FCC CFR47 PART 22 TYPE ACCEPTANCE

TEST REPORT

FOR

SINGLE CHANNEL 30W AMPLIFIERS

MODEL: LDA9301-30

FCC ID: E675JS0028

REPORT NUMBER: 98E7348

ISSUE DATE: MAY 13,1998

Prepared for
POWERWAVE TECHNOLOGIES, INC.
2026 McGAW AVENUE
IRVINE, CA 92614

Prepared by
COMPLIANCE ENGINEERING SERVICES, INC.
1366 BORDEAUX DRIVE
SUNNYVALE, CA 94089, USA
TEL: (408) 752-8166
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1. FCC TYPE ACCEPTANCE INFORMATION

The following information is in accordance with FCC Rules, 47CFR Part2, Subpart J, Sections 2.983 – 2.999.

2.983(a) Applicant: POWERWAVE TECHNOLOGIES, INC.
2026 McGAW AVENUE
IRVINE, CA 92614

Contact person: GEORGE SOREMEKUN

Telephone number: (714)757-6605

2.983(b) FCC ID: E675J50028
Model: LDA9301-30

2.983(c) Quantity production is planned

2.983(d) **Technical Description**

The LDA9301-30 is a single channel discrete power amplifier that operates from 935 to 940 MHz. The amplifier is modular in design, and is ideally suited for use in RAM-Mobitex base stations. The LDA9301-30 provides 30 watts of RF power, a 12-volt auxiliary output connection, and a fail-safe bypass mode. The amplifier consists of a DC power supply, a microprocessor control circuit, and a single stage of amplification to provide a gain minimum fo 10dB. The microprocessor control circuit controls all fail-safe bypass modes that provide protection in the event of an RF overpower input/output, an over-temperature, of loss of AC power.

1) **Type of emissions**

GSM, CW

2) **Frequency Range**

Power Amplifier: 932 – 935MHz

3) **Range of Operation Power**

-/+ 45dBm

4) **Maximum Power Rating**

30 Watts

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5) Applied voltage and currents into the final transistor elements

Refer to **Attachment: Schematics and Parts list**. Confidentiality is requested for these items.

6) Function of Each Active Device

Refer to **Attachment: Schematics and Parts list**. Confidentiality is requested for these items.

7) Complete Circuit Diagrams and Functional Diagram

Refer **Attachment: Schematics and Parts list**. Confidentiality is requested for these items.

8) Instructions/Installation Manual

Refer to **Attachment: Installation and Service manual**.

9) Tune-up/Optimizations Procedure

Refer to **Attachment: Installation and Service manual.**

10) Means for Frequency Stabilization

Not Applicable. Eut is a power amplifier

11) Means for Limiting Modulation

Not Applicable. Eut is a power amplifier

12) Means for Limiting Power.

Refer to **Attachment: Installation and Service manual.**

13) Means for Attenuating Higher Audio Frequencies

Not Applicable.

14) Description of Digital Modulation Techniques

Not Applicable.

2.983(e) Standard Test Condition

The power amplifier was tested under the following conditions.

AC Supply Voltage: 120Vac, 60Hz

The amplifier was aligned and tuned up according to manufacturer's alignment procedure, prior to testing. All data presented represents the worst case parameter being measured.

2.983(f) Equipment Identification

A drawing of the equipment identification nameplate appears under **Attachment: PROPOSED FCC ID LABEL FORMAT**.

2.983(g) Photographs

Photographs of the equipment, internal and external views, are found in the **Attachment: Eut Photographs** .

2.983 Description of Various Base Station Configuration

Not Applicable.

2.983 Use of Various Power Supplies

Not Applicable. Power supply is built-in and receives its power from public utility outlet (120Vac).

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TYPE OF EQUIPMENT:	SINGLE CHANNEL 30W AMPLIFIER
MEASUREMENT DISTANCE:	3 METER
TECHNICAL LIMIT:	FCC 22.359, 22.917
FCC RULES:	PART 15, PART 22
EQUIPMENT AUTHORIZATION PROCEDURE	TYPE ACCEPTANCE
MODIFICATIONS MADE ON EUT	☐ YES ☒ NO

The above equipment was tested by Compliance Consulting Services for compliance with the requirements set forth in the FCC CFR 47, PART 15 AND 22. The results of testing in this report apply to the product/system, which was tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Approved By

MIKE C.I. KUO / VICE - PRESIDENT
COMPLIANCE CONSULTING SERVICES

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2. TEST FACILITY

The open area test sites and conducted measurement facilities used to collect the radiated data are located at 561F Monterey Road, Morgan Hill, California, USA. The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

3. ACCREDITATION AND LISTING

The test facilities used to perform radiated and conducted emissions tests are accredited by National Voluntary Laboratory Accreditation Program for the specific scope of accreditation under Lab Code:200065-0 to perform Electromagnetic Interference tests according to FCC PART 15 AND CISPR 22 requirements. No part of this report may be used to claim or imply product endorsement by NVLAP or any agency of the US Government. In addition, the test facilities are listed with Federal Communications Commission (reference no: 31040/SIT (1300B3) and 31040/SIT(1300F2))

4. MEASUREMENT INSTRUMENTATION

Radiated emissions were measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, ridged waveguide, and liner horn. EMI receivers were used for line conducted readings, spectrum analyzers with pre-selectors and quasi-peak detectors were used to perform radiated measurements. Receiving equipment (i.e., receiver, analyzer, quasi-peak adapter, pre-selector) and LISNs conform to CISPR specification for "Radio Interference Measuring Apparatus and Measurement Methods," Publication 16.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

5. MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

6. UNITS OF MEASUREMENT

Measurements of radiated interference are reported in terms of dB(uV/m) at a specified distance. The indicated readings on the spectrum analyzer were converted to dB(uV/m) by

use of appropriate conversion factors. Measurements of conducted interference are reported in terms of dB(uV).

The field strength is calculated by adding the Antenna Factor and Cable Factors, then by subtracting the Amplifier Gain from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF - AG

Where FS = Field Strength
RA = Receiver Amplitude
AF = Antenna Factor
CF = Cable Attenuation Factor
AG = Amplifier Gain

Assume a receiver reading of 52.5 dBuV is obtained. The Antenna Factor of 7.4dB/m and a Cable Factor of 1.1dB is added. The Amplifier Gain of 29 dB is subtracted, giving a field strength of 32 dBuV/m. The 32 dBuV/m value was mathematically converted to its corresponding level in uV/m.

FS = 52.5 + 7.4 + 1.1 - 29 = 32 dBuV/m

Level in uV/m = Common Antilogarithm [(32 dBuV/m)/20] = 39.8 uV/m

7. CLASSIFICATION OF DIGITAL DEVICE

Class A includes digital devices that are marketed for use in commercial, industrial or business environments, excluding devices which are marketed for use by the general public or are intended to be used in the home.

Class B includes digital devices that are marketed for use in residential environments, notwithstanding use in commercial, business and industrial environments.

Note: The responsible party may also qualify a device intended to be marketed in a commercial, business or industrial environment as Class B device, and in fact is encouraged to do so provided the device complies with the technical specifications for a Class B digital device. In the event that a particular type of device has been found to repeatedly cause harmful interference to radio communications, the Commission may classify such a digital device as a Class B digital device, regardless of its intended use.

8. RADIATED EMISSION LIMITS

FCC PART 15 CLASS A

MEASURING DISTANCE OF 10 METER		
FREQUENCY RANGE (MHz)	FIELD STRENGTH (Microvolts/m)	FIELD STRENGTH (dBuV/m)
30-88	90	39.1
88-216	150	43.5
216-960	210	46.4
Above 960	300	49.5

FCC PART 15 CLASS B

MEASURING DISTANCE OF 3 METER		
FREQUENCY RANGE (MHz)	FIELD STRENGTH (Microvolts/m)	FIELD STRENGTH (dBuV/m)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

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9. RADIATED EMISSION TEST PROCEDURE

The EUT and all other support equipment are placed on a wooden table 80 cm above the ground screen. Antenna to EUT distance is 3 meters . During the test, the table is rotated 360 degrees to maximize emissions and the antenna is positioned from 1 to 4 meters above the ground screen to further maximize emissions. The antenna is polarized in both vertical and horizontal positions.

EUT test configuration is according to Section 8 of ANSI C63.4/1992.

Monitor the frequency range of interest at a fixed antenna height and EUT azimuth. Frequency span should be small enough to easily differentiate between broadcast stations and intermittent ambients. Rotate EUT 360 degrees to maximize emissions received from EUT. If emission increases by more than 1 dB, or if another emission appears that is greater by 1 dB, return to azimuth where maximum occurred and perform additional cable manipulation to further maximize received emission.

Move antenna up and down to further maximize suspected highest amplitude signal. If emission increased by 1 dB or more, or if another emission appears that is greater by 1dB or more, return to antenna height where maximum signal was observed and manipulate cables to produce highest emissions, noting frequency and amplitude.

10. CONDUCTED EMISSION LIMITS

FCC CLASS A

FREQUENCY RANGE	FIELD STRENGTH (Microvolts)	FIELD STRENGTH (dBuV)/QP
450kHz-1.705MHz	1000	60
1.705MHz - 30MHz	3000	69.54

FCC CLASS B

FREQUENCY RANGE	FIELD STRENGTH (Microvolts)	FIELD STRENGTH (dBuV)/QP
450kHz-30MHz	250	48

11. CONDUCTED EMISSION TEST PROCEDURE

The EUT is located so that the distance between the boundary of the EUT and the closest surface to the LISN is 0.8m.

EUT test configuration is according to Section 7 of ANSI C63.4/1992.

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Conducted disturbance shall be measured between the phase lead and the ground, and between the neutral lead and the ground. The frequency 0.450 - 30 MHz (or 0.150 - 30 MHz in case of CISPR 22/EN55022 method) shall be investigated.

Set the EMI receiver to PEAK detector setting and sweep continuously over the frequency range to be investigated. Set resolution bandwidth to 9kHz minimum. Connect EMI receiver input cable to LINE 1 RF measurement connection on the LISN. Connect a 50ohm terminator to the unused RF connection on the LISN. For each mode of EUT operation, maximize emissions readings by manipulating cable and wire positions. Record the configuration for each EUT power cord, which produces emissions closest to the limit. Repeat the same procedure for LINE 2 of each EUT power cord.

12. AMBIENT CONDITIONS

The ambient conditions at the time of final tests were as follows:

	Radiated Emission	Conducted Emission
Temperature	17° C	21° C
Humidity	81%	62%

13. EQUIPMENT MODIFICATIONS

Not Applicable

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14. A) TEST EQUIPMENT LIST

Equipment	Manufacturer	Model No.	Serial No.	Site	Cal Date	Due Date
Spectrum Analyzer	**H.P.**	**8593EM**	**3710A00205**	**A**	**05/97**	**05/98**
Log Periodic Antenna	**EMCO**	**3146**	**9107-3163**	**C**	**10/97**	**10/98**
Horn Antenna	**EMCO**	**3115**	**9001-3245**	**C**	**12/97**	**12/00**
Pre-Amp	**H.P.(P5)**	**8447D**	**2944A06550**	**C**	**09/97**	**09/98**
Pre-Amp	**H.P. (1-26.5GHz)**	**8449B**	**3008A00369**	**C**	**04/98**	**04/99**

B) SUPPORT EQUIPMENT

Device Type	**Manufacturer**	**Model Number**	**Serial No.**	**FCC ID / DoC**
SIGNAL GENERATOR	H.P.	E4432A	US3626061A	N/A
POWER METER	H.P.	437B	3125722256	N/A
HIGH POWER ATTENUATOR	NARDA	269-30	06260	N/A
ISOLATOR	DITOM	DF3253	103	N/A
DIRECTIONAL BRIDGE	H.P.	86205A	3140A01658	N/A
LOW PASS FILTER	K&L MICROWAVE	CP-0506	9985-76	N/A
BROADBAND RF AMPLIFIER	POWERWAVE	LSA2010-30	180840	N/A

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16. TEST RESULT SUMMARY FOR PART 15.

FCC PART 15 Radiated Emission Test was conducted by operating the configuration as indicated below.

LDA9301-30							
OATS No: C / 3 meter	Data Report No. 980515C1		Date 05/15/98		Tested By: JUAN MARTINEZ		
Six Highest Radiated Emission Readings							
Frequency Range Investigated				30 MHz TO 9350 MHz			
Freq. (MHz)	Meter Reading (dBuV)	C.F. (dB/m)	Corrected Reading (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Reading Type (P/Q/A)	Polar (H/V)
177.67	**32.7**	**-10.41**	**22.29**	**43.5**	**-21.21**	**P**	**V**
60	**30.5**	**-20.45**	**10.05**	**40.0**	**-29.95**	**P**	**V**
124	**35.4**	**-14.47**	**20.93**	**43.5**	**-22.57**	**P**	**V**
187	**33.5**	**-9.82**	**23.68**	**43.5**	**-19.82**	**P**	**V**
224	**30.7**	**-13.12**	**17.58**	**46.0**	**-28.42**	**P**	**H**
236	**31.4**	**-12.89**	**18.51**	**46.0**	**-27.49**	**P**	**H**

C.F.(Correction Factor)=Antenna Factor + Cable Loss-Amplifier Gain
Corrected Reading = Metering Reading + C.F. Margin = Corrected Reading - Limits
P= Peak Reading H= Horizontal Polarization/Antenna
Q= Quasi-peak V= Vertical Polarization/Antenna
A= Average Reading
Comments: N/A

17. FCC PART 15 FINAL CONDUCTED EMISSION TEST was conducted by operating the configuration as indicated below.

Conducted Room	Plot No. N/A	Date 5/14/98	Tested By: Juan Martinez

Six Highest Conducted Emission Readings

Frequency Range Investigated				450 kHz TO 30 MHz			
Freq. (MHz)	Meter Reading (dBuV)	C.F. (dB)	Corrected Reading (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Reading Type (P/Q/A)	Line (L1/L2)
1.05	**44.7**	**0**	**44.7**	**48**	**-3.3**	**P**	**L2**
1.15	**43.5**	**0**	**43.5**	**48**	**-4.5**	**P**	**L2**
1.57	**42.0**	**0**	**42.0**	**48**	**-6.0**	**P**	**L2**
7.85	**46.9**	**0**	**46.9**	**48**	**-1.1**	**P**	**L2**
7.92	**45.5**	**0**	**45.5**	**48**	**-2.5**	**P**	**L2**
7.86	**45.6**	**0**	**45.6**	**48**	**-2.4**	**P**	**L1**

C.F.(Correction Factor)=Insertion Loss + Cable Loss
Corrected Reading = Metering Reading + C.F.
Margin = Corrected Reading - Limits
P= Peak Reading L1=Hot
Q= Quasi-peak L2=Neutral
A= Average Reading

Comments: N/A

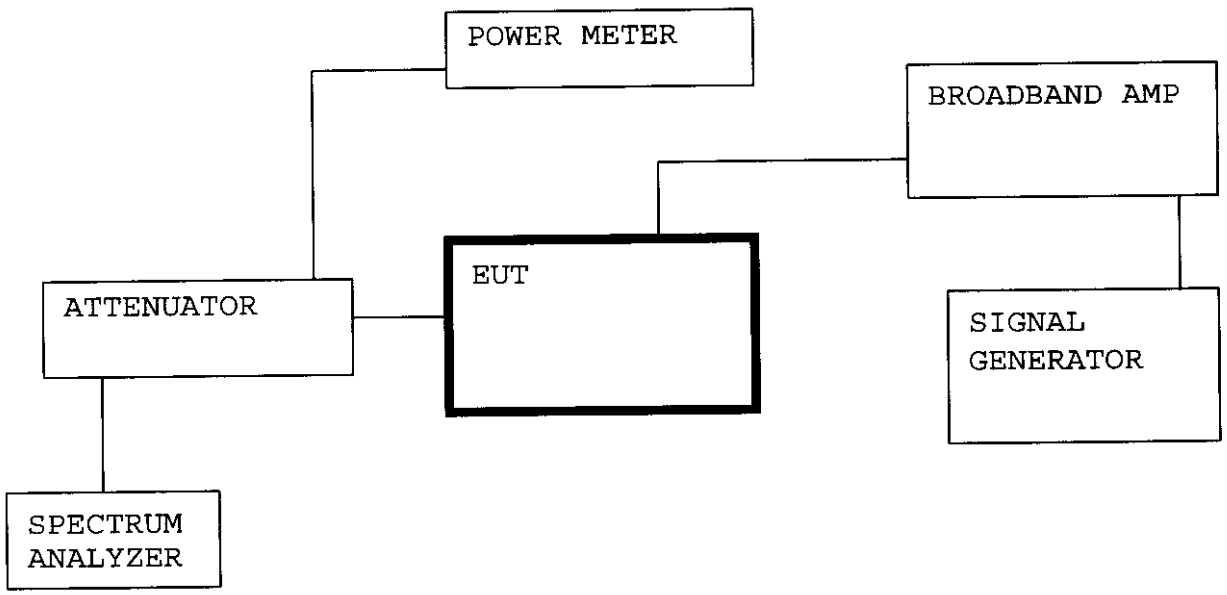
18. FCC PART 2 TYPE ACCEPTANCE TEST RESULTS:

SECTION 2.985 RF POWER OUTPUT

Measurement Equipment Used:

HP Power Meter /437B
Powerwave Broadband Amp/LSA2010-30
HP Signal Generator/E4443A
HP Spectrum Analyzer/8593EM
Narda 30dB Attenuator
Powerwaves "The Workhorse" low loss cables, 9ft. (loss: 0.85 dB/ft @ 26GHz)

Test Set-up:



RF power was measured with a HP power meter. Power output was 30 Watts (44.77dBm). Power output was check for low, middle, high channel.

LDA9301-30	
NO. OF AMPLIFIER	**MEASURED RF POWER OUTPUT**
1	**30W**

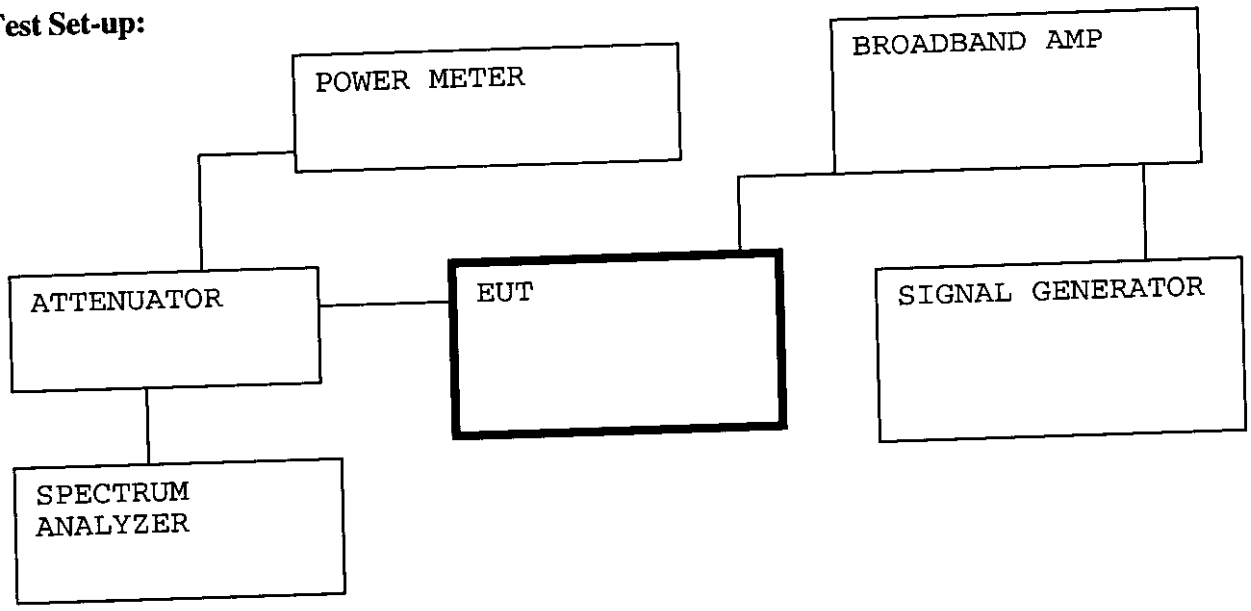
SECTION 2.987 MODULATION CHARACTERISTICS

Not applicable. EUT is a power amplifier.

SECTION 2.989 OCCUPIED BANDWIDTH

HP Power Meter /437B
Powerwave Broadband Amp/LSA2010-30
HP Signal Generator/E4443A
HP Spectrum Analyzer/8593EM
Narda 30dB Attenuator
Powerwaves "The Workhorse" low loss cables, 9ft. (loss: 0.85 dB/ft @ 26GHz)

Test Set-up:



Plots of occupied bandwidth were made one for the output from signal generator and another for output from amplifier. Test result are presented in spectrum analyzer plots from Low to High channels both GSM modulation and CW. Table shows the order of the plots.

FREQUENCY 932MHz(Low)	
MODULATION TYPE: GSM	
	PLOT NUMBER
From signal generator	**1**
Amplified signal from EUT (amplifier)	**2**
MODULATION TYPE: CW	
	PLOT NUMBER
From signal generator	**3**
Amplified signal from EUT (amplifier)	**4**
FREQUENCY 933.1MHz(Middle)	
MODULATION TYPE: GSM	
	PLOT NUMBER
From signal generator	**5**
Amplified signal from EUT (amplifier)	**6**
MODULATION TYPE: CW	
	PLOT NUMBER
From signal generator	**7**
Amplified signal from EUT (amplifier)	**8**
FREQUENCY 935MHz(High)	
MODULATION TYPE: GSM	
	PLOT NUMBER
From signal generator	**9**
Amplified signal from EUT (amplifier)	**10**
MODULATION TYPE: CW	
	PLOT NUMBER
From signal generator	**11**
Amplified signal from EUT (amplifier)	**12**

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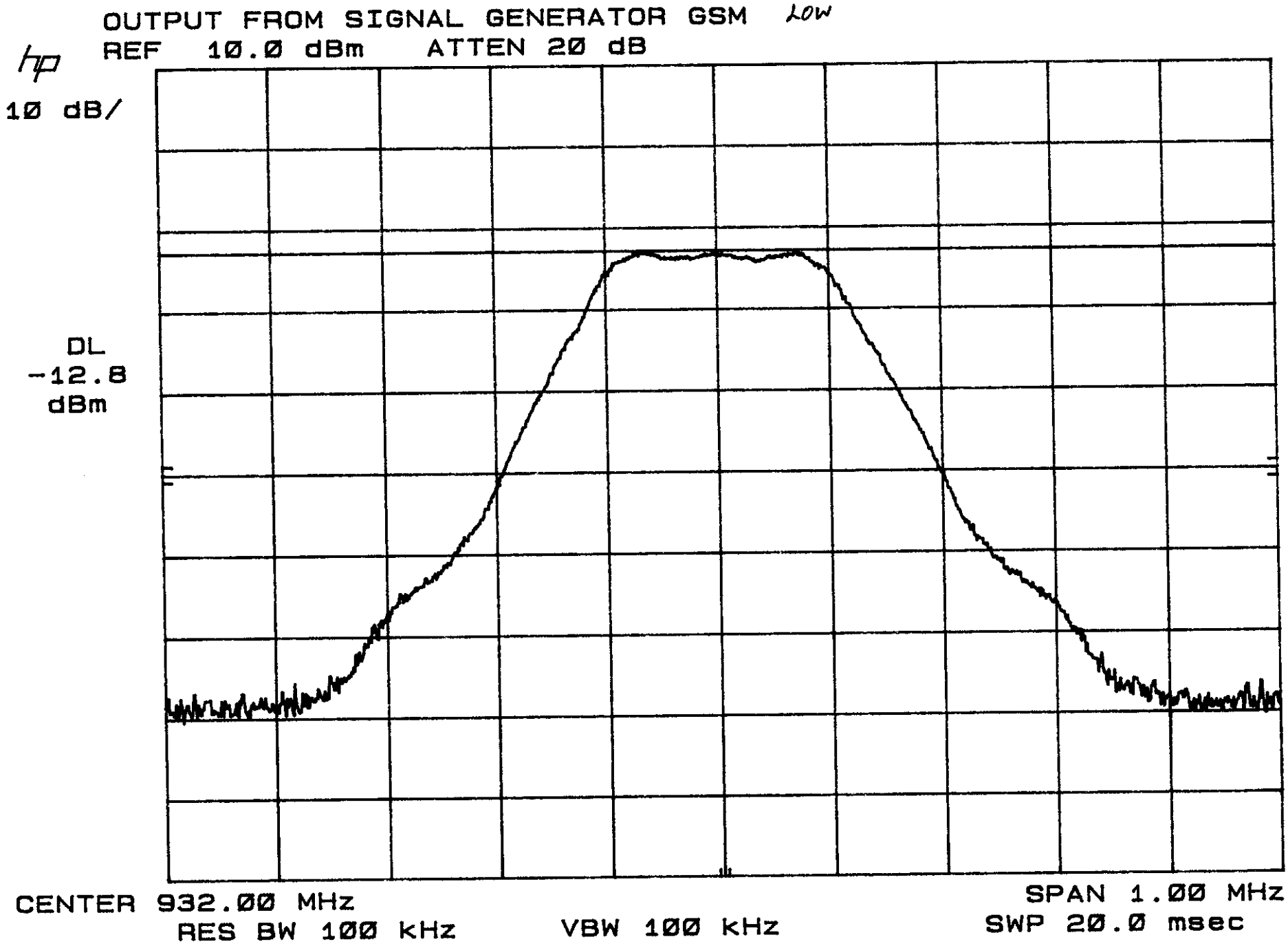
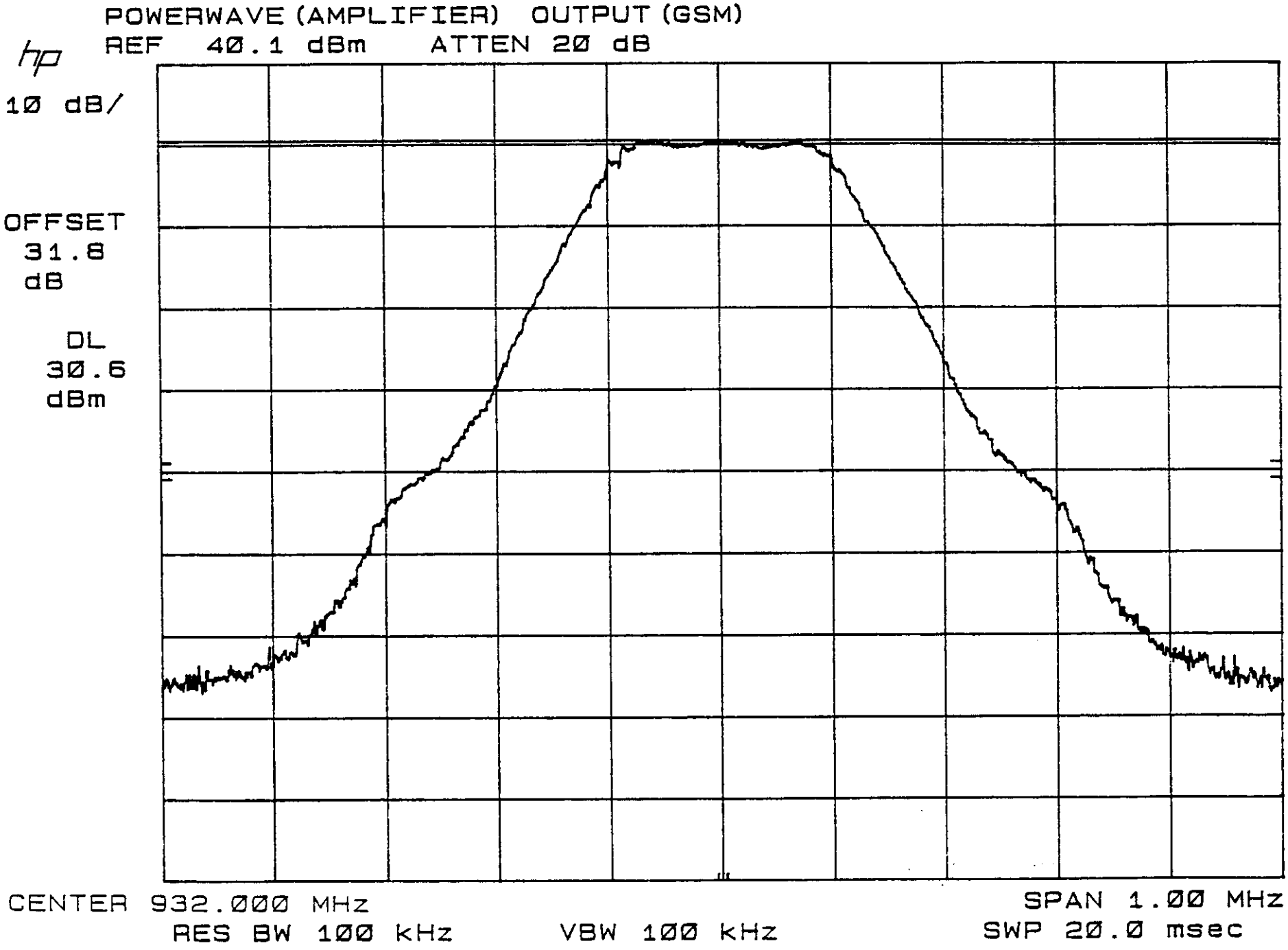
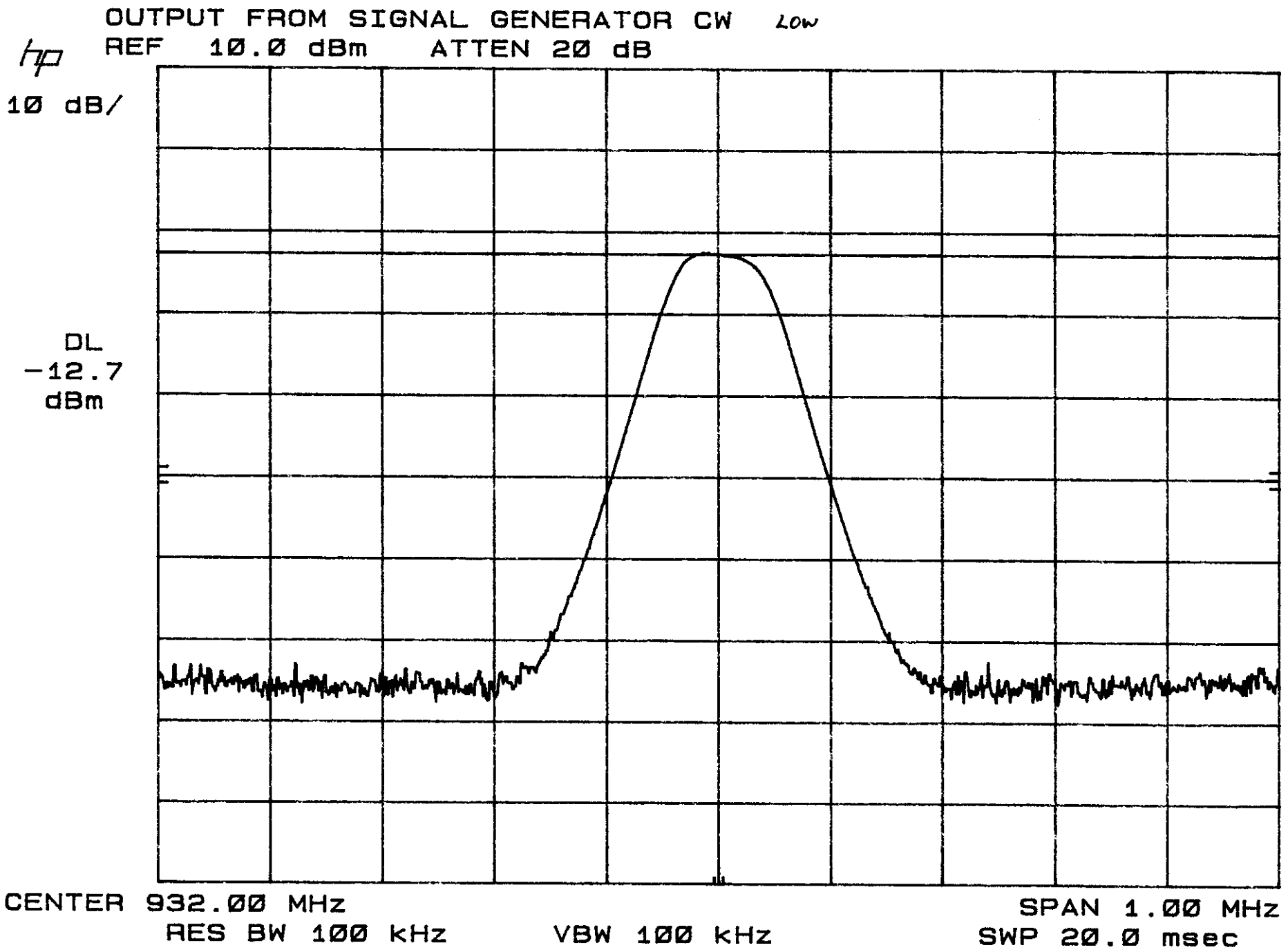
#1

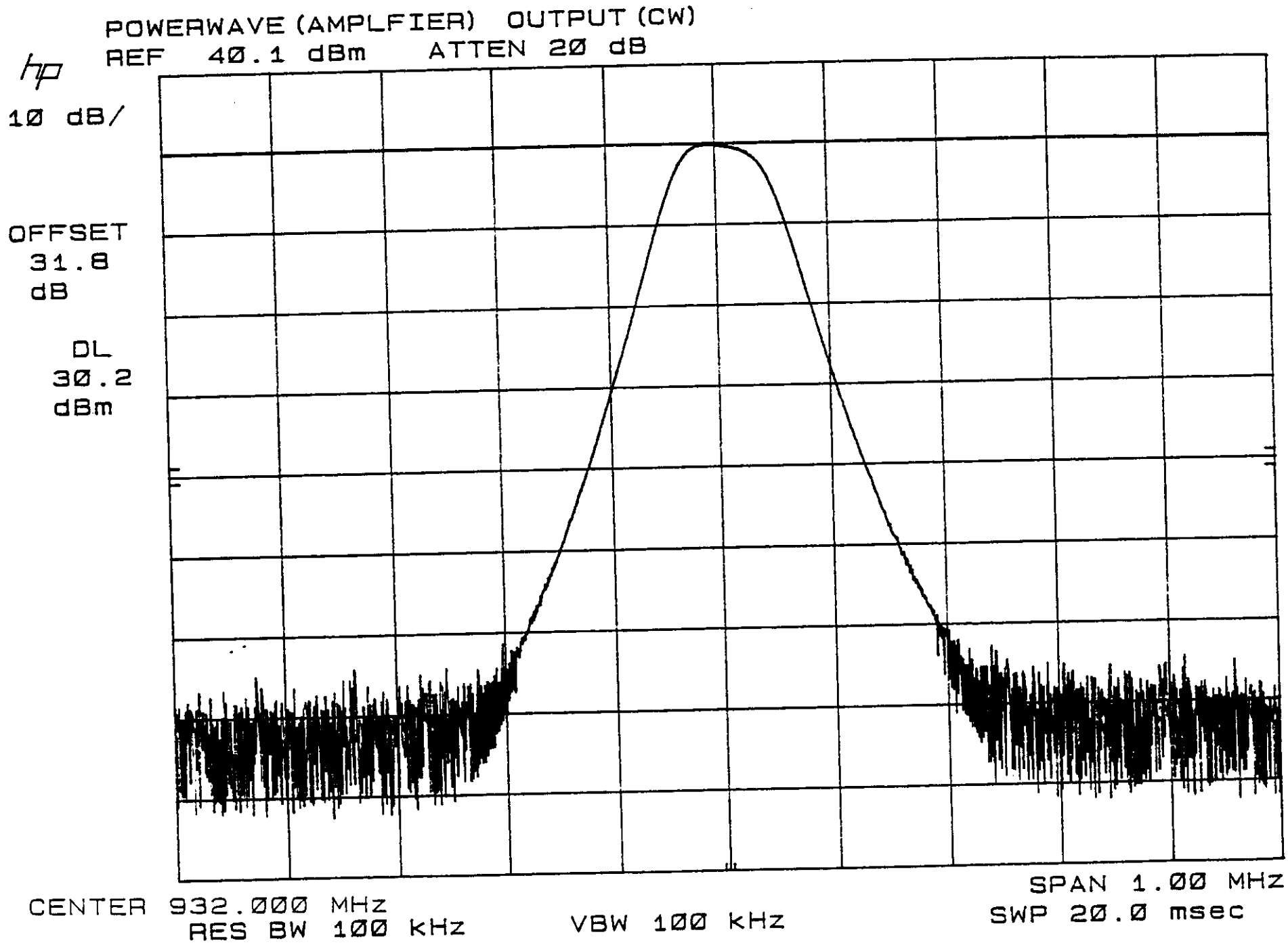

OUTPUT FROM SIGNAL GENERATOR GSM low
REF 10.0 dBm ATTEN 20 dB
10 dB/
DL
-12.8
dBm
CENTER 932.00 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 1.00 MHz
SWP 20.0 msec

#2

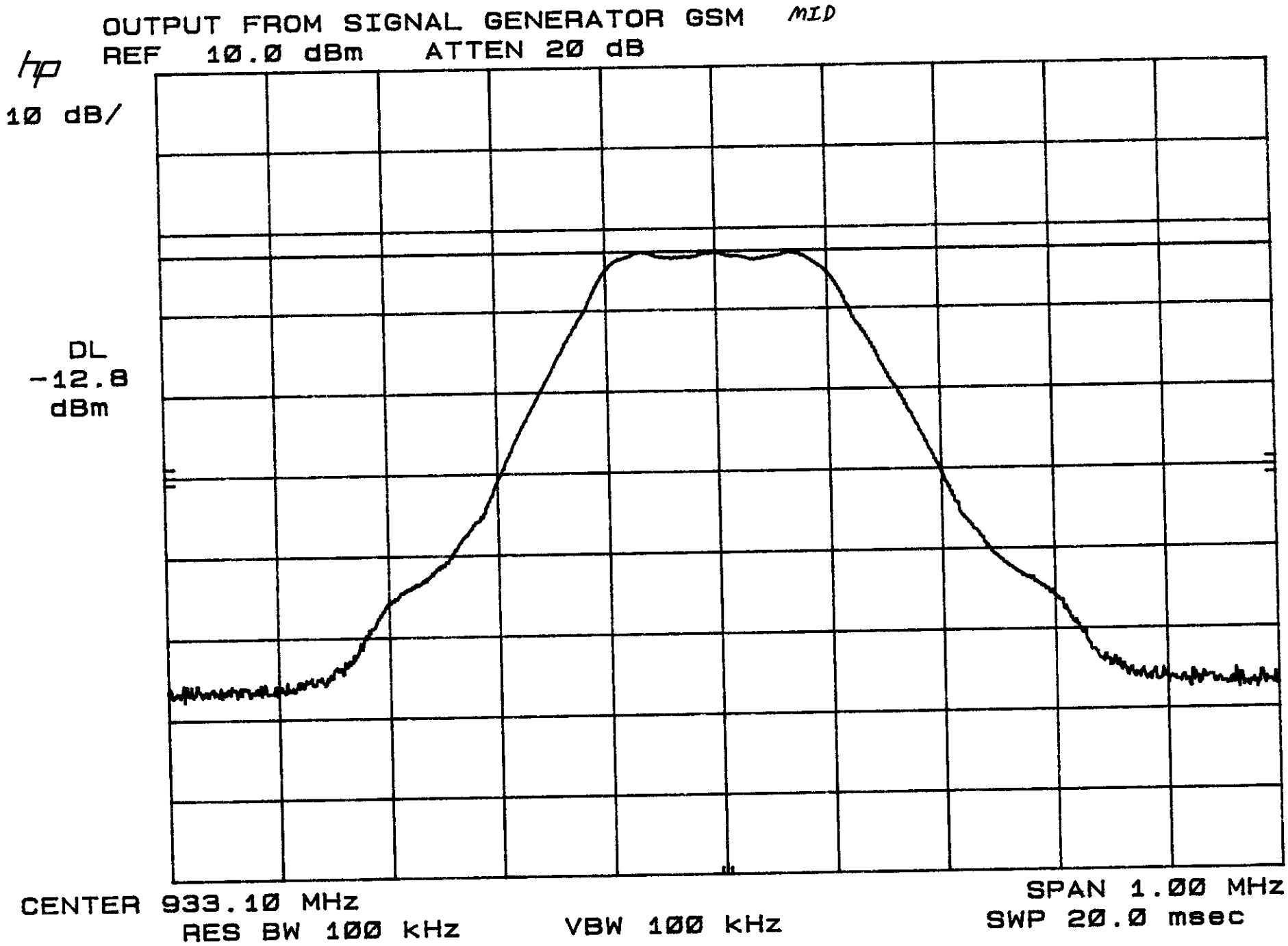

POWERWAVE (AMPLIFIER) OUTPUT (GSM)
REF 40.1 dBm ATTEN 20 dB
10 dB/
OFFSET
31.8
dB
DL
30.6
dBm
CENTER 932.000 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 1.00 MHz
SWP 20.0 msec

#3


OUTPUT FROM SIGNAL GENERATOR CW LOW
REF 10.0 dBm ATTEN 20 dB
10 dB/
DL
-12.7
dBm
CENTER 932.00 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 1.00 MHz
SWP 20.0 msec

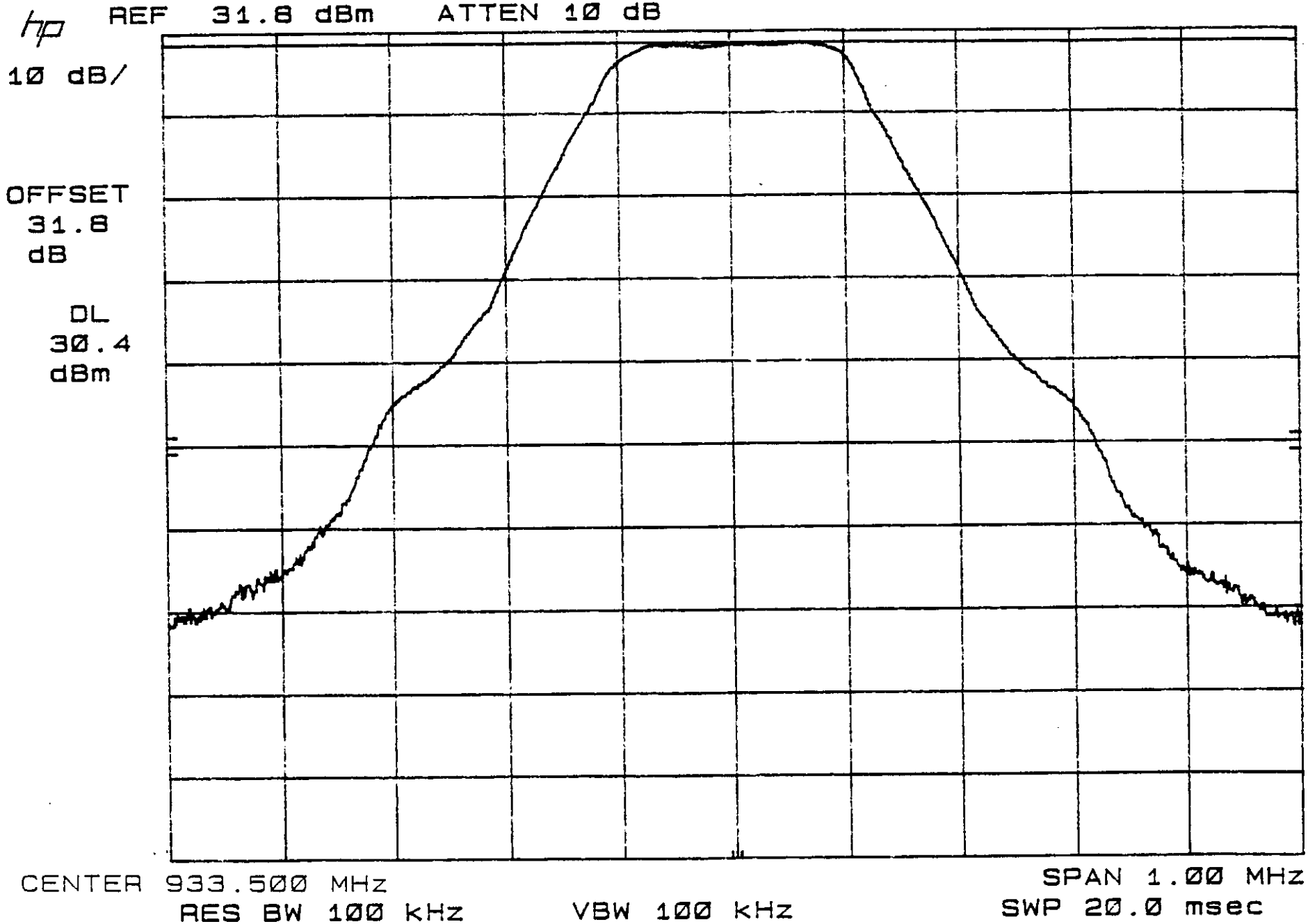

POWERWAVE (AMPLFIER) OUTPUT (CW)
REF 40.1 dBm ATTEN 20 dB
10 dB/
OFFSET
31.8
dB
DL
30.2
dBm
CENTER 932.000 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 1.00 MHz
SWP 20.0 msec

#5

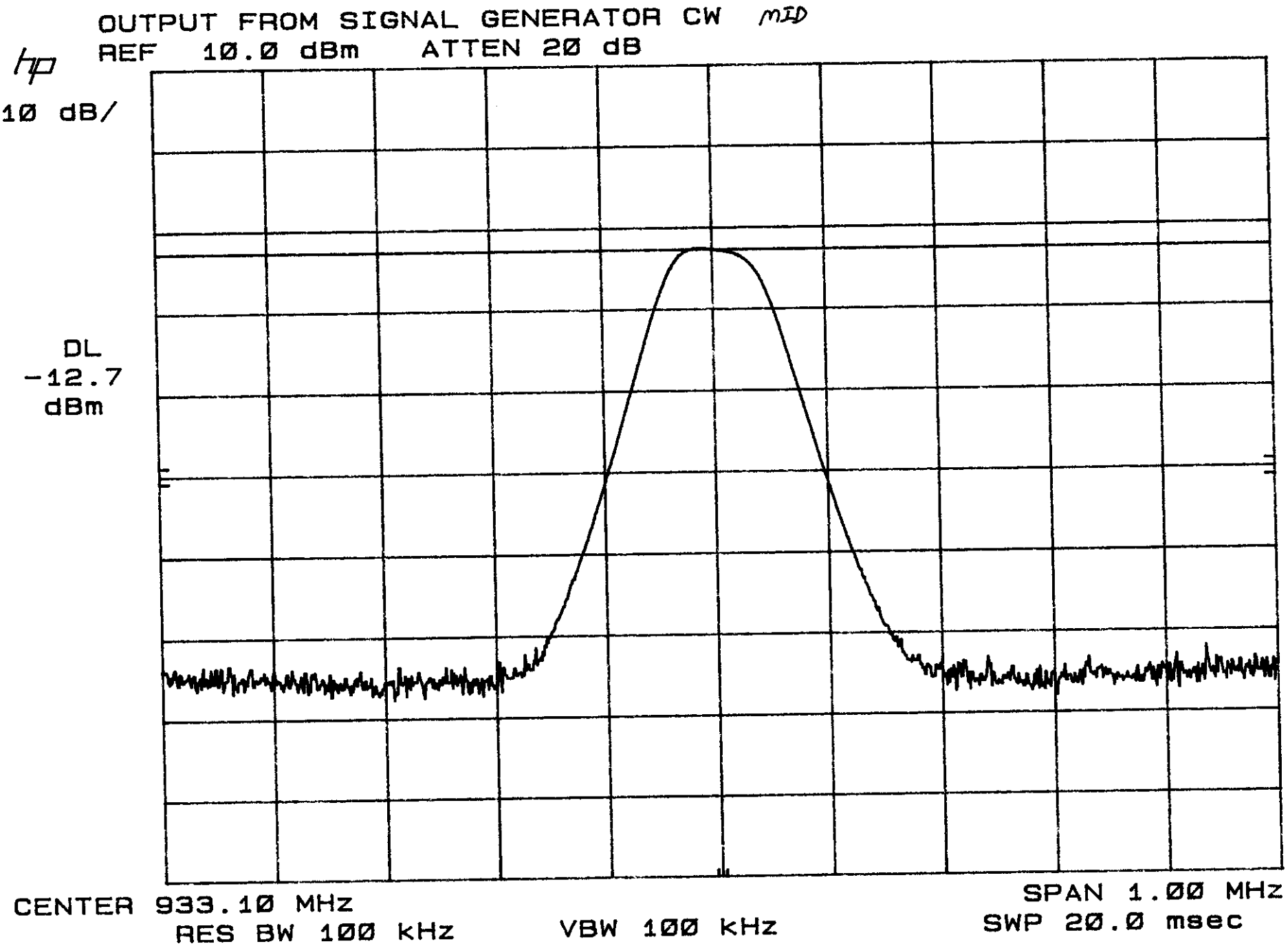

OUTPUT FROM SIGNAL GENERATOR GSM MID
REF 10.0 dBm ATTEN 20 dB
10 dB/
DL
-12.8
dBm
CENTER 933.10 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 1.00 MHz
SWP 20.0 msec

#6

OUTPUT FROM POWERWAVE (AMPLIFIER, LDA9301-30) GSM

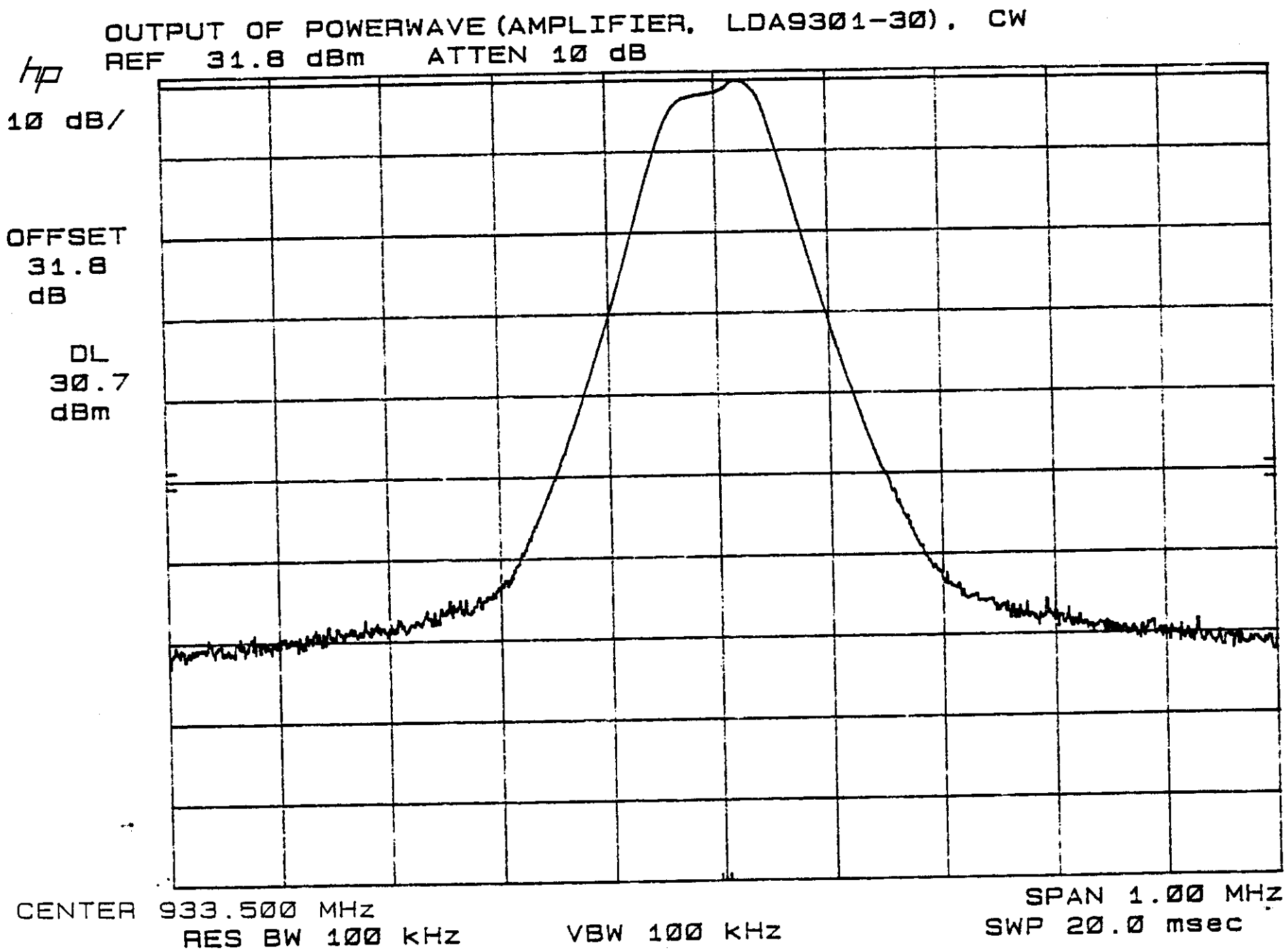


#7

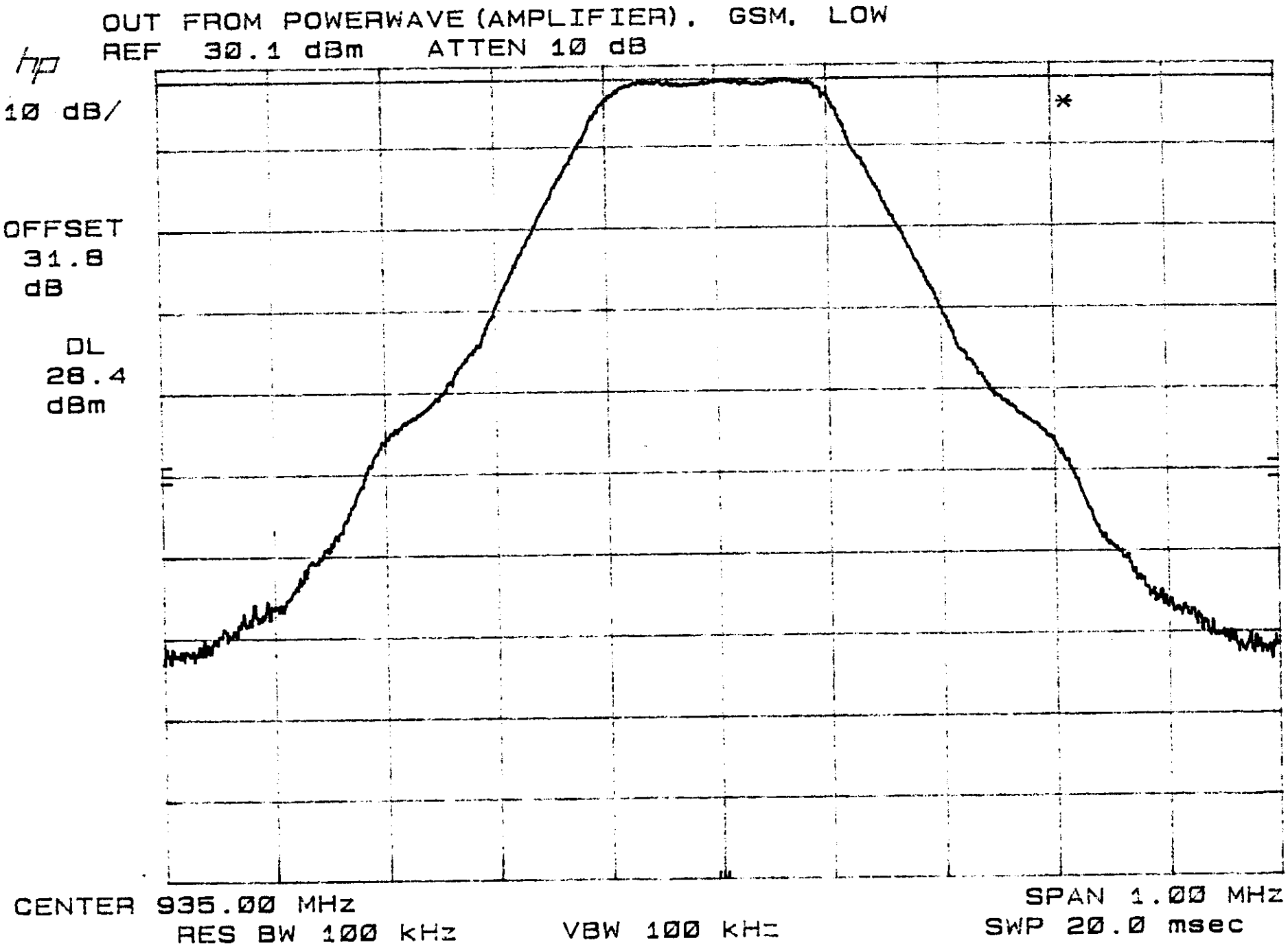

OUTPUT FROM SIGNAL GENERATOR CW mid
REF 10.0 dBm ATTEN 20 dB
10 dB/
DL
-12.7
dBm
CENTER 933.10 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 1.00 MHz
SWP 20.0 msec

