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1.0 Product Description

The Wireless Link Corporation Model CVDM-2000, FCC ID: NJICVDM-2000 is a Cellular Voice/Data/GPS module.

For more information, refer to the 'Users Manual' in Section I of Appendix B .

1.1 Justification

The Wireless Link Corporation Model CVDM-2000, FCC ID: NJICVDM-2000 is similar to Wireless Link's Model CVDM-3, FCC ID: NJICVDM-3, Grant date: November 12, 1997.

The CVDM-2000 module was created by extending the board outline of the existing CVDM-3 PCB design and adding the supplementary circuitry required to support the GPS receiver and power management system. Additionally, the modem was moved off of the daughter board and onto the main PCB and several digital I/O and A/D converter inputs wre provided.

The Model CVDM-2000 was tested only to the requirements of FCC Rule 2.993: Field Strength of Spurious Radiation. Test data for Model CVDM-3 is used to represent the test data for CVDM-2000 for all other requirements except for Field Strength of Spurious Radiation. The test data for CVDM-3 included in Appendix A.

Please see the 'Theory of Operation' in Section V of Appendix B for more describing the similarities between the two models.

1.2 Test Summary

FCC RULE	DESCRIPTION OF TEST	RESULT	PAGE
2.985	RF Power Output	Test Not Performed*	Appendix A
22.913	Effective Radiated Power	Test Not Performed*	Appendix A
2.987	Modulating Deviation Limiting	Test Not Performed*	Appendix A
22.915(d)(1)	Audio Filter Characteristics	Test Not Performed*	Appendix A
2.989° 22.917(b)(d)	Emission Limitations, Occupied Bandwidth	Test Not Performed*	Appendix A
22.917(e) 22.917(f)	Out of Band Emissions at Antenna Terminals Mobile Emissions In Base Frequency Range	Test Not Performed*	Appendix A
2.993	Field Strength of Spurious Radiation	Passed	13
15.109	AC Line Conducted Emission	N/A**	N/A
2.995(a)	Frequency Stability vs. Temperature	Test Not Performed*	Appendix A
2.995(d)(2)	Frequency Stability vs. Voltage	Test Not Performed*	Appendix A

*: Test was not performed because this model is identical to Wireless Link's model CVDM-3, FCC ID: NJICVDM-3, Grant date: November 12, 1997. Test data for the CVDM-3 is included in Appendix A to represent the CVDM-2000.

**: System is Battery Powered

Ollie Moyrong
Test Engineer

8/5/98
Date

2.0 RF Power Output

Requirements: FCC Part 2.985(a)

2.1 Test Procedure

The antenna was removed and a SMA connector was connected to the transmitter output. The transmitter output was connected to a calibrated coaxial attenuator (50 ohm), the other end of which was connected to a spectrum analyzer. Transmitter output was read off the spectrum analyzer in dBm. The power output at the transmitter was determined by adding the value of the attenuator to the spectrum analyzer reading.

The test was performed at three frequencies (low, middle, and high channels) and on all power levels which can be setup on the transmitters.

2.2 Test Equipment

Hewlett Packard HP8566B Spectrum Analyzer
Hewlett Packard HP 7470A Plotter

2.3 Test Results

Test not performed. See Appendix A, Section 2.0, for test data on Model CVDM-3, FCC ID: NJICVDM-3, Grant date: November 12, 1997.

3.0 **Effective Radiated Power**

Requirements: FCC 22.913

The Effective Radiated Power (ERP) of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

3.1 Test Procedure

The EUT was positioned on a non-conductive turntable, 0.8m above the ground plane on an open test site.

The radiated emission at the fundamental frequency was measured at 3m distance with a test antenna and spectrum analyzer. During the measurement, the resolution and video bandwidths of the spectrum analyzer were set to 100 kHz. Worst case emission was recorded with the rotation of the turntable and the raising and lowering of the test antenna. The spectrum analyzer reading (R_{EUT}) was recorded.

The EUT was replaced by a half-wave tuned dipole connected to a signal generator. The frequency of the signal generator was adjusted to the transmitter frequency.

The test antenna was raised and lowered to ensure that a maximum signal was received. The signal generator output level (P_G) was adjusted to obtain the spectrum analyzer reading (R_G) as close as possible to the previously recorded spectrum analyzer reading (R_{EUT}).

The ERP was calculated as follows:
$ERP(dBm) = P_G(dBm) + R_{EUT}(dBm) - R_G(dBm)$

The test was performed at three frequencies (low, middle, and high channels).
In addition, the Equivalent Isotropic Radiated Power (EIRP) in dBpW was calculated as follows:
$EIRP(dBpW) = ERP(dBm) + 90 + 10 \log 1.64$

3.2 Test Equipment

Rhode & Schwartz SMH Signal Generator
Hewlett Packard HP8566B Spectrum Analyzer
CDI Roberts Antenna

3.3 Test Results

Test not performed. See Appendix A, Section 3.0, for test data on Model CVDM-3, FCC ID: NJICVDM-3, Grant date: November 12, 1997.

4.0 Modulation Deviation Limiting

Requirements: FCC 2.987, 22.915(c)s

4.1 Test Procedure

The RF output of the transceiver was connected to the input of an FM deviation meter through sufficient attenuation so as not to overload the meter or distort the readings. An audio signal generator with a variable attenuator on the output was coupled into the external microphone jack of the transceiver, or alternatively, the microphone element was removed and the generator output was connected to the microphone wires by clip leads.

At three different modulating frequencies, the output level of the audio generator was varied and the FM deviation level was recorded (Table 4.1.a).

The audio input was adjusted for 8 kHz deviation at 1 kHz tone with the 2:1 compressor enabled and the SAT disabled. The audio input was increased by 20 dB in one step. Both the initial and the subsequent steady state values of the peak frequency deviation, at and following the time of the 20 dB increase, were measured and recorded in the frequency range 300 Hz - 3 kHz (Table 4.1.b).

4.2 Test Equipment

Rhode & Schwartz ESVP (in FM deviation measurement mode)
Marconi 2955A Radio Communication Test Set
Leader LFG-1300S Function Generator
LMV-182 AC Millivoltmeter

4.3 Test Results

Test not performed. See Appendix A, Section 4.0, for test data on Model CVDM-3, FCC ID: NJICVDM-3, Grant date: November 12, 1997.

WIRELESS LINK
corporation

Federal Communications Commission
C/o Mellon Bank Center
Three Mellon Bank Center
525 William Penn Way, 27th Fl, Rm 153-2713
Pittsburgh, PA 15259-0001

Attention: Wholesale Lockbox Supervisor

Subject: Return of Unprocessable Application

Dear Sir/Madam:

Our application was returned because the $450 filing fee check was not made payable to the Federal Communications Commission.

Enclosed, please find the resubmitted FCC Part 22 type acceptance application for Wireless Link Corporation (FCC ID: NJICVDM-2000) and a new check for $450 to cover the filing fee. Thank you

Sincerely,

Bill Crook

Bill Crook
Wireless Link Corporation
1909 Milmont Drive
Milpitas, CA 95035-2577

5.0 Audio Filter Characteristics

Requirements: FCC 22.915(d)

For mobile stations, these signals must be attenuated, relative to the level at 1 kHz, as follows:

(I) In the frequency ranges of 3.0 to 5.9 kHz and 6.1 to 15.0 kHz, signals must be attenuated by at least 40 log (f/3) dB, where f is the frequency of the signal in kHz.

(ii) In the frequency range of 5.9 to 6.1 kHz, signals must be attenuated at least 35 dB.

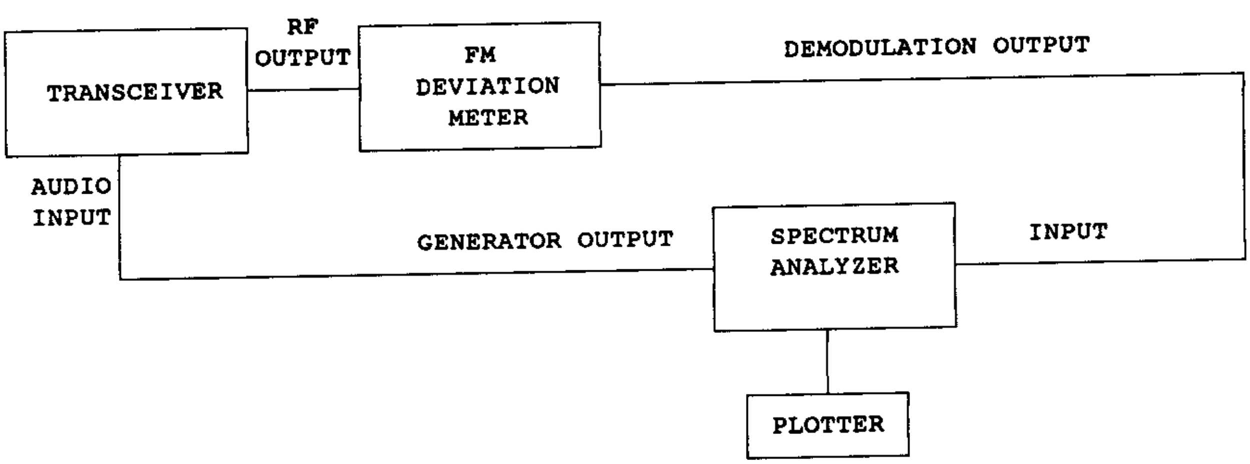
(iii) In the frequency range above 15 kHz, signals must be attenuated at least 28 dB.

5.1 Test Procedure

The RF output of the transceiver was connected to the input of an FM deviation meter through sufficient attenuation so as not to overload the meter or distort the readings. An audio signal generator with a variable attenuator on the output was coupled into the external microphone jack of the transceiver, or alternatively, the microphone element was removed and the generator output was connected to the microphone wires by clip leads.

The audio signal at the transceiver audio input was adjusted to obtain 8-9 kHz deviation at the more sensitive modulation frequency (approximately 2.6 kHz). The audio frequency was varied from 300 Hz to 30 kHz and the deviation was measured while maintaining a constant input level. Using the level measured at 1 kHz as a reference (0 dB), the audio filter response was calculated (See Table 5-1).

Thus the high noise floor level was not allowed to show requirement attenuation (35 dB) the additional measurements were performed using the block diagram of the test setup shown below.



On that block diagram, the HP 3885A spectrum analyzer having the tracing generator, and the Marconi 2955A Radio Communication Test Set having an output of a demodulator, are used. After the calibration was made (the -20 dBm reading of the spectrum analyzer corresponds to the 9 kHz deviation) the spectrum analyzer was set to scan the frequency from 300 Hz to 30 kHz, with the same audio input level as described above.

The audio filter response was plotted directly from the spectrum analyzer.

5.2 Test Equipment

Rohde & Schwartz ESVP (in FM deviation measurement mode)
Marconi Instruments 2955A Radio Communications Test Set
HP 3588A Spectrum Analyzer
HP 7470A Plotter
Leader LFG-1300S Function Generator
LMV-182 AC Millivoltmeter

5.3 Test Results

Test not performed. See Appendix A, Section 5.0, for test data on Model CVDM-3, FCC ID: NJICVDM-3, Grant date: November 12, 1997.

6.0 Emission Limitations, Occupied Bandwidth

Requirements: FCC 22.917(b)(d), FCC 2.989(b)(1)

F3E/F3D emission mask for use with audio filter. The mean power of emissions must be attenuated below the mean power of the unmodulated carrier wave (P) as follows:

(1) On any frequency removed from the carrier frequency by more than 20 kHz but not more than 45 kHz: at least 26 dB;

(2) On any frequency removed from the carrier frequency by more than 45 kHz, up to the first multiple of the carrier frequency: at least 60 dB or 43 + 10 log P dB, whichever is the lesser attenuation.

F1D emission mask. The mean power of emissions must be attenuated below the mean power of the unmodulated carrier (P) as follows:

(1) On any frequency removed from the carrier frequency by more than 20 kHz but no more than 45 kHz: at least 26 dB;

(2) On any frequency removed from the carrier frequency by more than 45 kHz but not more than 90 kHz: at least 45 dB;

(2) On any frequency removed from the carrier frequency by more than 90 kHz, up to the first multiple of the carrier frequency: at least 60 dB or 43 +10 log P db, whichever is the lesser attenuation.

6.1 Test Procedure

The RF output of the transceiver was connected to the input of the spectrum analyzer through sufficient attenuation. The audio generator was connected to the audio input of the transceiver.

The spectrum with no modulation was recorded. The audio input signal was adjusted to obtain the frequencies deviation equal 6 kHz at the audio frequency of maximum response which was determined measuring deviation versus frequency from 300 Hz to 3.5 kHz and was found 2.8 kHz. The audio input level was increased by 16 dB. The audio frequency was set to the frequency 2.5 kHz.

The resolution bandwidth of the spectrum analyzer was set at 300 Hz and the spectrum was recorded in the frequency band ±50 kHz from the carrier frequency. The same plots has been done for wideband emissions, SAT, ST, DTMF9 and some of the combinations of these modulating signals.

Note:

Some of the plots were only done in the frequency band of ±100 kHz because it was clear from these plots, that the levels of emissions were well below the limits.

6.2 Test Equipment

HP 8566B Spectrum Analyzer
Leader LFG-1300S Function Generator
Leader LMV-182 AC Millivoltmeter
Marconi 2955A Radio Communication Test Set
HP 7470A Plotter

6.3 Test Results

Test not performed. See Appendix A, Section 6.0, for test data on Model CVDM-3, FCC ID: NJICVDM-3, Grant date: November 12, 1997.

7.0 Out of Band Emissions at Antenna Terminals

Requirements: FCC 22.917(e), FCC 22.917(f)

Out of Band Emissions:

The mean power of emissions must be attenuated below the mean power of the unmodulated carrier (P) on any frequency twice or more than twice the fundamental frequency by at least 43 + 10 log P dB.

Mobile Emissions in Base Frequency Range:

The mean power of any emissions appearing in the base station frequency range from cellular mobile transmitters operated must be attenuated to a level not to exceed -80 dBm at the transmit antenna connector.

7.1 Test Procedure

The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 30 kHz. The audio modulating signal was adjusted like it is described in Section 6.1 of this report. Sufficient scans were taken to show the outband emissions if any up to 10th harmonic.

7.2 Test Equipment

HP 8566B Spectrum Analyzer
Leader LFG-1300S Function Generator
Leader LMV-182 AC Millivoltmeter
HP 7470A Plotter

7.3 Test Results

Test not performed. See Appendix A, Section 7.0, for test data on Model CVDM-3, FCC ID: NJICVDM-3, Grant date: November 12, 1997.

8.0 Field Strength of Spurious Radiation

Requirements: FCC 2.993, 22.917(e)

8.1 Test Procedure

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT.

The frequency range up to tenth harmonic of each of the three fundamental frequency (low, middle, and high channels) was investigated.

The spurious emissions attenuation was calculated as the difference between EIRP in dB(pW) at the fundamental frequency (See Section 3) and at the spurious emissions frequency.

8.2 Test Equipment

EMCO 3115 Horn Antenna
HP 8566B Spectrum Analyzer
Tektronix 2782 Spectrum Analyzer
Low Pass Filter
Preamplifier

8.3 Test Results

Refer to the attached data sheets.

The EUT passed the test.

INTERTEK TESTING SERVICES

Company: Wireless Link
EUT: Cellular/GPS Module
Model: CVDM-2000
Test Mode: Tx @ Low Channel

Project #: J98021352
Date of Test: 7/23/98
Test Site #: 1
Engineer: Ollie Moyrong

FCC Part 22 Radiated Emissions

Frequency (MHz)	Antenna Location (m)	Antenna Polariz. (H=0/V=1)	Reading (dBuV)	Antenna Factor (dB/m)	Preamp (dB)	Correction Factor (dB)	Cable Loss (dB)	Corrected Reading (dBuV/m)	EIRP (dBm)	Spurious Attenuation (dB)	Margin (dB)
824.0	3.0	1	105.0	22.1	0.0	0.0	0.5	127.6	32.3	N/A	N/A
1648.0	3.0	1	37.5	24.9	0.0	0.0	1.5	63.9	-31.4	63.7	-18.4
2472.1	3.0	0	55.0	27.7	-28.5	0.0	2.3	56.5	-38.8	71.1	-25.8
3296.2	3.0	1	52.1	30.2	-27.9	0.0	2.5	56.9	-38.4	70.7	-25.4
4120.1	3.0	1	48.5	32.5	-27.9	0.0	2.9	56.0	-39.3	71.6	-26.3
4944.2	3.0	1	43.8	32.1	-28.1	0.0	3.2	51.0	-44.3	76.6	-31.3
5768.2	3.0	1	39.5	34.4	-28.3	0.0	3.7	49.3	-46.0	78.3	-33.0
6592.5	3.0	1	35.6	34.2	-28.0	0.0	4.2	46.0	-49.3	81.6	-36.3
7416.5	3.0	0	37.5	35.8	-28.0	0.0	4.3	49.6	-45.7	78.0	-32.7
8240.5	3.0	1	34.9	36.9	-27.2	0.0	4.8	49.4	-45.9	78.2	-32.9 *

Note: Negative signs (-) in the Margin column signify levels below the limit.
Spurious emissions attenuation limit equals 43 + 10log P = 45.3 dB.
Measurements followed by a '*' are noise floor readings.

INTERTEK TESTING SERVICES

Company: Wireless Link
EUT: Cellular/GPS Module
Model: CVDM-2000
Test Mode: Tx @ Middle Channel

Project #: J98021352
Date of Test: 7/23/98
Test Site #: 1
Engineer: Ollie Moyrong O.M.

FCC Part 22 Radiated Emissions

Frequency (MHz)	Antenna Location (m)	Antenna Polariz. (H=0/V=1)	Reading (dBuV)	Antenna Factor (dB/m)	Preamp (dB)	Correction Factor (dB)	Cable Loss (dB)	Corrected Reading (dBuV/m)	EIRP (dBm)	Spurious Attenuation (dB)	Margin (dB)
836.0	3.0	1	106.0	22.3	0.0	0.0	0.5	128.8	33.5	N/A	N/A
1672.0	3.0	1	42.5	24.9	0.0	0.0	1.5	68.9	-26.4	59.9	-13.4
2503.2	3.0	1	47.1	27.9	-28.5	0.0	2.3	48.8	-46.5	80.0	-33.5
3337.7	3.0	1	53.2	30.2	-27.9	0.0	2.5	58.0	-37.3	70.8	-24.3
4180.0	3.0	1	51.4	32.5	-27.9	0.0	2.9	58.9	-36.4	69.9	-23.4
5016.0	3.0	1	35.7	33.1	-28.1	0.0	3.2	43.9	-51.4	84.9	-38.4
5852.1	3.0	1	42.7	34.4	-28.3	0.0	3.7	52.5	-42.8	76.3	-29.8
6688.1	3.0	1	36.1	34.2	-28.0	0.0	4.2	46.5	-48.8	82.3	-35.8
7528.8	3.0	1	36.2	37.5	-28.0	0.0	4.3	50.0	-45.3	78.8	-32.3
8360.1	3.0	0	36.3	37.0	-27.2	0.0	4.8	50.9	-44.4	77.9	-31.4

Note: Negative signs (-) in the Margin column signify levels below the limit.
Spurious emissions attenuation limit equals 43 + 10log P = 46.5 dB.
Measurements followed by a '*' are noise floor readings.

INTERTEK TESTING SERVICES

Company: Wireless Link
EUT: Cellular/GPS Module
Model: CVDM-2000
Test Mode: Tx @ High Channel

Project #: J98021352
Date of Test: 7/23/98
Test Site #: 1
Engineer: Ollie Moyrong

FCC Part 22 Radiated Emissions

Frequency (MHz)	Antenna Location (m)	Antenna Polariz. (H=0/V=1)	Reading (dBuV)	Antenna Factor (dB/m)	Preamp (dB)	Correction Factor (dB)	Cable Loss (dB)	Corrected Reading (dBuV/m)	EIRP (dBm)	Spurious Attenuation (dB)	Margin (dB)
849.0	3.0	1	104.4	22.5	0.0	0.0	0.5	127.4	32.1	N/A	N/A
1697.9	3.0	1	38.5	24.9	0.0	0.0	1.5	64.9	-30.4	62.5	-17.4
2546.9	3.0	0	41.6	28.1	-28.5	0.0	2.3	43.5	-51.8	83.9	-38.8
3395.8	3.0	1	48.8	30.2	-27.9	0.0	2.5	53.6	-41.7	73.8	-28.7
4244.8	3.0	1	48.5	32.5	-27.9	0.0	2.9	56.0	-39.3	71.4	-26.3
5093.8	3.0	1	41.3	33.1	-28.1	0.0	3.2	49.5	-45.8	77.9	-32.8
5942.9	3.0	1	36.5	34.4	-28.3	0.0	3.7	46.3	-49.0	81.1	-36.0
6791.9	3.0	1	35.4	34.2	-28.0	0.0	4.2	45.8	-49.5	81.6	-36.5
7640.8	3.0	1	36.4	37.5	-28.0	0.0	4.3	50.2	-45.1	77.2	-32.1
8489.8	3.0	1	35.1	36.9	-27.2	0.0	4.8	49.6	-45.7	77.8	-32.7 *

Note: Negative signs (-) in the Margin column signify levels below the limit.
Spurious emissions attenuation limit equals 43 + 10log P = 45.1 dB.
Measurements followed by a '*' are noise floor readings.

ITS Intertek Testing Services

1365 Adams Court, Menlo Park CA 94025

Radiated Emissions Test Data

Company:	Wireless Link Corp	Model #:	CVDM-2000
EUT:	Cellular/GPS Module	S/N or FCC	Not labelled
Project #:	J980	Engineer:	Barry
Test Mode:	Receive	Date of Test:	07/22/98

Initial: [signature]

	Antenna	Pre-Amp	Cable A	Cable B	OCF
Number:	2	5	2		
Model:	EMCO 314	CDI_P950	RG214	None	None

Standard_	FCC Part 15B	
Limits_	2	
Test Distance_	3	meters

Frequency MHz	Reading dB(uV)	Det. P/A/Q	Ant. Pol. H/V	Ant. Factor dB(1/m)	Pre-Amp dB	Insert. Loss dB	D. F. dB	Net dB(uV/m)	Limit @3m dB(uV/m)	Margin dB
78.6	38.2	P	H	7.6	18.9	0.3	0.0	27.2	40.0	-12.8
95.9	37.7	P	H	7.4	18.9	0.5	0.0	26.7	43.5	-16.8
98.3	37.4	P	H	7.4	18.9	0.5	0.0	26.4	43.5	-17.1
108.8	43.1	P	H	7.2	19.0	0.5	0.0	31.8	43.5	-11.7
111.8	43.5	P	H	6.8	19.0	0.5	0.0	31.8	43.5	-11.7
119.2	36.1	P	H	6.5	19.0	0.5	0.0	24.1	43.5	-19.4
926.0	12.5	P	H	23.3	12.3	1.9	0.0	25.4	46.0	-20.6

Notes:

a) P: Peak; A: Average; Q: Quasi Peak; H: Horizontal; V: Vertical; OCF:Other Correction Factor; DF:Distance Factor
b) Insert. Loss = Cable A + Cable B + OCF.
c) Negative signs (-) in Margin column signify levels below the limits.
d) All other emissions not reported are below the equipment noise floor which is at least 20 dB below the limits.

9.0 AC Line Conducted Emission

9.1 Test Procedure

The test was done according to the ANSI C63.4 procedure.

9.2 Test Equipment

HP 8566B Spectrum Analyzer
EMCO LISN

9.3 Test Results

Not applicable, the EUT is a battery powered device.

9.4 Test Configuration Setup - Line Conducted

Not applicable, the EUT is a battery powered device.

10.0 **Frequency Stability vs Temperature**

Requirements: FCC 2.995(a), 22.355
Frequency Tolerance: ±2.5 ppm

10.1 Test Procedure

The equipment under test was connected to an external DC power supply and the RF output was connected to a calibrated coaxial attenuator, the other end of which was connected to a frequency counter. The EUT was placed inside the temperature chamber. The DC leads, RF output cable, and external PTT cable exited the chamber through an opening made for that purpose.

After the temperature stabilized for approximately 20 minutes, the external PTT switch was activated, and the frequency output was recorded from the counter.

10.2 Test Equipment

Temperature Chamber, -50C to +100C
Hewlett Packard 5383A Frequency Counter
Goldstar DC Power Supply, GR303
Rohde & Schwarz ESVP Test Receiver

10.3 Test Results

Test not performed. See Appendix A, Section 10.0, for test data on Model CVDM-3, FCC ID: NJICVDM-3, Grant date: November 12, 1997.

11.0 Frequency Stability vs Voltage

Requirements: FCC 2.995(d)(2), 22.355
Frequency Tolerance: ±2.5 ppm

11.1 Test Procedure

An external variable DC power supply was connected to the battery terminals of the equipment under test. The voltage was set to 115% of the nominal value and was then decreased until the transmitter light no longer illuminates; i.e., the battery end point. The output frequency was recorded for each battery voltage.

11.2 Test Equipment

Hewlett Packard 5383A Frequency Counter
DC Power Supply
Goldstar Rohde & Schwarz ESVPGR303 Test Receiver

11.3 Test Results

Test not performed. See Appendix A, Section 11.0, for test data on Model CVDM-3, FCC ID: NJICVDM-3, Grant date: November 12, 1997.

Appendix A - Test Data for Model CVDM-3, FCC ID: NJICVDM-3, Grant date: November 12, 1997.

See attached.

2.0 **RF Power Output**

Requirements: FCC Part 2.985(a)

2.1 Test Procedure

The antenna was removed and a SMA connector was connected to the transmitter output. The transmitter output was connected to a calibrated coaxial attenuator (50 ohm), the other end of which was connected to a spectrum analyzer. Transmitter output was read off the spectrum analyzer in dBm. The power output at the transmitter was determined by adding the value of the attenuator to the spectrum analyzer reading.

The test was performed at three frequencies (low, middle, and high channels) and on all power levels which can be setup on the transmitters.

