ITS Intertek Testing Services

Specific Absorption Rate (SAR) Evaluation

Performed on the

Wireless PC Card Modem
Model: M130C
for
Tellus Technology, Inc.

FCC rule part 2.1093

Date of Test: August 24 & 25, 1998

Job #: J98019153

Total No. of Pages Contained in this Report: 16 + data pages

NVLAP®

FCC SAR and ANSI C63.4-1992, Rev. 6/97

Intertek Testing Services NA Inc.
1365 Adams Court, Menlo Park, CA 94025
Telephone 650-463-2900 Fax 650-463-2910 Home Page www.worldlab.com

ITS Intertek Testing Services

VERIFICATION OF COMPLIANCE
Report No. J98019153

Verification is hereby issued to the named APPLICANT and is VALID ONLY for the equipment tested hereon for use under the rules and regulations listed below

Equipment Under Test (EUT):	Wireless PC Card Modem
Trade Name:	Monarch
Model No.:	M130C
Serial No.:	Not Labelled
FCC ID:	NZ6M8130C
Applicant:	Tellus Technology, Inc.
Contact:	Minh Dao
Address:	40990 Encyclopedia Circle Fremont, California 94538,
Tel. number:	(510) 498-8500
Fax. number:	(510) 498-8540
Applicable Regulation:	FCC rule part 2.1093, FCC Docket 96-326 & Supplement C to OET Bulletion 65
Exposure Class:	General Population/Uncontrolled Exposure
Test Site Location:	Intertek Testing Services 1365 Adams Court Menlo Park, CA 94025, USA
Date of Test:	August 24 & 25, 1998

Based on the test results, the tested sample was found to be in compliance with the FCC requirements for Human Exposure to Radiofrequency Emissions.

We attest to the accuracy of this report:

Ollie Moyrong
Test Engineer

C. K. Li
Engineering Manager

Intertek Testing Services NA Inc.
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Table of Contents

1.0 INTRODUCTION

This measurement report is designed to show compliance with the FCC part 2.1093, ET Docket 96-326 Rules for mobile and portable devices. The test procedures, as described in American National Standards Institute C95.1-1992[1] and FCC OET Bulletin 65-1997[2], were employed. A description of the product and operating configuration, the various provisions of the rules, the methods for determining compliance, and a detailed summary of the results are included within this test report.

2.0 DESCRIPTION OF EQUIPMENT

Equipment	Wireless PC Card Modem		
Trade Name	Monarch	Model No.	M130C
FCC ID	NZ6M8130C	S/N No.	Not Labeled
Category	Portable	RF Exposure	Uncontrolled Environment
Frequency Band (uplink)	824-849 MHz	System	CDPD

EUT Antenna Description			
Type	Monopole	Configuration	Fixed
Dimensions	(L) 62.6 mm , (ϕ) 6.7mm	Gain	0 dBi
Location	Right, Top		

A pre-production version of the sample was provided by Tellus Technology, Inc. and received on 7/15/98 in good working condition.

3.0 TEST SUMMARY

The maximum spatial peak SAR value averaged over 1g of tissue found in all tested configurations was:

Measurement Summary					
SAR_{1g} (mW/g)	Measured Antenna Output Power (dbm)	Antenna	Usage	FCC Limits (mW/g)	Results
0.313	25.9	Extended	center of phantom	1.6	Pass*

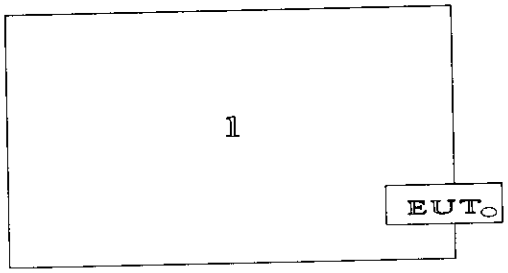
** worst case uncertainty not included*

4.0 SYSTEM TEST CONFIGURATION

4.1 Support Equipment

Item #	Description	Model No.	Serial No.	FCC ID
1	Laptop PC	6200AD	N64D721208529	L4PK6000T200

4.2 Block Diagram of Test Setup



4.3 Test Position

The EUT was configured for testing in a typical fashion (as a customer would normally use it), and in the confines as outlined in C95.1 (1992) and Supplement C of OET 65 (1998). Four different configurations were tested. The EUT was placed in the intended use position, under the center of the phantom (representing the EUT laying on a persons lap). The laptop PC, serving as the host to the EUT, was positioned upside down so the reference points of the phantom and the EUT were directly under each other and the case of the laptop PC was touching the surface of the phantom. The first two configurations were tested in this position, with the antenna positioned vertical and horizontal to the laptop PC. The laptop PC was then positoned to lie on its side with the EUT facing the phantom. The last two configurations were tested in this position. The distance from the EUT to the phantom was kept the same as the first two tests. See photos in section 5.2 for more details.

4.4 Test Condition

During tests, the worst case data (max. RF coupling) was determined with following conditions:

EUT Antenna	Horizontal (flat with laptop)	Orientation	Host PC upside down as shown in section 5.2
Usage	middle of phantom	Distance closest part of the EUT and the liquid surface:	27.87 mm
Simulating human hand	Not Used	EUT Battery	Fully Charged
Power output	Maximum 25.9 dBm ✓		

The spatial peak SAR values were accessed for lowest, middle and highest operating channels defined by the manufacturer.

Antenna port power measurement was performed, with the HP 435A power meter, before and after the SAR tests to ensure that the EUT operated at the highest power level.

4.5 Modifications Required for Compliance

The following modifications were installed during compliance testing in order to bring the product into compliance (Please note that this list does not include changes made specifically by Tellus Technology, Inc. prior to compliance testing):

No modifications were made to the EUT by Intertek Testing Services.

4.6 Additions, deviations and exclusions from standards

No additions, deviations or exclusions have been made from standard.

5.0 SAR EVALUATION

5.1 SAR Limits

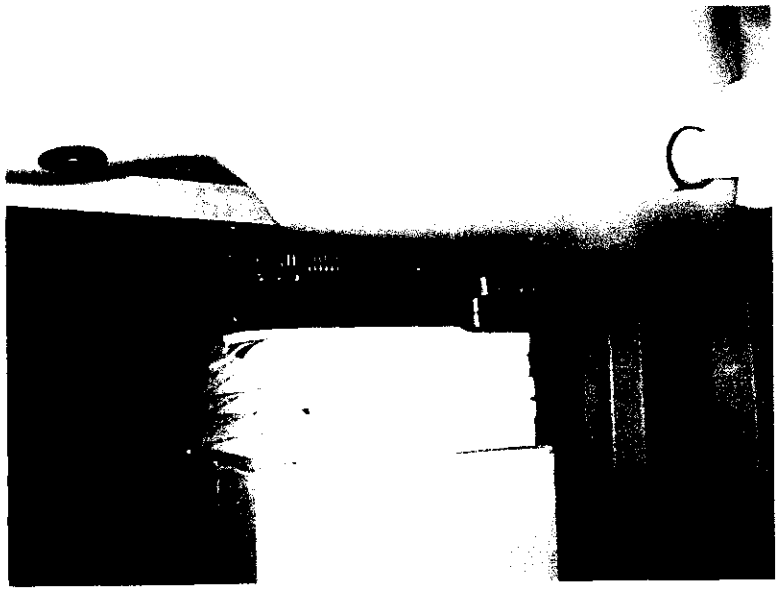
The following FCC limits for SAR apply to devices operate in General Population/Uncontrolled Exposure environment:

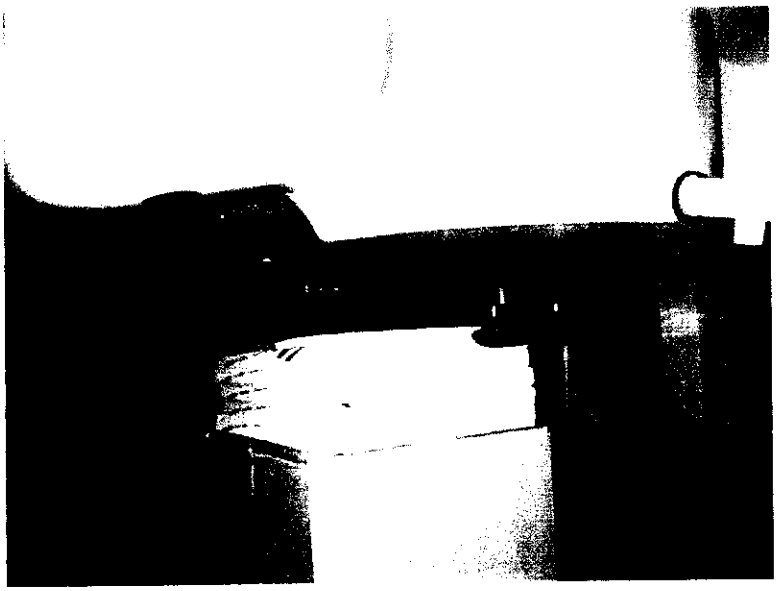
EXPOSURE (General Population/Uncontrolled Exposure environment)	SAR (W/kg)
Average over the whole body	0.08
Spatial Peak (1g)	1.60
Spatial Peak for hands, wrists, feet and ankles (10g)	4.00

5.2 Configuration Photographs

SAR measurement
at 836 MHz

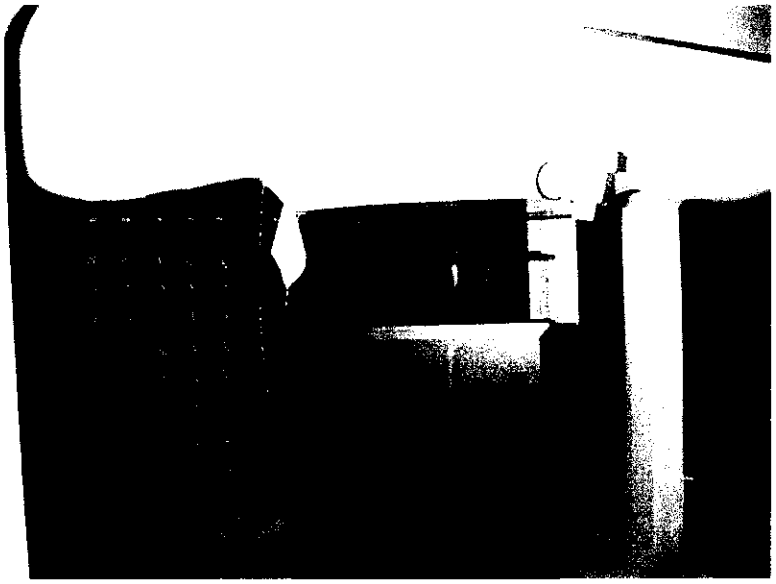
Worst-Case

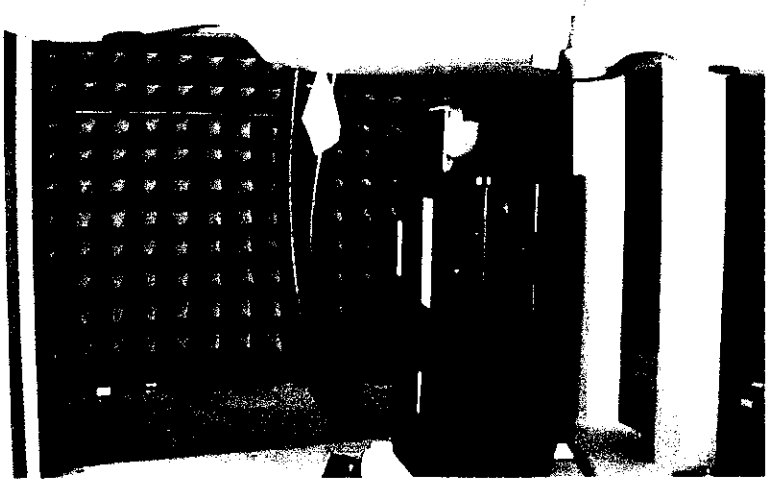




5.2 Configuration Photographs - continued

Worst-Case SAR measurement at 836 MHz





5.3 System Verification

Prior to the assessment, the system was verified to the ±5% of the specifications by using the system validation kit. The validation was performed at 900 MHz.

Validation kit	Targeted SAR_{1g} (mW/g)	Measured SAR_{1g} (mW/g)
D900V2, S/N #: 013	3.92	3.84

5.4 Evaluation Procedures

The SAR evaluation was performed with the following procedures:

a. SAR was measured at a fixed location above the reference point and used as a reference value for the assessing the power drop.

b. The SAR distribution at the exposed side of the body was measured at a distance of 4.3 mm from the inner surface of the shell. The area covered the entire dimension of the flat phantom and the horizontal grid spacing was 20 mm x 20 mm. Based on this data, the area of the maximum absorption was determined by spline interpolation.

c. Around this point, a volume of 32 mm x 32 mm x 34 mm was assessed by measuring 5 x 5 x 7 points. On the basis of this data set, the spatial peak SAR value was evaluated with the following procedure:

   I) The data at the surface were extrapolated, since the center of the dipoles is 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measurement point is 1.6 mm. The extrapolation was based on a least square algorithm. A polynomial of the fourth order was calculated through the points in Z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip.

   ii) The maximum interpolated value was searched with a straight-forward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1g or 10g) were computed using the 3-D spline interpolation algorithm. The 3-D spline is composed of three one-dimensional splines with the "Not a knot" condition (in x, y and z directions). The volume was integrated with the trapezoidal algorithm. 1000 points (10 x 10 x 10) were interpolated to calculate the average.

   iii) All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.

d. Re-measurement of the SAR value at the same location as in step a. above. If the value changed by more than 5 %, the evaluation was repeated.

5.5 Test Results

The results on the following page(s) were obtained when the device was tested in the condition described in this report. Detail measurement data and plots which reveal information about the location of the maximum SAR with respect to the device, are reported in Appendix A.

Trade Name:	Monarch	**Model No.:**	M130C
Serial No.:	Not Labeled	**Test Engineer:**	Ollie Moyrong

TEST CONDITIONS			
Ambient Temperature	22 °C	Relative Humidity	50 %
Test Signal Source	Test Mode	Signal Modulation	CW
Output Power Before SAR Test	25.9	Output Power After SAR Test	25.8
Test Duration	25 Min. Each	Number of Battery Change	4

Worst Case Test Data (Muscle Tissues)

Channel	Operating Mode	Duty Cycle ratio	Antenna Position	Measured SAR_{1g} (mW/g)
824 (MHz)	CDPD	1	horizontal (Flat with Laptop)	0.189
836 (MHz)	CDPD	1	Horizontal (Flat with Laptop)	0.313
849 (MHz)	CDPD	1	Horizontal (Flat with Laptop)	0.307

flat portion of plastic : Plate #1

Note: a) Worst case data were reported
b) Duty cycle factor included in the measured SAR data
c) Tests were performed with differnet device orientation that a user will encounter during normal use. Please refer to configuration photo section for detail.

6.0 TEST EQUIPMENT

6.1 Equipment List

The Specific Absorption Rate (SAR) tests were performed with the SPEAG model DASY 3 automated near-field scanning system which is package optimized for dosimetric evaluation of mobile radios [3]. The following major equipment/components were used for the SAR evaluations:

SAR Measurement System			
EQUIPMENT	**SPECIFICATIONS**	**S/N #**	**CAL. DATE**
Robot	**Stäubi RX60L** Repeatability: ± 0.025mm Accuracy: Number of Axes: 6	597412-01	N/A
E-Field Probe	**ET3DV5** Frequency Range: 10 MHz to 6 GHz Linearity: ± 0.2 dB Directivity: ± 0.1 dB in brain tissue	1333	01/14/98
Data Acquisition	**DAE3** Measurement Range: 1μV to >200mV Input offset Voltage: < 1μV (with auto zero) Input Resistance: 200 MΩ	317	N/A
Phantom	**Generic Twin V3.0** Type: Generic Twin, Homogenous Shell Material: Fiberglass Thickness: 2 ± 0.1 mm Capacity: 20 liter Ear spacer: ≈ 4 mm (between EUT ear piece and tissue simulating liquid)	N/A	N/A
Simulated Tissue	**Mixture** Please see section 6.2 for details	N/A	01/29/98
Power Meter	**HP** 435A w/ 8481H sensor Frequency Range: 100kHz to 18 GHz Power Range: 300μW to 3W	1312A01255	01/26/98

6.2 Muscle Tissue Simulating Liquid

Ingredient	Frequency (800 - 850 MHz)
Water	54.05 %
Sugar	45.05 %
Salt	0.1 %
HEC	0 %
Bactericide	0.8 %

The dielectric parameters were verified prior to assessment using the HP 85070A dielectric probe kit and the HP 8753C network Analyzer. The dielectric parameters were:

Frequency (MHz)	ε_r *	σ *(mho/m)	ρ **(kg/m^3)
900	56.5 ± 5%	0.99 ± 10%	1000

* *worst case uncertainty of the HP 85070A dielectric probe kit*

** *worst case assumption*

6.3 E-Field Probe Calibration

Probes were calibrated by the manufacturer in the TEM cell ifi 110. To ensure consistency, a strict protocol was followed. The conversion factor (ConF) between this calibration and the measurement in the tissue simulation solution was performed by comparison with temperature measurement and computer simulations. Probe calibration factors are included in Appendix C.

6.4 Measurement Uncertainty

The total uncertainty for the evaluation of the spatial peak SAR values averaged over a cube of 1 g tissue mass has been assessed for this system to be less than ±20% [4]. This uncertainty includes probe, calibration, positioning and evaluation errors as well as errors in assessing the correct dielectric parameters for the brain simulating liquid, etc.

UNCERTAINTY BUDGET	
Source of Uncertainty	**Uncertainty (±%)**
Field Measurement Isotropy error in tissue-simulating liquid: < ±0.2dB Frequency response: < ±0.1dB Linearity: < ±0.2dB Data acquisition and evaluation: < ±0.05dB Probe calibration: < ±10% ELF and RF disturbance: < ±10μW/g	***13***
Spatial Peak Evaluation Extrapolation and interpolation error, and position error: < ±0.1dB Integration and maximum search routine: < ±0.1dB Inaccuracies in cube's shape: < ±0.2dB	***7***
Tissue Calibration HP85070 dielectric probe	***10***
Total (rss)	**17.8**

6.5 Measurement Traceability

All measurements described in this report are traceable to National Institute of Standards and Technology (NIST) standards or appropriate national standards..

7.0 WARNING LABEL INFORMATION - USA

Not Applicable

8.0 REFERENCES

[1] ANSI, *ANSI/IEEE C95.1-1991: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3kHz to 300 Ghz*, The Institute of Ecetrical and Electronics Engineers, Inc., New York, NY 10017, 1992

[2] Federal Communications Commission, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields", OET Bulletin 65, FCC, Washington, D.C. 20554, 1997

[3] Thomas Schmid, Oliver Egger, and Niels Kuster, "Automated E-field scanning system for dosimetric assessments", *IEEE Transaction on Microwave Theory and Techniques*, vol. 44, pp. 105-113, Jan. 1996.

[4] Niels Kuster, Ralph Kastle, and Thomas Schmid, "Dosimetic evaluation of mobile communications equipment with know precision", IEICE Transactions on Communications, vol. E80-B, no. 5, pp.645-652, May 1997.

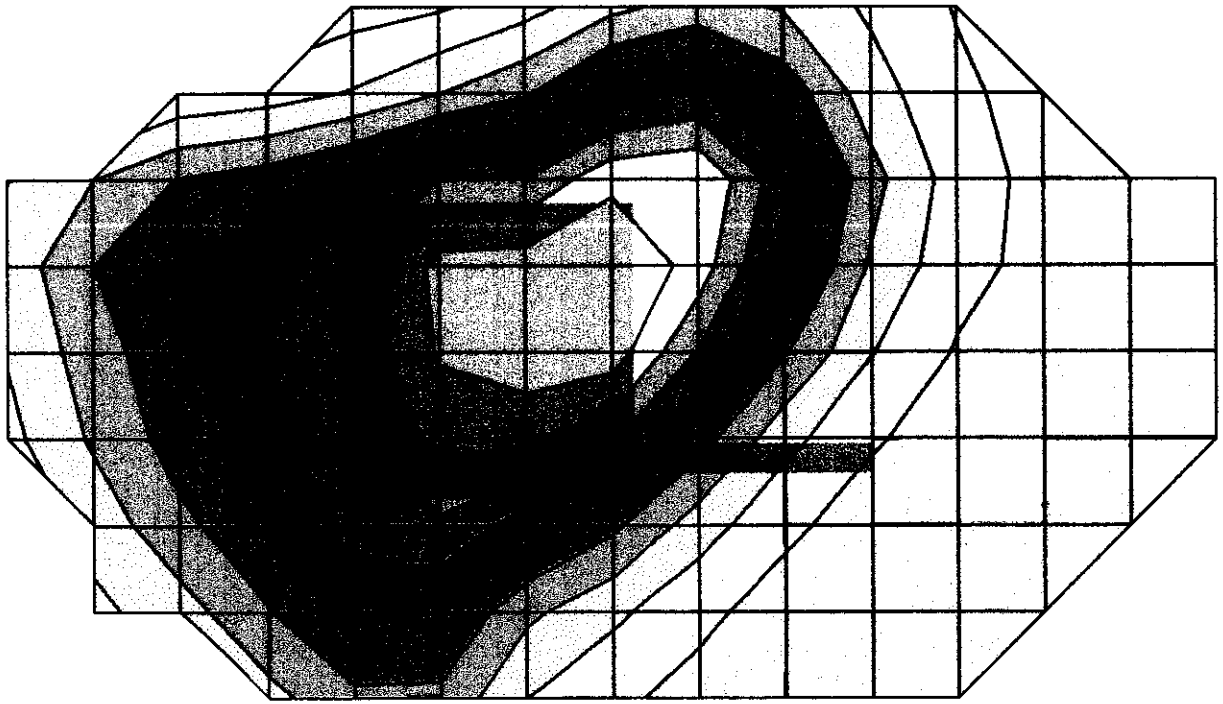
APPENDIX A - SAR Evaluation Data

Please note that the graphical visualization of the phone position onto the SAR distribution gives only limited information on the current distribution of the device, since the curvature of the head results in graphical distortion. Full information can only be obtained either by H-field scans in free space or SAR evaluation with a flat phantom.

