



COMPLIANCE TESTING  
OF  
Moto-Magnet II, Ultra

- TEST REPORT 90049-

Prepared for: Expedite International

***All results of this report relate only to the items that were tested.  
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Inc.***



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THE AMERICAN  
ASSOCIATION  
FOR LABORATORY  
ACCREDITATION

### ACCREDITED LABORATORY

A2LA has accredited

**L.S. COMPLIANCE, INC.**  
Cedarburg, WI

for technical competence in the field of

### Electrical (EMC) Testing

The accreditation covers the specific tests and types of tests listed on the agreed scope of accreditation. This laboratory meets the requirements of ISO/IEC Guide 25-1990 "General Requirements for the Competence of Calibration and Testing Laboratories" (equivalent to relevant requirements of the ISO 9000 series of standards) and any additional program requirements in the identified field of testing.

Presented this 30<sup>th</sup> day of December, 1998.



  
President  
For the Accreditation Council  
Certificate Number 1255.01  
Valid to January 31, 2001

For tests or types of tests to which this accreditation applies, please refer to the laboratory's Electrical (EMC) Scope of Accreditation



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DESCRIPTION OF MEASUREMENT FACILITIES

Site on File with the FCC

ID Number: 31040/SIT

1300F2

*“ The site referenced above has been found to comply with the test site criteria found in ANSI  
C63.4-1992 and 47CFR Section 2.948. ”*



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## *SI G NATURE PAGE*

Prepared By:

Approved By:

11 march

1999

Kenneth L. Boston, EMC Lab  
Manager

Date

PE #31926

Registered Professional Engineer

(State of Wisconsin)



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**FCC ID: OF6EI1000**

## 1.3 SUMMARY OF TEST REPORT

MANUFACTURER:	Expedite International
MODEL:	Moto-Magnet II, Ultra
SERIAL:	980177
DESCRIPTION:	Low power remote Transmitter
FREQUENCY RANGE:	49.86 MHz

The Moto-Magnet Ultra Remote control was found to “**meet**” the radiated emission specification of Title 47 CFR FCC, Part 15, subpart C. for an intentional radiator

This Remote Control device is meant to control the movement of a duck decoy which is mounted on top of a pedestal containing a superregenerative receiver. When the remote button is depressed, the pedestal platform begins to rock back and forth, which gives the appearance of a duck feeding, and when the remote button is pressed the second time, the platform ceases the movement. The product is intended to be used by hunters; in an outdoor environment, away from occupied urban and suburban environments.



## 1.4 INTRODUCTION

On 9 and 12 of February, 1999, a series of Radiated Emissions tests were performed on a sample model of the Moto-magnet II product; a Remote control which operates a by means of the transmission of a pulsed carrier train. These tests were performed using the test procedures outlined in ANSI C63.4-1992 for intentional radiators, and in accordance with the limits set forth in FCC Part 15.235. These tests were performed by Kenneth L. Boston, PE, of L. S. Compliance, Incorporated.

## 1.5 PURPOSE

The above mentioned tests were performed in order to determine the compliance of the Moto-magnet II Remote control product with limits contained in various provisions of Title 47 CFR, FCC Part 15, including:

15.235

15.209

All radiated emissions tests were performed to measure the emissions in the frequency bands described by the above sections, and to determine whether said emissions are below the limits established by the above sections. These tests were performed in accordance with the procedure described in the American National Standard for methods of measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (ANSI C63.4-1992). Another document used as reference for the EMI receiver specification was the International Special Committee on Radio Interference (CISPR) number 16-1 (1993).

## 1.6 RADIATED EMISSIONS TEST SETUP

The test sample was operated within the 3 meter Semi-Anechoic, FCC listed chamber located at L.S. Compliance in Cedarburg, WI. The sample was placed on an 80cm high wooden table, which was centered on the flush-mounted 2m diameter metal turntable. The test sample was operated on its own [new] internal battery. The test sample was configured to run in a continuous transmit mode during the 15.235 measurements. One test sample set to operate on the standard channel was tested as an intentional radiator, in order to determine compliance at a frequency of 49.86 MHz

Please refer to Section 1.11 for pictures of the test setup.





## 1.7 RADIATED EMISSION TEST PROCEDURE

The fundamental and spurious (harmonic) emissions of the transmitter were tested for compliance to Title 47 CFR, FCC Part 15.235 limits for a consumer device. For the calculations used to determine the limits applicable for the test sample, refer to Appendix A. These limits are expressed in decibels (dB) above 1 microvolt per meter ( $\mu\text{V}/\text{m}$ ). The sample was tested from the lowest frequency generated by the transmitter (without going below 9 kHz) to the 10th harmonic of the fundamental frequency generated by the device. The appropriate limits were also observed when the fundamental or spurious signals were located within any of the restricted bands as described in Part 15.205a. These frequencies, and their associated limits, are referenced in Section 1.10. The sample was placed on a nonconductive (wooden) table, in the 3 Meter chamber and the antenna mast was placed such that the antenna was 3m from the test object. A biconical antenna or tuned dipole was used to measure emissions from 30 to 200 MHz, a log periodic or tuned dipole was used to measure emissions from 200 to 1000 MHz, and a double ridged waveguide horn was used to measure emissions above 1 GHz. The test object was programmed to operate in continuous transmit, and the resultant signals were maximized by rotating the turntable 360 degrees, and by raising and lowering the antenna between 1 and 4 meters. The test object was also given several different orientations to determine the maximum signal levels, using both horizontal and vertical antenna polarities.

No significant emissions were found aside from the transmitter fundamental and several harmonics, plus a transient modulation characteristic found to be present at a frequency just below the fundamental carrier. The unit was scanned for emissions, over the range 30 to 1000 MHz to establish compliance with Part 15.235 and 15.209 while in continuous transmit.

