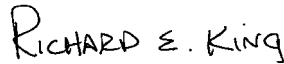





## Measurement of RF Interference from an Model No. AXT610 Zigbee Transceiver

For : Shure Inc.  
: 5800 West Touhy  
: Niles, IL 60714

P.O. No. : 4500188069  
Date Tested : November 15 – 22, 2010  
Test Personnel : Richard E King  
Specification : FCC "Code of Federal Regulations" Title 47, Part 15,  
Subpart B and Subpart C, Section 15.247 for Digital  
Transmission Systems Operating within The band 2400-  
2483.5MHz  
Industry Canada RSS-210  
Industry Canada RSS-GEN

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**REVISION HISTORY**

Revision	Date	Description
—	29 Dec 2010	Initial release

## Measurement of RF Emissions from a Model No. AXT610 Transceiver

### 1 INTRODUCTION

#### 1.1 Scope of Tests

This document represents the results of the series of radio interference measurements performed on a Zigbee Transceiver, Model No. AXT610 (hereinafter referred to as the EUT). Serial No Elite 1. The EUT was designed to transmit and receive in the 2405MHz to 2480MHz band using an internal antenna. The EUT transmitted using digital transmission system techniques. The EUT was manufactured and submitted for testing by Shure Inc. located in Niles, IL.

The receive portion of the EUT is a super-heterodyne type receiver designed to receive in the 2405MHz to 2480MHz band. The EUT contains a tuner which utilizes one local oscillator (LO) at the tuned frequency.

#### 1.2 Purpose

The test series was performed to determine if the EUT meets the radiated RF emission requirements of the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart B, Sections 15.109, and Subpart C, 15.247 for Intentional Radiators operating within the 2400-2483.5MHz band.

The test series was also performed to determine if the EUT meets the conducted and radiated RF emission requirements of the Industry Canada Radio Standards Specification, RSS-Gen, Section 7.2.4 and Section 6.1 for receivers and the Industry Canada Radio Standards Specification RSS-Gen Section 7.2.4 and 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 National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP). NVLAP Lab Code: 100278-0.

#### 1.5 Laboratory Conditions

The temperature at the time of the test was 23°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 2010
- FCC Public Notice, DA 00-705, "Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems", Released March 30, 2000
- 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"
- Industry Canada Radio Standards Specification, RSS-Gen, "General Requirements and Information for the Certification of Radiocommunication Equipment", Issue 2, June 2007
- Industry Canada Radio Standards Specification, RSS-210, "Low-power Licence-exempt

Radiocommunication Devices (All Frequency Bands): Category I Equipment”, Issue 7, June 2007

- Public Notice 558074, “New Guidance on Measurements for Digital Transmission Systems in 15.247”

### 3 EUT SET-UP AND OPERATION

#### 3.1 General Description

The EUT is a Zigbee Transceiver, Model No. AXT610 serial number Elite 1. A block diagram of the EUT set-up is shown as Figure 1. A photograph of the EUT is shown as Figure 2.

##### 3.1.1 Power Input

The EUT operates on POE power (Power Over Ethernet) at 48V from a Shure AXT400 UHF Receiver. The Shure AXT400 UHF Receiver was powered with 120VAC 60Hz.

##### 3.1.2 Peripheral Equipment

The EUT was submitted with a Shure AXT400 UHF Receiver and an IBM Thinkpad model T42P laptop computer. The Shure AXT400 UHF Receiver provided the input POE power to the EUT. The IBM Thinkpad laptop computer was used to program the EUT.

##### 3.1.3 Interconnect Cables

The EUT was submitted with 100 foot ethernet cable connected to a Shure AXT400 UHF Receiver. An IBM Thinkpad model T42P was connected to the Shure AXT400 UHF Receiver through a 6 foot ethernet cable. The laptop was used for programming the EUT.

##### 3.1.4 Grounding

The EUT was ungrounded during testing.

#### 3.2 Operational Mode

The output power, 6dB bandwidth and spectral density tests were performed on a unit modified with an antenna port. All remaining tests were performed with the antenna port removed. For all tests, the EUT was placed on an 80cm high non-conductive stand. The EUT was energized.

For radiated emissions tests, the EUT was programmed to operate in one of the following modes:

- transmit @ 2405MHz
- transmit @ 2445MHz
- transmit @ 2480MHz
- receive @ 2445MHz

#### 3.3 EUT Modifications

No modifications were required for compliance to the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart B, Sections 109, and Subpart C, Sections 15.207 and 15.247 requirements.

### 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 Equipment List. All equipment was calibrated per the instruction manuals supplied by the manufacturer.

Conducted emission tests were performed with a spectrum analyzer in conjunction with a quasi-peak adapter. Radiated emissions were performed with a spectrum analyzer. This receiver allows measurements with the bandwidths 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 Emission Measurements			
	Combined Standard Uncertainty	1.07	-1.07
	Expanded Uncertainty (95% confidence)	2.1	-2.1

Radiated Emission Measurements			
	Combined Standard Uncertainty	2.26	-2.26
	Expanded Uncertainty (95% confidence)	4.5	-4.5

5 TEST PROCEDURES

5.1 Duty Cycle Factor Measurements

5.1.1 Procedures

The duty cycle factor is used to convert peak detected readings to average readings. This factor is computed from the time domain trace of the pulse modulation signal.

The duty cycle calculation was provided in Shure document AXT610 Duty Cycle Measurement. For the EUT to utilize the worst case duty cycle, the EUT must be communicating with 16 portables. The duty cycle measurements were performed at Shure by Shure personnel. Please see this document for the duty cycle measurement and calculations.

5.1.2 Results

From table 2 of the Shure document AXT610 Duty Cycle Measurement document, the worst case duty cycle with 16 portables communicating was calculated to be 24.25 mSecs on-time in a 100 mSec period. The duty cycle factor was calculated to be  $20 \cdot \log(24.25\text{ms on time} / 100\text{mS}) = -12.3 \text{ dB}$ .

5.2 Radiated Measurements

5.2.1 Receiver

5.2.1.1 Requirements

Per 15.101(b), receivers operating above 960MHz are exempt from complying with the radiated emissions requirements of 15.109. Therefore, no radiated emissions tests are required with the EUT operating in the receive



mode.

Per RSS-GEN, the search for spurious emissions shall be from the lowest frequency internally generated or used in the receiver (e.g. local oscillator, intermediate or carrier frequency), or 30 MHz, whichever is the higher, to at least 3 times the highest tune-able or local oscillator frequency, whichever is the higher, without exceeding 40 GHz.

All emanations from a receiver shall be below the levels shown on the following table:

RADIATION LIMITS FOR A RECEIVER

Frequency MHz	Distance between EUT And Antenna in Meters	Field Strength uV/m	Field Strength dBuV/m
30-88	3	100	40
88-216	3	150	43.5
216-960	3	200	46
Above 960	3	500	54

Note: The tighter limit shall apply at the edge between the two frequency bands.

5.2.1.2 Procedure

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.

- a) The field strength of all emissions above 1GHz 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 1MHz was used on the spectrum analyzer.
- b) 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) For all radiated emissions measurements above 1GHz, if the peak reading is below the limits listed in above, no further measurements are required. If however, the peak readings exceed the limits listed above, then the emissions are re-measured using an average detector.

The measuring antenna was raised and lowered for each antenna polarization to maximize the readings.

5.2.1.3 Results

Preliminary radiated emissions plots with the EUT receiving in the 2405-2480MHz band are shown on pages 17 through 20. Final receiver radiated emissions data are presented on data page 21. As can be seen from the data, all emissions measured from the EUT were within the specification limits.

5.2.2 Transmitter

5.2.2.1 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

5.2.2.2 Procedures

For antenna conducted measurements

- a) The EUT was connected to a spectrum analyzer.
- b) The resolution bandwidth was set to 100kHz.
- c) The video bandwidth was set to 1MHz.
- d) Detector was set to positive peak.
- e) Averaging was OFF.
  - i) The frequency range was swept from 30MHz to 18GHz. Frequency range from 18GHz to 25 GHz was checked with the radiated measurements.
  - ii) The emissions were compared to the requirements listed in 5.3.2.1.

For Radiated Measurements

Radiated measurements were performed in a 32ft. x 20ft. x 14ft. high shielded enclosure. 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 25GHz was investigated using a peak detector function.

The final open field emission tests were then manually performed over the frequency range of 30MHz to 25GHz.

- 2) For all harmonics not in the restricted bands, the following procedure was used:
  - a) The field strength of the fundamental was measured using a double-ridged waveguide antenna. The double-ridged waveguide antenna was positioned at a 3 meter distance from the EUT. A peak detector with a resolution bandwidth of 100kHz was used on the spectrum analyzer.
  - b) The field strength 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 100kHz was used on the spectrum analyzer.
  - c) To ensure that maximum or worst case emission levels 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.
  - d) All harmonics not in the restricted bands must be at least 20dB below level measured at the fundamental. However, attenuation below the general limits specified in §15.209(a) is not required.
- 3) For all emissions in the restricted bands, the following procedure was used:
- a) The field strength of all emissions below 1GHz 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 100kHz was used on the spectrum analyzer.
  - b) The field strength of all emissions above 1GHz 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 1MHz 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.
  - d) For all radiated emissions measurements below 1GHz, 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 re-measured using a quasi-peak detector.
  - e) For all radiated emissions measurements above 1GHz, measurements were taken using a 1MHz resolution bandwidth and a 10Hz video bandwidth. For pulsed emissions, these readings were corrected to average levels using a duty cycle factor which was computed from the pulse train. All average levels must comply with the limits specified in 15.209(a).

### 5.2.2.3 Results

Conducted emission plots with the EUT transmitting are shown on pages 22 through 30. As can be seen from the data, all emissions measured from the EUT were within the specification limits.

Preliminary radiated emissions plots with the EUT transmitting are shown on pages 31 through 47. The final radiated emissions data is presented on data pages 49 through 54. As can be seen from the data, all emissions measured from the EUT were within the specification limits. Photographs of the test are shown on Figure 4.

## 5.36dB Bandwidth and 99% Bandwidth

### 5.3.1 Requirements

Per 15.247(a) (2), for systems using digital modulation in the 2400-2483.5MHz band, the minimum 6dB bandwidth shall be at least 500kHz.

### 5.3.2 Procedures

- a) The EUT was connected to the receiver through 40.1 dB of attenuation. With the modulation enabled, the EUT was allowed to transmit continuously at 2405MHz.
- b) The center frequency of the spectrum analyzer was set to the transmit frequency of the EUT. The resolution bandwidth on the analyzer was set to 100kHz.
- c) The 'Max-Hold' function of the spectrum analyzer was engaged. The analyzer was allowed to scan until the envelope of the transmitter bandwidth was defined.

- d) The marker-to-peak function of the analyzer was used to set the marker to the peak of the emission. The marker-delta function was used to measure 6dB down point from the peak of the emission. The marker-delta function was reset and the marker was moved to the other side of the emission until it is even with the reference marker level. The marker-delta reading at this point is the 6dB bandwidth.
- e) The analyzer's display was plotted using a 'screen dump' utility.
- f) The 'Max-Hold' function of the spectrum analyzer was engaged. The analyzer was allowed to scan until the envelope of the transmitter bandwidth was defined. The 99% bandwidth function of the spectrum analyzer was then used to measure the 99% bandwidth. The measurement was recorded.
- g) Steps (a) through (i) were repeated with the EUT transmitting at 2445MHz.
- h) Steps (a) through (i) were repeated with the EUT transmitting at 2480MHz.

### 5.3.3 Results

The plots of the 6dB bandwidth, with the EUT transmitting are shown on pages 55 through 57. As can be seen from the plots, the minimum 6dB bandwidth measured was 1.603MHz which is greater than the minimum required 6dB bandwidth of 500kHz. The 99% bandwidth was measured to be 3.03MHz.

## 5.4 Peak Output Power

### 5.4.1 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).

### 5.4.2 Procedures

- a) The EUT was allowed to transmit continuously at 2405MHz.
- b) The EUT was connected to the receiver through 40.1 dB of attenuation. The output power was measured and recorded.
- c) With the modulation enabled, the EUT was allowed to transmit continuously at 2405MHz.
- d) A double-ridged waveguide antenna was positioned at a 3 meter distance from the EUT. The output of the double-ridged waveguide antenna was connected to a spectrum analyzer.
- e) The center frequency of the spectrum analyzer was set to the transmit frequency of the EUT. The resolution bandwidth on the analyzer was set to 3MHz (greater than the 6dB bandwidth of the EUT).
- f) The EUT was maximized for worst case emissions (or maximum output power) at the measuring antenna. The maximum meter reading was recorded.
- g) The equivalent isotropic power was determined from the field intensity levels measured at 3 meters using substitution method. To determine the emission power, a second double ridged waveguide 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 and antenna gain, as required.
- h) Steps (a) through (e) were repeated with the EUT transmitting at 2445MHz.
- i) Steps (a) through (e) were repeated with the EUT transmitting at 2480MHz.

### 5.4.3 Results

The results are presented on pages 58 and 59. The maximum conducted output power measured from the transmitter was 7.85 dBm or 0.006W which is below the 1 Watt or 30dBm limit. The maximum EIRP measured from the transmitter was 6.2dBm or 0.004W which is below the 4 Watt or 36 dBm defacto limit.

## 5.5 Power Spectral Density

### 5.5.1 Requirements

Per section 15.247(d), for digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission.

### 5.5.2 Procedures

- a) The EUT was connected to the receiver through 40.1 dB of attenuation.
- b) With the modulation enabled the EUT was allowed to transmit continuously at 2405MHz.
- c) The center frequency of the spectrum analyzer was set to the transmit frequency of the EUT. The resolution bandwidth on the analyzer was set to 3MHz (greater than the 6dB bandwidth of the EUT).
- d) The display line on the spectrum analyzer was set. (This level represents the 8.0dBm power spectral density level.) The resolution bandwidth (RBW) was set to 3kHz, the sweep time was set to a time equal to or greater than the span divided by 3kHz ( $2 \text{ MHz}/3\text{kHz} = 666 \text{ seconds}$ ). The peak detector and 'Max-Hold' function was engaged.
- e) The analyzer's display was plotted using a 'screen dump' utility.
- i) Steps (a) through (m) were repeated with the EUT transmitting at 2445MHz.
- f) Steps (a) through (m) were repeated with the EUT transmitting at 2480MHz.

### 5.5.3 Results

Data pages 60 through 62 show the power spectral density results. As can be seen from this plot, the power spectral density is less than 8dBm in a 3kHz band during any time interval of continuous transmission.

## 5.6 Band-edge Compliance

### 5.6.1 Requirements

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. In addition, the radiated emissions which fall in the restricted band beginning at 2483.5 MHz must meet the general limits of 15.209(a).

### 5.6.2 Procedures

- a) The EUT was set up inside the test chamber on a non-conductive stand.
- b) A broadband measuring antenna was placed at a test distance of 3 meters from the EUT.
- c) The EUT was set to transmit continuously at the channel closest to the low band-edge.
- d) The EUT was maximized for worst case emissions at the measuring antenna. The maximum meter reading was recorded.
- e) To determine the band-edge compliance, the following spectrum analyzer settings were used:
  - i. 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.
  - ii. Resolution bandwidth (RBW) = 100kHz.
  - iii. The 'Max-Hold' function was engaged. The analyzer was allowed to scan until the envelope of the transmitter bandwidth was defined.
  - iv. 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.)

- v. The analyzer's display was plotted using a 'screen dump' utility.
- f) The EUT was set to transmit continuously at the channel closest to the high band-edge.
- g) Per Public Notice DA00-705, the Marker-Delta method of measuring band edge compliance can only be used for measuring emissions that are up to two "standard" bandwidths away from the band-edge. (Since C63.4 specifies a 1MHz resolution bandwidth for measurements above 1GHz, two "standard" bandwidths away from the band-edge would be 2MHz away from the band-edge.) Radiated emissions that are removed by more than two "standard" bandwidths must be measured in the conventional manner.
- h) The highest transmit frequency used by the EUT is 2480MHz. Since this is more than two "standard" bandwidths away from the band-edge, conventional radiated emissions measurements were taken at the band-edge.
- i) The EUT was set up in the test chamber. With the modulation enabled, the EUT was allowed to transmit continuously at 2480MHz.
- j) A double-ridged waveguide antenna was positioned at a 3 meter distance from the EUT. The output of the double-ridged waveguide antenna was connected to a spectrum analyzer.
- k) The center frequency of the spectrum analyzer was set to the band-edge (2483.5MHz). The resolution bandwidth on the analyzer was set to 1MHz.
- l) The EUT was maximized for worst case emissions at the measuring antenna. The video bandwidth was reduced to 10Hz and an average reading was taken.

### 5.6.3 Results

Page 63 shows the radiated band-edge compliance results at 2400MHz. As can be seen from the plot, the emissions at the band-edge are within the 20 dB down limits.

Page 64 shows the radiated band-edge compliance results at 2483.5MHz. As can be seen from the data, the emissions at the band-edge are within the general limits.

## 6 CONCLUSIONS

It was determined that the Shure Inc. Zigbee Transceiver, Model No. AXT610, (Serial No. Elite 1, did fully meet the conducted and radiated emission requirements of the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart B, Sections 15.109 for receivers and Subpart C Sections 15.207 and 15.247 for Intentional Radiators Operating within the 2400MHz to 2483.5MHz band, when tested per ANSI C63.4-2003.

It was also determined that the Shure Inc. Zigbee Transceiver, Model No. AXT610, (Serial No. Elite 1, did fully meet the conducted and radiated RF emission requirements of the Industry Canada Radio Standards Specification, RSS-Gen, Section 7.2.4 and Section 6.1 for receivers and 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.

## 7 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.

## 8 ENDORSEMENT DISCLAIMER

This report must not be used to claim product endorsement by NVLAP or any agency of the US 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	8/27/2010	8/27/2011
APW3	PREAMPLIFIER	PLANAR ELECTRONICS	PE2-35-120-5R0-10-12	PL2924	1GHZ-20GHZ	8/27/2010	8/27/2011
GBN2	SIGNAL GENERATOR	ROHDE & SCHWARZ	SMY 02	DE14046	9KHZ-2.080GHZ	3/12/2010	3/12/2011
GRE0	SIGNAL GENERATOR	AGILENT TECHNOLOGIES	E4438C	MY42083127	250KHZ-6GHZ	2/16/2010	2/16/2011
NHG0	STANDARD GAIN HORN ANTENNA	NARDA	638	---	18-26.5GHZ	NOTE 1	
NTA2	BILOG ANTENNA	TESEQ	6112D	28040	25-1000MHz	6/7/2010	6/7/2011
NWH0	RIDGED WAVE GUIDE	TENSOR	4105	2081	1-12.4GHZ	8/31/2010	8/31/2011
NWI0	RIDGED WAVE GUIDE	AEL	H1498	153	2-18GHZ	12/5/2009	2/5/2011
RBB0	EMI TEST RECEIVER 20HZ TO 40 GHZ.	ROHDE & SCHWARZ	ESIB40	100250	20 HZ TO 40GHZ	3/16/2010	3/16/2011
T2D2	20DB, 25W ATTENUATOR	WEINSCHTEL	46-20-43	AV5815	DC-18GHZ	8/9/2010	8/9/2011
XNH5	CISPR22 TWO BALANCED TELECOM PAIRS ISN	FISCHER CUSTOM COMM.	FCC-TLISN-T4	20096	9KHZ-30MHZ	4/29/2010	4/29/2011
XOB2	ADAPTER	HEWLETT PACKARD	K281C,012	09407	18-26.5GHZ	NOTE 1	

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.

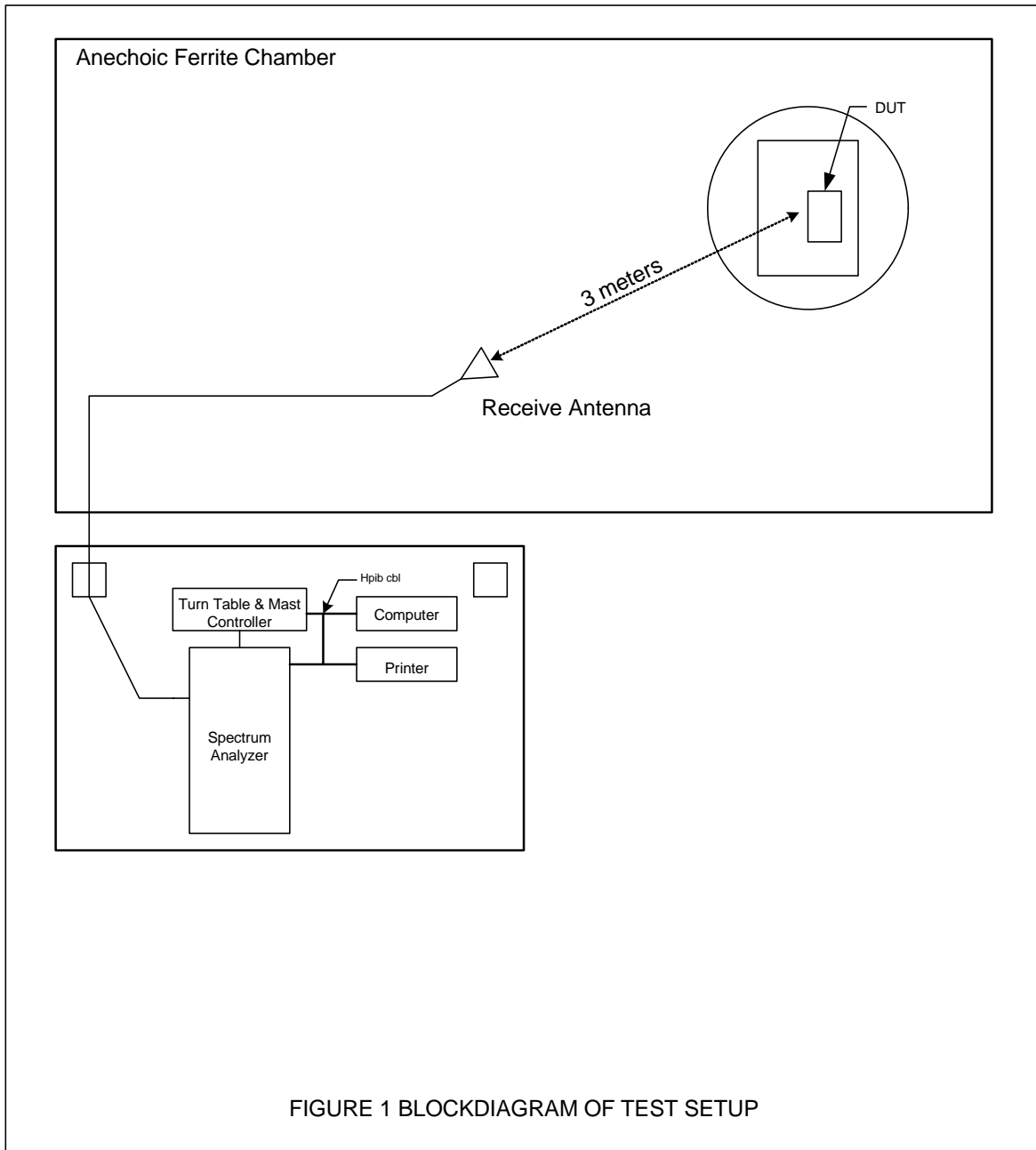
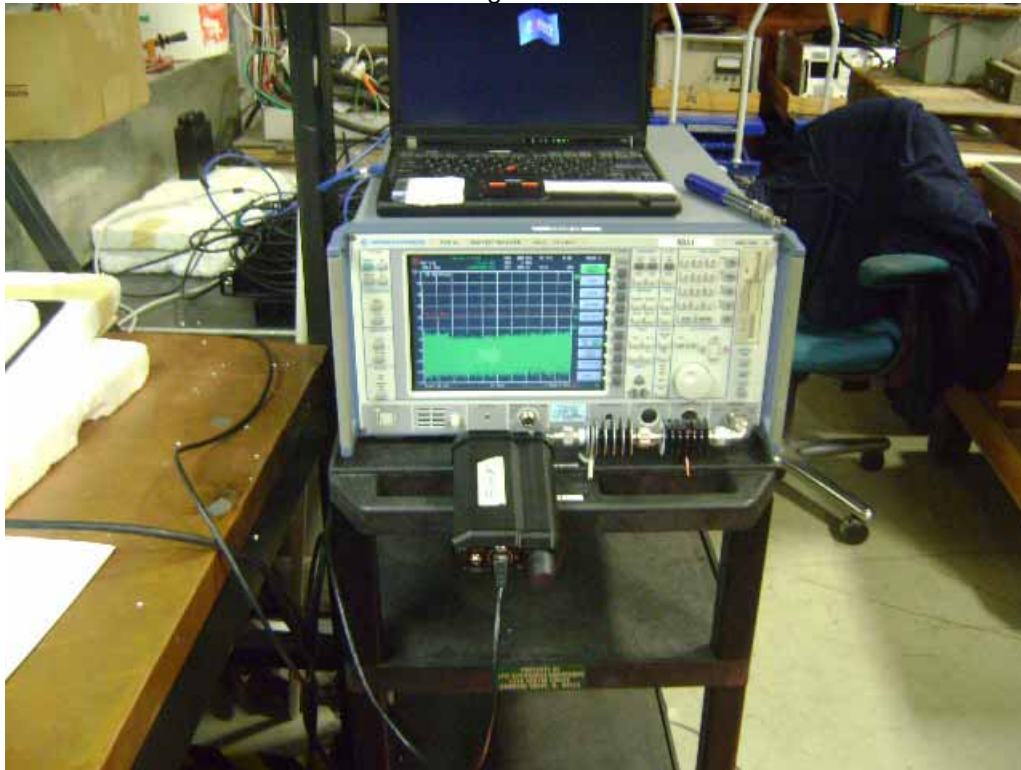


