TEST RESULT SUMMARY

FCC PART 15 SUBPART C
Section 15.247

MANUFACTURER'S NAME	Symbol Technologies Inc.
NAME OF EQUIPMENT	Truck Mobile GPS Tracking System
MODEL NUMBER	**LA-3021-100-US**
MANUFACTURER'S ADDRESS	One Symbol Plaza Holtsville NY 11742
TEST REPORT NUMBER	NC205177
TEST DATE	04 October 2002

According to testing performed at TÜV Product Service Inc, the above-mentioned unit is in compliance with the electromagnetic compatibility requirements defined in FCC Part 15. System uses FCC certified Symbol transmitter (FCC ID: H9PLA3021-100) with new Maxrad Z1370 Folded F antenna.

It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical characteristics. Any modifications necessary for compliance made during testing on the above mentioned date(s) must be implemented in all production units for compliance to be maintained.

TÜV Product Service Inc, as an independent testing laboratory, declares that the equipment tested as specified above conforms to the requirements of FCC Part 15.

Date: 24 October 2002

Location: Taylors Falls MN USA

G. S. Jakubowski
Tested By

J. T. Schneider
Reviewed By

Not Transferable

EMC EMISSION - T E S T R E P O R T

Test Report File No.	:	**NC205177**	Date of issue:	24 October 2002

Model No.	:	**LA-3021-100-US**
Product Type	:	Truck Mobile GPS Tracking System
Applicant	:	Symbol Technologies Inc.
Manufacturer	:	Symbol Technologies Inc.
License holder	:	Symbol Technologies Inc.
Address	:	One Symbol Plaza
	:	Holtsville NY 11742
Test Result	:	■ **Positive** ☐ **Negative**
Test Project Number Reference(s)	:	**NC205177**
Total pages including Appendices		50

TÜV Product Service Inc is a subcontractor to TÜV Product Service, GmbH according to the principles outlined in ISO/IEC Guide 25 and EN 45001.

TÜV Product Service Inc reports apply only to the specific samples tested under stated test conditions. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. TÜV Product Service Inc shall have no liability for any deductions, inferences or generalizations drawn by the client or others from TÜV Product Service Inc issued reports.

This report is the confidential property of the client. As a mutual protection to our clients, the public and ourselves, extracts from the test report shall not be reproduced except in full without our written approval. This report shall not be used by the client to claim product endorsement by NVLAP or any agency of the US government.

TÜV Product Service Inc and its professional staff hold government and professional organization certifications and are members of AAMI, ACIL, AEA, ANSI, IEEE, NVLAP, and VCCI

TÜV PRODUCT SERVICE INC 19333 Wild Mountain Road Taylors Falls MN 55084-1758 Tel: 651 638 0297 Fax: 651 638 0298 Rev.No 1.0

D I R E C T O R Y - EMISSIONS

TÜV PRODUCT SERVICE INC 19333 Wild Mountain Road Taylors Falls MN 55084-1758 Tel: 651 638 0297 Fax: 651 638 0298 Rev.No 1.0

EMISSIONS TEST REGULATIONS :

The emissions tests were performed according to following regulations:

☐ - EN 50081-1 / 1991

☐ - EN 55011 / 1998 w/Amendment A1:1999
- ☐ - Group 1
- ☐ - Class A
- ☐ - Group 2
- ☐ - Class B

☐ - EN 55013 / 1990

☐ - EN 55014 / 1987
- ☐ - Household appliances and similar
- ☐ - Portable tools
- ☐ - Semiconductor devices

☐ - EN 55014 / A2:1990

☐ - EN 55014 / 1993
- ☐ - Household appliances and similar
- ☐ - Portable tools
- ☐ - Semiconductor devices

☐ - EN 55015 / 1987

☐ - EN 55015 / A1:1990

☐ - EN 55015 / 1993

☐ - EN 55022 / 1987
- ☐ - Class A
- ☐ - Class B

■ - FCC Part 15 Subpart C Section 15.247

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Environmental conditions in the lab:

	Actual
Temperature	: 22 °C
Relative Humidity	: 49 %
Atmospheric pressure	: 99.0 kPa
Power supply system	: DC powered

Sign Explanations:

☐ - not applicable
■ - applicable

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Emissions Test Conditions: CONDUCTED EMISSIONS (Interference Voltage)

The *CONDUCTED EMISSIONS (INTERFERENCE VOLTAGE)* measurements were performed at the following test location:

■ - Test not applicable

☐ - Wild River Lab Large Test Site (Open Area Test Site)
☐ - Wild River Lab Small Test Site (Open Area Test Site)
☐ - Oakwood Lab (Open Area Test Site)
☐ - Wild River Lab Screen Room
☐ - New Brighton Lab Shielded Room

Emissions Test Conditions: RADIATED EMISSIONS (Magnetic Field)

The *RADIATED EMISSIONS (MAGNETIC FIELD)* measurements were performed at the following test location:

■ - Test not applicable

☐ - Wild River Lab Large Test Site (Open Area Test Site)
☐ - Wild River Lab Small Test Site (Open Area Test Site)
☐ - Oakwood Lab (Open Area Test Site)

at a test distance of :

☐ - 3 meters
☐ - 30 meters

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Emissions Test Conditions: RADIATED EMISSIONS (Electric Field)

The *RADIATED EMISSIONS (ELECTRIC FIELD)* measurements, in the frequency range of 30 MHz-1000 MHz, were tested in a horizontal and vertical polarization at the following test location:

☐ - Test not applicable

■ - Wild River Lab Large Test Site (Open Area Test Site) – NSA measurements made 7-02, due 7-03.
☐ - Wild River Lab Small Test Site (Open Area Test Site)
☐ - Oakwood Lab (Open Area Test Site)

at a test distance of :

■ - 3 meters
☐ - 10 meters
☐ - 30 meters

Test equipment used :

	TUV ID	Model Number	Manufacturer	Description	Serial Number	Cal Due
■-	2665	ZHL-1042J	Mini-Circuits	Preamplifier	32296	9-12-03
■-	2690	8566B	Hewlett-Packard	Spectrum Analyzer (Unit F)	2430A00930	11-19-02
■ -	2678	85662A	Hewlett-Packard	Analyzer Display (Unit F)	2403A08134	11-19-02
■ -	2684	85650A	Hewlett-Packard	Quasi-Peak Adapter (Unit F)	2521A01006	11-19-02
■ -	3203	EM-6917B	Electro-Metrics	Biconicalog Periodic	106	2-14-03

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST) and is calibrated annually.

Emissions Test Conditions: INTERFERENCE POWER

The *INTERFERENCE POWER* measurements were performed by using the absorbing clamp on the mains and interface cables in the frequency range 30 MHz - 300 MHz at the following test location :

■ - Test not applicable

☐ - Wild River Lab Large Test Site (Open Area Test Site)
☐ - Wild River Lab Small Test Site (Open Area Test Site)
☐ - Oakwood Lab (Open Area Test Site)
☐ - Wild River Lab Screen Room
☐ - New Brighton Lab Shielded Room

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Emissions Test Conditions: RADIATED EMISSIONS (Electric Field)

The *EQUIVALENT RADIATED EMISSIONS* measurements in the frequency range 1 GHz - 25 GHz were performed in a horizontal and vertical polarization at the following test location:

☐ **- Test not applicable**

■ - Wild River Lab Large Test Site (Open Area Test Site)
☐ - Wild River Lab Small Test Site (Open Area Test Site)
☐ - Oakwood Lab (Open Area Test Site)
☐ - Wild River Lab Screen Room

at a test distance of:

☐ - 1 meters
■ - 3 meters
☐ - 10 meters

Test equipment used :

	TUV ID	Model Number	Manufacturer	Description	Serial Number	Cal Due
■ -	2075	3115	Electro-Mechanics (EMCO)	Ridge Guide Ant. 1-18 GHz	9001-3275	10-20-02
■-	2665	ZHL-1042J	Mini-Circuits	Preamplifier	32296	09-12-03
■ -	2690	8566B	Hewlett-Packard	Spectrum Analyzer (Unit F)	2430A00930	11-19-02
■ -	2678	85662A	Hewlett-Packard	Analyzer Display (Unit F)	2403A08134	11-19-02
■ -	2684	85650A	Hewlett-Packard	Quasi-Peak Adapter (Unit F)	2521A01006	11-19-02
■ -	2478	AWT-18037	Avantek	Preamplifier 8-18 GHz	1001-9226	03-18-03
■ -	2477	AFT-8434	Avantek	Preamplifier 4-8 GHz	2613A92801	03-18-03
■ -	6717	3116	Electro-Mechanics (EMCO)	Ridge Guide Ant. 18-40 GHz	2005	N/A
■ -	2127	11975A	Hewlett-Packard	Amplifier	2738A01200	1-24-03
■ -	2662	11970K	Hewlett-Packard	External Mixer 18-26.5 GHz	2332A01170	1-17-03
■ -	2003	F5502-1	Acronetics	4-8 GHz Bandpass Filter	10	N/A
■ -	3203	EM-6917B	Electro-Metrics	Biconicalog Periodic	106	2-14-03
■ -	2661	11970A	Hewlett-Packard	Harm Mixer – 26.5-40 GHz	2332A01861	1-17-03

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST) and is calibrated annually.

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Equipment Under Test (EUT) Test Operation Mode - Emission tests :

The device under test was operated under the following conditions during emissions testing:

☐ - Standby

☐ - Test program (H - Pattern)

☐ - Test program (color bar)

☐ - Test program (customer specific)

☐ - Practice operation

☐ - Normal Operating Mode

■ - The conducted measurements were performed with the measurement device connected directly to the RF output of the transmitter module. The radiated measurements were performed with the transmitter antenna connected. Testing was performed at lowest, mid and highest channels and with device frequency hopping, as applicable.

Configuration of the device under test:

☐ - See Constructional Data Form in Appendix B - Page B2

☐ - See Product Information Form in Appendix B - beginning on Page B3

The following peripheral devices and interface cables were connected during the measurement:

☐ - _____ Type : _____

☐ - _____ Type : _____

☐ - _____ Type : _____

☐ - _____ Type : _____

☐ - _____ Type : _____

☐ - _____ Type : _____

☐ - _____ Type : _____

☐ - _____ Type : _____

☐ - unshielded power cable

☐ - unshielded cables

■ - shielded cables MPS.No.: _____

☐ - customer specific cables

☐ - _____

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Emission Test Results:

Frequency Separation [15.247 (a)(1)]

The requirements are ■ - MET ☐ - NOT MET

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

Remarks: The hopping channel carrier frequency is separated by 1.0 MHz, the 20 dB bandwidth of the hopping channel is 1.0 MHz. See data on pages A3 and A4.

Number of Hopping Frequencies [15.247 (a)(1)(iii)]

The requirements are ■ - MET ☐ - NOT MET

Minimum of 15 required.

Remarks: There are 79 hopping frequencies. See data on page A5.

Time of Occupancy [15.247 (a)(1)(iii)]

The requirements are ■ - MET ☐ - NOT MET

The average time of occupancy on any channel shall not be greater than 400 milliseconds within a period of 400 milliseconds multiplied by the number of hopping channels employed.

Remarks: The average time of occupancy is measured to be 11 milliseconds. See data on pages A6 and A7.

Output Power of Fundamental – direct measurement

The requirements are ■ - MET ☐ - NOT MET

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels, And all frequency hopping systems in the 5725-5850 MHz band: 1 Watt. For all other frequency hopping systems In the 2400-2483.5 MHz band: 0.125 Watts. See data on pages A12 - A17.

2402 MHz = 18.5 dBm (71.1 mW)

2441 MHz = 18.3 dBm (68.2 mW)

2480 MHz = 17.7 dBm (58.6 mW)

Transmitter is currently certified for 112 mW.

Emission Test Results Continued:

Spurious radiated emissions (electric field) 30 MHz - 1000 MHz (restricted bands)

The requirements are ■ - MET ☐ - NOT MET

Minimum margin of compliance >10 dB at _____ MHz

Maximum margin of non-compliance _____ dB at _____ MHz

Remarks: See data on pages A30 – A34.

Spurious conducted emissions 30 MHz – 24.8 GHz

The requirements are ■ - MET ☐ - NOT MET

Minimum margin of compliance >10 dB at _____ MHz

Maximum margin of non-compliance _____ dB at _____ MHz

Remarks: See data on pages A18 – A29. The limit is –20 dBc in any 100 kHz band outside the operating band. Special attention is paid to ensure band edge compliance.

Equivalent Radiated emissions 1 GHz – 24.8 GHz (restricted bands)

The requirements are ■ - MET ☐ - NOT MET

Minimum margin of compliance 8 dB at 2773.36 MHz

Maximum margin of non-compliance _____ dB at _____ MHz

Remarks: See data on pages A30 – A34.

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DEVIATIONS FROM STANDARD:

None

GENERAL REMARKS:

SUMMARY:

The requirements according to the technical regulations are

■ - met

☐ - **not** met.

The device under test does

■ - fulfill the general approval requirements mentioned on page 3.

☐ - **not** fulfill the general approval requirements mentioned on page 3.

Testing Start Date: 04 October 2002

Testing End Date: 04 October 2002

- TÜV PRODUCT SERVICE INC -

J. T. Schneider
Chief Engineer

Tested By:
G. S. Jakubowski

TÜV PRODUCT SERVICE INC 19333 Wild Mountain Road Taylors Falls MN 55084-1758 Tel: 651 638 0297 Fax: 651 638 0298 Rev.No 1.0

Test-setup photo(s):
Conducted emission 10/150 kHz - 30 MHz

Not Applicable

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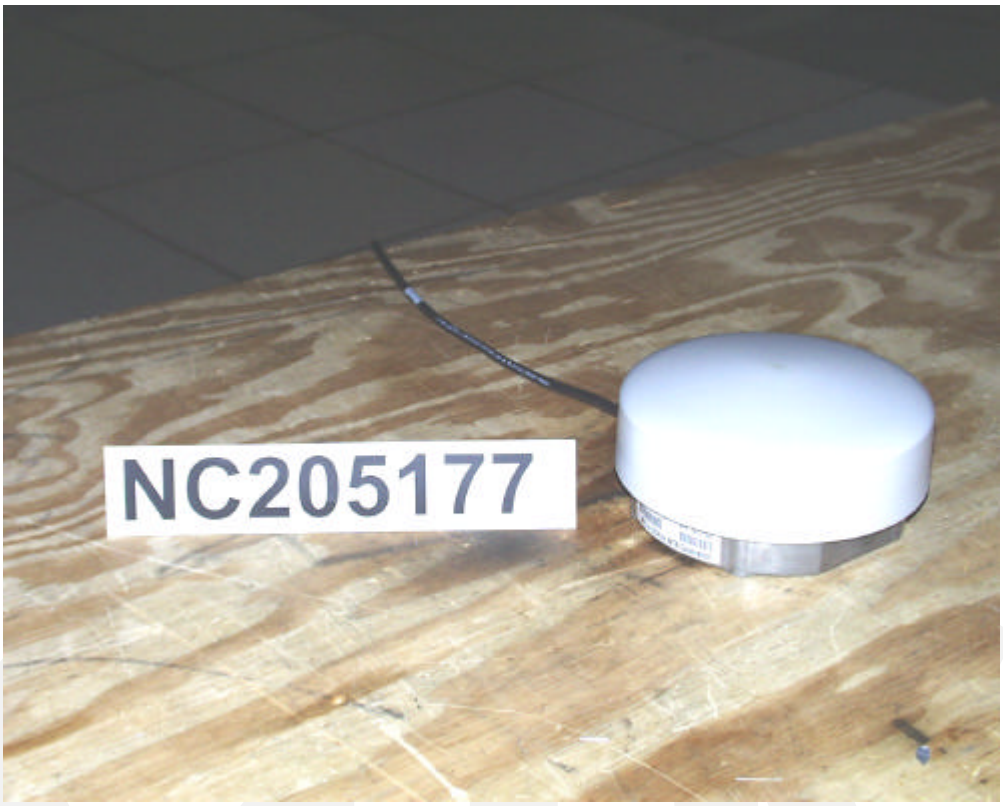
Test-setup photo(s):
Radiated emission 30 MHz - 25000 MHz



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Appendix A

Test Data Sheets

and

Test Setup Drawing(s)

TÜV PRODUCT SERVICE INC 19333 Wild Mountain Road Taylors Falls MN 55084-1758 Tel: 651 638 0297 Fax: 651 638 0298 Rev.No 1.0

TEST SETUP FOR EMISSIONS TESTING

WILD RIVER LAB
Large Test Site

Notes:

1. Items shown in dotted lines are located on the floor below the test area. It is 5 meters vertically from the ground floor to the test area.