In addition to measuring the levels of radiated emissions, the occupied bandwidth of the transmitter was measured. In accordance with FCC Part 15.235 the 26dB bandwidth of the transmitted signal should be within a window of  $\pm 50$  kHz of the 49.86 MHz carrier frequency. The resolution bandwidth was set to the closest available filter setting on the HP8546A EMI system that corresponded to 5% of the allowable bandwidth determined in the calculation mentioned above, without going below the resolution bandwidth of 10kHz, as dictated in ANSI C63.4-1992 section 13.1.7.

The sample was activated to transmit in a continuous mode and was placed on the aforementioned pedestal within the 3 meter chamber. The transmitted signal was received on a tuned dipole antenna and fed to the HP8546A EMI System, where the fundamental frequency was displayed, and a plot of the occupied bandwidth was produced. The bandwidth observed, 51.5 kHz, of the sample can be seen to fall within the 49.82 to 49.9 MHz band, when using the 15.209 general limits as the limit specification. The -26dBc bandwidth was seen to be 81.0 kHz and These plots are included in Appendix C.



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From the data supplied, it can be seen that the test samples do indeed “**meet**” the bandwidth requirement established by FCC Part 15.235.



## 1.8 TEST EQUIPMENT UTILIZED FOR RADIATED EMISSIONS TEST

A list of the test equipment and antennas used for the tests can be found in Section 1.13, which includes the calibration information as well as the equipment description. All equipment is calibrated and used according to the user manuals supplied by the manufacturer. All antenna calibrations were performed at a N.I.S.T traceable site, and the resultant correction factors were entered into the Hewlett Packard 8546A EMI receiver software database. The connecting cables used were also measured for loss using a calibrated signal generator and the HP 8546A EMI receiver. The resulting loss factors were entered into the HP 8546A database. This allowed for automatic changes in the antenna correction factor, as well as cable loss or other corrections, to be added to the EMI receiver display while taking measurements. Thus, the resulting data taken from the HP 8546A is an actual reading and can be entered into the database as a corrected meter reading. When a reading is taken using the peak detector, a duty cycle correction factor can be applied for conversion to an average reading. This operation can be used when measuring periodic data transmission, under FCC part 15.231b, and Part 15.35c. The calculation for deriving this duty factor can be found in Appendix A. The resulting average reading was then compared to the appropriate limit in order to determine compliance. The HP 8546A EMI receiver was operated with a bandwidth of 120 kHz when receiving signals below 1 GHz, and with a bandwidth of 1 MHz when receiving signals above 1 GHz, in accordance with CISPR 16. Both the peak and Quasi-peak detector functions were used.

## 1.9 CONDUCTED EMISSION TEST

Due to the fact that this product operated on its own internal battery power, as opposed to using a power cord, it was not necessary to perform a test for Conducted Emissions.

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Manufacturer: Expedite International

Model: Moto-Magnet II, Ultra

Serial Number(s): 980177

**1.10 - Restricted Bands affecting this product**

Frequency (MHz)	Limit ( $\mu$ V)	Limit (dB/ $\mu$ V/m)
73.0-74.6	100	40.0
108.0-121.94	150	43.5
123-138	150	43.5
149.9-150.05	150	43.5
156.525 $\pm$ .25khz	150	43.5
156.7-156.9	150	43.5
162.0125-167.17	150	43.5
167.72-173.2	150	43.5
240-285	200	43.5
322-335.4	200	46.0
399.9-410.0	200	46.0

### 1.11 – Photos taken during testing



view of the Remote Control transmitter during the Radiated Emissions tests. This view shows the orientation of the product where the maximum signal levels were present (vertical polarity).



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**FCC ID: OF6EI1000****1.12 SUMMARY OF RESULTS AND CONCLUSIONS**

Based on the procedures outlined in this report, and the test results included in appendices B and C, it can be determined that the Expedite International Remote Control Transmitter does **“meet”** the emission requirements of Title 47 CFR, FCC Part 15 Subpart C for an intentional radiator. The level of the 5<sup>th</sup> harmonic emission of the sample was found to be only 1.7 dB below the limit in the worst case configuration. As this level is within the tolerances of the test equipment and site employed, there is a possibility that this unit, or a similar unit selected out of production may not meet the required limit specification if tested by another agency.

The enclosed test results pertain to the samples of the test item listed, and only for the tests performed on the data sheets. Any subsequent modification or changes to the test items could invalidate the data contained herein, and could therefore invalidate the findings of this report.



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**FCC ID: OF6EI1000****1.13 - Test Equipment**

Asset #	Manufacturer	Model #	Serial #	Description	Due Date
AA960003	EMCO	3121C	786	Dipole Set Antenna	6/14/99
AA960004	EMCO	3146	9512-4276	Log Periodic Antenna	9/12/99
AA960005	EMCO	3110B	9601/2280	Biconical Antenna	9/12/99
EE960004	EMCO	2090	9607-1164	Mast/Ttable Controller	I.O
EE960013	HP	8546A	3617A00320	Receiver RF Section W/Display and RF filter section	8/12/99
EE960014	HP	85460A	3448A00296	Receiver RF Section Preselector	8/12/99



## **APPENDIX A:**

### **SAMPLE CALCULATIONS**



**FCC ID: OF6EI1000**

Manufacturer: Expedite International

Model: Moto-Magnet II, Ultra

Serial Number(s): 980177

**Calculation of Radiated Emissions limits for  
FCC Part 15.235(a) and 15.209(b)****FIELD STRENGTH OF FUNDAMENTAL FREQUENCIES:**

THE FUNDAMENTAL SIGNAL LEVEL IN THE BAND 49.82 MHz TO 49.90 MHz IS 10,000 UV/M

**FIELD STRENGTH OF SPURIOUS/HARMONIC FREQUENCIES:**

In accordance with 15.209(b):

For spurious and harmonics over the frequency range 30-88 MHz= 100  $\mu\text{V}/\text{m}$ For spurious and harmonics over the frequency range 88-216 MHz= 150  $\mu\text{V}/\text{m}$ For spurious and harmonics over the frequency range 216-960 MHz= 200  $\mu\text{V}/\text{m}$ 

