

TEST REPORT

TEST PROCEDURES AND TEST SITE DESCRIPTION

MEASUREMENT ITEMS		Section No.
1.	RF Output Power	2.1046
	DC Voltage & Current into Final Amplifying Device	2.1033 (c) (8)
2.	Modulation Characteristics (Audio Frequency Response)	2.1047
3.	Modulation Characteristics (Modulation Limiting)	2.1047
4.	Modulation Characteristics (Transient Response)	2.1047
5.	Occupied Bandwidth	2.1049
6.	Spurious & Harmonic Emission at Antenna Terminal	2.1051
7.	Field Strength of Spurious & Harmonic Radiation	2.1053
8.	Frequency Stability (Frequency vs. Temperature)	2.1055
9.	Frequency Stability (Frequency vs. Voltage)	2.1055

NOTE: List of measurement equipment and test site description are included in this exhibit.

1. RF Output Power &
DC Voltage & Current into Final Amplifying Device

JRH 2.1046
~~2.985~~
~~2.983(d)(5)~~
2.1033(c)(8)

a) RF Power Output

The unit was tuned-up in accordance with the alignment procedure stated in the EXHIBIT-6, and was loaded into a 50 ohm resistive termination. Unmodulated RF output power of the unit was measured by RF power meter.

FCC limits: 4 Watts

Test Results: Refer to TEST DATA.

b) DC Voltage & Current into Final Amplifying Device

To measure the DC Voltage and Current into Final Amplifying Device, the measuring equipment were connected to the actual P.C.Board of the unit.

FCC limits: Not specified

Test Results: Refer to TEST DATA.

2. Modulation Characteristics (Audio Frequency Response)

JRH 2.1047
~~2.987~~

An audio signal generator was connected to the microphone input circuit of the unit. An audio signal was supplied to obtain 50% modulation at the maximum audio frequency response of the unit, and this point was taken as the 0 dB reference level. The modulating frequency was varied from 100 Hz to 10 kHz and the level necessary to maintain a constant 50% modulation was recorded.

Test Results: Refer to TEST DATA.

3. Modulation Characteristics (Modulation Limiting)

JRH 2.1047
~~2.987~~

Means for applying audio signal is as per the Measurement Procedure for Audio Frequency Response. With modulation frequencies of 400, 1000 and 2500 Hz respectively, the modulation response was measured up to the maximum modulation for each audio signal respectively. The modulation percentage was read on the wave form which is displayed on the oscilloscope.

Test Results: Refer to TEST DATA.

4. Modulation Characteristics (Transient Response)

JKH 2.1047
~~2.987~~

The unit was modulated with a 2500 Hz tone at an input level 16dB greater than that required 50% modulation. And this signal was pulsed, without switching transients, at approximately one pulse per sec. and with a pulse length of approx. 1/2 sec. This tone burst signal was generated with the function generator.

The spectrum analyzer was tuned to the desired channel and set for the measurement as in the case of measuring the Occupied Bandwidth. Then, the spectrum analyzer was tuned to either of the two channels, adjacent (+/- 10 kHz) to the desired channel, then the spectrum analyzer was set to the time domain and modulation transient was observed.

FCC limits: The transient response not attenuated at a level of at least 33 dB with respect to the unmodulated carrier level was measured.

Test Results: Refer to TEST DATA.

5. Occupied Bandwidth

~~2.989~~

JKH 2.1049

The spectrum of the modulated carrier was monitored by a panoramic method capable of 60dB amplitude range. The unit was modulated with a 2500 Hz audio signal at an input level 16dB above that required for 50% of maximum system deviation.

FCC limits: a) -25dB (50 - 100% of assigned frequency)
b) -35dB (100 - 250% of assigned frequency)
c) -60dB (more than 250% of assigned frequency)

Test Results: Refer to TEST DATA.

6. Spurious & Harmonic Emission at Antenna Terminal

JKH 2.1051
~~2.991~~

The unit was modulated with a 2500 Hz tone at an input level 16dB greater than that required 50% modulation. The spectrum was scanned from the lowest frequency generated in the unit to the tenth harmonic of the carrier.

FCC limits: -60 dB

Test Results: Refer to TEST DATA.

7. Field Strength of Spurious & Harmonic Radiation

GRH 2.993
2.1053

Measurement Procedure & Test Site Description:

Field strength measurement of radiated spurious emissions were made on a 3 meter range maintained by Uniden Corporation in Japan. Complete description and measurement data of this test site have been placed on file with the Commission. The equipment was scanned for radiated emissions in a scheduled enclosure prior to open field testing.

For each spurious or harmonic frequency, the antenna was raised and lowered to obtain a maximum reading on the Spectrum Analyzer with antenna horizontally polarized. Then the turntable, on which the equipment under test was placed, was rotated a minimum of 360 degree to further increase the reading on the Spectrum Analyzer. This procedure was repeated with the antenna vertically polarized.

Test Condition:

The equipment was placed in its normal operating position on a turntable approximately 1 meter in height, with a normal power lead and microphone attached. The non-radiative dummy load was directly connected to the output terminal. The power lead was extended approximately vertically down to an external power supply located below the center of the turntable and as near to the floor of the test area as possible. Excess power lead was handled near the power supply terminals. The microphone cable was extended vertically to the maximum length of the lead above the point where its connector was attached to the equipment.

FCC limits: -60 dB

Test Results: Refer to TEST DATA.

8. Frequency Stability (Frequency vs. Temperature)

GRH 2.1055
2.995

Frequency measurements are made at 10 deg. C intervals starting at -30 deg. C and ending +50 deg. C allowing at least two hours at each temperature for stabilization.

Before the measurement, the unit is operated in the transmitting condition for 10 second after 15 minutes in standby condition.

Measurement data showing variation in transmitter output frequency from a start and elapsed time necessary for the frequency to stabilize are made at each temperature level.

FCC limits: $\pm 0.005\%$
Test Results: Refer to TEST DATA.

9. Frequency Stability (Frequency vs. Voltage)

~~2.995~~
2.1055

Frequency measurement was performed at the extremes of throughout the range 85% and 115% of the nominal voltage.

The frequency of the unit was measured by extracting a sample of the carrier and measuring its center frequency by equipment having a degree accuracy at least 10 times that of the minimum to be measured.

FCC limits: $\pm 0.005\%$
Test Results: Refer to TEST DATA.

1. RF Output Power & DC Voltage and Current into Final Amplifying Device

1-1 RF OUTPUT POWER

MEASURED FREQUENCY	OUTPUT POWER
26.965 MHz (CH 1)	3.85 Watts
27.175 MHz (CH 18)	3.92 Watts
27.405 MHz (CH 40)	3.82 Watts

1-2 DC VOLTAGE & CURRENT INTO FINAL AMPLIFYING DEVICE

MEASURED FREQUENCY	OUTPUT POWER	TX FINAL TRANSISTOR	
		COLLECTOR VOLTAGE	COLLECTOR CURRENT
26.965 MHz (CH 1)	3.85 Watts	11.9 V	0.68A
27.175 MHz (CH 18)	3.92 Watts	11.9 V	0.68A
27.405 MHz (CH 40)	3.82 Watts	11.9 V	0.68 A

AF RESPONSE

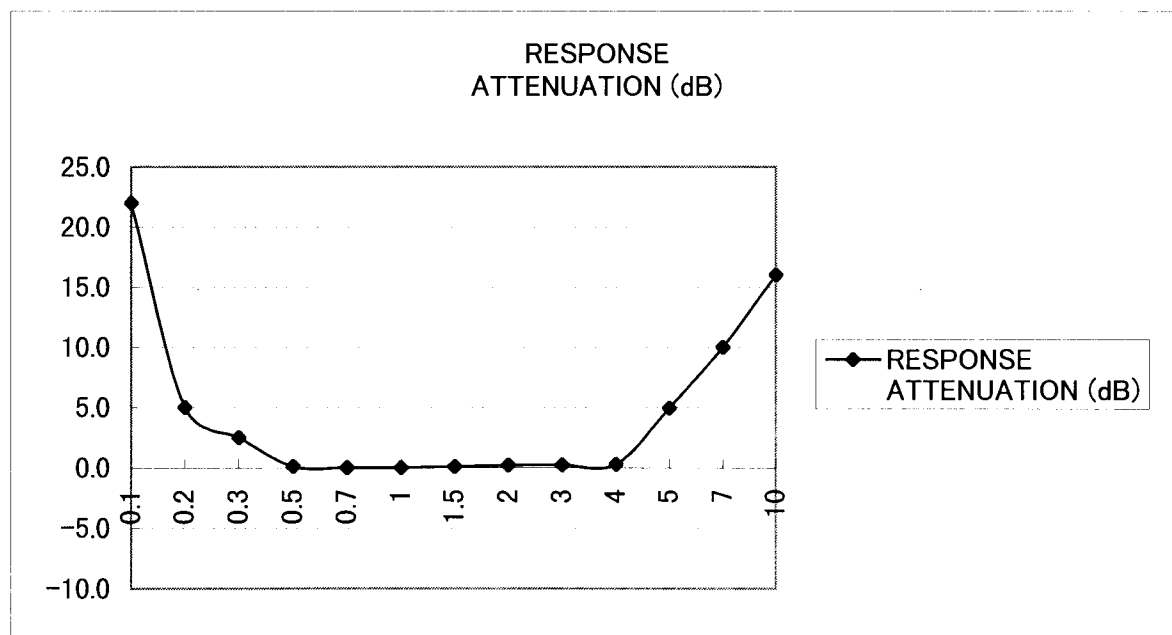
2. MODULATION CHARACTERISTICS (AUDIO FREQUENCY RESPONSE)