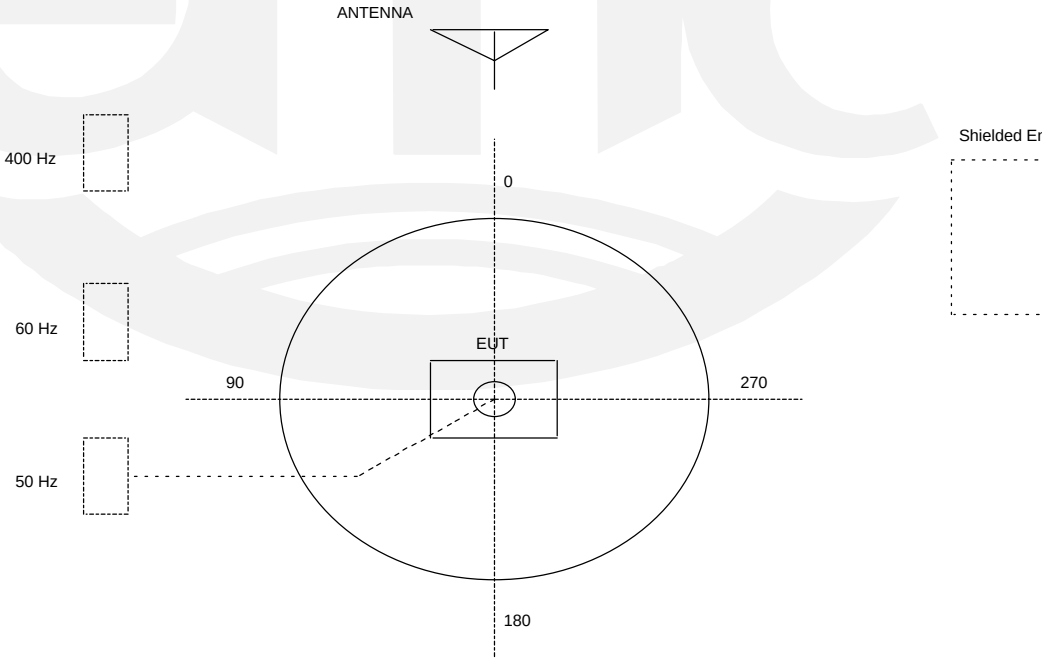
2. 50 Hz, 60 Hz, and 400 Hz are power panels for alternating current.

3. The antenna may be positioned horizontally 3, 10 or 30 meters from the center of the turntable.

4. The circle is a 6.7 meter diameter turntable.

5. A ground plane is in the plane of this sheet.

6. The test sample is shown in the azimuthal position representing zero degrees.



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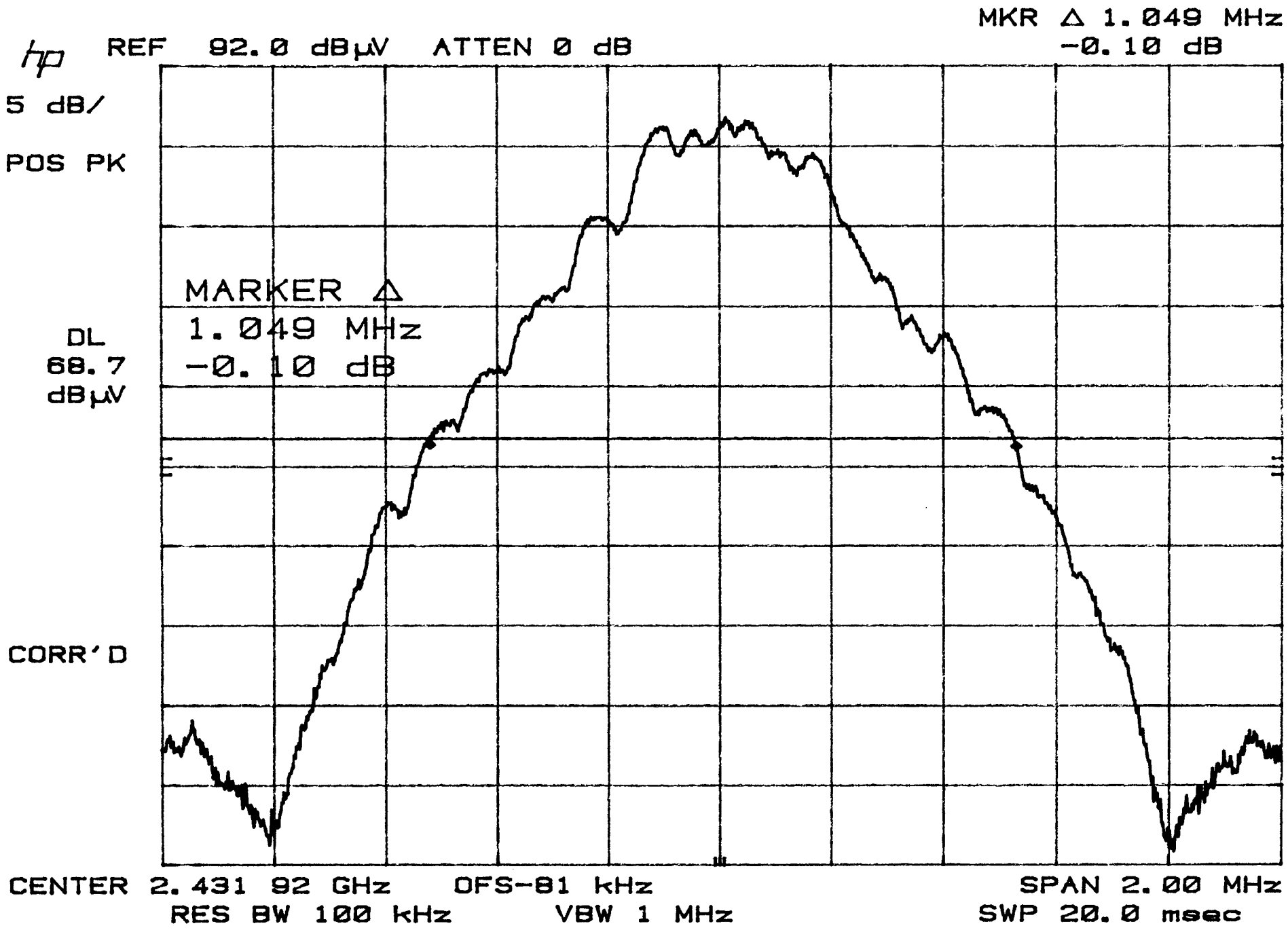
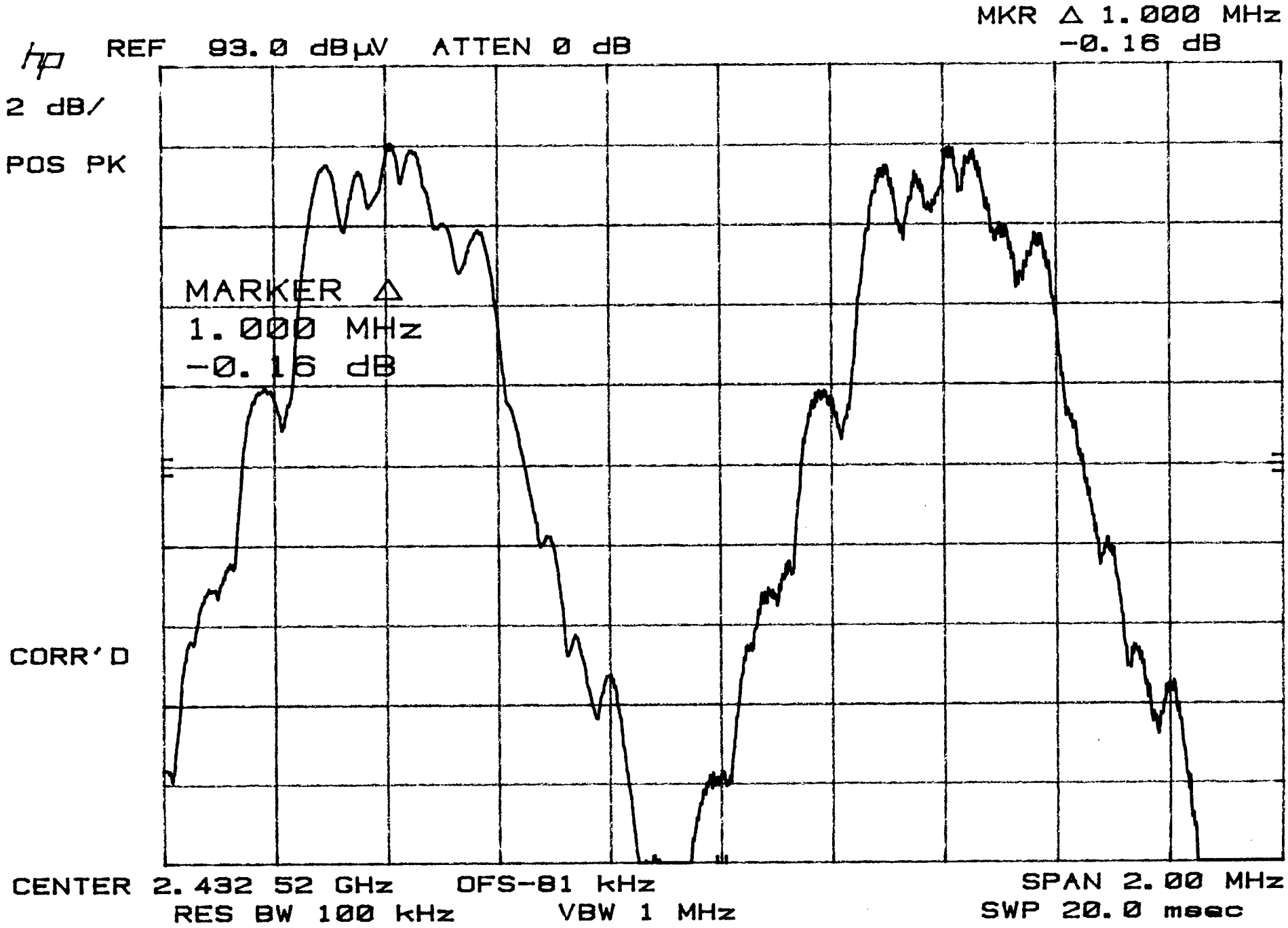
NC205177 Xata Corp 4-Oct-02

