Regulatory Compliance Report

EQUIPMENT IDENTIFICATION

FCC ID: MNT-PC-UC

Applicable FCC Parts

22, 90

NAMEPLATE DRAWING

ATTACHED, EXHIBIT A.

LOCATION

AS PER LABEL DRAWING(S)

DATE OF REPORT

May 15, 1999

Supervised By:

John Sonnenberg
CEO/Chief Technical Officer
Sonik Technologies Corporation

Table of Contents

1. Statements

1.1 INFORMATION TO USER(CFR 15.21)

The user's manual or instruction manual for an intentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

1.2 SPECIAL ACCESSORIES (CFR 15.27(a))

No special equipment or accessories are required to be supplied with the unit or by the user to ensure compliance with the applicable standards.

1.3 Spectrum Efficiency Certification(CFR 2.203(j)(i))

This product is compliant with the spectral efficiency standards of one voice channel per 12.5kHz. Its transmitter is factory programmable (non-user programmable), for use on either 12.5khz or 25kHz spaced channels. The only data transmission capability it has is to send one-way POCSAG paging data, which is exempt from the 4800bps/6.25kHz efficiency requirements for data per 90.203(j)(7).

1.4 Programmability (CFR 90.203(g))

The user cannot change the frequency or bandwidth of the product using the operator's controls. An internal test-point must be grounded upon power up to enter the radio configuration mode. The unit cannot transmit when it is in its frequency configuration mode.

2. Declaration of Conformity (CFR 2.1071)

The applicant is aware that it is the responsible party as defined per CFR 2.909.

The applicant has tested and confirmed that the product referenced in this application conforms to the applicable technical standards within the CFR Part 15, provided that no un-authorized change to the equipment is made.

The applicant warrants that each product marketed is identical to the unit tested for conformance.

The applicant maintains the records of the compliance testing of the product. All units produced are tested to ensure that they have the same characteristics as the unit tested.

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2.1033(C11): Labeling Information: See Exhibit A.

2.1033(C12): Photographs: See attached.

2.1033(C13): DIGITAL MODULATION DESCRIPTION: See attached circuit description.

2.1033(C13): TEST AND MEASUREMENT DATA: FOLLOWS

2.2.1073: Declaration of Conformity: See Statements in Section 2.5 of this report.

All tests and measurement data shown were performed in accordance with FCC Rules and Regulations, Volume II; Part 2, Sub-part J, Sections 2.1031-2.1057, and the following individual Parts:

90 - Private Land Mobile Radio Services
22 - Public Mobile Service
15 - Radio Frequency Devices

3. STANDARD TEST CONDITIONS and ENGINEERING PRACTICES

Except as noted herein, the following conditions and procedures were observed during the testing:

ROOM TEMPERATURE	= 25 ±5°C
ROOM HUMIDITY	= 20-50%
D.C. SUPPLY VOLTAGE, Vdc	= 12.0V and 5.0V

Prior to testing, the EUT was tuned up in accordance with the manufacturer's alignment procedures. There are no external gain controls on this unit.

Measurement results, unless otherwise noted, are worst case measurements.

4. Test Results

4.1 RF Power Output

PARAGRAPH: 47 CFR 2.1046(a)
GUIDE: EIA STANDARD 603, Paragraph 2.2.1
TEST CONDITIONS: STANDARD TEMPERATURE & HUMIDITY
TEST EQUIPMENT: AS PER ATTACHED LIST

MEASUREMENT PROCEDURE

1. The EUT was connected to a wattmeter and then to a 50 ohm resistive termination, and the unmodulated output power was measured by means of the RF Power Meter. The power jumper (JP3 on the main controller PCB) was set in the HIGH mode, putting 12V on the collector of the PA device.

2. Measurement accuracy is ±3%.

HIGH POWER MEASUREMENT RESULTS

Nominal Frequency	RF Power Output, Watts
450	3.9
460	3.7
470	3.6

3. The power jumper was set in the LOW mode, putting 8.0V on the collector of the PA device.

2. Measurement accuracy is ±3%.

MEASUREMENT RESULTS

Nominal Frequency	RF Power Output, Watts
450	1.9
460	1.8
470	1.8

POWER OUTPUT TEST EQUIPMENT

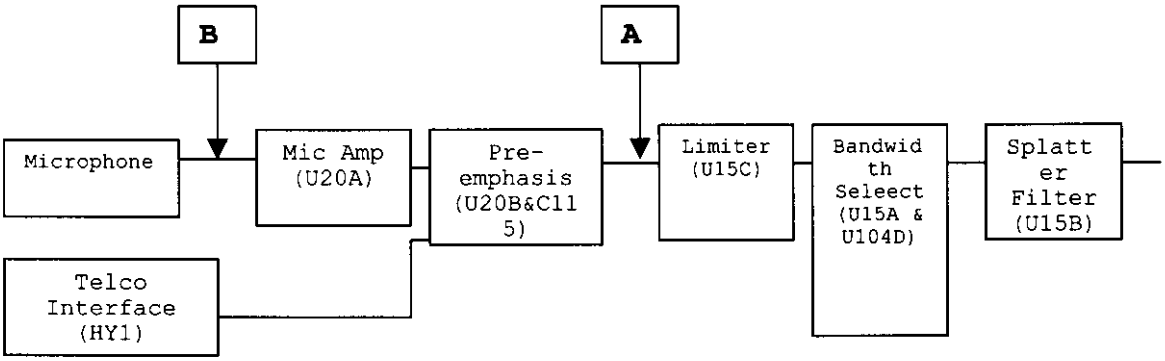
TEST 1: R. F. POWER OUTPUT

(1) COAXIAL ATTENUATOR: NARDA 771-30
(2) POWER METER Bird Model 43
(3) FREQUENCY COUNTER HP 8594A

4.2 VOICE MODULATION CHARACTERISTICS -

The tests in this section characterize a) 5.3.1 the low-pass filter after the limiter; b) 5.3.2 the limiter's performance; c) 5.3.3 the overall audio frequency response from microphone to air; d)5.3.4 the overall audio frequency response from telephone interface to air.

The general modulator block diagram and test points A and B are as follows:



The output of the audio pre-emphasis goes to a circuit that sets the limited voltage to either time 0.5 or time 0.25. The output of the Bandwidth select circuit goes to the splatter filter and then to the transmitter's modulation circuit in the VCO.

4.2.1 FREQUENCY RESPONSE OF LOW PASS FILTER AFTER LIMITER IN MODULATING CIRCUIT:

PARAGRAPH:	47 CFR 2.1047(a)
GUIDE:	EIA STANDARD 603, Paragraph 2.2.6
TEST CONDITIONS:	STANDARD TEMPERATURE & HUMIDITY
TEST EQUIPMENT:	AS PER ATTACHED PAGE
Limit:	3kHz-20kHz: 60 $\log_{10}$ (f/3) decibels. 50dB 20kHz and above.

MEASUREMENT PROCEDURE

1. The RF output of the EUT was connected to a modulation analyzer, HP model 53310A, via a 30dB attenuator.

2. An audio generator was connected to U15A pin 2 via a 10K resistor. This is test point A in the block diagram of section 5.3. U15A is an OP-Amp used as a mixer, that combines audio sources together as well as limits the deviation. The output of U15A goes to the splatter filter.

3. The transmitter was keyed using the F3 button on the front of the unit. This is the button used by an operator who wishes to talk into the unit and have his voice transmitted. The level of the audio signal was adjusted to 50% of full deviation at 1kHz tone as measured on the modulation analyzer. This point was taken as the 0dB reference level.

4. With the audio generator level held constant and below limiting at all levels, the audio generator was varied from 100Hz to 50kHz. The results of the tests, as measured on the modulation analyzer relative to the value at 1kHz are as follows:

Test Results:

Frequency (Hz)	Measured(dB)	Limit
100	0.0	NA
500	0.0	NA
1000	0.0	0dB
3000	-1.6	<0dB
3500	-5.4	<4.1dB
4000	-9.6	<7.4dB
5000	-17.5	<13.3dB
7000	-30.6	<22.1dB
10000	-49.2	<31.4dB
12500	-58.1	<37.2dB
15000	-54.0	<41.9dB
20000	-54.1	<49.43dB
All >20kHz	-54.1	<50dB

4.2.2 MODULATION LIMITING

PARAGRAPH: 47 CFR 2.1047(b)

GUIDE: EIA STANDARD 603, Paragraph 2.2.3

TEST CONDITIONS: STANDARD TEMPERATURE & HUMIDITY

TEST EQUIPMENT: AS PER ATTACHED PAGE

MEASUREMENT PROCEDURE:

1. The RF output of the EUT was connected to a modulation analyzer, HP model 53310A via a 30dB attenuator. The EUT was put in the wide-band mode (5kHz peak deviation).

2. An audio generator was connected to U15A pin 2 via a 10K resistor. This is test point A in the block diagram of section 5.3. U15A is an OP-Amp used as a mixer, that combines audio sources together as well as limits the deviation. The output of U15A goes to the splatter filter. Measurements were taken at audio frequencies of at 300 ,1kHz, 2kHz, 3kHz, and 4kHz tones, 2kHz being the maximum response.

3. The transmitter was keyed using the F3 button on the front of the unit. This is the button used by an operator who wishes to talk into the unit and have his voice transmitted. The level of the audio signal was adjusted to 30% of full deviation as measured on the modulation analyzer. This point was taken as the 0dB reference level.

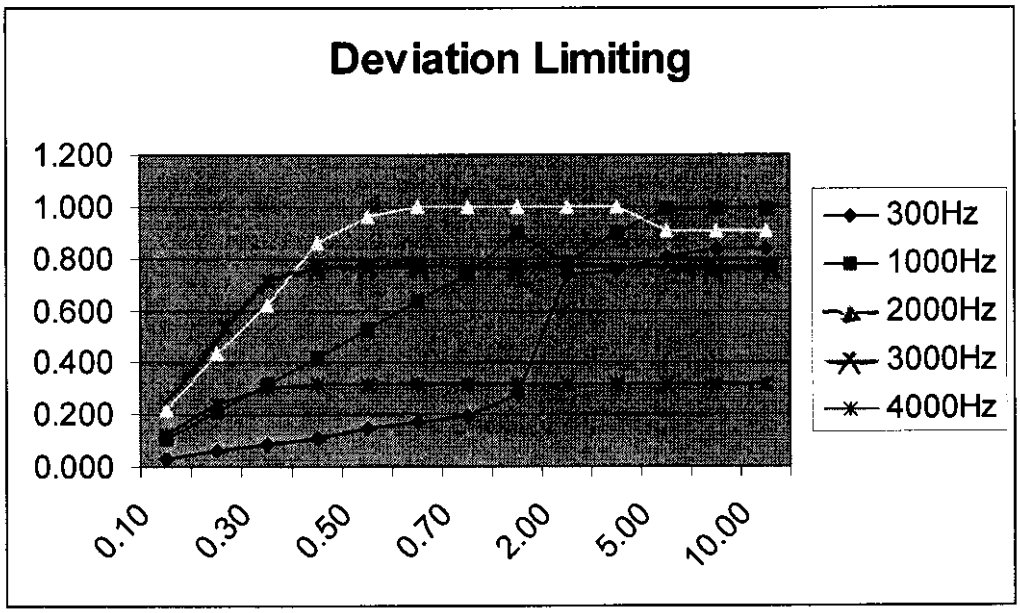
4. Measurements were taken between 30% and 20dB higher than the saturation point of the limiter, and the results were recorded.

5. The unit was switched into the narrow-band mode, and the tests repeated. The narrow-band test showed that the the limiting response was identical to the wode-band, with the exception that the deviation was ½ that of the wide-band mode level.

Limiter Test Results

(Frequency vs Input voltage, normalized to full deviation)

Input (Vp-p)	300Hz	1000Hz	2000Hz	3000Hz	4000Hz
0.10	0.030	0.112	0.215	0.244	0.124
0.20	0.060	0.209	0.431	0.493	0.239
0.30	0.086	0.314	0.622	0.718	0.299
0.40	0.110	0.421	0.861	0.766	0.321
0.50	0.144	0.526	0.957	0.766	0.321
0.60	0.167	0.632	0.995	0.766	0.321
0.70	0.191	0.732	0.995	0.766	0.321
1.00	0.282	0.895	0.995	0.766	0.321
2.00	0.732	0.785	1.000	0.766	0.321
3.00	0.751	0.895	0.995	0.766	0.321
5.00	0.804	0.990	0.909	0.766	0.321
7.00	0.837	0.990	0.909	0.766	0.321
10.00	0.837	0.990	0.909	0.766	0.321



4.2.3 FREQUENCY RESPONSE OF MICROPHONE AUDIO MODULATING CIRCUIT

PARAGRAPH: 47 CFR 2.1047(a)

GUIDE: EIA STANDARD RS 603, Paragraph 2.2.6

TEST CONDITIONS: STANDARD TEMPERATURE & HUMIDITY

TEST EQUIPMENT: AS PER ATTACHED PAGE

MEASUREMENT PROCEDURE

1. The RF output of the EUT was connected to a modulation analyzer, HP model 53310A via a 30dB attenuator.

2. An audio generator was connected to U20A pin 2 via a 10K resistor. This is test point B in the block diagram of section 5.3. U20A is an OP-Amp used as a microphone pre-amp. The output of U15A goes to the limiter and then to the splatter filter. This test reveals the overall frequency response of the transmit audio path.

