Measurement of RF Emissions from a Handheld Transmitter, Model No. ULXD2

For	Shure Incorporated 5800 West Touhy Avenue Niles, IL 60714
P.O. Number	4500275203
Date Tested	September 2, 2014 through September 12, 2014
Test Personnel	Mark Longinotti
Test Specification	FCC "Code of Federal Regulations" Title 47, Part 15, Subpart C, Section 15.247 for Digital Modulation Intentional Radiators Operating within The band 902-928MHz Industry Canada RSS-GEN Industry Canada RSS-210

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REVISION HISTORY

Revision	Date	Description
—	1 October 2014	Initial release

Measurement of RF Emissions from a Handheld Transmitter, Model No. ULXD2

1. INTRODUCTION

1.1. Scope of Tests

This report represents the results of the series of radio interference measurements performed on a Shure Incorporated Handheld Transmitter, Model No. ULXD2, Serial No. None Assigned, (hereinafter referred to as the Equipment Under Test (EUT)). The EUT is a digital modulation transmitter. The transmitter was designed to transmit in the 902-928 MHz band using an internal, non-removable antenna. The EUT was manufactured and submitted for testing by Shure Incorporated located in Niles, IL.

1.2. Purpose

The test series was performed to determine if the EUT meets the conducted and radiated RF emission requirements of the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart C, Sections 15.207 and 15.247 for Intentional Radiators. The test series was also performed to determine if the EUT meets the conducted RF emission requirements of the Industry Canada Radio Standards Specification, RSS-Gen, Section 7.2.4 and the radiated RF emission requirements of the Industry Canada Radio Standards Specification, RSS-210, Annex 8 for transmitters. Testing was performed in accordance with ANSI C63.4-2003.

1.3. Deviations, Additions and Exclusions

There were no deviations, additions to, or exclusions from the test specification during this test series.

1.4. EMC Laboratory Identification

This series of tests was performed by Elite Electronic Engineering Incorporated of Downers Grove, Illinois. The laboratory is accredited by The American Association for Laboratory Accreditation (A2LA). A2LA Certificate Number: 1786.01.

1.5. Laboratory Conditions

The temperature at the time of the test was 21^{o}C and the relative humidity was 35%.

2. APPLICABLE DOCUMENTS

The following documents of the exact issue designated form part of this document to the extent specified herein:

- Federal Communications Commission "Code of Federal Regulations", Title 47, Part 15, Subpart C, dated 1 October 2013
- ANSI C63.4-2003, "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"
- Federal Communications Commission Office of Engineering and Technology Laboratory Division Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under Section 15.247, June 5, 2014
- Industry Canada Radio Standards Specification, RSS-Gen, “General Requirements and Information for the Certification of Radiocommunication Equipment”, Issue 3, December 2010
- Industry Canada Radio Standards Specification, RSS-210, “Low-power License-exempt

Radiocommunication Devices (All Frequency Bands): Category I Equipment", Issue 8, December 2010

3. EUT SETUP AND OPERATION

3.1. General Description

The EUT is a Shure Incorporated, Handheld Transmitter, Model No. ULXD2. A block diagram of the EUT setup is shown as Figure 1.

3.1.1. Power Input

The EUT was powered with 3VDC from 2 each internal "AA" batteries.

3.1.2. Peripheral Equipment

The EUT was tested with a Shure SM58 microphone cartridge attached.

3.1.3. Signal Input/Output Leads

The EUT was submitted for testing with no signal leads.

3.1.4. Grounding

The EUT was not grounded during testing.

3.2. Software

For all tests the EUT had Firmware Version X52 1.5.14 loaded onto the device to provide correct load characteristics.

3.3. Operational Mode

All emissions tests were performed separately in the following modes:

- Transmit at 902.4MHz, 20mW
- Transmit at 915MHz, 20mW
- Transmit at 927.6MHz, 20mW

3.4. EUT Modifications

No modifications were required for compliance.

4. TEST FACILITY AND TEST INSTRUMENTATION

4.1. Shielded Enclosure

All tests were performed in a 32ft. x 20ft. x 18ft. hybrid ferrite-tile/anechoic absorber lined test chamber. With the exception of the floor, the reflective surfaces of the shielded chamber are lined with ferrite tiles on the walls and ceiling. Anechoic absorber material is installed over the ferrite tile. The floor of the chamber is used as the ground plane. The chamber complies with ANSI C63.4-2003 for site attenuation.

4.2. Test Instrumentation

The test instrumentation and auxiliary equipment used during the tests are listed in Table 9-1. All equipment was calibrated per the instruction manuals supplied by the manufacturer.

Conducted and radiated emission measurements were performed with a spectrum analyzer. This receiver allows measurements with the bandwidths and detector functions specified by the FCC.

4.3. Calibration Traceability

Test equipment is maintained and calibrated on a regular basis. All calibrations are traceable to the National

Institute of Standards and Technology (NIST).

4.4. Measurement Uncertainty

All measurements are an estimate of their true value. The measurement uncertainty characterizes, with a specified confidence level, the spread of values which may be possible for a given measurement system.

The measurement uncertainty for these tests is presented below:

Conducted Emissions Measurements		
Combined Standard Uncertainty	1.07	-1.07
Expanded Uncertainty (95% confidence)	2.1	-2.1

Radiated Emissions Measurements		
Combined Standard Uncertainty	2.26	-2.18
Expanded Uncertainty (95% confidence)	4.5	-4.4

5. TEST PROCEDURES

5.1. Powerline Conducted Emissions

5.1.1.Requirements

Since the EUT was powered by internal batteries and has no connections for AC power, no conducted emissions tests are required to be performed.

5.2. 6dB Bandwidth

5.2.1.Requirement

Per 15.247(a)(2),the minimum 6dB bandwidth shall be at least 500kHz for all systems using digital modulation techniques.

5.2.2.Procedures

The EUT was setup inside the chamber. The EUT was allowed to transmit continuously. The transmit channel was set separately to low, middle, and high channels. The resolution bandwidth (RBW) was set to 100kHz and the span was set to greater than the RBW.

The 'Max-Hold' function was engaged. The analyzer was allowed to scan until the envelope of the transmitter bandwidth was defined. The analyzer's display was plotted using a 'screen dump' utility.

5.2.3.Results

The plots on pages 17 through 19 show that the minimum 6 dB bandwidth was 556.11kHz which is greater than minimum allowable 6dB bandwidth requirement of 500kHz for systems using digital modulation techniques. The 99% bandwidth was measured to be 646.29kHz.

5.3. Effective Isotropic Radiated Power (EIRP)

5.3.1.Requirements

Per section 15.247(b)(3), for systems using digital modulation the maximum peak output conducted power

shall not be greater than 1.0W (30dBm). Per section 15.247(b)(4), this limit is based on the use of antennas with directional gains that do not exceed 6dBi. Since the limit allows for a 6dBi antenna gain, the maximum EIRP can be increased by 6dB to 4 Watt (36dBm).

5.3.2.Procedures

The EUT was placed on the non-conductive stand and set to transmit. A bilog antenna was placed at a test distance of 3 meters from the EUT. The resolution bandwidth (RBW) of the spectrum analyzer was set to greater than the 6dB bandwidth. The EUT was maximized for worst case emissions (or maximum output power) at the measuring antenna. The maximum meter reading was recorded. The peak power output was measured for the low, middle and high channels.

The equivalent power was determined from the field intensity levels measured at 3 meters using the substitution method. To determine the emission power, a dipole antenna was then set in place of the EUT and connected to a calibrated signal generator. The output of the signal generator was adjusted to match the received level at the spectrum analyzer. The signal level was recorded. The reading was then corrected to compensate for cable loss as required. The peak power output was calculated for low, middle, and high hopping frequencies.

5.3.3.Results

The results are presented on pages 20 through 22. The maximum EIRP measured from the transmitter was 17.0 dBm or 50.0mW which is below the 4 Watt limit.

5.4. Radiated Spurious Emissions Measurements

5.4.1.Requirements

Per section 15.247(d), in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated emissions measurement. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must comply with the radiated emission limits specified in §15.209(a).

Paragraph 15.209(a) has the following radiated emission limits:

Frequency MHz	Field Strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	3
30.0-88.0	100	3
88.0-216.0	150	3
216.0-960.0	200	3
Above 960	500	3

5.4.2.Procedures

All tests were performed in a 32ft. x 20ft. x 18ft. hybrid ferrite-tile/anechoic absorber lined test chamber. The walls and ceiling of the shielded chamber are lined with ferrite tiles. Anechoic absorber material is installed over the ferrite tile. The floor of the chamber is used as the ground plane. The chamber complies with ANSI C63.4-2003 for site attenuation.

The shielded enclosure prevents emissions from other sources, such as radio and TV stations from interfering with the measurements. All Powerline and signal lines entering the enclosure pass through filters on the enclosure wall. The Powerline filters prevent extraneous signals from entering the enclosure on these leads.

Preliminary radiated emissions tests were performed to determine the emission characteristics of the EUT. For the preliminary test, a broadband measuring antenna was positioned at a 3 meter distance from the EUT. The entire frequency range from 30MHz to 10.0GHz was investigated using a peak detector function.

The final open field emission tests were then manually performed over the frequency range of 30MHz to 10.0GHz.

1) For all harmonics not in the restricted bands, the following procedure was used:
   a) The field strength of the fundamental was measured using a bilog antenna. The bilog antenna was positioned at a 3 meter distance from the EUT. A peak detector with a resolution bandwidth of 100 kHz was used on the spectrum analyzer.
   b) The field strengths of all of the harmonics not in the restricted band were then measured using a double-ridged waveguide antenna. The waveguide antenna was positioned at a 3 meter distance from the EUT. A peak detector with a resolution bandwidth of 100 kHz was used on the spectrum analyzer.
   c) To ensure that maximum or worst case emission levels at the fundamental and harmonics were measured, the following steps were taken when measuring the fundamental emissions and the spurious emissions:
      i) The EUT was rotated so that all of its sides were exposed to the receiving antenna.
      ii) Since the measuring antenna is linearly polarized, both horizontal and vertical field components were measured.
      iii) The measuring antenna was raised and lowered for each antenna polarization to maximize the readings.
      iv) In instances where it was necessary to use a shortened cable between the measuring antenna and the spectrum analyzer, the measuring antenna was not raised or lowered to ensure maximized readings. Instead the EUT was rotated through all axes to ensure the maximum readings were recorded for the EUT.
   d) All harmonics not in the restricted bands must be at least 20 dB below levels measured at the fundamental. However, attenuation below the general limits specified in §15.209(a) is not required.

2) For all emissions in the restricted bands, the following procedure was used:
   a) The field strengths of all emissions below 1 GHz were measured using a bi-log antenna. The bi-log antenna was positioned at a 3 meter distance from the EUT. A peak detector with a resolution bandwidth of 100 kHz was used on the spectrum analyzer.
   b) The field strengths of all emissions above 1 GHz were measured using a double-ridged waveguide antenna. The waveguide antenna was positioned at a 3 meter distance from the EUT. A peak detector with a resolution bandwidth of 1 MHz was used on the spectrum analyzer.
   c) To ensure that maximum or worst case emission levels were measured, the following steps were taken when taking all measurements:
      i) The EUT was rotated so that all of its sides were exposed to the receiving antenna.
      ii) Since the measuring antenna is linearly polarized, both horizontal and vertical field components were measured.
      iii) The measuring antenna was raised and lowered for each antenna polarization to maximize the readings.
      iv) In instances where it was necessary to use a shortened cable between the measuring antenna and the spectrum analyzer, the measuring antenna was not raised or lowered to ensure maximized readings. Instead the EUT was rotated through all axes to ensure the maximum readings were recorded for the EUT.
   d) For all radiated emissions measurements below 1 GHz, if the peak reading is below the limits listed in 15.209(a), no further measurements are required. If however, the peak readings exceed the limits listed in 15.209(a), then the emissions are remeasured using a quasi-peak detector.
   e) For all radiated emissions measurements above 1 GHz, the peak readings must comply with the 15.35(b) limits. 15.35(b) states that when average radiated emissions measurements are specified, there also is a limit on the peak level of the radiated emissions. The limit on the peak radio frequency emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test. Therefore, all peak readings above 1 GHz must be no greater than 20 dB above the limits

specified in 15.209(a).

f) Next, for all radiated emissions measurements above 1GHz, the resolution bandwidth was set to 1MHz. The analyzer was set to linear mode with a 10Hz video bandwidth in order to simulate an average detector. An average reading was taken.

5.4.3.Results

Preliminary radiated emissions plots with the EUT transmitting at 902.4MHz, 915MHz, and 927.6MHz are shown on pages 23 through 34. Final radiated emissions data are presented on data pages 35 through 43. As can be seen from the data, all emissions measured from the EUT were within the specification limits. Photographs of the test configuration which yielded the highest, or worst case, radiated emission levels are shown on Figures 2 and 3.

5.5. Band Edge Compliance

5.5.1.Requirement

Per section 15.247(d), the emissions at the band-edges must be at least 20dB below the highest level measured within the band but attenuation below the general limits listed in 15.209(a) is not required.

5.5.2.Procedures

5.10.2.1 Low Band Edge

1) The EUT was setup inside the test chamber on a non-conductive stand.
2) A broadband measuring antenna was placed at a test distance of 3 meters from the EUT.
3) The EUT was set to transmit continuously at the channel closest to the low band-edge.
4) The EUT was maximized for worst case emissions at the measuring antenna. The maximum meter reading was recorded.
5) To determine the band edge compliance, the following spectrum analyzer settings were used:

    a. Center frequency = low band-edge frequency.
    b. Span = Wide enough to capture the peak level of the emission operating on the channel closest to the band-edge, as well as any modulation products which fall outside of the authorized band of operation.
    c. Resolution bandwidth (RBW) ≥ 1% of the span.
    d. The 'Max-Hold' function was engaged. The analyzer was allowed to scan until the envelope of the transmitter bandwidth was defined.
    e. The marker was set on the peak of the in-band emissions. A display line was placed 20dB down from the peak of the in-band emissions. All emissions which fall outside of the authorized band of operation must be below the 20dB down display line. (All emissions to the left of the center frequency (band-edge) must be below the display line.)
    f. The analyzer's display was plotted using a 'screen dump' utility.

5.10.2.2 High Band Edge

1) The EUT was setup inside the test chamber on a non-conductive stand.
2) A broadband measuring antenna was placed at a test distance of 3 meters from the EUT.
3) The EUT was set to transmit continuously at the channel closest to the high band-edge.
4) The EUT was maximized for worst case emissions at the measuring antenna.
5) To determine the band edge compliance, the following spectrum analyzer settings were used:

    a. Center frequency = high band-edge frequency.
    b. Span = Wide enough to capture the peak level of the emission operating on the channel closest to the band-edge, as well as any modulation products which fall outside of the authorized band of operation.
    c. Resolution bandwidth (RBW) ≥ 1% of the span.

d. The 'Max-Hold' function was engaged. The analyzer was allowed to scan until the envelope of the transmitter bandwidth was defined.
e. The marker was set on the peak of the in-band emissions. A display line was placed 20dB down from the peak of the in-band emissions. All emissions which fall outside of the authorized band of operation must be below the 20dB down display line. (All emissions to the right of the center frequency (band-edge) must be below the display line.)
f. The analyzer's display was plotted using a 'screen dump' utility.

5.5.3. Results

Pages 44 and 45 show the conducted band-edge compliance results. As can be seen from these plots, the emissions at the low end band edge and the high end band edge are within the 20 dB down limits.

5.6. Power Spectral Density

5.6.1. Requirements

Per section 15.247(e), the peak power spectral density from the intentional radiator shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

5.6.2. Procedures

1) The EUT was placed on the non-conductive stand and set to transmit continuously.
2) A broadband measuring antenna was placed near the EUT.
3) To determine the power spectral density, the following spectrum analyzer settings were used:
    a. Center frequency = transmit frequency
    b. Resolution bandwidth (RBW) greater than the 20dB bandwidth.
    c. Sweep time = auto
    d. The peak detector and 'Max-Hold' function was engaged. The analyzer was allowed to scan until the envelope of the transmitter bandwidth was defined.
    e. The analyzer's display was plotted using a 'screen dump' utility.
4) This reading corresponds to the peak EIRP measured for the mid channel.
5) Turn on Display Line 1 and place it at the peak of the measured level. Turn on Display Line 2 and place it at the corresponding +8dBm level (e.g. if the peak output power is +18dBm then the +8dBm level will be 10dB down from the radiated level and if the peak output power is +6dBm then the +8dBm level will be 2dB above the radiated level.)
6) To determine the power spectral density, the following spectrum analyzer settings were used:
    a. Center frequency = transmit frequency
    b. Span =1.5times the channel bandwidth
    c. Resolution bandwidth (RBW) ≥3kHz
    d. Video bandwidth (VBW) ≥ 3 x RBW
    e. Sweep time = auto couple
    f. The analyzer was allowed to scan until the envelope of the transmitter bandwidth was defined. The peak detector and 'Max-Hold' function was engaged.
    g. The analyzer's display was plotted using a 'screen dump' utility.
    h. If the measured value exceeds the +8dBm limit, reduce the RBW (no less than 3kHz) and repeat step 7.

5.6.3. Results

Pages 46 through 51 show the power spectral density results. As can be seen from the plots, the peak power density is less than 8dBm in a 3kHz band during any time interval of continuous transmission.

6. OTHER TEST CONDITIONS

6.1. Test Personnel and Witnesses

All tests were performed by qualified personnel from Elite Electronic Engineering Incorporated. The test series

was partially witnessed by Shure Incorporated personnel.

6.2. Disposition of the EUT

The EUT and all associated equipment were returned to Shure Incorporated upon completion of the tests.

7. CONCLUSIONS

It was determined that the Shure Incorporated Handheld Transmitter, Model No. ULXD2, digital modulation transmitter, Serial No. None Assigned, did fully meet the conducted and radiated emission requirements of the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart C, Sections 15.207 and 15.247 for Intentional Radiators Operating within the 902-928 MHz band when tested per ANSI C63.4-2003.

It was also determined that the Shure Incorporated Handheld Transmitter, Model No. ULXD2, digital modulation transmitter, Serial No. None Assigned, did fully meet the conducted and radiated RF emission requirements of the Industry Canada Radio Standards Specification, RSS-Gen Section 7.2.4 and RSS-210 Annex 8, for transmitters, when tested per ANSI C63.4-2003.

8. CERTIFICATION

Elite Electronic Engineering Incorporated certifies that the information contained in this report was obtained under conditions which meet or exceed those specified in the test specifications.

The data presented in this test report pertains to the EUT at the test date. Any electrical or mechanical modification made to the EUT subsequent to the specified test date will serve to invalidate the data and void this certification.

This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the Federal Government.

