APPENDIX A

TEST DATA

OUTPUT POWER

CUSTOMER: MA/Com
EQUIPMENT: OPENSKY Mobile Radio
TESTED BY: R. Fenton Jr
OPERATING MODE: Full Power

DATE: Nov. 27 1998
TEST NUMBER: 1
COUPLING DEVICE: Antenna Terminal
TEST SPEC: FCC

Channel No.	Base Frequency MHz	Output Power dB
1	806.0125	+41.5
300	813.0125	+41.6
600	820.9875	+41.6
601	821.0125	+41.3
715	822.5125	+41.5
830	823.9875	+41.5

Chomerics, 77 Dragon Court, Woburn, MA 01888-4014 (781) 935-4850 FAX (781) 935-2758

OCCUPIED BANDWIDTH
Part 2.989

CUSTOMER: MACom
EQUIPMENT: Open Sky Mobile Radio
TESTED BY: R. Foster
OPERATING MODE: Full Power

DATE: Nov. 30 1998
TEST NUMBER: 2
COUPLING DEVICE: Antenna Terminal
TEST SPEC: FCC

0.5% of Lower and 99% of Upper

Channel No.	Base Frequency MHz	Occupied Bandwidth
1	806.0125	Within Spec.
300	813.0125	Within Spec
600	820.9875	Within Spec
601	821.0125	Within Spec
715	822.5125	Within Spec
830	823.9875	Within Spec

Chomerics, 77 Dragon Court, Woburn, MA 01888-4014 (781) 935-4850 FAX (781) 935-2758

CHANNEL SPACEING

CUSTOMER: MACom
EQUIPMENT: OpenSky Mobile Radio
TESTED BY: R. Foster
OPERATING MODE: Full Power

DATE: Nov. 20 1998
TEST NUMBER: 3
COUPLING DEVICE: Antenna Terminal
TEST SPEC: FCC

Frequency MHz	Measured Spacing kHz	6dB Bandwidth kHz
Channel 1 806.0129	**24.8KHz**	**15kHz**
Channel 2 806.0377		**14kHz**
Channel 601 821.0127	**10kHz**	**14kHz**
Channel 602 821.0137		**14kHz**

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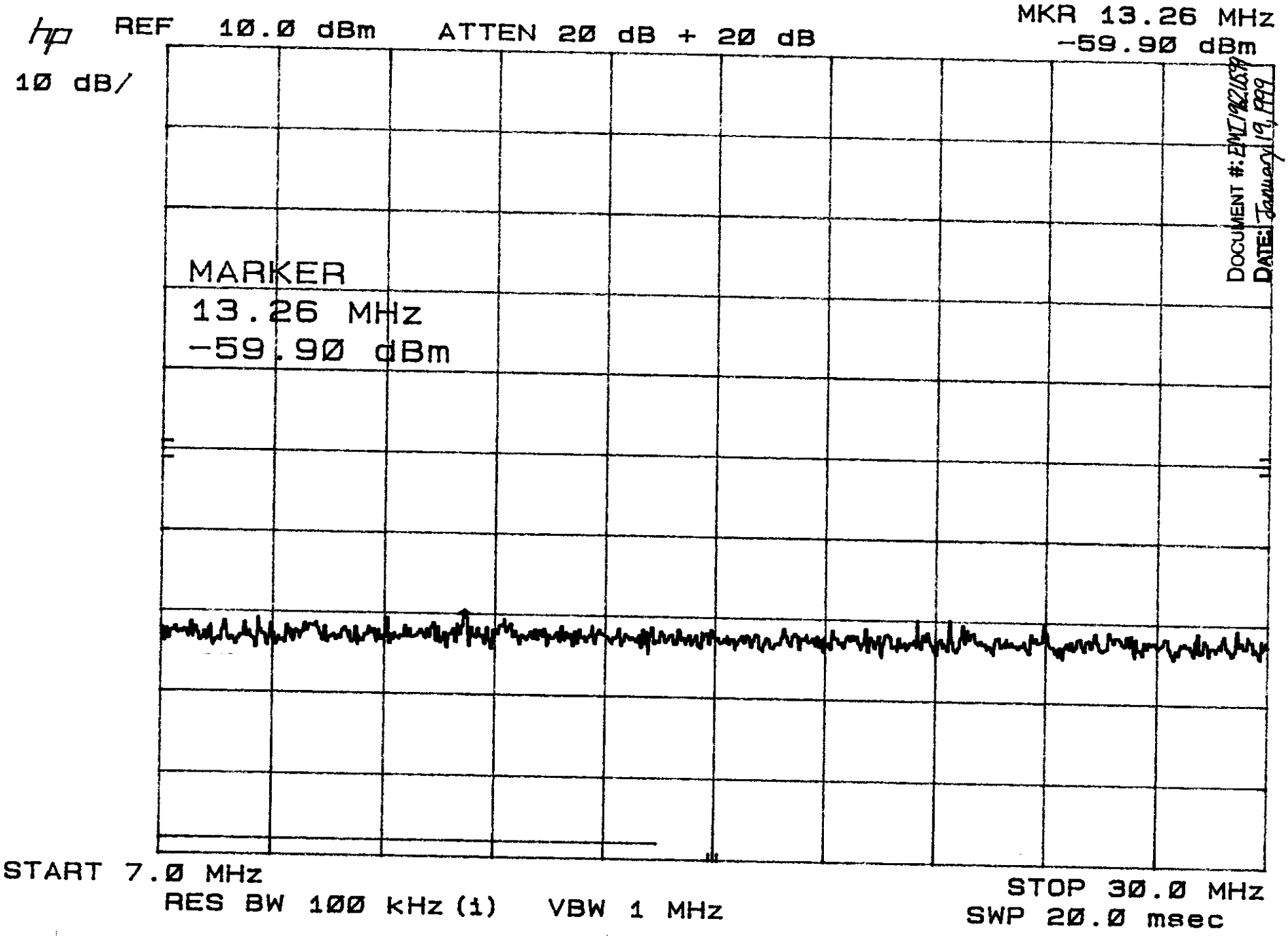
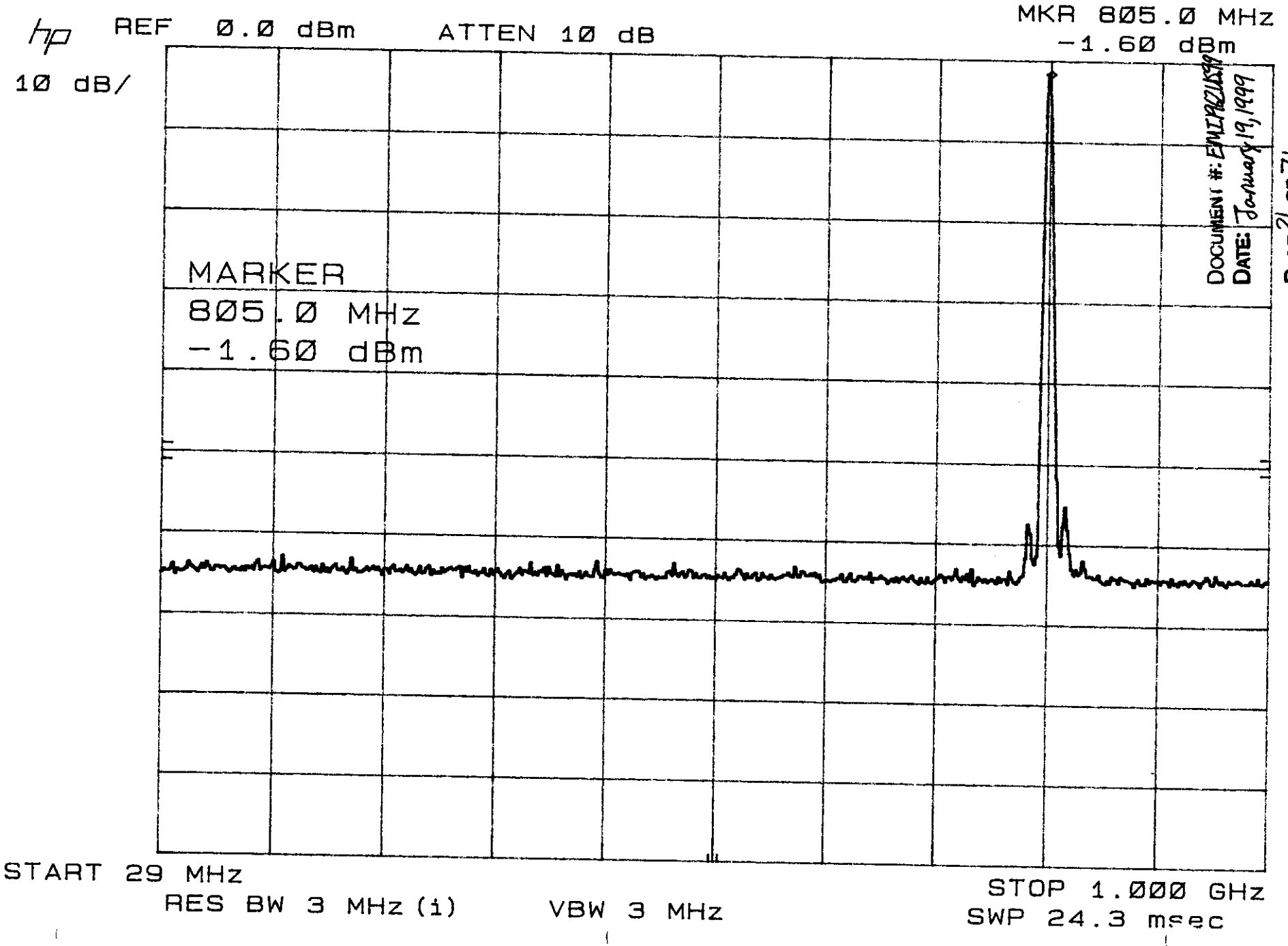
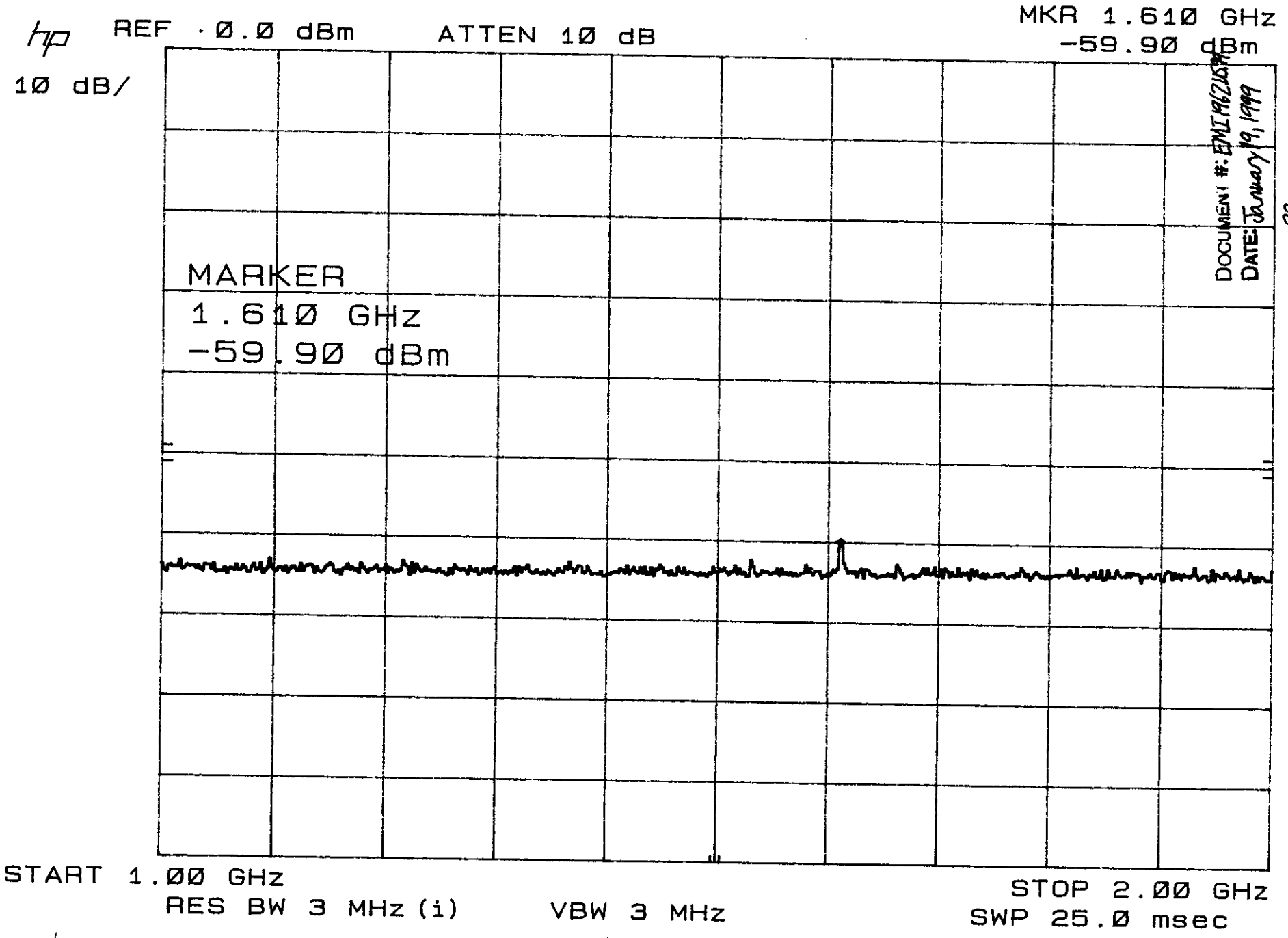
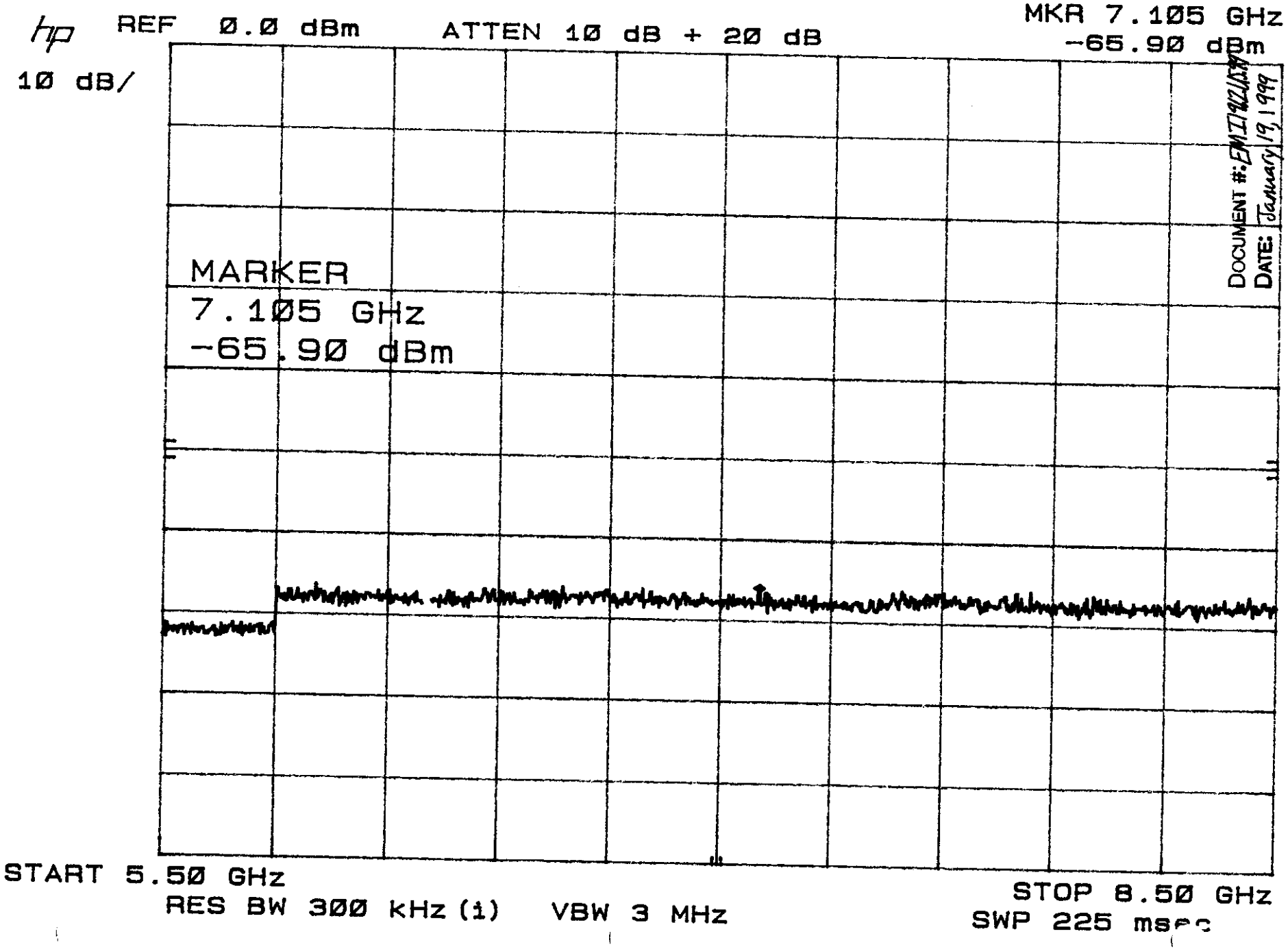
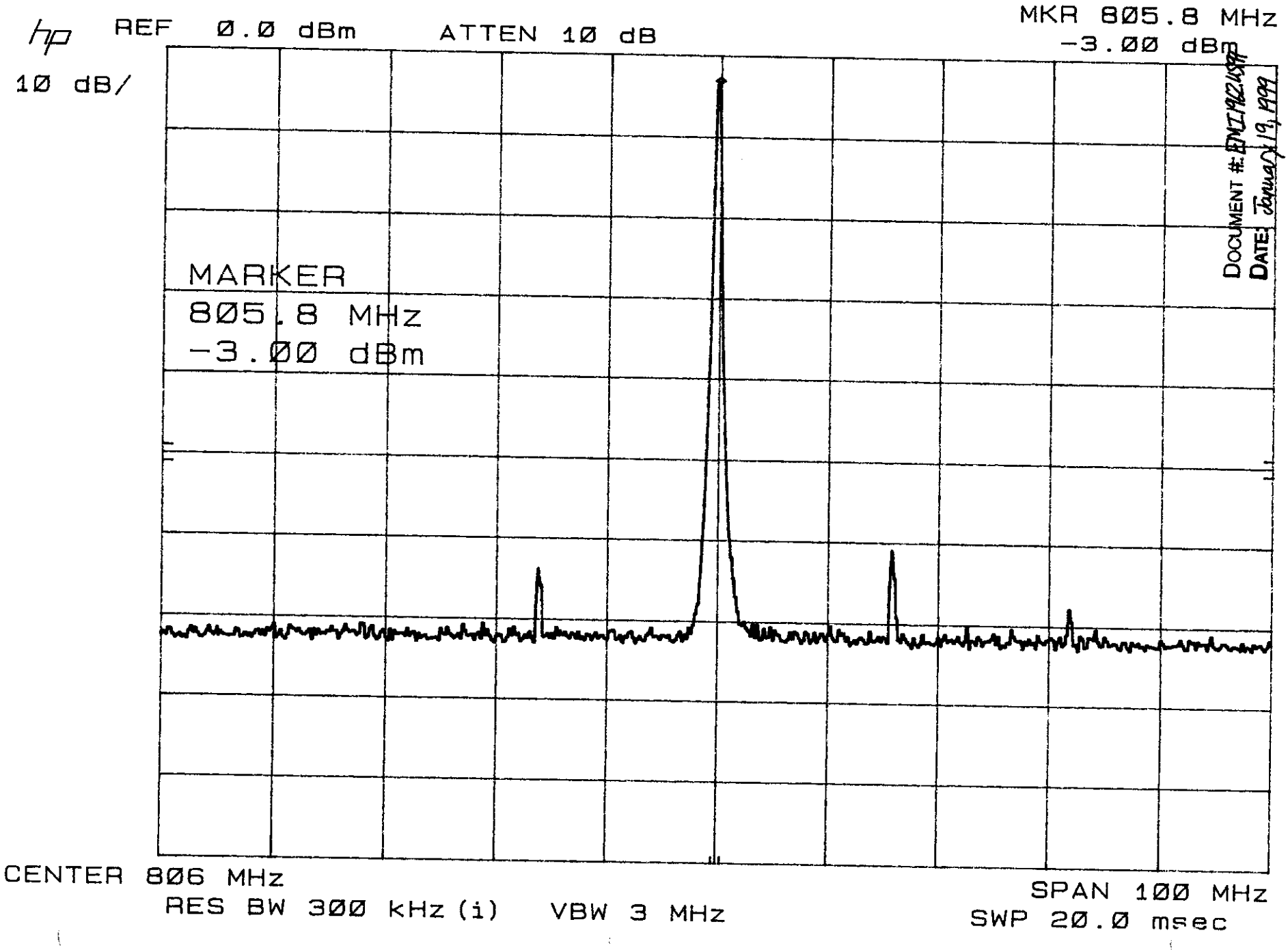

