MEASUREMENT AND TECHNICAL REPORT

POWERWAVE TECHNOLOGIES
2026 McGaw Avenue
Irvine, CA 92614

DATE: 20 April 2001

This Report Concerns:	Original Grant: X	Class II Change:
Equipment Type:	Seahawk 900, Model G3L-900-60	
Deferred grant requested per 47 CFR 0.457(d)(1)(ii)?	Yes: **Defer until:**	No: X
Company Name **agrees to notify the Commission by:** **of the intended date of announcement of the product so that the grant can be issued on that date.**	N/A	
Transition Rules Request per 15.37?	Yes:	*No: X

(*) 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

TABLE OF CONTENTS

1 GENERAL INFORMATION

1.1 Product Description

EUT Description: Multi-channel power Amplifier

EUT Name: Seahawk 900

Model No.: G3L-900-60 Serial No.: --

Product Options: N/A

Configurations to be tested: 75 Watt MAX output

Power Requirements

Voltage: 27 VDC (If battery powered, make sure battery life is sufficient to complete testing.)

# of Phases: N/A

Current (Amps/phase(max)): 27 A Current (Amps/phase(nominal)): N/A

Typical Installation and/or Operating Environment

TELCOM

EUT Power Cable

☐ Permanent OR ☐ Removable Length (in meters): _____

☐ Shielded OR ☐ Unshielded

☒ Not Applicable

EUT Interface Ports and Cables

Interface			Shielding							
Type	Analog / Digital	Qty	Yes / No	Type	Termination	Connector Type	Port Termination	Length (In meters)	Removable / Permanent	
RF IN/OUT / DC POWER	☒ ☐	0	☒ ☐			METALIZED D-SUB	RF CONNECTIONS / DC POWER		☐ ☒	

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 10th 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:

Corrected Meter Reading Limit (CMRL) = SAR + AF + CL - AG - 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:

CMRL = 29.4 dBuV + 9.2dB = 1.4 dB - 20 dB/M - 0.0 dB

CMRL = 20.0 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

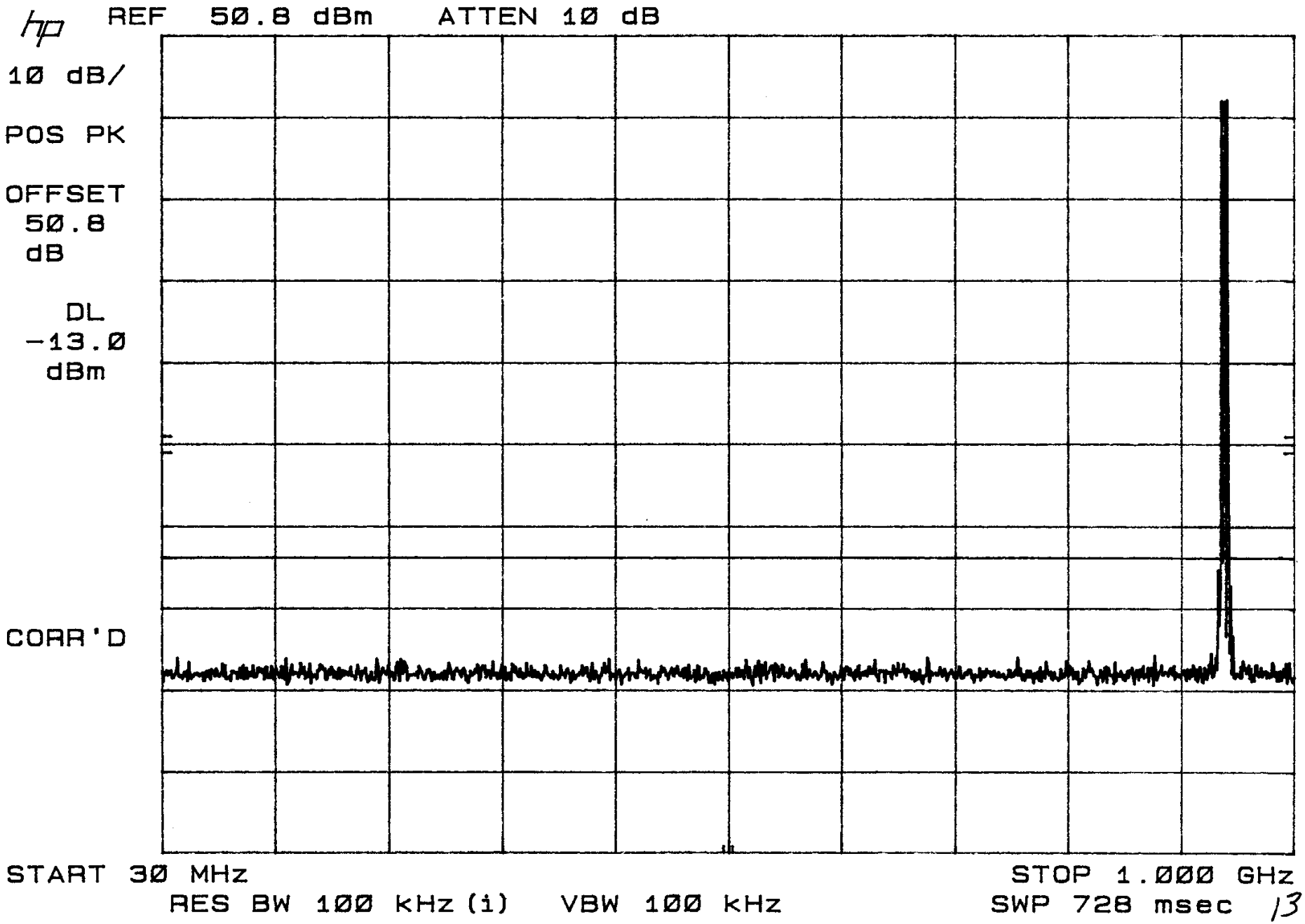
Test Equipment Used :

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.

