



Measurement of RF Emissions from a Model No. GLXD4R Transmitter

For	Shure Incorporated 5800 West Touhy Avenue Niles, IL 60714-4608
P.O. Number	4500348241
Date Tested	December 15 - 29, 2016
Test Personnel	Tylar Jozefczyk
Test Specification	FCC "Code of Federal Regulations" Title 47, Part 15, Subpart C, Section 15.247 for Digital Modulation Intentional Radiators Operating within The bands 2400-2483.5MHz Industry Canada RSS-GEN Industry Canada RSS-247 ANSI C63.10 2013

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REVISION HISTORY

Revision	Date	Description
—	1 Mar 2017	Initial release

Measurement of RF Emissions from a TRx, Model No. GLXD4R Transmitter

1. INTRODUCTION

1.1. Scope of Tests

This report represents the results of the series of radio interference measurements performed on a Shure Incorporated TRx, Model No. GLXD4R, Serial No. 4162880360 95A30908 04, transmitter (hereinafter referred to as the EUT). The EUT is a digital modulation transmitter. The transmitter was designed to transmit in the 2400-2483.5 MHz band using an External Omnidirectional 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 C63.4-2014.

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 22.4°C and the relative humidity was 18%.

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 2016
- ANSI C63.4-2014, "American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz"
- ANSI C63.10-2013, " American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices"
- 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, October 4, 2012
- Industry Canada Radio Standards Specification, RSS-Gen, "General Requirements for Compliance of Radio Apparatus", Issue 9, August 2016

- Industry Canada Radio Standards Specification, RSS-247, "Digital Transmission Systems (DTSS), Frequency Hopping Systems (FHSs) and License-Exempt Local Area Network (LE-LAN) Devices", Issue 1, May 2015

3. EUT SETUP AND OPERATION

3.1. General Description

The EUT is a Shure Incorporated, TRx, Model No. GLXD4R. A block diagram of the EUT setup is shown as Figure 1.

3.1.1. Power Input

The EUT obtained 15VDC power through 2 leads from a Shure power supply, Model No. PS43US. The power supply received 120V 60Hz power through low-pass powerline filters on the wall of the shielded enclosure. The 15VDC power from the power supply was provided to the EUT through a 2 wire, 2-meter long unshielded cord. Each primary lead was connected through a line impedance stabilization network (LISN) which was located on the ground plane. The network complies with the requirements of Paragraph 4.1.2 of ANSI C63.4-2014.

3.1.2. Peripheral Equipment

The following peripheral equipment was submitted with the EUT:

Item	Description
Laptop	Ran program changing transmit and receive frequencies and bandwidths.

3.1.3. Grounding

The EUT was grounded only through the third wire of its input power cord.

3.2. Operational Mode

For all tests the EUT and all peripheral equipment were placed on an 80cm high non-conductive stand. The EUT was energized.

For all tests, the EUT was placed on an 80cm high non-conductive stand. The EUT was energized. The unit was programmed to operate in one of the following modes:

- Transmit at 2404MHz
- Transmit at 2442MHz
- Transmit at 2478MHz

Mode 1 - Full Bandwidth: Transmitting at full bandwidth.

Mode 2 - Half Bandwidth: Transmitting at half bandwidth.

3.3. 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 C63.4-2014 for site attenuation.

4.2. Test Instrumentation

The test instrumentation and auxiliary equipment used during the tests are listed in Table 9-1.

Conducted and radiated emission measurements were performed with a spectrum analyzer. This receiver allows measurements with the bandwidths and detector functions specified in the requirements. The receiver bandwidth was 120kHz for the 30MHz to 1000MHz radiated emissions data and 1MHz for the 1000MHz to 5000MHz radiated emissions data.

4.3. Calibration Traceability

Test equipment is maintained and calibrated on a regular basis with a calibration interval not greater than two years. 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

No conducted emissions tests were 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 output of the EUT was connected to the spectrum analyzer through 20dB of attenuation.

The EUT was allowed to transmit continuously. The transmit channel was set separately to low, middle, and high channels in the Full Bandwidth mode. 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. This was then repeated for all channels in the Half Bandwidth mode.

5.2.3. Results

The plots on pages 20 through 25 show that the minimum 6 dB bandwidth was 2.06MHz for Full Bandwidth and 1.07MHz for Half Bandwidth, both of which are greater than minimum allowable 6dB bandwidth requirement of 500kHz for systems using digital modulation techniques. The 99% bandwidth was measured to be 4.3MHz for the Full Bandwidth and 3.69MHz for the Half Bandwidth.

5.3. Peak Output Power

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).

Per 15.247(b)(4)(i) Systems operating in the 2400–2483.5 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum peak output power of the intentional radiator is reduced by 1dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

5.3.2. Procedures

The output of the EUT was connected to the spectrum analyzer through 20dB of attenuation. The maximum meter reading was recorded. The peak power output was calculated for the low, middle and high channels.

The output of the EUT was connected to the spectrum analyzer through 20dB of attenuation. The EUT was set to transmit separately at the low, middle, and high channels. The resolution bandwidth (RBW) was set to greater than the 6dB bandwidth. The 'Max-Hold' function was engaged. The maximum meter reading was recorded. The peak power output was calculated for the low, middle and high channels.

The EUT was placed on the non-conductive stand and set to transmit. A dipole antenna (double ridged waveguide antenna for all measurements above 1GHz) 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 second dipole antenna (double ridged waveguide antenna for all measurements above 1GHz) 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 (and antenna gain for all measurements above 1GHz), as required. The peak power output was calculated for low, middle, and high hopping frequencies.

5.3.3. Results

For antenna conducted emissions method:

The results are presented on pages 26 and 31. The maximum peak conducted output power from the transmitter was 0.0027W (4.28dBm) which is below the 1 Watt limit.

For radiated emissions method:

The results are presented on pages 32 and 33. The maximum EIRP measured from the transmitter was 3.8dBm (0.0024W) which is below the 4 Watt limit.

5.4. Duty Cycle

5.4.1. Requirements

The duty cycle refers to the fraction of time over which the transmitter is on and is transmitting at its maximum power control level. The duty cycle is considered to be constant if variations are less than ± 2 percent, otherwise the duty cycle is considered to be non-constant. Preferably, the EUT shall be transmitting continuously (i.e., with a duty cycle of greater than or equal to 98%). When continuous transmission cannot be achieved a duty cycle correction will be required.

5.4.2. Procedures

The antenna port of the EUT was connected to the spectrum analyzer through 39.6 dB of attenuation.

- 1) Set center frequency to the transmit frequency of the EUT.
- 2) Set span to 0Hz
- 3) Set RBW \geq OBW if possible; otherwise, set RBW to the largest available value.
- 4) Set detector = peak or average.
- 5) Measure the fraction of time over which the transmitter is on and is transmitting at its maximum power control level

5.4.3. Results

Duty cycle plots are shown on pages 34 and 35. The EUT has an on time of 597 μ s in a 1msec period at Full Bandwidth and an on time of 1.20ms in a 1.50msec period at Half Bandwidth. The duty cycle results are 60% and 80% for each respective bandwidth. Since the duty cycle is less than 98%, a duty cycle correction factor based on these results will be added to the emission measurements where average detection is used to correct for the maximum power control level.

5.5. Antenna Conducted Spurious Emissions

5.5.1. Requirements

Per section 15.247(c), the spurious emissions in any 100 kHz BW outside the frequency band must be at least 20dB below the highest 100 kHz BW level measured within the band.

5.5.2. Procedures

The output of the EUT was connected to the spectrum analyzer through 20dB of attenuation. The resolution bandwidth (RBW) was set to 100kHz. The peak detector and 'Max-Hold' function were engaged. The emissions in the frequency range from 30MHz to 26.5GHz were observed and plotted separately with the EUT transmitting at low, middle and high channels.

5.5.3. Results

The results of the antenna conducted emissions levels were plotted. These plots are presented on pages 36 through 41. These plots show that the spurious emissions were at least 20 dB below the level of the fundamental.

5.6. Radiated Spurious Emissions Measurements

5.6.1. Requirements

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)
30.0-88.0	100	3
88.0-216.0	150	3
216.0-960.0	200	3
Above 960	500	3

5.6.2. 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 C63.4-2014 for site attenuation.

The shielded enclosure prevents emissions from other sources, such as radio and TV stations from interfering with the measurements. All powerlines 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 26.5GHz (26.5GHz used for 2400-2483.5MHz range) was investigated using a peak detector function.

The final open field emission tests were then manually performed over the frequency range of 30MHz to 26.5GHz.

- 1) 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 average detector was selected on the analyzer. An average reading was taken. If the duty cycle is less than 98% , a duty cycle correction factor of $20 \log (1/x)$ where x is the duty cycle is added to the measurement results prior to comparing to the emissions limit in order to compute the emission

level that would have been measured had the test been performed at 100 percent duty cycle.

5.6.3. Results

Preliminary radiated emissions plots with the EUT transmitting at Low Frequency, Middle Frequency, and High Frequency are shown on pages 42 through 91. Final radiated emissions data are presented on data pages 92 through 109. 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 3 through 6.

5.7. Band Edge Compliance

5.7.1. 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.

5.7.2. Procedures

5.4.2.1 Low Band Edge

- 1) The output of the EUT was connected to the spectrum analyzer through 20dB of attenuation.
- 2) The EUT was set to transmit continuously at the channel closest to the low band-edge.
- 3) 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) $\geq 1\%$ 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.

5.4.2.2 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 maximized for worst case emissions at the measuring antenna. A peak reading was taken with a resolution bandwidth of 1MHz and a video bandwidth of 1MHz or greater. An average reading was then taken with a resolution bandwidth of 1MHz and a video bandwidth of 10Hz. The maximum peak and average meter readings were recorded.
- 4) 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 both the peak level of the fundamental emission and the band-edge emission under investigation.
 - c. Resolution bandwidth (RBW) = 1% of the span (but never less than 30kHz).
 - 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. This level corresponds to the maximized peak (or average) reading previously taken. The "marker-delta" method described in Public Notice DA 00-705 was then used to determine band edge compliance. The delta between the marker and the general limit (74dB_{UV}/m or 54dB_{UV}/m) was calculated by subtracting the general limit (74dB_{UV}/m or 54dB_{UV}/m)

from the maximum reading taken with a 1MHz bandwidth. This delta represents how far below the marker the emissions outside of the authorized band of operation must be. A display line was placed at this level. All emissions which fall outside of the authorized band of operation must be below the 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.

In accordance with paragraph 15.247(c), all emissions within 20dB of the peak amplitude level of the center frequency are required to be within a band less than 0.25% of the center frequency wide.

5.7.3. Results

Pages 110 through 112 show the band-edge compliance results. As can be seen from these plots, the conducted emissions at the low end band edge are within the 20 dB down limits. The radiated emissions at the high end band edge are within the general limits.

5.8. Power Spectral Density

5.8.1. Requirements

Per section 15.247(d), 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.

5.8.2. Procedures

- 1) The output of the EUT was connected to the spectrum analyzer through 20dB of attenuation.
- 2) The EUT was set to transmit at a mid-channel.
- 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) The EUT was then placed in the normal operation mode (for DTS devices)
- 7) 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) $\geq 3\text{kHz}$
 - d. Video bandwidth (VBW) $\geq 3 \times \text{RBW}$
 - 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.

5.8.3. Results

Pages 114 through 119 show the power spectral density results. As can be seen from the plots, the peak power density is less than 8dBm in a 100kHz 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.

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 TRx, Model No. GLXD4R, digital modulation transmitter, Serial No. 4162880360 95A30908 04, 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 2400-2483.5 MHz band, when tested per ANSI C63.4-2014.

It was also determined that the Shure Incorporated TRx, Model No. GLXD4R, digital modulation transmitter, Serial No. 4162880360 95A30908 04, 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 C63.4-2014.

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 any agency of the Federal Government.

9. EQUIPMENT LIST

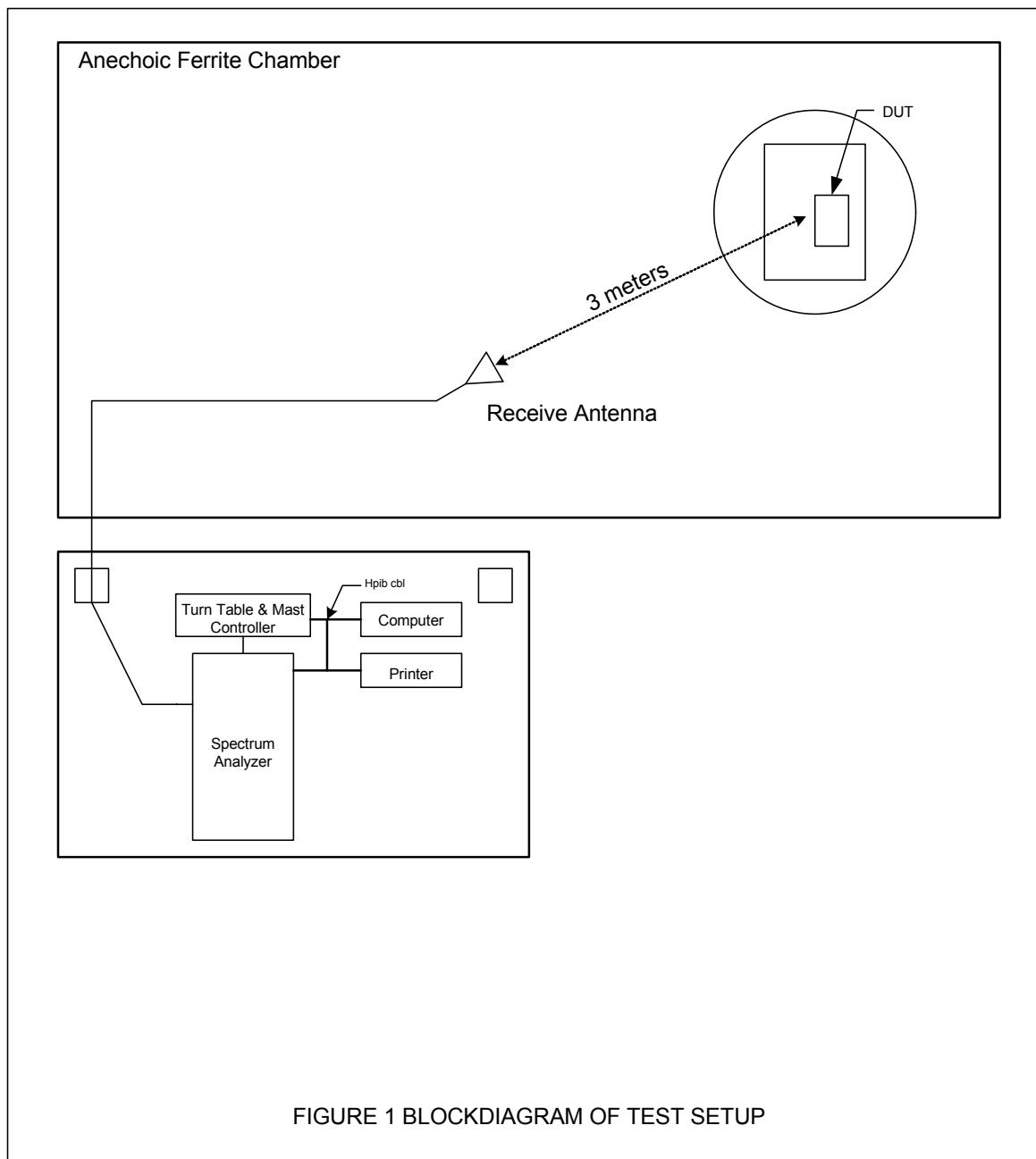
Table 9-1 Equipment List

Eq ID	Equipment Description	Manufacturer	Model No.	Serial No.	Frequency Range	Cal Date	Due Date
APW0	PREAMPLIFIER	PLANAR ELECTRONICS	PE2-30-20G20R6G	PL2926/0646	20GHZ-26.5GHZ	3/2/2016	3/2/2017
APW11	PREAMPLIFIER	PMI	PE2-35-120-5R0-10-12-SFF	PL11685/1241	1GHZ-20GHZ	4/18/2016	4/18/2017
CDU4	LAPTOP COMPUTER						
CDY0	WORKSTATION	ELITE	WORKSTATION		WINDOWS 7	N/A	
NHG0	STANDARD GAIN HORN ANTENNA	NARDA	638	---	18-26.5GHZ	NOTE 1	
NTA3	BILOG ANTENNA	TESEQ	6112D	32853	25-1000MHz	3/23/2016	3/23/2017
NWQ1	DOUBLE RIDGED WAVEGUIDE ANTENNA	ETS-LINDGREN	3117	66655	1GHZ-18GHZ	4/4/2016	4/4/2018
RBB0	EMI TEST RECEIVER 20HZ TO 40 GHZ	ROHDE & SCHWARZ	ESIB40	100250	20 HZ TO 40GHZ	2/16/2016	2/16/2017
RBG1	EMI ANALYZER	ROHDE & SCHWARZ	ESW500	101532	10HZ-44GHZ	11/16/2016	11/16/2017
SES1	24VDC POWER SUPPLY	P TRANS	FS-32024-1M	002	18-27VDC	NOTE 1	
T2D2	20DB, 25W ATTENUATOR	WEINSCHEL	46-20-43	AV5815	DC-18GHZ	5/26/2016	5/26/2018
WKA1	SOFTWARE, UNIVERSAL RCV EMI	ELITE	UNIV_RCV_EMI	1	---	I/O	
XPRO	HIGH PASS FILTER	K&L MICROWAVE	11SH10-4800/X20000	001	4.8-20GHZ	9/14/2016	9/14/2017

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.



Anechoic Ferrite Chamber

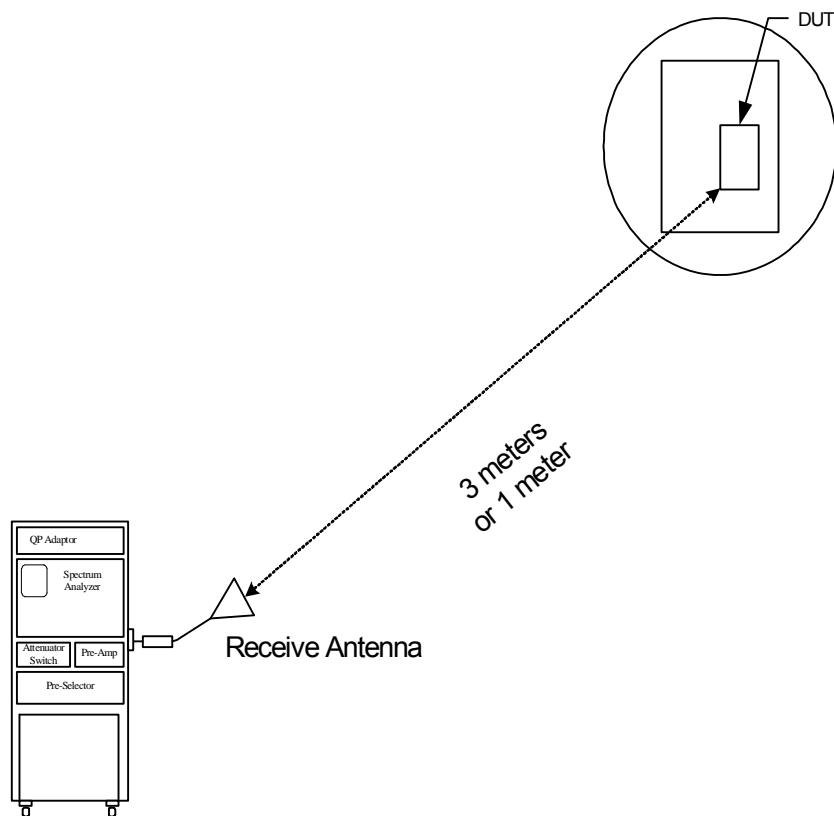
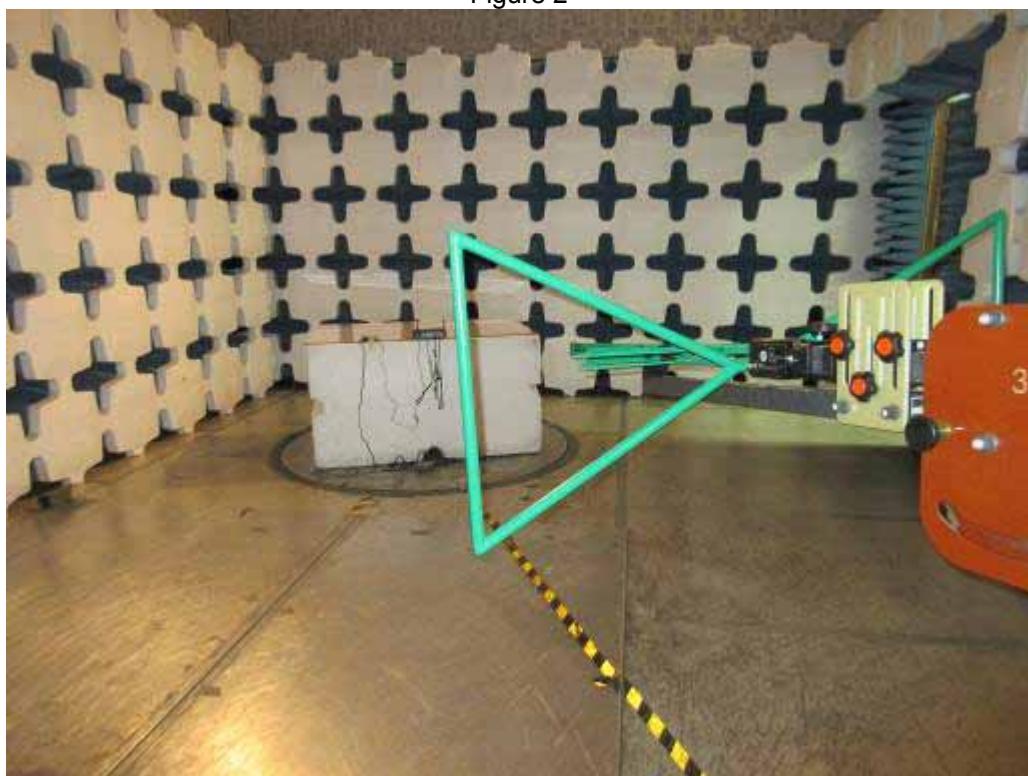


Figure 2

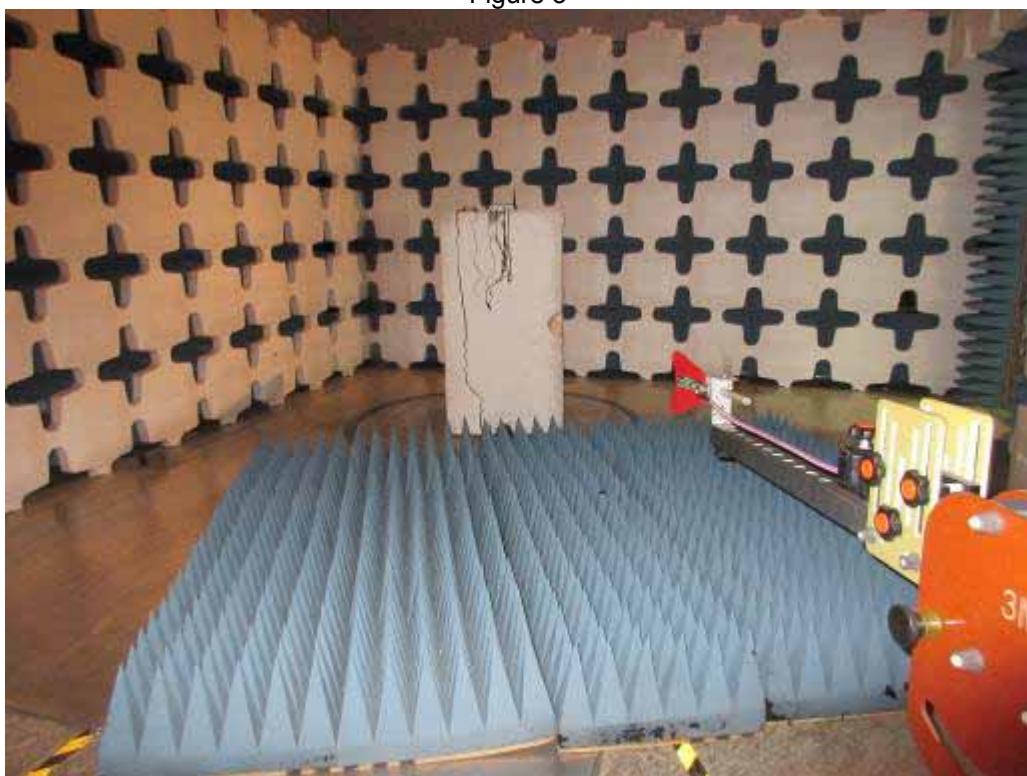


Test Setup for Radiated Emissions, 30MHz to 1GHz – Horizontal Polarization



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

Figure 3

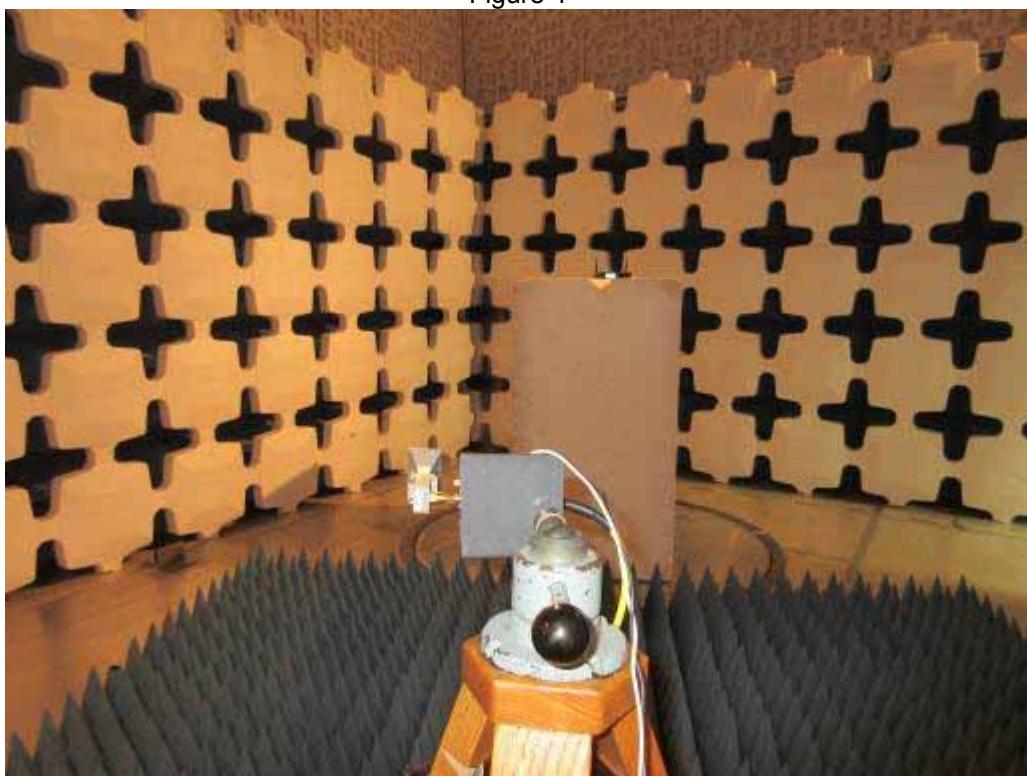


Test Setup for Radiated Emissions, 1 to 18GHz – Horizontal Polarization

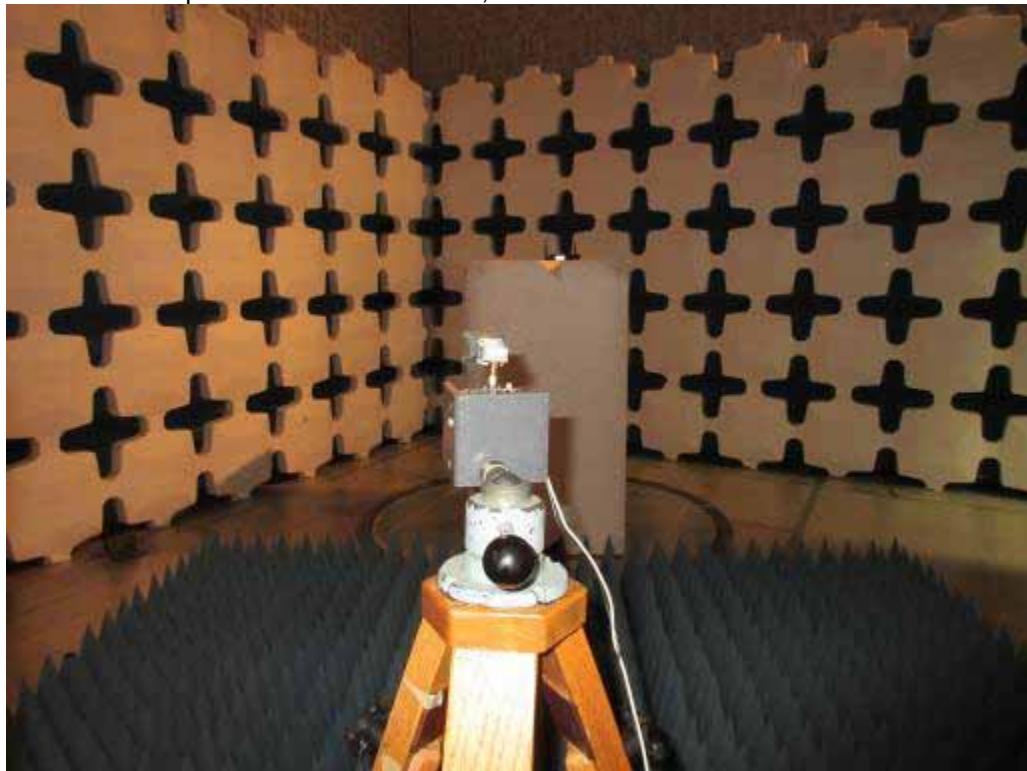


Test Setup for Radiated Emissions, 30MHz to 18GHz – Vertical Polarization

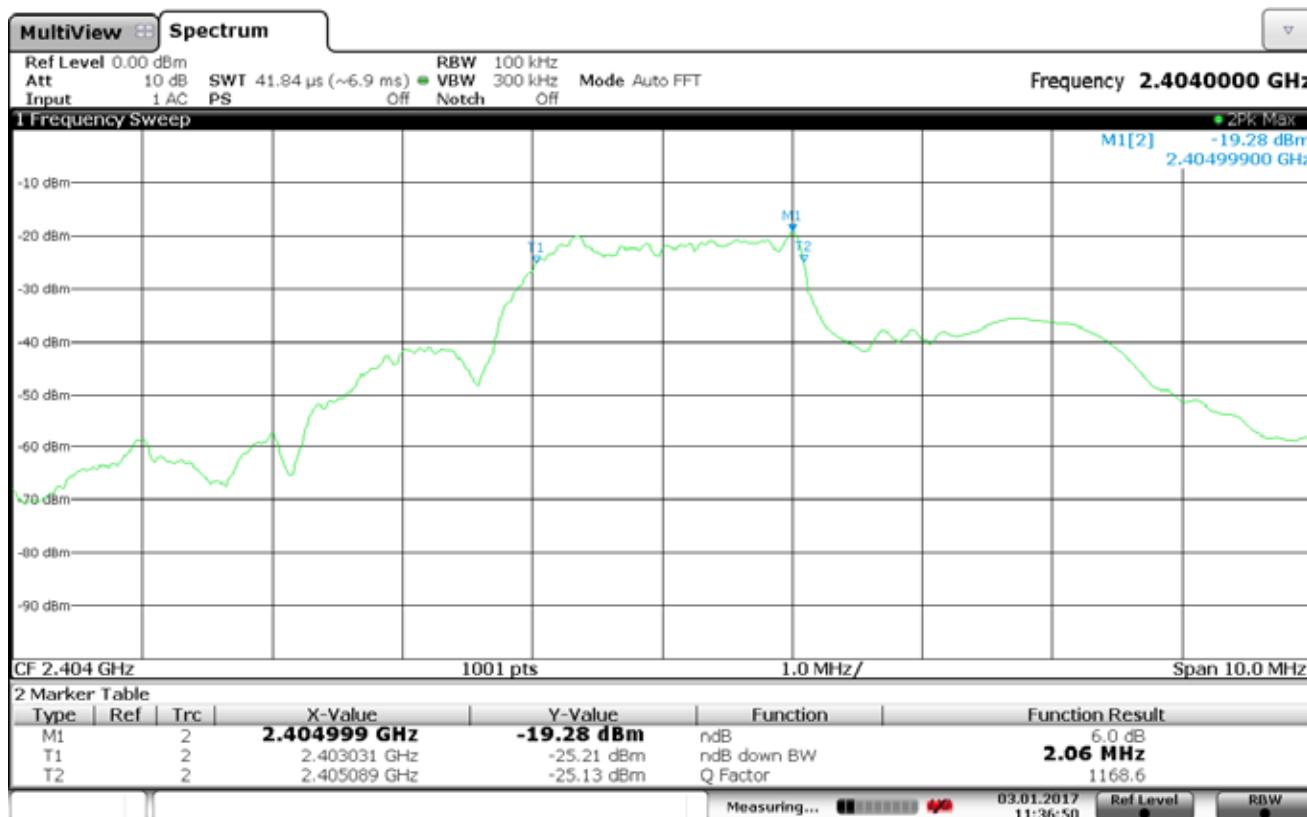
Figure 4



Test Setup for Radiated Emissions, 18 to 26.5GHz – Horizontal Polarization



Test Setup for Radiated Emissions, 18 to 26.5GHz – Vertical Polarization



6dB BANDWIDTH

MANUFACTURER : Shure Incorporated
 MODEL NUMBER : GLXD4R
 SERIAL NUMBER : 4162880360 95A30908 04
 TEST MODE : Low Channel - Full Bandwidth

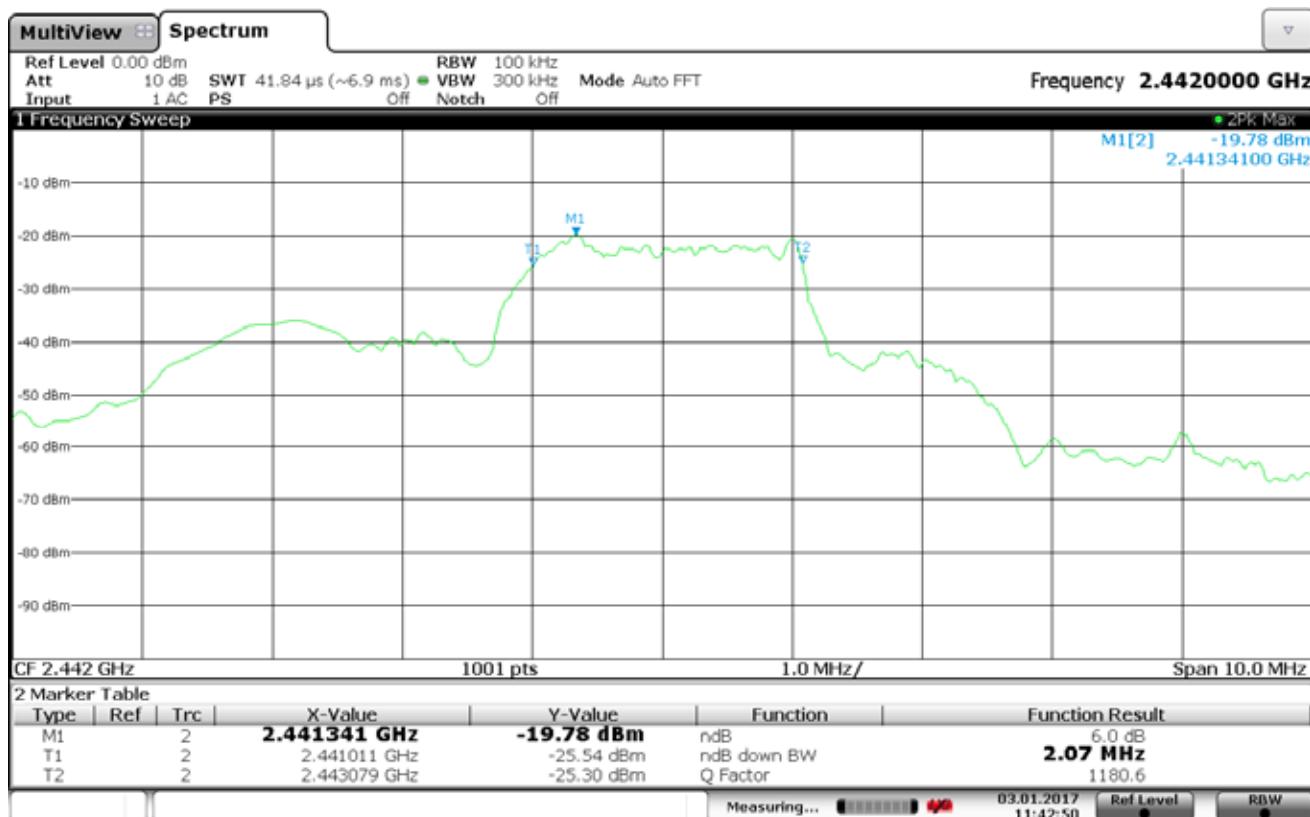
NOTES



6dB BANDWIDTH

MANUFACTURER : Shure Incorporated
 MODEL NUMBER : GLXD4R
 SERIAL NUMBER : 4162880360 95A30908 04
 TEST MODE : Low Channel - Half Bandwidth

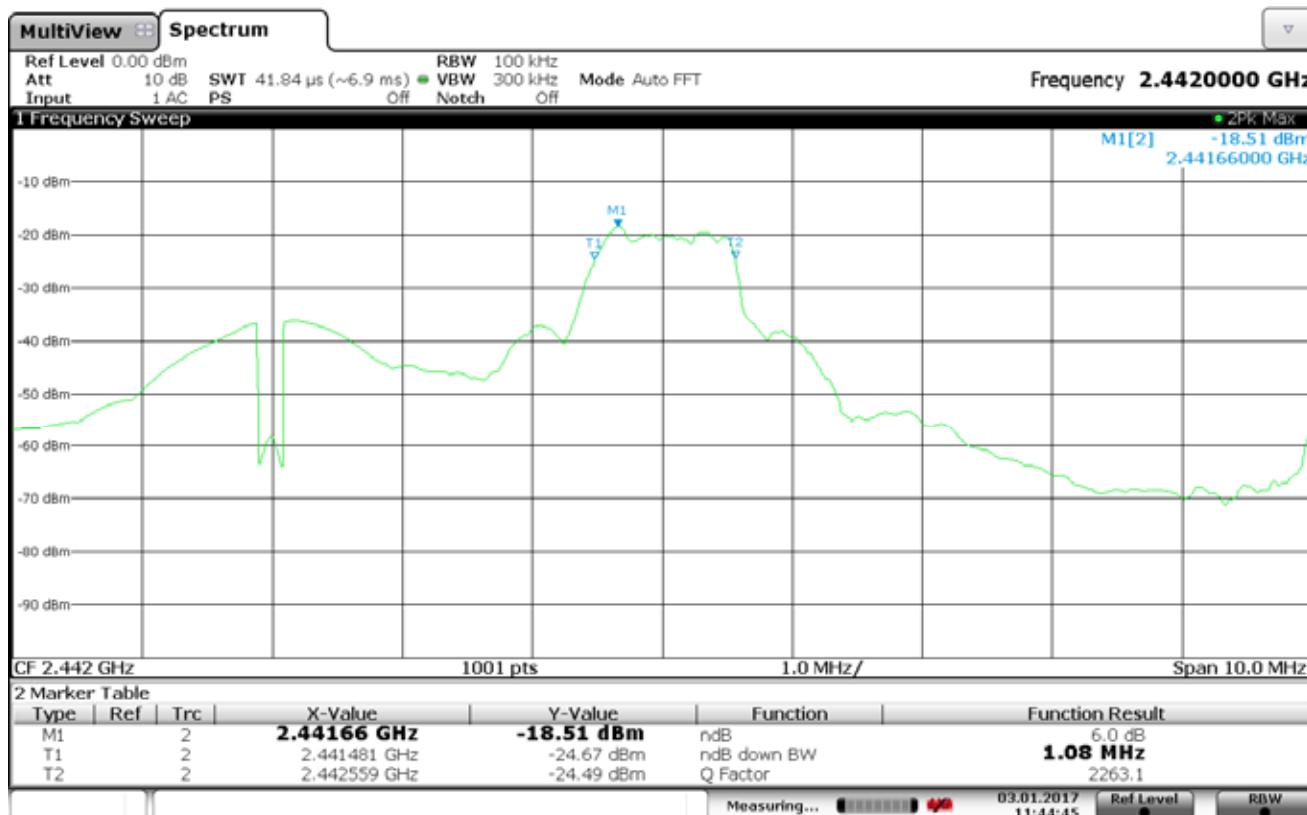
NOTES



6dB BANDWIDTH

MANUFACTURER : Shure Incorporated
 MODEL NUMBER : GLXD4R
 SERIAL NUMBER : 4162880360 95A30908 04
 TEST MODE : Mid Channel - Full Bandwidth