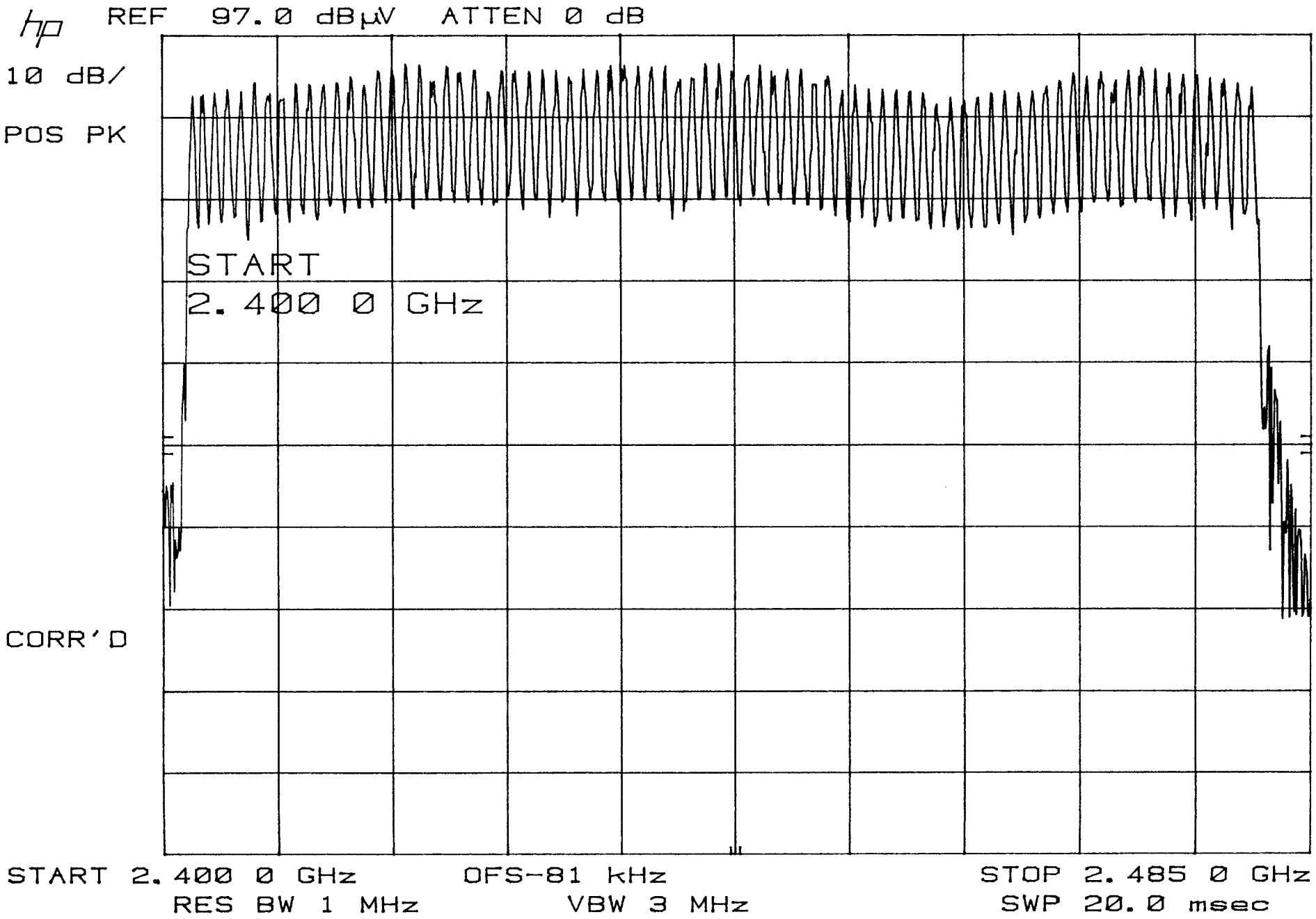
20dB BW



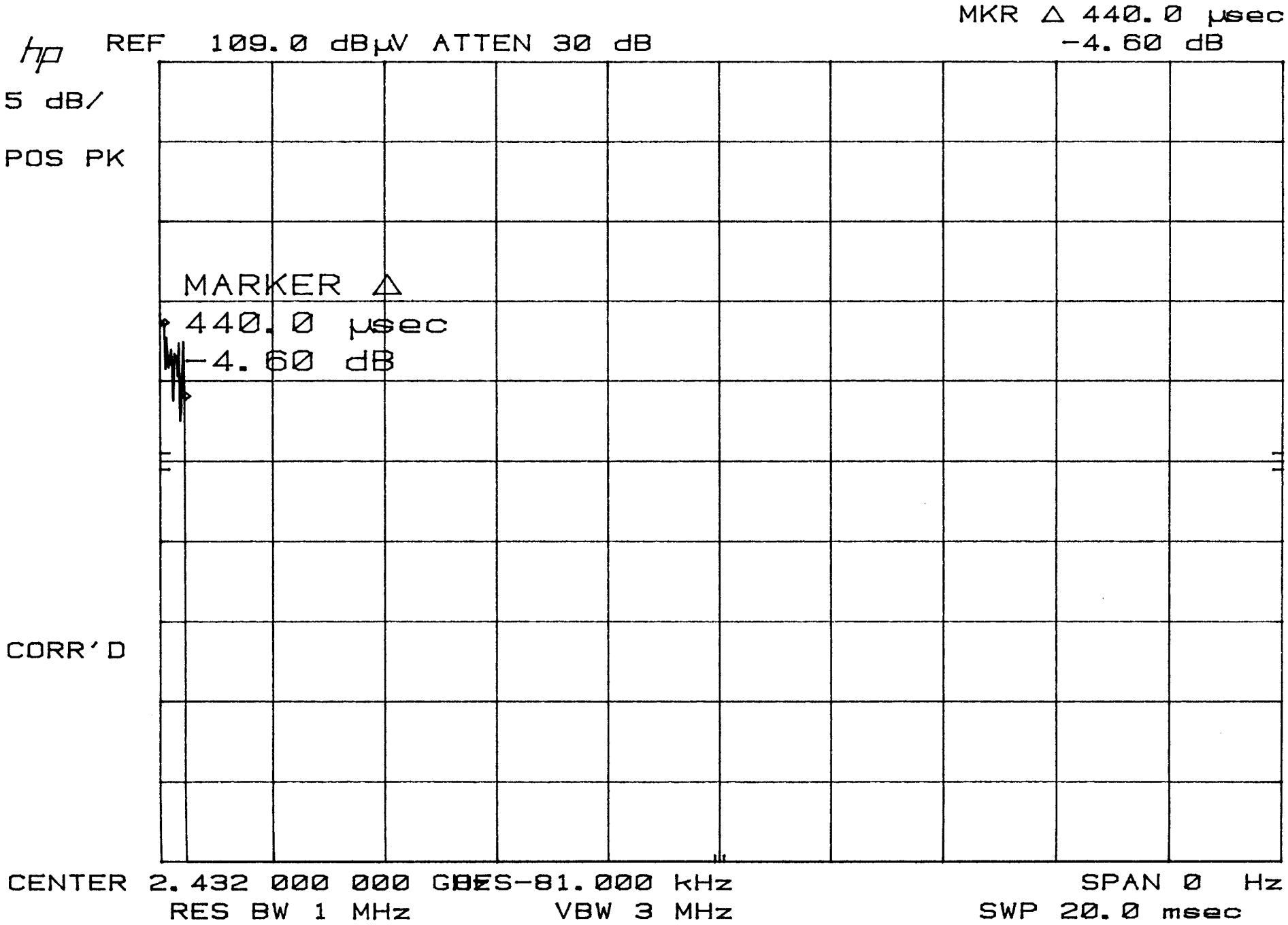
CARRIER FREQ SEPERATION



Number Of Hopping Frequencies = 79



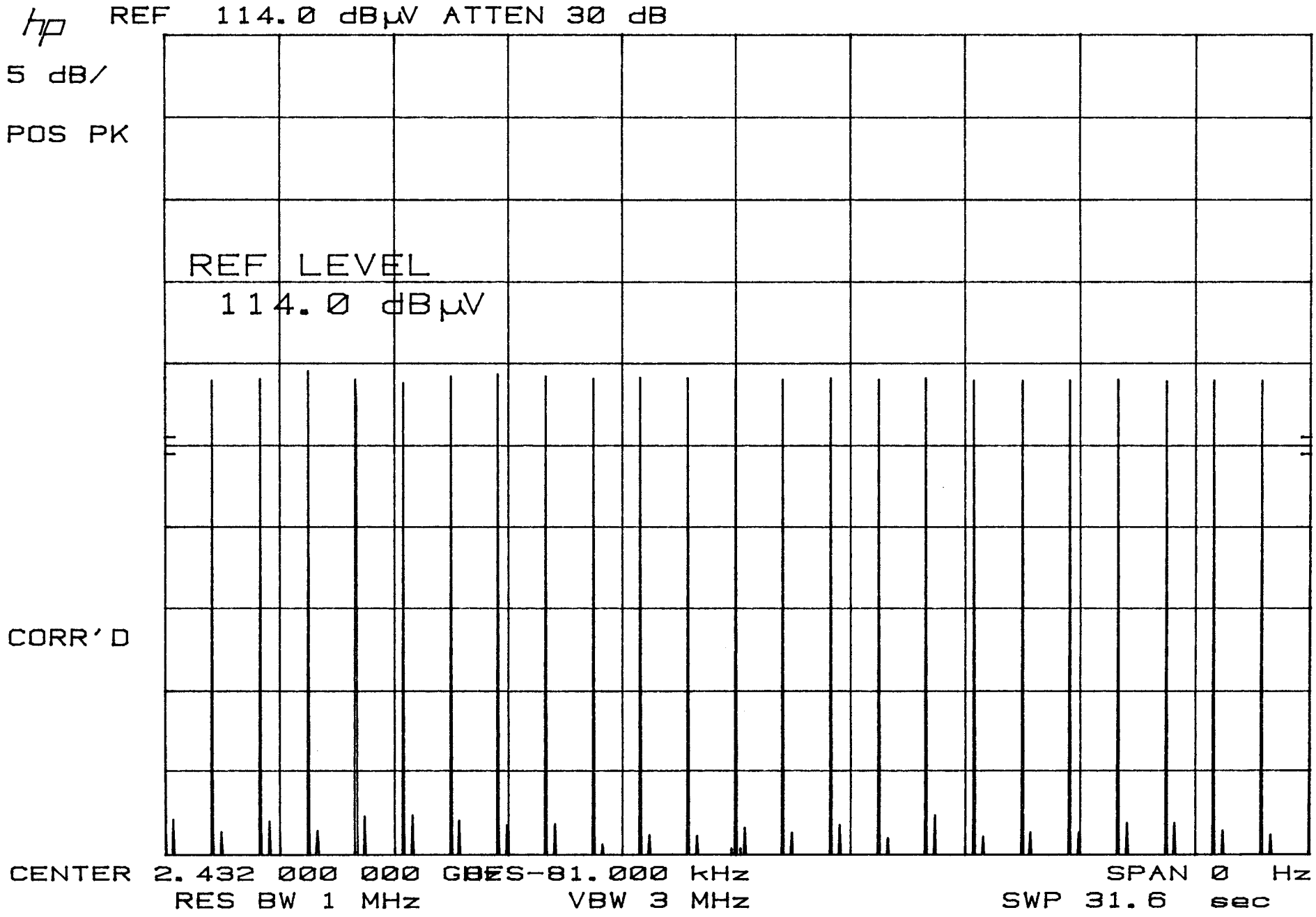
Time Of Occupancy Plot 1 of 2
On Time Per Pulse = 440μS



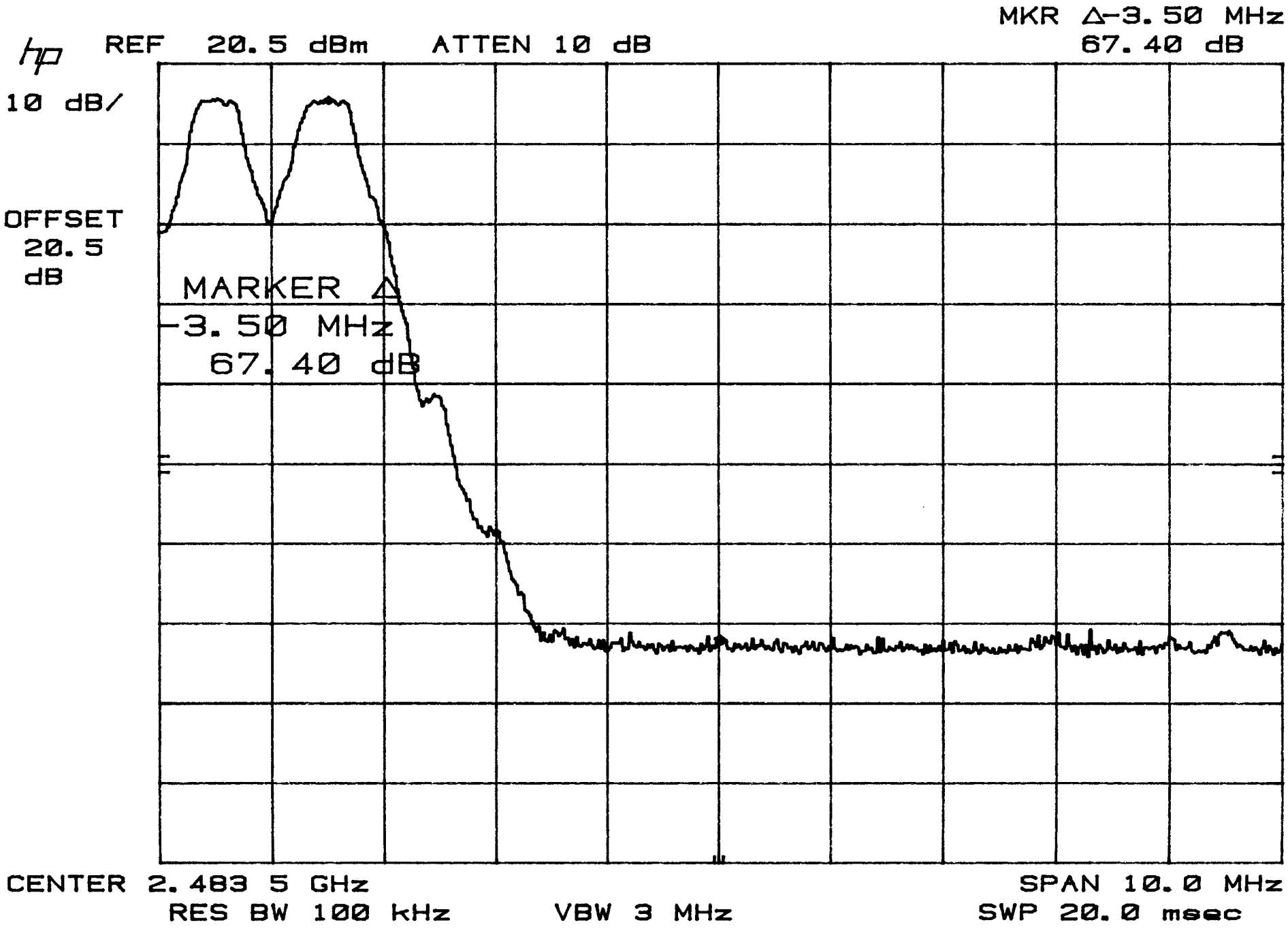
TIME OF OCCUPANCY PLOT 2 OF 2

NUMBER OF PULSES = 25 WITHIN 31.6 SECONDS (79 × .4 = 31.6 s)

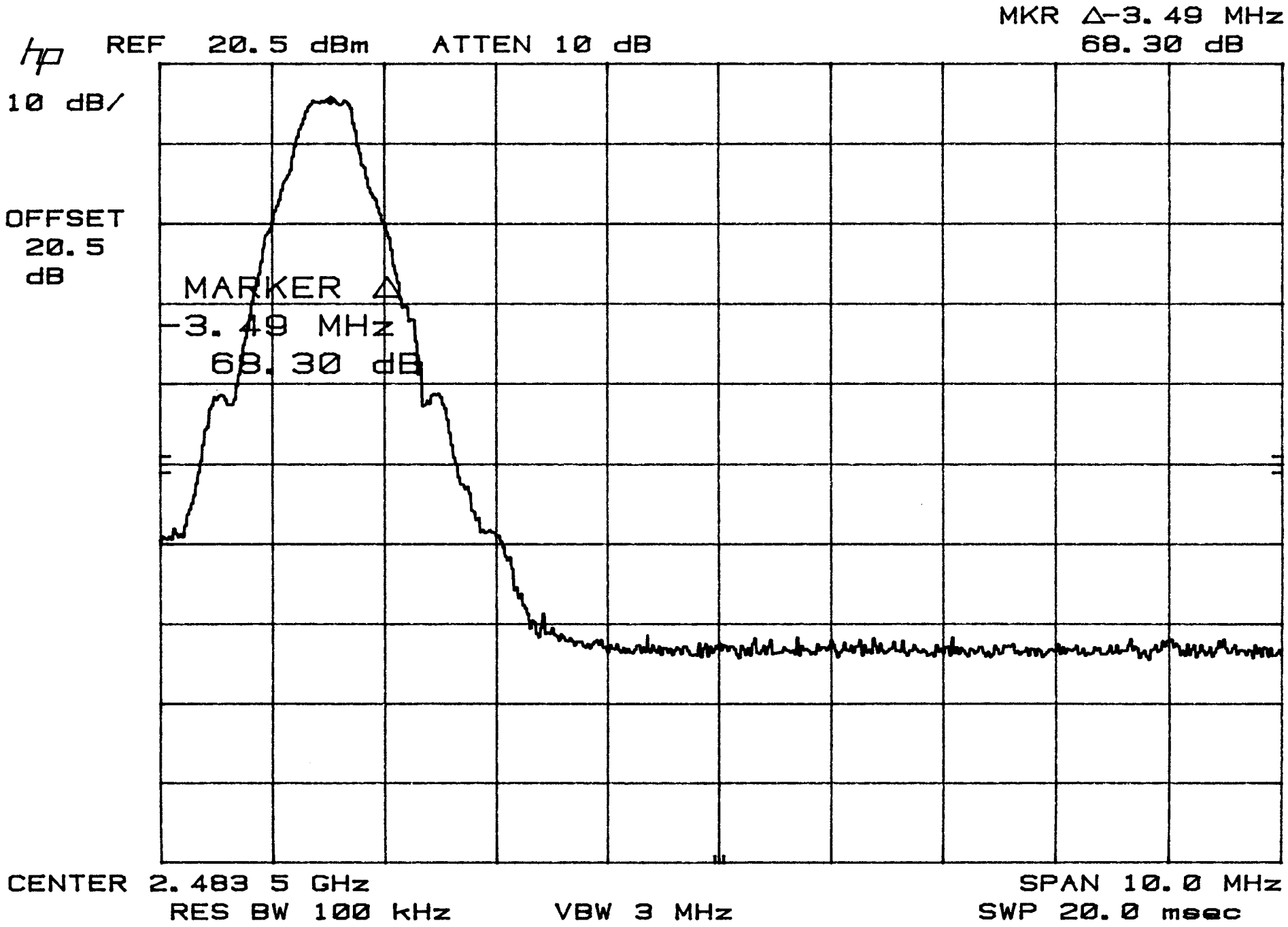
25 × 440 µs = 11 ms TOTAL, LESS THAN 400 ms



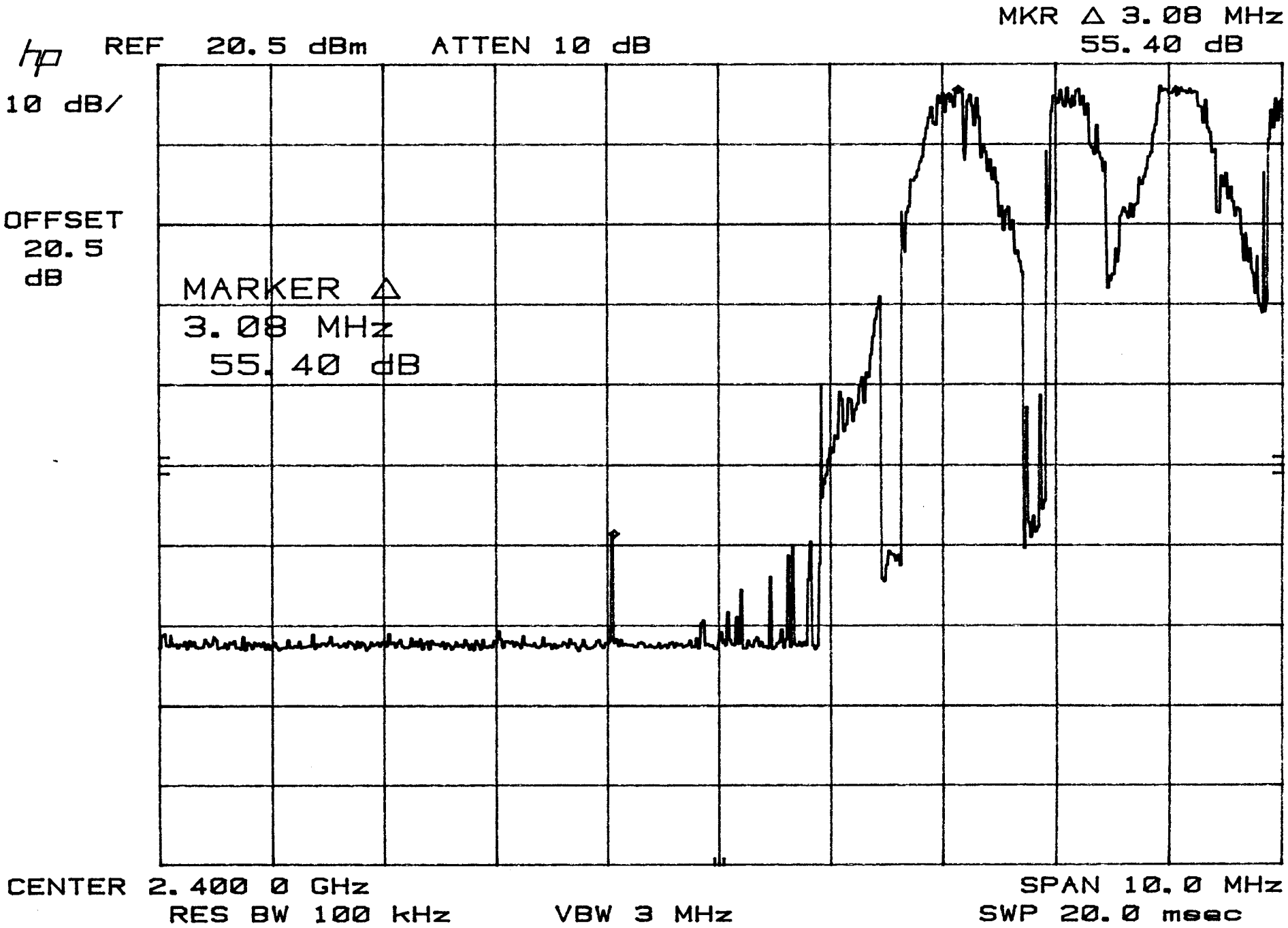
Band Edge Compliance, Conducted, High End, Hopping Enabled