3. The transmitter was keyed using the F3 button on the front of the unit. This is the button used by an operator who wishes to talk into the unit and have his voice transmitted. The level of the audio signal was adjusted to 50% of full deviation at 1kHz tone as measured on the modulation analyzer. This point was taken as the 0dB reference level.

4. With the audio generator level held constant and below limiting at all levels, the audio generator was varied from 100Hz to 5kHz. If any stage in the audio path began to clip, then the level was reduced, and again re-normalized, so as to reveal the mic-to-modulator response. The results of the tests, as measured on the modulation analyzer are as follows:

Test Results:

Frequency	***Measured***
50	-43dB
100	-40.5dB
200	-21.6dB
300	-12.2dB
500	-6.4dB
1000	0dB
2000	6.4dB
2500	8.0dB
3000	7.8dB
3500	5.1dB
4000	2.0dB
5000	-4.4dB
10000	-34.0dB

4.2.4 FREQUENCY RESPONSE OF TELEPHONE INTERFACE AUDIO MODULATING CIRCUIT

PARAGRAPH: 47 CFR 2.1047(a)

GUIDE: EIA STANDARD 603, Paragraph 2.2.6

TEST CONDITIONS: STANDARD TEMPERATURE & HUMIDITY

TEST EQUIPMENT: AS PER ATTACHED PAGE

MEASUREMENT PROCEDURE

1. The RF output of the EUT was connected to a modulation analyzer, HP model 53310A via a 30dB attenuator.

2. An audio generator with a 600 ohm output impedance was connected to the telephone line interface. This test reveals the overall frequency response of the transmit audio path via the telephone port. The overall frequency response does not vary between wide and narrow-band operating modes.

3. The transmitter was keyed using a built-in test routine for performing this test. The level of the audio signal was adjusted to 50% of full deviation at 1kHz tone as measured on the modulation analyzer. This point was taken as the 0dB reference level.

4. With the audio generator level held constant and below limiting at all levels, the audio generator was varied from 100Hz to 5kHz. If any stage in the audio path began to clip, then the level was reduced, and again re-normalized, so as to reveal the telco-to-modulator response. The results of the tests, as measured on the modulation analyzer are as follows:

Test Results:

Frequency	***Measured***
50	-46dB
100	-41.3dB
200	-22.1dB
300	-11.2dB
500	-6.7dB
1000	0dB
2000	6.8dB
2500	8.1dB
3000	7.5dB
3500	5.2dB
4000	1.0dB
5000	-5.4dB
10000	-37.8dB

4.3 OCCUPIED BANDWIDTH

PARAGRAPH:	47 CFR 2.1049(c) for narrow-band 12.5kHz 47 CFR 2.1049(b) for wide-band 25kHz
GUIDE:	EIA STANDARD RS 603, Paragraph 2.2.11
TEST CONDITIONS:	S. T. & H.
TEST EQUIPMENT	AS PER ATTACHED PAGE

MEASUREMENT PROCEDURE

1. The EUT and test equipment were set up as shown on the following page, with the Spectrum Analyzer connected. The EUT was set in the wide-band mode (25kHz channel spacing mode).

2. A 2500 Hz audio signal was applied to the mic input, 16dB above the 50% modulation level.

3. The total power was measured on the spectrum analyzer using a 100kHz RBW. It was noted that the total channel power was +1.9dBm at the input of the spectrum analyzer. See plot in section 4.3.1. of this report. The display was normalized with the total channel power level as the reference level.

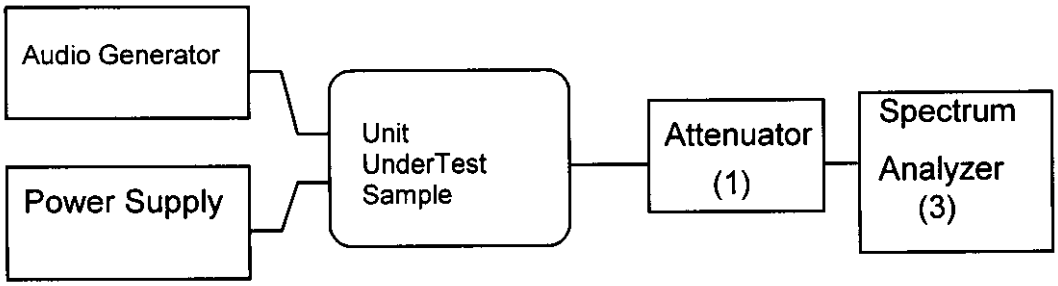
4. The RBW was changed to 100Hz and the spectrum analyzer swept on peak-hold over a 100kHz span. The plot is shown in section 4.3.2 of this report and the limits noted on it. The EUT contains an internal modulation limiter and low-pass filter per CFR 90.211, and thus the limits are as shown.

5. The EUT was changed to the narrow-band mode (12.5kHz spacing). The spectrum analyzer was swept on peak-hold over a 50kHz span. The plot is shown in 4.3.3 of this report and the limits noted on it. The EUT contains an internal modulation limiter and low-pass filter per CFR 90.211, and thus the applicable limits are as shown.

6. The EUT was changed to POCSAG ENCODE mode. In this mode, the limiter and low-pass fitler are still utilized to control the modulation. To verify compliance, the Occupied Bandwidth was measured with the Spectrum Analyzer controls set as shown on the test results, using 2400 baud data in both the wide-band and narrow-band modes of operation. The results are shown in 4.3.4 or this report.

TRANSMITTER SPURIOUS EMISSION AND SPURIOUS OUTPUT TEST SETUP

TEST A. OCCUPIED BANDWIDTH (IN-BAND SPURIOUS)
TEST B. OUT-OF-BAND SPURIOUS



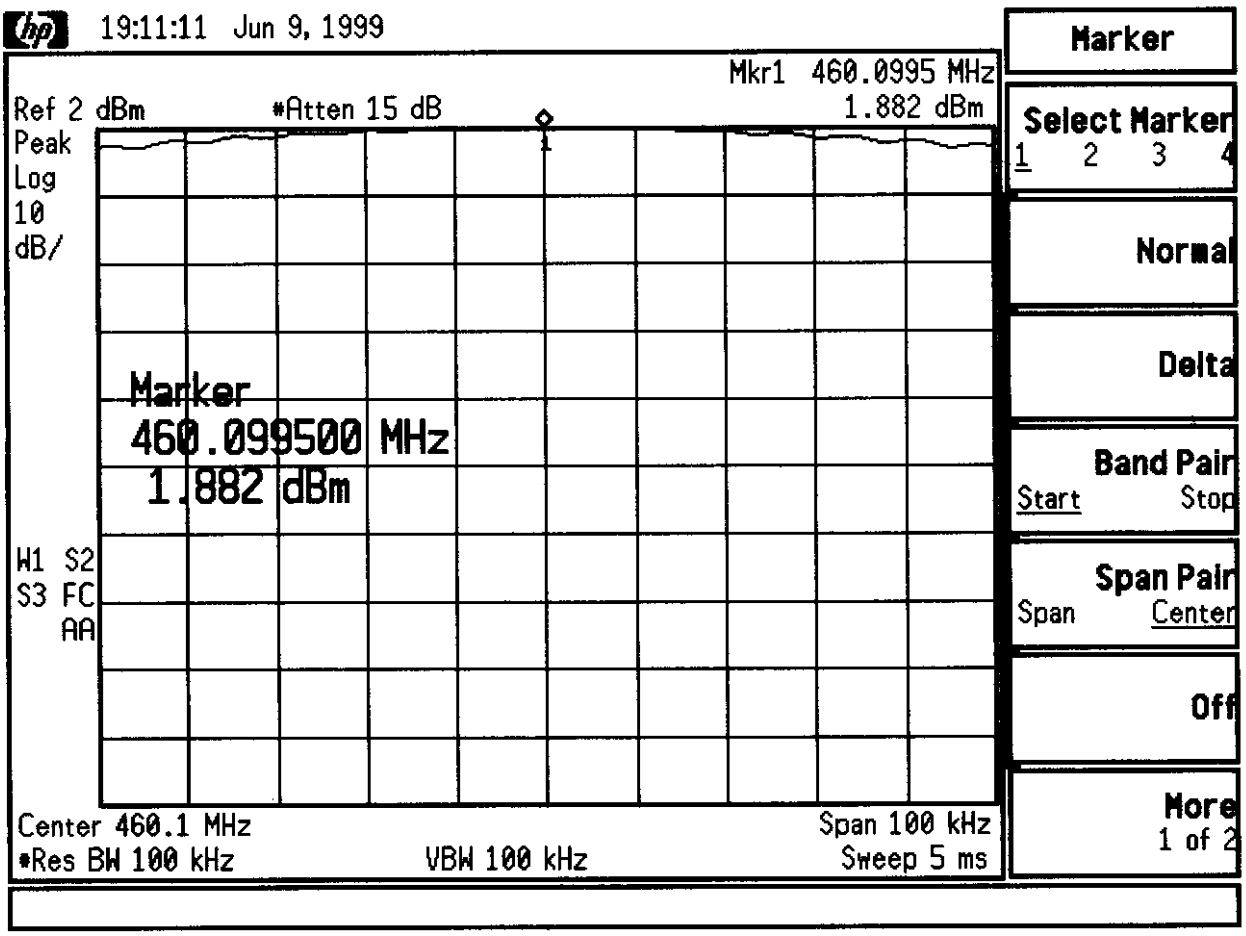
1. COAXIAL ATTENUATOR: NARDA 771-30

2. FILTERS: Note used

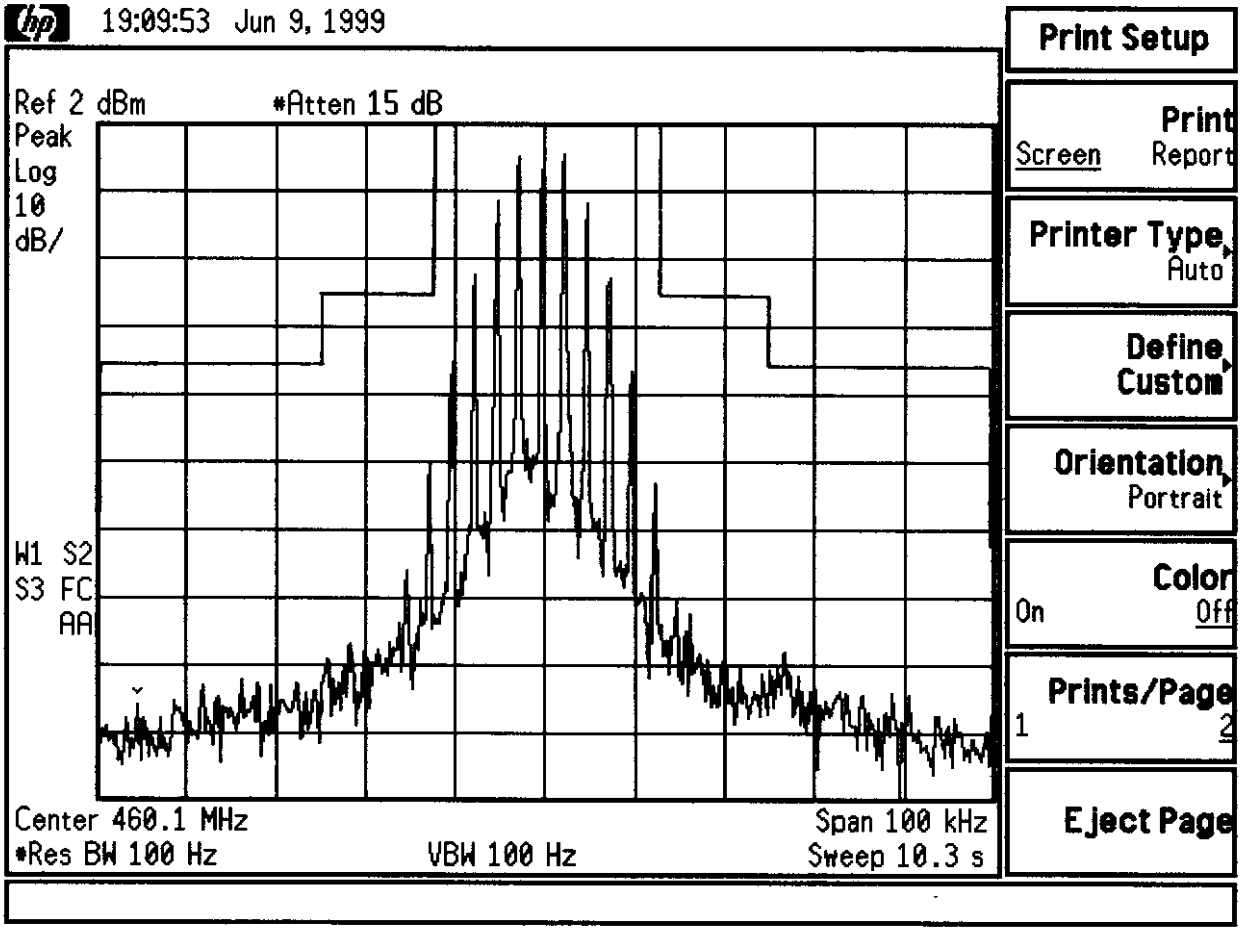
3. SPECTRUM ANALYZER: HP E4407B
HP 8593E