Figure 4



Test Set-up for Antenna Conducted Emissions – 30MHz to 18GHz



Test Set-up for Radiated Emissions – 2GHz to 18GHz, Vertical Polarization

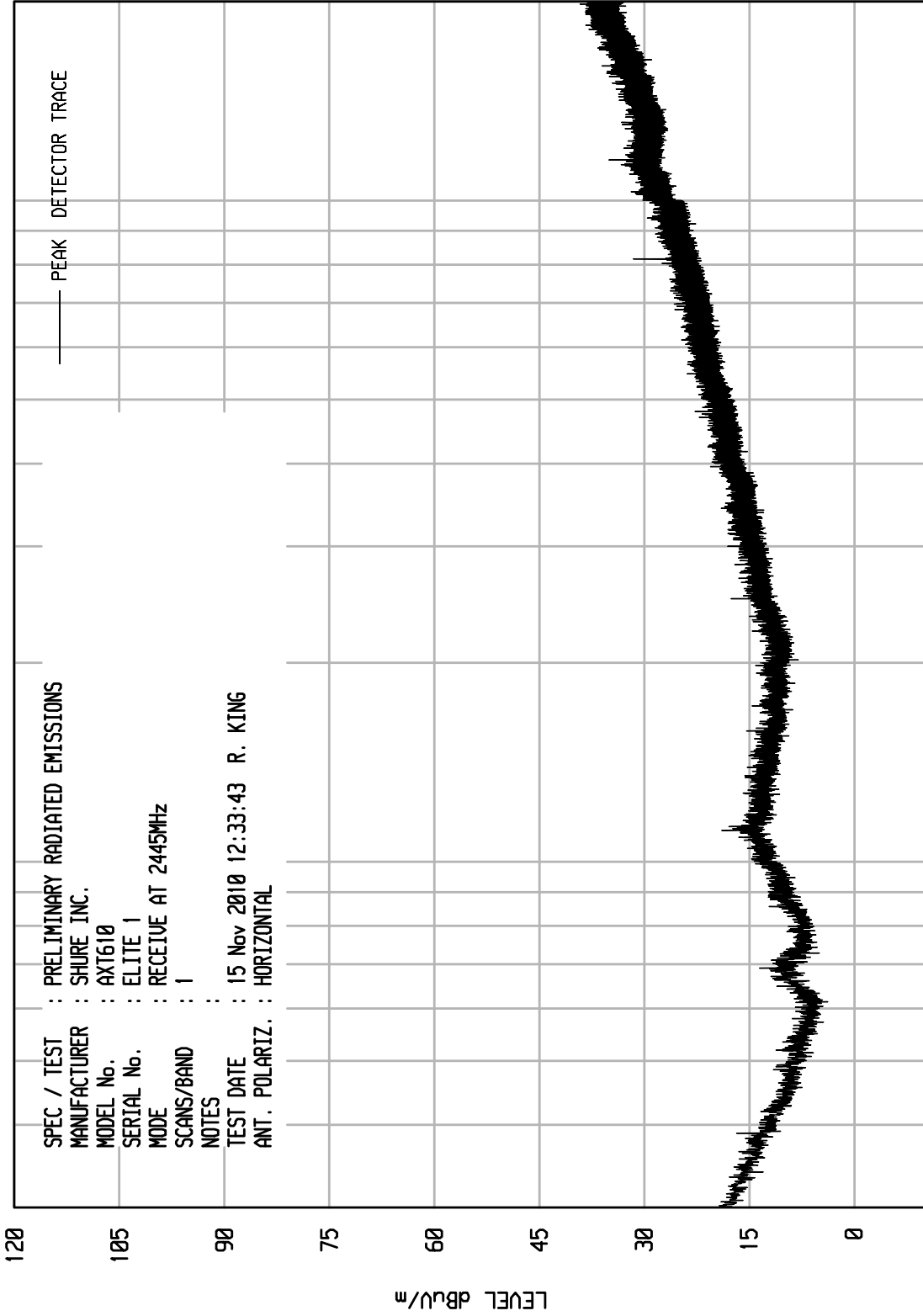


ELITE ELECTRONIC ENGINEERING Inc.  
Downers Grove, Ill. 60515

UNIV RCU EMI RUN 10

UKA1 01/25/10

SPEC / TEST : PRELIMINARY RADIATED EMISSIONS  
 MANUFACTURER : SHURE INC.  
 MODEL No. : AXT610  
 SERIAL No. : ELITE 1  
 MODE : RECEIVE AT 2445MHZ  
 SCANS/BAND : 1  
 NOTES :  
 TEST DATE : 15 Nov 2010 12:33:43 R. KING  
 ANT. POLARIZ. : HORIZONTAL



START = 30

STOP = 2000

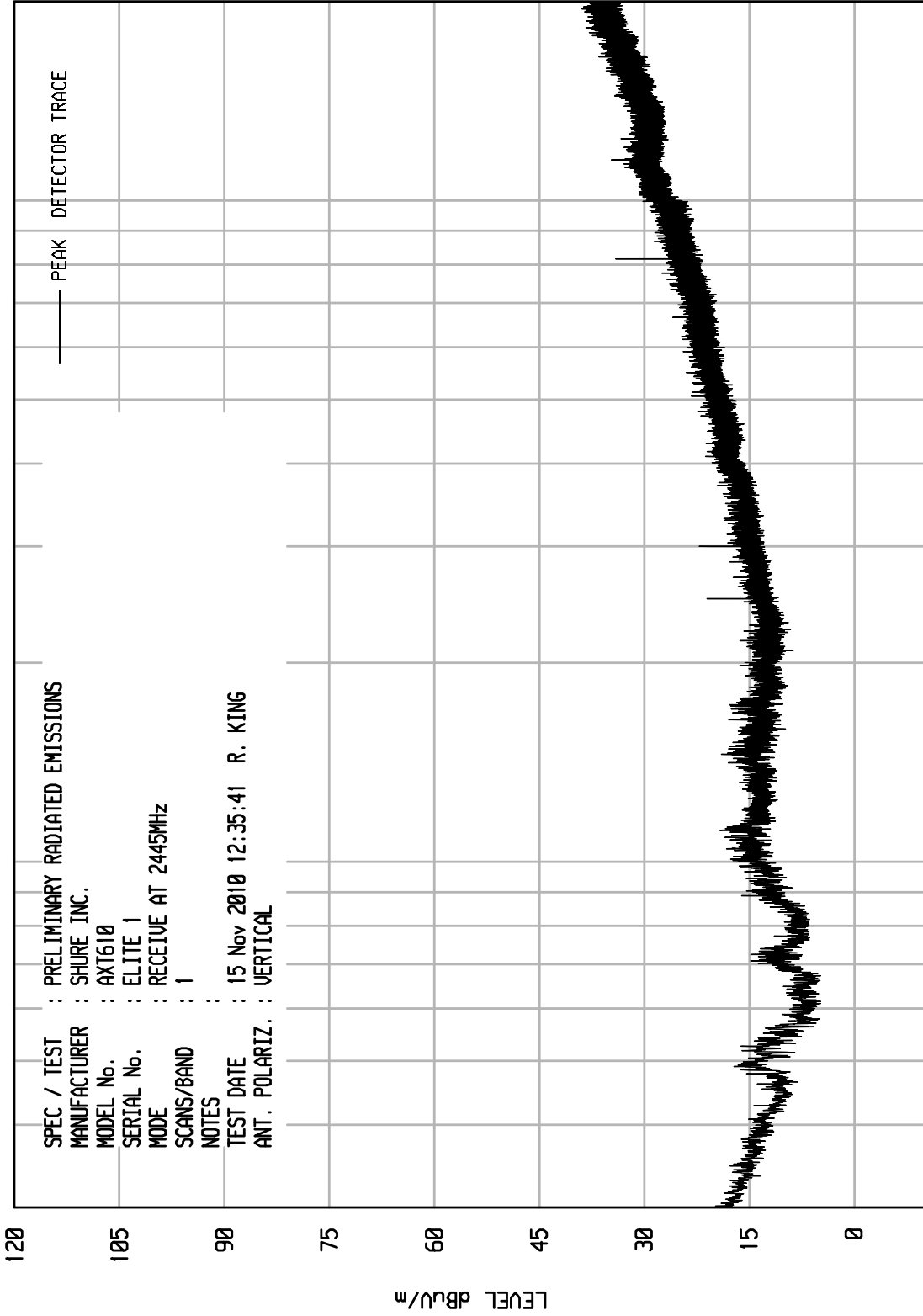


ELITE ELECTRONIC ENGINEERING Inc.  
Downers Grove, Ill. 60515

UNIV RCU EMI RUN 11

UKA1 01/25/10

SPEC / TEST : PRELIMINARY RADIATED EMISSIONS  
 MANUFACTURER : SHURE INC.  
 MODEL No. : AXT610  
 SERIAL No. : ELITE 1  
 MODE : RECEIVE AT 2445MHZ  
 SCANS/BAND : 1  
 NOTES :  
 TEST DATE : 15 Nov 2010 12:35:41 R. KING  
 ANT. POLARIZ. : VERTICAL



START = 30

STOP = 2000



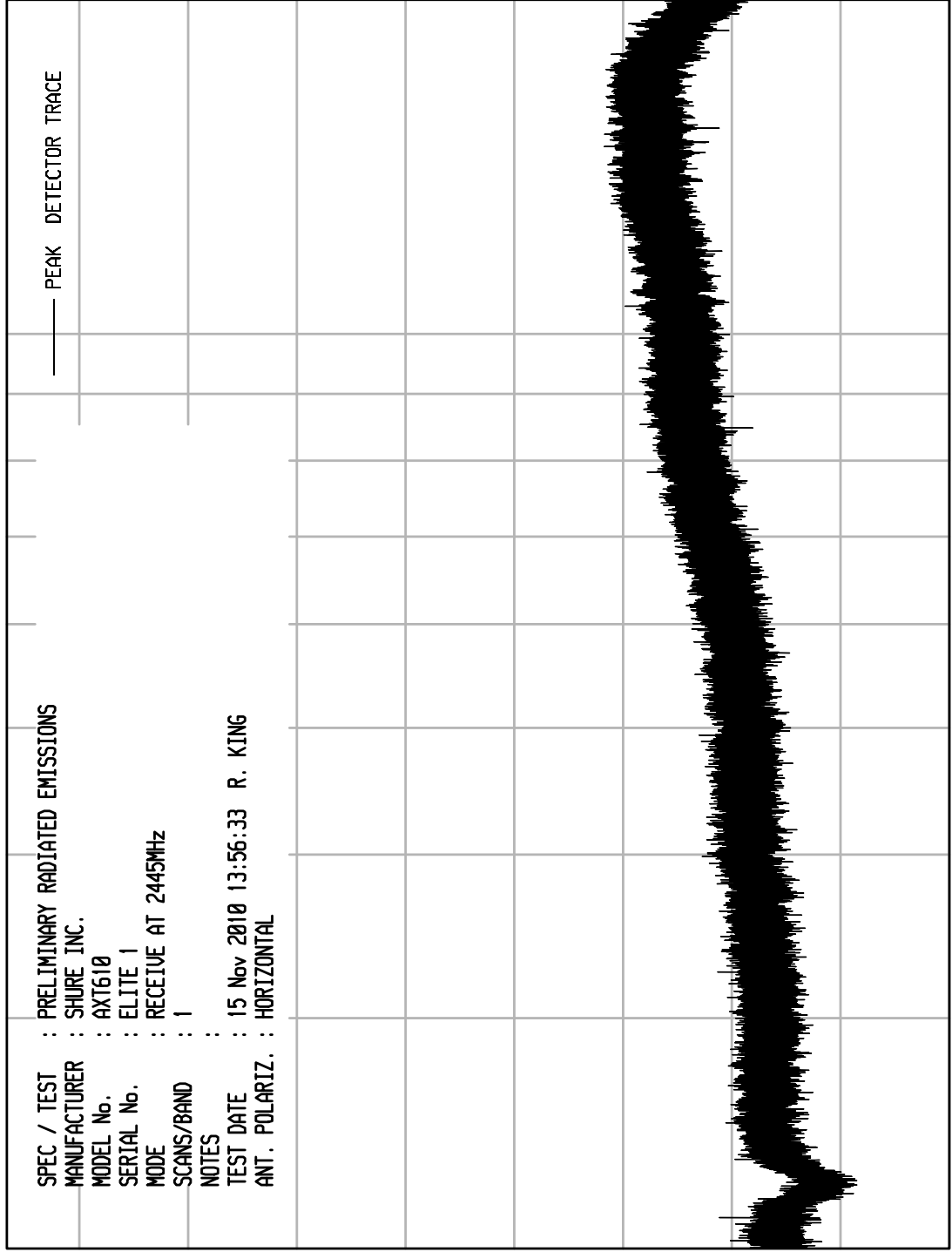
ELITE ELECTRONIC ENGINEERING Inc.  
Downers Grove, Ill. 60515

UNIU RCU EMI RUN 17

UKA1 01/25/10

SPEC / TEST : PRELIMINARY RADIATED EMISSIONS  
 MANUFACTURER : SHURE INC.  
 MODEL No. : AXT610  
 SERIAL No. : ELITE 1  
 MODE : RECEIVE AT 2445MHz  
 SCANS/BAND : 1  
 NOTES :  
 TEST DATE : 15 Nov 2010 13:56:33 R. KING  
 ANT. POLARIZ. : HORIZONTAL

— PEAK DETECTOR TRACE



START = 2000

FREQUENCY MHz

10000

STOP = 18000



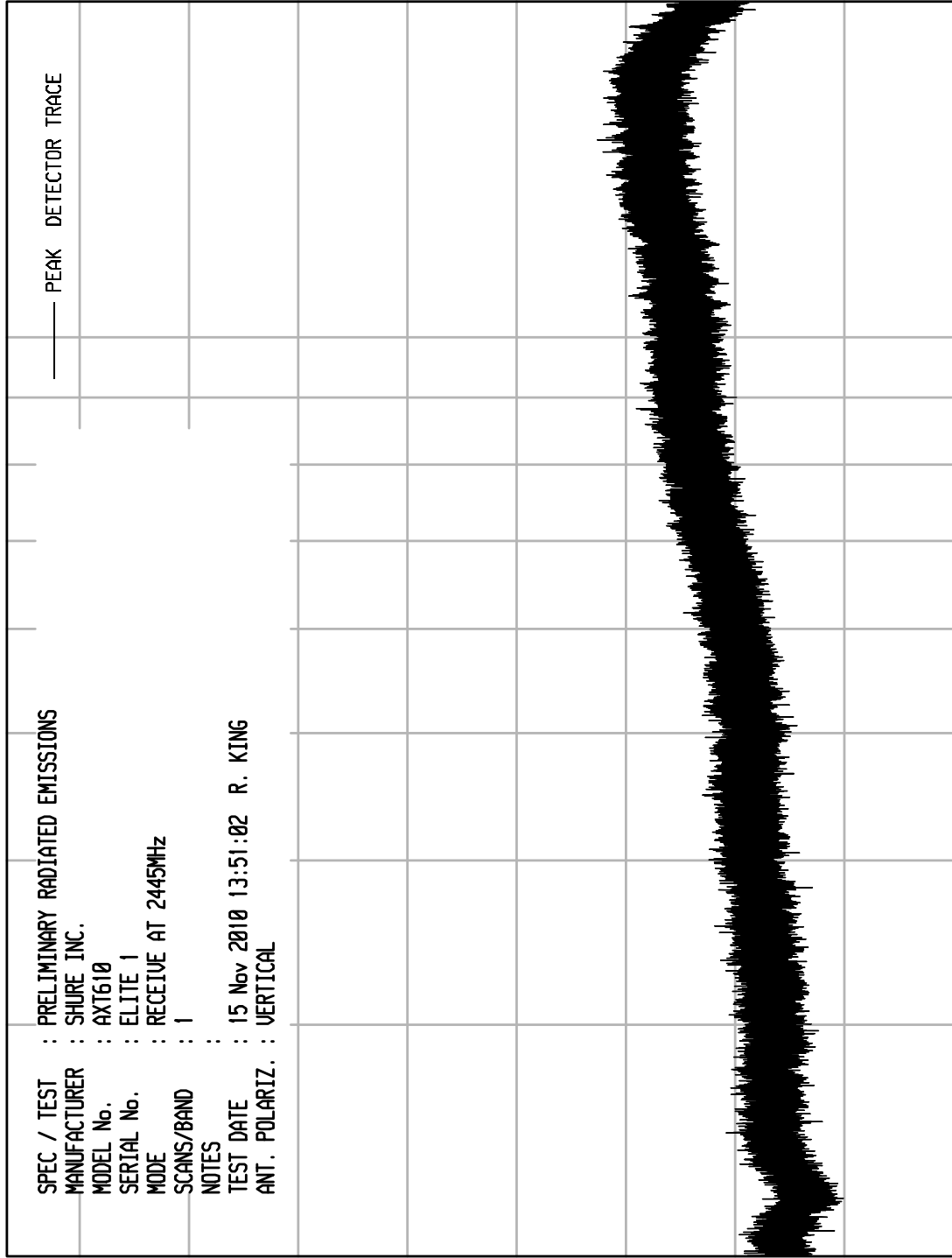
ELITE ELECTRONIC ENGINEERING Inc.  
Downers Grove, Ill. 60515

UNIU RCU EMI RUN 16

UKA1 01/25/10

SPEC / TEST : PRELIMINARY RADIATED EMISSIONS  
 MANUFACTURER : SHURE INC.  
 MODEL No. : AXT610  
 SERIAL No. : ELITE 1  
 MODE : RECEIVE AT 2445MHz  
 SCANS/BAND : 1  
 NOTES :  
 TEST DATE : 15 Nov 2010 13:51:02 R. KING  
 ANT. POLARIZ. : VERTICAL

— PEAK DETECTOR TRACE



START = 2000

STOP = 18000



Manufacturer : Shure Inc.  
 EUT : Zigbee Transceiver  
 Model No. : AXT610  
 Test Specification : Industry Canada Radiated Receiver Emissions  
 Date : November 16, 2010  
 Mode : Receive @ 2445MHz  
 Test Distance : 3 meters  
 Notes : none

Total = Meter Reading + Cable Loss + Antenna Factor + Preamp Gain

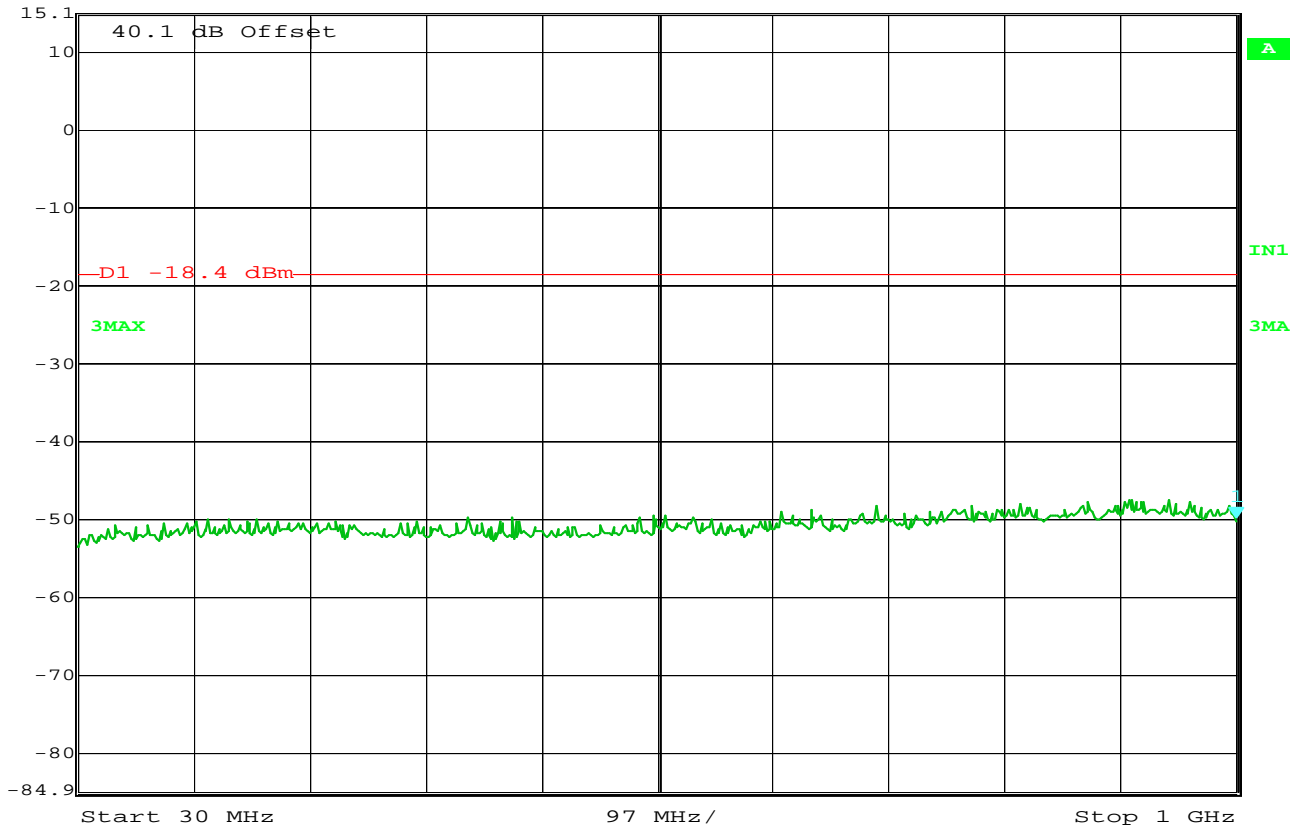
Freq (MHz)	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Total dBuV/m at 3 M	Total uV/m at 3M	Limit uV/m at 3M	Margin (dB)
2445.0	H	33.4	*	3.8	29.3	-39.7	26.8	21.9	500.0	-27.2
2445.0	V	33.4	*	3.8	29.3	-39.7	26.8	21.8	500.0	-27.2
4890.0	H	31.5	*	5.8	34.5	-38.3	33.5	47.3	500.0	-20.5
4890.0	V	31.6	*	5.8	34.5	-38.3	33.6	47.7	500.0	-20.4
7335.0	H	32.0	*	7.7	37.8	-38.4	39.0	89.5	500.0	-14.9
7335.0	V	32.0	*	7.7	37.8	-38.4	39.0	89.3	500.0	-15.0

Checked BY Richard E. King :

Richard E. King



Marker 1 [T3] RBW 100 kHz RF Att 0 dB  
 Ref Lvl -49.78 dBm VBW 100 kHz  
 15.1 dBm 1.00000000 GHz SWF 245 ms Unit dBm