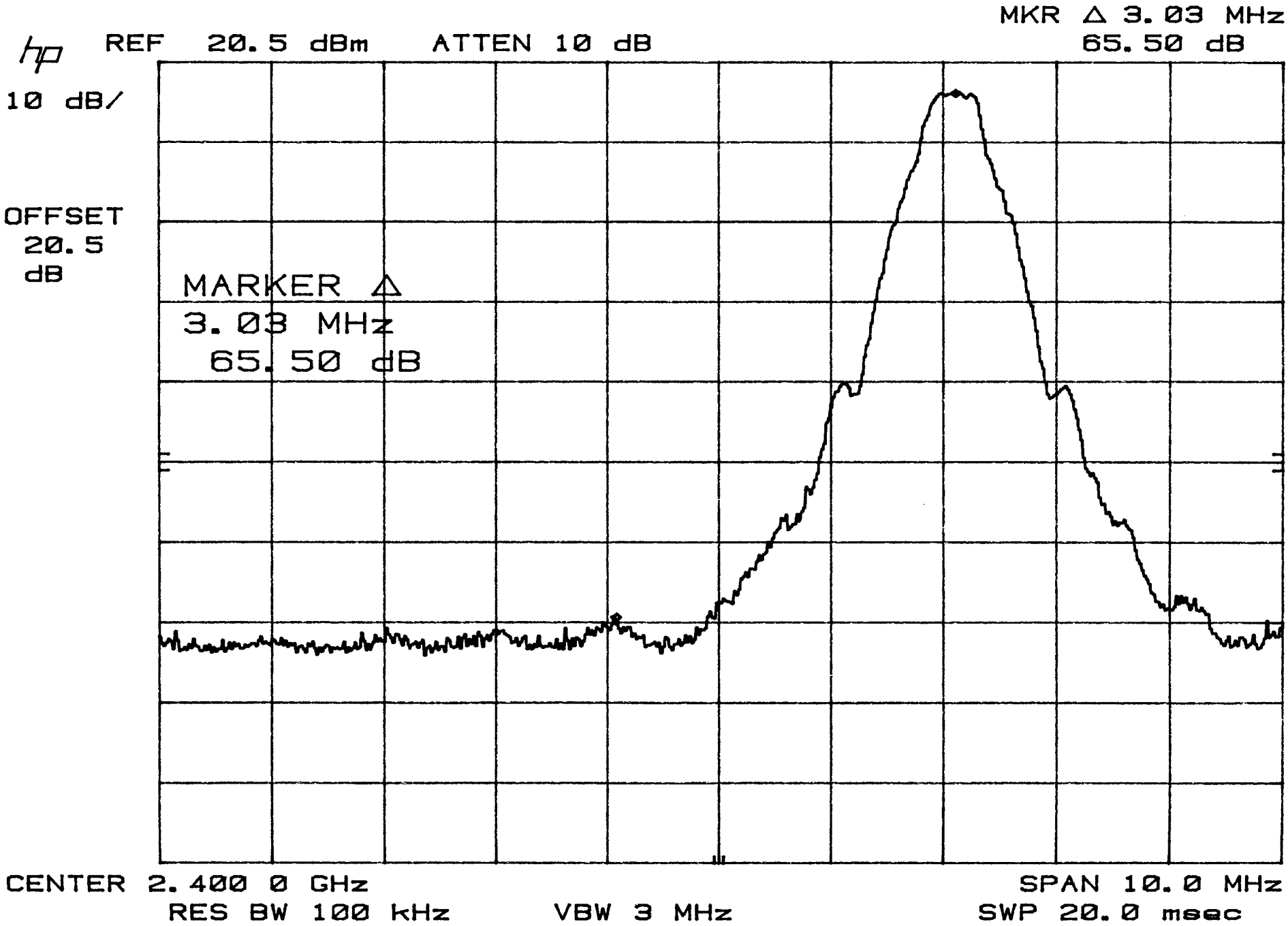
Band Edge Compliance, Conducted, High Channel, Hopping Disabled
2.480 GHz



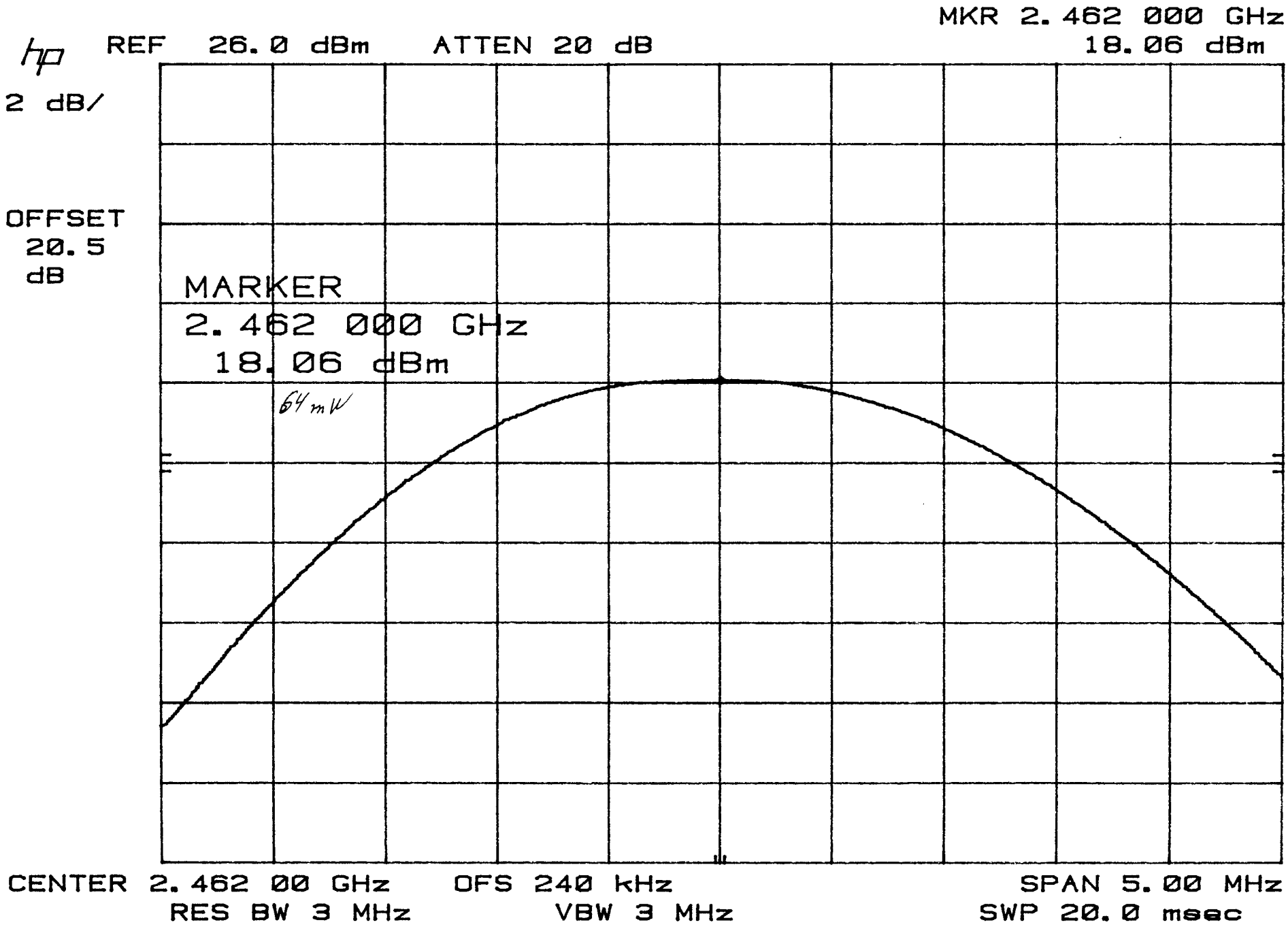
Band Edge Compliance, Conducted, Low End, Hopping Enabled



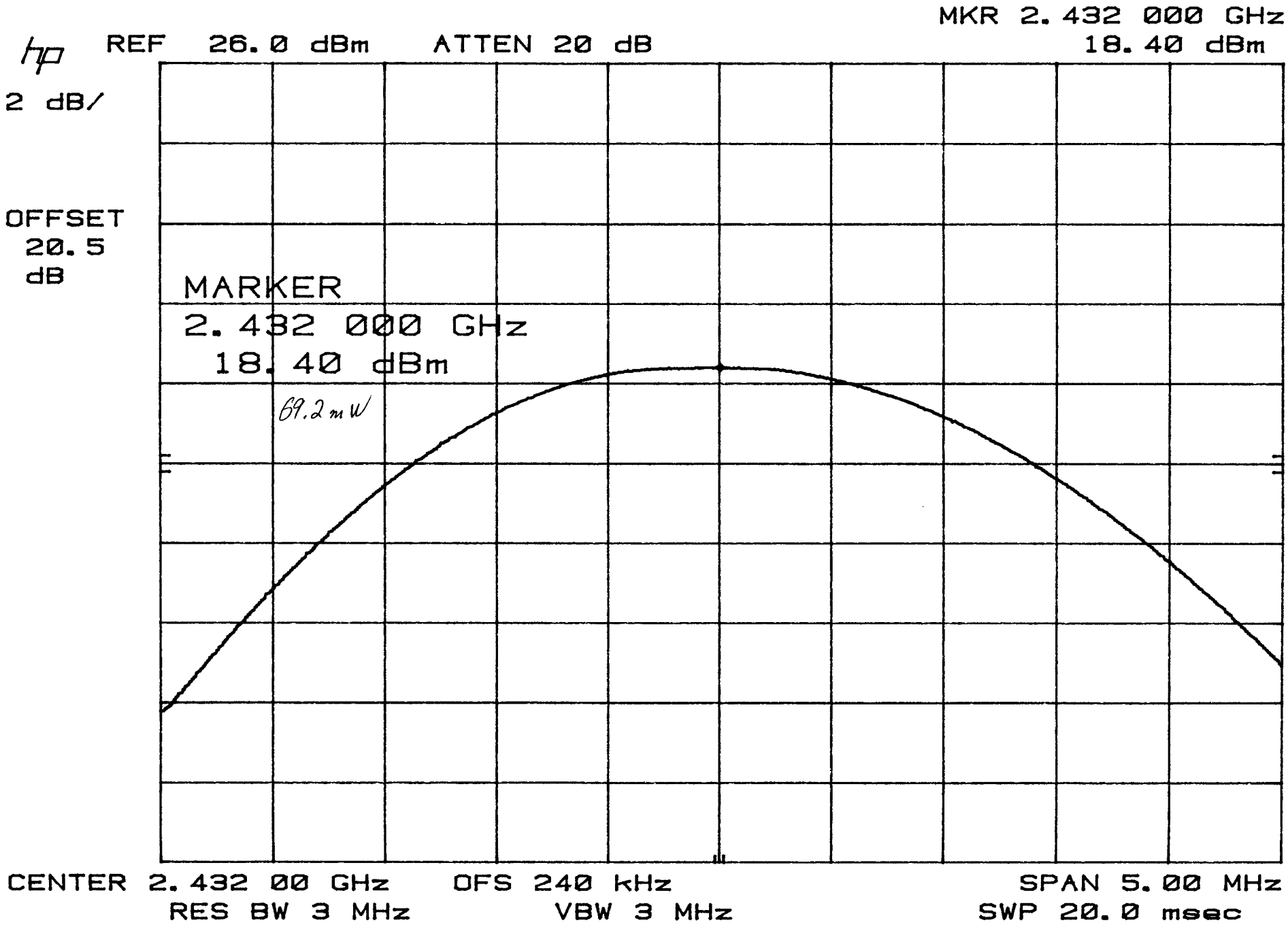
Band Edge Compliance, Conducted, Low Freq, Hopping Disabled
2.402 GHz



