



1250 Peterson Dr., Wheeling, IL 60090

Company: Shure Incorporated
Model Tested: UR1M/R L3
Report Number: 14843

FCC Rules and Regulations / Intentional Radiators

Low Power Auxiliary Stations

Part 74, Subpart H, Sections 74.801 - 74.882

Part 74.861 (e) TV Broadcasting

THE FOLLOWING **MEETS** THE ABOVE TEST SPECIFICATION

Formal Name: Micro Bodypack Transmitter

Kind of Equipment: Wireless Microphone Transmitter

Frequency Range: 638 MHz - 698 MHz

Test Configuration: Stand Alone (Tested at 3 vdc)

Model Number(s): UR1M/R L3, UR1M/RLEMO3 L3, UR1M- L3, UR1MLEMO3- L3

Model(s) Tested: UR1M/R L3

Serial Number(s): N/A

Emission Designator: 90K6F3E

Date of Tests: October 1, 2, 3, & 9, 2008

Test Conducted For: Shure Incorporated
5800 W. Touhy Ave.
Niles, Illinois 60714-4608

NOTICE: "This report must not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government". Please see the "Additional Description of Equipment Under Test" page listed inside of this report.

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Model Tested: UR1M/R L3
Report Number: 14843

SIGNATURE PAGE

Report By:

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Test Engineer
EMC-001375-NE

Reviewed By:

William Stumpf
OATS Manager

Approved By:

Brian Mattson
General Manager



Company: Shure Incorporated
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United States Department of Commerce
National Institute of Standards and Technology



Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 100276-0

D.L.S. Electronic Systems, Inc.
Wheeling, IL

*is accredited by the National Voluntary Laboratory Accreditation Program for specific services,
listed on the Scope of Accreditation, for:*

ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS

*This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality
management system (refer to joint ISO-ILAC-IAF Communiqué dated 18 June 2005).*

2008-10-01 through 2009-09-30

Effective dates



Sally J. Bruce
For the National Institute of Standards and Technology

NVLAP-01C (REV. 2006-09-13)



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1.0 SUMMARY OF TEST REPORT

It was found that the Micro Bodypack Transmitter, Model Number(s) UR1M/R L3 **meets** the radio interference radiated emission requirements of the FCC "Rules and Regulations", Part 74, Subpart H, Section 74.861 (e), for low power auxiliary stations. The AC Power Line conducted emissions test was not required because the Micro Bodypack Transmitter is powered from a D.C. power source. It does not have a line cord to plug into the A.C. power line.

2.0 INTRODUCTION

On October 1, 2, 3, & 9, 2008, a series of radio frequency interference measurements was performed on Micro Bodypack Transmitter, Model Number(s) UR1M/R L3, Serial Number: N/A. The tests were performed according to the procedures of the FCC as stated in Part 2 - Frequency Allocations and Radio Treaty Matters: General Rules and Regulations, Subpart J, Equipment Authorization Procedures of the Code of Federal Regulations 47. Tests were performed by personnel of D.L.S. Electronic Systems, Inc. who are responsible to Donald L. Sweeney, Senior EMC Engineer.

D.L.S. Electronic Systems, Inc. is a full service EMC/Safety Testing Laboratory accredited to ISO Guide 17025. NVLAP Certificate and Scope can be viewed at <http://www.dlsemc.com/certificate>. Our facilities are registered with the FCC, Industry Canada, and VCCI. All immunity tests were performed by personnel of D.L.S. Electronic Systems, Inc. at the following location(s):

Main Test Facility:

D.L.S. Electronic Systems, Inc.
1250 Peterson Drive
Wheeling, Illinois 60090

O.A.T.S. Test Facility:

D.L.S. Electronic Systems, Inc.
166 S. Carter Street
Genoa City, Wisconsin 53128

3.0 OBJECT

The purpose of this series of tests was to determine if the test sample could meet the radio frequency interference requirements of the FCC "Rules and Regulations", Part 74, Subpart H, Section 74.861 (e), for low power auxiliary stations.



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4.0 TEST SET-UP

All tests were performed at D.L.S. Electronic Systems, Inc. and set up according to the FCC and TIA-603C regulations. The conducted tests if required were performed with the test item placed on a non-conductive table (table top equipment), located in the test room. Equipment normally operated on the floor was tested by placing it on the metal ground plane. The ground plane has an electrical isolation layer over its surface approximately 7mm thick. The power line supplied was connected to a dual line impedance stabilization network electrically bonded to the ground plane, located on the floor. The networks were constructed per the requirements of the American National Standards Institute, ANSI C63.4-2003.

All radiated emissions tests were performed with the test item placed on a 80 cm high rotating non-conductive table, located in the test room. Equipment normally operated on the floor was placed on a metal covered turntable, which is flush with the surrounding conducting ground plane. The ground plane has an electrical isolation layer over its surface approximately 7 mm thick. The EUT is separated from the turntable ground plane by a non-conductive layer. The equipment under test was set up according to TIA Standard, TIA-603-C:2004, Section 2.2.12.

5.0 TEST EQUIPMENT (Bandwidths and Detector Function)

All preliminary data below 1000 MHz was automatically plotted using the ESI 26/ESI 40 Fixed Tuned Receiver. The data was taken using Peak, Quasi-Peak or the Average Detector Functions as required. This information was then used to determine the frequencies of maximum emissions. Above 1000 MHz, final data was taken using the Average Detector.

Below 1000 MHz, final data was taken using the ESI 26/ESI 40 fixed tuned receiver. These plots were made using the Peak or Quasi-Peak Detector functions, with manual measurements performed on the questionable frequencies using the Quasi-Peak or the Average Detector Function of the Analyzer or ESI 26/ESI 40 Receiver as required. Above 1000 MHz, final data was taken using the Average Detector on the ESI 26/ESI 40 Fixed Tuned Receiver.

The bandwidths shown below are specified by ANSI C63.4-2003.

Frequency Range	Bandwidth (-6 dB)
10 to 150 kHz	200 Hz
150 kHz to 30 MHz	9 kHz
30 MHz to 1 GHz	120 kHz
Above 1 GHz	1 MHz

A list of the equipment used can be found in Table 1. All primary equipment was calibrated against known reference standards with a verified traceable path to NIST.



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6.0 AMBIENT MEASUREMENTS

For emissions measurements, broadband antennas and an EMI Test Receiver with a panoramic spectrum display are used. First the frequency range is scanned and displayed on the test receiver display. Next the scanned frequency range is divided into smaller ranges, and then it is manually tuned through to determine the emissions from the EUT. A headset or loudspeaker is connected to the test receiver's AM/FM demodulated output as an aid in detecting ambient signals and finding frequencies of significant emission from the EUT. If there is any doubt as to the source of the emission, it is further investigated by rotating the EUT, or by disconnecting the power from the EUT.

The EUT is set up in its typical configuration and operated in its various modes. For tabletop systems, cables are manipulated within the range of likely configurations. For floor-standing equipment, the cables are located in the same manner as the user would install them and no further manipulation is made. If the manner of cable installation is not known, or if it changes with each installation, cables or wires for floor-standing equipment shall be manipulated to the extent possible to produce the maximum level of emissions. For each mode of operation, the frequency spectrum is monitored. Variations in antenna height, antenna polarization, EUT azimuth, and cable or wire placement (each variable within bounds specified elsewhere) are explored to produce the emission that has the highest amplitude relative to the limit.

7.0 AC POWER LINE CONDUCTED EMISSION MEASUREMENTS – Part 15.207

The Micro Bodypack Transmitter is powered from a D.C. power source and will not at any time be directly plugged into the public utility lines, therefore the conducted emissions test was not performed.



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8.0 DESCRIPTION OF TEST SAMPLE:

8.1 Description:

The UHF-R Wireless Microphone System uses the latest wireless technology, delivers outstanding audio clarity, and is rugged and reliable. It operates over the frequency range of 518 to 865 MHz (in different frequency bands). The products are identical, with the exception of the frequency components needed for each range. The User Interface includes directional buttons, and an LCD that displays battery status, group/channel, and transmitter/receiver frequency synchronization. It is easy to set up and operate with advanced features for professional installations requiring multiple wireless microphone systems.

8.2 PHYSICAL DIMENSIONS OF EQUIPMENT UNDER TEST

Length: 49 mm x Width: 60mm x Height: 17 mm

8.3 LINE FILTER USED:

NA

8.4 INTERNAL CLOCK FREQUENCIES:

Switching Power Supply Frequencies:

NA

Clock Frequencies:

0.025, 0.064, 1.2, 4, 38.4 MHz

8.5 DESCRIPTION OF ALL CIRCUIT BOARDS:

1. Printed Circuit Board

PN: 190-112281



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9.0 ADDITIONAL DESCRIPTION OF TEST SAMPLE:
(See also Paragraph 8.0)

1: There were no additional descriptions noted at the time of test.

NOTE:

Each device had a matching antenna for its frequency range and was connected for all radiated emission testing. The microphone cable also was connected during radiated emission testing. Each device was tunable within its RF band of operation. When appropriate, modulation was supplied to the device.

10.0 PHOTO INFORMATION AND TEST SET-UP

Item 0 Micro Bodypack Transmitter

Model Number: UR1M/R L3, Serial Number: N/A



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11.0 RADIATED PHOTOS TAKEN DURING TESTING



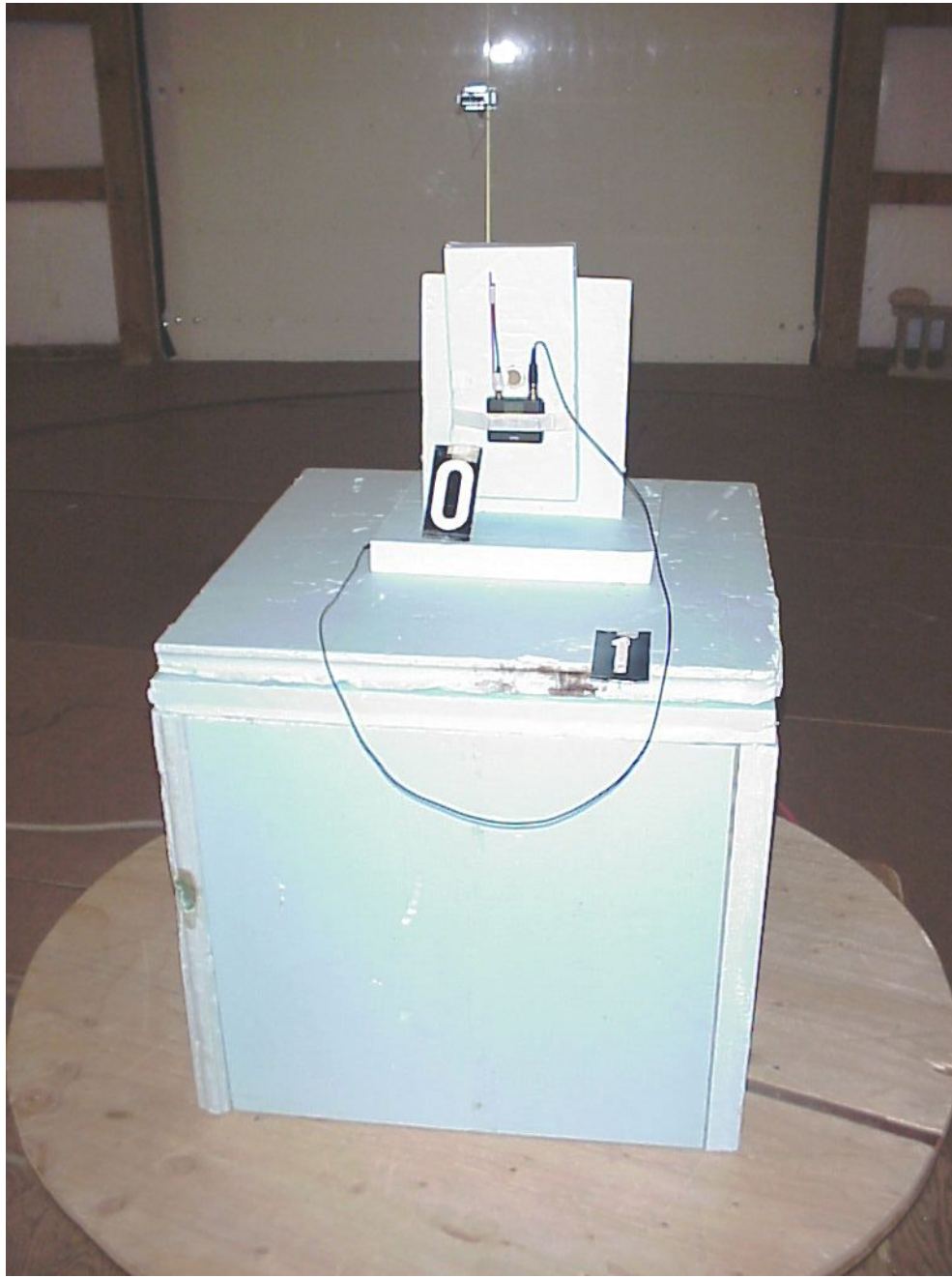
RADIATED FUNDAMENTAL – X ORIENTATION



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Company: Shure Incorporated
Model Tested: UR1M/R L3
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11.0 RADIATED PHOTOS TAKEN DURING TESTING



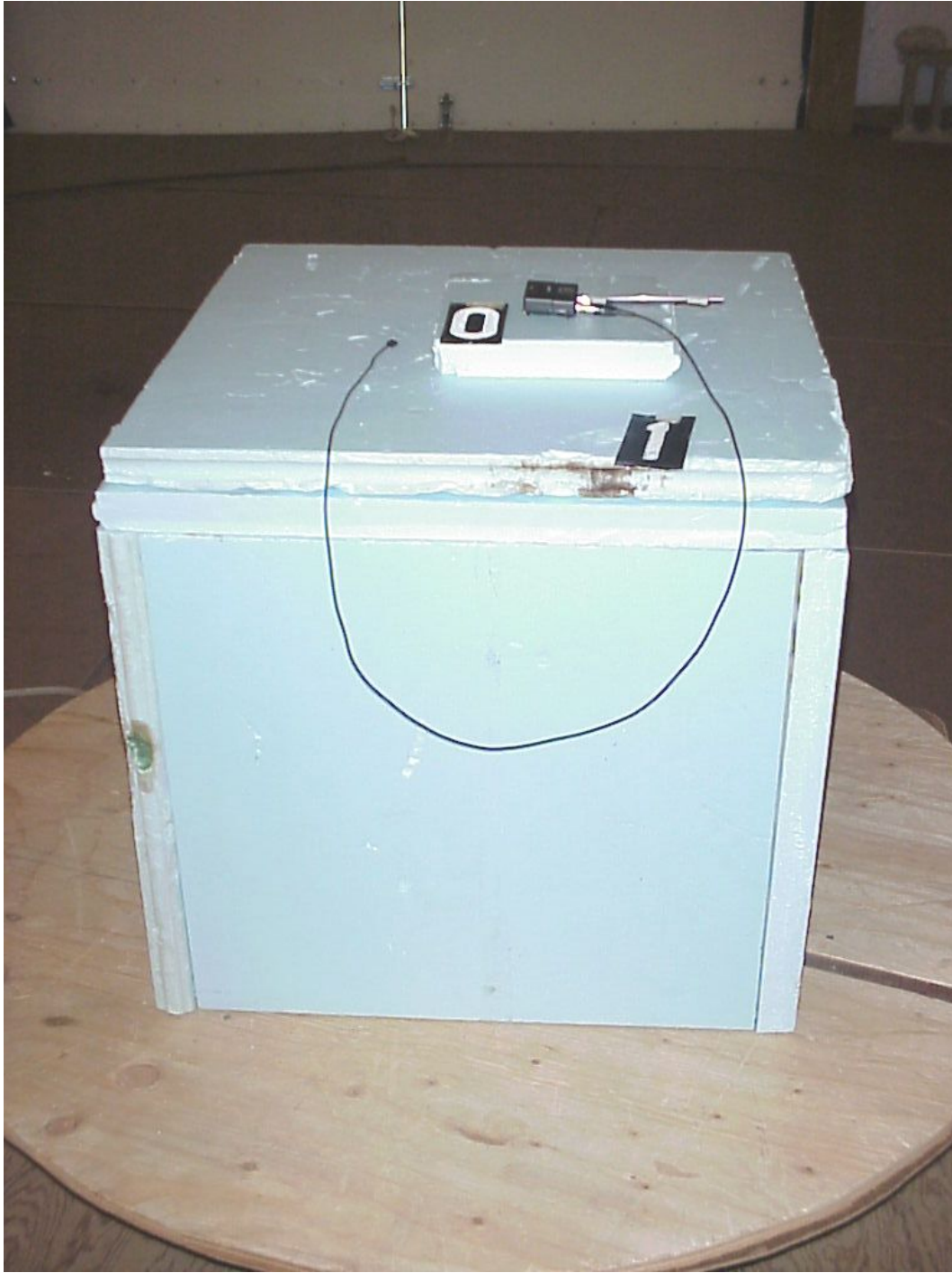
RADIATED FUNDAMENTAL – Y ORIENTATION



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Company: Shure Incorporated
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11.0 RADIATED PHOTOS TAKEN DURING TESTING