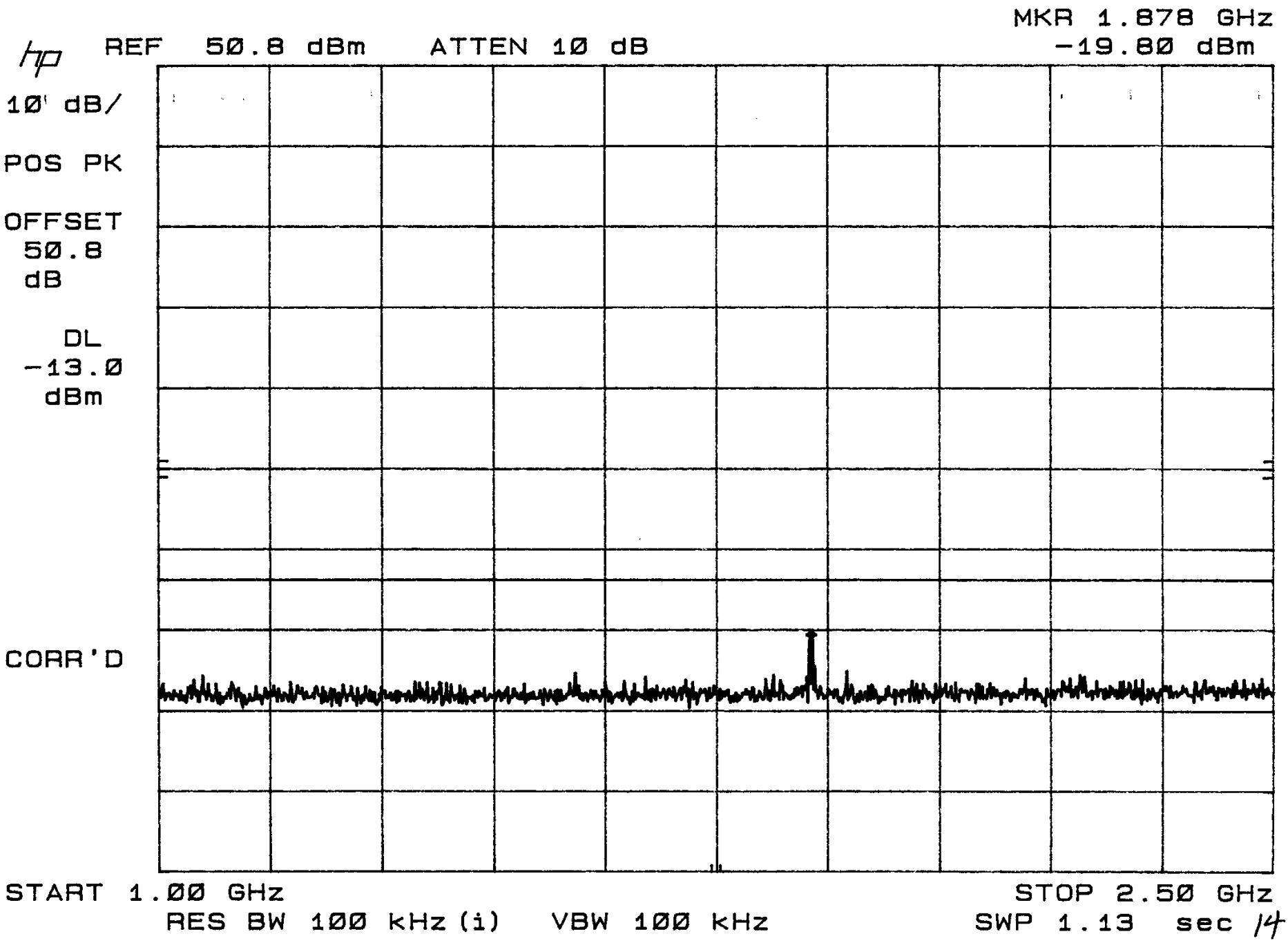
Part 90, 90.210 Conducted Spurious 2.1051