Frequency (MHz)	Fundamental limit ( $\mu\text{V}/\text{m}$ )	Fundamental limit (dB $\mu\text{V}/\text{m}$ )	Harmonic limit ( $\mu\text{V}/\text{m}$ )	Harmonic limit (dB $\mu\text{V}/\text{m}$ )
49.86	10,000	80.0		
30-88			100	40.0
88-216			150	43.5
216-960			200	46.0



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**FCC ID: OF6EI1000**

Manufacturer: Expedite International

Model: Moto-Magnet II, Ultra

Serial Number(s): 980177

## **Duty Cycle Correction Factor Calculation**

For a graphical presentation of the pulses being transmitted from the Remote Control Transmitter, refer to Appendix C. The remote transmitter sends a simple repeating pulse train, of 2.0 milliseconds on time followed by a 0.4 milliseconds off period. This pulse train is sent continuously for as long as the button is held down. The total on time over a 100 milli-second window then becomes the pulse width divided by the repetition total period.

$$\begin{aligned}\text{Relaxation Factor} &= 20 \log (2.0/2.4) \\ &= 1.6 \text{ dB}\end{aligned}$$



## **APPENDIX B:**

### **DATA CHARTS**

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## Measurement of Electromagnetic Radiated Emission within 3 Meter FCC Listed Chamber

Date of Test:	9, 12 February, 1999	Manufacturer:	Expedite International
Location:	L. S. Compliance, Inc.	Model No.:	Moto-Magnet II, Ultra
	W66 N220 Commerce Court	Operating Freq.	49.86 MHz
	Cedarburg, WI 53012		
Specifications:	47CFR FCC Part 15.235,,15.209	Serial No.:	980177
Distance:	3 meters	Configuration:	Active, continuous burst
Equipment:	HP 8546A EMI Receiver	Detector(s) Used:	Peak
	EMCO 3146A Log Periodic		
	EMCO 3121C Tuned Dipole		
	EMCO 3110B Biconical		Quasi-peak (**)

The following table depicts the level of significant fundamental and harmonic emissions found:

Frequency (MHz)	Antenna Polarity	Height (meters)	Azimuth (0° - 360°)	EMI Meter Reading (dB $\mu$ V/m)	Duty Cycle Correction (dB)	Corrected Reading (dB $\mu$ V/m)	15.231b Limit (dB $\mu$ V/m)	Margin (dB)
48.05	H	3.6	180	26.9**	0.0**	26.9	40.0	13.1
47.95	V	1.0	180	34.4**	0.0**	34.4	40.0	5.6
49.86	H	3.6	180.	55.4	1.6	53.8	80.0	26.2
49.86	V	1.0	90	61.7	1.6	60.1	80.0	19.9
99.72	H	2.6	180	33.4	1.6	31.8	43.5	11.7
99.72	V	1.0	0	31.6	1.6	30.0	43.5	13.5
149.58	H	2.2	180	26.3	1.6	24.7	43.5	18.8
149.58	V	1.0	180	22.7	1.6	21.1	43.5	22.4
199.43	H	1.6	180	32.7	1.6	31.1	43.5	12.4
199.43	V	1.0	90	28.2	1.6	26.6	43.5	16.9
249.29	H	1.4	180	45.9	1.6	44.3	46.0	1.7
249.29	V	1.9	180	40.2	1.6	38.6	46.0	7.4
299.16	H	1.05	180	35.3	1.6	33.7	46.0	12.3
299.16	V	2.0	90	32.0	1.6	30.4	46.0	15.6
349.02	H	1.0	180	35.9	1.6	34.3	46.0	11.7
349.02	V	1.4	145	32.7	1.6	31.1	46.0	14.9

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398.88	H	1.0	180	34.4	1.6	32.8	46.0	13.2
398.88	V	1.15	230	32.9	1.6	31.3	46.0	14.7
448.74	H	2.0	50	32.9	1.6	31.3	46.0	14.7
448.74	V	2.1	110	30.7	1.6	29.1	46.0	16.9
498.60	H	1.85	50	26.9	1.6	25.3	46.0	20.7
498.60	V	1.6	210	25.5	1.6	23.9	46.0	22.1

