

**MEASUREMENT AND TECHNICAL REPORT**  
**POWERWAVE TECHNOLOGIES**  
2026 McGaw Avenue  
Irvine, CA 92614

**DATE: 20 April 2001**

**This Report Concerns:**      Original Grant: ☒      Class II Change:

**Equipment Type:**      Seahawk 900, Model G3L-900-60

**Deferred grant requested per 47 CFR 0.457(d)(1)(ii)?**      Yes:      No: ☒  
**Defer until:**

*Company Name* **agrees to notify the Commission by:**      N/A  
**of the intended date of announcement of the product so that the grant can be issued on that date.**

**Transition Rules Request per 15.37?**      Yes:      \*No: ☒

*(\*) FCC Part 2, Paragraphs, 2.1046, 2.1051, 2.1053 and Part 90, Paragraph 90.210*

**Report Prepared by:**

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

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## 1.1 Product Description (continued)

### EUT Operating Modes to be Tested

1. Rf applied to reach 75 Watt output

### EUT System Components

Description	Model #	Serial #	FCC ID #
Power amplifier module	G3L-900-60		

### Support Equipment

Description	Model #	Serial #	FCC ID #
HP SIGNAL GENERATOR	E4436B	US39260103	
HP POWER METER	E4419B	GB40201926	
RF CABLES AND CONNECTORS			

### Oscillator Frequencies

Frequency	Derived Frequency	Component # / Location	Description of Use
15 MHz	15 MHz	Y1 MULTIFUNCTION BRD	CLOCK

### Power Line Filters

Manufacturer	Model #	Location in EUT
Spectrum Control	52-978-107-FA3	Multifunction Brd.
Panasonic	ELK-E103FA	Multifunction Brd.

### Critical EMI Components (Capacitors, ferrites, etc.)

Description	Manufacturer	Part # or Value	Qty	Component # / Location
Ferrite	Fair-Rite	2743021447	10	FB1-FB10 / Multifunction brd
Bandpass Filter	Panasonic	ELK-E103FA	1	FL17 / Multifunction Brd.

### EMC Critical Detail

Inductive filters, capacitive filters, noise filters

## 1 GENERAL INFORMATION (continued)

### 1.2 Related Submittal/Grant

None

### 1.3 Tested System Details

The FCC IDs for all equipment, plus descriptions of all cables used in the tested system are:

None

### 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 90, Paragraph 90.210
- 2. Radiated Emissions EN55022: 1992 Class B limit, 30 - 1,000 MHz, 10 meters
- X 3. Radiated Emission per FCC Part 2, Paragraph 2.153
- 4. Engineering evaluations
- 5. Frequency Stability, Part 2, Paragraph 2.995, and Part 87, Paragraph 87.133
- X RF Output Power, Part 2, Paragraph 1.1046, Part 90, Paragraph 90.210

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: 619 546 3999  
Fax: 619 546 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.

## 1.6 Part 2 Requirements

### Equipment Specifications

Frequency range in MHz	Rated RF power output in watts	Frequency tolerance %, Hz, ppm	Emission designator (see 47 CFR §2.201 and §2.202)	Microprocessor model number
935 - 940	75 W		GXW	

**DC voltages** applied to and **dc currents** into the several elements of the final radio frequency amplifying device for normal operation over the power range.

**27 Vdc / 32 A**

**For equipment employing digital modulation techniques...** N/A

**If equipment is an AM broadcast stereophonic exciter-generator:** N/A

## **2. SYSTEM TEST CONFIGURATION**

### **2.1 Justification**

The Seahawk 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 EQUIPMENT/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).

See test setup photos for radiated emissions test setup.

**Low, mid and high channels were tested. All emissions (spurious and harmonics) were greater than 20 dB below the limit. Frequency range investigated from lowest RF frequency generated up to the 10<sup>th</sup> harmonic.**

## 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 EQUIPMENT/DATA**

See following page(s).

**Emissions Test Conditions: CONDUCTED EMISSIONS; INTERMODULATION; INPUT/OUTPUT;  
RF POWER OUTPUT**

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 :**

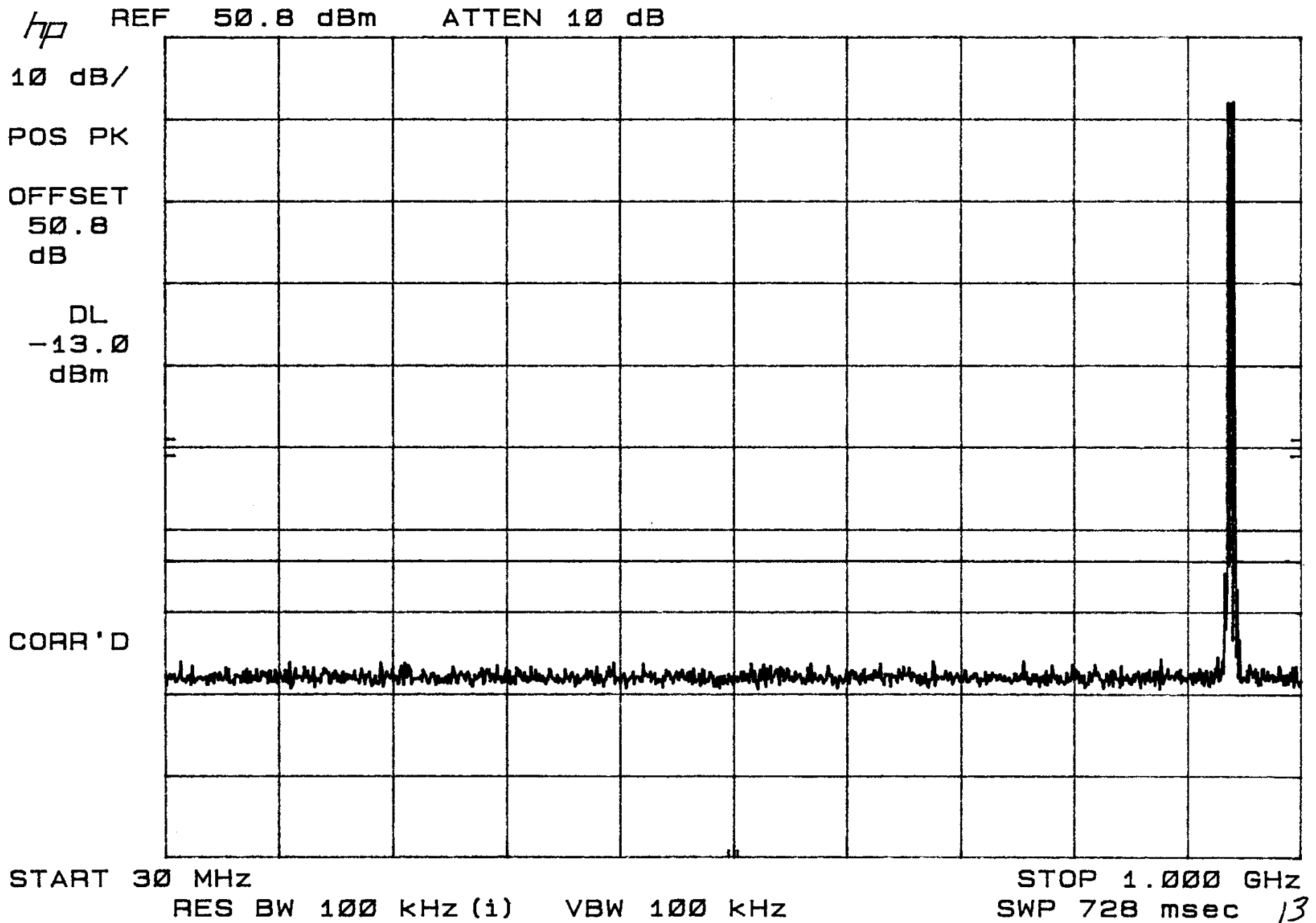
Signal Generator, Agilent, Model E4433B, Cal: 04/01  
Signal Generator, Agilent, Model E4433B, Cal: 08/02  
Signal Generator, Agilent, Model E4436B, Cal: 09/01  
Attenuator , Narda, Model 769-30, verified internally  
Spectrum Analyzer, Model HP8594E, P/N 430, Cal: 05/01  
Power Meter, Agilent, E4419B, Cal 07/01  
Power Sensor, HP8481A; Cal: 07/01  
Directional Coupler, HP, HP778D, verified internally  
30 dB Attenuator, JFW, 50FH-030-100, verified internally  
20 dB Attenuator, BPF, FSY 80212, DC0030, S/N 0003, verified

