



Company: Shure Inc.  
Model Tested: SLX2-G4  
Report Number: 13810

1250 Peterson Dr., Wheeling, IL 60090

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: SLX2-G4 Handheld Wireless Microphone Transmitter  
Frequency Range: 470 MHz – 494 MHz  
Kind of Equipment: Wireless Microphone Transmitter  
Test Configuration: Connected to a microphone cartridge. (Tested at 3 vdc)  
Model Number(s): SLX2-G4  
Model(s) Tested: SLX2-G4  
Serial Number(s): N/A  
Emission Designator: 89KF3E  
Date of Tests: November 7, 9, 16 & 19, 2007 & September 22, 2008  
Test Conducted For: Shure Inc.  
5800 W. Touhy Ave.  
Niles, IL 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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SIGNATURE PAGE

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Company Official: Shure Inc.



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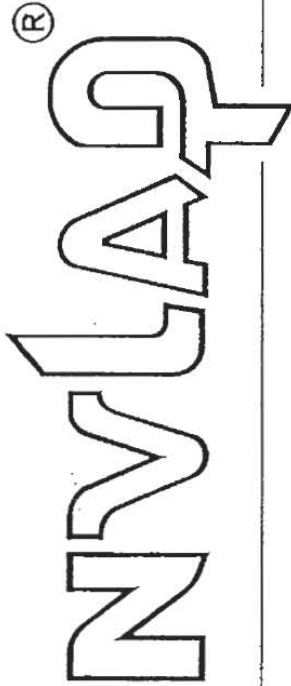
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United States Department of Commerce  
National Institute of Standards and Technology



## 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 Communique dated 18 June 2005).



2007-10-01 through 2008-09-30

Effective dates

*Dolly S. Bruce*  
For the National Institute of Standards and Technology



Company: Shure Inc.  
Model Tested: SLX2-G4  
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## 1.0 SUMMARY OF TEST REPORT

It was found that the SLX2-G4 Handheld Wireless Microphone Transmitter, Model Number(s) SLX2-G4 **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 SLX2-G4 Handheld Wireless Microphone 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 November 7, 9, 16 & 19, 2007 & September 22, 2008, a series of radio frequency interference measurements was performed on SLX2-G4 Handheld Wireless Microphone Transmitter, Model Number(s) SLX2-G4, 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

## 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 American National Standards Institute, ANSI C63.4-2003. 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.



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## 5.0 TEST EQUIPMENT (Bandwidths and Detector Function)

All preliminary data below 1000 MHz was automatically plotted using the HP Spectrum Analyzer or 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 HP Spectrum Analyzer and or 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. These methods are performed to the specifications in ANSI C63.4: 2003.

## 7.0 AC POWER LINE CONDUCTED EMISSION MEASUREMENTS – Part 15.207

**The SLX2-G4 Handheld Wireless Microphone 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 Shure Model SLX2-G4 is a microprocessor controlled frequency agile UHF handheld microphone transmitter operating over the frequency range of 470MHz to 494MHz. The user interface includes Mode and Set buttons, and an LCD that displays battery status, group/channel and transmitter/receiver frequency synchronization. The SLX2-G4 has a plastic enclosure and utilizes an internal antenna (Internal Power Supply Batteries Configured as  $\frac{1}{4}$  Wave Antenna) for optimum range and reliability.

### 8.2 PHYSICAL DIMENSIONS OF EQUIPMENT UNDER TEST

Length: 254mm x Width: 51mm x Height: 51mm

### 8.3 LINE FILTER USED:

N/A

### 8.4 INTERNAL CLOCK FREQUENCIES:

Switching Power Supply Frequencies:

N/A kHz

Clock Frequencies:

16MHz, 0.32768 MHz

### 8.5 DESCRIPTION OF ALL CIRCUIT BOARDS:

1. PC Board Assy.

PN: 190-10304



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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.

10.0 PHOTO INFORMATION AND TEST SET-UP

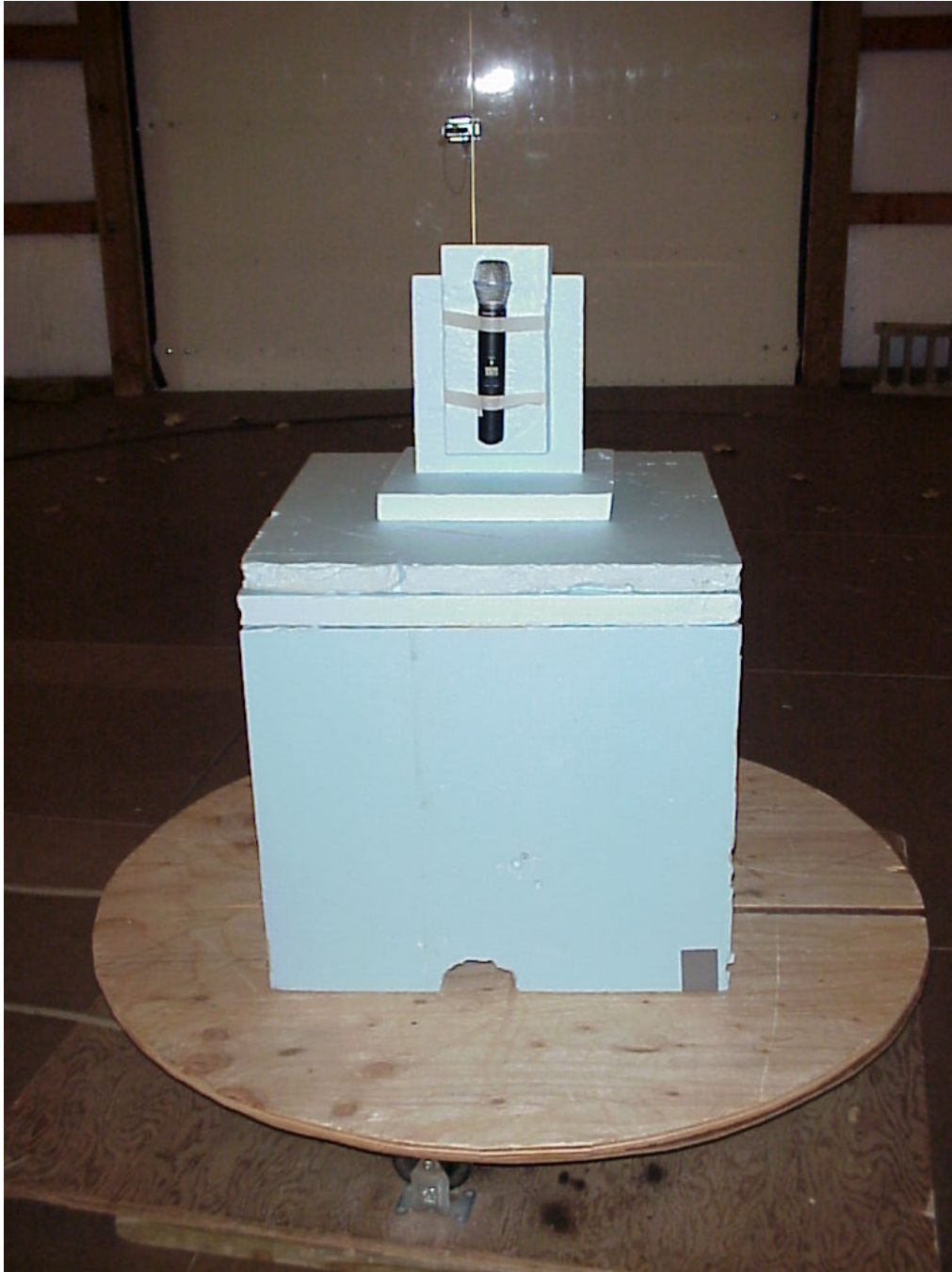
Item 0 SLX2-G4 Handheld Wireless Microphone Transmitter  
Model Number: SLX2-G4, Serial Number: N/A



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## 11.0 RADIATED PHOTOS TAKEN DURING TESTING



ORIENTATION Y-AXIS



Company: Shure Inc.  
Model Tested: SLX2-G4  
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## 11.0 RADIATED PHOTOS TAKEN DURING TESTING



**ORIENTATION X-AXIS**



Company: Shure Inc.  
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## 12.0 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.

## 13.0 CONCLUSION

It was found that the SLX2-G4 Handheld Wireless Microphone Transmitter, Model Number(s) SLX2-G4 **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 SLX2-G4 Handheld Wireless Microphone 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

<b>Test Equipment</b>	<b>Manufacturer</b>	<b>Model Number</b>	<b>Serial Number</b>	<b>Frequency Range</b>	<b>Cal Due Dates</b>
Receiver	Rohde & Schwarz	ESI 40	837808/006	20 Hz – 40 GHz	3/09
Preamplifier	Rohde & Schwarz	TS-PR10	032001/004	9 kHz – 1 GHz	1/09
Preamp	Ciao	CA118-4010	101	1 GHz-18 GHz	1/09
Signal Generator	Marconi	2022A	119026	10 kHz – 1 GHz	7/09
Oscilloscope	Yukogawa	DL1720	R047912	1 Hz – 500 MHz	10/09
Antenna	Electrometrics	3146	1205	200 MHz – 1 GHz	4/10
Dipole Antenna	Com-Power	AD-100	40140	400 MHz – 1 GHz	N/A
Horn Antenna	EMCO	3115	4451	1-18 GHz	5/09
Power Meter	Anritsu	ML2487A	6K00002069	100 kHz – 65 GHz	10/09
High Pass Filter	Mini-Circuits	NHP-600	10521	600 MHz	10/08
High Pass Filter	Q-Microwave	100460	001	1.1 GHz	5/09
Attenuator-20dB Fixed	Aeroflex Weinschel	75A-20-12	1071	DC – 40 GHz	7/09
Power Sensor	Anritsu	MA2490A	031563	50 MHz – 8 GHz	10/09

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)

5 Vdc @ 27.64 mA

### 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 0.25 watt(s). The RF output of the SLX2-G4 Handheld Wireless Microphone Transmitter was connected to a Power Meter through suitable attenuation. All cables, connectors, and attenuators were calibrated prior to testing. The RF output power was measured using the following test method:

#### **Actual Measurements Taken:**

15.15 dBm Measured output of the transmitter

15.15 dBm equals 0.032734 watt(s)

#### **LIMIT:**

Manufacturer's rated output power = 14 dBm  $\pm$  2 dB

#### **MARGIN:**

0.25 - 0.032734 = 0.217266 watt(s)





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# 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



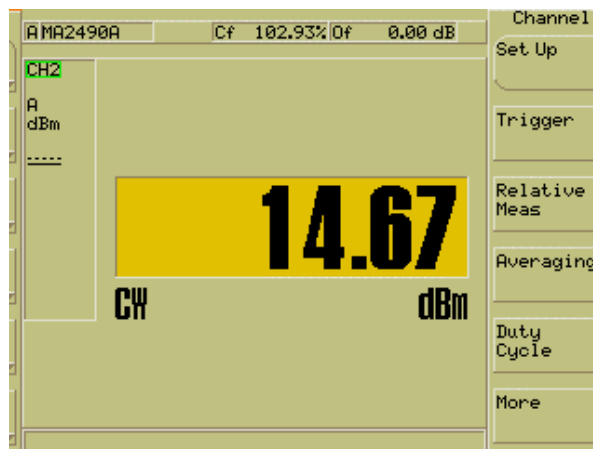
Company: Shure Inc.  
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### APPENDIX A

Test Date: 11-16-2007  
Company: Shure, Inc.  
EUT: SLX2-G4  
Test: Peak Power Output - Conducted  
Rule part: FCC Part 74; FCC Part 2.1046  
Operator: Craig B  
Comment: Channel: 470.125 MHz

Peak Output Power = 14.67 dBm = 29.31 mW





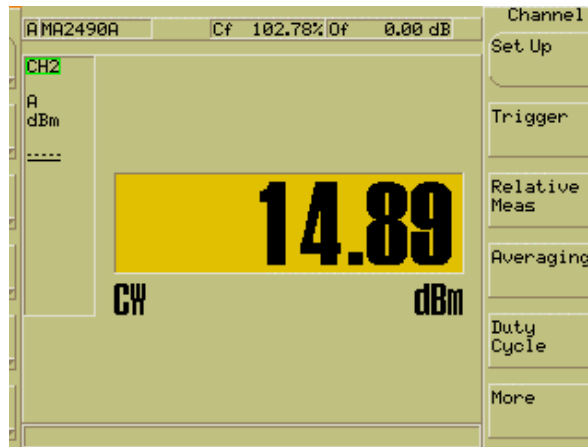
Company: Shure Inc.  
Model Tested: SLX2-G4  
Report Number: 13810

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### APPENDIX A

Test Date: 11-16-2007  
Company: Shure, Inc.  
EUT: SLX2-G4  
Test: Peak Power Output - Conducted  
Rule part: FCC Part 74; FCC Part 2.1046  
Operator: Craig B  
Comment: Channel: 481.750 MHz

Peak Output Power = 14.89 dBm = 30.83 mW





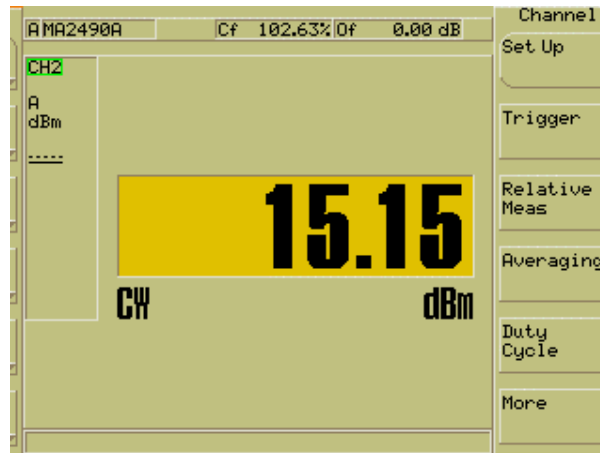
Company: Shure Inc.  
Model Tested: SLX2-G4  
Report Number: 13810