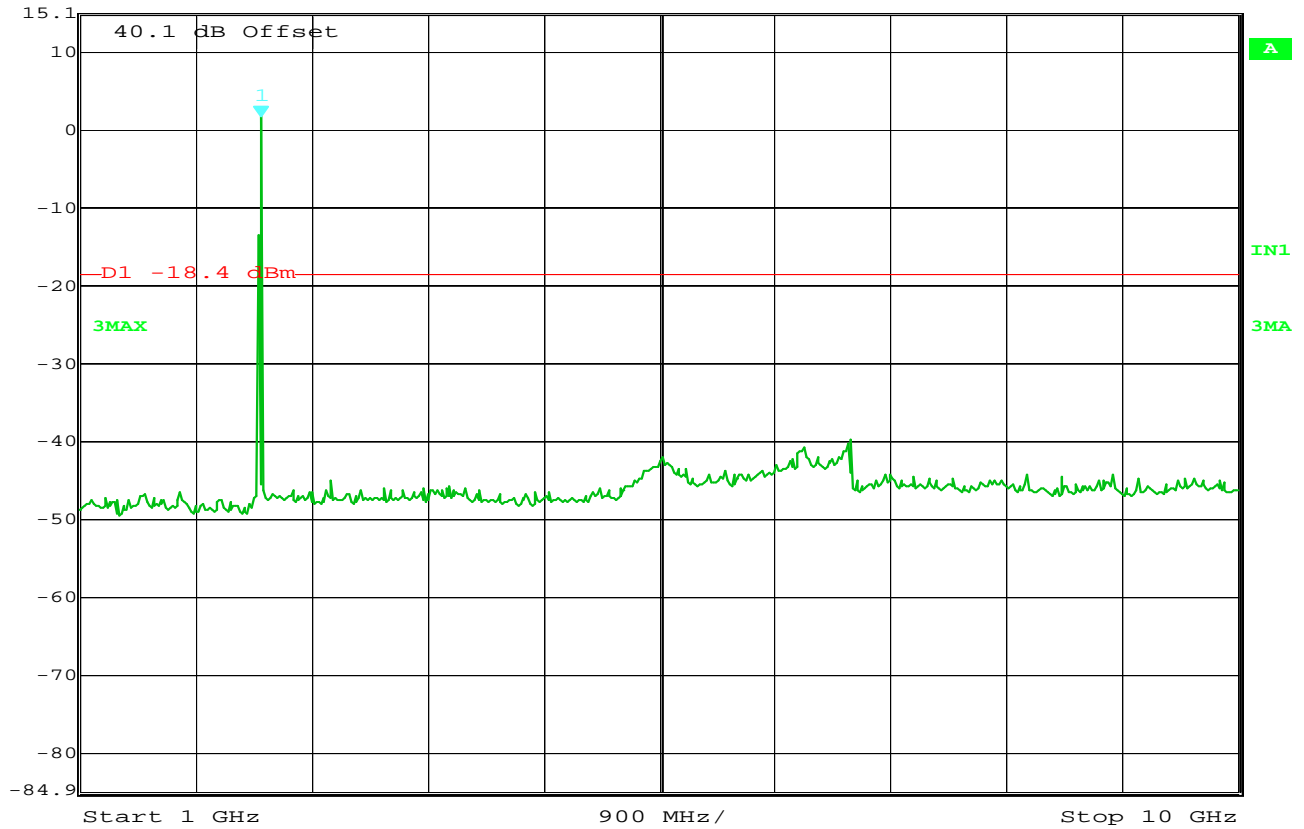
Date: 15.NOV.2010 11:31:43

MANUFACTURER :SHURE INC.  
 MODEL NUMBER :AXT610  
 SERIAL NUMBER :ELITE 1  
 TEST MODE :TRANSMIT AT 2405MHz  
 TEST PARAMETERS :FCC ANT CONDUCTED  
 NOTES :  
 EQUIPMENT USED :RBB0, T2D2, T2DW

NOTES



Marker 1 [T3] RBW 100 kHz RF Att 0 dB  
 Ref Lvl 15.1 dBm 1.79 dBm VBW 100 kHz  
 15.1 dBm 2.40681363 GHz SWT 2.25 s Unit dBm



Date: 15.NOV.2010 11:29:51

MANUFACTURER :SHURE INC.  
 MODEL NUMBER :AXT610  
 SERIAL NUMBER :ELITE 1  
 TEST MODE :TRANSMIT AT 2405MHz  
 TEST PARAMETERS :FCC ANT CONDUCTED  
 NOTES :  
 EQUIPMENT USED :RBB0, T2D2, T2DW

NOTES



Marker 1 [T3]

RBW 100 kHz RF Att 0 dB

Ref Lvl -45.91 dBm

VBW 100 kHz

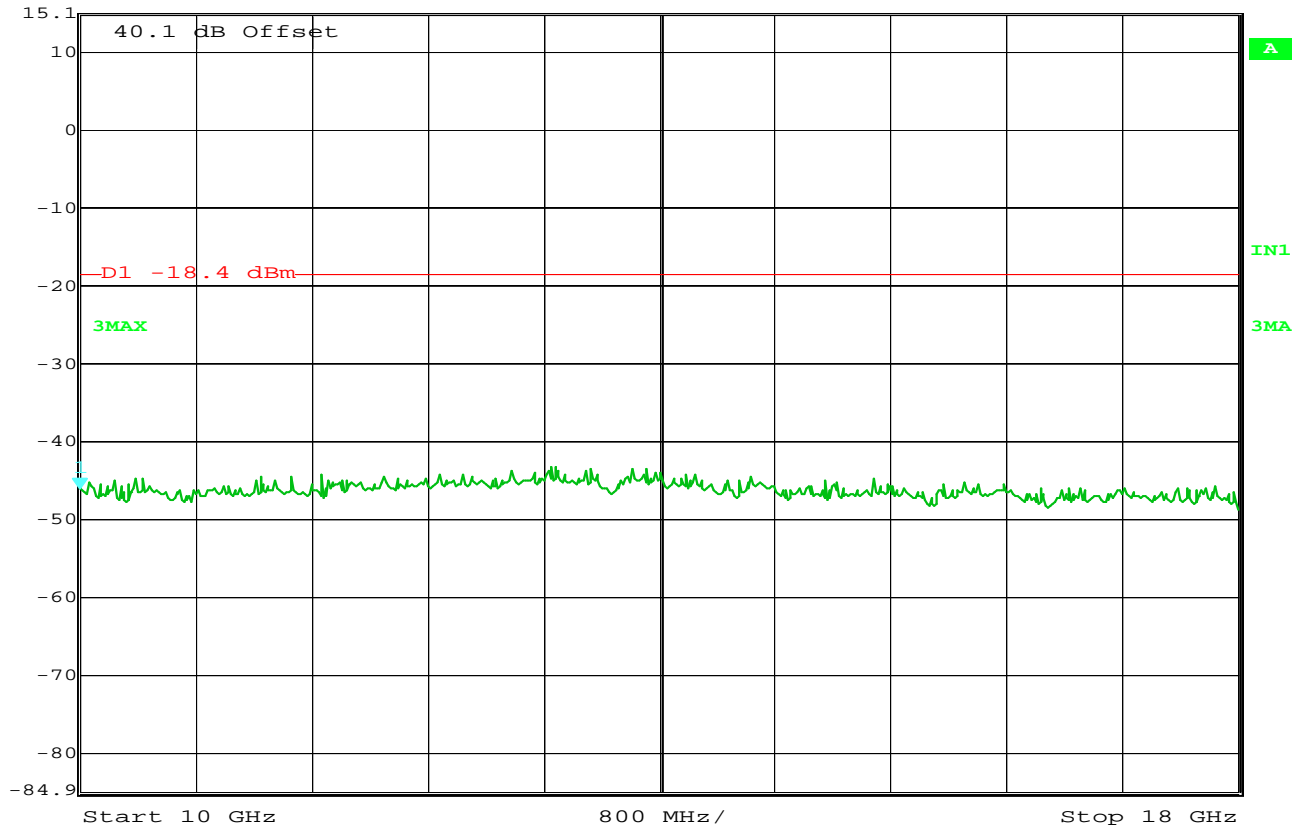
15.1 dBm

10.00000000 GHz

SWT 2 s

Unit

dBm



Date: 15.NOV.2010 11:30:49

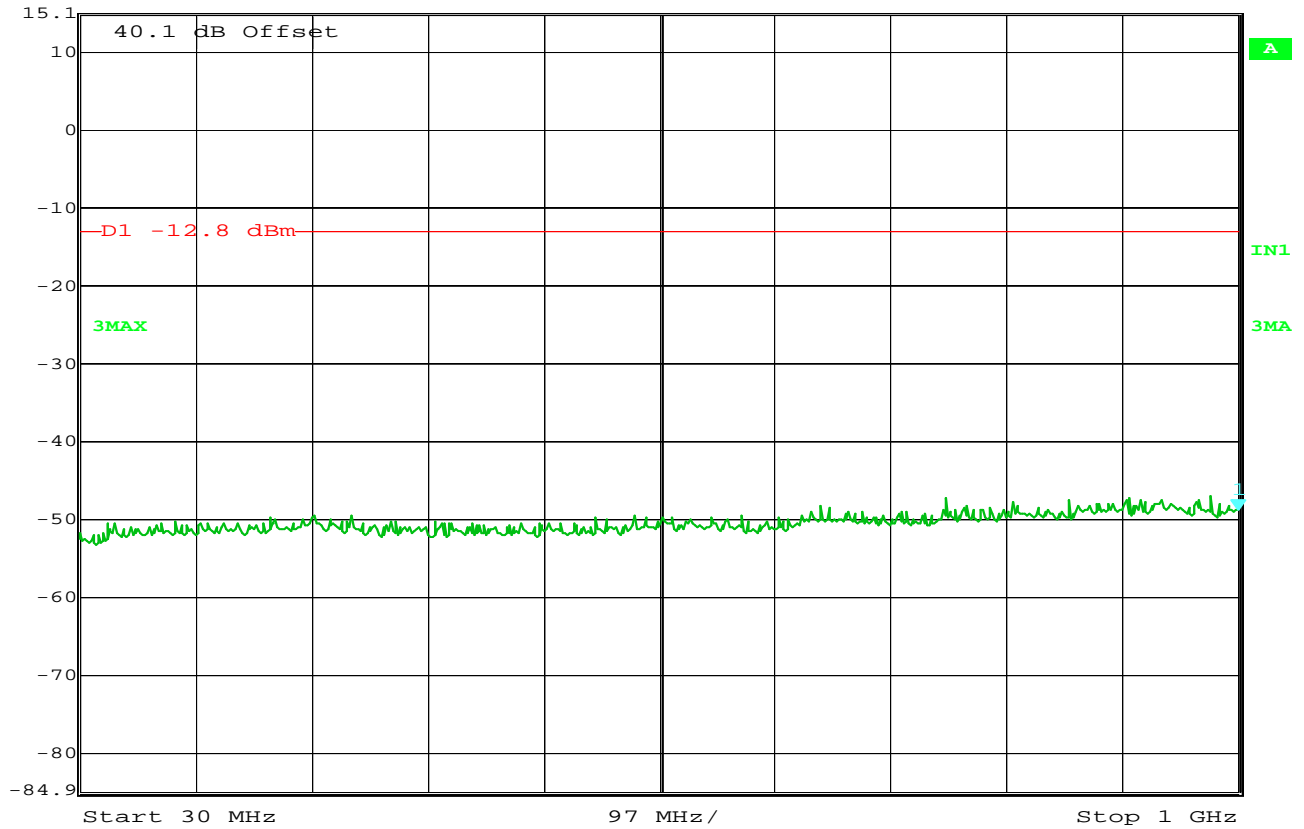
MANUFACTURER :SHURE INC.  
 MODEL NUMBER :AXT610  
 SERIAL NUMBER :ELITE 1  
 TEST MODE :TRANSMIT AT 2405MHz  
 TEST PARAMETERS :FCC ANT CONDUCTED  
 NOTES :  
 EQUIPMENT USED :RBB0, T2D2, T2DW

NOTES





Marker 1 [T3]      RBW 100 kHz      RF Att 0 dB  
 Ref Lvl      -48.73 dBm      VBW 100 kHz  
 15.1 dBm      1.00000000 GHz      SWF 245 ms      Unit dBm



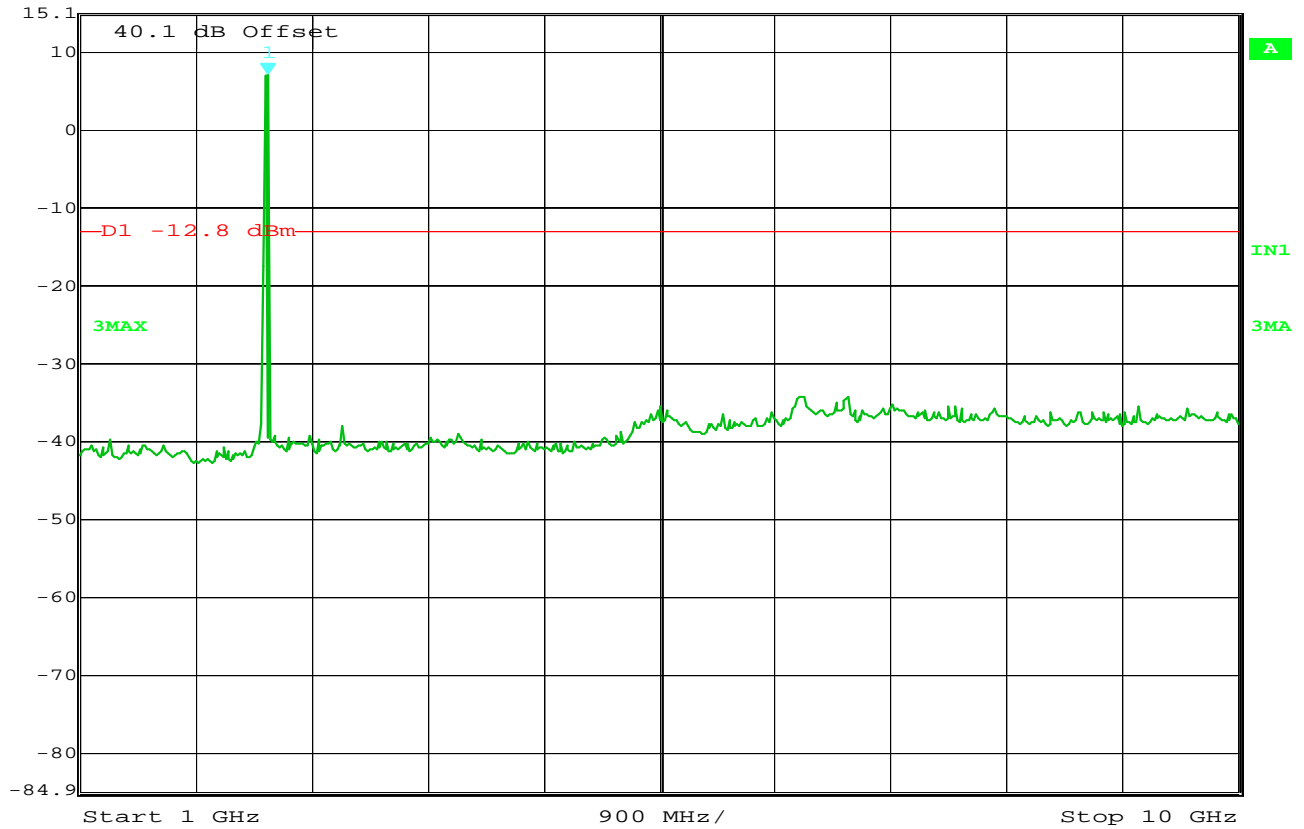
Date: 15.NOV.2010 11:15:22

MANUFACTURER :SHURE INC.  
 MODEL NUMBER :AXT610  
 SERIAL NUMBER :ELITE 1  
 TEST MODE :TRANSMIT AT 2445MHz  
 TEST PARAMETERS :FCC ANT CONDUCTED  
 NOTES :  
 EQUIPMENT USED :RBB0, T2D2, T2DW

NOTES



Marker 1 [T3] RBW 100 kHz RF Att 0 dB  
 Ref Lvl 7.20 dBm VBW 100 kHz  
 15.1 dBm 2.46092184 GHz SWT 2.25 s Unit dBm



Date: 15.NOV.2010 11:13:19

MANUFACTURER :SHURE INC.  
 MODEL NUMBER :AXT610  
 SERIAL NUMBER :ELITE 1  
 TEST MODE :TRANSMIT AT 2445MHz  
 TEST PARAMETERS :FCC ANT CONDUCTED  
 NOTES :  
 EQUIPMENT USED :RBB0, T2D2, T2DW

NOTES



Marker 1 [T3]

RBW 100 kHz RF Att 0 dB

Ref Lvl -46.57 dBm

VBW 100 kHz

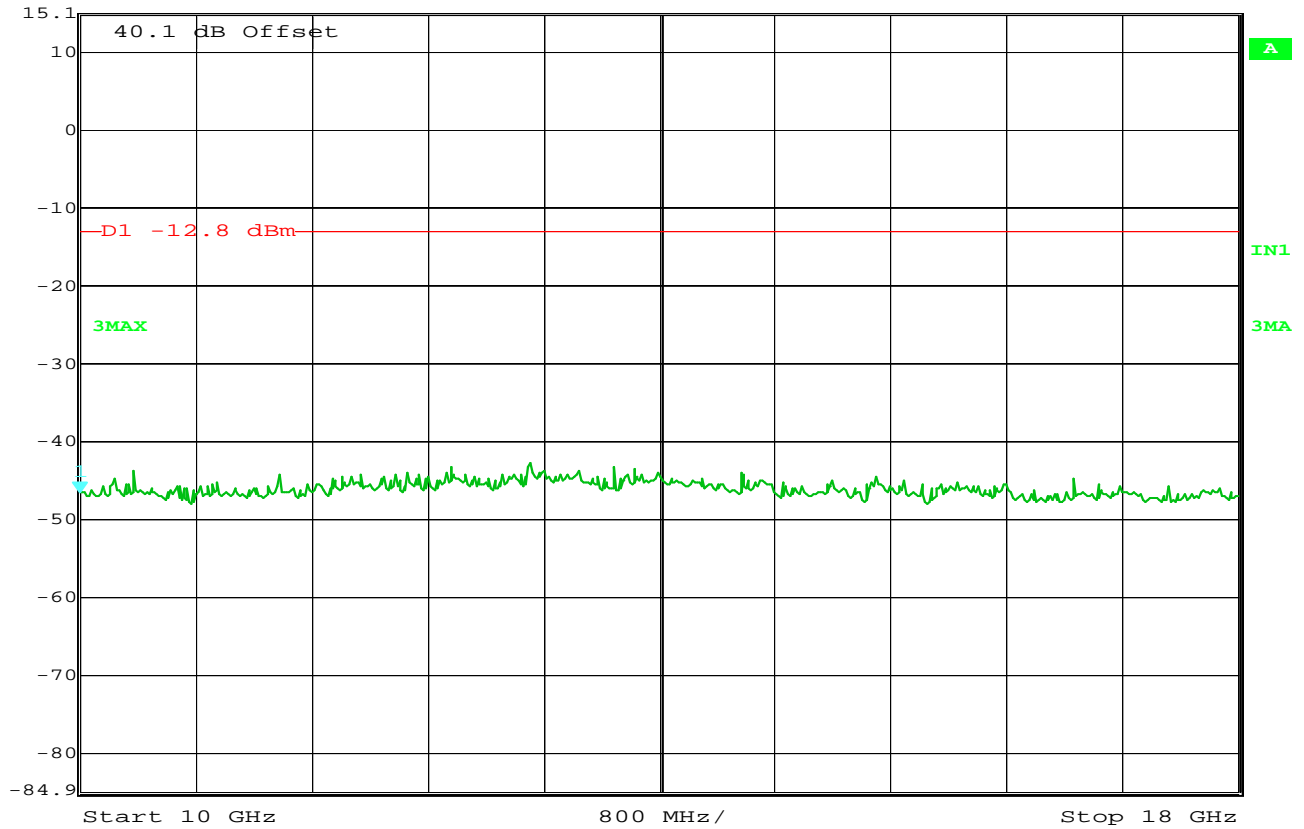
15.1 dBm

10.00000000 GHz

SWT 2 s

Unit

dBm



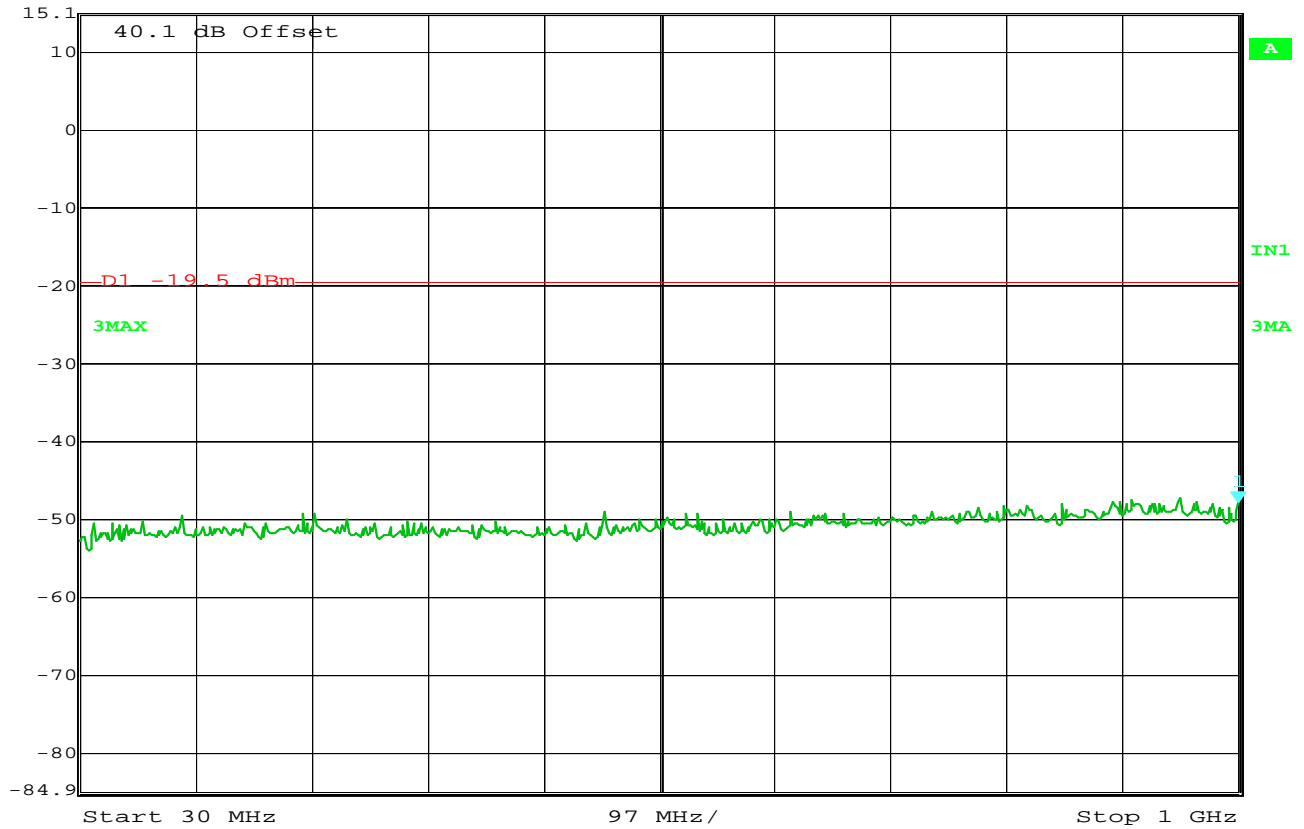
Date: 15.NOV.2010 11:14:23

MANUFACTURER :SHURE INC.  
 MODEL NUMBER :AXT610  
 SERIAL NUMBER :ELITE 1  
 TEST MODE :TRANSMIT AT 2445MHz  
 TEST PARAMETERS :FCC ANT CONDUCTED  
 NOTES :  
 EQUIPMENT USED :RBB0, T2D2, T2DW

NOTES



Marker 1 [T3] RBW 100 kHz RF Att 0 dB  
 Ref Lvl -47.82 dBm VBW 100 kHz  
 15.1 dBm 1.00000000 GHz SWT 245 ms Unit dBm