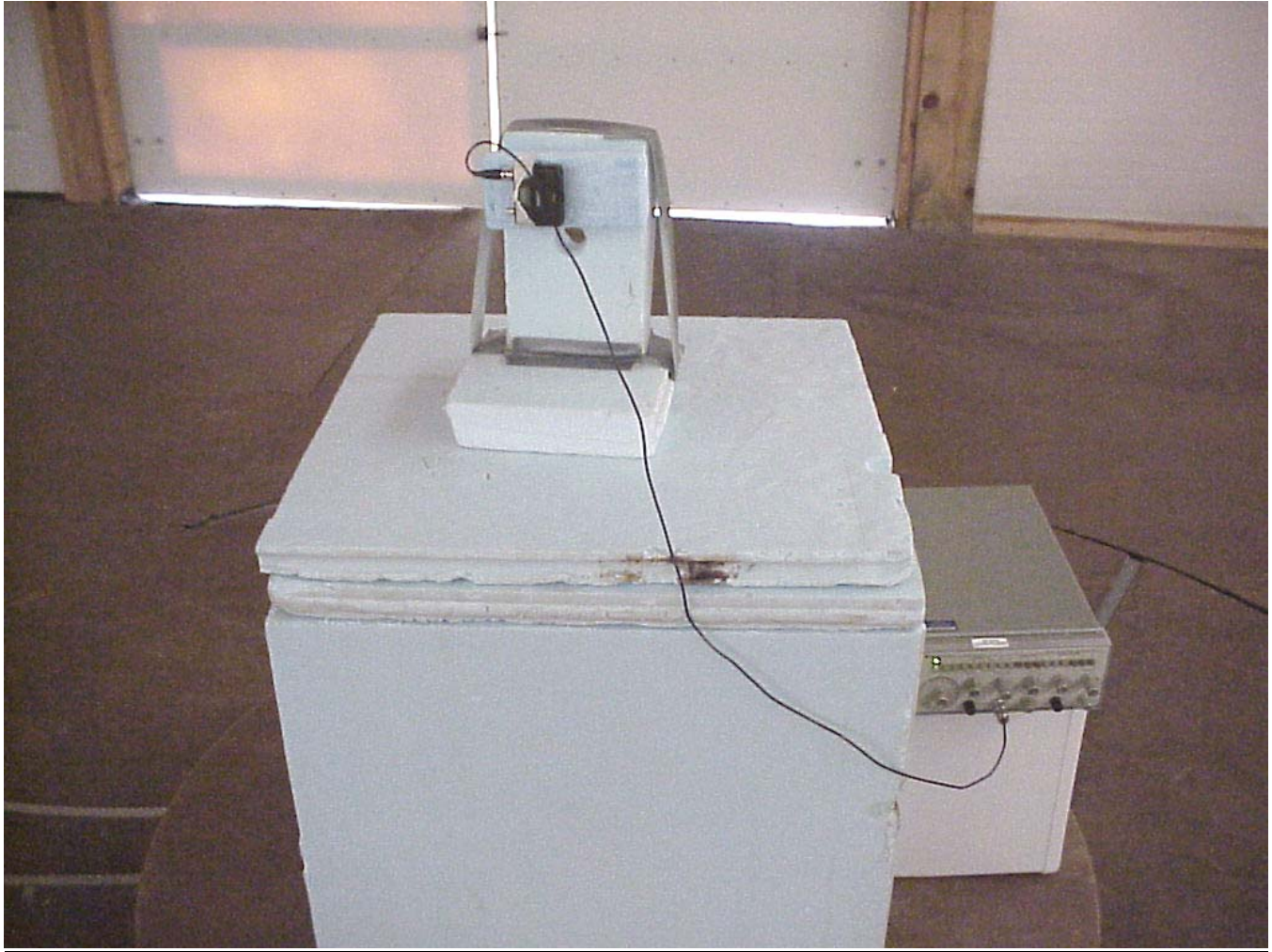
RADIATED FUNDAMENTAL – Z ORIENTATION



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11.0 RADIATED PHOTOS TAKEN DURING TESTING



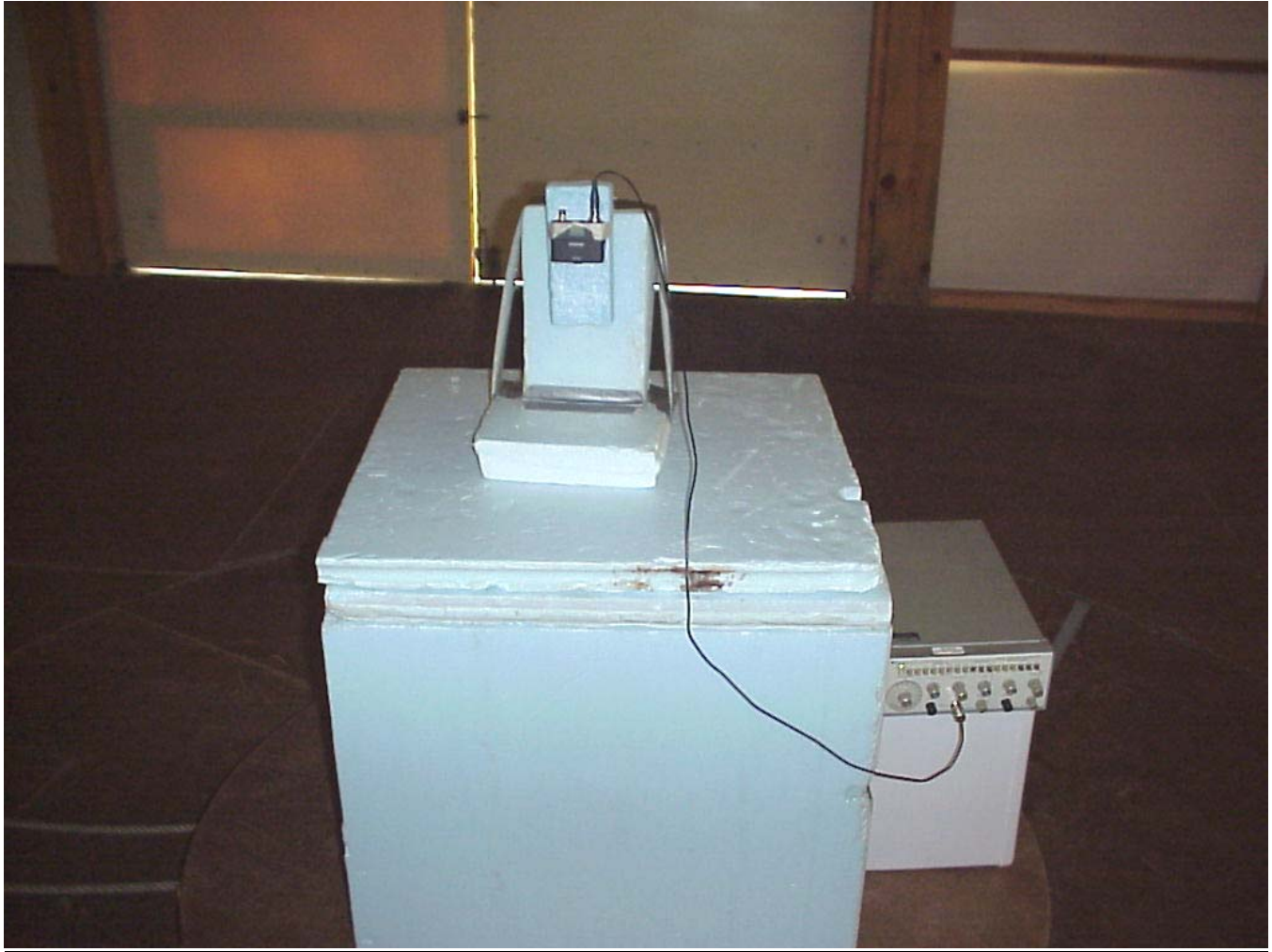
RADIATED SPURIOUS – X ORIENTATION



Company: Shure Incorporated
Model Tested: UR1M/R L3
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11.0 RADIATED PHOTOS TAKEN DURING TESTING



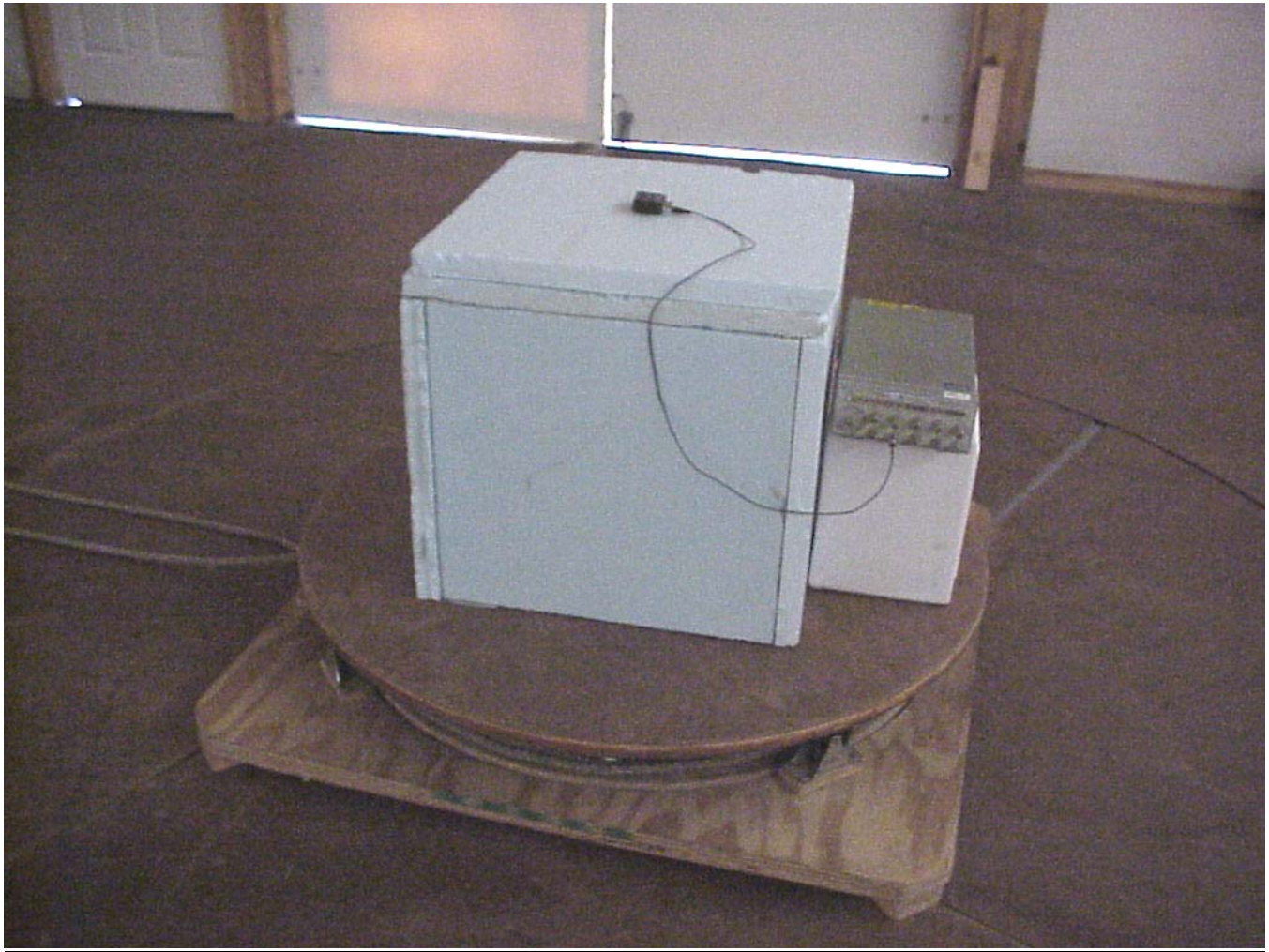
RADIATED SPURIOUS – Y ORIENTATION



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11.0 RADIATED PHOTOS TAKEN DURING TESTING



RADIATED SPURIOUS – Z ORIENTATION



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12.0 AC POWER LINE CONDUCTED PHOTOS TAKEN DURING TESTING

The Micro Bodypack Transmitter is powered from a D.C. power source and will not at any time be directly plugged into the public utility lines, therefore the conducted emissions test was not performed.

13.0 RESULTS OF TESTS

The radio interference emission charts can be seen on the pages at the end of this report. Data sheets indicating the test measurements taken during testing can also be found at the end of this report.

14.0 CONCLUSION

It was found that the Micro Bodypack Transmitter Model Number(s) UR1M/R L3 **meets** the radio interference radiated emission requirements of the FCC "Rules and Regulations", Part 74, Subpart H, Section 74.861 (e), for low power auxiliary stations. The AC Power Line conducted emissions test was not required because the Micro Bodypack Transmitter is powered from a D.C. power source. It does not have a line cord to plug into the A.C. power line.



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TABLE 1 – EQUIPMENT LIST

Test Equipment	Manufacturer	Model Number	Serial Number	Frequency Range	Cal Due Dates
Receiver	Rohde & Schwarz	ESI 40	837808/005	20 Hz – 40 GHz	7/09
Preamplifier	Rohde & Schwarz	TS-PR10	032001/005	9 kHz – 1 GHz	3/09
Antenna	EMCO	3104C	97014785	20 MHz – 200 MHz	5/10
Antenna	EMCO	3146	97024895	200 MHz – 1 GHz	5/10
Preamp	Miteq	AMF-6D-010100-50	213976	1GHz-10GHz	5/09
Horn Antenna	EMCO	3115	5731	1-18GHz	6/09
Filter –High Pass	Q-Microwave	100460	002	1.1 GHz	5/09

All primary equipment is calibrated against known reference standards with a verified traceable path to NIST.



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TABLE 2 – EQUIPMENT LIST

Test Equipment	Manufacturer	Model Number	Serial Number	Frequency Range	Cal Due Dates
Receiver	Rhode & Schwarz	ESI 26	837491/010	20 Hz – 26 GHz	12/08
Attenuator 20 dB Fixed	Aeroflex Weinschel	75A-20-12	1071	DC – 40 GHz	7/09
Power Meter	Anritsu	ML2487A	6K00002069	100 kHz – 65 GHz	10/09
Power Sensor	Anritsu	MA2490A	031563	50 MHz – 8 GHz	10/09
RF Cable	Insulated Wire Inc.	KPS-1501-1182-KPS	01182007	30 MHz – 40 GHz	5/09
RF Cable	Manhattan / CDT	M4218	E96824-I	30 MHz – 1 GHz	3/09
Dipole Antenna	Com-Power	AD-100	40140	400 MHz – 1 GHz	7/09
Spectrum Analyzer	Hewlett-Packard	8591A	3009A00700	9 kHz – 1.8 GHz	9/09
Function Generator	Hewlett-Packard	3312A	1432A12543	1 Hz – 500 MHz	6/10
Oscilloscope	Yukogawa	DL1720	R047912	1 Hz – 500 MHz	10/09
Signal Generator	Marconi	2022A	119026	10 kHz – 1 GHz	7/09
Modulation Analyzer	Hewlett-Packard	8901B	2920A02096	150 kHz – 1.3 GHz	7/09

All primary equipment is calibrated against known reference standards with a verified traceable path to NIST.



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APPENDIX A

TEST PROCEDURE

SUBPART H

LOW POWER AUXILIARY STATIONS OPERATING IN THE BANDS ALLOCATED FOR TV BROADCASTING



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APPENDIX A

1.0 TEST SET-UP

All radiated emission tests were performed at D.L.S. Electronic Systems, Inc. The radiated tests were made with the test item placed on a non-conductive turntable located in the Test Room with the receive antenna placed three or one meter(s) from the device under test

2.0 DC VOLTAGES AND CURRENTS APPLIED INTO FINAL AMPLIFYING STAGE – PART 2.1033(c-8)

3.3V, 30 mA I_{max}) (@ 10mW)
5V, 60 mA (I_{max}) (@ 50mW)

3.0 RF-POWER OUTPUT – PART 2.1046 and EIA /TIA-603-C:2004, SECTION 2.2.17

As stated in PART 74.861 (e)(1)(ii), the RF output power should not exceed .25 watt(s). The RF output power was measured with the transmitter unmodulated. The RF output power was measured using the substitution method because there is no antenna port for a direct connection. The RF output power was measured using the following test method:

Actual Measurements Taken:

17.09 dBm Measured output of the transmitter

17.09 dBm equals 0.0512 watt(s)

LIMIT:

Manufacturer's rated output power = 10 mW or 50 mW (radiated)

MARGIN:

.25 - 0.0512 = 0.1988 watt(s)



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APPENDIX A

DATA TAKEN OF THE RF POWER OUTPUT MEASUREMENT

EIA /TIA-603-C:2004, SECTION 2.2.17

FCC Part 74.861 (e)(1) & PART 2.1046



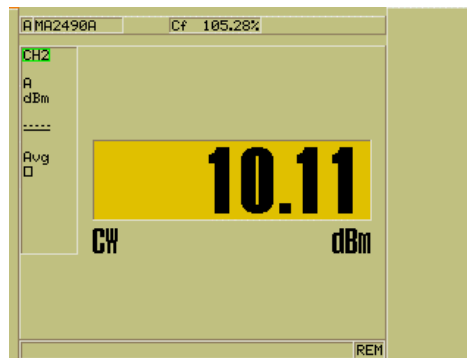
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APPENDIX A

Test Date: 10-01-2008
Company: Shure, Inc.
EUT: UR1M/R L3
Test: Peak Power Output - Conducted
Rule part: FCC Part 74; FCC Part 2.1046
Operator: Craig B
Comment: Channel: 638 MHz
Power set to 10 mW

Peak Output Power = 10.11 dBm = 10.3 mW





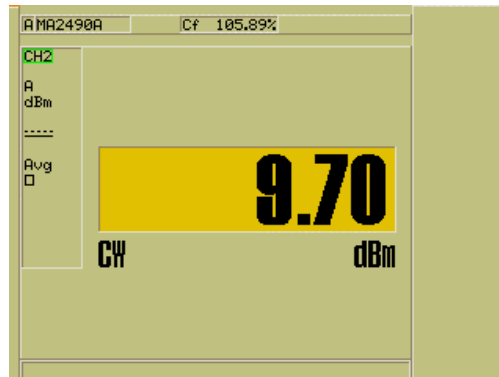
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Company: Shure Incorporated
Model Tested: UR1M/R L3
Report Number: 14843

APPENDIX A

Test Date: 10-01-2008
Company: Shure, Inc.
EUT: UR1M/R L3
Test: Peak Power Output - Conducted
Rule part: FCC Part 74; FCC Part 2.1046
Operator: Craig B
Comment: Channel: 668 MHz
Power set to 10 mW

Peak Output Power = 9.70 dBm = 9.3 mW





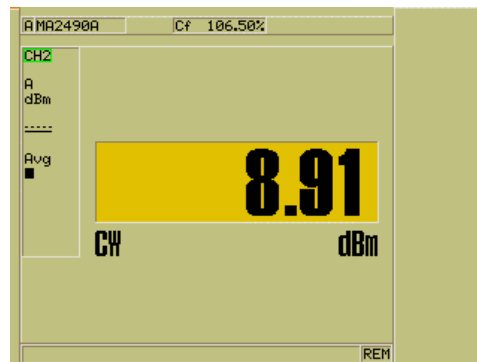
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Company: Shure Incorporated
Model Tested: UR1M/R L3
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APPENDIX A

Test Date: 10-01-2008
Company: Shure, Inc.
EUT: UR1M/R L3
Test: Peak Power Output - Conducted
Rule part: FCC Part 74; FCC Part 2.1046
Operator: Craig B
Comment: Channel: 698 MHz
Power set to 10 mW

Peak Output Power = 8.91 dBm = 7.8 mW





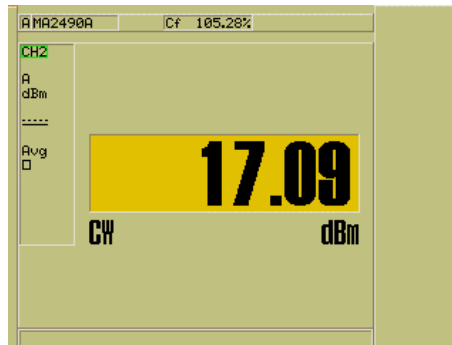
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APPENDIX A

