

TEST RESULT SUMMARY

FCC PART 22 SUBPART H

MANUFACTURER'S NAME	ADC Telecommunications
NAME OF EQUIPMENT	Digivance Indoor Coverage Solution System consisting of the Digital Host Unit, Digital Expansion Unit, and Digital Remote Unit
MODEL NUMBER	DVICS800 (Digivance Indoor Coverage Solution System) DVIG-112110DHU (Digital Host Unit) DVIG-710100DEU (Digital Expansion Unit) DVIG-113120DRU (Digital Remote Unit)
MANUFACTURER'S ADDRESS	PO Box 1101 Minneapolis MN 55440
TEST REPORT NUMBER	W0621
TEST DATE	30 November & 06 December 2000

According to testing performed at TÜV Product Service Inc, the above-mentioned unit is in compliance with the electromagnetic compatibility requirements defined in FCC Part 22 Subpart H.

It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical characteristics. Any modifications necessary for compliance made during testing on the above mentioned date(s) must be implemented in all production units for compliance to be maintained.

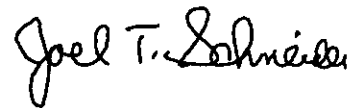
TÜV Product Service Inc, as an independent testing laboratory, declares that the equipment tested as specified above conforms to the requirements of FCC Part 22 Subpart H.

Date: 22 January 2001

Location: Taylors Falls MN
USA



R. M. Johnson
Test Technician
Not Transferable



J. T. Schneider
Lead Engineer

EMC EMISSION - TEST REPORT

Test Report File No. : **WC1G062101** Date of issue: 22 January 2001

Model / Serial No. : **DVICS800 (Digivance Indoor Coverage Solution System) /
DVIG-112110DHU (Digital Host Unit) /
DVIG-710100DEU (Digital Expansion Unit) /
DVIG-113120DRU (Digital Remote Unit) /**

Product Type : **Digivance Indoor Coverage Solution System consisting of the
Digital Host Unit, Digital Expansion Unit, and Digital Remote
Unit**

Applicant : **ADC Telecommunications**

Manufacturer : **ADC Telecommunications**

License holder : **ADC Telecommunications**

Address : **PO Box 1101
Minneapolis MN 55440**

Test Result : ☒ **Positive** ☐ **Negative**

Test Project Number :
Reference(s) **W0621**

Total pages including
Appendices **54**

TÜV Product Service Inc is a subcontractor to TÜV Product Service, GmbH according to the principles outlined in ISO/IEC Guide 25 and EN 45001. TÜV Product Service Inc reports apply only to the specific samples tested under stated test conditions. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. TÜV Product Service Inc shall have no liability for any deductions, inferences or generalizations drawn by the client or others from TÜV Product Service Inc issued reports. This report is the confidential property of the client. As a mutual protection to our clients, the public and ourselves, extracts from the test report shall not be reproduced except in full without our written approval. This report shall not be used by the client to claim product endorsement by NVLAP or any agency of the US government.

*TÜV Product Service Inc and its professional staff hold government
and professional organization certifications and are members of
AAMI, ACIL, AEA, ANSI, IEEE, NVLAP, and VCCI*

DIRECTORY - EMISSIONS

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EMISSIONS TEST REGULATIONS :

The emissions tests were performed according to following regulations:

- | | | |
|---|---|------------------------------------|
| ☐ - EN 50081-1 / 1991 | ☐ - Group 1 | ☐ - Group 2 |
| ☐ - EN 55011 / 1991 | ☐ - Class A | ☐ - Class B |
| ☐ - EN 55013 / 1990 | ☐ - Household appliances and similar | |
| ☐ - EN 55014 / 1987 | ☐ - Portable tools | |
| | ☐ - Semiconductor devices | |
| ☐ - EN 55014 / A2:1990 | ☐ - Household appliances and similar | |
| ☐ - EN 55014 / 1993 | ☐ - Portable tools | |
| | ☐ - Semiconductor devices | |
| ☐ - EN 55015 / 1987 | | |
| ☐ - EN 55015 / A1:1990 | | |
| ☐ - EN 55015 / 1993 | | |
| ☐ - EN 55022 / 1987 | ☐ - Class A | ☐ - Class B |
| ☒ - FCC Part 22 Subpart H | | |
| ☐ - BS | | |
| ☐ - VCCI | ☐ - Class A | ☐ - Class B |
| ☐ - FCC | ☐ - Class A | ☐ - Class B |
| ☐ - AS 3548 (1992) | ☐ - Class A | ☐ - Class B |
| ☐ - CISPR 11 (1990) | ☐ - Group 1 | ☐ - Group 2 |
| | ☐ - Class A | ☐ - Class B |
| ☐ - CISPR 22 (1993) | ☐ - Class A | ☐ - Class B |

Environmental conditions in the lab:

	<u>Actual</u>
Temperature	: 22 °C
Relative Humidity	: 18 %
Atmospheric pressure	: 98.9 kPa
Power supply system	: 60 Hz - 115 V - 1-phase

Sign Explanations:

- ☐ - not applicable
- ☒ - applicable

Emissions Test Conditions: CONDUCTED EMISSIONS (Interference Voltage)

The **CONDUCTED EMISSIONS (INTERFERENCE VOLTAGE)** measurements were performed at the following test location:

☐ - Test not applicable

- ☐ - Wild River Lab Large Test Site (Open Area Test Site)
- ☐ - Wild River Lab Small Test Site (Open Area Test Site)
- ☐ - Oakwood Lab (Open Area Test Site)
- ☒ - Wild River Lab Screen Room
- ☐ - New Brighton Lab Shielded Room

Test equipment used :

Model Number	Manufacturer	Description	Serial Number	Cal Due
■ - ESHS-20	Rohde & Schwarz	EMI Receiver	837055/003	3-01
■ - 3825/2	Electro-Mechanics (EMCO)	50 Ω LISN	1329	4-01

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST) and is calibrated annually.

Conducted emissions on the 60 Hz power interface of the EUT are measured in the frequency range of 450 kHz to 30 MHz. The measurements are performed using a receiver, which has CISPR characteristic bandwidth and quasi-peak detection, and a Line Impedance Stabilization Network (LISN), with 50 Ω /50 μ H (CISPR 16) characteristics. Table top equipment is placed on a non-conducting table 80 centimeters above the floor and is positioned 40 centimeters from the vertical ground plane (wall) of the screen room. In some cases, a pre-scan using a spectrum analyzer is initially performed on the units comprising the system under test to locate the highest emissions. If the minimum passing margin appears to be less than 20 dB with a peak mode measurement, the emissions are re-measured using a tuned receiver or spectrum analyzer with quasi-peak and average detection and recorded on the data sheets.

CONDUCTED EMISSIONS ON DIGIVANCE ICS

TEST REPORT #W0621 DATE 06 DECEMBER 2000

MHz	dBuV NEUTRAL	dBuV LINE	spec limit FCC A	margin-dB FCC A
0.45			60	60
0.725	28	28	60	32
1.2	26	26	60	34
1.705			60	60
1.705			69.5	69.5
10	47	47	69.5	22.5
12.67	52	52	69.5	17.5
14.27	52	52	69.5	17.5
17.46	46	46	69.5	23.5
29.83	29	29	69.5	40.5
30			69.5	69.5

60 HZ, 115 VAC, 1-PHASE TESTED BY: GSJ

The EUT meets the FCC Class A requirements by a minimum of 17 dB.

22.355 Frequency tolerance

The Frequency Tolerance measurements were performed at the following test location:

■ - The Specialty Lab Inc

Test equipment used :

Model Number	Manufacturer	Description	Serial Number	Cal Due
■ - F-12-CHV-S-5	Thermotron	Temperature chamber	4949	5-01
■ - 5350B	Hewlett-Packard	Microwave Frequency Counter	2832A01541	3-01
■ - HH23	Omega	Microprocessor Thermometer		11-01

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST) and is calibrated annually.

Input voltage	Carrier frequency	Measured Frequency	Meets 1.5 ppm requirement
102 VAC	893.97 MHz	893.9698 MHz	.3 ppm
120 VAC	893.97 MHz	893.9698 MHz	.3 ppm
138 VAC	893.97 MHz	893.9698 MHz	.3 ppm
102 VAC	881.52 MHz	881.5199 MHz	.2 ppm
120 VAC	881.52 MHz	881.5199 MHz	.2 ppm
138 VAC	881.52 MHz	881.5199 MHz	.2 ppm
102 VAC	869.04 MHz	869.0397 MHz	.4 ppm
120 VAC	869.04 MHz	869.0399 MHz	.2 ppm
138 VAC	869.04 MHz	869.0398 MHz	.3 ppm

Temperature	Carrier frequency	Measured Frequency	Meets 1.5 ppm requirement
-30° C	893.97 MHz	893.969604 MHz	.4 ppm
-20° C	893.97 MHz	893.969608 MHz	.4 ppm
-10° C	893.97 MHz	893.969611 MHz	.4 ppm
0° C	893.97 MHz	893.969616 MHz	.4 ppm
10° C	893.97 MHz	893.969618 MHz	.4 ppm
20° C	893.97 MHz	893.969622 MHz	.4 ppm
30° C	893.97 MHz	893.969626 MHz	.4 ppm
40° C	893.97 MHz	893.969631 MHz	.4 ppm
50° C	893.97 MHz	893.969631 MHz	.4 ppm
-30° C	881.52 MHz	881.519611 MHz	.4 ppm
-20° C	881.52 MHz	881.519613 MHz	.4 ppm
-10° C	881.52 MHz	881.519618 MHz	.4 ppm
0° C	881.52 MHz	881.519620 MHz	.4 ppm
10° C	881.52 MHz	881.519624 MHz	.4 ppm
20° C	881.52 MHz	881.519628 MHz	.4 ppm
30° C	881.52 MHz	881.519632 MHz	.4 ppm
40° C	881.52 MHz	881.519634 MHz	.4 ppm
50° C	881.52 MHz	881.519637 MHz	.4 ppm
-30° C	869.04 MHz	869.039616 MHz	.4 ppm
-20° C	869.04 MHz	869.039618 MHz	.4 ppm
-10° C	869.04 MHz	869.039622 MHz	.4 ppm
0° C	869.04 MHz	869.039626 MHz	.4 ppm
10° C	869.04 MHz	869.039629 MHz	.4 ppm
20° C	869.04 MHz	869.039633 MHz	.4 ppm
30° C	869.04 MHz	869.039637 MHz	.4 ppm
40° C	869.04 MHz	869.039640 MHz	.4 ppm
50° C	869.04 MHz	869.039642 MHz	.4 ppm

22.913 Effective Radiated Power Limit

The Effective Radiated Power Limit measurements were tested at the following test location :

☐ - Test not applicable

- - Wild River Lab Large Test Site (Open Area Test Site)
- ☐ - Wild River Lab Small Test Site (Open Area Test Site)
- ☐ - Oakwood Lab (Open Area Test Site)

at a test distance of :

- ☐ - 3 meters
- ☐ - 10 meters
- ☐ - 30 meters

Test equipment used :

Model Number	Manufacturer	Description	Serial Number	Cal Due
■ - 8566B	Hewlett-Packard	Spectrum Analyzer	2430A00930	5-01
■ - 85662A	Hewlett-Packard	Analyzer Display	2403A08134	5-01
■ - 85650A	Hewlett-Packard	Quasi-Peak Adapter	2521A01006	5-01

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST) and is calibrated annually.

This measurement was made as a direct conducted emission measurement. The output from the EUT antenna connector was connected directly to the spectrum analyzer, which was set up with a 1 MHz resolution bandwidth. The spectrum analyzer level was offset by 20 dB to compensate for the attenuator placed between the EUT and the analyzer, and by 2 dB for the measured cable loss between the EUT and the analyzer.

Carrier Frequency	Carrier Output
893.97 MHz	+13 dBm (20 mW)
881.52 MHz	+13 dBm
869.04 MHz	+13 dBm

22.915 Modulation requirements

The Modulation requirement measurements were performed at the following test location :

☒ - Test not applicable

- ☐ - Wild River Lab Large Test Site
- ☐ - Wild River Lab Small Test Site (Open Area Test Site)
- ☐ - Oakwood Lab (Open Area Test Site)
- ☐ - Wild River Lab Screen Room
- ☐ - New Brighton Lab Shielded Room

The instantaneous frequency deviation measurements and the audio filter characteristics measurements are not applicable to this device – it is an amplifier.

22.917 Emission Limitations for cellular

The Emission limitations for cellular measurements were performed at the following test location :

■ - Wild River Lab Large Test Site (Open Area Test Site)

at a test distance of:

- - 3 meters
- - 10 meters

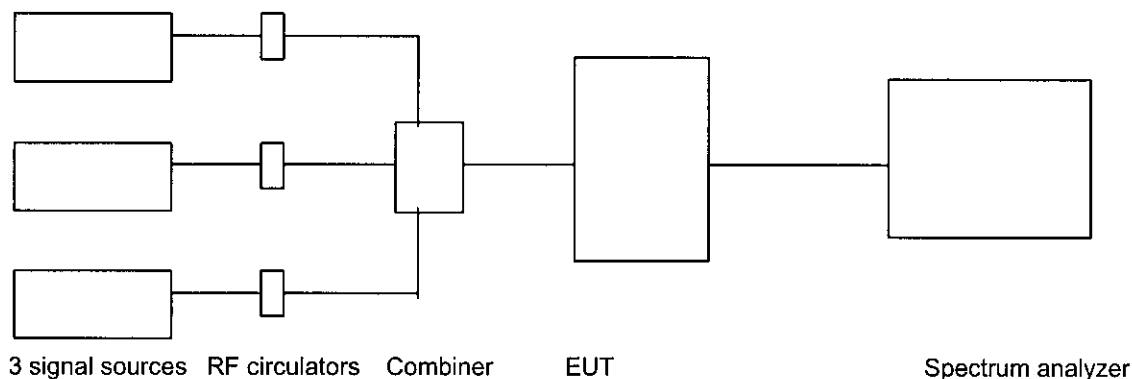
Test equipment used :

Model Number	Manufacturer	Description	Serial Number	Cal Due
■ - ZHL-1042J	Mini-Circuits	Preamplifier	H072294-11	3-01
■ - EM-6917B	Electro-Metrics	Biconicalog Periodic	101	9-01
■ - 8566B	Hewlett-Packard	Spectrum Analyzer	2430A00930	5-01
■ - 85662A	Hewlett-Packard	Analyzer Display	2403A08134	5-01
■ - 8657B	Hewlett-Packard	Signal Generator	3133U01953	3-01
■ - 8672A	Hewlett-Packard	Signal Generator	2214A00127	3-01
■ -	Noise/Com	CDMA Simulator	F989	7-01
■ - 2520	Wavetek	Signal Generator	6271013	3-01
■ - IS-46	MCLI	Circulators	801, 802, 803	12-01
■ - ZA3PD-1	MCLI	Combiner		12-01
■ - UHAP-10dB	Schwarzbeck	Dipole Antenna	164	
■ - VHAP-10dB	Schwarzbeck	Dipole Antenna	177	
■ - 3115	EMCO	Horn Antenna	2483	12-01
■ - 3115	EMCO	Horn Antenna	9001-3275	10-01
■ - AWT-18037	Avantek	Preamplifier	1001-9226	3-01
■ - AFT-8434	Avantek	Preamplifier	9112 Z221	3-01

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST) and is calibrated annually.