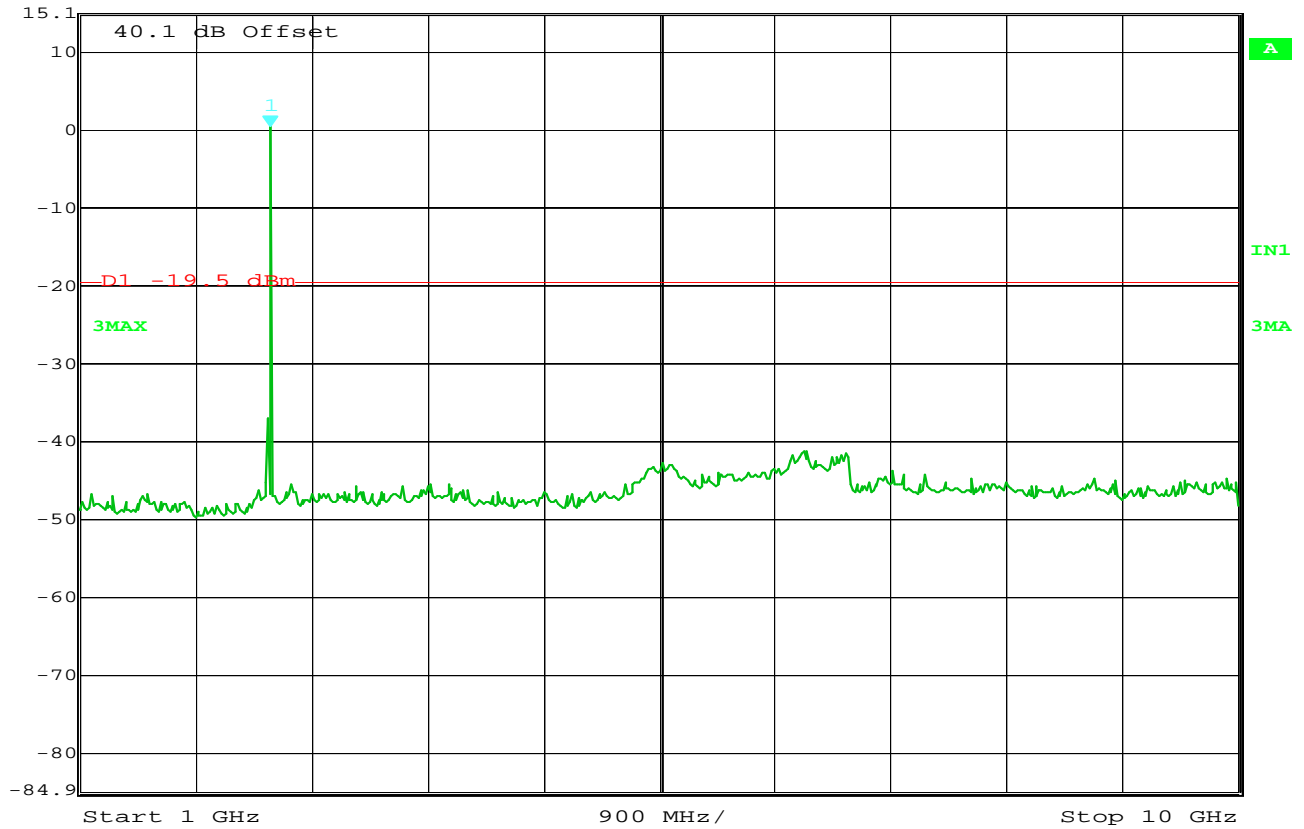
Date: 15.NOV.2010 11:26:49

MANUFACTURER :SHURE INC.  
 MODEL NUMBER :AXT610  
 SERIAL NUMBER :ELITE 1  
 TEST MODE :TRANSMIT AT 2480MHz  
 TEST PARAMETERS :FCC ANT CONDUCTED  
 NOTES :  
 EQUIPMENT USED :RBB0, T2D2, T2DW

NOTES



Marker 1 [T3] RBW 100 kHz RF Att 0 dB  
 Ref Lvl 0.51 dBm VBW 100 kHz  
 15.1 dBm 2.47895792 GHz SWT 2.25 s Unit dBm



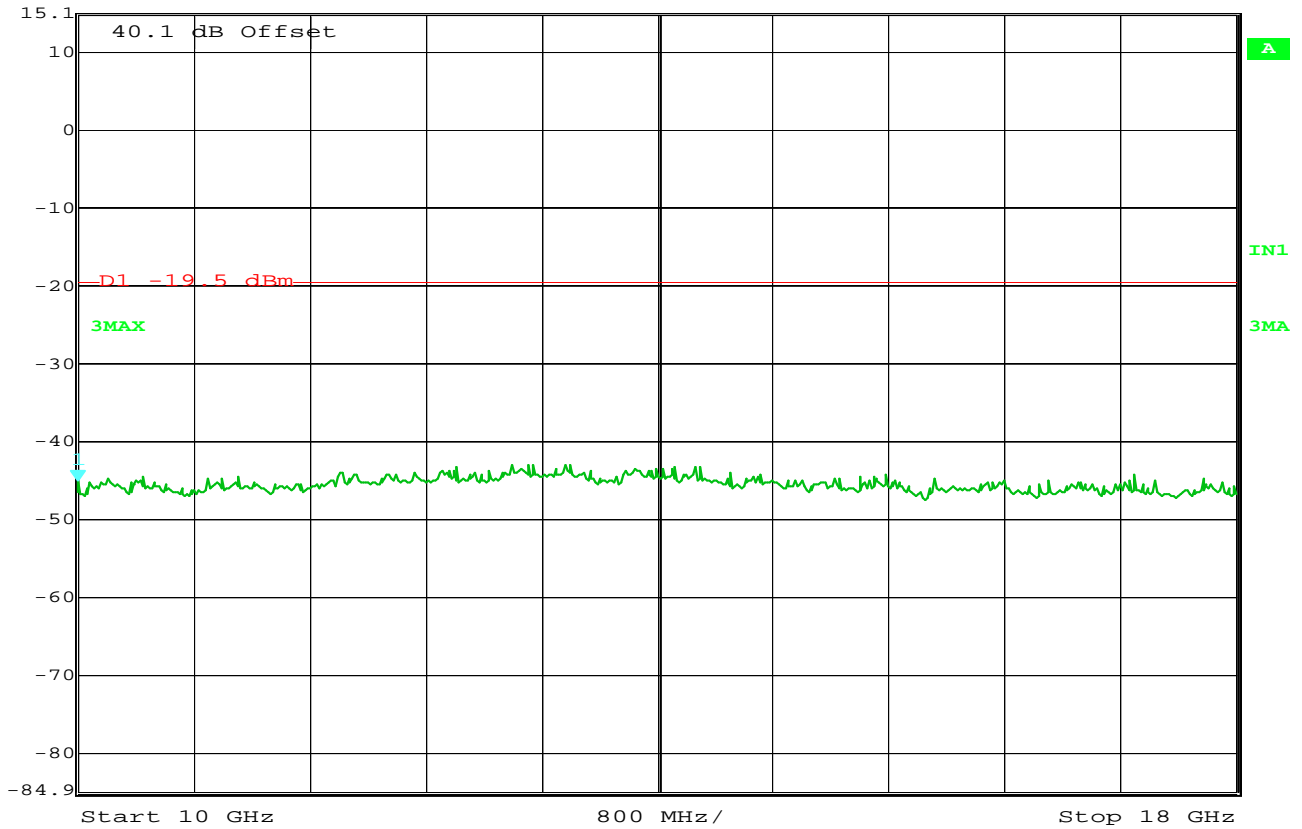
Date: 15.NOV.2010 11:24:46

MANUFACTURER :SHURE INC.  
 MODEL NUMBER :AXT610  
 SERIAL NUMBER :ELITE 1  
 TEST MODE :TRANSMIT AT 2480MHz  
 TEST PARAMETERS :FCC ANT CONDUCTED  
 NOTES :  
 EQUIPMENT USED :RBB0, T2D2, T2DW

NOTES



Marker 1 [T3] RBW 100 kHz RF Att 0 dB  
 Ref Lvl -44.98 dBm VBW 100 kHz  
 15.1 dBm 10.00000000 GHz SWF 2 s Unit dBm



Date: 15.NOV.2010 11:25:55

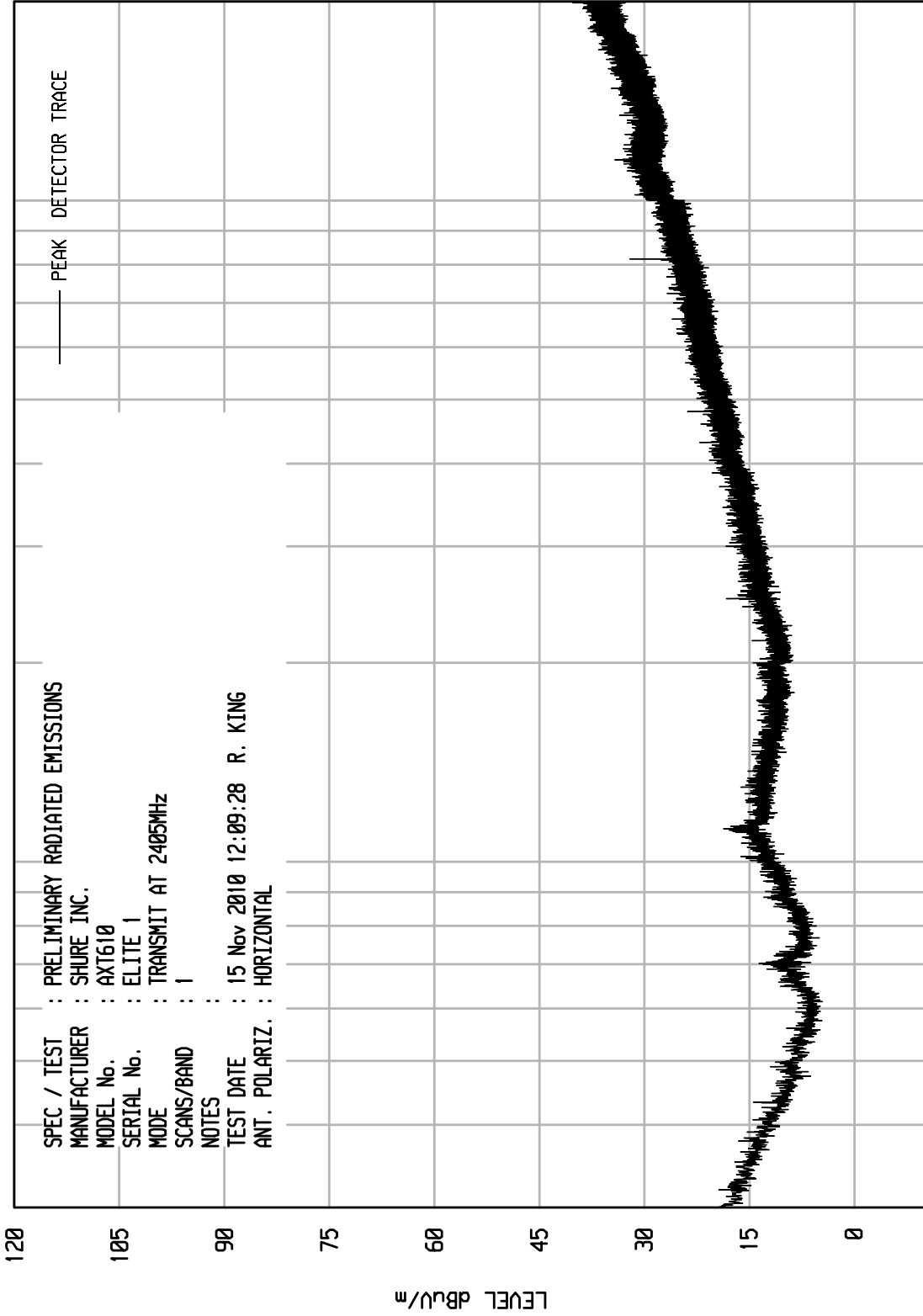
MANUFACTURER :SHURE INC.  
 MODEL NUMBER :AXT610  
 SERIAL NUMBER :ELITE 1  
 TEST MODE :TRANSMIT AT 2480MHz  
 TEST PARAMETERS :FCC ANT CONDUCTED  
 NOTES :  
 EQUIPMENT USED :RBB0, T2D2, T2DW

NOTES

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UNIV RCU EMI RUN 2

UKA1 01/25/10



STOP = 2000

FREQUENCY MHz

100

START = 30

PRELIMINARY RADIATED EMISSIONS  
 SPEC / TEST : SHURE INC.  
 MANUFACTURER : AXT610  
 MODEL No. : ELITE 1  
 SERIAL No. : TRANSMIT AT 2405MHz  
 MODE :  
 SCANS/BAND :  
 NOTES :  
 TEST DATE : 15 Nov 2010 12:09:28 R. KING  
 ANT. POLARIZ. : HORIZONTAL

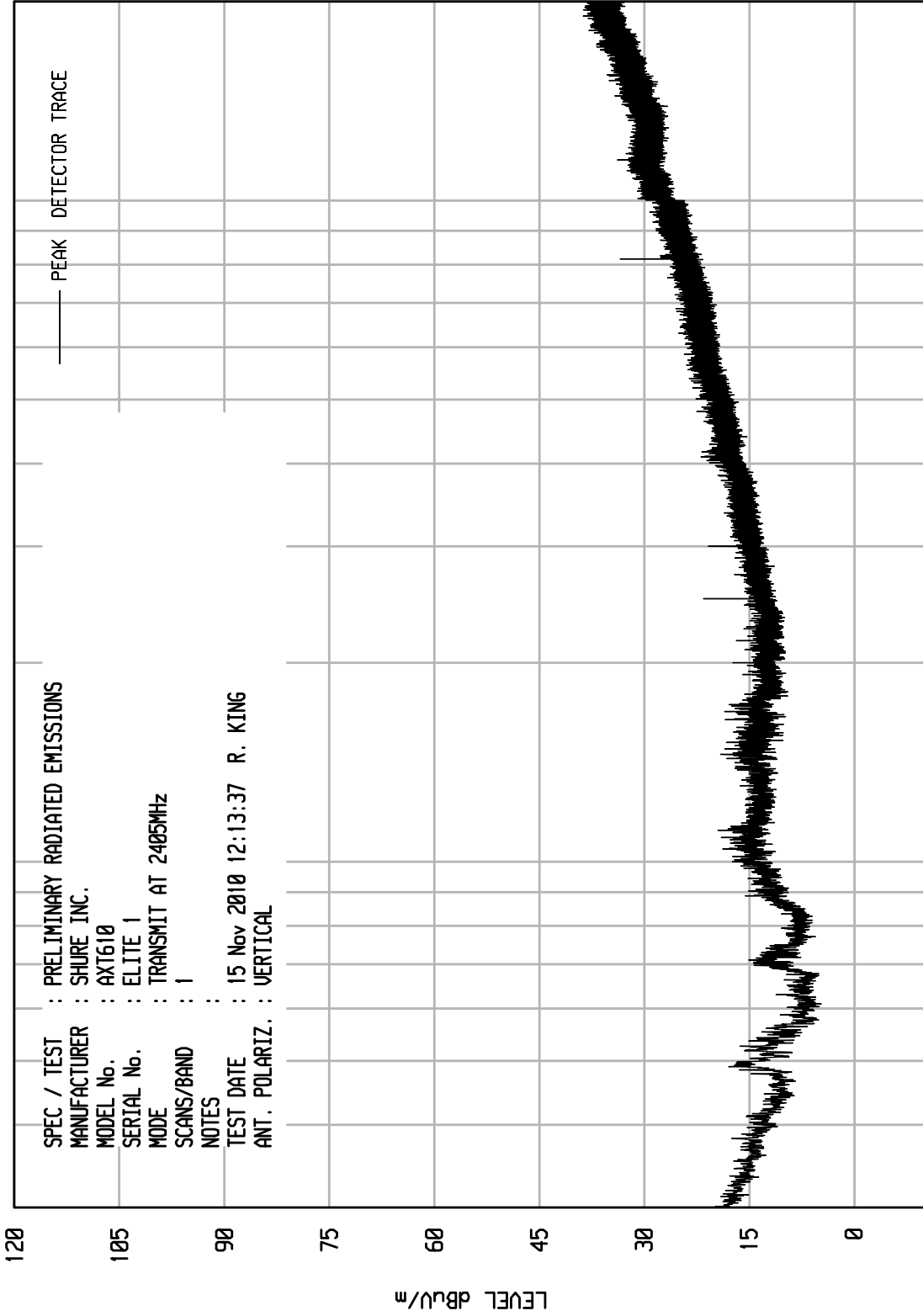


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Downers Grove, Ill. 60515

UNIV RCU EMI RUN 3

UKA1 01/25/10

SPEC / TEST : PRELIMINARY RADIATED EMISSIONS  
 MANUFACTURER : SHURE INC.  
 MODEL No. : AXT610  
 SERIAL No. : ELITE 1  
 MODE : TRANSMIT AT 2405MHz  
 SCANS/BAND : 1  
 NOTES :  
 TEST DATE : 15 Nov 2010 12:13:37 R. KING  
 ANT. POLARIZ. : VERTICAL



START = 30

FREQUENCY MHz

1000

STOP = 2000

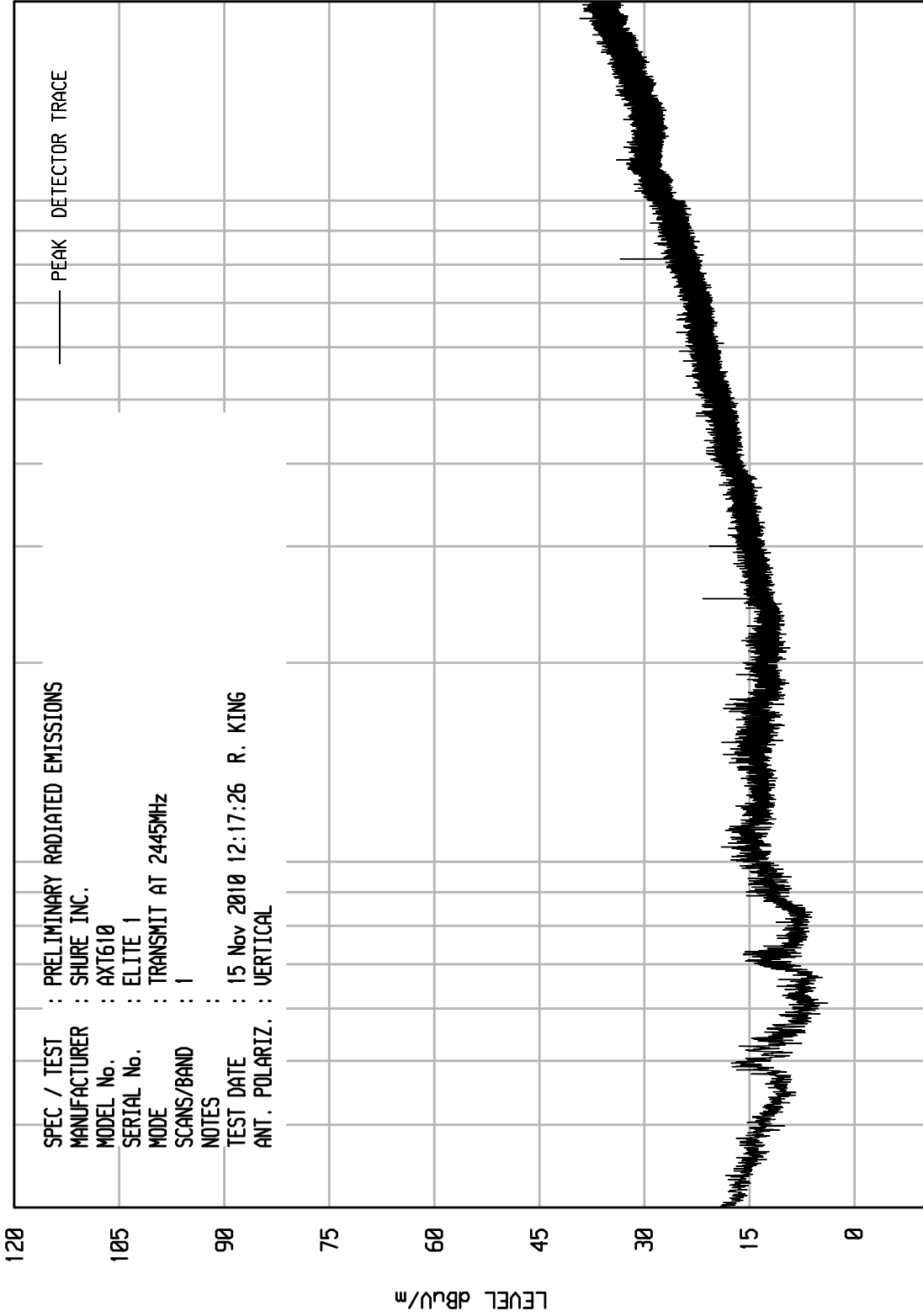


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Downers Grove, Ill. 60515

UNIU RCU EMI RUN 4

UKA1 01/25/10

SPEC / TEST : PRELIMINARY RADIATED EMISSIONS  
 MANUFACTURER : SHURE INC.  
 MODEL No. : AXT610  
 SERIAL No. : ELITE 1  
 MODE : TRANSMIT AT 2445MHz  
 SCANS/BAND : 1  
 NOTES :  
 TEST DATE : 15 Nov 2010 12:17:26 R. KING  
 ANT. POLARIZ. : VERTICAL



START = 30

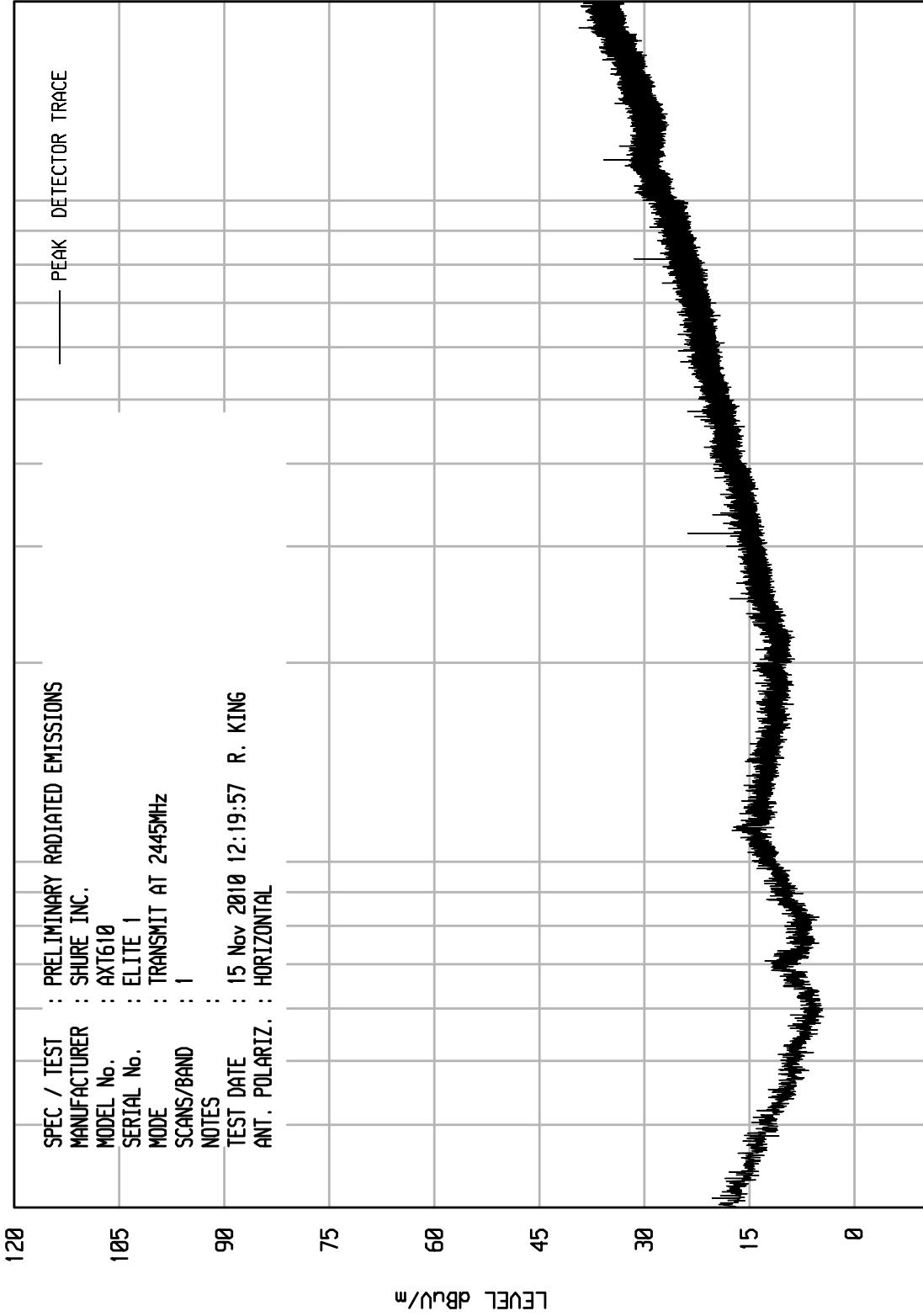
STOP = 2000

ELITE ELECTRONIC ENGINEERING Inc.  
Downers Grove, Ill. 60515

UNIV RCU EMI RUN 5

UKA1 01/25/10

SPEC / TEST : PRELIMINARY RADIATED EMISSIONS  
 MANUFACTURER : SHURE INC.  
 MODEL No. : AXT610  
 SERIAL No. : ELITE 1  
 MODE : TRANSMIT AT 2445MHz  
 SCANS/BAND : 1  
 NOTES :  
 TEST DATE : 15 Nov 2010 12:19:57 R. KING  
 ANT. POLARIZ. : HORIZONTAL