9. EQUIPMENT LIST

Table 9-1 Equipment List

Eq ID	Equipment Description	Manufacturer	Model No.	Serial No.	Frequency Range	Cal Date	Due Date
APW11	PREAMPLIFIER	PMI	PE2-35-120-5R0-10-12-SFF	PL11685/1241	1GHZ-20GHZ	3/11/2014	3/11/2015
CDX8	COMPUTER	ELITE	WORKSTATION			N/A	
GSD3	SIGNAL GENERATOR	ROHDE & SCHWARZ	SMB100A	104454	9KHZ-6GHZ	9/10/2014	9/10/2015
NDQ1	TUNED DIPOLE ANTENNA	EMCO	3121C-DB4	313	400-1000MHZ	4/17/2014	4/17/2015
NTA3	BILOG ANTENNA	TESEQ	6112D	28040	25-1000MHz	2/19/2014	2/19/2015
NWQ1	DOUBLE RIDGED WAVEGUIDE ANTENNA	ETS-LINDGREN	3117	66655	1GHZ-18GHZ	3/11/2014	3/11/2015
RBA0	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESIB26	100145	20HZ-26.5GHZ	3/7/2014	3/7/2015
T2D4	20DB, 25W ATTENUATOR	WEINSCHEL	46-20-43	AY9243	DC-18GHZ	8/11/2014	8/11/2015
T2DA	20DB, 25W ATTENUATOR	WEINSCHEL	46-20-34	BH5446	DC-18GHZ	7/22/2014	7/22/2015
XPQ3	HIGH PASS FILTER	K&L MICROWAVE	4IH30-1804/T10000-0	4	1.8GHZ-10GHZ	11/25/2013	11/25/2014

I/O: Initial Only
N/A: Not Applicable
Note 1: For the purpose of this test, the equipment was calibrated over the specified frequency range, pulse rate, or modulation prior to the test or monitored by a calibrated instrument.

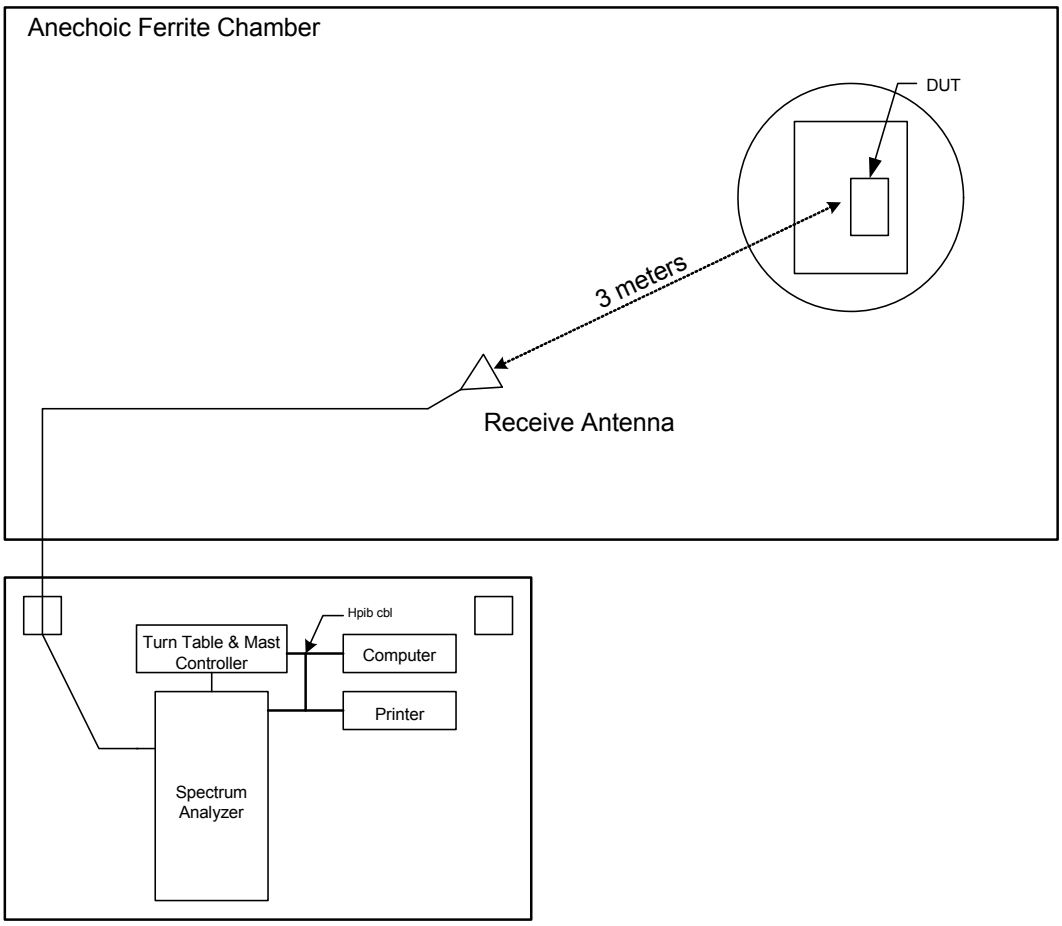
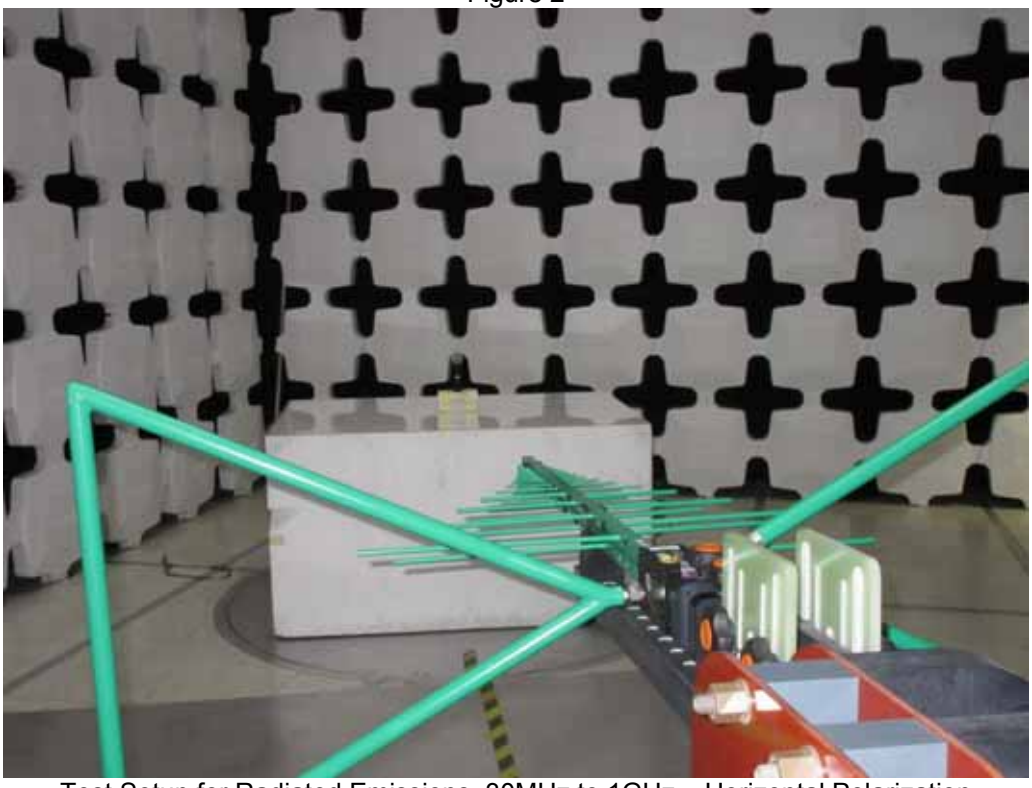
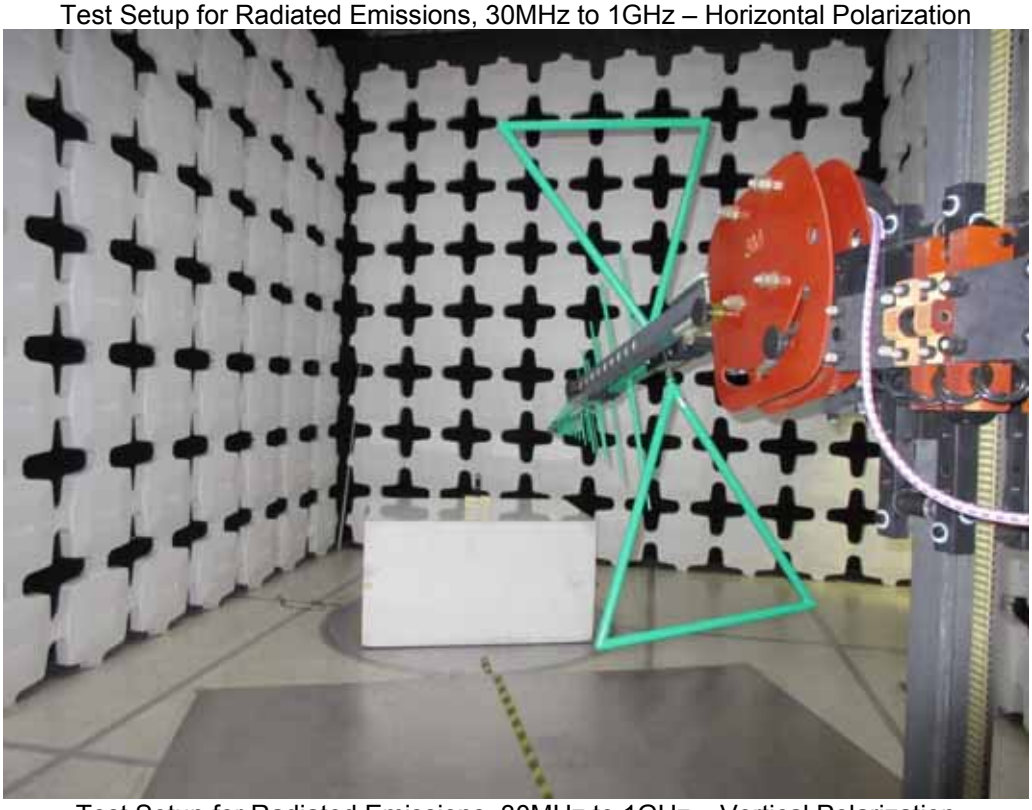