The intermodulation products test was performed. Test 1 was with 3 CW signals input to the EUT, 2 at lower end channels and one at a higher end channel. Test 2 was with 3 modulated signals (1 kHz @ 8 kHz deviation) input to the EUT. Test 3 was with 2 CDMA signals (at lower end channels) and 1 modulated (1 kHz @ 8 kHz deviation), at a higher end channel, input to the EUT. Spurious limit = -13 dBm. In all cases, the out of band emissions were less than -13 dBm (+13 dBm - [43 + 10log(.02W)]).

See the following plots.



w/modulation
1KHz, 8KHz deviation

MKR 880.00 MHz
-39.90 dBm

hp REF 22.0 dBm ATTN 20 dB

10 dB/

OFFSET
22.0
dB

DL
-13.0
dBm

CENTER

880.0 MHz

STEP 50.0 MHz

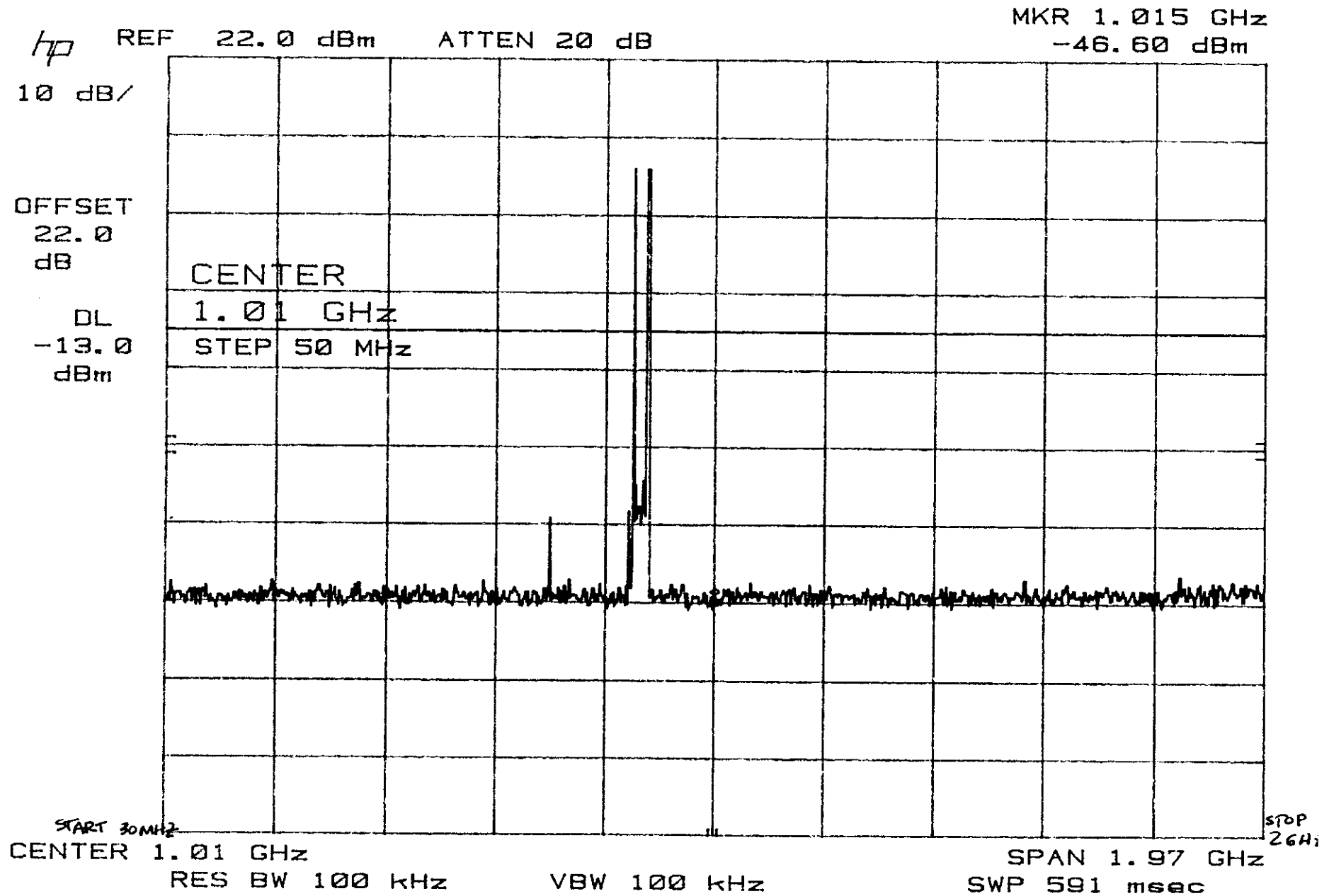
START 860MHz
CENTER 880.0 MHz
RES BW 100 kHz

VBW 100 kHz

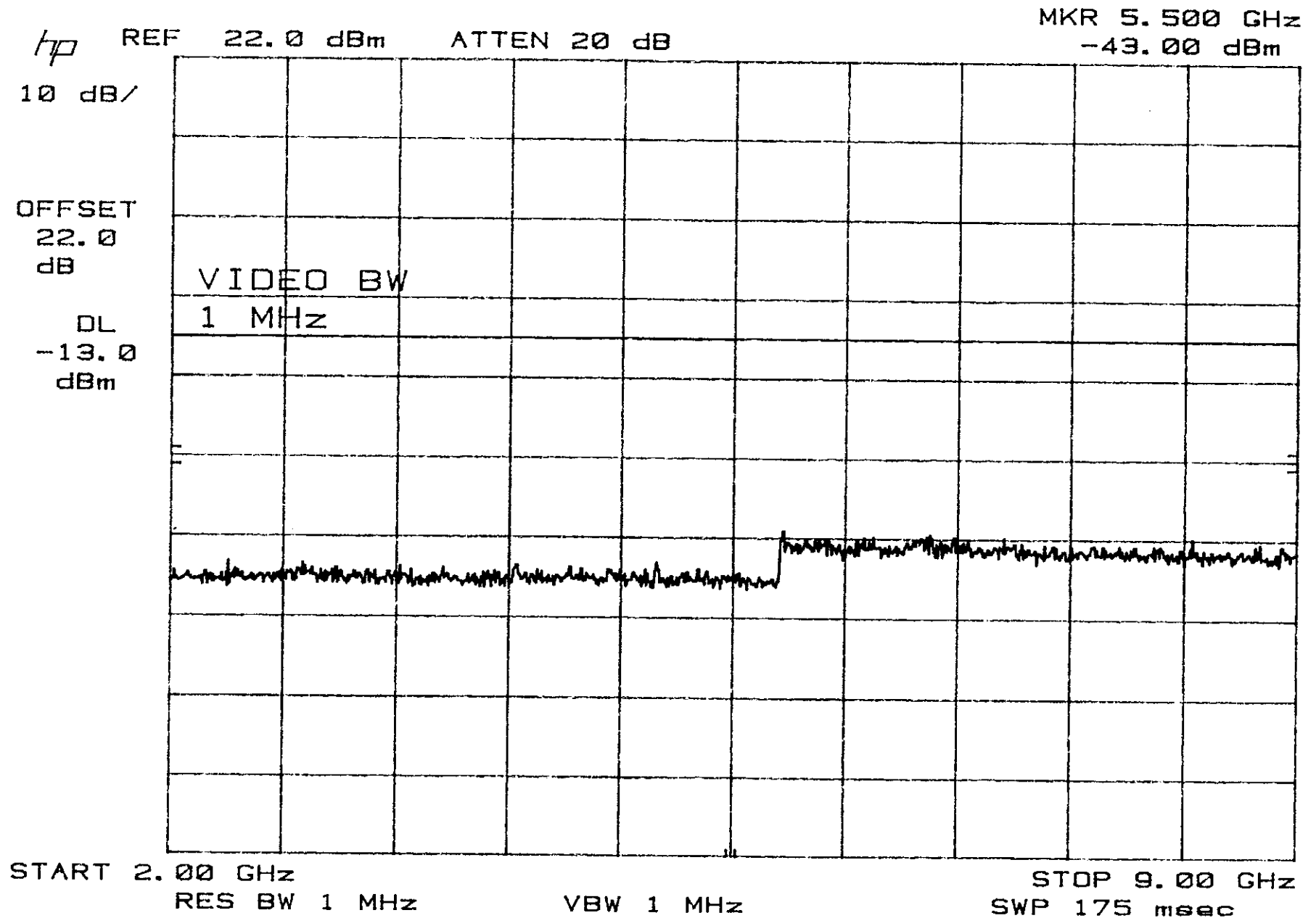
SPAN 40.0 MHz
SWP 20.0 msec

STOP
900 MHz

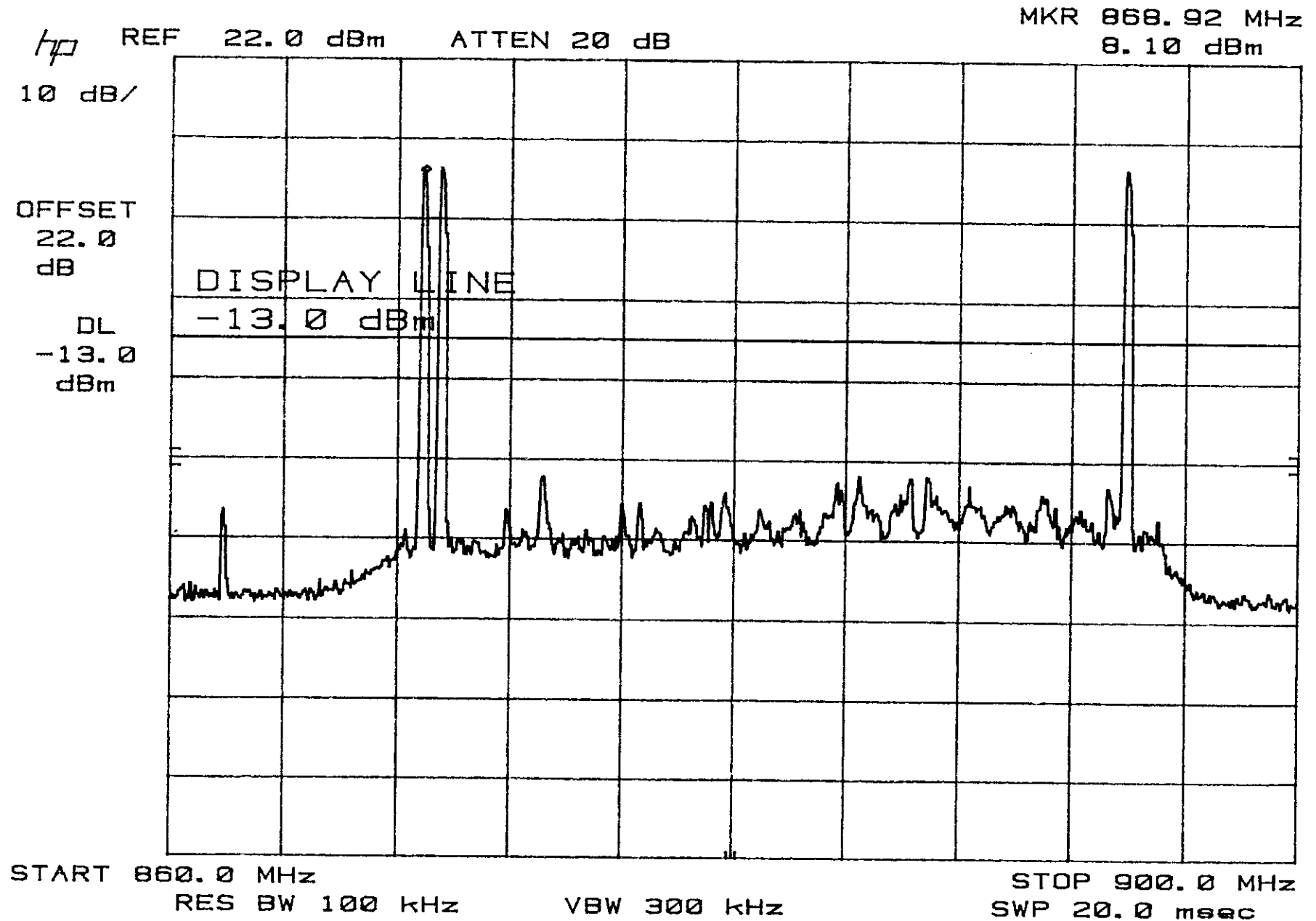
w/mod.