3/26/01



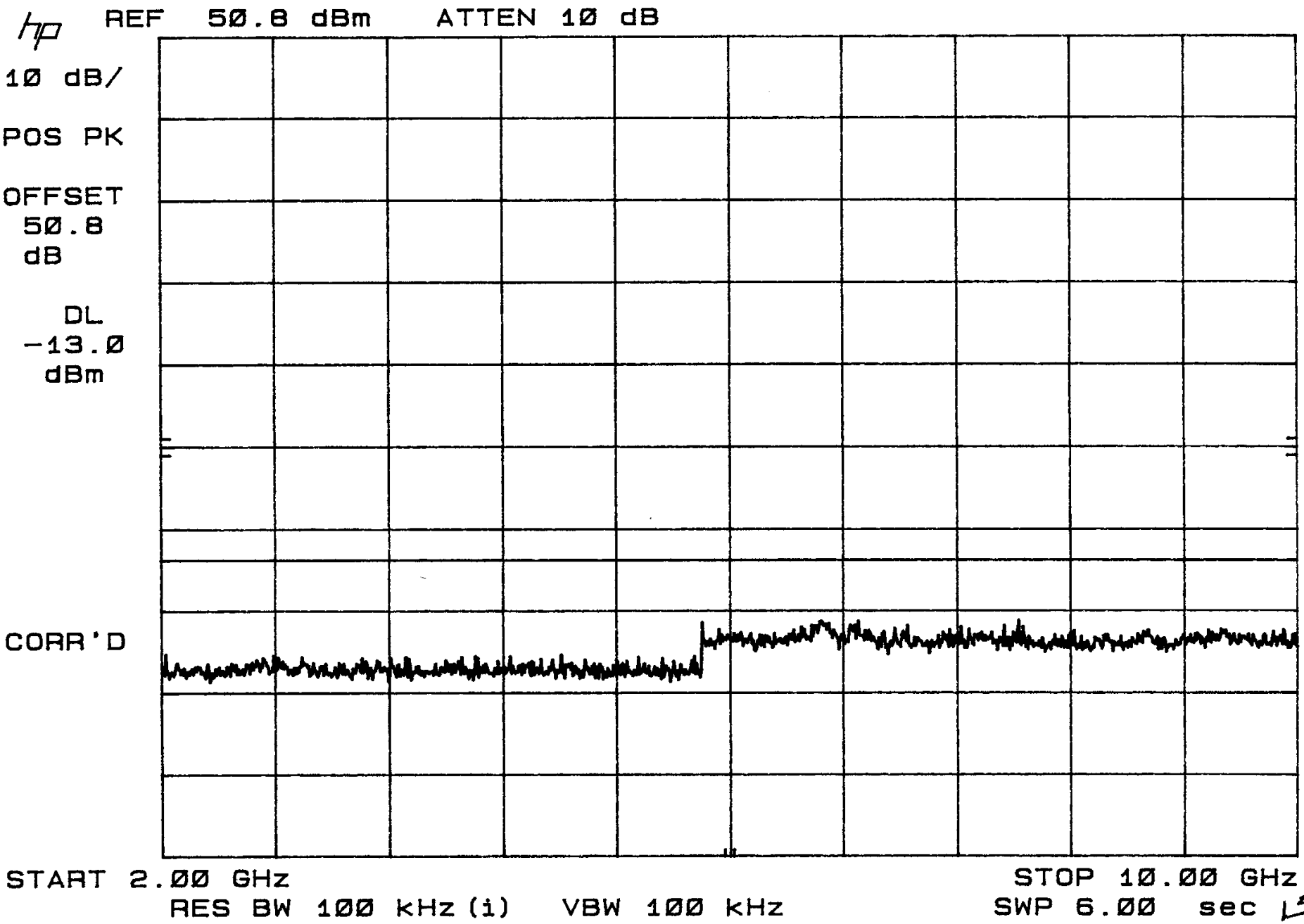
13

Part 90, 90.210 Conducted Spurious 2.1051 3/26/01



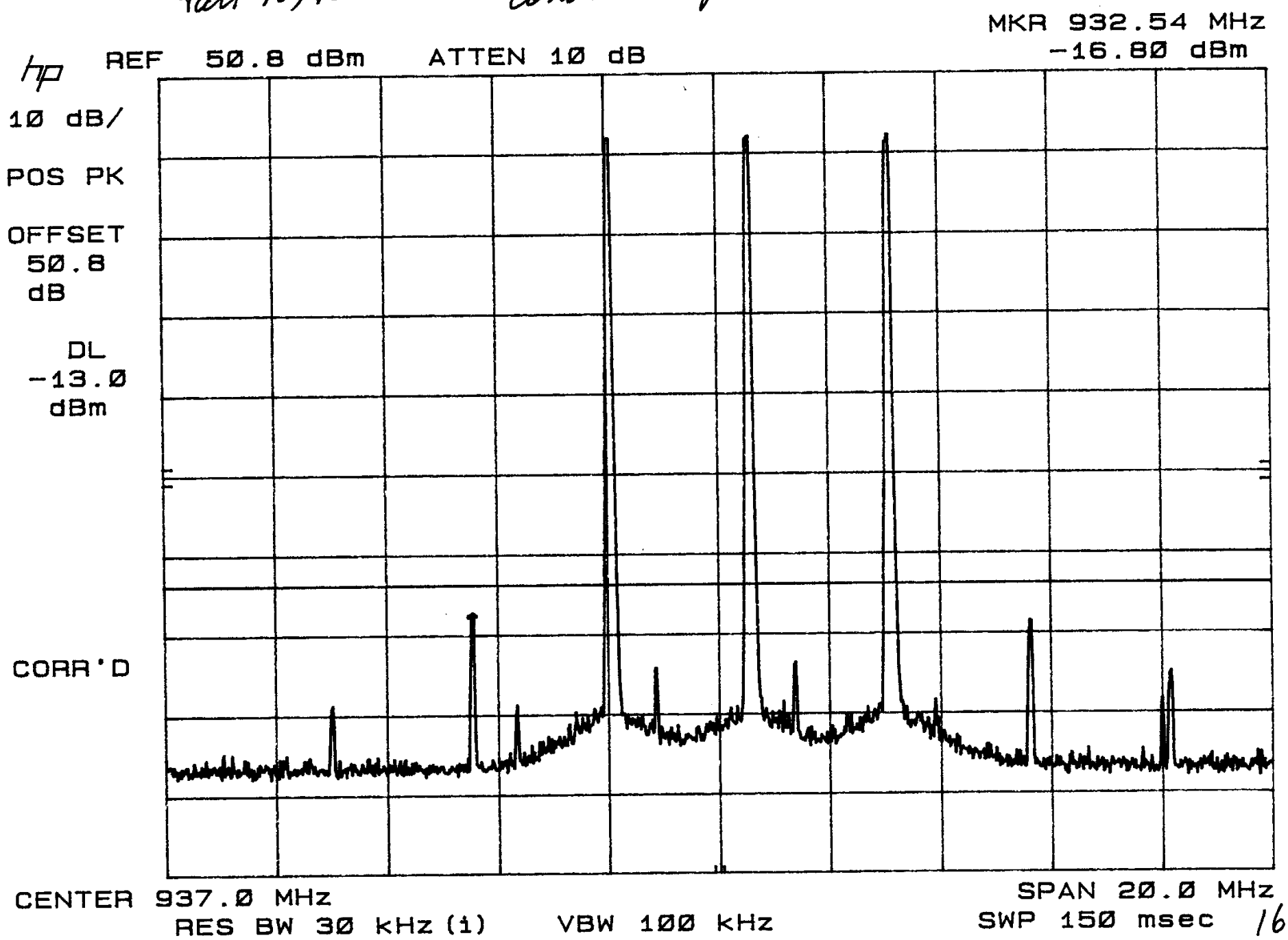
14

Part 90, 90.210 Conducted Spurious 2.1051 3/26/01