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### APPENDIX A

Test Date: 11-16-2007  
Company: Shure, Inc.  
EUT: SLX2-G4  
Test: Peak Power Output - Conducted  
Rule part: FCC Part 74; FCC Part 2.1046  
Operator: Craig B  
Comment: Channel: 493.825 MHz

Peak Output Power = 15.15 dBm = 32.73 mW



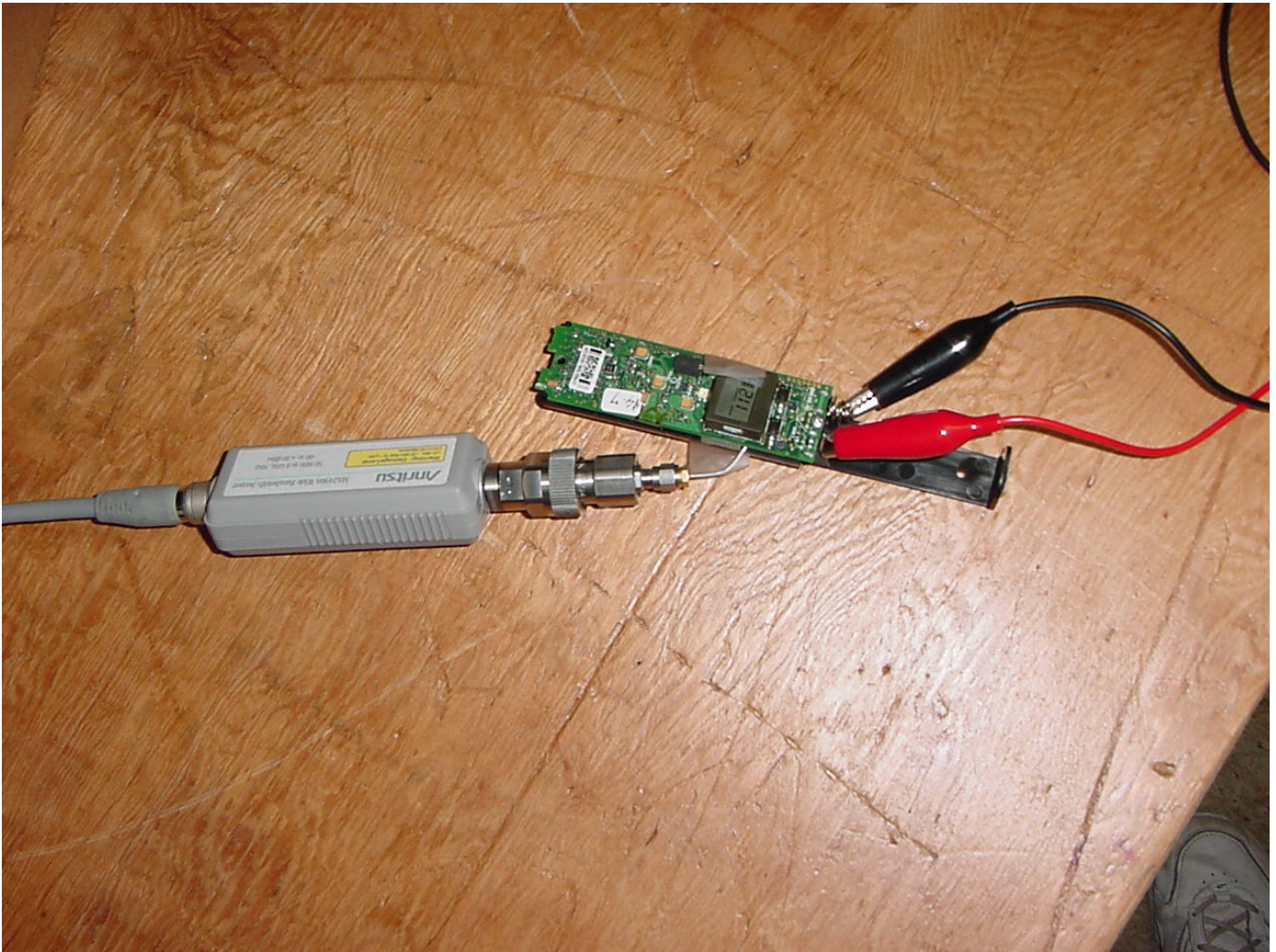


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## APPENDIX A

### 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 45 Hz to 15 kHz 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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# GRAPH(S) TAKEN SHOWING THE FREQUENCY RESPONSE OF THE AUDIO MODULATING CIRCUIT

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

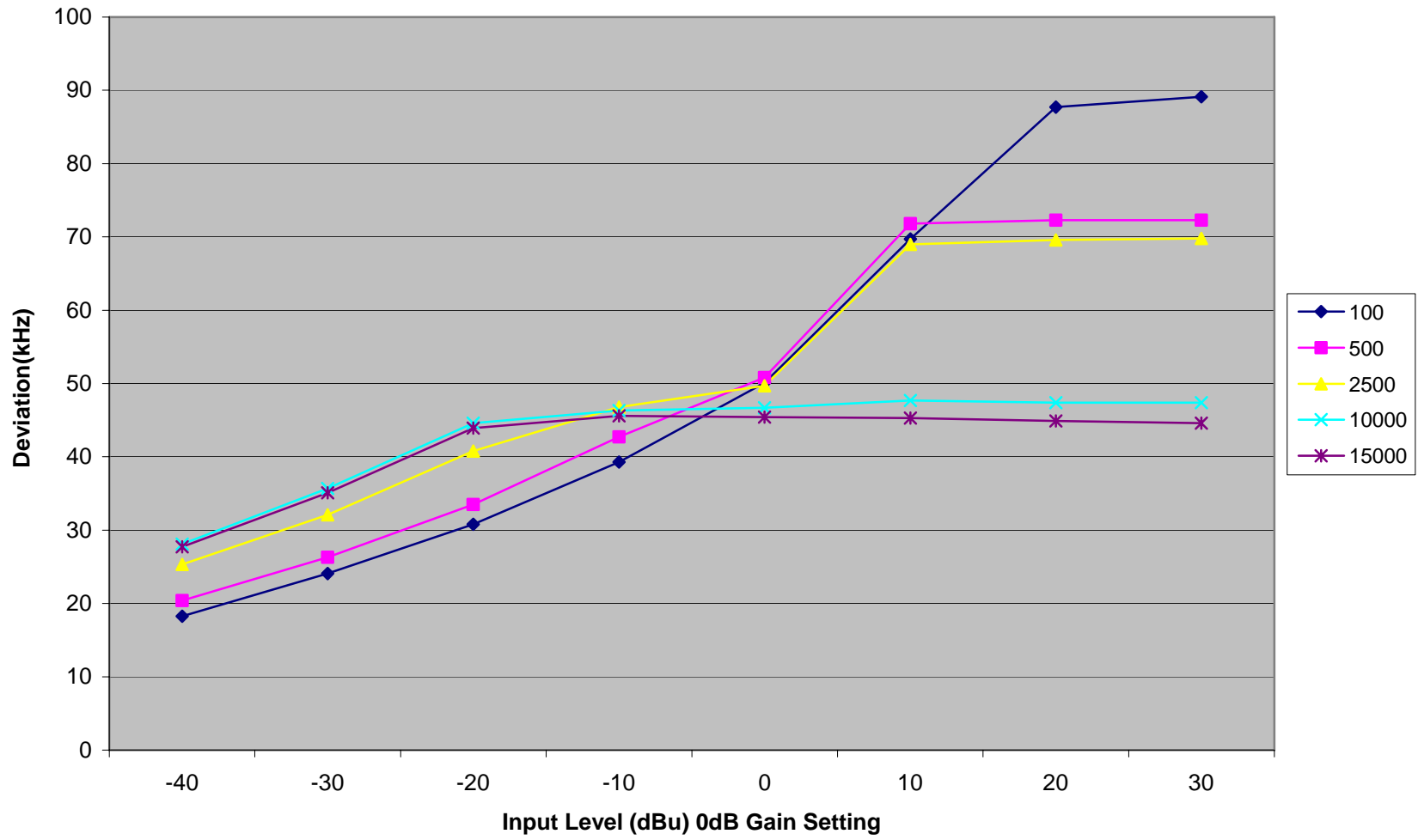
PART 2.1047



Company: Shure Inc.  
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### SLX2 G4 Deviation vs. Input Levels for Different Input Frequencies



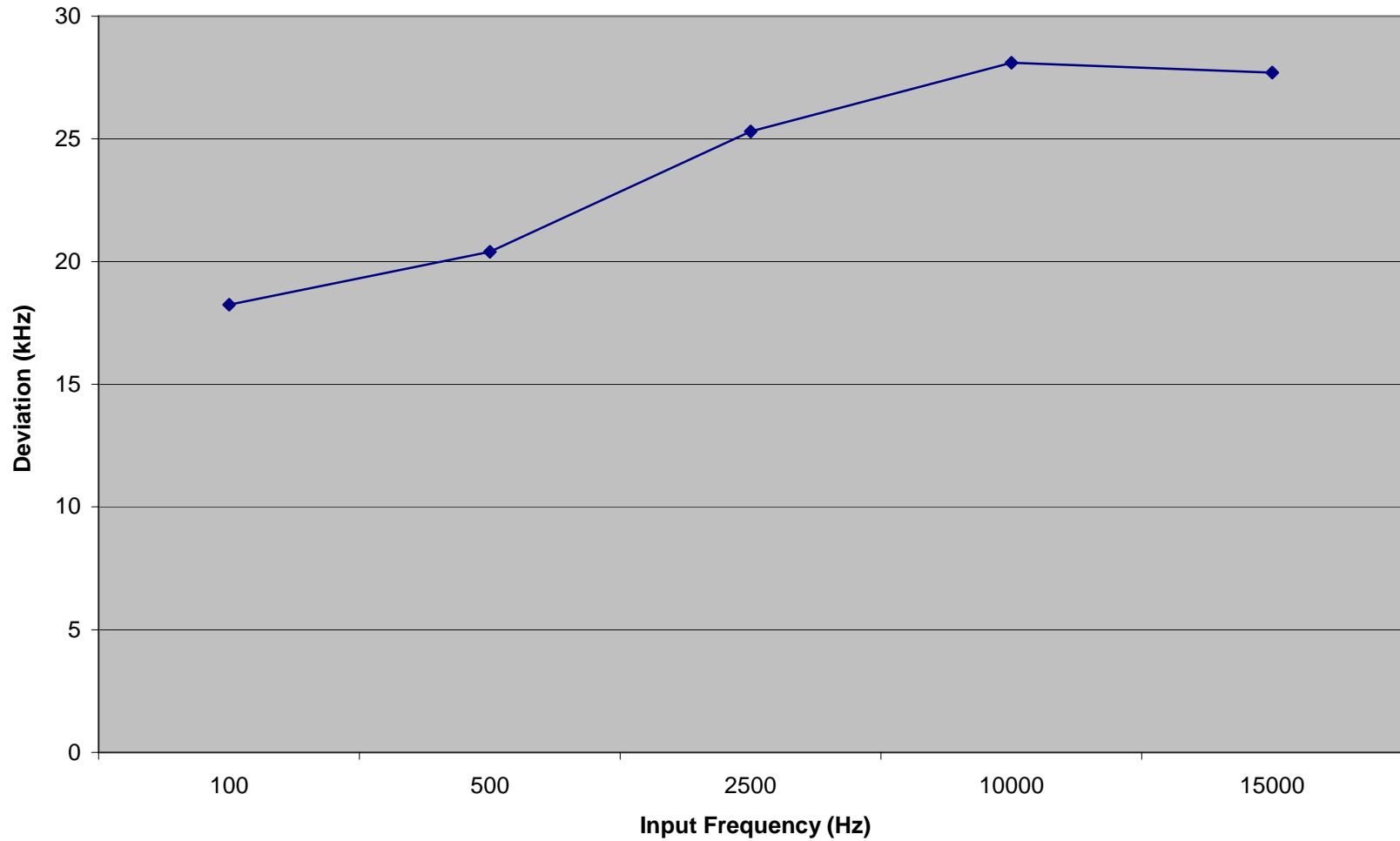




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### SLX2 G4 Deviation vs. Input Frequency (-40dBu Input 0dB Gain Setting)





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		SLX2 G4					
		100	500	2500	10000	15000	(Hz)
	-40	18.25	20.4	25.3	28.1	27.7	
	-30	24.1	26.3	32.1	35.7	35.1	
(dBu)	-20	30.8	33.5	40.8	44.6	43.9	
	-10	39.3	42.7	46.8	46.3	45.6	
	0	50.1	50.8	49.7	46.7	45.4	
	10	69.7	71.8	69	47.7	45.3	
	20	87.7	72.3	69.6	47.4	44.9	
	30	89.1	72.3	69.8	47.4	44.6	



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## 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 of  $\pm 75$  kHz is permitted when frequency modulation is used.  
Carson's Rule:

Section 2.202 (g)

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

$B_n$  = Bandwidth

$$M = 15 \text{ kHz,}$$

$M$  = Maximum Modulating Frequency

$$D = 45 \text{ kHz,}$$

$D$  = Peak Deviation

$$\mathbf{B_n = 2(15) + 2(45)(1) = 120 \text{ kHz}}$$

#### NOTE:

The modulation will not exceed 75 kHz as describes in the Operation Description.