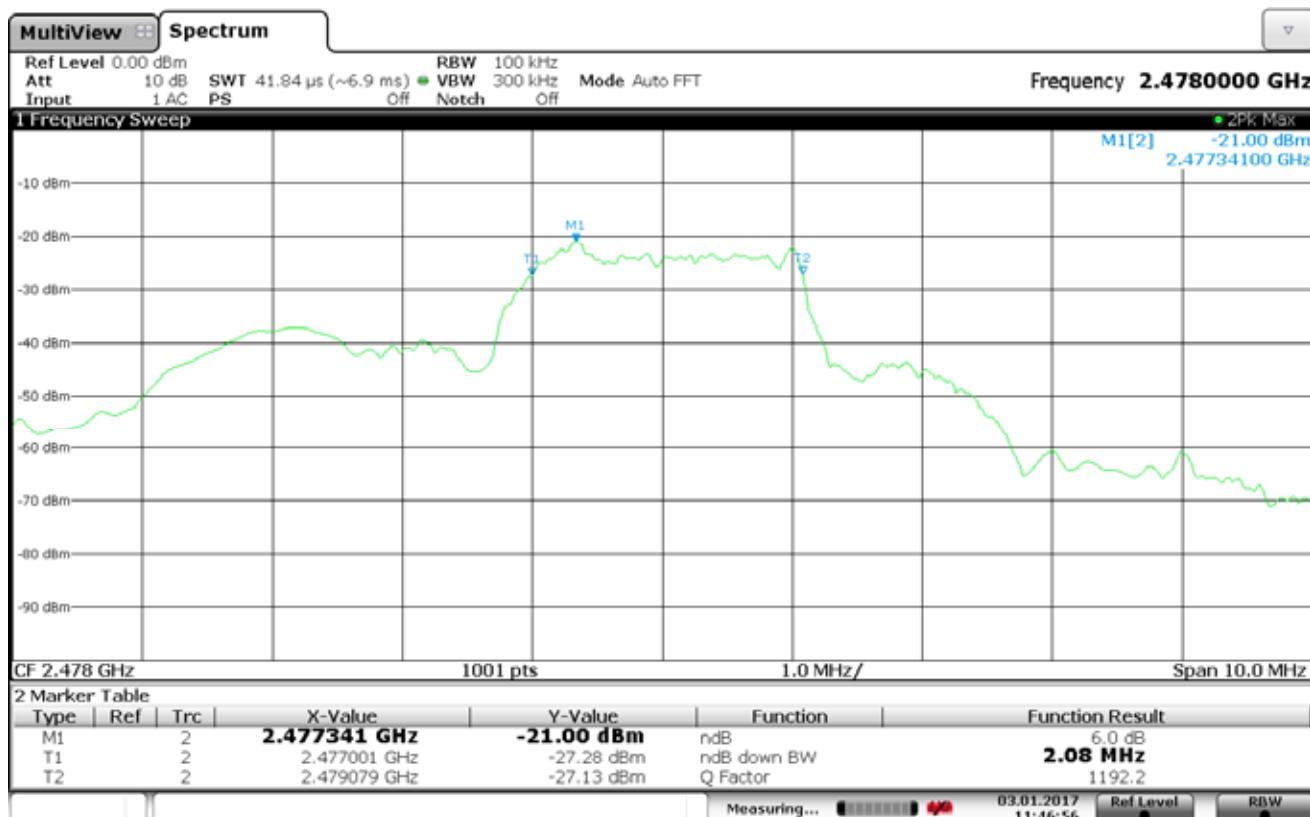
NOTES



6dB BANDWIDTH

MANUFACTURER : Shure Incorporated
 MODEL NUMBER : GLXD4R
 SERIAL NUMBER : 4162880360 95A30908 04
 TEST MODE : Mid Channel - Half Bandwidth

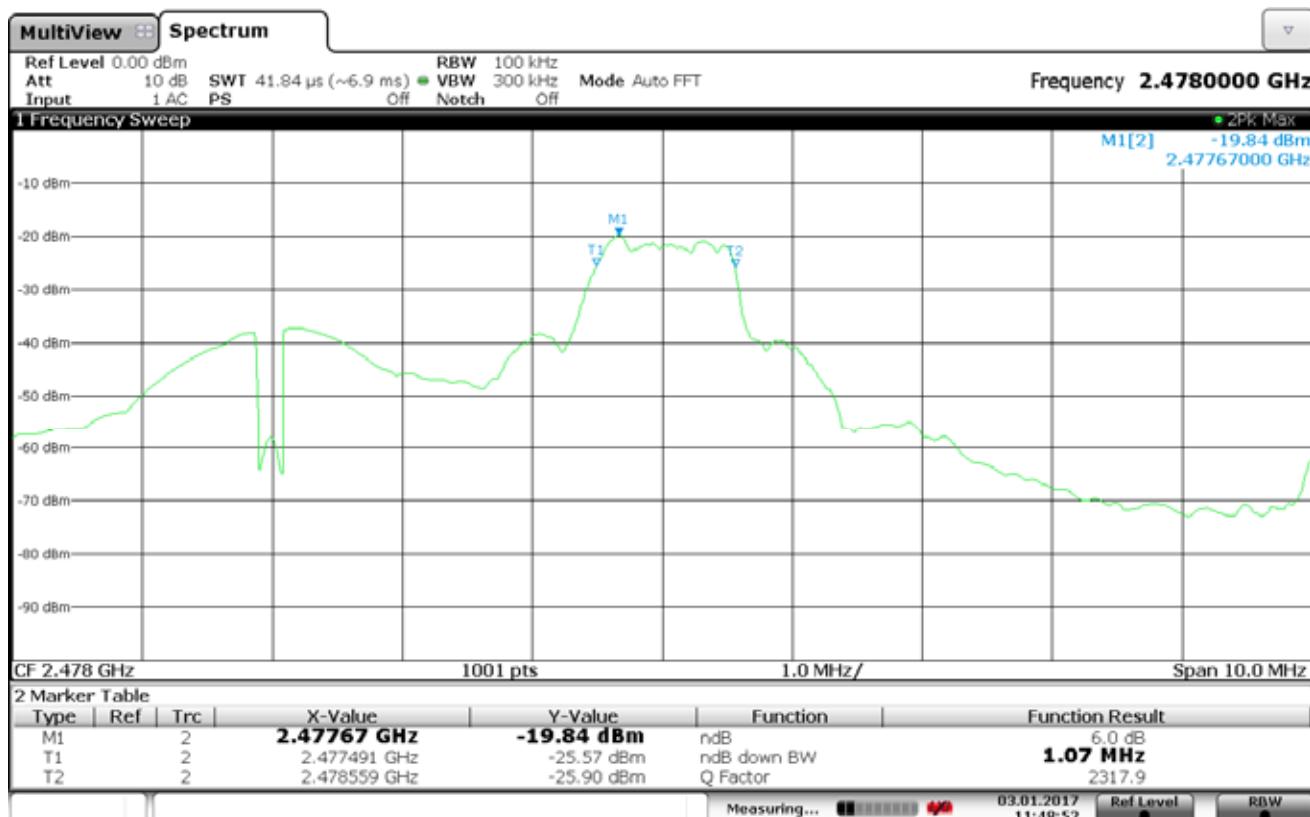
NOTES



6dB BANDWIDTH

MANUFACTURER : Shure Incorporated
MODEL NUMBER : GLXD4R
SERIAL NUMBER : 4162880360 95A30908 04
TEST MODE : High Channel - Full Bandwidth

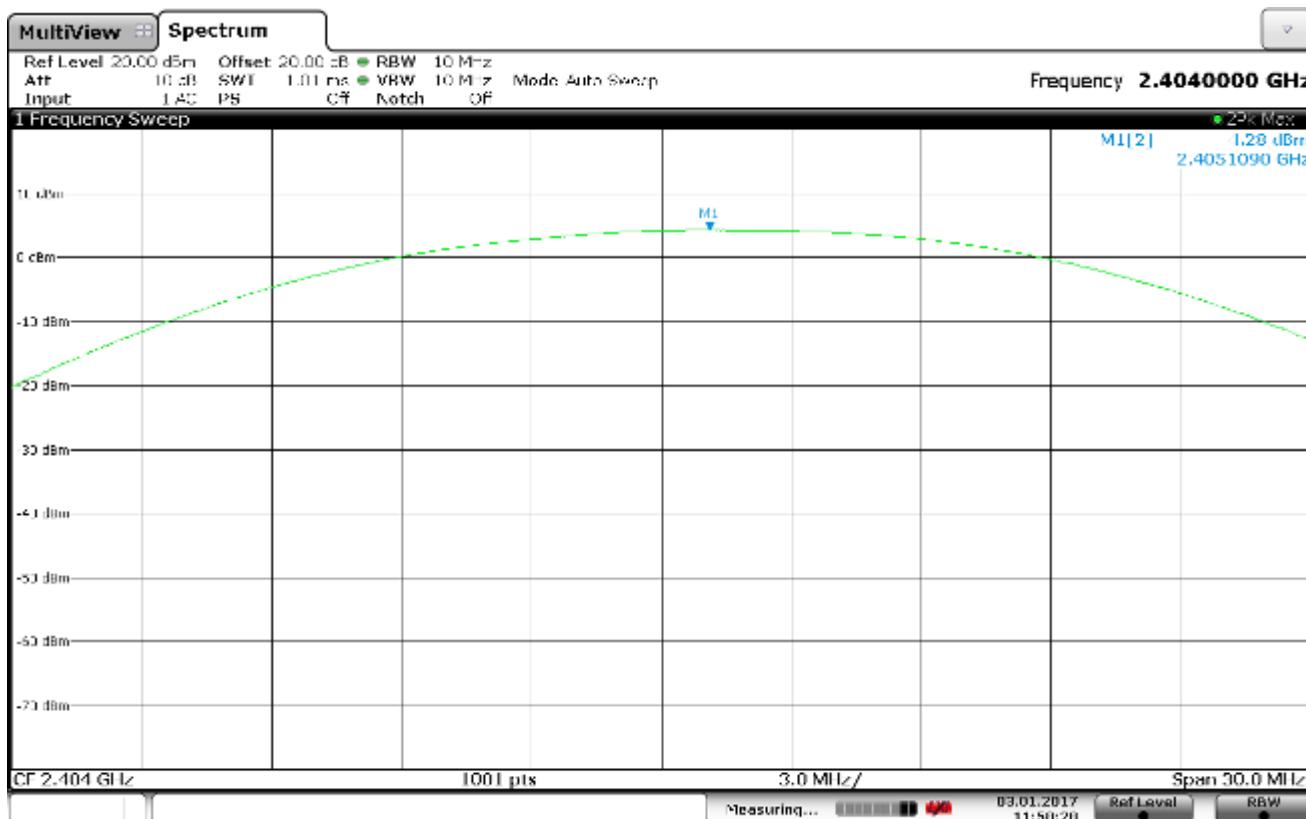
NOTES



6dB BANDWIDTH

MANUFACTURER : Shure Incorporated
 MODEL NUMBER : GLXD4R
 SERIAL NUMBER : 4162880360 95A30908 04
 TEST MODE : High Channel - Half Bandwidth

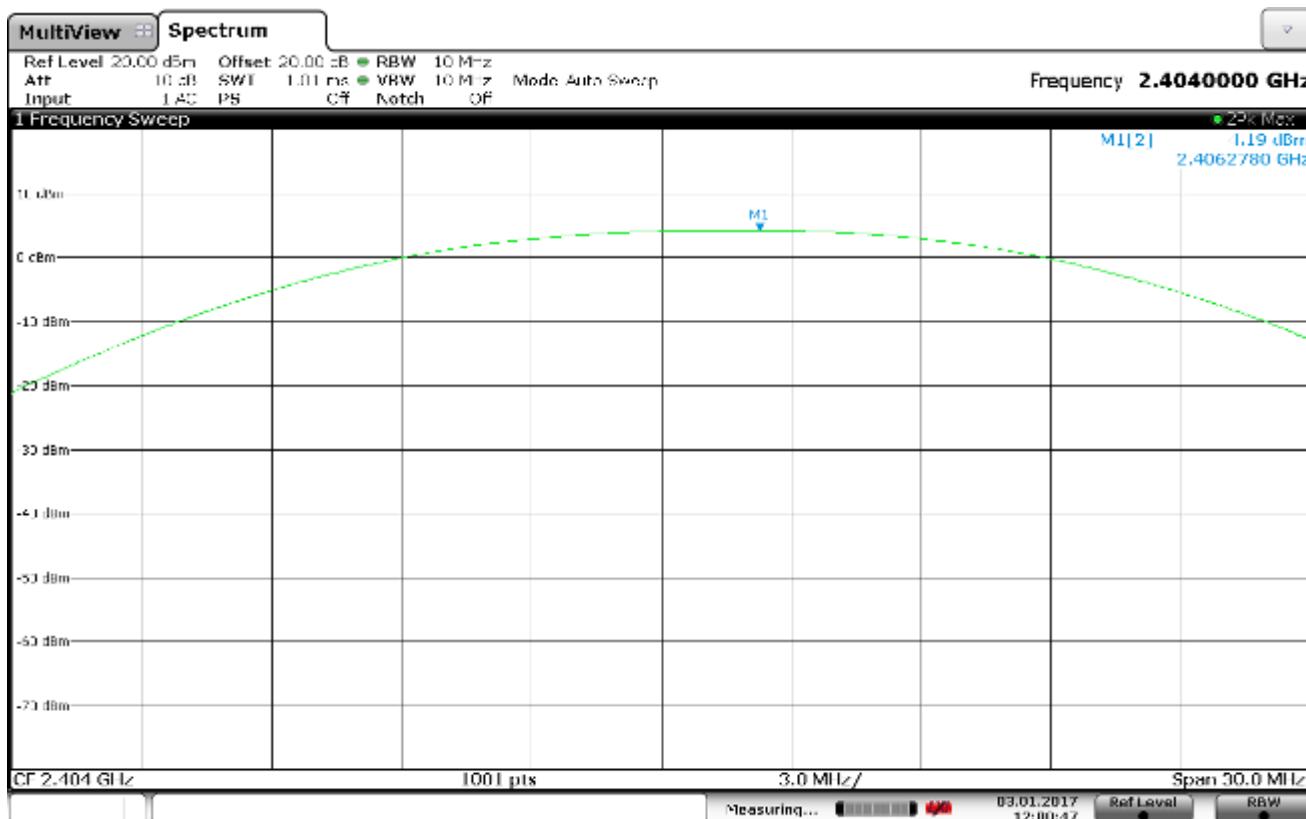
NOTES



PEAK OUTPUT POWER

MANUFACTURER : Shure Incorporated
MODEL NUMBER : GLXD4R
SERIAL NUMBER : 4162880360 95A30908 04
TEST MODE : Low Channel - Full Bandwidth

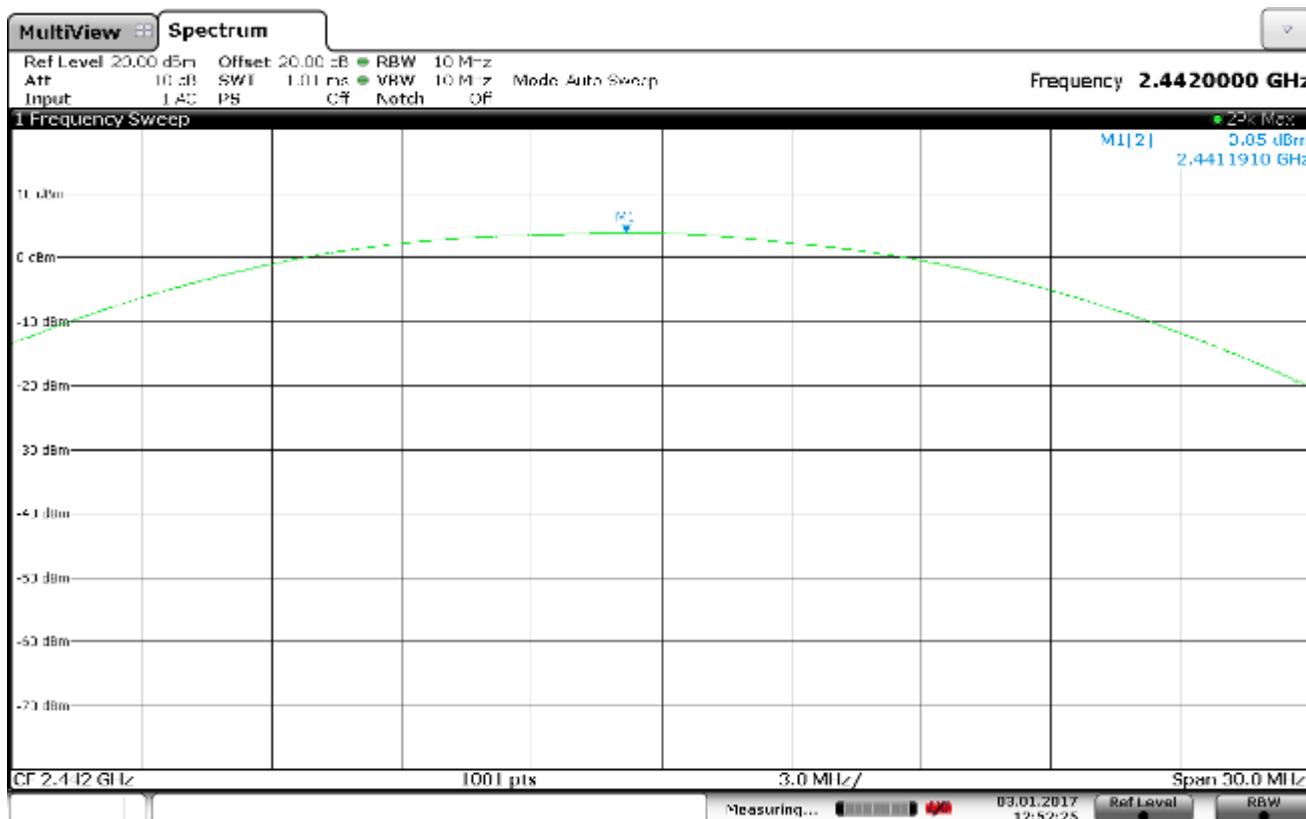
NOTES



PEAK OUTPUT POWER

MANUFACTURER : Shure Incorporated
 MODEL NUMBER : GLXD4R
 SERIAL NUMBER : 4162880360 95A30908 04
 TEST MODE : Low Channel - Half Bandwidth

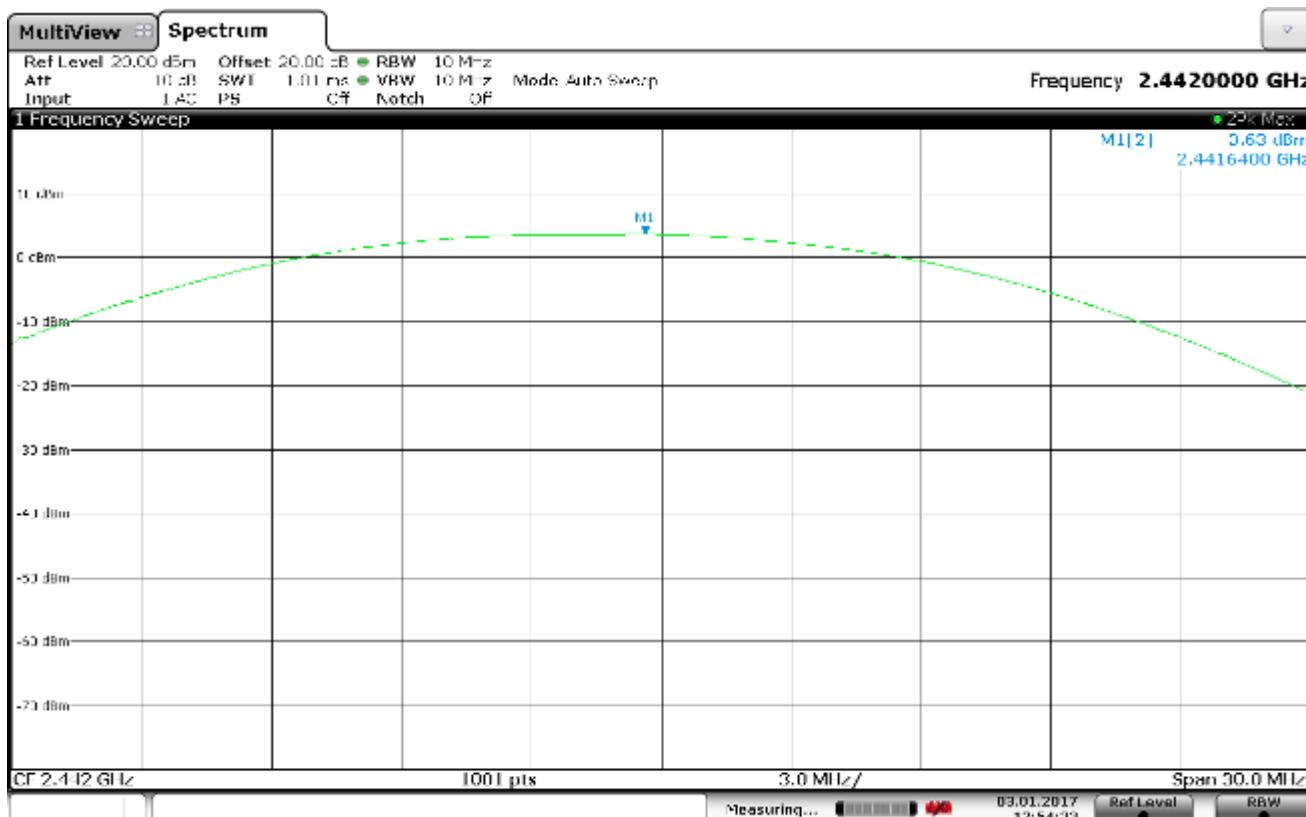
NOTES



PEAK OUTPUT POWER

MANUFACTURER : Shure Incorporated
 MODEL NUMBER : GLXD4R
 SERIAL NUMBER : 4162880360 95A30908 04
 TEST MODE : Mid Channel - Full Bandwidth

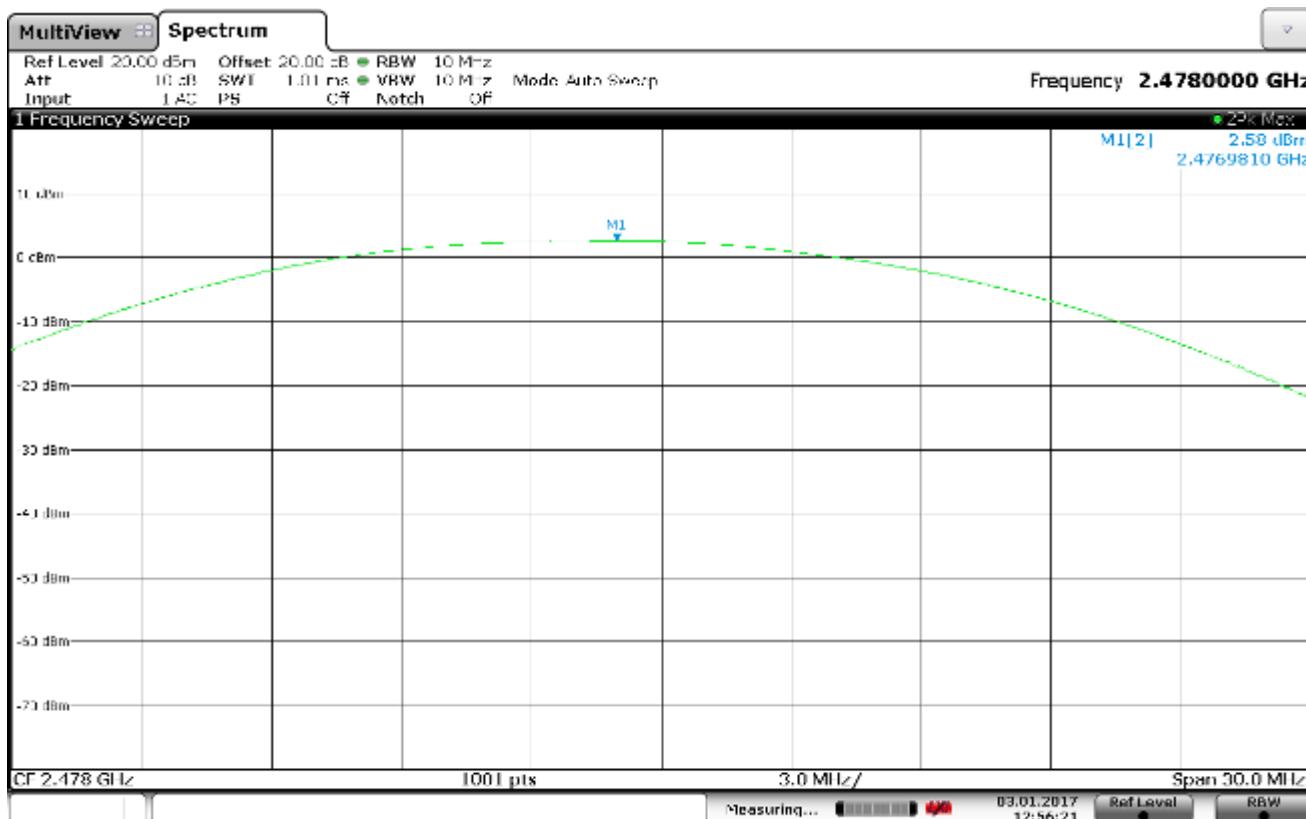
NOTES



PEAK OUTPUT POWER

MANUFACTURER : Shure Incorporated
MODEL NUMBER : GLXD4R
SERIAL NUMBER : 4162880360 95A30908 04
TEST MODE : Mid Channel - Half Bandwidth

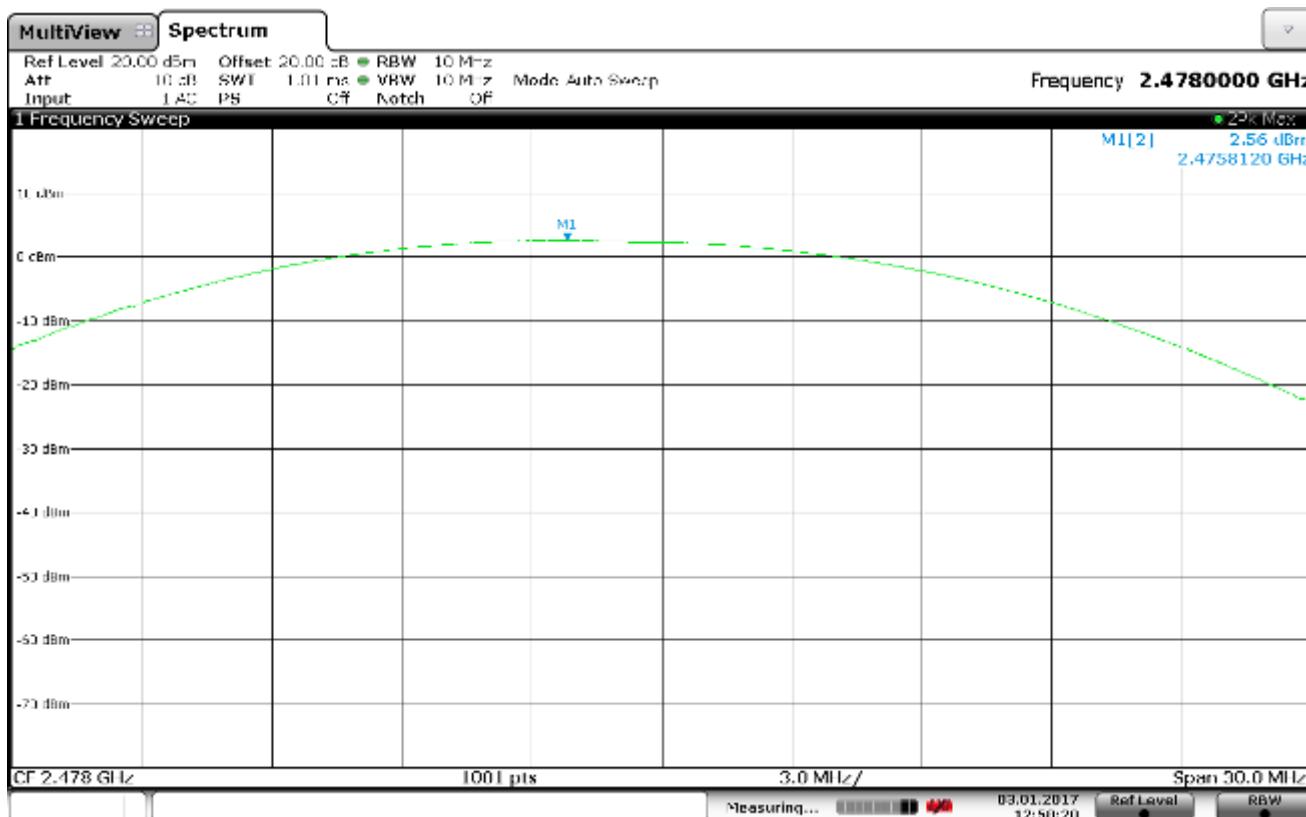
NOTES



PEAK OUTPUT POWER

MANUFACTURER : Shure Incorporated
 MODEL NUMBER : GLXD4R
 SERIAL NUMBER : 4162880360 95A30908 04
 TEST MODE : High Channel - Full Bandwidth

NOTES



PEAK OUTPUT POWER

MANUFACTURER : Shure Incorporated
MODEL NUMBER : GLXD4R
SERIAL NUMBER : 4162880360 95A30908 04
TEST MODE : High Channel - Half Bandwidth

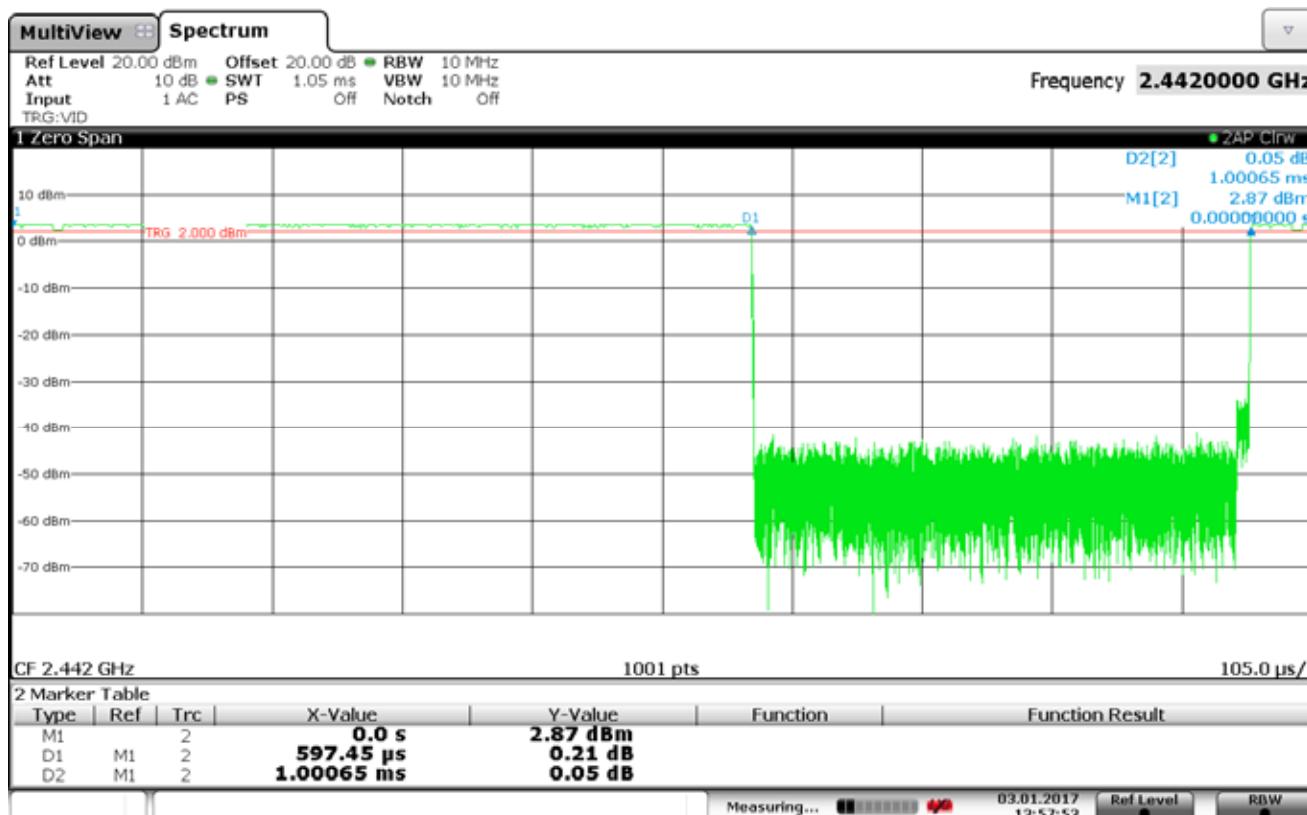
NOTES

Manufacturer : Shure Incorporated
Test Item : TRx
Model No. : GLXD4R
Mode : Full Bandwidth
Test Specification : FCC-15.247, RSS-247 Peak Output Power
Date : December 21, 2016

Freq. (MHz)	Ant Pol	Matched Sig. Gen. Reading (dBm)	Equivalent Antenna Gain (dB)	Cable Loss (dB)	EIRP (dBm)
2404.00	H	-3.6	5.9	2.7	-0.5
2404.00	V	3.1	5.9	2.7	6.2
2442.00	H	-3.6	5.9	2.8	-0.5
2442.00	V	3.8	5.9	2.8	6.9
2478.00	H	-6.7	5.9	2.8	-4.2
2478.00	V	1.8	5.9	2.8	4.1

Manufacturer : Shure Incorporated
Test Item : TRx
Model No. : GLXD4R
Mode : Half Bandwidth
Test Specification : FCC-15.247, RSS-247 Peak Output Power
Date : December 21, 2016

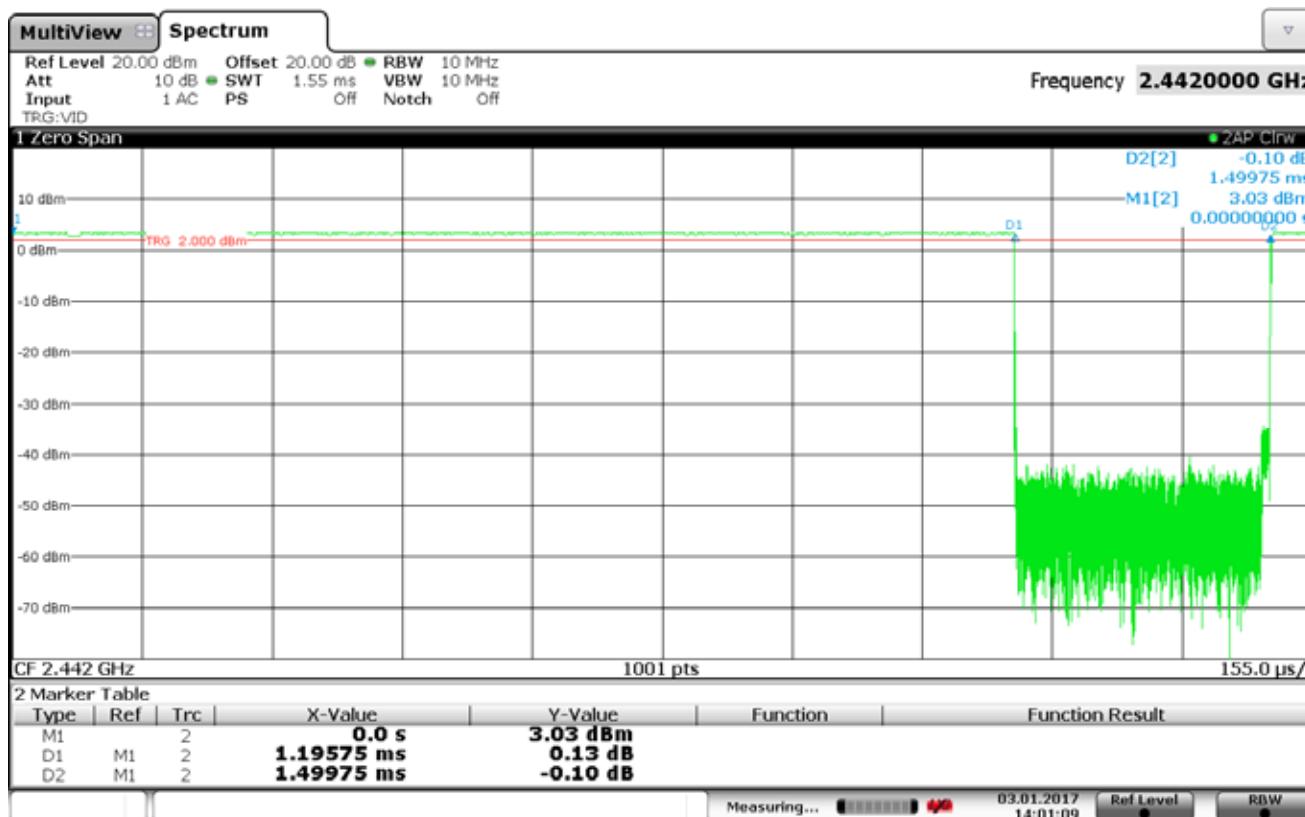
Freq. (MHz)	Ant Pol	Matched Sig. Gen. Reading (dBm)	Equivalent Antenna Gain (dB)	Cable Loss (dB)	EIRP (dBm)
2404.00	H	-5.0	5.9	2.7	-2.6
2404.00	V	3.5	5.9	2.7	5.6
2442.00	H	-4.8	5.9	2.8	-2.3
2442.00	V	3.8	5.9	2.8	6.0
2478.00	H	-7.3	5.9	2.8	-4.8
2478.00	V	1.1	5.9	2.8	3.3



DUTY CYCLE

MANUFACTURER : Shure Incorporated
 MODEL NUMBER : GLXD4R
 SERIAL NUMBER : 4162880360 95A30908 04
 TEST MODE : Mid Channel - Full Bandwidth

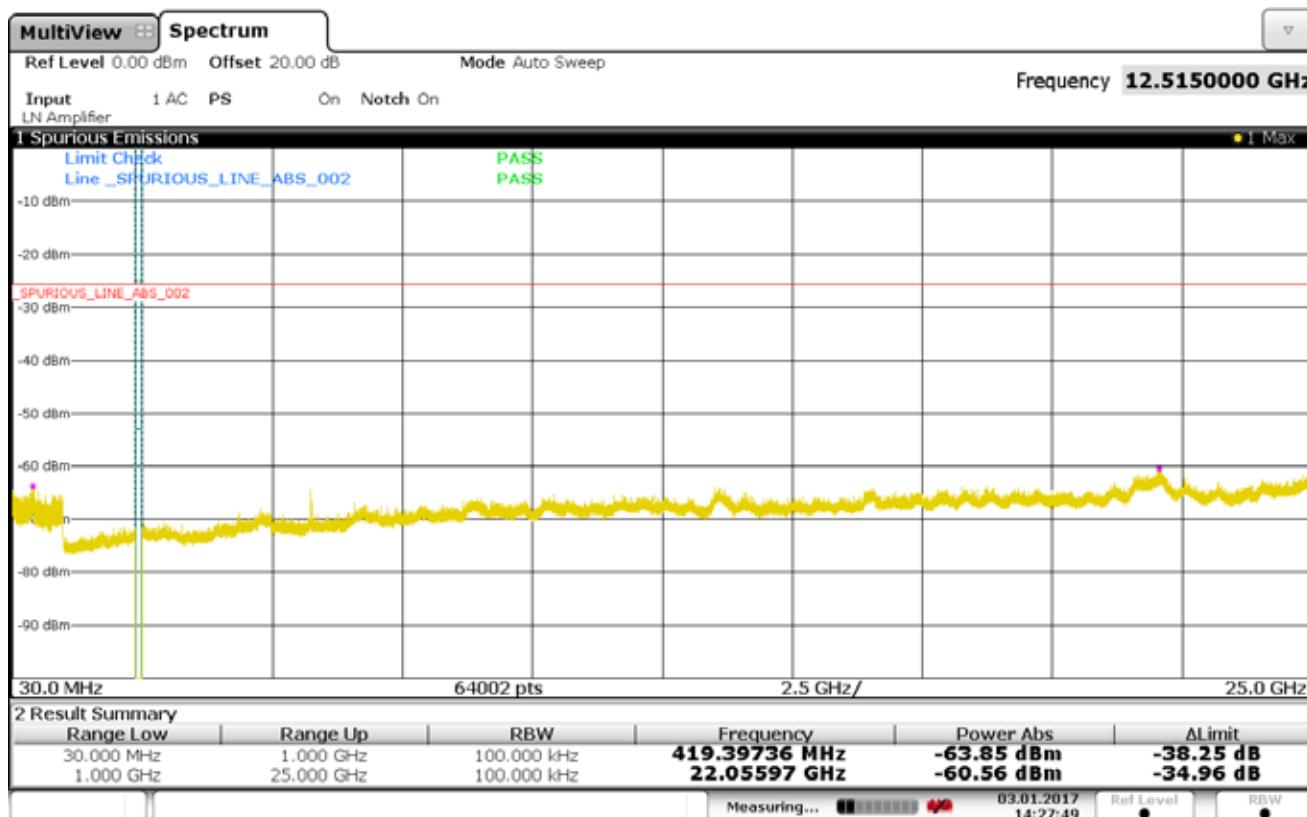
NOTES – On-time = 597.4uS, Period = 1.0mS. Duty Cycle = 0.60



DUTY CYCLE

MANUFACTURER : Shure Incorporated
 MODEL NUMBER : GLXD4R
 SERIAL NUMBER : 4162880360 95A30908 04
 TEST MODE : Mid Channel - Half Bandwidth