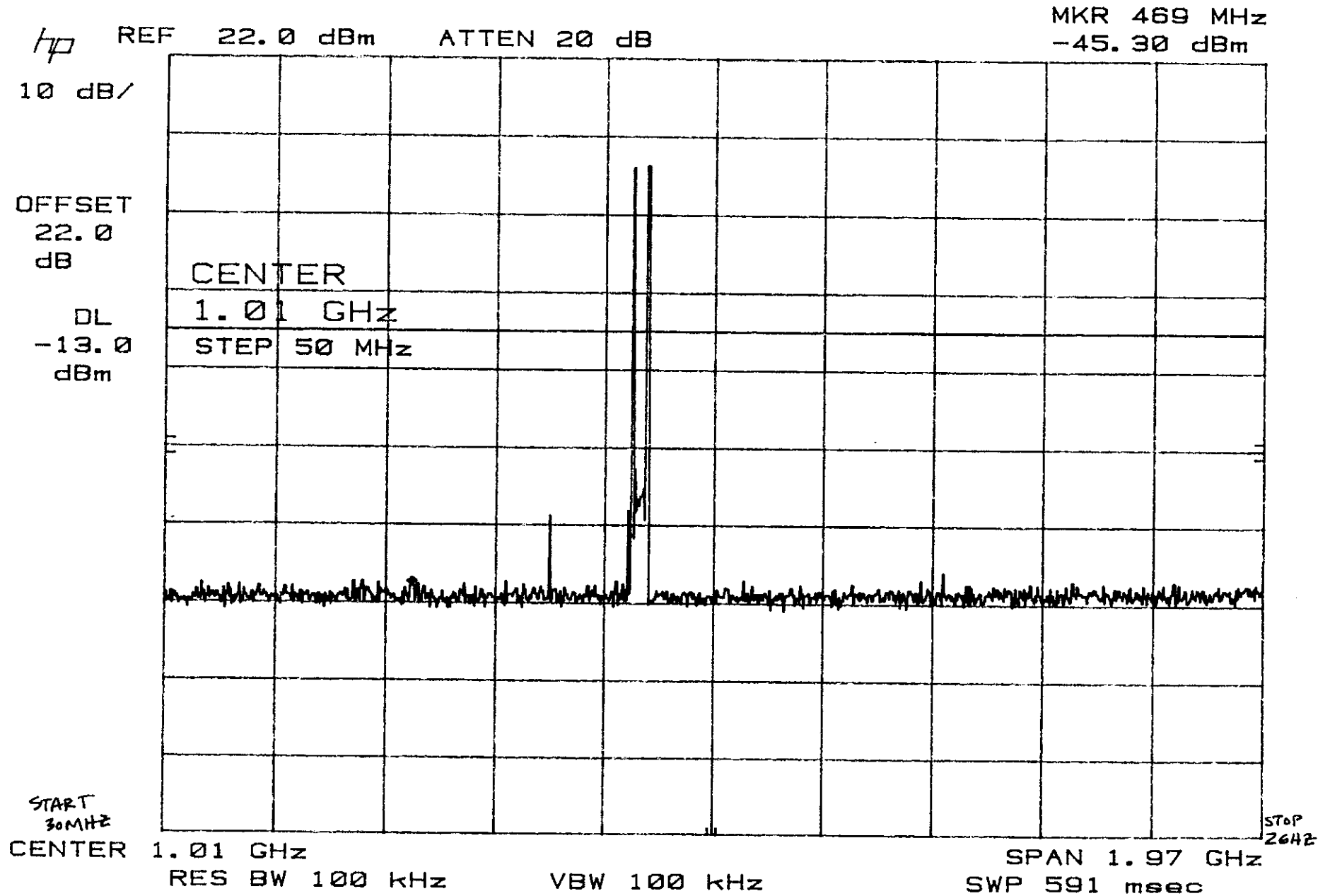
w/modulation
Intermod



cw



CW



intermod
CW

MKR 5.500 GHz
-43.00 dBm

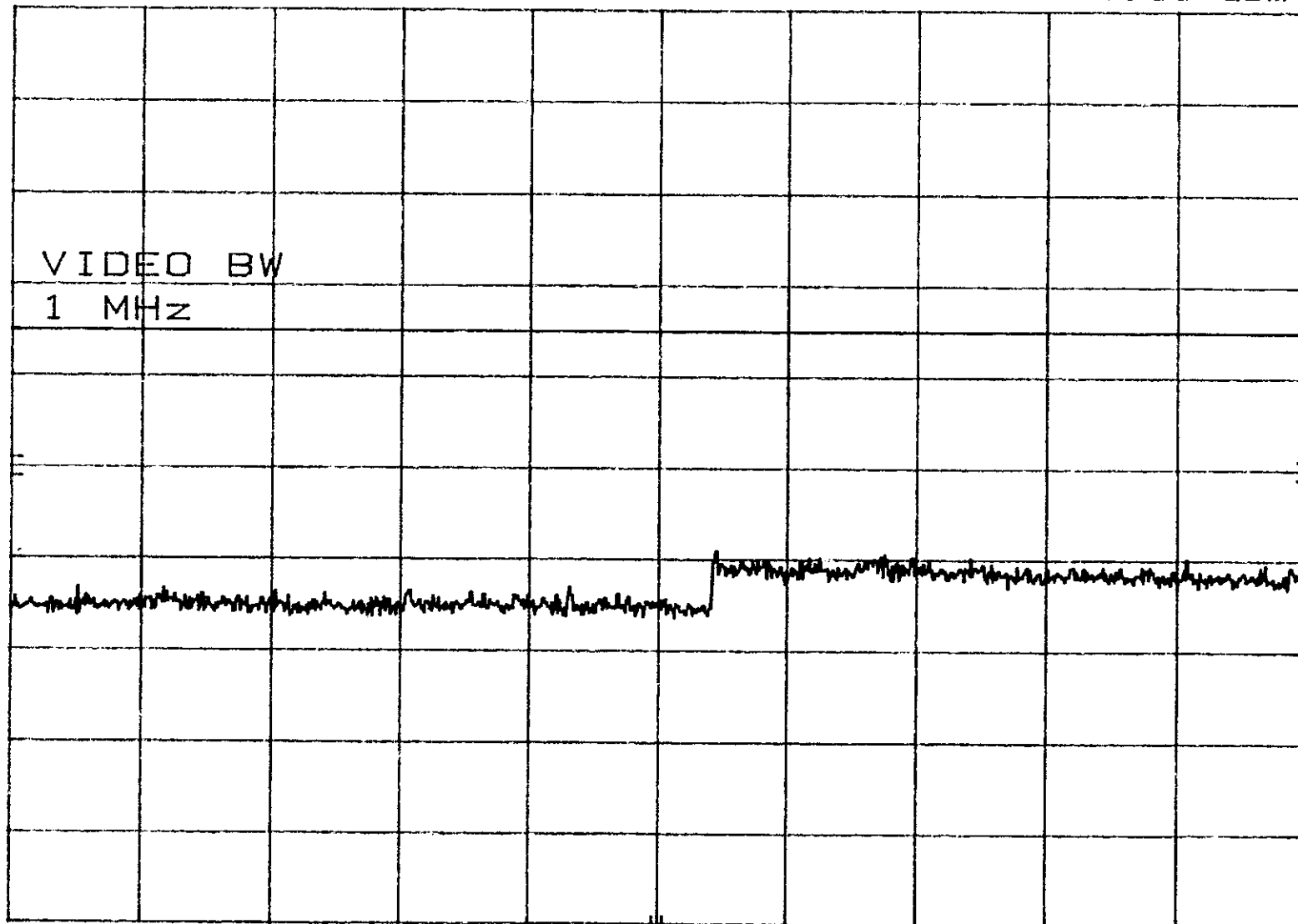
hp REF 22.0 dBm ATTN 20 dB

10 dB/

OFFSET
22.0
dB

DL
-13.0
dBm

VIDEO BW
1 MHz



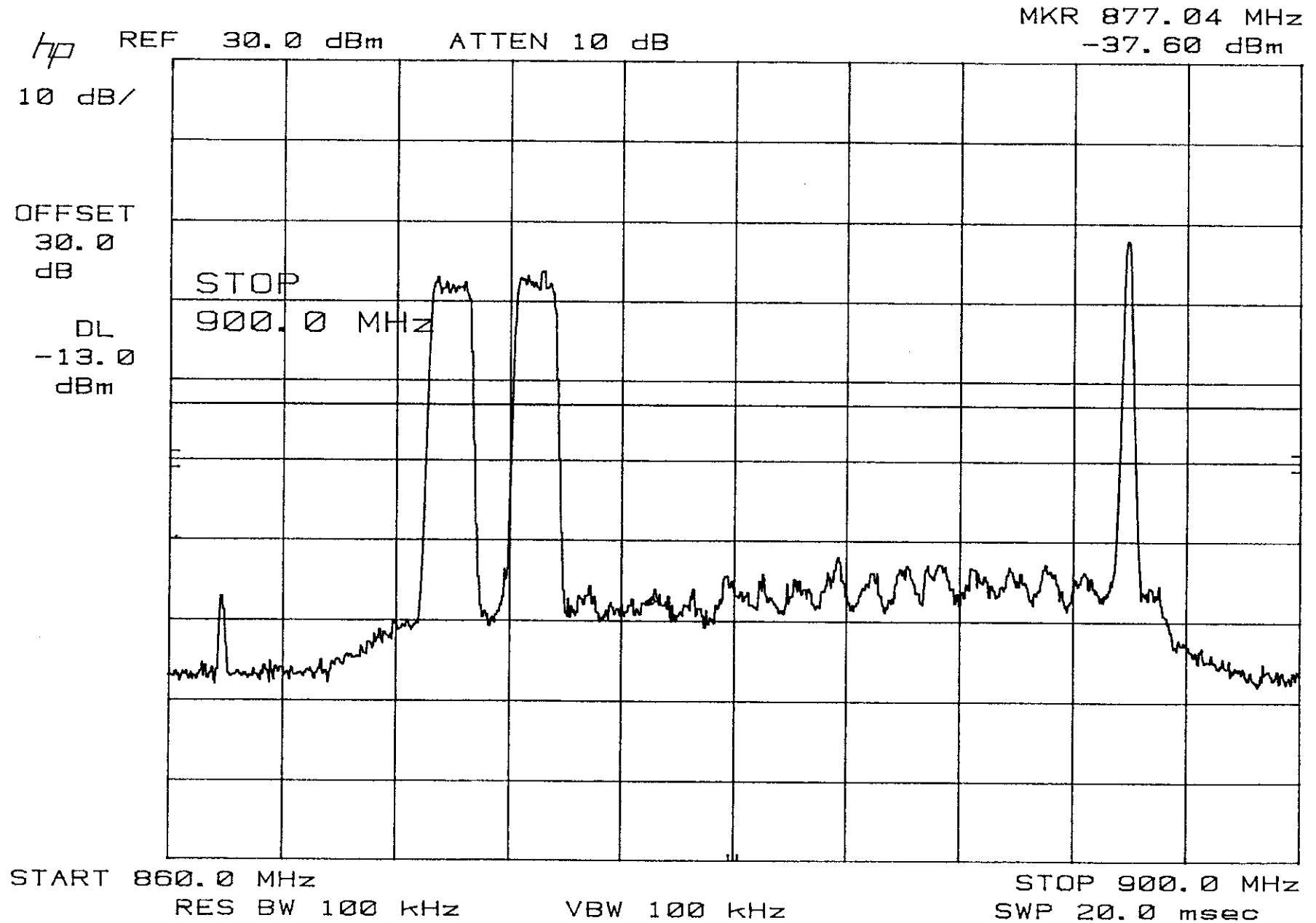
START 2.00 GHz

RES BW 1 MHz

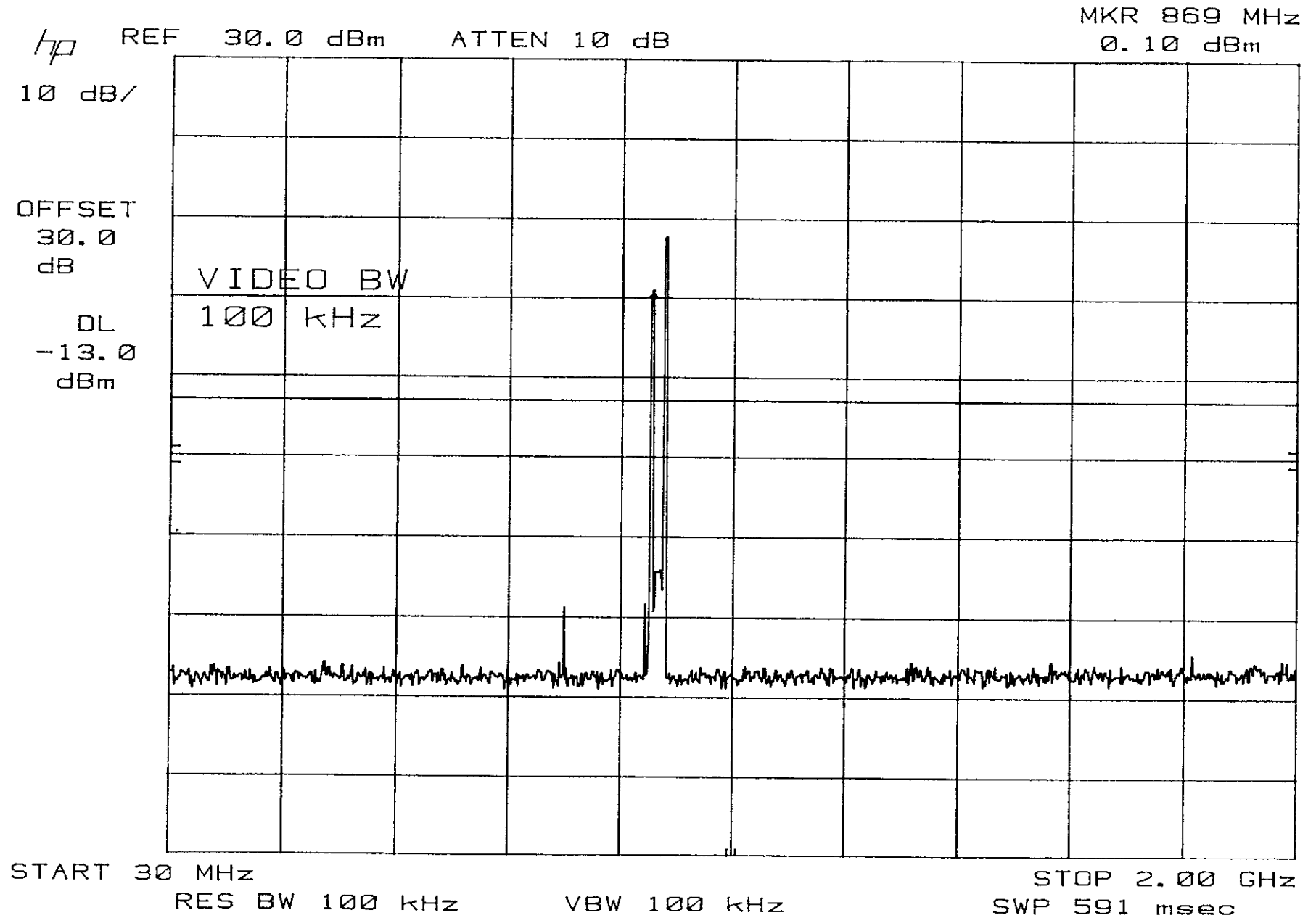
VBW 1 MHz

STOP 9.00 GHz
SWP 175 msec

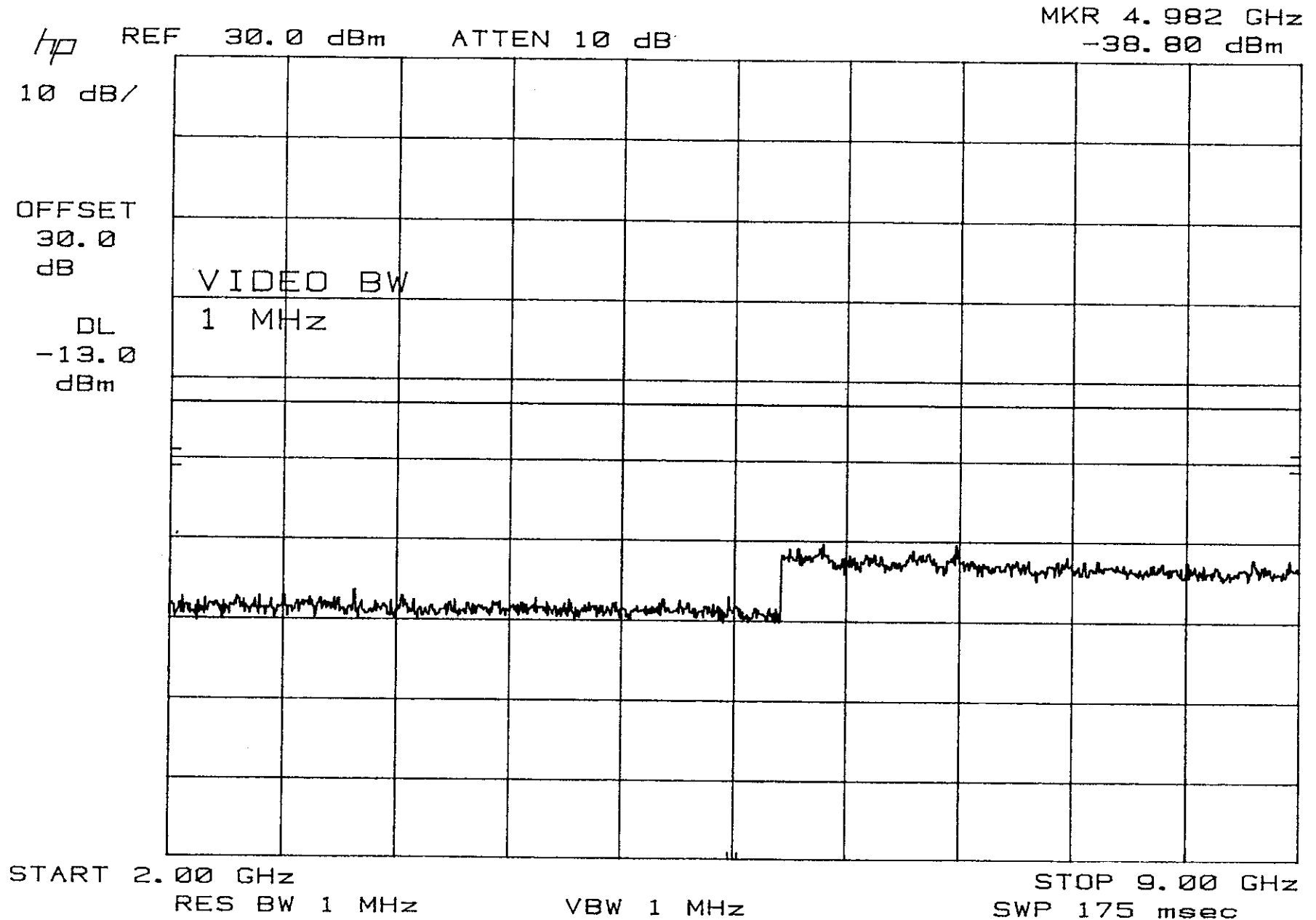
CDMA lower 2 channels



COMA lower 2 channels



CDMA lower 2 channels



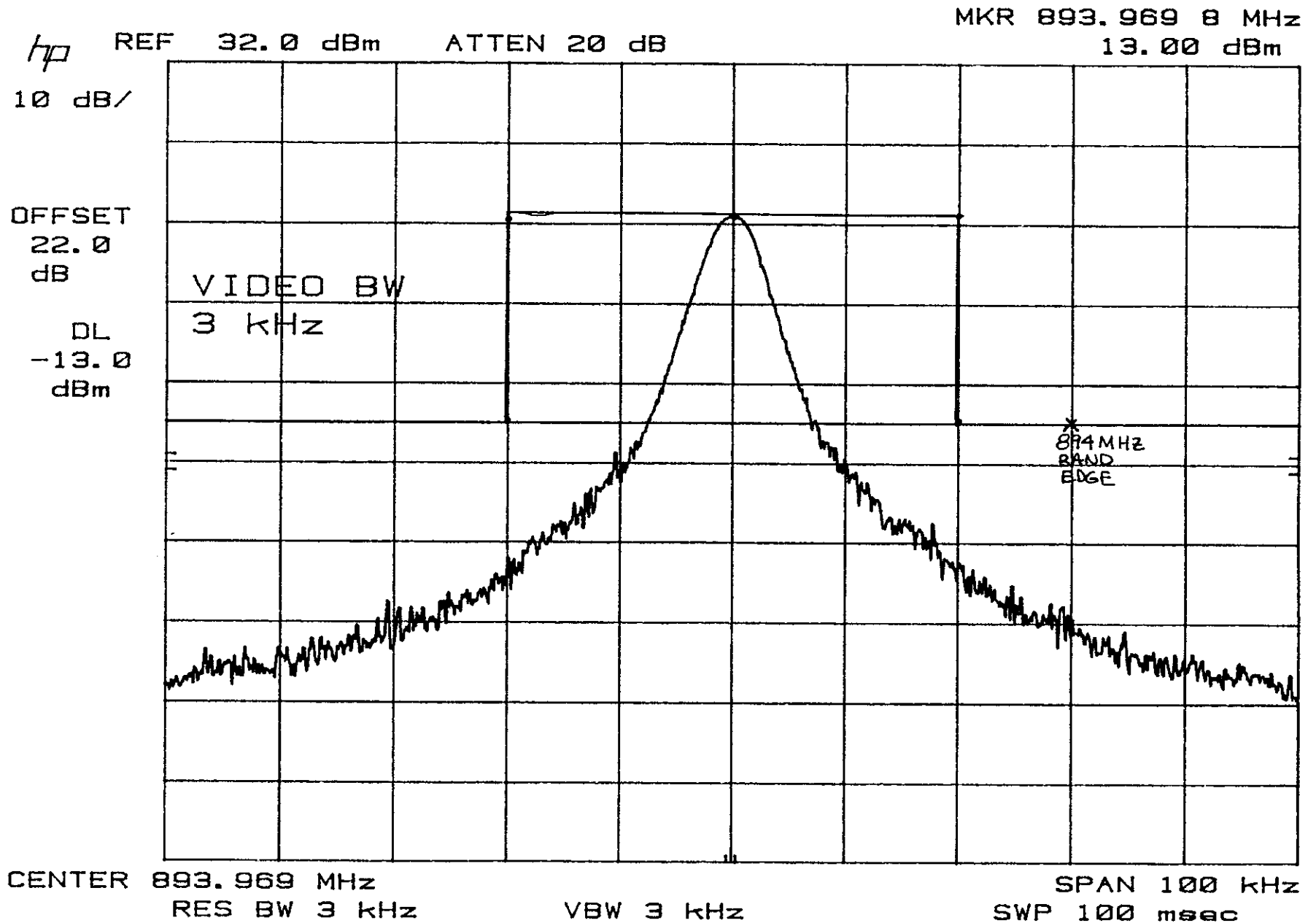
The out of band emissions were measured directly from the EUT output with a spectrum analyzer from 30 MHz up to the 10th harmonic of the carrier frequency. Test 1 was with a CW signal