hp
REF 10.0 dBm
ATTEN 20 dB + 20 dB
MKR 13.26 MHz
-59.90 dBm
10 dB/
MARKER
13.26 MHz
-59.90 dBm
START 7.0 MHz
RES BW 100 kHz (i)
VBW 1 MHz
STOP 30.0 MHz
SWP 20.0 msec

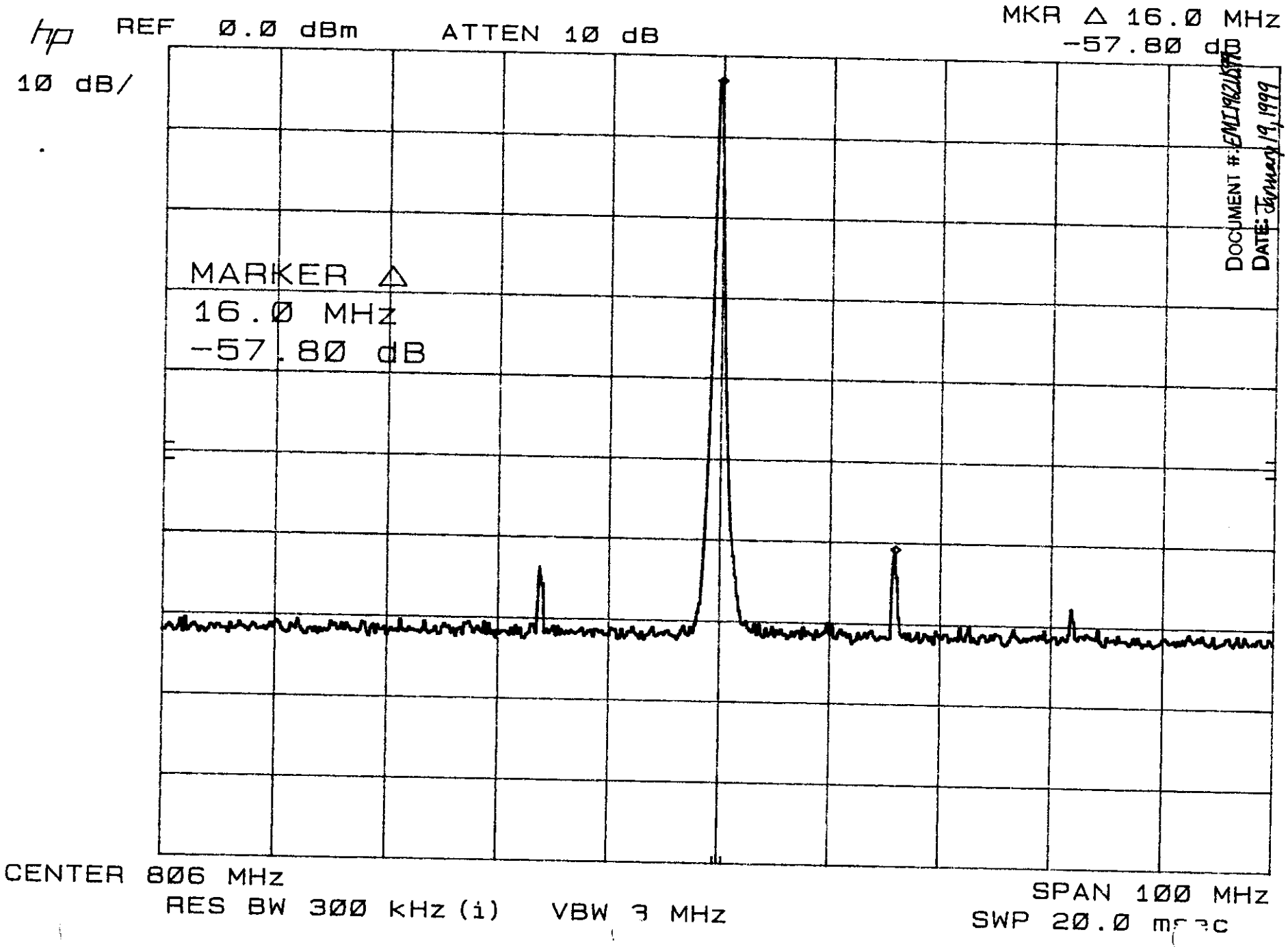


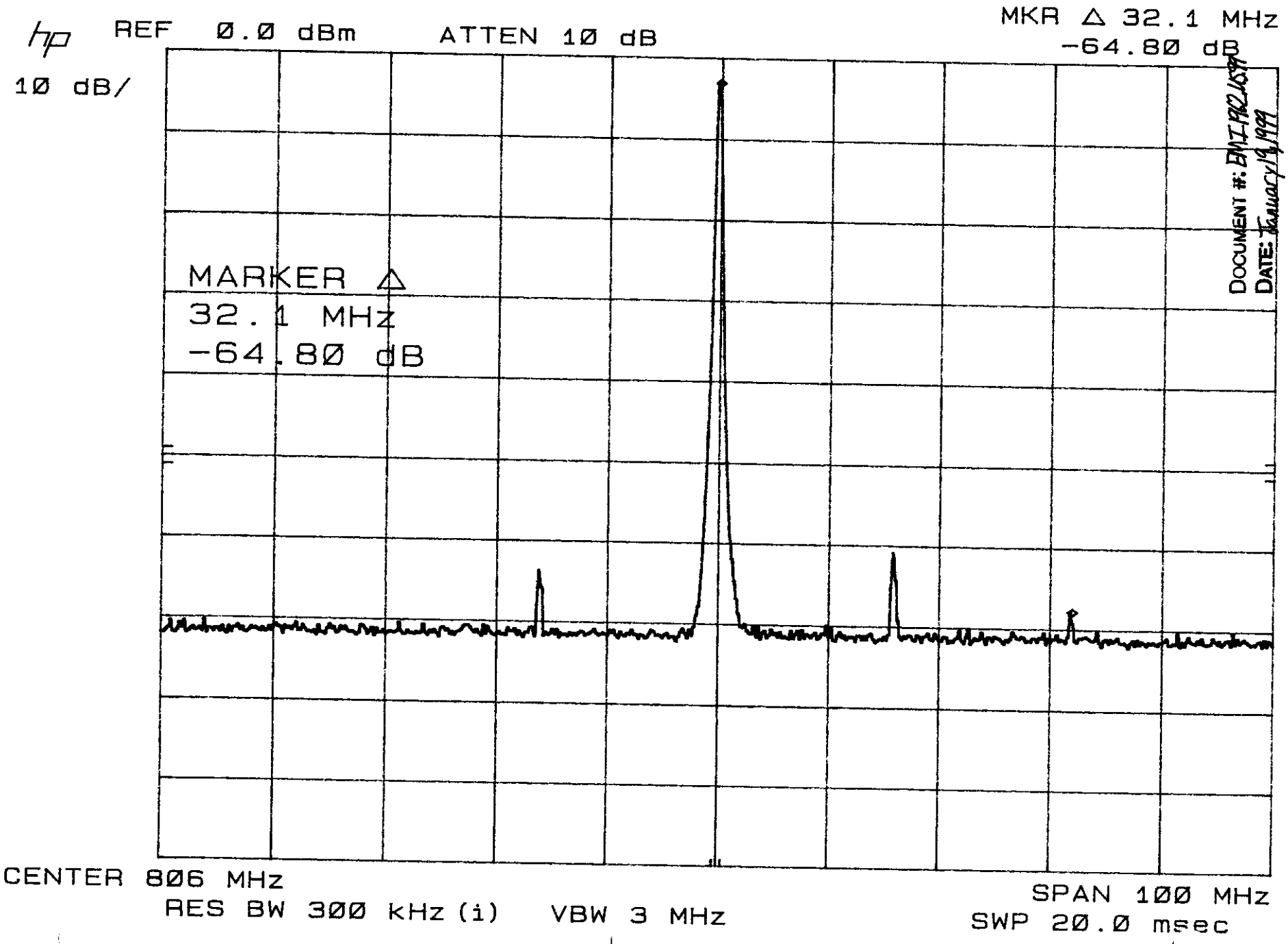
DOCUMENT #: EMI980115
DATE: January 19, 1999


hp
REF -0.0 dBm
ATTEN 10 dB
MKR 1.610 GHz
-59.90 dBm
10 dB/
MARKER
1.610 GHz
-59.90 dBm
START 1.00 GHz
RES BW 3 MHz (i)
VBW 3 MHz
STOP 2.00 GHz
SWP 25.0 msec

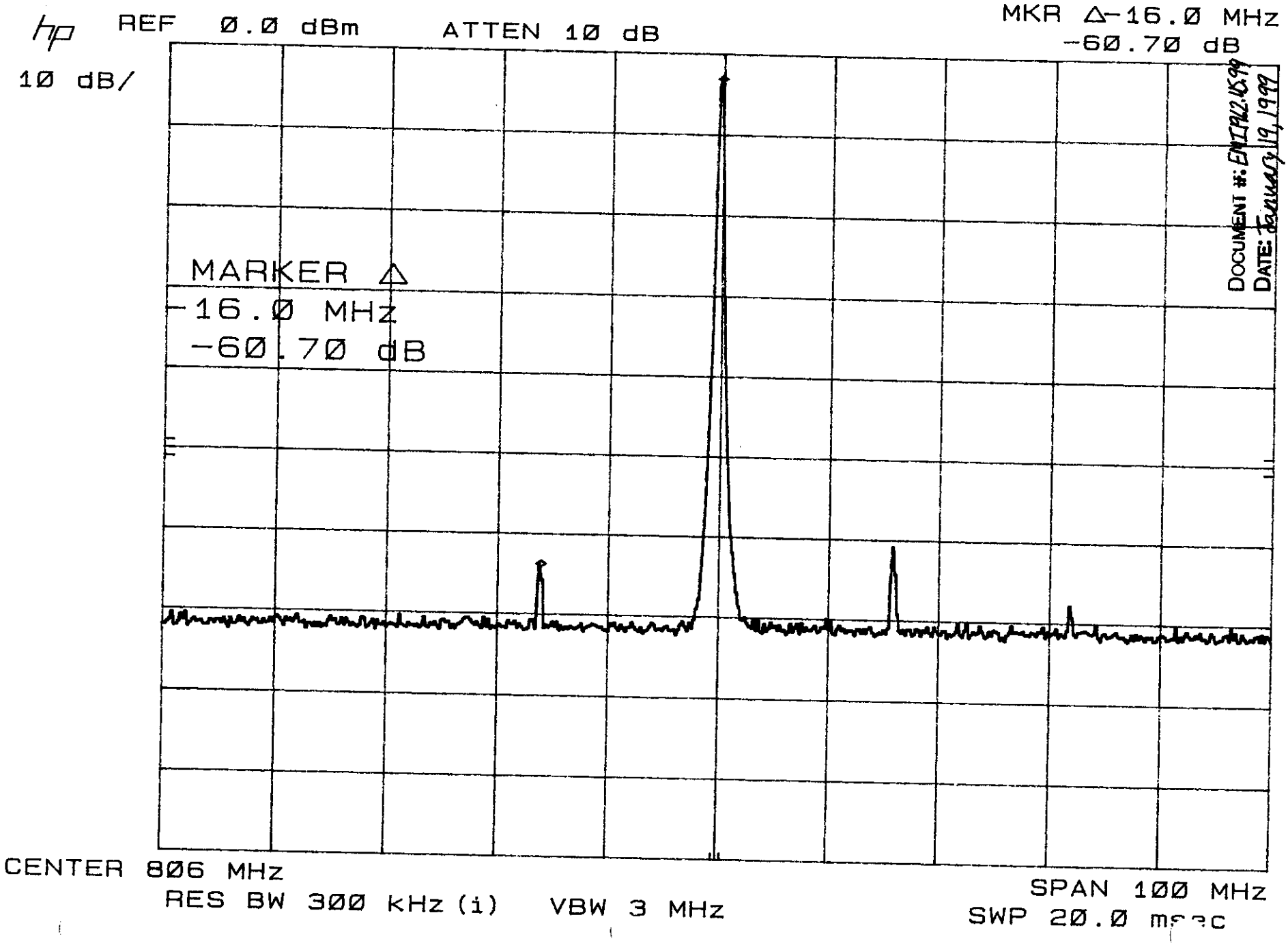

hp REF 0.0 dBm
ATTEN 10 dB + 20 dB
MKR 7.105 GHz
-65.90 dBm
10 dB/
MARKER
7.105 GHz
-65.90 dBm
START 5.50 GHz
RES BW 300 kHz (i)
VBW 3 MHz
STOP 8.50 GHz
SWP 225 msec