Test Date: 10-01-2008
Company: Shure, Inc.
EUT: UR1M/R L3
Test: Peak Power Output - Conducted
Rule part: FCC Part 74; FCC Part 2.1046
Operator: Craig B
Comment: Channel: 638 MHz
Power set to 50 mW

Peak Output Power = 17.09 dBm = 51.2 mW





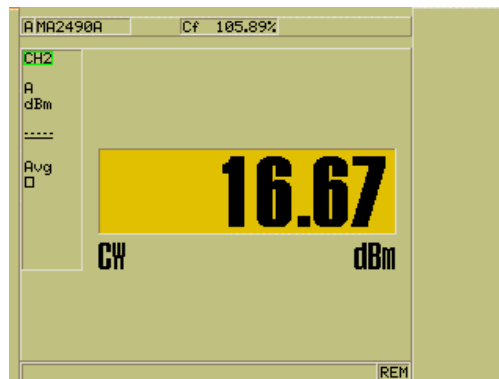
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APPENDIX A

Test Date: 10-01-2008
Company: Shure, Inc.
EUT: UR1M/R L3
Test: Peak Power Output - Conducted
Rule part: FCC Part 74; FCC Part 2.1046
Operator: Craig B
Comment: Channel: 668 MHz
Power set to 50 mW

Peak Output Power = 16.67 dBm = 46.5 mW





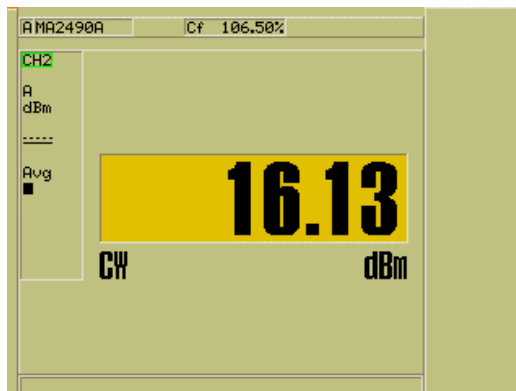
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APPENDIX A

Test Date: 10-01-2008
Company: Shure, Inc.
EUT: UR1M/R L3
Test: Peak Power Output - Conducted
Rule part: FCC Part 74; FCC Part 2.1046
Operator: Craig B
Comment: Channel: 698 MHz
Power set to 50 mW

Peak Output Power = 16.13 dBm = 41.0 mW



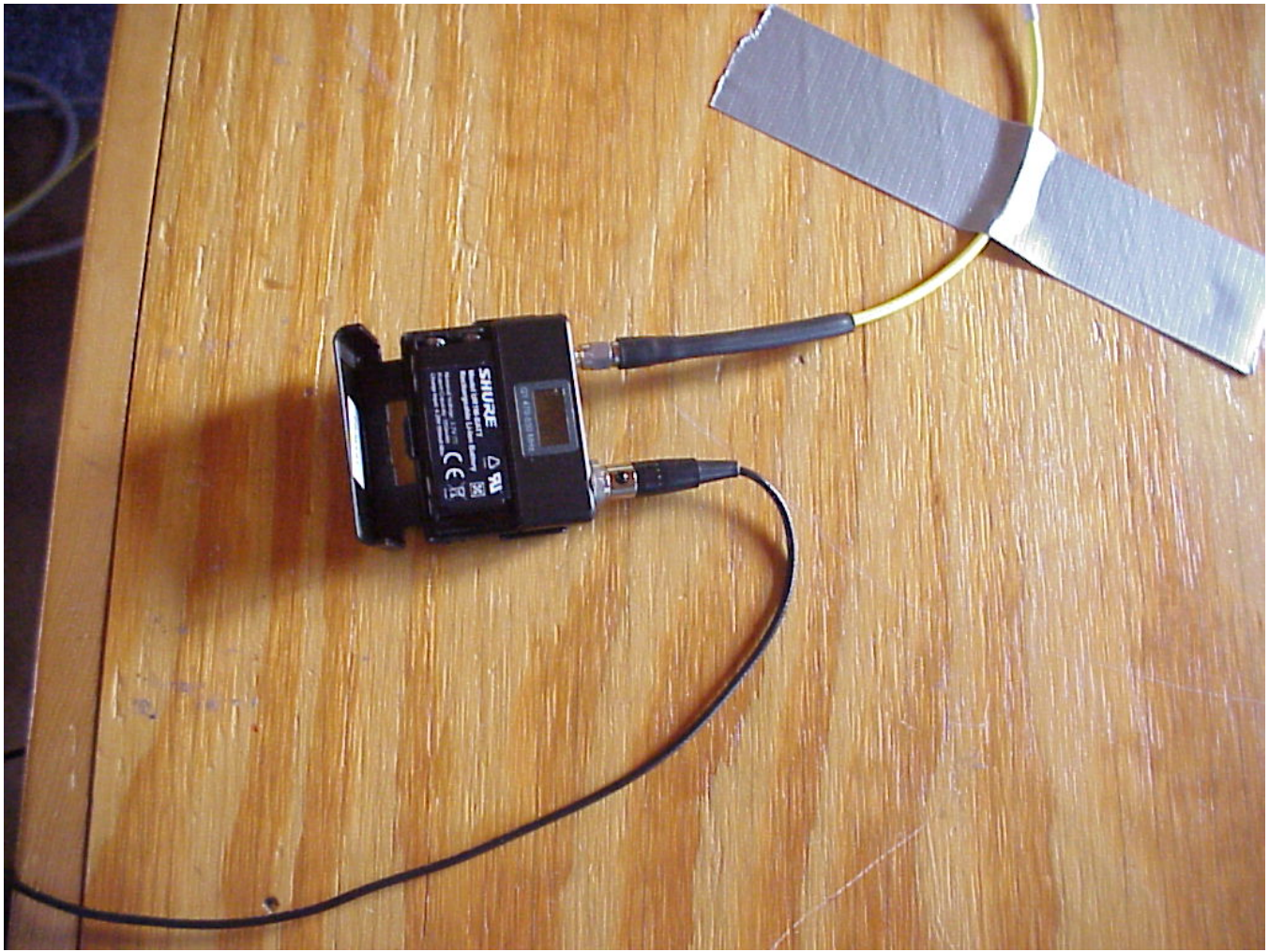


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APPENDIX A

3.0 RF POWER OUTPUT PHOTOS TAKEN DURING TESTING





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APPENDIX A

4.0 MODULATION CHARACTERISTICS – PART 2.1047 and EIA /TIA-603-C:2004, SECTION 2.2.3

a. Voice modulated communication equipment.

A curve showing the frequency response of the audio modulating circuit over a range of 50 Hz to 15 kHz -3.0 - 0 dB Hz is submitted with this report.

b. Equipment which employs modulation limiting

A family of curves showing the percentage of modulation versus the modulation input voltage with sufficient information showing the modulation limiting capability throughout the range of modulating frequencies and input modulating signal levels employed.



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APPENDIX A

GRAPH(S) TAKEN SHOWING THE FREQUENCY RESPONSE OF THE AUDIO MODULATING CIRCUIT

EIA /TIA-603-C:2004, SECTION 2.2.3

PART 2.1047

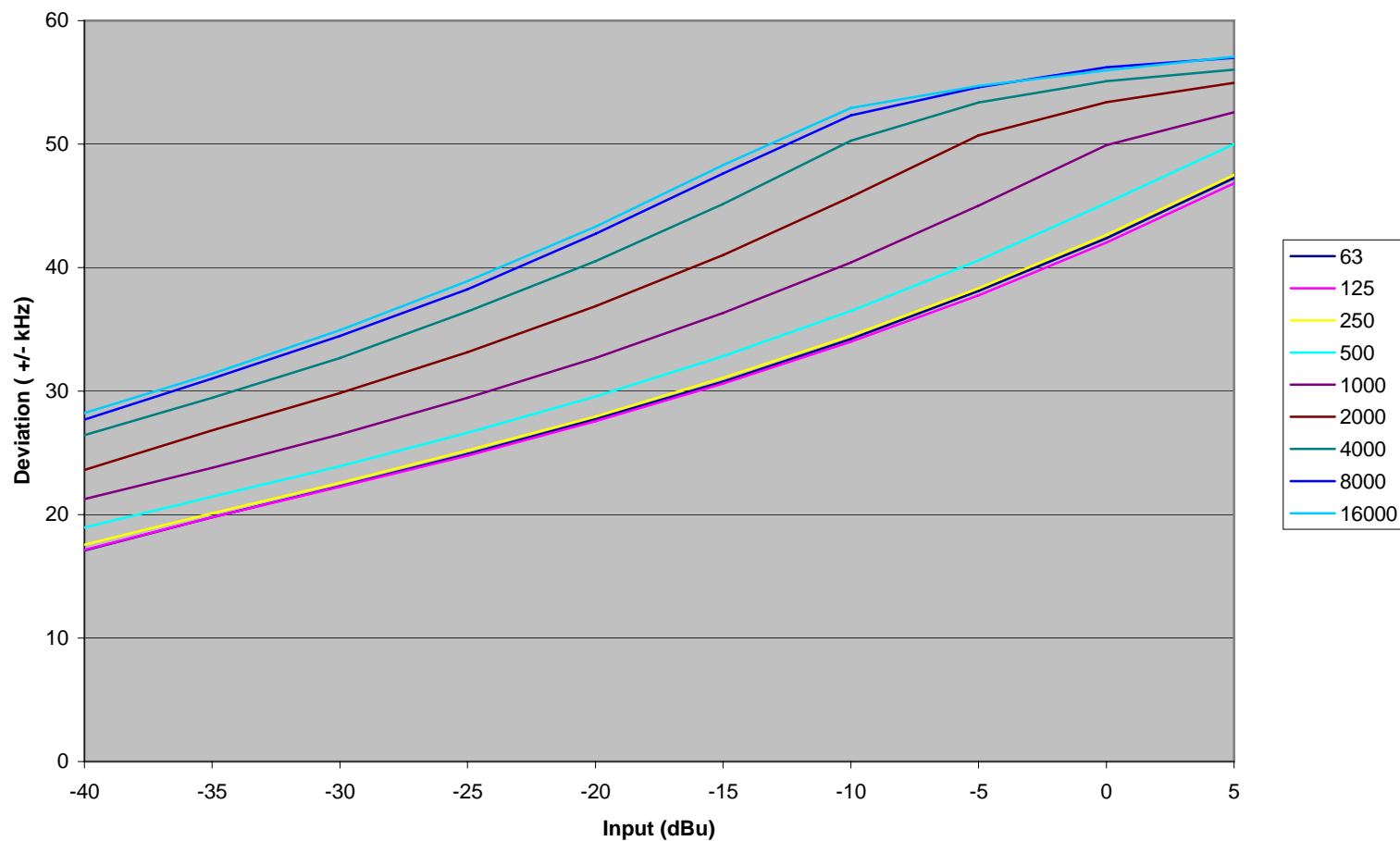


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APPENDIX A

Deviation vs. Input (13 units averaged)



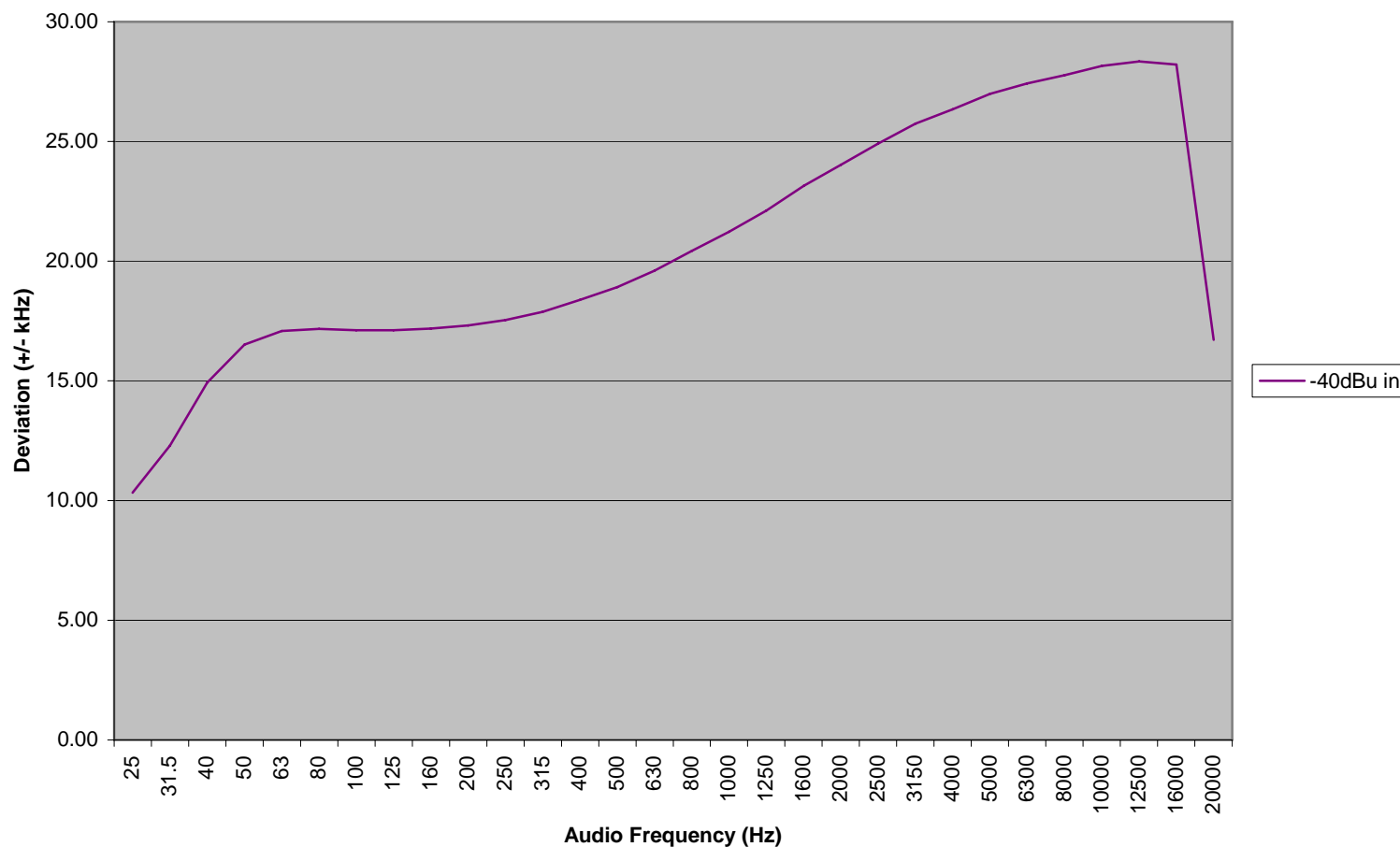


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APPENDIX A

Deviation vs. Frequency (13 units averaged)





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APPENDIX A

L3E (7789)	63	125	250	500	1000	2000	4000	8000	16000
-40	17.30	17.30	17.80	19.10	21.50	21.30	26.50	28.40	28.90
-35	20.00	19.90	20.30	21.60	24.00	27.20	29.90	31.60	32.20
-30	22.50	22.40	22.80	24.10	26.70	30.20	33.10	35.10	35.80
-25	25.10	25.00	25.30	26.80	29.70	33.50	36.80	39.10	39.90
-20	27.90	27.80	28.10	29.80	32.90	37.30	41.20	43.50	44.40
-15	31.00	30.80	31.30	33.10	36.60	41.40	45.90	48.50	49.60
-10	34.50	34.20	34.70	36.70	40.70	46.20	51.10	53.20	53.80
-5	38.40	38.00	38.60	40.80	45.30	51.30	54.30	55.60	55.90
0	42.60	42.30	42.90	45.50	50.30	54.00	55.80	57.00	57.30
5	47.60	47.10	47.80	50.30	53.00	55.70	56.30	58.00	58.20



1250 Peterson Dr., Wheeling, IL 60090

Company: Shure Incorporated
Model Tested: UR1M/R L3
Report Number: 14843

APPENDIX A

5.0 OCCUPIED BANDWIDTH - PART 2.1049

The occupied bandwidth is that between the lower and upper limits of the signal where the mean power is 99.0% of the total mean power and measured under the following conditions:

For low power auxiliary stations operating in the bands other than those allocated for TV broadcasting, the occupied bandwidth shall not be greater than that necessary for satisfactory transmission and emissions appearing on any discrete frequency outside the authorize band shall be attenuated $43+10 \log^{10}$ (mean output power, in watts) dB below the mean output power of the transmitting unit (device under test).

For low power auxiliary stations operating in the bands allocated for TV broadcasting, any form of modulation may be used. A maximum ± 75 kHz deviation is permitted when frequency modulation is used. The operating bandwidth shall not exceed 200 kHz.