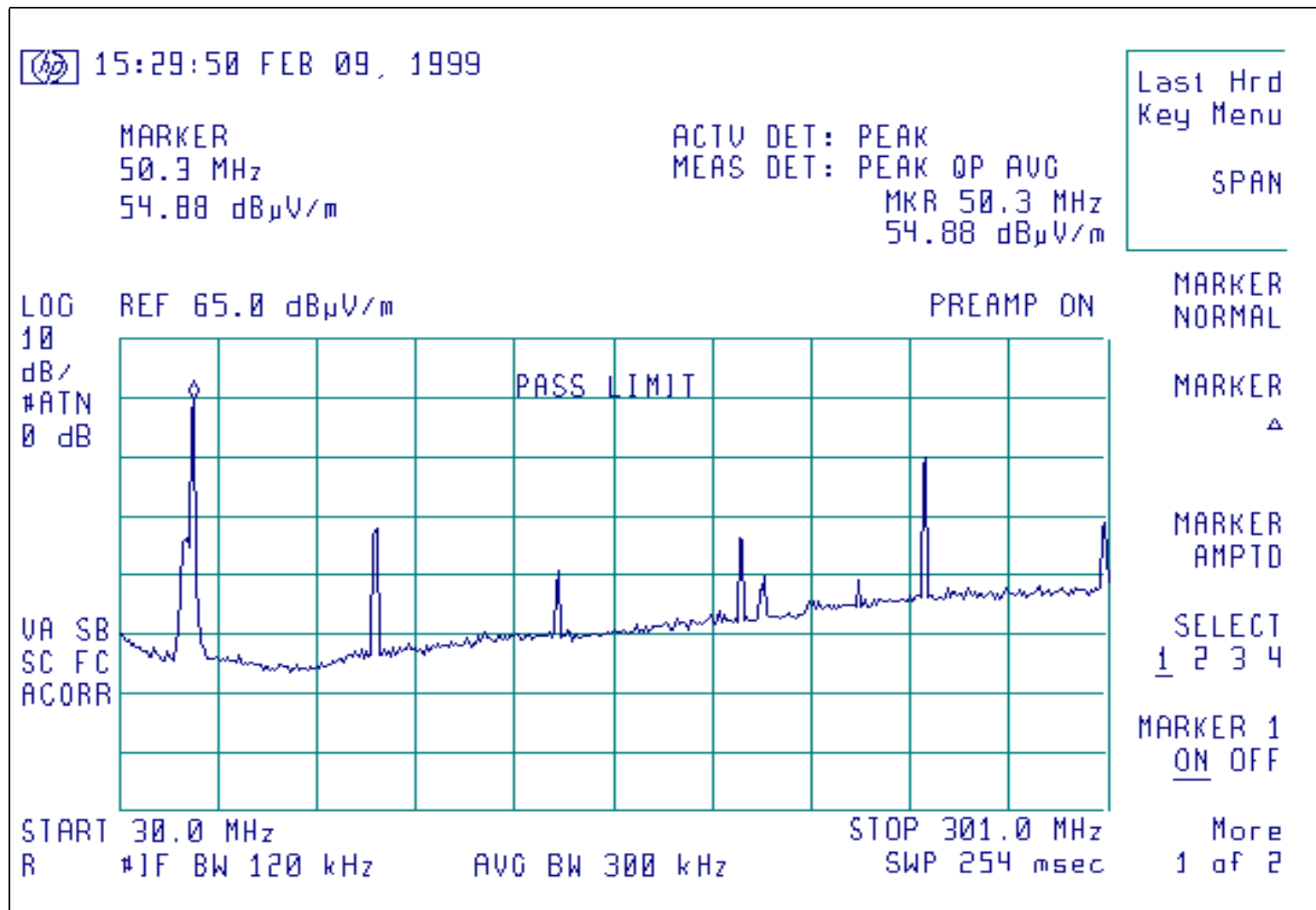


# **APPENDIX C:**

## **GRAPHS**

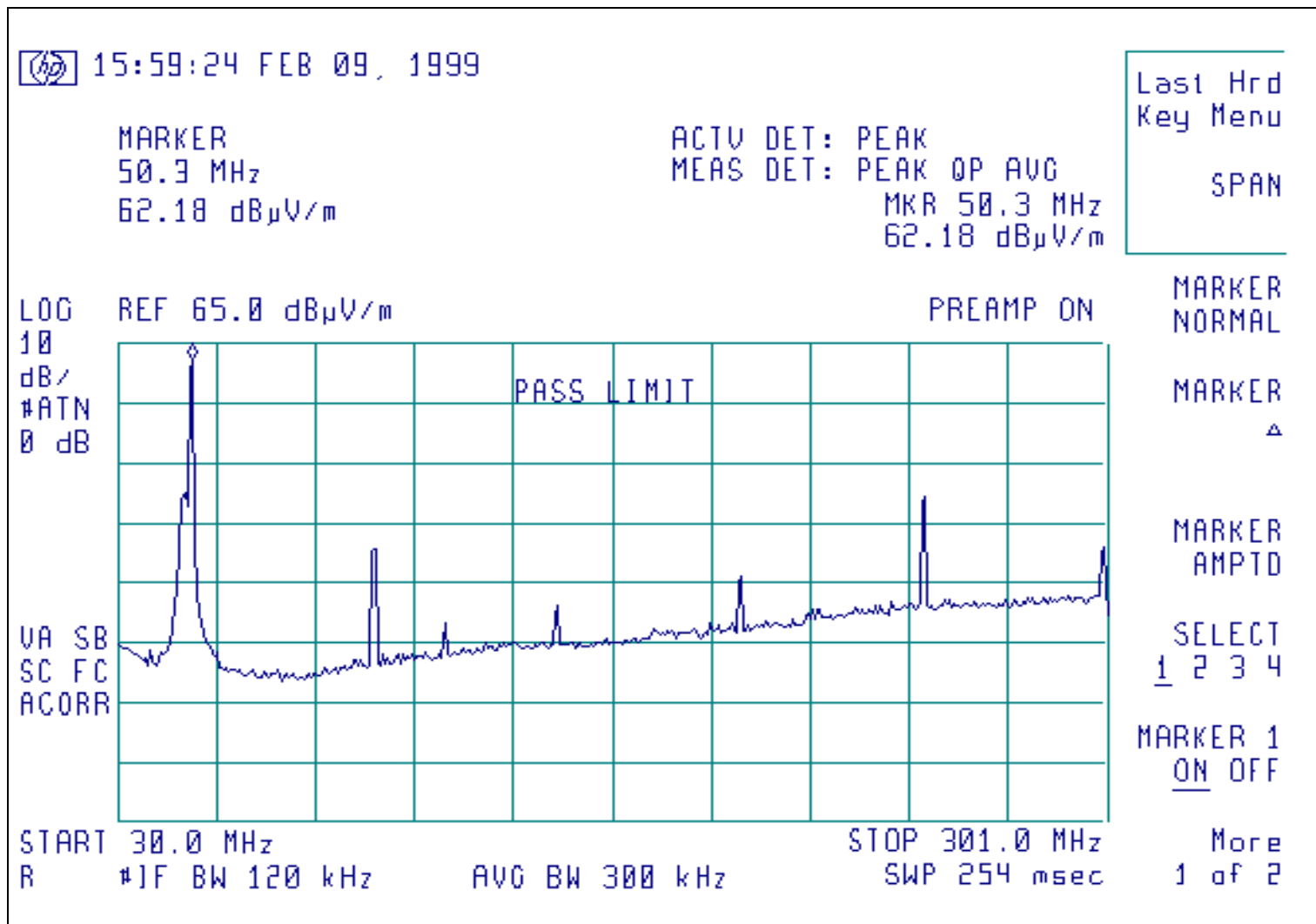


FCC ID: OF6EI1000

**49.86 MHz Remote Transmitter, emissions below 300 MHz, horizontal polarity**



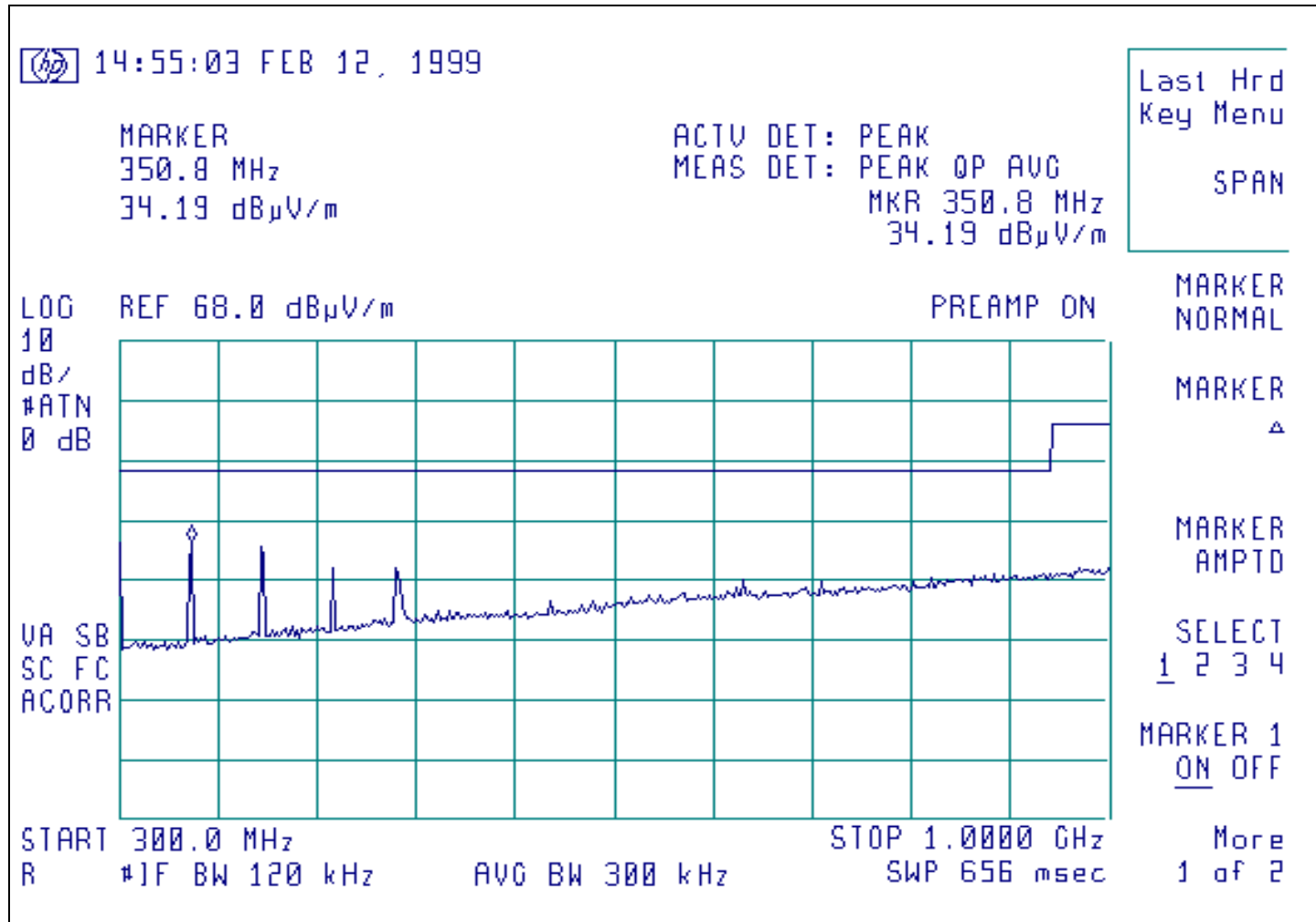