Remarks: The power output is 75 W as measured by the Agilent power meter. The spectrum analyzer plots are  
added for additional information.

Part 90, 90.210

Conducted Spurious 2.1051

3/26/01



Part 90, 90.210

Conducted Spurious 2.1051

3/26/01

MKR 1.878 GHz

-19.80 dBm

hp

REF 50.8 dBm

ATTEN 10 dB

10 dB/

POS PK

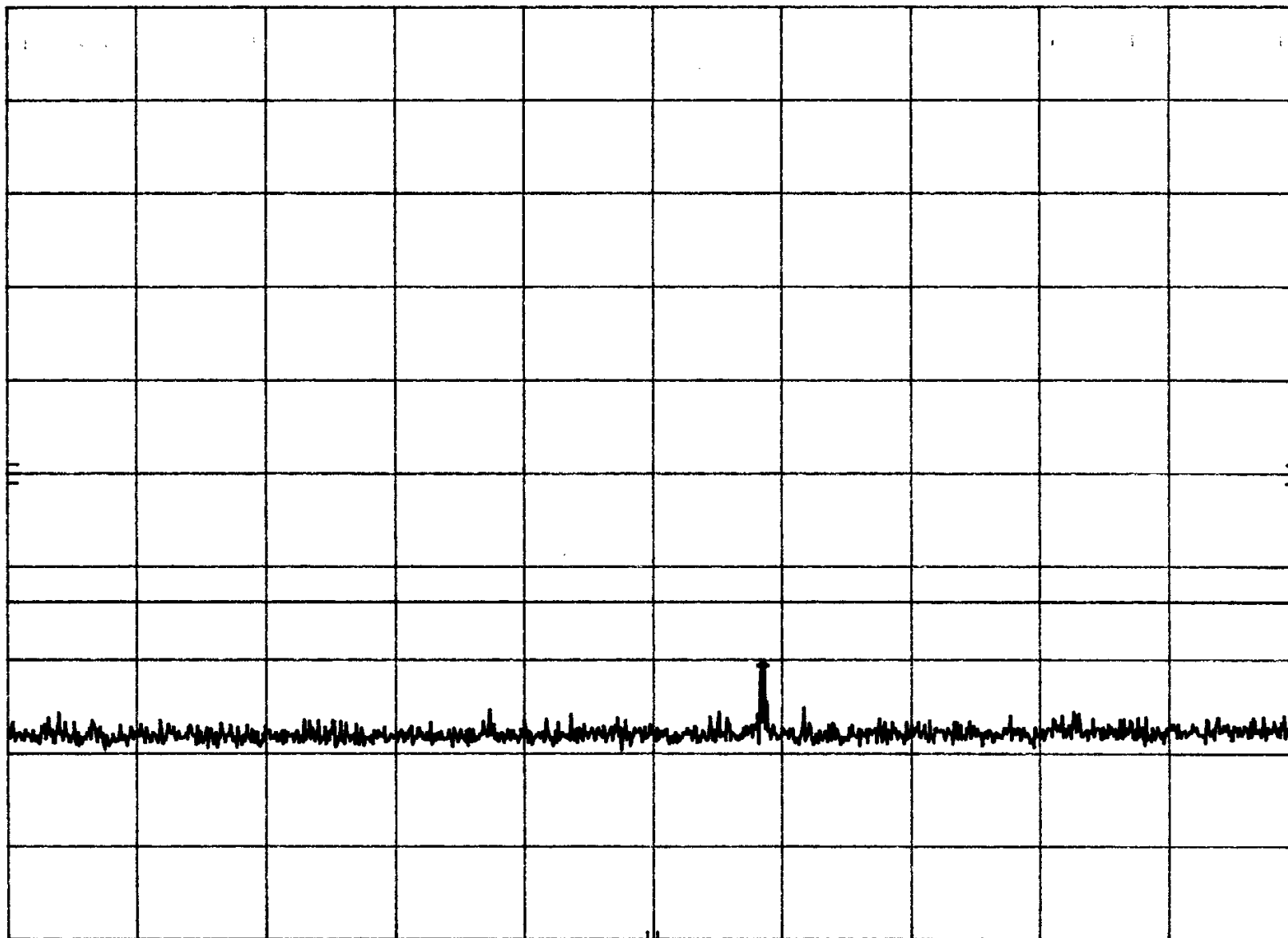
OFFSET

50.8  
dB

DL

-13.0  
dBm

CORR'D



START 1.00 GHz

RES BW 100 kHz (i)