Carson's Rule:

Section 2.202 (g) Sound Broadcasting

$$B_n = 2M + 2DK, \quad K=1$$

B_n = Bandwidth

$$M = 16 \text{ kHz},$$

M = Maximum Modulating Frequency

$$D = 50 \text{ kHz},$$

D = Peak Deviation

$$B_n = 2(16) + 2(50)(1) = 132 \text{ kHz}$$



1250 Peterson Dr., Wheeling, IL 60090

Company: Shure Incorporated
Model Tested: UR1M/R L3
Report Number: 14843

APPENDIX A

DATA AND GRAPH(S) TAKEN OF THE

99% OCCUPIED BANDWIDTH

Part 74.861 (e)(5) & PART 2.1049



Company: Shure Incorporated
Model Tested: UR1M/R L3
Report Number: 14843

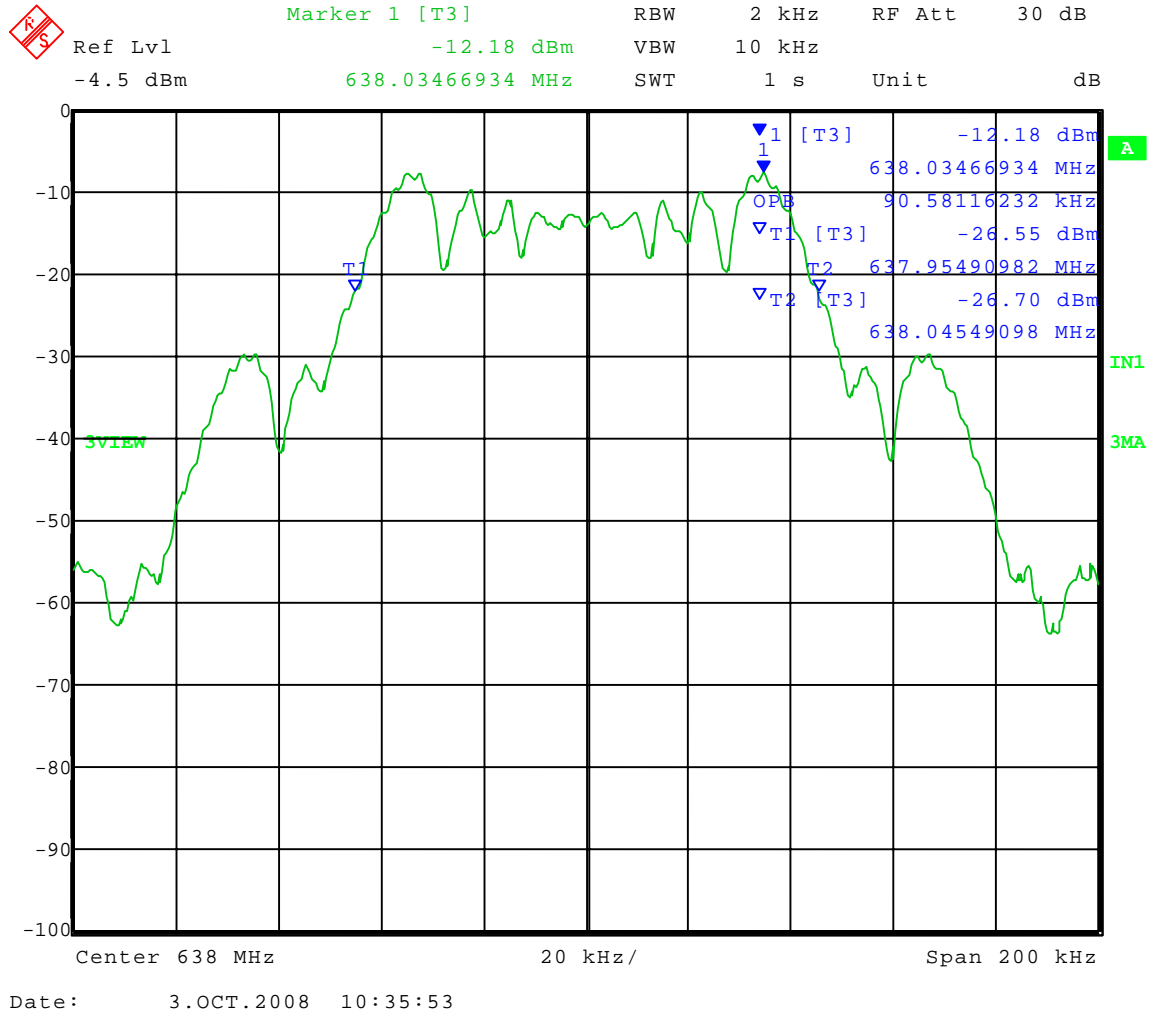
1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

Test Date: 10-03-2008
Company: Shure, Inc.
EUT: UR1M/R L3
Test: Occupied Bandwidth; 99% bandwidth
Rule part: FCC Part 74; FCC Part 2.1049
Operator: Craig B

Frequency: 638 MHz

99% power bandwidth = 90.6 kHz





Company: Shure Incorporated
Model Tested: UR1M/R L3
Report Number: 14843

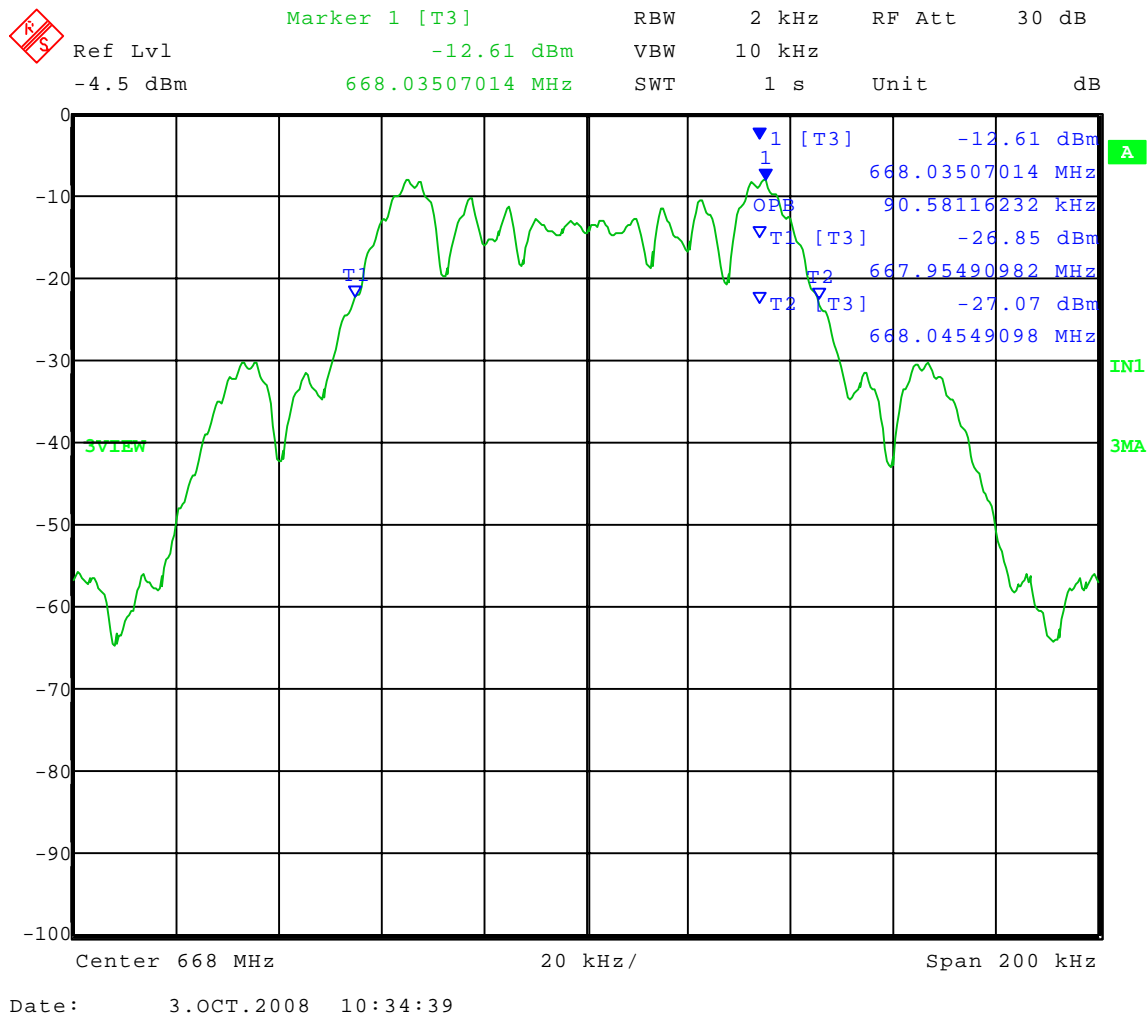
1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

Test Date: 10-03-2008
Company: Shure, Inc.
EUT: UR1M/R L3
Test: Occupied Bandwidth; 99% bandwidth
Rule part: FCC Part 74; FCC Part 2.1049
Operator: Craig B

Frequency: 668 MHz

99% power bandwidth = 90.6 kHz





Company: Shure Incorporated
Model Tested: UR1M/R L3
Report Number: 14843

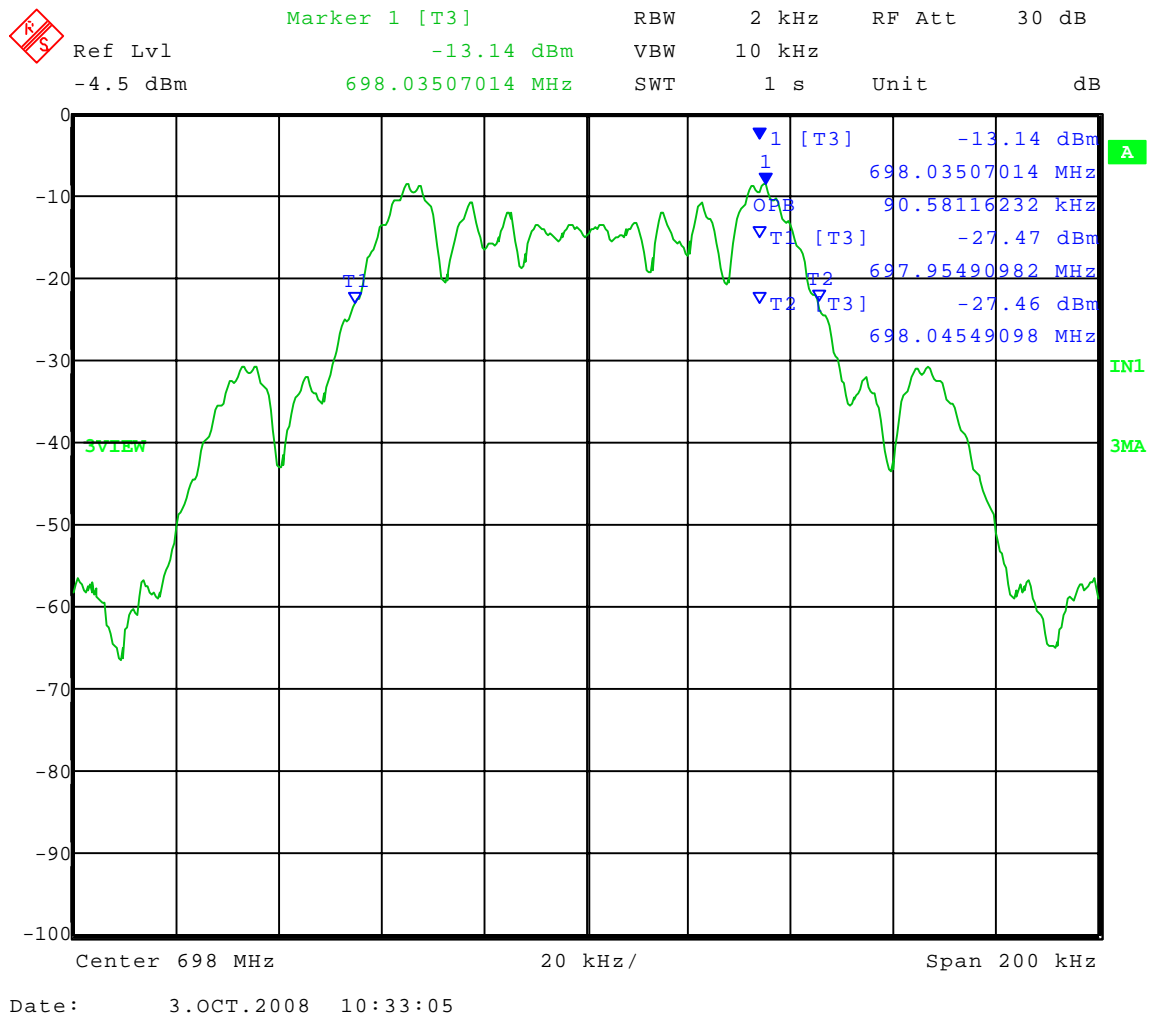
1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

Test Date: 10-03-2008
Company: Shure, Inc.
EUT: UR1M/R L3
Test: Occupied Bandwidth; 99% bandwidth
Rule part: FCC Part 74; FCC Part 2.1049
Operator: Craig B

Frequency: 698 MHz

99% power bandwidth = 90.6 kHz





1250 Peterson Dr., Wheeling, IL 60090

Company: Shure Incorporated
Model Tested: UR1M/R L3
Report Number: 14843

APPENDIX A

DATA AND GRAPH(S) TAKEN OF THE EMISSION MASK

Part 74.861(d)(3) (e)(6) & PART 2.1049



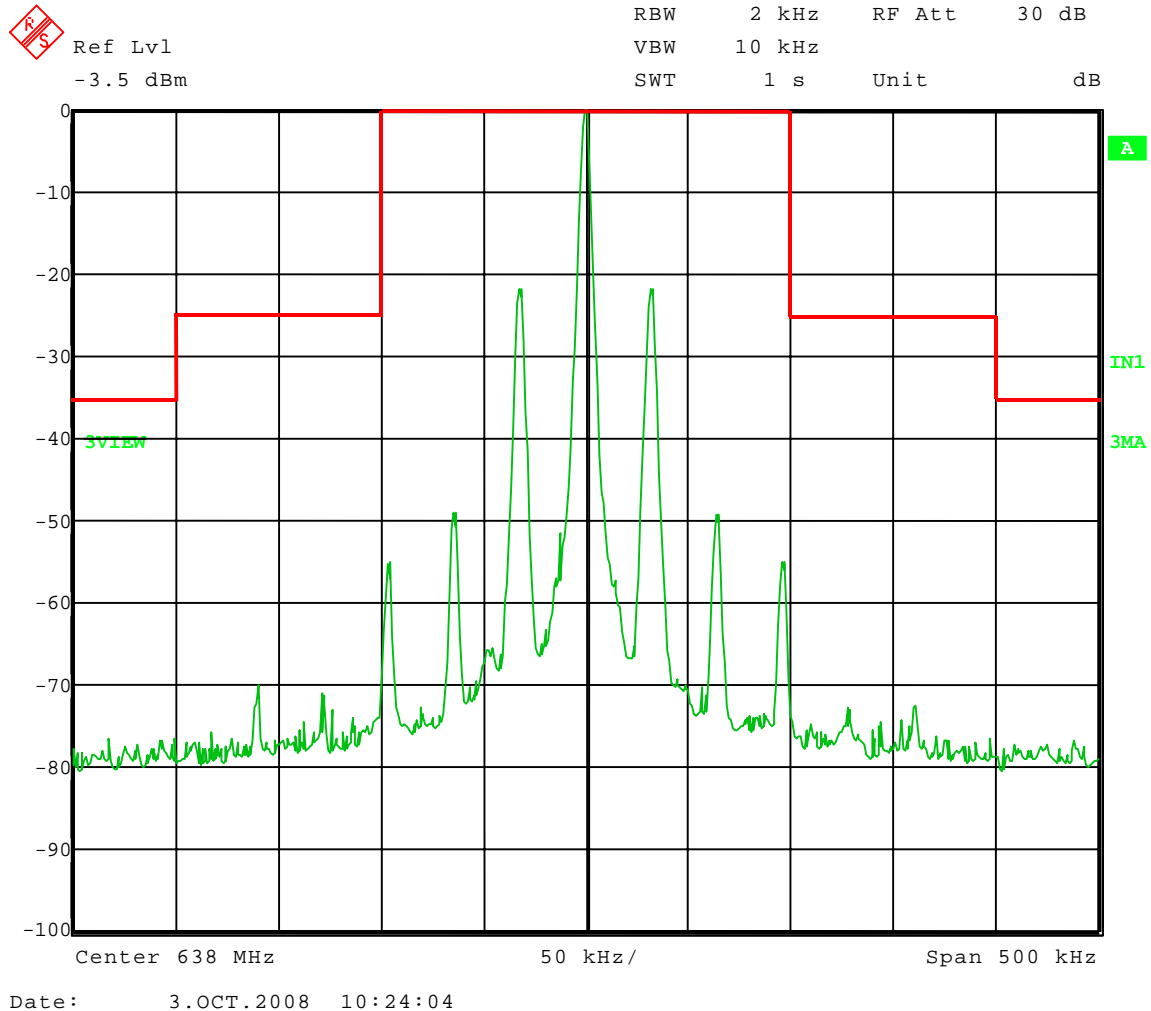
Company: Shure Incorporated
Model Tested: UR1M/R L3
Report Number: 14843

1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

Test Date: 10-03-2008
Company: Shure, Inc.
EUT: UR1M/R L3
Test: Emission Mask
Rule Part: FCC Pt. 74.861(e)
Operator: Craig B

Nominal Frequency: 638 MHz
Reference, Unmodulated





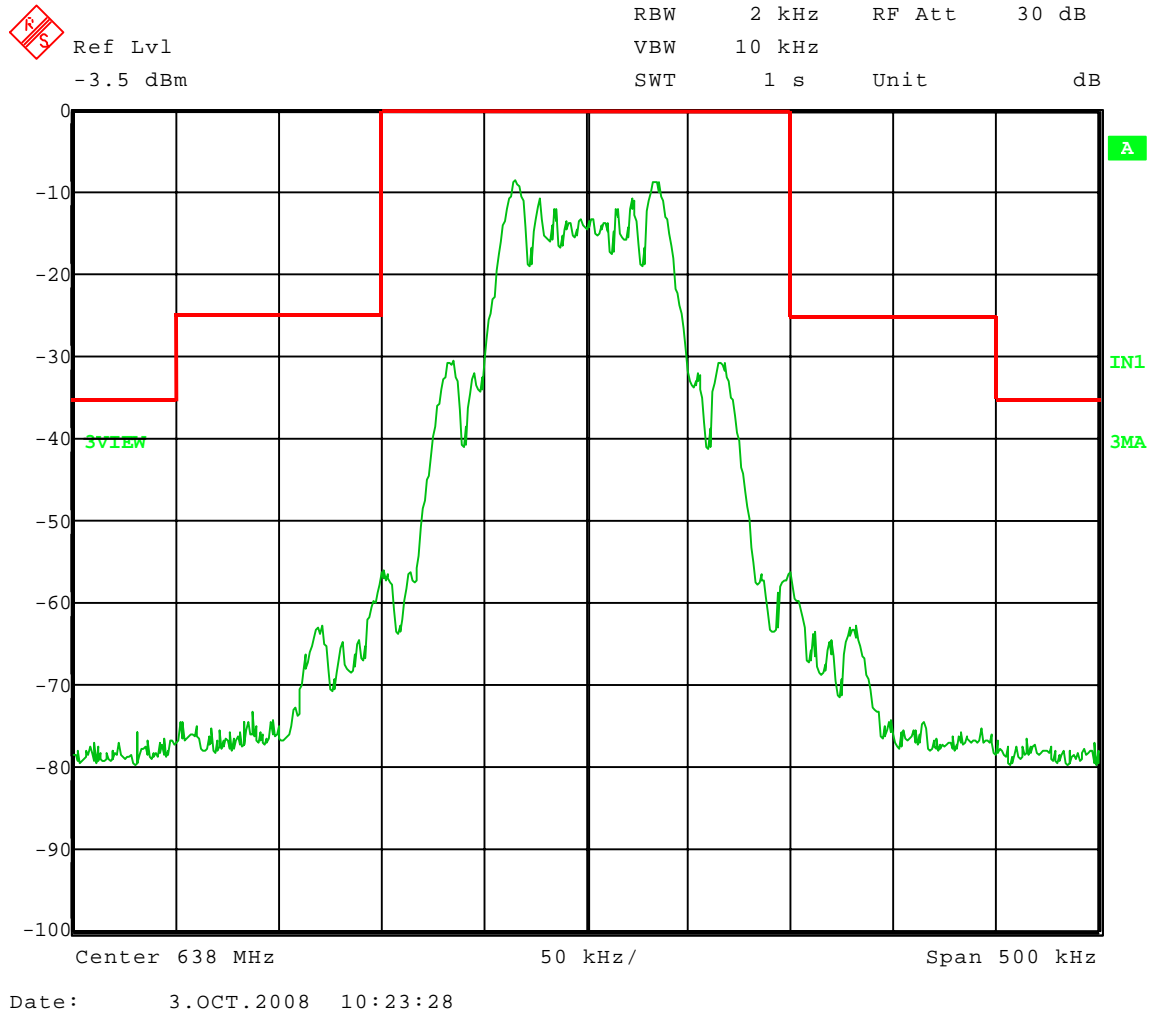
Company: Shure Incorporated
Model Tested: UR1M/R L3
Report Number: 14843

