

MEASUREMENT AND TECHNICAL REPORT

SONIK TECHNOLOGIES CORPORATION
2310 Cousteau Court
Vista, CA 92083

DATE: 23 March 2001

This Report Concerns:	Original Grant: X	Class II Change:
Equipment Type:	OSMAC, Model 6A303-UC-N-T	
Deferred grant requested per 47 CFR 0.457(d)(1)(ii)?	Yes:	No: X
	Defer until:	
<i>Company Name</i> agrees to notify the Commission by:	N/A	
of the intended date of announcement of the product so that the grant can be issued on that date.		
Transition Rules Request per 15.37?	Yes:	*No:
(*) FCC Part 2, Paragraphs 2.1046; 2.1047(a); 2.1047(b); 2.1049; 2.1051; 2.1053; 2.1055(a)(1); 2.1055(d); Part 22, Paragraph 22.359; and Part 90, Paragraphs 90.210(b) and 90.214		
<i>Report Prepared by:</i> TÜV PRODUCT SERVICE 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone: 619 546 3999 Fax: 619 546 0364		

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1 GENERAL INFORMATION

1.1 Product Description

EUT Description	Paging Terminal Transceiver		
EUT Name	OSMAC & PageCenter {Two different trade names of the same product}		
Model No.:	6A303-UC-N-T	Serial No.:	0430106C2/D55
	6A303-UC-N-Z		

Power Requirements

Regulations require testing to be performed at typical power ratings in the countries of intended use. (i.e., European power is typically 230 VAC 50 Hz or 400 VAC 50 Hz, single and three phase, respectively)

Voltage: 115v - External power supply supplied

of Phases: 1

Current	Current
(Amps/phase(max)):	(Amps/phase(nominal)):
700 mA	

Typical Installation and/or Operating Environment

General purpose paging transmitter. Typically used for industrial sprinkler controls, small businesses, industrial applications, etc.

EUT Power Cable

☐ Permanent	OR	☒ Removable	Length (in meters): Approx 1 meter
☐ Shielded	OR	☒ Unshielded	
☐ Not Applicable			

EUT Operating Modes to be Tested

1. Receive Mode {Part 15 unintentional radiator testing.}
2. Transmit Mode: Use a diagnostics mode to transmit 2400 baud POCSAG signals at a 50% duty cycle. {For Part 22 and Part 90 testing.}

1 GENERAL INFORMATION (continued)

Oscillator Frequencies			
<i>Frequency</i>	<i>Derived Frequency</i>	<i>Component # / Location</i>	<i>Description of Use</i>
4 MHz		Y1 - Digital PCB	CTCSS Tone Generator Reference
3.579 MHz		Y2 - Digital PCB	DTMF Tone Generator Reference
48 MHz		OSC1 - Digital PCB	CPU Clock Oscillator
17.5 MHz		Y801 - Radio Module	PLL Frequency Reference

Power Supply			
<i>Manufacturer</i>	<i>Model #</i>	<i>Serial #</i>	<i>Type</i>
UMEC	UP0252A-01P	C8110878	☒ Switched-mode: (Frequency) <u>Unknown</u> ☐ Linear ☐ Other: _____

1 GENERAL INFORMATION (continued)

1.2 Related Submittal/Grant

None

1.3 Tested System Details

The FCC IDs for all equipment, plus descriptions of all cables used in the tested system are:

None

1.4 Test Methodology

Purpose of Test: To demonstrate compliance with the ANSI C63.4 setup.

Test Performed:

- X 1. Conducted Emissions, FCC Part 2, Paragraphs 2.1047(a), (b); 2.1051 and Part 22, Paragraph 22.359; and Part 90, Paragraph 90.210(b); 90.214
- 2. Radiated Emissions EN55022: 1992 Class B limit, 30 - 1,000 MHz, 10 meters
- X 3. Radiated Emission per FCC Part 2, Paragraph 2.1053
- 4. Engineering evaluations
- X 5. Frequency Stability, Part 2, Paragraph 2.1055
- X 6. RF Output Power, Part 2, Paragraph 2.1046, 2.1049 AND 2.1051 Part 22, Paragraph 22.359 and Part 90, Paragraph 90.210(b)

Both Conducted and radiated testing were performed according to the procedures in FCC/ANSI C63.4 and CSA 108.8 - M1983. Radiated testing was performed at an antenna-to-EUT distance of 3 meters (1 - 10 GHz).

1.5 Test Facility

The open area test site and conducted measurement data were tested by:

TÜV PRODUCT SERVICE
10040 Mesa Rim Road
San Diego, CA 92121-2912
Phone: 619 546 3999
Fax: 619 546 0364

The Test Site Data and performance comply with ANSI 63.4 and are registered with the FCC, 7435 Oakland Mills Rd, Columbia Maryland 21046. All Measurement Data is acquired according to the content of FCC Measurement Procedure and ANSI C63.4, unless supplemented with additional requirements as noted in the test report.

1.6 Part 2 Requirements

Type of emissions: Frequency modulation with voice, tone and digital signals, 12.5 kHz channel spacing.

Range of operating power values or specific operating power levels:
Factory programmable transmit power over a 20+ dB range via front panel keypad or alternatively via computer control using a secret password.

Maximum power rating: 5 watts

Suppression of spurious radiation, for limiting modulation and for limiting power: Conductive paint applied to interior of the plastic housing (see schematics).

For equipment employing digital modulation techniques: a) Detailed description of the modulation system...b) Description of the modulating wavetrain...

a) Analog signals from the microphone and phone inputs and internal tone generators are lowpass filtered and limited. Digital signals are scaled to provide the desired deviation. The analog and digital signals are combined and lowpass filtered prior to being applied to the FM modulation input of the radio module.

b) The digital waveform uses two-level FSK modulation employing standard POCSAG encoding for paging applications.

The voltage applied to the final transistor is 13.3 volts. The current is less than 2.5 Amps.

2. SYSTEM TEST CONFIGURATION

2.1 Justification

The EUT was initially tested for FCC emission in the following configuration:

See Block Diagram.

2.2 EUT Exercise Software

None

2.3 Special Accessories

None

2.4 Modification

None

2.5 Configuration of Tested System

See Block Diagram.

3 RADIATED EMISSION EQUIPMENT/DATA

The following data lists the significant emission frequencies, measured levels, correction factor (which includes cable and antenna corrections), the corrected reading, and the limit.

See following page(s).

Radiated Spurious Emissions

REPORT #: S101370

SPEC: FCC Part 2, Section 2.1053

CUSTOMER: Sonik

TEST DIST: 3 meters

EUT: Pagecenter 6A303-UCN-2

TEST SITE: Roof CAT3

EUT MODE: TX Full Power

BICONICAL: N/A

DATE: 03/06/01

LOG: P/N 244

OTHER: P/N 451

NOTES: RBW & VBW = 100 kHz below 1 GHz.
RBW & VBW = 1 MHz above 1 GHz
All other emissions greater than 20 dBc.

Frequency (MHz)	dBc
F _o = 450	
900	14.4
F _o = 467.8125	
935.625	15.4
F _o = 470	
940	15.4

Tested By: Mary Washington
 Printed

Mary Washington
 Signature

Emissions Test Conditions: RADIATED SPURIOUS EMISSIONS

The *RADIATED EMISSIONS* measurements were performed at the following test location :

☐ - Test not applicable

Roof (Small Open Area Test Site)

Testing was performed at a test distance of:

3 meters

Test Equipment Used :

Model No.	Prop. No.	Description	Manufacturer	Serial No.	Cal Date
3115	251	Antenna, Double Ridge Guide	EMCO	2495	10/01
8566B	720	Spectrum Analyzer	Hewlett Packard	211500842	03/17/01
8566B	721	Spectrum Analyzer Display	Hewlett Packard	2112A02185	03/17/01
AFD3-0208-40-ST	367	Pre-amplifier (30 dB gain) 2 - 8 GHz	Miteq, Inc.	16429	*
--	732	High Frequency Cable	--	--	*
--	787	High Frequency Cable	--	--	*

Remarks: (*) Verified internally.

Field Strength Calculation

If a preamplifier was used during the Radiated Emission Testing, it is required that the amplifier gain must be subtracted from the Spectrum Analyzer (Meter) Reading. In addition, a correction factor for the antenna , cable used and a distance factor, if any, must be applied to the Meter Reading before a true field strength reading can be obtained. In the automatic measurement, these considerations are automatically presented as a part of the print out. In the case of manual measurements and for greater efficiency and convenience, instead of using these correlation factors for each meter reading, the specification limit was modified to reflect these correlation factors at each frequency value so that the meter readings can be compared directly to the modified specification limit. This modified specification limit is referred to as the "Corrected Meter Reading Limit" or simply the CMRL, which is the actual field strength present at the antenna. The quantity can be derived in the following manner:

$$\text{Corrected Meter Reading Limit (CMRL)} = \text{SAR} + \text{AF} + \text{CL} - \text{AG} - \text{DC}$$

Where, SAR = Spectrum Analyzer Reading

AF = Antenna Factor

CL = Cable Loss

AG = Amplifier Gain (if any)

DC = Distance Correction (if any)

Assume the following situation: A meter reading of 29.4 dBuV was obtained from a Class A computing device measured at 83 MHz. Assume an antenna factor of 9.2 dB, a cable loss of 1.4 dB and amplifier gain of 20.0 dB at 83 MHz. The final field strength would be determined as follows:

$$\text{CMRL} = 29.4 \text{ dBuV} + 9.2 \text{ dB} - 1.4 \text{ dB} - 20 \text{ dB/M} - 0.0 \text{ dB}$$

$$\text{CMRL} = 20.0 \text{ dBuV/M}$$

This result is well below the FCC and CSA Class A limit of 29.5 dbuV/m at 83 MHz.

For the manual mode of measurement, a table of corrected meter reading limit was used to permit immediate comparison of the meter reading to determine if the measure emission amplitude exceeded the specification limit at that specific frequency.