START = 30

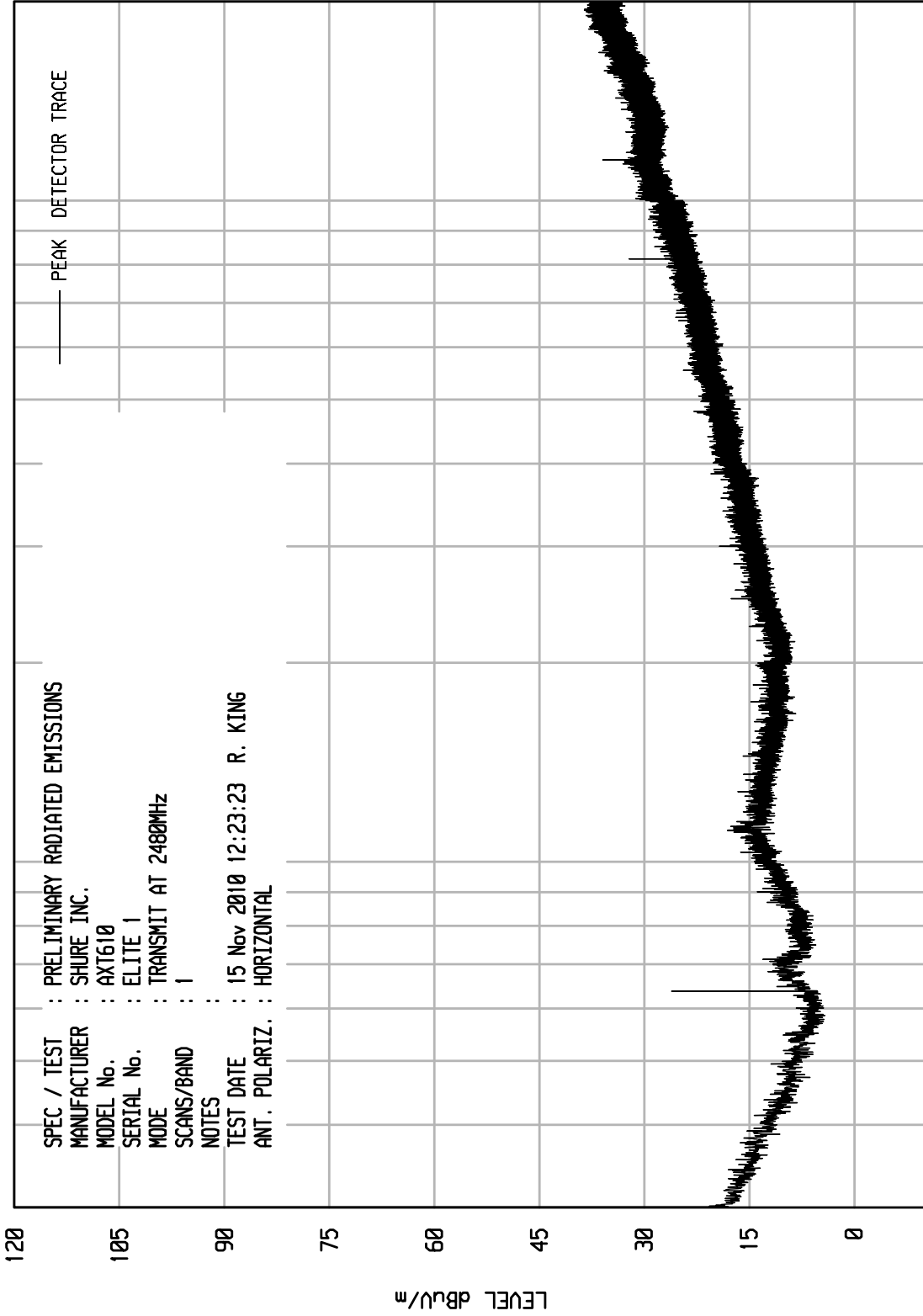
STOP = 2000

ELITE ELECTRONIC ENGINEERING Inc.  
Downers Grove, Ill. 60515

UNIV RCU EMI RUN 6

UKA1 01/25/10

SPEC / TEST : PRELIMINARY RADIATED EMISSIONS  
 MANUFACTURER : SHURE INC.  
 MODEL No. : AXT610  
 SERIAL No. : ELITE 1  
 MODE : TRANSMIT AT 2480MHz  
 SCANS/BAND : 1  
 NOTES :  
 TEST DATE : 15 Nov 2010 12:23:23 R. KING  
 ANT. POLARIZ. : HORIZONTAL



START = 30

FREQUENCY MHz

1000

STOP = 2000



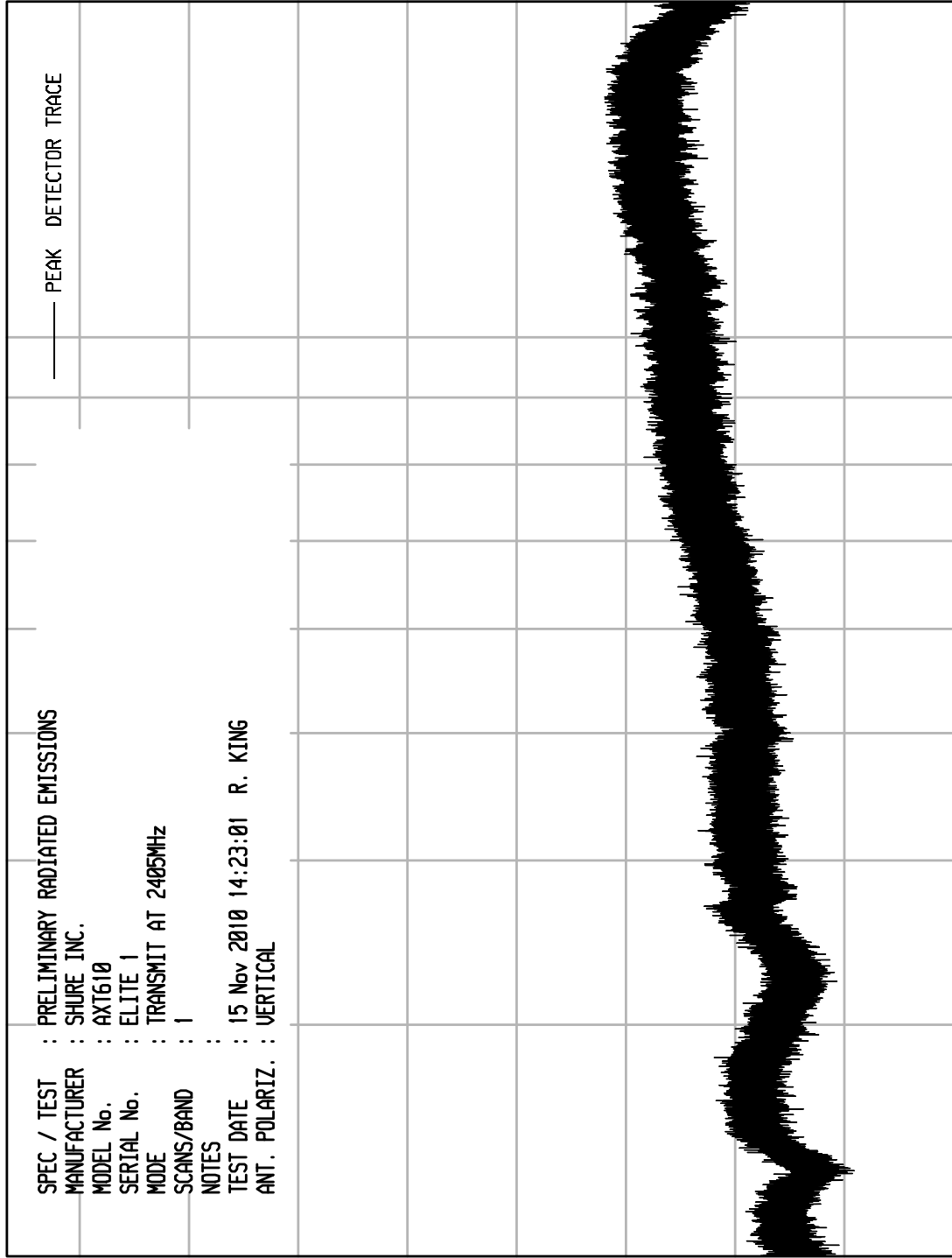
ELITE ELECTRONIC ENGINEERING Inc.  
Downers Grove, Ill. 60515

UNIV RCU EMI RUN 21

UKA1 01/25/10

SPEC / TEST : PRELIMINARY RADIATED EMISSIONS  
 MANUFACTURER : SHURE INC.  
 MODEL No. : AXT610  
 SERIAL No. : ELITE 1  
 MODE : TRANSMIT AT 2405MHz  
 SCANS/BAND : 1  
 NOTES :  
 TEST DATE : 15 Nov 2010 14:23:01 R. KING  
 ANT. POLARIZ. : VERTICAL

— PEAK DETECTOR TRACE



START = 2000

FREQUENCY MHz

10000

STOP = 18000

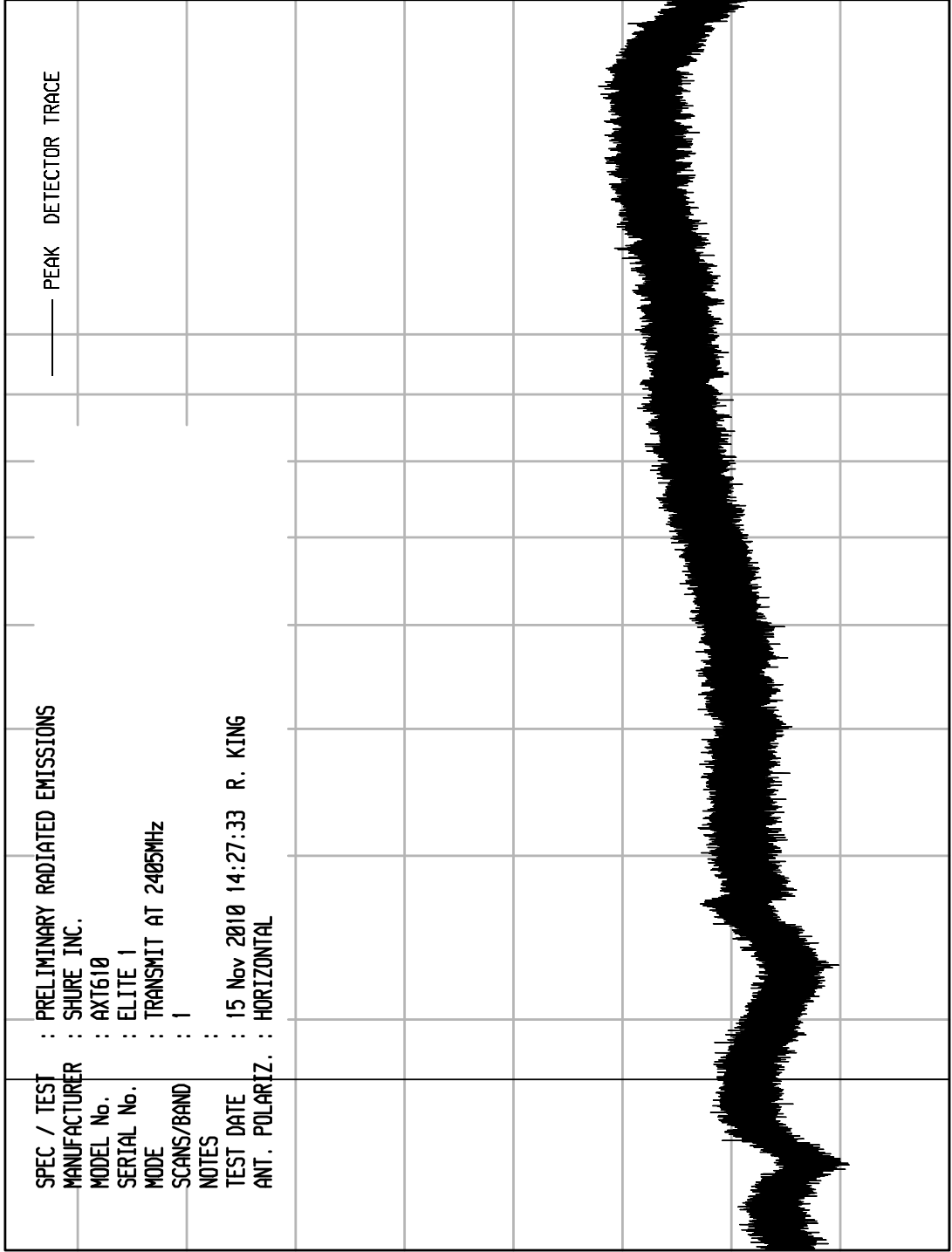
ELITE ELECTRONIC ENGINEERING Inc.  
Downers Grove, Ill. 60515

UNIV RCU EMI RUN 22

UKA1 01/25/10

SPEC / TEST : PRELIMINARY RADIATED EMISSIONS  
 MANUFACTURER : SHURE INC.  
 MODEL No. : AXT610  
 SERIAL No. : ELITE 1  
 MODE : TRANSMIT AT 2405MHz  
 SCANS/BAND : 1  
 NOTES :  
 TEST DATE : 15 Nov 2010 14:27:33 R. KING  
 ANT. POLARIZ. : HORIZONTAL

— PEAK DETECTOR TRACE



START = 2000

STOP = 18000



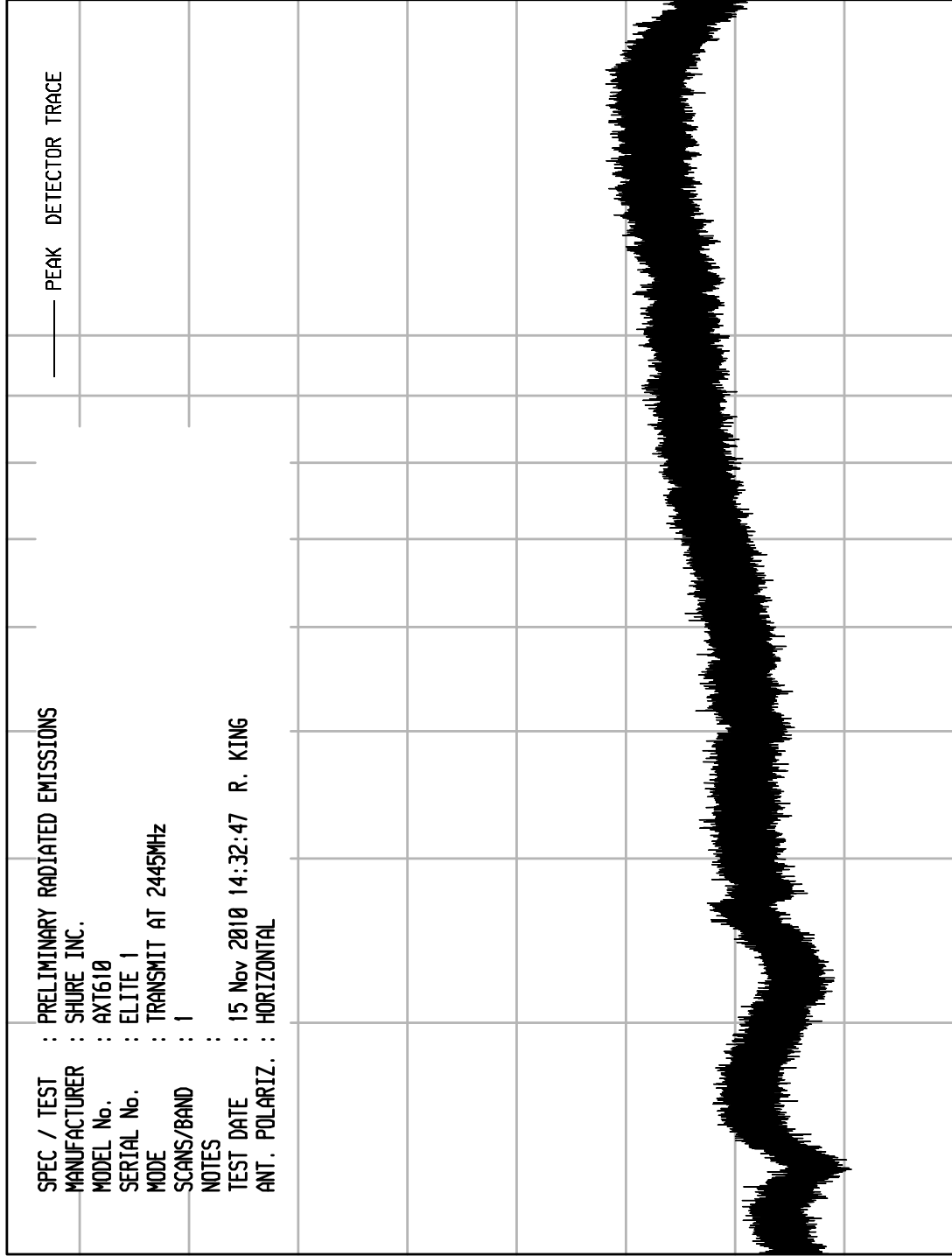
ELITE ELECTRONIC ENGINEERING Inc.  
Downers Grove, Ill. 60515

UNIV RCU EMI RUN 23

UKA1 01/25/10

SPEC / TEST : PRELIMINARY RADIATED EMISSIONS  
 MANUFACTURER : SHURE INC.  
 MODEL No. : AXT610  
 SERIAL No. : ELITE 1  
 MODE : TRANSMIT AT 2445MHz  
 SCANS/BAND : 1  
 NOTES :  
 TEST DATE : 15 Nov 2010 14:32:47 R. KING  
 ANT. POLARIZ. : HORIZONTAL

— PEAK DETECTOR TRACE



START = 2000

FREQUENCY MHz

10000

STOP = 18000

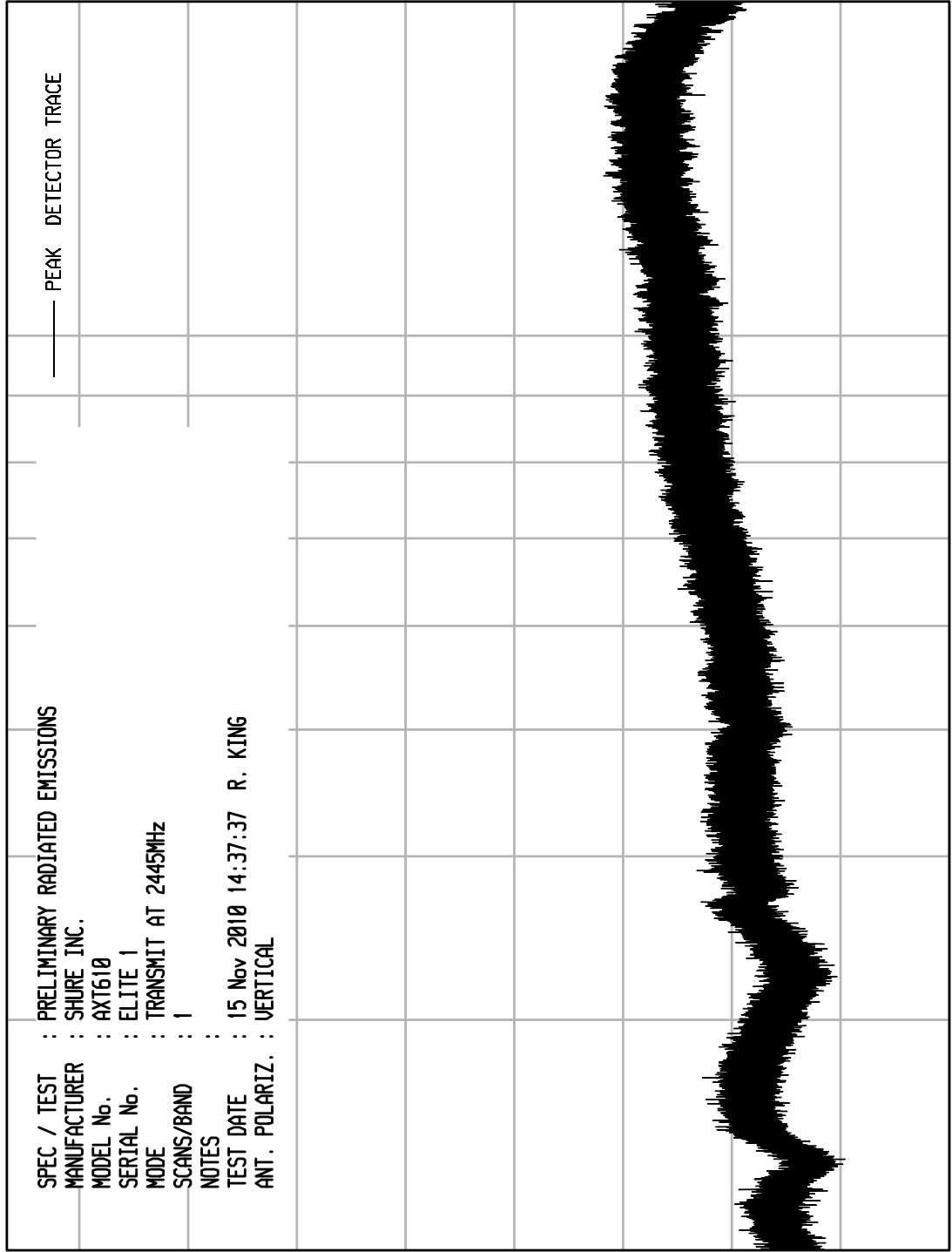
ELITE ELECTRONIC ENGINEERING Inc.  
Downers Grove, Ill. 60515

UNIV RCU EMI RUN 24

UKA1 01/25/10

SPEC / TEST : PRELIMINARY RADIATED EMISSIONS  
 MANUFACTURER : SHURE INC.  
 MODEL No. : AXT610  
 SERIAL No. : ELITE 1  
 MODE : TRANSMIT AT 2445MHz  
 SCANS/BAND : 1  
 NOTES :  
 TEST DATE : 15 Nov 2010 14:37:37 R. KING  
 ANT. POLARIZ. : VERTICAL