4. Audio Generator: HP33120A

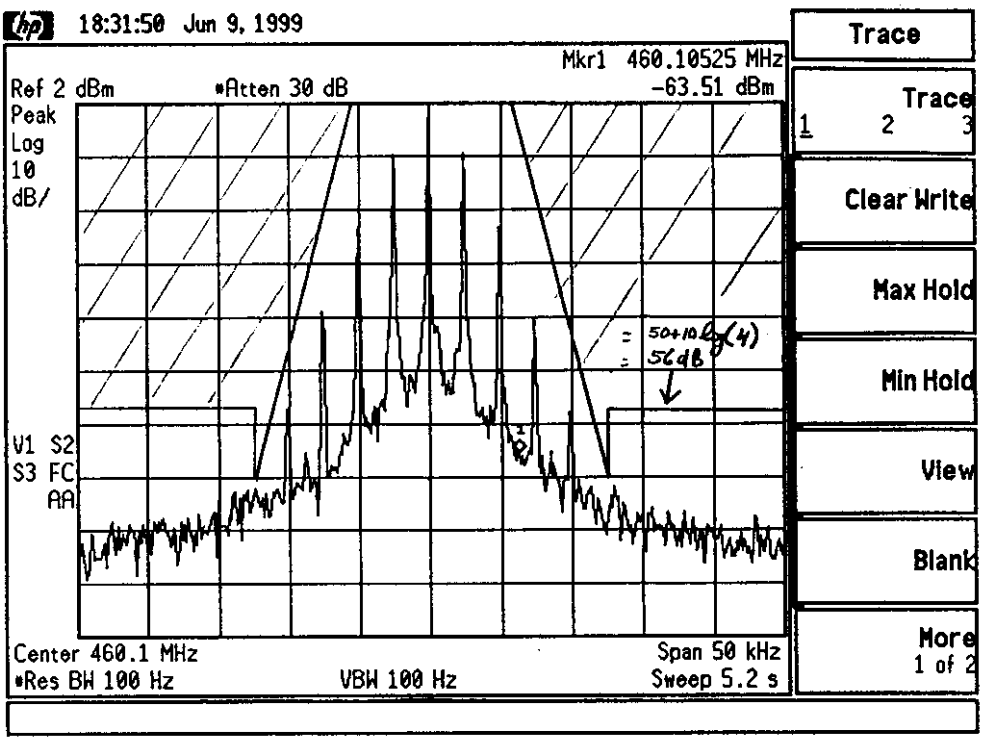
4.3.1 Total Channel Power



4.3.2 Occupied bandwidth, Wide-band mode (25kHz)



4.3.3 Occupied Bandwidth, Narrow-band Mode (12.5kHz)

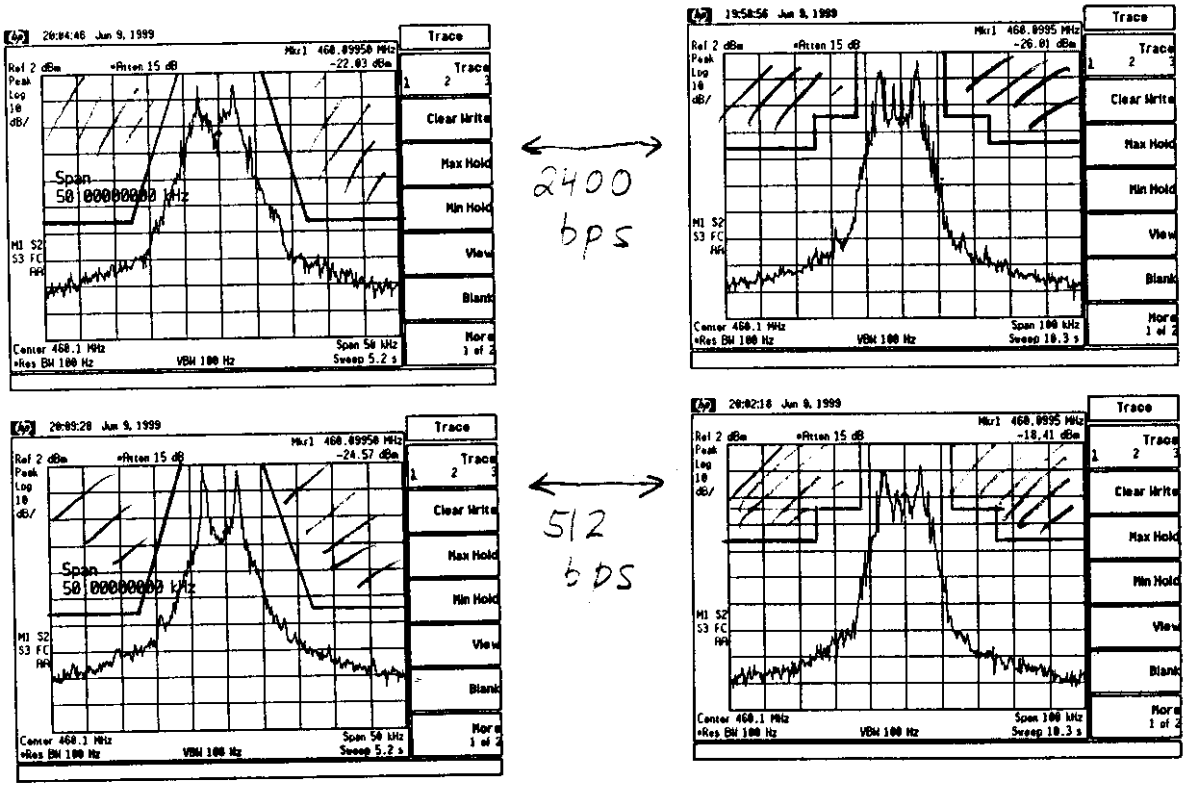


4.3.4 Occupied Channel Bandwidth in POCSAG encode mode

Note: Limiter and audio low-pass filter are still in use when encoding POCSAG paging data.

12.5kHz Mode

25kHz Mode



4.4 TRANSMITTER CONDUCTED SPURIOUS EMISSIONS

PARAGRAPH:	47 CFR 2.1049
GUIDE:	EIA STANDARD 603, Paragraph 2.2.13
TEST CONDITIONS:	S. T. & H.
TEST EQUIPMENT:	AS PER ATTACHED PAGE

MEASUREMENT PROCEDURE

1. The emissions were measured for the worst case as follows:

(a): within a band of frequencies defined by the carrier frequency plus and minus one channel.

(b): from the lowest frequency generated in the EUT and to at least the 10th harmonic of the carrier frequency.

2. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

3. The spectrum analyzer was configured to take into account the 30dB external attenuation and cable losses. The magnitude of the largest spurious emissions was measured.

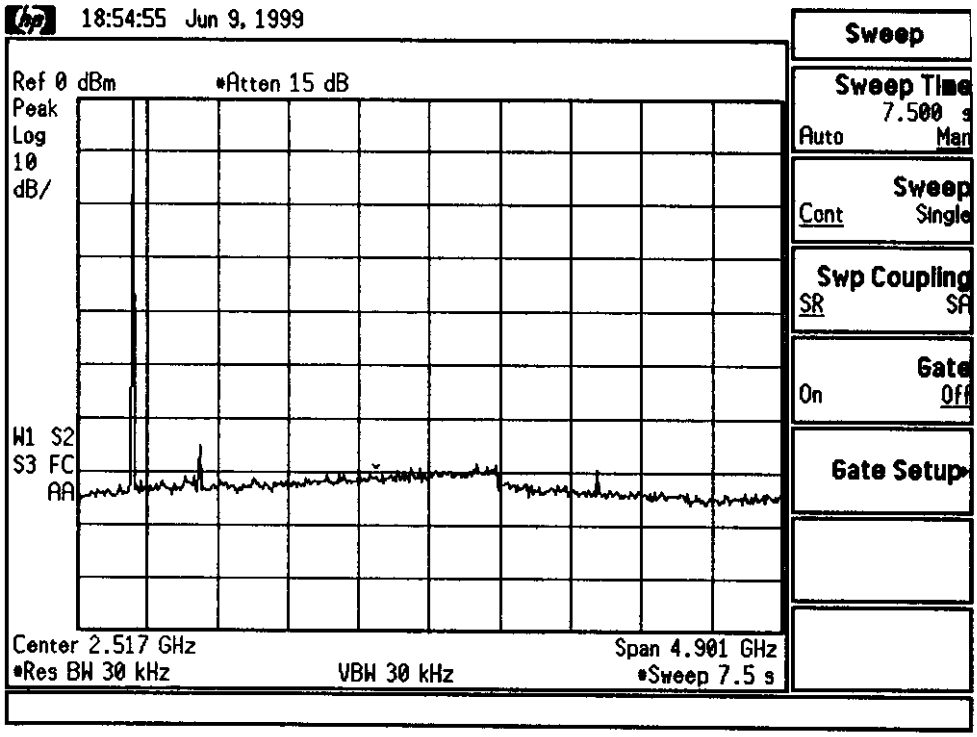
3. MEASUREMENT RESULTS: ATTACHED FOR WORST CASE

FREQUENCY OF CARRIER, MHz	= 450, 460, 470
SPECTRUM SEARCHED, GHz	= 0 to 10 x Fc
MAXIMUM RESPONSE, Hz	= N/A
ALL OTHER EMISSIONS	= ≥ 20 dB BELOW LIMIT
LIMIT, dBc: -[43 + 10 LOG(P0)]	= -49.0dBc (wide band mode)
Limit, dBc: -[50+10LOG(Po)}	= -56.0dBc (narrow-band mode)

Transmitter Conducted Spurious Emissions Results

ed Frequency, MHz	Emission Frequency, MHz	Level, dBc
450	900	-66
450	1350	-73
460	920	-67
460	1380	-72
470	940	-65
470	1410	-75

All other emissions were >20 dB below limit



4.5 FIELD STRENGTH OF SPURIOUS RADIATION

PARAGRAPH: 47 CFR 2.1053(a)
GUIDE: SEE MEASUREMENT PROCEDURE BELOW
TEST CONDITIONS: S. T. & H.
TEST EQUIPMENT: AS PER ATTACHED PAGE

MEASUREMENT PROCEDURE

1. A description of the measurement facilities was filed with the F.C.C. and was found to be in compliance with the requirements of Section 15.38, by letter from the F.C.C. dated October 21, 1996 FILE 31040/SIT (1300F2). All pertinent changes will be reported to the Commission by up-date prior to October 1999. The radiated field strength measurements were taken at *Electromagnetic Engineering Services, Incorporated,* San Diego, CA (EESI).

2. At first, in order to locate all spurious frequencies and approximate amplitudes, and to determine proper equipment functioning, the test sample was set up in an RF shielded room, at a distance of 1 meter from suitable test antennas. Any signal found to be emitted by the unit under test was noted for later field evaluation. The unit was scanned while transmitting at 450MHz, 460MHz, and 470MHz. It was noted that emissions when operating at 470Mhz were slightly higher than at the other two frequencies.

3. In the field, the test sample was placed on a wooden turntable above ground at three meters away from the search antenna. The test sample was connected to an R.F. Wattmeter and a 50 ohm dummy load, and adjusted to its rated output.

4. In order to obtain the maximum response at each spurious frequency, the turntable was rotated. Also, the Search Antennas were raised and lowered vertically, and all cables were oriented. Excess power lead was coiled near the power supply.

5. Step 4 was repeated with antennas oriented at 90 degrees to the way they were oriented in step 4. The maximum value of step 4 and 5 at each spurious frequency was recorded.

6. The level of each spurious radiation with reference to the transmitter power in dB, was calculated from:

Carrier Power = 4.0 watts = 36.0dBm
Maximum spurious output = -43 - 10Log(P) = -49.0dBc (25kHz mode)
Maximum spurious output = -50 - 10Log(P) = -56.0dBc (25kHz mode)
Field Strength of 4.0W at 3 meters = 36.0 + 95.2 = 131.2dBuV
Maximum Filed strength of spurs = 131.2 - 56.0 = 75.2dBuV = 5750uV

9. The worst case for all channels is shown.

10. Measurement summary:

FREQUENCY OF CARRIER, MHz	= 450, 460, 470
SPECTRUM SEARCHED, GHz	= 0 TO 4700MHz
ALL OTHER EMISSIONS	= ≥ 20 dB BELOW LIMIT
Worst case measurement	= 66.8dBuV/m
LIMIT, dBuV/m	= 75.2dBuV/m

11. Measurement results: See attached report from EESI for test results.

4.6 FREQUENCY STABILITY - TEMPERATURE VARIATION

PARAGRAPH: 47 CFR 2.1055 (a)(1)&(b)
GUIDE: EIA STANDARD RS 603, Paragraph 2.2.2.
TEST CONDITIONS: AS INDICATED
TEST EQUIPMENT: AS PER ATTACHED PAGE

MEASUREMENT PROCEDURE

1. The EUT and test equipment were set up as shown on the following page.

2. With all power removed, the temperature was decreased to -30°C and permitted to stabilize for three hours. Power was applied and the maximum change in frequency was noted within one minute.

3. With power OFF, the temperature was raised in 10°C steps. The sample was permitted to stabilize at each step for at least one-half hour. Power was applied and the maximum frequency change was noted within one minute.