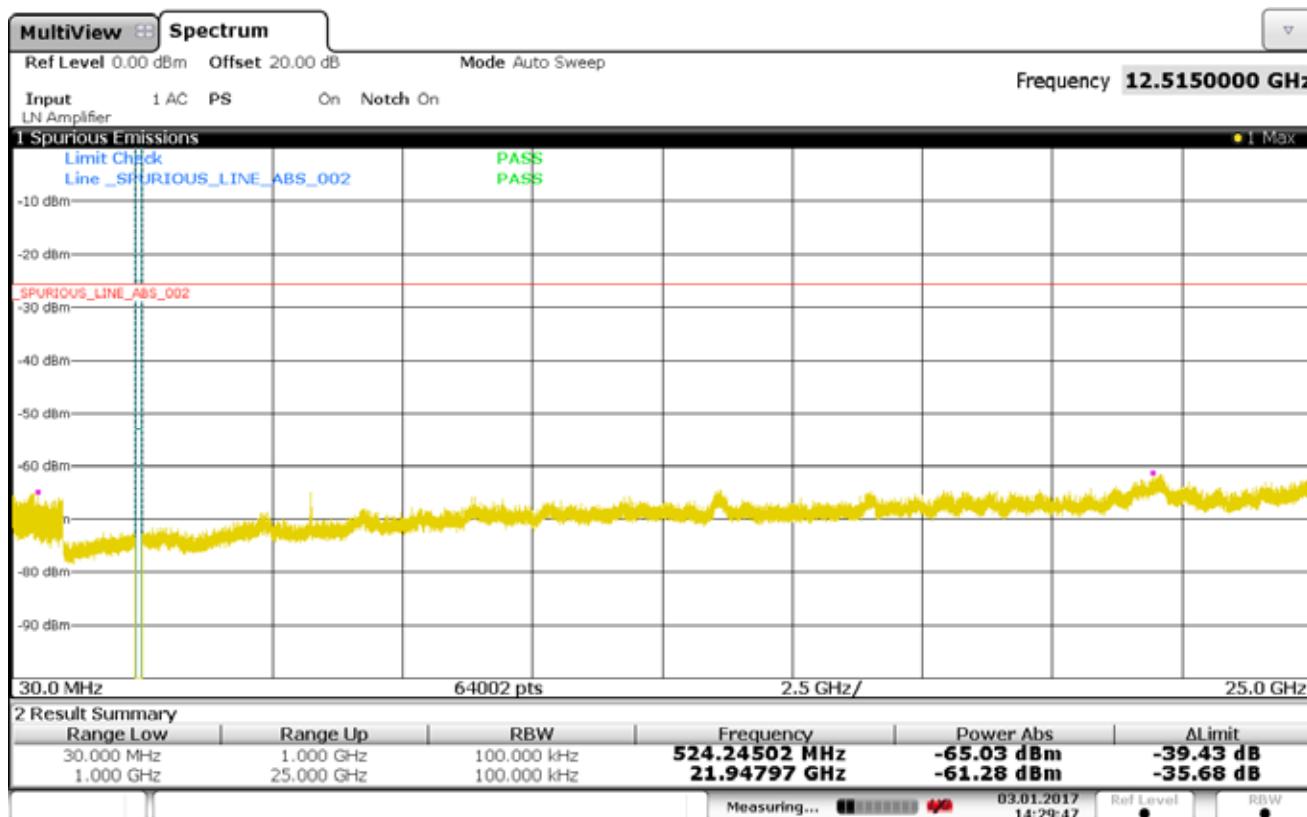
NOTES – On-time = 1.2mS, Period = 1.5mS. Duty Cycle = 0.80



ANTENNA CONDUCTED SPURIOUS EMISSIONS

MANUFACTURER : Shure Incorporated
 MODEL NUMBER : GLXD4R
 SERIAL NUMBER : 4162880360 95A30908 04
 TEST MODE : Low Channel - Full Bandwidth

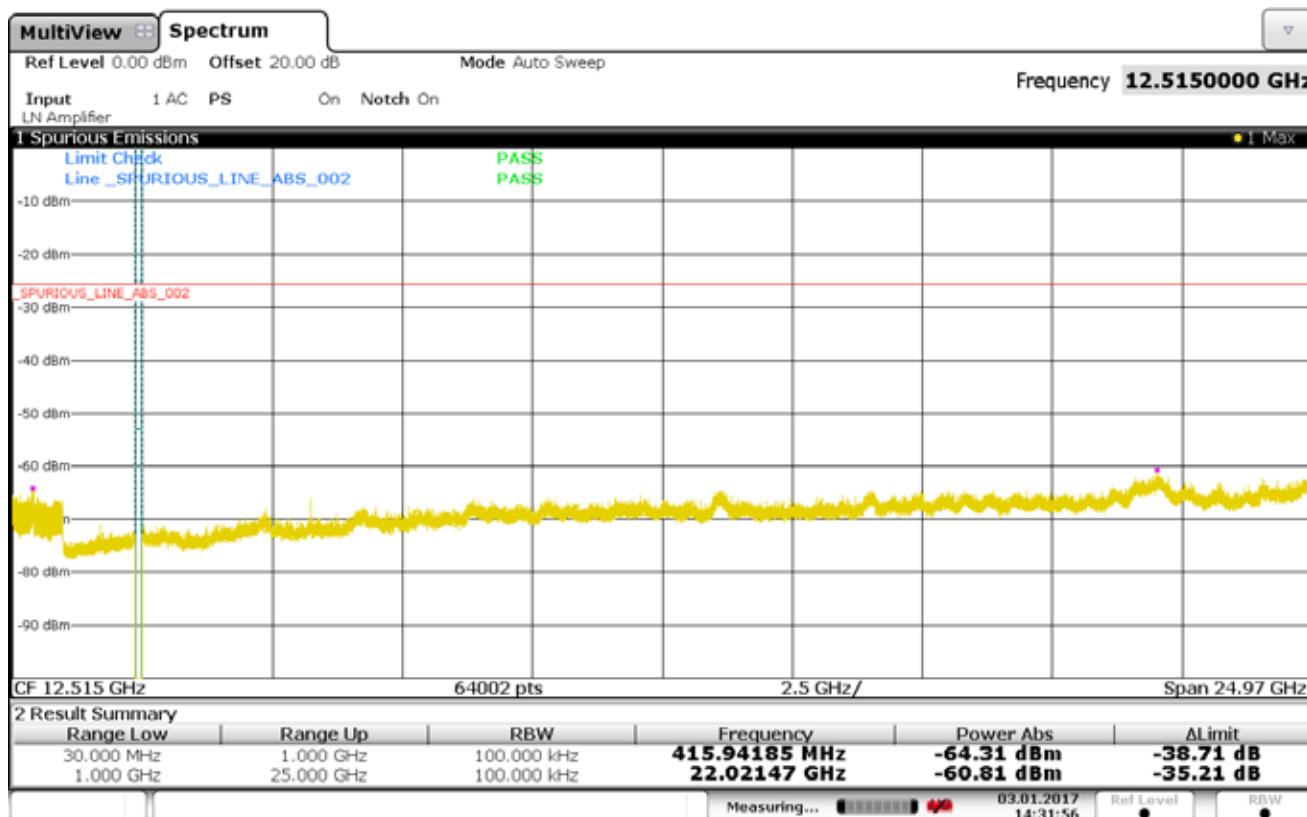
NOTES



ANTENNA CONDUCTED SPURIOUS EMISSIONS

MANUFACTURER : Shure Incorporated
 MODEL NUMBER : GLXD4R
 SERIAL NUMBER : 4162880360 95A30908 04
 TEST MODE : Low Channel - Half Bandwidth

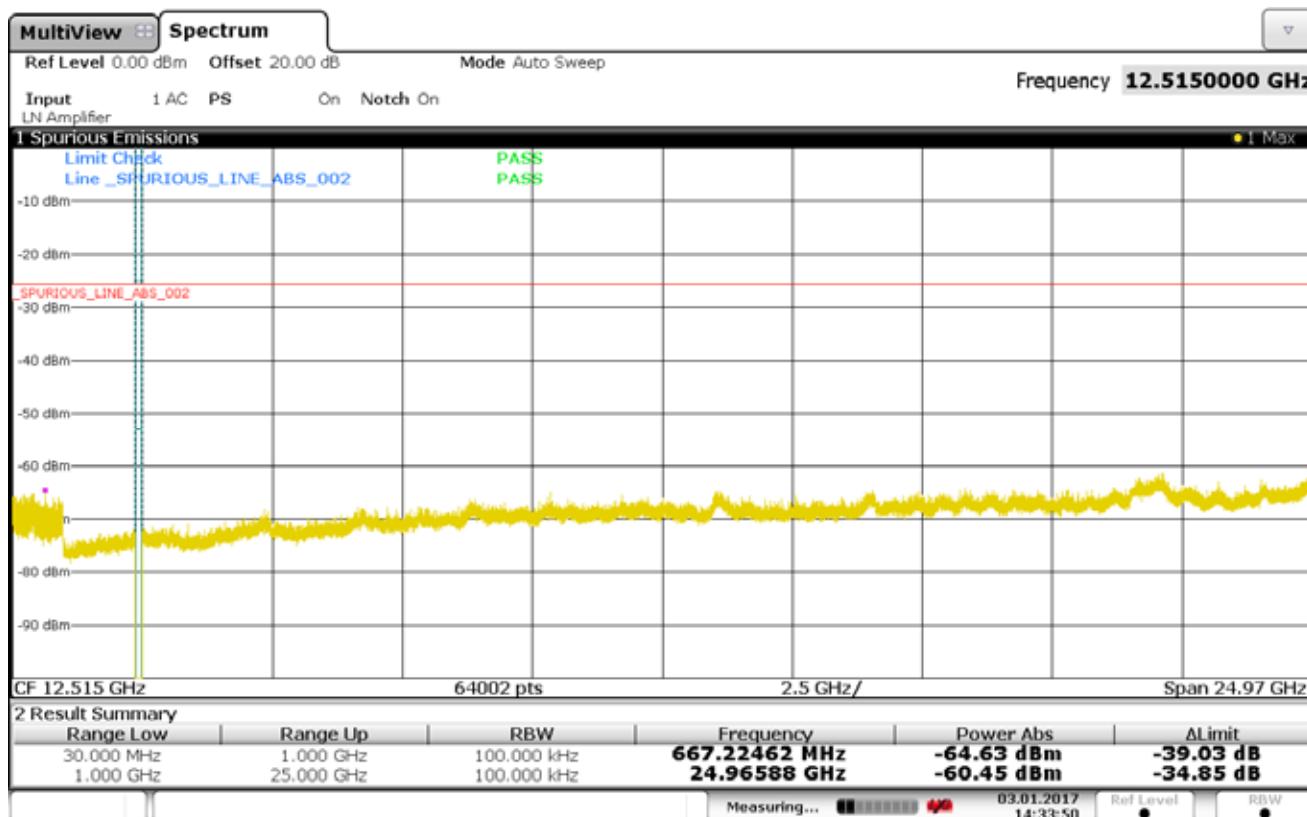
NOTES



ANTENNA CONDUCTED SPURIOUS EMISSIONS

MANUFACTURER : Shure Incorporated
 MODEL NUMBER : GLXD4R
 SERIAL NUMBER : 4162880360 95A30908 04
 TEST MODE : Mid Channel - Full Bandwidth

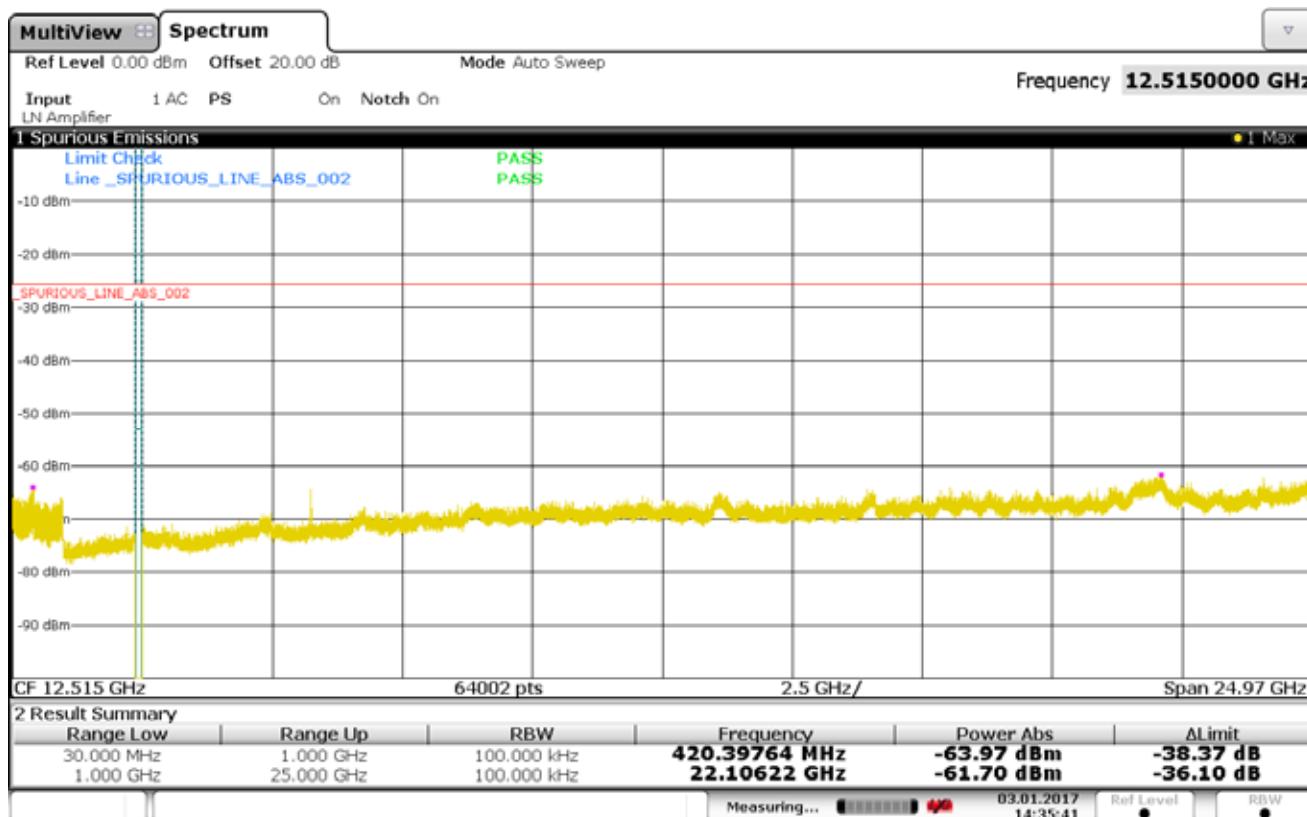
NOTES



ANTENNA CONDUCTED SPURIOUS EMISSIONS

MANUFACTURER : Shure Incorporated
 MODEL NUMBER : GLXD4R
 SERIAL NUMBER : 4162880360 95A30908 04
 TEST MODE : Mid Channel - Half Bandwidth

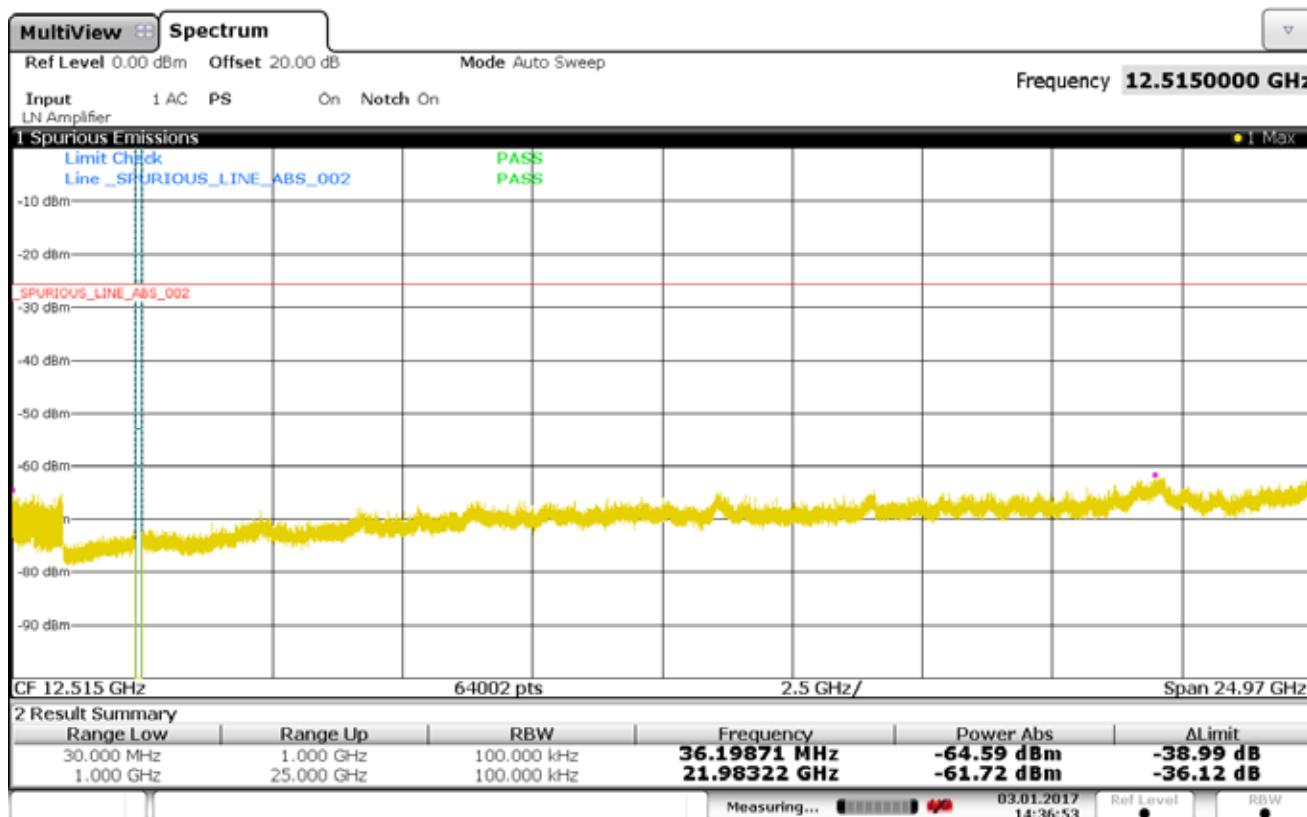
NOTES



ANTENNA CONDUCTED SPURIOUS EMISSIONS

MANUFACTURER : Shure Incorporated
 MODEL NUMBER : GLXD4R
 SERIAL NUMBER : 4162880360 95A30908 04
 TEST MODE : High Channel - Full Bandwidth

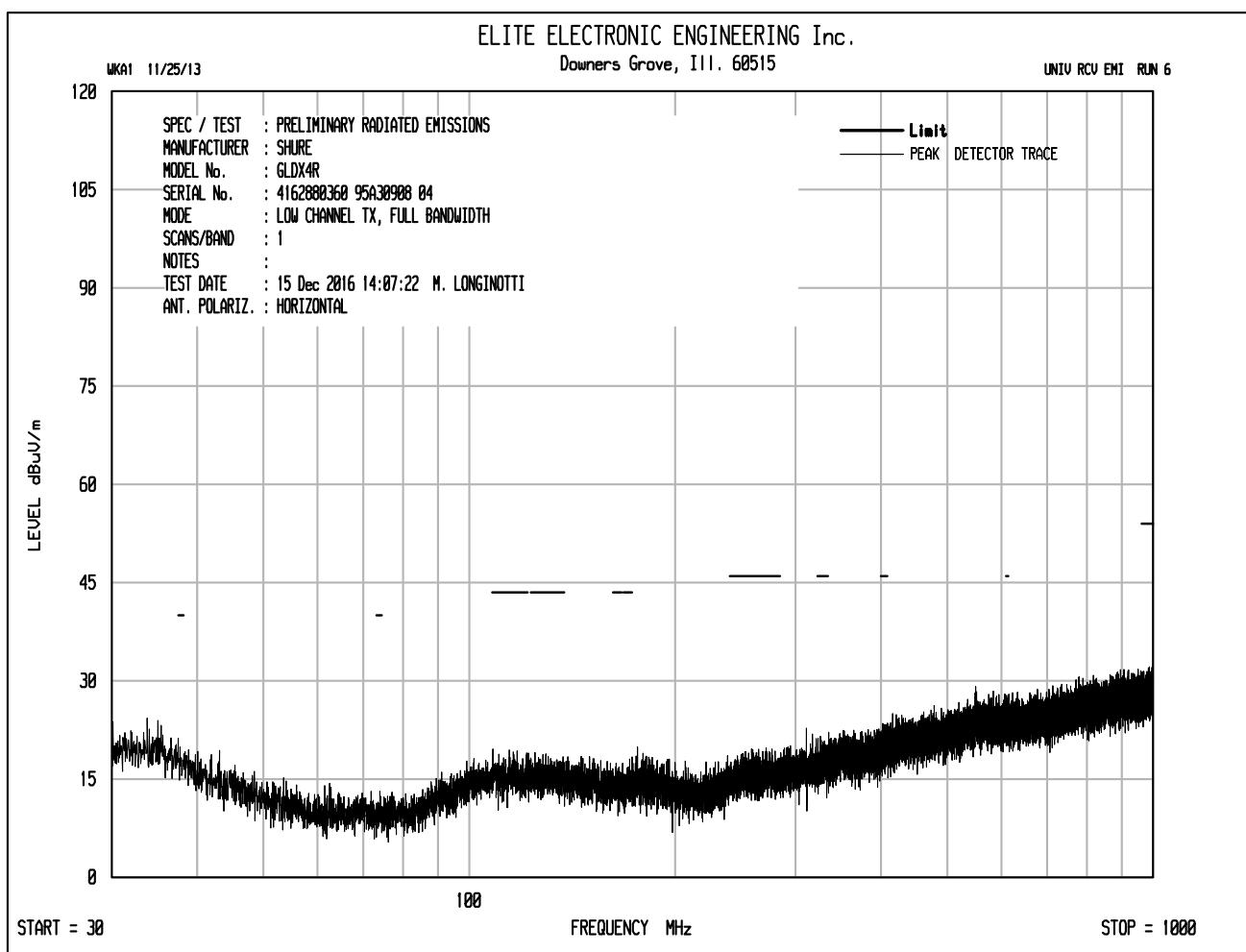
NOTES

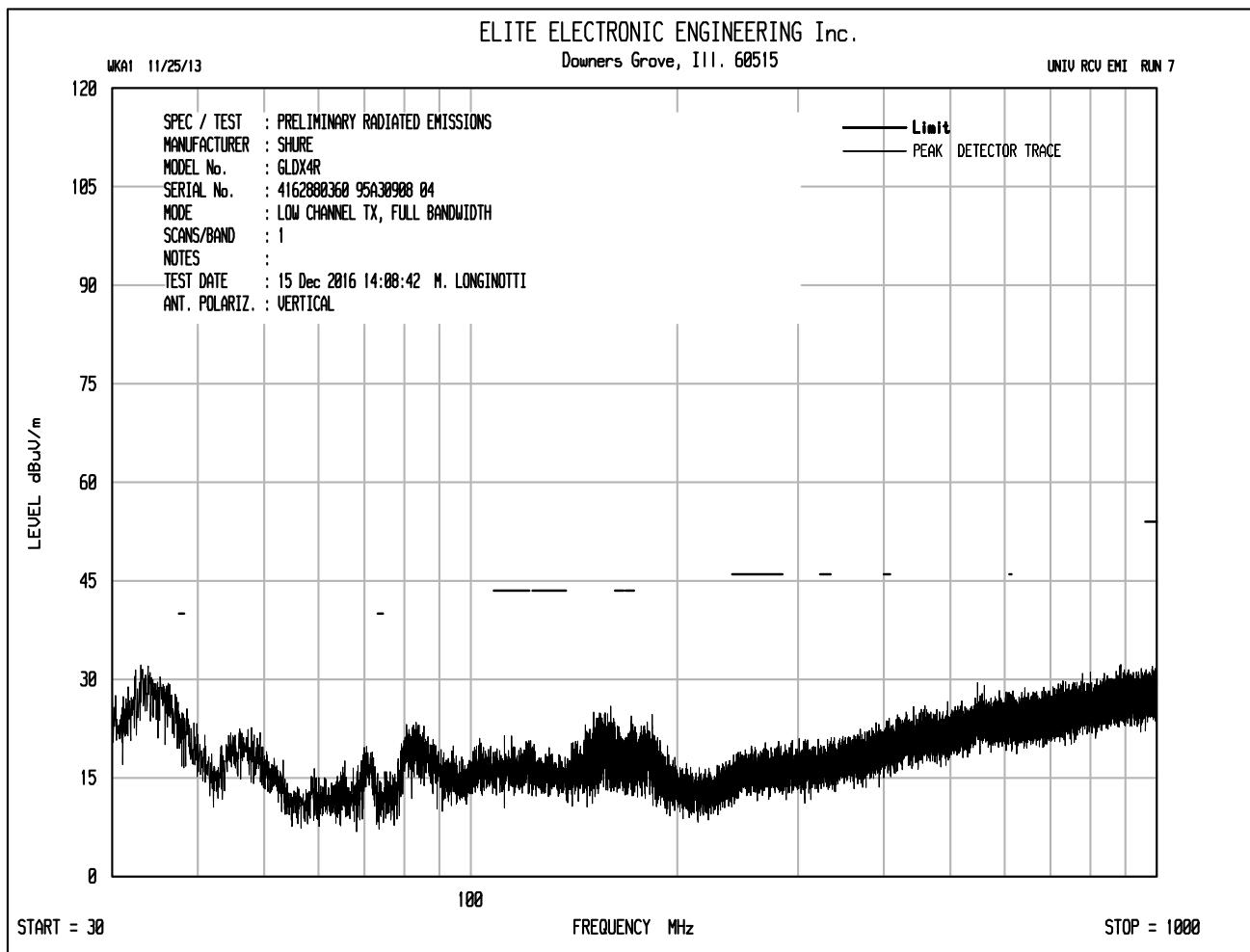


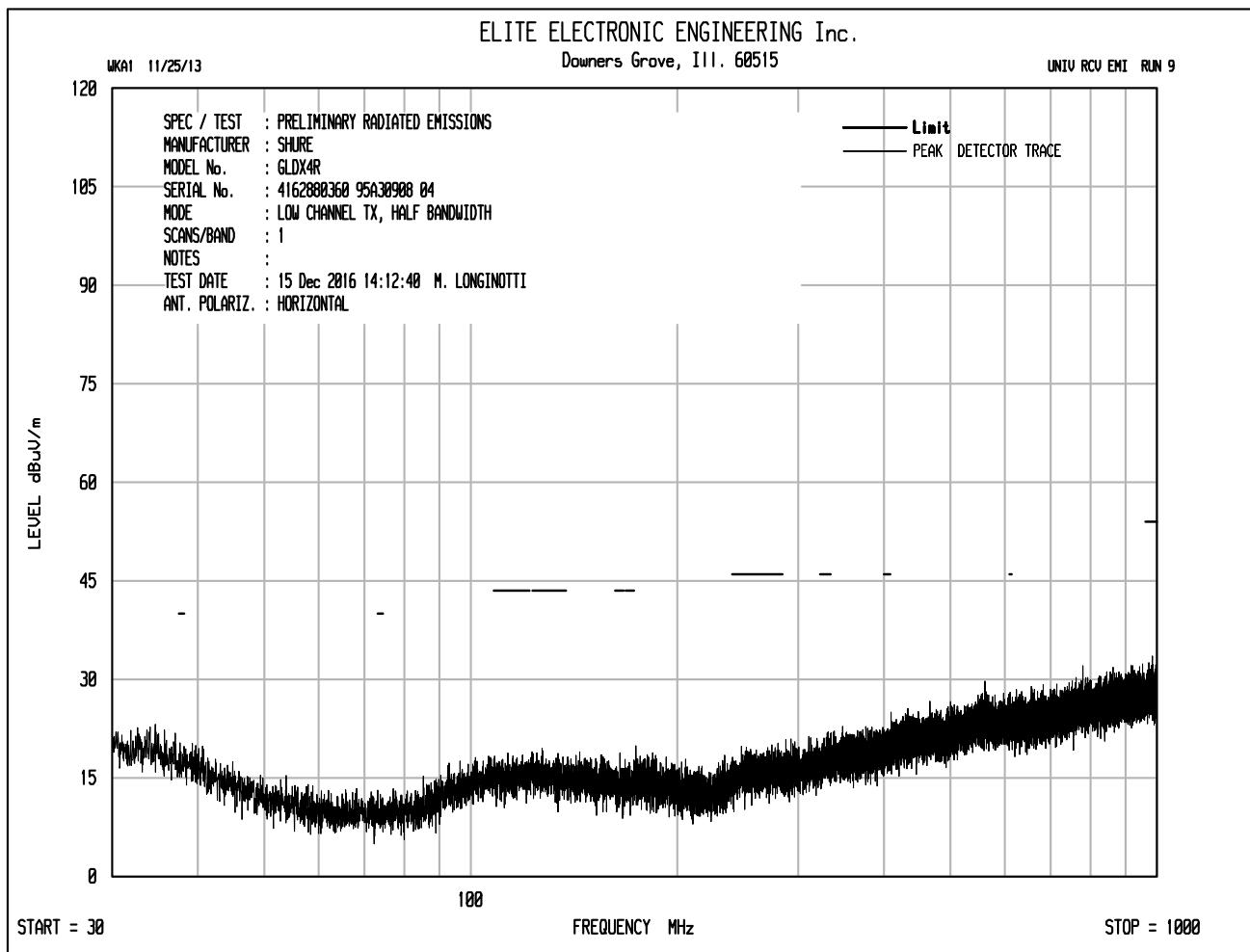
ANTENNA CONDUCTED SPURIOUS EMISSIONS

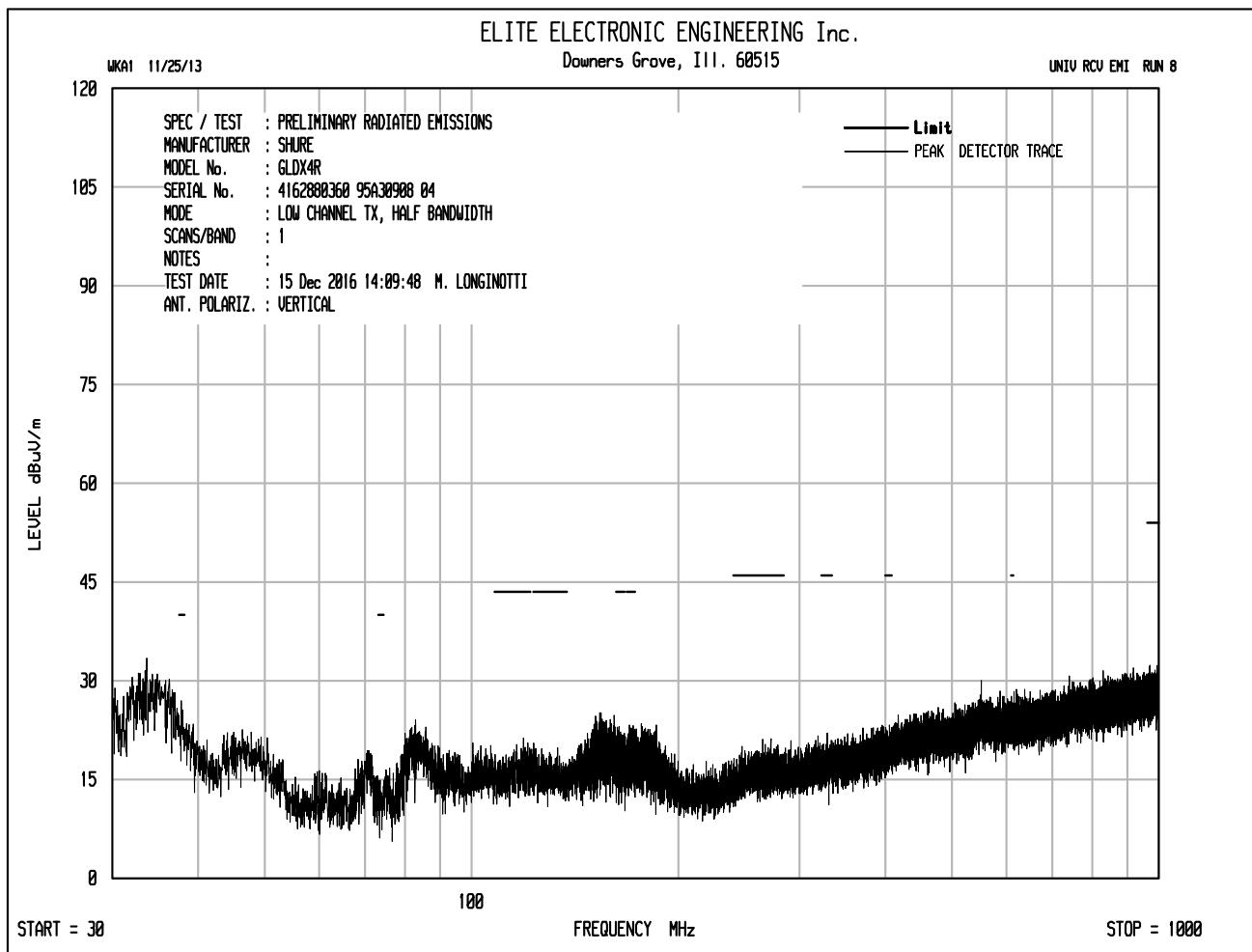
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 TEST MODE : High Channel - Half Bandwidth

