



Measurement of RF Emissions from a RCSE-01 Keypad transceiver

For	Turning Technologies, LLC. 255 W Federal Street Youngstown, OH 44503
P.O. Number	0000008713
Date Tested	June 17 th through July 1 st , 2013
Test Personnel	Richard E. King
Test Specification	FCC "Code of Federal Regulations" Title 47 Part15, Subpart C Industry Canada RSS-GEN Industry Canada RSS-210

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THIS REPORT SHALL NOT BE REPRODUCED, EXCEPT IN FULL, WITHOUT THE WRITTEN APPROVAL OF ELITE ELECTRONIC ENGINEERING INCORPORATED.



REVISION HISTORY

Revision	Date	Description
—	12 July 2013	Initial release



Measurement of RF Emissions from a Keypad transceiver, Model No. RCSE-01

1. INTRODUCTION

1.1. Scope of Tests

This report presents the results of the RF emissions measurements performed on a Keypad transceiver, Model No. RCSE-01, Serial No. E10024, (hereinafter referred to as the Equipment Under Test (EUT)). The EUT was designed to transmit between 2411 to 2455MHz using an internal antenna. The EUT was manufactured and submitted for testing by Turning Technologies, LLC. located in Youngstown, Ohio.

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 15.249 for Intentional Radiators. Testing was performed in accordance with ANSI C63.4-2009.

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 23°C and the relative humidity was 40%.

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 2012
- ANSI C63.4-2009, "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 3, December 2010
- Industry Canada Radio Standards Specification, RSS-210, "Low-power License-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment", Issue 8, December 2010

3. EUT SETUP AND OPERATION

3.1. General Description

The EUT is a Turning Technologies, LLC., Keypad transceiver, Model No. RCSE-01. A block diagram of the EUT setup is shown as Figure 1.



3.1.1.Power Input

The EUT obtained 3.3VDC power from a coin battery.

3.1.2.Peripheral Equipment

No peripheral equipment required for the EUT to operate properly.

3.1.3.Signal Input/Output Leads

No signal input or output leads are required for the EUT to properly.

3.1.4.Grounding

The EUT was ungrounded during testing.

3.1.5. Software and Firmware Versions

The EUT was loaded with RCSE01 0.5 firmware during testing. The EUT used KEIL PK51 software during testing.

3.2. Operational Mode

The EUT was placed on an 80cm high non-conductive stand. The EUT was programmed so that it could transmit or receive continuously. All tests were performed separately with the EUT transmitting at 2411MHz, 2433MHz and 2455MHz.

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 C63.4-2009 for site attenuation.

4.2. Test Instrumentation

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

4.3. Calibration Traceability

Test equipment is maintained and calibrated on a regular basis. All calibrations are traceable to the National Institute of Standards and Technology (NIST).

4.4. Measurement Uncertainty

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

The measurement uncertainty for these tests is presented below:

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

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

5. TEST PROCEDURES

5.1. Powerline Conducted Emissions

5.1.1. Requirements

Since the EUT was powered by internal batteries and does not connect to AC, no conducted emissions tests were required.

5.2. Duty Cycle Factor Measurements

5.2.1. 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. With the transmitter set up to transmit for maximum pulse density, the time domain trace is displayed on the spectrum analyzer. This trace is obtained by tuning center frequency to the transmitter frequency and then setting a zero span width with 100usec/div. The amplitude settings are adjusted so that the on/off transitions clear the 4th division from the bottom of the display. The markers are set at the beginning and end of a word period. The sweep time was then increased to 10msec to show the worst case time between each pulse. The duty cycle is then computed as the On-time/(On-time + Off-time).

5.2.2. Results

The plots of the duty cycle are shown on data pages 14 through 15. The duty cycle factor was computed to be -32.5 dB.

5.3. Radiated Measurements

5.3.1. Requirements

The EUT must comply with the requirements of FCC "Code of Federal Regulations Title 47", Part 15, Subpart C, Section 15.249(a) and Industry Canada RSS-210 Annex 2, Section A2.9. Both standards have the following radiated emission limits:

Fundamental Frequency MHz	Field Intensity mV/m @ 3 meter	Field Strength of Harmonics uV/m @ 3 meter
2400 – 2483.5	50	500

The field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits by more than 20 dB under any condition of modulation.

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits, whichever is the lesser attenuation.

5.3.2. Procedures

All 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. The floor of the chamber is used as the ground plane. The chamber complies with ANSI C63.4-2003 for site attenuation.

A preliminary radiated emissions test was 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 data was then processed by the computer to calculate equivalent field intensity.

The final emission tests were then manually performed over the frequency range of 30MHz to 25GHz. Between 30MHz and 1000MHz, a bilog antenna was used as the pick-up device. A broadband double ridged waveguide antenna was used as the pick-up device for all frequencies above 1GHz. All significant broadband and narrowband signals were measured and recorded.

To ensure that maximum or worst case, emission levels were measured, the following steps were taken:

- 1) The EUT was rotated so that all of its sides were exposed to the receiving antenna.
- 2) Since the measuring antenna is linearly polarized, both horizontal and vertical field components were measured.
- 3) The measuring antenna was raised and lowered from 1 to 4 meters for each antenna polarization to maximize the readings.
- 4) For hand-held or body-worn devices, the EUT was rotated through three orthogonal axes to determine which orientation produces the highest emission relative to the limit.
- 5) In some instances, it was necessary to use a shortened cable between the measuring antenna and the spectrum analyzer and the antenna could not be raised to 4 meters. The measuring antenna was raised and lowered as much as the cable would allow and the EUT is rotated through all axes to ensure the maximum readings are recorded. See attached Figure 2.

5.3.3.Results

The preliminary plots, with the EUT transmitting at 2411MHz, 2433MHz and 2455MHz are presented on pages 16 through 39. The plots are presented for a reference only, and are not used to determine compliance. The final radiated levels are presented on pages 40 through 45. As can be seen from the data, all emissions measured from the EUT were within the specification limits.

5.4. Bandedge Compliance

5.4.1.Requirement

In accordance with FCC "Code of Federal Regulations Title 47", Part 15, Subpart C, Section 15.249, emissions outside of the specified frequency bands shall be below the general radiated emissions limits of 15.209. Therefore the radiated emissions at the band edges (2400MHz and 2483.5MHz) must meet the general limits of 15.209.

In accordance with Industry Canada RSS-210 Annex 2, Section A2.9(b), emissions outside of the specified frequency bands shall be below the general radiated emissions limits of RSS-210 Annex 2, Section A2.9(a). Therefore the radiated emissions at the band edges (2400MHz and 2483.5MHz) must meet the general limits of Annex 2 Section A2.9.

5.4.2.Procedures

Low Band Edge

- 1) The EUT was set up 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. The maximum peak meter readings were recorded and compared to the peak general limit.



- 4) The maximum peak meter readings were corrected by applying the duty cycle correction factor and compared to average general limit.

High Band Edge

- 1) The EUT was set up 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. The maximum peak meter readings were recorded and compared to the peak general limit.
- 4) The maximum peak meter readings were corrected by applying the duty cycle correction factor and compared to average general limit.

5.4.3.Results

Pages 46 through 49 show the radiated band-edge compliance results. As can be seen from these data pages, the radiated emissions at the low end band edge and the high end band edge are within the general limits. The 99% bandwidth was measured to be 893.7.4kHz.

6. OTHER TEST CONDITIONS

6.1. Test Personnel and Witnesses

All tests were performed by qualified personnel from Elite Electronic Engineering Incorporated. The test series was witnessed by Turning Technologies, LLC. personnel.

6.2. Disposition of the EUT

The EUT and all associated equipment were returned to Turning Technologies, LLC. upon completion of the tests.

7. CONCLUSIONS

It was determined that the Turning Technologies, LLC. Keypad transceiver, Model No. RCSE-01, Serial No. E10024, did fully meet the conducted and radiated emission requirements of the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart C, Section 15.205 et seq. for Intentional Radiators, when tested per ANSI C63.4-2009.

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 as operated by Turning Technologies, LLC. personnel. 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 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	3/8/2013	3/8/2014
APW3	PREAMPLIFIER	PLANAR ELECTRONICS	PE2-35-120-5R0-10-12	PL2924	1GHZ-20GHZ	8/22/2012	8/22/2013
CDX4	COMPUTER	ELITE CUSTOM	WINDOW 7 PRO			NOTE 1	
CDY0	WORKSTATION	ELITE	WORKSTATION			N/A	
CMA1	Controllers	EMCO	2090	9701-1213	---	N/A	
MDA0	MULTIMETER (R. KING)	FLUKE CORPORATION	26	72120781	I;VDC;VAC;R	3/18/2013	3/18/2014
NHG0	STANDARD GAIN HORN ANTENNA	NARDA	638	---	18-26.5GHZ	NOTE 1	
NTA2	BILOG ANTENNA	TESEQ	6112D	28040	25-1000MHz	7/30/2012	7/30/2013
NWQ2	DOUBLE RIDGED WAVEGUIDE ANTENNA	ETS LINDGREN	3117	66659	1GHZ-18GHZ	3/18/2013	3/18/2014
RAKG	RF SECTION	HEWLETT PACKARD	85462A	3549A00284	0.009-6500MHZ	3/20/2013	3/20/2014
RAKH	RF FILTER SECTION	HEWLETT PACKARD	85460A	3448A00324	---	3/12/2013	3/12/2014
RBB0	EMI TEST RECEIVER 20HZ TO 40 GHZ.	ROHDE & SCHWARZ	ESIB40	100250	20 HZ TO 40GHZ	3/7/2013	3/7/2014
WKA1	SOFTWARE, UNIVERSAL RCV EMI	ELITE	UNIV_RCV_EMI	1	---	I/O	
XOB2	ADAPTER	HEWLETT PACKARD	K281C,012	09407	18-26.5GHZ	NOTE 1	
XPR0	HIGH PASS FILTER	K&L MICROWAVE	11SH10-4800/X20000	001	4.8-20GHZ	8/22/2012	8/22/2013

I/O: Initial Only

N/A: Not Applicable

Note 1: For the purpose of this test, the equipment was calibrated over the specified frequency range, pulse rate, or modulation prior to the test or monitored by a calibrated instrument.