input to the EUT at 893.97 MHz. Test 2 was with a CW signal input to the EUT at 881.52 MHz. Test 3 was with a CW signal input to the EUT at 869.04 MHz. In all cases, the out of band emissions were less than -13 dBm, from the formula in 22.917(e):

$$(+13 \text{ dBm} - [43 + 10\log(.02W)]).$$

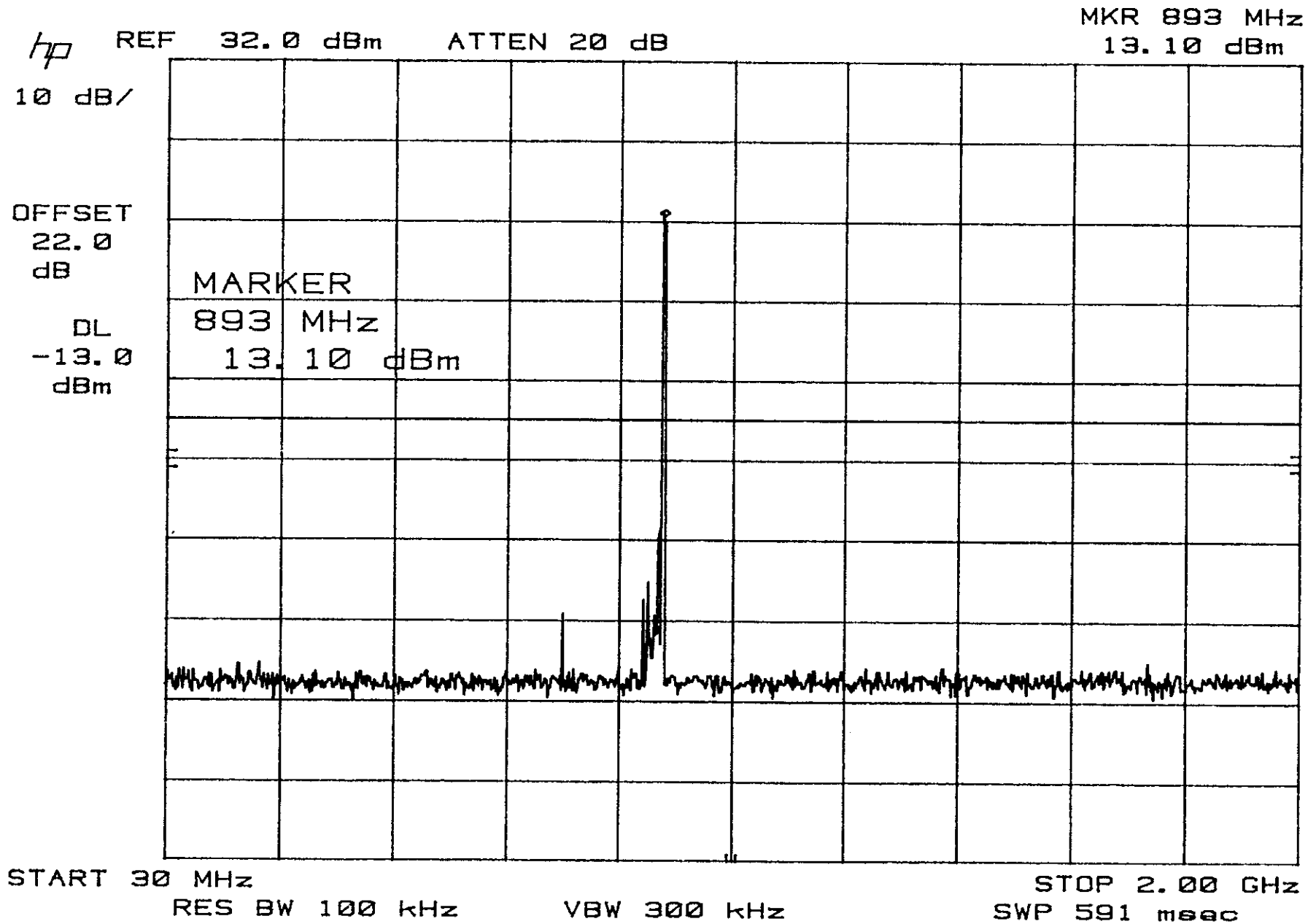
For the in band emissions, on any frequency removed from the carrier frequency by more than 20 kHz, but not more than 45 kHz, the emissions are at least 26 dB below the carrier power level. On any frequency removed from the carrier frequency by more than 45 kHz, the emissions are at least below -13 dBm (from above formula). These plots also demonstrate band edge compliance.

See the following plots.