4 CONDUCTED EMISSION/FREQUENCY STABILITY EQUIPMENT/DATA

Conducted Spurious Emissions: All emissions are greater than 20 dBc.

See following page(s).

Emissions Test Conditions: CONDUCTED / FREQUENCY STABILITY EMISSIONS

The *Conducted EMISSIONS* measurements were performed at the following test location :

☐ - Test not applicable

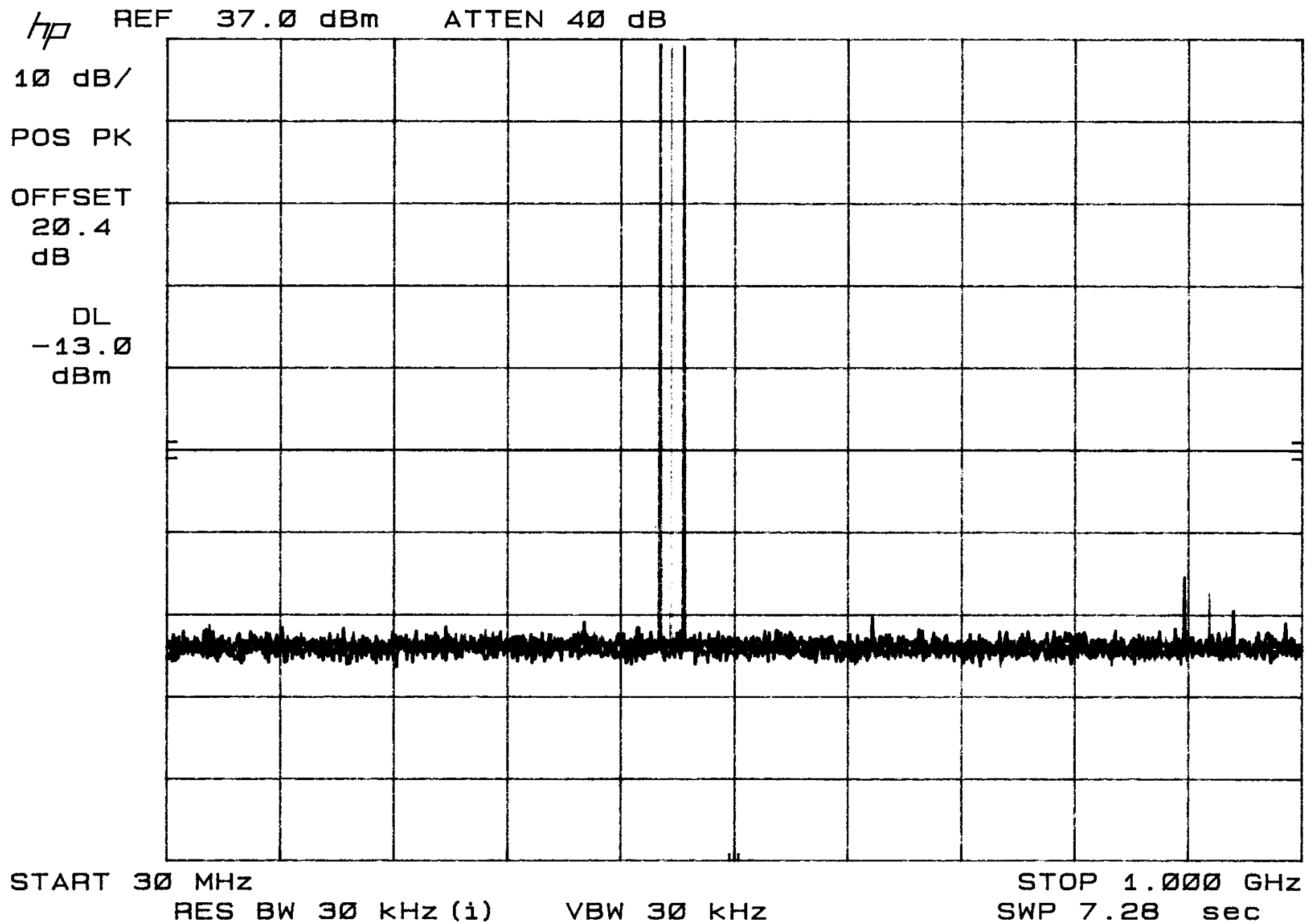
■ - SR-3, Shielded Room, 12' x 20' x 8', Metal Chamber

Test Equipment Used :

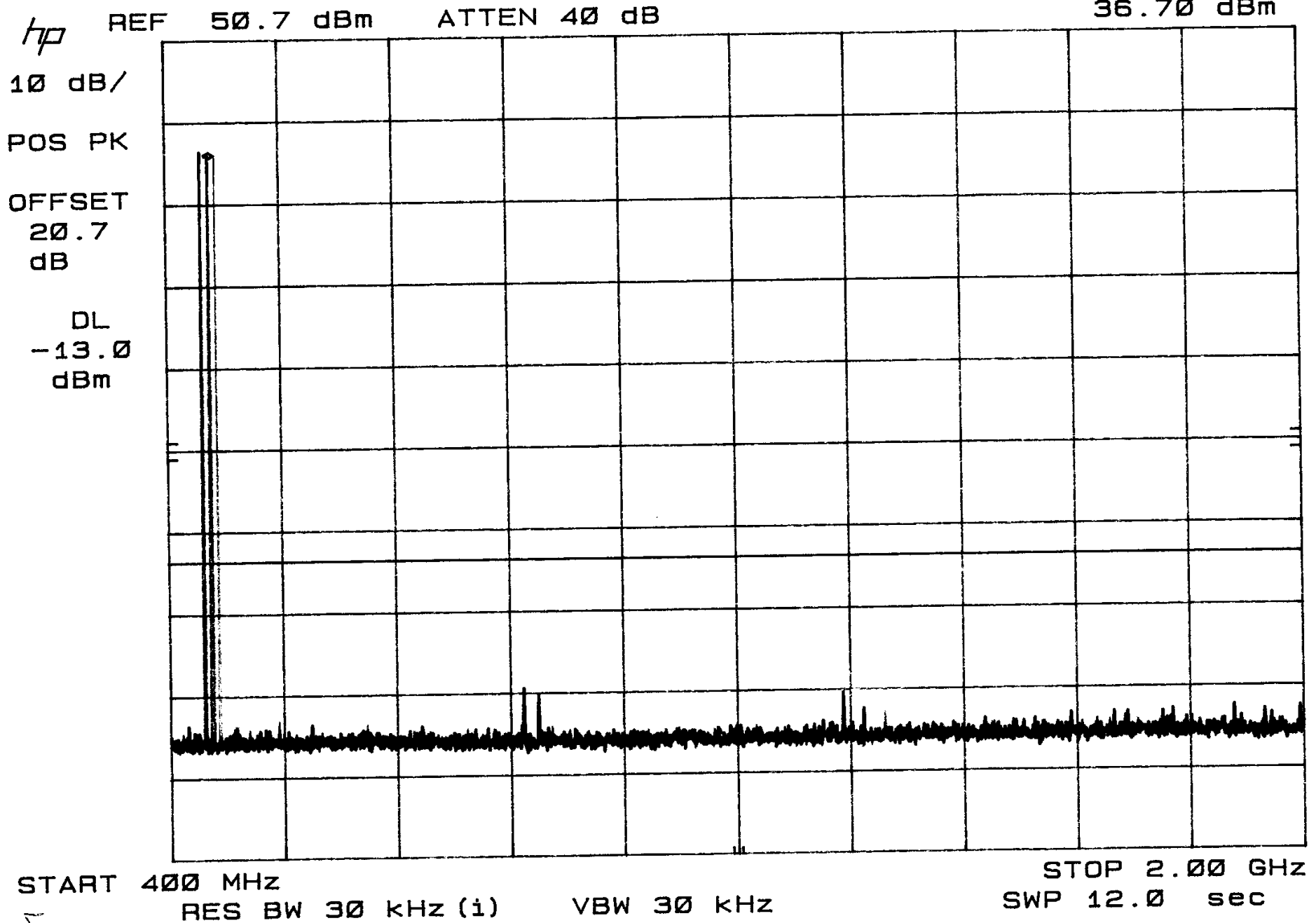
HP 33120A, Audio Generator, P/N 772, Cal 03/02
10 dB Pad, Minicircuits, P/N 547, *
20 dB Pad, Minicircuits, *
20 dB Weinschel, P/N 761, *
10 dB, Weinschel, P/N 760, *
Spectrum Analyzer, P/N 744, Cal 9/01
HP 8648C, Signal Generator, P/N 789, Cal 11/01
Combiner, Weinschel, Model 1506A, S/N M5134
Spectrum Analyzer, HP 8566B, Cal 3/17/01
20 dB Attenuator, HP *
HP 53310A Modulation Domain Analyzer
HP Harmonic Flicker Test System, P/N 580, Cal 8/01
High Frequency Cable, P/N 655*