2.987

CARRIER FREQUENCY: 27.1750 MHz

OUTPUT POWER: 3.92 WATTS

AUDIO FREQUENCY (kHz)	RESPONSE ATTENUATION (dB)
0.1	22.0
0.2	5.0
0.3	2.5
0.5	0.1
0.7	0.0
1	0.0
1.5	0.1
2	0.2
3	0.3
4	0.3
5	5.0
7	10.0
10	16.0



MOD LIMITING

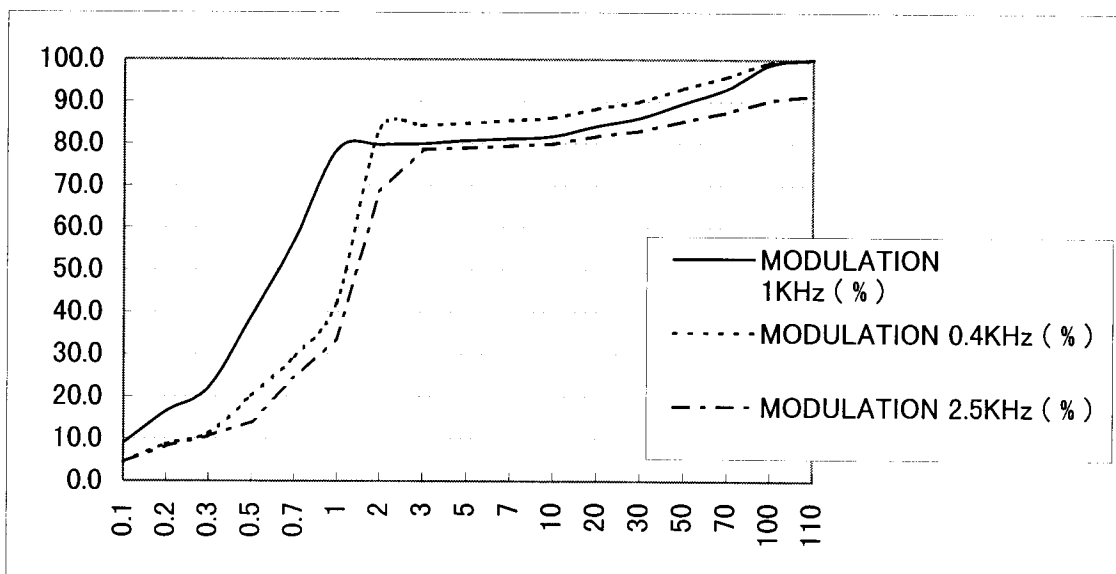
3. MODULATION CHARACTERISTICS (MODULATION LIMITING)

2.987

CARRIER FREQUENCY: 27.185 MHz

OUTPUT POWER: 3.92 WATTS

AUDIO INPUT LEVEL	MODULATION 1KHz	MODULATION 0.4KHz	MODULATION 2.5KHz
(mV)	(%)	(%)	(%)
0.1	8.9	4.4	4.3
0.2	16.4	8.6	8.1
0.3	22.0	11.2	10.5
0.5	39.0	20.0	13.8
0.7	56.9	29.3	24.2
1	78.5	42.0	33.7
2	79.6	83.5	68.5
3	79.9	84.2	78.5
5	80.6	84.7	78.9
7	81.1	85.4	79.3
10	81.7	86.1	79.9
20	84.1	88.2	81.7
30	86.1	90.0	83.0
50	89.6	93.1	85.3
70	93.0	95.8	87.5
100	98.7	99.2	90.3
110	100.0	99.8	91.4



4. MODULATION TRANSIENT RESPONSE

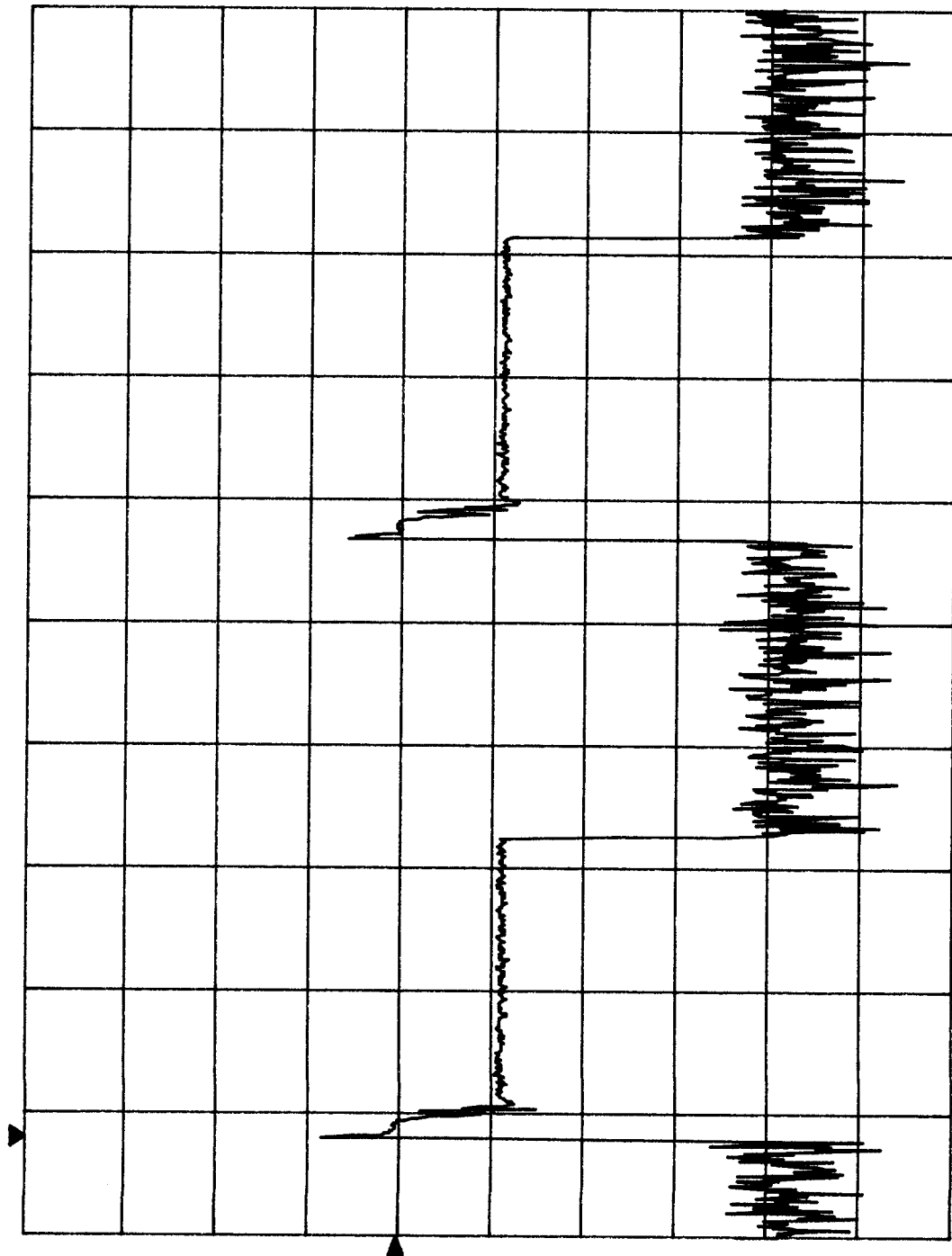
2.987

See attached graphs.

