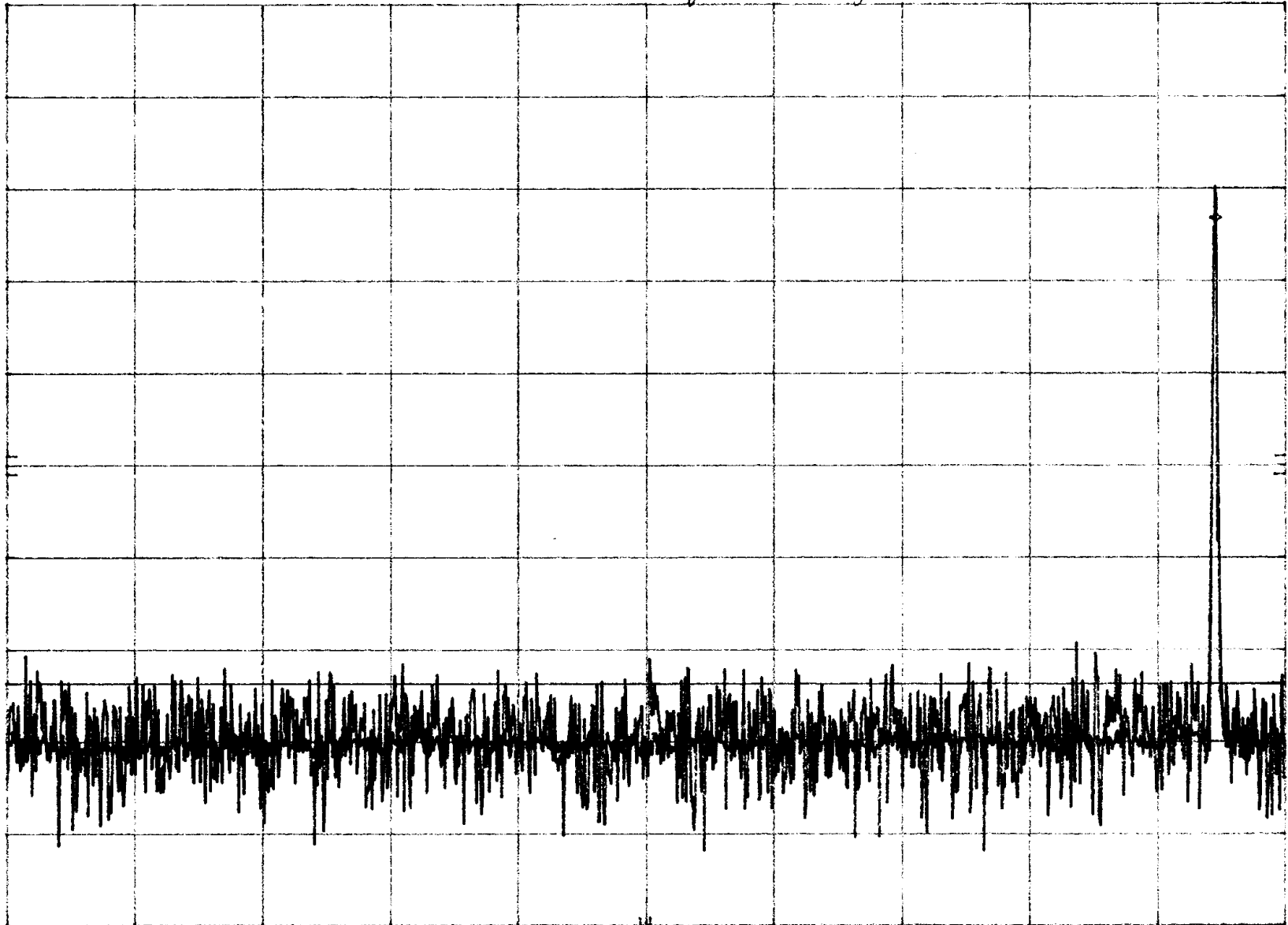
60.7
dB

DL

-13.0
dBm

VID AVG

30



START 1.00 GHz

RES BW 1 MHz

VBW 1 MHz

STOP 2.00 GHz

SWP 25.0 msec

31

08/16/00

SPEC: Fcc Part 2, Para. 2.1051

NOTES:

1. SG = -1.6 dBm

2. High channel, 1945 MHz

3. CDMA

MKR 1.943 2 GHz

hp REF 62.7 dBm

ATTEN 10 dB *Mary Washburn*

35.60 dBm

10 dB/

SAMPLE

OFFSET

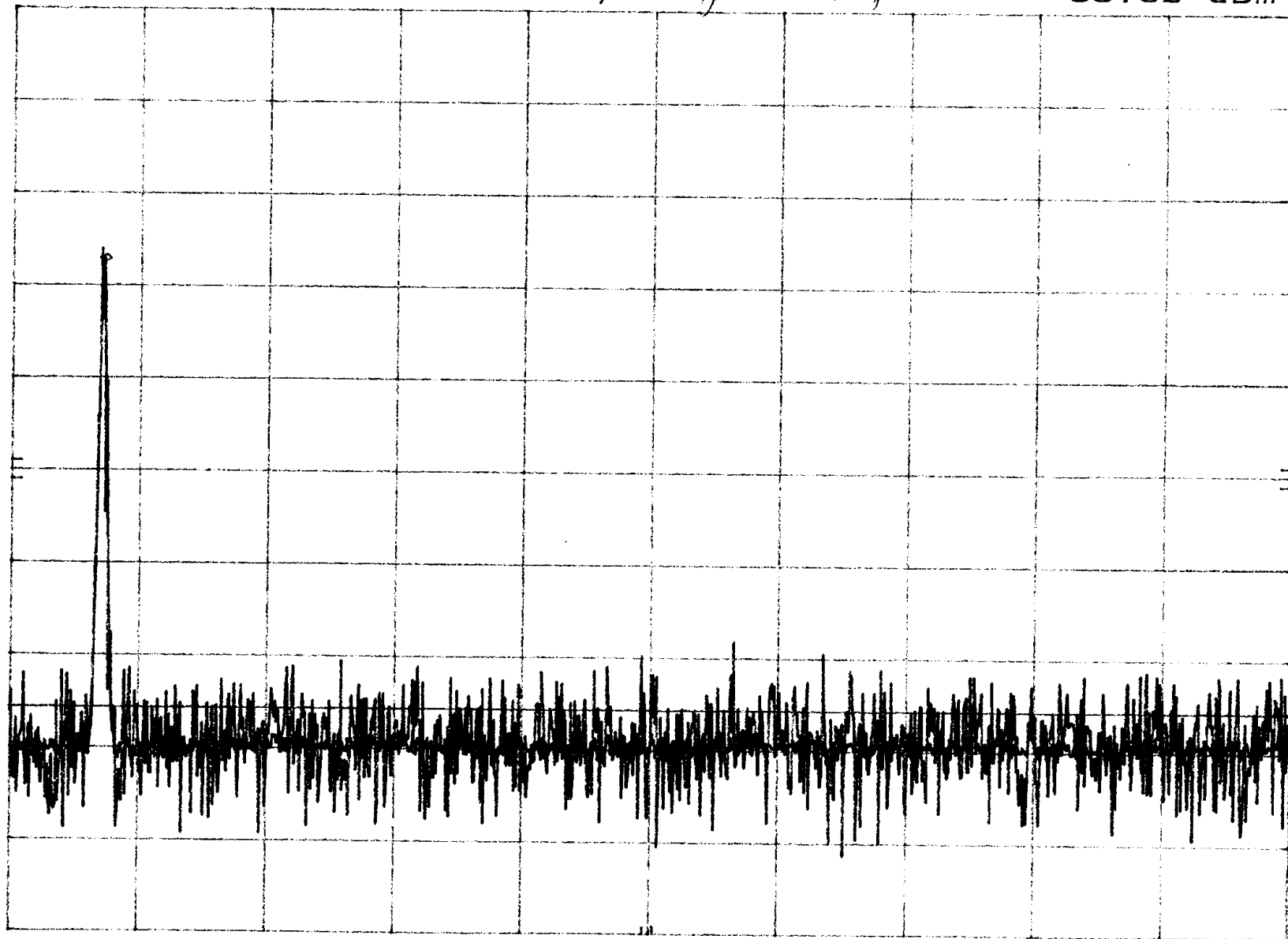
62.7
dB

DL

-13.0
dBm

VID AVG

30



START 1.900 GHz

RES BW 1 MHz

VBW 1 MHz

STOP 2.500 GHz

SWP 20.0 msec

32

08/16/00

SPEC: Fcc Part 2, Para. 2.1051

NOTES:

1. SG = -1.6 dBm

2. High channel, 1945 MHz

3. CDMA

MKR 2.718 GHz

-15.50 dBm

hp REF 62.7 dBm

ATTEN 10 dB

Mary Washington

10 dB/

SAMPLE

OFFSET

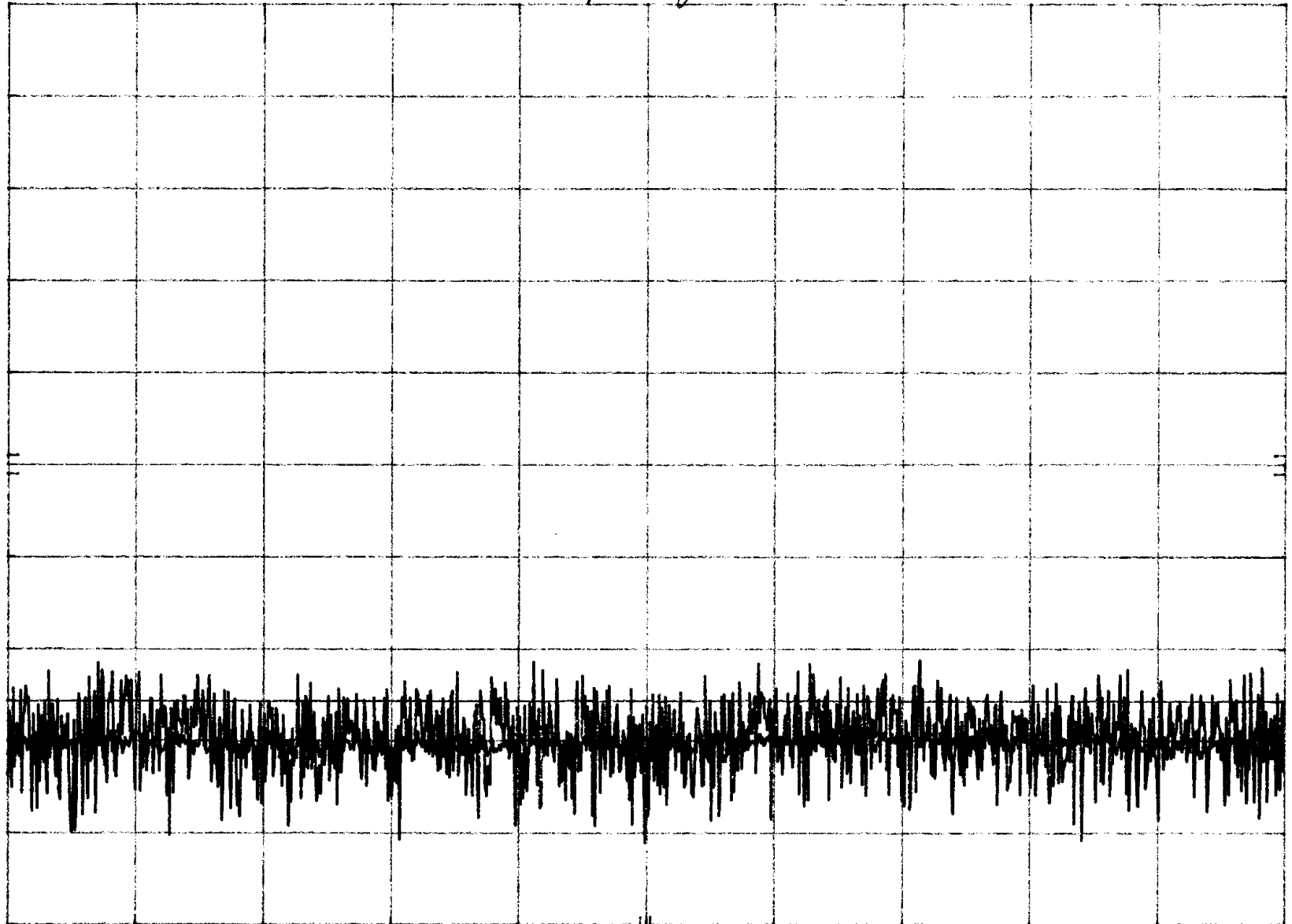
62.7
dB

DL

-13.0
dBm

VID AVG

30



START 2.50 GHz

RES BW 1 MHz

VBW 1 MHz

STOP 5.80 GHz

SWP 82.5 msec

32

08/16/00

SPEC: Fcc Part 2, Para. 2.1051

NOTES:

1. SG = -1.6 dBm

2. High channel, 1945 MHz

3. CDMA

MKR 12.765 GHz

-15.70 dBm

hp

REF 52.7 dBm

ATTEN 0 dB *Mary Washington*

10 dB/

SAMPLE

OFFSET

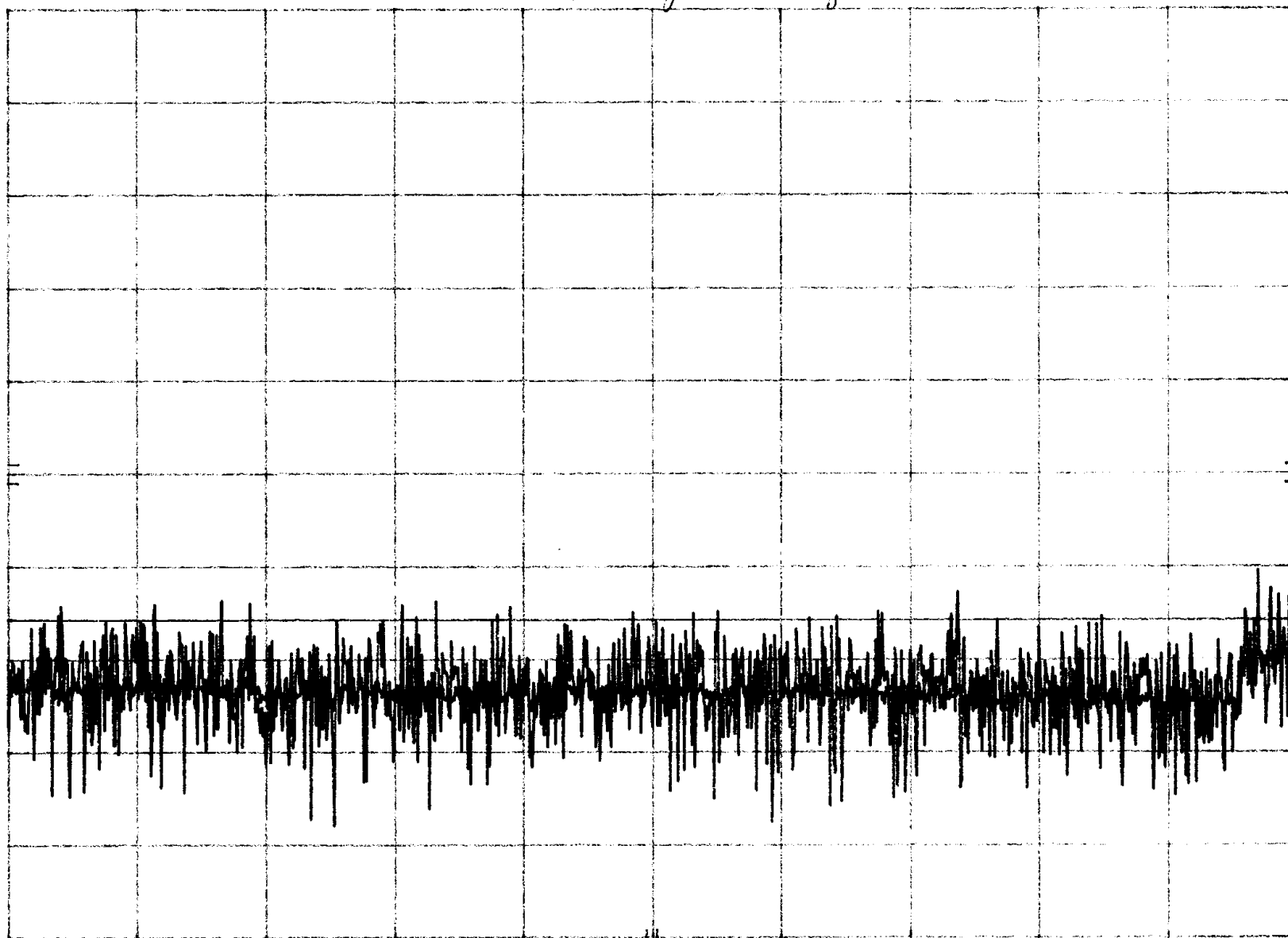
62.7
dB

DL

-13.0
dBm

VID AVG

30



START 5.80 GHz

RES BW 1 MHz

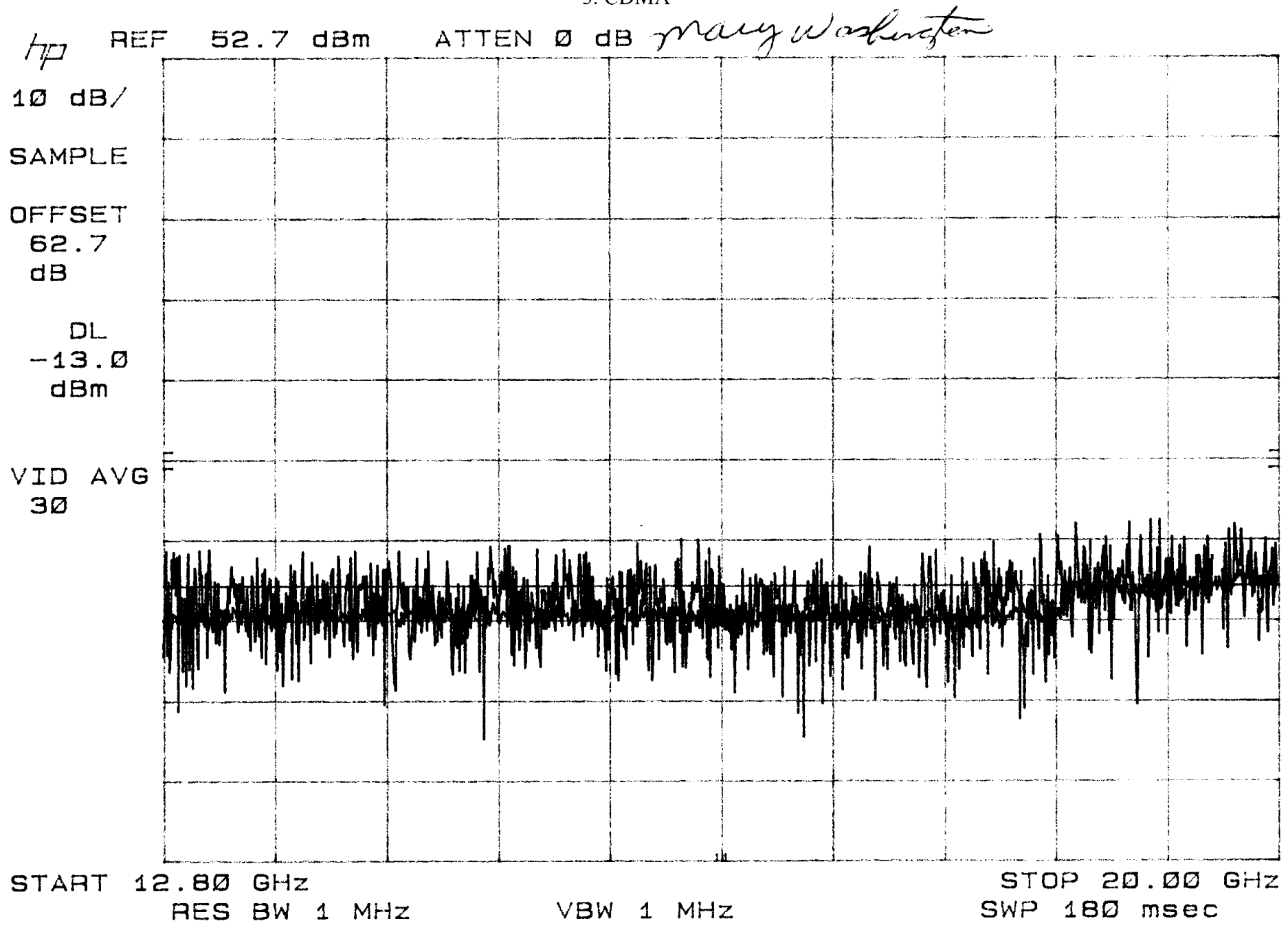
VBW 1 MHz

STOP 12.80 GHz

SWP 175 msec

34

08/16/00 SPEC: Fcc Part 2, Para. 2.1051
NOTES: 1. SG = -1.6 dBm
2. High channel, 1945 MHz
3. CDMA