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## APPENDIX A

DATA AND GRAPH(S) TAKEN OF THE

99% OCCUPIED BANDWIDTH

Part 74.861 (e)(5) & PART 2.1049



Company: Shure Inc.  
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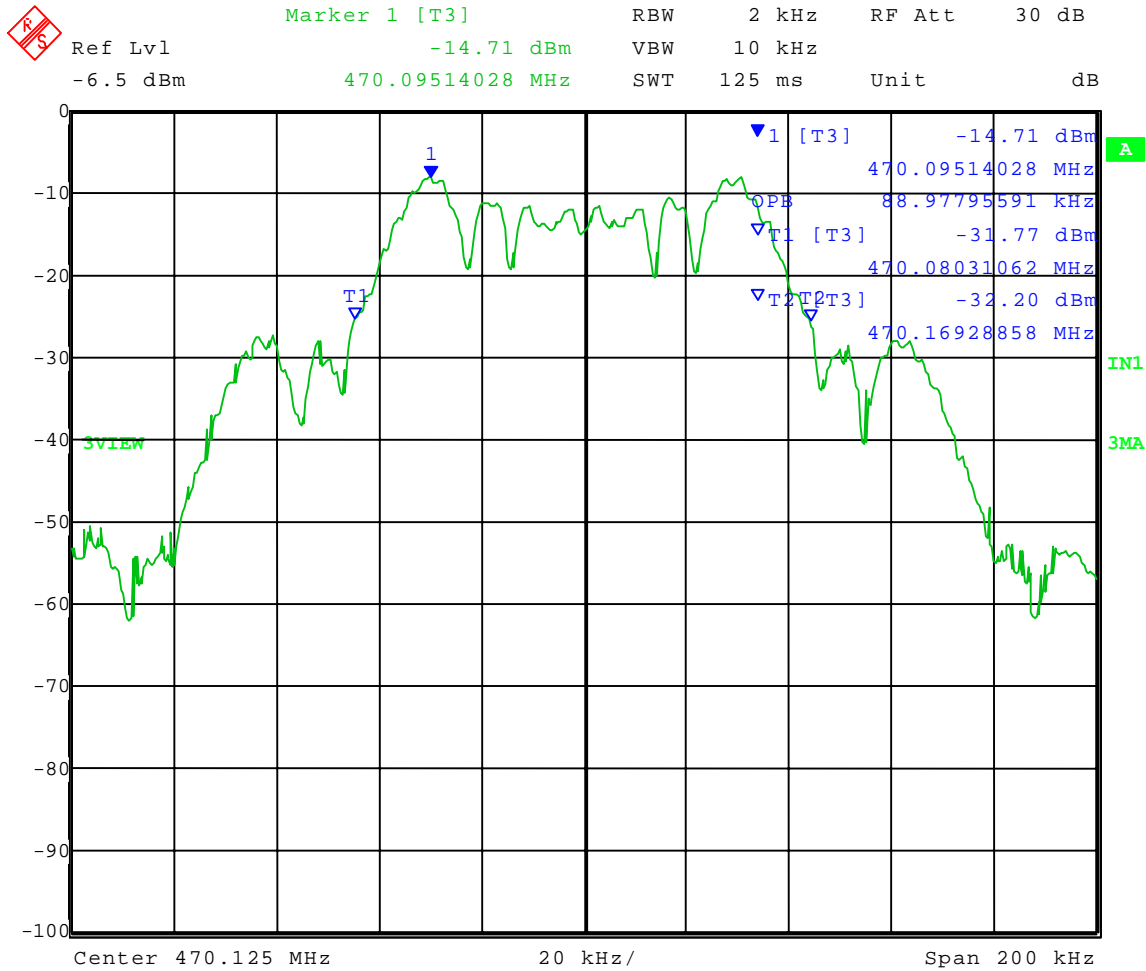
1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

Test Date: 11-16-2007  
 Company: Shure, Inc.  
 EUT: SLX2-G4  
 Test: Occupied Bandwidth; 99% bandwidth  
 Rule part: FCC Part 74; FCC Part 2.1049  
 Operator: Craig B

Frequency: 470.125 MHz

99% power bandwidth = 88.98 kHz



Date: 16.NOV.2007 14:18:21



Company: Shure Inc.  
Model Tested: SLX2-G4  
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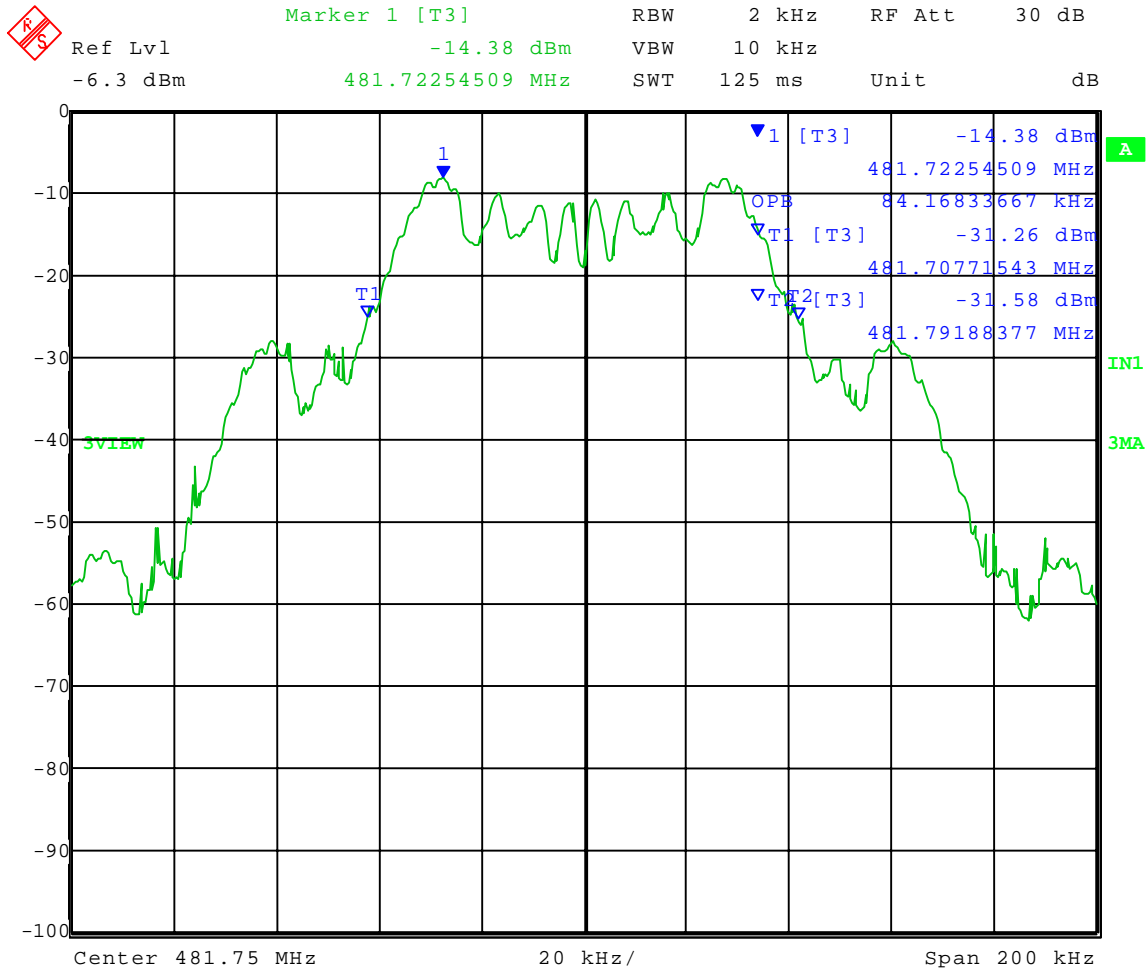
1250 Peterson Dr., Wheeling, IL 60090

### APPENDIX A

Test Date: 11-16-2007  
Company: Shure, Inc.  
EUT: SLX2-G4  
Test: Occupied Bandwidth; 99% bandwidth  
Rule part: FCC Part 74; FCC Part 2.1049  
Operator: Craig B

Frequency: 481.750 MHz

99% power bandwidth = 84.17 kHz



Date: 16.NOV.2007 14:30:41



Company: Shure Inc.  
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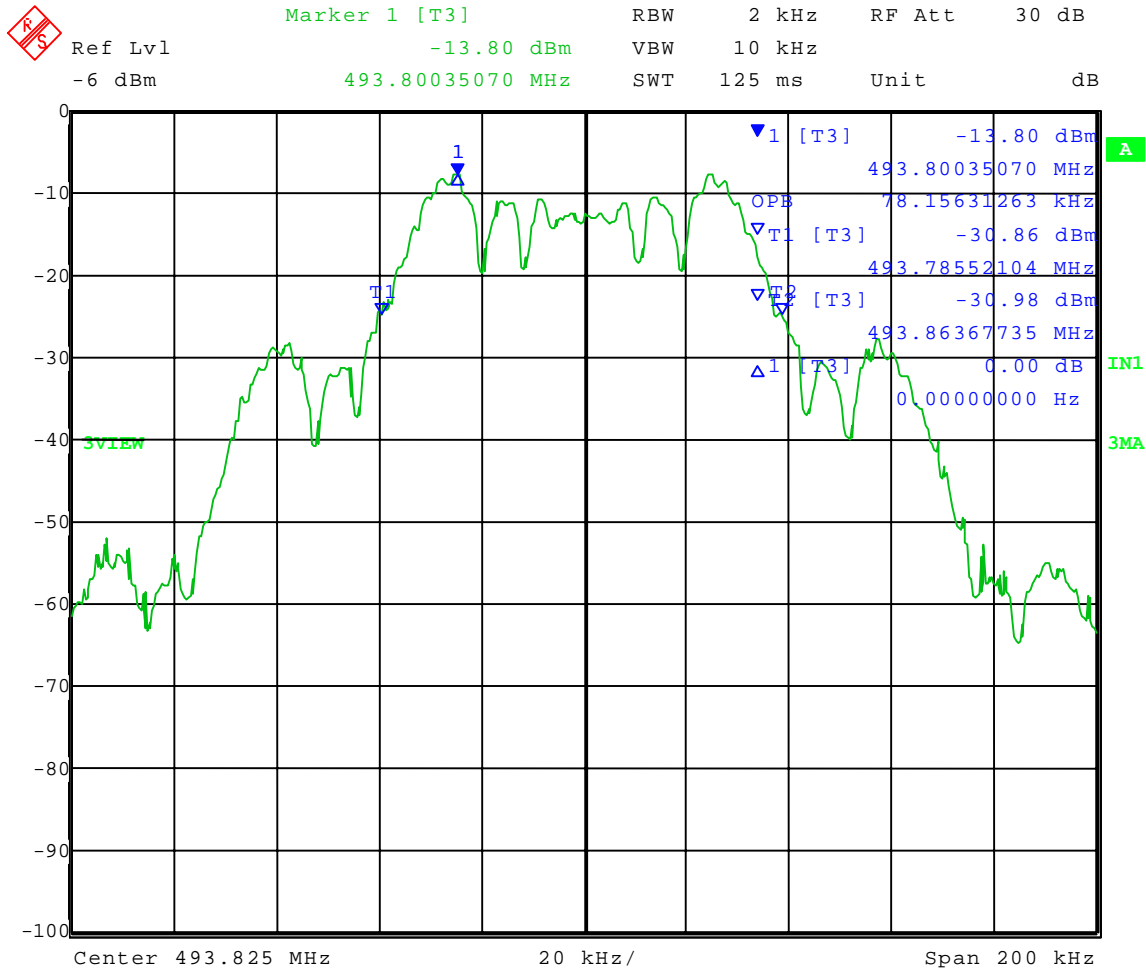
1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

Test Date: 11-16-2007  
 Company: Shure, Inc.  
 EUT: SLX1-G4  
 Test: Occupied Bandwidth; 99% bandwidth  
 Rule part: FCC Part 74; FCC Part 2.1049  
 Operator: Craig B

Frequency: 493.825 MHz

99% power bandwidth = 78.16 kHz



Date: 16.NOV.2007 14:39:44



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## APPENDIX A

# DATA AND GRAPH(S) TAKEN OF THE EMISSION MASK

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

2500 Hz 16 dB > 50% Modulated





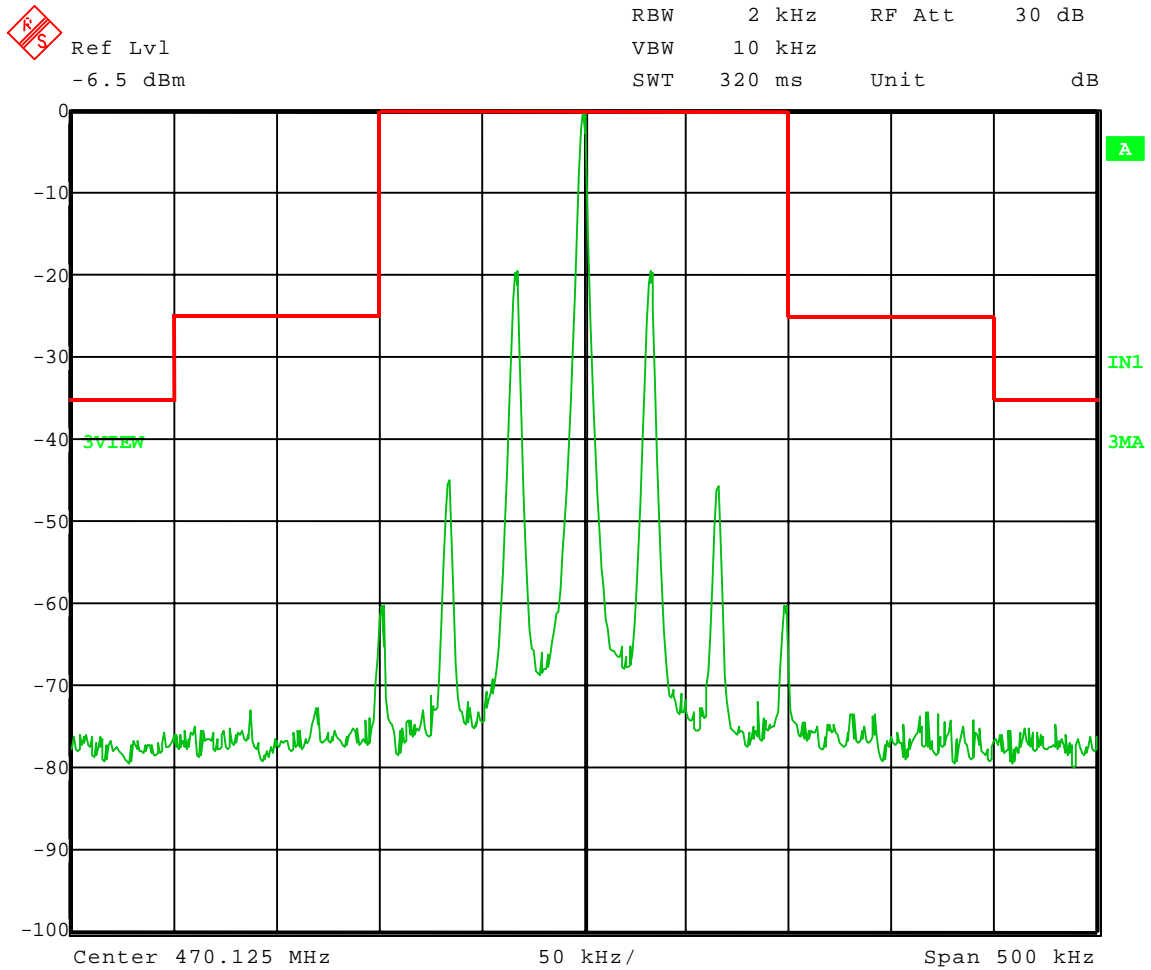
Company: Shure Inc.  
Model Tested: SLX2-G4  
Report Number: 13810