— PEAK DETECTOR TRACE



START = 2000

FREQUENCY MHz

10000

STOP = 18000



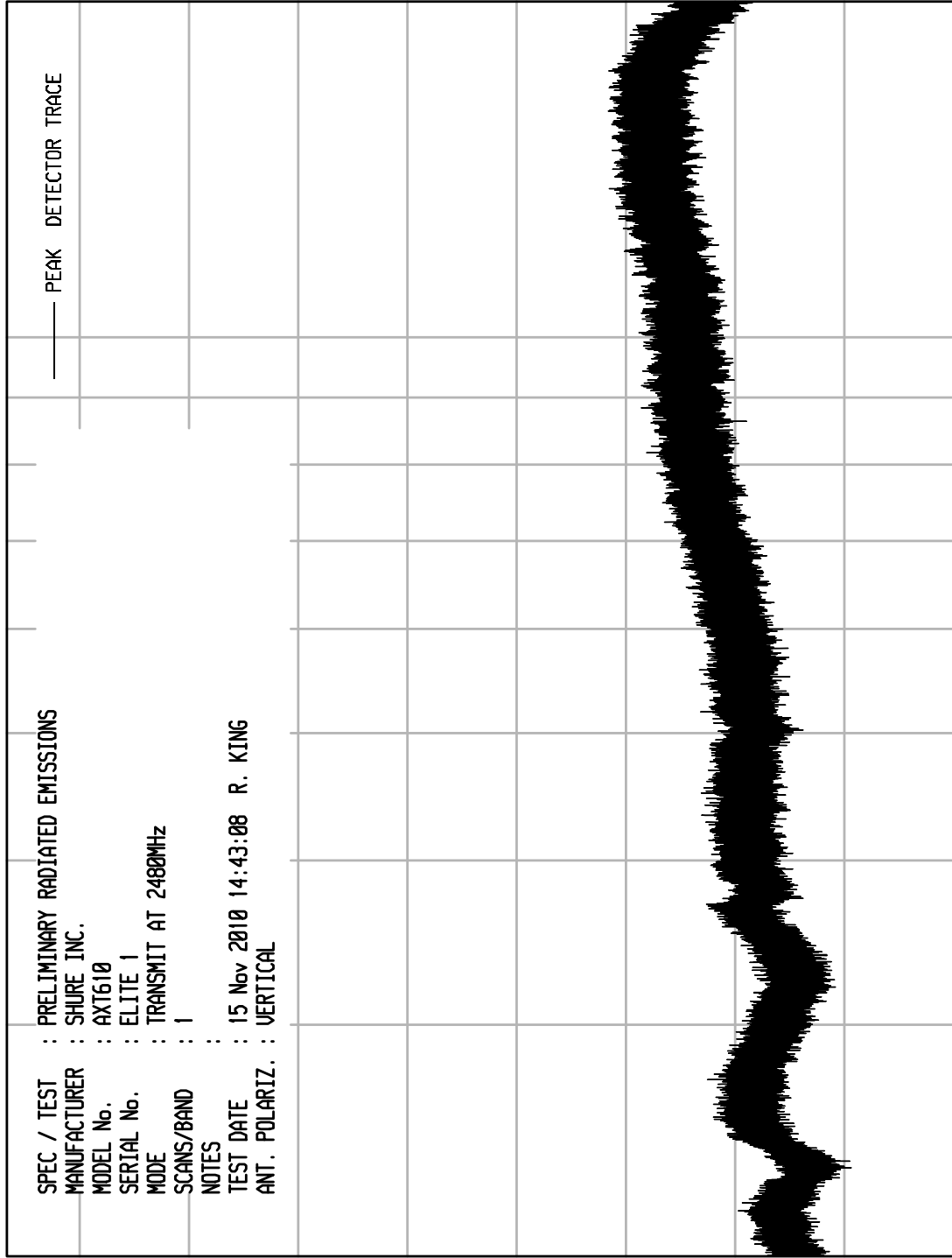
ELITE ELECTRONIC ENGINEERING Inc.  
Downers Grove, Ill. 60515

UNIV RCU EMI RUN 25

UKA1 01/25/10

SPEC / TEST : PRELIMINARY RADIATED EMISSIONS  
 MANUFACTURER : SHURE INC.  
 MODEL No. : AXT610  
 SERIAL No. : ELITE 1  
 MODE : TRANSMIT AT 2480MHz  
 SCANS/BAND : 1  
 NOTES :  
 TEST DATE : 15 Nov 2010 14:43:08 R. KING  
 ANT. POLARIZ. : VERTICAL

— PEAK DETECTOR TRACE



START = 2000

FREQUENCY MHz

10000

STOP = 18000





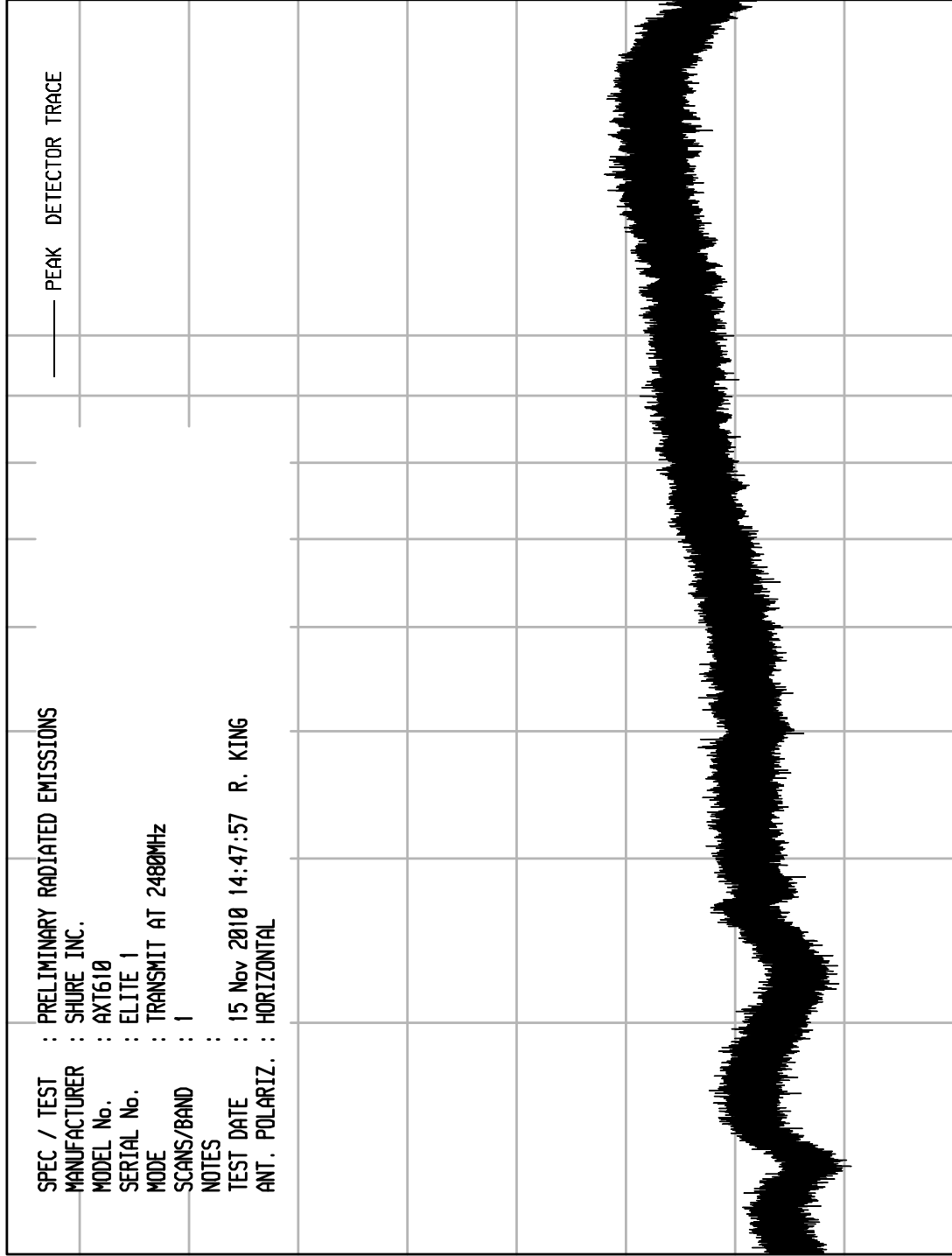
ELITE ELECTRONIC ENGINEERING Inc.  
Downers Grove, Ill. 60515

UNIV RCU EMI RUN 26

UKA1 01/25/10

SPEC / TEST : PRELIMINARY RADIATED EMISSIONS  
 MANUFACTURER : SHURE INC.  
 MODEL No. : AXT610  
 SERIAL No. : ELITE 1  
 MODE : TRANSMIT AT 2480MHz  
 SCANS/BAND : 1  
 NOTES :  
 TEST DATE : 15 Nov 2010 14:47:57 R. KING  
 ANT. POLARIZ. : HORIZONTAL

— PEAK DETECTOR TRACE



START = 2000

FREQUENCY MHz

10000

STOP = 18000



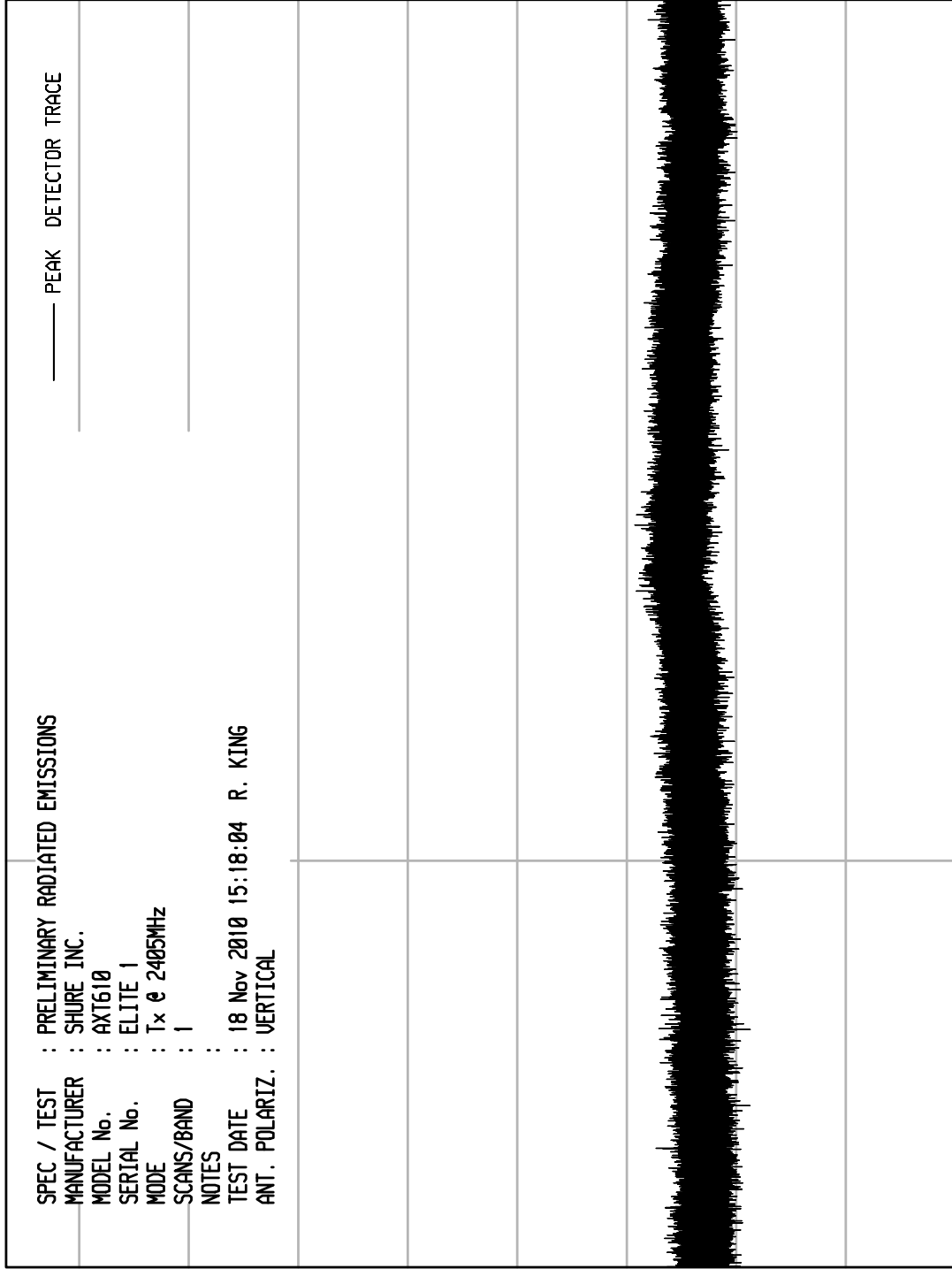
ELITE ELECTRONIC ENGINEERING Inc.  
Downers Grove, Ill. 60515

UNIU RCU EMI RUN 1

UKA1 07/14/10

SPEC / TEST : PRELIMINARY RADIATED EMISSIONS  
 MANUFACTURER : SHURE INC.  
 MODEL No. : AXT610  
 SERIAL No. : ELITE 1  
 MODE : Tx @ 2405MHz  
 SCANS/BAND : 1  
 NOTES :  
 TEST DATE : 18 Nov 2010 15:18:04 R. KING  
 ANT. POLARIZ. : VERTICAL

— PEAK DETECTOR TRACE



START = 18000

FREQUENCY MHz

STOP = 25000



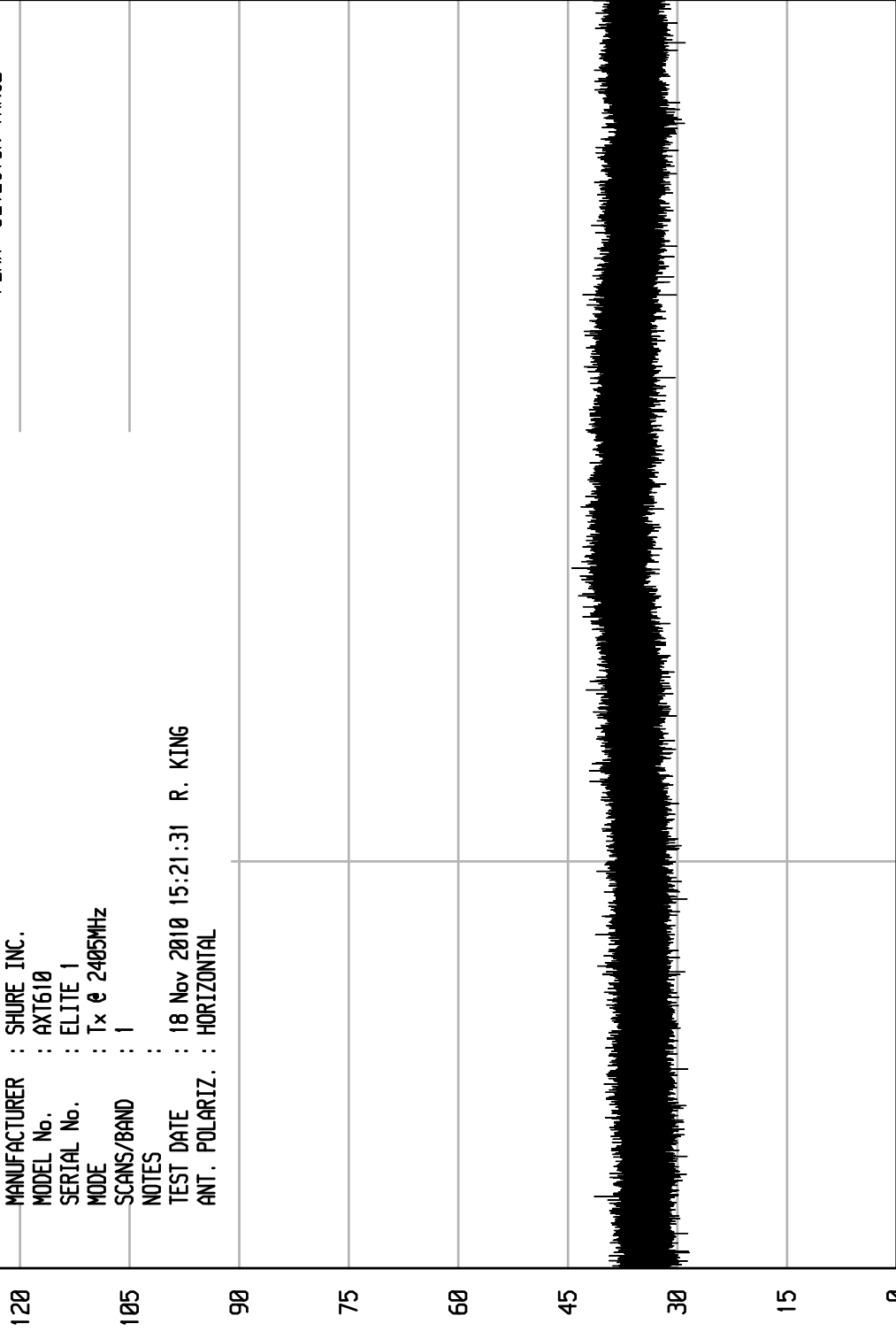
ELITE ELECTRONIC ENGINEERING Inc.  
Downers Grove, Ill. 60515

UNIU RCU EMI RUN 2

UKA1 07/14/10

SPEC / TEST : PRELIMINARY RADIATED EMISSIONS  
 MANUFACTURER : SHURE INC.  
 MODEL No. : AXT610  
 SERIAL No. : ELITE 1  
 MODE : Tx @ 2405MHz  
 SCANS/BAND : 1  
 NOTES :  
 TEST DATE : 18 Nov 2010 15:21:31 R. KING  
 ANT. POLARIZ. : HORIZONTAL

— PEAK DETECTOR TRACE



START = 18000

FREQUENCY MHz

STOP = 25000



ELITE ELECTRONIC ENGINEERING Inc.

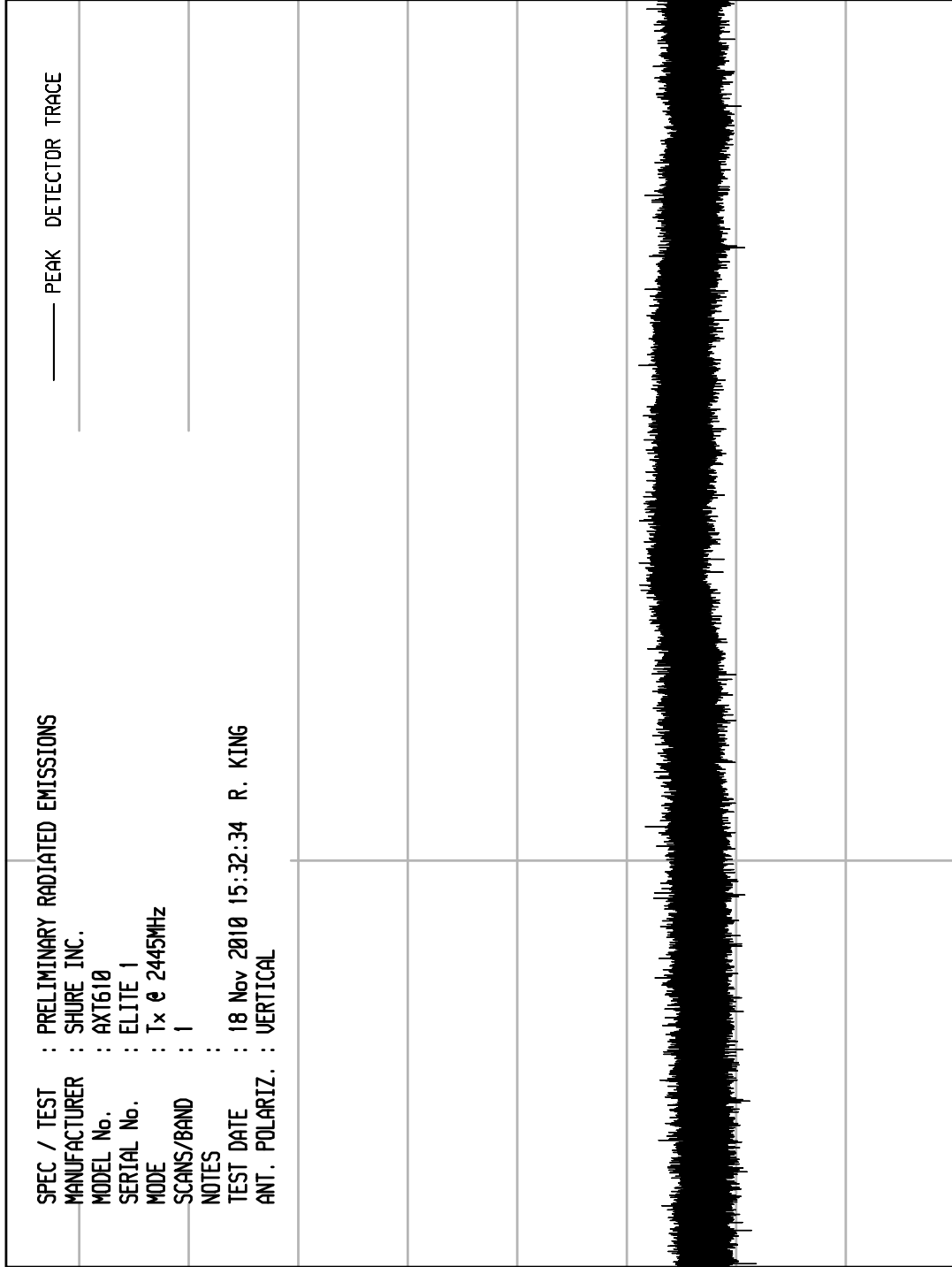
Downers Grove, Ill. 60515

UNIU RCU EMI RUN 3

UKA1 07/14/10

SPEC / TEST : PRELIMINARY RADIATED EMISSIONS  
 MANUFACTURER : SHURE INC.  
 MODEL No. : AXT610  
 SERIAL No. : ELITE 1  
 MODE : Tx @ 2445MHz  
 SCANS/BAND : 1  
 NOTES :  
 TEST DATE : 18 Nov 2010 15:32:34 R. KING  
 ANT. POLARIZ. : VERTICAL

— PEAK DETECTOR TRACE



START = 18000

FREQUENCY MHz

STOP = 25000



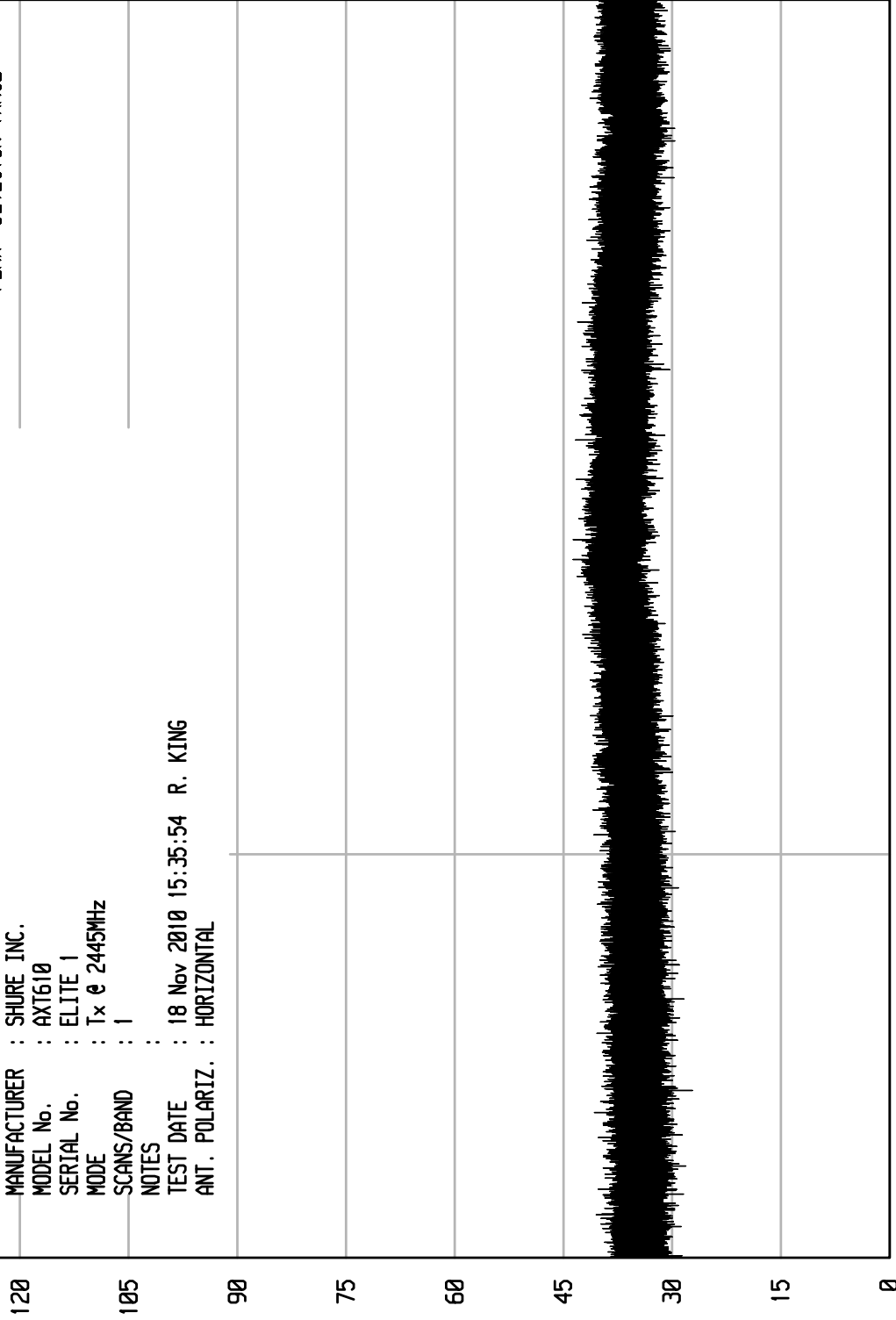
ELITE ELECTRONIC ENGINEERING Inc.  
Downers Grove, Ill. 60515