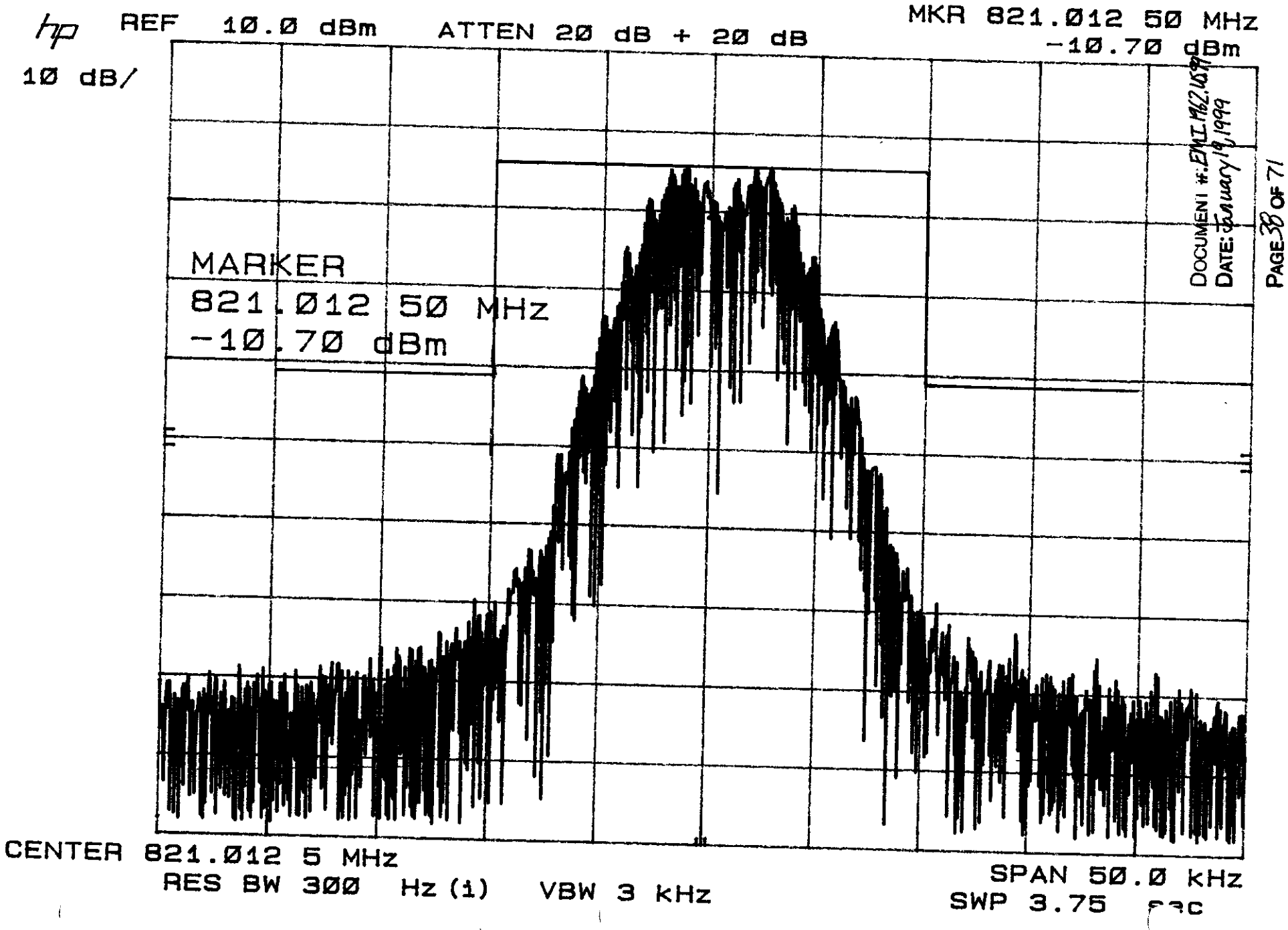

REF 0.0 dBm
ATTEN 10 dB
MKR 805.8 MHz
-3.00 dBm
10 dB/
MARKER
805.8 MHz
-3.00 dBm
CENTER 806 MHz
RES BW 300 kHz (i)
VBW 3 MHz
SPAN 100 MHz
SWP 20.0 msec


hp REF 0.0 dBm
ATTEN 10 dB
MKR Δ 16.0 MHz
-57.80 dB
10 dB/
MARKER Δ
16.0 MHz
-57.80 dB
CENTER 806 MHz
RES BW 300 kHz (i)
VBW 3 MHz
SPAN 100 MHz
SWP 20.0 msec


REF 0.0 dBm
ATTEN 10 dB
MKR Δ 32.1 MHz
-64.80 dB
10 dB/
MARKER Δ
32.1 MHz
-64.80 dB
CENTER 806 MHz
RES BW 300 kHz (i)
VBW 3 MHz
SPAN 100 MHz
SWP 20.0 msec

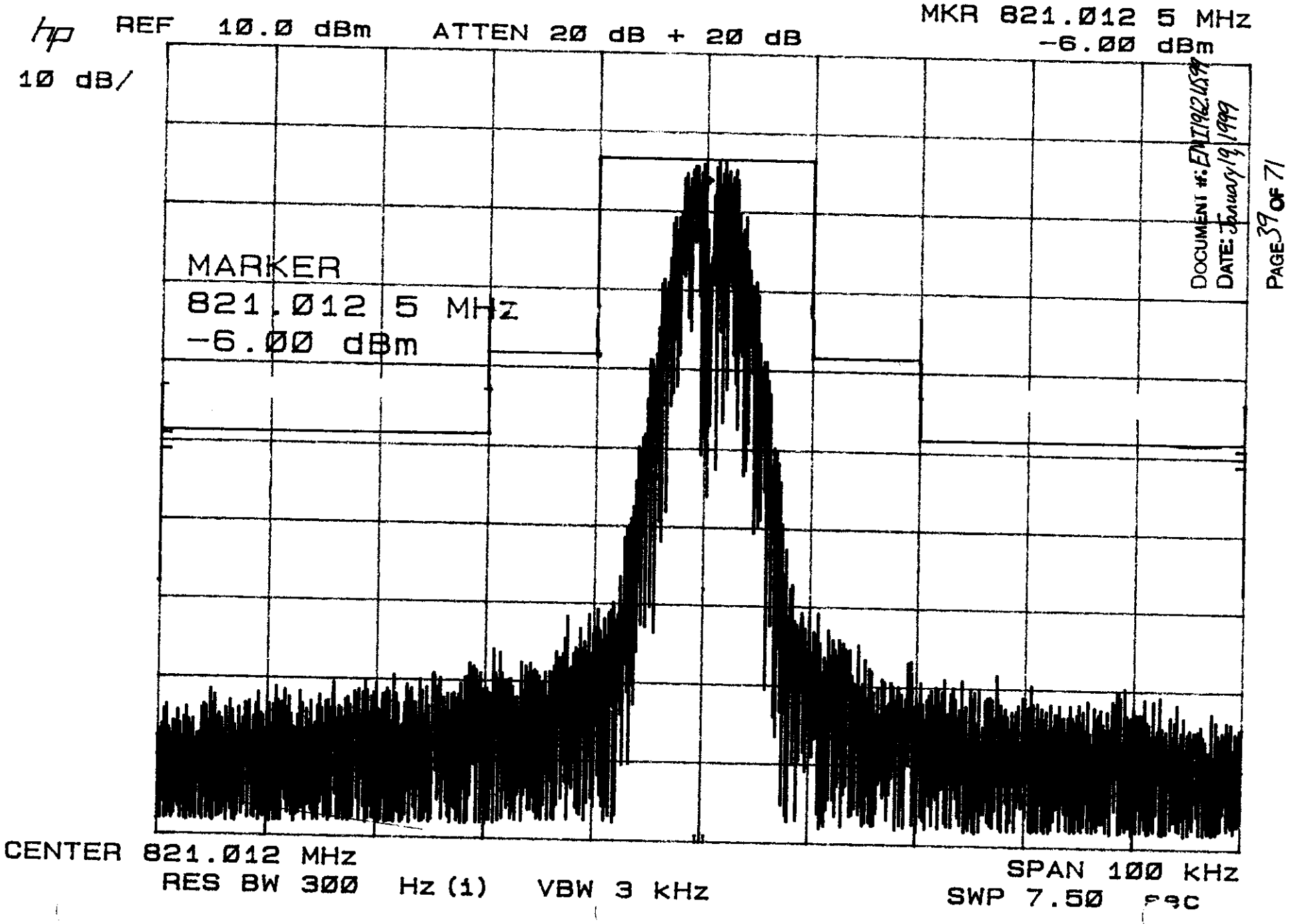
Unwanted Emissions



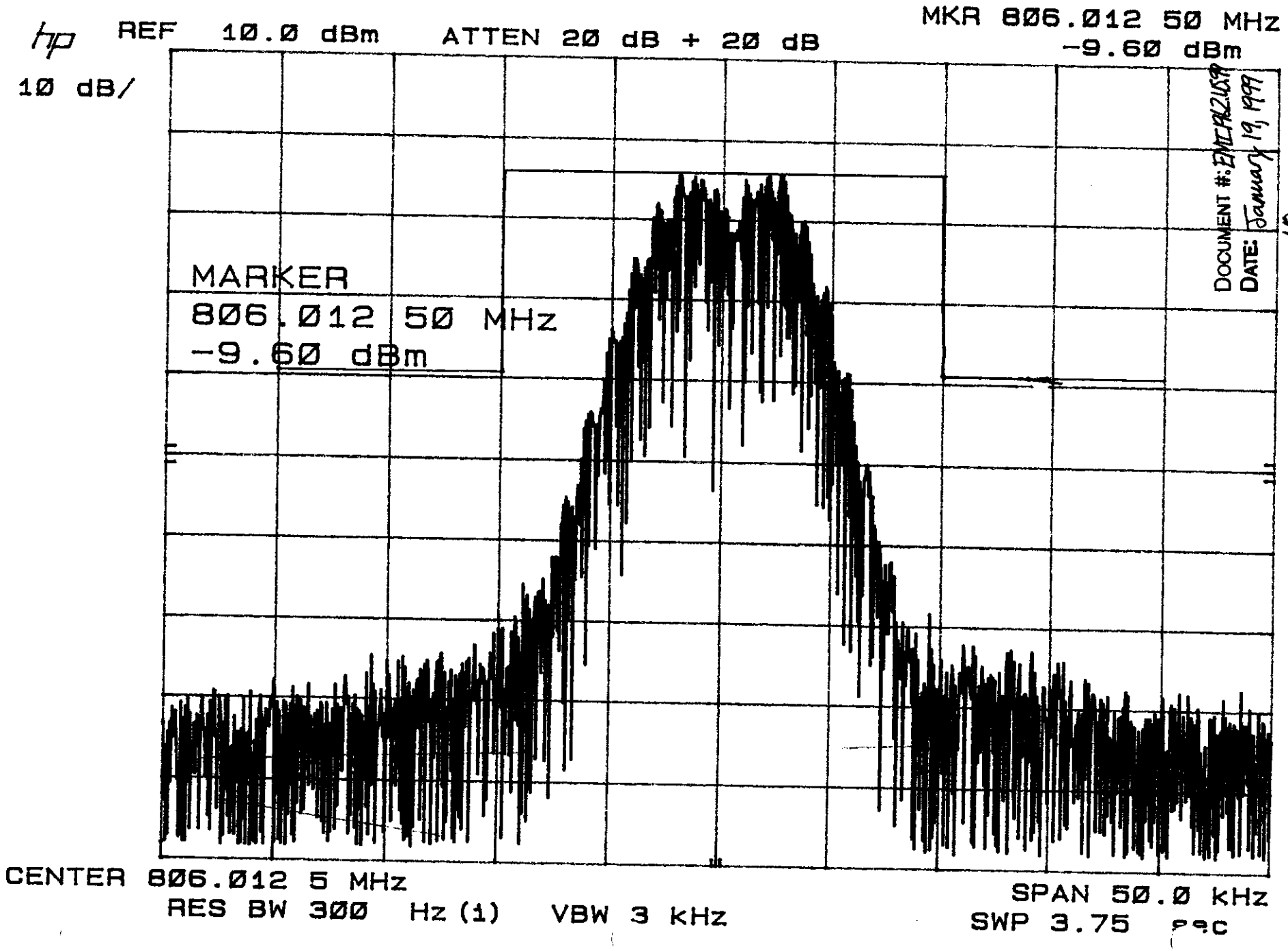


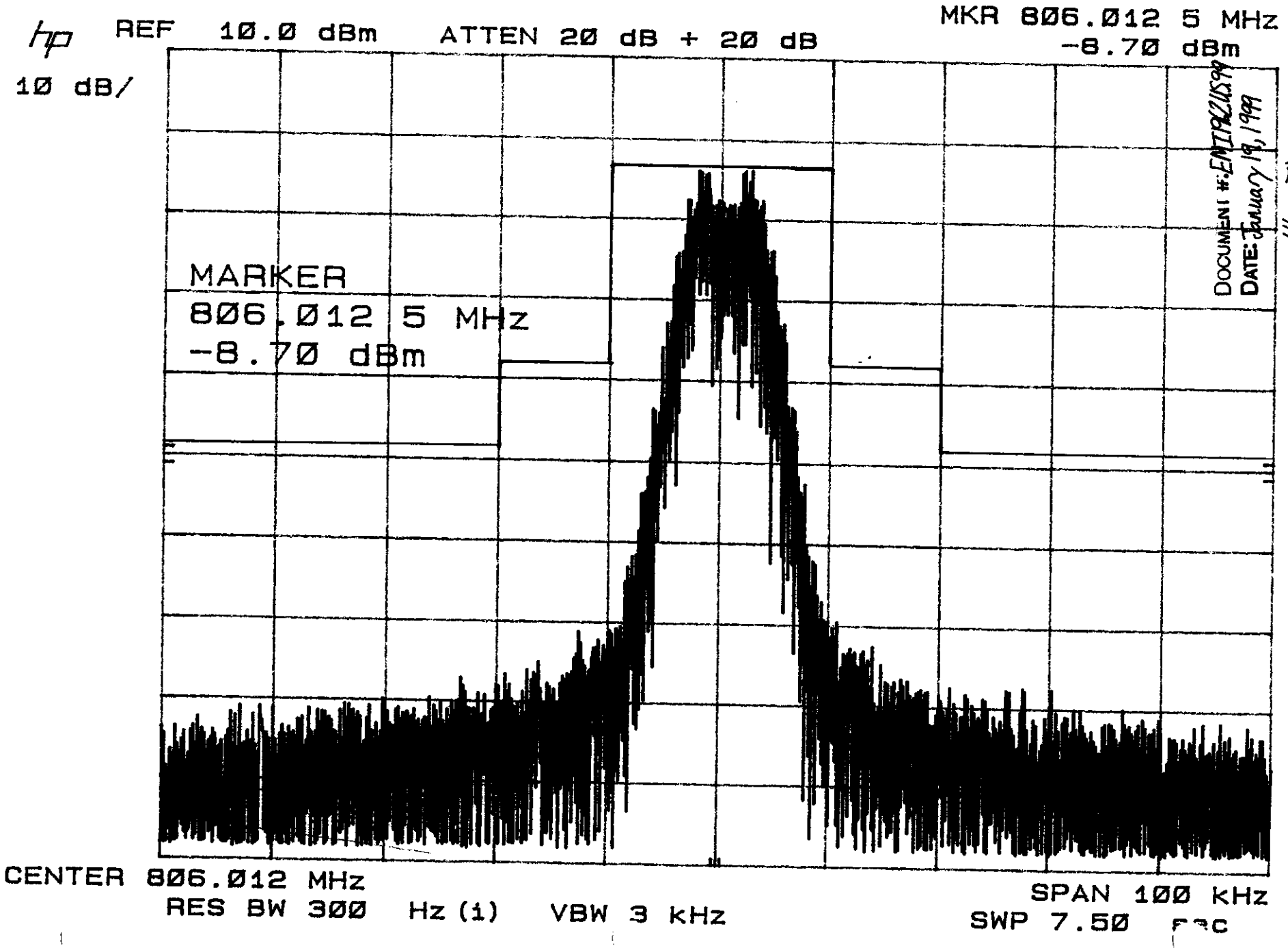
DOCUMENT #: EMI.M12.1499
DATE: January 19, 1999

EMISSION MASK B(A)

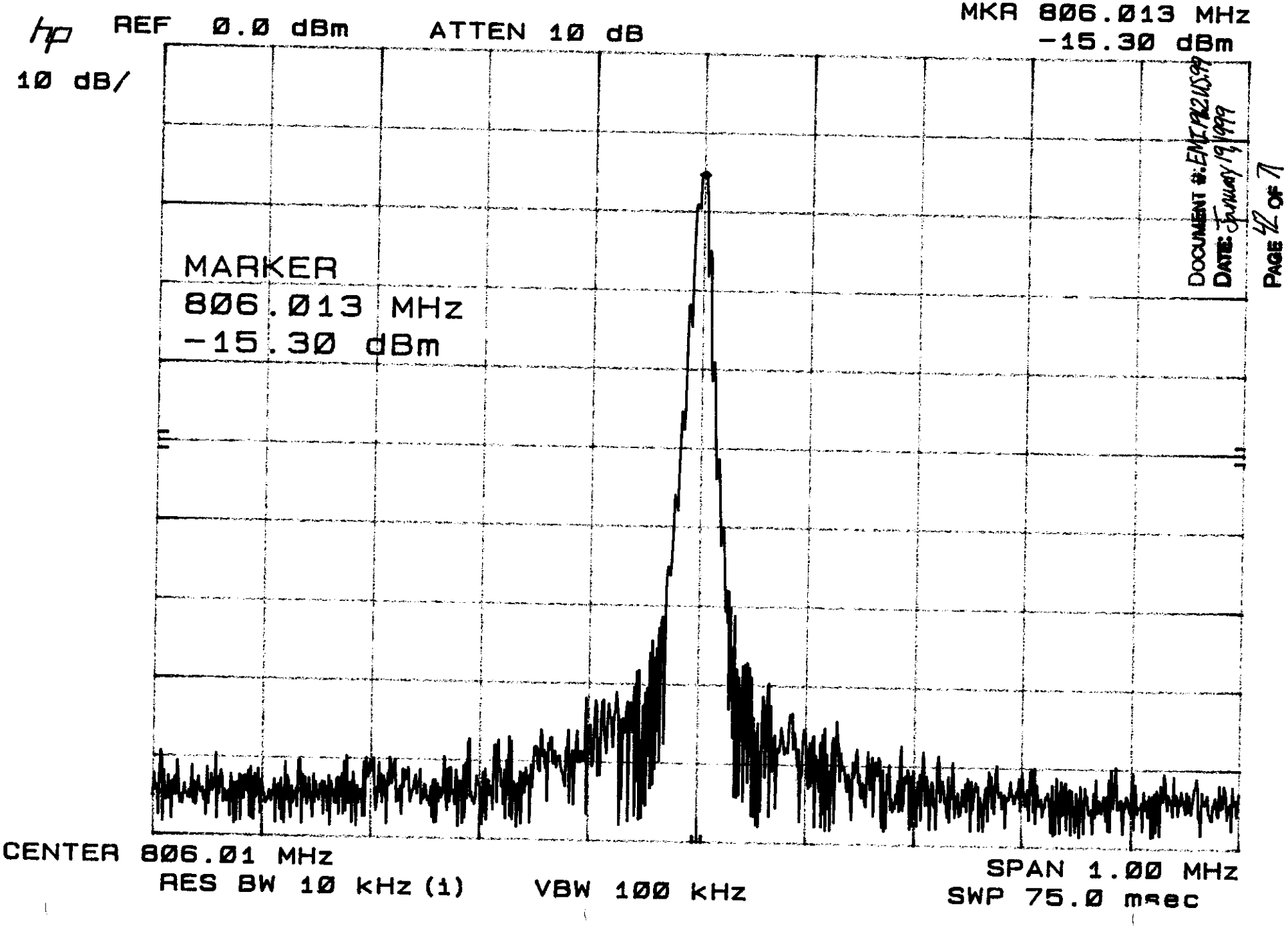


DOCUMENT #: EMI1962115A99
DATE: January 19, 1999
PAGE 39 OF 71


hp REF 10.0 dBm
ATTEN 20 dB + 20 dB
MKR 806.012 50 MHz
-9.60 dBm
10 dB/
MARKER
806.012 50 MHz
-9.60 dBm
CENTER 806.012 5 MHz
RES BW 300 Hz (1)
VBW 3 kHz
SPAN 50.0 kHz
SWP 3.75 sec