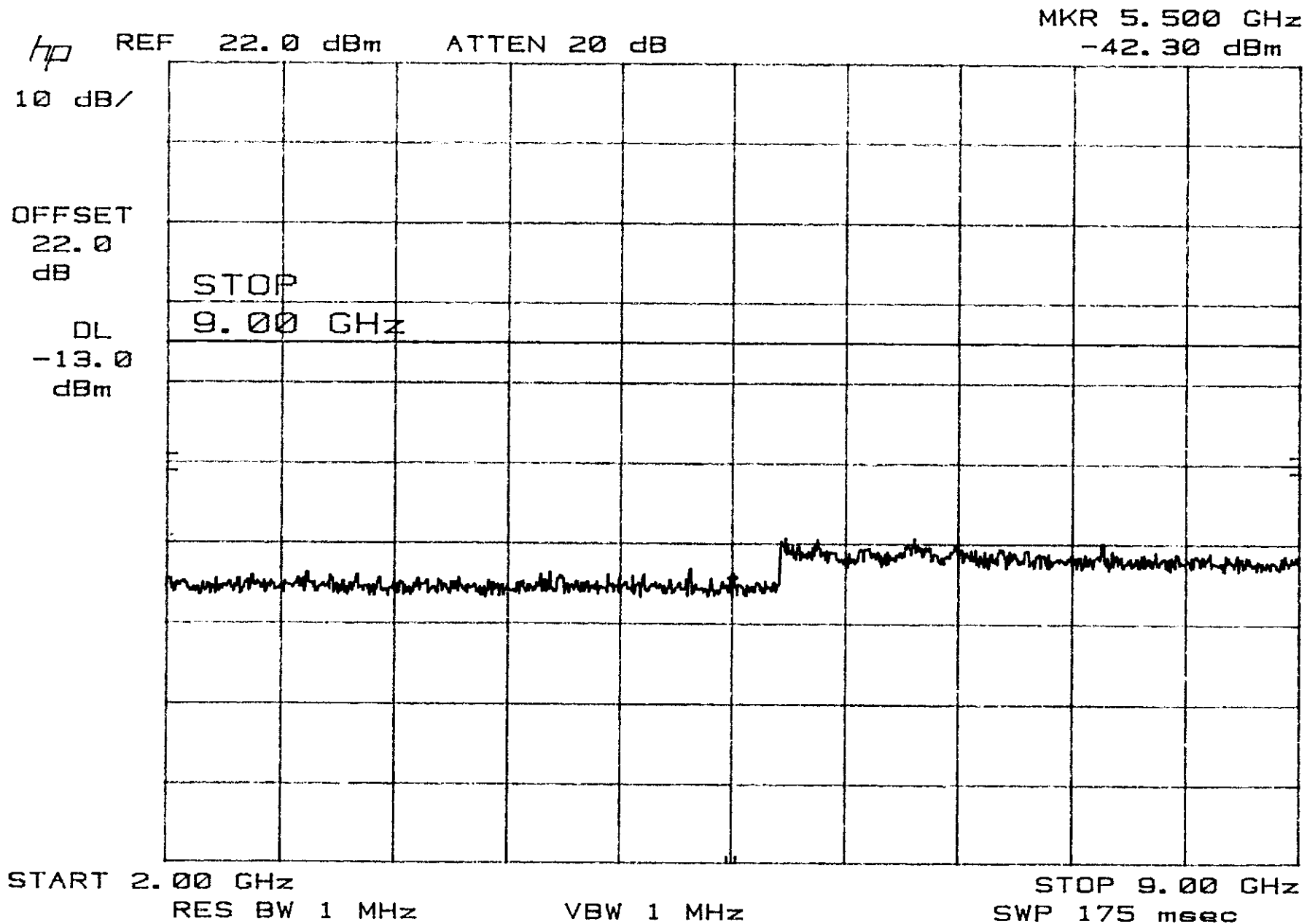
893.969 MHz @ 102 VAC
893.9698 @ 120 VAC
@ 138 VAC



893.7 MHz CW



89397MHz CW



102VAC INPUT- 881.5199 MHz
120 VAC "
138VAC "