1250 Peterson Dr., Wheeling, IL 60090

### APPENDIX A

Test Date: 11-16-2007  
Company: Shure, Inc.  
EUT: SLX2-G4  
Test: Occupied Bandwidth  
Operator: Craig B

Nominal Frequency: 470.125 MHz  
Unmodulated



Date: 16.NOV.2007 14:06:01



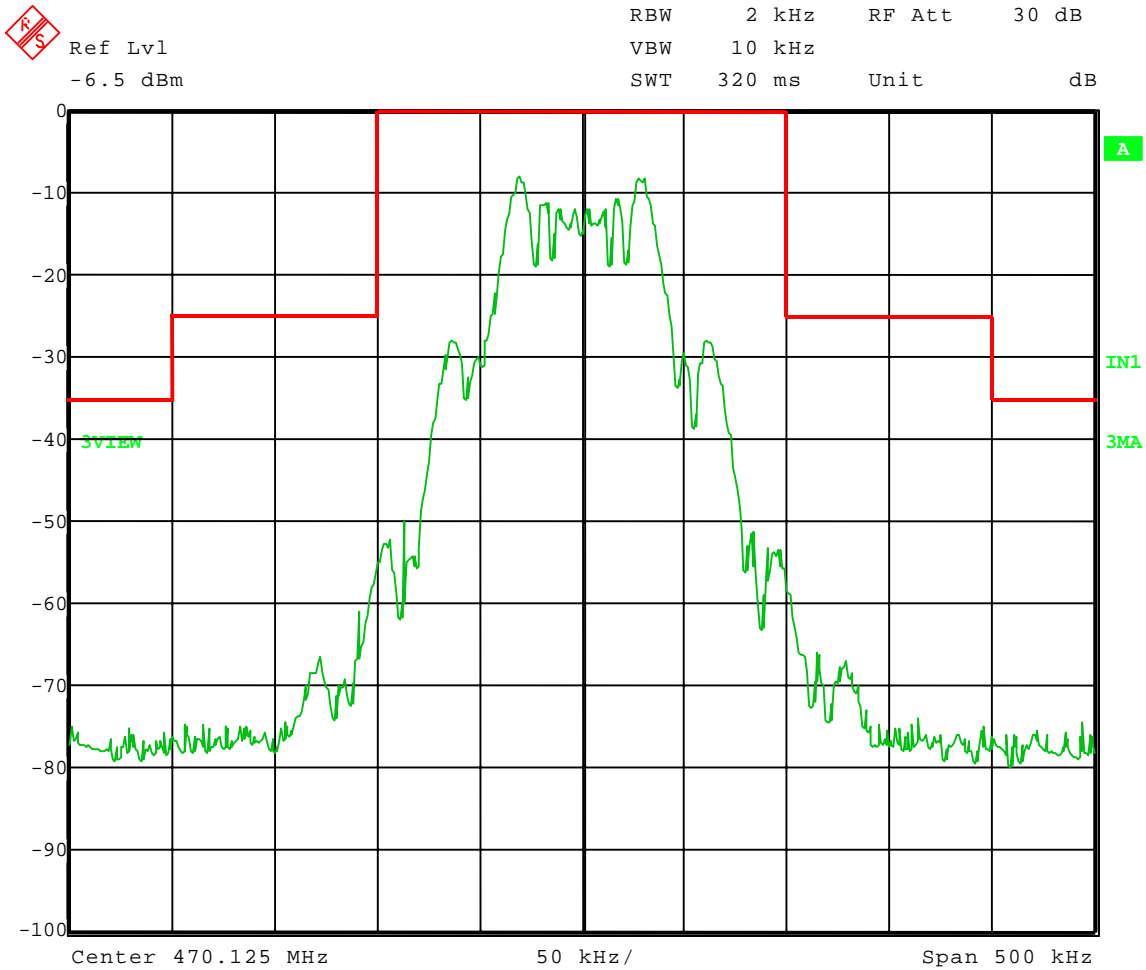
Company: Shure Inc.  
Model Tested: SLX2-G4  
Report Number: 13810

1250 Peterson Dr., Wheeling, IL 60090

### APPENDIX A

Test Date: 11-16-2007  
Company: Shure, Inc.  
EUT: SLX2-G4  
Test: Occupied Bandwidth  
Operator: Craig B

Nominal Frequency: 470.125 MHz  
2500 Hz 16 dB > 50% modulated



Date: 16.NOV.2007 14:16:36



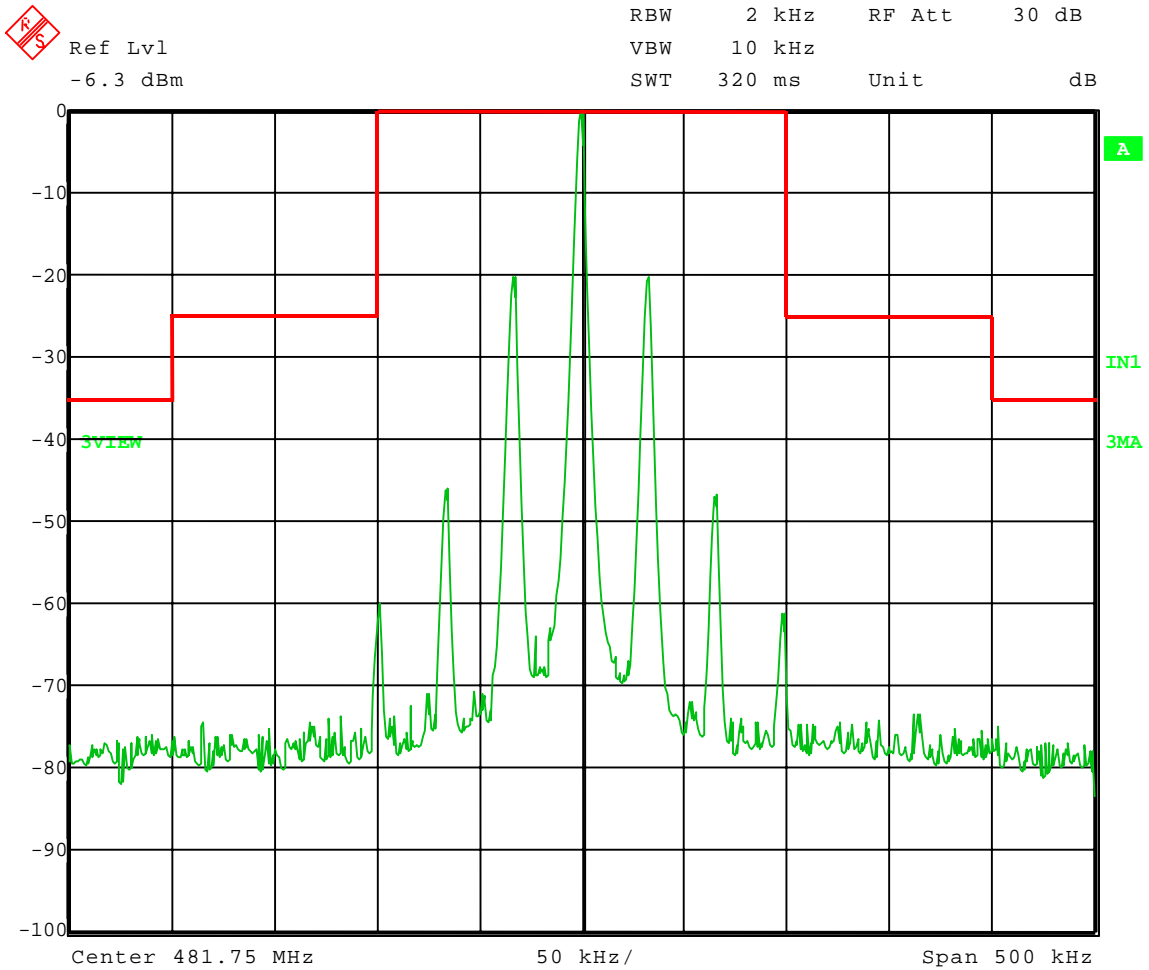
Company: Shure Inc.  
Model Tested: SLX2-G4  
Report Number: 13810

1250 Peterson Dr., Wheeling, IL 60090

### APPENDIX A

Test Date: 11-16-2007  
Company: Shure, Inc.  
EUT: SLX2-G4  
Test: Occupied Bandwidth  
Operator: Craig B

Nominal Frequency: 481.750 MHz  
Unmodulated



Date: 16.NOV.2007 14:27:44



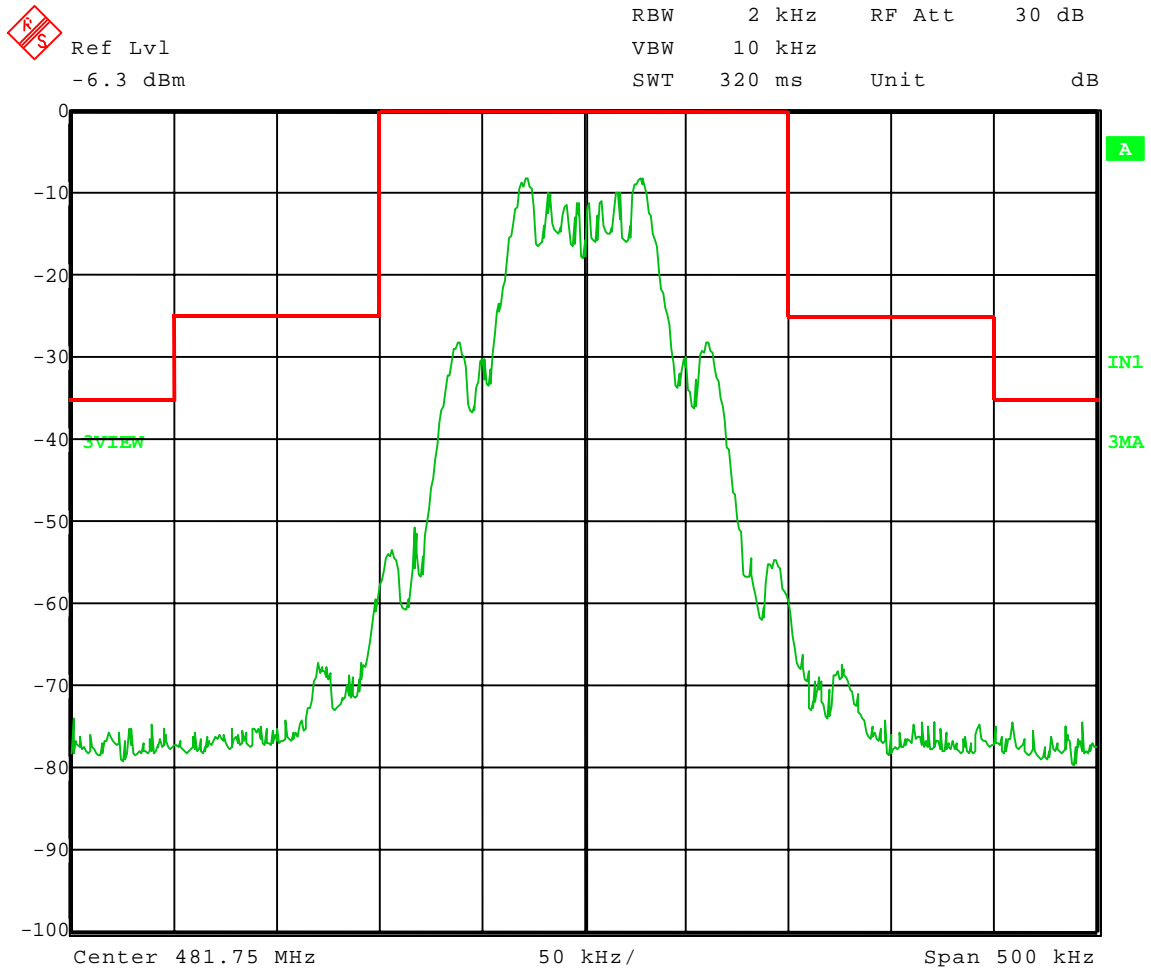
Company: Shure Inc.  
 Model Tested: SLX2-G4  
 Report Number: 13810