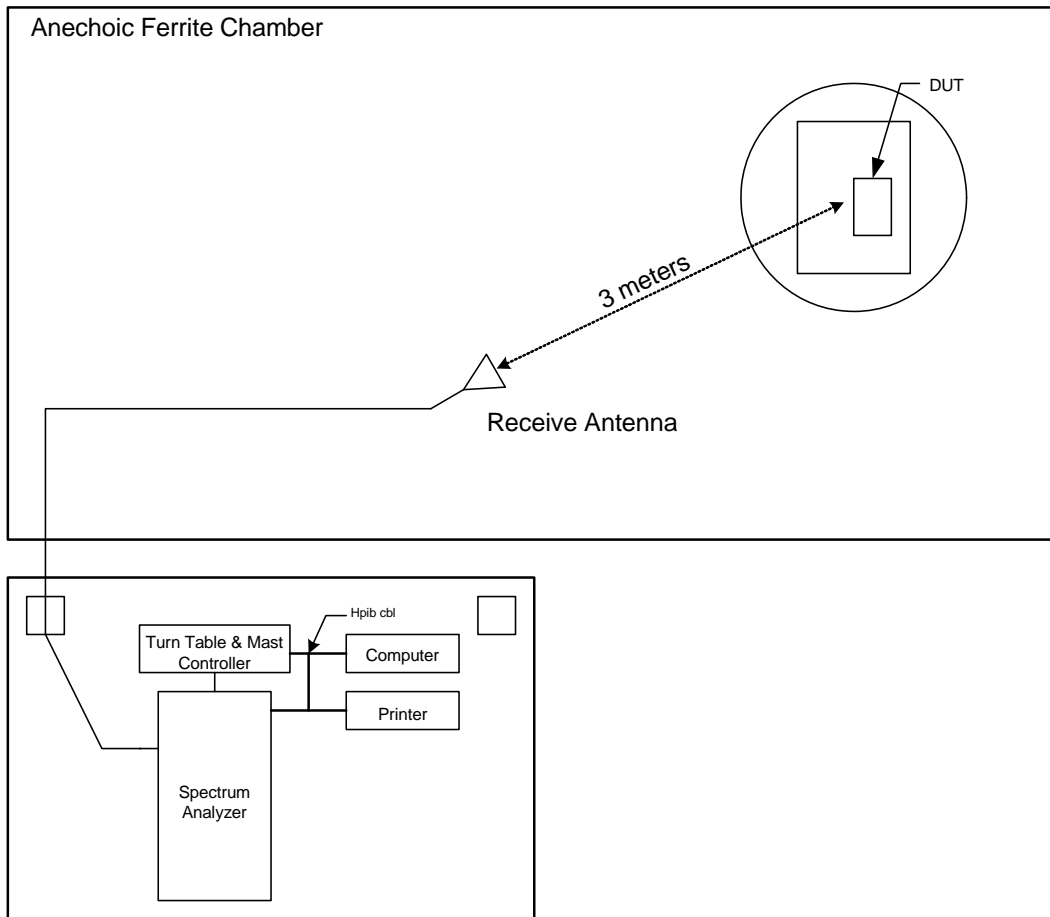


FIGURE 1 BLOCKDIAGRAM OF TEST SETUP

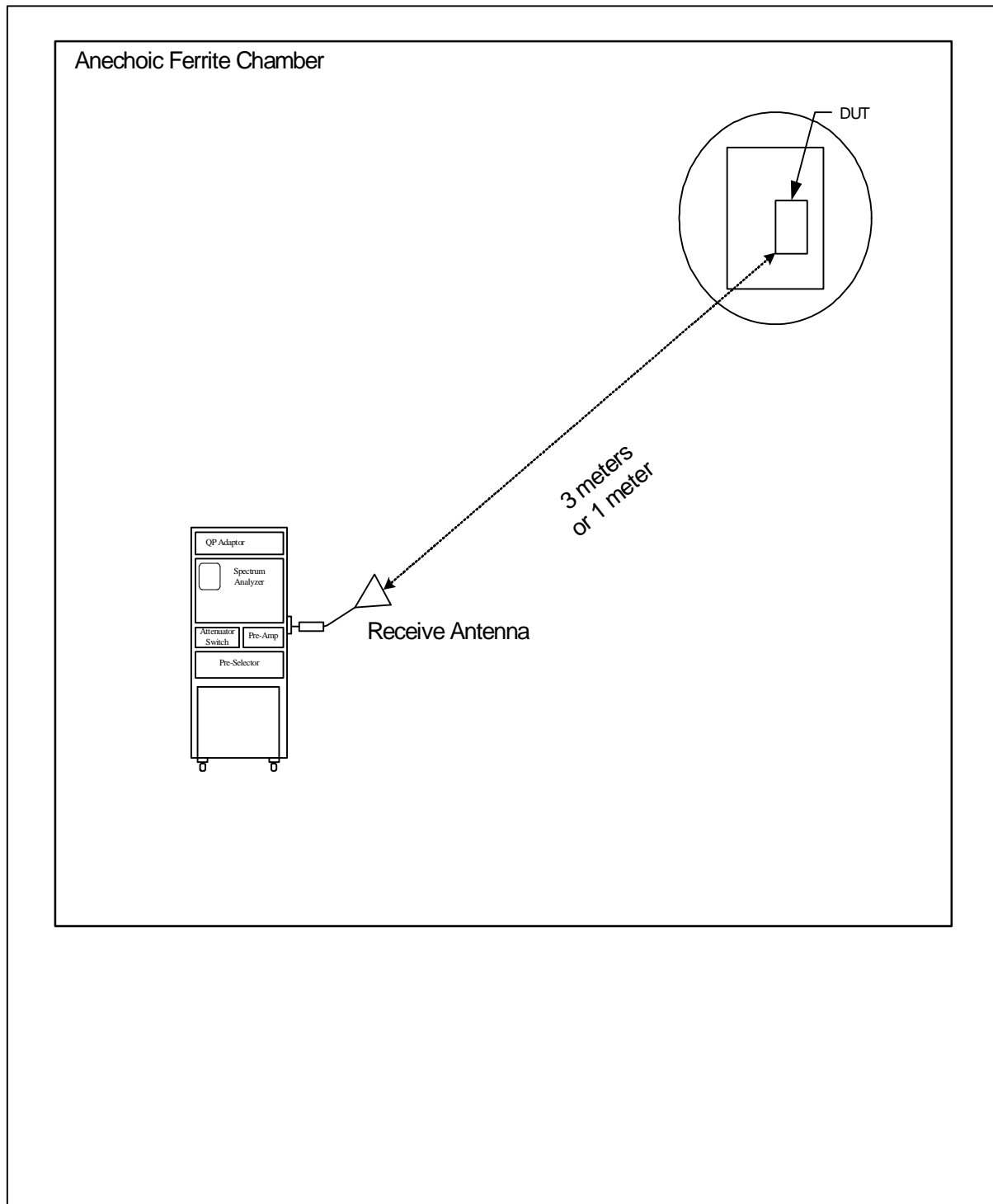
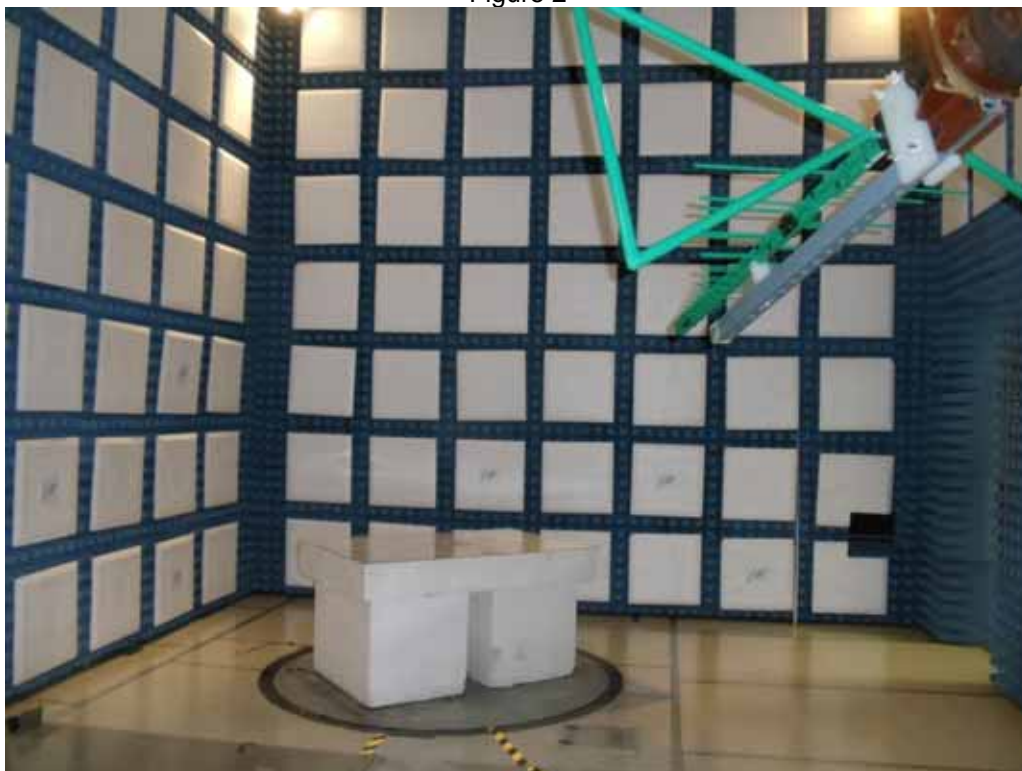