1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

Test Date: 10-03-2008
Company: Shure, Inc.
EUT: UR1M/R L3
Test: Emission Mask
Rule Part: FCC Pt. 74.861(e)
Operator: Craig B

Nominal Frequency: 638 MHz
2500 Hz 16 dB > 50% modulated





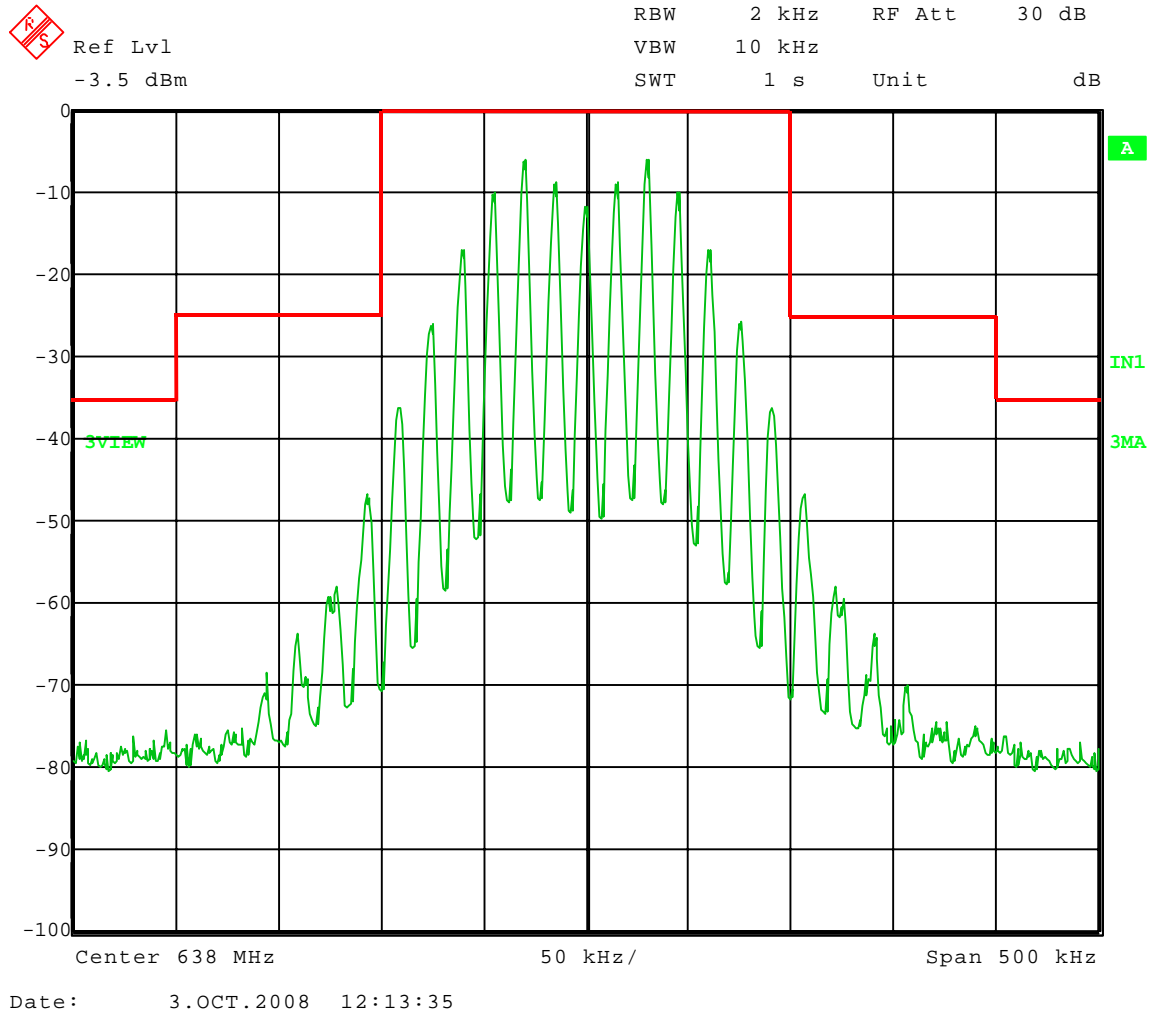
Company: Shure Incorporated
Model Tested: UR1M/R L3
Report Number: 14843

1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

Test Date: 10-03-2008
Company: Shure, Inc.
EUT: UR1M/R L3
Test: Emission Mask
Rule Part: FCC Pt. 74.861(e)
Operator: Craig B

Nominal Frequency: 638 MHz
15 kHz modulation





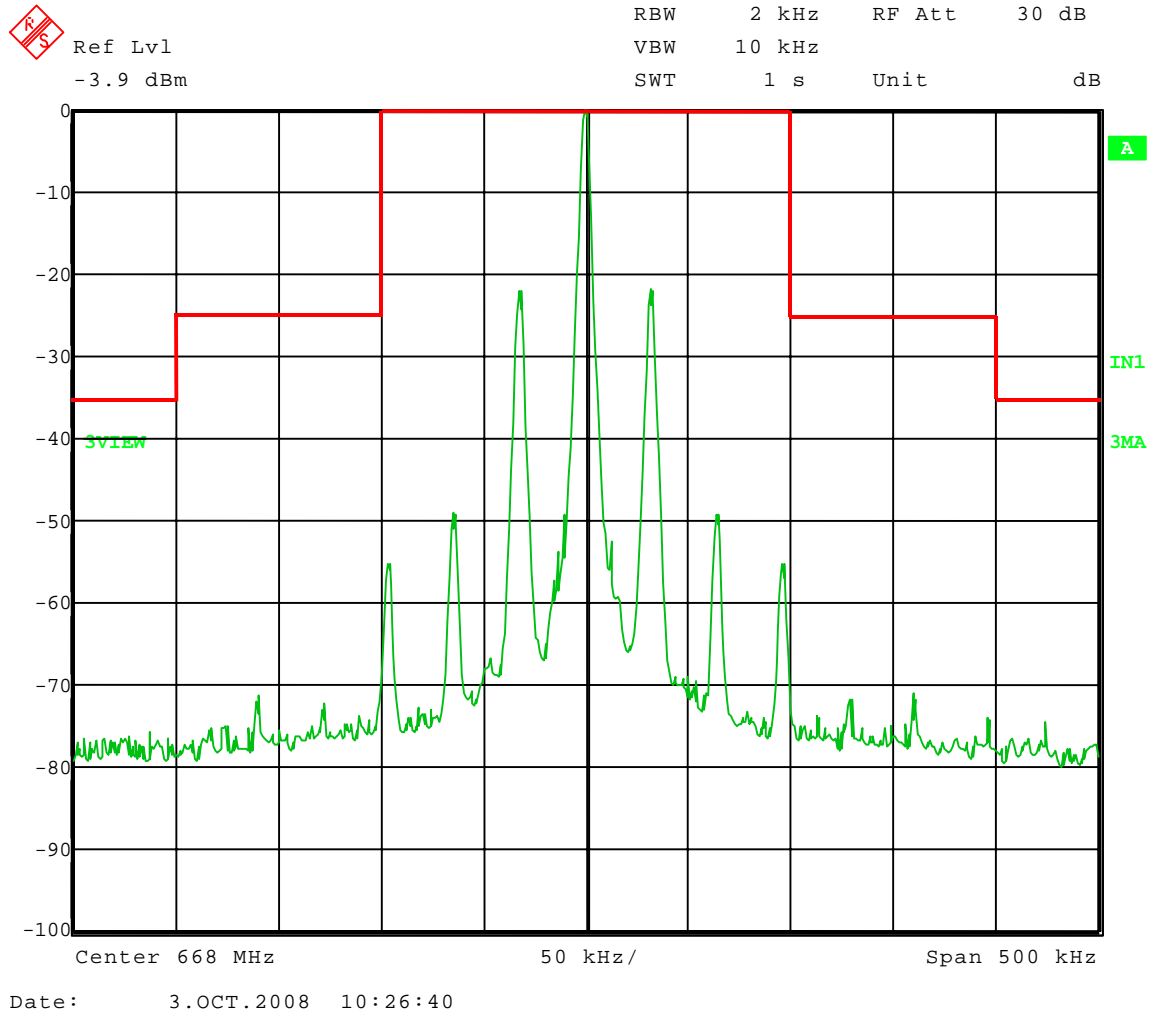
Company: Shure Incorporated
Model Tested: UR1M/R L3
Report Number: 14843

1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

Test Date: 10-03-2008
Company: Shure, Inc.
EUT: UR1M/R L3
Test: Emission Mask
Rule Part: FCC Pt. 74.861(e)
Operator: Craig B

Nominal Frequency: 668 MHz
Reference, Unmodulated





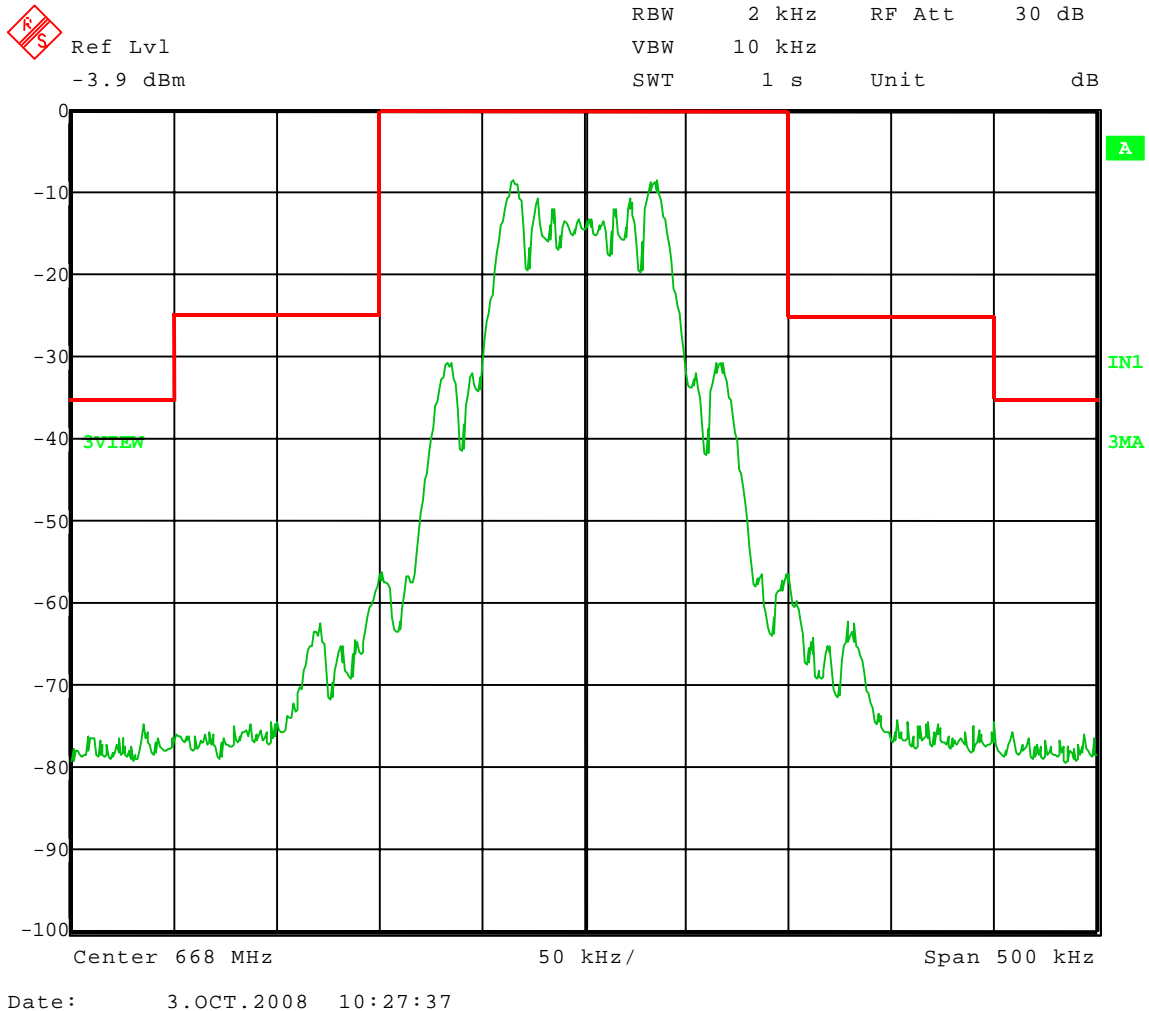
Company: Shure Incorporated
Model Tested: UR1M/R L3
Report Number: 14843

1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

Test Date: 10-03-2008
Company: Shure, Inc.
EUT: UR1M/R L3
Test: Emission Mask
Rule Part: FCC Pt. 74.861(e)
Operator: Craig B

Nominal Frequency: 668 MHz
2500 Hz 16 dB > 50% modulated





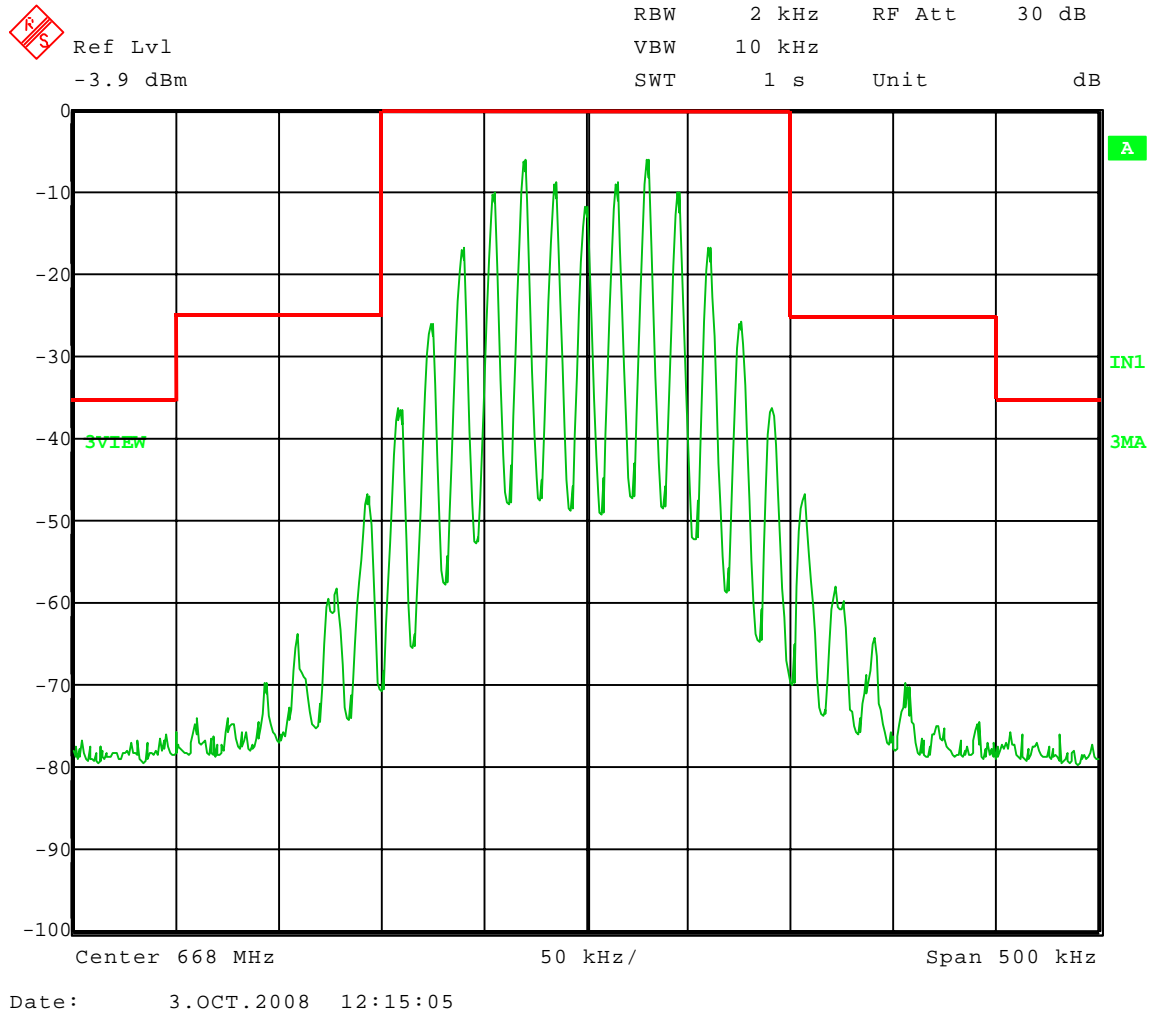
Company: Shure Incorporated
Model Tested: UR1M/R L3
Report Number: 14843

1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

Test Date: 10-03-2008
Company: Shure, Inc.
EUT: UR1M/R L3
Test: Emission Mask
Rule Part: FCC Pt. 74.861(e)
Operator: Craig B