1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

Test Date: 11-16-2007  
 Company: Shure, Inc.  
 EUT: SLX2-G4  
 Test: Occupied Bandwidth  
 Operator: Craig B

Nominal Frequency: 481.750 MHz  
 2500 Hz 16 dB > 50% modulated



Date: 16.NOV.2007 14:28:57



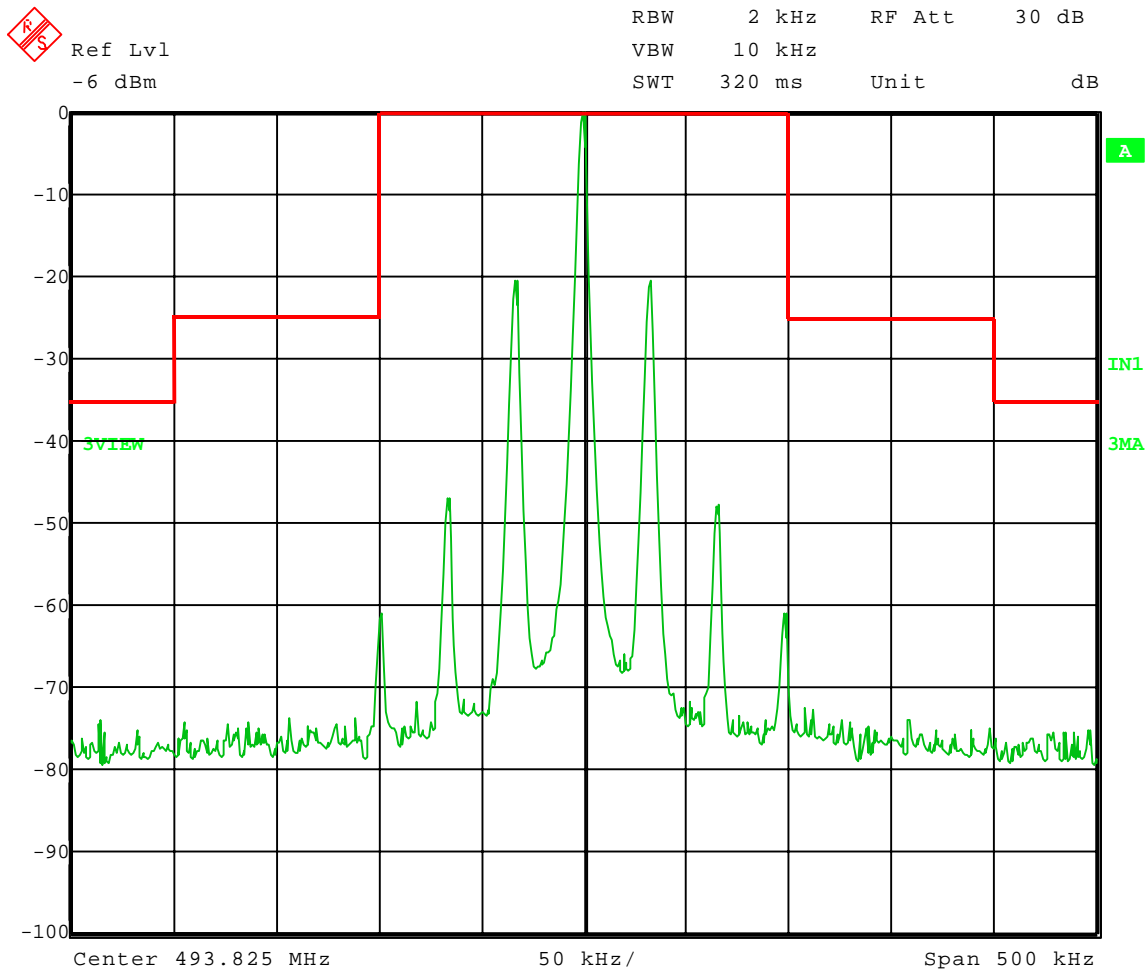
Company: Shure Inc.  
Model Tested: SLX2-G4  
Report Number: 13810

1250 Peterson Dr., Wheeling, IL 60090

### APPENDIX A

Test Date: 11-16-2007  
Company: Shure, Inc.  
EUT: SLX2-G4  
Test: Occupied Bandwidth  
Operator: Craig B

Nominal Frequency: **493.825 MHz**  
Unmodulated



Date: 16.NOV.2007 14:36:28



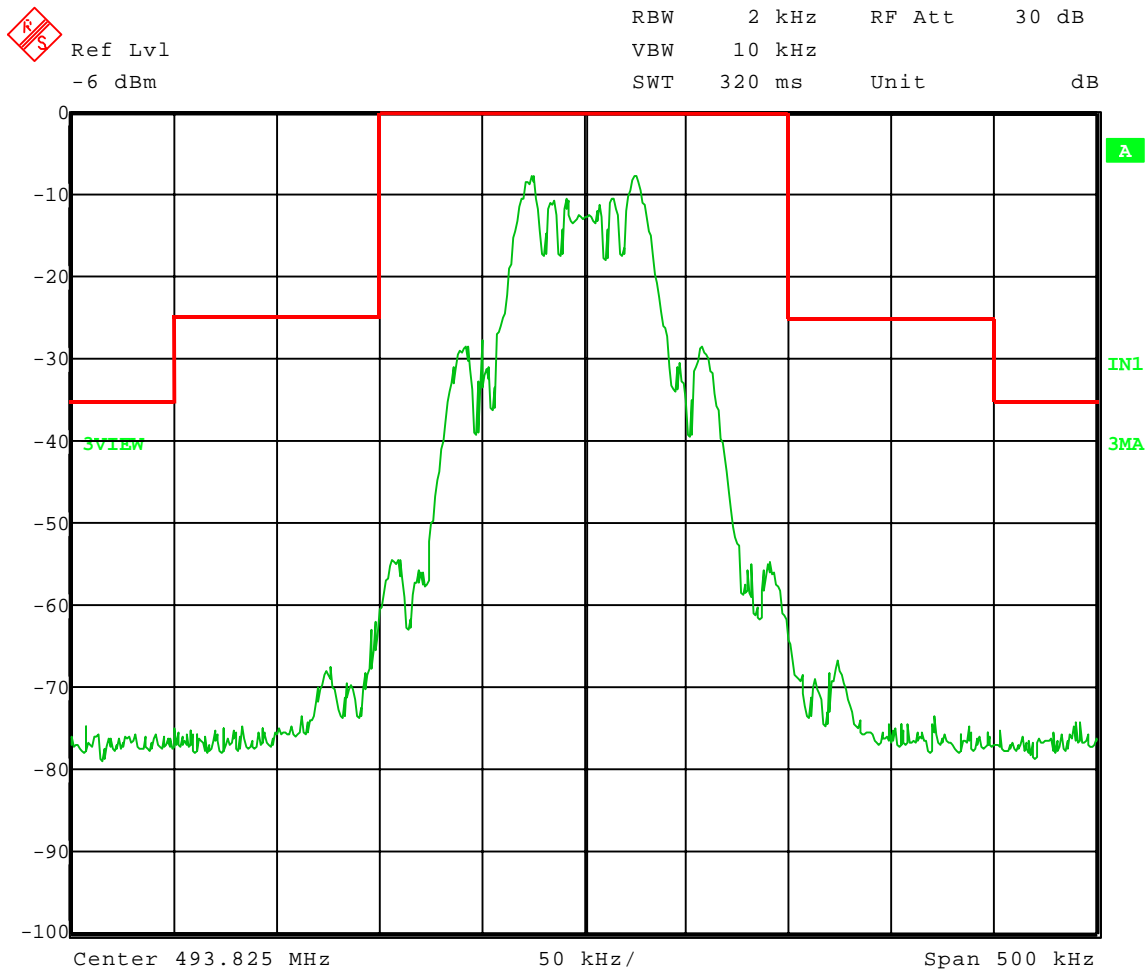
Company: Shure Inc.  
Model Tested: SLX2-G4  
Report Number: 13810

1250 Peterson Dr., Wheeling, IL 60090

### APPENDIX A

Test Date: 11-16-2007  
Company: Shure, Inc.  
EUT: SLX2-G4  
Test: Occupied Bandwidth  
Operator: Craig B

Nominal Frequency: **493.825 MHz**  
2500 Hz 16 dB > 50% modulated



Date: 16.NOV.2007 14:38:14



1250 Peterson Dr., Wheeling, IL 60090

Company: Shure Inc.  
Model Tested: SLX2-G4  
Report Number: 13810

## APPENDIX A

DATA AND GRAPH(S) TAKEN OF THE

EMISSION MASK

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

15 kHz Modulation



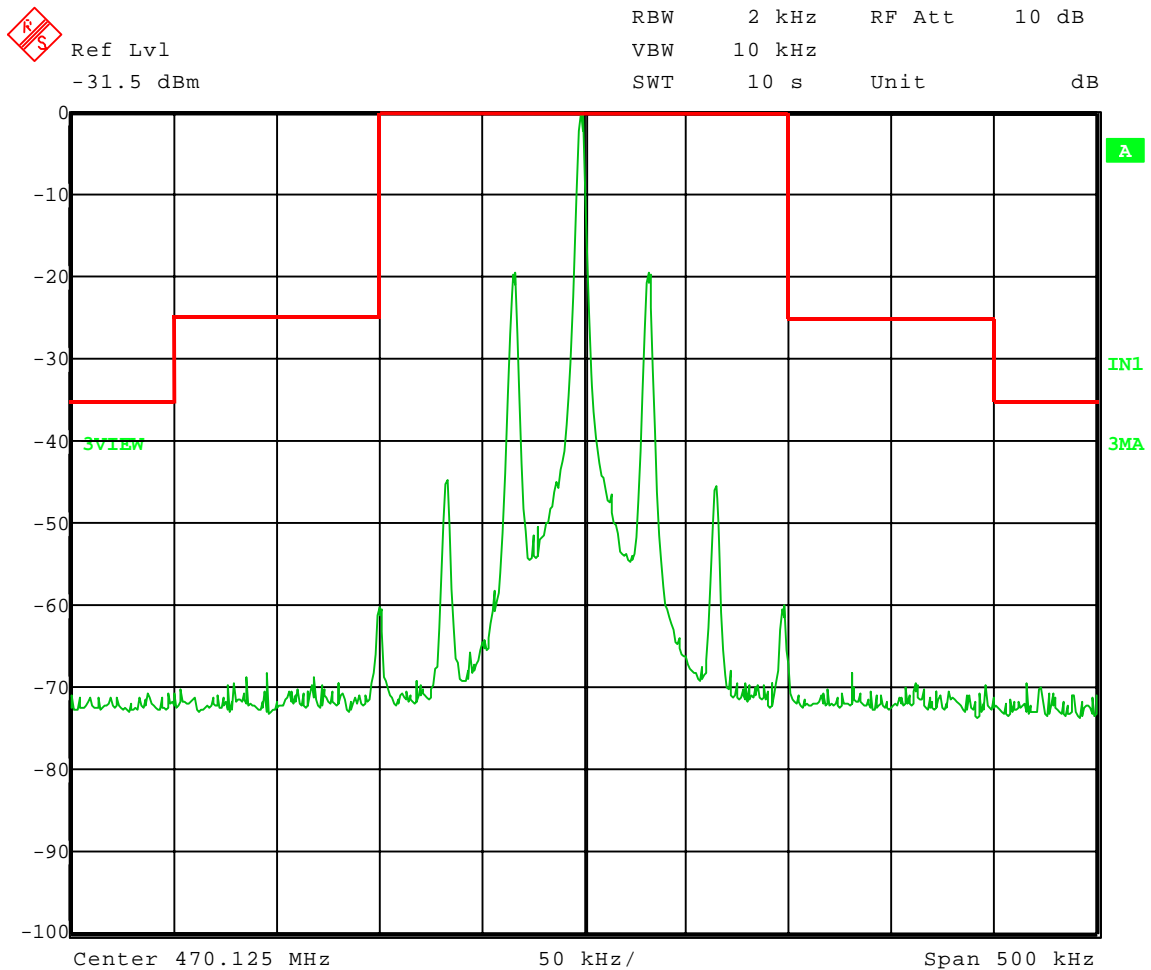
Company: Shure Inc.  
Model Tested: SLX2-G4  
Report Number: 13810

1250 Peterson Dr., Wheeling, IL 60090

### APPENDIX A

Test Date: 09-22-2008  
Company: Shure, Inc.  
EUT: SLX2-G4  
Test: Occupied Bandwidth  
Operator: Craig B