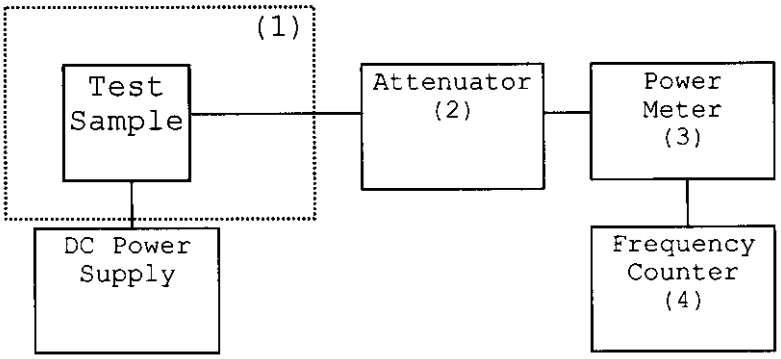
4. The temperature tests were performed for the worst case.

5. MEASUREMENT RESULTS:

Temp	-30°	-20°	-10°	0°	+10°	+20°	+25°	+30°	+40°	+50°	+60°
ppm err	-1.2	-.3	+1.1	+.8	+.5	+.4	0.0	-.6	-1.1	-.3	+.3

Limit: 1.5ppm
Worst case measured: -1.2ppm

TRANSMITTER FREQUENCY STABILITY TEST EQUIPMENT



(1)TEMPERATURE: Thermatron Temp. Chamber
(2)COAXIAL ATTENUATOR: Narda 771-30
(3)R.F. POWER: Bird model 43
(4)FREQUENCY COUNTER: HP 8595E with external rubidium reference.

4.7 FREQUENCY STABILITY - VOLTAGE VARIATION

PARAGRAPH: 47 CFR 2.1055 (d)
GUIDE: SEE MEASUREMENT PROCEDURE BELOW
TEST CONDITIONS: AS SHOWN
TEST EQUIPMENT: AS PER PREVIOUS PAGE

MEASUREMENT PROCEDURE

1. The EUT was placed in a temperature chamber at 25±5°C and connected as for "Frequency Stability - Temperature Variation" test.

2. Each of the power supply voltages to the EUT was varied from 85% to 115% of the nominal value measured at the input to the EUT.

3. The variation in frequency was measured for the worst case.

MEASUREMENT RESULTS

LIMIT, ppm = 1.5
LIMIT, Hz = 705Hz

Standard Test Voltage	12V supply	5V supply	Change in Frequency in hertz
85%	10.2	4.25	-25
100%	12.0	5.0	0
115%	13.8	5.75	+30

4.8 NECESSARY BANDWIDTH AND EMISSION BANDWIDTH

PARAGRAPH: 47 CFR 2.201 and 2.202

There are four modulation modes within the unit. They are automatically configured by the microprocessor in the device. The four modes are:

POCSAG paging data, 2400bps, +/- 4.5kHz deviation	16K0F1D
POCSAG paging data, 2400bps, +/- 2.25kHz deviation	11K0F1D
Voice from mic or telco, 5kHz deviation limiter	16K0F3E
Voice from mic or telco, 2.5kHz deviation limiter	11K0F3E

Calucations:

NECESSARY BANDWIDTH CALCULATION **(25kHz channel spacing, data) :**

MAXIMUM MODULATION (M) , kHz	= 1.2
MAXIMUM DEVIATION (D), kHz	= 4.5
CONSTANT FACTOR (K)	= 1.51
NECESSARY BANDWIDTH (Bn), kHz	= (2 x M) + (2 x D x K)= 16.0

Regarding the value of M, D and K for the maximum modulation frequency. These values were chosen for the following reasons:

1) 2.4kbps is the highest modulation data rate this product has. By 47 CFR 2.202, M=B/2.

2) The deviation in the type of paging system this transmitter will be used is set to 4.5KHz. Therefore D=4.5

3) The occupied bandwidth of this signal is approximately 16kHz. K must equal 1.51 in this case.

4) Other POCSAG transmitters made by our competitors have been approved with designators of 16K0F1D, and Sonik was following them by also specifying a 16kHz bandwidth, which at 4.5kHz deviation means k must = 1.51.

NECESSARY BANDWIDTH CALCULATION **(12.5kHz channel spacing, data) :**

MAXIMUM MODULATION (M) , kHz	= 1.2
MAXIMUM DEVIATION (D), kHz	= 2.25
CONSTANT FACTOR (K)	= 1.91
NECESSARY BANDWIDTH (Bn), kHz	= (2 x M) + (2 x D x K)= 11.0

Regarding the value of M, D and K for the maximum modulation frequency. These values were chosen for the following reasons:

1) 2.4kbps is the highest modulation data rate this product has. By 47 CFR 2.202, M=B/2.

2) The deviation in the type of paging system this transmitter will be used is set to 4.5KHz. Therefore D=4.5

3) The occupied bandwidth of this signal is approximately 11kHz. K must equal 1.91 in this case.

4) Other POCSAG narrow-band transmitters made by our competitors have been approved with designators of 11K0F1D, and Sonik was following them by also specifying a 11kHz bandwidth, which at 4.5kHz deviation means k must = 1.91.

NECESSARY BANDWIDTH CALCULATION **(25kHz channel spacing, voice) :**

MAXIMUM MODULATION (M) , kHz	= 3.0
MAXIMUM DEVIATION (D), kHz	= 5.0
CONSTANT FACTOR (K)	= 1
NECESSARY BANDWIDTH (Bn), kHz	= (2 x M) + (2 x D x K)= 16.0

NECESSARY BANDWIDTH CALCULATION **(12.5kHz channel spacing, voice):**

MAXIMUM MODULATION (M) , kHz	= 3.0
MAXIMUM DEVIATION (D), kHz	= 2.5
CONSTANT FACTOR (K)	= 1
NECESSARY BANDWIDTH (Bn), kHz	= (2 x M) + (2 x D x K)= 11.0

4.9 TRANSIENT FREQUENCY BEHAVIOR

PARAGRAPH: 47 CFR 90.214

GUIDE: SEE MEASUREMENT PROCEDURE BELOW and EIA603 2.2.19

TEST CONDITIONS: S. T. & H.

TEST EQUIPMENT: AS PER ATTACHED PAGE

MEASUREMENT PROCEDURE

1. The EUT was set up as per EIA-603 paragraph 2.2.19. It was operated in the wide-band (25kHz channel spaced) mode.

2. The oscilloscope was set to trigger on any detected RF pulse.

3. The modulation analyzer (test receiver) was adjusted for ranges fixed by user to insure proper dynamic range for power and deviation.

4. All settings were verified with a spectrum analyzer to show a minimum 30 dB difference in the input of the peak detector with the transmitter turned "ON" or "OFF".

5. The RF signal generator was set to a level 50dB below the output of the attenuator, and to ±25kHz deviation.

6. The EUT was keyed on and the Transient Frequency Behavior was measured with the instrument controls set as shown on the test results. The test was also run with modulation enabled sending POCSAG paging data, and it should be noted that the transient characteristics did not change.

7. The test were re-run in the narrow-band mode, ±12.5kHz reference tone, and the results are show in the report, section .

7. MEASUREMENT RESULTS: See following page

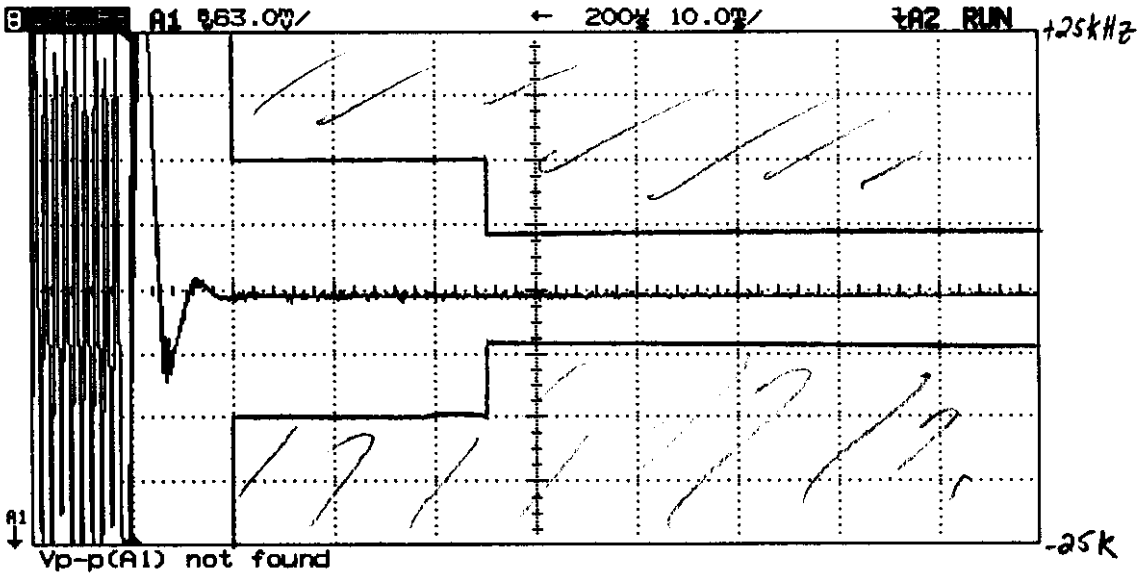
8. Test Equipment List:

TRANSIENT FREQUENCY BEHAVIOR TEST EQUIPMENT

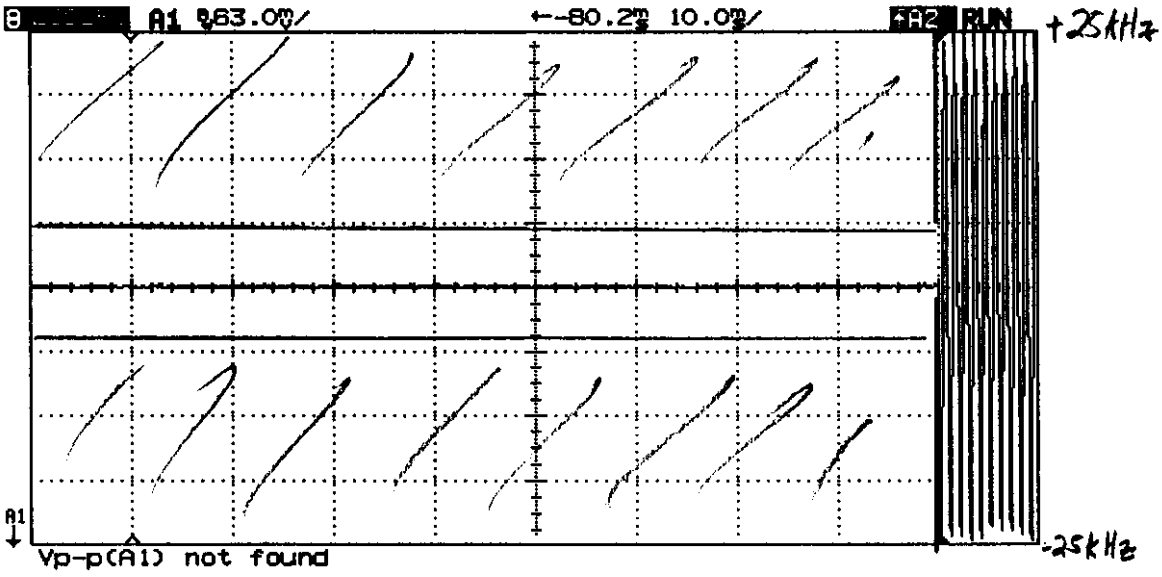
(1) COAXIAL ATTENUATOR:	NARDA 771-30
(2) COAXIAL ATTENUATOR	BIRD 8329 (30dB)
(3) COMBINER LAB, 10 dB	
(4) RF SIGNAL GENERATOR	HP 8656B
(5) DETECTOR	HP 8595E tuned to Fo.