Nominal Frequency: 668 MHz
15 kHz modulation





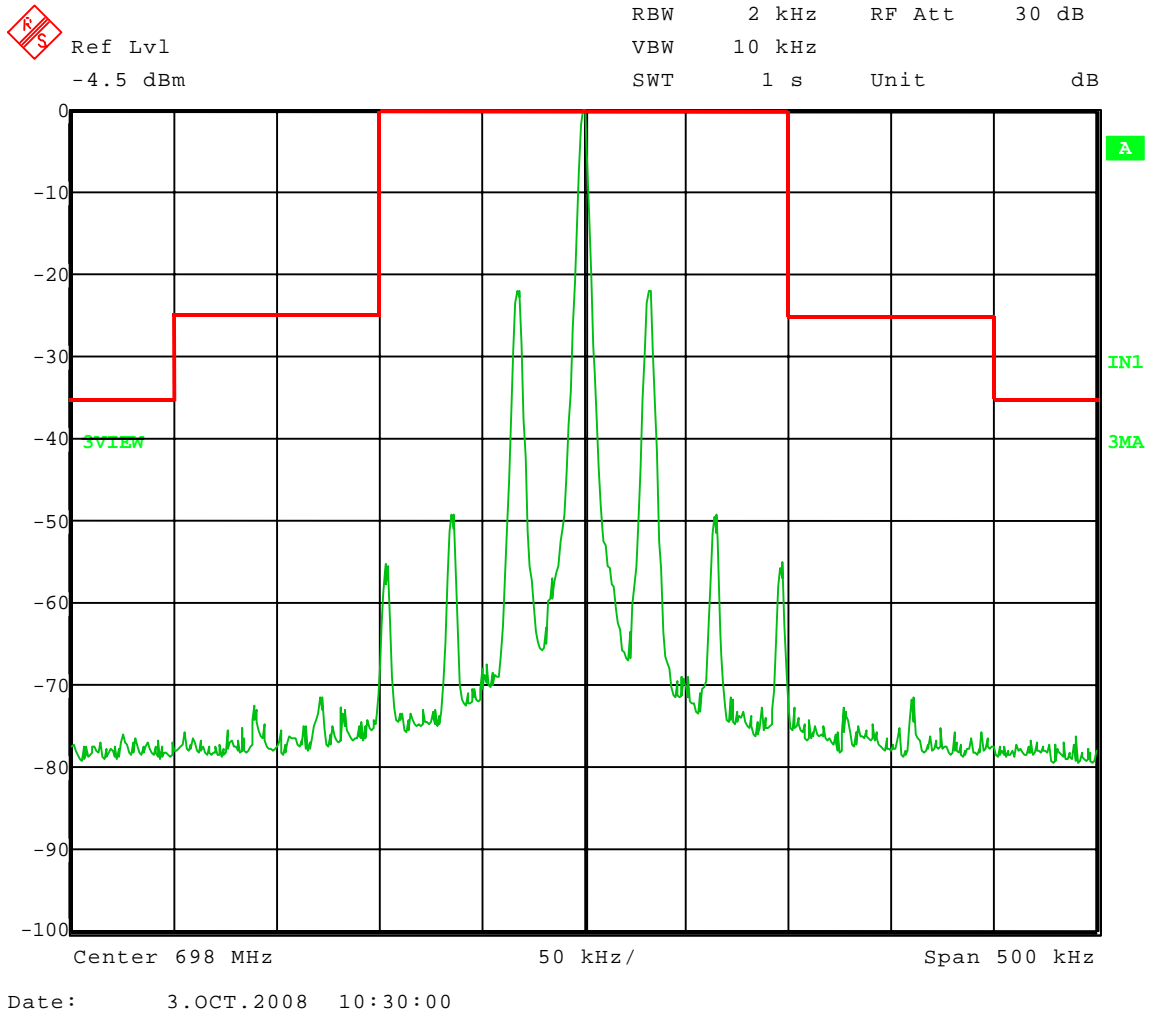
Company: Shure Incorporated
Model Tested: UR1M/R L3
Report Number: 14843

1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

Test Date: 10-03-2008
Company: Shure, Inc.
EUT: UR1M/R L3
Test: Emission Mask
Rule Part: FCC Pt. 74.861(e)
Operator: Craig B

Nominal Frequency: 698 MHz
Reference, Unmodulated





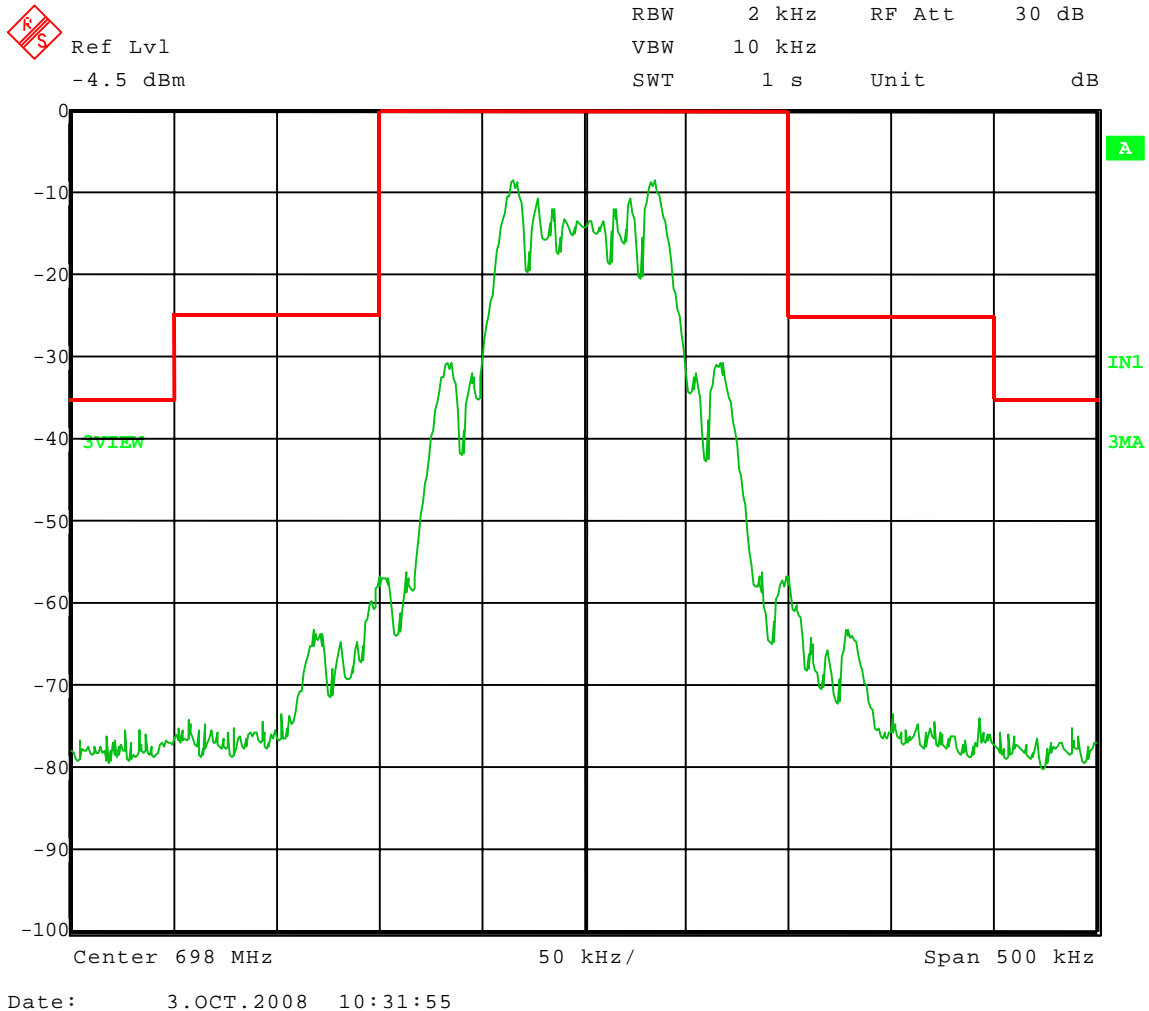
Company: Shure Incorporated
Model Tested: UR1M/R L3
Report Number: 14843

1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

Test Date: 10-03-2008
Company: Shure, Inc.
EUT: UR1M/R L3
Test: Emission Mask
Rule Part: FCC Pt. 74.861(e)
Operator: Craig B

Nominal Frequency: 698 MHz
2500 Hz 16 dB > 50% modulated





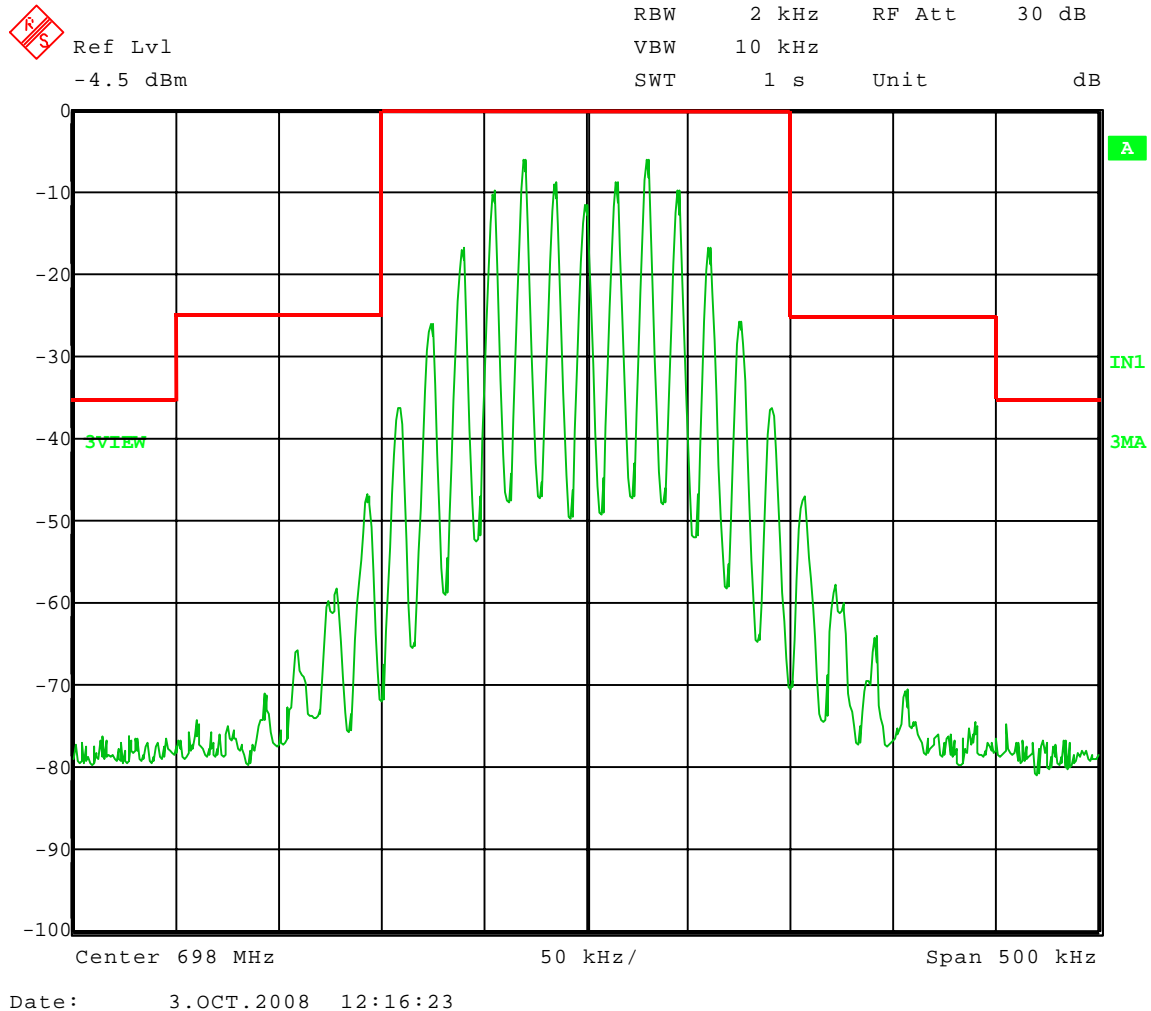
Company: Shure Incorporated
Model Tested: UR1M/R L3
Report Number: 14843

1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

Test Date: 10-03-2008
Company: Shure, Inc.
EUT: UR1M/R L3
Test: Emission Mask
Rule Part: FCC Pt. 74.861(e)
Operator: Craig B

Nominal Frequency: **698 MHz**
15 kHz modulation





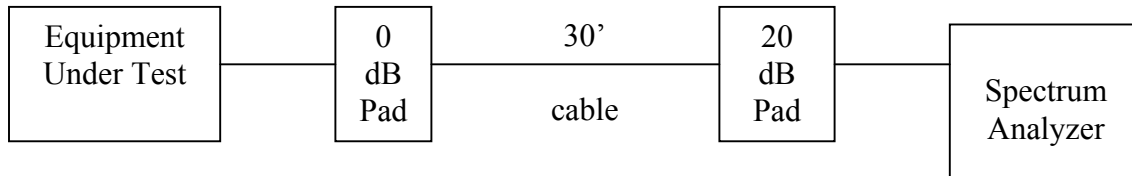
1250 Peterson Dr., Wheeling, IL 60090

Company: Shure Incorporated
Model Tested: UR1M/R L3
Report Number: 14843

APPENDIX A

7.0 SPURIOUS EMISSIONS AT ANTENNA TERMINALS – PART 2.1051 and EIA /TIA-603-C:2004, SECTION 2.2.13

Spurious conducted emissions were measured at the antenna terminals using an artificial load. Plots were made showing the amplitude of each harmonic emission with the equipment operated as specified in 2.989. Measurements were made up to the 10th harmonic of the fundamental. The following setup was used showing placement of the attenuators:



The allowed emissions for transmitters operating in the 638 MHz - 698 MHz bands for Micro Bodypack Transmitter equipment are found under Part 74, Section 74.861, Paragraph e-6 for Low Power Auxiliary Stations. This paragraph states the mean power of the emissions shall be attenuated below the mean output power of the transmitter in accordance with the following schedule:

- (1) On any frequency removed from the operating frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: at least 25 dB.
- (2) On any frequency removed from the operating frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: at least 35 dB.
- (3) On any frequency removed from the operating frequency by more than 250 percent of the authorized bandwidth: at least $43 + 10 \log_{10}$ (mean output power in watts) dB.

NOTE:

The Micro Bodypack Transmitter uses the **Whip Antenna**. See the following pages for the data and graphs of the actual measurements made:



1250 Peterson Dr., Wheeling, IL 60090

Company: Shure Incorporated
Model Tested: UR1M/R L3
Report Number: 14843

APPENDIX A

CONDUCTED EMISSION DATA & CHARTS TAKEN FOR SPURIOUS EMISSION MEASUREMENTS MADE AT THE ANTENNA TERMINALS EIA /TIA-603-C:2004, SECTION 2.2.13 PART 2.1051

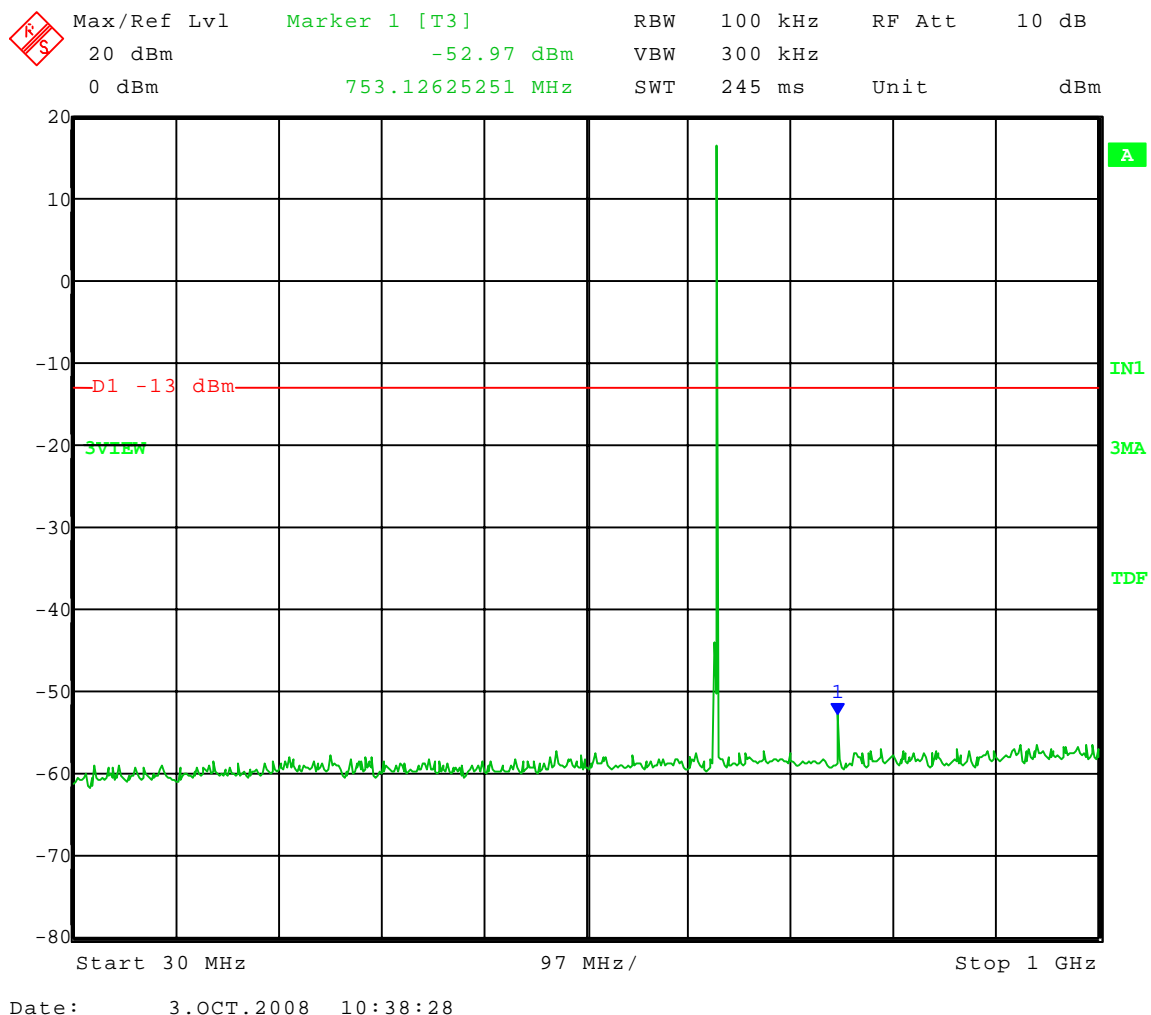


Company: Shure Incorporated
Model Tested: UR1M/R L3
Report Number: 14843

1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

Test Date: 10-03-2008
Company: Shure, Inc.
EUT: UR1M/R L3
Test: Spurious Emissions - Conducted
Rule part: FCC Part 74; FCC Part 2.1051
Operator: Craig B
Comment: Channel: 638 MHz
Power set to 50 mW
Frequency Range: 30 to 1000 MHz
Limit = -13 dBm