2.2 Test Equipment

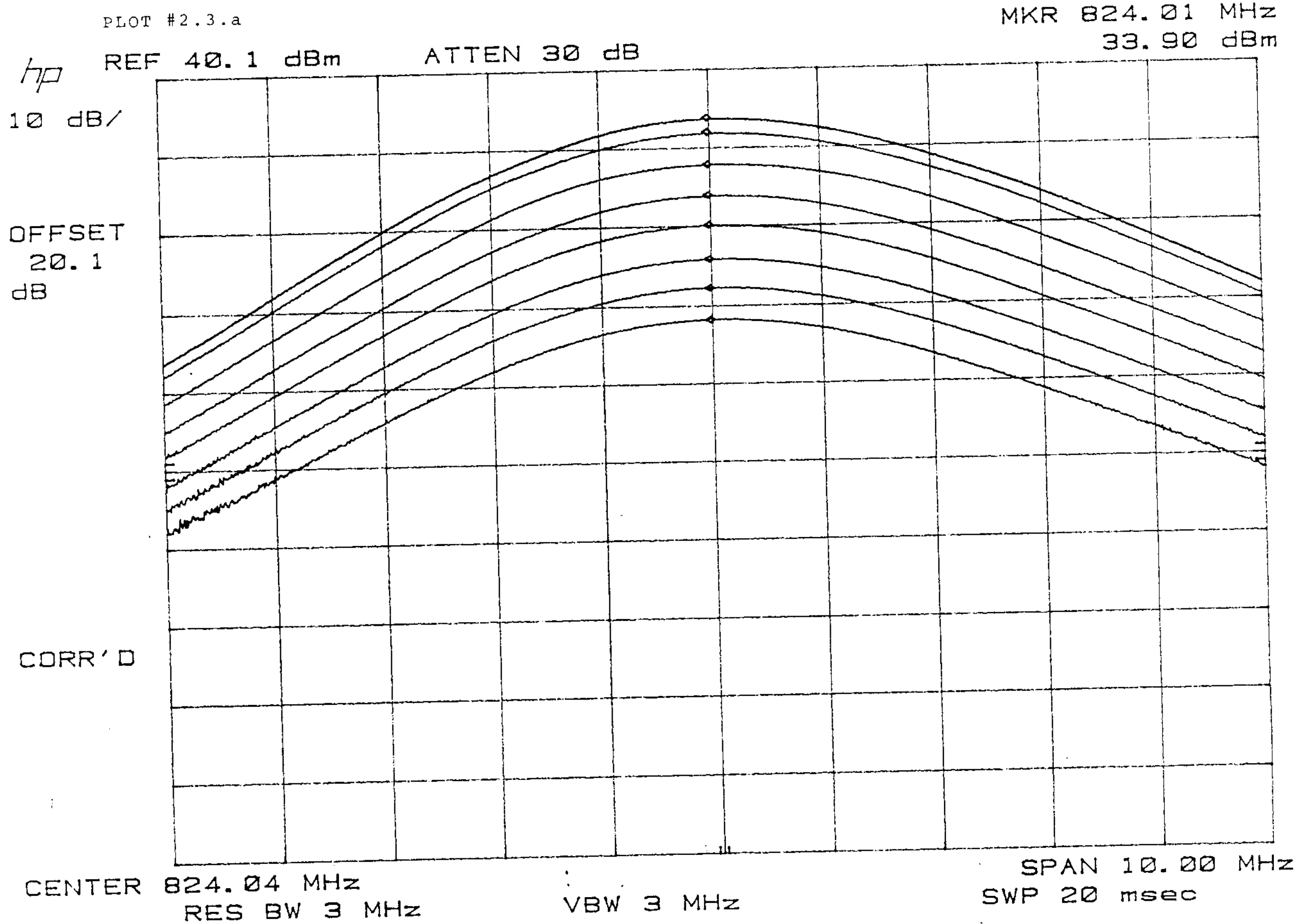
Hewlett Packard HP8566B Spectrum Analyzer
Hewlett Packard HP 7470A Plotter

2.3 Test Results

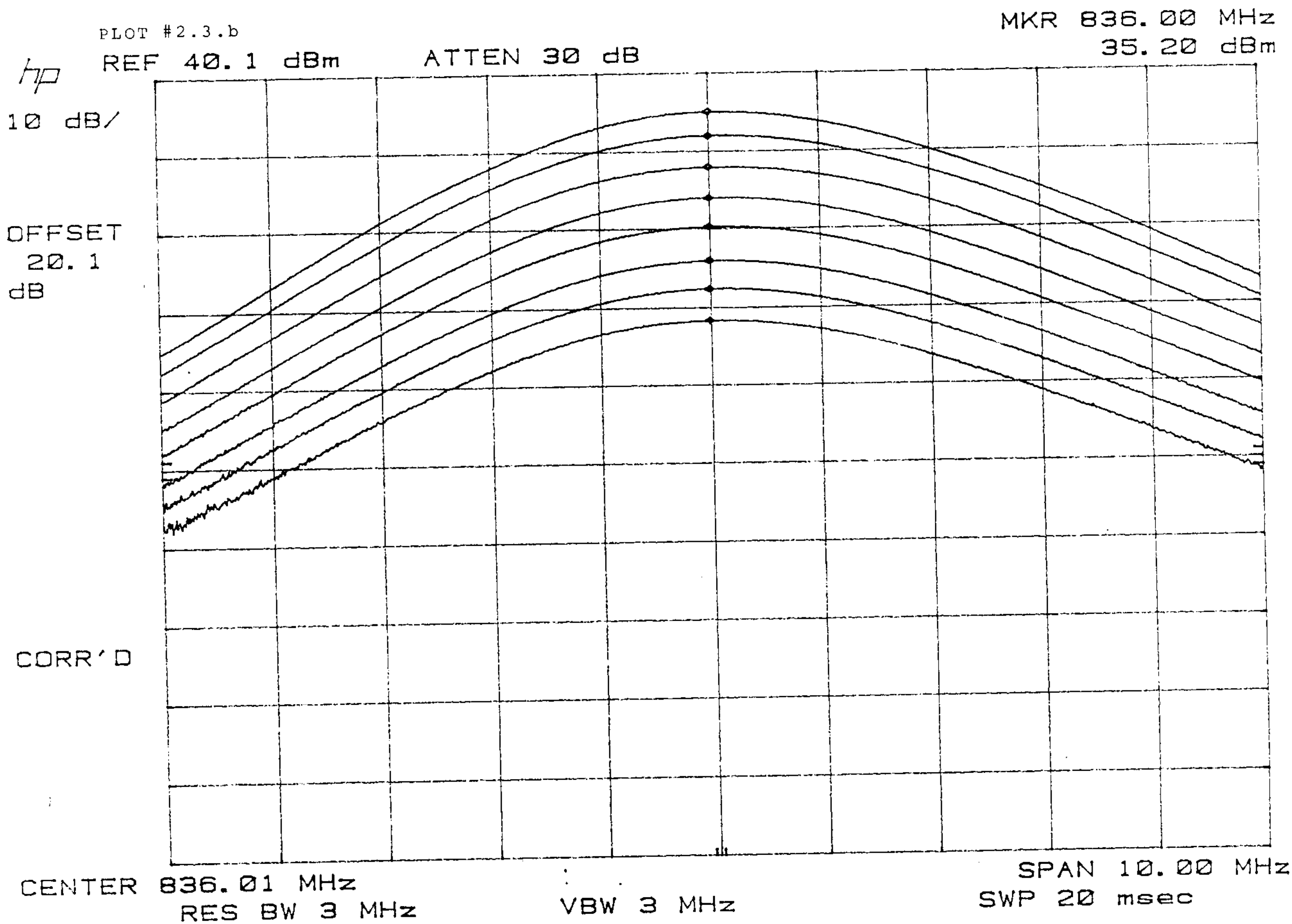
Refer to the attached plots:

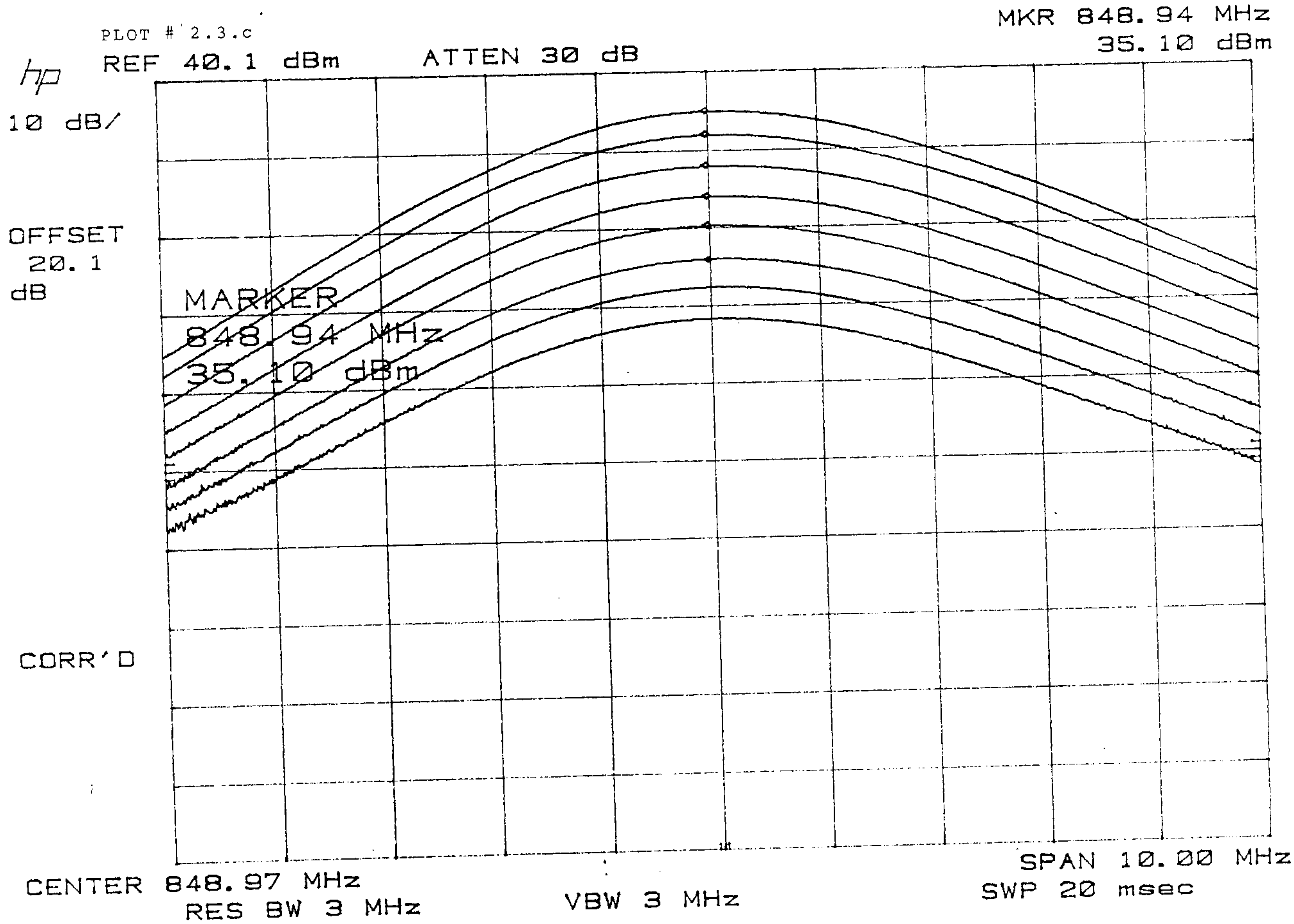
Plot #2.3.a
Plot #2.3.b
Plot #2.3.c

PLOT #2.3.a


MKR 824.01 MHz
33.90 dBm
REF 40.1 dBm
ATTEN 30 dB
10 dB/
OFFSET
20.1
dB
CORR'D
CENTER 824.04 MHz
RES BW 3 MHz
VBW 3 MHz
SPAN 10.00 MHz
SWP 20 msec

PLOT #2.3.b


MKR 836.00 MHz
35.20 dBm
REF 40.1 dBm
ATTEN 30 dB
10 dB/
OFFSET
20.1
dB
CORR'D
CENTER 836.01 MHz
RES BW 3 MHz
VBW 3 MHz
SPAN 10.00 MHz
SWP 20 msec


PLOT # 2.3.c
REF 40.1 dBm
ATTEN 30 dB
MKR 848.94 MHz
35.10 dBm
10 dB/
OFFSET
20.1
dB
MARKER
848.94 MHz
35.10 dBm
CORR'D
CENTER 848.97 MHz
RES BW 3 MHz
VBW 3 MHz
SPAN 10.00 MHz
SWP 20 msec

3.0 Effective Radiated Power

Requirements: FCC 22.913

The Effective Radiated Power (ERP) of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

3.1 Test Procedure

The EUT was positioned on a non-conductive turntable, 0.8m above the ground plane on an open test site.

The radiated emission at the fundamental frequency was measured at 3m distance with a test antenna and spectrum analyzer. During the measurement, the resolution and video bandwidths of the spectrum analyzer were set to 100 kHz. Worst case emission was recorded with the rotation of the turntable and the raising and lowering of the test antenna. The spectrum analyzer reading (R_{EUT}) was recorded.

The EUT was replaced by a half-wave tuned dipole connected to a signal generator. The frequency of the signal generator was adjusted to the transmitter frequency.

The test antenna was raised and lowered to ensure that a maximum signal was received. The signal generator output level (P_G) was adjusted to obtain the spectrum analyzer reading (R_G) as close as possible to the previously recorded spectrum analyzer reading (R_{EUT}).

The ERP was calculated as follows:

$$ERP(dBm) = P_G(dBm) + R_{EUT}(dBm) - R_G(dBm)$$

The test was performed at three frequencies (low, middle, and high channels).

In addition, the Equivalent Isotropic Radiated Power (EIRP) in dBpW was calculated as follows:

$$EIRP(dBpW) = ERP(dBm) + 90 + 10 \log 1.64$$

3.2 Test Equipment

Rhode & Schwartz SMH Signal Generator
Hewlett Packard HP8566B Spectrum Analyzer
CDI Roberts Antenna

3.3 Test Results

Refer to the attached data sheet. The EUT passed the test.

INTERTEK TESTING SERVICES

ompany: Wireless link Corp.
UT: Cellular Module
fodel: CVDM-3
est Mode: Tx @ 824, 836, & 849 MHz

Project #: J97011231
Date of Test: 8-4-97
Test Site #: 1
Engineer: G.B.

FCC Part 22.913 Effective Radiated Power

FREQUENCY	ANTENNA POLARIZATION	SPEC. ANLZR. READING (EUT)	SPEC. ANLZR. READING SIGNAL GEN. + TUNED DIPOLE	SIGNAL GENERATOR POWER	EFFECTIVE RADIATED POWER	EQUIVALENT ISOTROPIC RADIATED POWER
MHz	H/V	dB(uV)	dB(uV)	dBm	dBm	dB(pW)
824.0	V	110.6	83.8	9.0	35.8	128.0
836.0	V	110.9	82.5	9.0	37.4	129.6
849.0	V	110.7	83.0	9.0	36.7	128.9

Note: All measurements were made at 3 meters.

4.0 Modulation Deviation Limiting

Requirements: FCC 2.987, 22.915(c)s

4.1 Test Procedure

The RF output of the transceiver was connected to the input of an FM deviation meter through sufficient attenuation so as not to overload the meter or distort the readings. An audio signal generator with a variable attenuator on the output was coupled into the external microphone jack of the transceiver, or alternatively, the microphone element was removed and the generator output was connected to the microphone wires by clip leads.

At three different modulating frequencies, the output level of the audio generator was varied and the FM deviation level was recorded (Table 4.1.a).

The audio input was adjusted for 8 kHz deviation at 1 kHz tone with the 2:1 compressor enabled and the SAT disabled. The audio input was increased by 20 dB in one step. Both the initial and the subsequent steady state values of the peak frequency deviation, at and following the time of the 20 dB increase, were measured and recorded in the frequency range 300 Hz - 3 kHz (Table 4.1.b).

4.2 Test Equipment

Rhode & Schwartz ESVP (in FM deviation measurement mode)
Marconi 2955A Radio Communication Test Set
Leader LFG-1300S Function Generator
LMV-182 AC Millivoltmeter

4.3 Test Results

Please refer to the attached data sheets.

The EUT passed the test.

Table 4.1a
Modulation Limiting

Output Level (mV)	FM Deviation In kHz At Indicated Modulating Frequency		
	3000 Hz	1000 Hz	300 Hz
1	2.7	1.3	0.5
2	3.7	1.8	0.6
5	5.1	2.7	0.8
10	8.3	3.9	1.1
20	8.4	5.4	1.5
30	8.3	6.6	1.9
40	8.3	7.7	2.1
50	8.4	8.6	2.4
60	8.4	9.4	2.6
70	8.4	10.1	2.8
80	8.4	10.8	3.0
90	8.4	11.1	3.2
100	8.4	11.2	3.4
150	8.4	11.4	6.1
200	8.4	11.4	6.4
250	8.4	11.0	5.9

Table 4.1a (Continuation)
Modulation Limiting

Output Level (mV)	FM Deviation In kHz At Indicated Modulating Frequency		
	3000 Hz	1000 Hz	300 Hz
300	8.4	10.5	5.5
400	8.4	10.2	4.9
450	8.4	10.2	4.9
500	8.4	10.1	4.9
600	8.4	10.0	4.9
650	8.4	9.9	4.9
700	8.4	9.8	4.9
800	8.4	9.9	4.9
900	8.4	9.9	4.9
1000	8.4	9.8	4.9

Table 4.1b
Peak Frequency Deviation

FREQUENCY kHz	INITIAL DEVIATION	PEAK DEVIATION	STEADY STATE DEVIATION
0.3	2.2	4.9	9.9
0.5	4.1	11.9	11.9
0.7	5.7	11.2	11.2
0.9	5.8	11.2	11.1
1.0	8.0	10.2	10.2
1.2	9.4	8.9	8.8
1.4	10.9	11.0	9.7
1.6	11.0	11.0	10.4
1.8	10.8	10.8	10.7
2.0	11.0	11.0	10.9
2.4	11.5	11.5	11.3
2.8	9.9	9.9	9.8
3.0	8.3	8.4	8.4

Test Conditions:

V_{inp} = 45 mV
Deviation = 8 kHz at modulation frequency 1 kHz
Middle Channel f = 836.52 MHz

5.0 Audio Filter Characteristics

Requirements: FCC 22.915(d)

For mobile stations, these signals must be attenuated, relative to the level at 1 kHz, as follows:

(i) In the frequency ranges of 3.0 to 5.9 kHz and 6.1 to 15.0 kHz, signals must be attenuated by at least 40 log (f/3) dB, where f is the frequency of the signal in kHz.

(ii) In the frequency range of 5.9 to 6.1 kHz, signals must be attenuated at least 35 dB.

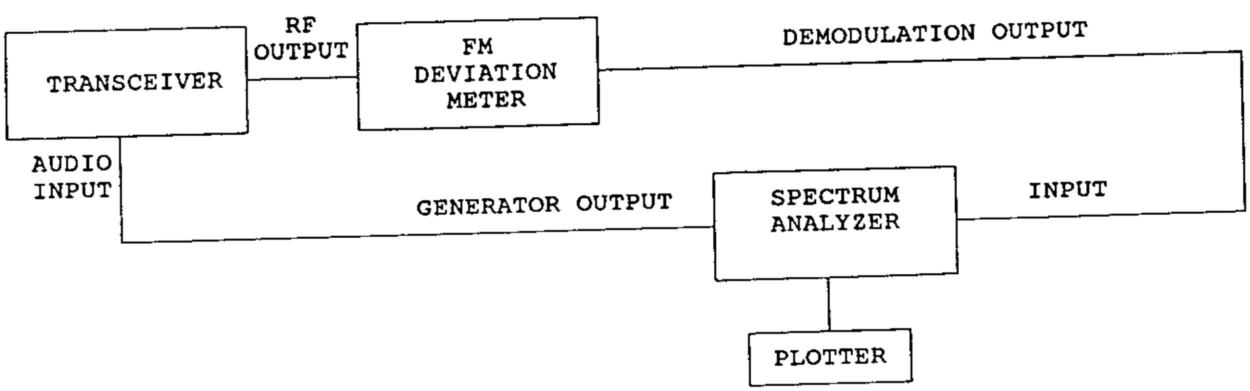
(iii) In the frequency range above 15 kHz, signals must be attenuated at least 28 dB.

5.1 Test Procedure

The RF output of the transceiver was connected to the input of an FM deviation meter through suffecient attenuation so as not to overload the meter or distort the readings. An audio signal generator with a variable attenuator on the output was coupledl into the external microphone jack of the transceiver, or alternatively, the microphone element was removed and the generator output was connected to the microphone wires by clip leads.

The audio signal at the transceiver audio input was adjusted to obtain 8-9 kHz deviation at the more sensitive modulation frequency (approximately 2.6 kHz). The audio frequency was varied from 300 Hz to 30 kHz and the deviation was measured while maintaining a constant input level.. . Using the level measured at 1 kHz as a reference (0 dB), the audio filter response was calculated (See Table 5-1).

Thus the high noise floor level was not allowed to show requirement attenuation (35 dB) the additional measurements were performed using the block diagram of the test setup shown below.



On that block diagram, the HP 3885A spectrum analyzer having the tracing generator, and the Marconi 2955A Radio Communication Test Set having an output of a demodulator, are used. After the calibration was made (the -20 dBm reading of the spectrum analyzer corresponds to the 9 kHz deviation) the spectrum analyzer was set to scan the frequency from 300 Hz to 30 kHz, with the same audio input level as described above.

The audio filter response was plotted directly from the spectrum analyzer (Refer to Plots # 5.1.a, 5.1.b, & 5.1.c).

5.2 Test Equipment

Rohde & Schwartz ESVP (in FM deviation measurement mode)
Marconi Instruments 2955A Radio Communications Test Set
HP 3588A Spectrum Analyzer
HP 7470A Plotter
Leader LFG-1300S Function Generator
LMV-182 AC Millivoltmeter

5.3 Test Results

Refer to the attached data sheet and plot.

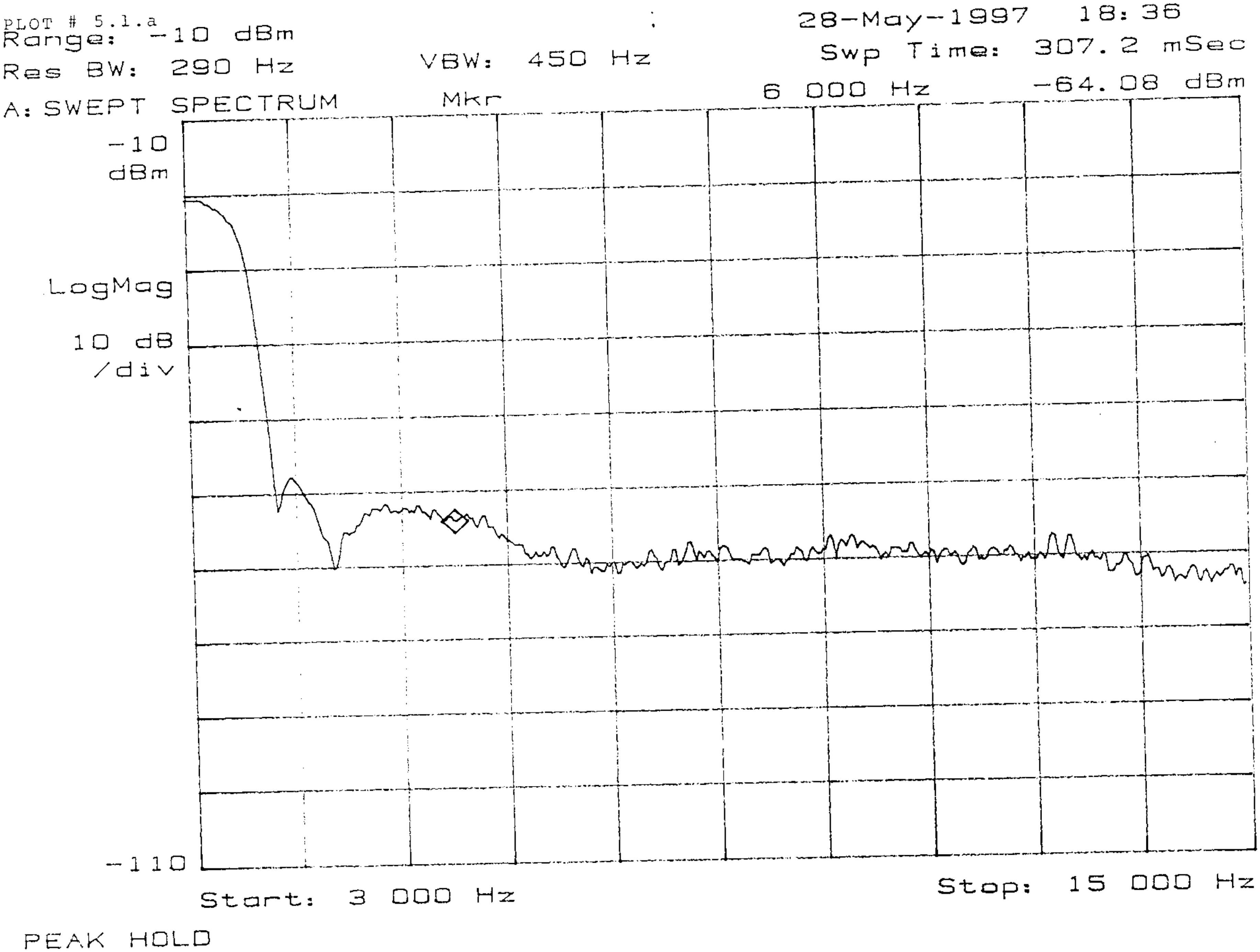
As can be seen from the plots, the attenuation at the frequencies 5.9 - 6.1 kHz is 50 dB relative to 2.7 kHz. The attenuation from 2.7 kHz to 1 kHz is approximately 8 dB, (see also Table 5.1), so the attenuation at 5.9 - 6.1 kHz is 42 dB relative to 1 kHz.

The EUT meets the requirements.