(6) SCOPE	HP 54502A
(7) FM DEMODULATOR	HP 8595E w/FM demodulator option

4.9.1 TRANSIENT FREQUENCY BEHAVIOR, NO MODULATION, 25kHz mode

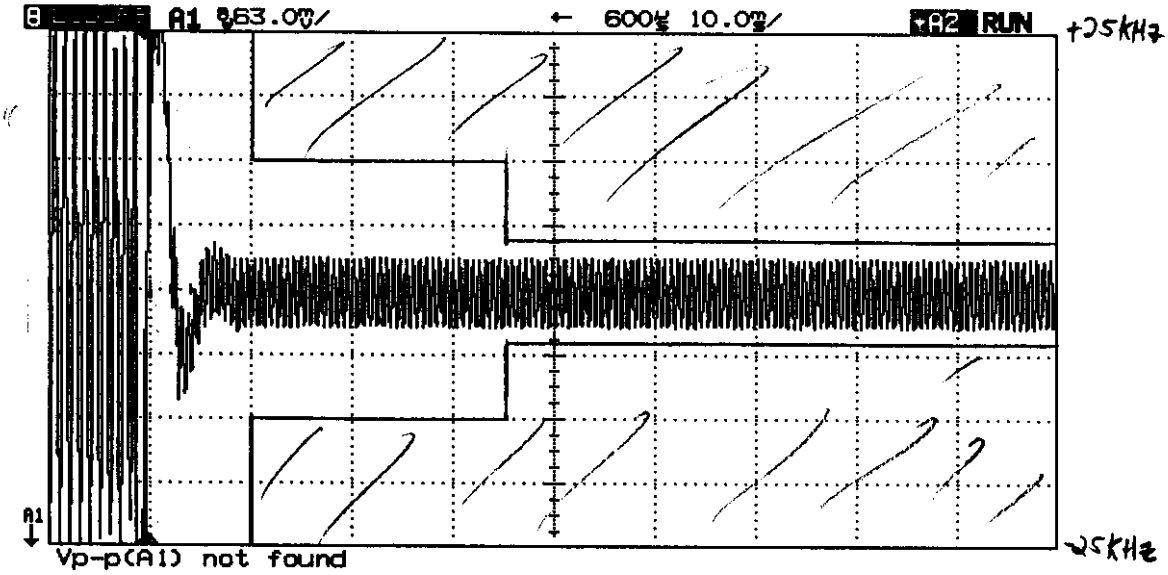


MODULATION: REF GENERATOR = 25 KHz
REMARK: CARRIER ON TIME



MODULATION: REF GENERATOR ±25 KHz DEVIATION
REMARK: CARRIER OFF TIME

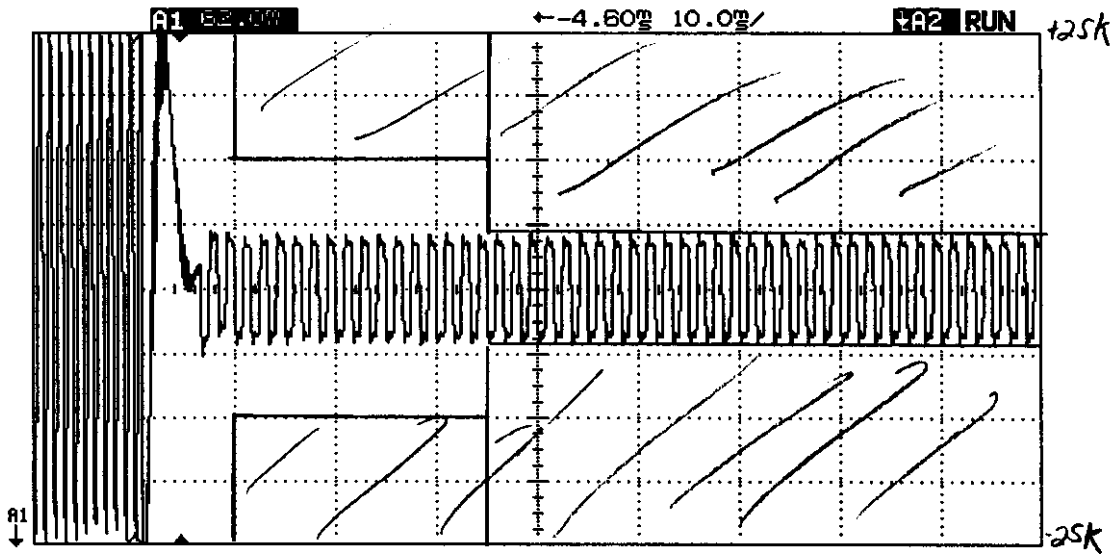
4.9.2 TRANSIENT FREQUENCY BEHAVIOR, 25kHz BW, AUDIO MODULATION



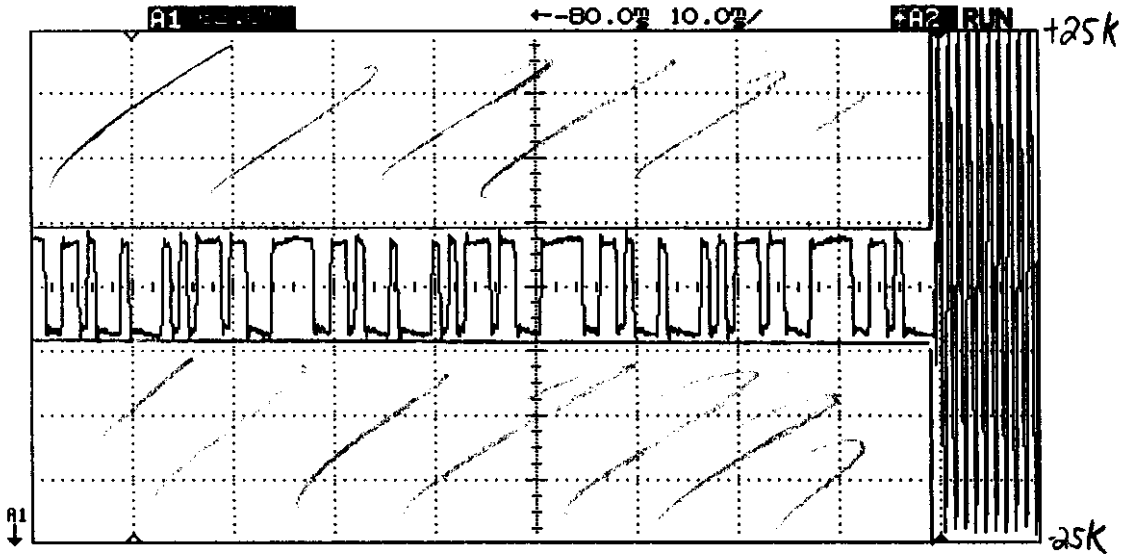
MODULATION: REF GENERATOR = 25 KHz
REMARK: CARRIER ON TIME