VBW 100 kHz

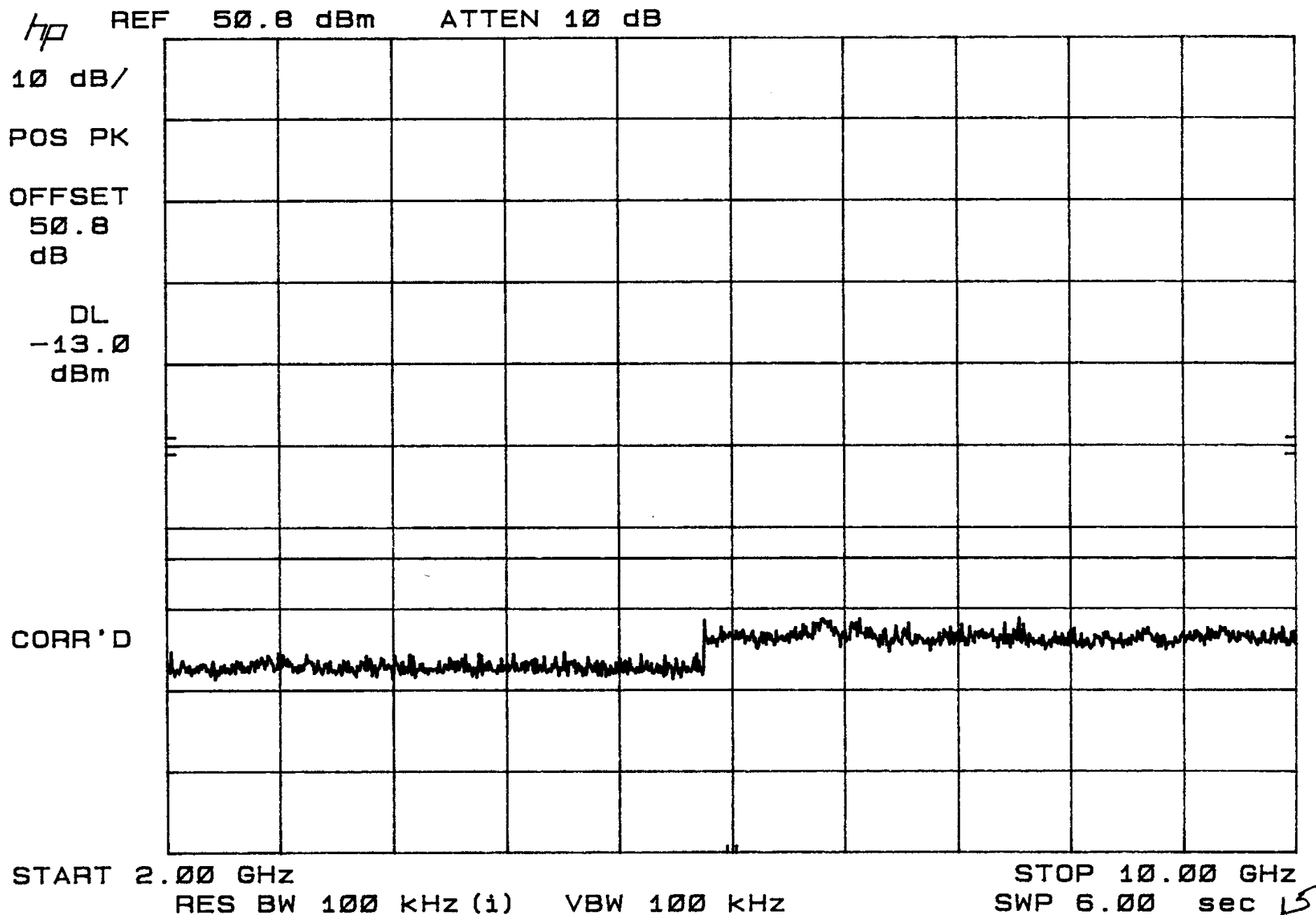
STOP 2.50 GHz

SWP 1.13 sec 14

Part 90, 90.210

Conducted Spurious 2.1051

3/26/01

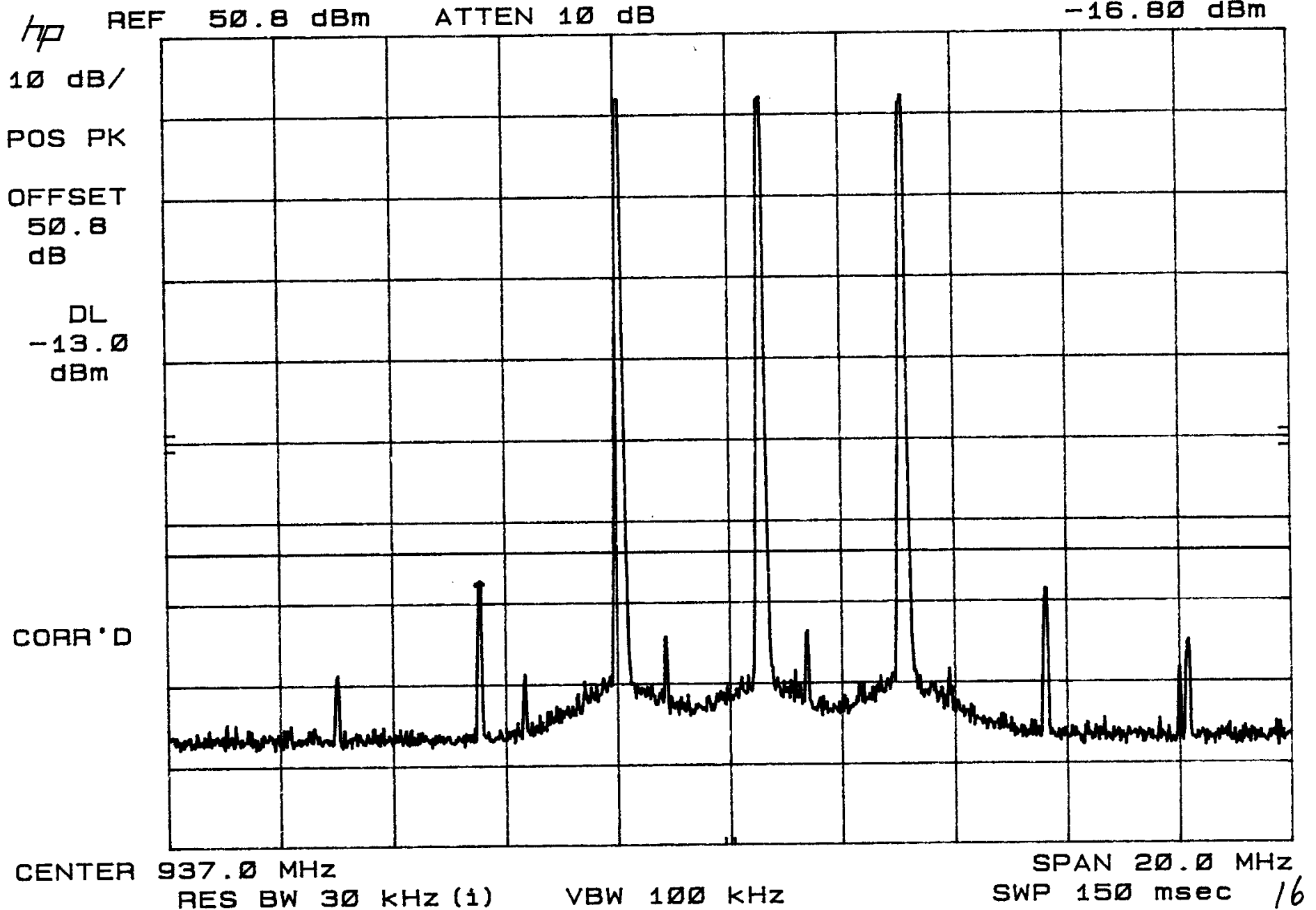


Part 90, 90.210

Conducted Spurious 2.1051

3/26/01

MKR 932.54 MHz  
-16.80 dBm





# 3-TONE Intermodulation

3/26/01

15:14:00 MAR 26, 2001

MKR 930.12 MHz

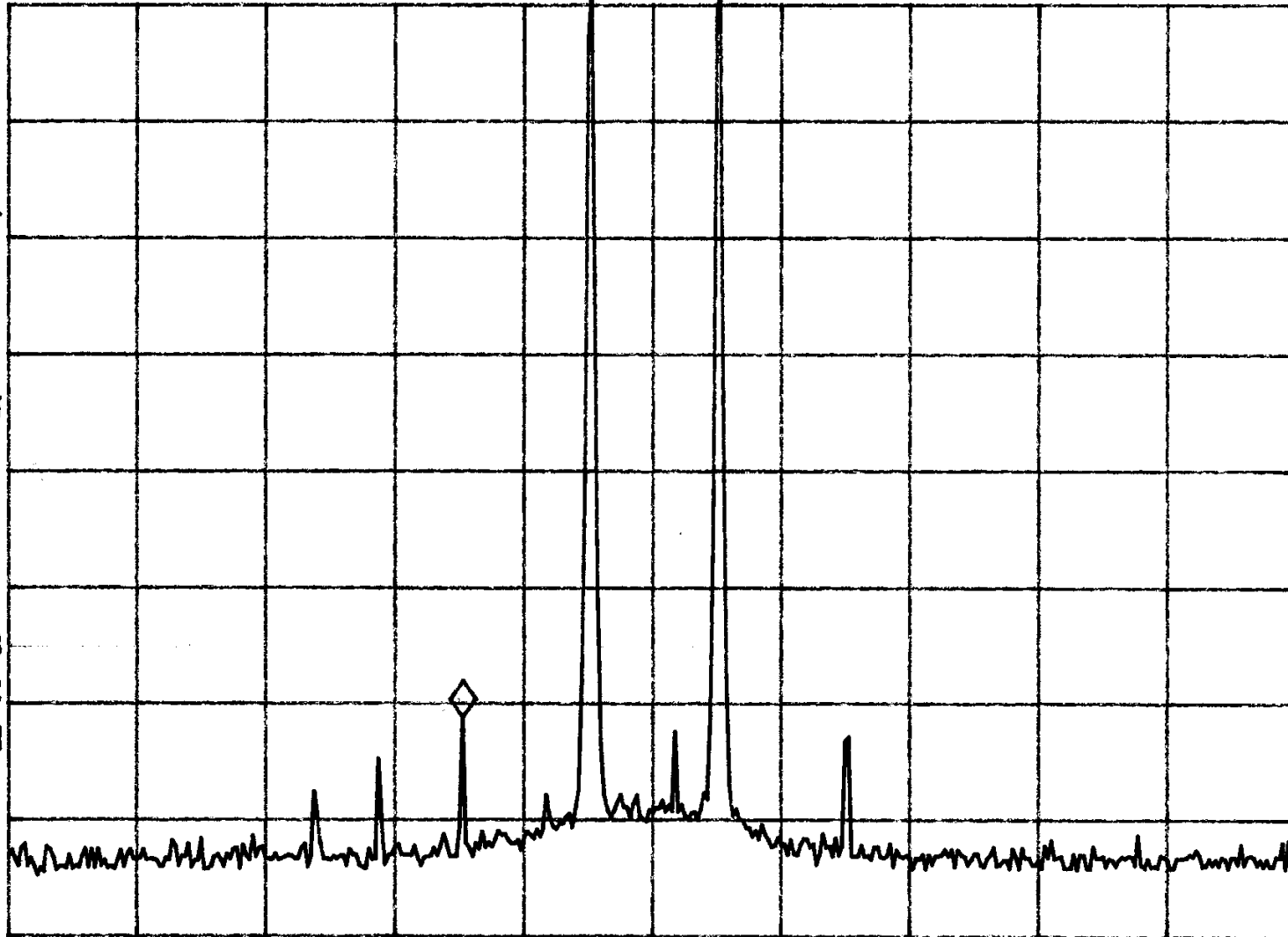
REF 42.0 dBm

AT 10 dB PG -.9 dB

-19.26 dBm

PEAK  
LOG  
10  
dB/  
OFFST  
50.8  
dB  
DL  
-13.0  
dBm

VA SB  
SC FC  
CORR



CENTER 937.50 MHz

#RES BW 30 kHz

#VBW 300 kHz