FCC ID: OF6EI1000

**49.86 MHz Remote Transmitter, emissions below 300 MHz, vertical polarity**



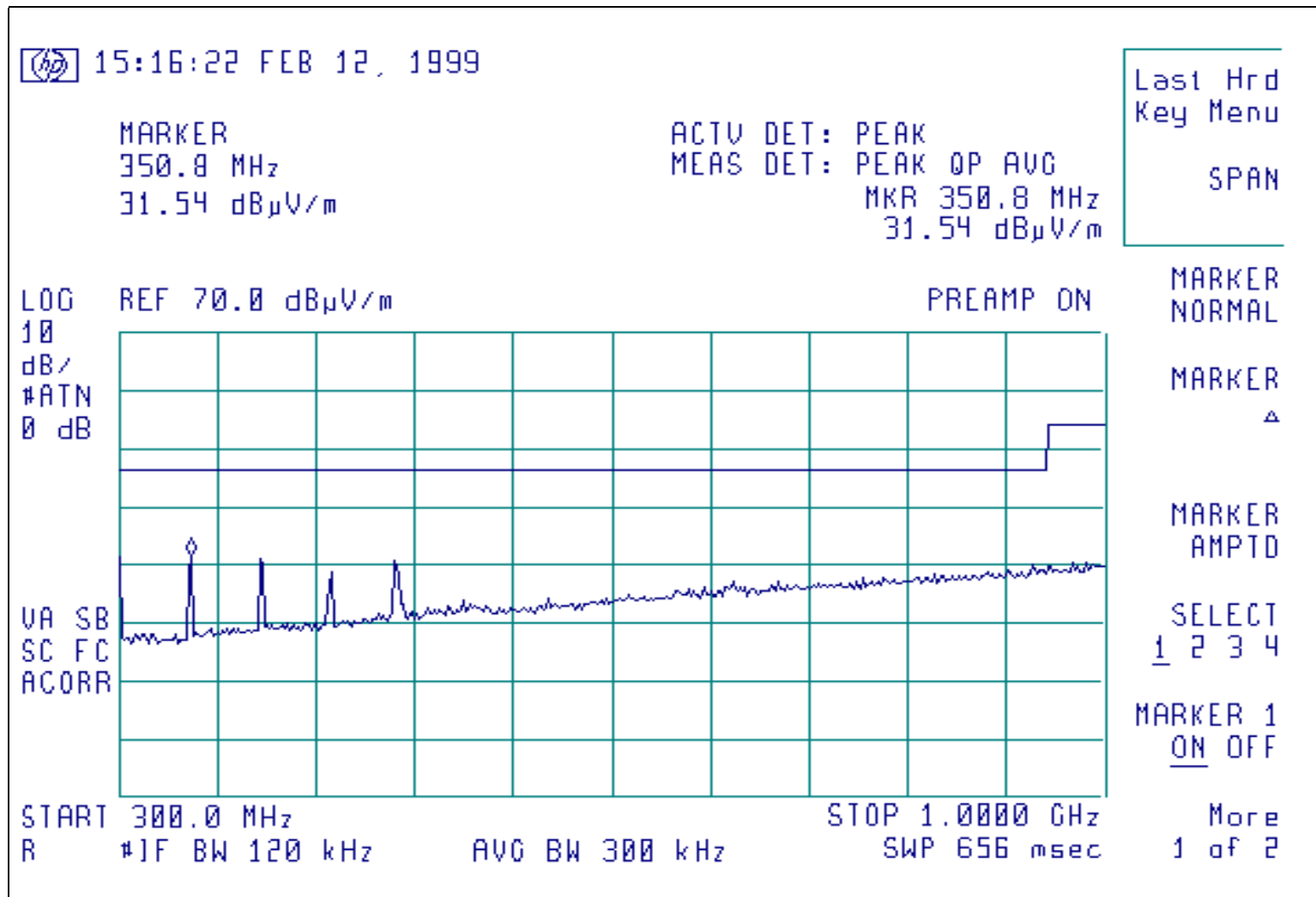


FCC ID: OF6EI1000

**49.86 MHz Remote Transmitter, emissions above 300 MHz, horizontal