MODULATION: REF GENERATOR ±25 KHz DEVIATION
REMARK: CARRIER OFF TIME

4.9.3 TRANSIENT FREQUENCY BEHAVIOR, 25kHz BW, DATA MODULATION

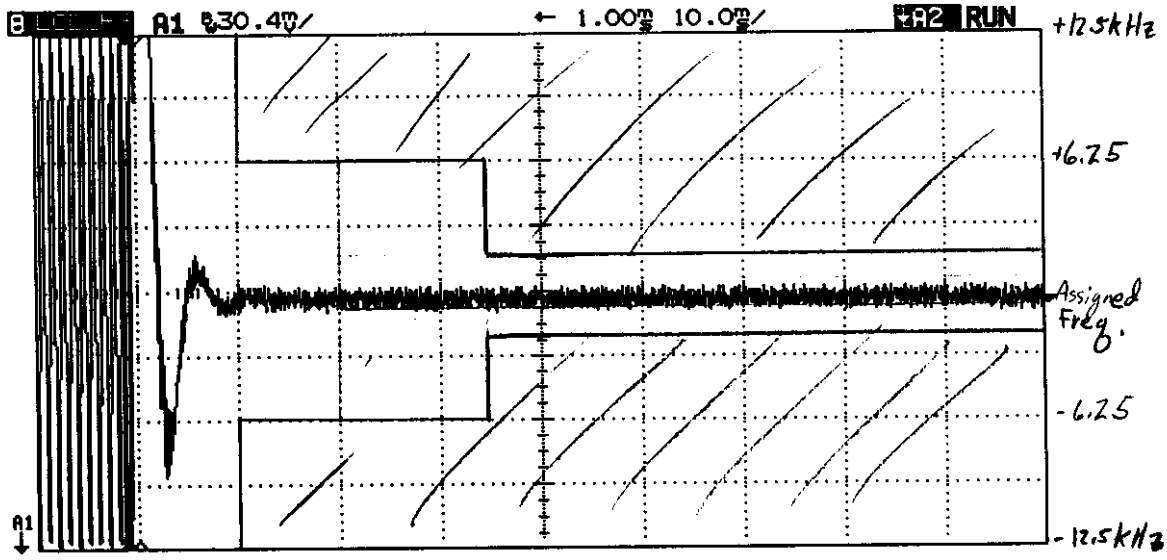


MODULATION: REF GENERATOR = 25 KHz
REMARK: CARRIER ON TIME

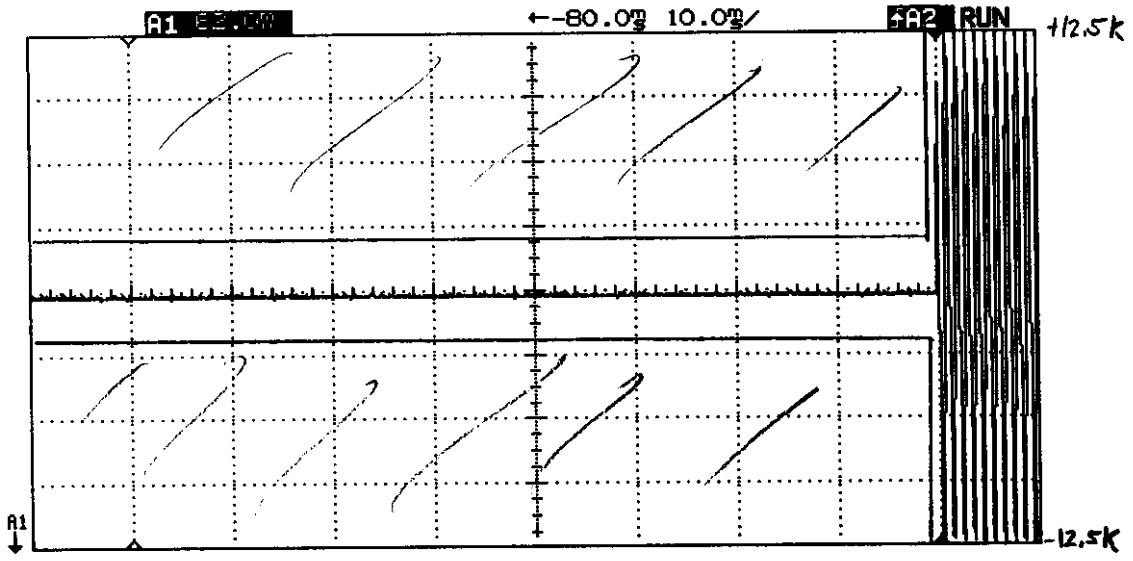


MODULATION: REF GENERATOR ±25 KHz DEVIATION
REMARK: CARRIER OFF TIME

4.9.4 TRANSIENT FREQUENCY BEHAVIOR, NO MODULATION, 12.5kHz mode

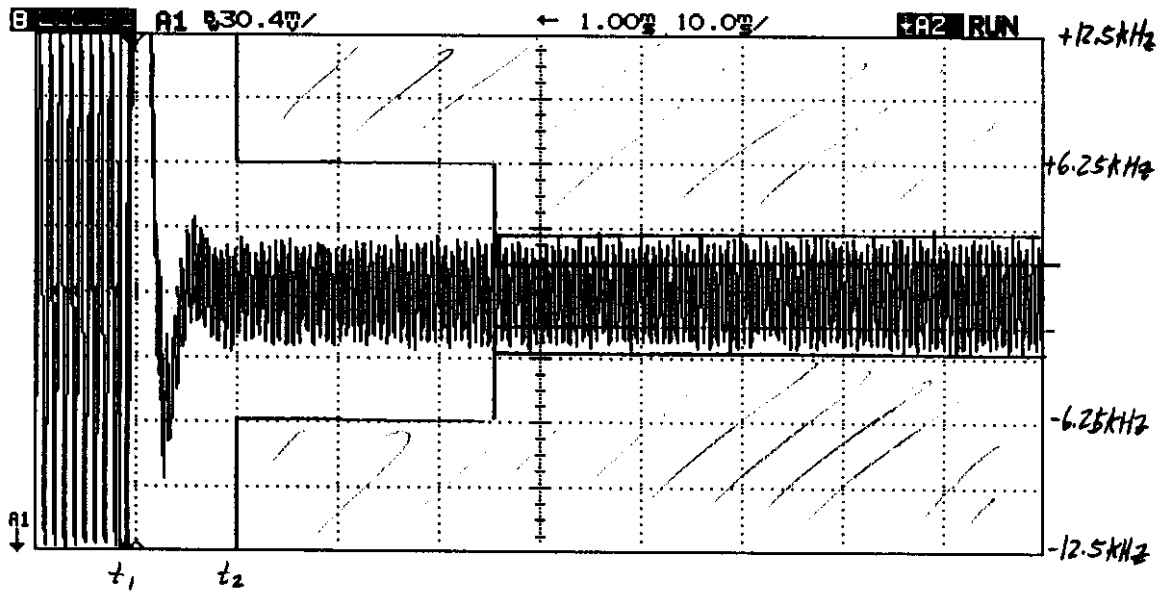


MODULATION: REF GENERATOR = 25 KHz
REMARK: CARRIER ON TIME

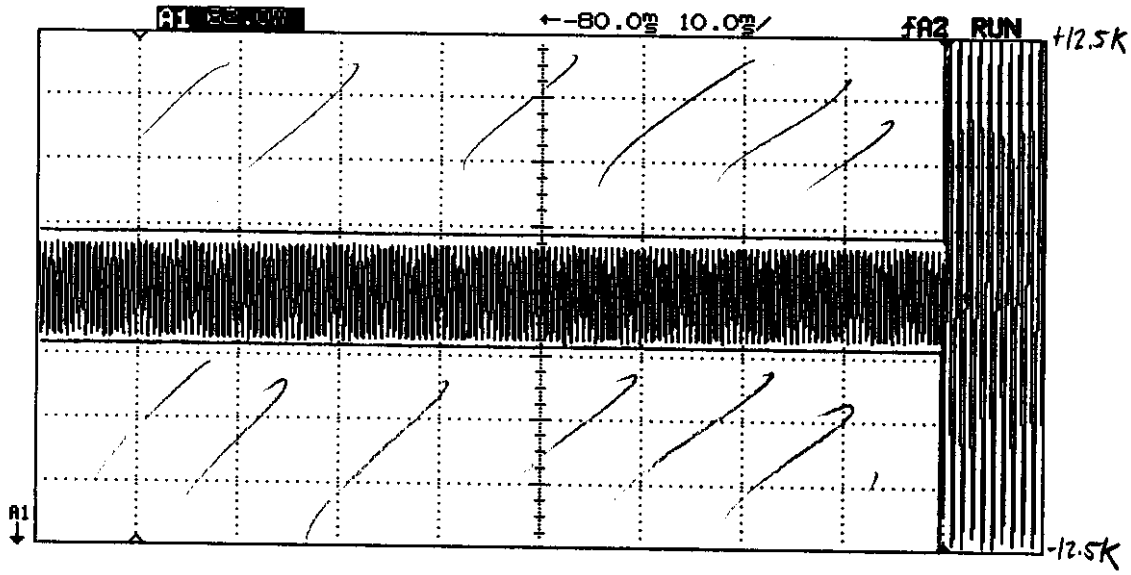


MODULATION: REF GENERATOR ±25 KHz DEVIATION
REMARK: CARRIER OFF TIME

4.9.5 TRANSIENT FREQUENCY BEHAVIOR, 12.5kHz BW, AUDIO MODULATION

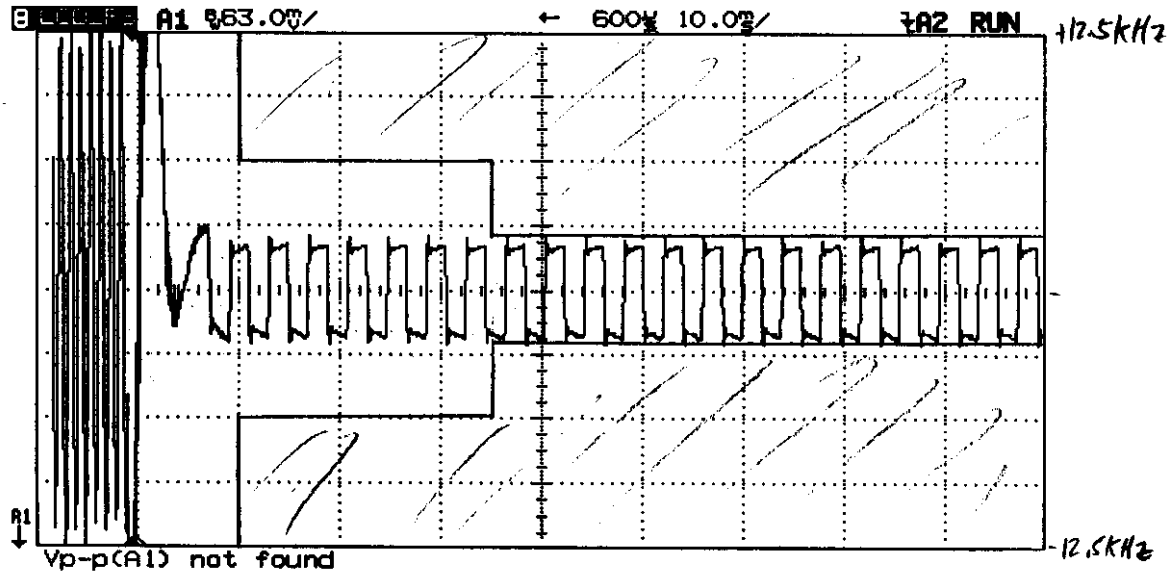


MODULATION: REF GENERATOR = 25 KHz
REMARK: CARRIER ON TIME

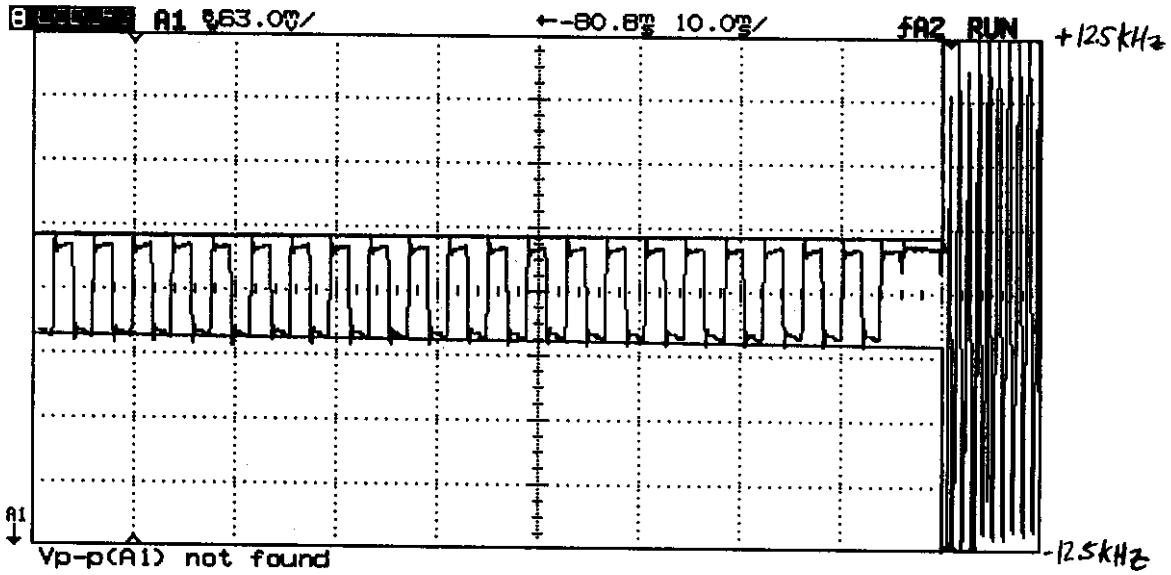


MODULATION: REF GENERATOR ±25 KHz DEVIATION
REMARK: CARRIER OFF TIME

4.9.6 TRANSIENT FREQUENCY BEHAVIOR, 12.5kHz BW, DATA MODULATION



MODULATION: REF GENERATOR = 25 KHz
REMARK: CARRIER ON TIME



MODULATION: REF GENERATOR ±25 KHz DEVIATION
REMARK: CARRIER OFF TIME

4.10 TESTIMONIAL AND STATEMENT OF CERTIFICATION:

THIS IS TO CERTIFY:

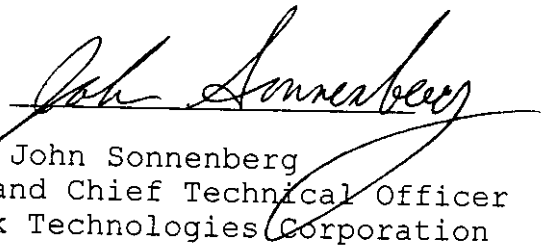
1. THAT the application was prepared either by, or under the direct supervision of, the undersigned.

2. THAT the technical data supplied with the application was taken under my direction and supervision.

3. THAT the data was obtained on representative units, randomly selected.

4. THAT, to the best of my knowledge and belief, the facts set forth in the application and accompanying technical data are true and correct.

5. THAT, the test equipment used to perform the tests reported herein is calibrated.



By: John Sonnenberg
CEO and Chief Technical Officer
Sonik Technologies Corporation

MNT-PC-UC

Electromagnetic Engineering Services, Incorporated
Spurious Emissions Data Sheet
(3m Open Area Test Site)

Client: Sonik Technologies
EUT: Paging Base Station
Model #: OSMAC (transmit mode 470MHz)

Conducted by: C. Bickel
Date of Test: 04-28-99
Test Distance, Amp. gain: 3 m, 0 dB

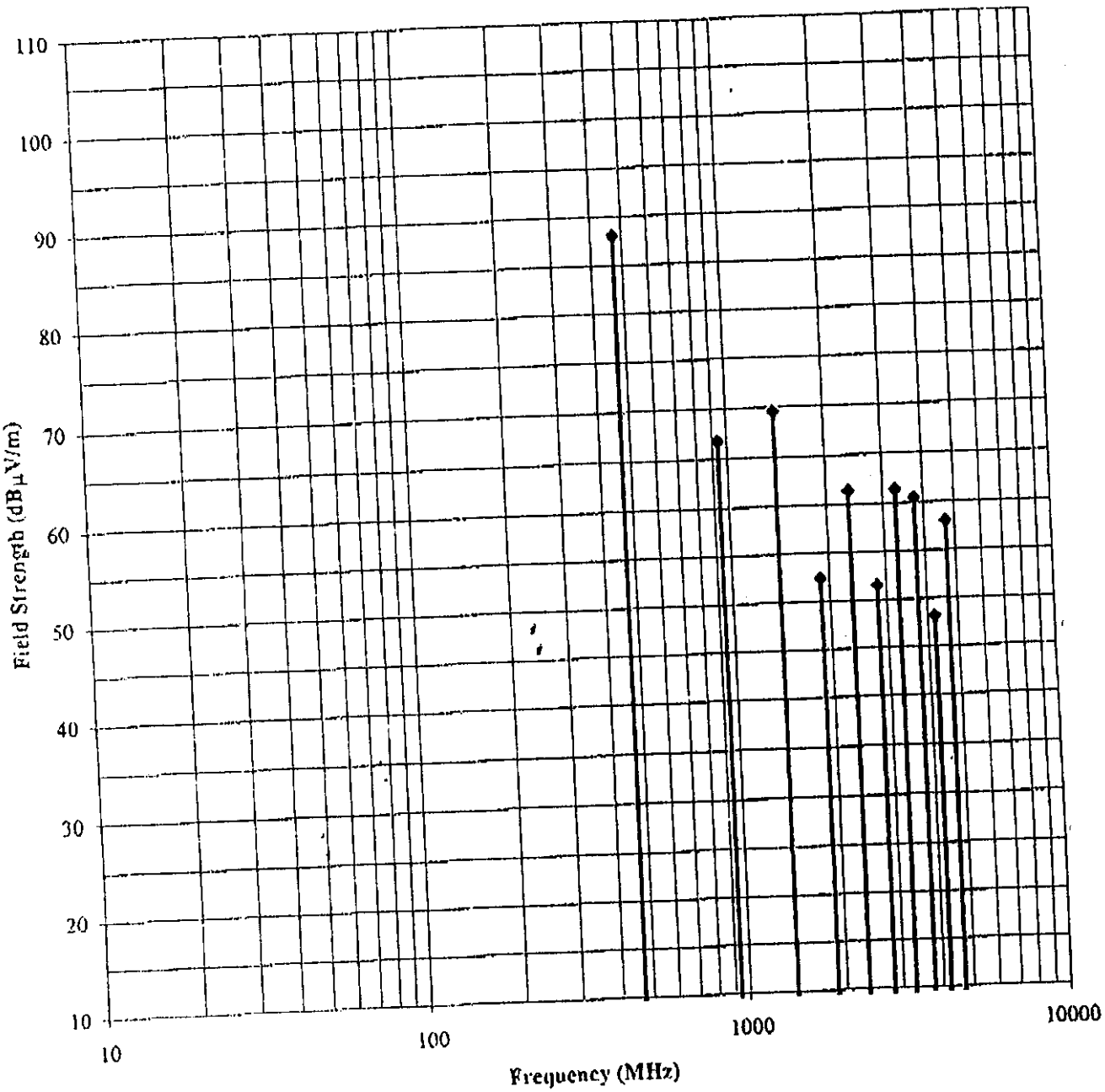
Frequency (MHz)	Spectrum Analyzer Reading at 3m (dBμV)	Antenna Polorization (vertical or horizontal)	Amp. Gain & Cable Loss, Distance & Antenna Factor Correction for 3 m (dBuV/m)	Total Interference Level at 3 m (dBμV/m)
470.000	60.7	h	27.4	88.1
940.000	38.8	v	28.0	66.8
1410.000	40.7	v	28.9	69.6
1880.000	20.2	h	32.3	52.5
2350.000	28.7	h	32.7	61.4
2820.000	19.0	h	32.6	51.6
3290.000	28.7	h	32.7	61.4
3760.000	24.8	h	35.7	60.5
4230.000	11.8	v	36.4	48.2
4700.000	21.5	v	36.6	58.1

Test Conditions: Standard radiated emissions test set up on FCC registered open field site. The highest emissions for all antenna heights, polarities, and table orientations are the only emissions recorded.