SPAN 50.00 MHz

#SWP 1.00 sec

RF Output Power  
2.1046

11:04:32 MAR 26, 2001

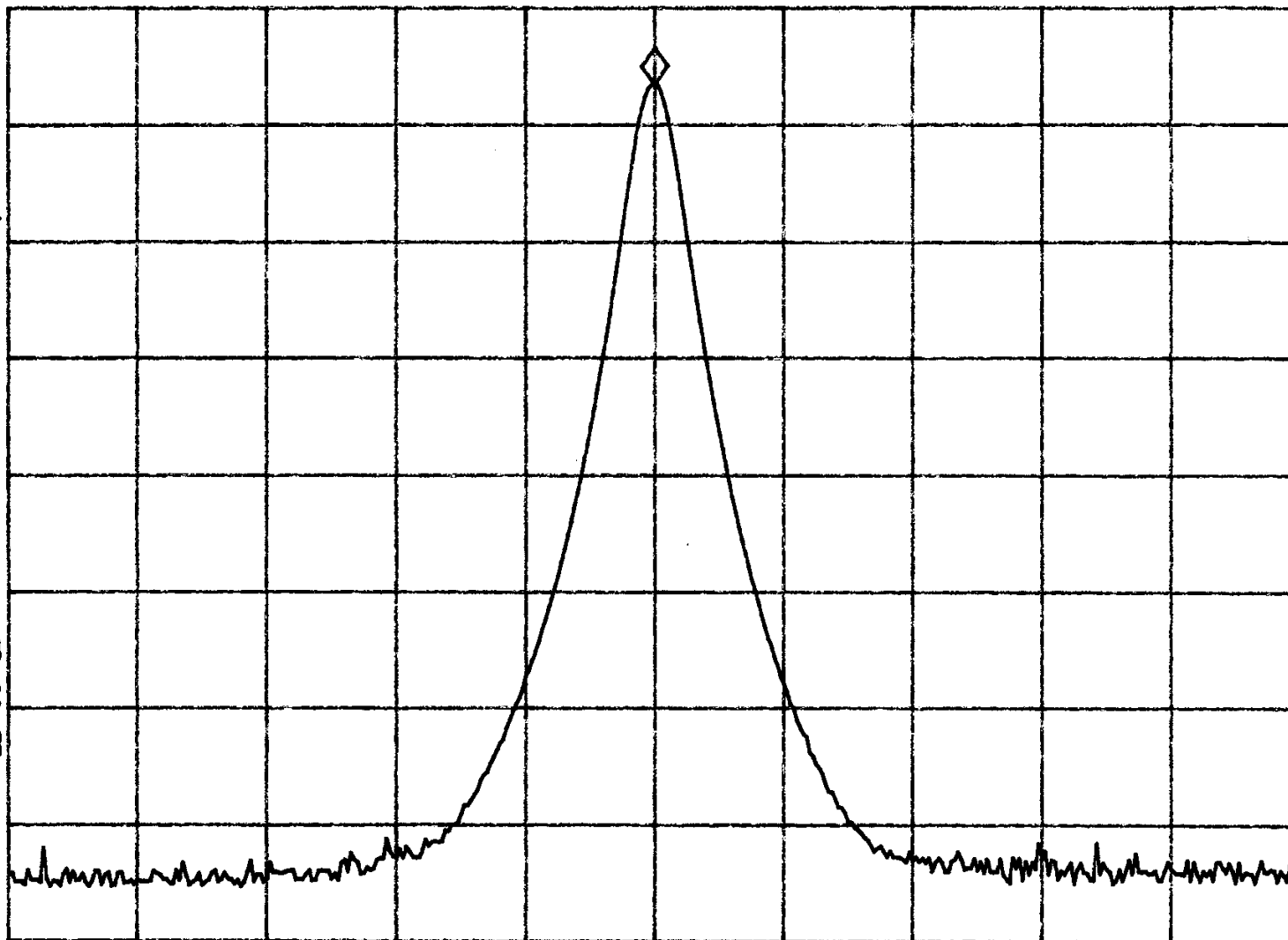
REF 120.2 W AT 10 dB PG -0.9 dB

MKR 935.000 MHz

26.303 W = 44.2 dBm

PEAK  
LOG  
10  
dB/  
OFFST  
50.8  
dB

VA SB  
SC FC  
CORR



CENTER 935.000 MHz

#RES BW 100 kHz

#VBW 300 kHz

SPAN 5.000 MHz

SWP 20.0 msec

18

RF Power Output  
2.1046

15: 45: 40 MAR 26, 2001

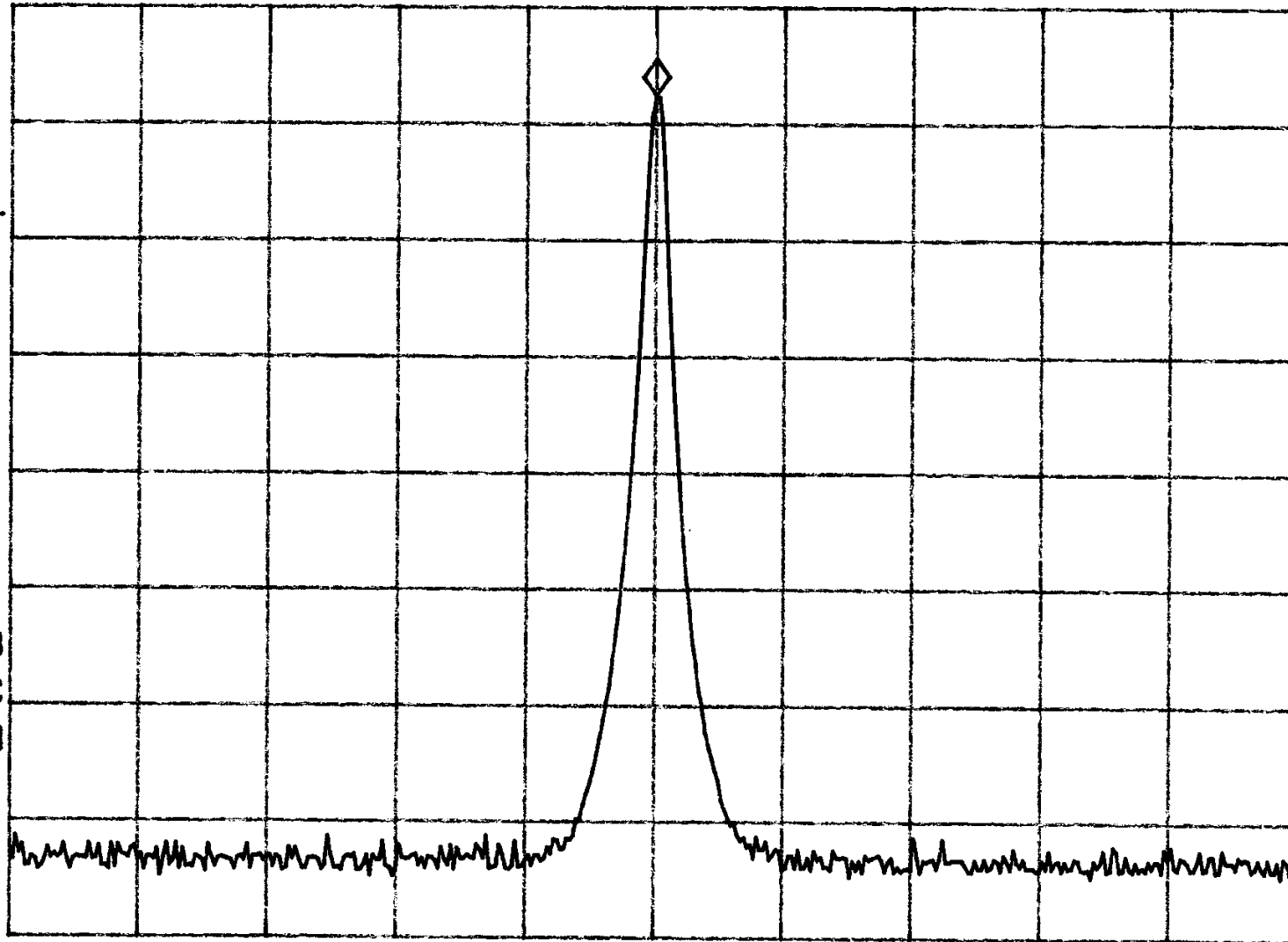
MKR 937.500 MHz

REF 158.5 W AT 20 dB PG -.9 dB

27.733 W = 44.43 dBm

PEAK  
LOG  
10  
dB/  
OFFST  
50.8  
dB

VA SB  
SC FC  