UNIU RCU EMI RUN 4

UKA1 07/14/10

SPEC / TEST : PRELIMINARY RADIATED EMISSIONS  
 MANUFACTURER : SHURE INC.  
 MODEL No. : AXT610  
 SERIAL No. : ELITE 1  
 MODE : Tx @ 2445MHz  
 SCANS/BAND : 1  
 NOTES :  
 TEST DATE : 18 Nov 2010 15:35:54 R. KING  
 ANT. POLARIZ. : HORIZONTAL

— PEAK DETECTOR TRACE



START = 18000

FREQUENCY MHz

STOP = 25000

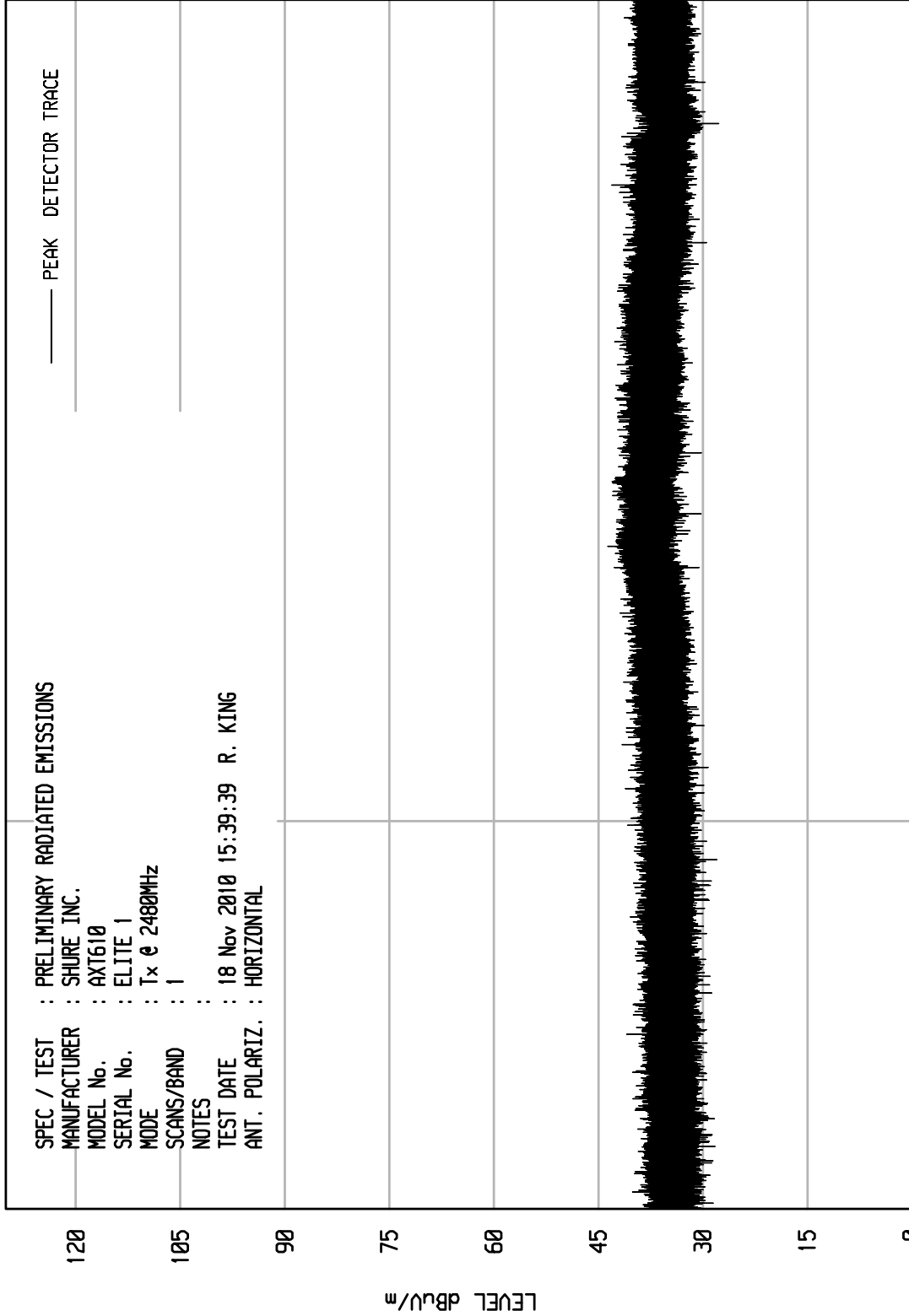
ELITE ELECTRONIC ENGINEERING Inc.  
Downers Grove, Ill. 60515

UNIU RCU EMI RUN 5

UKA1 07/14/10

SPEC / TEST : PRELIMINARY RADIATED EMISSIONS  
 MANUFACTURER : SHURE INC.  
 MODEL No. : AXT610  
 SERIAL No. : ELITE 1  
 MODE : Tx @ 2480MHz  
 SCANS/BAND : 1  
 NOTES :  
 TEST DATE : 18 Nov 2010 15:39:39 R. KING  
 ANT. POLARIZ. : HORIZONTAL

— PEAK DETECTOR TRACE



START = 18000

FREQUENCY MHz

STOP = 25000



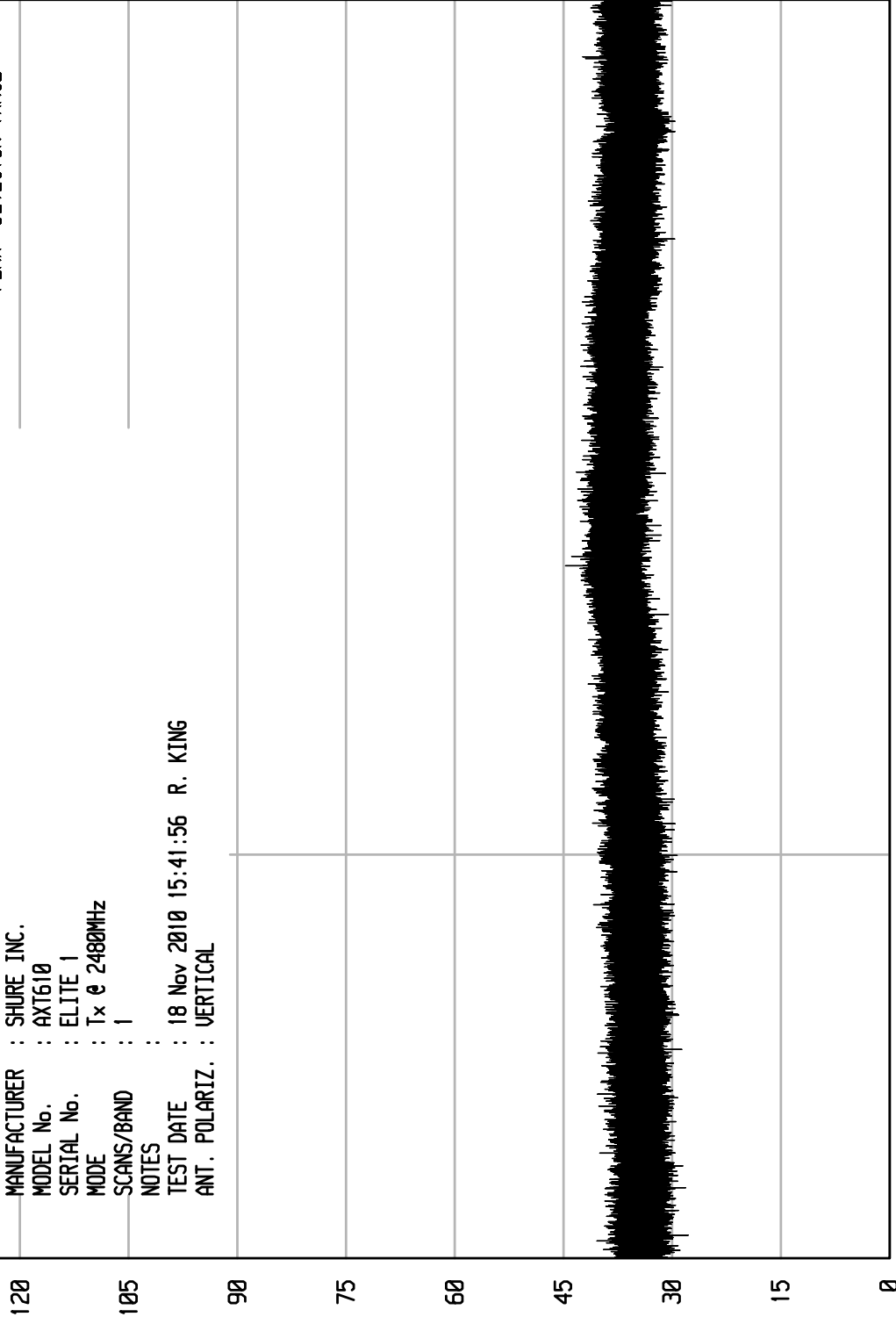
ELITE ELECTRONIC ENGINEERING Inc.  
Downers Grove, Ill. 60515

UNIU RCU EMI RUN 6

UKA1 07/14/10

SPEC / TEST : PRELIMINARY RADIATED EMISSIONS  
 MANUFACTURER : SHURE INC.  
 MODEL No. : AXT610  
 SERIAL No. : ELITE 1  
 MODE : Tx @ 2480MHz  
 SCANS/BAND : 1  
 NOTES :  
 TEST DATE : 18 Nov 2010 15:41:56 R. KING  
 ANT. POLARIZ. : VERTICAL

— PEAK DETECTOR TRACE



START = 18000

FREQUENCY MHz

STOP = 25000







Manufacturer : Shure Inc.  
 EUT : Zigbee Transceiver  
 Model No. : AXT610  
 Test Specification : FCC Part 15, Subpart C, Section 15.247, Radiated Emissions  
 Date : November 16, 2010  
 Mode : Transmit @ 2405MHz  
 Test Distance : 3 meters  
 Notes : Measurements in restricted bands using a peak detector

Total = Meter Reading + Cable Loss + Antenna Factor + Preamp Gain

Freq (MHz)	Ant Pol	Meter Reading (dBuV)	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Total dBuV/m at 3 M	Total uV/m at 3M	Limit uV/m at 3M	Margin (dB)
4810.000	H	41.8	5.7	34.3	-38.3	43.6	151.0	5000.0	-30.4
4810.000	V	41.2	5.7	34.3	-38.3	43.0	141.3	5000.0	-31.0
12025.000	H	41.1	9.8	41.4	-38.4	53.9	498.2	5000.0	-20.0
12025.000	V	40.5	9.8	41.4	-38.4	53.3	463.9	5000.0	-20.7
19240.000	H	33.8	2.2	40.4	-27.5	48.9	279.0	5000.0	-25.1
19240.000	V	33.9	2.2	40.4	-27.5	49.0	282.2	5000.0	-25.0

Checked BY Richard E. King :

Richard E. King



Manufacturer : Shure Inc.  
 EUT : Zigbee Transceiver  
 Model No. : AXT610  
 Test Specification : FCC Part 15, Subpart C, Section 15.247, Radiated Emissions  
 Date : November 16, 2010  
 Mode : Transmit @ 2405MHz  
 Test Distance : 3 meters  
 Notes : Measurements in restricted bands using an average detector

Total = Meter Reading + Cable Loss + Antenna Factor + Preamp Gain + Duty Cycle Factor

Freq (MHz)	Ant Pol	Meter Reading (dBuV)	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Duty Cycle (dB)	Total dBuV/m at 3 M	Total uV/m at 3M	Limit uV/m at 3M	Margin (dB)
4810.0	H	28.9	5.7	34.8	-38.3	-12.3	18.9	8.8	500.0	-35.1
4810.0	V	31.6	5.7	34.8	-38.3	-12.3	21.5	11.9	500.0	-32.5
12025.0	H	28.5	9.8	41.4	-38.4	-12.3	29.0	28.3	500.0	-25.0
12025.0	V	28.5	9.8	41.4	-38.4	-12.3	29.0	28.2	500.0	-25.0
19240.0	H	21.2	2.2	40.4	-27.5	-12.3	24.1	15.9	500.0	-29.9
19240.0	V	21.2	2.2	40.4	-27.5	-12.3	24.0	15.9	500.0	-29.9

Checked BY Richard E. King :

Richard E. King



Manufacturer : Shure Inc.  
 EUT : Zigbee Transceiver  
 Model No. : AXT610  
 Test Specification : FCC Part 15, Subpart C, Section 15.247, Radiated Emissions  
 Date : November 16, 2010  
 Mode : Transmit @ 2445MHz  
 Test Distance : 3 meters  
 Notes : Measurements in restricted bands using a peak detector

Total = Meter Reading + Cable Loss + Antenna Factor + Preamp Gain

Freq (MHz)	Ant Pol	Meter Reading (dBuV)	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Total dBuV/m at 3 M	Total uV/m at 3M	Limit uV/m at 3M	Margin (dB)
4890.0	H	42.2	5.8	34.9	-38.3	44.6	169.2	5000	-29.4
4890.0	V	41.7	5.8	34.9	-38.3	44.1	159.9	5000	-29.9
7335.0	H	41.4	7.7	38.2	-38.4	48.8	275.2	5000	-25.2
7335.0	V	42.0	7.7	38.2	-38.4	49.4	295.5	5000	-24.6
12225.0	H	41.2	9.9	41.5	-38.4	54.2	511.5	5000	-19.8
12225.0	V	41.2	9.9	41.5	-38.4	54.2	511.5	5000	-19.8
19560.0	H	34.0	2.2	40.4	-27.1	49.4	296.8	5000	-24.5
19560.0	V	34.0	2.2	40.4	-27.1	49.5	297.1	5000	-24.5

Checked BY RICHARD E. KING :

Richard E. King



Manufacturer : Shure Inc.  
 EUT : Zigbee Transceiver  
 Model No. : AXT610  
 Test Specification : FCC Part 15, Subpart C, Section 15.247, Radiated Emissions  
 Date : November 16, 2010  
 Mode : Transmit @ 2445MHz  
 Test Distance : 3 meters  
 Notes : Measurements in restricted bands using an average detector

Total = Meter Reading + Cable Loss + Antenna Factor + Preamp Gain + Duty Cycle Factor

Freq (MHz)	Ant Pol	Meter Reading (dBUV)	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Duty Cycle (dB)	Total dBUV/m at 3 M	Total uV/m at 3M	Limit uV/m at 3M	Margin (dB)
4890.0	H	29.7	5.8	34.9	-38.3	-12.3	19.7	9.7	500	-34.2
4890.0	V	29.6	5.8	34.9	-38.3	-12.3	19.7	9.6	500	-34.3
7335.0	H	29.4	7.7	38.2	-38.4	-12.3	24.5	16.8	500	-29.5
7335.0	V	29.3	7.7	38.2	-38.4	-12.3	24.4	16.6	500	-29.6
12225.0	H	28.6	9.9	41.5	-38.4	-12.3	29.2	28.9	500	-24.8
12225.0	V	28.6	9.9	41.5	-38.4	-12.3	29.2	28.8	500	-24.8
19560.0	H	21.8	2.2	40.4	-27.1	-12.3	24.9	17.6	500	-29.1
19560.0	V	21.7	2.2	40.4	-27.1	-12.3	24.9	17.5	500	-29.1

Checked BY Richard E. King :

Richard E. King



Manufacturer : Shure Inc.  
 EUT : Zigbee Transceiver  
 Model No. : AXT610  
 Test Specification : FCC Part 15, Subpart C, Section 15.247, Radiated Emissions  
 Date : November 16, 2010  
 Mode : Transmit @ 2480MHz  
 Test Distance : 3 meters  
 Notes : Measurements in restricted bands using a peak detector

Total = Meter Reading + Cable Loss + Antenna Factor + Preamp Gain

Freq (MHz)	Ant Pol	Meter Reading (dBuV)	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Total dBuV/m at 3 M	Total uV/m at 3M	Limit uV/m at 3M	Margin (dB)
4960.0	H	42.5	5.8	34.5	-38.3	44.5	168.3	5000	-29.5
4960.0	V	41.5	5.8	34.5	-38.3	43.5	150.0	5000	-30.5
7440.0	H	41.4	7.7	38.1	-38.5	48.7	272.5	5000	-25.3
7440.0	V	41.2	7.7	38.1	-38.5	48.5	267.2	5000	-25.4
12400.0	H	42.6	9.9	41.5	-38.4	55.7	606.0	5000	-18.3
12400.0	V	42.8	9.9	41.3	-38.4	55.6	602.9	5000	-18.4
19840.0	H	34.2	2.2	40.4	-26.9	49.9	313.2	5000	-24.1
19840.0	V	34.2	2.2	40.4	-26.9	49.9	313.2	5000	-24.1
22320.0	H	35.4	2.2	40.6	-27.1	51.1	360.1	5000	-22.9
22320.0	V	35.4	2.2	40.6	-27.1	51.1	360.1	5000	-22.9

Checked BY Richard E. King :

Richard E. King



Manufacturer : Shure Inc.  
 EUT : Zigbee Transceiver  
 Model No. : AXT610  
 Test Specification : FCC Part 15, Subpart C, Section 15.247, Radiated Emissions  
 Date : November 16, 2010  
 Mode : Transmit @ 2480MHz  
 Test Distance : 3 meters  
 Notes : Measurements in restricted bands using an average detector

Total = Meter Reading + Cable Loss + Antenna Factor + Preamp Gain + Duty Cycle Factor

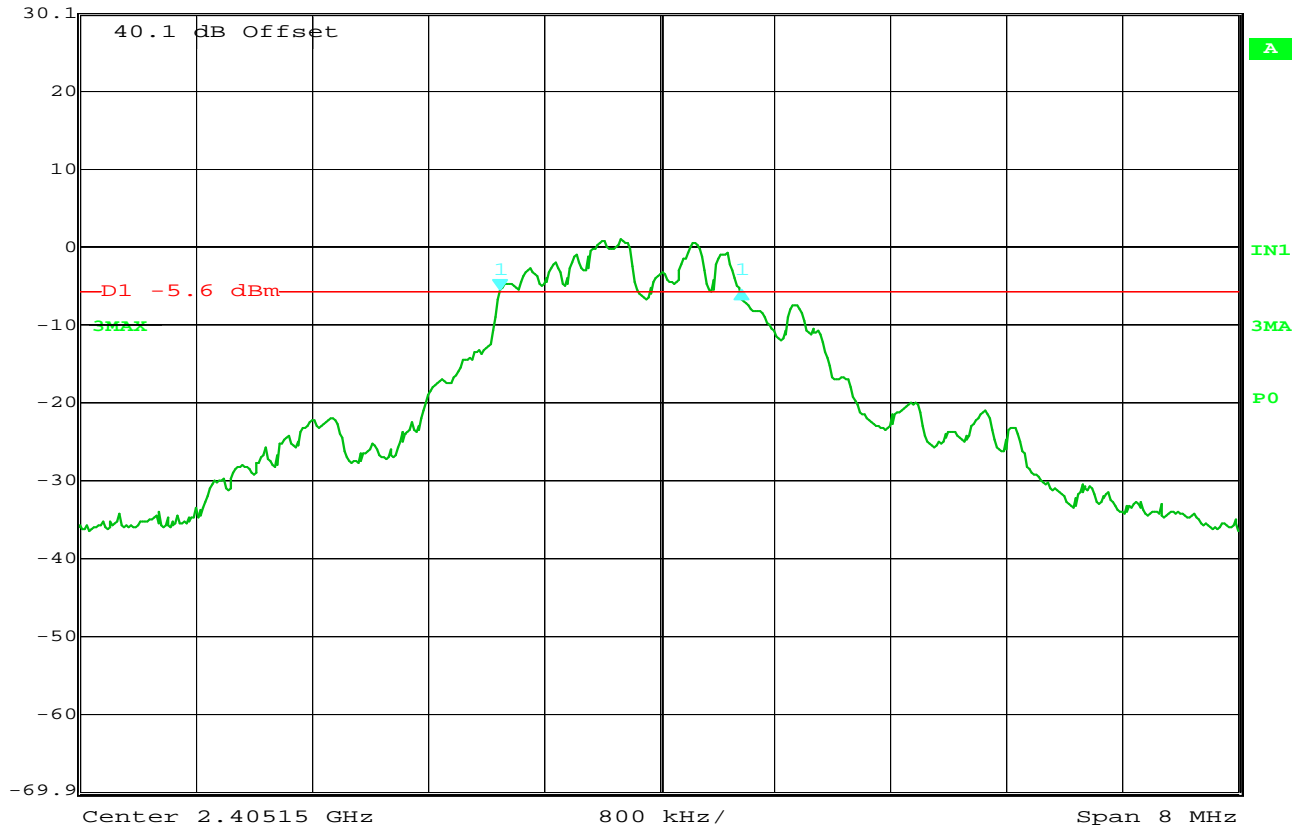
Freq (MHz)	Ant Pol	Meter Reading (dBuV)	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Duty Cycle (dB)	Total dBuV/m at 3 M	Total uV/m at 3M	Limit uV/m at 3M	Margin (dB)
4960.0	H	31.1	5.8	34.5	-38.3	-12.3	20.8	11.0	500	-33.1
4960.0	V	31.3	5.8	34.5	-38.3	-12.3	21.0	11.2	500	-33.0
7440.0	H	28.9	7.7	38.1	-38.5	-12.3	24.0	15.8	500	-30.0
7440.0	V	29.0	7.7	38.1	-38.5	-12.3	24.0	15.8	500	-30.0
12400.0	H	29.3	9.9	41.5	-38.4	-12.3	30.0	31.7	500	-24.0
12400.0	V	29.3	9.9	41.3	-38.4	-12.3	29.9	31.1	500	-24.1
19840.0	H	21.4	2.2	40.4	-26.9	-12.3	24.8	17.4	500	-29.2
19840.0	V	21.4	2.2	40.4	-26.9	-12.3	24.8	17.4	500	-29.2
22320.0	H	23.1	2.2	40.6	-27.1	-12.3	26.5	21.2	500	-27.5
22320.0	V	23.1	2.2	40.6	-27.1	-12.3	26.5	21.2	500	-27.5

Checked BY RICHARD E. KING :

Richard E. King



	Delta 1 [T3]	RBW	100 kHz	RF Att	10 dB
Ref Lvl	-0.11 dB	VBW	1 MHz		
30.1 dBm	1.66733467 MHz	SWT	5 ms	Unit	dBm



Date: 19.NOV.2010 13:08:31

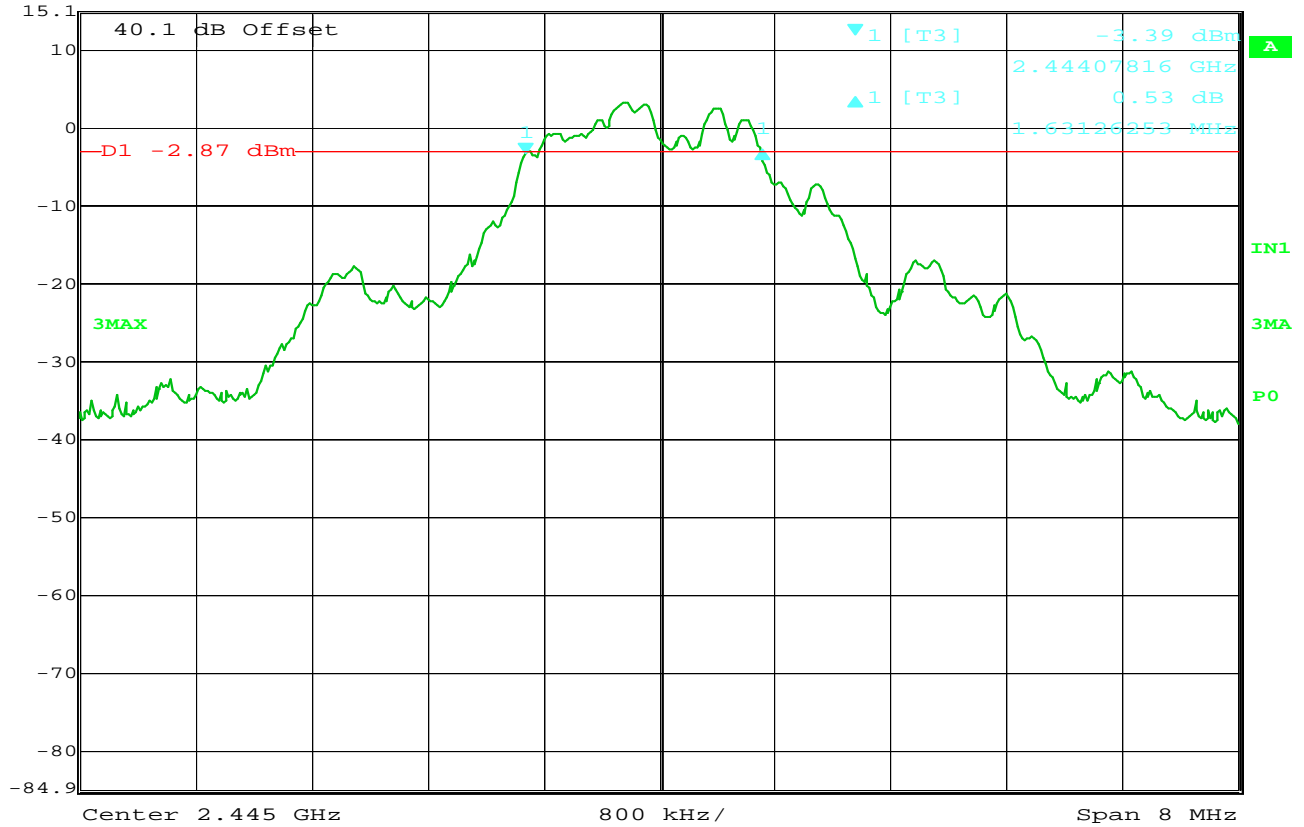
**FCC 15.247 6dB Bandwidth**

MANUFACTURER : Shure Inc.  
 EUT : Zigbee Transceiver  
 MODEL NUMBER : AXT610  
 TEST MODE : Transmit @ 2405MHz  
 TEST PARAMETERS : 6dB bandwidth at 2405MHz  
 NOTES :