FIGURE 1 BLOCKDIAGRAM OF TEST SETUP

Figure 2

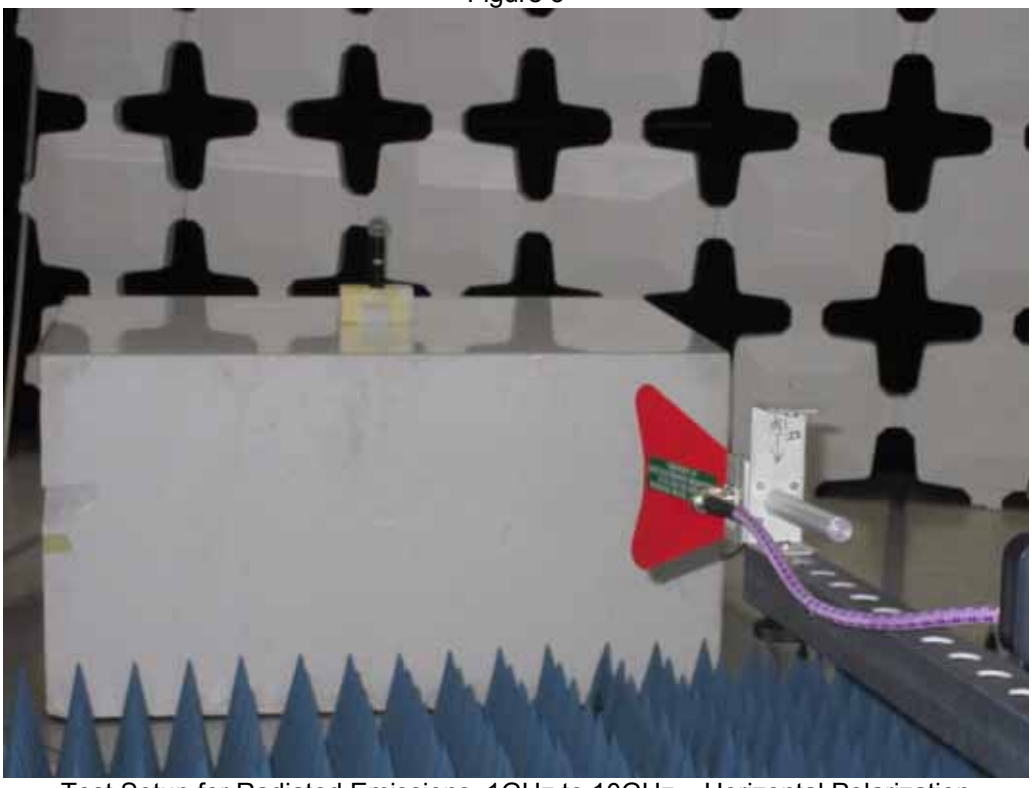


Test Setup for Radiated Emissions, 30MHz to 1GHz – Horizontal Polarization

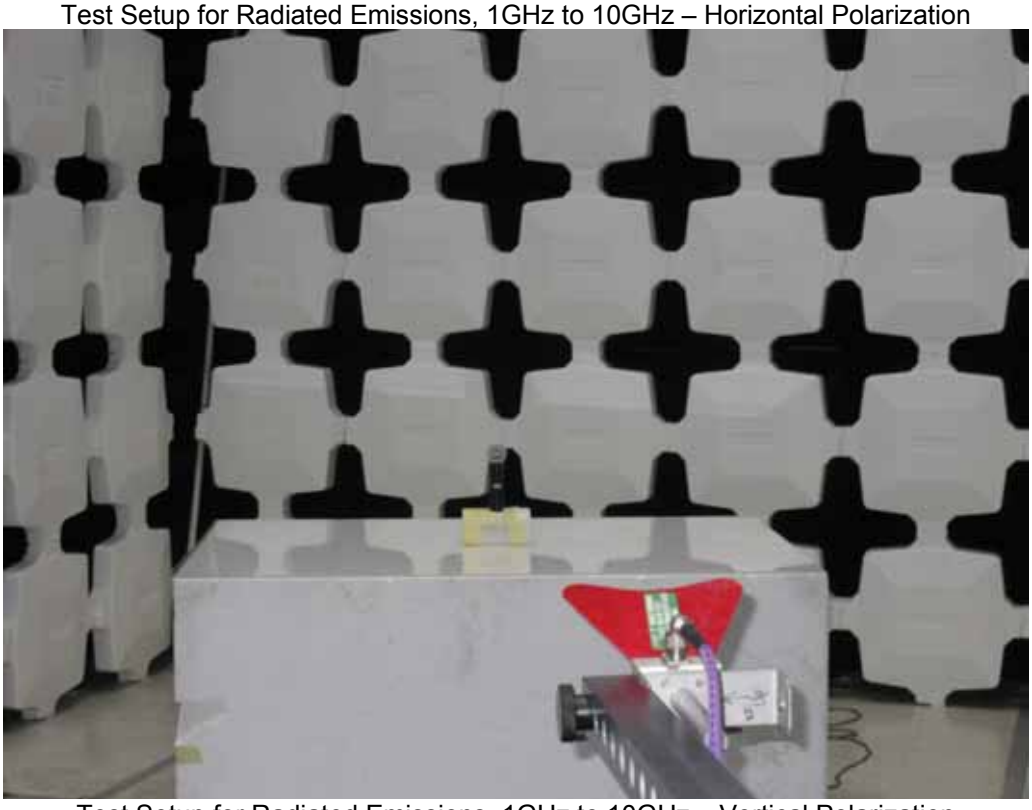


Test Setup for Radiated Emissions, 30MHz to 1GHz – Vertical Polarization

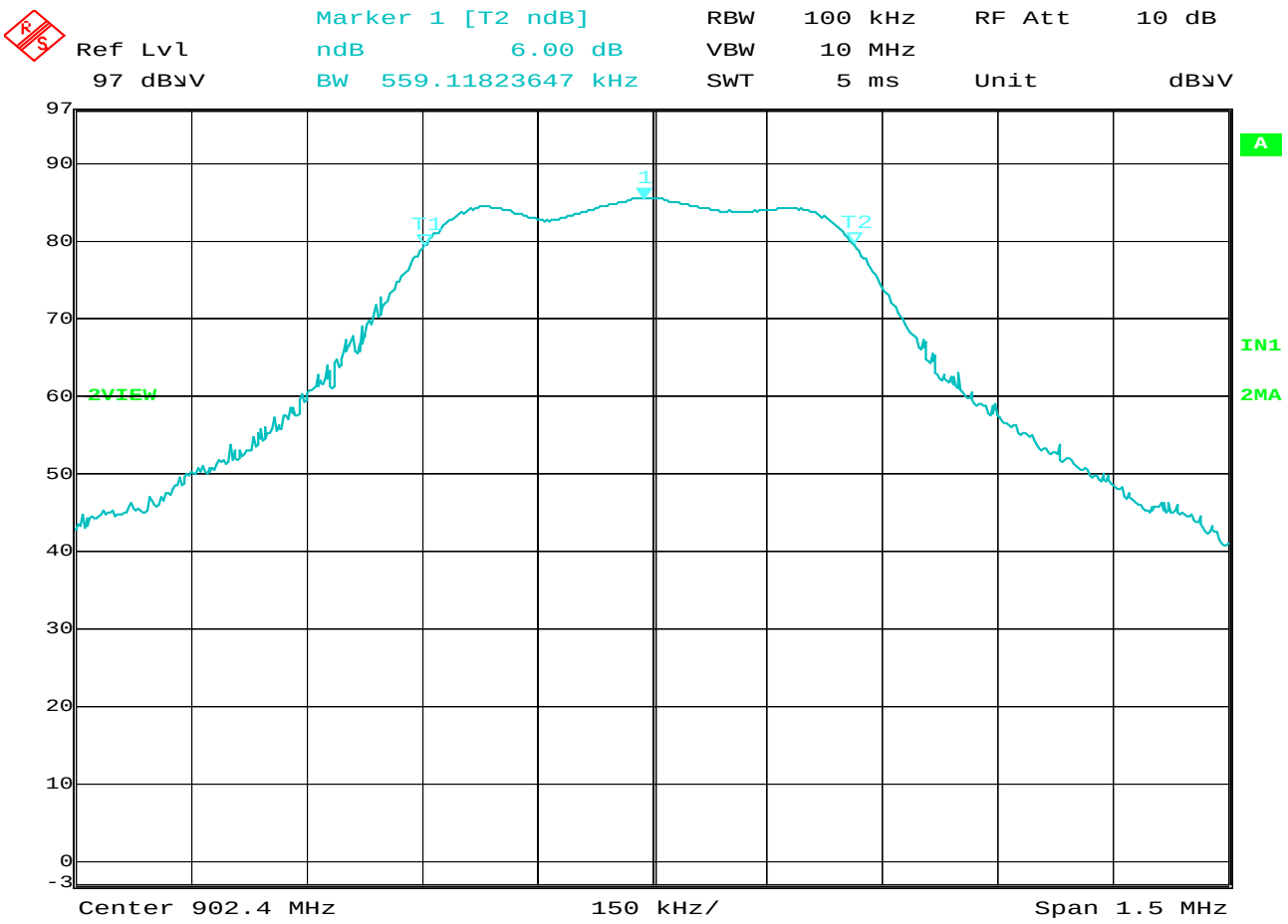
Figure 3



Test Setup for Radiated Emissions, 1GHz to 10GHz – Horizontal Polarization



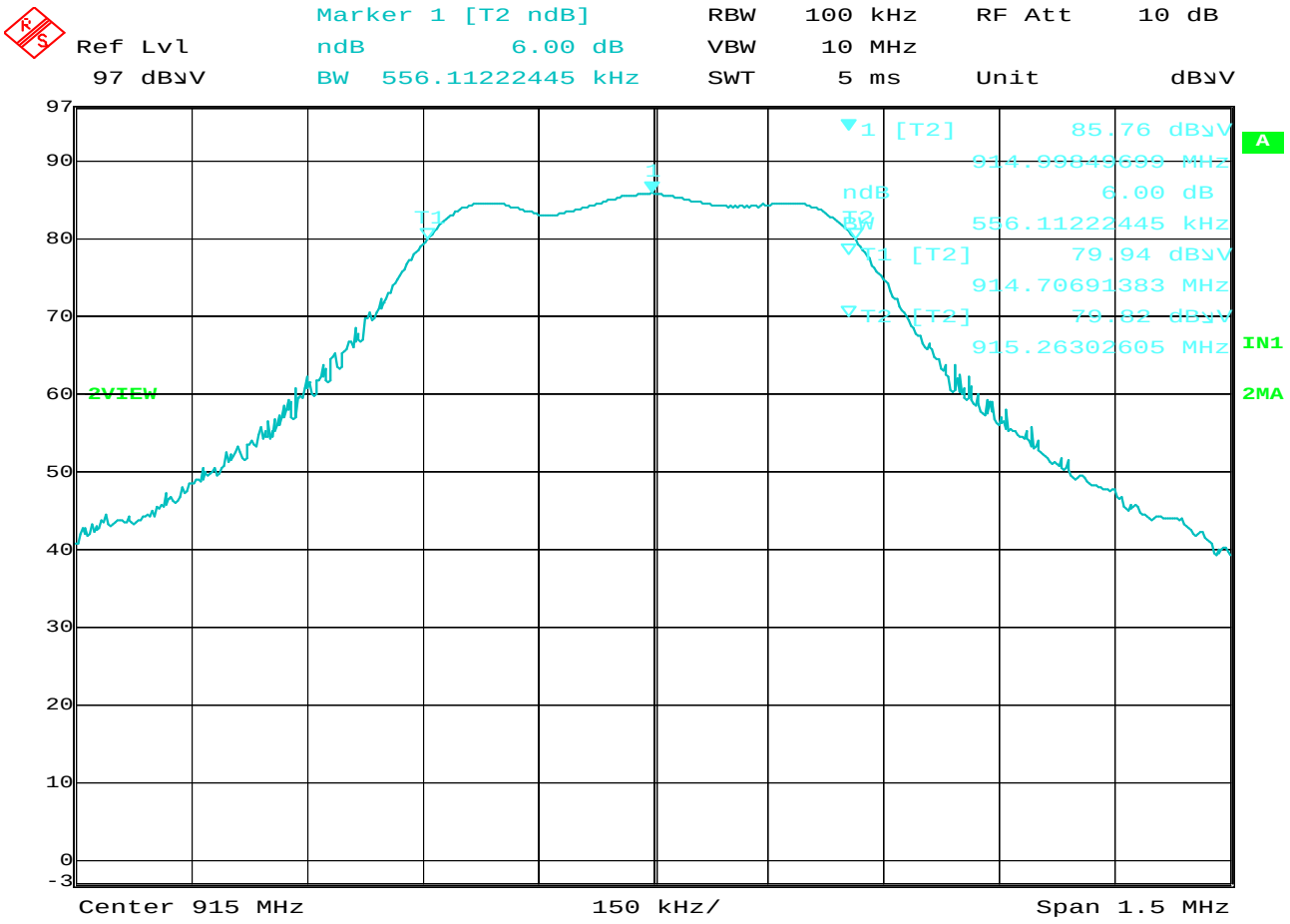
Test Setup for Radiated Emissions, 1GHz to 10GHz – Vertical Polarization



6dB Bandwidth

MANUFACTURER	:	Shure, Inc.
MODEL NUMBER	:	ULXD2
SERIAL NUMBER	:	None Assigned
TEST MODE	:	Tx @ 902.4MHz, 20mW
TEST PARAMETERS	:	6dB Bandwidth
NOTES	:	6dB Bandwidth= 559.12kHz
EQUIPMENT USED	:	RBA0, NTA3

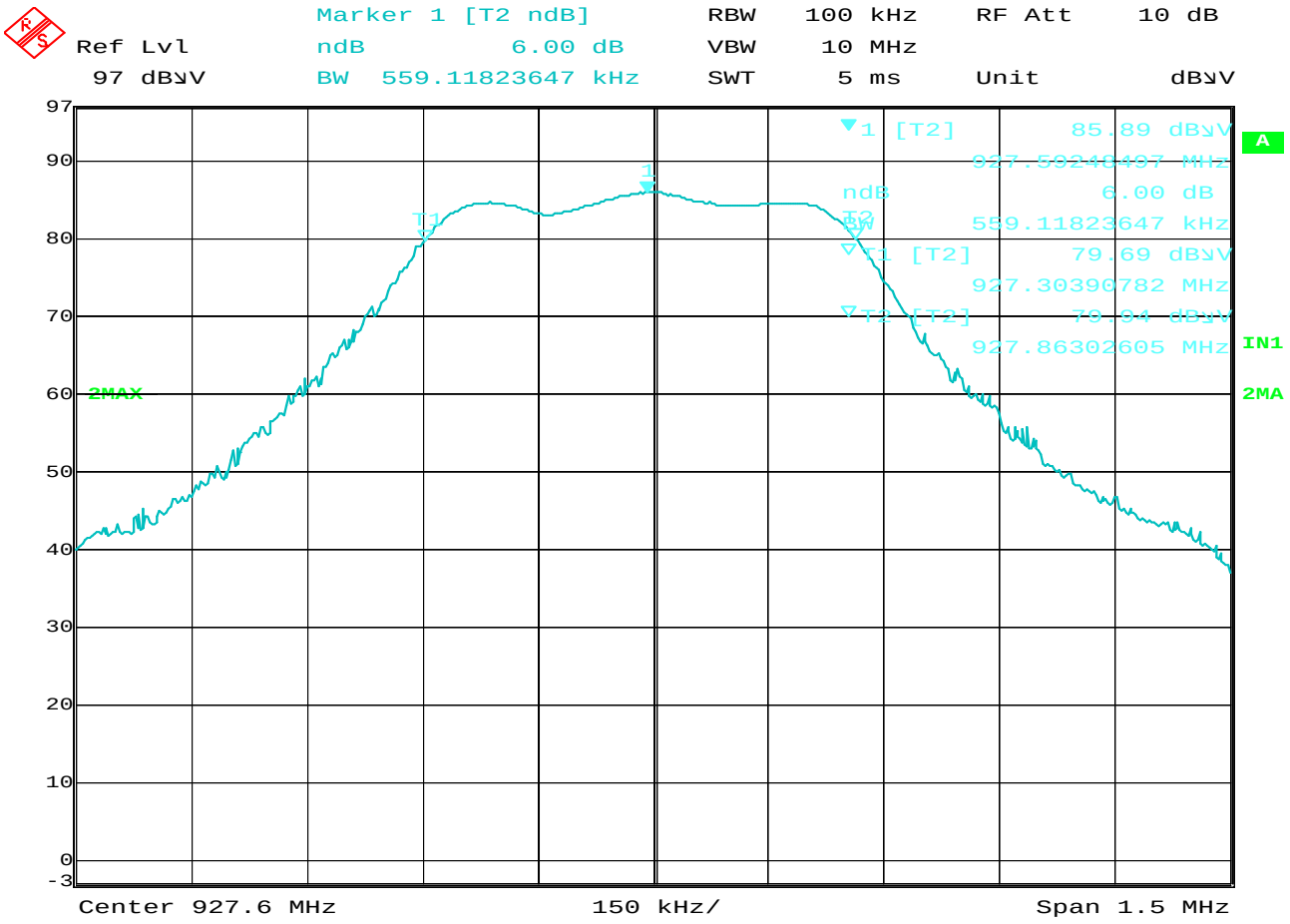
NOTES



6dB Bandwidth

MANUFACTURER	:	Shure, Inc.
MODEL NUMBER	:	ULXD2
SERIAL NUMBER	:	None Assigned
TEST MODE	:	Tx @ 915.0MHz, 20mW
TEST PARAMETERS	:	6dB Bandwidth
NOTES	:	6dB Bandwidth= 556.11kHz
EQUIPMENT USED	:	RBA0, NTA3

NOTES



6dB Bandwidth

MANUFACTURER	:	Shure, Inc.
MODEL NUMBER	:	ULXD2
SERIAL NUMBER	:	None Assigned
TEST MODE	:	Tx @ 927.6MHz, 20mW
TEST PARAMETERS	:	6dB Bandwidth
NOTES	:	6dB Bandwidth= 559.12kHz
EQUIPMENT USED	:	RBA0, NTA3

NOTES

Manufacturer : Shure Incorporated
Model No. : ULXD2
Serial No. : None Assigned
Date Tested : September 10 and 11, 2014
Test Performed : Effective Isotropic Radiated Power (EIRP)
Mode : Transmit at 902.4MHz, 20mW
Test Distance : 3 meters

Freq. (MHz)	Ant Pol	Meter Reading (dBuV)	Matched Sig. Gen. Reading (dBm)	Equivalent Antenna Gain (dB)	Cable Loss (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
902.40	H	75.6	0.3	2.2	2.4	0.0	36.0	-36.0
902.40	V	90.1	15.6	2.2	2.4	15.3	36.0	-20.7

EIRP (dBm) =Meter Reading (dBuV) + Matched Sig. Gen. Reading (dBm) + Antenna Gain (dB) – Cable Loss (dB)

Manufacturer : Shure Incorporated
Model No. : ULXD2
Serial No. : None Assigned
Test Performed : Effective Isotropic Radiated Power (EIRP)
Date Tested : September 10 and 11, 2014
Mode : Transmit at 915MHz, 20mW
Test Distance : 3 meters

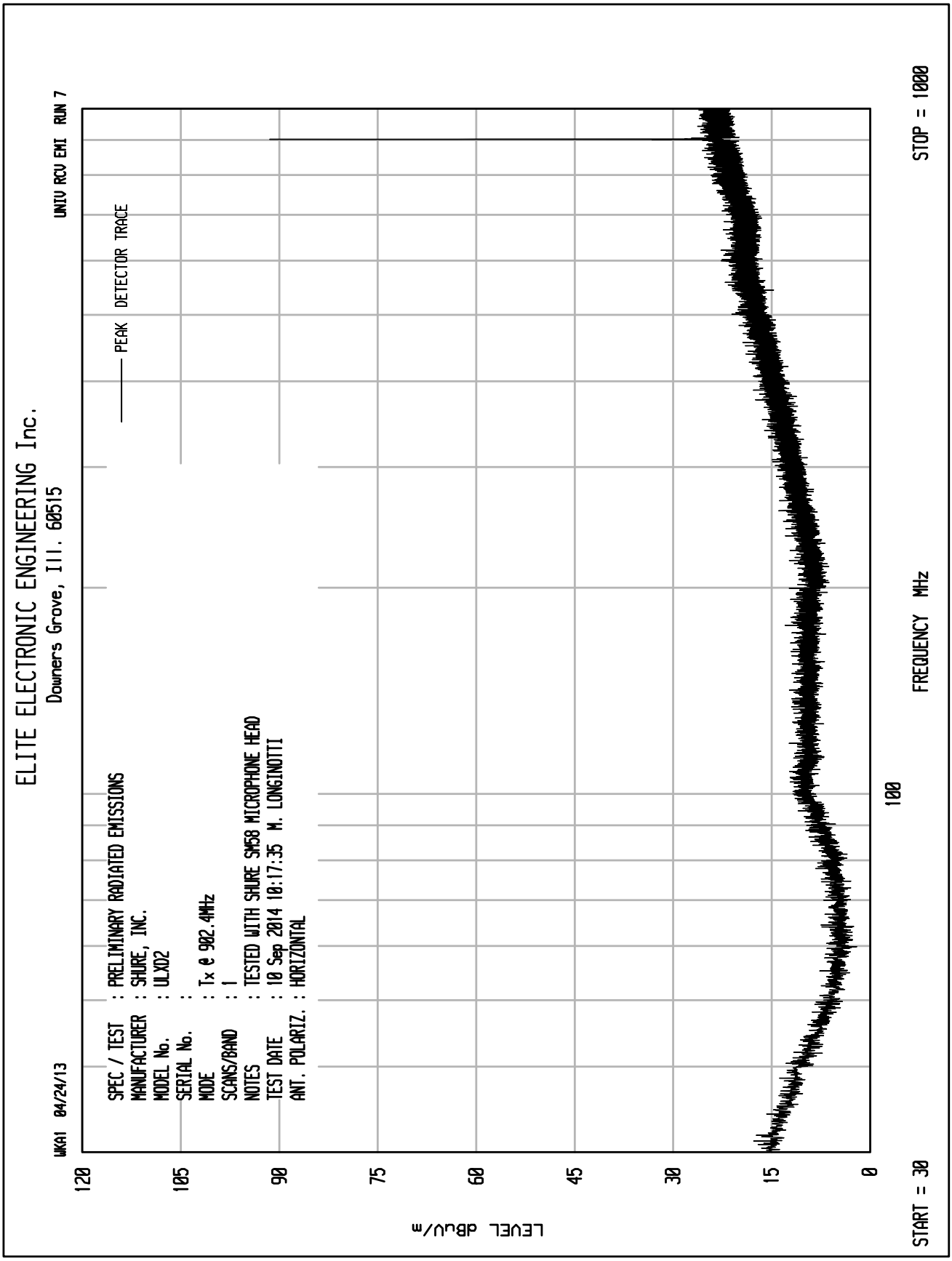
Freq. (MHz)	Ant Pol	Meter Reading (dBuV)	Matched Sig. Gen. Reading (dBm)	Equivalent Antenna Gain (dB)	Cable Loss (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
915.00	H	72.8	-2.8	2.2	2.5	-3.1	36.0	-39.1
915.00	V	90.7	17.0	2.2	2.5	16.7	36.0	-19.3

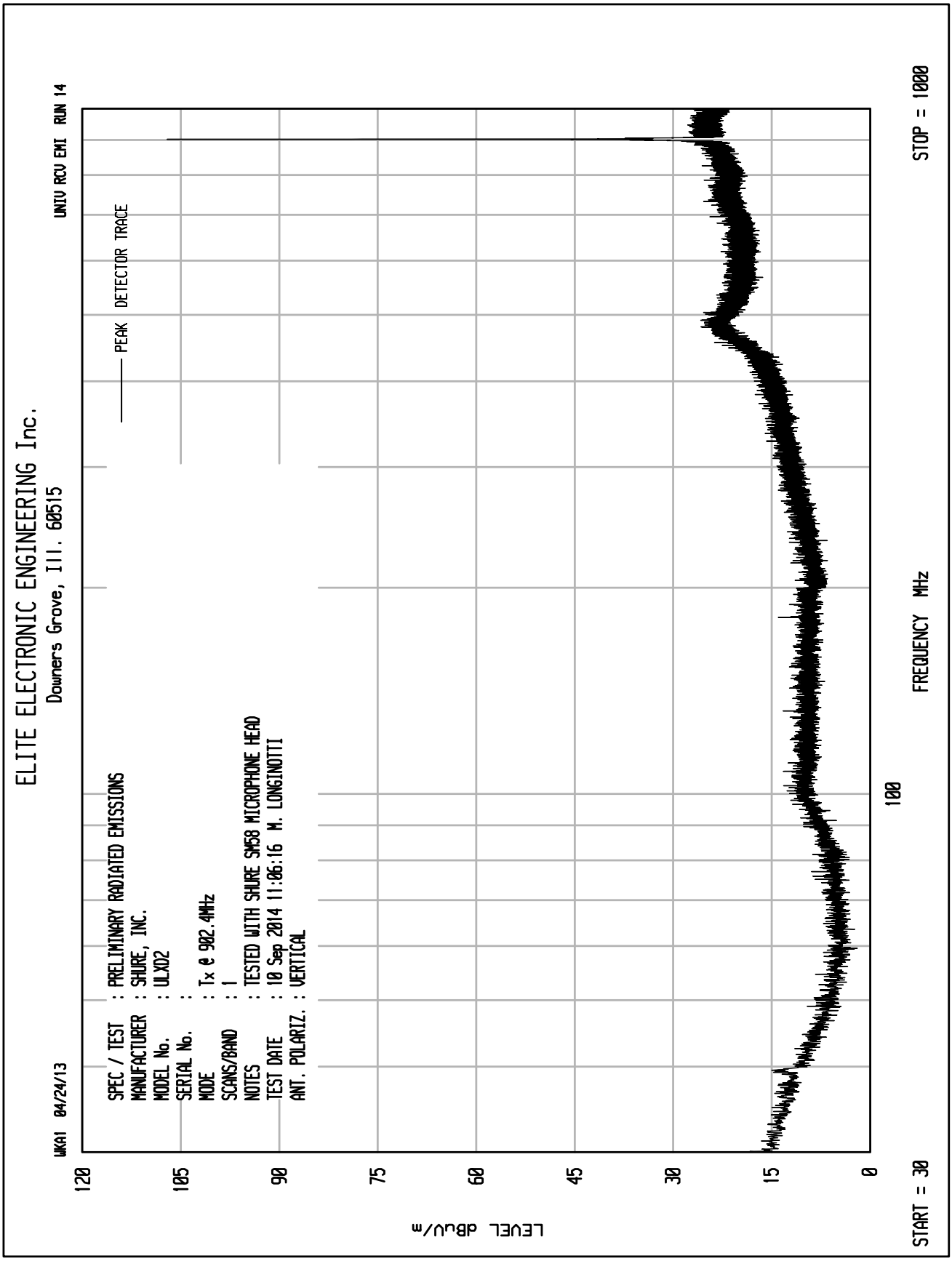
EIRP (dBm) =Meter Reading (dBuV) + Matched Sig. Gen. Reading (dBm) + Antenna Gain (dB) – Cable Loss (dB)