CORR



CENTER 937.500 MHz

#RES BW 30 KHz

SPAN 5.000 MHz

#VBW 300 KHz

#SWP 1.00 sec 19

10:58:49 MAR 26, 2001  
hp

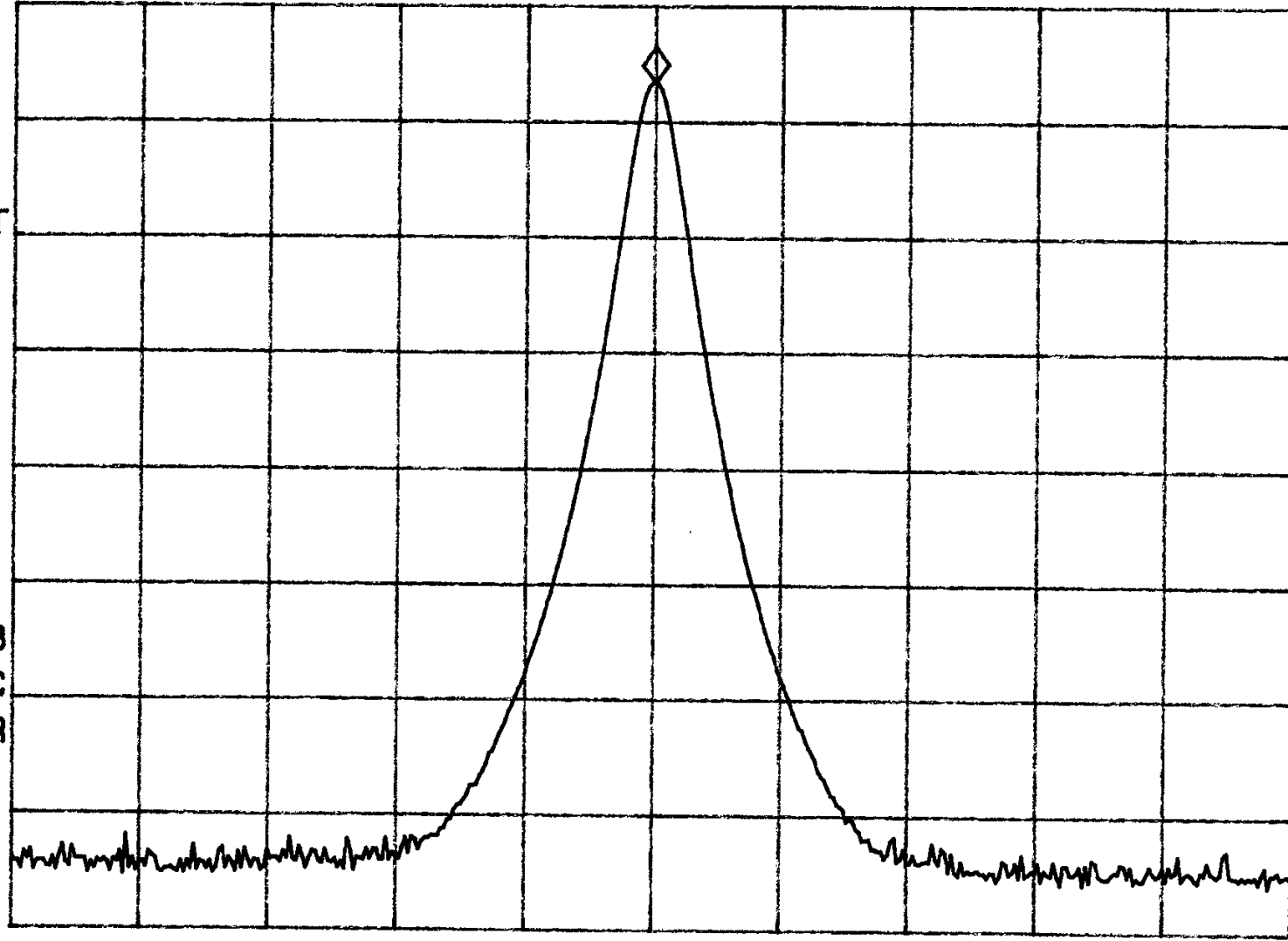
RF Power Output  
2.1046

MKR 940.000 MHz  
25.704 W

REF 120.2 W AT 10 dB PG -0.9 dB

PEAK  
LOG  
10  
dB/  
OFFST  
50.8  
dB

VA SB  
SC FC  
CORR



User  
Menus

N dB PTS  
ON OFF

% AM  
ON OFF

TOI  
ON OFF

Power  
Menu

FFT  
Menu

CENTER 940.000 MHz  
#RES BW 100 kHz

#VBW 300 kHz

SPAN 5.000 MHz  
SWP 20.0 msec

20

# INPUT PLOT

3/26/01

15:37:33 MAR 26, 2001

hp

REF -8.8 dBm