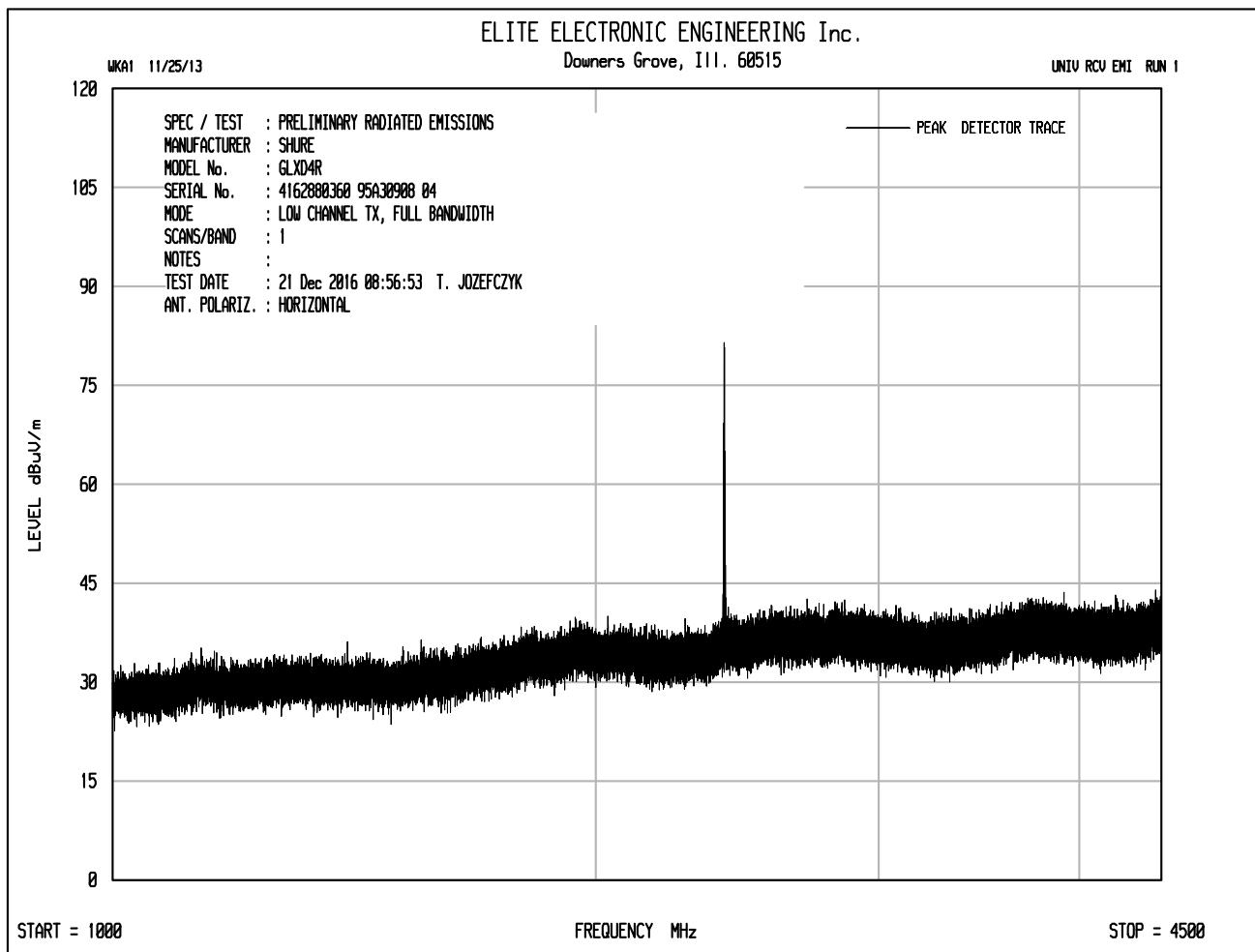
NOTES

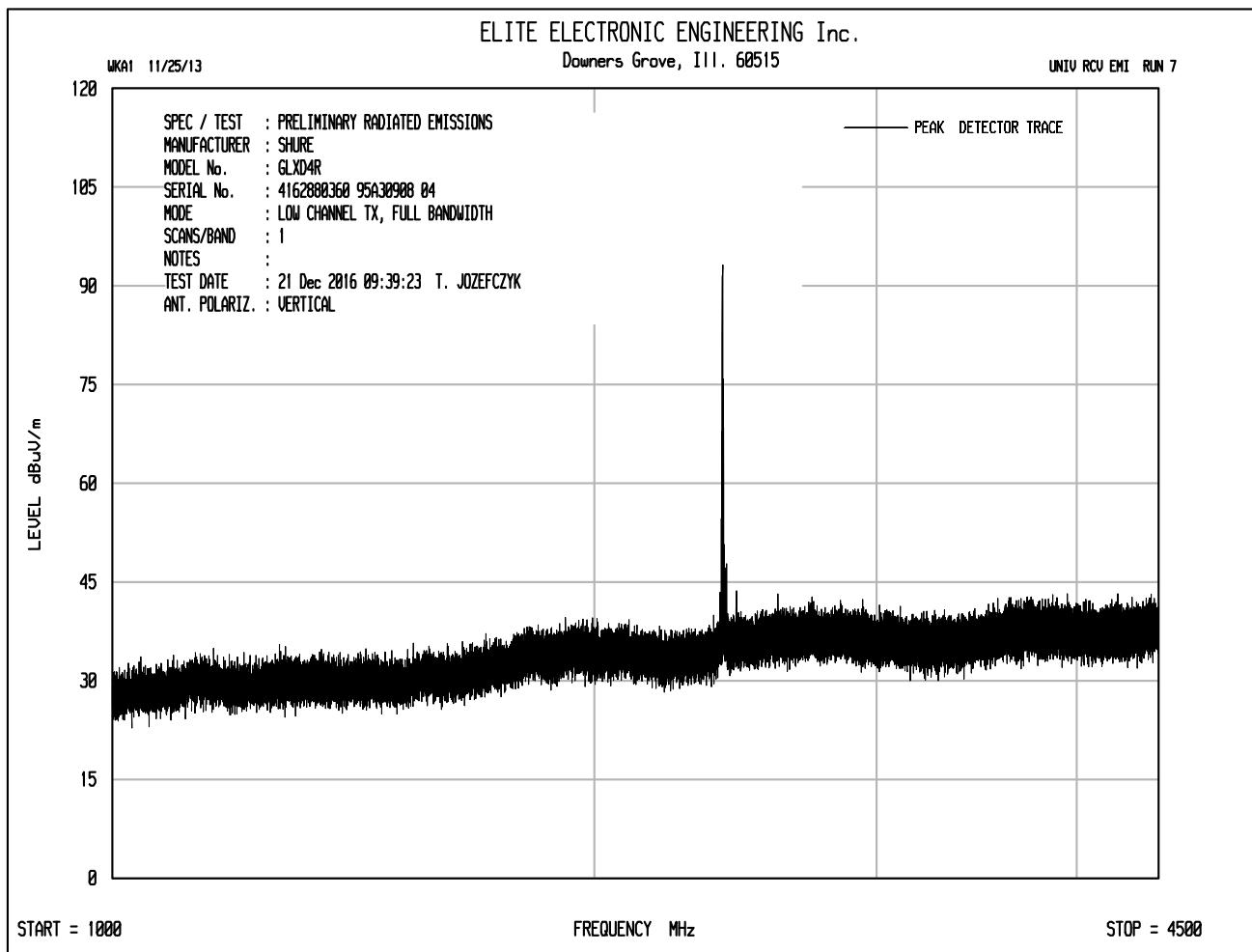


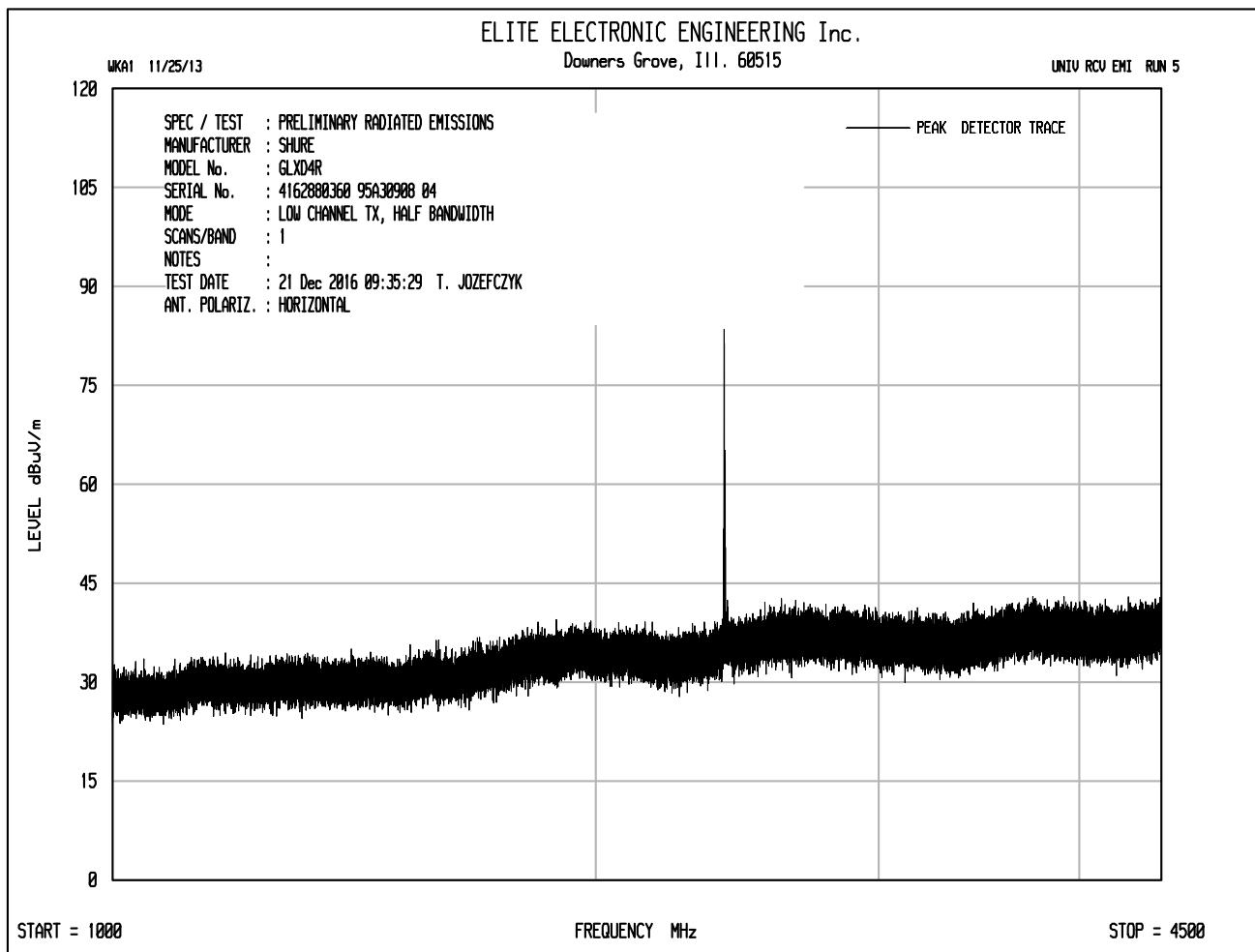


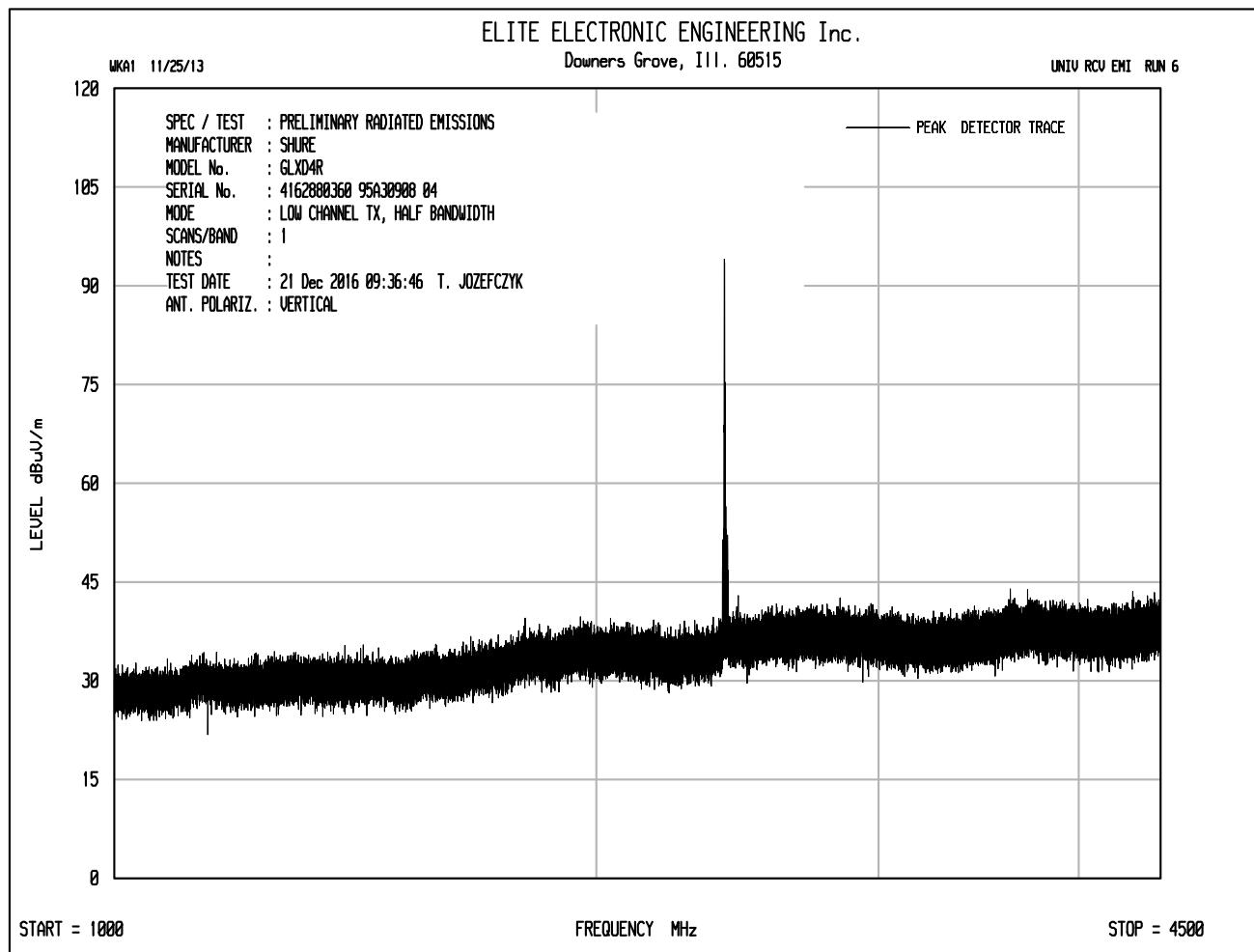


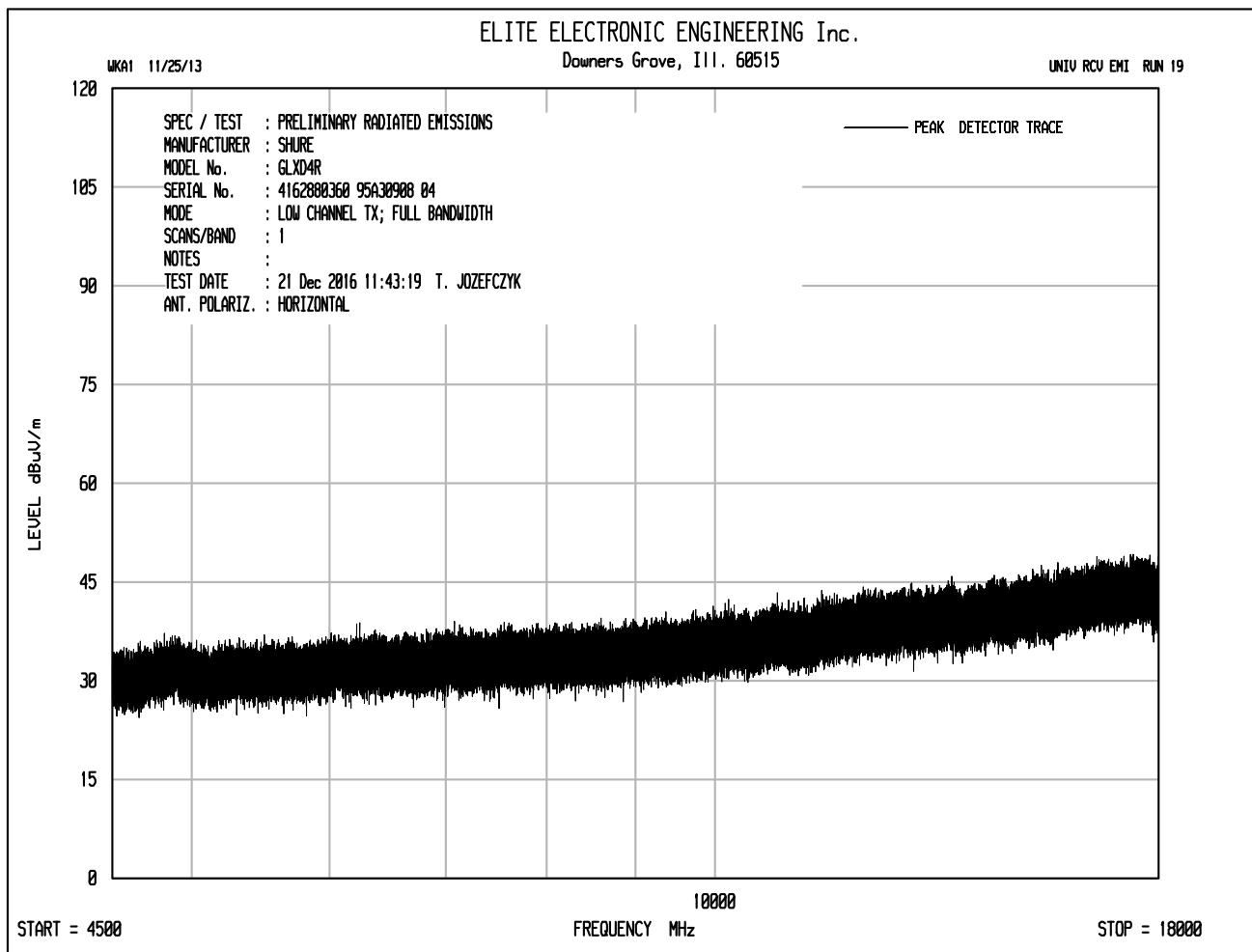


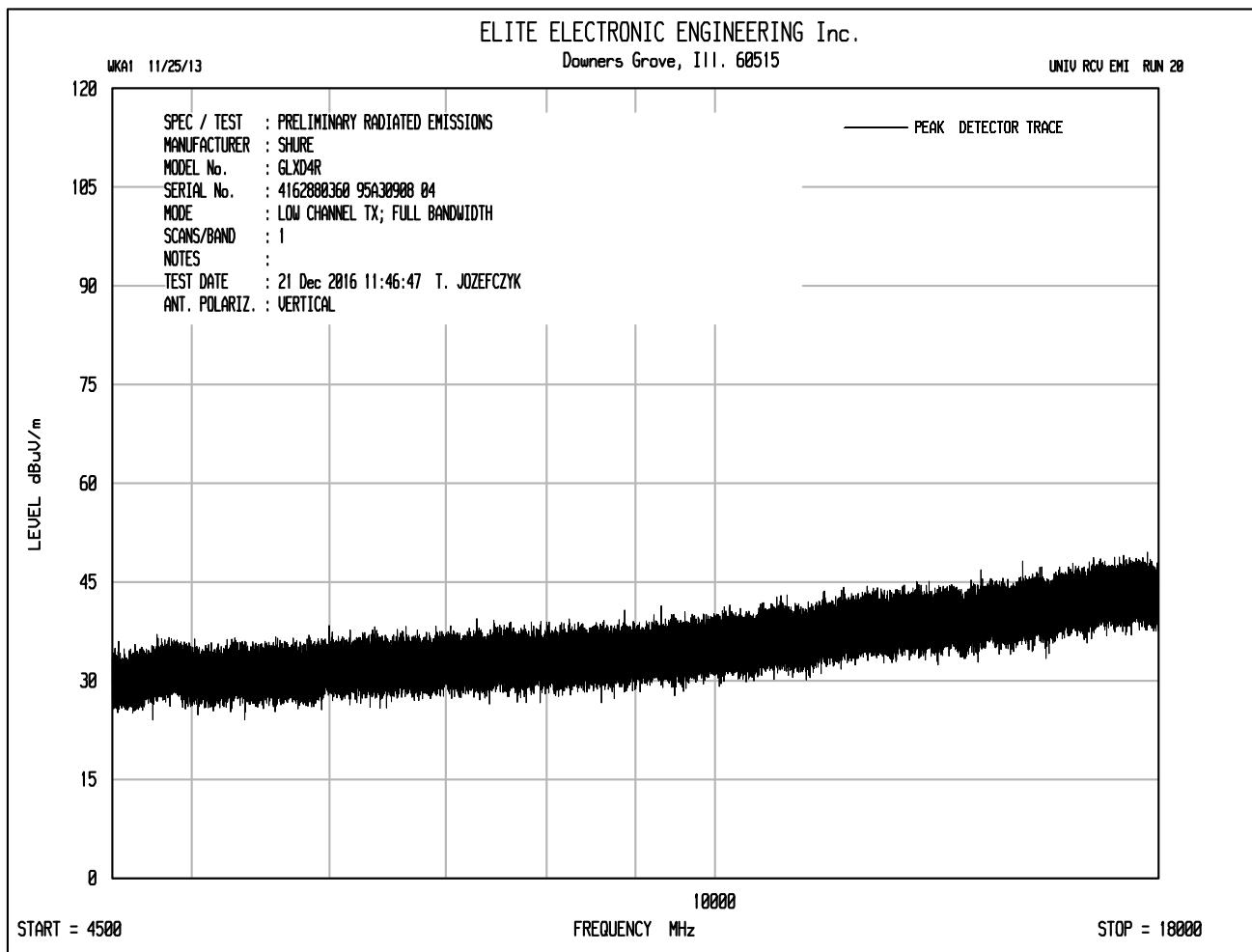


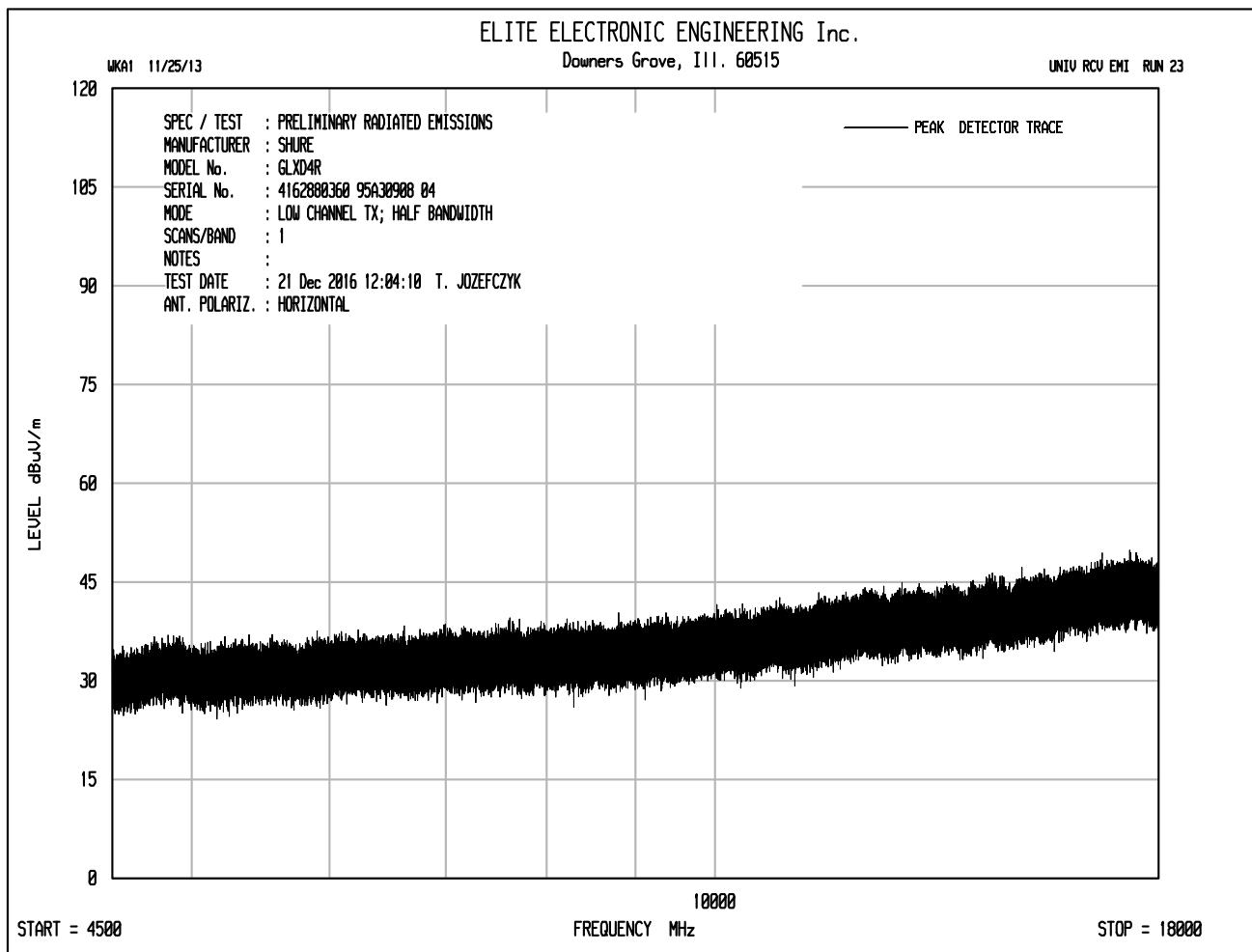


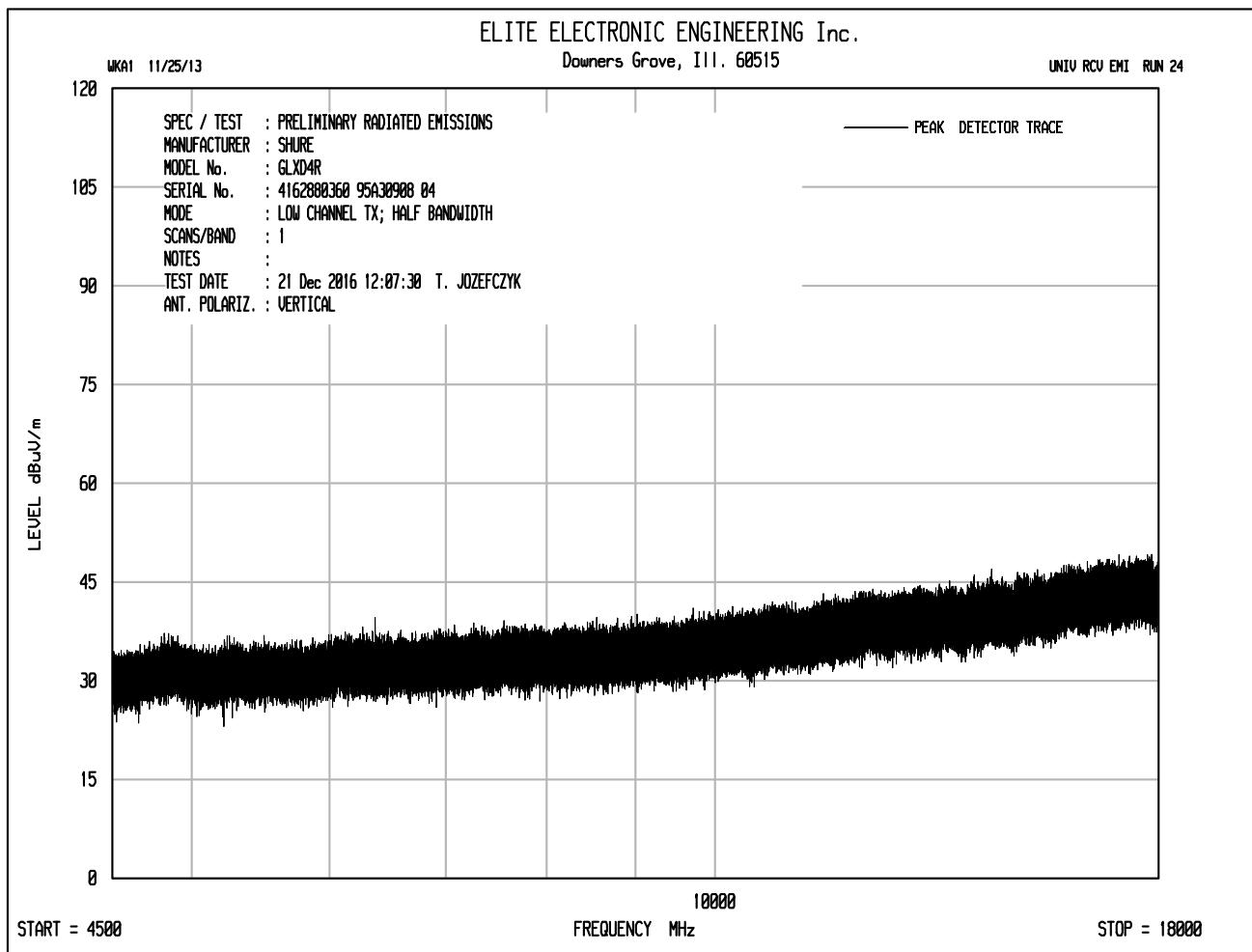










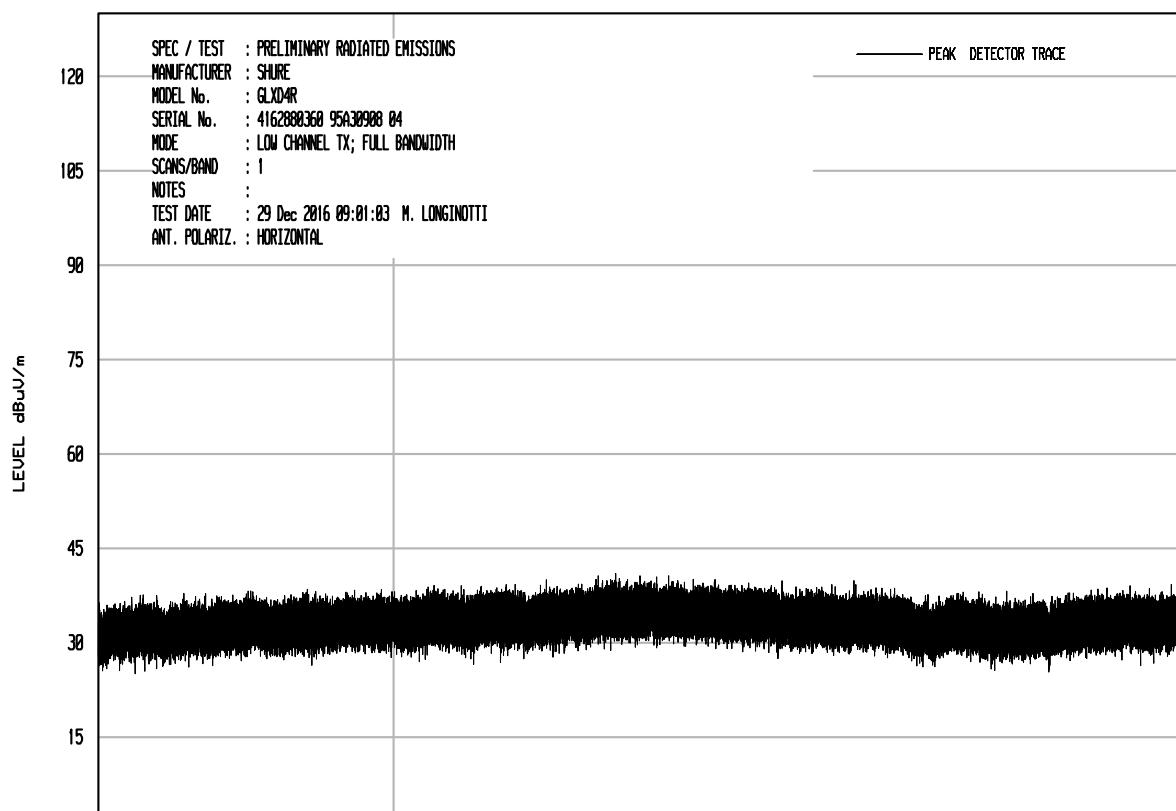


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ELITE ELECTRONIC ENGINEERING Inc.

Downers Grove, Ill. 60515

UNIV RCV EMI RUN 2



START = 18000

FREQUENCY MHz

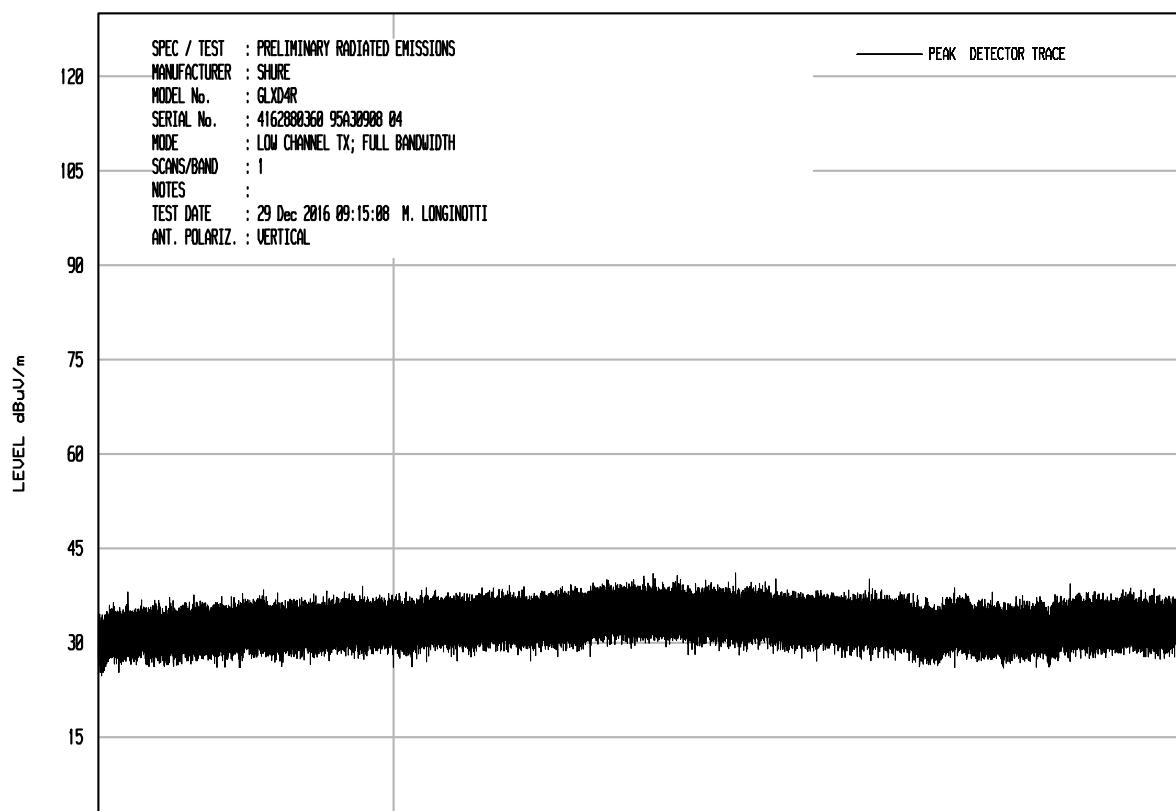
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ELITE ELECTRONIC ENGINEERING Inc.

Downers Grove, Ill. 60515

UNIV RCV EMI RUN 3

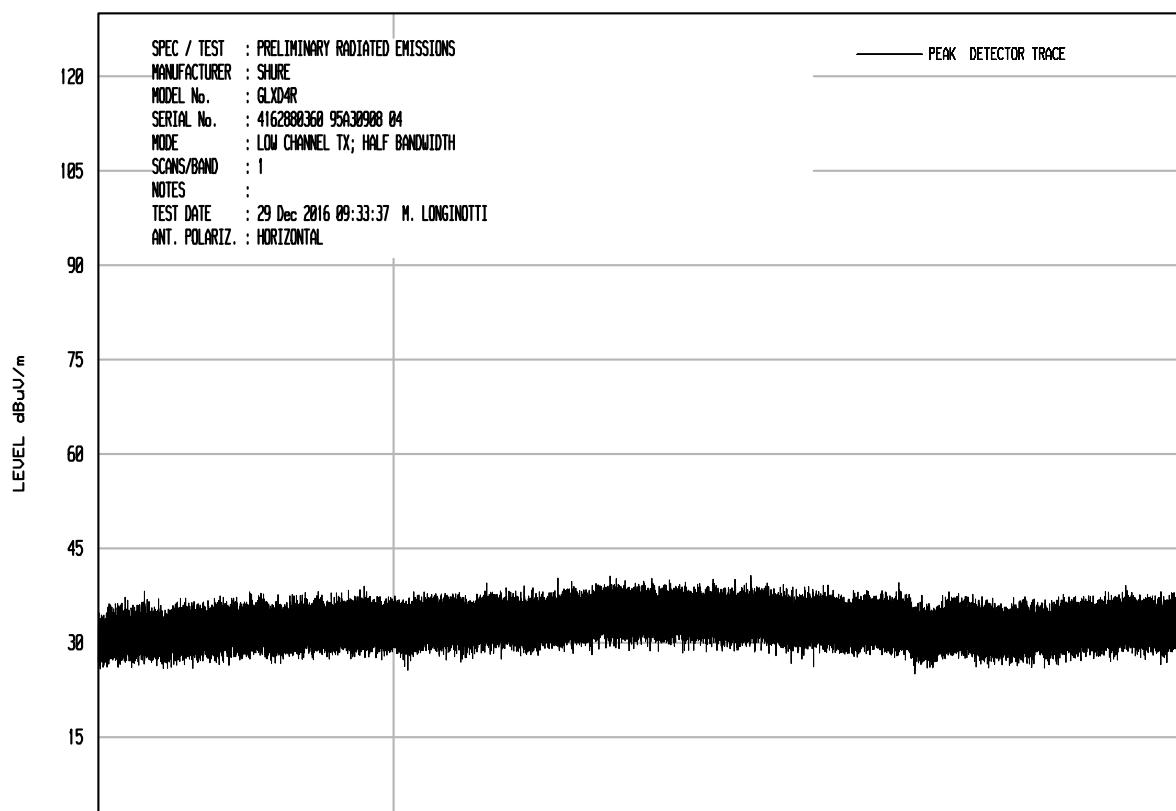


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ELITE ELECTRONIC ENGINEERING Inc.

Downers Grove, Ill. 60515

UNIV RCV EMI RUN 5



START = 18000

FREQUENCY MHz

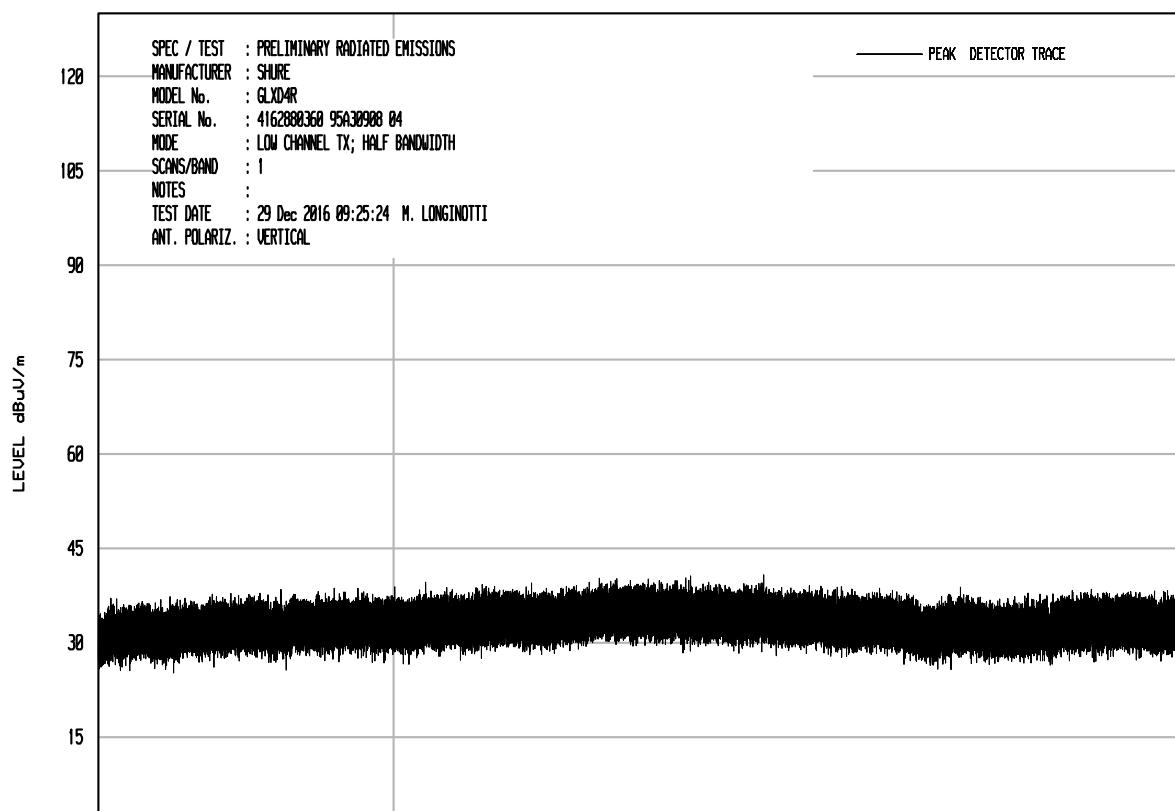
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ELITE ELECTRONIC ENGINEERING Inc.

Downers Grove, Ill. 60515

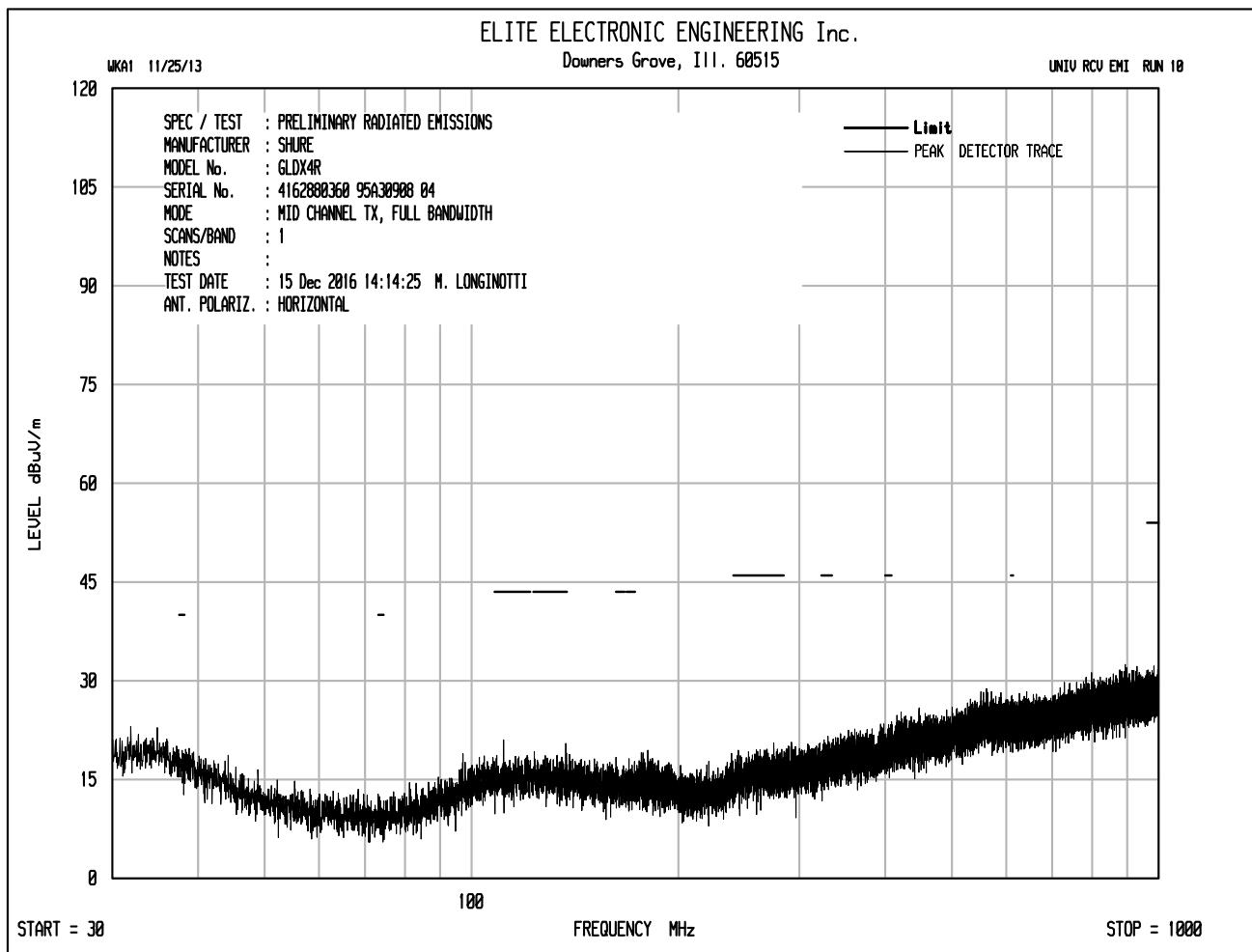
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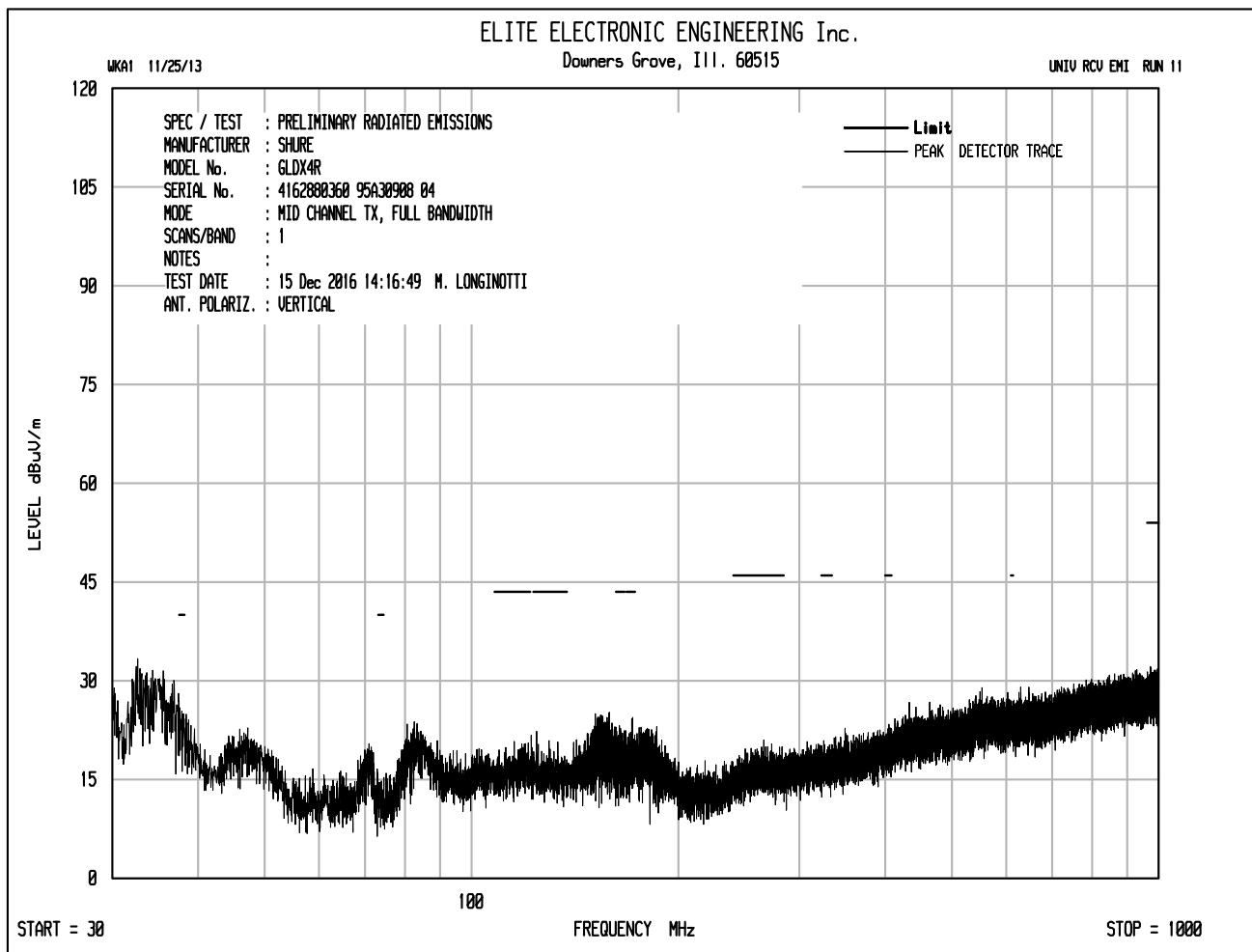