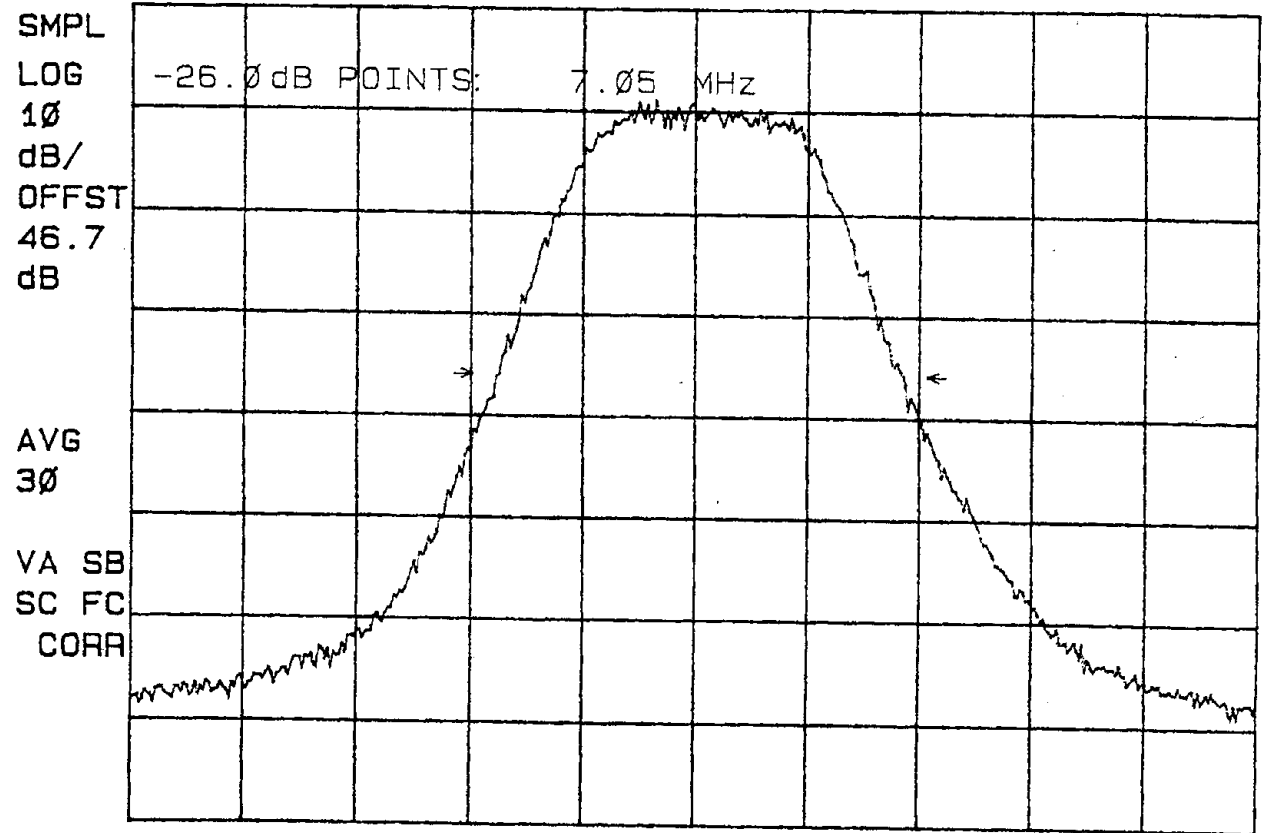
35

09:45:21 JUN 15, 2000

Emission Bandwidth
Low Channel/
FCC 24.258(b)