Table 5.1 Audio Filter Characteristics		
Modulation Frequency kHz	**Deviation kHz**	**Attenuation**
0.3	1.0	10.4
0.4	1.4	7.4
0.5	1.7	5.8
0.6	2.1	3.9
0.7	2.4	2.8
0.8	2.7	1.7
0.9	3.0	0.8
1.0	3.3	0.0
1.2	3.8	-1.2
1.4	4.4	-2.5
1.6	4.9	-3.4
1.8	5.6	-4.6
2.0	6.3	-5.6
2.5	8.4	-8.1
2.6	8.6	-8.3
3.0	7.1	-6.7
3.2	6.0	-5.2
3.5	1.7	5.8
4.5	0.3	20.8
V 5.0	0.2	24.3
5.5	0.2	24.3
5.9	0.2	24.3
6.0	0.2	24.3
6.1	0.2	24.3
8.0	0.2	24.3
10.0	0.2	24.3
15.0	0.2	24.3
20.0	0.2	24.3
30.0	0.2	24.3

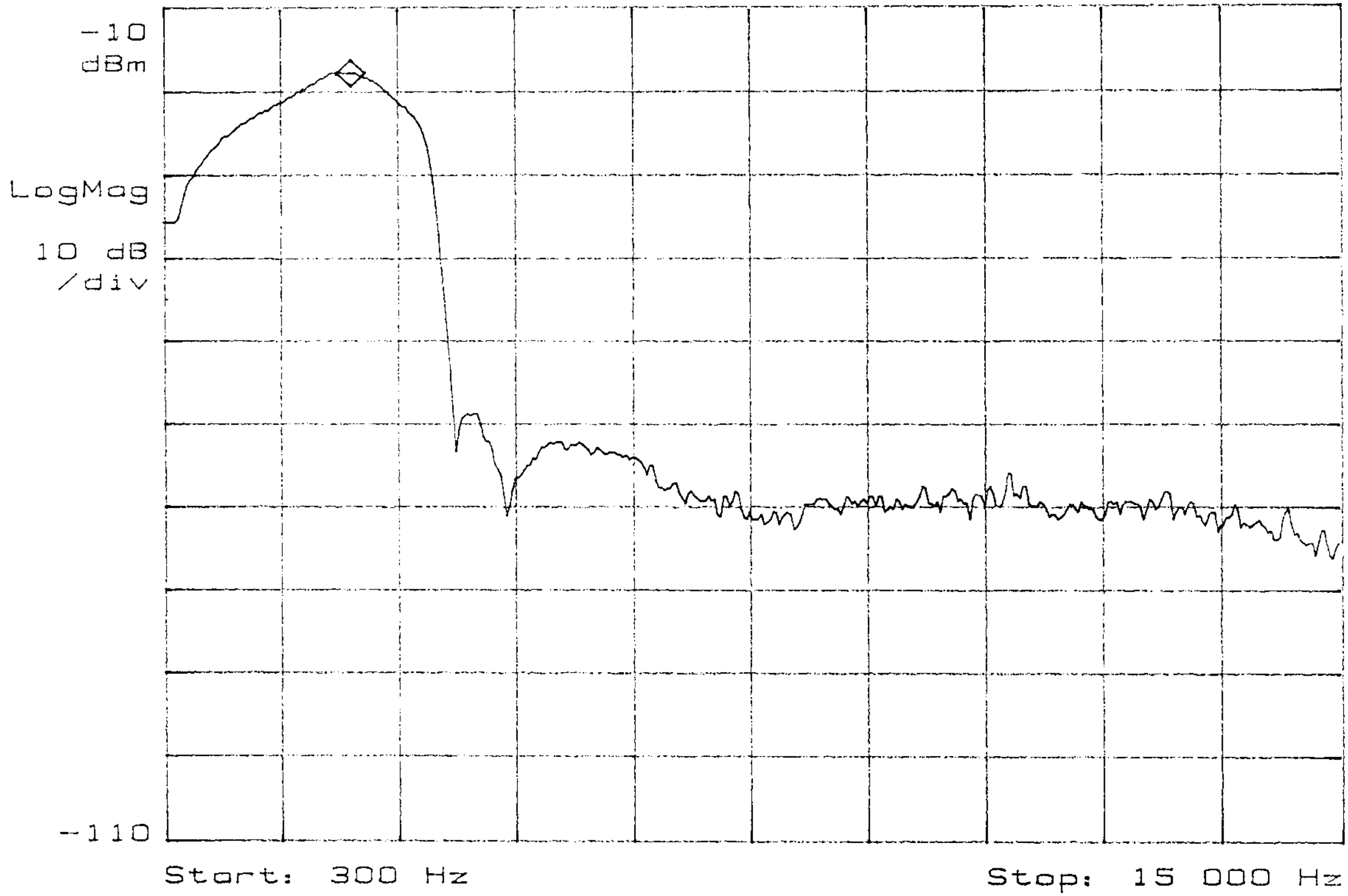
Deviation 0.2 kHz is a noise floor.

PLOT # 5.1.a


Range: -10 dBm
Res BW: 290 Hz
VBW: 450 Hz
A: SWEPT SPECTRUM
Mkr
28-May-1997 18:36
Swp Time: 307.2 mSec
6 000 Hz
-64.08 dBm
-10
dBm
LogMag
10 dB
/div
-110
Start: 3 000 Hz
Stop: 15 000 Hz
PEAK HOLD

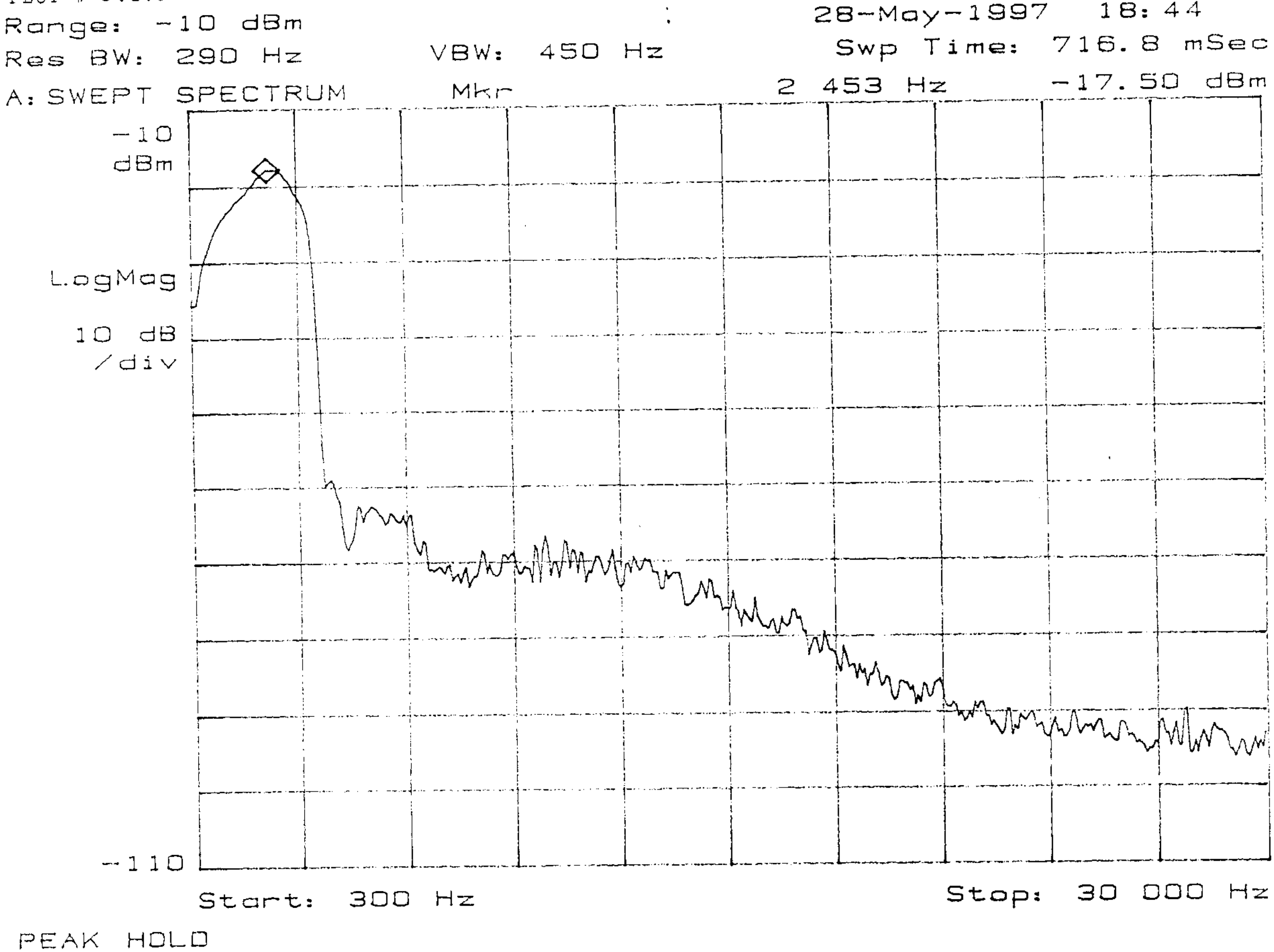
PLOT # 5.1.b

Range: -10 dBm   28-May-1997   18:39
Res BW: 290 Hz   VBW: 450 Hz   Swp Time: 409.6 mSec
A: SWEPT SPECTRUM   Mkr   2 652 Hz   -17.47 dBm



PEAK HOLD

PLOT # 5.1.c


Range: -10 dBm
Res BW: 290 Hz
VBW: 450 Hz
28-May-1997 18:44
Swp Time: 716.8 mSec
A: SWEPT SPECTRUM
Mkr
2 453 Hz
-17.50 dBm
-10
dBm
LogMag
10 dB
/div
-110
Start: 300 Hz
Stop: 30 000 Hz
PEAK HOLD

6.0 Emission Limitations, Occupied Bandwidth

Requirements: FCC 22.917(b)(d), FCC 2.989(b)(1)

F3E/F3D emission mask for use with audio filter. The mean power of emissions must be attenuated below the mean power of the unmodulated carrier wave (P) as follows:

(1) On any frequency removed from the carrier frequency by more than 20 kHz but not more than 45 kHz: at least 26 dB;

(2) On any frequency removed from the carrier frequency by more than 45 kHz, up to the first multiple of the carrier frequency: at least 60 dB or 43 + 10 log P dB, whichever is the lesser attenuation.

F1D emission mask. The mean power of emissions must be attenuated below the mean power of the unmodualted carrier (P) as follows:

(1) On any frequency removed from the carrier frequency by more than 20 kHz but no more than 45 kHz: at least 26 dB;

(2) On any frequency removed from the carrier frequency by more than 45 kHz but not more than 90 kHz: at least 45 dB;

(2) On any frequency removed from the carrier frequency by more than 90 kHz, up to the first multiple ofthe carrier frequency: at least 60 dB or 43 +10 log P db, whichever is the lesser attenuation.

6.1 Test Procedure

The RF output of the transceiver was connected to the input of the spectrum analyzer through sufficient attenuation. The audio generator was connected to the audio input of the transceiver.

The spectrum with no modulation was recorded. The audio input signal was adjusted to obtain the frequencies deviation equal 6 kHz at the audio frequency of maximum response which was determined measuring deviation versus frequency from 300 Hz to 3.5 kHz and was found 2.8 kHz. The audio input level was increased by 16 dB. The audio frequency was set to the frequency 2.5 kHz.

The resolution bandwidth of the spectrum analyzer was set at 300 Hz and the spectrum was recorded in the frequency band ±50 kHz from the carrier frequency. The same plots has been done for wideband emissions, SAT, ST, DTMF9 and some of the combinations of these modulating signals.

Note:

Some of the plots were only done in the frequency band of ±100 kHz because it was clear from these plots, that the levels of emissions were well below the limits.

6.2 Test Equipment

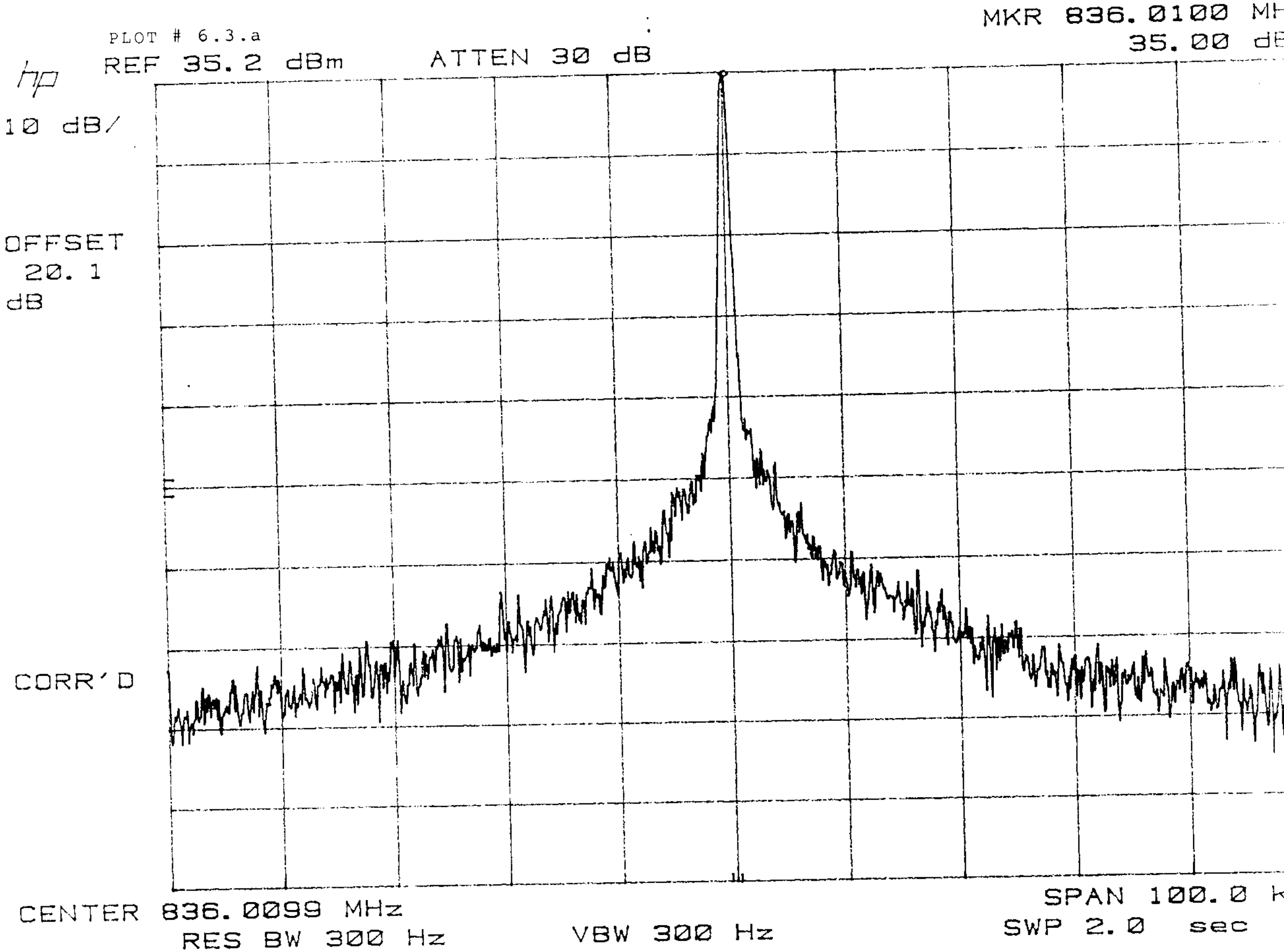
HP 8566B Spectrum Analyzer
Leader LFG-1300S Function Generator
Leader LMV-182 AC Millivoltmeter
Marconi 2955A Radio Communication Test Set
HP 7470A Plotter

6.3 Test Results

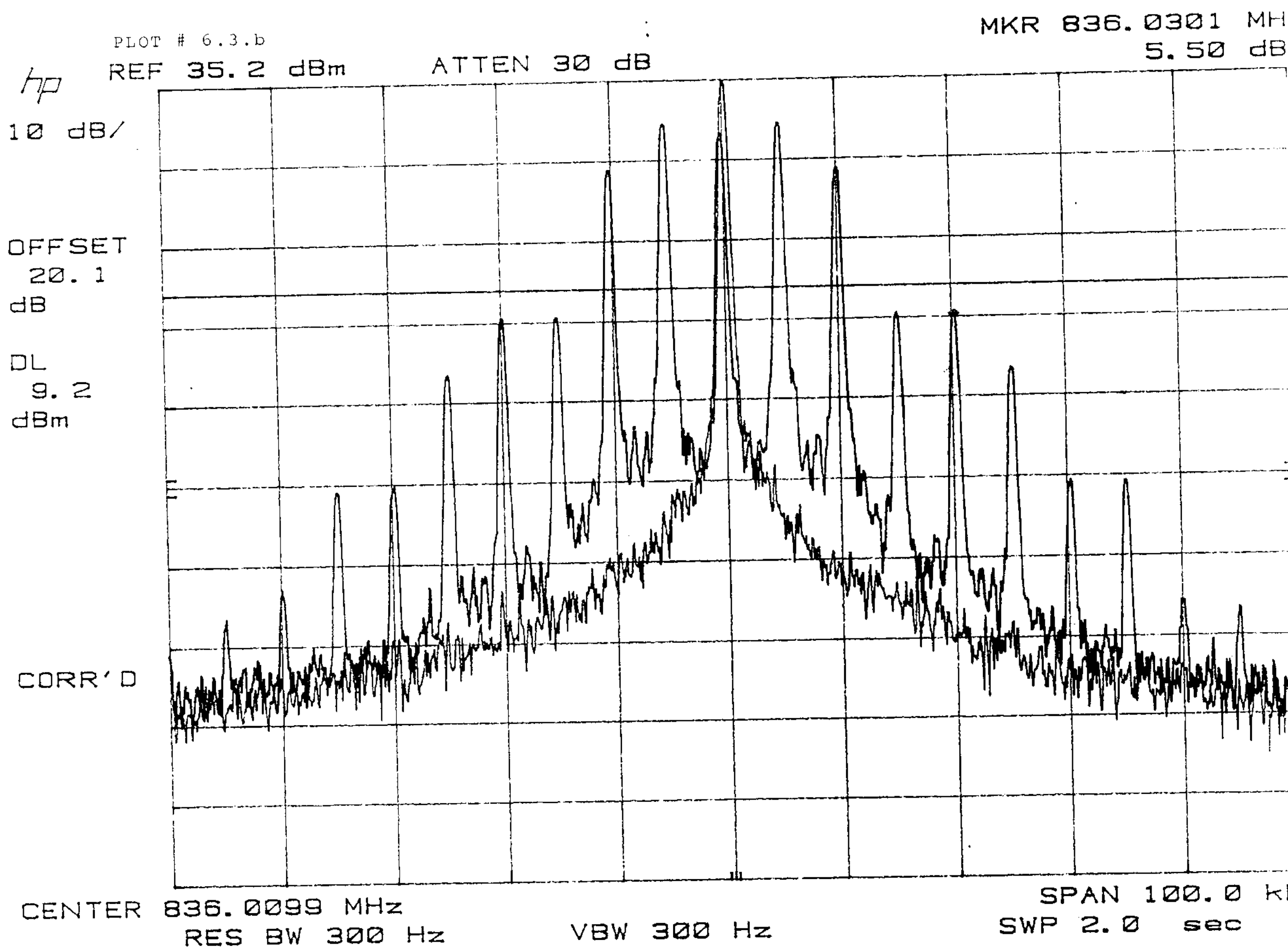
Refer to the attached plots.

The EUT passed the test.

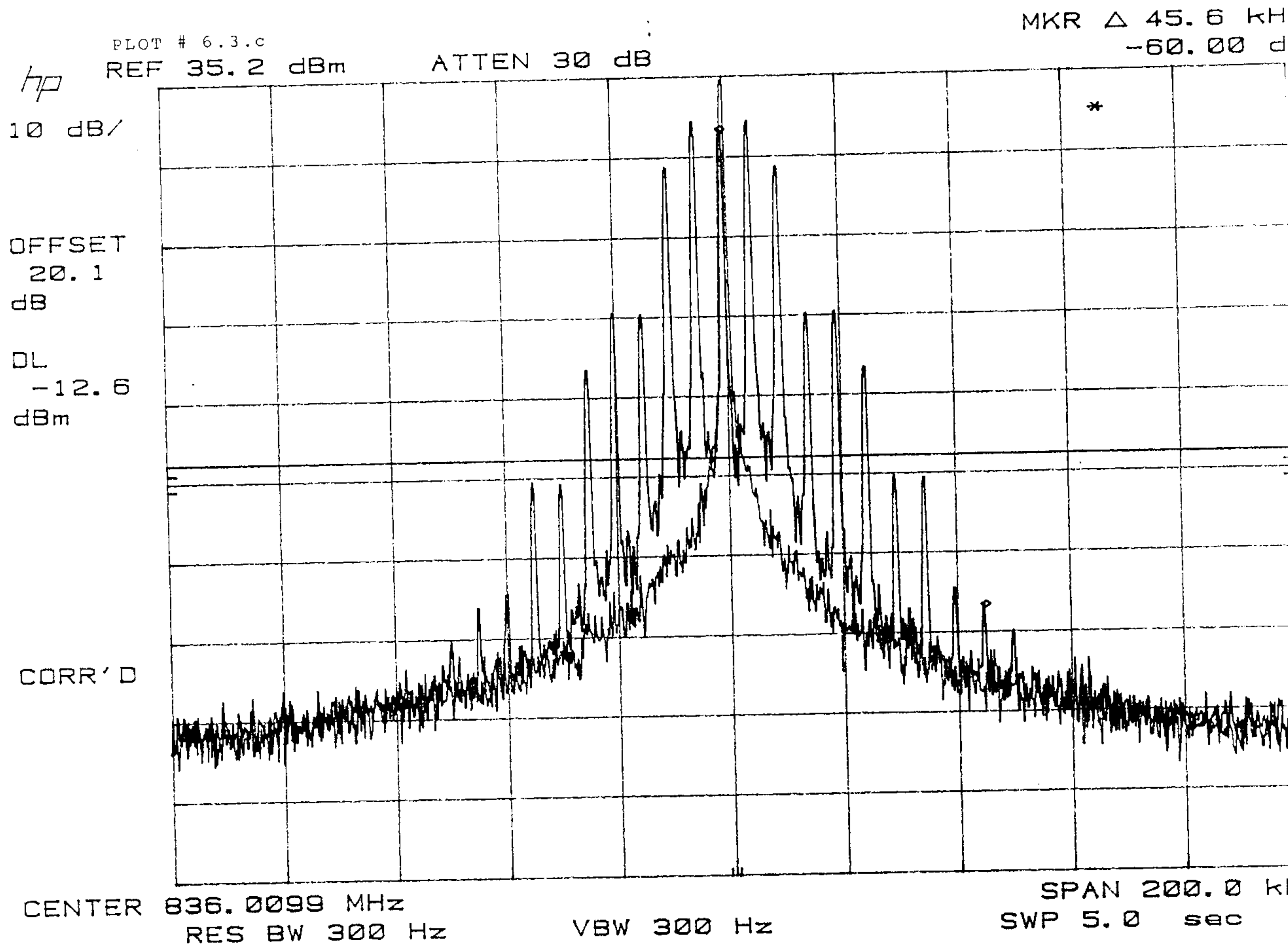
PLOT #	PLOT DESCRIPTION
6.3.a	Carrier frequency, no modulation
6.3.b	Wideband emissions (010101), scan 100 kHz
6.3.c	Wideband emissions (010101), scan 200 kHz
6.3.d	DTMF "9"
6.3.e	SAT (6 kHz, 2 kHz deviation), scan 100 kHz
6.3.f	DTMF + SAT, scan 100 kHz
6.3.g	DTMF + SAT, scan 200 kHz
6.3.h	ST (10 kHz, 8 kHz deviation), scan 50 kHz
6.3.i	ST (10 kHz, 8 kHz deviation), scan 50 kHz
6.3.j	ST (10 kHz, 8 kHz deviation), scan 200 kHz
6.3.k	ST & SAT, scan 100 kHz
6.3.l	Voice (2.5 kHz), scan 100 kHz
6.3.m	Voice (2.5 kHz), scan 200 kHz
6.3.n	Voice & SAT, scan 200 kHz
6.3.o	Voice & SAT, low power

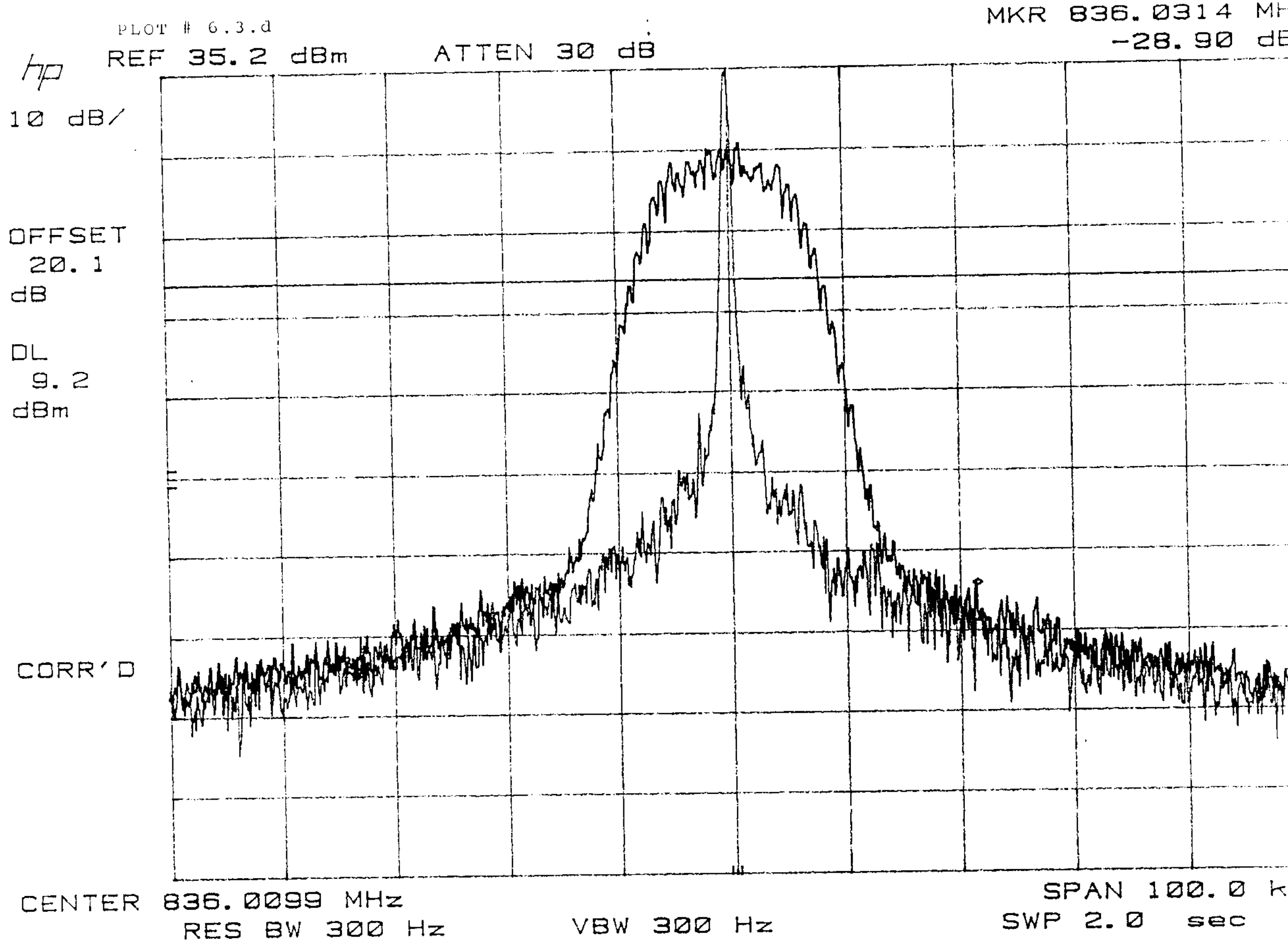

PLOT # 6.3.a
REF 35.2 dBm
ATTEN 30 dB
MKR 836.0100 MH
35.00 dB
10 dB/
OFFSET
20.1
dB
CORR'D
CENTER 836.0099 MHz
RES BW 300 Hz
VBW 300 Hz
SPAN 100.0 k
SWP 2.0 sec