AT 10 dB

MKR 935.000 MHz

-11.50 dBm

PEAK

LOG

10

dB/

DL

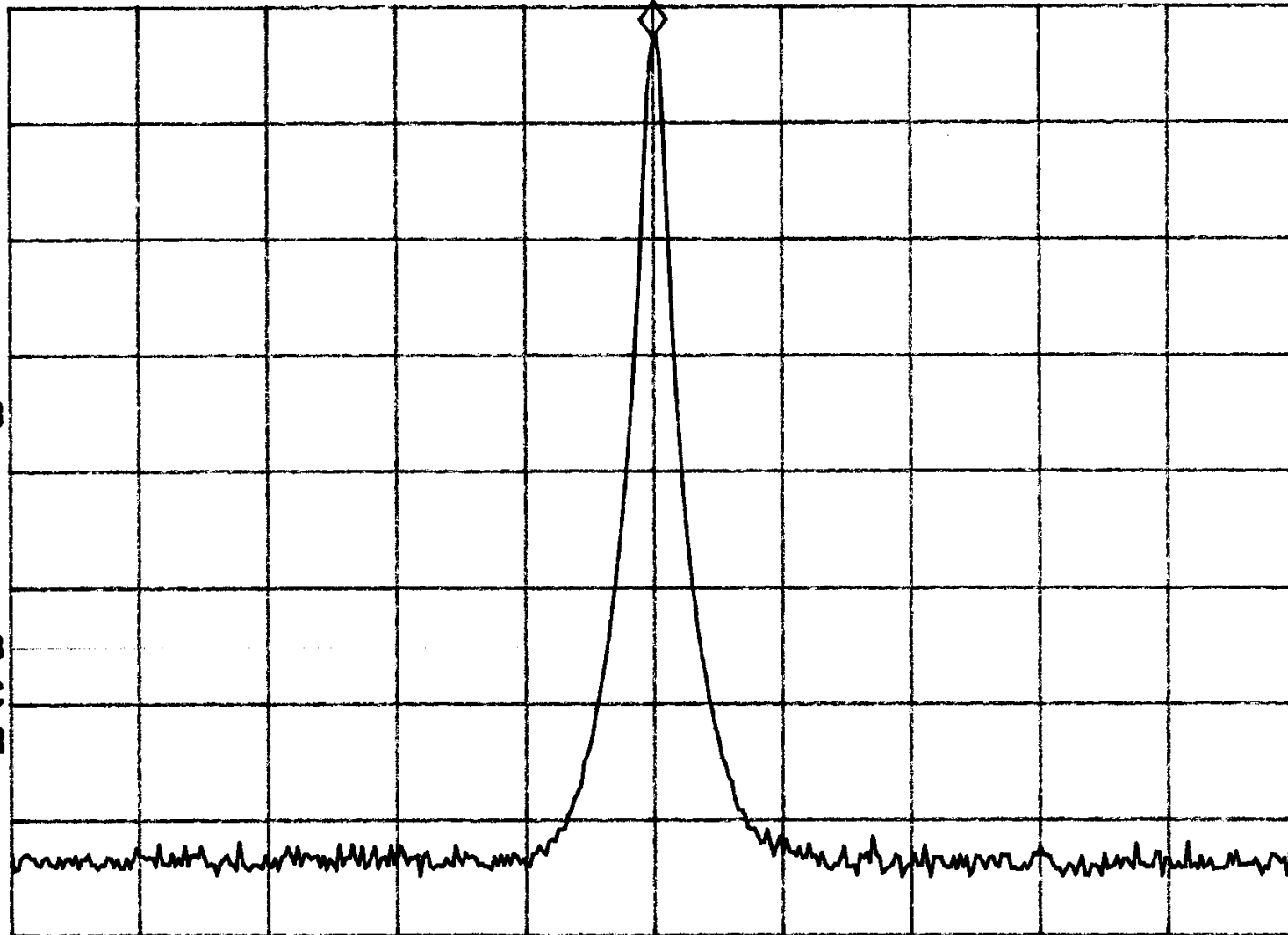
-63.8

dBm

VA SB

SC FC

CORR



CENTER 935.000 MHz

#RES BW 30 KHz

#VBW 300 KHz

SPAN 5.000 MHz

#SWP 1.00 sec

21

# INPUT PLOT

3/26/01

15:37:33 MAR 26, 2001  
HP

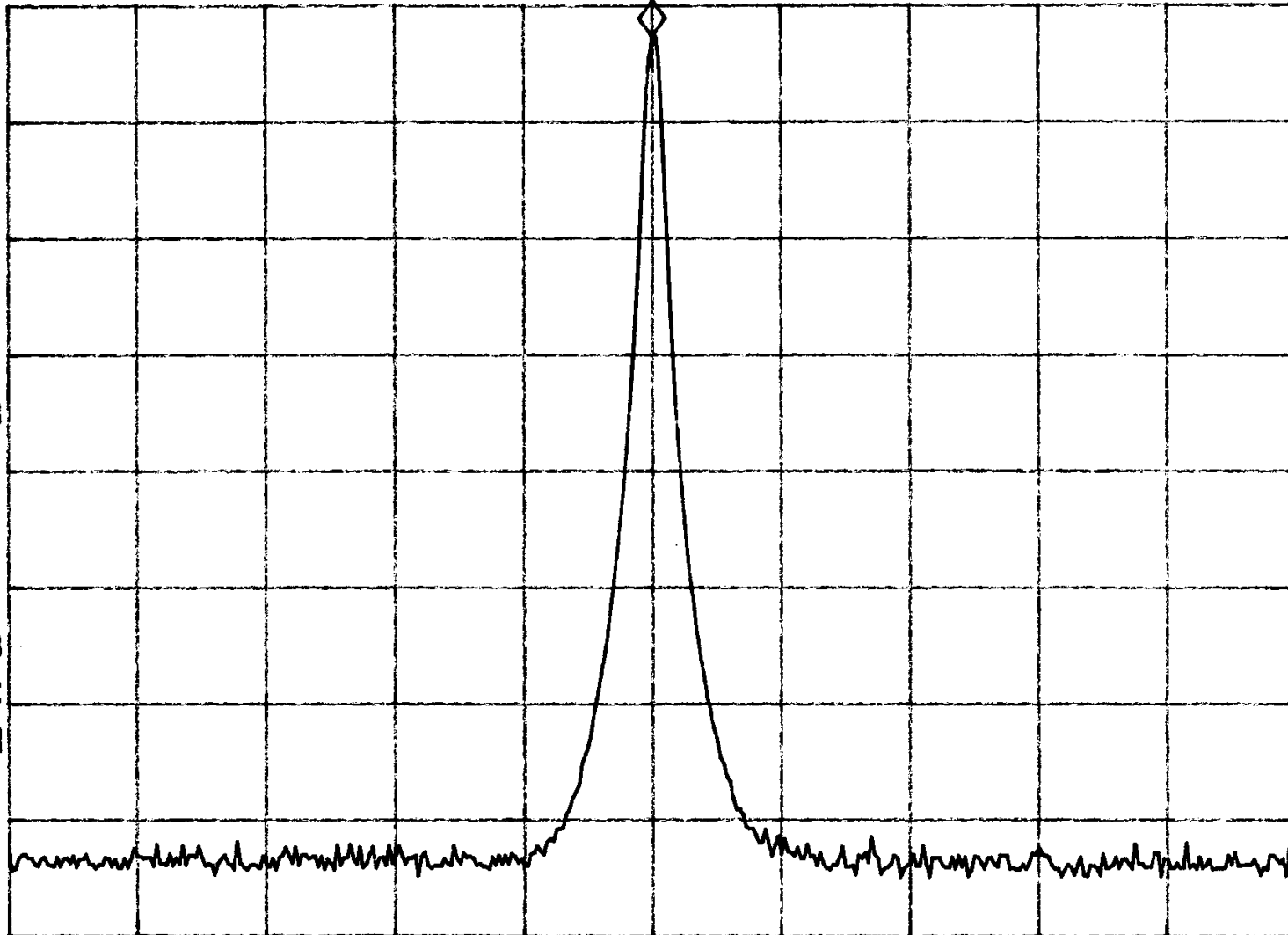
MKR 935.000 MHz  
-11.50 dBm

REF -8.8 dBm AT 10 dB

PEAK  
LOG  
10  
dB/

DL  
-63.8  
dBm

VA SB  
SC FC  
CORR



CENTER 935.000 MHz  
#RES BW 30 KHz

#VBW 300 KHz

SPAN 5.000 MHz  
#SWP 1.00 sec

22

# INPUT PLOT

3/26/01

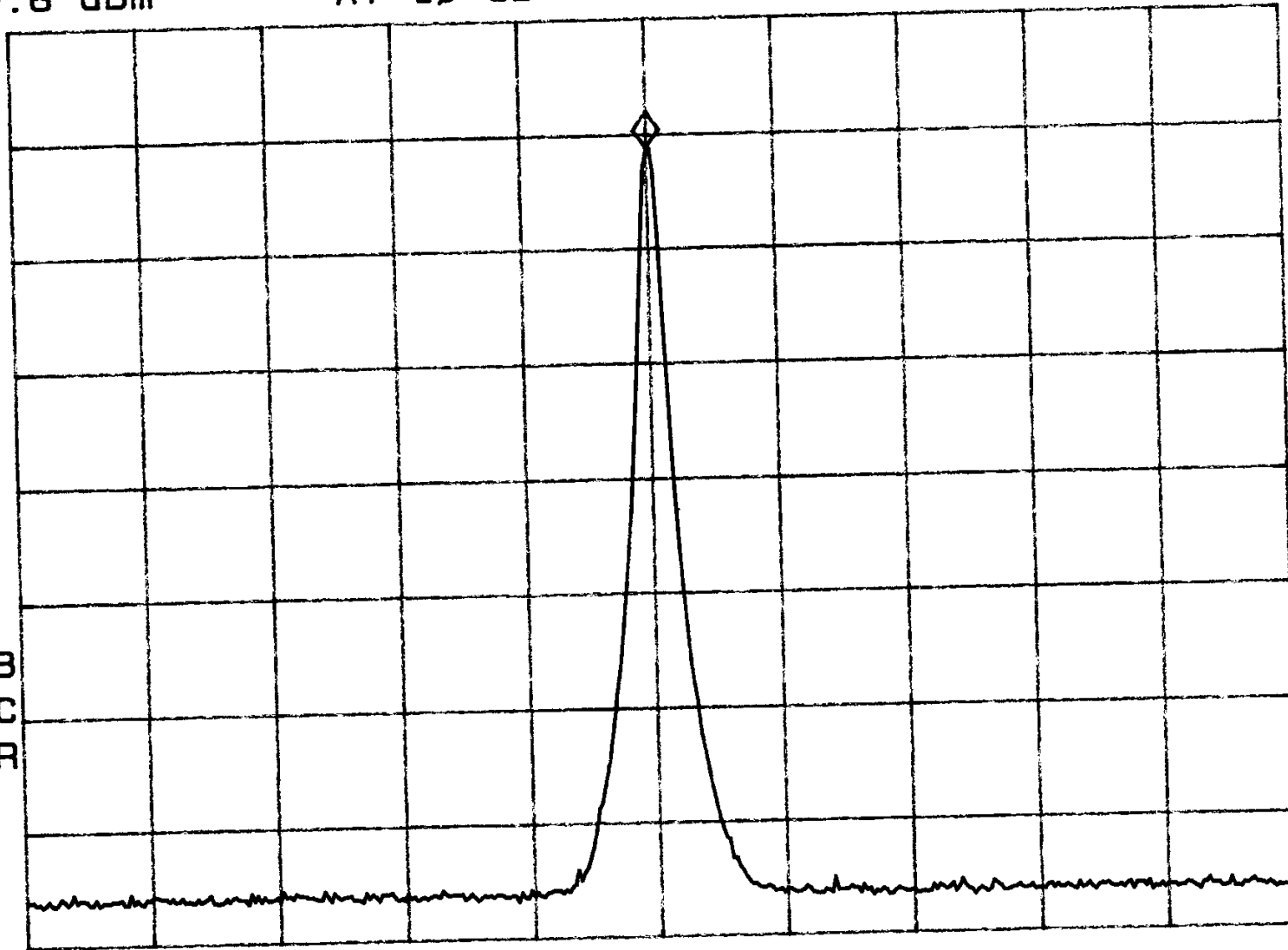