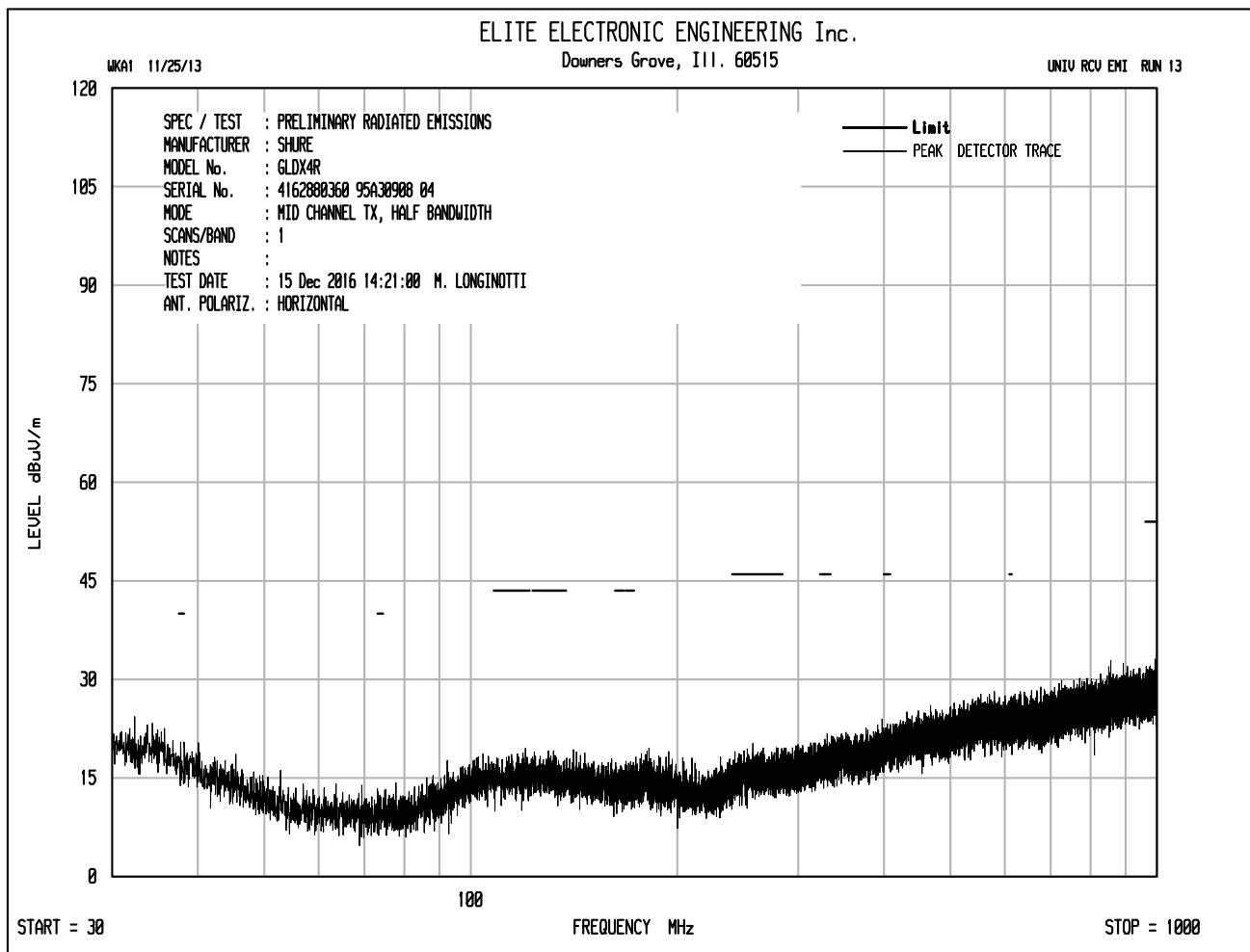
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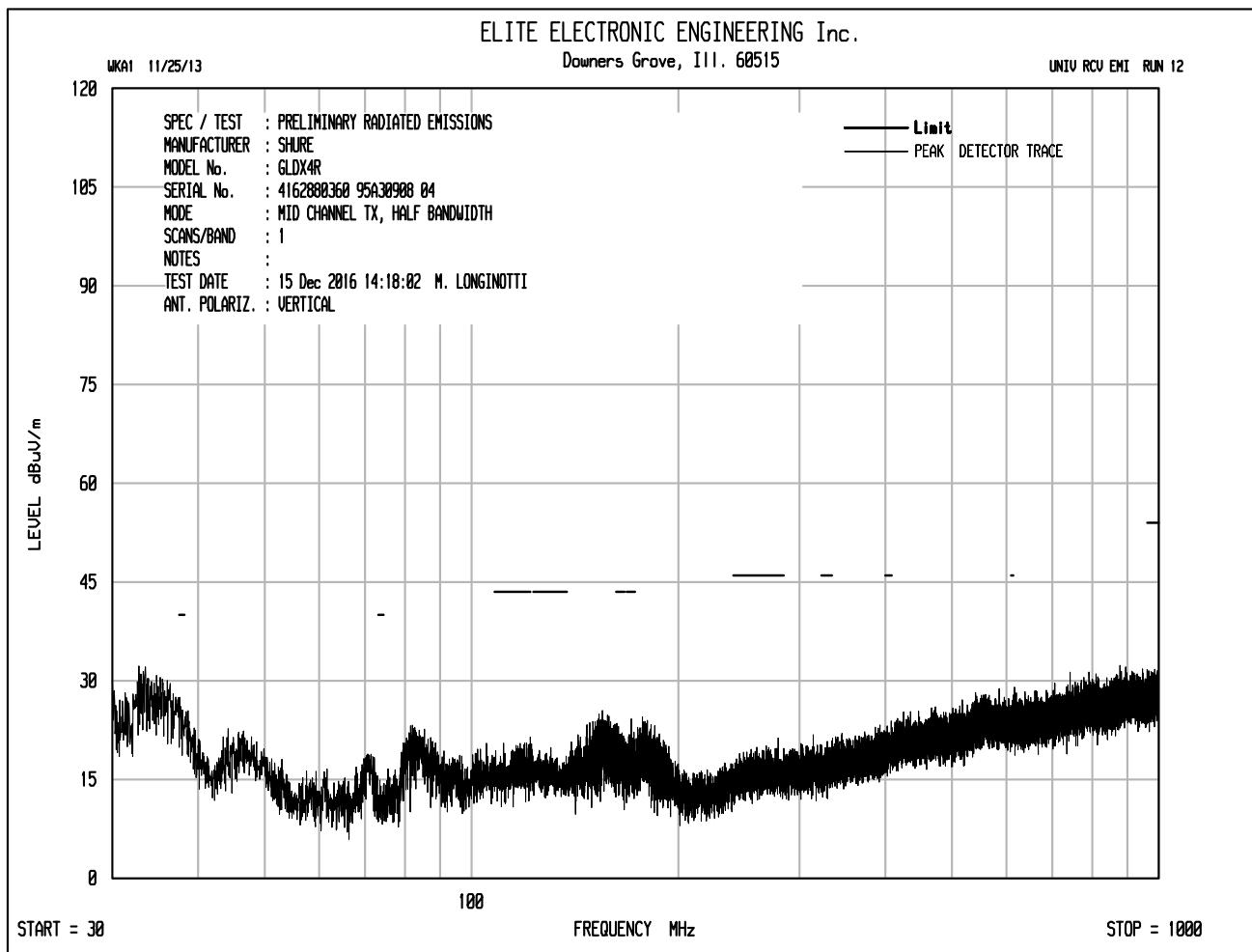
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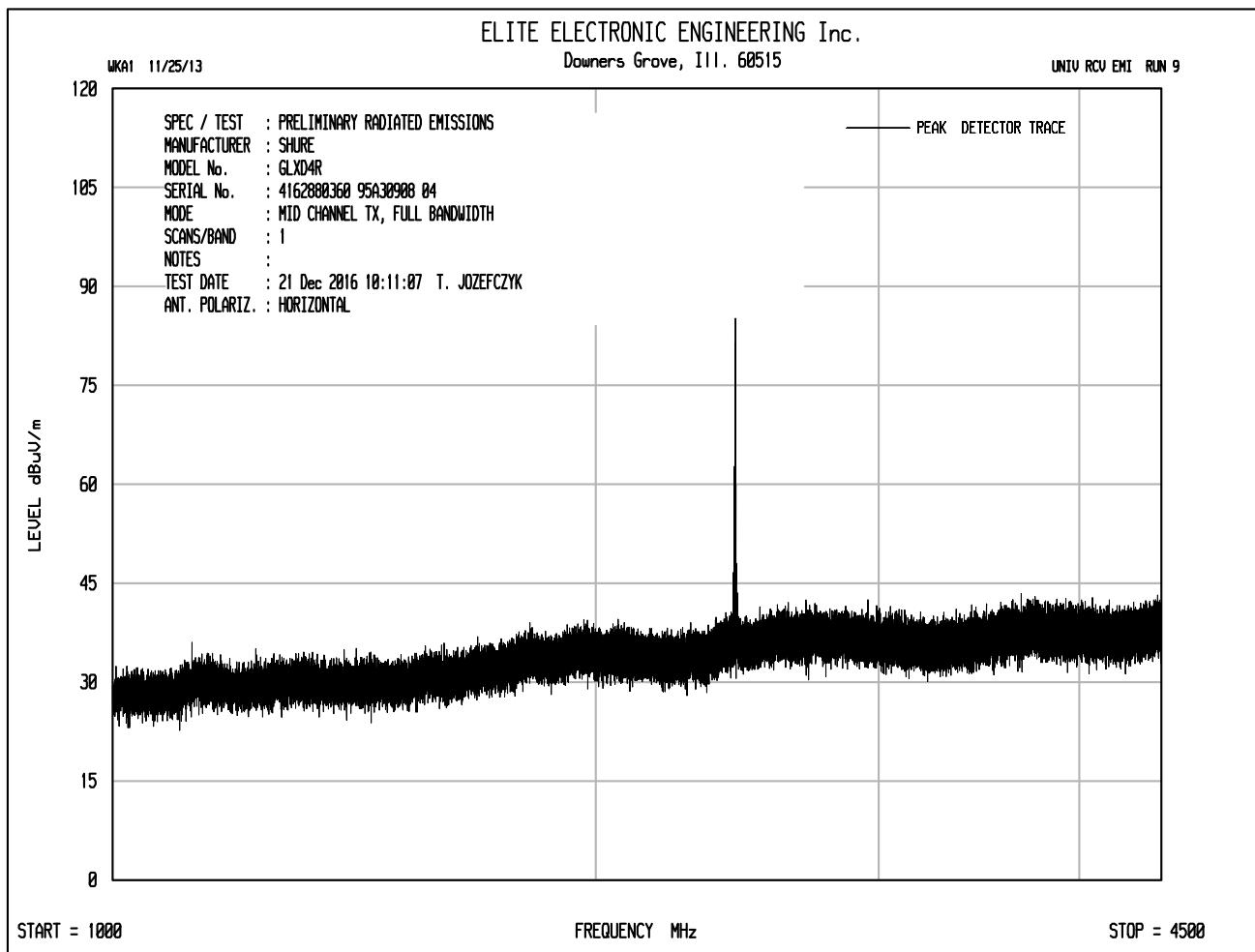
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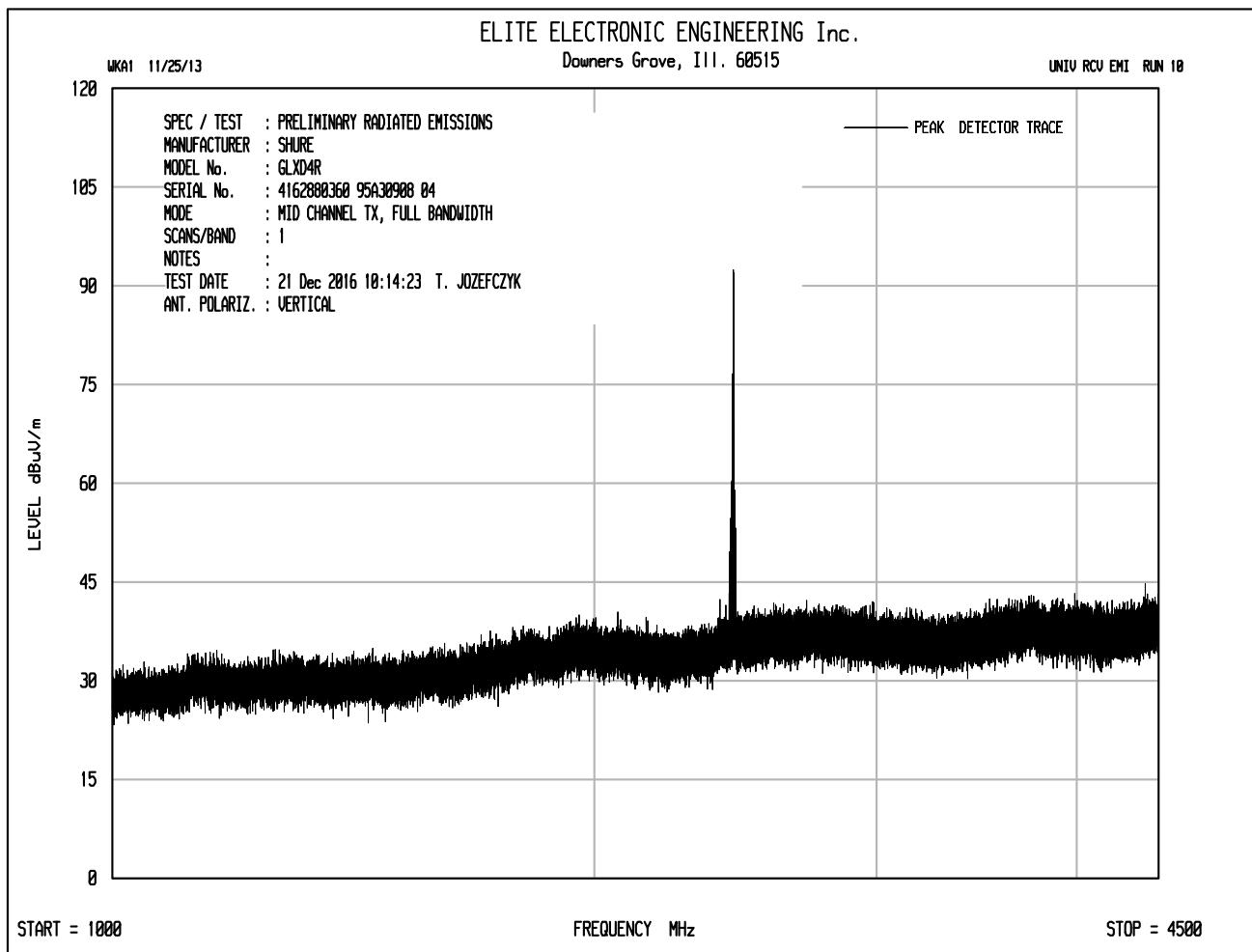


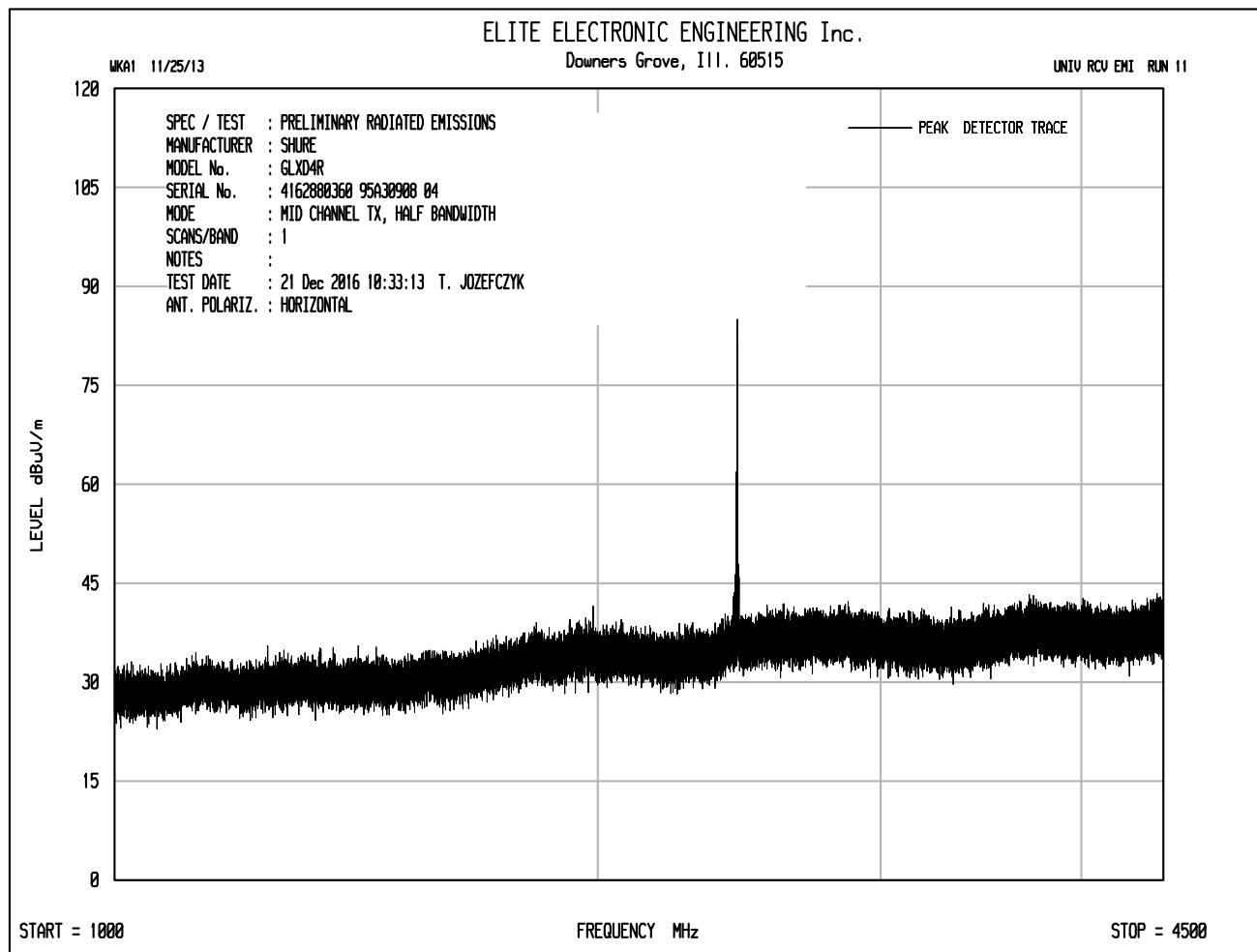


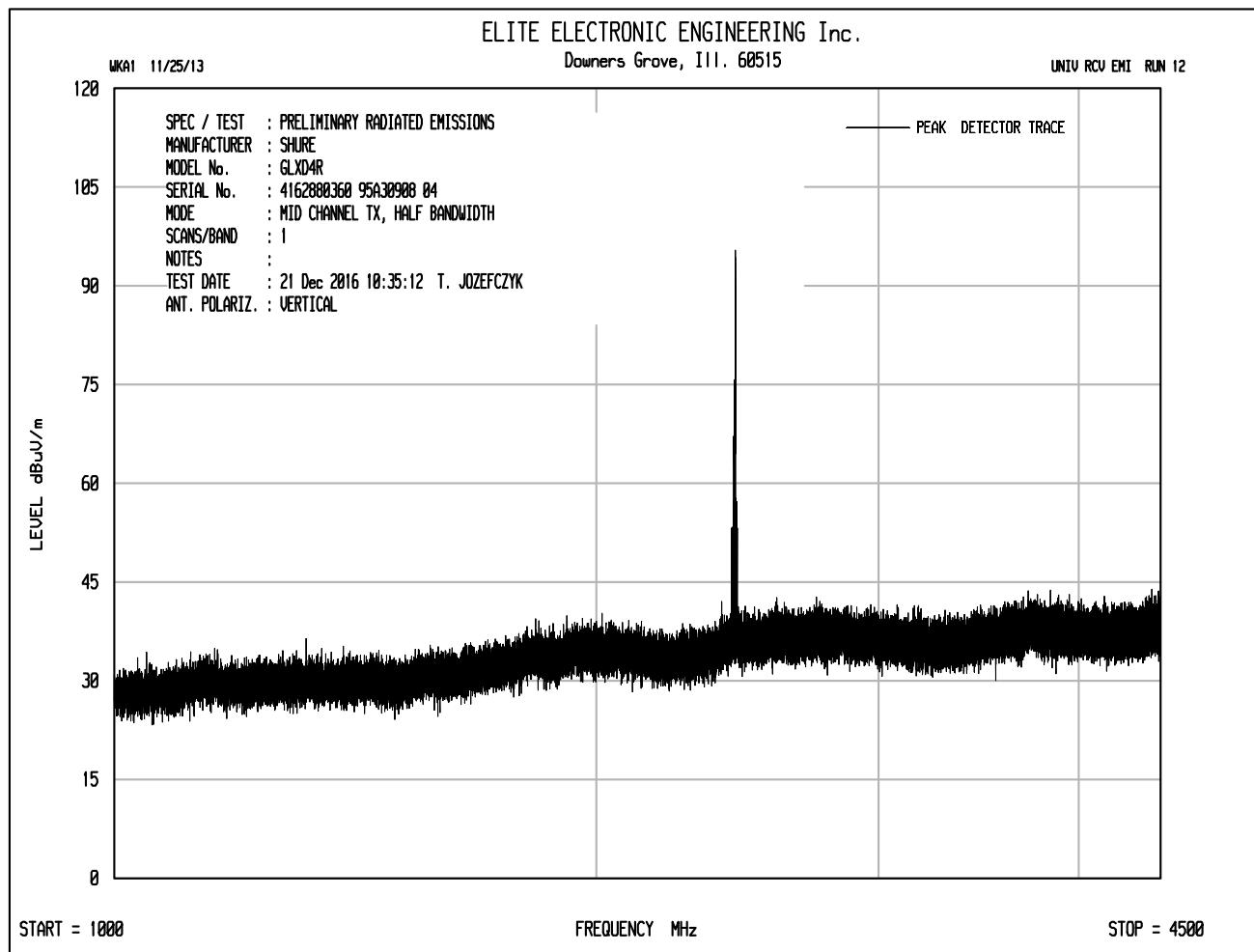


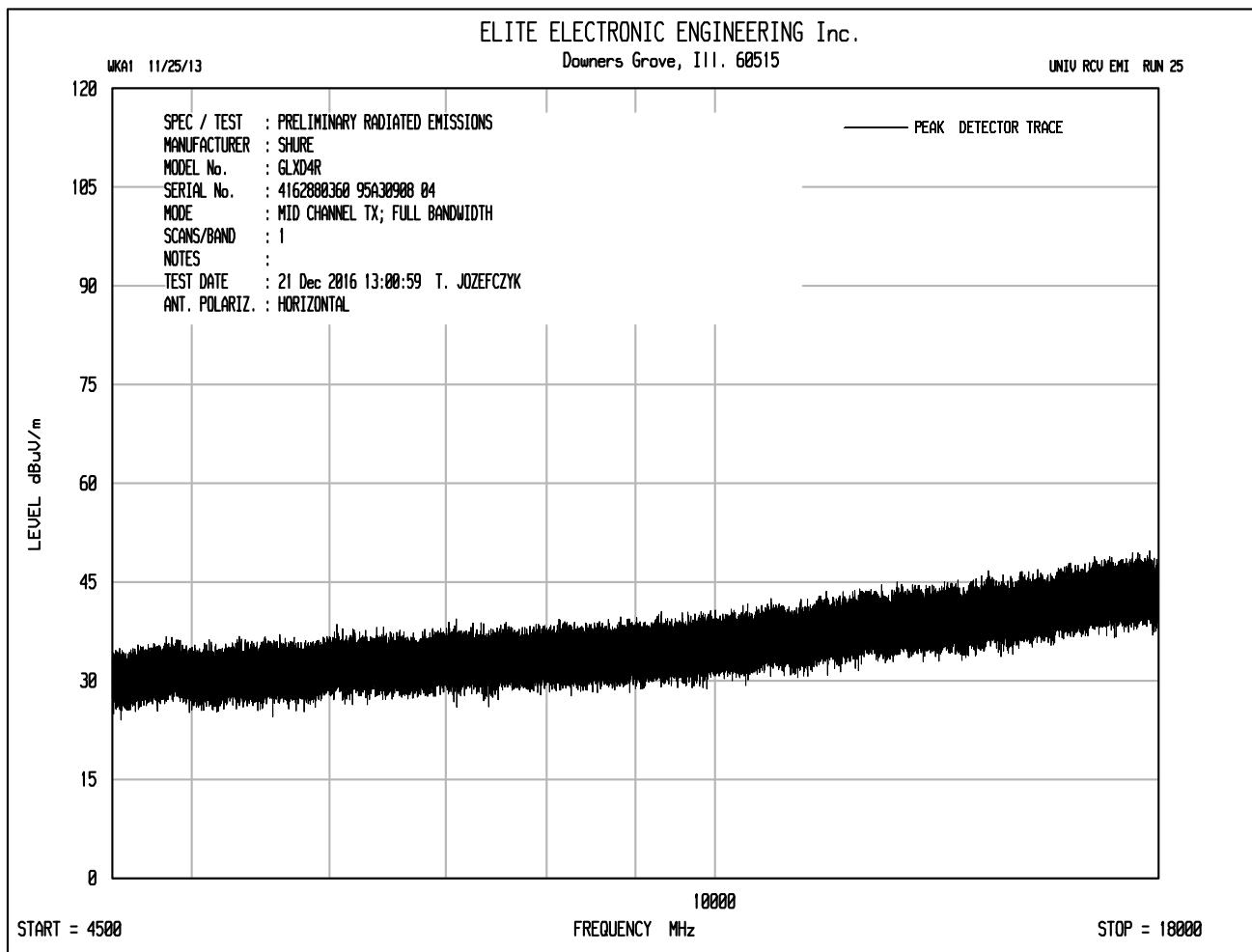


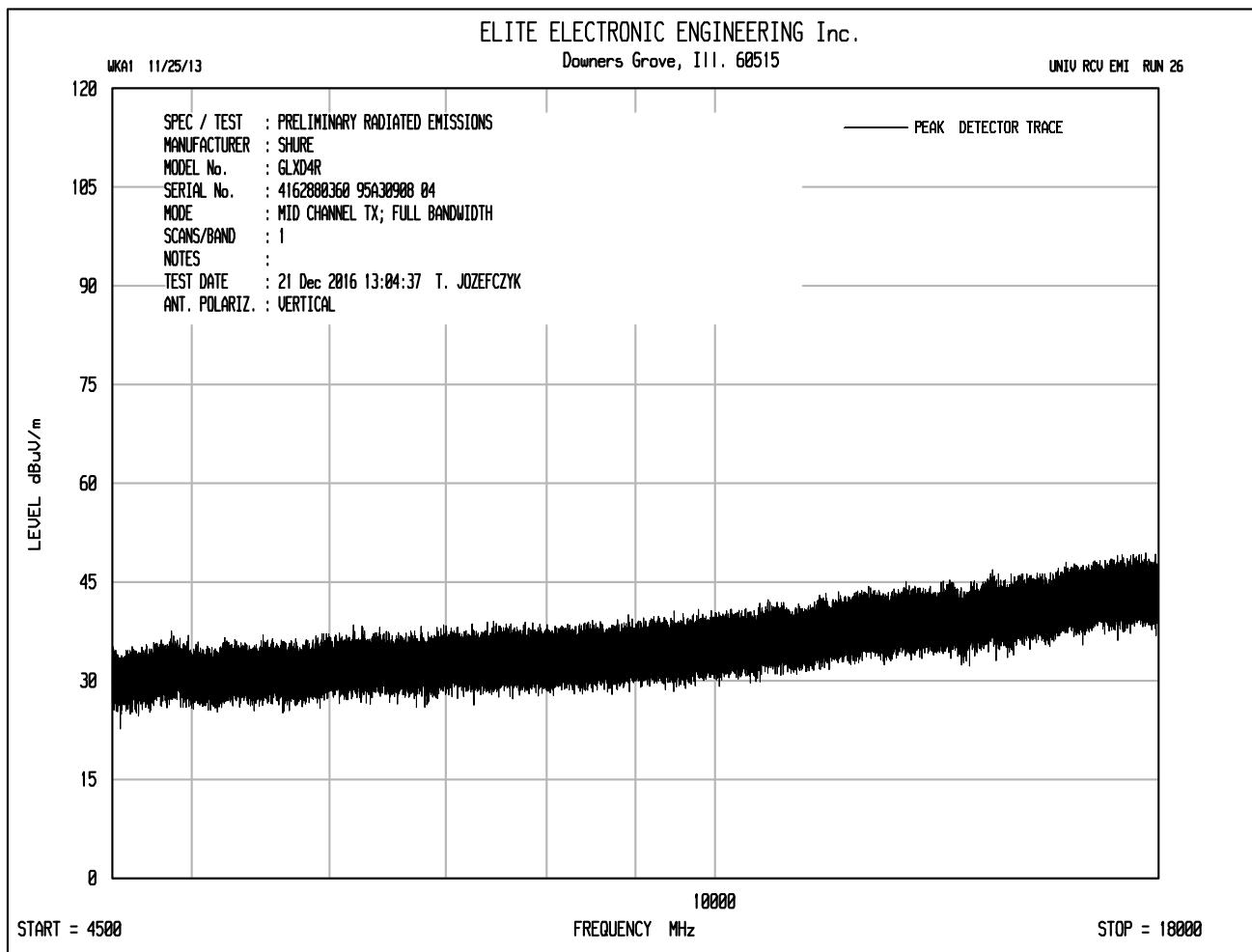


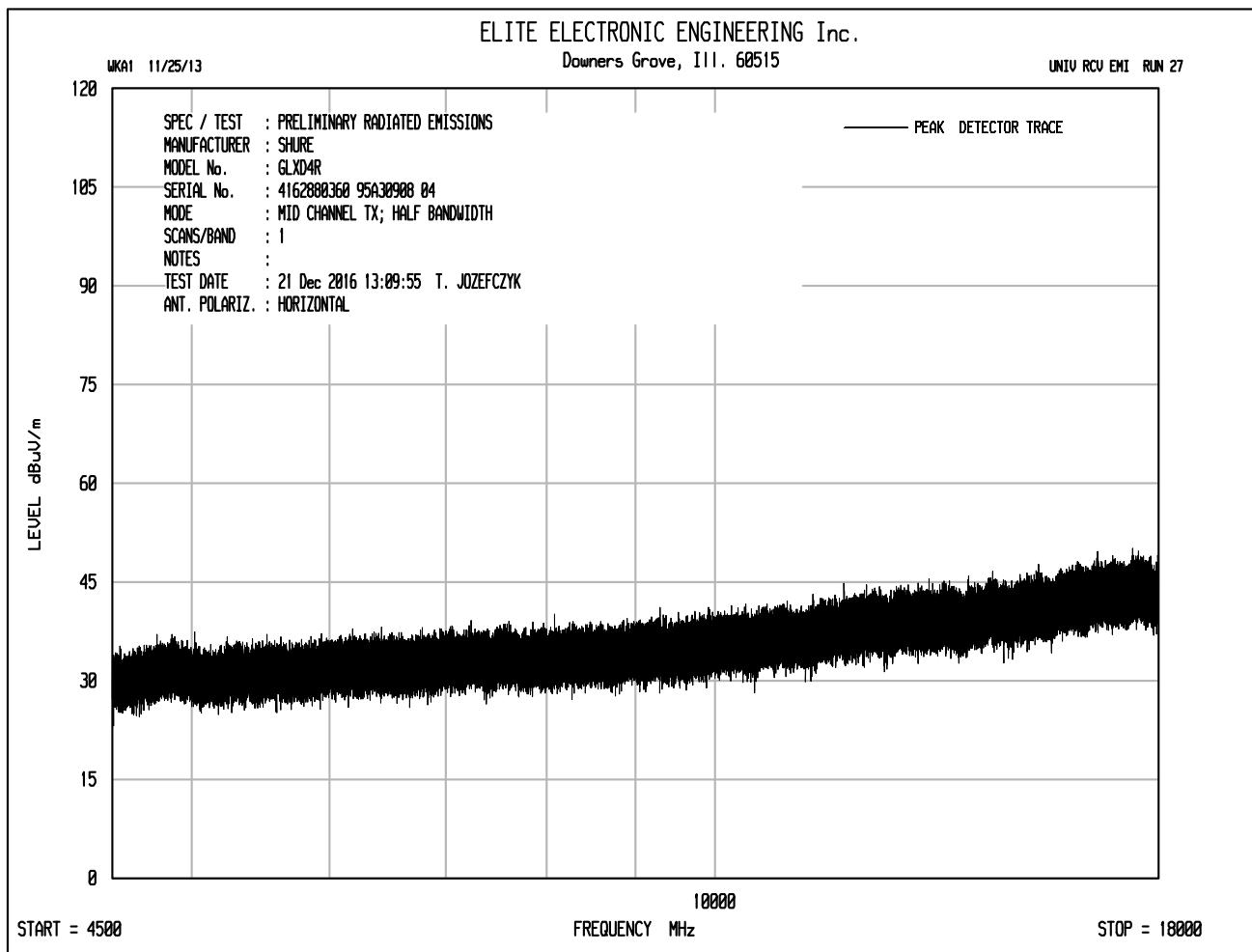


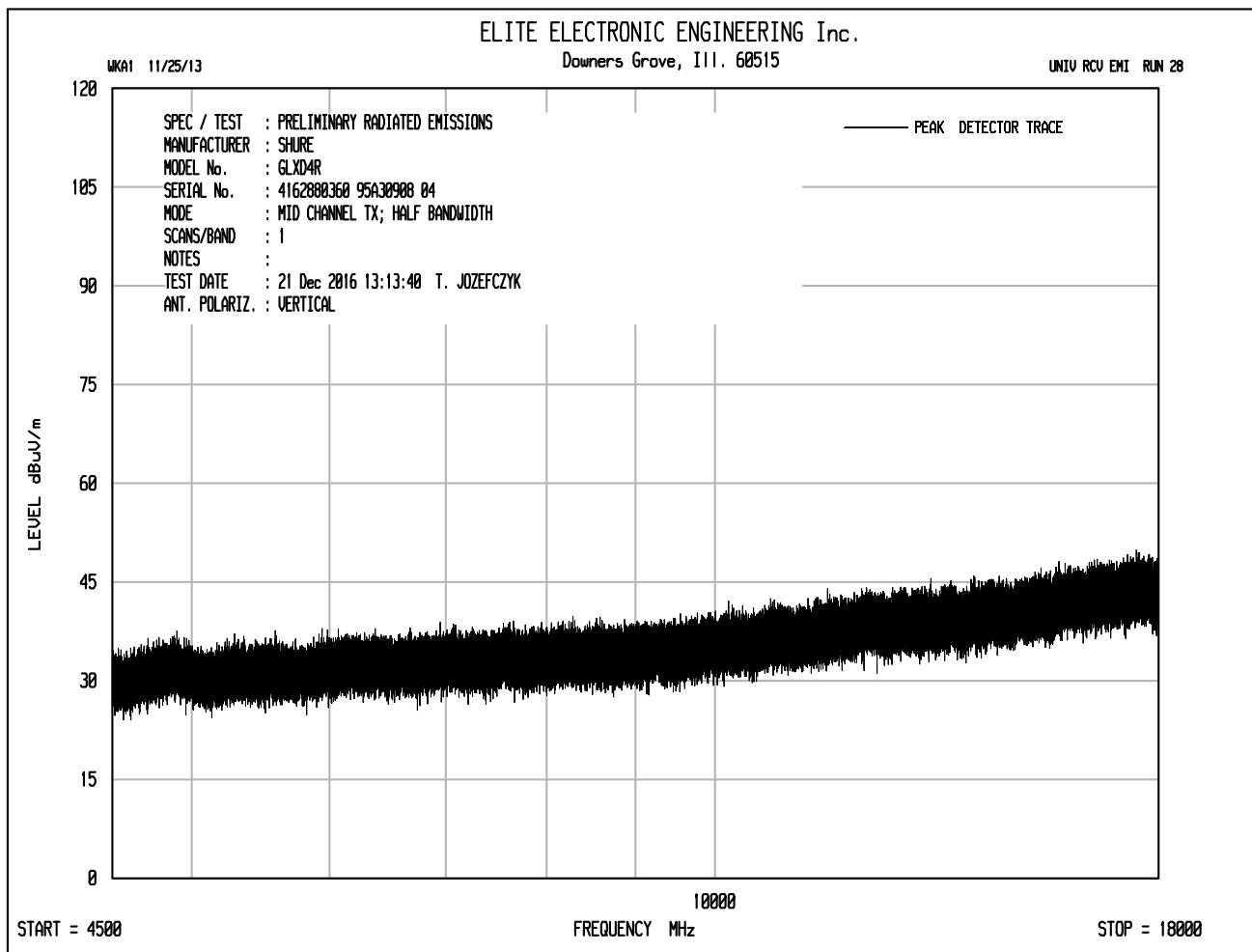










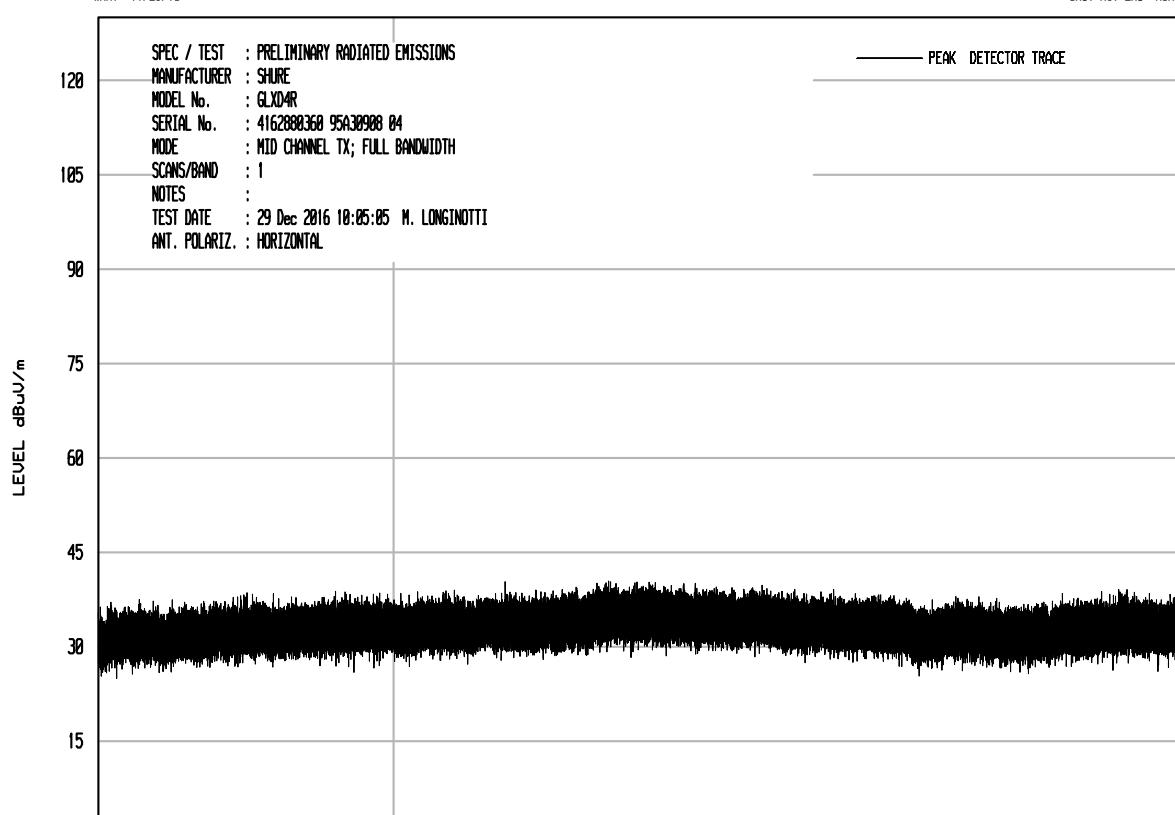


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ELITE ELECTRONIC ENGINEERING Inc.

Downers Grove, Ill. 60515

UNIV RCV EMI RUN 6



START = 18000

FREQUENCY MHz

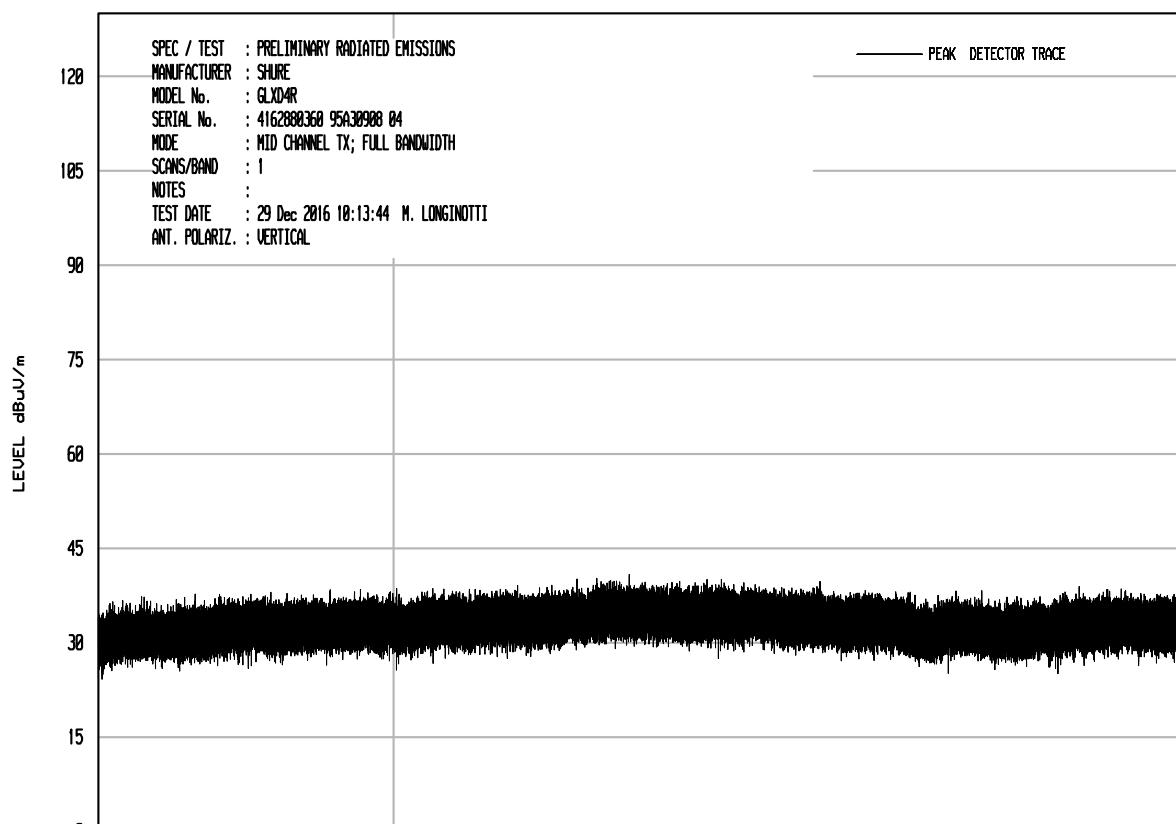
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ELITE ELECTRONIC ENGINEERING Inc.