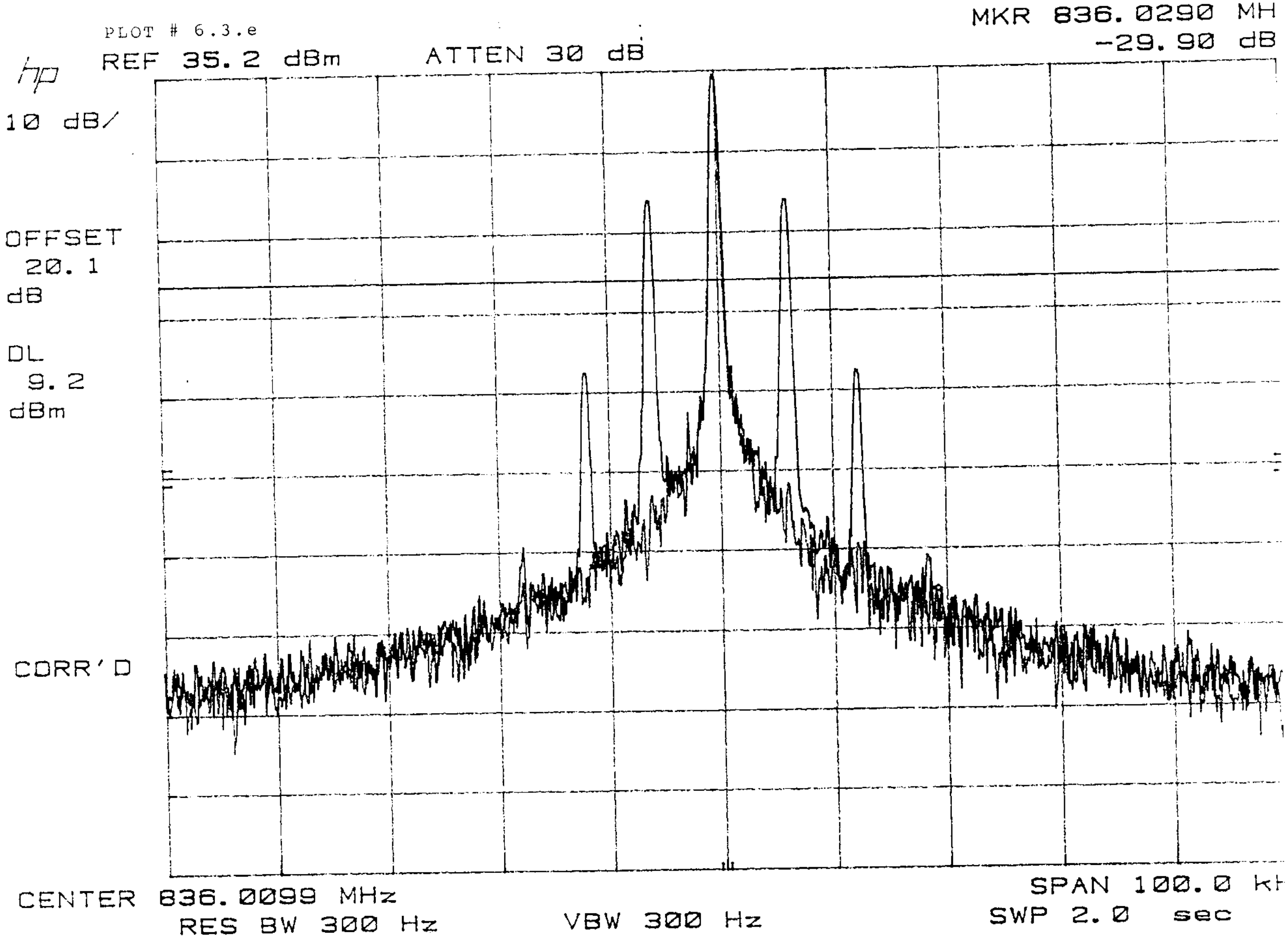
PLOT # 6.3.b



REF 35.2 dBm
ATTEN 30 dB
MKR 836.0301 MH
5.50 dB
10 dB/
OFFSET
20.1
dB
DL
9.2
dBm
CORR'D
CENTER 836.0099 MHz
RES BW 300 Hz
VBW 300 Hz
SPAN 100.0 k
SWP 2.0 sec

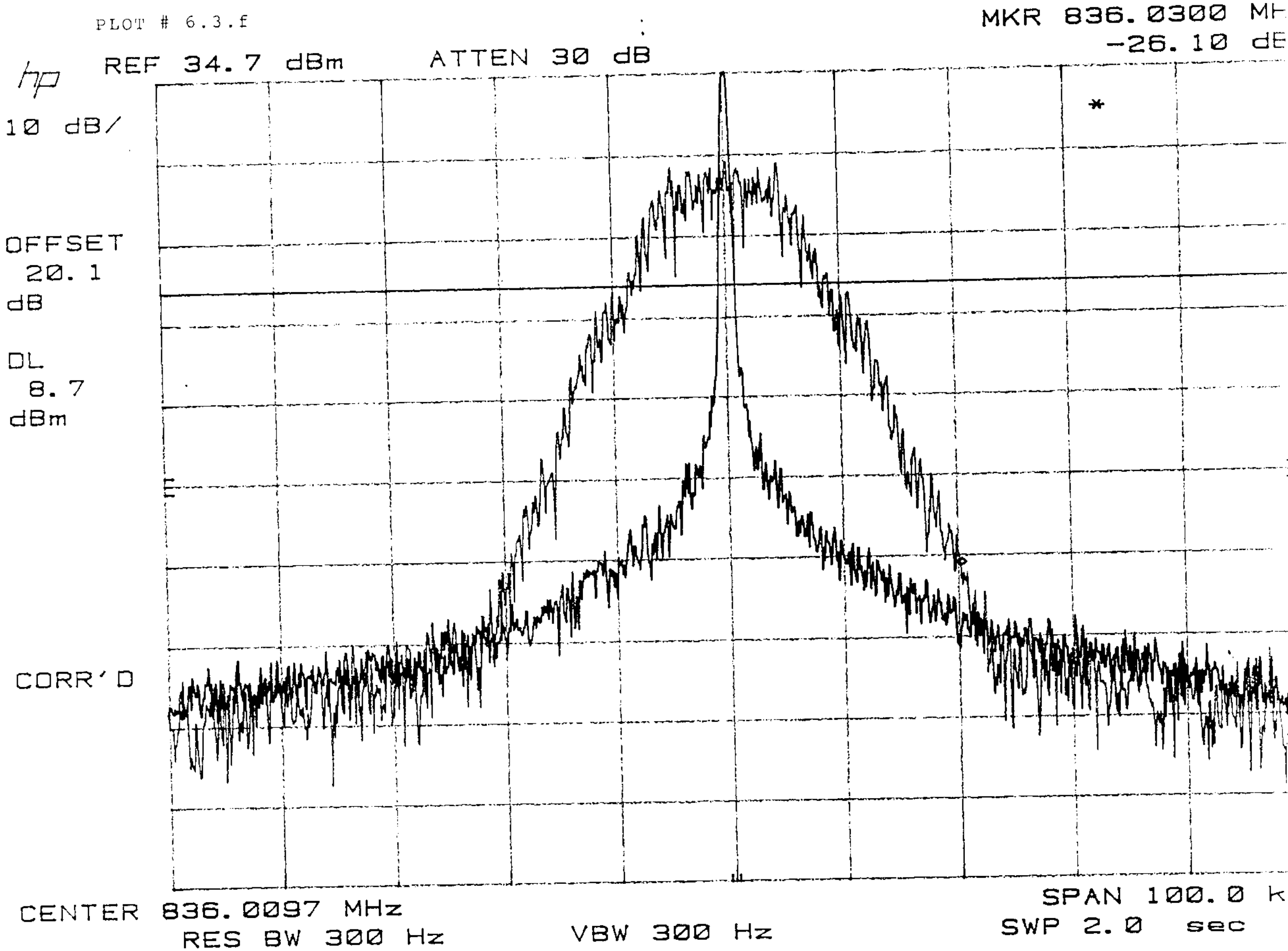

PLOT # 6.3.c
REF 35.2 dBm
ATTEN 30 dB
MKR △ 45.6 kH
-60.00 d
10 dB/
OFFSET
20.1
dB
DL
-12.6
dBm
CORR'D
CENTER 836.0099 MHz
RES BW 300 Hz
VBW 300 Hz
SPAN 200.0 kH
SWP 5.0 sec

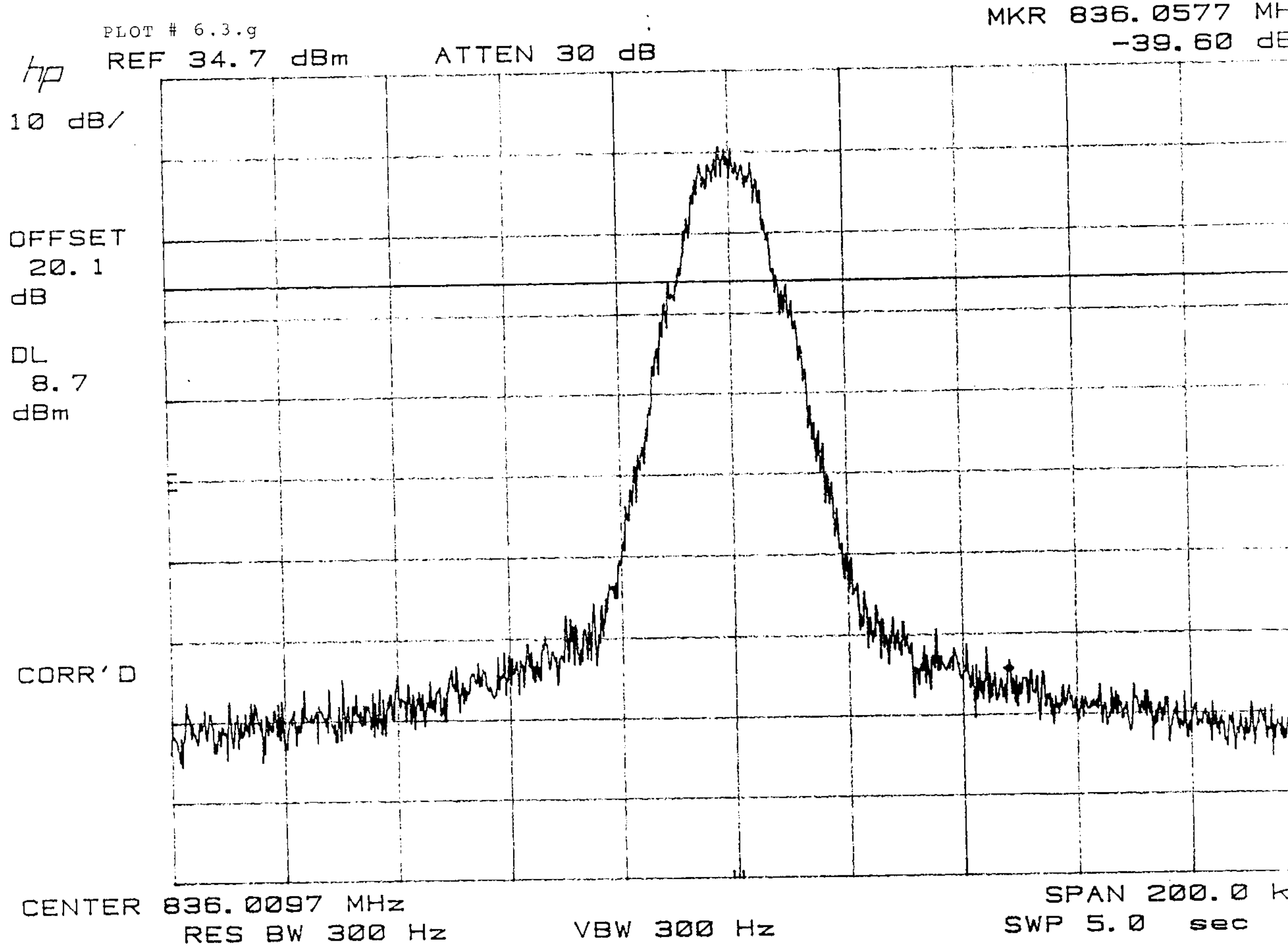

PLOT # 6.3.d
REF 35.2 dBm
ATTEN 30 dB
MKR 836.0314 MH
-28.90 dB
10 dB/
OFFSET
20.1
dB
DL
9.2
dBm
CORR'D
CENTER 836.0099 MHz
RES BW 300 Hz
VBW 300 Hz
SPAN 100.0 k
SWP 2.0 sec

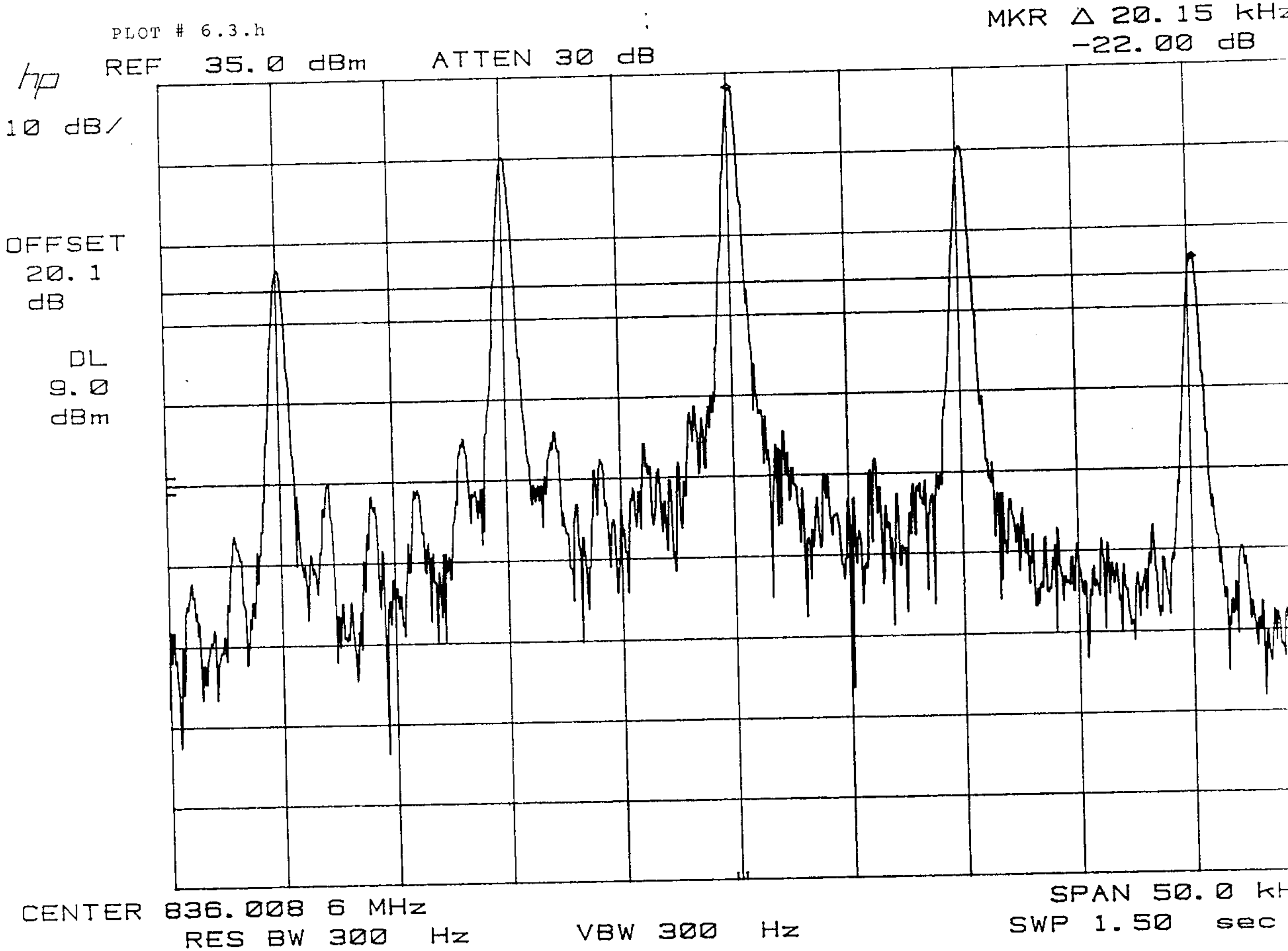


PLOT # 6.3.e
REF 35.2 dBm
ATTEN 30 dB
MKR 836.0290 MH
-29.90 dB
hp
10 dB/
OFFSET
20.1
dB
DL
9.2
dBm
CORR'D
CENTER 836.0099 MHz
RES BW 300 Hz
VBW 300 Hz
SPAN 100.0 kH
SWP 2.0 sec

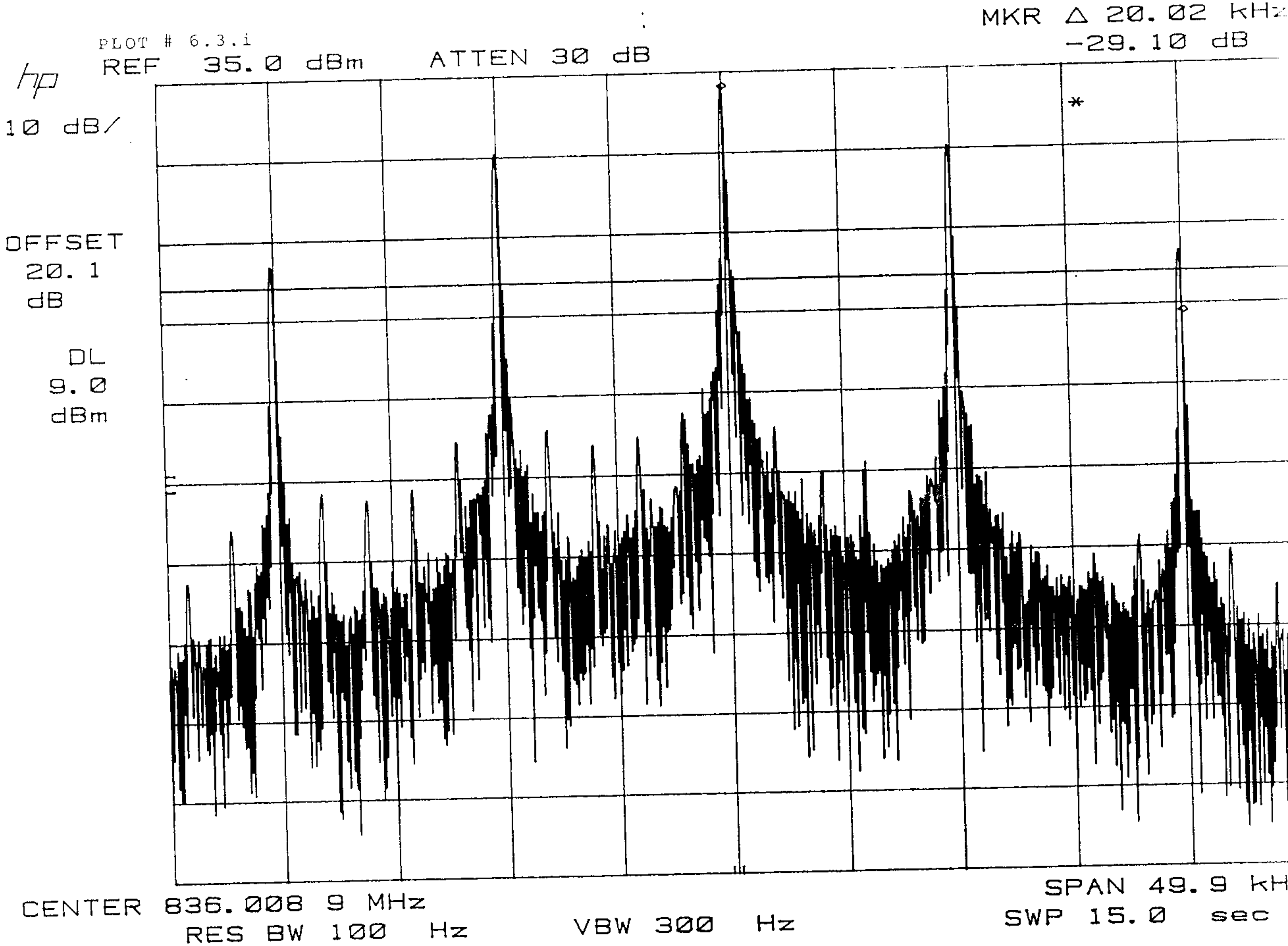
PLOT # 6.3.f


MKR 836.0300 MH
-26.10 dB
hp
REF 34.7 dBm
ATTEN 30 dB
10 dB/
OFFSET
20.1
dB
DL
8.7
dBm
CORR'D
CENTER 836.0097 MHz
RES BW 300 Hz
VBW 300 Hz
SPAN 100.0 k
SWP 2.0 sec

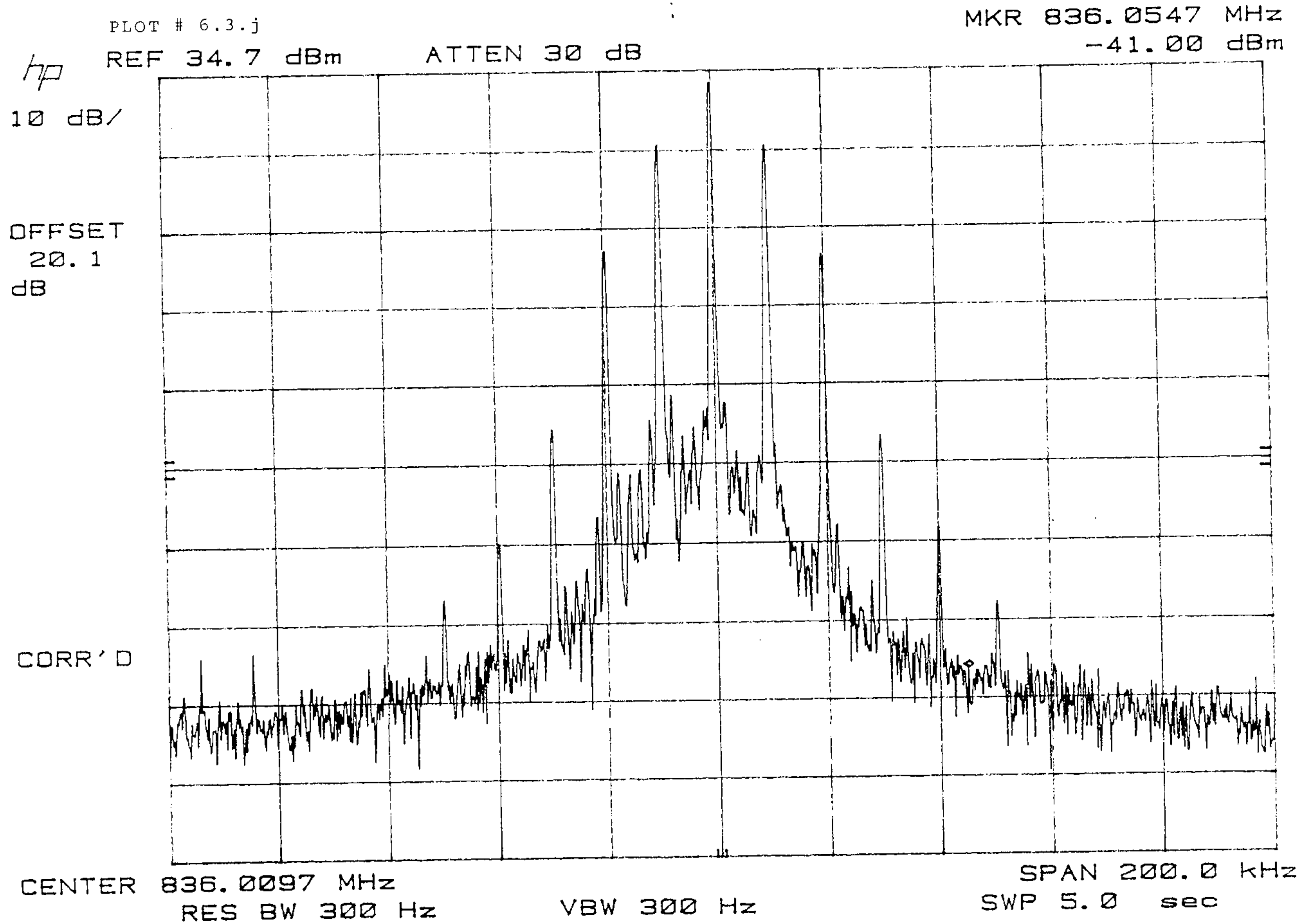

PLOT # 6.3.g
REF 34.7 dBm
ATTEN 30 dB
MKR 836.0577 MH
-39.60 dB
10 dB/
OFFSET
20.1
dB
DL
8.7
dBm
CORR'D
CENTER 836.0097 MHz
RES BW 300 Hz
VBW 300 Hz
SPAN 200.0 k
SWP 5.0 sec

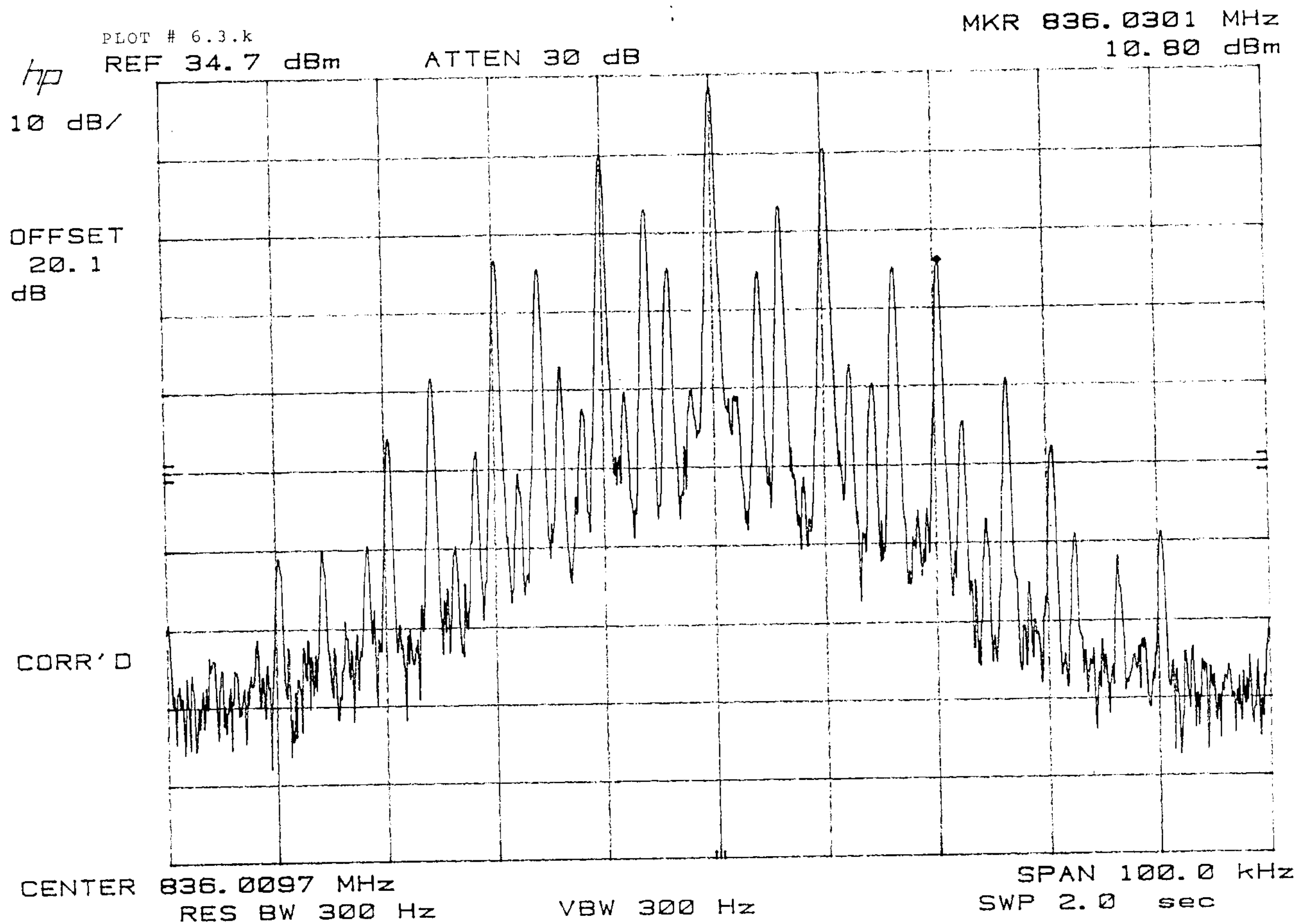


PLOT # 6.3.h
hp
REF 35.0 dBm ATTEN 30 dB
MKR Δ 20.15 kHz
-22.00 dB
10 dB/
OFFSET
20.1
dB
DL
9.0
dBm
CENTER 836.008 6 MHz
RES BW 300 Hz
VBW 300 Hz
SPAN 50.0 kH
SWP 1.50 sec