(*) Verified internally

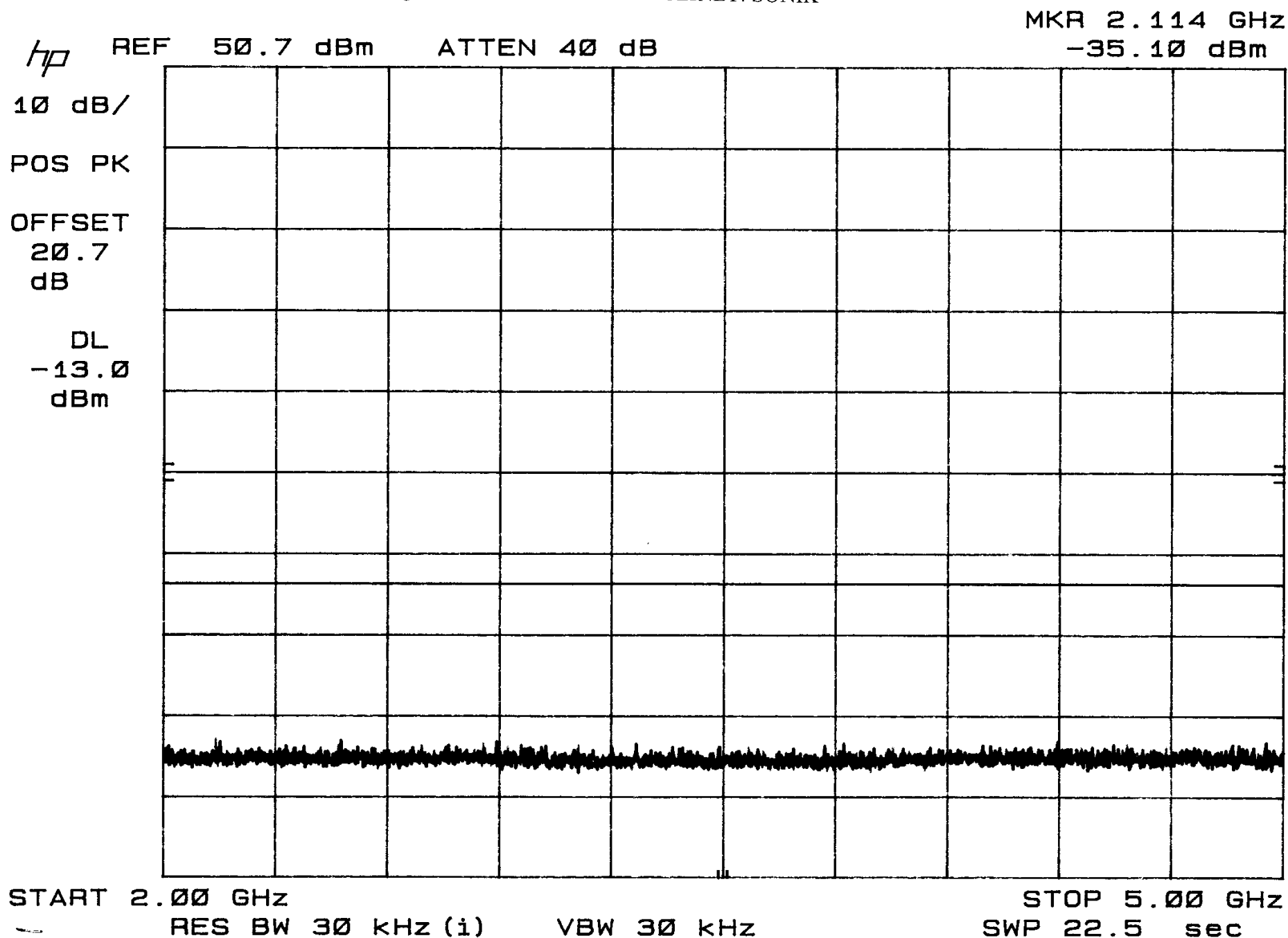
Remarks: _____



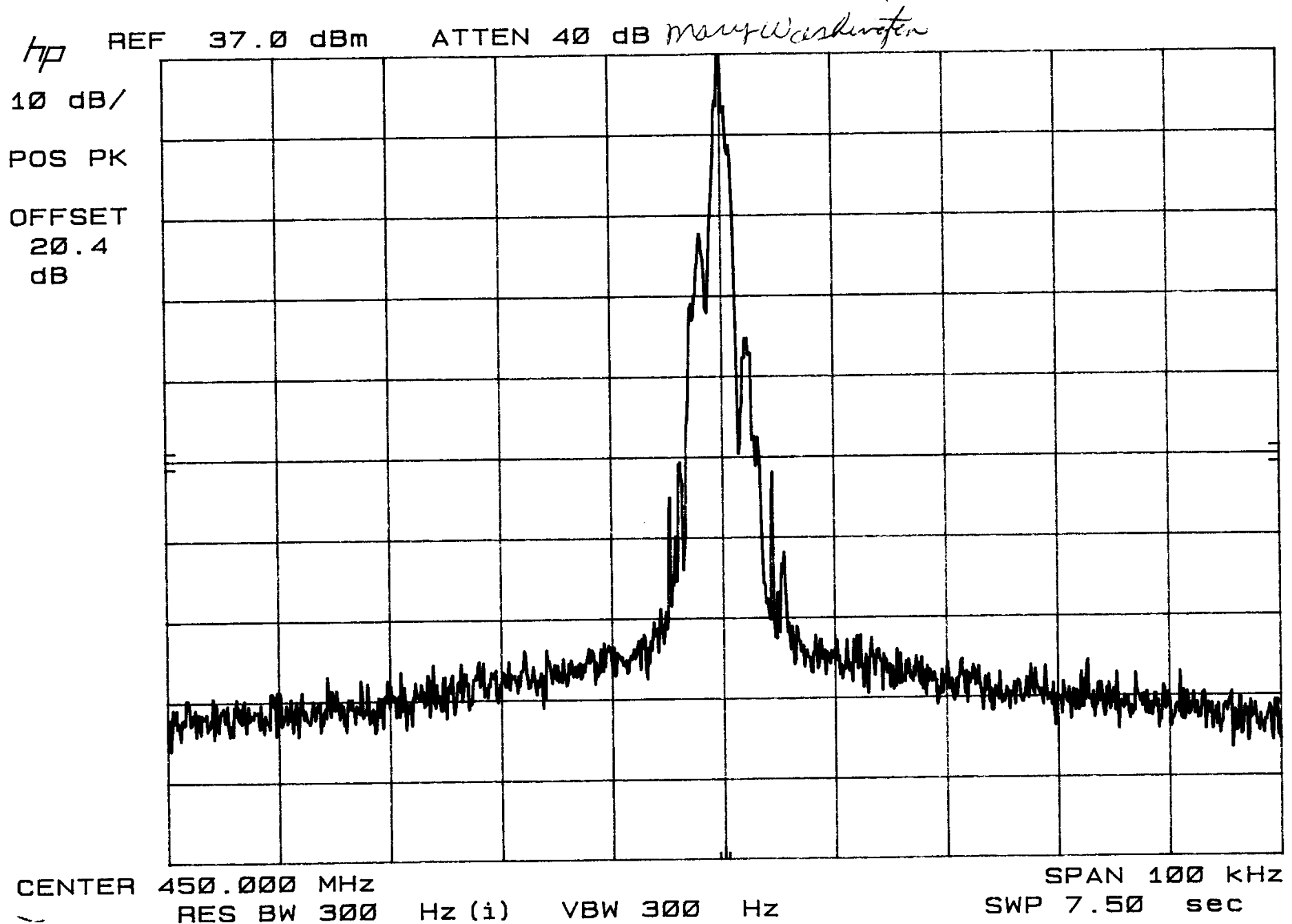
MKR 461 MHz
36.70 dBm

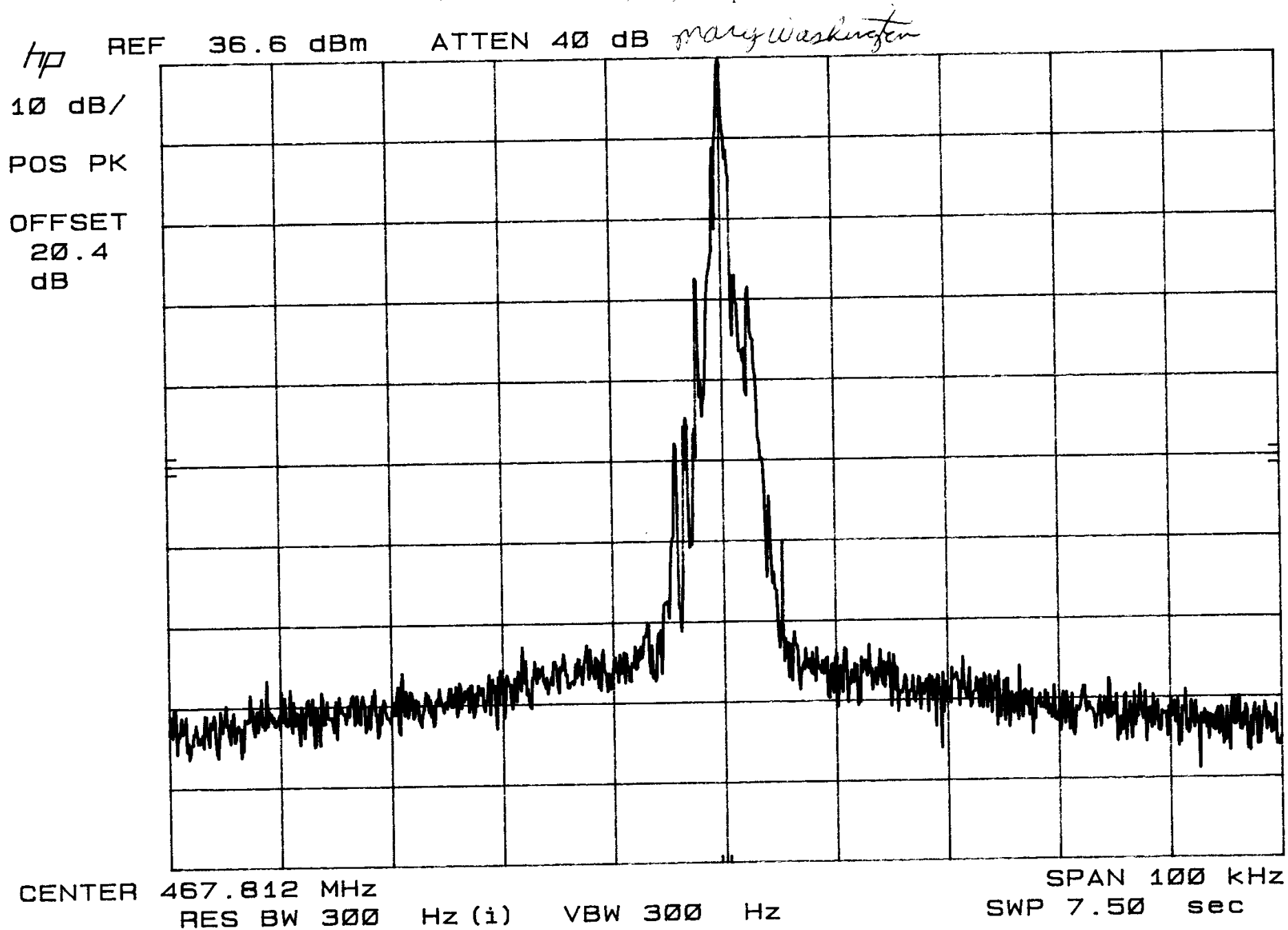


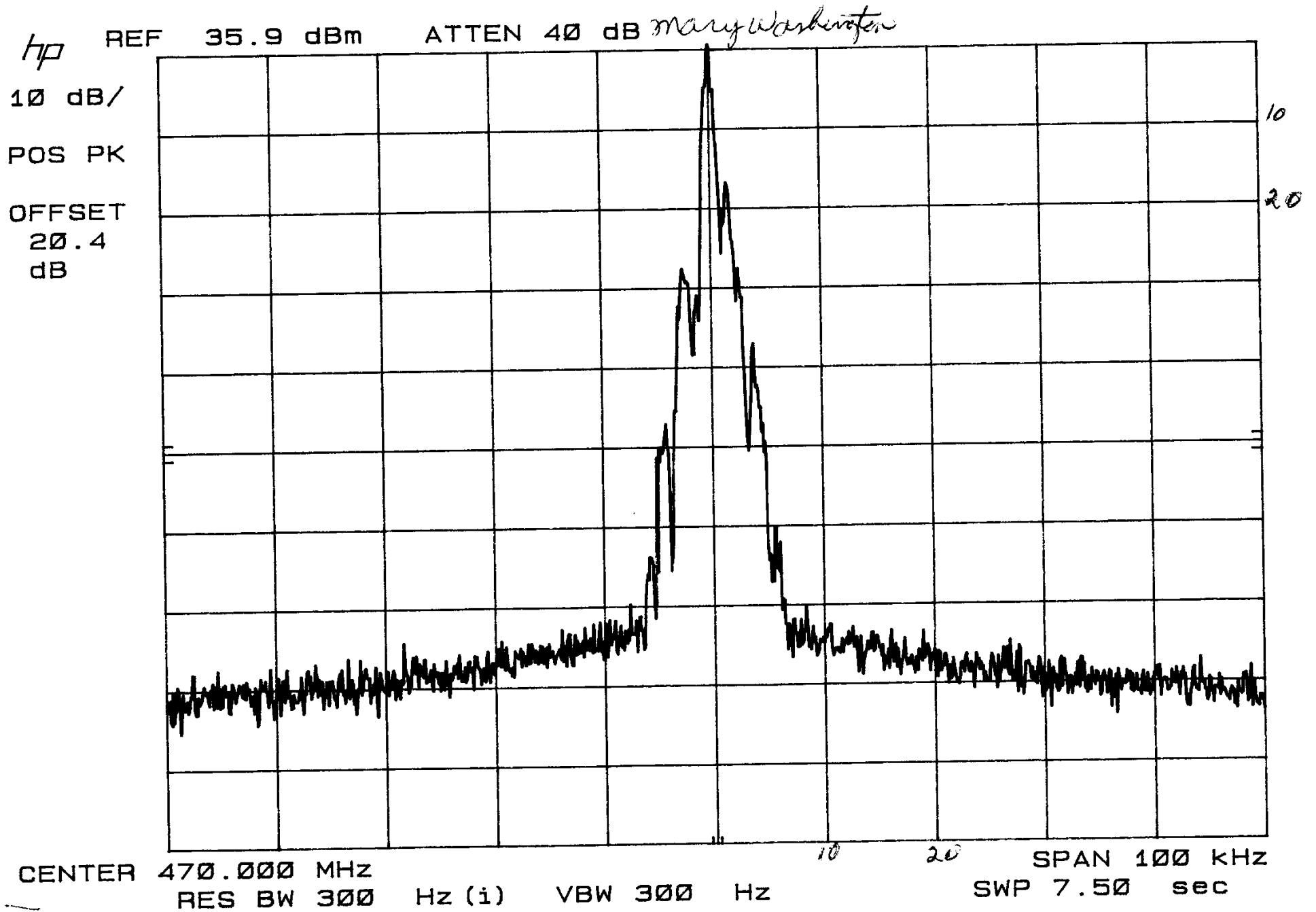
Conducted Spurious Emissions; FCC Part 2, Para. 2.1051; Part 22. Para. 22.359; Part 90, Para. 90.210(b)
CW Plot of low, mid and high channels Date: 3/2/01 CLINET: SONIK



CLIENT: SONIK DATE: 3/2/01 FCC Part 2, Para. 2.1049; Part 90, Para. 90.210(d) and Part 22, Para. 22.359 Emission mask
Low channel POCSAGE modulation (FM) Three data rates: 800, 1200, 2400 bps