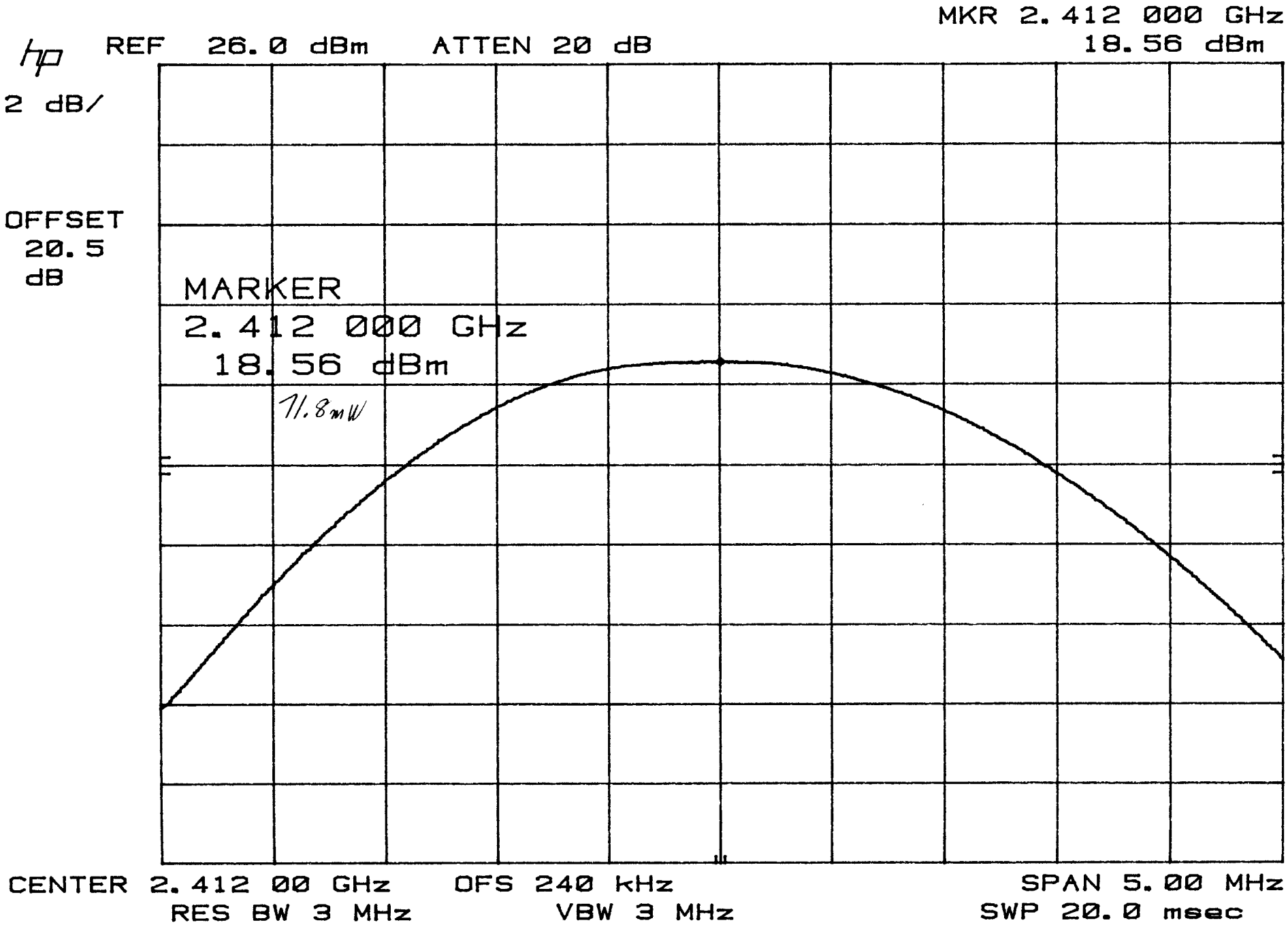
MAX PK OUTPUT POWER, CONDUCTED



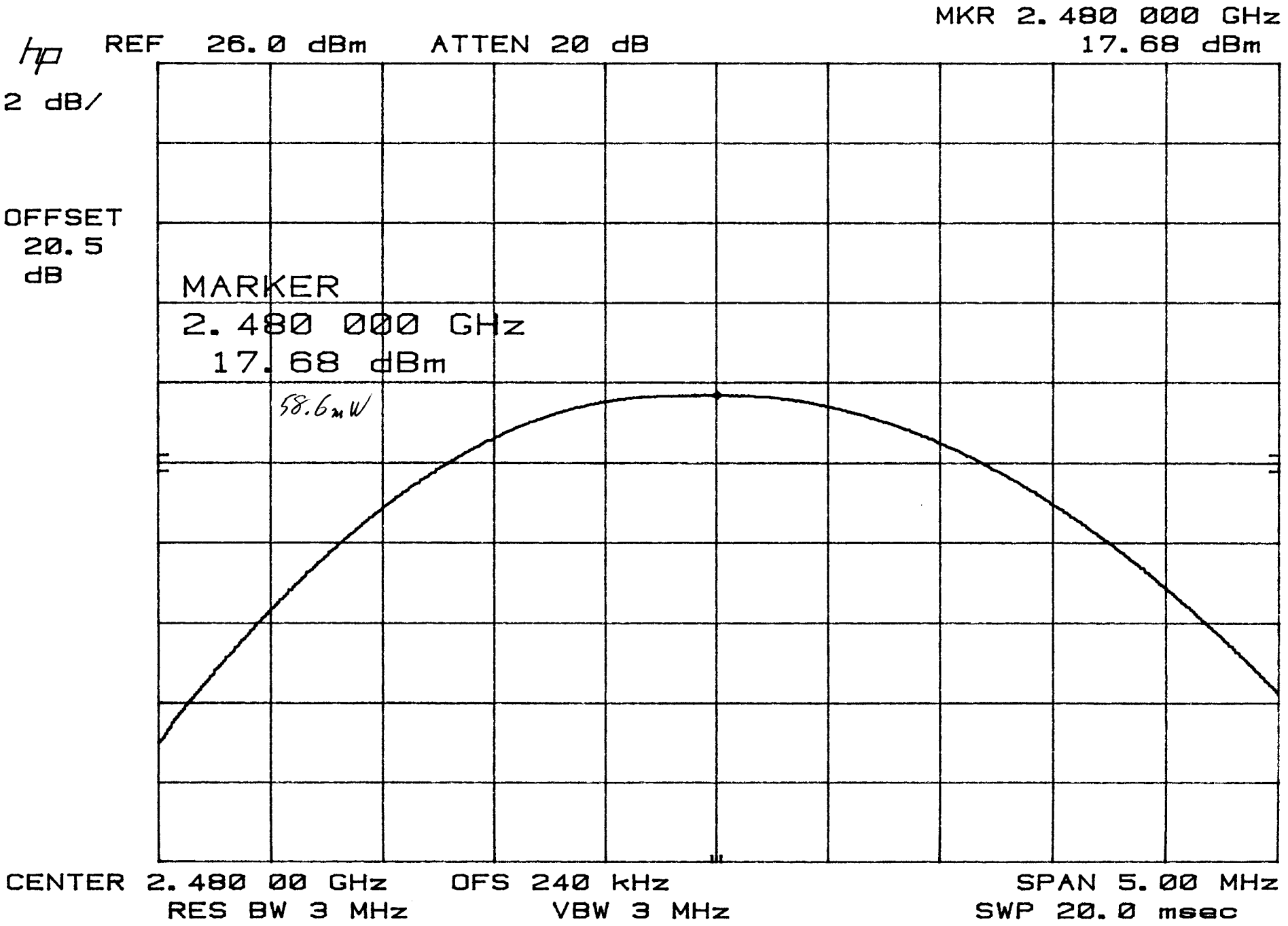
Mid Pk Output Pwr, Conducted



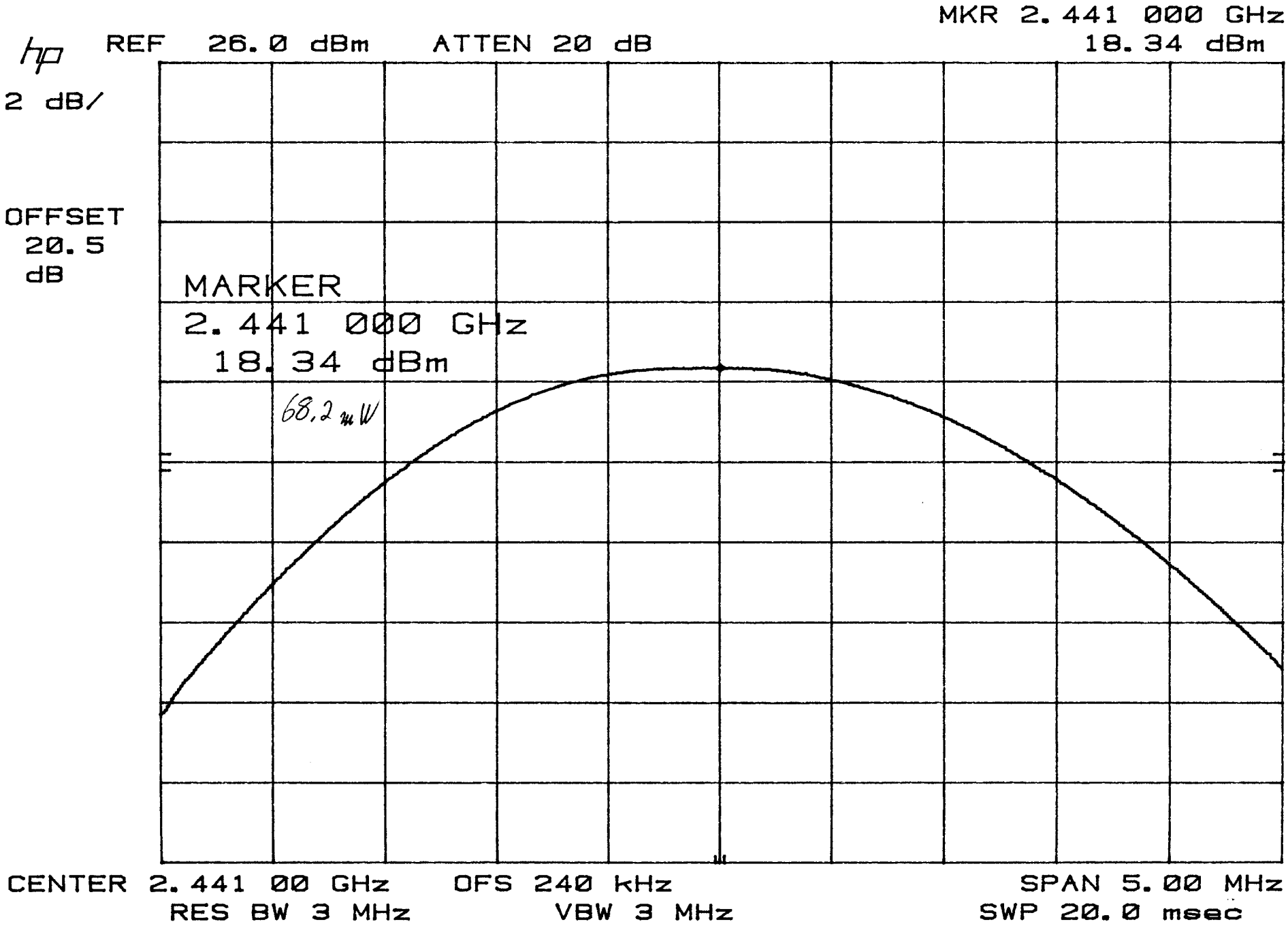
MAX PK OUTPUT PWR, CONDUCTED



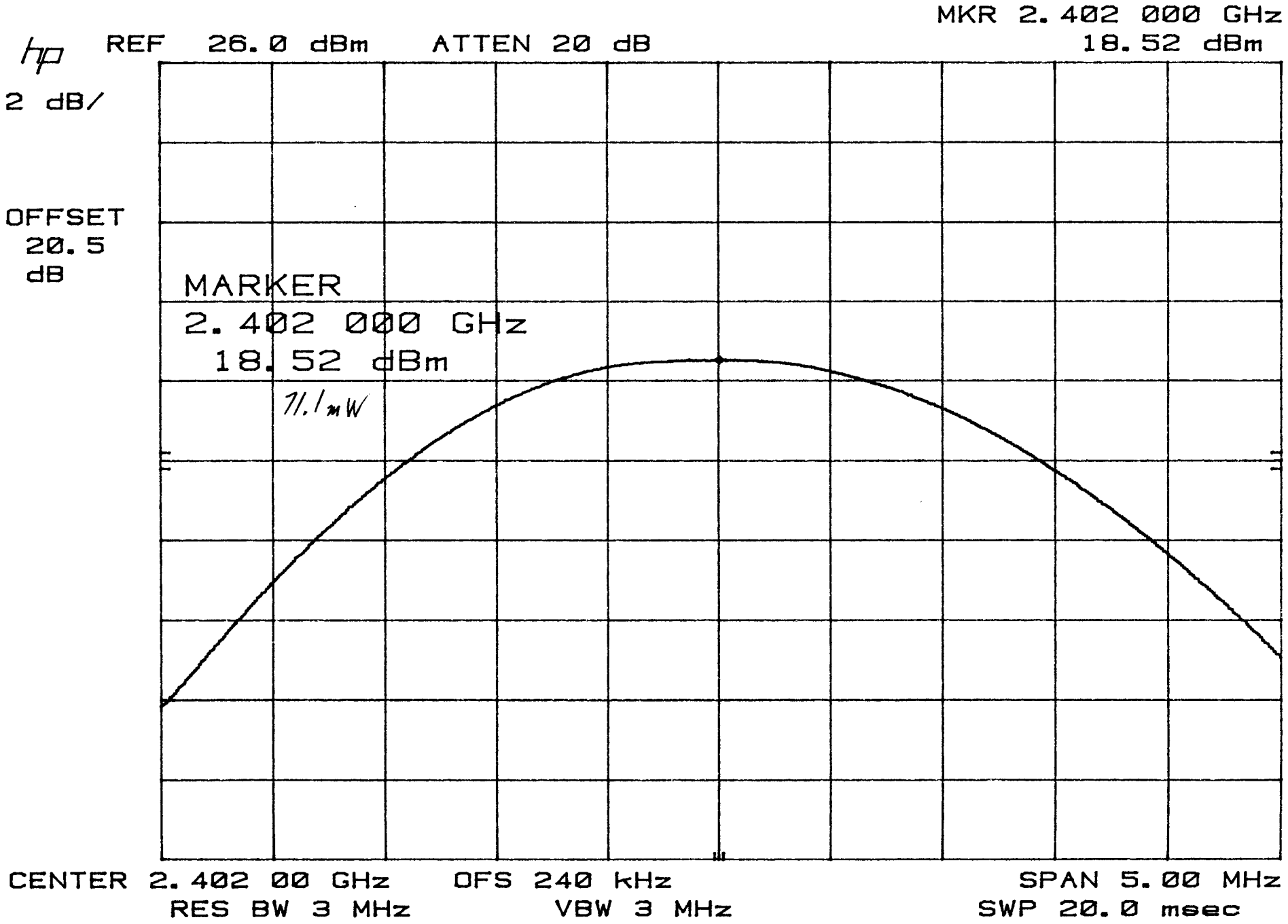
MAX PK OUTPUT POWER, HIGH CHANNEL, CONDUCTED



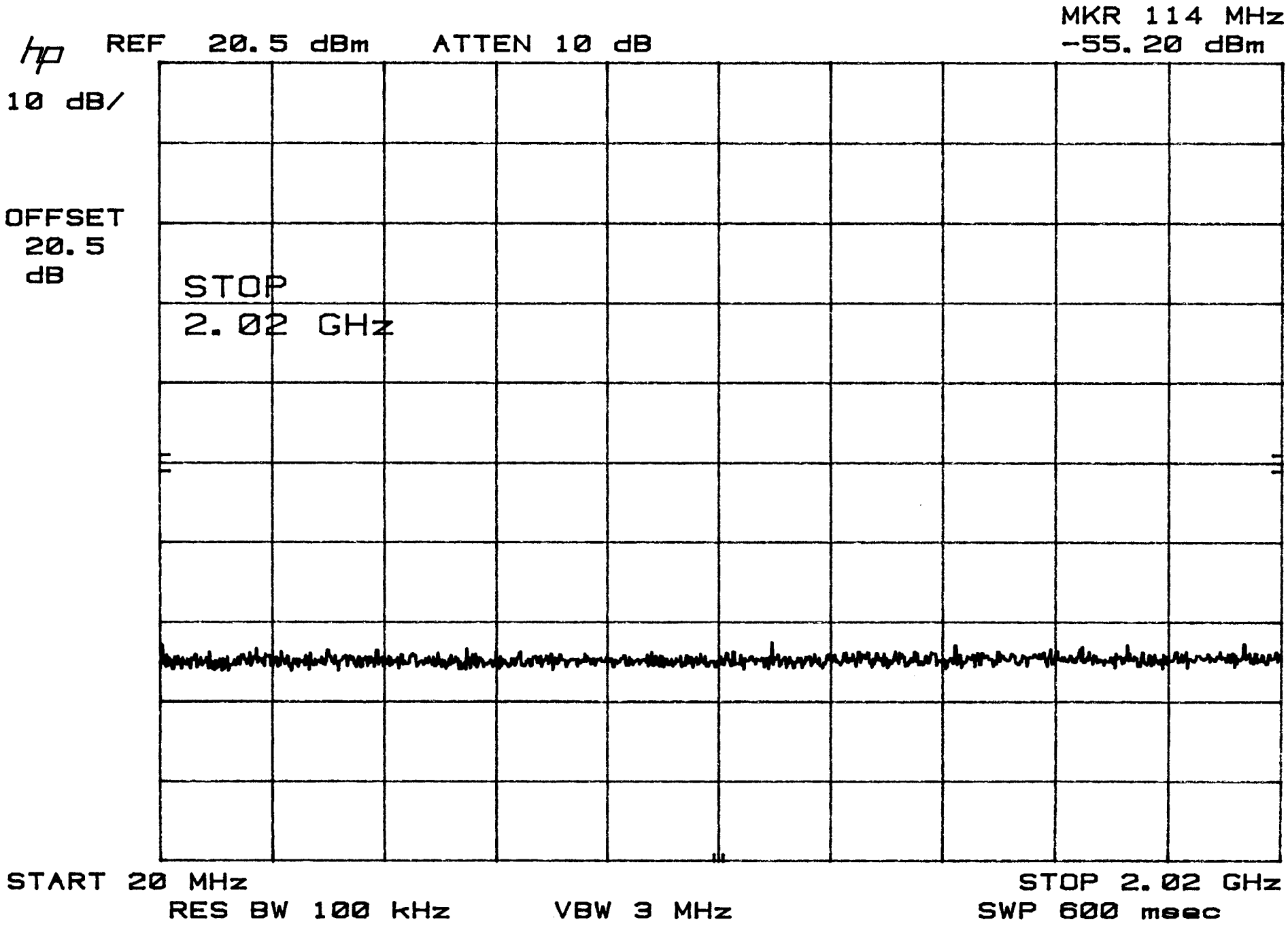
Max Pk Output Power, Mid Channel, Conducted



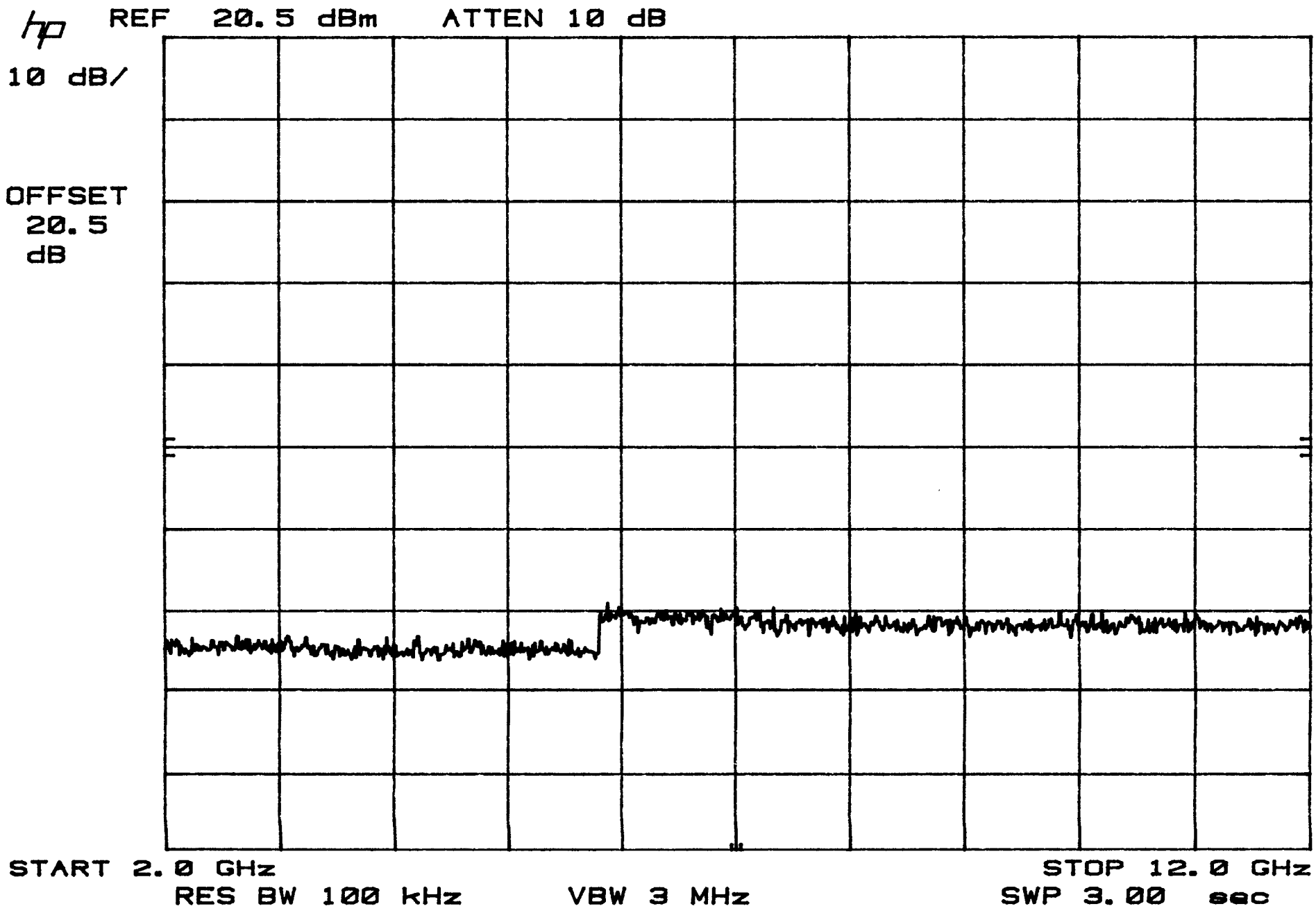
MAX PK OUTPUT POWER, LOW CHANNEL, CONDUCTED