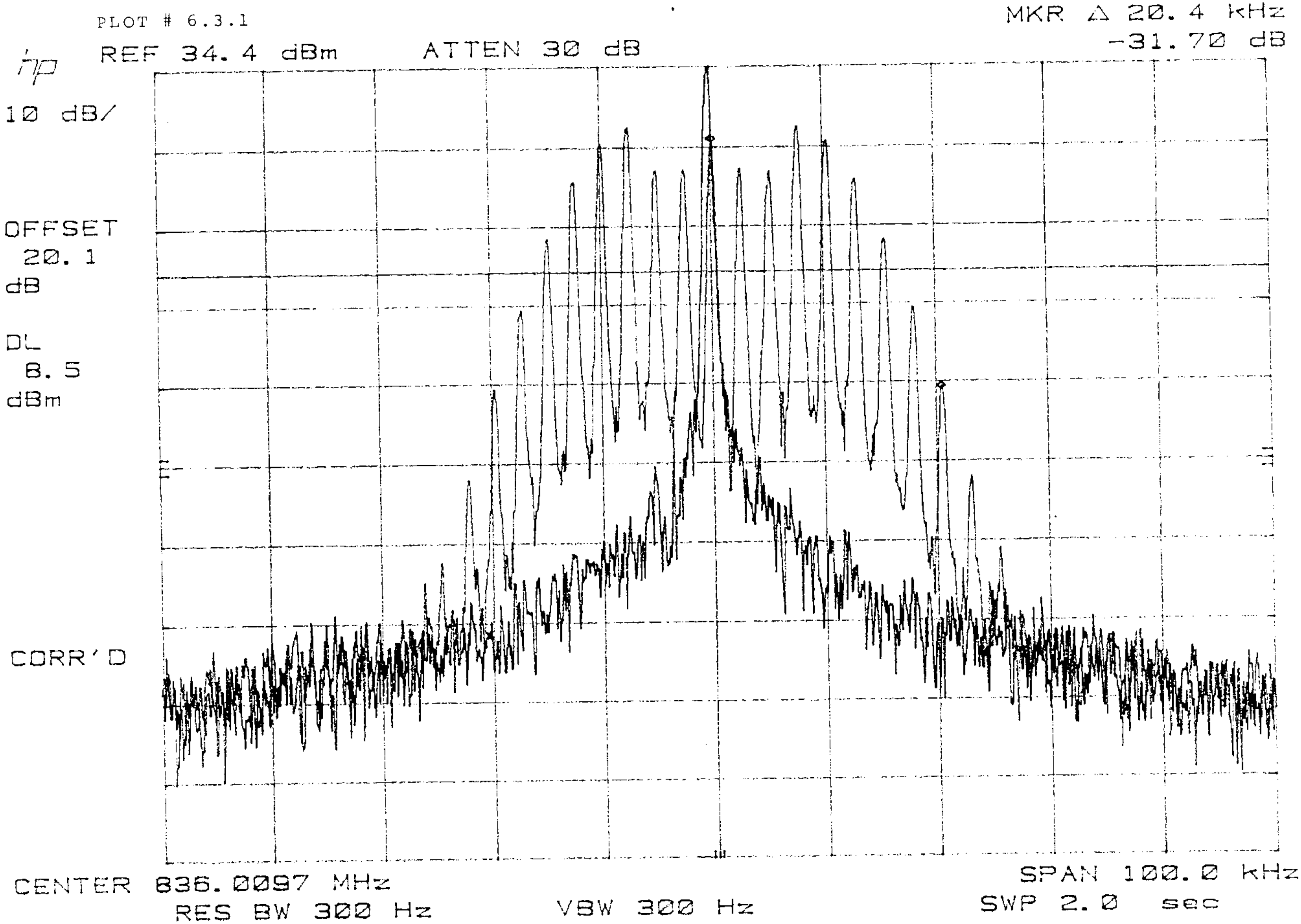

PLOT # 6.3.i
REF 35.0 dBm ATTEN 30 dB
MKR Δ 20.02 kHz
-29.10 dB
hp
10 dB/
OFFSET
20.1
dB
DL
9.0
dBm
CENTER 836.008 9 MHz
RES BW 100 Hz
VBW 300 Hz
SPAN 49.9 kHz
SWP 15.0 sec

PLOT # 6.3.j

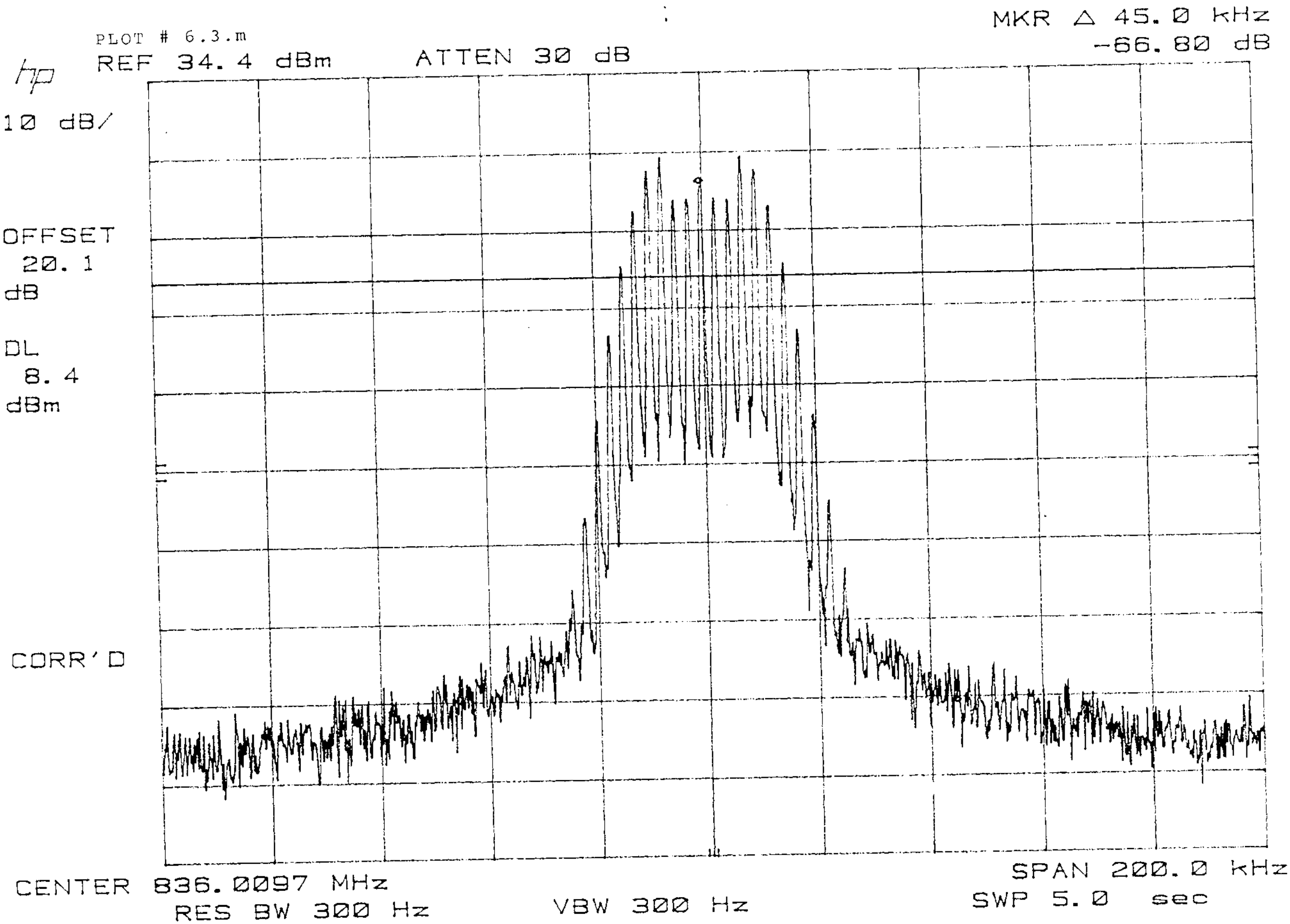

REF 34.7 dBm
ATTEN 30 dB
MKR 836.0547 MHz
-41.00 dBm
10 dB/
OFFSET
20.1
dB
CORR'D
CENTER 836.0097 MHz
RES BW 300 Hz
VBW 300 Hz
SPAN 200.0 kHz
SWP 5.0 sec


PLOT # 6.3.k
REF 34.7 dBm
ATTEN 30 dB
MKR 836.0301 MHz
10.80 dBm
10 dB/
OFFSET
20.1
dB
CORR'D
CENTER 836.0097 MHz
RES BW 300 Hz
VBW 300 Hz
SPAN 100.0 kHz
SWP 2.0 sec

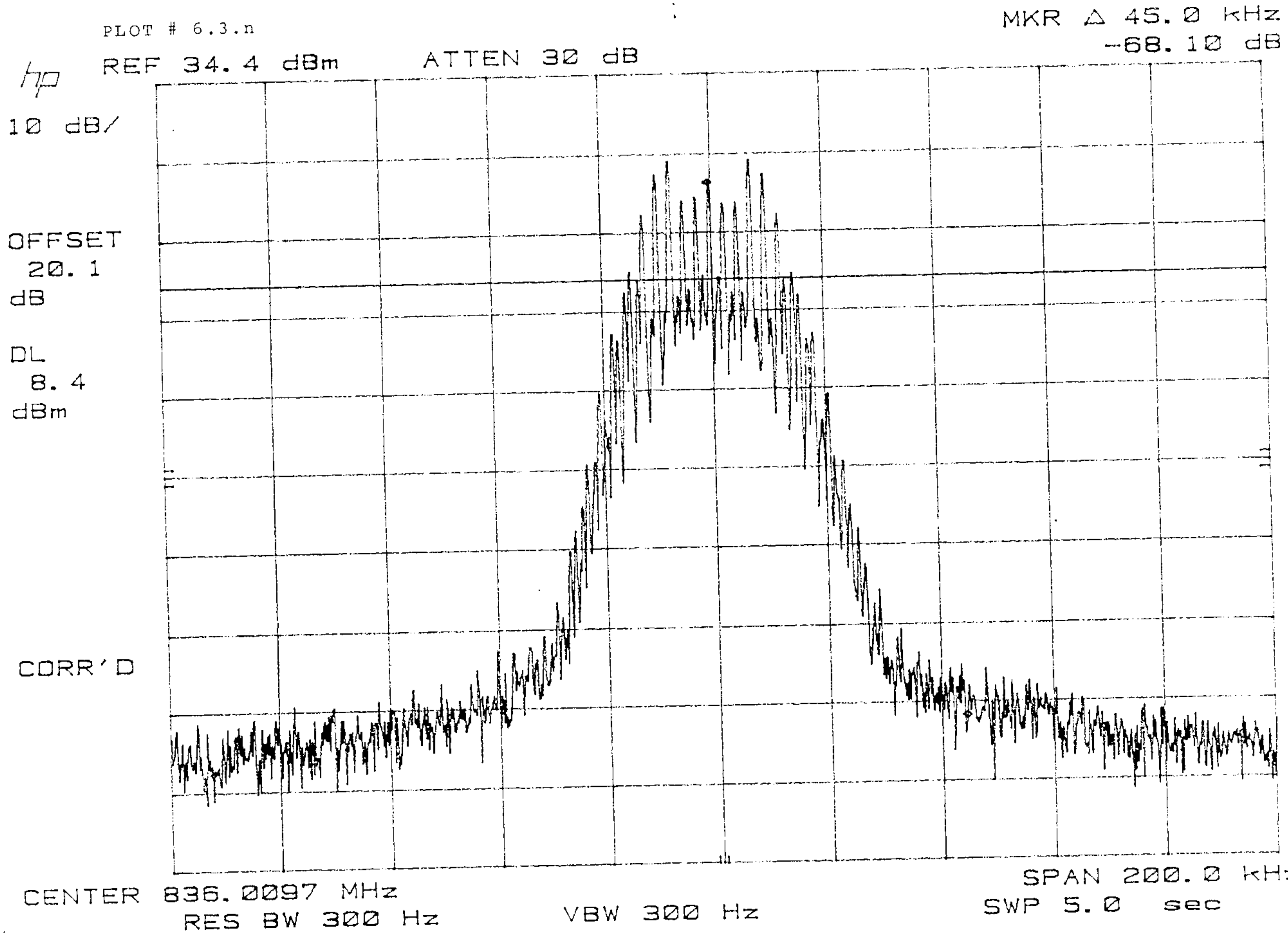
PLOT # 6.3.1



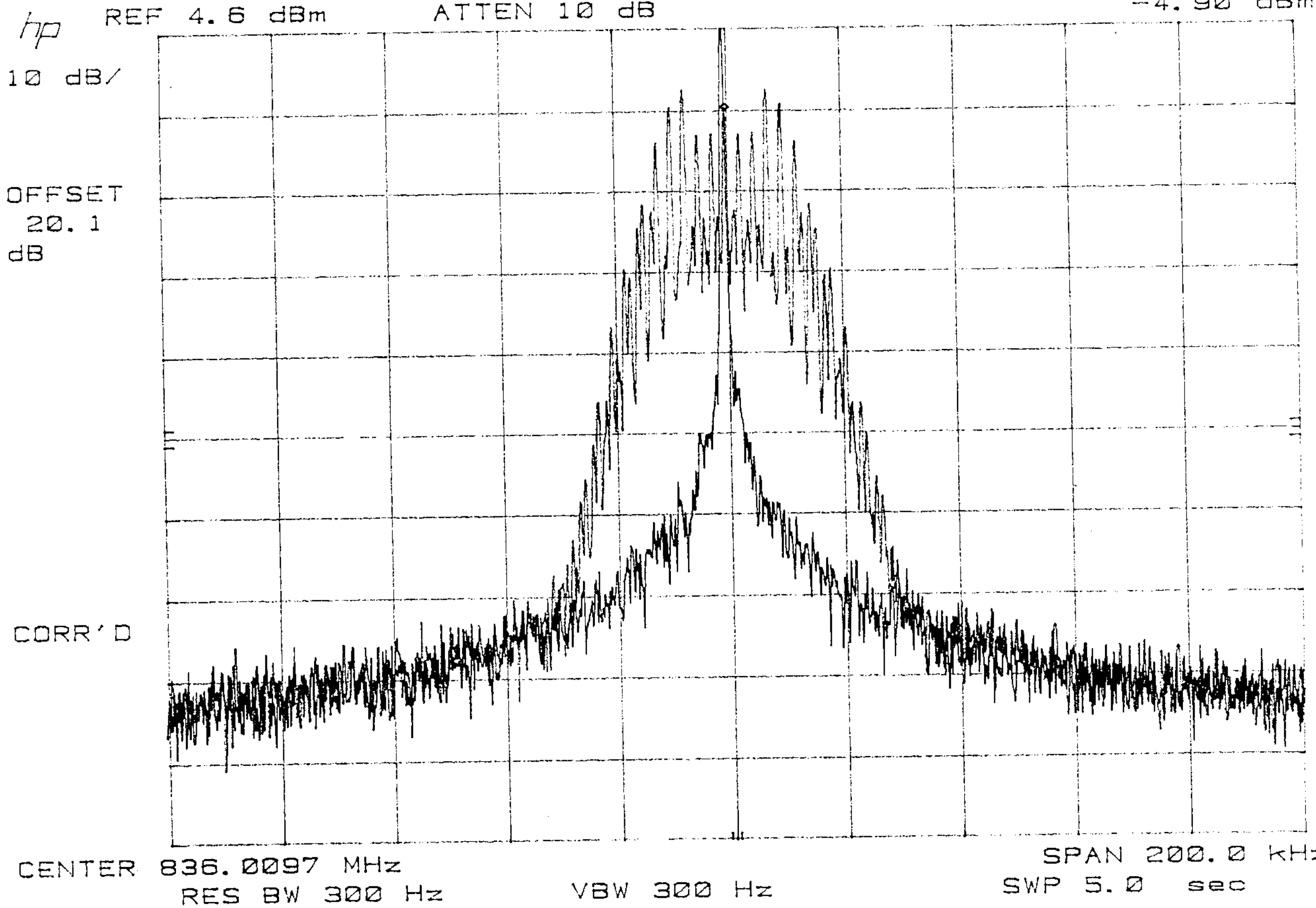
hp
REF 34.4 dBm
ATTEN 30 dB
MKR Δ 20.4 kHz
-31.70 dB
10 dB/
OFFSET
20.1
dB
DL
8.5
dBm
CORR'D
CENTER 836.0097 MHz
RES BW 300 Hz
VBW 300 Hz
SPAN 100.0 kHz
SWP 2.0 sec


PLOT # 6.3.m
REF 34.4 dBm
ATTEN 30 dB
MKR △ 45.0 kHz
-66.80 dB
10 dB/
OFFSET
20.1
dB
DL
8.4
dBm
CORR'D
CENTER 836.0097 MHz
RES BW 300 Hz
VBW 300 Hz
SPAN 200.0 kHz
SWP 5.0 sec

PLOT # 6.3.n


MKR Δ 45.0 kHz
-68.10 dB
REF 34.4 dBm
ATTEN 30 dB
10 dB/
OFFSET
20.1
dB
DL
8.4
dBm
CORR'D
CENTER 836.0097 MHz
RES BW 300 Hz
VBW 300 Hz
SPAN 200.0 kHz
SWP 5.0 sec

PLOT # 6.3.o


hp
REF 4.6 dBm
ATTEN 10 dB
MKR 836.0093 MHz
-4.90 dBm
10 dB/
OFFSET
20.1
dB
CORR'D
CENTER 836.0097 MHz
RES BW 300 Hz
VBW 300 Hz
SPAN 200.0 kHz
SWP 5.0 sec

7.0 Out of Band Emissions at Antenna Terminals

Requirements: FCC 22.917(e), FCC 22.917(f)

Out of Band Emissions:

The mean power of emissions must be attenuated below the mean power of the unmodulated carrier (P) on any frequency twice or more than twice the fundamental frequency by at least 43 + 10 log P dB.

Mobile Emissions in Base Frequency Range:

The mean power of any emissions appearing in the base station frequency range from cellular mobile transmitters operated must be attenuated to a level not to exceed -80 dBm at the transmit antenna connector.

7.1 Test Procedure

The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 30 kHz. The audio modulating signal was adjusted like it is described in Section 6.1 of this report. Sufficient scans were taken to show the outband emissions if any up to 10th harmonic.

7.2 Test Equipment

HP 8566B Spectrum Analyzer
Leader LFG-1300S Function Generator
Leader LMV-182 AC Millivoltmeter
HP 7470A Plotter

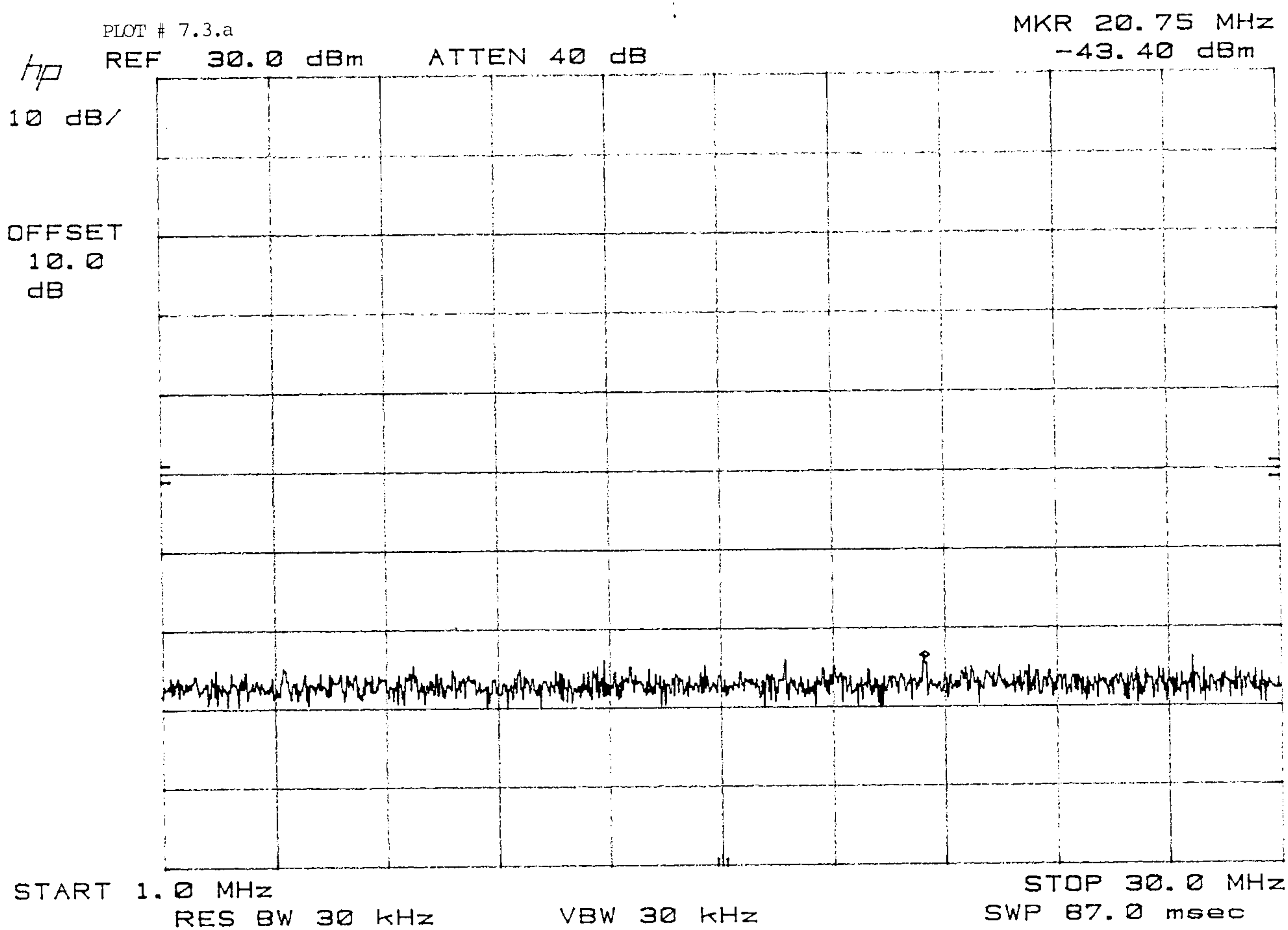
7.3 Test Results

Refer to the attached plots.

The EUT passed the test.