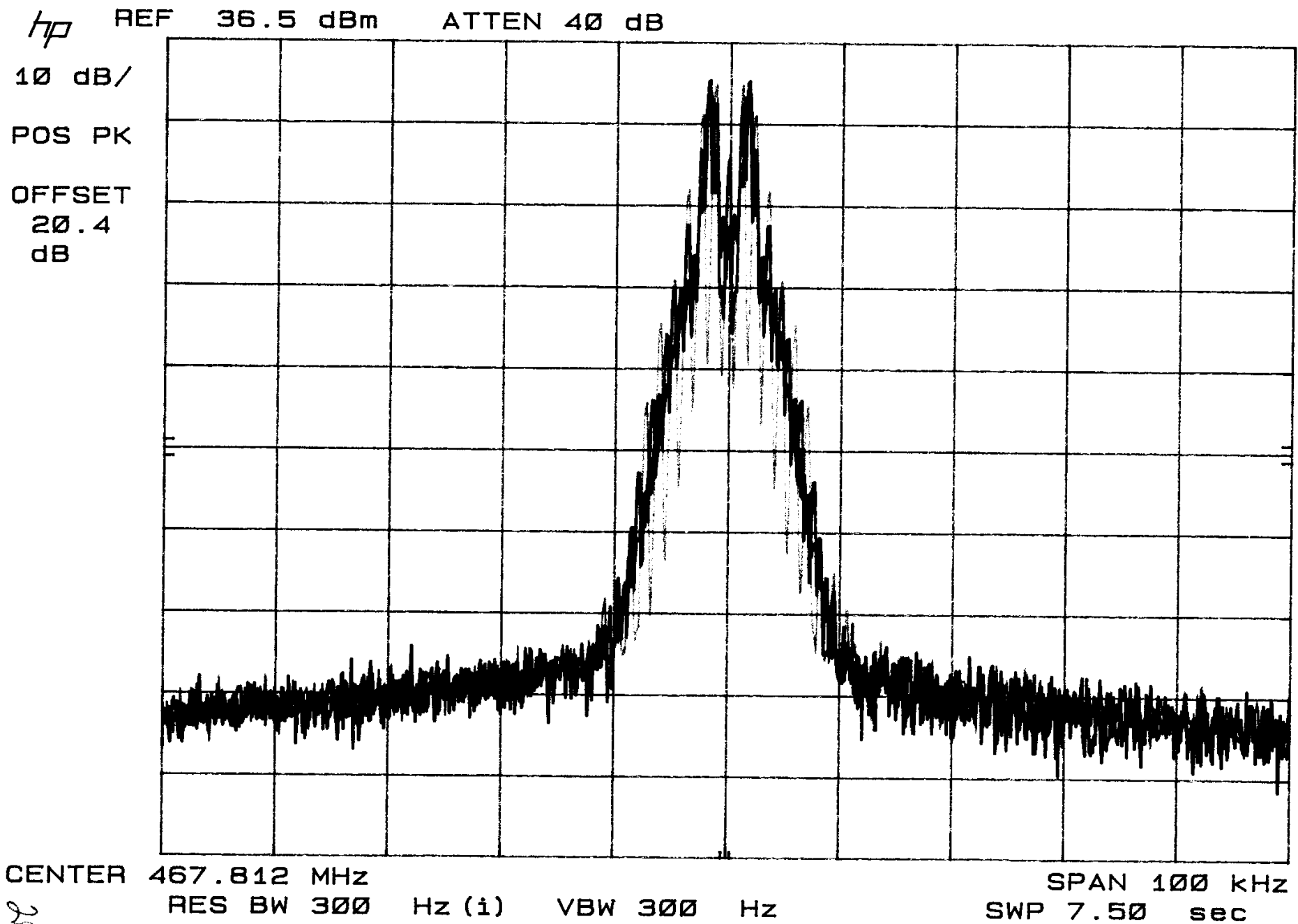


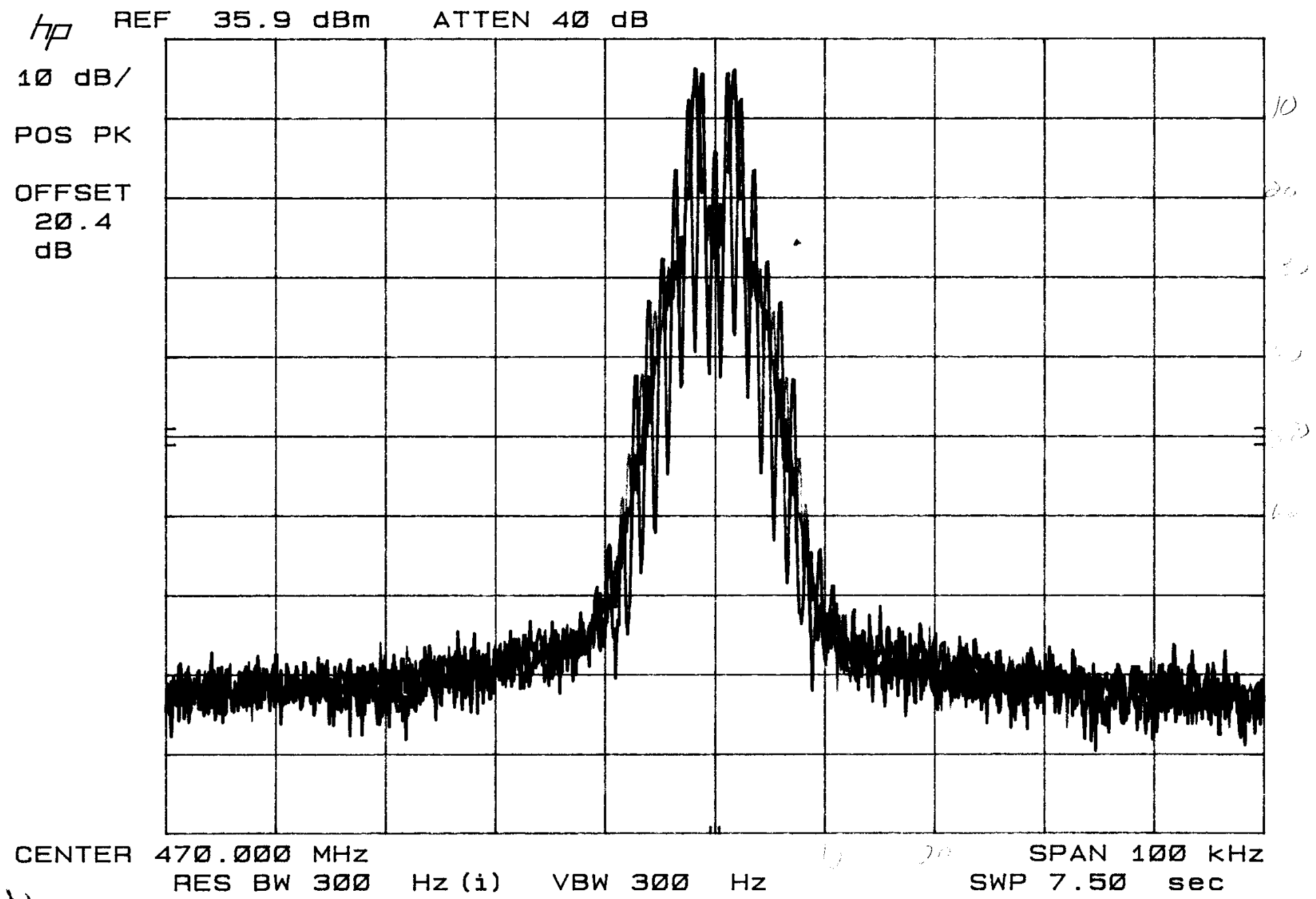


61

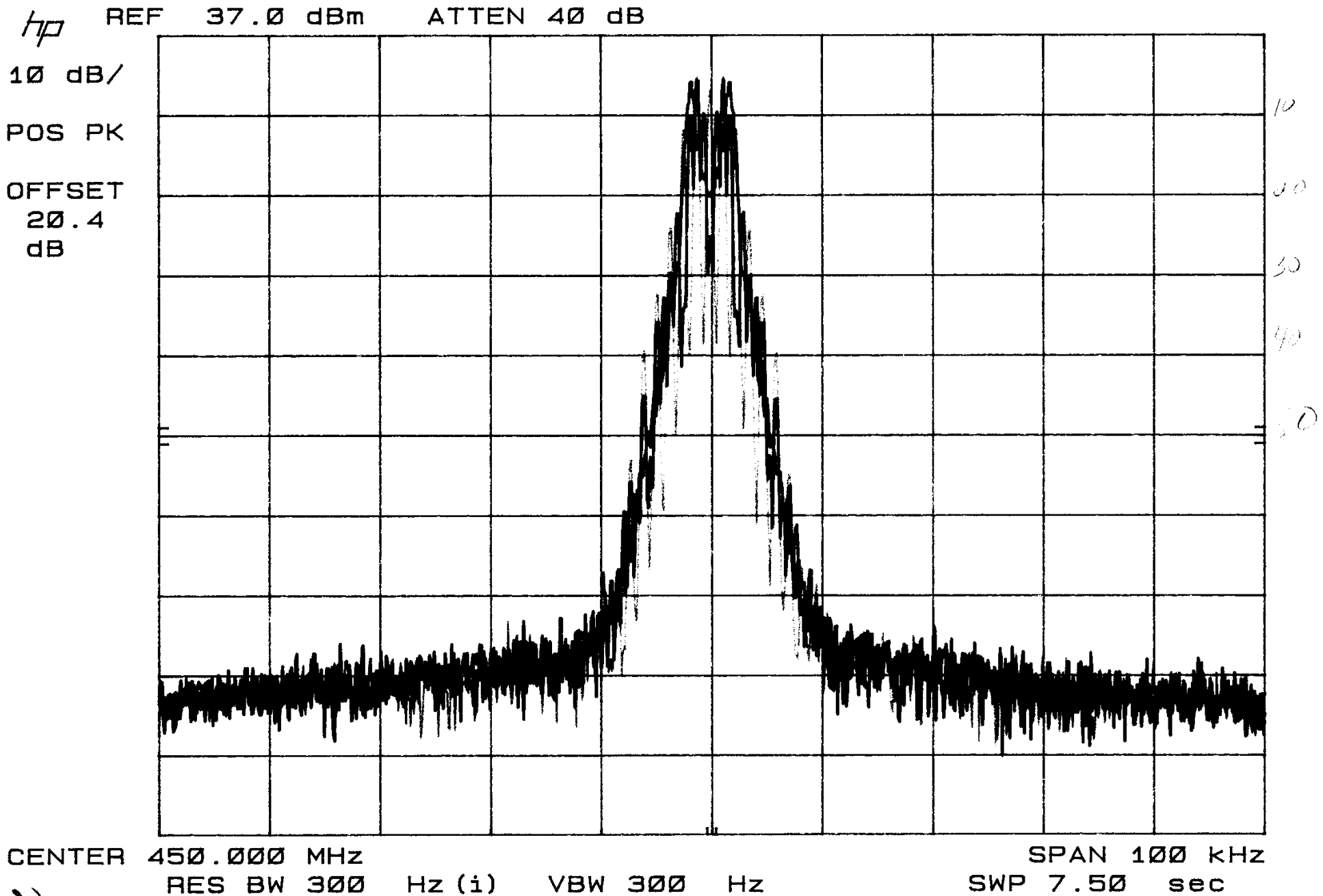
> 600 kHz 30 dB
10, kHz 20 dB

CLIENT: SONIK DATE: 3/2/01 FCC Part 2, Para. 2.1049; Part 90, Para. 90.210(b) and Part 22, Para. 22.359
High channel POCSAGE modulation (FM) Three data rates: 800, 1200, 2400 bps





CLIENT: SONIK DATE: 3/2/01 FCC Part 2, Para. 2.1049; Part 90, Para. 90.210(b) and Part 22, Para. 22.359
Low channel POCSAGE modulation (FM) Three data rates: 800, 1200, 2400 bps



Frequency Response

Test Report #: S101370

Test Area: SR3

Customer: Sonik Technologies

Test Method: FCC Part 2, Section 2.1047(a)

Date: 03/05/01

EUT Model #: 6A303-UC-N-2

EUT Power:

☐ 230 Vac/50 Hz ☒ 120 Vac/60 Hz

☐ Other: _____

EUT Description: PageCenter

NOTES: Middle Channel = 460 MHz. Frequency response of microphone audio modulating circuit

Audio Frequency (Hz)	Deviation in (kHz)
200	.043
300	.1641
500	.410
1000	1.133
2000	2.207
2500	2.422
3000	2.051
3500	1.348
4000	.8438
5000	.3281

Tested By: Mary Washington
Printed

Mary Washington
Signature

Frequency Response

Test Report #: S101370

Test Area: SR 3

Customer: Sonik Technologies

Test Method: FCC Part 2, Section
2.1047(a)

Date: 03/05/01

EUT Model #: 6A303-KC-N-2

EUT Power:

☐ 230 Vac/50 Hz ☒ 120 Vac/60 Hz

☐ Other: _____

EUT Description: Pagecenter

NOTES: Middle Channel = 460 MHz. Frequency response of
Low Pass filter After Limiter in Modulating Circuit

Audio Frequency (Hz)	Deviation in (kHz)
100	12.578
500	10
1000	10.547
3000	10.234
3500	6.484
4000	3.906
5000	1.95
7000	.448
10000	.0057
12500	.0012
15000	.0023
20000	.0023

Tested By: Mary Washington
Printed

Mary Washington
Signature

Modulation Limiting

Test Report #: 5101370

Test Area: SR-3

Customer: Sonik Technologies

Test Method: FCC Part 2, Section 2.1047(b)

Date: 03/05/01

EUT Model #: 6A303-UC-N-2

EUT Power:

☐ 230 Vac/50 Hz

☒ 120 Vac/60 Hz

☐ Other: _____

EUT Description: Pagecenter

NOTES:

Middle channel = 460 MHz.