Powerdrift is the measurement of power drift of the device over one complete SAR scan.

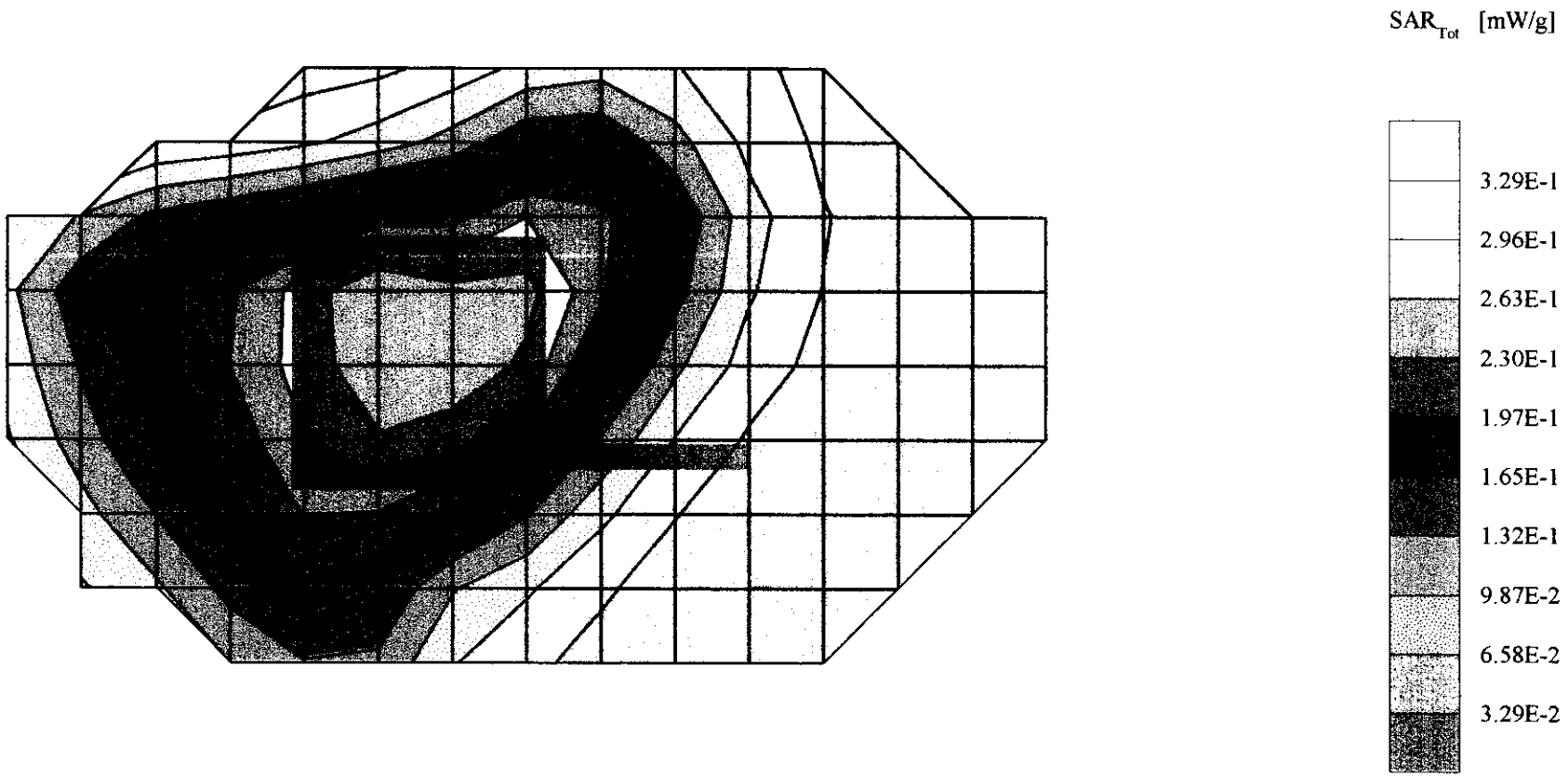
Tellus Technology, Inc

Phantom: Generic Twin; Section: Flat; Position: (90°,90°); Frequency: 824 [MHz]
Probe: ET3DV5 - SN1333; ConvF(5.76,5.76,5.76); Crest Factor: 1.0; Muscle 900 MHz:σ = 0.99 [mho/m] ε_r = 56.5 ρ = 1.00 [g/cm^3]
Cube 5x5x7; SAR (1g): 0.189 [mW/g], SAR (10g): 0.148 [mW/g] * Max outside; (Worst-case extrapolation)
Course:Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: -0.00 dB,



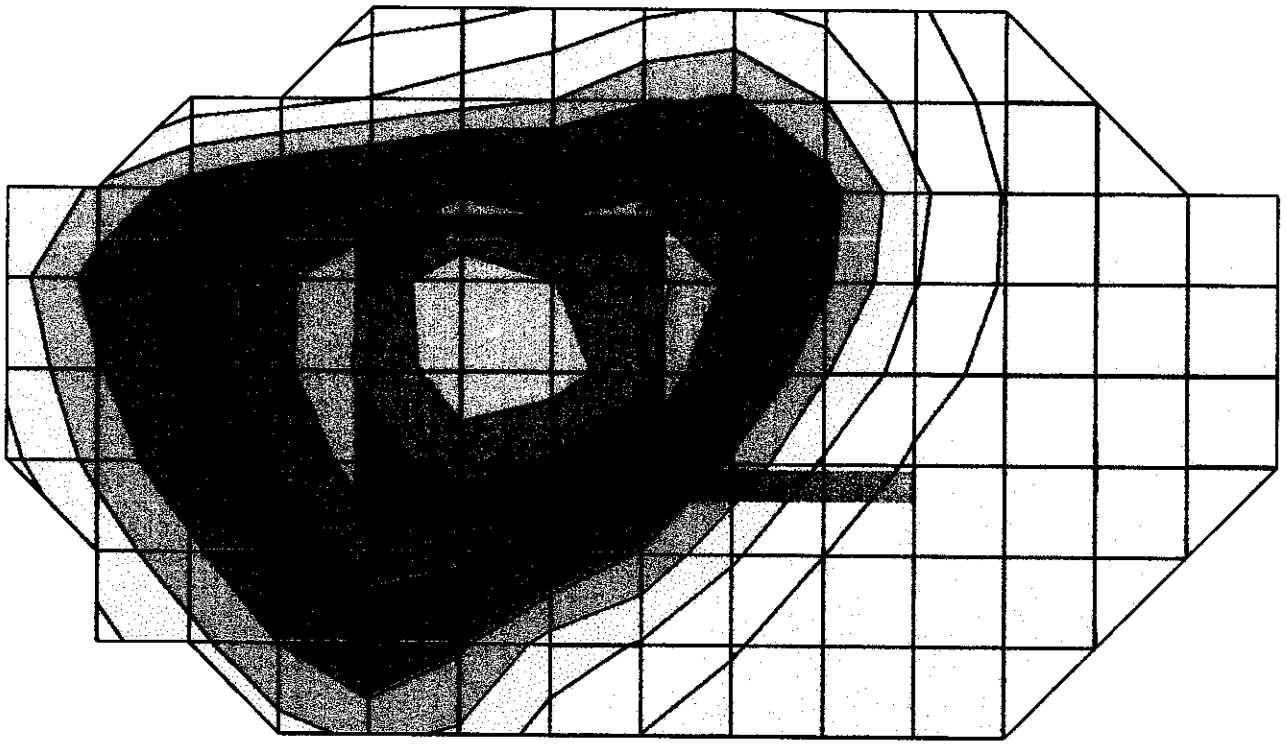
Tellus Technology, Inc

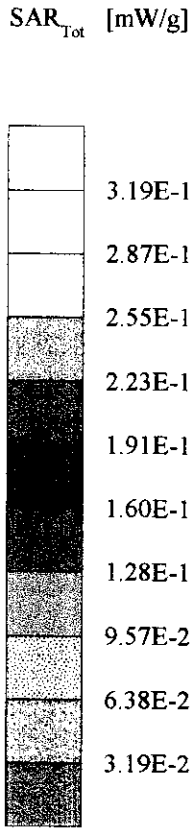
Phantom: Generic Twin; Section: Flat; Position: (90°,90°); Frequency: 836 [MHz]
Probe: ET3DV5 - SN1333; ConvF(5.76,5.76,5.76); Crest Factor: 1.0; Muscle 900 MHz:σ = 0.99 [mho/m] ε_r = 56.5 ρ = 1.00 [g/cm^3]
Cube 5x5x7; SAR (1g): 0.313 [mW/g], SAR (10g): 0.244 [mW/g]; (Worst-case extrapolation)
Course:Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: -0.11 dB,



Tellus Technology, Inc

Phantom: Generic Twin; Section: Flat; Position: (90°,90°); Frequency: 849 [MHz]
Probe: ET3DV5 - SN1333; ConvF(5.76,5.76,5.76); Crest Factor: 1.0; Muscle 900 MHz:σ = 0.99 [mho/m] ε_r = 56.5 ρ = 1.00 [g/cm^3]
Cube 5x5x7; SAR (1g): 0.307 [mW/g], SAR (10g): 0.239 [mW/g] * Max outside; (Worst-case extrapolation)
Course:Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: -0.07 dB,





APPENDIX B - Antenna Specifications

TeLLUS Technology Inc.

40990 Encyclopedia Circle
Fremont, California 94538-2470, USA
Tel: +1 (510) 498 8500
Fax: +1 (510) 498 8540

MONARCH M130C ANTENNA SPECIFICATIONS

Frequency Range:	824 – 894 MHz
Gain:	0 dBi
VSWR:	2.0 : 1 maximum
Radiation Pattern:	Omnidirectional in horizontal plane
Operating Temp.:	0 to +50 degrees C
Storage Temp.:	-25 to +85 degrees C

APPENDIX C - E-Field Probe Calibration Data

10.0 **Frequency Stability vs Temperature**, 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 frequency counter via feedthrough attenuators. 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 Result:	Passes

Frequency: 837.00 MHz **Tolerance: ±2091 Hz**		
TEMPERATURE, °C	**FREQUENCY (MHz)**	**DIFFERENCE (Hz)**
50	836.999948	-52
40	836.999870	-139
30	836.999914	-86
20	836.999986	-14
10	836.999968	-32
0	836.999916	-84
-10	836.999924	-76
-20	836.999902	-98
-30	836.999874	-123

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Contact:	Minh Dao
Address:	40990 Encyclopedia Circle Fremont, California 94538,
Tel. number:	(510) 498-8500
Fax. number:	(510) 498-8540
Applicable Regulation:	FCC rule part 2.1093, FCC Docket 96-326 & Supplement C to OET Bulletion 65
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We attest to the accuracy of this report:

Ollie Moyrong
Test Engineer

C. K. Li
Engineering Manager

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Telephone 650-463-2900 Fax 650-463-2910 Home Page www.worldlab.com

INTERTEK TESTING SERVICES

Company:	Tellus Technology, Inc.	Project #:	J98019153
EUT:	CDPD Wireless Modem	Date of Test:	8/21/98
Model:	M130C	Test Site #:	1
Test Mode:	Tx @ High Channel	Engineer:	Ollie Moyrong OM

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)	Spurious Attenuation (dB)	Margin (dB)
849.0	3.0	0	96.4	22.5	0.0	0.0	0.8	119.7	N/A	N/A
1697.8	3.0	1	36.2	24.7	0.0	0.0	1.2	62.1	57.6	-18.7
2546.9	3.0	1	30.2	28.1	0.0	0.0	2.3	60.6	59.1	-20.2
3395.9	3.0	0	28.5	30.2	0.0	0.0	2.5	61.2	58.5	-19.6
4244.7	3.0	0	58.1	32.4	-27.9	0.0	2.9	65.5	54.2	-15.3
5093.7	3.0	1	49.8	32.2	-28.1	0.0	3.2	57.1	62.6	-23.7
5942.8	3.0	1	48.1	34.4	-28.3	0.0	3.7	57.9	61.8	-22.9
6791.7	3.0	1	48.8	34.0	-28.0	0.0	4.2	59.0	60.7	-21.8
7640.7	3.0	1	48.9	35.8	-28.0	0.0	4.3	61.0	58.7	-19.8
8489.7	3.0	1	48.9	37.0	-27.2	0.0	4.8	63.5	56.2	-17.3

Note: Negative signs (-) in the Margin column signify levels below the limit.
Spurious emissions attentuation limit = 43 + 10log P = 38.9

INTERTEK TESTING SERVICES

Company:	Tellus Technology, Inc.	Project #:	J98019153
EUT:	CDPD Wireless Modem	Date of Test:	8/21/98
Model:	M130C	Test Site #:	1
Test Mode:	Tx @ Middle Channel	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)	Spurious Attenuation (dB)	Margin (dB)
837.0	3.0	1	98.4	22.3	0.0	0.0	0.8	121.5	N/A	N/A
1674.0	3.0	1	36.2	24.7	0.0	0.0	1.2	62.1	59.4	-20.5
2511.0	3.0	1	29.6	28.1	0.0	0.0	2.3	60.0	61.5	-22.6
3347.0	3.0	0	33.6	30.2	0.0	0.0	2.5	66.3	55.2	-16.3
4184.0	3.0	0	55.4	32.4	-27.9	0.0	2.9	62.8	58.7	-19.8
5021.0	3.0	0	48.7	32.2	-28.1	0.0	3.2	56.0	65.5	-26.6
5858.0	3.0	1	51.3	34.4	-28.3	0.0	3.7	61.1	60.4	-21.5
6695.0	3.0	1	46.9	34.0	-28.0	0.0	4.2	57.1	64.4	-25.5
7529.0	3.0	0	47.4	35.8	-28.0	0.0	4.3	59.5	62.0	-23.1
8367.0	3.0	0	45.2	37.0	-27.2	0.0	4.8	59.8	61.7	-22.8

Note: Negative signs (-) in the Margin column signify levels below the limit.
Spurious emissions attentuation limit = 43 + 10log P = 38.9

INTERTEK TESTING SERVICES

Company:	Tellus Technology, Inc.	Project #:	J98019153
EUT:	CDPD Wireless Modem	Date of Test:	8/21/98
Model:	M130C	Test Site #:	1
Test Mode:	Tx @ Low Channel	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)	Spurious Attenuation (dB)	Margin (dB)
824.0	3.0	0	100.3	22.3	0.0	0.0	0.8	123.4	N/A	N/A
1648.0	3.0	1	42.8	24.7	0.0	0.0	1.2	68.7	54.7	-15.8
2472.1	3.0	1	41.4	28.1	0.0	0.0	2.3	71.8	51.6	-12.7
3296.1	3.0	1	55.1	30.2	-27.9	0.0	2.5	59.9	63.5	-24.6
4120.1	3.0	1	47.0	32.4	-27.9	0.0	2.9	54.4	69.0	-30.1
4944.2	3.0	0	48.3	32.2	-28.1	0.0	3.2	55.6	67.8	-28.9
5768.3	3.0	0	47.1	34.4	-28.3	0.0	3.7	56.9	66.5	-27.6
6592.3	3.0	0	46.2	34.0	-28.0	0.0	4.2	56.4	67.0	-28.1
7416.3	3.0	0	46.9	35.8	-28.0	0.0	4.3	59.0	64.4	-25.5
8240.4	3.0	0	44.3	37.0	-27.2	0.0	4.8	58.9	64.5	-25.6

Note: Negative signs (-) in the Margin column signify levels below the limit.
Spurious emissions attentuation limit = 43 + 10log P = 38.9

ITS Intertek Testing Services

Specific Absorption Rate (SAR) Evaluation

Performed on the

Wireless PC Card Modem
Model: M130C
for
Tellus Technology, Inc.

FCC rule part 2.1093

Date of Test: August 24 & 25, 1998

Job #: J98019153

Total No. of Pages Contained in this Report: 16 + data pages

The results contained in this report were derived from measurements performed on the identified test samples. Any implied performance of other samples on this report is dependent on the representative of the samples tested.

NVLAP®

FCC SAR and ANSI C63.4-1992, Rev. 6/97

Intertek Testing Services NA Inc.
1365 Adams Court, Menlo Park, CA 94025
Telephone 650-463-2900 Fax 650-463-2910 Home Page www.worldlab.com

Trade Name:	Monarch	**Model No.:**	M130C
Serial No.:	Not Labeled	**Test Engineer:**	Ollie Moyrong

TEST CONDITIONS			
Ambient Temperature	22 °C	Relative Humidity	50 %
Test Signal Source	Test Mode	Signal Modulation	CW
Output Power Before SAR Test	25.9	Output Power After SAR Test	25.8
Test Duration	25 Min. Each	Number of Battery Change	4

Worst Case Test Data (Muscle Tissues)

Channel	Operating Mode	Duty Cycle ratio	Antenna Position	Measured SAR_{1g} (mW/g)
824 (MHz)	CDPD	1	horizontal (Flat with Laptop)	0.189
836 (MHz)	CDPD	1	Horizontal (Flat with Laptop)	0.313
849 (MHz)	CDPD	1	Horizontal (Flat with Laptop)	0.307

Note: a) Worst case data were reported
b) Duty cycle factor included in the measured SAR data
c) Tests were performed with differnet device orientation that a user will encounter during normal use. Please refer to configuration photo section for detail.

ITS Intertek Testing Services

FCC Part 22 Type Acceptance

Performed on the

Wireless PC Card Modem
Model: M130C
for
Tellus Technology, Inc.

FCC ID: NZ6M8130C

Date of Test: 7/16 & 24/98, 8/21/98, & 9/1-2/98

Report #: J98019153

Total No. of Pages Contained in this Report: 26 + Data Pages & Supporting Documents

NVLAP®

Intertek Testing Services NA Inc.
1365 Adams Court, Menlo Park, CA 94025
Telephone 650-463-2900 Fax 650-463-2910 Home Page www.worldlab.com

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Tested By: _____ 9/9/98

Ollie Moyrong
Test Engineer

Date

Apprroved By: _____ 9/8/98

C.K. Li
EMC Engineering Manager

Date

1.2 Product Description

The Monarch Model 8130C is a wireless PC card modem.

Use of Product	Wireless modem for data
Whether quantity (>1) production is planned	[X] Yes, [ ] No
Cellular Phone standards	[ ] AMPS [ ] NAMPS [X] CDPD [ ] TDMA [ ] CDMA
Type(s) of Emission	30K0F1D
Max. Allowed modulation	10 **kHz**
Max. Allowed deviation	4.8 **kHz**
Range of RF Output	400 **mW**
The dc voltage applied to and current into the several elements of the final RF amplifying device	*Voltage:* **V** Current: **A**
Frequency Range	824 - 849 **MHz**
Max. number of Channels	832
Antenna(e) & Gain	Monopole, 0 **dBi**
Detachable antenna ?	[ ]Yes [X] No
Receiver L.O. frequency	914 - 939 **MHz**
External input	[ ] Audio [X] Digital Data

1.3 Related Submittal(s) Grants

[X] None

[X] DOC for computer section, a separate DOC is prepared.

2.0 **RF Power Output**, FCC §2.985(a), §22.913

2.1 Test Procedure

The transmitter output was connected to a calibrated coaxial attenuator, 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 antenna port was determined by adding the value of the attenuator to the spectrum analyzer reading.