Downers Grove, Ill. 60515

UNIV RCV EMI RUN 7

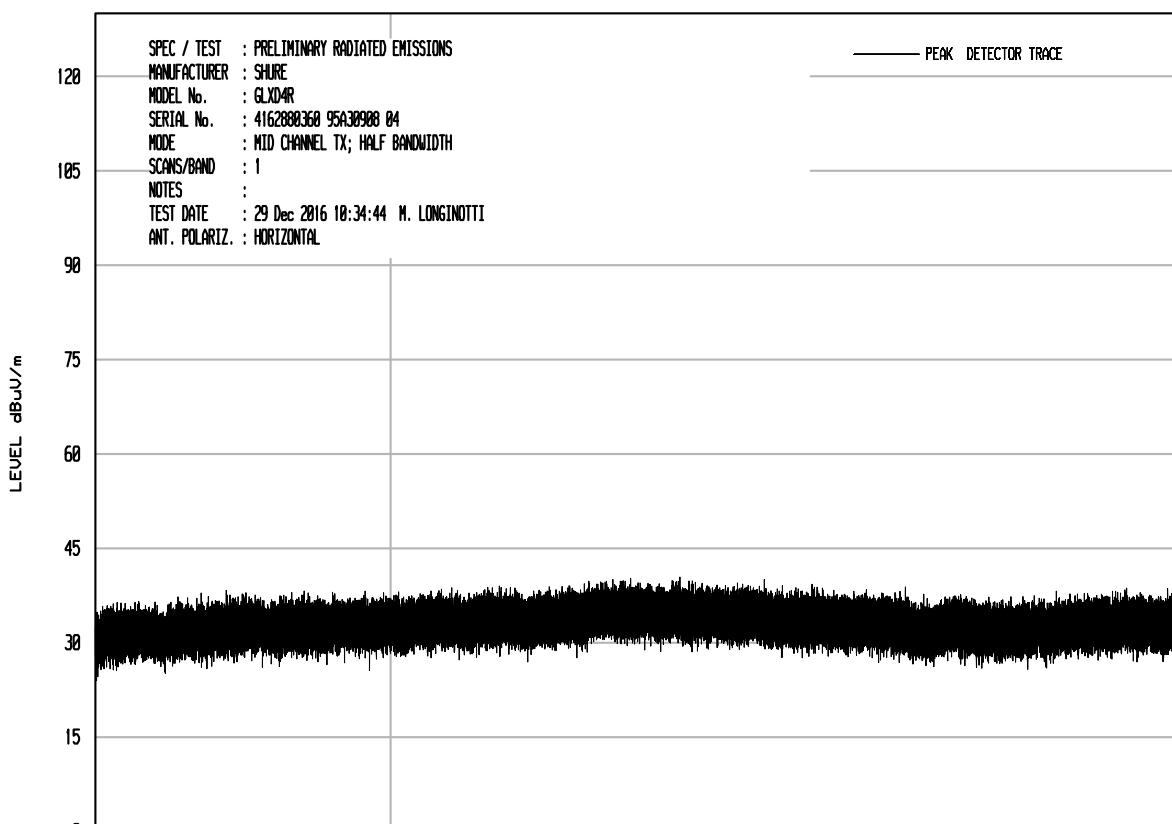


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ELITE ELECTRONIC ENGINEERING Inc.

Downers Grove, Ill. 60515

UNIV RCV EMI RUN 9



START = 18000

FREQUENCY MHz

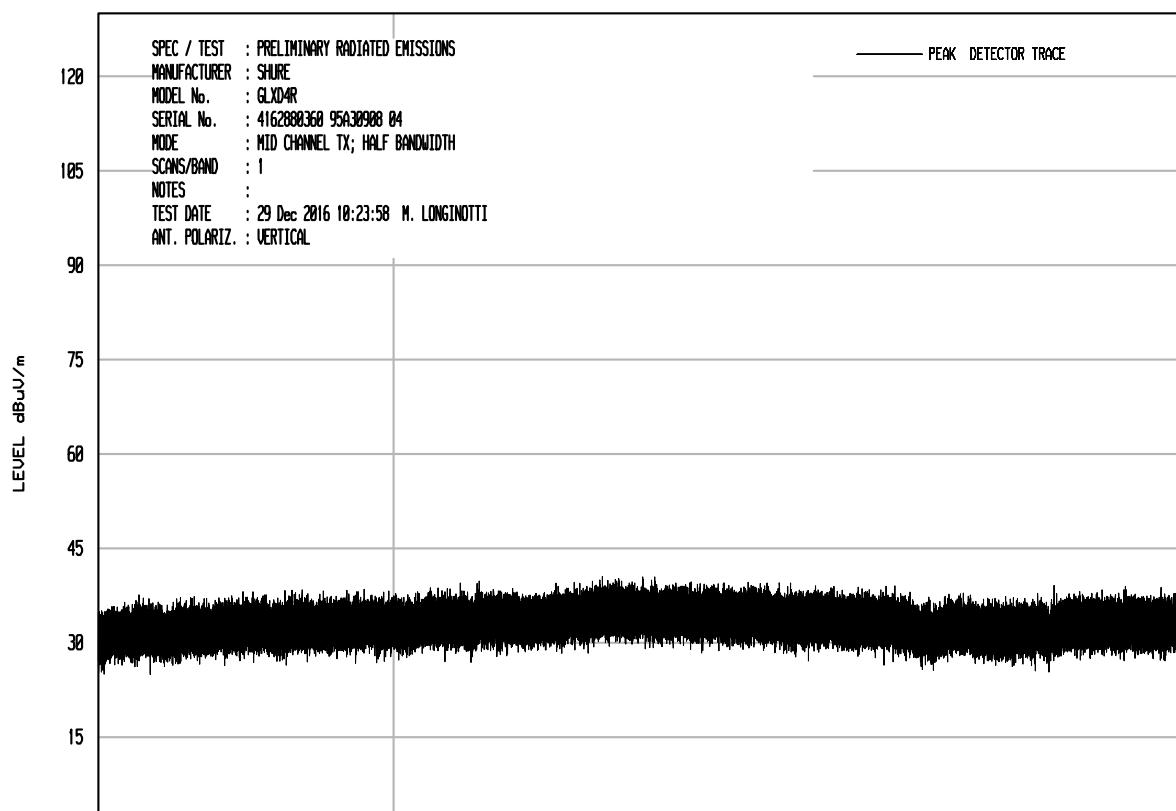
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ELITE ELECTRONIC ENGINEERING Inc.

Downers Grove, Ill. 60515

UNIV RCV EMI RUN 8

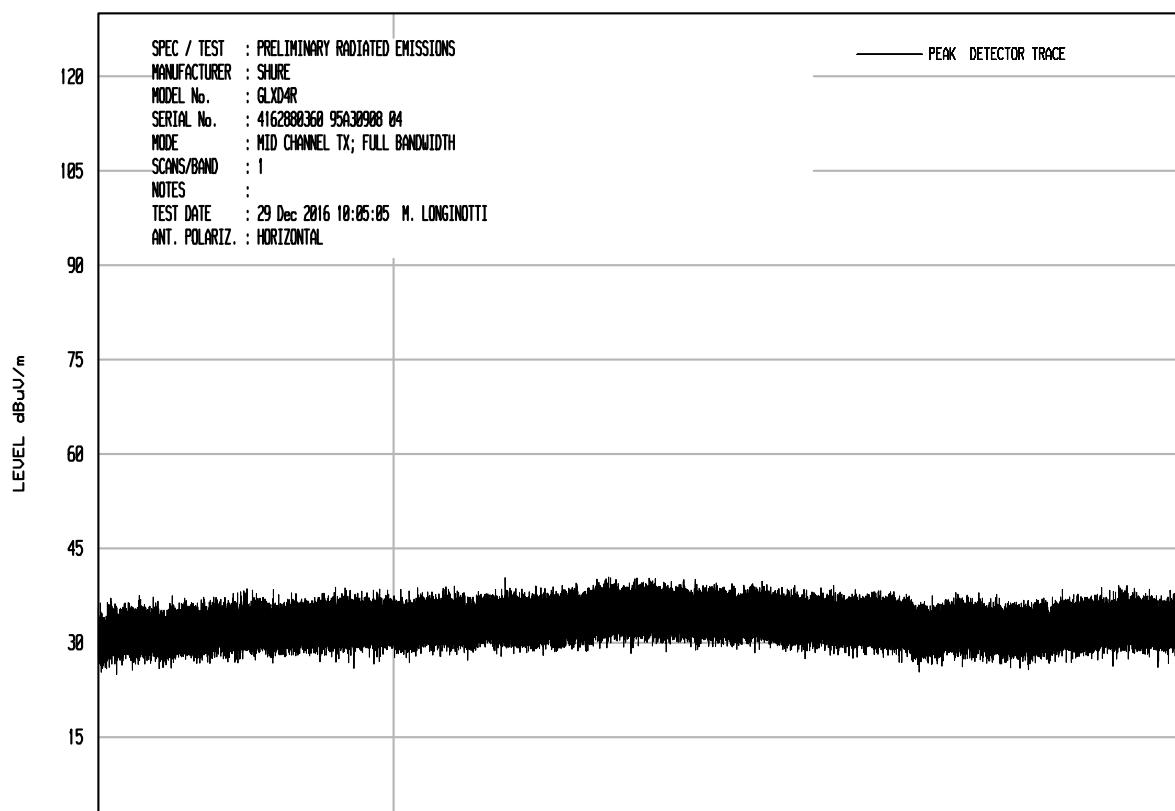


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ELITE ELECTRONIC ENGINEERING Inc.

Downers Grove, Ill. 60515

UNIV RCV EMI RUN 6



START = 18000

FREQUENCY MHz

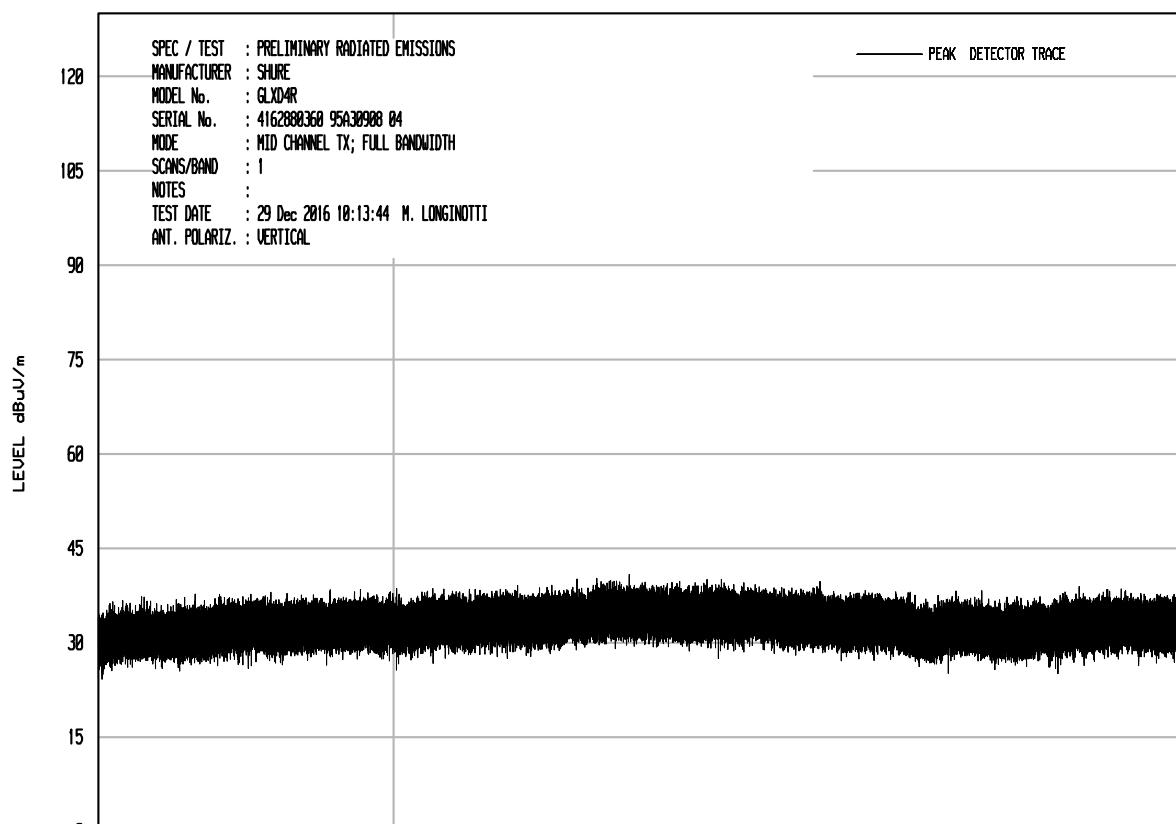
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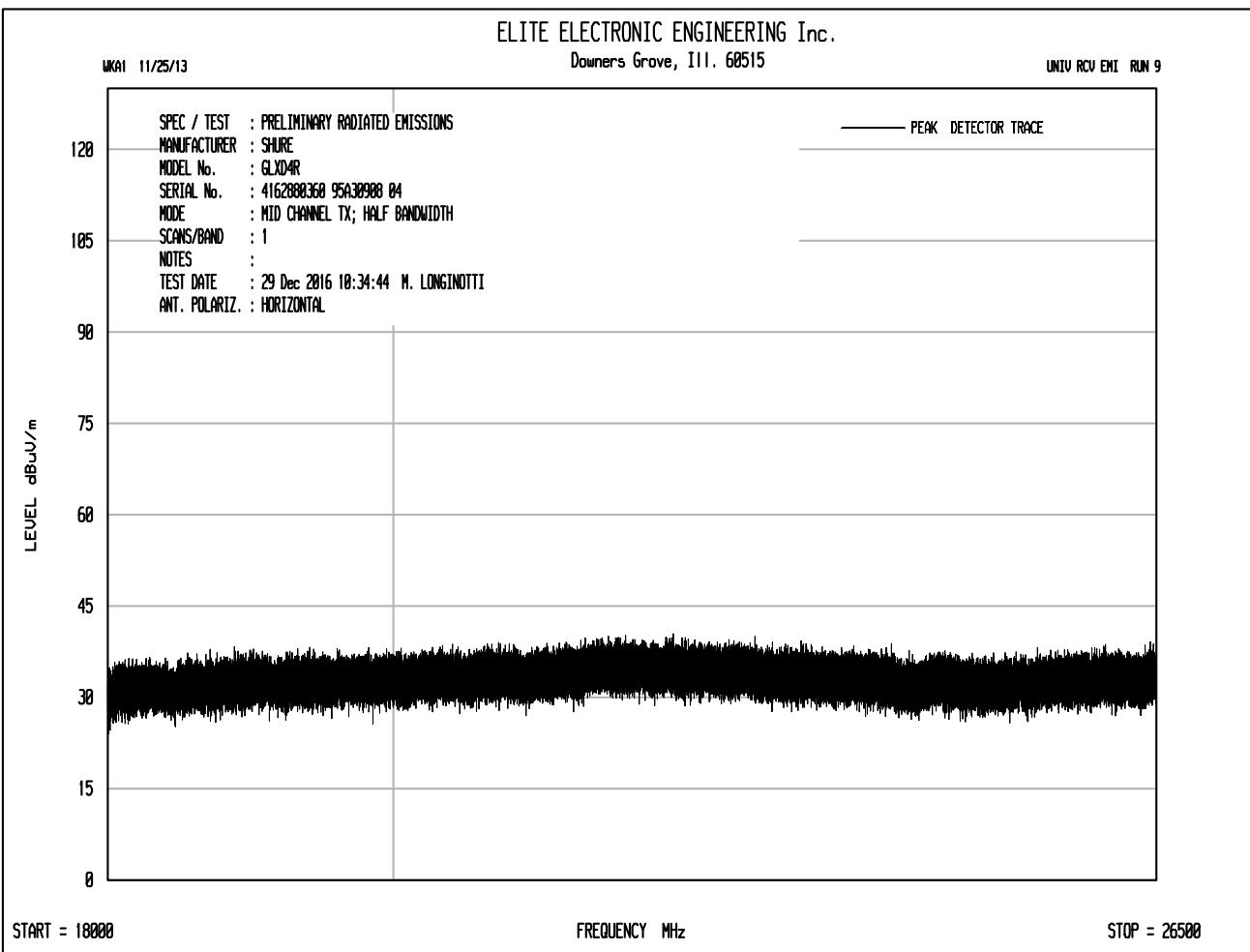
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ELITE ELECTRONIC ENGINEERING Inc.

Downers Grove, Ill. 60515

UNIV RCV EMI RUN 7



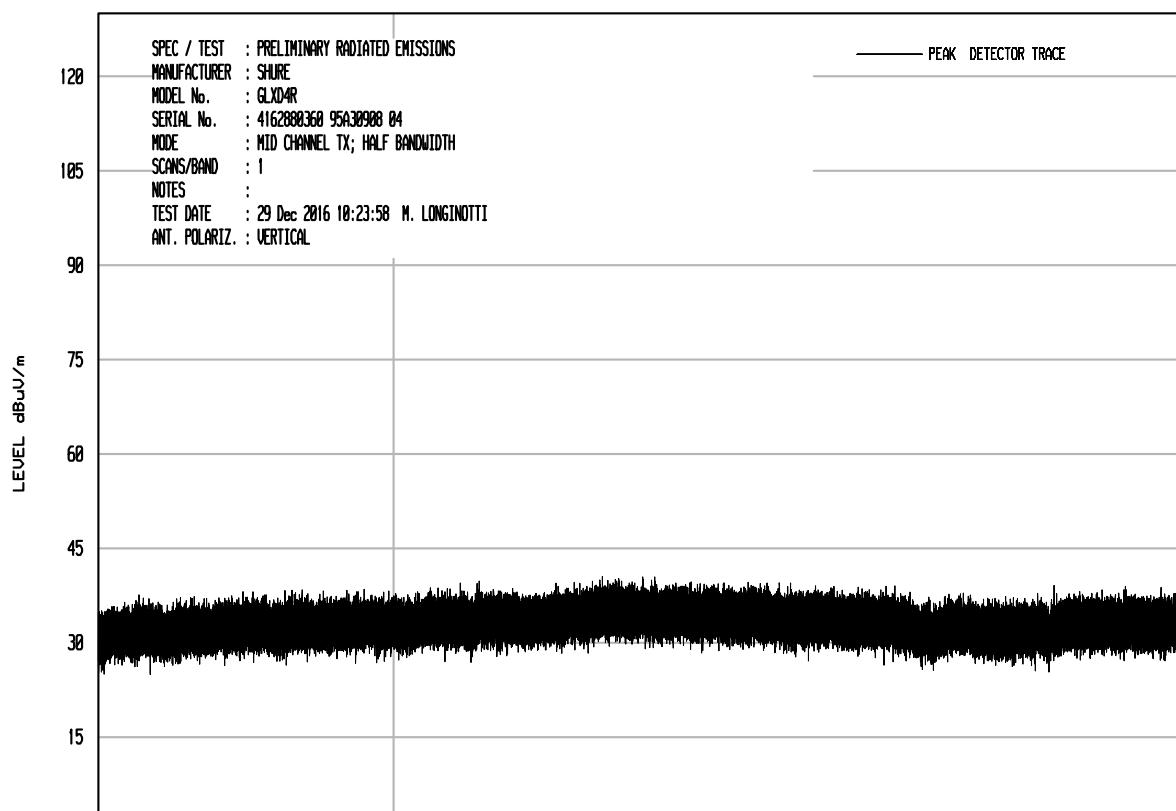


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ELITE ELECTRONIC ENGINEERING Inc.

Downers Grove, Ill. 60515

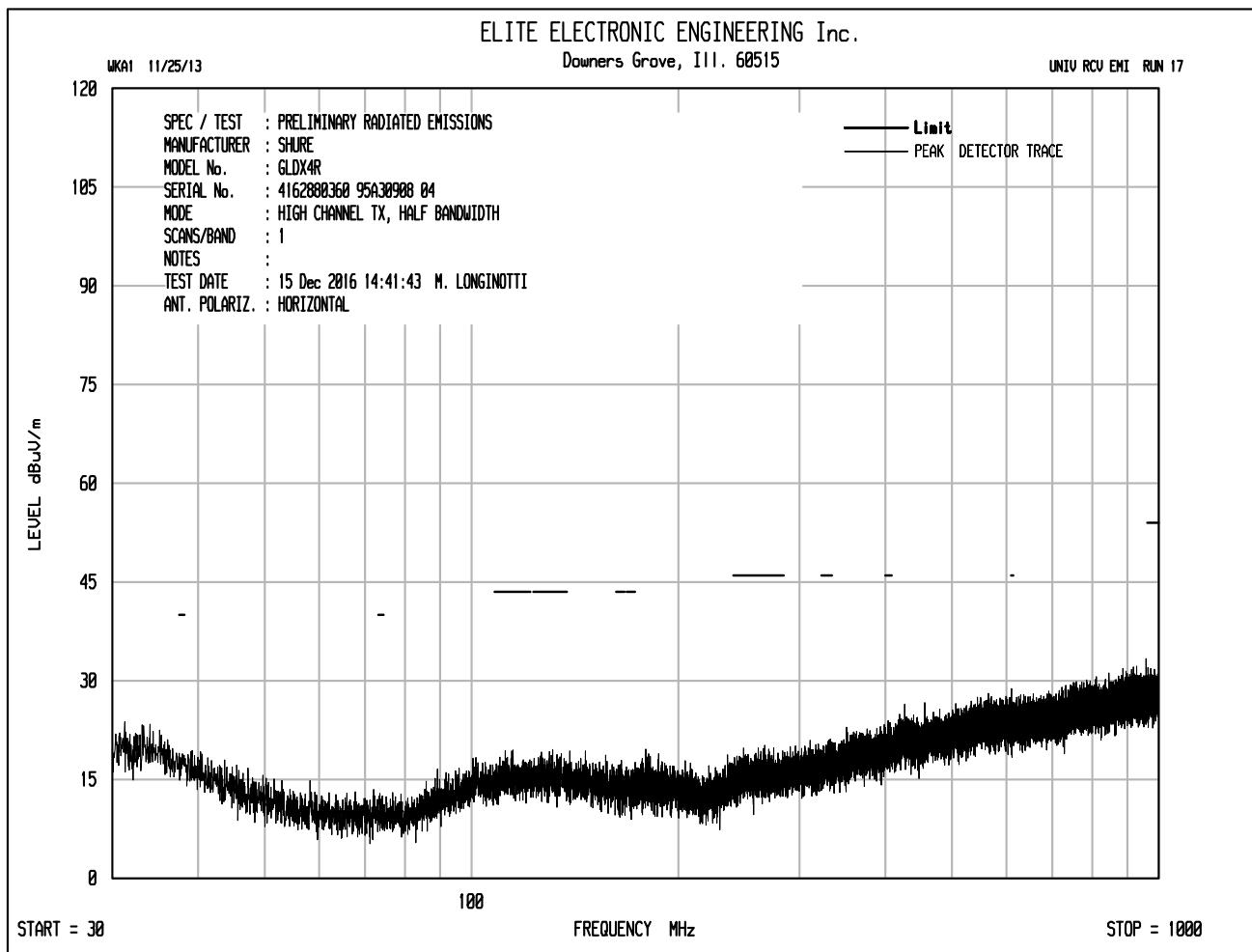
UNIV RCV EMI RUN 8

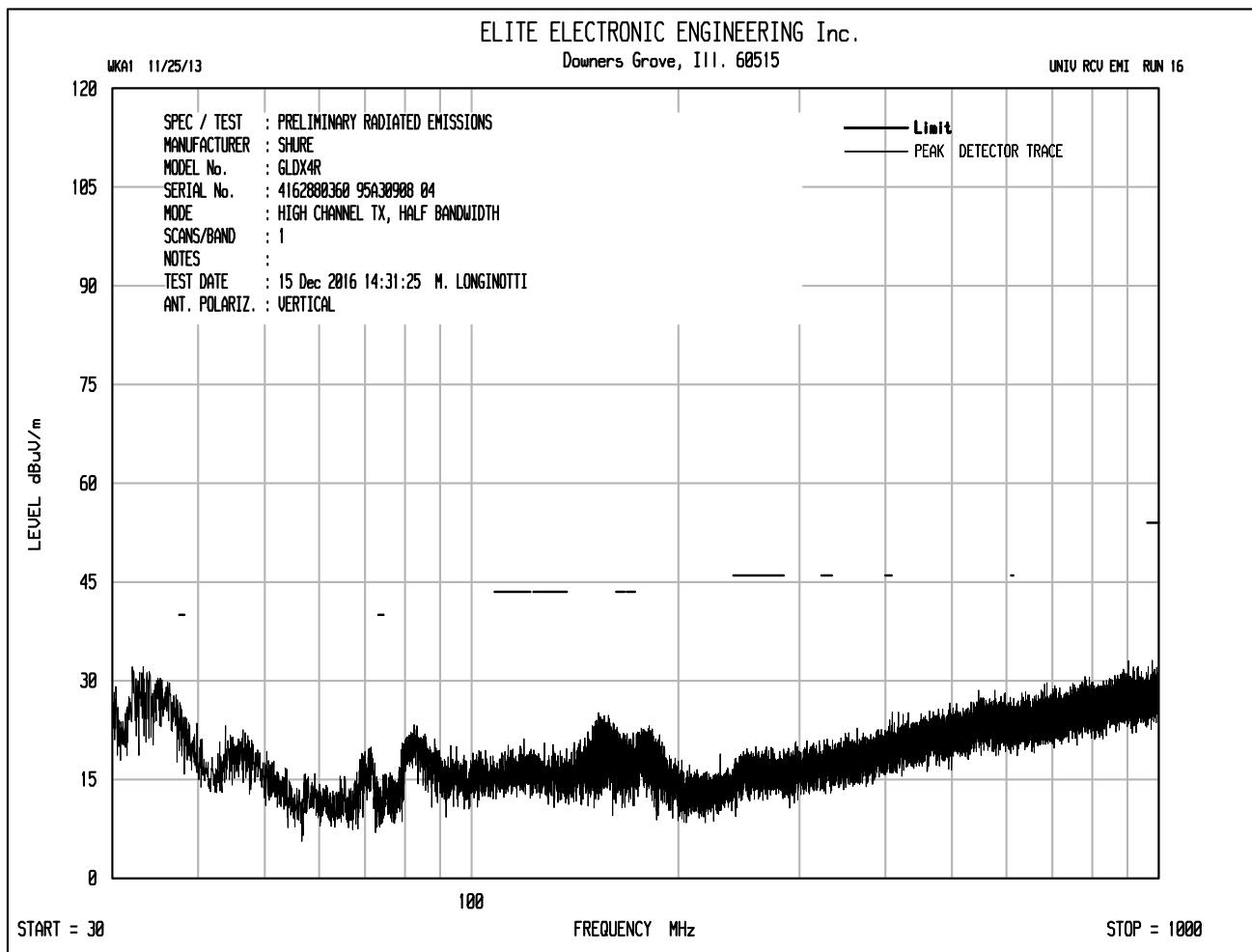


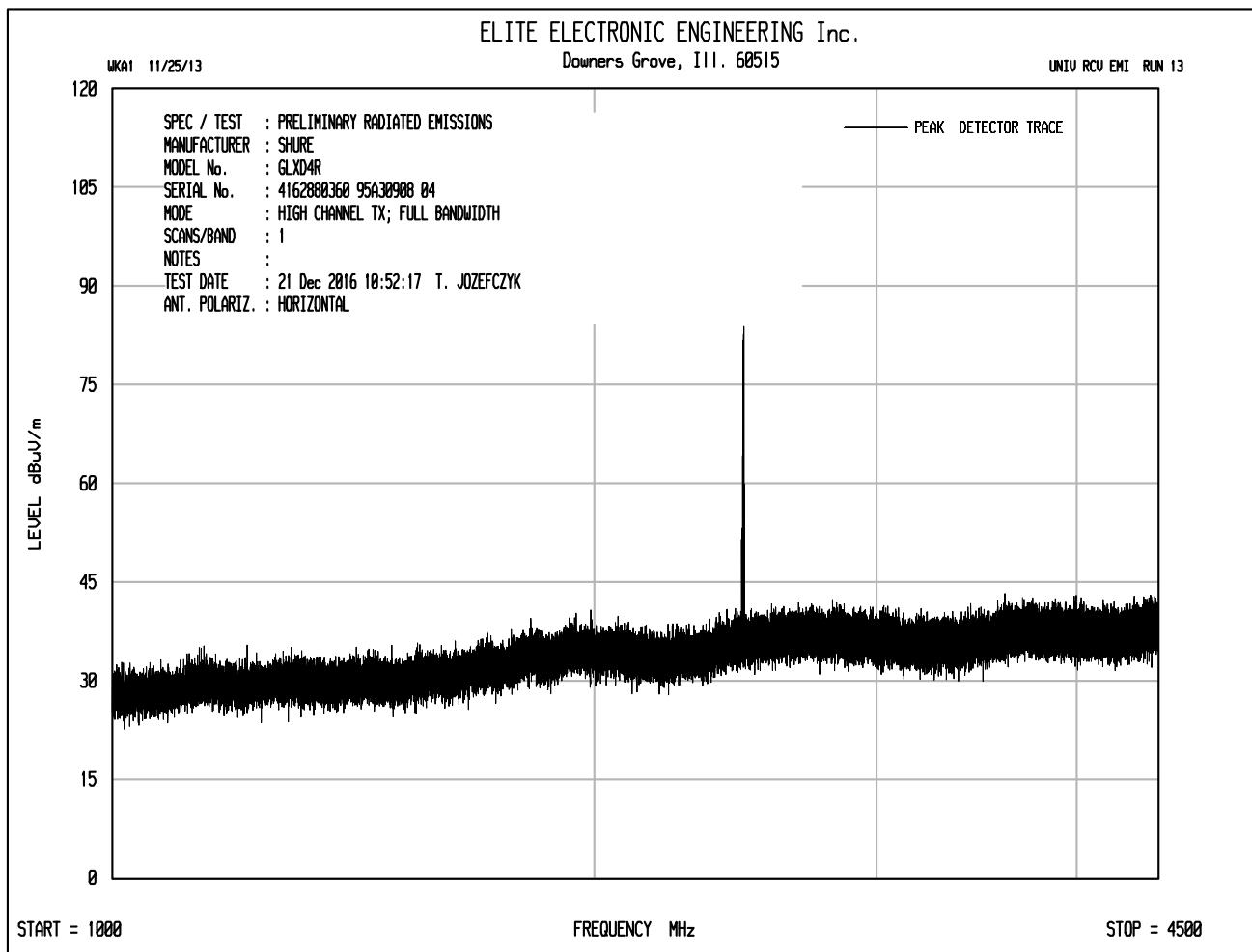
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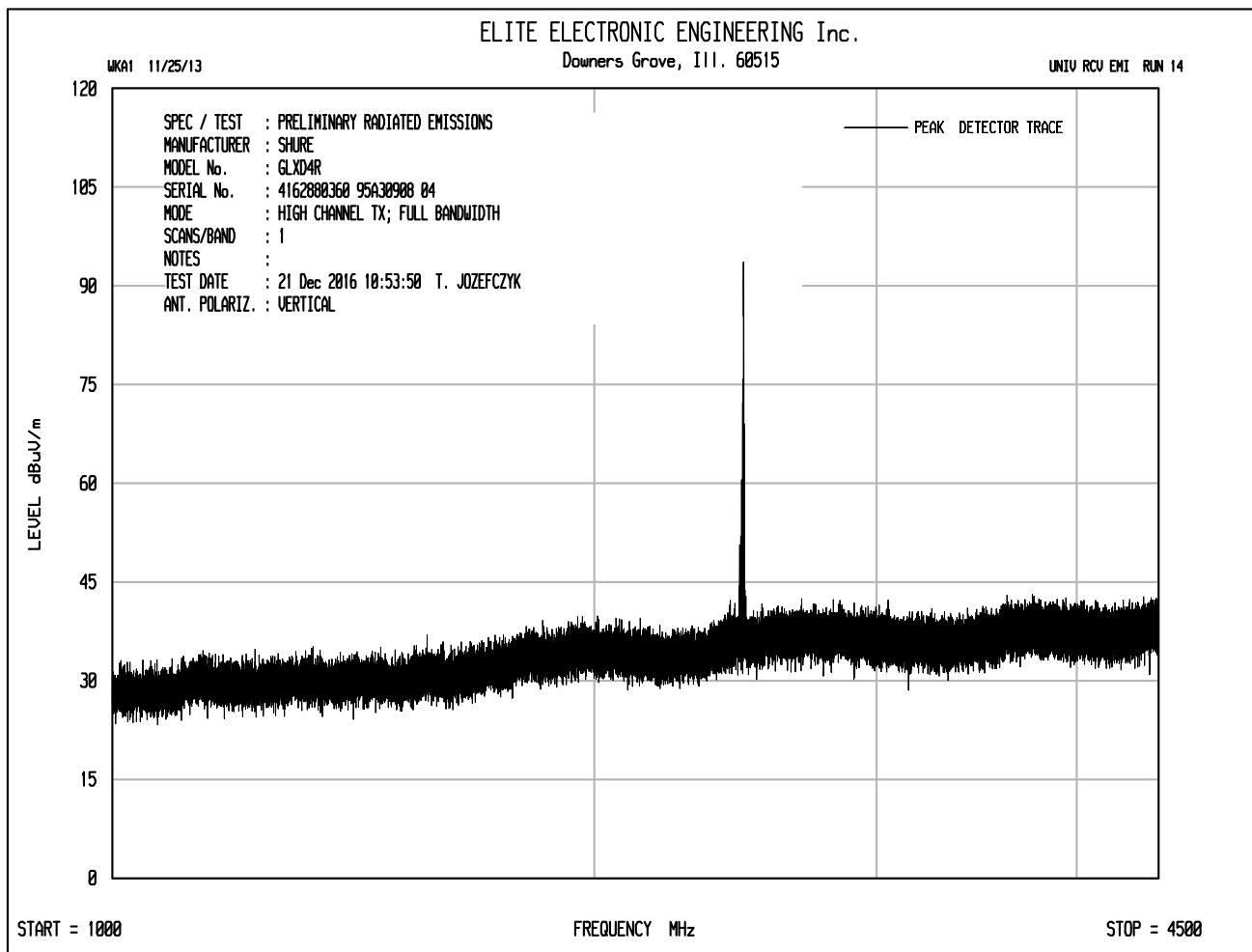
FREQUENCY MHz

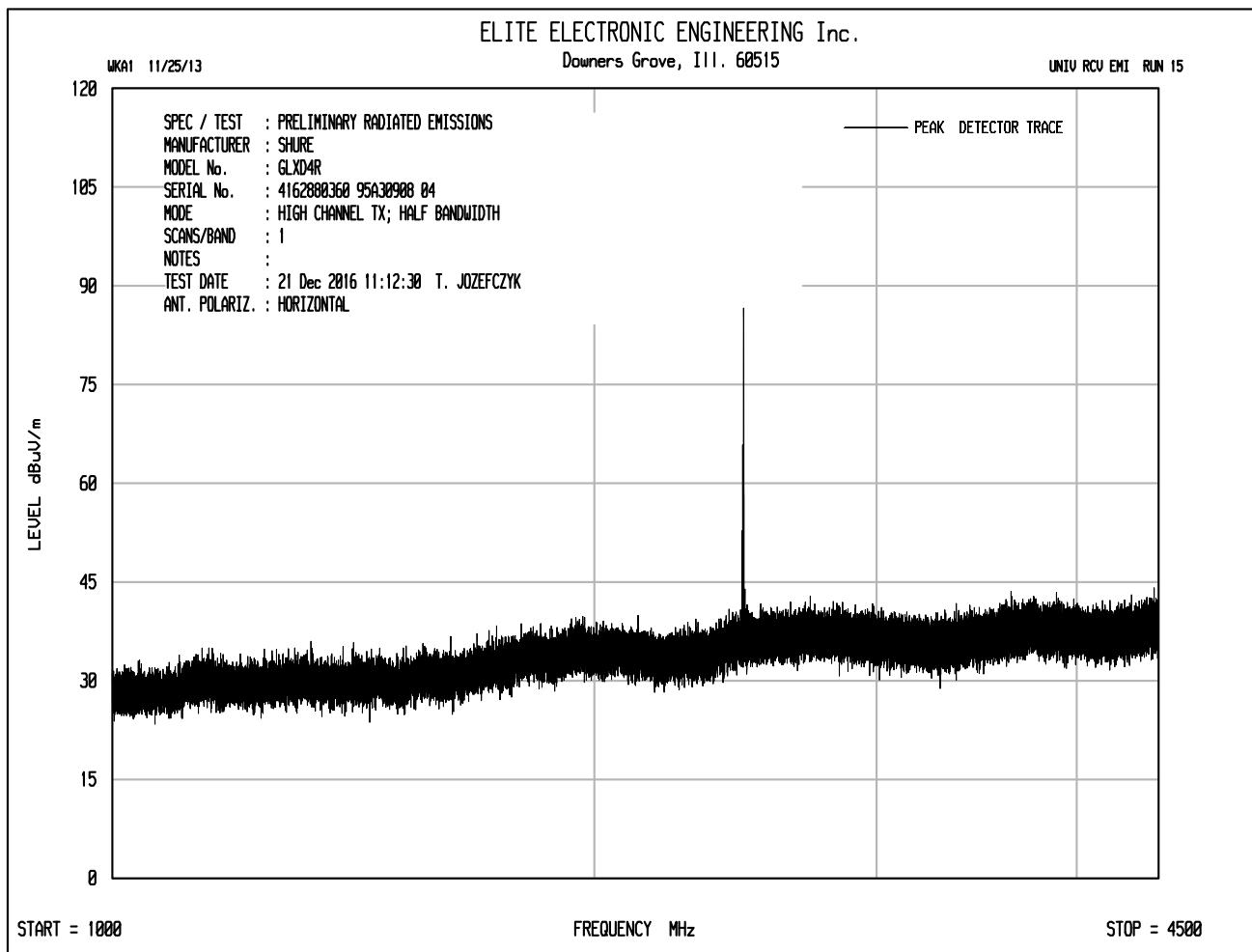
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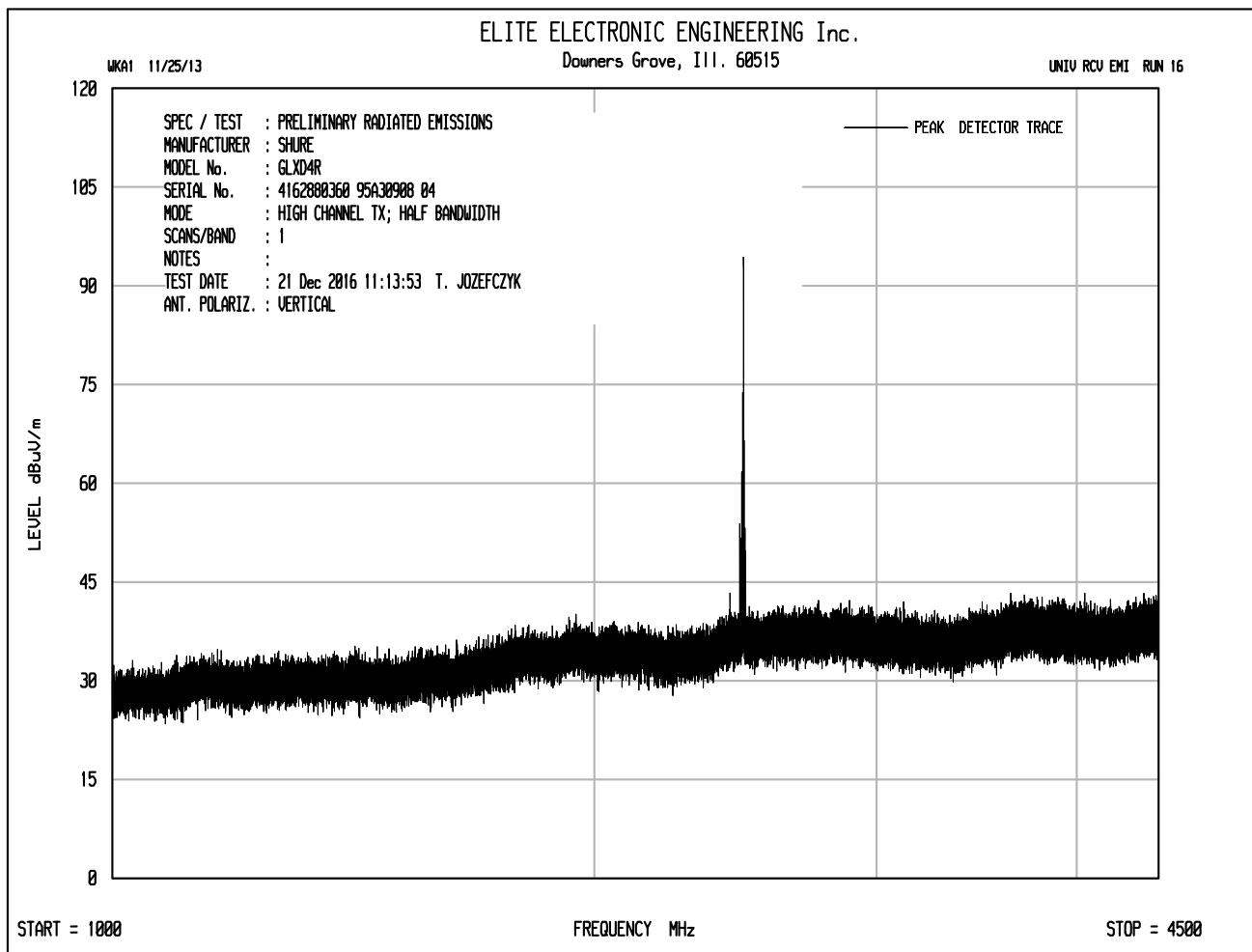