polarity**

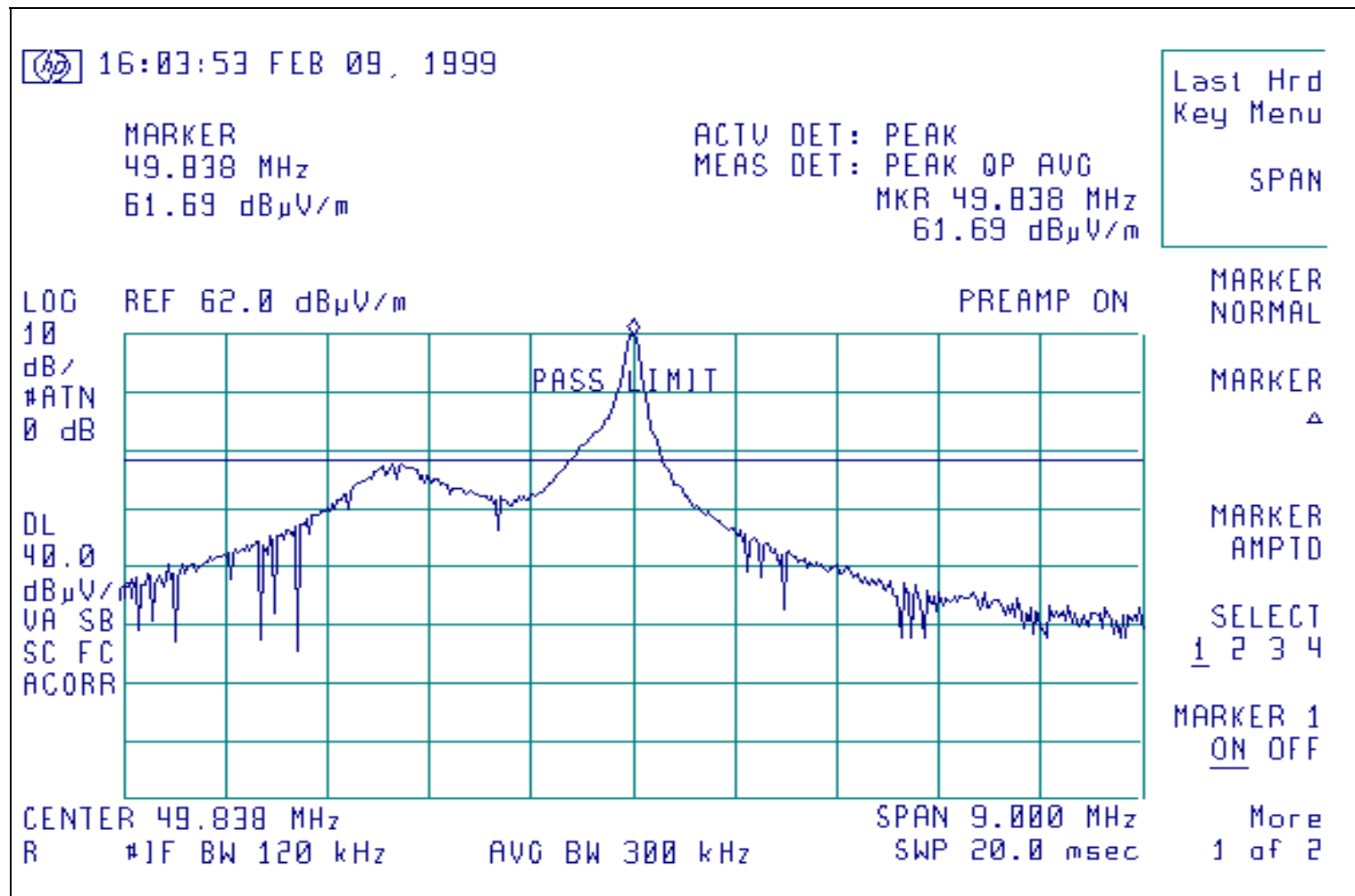


FCC ID: OF6EI1000

**49.86 MHz Remote Transmitter, emissions above 300 MHz, vertical polarity**

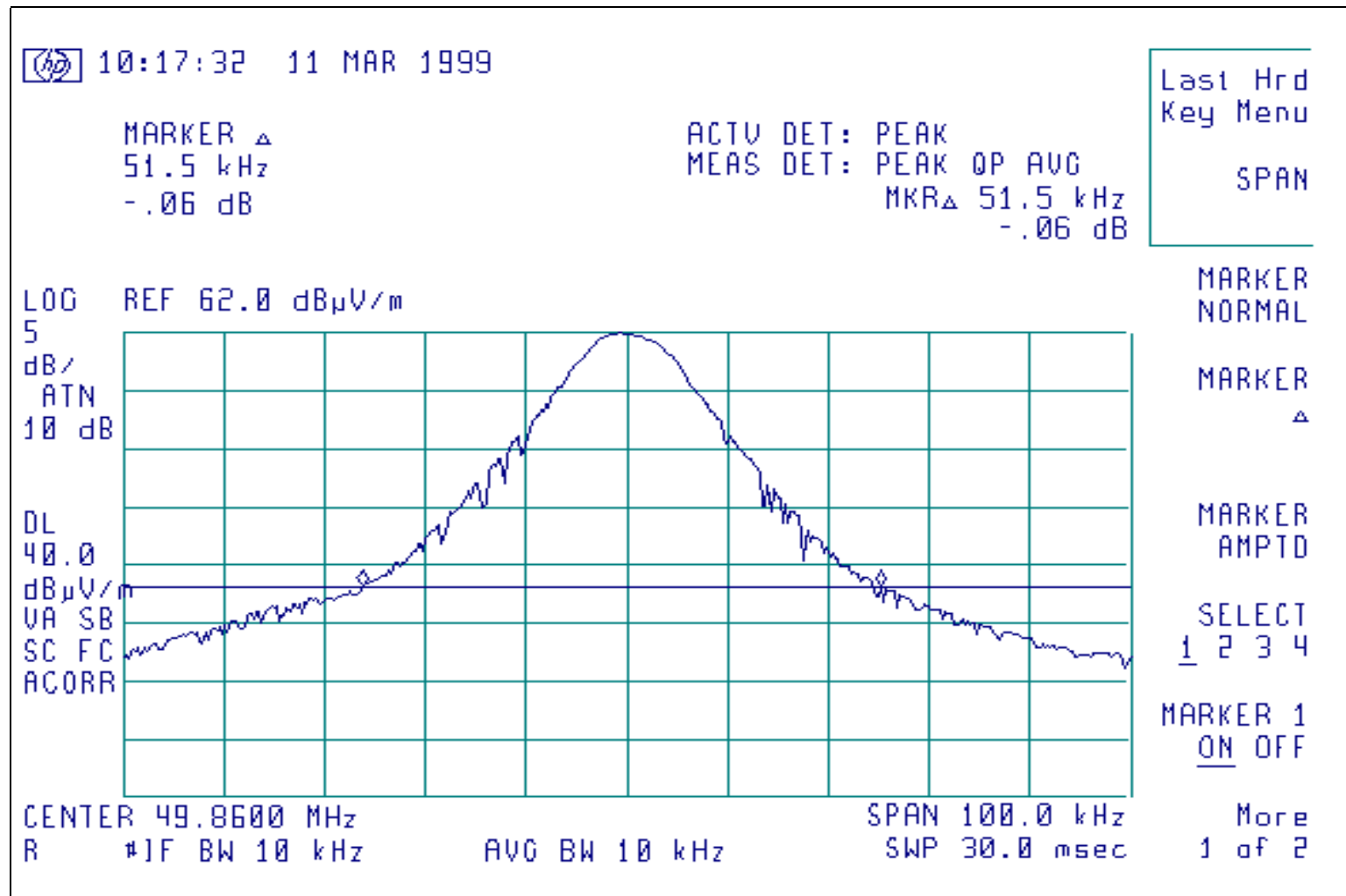


FCC ID: OF6EI1000

**49.86 MHz Remote Transmitter, occupied