Audio Input (V _{p-p})	Audio Input Frequency (Hz)				
	300 Hz	1 K	2 K	2.5 K	3 K
1.2	1.406 kHz	1.348 kHz	1.523 kHz	1.66 kHz	1.328 kHz
1.7	1.453 kHz	1.953 kHz	2.305 kHz	2.305 kHz	1.797 kHz
2.3	2.656 kHz	2.656 kHz	3.125 kHz	3.125 kHz	2.48 kHz
2.7	2.949 kHz	2.949 kHz	3.574 kHz	3.574 kHz	2.852 kHz
3.2	3.105 kHz	3.301 kHz	3.848 kHz	3.848 kHz	3.047 kHz
3.7	3.105 kHz	3.457 kHz	4.004 kHz	3.984 kHz	3.125 kHz
4.2	3.184 kHz	3.555 kHz	4.084 kHz	4.0 kHz	3.164 kHz
4.7	3.184 kHz	3.672 kHz	4.082 kHz	4.082 kHz	3.262 kHz
5.2	3.184 kHz	3.789 kHz	4.082 kHz	4.082 kHz	3.262 kHz
5.7	3.184 kHz	3.789 kHz	4.121 kHz	4.16 kHz	3.34 kHz
10	4.023 kHz	3.906 kHz	4.141 kHz	4.258 kHz	3.242 kHz