NOTES



Ref Lvl	Delta 1 [T3]	RBW	100 kHz	RF Att	10 dB
15.1 dBm	0.53 dB	VBW	1 MHz		
	1.63126253 MHz	SWT	5 ms	Unit	dBm



Date: 19.NOV.2010 14:03:45

**FCC 15.247 6dB Bandwidth**

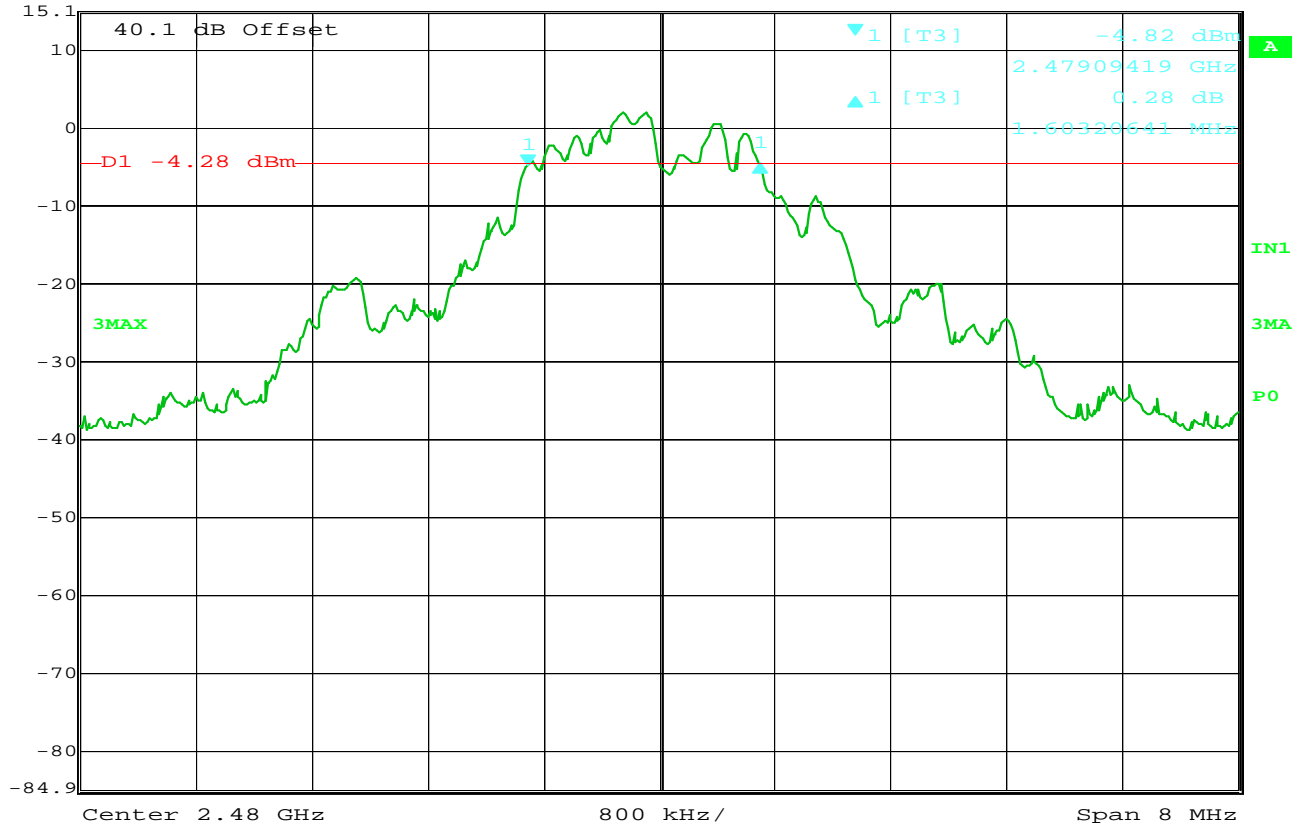
MANUFACTURER : Shure Inc.  
 EUT : Zigbee Transceiver  
 MODEL NUMBER : AXT610  
 TEST MODE : Transmit @ 2405MHz  
 TEST PARAMETERS : 6dB bandwidth at 2405MHz  
 NOTES :

NOTES





Delta 1 [T3] RBW 100 kHz RF Att 10 dB  
 Ref Lvl 0.28 dB VBW 1 MHz  
 15.1 dBm 1.60320641 MHz SWT 5 ms Unit dBm



Date: 19.NOV.2010 14:09:53

### FCC 15.247 6dB Bandwidth

MANUFACTURER : Shure Inc.  
 EUT : Zigbee Transceiver  
 MODEL NUMBER : AXT610  
 TEST MODE : Transmit @ 2480MHz  
 TEST PARAMETERS : 6dB bandwidth at 2480MHz  
 NOTES :

NOTES



DATA SHEET

Manufacturer : Shure Inc.  
EUT : Zigbee Transceiver  
Model No. : AXT610  
Test Specification : FCC Part 15, Subpart C, Section 15.247, Output Power  
Date : November 15, 2010  
Notes :

Freq (MHz)	Total (dBm)	Total (Watts)	Limit (dBm)	Limit (Watts)
2405.0	7.85	0.0060	30	1
2440.0	7.48	0.0055	30	1
2480.0	6.85	0.0048	30	1

Checked BY RICHARD E. KING :

Richard E. King



DATA SHEET

Manufacturer : Shure Inc.  
EUT : Zigbee Transceiver  
Model No. : AXT610  
Test Specification : FCC Part 15, Subpart C, Section 15.247, Radiated Peak Output Power  
Date : November 16, 2010  
Notes : EIRP = Matched Signal - Cable Loss + Antenna Gain

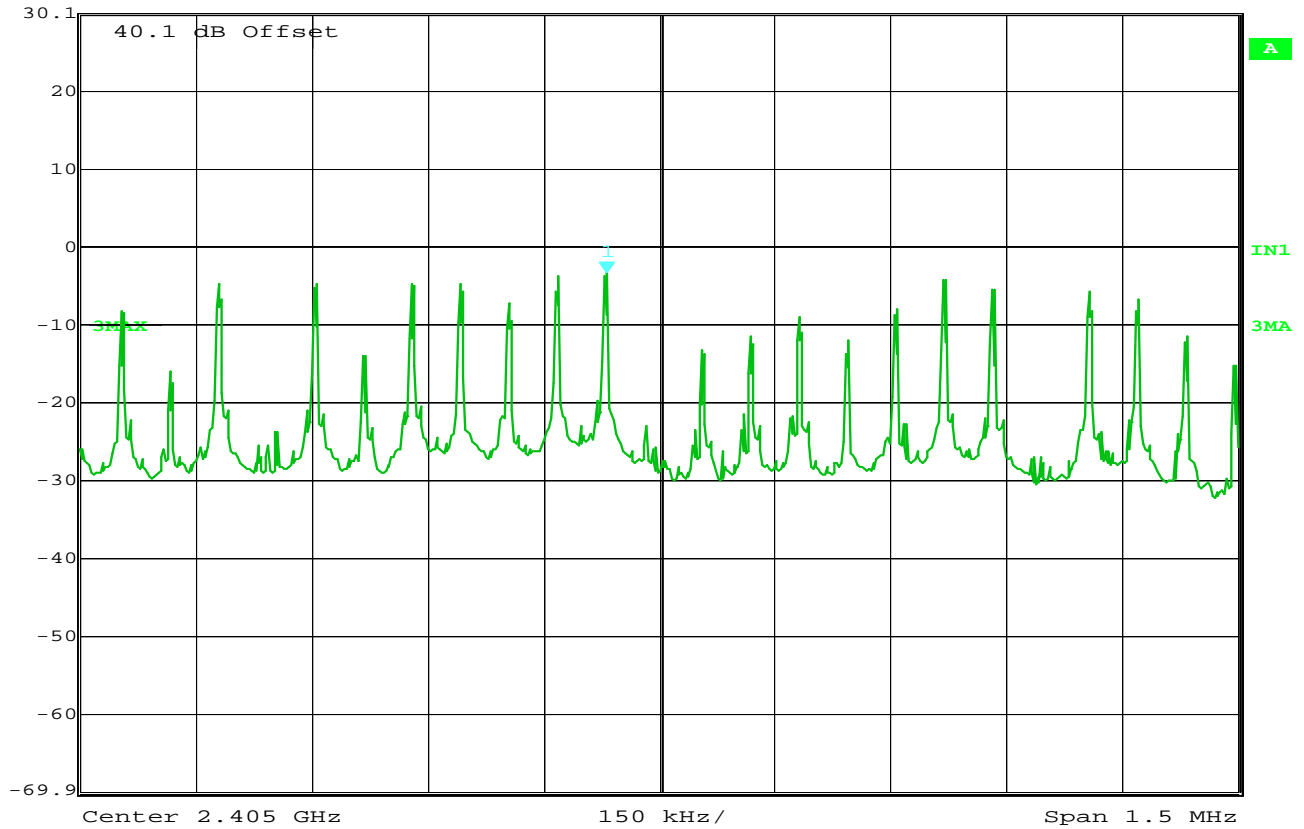
Freq (MHz)	Ant Pol	Meter Reading (dBuV)	Matched SIG. GEN. (dB)	Ant Gain (dB)	CBL (dB)	Total (dBm)	Limit
2405.0	H	72.6	-0.1	4.3	3.0	1.2	36
2405.0	V	74.5	4.0	4.3	3.0	5.3	36
2445.0	H	71.0	-1.5	4.4	3.1	-0.2	36
2445.0	V	76.0	5.7	4.4	3.1	7.1	36
2480.0	H	70.0	-2.5	4.6	3.1	-1.0	36
2480.0	V	74.8	4.7	4.6	3.1	6.2	36

Checked BY Richard E. King :

Richard E. King



Ref Lvl 30.1 dBm  
 Marker 1 [T3] -3.16 dBm  
 2.40493236 GHz  
 RBW 3 kHz  
 VBW 3 kHz  
 SWF 500 s  
 RF Att 10 dB  
 Unit dBm



Date: 15.NOV.2010 10:50:16

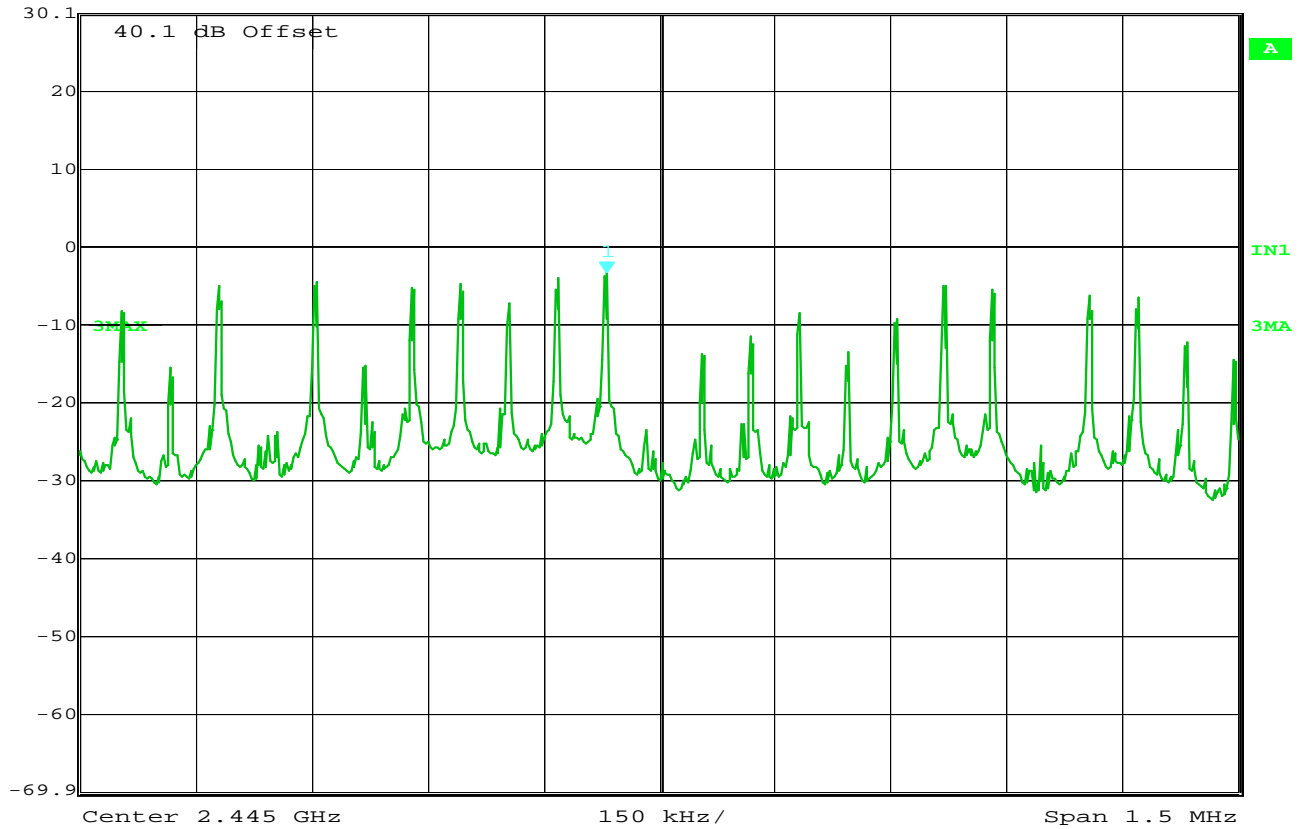
### FCC 15.247 Power Spectral Density

MANUFACTURER : Shure Inc.  
 EUT : Zigbee Transceiver  
 MODEL NUMBER : AXT610  
 TEST MODE : Transmit @ 2405MHz  
 TEST PARAMETERS : Power Spectral Density at 2405MHz  
 NOTES :

NOTES



Marker 1 [T3] RBW 3 kHz RF Att 10 dB  
 Ref Lvl -3.32 dBm VBW 3 kHz  
 30.1 dBm 2.44493236 GHz SWT 500 s Unit dBm



Date: 15.NOV.2010 10:37:20

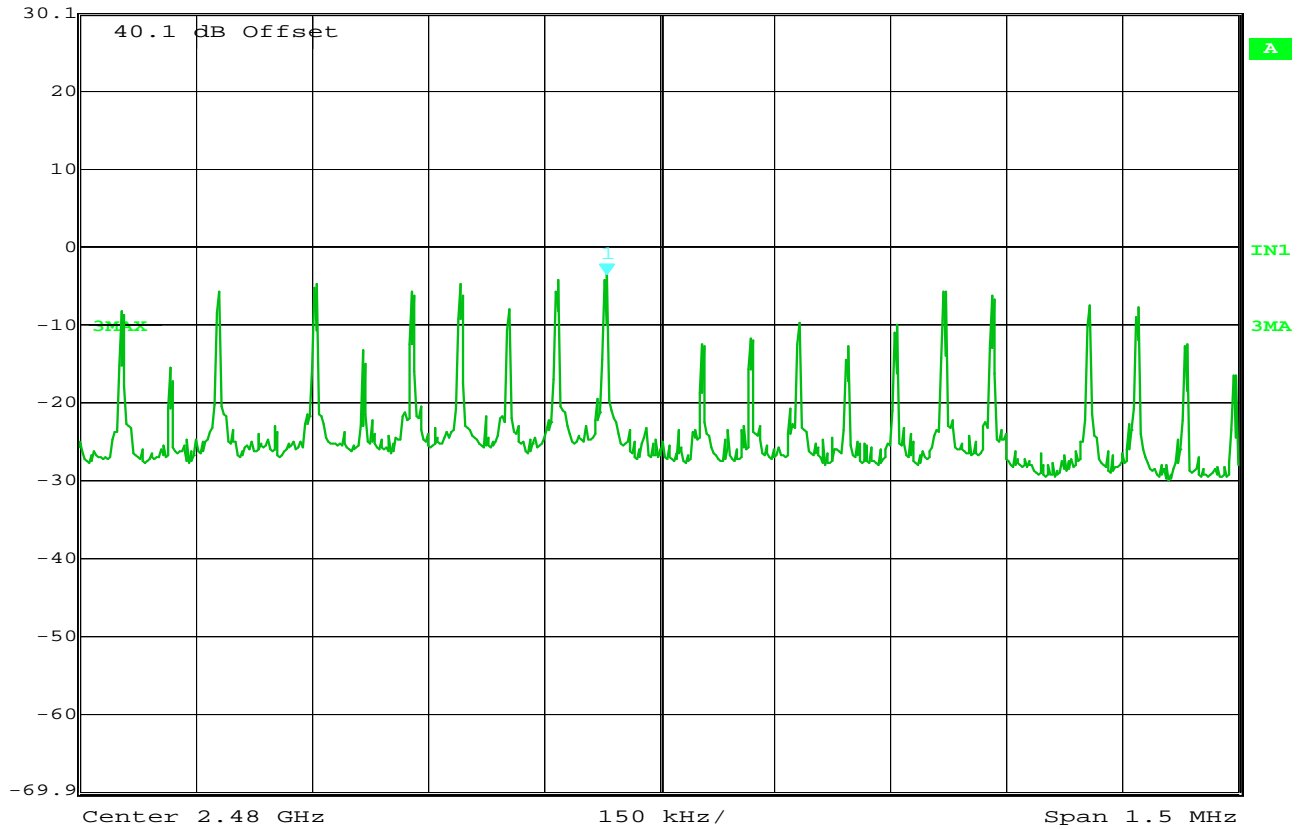
**FCC 15.247 Power Spectral Density**

MANUFACTURER : Shure Inc.  
 EUT : Zigbee Transceiver  
 MODEL NUMBER : AXT610  
 TEST MODE : Transmit @ 2405MHz  
 TEST PARAMETERS : Power Spectral Density at 2405MHz  
 NOTES :

NOTES



Marker 1 [T3] RBW 3 kHz RF Att 10 dB  
 Ref Lvl -3.63 dBm VBW 3 kHz  
 30.1 dBm 2.47993236 GHz SWT 500 s Unit dBm



Date: 15.NOV.2010 10:23:15

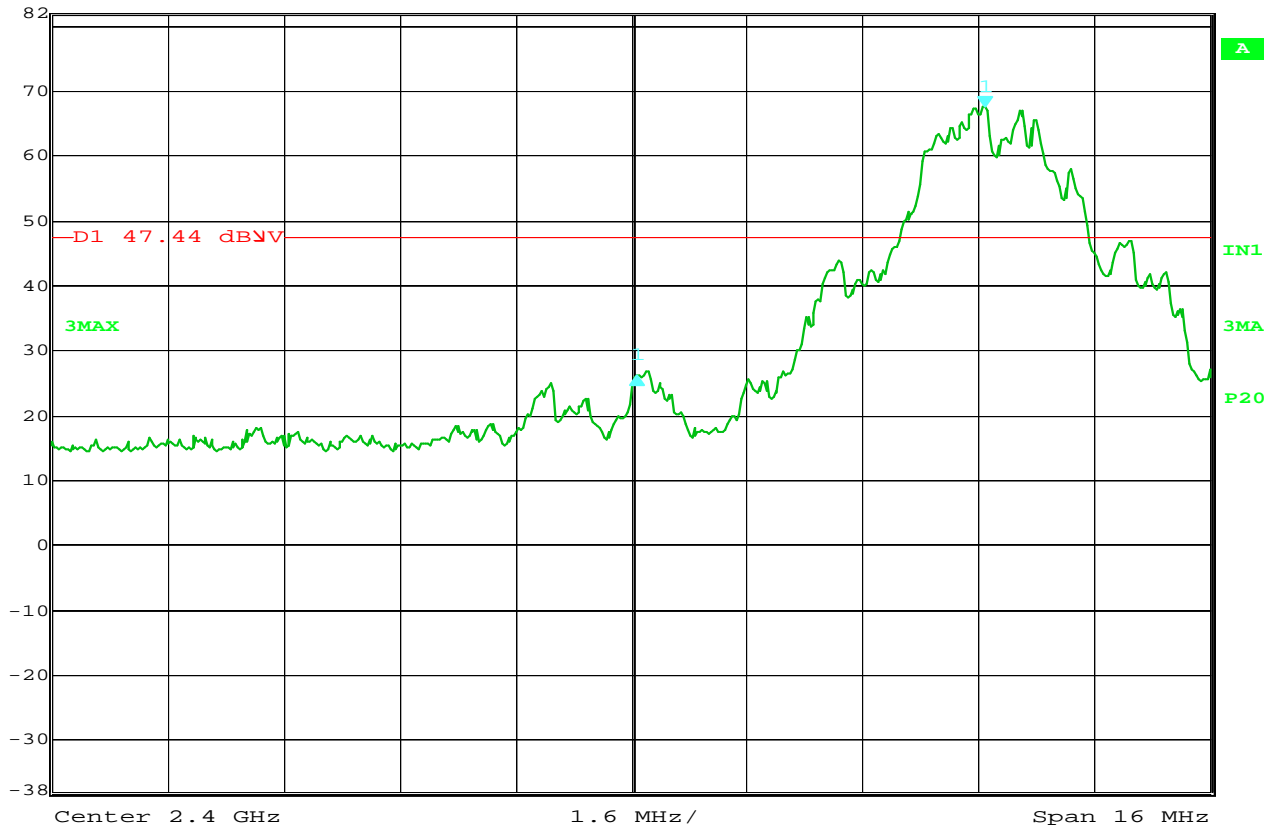
### FCC 15.247 Power Spectral Density

MANUFACTURER : Shure Inc.  
 EUT : Zigbee Transceiver  
 MODEL NUMBER : AXT610  
 TEST MODE : Transmit @ 2405MHz  
 TEST PARAMETERS : Power Spectral Density at 2405MHz  
 NOTES :

NOTES



Delta 1 [T3]      RBW    100 kHz    RF Att    10 dB  
 Ref Lvl            -41.39 dB    VBW    1 MHz  
 82 dBV            -4.80961924 MHz    SWT    5 ms    Unit    dBV



Date: 17.NOV.2010 14:50:15

### FCC 15.247 Band Edge Compliance

MANUFACTURER : Shure Inc.  
 EUT : Zigbee Transceiver  
 MODEL NUMBER : AXT610  
 TEST MODE : Transmit @ 2405MHz  
 TEST PARAMETERS : Band Edge Compliance at 2400MHz  
 NOTES : Center is at 2400MHz

NOTES



Manufacturer : Shure Inc.  
EUT : Zigbee Transceiver  
Model No. : AXT610  
Test Specification : FCC Part 15, Subpart C, Section 15.247, Band-edge compliance  
Date : November 19, 2010  
Mode : Transmit @ 2480MHz  
Test Distance : 3 meters  
Notes : none

Freq (MHz)	Ant Pol	Meter Reading (dBUV)	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Duty Cycle (dB)	Total dBuV/m at 3 M	Total uV/m at 3M	Limit uV/m at 3M	Margin (dB)
2483.5	H	24.5	3.8	29.3	0.0	-12.3	45.4	185.8	500.0	-8.6
2483.5	V	26.9	3.8	29.3	0.0	-12.3	47.8	245.8	500.0	-6.2

Total = Meter Reading + Cable Loss + Antenna Factor

Checked BY Richard E. King :

Richard E. King