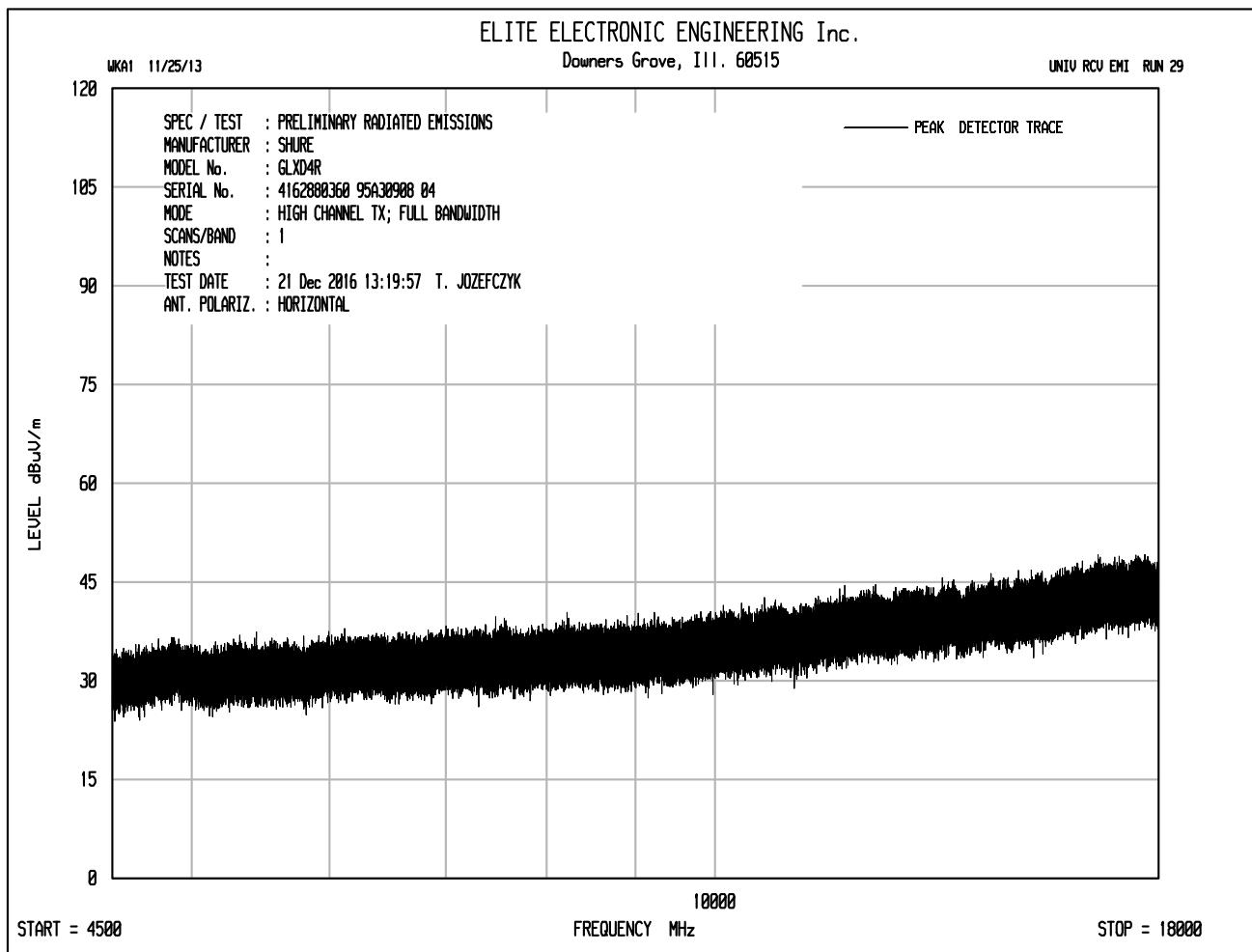


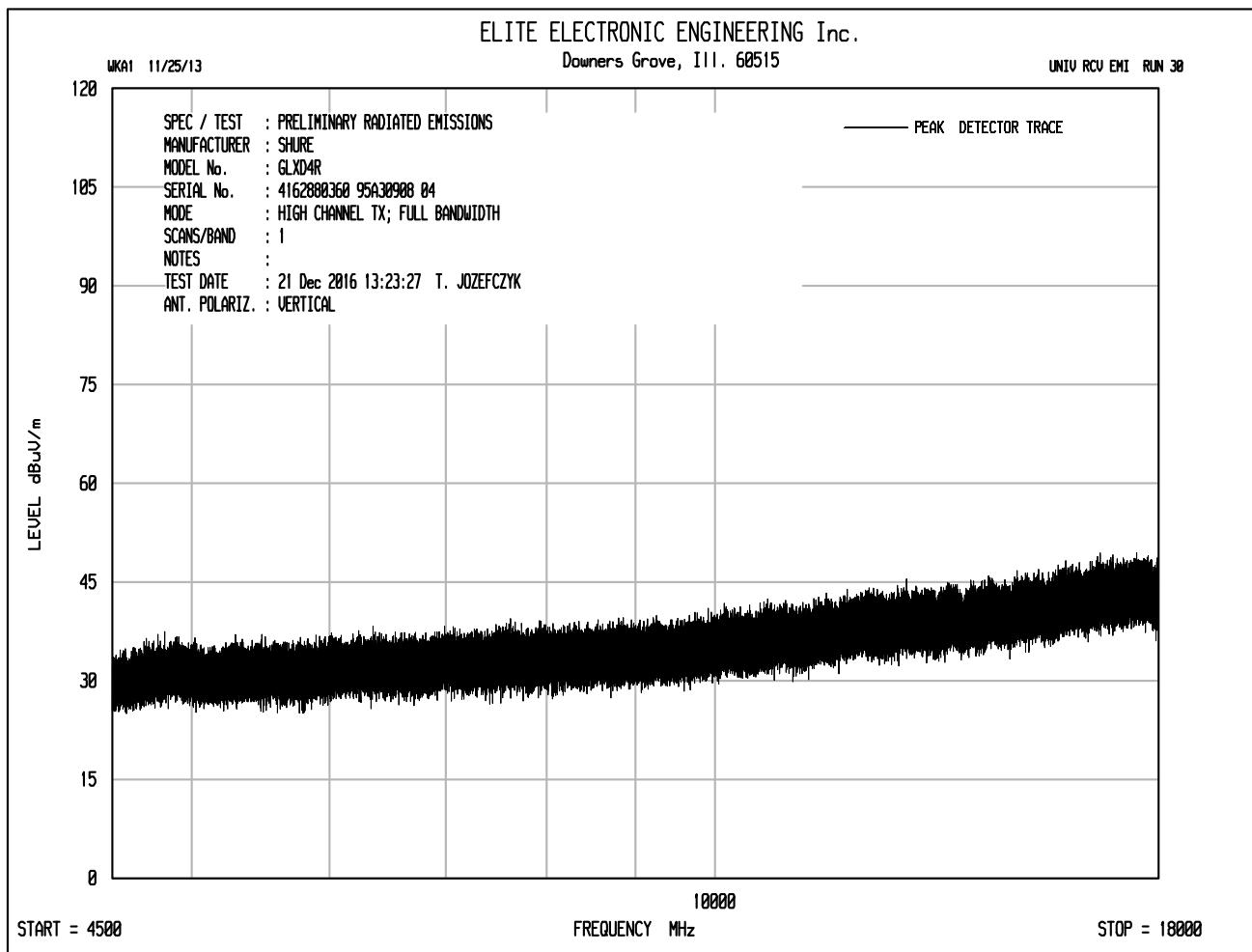


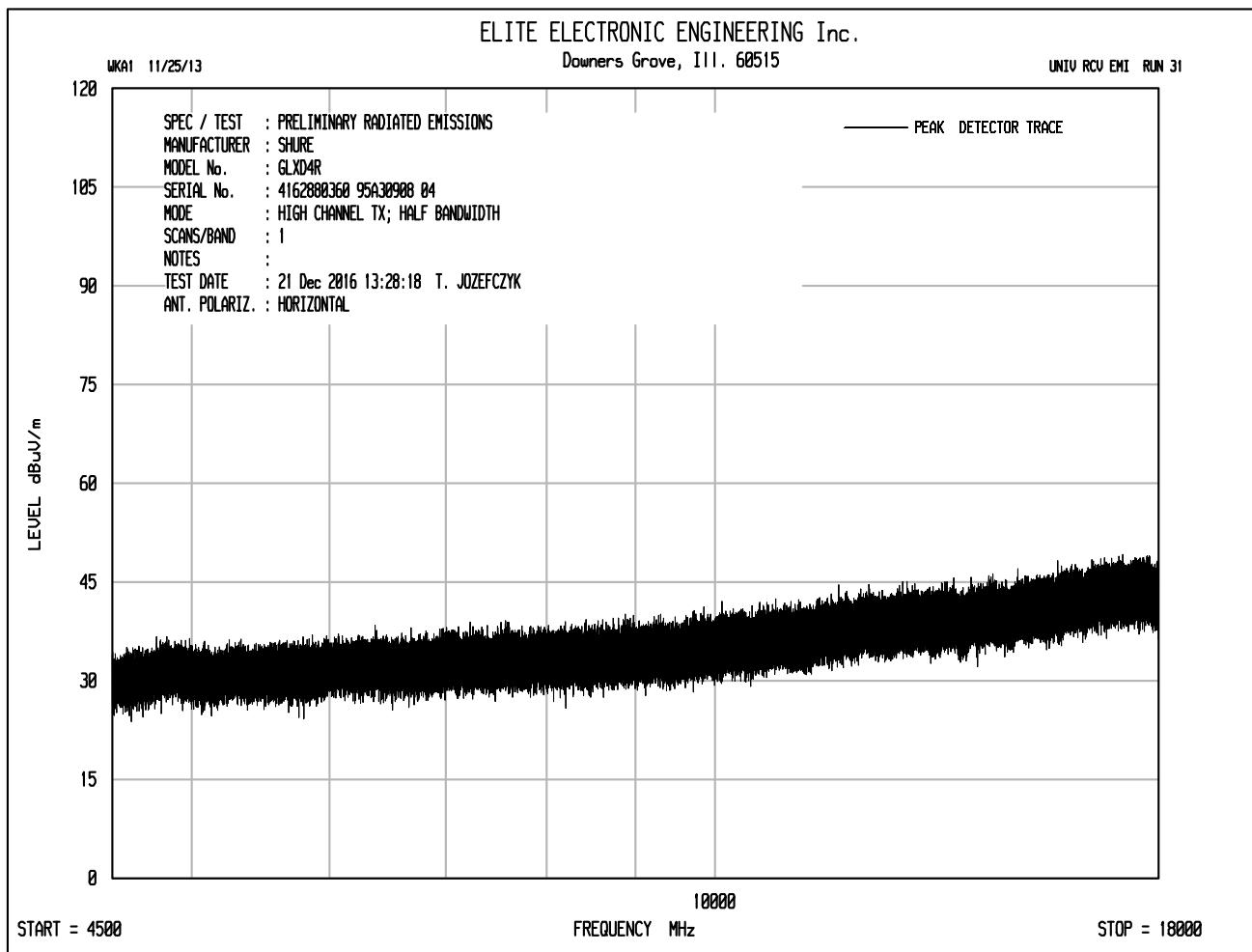


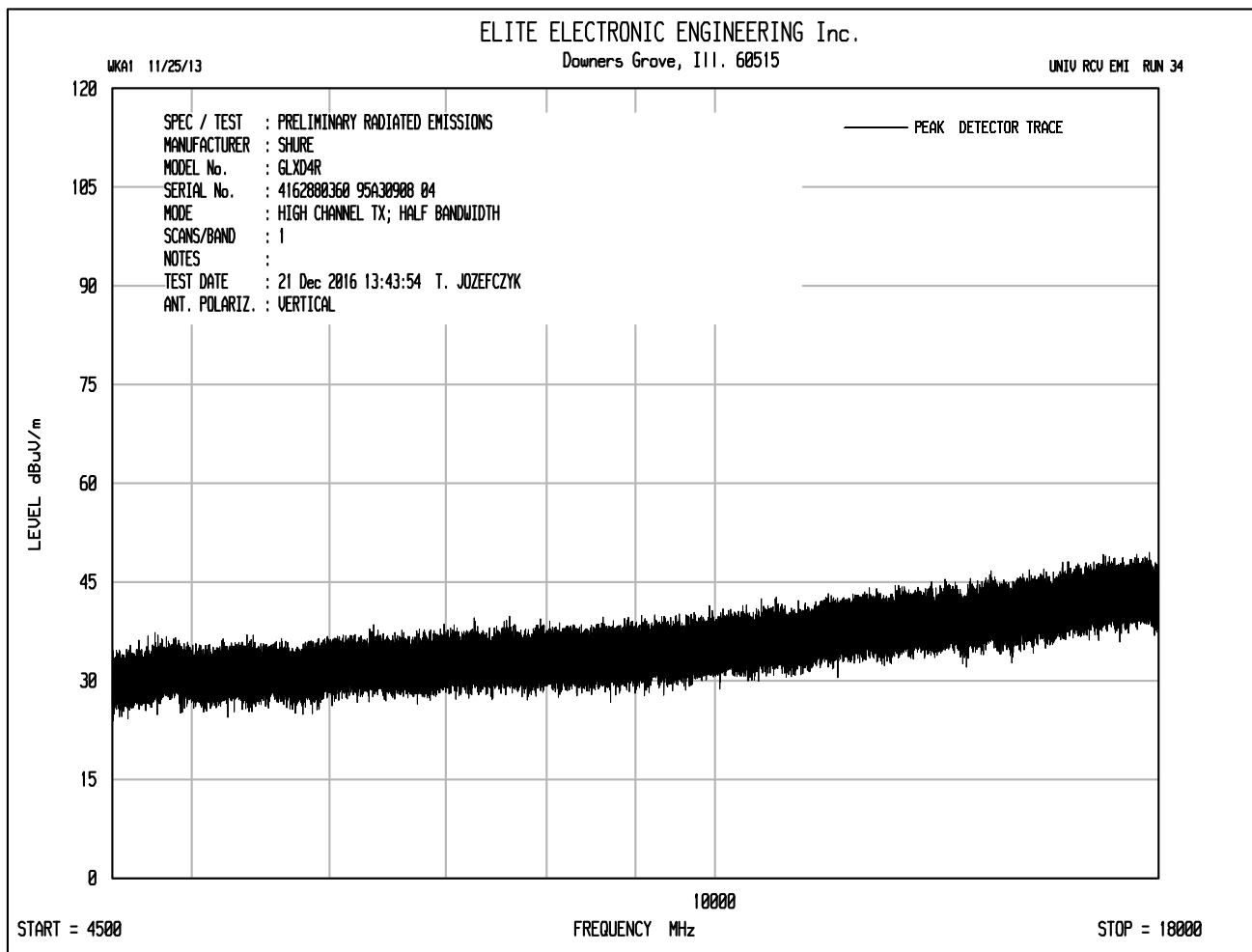










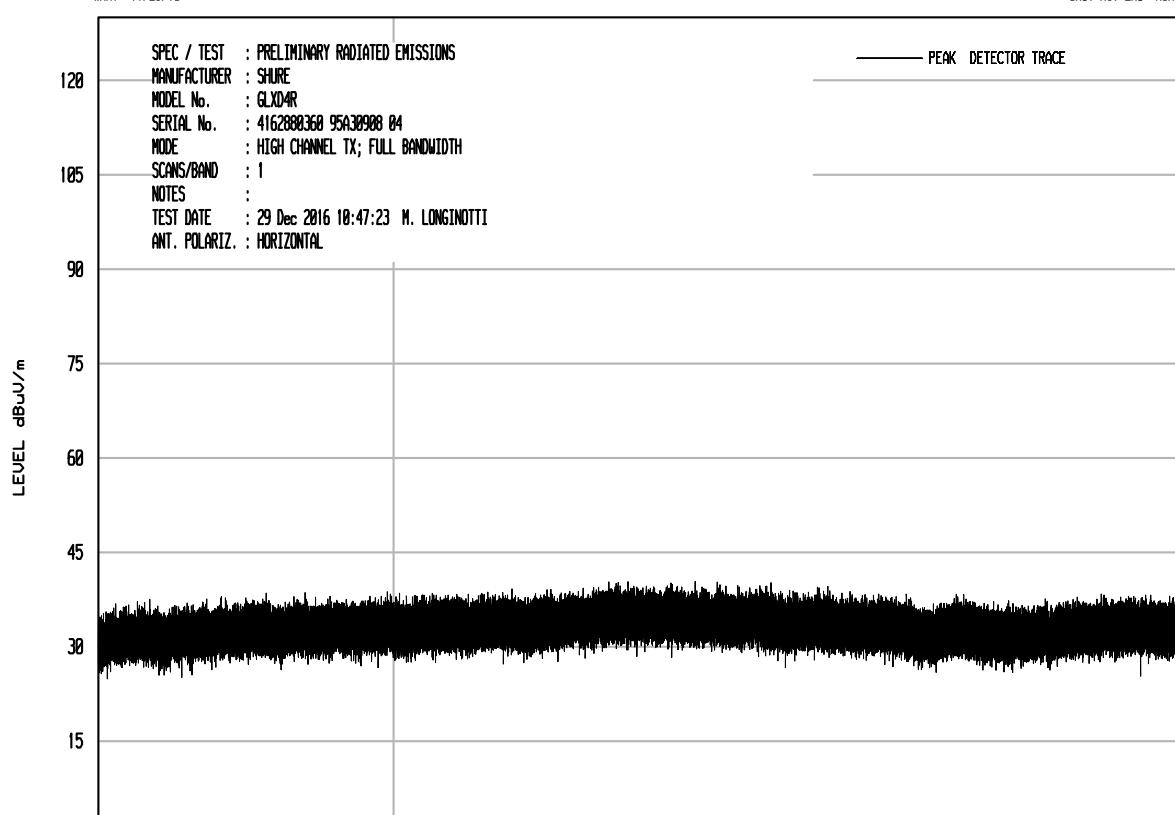


WKA1 11/25/13

ELITE ELECTRONIC ENGINEERING Inc.

Downers Grove, Ill. 60515

UNIV RCV EMI RUN 10



START = 18000

FREQUENCY MHz

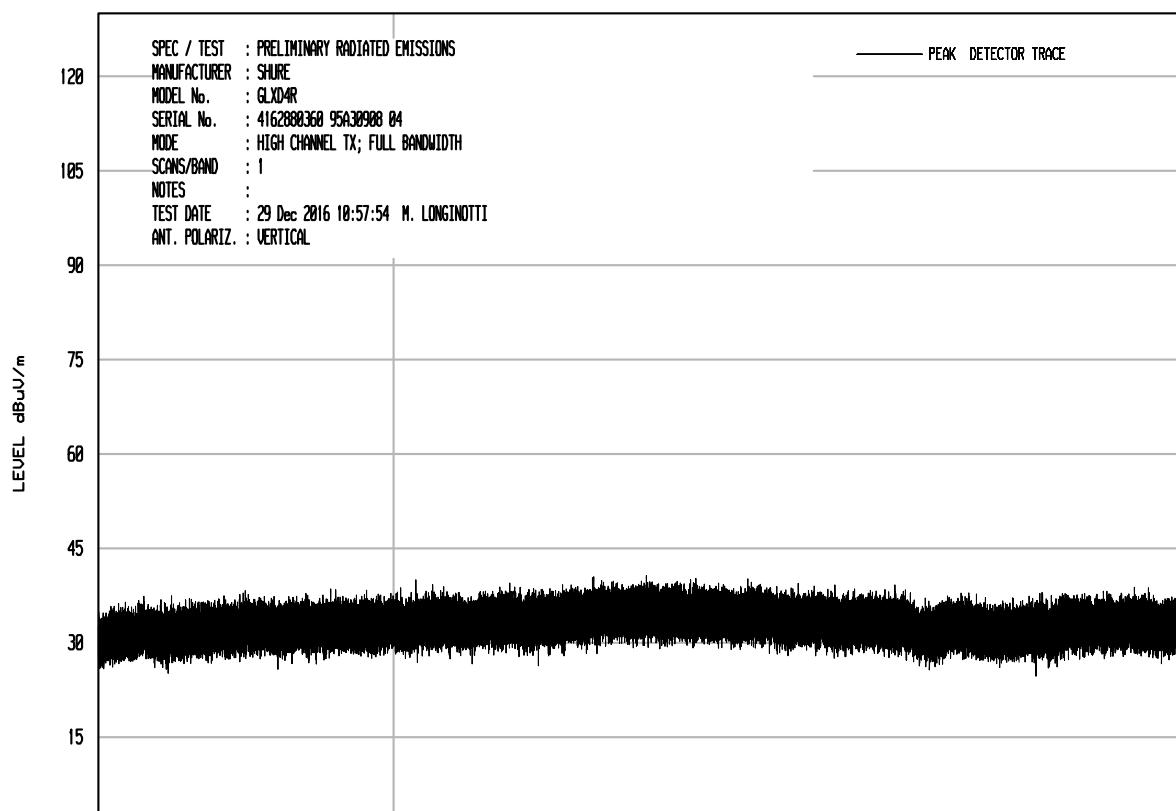
STOP = 26500

WKA1 11/25/13

ELITE ELECTRONIC ENGINEERING Inc.

Downers Grove, Ill. 60515

UNIV RCV EMI RUN 11

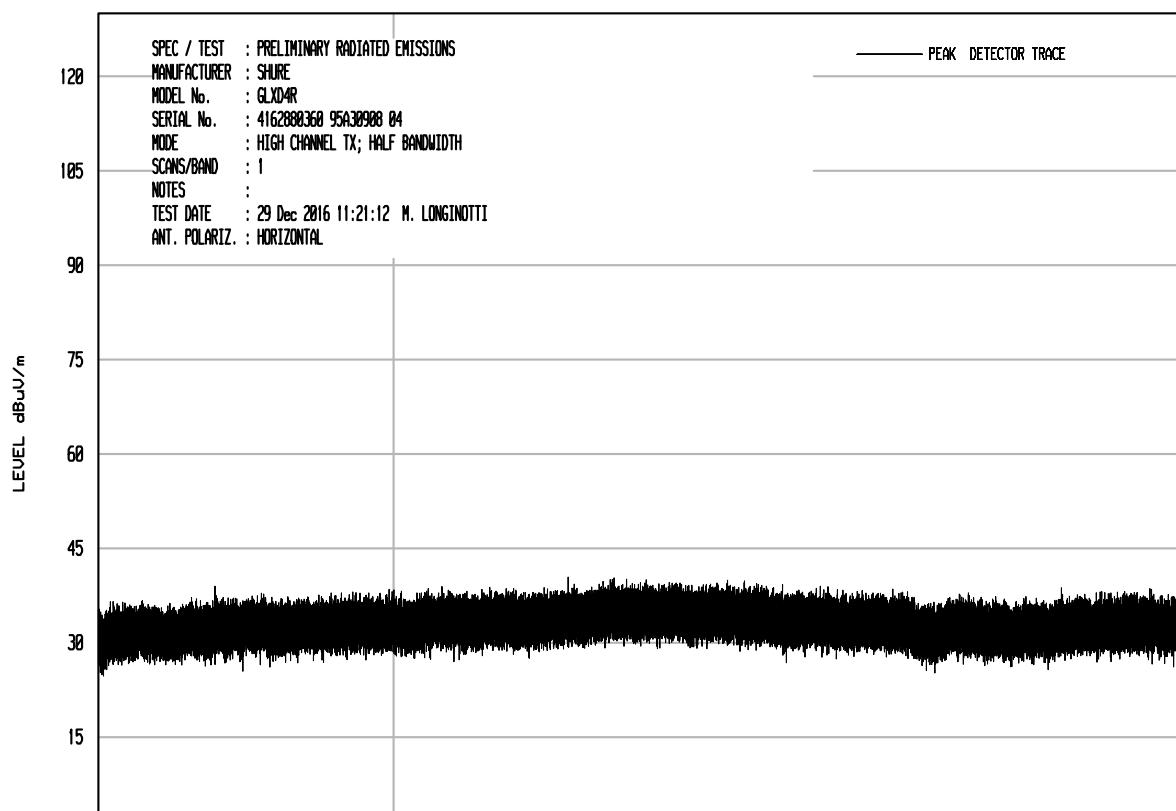


WKA1 11/25/13

ELITE ELECTRONIC ENGINEERING Inc.

Downers Grove, Ill. 60515

UNIV RCV EMI RUN 13



START = 18000

FREQUENCY MHz

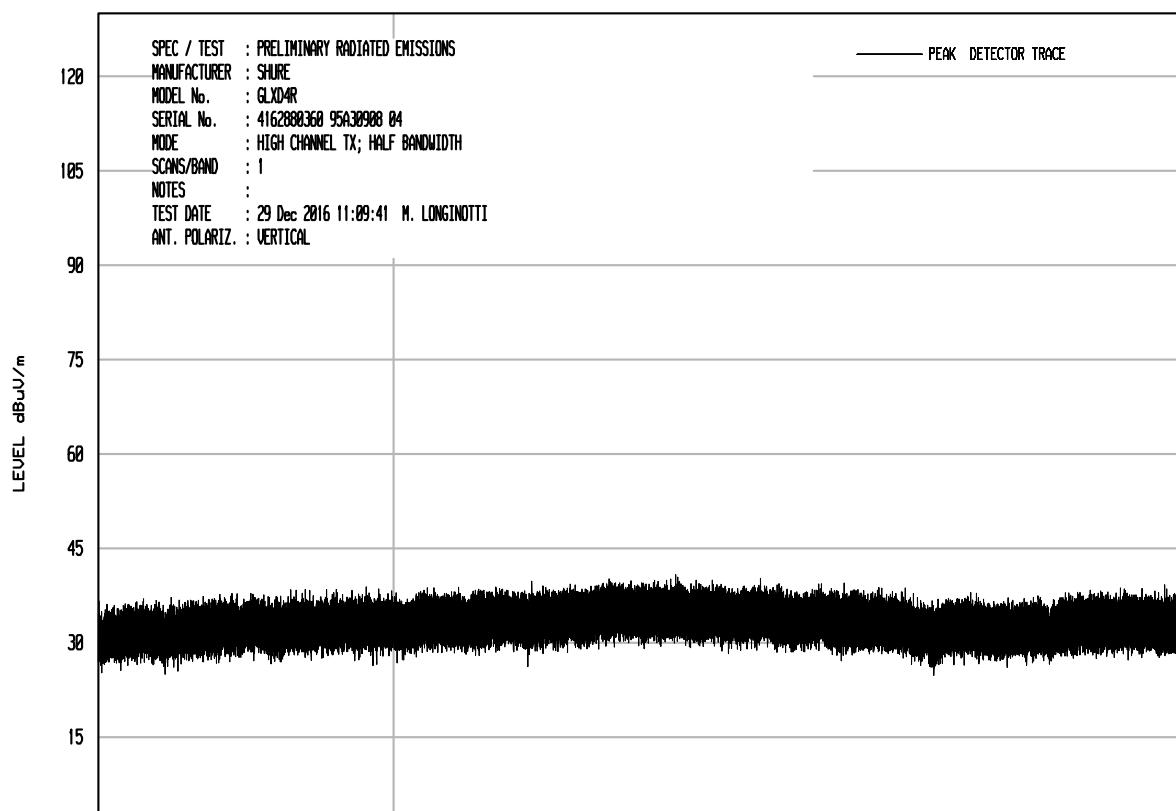
STOP = 26500

WKA1 11/25/13

ELITE ELECTRONIC ENGINEERING Inc.

Downers Grove, Ill. 60515

UNIV RCV EMI RUN 12



Manufacturer : Shure Incorporated
 Test Item : TRx
 Model No. : GLXD4R
 Serial No. : 4162880360 95A30908 04
 Mode : Transmit at 2404MHz - Full Bandwidth
 Test Specification : FCC-15.247, RSS-247 Radiated Spurious Emissions - Harmonics

Freq. MHz	Ant Pol	Meter Reading (dBuV)	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)
2404.00	H	57.6	3.4	32.0	0.0	93.1	44949.5		
2404.00	V	64.1	3.4	32.0	0.0	99.5	94346.2		
7212.00	H	47.9	6.1	35.7	-39.4	50.3	326.8	9434.6	-29.2
7212.00	V	48.6	6.1	35.7	-39.4	51.0	353.0	9434.6	-28.5
9616.00	H	48.7	6.8	36.6	-39.3	52.9	441.0	9434.6	-26.6
9616.00	V	49.4	6.8	36.6	-39.3	53.6	479.7	9434.6	-25.9
14424.00	H	49.2	8.7	39.6	-38.3	59.2	911.2	9434.6	-20.3
14424.00	V	49.3	8.7	39.6	-38.3	59.3	920.7	9434.6	-20.2
16828.00	H	47.9	9.4	41.7	-37.5	61.5	1190.0	9434.6	-18.0
16828.00	V	47.4	9.4	41.7	-37.5	61.0	1127.3	9434.6	-18.5
21636.00	H	37.5	2.2	40.6	-28.6	51.7	382.9	9434.6	-27.8
21636.00	V	36.9	2.2	40.6	-28.6	51.1	357.8	9434.6	-28.4
24040.00	H	37.6	2.2	40.6	-30.0	50.4	332.4	9434.6	-29.1
24040.00	V	36.5	2.2	40.6	-30.0	49.3	291.8	9434.6	-30.2

Manufacturer : Shure Incorporated
Test Item : TRx
Model No. : GLXD4R
Serial No. : 4162880360 95A30908 04
Mode : Transmit at 2404MHz - Full Bandwidth
Test Specification : FCC-15.247, RSS-247 Radiated Spurious Emissions - Harmonics

Freq. MHz	Ant Pol	Meter Reading (dBuV)	CBL (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)
4808.00	H	49.3	4.8	34.6	-39.3	49.4	294.5	5000.0	-24.6
4808.00	V	52.0	4.8	34.6	-39.3	52.1	400.9	5000.0	-21.9
12020.00	H	48.8	8.0	38.7	-39.2	56.4	657.3	5000.0	-17.6
12020.00	V	48.6	8.0	38.7	-39.2	56.2	644.6	5000.0	-17.8
19232.00	H	40.4	2.2	40.4	-28.5	54.4	526.9	5000.0	-19.5
19232.00	V	35.0	2.2	40.4	-28.5	49.1	284.6	5000.0	-24.9

Manufacturer : Shure Incorporated
 Test Item : TRx
 Model No. : GLXD4R
 Serial No. : 4162880360 95A30908 04
 Mode : Transmit at 2404MHz - Full Bandwidth
 Test Specification : FCC-15.247, RSS-247 Radiated Spurious Emissions – Restricted Band Averages

Freq. MHz	Ant Pol	Meter Reading (dBuV)	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Duty Cycle (dB)	Average Total dBuV/m at 3m	Average Total uV/m at 3 m	Average Limit uV/m at 3 m	Margin (dB)
4808.00	H	36.8	4.8	34.6	-39.3	4.4	41.3	116.4	500.0	-12.7
4808.00	V	41.9	4.8	34.6	-39.3	4.4	46.5	210.1	500.0	-7.5
12020.00	H	36.2	8.0	38.7	-39.2	4.4	48.1	255.4	500.0	-5.8
12020.00	V	36.2	8.0	38.7	-39.2	4.4	48.2	256.9	500.0	-5.8
19232.00	H	28.7	2.2	40.4	-28.5	4.4	47.2	229.5	500.0	-6.8
19232.00	V	22.3	2.2	40.4	-28.5	4.4	40.8	110.0	500.0	-13.2

Manufacturer : Shure Incorporated
 Test Item : TRx
 Model No. : GLXD4R
 Serial No. : 4162880360 95A30908 04
 Mode : Transmit at 2404MHz - Half Bandwidth
 Test Specification : FCC-15.247, RSS-247 Radiated Spurious Emissions - Harmonics

Freq. MHz	Ant Pol	Meter Reading (dBuV)	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)
2404.00	H	55.8	3.4	32.0	0.0	91.2	36410.3		
2404.00	V	64.7	3.4	32.0	0.0	100.1	101443.5		
7212.00	H	48.3	6.1	35.7	-39.4	50.6	340.2	10144.4	-29.5
7212.00	V	48.9	6.1	35.7	-39.4	51.2	364.5	10144.4	-28.9
9616.00	H	49.5	6.8	36.6	-39.3	53.7	481.9	10144.4	-26.5
9616.00	V	48.6	6.8	36.6	-39.3	52.8	435.5	10144.4	-27.3
14424.00	H	48.7	8.7	39.6	-38.3	58.7	864.2	10144.4	-21.4
14424.00	V	49.0	8.7	39.6	-38.3	59.1	897.7	10144.4	-21.1
16828.00	H	48.2	9.4	41.7	-37.5	61.9	1238.9	10144.4	-18.3
16828.00	V	48.1	9.4	41.7	-37.5	61.8	1230.4	10144.4	-18.3
21636.00	H	37.3	2.2	40.6	-28.6	51.4	372.1	10144.4	-28.7
21636.00	V	37.2	2.2	40.6	-28.6	51.3	369.1	10144.4	-28.8
24040.00	H	36.5	2.2	40.6	-30.0	49.3	293.2	10144.4	-30.8
24040.00	V	36.8	2.2	40.6	-30.0	49.7	304.2	10144.4	-30.5

Manufacturer : Shure Incorporated
 Test Item : TRx
 Model No. : GLXD4R
 Serial No. : 4162880360 95A30908 04
 Mode : Transmit at 2404MHz - Half Bandwidth
 Test Specification : FCC-15.247, RSS-247 Radiated Spurious Emissions - Harmonics

Freq. MHz	Ant Pol	Meter Reading (dBuV)	CBL (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)
4808.00	H	48.7	4.8	34.6	-39.3	48.8	276.4	5000.0	-25.1
4808.00	V	51.7	4.8	34.6	-39.3	51.8	388.6	5000.0	-22.2
12020.00	H	48.5	8.0	38.7	-39.2	56.1	636.5	5000.0	-17.9
12020.00	V	48.9	8.0	38.7	-39.2	56.5	664.9	5000.0	-17.5
19232.00	H	34.6	2.2	40.4	-28.5	48.7	271.8	5000.0	-25.3
19232.00	V	35.7	2.2	40.4	-28.5	49.8	308.5	5000.0	-24.2

Manufacturer : Shure Incorporated
 Test Item : TRx
 Model No. : GLXD4R
 Serial No. : 4162880360 95A30908 04
 Mode : Transmit at 2404MHz - Half Bandwidth
 Test Specification : FCC-15.247, RSS-247 Radiated Spurious Emissions – Restricted Band

Freq. MHz	Ant Pol	Meter Reading (dBuV)	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Duty Cycle (dB)	Average Total dBuV/m at 3m	Average Total uV/m at 3 m	Average Limit uV/m at 3 m	Margin (dB)
4808.00	H	36.9	4.8	34.6	-39.3	2.0	38.9	88.4	500.0	-15.0
4808.00	V	39.1	4.8	34.6	-39.3	2.0	41.2	114.8	500.0	-12.8
12020.00	H	36.2	8.0	38.7	-39.2	2.0	45.7	192.9	500.0	-8.3
12020.00	V	36.2	8.0	38.7	-39.2	2.0	45.7	192.9	500.0	-8.3
19232.00	H	22.4	2.2	40.4	-28.5	2.0	38.5	83.9	500.0	-15.5
19232.00	V	22.5	2.2	40.4	-28.5	2.0	38.5	84.2	500.0	-15.5

Manufacturer : Shure Incorporated
 Test Item : TRx
 Model No. : GLXD4R
 Serial No. : 4162880360 95A30908 04
 Mode : Transmit at 2442MHz - Full Bandwidth
 Test Specification : FCC-15.247, RSS-247 Radiated Spurious Emissions - Harmonics

Freq. MHz	Ant Pol	Meter Reading (dBuV)	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)
2442.00	H	57.5	3.5	32.1	0.0	93.0	44594.1		
2442.00	V	65.1	3.5	32.1	0.0	100.6	107220.4		
9768.00	H	49.2	6.9	36.9	-39.3	53.7	484.9	10722.0	-26.9
9768.00	V	49.2	6.9	36.9	-39.3	53.7	483.7	10722.0	-26.9
14652.00	H	48.8	8.8	39.6	-38.2	59.0	895.9	10722.0	-21.6
14652.00	V	48.8	8.8	39.6	-38.2	59.0	891.8	10722.0	-21.6
17094.00	H	48.7	9.5	41.6	-37.6	62.3	1300.1	10722.0	-18.3
17094.00	V	48.4	9.5	41.6	-37.6	62.0	1261.7	10722.0	-18.6
21978.00	H	37.4	2.2	40.6	-29.2	51.0	353.6	10722.0	-29.6
21978.00	V	37.4	2.2	40.6	-29.2	51.0	355.6	10722.0	-29.6
24420.00	H	37.0	2.2	40.6	-30.2	49.6	302.6	10722.0	-31.0
24420.00	V	36.9	2.2	40.6	-30.2	49.5	300.2	10722.0	-31.1

Manufacturer : Shure Incorporated
Test Item : TRx
Model No. : GLXD4R
Serial No. : 4162880360 95A30908 04
Mode : Transmit at 2442MHz - Full Bandwidth
Test Specification : FCC-15.247, RSS-247 Radiated Spurious Emissions - Harmonics

Freq. MHz	Ant Pol	Meter Reading (dBuV)	CBL (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)
4884.00	H	48.5	4.9	34.5	-39.3	48.5	267.3	5000.0	-25.4
4884.00	V	49.1	4.9	34.5	-39.3	49.2	287.1	5000.0	-24.8
7326.00	H	48.9	6.2	35.7	-39.4	51.3	367.9	5000.0	-22.7
7326.00	V	49.6	6.2	35.7	-39.4	52.0	397.9	5000.0	-22.0
12210.00	H	48.4	8.0	38.8	-39.1	56.1	640.7	5000.0	-17.8
12210.00	V	48.8	8.0	38.8	-39.1	56.5	670.9	5000.0	-17.4
19536.00	H	35.1	2.2	40.4	-28.5	49.3	291.1	5000.0	-24.7
19536.00	V	35.0	2.2	40.4	-28.5	49.1	285.5	5000.0	-24.9

Manufacturer : Shure Incorporated
 Test Item : TRx
 Model No. : GLXD4R
 Serial No. : 4162880360 95A30908 04
 Mode : Transmit at 2442MHz - Full Bandwidth
 Test Specification : FCC-15.247, RSS-247 Radiated Spurious Emissions – Restricted Band

Freq. MHz	Ant Pol	Meter Reading (dBuV)	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Duty Cycle (dB)	Average Total dBuV/m at 3m	Average Total uV/m at 3 m	Average Limit uV/m at 3 m	Margin (dB)
4884.00	H	36.8	4.9	34.5	-39.3	4.4	41.4	117.0	500.0	-12.6
4884.00	V	36.8	4.9	34.5	-39.3	4.4	41.4	116.8	500.0	-12.6
7326.00	H	36.86	6.2	35.7	-39.4	4.4	43.7	153.4	500.0	-10.3
7326.00	V	36.9	6.2	35.7	-39.4	4.4	43.8	154.1	500.0	-10.2
12210.00	H	36.6	8.0	38.8	-39.1	4.4	48.7	273.3	500.0	-5.2
12210.00	V	36.5	8.0	38.8	-39.1	4.4	48.7	271.7	500.0	-5.3
19536.00	H	22.9	2.2	40.4	-28.5	4.4	41.5	118.2	500.0	-12.5
19536.00	V	22.7	2.2	40.4	-28.5	4.4	41.3	116.2	500.0	-12.7

Manufacturer : Shure Incorporated
 Test Item : TRx
 Model No. : GLXD4R
 Serial No. : 4162880360 95A30908 04
 Mode : Transmit at 2442MHz - Half Bandwidth
 Test Specification : FCC-15.247, RSS-247 Radiated Spurious Emissions - Harmonics

Freq. MHz	Ant Pol	Meter Reading (dBuV)	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)
2442.00	H	56.2	3.5	32.1	0.0	91.7	38439.5		
2442.00	V	64.5	3.5	32.1	0.0	100.1	100641.6		
9768.00	H	49.0	6.9	36.9	-39.3	53.5	473.3	10064.2	-26.6
9768.00	V	49.2	6.9	36.9	-39.3	53.7	485.4	10064.2	-26.3
12210.00	H	48.7	8.0	38.8	-39.1	56.4	657.8	5000.0	-17.6
12210.00	V	49.6	8.0	38.8	-39.1	57.3	729.7	5000.0	-16.7
14652.00	H	48.3	8.8	39.6	-38.2	58.5	842.9	10064.2	-21.5
14652.00	V	48.6	8.8	39.6	-38.2	58.8	875.5	10064.2	-21.2
17094.00	H	48.1	9.5	41.6	-37.6	61.7	1220.3	10064.2	-18.3
17094.00	V	48.7	9.5	41.6	-37.6	62.3	1304.6	10064.2	-17.7
21978.00	H	37.2	2.2	40.6	-29.2	50.8	345.9	10064.2	-29.3
21978.00	V	37.6	2.2	40.6	-29.2	51.2	363.1	10064.2	-28.9
24420.00	H	37.0	2.2	40.6	-30.2	49.6	303.3	10064.2	-30.4
24420.00	V	36.6	2.2	40.6	-30.2	49.2	289.3	10064.2	-30.8

Manufacturer : Shure Incorporated
 Test Item : TRx
 Model No. : GLXD4R
 Serial No. : 4162880360 95A30908 04
 Mode : Transmit at 2442MHz - Half Bandwidth
 Test Specification : FCC-15.247, RSS-247 Radiated Spurious Emissions - Harmonics

Freq. MHz	Ant Pol	Meter Reading (dBuV)	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)
4884.00	H	48.7	4.9	34.5	-39.3	48.8	274.2	5000.0	-25.2
4884.00	V	50.6	4.9	34.5	-39.3	50.7	342.0	5000.0	-23.3
7326.00	H	49.0	6.2	35.7	-39.4	51.4	373.0	5000.0	-22.5
7326.00	V	49.4	6.2	35.7	-39.4	51.8	389.3	5000.0	-22.2
12210.00	H	48.7	8.0	38.8	-39.1	56.4	657.8	5000.0	-17.6
12210.00	V	49.6	8.0	38.8	-39.1	57.3	729.7	5000.0	-16.7
19536.00	H	35.3	2.2	40.4	-28.5	49.5	298.2	5000.0	-24.5
19536.00	V	35.9	2.2	40.4	-28.5	50.1	318.8	5000.0	-23.9

Manufacturer : Shure Incorporated
 Test Item : TRx
 Model No. : GLXD4R
 Serial No. : 4162880360 95A30908 04
 Mode : Transmit at 2442MHz - Half Bandwidth
 Test Specification : FCC-15.247, RSS-247 Radiated Spurious Emissions – Restricted Band