Tue 1998 Dec 1 14:22

REF -21.7 dBm
10 dB/

A_Write

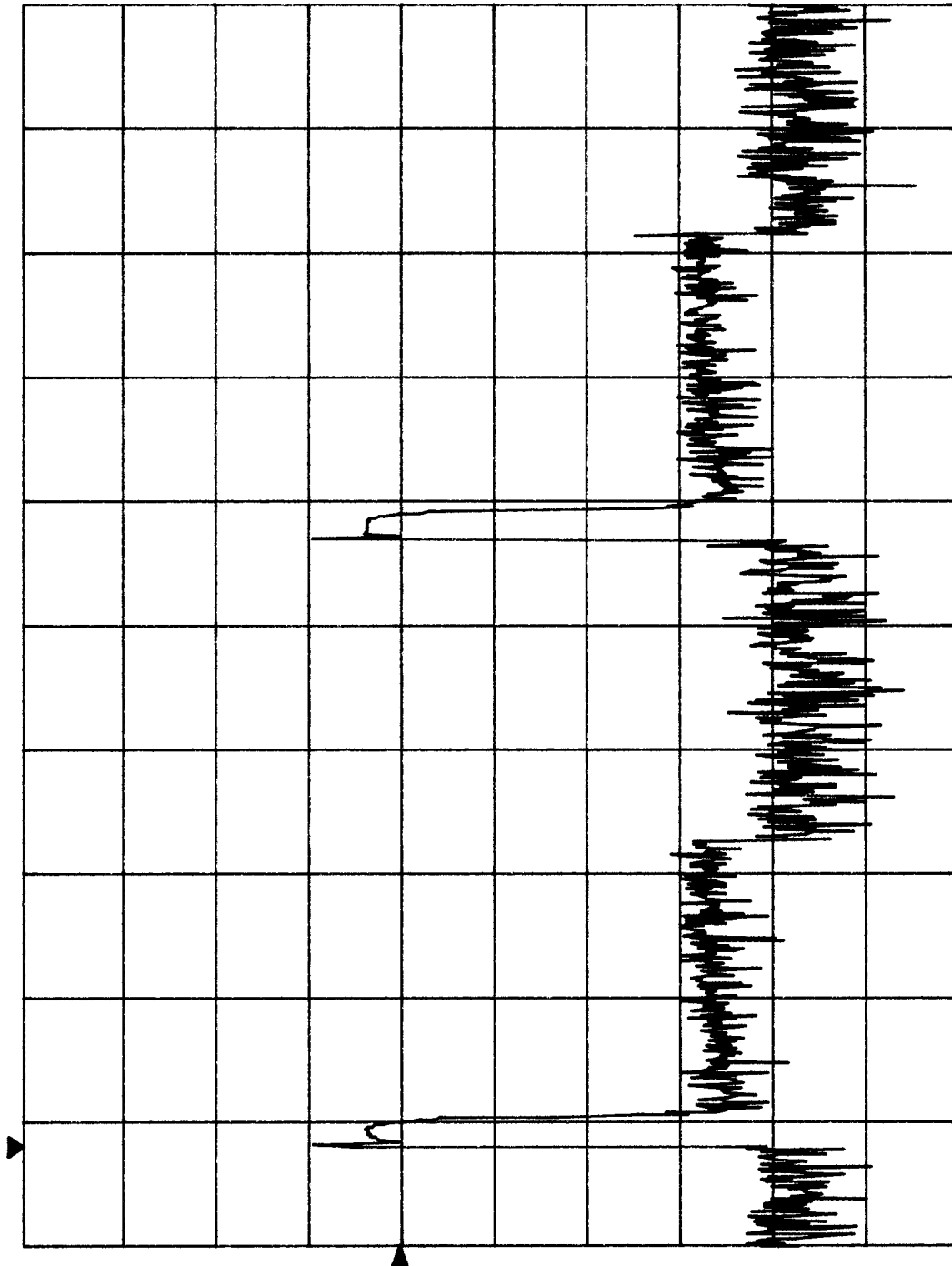


CENTER 26.955000 MHz
*RBW 300 Hz *VBW 10 kHz *SMP 2.0 s
SPAN 0 Hz ATT 10 dB

1.1
-10K

Tue 1998 Dec 1 14:20

REF -21.7 dBm A_Write
10 dB/



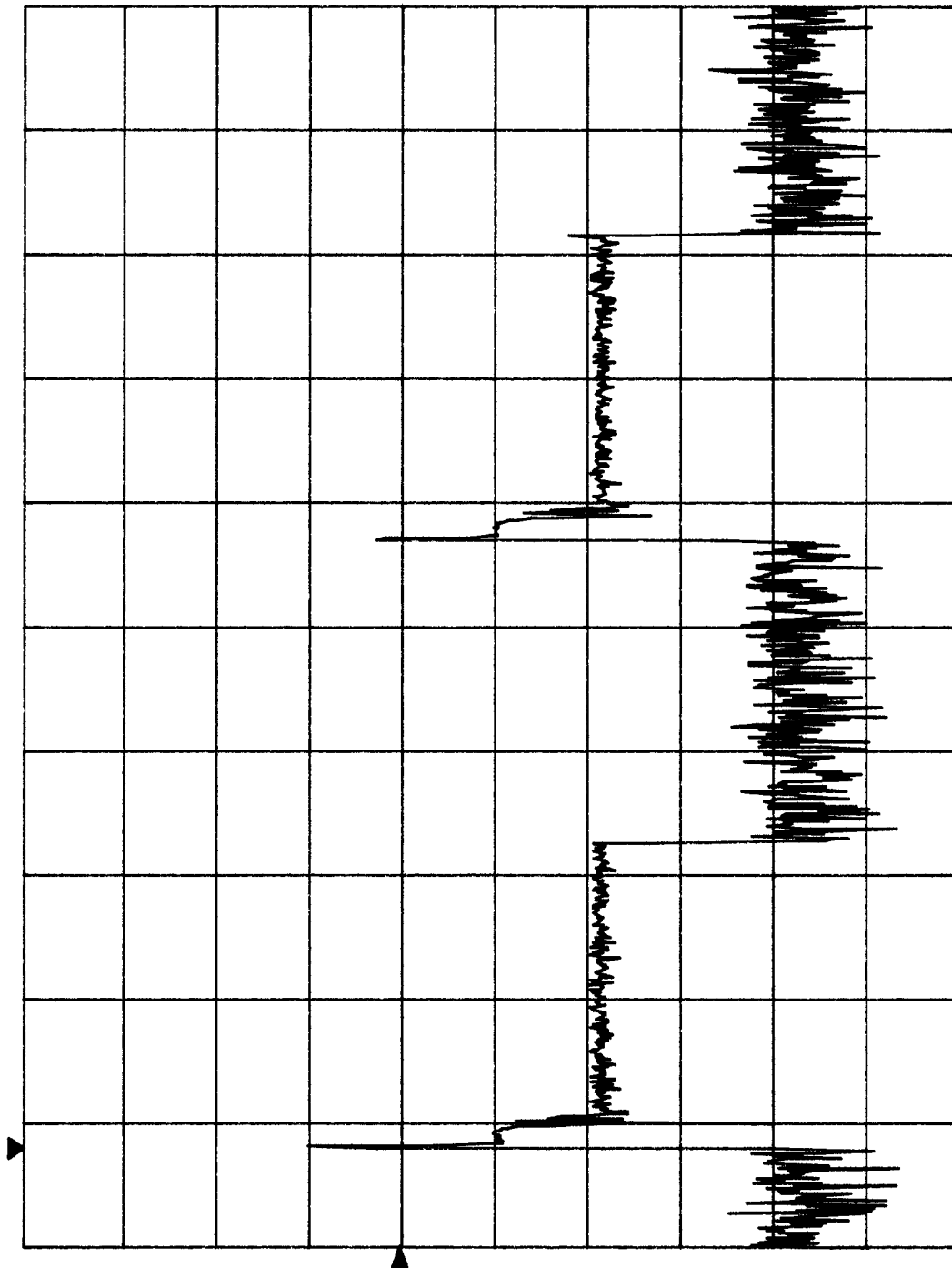
CENTER 26.975000 MHz SPAN 0 Hz
*RBW 300 Hz *VBW 10 kHz ATT 10 dB

2/6

1.0H
+1.0K

Tue 1998 Dec 1 14: 14

REF -21.7 dBm A_Write
10 dB/



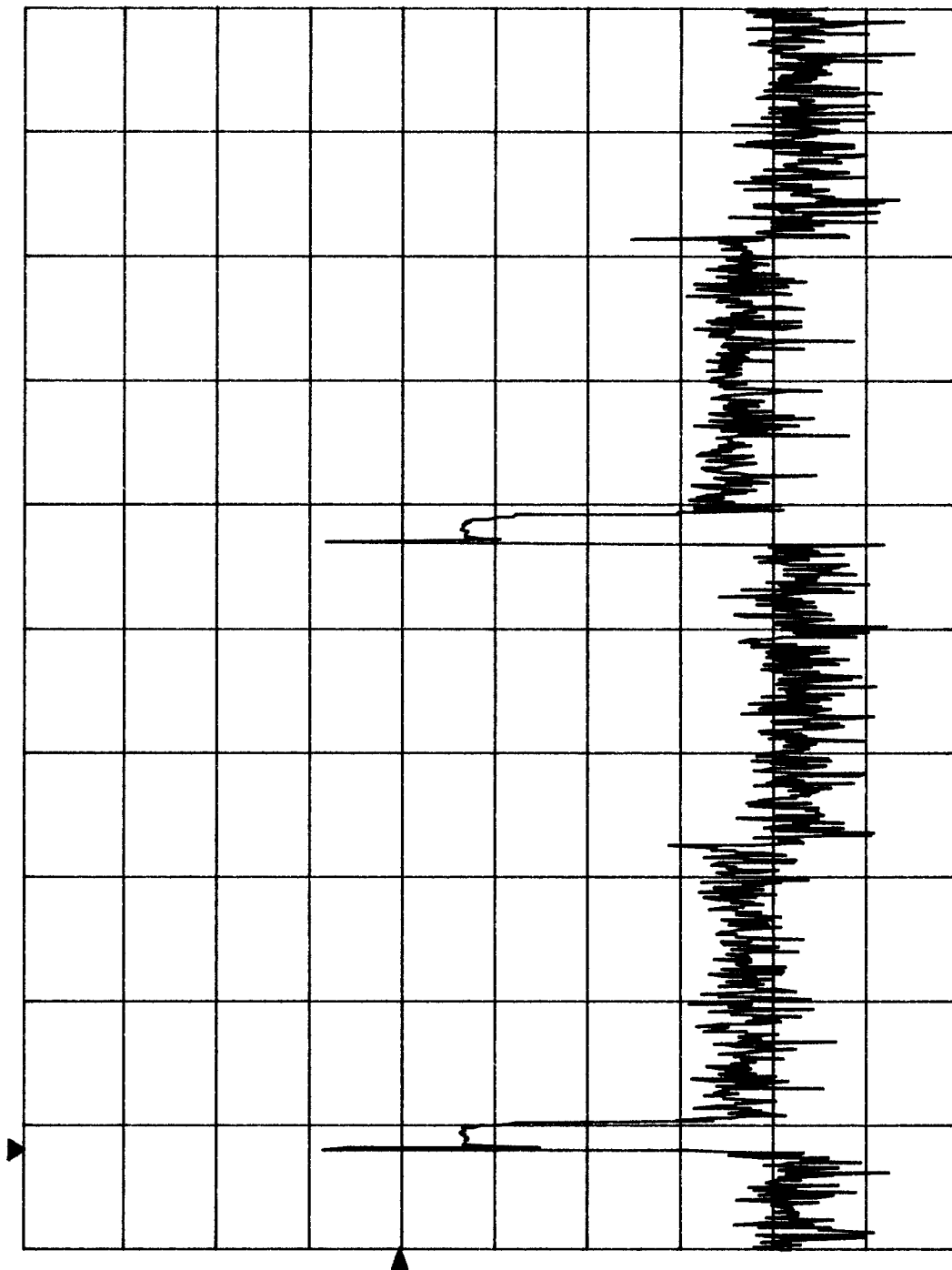
CENTER 27.165200 MHz
*RBW 300 Hz *VBW 10 kHz *SWP 2.0 s SPAN 0 Hz
ATT 10 dB