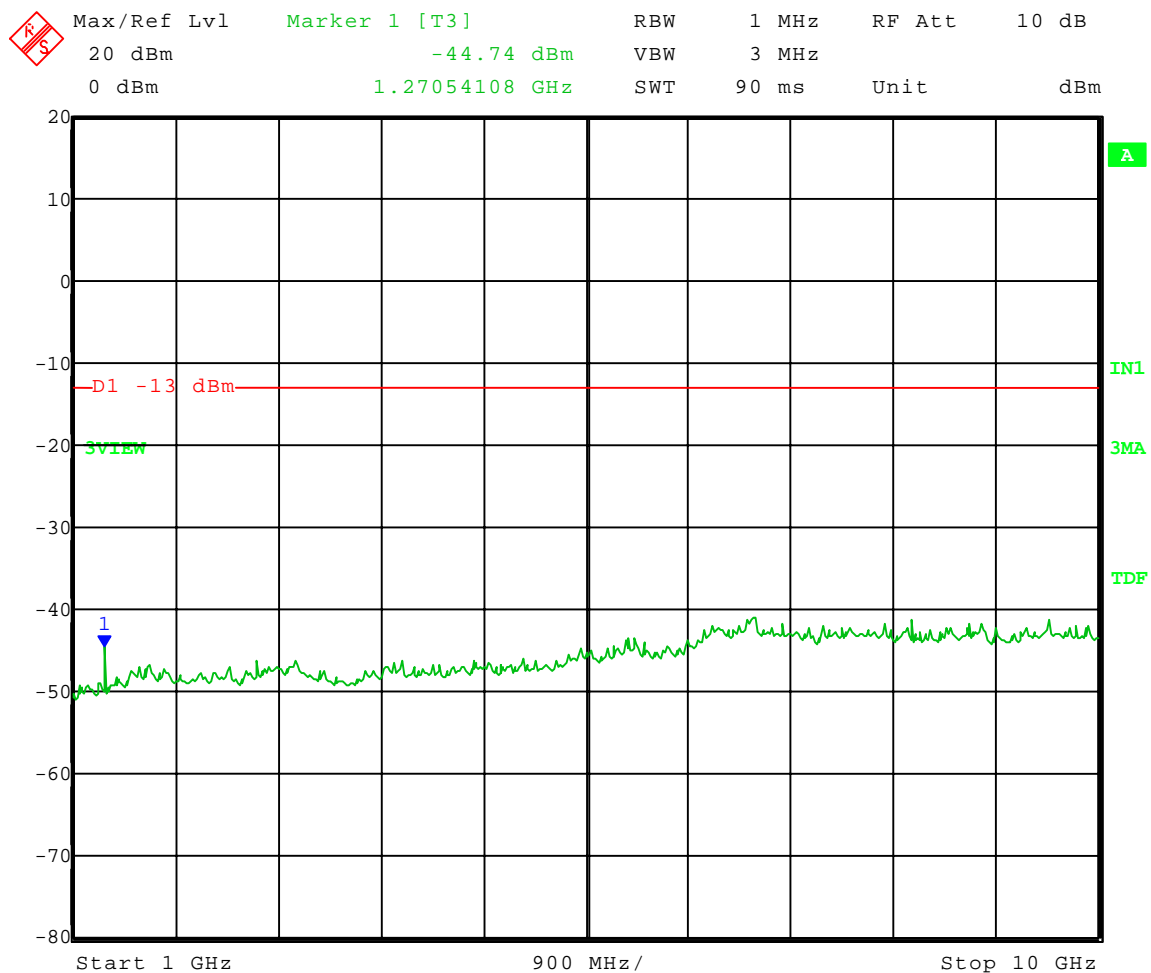


Company: Shure Incorporated
Model Tested: UR1M/R L3
Report Number: 14843

1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

Test Date: 10-03-2008
Company: Shure, Inc.
EUT: UR1M/R L3
Test: Spurious Emissions - Conducted
Rule part: FCC Part 74; FCC Part 2.1051
Operator: Craig B
Comment: Channel: 638 MHz
Power set to 50 mW
Frequency Range: 1 to 10 GHz
Limit = -13 dBm



Date: 3.OCT.2008 10:39:39

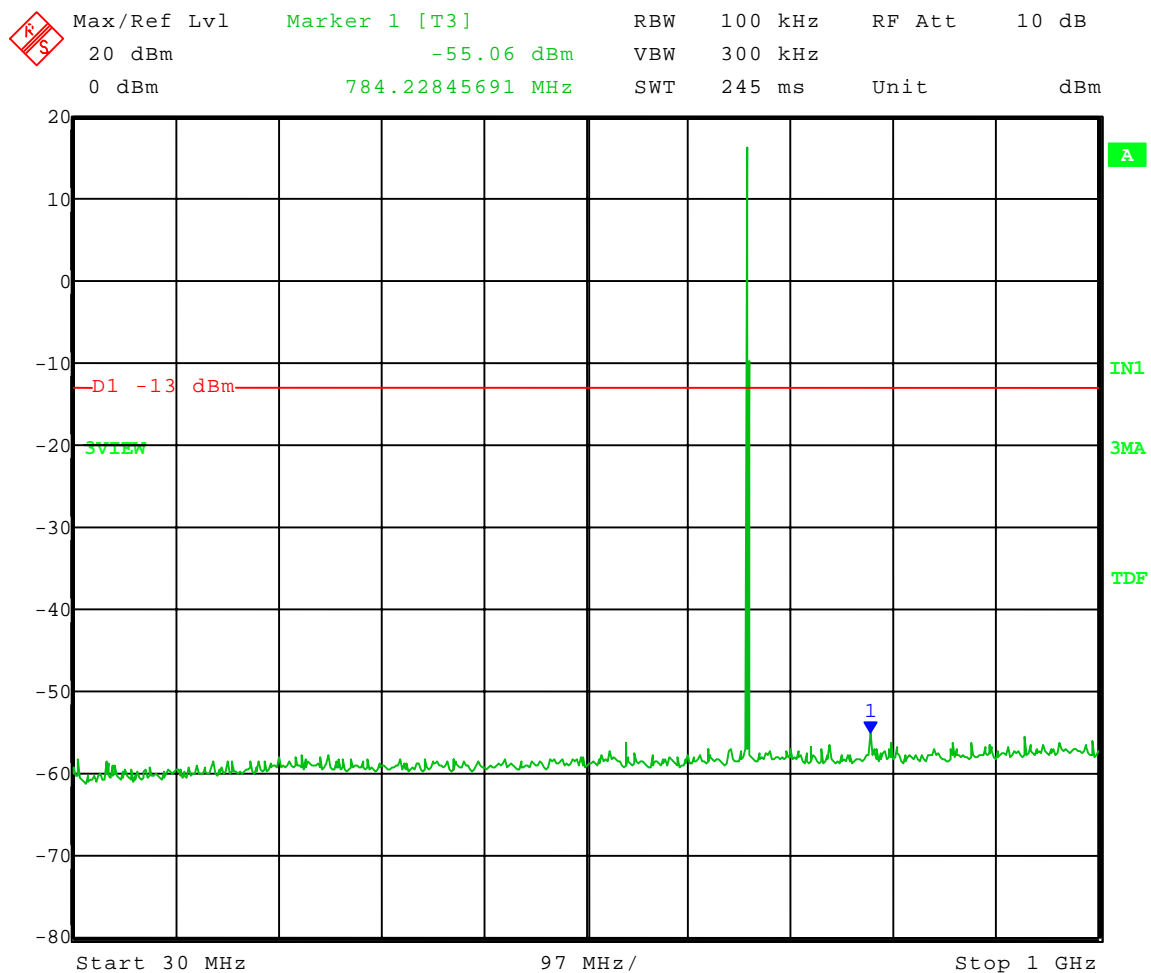


Company: Shure Incorporated
Model Tested: UR1M/R L3
Report Number: 14843

1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

Test Date: 10-03-2008
Company: Shure, Inc.
EUT: UR1M/R L3
Test: Spurious Emissions - Conducted
Rule part: FCC Part 74; FCC Part 2.1051
Operator: Craig B
Comment: Channel: 668 MHz
Power set to 50 mW
Frequency Range: 30 to 1000 MHz
Limit = -13 dBm



Date: 3.OCT.2008 10:43:21

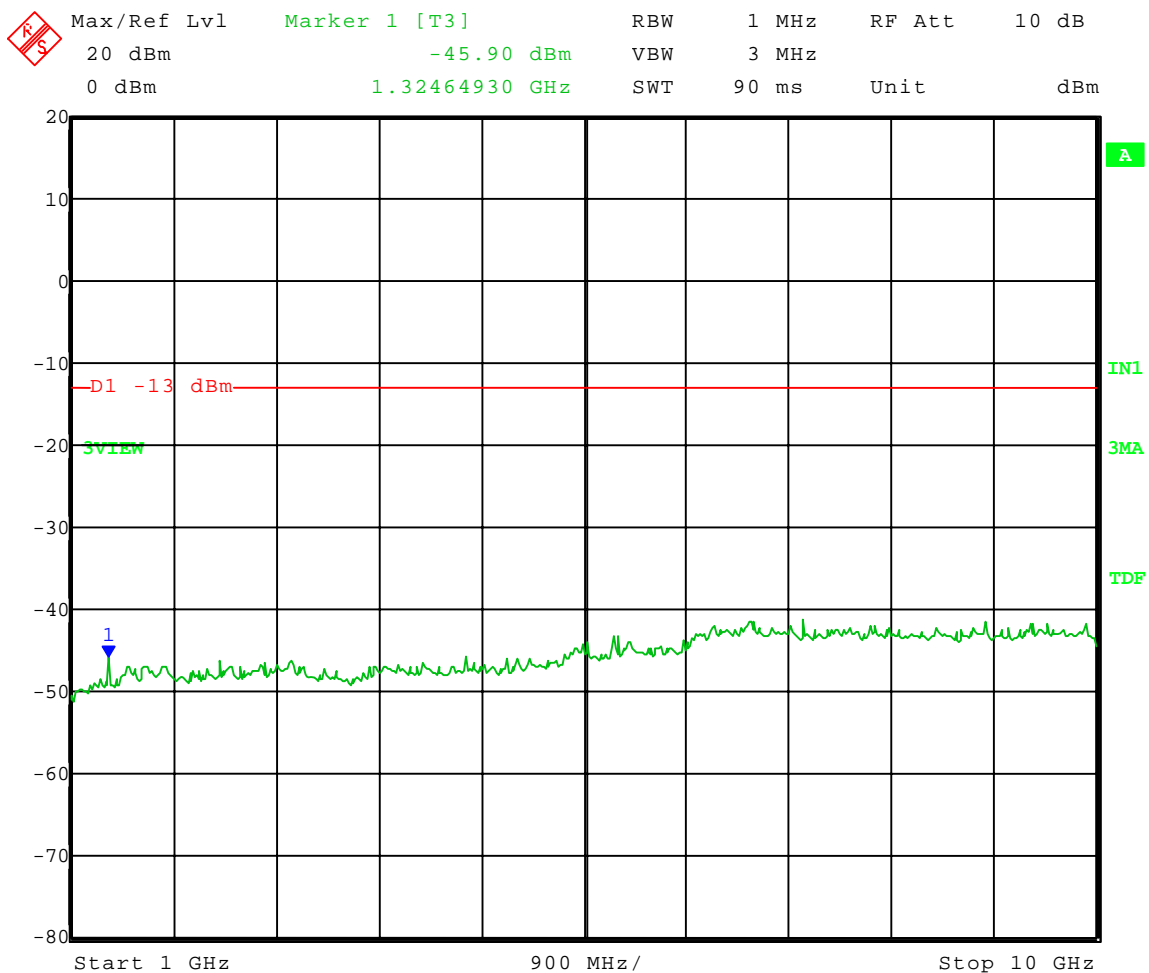


Company: Shure Incorporated
Model Tested: UR1M/R L3
Report Number: 14843

1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

Test Date: 10-03-2008
Company: Shure, Inc.
EUT: UR1M/R L3
Test: Spurious Emissions - Conducted
Rule part: FCC Part 74; FCC Part 2.1051
Operator: Craig B
Comment: Channel: 668 MHz
Power set to 50 mW
Frequency Range: 1 to 10 GHz
Limit = -13 dBm



Date: 3.OCT.2008 10:41:41

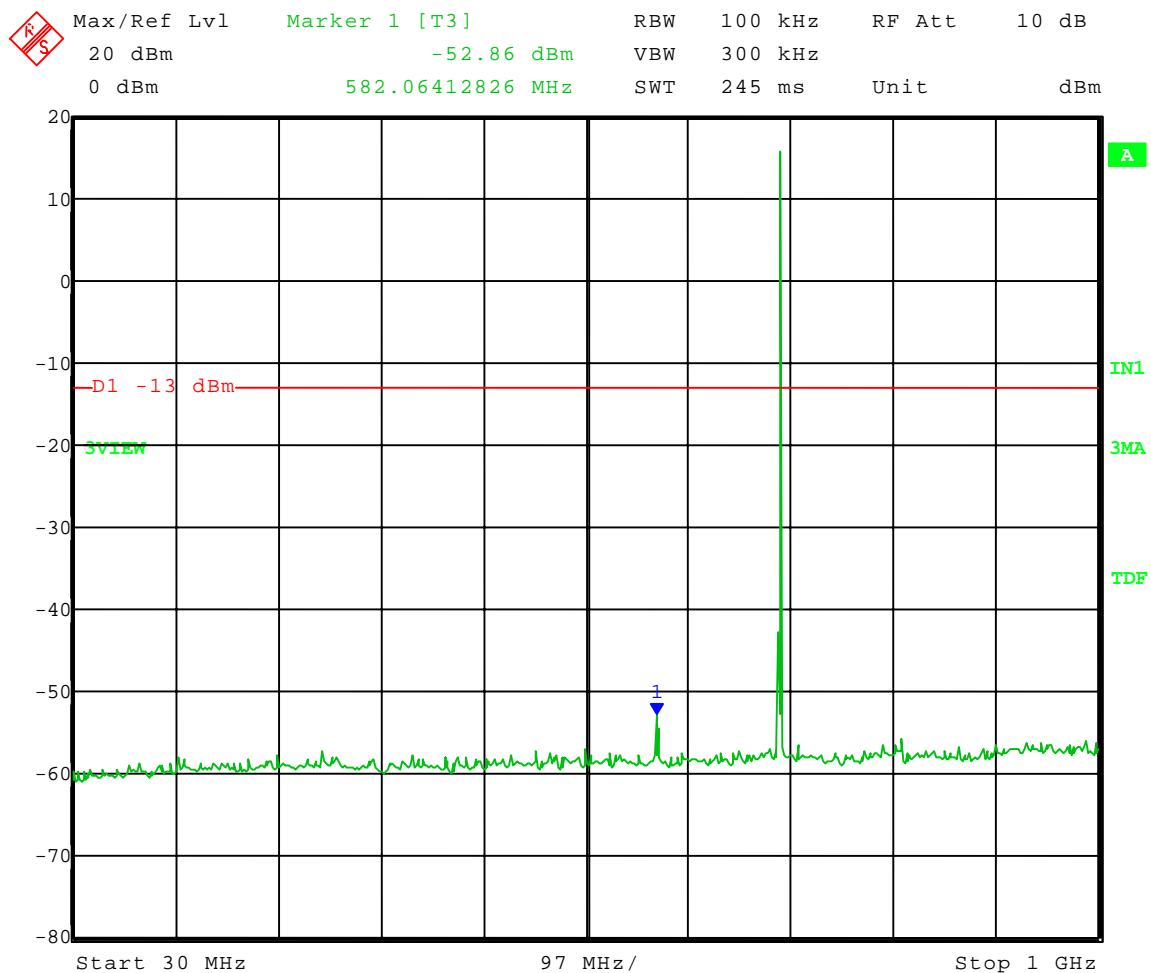


Company: Shure Incorporated
Model Tested: UR1M/R L3
Report Number: 14843

1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

Test Date: 10-03-2008
Company: Shure, Inc.
EUT: UR1M/R L3
Test: Spurious Emissions - Conducted
Rule part: FCC Part 74; FCC Part 2.1051
Operator: Craig B
Comment: Channel: 698 MHz
Power set to 50 mW
Frequency Range: 30 to 1000 MHz
Limit = -13 dBm



Date: 3.OCT.2008 10:44:50

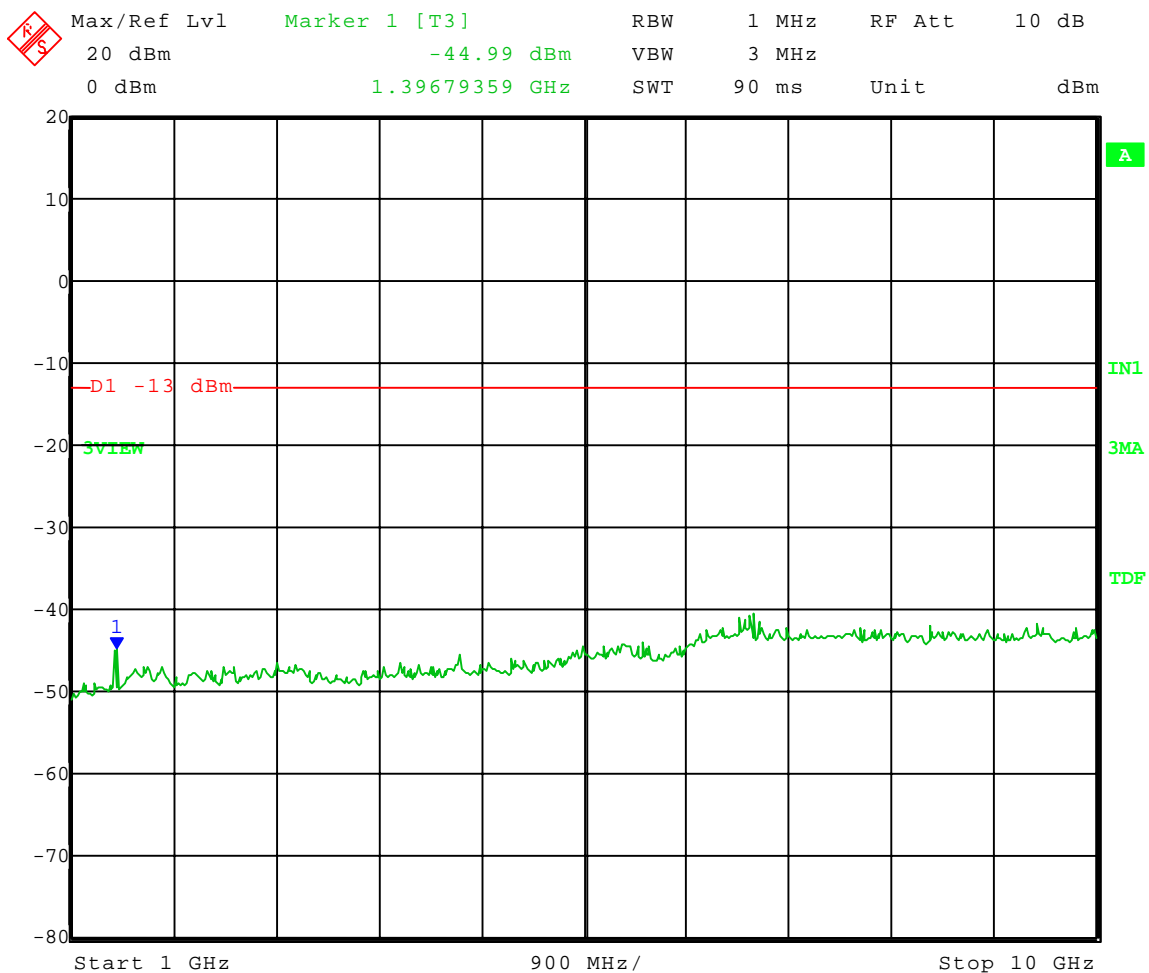


Company: Shure Incorporated
Model Tested: UR1M/R L3
Report Number: 14843

1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

Test Date: 10-03-2008
Company: Shure, Inc.
EUT: UR1M/R L3
Test: Spurious Emissions - Conducted
Rule part: FCC Part 74; FCC Part 2.1051
Operator: Craig B
Comment: Channel: **698 MHz**
Power set to 50 mW
Frequency Range: 1 to 10 GHz
Limit = -13 dBm



Date: 3.OCT.2008 10:45:55



1250 Peterson Dr., Wheeling, IL 60090

Company: Shure Incorporated
Model Tested: UR1M/R L3
Report Number: 14843

APPENDIX A

DATA AND GRAPH(S) TAKEN OF THE BAND EDGE COMPLIANCE

Part 74.861(d)(3) (e)(6) & PART 2.1051

NOTE:

This frequency band 638 MHz - 698 MHz lies outside the restricted bands, therefore the Band Edge Compliance is not required.