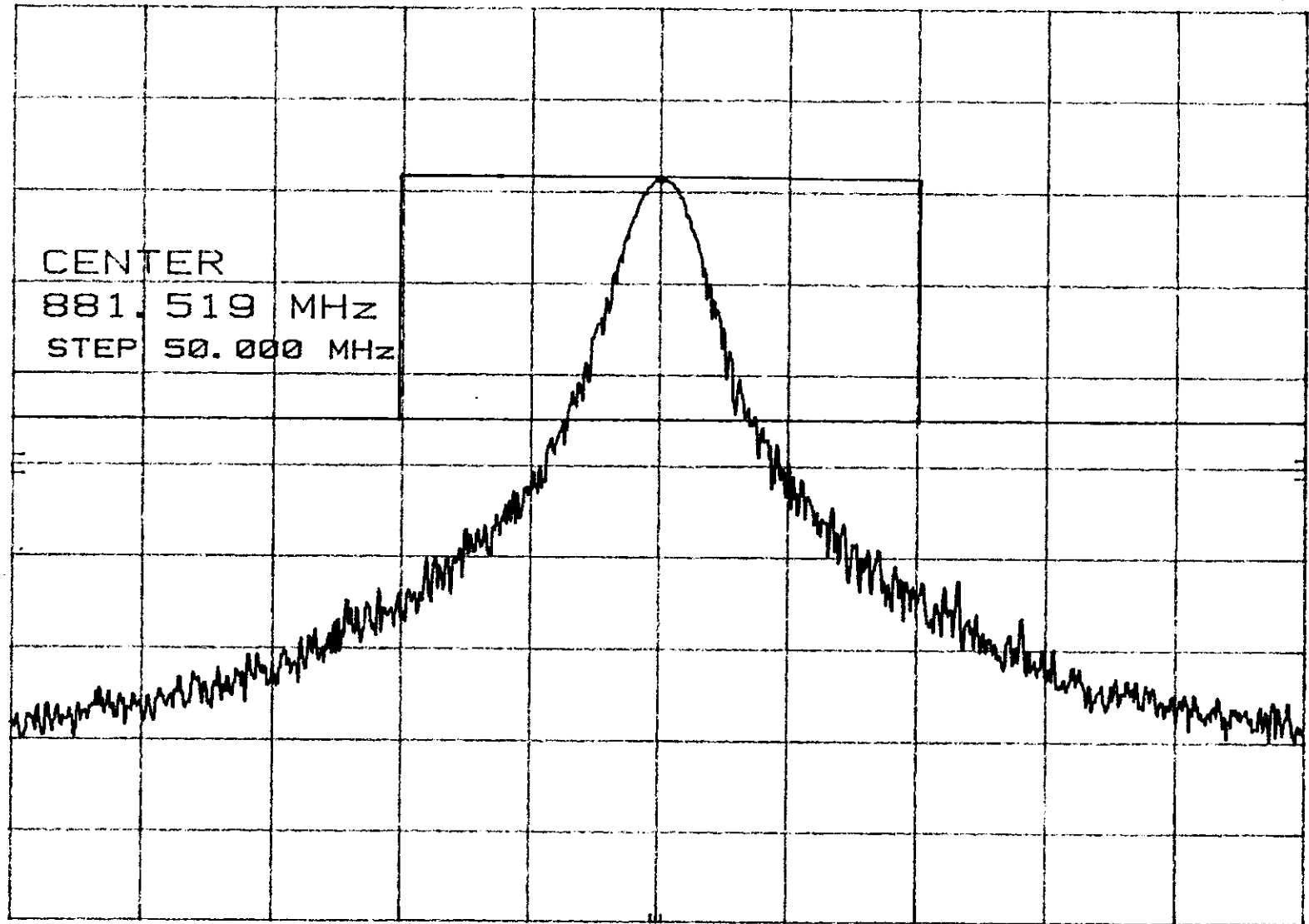
MKR 881.519 7 MHz
13.30 dBm

hp REF 32.0 dBm ATTN 20 dB

10 dB/

OFFSET
22.0
dB

DL
-13.0
dBm

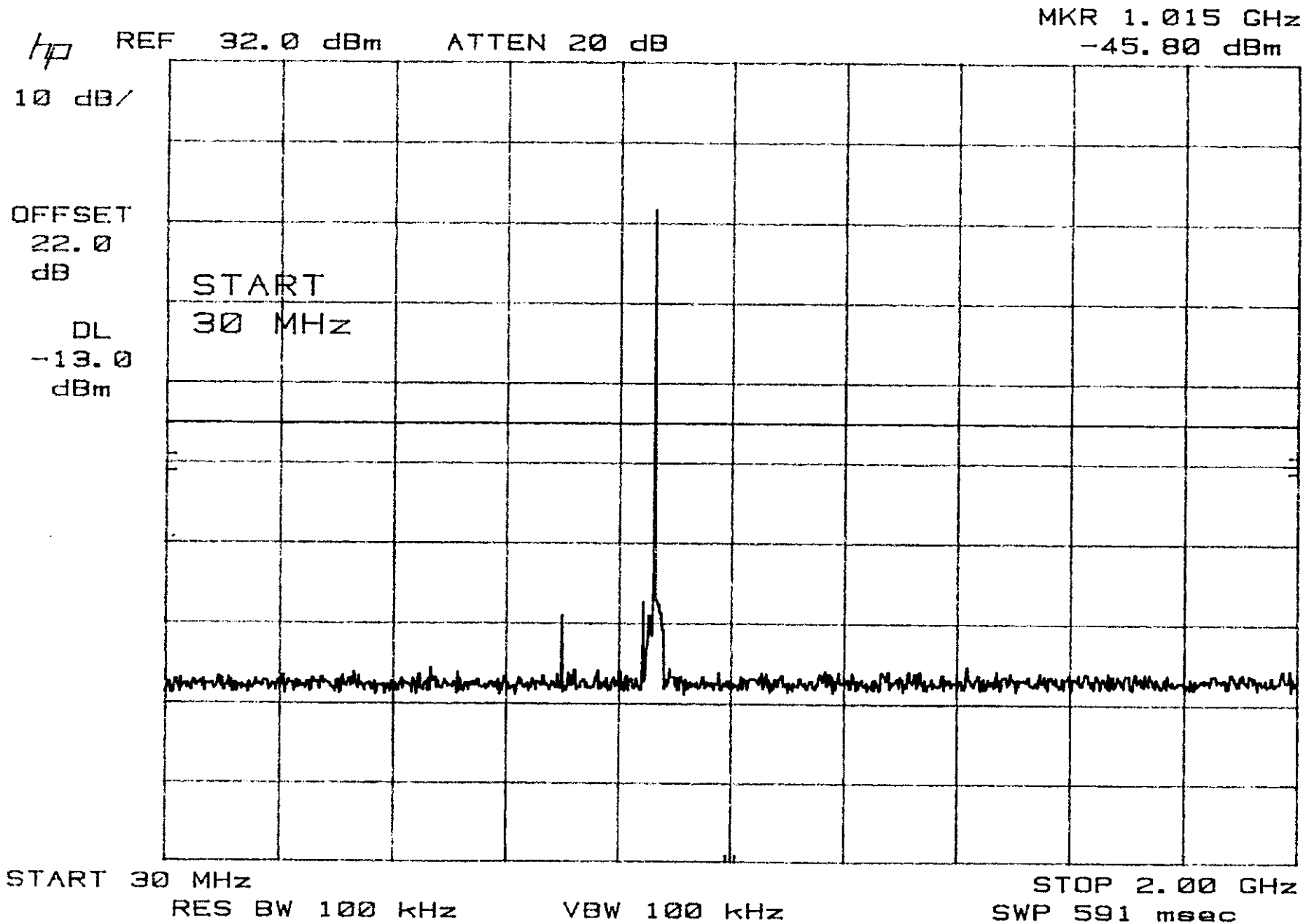


CENTER 881.519 MHz
RES BW 3 kHz

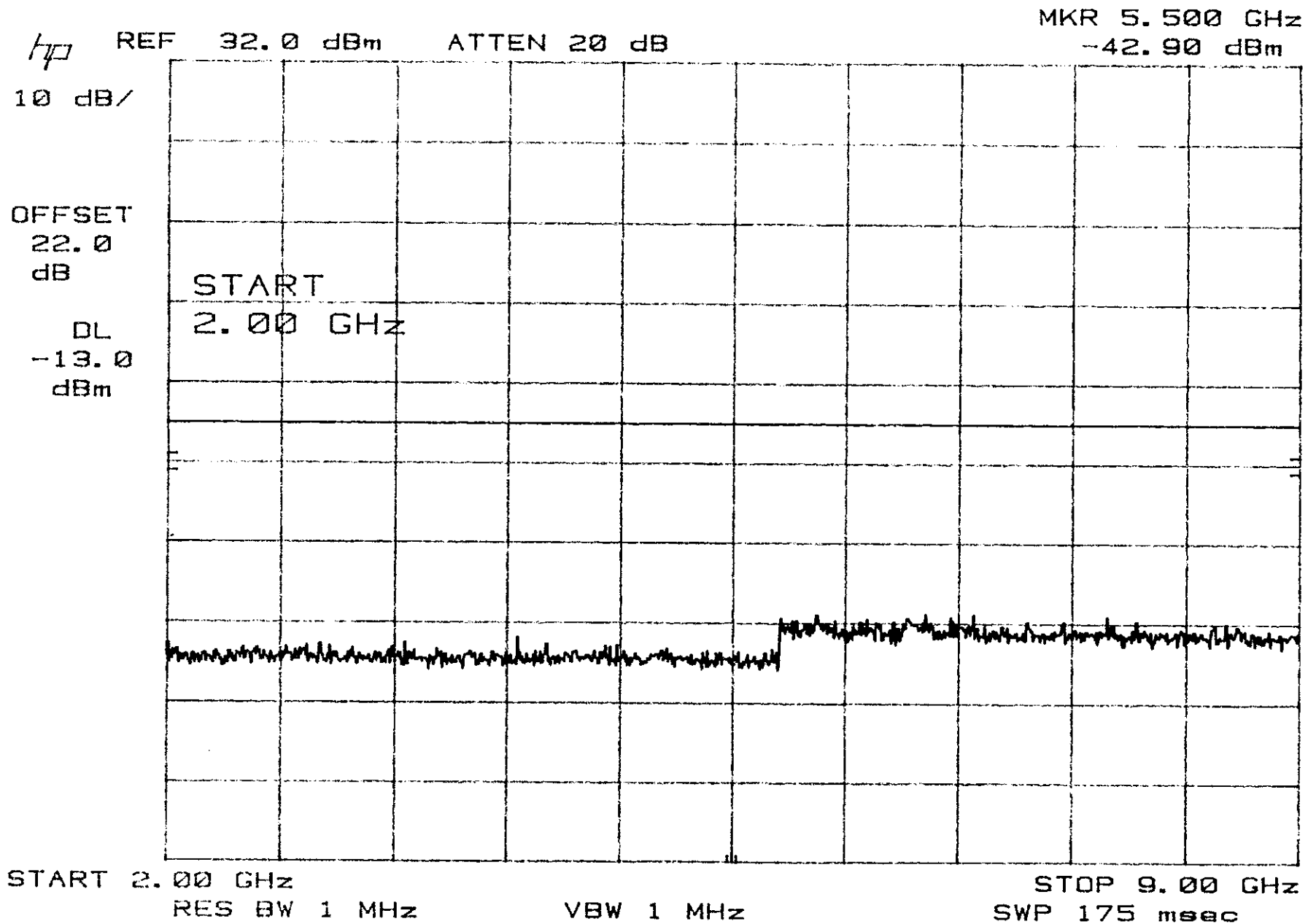
VBW 3 kHz

SPAN 100 kHz
SWP 100 msec

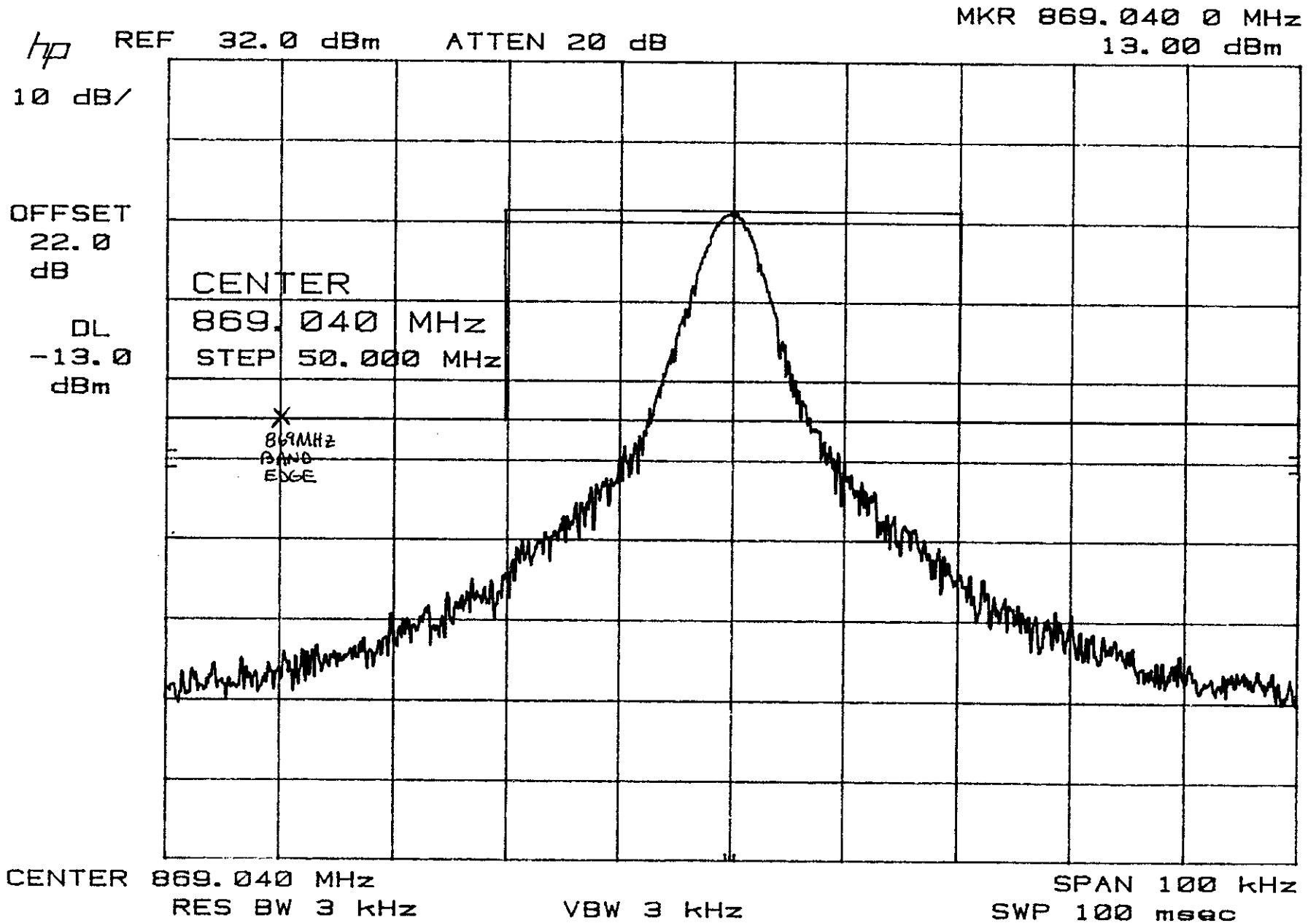
881.52 MHz CW



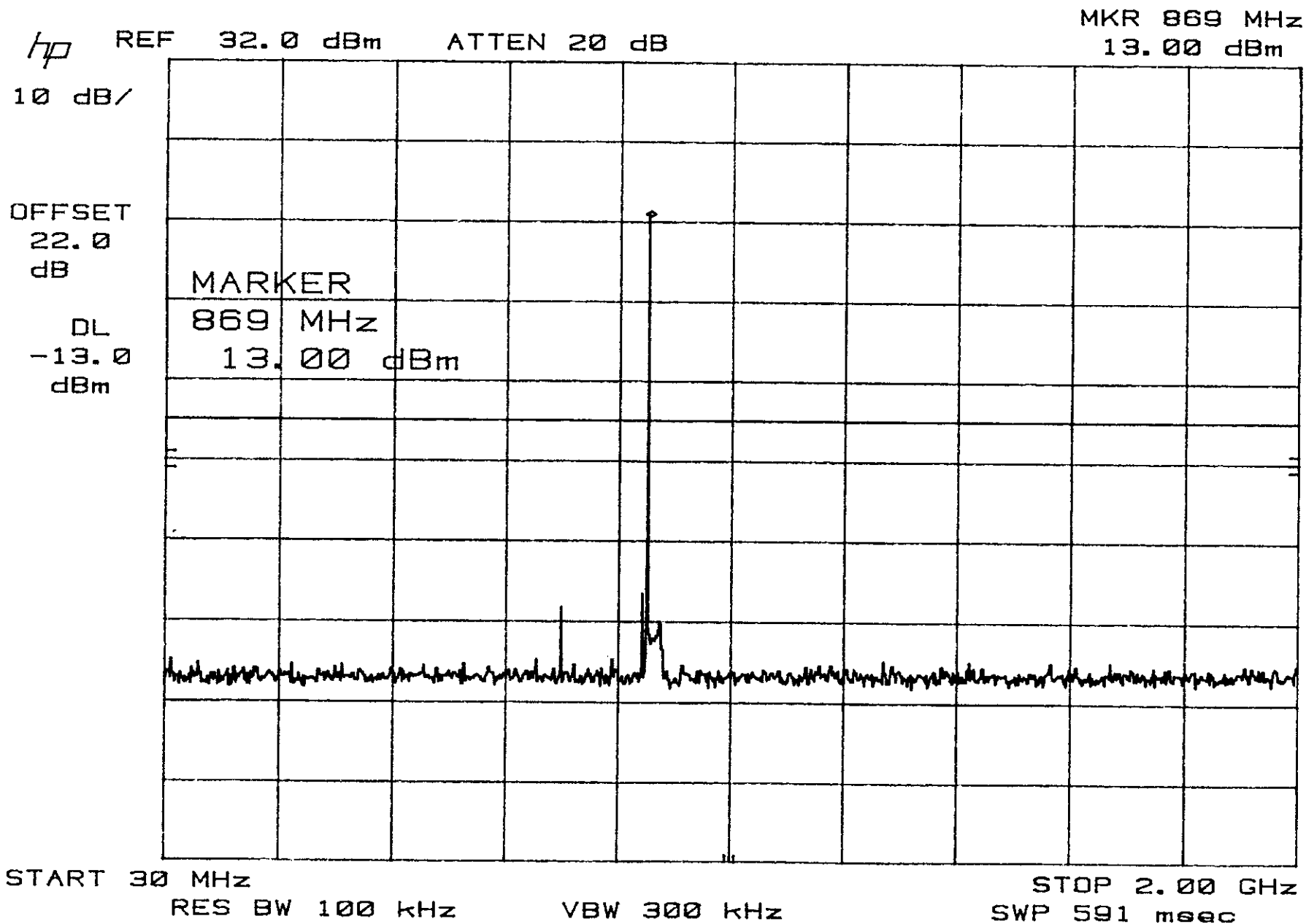
881.52MHz CW



869.0397 @ 102 VAC
869.0398 @ 120 VAC
869.0398 @ 138 VAC



869.04 MHz



869.04 MHz CW

MKR 4.854 GHz
-41.00 dBm

hp REF 32.0 dBm ATTEN 20 dB

10 dB/

OFFSET
22.0
dB

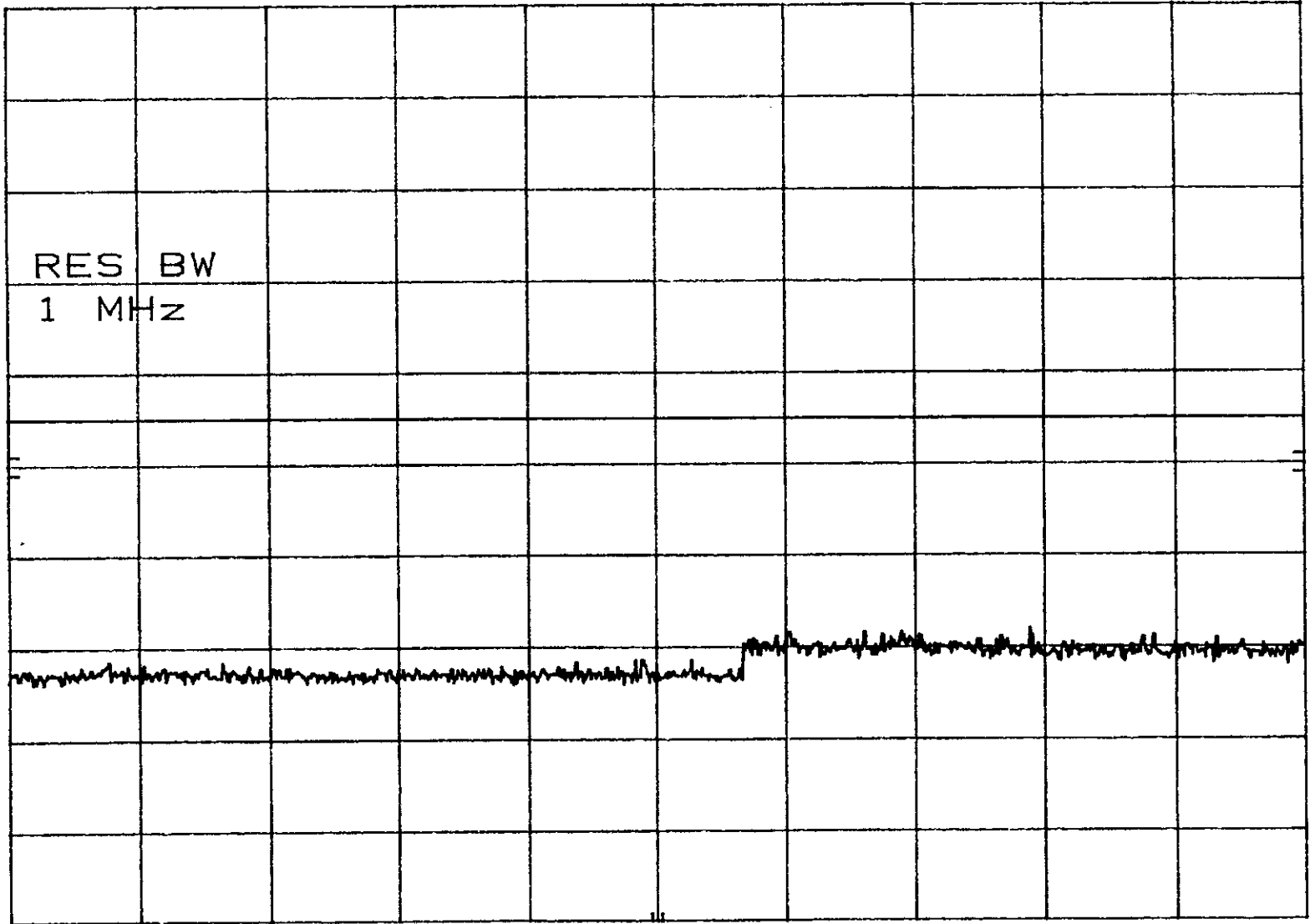
DL
-13.0
dBm

RES BW
1 MHz

START 2.00 GHz
RES BW 1 MHz

VBW 3 MHz

STOP 8.70 GHz
SWP 168 msec



08:51:47 MAR 16, 2001

REL 12.0 dBm

AT 30 dB

MKR Δ 1.975 MHz

-54.36 dB

PEAK

LOG

10

dB/

MARKER

NORMAL

MARKER

Δ

MARKER Δ
1.975 MHz
-54.36 dB

MARKER

AMPTD

SELECT

1 2 3 4

VA SB

SC FC

CORR

MARKER 3

ON OFF

More

1 of 2

CENTER 893.000 MHz

#RES BW 30 kHz

SPAN 5.000 MHz

SWP 50.0 msec

#VBW 10 kHz

08:48:45 MAR 16, 2001

17

REF 12.0 dBm

AT 30 dB

MKR Δ 1.975 MHz

-47.43 dB

PEAK

LOG