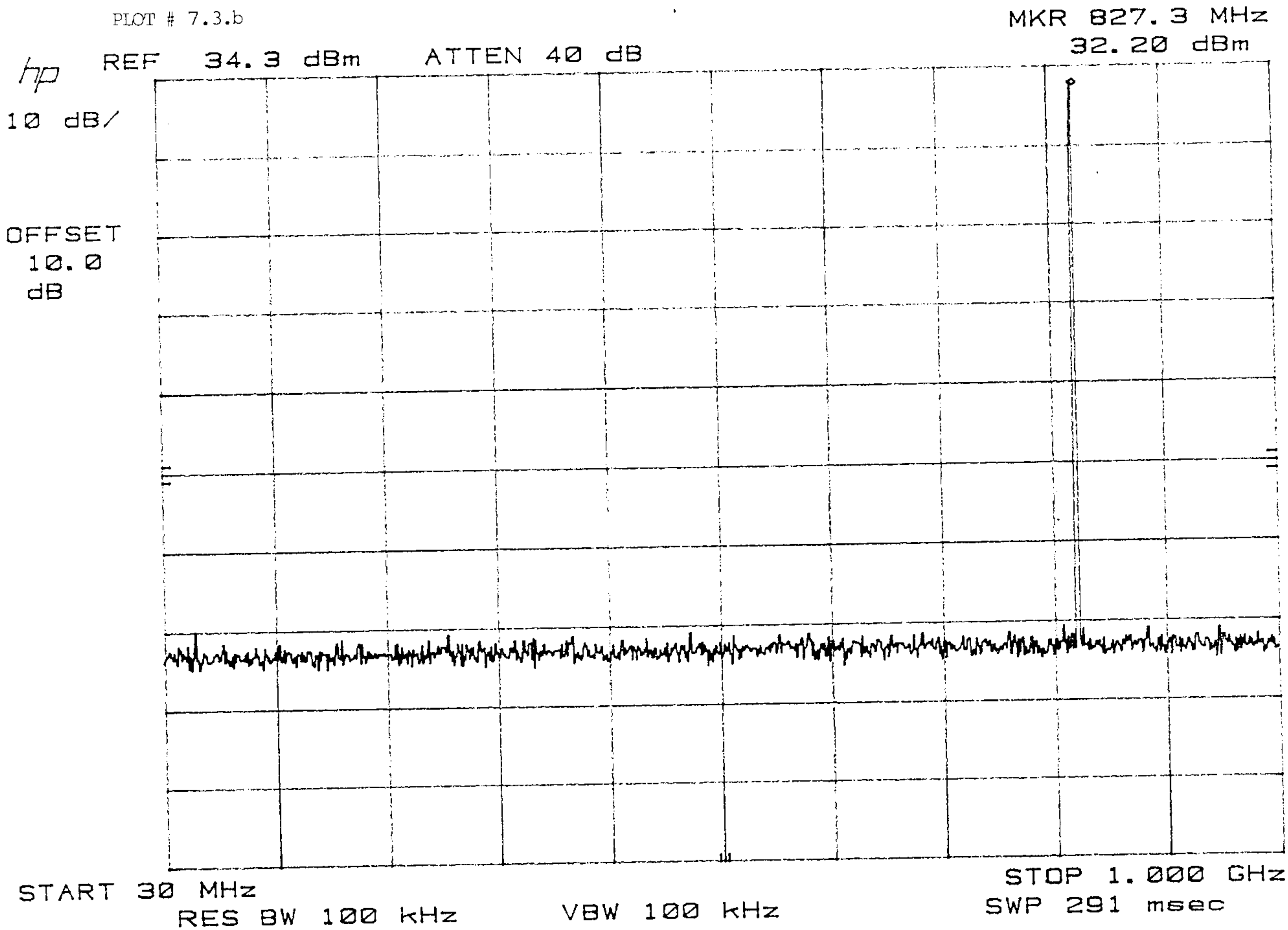
PLOT #	PLOT DESCRIPTION
7.3.a	1 MHz - 30 MHz (Low Channel)
7.3.b	30 MHz - 1 GHz (Low Channel)
7.3.c	1 GHz - 2.5 GHz (Low Channel)
7.3.d	2.5 GHz - 10 GHz (Low Channel)
7.3.e	1 MHz - 30 MHz (Middle Channel)
7.3.f	30 MHz - 1 GHz (Middle Channel)
7.3.g	1 GHz - 2.5 GHz (Middle Channel)
7.3.h	2.5 GHz - 10 GHz (Middle Channel)
7.3.i	1 MHz - 30 MHz (High Channel)
7.3.j	30 MHz - 1 GHz (High Channel)
7.3.k	1 GHz - 2.5 GHz (High Channel)
7.3.l	2.5 GHz - 10 GHz (High Channel)
7.3.m	869 MHz - 894 MHz (Low Channel)
7.3.n	869 MHz - 894 MHz (Middle Channel)
7.3.o	869 MHz - 894 MHz (High Channel)

PLOT # 7.3.a



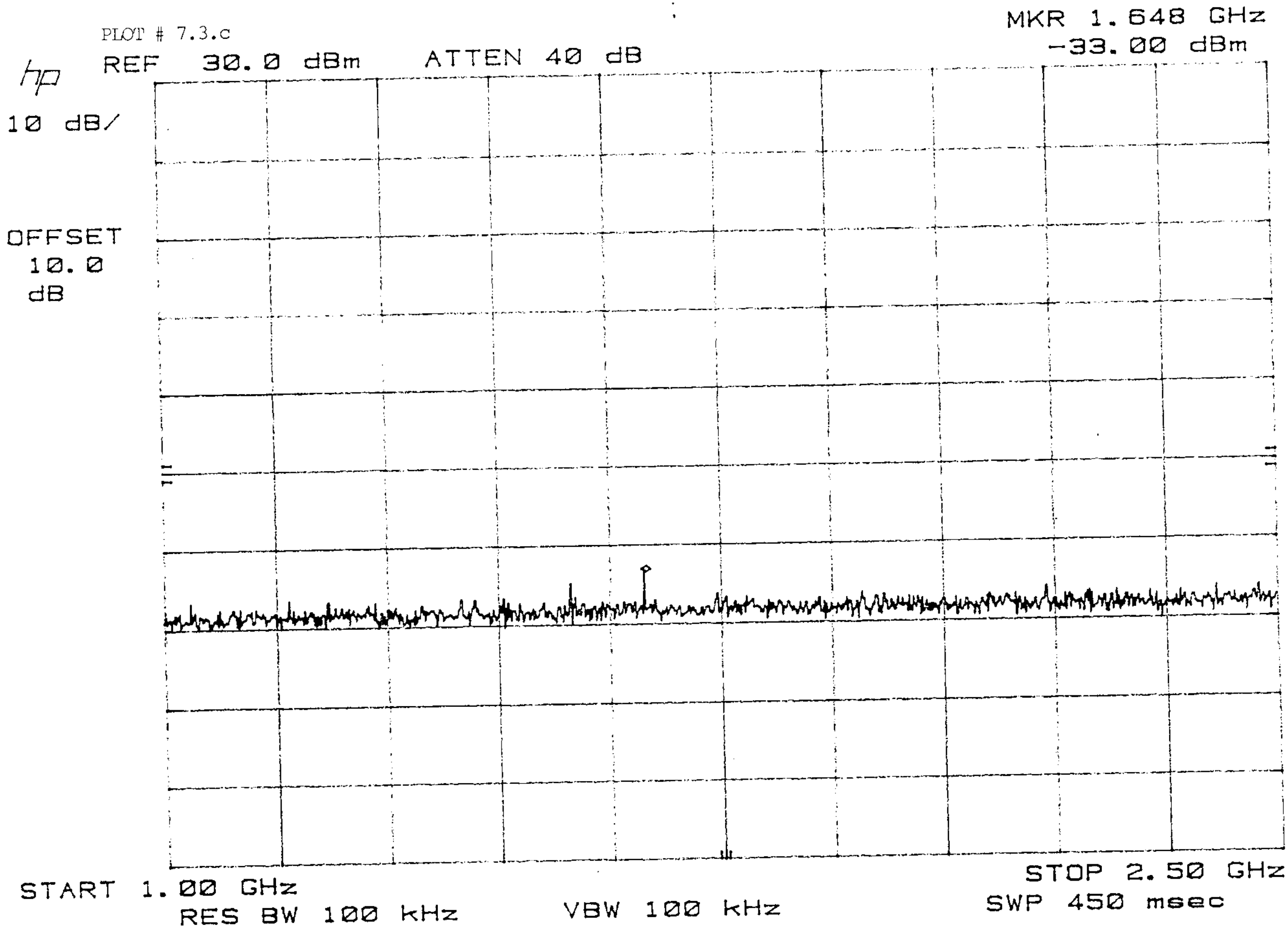
MKR 20.75 MHz
-43.40 dBm
REF 30.0 dBm
ATTEN 40 dB
10 dB/
OFFSET
10.0
dB
START 1.0 MHz
RES BW 30 kHz
VBW 30 kHz
STOP 30.0 MHz
SWP 87.0 msec

PLOT # 7.3.b

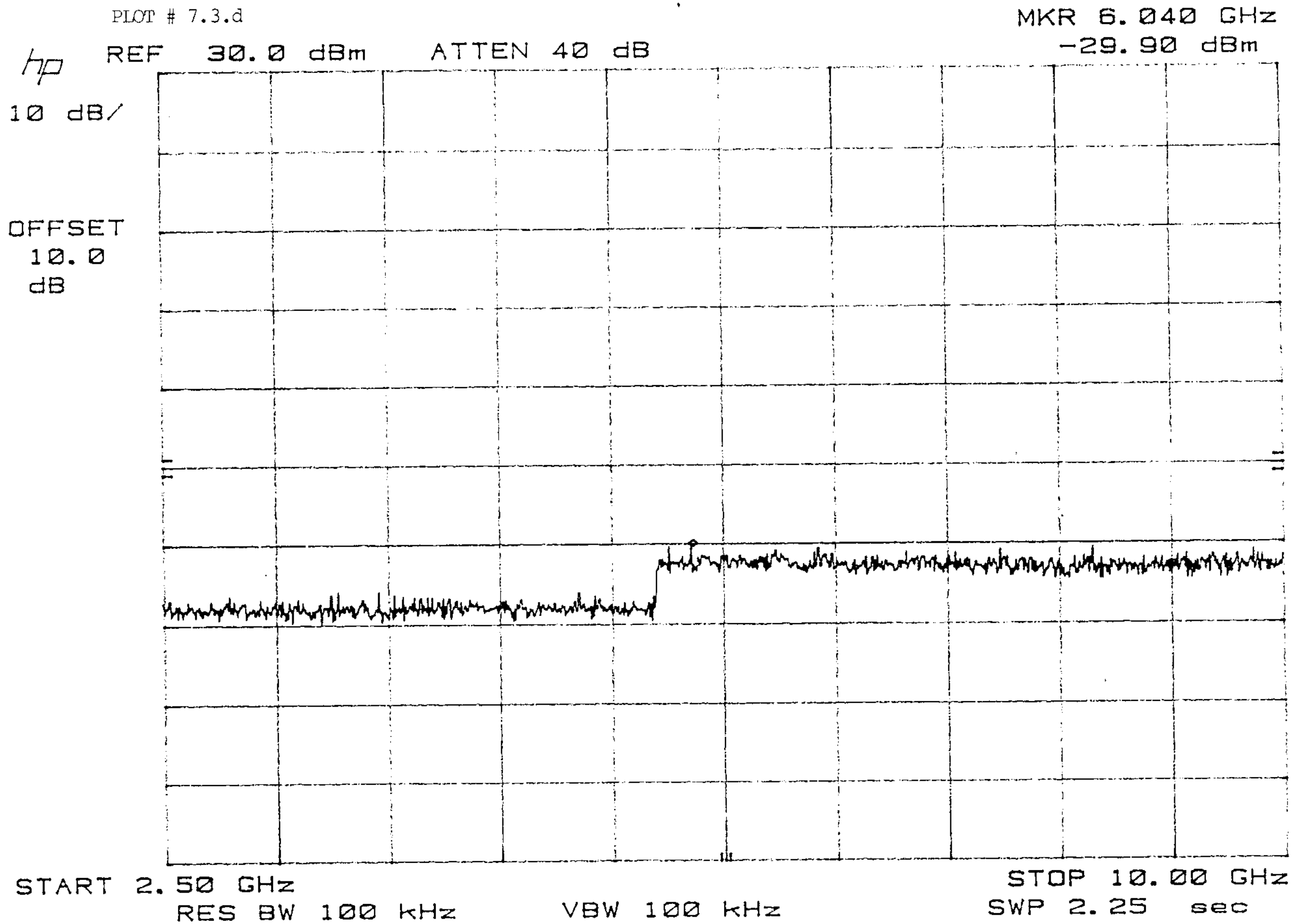


MKR 827.3 MHz
32.20 dBm
REF 34.3 dBm
ATTEN 40 dB
10 dB/
OFFSET
10.0
dB
START 30 MHz
RES BW 100 kHz
VBW 100 kHz
STOP 1.000 GHz
SWP 291 msec

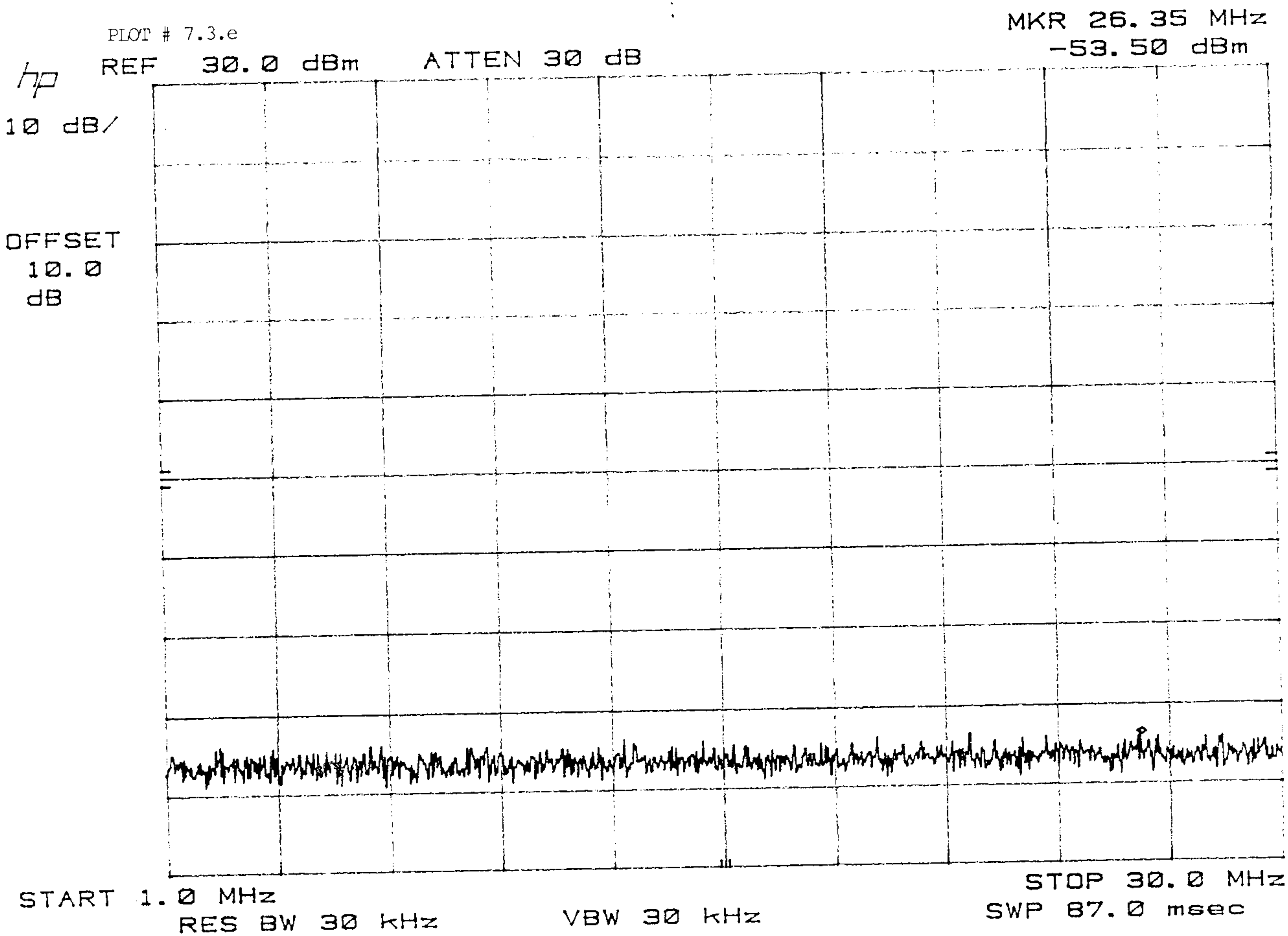
PLOT # 7.3.c


REF 30.0 dBm
ATTEN 40 dB
MKR 1.648 GHz
-33.00 dBm
10 dB/
OFFSET
10.0
dB
START 1.00 GHz
RES BW 100 kHz
VBW 100 kHz
STOP 2.50 GHz
SWP 450 msec

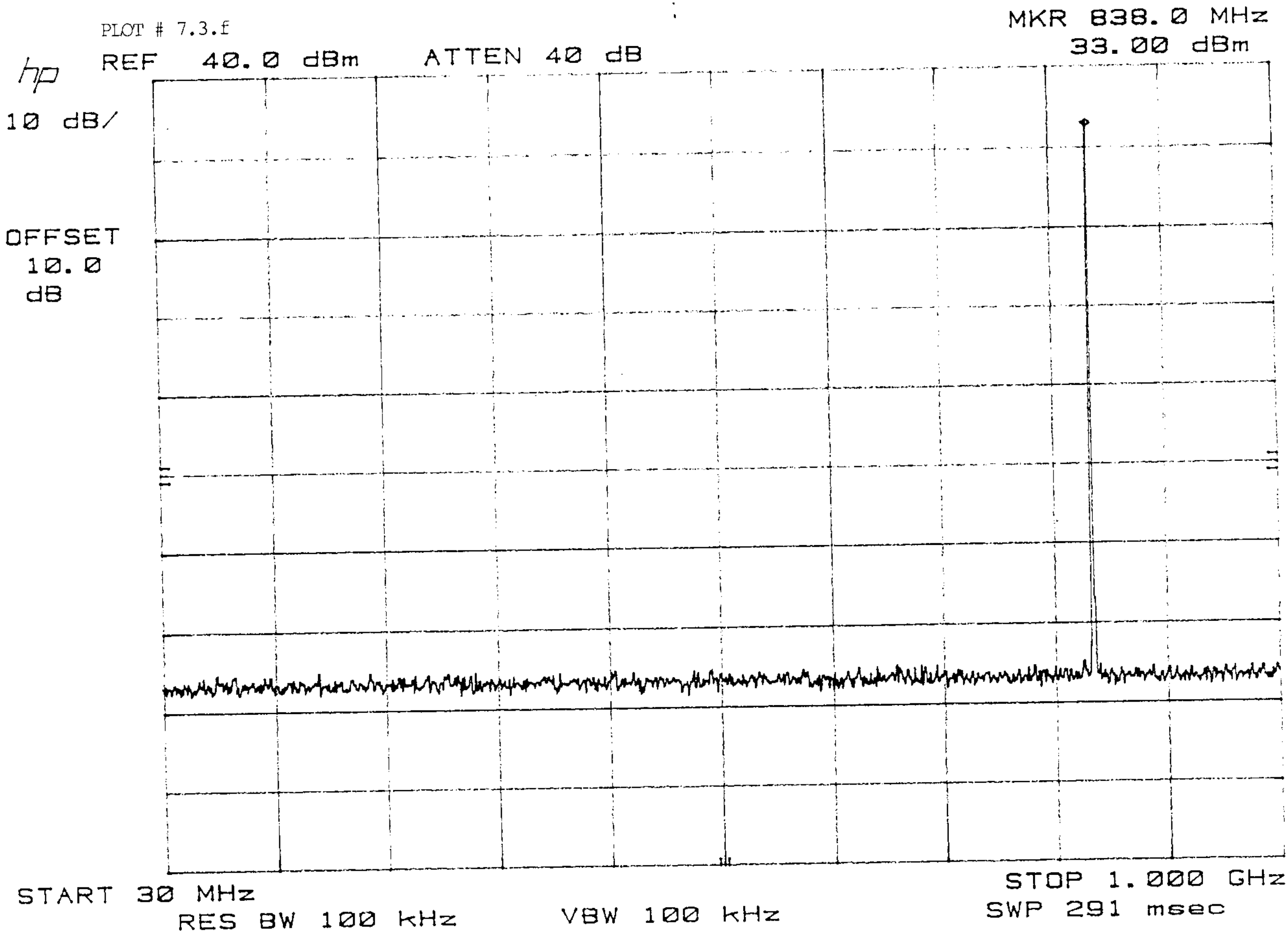
PLOT # 7.3.d


MKR 6.040 GHz
-29.90 dBm
hp
REF 30.0 dBm
ATTEN 40 dB
10 dB/
OFFSET
10.0
dB
START 2.50 GHz
RES BW 100 kHz
VBW 100 kHz
STOP 10.00 GHz
SWP 2.25 sec

PLOT # 7.3.e

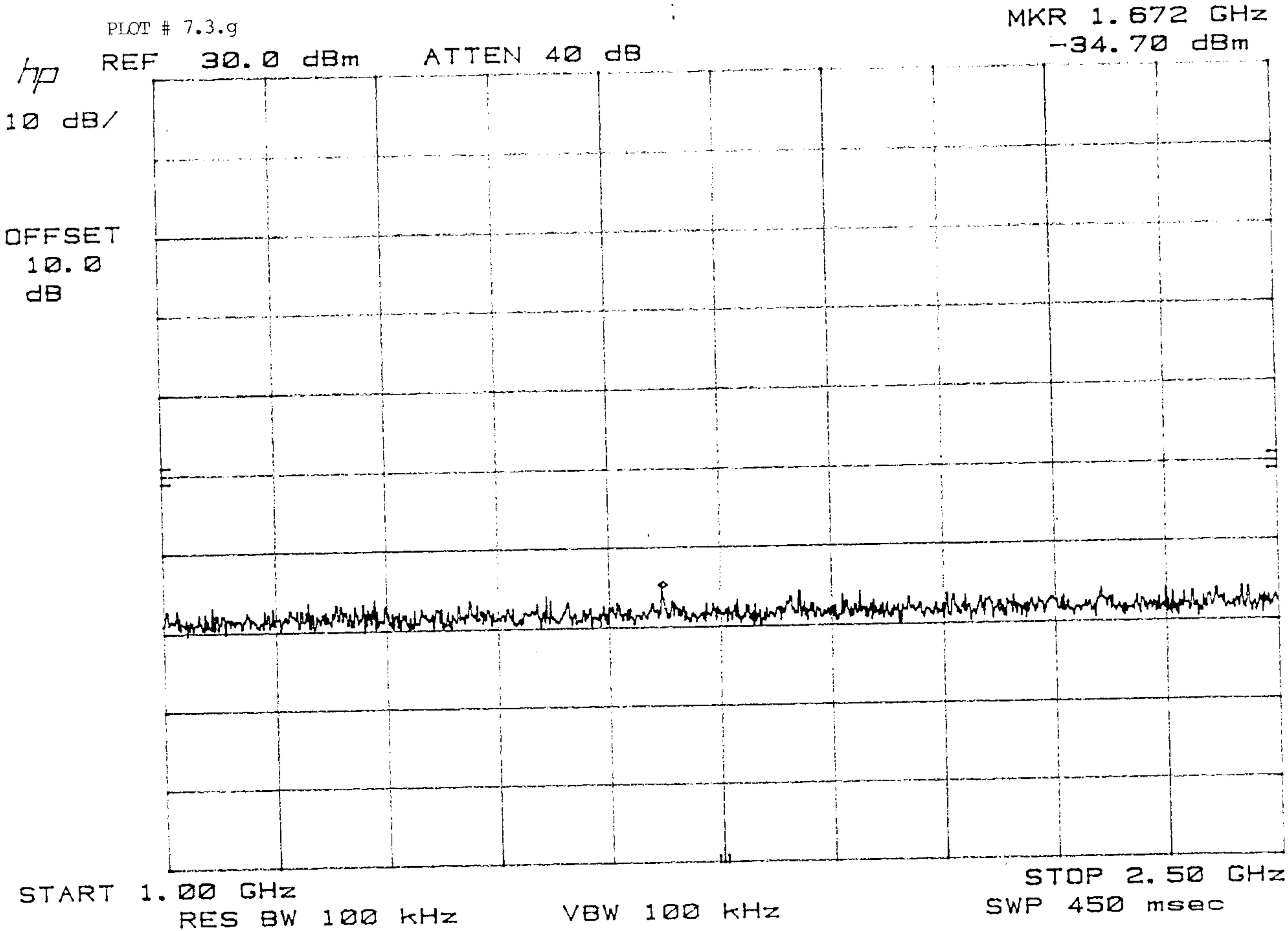

hp
REF 30.0 dBm
ATTEN 30 dB
MKR 26.35 MHz
-53.50 dBm
10 dB/
OFFSET
10.0
dB
START 1.0 MHz
RES BW 30 kHz
VBW 30 kHz
STOP 30.0 MHz
SWP 87.0 msec

PLOT # 7.3.f

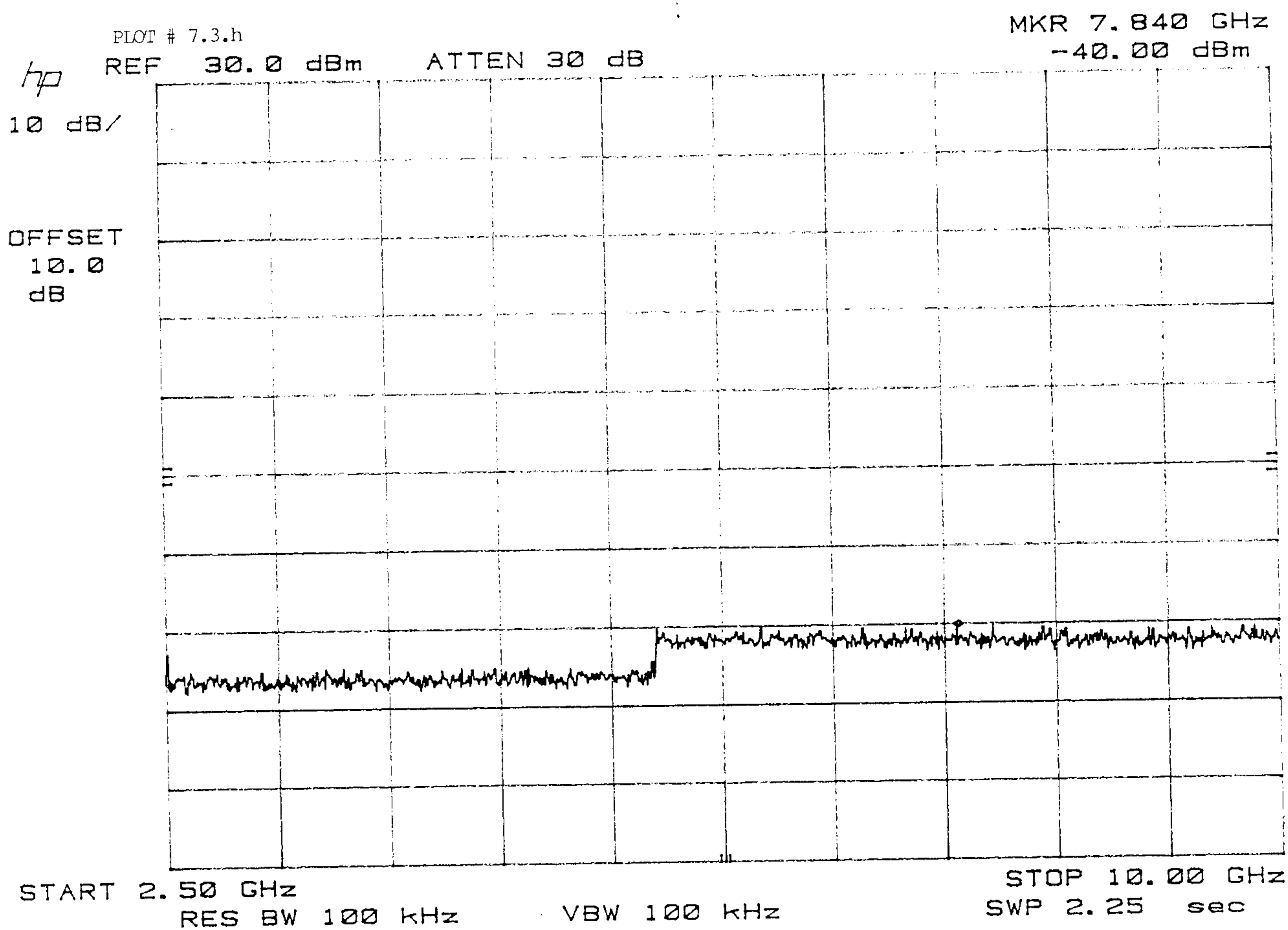


REF 40.0 dBm
ATTEN 40 dB
MKR 838.0 MHz
33.00 dBm
10 dB/
OFFSET
10.0
dB
START 30 MHz
STOP 1.000 GHz
RES BW 100 kHz
VBW 100 kHz
SWP 291 msec