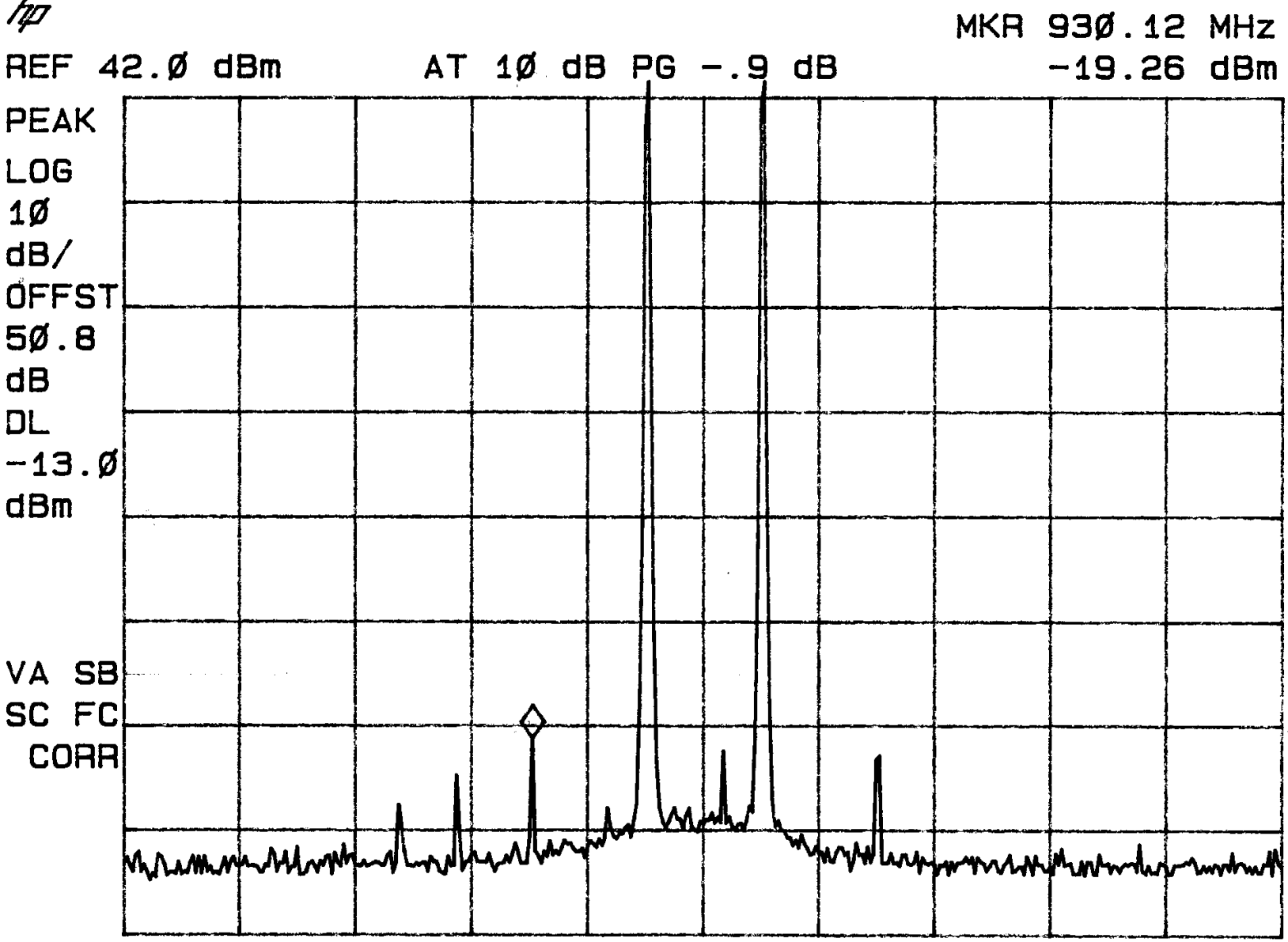
15

Part 90, 90.210 Conducted Spurious 2.1051 3/26/01



16

3 - TONE Intermodulation 3/26/01



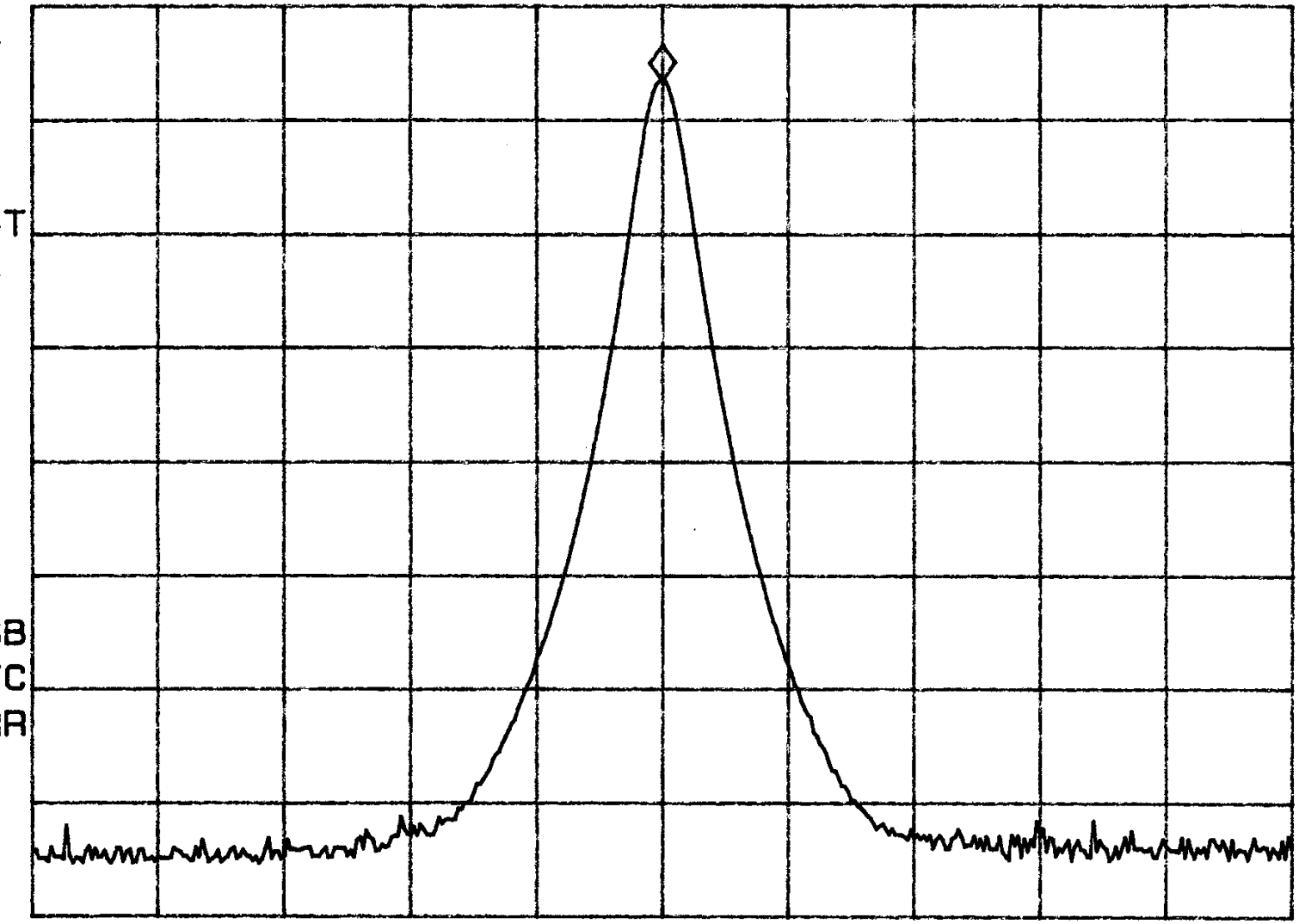