Hp

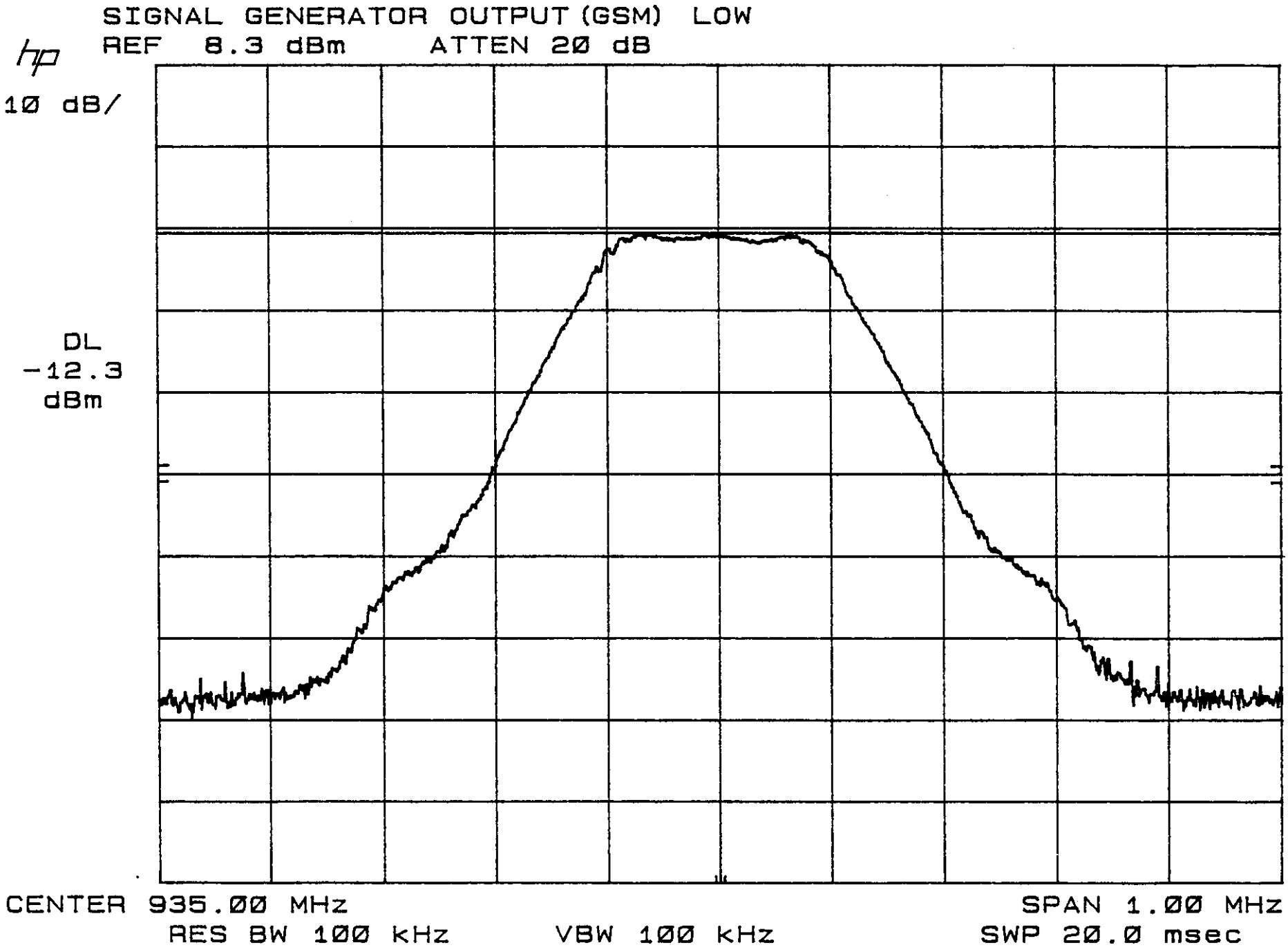
OUTPUT OF POWERWAVE (AMPLIFIER, LDA9301-30), CW

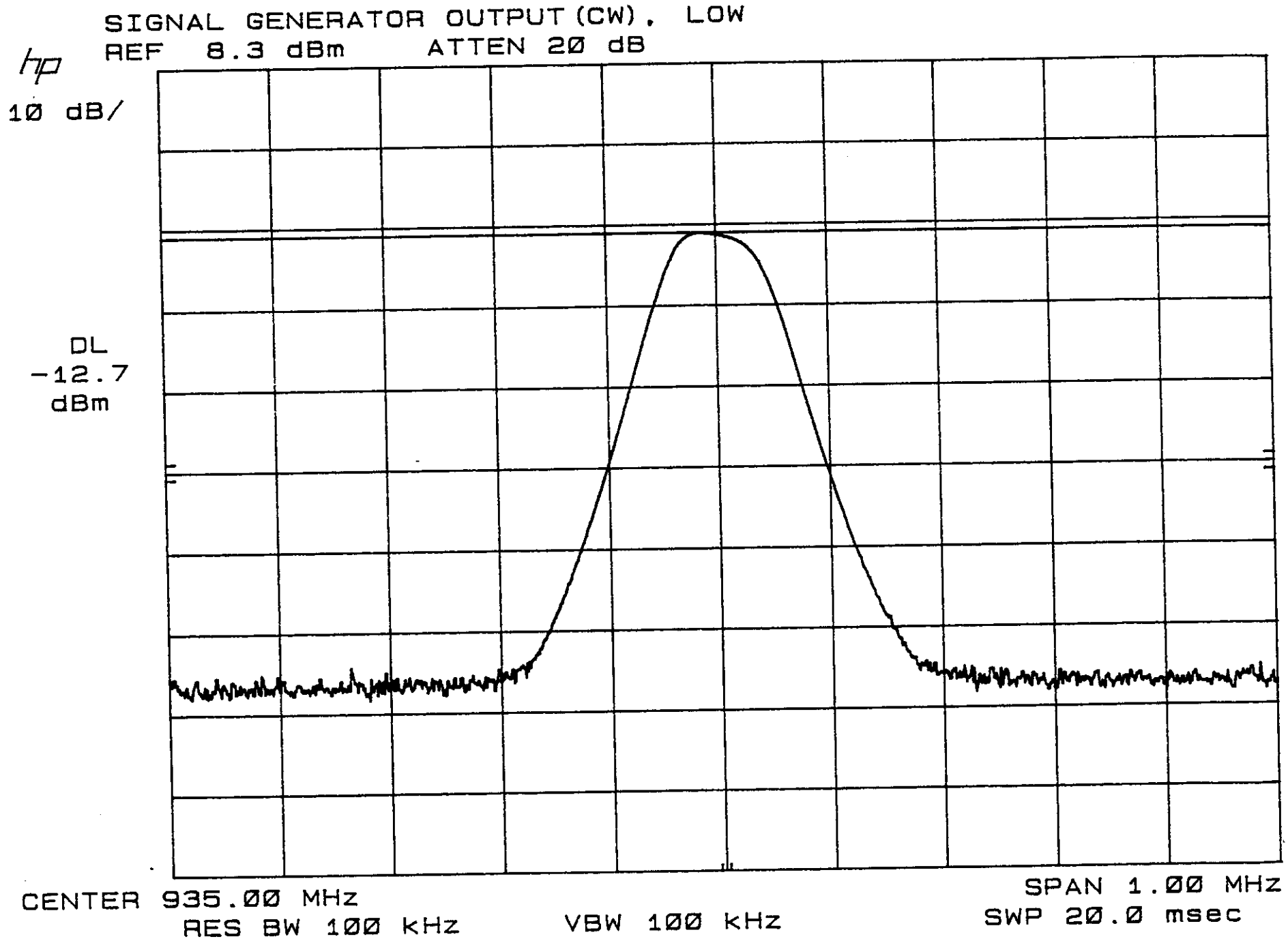


#9

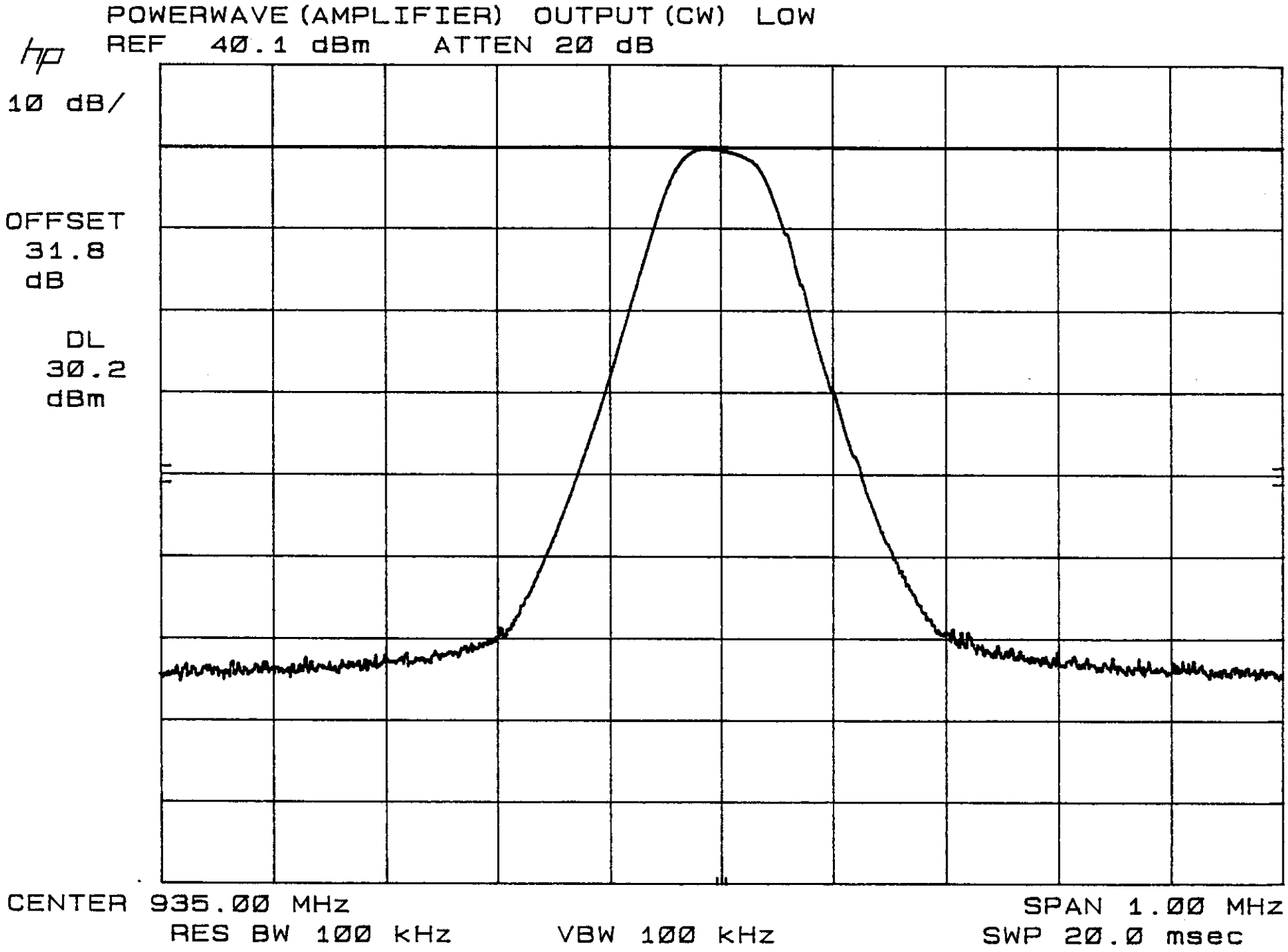

OUT FROM POWERWAVE (AMPLIFIER). GSM. LOW
REF 30.1 dBm ATTEN 10 dB
10 dB/
OFFSET
31.8
dB
DL
28.4
dBm
CENTER 935.00 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 1.00 MHz
SWP 20.0 msec

#10


SIGNAL GENERATOR OUTPUT (GSM) LOW
REF 8.3 dBm
ATTEN 20 dB
10 dB/
DL
-12.3
dBm
CENTER 935.00 MHz
SPAN 1.00 MHz
RES BW 100 kHz
VBW 100 kHz
SWP 20.0 msec


SIGNAL GENERATOR OUTPUT (CW). LOW
REF 8.3 dBm
ATTEN 20 dB
hp
10 dB/
DL
-12.7
dBm
CENTER 935.00 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 1.00 MHz
SWP 20.0 msec

#12

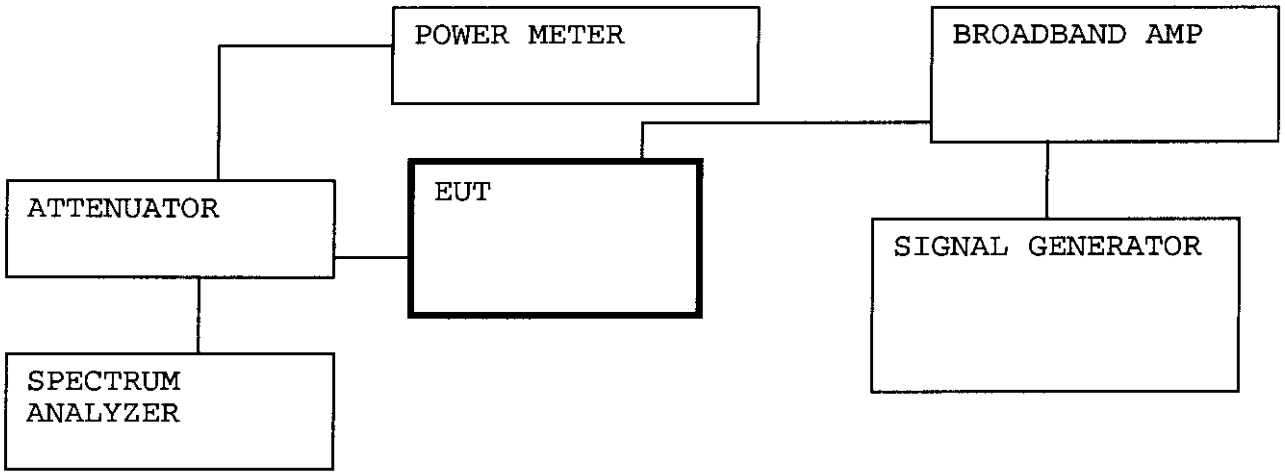

POWERWAVE (AMPLIFIER) OUTPUT (CW) LOW
REF 40.1 dBm ATTEN 20 dB
10 dB/
OFFSET
31.8
dB
DL
30.2
dBm
CENTER 935.00 MHz
SPAN 1.00 MHz
RES BW 100 kHz
VBW 100 kHz
SWP 20.0 msec

SECTION 2.991 SPURIOUS EMISSION AT ANTENNA TERMINALS

Measurement Equipment Used:

HP Power Meter /437B
Powerwave Broadband Amp/LSA2010-30
HP Signal Generator/E4443A
HP Spectrum Analyzer/8593EM
Narda 30dB Attenuator
Powerwaves "The Workhorse" low loss cables, 9ft. (loss: 0.85 dB/ft @ 26GHz)

Test Set-up



Section 22.359(a) Analog Modulation applied.

Spurious emissions tests were performed for Single input signal to amplifier. For all modulations that applies to EUT. Spectrum was scanned from 1 MHz to 9350 MHz to search for spurious, harmonics, and intermodulation product emissions.

FREQUENCY 932MHz(Low)	
MODULATION TYPE: GSM	
FREQUENCY RANGE	**PLOT NUMBER**
1 MHz TO 930 MHz	**13**
930 MHz TO 934 MHz	**14**
934 MHz TO 2.5 GHz	**15**
2.5 GHz TO 9.32 GHz	**16**
MODULATION TYPE: CW	
FREQUENCY RANGE	**PLOT NUMBER**
1 MHz TO 930 MHz	**17**
930 MHz TO 934 MHz	**18**
934 MHz TO 2.5 GHz	**19**
2.5 GHz TO 9.32 GHz	**20**
FREQUENCY 933.1MHz(Middle)	
MODULATION TYPE: GSM	
FREQUENCY RANGE	**PLOT NUMBER**
1 MHz TO 930 MHz	**21**
930 MHz TO 935 MHz	**22**
935 MHz TO 2.5 GHz	**23**
2.5 GHz TO 9.4 GHz	**24**
MODULATION TYPE: CW	
FREQUENCY RANGE	**PLOT NUMBER**
1 MHz TO 930 MHz	**25**
930 MHz TO 935 MHz	**26**
935 MHz TO 2.5 GHz	**27**
2.5 GHz TO 9.4 GHz	**28**

FREQUENCY 935MHz(High)	
MODULATION TYPE: GSM	
FREQUENCY RANGE	**PLOT NUMBER**
1 MHz TO 933 MHz	**29**
933 MHz TO 937 MHz	**30**
937 MHz TO 2.5 GHz	**31**
2.5 GHz TO 9.35 GHz	**32**
MODULATION TYPE: CW	
FREQUENCY RANGE	**PLOT NUMBER**
1 MHz TO 933 MHz	**33**
933 MHz TO 937 MHz	**34**
937 MHz TO 2.5 GHz	**35**
2.5 GHz TO 9.35 GHz	**36**

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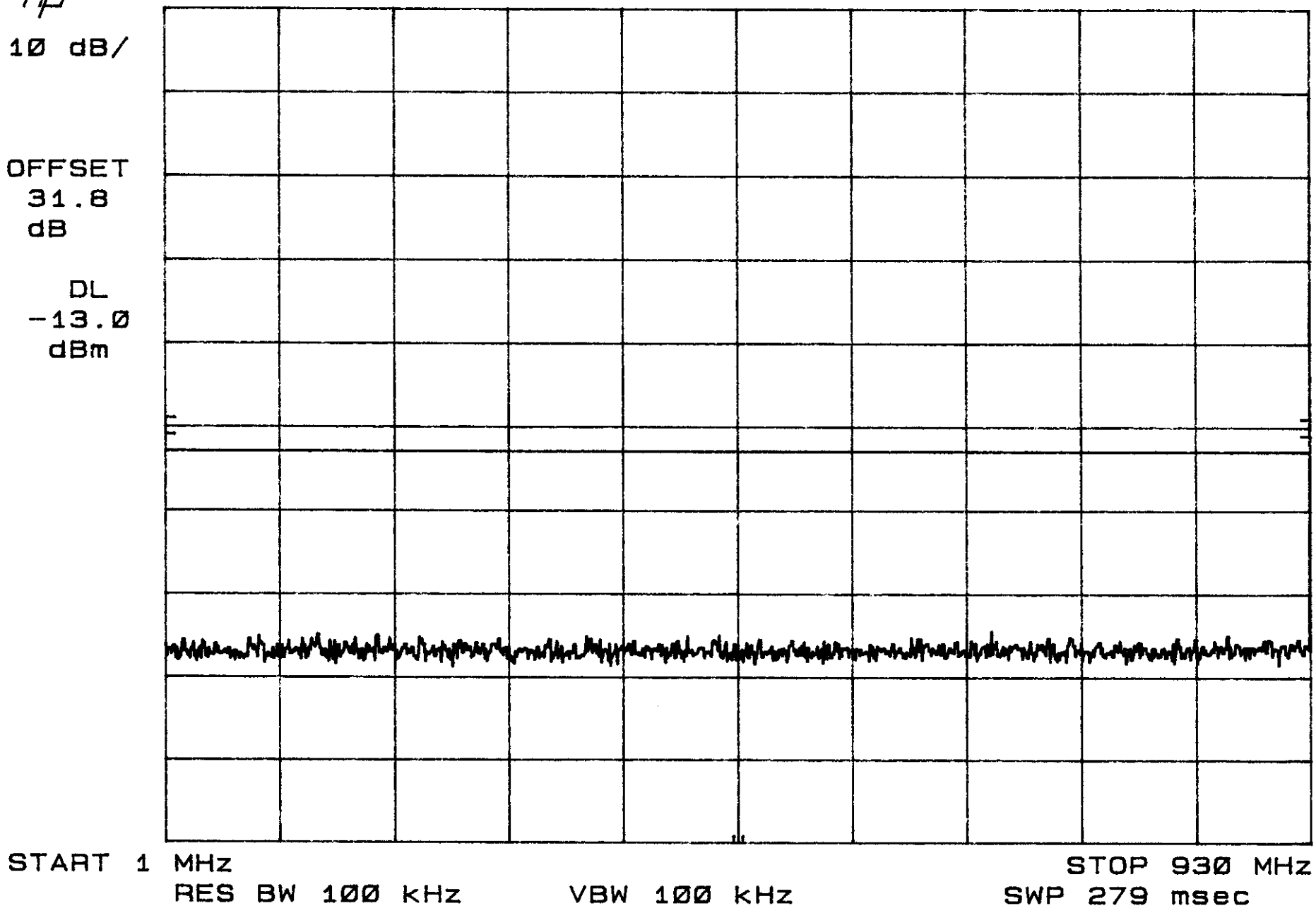
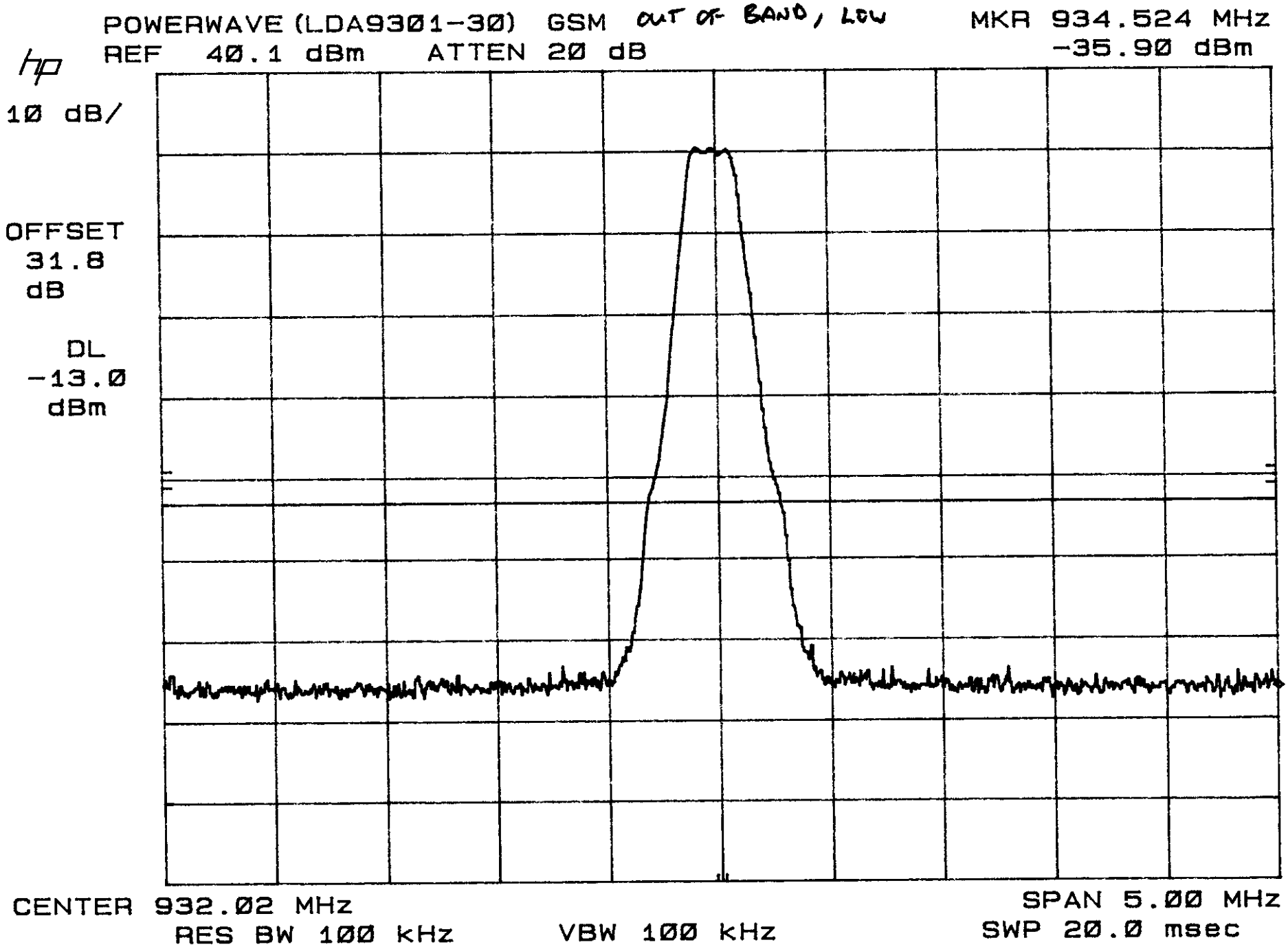
#13

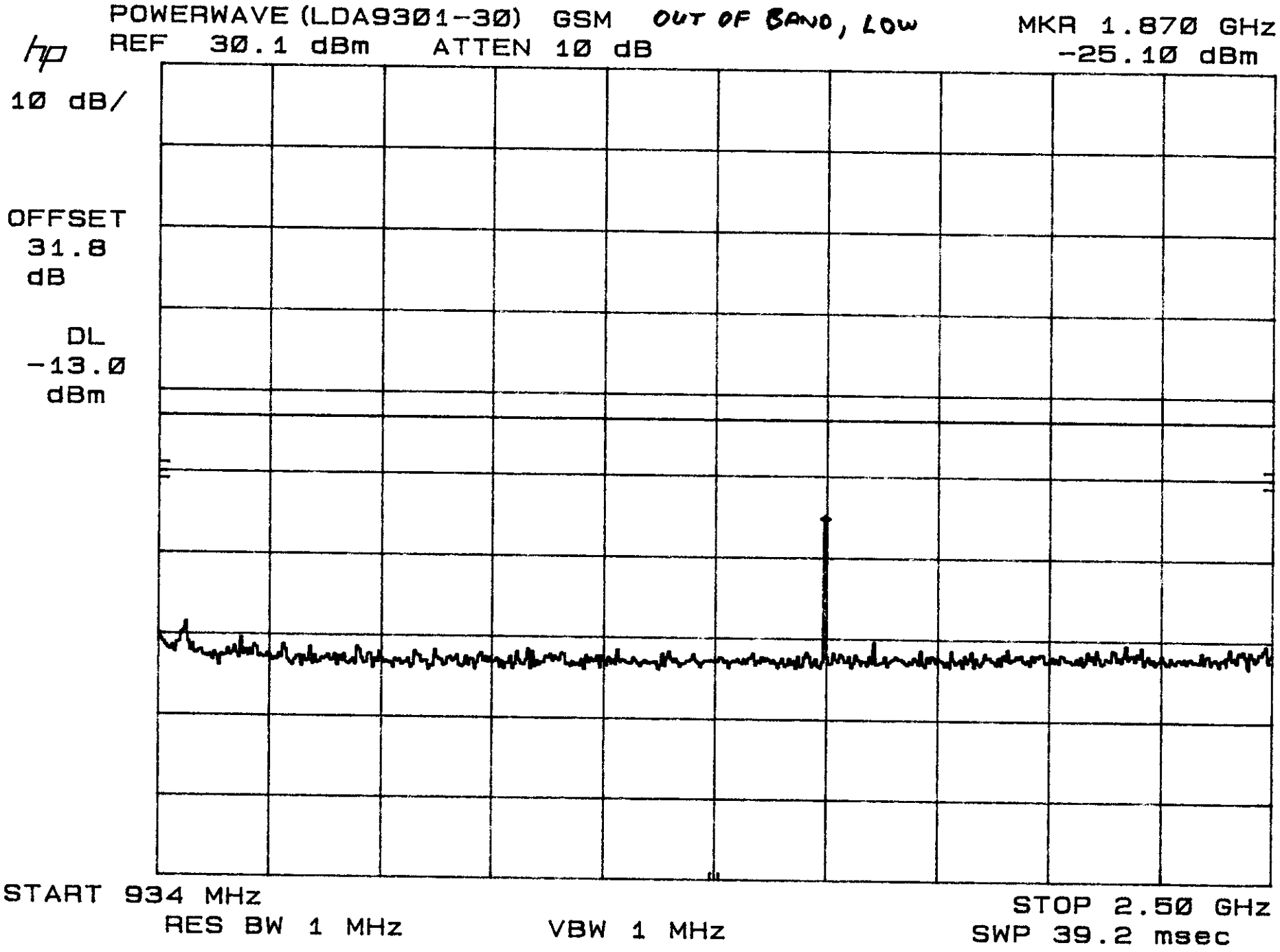
POWERWAVE (LDA9301-30) GSM OUT OF BAND, LOW



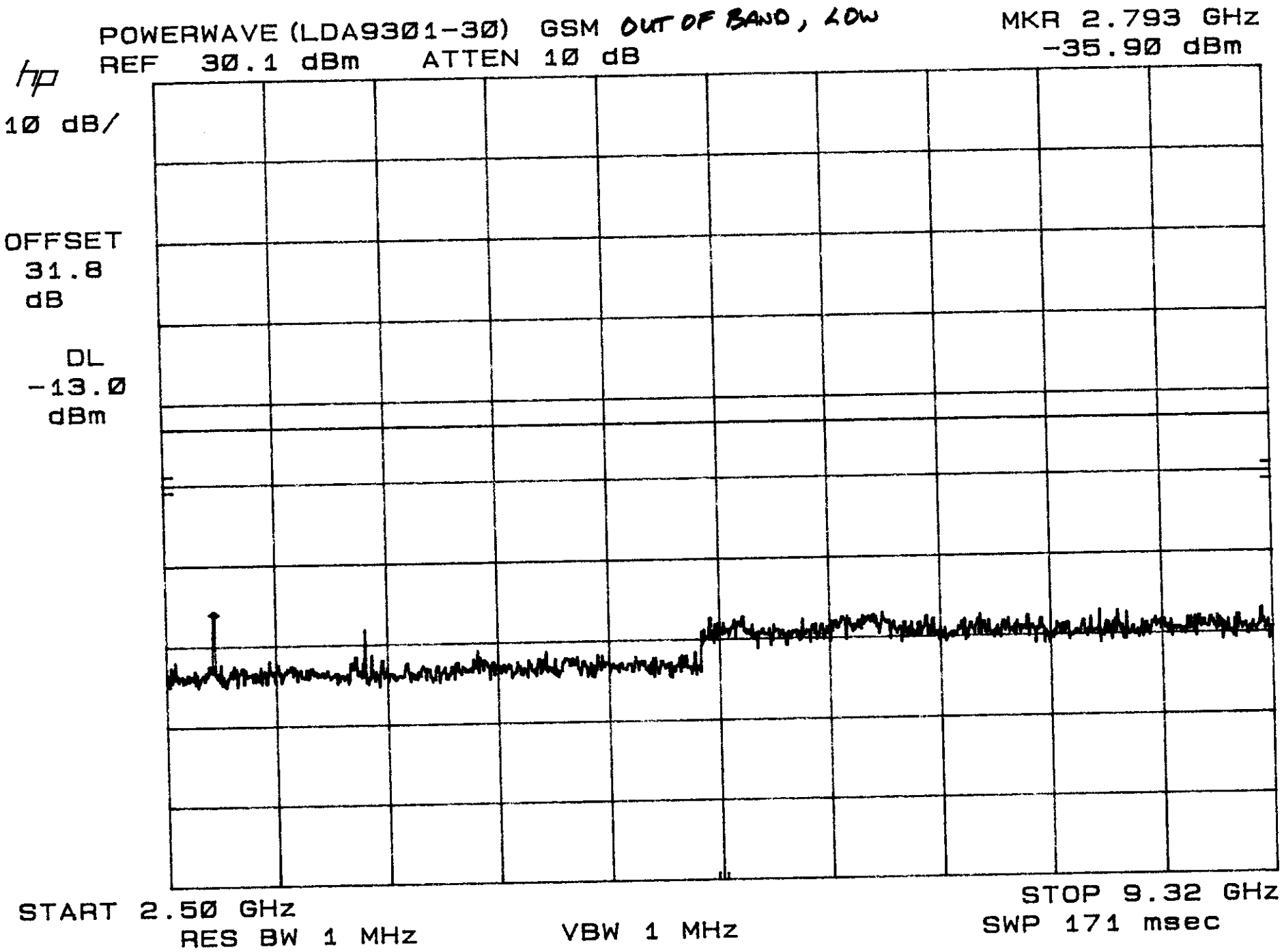
#14


POWERWAVE (LDA9301-30) GSM OUT OF BAND, LOW
MKR 934.524 MHz
REF 40.1 dBm ATTEN 20 dB
-35.90 dBm
10 dB/
OFFSET
31.8
dB
DL
-13.0
dBm
CENTER 932.02 MHz
SPAN 5.00 MHz
RES BW 100 kHz
VBW 100 kHz
SWP 20.0 msec

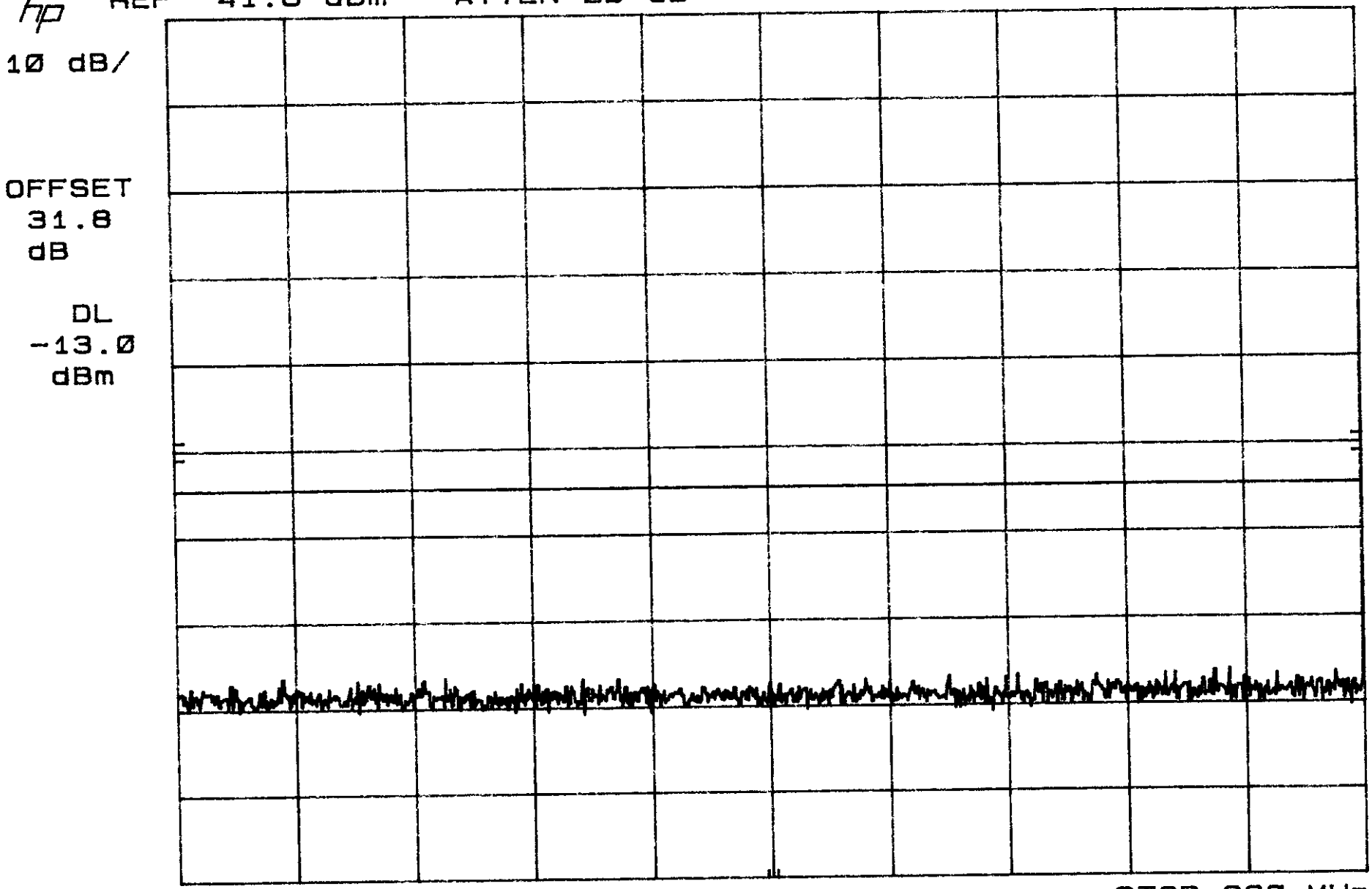
#15


POWERWAVE (LDA9301-30) GSM OUT OF BAND, LOW
REF 30.1 dBm ATTEN 10 dB
MKR 1.870 GHz
-25.10 dBm
10 dB/
OFFSET
31.8
dB
DL
-13.0
dBm
START 934 MHz
RES BW 1 MHz
VBW 1 MHz
STOP 2.50 GHz
SWP 39.2 msec

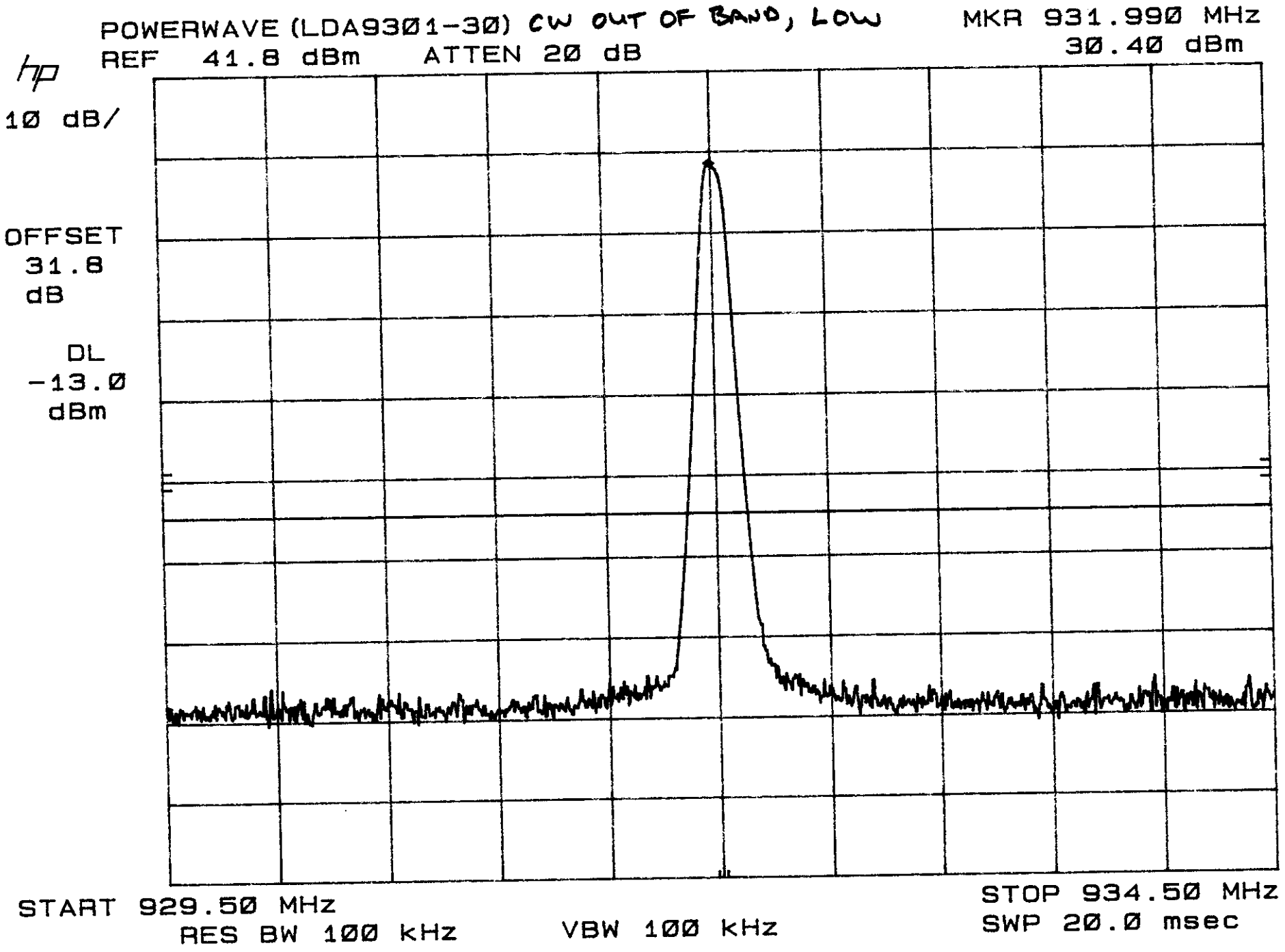
#16


POWERWAVE (LDA9301-30) GSM OUT OF BAND, LOW
MKR 2.793 GHz
-35.90 dBm
REF 30.1 dBm
ATTEN 10 dB
10 dB/
OFFSET
31.8
dB
DL
-13.0
dBm
START 2.50 GHz
RES BW 1 MHz
VBW 1 MHz
STOP 9.32 GHz
SWP 171 msec

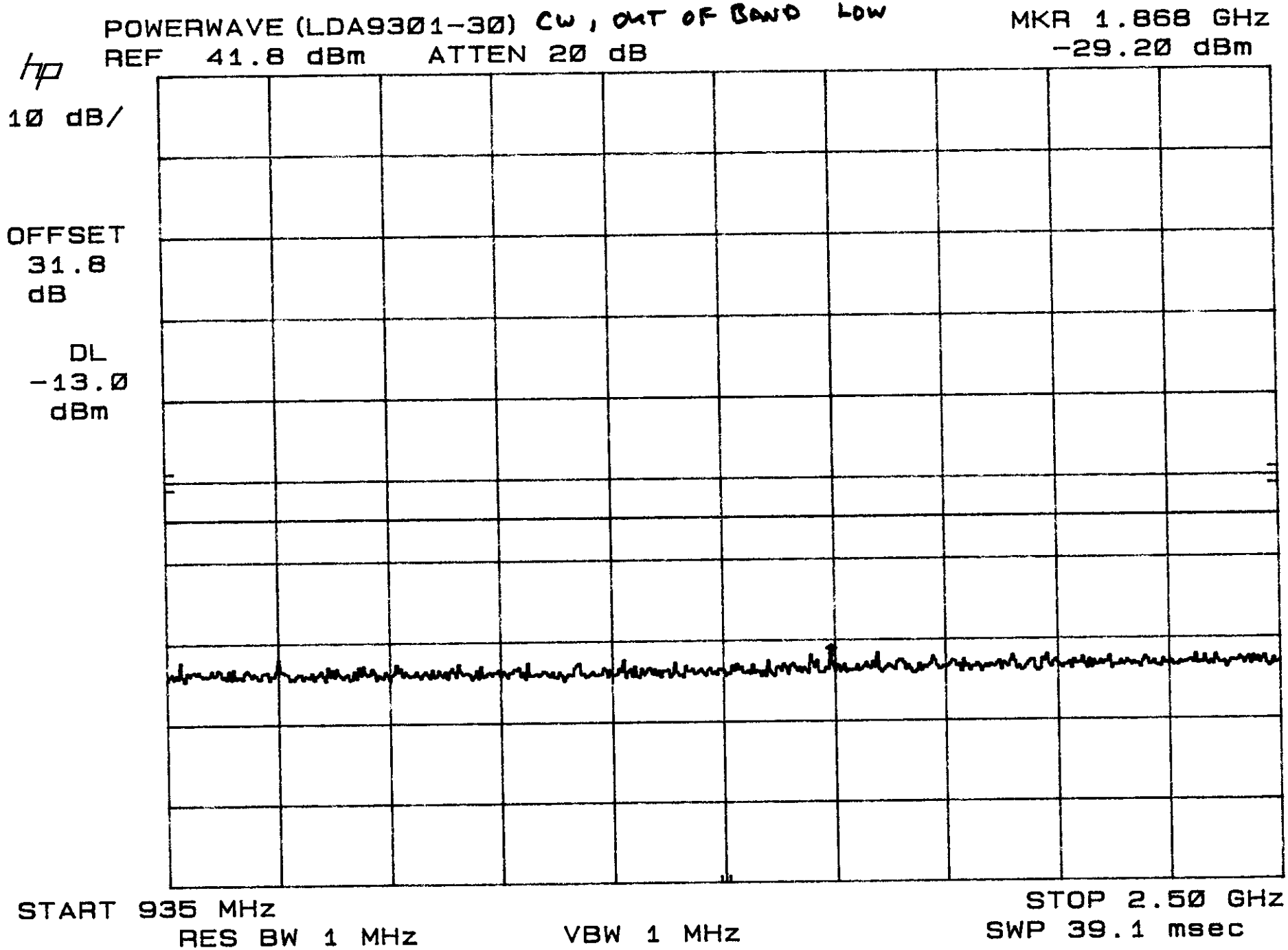
POWERWAVE (LDA9301-30) CW, OUT OF BAND LOW



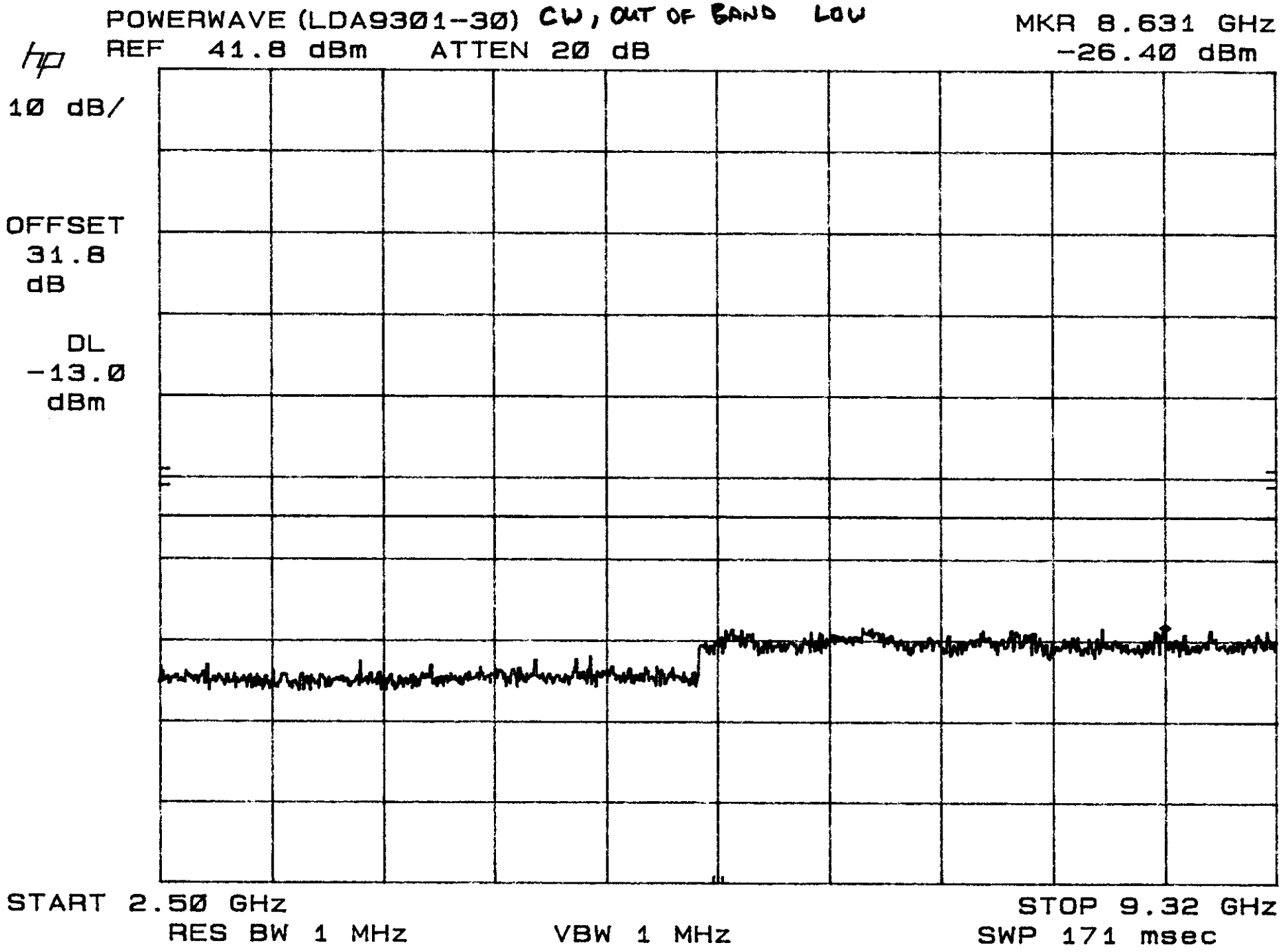
#18


POWERWAVE (LDA9301-30) CW OUT OF BAND, LOW
REF 41.8 dBm ATTEN 20 dB
MKR 931.990 MHz
30.40 dBm
10 dB/
OFFSET
31.8
dB
DL
-13.0
dBm
START 929.50 MHz
RES BW 100 kHz
VBW 100 kHz
STOP 934.50 MHz
SWP 20.0 msec

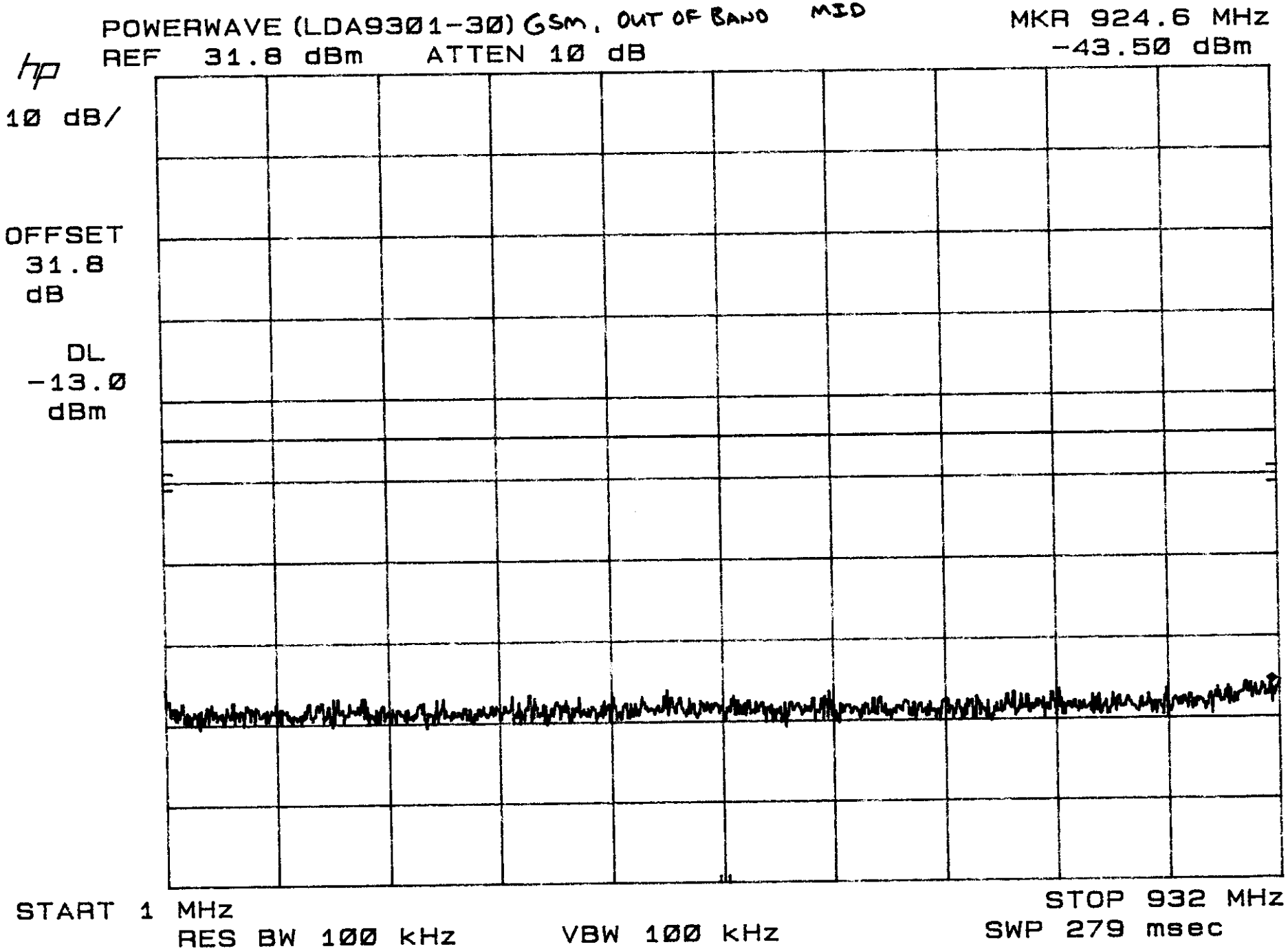
#17


POWERWAVE (LDA9301-30) CW, OUT OF BAND LOW
REF 41.8 dBm ATTEN 20 dB
MKR 1.868 GHz
-29.20 dBm
10 dB/
OFFSET
31.8
dB
DL
-13.0
dBm
START 935 MHz
RES BW 1 MHz
VBW 1 MHz
STOP 2.50 GHz
SWP 39.1 msec