MNT-PC-UC

FCC/MELLON JUN 29 1999

Sonik Technologies - Paging Base Station: OSMAC (transmit mode 470MHz)
Radiated Emissions Profile (04-28-99) - EESI



RADIATED EMISSIONS DATA SHEET

Date: 28 APR99 | Location: NOATS | Test Personnel: C. Lucas | Co./EUT: SONIK OSMAC Base

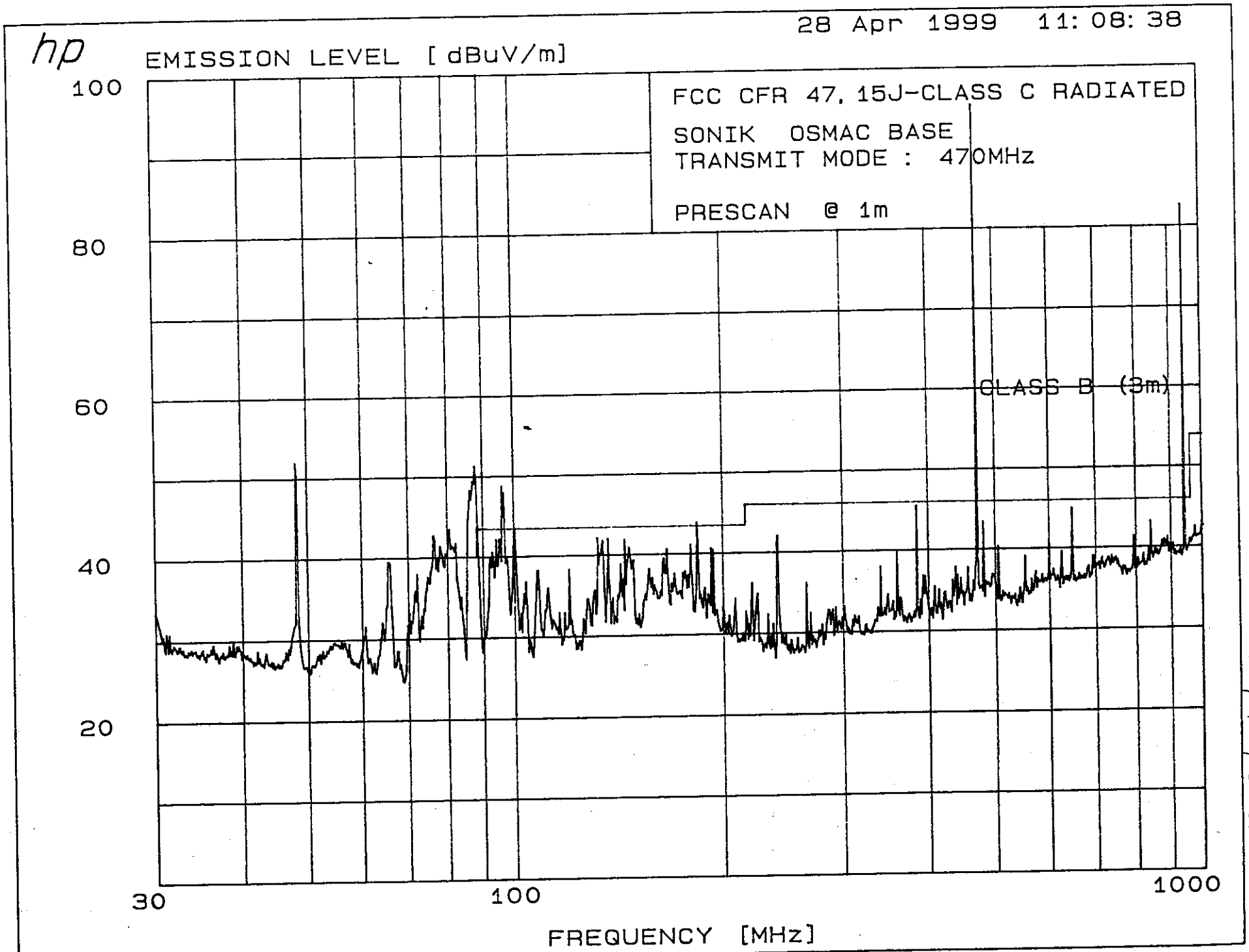
Power: + 12VDC | Temp. °C: | R.H.: % | Barometric Press: in. Hg | Frequency Range Requirement:

Test Description: FCC part 90 @ 3m TX Mode.

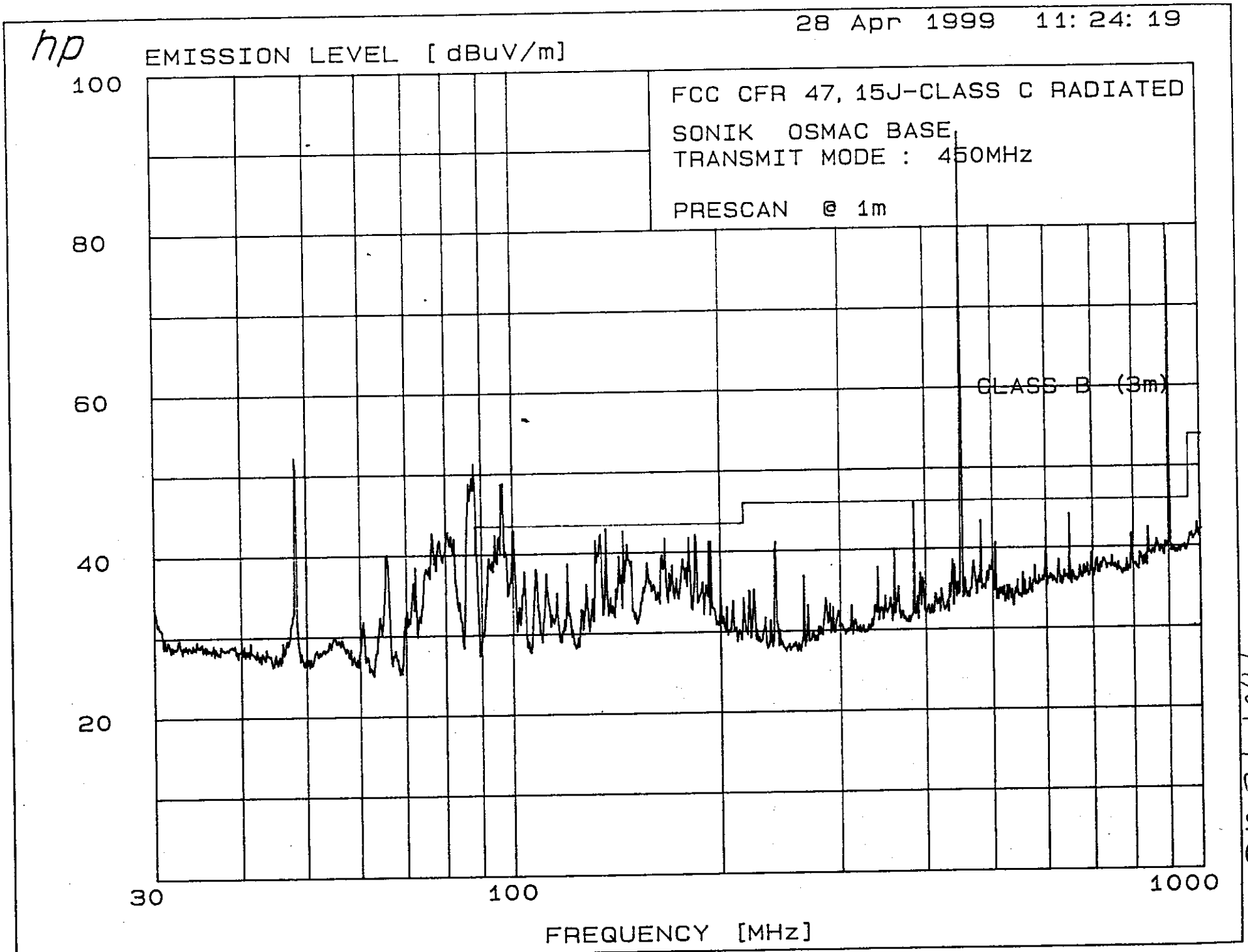
Frequency MHz	V Pol Peak	H Pol Peak	V Pol ~~Quasi Peak~~ AVG	H Pol ~~Quasi Peak~~ AVG	Amp dB	Ant Fact dB	Total Inter.	Spec. Level dBuV/m	Delta Spec. Level	Comments
~~1253.34~~	~~25.8~~	~~>8.1~~	21.7							Receive mode.
↳ nothing	else to	5GHz.								
470										TX Mode: 470 MHz
940										
1410	41.3	38.3	40.7			28.9	69.6			
1880	24.9	24.6	19.8	20.2		32.3	52.5			
2350	29.3	30.1	23.5	23.8		32.7	61.5			
2820	20.9	23.3	12.2	19.0		32.6	51.6			
3290	28.9	30.3	26.2	28.7		32.7	61.4			
3760	26.2	27.5	22.2	24.8		35.7	60.5			
4230	20.0	15.5	11.8			36.4	48.2			
4700	23.7	23.5	21.5			36.6	58.1			
			Q-Peak	Q-Peak						
470	56.4	60.5	56.7	60.7						
940	38.9	35.9	38.8							

fccemiss

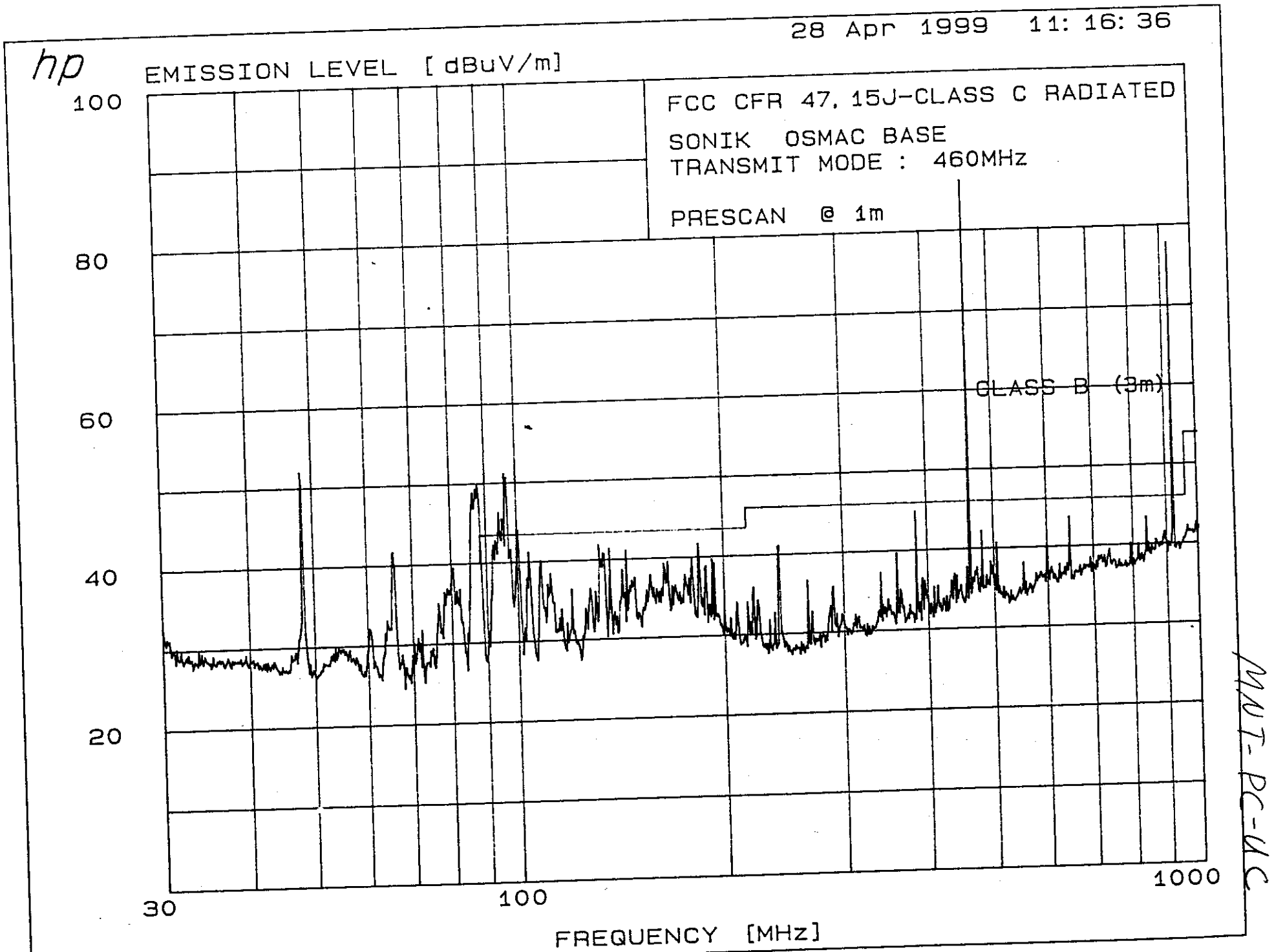
MUT-PC-UC


28 Apr 1999 11:08:38
hp
EMISSION LEVEL [dBuV/m]
FCC CFR 47, 15J-CLASS C RADIATED
SONIK OSMAC BASE
TRANSMIT MODE : 470MHz
PRESCAN @ 1m
CLASS B (3m)
100
80
60
40
20
30
100
1000
FREQUENCY [MHz]