Figure 2



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

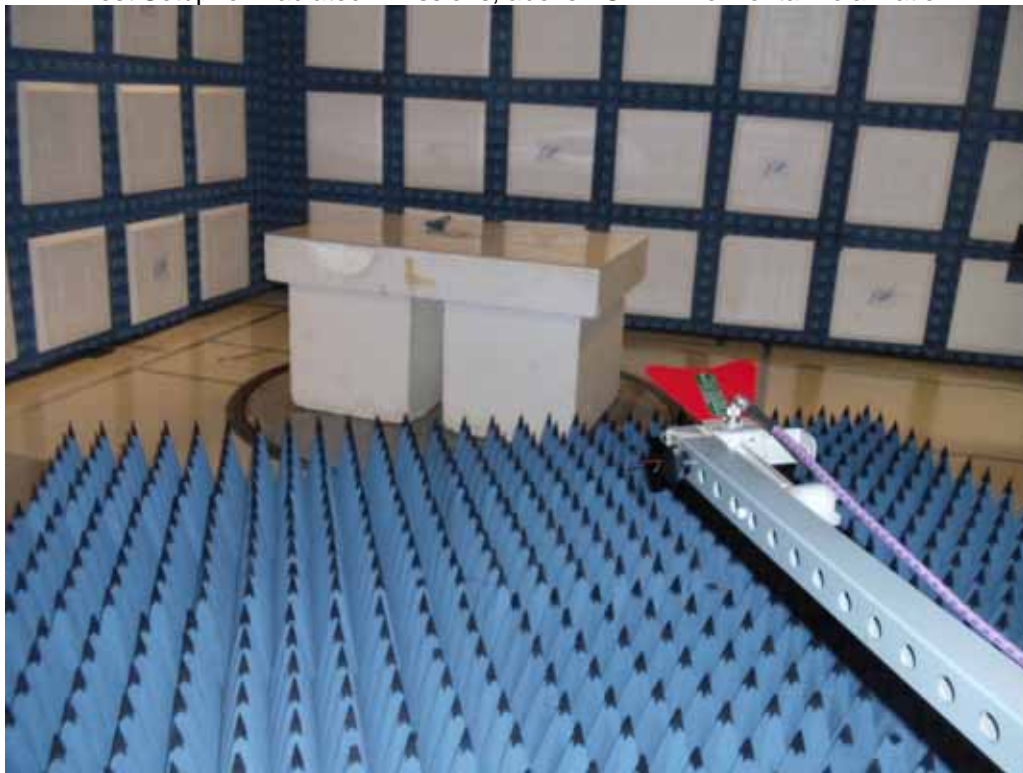


Test Setup for Radiated Emissions, 30MHz to 1GHz – Vertical Polarization

Figure 4



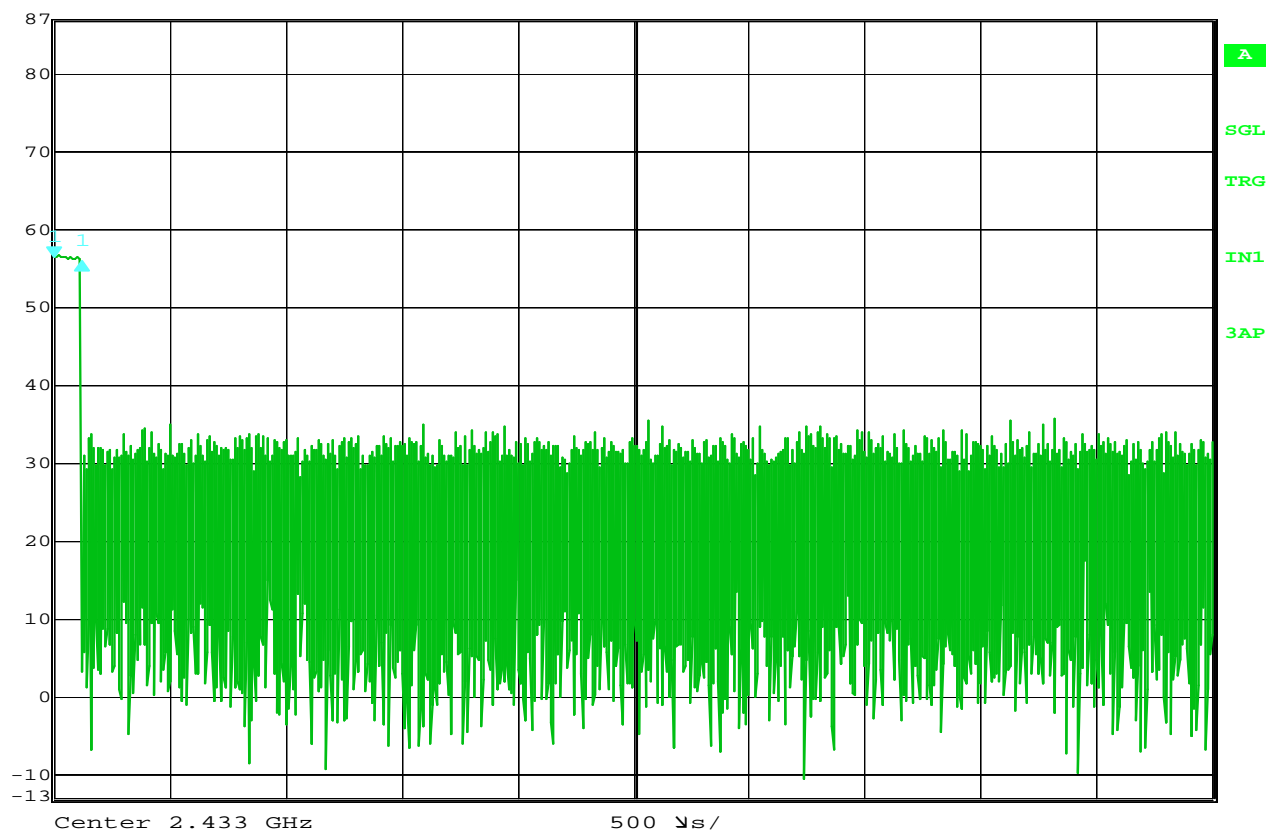
Test Setup for Radiated Emissions, above 1GHz – Horizontal Polarization



Test Setup for Radiated Emissions, above 1GHz – Vertical Polarization



Delta 1 [T3] RBW 1 MHz RF Att 10 dB
Ref Lvl -0.41 dB VBW 10 MHz
87 dB μ V 120.240481 μ s SWT 5 ms Unit dB μ V



Date: 1.JUL.2013 10:05:11

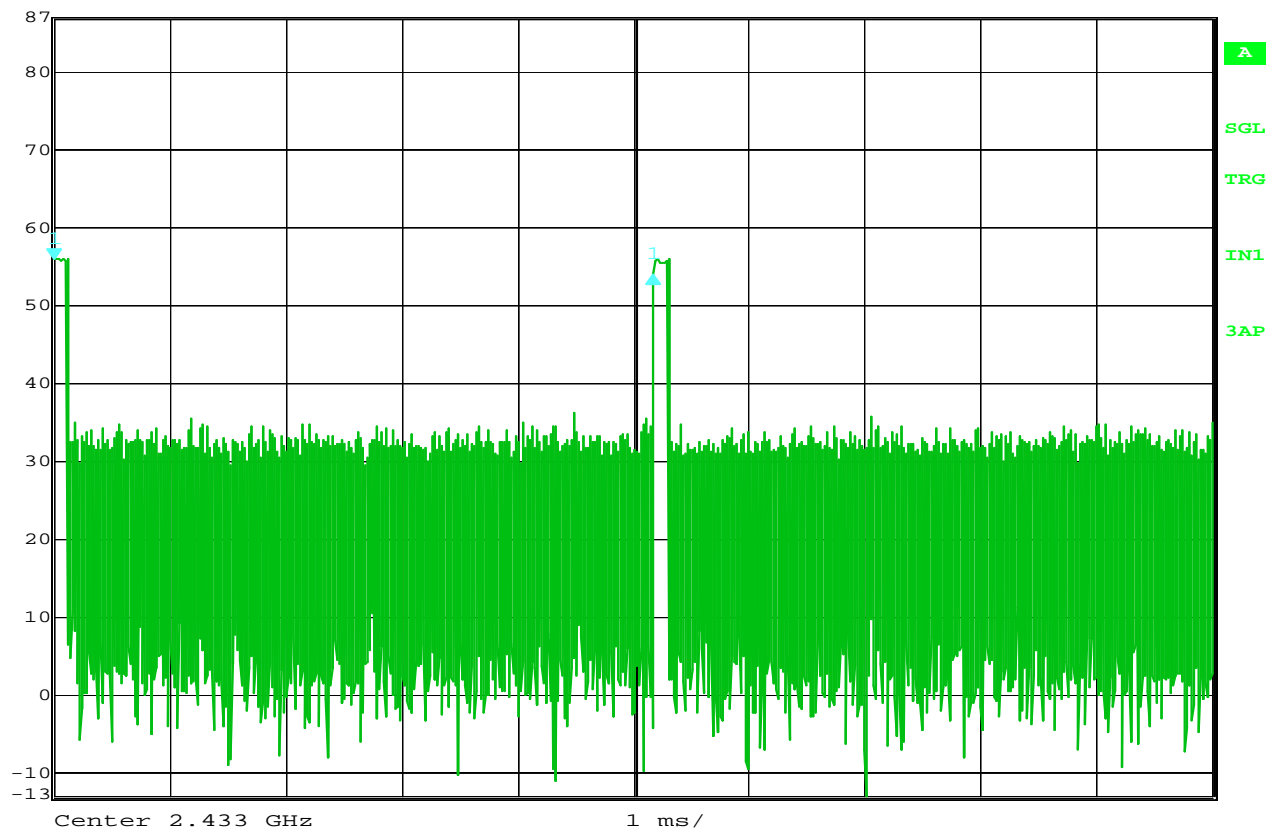
FCC 15.35 Duty Cycle Correction Factor

MANUFACTURER : Turning Technologies
MODEL NUMBER : RCSE-01
SERIAL NUMBER :
TEST MODE : Tx @ 2433MHz
TEST DATE : July 1, 2013
TEST PARAMETER : Pulse width = 120.24 μ s

NOTES



Delta 1 [T3] RBW 1 MHz RF Att 10 dB
Ref Lvl -2.05 dB VBW 10 MHz
87 dB μ V 5.170341 ms SWT 10 ms Unit dB μ V



Date: 1.JUL.2013 10:11:49

FCC 15.35 Duty Cycle Correction Factor

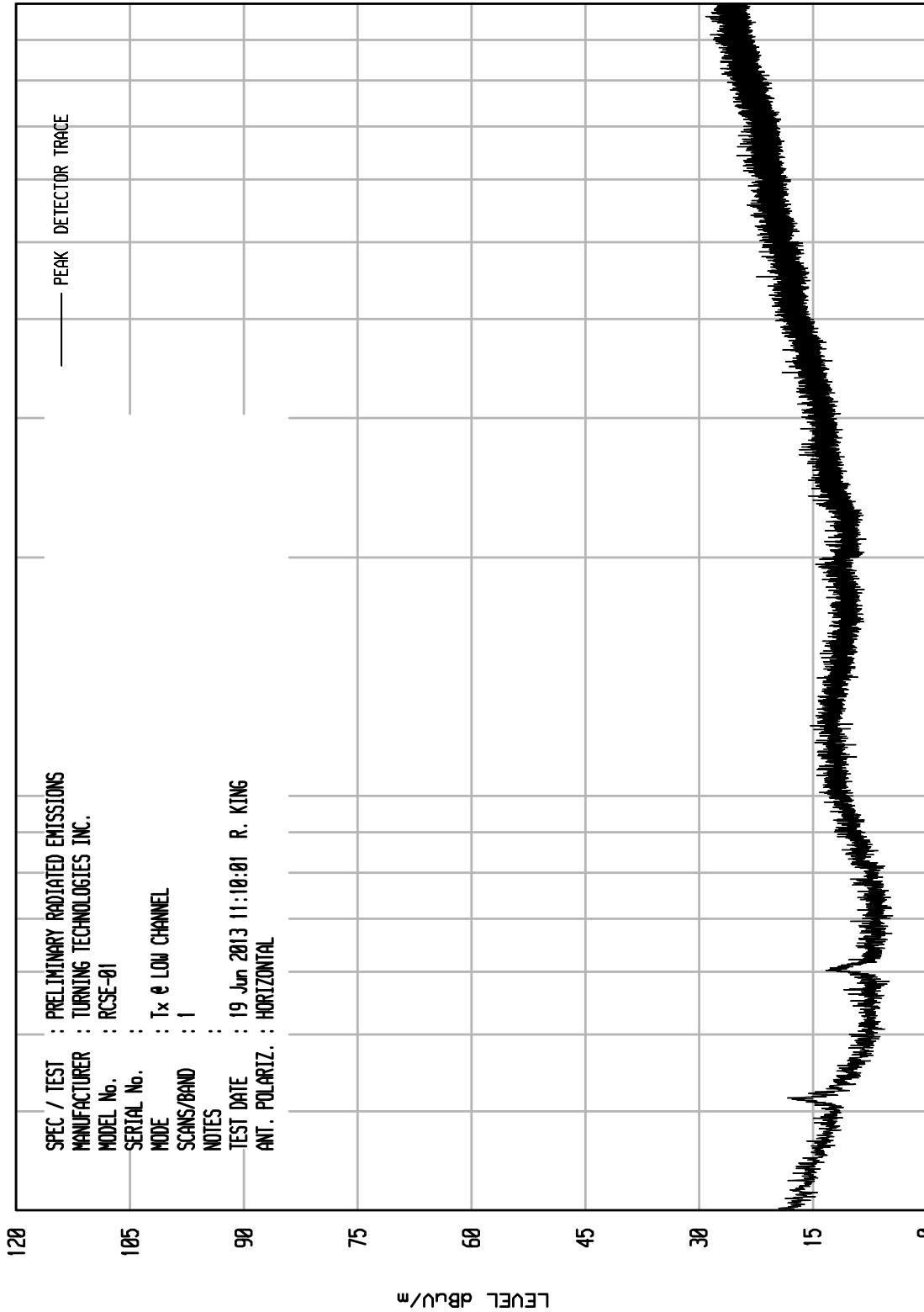
MANUFACTURER : Turning Technologies
MODEL NUMBER : RCSE-01
SERIAL NUMBER :
TEST MODE : Tx @ 2433MHz
TEST DATE : July 1, 2013
TEST PARAMETER : Pulse width = 120.24 μ S
: Word = 5.1 mS
: $20 * \log (120.24\mu\text{S}/5.1\text{mS})$
: = -32.5 dB