3/6

180H
-10K

Tue 1998 Dec 1 14:17

REF -21.7 dBm A_Write
10 dB/



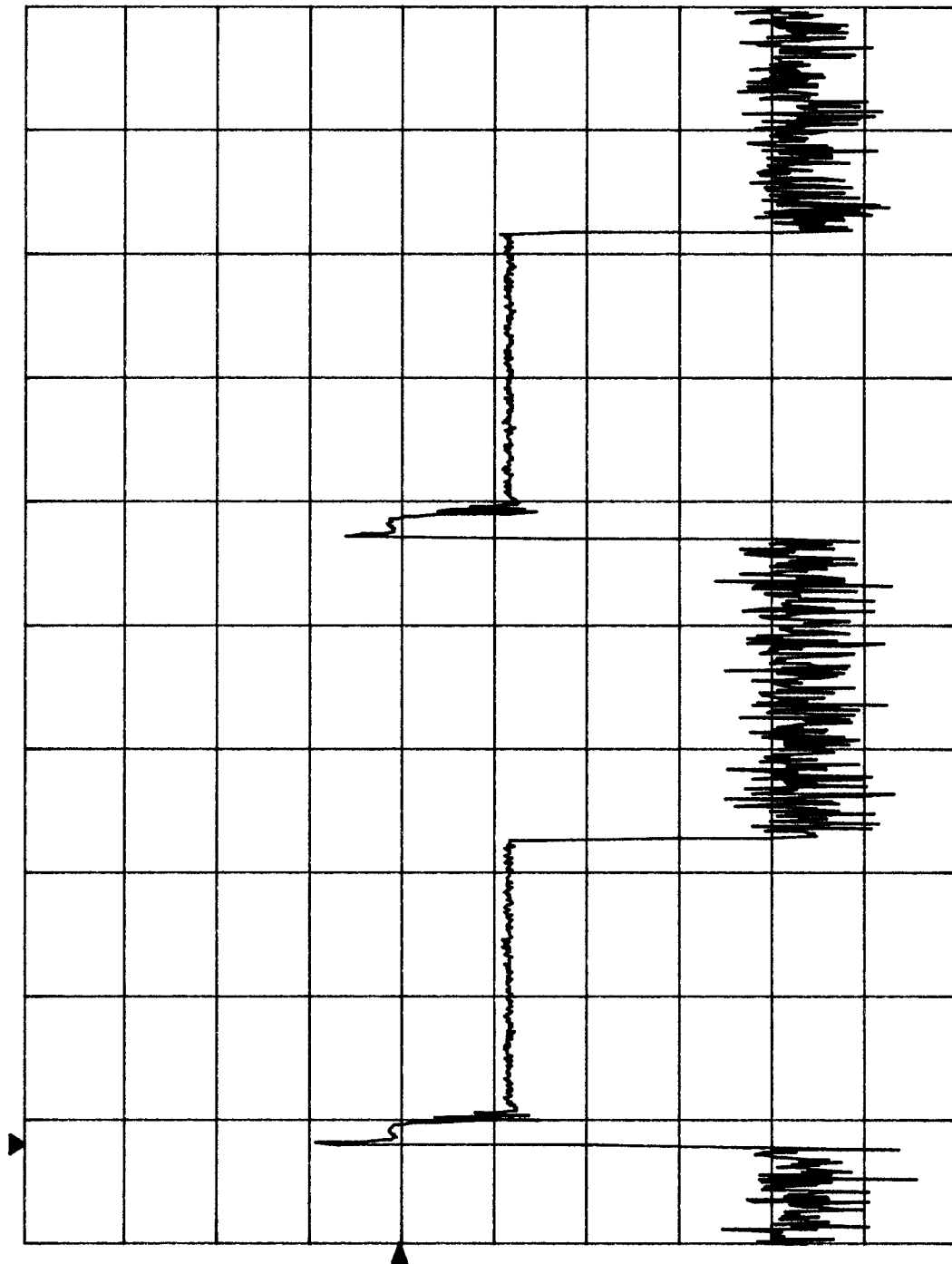
CENTER 27.185200 MHz SPAN 0 Hz
*RBW 300 Hz *VBW 10 kHz ATT 10 dB *SWP 2.0 s

4/6

1804
+10k

Tue 1998 Dec 1 14: 09

REF -21.7 dBm A_Write
10 dB/



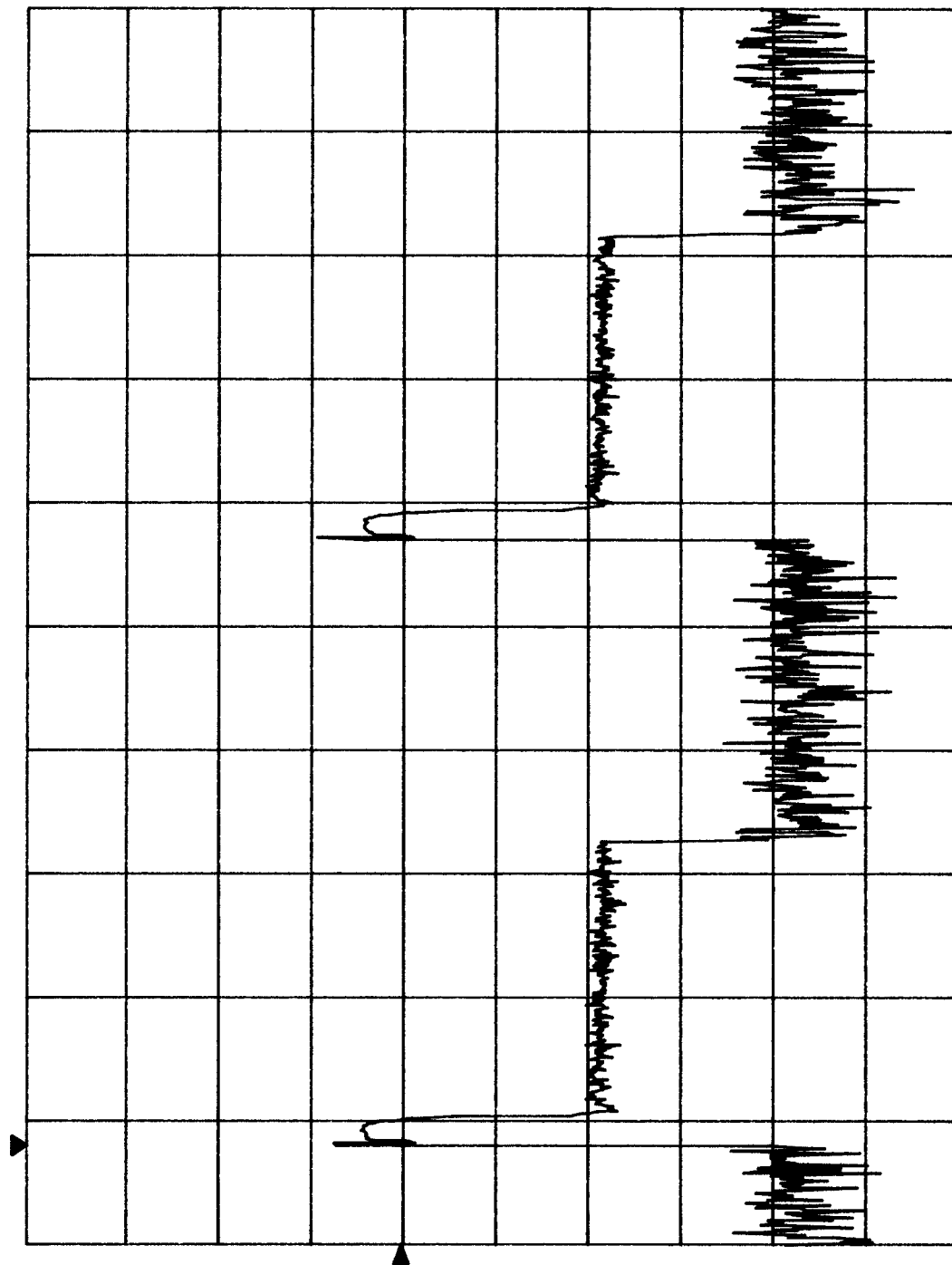
CENTER 27.395000 MHz SPAN 0 Hz
*RBW 300 Hz *VBW 10 kHz *SWP 2.0 s ATT 10 dB