Tested By: Mary Washington
Printed

Mary Washington
Signature

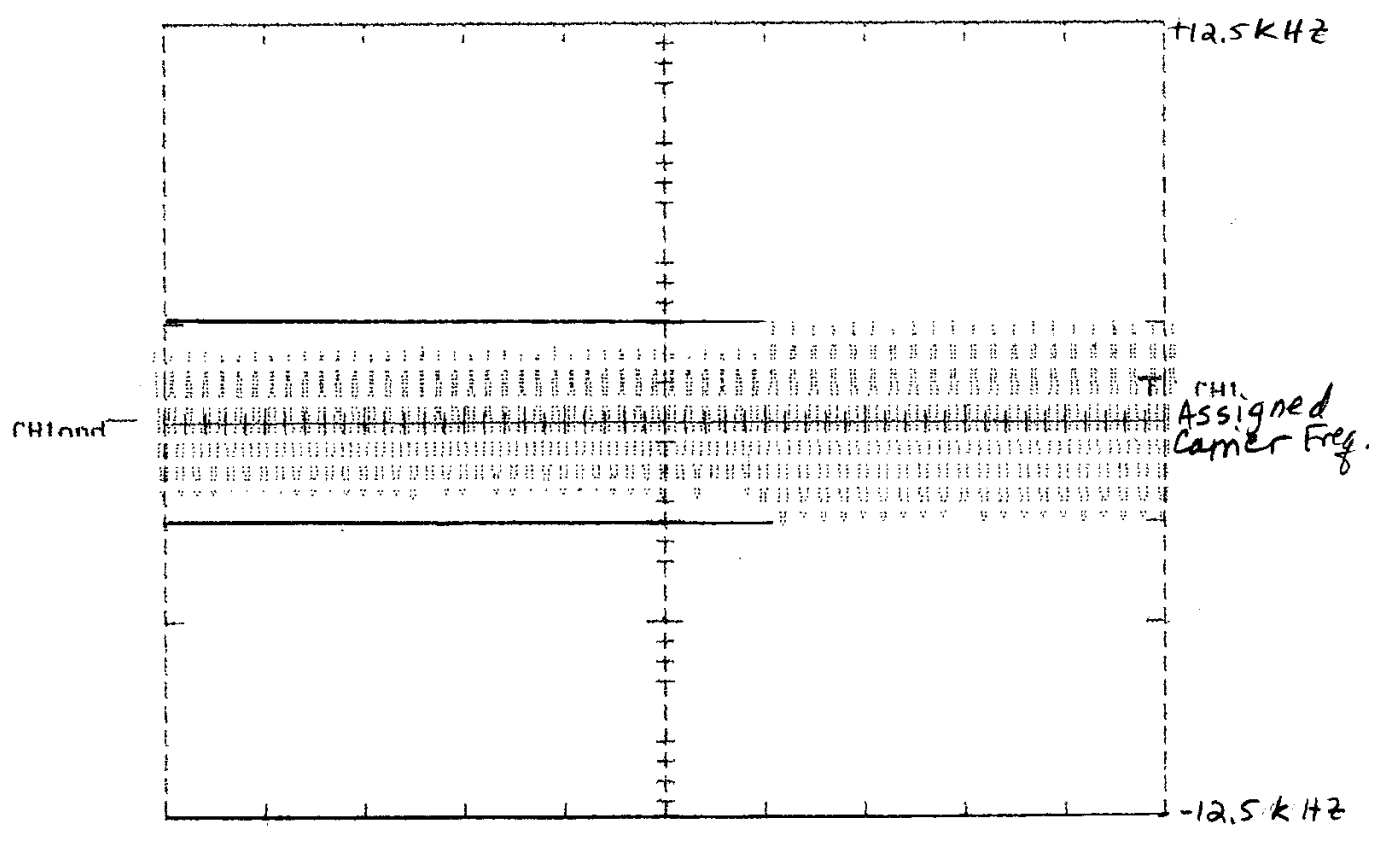
S101370
Sonik
3/2/01

90.214 Transient Frequency
carrier off
modulated carrier

CH1 >500mV

A 5ms -31 3mV2 VERT

Mary Washington



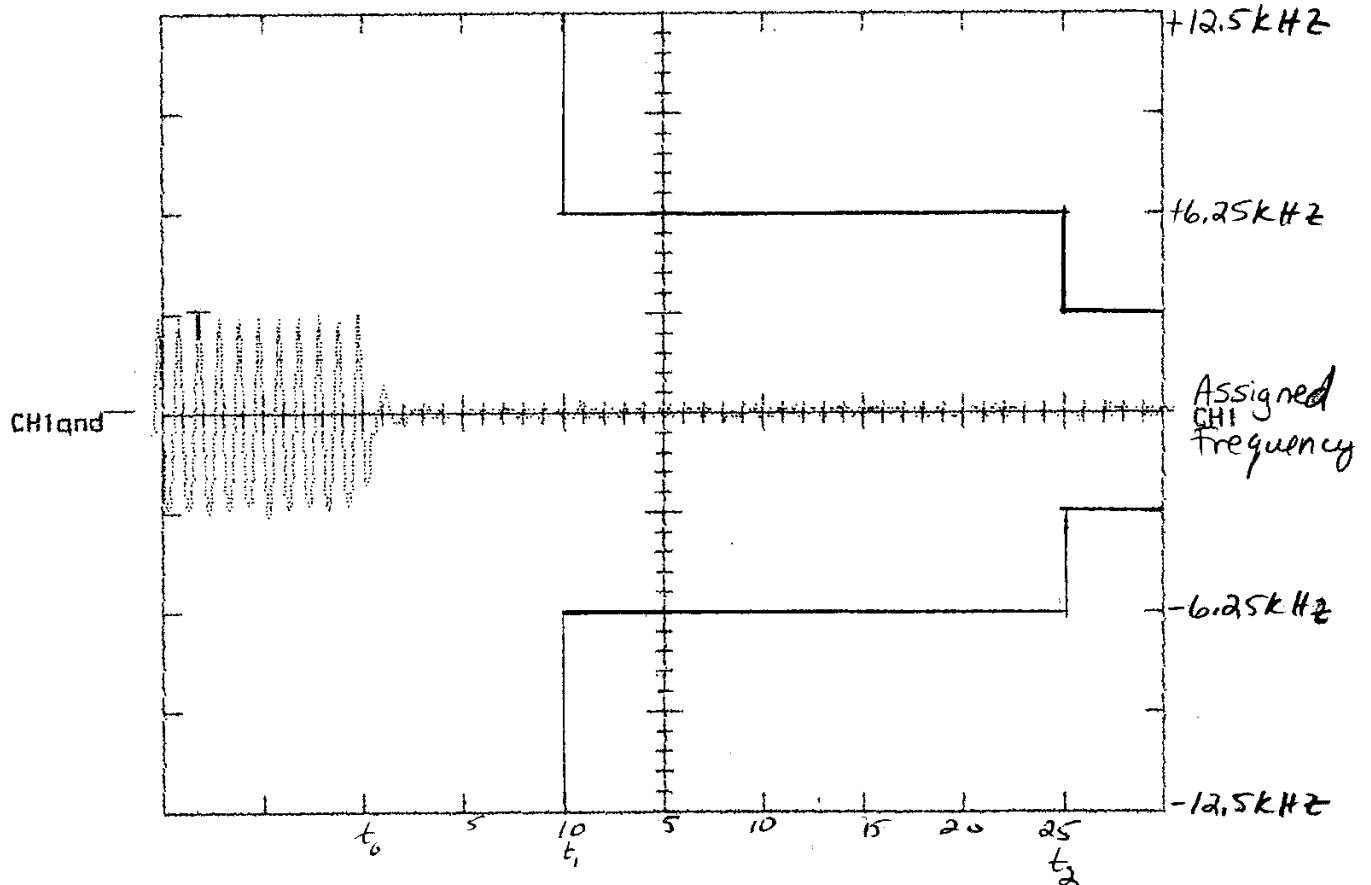
S101370
sonik
3/2/01

90.214 Transient Frequency
Carrier on
unmodulated carrier

CH1 >500mV

A 5ms 166mV? VERT

Mary Washington



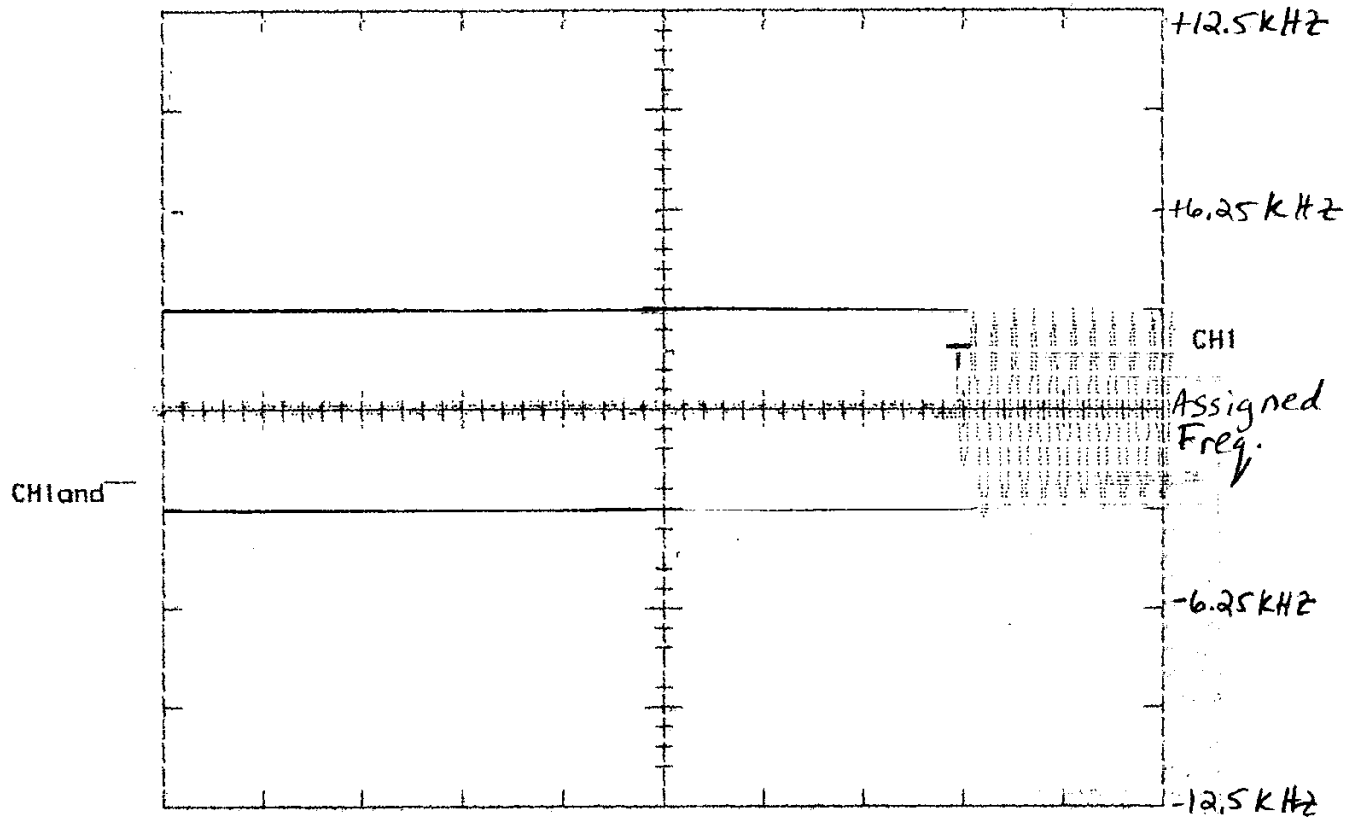