PLOT # 7.3.g

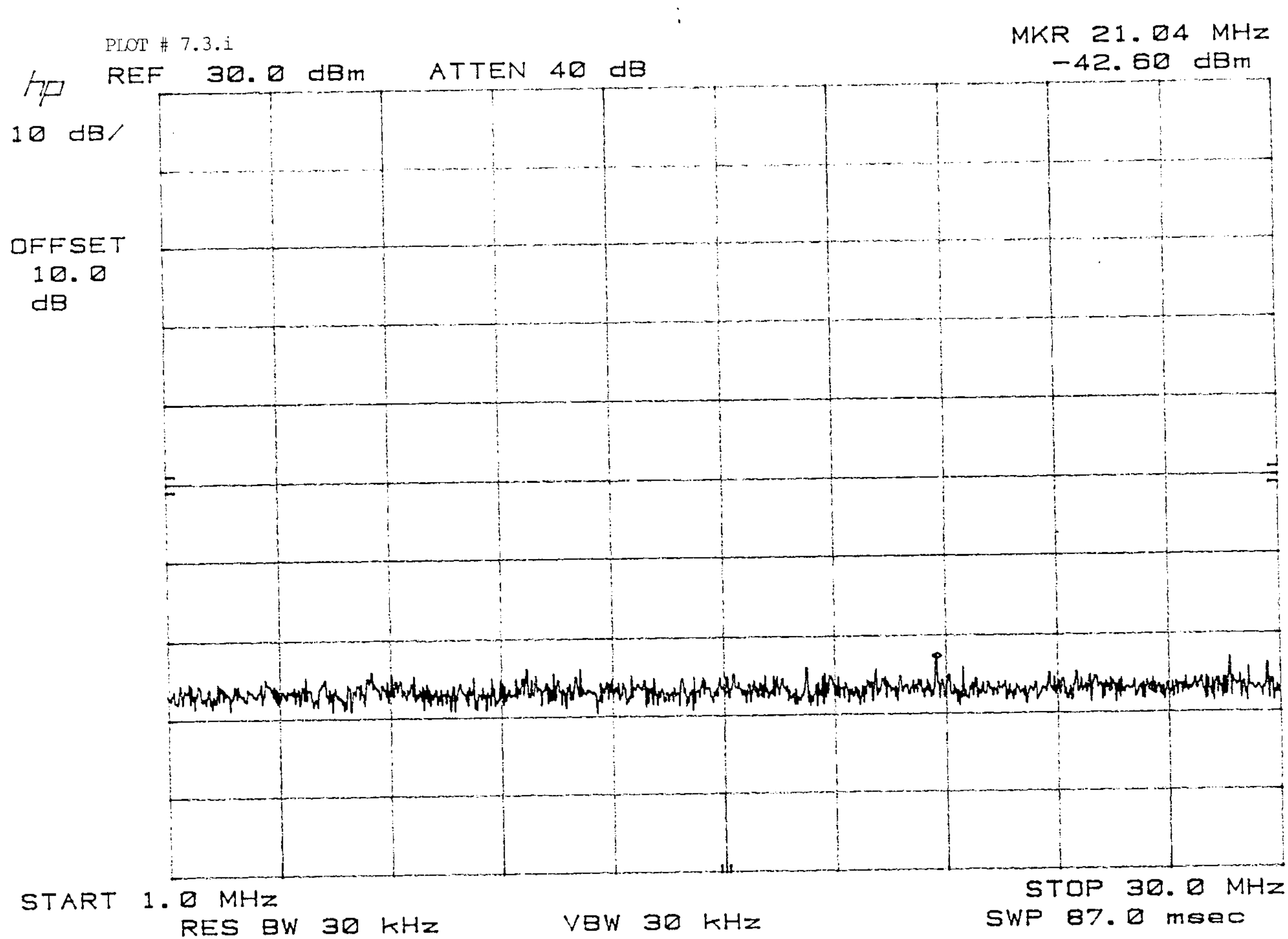

MKR 1.672 GHz
-34.70 dBm
REF 30.0 dBm ATTEN 40 dB
10 dB/
OFFSET
10.0
dB
START 1.00 GHz
RES BW 100 kHz VBW 100 kHz
STOP 2.50 GHz
SWP 450 msec

PLOT # 7.3.h



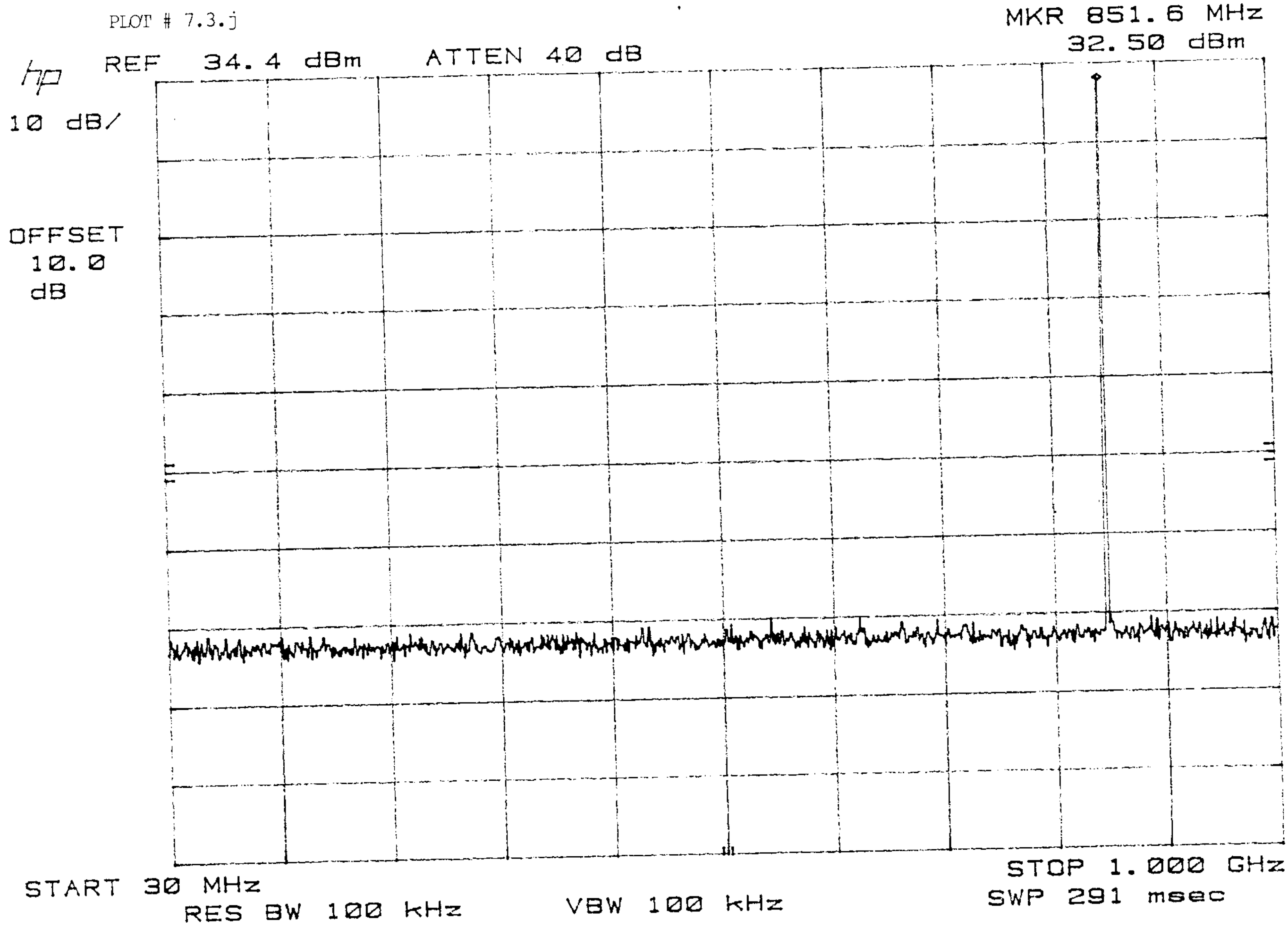
hp
REF 30.0 dBm
ATTEN 30 dB
MKR 7.840 GHz
-40.00 dBm
10 dB/
OFFSET
10.0
dB
START 2.50 GHz
RES BW 100 kHz
VBW 100 kHz
STOP 10.00 GHz
SWP 2.25 sec

PLOT # 7.3.i



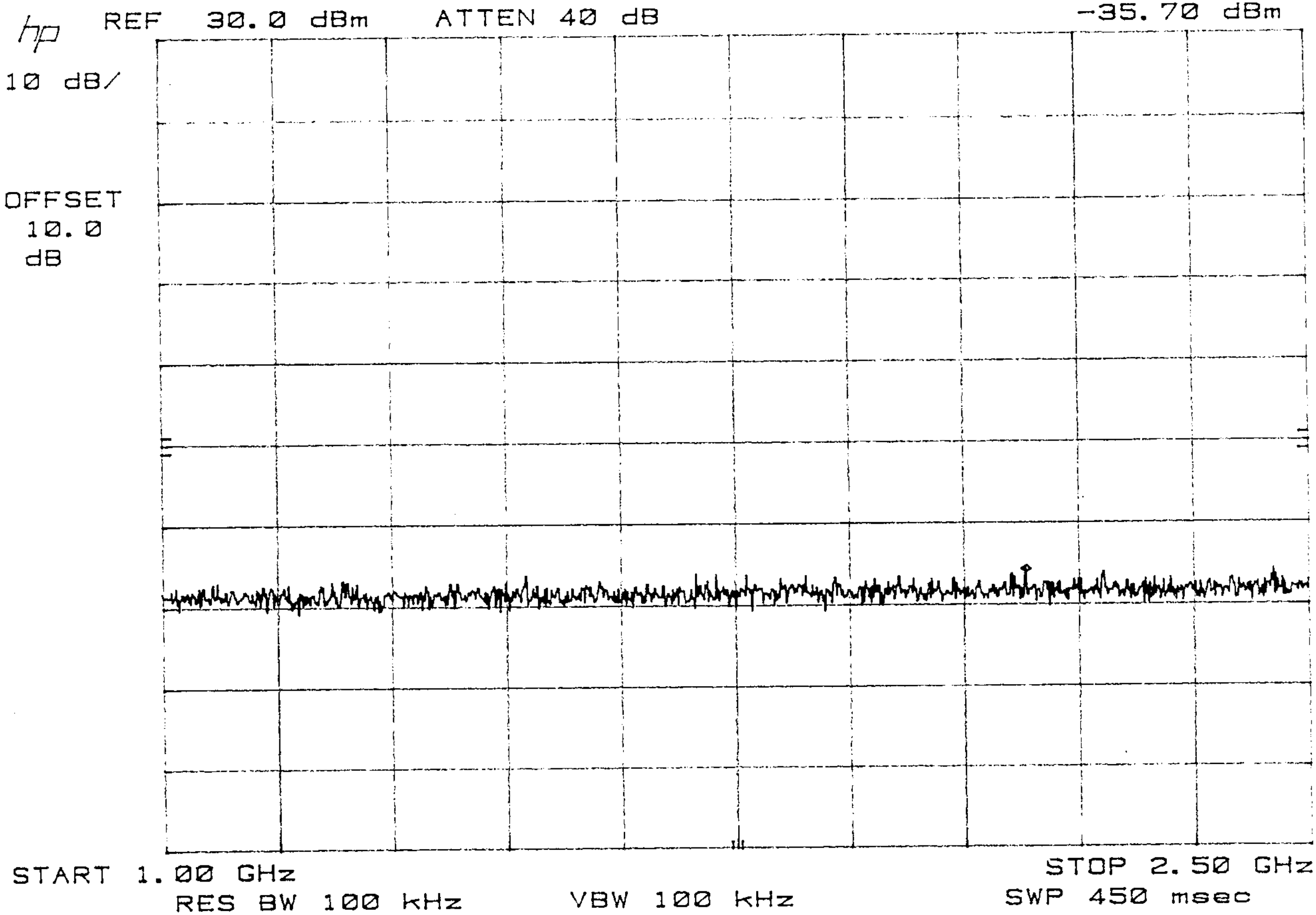
REF 30.0 dBm ATTEN 40 dB
MKR 21.04 MHz
-42.60 dBm
10 dB/
OFFSET
10.0
dB
START 1.0 MHz
RES BW 30 kHz
VBW 30 kHz
STOP 30.0 MHz
SWP 87.0 msec

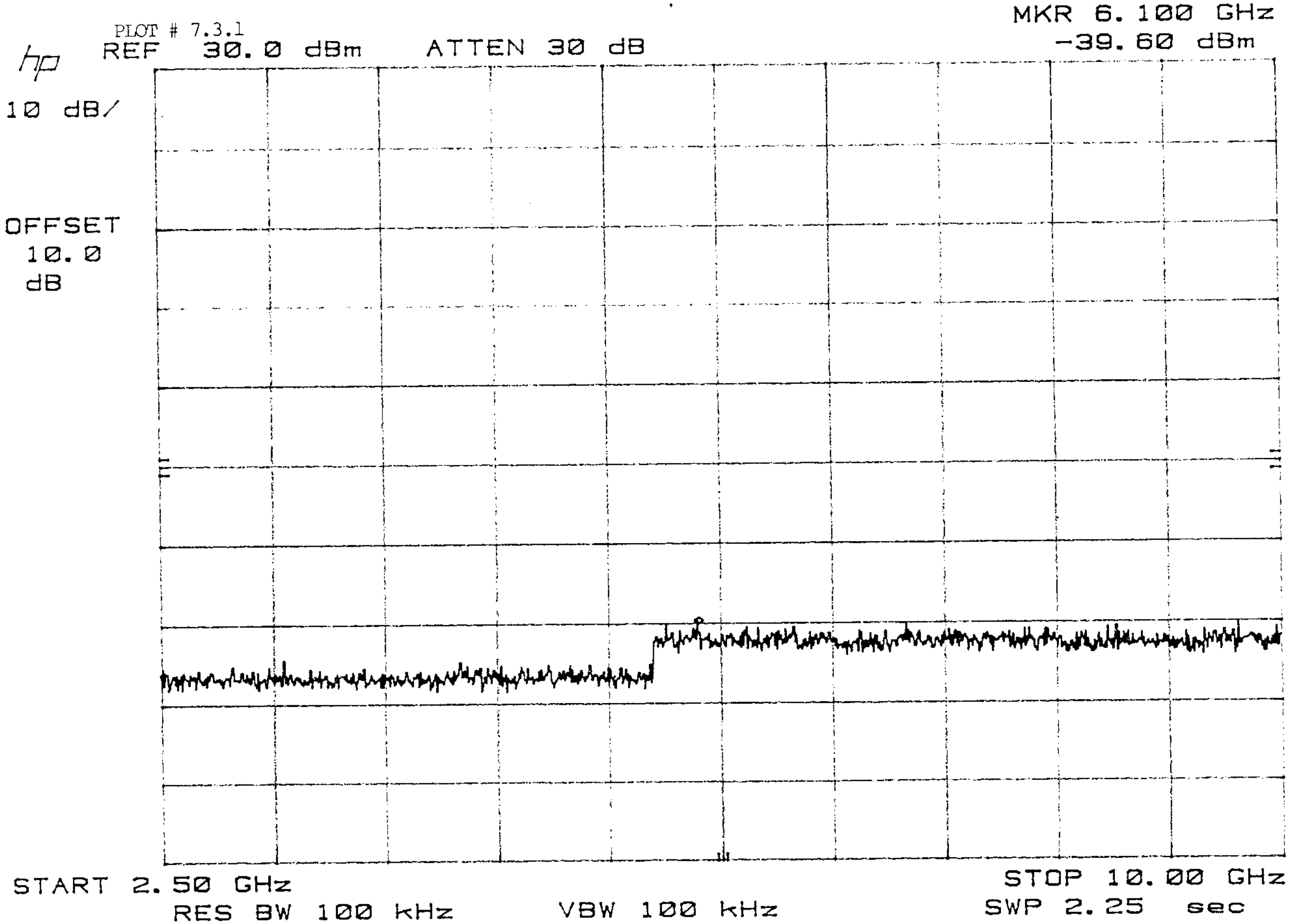
PLOT # 7.3.j



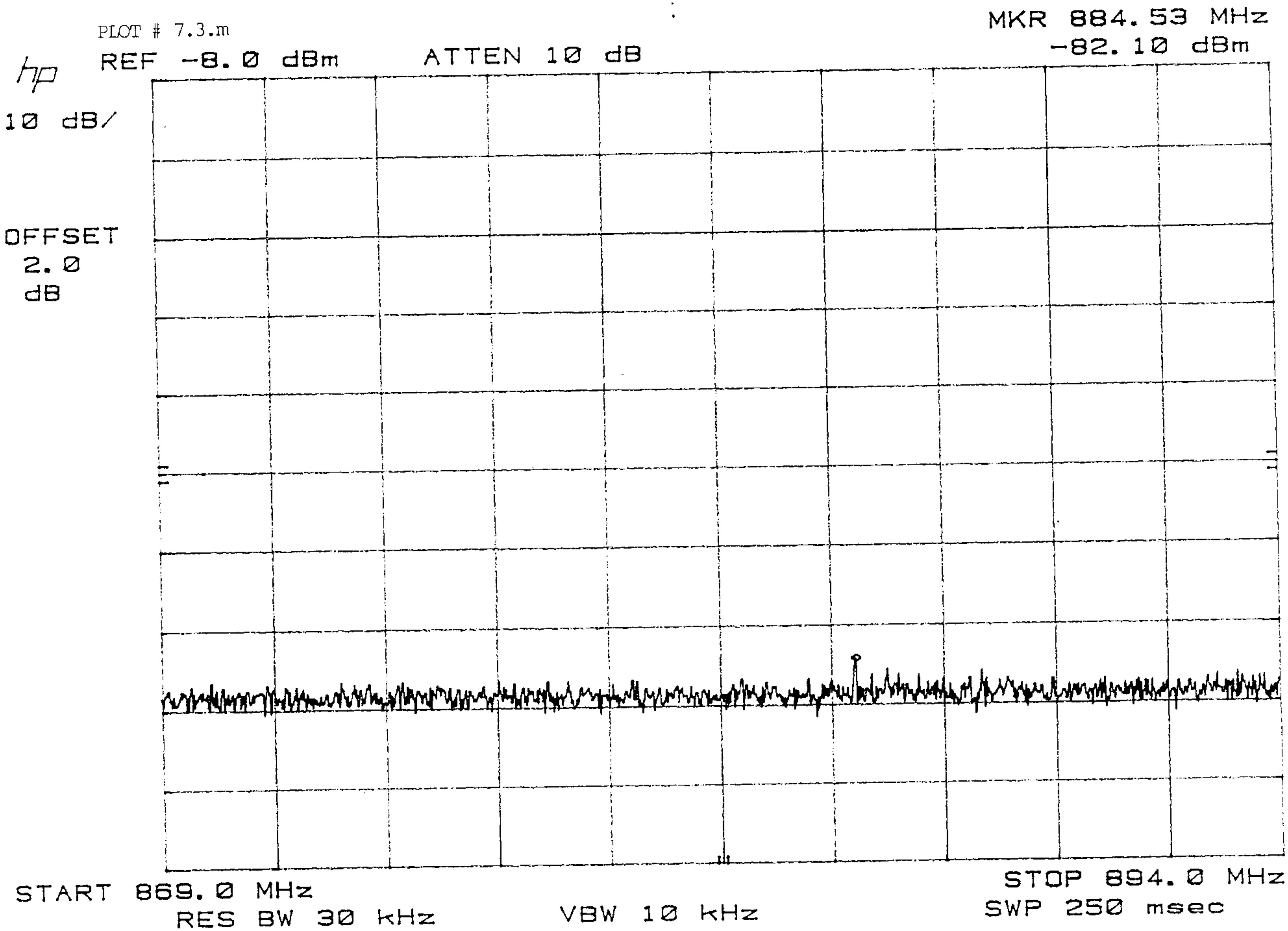
hp
REF 34.4 dBm ATTEN 40 dB
MKR 851.6 MHz
32.50 dBm
10 dB/
OFFSET
10.0
dB
START 30 MHz
RES BW 100 kHz
VBW 100 kHz
STOP 1.000 GHz
SWP 291 msec

PLOT # 7.3.k


hp
REF 30.0 dBm
ATTEN 40 dB
MKR 2.130 GHz
-35.70 dBm
10 dB/
OFFSET
10.0
dB
START 1.00 GHz
RES BW 100 kHz
VBW 100 kHz
STOP 2.50 GHz
SWP 450 msec

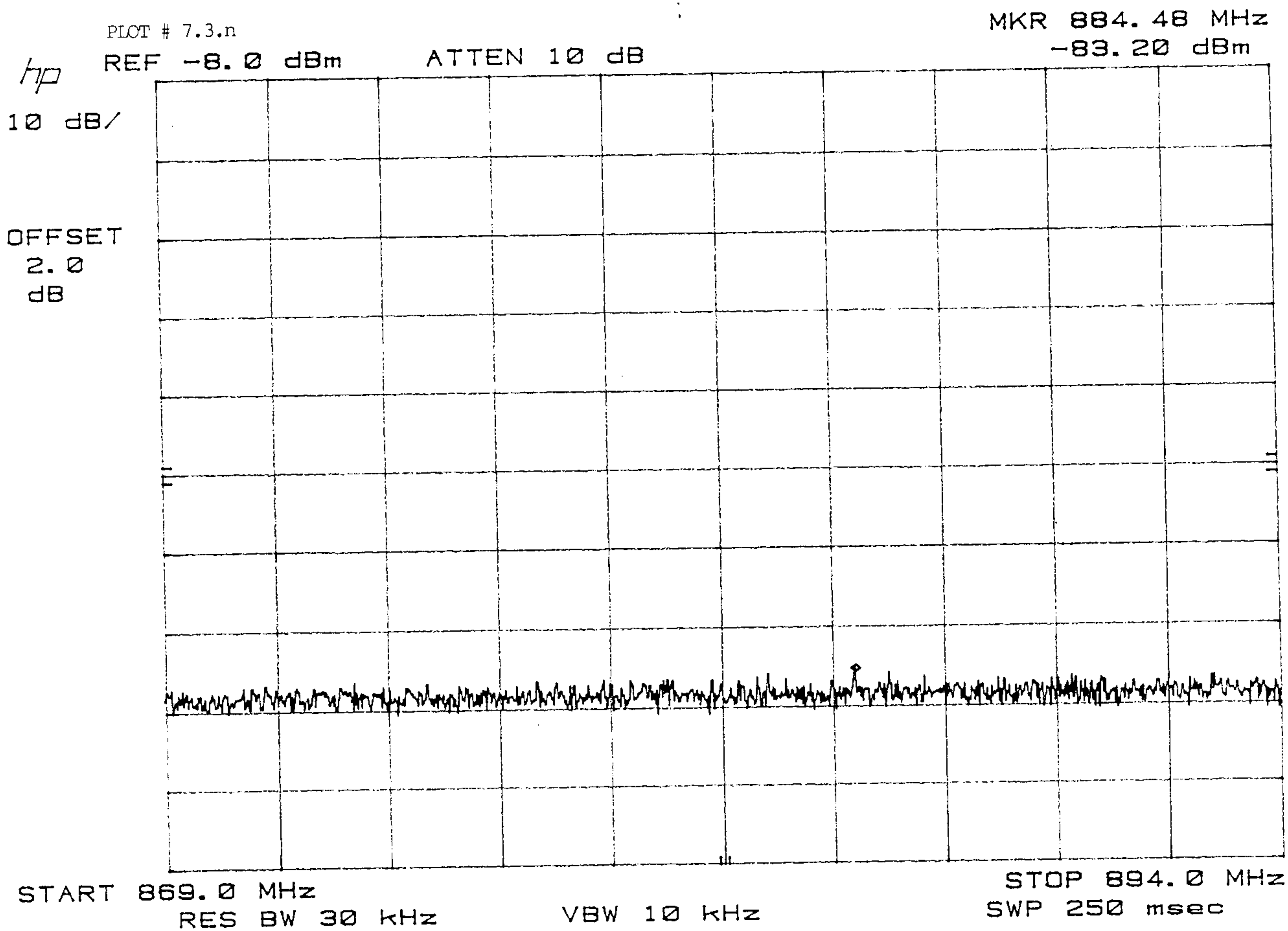

PLOT # 7.3.1
REF 30.0 dBm ATTEN 30 dB
MKR 6.100 GHz
-39.60 dBm
10 dB/
OFFSET
10.0
dB
START 2.50 GHz
RES BW 100 kHz
VBW 100 kHz
STOP 10.00 GHz
SWP 2.25 sec

PLOT # 7.3.m

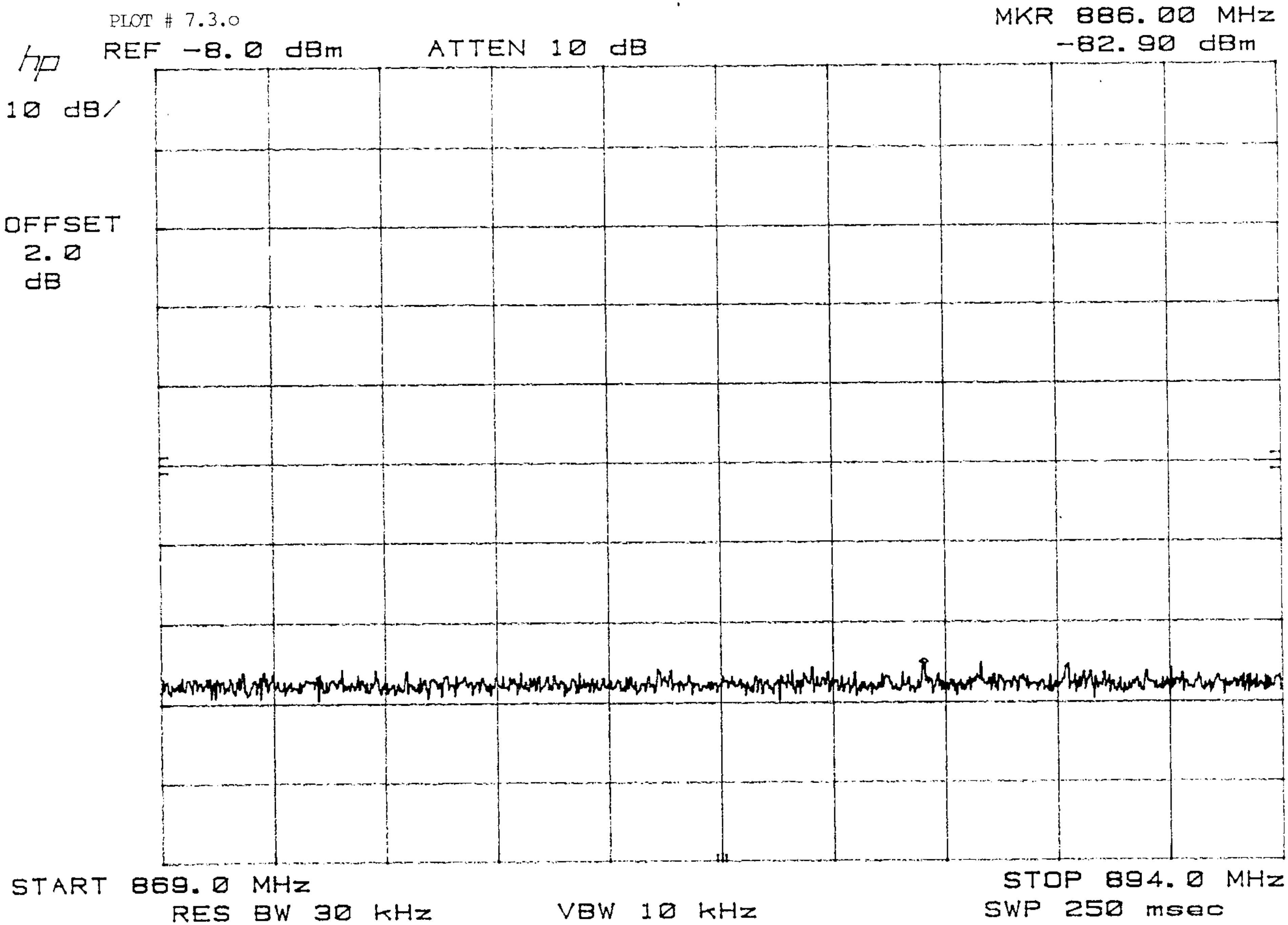


hp
REF -8.0 dBm
ATTEN 10 dB
MKR 884.53 MHz
-82.10 dBm
10 dB/
OFFSET
2.0
dB
START 869.0 MHz
RES BW 30 kHz
VBW 10 kHz
STOP 894.0 MHz
SWP 250 msec

PLOT # 7.3.n


hp
REF -8.0 dBm
ATTEN 10 dB
MKR 884.48 MHz
-83.20 dBm
10 dB/
OFFSET
2.0
dB
START 869.0 MHz
RES BW 30 kHz
VBW 10 kHz
STOP 894.0 MHz
SWP 250 msec

PLOT # 7.3.o



hp
REF -8.0 dBm
ATTEN 10 dB
MKR 886.00 MHz
-82.90 dBm
10 dB/
OFFSET
2.0
dB
START 869.0 MHz
RES BW 30 kHz
VBW 10 kHz
STOP 894.0 MHz
SWP 250 msec

10.0 Frequency Stability vs Temperature

Requirements: FCC 2.995(a), 22.355
Frequency Tolerance: $\pm$2.5 ppm

10.1 Test Procedure

The equipment under test was connected to an external DC power supply and the RF output was connected to a calibrated coaxial attenuator, the other end of which was connected to a frequency counter. The EUT was placed inside the temperature chamber. The DC leads, RF output cable, and external PTT cable exited the chamber through an opening made for that purpose.