Nominal Frequency: 470.125 MHz  
Unmodulated



Date: 22.SEP.2008 15:23:52





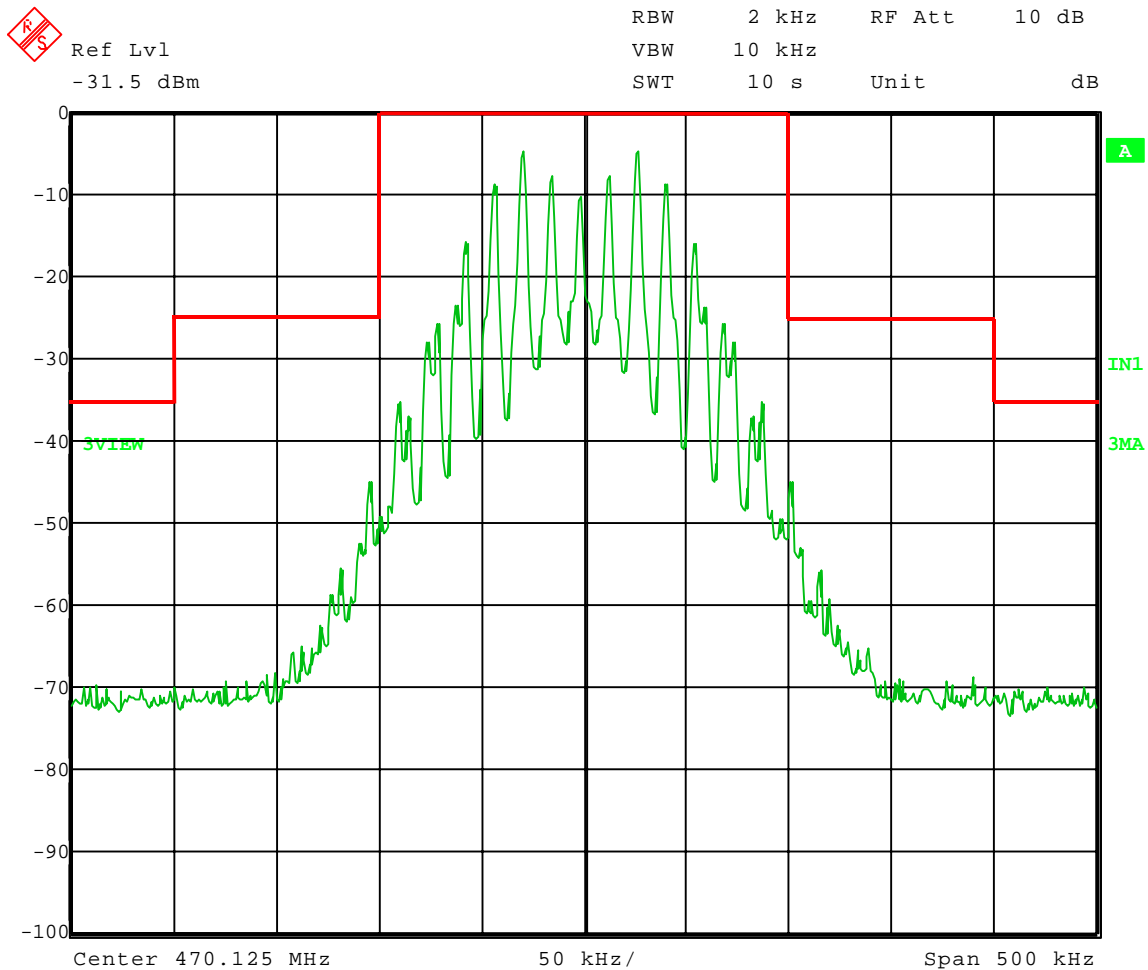
Company: Shure Inc.  
Model Tested: SLX2-G4  
Report Number: 13810

1250 Peterson Dr., Wheeling, IL 60090

### APPENDIX A

Test Date: 09-22-2008  
Company: Shure, Inc.  
EUT: SLX2-G4  
Test: Occupied Bandwidth  
Operator: Craig B

Nominal Frequency: 470.125 MHz  
15 kHz modulation



Date: 22.SEP.2008 15:30:49



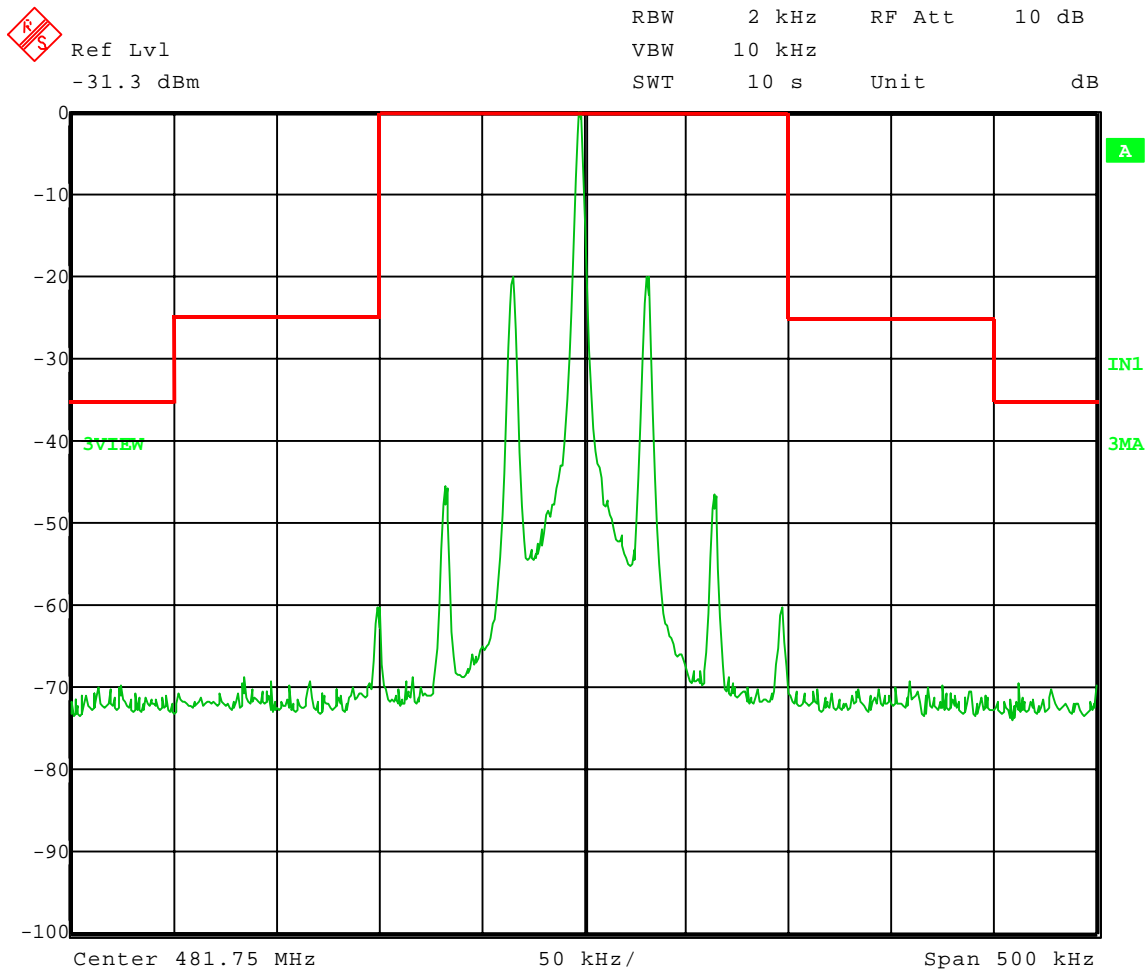
Company: Shure Inc.  
Model Tested: SLX2-G4  
Report Number: 13810

1250 Peterson Dr., Wheeling, IL 60090

### APPENDIX A

Test Date: 09-22-2008  
Company: Shure, Inc.  
EUT: SLX2-G4  
Test: Occupied Bandwidth  
Operator: Craig B

Nominal Frequency: 481.750 MHz  
Unmodulated



Date: 22.SEP.2008 15:34:19



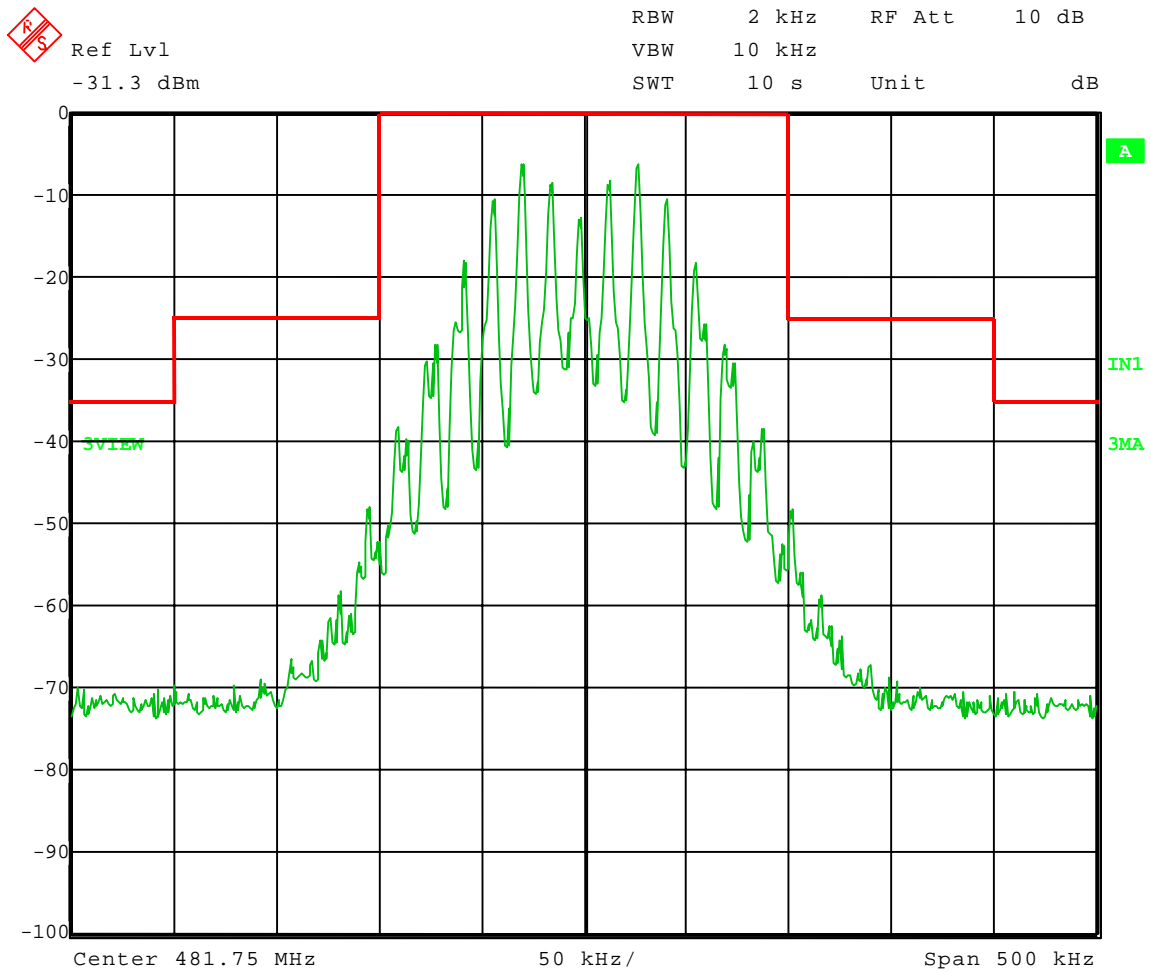
Company: Shure Inc.  
Model Tested: SLX2-G4  
Report Number: 13810

1250 Peterson Dr., Wheeling, IL 60090

### APPENDIX A

Test Date: 09-22-2008  
Company: Shure, Inc.  
EUT: SLX2-G4  
Test: Occupied Bandwidth  
Operator: Craig B

Nominal Frequency: 481.750 MHz  
15 kHz modulation



Date: 22.SEP.2008 15:36:09



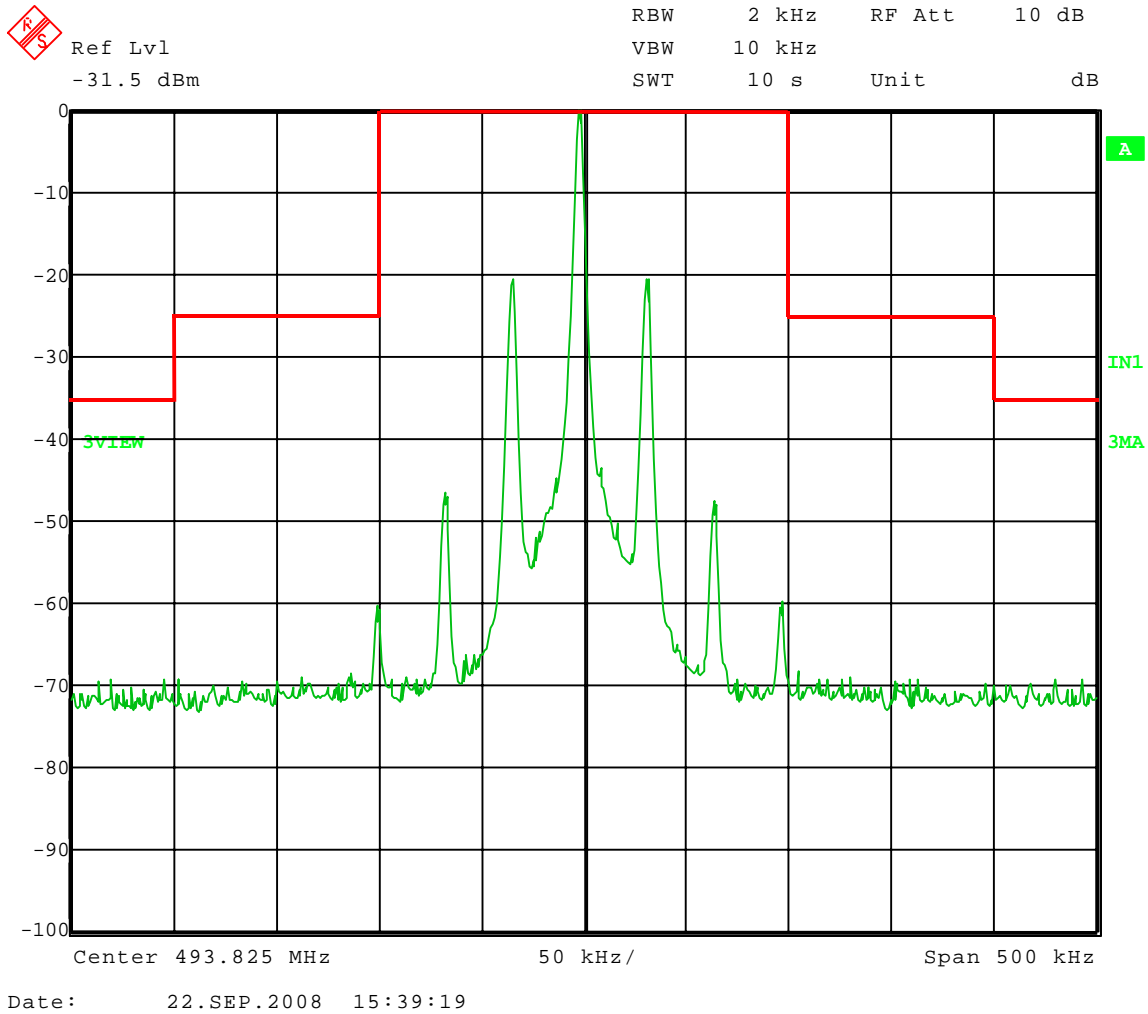
Company: Shure Inc.  
 Model Tested: SLX2-G4  
 Report Number: 13810