REF 10.0 dBm
ATTEN 20 dB + 20 dB
MKR 806.012 5 MHz
-8.70 dBm
10 dB/
MARKER
806.012 5 MHz
-8.70 dBm
CENTER 806.012 MHz
RES BW 300 Hz (i)
VBW 3 kHz
SPAN 100 kHz
SWP 7.50

Ch#1



DOCUMENT #: EMI#2103.99
DATE: January 19, 1999
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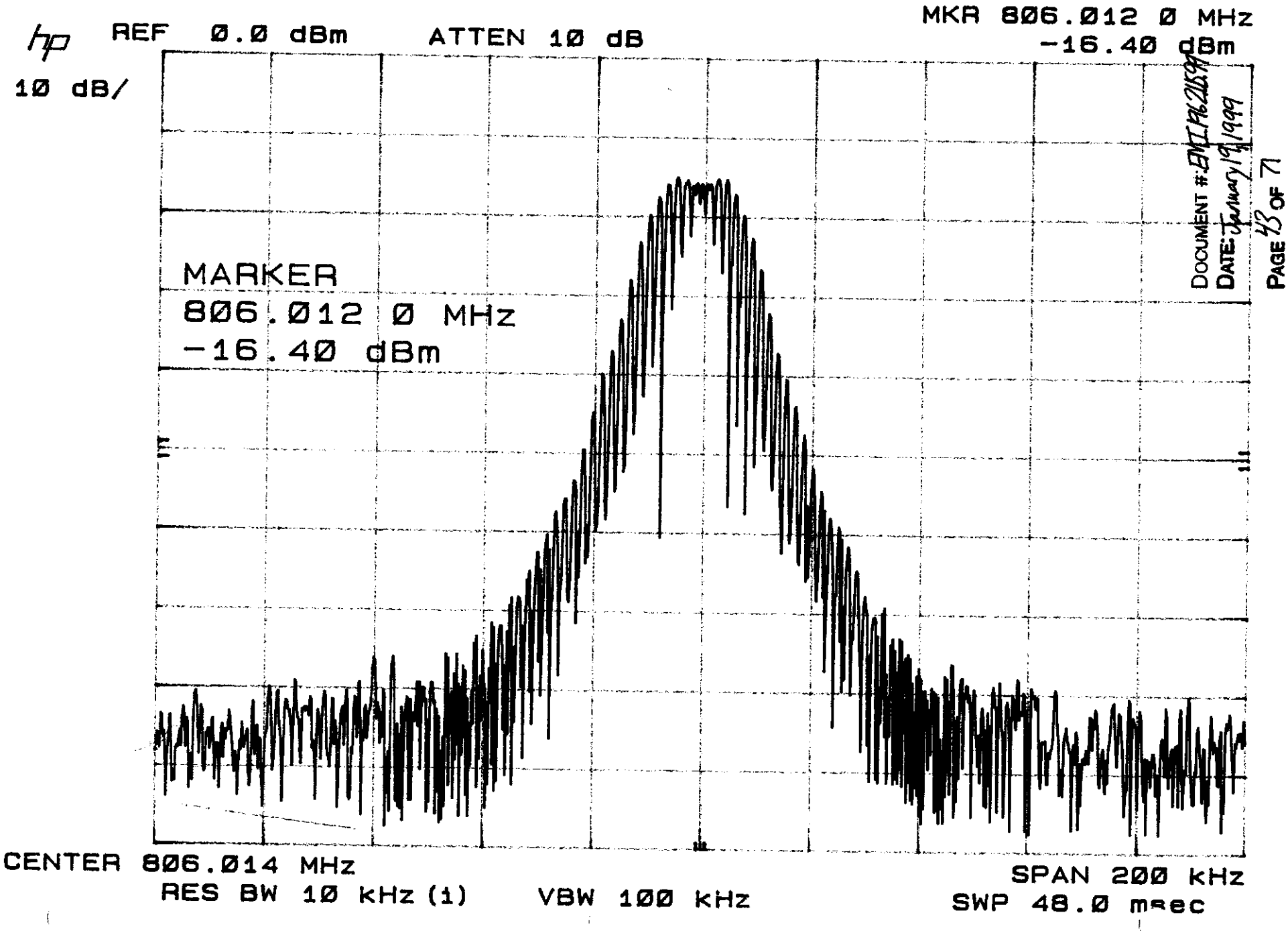
CX#1



DOCUMENT #: EMI#2115.94
DATE: January 19, 1999
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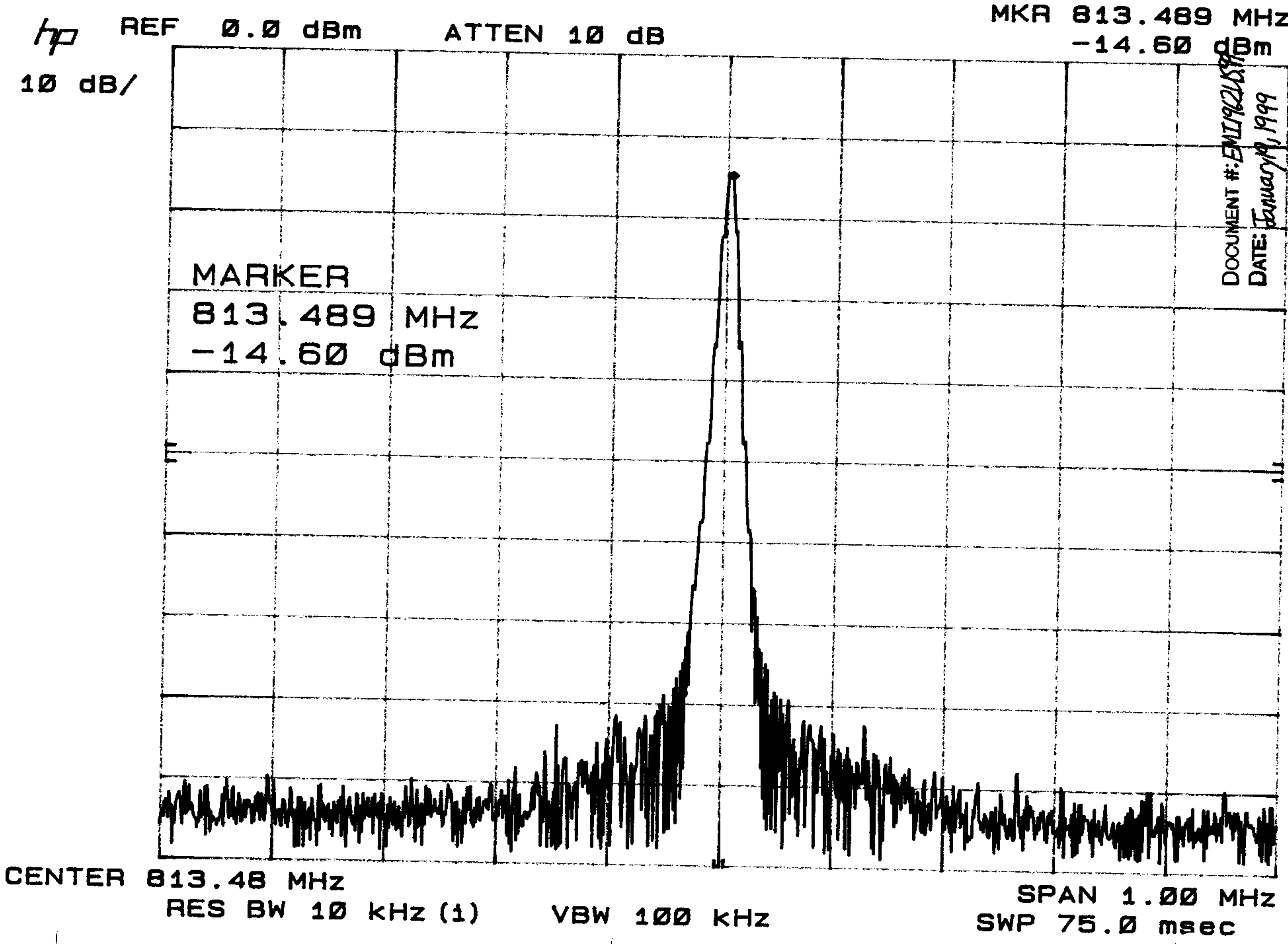
CH #300



DOCUMENT #: EMI1962US99
DATE: January 19, 1999
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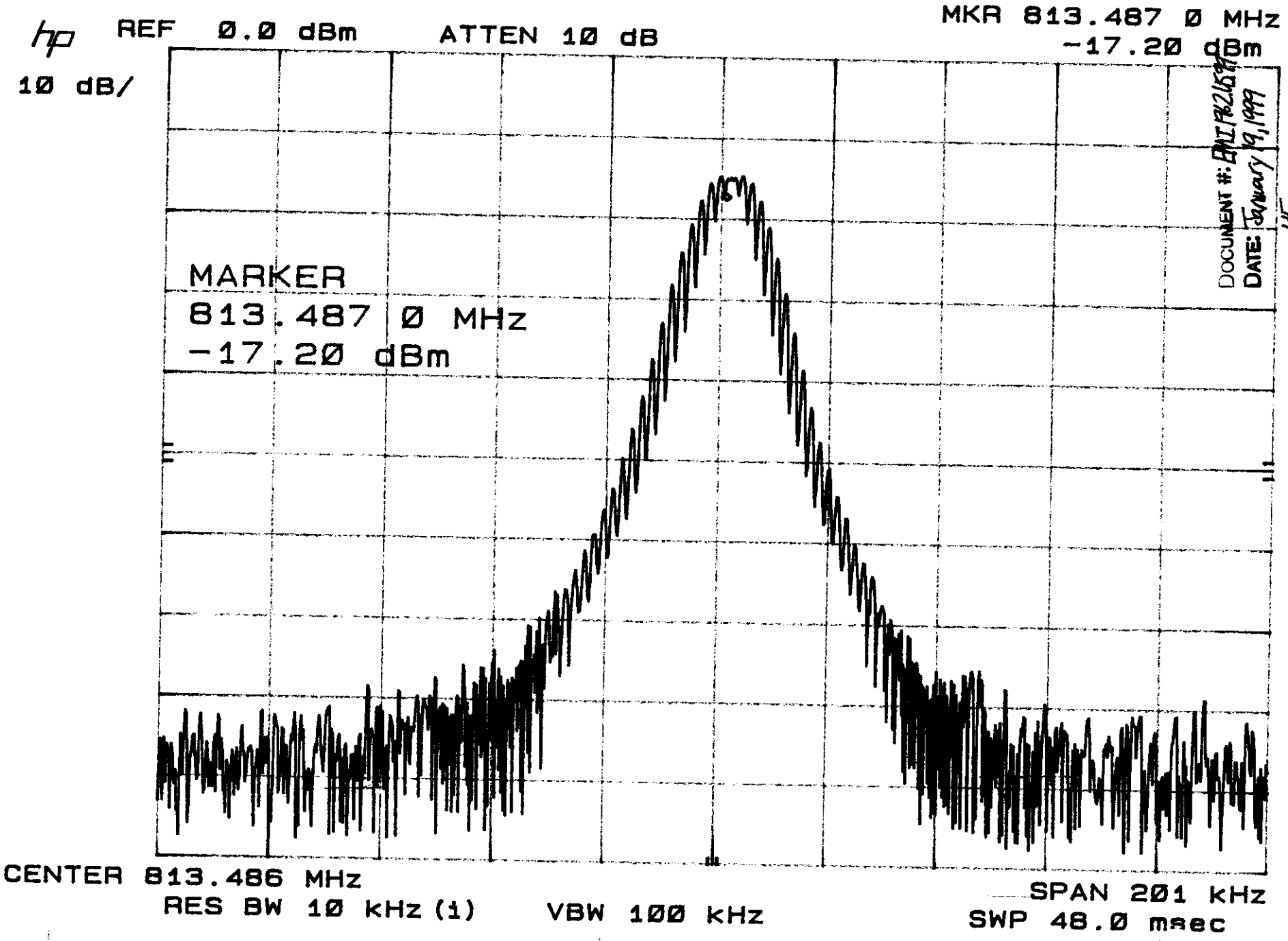
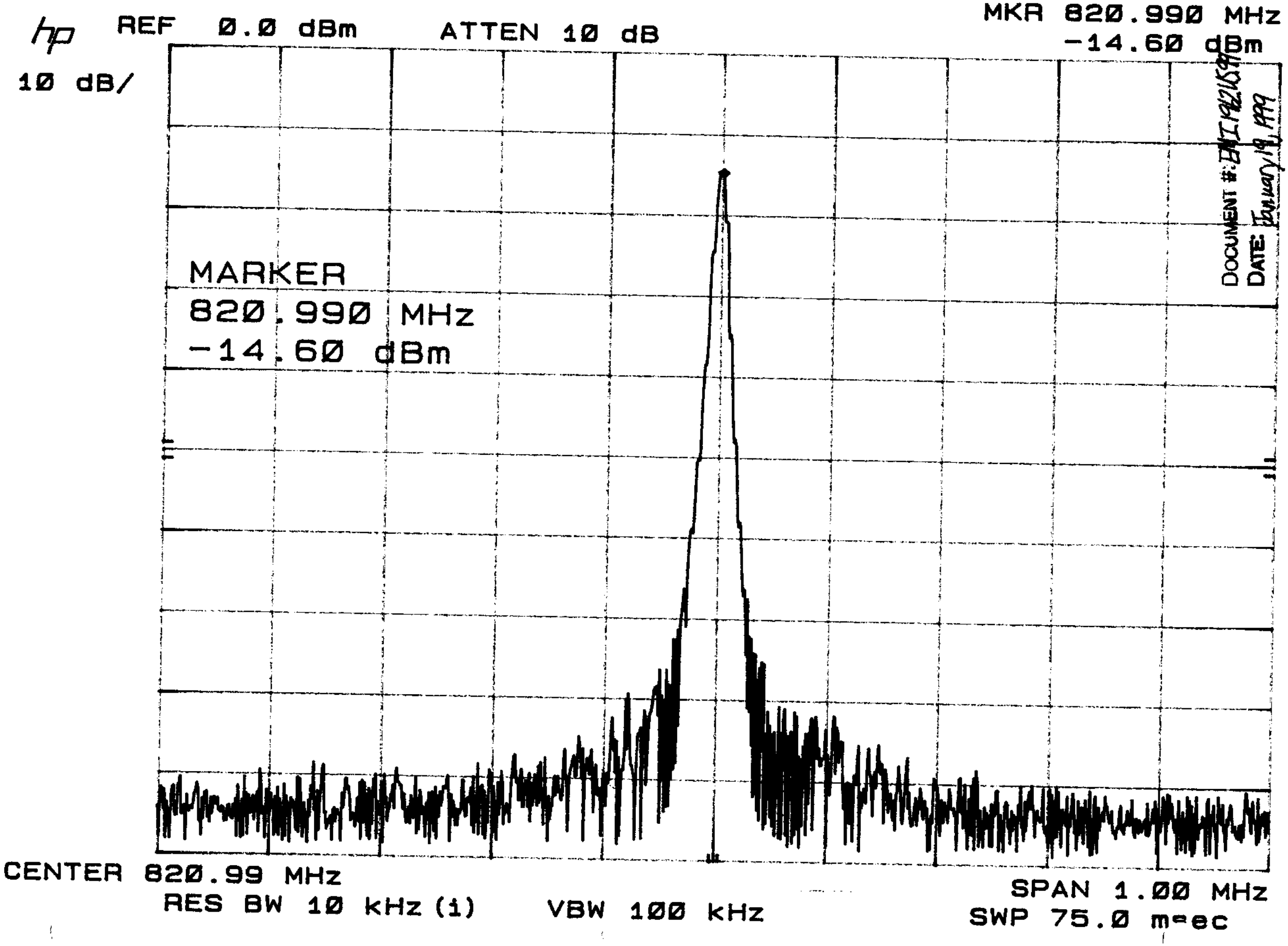
CH#300