17

RF Output Power
2.1046

11: Ø4: 32 MAR 26, 2ØØ1

MKR 935.ØØØ MHz

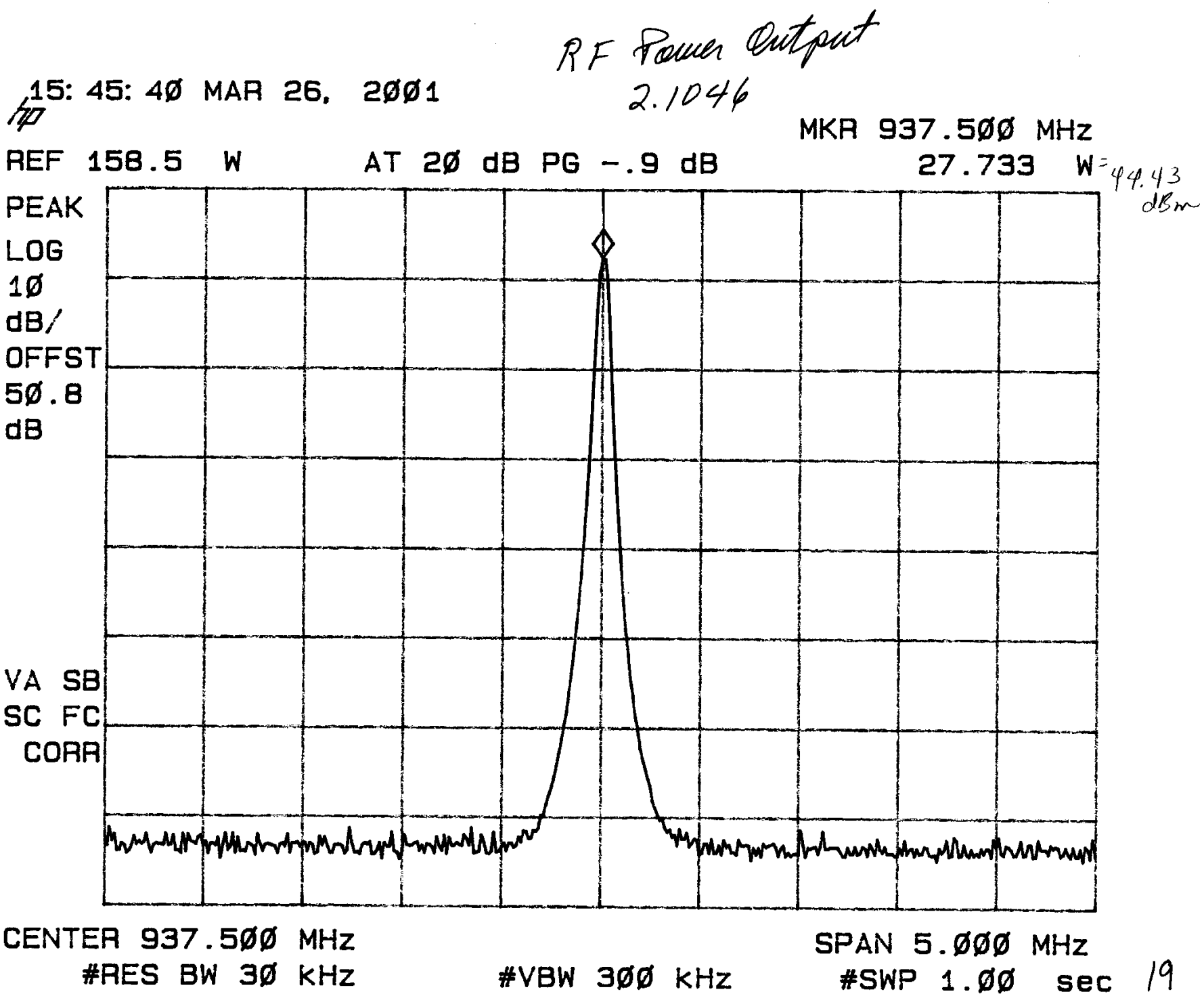
REF 12Ø.2 W AT 1Ø dB PG -.9 dB 26.3Ø3 W = 44.2 dBm