6-15-00
Q950

REF 46.7 dBm #AT 20 dB



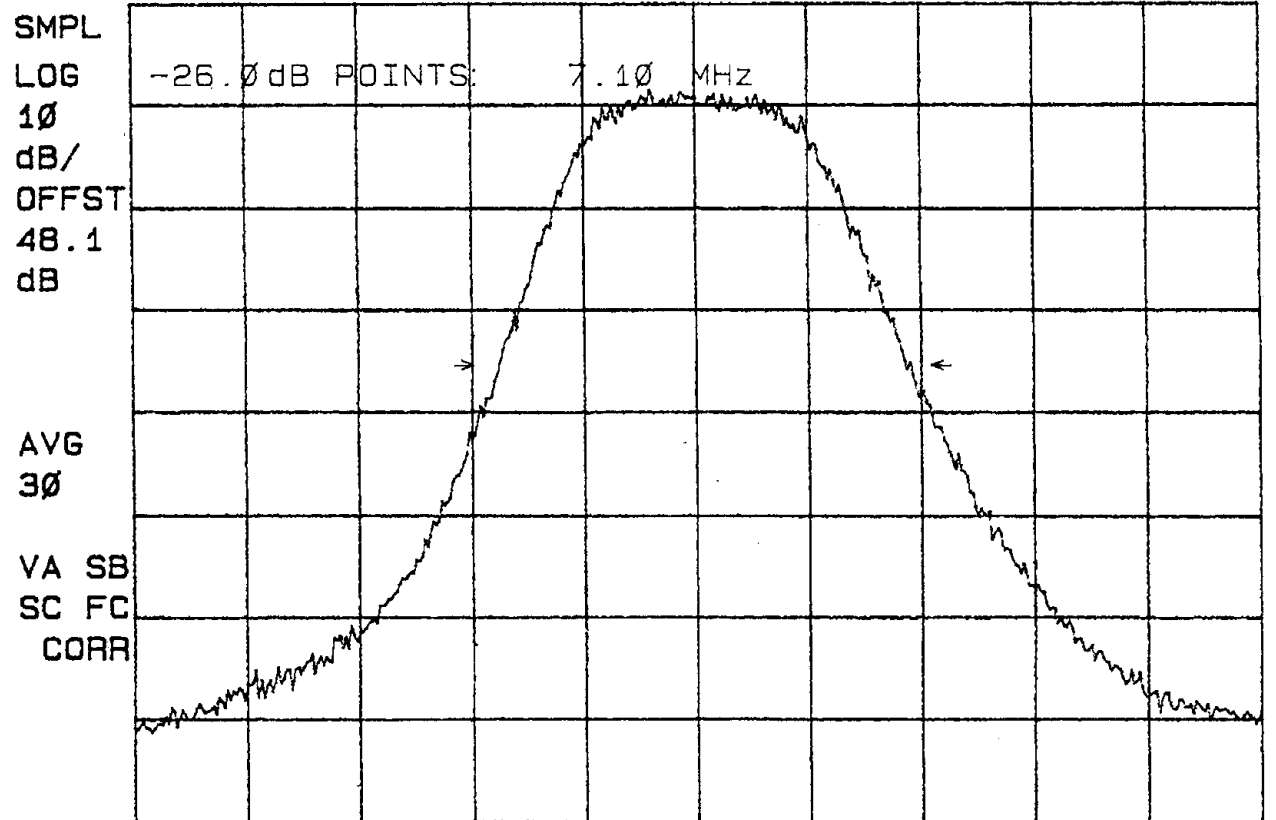
CENTER 1.93000 GHz SPAN 20.00 MHz
#RES BW 1.0 MHz #VBW 1 MHz SWP 20.0 msec

Emission Bandwidth
High Channel
Fcc 24.239(b)