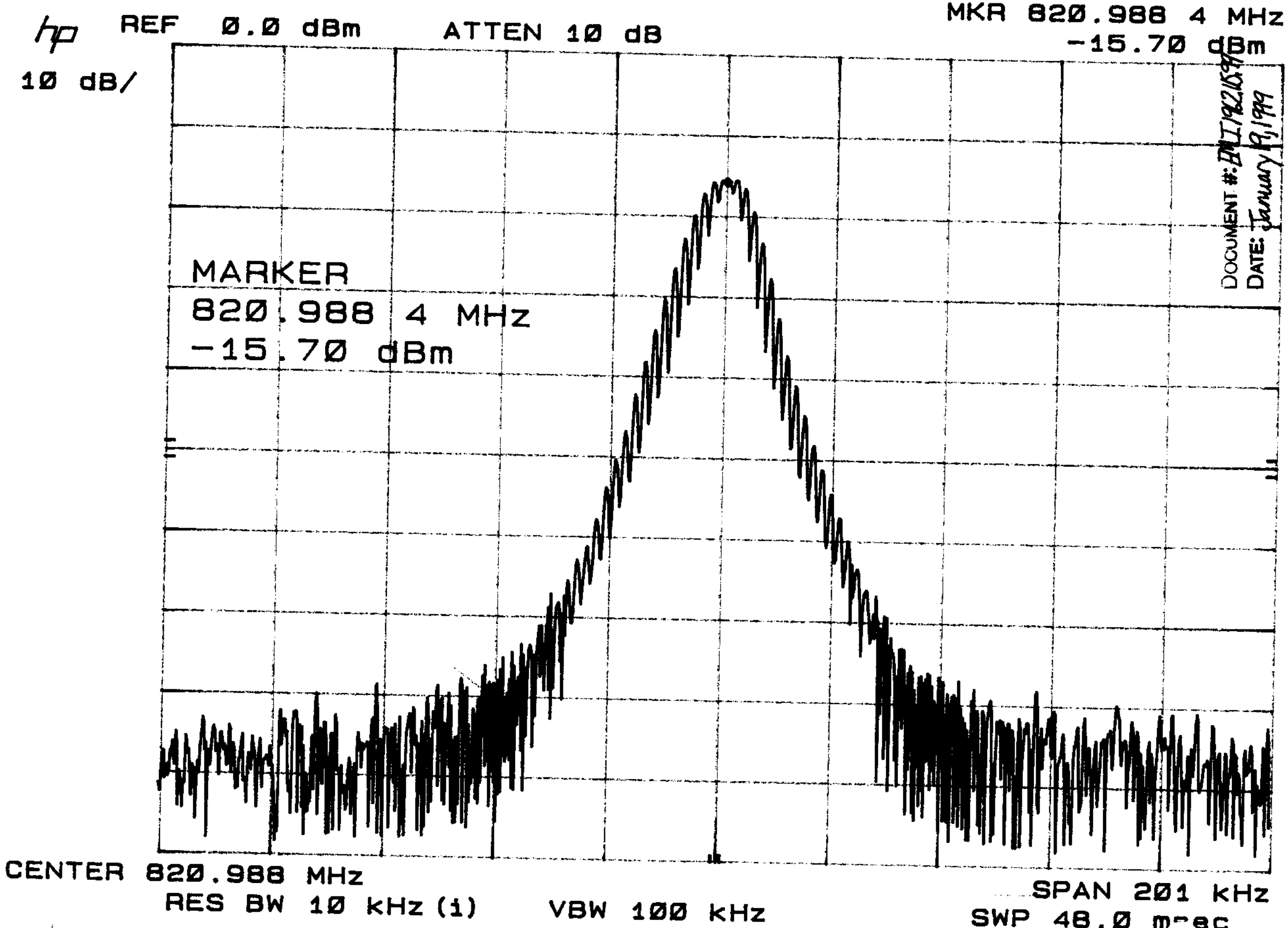
DOCUMENT #: AMI7K2150
DATE: January 19, 1999
PAGE 45 OF 71

CH 600



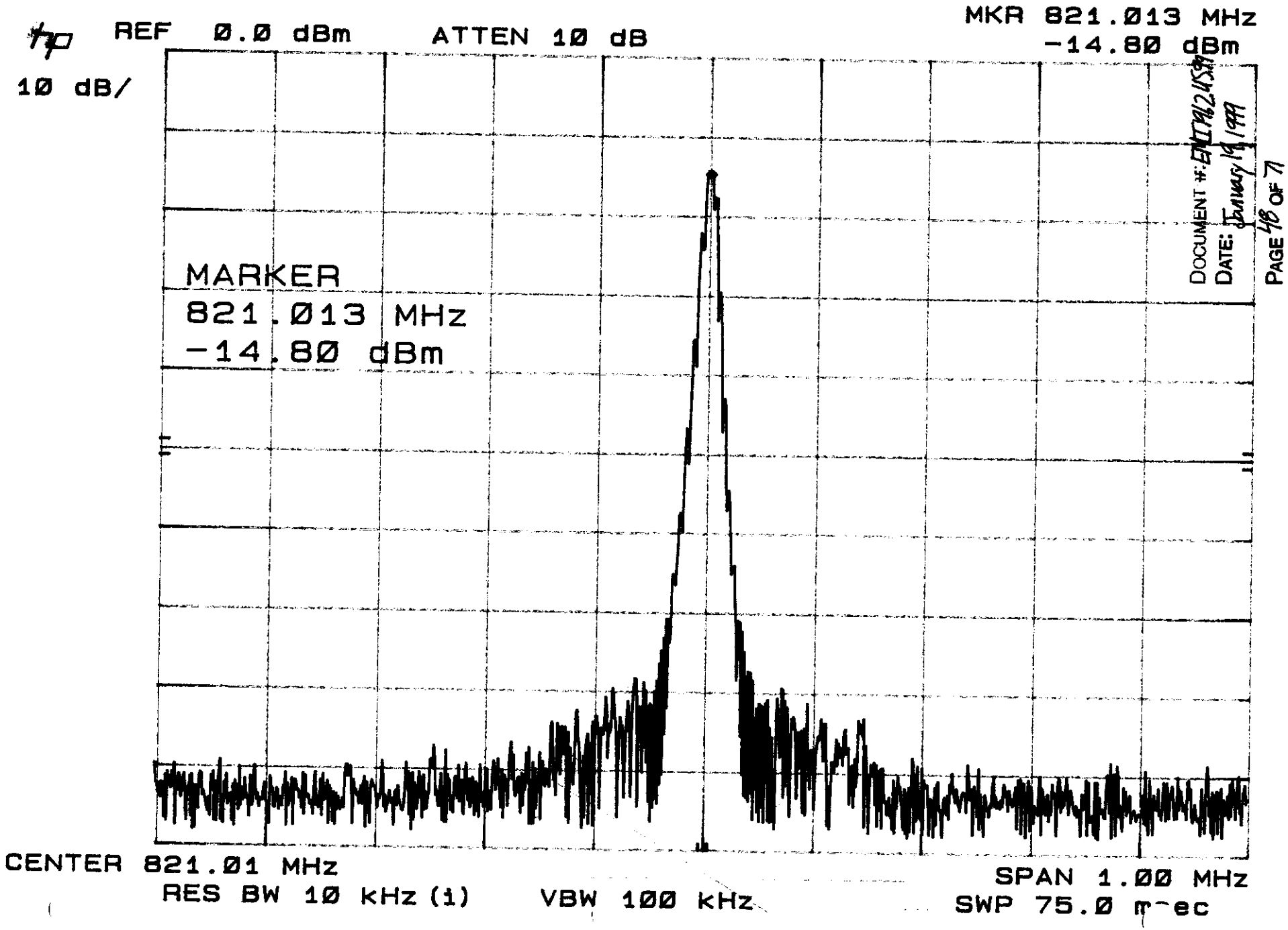
DOCUMENT #: EMI19621599
DATE: January 19, 1999

Ch #600

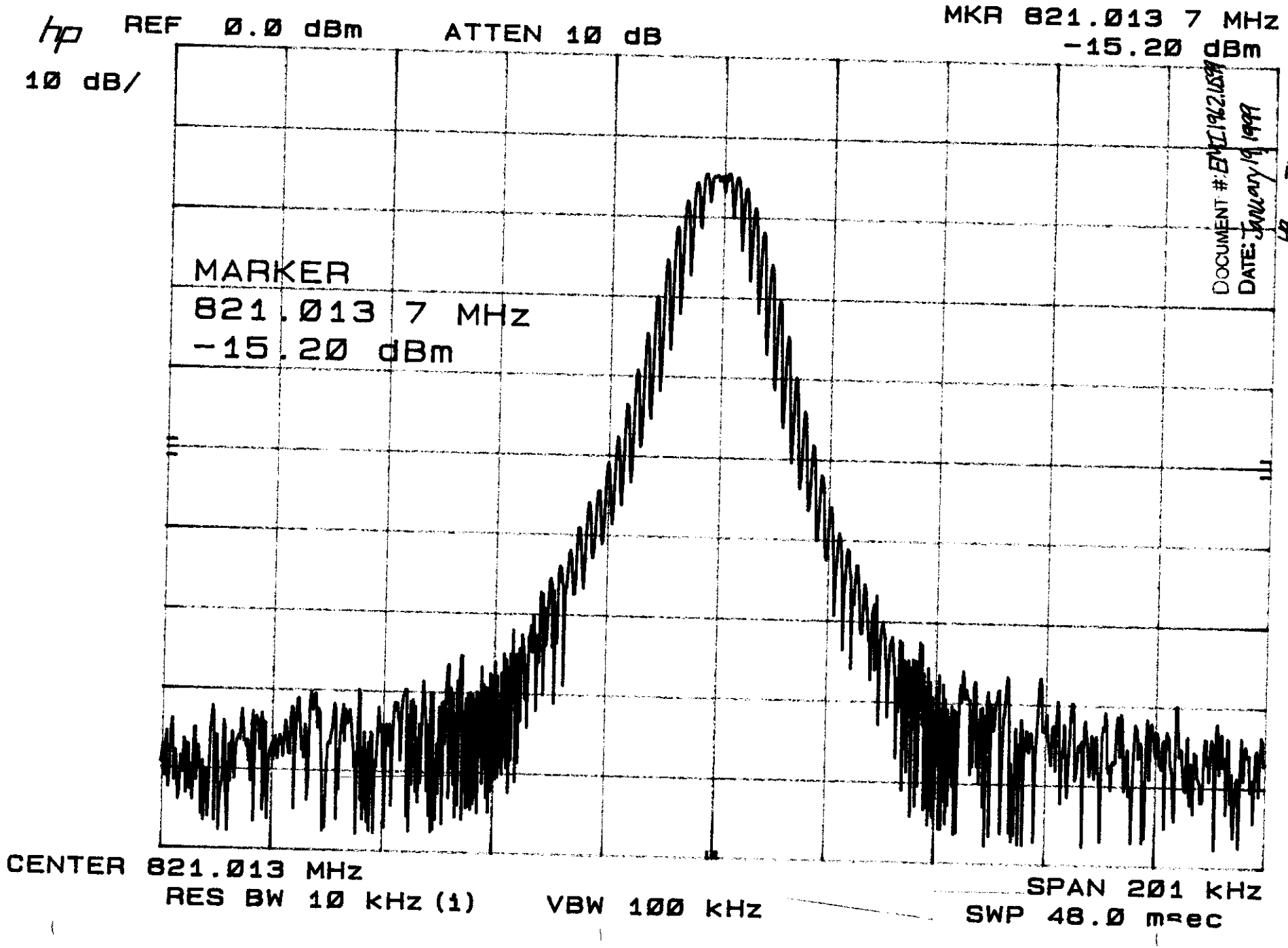


DOCUMENT #: EMI19821699
DATE: January 19, 1999

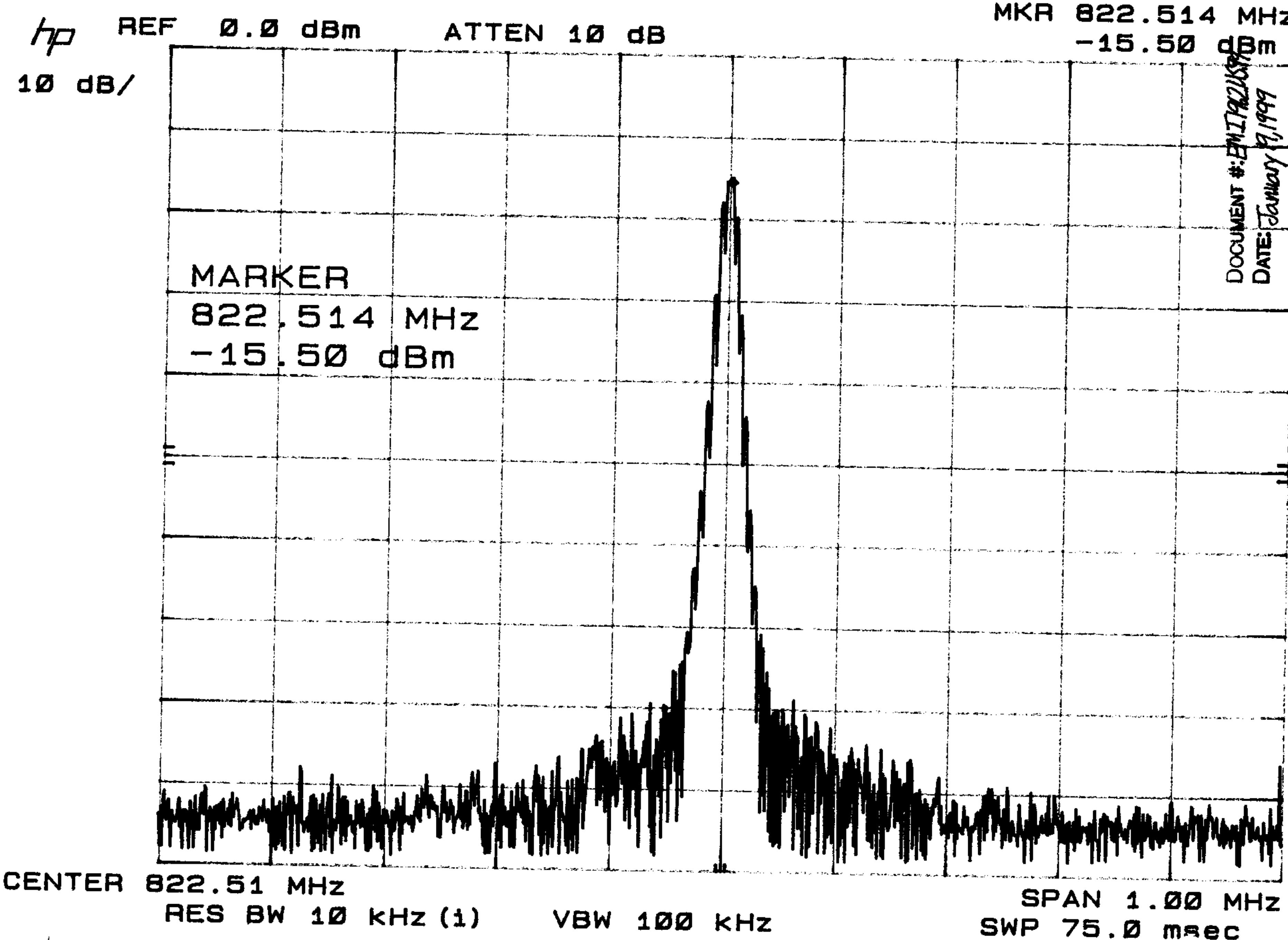
CH 601


REF 0.0 dBm
ATTEN 10 dB
MKR 821.013 MHz
-14.80 dBm
10 dB/
MARKER
821.013 MHz
-14.80 dBm
CENTER 821.01 MHz
RES BW 10 kHz (i)
VBW 100 kHz
SPAN 1.00 MHz
SWP 75.0 msec

CAL 601

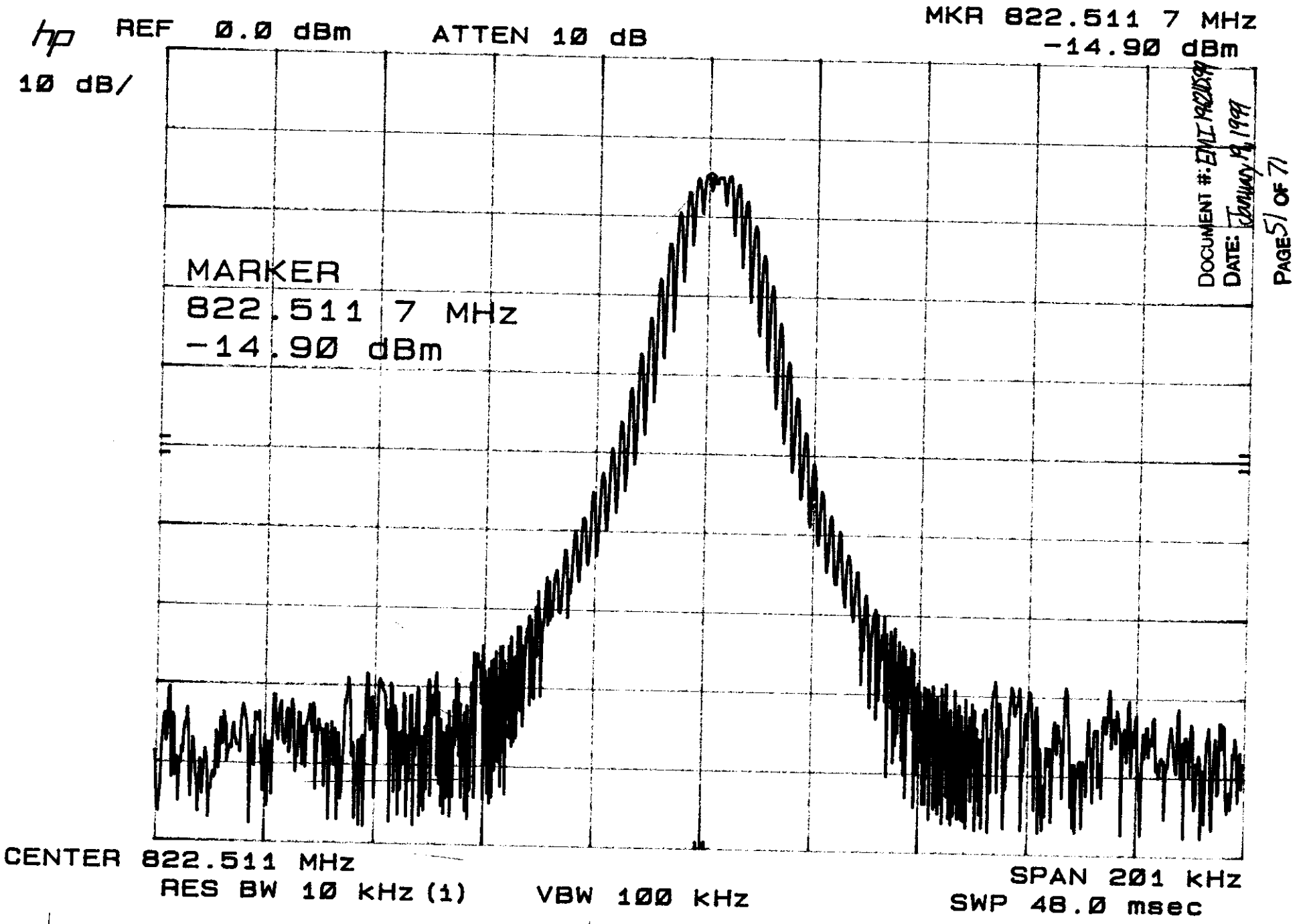

REF 0.0 dBm
ATTEN 10 dB
MKR 821.013 7 MHz
-15.20 dBm
10 dB/
MARKER
821.013 7 MHz
-15.20 dBm
CENTER 821.013 MHz
RES BW 10 kHz (1)
VBW 100 kHz
SPAN 201 kHz
SWP 48.0 msec