NOTES

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515

UKA1 04/24/13

UNTU RCU ENI RUN 26



START = 30

100

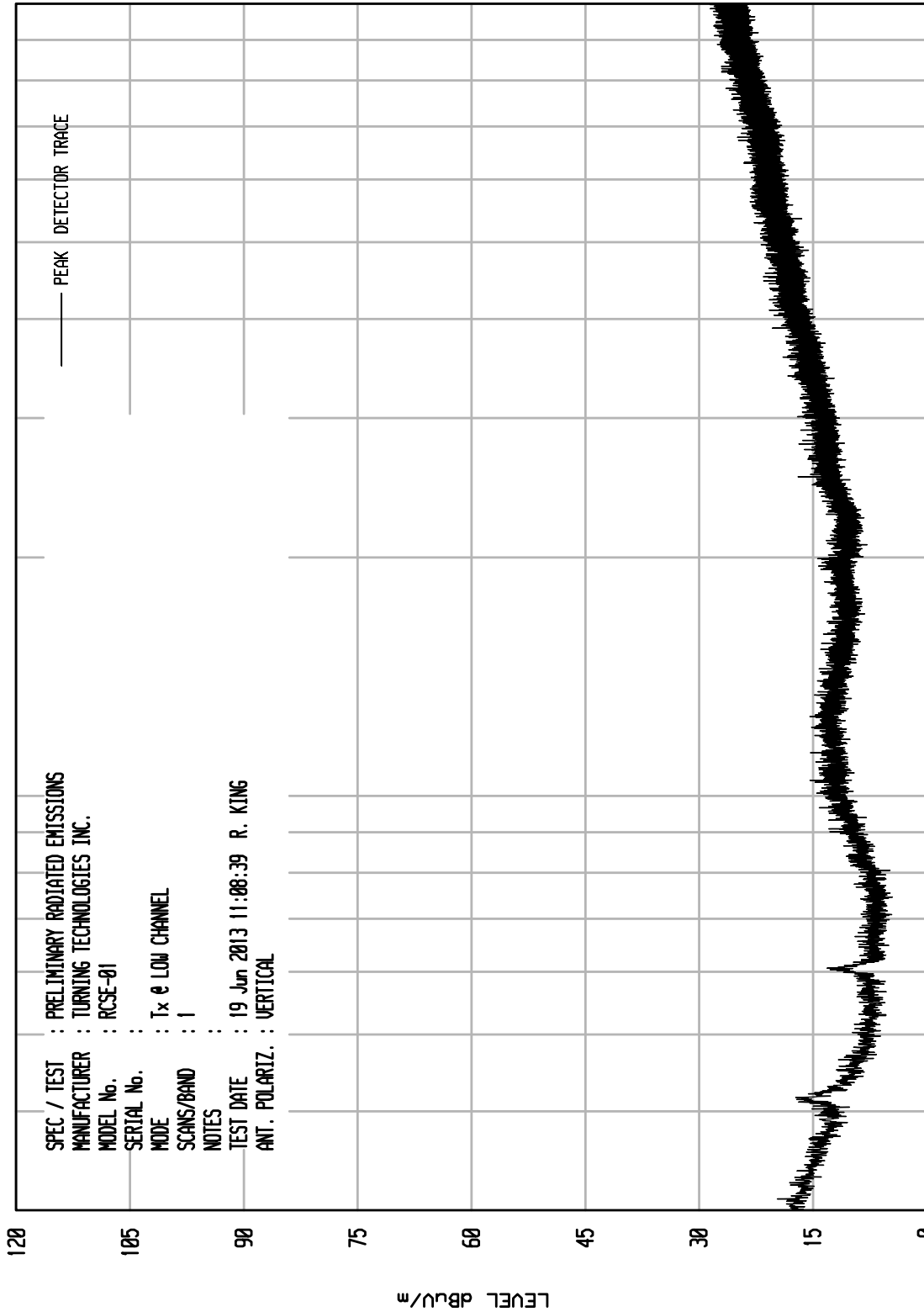
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ELITE ELECTRONIC ENGINEERING Inc.
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UKA1 04/24/13

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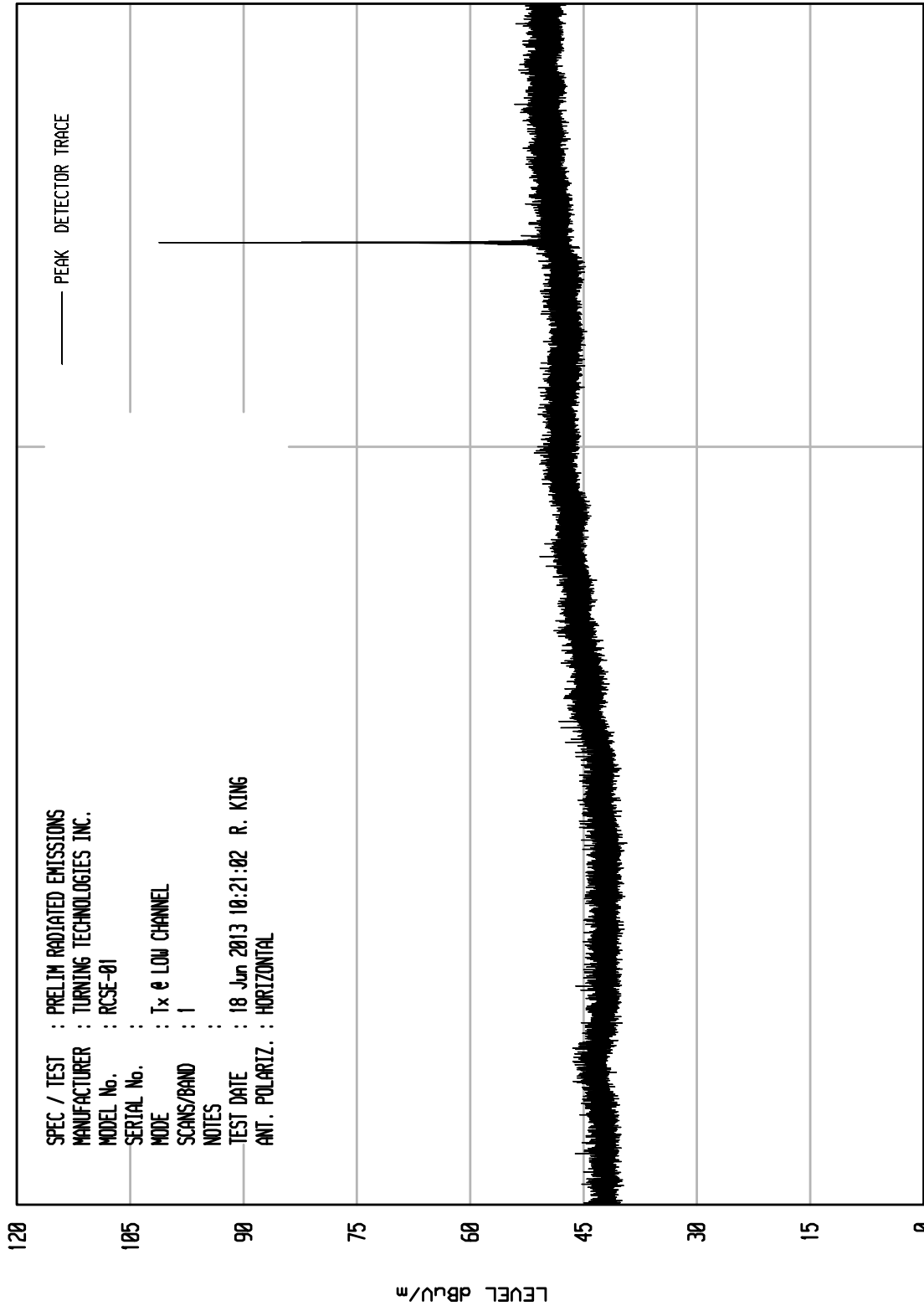
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SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : TURNING TECHNOLOGIES INC.
MODEL No. : RCSE-01
SERIAL No. :
MODE : Tx @ LOW CHANNEL
SCANS/BAND : 1
NOTES :
TEST DATE : 19 Jun 2013 11:08:39 R. KING
ANT. POLARIZ. : VERTICAL

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515

UKA1 04/24/13

UNITU RCU ENI RUN 5



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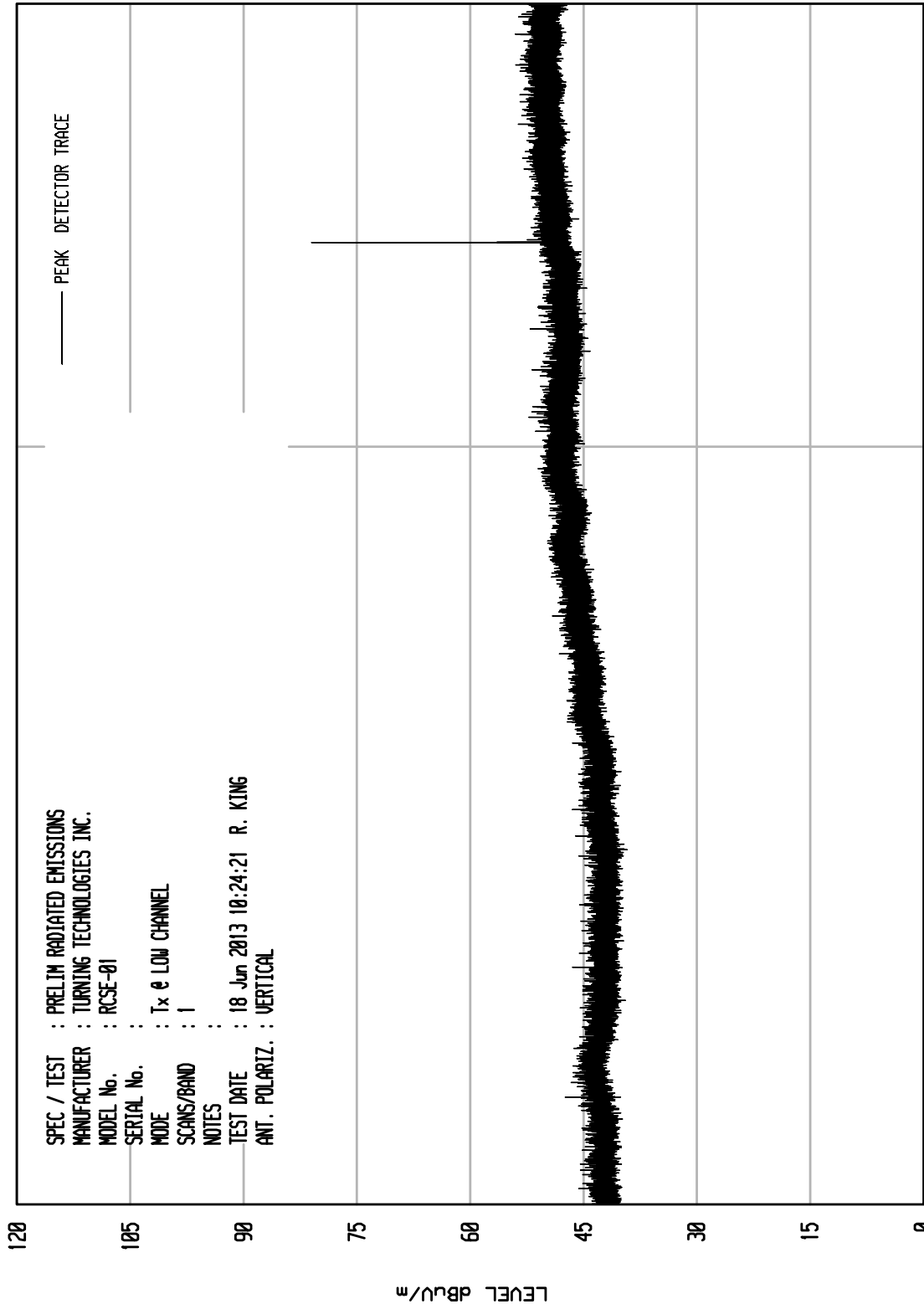
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ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515