5/6

400M -10K

Tue 1998 Dec 1 14:12

REF -21.7 dBm A_Write
10 dB/



CENTER 27.415000 MHz SPAN 0 Hz
*RBW 300 Hz *VBW 10 kHz *SWP 2.0 s ATT 10 dB

6/6

400H
+10K

OBW

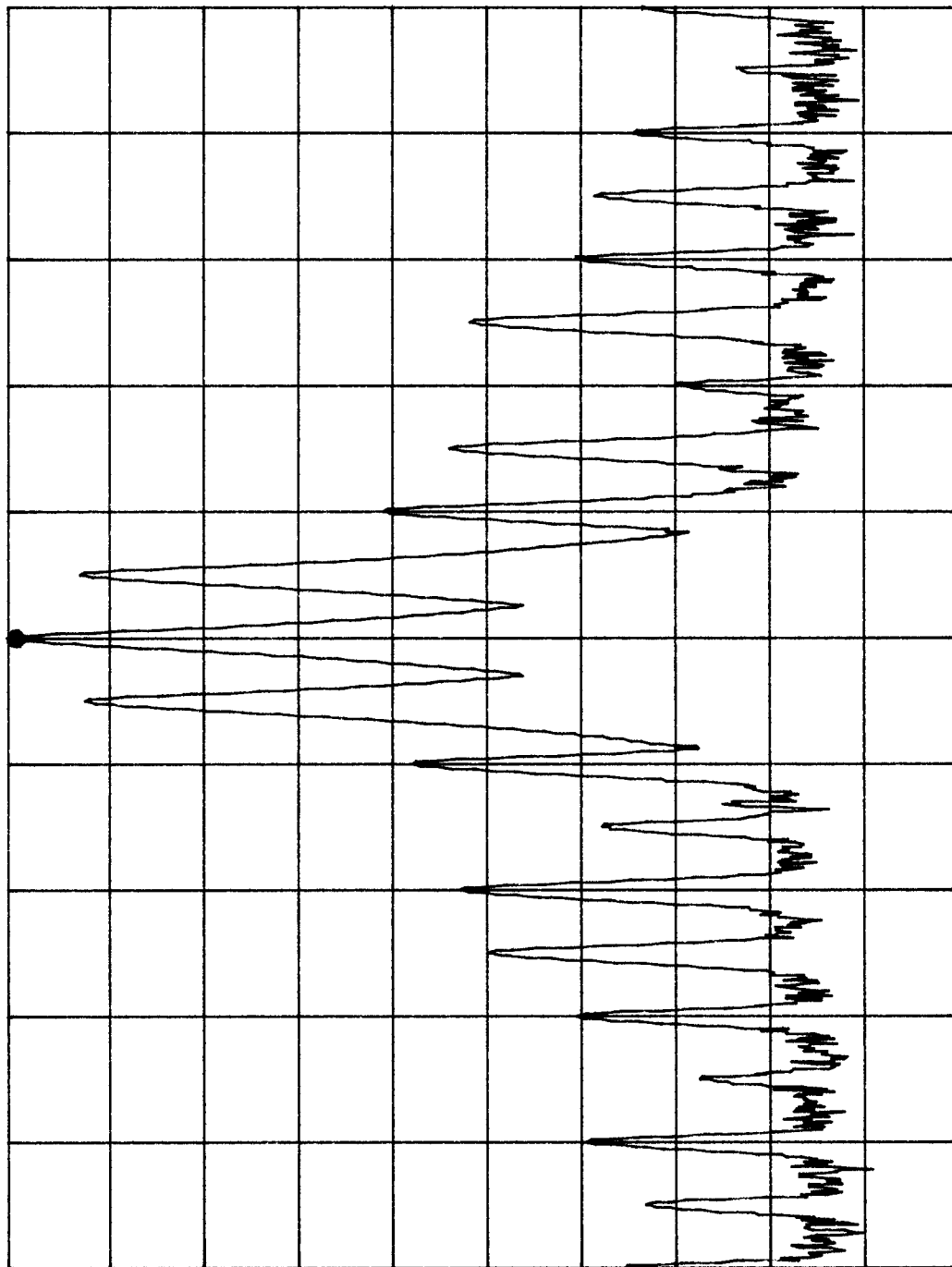
data

5. OCCUPIED BANDWIDTH

2.989

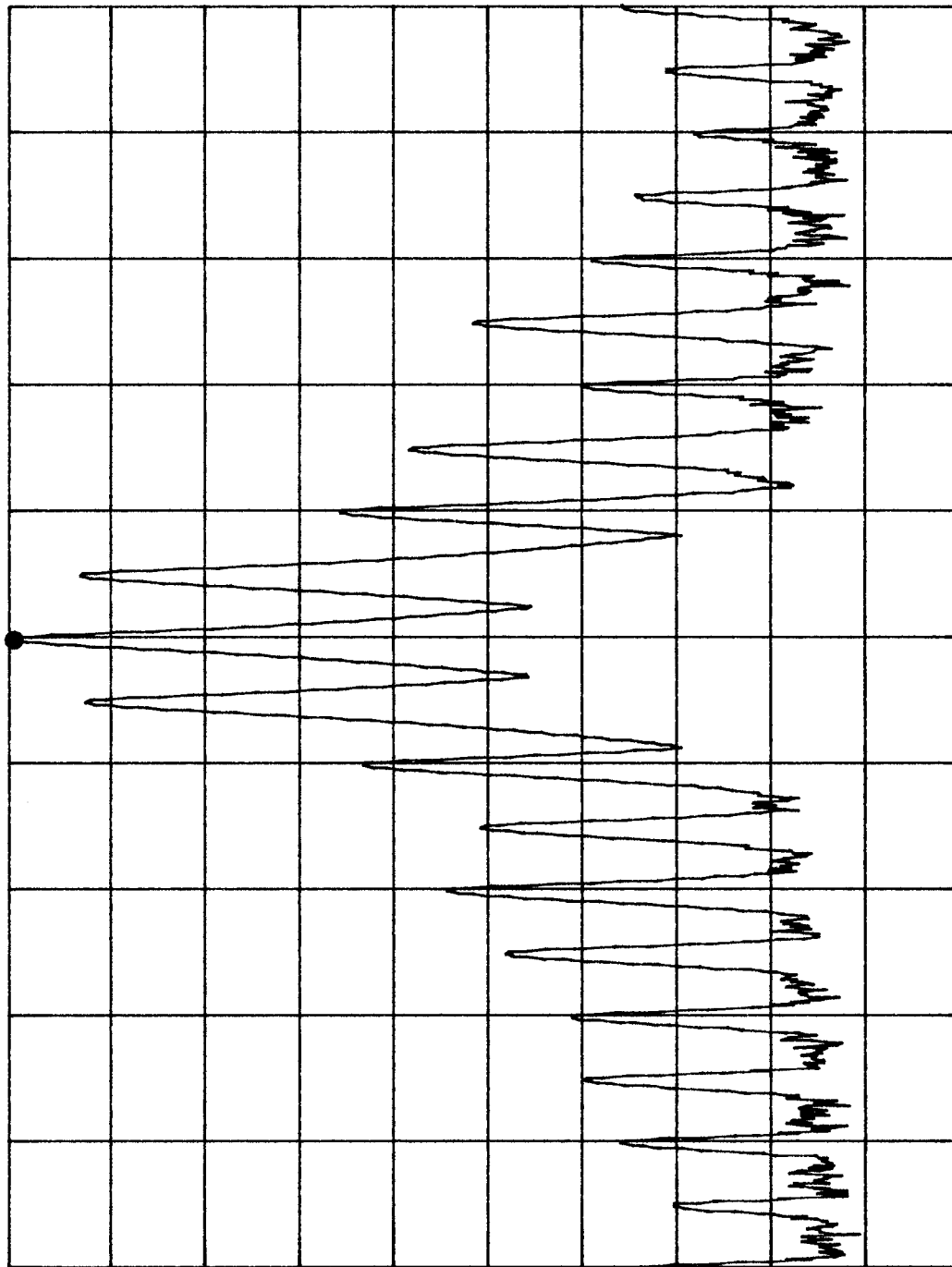
See attached graphs.