CH 715



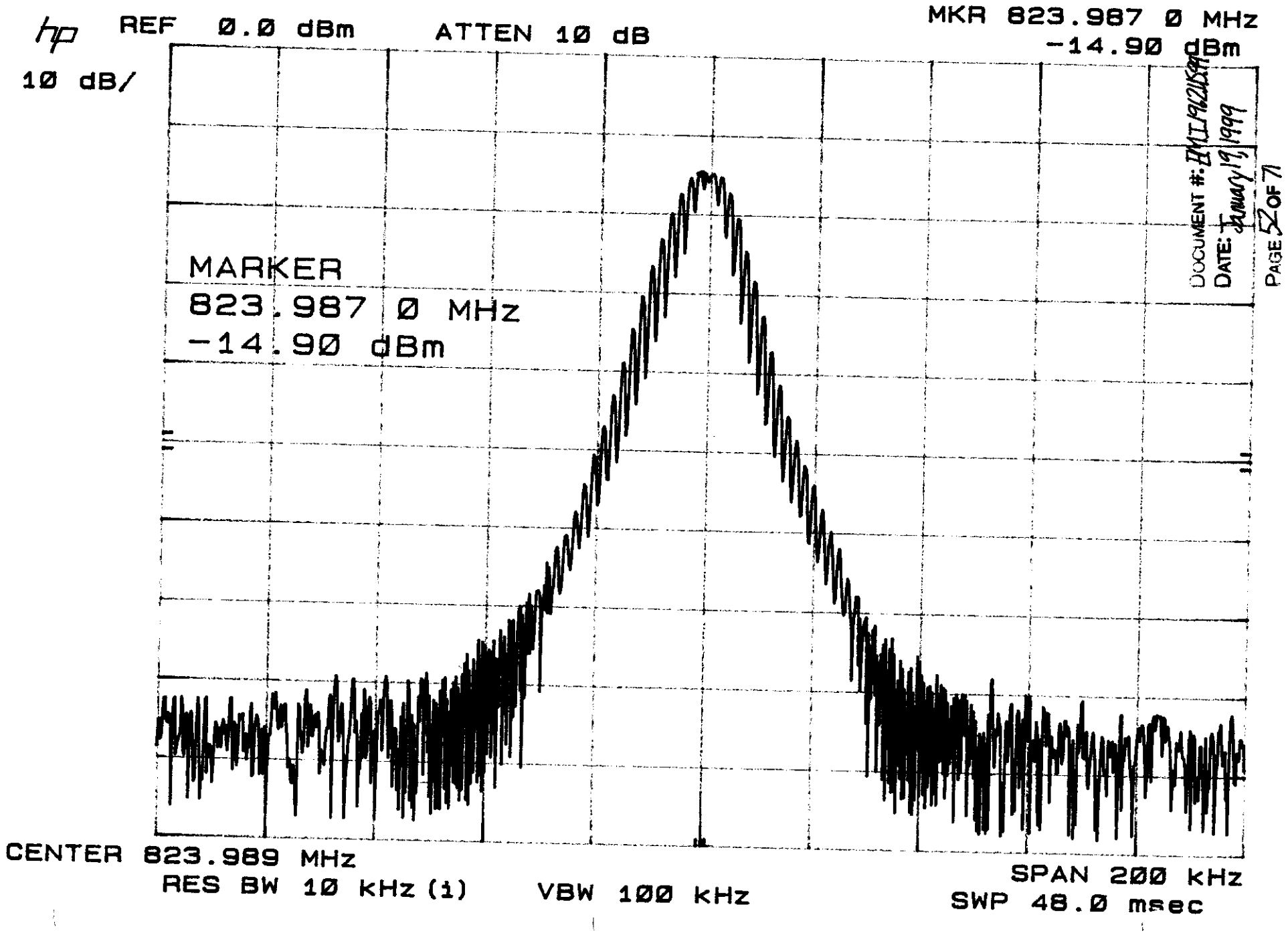
DOCUMENT #: EMI1902US98
DATE: January 19, 1999

CH 715



DOCUMENT #: EMI 1402B99
DATE: January 4, 1999

CH 820



DOCUMENT #: HMI-9602SAR
DATE: January 19, 1999
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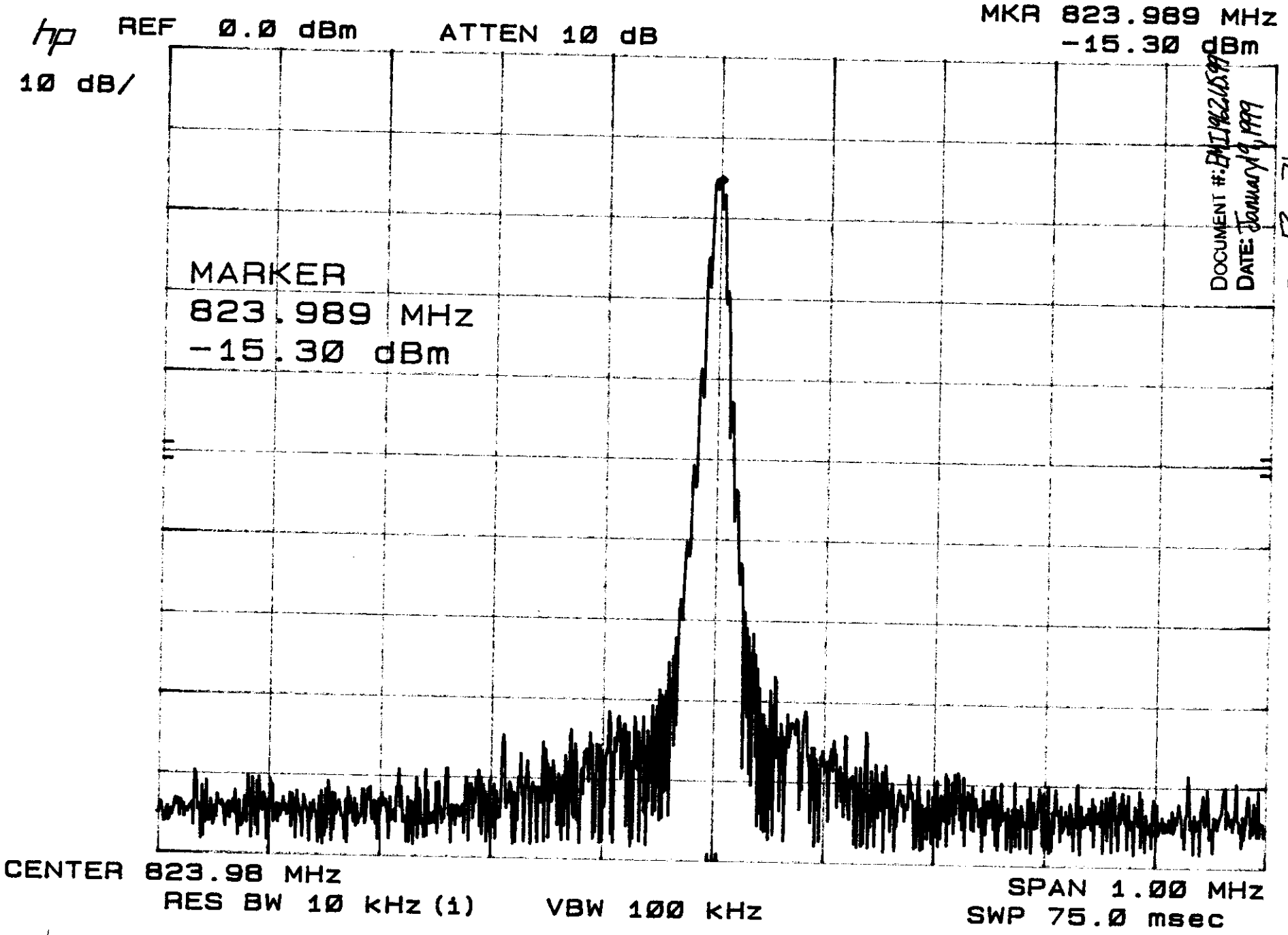
CH 830



DOCUMENT #: EMI1962.DSM
DATE: January 4, 1999

FREQUENCY STABILITY
DC Voltage vs Frequency

CUSTOMER: MACOM
EQUIPMENT: Open Sky Mobile Radio
TESTED BY: R. Foster
OPERATING MODE: Normal Full Power

DATE: December 13, 1998
TEST NUMBER: 6
COUPLING DEVICE: Antenna Terminal
TEST SPEC: FCC

Center Frequency 813.0129MHz at 20°C and 12VDC

DC Voltage	Frequency MHz
8.5	813.0133
9	813.0200
9.5	813.0199
10	813.0140
10.5	813.0128
11	813.0127
11.5	813.0145
12	813.0129
12.5	813.0150
13	813.0150
13.5	813.0129
14	813.0145
14.5	813.0155
15	813.0155
15.5	813.0170
16	813.0136

Maximum Deviation .07ppm at 9VDC

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FREQUENCY STABILITY
Temperature vs Frequency

CUSTOMER: MACom
EQUIPMENT: Open Sky Mobile Radio
TESTED BY: R. Foster
OPERATING MODE: Full Power

DATE: December 13-14 1998
TEST NUMBER: 6
COUPLING DEVICE: Antenna Terminals
TEST SPEC: FCC

Center Frequency 813.0127MHz at 20°C

Temperature	Frequency MHz
-30°C	813.01828
-20°C	813.01965
-10°C	813.0327
0°C	813.0265
10°C	813.0223
20°C	813.0127
30°C	813.0130
40°C	813.0199
50°C	813.0265

Maximum Deviation .2ppm at 10°C

Chomerics, 77 Dragon Court, Woburn, MA 01888-4014 (781) 935-4850 FAX (781) 935-2758

RADIATED E FIELD EMISSION MEASUREMENTS

CUSTOMER: MA/Com

EQUIPMENT: OPEN SKY Missile Radio

TESTED BY: R. Foster

BANDWIDTH: [X] 100 kHz (PEAK) / 120 kHz (QP)

OTHER (SPECIFY)

FREQUENCY RANGE: [X] 30MHz - 1GHz

OTHER (SPECIFY) 30 MHz - 10GHz

DATE: Nov 10, 1998

TEST NUMBER: 7

OPERATING MODE: Receiving Only

TEST SPEC: Radiated [illegible]

PROCEDURE: ANSI C63.4

ANTENNA DISTANCE: [X] 3 METERS [ ] 10 METERS

Frequency MHz	Peak Measured Level -dBm	Quasi-Peak Measured Level dBuV	Antenna Height (Meters)	Turntable Azimuth (Degrees)	Antenna H/V	Antenna Fac/Cable Loss dB	Field Level dB uV/m **	Limit dBuV/m (QP)
113	-	30	2.5	180	V	-6.2	23.2	43.5
116	-	31	2.5	0	V	-5.5	25.5	43.5
126	-	24	2.0	0	V	-4.4	20	43.5
128	-	23	2.0	0	V	-4.3	19	43.5
130	-	23	2.0	0	V	-4.3	19	43.5
136	-	32	2.5	0	V	-4.7	27.3	43.5
140	-	26	2.0	180	V	-6.0	26	43.5
145	-	24	2.0	180	V	-5.7	19	43.5
			No other Signals detected					

** All signals greater than 3dB from the limit are calculated to the nearest whole number.

** Field Level (dBuV/m) = [107 - Measured Level (dBm)] + Antenna Factor/Cable Loss (dB)

Chomerics, 77 Dragon Court, Woburn, MA 01888-4014 (617)935-4850 FAX (617) 935-2758

RADIATED E FIELD EMISSION MEASUREMENTS

CUSTOMER: MA/Com

EQUIPMENT: OPEN SKY Mobile Radio

TESTED BY: R. Foster

BANDWIDTH: [√] 100 kHz (PEAK) / 120 kHz (QP)

OTHER (SPECIFY) 100 KHz

FREQUENCY RANGE: [X] 30MHz - 1GHz

OTHER (SPECIFY) 30 MHz - 10 GHz

DATE: NOV 10 1998

TEST NUMBER: 8

OPERATING MODE: Full Power

TEST SPEC: Field Strength Spurious Radiation

PROCEDURE: ANSI C63.4

ANTENNA DISTANCE: [√] 3 METERS [ ] 10 METERS

Out Put Power 149 dBuV or 15 Watts

Frequency MHz	Peak Measured Level -dBm	Quasi-Peak Measured Level dBuV	Antenna Height (Meters)	Turntable Azimuth (Degrees)	Antenna H/V	Antenna Fac/Cable Loss dB	Field Level dB uV/m **	Limit dBuV/m (QP)
113	-	30	2.5	180	V	-6.2	23.8	91.6
112	-	31	2.5	0	V	-5.5	25.5	91.6
126	-	24	2.0	6	V	-4.4	20	91.6
128	-	20	2.0	0	V	-4.3	16	91.6
130	-	20	2.0	0	V	-4.3	16	91.6
136	-	35	2.5	0	V	-4.7	30	91.6
140	-	29	2.0	180	V	-6.0	23	91.6
145	-	26	2.0	180	V	-5.7	20	91.6
				No other Signals detected				

** All signals greater than 3dB from the limit are calculated to the nearest whole number.

** Field Level (dBuV/m) = [107 - Measured Level (dBm)] + Antenna Factor/Cable Loss (dB)

Chomerics, 77 Dragon Court, Woburn, MA 01888-4014 (617)935-4850 FAX (617) 935-2758

APPENDIX B

SET-UP PHOTOGRAPHS

APPENDIX C

TEST SETUP DIAGRAMS
FIGURE 3 AND 4

Test Setup

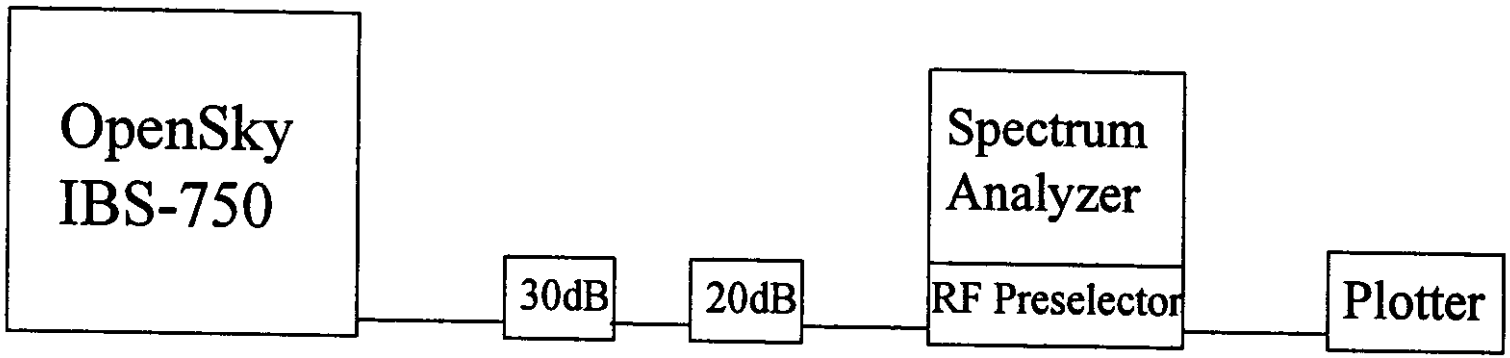


Figure 3

Test Setup

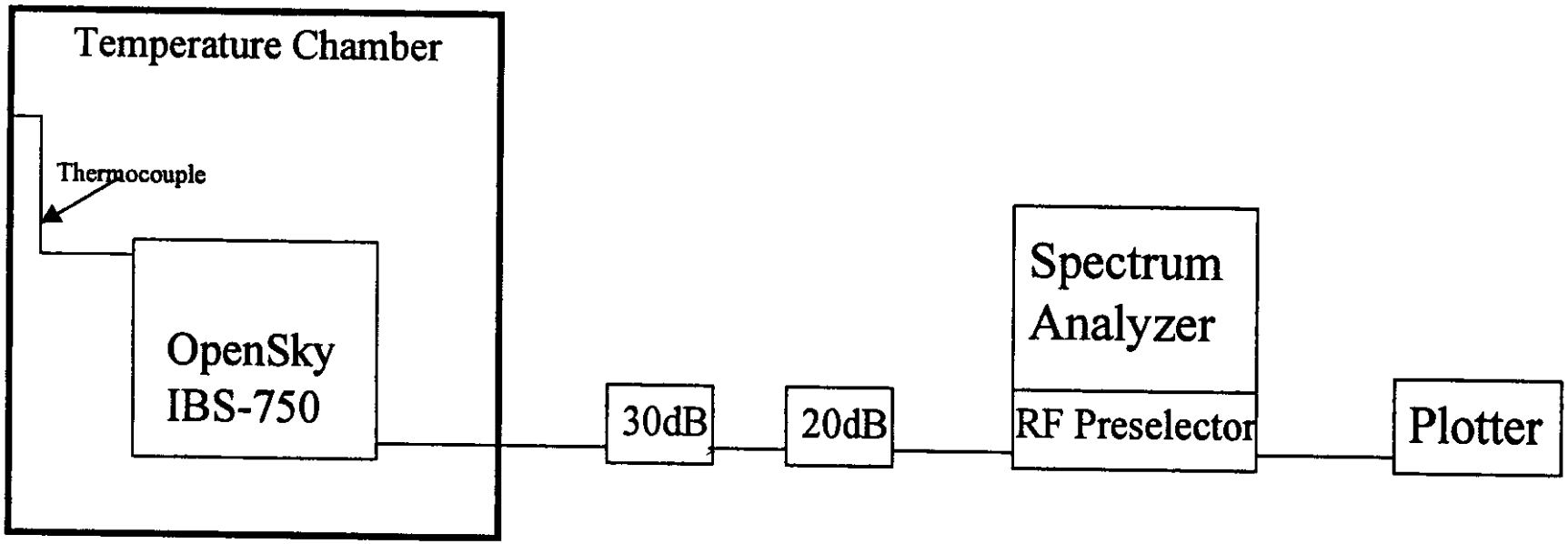


Figure 4

APPENDIX D

CUSTOMER SUPPLIED DESCRIPTION OF OPENSKY MOBILE RADIO

Product Description

The radio is a versatile voice and data radio designed for the mobile environment. It operates in the SMR frequency band. This band provides a total of over 830 possible channels spread over the 806-824 MHz (transmit) band. The RADIO operates half-duplex with a 15 Watt (typical) transmit output power in the SMR band.