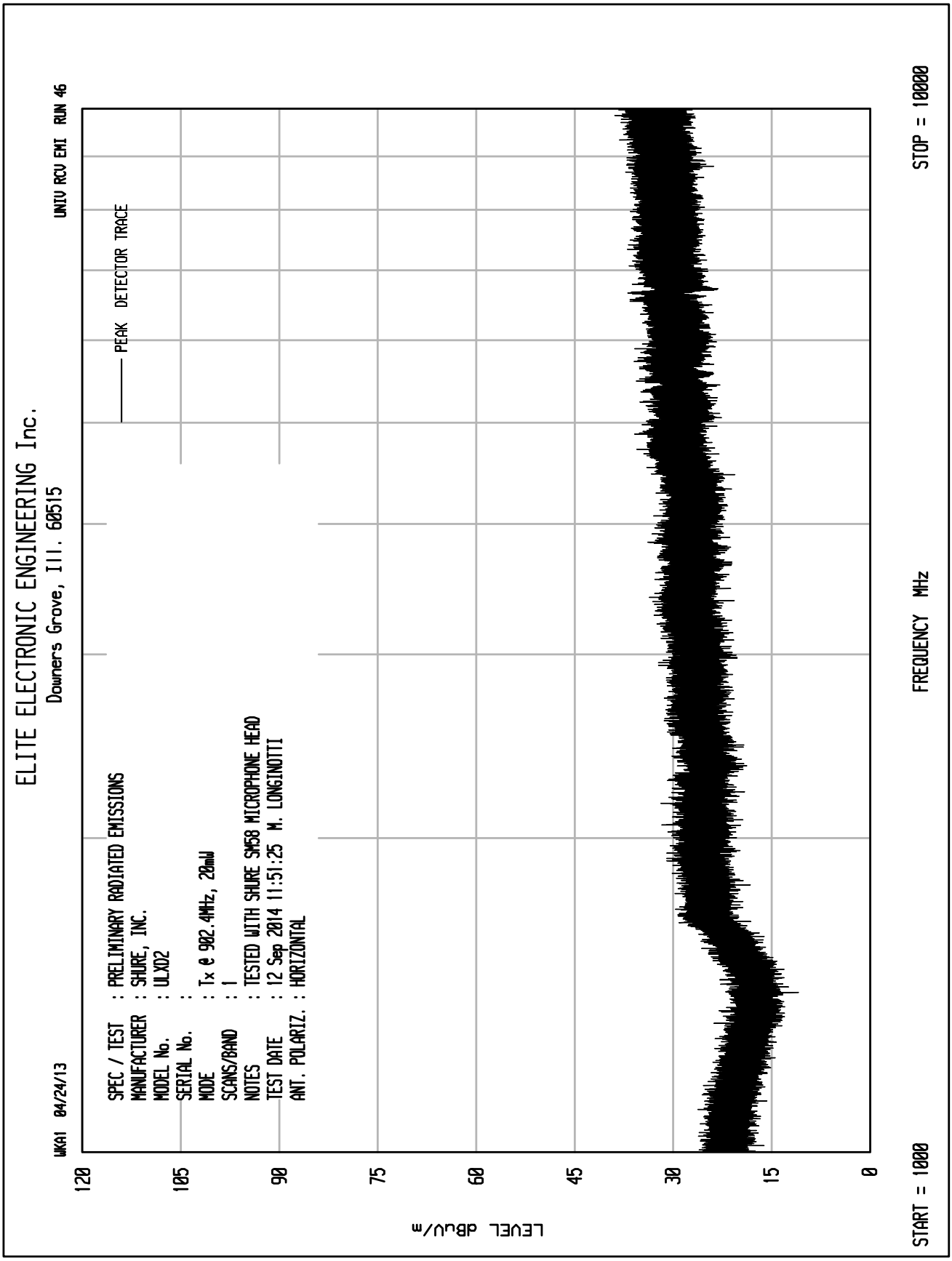
Manufacturer : Shure Incorporated
Model No. : ULXD2
Serial No. : None Assigned
Test Performed : Effective Isotropic Radiated Power (EIRP)
Date Tested : September 10 and 11, 2014
Mode : Transmit at 927.6MHz, 20mW
Test Distance : 3 meters

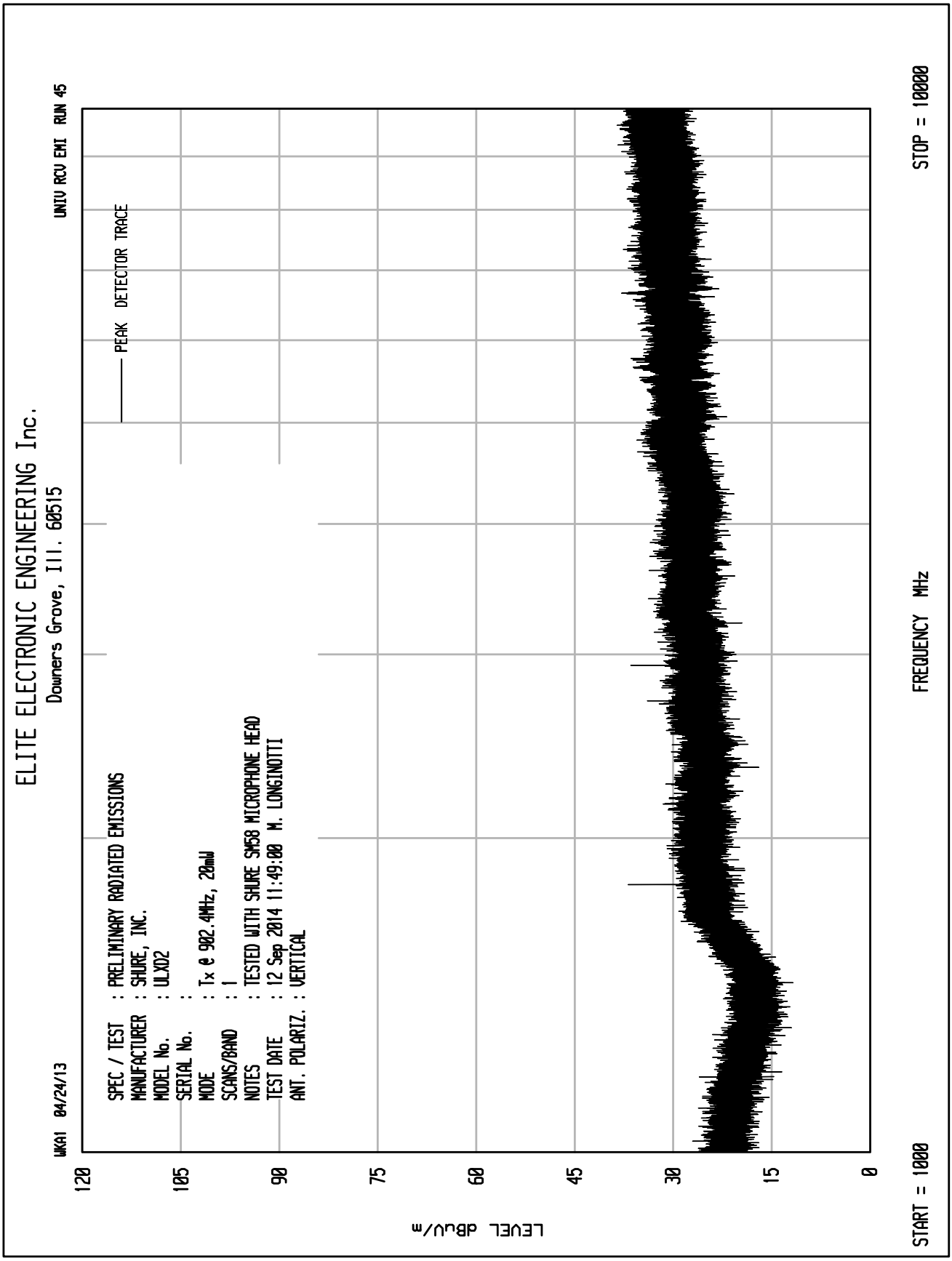
Freq. (MHz)	Ant Pol	Meter Reading (dBuV)	Matched Sig. Gen. Reading (dBm)	Equivalent Antenna Gain (dB)	Cable Loss (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
927.60	H	73.8	-1.8	2.2	2.5	-2.1	36.0	-38.1
927.60	V	91.5	17.3	2.2	2.5	17.0	36.0	-19.0

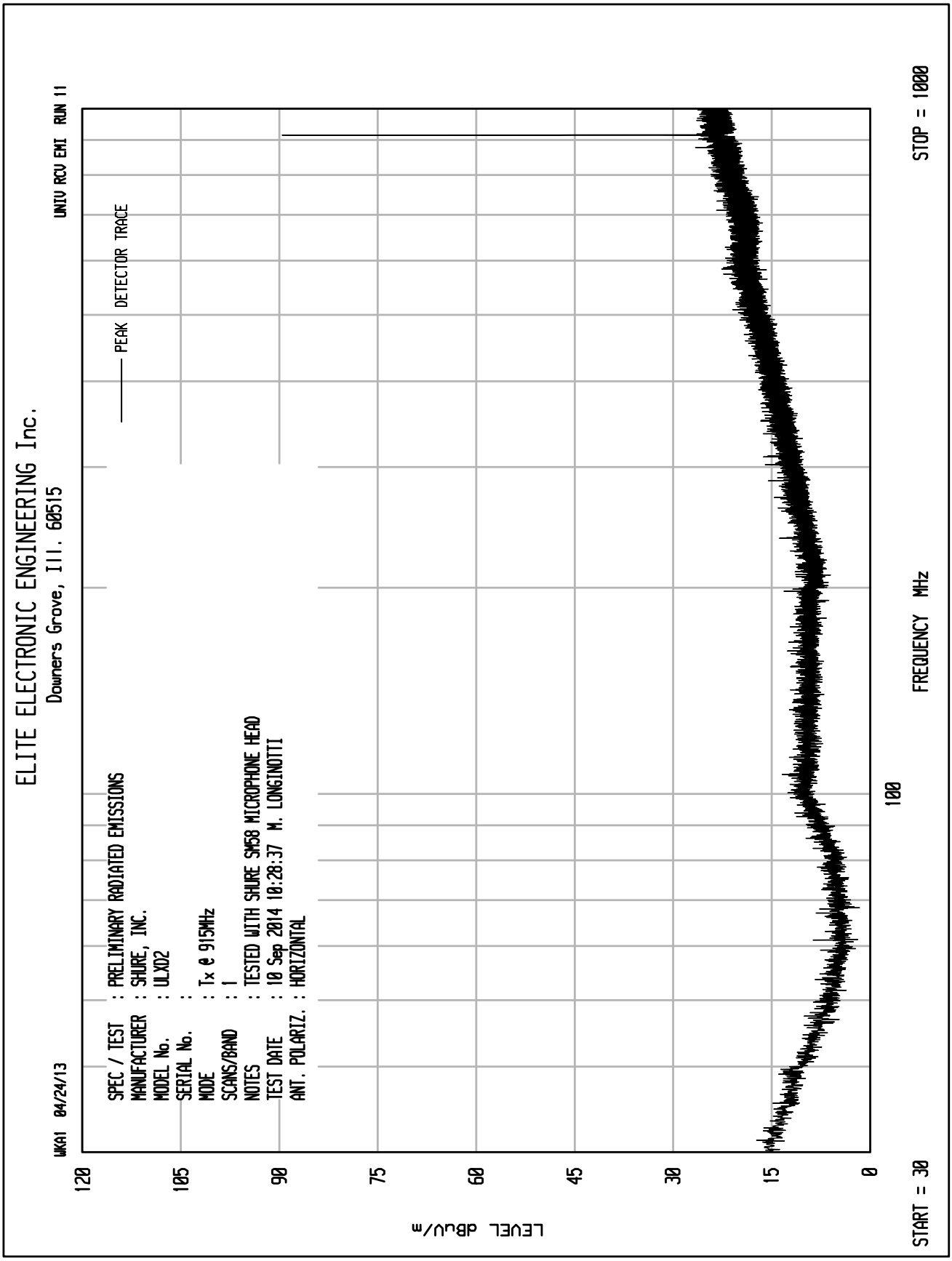
EIRP (dBm) =Meter Reading (dBuV) + Matched Sig. Gen. Reading (dBm) + Antenna Gain (dB) – Cable Loss (dB)

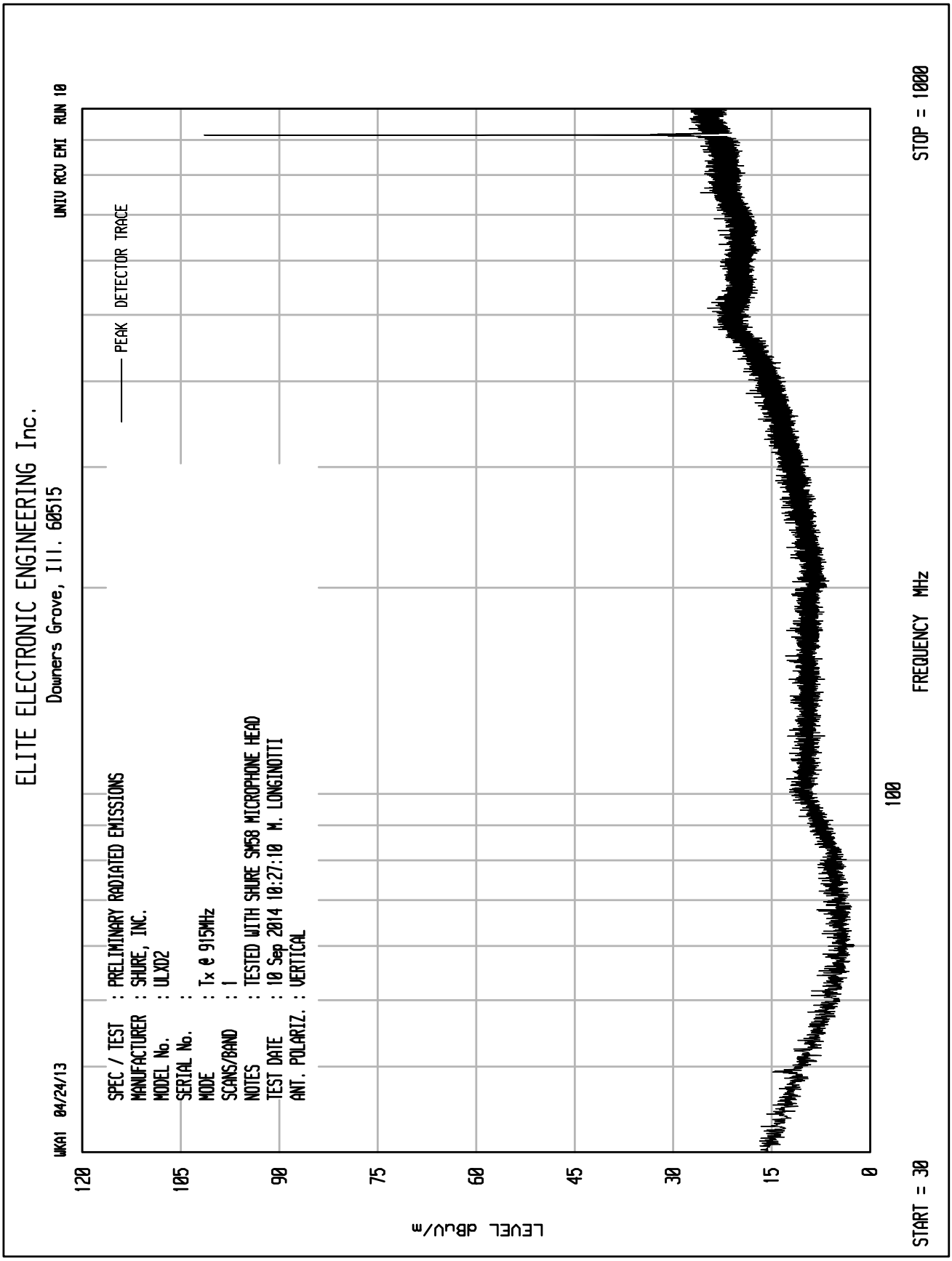

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 7
WKA1 04/24/13
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : SHURE, INC.
MODEL No. : ULX02
SERIAL No. :
MODE : Tx @ 902.4MHz
SCANS/BAND : 1
NOTES : TESTED WITH SHURE SM58 MICROPHONE HEAD
TEST DATE : 10 Sep 2014 10:17:35 M. LONGINOTTI
ANT. POLARIZ. : HORIZONTAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 30
100
FREQUENCY MHz
STOP = 1000

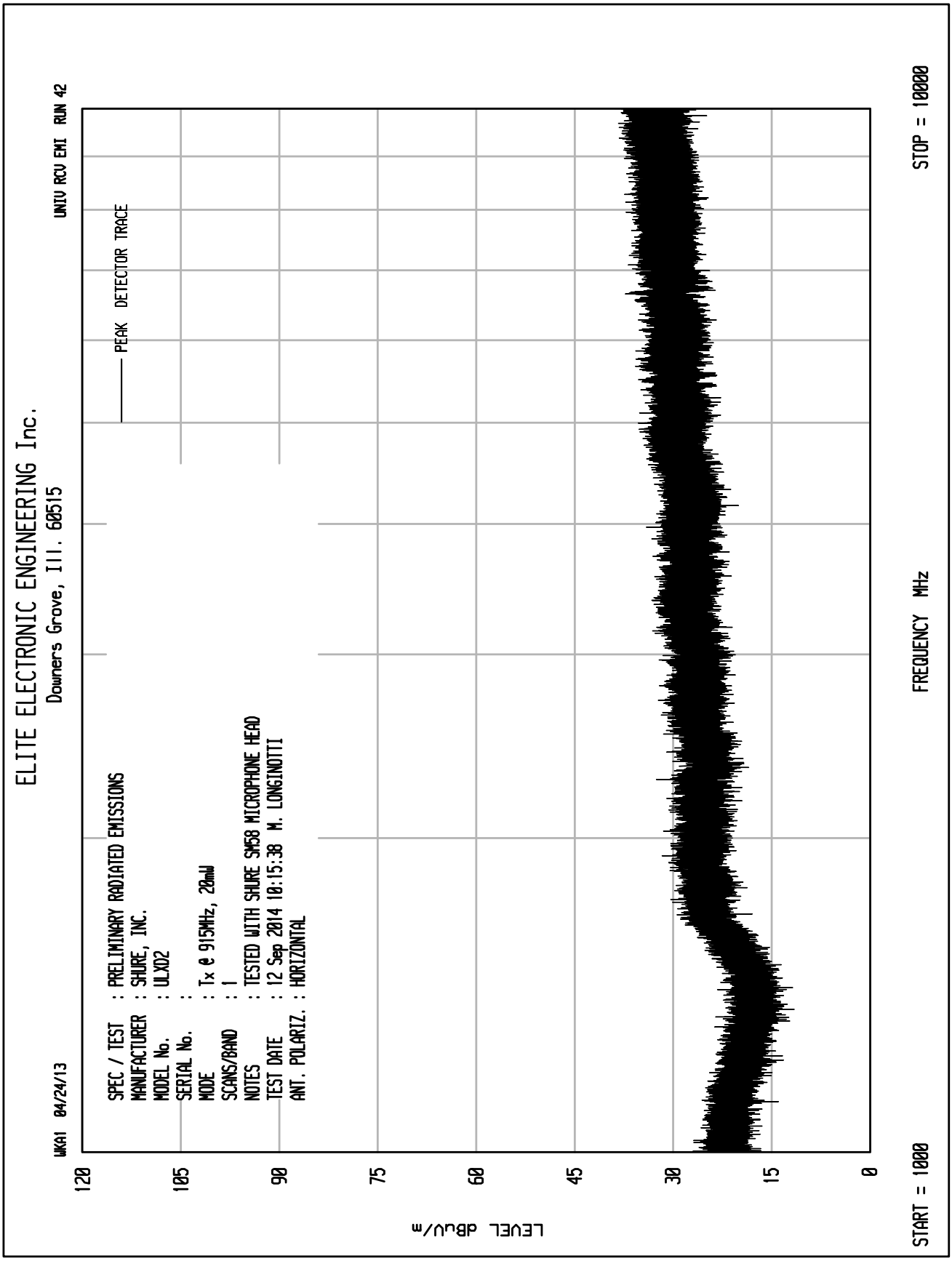

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 14
WKA1 04/24/13
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : SHURE, INC.
MODEL No. : ULX02
SERIAL No. :
MODE : Tx @ 902.4MHz
SCANS/BAND : 1
NOTES : TESTED WITH SHURE SM58 MICROPHONE HEAD
TEST DATE : 10 Sep 2014 11:06:16 M. LONGINOTTI
ANT. POLARIZ. : VERTICAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 30
100
FREQUENCY MHz
STOP = 1000