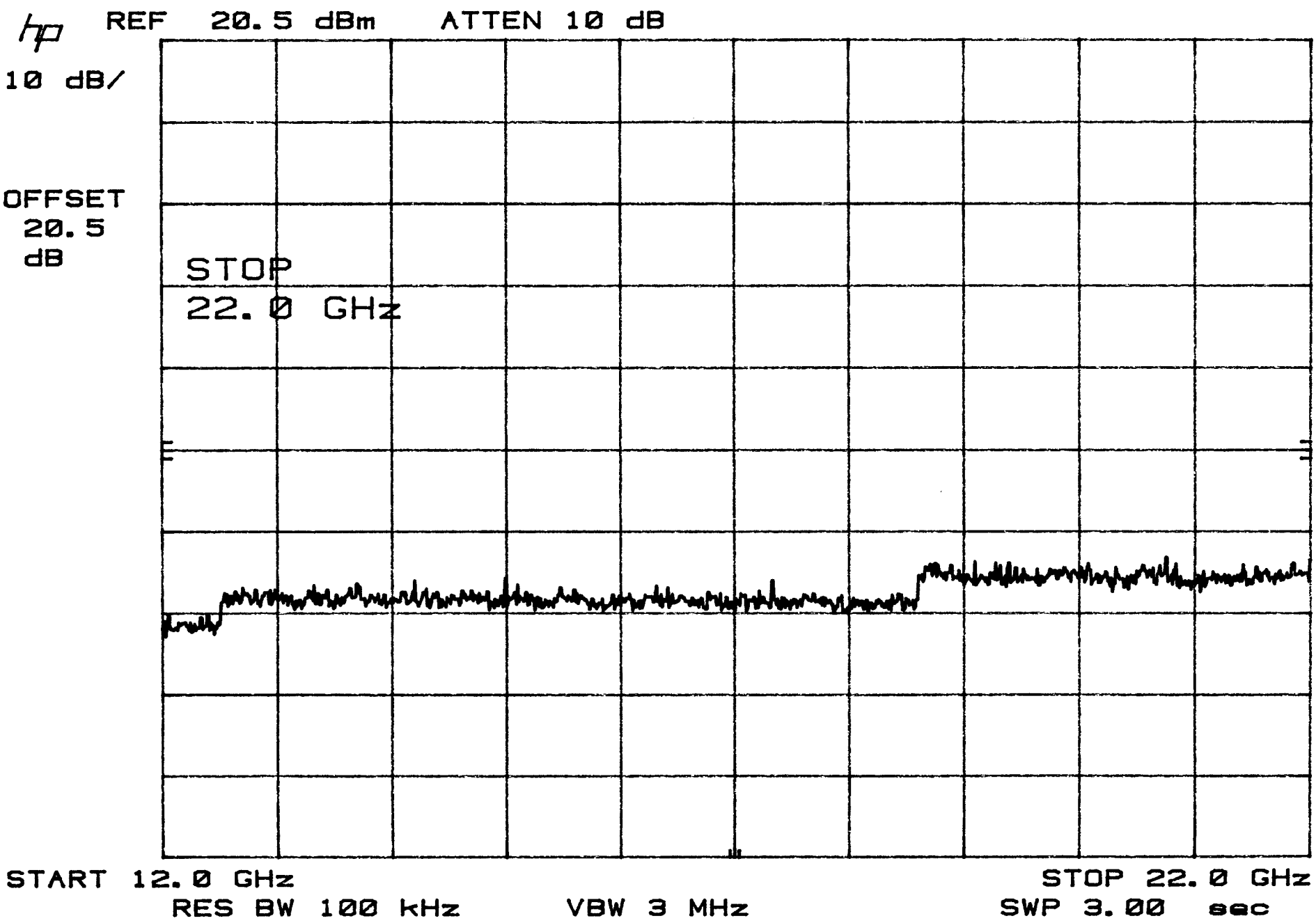
SPURIOUS CONDUCTED, HOPPING, 1 OF 3



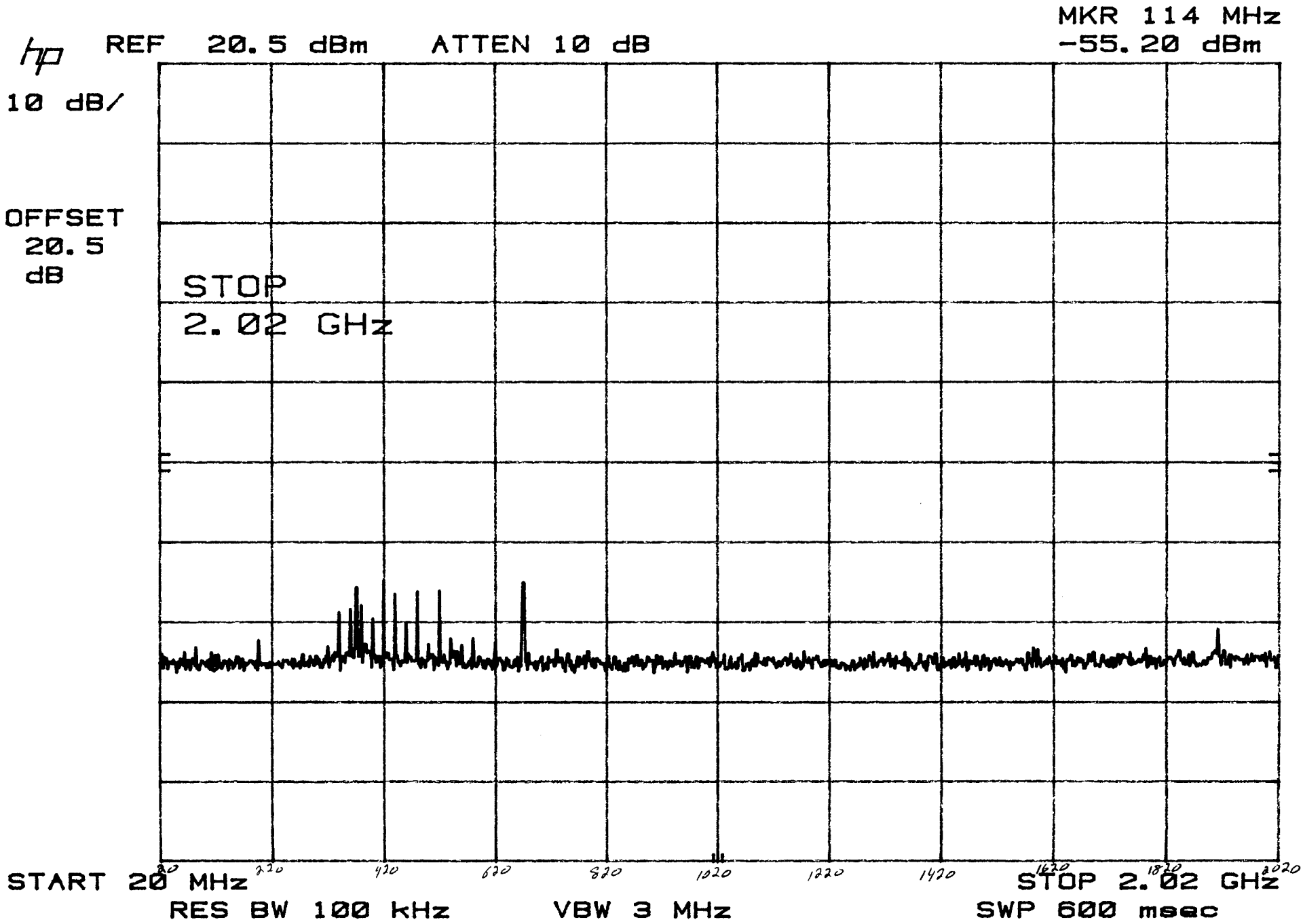
SPURIOUS CONDUCTED, HOPPING, 2 of 3



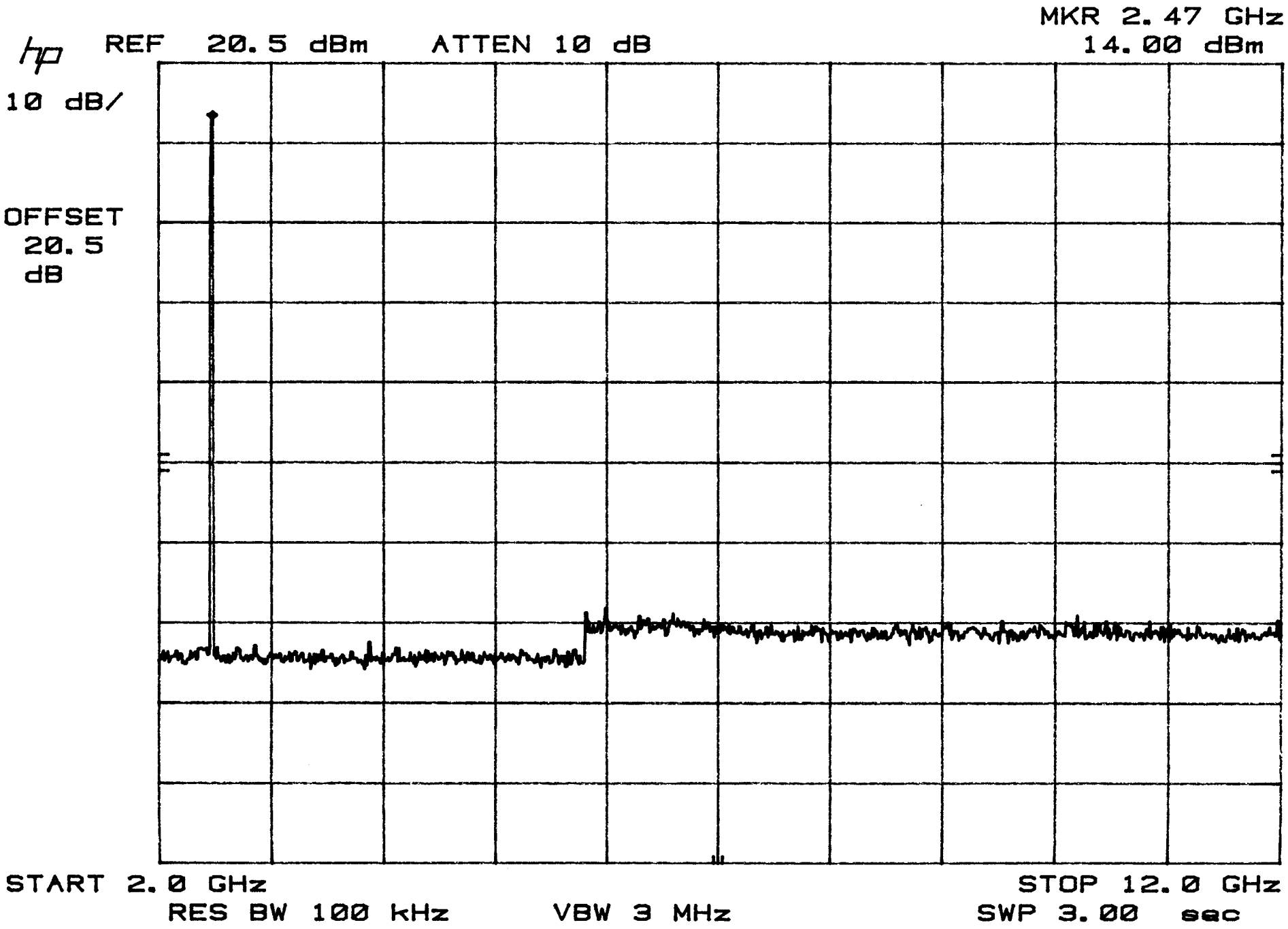
SPURIOUS CONDUCTED, HOPPING, 3 OF 3



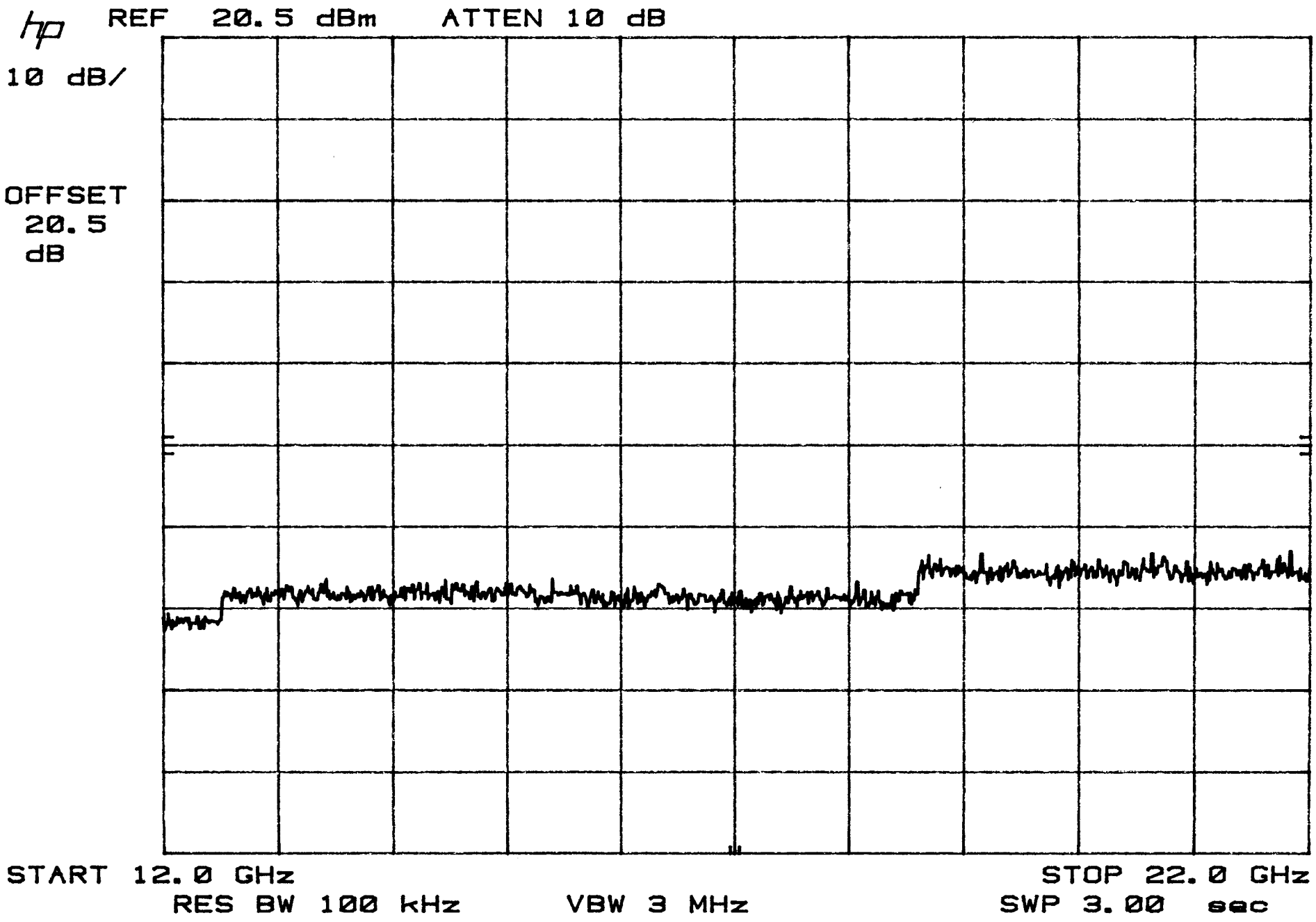
SPURIOUS CONDUCTED, HIGH CH., 1 OF 3
2.480 GHz



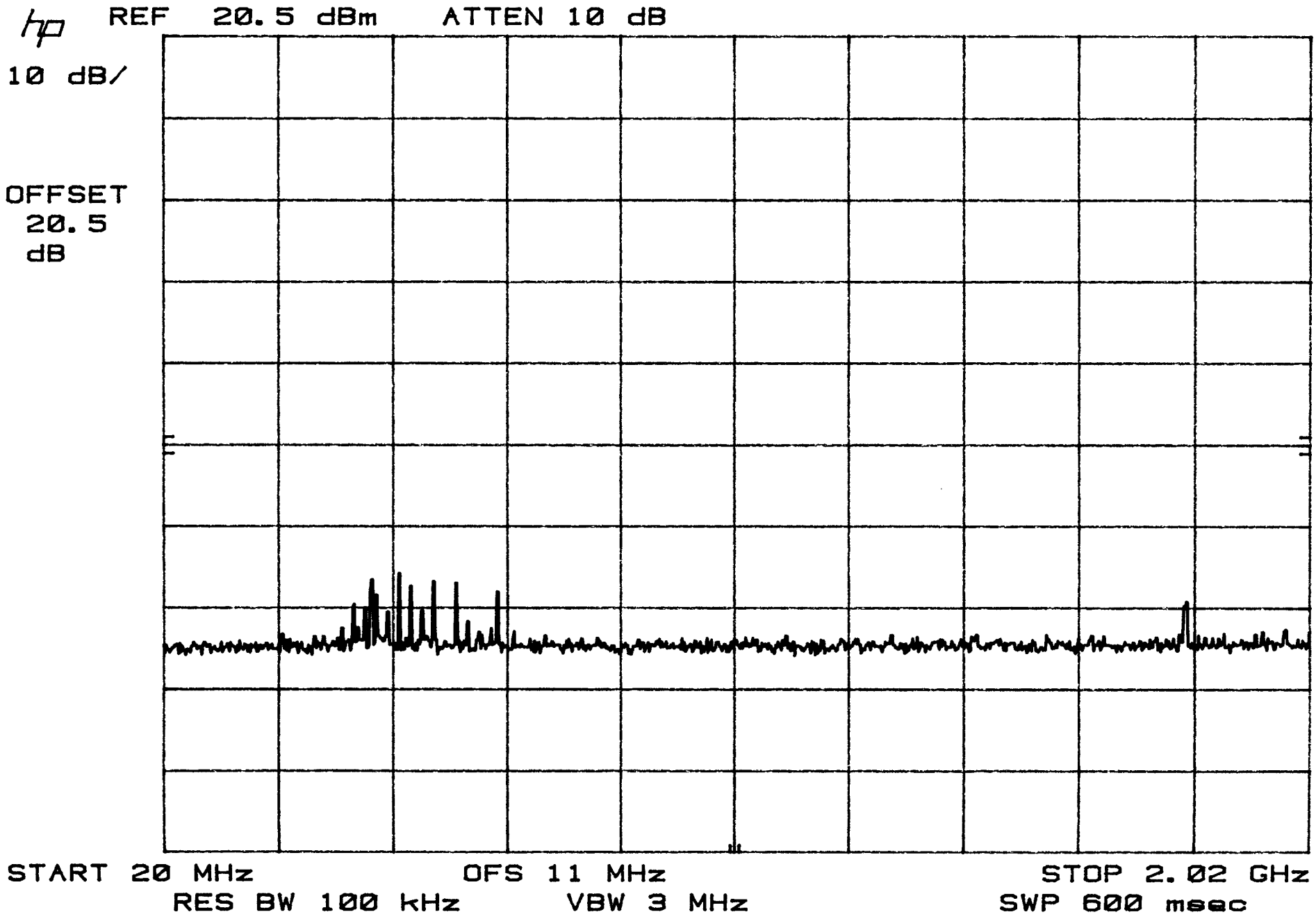
SPURIOUS CONDUCTED, HIGH CH., 2 OF 3
2.480 GHz