The radio provides voice and data service in a dispatch operation. Voice operation is provided using the included microphone and speaker. Data connectivity is provided by a separate mobile data terminal (MDT.) There are two interfaces to the MDT: standard RS-232 serial (DCE) and a custom interface. The custom interface, labeled BASEBAND, provides analog baseband signals, power, and speaker output. This custom interface allows the RADIO to emulate a conventional analog FM radio.

Modulation waveforms and communications protocol are controlled by downloadable firmware. At the present time, four separate protocols are supported: conventional FM, FMP (Federal Express Mobile Protocol), OCP (Opensky Communication Protocol), and OTP (Opensky Trunking Protocol).

Conventional FM mode mimics a FM radio with front and rear baseband paths. The front baseband path provides a microphone interface with push-to-talk (PTT.) The rear panel provides speaker audio output. Traditional squelch (based on received signal strength) and CTCSS squelch are supported. Audio paths include emphasis and de-emphasis as applicable.

Rear panel line level signals are also provided. These paths operate similarly to the voice paths, but may be configured without emphasis for connection to a data modem. A "push-to-voice or data" line is provided to control transmission.

In FMP, OCP, and OTP protocols all transmitted information is digital. Each of these protocols is TDMA based and operates at a data rate of 19.2kbps. Another difference between the modes is that, under the TDMA protocols listed, all information in and out of the radio will use the RS-232 serial port.

The radio has a LCD display and LED indicators for status display. Three pairs of pushbuttons: "VOL" for volume, "MENU" to select a control menu, and "SEL" to change a control setting allow user configuration. In addition, the radio can be configured and controlled by a large suite of "AT"-style software commands via the RS-232 serial port.

APPENDIX E

CUSTOMER SUPPLIED MODULATION CHARACTERISTICS

Description of Modulation System

Conventional FM Mode

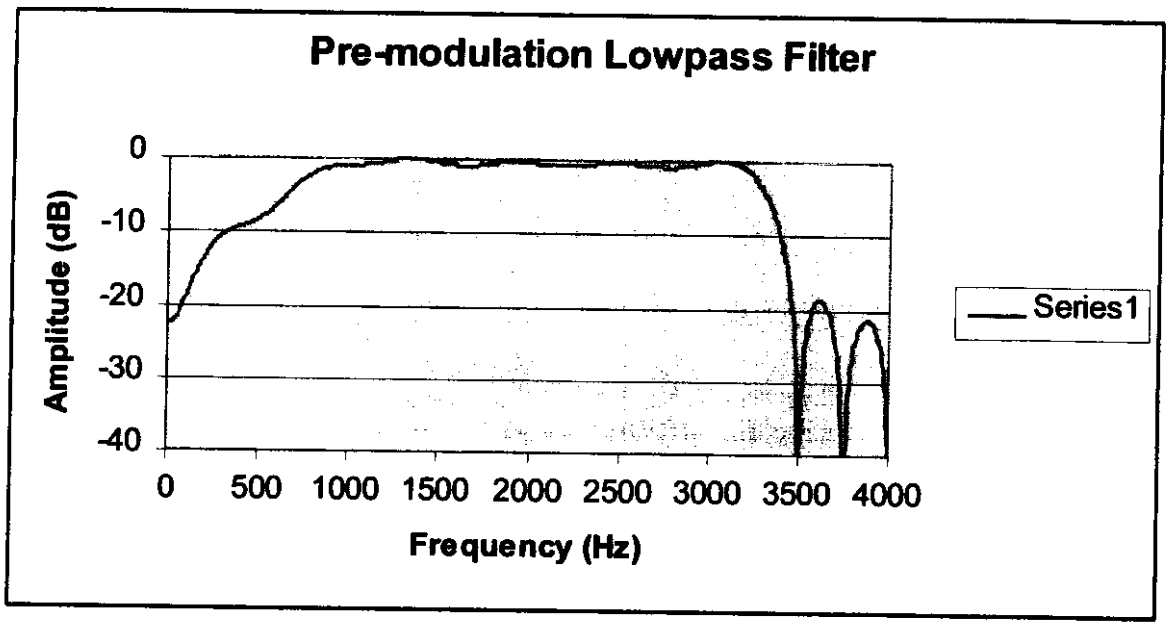
Conventional FM Mode, based on TIA/EIA-603, provides standard FM radio capabilities. The receiver functions include FM demodulation, RSSI squelch, CTCSS squelch, audio de-emphasis, line level audio output, and audio speaker output. The transmitter functions consist of audio leveling, high pass filtering, low pass filtering, emphasis, CTCSS tone generation, deviation limiting, and FM modulation. All baseband signal processing, filtering, tone generation, and modulation is implemented by digital signal processing (DSP) software and is therefore not subject to temperature drift and aging effects.

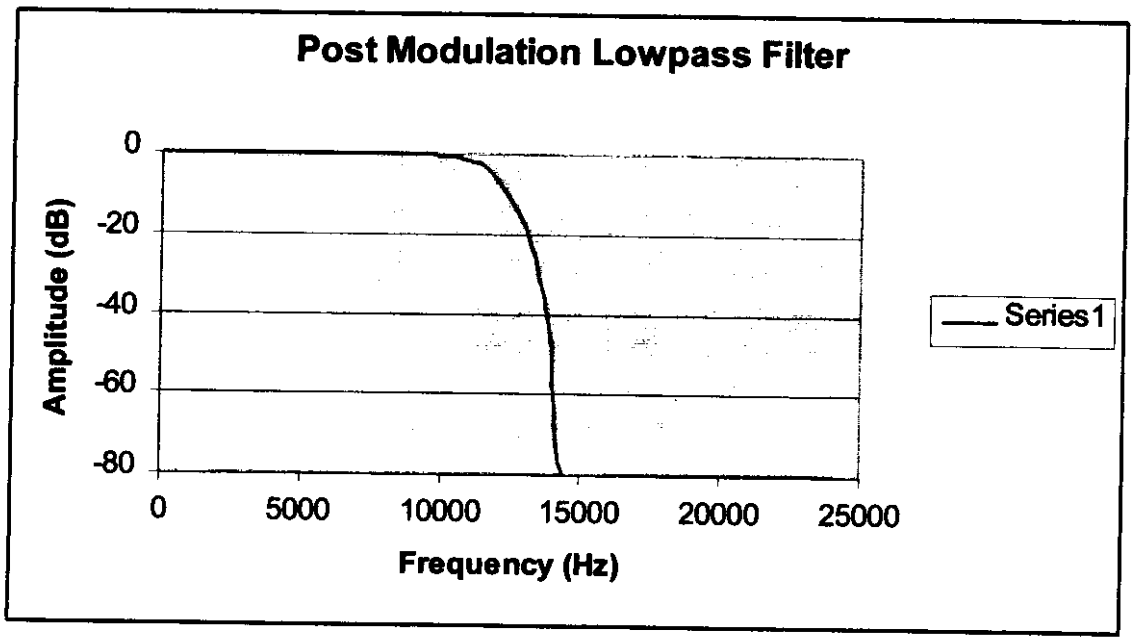
FMP, OCP,OTP,OAD Modes

The digital modes use a 4 level guassian frequency shift keying (GFSK) signal to send data at a symbol rate of 9600 baud and a corresponding data rate of 19.2kbits/sec. Before FM modulation symbols are filtered by a guassian filter with a B_B T=0.7 and peak frequency deviation of 5.5 kHz. All data, control and encoded voice are sent using the GFSK waveform. All baseband signal processing, filtering, tone generation, and modulation is implemented by digital signal processing (DSP) software and is therefore not subject to temperature drift and aging effects.

Audio Filter Used in Conventional FM Mode

The radio transmitter includes lowpass filtering before and after FM modulation. The lowpass filter before modulation is shown below. A more selective filter is provided after modulation, its response is also included.





OPEN AREA TEST SITE A
Figure 1

CHOMERICS

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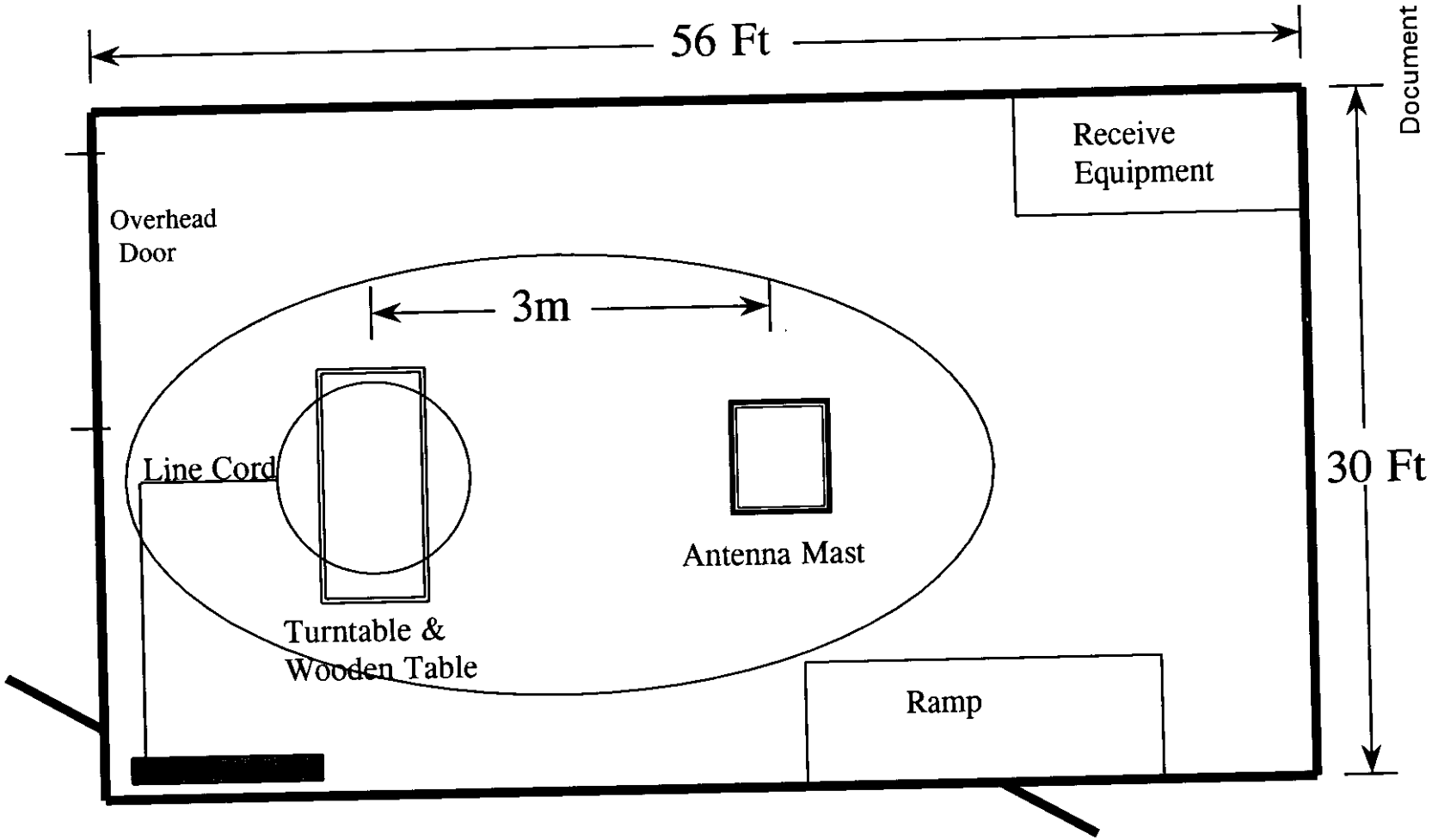
Parker Seals



Key: Not to Scale

= Power board

The structure used to support equipment under test is a 14 foot diameter motorized turntable. The sheet metal surface is flush with the ground plane. To ground the turntable, 175 copper fingers (1" x 1.5") are mounted around the outer edge of the turntable using machine screws. The spring fingers are equally spaced and provide a uniform interface between the turntable metal surface and ground plane. For table top equipment, a wooden table measuring 1.5 x 1 meter in size is positioned at the center of the turntable, at the proper height above the ground plane.

The addition at the end of the open area test site is the location for the test personnel and equipment to ensure they are outside the imaginary ellipse.

The available AC power within Open Area Test Site B is 12VDC Single Phase 60Amps; 208V 60Hz Three Phase 60Amps; 208V 60Hz Single Phase 60Amps; 230V 50Hz Single Phase 50Amps.

This site is listed by the Federal Communications Commissions (FCC).

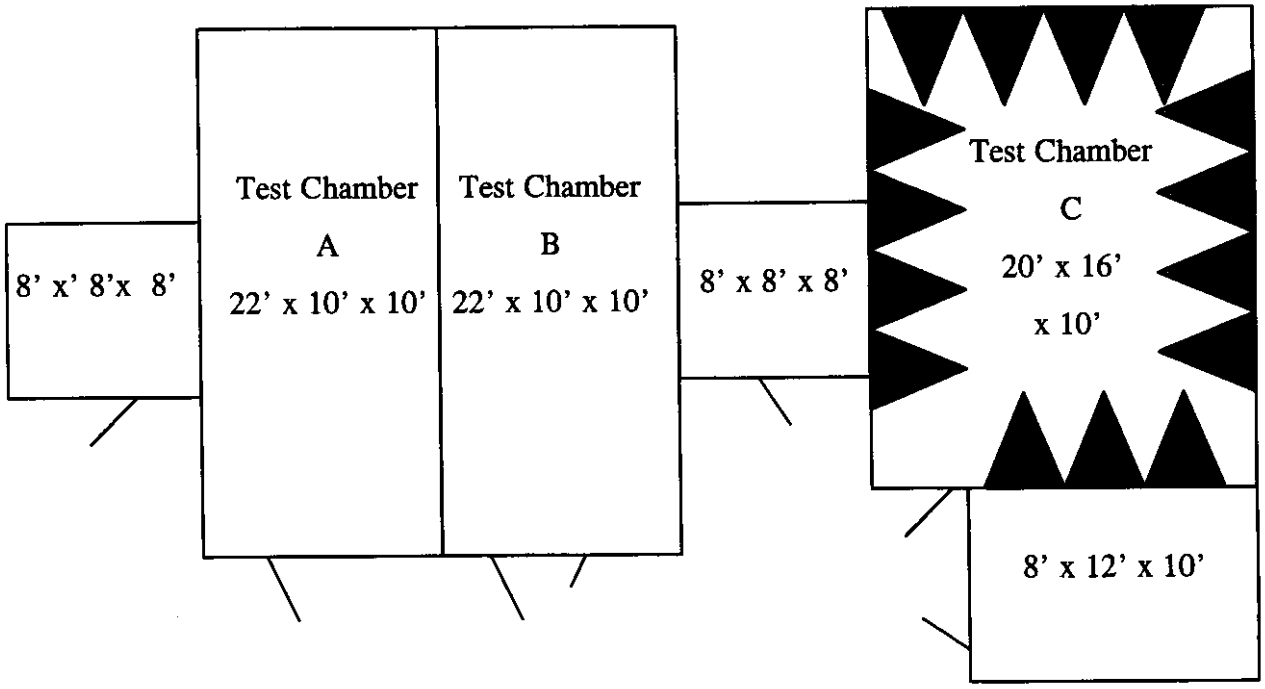
Test Chamber A: Chomerics Test Chamber A, if used for this test program, is located in the Seeger Building at Chomerics, 77 Dragon Court, Woburn, Massachusetts (see Figure 2). The shielded enclosures (test chambers) were manufactured and installed by Universal Shielding Corporation of Deer Park, New York. Attenuation tests have demonstrated that the shielded enclosures meet the attenuation requirements of MIL-STD-285 and NSA 65-6. The main test chamber is 22 x 10 x 10 feet in size with an adjacent enclosure which is 8 x 8 x 8 feet in size. The adjacent room used for support equipment and the main test chamber are connected together and referenced to the same single point ground.