UNIT: RCU ENI RUN 7

UKA1 04/24/13



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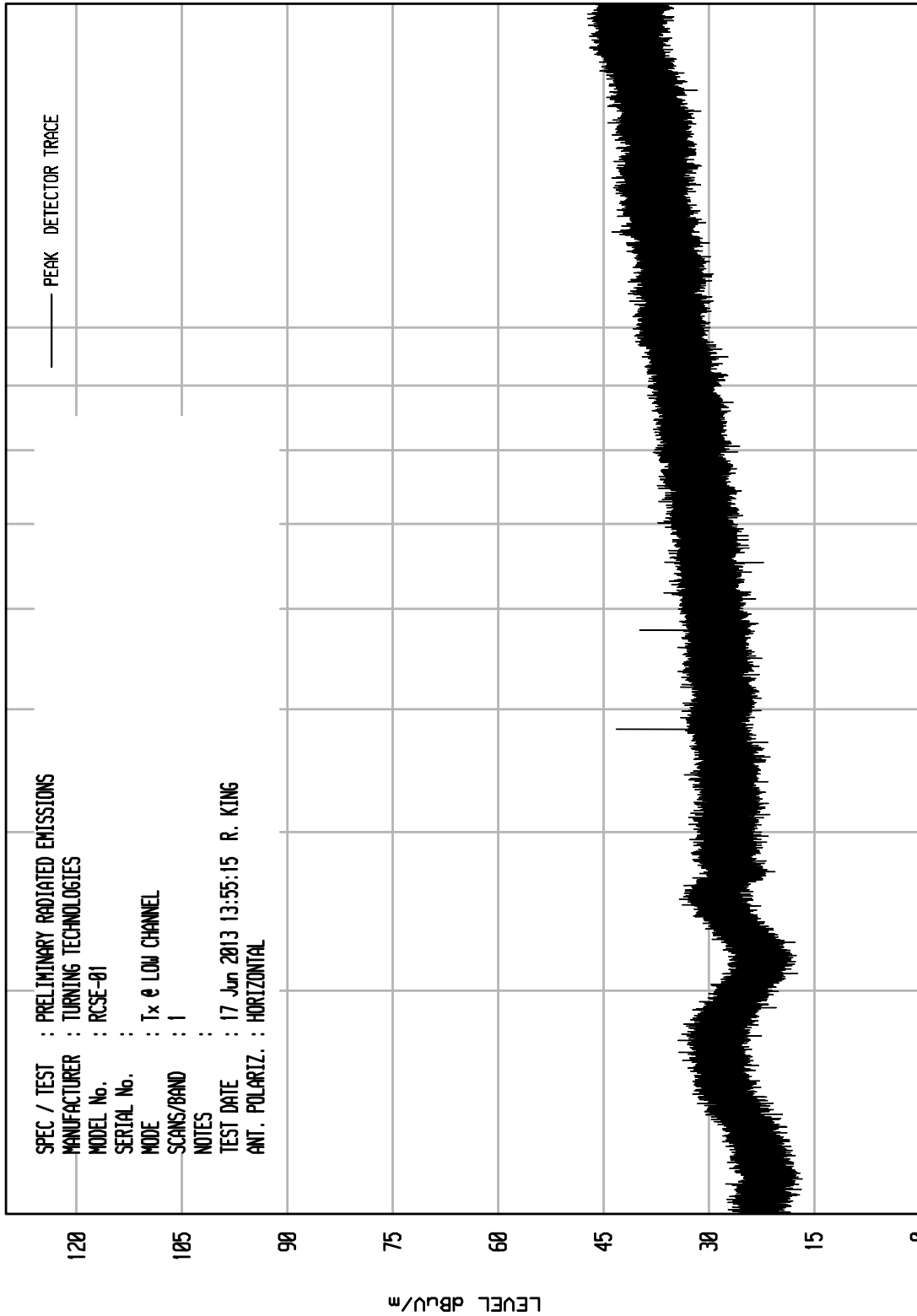
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ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515

UKA1 04/24/13

UNIT: RCU ENI RUN 2



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FREQUENCY MHz

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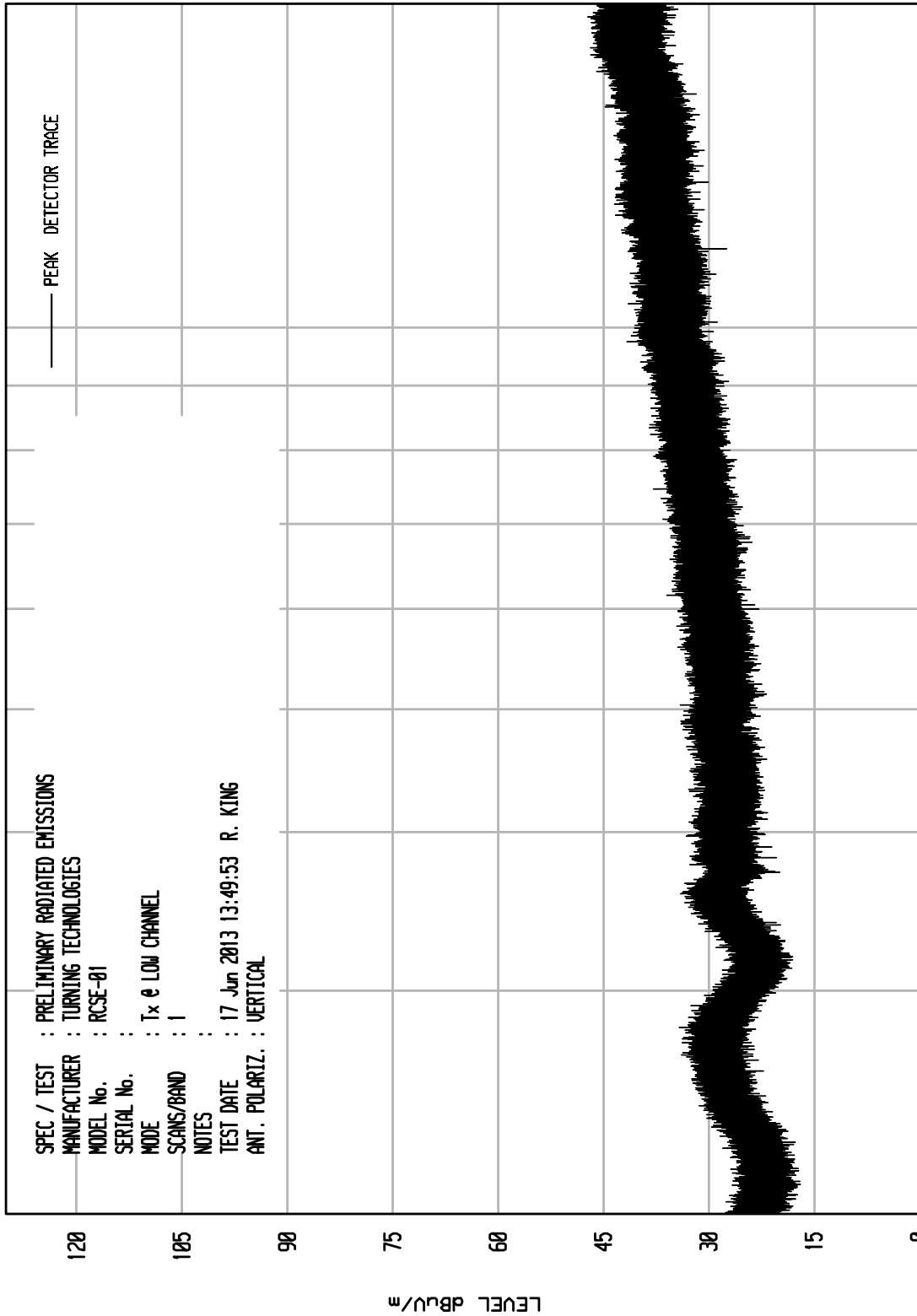
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ELITE ELECTRONIC ENGINEERING Inc.