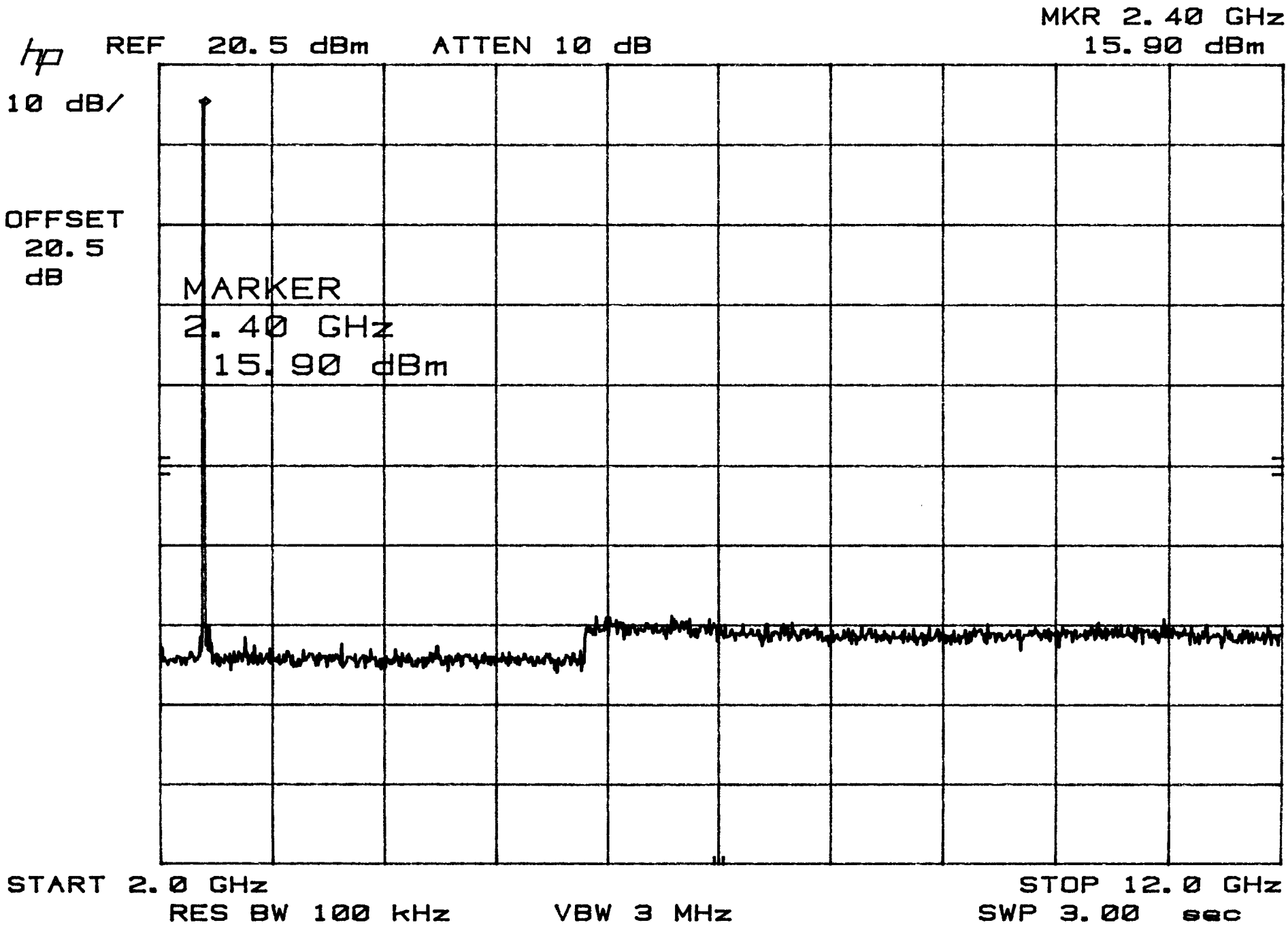
Spurious Conducted, High Ch., 3 of 3
2.480 GHz



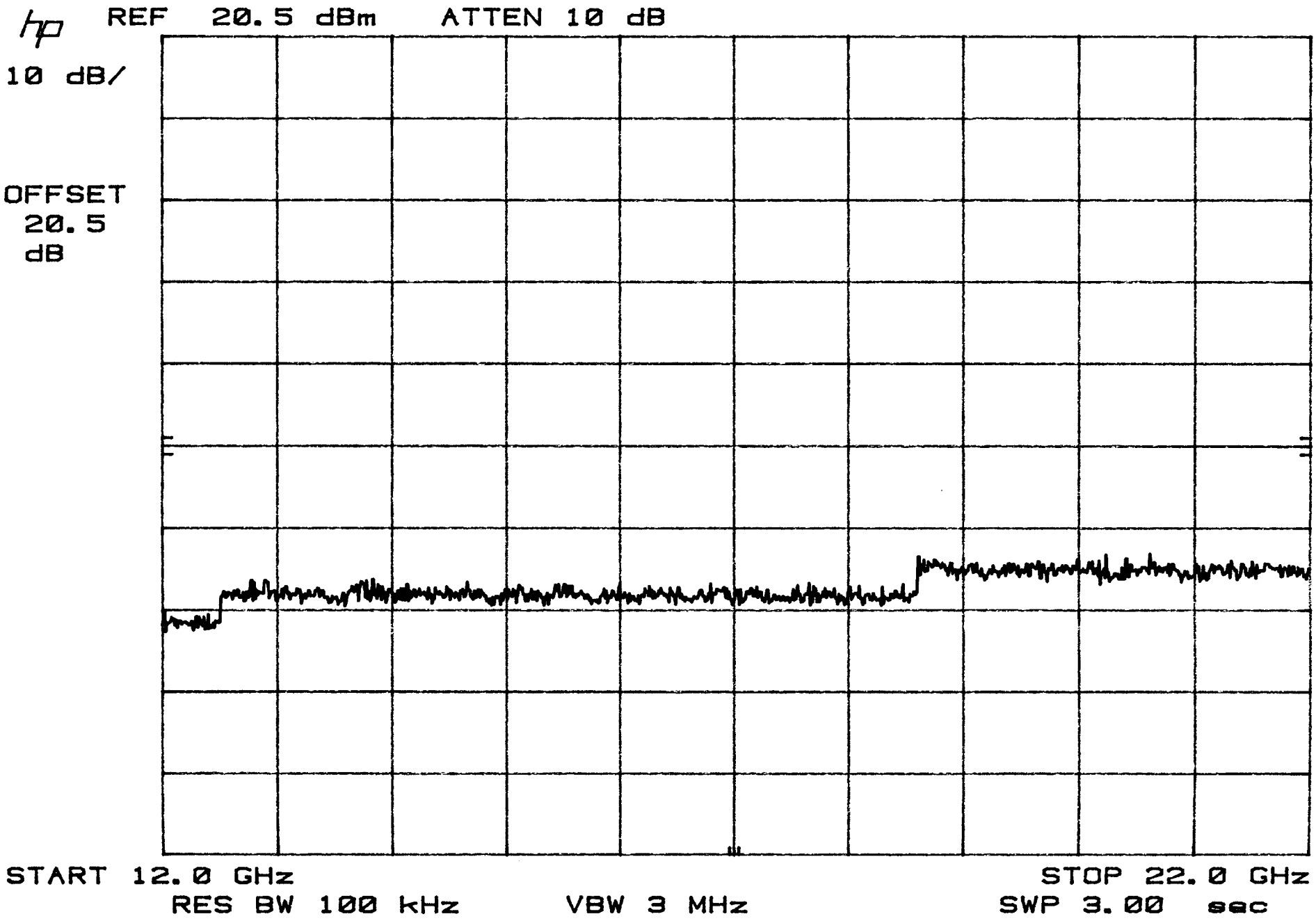
Spurious Conducted, Low Channel, 1 of 3
2.402 GHz



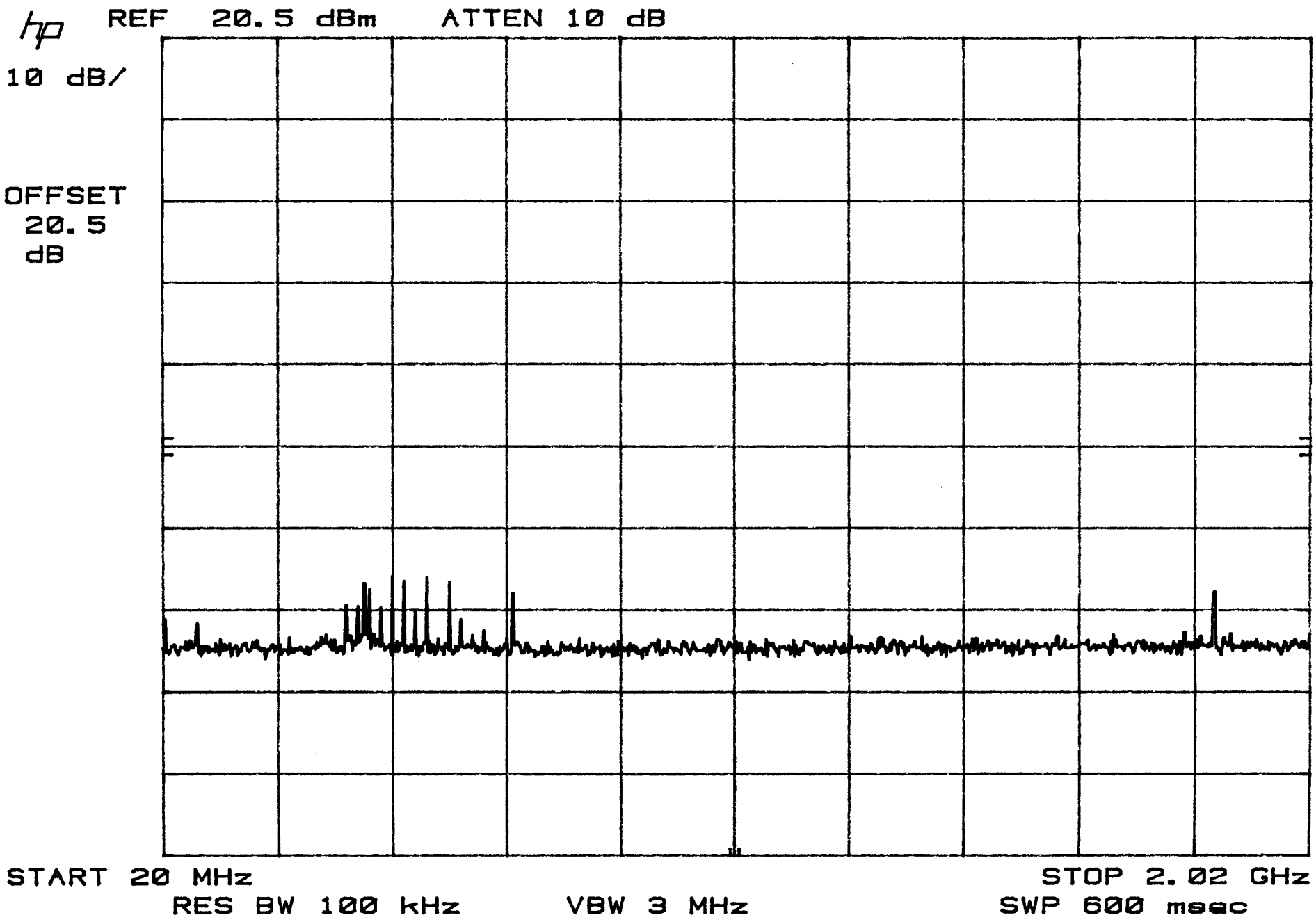
Spurious Conducted, Low Channel, 2 of 3
2.402 GHz



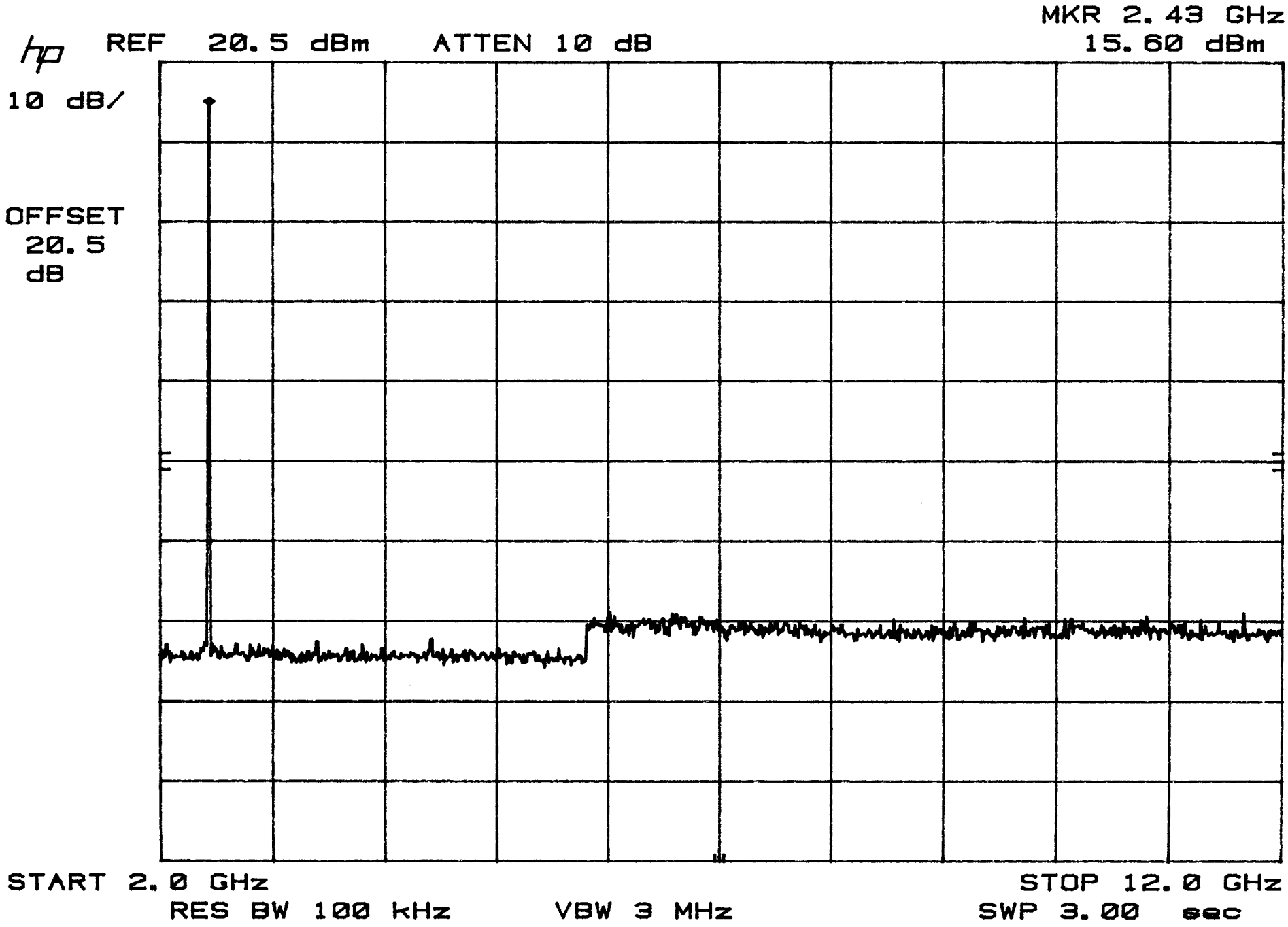
Spurious Conducted, Low Channel, 3 of 3
2.402 GHz