1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

Test Date: 09-22-2008  
 Company: Shure, Inc.  
 EUT: SLX2-G4  
 Test: Occupied Bandwidth  
 Operator: Craig B

Nominal Frequency: 493.825 MHz  
 Unmodulated





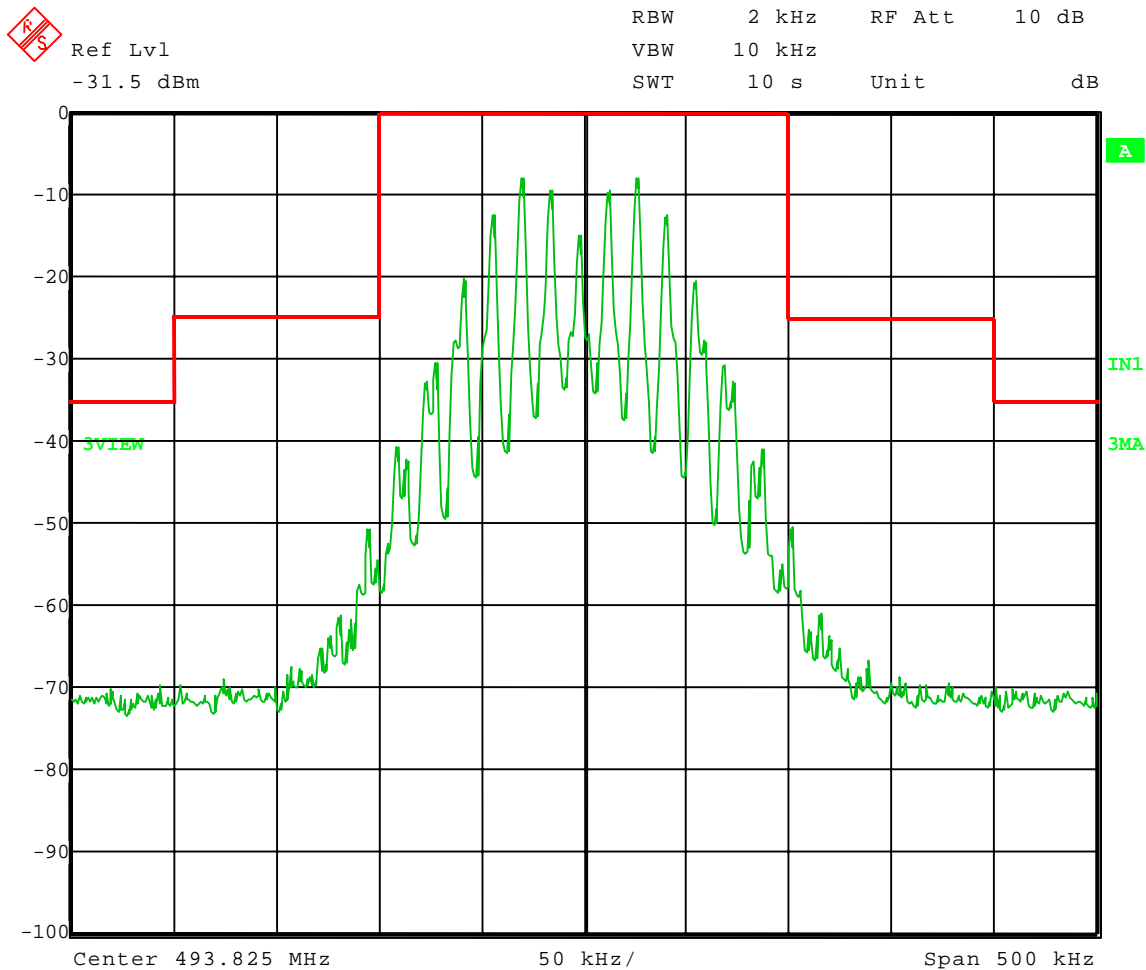
Company: Shure Inc.  
Model Tested: SLX2-G4  
Report Number: 13810

1250 Peterson Dr., Wheeling, IL 60090

### APPENDIX A

Test Date: 09-22-2008  
Company: Shure, Inc.  
EUT: SLX2-G4  
Test: Occupied Bandwidth  
Operator: Craig B

Nominal Frequency: **493.825 MHz**  
15 kHz modulation



Date: 22.SEP.2008 15:44:42



Company: Shure Inc.  
Model Tested: SLX2-G4  
Report Number: 13810

1250 Peterson Dr., Wheeling, IL 60090

## APPENDIX A

### 6.0 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 10<sup>th</sup> harmonic of the fundamental frequency.

For the SLX2-G4 Handheld Wireless Microphone Transmitter, the highest fundamental frequency is 493.825 MHz so the scans were made up to 5000 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 470 MHz - 494 MHz bands for SLX2-G4 Handheld Wireless Microphone 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.



Company: Shure Inc.  
Model Tested: SLX2-G4  
Report Number: 13810

1250 Peterson Dr., Wheeling, IL 60090

## APPENDIX A

### 6.0 FIELD STRENGTH OF SPURIOUS EMISSION MEASUREMENTS (CON'T) – PART 2.1053

On any frequency removed from the operating frequency by more than 250 percent of the authorized bandwidth, the mean power of emissions shall be attenuated below the mean output power of the transmitter at least  $43 + 10 \log_{10}$  (mean output power in watts) dB.

To determine the **LIMIT** for Spurious Emissions the following method was used:

Measured output power = 15.15 dBm = 0.03273 Watts

**The emissions must be reduced by:**

$$43 + 10 \log_{10} (0.03273 \text{ Watts}) = 28.15 \text{ dB}$$

Therefore, the **LIMIT** at three/ten meters equals:

$$\text{Limit} = 15.15 \text{ dBm} - 28.15 \text{ dB} = -13 \text{ dBm}$$



1250 Peterson Dr., Wheeling, IL 60090

Company: Shure Inc.  
Model Tested: SLX2-G4  
Report Number: 13810

APPENDIX A

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





Company: Shure Inc.  
 Model Tested: SLX2-G4  
 Report Number: 13810

1250 Peterson Dr., Wheeling, IL 60090

## APPENDIX A

DLS Electronic Systems, Inc.

Company: Shure, Inc.  
 Operator: Craig B  
 Date of test: 11-07-2007  
 Temperature: 67 deg. F  
 Humidity: 29% R.H.

Rated Power = 32 mW = 15.05 dBm

### Output Power - ERP - Substitution Method

Model: <b>SLX2-G4</b>								
Channel: <b>470.125 MHz</b>								
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)
470.125 vertical	109.64	20.12	7.56	2.15	12.56	24	11.44	18.03
470.125 horizontal	109.11	19.81	7.56	2.15	12.25	24	11.75	16.79

EIRP = Signal generator output - cable loss + antenna gain

ERP<sub>(ref. to 1/2λ dipole)</sub> = Signal generator output - cable loss + antenna gain - 2.15



Company: Shure Inc.  
 Model Tested: SLX2-G4  
 Report Number: 13810

1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

DLS Electronic Systems, Inc.

Company: Shure, Inc.  
 Operator: Craig B  
 Date of test: 11-07-2007  
 Temperature: 67 deg. F  
 Humidity: 29% R.H.

Rated Power = 32 mW = 15.05 dBm

Output Power - ERP - Substitution Method

Model: <b>SLX2-G4</b>								
Channel: <b>481.750 MHz</b>								
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)
481.750 vertical	110.07	19.48	7.62	2.15	11.86	24	12.14	15.35
481.750 horizontal	109.32	19.24	7.62	2.15	11.62	24	12.38	14.52

EIRP = Signal generator output - cable loss + antenna gain

ERP<sub>(ref. to 1/2λ dipole)</sub> = Signal generator output - cable loss + antenna gain - 2.15



Company: Shure Inc.  
 Model Tested: SLX2-G4  
 Report Number: 13810

1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

DLS Electronic Systems, Inc.

Company: Shure, Inc.  
 Operator: Craig B  
 Date of test: 11-07-2007  
 Temperature: 67 deg. F  
 Humidity: 29% R.H.

Rated Power = 32 mW = 15.05 dBm

Output Power - ERP - Substitution Method

Model: <b>SLX2-G4</b>								
Channel: <b>493.825 MHz</b>								
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)
493.825 vertical	109.36	19.13	7.67	2.15	11.46	24	12.54	14.00
493.825 horizontal	108.99	18.91	7.67	2.15	11.24	24	12.76	13.30

EIRP = Signal generator output - cable loss + antenna gain

ERP<sub>(ref. to 1/2λ dipole)</sub> = Signal generator output - cable loss + antenna gain - 2.15



1250 Peterson Dr., Wheeling, IL 60090

Company: Shure Inc.  
Model Tested: SLX2-G4  
Report Number: 13810

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



Company: Shure Inc.  
 Model Tested: SLX2-G4  
 Report Number: 13810

1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

DLS Electronic Systems, Inc.

Company: Shure, Inc.  
 Operator: Craig B  
 Date of test: 11-09-2007  
 Temperature: 66 deg. F.  
 Humidity: 30% R.H.

Radiated Spurious Emissions (e.i.p. substitution method) FCC Part 74; FCC Part 2.1053								
Model: <b>SLX2-G4</b> Transmit Frequency: <b>470.125 MHz</b>								
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)
0.94025	71.8	94.9	-23.1	-13	10.1	Horizontal	315	1.0
1.41038	65.2	99.6	-34.4	-13	21.4	Horizontal	225	1.6
1.88050	60.5	99.0	-38.5	-13	25.5	Horizontal	225	1.1
2.35063	54.3	100.5	-46.2	-13	33.2	Horizontal	30	1.2
2.82075	60.4	101.0	-40.6	-13	27.6	Horizontal	135	1.0
3.29088	64.3	100.0	-35.7	-13	22.7	Horizontal	160	1.3
3.76100	68.5	100.1	-31.6	-13	18.6	Horizontal	180	1.5
4.23113	66.3	100.1	-33.8	-13	20.8	Horizontal	100	1.1
4.70125	64.1	98.5	-34.4	-13	21.4	Horizontal	240	1.2
5.17138	66.1	98.1	-32.0	-13	19.0	Horizontal	120	1.1
0.94025	68.5	95.3	-26.8	-13	13.8	Vertical	0	2.0
1.41038	66.1	100.8	-34.7	-13	21.7	Vertical	190	1.0
1.88050	58.4	98.5	-40.1	-13	27.1	Vertical	180	1.0
2.35063	55.2	98.7	-43.5	-13	30.5	Vertical	225	1.0
2.82075	57.9	99.0	-41.1	-13	28.1	Vertical	260	1.1
3.29088	62.0	98.5	-36.5	-13	23.5	Vertical	180	1.0
3.76100	69.4	99.1	-29.7	-13	16.7	Vertical	180	1.1
4.23113	70.2	100.2	-30.0	-13	17.0	Vertical	225	1.0
4.70125	64.7	99.7	-35.0	-13	22.0	Vertical	180	1.2
5.17138	64.2	99.5	-35.3	-13	22.3	Vertical	170	1.2



Company: Shure Inc.  
 Model Tested: SLX2-G4  
 Report Number: 13810

1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

DLS Electronic Systems, Inc.

Company: Shure, Inc.  
 Operator: Craig B  
 Date of test: 11-09-2007  
 Temperature: 66 deg. F.  
 Humidity: 30% R.H.

Radiated Spurious Emissions (e.r.p. substitution method) FCC Part 74; FCC Part 2.1053								
Model: <b>SLX2-G4</b> Transmit Frequency: <b>481.750 MHz</b>								
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)
0.963500	61.9	95.9	-34.0	-13	21.0	Horizontal	225	1.2
1.445250	64.4	99.7	-35.3	-13	22.3	Horizontal	135	1.7
1.927000	61.1	98.5	-37.4	-13	24.4	Horizontal	225	1.1
2.408750	62.0	100.1	-38.1	-13	25.1	Horizontal	110	1.1
2.890500	63.9	101.4	-37.5	-13	24.5	Horizontal	190	1.1
3.372250	67.4	100.6	-33.2	-13	20.2	Horizontal	180	1.3
3.854000	69.5	100.0	-30.5	-13	17.5	Horizontal	135	1.8
4.335750	69.2	99.9	-30.7	-13	17.7	Horizontal	270	1.1
4.817500	65.2	98.0	-32.8	-13	19.8	Horizontal	225	1.2
5.299250	65.8	98.0	-32.2	-13	19.2	Horizontal	135	1.3
0.963500	58.2	96.6	-38.4	-13	25.4	Vertical	35	2.0
1.445250	62.2	100.4	-38.2	-13	25.2	Vertical	0	1.0
1.927000	56.4	98.8	-42.4	-13	29.4	Vertical	180	1.0
2.408750	57.2	98.8	-41.6	-13	28.6	Vertical	250	1.0
2.890500	61.7	98.9	-37.2	-13	24.2	Vertical	180	1.0
3.372250	66.1	98.8	-32.7	-13	19.7	Vertical	180	1.0
3.854000	74.8	98.2	-23.4	-13	10.4	Vertical	180	1.4
4.335750	67.8	100.2	-32.4	-13	19.4	Vertical	180	1.2
4.817500	68.6	99.7	-31.1	-13	18.1	Vertical	180	1.0
5.299250	67.2	100.4	-33.2	-13	20.2	Vertical	210	1.0



Company: Shure Inc.  
 Model Tested: SLX2-G4  
 Report Number: 13810

1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

DLS Electronic Systems, Inc.