Downers Grove, Ill. 60515

UKA1 04/24/13

UNIT: RCU ENI RUN 1



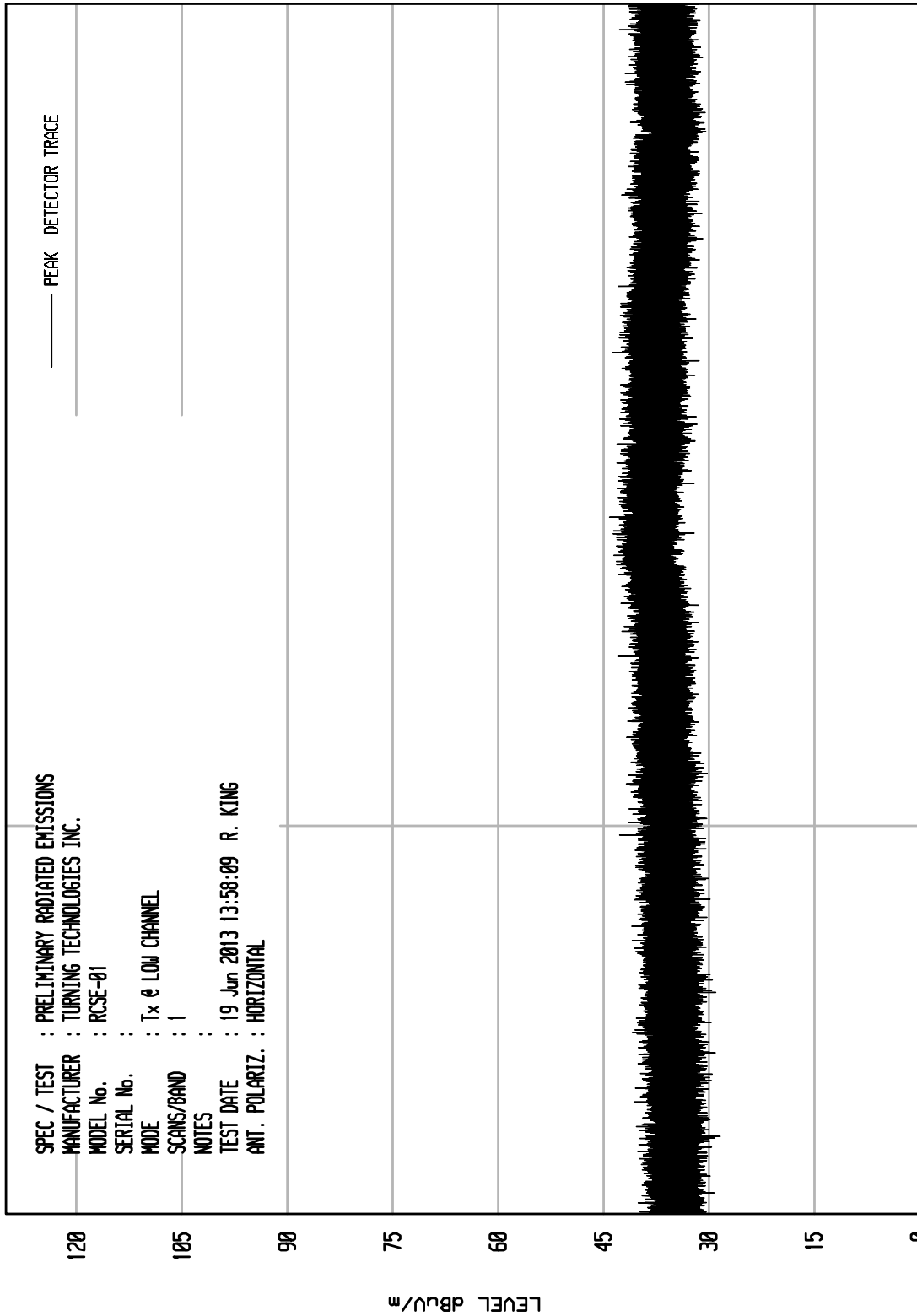
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ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515

UNIT: RCU ENI RUN 2

UKA1 04/26/11



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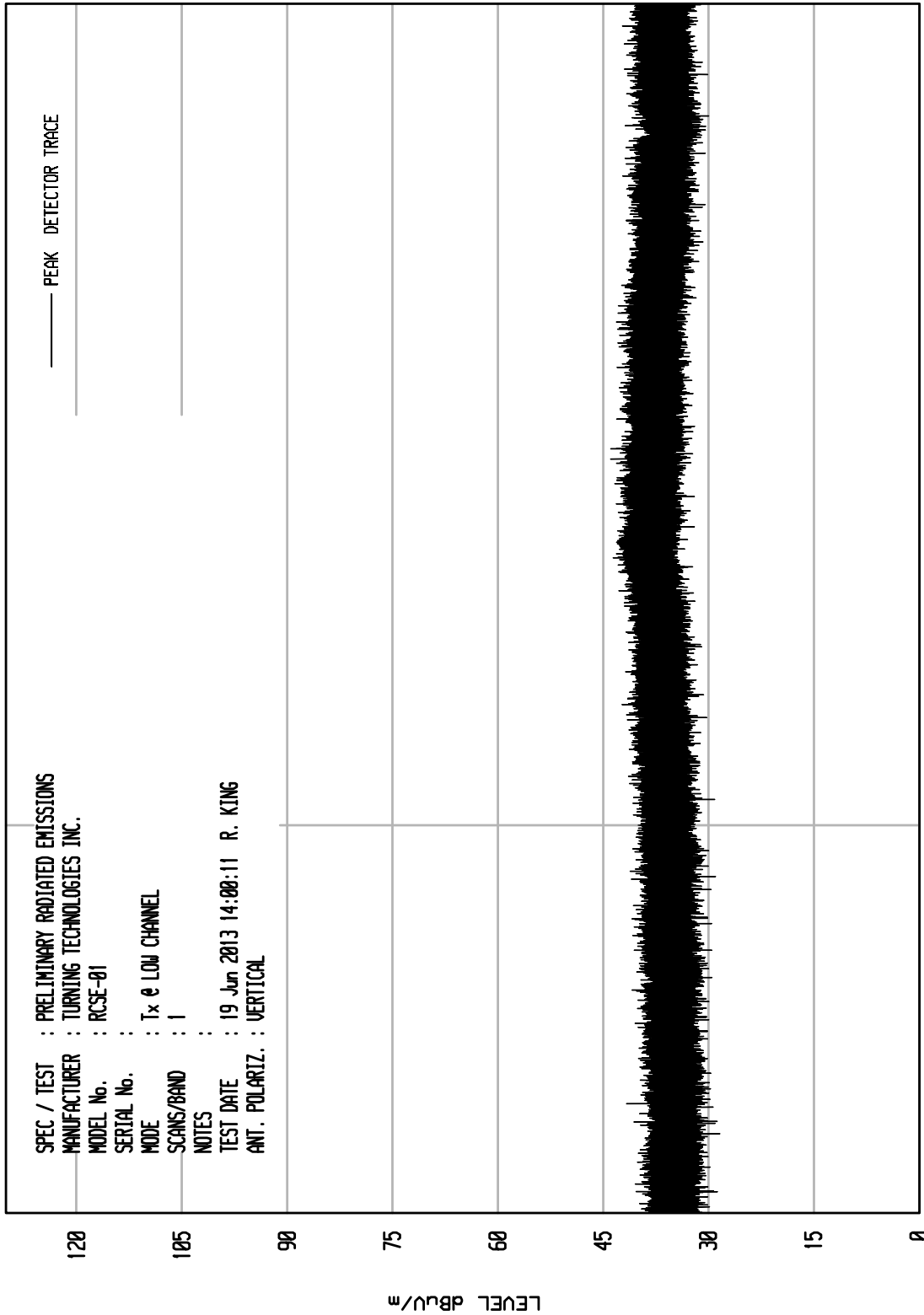
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ELITE ELECTRONIC ENGINEERING Inc.
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UKA1 04/26/11

UNIT: RCU ENI RUN 3



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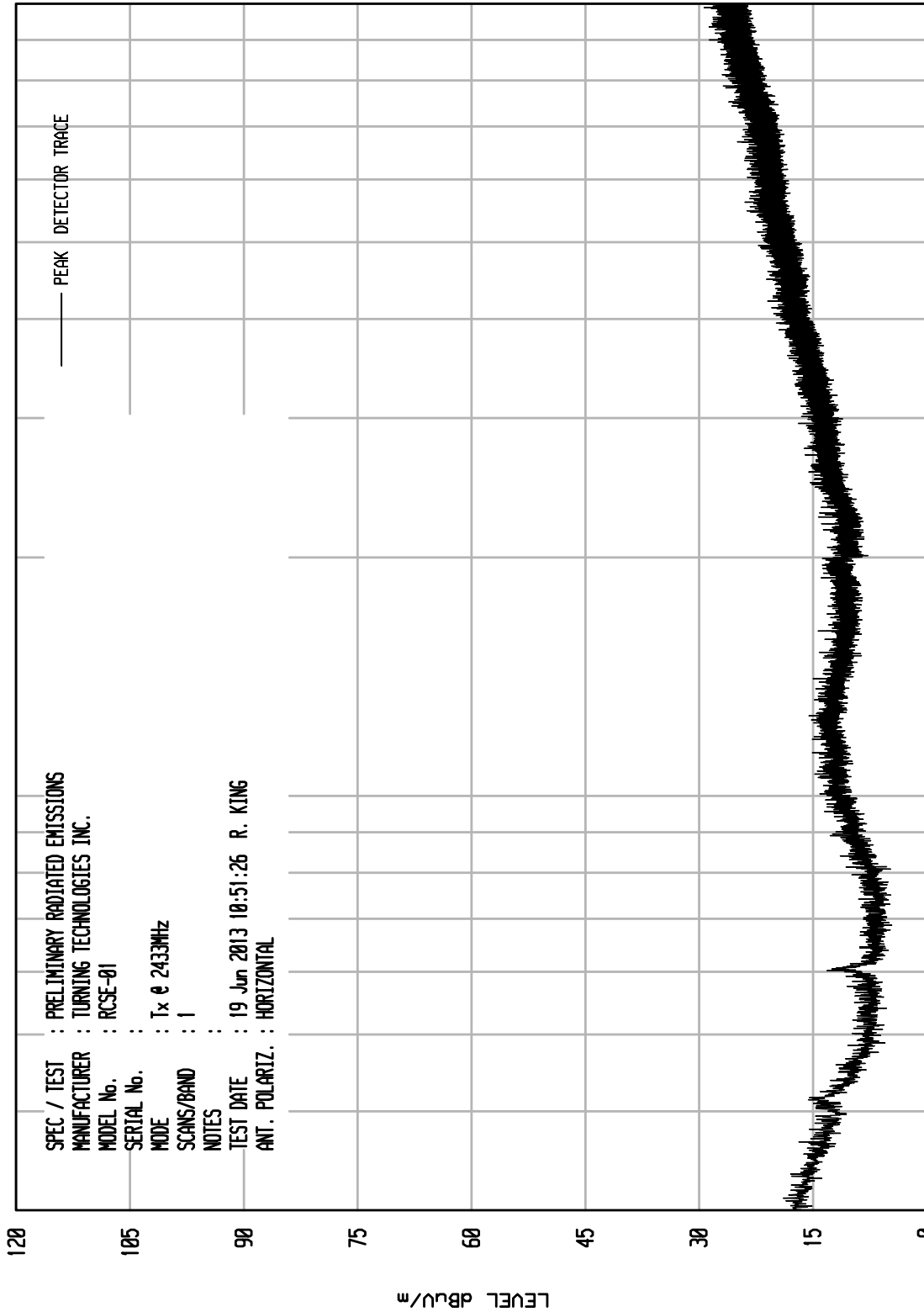
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ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515