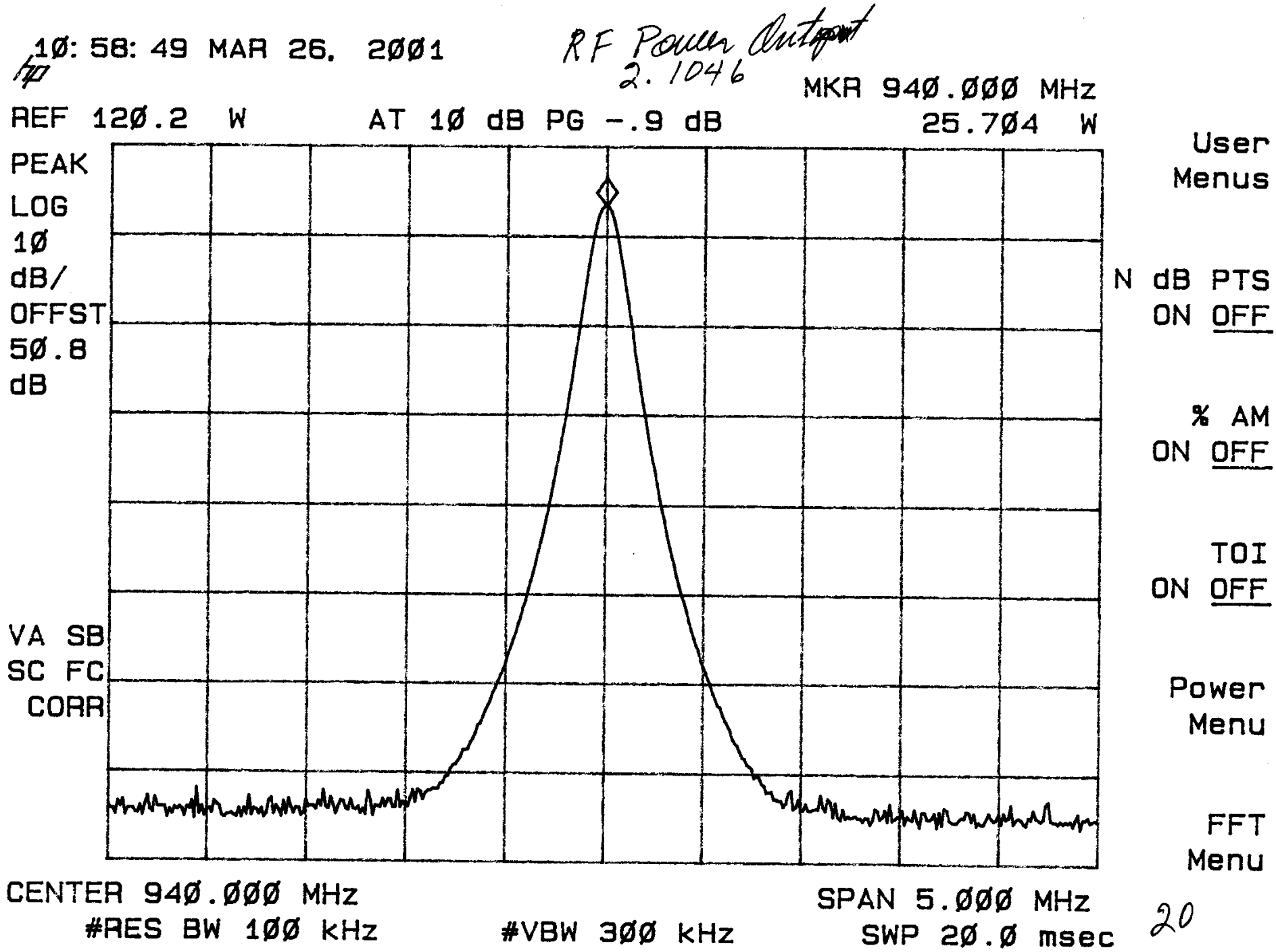


CENTER 935.ØØØ MHz SPAN 5.ØØØ MHz

#RES BW 1ØØ kHz #VBW 3ØØ kHz SWP 2Ø.Ø msec

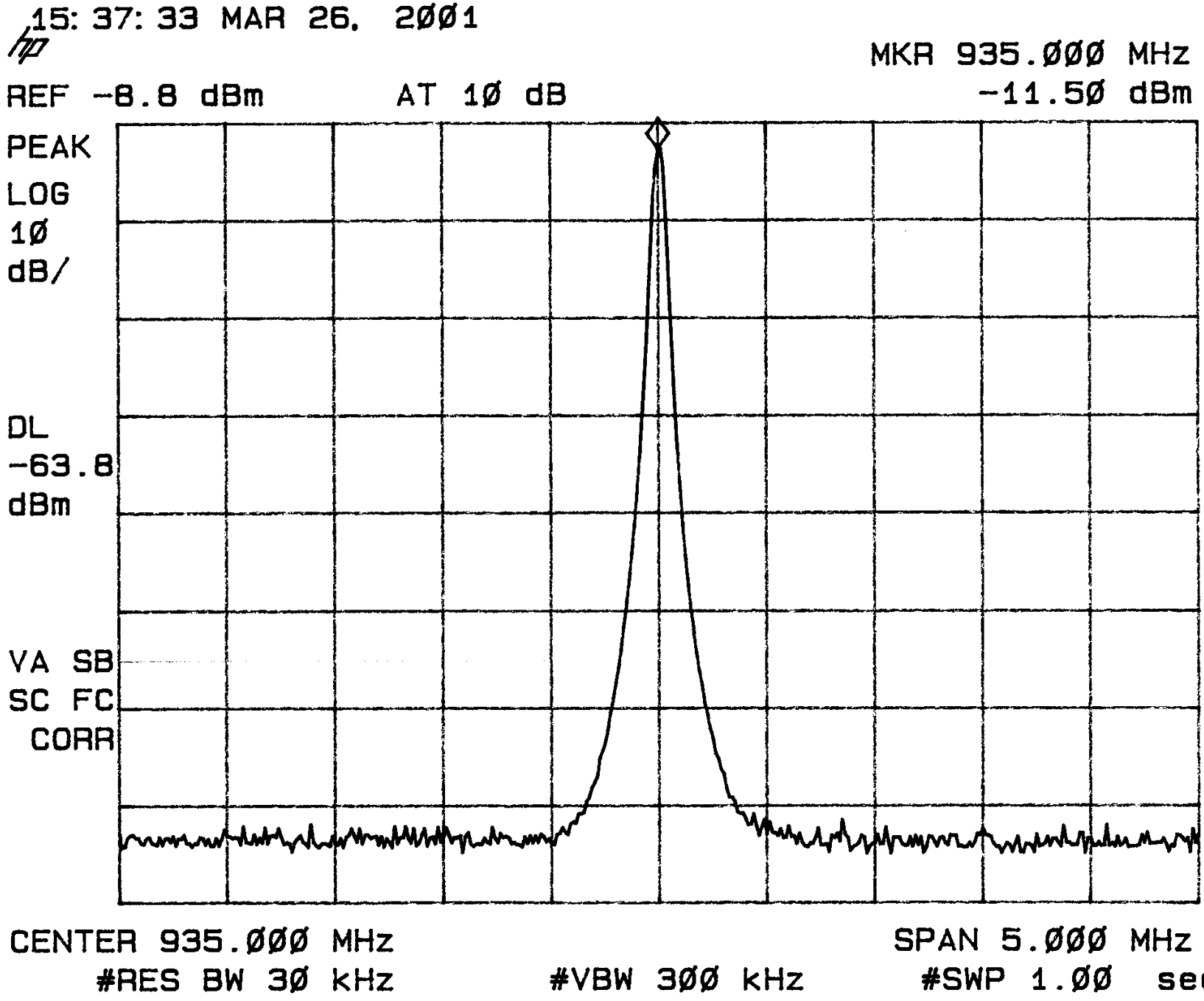
RF Power Output
2.1046



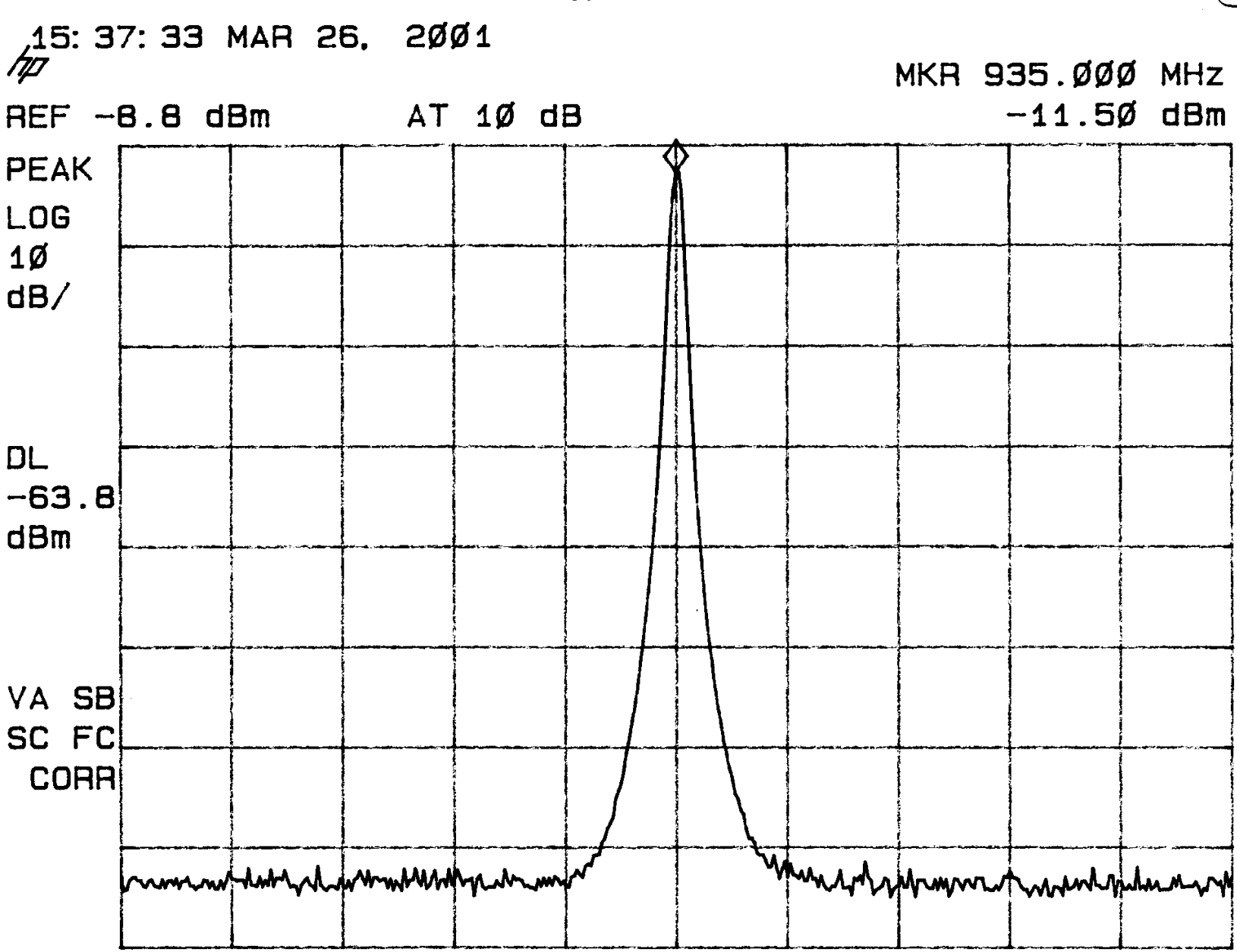

10: 58: 49 MAR 26, 2001
RF Power Output
2.1046
MKR 940.000 MHz
REF 120.2 W
AT 10 dB PG -.9 dB
25.704 W
PEAK
LOG
10
dB/
OFFST
50.8
dB
User
Menus
N dB PTS
ON OFF
% AM
ON OFF
TOI
ON OFF
VA SB
SC FC
CORR
Power
Menu
FFT
Menu
CENTER 940.000 MHz
#RES BW 100 kHz
#VBW 300 kHz
SPAN 5.000 MHz
SWP 20.0 msec