Freq. MHz	Ant Pol	Meter Reading (dBuV)	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Duty Cycle (dB)	Average Total dBuV/m at 3m	Average Total uV/m at 3 m	Average Limit uV/m at 3 m	Margin (dB)
4884.00	H	36.8	4.9	34.5	-39.3	2.0	38.9	87.7	500.0	-15.1
4884.00	V	36.9	4.9	34.5	-39.3	2.0	38.9	88.5	500.0	-15.0
7326.00	H	36.85	6.2	35.7	-39.4	2.0	41.2	115.1	500.0	-12.8
7326.00	V	36.9	6.2	35.7	-39.4	2.0	41.2	115.1	500.0	-12.8
12210.00	H	36.5	8.0	38.8	-39.1	2.0	46.2	203.8	500.0	-7.8
12210.00	V	36.5	8.0	38.8	-39.1	2.0	46.2	203.5	500.0	-7.8
19536.00	H	22.8	2.2	40.4	-28.5	2.0	38.9	87.9	500.0	-15.1
19536.00	V	22.6	2.2	40.4	-28.5	2.0	38.7	85.8	500.0	-15.3

Manufacturer : Shure Incorporated
 Test Item : TRx
 Model No. : GLXD4R
 Serial No. : 4162880360 95A30908 04
 Mode : Transmit at 2478MHz - Full Bandwidth
 Test Specification : FCC-15.247, RSS-247 Radiated Spurious Emissions - Harmonics

Freq. MHz	Ant Pol	Meter Reading (dBuV)	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)
2478.00	H	50.1	3.5	32.1	0.0	85.7	19294.2		
2478.00	V	59.7	3.5	32.1	0.0	95.4	58671.3		
9912.00	H	49.6	7.0	37.0	-39.2	54.3	516.6	5867.1	-21.1
9912.00	V	49.0	7.0	37.0	-39.2	53.7	483.8	5867.1	-21.7
14868.00	H	48.7	8.9	39.6	-38.2	59.2	908.2	5867.1	-16.2
14868.00	V	48.5	8.9	39.6	-38.2	58.9	883.5	5867.1	-16.4
17346.00	H	48.5	9.7	41.4	-37.7	61.8	1231.6	5867.1	-13.6
17346.00	V	48.6	9.7	41.4	-37.7	61.9	1244.4	5867.1	-13.5
24780.00	H	36.8	2.2	40.6	-30.8	48.8	277.0	5867.1	-26.5
24780.00	V	36.9	2.2	40.6	-30.8	48.9	277.3	5867.1	-26.5

Manufacturer : Shure Incorporated
 Test Item : TRx
 Model No. : GLXD4R
 Serial No. : 4162880360 95A30908 04
 Mode : Transmit at 2478MHz - Full Bandwidth
 Test Specification : FCC-15.247, RSS-247 Radiated Spurious Emissions - Harmonics

Freq. MHz	Ant Pol	Meter Reading (dBuV)	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)
2490.60	H	25.0	3.5	32.2	0.0	60.6	1076.2	5000.0	-13.3
2492.90	V	37.2	3.5	32.2	0.0	72.9	4402.9	5000.0	-1.1
4956.00	H	49.0	4.9	34.5	-39.3	49.0	282.9	5000.0	-24.9
4956.00	V	48.2	4.9	34.5	-39.3	48.3	258.9	5000.0	-25.7
7434.00	H	53.4	6.2	35.6	-39.4	55.8	614.7	5000.0	-18.2
7434.00	V	48.7	6.2	35.6	-39.4	51.2	361.6	5000.0	-22.8
12390.00	H	49.4	8.0	38.8	-39.0	57.2	721.5	5000.0	-16.8
12390.00	V	48.7	8.0	38.8	-39.0	56.5	667.2	5000.0	-17.5
19824.00	H	34.9	2.2	40.4	-28.1	49.4	294.8	5000.0	-24.6
19824.00	V	35.0	2.2	40.4	-28.1	49.5	299.6	5000.0	-24.4
22302.00	H	37.5	2.2	40.6	-29.0	51.3	367.9	5000.0	-22.7
22302.00	V	37.3	2.2	40.6	-29.0	51.1	358.3	5000.0	-22.9

Manufacturer : Shure Incorporated
 Test Item : TRx
 Model No. : GLXD4R
 Serial No. : 4162880360 95A30908 04
 Mode : Transmit at 2478MHz - Full Bandwidth
 Test Specification : FCC-15.247, RSS-247 Radiated Spurious Emissions – Restricted Band

Freq. MHz	Ant Pol	Meter Reading (dBuV)	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Duty Cycle (dB)	Average Total dBuV/m at 3m	Average Total uV/m at 3 m	Average Limit uV/m at 3 m	Margin (dB)
2490.60	H	13.4	3.5	32.2	0.0	4.4	41.2	115.0	500.0	-12.8
2492.90	V	16.1	3.5	32.2	0.0	4.4	41.1	113.9	500.0	-12.8
4956.00	H	36.7	4.9	34.5	-39.3	4.4	43.2	144.6	500.0	-10.8
4956.00	V	36.6	4.9	34.5	-39.3	4.4	43.4	147.1	500.0	-10.6
7434.00	H	36.34	6.2	35.6	-39.4	4.4	48.8	276.8	500.0	-5.1
7434.00	V	36.5	6.2	35.6	-39.4	4.4	48.8	275.2	500.0	-5.2
12390.00	H	36.6	8.0	38.8	-39.0	4.4	41.5	119.3	500.0	-12.4
12390.00	V	36.6	8.0	38.8	-39.0	4.4	41.5	119.1	500.0	-12.5
19824.00	H	22.6	2.2	40.4	-28.1	4.4	43.0	140.9	500.0	-11.0
19824.00	V	22.6	2.2	40.4	-28.1	4.4	43.0	141.0	500.0	-11.0
22302.00	H	24.7	2.2	40.6	-29.0	4.4	41.5	119.3	500.0	-12.4
22302.00	V	24.8	2.2	40.6	-29.0	4.4	41.5	119.1	500.0	-12.5

Manufacturer : Shure Incorporated
 Test Item : TRx
 Model No. : GLXD4R
 Serial No. : 4162880360 95A30908 04
 Mode : Transmit at 2478MHz - Half Bandwidth
 Test Specification : FCC-15.247, RSS-247 Radiated Spurious Emissions - Harmonics

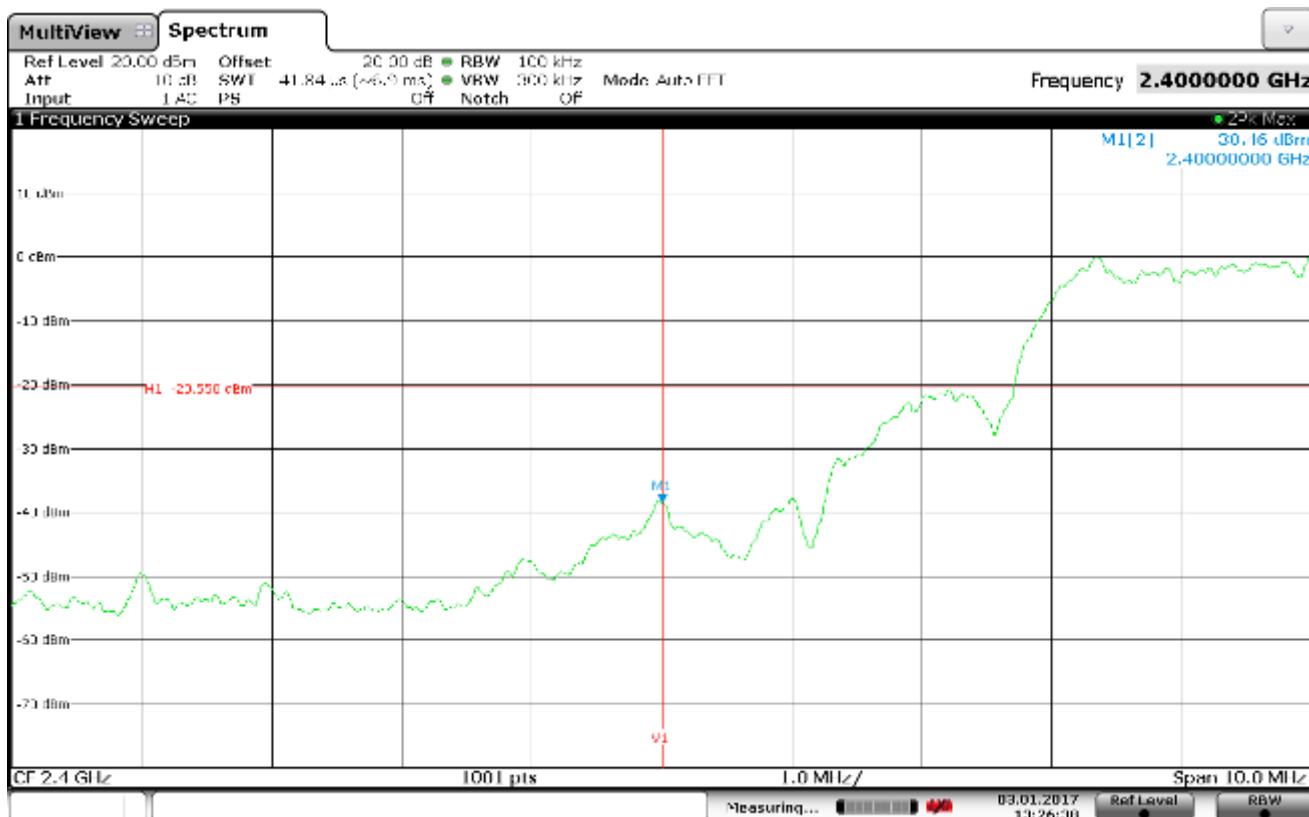
Freq. MHz	Ant Pol	Meter Reading (dBuV)	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Peak Total dBuV/m at 3m	Peak Total uV/m at 3 m	Peak Limit uV/m at 3 m	Margin (dB)
2478.00	H	50.8	3.5	32.1	0.0	86.5	21082.7		
2478.00	V	61.2	3.5	32.1	0.0	96.9	69650.8		
9912.00	H	52.7	7.0	37.0	-39.2	57.4	741.6	6965.1	-19.5
9912.00	V	53.0	7.0	37.0	-39.2	57.7	765.9	6965.1	-19.2
14868.00	H	52.5	8.9	39.6	-38.2	62.9	1398.6	6965.1	-13.9
14868.00	V	52.7	8.9	39.6	-38.2	63.1	1427.9	6965.1	-13.8
17346.00	H	52.7	9.7	41.4	-37.7	66.1	2009.0	6965.1	-10.8
17346.00	V	47.9	9.7	41.4	-37.7	61.2	1150.7	6965.1	-15.6
24780.00	H	37.6	2.2	40.6	-30.8	49.6	302.3	6965.1	-27.2
24780.00	V	36.6	2.2	40.6	-30.8	48.6	268.8	6965.1	-28.3

Manufacturer : Shure Incorporated
 Test Item : TRx
 Model No. : GLXD4R
 Serial No. : 4162880360 95A30908 04
 Mode : Transmit at 2478MHz - Half Bandwidth
 Test Specification : FCC-15.247, RSS-247 Radiated Spurious Emissions - Harmonics

Freq. MHz	Ant Pol	Meter Reading (dBuV)	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)
2490.33	H	29.1	3.5	32.2	0.0	64.8	1735.2	5000.0	-9.2
2483.50	V	30.0	3.5	32.2	0.0	65.7	1919.9	5000.0	-8.3
4956.00	H	53.3	4.9	34.5	-39.3	53.4	465.1	5000.0	-20.6
4956.00	V	53.4	4.9	34.5	-39.3	53.5	472.7	5000.0	-20.5
7434.00	H	53.0	6.2	35.6	-39.4	55.4	587.1	5000.0	-18.6
7434.00	V	52.8	6.2	35.6	-39.4	55.2	576.4	5000.0	-18.8
12390.00	H	52.9	8.0	38.8	-39.0	60.7	1085.7	5000.0	-13.3
12390.00	V	52.7	8.0	38.8	-39.0	60.5	1058.6	5000.0	-13.5
19824.00	H	36.3	2.2	40.4	-28.1	50.8	346.4	5000.0	-23.2
19824.00	V	35.3	2.2	40.4	-28.1	49.8	308.4	5000.0	-24.2
22302.00	H	37.6	2.2	40.6	-29.0	51.4	370.5	5000.0	-22.6
22302.00	V	37.4	2.2	40.6	-29.0	51.2	364.1	5000.0	-22.8

Manufacturer : Shure Incorporated
 Test Item : TRx
 Model No. : GLXD4R
 Serial No. : 4162880360 95A30908 04
 Mode : Transmit at 2478MHz - Half Bandwidth
 Test Specification : FCC-15.247, RSS-247 Radiated Spurious Emissions – Restricted Band

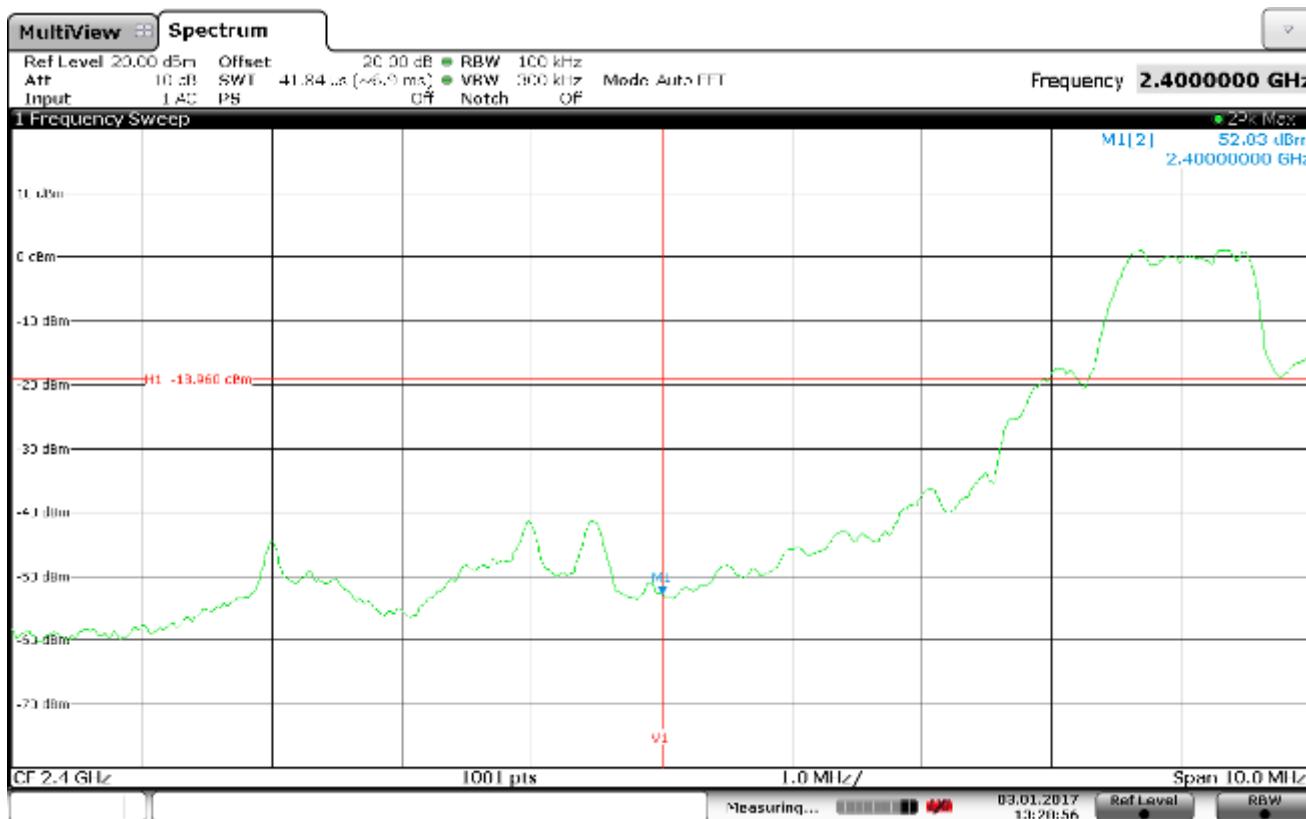
Freq. MHz	Ant Pol	Meter Reading (dBuV)	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Duty Cycle (dB)	Average Total dBuV/m at 3m	Average Total uV/m at 3 m	Average Limit uV/m at 3 m	Margin (dB)
2490.33	H	14.9	3.5	32.2	0.0	2.0	42.9	140.3	500.0	-11.0
2483.50	V	17.3	3.5	32.2	0.0	2.0	43.0	140.5	500.0	-11.0
4956.00	H	40.9	4.9	34.5	-39.3	2.0	44.4	166.2	500.0	-9.6
4956.00	V	40.9	4.9	34.5	-39.3	2.0	44.4	165.8	500.0	-9.6
7434.00	H	40.03	6.2	35.6	-39.4	2.0	49.4	296.0	500.0	-4.6
7434.00	V	40.0	6.2	35.6	-39.4	2.0	49.5	297.7	500.0	-4.5
12390.00	H	39.7	8.0	38.8	-39.0	2.0	39.1	90.4	500.0	-14.9
12390.00	V	39.7	8.0	38.8	-39.0	2.0	39.1	90.3	500.0	-14.9
19824.00	H	22.7	2.2	40.4	-28.1	2.0	40.5	106.5	500.0	-13.4
19824.00	V	22.6	2.2	40.4	-28.1	2.0	40.5	106.5	500.0	-13.4
22302.00	H	24.8	2.2	40.6	-29.0	2.0	39.1	90.4	500.0	-14.9
22302.00	V	24.8	2.2	40.6	-29.0	2.0	39.1	90.3	500.0	-14.9



BAND EDGE COMPLIANCE

MANUFACTURER : Shure Incorporated
 MODEL NUMBER : GLXD4R
 SERIAL NUMBER : 4162880360 95A30908 04
 TEST MODE : Low Channel - Full Bandwidth

NOTES



BAND EDGE COMPLIANCE

MANUFACTURER : Shure Incorporated
 MODEL NUMBER : GLXD4R
 SERIAL NUMBER : 4162880360 95A30908 04
 TEST MODE : Low Channel Half Bandwidth

NOTES

Manufacturer : Shure Incorporated
 Test Item : TRx
 Model No. : GLXD4R
 Serial No. : 4162880360 95A30908 04
 Mode : High Channel - Full Bandwidth & Half Bandwidth
 Notes :

Freq. MHz	Ant Pol	Meter Reading (dBuV)	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)
2490.60	H	25.0	3.5	32.2	0.0	60.6	1076.2	5000.0	-13.3
2492.90	V	37.2	3.5	32.2	0.0	72.9	4402.9	5000.0	-1.1

Table 1 - Full Bandwidth

Freq. MHz	Ant Pol	Meter Reading (dBuV)	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)
2490.33	H	29.1	3.5	32.2	0.0	64.8	1735.2	5000.0	-9.2
2483.50	V	30.0	3.5	32.2	0.0	65.7	1919.9	5000.0	-8.3

Table 2 - Half Bandwidth

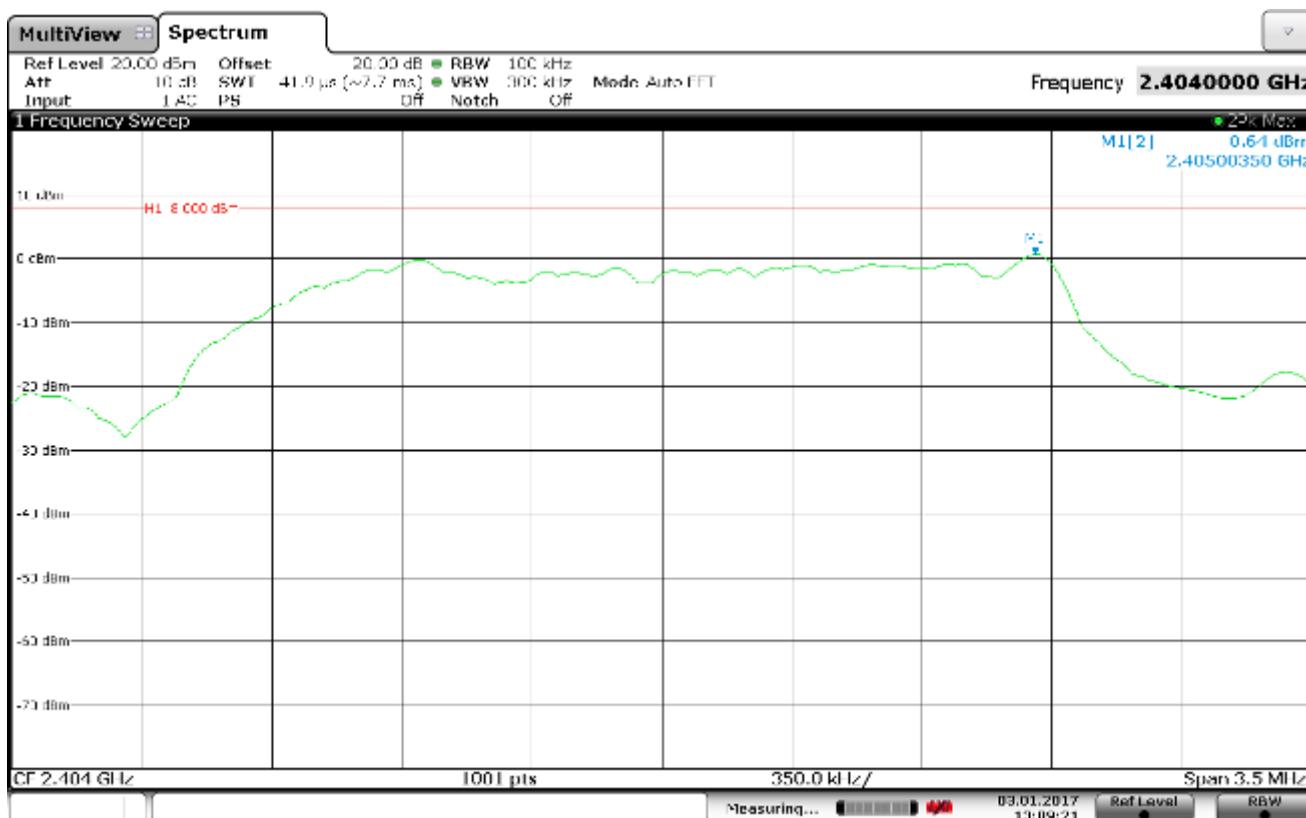
Manufacturer : Shure Incorporated
 Test Item : TRx
 Model No. : GLXD4R
 Serial No. : 4162880360 95A30908 04
 Mode : High Channel - Full Bandwidth & Half Bandwidth - Averages
 Notes :

Freq. MHz	Ant Pol	Meter Reading (dBuV)	CBL Fac	Ant Fac (dB)	Pre Amp (dB)	Duty Cycle (dB)	Average Total dBuV/m at 3m	Average Total uV/m at 3 m	Average Limit uV/m at 3 m	Margin (dB)
2490.60	H	13.4	3.5	32.2	0.0	0.0	49.0	283.1	500.0	-4.9
2492.90	V	16.1	3.5	32.2	0.0	0.0	51.8	388.8	500.0	-2.2

Table 1 - Full Bandwidth

Freq. MHz	Ant Pol	Meter Reading (dBuV)	CBL Fac	Ant Fac (dB)	Pre Amp (dB)	Duty Cycle (dB)	Average Total dBuV/m at 3m	Average Total uV/m at 3 m	Average Limit uV/m at 3 m	Margin (dB)
2490.33	H	14.9	3.5	32.2	0.0	0.0	50.6	339.5	500.0	-3.4
2483.50	V	17.3	3.5	32.2	0.0	0.0	52.9	443.9	500.0	-1.0

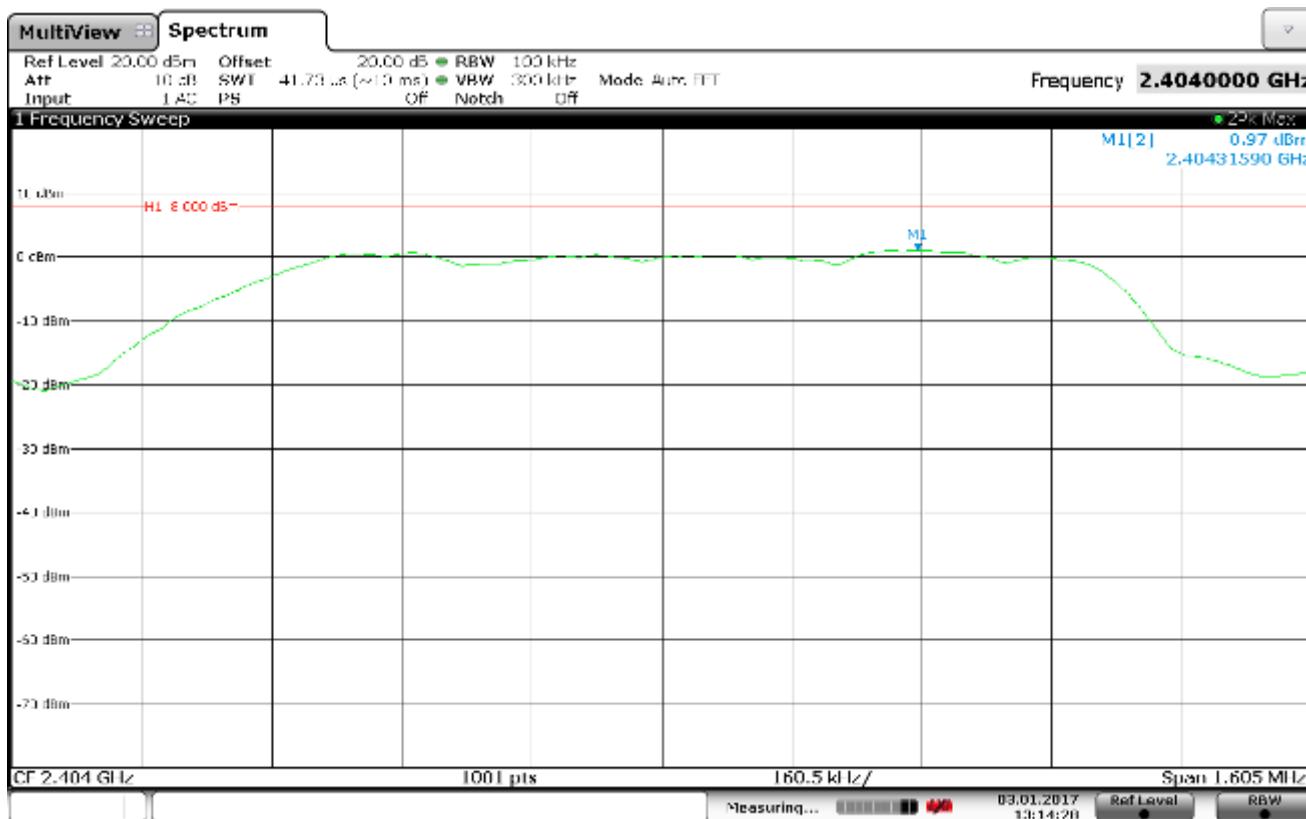
Table 2 - Half Bandwidth



POWER SPECTRAL DENSITY

MANUFACTURER : Shure Incorporated
 MODEL NUMBER : GLXD4R
 SERIAL NUMBER : 4162880360 95A30908 04
 TEST MODE : Low Channel - Full Bandwidth

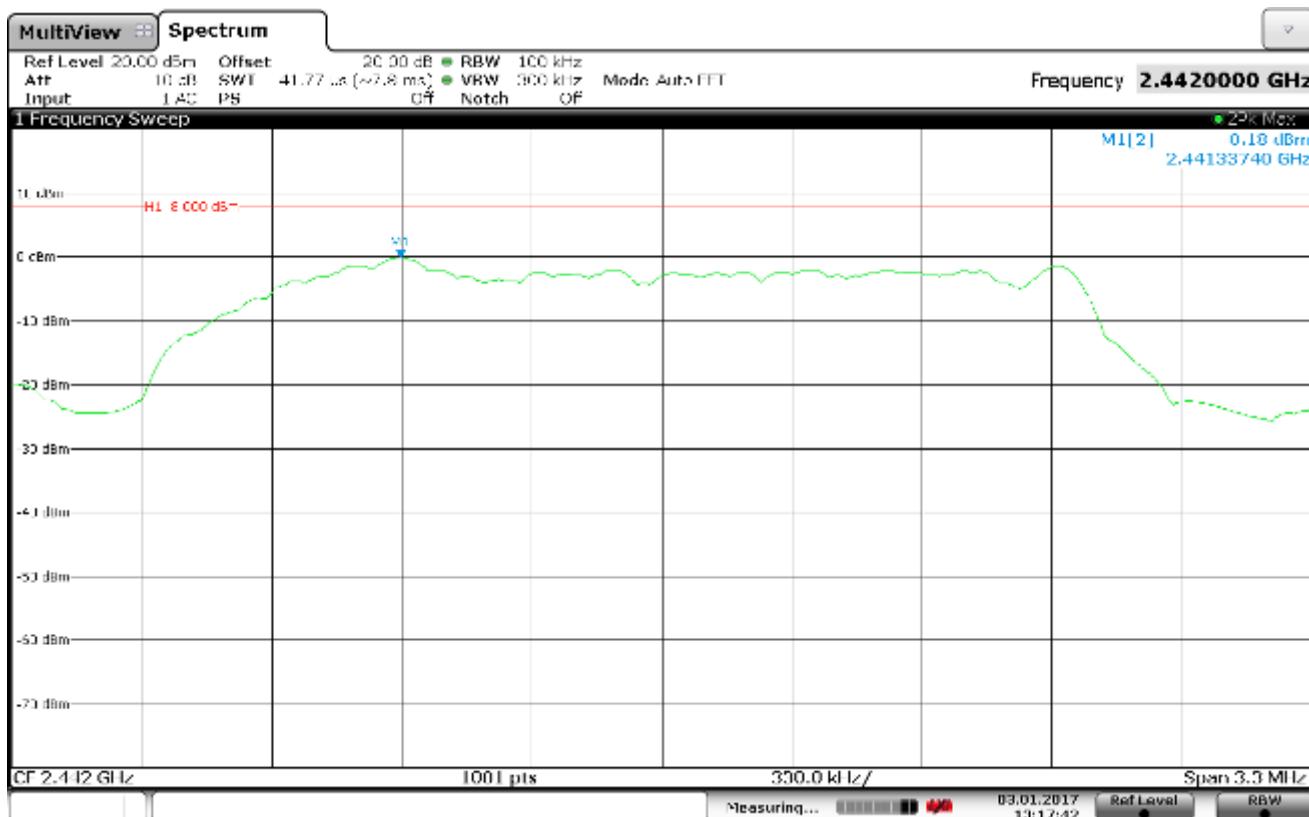
NOTES



POWER SPECTRAL DENSITY

MANUFACTURER : Shure Incorporated
 MODEL NUMBER : GLXD4R
 SERIAL NUMBER : 4162880360 95A30908 04
 TEST MODE : Low Channel - Half Bandwidth

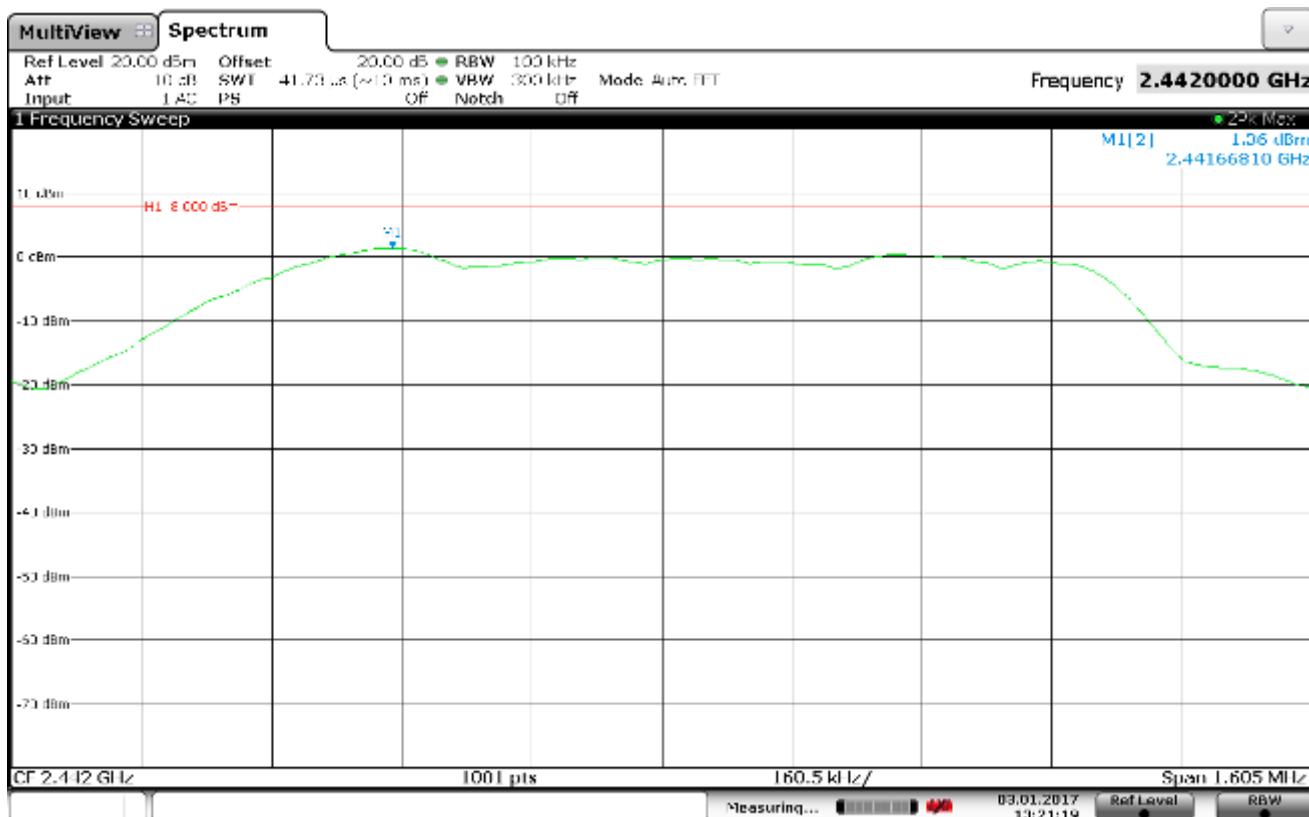
NOTES



POWER SPECTRAL DENSITY

MANUFACTURER : Shure Incorporated
 MODEL NUMBER : GLXD4R
 SERIAL NUMBER : 4162880360 95A30908 04
 TEST MODE : Mid Channel - Full Bandwidth

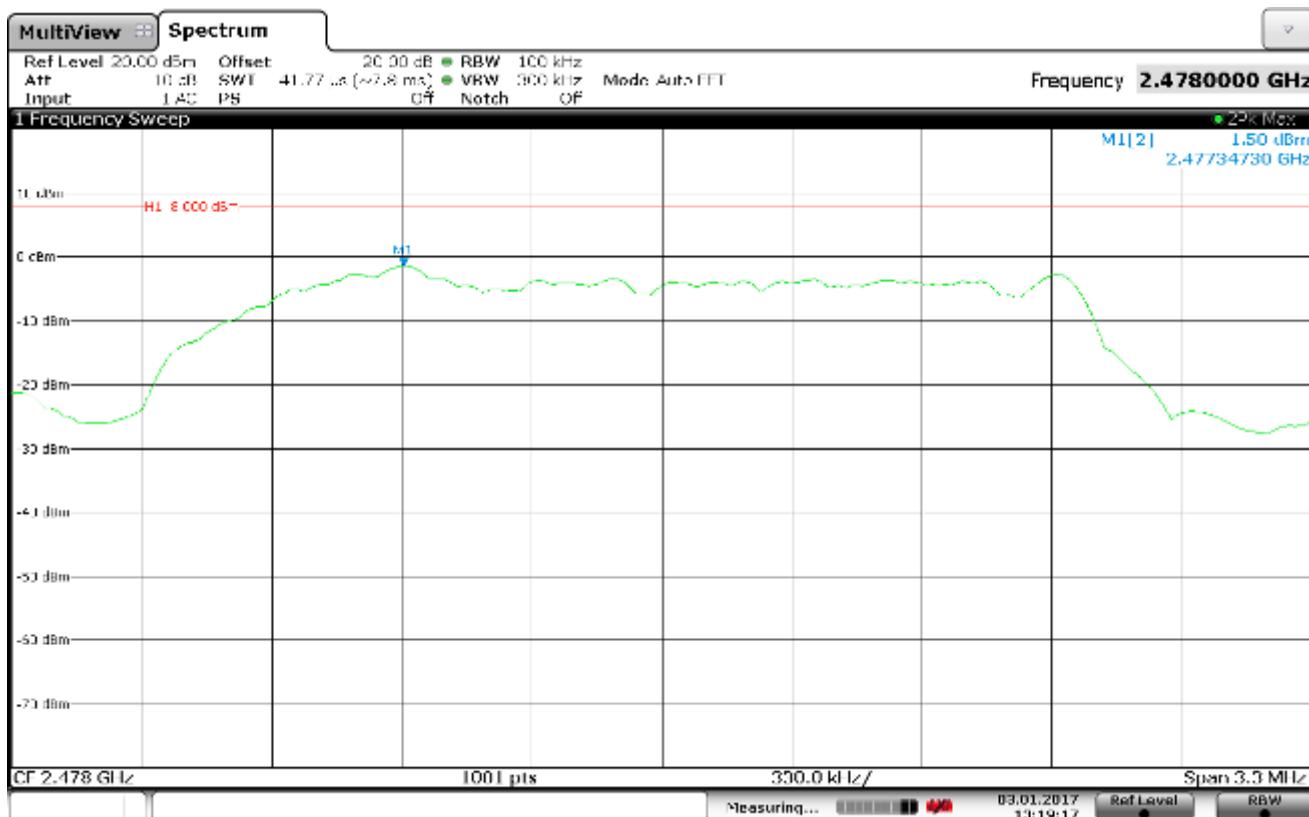
NOTES



POWER SPECTRAL DENSITY

MANUFACTURER : Shure Incorporated
 MODEL NUMBER : GLXD4R
 SERIAL NUMBER : 4162880360 95A30908 04
 TEST MODE : Mid Channel - Half Bandwidth

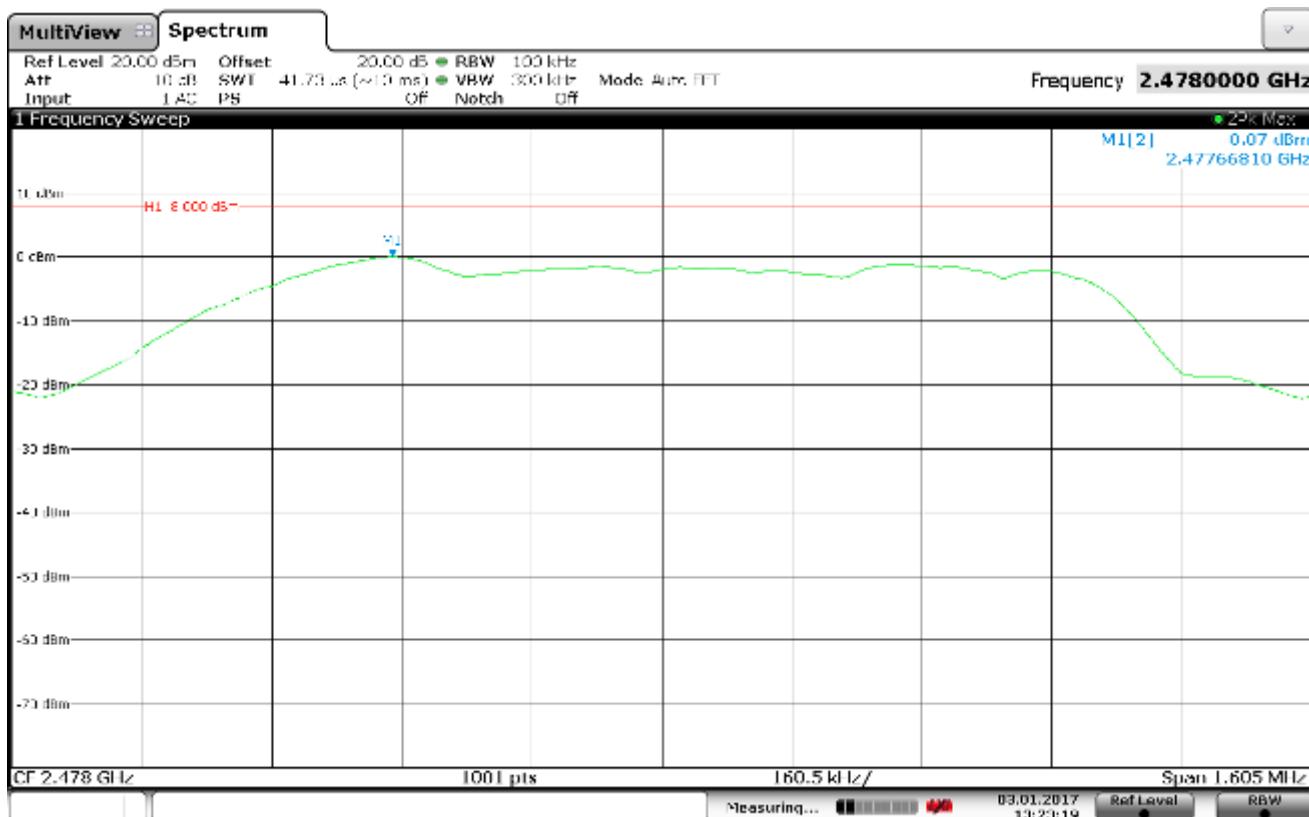
NOTES



POWER SPECTRAL DENSITY

MANUFACTURER : Shure Incorporated
 MODEL NUMBER : GLXD4R
 SERIAL NUMBER : 4162880360 95A30908 04
 TEST MODE : High Channel - Full Bandwidth

NOTES



POWER SPECTRAL DENSITY

MANUFACTURER : Shure Incorporated
MODEL NUMBER : GLXD4R
SERIAL NUMBER : 4162880360 95A30908 04
TEST MODE : High Channel - Half Bandwidth

NOTES