UKA1 04/24/13

UNITU RCU ENI RUN 22



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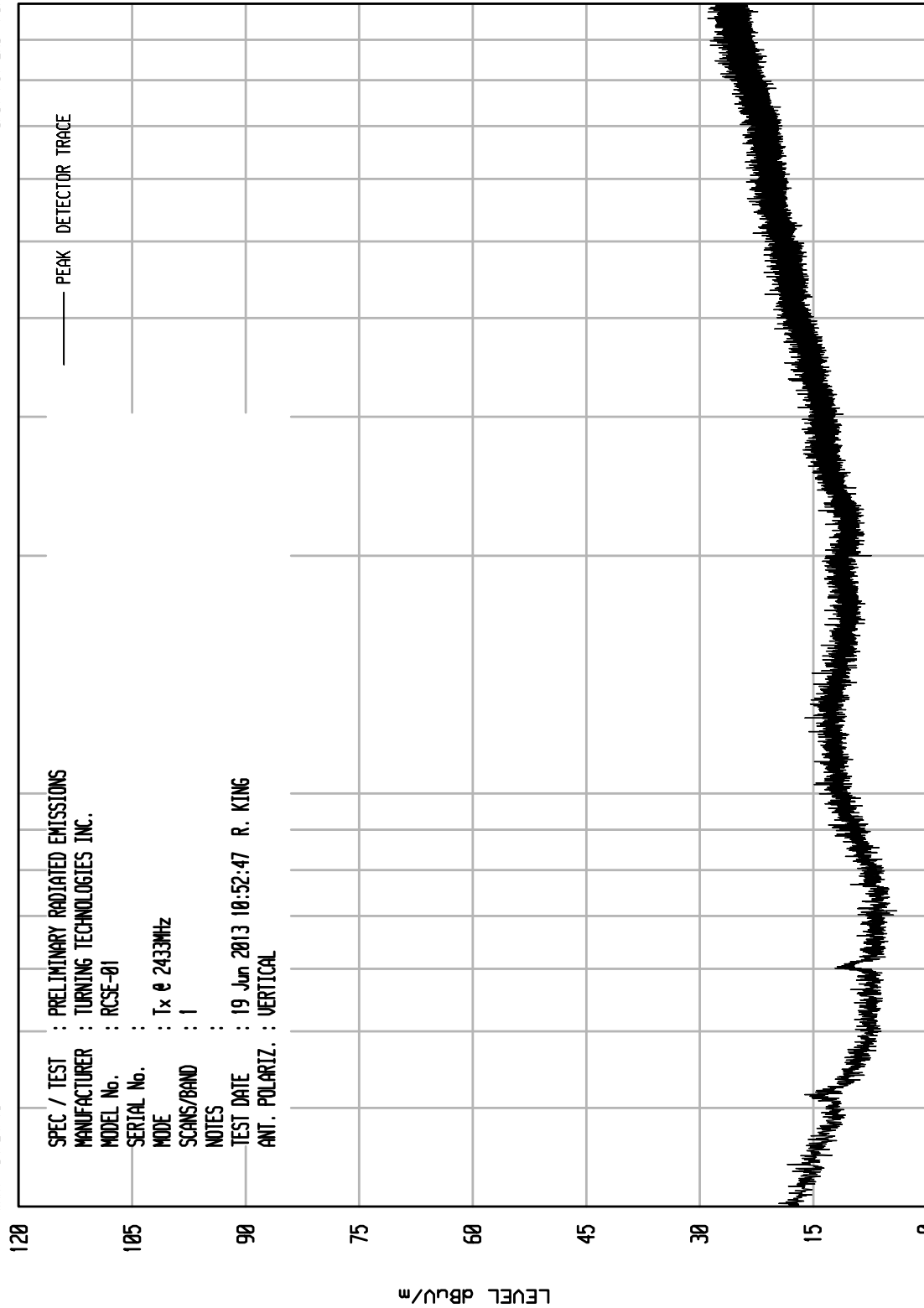
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ELITE ELECTRONIC ENGINEERING INC.
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UKA1 04/24/13

UNTU RCU ENI RUN 23



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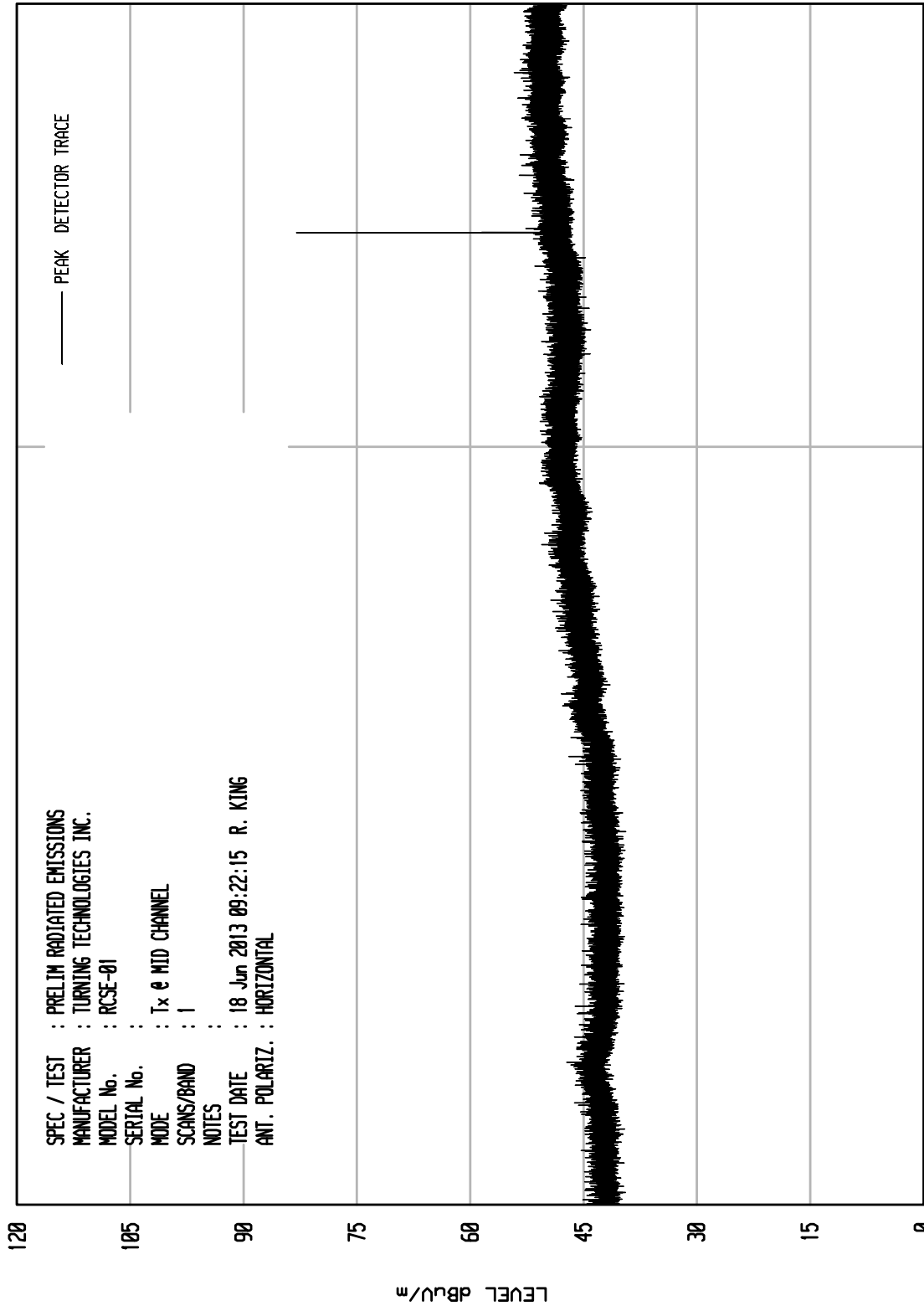
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ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515

UKA1 04/24/13

UNITU RCU ENI RUN 4



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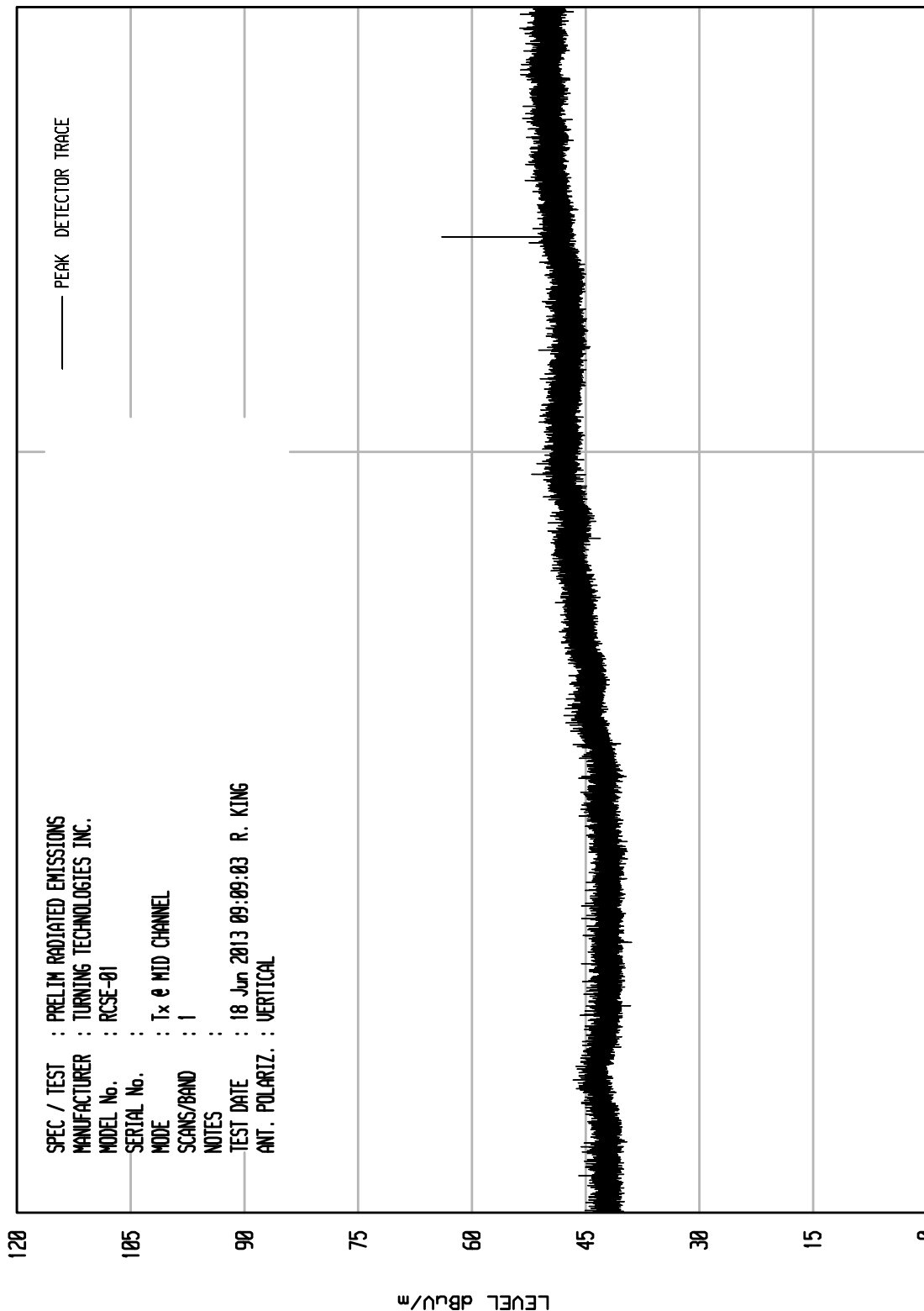
FREQUENCY MHz

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ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515