1250 Peterson Dr., Wheeling, IL 60090

Company: Shure Incorporated
Model Tested: UR1M/R L3
Report Number: 14843

APPENDIX A

9.0 FIELD STRENGTH OF SPURIOUS EMISSION MEASUREMENTS – PART 2.1053 and EIA /TIA-603-C:2004, SECTION 2.2.12

Radiated measurements were performed scanning the frequency range from 200 MHz to at least the 10th harmonic of the fundamental frequency.

For the Micro Bodypack Transmitter, the highest fundamental frequency is 698 MHz so the scans were made up to 10000 MHz, to cover the tenth harmonic.

All signals in the frequency range of 30 MHz to 200 MHz were measured with a Biconical Antenna and from 200 MHz to 1000 MHz a Log Periodic Antenna was used as the pickup devices. From 1000 MHz to 10000 MHz, a Double Ridge Horn Antenna was used. The cables and equipment were placed and moved within the range of positions likely to find their maximum emissions. Tests were made in both the horizontal and vertical planes of polarization.

The allowed emissions for transmitters operating in the 638 MHz - 698 MHz bands for Micro Bodypack Transmitter are found under Part 74, Section 74.861, Paragraph e-6 for Low Power Auxiliary Stations. This paragraph states that the mean power of the emissions shall be attenuated below the mean output power of the transmitter in accordance with the following schedule:

- (1) On any frequency removed from the operating frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: at least 25 dB.
- (2) On any frequency removed from the operating frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: at least 35 dB.
- (3) On any frequency removed from the operating frequency by more than 250 percent of the authorized bandwidth: at least $43 + 10 \log_{10}$ (mean output power in watts) dB.



1250 Peterson Dr., Wheeling, IL 60090

Company: Shure Incorporated
Model Tested: UR1M/R L3
Report Number: 14843

APPENDIX A

RADIATED EMISSION DATA & CHARTS TAKEN FOR FUNDAMENTAL EMISSIONS USING THE SUBSTITUTION METHOD EIA /TIA-603-C:2004, SECTION 2.2.12



1250 Peterson Dr., Wheeling, IL 60090

Company: Shure Incorporated
 Model Tested: UR1M/R L3
 Report Number: 14843

APPENDIX A

DLS Electronic Systems, Inc.

Company: Shure, Inc.
 Operator: Craig B
 Date of test: 10-01-2008
 Temperature: 73 deg. F
 Humidity: 42% R.H.

Output Power - ERP - Substitution Method

Model: UR1M/R L3 Power set to 50 mW = 17 dBm								
Channel: Low; 638.000 MHz								
Frequency and Polarization (MHz)	Max. Field Strength of EUT @ 3 meters (dBuV/m)	Output of Signal Generator when field strength equals that of EUT (dBm)	Correction factor for cable between Signal Gen. and subst. antenna (dB)	Gain of subst. antenna (dBi)	Strength of emission [ERP] (dBm)	Limit (dBm)	Margin (dB)	Strength of emission [ERP] (mW)
638.000 vertical	119.80	24.18	5.53	2.15	18.65	24	4.03	73.28
638.000 horizontal	120.79	22.4	5.53	2.15	16.87	24	7.13	48.64

EIRP = Signal generator output - cable loss + antenna gain

ERP_(ref. to ½λ dipole) = Signal generator output - cable loss + antenna gain - 2.15



1250 Peterson Dr., Wheeling, IL 60090

Company: Shure Incorporated
 Model Tested: UR1M/R L3
 Report Number: 14843

APPENDIX A

DLS Electronic Systems, Inc.

Company: Shure, Inc.
 Operator: Craig B
 Date of test: 10-01-2008
 Temperature: 73 deg. F
 Humidity: 42% R.H.

Output Power - ERP - Substitution Method

Model: UR1M/R L3 Power set to 50 mW = 17 dBm								
Channel: Mid; 668.000 MHz								
Frequency and Polarization (MHz)	Max. Field Strength of EUT @ 3 meters (dBuV/m)	Output of Signal Generator when field strength equals that of EUT (dBm)	Correction factor for cable between Signal Gen. and subst. antenna (dB)	Gain of subst. antenna (dBi)	Strength of emission [ERP] (dBm)	Limit (dBm)	Margin (dB)	Strength of emission [ERP] (mW)
668.000 vertical	118.42	23.41	5.76	2.15	17.65	24	4.56	58.2
668.000 horizontal	120.04	21.4	5.76	2.15	15.64	24	8.36	36.64

EIRP = Signal generator output - cable loss + antenna gain

ERP_(ref. to ½λ dipole) = Signal generator output - cable loss + antenna gain - 2.15



1250 Peterson Dr., Wheeling, IL 60090

Company: Shure Incorporated
 Model Tested: UR1M/R L3
 Report Number: 14843

APPENDIX A

DLS Electronic Systems, Inc.

Company: Shure, Inc.
 Operator: Craig B
 Date of test: 10-01-2008
 Temperature: 73 deg. F
 Humidity: 42% R.H.

Output Power - ERP - Substitution Method

Model: UR1M/R L3 Power set to 50 mW = 17 dBm								
Channel: High; 698.000 MHz								
Frequency and Polarization (MHz)	Max. Field Strength of EUT @ 3 meters (dBuV/m)	Output of Signal Generator when field strength equals that of EUT (dBm)	Correction factor for cable between Signal Gen. and subst. antenna (dB)	Gain of subst. antenna (dBi)	Strength of emission [ERP] (dBm)	Limit (dBm)	Margin (dB)	Strength of emission [ERP] (mW)
698.000 vertical	119.39	24.1	5.94	2.15	18.16	24	5.84	65.46
698.000 horizontal	118.04	20.4	5.94	2.15	14.46	24	9.54	27.93

EIRP = Signal generator output - cable loss + antenna gain

ERP_(ref. to ½λ dipole) = Signal generator output - cable loss + antenna gain - 2.15



1250 Peterson Dr., Wheeling, IL 60090

Company: Shure Incorporated
Model Tested: UR1M/R L3
Report Number: 14843

APPENDIX A

RADIATED EMISSION DATA AND GRAPH(S)

TAKEN FOR

SPURIOUS EMISSION MEASUREMENTS

USING THE SUBSTITUTION METHOD

EIA /TIA-603-C:2004, SECTION 2.2.12

PART 2.1053



1250 Peterson Dr., Wheeling, IL 60090

Company: Shure Incorporated
Model Tested: UR1M/R L3
Report Number: 14843

APPENDIX A

DLS Electronic Systems, Inc.

Company: Shure, Inc.
Operator: Adam A
Date of test: 10-02-2008
Temperature: 68 deg. F.
Humidity: 43% R.H.
DLS OATS: 3

Radiated Spurious Emissions (e.r.p. substitution method) FCC Part 74; FCC Part 2.1053								
Model: UR1M/R L3 Transmit Frequency: 638.000 MHz Power set to 50 mW								
Frequency GHz	Field Strength Level dBuV/m	Factor to Convert to dBm	Power ERP dBm	Limit dBm	Margin dB	Receive Antenna Polarization	EUT Antenna Orientation	Receive Antenna Height (m)
2.552	44.9	101.3	-56.5	-13	43.5	Horizontal	90	1.1
4.466	46.9	99.5	-52.6	-13	39.6	Horizontal	90	1.1
2.552	43.6	99.5	-55.9	-13	42.9	Vertical	0	1.1
4.466	46.5	100.0	-53.5	-13	40.5	Vertical	0	1.1



1250 Peterson Dr., Wheeling, IL 60090

Company: Shure Incorporated
Model Tested: UR1M/R L3
Report Number: 14843

APPENDIX A

DLS Electronic Systems, Inc.

Company: Shure, Inc.
Operator: Adam A
Date of test: 10-02-2008
Temperature: 68 deg. F.
Humidity: 43% R.H.
DLS OATS: 3

Radiated Spurious Emissions (e.r.p. substitution method) FCC Part 74; FCC Part 2.1053								
Model: UR1M/R L3 Transmit Frequency: 668.000 MHz Power set to 50 mW								
Frequency GHz	Field Strength Level dBuV/m	Factor to Convert to dBm	Power ERP dBm	Limit dBm	Margin dB	Receive Antenna Polarization	EUT Antenna Orientation	Receive Antenna Height (m)
4.676	51.7	100.2	-48.5	-13	35.5	Horizontal	90	1.2
4.676	52.1	100.8	-48.7	-13	35.7	Vertical	0	1.2



1250 Peterson Dr., Wheeling, IL 60090

Company: Shure Incorporated
Model Tested: UR1M/R L3
Report Number: 14843

APPENDIX A

DLS Electronic Systems, Inc.

Company: Shure, Inc.
Operator: Adam A
Date of test: 10-02-2008
Temperature: 68 deg. F.
Humidity: 43% R.H.
DLS OATS: 3

Radiated Spurious Emissions (e.r.p. substitution method) FCC Part 74; FCC Part 2.1053								
Model: UR1M/R L3 Transmit Frequency: 698.000 MHz Power set to 50 mW								
Frequency GHz	Field Strength Level dBuV/m	Factor to Convert to dBm	Power ERP dBm	Limit dBm	Margin dB	Receive Antenna Polarization	EUT Antenna Orientation	Receive Antenna Height (m)
4.886	50.3	99.4	-49.1	-13	36.1	Horizontal	90	1.2
4.886	51.4	100.1	-48.7	-13	35.7	Vertical	0	1.1



1250 Peterson Dr., Wheeling, IL 60090

Company: Shure Incorporated
Model Tested: UR1M/R L3
Report Number: 14843

APPENDIX A

10.0 FREQUENCY STABILITY (TEMPERATURE)– PART 2.1055(a1)

The frequency stability was measured from -30° to +50° centigrade at intervals of 10° centigrade throughout the range. Prior to each frequency measurement, the equipment was left alone for a sufficient period of time (approximately 30 minutes or more) to allow the components of the Wireless Boundary Microphone oscillator circuitry to stabilize.

See the following page for the data taken during testing.

11.0 FREQUENCY STABILITY (VOLTAGE VARIATION)– PART 2.1055(d2)

The frequency stability of Micro Bodypack Transmitter was measured by reducing the primary supply voltage to the battery end point specified by the manufacturer.

See the following page for the data taken during testing.



1250 Peterson Dr., Wheeling, IL 60090

Company: Shure Incorporated
Model Tested: UR1M/R L3
Report Number: 14843

APPENDIX A

DATA TAKEN FOR FREQUENCY STABILITY WHEN VARYING THE TEMPERATURE AND PRIMARY SUPPLY VOLTAGE VARIATION PART 2.1055a(1) & PART 2.1055d(d2)



Company: Shure Incorporated
Model Tested: UR1M/R L3
Report Number: 14843

1250 Peterson Dr., Wheeling, IL 60090

DLS Electronic Systems, Inc.

Company: Shure, Inc.
Operator: Adam A
Date of test: 10-09-2008

Limit = 31.9 kHz (0.005% of 638 MHz)

Frequency Stability FCC Part 74; FCC Part 2.1055

Model	Nominal Frequency (MHz)	Measured Frequency									
		+50 deg. C	Error (kHz)	+40 deg. C	Error (kHz)	+30 deg. C	Error (kHz)	+20 deg. C	Error (kHz)	+10 deg. C	Error (kHz)
UR1M/R L3	638.000	638.000450	0.450	638.000150	0.150	638.000100	0.100	638.000200	0.200	638.000350	0.350
UR1M/R L3	668.000	668.000450	0.450	668.000150	0.150	668.000100	0.100	668.000200	0.200	668.000300	0.300
UR1M/R L3	698.000	698.000450	0.450	698.000200	0.200	698.000100	0.100	698.000200	0.200	698.000300	0.300

Frequency Stability FCC Part 74; FCC Part 2.1055

Model	Nominal Frequency (MHz)	Measured Frequency									
		0 deg. C	Error (kHz)	-10 deg. C	Error (kHz)	-20 deg. C	Error (kHz)	-30 deg. C	Error (kHz)	1.9 Volts	Error (kHz)
UR1M/R L3	638.000	638.000350	0.350	638.000300	0.300	638.000250	0.250	638.000400	0.400	638.000200	0.200
UR1M/R L3	668.000	668.000400	0.400	668.000050	0.050	668.000200	0.200	668.000400	0.400	668.000150	0.150
UR1M/R L3	698.000	698.000400	0.400	698.000150	0.150	698.000250	0.250	698.000400	0.400	698.000200	0.200

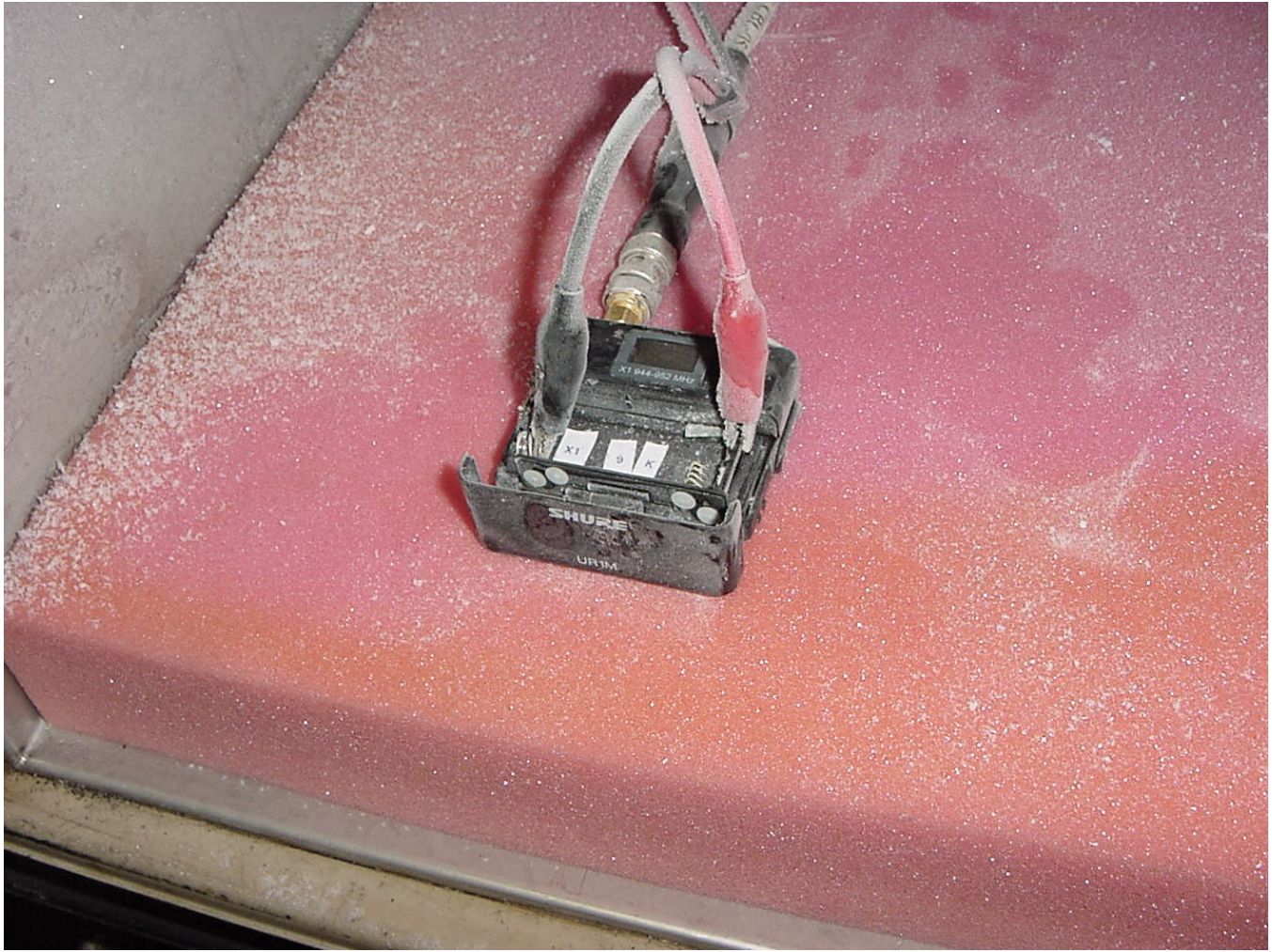


1250 Peterson Dr., Wheeling, IL 60090

Company: Shure Incorporated
Model Tested: UR1M/R G1
Report Number: 14838

APPENDIX A

12.0 FREQUENCY STABILITY PHOTOS TAKEN DURING TESTING



TEMPERATURE CHAMBER – FREQUENCY STABILITY