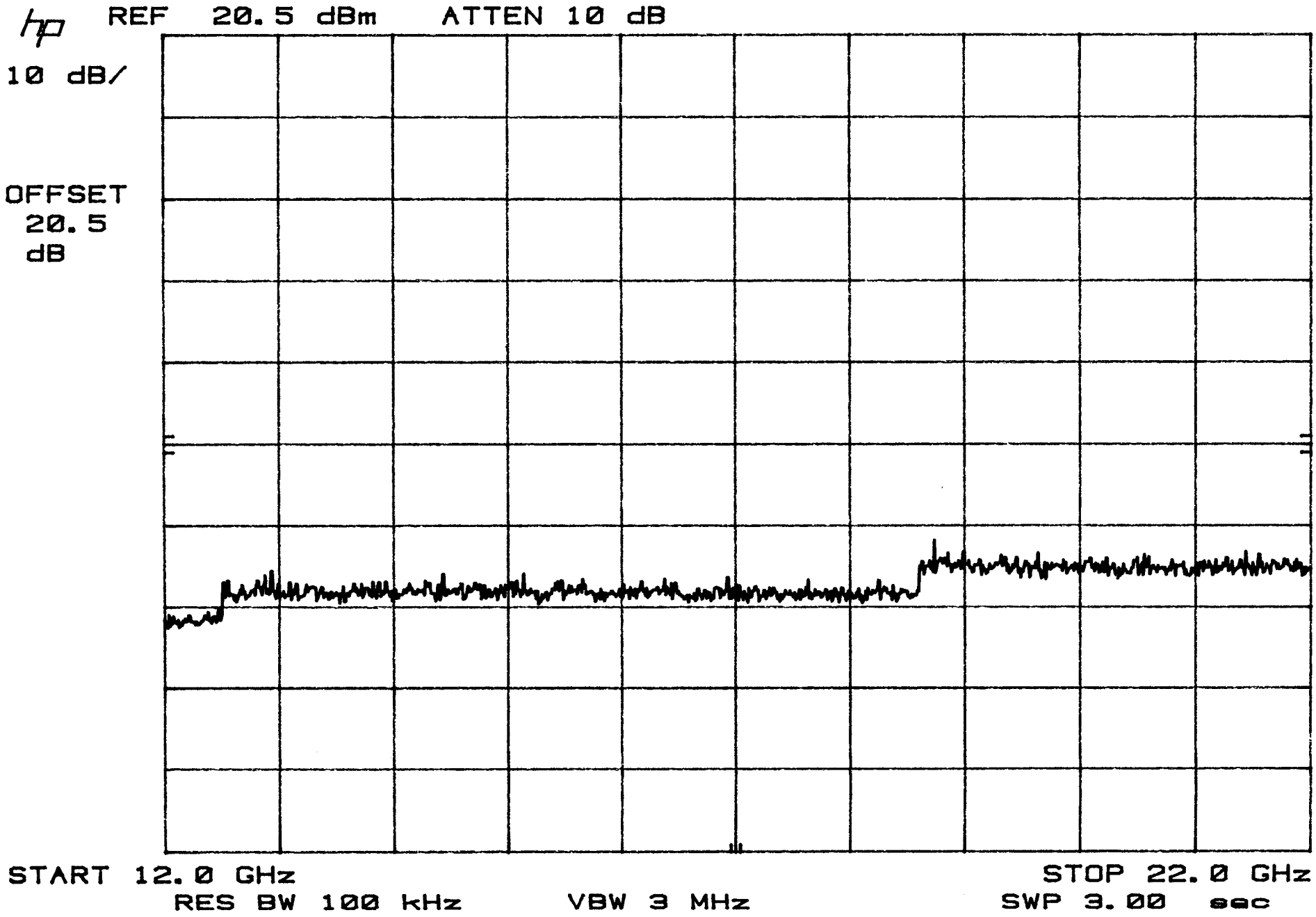
Spurious Conducted, Mid Channel, 1 of 3
2.441 GHz



Spurious Conducted, Mid Ch., 2 of 3
2.441 GHz



Spurious Conducted, Mid Ch. 3 of 3
2.441 GHz



Radiated Electromagnetic Emissions

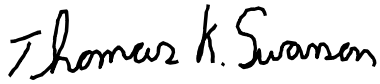
Test Report #:	**5177 Run 01**	Test Area:	LTS 3m		
Test Method:	FCC Part 15	Test Date:	04-Oct-2002		
EUT Model #:	XAM	EUT Power:	12VDC		
EUT Serial #:				Temperature:	22 °C
Manufacturer:	Xata Corp.			Relative Humidity:	49 %
EUT Description:	Truck Mobile GPS Tracking System			Air Pressure:	99 kPa
Notes:				Page:	1 of 5

FREQ (MHz)	LEVEL (dBuV)	CABLE / ANT / PREAMP (dB) (dB/m) (dB)	FINAL (dBuV/m)	POL / HGT / AZ (m) (DEG)	DELTA1 FCC B (< 1GHz)	DELTA2 FCC B (> 1GHz)
EUT Hopping Enabled						
Begin scan 30MHz to 2000MHz						
50.34	42.9 Qp	0.6 / 14.3 / 27.7	30.1	V / 1.0 / 0.0	-9.9	N/A
80.00	46.6 Qp	0.8 / 7.6 / 27.9	27.1	V / 1.0 / 0.0	-12.9	N/A
160.00	42.0 Qp	1.1 / 8.8 / 27.9	24.0	V / 1.0 / 0.0	-19.5	N/A
180.00	33.8 Qp	1.1 / 9.4 / 27.9	16.4	V / 1.0 / 0.0	-27.1	N/A
226.48	33.5 Qp	1.4 / 11.1 / 27.6	18.3	V / 1.0 / 0.0	-27.7	N/A
Maximized						
50.34	45.6 Qp	0.6 / 14.3 / 27.7	32.8	V / 1.0 / 290.0	-7.2	N/A
80.00	47.4 Qp	0.8 / 7.6 / 27.9	27.9	V / 1.4 / 10.0	-12.1	N/A
160.00	41.6 Qp	1.1 / 8.8 / 27.9	23.6	V / 1.0 / 194.0	-19.9	N/A
Frequency fixed at 2.402GHz						
Previous measurements unchanged						
Frequency fixed at 2.441GHz						
Previous measurements unchanged						
Frequency fixed at 2.480GHz						
Previous measurements unchanged						
Fixed frequencies at 2.412GHz, 2.432GHz, & 2.462GHz						

Tested by: G Jakubowski

Printed Signature

Reviewed by: TKS



Printed Signature

Radiated Electromagnetic Emissions

Test Report #:	**5177 Run 01**	Test Area:	LTS 3m		
Test Method:	FCC Part 15	Test Date:	04-Oct-2002		
EUT Model #:	XAM	EUT Power:	12VDC		
EUT Serial #:				Temperature:	22 °C
Manufacturer:	Xata Corp.			Relative Humidity:	49 %
EUT Description:	Truck Mobile GPS Tracking System			Air Pressure:	99 kPa
Notes:				Page:	2 of 5

FREQ (MHz)	LEVEL (dBuV)	CABLE / ANT / PREAMP (dB) (dB/m) (dB)	FINAL (dBuV/m)	POL / HGT / AZ (m) (DEG)	DELTA1 FCC B (< 1GHz)	DELTA2 FCC B (> 1GHz)
Previous measurements unchanged						
End scan 30MHz to 2000MHz						
Begin scan 2GHz to 4GHz						
Hopping enabled						
No emissions detected						
Frequency = 2.402GHz						
2342.66	32.6 Pk	4.4 / 30.4 / 26.8	40.5	V / 1.0 / 194.0	N/A	-13.5
2773.36	35.2 Pk	4.8 / 31.2 / 27.1	44.2	V / 1.0 / 194.0	N/A	-9.8
Max'd						
2342.66	36.6 Pk	4.4 / 30.4 / 26.8	44.5	V / 2.3 / 95.0	N/A	-9.5
2773.36	36.4 Pk	4.8 / 31.2 / 27.1	45.4	V / 2.3 / 95.0	N/A	-8.6
Fixed frequencies at 2.441GHz, 2.480GHz, 2.412GHz, 2.432GHz, & 2.462GHz						
No new emissions detected						
End scan 2GHz to 4GHz						
Begin scan 4GHz to 8GHz						
Hopping enabled						
No significant emissions detected						

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Radiated Electromagnetic Emissions

Test Report #:	**5177 Run 01**	Test Area:	LTS 3m		
Test Method:	FCC Part 15	Test Date:	04-Oct-2002		
EUT Model #:	XAM	EUT Power:	12VDC		
EUT Serial #:				Temperature:	22 °C
Manufacturer:	Xata Corp.			Relative Humidity:	49 %
EUT Description:	Truck Mobile GPS Tracking System			Air Pressure:	99 kPa
Notes:				Page:	3 of 5

FREQ (MHz)	LEVEL (dBuV)	CABLE / ANT / PREAMP (dB) (dB/m) (dB)	FINAL (dBuV/m)	POL / HGT / AZ (m) (DEG)	DELTA1 FCC B (< 1GHz)	DELTA2 FCC B (> 1GHz)
Frequency = 2.402GHz						
Max'd						
4804.00	39.6 Pk	6.5 / 34.6 / 41.3	39.5	V / 1.0 / 355.0	N/A	-14.5
Frequency = 2.441GHz						
Max'd						
4882.00	38.8 Pk	6.6 / 34.8 / 41.1	39.1	V / 1.4 / 259.0	N/A	-14.9
Frequencies fixed at 2.480GHz, 2.412GHz, 2.432GHz, & 2.462GHz						
2nd harmonics measure less than 10dB below limit						
End scan 4-8GHz						
Begin scan above 8GHz						
Hopping enabled						
No significant emissions detected 8-25GHz						
Fixed frequencies at 2.402GHz, 2.441GHz, 2.480GHz, 2.412GHz, 2.432GHz, & 2.462GHz						
No significant emissions detected above 8GHz						
End scan 30MHz to 25GHz						
Fundamental measurements						
Max'd						
2402.04	82.9 Pk	4.4 / 30.5 / 0.0	117.8	V / 1.5 / 137.0	N/A	63.8 *

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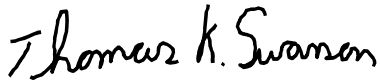

Printed Signature

Radiated Electromagnetic Emissions

Test Report #:	**5177 Run 01**	Test Area:	LTS 3m			
Test Method:	FCC Part 15	Test Date:	04-Oct-2002			
EUT Model #:	XAM	EUT Power:	12VDC			
EUT Serial #:				Temperature:	22	°C
Manufacturer:	Xata Corp.			Relative Humidity:	49	%
EUT Description:	Truck Mobile GPS Tracking System			Air Pressure:	99	kPa
Notes:				Page:	4 of 5	

FREQ (MHz)	LEVEL (dBuV)	CABLE / ANT / PREAMP (dB) (dB/m) (dB)	FINAL (dBuV/m)	POL / HGT / AZ (m) (DEG)	DELTA1 FCC B (< 1GHz)	DELTA2 FCC B (> 1GHz)
2402.04	82.4 Av	4.4 / 30.5 / 0.0	117.3	V / 1.5 / 137.0	N/A	63.3 *
2441.04	83.7 Pk	4.5 / 30.6 / 0.0	118.7	V / 1.7 / 135.0	N/A	64.7 *
2441.04	83.1 Av	4.5 / 30.6 / 0.0	118.2	V / 1.7 / 135.0	N/A	64.2 *
2480.05	82.4 Pk	4.5 / 30.7 / 0.0	117.5	V / 1.6 / 173.0	N/A	63.5 *
2480.05	81.8 Av	4.5 / 30.7 / 0.0	116.9	V / 1.6 / 173.0	N/A	62.9 *

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Radiated Electromagnetic Emissions

Test Report #:	**5177 Run 01**	Test Area:	LTS 3m			
Test Method:	FCC Part 15	Test Date:	04-Oct-2002			
EUT Model #:	XAM	EUT Power:	12VDC			
EUT Serial #:				Temperature:	22	°C
Manufacturer:	Xata Corp.			Relative Humidity:	49	%
EUT Description:	Truck Mobile GPS Tracking System			Air Pressure:	99	kPa
Notes:				Page:	5 of 5	

FREQ (MHz)	LEVEL (dBuV)	CABLE / ANT / PREAMP (dB) (dB/m) (dB)	FINAL (dBuV/m)	POL / HGT / AZ (m) (DEG)	DELTA1 FCC B (< 1GHz)	DELTA2 FCC B (> 1GHz)
********** **MEASUREMENT SUMMARY** **********						
50.34	45.6 Qp	0.6 / 14.3 / 27.7	32.8	V / 1.0 / 290.0	-7.2	N/A
2773.36	36.4 Pk	4.8 / 31.2 / 27.1	45.4	V / 2.3 / 95.0	N/A	-8.6
2342.66	36.6 Pk	4.4 / 30.4 / 26.8	44.5	V / 2.3 / 95.0	N/A	-9.5
80.00	47.4 Qp	0.8 / 7.6 / 27.9	27.9	V / 1.4 / 10.0	-12.1	N/A
4804.00	39.6 Pk	6.5 / 34.6 / 41.3	39.5	V / 1.0 / 355.0	N/A	-14.5
4882.00	38.8 Pk	6.6 / 34.8 / 41.1	39.1	V / 1.4 / 259.0	N/A	-14.9
160.00	42.0 Qp	1.1 / 8.8 / 27.9	24.0	V / 1.0 / 0.0	-19.5	N/A
180.00	33.8 Qp	1.1 / 9.4 / 27.9	16.4	V / 1.0 / 0.0	-27.1	N/A
226.48	33.5 Qp	1.4 / 11.1 / 27.6	18.3	V / 1.0 / 0.0	-27.7	N/A

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Appendix B

Constructional Data Form(s)

and/or

Product Information Form(s)

No Product Information was provided for the Test Report.

TÜV PRODUCT SERVICE INC 19333 Wild Mountain Road Taylors Falls MN 55084-1758 Tel: 651 638 0297 Fax: 651 638 0298 Rev.No 1.0

Appendix C

MEASUREMENT PROTOCOL

GENERAL INFORMATION

Test Methodology

Conducted and radiated emission testing is performed according to the procedures in International Special Committee on Radio Interference (CISPR) Publication 22 (1993), European Standard EN 55022 and Australian Standard AS 3548 (which are based on CISPR 22).

The Japanese standard, "Voluntary Control Council for Interference (VCCI) by Data Processing Equipment and Electronic Office Machines, Technical Requirements" is technically equivalent to CISPR 22 (1993). For official compliance, a conformance report must be sent to and accepted by the VCCI.

In compliance with FCC Docket 92-152, "Harmonization of Rules for Digital Devices Incorporate International Standards", testing for FCC compliance may be done following the ANSI C63.4-1992 procedures and using the CISPR 22 Limits.

Measurement Uncertainty

The test system for conducted emissions is defined as the LISN, tuned receiver or spectrum analyzer, and coaxial cable. The test system for radiated emissions is defined as the antenna, the pre-amplifier, the spectrum analyzer and the coaxial cable. These test systems have a measurement uncertainty of ±4.5 dB. The equipment comprising the test systems are calibrated on an annual basis.

Justification

The Equipment Under Test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions. A cable is connected to each available port and either terminated with a peripheral into it's characteristic impedance or left unterminated. When appropriate, the cables are manually manipulated with respect to each other to obtain maximum emissions from the unit.

CONDUCTED EMISSIONS

The final level, expressed in dBµV, is arrived at by taking the reading directly from the EMI receiver. This level is compared directly to the CISPR limit.

To convert between dBµV and µV, the following conversions apply:

dBµV = 20(log µV)

µV = Inverse log(dBµV/20)

RADIATED EMISSIONS

The final level, expressed in dBµV/m, is arrived at by taking the reading from the spectrum analyzer (Level dBµV), adding the antenna correction factor and cable loss factor (Factor dB) to it, then subtracting the preamp gain. This result then has the CISPR limit subtracted from it to provide the Delta which gives the tabular data as shown in the data sheets in Attachment A.

Example:

FREQ (MHz)	LEVEL (dBuV)		CABLE/ANT/PREAMP (dB)			FINAL (dBuV/m)	POL/HGT/AZ	(m)	(deg)	DELTA1 EN 55022 A
60.80	42.5Qp	+	1.2	+ 10.9	- 25.5 =	29.1	V	1.0	0.0	-10.9

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DETAILS OF TEST PROCEDURES

General Standard Information

The test methods used comply with ANSI C63.4-1992 - "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz."

Conducted Emissions

Conducted emissions on the 50 Hz and/or 60 Hz power interface of the EUT are measured in the frequency range of 150 kHz to 30 MHz. The measurements are performed using a receiver, which has CISPR characteristic bandwidth and quasi-peak detection, and a Line Impedance Stabilization Network (LISN), with 50 Ω/50 μH (CISPR 16) characteristics. Table top equipment is placed on a non-conducting table 80 centimeters above the floor and is positioned 40 centimeters from the vertical ground plane (wall) of the screen room. In some cases, a pre-scan using a spectrum analyzer is initially performed on the units comprising the system under test to locate the highest emissions. If the minimum passing margin appears to be less than 20 dB with a peak mode measurement, the emissions are re-measured using a tuned receiver or spectrum analyzer with quasi-peak and average detection and recorded on the data sheets.

Conducted emissions on the transmitter output are made in accordance with FCC Public Notice DA 00-705, Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems.

Radiated Emissions

Radiated emissions from the EUT are measured in the frequency range of 30 to 25000 MHz using a spectrum analyzer and appropriate broadband linearly polarized antennas. Measurements between 30 MHz and 1000 MHz are made with 120 kHz/6 dB bandwidth and quasi-peak detection and measurements above 1000 MHz are made with a 1 MHz/6 dB bandwidth and peak detection. Table top equipment is placed on a 1.0 X 1.5 meter non-conducting table 80 centimeters above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. Interface cables that are closer than 40 centimeters to the ground plane are bundled in the center in a serpentine fashion so they are at least 40 centimeters from the ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screen room located outside the test area. The antenna is positioned 3, 10 or 30 meters horizontally from the EUT. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 meters, measurement scans are made with both horizontal and vertical antenna polarizations and the EUT are rotated 360 degrees. The transmitter is rotated through 3 orthogonal axes in order to determine the maximum emission levels.

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