S101370
Smik
3/2/01

90.214 Transient Frequency
Carrier off
unmodulated carrier

CH1 >500mV

A 5ms 555mV? VERT

Mary Washington



CLIENT: SONIK
CW High Channel

DATE: 3/2/01 FCC Part 2, Para. 2.1046 RF Power Output High and low Power

MKR Δ 0 Hz
22.90 dB

hp

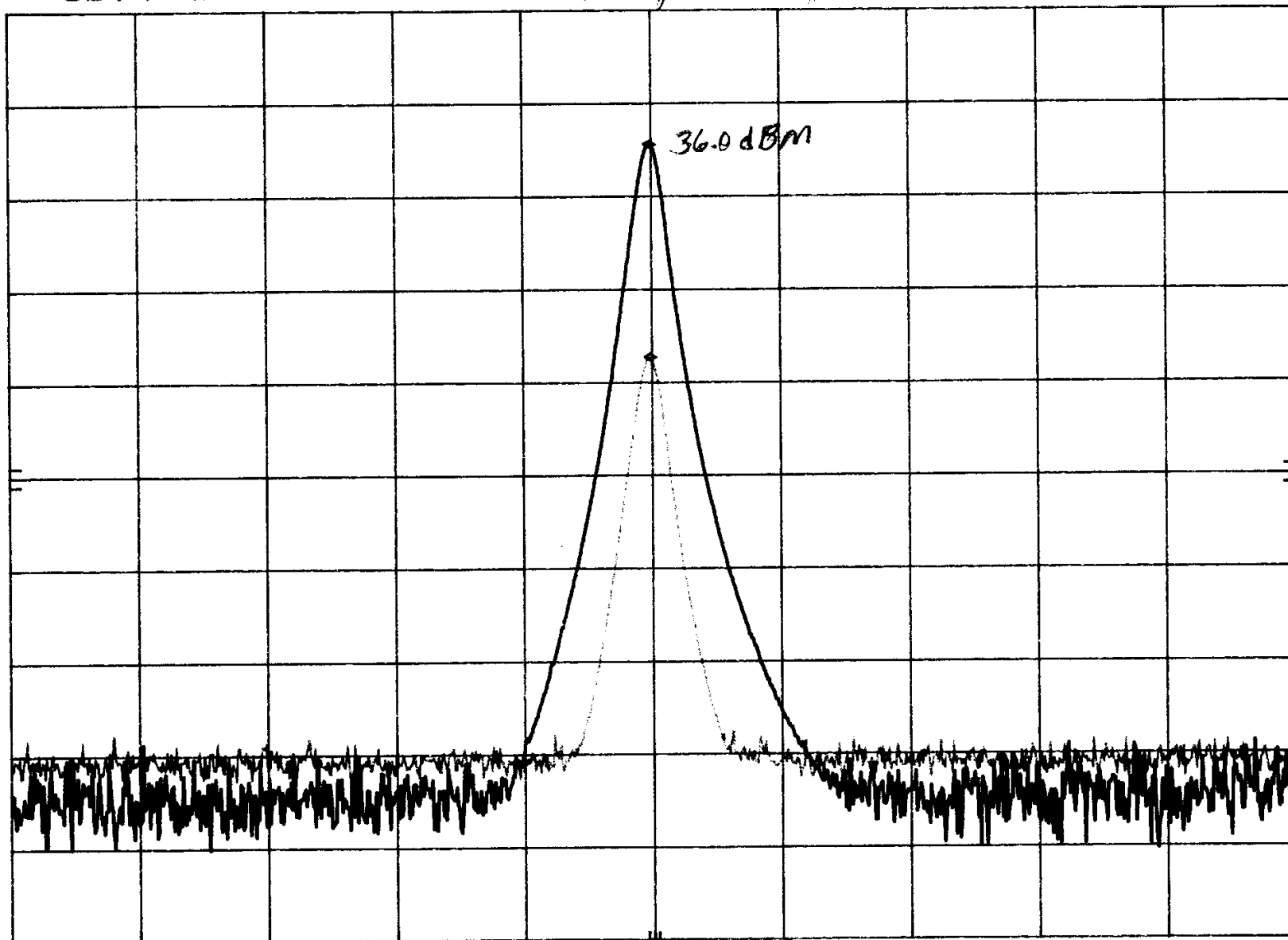
REF 50.4 dBm

ATTEN 40 dB *Mary Washington*

10 dB/

POS PK

OFFSET
20.4
dB



CENTER 470.00 MHz

RES BW 100 kHz (1)