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

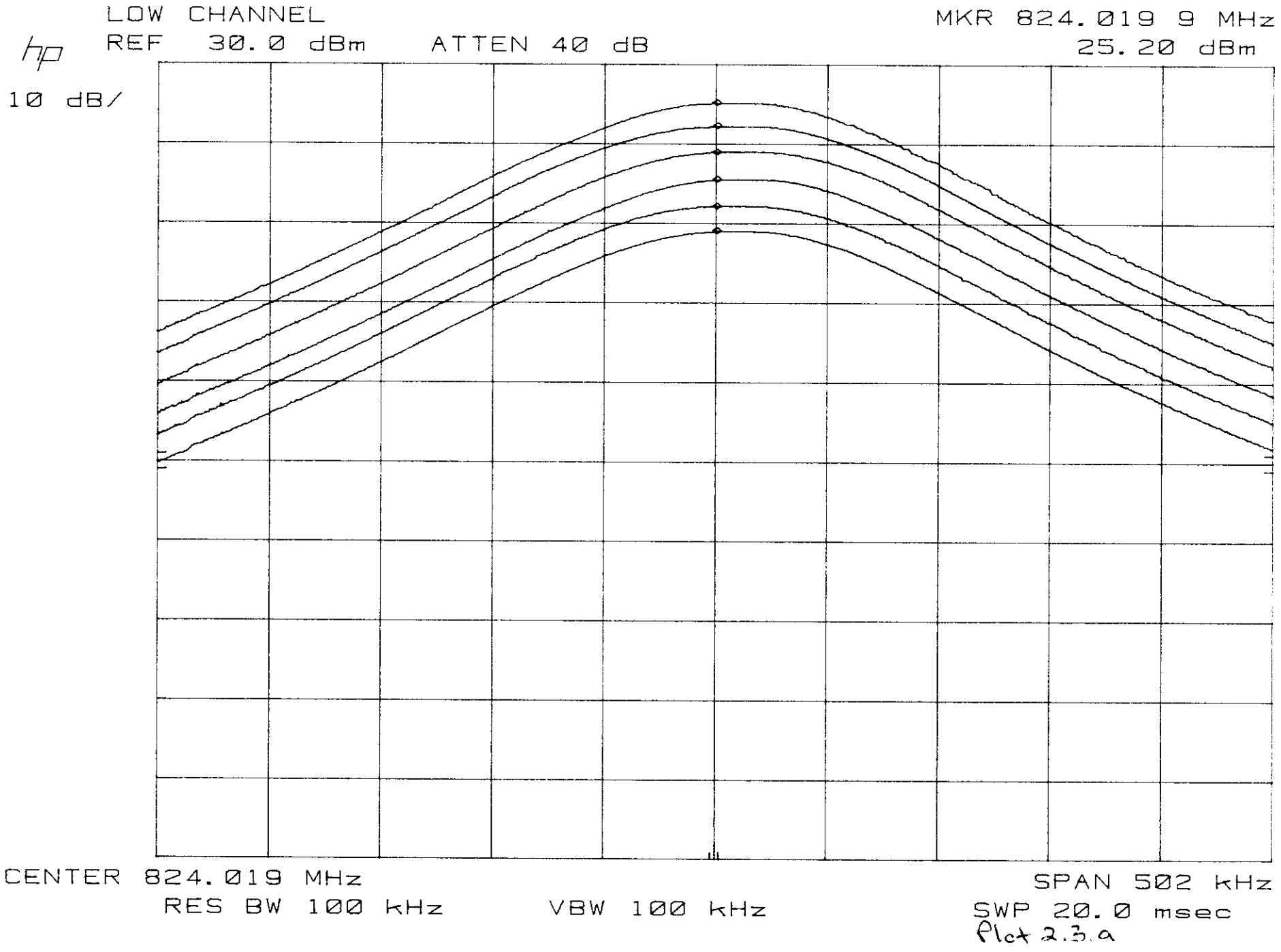
2.2 Test Equipment

Hewlett Packard HP8566B Spectrum Analyzer, 100 Hz - 22 GHz
Tektronix 2782

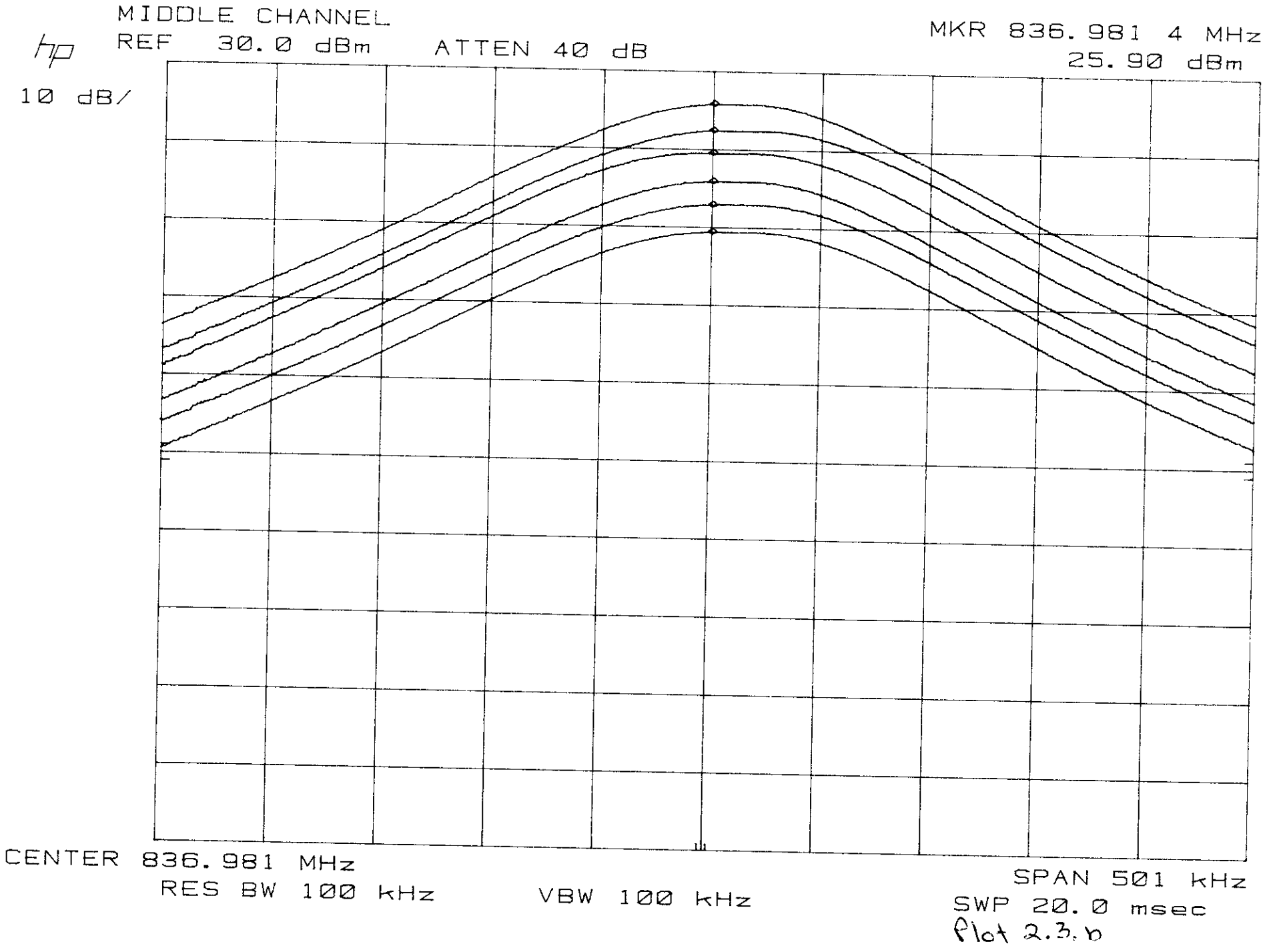
2.3 Test Results

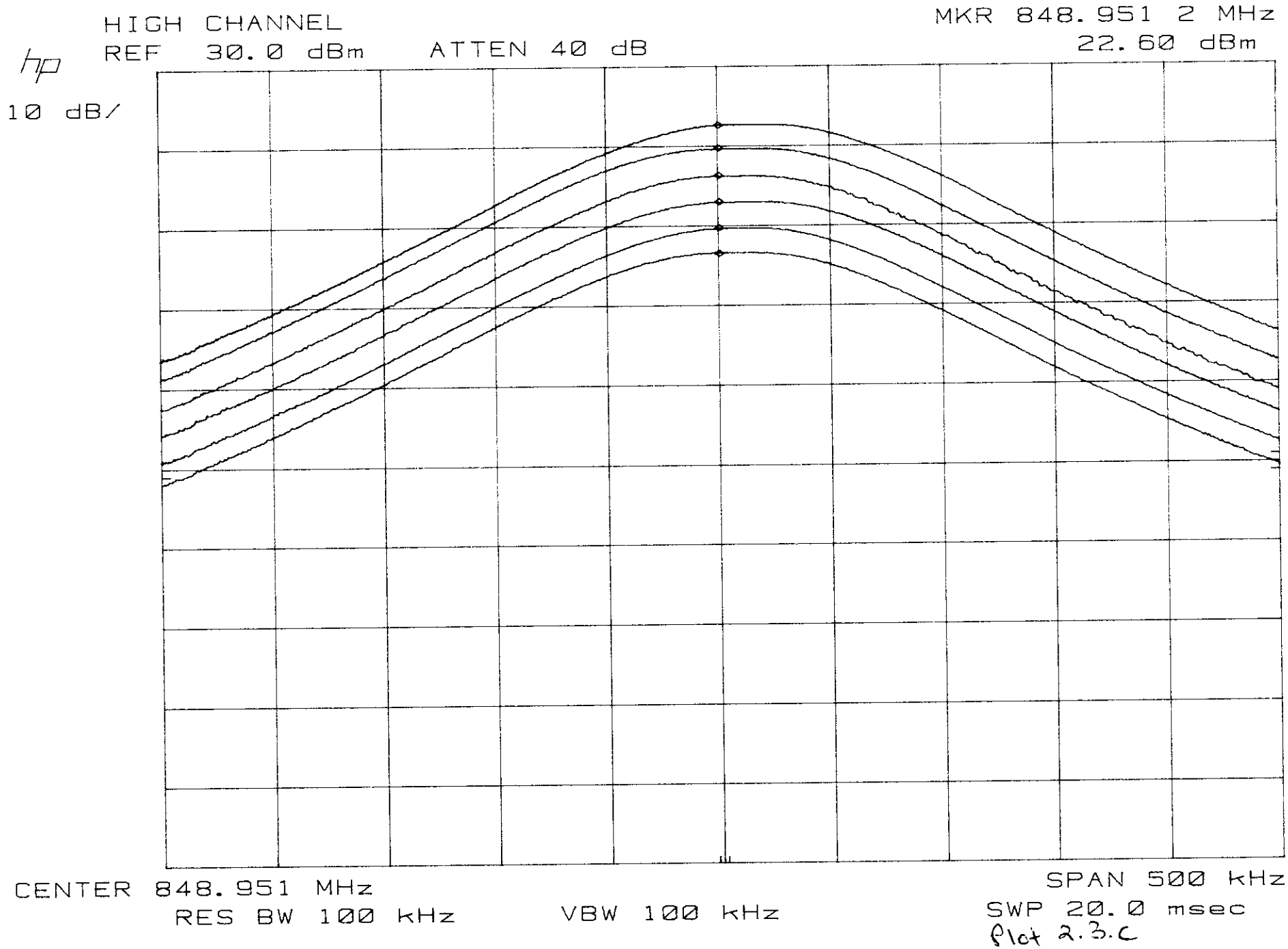
Refer to the attached plots:

2.3.a Low Channel
2.3.b Middle Channel
2.3.c High Channel


LOW CHANNEL
REF 30.0 dBm
ATTEN 40 dB
MKR 824.019 9 MHz
25.20 dBm
10 dB/
CENTER 824.019 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 502 kHz
SWP 20.0 msec

Plot 2.3.a


MIDDLE CHANNEL
hp
REF 30.0 dBm
ATTEN 40 dB
MKR 836.981 4 MHz
25.90 dBm
10 dB/
CENTER 836.981 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 501 kHz
SWP 20.0 msec
Plot 2.3.b


HIGH CHANNEL
REF 30.0 dBm
ATTEN 40 dB
MKR 848.951 2 MHz
22.60 dBm
10 dB/
CENTER 848.951 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 500 kHz
SWP 20.0 msec

Plot 2.3.C

3.0 Effective Radiated Power, 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 ERP was calculated as follows:

$$ERP(dBm) = E(dBuV/m) + 20 \log D - 10 \log 30 - 10 \log G - 90$$

where D = 3m, distance
G = 1.64, gain of half-wave dipole

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
Attenuator 20 dB

3.3 Test Results

Passes	Refer to the attached data sheet.

Test Mode:	Tx		
Test site:	1	Test Distance:	3 m
Engineer:	O.M.		

FCC Part 22 Effective Radiated Power

Frequency MHz	SA Reading dB(μV)	Antenna Factor dB(1/m)	Cable Loss dB	Field Strength dB(μV/m)	ERP dBm	EIRP dB(pW)
824.0	100.3	22.3	.8	123.4	26.0	118.1
837.0	98.4	22.3	.8	121.5	24.1	116.2
849.0	96.4	22.5	.8	119.7	22.3	114.4

4.0 **Modulation Deviation Limiting**, 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 4.1a).

4.2 Test Equipment

Marconi 2955A Radio Communication Test Set
Leader LFG-1300S Function Generator
LMV-182 AC Millivoltmeter

4.3 Test Results

X	Not applicable, the unit has no audio port

5.0 Audio Filter Characteristics, 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.

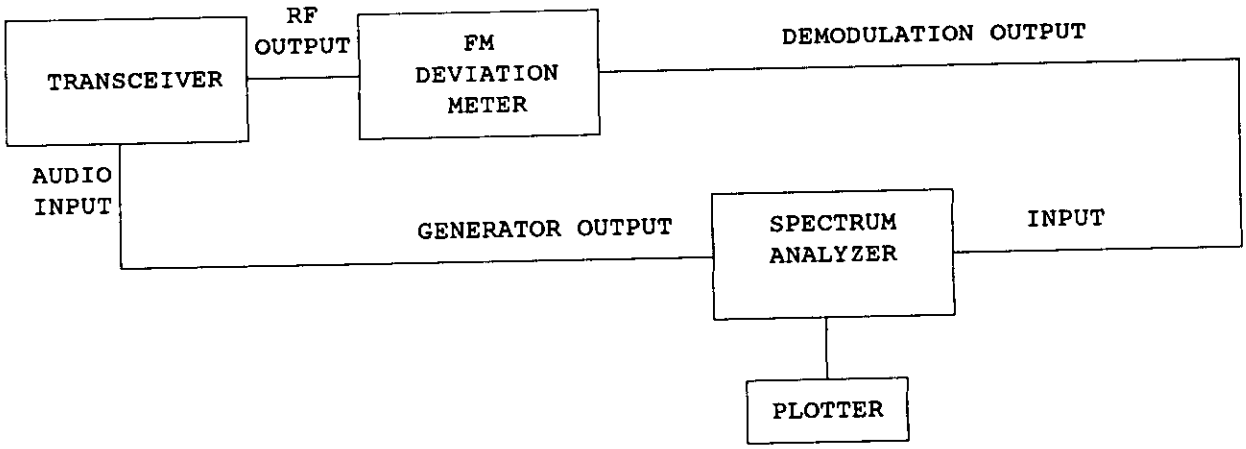
(iii) In the frequency range above 15 kHz, signals must be attenuated at least 28 dB.

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 2.7 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).

The block diagram of the test setup is 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, and with compressor OFF and expander OFF.

The audio filter response was plotted directly from the spectrum analyzer

5.2 Test Equipment

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

X	Not applicable, the unit has no audio port

6.3 Test Results

Passes	Refer to the attached plots.

Plot Number	Description
6.3.a	Carrier (No modulation), scan 100 kHz
6.3.b	Wideband emissions (Random Numbers), scan 100 kHz
6.3.c	Wideband emissions (Random Numbers), scan 300 kHz

TeLLUS Technology Inc.

40990 Encyclopedia Circle
Fremont, California 94538-2470, USA
Tel: +1 (510) 498 8500
Fax: +1 (510) 498 8540

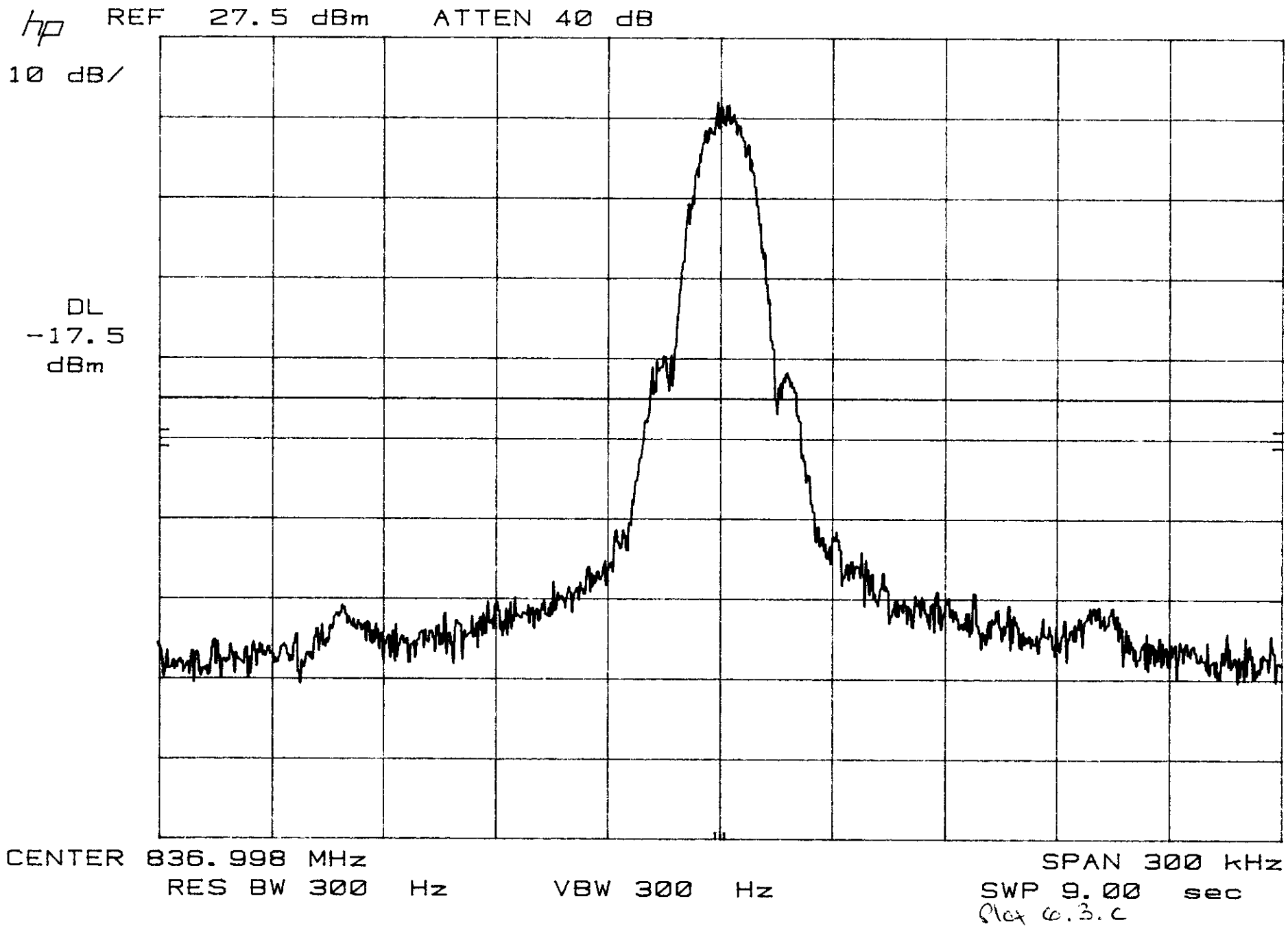
September 1, 1998

CDPD Wireless Modem, Monarch, Model M130C

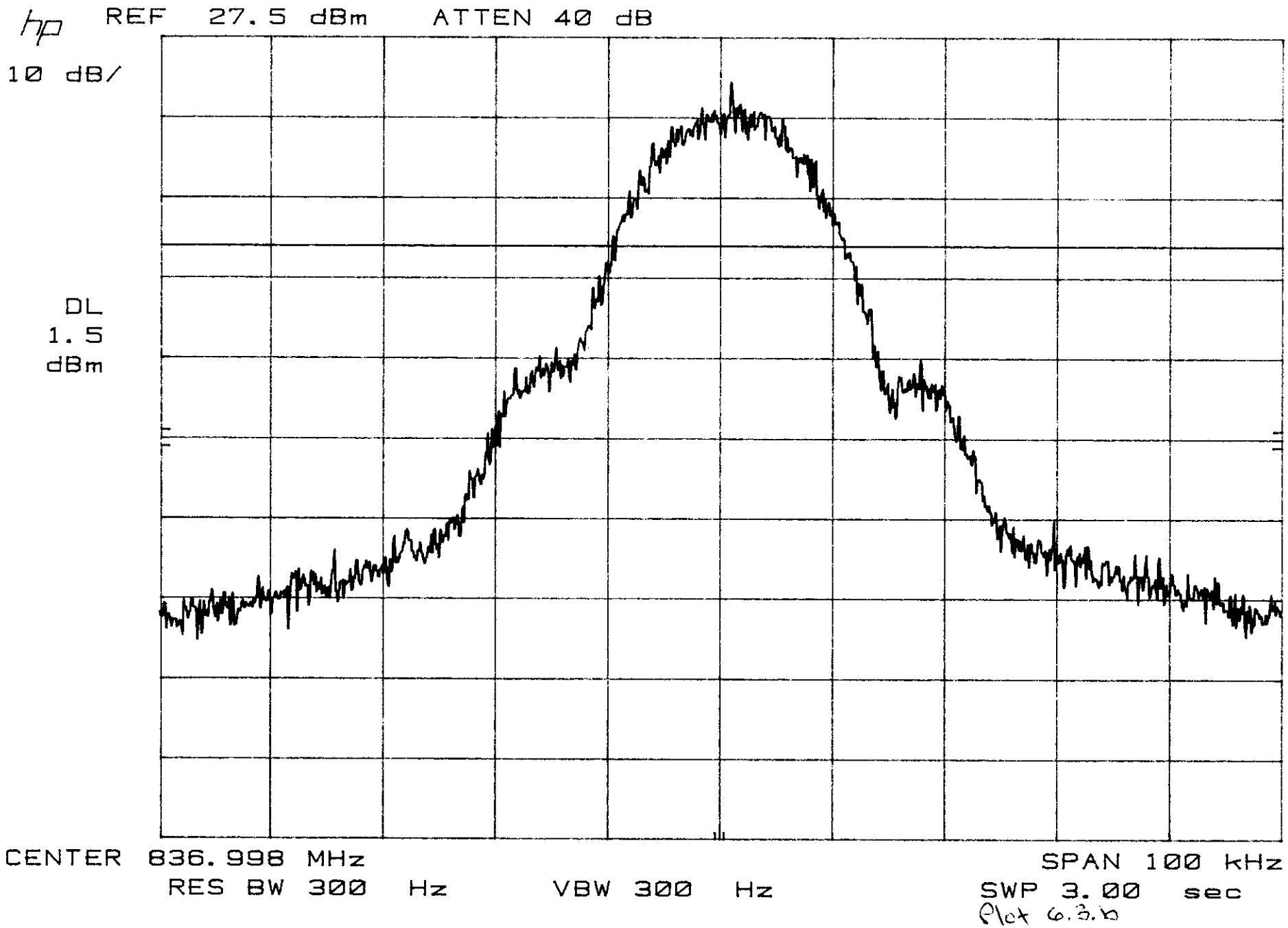
Explanation for the Spikes in the accompanying graph

The spikes resulting from the modulation tests of the CDPD equipment was caused by the UHF Quadrature Modulator Chip, RF2402. The chip is part of the equipment and hence the spikes are expected.