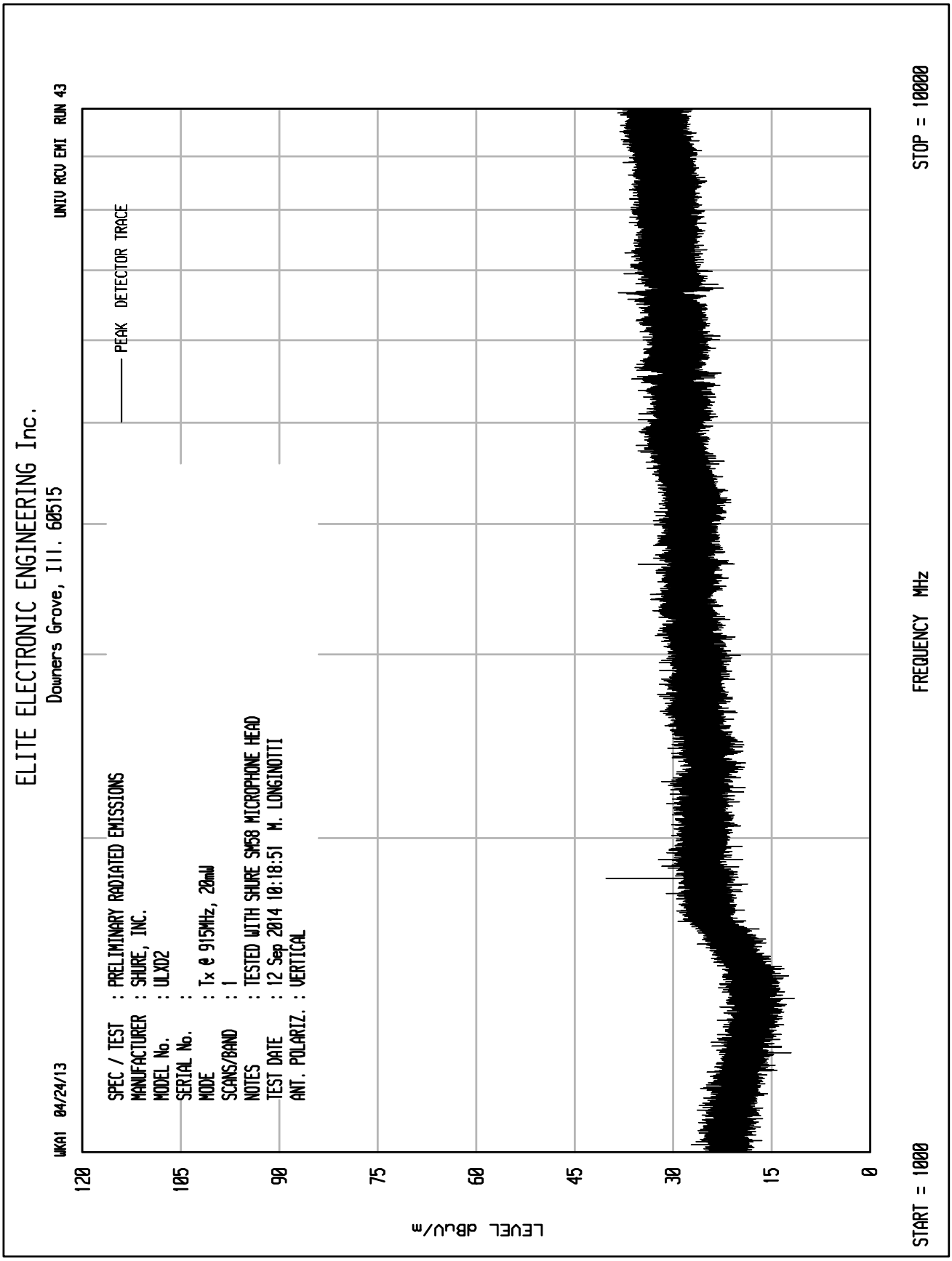

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 46
WKA1 04/24/13
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : SHURE, INC.
MODEL No. : ULX02
SERIAL No. : :
MODE : Tx @ 902.4MHz, 20mW
SCANS/BAND : 1
NOTES : TESTED WITH SHURE SM58 MICROPHONE HEAD
TEST DATE : 12 Sep 2014 11:51:25 M. LONGINOTTI
ANT. POLARIZ. : HORIZONTAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 1000
FREQUENCY MHz
STOP = 10000

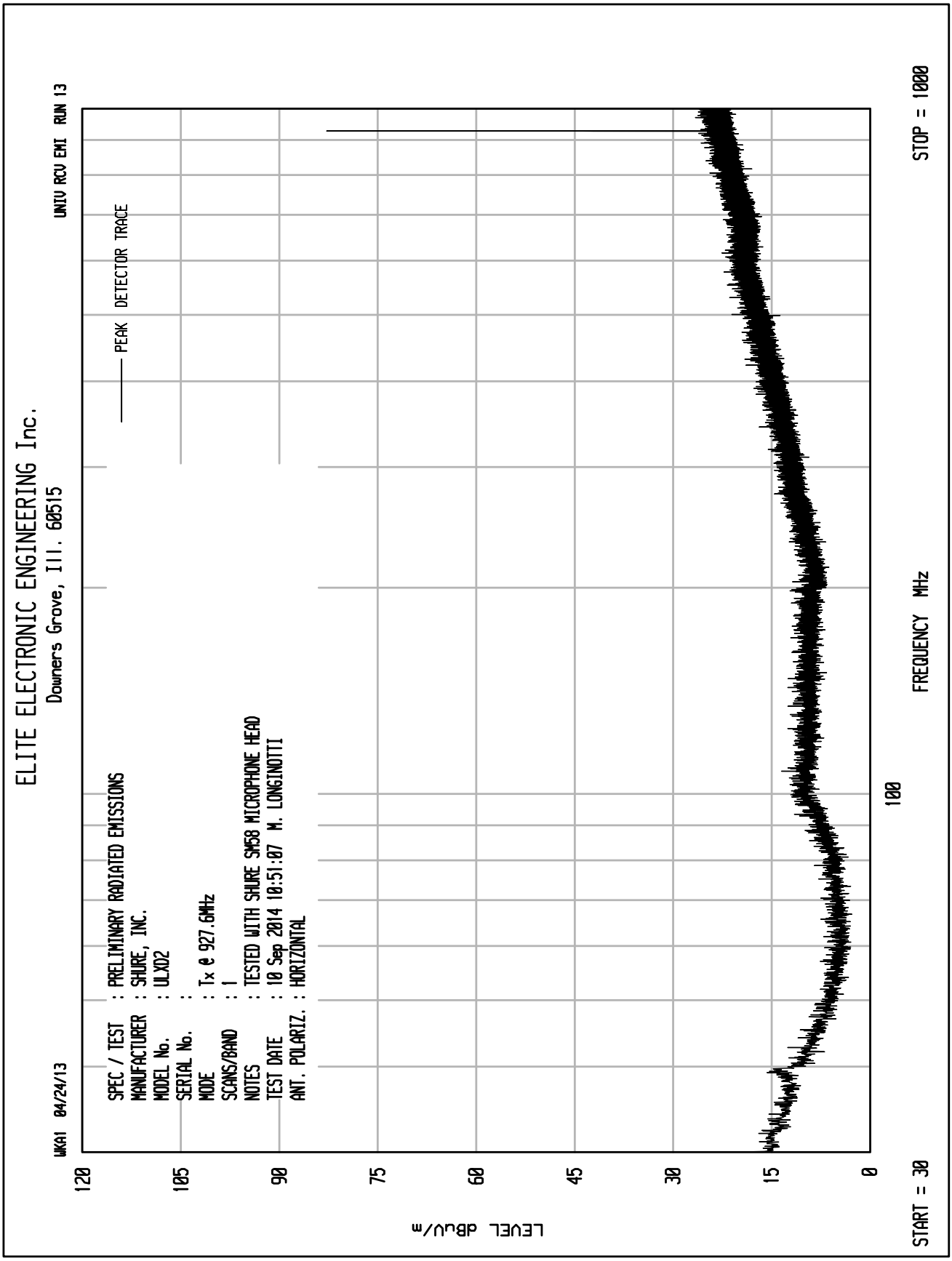

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 45
WKA1 04/24/13
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : SHURE, INC.
MODEL No. : ULX02
SERIAL No. : :
MODE : Tx @ 902.4MHz, 20mW
SCANS/BAND : 1
NOTES : TESTED WITH SHURE SM58 MICROPHONE HEAD
TEST DATE : 12 Sep 2014 11:49:00 M. LONGINOTTI
ANT. POLARIZ. : VERTICAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 1000
FREQUENCY MHz
STOP = 10000

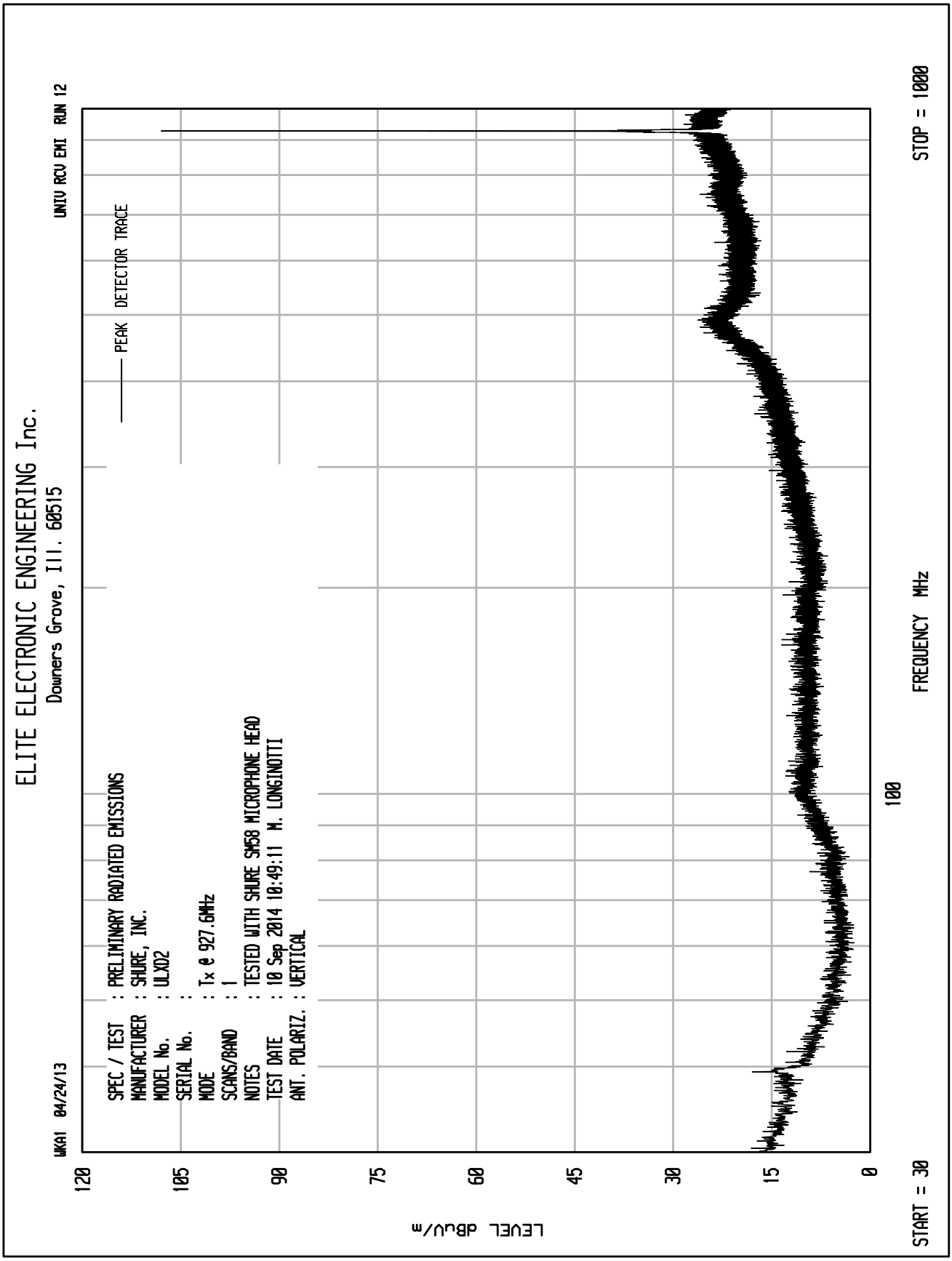

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 11
WKA1 04/24/13
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : SHURE, INC.
MODEL No. : ULX02
SERIAL No. :
MODE : Tx @ 915MHz
SCANS/BAND : 1
NOTES : TESTED WITH SHURE SM58 MICROPHONE HEAD
TEST DATE : 10 Sep 2014 10:28:37 M. LONGINOTTI
ANT. POLARIZ. : HORIZONTAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 30
100
FREQUENCY MHz
STOP = 1000

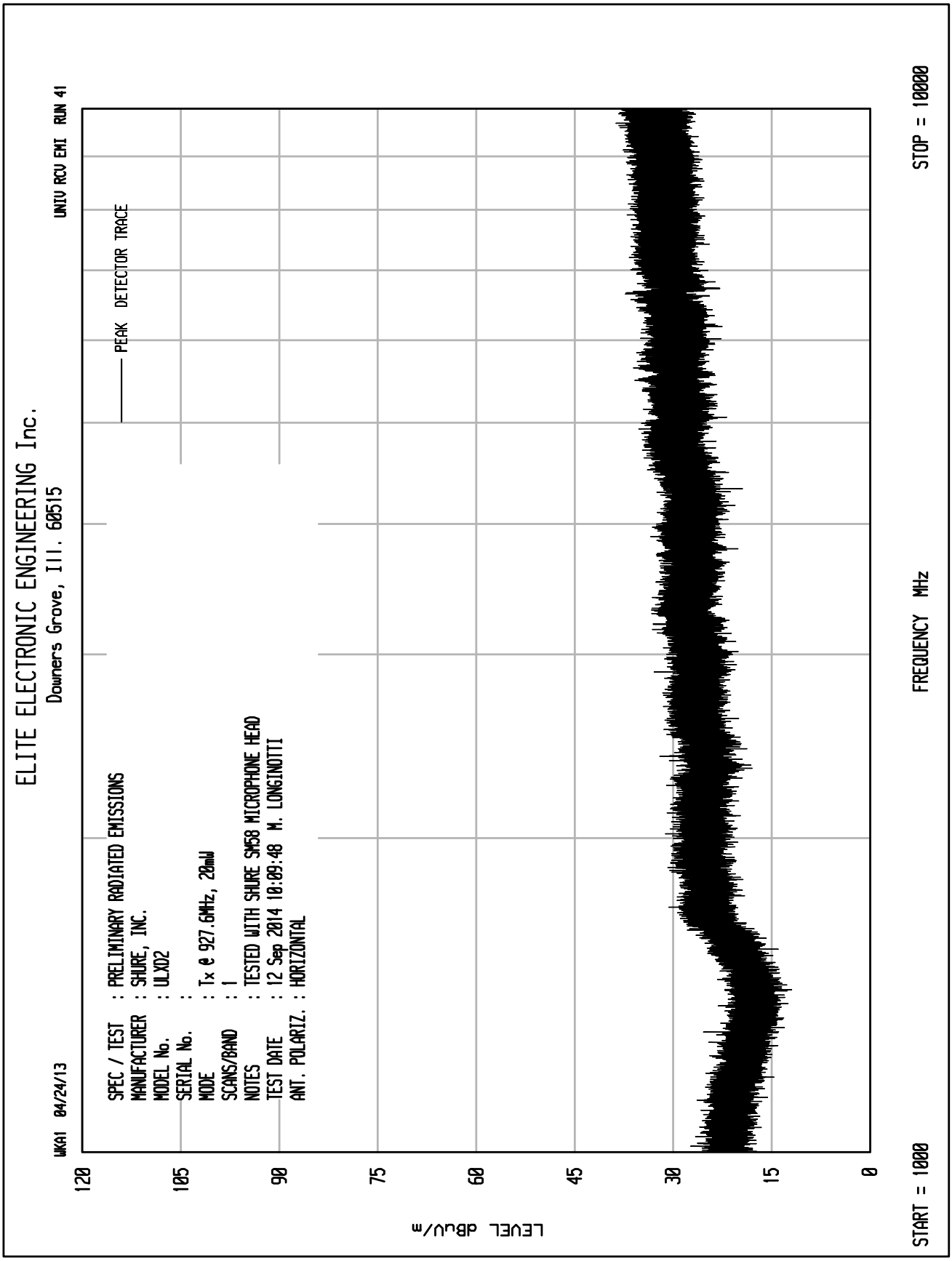

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 10
WKA1 04/24/13
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : SHURE, INC.
MODEL No. : ULX02
SERIAL No. :
MODE : Tx @ 915MHz
SCANS/BAND : 1
NOTES : TESTED WITH SHURE SM58 MICROPHONE HEAD
TEST DATE : 10 Sep 2014 10:27:10 M. LONGINOTTI
ANT. POLARIZ. : VERTICAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 30
100
FREQUENCY MHz
STOP = 1000