6-16-00
JSC

06:27:29 JUN 16, 2000
~~17~~

REF 48.1 dBm AT 10 dB



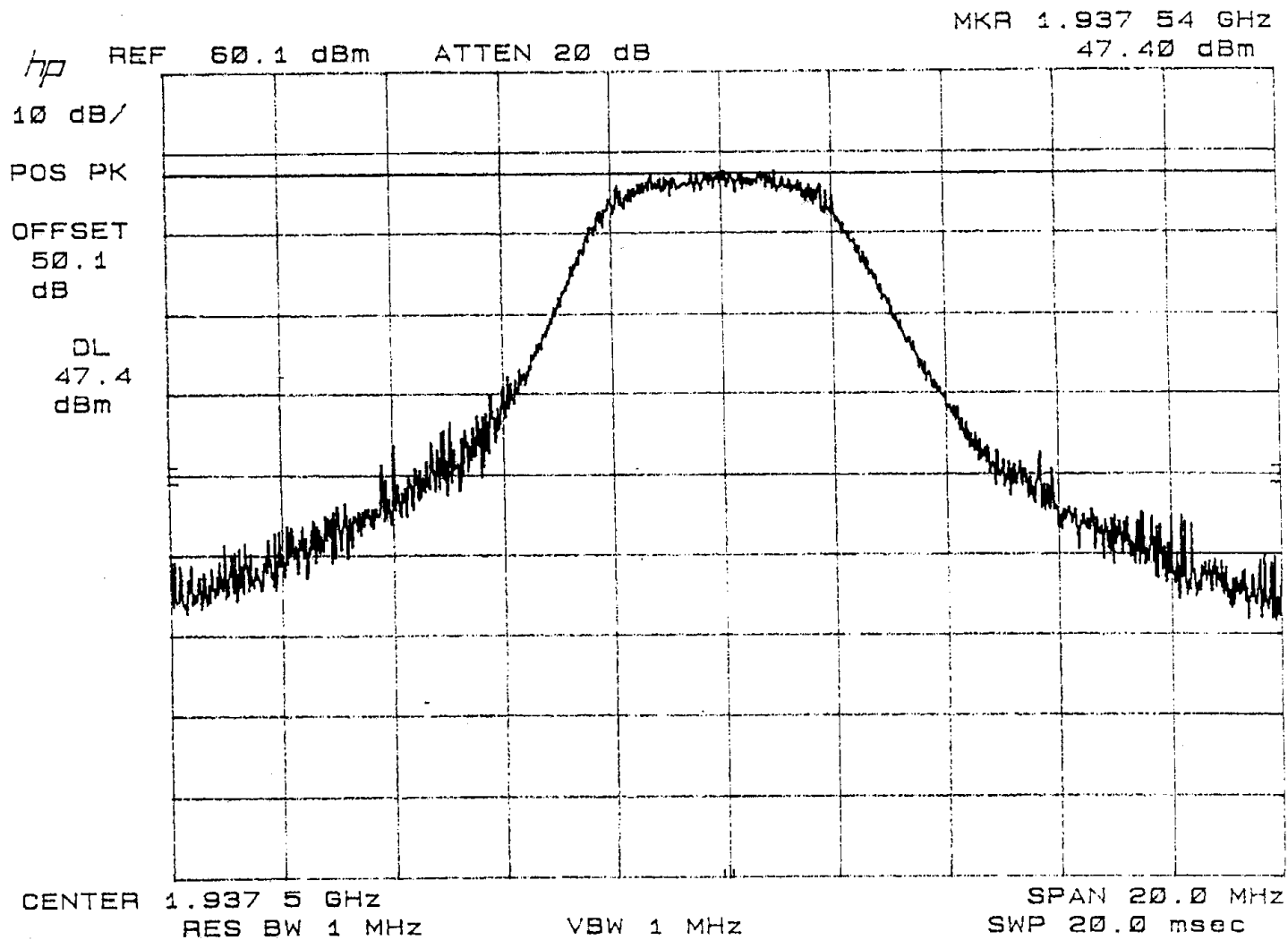
CENTER 1.94500 GHz
#RES BW 1.0 MHz

VBW 1 MHz

SPAN 20.00 MHz
SWP 20.0 msec

RF Power Output
2.1046

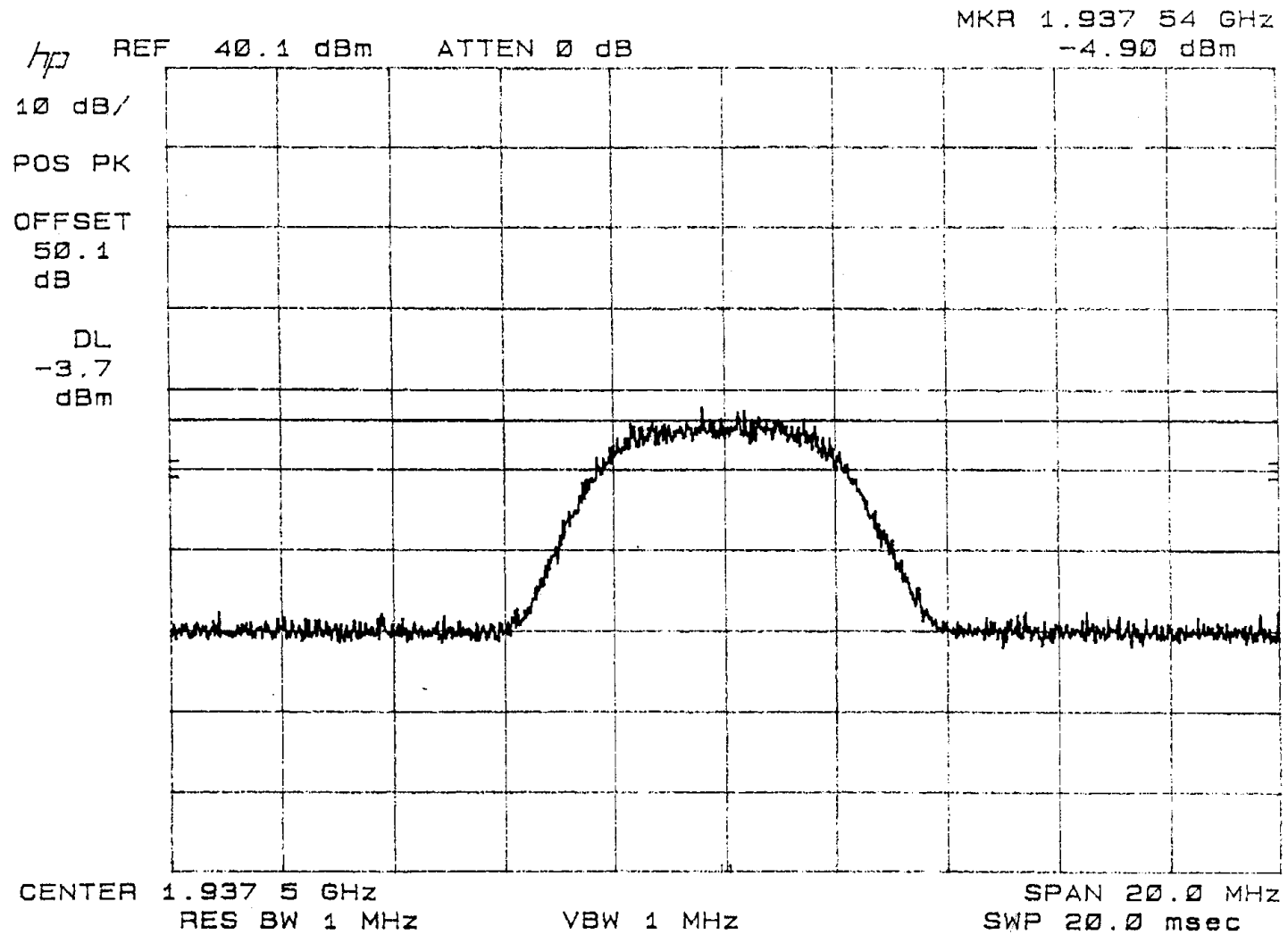
6-14-00
DGO



Amplifier Gain - Input

HP 8566B
PN: 744

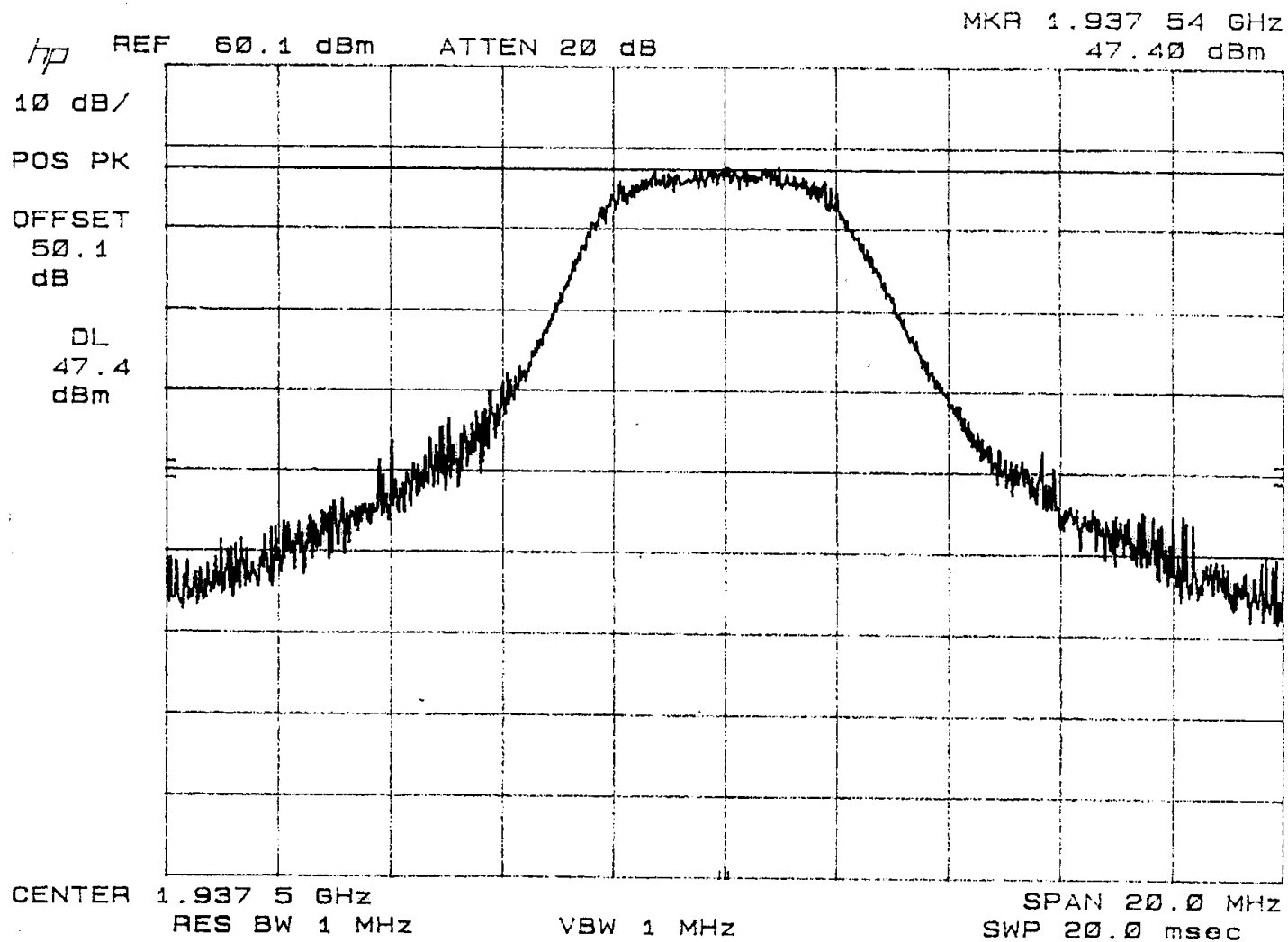
6-14-00
JCO



Mid channel Example
Low " Taken with power
High " meter set to
47.4 dBm

Amplifier Gain - Output

6-14-00
JCO



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5 ATTESTATION STATEMENT

GENERAL REMARKS:

SUMMARY:

All tests according to the standards cited on page 1 of this report.

■ - Performed

□ - **Not** Performed

The Equipment Under Test

■ - **Fulfills** the general approval requirements cited on page 1.

□ - **Does not** fulfill the general approval requirements cited on page 1.

- TÜV PRODUCT SERVICE, INC. -

Responsible Engineer:



Jim Owen
(EMC Engineer)