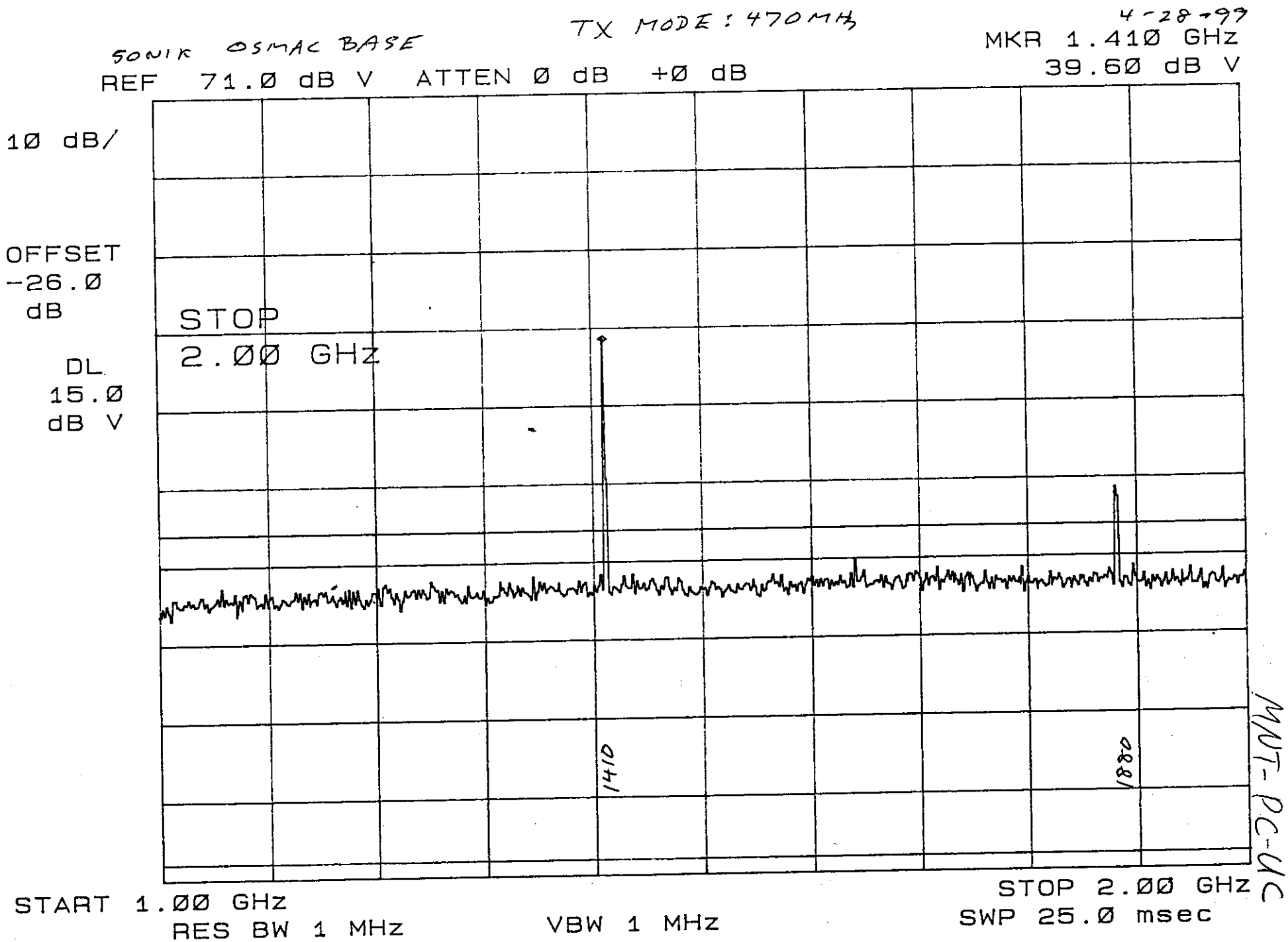
MNT-PC-UC


28 Apr 1999 11:24:19
hp
EMISSION LEVEL [dBuV/m]
FCC CFR 47, 15J-CLASS C RADIATED
SONIK OSMAC BASE
TRANSMIT MODE : 450MHz
PRESCAN @ 1m
CLASS B (3m)
100
80
60
40
20
30
100
1000
FREQUENCY [MHz]

MUT-PC-UC


28 Apr 1999 11:16:36
hp
EMISSION LEVEL [dBuV/m]
FCC CFR 47, 15J-CLASS C RADIATED
SONIK OSMAC BASE
TRANSMIT MODE : 460MHz
PRESCAN @ 1m
CLASS B (3m)
100
80
60
40
20
30
100
1000
FREQUENCY [MHz]

MUT-PC-UC


SONIK OSMAC BASE
TX MODE: 470MHz
4-28-99
REF 71.0 dB V ATTEN 0 dB +0 dB
MKR 1.410 GHz
39.60 dB V
10 dB/
OFFSET
-26.0
dB
DL
15.0
dB V
STOP
2.00 GHz
1410
1880
MUT-PC-UC
START 1.00 GHz
RES BW 1 MHz
VBW 1 MHz
STOP 2.00 GHz
SWP 25.0 msec

TX MODE : 450MHz

4-28-99

SONIK OSMAC Base

REF 71.0 dB V ATTEN 0 dB +0 dB

MKR 1.350 GHz
31.40 dB V

10 dB/

OFFSET
-26.0
dB

REF LEVEL
71.0 dB V

DL
15.0
dB V

1350.015

START 1.00 GHz
RES BW 1 MHz

VBW 1 MHz

STOP 2.00 GHz
SWP 25.0 msec

MUT- PC-UC

4-28-99

SONIK OSMAC Base

TX MODE : 460 MHz

REF 71.0 dB V ATTEN 0 dB +0 dB

MKR 1.380 0 GHz
26.30 dB V

10 dB/

OFFSET
-26.0
dB

DL
15.0
dB V

STOP
2.00 GHz

1380

1840

START 1.00 GHz
RES BW 1 MHz

VBW 1 MHz

STOP 2.00 GHz
SWP 25.0 msec

MUT-PC-4C

SONIK OSMAC Base TX MODE: 460MHz 4-28-99

REF 71.0 dB V ATTEN 0 dB +0 dB

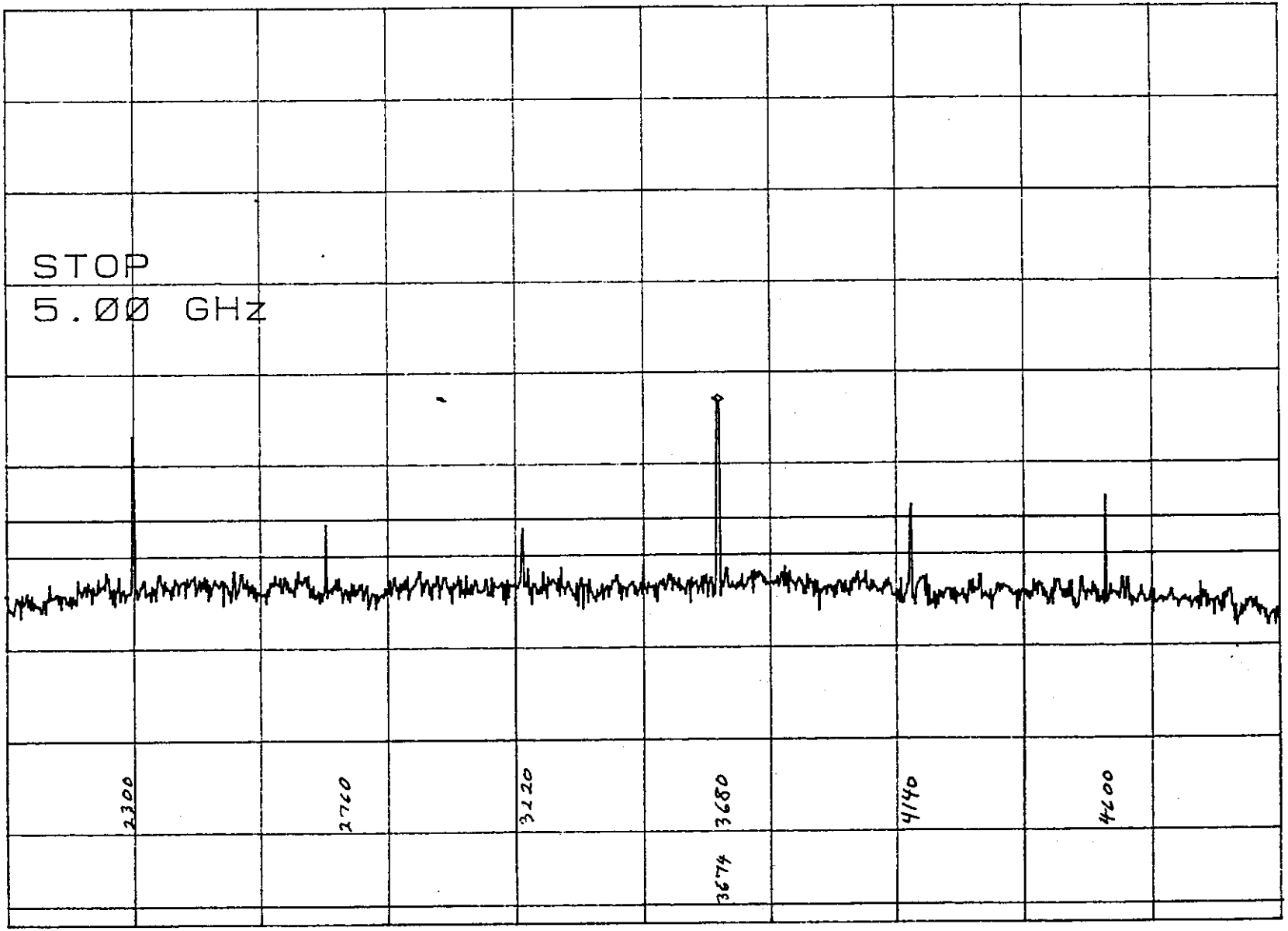
MKR 3.674 GHz
28.10 dB V

10 dB/

OFFSET
-26.0
dB

DL
15.0
dB V

STOP
5.00 GHz



START 2.00 GHz

STOP 5.00 GHz

RES BW 1 MHz VBW 1 MHz SWP 75.0 msec

MUT-PC-UC

4-28-99

TX MODE: 450 MHz

SONIK OSMAC Base

REF 71.0 dB V ATTEN 0 dB +0 dB

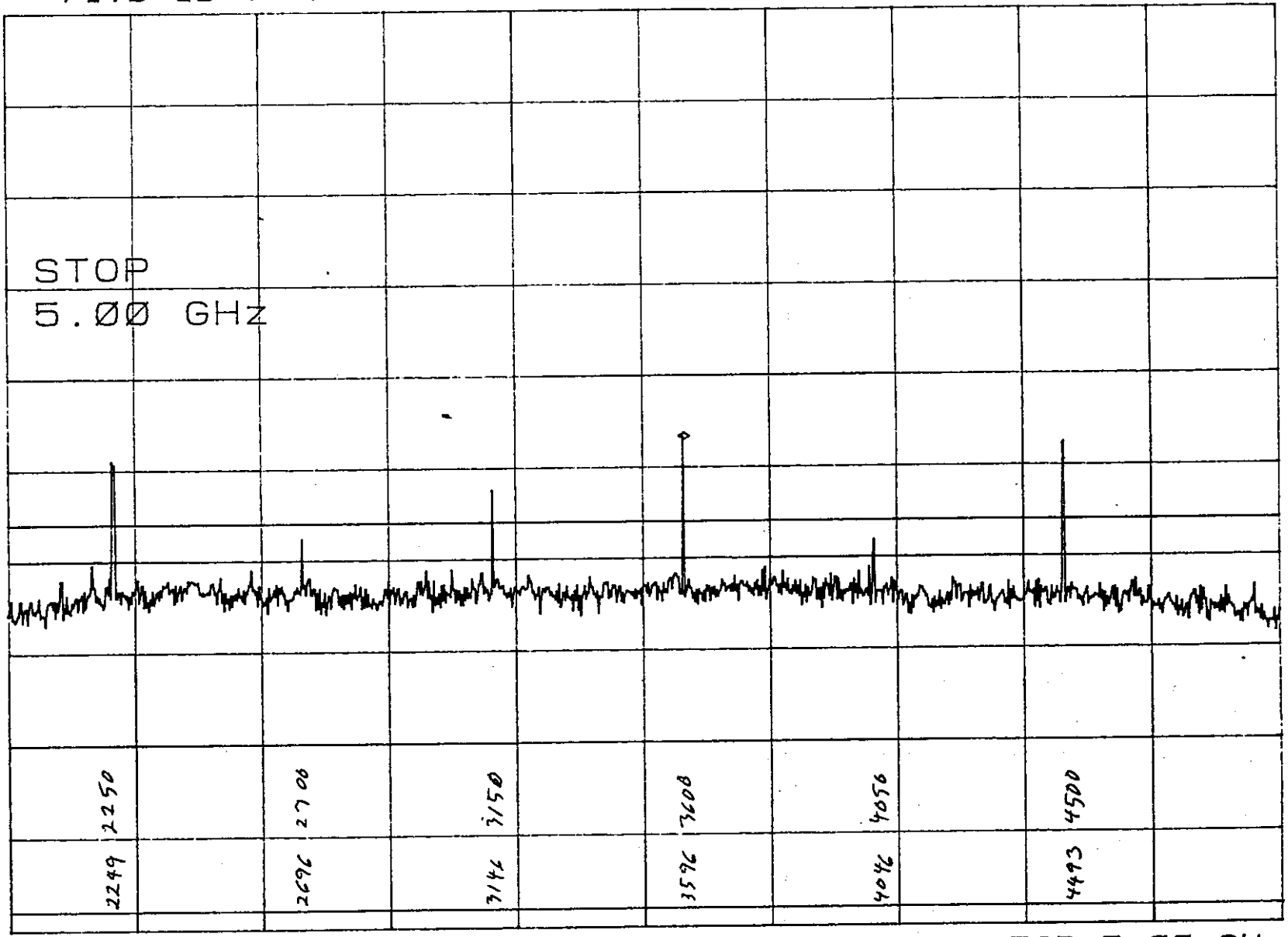
MKR 3.596 GHz
24.40 dB V

10 dB/

OFFSET
-26.0
dB

DL
15.0
dB V

STOP
5.00 GHz



START 2.00 GHz
RES BW 1 MHz

VBW 1 MHz

STOP 5.00 GHz
SWP 75.0 msec

MUT-PC-UC

4-28-99

TX MODE : 470 MHz

SONIK OSMAC Base