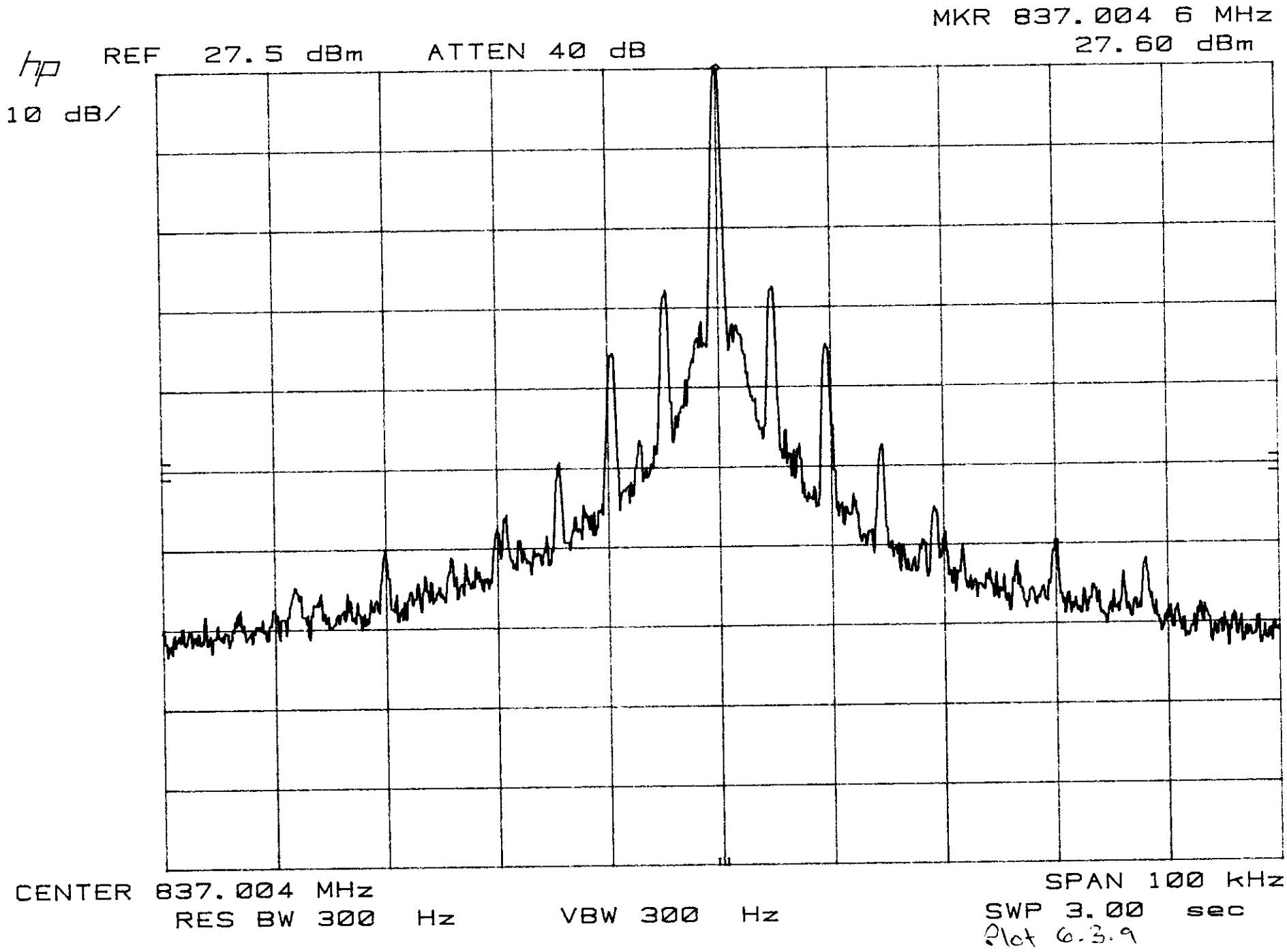
Ken Dunnegan
Ken Dunnegan


hp
REF 27.5 dBm
ATTEN 40 dB
10 dB/
DL
-17.5
dBm
CENTER 836.998 MHz
SPAN 300 kHz
RES BW 300 Hz
VBW 300 Hz
SWP 9.00 sec

Plot 6.3.C


hp
REF 27.5 dBm
ATTEN 40 dB
10 dB/
DL
1.5
dBm
CENTER 836.998 MHz
SPAN 100 kHz
RES BW 300 Hz
VBW 300 Hz
SWP 3.00 sec

Plot 6.3.b


MKR 837.004 6 MHz
27.60 dBm
hp
REF 27.5 dBm
ATTEN 40 dB
10 dB/
CENTER 837.004 MHz
RES BW 300 Hz
VBW 300 Hz
SPAN 100 kHz
SWP 3.00 sec

Plot 6.3.9

7.0 **Out of Band Emissions at Antenna Terminals** , 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.

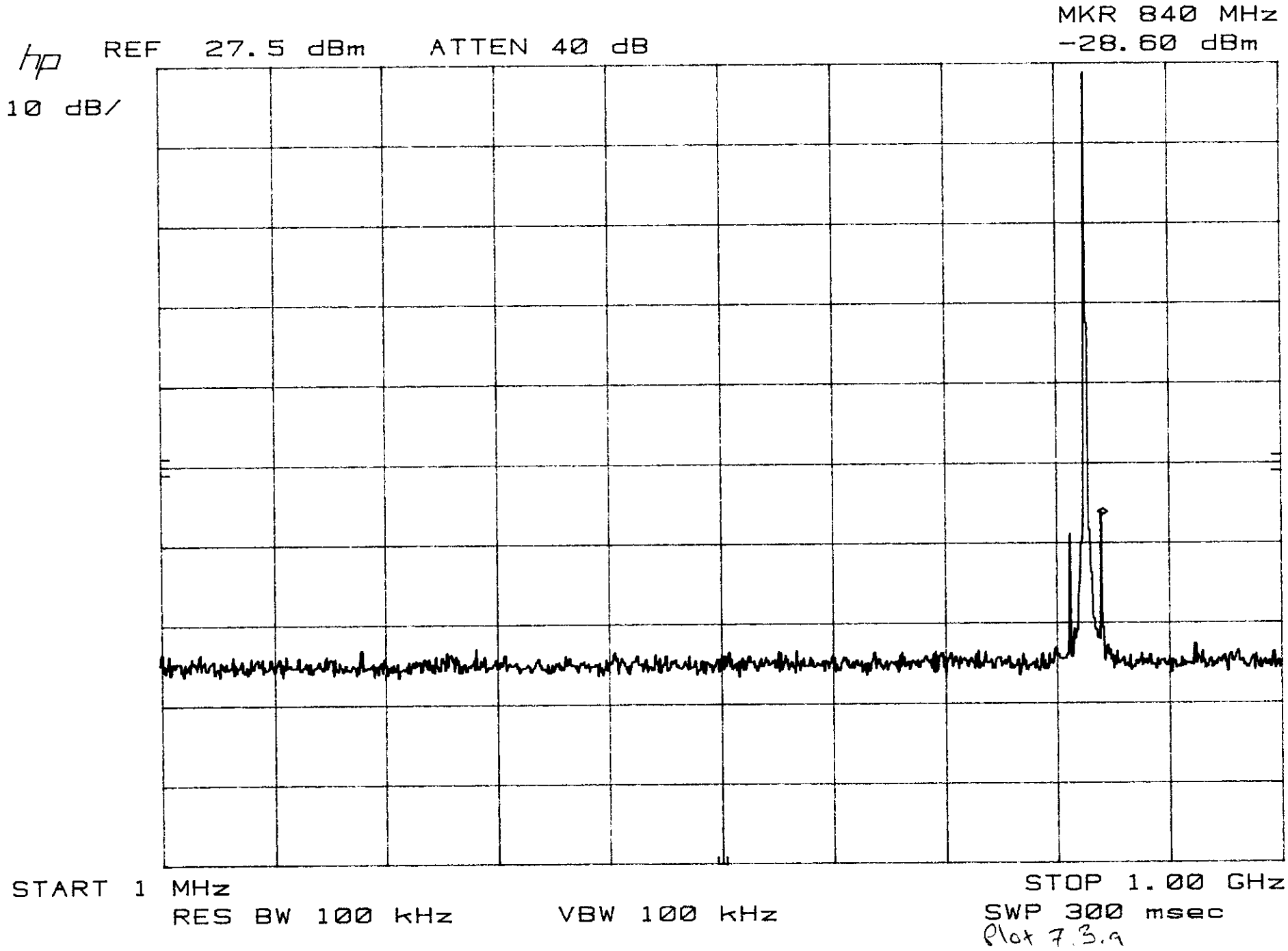
7.2 Test Equipment

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

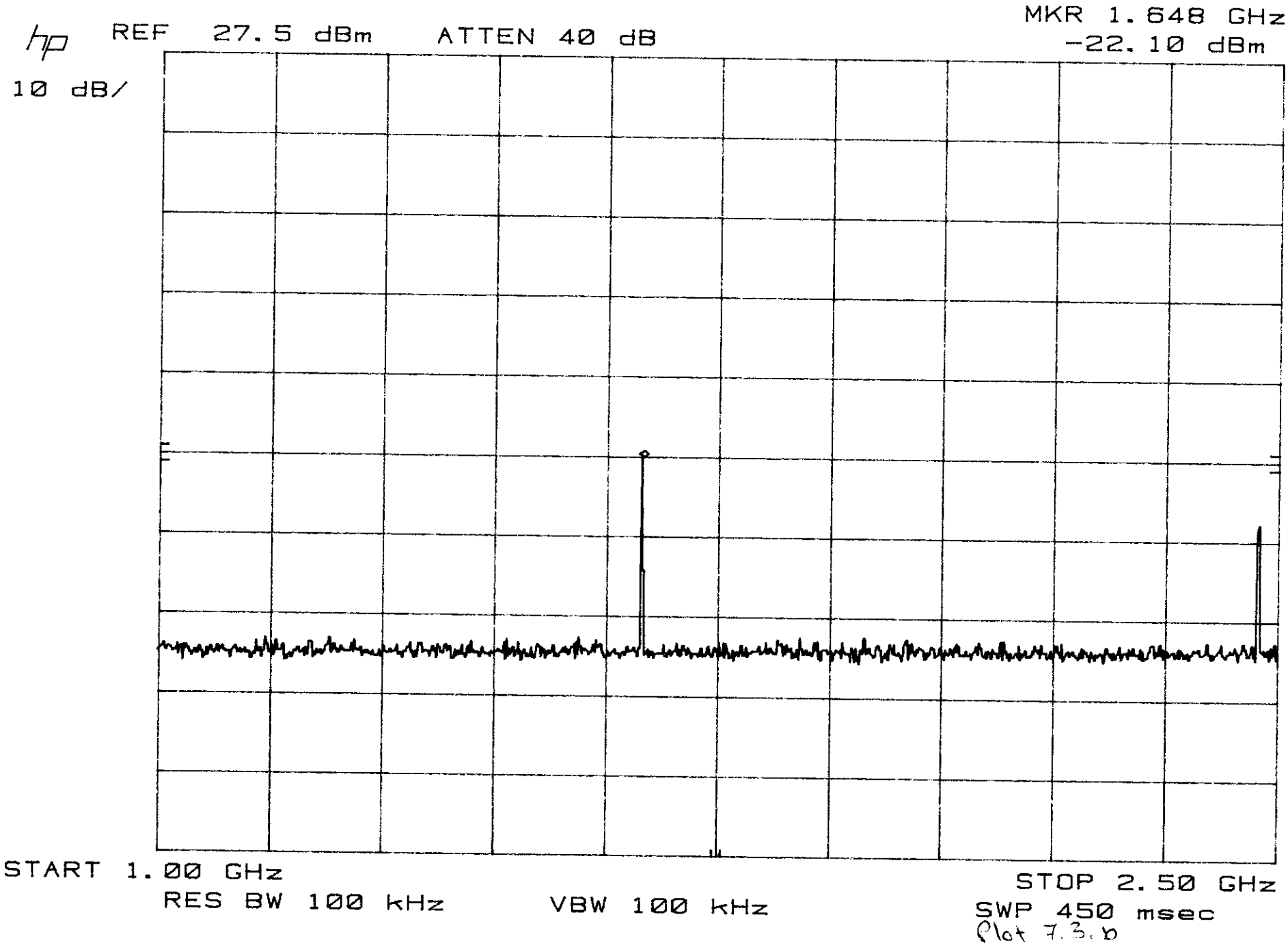
7.3 Test Results

Passes	Refer to the attached plots.

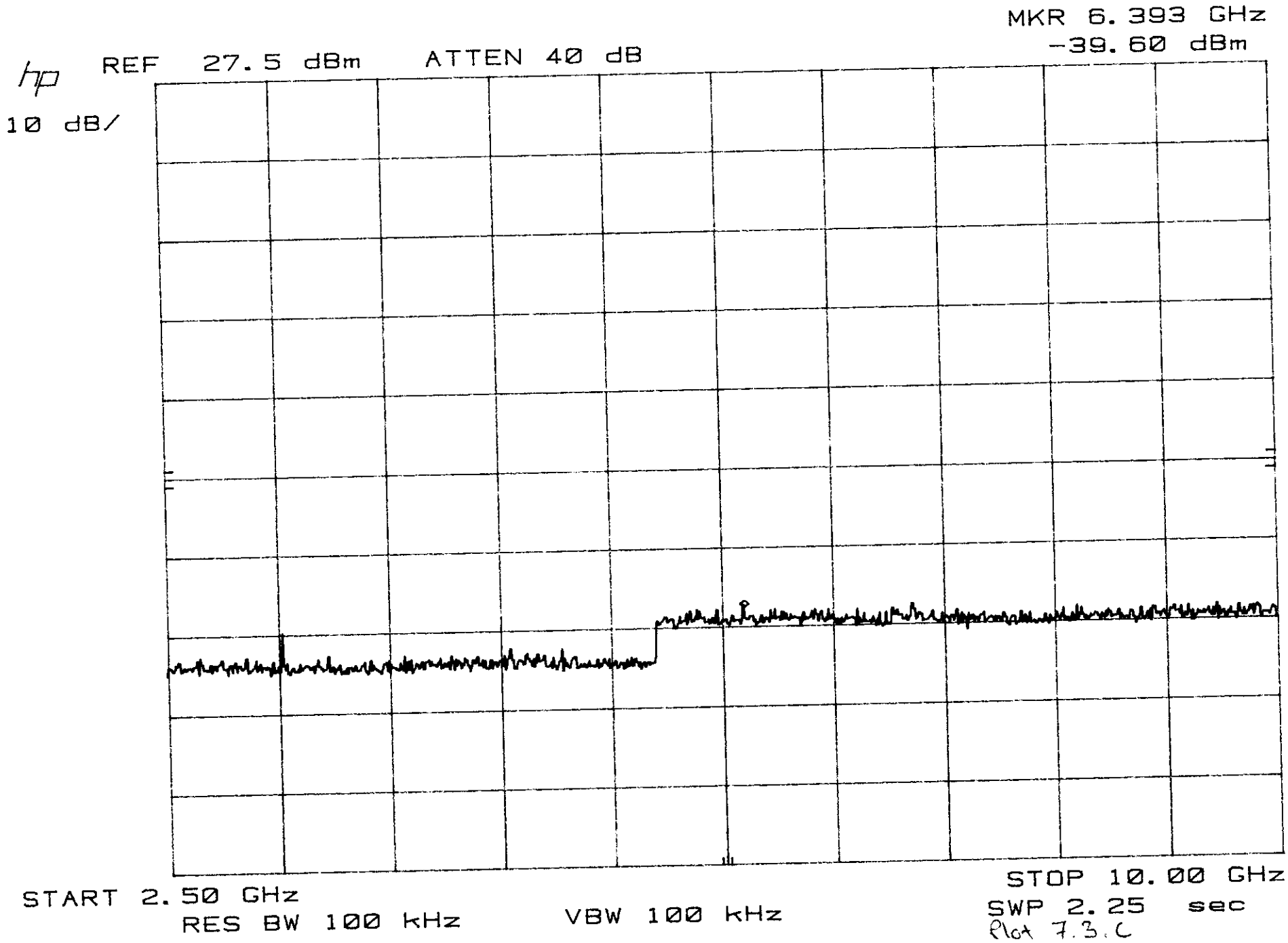
ANTENNA OUTPUT CONDUCTED EMISSIONS SPECTRUM ANALYZER PLOTS	
Plot Number	**Description**
7.3.a - 7.3.c	Low Channel, 1 MHz - 10 GHz
7.3.d - 7.3.f	Middle Channel 1 MHz - 10 GHz
7.3.h - 7.3.j	High Channel, 1 MHz - 10 GHz
7.3.k - 7.3.m	Low, Middle, & High Channels, 869 - 894 MHz


MKR 840 MHz
-28.60 dBm
REF 27.5 dBm
ATTEN 40 dB
10 dB/
START 1 MHz
STOP 1.00 GHz
RES BW 100 kHz
VBW 100 kHz
SWP 300 msec