When needed for table top equipment, a wooden table measuring 3 x 9 feet in size is positioned within the test chamber. When used for MIL-STD-461D tests the table top surface is covered with a copper sheet and grounded to the test chamber wall so that the resistance is less than 2.5 milliohms.

The power line filters supplying the power to the enclosures provide 100dB of attenuation from 10kHz to 10GHz. The adjacent room used for support equipment and the main test chamber have independent AC power obtained from independent AC power line filters.

The available AC power in Test Chamber A is 12VDC Single Phase 100Amps; 120V 400Hz Three Phase 50Amps; 208V 60Hz Three Phase 100Amps; 208V 60Hz Single Phase 100Amps; 230V 50Hz Single Phase 50Amps.

Immunity Lab Layout
Figure 2



Key: 1/8" = 1'

▲ = Emerson-Cuming RF absorber material

Test Chamber B: Chomerics Test Chamber B, if used for this test program, is located in the Seeger Building at Chomerics, 77 Dragon Court, Woburn, Massachusetts (see Figure 2). The shielded enclosures (test chambers) were manufactured and installed by Universal Shielding Corporation of Deer Park, New York. Attenuation tests have demonstrated that the shielded enclosures meet the attenuation requirements of MIL-STD-285 and NSA 65-6.

The main test chamber is 22 x 10 x 10 feet in size with an adjacent enclosure which is 8 x 8 x 8 feet in size. The adjacent room used for support equipment and the main test chamber are connected together and referenced to the same single point ground.

Test Chamber B is lined with Rantec ferrite absorber tiles FT-100. All surfaces of the room are lined with FT-100. The floor is lined with removable tiles. This absorber material allows the test chamber to meets the 0-6dB field uniformity requirements of IEC 1000-4-3 and ENV50140.

There are two access panels between the main test chamber and the support room. The access panels are covered with absorber tiles. The absorber tiles can be removed from the access panels.

The power line filters supplying the power to the enclosures provide 100dB of attenuation from 10kHz to 10GHz. The adjacent rooms used for support equipment and the main test chamber have independent AC power obtained from independent AC power line filters.

The available AC power in Test Chamber B is 12VDC Single Phase 30Amps; 208V 60Hz Three Phase 30Amps; and 230V 50Hz Single Phase 30Amps: A wooden table 3 x 6 feet in size is used for tabletop equipment.

Only one power line frequency is available in the chamber at a time, 50, 60 or 400 cycle, unless power is brought through an access panel.

Test Chamber C: Chomerics Test Chamber C, if used for this test program, is located in the Seeger Building at Chomerics, 77 Dragon Court, Woburn, Massachusetts (see Figure 2). The shielded enclosures (test chambers) were manufactured and installed by Universal Shielding Corporation of Deer Park, New York.

Attenuation tests have demonstrated that the shielded enclosures meet the attenuation requirements of MIL-STD-285 and NSA 65-6. The main test chamber is 16 x 20 x 10 feet in size with two adjacent enclosures on either side which are 8 x 8 x 8 and 8 x 12 x 10 feet in size, respectively.

Test Chamber C is lined with Emerson-Cuming RF absorber material. This absorber material meets the following absorption specifications: 80MHz 6dB, 300MHz 30dB, 500MHz 35dB, 1GHz 40dB, and 3 to 24 GHz 50dB. Each of the two adjacent rooms used for support equipment and the main test chamber are connected together and referenced to the same single point ground.

When needed for table top equipment, a wooden table measuring 3 x 9 feet in size is positioned within the test chamber. When used for MIL-STD-461D tests, the table top surface is covered with a copper sheet and grounded to the test chamber wall so that the resistance is less that 2.5 milliohms. When used for radiated electromagnetic field tests, to some standards, the copper table top surface is removed.

The available AC power in Test Chamber C is 12VDC AC Single Phase 60Amps; 230V 50Hz AC Single Phase 50Amps; 115V 400Hz AC Three Phase 30Amps (through access panel); 208V 60Hz AC Three Phase AC 30Amps (through access panel).

The power line filters supplying the power to the enclosures provide 100dB of attenuation from 10kHz to 10GHz. Each of the two adjacent rooms used for support equipment and the main test chamber have independent AC power obtained from independent AC power line filters.

EC Lab A: Chomerics EC Lab A is located in the Seeger Building at Chomerics, 77 Dragon Court, Woburn, Massachusetts.

EC Lab A is a typical room measuring 20 x 16 feet with an aluminum sheet metal (8 x 12 feet in size) in the center of the floor for a ground plane. When needed for table top equipment, a wooden table (0.8 meters in height) is placed on the metal ground plane that extends at least 0.1m beyond all sides of the table. A removable 3 x 6 foot sheet of aluminum is placed on top of the wooden table when a horizontal coupling plane is required.

The appropriate connections, as needed for each test, are used to interconnect the table horizontal coupling plane, ground plane floor, test equipment, and earth ground.

The available AC power in the EC Lab A is 12VDC AC Single Phase 60Amps; 230V 50Hz AC Single Phase 50Amps; and 208V 60Hz AC Three Phase AC 30Amps.

EC Lab A is equipped with air and water services for use with equipment that requires it.

The humidity in EC Lab A can be automatically controlled in the range of 20% to 60%.

EC Lab B: Chomerics EC Lab B is located in the Seeger Building at Chomerics, 77 Dragon Court, Woburn, Massachusetts.

EC Lab B is a typical room measuring 12 x 14 feet with a copper sheet (6 x 8 feet in size) in the center of the floor for a ground plane. When needed for table top equipment, a wooden table (0.8 meters in height) is placed on the metal ground plane that extends at least 0.1m beyond all sides of the table. A removable 3 x 6 foot sheet of aluminum is placed on top of the wooden table when a horizontal coupling plane is required.

The appropriate connections, as needed for each test, are used to interconnect the table horizontal coupling plane, ground plane floor, test equipment, and earth ground.

The available AC power in the EC Lab B is 12VDC AC Single Phase 60Amps, 230V 50Hz AC Single Phase 50Amps; and 208V 60Hz AC Three Phase AC 30Amps.

The humidity in EC Lab B can be automatically controlled in the range of 20% to 60%.

1.3.3 Equipment Under Test

See Appendix C for a complete description of the OpenSky Multi Mode Radio

2.0 SUMMARY

The terms "Passed" or "Failed" in this section are intended to guide the reader as to whether or not the EUT met the minimum Performance Criteria that can be interpreted from the FCC Parts 2, 15 and 90. The "Results" paragraph in each test section to follow, and the test data sheets, will outline specifically how the EUT performed during each test.

Output Power	Pass
Occupied Bandwidth	Pass
Emission Mask and Spurious Emissions at Antenna Terminals	Pass
Channel Spacing/Bandwidth	Pass
Field Strength of Spurious Radiation	Pass
Frequency Stability	Pass
Radiated Emission Receiver	Pass

2.1 Summary of Recommendations

The M/A-Com OpenSky Mobile Radio will not require modifications in order to insure compliance with FCC Parts 2, 15 and 90.

3.0 TESTS PERFORMED

3.1 Output Power

3.1.1 Equipment Used

Test Equipment		Asset #	Serial #	Cal Date
X	H/P 8566B Spectrum Analyzer	47	2637A04064	07/99
X	H/P 85658A RF Preselector	48	2648A00483	07/99
X	H/P OPT 462 Display	46	2648A14289	07/99
X	Narda 769-30 High Power Attenuator	284	03793	C.P.U.
X	Narda 769-20 High Power Attenuator	471	02951	C.P.U.

3.1.2 Test Conditions

For measurement of the output power the Open Sky Mobile Radio was placed inside a shielded room. The ambient temperature of the room was 20°C.

The OpenSky Mobile Radio was configured to operate in a normal full power transmit mode. The OpenSky Mobile Radio was set up and powered by 12VDC for the test.

3.1.3 Test Method

The output of the OpenSky Mobile Radio was measured at six frequencies between the frequency range of 806MHz to 824MHz. The output of the transmitter was connected to two high power attenuators. The attenuators were connected to a Spectrum Analyzer. See Figure 3 for test up. The frequencies measured are as follows:

Channel No.	Base Frequency MHz
1	806.0125
300	813.0125
600	820.9875
601	821.0125
715	822.5125
830	823.9875

3.1.4 Results

The output power of the M/A-Com OpenSky Mobile Radio is within ±1dB throughout the frequency range.

3.2 Occupied Bandwidth

3.2.1 Equipment Used

	Test Equipment	Asset #	Serial #	Cal Date
X	H/P 8566B Spectrum Analyzer	47	2637A04064	07/99
X	H/P 85658A RF Preselector	48	2648A00483	07/99
X	H/P OPT 462 Display	46	2648A14289	07/99
X	Narda 769-30 High Power Attenuator	284	03793	C.P.U.
X	Narda 769-20 High Power Attenuator	471	02951	C.P.U.

3.2.2 Test Conditions

For measurement of the occupied bandwidth the Open Sky Mobile Radio was placed inside a shielded room. The ambient temperature of the room was 20°C.

The OpenSky Mobile Radio was configured to operate in a normal full power transmit mode. The OpenSky Mobile Radio was set up and powered by 12VDC for the test.

3.2.3 Test Method

The output of the OpenSky Mobile Radio was measured at six frequencies between the frequency range of 806MHz to 824MHz. The output of the transmitter was connected to two high power attenuators. The attenuators were connected to a Spectrum Analyzer. See Figure 3 for test setup.

The frequencies measured are as follows:

Channel No.	Base Frequency MHz
1	806.0125
300	813.0125
600	820.9875
601	821.0125
715	822.5125
830	823.9875

3.2.4 Results

The M/A-Com OpenSky Mobile Radio meets the requirements of FCC Part 2.989 Occupied Bandwidth.

3.3 Emissions Mask and Spurious Emissions at Antenna Terminals

3.3.1 Equipment Used

	Test Equipment	Asset #	Serial #	Cal Date
X	H/P 8566B Spectrum Analyzer	47	2637A04064	07/99
X	H/P 85658A RF Preselector	48	2648A00483	07/99
X	H/P OPT 462 Display	46	2648A14289	07/99
X	Narda 769-30 High Power Attenuator	284	03793	C.P.U.
X	Narda 769-20 High Power Attenuator	471	02951	C.P.U.

3.3.2 Test Conditions

The Emissions Mask measurements of the Open Sky Mobile Radio were made inside a shielded room. The ambient temperature of the room was 20°C.

The OpenSky Mobile Radio was configured to operate in a normal full power transmit mode. The OpenSky Mobile Radio was set up and powered by 12VDC for the test.

3.3.3 Test Method

The output of the transmitter was connected to two high power attenuators. The attenuators were connected to a Spectrum Analyzer. See Figure 3 for test setup.

The frequencies measured are as follows:

Channel No.	Base Frequency MHz
1	806.0125
601	821.0125

A full scan from 7MHz to 10GHz was performed for Channel 1 806.0125MHz only.

3.3.4 Results

The M/A-Com OpenSky Mobile Radio meets the requirements of FCC Part 90.210 and Part 2.991 "Emissions Mask and Spurious Emissions at Antenna Terminals".

3.4 Channel Spacing/Bandwidth

3.4.1 Equipment Used

Test Equipment		Asset #	Serial #	Cal Date
X	H/P 8566B Spectrum Analyzer	47	2637A04064	07/99
X	H/P 85658A RF Preselector	48	2648A00483	07/99
X	H/P OPT 462 Display	46	2648A14289	07/99
X	Narda 769-30 High Power Attenuator	284	03793	C.P.U.
X	Narda 769-20 High Power Attenuator	471	02951	C.P.U.

3.4.2 Test Conditions

The Channel Spacing/Bandwidth measurements of the Open Sky Mobile Radio were made inside a shielded room. The ambient temperature of the room was 20°C.

The OpenSky Mobile Radio was configured to operate in a normal full power transmit mode. The OpenSky Mobile Radio was set up and powered by 12VDC for the test.

3.4.3 Test Method

The output of the OpenSky Mobile Radio was measured at four frequencies. The channel spacing and bandwidth were checked.

The output of the transmitter was connected to two high power attenuators. The attenuators were connected to a Spectrum Analyzer. See Figure 3 for test setup.

The frequencies measured are as follows:

Channel No.	Base Frequency MHz
1	806.0125
2	806.0375
601	821.0125
602	821.0135

3.4.4 Results

The M/A-Com OpenSky Mobile Radio meets the requirements of FCC Part 90.209 channel spacing/bandwidth.

3.5 Field Strength of Spurious Radiation Electromagnetic Emissions

3.5.1 Equipment Used

	Test Equipment	Asset #	Serial #	Cal Date
X	Tektronix 496 Spectrum Analyzer	1	B010559	10/99
X	Tektronix 494 AP Spectrum Analyzer	543	B010201	9/99
X	Rhode and Schwartz ESV Test Receiver	15	875931049	9/99
X	Hewlett Packard 8447D Pre Amp	4	2727A06065	1/99
X	EMCO 3120 Tuned Dipole Antenna B1	477	56	1/99
X	EMCO 3121 Tuned Dipole Antenna B2	478	176	1/99
X	EMCO 3121 Tuned Dipole Antenna B3	479	728	1/99
X	EMCO 3115 Microwave Horn Antenna	376	2796	1/99

3.5.2 Test Conditions

For radiated emissions testing of small devices, the devices are set up above the turntable on a wooden table 10 meters from a tuned dipole antenna within Open Area Test Site B.

The OpenSky Mobile Radio was configured to operate in the full power mode of operation to maximize the emissions. The EUT was set up and powered by 12VDC for radiated emission tests. The output of the OpenSky Mobile Radio was connected to a load. The worst case signals detected were recorded.

3.5.3 Test Method

The test method of ANSI C63.4 was followed. For the radiated emission measurements, a manual scan was performed from 30MHz to 10GHz. During this scan, the antenna, turntable and EUT's cable positions were manipulated to maximize the emission levels in a given frequency band displayed on the spectrum analyzer.

3.5.4 Results

The M/A-Com OpenSky Mobile Radio meets the FCC Part 2.993 Field Strength of spurious radiated Electromagnetic Emissions requirements.

3.6 Modulation Characteristics

See Appendix D for the modulation characteristics of the audio filter which were supplied by M/A-Com.

3.7 Frequency Stability

3.7.1 Equipment Used

	Test Equipment	Asset #	Serial #	Cal Date
X	H/P 8566B Spectrum Analyzer	47	2637A04064	07/99
X	H/P 85658A RF Preselector	48	2648A00483	07/99
X	H/P OPT 462 Display	46	2648A14289	07/99
X	Cincinnati Sub Zero ZH-32-2H/AC Temp. Chamber	544	Z09712530	05/99
X	Narda 769-30 High Power Attenuator	284	03793	C.P.U.
X	Narda 769-20 High Power Attenuator	471	02951	C.P.U.

3.7.2 Test Conditions

The Frequency Stability measurements of the Open Sky Mobile Radio were made inside a Temperature/Humidity Chamber.

The OpenSky Mobile Radio was configured to operate in a normal full power transmit mode. The OpenSky Mobile Radio was set up and powered by 12VDC for the test.

3.7.3 Test Method

With the OpenSky Mobile Radio in the temperature chamber, the output of the transmitter was connected to two high power attenuators. The attenuators were connected to a Spectrum Analyzer. See Figure 4 for test setup.

The temperature was measured by placing a thermal couple on the RF chain. The Temperature was varied from -30° to +50°C in 10° steps. At each 10° step the output of the OpenSky Mobile Radio was measured for frequency stability.

The OpenSky Mobile Radio was turned off between each 10° step. The OpenSky Mobile Radio was allowed two minutes for warm up before the frequency was measured.

The input voltage to the OpenSky Mobile Radio was varied from 8.5VDC to 16VDC in .5VDC. The output frequency was measured for frequency stability.

The output of the OpenSky Mobile Radio was measured at 813.025MHz.

3.7.4 Results

The M/A-Com OpenSky Mobile Radio meets the frequency stability requirements of FCC Part 90.210 and Part 2.995.

3.8 Radiated Electromagnetic Emissions - Receiver

3.8.1 Equipment Used

Test Equipment		Asset #	Serial #	Cal Date
X	Tektronix 496 Spectrum Analyzer	1	B010559	10/99
X	Tektronix 494 AP Spectrum Analyzer	543	B010201	9/99
X	Rhode and Schwartz ESV Test Receiver	15	875931049	9/99
X	Hewlett Packard 8447D Pre Amp	4	2727A06065	1/99
X	EMCO 3120 Tuned Dipole Antenna B1	477	56	1/99
X	EMCO 3121 Tuned Dipole Antenna B2	478	176	1/99
X	EMCO 3121 Tuned Dipole Antenna B3	479	728	1/99
X	EMCO 3115 Microwave Horn Antenna	376	2796	1/99

3.8.2 Test Conditions

For radiated emissions testing of small devices, the devices are set up above the turntable on a wooden table 10 meters from a tuned dipole antenna within Open Area Test Site B.

The OpenSky Mobile Radio was configured to operate in the non-transmitting mode of operation to maximize the emissions. The EUT was set up and powered by 12VDC for radiated emission tests. The worst case signals detected were recorded.

3.8.3 Test Method

The test method of ANSI-C63.4 was followed for Class B equipment. For the radiated emission measurements, a manual scan was performed from 30MHz to 10GHz. During this scan, the antenna, turntable and EUT's cable positions were manipulated to maximize the emission levels in a given frequency band displayed on the spectrum analyzer.

3.8.4 Results

The M/A-Com OpenSky Mobile Radio meets the requirements for radiated emissions as required by FCC Part 15 Subpart B for Class B equipment.