REF -21.0 dBm A_View B_Blank MKR 26.96490 MHz Tue 1998 Dec 1 13:38
10 dB/ -21.65 dBm



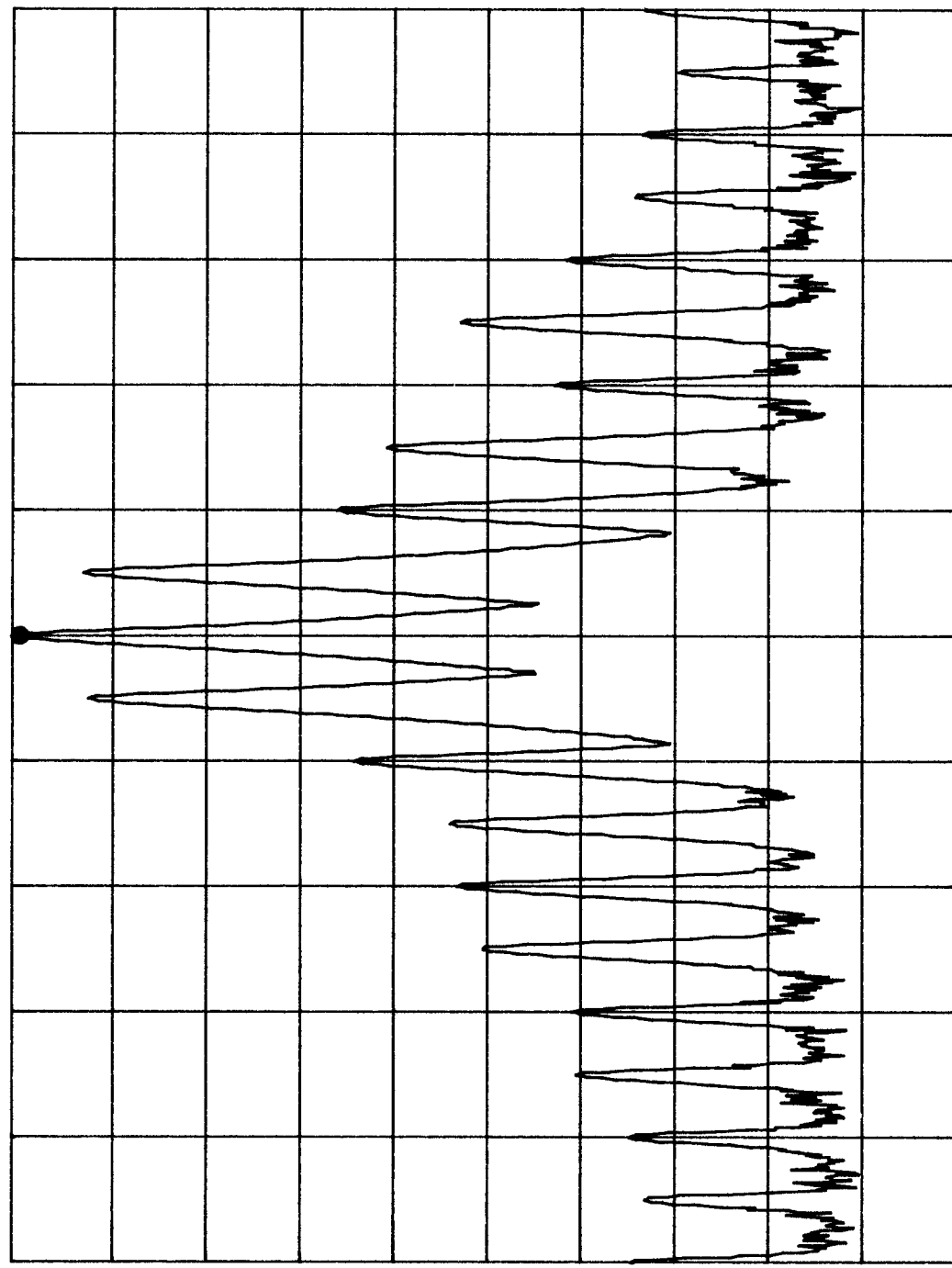
CENTER 26.96490 MHz SPAN 50.0 kHz
*RBW 300 Hz *VBW 1 kHz SWP 1.2 s ATT 10 dB

REF -21.0 dBm A_View B_Blank MKR 27.17495 MHz Tue 1998 Dec 1 13:35
10 dB/ -21.52 dBm



CENTER 27.17500 MHz SPAN 50.0 kHz
*RBW 300 Hz *VBW 1 kHz SWP 1.2 s ATT 10 dB

REF -21.0 dBm 10 dB/ Tue 1998 Dec 1 13:41
A_View B_Blank MKR 27.40490 MHz
-21.81 dBm



CENTER 27.40490 MHz SPAN 50.0 kHz
*RBW 300 Hz *VBW 1 kHz SWP 1.2 s ATT 10 dB

6. SPURIOUS & HARMONICS EMISSION AT ANTENNA TERMINAL**2.991**

See attached graphs.