bandwidth**

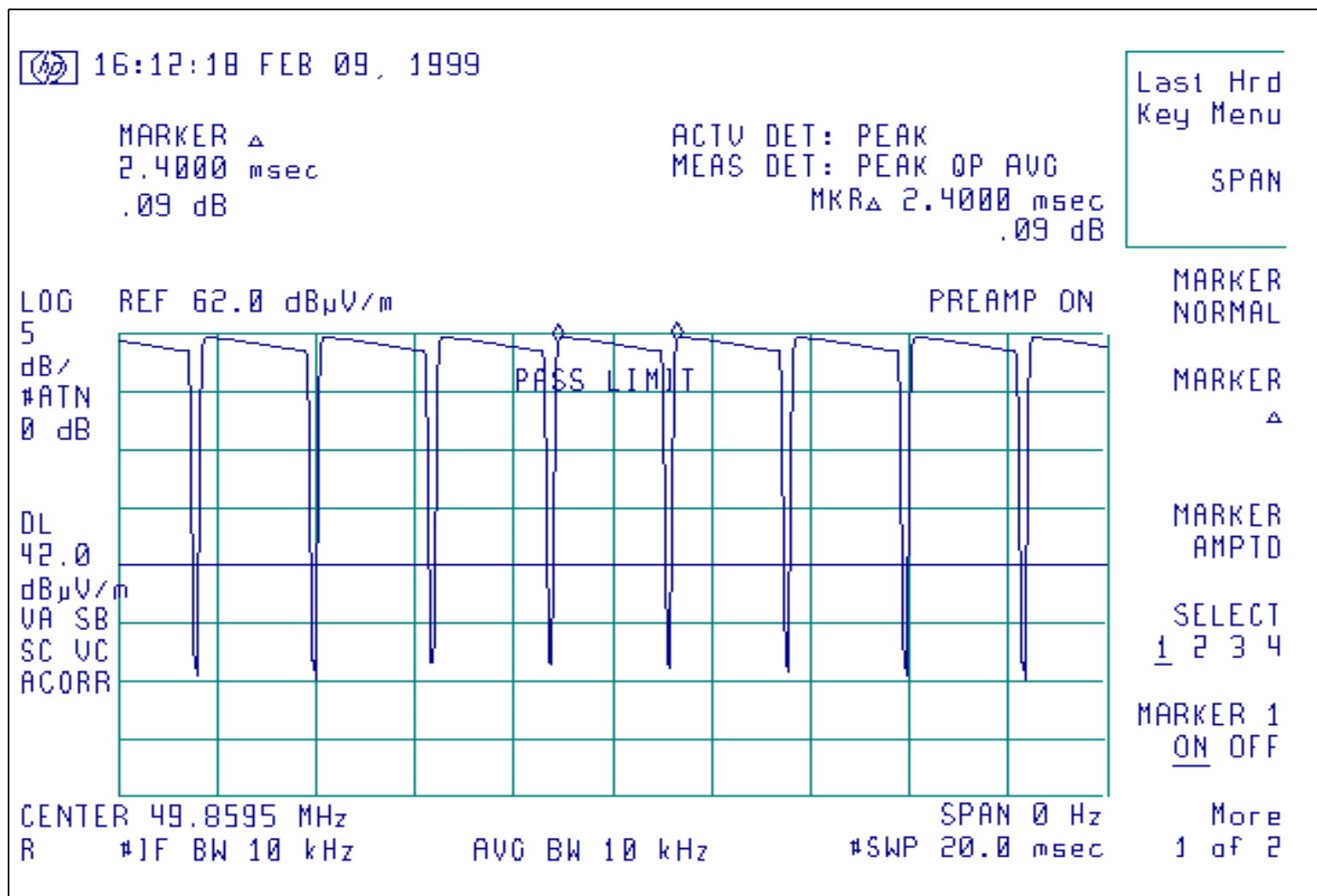


FCC ID: OF6EI1000

**49.86 MHz Remote Transmitter, occupied bandwidth**

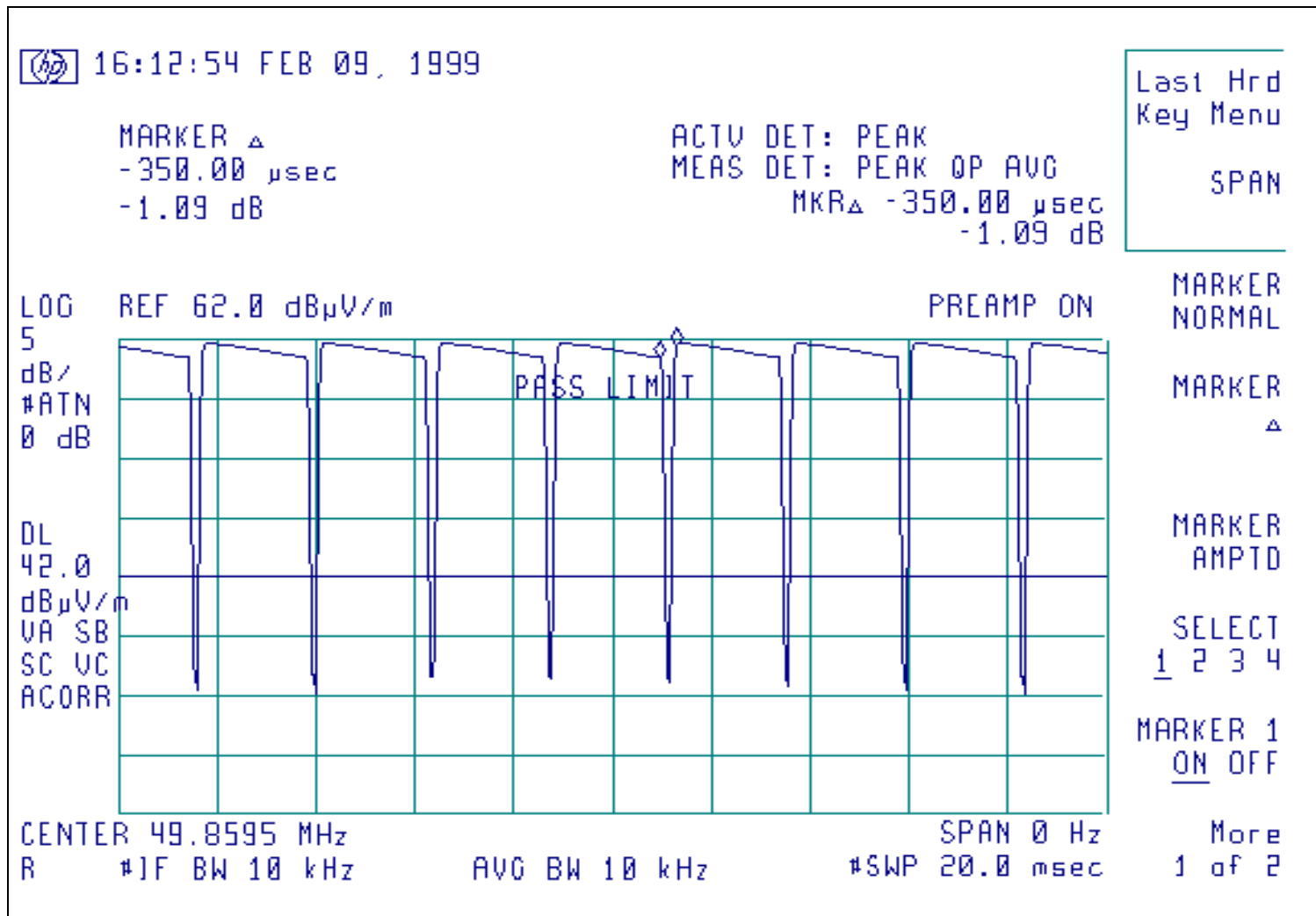
FCC ID: OF6EI1000

**49.86 MHz Remote Transmitter, duty cycle, burst period**





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49.86 MHz Remote Transmitter, duty cycle, burst duty cycle

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49.86 MHz Remote Transmitter, duty cycle over a 100 millisecond frame.