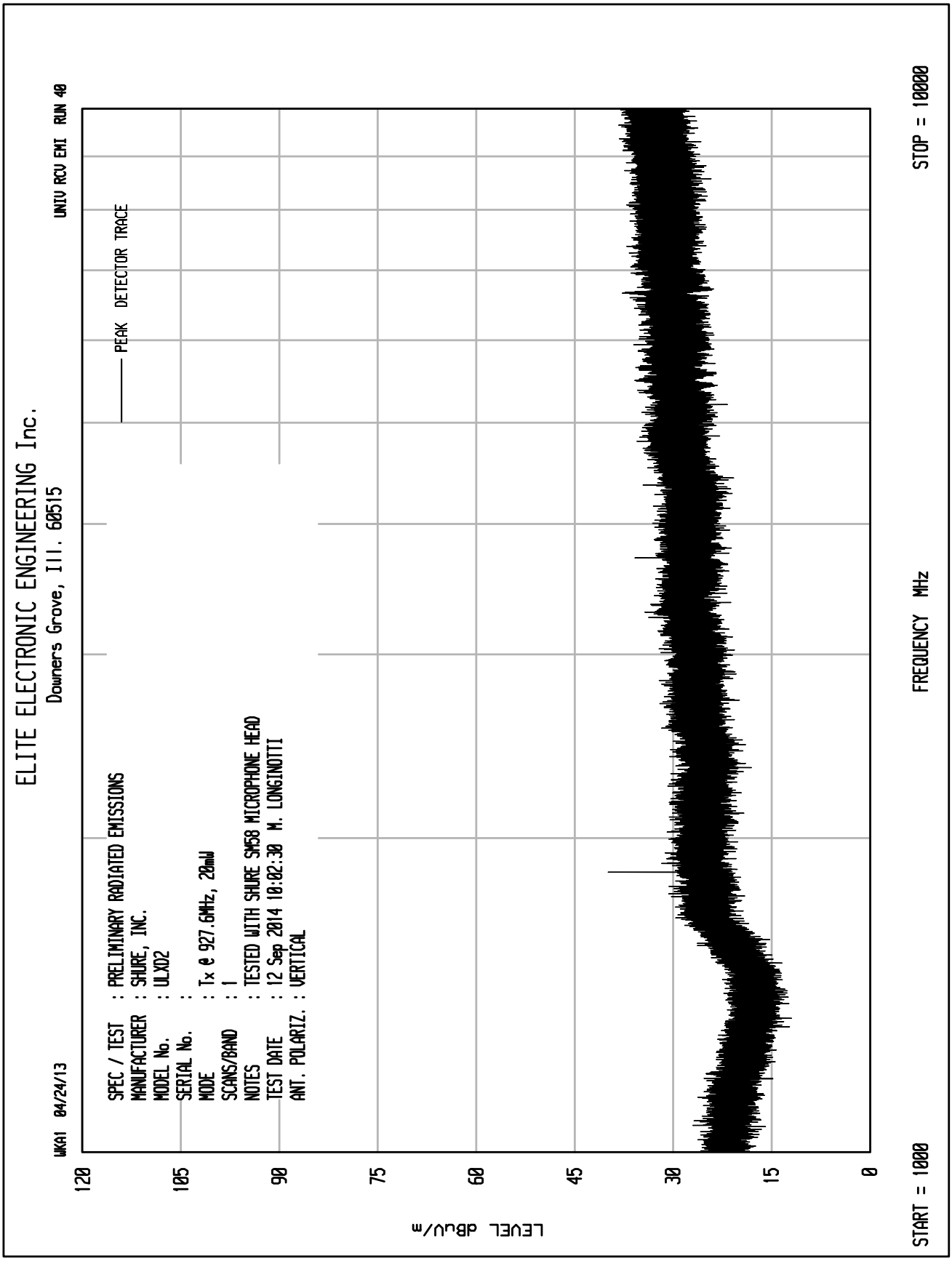

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 42
WKA1 04/24/13
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : SHURE, INC.
MODEL No. : ULX02
SERIAL No. :
MODE : Tx @ 915MHz, 20mW
SCANS/BAND : 1
NOTES : TESTED WITH SHURE SM58 MICROPHONE HEAD
TEST DATE : 12 Sep 2014 10:15:38 M. LONGINOTTI
ANT. POLARIZ. : HORIZONTAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 1000
FREQUENCY MHz
STOP = 10000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 43
WKA1 04/24/13
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : SHURE, INC.
MODEL No. : ULX02
SERIAL No. :
MODE : Tx @ 915MHz, 20mW
SCANS/BAND : 1
NOTES : TESTED WITH SHURE SM58 MICROPHONE HEAD
TEST DATE : 12 Sep 2014 10:18:51 M. LONGINOTTI
ANT. POLARIZ. : VERTICAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 1000
FREQUENCY MHz
STOP = 10000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 13
WKA1 04/24/13
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : SHURE, INC.
MODEL No. : ULX02
SERIAL No. :
MODE : Tx @ 927.6MHz
SCANS/BAND : 1
NOTES : TESTED WITH SHURE SM58 MICROPHONE HEAD
TEST DATE : 10 Sep 2014 10:51:07 M. LONGINOTTI
ANT. POLARIZ. : HORIZONTAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 30
100
FREQUENCY MHz
STOP = 1000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 12
WKA1 04/24/13
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : SHURE, INC.
MODEL No. : ULX02
SERIAL No. : :
MODE : Tx @ 927.6MHz
SCANS/BAND : 1
NOTES : TESTED WITH SHURE SM58 MICROPHONE HEAD
TEST DATE : 10 Sep 2014 10:49:11 M. LONGINOTTI
ANT. POLARIZ. : VERTICAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 30
100
FREQUENCY MHz
STOP = 1000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 41
WKA1 04/24/13
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : SHURE, INC.
MODEL No. : ULX02
SERIAL No. : :
MODE : Tx @ 927.6MHz, 20mW
SCANS/BAND : 1
NOTES : TESTED WITH SHURE SM58 MICROPHONE HEAD
TEST DATE : 12 Sep 2014 10:09:48 M. LONGINOTTI
ANT. POLARIZ. : HORIZONTAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 1000
FREQUENCY MHz
STOP = 10000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 40
WKA1 04/24/13
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : SHURE, INC.
MODEL No. : ULX02
SERIAL No. :
MODE : Tx @ 927.6MHz, 20mW
SCANS/BAND : 1
NOTES : TESTED WITH SHURE SM58 MICROPHONE HEAD
TEST DATE : 12 Sep 2014 10:02:30 M. LONGINOTTI
ANT. POLARIZ. : VERTICAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 1000
FREQUENCY MHz
STOP = 10000

Manufacturer : Shure Incorporated
Model No. : ULXD2
Serial No. : None Assigned
Date Tested : September 10 through 12, 2014
Test Performed : Radiated Spurious Emissions NOT in Restricted Bands
Mode : Transmit at 902.4MHz, 20mW
Test Distance : 3 meters
Notes : Peak Readings with a 100kHz RBW

Freq. MHz	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Peak Total dBuV/m at 3m	Peak Total uV/m at 3 m	Peak Limit uV/m at 3 m	Margin (dB)
902.40	H	68.8		1.5	20.5	0.0	90.9	35066.4		
902.40	V	85.2		1.5	20.5	0.0	107.3	231681.3		
1804.80	H	41.6	Ambient	2.2	30.7	-39.8	34.8	54.7	23168.1	-52.5
1804.80	V	47.8		2.2	30.7	-39.8	41.0	111.6	23168.1	-46.3
6316.80	H	37.5	Ambient	4.3	35.8	-39.0	38.5	84.3	23168.1	-48.8
6316.80	V	38.0	Ambient	4.3	35.8	-39.0	39.0	89.3	23168.1	-48.3
7219.20	H	39.8	Ambient	4.6	35.6	-39.0	41.0	112.8	23168.1	-46.3
7219.20	V	38.5	Ambient	4.6	35.6	-39.0	39.7	97.1	23168.1	-47.6

Peak Total (dBuV/m) = Meter Reading (dBuV) + CBL Fac (dB) + Ant Fac (dB) + Pre Amp (dB)

Peak Total (uV/m = 10^(Peak Total (dBuV/m)/20)

Manufacturer : Shure Incorporated
Model No. : ULXD2
Serial No. : None Assigned
Date Tested : September 10 through 12, 2014
Test Performed : Radiated Spurious Emissions in Restricted Bands
Mode : Transmit at 902.4MHz, 20mW
Test Distance : 3 meters
Notes : Peak Readings with a 1MHz RBW

Freq. MHz	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Peak Total dBuV/m at 3m	Peak Total uV/m at 3 m	Peak Limit uV/m at 3 m	Margin (dB)
2707.20	H	50.0	Ambient	2.8	32.7	-39.5	46.0	198.9	5000.0	-28.0
2707.20	V	50.7	Ambient	2.8	32.7	-39.5	46.7	215.6	5000.0	-27.3
3609.60	H	48.5	Ambient	3.2	33.4	-38.9	46.3	207.2	5000.0	-27.7
3609.60	V	49.6	Ambient	3.2	33.4	-38.9	47.4	235.2	5000.0	-26.6
4512.00	H	48.1	Ambient	3.6	34.5	-38.9	47.3	232.2	5000.0	-26.7
4512.00	V	48.8	Ambient	3.6	34.5	-38.9	48.0	251.6	5000.0	-26.0
5414.40	H	46.8	Ambient	3.9	34.9	-39.0	46.6	213.9	5000.0	-27.4
5414.40	V	47.5	Ambient	3.9	34.9	-39.0	47.3	231.8	5000.0	-26.7
8121.60	H	47.4	Ambient	4.9	35.9	-39.0	49.3	290.2	5000.0	-24.7
8121.60	V	48.7	Ambient	4.9	35.9	-39.0	50.6	337.0	5000.0	-23.4
9024.00	H	48.6	Ambient	4.9	36.2	-38.9	50.8	348.3	5000.0	-23.1
9024.00	V	47.8	Ambient	4.9	36.2	-38.9	50.0	317.7	5000.0	-23.9

Peak Total (dBuV/m) = Meter Reading (dBuV) + CBL Fac (dB) + Ant Fac (dB) + Pre Amp (dB)

Peak Total (uV/m) = 10^(Peak Total (dBuV/m)/20)

Manufacturer : Shure Incorporated
Model No. : ULXD2
Serial No. : None Assigned
Date Tested : September 10 through 12, 2014
Test Performed : Radiated Spurious Emissions in Restricted Bands
Mode : Transmit at 902.4MHz, 20mW
Test Distance : 3 meters
Notes : Average Readings with a 1MHz RBW, 10Hz VBW

Freq. MHz	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Average Total dBuV/m at 3m	Average Total uV/m at 3 m	Average Limit uV/m at 3 m	Margin (dB)
2707.20	H	37.50	Ambient	2.8	32.7	-39.5	33.5	47.2	500.0	-20.5
2707.20	V	39.8	Ambient	2.8	32.7	-39.5	35.8	61.5	500.0	-18.2
3609.60	H	37.0	Ambient	3.2	33.4	-38.9	34.8	55.1	500.0	-19.2
3609.60	V	39.4	Ambient	3.2	33.4	-38.9	37.2	72.7	500.0	-16.8
4512.00	H	35.9	Ambient	3.6	34.5	-38.9	35.1	57.0	500.0	-18.9
4512.00	V	35.9	Ambient	3.6	34.5	-38.9	35.1	57.0	500.0	-18.9
5414.40	H	34.1	Ambient	3.9	34.9	-39.0	33.9	49.6	500.0	-20.1
5414.40	V	34.1	Ambient	3.9	34.9	-39.0	33.9	49.6	500.0	-20.1
8121.60	H	35.6	Ambient	4.9	35.9	-39.0	37.5	74.6	500.0	-16.5
8121.60	V	35.5	Ambient	4.9	35.9	-39.0	37.4	73.7	500.0	-16.6
9024.00	H	35.2	Ambient	4.9	36.2	-38.9	37.4	74.5	500.0	-16.5
9024.00	V	35.2	Ambient	4.9	36.2	-38.9	37.4	74.5	500.0	-16.5

Average Total (dBuV/m) = Meter Reading (dBuV) + CBL Fac (dB) + Ant Fac (dB) + Pre Amp (dB)

Average Total (uV/m) = 10^(Average Total (dBuV/m)/20)

Manufacturer : Shure Incorporated
Model No. : ULXD2
Serial No. : None Assigned
Date Tested : September 10 through 12, 2014
Test Performed : Radiated Spurious Emissions NOT in Restricted Bands
Mode : Transmit at 915MHz, 20mW
Test Distance : 3 meters
Notes : Peak Readings with a 100kHz RBW

Freq. MHz	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Peak Total dBuV/m at 3m	Peak Total uV/m at 3 m	Peak Limit uV/m at 3 m	Margin (dB)
915.00	H	69.1		1.6	20.6	0.0	91.3	36562.1		
915.00	V	85.3		1.6	20.6	0.0	107.5	236064.5		
1830.00	H	41.7	Ambient	2.2	30.8	-39.7	35.0	56.1	23606.5	-52.5
1830.00	V	51.5		2.2	30.8	-39.7	44.8	173.3	23606.5	-42.7
5490.00	H	40.5	Ambient	3.9	34.9	-39.0	40.3	103.0	23606.5	-47.2
5490.00	V	39.1	Ambient	3.9	34.9	-39.0	38.9	87.7	23606.5	-48.6
6405.00	H	37.3	Ambient	4.3	35.9	-39.0	38.5	84.5	23606.5	-48.9
6405.00	V	37.0	Ambient	4.3	35.9	-39.0	38.2	81.6	23606.5	-49.2

Peak Total (dBuV/m) = Meter Reading (dBuV) + CBL Fac (dB) + Ant Fac (dB) + Pre Amp (dB)

Peak Total (uV/m = 10^(Peak Total (dBuV/m)/20)

Manufacturer : Shure Incorporated
Model No. : ULXD2
Serial No. : None Assigned
Date Tested : September 10 through 12, 2014
Test Performed : Radiated Spurious Emissions in Restricted Bands
Mode : Transmit at 915MHz, 20mW
Test Distance : 3 meters
Notes : Peak Readings with a 1MHz RBW

Freq. MHz	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Peak Total dBuV/m at 3m	Peak Total uV/m at 3 m	Peak Limit uV/m at 3 m	Margin (dB)
2745.00	H	49.5	Ambient	2.8	32.8	-39.5	45.6	190.3	5000.0	-28.4
2745.00	V	50.4	Ambient	2.8	32.8	-39.5	46.5	211.1	5000.0	-27.5
3660.00	H	48.1	Ambient	3.3	33.5	-38.9	46.0	199.6	5000.0	-28.0
3660.00	V	48.9	Ambient	3.3	33.5	-38.9	46.8	218.8	5000.0	-27.2
4575.00	H	48.7	Ambient	3.6	34.5	-38.9	47.9	249.0	5000.0	-26.1
4575.00	V	49.0	Ambient	3.6	34.5	-38.9	48.2	257.8	5000.0	-25.8
7320.00	H	50.0	Ambient	4.7	35.6	-39.0	51.3	368.1	5000.0	-22.7
7320.00	V	48.4	Ambient	4.7	35.6	-39.0	49.7	306.2	5000.0	-24.3
8235.00	H	48.3	Ambient	4.9	35.9	-39.0	50.2	324.1	5000.0	-23.8
8235.00	V	48.6	Ambient	4.9	35.9	-39.0	50.5	335.5	5000.0	-23.5
9150.00	H	48.1	Ambient	5.0	36.2	-38.9	50.4	331.2	5000.0	-23.6
9150.00	V	48.1	Ambient	5.0	36.2	-38.9	50.4	331.2	5000.0	-23.6

Peak Total (dBuV/m) = Meter Reading (dBuV) + CBL Fac (dB) + Ant Fac (dB) + Pre Amp (dB)

Peak Total (uV/m) = 10^(Peak Total (dBuV/m)/20)

Manufacturer : Shure Incorporated
Model No. : ULXD2
Serial No. : None Assigned
Date Tested : September 10 through 12, 2014
Test Performed : Radiated Spurious Emissions in Restricted Bands
Mode : Transmit at 915MHz, 20mW
Test Distance : 3 meters
Notes : Average Readings with a 1MHz RBW, 10Hz VBW

Freq. MHz	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Average Total dBuV/m at 3m	Average Total uV/m at 3 m	Average Limit uV/m at 3 m	Margin (dB)
2745.00	H	37.00	Ambient	2.8	32.8	-39.5	33.1	45.1	500.0	-20.9
2745.00	V	40.2	Ambient	2.8	32.8	-39.5	36.3	65.2	500.0	-17.7
3660.00	H	35.5	Ambient	3.3	33.5	-38.9	33.4	46.8	500.0	-20.6
3660.00	V	38.0	Ambient	3.3	33.5	-38.9	35.9	62.4	500.0	-18.1
4575.00	H	36.0	Ambient	3.6	34.5	-38.9	35.2	57.7	500.0	-18.8
4575.00	V	36.0	Ambient	3.6	34.5	-38.9	35.2	57.7	500.0	-18.8
7320.00	H	36.0	Ambient	4.7	35.6	-39.0	37.3	73.5	500.0	-16.7
7320.00	V	36.1	Ambient	4.7	35.6	-39.0	37.4	74.3	500.0	-16.6
8235.00	H	35.3	Ambient	4.9	35.9	-39.0	37.2	72.6	500.0	-16.8
8235.00	V	35.3	Ambient	4.9	35.9	-39.0	37.2	72.6	500.0	-16.8
9150.00	H	35.4	Ambient	5.0	36.2	-38.9	37.7	76.8	500.0	-16.3
9150.00	V	34.4	Ambient	5.0	36.2	-38.9	36.7	68.4	500.0	-17.3

Average Total (dBuV/m) = Meter Reading (dBuV) + CBL Fac (dB) + Ant Fac (dB) + Pre Amp (dB)

Average Total (uV/m) = 10^(Average Total (dBuV/m)/20)

Manufacturer : Shure Incorporated
Model No. : ULXD2
Serial No. : None Assigned
Date Tested : September 10 through 12, 2014
Test Performed : Radiated Spurious Emissions NOT in Restricted Bands
Mode : Transmit at 927.6MHz, 20mW
Test Distance : 3 meters
Notes : Peak Readings with a 100kHz RBW

Freq. MHz	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Peak Total dBuV/m at 3m	Peak Total uV/m at 3 m	Peak Limit uV/m at 3 m	Margin (dB)
927.60	H	68.2		1.6	19.8	0.0	89.6	30266.6		
927.60	V	85.8		1.6	19.8	0.0	107.2	229595.3		
1855.20	H	41.7	Ambient	2.3	30.9	-39.7	35.1	56.8	22959.5	-52.1
1855.20	V	52.7		2.3	30.9	-39.7	46.1	201.7	22959.5	-41.1
5565.60	H	37.4	Ambient	4.0	34.8	-39.0	37.2	72.1	22959.5	-50.1
5565.60	V	38.0	Ambient	4.0	34.8	-39.0	37.8	77.3	22959.5	-49.5
6493.20	H	37.5	Ambient	4.4	36.0	-39.0	38.8	87.5	22959.5	-48.4
6493.20	V	38.2	Ambient	4.4	36.0	-39.0	39.5	94.8	22959.5	-47.7
9276.00	H	38.9	Ambient	5.0	36.1	-38.9	41.2	115.3	22959.5	-46.0
9276.00	V	38.8	Ambient	5.0	36.1	-38.9	41.1	114.0	22959.5	-46.1

Peak Total (dBuV/m) = Meter Reading (dBuV) + CBL Fac (dB) + Ant Fac (dB) + Pre Amp (dB)

Peak Total (uV/m = 10^(Peak Total (dBuV/m)/20)

Manufacturer : Shure Incorporated
Model No. : ULXD2
Serial No. : None Assigned
Date Tested : September 10 through 12, 2014
Test Performed : Radiated Spurious Emissions in Restricted Bands
Mode : Transmit at 927.6MHz, 20mW
Test Distance : 3 meters
Notes : Peak Readings with a 1MHz RBW