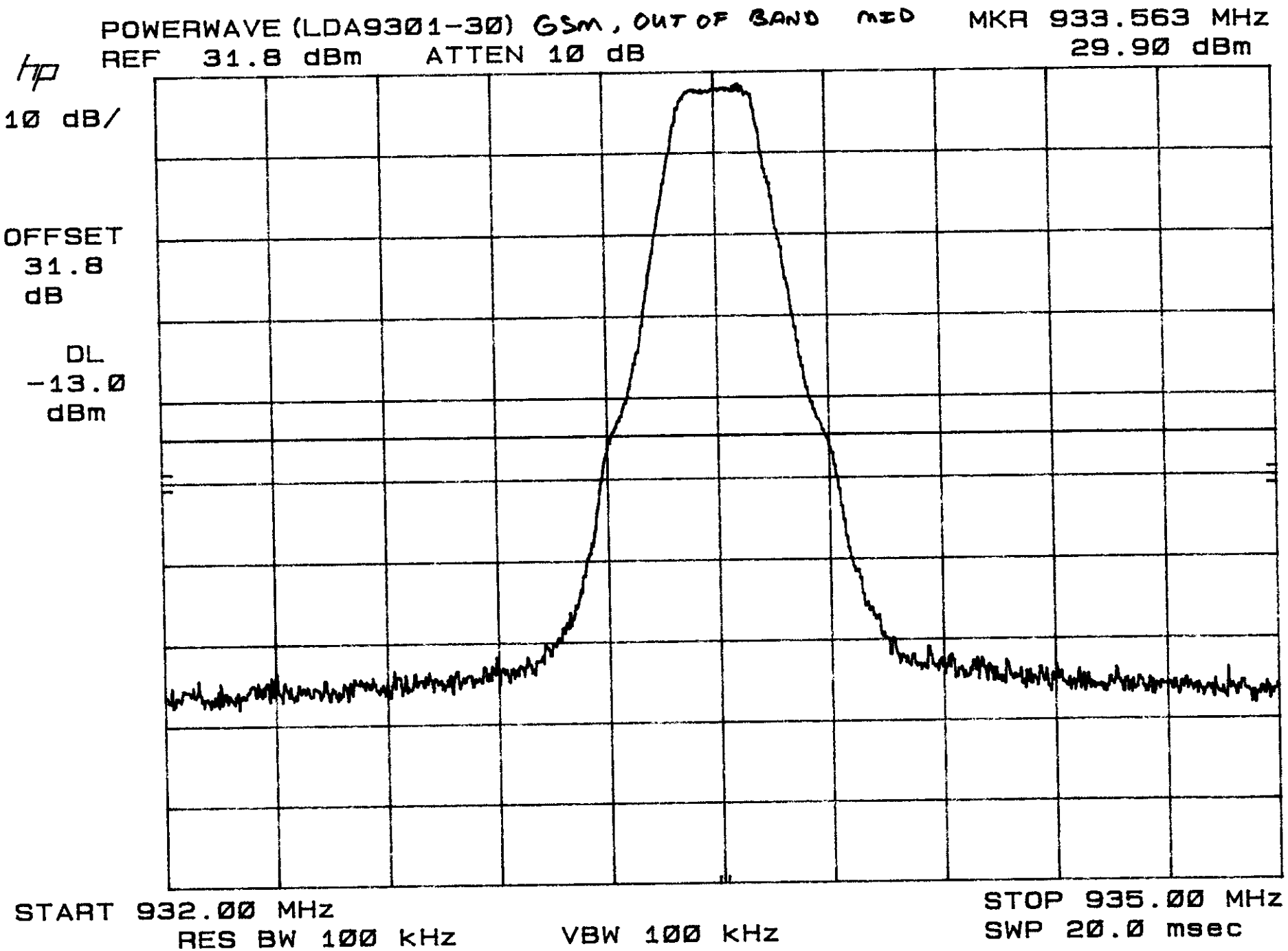
#20

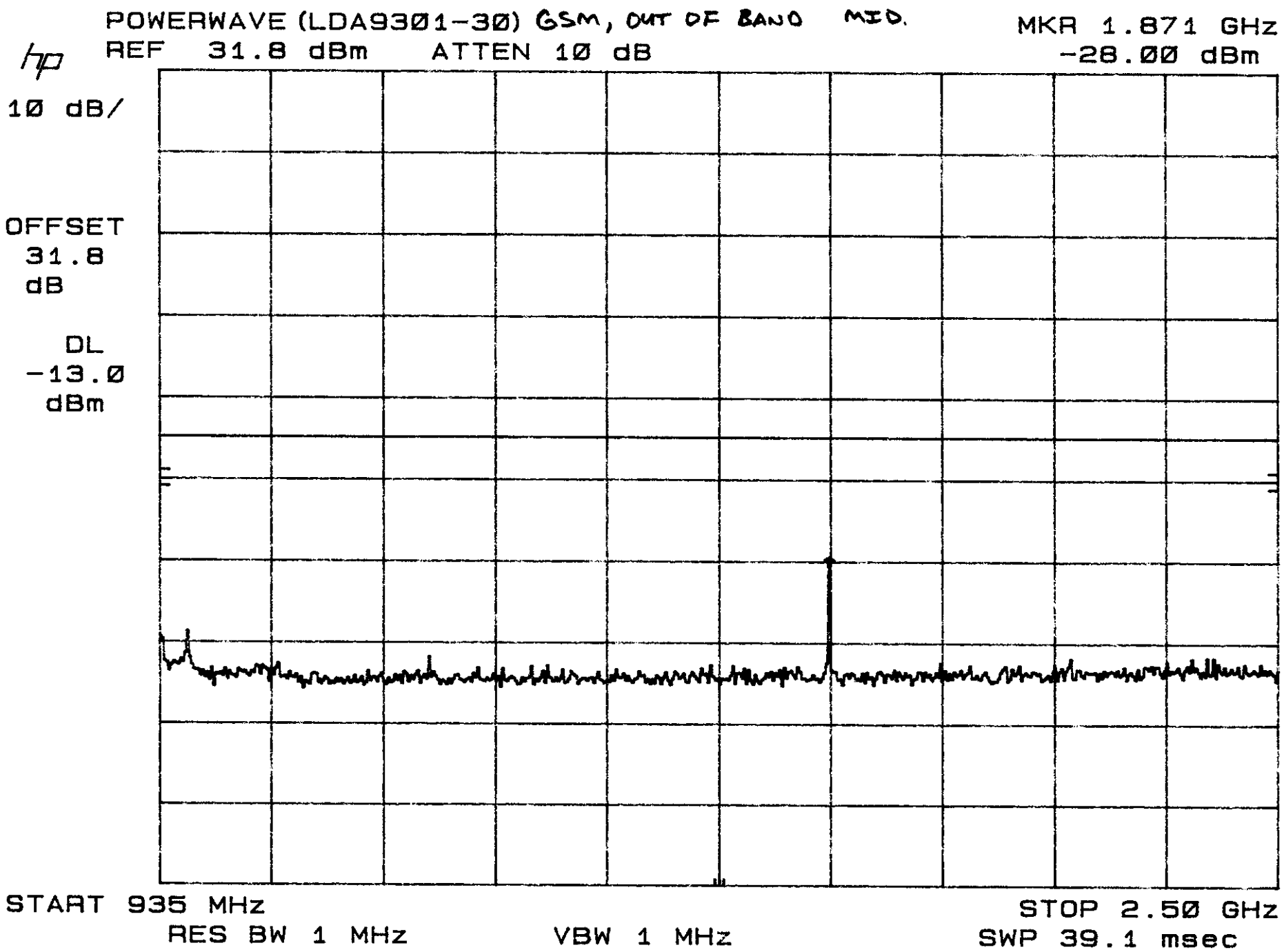

POWERWAVE (LDA9301-30) CW, OUT OF BAND LOW
REF 41.8 dBm ATTEN 20 dB
MKR 8.631 GHz
-26.40 dBm
10 dB/
OFFSET
31.8
dB
DL
-13.0
dBm
START 2.50 GHz
RES BW 1 MHz
VBW 1 MHz
STOP 9.32 GHz
SWP 171 msec

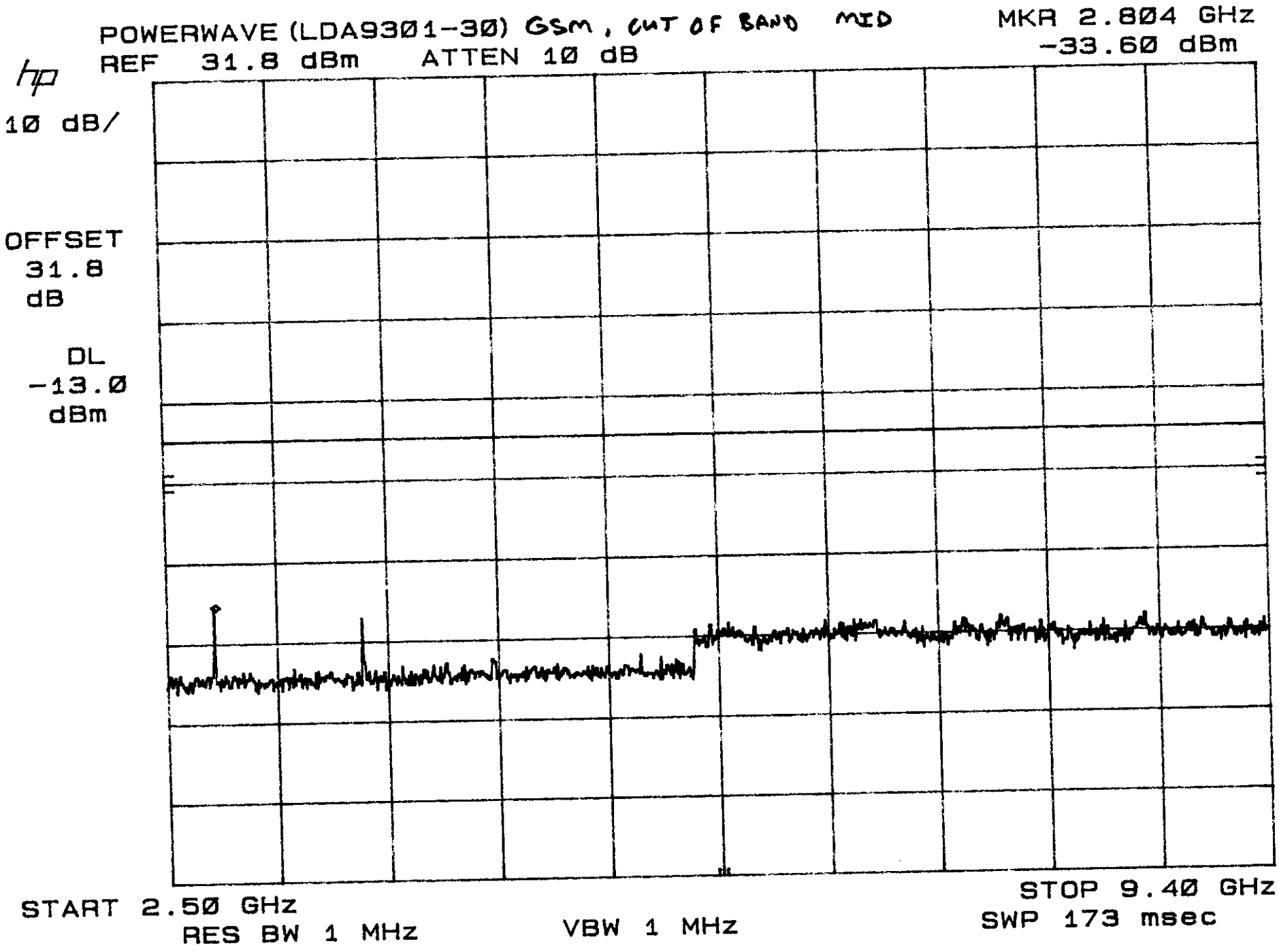
#21


POWERWAVE (LDA9301-30) GSM, OUT OF BAND MID
MKR 924.6 MHz
REF 31.8 dBm
ATTEN 10 dB
-43.50 dBm
hp
10 dB/
OFFSET
31.8
dB
DL
-13.0
dBm
START 1 MHz
STOP 932 MHz
RES BW 100 kHz
VBW 100 kHz
SWP 279 msec

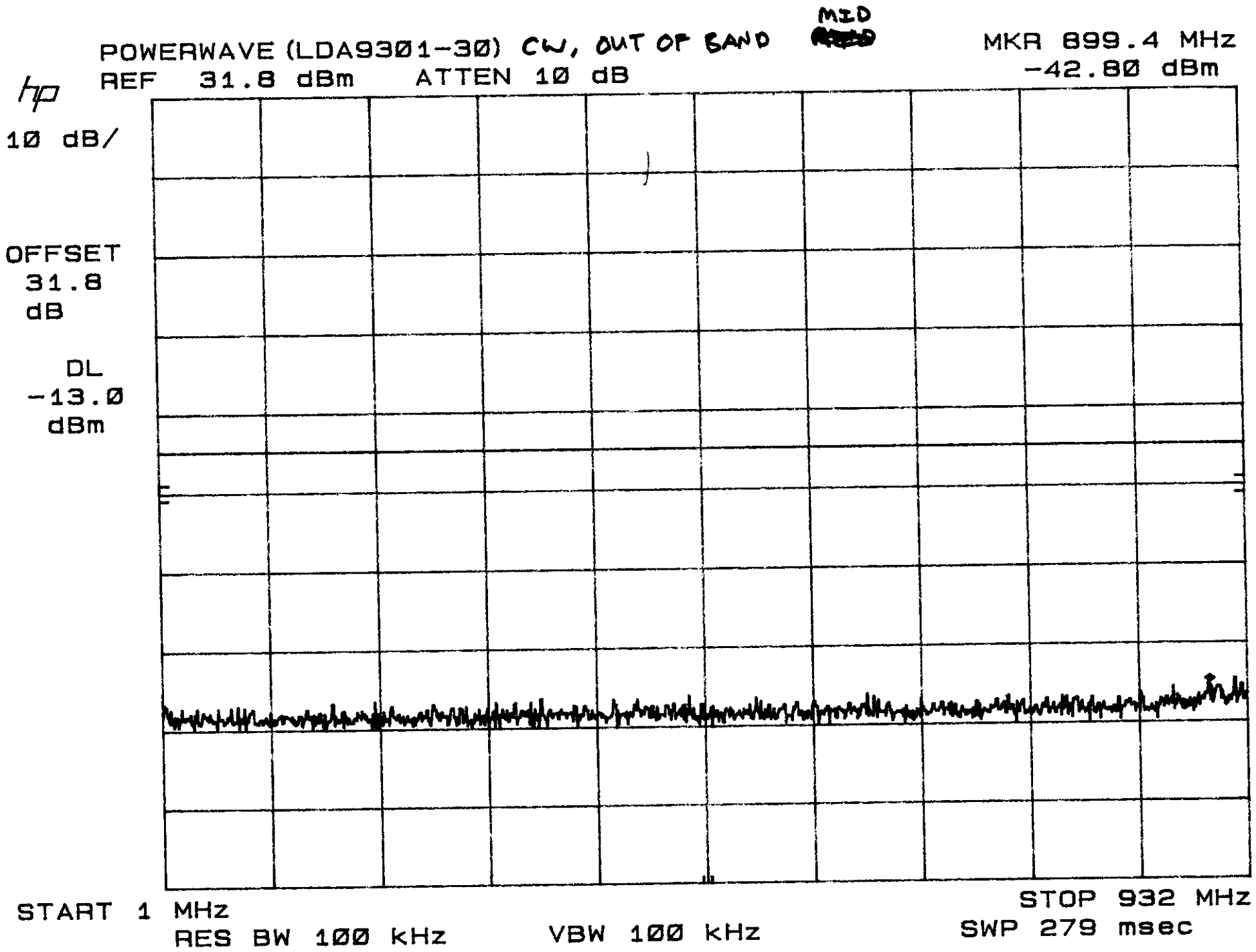
#22

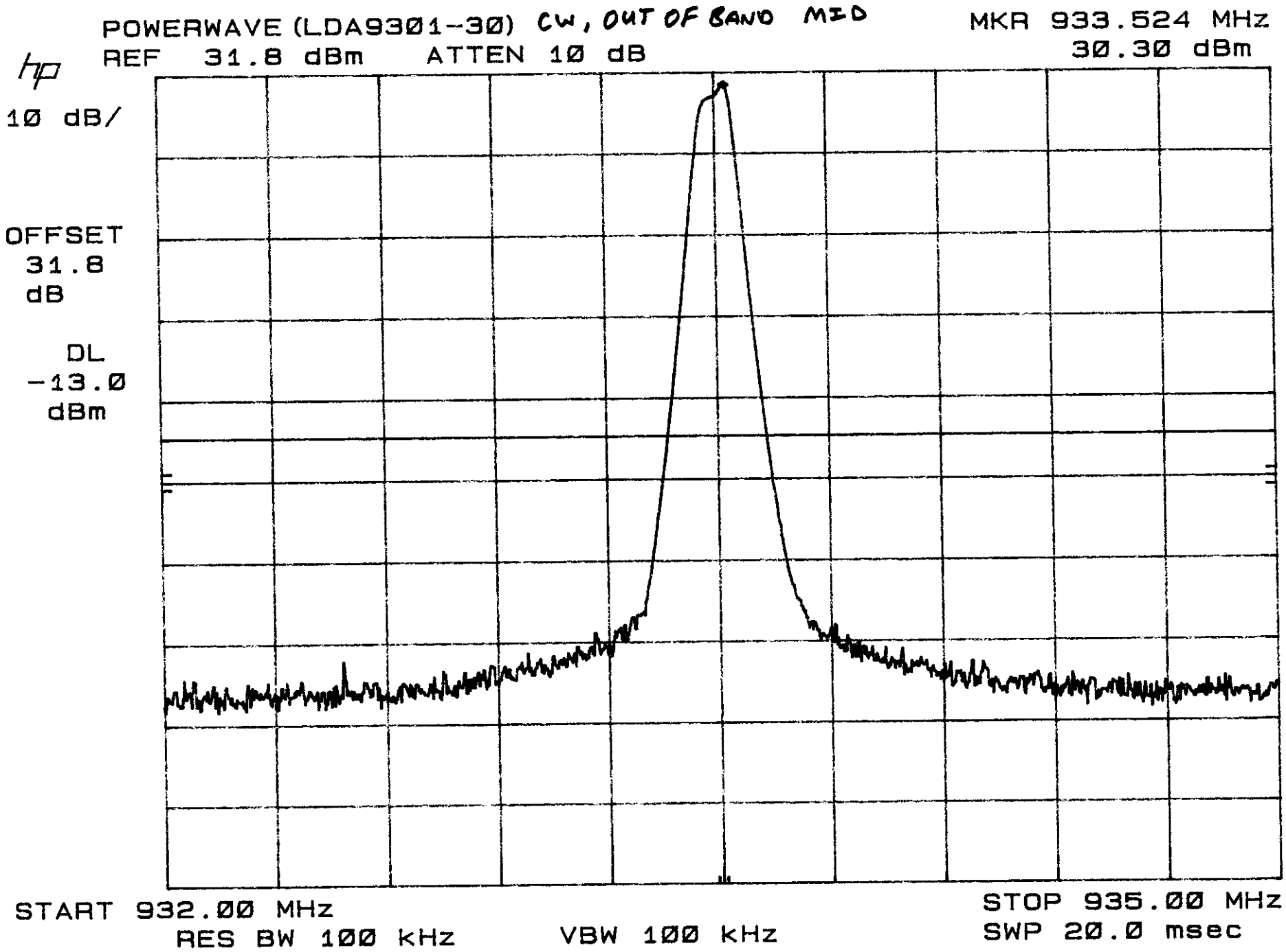

POWERWAVE (LDA9301-30) GSM, OUT OF BAND MID
MKR 933.563 MHz
29.90 dBm
REF 31.8 dBm
ATTEN 10 dB
10 dB/
OFFSET
31.8
dB
DL
-13.0
dBm
START 932.00 MHz
RES BW 100 kHz
VBW 100 kHz
STOP 935.00 MHz
SWP 20.0 msec


POWERWAVE (LDA9301-30) GSM, OUT OF BAND MID.
REF 31.8 dBm
ATTEN 10 dB
MKR 1.871 GHz
-28.00 dBm
10 dB/
OFFSET
31.8
dB
DL
-13.0
dBm
START 935 MHz
RES BW 1 MHz
VBW 1 MHz
STOP 2.50 GHz
SWP 39.1 msec


POWERWAVE (LDA9301-30) GSM, CUT OF BAND MID
REF 31.8 dBm
ATTEN 10 dB
MKR 2.804 GHz
-33.60 dBm
hp
10 dB/
OFFSET
31.8
dB
DL
-13.0
dBm
START 2.50 GHz
RES BW 1 MHz
VBW 1 MHz
STOP 9.40 GHz
SWP 173 msec

#25


POWERWAVE (LDA9301-30) CW, OUT OF BAND MID
REF 31.8 dBm ATTEN 10 dB
MKR 899.4 MHz
-42.80 dBm
10 dB/
OFFSET
31.8
dB
DL
-13.0
dBm
START 1 MHz
RES BW 100 kHz
VBW 100 kHz
STOP 932 MHz
SWP 279 msec


POWERWAVE (LDA9301-30) CW, OUT OF BAND MID
REF 31.8 dBm ATTEN 10 dB
MKR 933.524 MHz
30.30 dBm
10 dB/
OFFSET
31.8
dB
DL
-13.0
dBm
START 932.00 MHz
RES BW 100 kHz
VBW 100 kHz
STOP 935.00 MHz
SWP 20.0 msec

POWERWAVE (LDA9301-30) CW, OUT OF BAND MID

MKR 1.871 GHz
-29.90 dBm

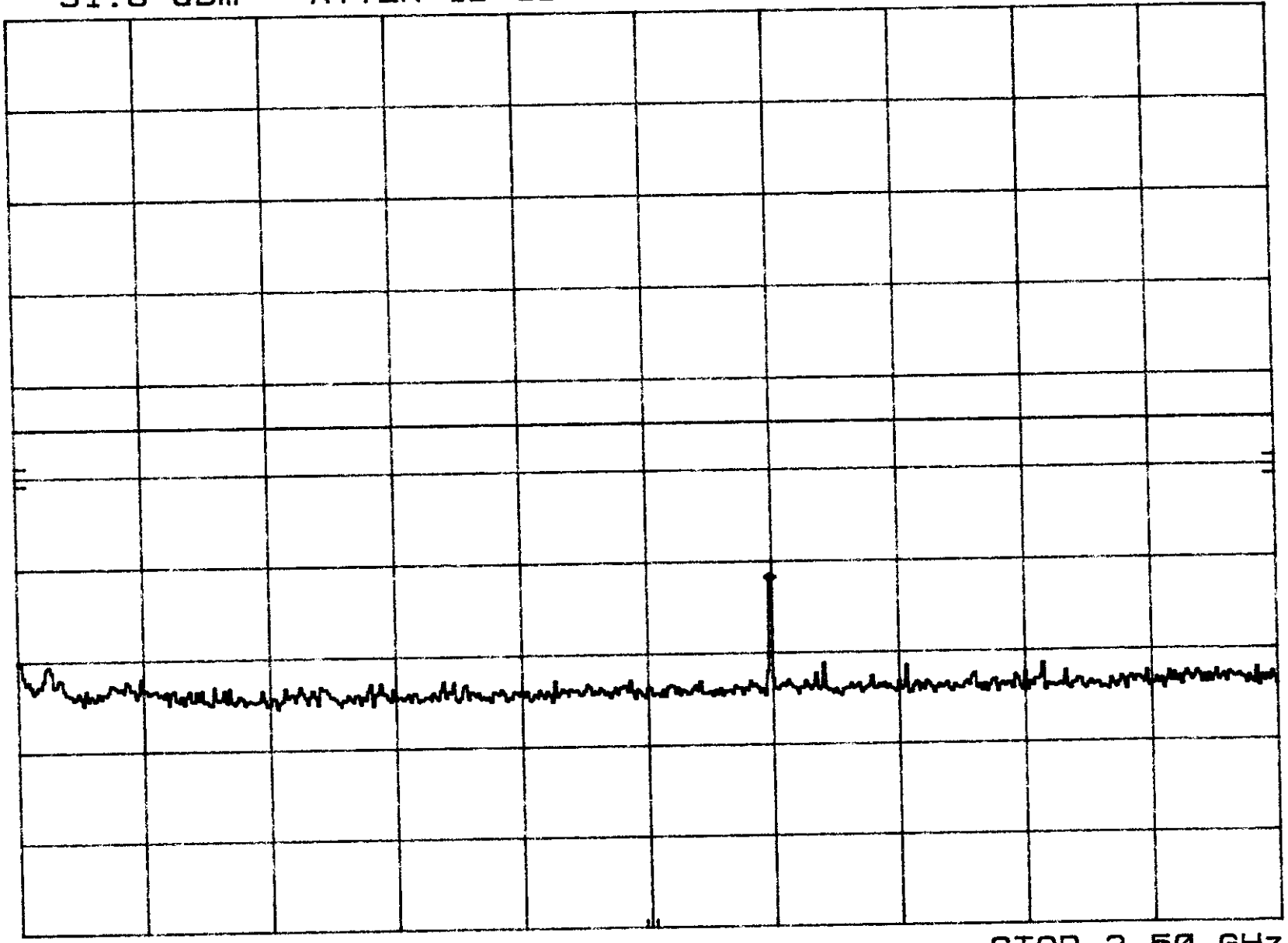
REF 31.8 dBm ATTEN 10 dB

hp

10 dB/

OFFSET
31.8
dB

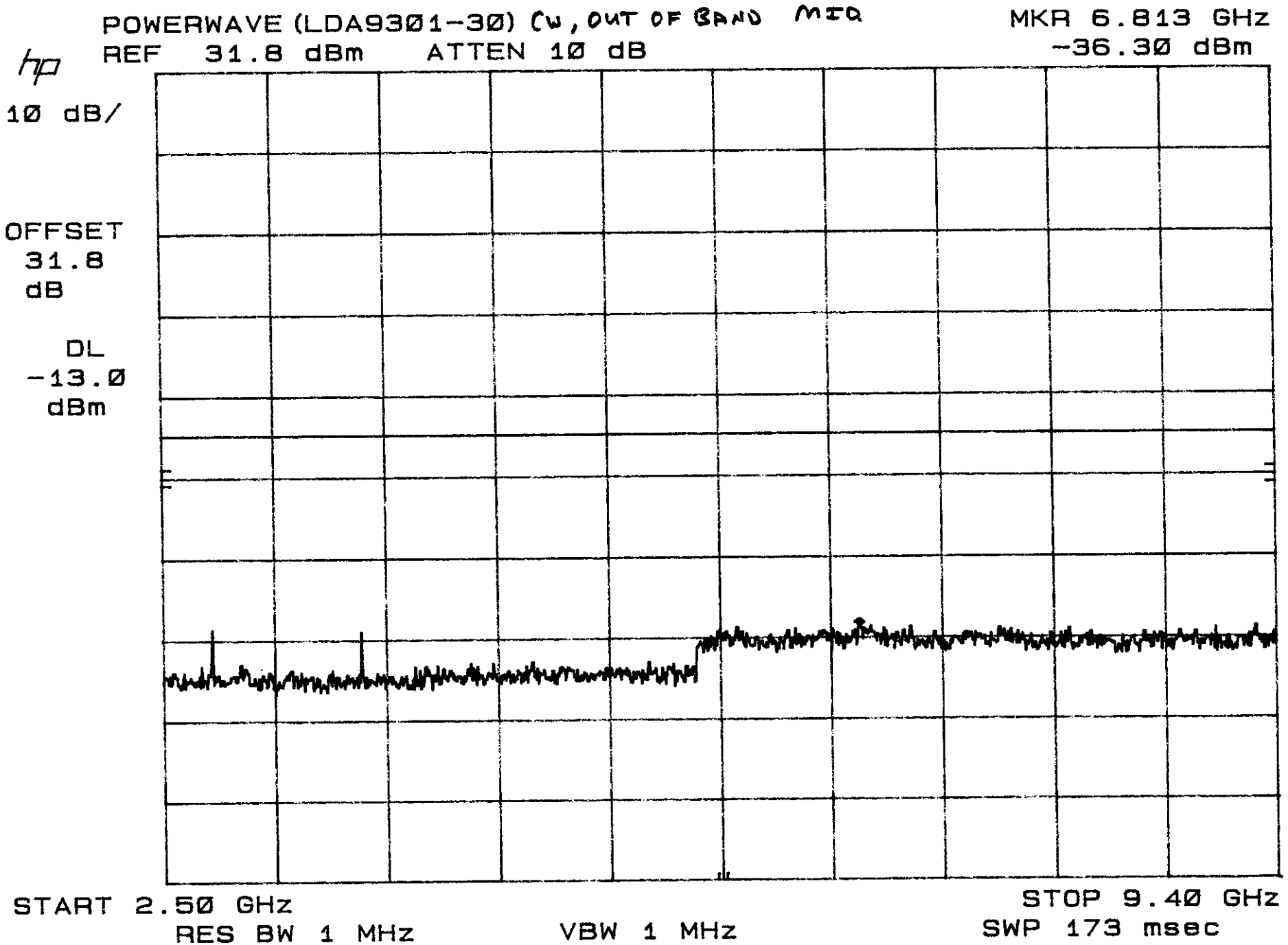
DL
-13.0
dBm



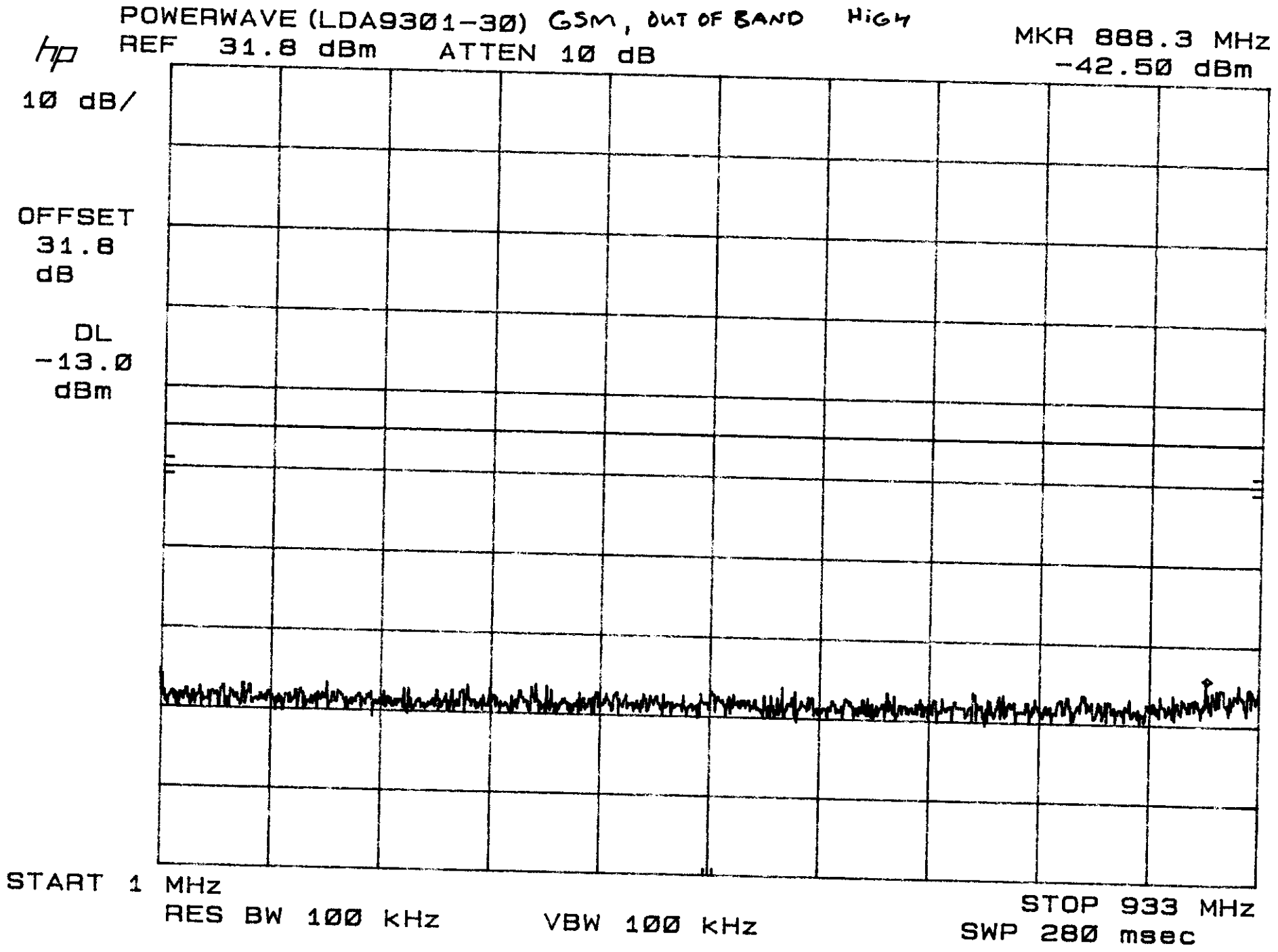
START 935 MHz
RES BW 1 MHz

VBW 1 MHz

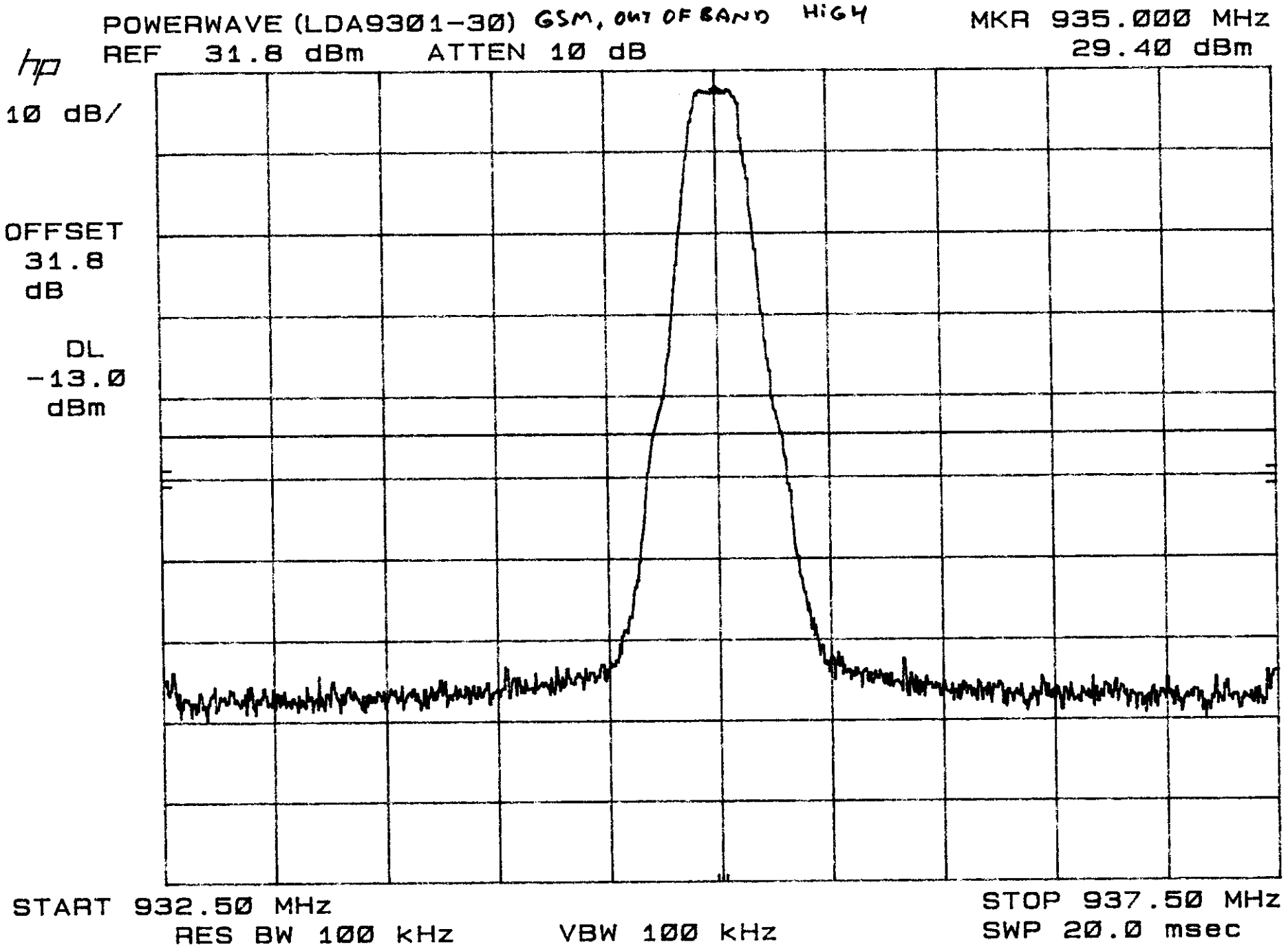
STOP 2.50 GHz
SWP 39.1 msec


POWERWAVE (LDA9301-30) CW, OUT OF BAND MIQ
MKR 6.813 GHz
REF 31.8 dBm
ATTEN 10 dB
-36.30 dBm
10 dB/
OFFSET
31.8
dB
DL
-13.0
dBm
START 2.50 GHz
STOP 9.40 GHz
RES BW 1 MHz
VBW 1 MHz
SWP 173 msec

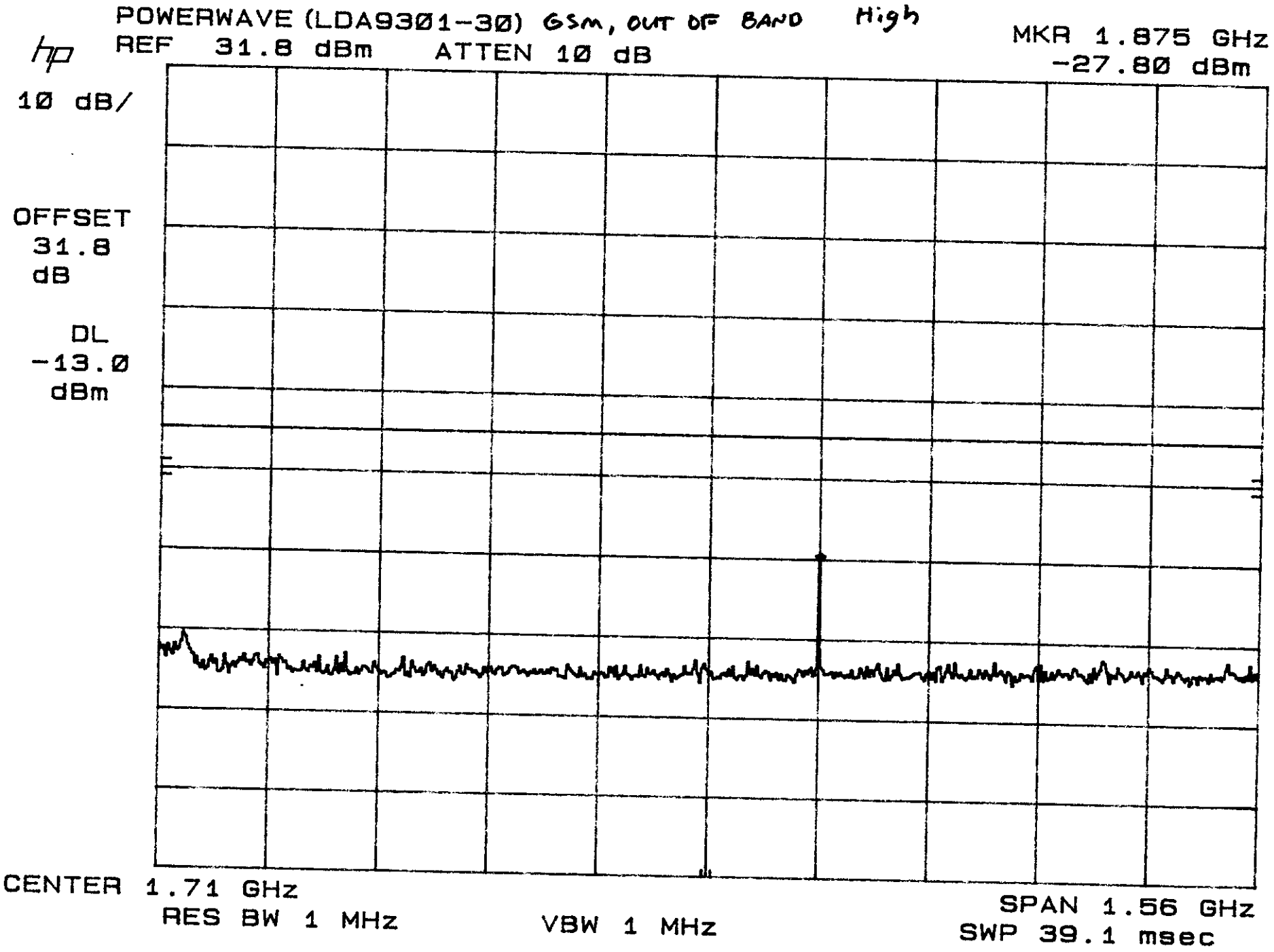
#9

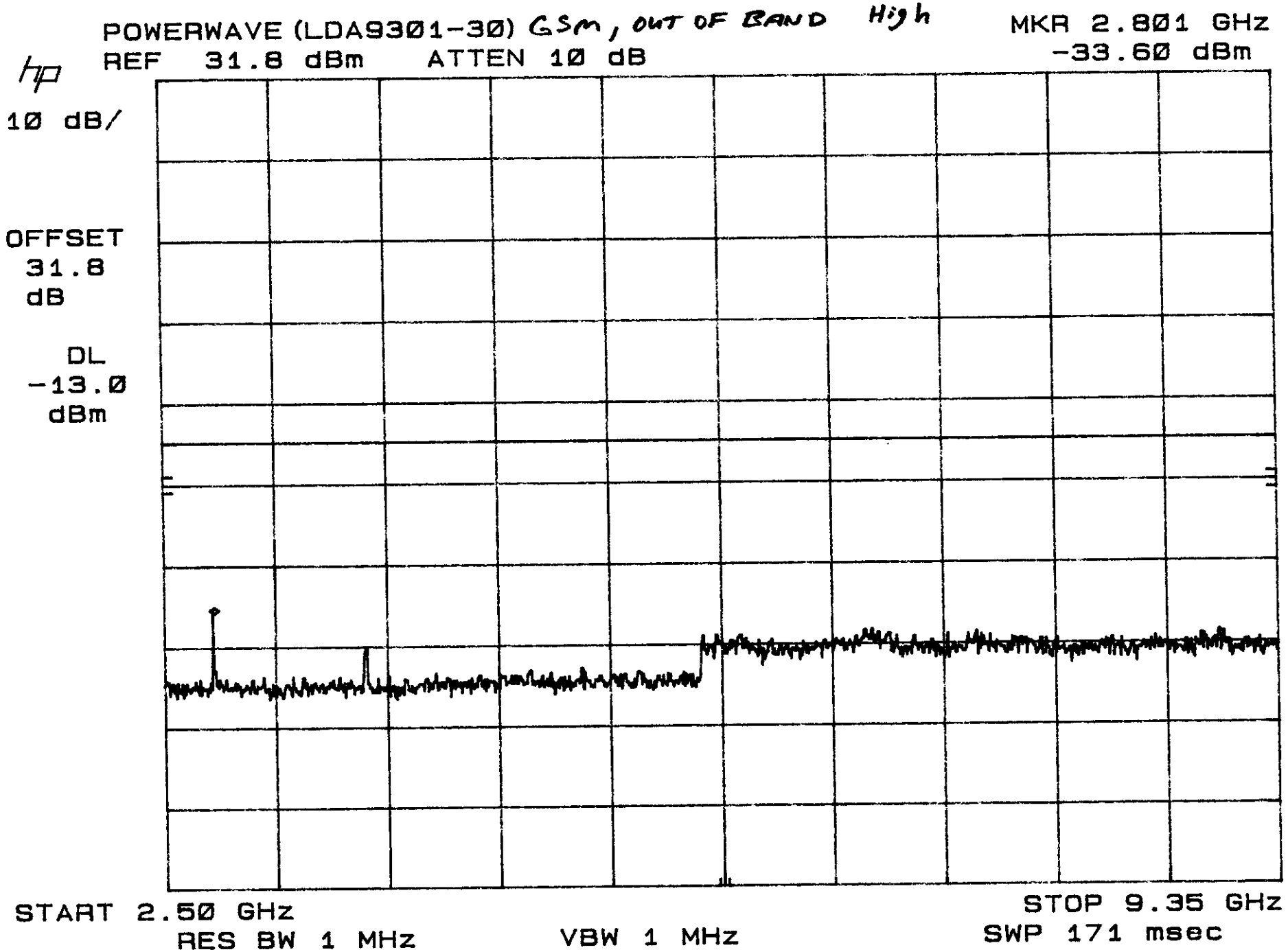

POWERWAVE (LDA9301-30) GSM, OUT OF BAND HIGH
REF 31.8 dBm
ATTEN 10 dB
MKR 888.3 MHz
-42.50 dBm
10 dB/
OFFSET
31.8
dB
DL
-13.0
dBm
START 1 MHz
RES BW 100 kHz
VBW 100 kHz
STOP 933 MHz
SWP 280 msec

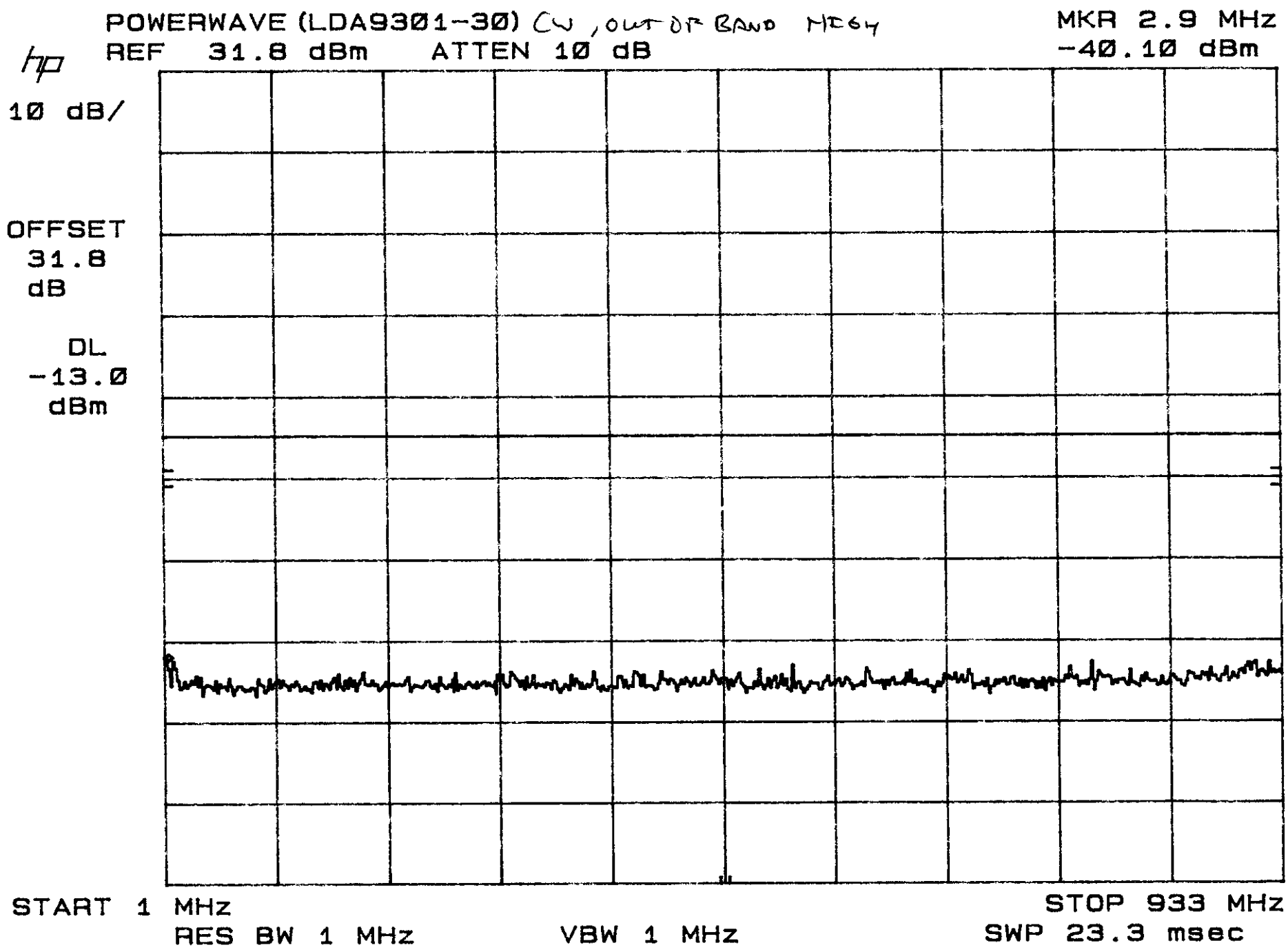
#30

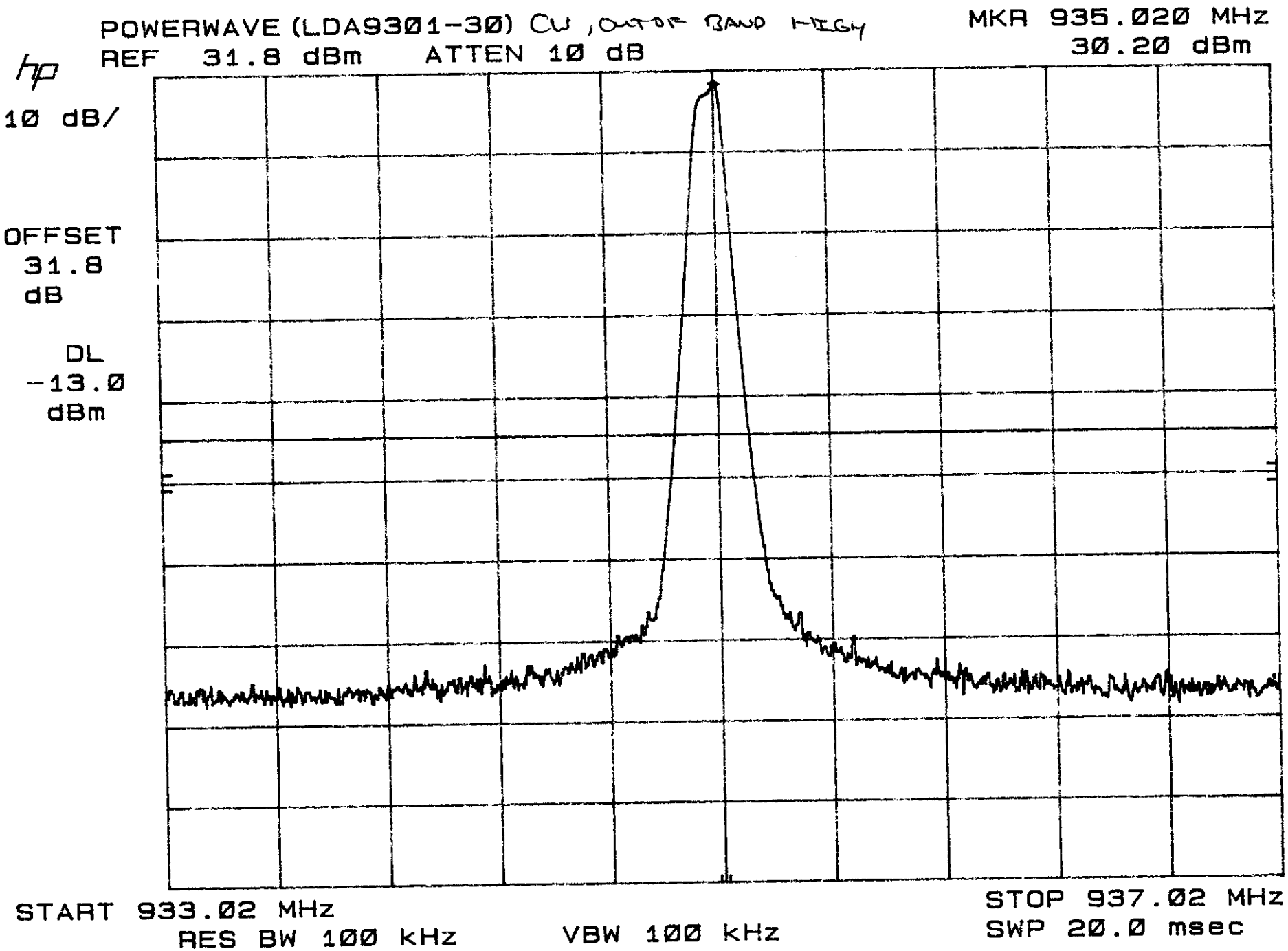

POWERWAVE (LDA9301-30) GSM, OUT OF BAND HIGH
MKR 935.000 MHz
REF 31.8 dBm ATTEN 10 dB
29.40 dBm
hp
10 dB/
OFFSET
31.8
dB
DL
-13.0
dBm
START 932.50 MHz
STOP 937.50 MHz
RES BW 100 kHz
VBW 100 kHz
SWP 20.0 msec

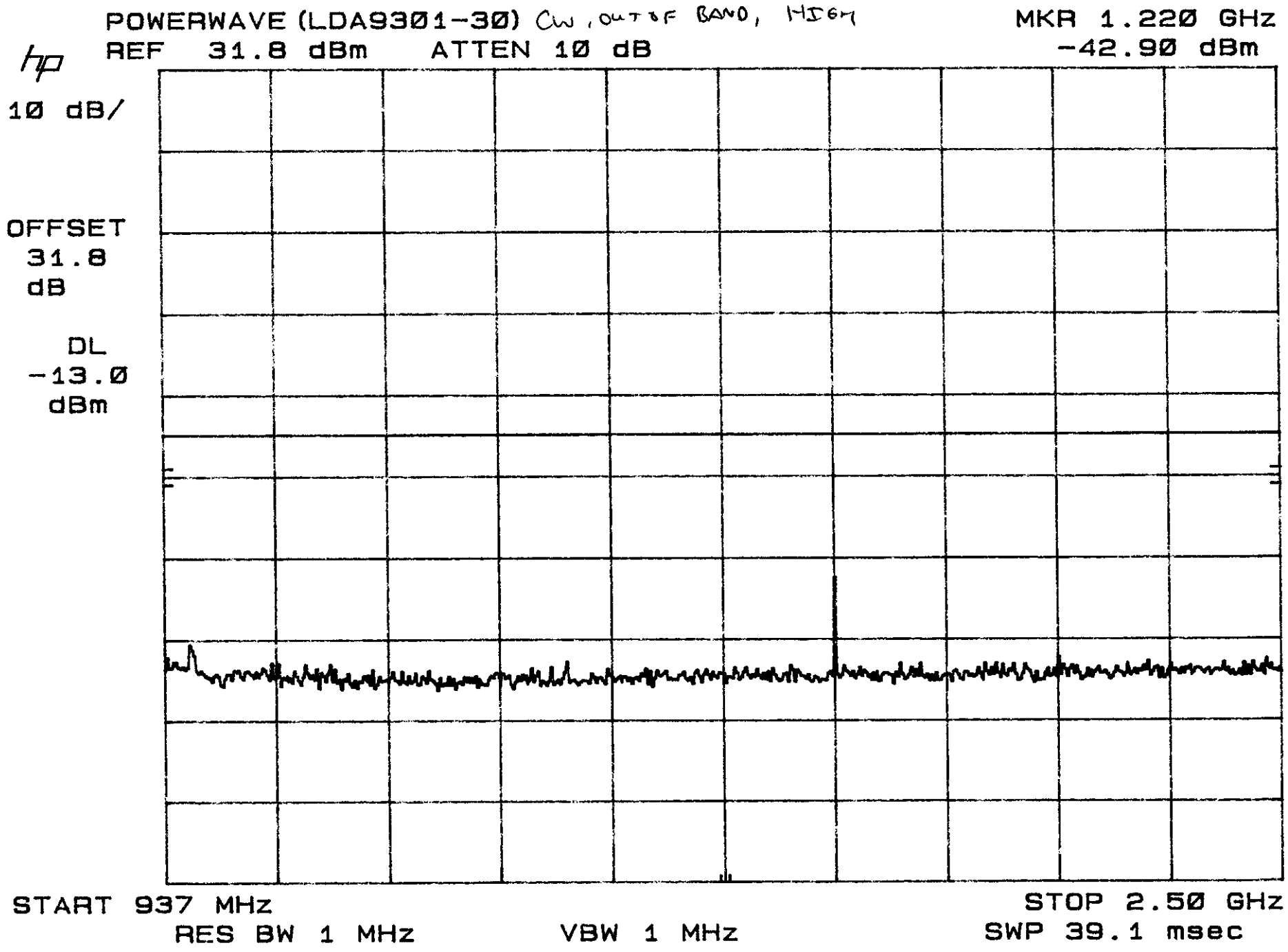
#31


POWERWAVE (LDA9301-30) GSM, OUT OF BAND High
REF 31.8 dBm
ATTEN 10 dB
MKR 1.875 GHz
-27.80 dBm
10 dB/
OFFSET
31.8
dB
DL
-13.0
dBm
CENTER 1.71 GHz
RES BW 1 MHz
VBW 1 MHz
SPAN 1.56 GHz
SWP 39.1 msec

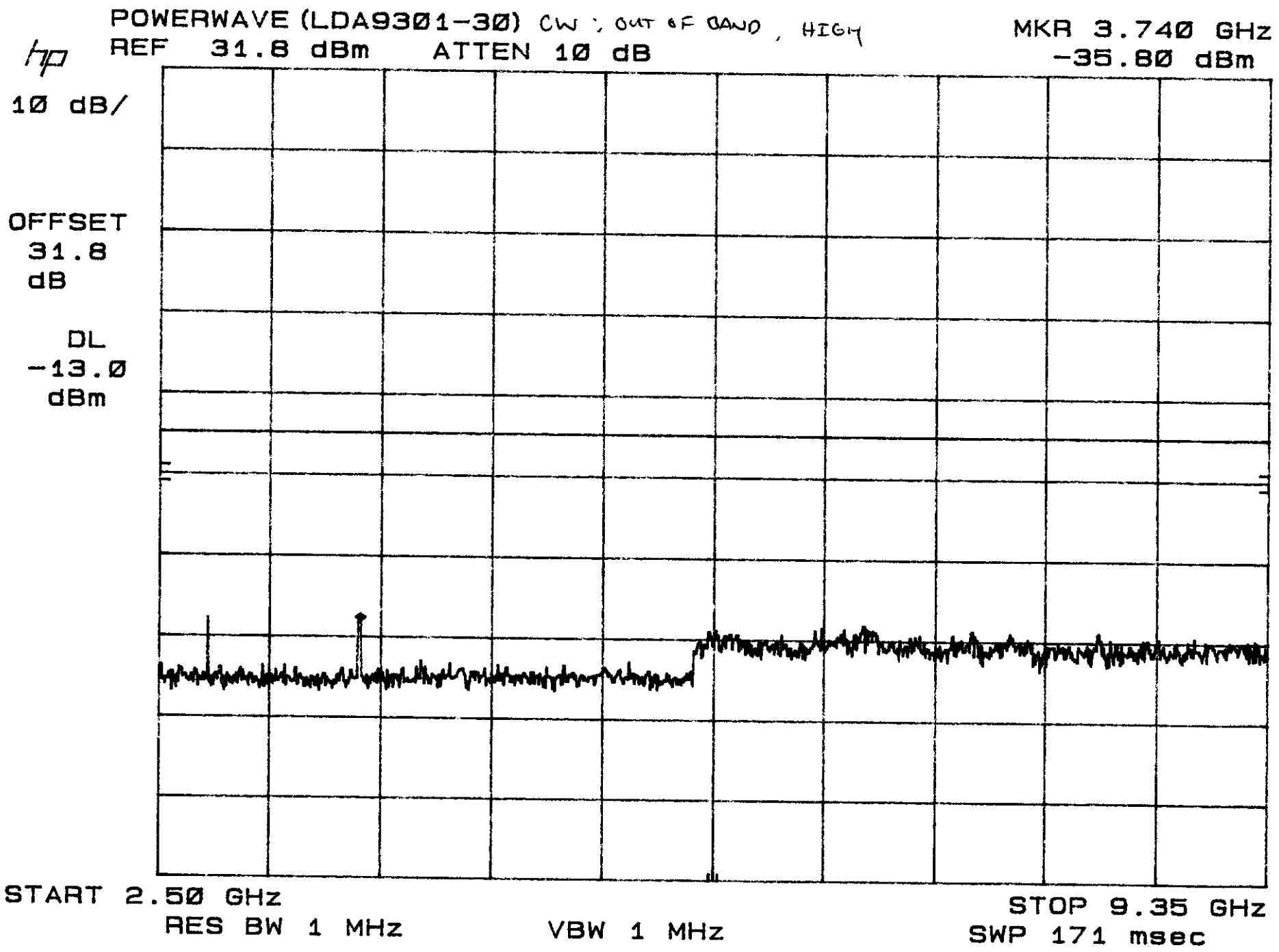

POWERWAVE (LDA9301-30) GSM, OUT OF BAND High
MKR 2.801 GHz
REF 31.8 dBm
ATTEN 10 dB
-33.60 dBm
hp
10 dB/
OFFSET
31.8
dB
DL
-13.0
dBm
START 2.50 GHz
STOP 9.35 GHz
RES BW 1 MHz
VBW 1 MHz
SWP 171 msec


POWERWAVE (LDA9301-30) CW, OUT OF BAND MEAS
MKR 2.9 MHz
REF 31.8 dBm
ATTEN 10 dB
-40.10 dBm
10 dB/
OFFSET
31.8
dB
DL
-13.0
dBm
START 1 MHz
STOP 933 MHz
RES BW 1 MHz
VBW 1 MHz
SWP 23.3 msec


POWERWAVE (LDA9301-30) CW, OUTOF BAND HIGH
MKR 935.020 MHz
30.20 dBm
REF 31.8 dBm
ATTEN 10 dB
hp
10 dB/
OFFSET
31.8
dB
DL
-13.0
dBm
START 933.02 MHz
RES BW 100 kHz
VBW 100 kHz
STOP 937.02 MHz
SWP 20.0 msec


POWERWAVE (LDA9301-30) CW, OUT OF BAND, HIGH
MKR 1.220 GHz
REF 31.8 dBm
ATTEN 10 dB
-42.90 dBm
10 dB/
OFFSET
31.8
dB
DL
-13.0
dBm
START 937 MHz
STOP 2.50 GHz
RES BW 1 MHz
VBW 1 MHz
SWP 39.1 msec

#36


POWERWAVE (LDA9301-30) CW, OUT OF BAND, HIGH
REF 31.8 dBm
ATTEN 10 dB
MKR 3.740 GHz
-35.80 dBm
10 dB/
OFFSET
31.8
dB
DL
-13.0
dBm
START 2.50 GHz
RES BW 1 MHz
VBW 1 MHz
STOP 9.35 GHz
SWP 171 msec

SECTION 2.995 FREQUENCT STABILITY

Not Applicable. Device is a power amplifier.