15:55:27 MAR 26, 2001

MKR 937.500 MHz  
-12.02 dBm

REF -.8 dBm AT 10 dB

PEAK  
LOG  
10  
dB/

VA SB  
SC FC  
CORR



CENTER 937.500 MHz  
#RES BW 30 kHz

#VBW 300 kHz

SPAN 5.000 MHz  
#SWP 1.00 sec

23

# Input Plot

3/26/01

15: 40: 21 MAR 26, 2001

MKR 940.000 MHz

REF -8.8 dBm

AT 10 dB

-11.69 dBm

PEAK

LOG

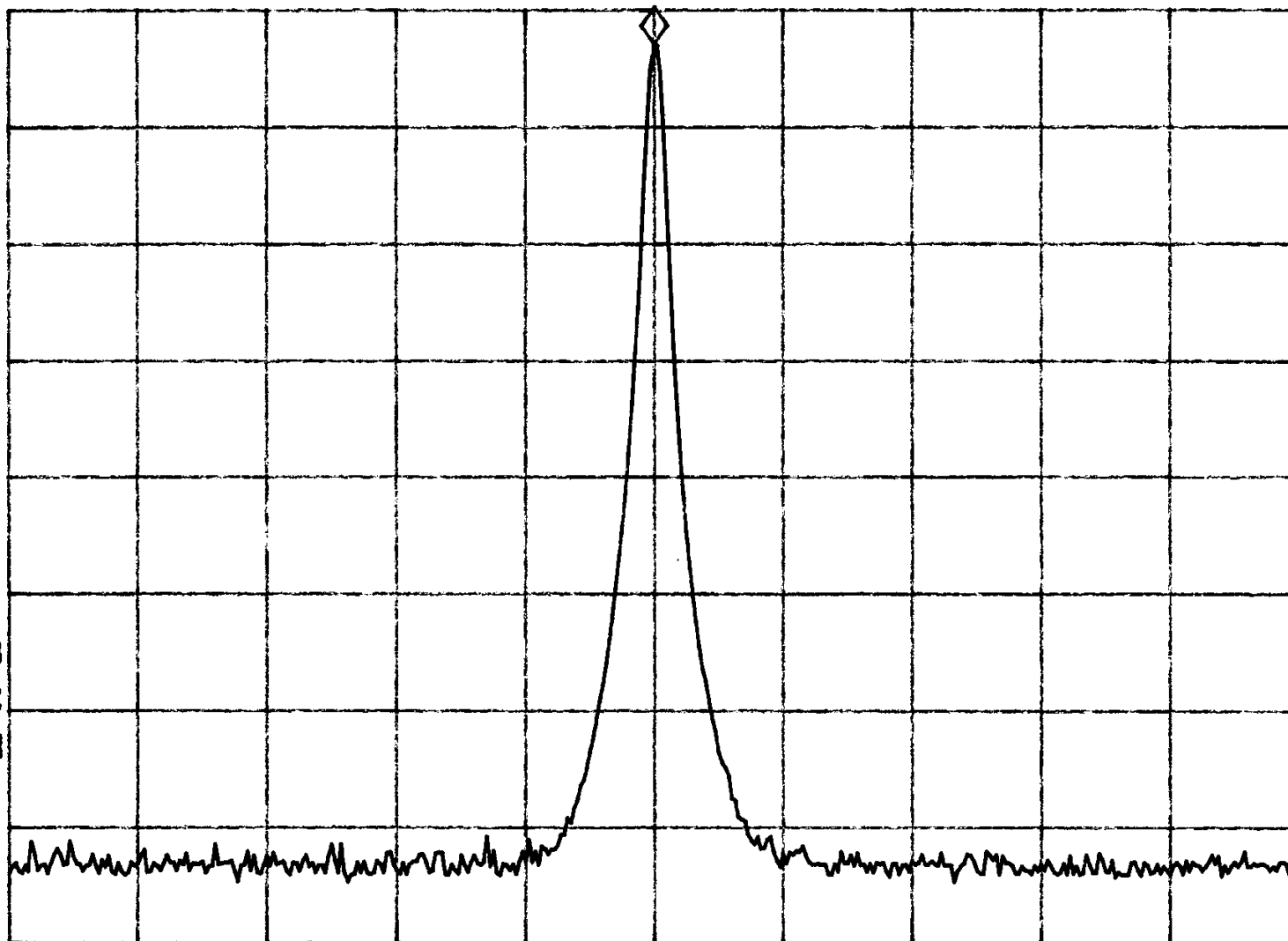
10

dB/

VA SB

SC FC

CORR



CENTER 940.000 MHz

SPAN 5.000 MHz

#RES BW 30 KHz

#VBW 300 KHz

#SWP 1.00 sec

24



**5 ATTESTATION STATEMENT**

**GENERAL REMARKS:**

**SUMMARY:**

All tests according to *FCC Part 2, Paragraphs, 2.1046, 2.1051, 2. 1053 and Part 90, Paragraph 90.210* were .

☒ - Performed

☐ - **Not** Performed

The Equipment Under Test

☒ - **Fulfills** the requirements of *FCC Part 2, Paragraphs, 2.1046, 2.1051, 2. 1053 and Part 90, Paragraph 90.210*.

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

- TÜV PRODUCT SERVICE, INC. -

Responsible Engineer:

A handwritten signature in black ink, appearing to read "Jim Owen". The signature is fluid and cursive, with a large initial "J" and "O".

Jim Owen  
(EMC Engineer)