Company: Shure, Inc.  
 Operator: Craig B  
 Date of test: 11-09-2007  
 Temperature: 66 deg. F.  
 Humidity: 30% R.H.

Radiated Spurious Emissions (e.r.p. substitution method) FCC Part 74; FCC Part 2.1053								
Model: <b>SLX2-G4</b> Transmit Frequency: <b>493.825 MHz</b>								
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)
0.987650	62.0	95.7	-33.7	-13	20.7	Horizontal	225	1.1
1.481475	63.3	99.4	-36.1	-13	23.1	Horizontal	170	1.8
1.975300	55.8	99.9	-44.1	-13	31.1	Horizontal	225	1.1
2.469125	62.7	101.0	-38.3	-13	25.3	Horizontal	135	1.1
2.962950	66.6	100.1	-33.5	-13	20.5	Horizontal	180	1.1
3.456775	67.2	100.5	-33.3	-13	20.3	Horizontal	180	1.0
3.950600	71.3	99.9	-28.6	-13	15.6	Horizontal	250	1.0
4.444425	65.7	98.7	-33.0	-13	20.0	Horizontal	225	1.5
4.938250	66.9	98.8	-31.9	-13	18.9	Horizontal	180	1.1
5.432075	64.7	98.4	-33.7	-13	20.7	Horizontal	135	1.3
0.987650	58.8	96.2	-37.4	-13	24.4	Vertical	180	1.9
1.481475	63.2	101.0	-37.8	-13	24.8	Vertical	200	1.5
1.975300	50.2	99.4	-49.2	-13	36.2	Vertical	45	1.4
2.469125	52.3	99.0	-46.7	-13	33.7	Vertical	45	1.0
2.962950	64.8	98.8	-34.0	-13	21.0	Vertical	190	1.0
3.456775	66.5	99.1	-32.6	-13	19.6	Vertical	180	1.1
3.950600	75.0	98.8	-23.8	-13	10.8	Vertical	180	1.3
4.444425	67.2	99.3	-32.1	-13	19.1	Vertical	180	1.1
4.938250	66.9	99.7	-32.8	-13	19.8	Vertical	180	1.0
5.432075	65.7	100.0	-34.3	-13	21.3	Vertical	160	1.0



Company: Shure Inc.  
Model Tested: SLX2-G4  
Report Number: 13810

1250 Peterson Dr., Wheeling, IL 60090

## APPENDIX A

### 7.0 FREQUENCY STABILITY (TEMPERATURE)– PART 2.1055(a1)

The frequency stability was measured from  $-30^{\circ}$  to  $+50^{\circ}$  centigrade at intervals of  $10^{\circ}$  centigrade throughout the range. With power to the transmitter removed, the equipment was left alone for a sufficient period of time (approximately 30 minutes or more) to allow the temperature inside the transmitter to stabilize. Power was then applied to the unit. Prior to each frequency measurement, the unit was operated for a period of time sufficient to stabilize all of the components of the oscillator circuit.

See the following page for the data taken during testing.

### 8.0 FREQUENCY STABILITY (VOLTAGE VARIATION)– PART 2.1055(d2)

The frequency stability of Wireless Boundary Microphone 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.





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Company: Shure Inc.  
Model Tested: SLX2-G4  
Report Number: 13810

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 Inc.  
 Model Tested: SLX2-G4  
 Report Number: 13810

1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

DLS Electronic Systems, Inc.

Company: Shure, Inc.  
 Operator: Craig B  
 Date of test: 11-19-2007

Limit = 23.5 kHz (0.005% of 470 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)
SLX2-G4	470.125	470.121413	<b>-3.587</b>	470.122495	<b>-2.505</b>	470.123697	<b>-1.303</b>	470.125020	<b>0.020</b>	470.126543	<b>1.543</b>
SLX2-G4	481.750	481.746373	<b>-3.627</b>	481.747335	<b>-2.665</b>	481.748938	<b>-1.062</b>	481.749860	<b>-0.140</b>	481.751423	<b>1.423</b>
SLX2-G4	493.825	493.821373	<b>-3.627</b>	493.822174	<b>-2.826</b>	493.823737	<b>-1.263</b>	493.824659	<b>-0.341</b>	493.826383	<b>1.383</b>

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)	2.1 Volts	Error (kHz)
SLX2-G4	470.125	470.127064	<b>2.064</b>	470.127184	<b>2.184</b>	470.126743	<b>1.743</b>	470.126343	<b>1.343</b>	470.124459	<b>-0.541</b>
SLX2-G4	481.750	481.752064	<b>2.064</b>	481.752224	<b>2.224</b>	481.751824	<b>1.824</b>	481.751423	<b>1.423</b>	481.749419	<b>-0.581</b>
SLX2-G4	493.825	493.827184	<b>2.184</b>	493.827305	<b>2.305</b>	493.826944	<b>1.944</b>	493.825982	<b>0.982</b>	493.824579	<b>-0.421</b>

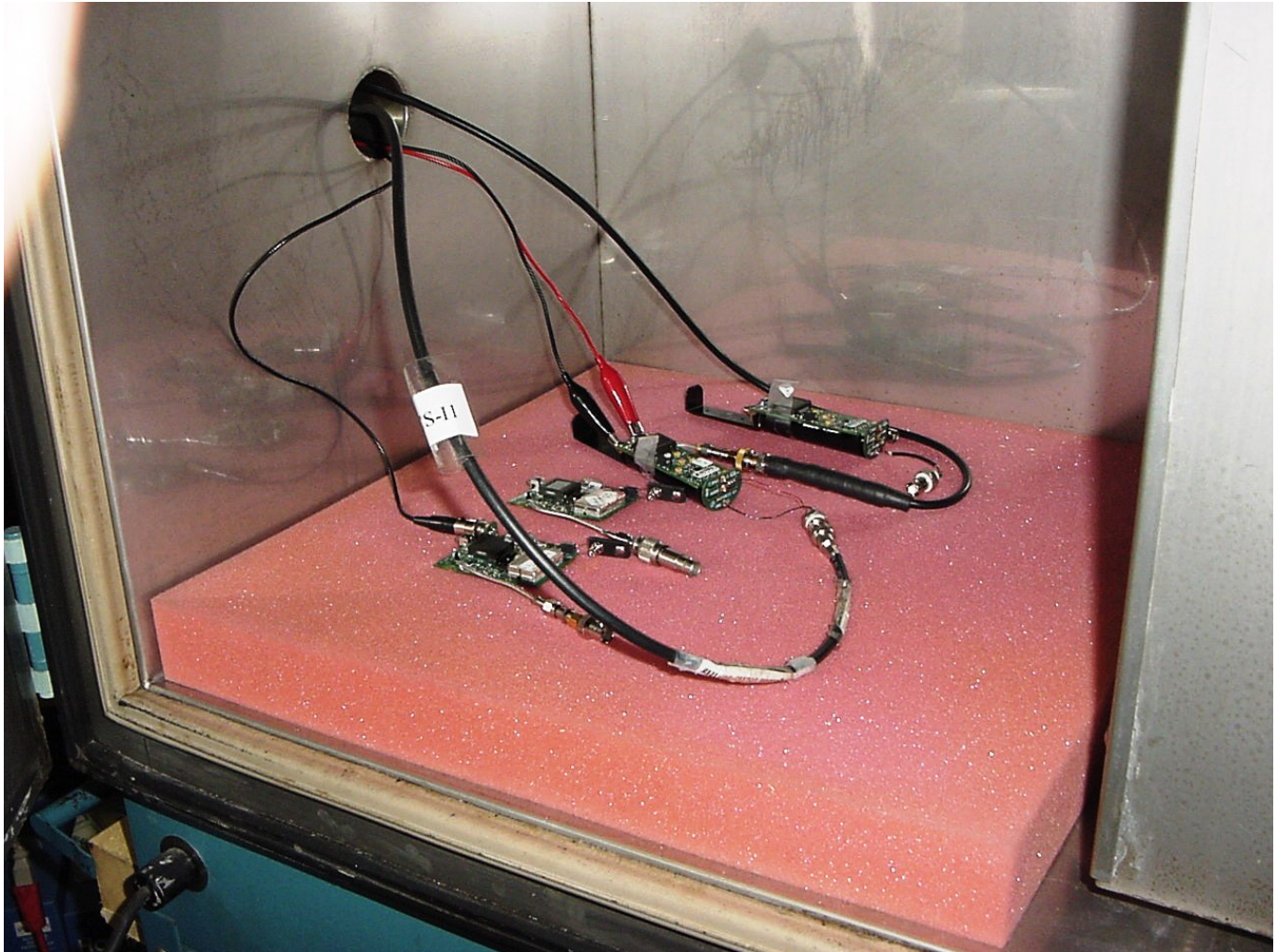


Company: Shure Inc.  
Model Tested: SLX2-G4  
Report Number: 13810

1250 Peterson Dr., Wheeling, IL 60090

## APPENDIX A

### 9.0 FREQUENCY STABILITY PHOTOS TAKEN DURING TESTING





1250 Peterson Dr., Wheeling, IL 60090

Company: Shure Inc.  
Model Tested: SLX2-G4  
Report Number: 13810

## APPENDIX A

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



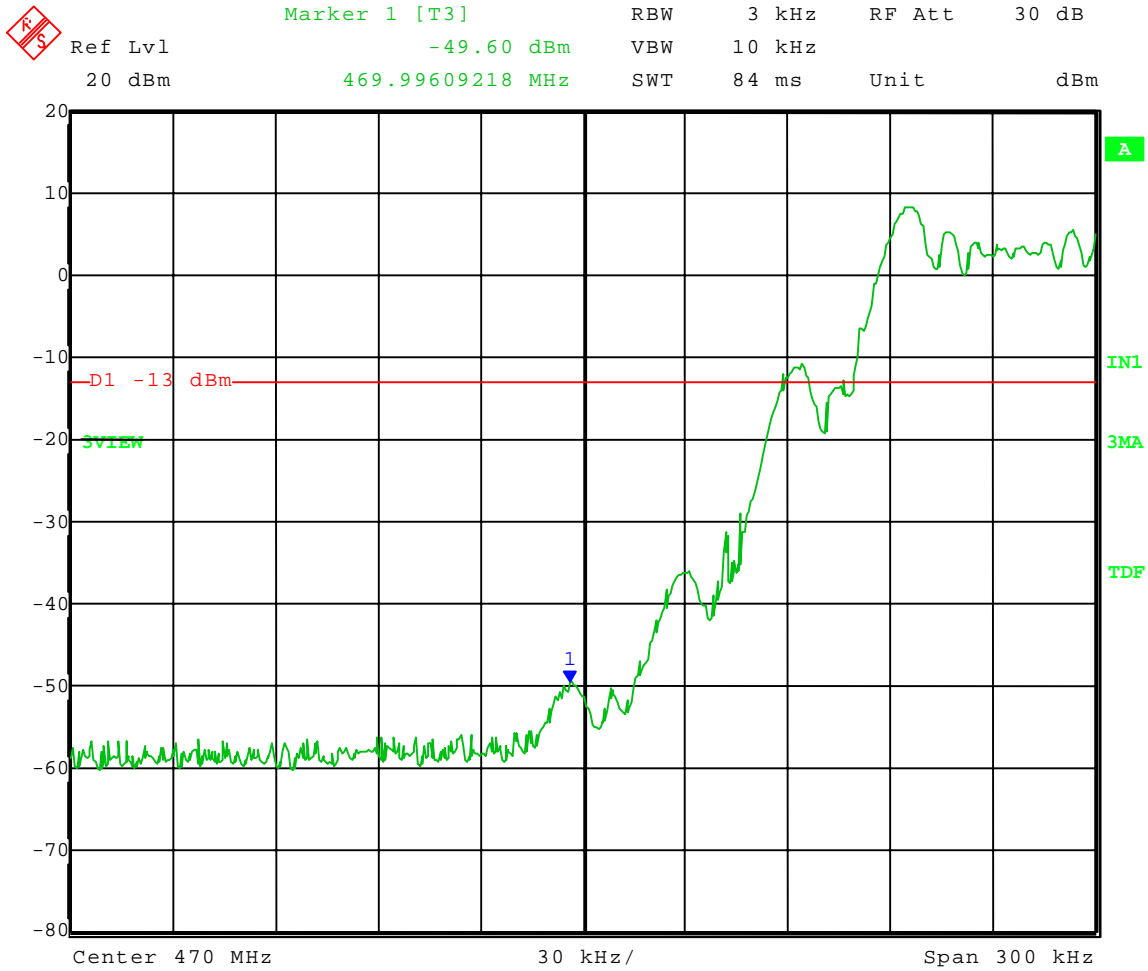
Company: Shure Inc.  
 Model Tested: SLX2-G4  
 Report Number: 13810

1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

Test Date: 11-16-2007  
 Company: Shure, Inc.  
 EUT: SLX2-G4  
 Test: Band-Edge Compliance - Conducted  
 Rule part: FCC Part 74; FCC Part 2.1051  
 Operator: Craig B  
 Comment: Channel; 470.125 MHz

Band-Edge Frequency = 470 MHz  
 Band-Edge limit = -13 dBm



Date: 16.NOV.2007 14:20:52