SECTION 2.993 FIELD STRENGTH OF SPURIOUS RADIATION

Technical Limits applied Section 22.359 emission mask

(a) Analog modulation applied.

LDA9301-30

All readings GSM Vertical polarized on second Harmonic @ 1800MHz

Fo=932MHz
1 Amplifiers 30WATTS Output:

($\sqrt{30}$ * 30) / 3 = 10 V/m= 140dBuV/m

Emission Masks = 43 + 10 log (30) = 57.8

140.0 - 57.8 = 82.2

dBuV	AF	CL	AMP	dBuV/m	LIMIT	MARGIN
49.13	26.7	2.1	-35	42.93	82.2	-39.27

Fo=933.5MHz

1 Amplifiers 30WATTS Output:

($\sqrt{30}$ * 30) / 3 = 10 V/m= 140.0dBuV/m

Emission Masks = 43 + 10 log (30) = 57.8

140.0 - 57.8 = 82.2

dBuV	AF	CL	AMP	dBuV/m	LIMIT	MARGIN
48.67	26.7	2.1	-35	42.47	82.2	-39.73

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Fo=935MHz

1 Amplifiers 30WATTS Output:

($\sqrt{30}$ * 30) / 3 = 10 V/m= 140.0dBuV/m

Emission Masks = 43 + 10 log (94) = 57.8

140.0 - 57.8 = 82.2

dBuV	AF	CL	AMP	dBuV/m	LIMIT	MARGIN
49.75	26.7	2.1	-35	43.55	82.2	-38.65

b) Radiated emissions data of harmonics at 1 meter from second to 10*fo* attached.

Radiated Emissions
FCC 22.359

5/18/98
Juan Martinez
Site C (1 meter)

Powerwave Technologies
SINGLE CHANNEL 30W AMPLIFIER-GSM (LDA9301-30)

F(MHz)	READING (dBuV)	AF (dB)	CL (dB)	Amp (dB)	DIST (dB)	DUTY (dB)	Other (dB)	Total (dBuV/m)	Limit (dBuV/m)	Margin (dB)
fo= 932MHz (-12.8dBm)										
1864	60.51	26.7	2.1	-35	-9.5	0	1	45.81	82	-36.19
2796	54.81	30	3.99	-35	-9.5	0	1	45.3	82	-36.7
3728	47.01	32	4.75	-35	-9.5	0	1	40.26	82	-41.74
4660	45.11	32.5	5.32	-35	-9.5	0	1	39.43	82	-42.57
5592NF	41.97	35.2	5.7	-35	-9.5	0	1	39.37	82	-42.63
6524	48.47	35.3	6.08	-35	-9.5	0	1	46.35	82	-35.65
7456NF	46.53	36.8	6.65	-35	-9.5	0	1	46.48	82	-35.52
8388NF	47.34	37.6	7.6	-35	-9.5	0	1	49.04	82	-32.96
9320NF	45.47	38.3	7.98	-35	-9.5	0	1	48.25	82	-33.75
fo= 933.5MHz (-12.8dBm)										
1867	57.12	26.7	2.1	-35	-9.5	0	1	42.42	82	-39.58
2800	54.87	30	3.99	-35	-9.5	0	1	45.36	82	-36.64
3734	47.65	32	4.75	-35	-9.5	0	1	40.9	82	-41.1
4667	44.42	32.5	5.32	-35	-9.5	0	1	38.74	82	-43.26
5601NF	42.46	35.2	5.7	-35	-9.5	0	1	39.86	82	-42.14
6534	49.31	35.3	6.08	-35	-9.5	0	1	47.19	82	-34.81
7468NF	43.07	36.8	6.65	-35	-9.5	0	1	43.02	82	-38.98
8401NF	47.19	37.6	7.6	-35	-9.5	0	1	48.89	82	-33.11
9335NF	46.46	38.3	7.98	-35	-9.5	0	1	49.24	82	-32.76
fo= 935MHz(-12.8dBm)										
1870	51.25	26.7	2.1	-35	-9.5	0	1	36.55	82	-45.45
2805	46.15	30	3.99	-35	-9.5	0	1	36.64	82	-45.36
3740	45.74	32	4.75	-35	-9.5	0	1	38.99	82	-43.01
4675	44.83	32.5	5.32	-35	-9.5	0	1	39.15	82	-42.85
5610NF	42.14	35.2	5.7	-35	-9.5	0	1	39.54	82	-42.46

6545	47.65	35.3	6.08	-35	-9.5	0	1	45.53	82	-36.47
7480NF	46.18	36.8	6.65	-35	-9.5	0	1	46.13	82	-35.87
8415NF	46.29	37.6	7.6	-35	-9.5	0	1	47.99	82	-34.01
9350NF	46.18	38.3	7.98	-35	-9.5	0	1	48.96	82	-33.04

NOTE: ALL READINGS ARE PEAK MEASUREMENTS
DIST: Correction to extrapolate reading to 3m specification distance
1M measurement distance: **-9.5** dB
OTHER: High pass filter insertion loss (**1.802GHz**)
AF: Antenna Factor
AMP: Pre-amp gain
NF= **Noise Floor**
DUTY: Duty Cycle correction factor
CL: CABLE LOSS

ANALYZER BANDWIDTH SETTINGS

	Res Bw:	Video Bw:
Peak(P):	1MHz	1MHz

19. EXTERNAL I/O CABLE CONSTRUCTION DESCRIPTION

CABLE NO:1	
I/O Port: : RF OUTPUT TO ATTENUATOR	Number of I/O ports of this type:1
Number of Conductors: 2	**Connector Type: N TYPE**
Capture Type: SCREW-IN	**Type of Cable used: SHIELDED**
Cable Connector Type: METAL	**Cable Length:1.5 M**
Bundled During Tests: NO	**Data Traffic Generated: YES**
Remark: N/A	

CABLE NO:2	
I/O Port:: RF INOUT	Number of I/O ports of this type:1
Number of Conductors: 2	**Connector Type: N-TYPE**
Capture Type: SCREW-IN	**Type of Cable used: SHIELDED**
Cable Connector Type: METAL	**Cable Length:2.5M**
Bundled During Tests: NO	**Data Traffic Generated: YES**
Remark: N/A	

CABLE NO:3	
I/O Port: EUT AC-INPUT	Number of I/O ports of this type:1
Number of Conductors: 8	**Connector Type: USA POWER PLUG**
Capture Type: PUSH-IN	**Type of Cable used: UN-SHIELDED**
Cable Connector Type: MOLDED	**Cable Length: 2.0M**
Bundled During Tests: NO	**Data Traffic Generated: NO**
Remark: N/A	

CABLE NO:4	
I/O Port: ATTENUATOR (RF-OUT)	Number of I/O ports of this type:1
Number of Conductors: 2	**Connector Type: N -TYPE**
Capture Type: SCREW-IN	**Type of Cable used: SHIELDED**
Cable Connector Type: METAL	**Cable Length:1.5M**
Bundled During Tests: NO	**Data Traffic Generated: YES**
Remark: N/A	

CABLE NO:5	
I/O Port: SIGNAL GENERATOR OUTPUT	Number of I/O ports of this type:1
Number of Conductors: 2	**Connector Type: N -TYPE**
Capture Type: SCREW-IN	**Type of Cable used: SHIELDED**
Cable Connector Type: METAL	**Cable Length:1.5M**
Bundled During Tests: NO	**Data Traffic Generated: YES**
Remark: N/A	

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20. CONFIGURATION BLOCK DIAGRAM

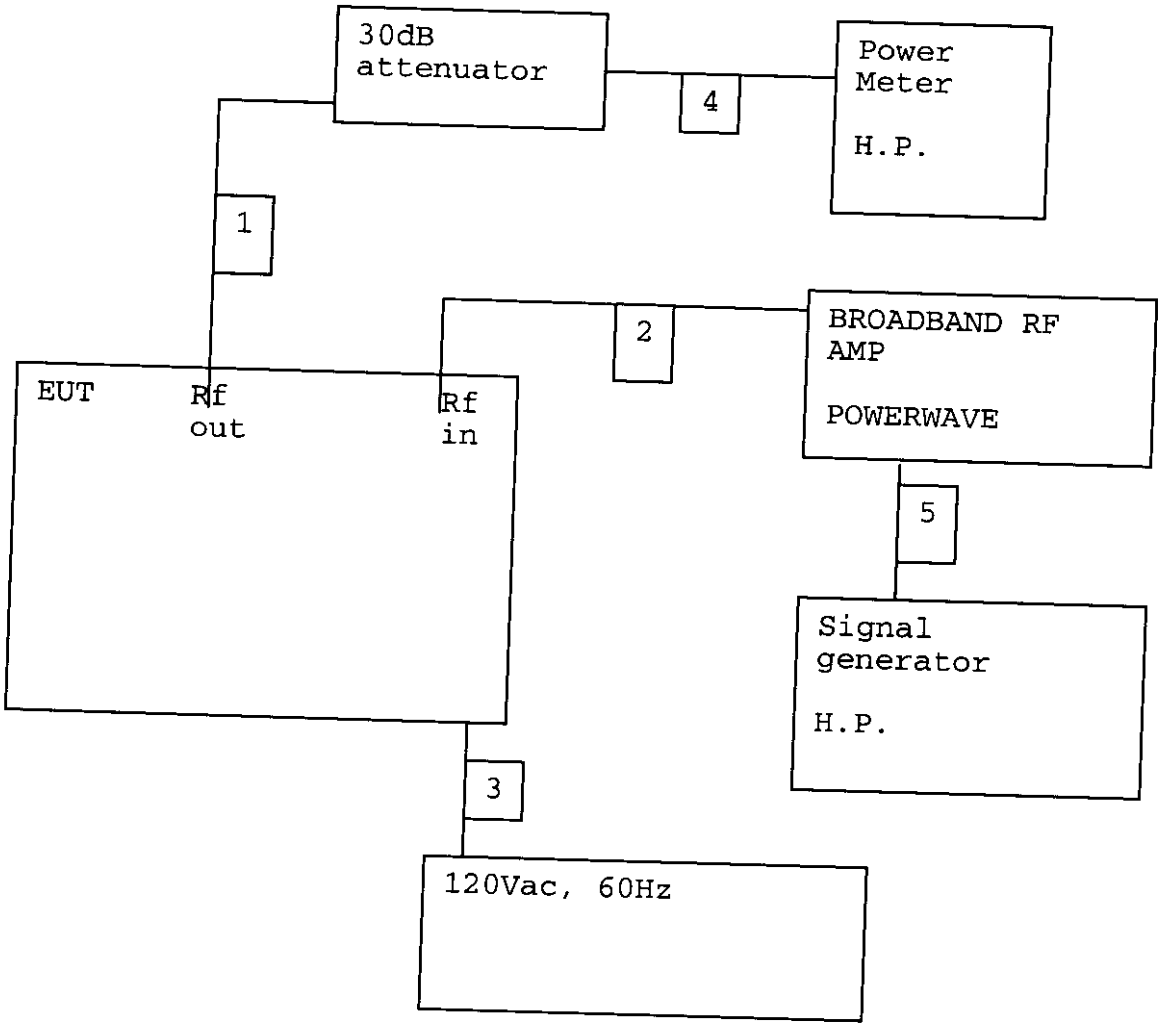

EXHIBIT 6: Spectral Efficiency Per Section 90.203

PARAGRAPH 2: Any manufacturer of radio transmitting equipment (including signal booster) to be used in these services may request type acceptance for such equipment following the procedure set forth in subpart J of part 2 of this chapter.

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EXHIBIT 7: TYPE ACCEPTANCE INFORMATION

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FCC TYPE ACCEPTANCE INFORMATION

The following information is in accordance with FCC Rules, 47CFR Part2, Subpart J, Sections 2.983 – 2.999.

2.983(a) Applicant: POWERWAVE TECHNOLOGIES, INC.
2026 McGAW AVENUE
IRVINE, CA 92614

Contact person: GEORGE SOREMEKUN

Telephone number: (714)757-6605

2.983(b) FCC ID: E675JS0028
Model: LDA9301-30

2.983(c) Quantity production is planned

2.983(d) **Technical Description**

The LDA9301-30 is a single channel discrete power amplifier that operates from 935 to 940 MHz. The amplifier is modular in design, and is ideally suited for use in RAM-Mobitex base stations. The LDA9301-30 provides 30 watts of RF power, a 12-volt auxiliary output connection, and a fail-safe bypass mode. The amplifier consists of a DC power supply, a microprocessor control circuit, and a single stage of amplification to provide a gain minimum fo 10dB. The microprocessor control circuit controls all fail-safe bypass modes that provide protection in the event of an RF overpower input/output, an over-temperature, of loss of AC power.

1) **Type of emissions**

   GSM, CW

2) **Frequency Range**

   Power Amplifier: 935 – 940MHz

3) **Range of Operation Power**

   -/+ 45dBm

4) **Maximum Power Rating**

   30 Watts

5) Applied voltage and currents into the final transistor elements

Refer to **Exhibit 2: Schematics and Exhibit 4: functional Block Diagram.**

6) Function of Each Active Device

Refer to **Exhibit 2: Schematics and Exhibit 4:functional Block Diagram.**

7) Complete Circuit Diagrams and Functional Diagram

Refer to **Exhibit 2: Schematics and Exhibit 4:functional Block Diagram..**

8) Instructions/Installation Manual

Refer to **Exhibit 5.**

9) Tune-up/Optimizations Procedure

Refer to installation manual in **Exhibit 5.**

10) Means for Frequency Stabilization

Not Applicable. Eut is a power amplifier

11) Means for Limiting Modulation

Not Applicable. Eut is a power amplifier

12) Means for Limiting Power.

Refer to installation manual in **Exhibit 5.**

13) Means for Attenuating Higher Audio Frequencies

Not Applicable.

14) Description of Digital Modulation Techniques

Not Applicable.

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2.983(e) Standard Test Condition

The power amplifier was tested under the following conditions.

AC Supply Voltage: 120Vac, 60Hz

The amplifier was aligned and tuned up according to manufacturer's alignment procedure, prior to testing. All data presented represents the worst case parameter being measured.

2.983(f) Equipment Identification

A drawing of the equipment identification nameplate appears in **Exhibit 5.**

2.983(g) Photographs

Photographs of the equipment, internal and external views, are found in the **Exhibit 3.**

2.983 Description of Various Base Station Configuration

Not Applicable.

2.983 Use of Various Power Supplies

Not Applicable. Power supply is built-in and receives its power from public utility outlet (120Vac).

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EXHIBIT 8:REPORT OF MEASUREMENTS

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SECTION 2.983(e) REPORT OF MEASUREMENTS

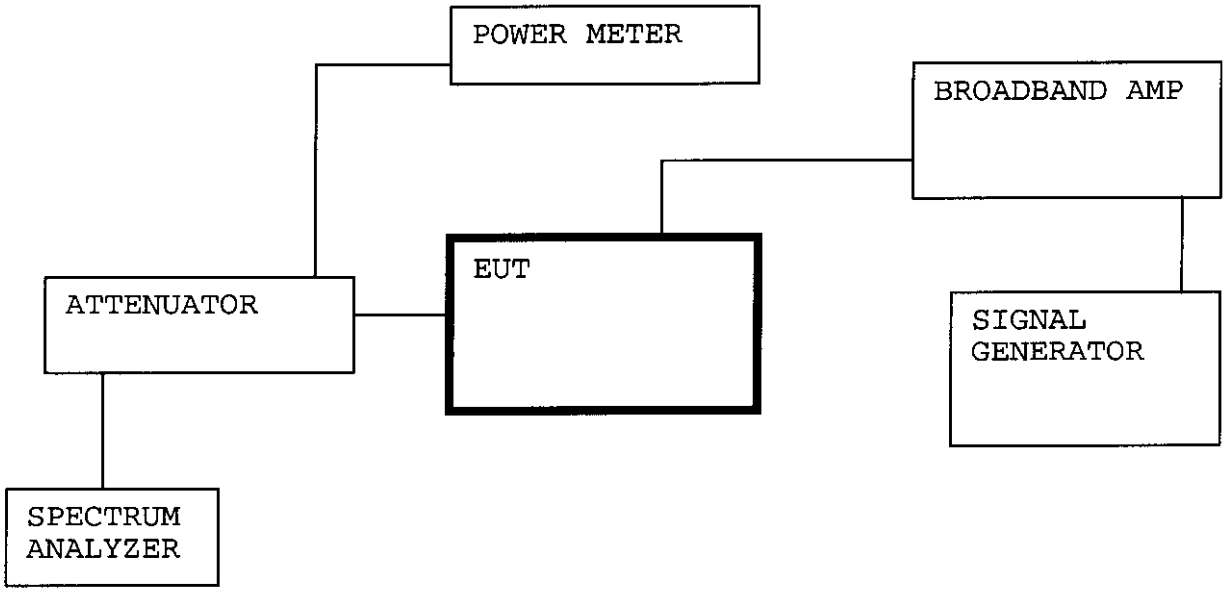
Data required from 2.985 trough 2.997, inclusive, measured in accordance with the procedure set out in 2.999.

SECTION 2.985 RF POWER OUTPUT

Measurement Equipment Used:

HP Power Meter /437B
Powerwave Broadband Amp/LSA2010-30
HP Signal Generator/E4443A
HP Spectrum Analyzer/8593EM
Narda 30dB Attenuator
Powerwaves "The Workhorse" low loss cables, 9ft. (loss: 0.85 dB/ft @ 26GHz)

Test Set-up:



Section 90.205 refers to Section 90.635 were it states that maximum power is 500Watts. RF power was measured with a HP power meter. Power output was 30 Watts (44.77dBm). Power output was check for low, middle, high channel.

LDA9301-30	
NO. OF AMPLIFIER	**MEASURED RF POWER OUTPUT**
1	**30W**

SECTION 2.987 MODULATION CHARACTERISTICS

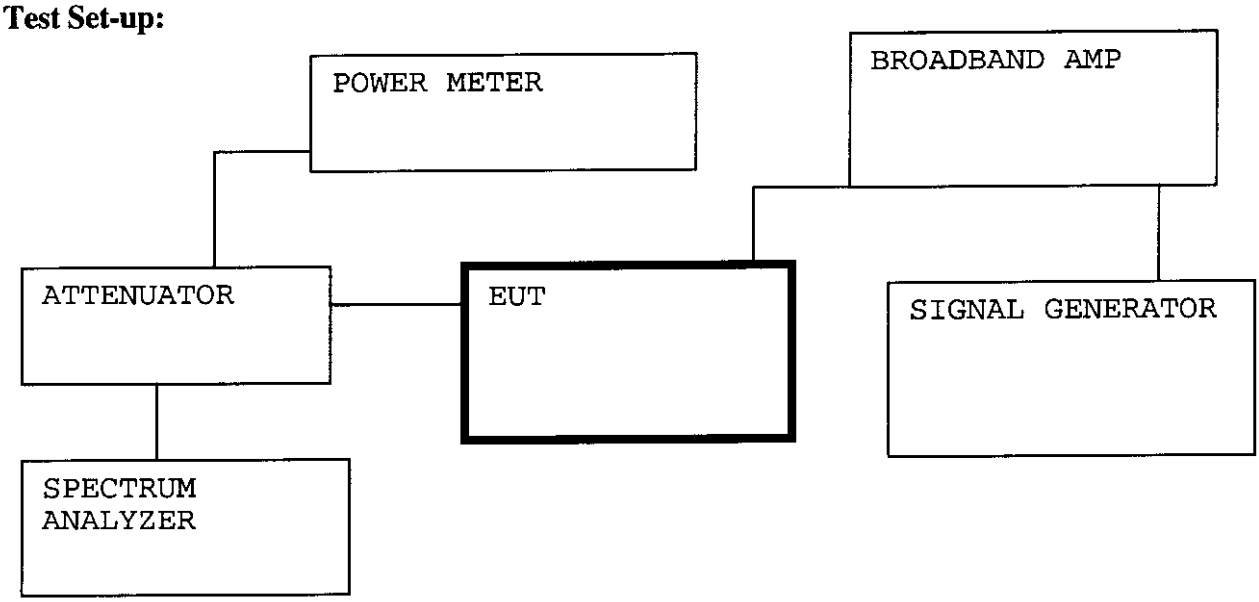
Not applicable. EUT is a power amplifier.

SECTION 2.989 OCCUPIED BANDWIDTH

Measurement Equipment Used:

HP Power Meter /437B
Powerwave Broadband Amp/LSA2010-30
HP Signal Generator/E4443A
HP Spectrum Analyzer/8593EM
Narda 30dB Attenuator
Powerwaves "The Workhorse" low loss cables, 9ft. (loss: 0.85 dB/ft @ 26GHz)

Test Set-up:



As required in Section 90.209 plots of occupied bandwidth were made one for the output from signal generator and another for output from amplifier. Test result are presented in spectrum analyzer plots from Low to High channels both GSM modulation and CW. Table shows the order of the plots.

FREQUENCY 935MHz(LOW)	
MODULATION TYPE: GSM	
	PLOT NUMBER
From signal generator	**1**
Amplified signal from EUT (amplifier)	**2**
MODULATION TYPE: CW	
	PLOT NUMBER
From signal generator	**3**
Amplified signal from EUT (amplifier)	**4**
FREQUENCY 937MHz(MIDDLE)	
MODULATION TYPE: GSM	
	PLOT NUMBER
From signal generator	**5**
Amplified signal from EUT (amplifier)	**6**
MODULATION TYPE: CW	
	PLOT NUMBER
From signal generator	**7**
Amplified signal from EUT (amplifier)	**8**
FREQUENCY 940MHz(HIGH)	
MODULATION TYPE: GSM	
	PLOT NUMBER
From signal generator	**9**
Amplified signal from EUT (amplifier)	**10**
MODULATION TYPE: CW	
	PLOT NUMBER
From signal generator	**11**
Amplified signal from EUT (amplifier)	**12**

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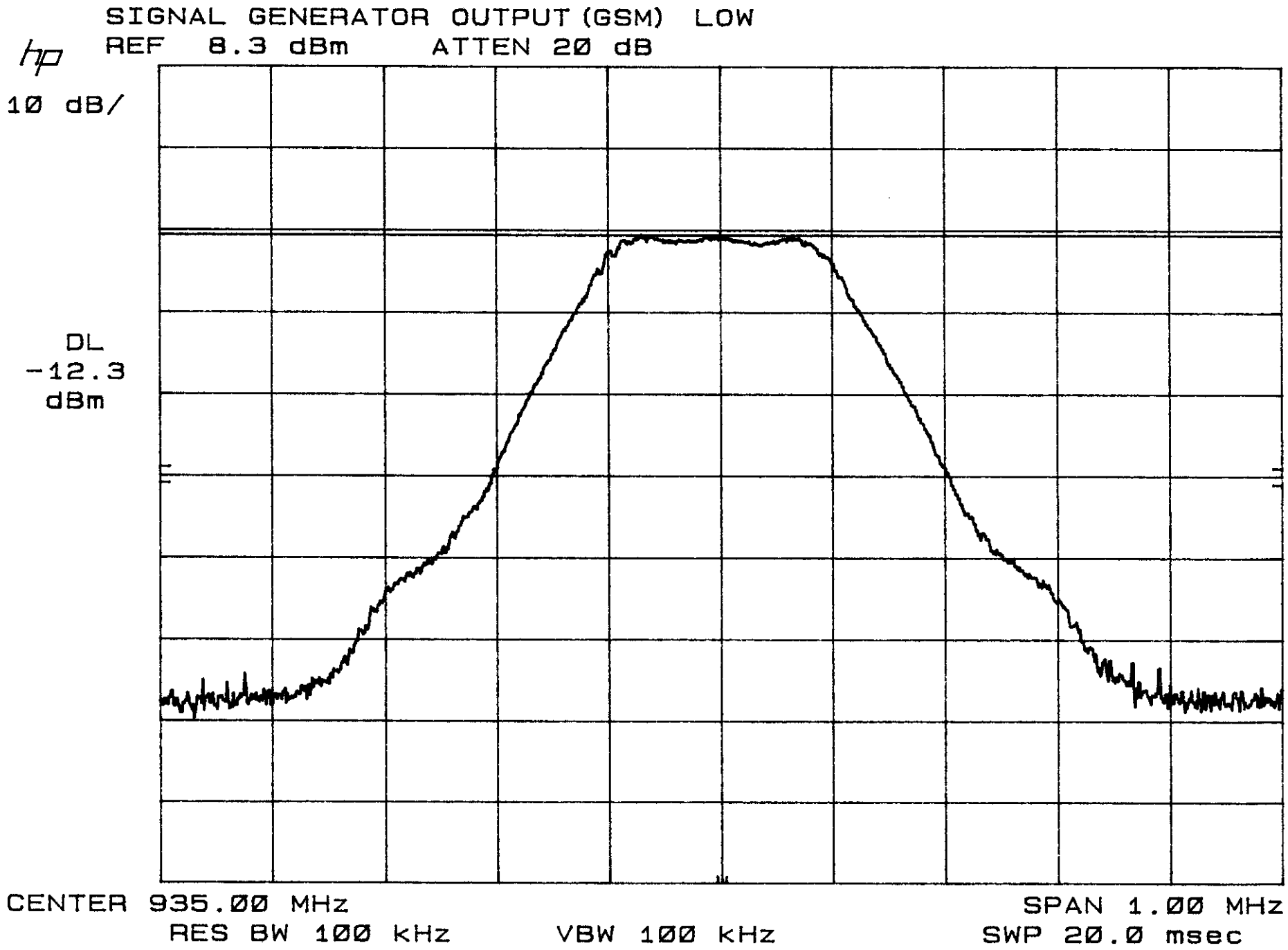
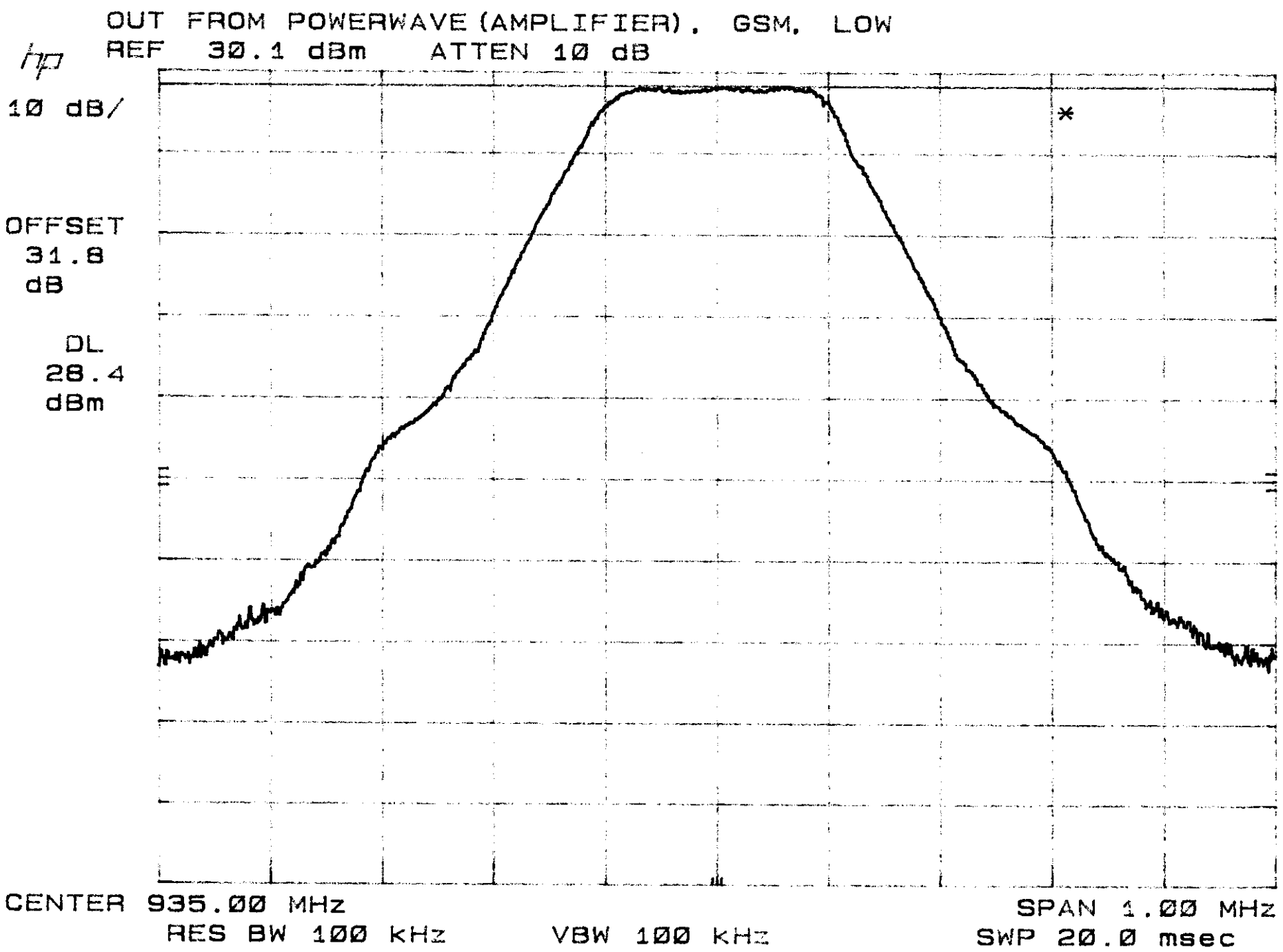
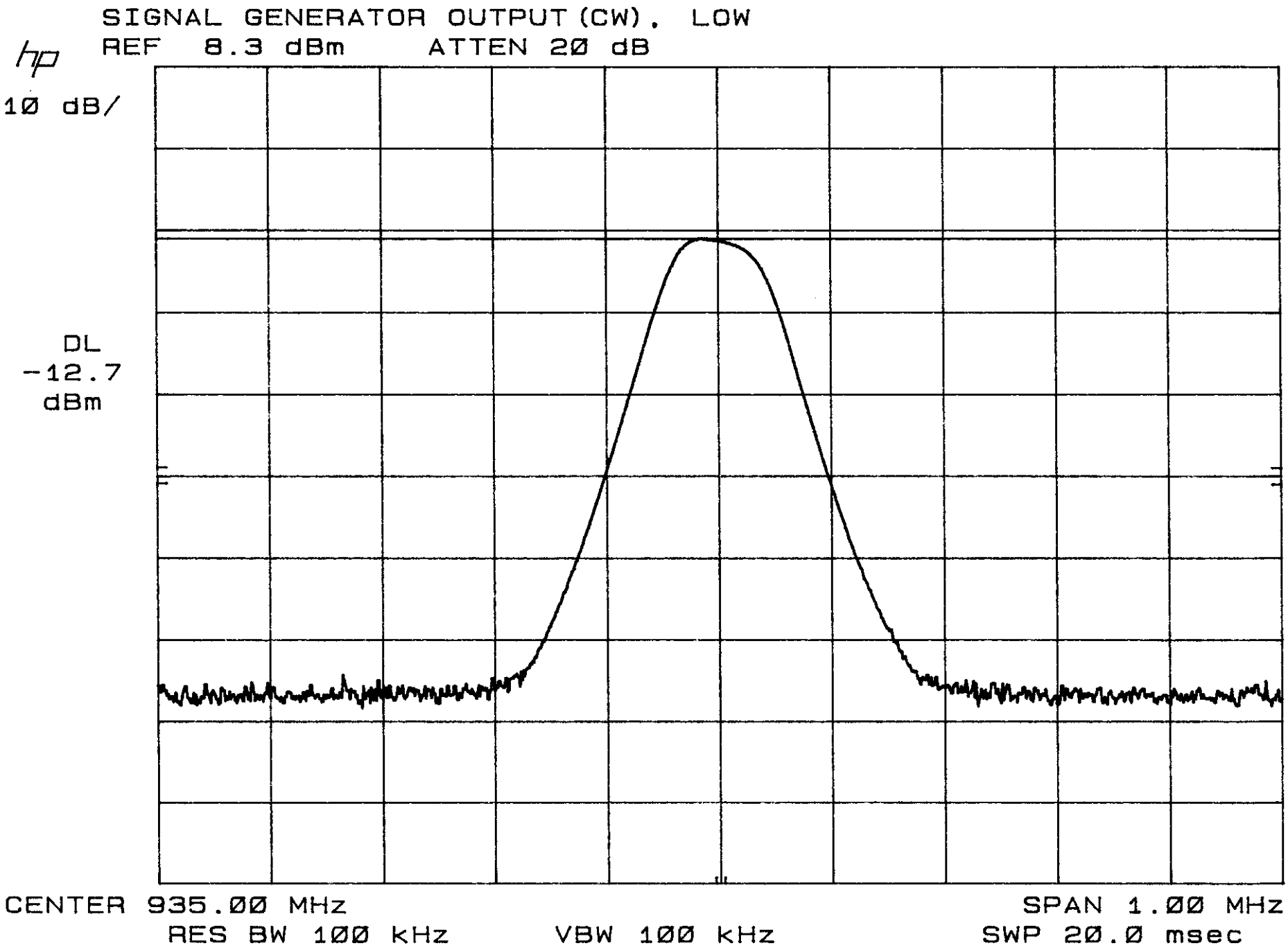
#1


SIGNAL GENERATOR OUTPUT (GSM) LOW
REF 8.3 dBm
ATTEN 20 dB
10 dB/
DL
-12.3
dBm
CENTER 935.00 MHz
SPAN 1.00 MHz
RES BW 100 kHz
VBW 100 kHz
SWP 20.0 msec

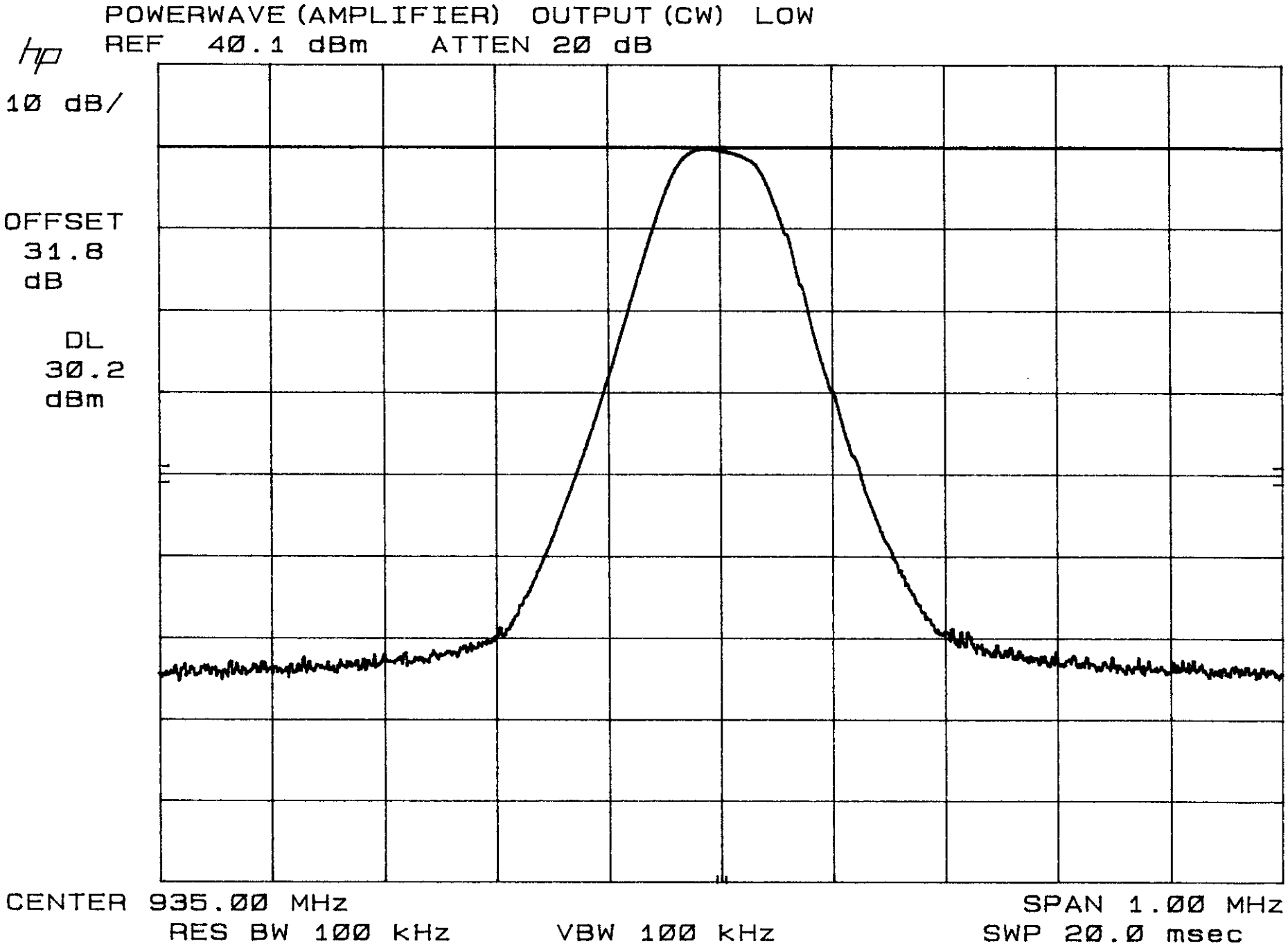
#2

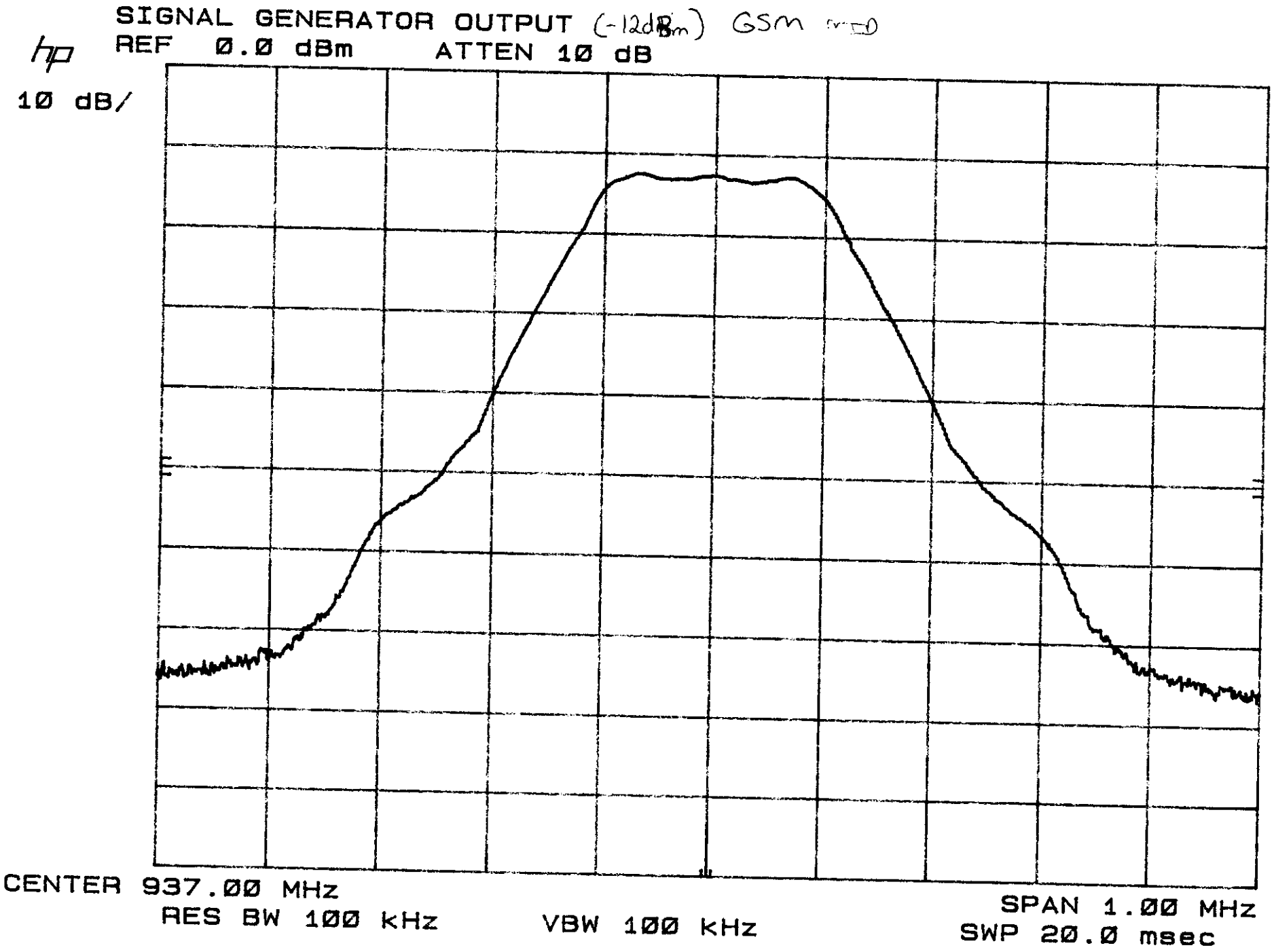

OUT FROM POWERWAVE (AMPLIFIER). GSM. LOW
REF 30.1 dBm ATTEN 10 dB
10 dB/
OFFSET
31.8
dB
DL
28.4
dBm
CENTER 935.00 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 1.00 MHz
SWP 20.0 msec

#3

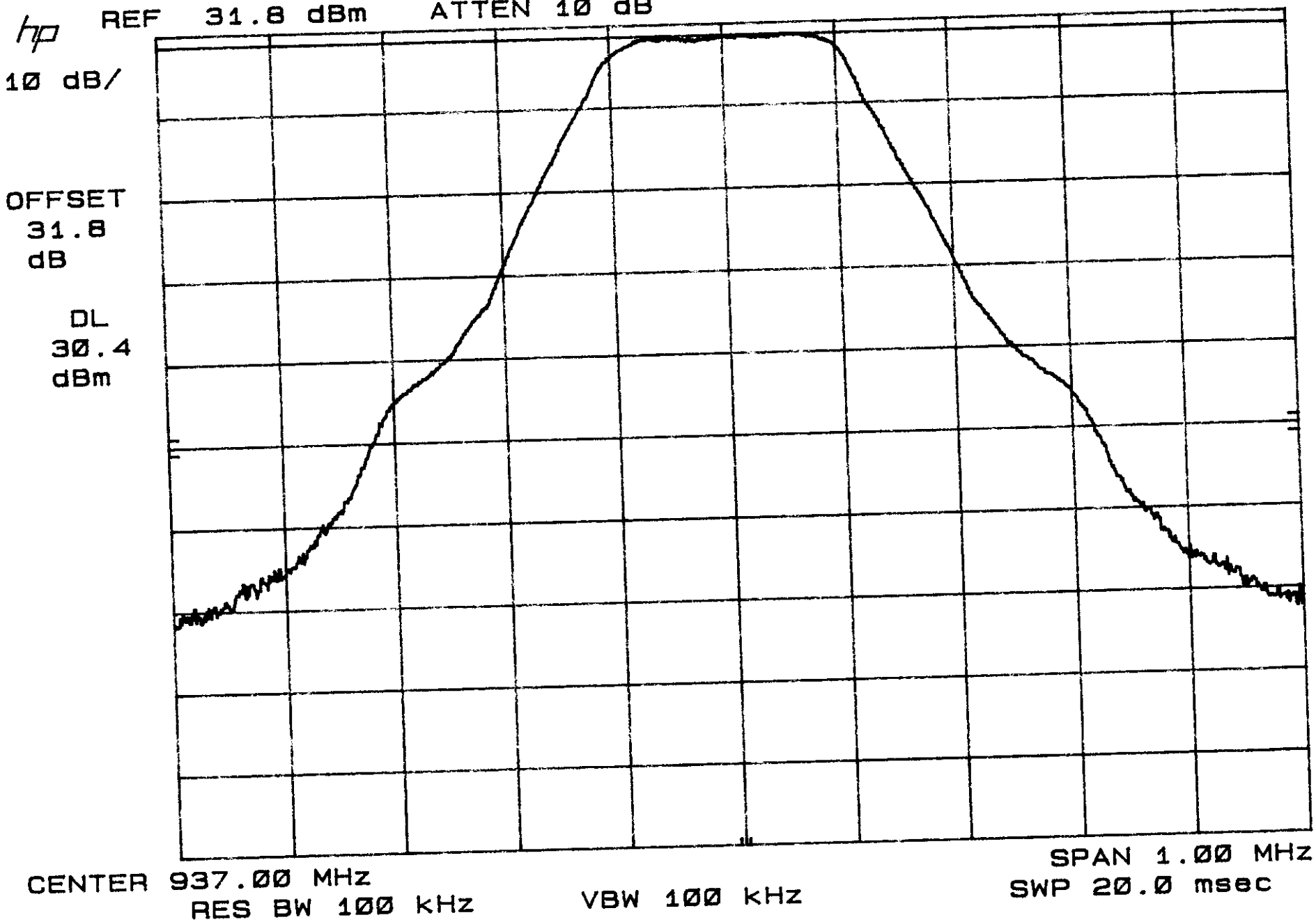

SIGNAL GENERATOR OUTPUT (CW). LOW
REF 8.3 dBm
ATTEN 20 dB
hp
10 dB/
DL
-12.7
dBm
CENTER 935.00 MHz
SPAN 1.00 MHz
RES BW 100 kHz
VBW 100 kHz
SWP 20.0 msec

#4

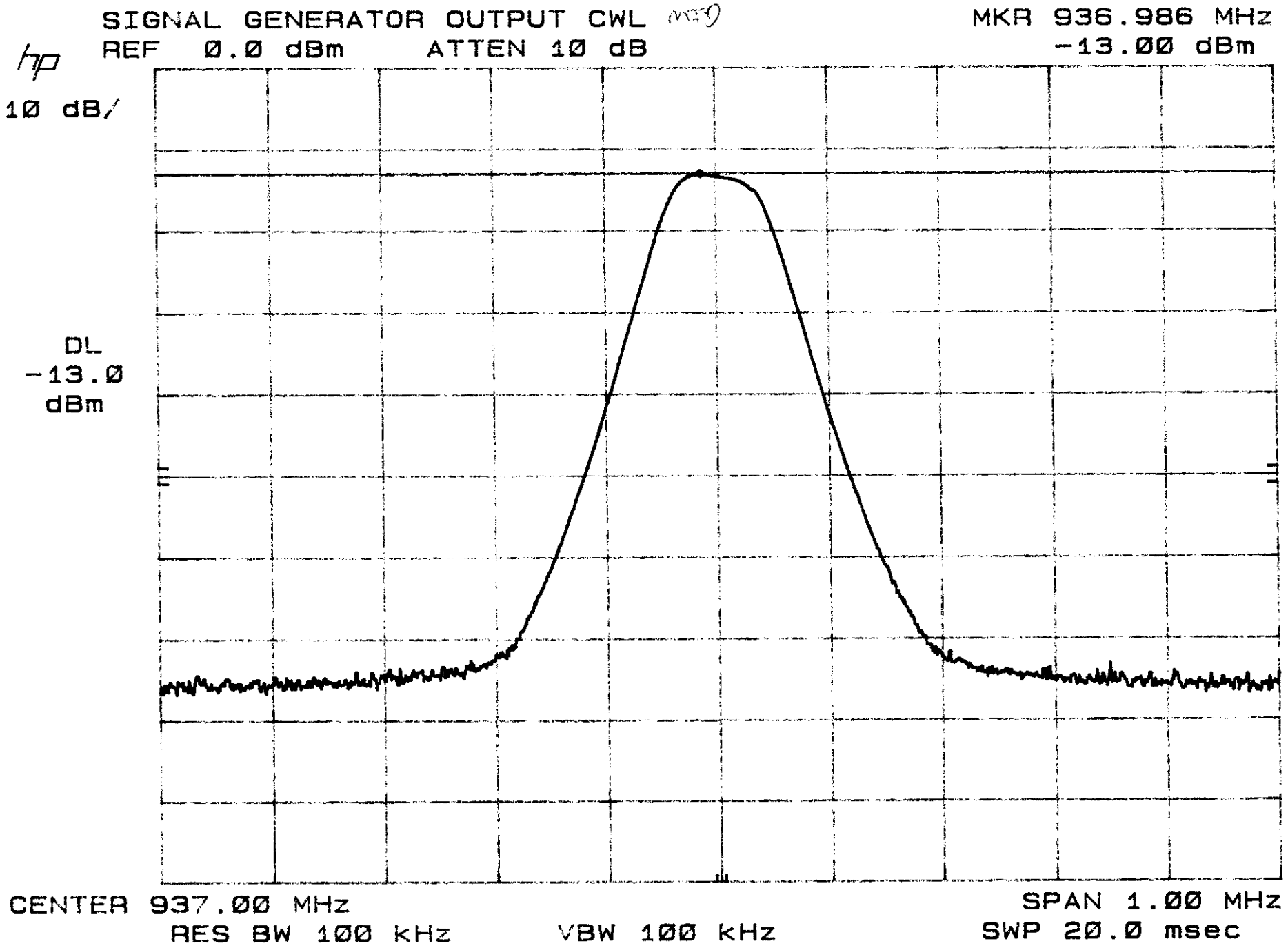

POWERWAVE (AMPLIFIER) OUTPUT (CW) LOW
REF 40.1 dBm ATTEN 20 dB
10 dB/
OFFSET
31.8
dB
DL
30.2
dBm
CENTER 935.00 MHz
SPAN 1.00 MHz
RES BW 100 kHz
VBW 100 kHz
SWP 20.0 msec


SIGNAL GENERATOR OUTPUT (-12dBm) GSM mod
hp
REF 0.0 dBm
ATTEN 10 dB
10 dB/
CENTER 937.00 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 1.00 MHz
SWP 20.0 msec

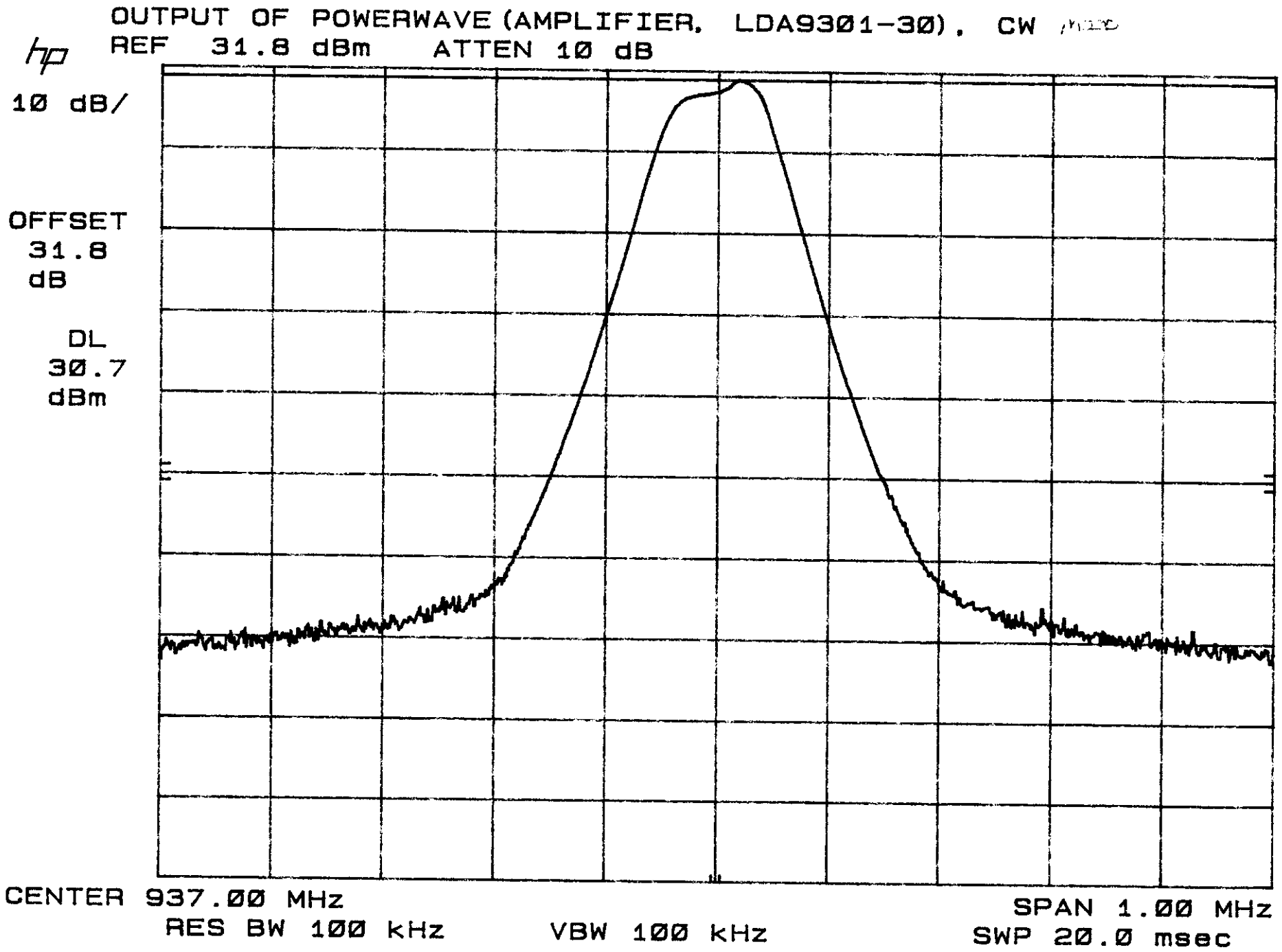
OUTPUT FROM POWERWAVE (AMPLIFIER, LDA9301-30) GSM MID