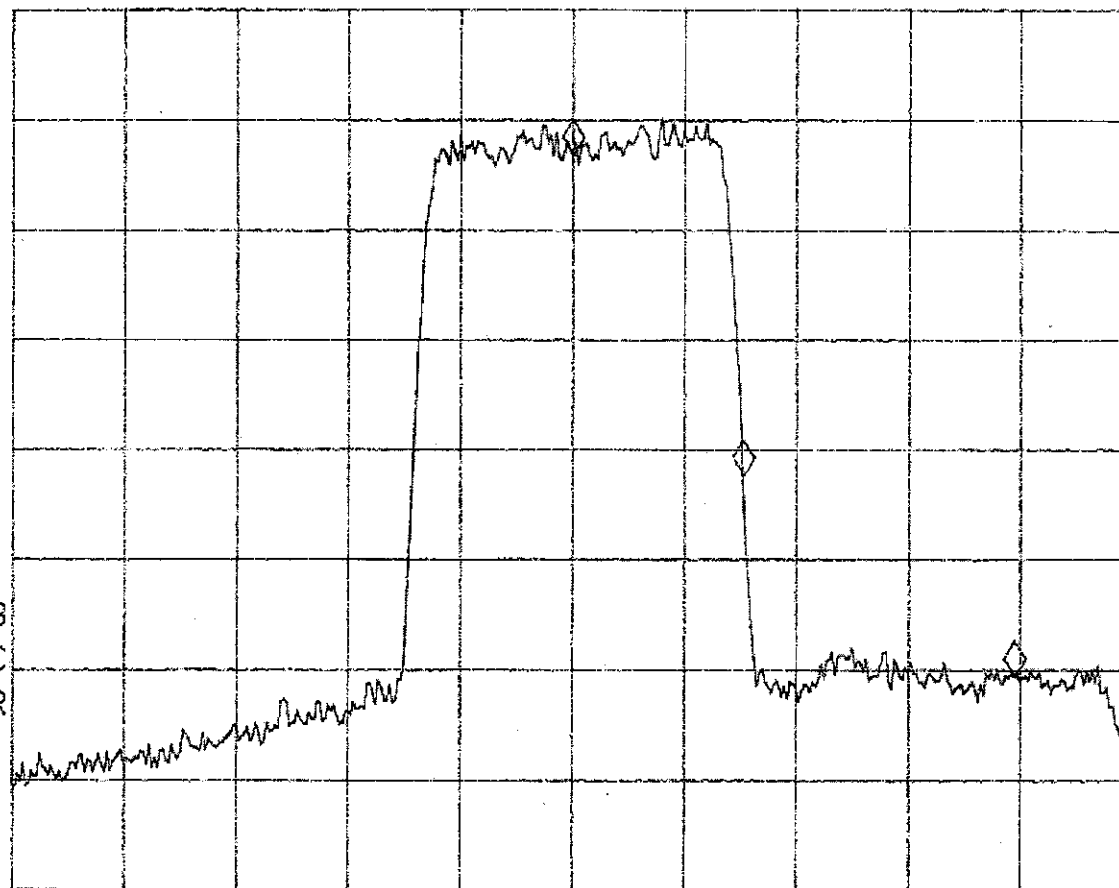
10

dB/

VA SB

SC FC

CORR



CENTER 869.975 MHz

#RES BW 30 kHz

#VBW 10 kHz

SPAN 5.000 MHz

SWP 50.0 msec

08:36:01 MAR 16, 2001

HP

REF 12.0 dBm

AT 30 dB

MKR Δ 1.975 MHz

-55.91 dB

PEAK

LOG

10

dB/

COPY DEV
PRNT PLT

Plot
Config

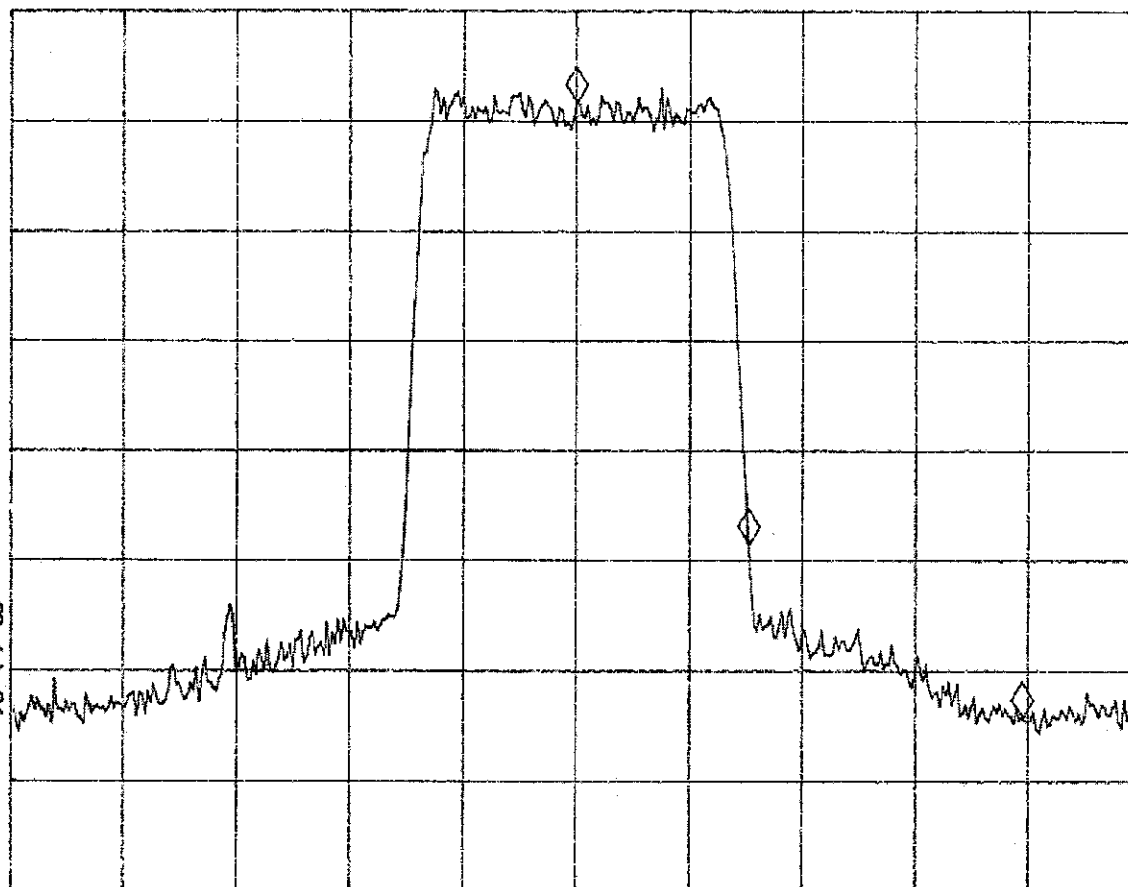
Print
Config

Time
Date

Change
Prefix

More
1 of 3

VA SB
SC FC
CORR



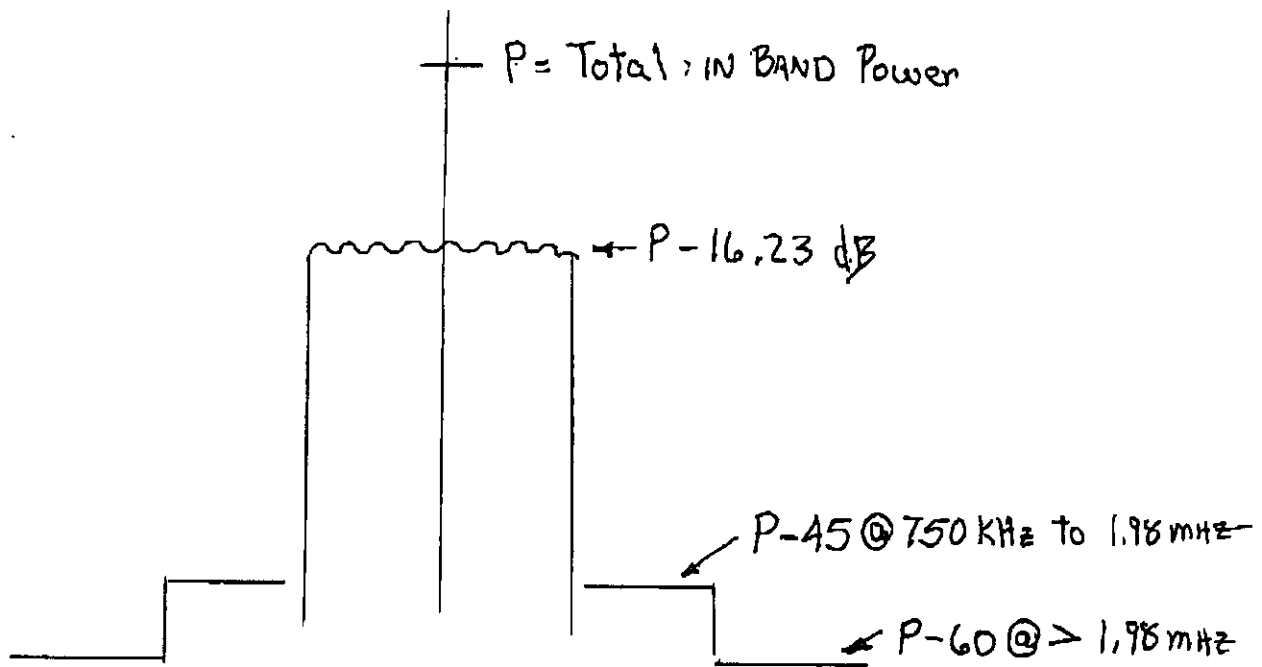
CENTER 881.250 MHz

#RES BW 30 kHz

SPAN 5.000 MHz

#VBW 10 kHz

SWP 50.0 msec



30 KHz Res. Bw
>100 KHz Video Bw

PER TIA/EIA/IS-97

Inter-modulation Test for ADC Inc. Digivance 800 System.

Test Set-up

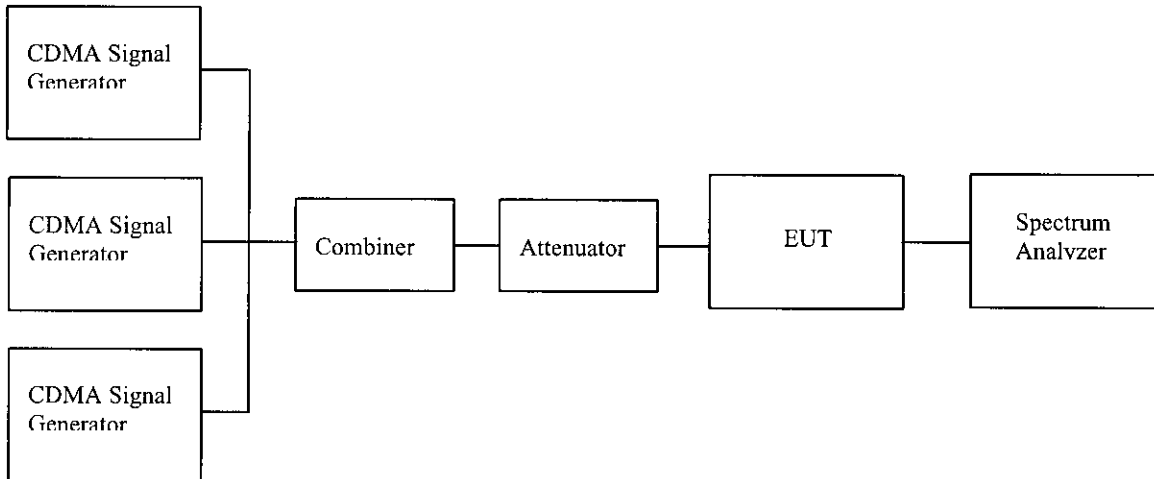


Table 1 Test Equipment

Equipment	MFG/Model	ADC Serial Number	Calibration Due. (NIST)
Dual Output CDMA Signal Generator	Noise.com/UFX-CDMA	MC27639	June 01
Signal Generator	HP/HP8921A	MC27526	Sept 01
CDMA Adapter	HP/HP83203B	MC27525	Sept 01
Combiner	MiniCircuits/ZC2PD-900	9433-05	Nov 01
Attenuator	Alan/50SDV59-1682	87269	Nov 01
Spectrum Analyzer	HP/HP8594E	MC27731	March 01

Results: Spurious Emission limit = -13 dBm

Pass (see plots)