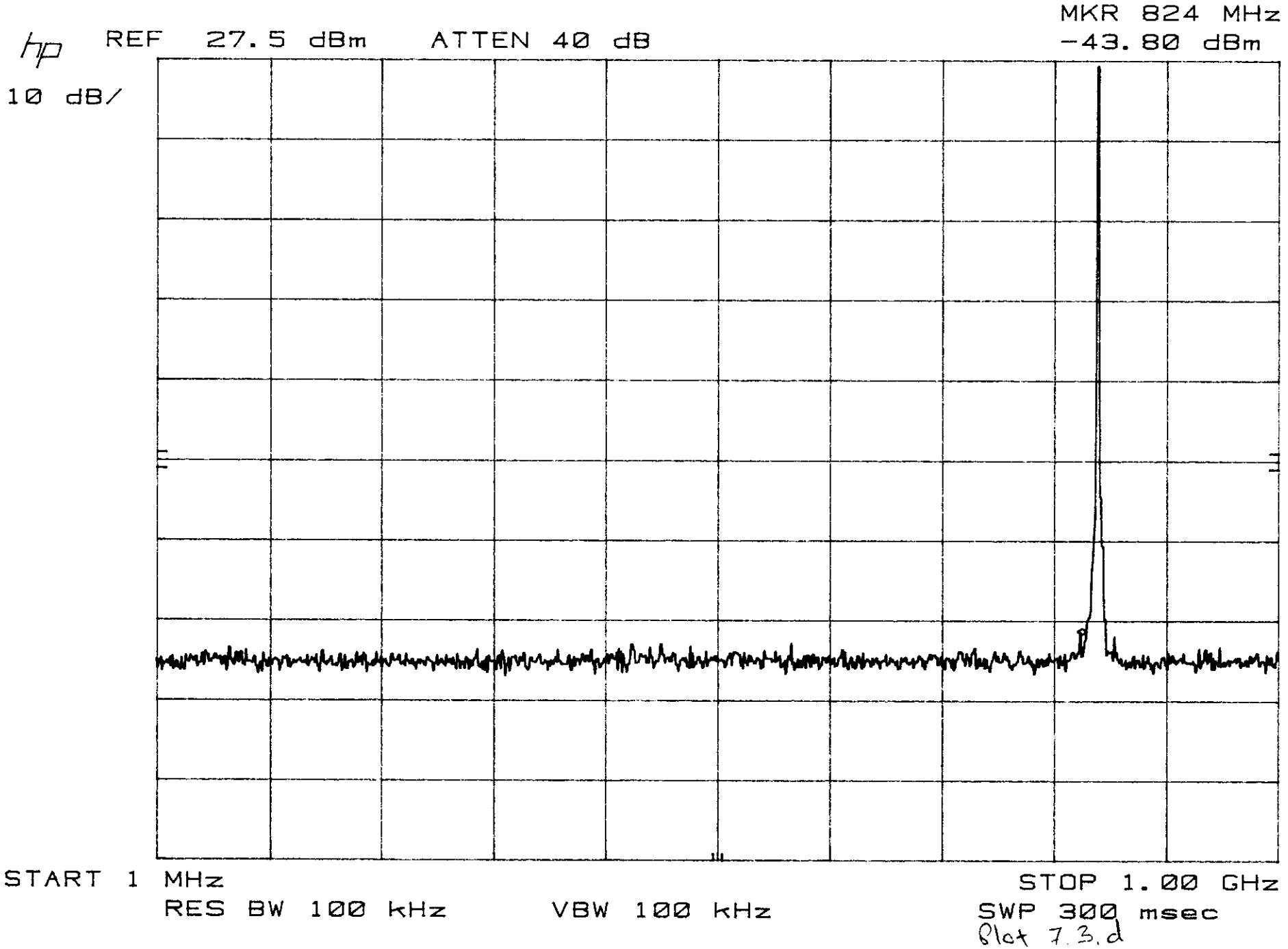
Plot 7.3.9

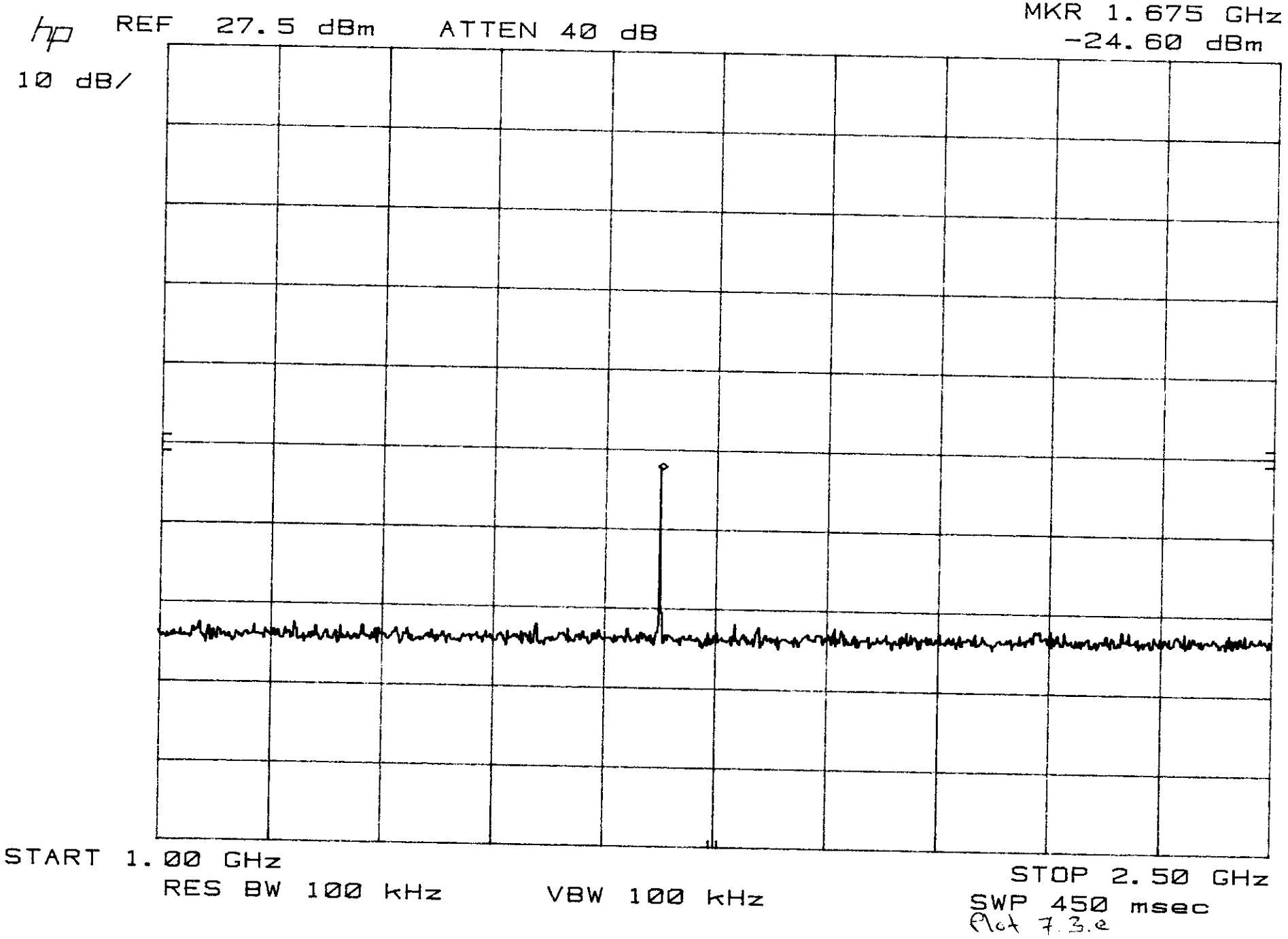

hp
REF 27.5 dBm
ATTEN 40 dB
MKR 1.648 GHz
-22.10 dBm
10 dB/
START 1.00 GHz
RES BW 100 kHz
VBW 100 kHz
STOP 2.50 GHz
SWP 450 msec

Plot 7.3.b

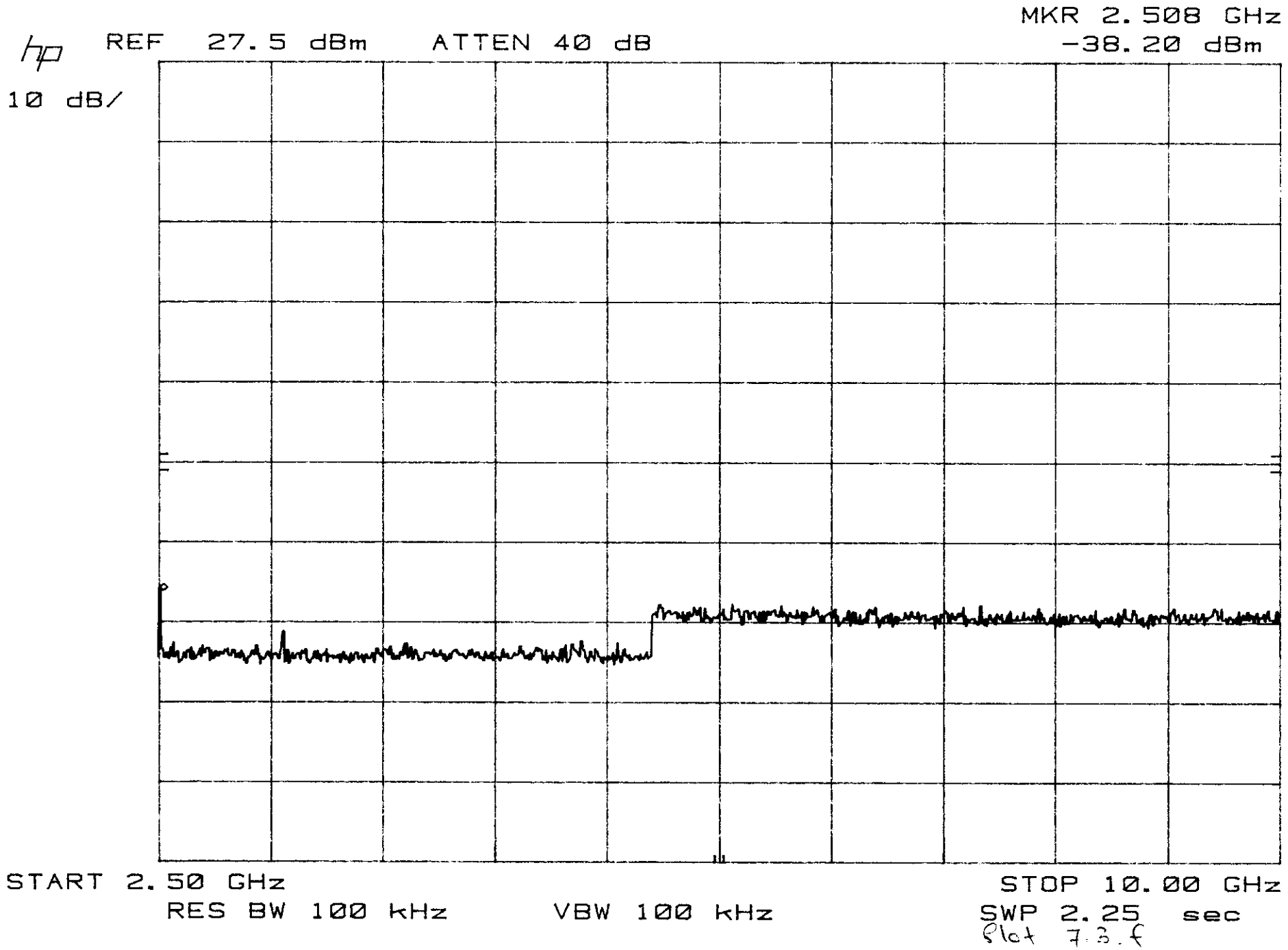

MKR 6.393 GHz
-39.60 dBm
hp
REF 27.5 dBm
ATTEN 40 dB
10 dB/
START 2.50 GHz
RES BW 100 kHz
VBW 100 kHz
STOP 10.00 GHz
SWP 2.25 sec

Plot 7.3.C

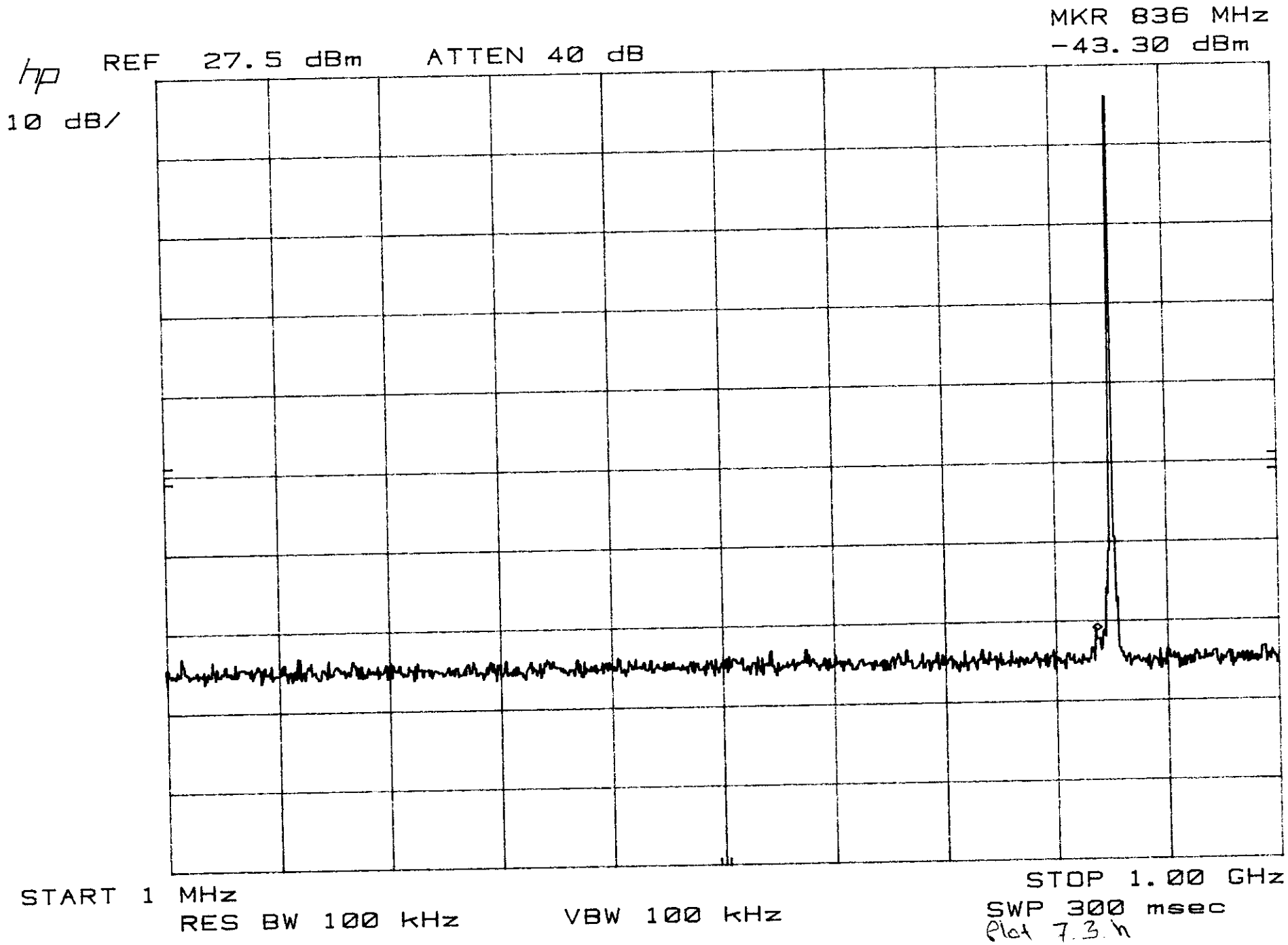

hp
REF 27.5 dBm
ATTEN 40 dB
MKR 824 MHz
-43.80 dBm
10 dB/
START 1 MHz
STOP 1.00 GHz
RES BW 100 kHz
VBW 100 kHz
SWP 300 msec
Plot 7.3.d


REF 27.5 dBm
ATTEN 40 dB
MKR 1.675 GHz
-24.60 dBm
10 dB/
START 1.00 GHz
RES BW 100 kHz
VBW 100 kHz
STOP 2.50 GHz
SWP 450 msec

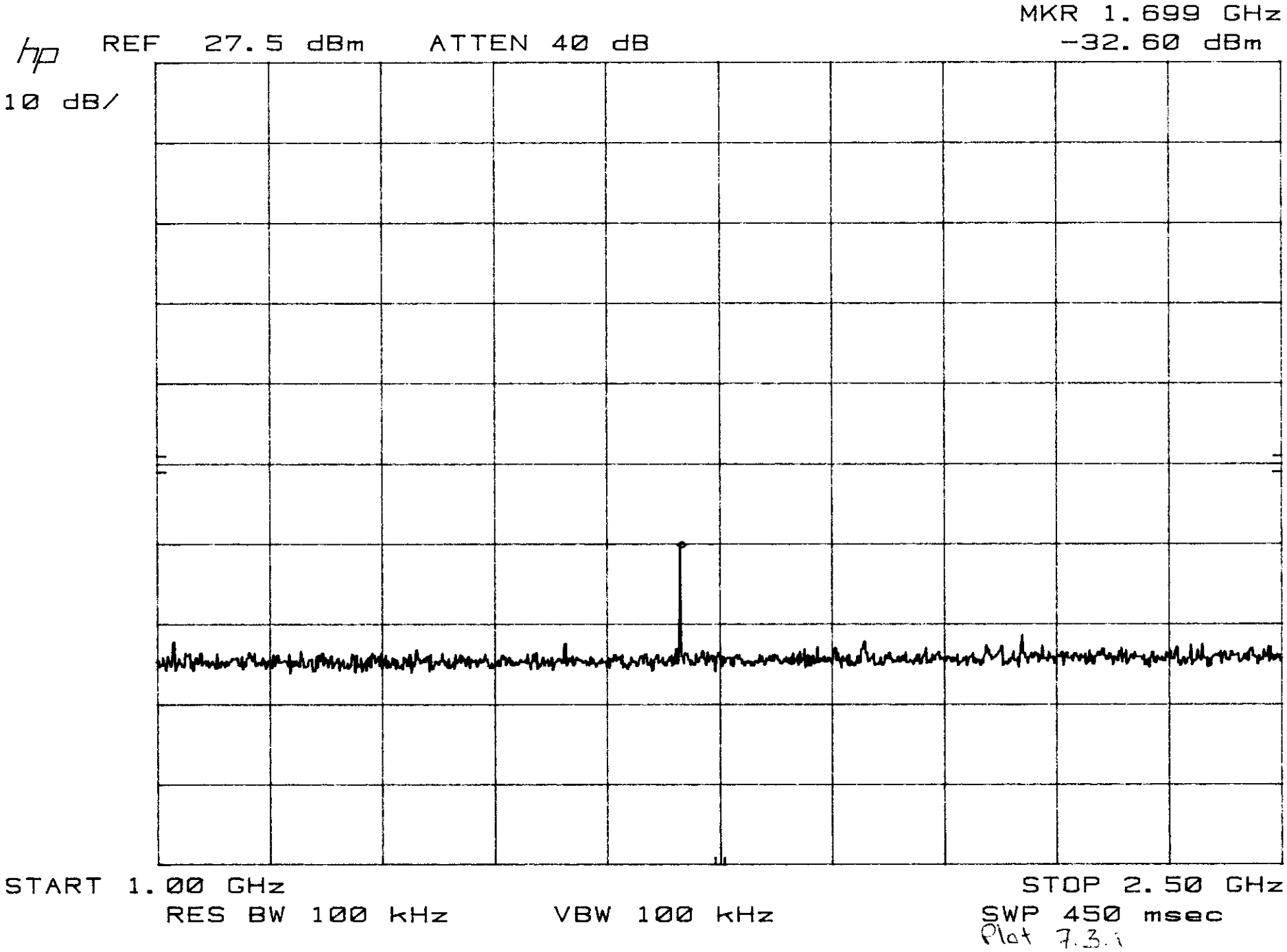
Plot 7.3.e


MKR 2.508 GHz
REF 27.5 dBm
ATTEN 40 dB
-38.20 dBm
10 dB/
START 2.50 GHz
STOP 10.00 GHz
RES BW 100 kHz
VBW 100 kHz
SWP 2.25 sec