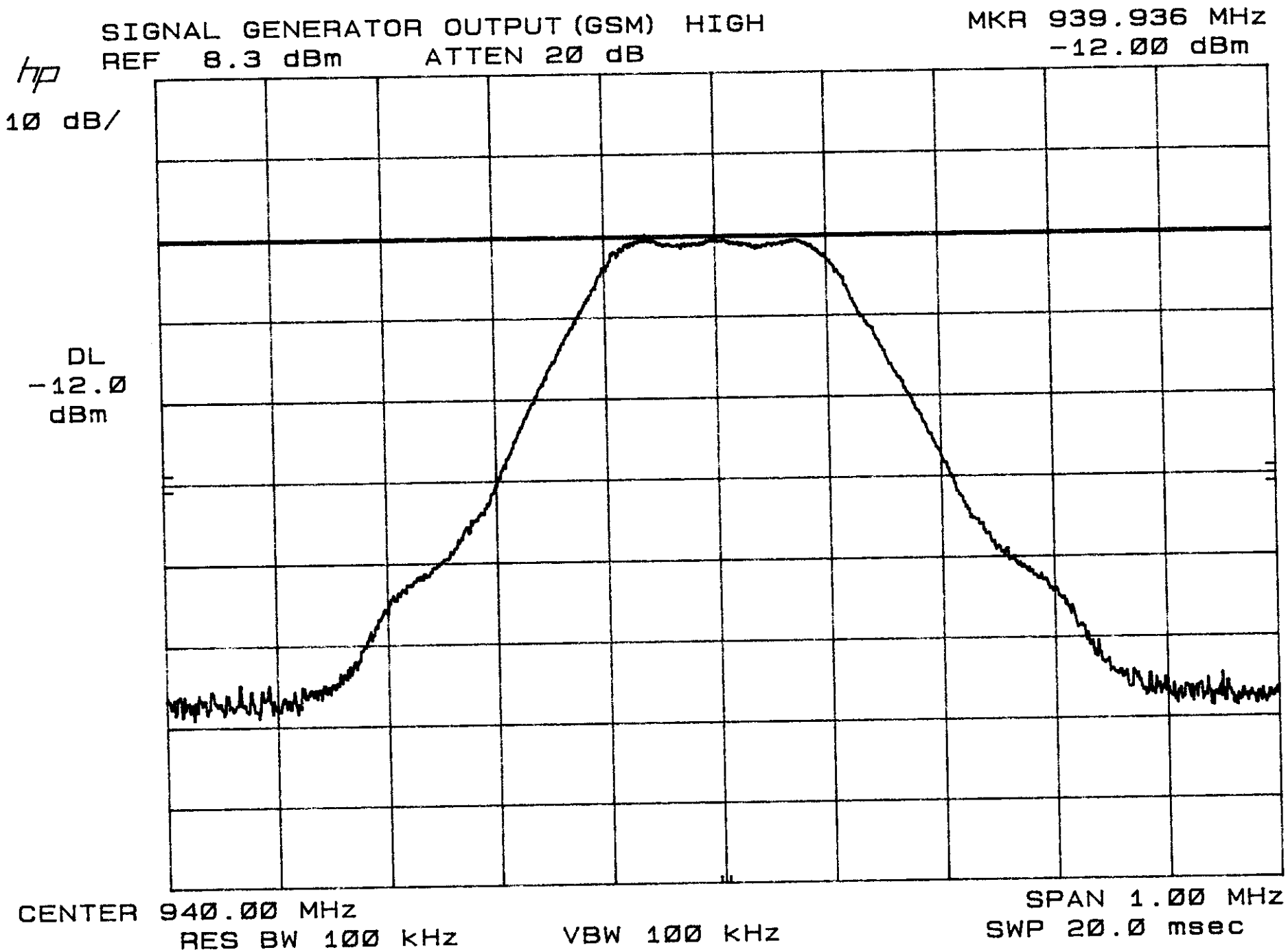


#7

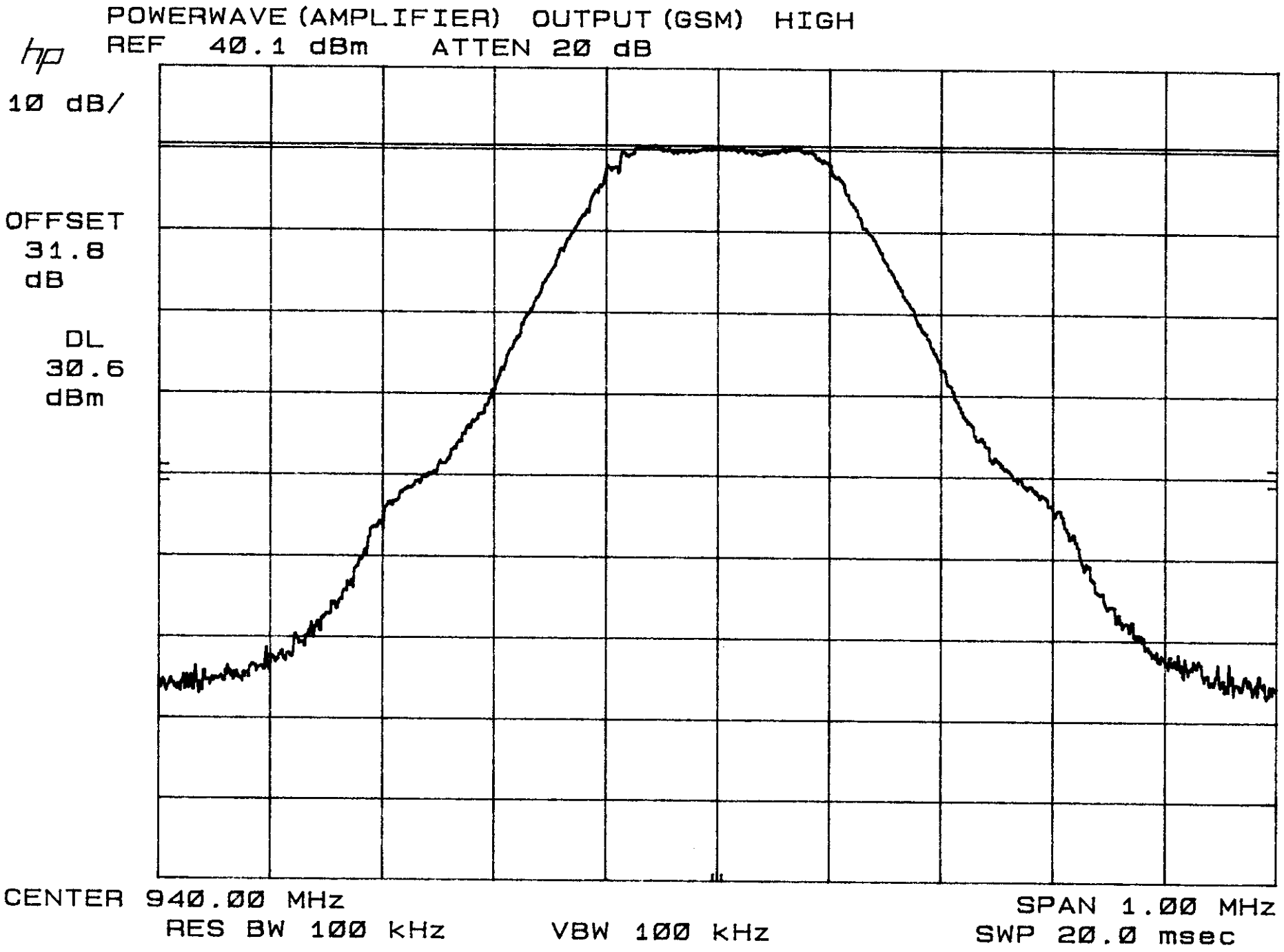

SIGNAL GENERATOR OUTPUT CWL
REF 0.0 dBm
ATTEN 10 dB
MKR 936.986 MHz
-13.00 dBm
10 dB/
DL
-13.0
dBm
CENTER 937.00 MHz
SPAN 1.00 MHz
RES BW 100 kHz
VBW 100 kHz
SWP 20.0 msec

#8

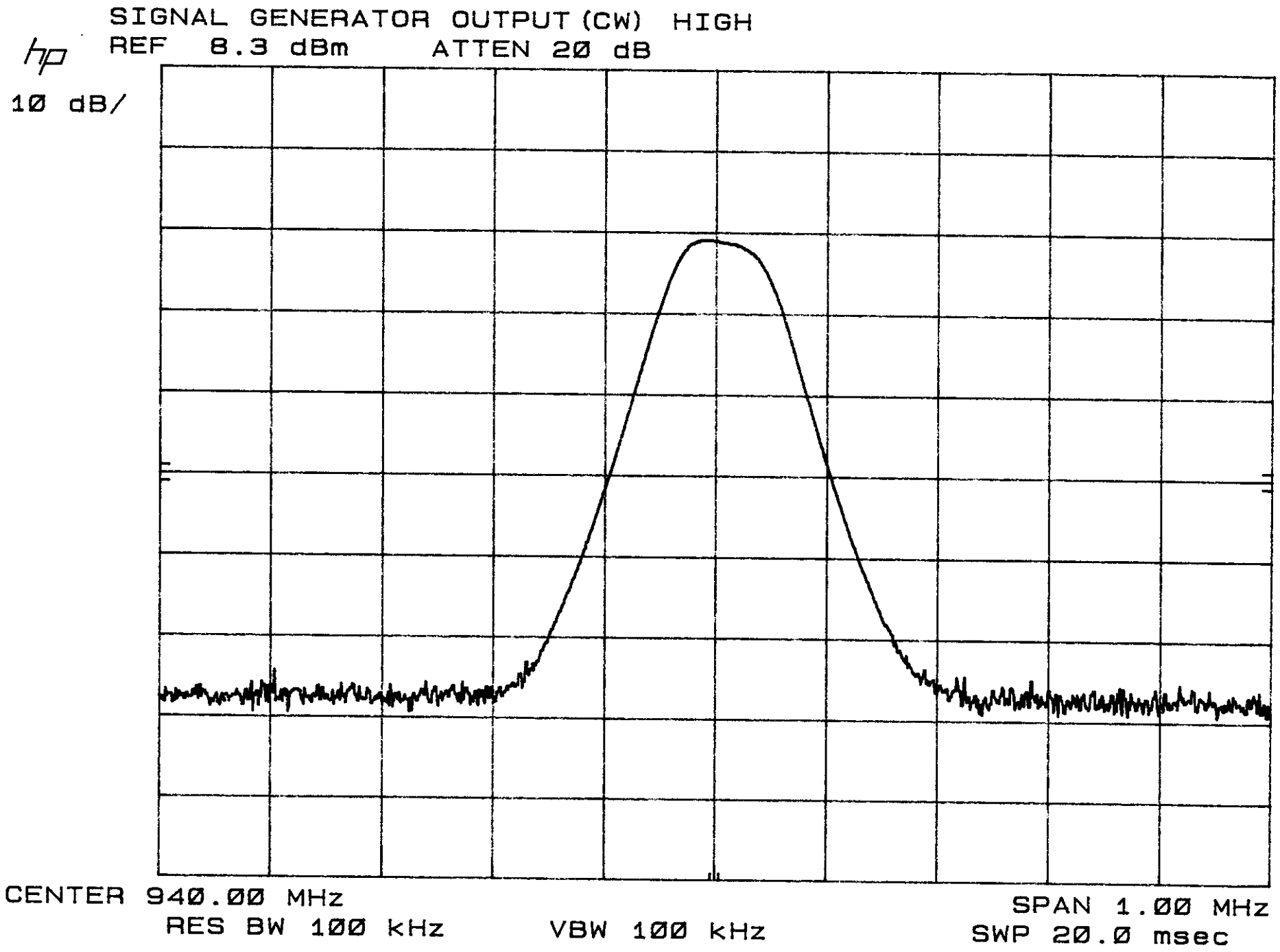

OUTPUT OF POWERWAVE (AMPLIFIER, LDA9301-30), CW
REF 31.8 dBm
ATTEN 10 dB
10 dB/
OFFSET
31.8
dB
DL
30.7
dBm
CENTER 937.00 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 1.00 MHz
SWP 20.0 msec


SIGNAL GENERATOR OUTPUT (GSM) HIGH
REF 8.3 dBm
ATTEN 20 dB
MKR 939.936 MHz
-12.00 dBm
hp
10 dB/
DL
-12.0
dBm
CENTER 940.00 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 1.00 MHz
SWP 20.0 msec

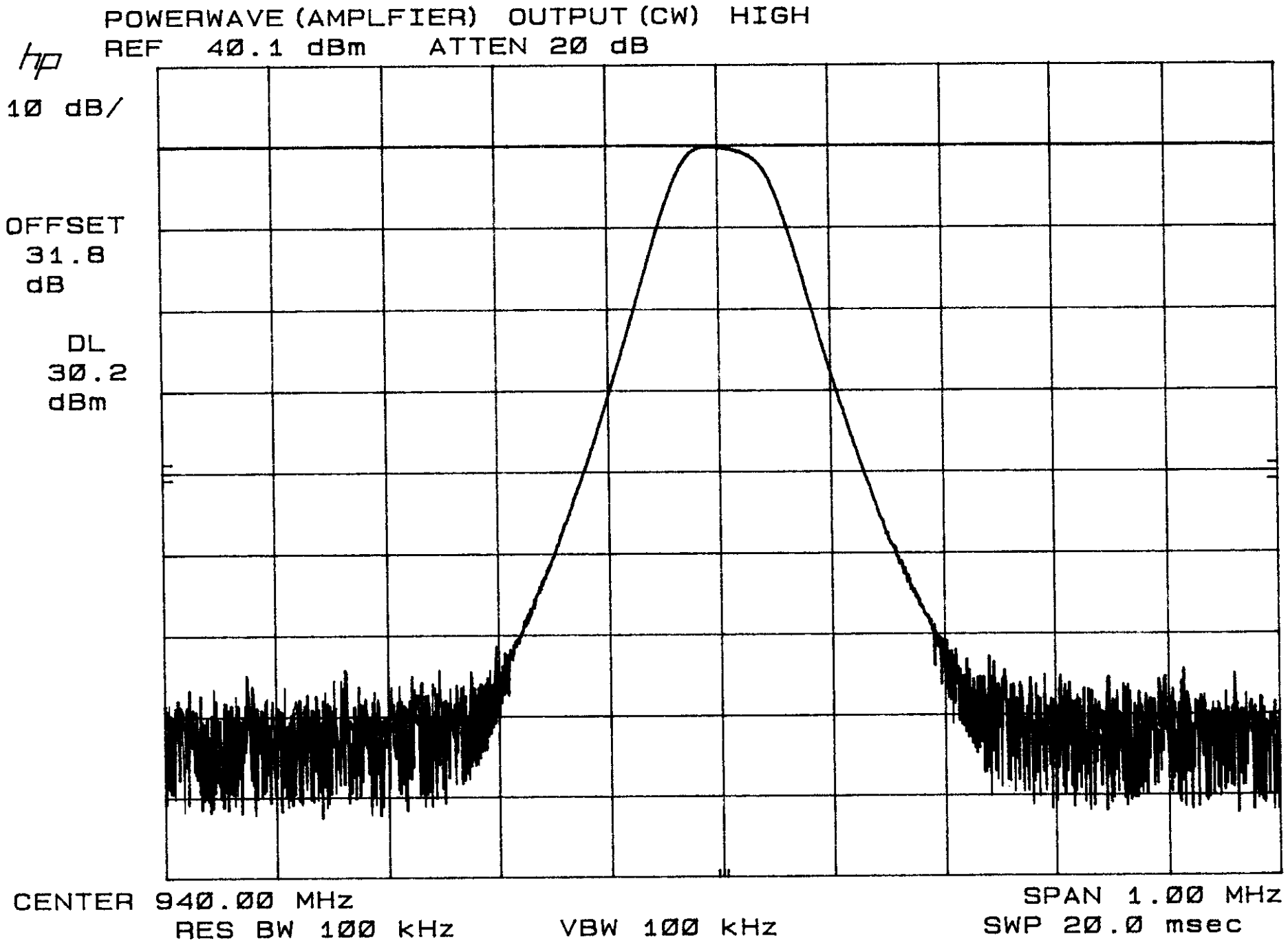
#10


POWERWAVE (AMPLIFIER) OUTPUT (GSM) HIGH
REF 40.1 dBm
ATTEN 20 dB
10 dB/
OFFSET
31.8
dB
DL
30.6
dBm
CENTER 940.00 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 1.00 MHz
SWP 20.0 msec

#11


SIGNAL GENERATOR OUTPUT (CW) HIGH
REF 8.3 dBm
ATTEN 20 dB
10 dB/
CENTER 940.00 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 1.00 MHz
SWP 20.0 msec

#12

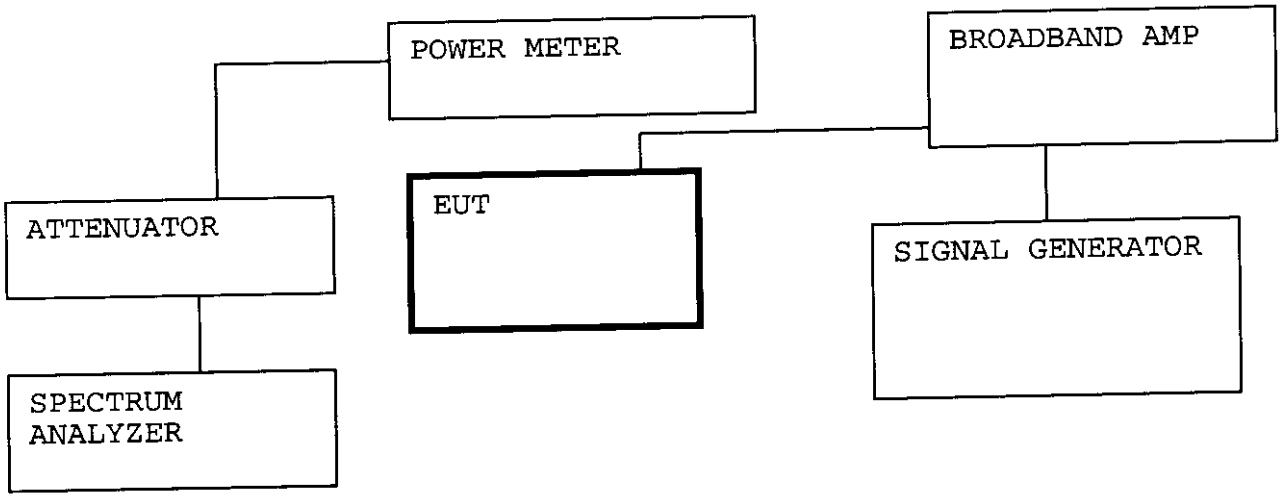

POWERWAVE (AMPLFIER) OUTPUT (CW) HIGH
REF 40.1 dBm ATTEN 20 dB
10 dB/
OFFSET
31.8
dB
DL
30.2
dBm
CENTER 940.00 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 1.00 MHz
SWP 20.0 msec

SECTION 2.991 SPURIOUS EMISSION AT ANTENNA TERMINALS.

Measurement Equipment Used:

HP Power Meter /437B
Powerwave Broadband Amp/LSA2010-30
HP Signal Generator/E4443A
HP Spectrum Analyzer/8593EM
Narda 30dB Attenuator
Powerwaves "The Workhorse" low loss cables, 9ft. (loss: 0.85 dB/ft @ 26GHz)

Test Set-up



Minimum Requirement:

Section 90.210(J) and 90.669 were used to demonstrate compliance for out-of-band emissions.

Section 90.210(J); Emissions should be attenuated below 50 + 10log (P); -20 dBm

Section 90.669; Emissions should be attenuated below 43 + 10log (P); -13 dBm.

Spurious emissions test was performed for a single input signals to amplifier. Modulation tested GSM. Spectrum was scanned from 1 MHz to 10th harmonic to search for spurious, harmonics, and intermodulation products emissions.

Test Results

Plots for low to high channels were made, which include all modulations that apply to EUT. EUT was scanned from 1 MHz to 9400 MHz to search for spurious, harmonics, and intermodulation product emissions. Table shows the order of the plots, label "OUT OF BAND".

Emissions mask applied 90.210(J);

FREQUENCY 937MHz(MIDDLE)	
MODULATION TYPE: GSM	
	PLOT NUMBER
1 MHz TO 935 MHz	**13**
935 MHz TO 941 MHz	**14**
941 MHz TO 1GHz	**15**
1GHz TO 2GHz	**16**
2GHz TO 9.4 GHz	**17**
MODULATION TYPE: CW	
	PLOT NUMBER
1 MHz TO 935 MHz	**18**
935 MHz TO 941 MHz	**19**
940 MHz TO 2.5 GHz	**20**
2.5 GHz TO 9.4 GHz	**21**
FREQUENCY 935MHz(LOW)	
MODULATION TYPE: GSM	
	PLOT NUMBER
1 MHz TO 935 MHz	**22**
935 MHz TO 940 MHz	**23**
940 MHz TO 2.5 GHz	**24**
2.5 GHz TO 9.35 GHz	**25**
MODULATION TYPE: CW	
	PLOT NUMBER
1 MHz TO 1GHz	**26**
925 MHz TO 945 MHz	**27**
1GHz TO 2.5 GHz	**28**
2.5 GHz TO 9.35 GHz	**29**

FREQUENCY 940MHz(HIGH)	
MODULATION TYPE: GSM	
	PLOT NUMBER
1 MHz TO 1GHz	**30**
930 MHz TO 950 MHz	**31**
1GHz TO 2.5GHz	**32**
2.5GHz TO 9.4GHz	**33**
MODULATION TYPE: CW	
	PLOT NUMBER
1 MHz TO 1GHz	**34**
930 MHz TO 950 MHz	**35**
1GHz TO 2.5GHz	**36**
2.5GHz TO 9.4 GHz	**37**

Emissions mask applied 90.669;

FREQUENCY 937MHz(MIDDLE)	
MODULATION TYPE: GSM	
	PLOT NUMBER
1 MHz TO 935 MHz	**38**
935 MHz TO 941 MHz	**39**
941 MHz TO 1GHz	**40**
1GHz TO 2GHz	**41**
2GHz TO 9.4 GHz	**42**
MODULATION TYPE: CW	
	PLOT NUMBER
1 MHz TO 935 MHz	**43**
935 MHz TO 941 MHz	**44**
940 MHz TO 2.5 GHz	**45**
2.5 GHz TO 9.4 GHz	**46**

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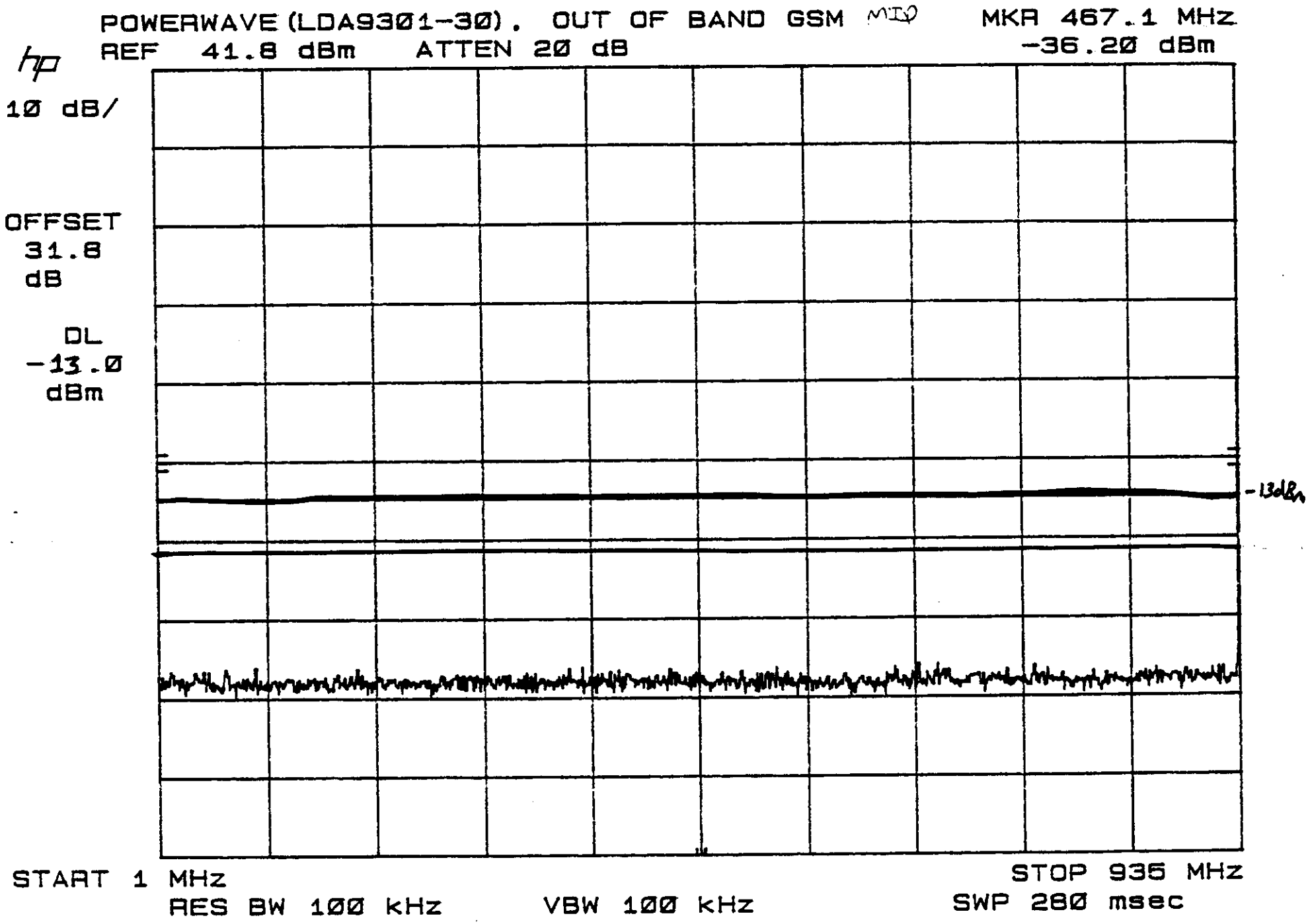
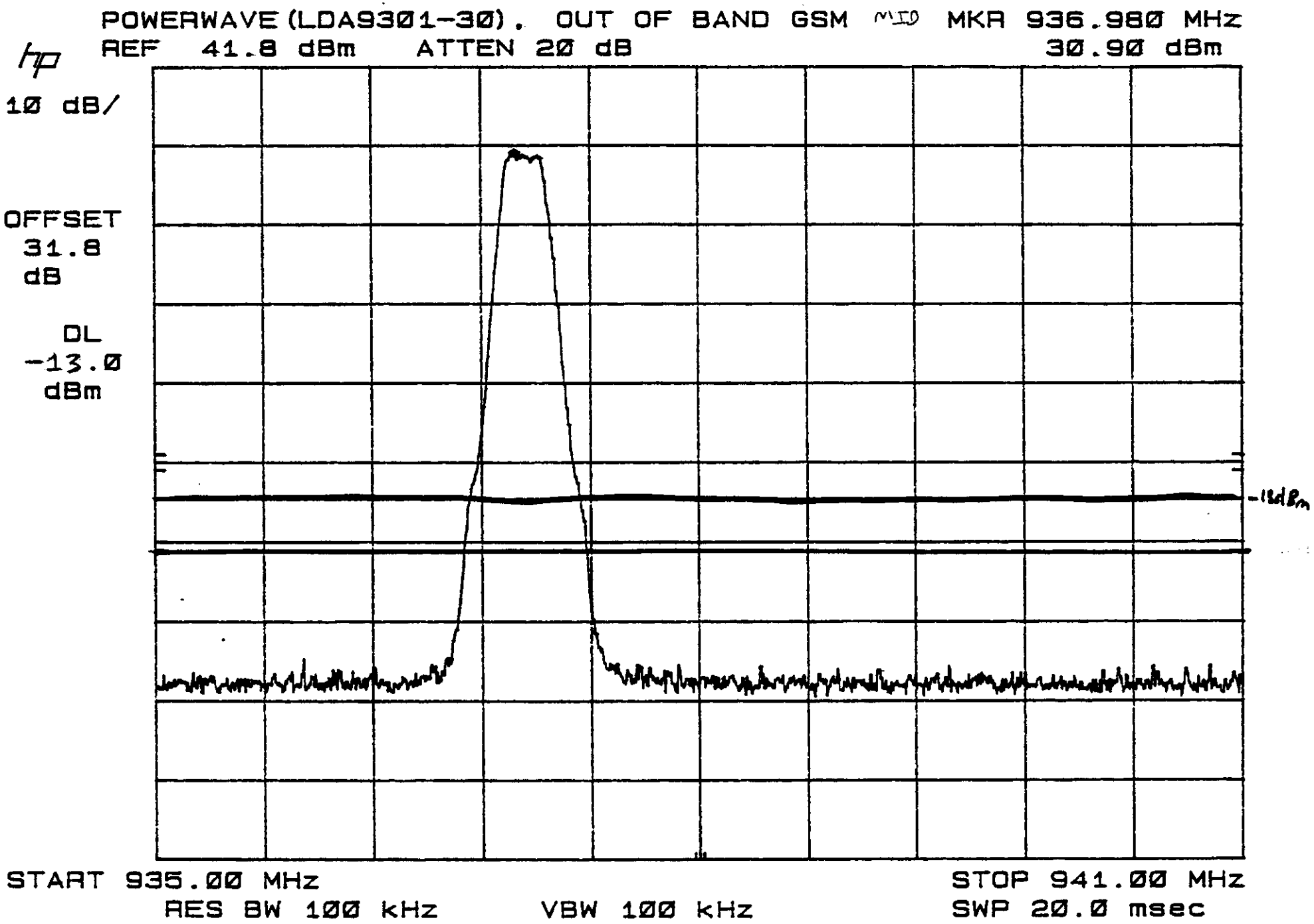
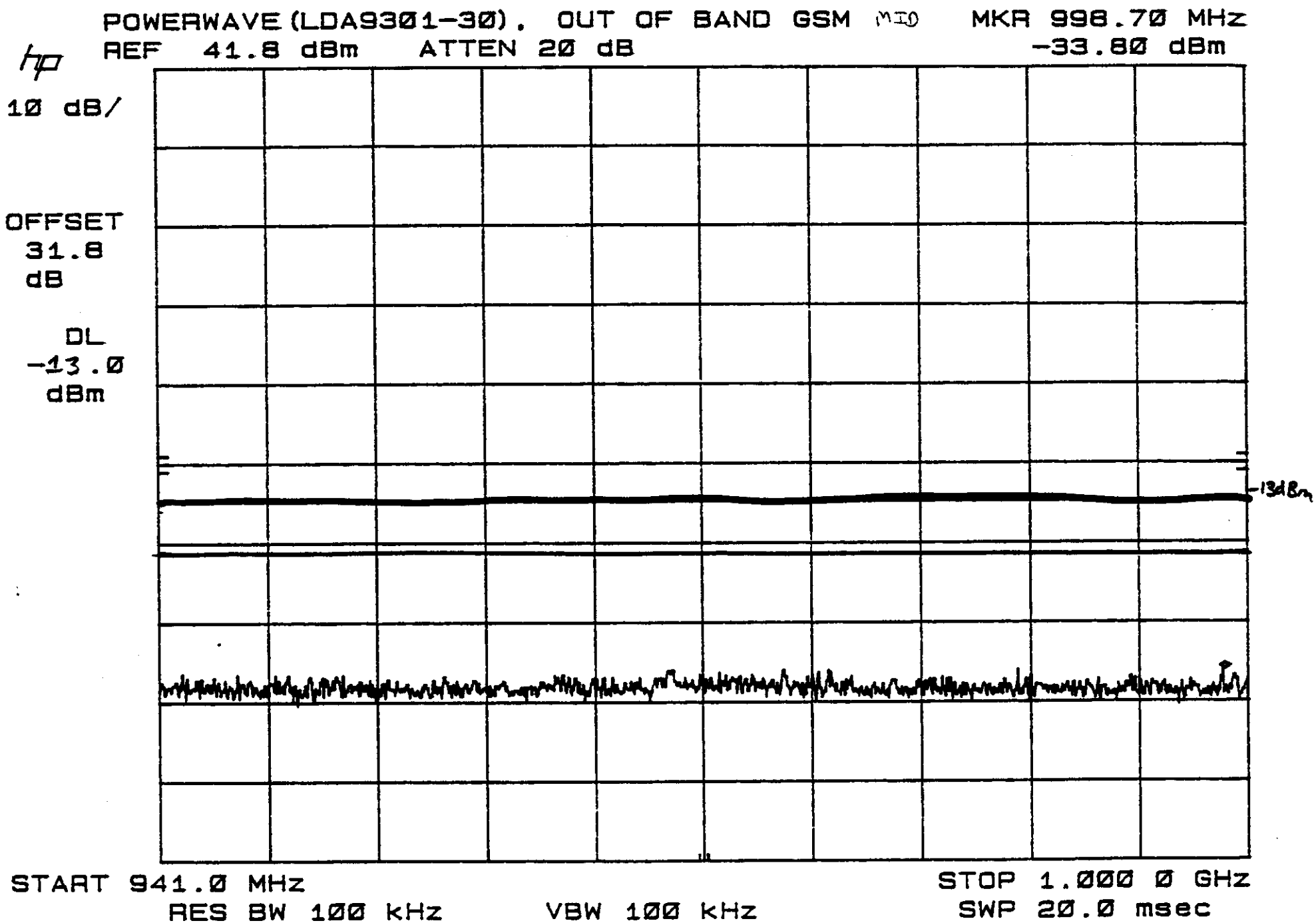
FREQUENCY 935MHz(LOW)	
MODULATION TYPE: GSM	
	PLOT NUMBER
1 MHz TO 935 MHz	**47**
935 MHz TO 940 MHz	**48**
940 MHz TO 2.5 GHz	**49**
2.5 GHz TO 9.35 GHz	**50**
MODULATION TYPE: CW	
	PLOT NUMBER
1 MHz TO 1GHz	**51**
925 MHz TO 945 MHz	**52**
1GHz TO 2.5 GHz	**53**
2.5 GHz TO 9.32 GHz	**54**
FREQUENCY 940MHz(HIGH)	
MODULATION TYPE: GSM	
	PLOT NUMBER
1 MHz TO 1GHz	**55**
930 MHz TO 950 MHz	**56**
1GHz TO 2.5GHz	**57**
2.5GHz TO 9.4GHz	**58**
MODULATION TYPE: CW	
	PLOT NUMBER
1 MHz TO 1GHz	**59**
930 MHz TO 950 MHz	**60**
1GHz TO 2.5GHz	**61**
2.5GHz TO 9.4 GHz	**62**

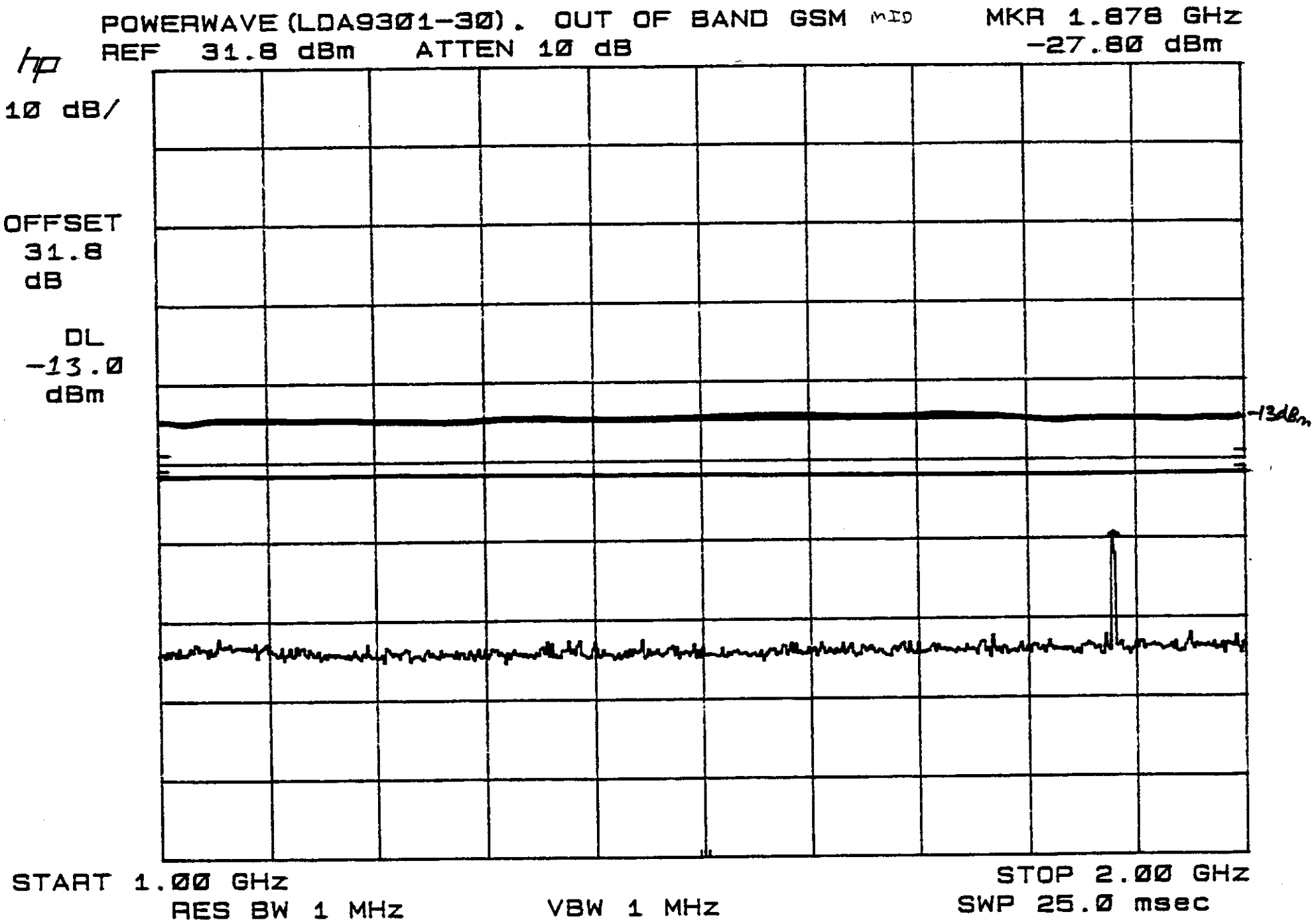
COMPLIANCE CONSULTING SERVICES
1366 BORDEAUX DRIVE SUNNYVALE, CA 94089 USA
DOCUMENT NO:CCSUP4031A
TEL:(408) 752-8166 FAX:(408) 752-8168

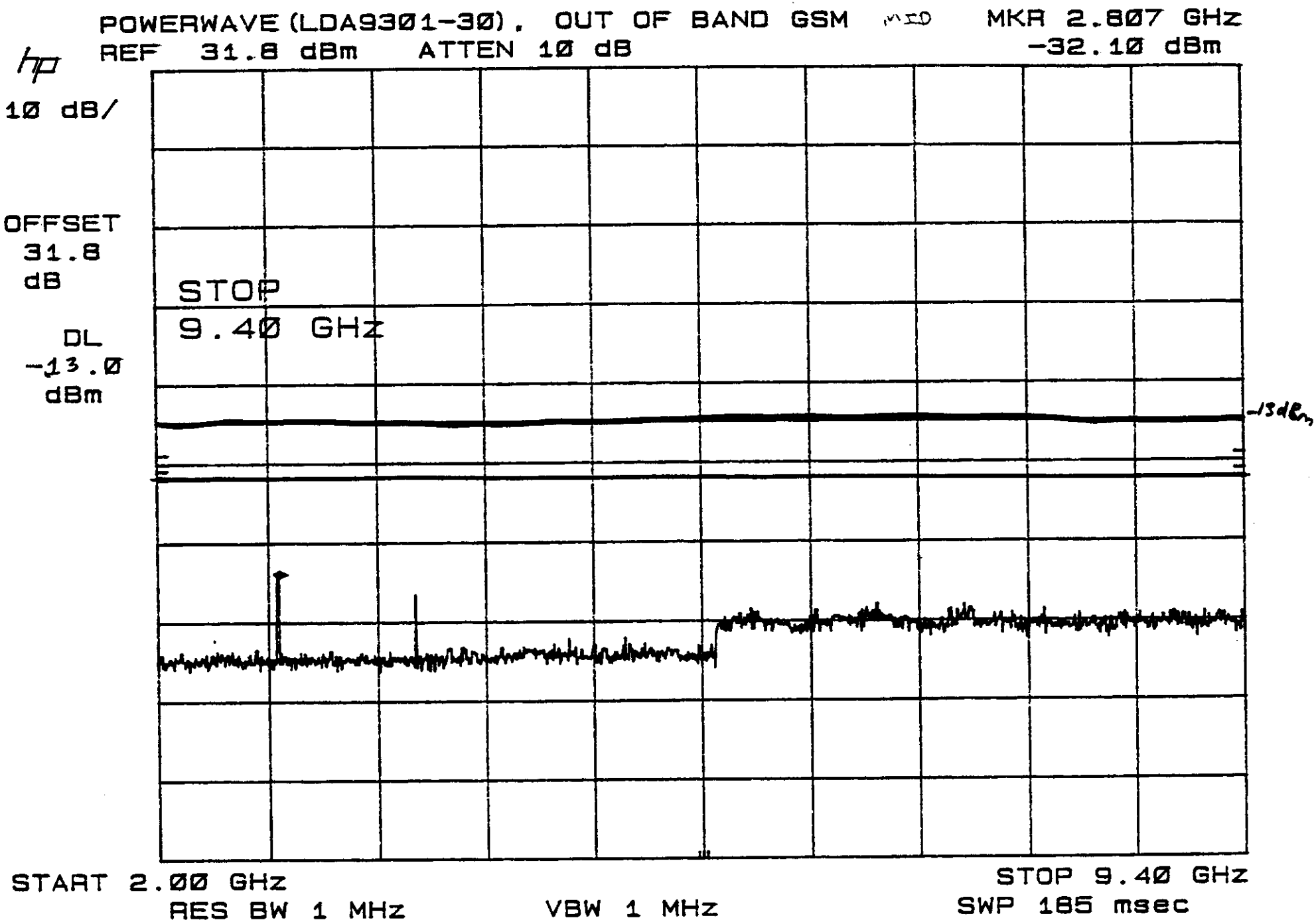

POWERWAVE (LDA9301-30). OUT OF BAND GSM MID
MKR 467.1 MHz
-36.20 dBm
REF 41.8 dBm
ATTEN 20 dB
10 dB/
OFFSET
31.8
dB
DL
-13.0
dBm
-13dBm
START 1 MHz
STOP 935 MHz
RES BW 100 kHz
VBW 100 kHz
SWP 280 msec

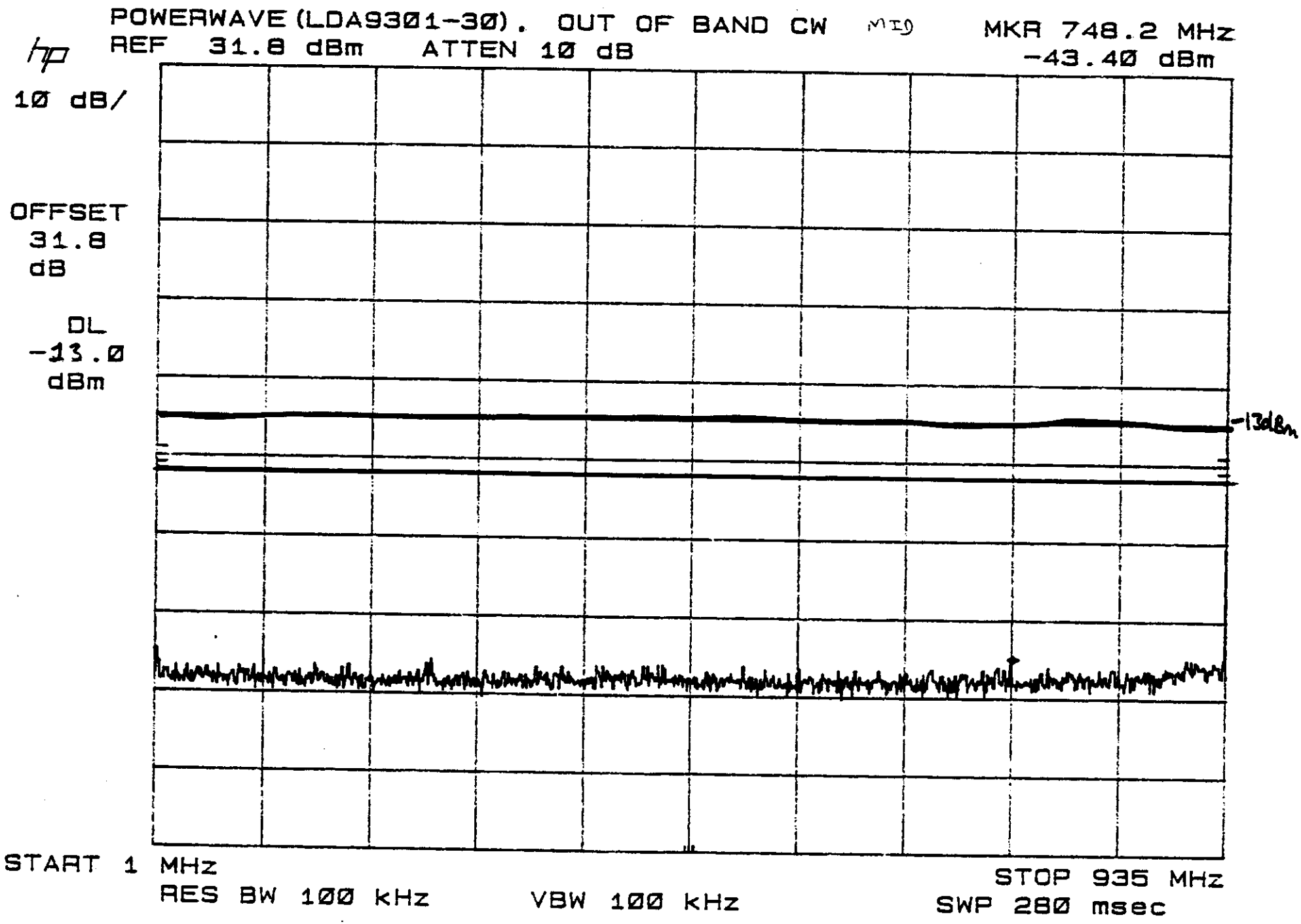

POWERWAVE (LDA9301-30). OUT OF BAND GSM MID MKR 936.980 MHz
REF 41.8 dBm ATTEN 20 dB 30.90 dBm
10 dB/
OFFSET
31.8
dB
DL
-13.0
dBm
-13dBm
START 935.00 MHz
STOP 941.00 MHz
RES BW 100 kHz
VBW 100 kHz
SWP 20.0 msec

±40

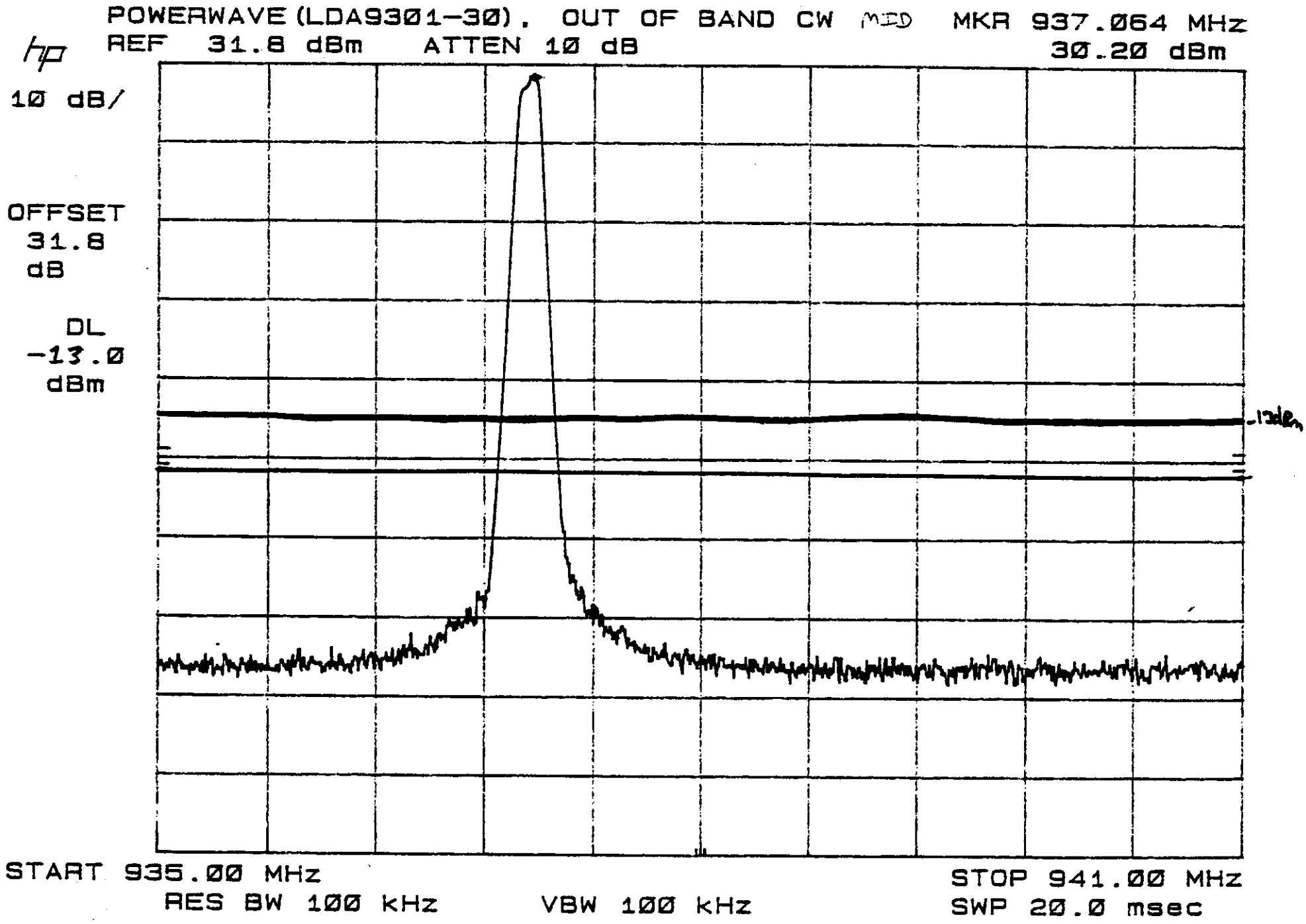

POWERWAVE (LDA9301-30). OUT OF BAND GSM MID
MKR 998.70 MHz
REF 41.8 dBm
ATTEN 20 dB
-33.80 dBm
10 dB/
OFFSET
31.8
dB
DL
-13.0
dBm
-13dBm
START 941.0 MHz
STOP 1.000 0 GHz
RES BW 100 kHz
VBW 100 kHz
SWP 20.0 msec


POWERWAVE (LDA9301-30). OUT OF BAND GSM MID
MKR 1.878 GHz
-27.80 dBm
REF 31.8 dBm
ATTEN 10 dB
10 dB/
OFFSET
31.8
dB
DL
-13.0
dBm
-13dBm
START 1.00 GHz
STOP 2.00 GHz
RES BW 1 MHz
VBW 1 MHz
SWP 25.0 msec

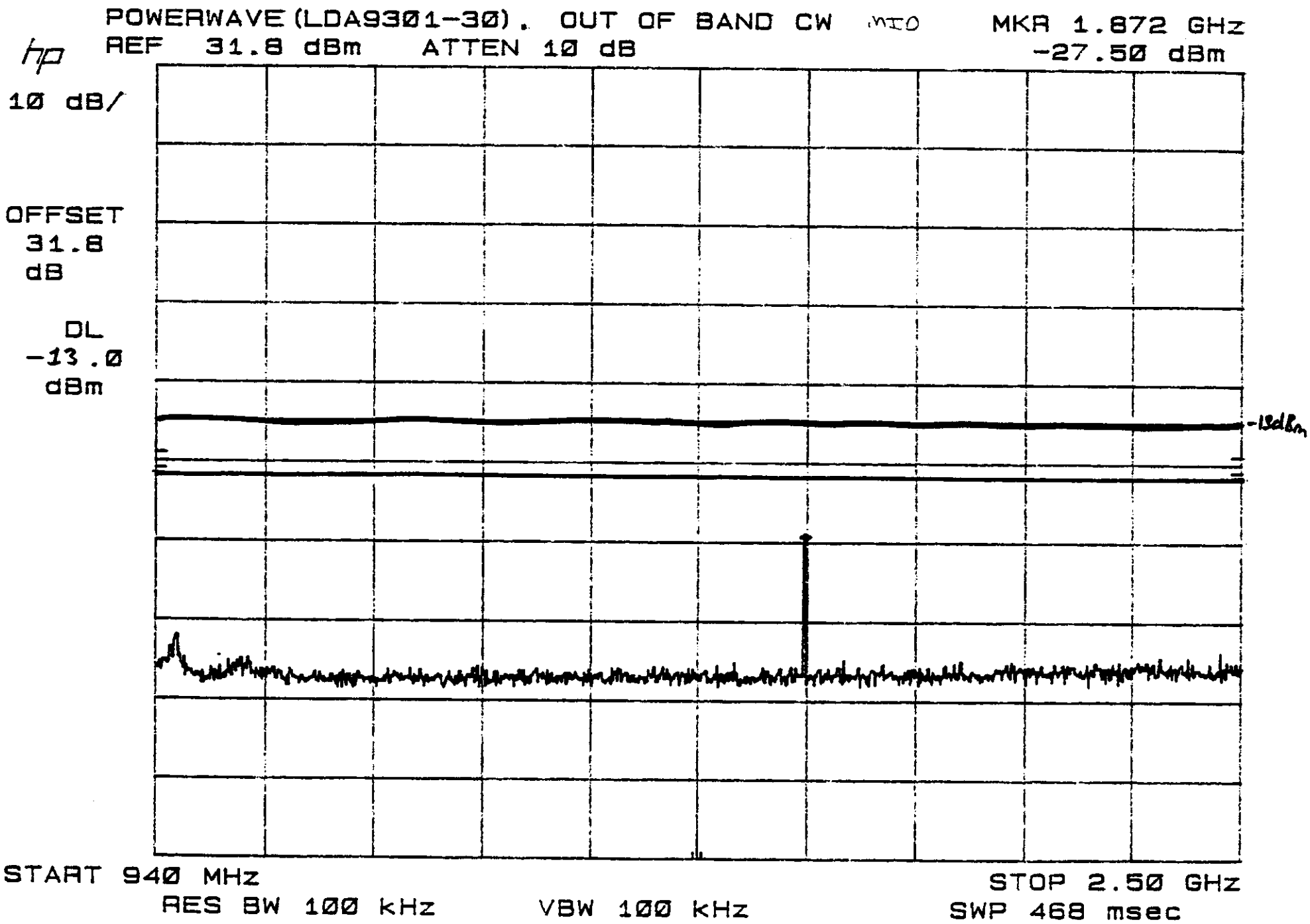

POWERWAVE (LDA9301-30), OUT OF BAND GSM MSD
MKR 2.807 GHz
REF 31.8 dBm
ATTEN 10 dB
-32.10 dBm
hp
10 dB/
OFFSET
31.8
dB
STOP
9.40 GHz
DL
-13.0
dBm
-13dBm
START 2.00 GHz
STOP 9.40 GHz
RES BW 1 MHz
VBW 1 MHz
SWP 185 msec