VBW 100 kHz

SPAN 5.00 MHz

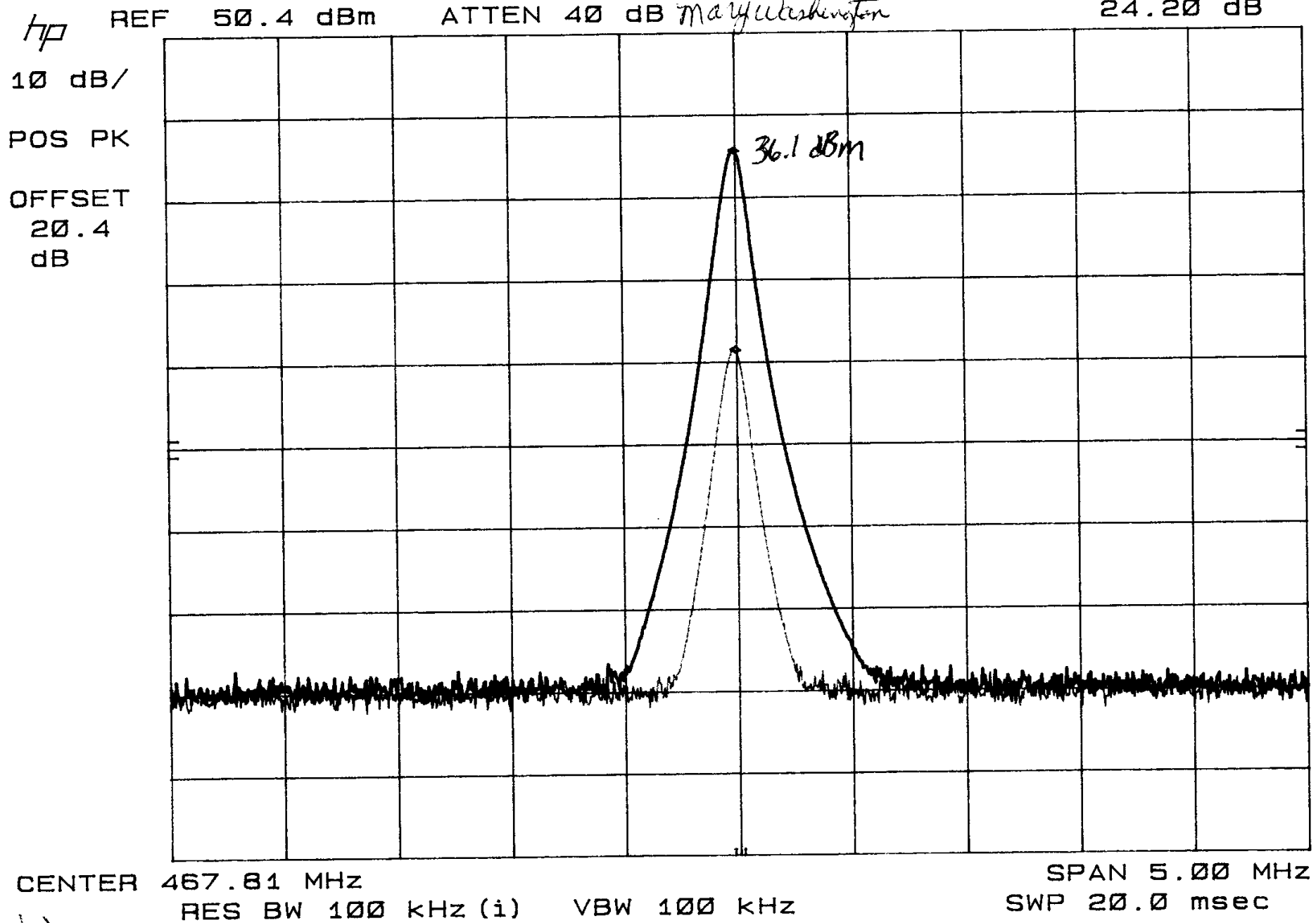
SWP 20.0 msec

30

CLIENT: SONIK
CW Mid Channel

DATE: 3/2/01 FCC Part 2, Para. 2.1046 RF Power Output High and low Power

MKR Δ 0 Hz
24.20 dB



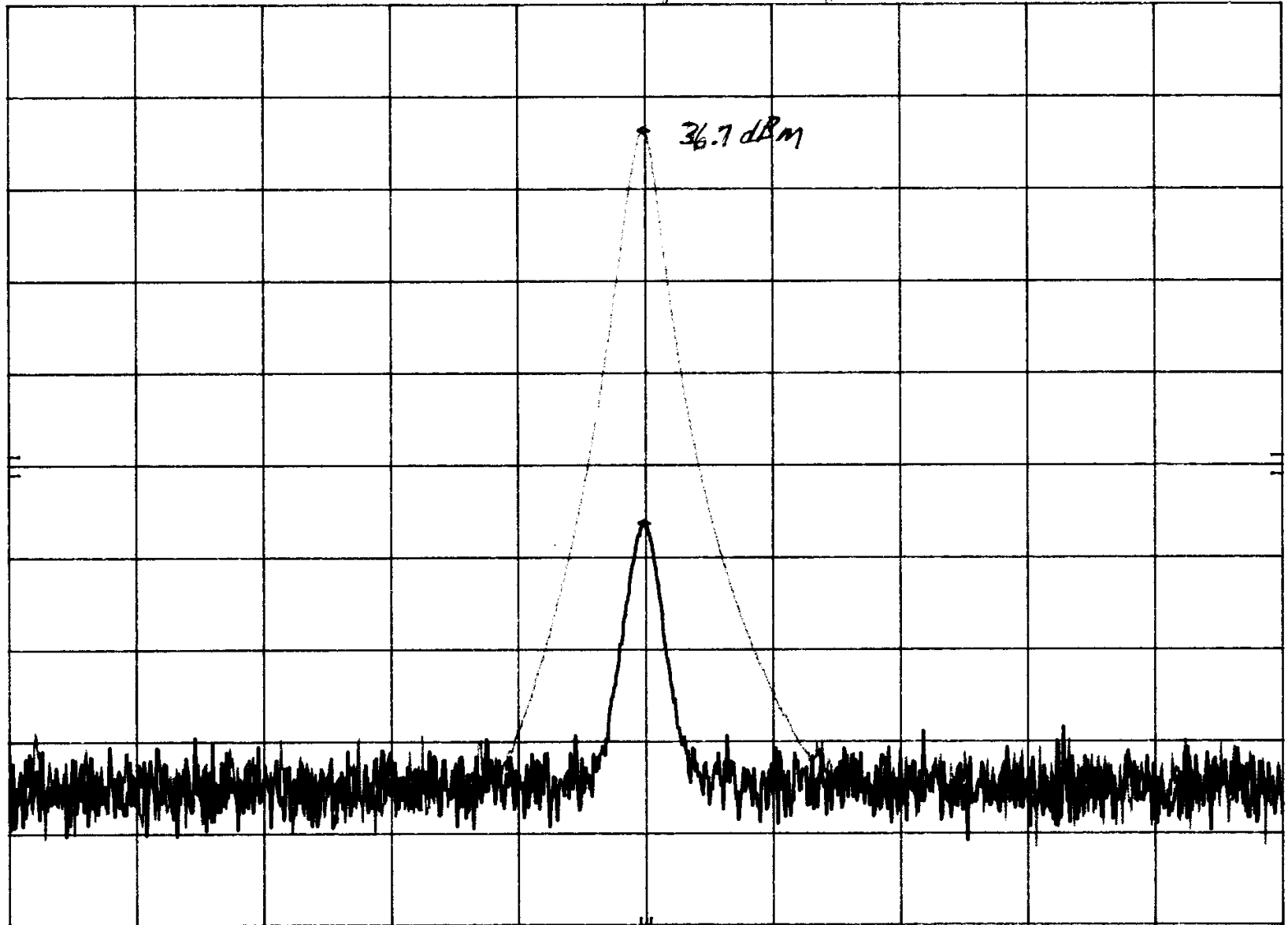
CLIENT: SONIK
CW Low Channel

DATE: 3/2/01 FCC Part 2, Para. 2.1046 RF Power Output High and low Power

MKR Δ 0 Hz
-42.60 dB

hp
REF 50.4 dBm
ATTEN 40 dB
10 dB/
POS PK
OFFSET
20.4
dB

Mary Wasberg



CENTER 450.00 MHz
RES BW 100 kHz (i) VBW 100 kHz

SPAN 5.00 MHz
SWP 20.0 msec

32

FREQUENCY STABILITY 2.1055(d) VOLTAGE VARIATION

CLIENT: SONIK

DATE: 3/2/01

FCC Part 2, Para. 2.1055(d) Voltage Variation

Standard Test Voltage	Frequency (MHz)
120 Vac	470,000,089
85% (102 Vac)	470,000,084
115% (138 Vac)	470,000,080

Limit = 705 Hz or 1.5 ppm

*Frequency Stability.
Temperature Variation
2.1055(a)(1)*

"01:00:42", 608, -31.27
"01:01:46", 608, -31.36
"01:02:51", 704, -31.32
"01:03:56", 608, -31.34
"01:05:01", 608, -31.38
"01:06:05", 608, -31.44
"01:07:10", 608, -31.46
"01:08:15", 512, -31.56
"01:09:20", 512, -31.45
"01:10:24", 608, -31.42
"02:11:10", 384, -22.563
"02:12:14", 512, -22.529
"02:13:19", 384, -22.527
"02:14:24", 608, -22.518
"02:15:29", 512, -22.618
"02:16:33", 512, -22.577
"02:17:39", 608, -22.553
"02:18:44", 512, -22.626
"02:19:49", 608, -22.545
"02:20:54", 608, -22.554
"03:21:39", 608, -13.214
"03:22:44", 608, -13.205
"03:23:49", 608, -13.168
"03:24:54", 608, -13.139
"03:25:59", 608, -13.129
"03:27:04", 608, -13.181
"03:28:09", 608, -13.141
"03:29:14", 608, -13.115
"03:30:19", 512, -13.075
"03:31:24", 512, -13.139
"04:32:10", 512, -3.656
"04:33:15", 512, -3.637
"04:34:20", 384, -3.624
"04:35:24", 512, -3.624
"04:36:29", 512, -3.658
"04:37:34", 288, -3.625
"04:38:39", 384, -3.553
"04:39:44", 512, -3.605
"04:40:50", 384, -3.553
"04:41:55", 288, -3.531
"05:42:40", 384, 5.737
"05:43:45", 384, 5.758
"05:44:50", 288, 5.748
"05:45:55", 288, 5.72
"05:47:00", 384, 5.823
"05:48:05", 192, 5.821
"05:49:10", 288, 5.795
"05:50:15", 192, 5.828
"05:51:20", 288, 5.836
"05:52:25", 192, 5.825
"06:53:10", 192, 14.696

*Frequency Stability
Temperature Variation
2.1055(a)(1)*

"06:54:15", 192, 14.77
 "06:55:20", 96, 14.743
 "06:56:25", 96, 14.772
 "06:57:30", 192, 14.805
 "06:58:35", 96, 14.783
 "06:59:40", 96, 14.781
 "07:00:45", 96, 14.874
 "07:01:50", 96, 14.914
 "07:02:55", 96, 14.934
 "08:03:41", 96, 26.583
 "08:04:46", 96, 26.343
 "08:05:51", 0, 25.554
 "08:06:56", 96, 24.92
 "08:08:01", 0, 24.332
 "08:09:06", 0, 23.969
 "08:10:11", 0, 23.716
 "08:11:16", 0, 23.54
 "08:12:21", 0, 23.559
 "08:13:26", 0, 23.53
 "09:14:12", 0, 36.03
 "09:15:17", -96, 36.03
 "09:16:22", 0, 36.03
 "09:17:27", -96, 36.01
 "09:18:32", 96, 35.99
 "09:19:37", 0, 35.99
 "09:20:42", 0, 36.02
 "09:21:46", -96, 36.03
 "09:22:51", 0, 36.03
 "09:23:56", 0, 36.04
 "10:24:42", 96, 45.72
 "10:25:47", -96, 45.74
 "10:26:52", 0, 45.72
 "10:27:57", 0, 45.76
 "10:29:02", 0, 45.74
 "10:30:07", 0, 45.76
 "10:31:12", -192, 45.77
 "10:32:17", 0, 45.77
 "10:33:22", -96, 45.77
 "10:34:27", -192, 45.79

ATTESTATION STATEMENT

GENERAL REMARKS:

SUMMARY:

All tests were performed per CFR 47, *Part 2, Paragraphs 2.1046; 2.1047(a); 2.1047(b); 2.1049; 2.1051; 2.1053; 2.1055(a)(1); 2.1055(d); Part 22, Paragraph 22.359; and Part 90, Paragraphs 90.210(b) and 90.214*

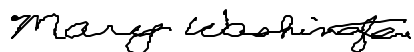
■ - Performed

The Equipment Under Test

■ - **Fulfills** the requirements of CFR 47, *Part 2, Paragraphs 2.1046; 2.1047(a); 2.1047(b); 2.1049; 2.1051; 2.1053; 2.1055(a)(1); 2.1055(d); Part 22, Paragraph 22.359; and Part 90, Paragraphs 90.210(b) and 90.214*

- TÜV PRODUCT SERVICE, INC. -

Responsible Engineer:



Mary Washington
(EMC Senior Engineer)