Figure 1 Passband Intermod. Plot

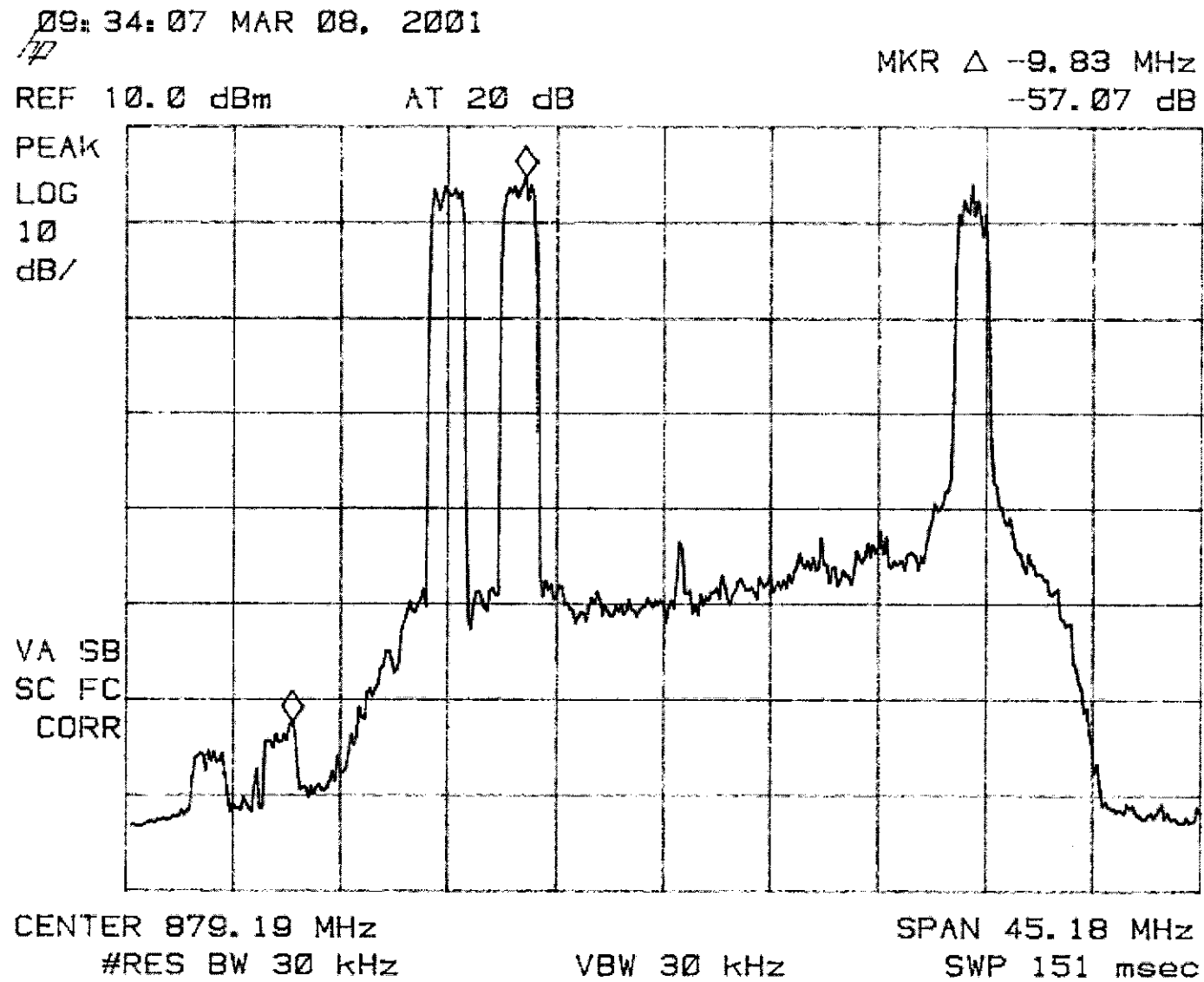


Figure 2 Wide Spectrum Intermod. Plot

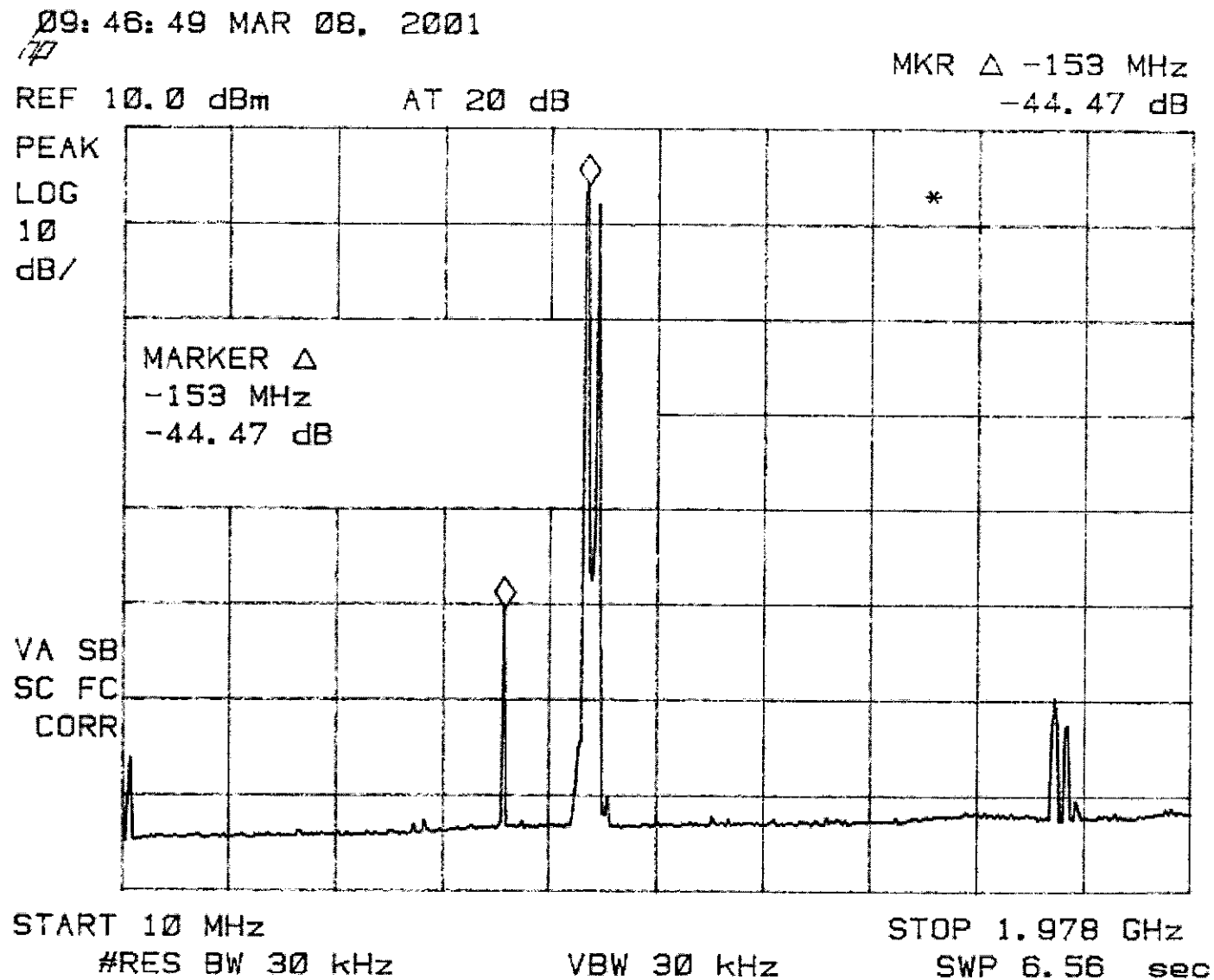
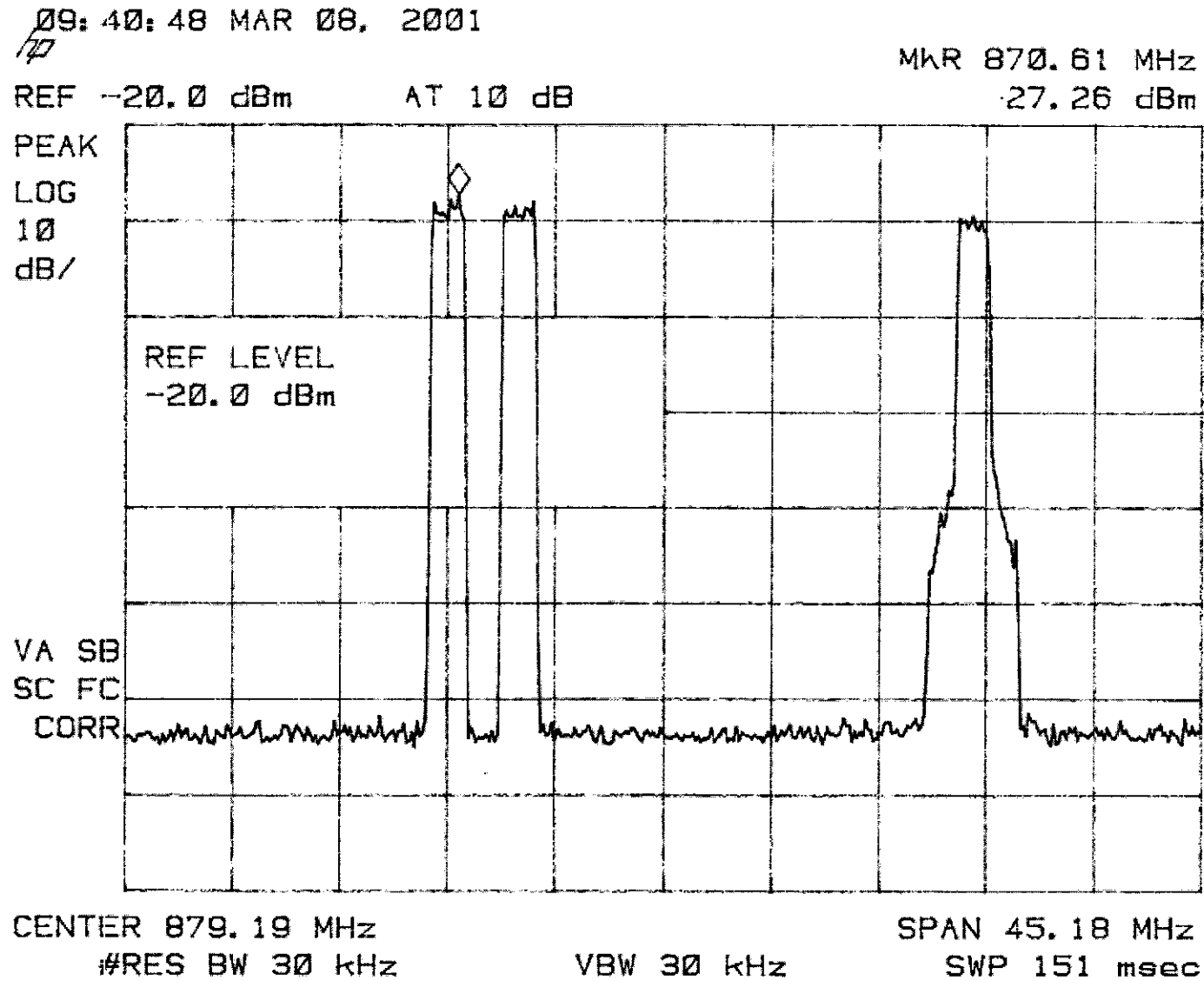


Figure 3 CDMA Input Signals



A radiated emission scan was also made with the EUT's antenna replaced with a termination to demonstrate case radiation compliance to the -13 dBm requirement at the 3 carrier frequencies. Radiated emissions from the EUT are measured in the frequency range of 30 to 9000 MHz using a spectrum analyzer and appropriate broadband linearly polarized antennas. Measurements between 30 MHz and 1000 MHz are made with 120 kHz/6 dB bandwidth and quasi-peak detection and measurements above 1000 MHz are made with a 1 MHz/6 dB bandwidth and peak detection. Table top equipment is placed on a 1.0 X 1.5 meter non-conducting table 80 centimeters above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. Interface cables that are closer than 40 centimeters to the ground plane are bundled in the center in a serpentine fashion so they are at least 40 centimeters from the ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screen room located outside the test area. The antenna is positioned 10 meters horizontally from the EUT. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 meters, measurement scans are made with both horizontal and vertical antenna polarizations and the EUT are rotated 360 degrees. The field strength levels were measured per ANSI C63.4. The EUT is then replaced with a tuned dipole antenna (below 1 GHz) or horn antenna (above 1 GHz). The substitute antenna was placed in the same polarization as the test antenna. A signal generator was used to generate a signal level that matched the level measured from the EUT. The signal generator level minus the cable loss from the signal generator to the substitute antenna plus the substitute antenna gain equals the spurious power level. The 10 highest frequencies are listed below.

Frequency MHz	dBuV/m(from EUT)	Substitution power level - dBm
355	63.8	-27.3
2840	57.6	-33
497	57.5	-33
893.9	57	-33
639	55.3	-35
781	55.2	-35
1420	55.2	-35
2201	54.0	-36
4260	53.2	-37
426	53.1	-37

Equipment Under Test (EUT) Test Operation Mode - Emission tests :

The device under test was operated under the following conditions during emissions testing:

- ☐ - Standby
- ☐ - Test program (H - Pattern)
- ☐ - Test program (color bar)
- ☐ - Test program (customer specific)
- ☐ - Practice operation
- ☒ - Normal Operating Mode
- ☐ - _____

Configuration of the device under test:

The following peripheral devices and interface cables were connected during the measurement:

- | | |
|--|----------------|
| ☐ - _____ | Type : _____ |
| ☐ - _____ | Type : _____ |
| ☐ - _____ | Type : _____ |
| ☐ - _____ | Type : _____ |
| ☐ - _____ | Type : _____ |
| ☐ - _____ | Type : _____ |
| ☐ - _____ | Type : _____ |
| ☐ - _____ | Type : _____ |
| ☒ - unshielded power cable | |
| ☐ - unshielded cables | |
| ☒ - shielded cables | MPS.No.: _____ |
| ☐ - customer specific cables | |
| ☐ - _____ | |
| ☐ - _____ | |

DEVIATIONS FROM STANDARD:

None

GENERAL REMARKS:**SUMMARY:**

The requirements according to the technical regulations are

■ - met

□ - not met.

The device under test does

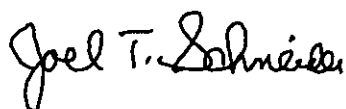
■ - fulfill the general approval requirements mentioned on page 3.

□ - not fulfill the general approval requirements mentioned on page 3.

Testing Start Date: 30 November 2000

Testing End Date: 06 December 2000

- TÜV PRODUCT SERVICE INC -



Reviewed By:
J. T. Schneider



Tested By:
R. M. Johnson