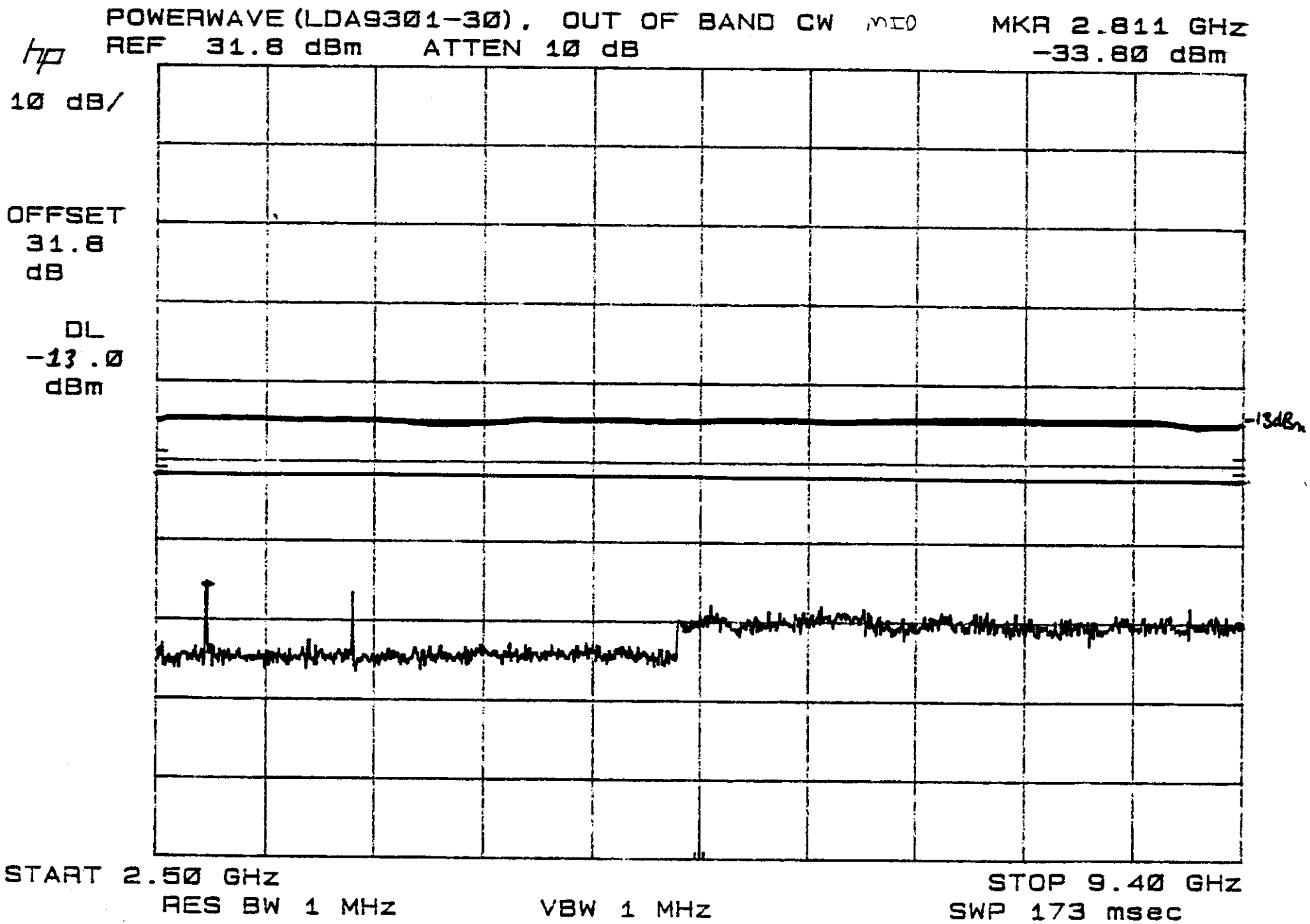

POWERWAVE (LDA9301-30). OUT OF BAND CW MID
REF 31.8 dBm ATTEN 10 dB
MKR 748.2 MHz
-43.40 dBm
10 dB/
OFFSET
31.8
dB
OL
-13.0
dBm
-13dBm
START 1 MHz
RES BW 100 kHz
VBW 100 kHz
STOP 935 MHz
SWP 280 msec

#4/4

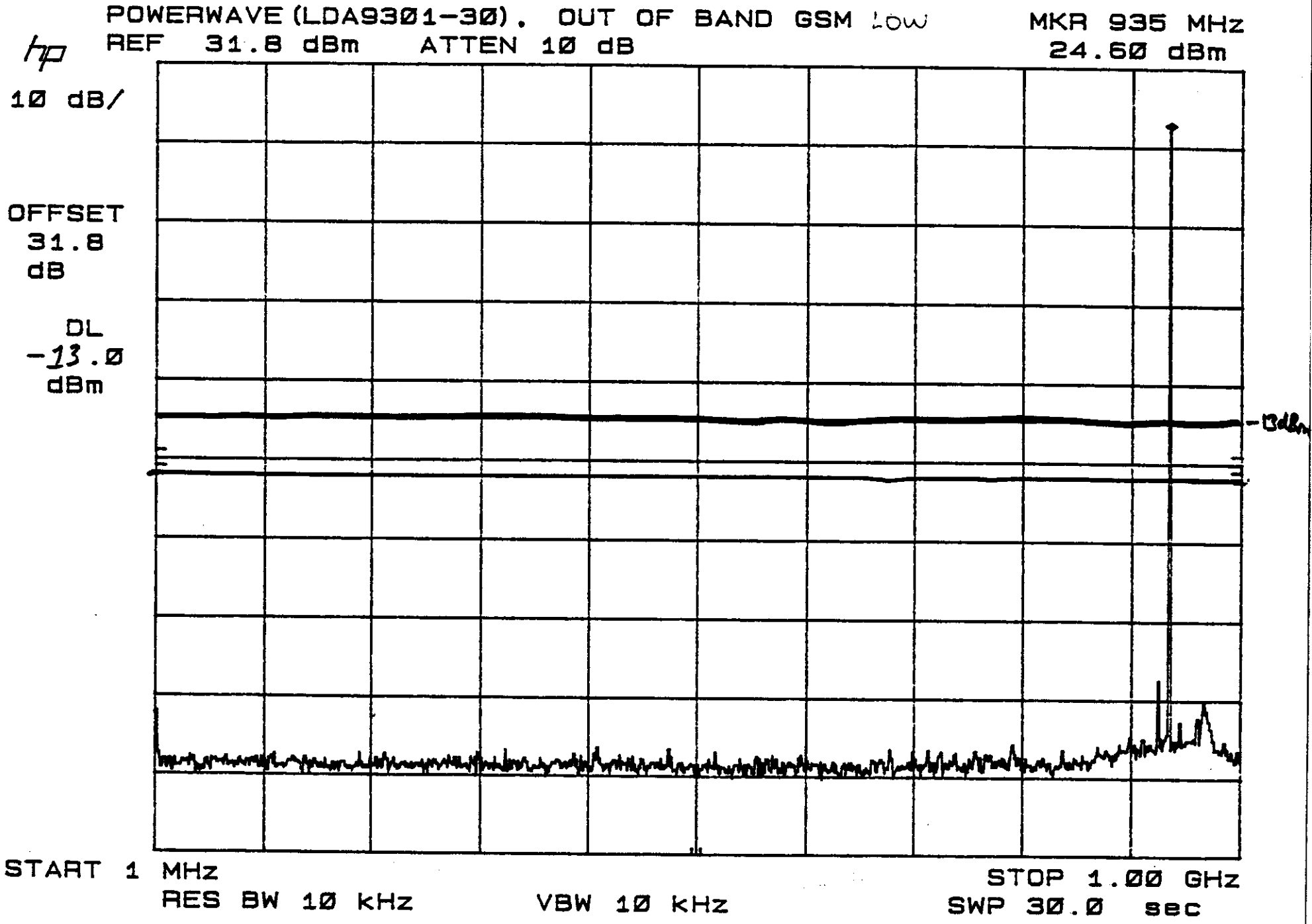

POWERWAVE (LDA9301-30). OUT OF BAND CW MID MKR 937.064 MHz
REF 31.8 dBm ATTEN 10 dB 30.20 dBm
10 dB/
OFFSET
31.8
dB
DL
-13.0
dBm
START 935.00 MHz
STOP 941.00 MHz
RES BW 100 kHz
VBW 100 kHz
SWP 20.0 msec

#85

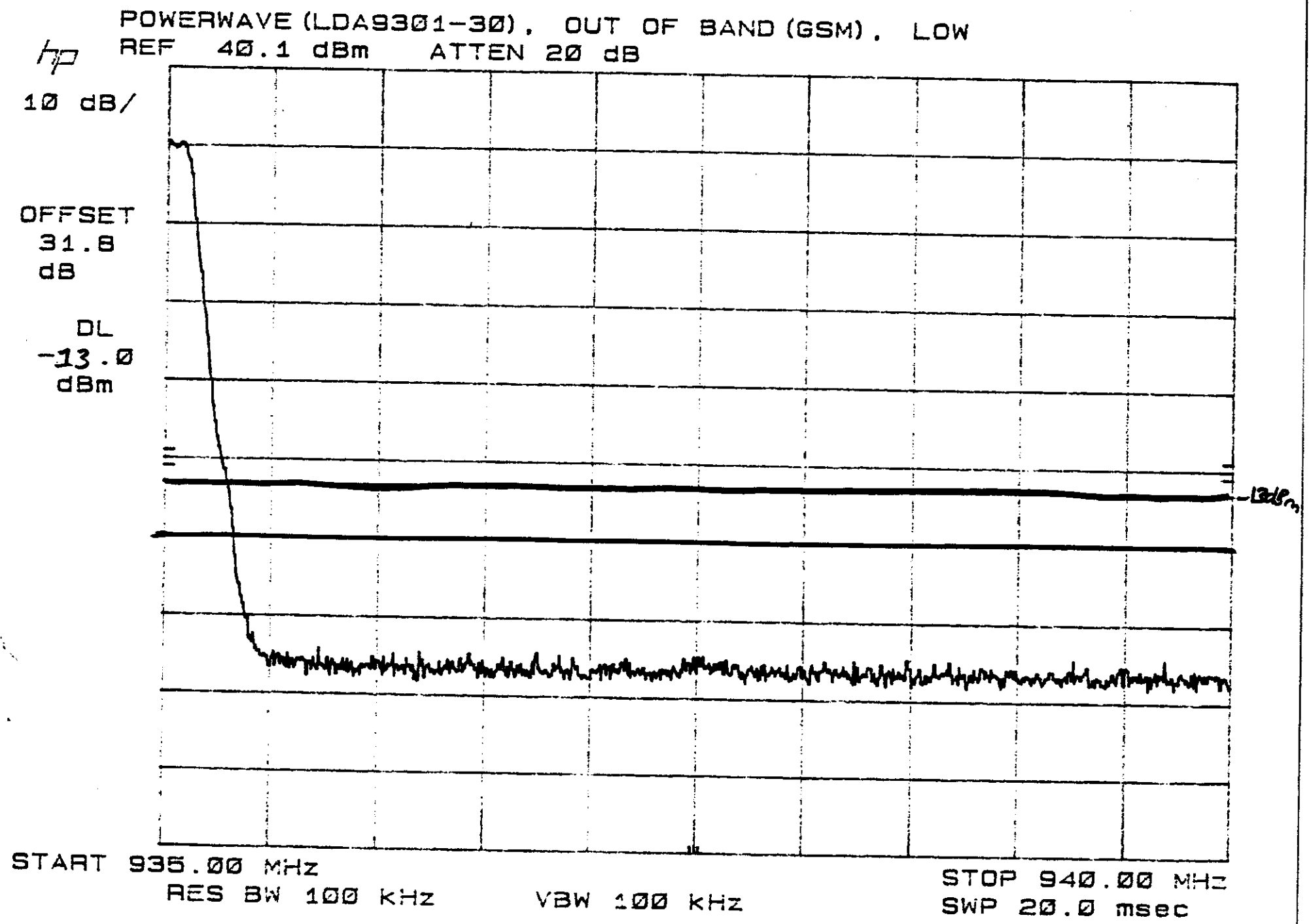

POWERWAVE (LDA9301-30). OUT OF BAND CW MID
MKR 1.872 GHz
-27.50 dBm
hp
REF 31.8 dBm
ATTEN 10 dB
10 dB/
OFFSET
31.8
dB
DL
-13.0
dBm
-13dBm
START 940 MHz
STOP 2.50 GHz
RES BW 100 kHz
VBW 100 kHz
SWP 468 msec


POWERWAVE (LDA9301-30), OUT OF BAND CW MID
MKR 2.811 GHz
-33.80 dBm
REF 31.8 dBm
ATTEN 10 dB
10 dB/
OFFSET
31.8
dB
DL
-13.0
dBm
-13dBm
START 2.50 GHz
STOP 9.40 GHz
RES BW 1 MHz
VBW 1 MHz
SWP 173 msec

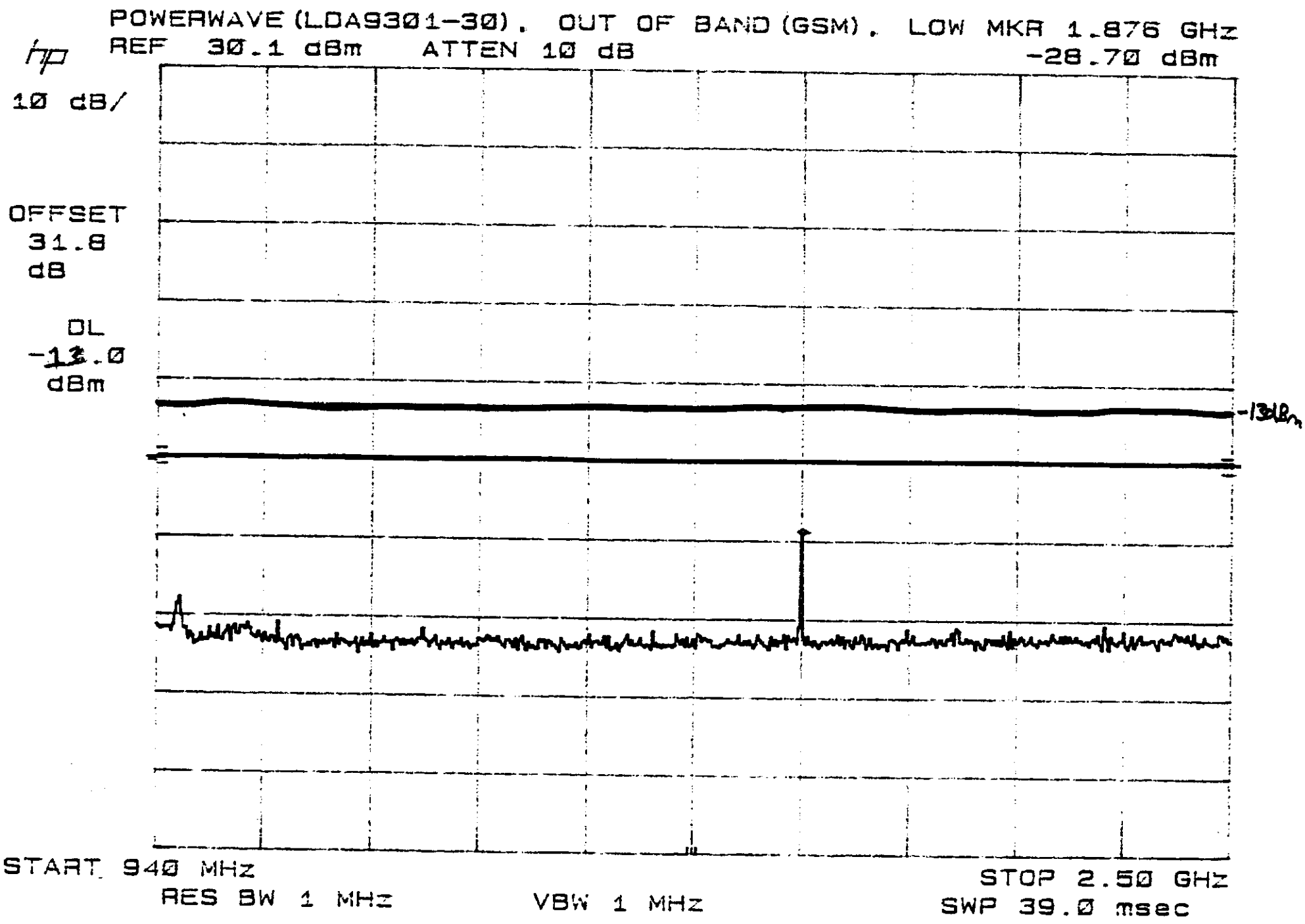
=47


POWERWAVE (LDA9301-30). OUT OF BAND GSM Low
MKR 935 MHz
REF 31.8 dBm ATTEN 10 dB
24.60 dBm
10 dB/
OFFSET
31.8
dB
DL
-13.0
dBm
-13dBm
START 1 MHz
STOP 1.00 GHz
RES BW 10 kHz
VBW 10 kHz
SWP 30.0 sec

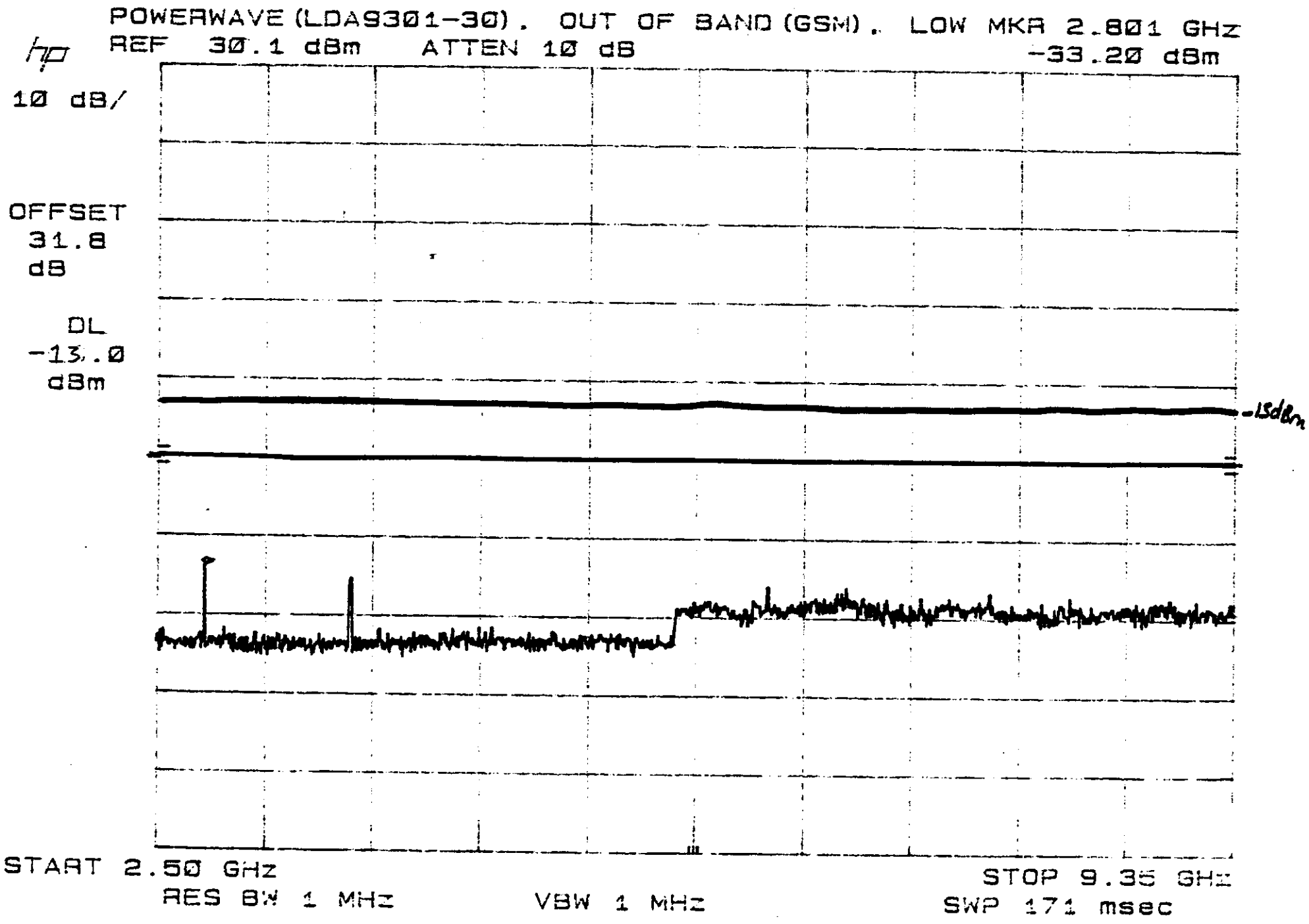
#48


POWERWAVE (LDA9301-30), OUT OF BAND (GSM), LOW
REF 40.1 dBm ATTEN 20 dB
10 dB/
OFFSET
31.8
dB
DL
-13.0
dBm
-13dBm
START 935.00 MHz
RES BW 100 kHz
VBW 100 kHz
STOP 940.00 MHz
SWP 20.0 msec

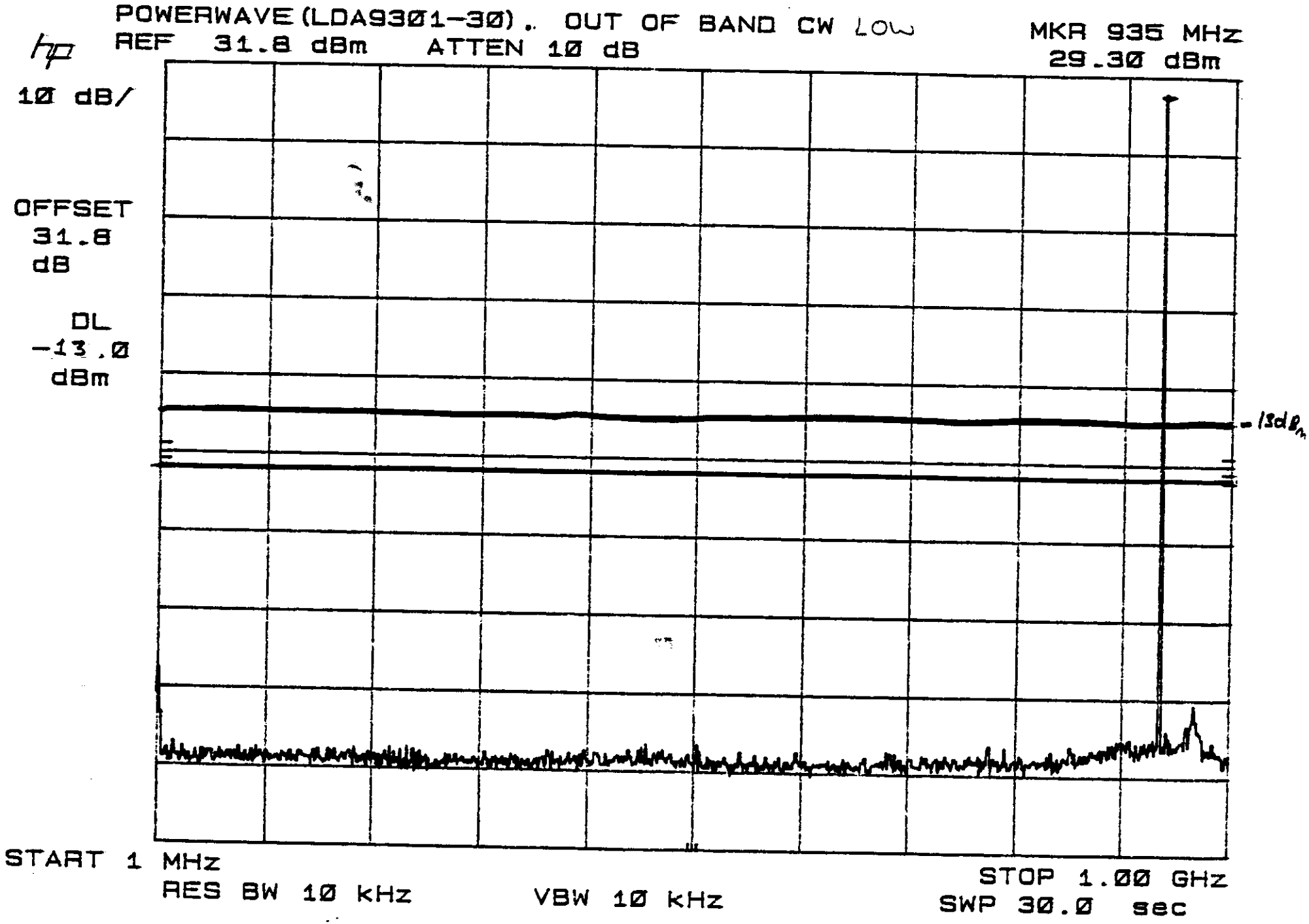
#49


POWERWAVE (LDA9301-30). OUT OF BAND (GSM). LOW MKR 1.876 GHz
REF 30.1 dBm ATTEN 10 dB
-28.70 dBm
10 dB/
OFFSET
31.8
dB
DL
-13.0
dBm
-13dBm
START 940 MHz
RES BW 1 MHz
VBW 1 MHz
STOP 2.50 GHz
SWP 39.0 msec

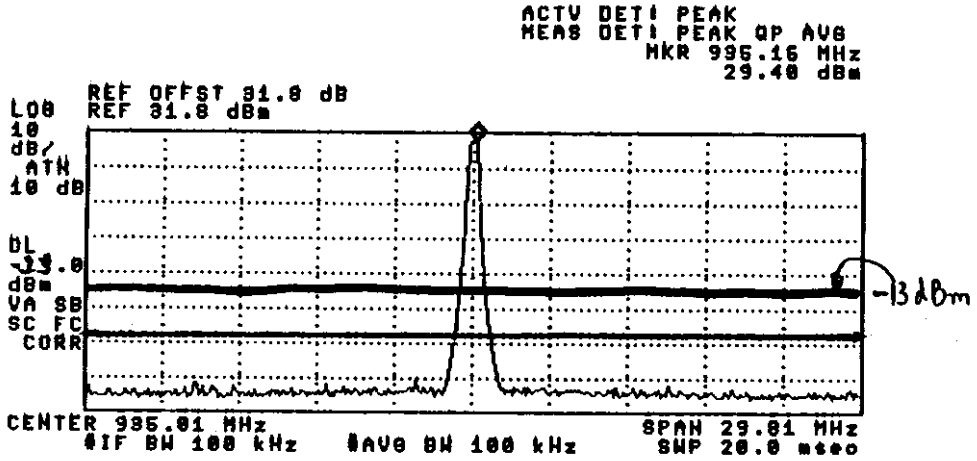
#50


POWERWAVE (LDA9301-30). OUT OF BAND (GSM). LOW MKR 2.801 GHz
REF 30.1 dBm ATTEN 10 dB
-33.20 dBm
10 dB/
OFFSET
31.8
dB
DL
-13.0
dBm
-15dBm
START 2.50 GHz
RES BW 1 MHz
VBW 1 MHz
STOP 9.35 GHz
SWP 171 msec

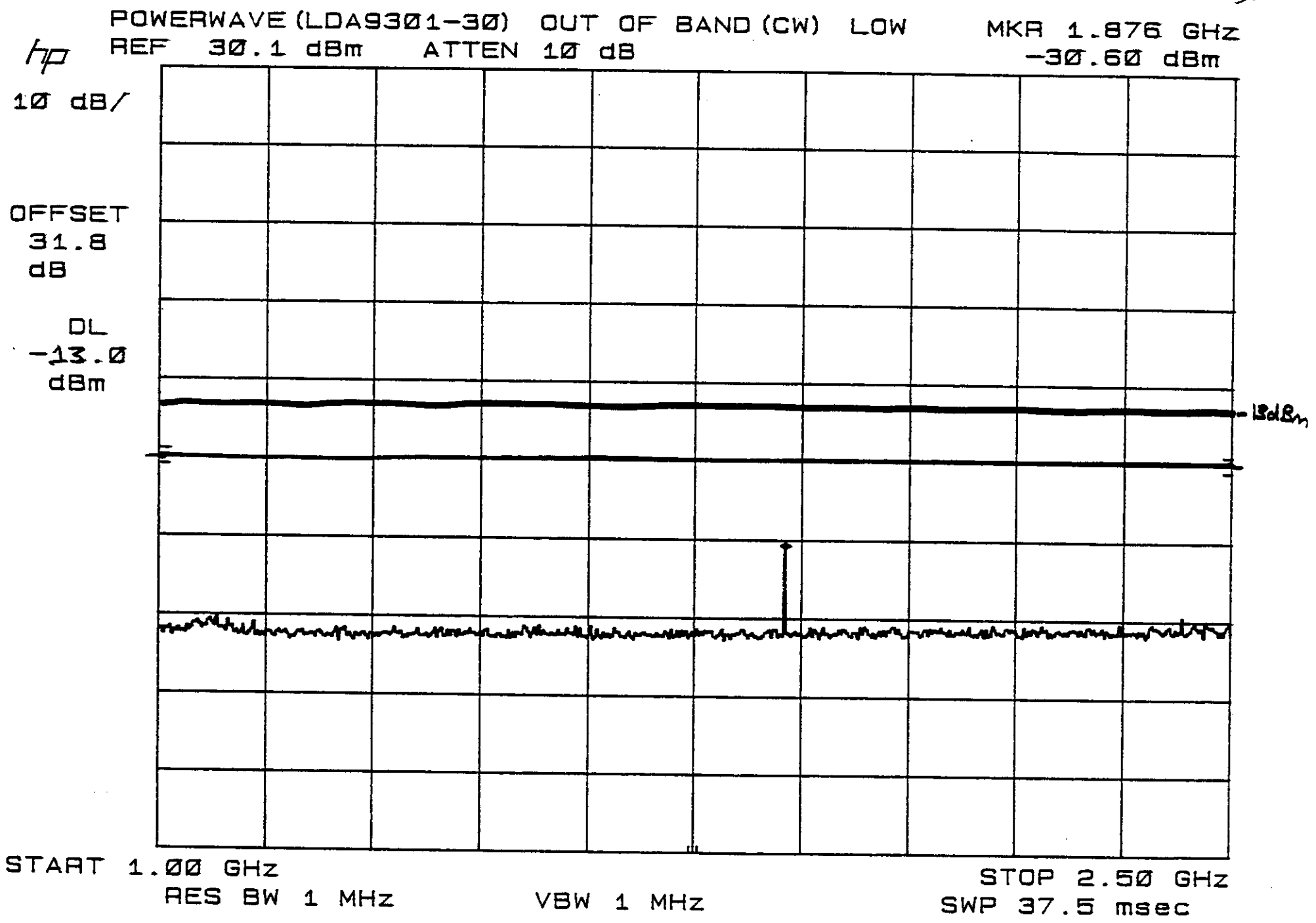
#0051

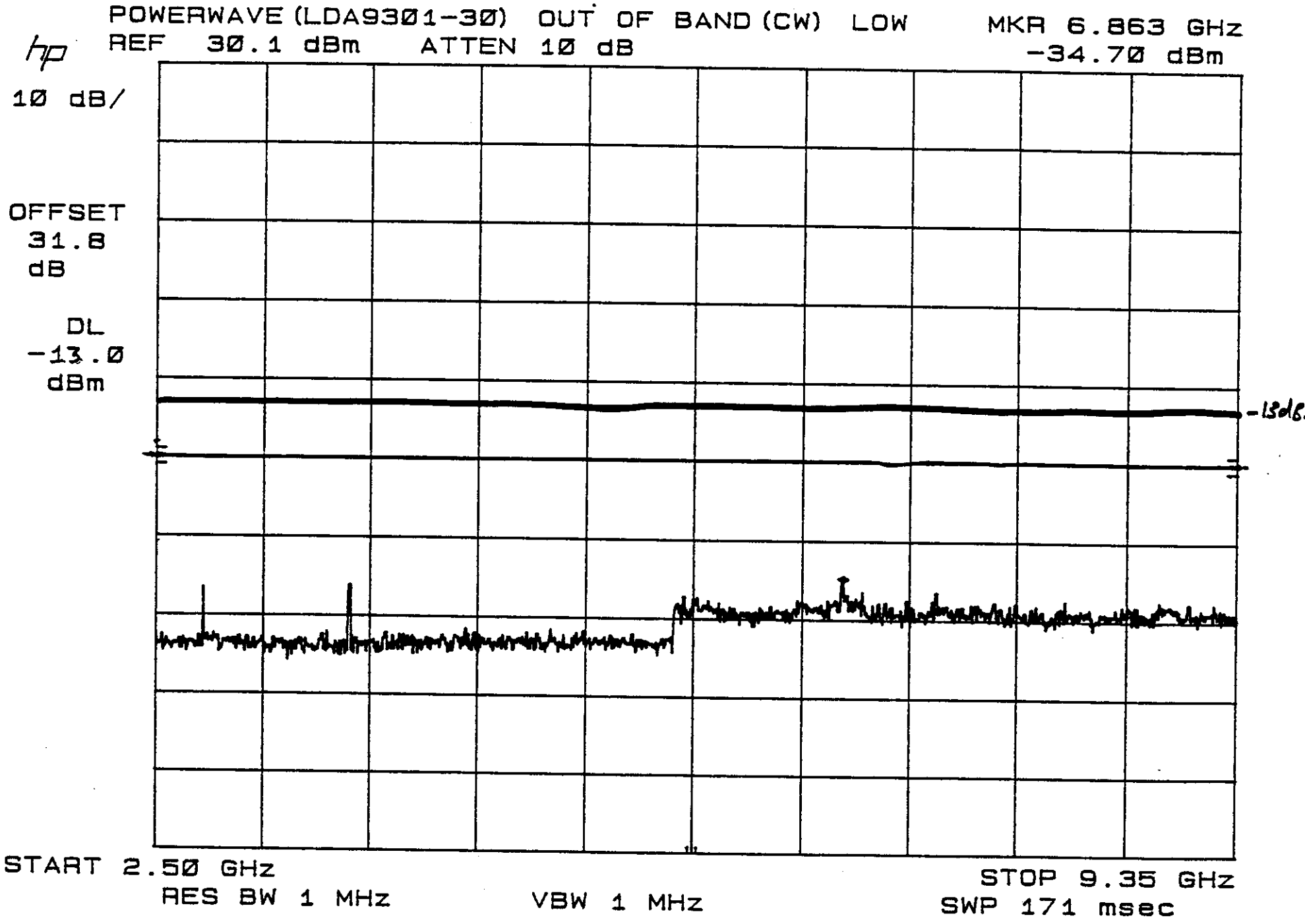

POWERWAVE (LDA9301-30). OUT OF BAND CW LOW
REF 31.8 dBm ATTEN 10 dB
MKR 935 MHz
29.30 dBm
10 dB/
OFFSET
31.8
dB
DL
-13.0
dBm
-13dBm
START 1 MHz
RES BW 10 kHz
VBW 10 kHz
STOP 1.00 GHz
SWP 30.0 sec

09:39:59 MAY 18, 1998
POWERWAVE(LDA9901-30) CW, OUT OF BAND LOW

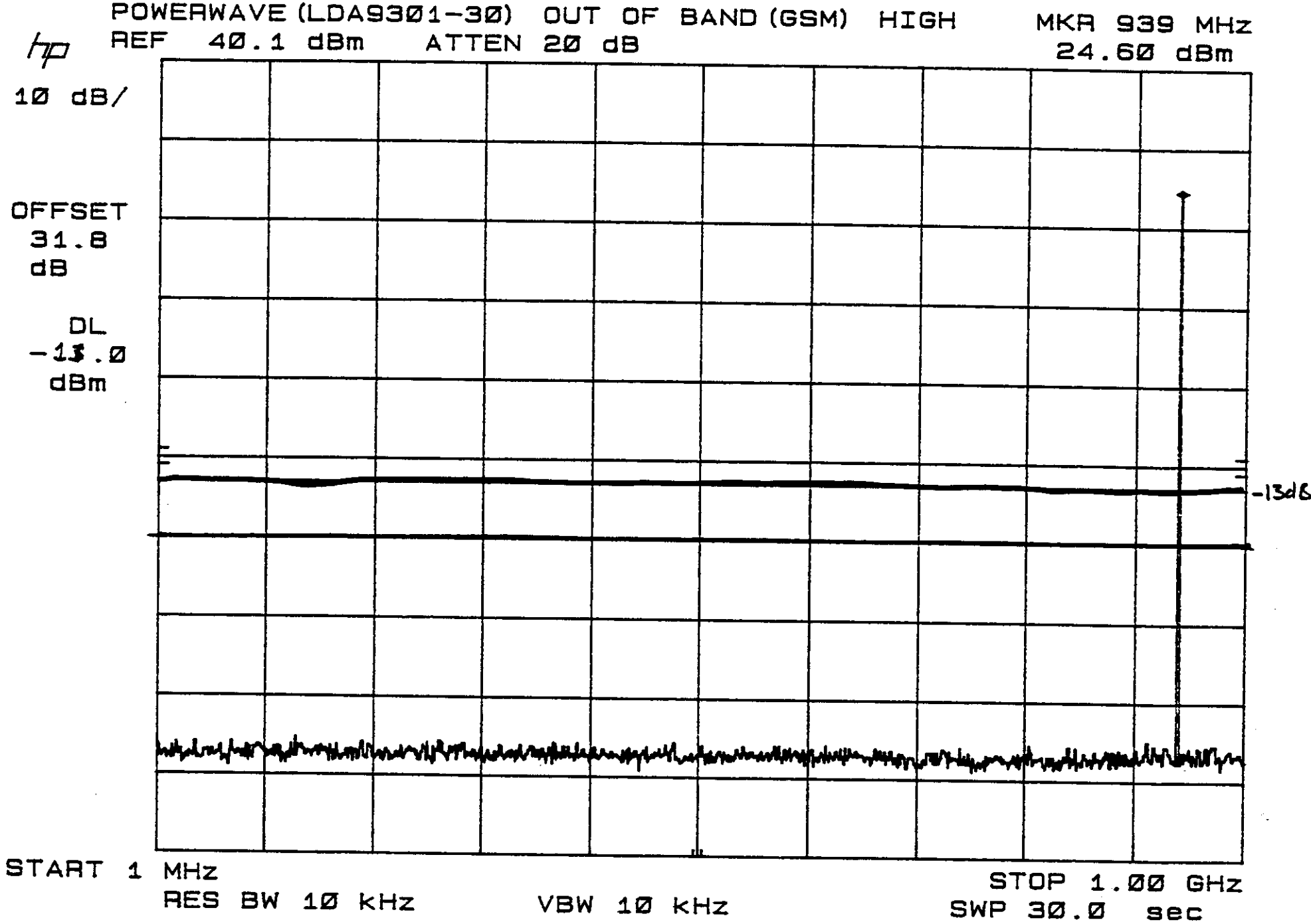


53


POWERWAVE (LDA9301-30) OUT OF BAND (CW) LOW
REF 30.1 dBm ATTEN 10 dB
MKR 1.876 GHz
-30.60 dBm
10 dB/
OFFSET
31.8
dB
DL
-13.0
dBm
START 1.00 GHz
RES BW 1 MHz
VBW 1 MHz
STOP 2.50 GHz
SWP 37.5 msec

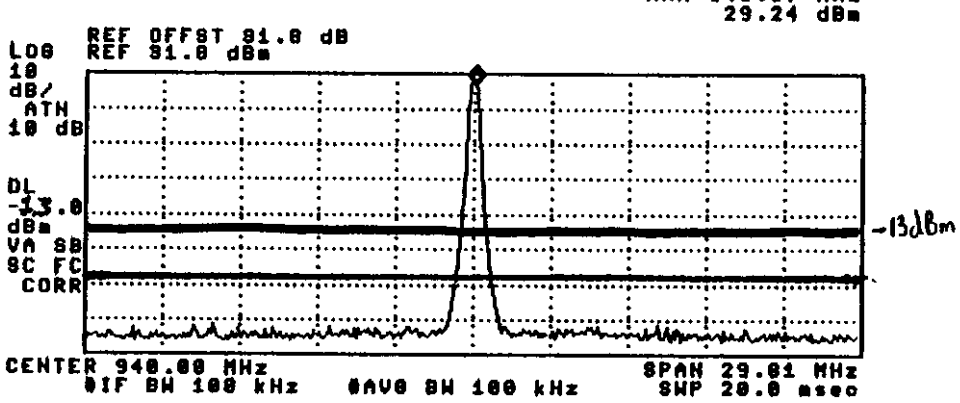

POWERWAVE (LDA9301-30) OUT OF BAND (CW) LOW
REF 30.1 dBm ATTEN 10 dB
MKR 6.863 GHz
-34.70 dBm
hp
10 dB/
OFFSET
31.8
dB
DL
-13.0
dBm
-13dB
START 2.50 GHz
RES BW 1 MHz
VBW 1 MHz
STOP 9.35 GHz
SWP 171 msec

#55

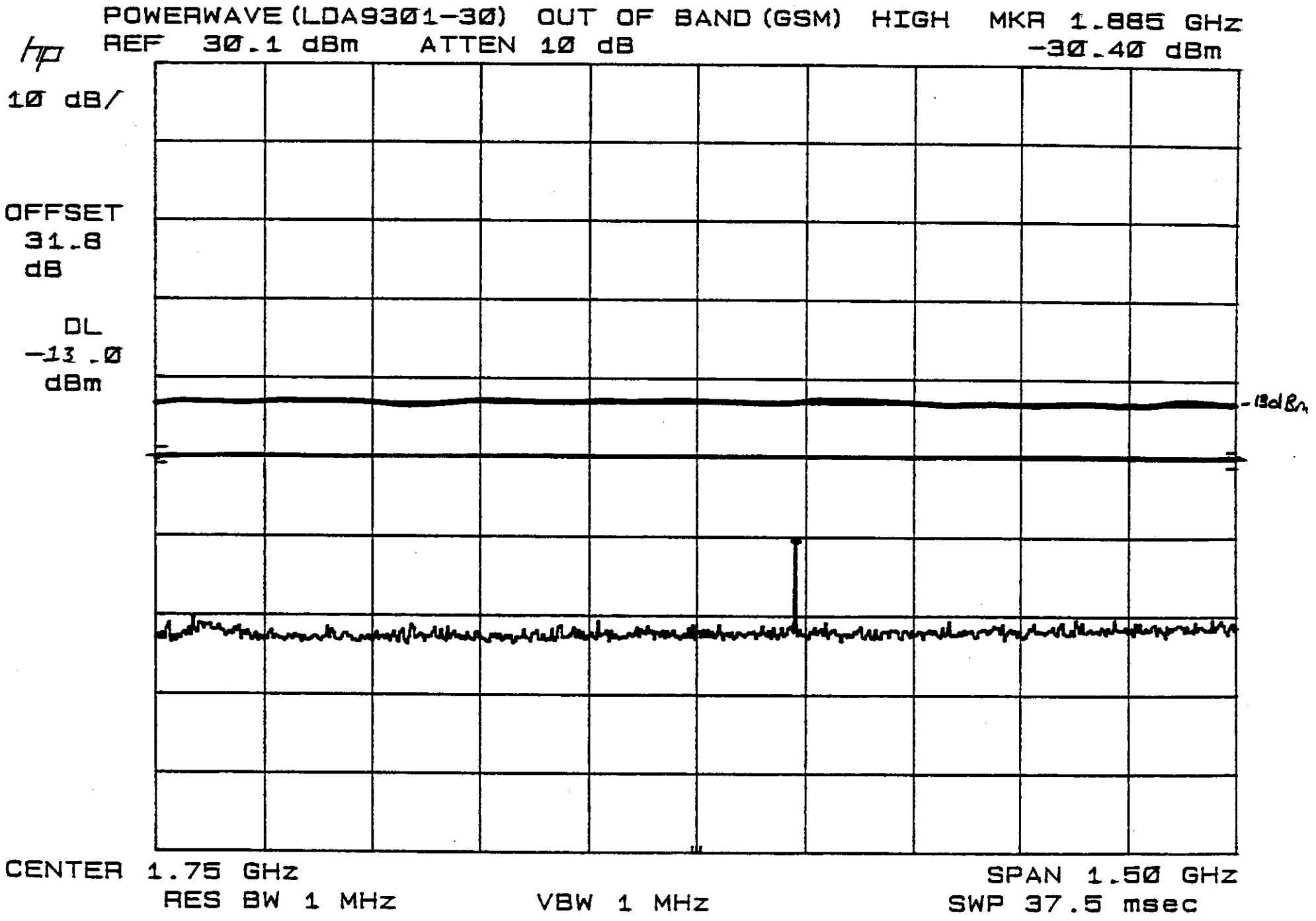

POWERWAVE (LDA9301-30) OUT OF BAND (GSM) HIGH
REF 40.1 dBm ATTEN 20 dB
MKR 939 MHz
24.60 dBm
10 dB/
OFFSET
31.8
dB
DL
-13.0
dBm
-13dB
START 1 MHz
RES BW 10 kHz
VBW 10 kHz
STOP 1.00 GHz
SWP 30.0 sec

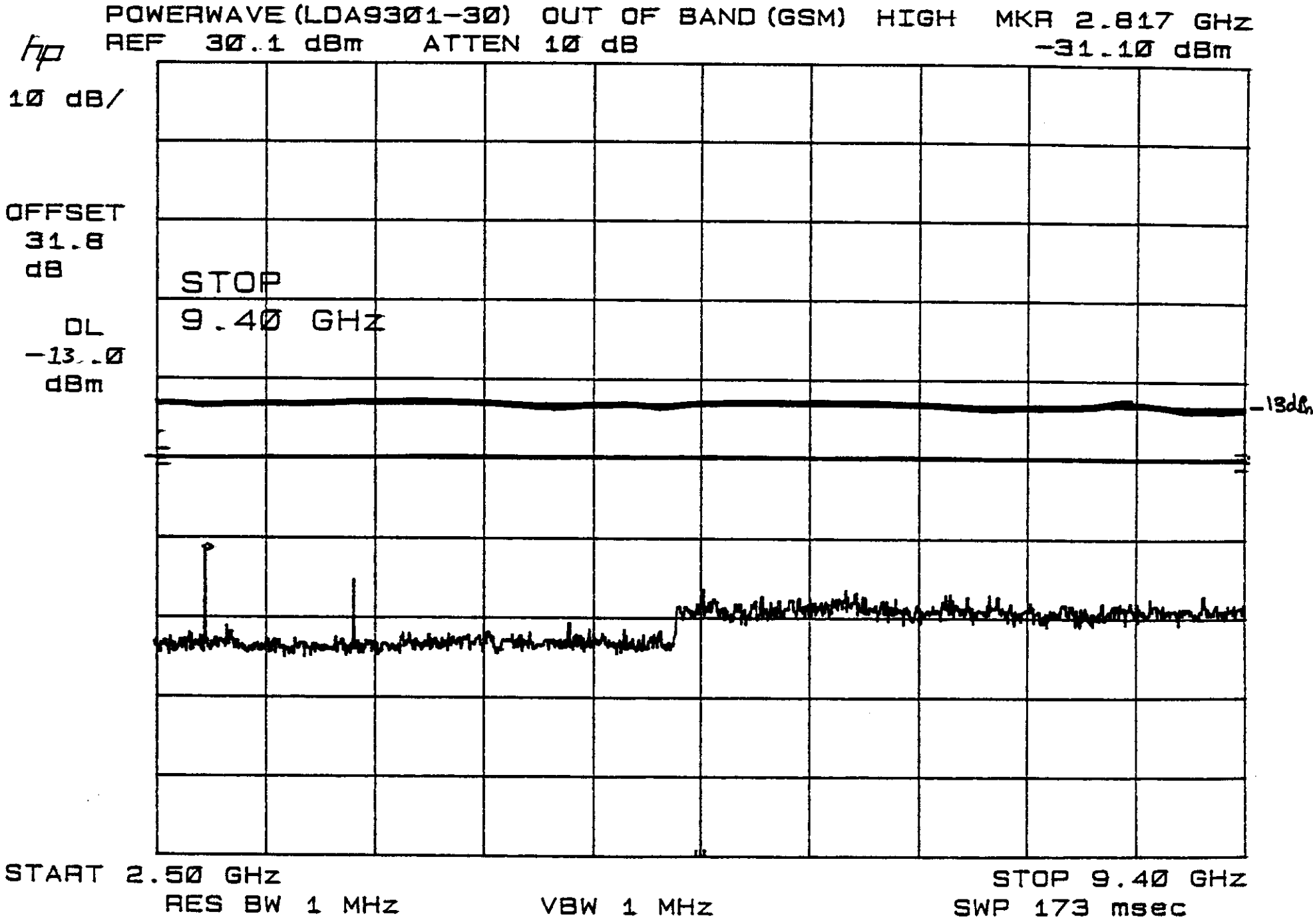
09:42:47 MAY 18, 1998
POWERWAVE(LDA9301-80) GSM, OUT OF BAND HIGH

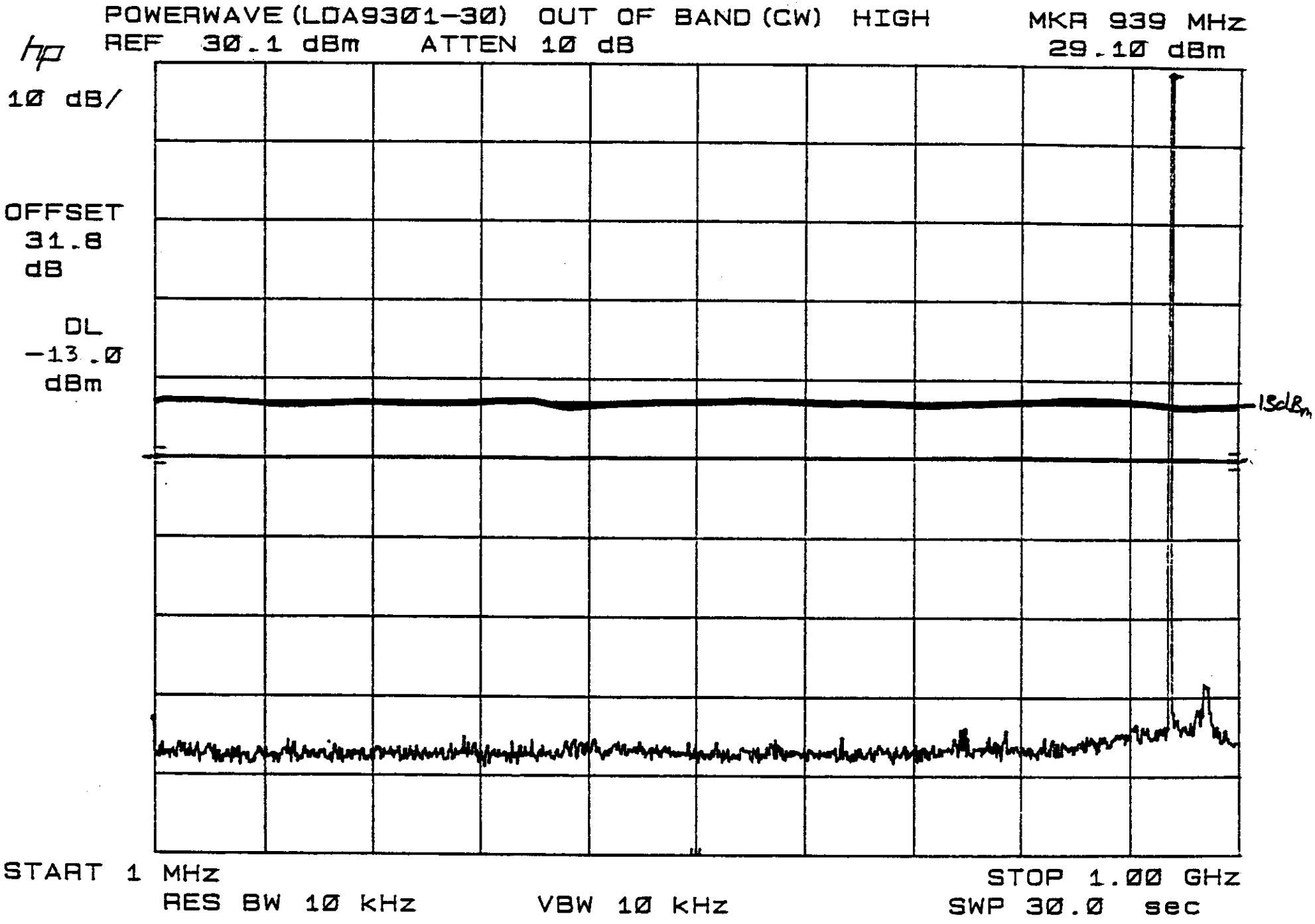
ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 940.07 MHz
29.24 dBm



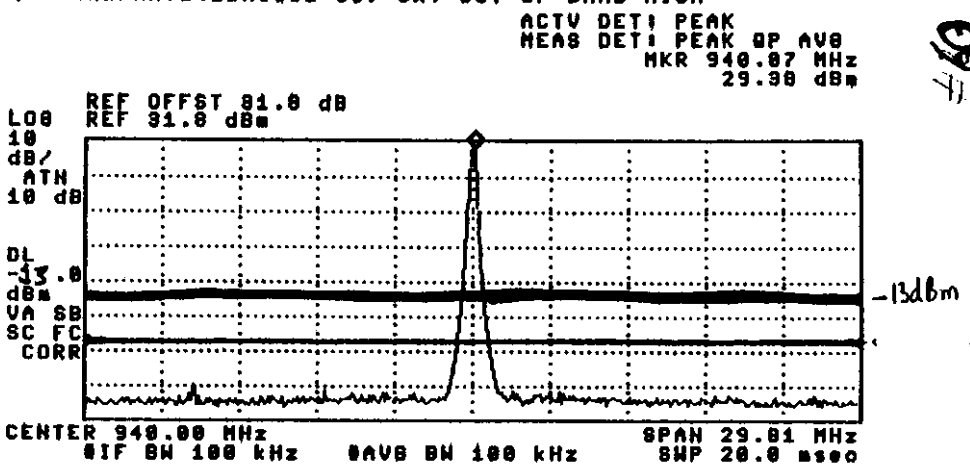
#28


POWERWAVE (LDA9301-30) OUT OF BAND (GSM) HIGH MKR 1.885 GHz
REF 30.1 dBm ATTEN 10 dB -30.40 dBm
10 dB/
OFFSET
31.8
dB
DL
-13.0
dBm
-13dBm
CENTER 1.75 GHz
SPAN 1.50 GHz
RES BW 1 MHz
VBW 1 MHz
SWP 37.5 msec


POWERWAVE (LDA9301-30) OUT OF BAND (GSM) HIGH MKR 2.817 GHz
REF 30.1 dBm ATTEN 10 dB
-31.10 dBm
10 dB/
OFFSET
31.8
dB
STOP
9.40 GHz
DL
-13.0
dBm
-13dBm
START 2.50 GHz
STOP 9.40 GHz
RES BW 1 MHz
VBW 1 MHz
SWP 173 msec

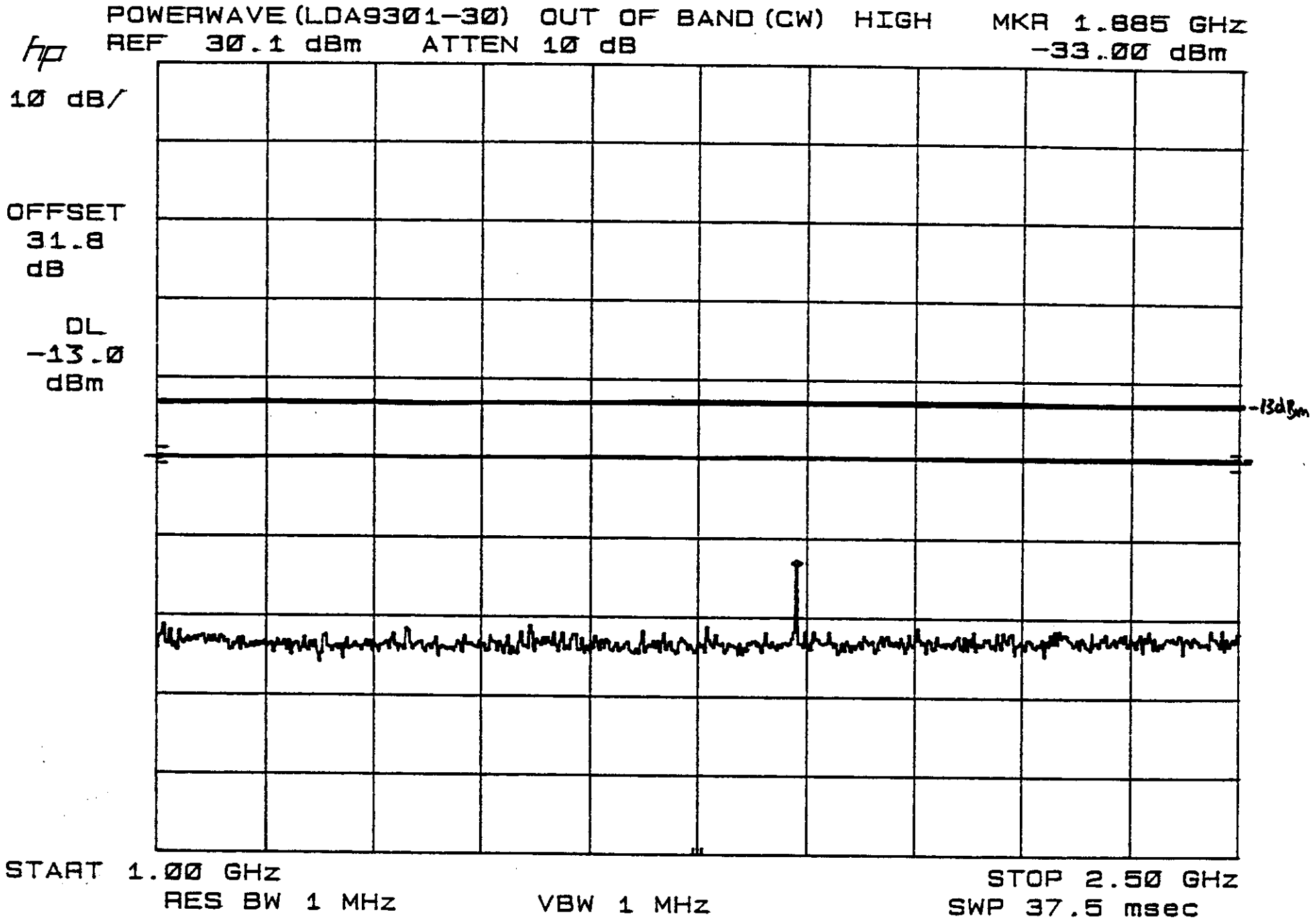

POWERWAVE (LDA9301-30) OUT OF BAND (CW) HIGH
REF 30.1 dBm ATTEN 10 dB
MKR 939 MHz
29.10 dBm
10 dB/
OFFSET
31.8
dB
DL
-13.0
dBm
START 1 MHz
RES BW 10 kHz
VBW 10 kHz
STOP 1.00 GHz
SWP 30.0 sec

09:41:14 MAY 18, 1998
POWERWAVE(LDA9801-30) CW, OUT OF BAND HIGH

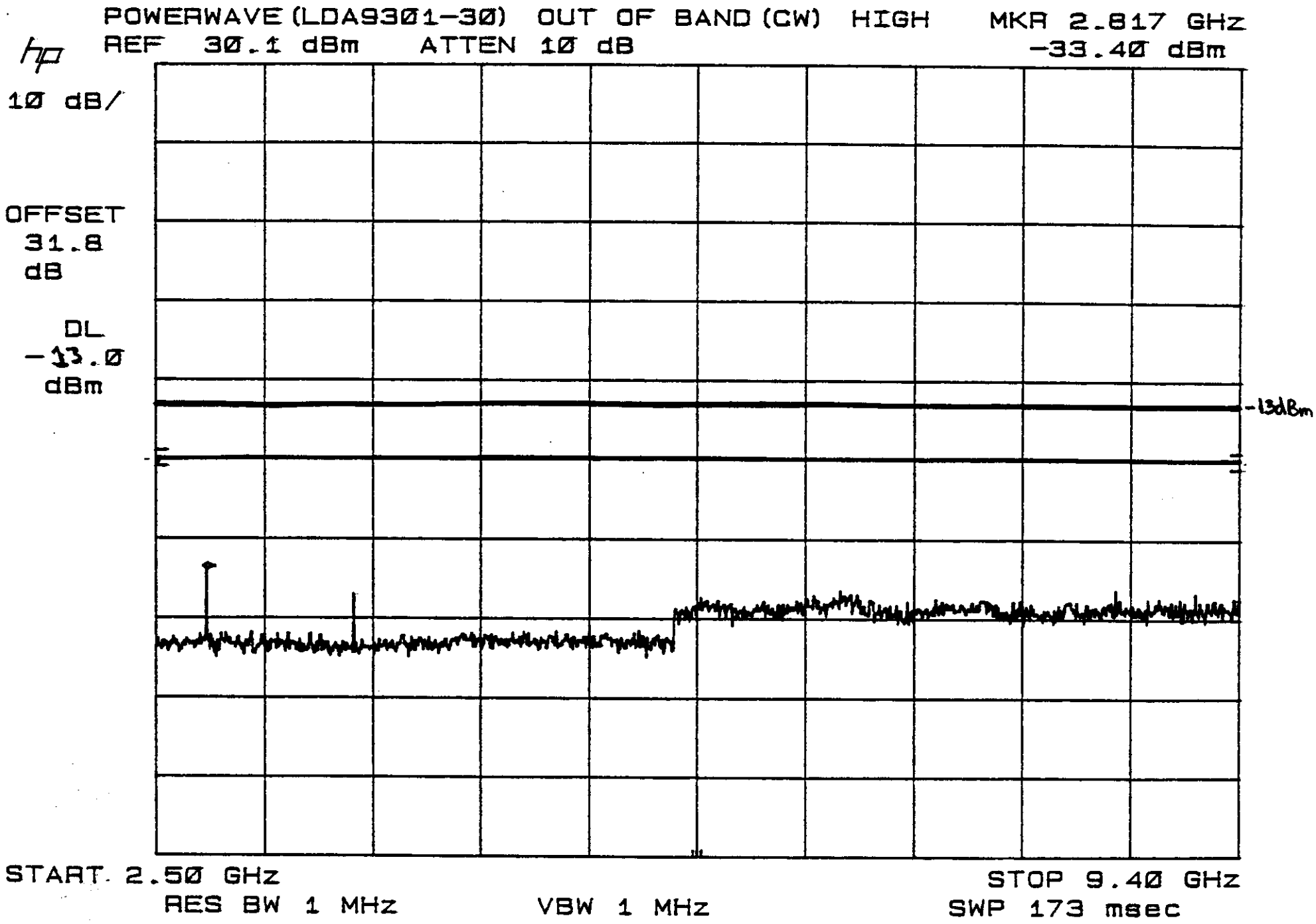


49
41

=61


POWERWAVE (LDA9301-30) OUT OF BAND (CW) HIGH
REF 30.1 dBm ATTEN 10 dB
MKR 1.885 GHz
-33.00 dBm
10 dB/
OFFSET
31.8
dB
DL
-13.0
dBm
-13dBm
START 1.00 GHz
RES BW 1 MHz
VBW 1 MHz
STOP 2.50 GHz
SWP 37.5 msec

#62


POWERWAVE (LDA9301-30) OUT OF BAND (CW) HIGH
REF 30.1 dBm ATTEN 10 dB
MKR 2.817 GHz
-33.40 dBm
10 dB/
OFFSET
31.8
dB
DL
-13.0
dBm
-13dBm
START 2.50 GHz
STOP 9.40 GHz
RES BW 1 MHz
VBW 1 MHz
SWP 173 msec

SECTION 2.995 FREQUENCT STABILITY

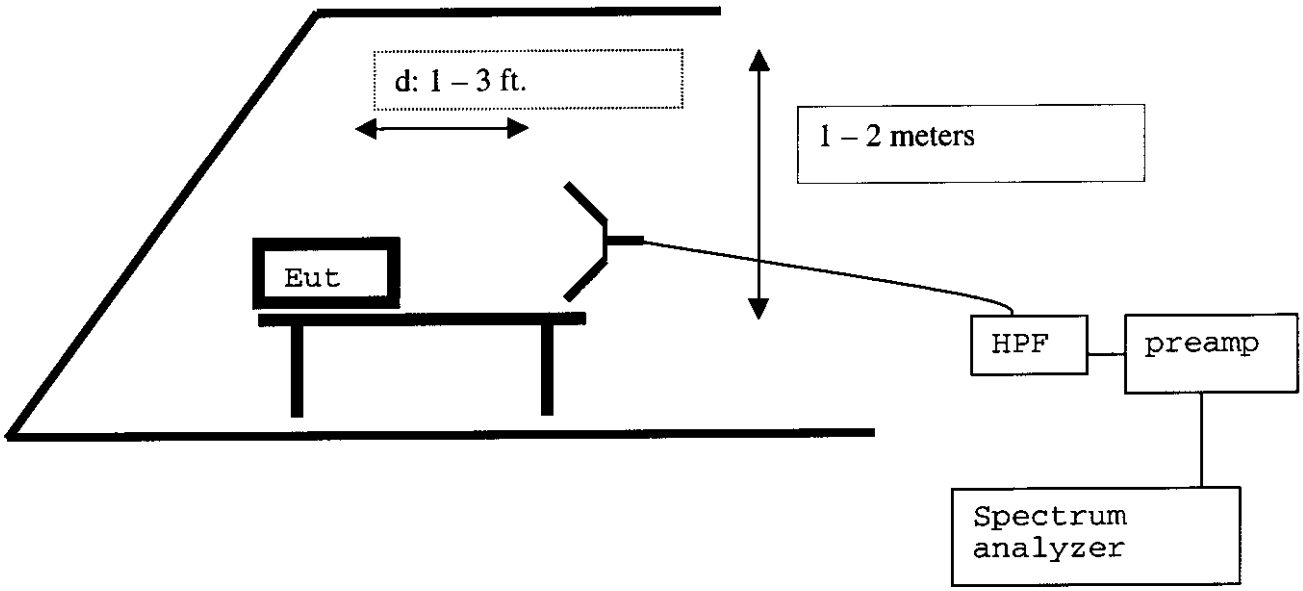
Not Applicable. EUT is a power amplifier.