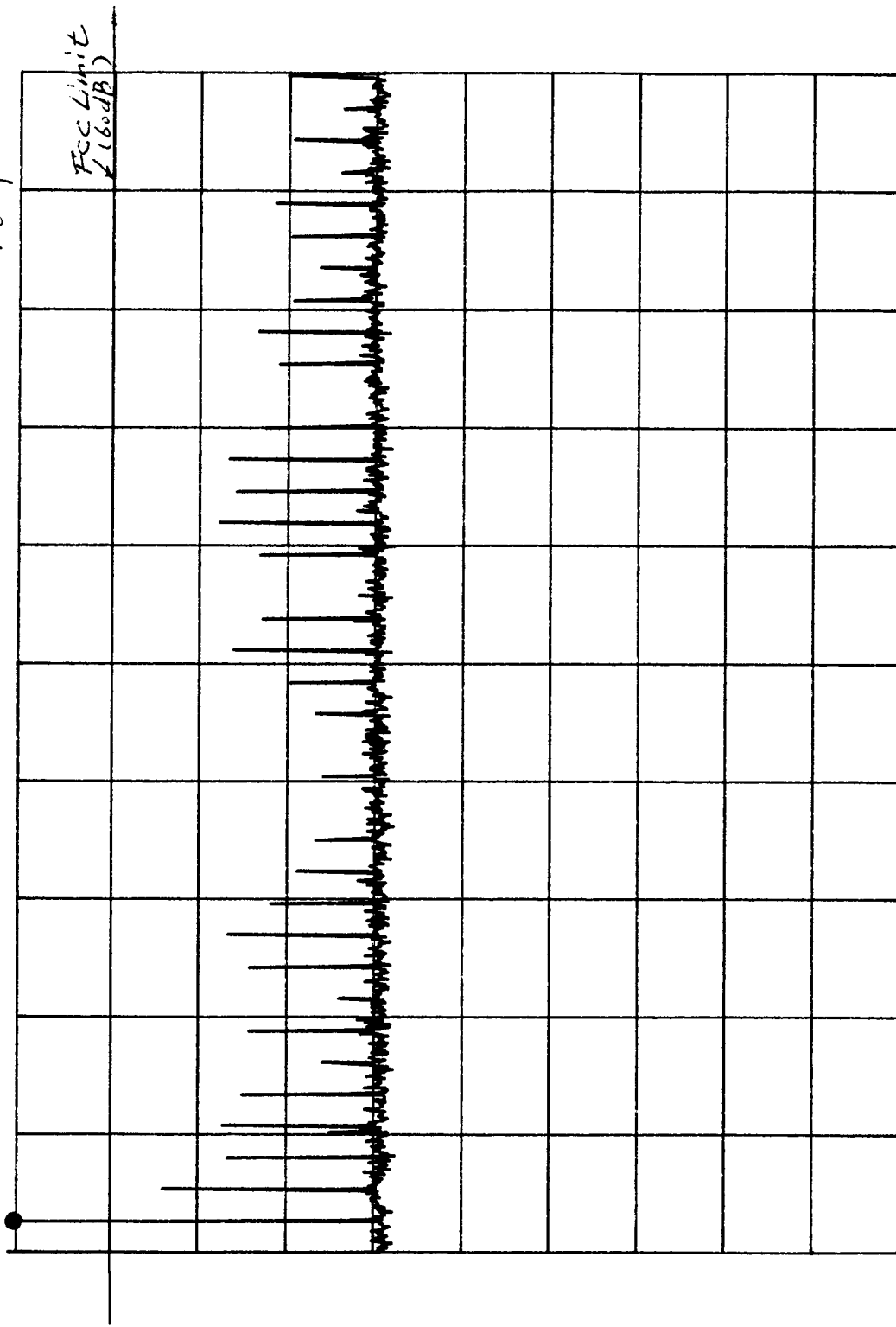
Tue 1998 Dec 1 14:51

REF -43.6 dBm
10 dB/

A_View

B_Blank MKR 27 MHz
-43.29 dBm

101-



CENTER 500 MHz
*RBW 30 kHz

VBW 30 kHz

SWP 2.3 s

SPAN 1.000 GHz
ATT 10 dB

101-

Tue 1998 Dec 1 14: 49

REF -43.6 dBm

A_View

B_Blank

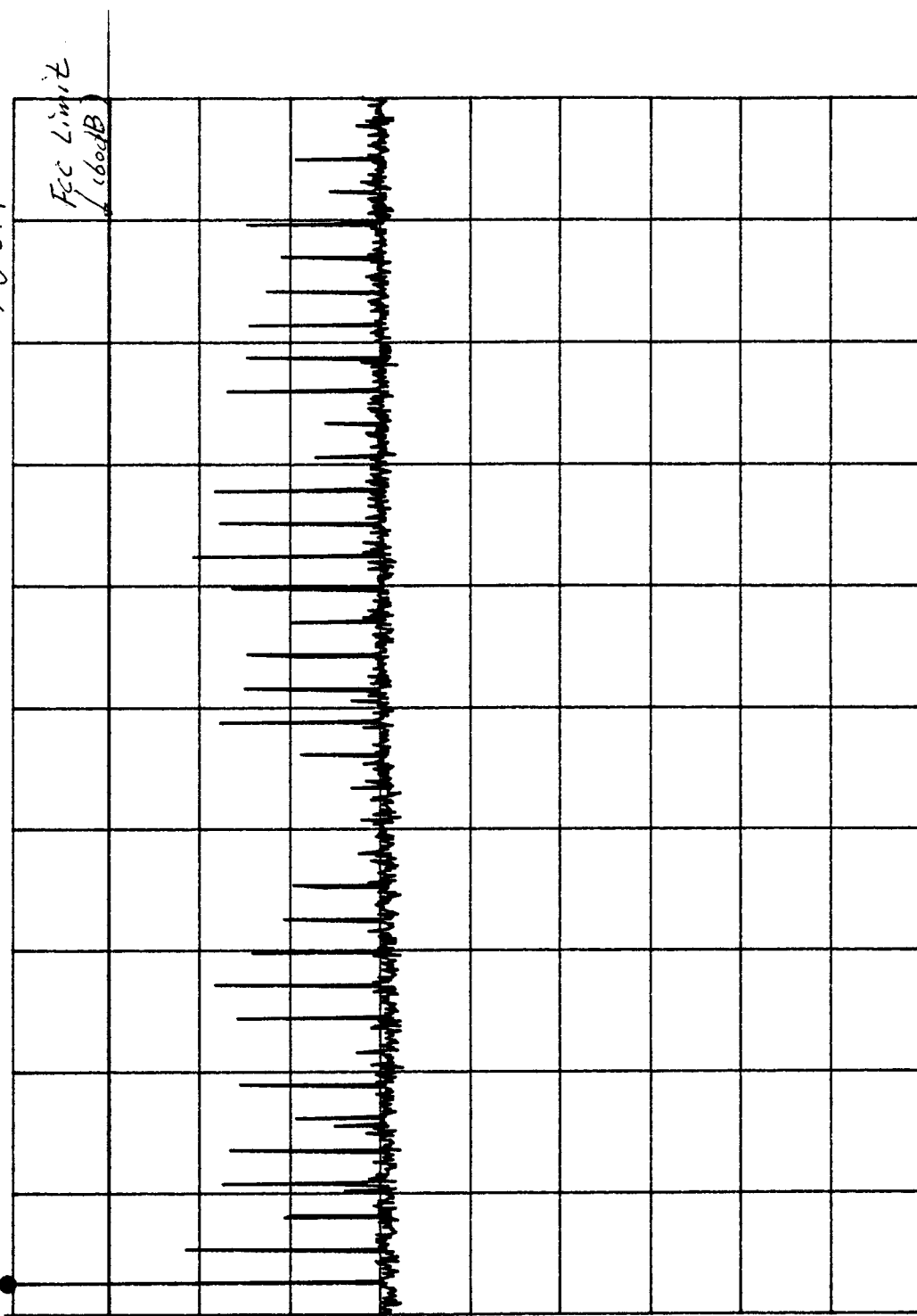
MKR

27 MHz

10 dB/

-42.90 dBm

18CH



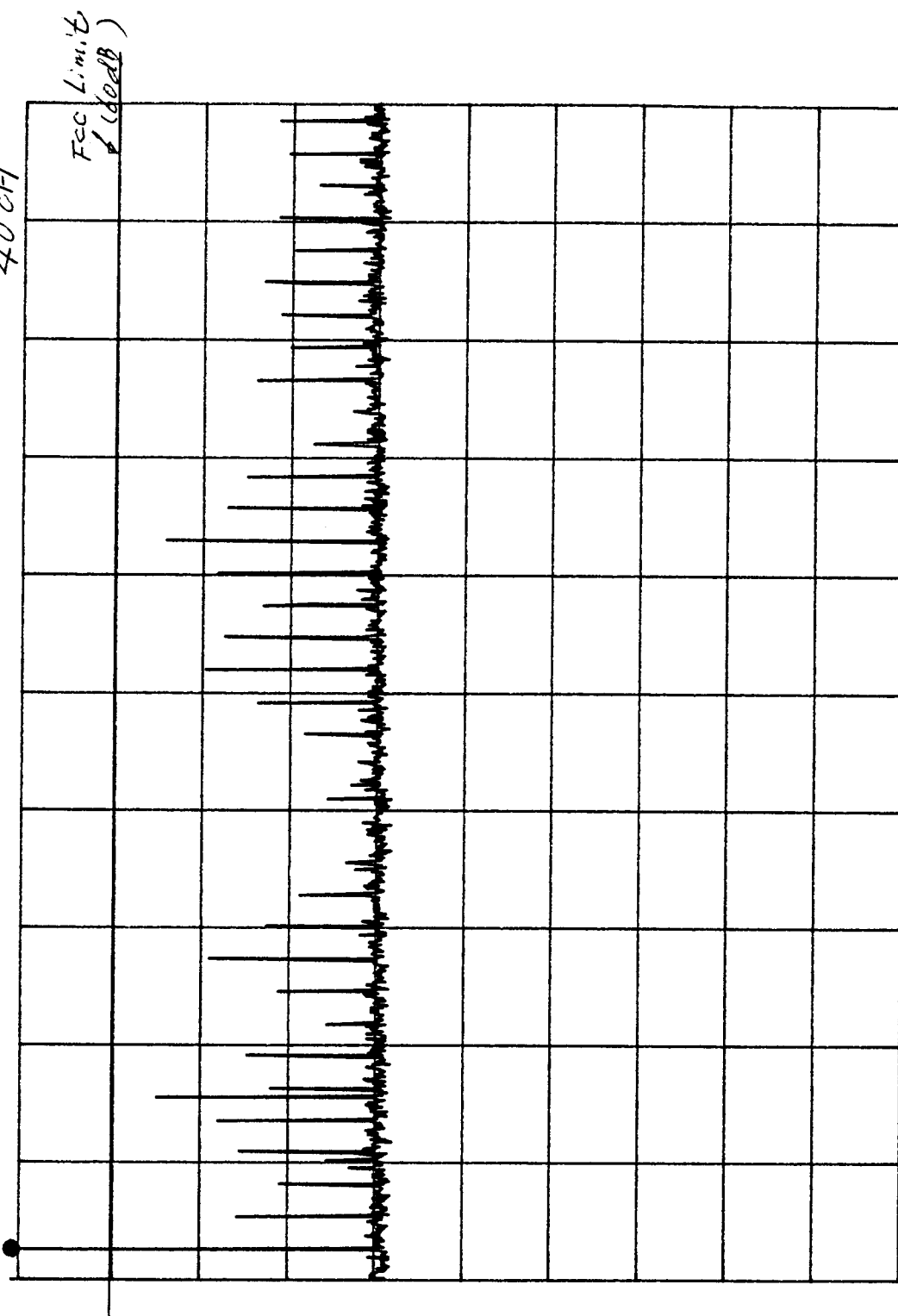
CENTER 500 MHz
*RBW 30 kHz
VBW 30 kHz
SWP 2.3 s
SPAN 1.000 GHz
ATT 10 dB

Tue 1998 Dec 1 14:54

REF -43.6 dBm
10 dB/

Channel	Frequency	Power
A_View	B_Blank	MKR 27 MHz
		-42.52 dBm

40 ct-1



CENTER 500 MHz SWP 2.3 s SPAN 1.000 GHz
*RBW 30 kHz VBW 30 kHz ATT 10 dB

6. SPURIOUS & HARMONICS EMISSION AT ANTENNA TERMINAL

2.991

See attached graphs.

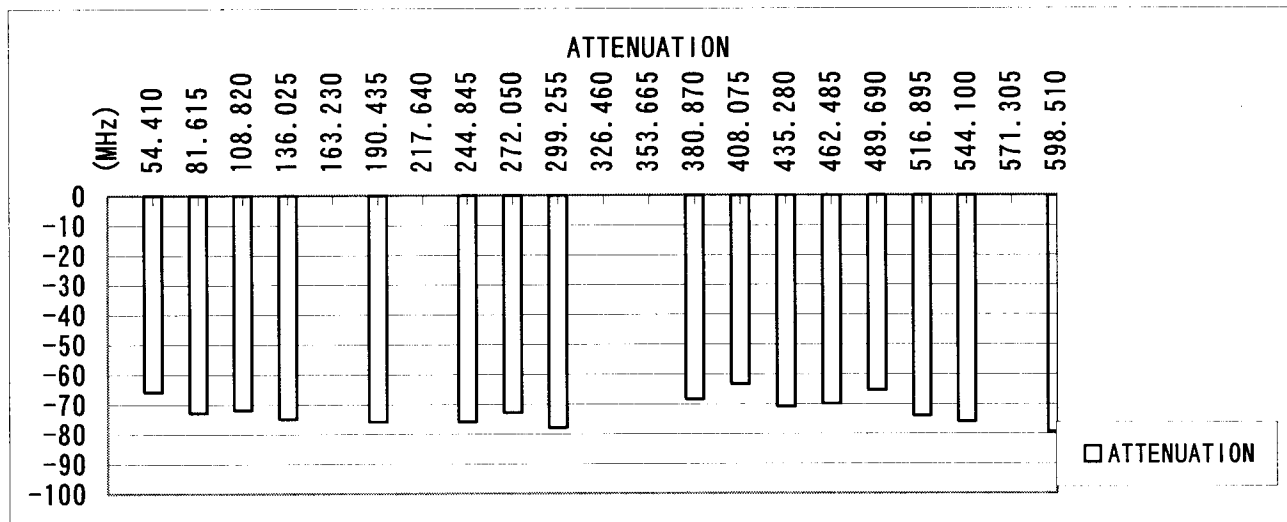
7. SPURIOUS & HARMONICS EMISSION AT ANTENNA TERMINAL