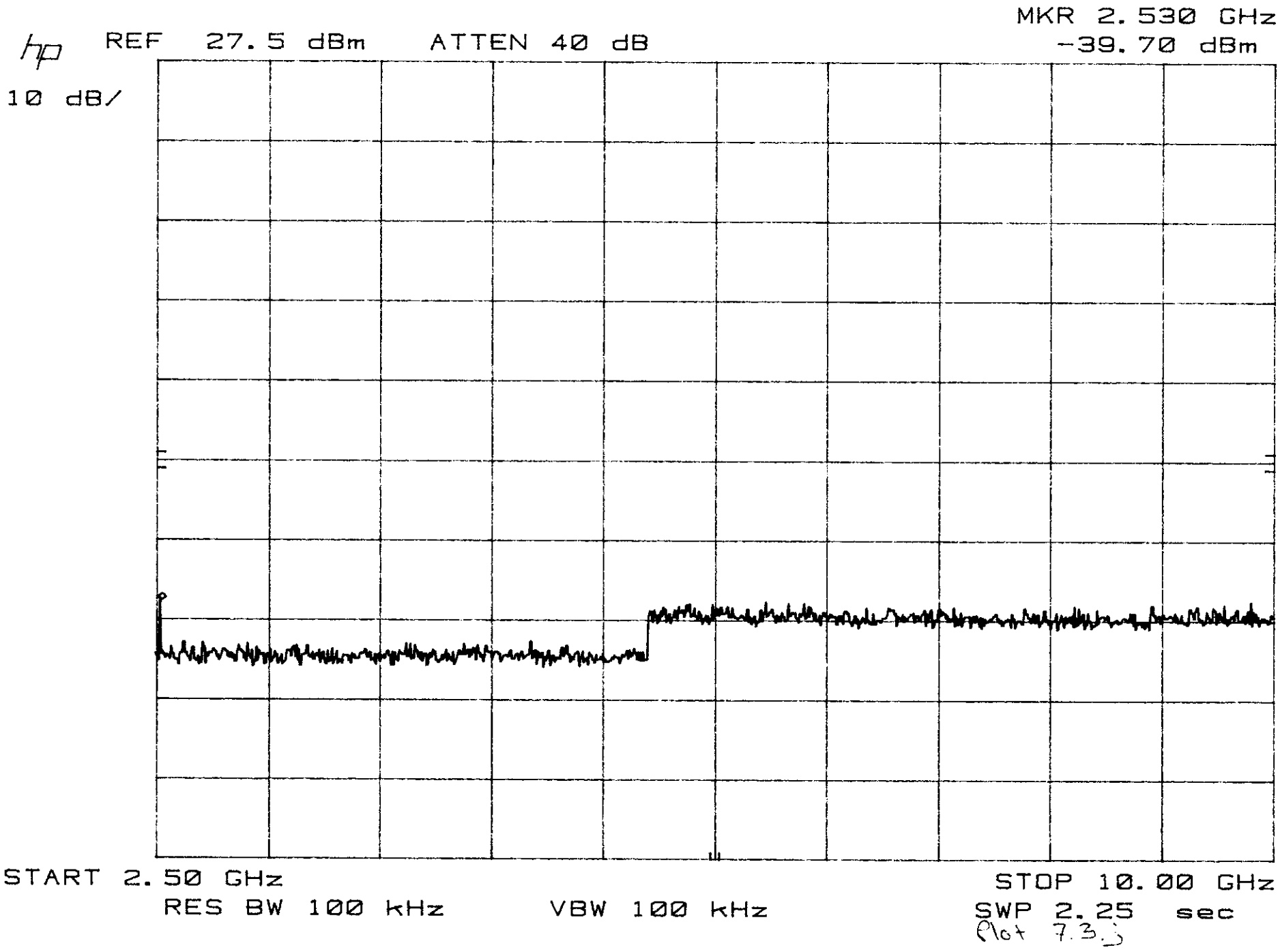
Plot 7.3.f


MKR 836 MHz
-43.30 dBm
REF 27.5 dBm
ATTEN 40 dB
10 dB/
START 1 MHz
RES BW 100 kHz
VBW 100 kHz
STOP 1.00 GHz
SWP 300 msec

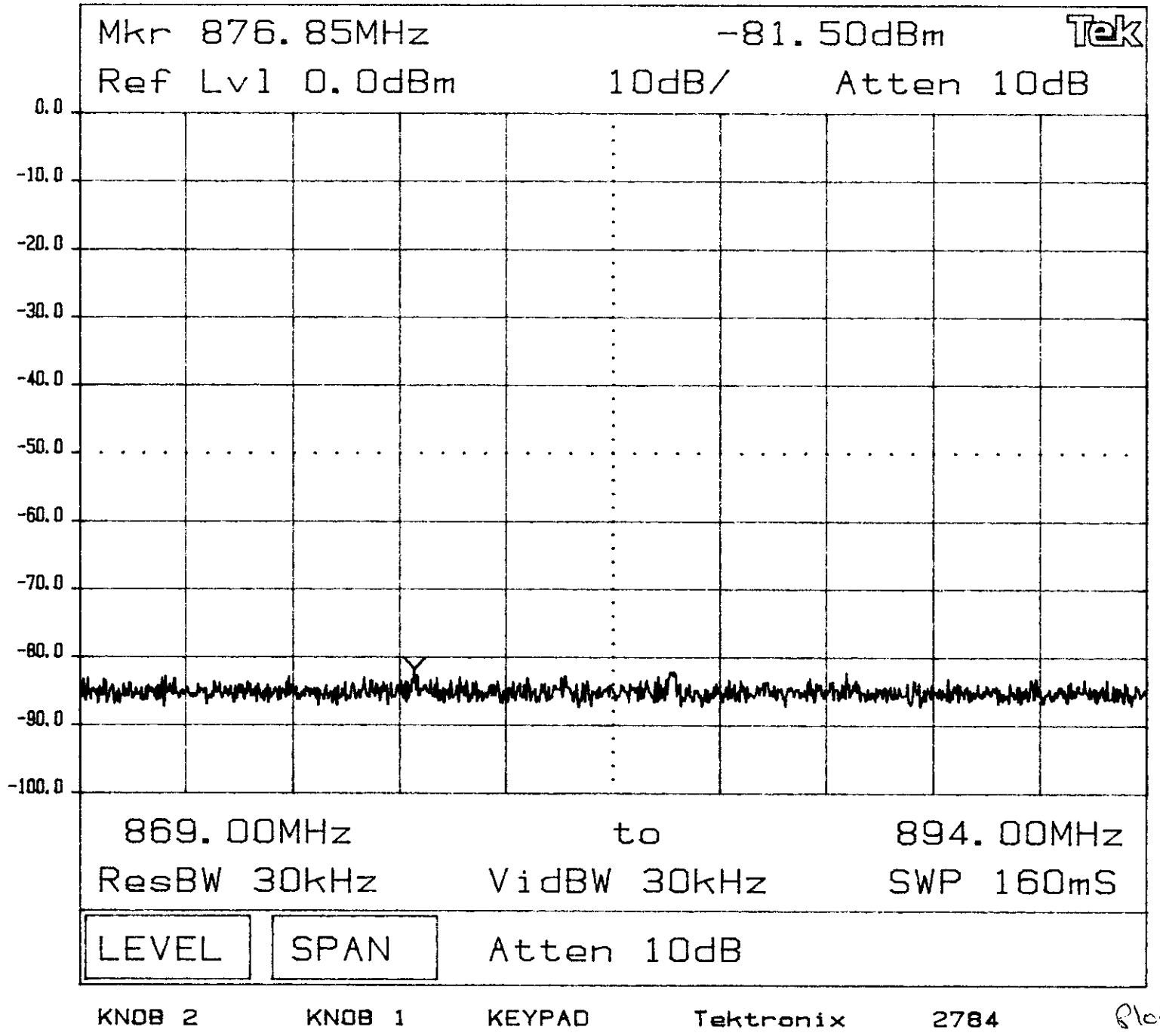
Plot 7.3.h


MKR 1.699 GHz
-32.60 dBm
REF 27.5 dBm
ATTEN 40 dB
10 dB/
START 1.00 GHz
STOP 2.50 GHz
RES BW 100 kHz
VBW 100 kHz
SWP 450 msec

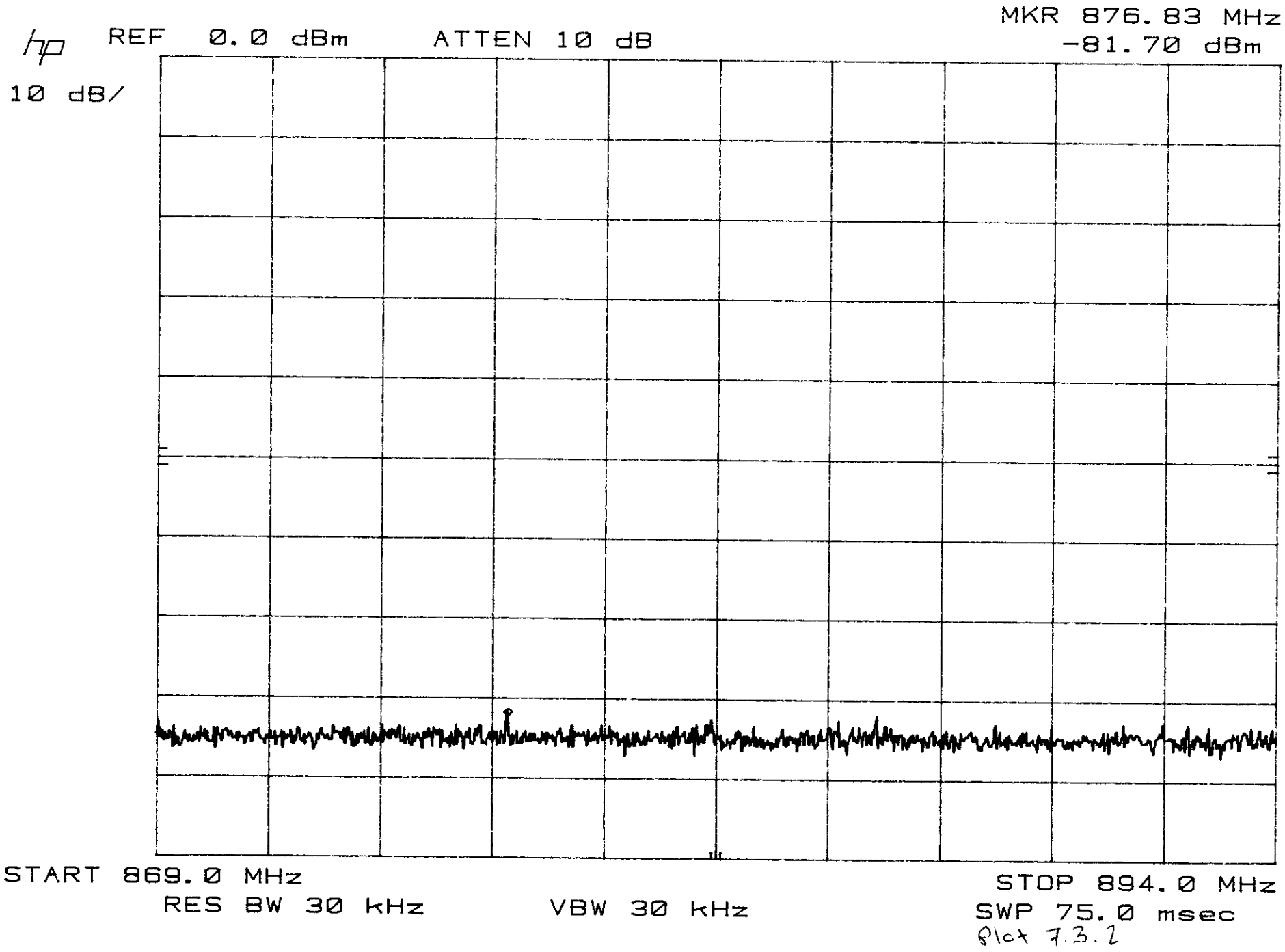
Plot 7.3.1


MKR 2.530 GHz
-39.70 dBm
REF 27.5 dBm
ATTEN 40 dB
10 dB/
START 2.50 GHz
STOP 10.00 GHz
RES BW 100 kHz
VBW 100 kHz
SWP 2.25 sec

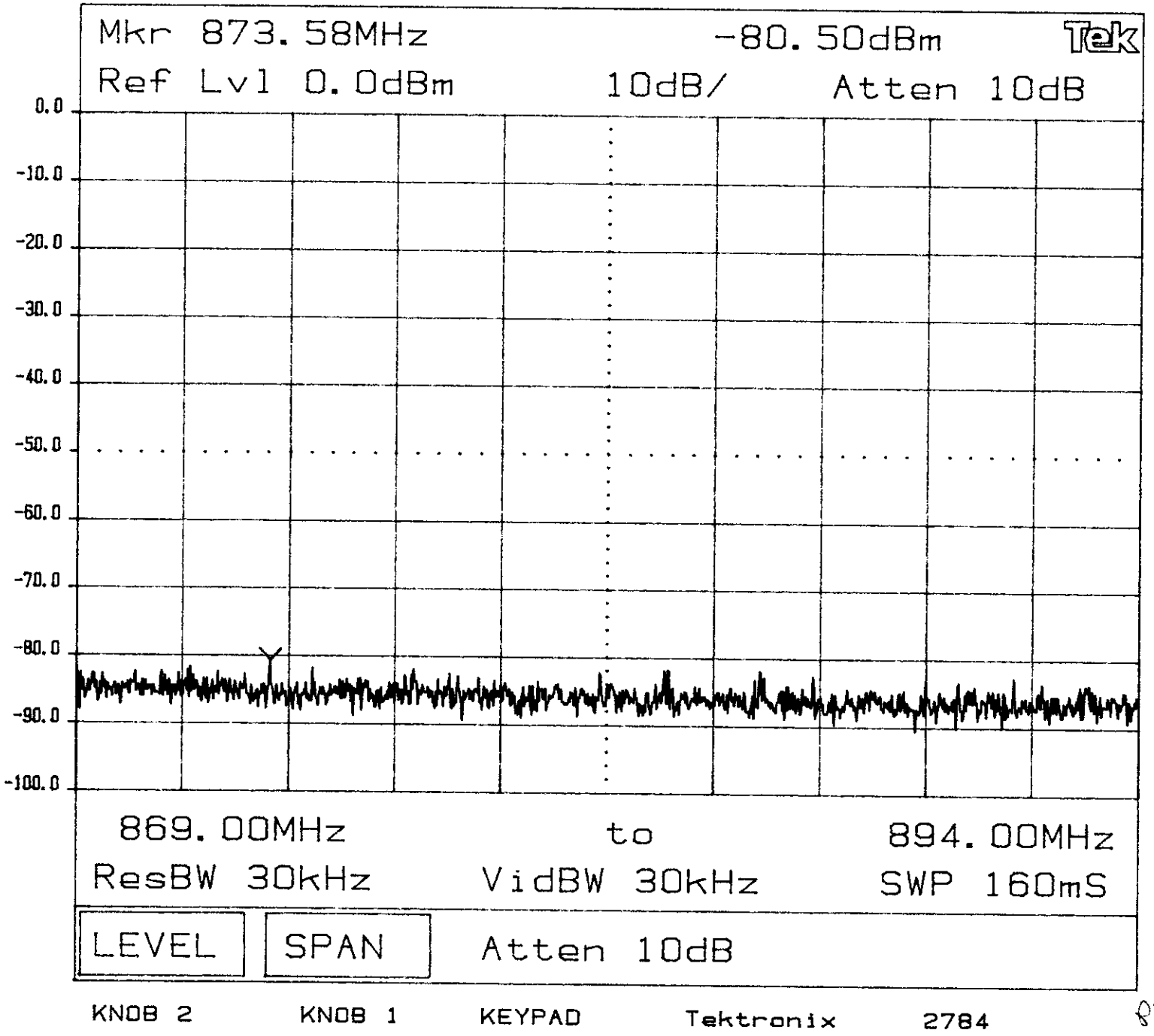
Plot 7.3.5


Mkr 876.85MHz
-81.50dBm
Tek
Ref Lvl 0.0dBm
10dB/
Atten 10dB
0.0
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
-100.0
869.00MHz
to
894.00MHz
ResBW 30kHz
VidBW 30kHz
SWP 160mS
LEVEL
SPAN
Atten 10dB
KNOB 2
KNOB 1
KEYPAD
Tektronix
2784

Plot 7.3.K


REF 0.0 dBm
ATTEN 10 dB
MKR 876.83 MHz
-81.70 dBm
10 dB/
START 869.0 MHz
RES BW 30 kHz
VBW 30 kHz
STOP 894.0 MHz
SWP 75.0 msec

Plot 7.3.2


Mkr 873.58MHz
-80.50dBm
Tek
Ref Lvl 0.0dBm
10dB/
Atten 10dB
0.0
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
-100.0
869.00MHz
to
894.00MHz
ResBW 30kHz
VidBW 30kHz
SWP 160mS
LEVEL
SPAN
Atten 10dB
KNOB 2
KNOB 1
KEYPAD
Tektronix
2784

Plot 7.3.m

8.0 **Field Strength of Spurious Radiation**, 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.

Test Result:	Passes

INTERTEK TESTING SERVICES

Company:	Tellus Technology, Inc	Project #:	J98019153
EUT:	CDPD Wireless Modem	Date of Test:	8/21/98
Model:	M130C	Test Site #:	1
Test Mode:	Tx @ Low Channel	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)	Spurious Attenuation (dB)	Margin (dB)
824.0	3.0	0	100.3	22.3	0.0	0.0	0.8	123.4	N/A	N/A
1648.0	3.0	1	42.8	24.7	0.0	0.0	1.2	68.7	54.7	-15.8
2472.1	3.0	1	41.4	28.1	0.0	0.0	2.3	71.8	51.6	-12.7
3296.1	3.0	1	55.1	30.2	-27.9	0.0	2.5	59.9	63.5	-24.6
4120.1	3.0	1	47.0	32.4	-27.9	0.0	2.9	54.4	69.0	-30.1
4944.2	3.0	0	48.3	32.2	-28.1	0.0	3.2	55.6	67.8	-28.9
5768.3	3.0	0	47.1	34.4	-28.3	0.0	3.7	56.9	66.5	-27.6
6592.3	3.0	0	46.2	34.0	-28.0	0.0	4.2	56.4	67.0	-28.1
7416.3	3.0	0	46.9	35.8	-28.0	0.0	4.3	59.0	64.4	-25.5
8240.4	3.0	0	44.3	37.0	-27.2	0.0	4.8	58.9	64.5	-25.6

Note: Negative signs (-) in the Margin column signify levels below the limit.
Spurious emissions attentuation limit = 43 + 10log P = 38.9

INTERTEK TESTING SERVICES

Company:	Tellus Technology, Inc	Project #:	J98019153
EUT:	CDPD Wireless Modem	Date of Test:	8/21/98
Model:	M130C	Test Site #:	1
Test Mode:	Tx @ Middle Channel	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)	Spurious Attenuation (dB)	Margin (dB)
837.0	3.0	1	98.4	22.3	0.0	0.0	0.8	121.5	N/A	N/A
1674.0	3.0	1	36.2	24.7	0.0	0.0	1.2	62.1	59.4	-20.5
2511.0	3.0	1	29.6	28.1	0.0	0.0	2.3	60.0	61.5	-22.6
3347.0	3.0	0	33.6	30.2	0.0	0.0	2.5	66.3	55.2	-16.3
4184.0	3.0	0	55.4	32.4	-27.9	0.0	2.9	62.8	58.7	-19.8
5021.0	3.0	0	48.7	32.2	-28.1	0.0	3.2	56.0	65.5	-26.6
5858.0	3.0	1	51.3	34.4	-28.3	0.0	3.7	61.1	60.4	-21.5
6695.0	3.0	1	46.9	34.0	-28.0	0.0	4.2	57.1	64.4	-25.5
7529.0	3.0	0	47.4	35.8	-28.0	0.0	4.3	59.5	62.0	-23.1
8367.0	3.0	0	45.2	37.0	-27.2	0.0	4.8	59.8	61.7	-22.8

Note: Negative signs (-) in the Margin column signify levels below the limit.
Spurious emissions attentuation limit = 43 + 10log P = 38.9

INTERTEK TESTING SERVICES

Company: Tellus Technology, Inc
EUT: CDPD Wireless Modem
Model: M130C
Test Mode: Tx @ High Channel

Project #: J98019153
Date of Test: 8/21/98
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)	Spurious Attenuation (dB)	Margin (dB)
849.0	3.0	0	96.4	22.5	0.0	0.0	0.8	119.7	N/A	N/A
1697.8	3.0	1	36.2	24.7	0.0	0.0	1.2	62.1	57.6	-18.7
2546.9	3.0	1	30.2	28.1	0.0	0.0	2.3	60.6	59.1	-20.2
3395.9	3.0	0	28.5	30.2	0.0	0.0	2.5	61.2	58.5	-19.6
4244.7	3.0	0	58.1	32.4	-27.9	0.0	2.9	65.5	54.2	-15.3
5093.7	3.0	1	49.8	32.2	-28.1	0.0	3.2	57.1	62.6	-23.7
5942.8	3.0	1	48.1	34.4	-28.3	0.0	3.7	57.9	61.8	-22.9
6791.7	3.0	1	48.8	34.0	-28.0	0.0	4.2	59.0	60.7	-21.8
7640.7	3.0	1	48.9	35.8	-28.0	0.0	4.3	61.0	58.7	-19.8
8489.7	3.0	1	48.9	37.0	-27.2	0.0	4.8	63.5	56.2	-17.3

Note: Negative signs (-) in the Margin column signify levels below the limit.
Spurious emissions attentuation limit = 43 + 10log P = 38.9

9.0 **Line Conducted Emissions**, FCC § 15.107

Test not performed by Intertek Testing Services. See report # BT03344FCC in Apendix I.

10.0 **Frequency Stability vs Temperature**, 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 frequency counter via feedthrough attenuators. 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 Result:	Passes

Frequency: 837.00 MHz	**Tolerance: ±2091 Hz**	
TEMPERATURE, °C	**FREQUENCY (MHz)**	**DIFFERENCE (Hz)**
50	836.999948	-52
40	836.999870	-139
30	836.999914	-86
20	836.999986	-14
10	836.999968	-32
0	836.999916	-84
-10	836.999924	-76
-20	836.999902	-98

11.0 **Frequency Stability vs Voltage**, 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
Rohde & Schwarz ESVP Test Receiver

11.3 Test Results.

Test Result: Passes

Frequency: 837.00 MHz (High Channel)		**Tolerance: ±2091 Hz**
D.C VOLTS	**FREQUENCY (MHz)**	**DIFFERENCE (Hz)**
16.15 (85%)	837.000620	620
19.0 (0%)	836.999833	-167
21.85 (115%)	836.999765	-235

Appendix A - Photographs

See attached.