SECTION 2.993 FIELD STRENGTH OF SPURIOUS RADIATION

Measurement Equipment Used:

Emco Horn Antenna/3146
HP Pre-Amp (1 – 26.5 GHz)/8449B
HP Signal Generator/E4443A
HP Spectrum Analyzer/8593EM
FSY High Pass Filter(1.802GHz)/001
FLEXCO cable/20761; 19ft. coaxial cable (loss: .9dB/ft @ 26GHz)

Test Setup



(A) **Minimum Requirement**

Technical Limits applied Section 90.210(J), 90.669 emission masks.

Test Method

The antenna output port of the EUT was load and source with a 50 ohm termination.

With the amplifier operating at full power, the EUT was rotated 360 degrees and the search antenna was raised and lowered in both polarities, all in an attempt to maximize the levels of the received emission for each harmonic and spurious emissions up to 10*f*o.

Test Results

LDA9301-30

All readings GSM Vertical polarized on second Harmonic @ 1800MHz

*F*o=935MHz
1 Amplifiers 30WATTS Output:

(√30 * 30) / 3 = 10 V/m= 140dBuV/m

90.210(j)
Emission Masks = 50 + 10 log (30) = 64.77

140.0 – 64.77 = 75.2

dBuV	AF	CL	AMP	dBuV/m	LIMIT	MARGIN
49.75	26.7	2.1	-35	43.55	75.2	-31.65

90.669
Emission Masks = 43 + 10 log (30) = 57.77

140.0 – 57.77 = 82.2

dBuV	AF	CL	AMP	dBuV/m	LIMIT	MARGIN
49.75	26.7	2.1	-35	43.55	82.2	-38.65

*F*o=937Hz
1 Amplifiers 30WATTS Output:

(√30 * 30) / 3 = 10 V/m= 140.0dBuV/m

90.210(j)
Emission Masks = 50 + 10 log (30) = 64.77

140.0 – 64.77 = 75.2

dBuV	AF	CL	AMP	dBuV/m	LIMIT	MARGIN
51.83	26.7	2.1	-35	45.63	75.2	-29.57

90.669
Emission Masks = 43 + 10 log (30) = 57.77

140.0 – 57.77 = 82.2

dBuV	AF	CL	AMP	dBuV/m	LIMIT	MARGIN
51.83	26.7	2.1	-35	45.63	82.2	-36.57

Fo=940MHz
1 Amplifiers 30WATTS Output:

(√30 * 30) / 3 = 10 V/m= 140.0dBuV/m

90.210(j)
Emission Masks = 50 + 10 log (30) = 64.77

140.0 – 64.77 = 75.2

dBuV	AF	CL	AMP	dBuV/m	LIMIT	MARGIN
50.44	26.7	2.1	-35	44.24	75.2	–30.96

90.669
Emission Masks = 43 + 10 log (30) = 57.77

140.0 – 57.77 = 82.2

dBuV	AF	CL	AMP	dBuV/m	LIMIT	MARGIN
50.44	26.7	2.1	-35	44.24	82.2	–39.96

B) Radiated emissions data of Fundamental harmonics at 1 meter from second to 10*f*o attached. Measurements were made for Low, Middle, and High channel.

Radiated Emissions
FCC 90.210(J)

5/18/98
Juan Martinez
Site C (1 meter)

Powerwave Technologies
SINGLE CHANNEL 30W AMPLIFIER-GSM (LDA9301-30)

F(MHz)	READING (dBuV)	AF (dB)	CL (dB)	Amp (dB)	DIST (dB)	DUTY (dB)	Other (dB)	Total (dBuV/m)	Limit (dBuV/m)	Margin (dB)
fo= 937MHz(-12.8dBm)										
1874	52	26.7	2.1	-35	-9.5	0	1	37.3	75.2	-37.9
2810	51.63	30	3.99	-35	-9.5	0	1	42.12	75.2	-33.08
3748	54.36	32	4.75	-35	-9.5	0	1	47.61	75.2	-27.59
4685	43.56	32.5	5.32	-35	-9.5	0	1	37.88	75.2	-37.32
5622NF	41.3	35.2	5.7	-35	-9.5	0	1	38.7	75.2	-36.5
6550	49.7	35.3	6.08	-35	-9.5	0	1	47.58	75.2	-27.62
7490NF	45.03	36.8	6.65	-35	-9.5	0	1	44.98	75.2	-30.22
8433NF	45.72	37.6	7.6	-35	-9.5	0	1	47.42	75.2	-27.78
9320NF	46.49	38.3	7.98	-35	-9.5	0	1	49.27	75.2	-25.93
fo= 940MHz(-12.8dBm)										
1879	53.03	26.7	2.1	-35	-9.5	0	1	38.33	75.2	-36.87
2824	55.53	30	3.99	-35	-9.5	0	1	46.02	75.2	-29.18
3760	50.89	32	4.75	-35	-9.5	0	1	44.14	75.2	-31.06
4700	44.34	32.5	5.32	-35	-9.5	0	1	38.66	75.2	-36.54
5637NF	44.32	35.2	5.7	-35	-9.5	0	1	41.72	75.2	-33.48
6580	48.93	35.3	6.08	-35	-9.5	0	1	46.81	75.2	-28.39
7520NF	44.2	36.8	6.65	-35	-9.5	0	1	44.15	75.2	-31.05
8460NF	45.07	37.6	7.6	-35	-9.5	0	1	46.77	75.2	-28.43
9400NF	44.55	38.3	7.98	-35	-9.5	0	1	47.33	75.2	-27.87
fo= 935MHz(-12.8dBm)										
1870	51.25	26.7	2.1	-35	-9.5	0	1	36.55	75.2	-38.65
2805	46.15	30	3.99	-35	-9.5	0	1	36.64	75.2	-38.56
3740	45.74	32	4.75	-35	-9.5	0	1	38.99	75.2	-36.21
4675	44.83	32.5	5.32	-35	-9.5	0	1	39.15	75.2	-36.05
5610NF	42.14	35.2	5.7	-35	-9.5	0	1	39.54	75.2	-35.66

6545	47.65	35.3	6.08	-35	-9.5	0	1	45.53	75.2	-29.67
7480NF	46.18	36.8	6.65	-35	-9.5	0	1	46.13	75.2	-29.07
8415NF	46.29	37.6	7.6	-35	-9.5	0	1	47.99	75.2	-27.21
9350NF	46.18	38.3	7.98	-35	-9.5	0	1	48.96	75.2	-26.24

NOTE: ALL READINGS ARE PEAK MEASUREMENTS

DIST: Correction to extrapolate reading to 3m specification distance
1M measurement distance: **-9.5** dB

OTHER: High pass filter insertion loss (**1.802GHz**)

AF: Antenna Factor

AMP: Pre-amp gain

DUTY: Duty Cycle correction factor

CL: CABLE LOSS

NF= **Noise Floor**

ANALYZER BANDWIDTH SETTINGS

	Res Bw:	Video Bw:
Peak(P):	1MHz	1MHz

Radiated Emissions
FCC 90.669

5/18/98
Juan Martinez
Site C (1 meter)

Powerwave Technologies
SINGLE CHANNEL 30W AMPLIFIER-GSM (LDA9301-30)

F(MHz)	READING (dBuV)	AF (dB)	CL (dB)	Amp (dB)	DIST (dB)	DUTY (dB)	Other (dB)	Total (dBuV/m)	Limit (dBuV/m)	Margin (dB)
fo= 937MHz(-12.8dBm)										
1874	52	26.7	2.1	-35	-9.5	0	1	37.3	82	-44.7
2810	51.63	30	3.99	-35	-9.5	0	1	42.12	82	-39.88
3748	54.36	32	4.75	-35	-9.5	0	1	47.61	82	-34.39
4685	43.56	32.5	5.32	-35	-9.5	0	1	37.88	82	-44.12
5622NF	41.3	35.2	5.7	-35	-9.5	0	1	38.7	82	-43.3
6550	49.7	35.3	6.08	-35	-9.5	0	1	47.58	82	-34.42
7490NF	45.03	36.8	6.65	-35	-9.5	0	1	44.98	82	-37.02
8433NF	45.72	37.6	7.6	-35	-9.5	0	1	47.42	82	-34.58
9320NF	46.49	38.3	7.98	-35	-9.5	0	1	49.27	82	-32.73
fo= 940MHz(-12.8dBm)										
1879	53.03	26.7	2.1	-35	-9.5	0	1	38.33	82	-43.67
2824	55.53	30	3.99	-35	-9.5	0	1	46.02	82	-35.98
3760	50.89	32	4.75	-35	-9.5	0	1	44.14	82	-37.86
4700	44.34	32.5	5.32	-35	-9.5	0	1	38.66	82	-43.34
5637NF	44.32	35.2	5.7	-35	-9.5	0	1	41.72	82	-40.28
6580	48.93	35.3	6.08	-35	-9.5	0	1	46.81	82	-35.19
7520NF	44.2	36.8	6.65	-35	-9.5	0	1	44.15	82	-37.85
8460NF	45.07	37.6	7.6	-35	-9.5	0	1	46.77	82	-35.23
9400NF	44.55	38.3	7.98	-35	-9.5	0	1	47.33	82	-34.67
fo= 935MHz(-12.8dBm)										
1870	51.25	26.7	2.1	-35	-9.5	0	1	36.55	82	-45.45
2805	46.15	30	3.99	-35	-9.5	0	1	36.64	82	-45.36
3740	45.74	32	4.75	-35	-9.5	0	1	38.99	82	-43.01
4675	44.83	32.5	5.32	-35	-9.5	0	1	39.15	82	-42.85
5610NF	42.14	35.2	5.7	-35	-9.5	0	1	39.54	82	-42.46

6545	47.65	35.3	6.08	-35	-9.5	0	1	45.53	82	-36.47
7480NF	46.18	36.8	6.65	-35	-9.5	0	1	46.13	82	-35.87
8415NF	46.29	37.6	7.6	-35	-9.5	0	1	47.99	82	-34.01
9350NF	46.18	38.3	7.98	-35	-9.5	0	1	48.96	82	-33.04

NOTE: ALL READINGS ARE PEAK MEASUREMENTS

DIST: Correction to extrapolate reading to 3m specification distance
1M measurement distance: **-9.5** dB

OTHER: High pass filter insertion loss (**1.802GHz**)

AF: Antenna Factor

AMP: Pre-amp gain

DUTY: Duty Cycle correction factor

CL: CABLE LOSS

NF= **Noise Floor**

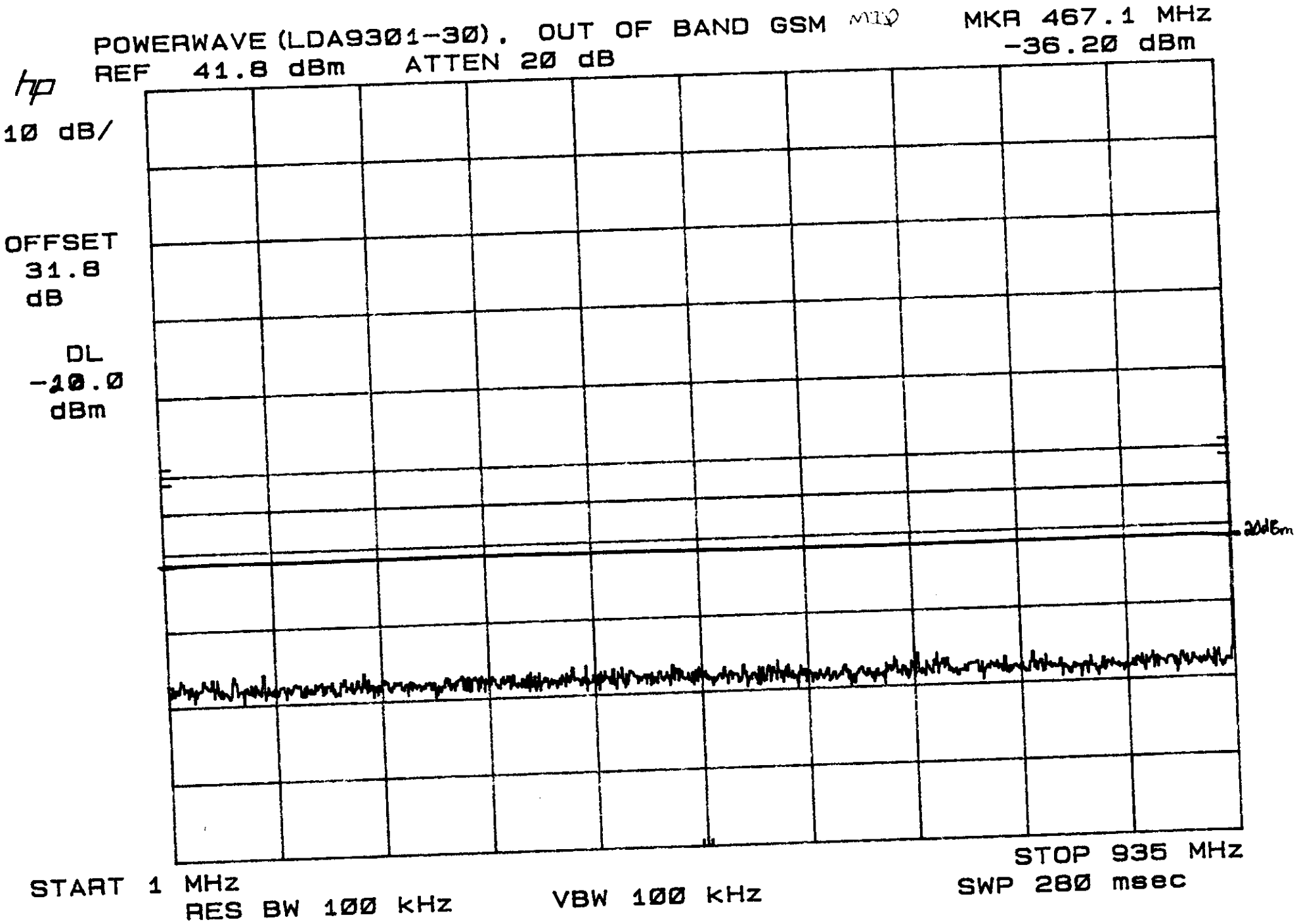
ANALYZER BANDWIDTH SETTINGS

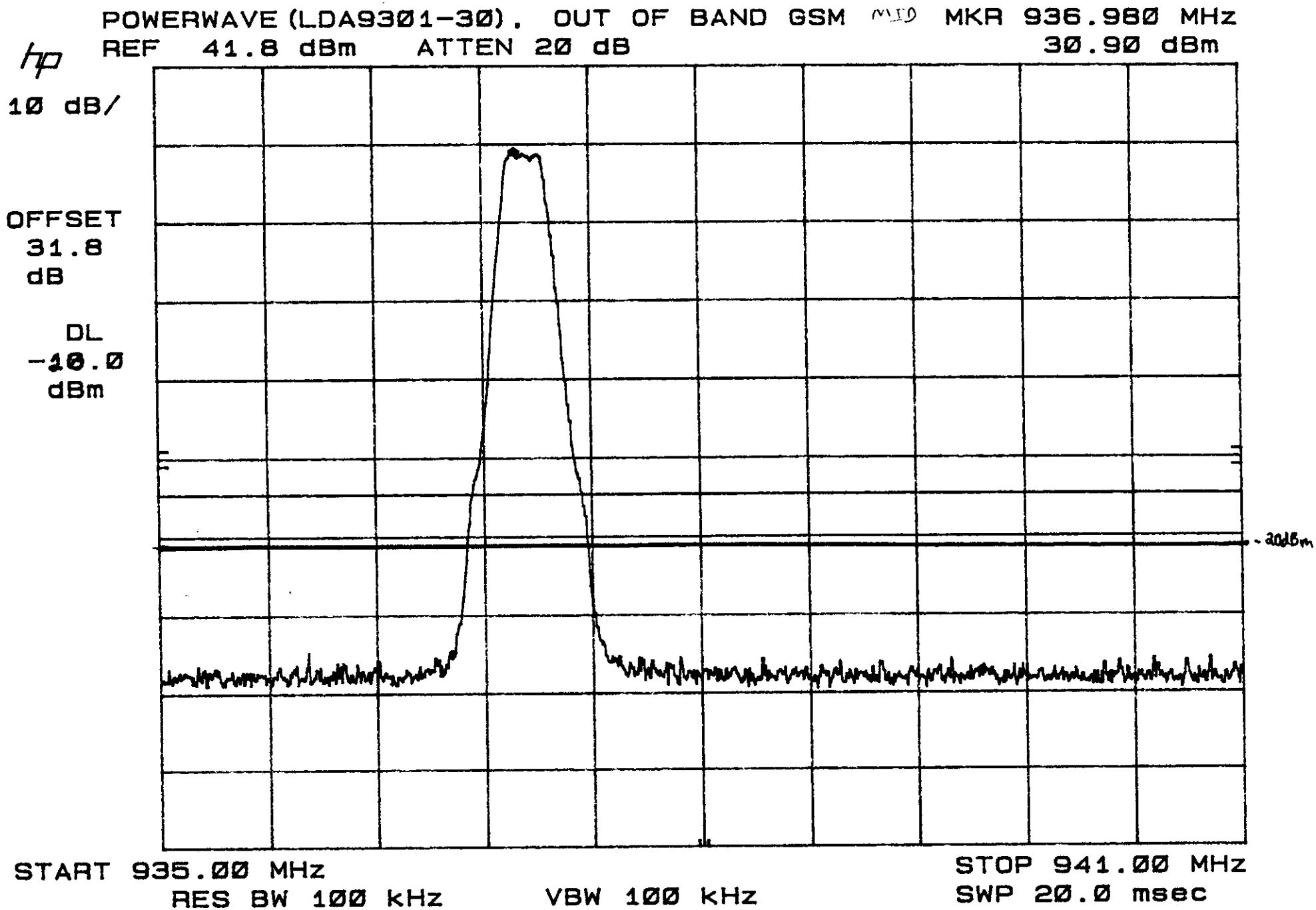
	Res Bw:	Video Bw:
Peak(P):	1MHz	1MHz

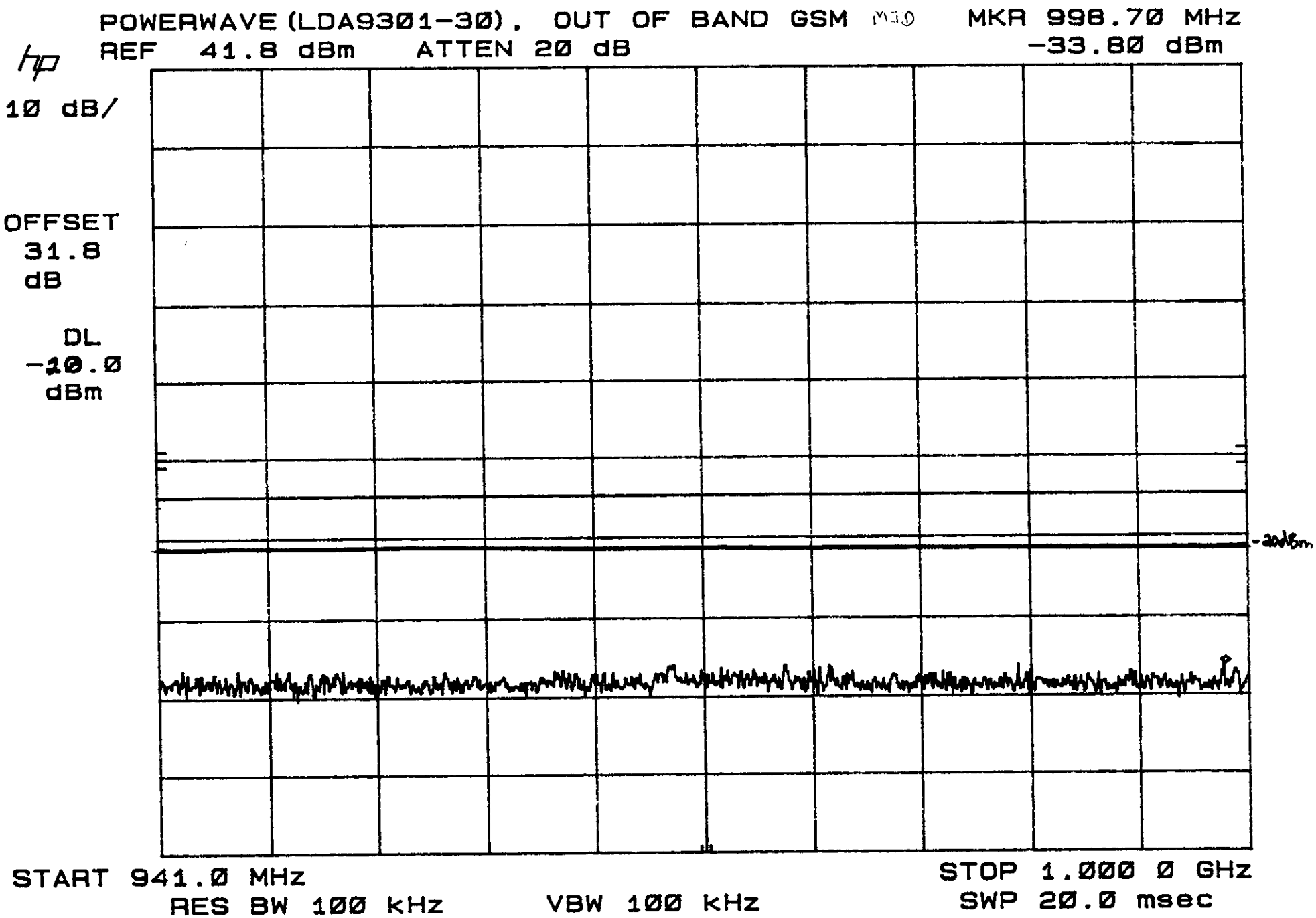
EXHIBIT 9: SETUP PHOTOS

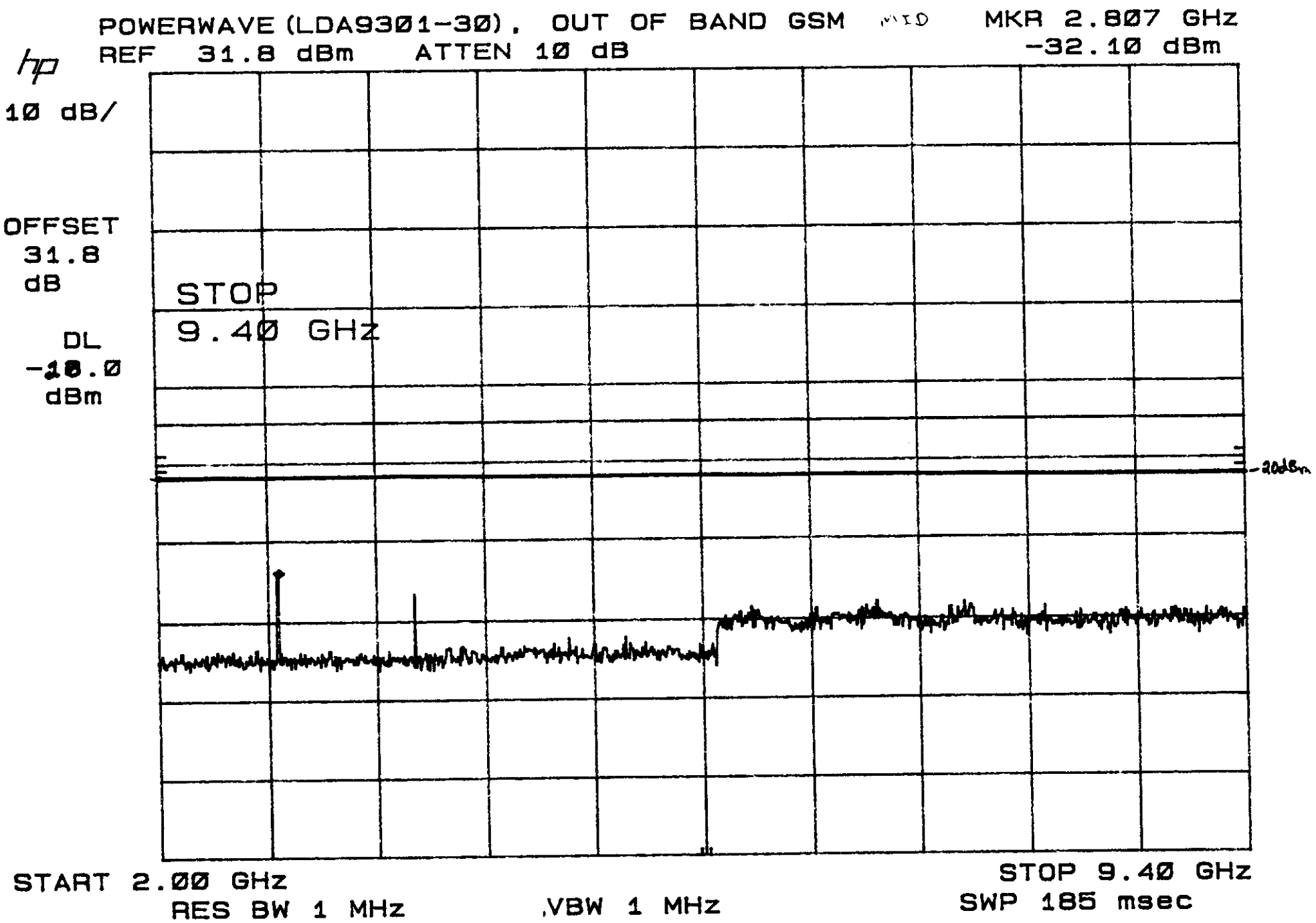
COMPLIANCE CONSULTING SERVICES
1366 BORDEAUX DRIVE SUNNYVALE, CA 94089 USA
DOCUMENT NO:CCSUP4031A
TEL:(408) 752-8166 FAX:(408) 752-8168

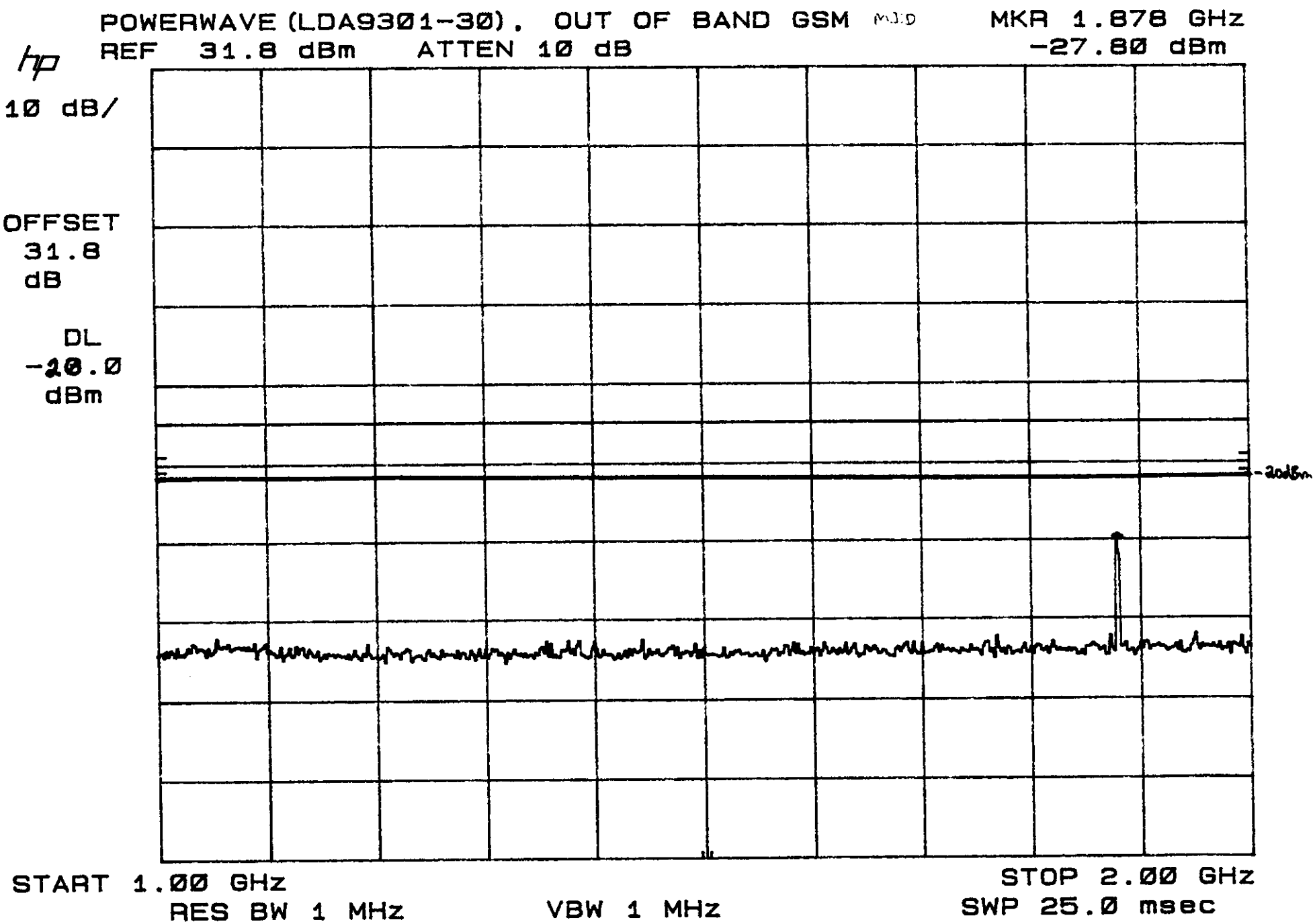
#13

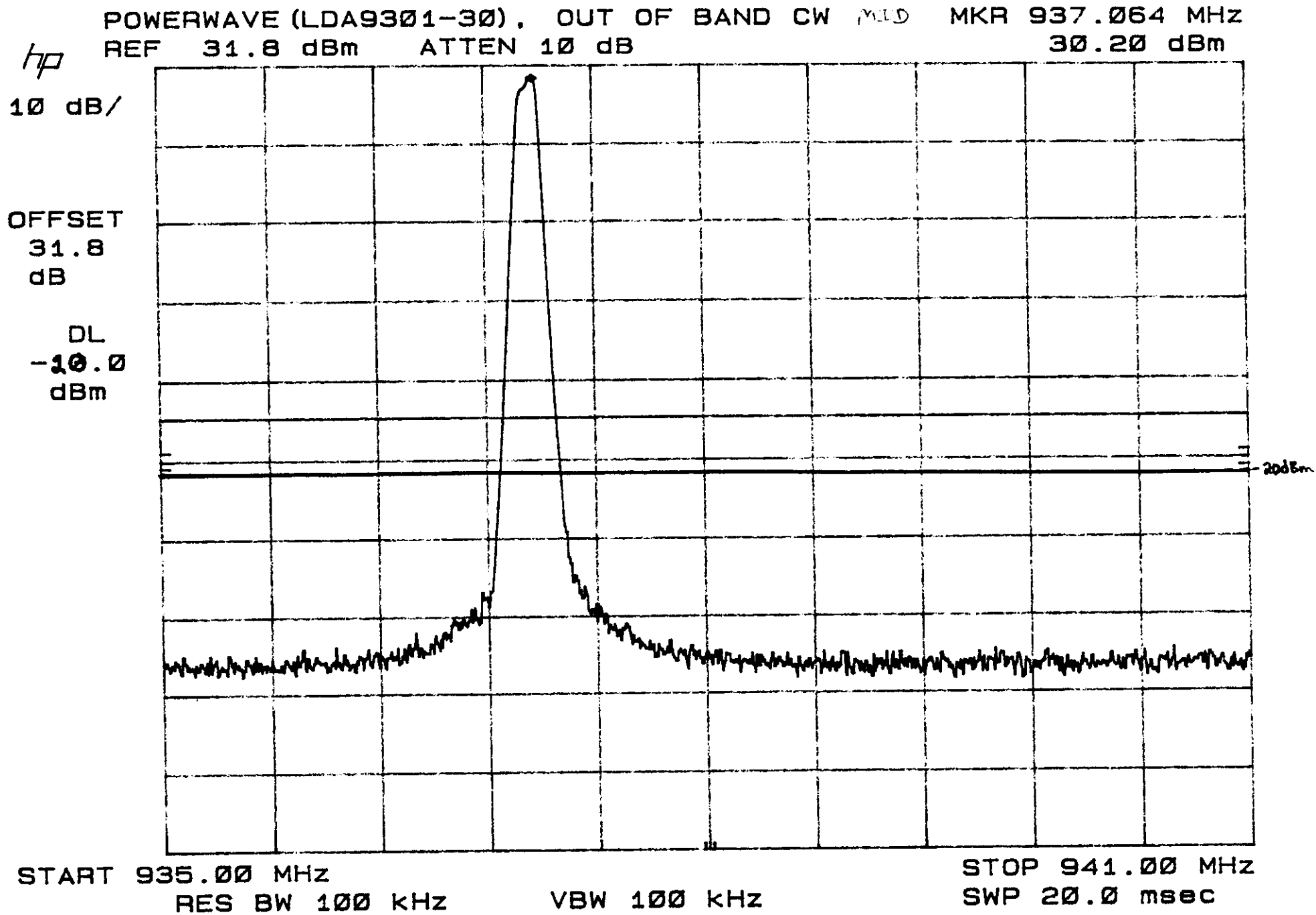

POWERWAVE (LDA9301-30). OUT OF BAND GSM MID
MKR 467.1 MHz
-36.20 dBm
REF 41.8 dBm
ATTEN 20 dB
10 dB/
OFFSET
31.8
dB
DL
-10.0
dBm
20dBm
START 1 MHz
RES BW 100 kHz
VBW 100 kHz
STOP 935 MHz
SWP 280 msec

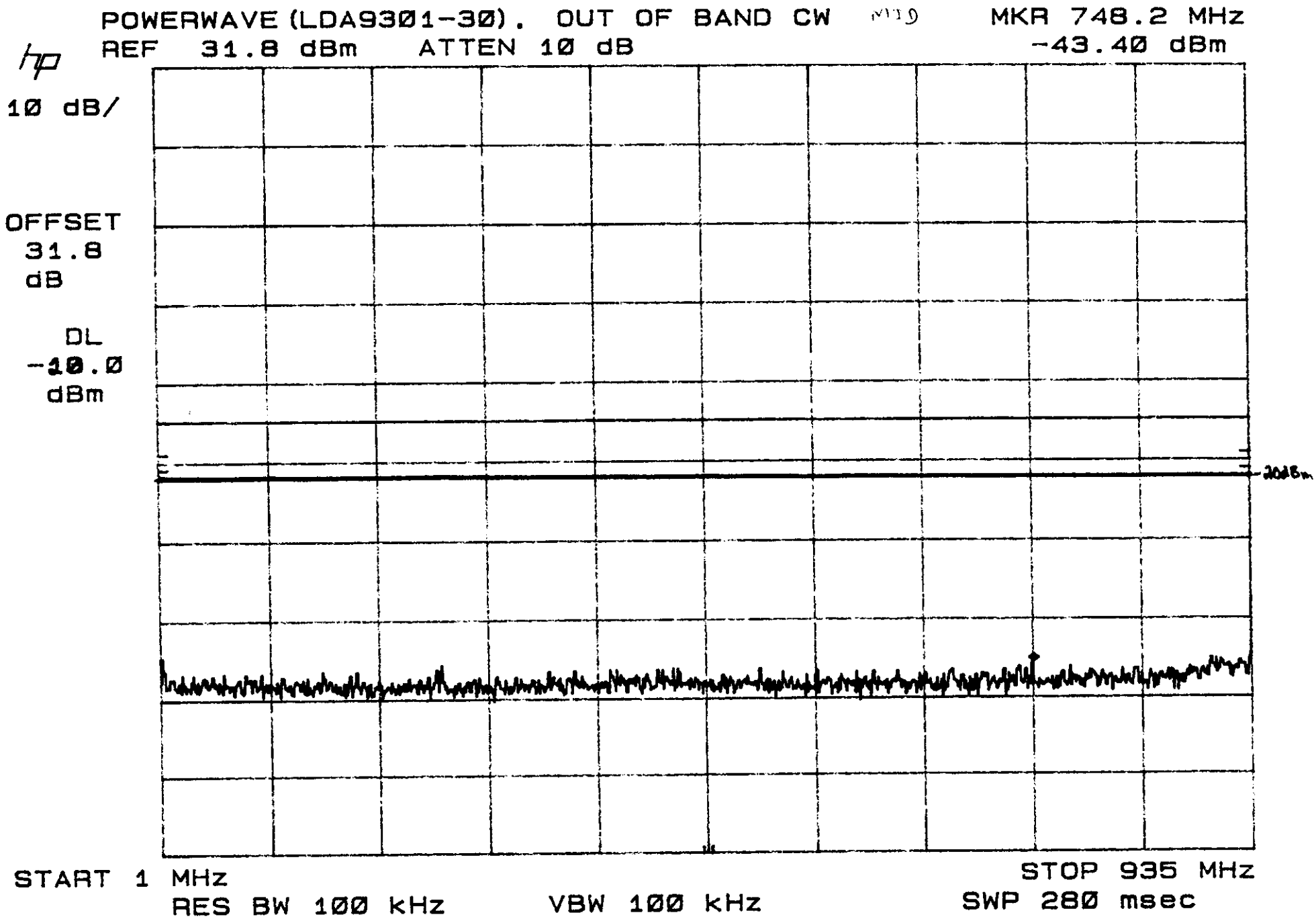

POWERWAVE (LDA9301-30). OUT OF BAND GSM MID
MKR 936.980 MHz
30.90 dBm
REF 41.8 dBm
ATTEN 20 dB
10 dB/
OFFSET
31.8
dB
DL
-10.0
dBm
-20dBm
START 935.00 MHz
RES BW 100 kHz
VBW 100 kHz
STOP 941.00 MHz
SWP 20.0 msec

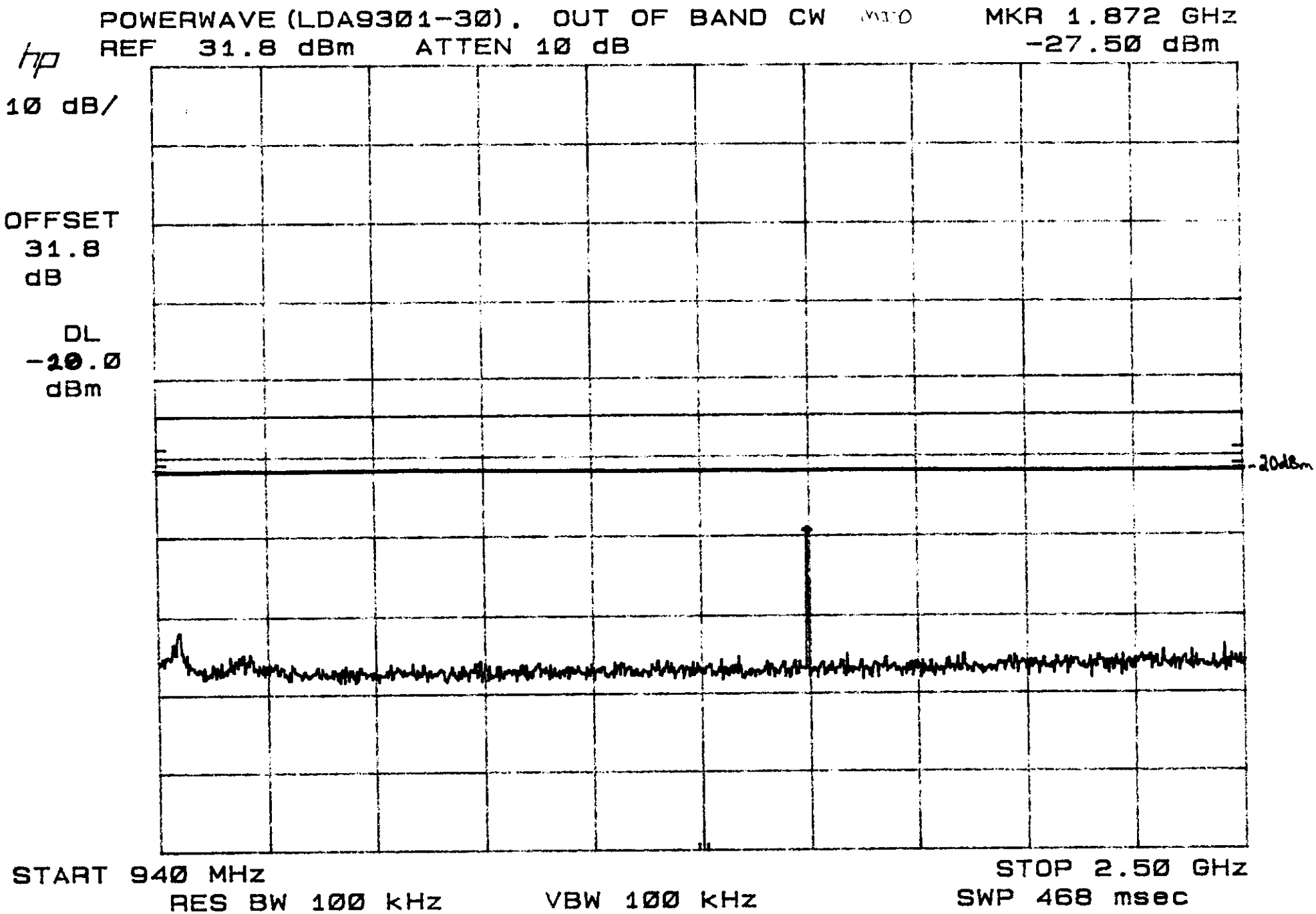

POWERWAVE (LDA9301-30), OUT OF BAND GSM
MKR 998.70 MHz
REF 41.8 dBm
ATTEN 20 dB
-33.80 dBm
10 dB/
OFFSET
31.8
dB
DL
-10.0
dBm
-30dBm
START 941.0 MHz
RES BW 100 kHz
VBW 100 kHz
STOP 1.000 0 GHz
SWP 20.0 msec

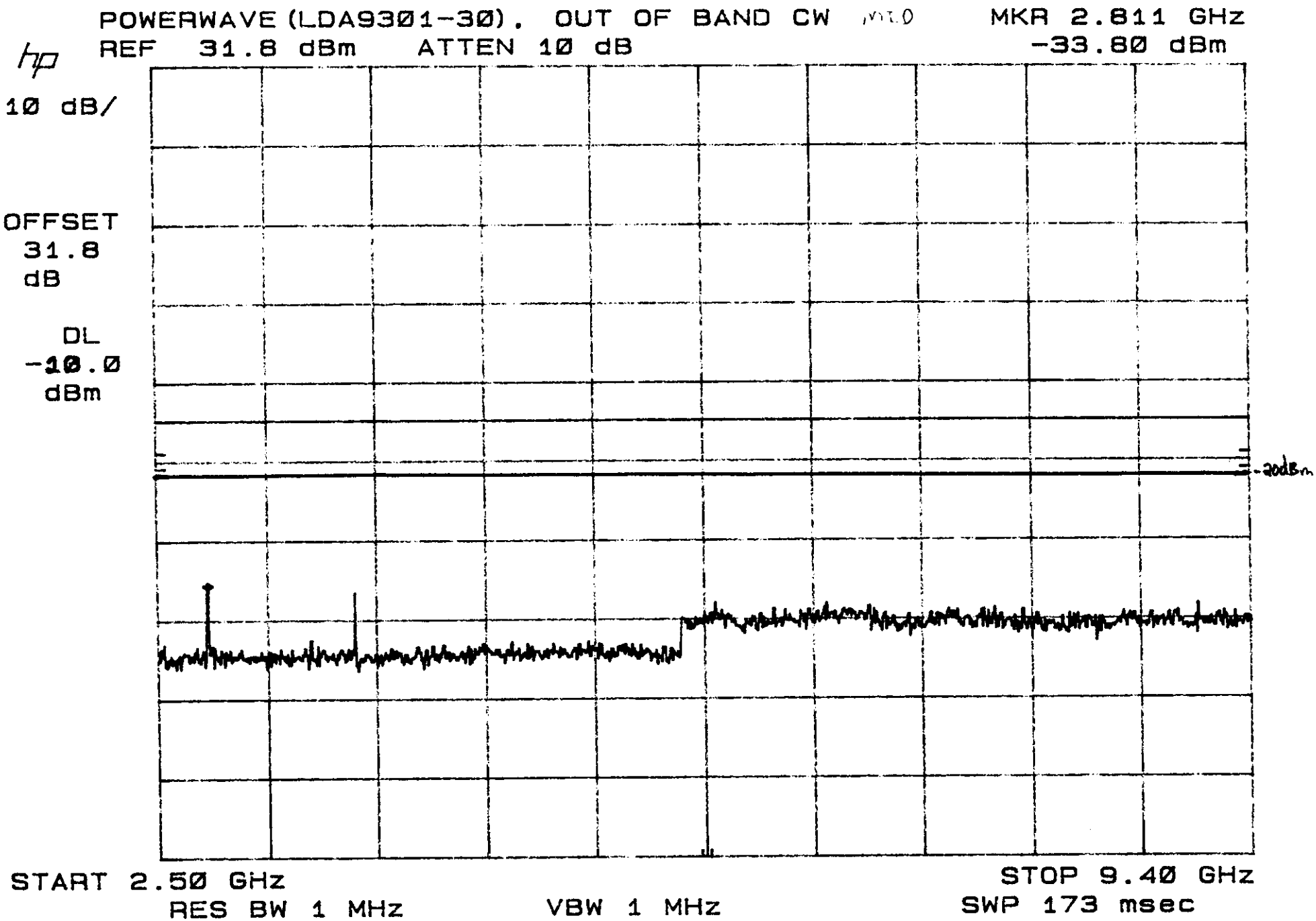

POWERWAVE (LDA9301-30), OUT OF BAND GSM MID
MKR 2.807 GHz
-32.10 dBm
REF 31.8 dBm
ATTEN 10 dB
10 dB/
OFFSET
31.8
dB
STOP
9.40 GHz
DL
-10.0
dBm
START 2.00 GHz
RES BW 1 MHz
VBW 1 MHz
STOP 9.40 GHz
SWP 185 msec

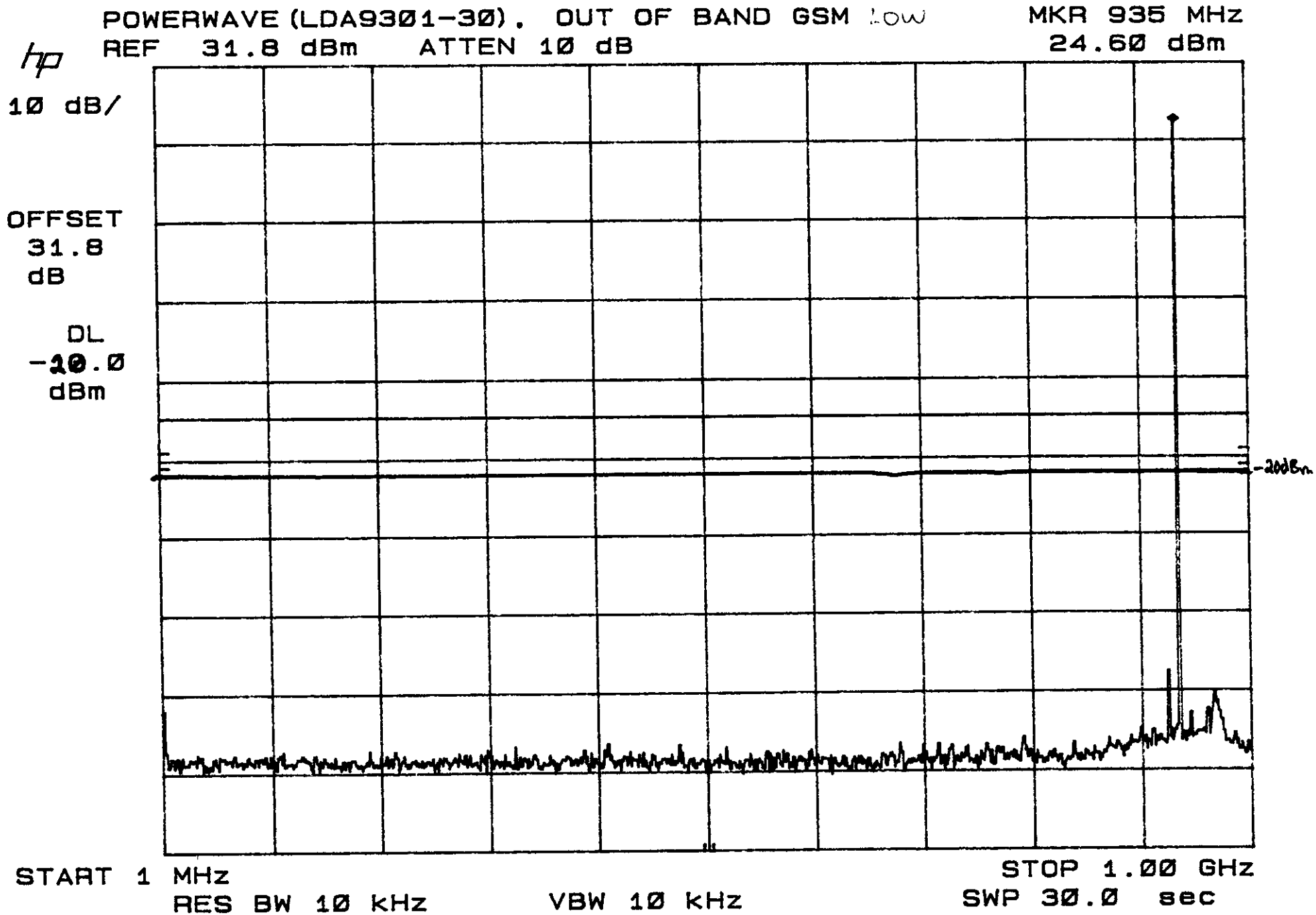

POWERWAVE (LDA9301-30). OUT OF BAND GSM MID
MKR 1.878 GHz
-27.80 dBm
REF 31.8 dBm
ATTEN 10 dB
10 dB/
OFFSET
31.8
dB
DL
-20.0
dBm
-20dBm
START 1.00 GHz
STOP 2.00 GHz
RES BW 1 MHz
VBW 1 MHz
SWP 25.0 msec