Freq. MHz	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Peak Total dBuV/m at 3m	Peak Total uV/m at 3 m	Peak Limit uV/m at 3 m	Margin (dB)
2782.80	H	49.7	Ambient	2.8	32.8	-39.5	45.9	197.4	5000.0	-28.1
2782.80	V	51.2	Ambient	2.8	32.8	-39.5	47.4	234.6	5000.0	-26.6
3710.40	H	49.9	Ambient	3.3	33.5	-38.9	47.9	246.9	5000.0	-26.1
3710.40	V	52.8	Ambient	3.3	33.5	-38.9	50.8	344.8	5000.0	-23.2
4638.00	H	49.4	Ambient	3.6	34.6	-38.9	48.7	272.6	5000.0	-25.3
4638.00	V	48.9	Ambient	3.6	34.6	-38.9	48.2	257.3	5000.0	-25.8
7420.80	H	47.8	Ambient	4.7	35.7	-39.0	49.2	287.6	5000.0	-24.8
7420.80	V	47.8	Ambient	4.7	35.7	-39.0	49.2	287.6	5000.0	-24.8
8348.40	H	47.8	Ambient	4.9	35.9	-39.0	49.7	304.3	5000.0	-24.3
8348.40	V	48.2	Ambient	4.9	35.9	-39.0	50.1	318.7	5000.0	-23.9

Peak Total (dBuV/m) = Meter Reading (dBuV) + CBL Fac (dB) + Ant Fac (dB) + Pre Amp (dB)

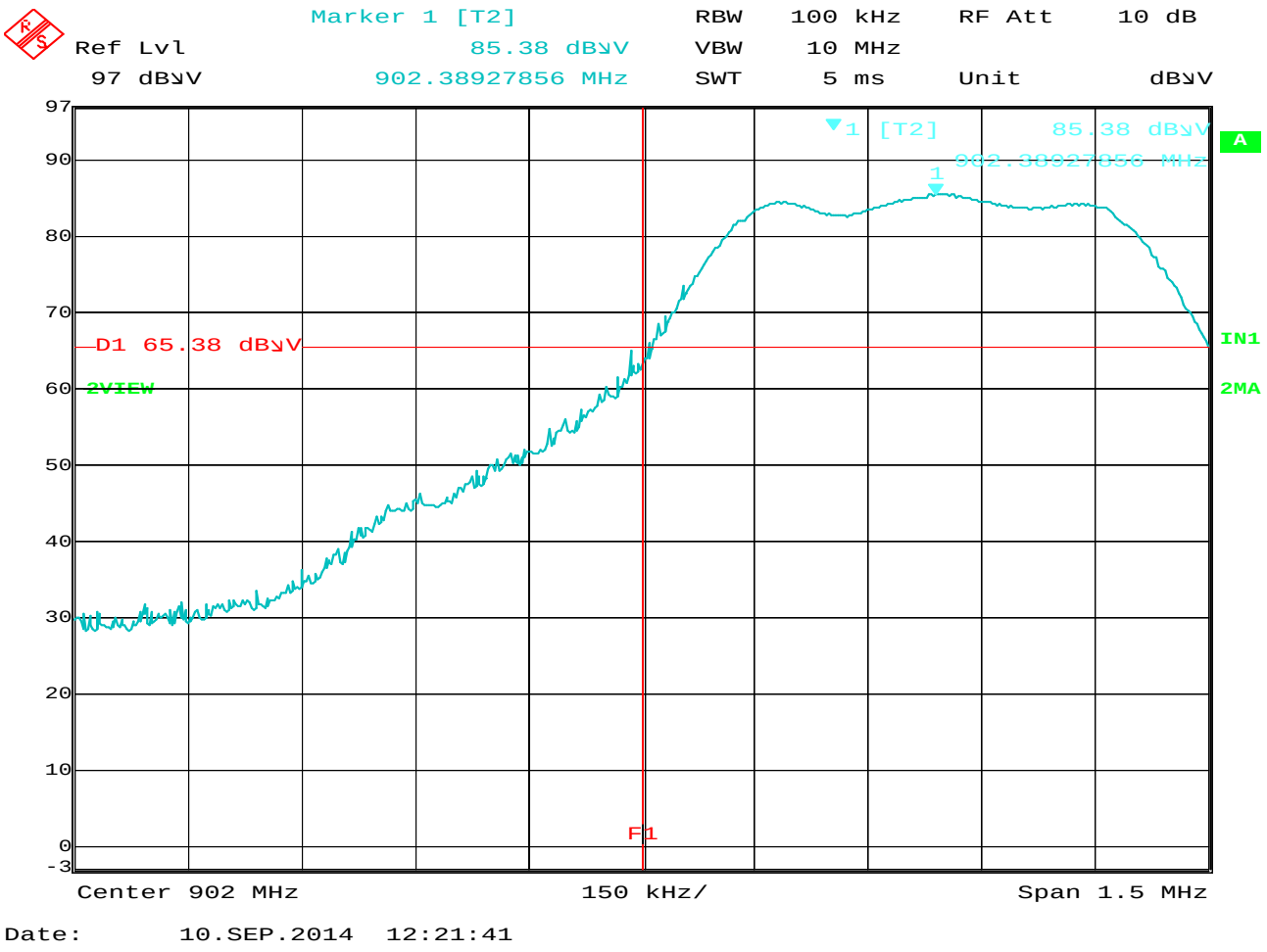
Peak Total (uV/m) = 10^(Peak Total (dBuV/m)/20)

Manufacturer : Shure Incorporated
Model No. : ULXD2
Serial No. : None Assigned
Date Tested : September 10 through 12, 2014
Test Performed : Radiated Spurious Emissions in Restricted Bands
Mode : Transmit at 927.6MHz, 20mW
Test Distance : 3 meters
Notes : Average Readings with a 1MHz RBW, 10Hz VBW

Freq. MHz	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Average Total dBuV/m at 3m	Average Total uV/m at 3 m	Average Limit uV/m at 3 m	Margin (dB)
2782.80	H	38.20	Ambient	2.8	32.8	-39.5	34.4	52.5	500.0	-19.6
2782.80	V	41.3	Ambient	2.8	32.8	-39.5	37.5	75.0	500.0	-16.5
3710.40	H	39.1	Ambient	3.3	33.5	-38.9	37.1	71.2	500.0	-16.9
3710.40	V	42.2	Ambient	3.3	33.5	-38.9	40.2	101.7	500.0	-13.8
4638.00	H	35.9	Ambient	3.6	34.6	-38.9	35.2	57.6	500.0	-18.8
4638.00	V	35.8	Ambient	3.6	34.6	-38.9	35.1	57.0	500.0	-18.9
7420.80	H	35.5	Ambient	4.7	35.7	-39.0	36.9	69.8	500.0	-17.1
7420.80	V	35.5	Ambient	4.7	35.7	-39.0	36.9	69.8	500.0	-17.1
8348.40	H	35.6	Ambient	4.9	35.9	-39.0	37.5	74.7	500.0	-16.5
8348.40	V	35.5	Ambient	4.9	35.9	-39.0	37.4	73.8	500.0	-16.6

Average Total (dBuV/m) = Meter Reading (dBuV) + CBL Fac (dB) + Ant Fac (dB) + Pre Amp (dB)

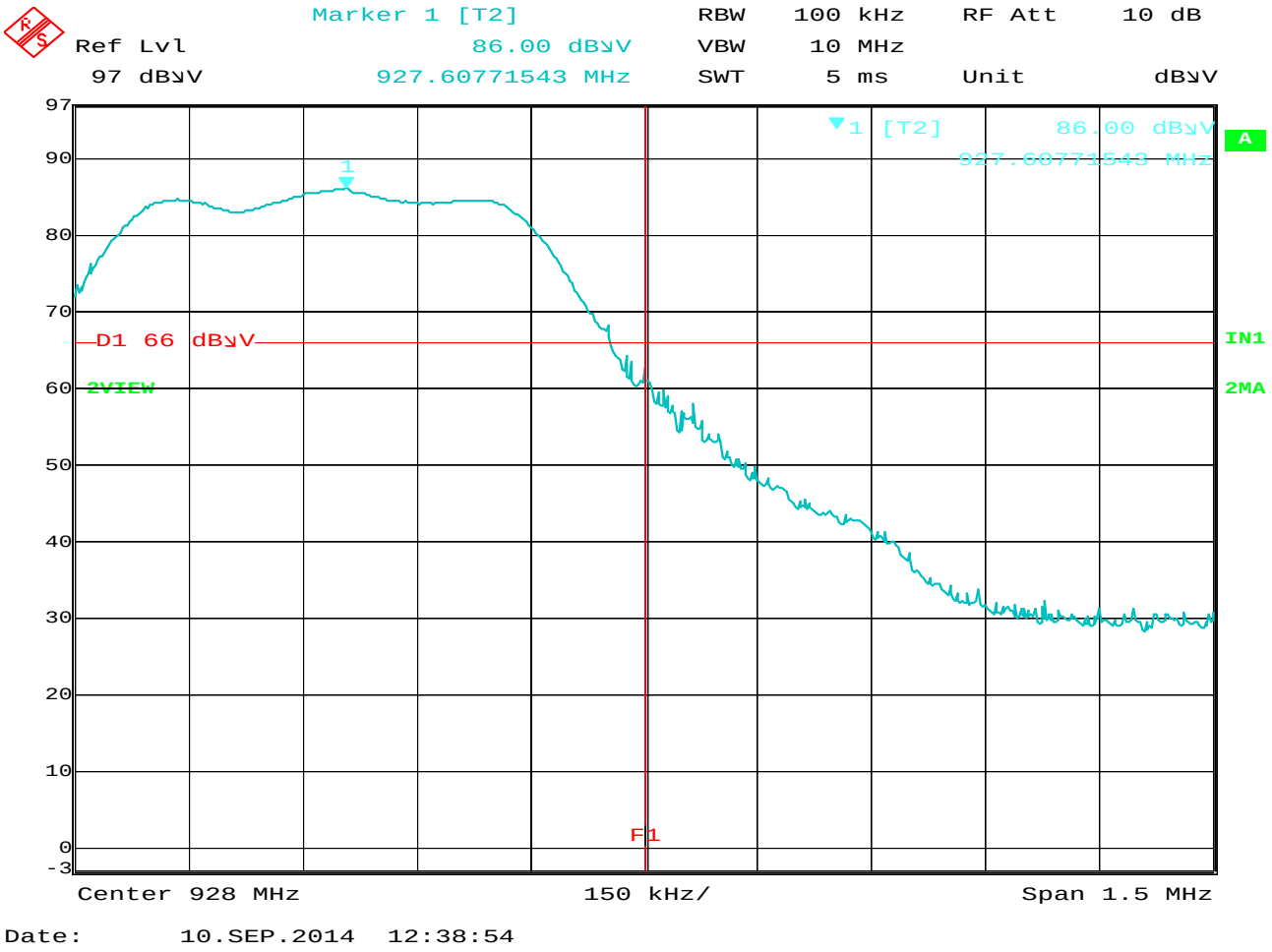
Average Total (uV/m) = 10^(Average Total (dBuV/m)/20)



Band-edge Requirements

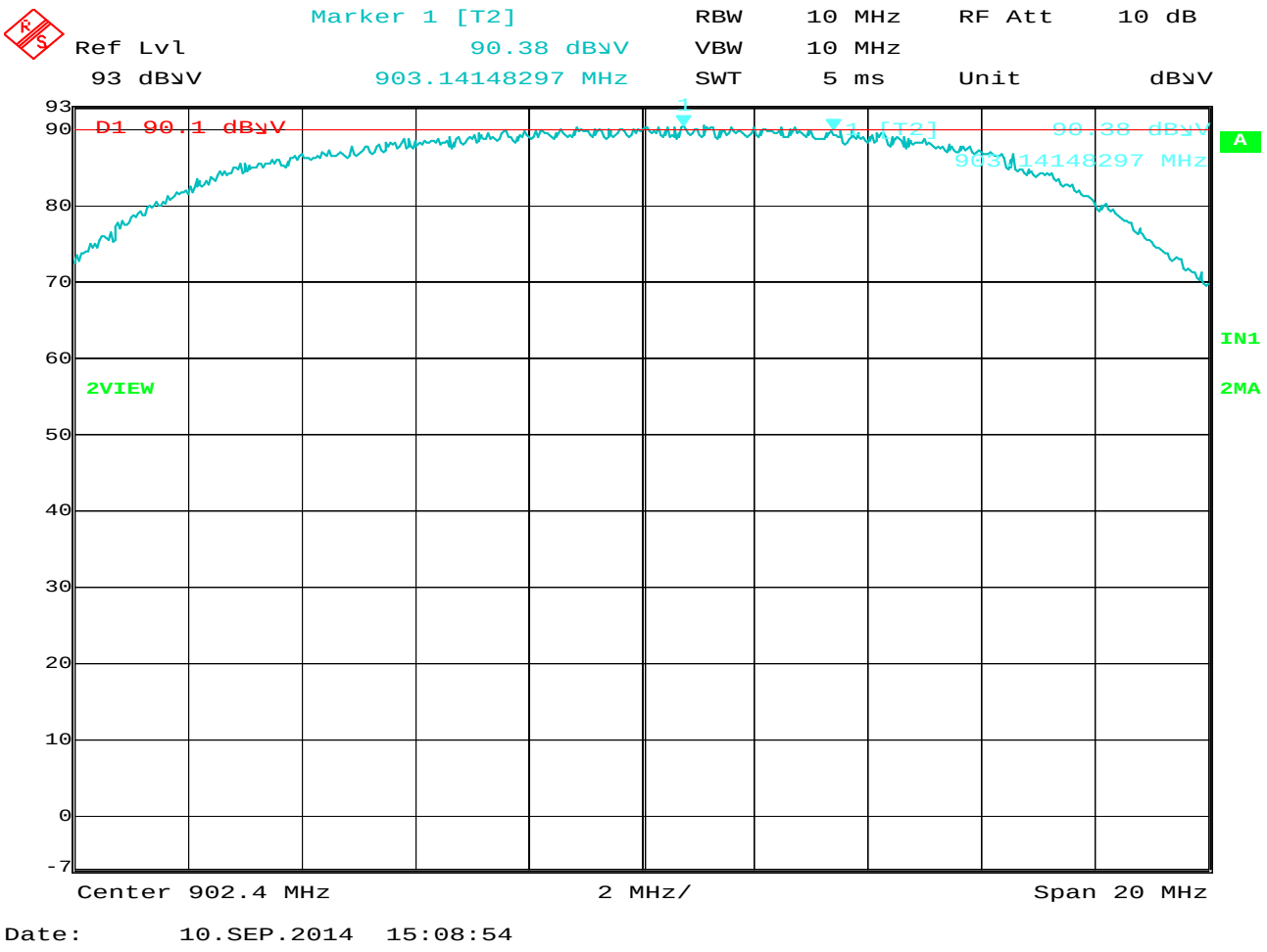
MANUFACTURER	:	Shure, Inc.
MODEL NUMBER	:	ULXD2
SERIAL NUMBER	:	None Assigned
TEST MODE	:	Tx @ 902.4MHz, 20mW
TEST PARAMETERS	:	Band-edge requirements
NOTES	:	Marker 1 = peak power in a 100kHz bandwidth. Display Line D1 represents the level 20dB down from the peak power in a 100kHz bandwidth. Display Line F1 represents the band-edge (902MHz).
EQUIPMENT USED	:	RBA0, NTA3

NOTES



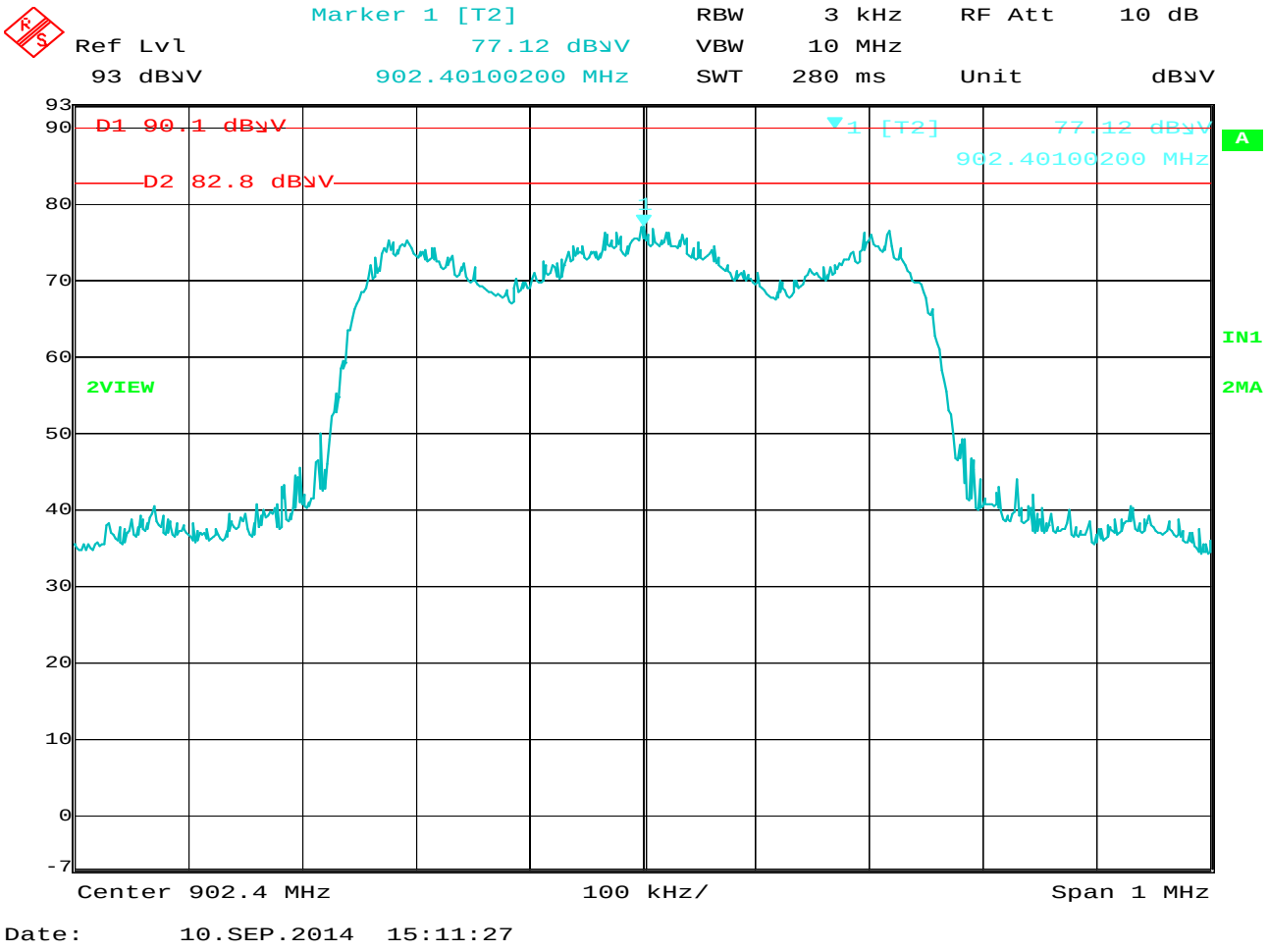
Band-edge Requirements

MANUFACTURER	:	Shure, Inc.
MODEL NUMBER	:	ULXD2
SERIAL NUMBER	:	None Assigned
TEST MODE	:	Tx @ 927.6MHz, 20mW
TEST PARAMETERS	:	Band-edge requirements
NOTES	:	Marker 1 = peak power in a 100kHz bandwidth. Display Line D1 represents the level 20dB down from the peak power in a 100kHz bandwidth. Display Line F1 represents the band-edge (928MHz).
EQUIPMENT USED	:	RBA0, NTA3