Appendix I - DoC Report

See attached.

FCC CLASS B EMI TEST REPORT

of

CDPD Wireless Modem, Monarch

model

M130C

for

Tellus Technology, Inc.
40990 Encyclopedia Circle
Fremont, CA 94538

Test performed by
BEMA Technology LLC
4063 Clipper Court
Fremont, CA 94538

Tel:(510)490-9215

Report Number: BT03344FCC **Test Date: June 24, 1998**

FCC CLASS B
EMI TEST REPORT

of

CDPD Wireless Modem, Monarch

model

M130C

for

Tellus Technology, Inc.
40990 Encyclopedia Circle
Fremont, CA 94538

Test performed by
BEMA Technology LLC
4063 Clipper Court
Fremont, CA 94538

Tel:(510)490-9215

Report Number: BT03344FCC **Test Date: June 24, 1998**

Contents of Report

Part 1 - General

Part 1 - General

1.1 Certification of Accuracy of Test Data

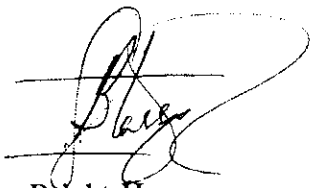
The electromagnetic interference tests which this report describes were performed by an independent electromagnetic compatibility consultant, BEMA Technology LLC, in accordance with the FCC rules and test procedure ANSI C63.4-1992.

The test results contained in this report accurately represent the radiated and power line conducted electromagnetic emissions generated by the sample equipment under test at the time of the test.

Equipment Tested: CDPD Wireless Modem, Monarch, Model M130C

Date of test: June 24, 1998

The results show that the sample equipment tested as described in this report is in compliance with the Class B conducted and radiated emission limits of FCC Rules Part 15 Subpart B.



Bright Harry
Vice-President
BEMA Technology LLC
4063 Clipper Court
Fremont, CA 94538

General

1.2 Summary

1.2.1 Description of Equipment Under Test (EUT)

Description:	CDPD Wireless Modem, Monarch
Model Number:	M130C
FCC ID:	NZ6M8130C
Applicant:	Tellus Technology, Inc. 40990 Encyclopedia Circle Fremont, CA 94538
Telephone:	(510) 498-8500
Contact:	Mr. Minh Dao
Date of Test:	June 24, 1998

A more detailed, technical description of the EUT is contained in Appendix G. Please see attachment for FCC label drawing.

1.2.2 Description of EUT and Support Equipment Included in Tests

The EUT is a Cellular Digital Packet Data (CDPD) wireless modem called Monarch, Model 130C. It is a Wide Area digital wireless data system, which is currently implemented as an overlay to an Advanced Mobile Phone System (AMPS) cellular networks. It is TCP/IP based. It has PCMCIA card dimensions, 54mm W x 155mm L x 14mm H. The transmitter has a frequency range of 824.040 - 848.970 MHz while the receiver has a range of 869.040 - 893.970 MHz.

The EUT was put into the PCMCIA slot of a Notebook Computer (PC). The PC or Notebook was placed on the EUT Table in such a way that its back edge was flush with the back edge of the table. Once the computer was turned on, a Tellus Diagnostic software continuosly transmitted and received data through the PC. A more detailed, technical description of the support equipment is contained in Appendix E.

1.2.3 Test Procedure and Specification

The tests were performed in accordance with FCC rules and test procedures ANSI C63.4-1992 as detailed in Appendices B and C, and in the individual test sections. The test equipment used is detailed in Appendix E. The open field test site is described in Appendix D. The specification used was the Class B limits of FCC Rules Part 15 Subpart B.

1.2.4 Tests Performed

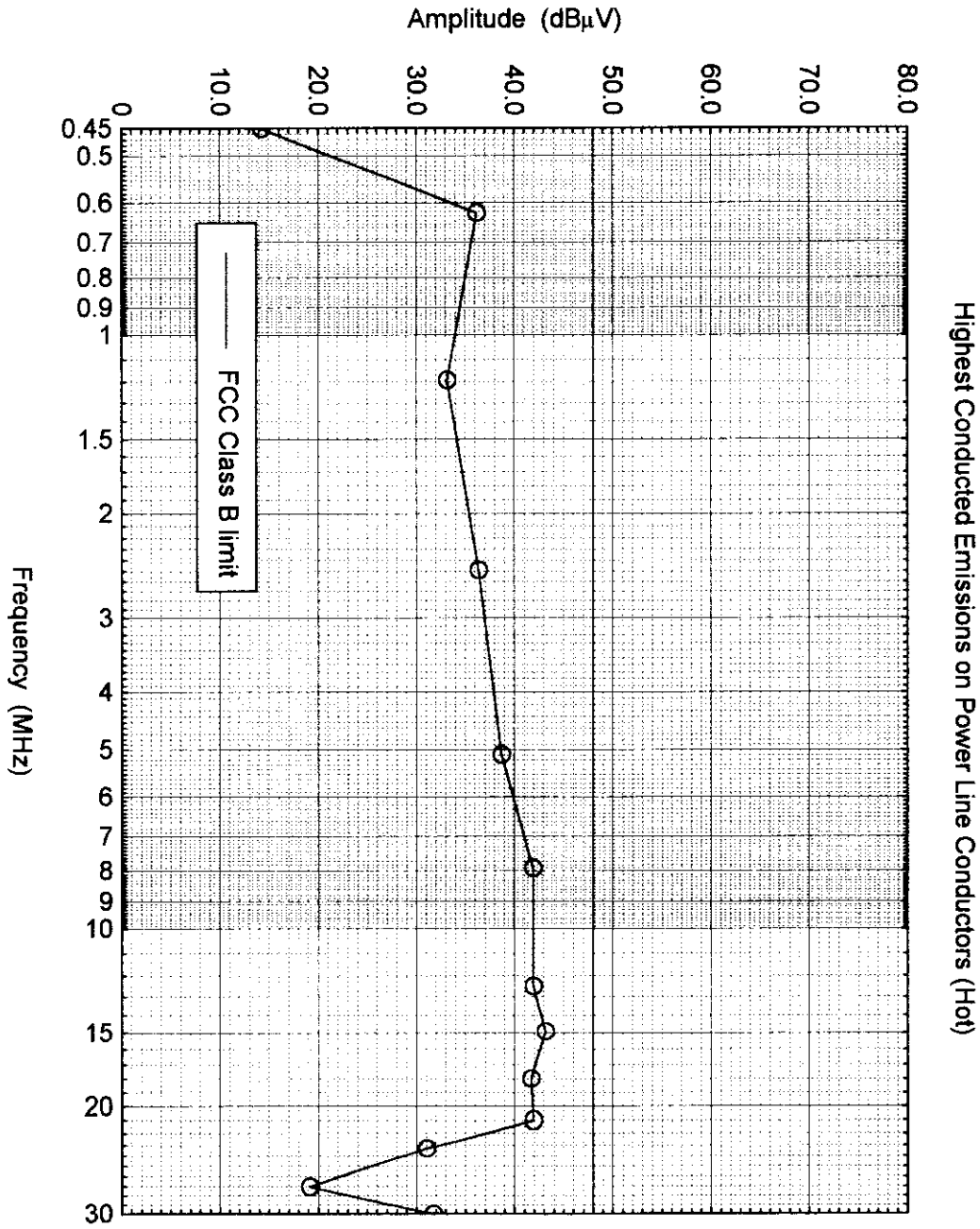
1. Power line conducted emissions in shielded room. See Part 2 of this report for full details. (Not Applicable, EUT battery operated).
2. Radiated emissions in 3 meter open area. See Part 3 of this report for details.

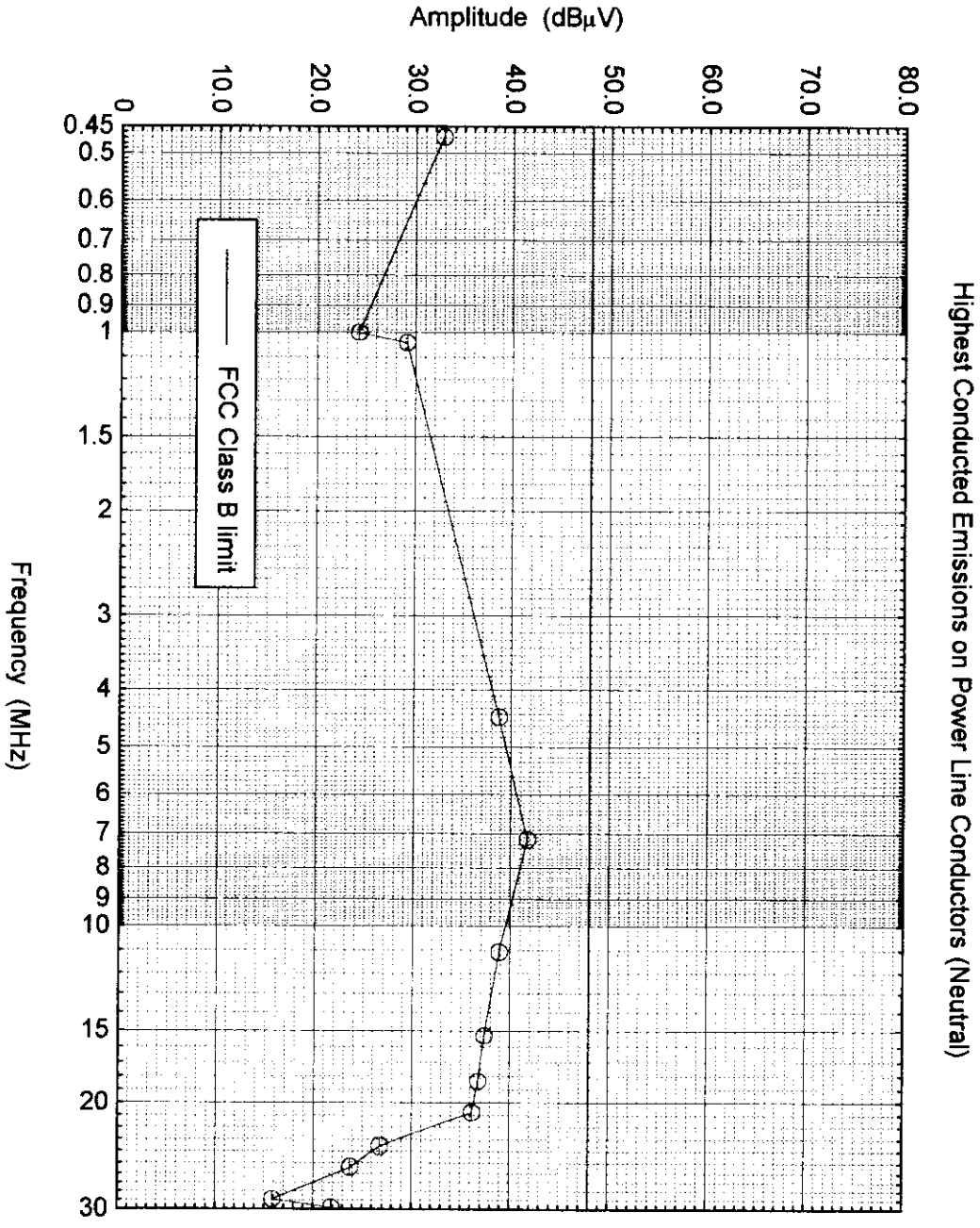
Part 2 - Power line Conducted Emissions

Freq MHz	Ampl dBuV	Mode -	Cond -	Gnd -	CFact dB	CorAmpl dBuV	B Limit dBuV	B Margin dB
0.450	13.20	PK	HOT	C	1.00	14.20	47.96	-33.76
0.622	35.10	PK	HOT	C	1.00	36.10	47.96	-11.86
1.190	32.10	PK	HOT	C	1.00	33.10	47.96	-14.86
2.490	35.30	PK	HOT	C	1.00	36.30	47.96	-11.66
5.090	37.60	PK	HOT	C	1.00	38.60	47.96	-9.36
7.890	40.80	PK	HOT	C	1.00	41.80	47.96	-6.16
12.490	40.90	PK	HOT	C	1.00	41.90	47.96	-6.06
14.890	42.10	PK	HOT	C	1.00	43.10	47.96	4.86
17.940	40.60	PK	HOT	C	1.00	41.60	47.96	-6.36
20.990	40.90	PK	HOT	C	1.00	41.90	47.96	-6.06
23.240	30.00	PK	HOT	C	1.00	31.00	47.96	-16.96
27.040	18.10	PK	HOT	C	1.00	19.10	47.96	-28.86
29.990	30.70	PK	HOT	C	1.00	31.70	47.96	-16.26
0.468	31.80	PK	NEUTRAL	C	1.00	32.80	47.96	-15.16
0.999	23.20	PK	NEUTRAL	C	1.00	24.20	47.96	-23.76
1.040	28.10	PK	NEUTRAL	C	1.00	29.10	47.96	-18.86
4.440	37.70	PK	NEUTRAL	C	1.00	38.70	47.96	-9.26
7.140	40.60	PK	NEUTRAL	C	1.00	41.60	47.96	-6.36
11.040	37.80	PK	NEUTRAL	C	1.00	38.80	47.96	-9.16
15.290	36.30	PK	NEUTRAL	C	1.00	37.30	47.96	-10.66
18.340	35.70	PK	NEUTRAL	C	1.00	36.70	47.96	-11.26
20.740	35.10	PK	NEUTRAL	C	1.00	36.10	47.96	-11.86
23.540	25.70	PK	NEUTRAL	C	1.00	26.70	47.96	-21.26
25.340	22.70	PK	NEUTRAL	C	1.00	23.70	47.96	-24.26
28.840	14.80	PK	NEUTRAL	C	1.00	15.80	47.96	-32.16
29.790	20.80	PK	NEUTRAL	C	1.00	21.80	47.96	-26.16

Table 2.2.1 Power Line Conducted Emissions

* NOTE: 'Margin' indicates the degree of compliance with the applicable limit. For example
A margin of -8 dB means that the emission is 8 dB below the limit *(in compliance);*
A margin of +4 dB means that the emission is 4 dB over the limit *(out of compliance).*


Amplitude (dBμV)
0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
Frequency (MHz)
0.45
0.5
0.6
0.7
0.8
0.9
1
1.5
2
3
4
5
6
7
8
9
10
15
20
30
FCC Class B limit
Highest Conducted Emissions on Power Line Conductors (Hot)


Amplitude (dBμV)
0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
0.45
0.5
0.6
0.7
0.8
0.9
1
1.5
2
3
4
5
6
7
8
9
10
15
20
30
FCC Class B limit
Frequency (MHz)
Highest Conducted Emissions on Power Line Conductors (Neutral)

Part 3 - Open Field Radiated Emissions

3.1 Configuration and Procedure

3.1.1 EUT Configuration

The equipment under test was set up in the 3 meter open field test site on the non-conductive table 80 cm above ground. The EUT was put into the PCMCIA slot of a Notebook Computer (PC). The PC or Notebook was placed on the EUT Table in such a way that its back edge was flush with the back edge of the table. Once the computer was turned on, a Tellus Diagnostic software continuosly transmitted and received data through the PC. **The EUT was tested at three different modes, low, middle and high channels.**

Excess cables were not folded back and forth to form a 30 cm by 40 cm bundle. Any changes made to the configuration, or modifications made to the EUT, during testing are noted in the following test records.

3.1.2 Test Procedure

The system was set up as described above, with the diagnostic software running (see Appendix F). Unless stated otherwise in the following test results, the antenna distance was 3 meters.

The highest emissions were analyzed in detail by operating the spectrum analyzer in fixed tuned peak mode to determine the precise amplitude of the emissions. While doing so, the interconnecting cables and major parts of the system were moved around, the antenna height was varied between one and four meters, its polarization was changed between vertical and horizontal, and the turntable was slowly rotated, to maximize the emissions.

3.1.3 Spectrum Analyzer Configuration (during swept frequency scans)

Start Frequency . . . . . 30 MHz
Stop Frequency . . . . . 1000 MHz
Sweep Speed . . . . . 20 ms
IF Bandwidth . . . . . 100 KHz
Video Bandwidth . . . . . 100 KHz
Quasi Peak Adaptor Mode . . . . . Normal
Quasi Peak Adaptor Bandwidth . . . 100 KHz

Open Field Radiated Emissions

3.2.1 Administrative Details

Test Number:	3.2
Date of Test:	June 24, 1998
Tested By:	Charles Brooks
Emission Limits:	FCC Rules Part 15 Subpart B; Radiated Emission Limits for Class B devices

3.2.2 EUT Configuration Summary

The EUT was set up with the support equipment on the 3 meter open field test site as described in 3.1 and Appendix C.

3.2.3 Test Results

Radiated emissions measured from the equipment under test at various antenna heights, antenna polarizations, EUT orientation, etc. are tabulated and plotted on the next pages.

Freq MHz	Ampl dBuV	Mode -	Ht m	Ori deg	Ant -	Pol -	AFact dBuV/m	CFact dB	DFact dB	CorAmpl dBuV/m	B Limit dBuV/m	B Margin dB
30.00	2.10	PK	2.0	0	B	H	16.80	2.10	0.00	21.00	40.00	-19.00
40.47	2.30	PK	2.0	0	B	H	14.77	2.20	0.00	19.27	40.00	-20.73
50.09	1.70	PK	2.0	0	B	H	12.16	2.51	0.00	16.37	40.00	-23.63
86.35	1.90	PK	2.0	0	B	H	8.43	4.03	0.00	14.36	40.00	-25.64
110.89	3.40	PK	2.0	0	B	H	12.19	4.00	0.00	19.59	43.52	-23.93
149.95	3.90	PK	2.0	0	B	H	15.00	5.40	0.00	24.30	43.52	-19.22
196.53	1.70	PK	2.0	0	B	H	17.13	5.96	0.00	24.79	43.52	-18.73
207.03	4.40	PK	2.0	0	B	H	17.65	6.24	0.00	28.29	43.52	-15.23
260.76	1.00	PK	2.0	0	B	H	19.50	6.92	0.00	27.42	46.02	-18.60
297.26	2.10	PK	2.0	0	B	H	20.92	7.30	0.00	30.32	46.02	-15.70
301.25	3.20	PK	2.0	0	L	H	14.07	7.33	0.00	24.69	46.02	-21.33
358.20	3.60	PK	2.0	0	L	H	14.80	8.36	0.00	26.76	46.02	-19.26
400.40	1.20	PK	2.0	0	L	H	16.39	8.80	0.00	26.40	46.02	-19.62
458.40	1.20	PK	2.0	0	L	H	16.70	9.74	0.00	27.64	46.02	-18.38
499.04	3.10	PK	2.0	0	L	H	17.97	10.22	0.00	31.29	46.02	-14.73
522.07	1.30	PK	2.0	0	L	H	18.44	10.02	0.00	29.76	46.02	-16.26
551.57	1.60	PK	2.0	0	L	H	18.32	10.15	0.00	30.07	46.02	-15.95
584.40	2.90	PK	2.0	0	L	H	18.68	10.90	0.00	32.48	46.02	-13.54
617.86	1.20	PK	2.0	0	L	H	19.09	11.11	0.00	31.40	46.02	-14.62
646.73	2.30	PK	2.0	0	L	H	19.81	11.37	0.00	33.48	46.02	-12.54
689.75	1.00	PK	2.0	0	L	H	21.25	11.78	0.00	34.03	46.02	-11.99
705.08	1.60	PK	2.0	0	L	H	21.76	11.78	0.00	35.14	46.02	-10.88
742.64	2.90	PK	2.0	0	L	H	21.44	12.38	0.00	36.72	46.02	-9.30
796.92	1.20	PK	2.0	0	L	H	21.55	13.34	0.00	36.10	46.02	-9.92
800.42	2.90	PK	2.0	0	L	H	21.62	13.41	0.00	37.92	46.02	-8.10
825.45**	21.10	PK	2.0	0	L	H	22.60	13.76	0.00	57.46	46.02	11.44
895.86	0.30	PK	2.0	0	L	H	22.47	14.38	0.00	37.14	46.02	-8.88
903.39	3.00	PK	2.0	0	L	H	22.58	14.44	0.00	40.02	46.02	-6.00
958.83	1.40	PK	2.0	0	L	H	24.34	14.89	0.00	40.63	46.02	-5.39
1000.00	1.70	PK	2.0	0	L	H	23.70	14.40	0.00	39.80	53.98	-14.18

Table 3.2.1 Normal Mode Open Field Radiated Emissions for Horizontal Polarization

No emissions of significant levels were observed between 30 MHz and the lowest frequencies shown in the above data. No emissions of significant levels were observed between the highest frequency shown in the above data and 1000 MHz.