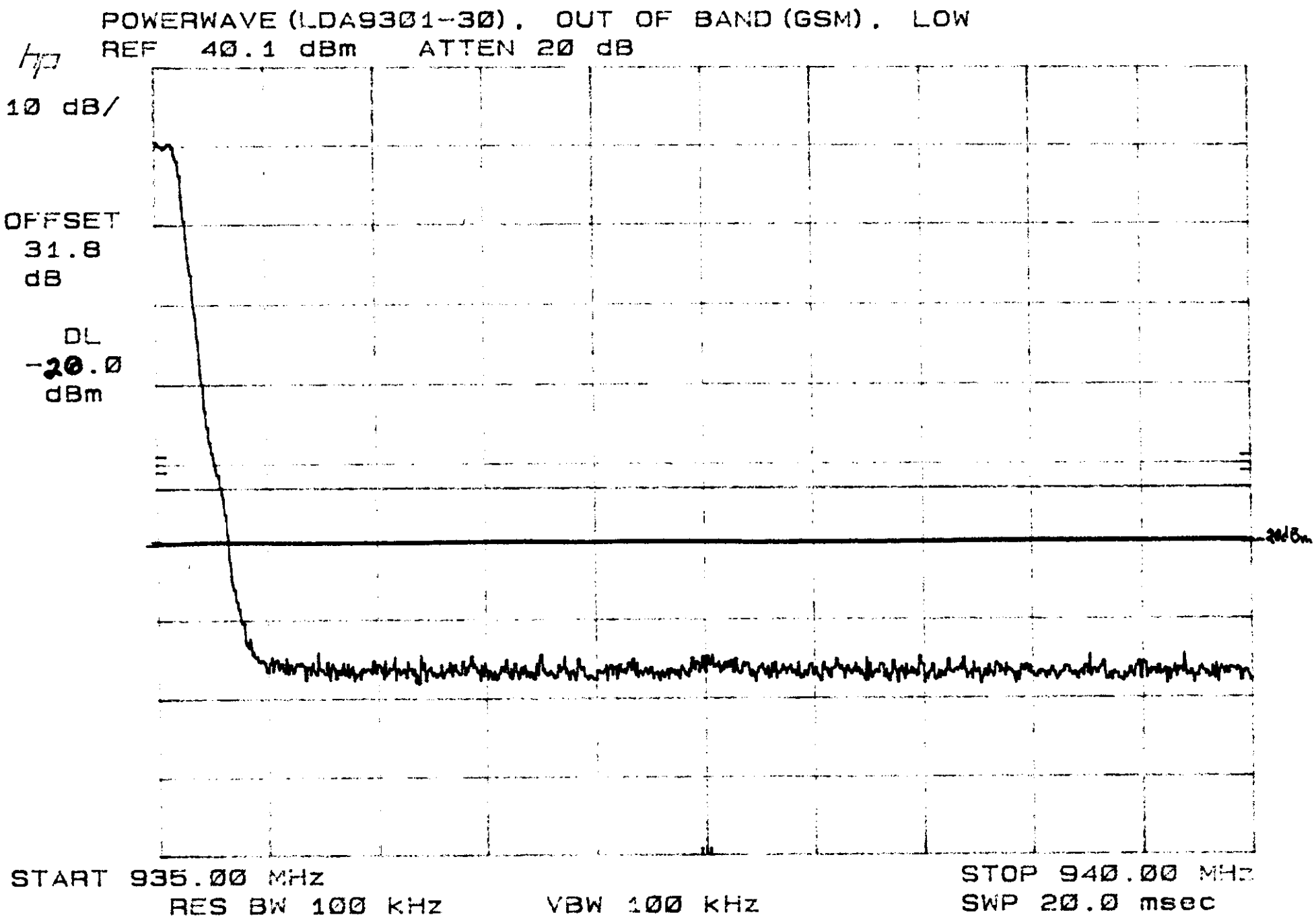

POWERWAVE (LDA9301-30), OUT OF BAND CW MID
MKR 937.064 MHz
30.20 dBm
REF 31.8 dBm
ATTEN 10 dB
hp
10 dB/
OFFSET
31.8
dB
DL
-10.0
dBm
20dBm
START 935.00 MHz
RES BW 100 kHz
VBW 100 kHz
STOP 941.00 MHz
SWP 20.0 msec

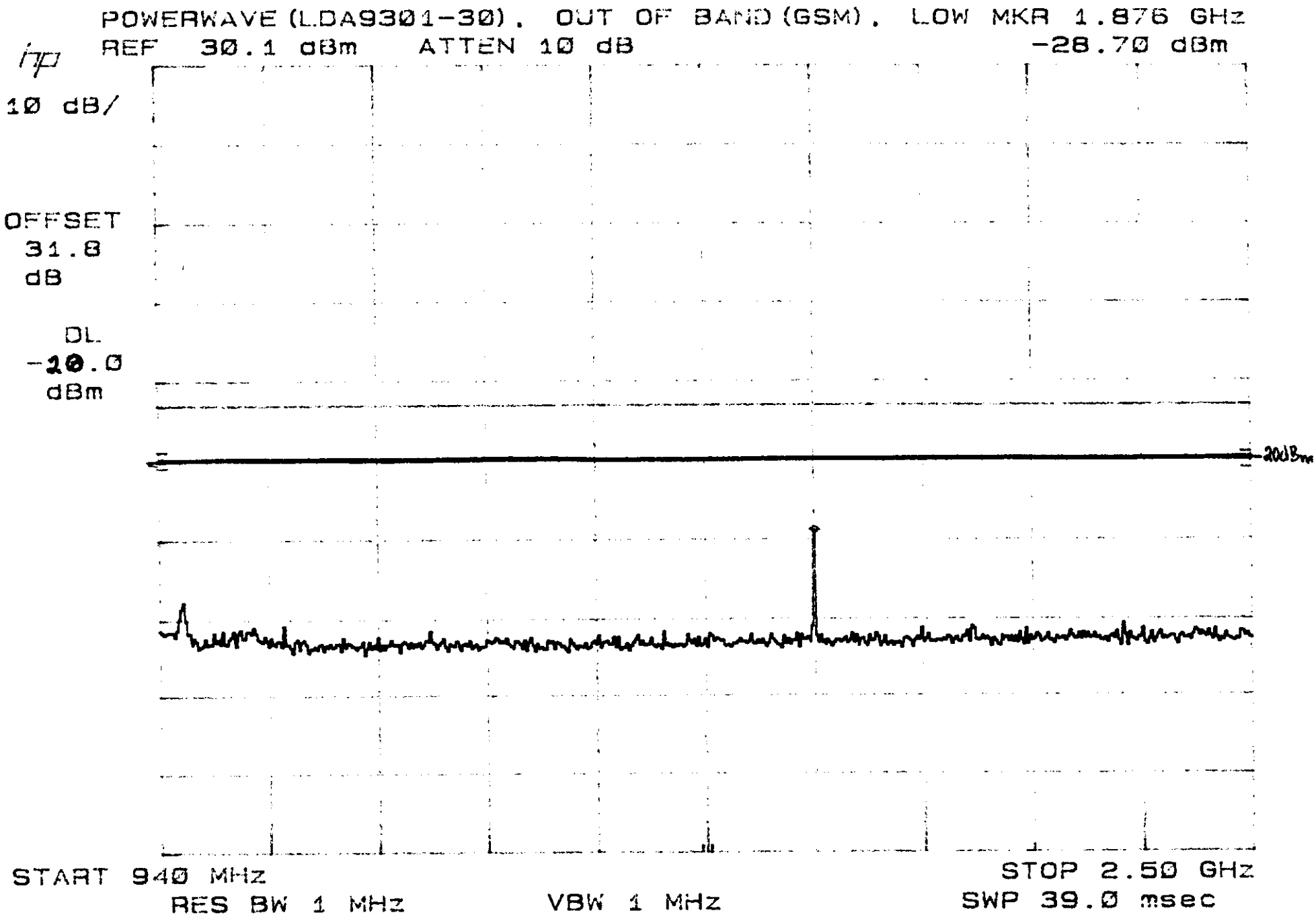

POWERWAVE (LDA9301-30). OUT OF BAND CW
MKR 748.2 MHz
REF 31.8 dBm
ATTEN 10 dB
-43.40 dBm
10 dB/
OFFSET
31.8
dB
DL
-10.0
dBm
START 1 MHz
STOP 935 MHz
RES BW 100 kHz
VBW 100 kHz
SWP 280 msec

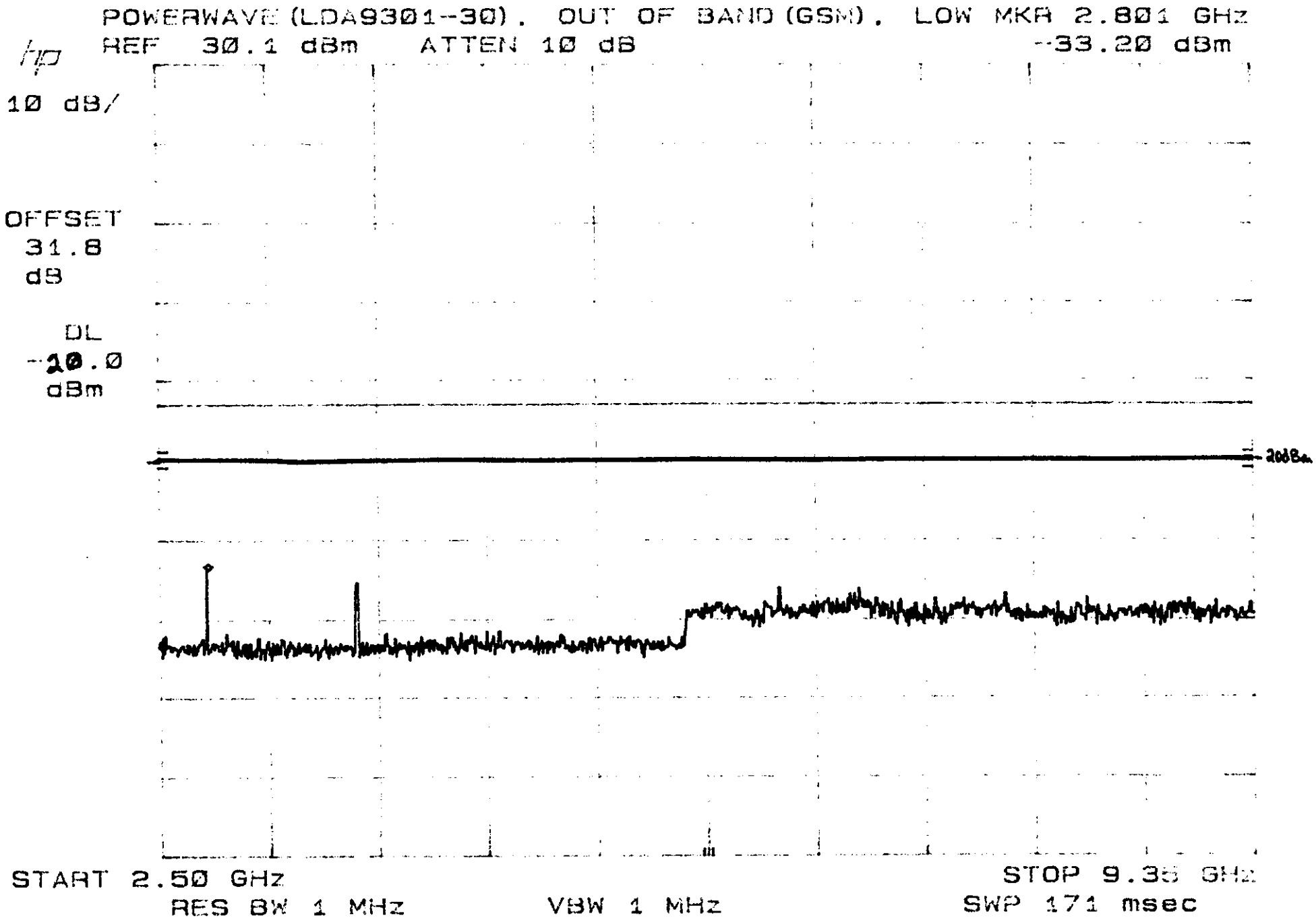

POWERWAVE (LDA9301-30). OUT OF BAND CW
MKR 1.872 GHz
-27.50 dBm
REF 31.8 dBm
ATTEN 10 dB
10 dB/
OFFSET
31.8
dB
DL
-10.0
dBm
-20dBm
START 940 MHz
STOP 2.50 GHz
RES BW 100 kHz
VBW 100 kHz
SWP 468 msec

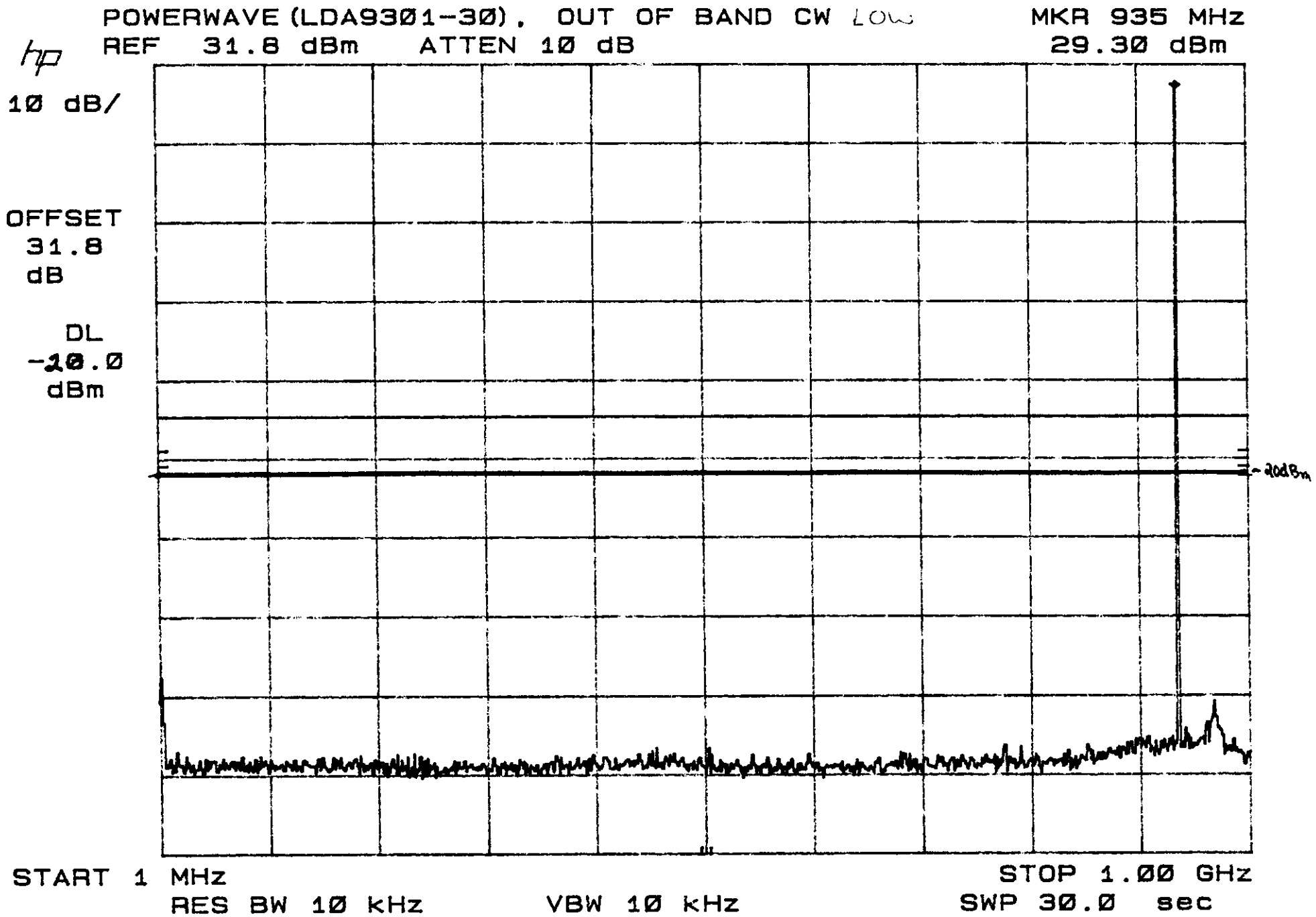

POWERWAVE (LDA9301-30). OUT OF BAND CW
MKR 2.811 GHz
-33.80 dBm
REF 31.8 dBm
ATTEN 10 dB
10 dB/
OFFSET
31.8
dB
DL
-10.0
dBm
-20dBm
START 2.50 GHz
STOP 9.40 GHz
RES BW 1 MHz
VBW 1 MHz
SWP 173 msec


POWERWAVE (LDA9301-30). OUT OF BAND GSM Low
MKR 935 MHz
24.60 dBm
REF 31.8 dBm
ATTEN 10 dB
10 dB/
OFFSET
31.8
dB
DL
-20.0
dBm
-20dBm
START 1 MHz
STOP 1.00 GHz
RES BW 10 kHz
VBW 10 kHz
SWP 30.0 sec

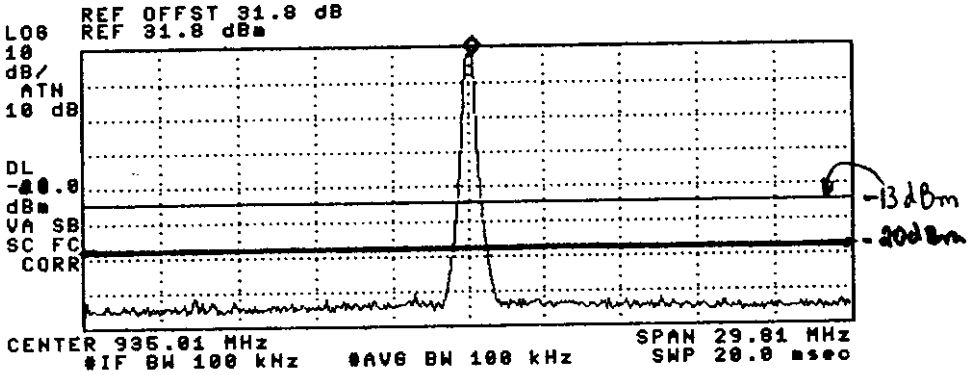

POWERWAVE (LDA9301-30). OUT OF BAND (GSM). LOW
REF 40.1 dBm ATTEN 20 dB
10 dB/
OFFSET
31.8
dB
DL
-20.0
dBm
START 935.00 MHz
RES BW 100 kHz
VBW 100 kHz
STOP 940.00 MHz
SWP 20.0 msec

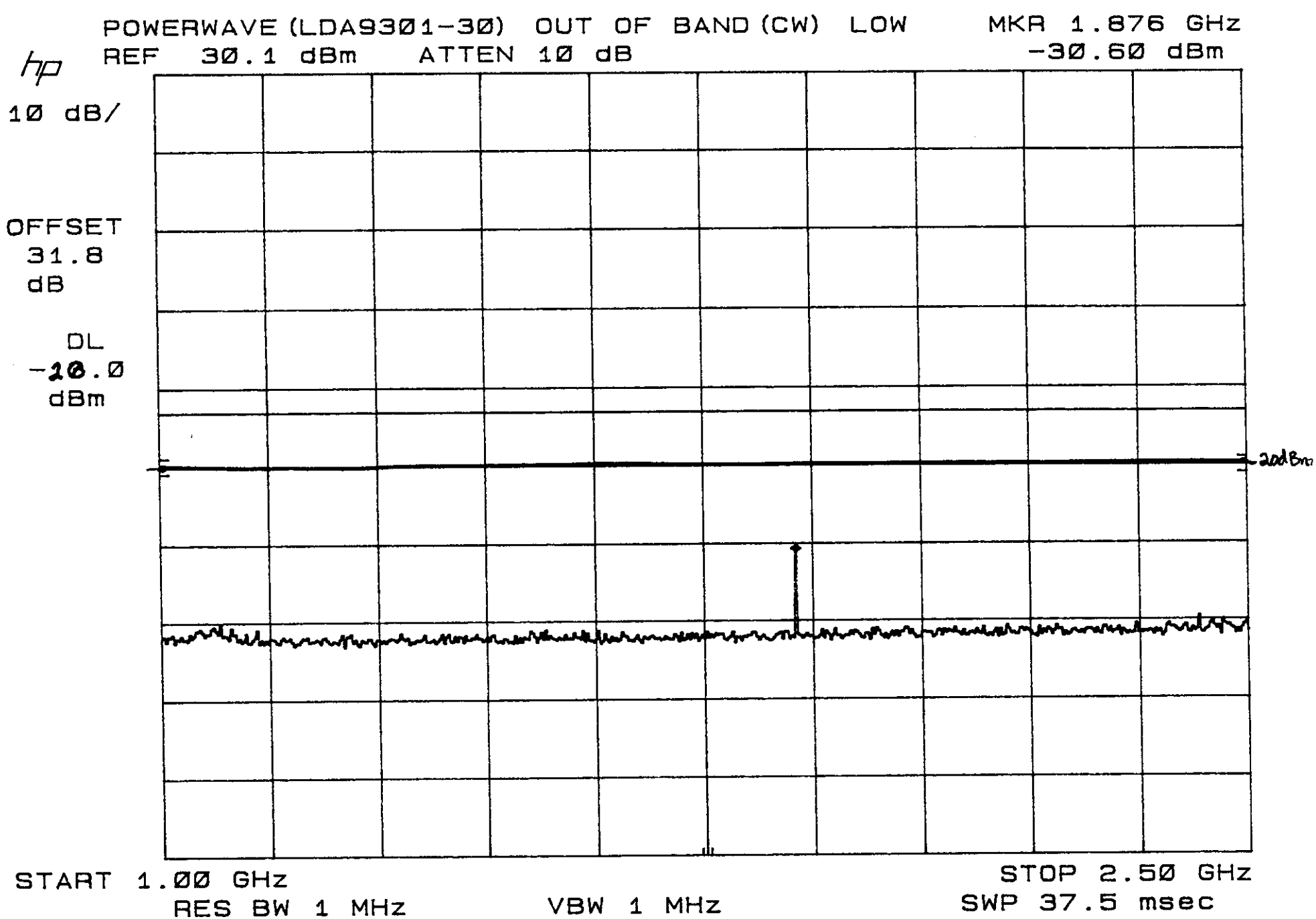

POWERWAVE (LDA9301-30). OUT OF BAND (GSM). LOW MKR 1.876 GHz
REF 30.1 dBm ATTEN 10 dB -28.70 dBm
10 dB/
OFFSET
31.8
dB
DL
-20.0
dBm
-20dBm
START 940 MHz
STOP 2.50 GHz
RES BW 1 MHz
VBW 1 MHz
SWP 39.0 msec

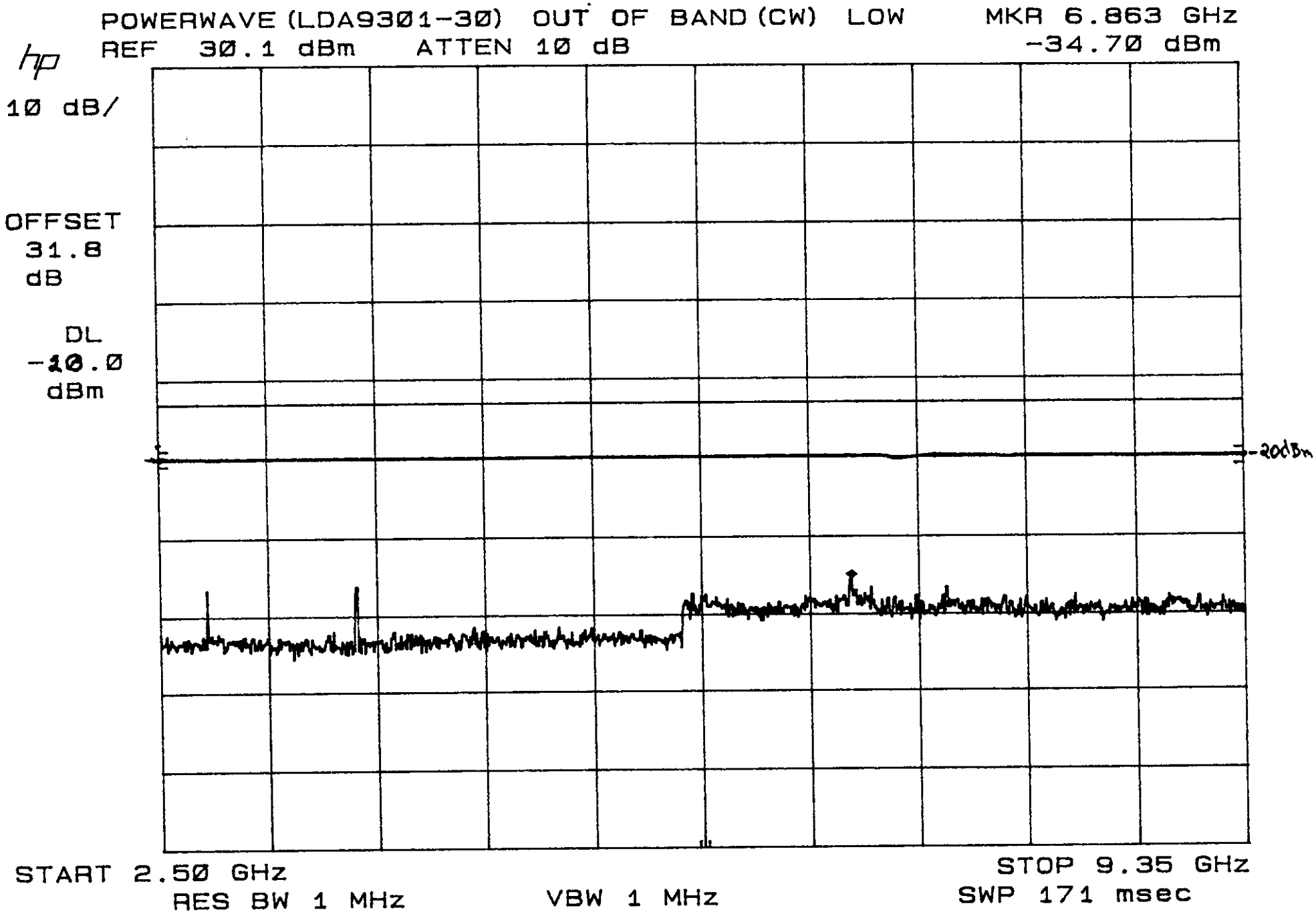

POWERWAVE (LDA9301-30). OUT OF BAND (GSM). LOW MKR 2.801 GHz
REF 30.1 dBm ATTEN 10 dB -33.20 dBm
10 dB/
OFFSET
31.8
dB
DL
-10.0
dBm
START 2.50 GHz
STOP 9.35 GHz
RES BW 1 MHz
VBW 1 MHz
SWP 171 msec

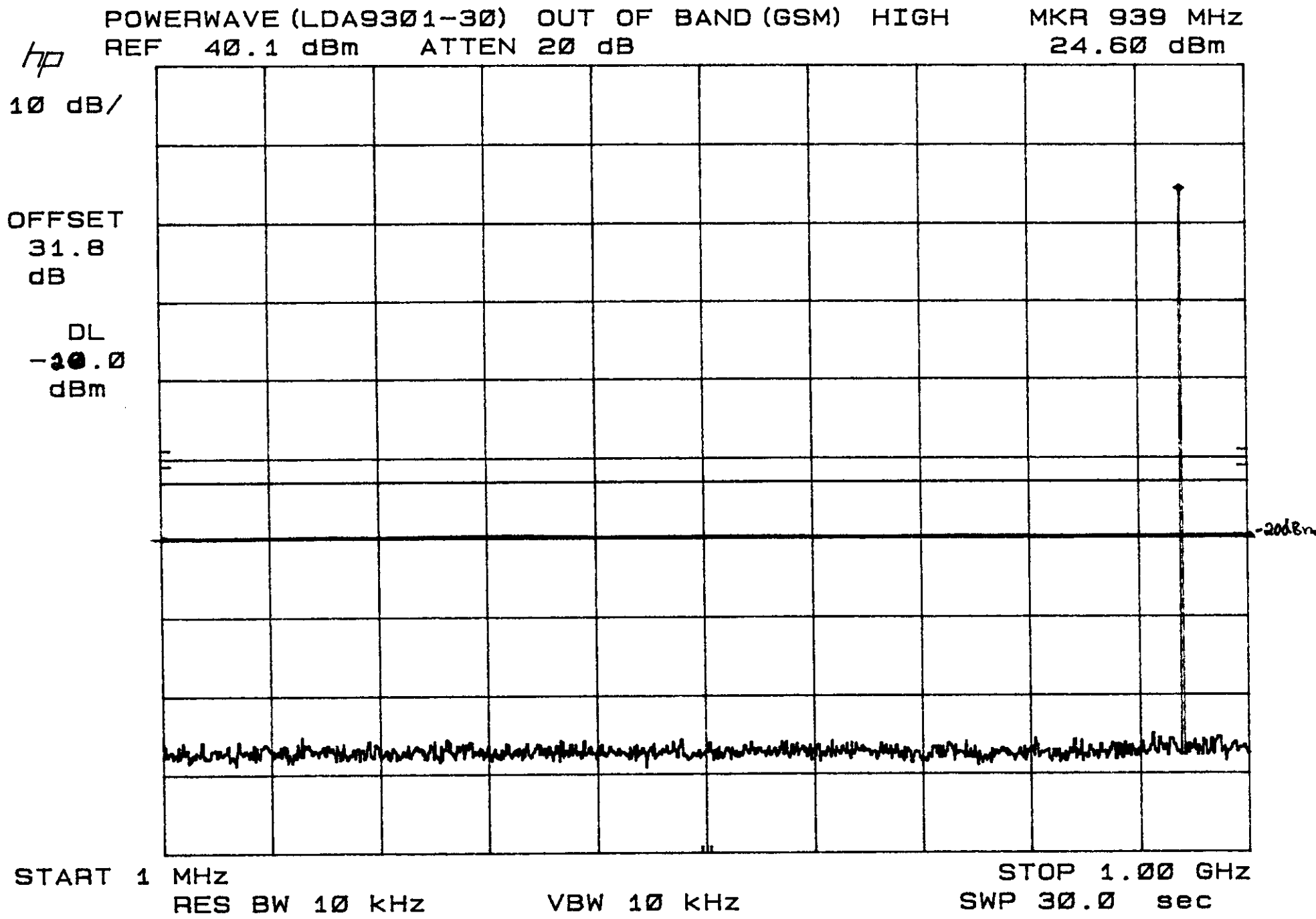

POWERWAVE (LDA9301-30), OUT OF BAND CW LOW
MKR 935 MHz
REF 31.8 dBm
ATTEN 10 dB
29.30 dBm
hp
10 dB/
OFFSET
31.8
dB
DL
-10.0
dBm
-20dBm
START 1 MHz
STOP 1.00 GHz
RES BW 10 kHz
VBW 10 kHz
SWP 30.0 sec

09:39:59 MAY 18, 1998
POWERWAVE(LDA9301-30) CW, OUT OF BAND LOW
ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 935.16 MHz
29.40 dBm



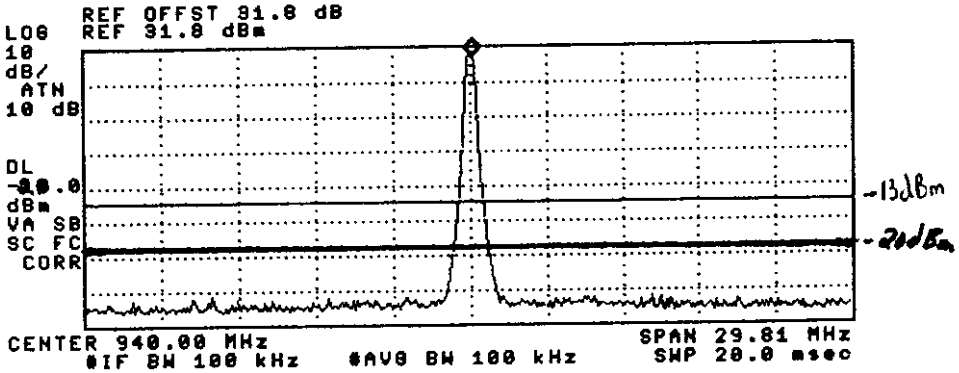

POWERWAVE (LDA9301-30) OUT OF BAND (CW) LOW
MKR 1.876 GHz
REF 30.1 dBm
ATTEN 10 dB
-30.60 dBm
hp
10 dB/
OFFSET
31.8
dB
DL
-10.0
dBm
20dBm
START 1.00 GHz
STOP 2.50 GHz
RES BW 1 MHz
VBW 1 MHz
SWP 37.5 msec

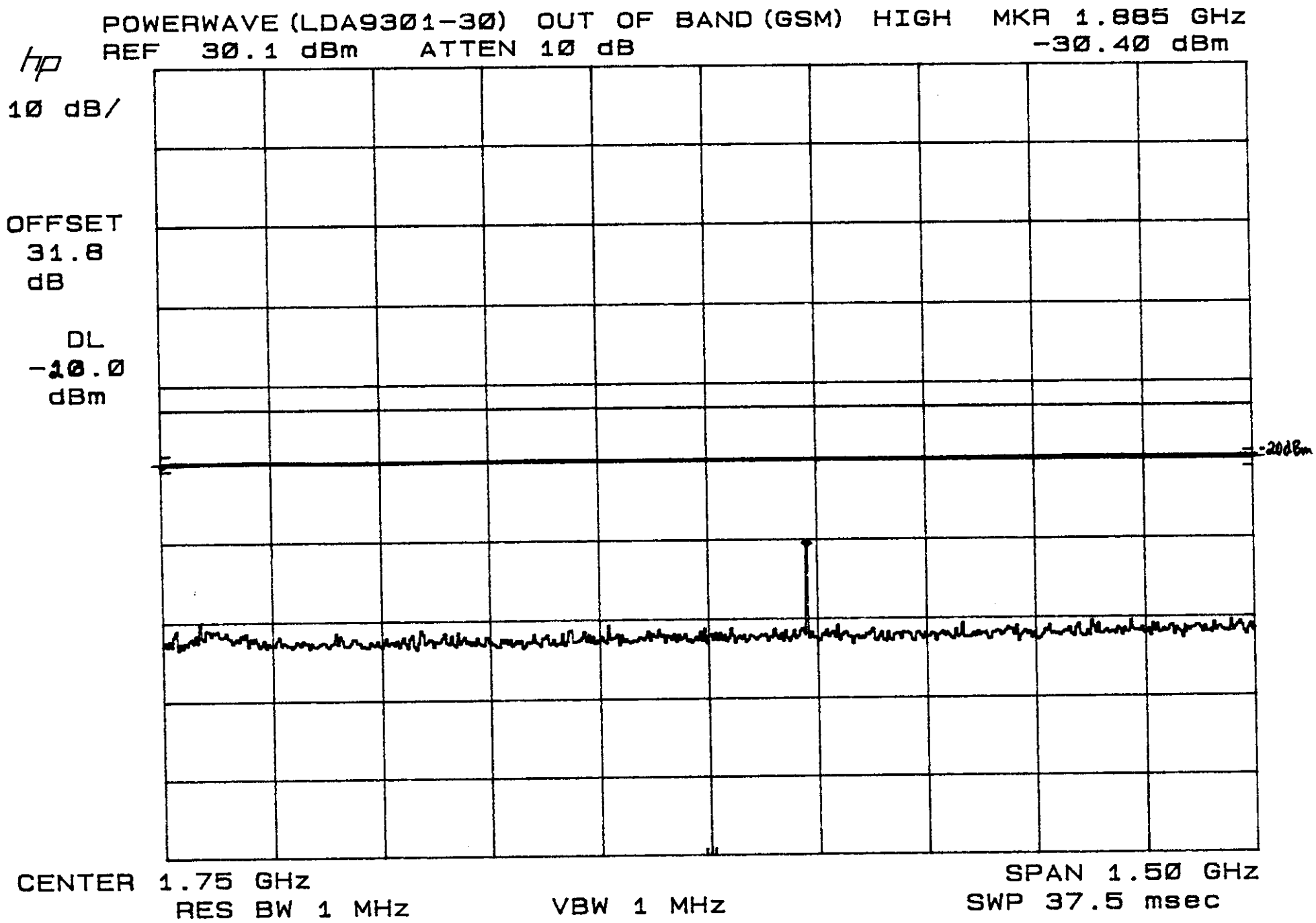

POWERWAVE (LDA9301-30) OUT OF BAND (CW) LOW
MKR 6.863 GHz
REF 30.1 dBm
ATTEN 10 dB
-34.70 dBm
10 dB/
OFFSET
31.8
dB
DL
-10.0
dBm
-20dBm
START 2.50 GHz
STOP 9.35 GHz
RES BW 1 MHz
VBW 1 MHz
SWP 171 msec

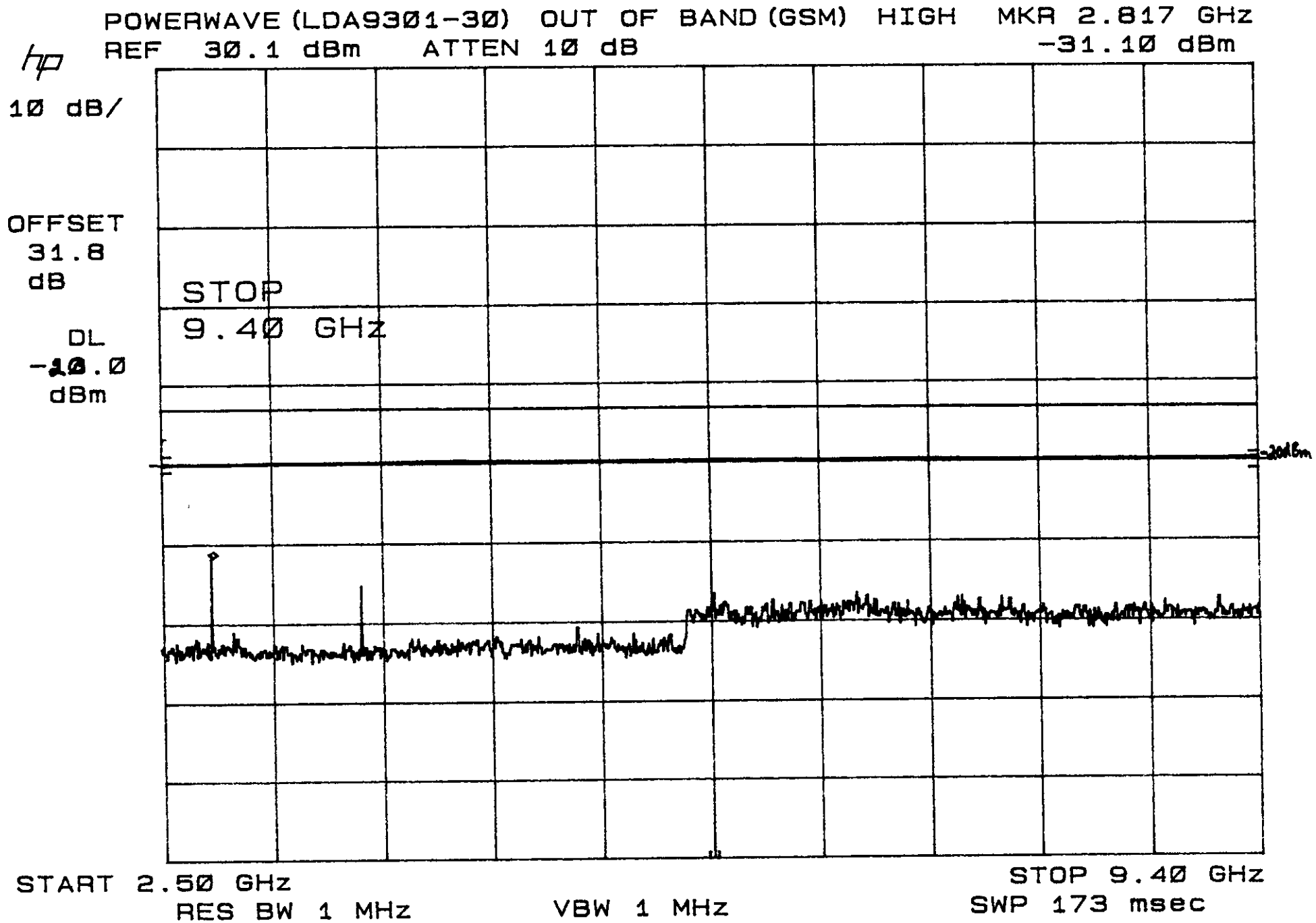

POWERWAVE (LDA9301-30) OUT OF BAND (GSM) HIGH
MKR 939 MHz
REF 40.1 dBm
ATTEN 20 dB
24.60 dBm
hp
10 dB/
OFFSET
31.8
dB
DL
-20.0
dBm
-20dBm
START 1 MHz
STOP 1.00 GHz
RES BW 10 kHz
VBW 10 kHz
SWP 30.0 sec

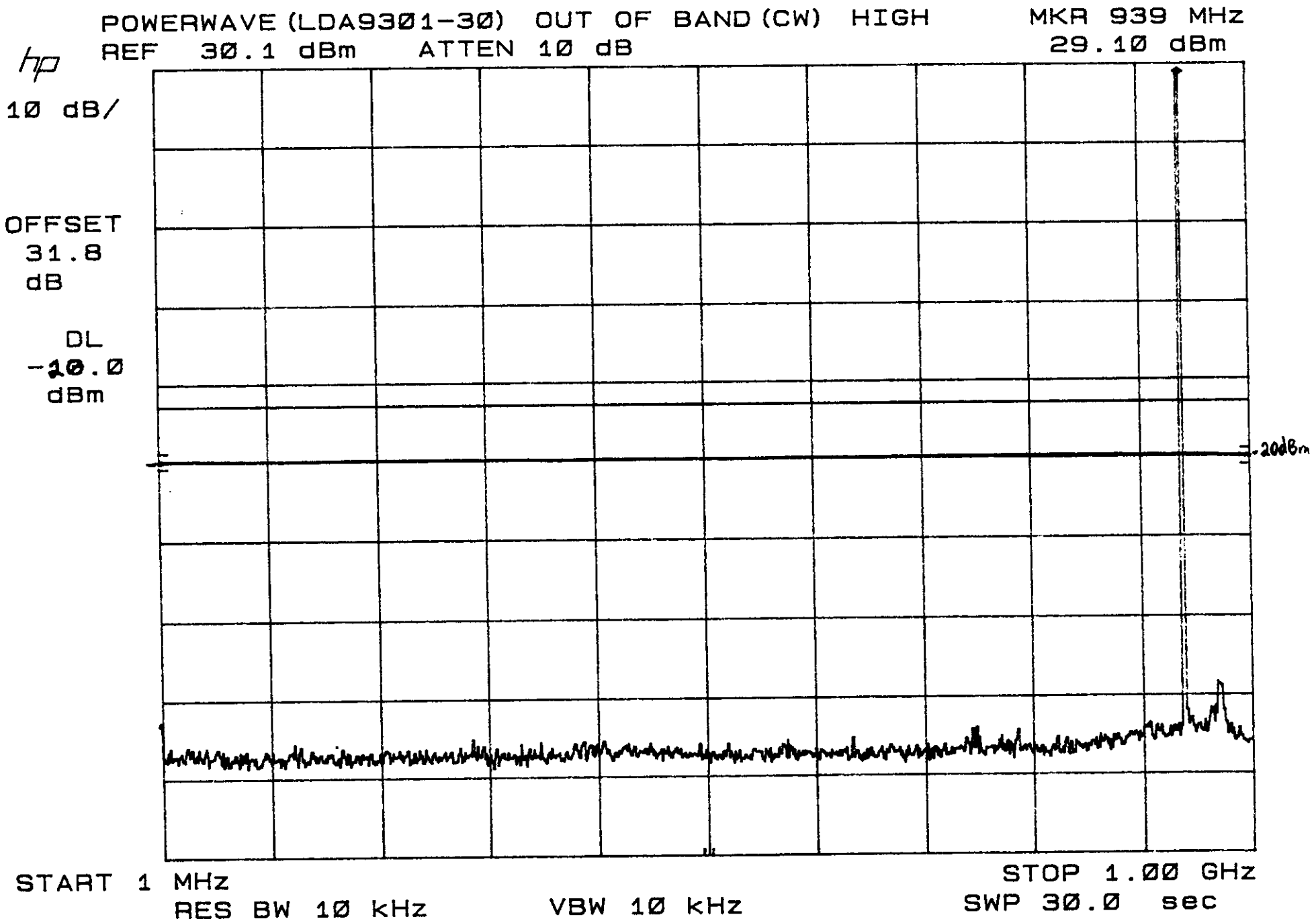
#31

09:42:47 MAY 18, 1998
POWERWAVE(LDA9301-30) GSM, OUT OF BAND HIGH
ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 940.07 MHz
29.24 dBm



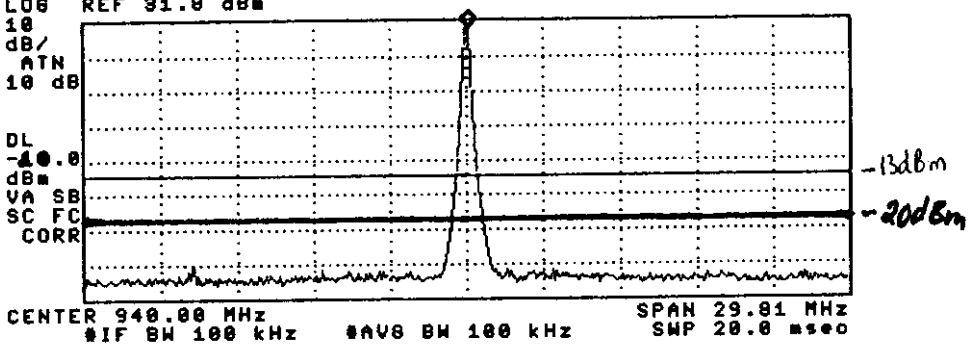

POWERWAVE (LDA9301-30) OUT OF BAND (GSM) HIGH
MKR 1.885 GHz
REF 30.1 dBm
ATTEN 10 dB
-30.40 dBm
10 dB/
OFFSET
31.8
dB
DL
-10.0
dBm
-20dBm
CENTER 1.75 GHz
SPAN 1.50 GHz
RES BW 1 MHz
VBW 1 MHz
SWP 37.5 msec


POWERWAVE (LDA9301-30) OUT OF BAND (GSM) HIGH
MKR 2.817 GHz
REF 30.1 dBm
ATTEN 10 dB
-31.10 dBm
10 dB/
OFFSET
31.8
dB
STOP
9.40 GHz
DL
-20.0
dBm
START 2.50 GHz
RES BW 1 MHz
VBW 1 MHz
STOP 9.40 GHz
SWP 173 msec

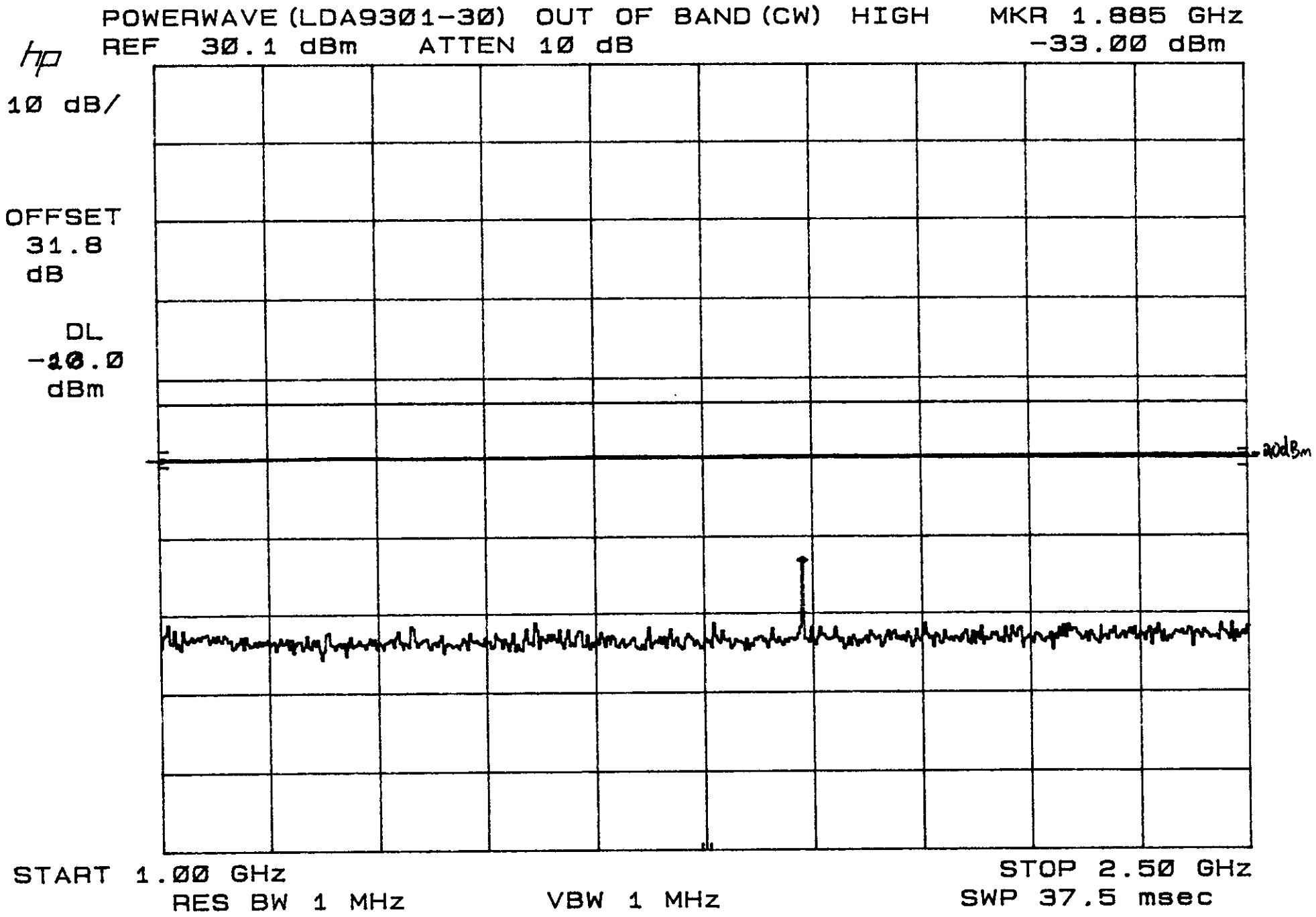

POWERWAVE (LDA9301-30) OUT OF BAND (CW) HIGH
REF 30.1 dBm ATTEN 10 dB
MKR 939 MHz
29.10 dBm
10 dB/
OFFSET
31.8
dB
DL
-10.0
dBm
-20dBm
START 1 MHz
RES BW 10 kHz
VBW 10 kHz
STOP 1.00 GHz
SWP 30.0 sec

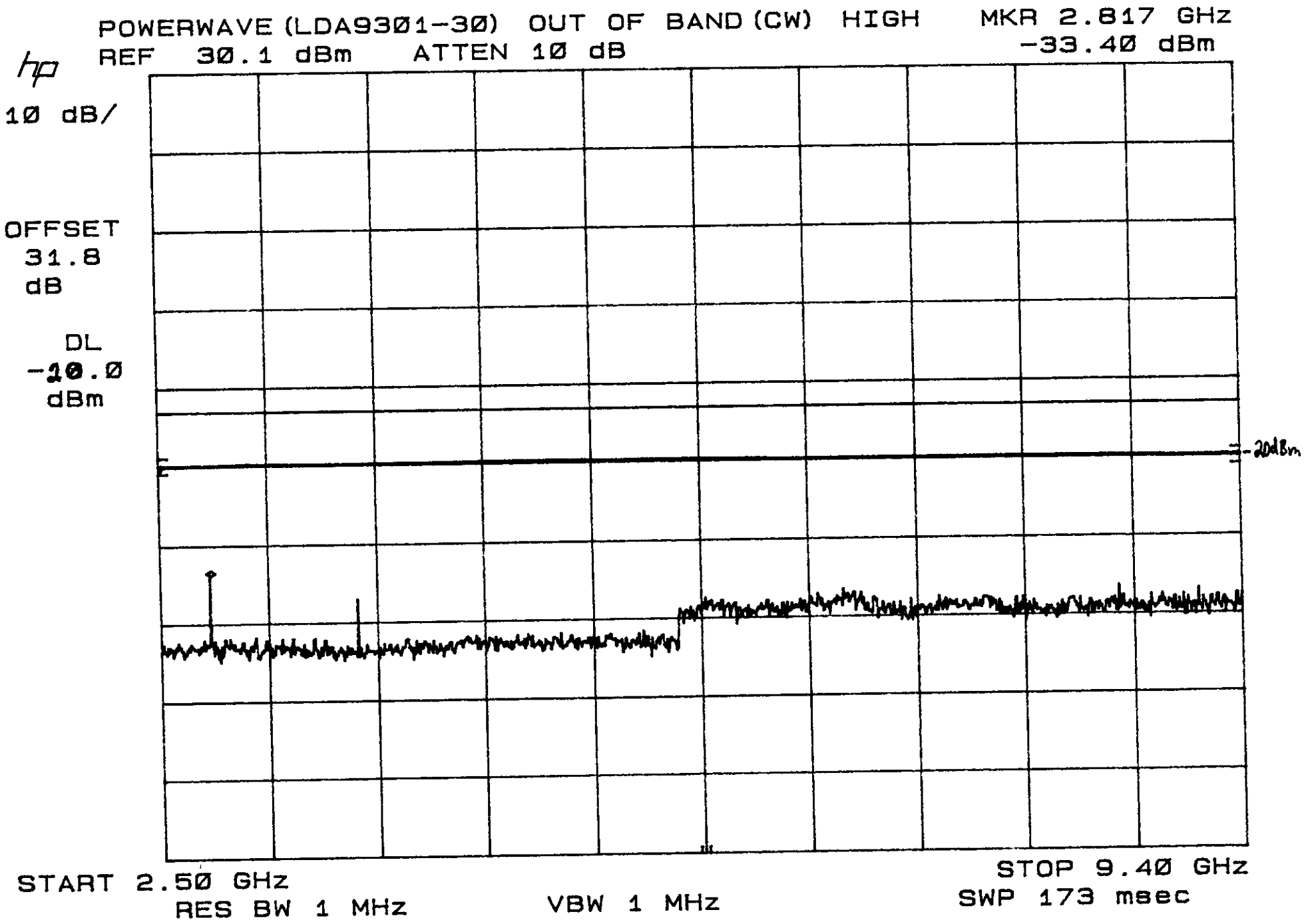
09:41:14 MAY 18, 1998
POWERWAVE(LDA9301-30) CW, OUT OF BAND HIGH
ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 940.07 MHz
29.38 dBm

35



CENTER 940.00 MHz
#IF BW 100 kHz
#AVG BW 100 kHz
SPAN 29.81 MHz
SWP 20.0 msec


POWERWAVE (LDA9301-30) OUT OF BAND (CW) HIGH
MKR 1.885 GHz
REF 30.1 dBm
ATTEN 10 dB
-33.00 dBm
10 dB/
OFFSET
31.8
dB
DL
-10.0
dBm
START 1.00 GHz
STOP 2.50 GHz
RES BW 1 MHz
VBW 1 MHz
SWP 37.5 msec


POWERWAVE (LDA9301-30) OUT OF BAND (CW) HIGH
REF 30.1 dBm
ATTEN 10 dB
MKR 2.817 GHz
-33.40 dBm
10 dB/
OFFSET
31.8
dB
DL
-10.0
dBm
-20dBm
START 2.50 GHz
RES BW 1 MHz
VBW 1 MHz
STOP 9.40 GHz
SWP 173 msec