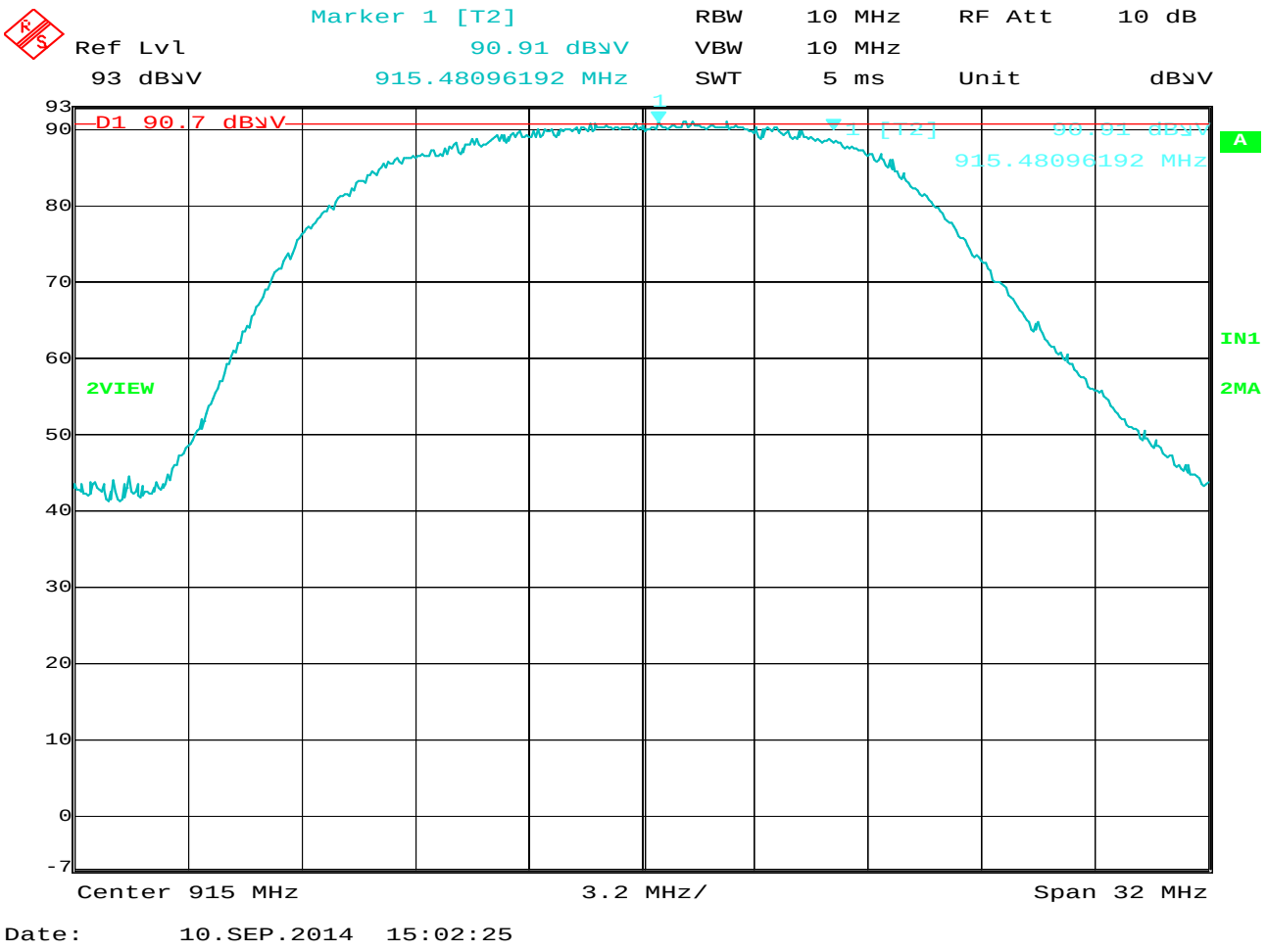
Power Spectral Density

MANUFACTURER	:	Shure, Inc.
MODEL NUMBER	:	ULXD2
SERIAL NUMBER	:	None Assigned
TEST MODE	:	Tx @ 902.4MHz, 20mW
TEST PARAMETERS	:	Power Spectral Density
NOTES	:	Display Line D1 represents the EIRP reading of 15.3dBm in a wide bandwidth
EQUIPMENT USED	:	RBA0, NTA3



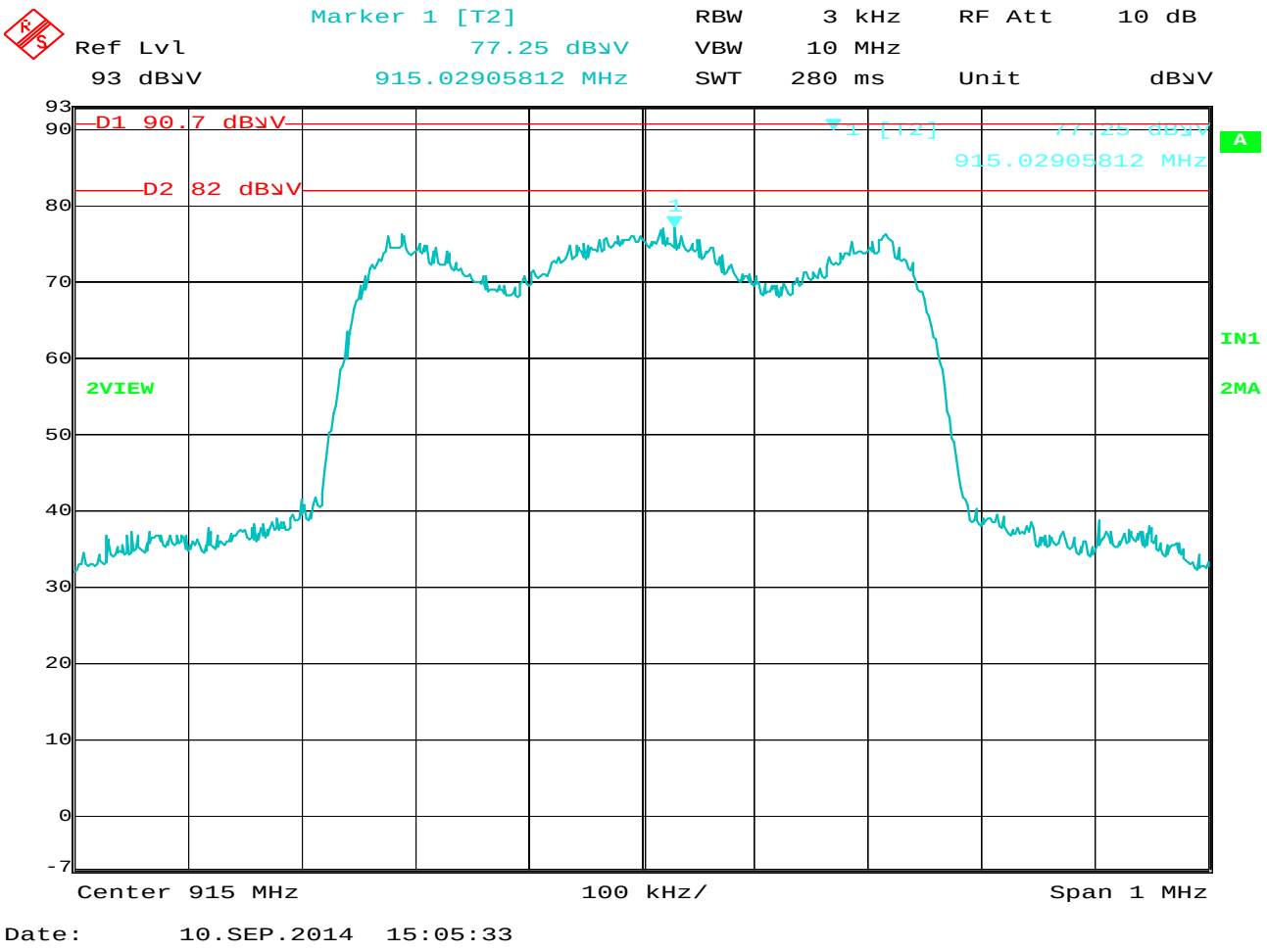
Power Spectral Density (Radiated)

MANUFACTURER	:	Shure, Inc.
MODEL NUMBER	:	ULXD2
SERIAL NUMBER	:	None Assigned
TEST MODE	:	Tx @ 902.4MHz, 20mW
TEST PARAMETERS	:	Power Spectral Density
NOTES	:	Display Line D1 represents the EIRP reading of 15.3dBm in a wide bandwidth. Display Line D2 is 7.3dB down from D1 (15.3dB – 8.0dB) and represents the EIRP reading of 8.0dBm. The trace shows the power spectral density in a 3kHz bandwidth.
EQUIPMENT USED	:	RBA0, NTA3



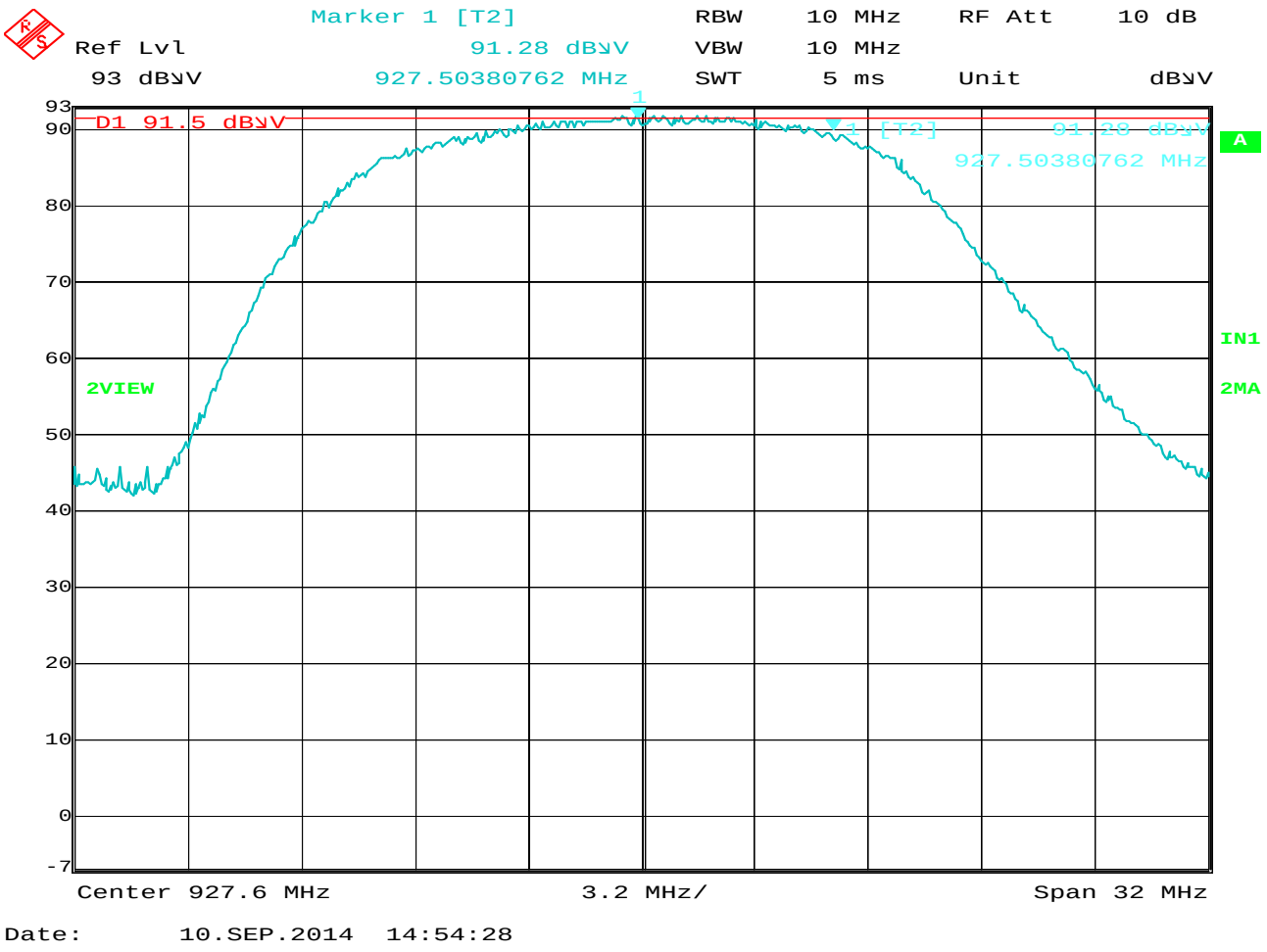
Power Spectral Density (Radiated)

MANUFACTURER	:	Shure, Inc.
MODEL NUMBER	:	ULXD2
SERIAL NUMBER	:	None Assigned
TEST MODE	:	Tx @ 915.0MHz, 20mW
TEST PARAMETERS	:	Power Spectral Density
NOTES	:	Display Line D1 represents the EIRP reading of 16.7dBm in a wide bandwidth
EQUIPMENT USED	:	RBA0, NTA3



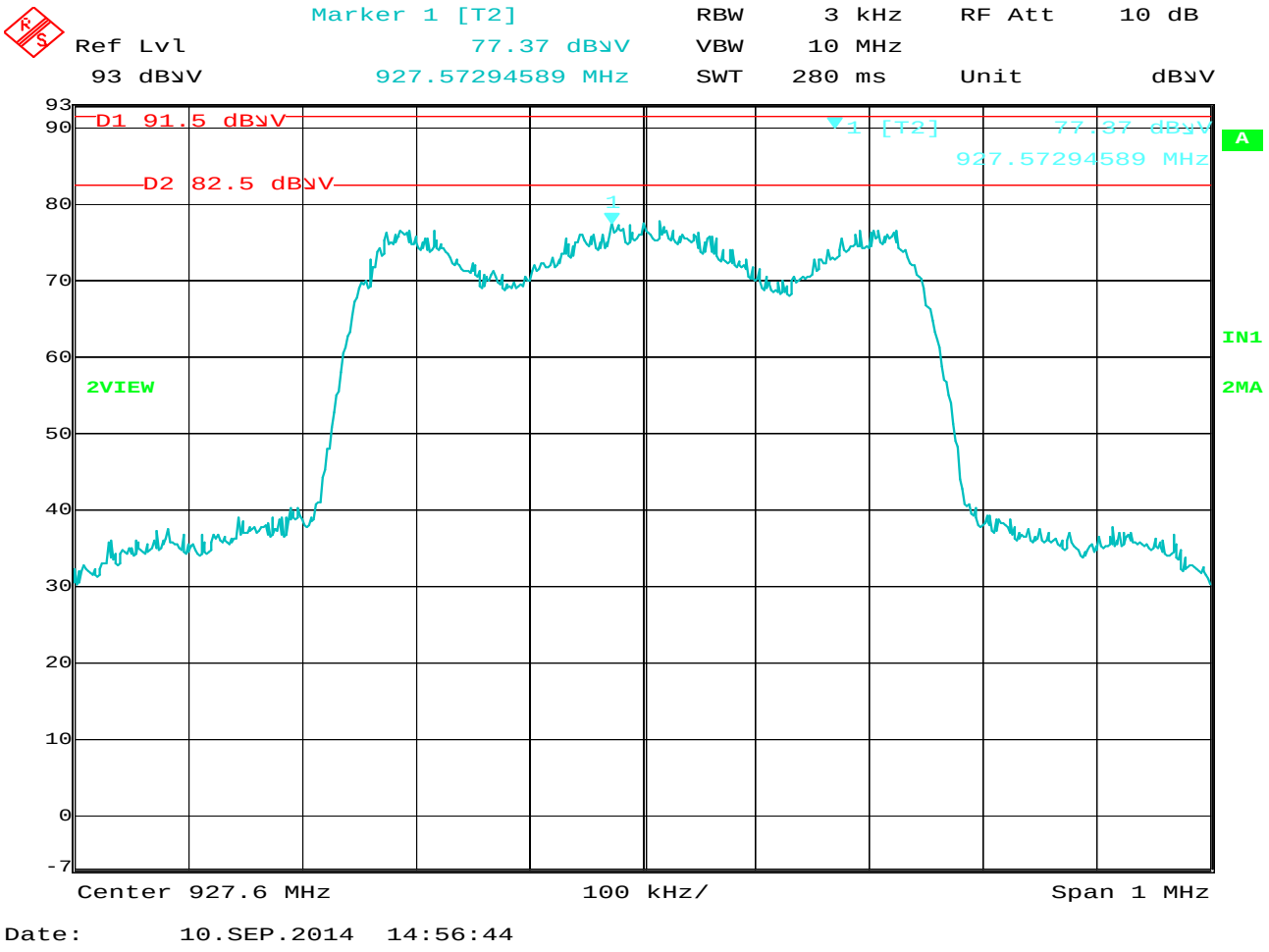
Power Spectral Density (Radiated)

MANUFACTURER	:	Shure, Inc.
MODEL NUMBER	:	ULXD2
SERIAL NUMBER	:	None Assigned
TEST MODE	:	Tx @ 927.6MHz, 20mW
TEST PARAMETERS	:	Power Spectral Density
NOTES	:	Display Line D1 represents the EIRP reading of 16.7dBm in a wide bandwidth. Display Line D2 is 8.7dB down from D1 (16.7dB – 8.0dB) and represents the EIRP reading of 8.0dBm. The trace shows the power spectral density in a 3kHz bandwidth.
EQUIPMENT USED	:	RBA0, NTA3



Power Spectral Density (Radiated)

MANUFACTURER	:	Shure, Inc.
MODEL NUMBER	:	ULXD2
SERIAL NUMBER	:	None Assigned
TEST MODE	:	Tx @ 927.6MHz, 20mW
TEST PARAMETERS	:	Power Spectral Density
NOTES	:	Display Line D1 represents the EIRP reading of 17.0dBm in a wide bandwidth
EQUIPMENT USED	:	RBA0, NTA3



Power Spectral Density (Radiated)

MANUFACTURER	:	Shure, Inc.
MODEL NUMBER	:	ULXD2
SERIAL NUMBER	:	None Assigned
TEST MODE	:	Tx @ 927.6MHz, 20mW
TEST PARAMETERS	:	Power Spectral Density
NOTES	:	Display Line D1 represents the EIRP reading of 17.0dBm in a wide bandwidth. Display Line D2 is 9.0dB down from D1 (17.0dB – 8.0dB) and represents the EIRP reading of 8.0dBm. The trace shows the power spectral density in a 3kHz bandwidth.
EQUIPMENT USED	:	RBA0, NTA3