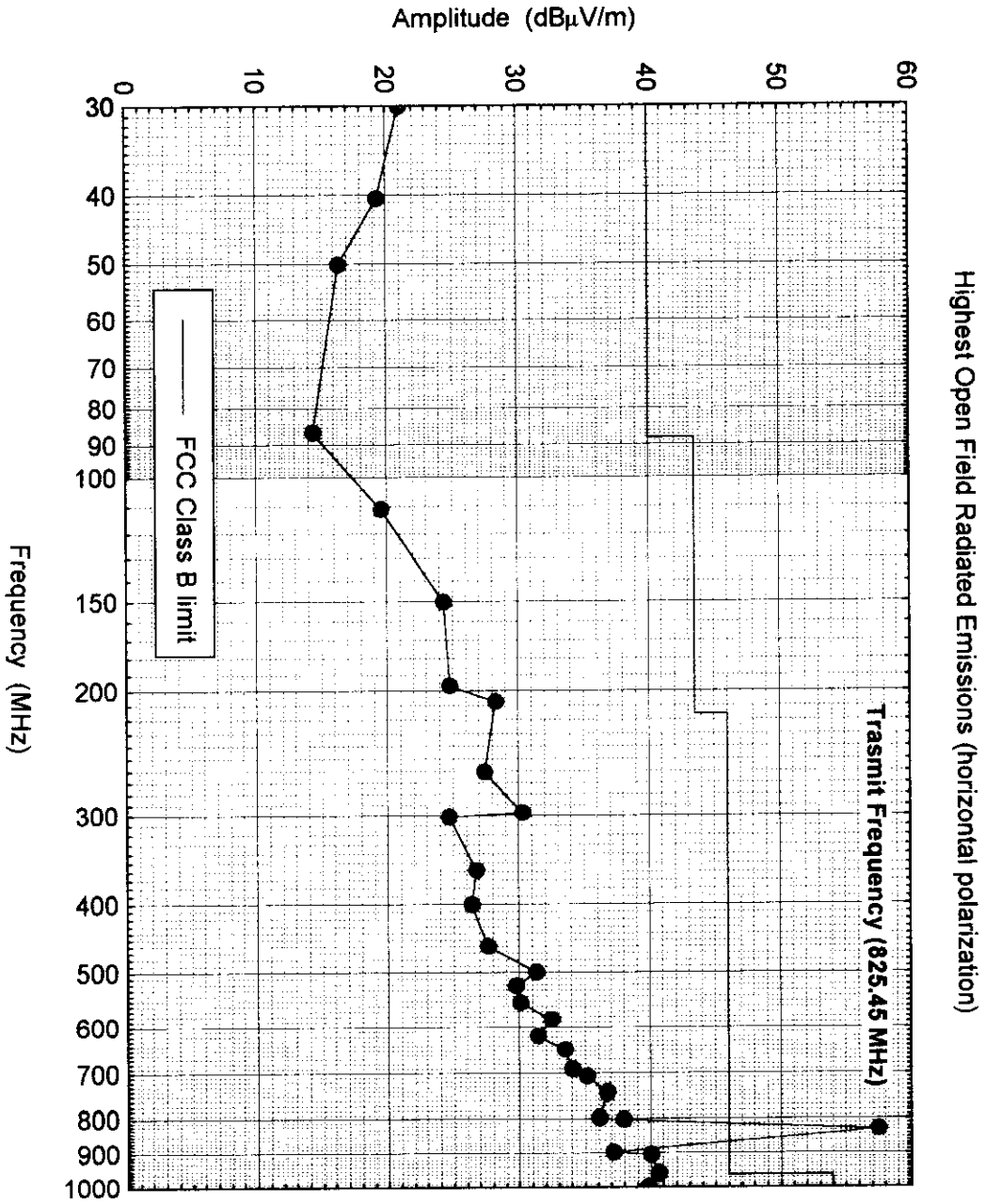
* NOTE: 'Margin' indicates the degree of compliance with the applicable limit. For example
A margin of -8 dB means that the emission is 8 dB below the limit *(in compliance)*;
A margin of +4 dB means that the emission is 4 dB over the limit *(out of compliance)*.
The margin is calculated as follows:
Margin = Corrected Amplitude - Limit
where Corrected Amplitude = Amplitude + Cable Factor + Antenna Factor - Distance Factor.

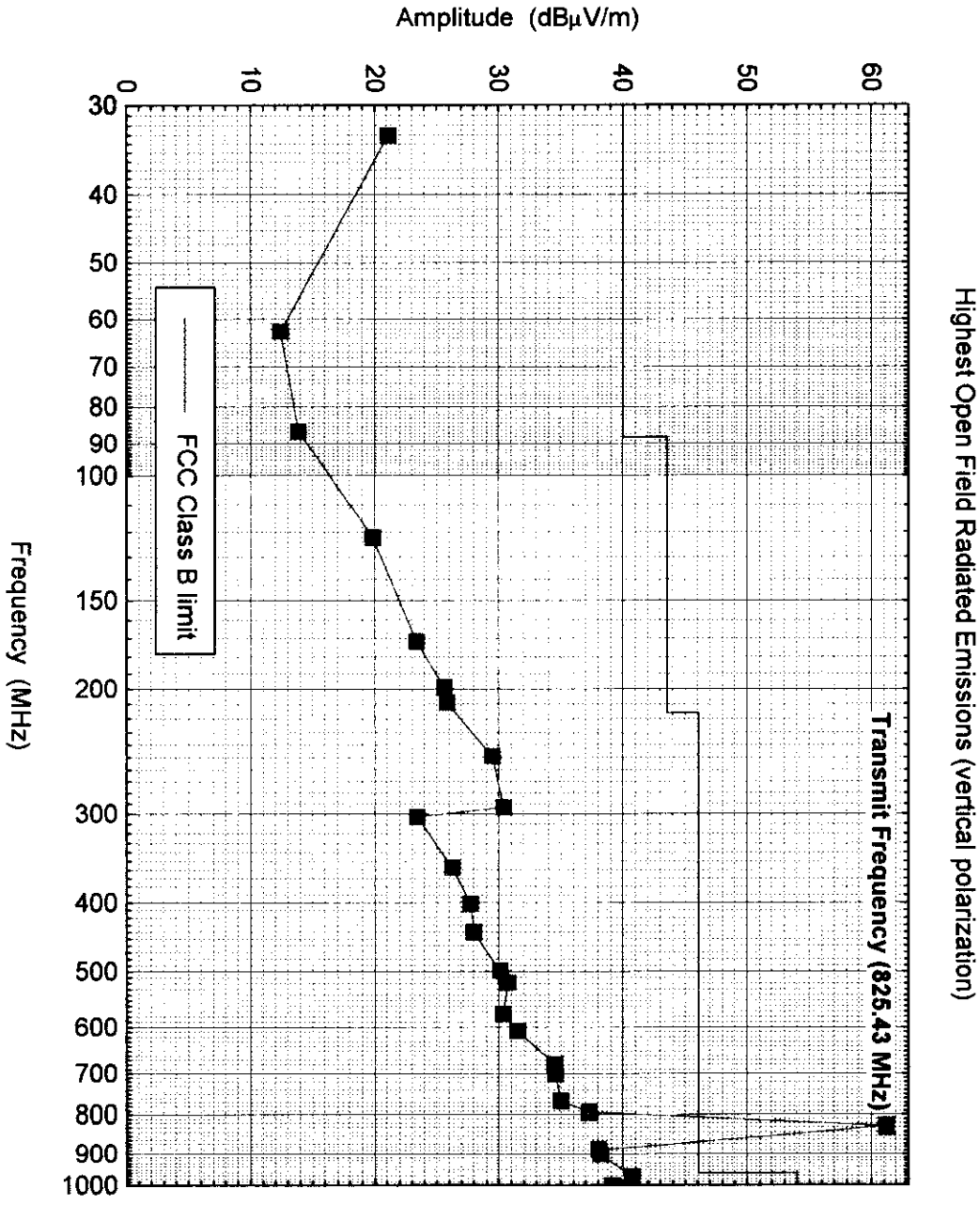
** = Transmit frequency {825.45 MHz}.

Freq MHz	Ampl dBuV	Mode -	Ht m	Ori deg	Ant -	Pol -	AFact dBuV/m	CFact dB	DFact dB	CorAmpl dBuV/m	B Limit dBuV/m	B Margin dB
33.00	2.70	PK	2.0	0	B	V	16.23	12.16	0.00	21.09	40.00	-18.91
62.37	1.90	PK	2.0	10	B	V	7.63	2.85	0.00	12.38	40.00	-27.62
86.17	1.40	PK	2.0	10	B	V	8.39	4.02	0.00	13.82	40.00	-26.18
122.00	2.30	PK	2.0	10	B	V	13.28	4.22	0.00	19.80	43.52	-23.72
171.04	2.40	PK	2.0	0	B	V	15.76	5.18	0.00	23.34	43.52	-20.18
198.41	2.30	PK	2.0	0	B	V	17.22	6.04	0.00	25.56	43.52	-17.96
208.95	1.80	PK	2.0	0	B	V	17.75	6.28	0.00	25.83	43.52	-17.69
248.53	3.90	PK	2.0	0	B	V	19.06	6.50	0.00	29.46	46.02	-16.56
292.98	2.30	PK	2.0	0	B	V	20.79	7.26	0.00	30.35	46.02	-15.67
302.43	1.90	PK	2.0	20	L	V	14.14	7.35	0.00	23.39	46.02	-22.63
356.71	3.10	PK	2.0	20	L	V	14.76	8.33	0.00	26.20	46.02	-19.82
401.45	2.50	PK	2.0	0	L	V	16.38	8.81	0.00	27.69	46.02	-18.33
439.35	2.20	PK	2.0	0	L	V	16.23	9.49	0.00	27.92	46.02	-18.10
497.62	1.90	PK	2.0	0	L	V	17.93	10.25	0.00	30.08	46.02	-15.94
517.78	2.30	PK	2.0	20	L	V	18.36	10.06	0.00	30.71	46.02	-15.31
573.05	0.90	PK	2.0	0	L	V	18.58	10.84	0.00	30.31	46.02	-15.71
606.23	1.60	PK	2.0	0	L	V	18.90	10.97	0.00	31.47	46.02	-14.55
677.17	1.90	PK	2.0	30	L	V	20.70	11.88	0.00	34.48	46.02	-11.54
700.73	1.10	PK	2.0	0	L	V	21.71	11.71	0.00	34.52	46.02	-11.50
764.82	1.00	PK	2.0	0	L	V	21.20	12.77	0.00	34.97	46.02	-11.05
791.70	2.50	PK	2.0	0	L	V	21.47	13.25	0.00	37.22	46.02	-8.80
825.43**	24.80	PK	2.0	0	L	V	22.60	13.76	0.00	61.16	46.02	5.14
886.72	1.30	PK	2.0	0	L	V	22.39	14.32	0.00	38.01	46.02	-8.01
900.93	1.20	PK	2.0	0	L	V	22.52	14.41	0.00	38.13	46.02	-7.89
969.35	1.50	PK	2.0	0	L	V	24.38	14.77	0.00	40.65	53.98	-13.33
1000.00	1.00	PK	2.0	0	L	V	23.70	14.40	0.00	39.10	53.98	-14.88

Table 3.2.2 Normal Mode Open Field Radiated Emissions for Vertical Polarization

No emissions of significant levels were observed between 30 MHz and the lowest frequencies shown in the above data. No emissions of significant levels were observed between the highest frequency shown in the above data and 1000 MHz.
* NOTE: 'Margin' indicates the degree of compliance with the applicable limit. For example
A margin of -8 dB means that the emission is 8 dB below the limit *(in compliance)*;
A margin of +4 dB means that the emission is 4 dB over the limit *(out of compliance)*.
The margin is calculated as follows:
Margin = Corrected Amplitude - Limit
where Corrected Amplitude = Amplitude + Cable Factor + Antenna Factor - Distance Factor.
** = Transmit frequency {825.43 MHz}.


Highest Open Field Radiated Emissions (horizontal polarization)
Amplitude (dBμV/m)
0
10
20
30
40
50
60
Frequency (MHz)
30
40
50
60
70
80
90
100
150
200
300
400
500
600
700
800
900
1000
FCC Class B limit
Trasmit Frequency (825.45 MHz)


Amplitude (dBµV/m)
0
10
20
30
40
50
60
Frequency (MHz)
30
40
50
60
70
80
90
100
150
200
300
400
500
600
700
800
900
1000
FCC Class B limit
Transmit Frequency (825.43 MHz)
Highest Open Field Radiated Emissions (vertical polarization)

Appendices

A Warning Labels

Label Requirements

A Class B digital device subject to certification by the FCC, or subject to verification, shall carry a warning label which includes the following statement in a conspicuous location on the device:

> *This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.*

Where a device is constructed in two or more sections connected by wires and marketed together, the above statement is required to be affixed only to the main control unit.

The users manual or instruction manual for the EUT shall contain the following statements or equivalent:

> ***CAUTION:* CHANGES OR MODIFICATIONS NOT EXPRESSLY APPROVED BY THE PARTY RESPONSIBLE FOR COMPLIANCE COULD VOID THE USER'S AUTHORITY TO OPERATE THE EQUIPMENT.**

If the EUT requires accessories such as *special* shielded cables and/or connectors to enable compliance with emission limits, the instruction manual for the EUT shall include appropriate instructions on the first page of the text concerned with the installation of the device that these special accessories must be used with the device. It is the responsibility of the user to use the needed special accessories supplied with the equipment.

Operators manuals for Class B computing devices and peripherals shall contain the following statements or their equivalent placed in a prominent location in the text of the manual. For systems incorporating several digital devices, the statement needs to be contained only in the manual for the main control unit.

> NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a commercial installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

* Reorient or relocate the receiving antenna.

* Increase the separation between the equipment and receiver.

* Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

* Consult the dealer or an experienced radio/TV technician for help.

The user may find the following booklet prepared by the Federal Communications Commission helpful:

How to Identify and Resolve Radio-TV Interference Problems

This booklet is available from the US Government Printing Office, Washington, DC 20402, Stock Number 004-000-00345-4.

B Measurement Procedure for Power Line Conducted Emissions

The EUT is set up in accordance with the suggested configuration given in ANSI C63.4-1992 Measurement Procedure 7.2. The measurements are performed in a shielded room. A wooden table, 80 cm in height, is located on one side of the shielded room; desktop EUTs are placed on top of this bench. The rear of the EUT is placed 40 cm from the shielded room wall. The LISNs are bonded to the shielded room floor with bonding straps. The excess power cords and cables from the EUT is folded back and forth to form a 30 x 40 cm non-inductive bundle. The measuring equipment is located outside the shielded room. The coaxial cable is fed through the wall of the shielded room.

The conducted emissions are first automatically scanned, measured and plotted in the peak mode for all the current carrying conductors in accordance with 7.2.3, Preliminary Conducted Emission Tests. The highest points are then re-measured manually in the peak detector mode for all the current carrying conductors as in 7.2.4 for the Final Conducted Emission Tests.

During the manual measurements, peaks are selected, the scan-width is reduced to 0, the audible modulation is monitored with a speaker and the readings are recorded at the indicated frequency and at the specified bandwidths.

C Test Procedure for Radiated Emissions

Measurements on a Test Site

When preliminary measurements are made, radiated emissions are measured in the lab at a measurement distance of 1 meter in accordance with ANSI C63.4-1992 8.3.1.1 Preliminary Radiated Emission Tests. Desktop EUTs are placed on a wooden table 80 cm in height. The measurement antenna is one meter from the EUT. Cables are bundled 30 x 40 cm. The primary objective of the preliminary radiated test is to identify the frequency and approximate amplitude of the radiated emissions. The preliminary measuring distance of 1 meter reduces the significance of ambient signals.

The frequencies are then pre-selected on the open test site to obtain the corresponding amplitude at the antenna distance specified by the regulations. The initial scan is made following the Method of Preliminary Radiated Emission Maximization in Appendix D of ANSI C63.4-1992. The highest readings are recorded for the worst case configuration of the EUT mode of operation and cable configuration to use for the final radiated emissions test.

Measurements on the Open Field Site

The final radiated emissions tests in 8.3.1.2 are performed on the open site to measure the amplitudes accurately. The EUT and support equipment are set up on the turntable of the open field site. Desktop EUTs are set up on a wooden stand 80 cm above the turntable in the same configuration and mode of operation as found in preliminary radiated emission tests.

The EUT is rotated in the horizontal plane and the antenna elevation is varied between the specified limits to maximize the readings at each frequency. This procedure is repeated with the antenna in the vertical and horizontal polarization positions.

At the highest amplitudes observed, readings may also be recorded with the quasi-peak detector. When this is done, the peaks are selected, the scanwidth is reduced to zero, the audible modulation is monitored with a loudspeaker and the quasi-peak reading is recorded at the indicated frequency and at the specified bandwidths.

D Description of Open Field Test Site

The open field test site is located at 4063 Clipper Court in Fremont, California, at the southwest end of the city approximately 3/4 of a mile to the west of Interstate 880 at the Fremont Gateway exit.

The open field test site consists of a flat, level 1/4-inch mesh galvanized steel wire ground plane, measuring 17.5 m by 22.5 m, supported above the ground by a 5-1/2 inch high wooden framework. The ground plane is assembled from 4-foot wide strips of mesh, which are overlap, are securely fastened mechanically and permanently bonded electrically to each other to form a continuous sheet.

The ground plane is located on flat, level, paved ground, approximately 16 meters behind the office building, and is surrounded by Redwood Fence with 2" gaps between the 4" x 8" wooden panels. The fence is approximately 6 feet high and is located 6 inches away from the left, right and rear sides of the ground plane and 32 feet from the front of the ground plane. The 10-meter ellipse specified in ANSI C63.4-1991 5.4.1 lies further inside the perimeter of the ground plane.

At the center of the test site is a cross-shaped wooden platform on which is located a wooden shade or gazebo to provide shelter from the environment. The turntable is position in the middle of this wooden gazebo. The wooden shade or gazebo has no detectable effect on the test results. The antenna is mounted on a wooden mast which allows for variation of antenna polarization and remote variation of antenna height. The antenna mast is moveable from 3 m to 10 m and vise versa. Once positioned, it is secured in place to eliminate unintentional movement during the test. All cables and wiring for the open field site are located inside metal conduits underneath the ground plane. The conduits and wiring have no detectable influence on the test results.

BEMA Technology LLC EMI/RFI test site described above has been listed with FCC for conducting contract EMI/RFI measurement work for client companies following the procedures stated in ANSI C63.4-1992.

E Test Equipment

The following is a list of equipment which is used by BEMA Technology LLC for EMI/RFI testing.

Description	Model	Serial Number
Spectrum Analyzer	HP 8591A	3149A02541
Spectrum Analyzer	HP 8568B	3019A05393
Quasi Peak Adaptor	HP 85650A	3107A01572
RF Preselector	HP 85685A	3107A01227
Signal Generator	HP 8656	3044U09270
Biconical Antenna	EMCO 3110	1421
Log Periodic Antenna	EMCO 3146	3115
Tuned dipole Antenna	Electro-Matrics	TDA-30/1-4121
Tuned dipole Antenna	Electro-Matrics	TDA-30/1-4125
LISN	EMCO 3825/2	9108-1848
LISN	EMCO 3825	9204-1957

Self-calibration procedures are performed regularly on all instruments having this feature. All signal cable assemblies are inspected and calibrated regularly to verify their correction factors. Any cable or connector which shows signs of minor damage is replaced or repaired before further use. Instruments are calibrated to NBS standards every 12 months.

F Description of Support Equipment

SUPPORT EQUIPMENT #1

DESCRIPTION	HOST COMPUTER
MANUFACTURER	Notebook Computer
MODEL	6200RD
SERIAL NUMBER	N6UD721208529
POWER CORD	NON-SHIELDED
DATA CABLE	NON-SHIELDED
FCC ID	L4pk6000T200

SOFTWARE

The EUT being tested, the CDPD Wireless Modem, Monarch, Model M130C was put into the PCMCIA slot of the host Computer. During the test, the software program in the PC facilitated the continuous transmission and reception of data through the EUT.

G Description of Equipment Under Test and Summary

EUT

Description	CDPD Wireless Modem, Monarch
Manufacturer	Tellus Technology, Inc.
Model Number	M130C
Power Adapter	N/A
Power Cord	Non-Shielded
FCC ID	NZ6M8130C

The EUT is a Cellular Digital Packet Data (CDPD) wireless modem called Monarch, Model M130C. It is a Wide Area digital wireless data system, which is currently implemented as an overlay to an Advanced Mobile Phone System (AMPS) cellular networks. It is TCP/IP based. It has PCMCIA card dimensions, 54mm W x 155mm L x 14mm H. The transmitter has a frequency range of 824.040 - 848.970 MHz while the receiver has a range of 869.040 - 893.970 MHz.

The EUT was tested in all three modes, low channel (824.04 MHz), middle channel (837 MHz) and high channel (849 MHz). In each mode, the power transmit level was varied from 45 to 191. The data was collected for the worst case which was the low channel (824.04 MHz) at the highest power transmit level (191).

The EUT passed the radiated emissions test with margins shown in tables 3.2.1 and 3.2.2 on pages 9 and 10.