20

INPUT PLOT 3/26/01

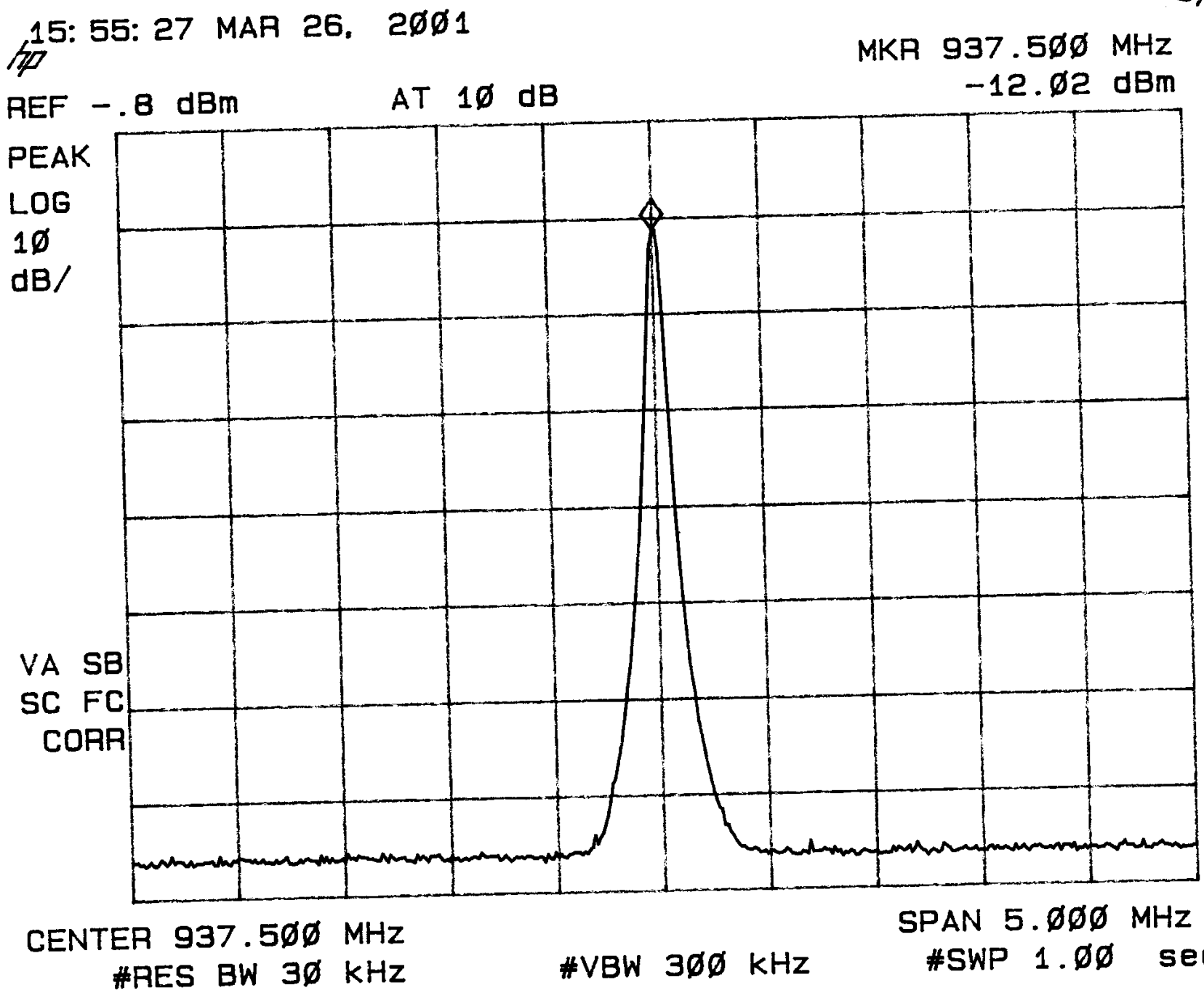


INPUT PLOT 3/26/01



INPUT PLOT

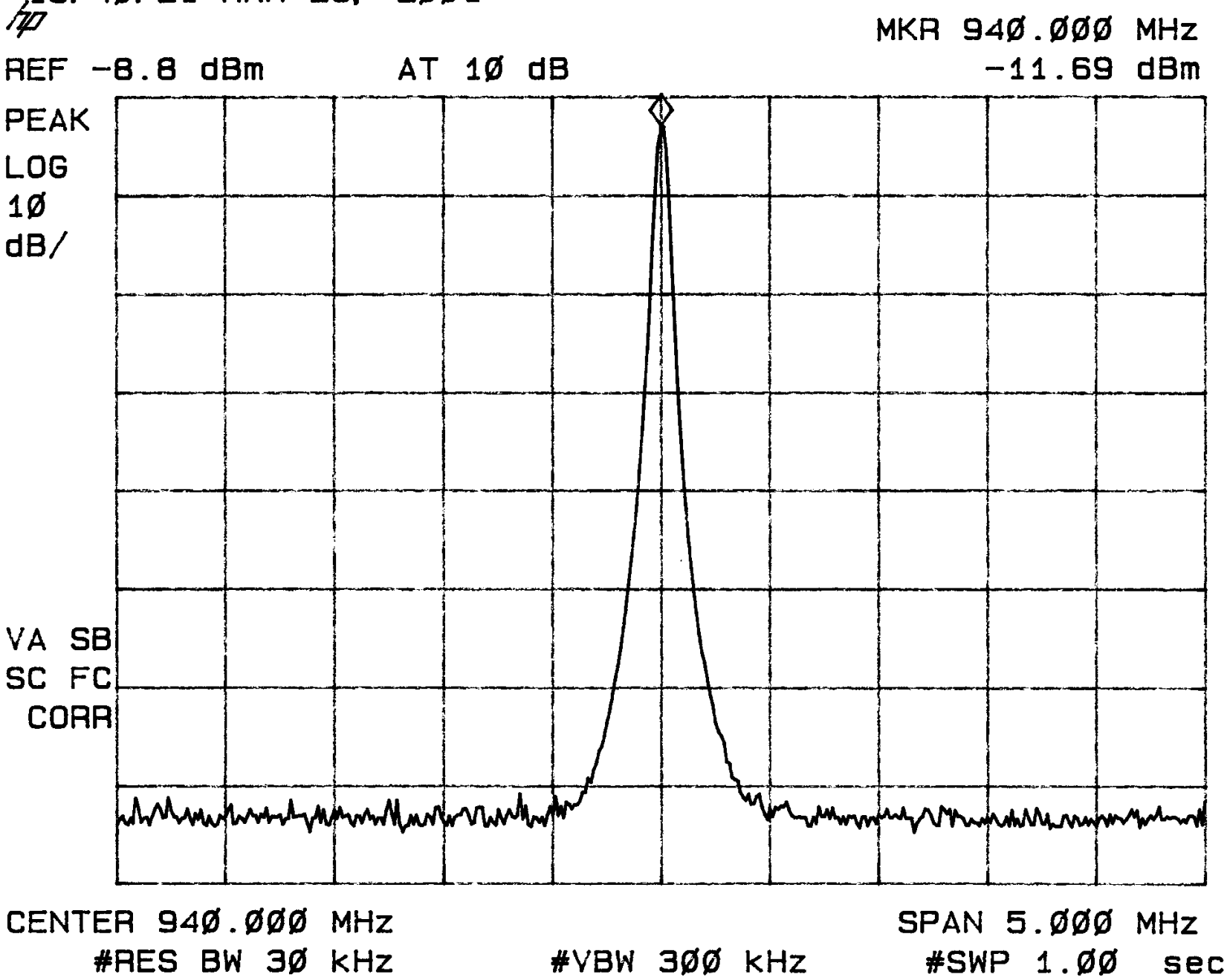
3/26/01



23

Input Plot

3/26/01



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:

Jim Owen
(EMC Engineer)