2.933

CH-20: 27.205 MHz

EMISSIONS (MHz)	ATTENUATION (dB)	FCC LIMIT (dB)	MARGIN (dB)
54.410	-66.0	-60	6.0
81.615	-73.0	-60	13
108.820	-72.0	-60	12
136.025	-75.0	-60	15
163.230	-	-60	--
190.435	-76.0	-60	16
217.640	-	-60	-
244.845	-76.0	-60	16.0
272.050	-73.0	-60	13.0
299.255	-78.0	-60	18.0
326.460	--	-60	--
353.665	--	-60	--
380.870	-68.5	-60	8.5
408.075	-63.5	-60	3.5
435.280	-71.0	-60	11.0
462.485	-70.0	-60	10.0
489.690	-65.5	-60	5.5
516.895	-74.0	-60	14.0
544.100	-76.0	-60	16.0
571.305	-	-60	-
598.510	-79.5	-60	19.5

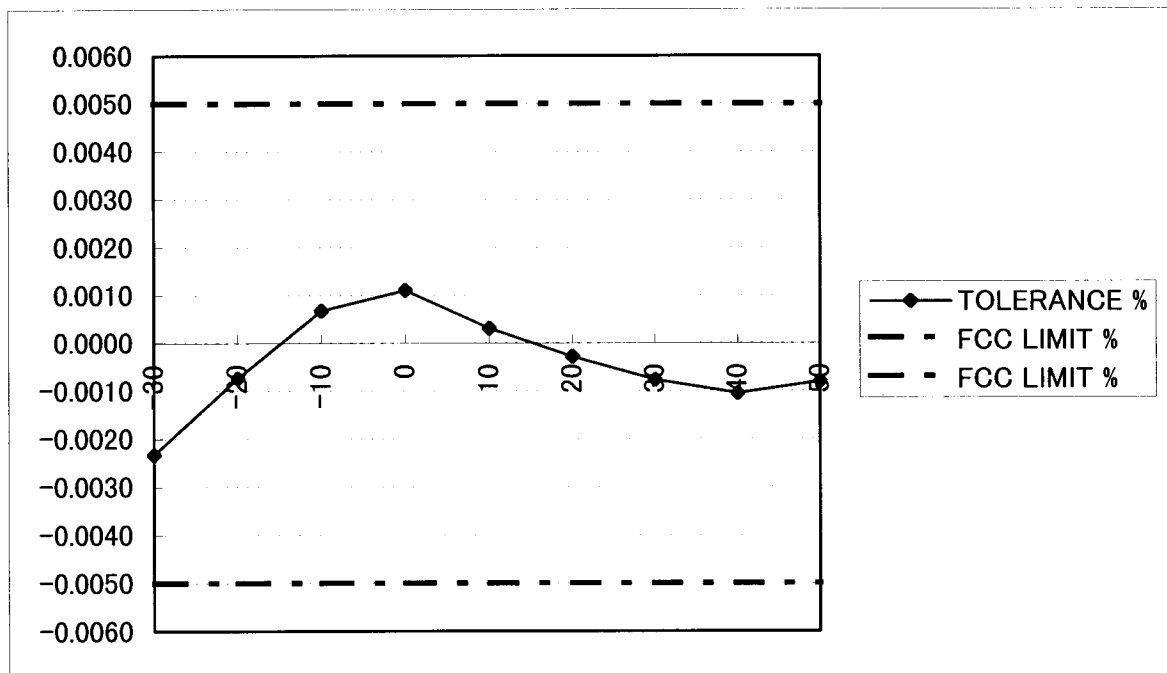
Note: All spurious emissions note reported were attenuated
by at least 80 dB below the FCC limit.



8. FREQUENCY STABILITY (TEMPERATURE RANGE)

2.995 & 80.209

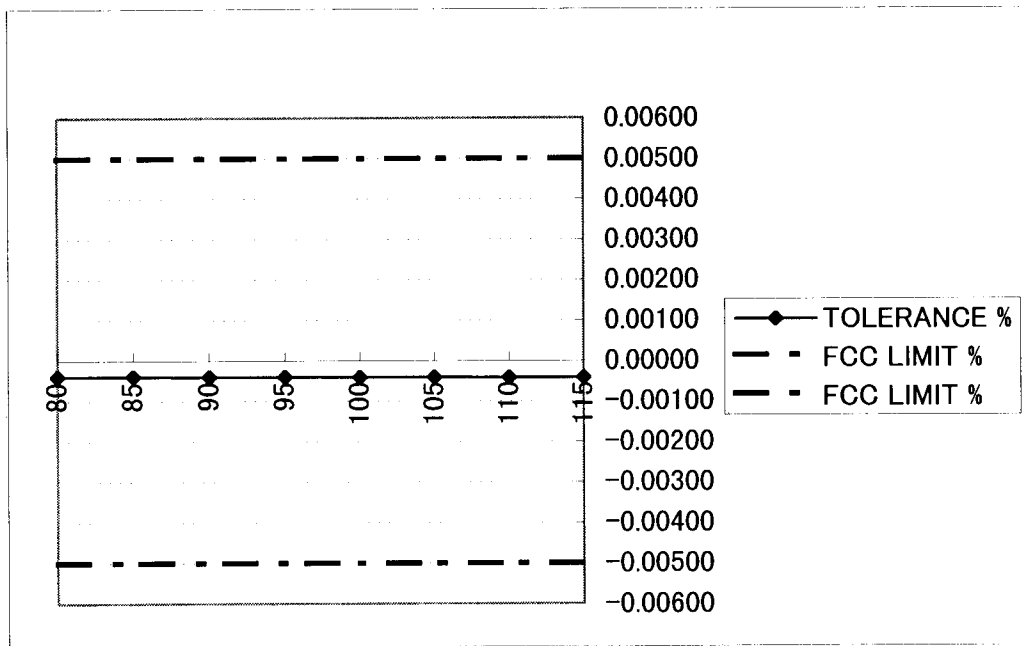
TEMPERATURE	FREQ.	TOLERANCE		FCC LIMIT	
°C	MHz	Hz	%	%	%
-30	27.184366	-634	-0.0023	0.005	-0.005
-20	27.1848	-200	-0.0007	0.005	-0.005
-10	27.185183	183	0.0007	0.005	-0.005
0	27.185298	298	0.0011	0.005	-0.005
10	27.185082	82	0.0003	0.005	-0.005
20	27.184921	-79	-0.0003	0.005	-0.005
30	27.18479	-210	-0.0008	0.005	-0.005
40	27.184715	-285	-0.0010	0.005	-0.005
50	27.184782	-218	-0.0008	0.005	-0.005



9. FREQUENCY STABILITY (VOLTAGE RANGE)

2.995 & 80.209

VOLTAGE		FREQ.	TOLERANCE		FCC LIMIT	
(V)	(%)	MHz	Hz	%	%	%
11.04	80	27.18489	-108	-0.00040	0.005	-0.005
11.73	85	27.18489	-109	-0.00040	0.005	-0.005
12.42	90	27.184890	-110	-0.00040	0.005	-0.005
13.11	95	27.18489	-111	-0.00041	0.005	-0.005
13.80	100	27.18489	-112	-0.00041	0.005	-0.005
14.49	105	27.18489	-113	-0.00042	0.005	-0.005
15.18	110	27.18489	-115	-0.00042	0.005	-0.005
15.87	115	27.18489	-115	-0.00042	0.005	-0.005



LIST OF MEASUREMENT EQUIPMENT

ENG-NO	TEST EQUIPMENT	TYPE	MFR	SERIAL NO.	CATEGORY	CODE
1287	AMPLIFIER	AFS30010040020	MITEQ	138315	2171	D
1294	ANTENNA (BILOG)	CBL6111	CHASE	1057	2121	D
1602	ANTENNA (DIPOLE)	3120-B1	EMCO	0075		D
1603	ANTENNA (DIPOLE)	3120-B2	EMCO	0076		D
1604	ANTENNA (DIPOLE)	3120-B3	EMCO	0076		D
1560	ANTENNA (HORN)	3115	EMCO	2167		D
1305	SPECTRUM ANALYZER	8566B	HP	2504A01433	2171	D
1306	SPECTRUM ANALYZER DISPLAY	85662A	HP	2403A09044	2171	D
0491	ATTENUATOR	30dB	HP	1802A00930		3
0691	AUDIO ANALYZER	8903A	HP	2433A04343	2171	4
1437	CURRENT METER	2011	YEW	M2D3017		4
1214	LOW TEMPERATURE CHAMBER	SU240	TABAI ESPEC	91001336	2171	4
0548	MODULATION ANALYZER	8901A	HP	2038A00181	2161	4
0510	MULTIMETER	E2377A	HP	3323J16273		4
0643	OSCILLOSCOPE	COR5501	KIKUSUI	13080828	2171	4
0645	POWER METER (WATTMETER)	436A	HP	2101A08680		3
1352	POWER SENSOR	8482B	HP	1802A00930		3
0551	POWER SUPPLY	PAK20-18A	KIKUSUI	13083702		4
1626	RADIO COMM. TEST SET	8920A	HP	3339A03106	2171	4
1423	SPECTRUM ANALYZER	8561E	HP	3221A00132		4