After the temperature stabilized for approximately 20 minutes, the external PTT switch was activated, and the frequency output was recorded from the counter.

10.2 Test Equipment

Temperature Chamber, -50C to +100C
Hewlett Packard 5383A Frequency Counter
Goldstar DC Power Supply, GR303
Rohde & Schwarz ESVP Test Receiver

10.3 Test Results

Refer to the attached data sheet.

The EUT passed the test.

INTERTEK TESTING SERVICES

mpany: Wireless link Corp.
T: Cellular Module
del: CVDM-3
st Mode: Tx @ 836.01 MHz

Project #: J97011231
Date of Test: 6-9-97
Test Site #: 1
Engineer: Richard Lee RL

Frequency Stability vs. Temperature
Frequency: 836.01 MHz
Tolerance: +/- 2091Hz

Temperature (C)	Frequency (MHz)	Difference ("Hz)	Output Power (dBm)
60	836.009085	-915	35.5
50	836.009494	-506	35.6
40	836.010216	216	35.3
30	836.010580	580	35.3
20	836.010856	856	35.3
10	836.011060	1060	35.3
0	836.011101	1101	35.3
-10	836.011280	1280	35.3
-20	836.011320	1320	35.5
-30	836.009510	-490	35.4

11.0 Frequency Stability vs Voltage

Requirements: FCC 2.995(d)(2), 22.355
Frequency Tolerance: ±2.5 ppm

11.1 Test Procedure

An external variable DC power supply was connected to the battery terminals of the equipment under test. The voltage was set to 115% of the nominal value and was then decreased until the transmitter light no longer illuminates; i.e., the battery end point. The output frequency was recorded for each battery voltage.

11.2 Test Equipment

Hewlett Packard 5383A Frequency Counter
DC Power Supply
Goldstar Rohde & Schwarz ESVPGR303 Test Receiver

11.3 Test Results

Refer to the attached sheet.

The EUT passed the test.

INTERTEK TESTING SERVICES

ompany: Wireless link Corp.
UT: Cellular Module
odel: CVDM-3
est Mode: Tx @ 836.01 MHz

Project #: J97011231
Date of Test: 5-30-97
Test Site #: 1
Engineer: Richard Lee

Frequency Stability vs. Voltage
Frequency: 836.01 MHz
Tolerance: +/- 2091Hz

DC Volts		Frequency (MHz)	Difference (Hz)
85%	10.80	836.009690	-310
100%	12.00	836.009675	-325
115%	13.80	836.009600	-400
Minimum	9.00	836.010020	20

Appendix B - Application Documents

Owners Manual	Section I
FCC Label Format & Label Location	Section II
Block Diagram	Section III
Circuit Diagram	Section IV
Theory of Operation	Section V
Circuit Device Specifications	Section VI
Test/Calibration Procedure	Section VII
ESN Protection Guidelines (FCC §2.919)	Section VIII
SAR Data	Section IX

See attached.

REV	REF	DESCRIPTION	APPR	DATE
'		Initial draft.	WDC	4/26/98
		Clean up.	WDC	2/28/98
3		Release to Shinwoo	WDC	2/29/98

REQUIRED APPROVALS		DISTRIBUTION	
MFG/TEST ENGINEER	DATE	TEST ENG.	
QA	DATE	QUALITY	
	DATE	MANUFACTURING	
OPTIONAL APPROVALS		FIELD SERVICE	
MGR. MFG. ENGINEERING	DATE	PURCHASING	
DESIGN ENGINEER	DATE		
LEAD TECHNICIAN	DATE		

WIRELESS LINK CORPORATION

479 Potrero Avenue

Sunnyvale, CA 94086

TITLE

CVDM-2000 Board Level Test

DWG. NO.	PAGE
Preliminary	1 OF 11

1. Scope
   1.1. This document defines the board level tests to be performed on the CVDM-2000 Cellular radio module
2. References
   2.1. __-_____-__ Schematic, CVDM-2000 Cellular Module
   2.2. __-_____-__ PCB Assembly, CVDM-2000 Cellular Module
   2.3. __-_____-__ BOM, CVDM-2000 Cellular Module
   2.4. __-_____-__ CVDM-2000 Product Specification
3. Requirements
   3.1. All test equipment used to perform the board level testing shall have evidence of current calibration. Equipment not requiring calibration shall be so labeled.
   3.2. The following list of equipment is necessary to perform the board level testing. In the event that one of the pieces of equipment listed is unavailable, an equivalent test instrument may be substituted.
      3.2.1. HP8920B RF Communications Test Set
         3.2.1.1. OPT 001 High Stability Time Base
         3.2.1.2. OPT 002 Spectrum Analyzer/Tracking Gen/ACP
      3.2.2. HP11807A Radio Test Software
         3.2.2.1. OPT 004 AMPS/EAMPS/NAMPS Cellular Tests
      3.2.3. HP8633B Programmable Power Supply
      3.2.4. Computer, Running Windows 95
      3.2.5. CellCom Test Software
      3.2.6. CellAssist Test Software
      3.2.7. FZTAT Test Software
      3.2.8. Bed-of-Nails Test Fixture
      3.2.9. Assorted Cables, Adapters
4. Test Preparation
   4.1. Set up the test equipment as shown in figure 1.
   4.2. To insure accurate frequency and power measurements, apply AC power to the test equipment and allow the RF Communications Test Set to warm up for a minimum of 30 minutes before making any measurements.
   4.3. The following steps are used to configure and save a cellular parametric test for the CVDM-2000. If this has already been done, proceed to step 4.4.
      4.3.1. If the automated cellular test is running, depress the ***K4*** button on the HP8920 to quit the test sequence.
      4.3.2. Depress the ***TESTS*** button on the HP8920 RF Communications Test set to display the TESTS screen.
      4.3.3. Set the ***Select Procedure Location*** field to ***Card***.
      4.3.4. Set the ***Select Procedure Filename*** field to ***PARAMTR***.

4.3.5. Highlight and select the ***Seqn, Order of Tests*** function on the HP8920 RF Communications Test set to display the TESTS (Order of Tests) screen and edit the test sequence as shown in table 1.
4.3.6. Depress the ***TESTS*** button on the HP8920 RF Communications Test set to return to the main menu.
4.3.7. Highlight and select the ***Parm, Test Parameters*** function on the HP8920 RF Communications Test set to display the TESTS (Test Parameters) screen and edit the following parameter values.
   4.3.7.1. For ***Parm# 9***, change the value for the ***RT external path loss*** to reflect the total cable loss in the test setup (i.e.: if the loss is 1.5 dB, enter 1.5).
   4.3.7.2. For ***Parm# 15***, change the value for the ***RX audio response start frequency*** to ***0.5 kHz***.
   4.3.7.3. For ***Parm# 17***, change the value for the ***RX audio response stop frequency*** to ***2.5 kHz***.
   4.3.7.4. For ***Parm# 19***, change the value for the ***RX expander step level*** to ***–10 dB***.
   4.3.7.5. For ***Parm# 20***, change the value for the ***RX expander stop level*** to ***–10 dB***.
   4.3.7.6. For ***Parm# 28***, change the value for the ***RX RF level for SINAD*** to ***–113 dB***.
   4.3.7.7. For ***Parm# 32***, change the value for the ***TX audio response start frequency*** to ***0.5 kHz***.
   4.3.7.8. For ***Parm# 34***, change the value for the ***TX audio response stop frequency*** to ***2.5 kHz***.
   4.3.7.9. For ***Parm# 35***, change the value for the ***TX compressor start level*** to ***20 dB***.
   4.3.7.10. For ***Parm# 36***, change the value for the ***TX compressor step level*** to ***–20 dB***.
   4.3.7.11. For ***Parm# 37***, change the value for the ***TX compressor stop level*** to ***–20 dB***.
   4.3.7.12. For ***Parm# 39***, change the value for the***TX frequency deviation step frequency*** to ***1.35 kHz***.
4.3.8. Depress the ***TESTS*** button on the HP8920 RF Communications Test set to return to the main menu.
4.3.9. Highlight and select the ***Freq, Channel Information*** function on the HP8920 RF Communications Test set to display the TESTS (Channel Information) screen and edit the frequency list as shown in table 2.
4.3.10. Depress the ***TESTS*** button on the HP8920 RF Communications Test set to return to the main menu.
4.3.11. Highlight and select the ***Exec, Execution Cond.*** function on the HP8920 RF Communications Test set to display the TESTS (Execution Condition) screen and edit the following fields.
   4.3.11.1. Set the ***Output Results To:*** field to ***CRT***.
   4.3.11.2. Set the ***Output Results For:*** field to ***All***.
   4.3.11.3. Set the ***Output Results To:*** field to ***CRT***.
   4.3.11.4. Set the ***Output Heading:*** field to ***CVDM-2000***.
   4.3.11.5. Set the ***If Unit-Under-Test Fails:*** field to ***Continue***.
   4.3.11.6. Set the ***Test Procedure Run Mode:*** field to ***Continuous***.

4.3.11.7. Set the ***Auto Start Test Procedure on Power-Up:*** field to ***OFF***.

4.3.12. Depress the ***TESTS*** button on the HP8920 RF Communications Test set to return to the main menu.

4.3.13. Highlight and select the ***Proc, Save / Delete Procedure*** function on the HP8920 RF Communications Test set to display the TESTS (Save / Delete Procedure) screen.

4.3.14. Insert a memory card into the HP8920 and save the modified procedure as ***CVDM2000***.

4.4. Click the ***Start*** button on the Windows 95 Taskbar and choose the ***Testexec.prj*** icon in the start menu to run the Lab Windows Test Executive program.

4.5. Click the ***Project*** pull down menu on the menu bar and choose ***Run Project*** to compile, link and run the current project.

4.5.1. Just click the ***OK*** button when the Log in pop-up window appears.

4.6. Verify that the ***Test1.squ*** file appears in the ***Sequence*** box on the Test Executive main panel.

4.7. Scroll down to the bottom of the list in the ***Tests*** window and run the ***HP8920 Full Init*** test, by double clicking the name. This will configure and save several HP8920 screens that will be used by many of the Test Executive, CVDM-2000 calibration tests. Generally, this will only have to be done once.

4.7.1.1. When the ***Cable Loss*** pop-up window appears, enter the the total cable loss in the test setup (i.e.: if the loss is 1.5 dB, enter -1.5). ***It is very important that the insertion loss value is entered as a negative value in this instance.***

4.7.2. Power Supply Test and Code Download

4.8. Verify that the ***test fixture*** ON / OFF switch is in the ***ON*** position and the ***HP6633B*** power supply is turned ***OFF***.

4.9. Place a UUT into the test fixture, lower the cover and lock it into place.

4.10. Turn the ***HP6633B*** power supply ***ON***.

4.11. Click the ***Single Pass*** button on the Test Executive main panel to begin running the test sequence. If all of the tests pass, this verifies that all of the main CVDM-2000 power supply circuits are functional and also prepares the Hitachi processor for accepting a code download.

4.12. Click the ***Start*** button on the Windows 95 Taskbar and choose the ***F-ZTAT.EXE*** icon in the start menu to run the Hitachi code downloader program.

4.13. Verify that the ***COM port*** is set to ***COM1*** and then click the ***OK*** button.

4.14. Click the ***Transfer*** button in the Transfer Software window to begin the Hitachi code downloading process.

4.15. The WriteBoard switch has already been turned on, so click the ***OK*** button, followed by the ***Start Transfer*** button, in the Transfer Confirmation window.

4.15.1. If communications between the downloader and Hitachi processor is successful, you will see a progress bar indicating how the code downloading process is going.

4.16. After the Hitachi downloading process has been completed, click ***OK*** to confirm and then click the ***EXIT*** button to terminate the FZTAT program. This action should return you to the Test Executive main panel.

4.17. Run the ***Select RS-232 to ACE*** test, by double clicking the name. This will configure the test fixture to route the computer COM port to the ACE9050 COM port.

4.18. Depress the ***Local*** button on the ***HP6633B*** power supply to regain local control and then depress the ***Output ON / OFF*** button to turn off the voltage output.
4.19. Click the ***Start*** button on the Windows 95 Taskbar and choose the ***CellCom-CVDM.EXE*** icon in the start menu to run the CellCom cellular communications program.
4.20. Click the ***Program*** button in the Cellcom taskbar and then click ***OK*** to confirm your desire to download new firmware. Do not click the next ***OK*** button that appears just yet.
4.21. Depress the ***Output ON / OFF*** button on the HP6633 power supply to turn the output voltage back on and then click CellCom's ***OK*** button roughly 3 seconds later (Counting to four is usually sufficient to meet the 3 second requirement).
4.22. If all went well, you should see an indication that the flash is being programmed within the Monitor window. Click ***OK*** when CELLCOM displays the pop-up window telling you that the programming is complete.
4.22.1. The required timing between turning on the power supply and clicking the OK button in CellCom is fairly tight (3 sec +/- 1 sec). If an error message appears, depress the ***Output On / OFF*** button on the HP6633 power supply to turn off the voltage output and repeat steps 5.13 through 5.15 using slightly different timing.
4.23. Depress the ***Output ON / OFF*** button on the HP6633 power supply to turn the output voltage back off and then exit the CellCom program. This action should return you to the Test Executive main panel.

5. Radio Test and Calibration
5.1. After returning to the Test Executive, click the ***File*** pull down menu on the menu bar, choose ***Open*** and select the ***Test2.squ*** file. This filename should then appear in the ***Sequence*** box on the Test Executive main panel.
5.2. Click the ***Single Pass*** button on the Test Executive main panel to begin running the test sequence. If all of the tests pass, this verifies that all of the radio calibrations were completed successfully and the CVDM-2000, I/O ports are functional.

6. Radio Calibration Verification and Call Processing Test
6.1. Depress the ***Local*** button on the HP8920 RF Communications test set to regain local control, depress the ***TESTS*** button and then load the ***CVDM2000*** test sequence into memory.
6.2. Click the ***Start*** button on the Windows 95 Taskbar and choose the ***CellAssist.EXE*** icon in the start menu to run the CellAssist cellular communications program.
6.3. Click the ***CVDM2000*** pull down menu on the menu bar and choose ***Status*** to display the ***CVDV2000 Hardware Testing and Status*** window.
6.4. Depress the ***Local*** button on the ***HP6633B*** power supply to regain local control and then depress the ***Output ON / OFF*** button to turn off the voltage output. Wait about 10 seconds and then depress the ***Output ON / OFF*** button on the HP6633 power supply to turn the output voltage back on.
6.5. Click the ***Load Process Status*** button in the ***CVDV2000 Hardware Testing and Status*** window. This will display the current process status in the ***Process Control*** window.
6.6. In the ***Process Control*** window, choose the following menu options to disable the scheduler, CVDM, GPS and exception handler processes.
6.6.1. ***Suspend Scheduler***

6.6.2. ***Suspend CVDM***
6.6.3. ***GPS Suspend***
6.6.4. ***Exceptions Suspend***

6.7. Click the ***Load Process Status*** button in the ***CVDV2000 Hardware Testing and Status*** window once again and verify that the four processes are suspended.

6.8. Exit the ***CVDV2000 Hardware Testing and Status*** window and click the ***Extra*** button to bring up the ***Configure Phone*** window.

6.8.1. Verify or set the following ***Configuration Parameters***.
6.8.1.1. System Select: ***B Only***
6.8.1.2. Auto Retry: ***Enabled***
6.8.1.3. NAM Select: ***NAM1***

6.8.2. Enable the following ***Autonomous Status*** box (checked). All others should be disabled.
6.8.2.1. ***Current Channel Info***

6.8.3. Enable the following ***Trace Enable*** box (checked). All others should be disabled.
6.8.3.1. ***Task Execution Info ("prints")***

6.8.4. Click the ***Send*** button to load the parameters into the CVDM-2000.

6.9. Run the ***CVDM2000*** test sequence to and verify that the test passes with no errors

6.9.1. Press the ***Run*** button on the HP8920.
6.9.2. Change the System Select parameter in the ***Configure Phone*** window to ***A Only*** and click the send button, after you see the ***Testing CP Registration*** message appear on the HP8920 screen.
6.9.3. Exit the ***Configure Phone*** screen and click the ***Call*** button to bring up the ***Call Processing*** window.
6.9.4. Enter the number ***1231234567*** into the ***Originate*** box.
6.9.5. Click the ***Answer*** button when you are prompted to answer a call.
6.9.6. Click the ***Originate*** button when you are prompted to originate a call.
6.9.7. Click the ***Disconnect*** button after the test has completed.

'. Modem Test

7.1. Depress the ***TESTS*** button on the HP8920 RF Communications test set, load the ***Manual*** test sequence into memory and then run the test.

7.2. Exit the ***Call Processing*** window and click the ***Modem*** button to bring up the ***Modem Control*** window.

7.3. Click the ***Default*** button to view the default modem initialization string and then click the ***Send*** button to enter the string into memory. Click the ***Load*** button to verify that the modem initialization string is still being displayed.

7.4. Click the ***Reset*** button to reset the modem and click the ***Load*** button for ***Get State:***. Verify that the modem state is either ***Sleep*** or ***Online***.

7.5. Exit the ***Modem Control*** window, click the ***CVDM2000*** pull down menu on the menu bar and choose ***General Configuration*** to display the ***CVDV2000 Dial String, Asset ID, Scheduling parameters*** window.

7.6. Click the ***Load Data*** button to load the current data into the various fields.

7.7. Enter the number ***123*** into the ***Asset ID*** field and the number ***1231234567*** into the ***Dial String*** field.
7.8. Click the ***Save Data*** button to save the new data into memory.
7.9. Click the ***Load Data*** button once again and verify that the ***Asset ID*** and ***Dial String*** fields still contain the numbers that you just saved into memory.
7.10. Exit the ***CVDV2000 Dial String, Asset ID, Scheduling parameters*** window, click the ***CVDM2000*** pull down menu on the menu bar and choose ***Status*** to display the ***CVDV2000 Hardware Testing and Status*** window.
7.11. In the ***Process Control*** window, choose the ***Unsuspend scheduler*** menu option for the ***Scheduler*** process.
7.12. In the ***Process Control*** window, choose the ***Unsuspend CVDM*** menu option for the ***CVDM*** process.
7.13. In the ***Process Control*** window, choose the ***Immediate Ears On*** menu option for the ***CVDM*** process.
7.14. Depress the ***Registration*** soft key on the HP8920 to initiate a CVDM-2000 registration. Verify that the CVDM-2000 registered successfully.
7.15. Turn up the ***Volume*** control on the HP8920 to allow the reverse channel audio signal to be heard.
7.16. Depress the ***Page*** soft key on the HP8920 to initiate a page to the CVDM-2000.
7.17. The CVDM-2000 modem should auto-answer the page. Verify that a modem tone is heard on the HP8920 speaker.
7.18. Depress the ***Clear Is*** soft key on the HP8920 to release the call.
7.19. In the ***Process Control*** window, choose the ***Immediate Check-In*** menu option for the ***CVDM*** process.
7.20. After the HP8920 call processing flow chart indicates that the CVDM-2000 has entered the ***Voice*** mode, quickly perform the following steps.
7.20.1. Depress the ***Cancel*** button on the HP8920 to halt the call processing test.
7.20.2. Depress the ***Duplex*** button on the HP8920 to display the current duplex settings.
7.20.3. Change the ***AFGen1 Freq*** to ***2.2kHz*** , which will simulate a modem answer tone.
7.20.4. Verify that data is heard (noisy sound) on the HP8920 speaker, which verifies that the modem responded to the answer tone.
7.21. Depress the ***Prev*** button on the HP8920 to return to the CP flowchart.
7.22. Depress the ***Continue*** soft key on the HP8920 to resume the call processing test.
7.23. Depress the ***Clear Is*** soft key on the HP8920 to release the call.

. Hardware Status Test
8.1. In the ***Process Control*** window, choose the ***Suspend CVDM*** menu option for the ***CVDM*** process.
8.2. In the ***Process Control*** window, choose the ***GPS unsuspend*** menu option for the ***GPS*** process.
8.3. In the ***Process Control*** window, choose the ***GPS power on*** menu option for the ***GPS*** process.

8.4. Click the ***Load Hardware Status*** button in the ***CVDV2000 Hardware Testing and Status*** window. This will display the current hardware status in the ***Hardware Status*** window.

- 8.4.1. Verify that the temperature reading is between 20C and 50C.
- 8.4.2. Verify that the ***External I/O Fault*** box is not checked.
- 8.4.3. Verify that the ***GPS Receiver Not Detected*** box is not checked.
- 8.4.4. Verify that the ***GPS Antenna Line Fault*** box is checked
- 8.4.5. Verify that the ***Hayes Modem Not Detected*** box is not checked.

8.5. Depress the ***Output ON / OFF*** button on the HP6633 power supply to turn the output voltage off .

8.6. Remove the UUT from the test fixture.

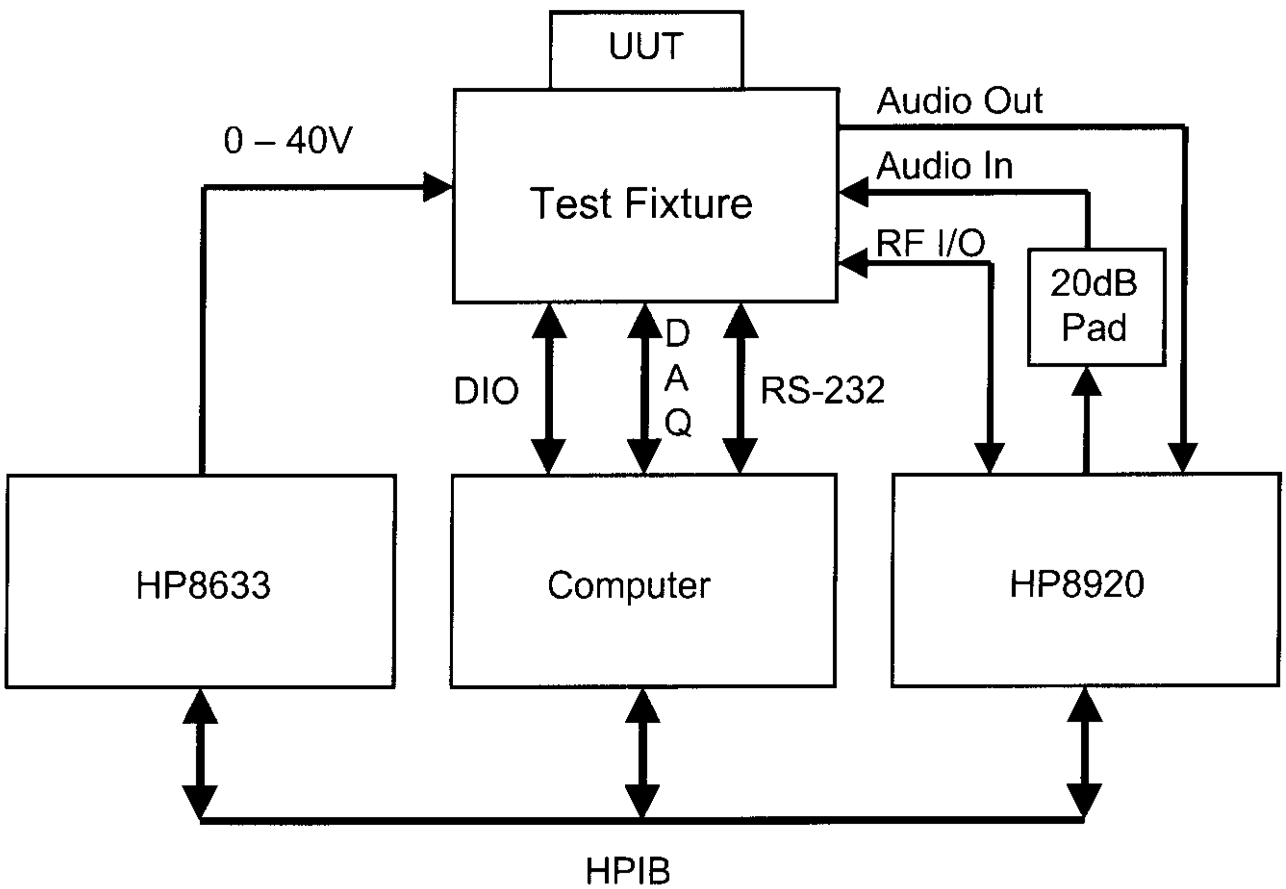

UUT
Audio Out
0 – 40V
Audio In
Test Fixture
RF I/O
20dB
Pad
D
A
Q
DIO
RS-232
HP8633
Computer
HP8920
HPIB

FIGURE 1

Step #	Test Name Description	All Chans?
1	TEST_01 CP Registration	No
2	TEST_02 CP page	No
3	TEST_04 TX RF power output	Yes
4	TEST_03 TX frequency error	Yes
5	TEST_05 TX modulation deviation limiting	No
6	TEST_07 TX audio distortion	Yes
7	TEST_06 TX audio frequency response	No
8	TEST_12 TX compressor response	No
9	TEST_10 TX SAT / DSAT	No
10	TEST_08 TX signaling tone / DST	No
11	TEST_18 RX SINAD	Yes
12	TEST_16 RX audio distortion	Yes
13	TEST_15 RX audio frequency response	No
14	TEST_14 RX expandor	No
15	TEST_20 CP release	No
16	TEST_21 CP origination	No

Table 1