UKA1 04/24/13

UNITU RCU ENI RUN 3



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FREQUENCY MHz

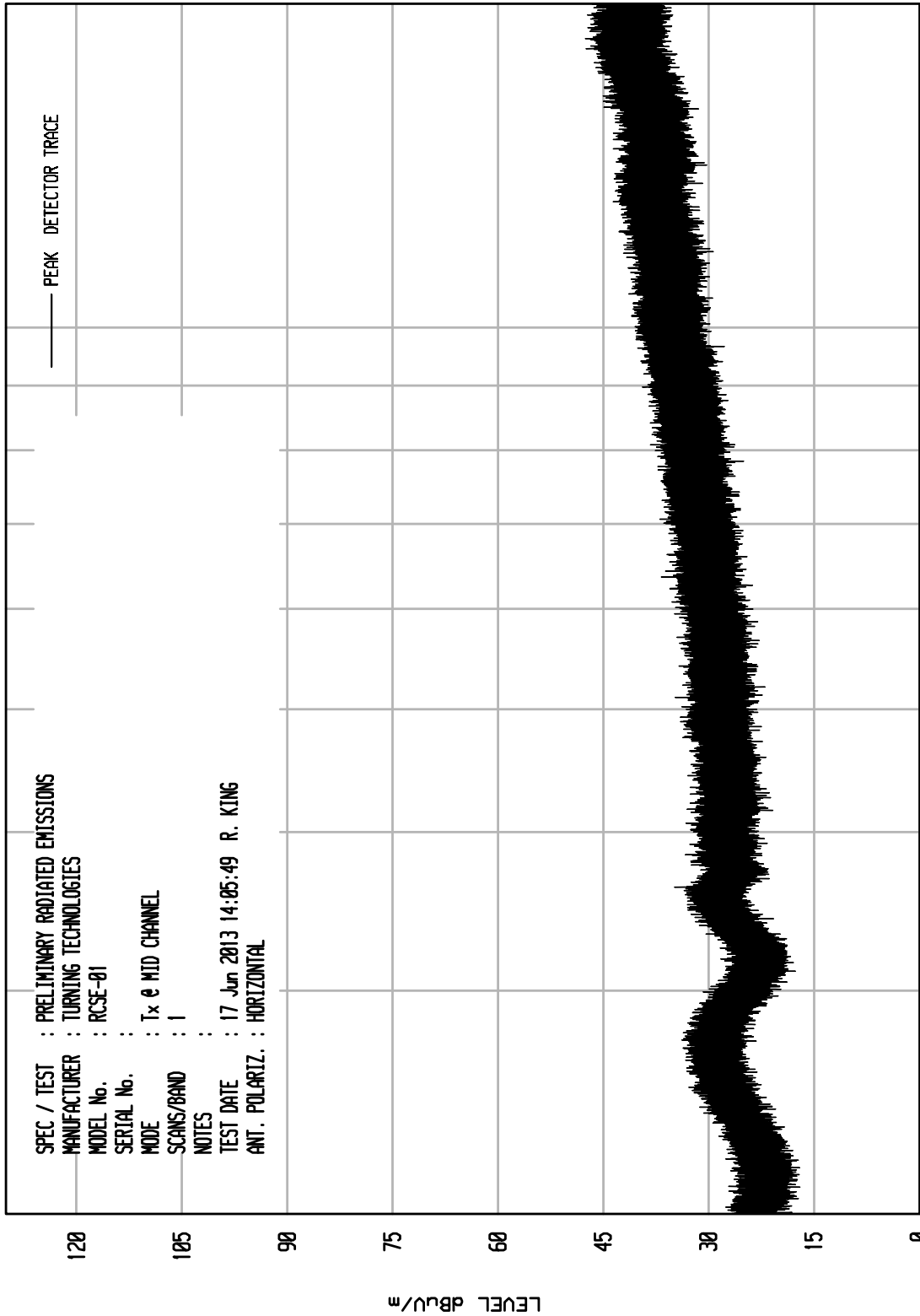
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ELITE ELECTRONIC ENGINEERING Inc.

Downers Grove, Ill. 60515

UKA1 04/24/13

UNIT: RCU ENI RUN 4



START = 2000

FREQUENCY MHz

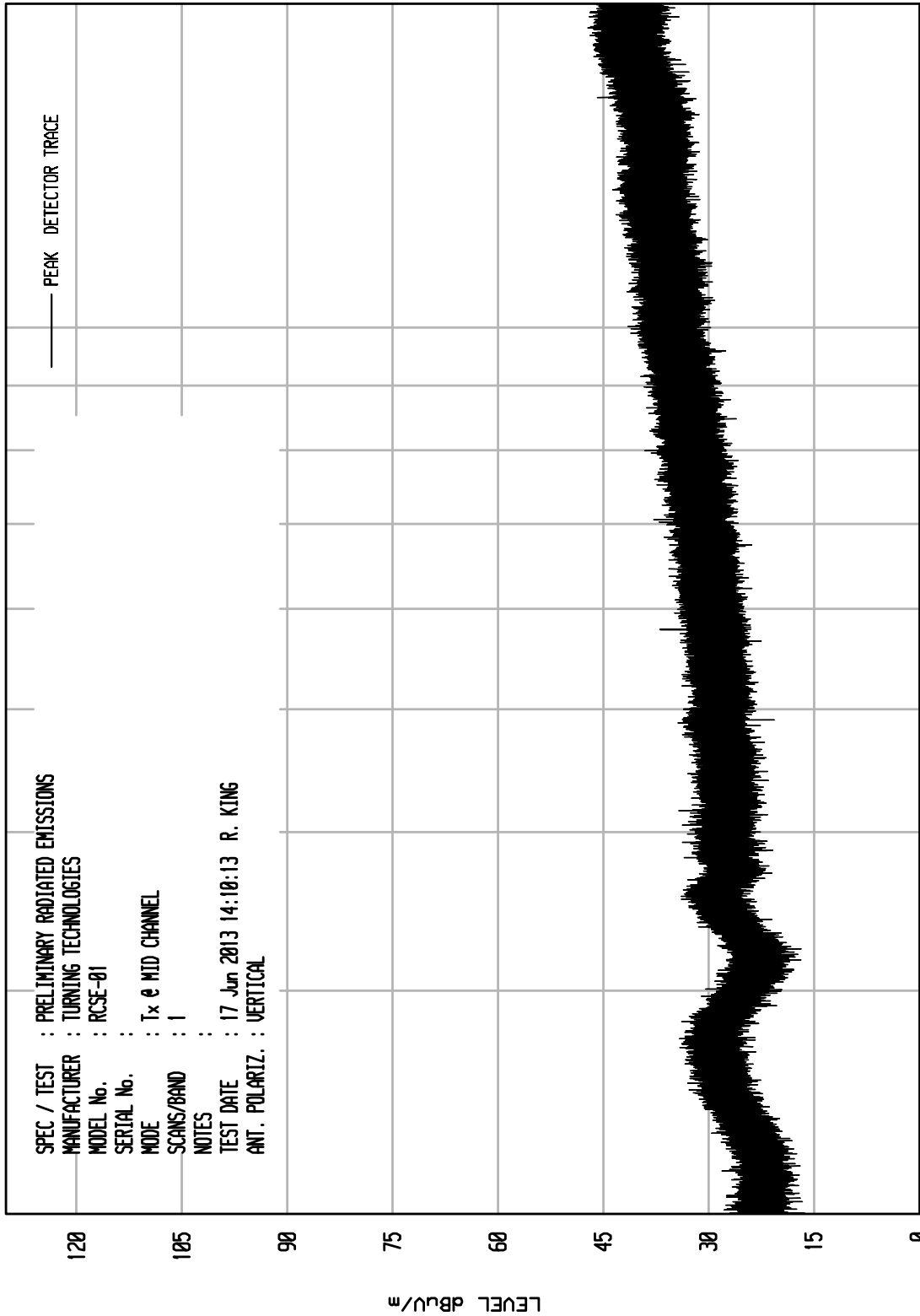
10000

STOP = 18000

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515

UKA1 04/24/13

UNIT: RCU ENI RUN 5



START = 2000

FREQUENCY MHz

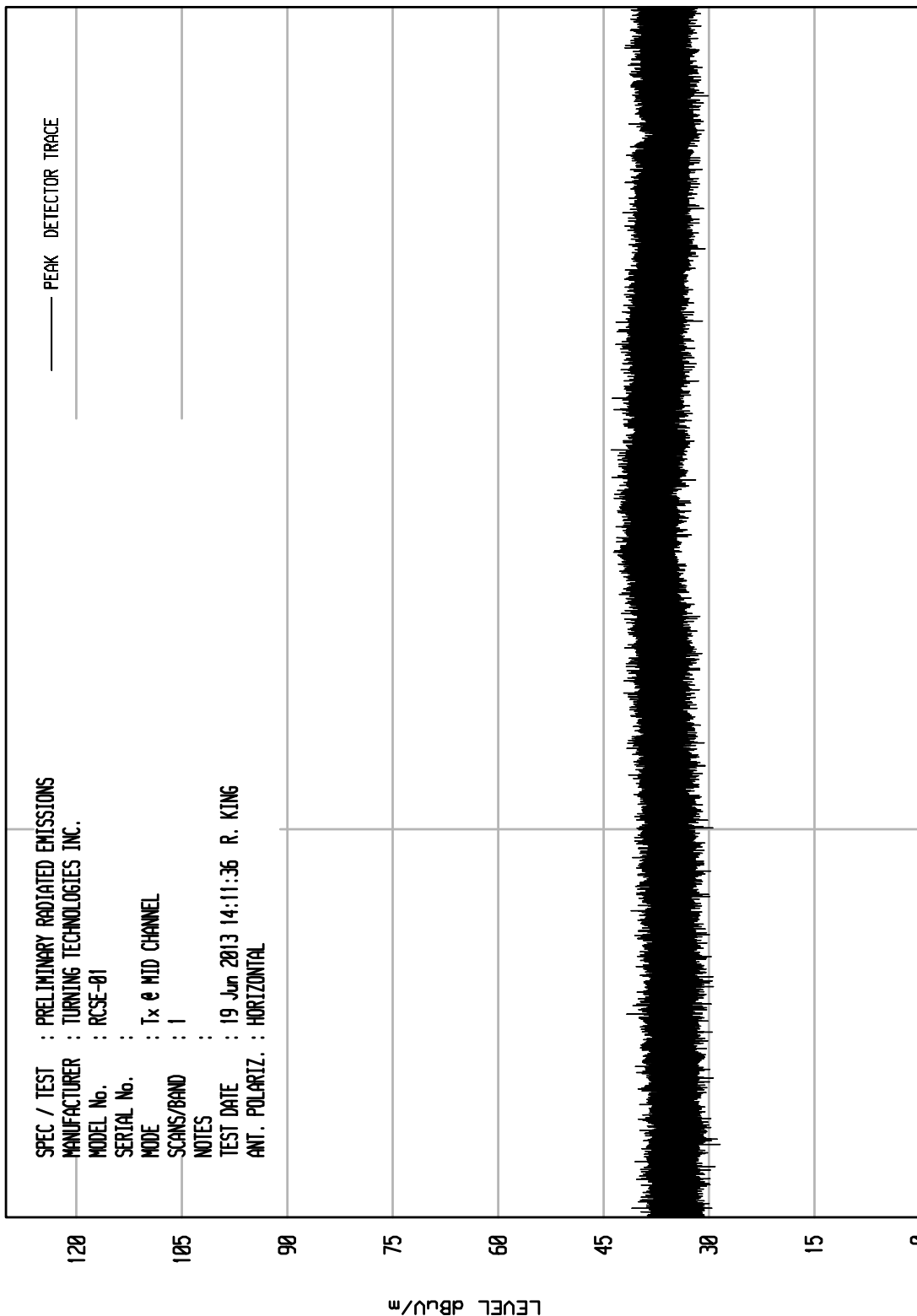
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STOP = 18000

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515

UNIT: RCU ENI RUN 5

UKA1 04/26/11



STOP = 25000

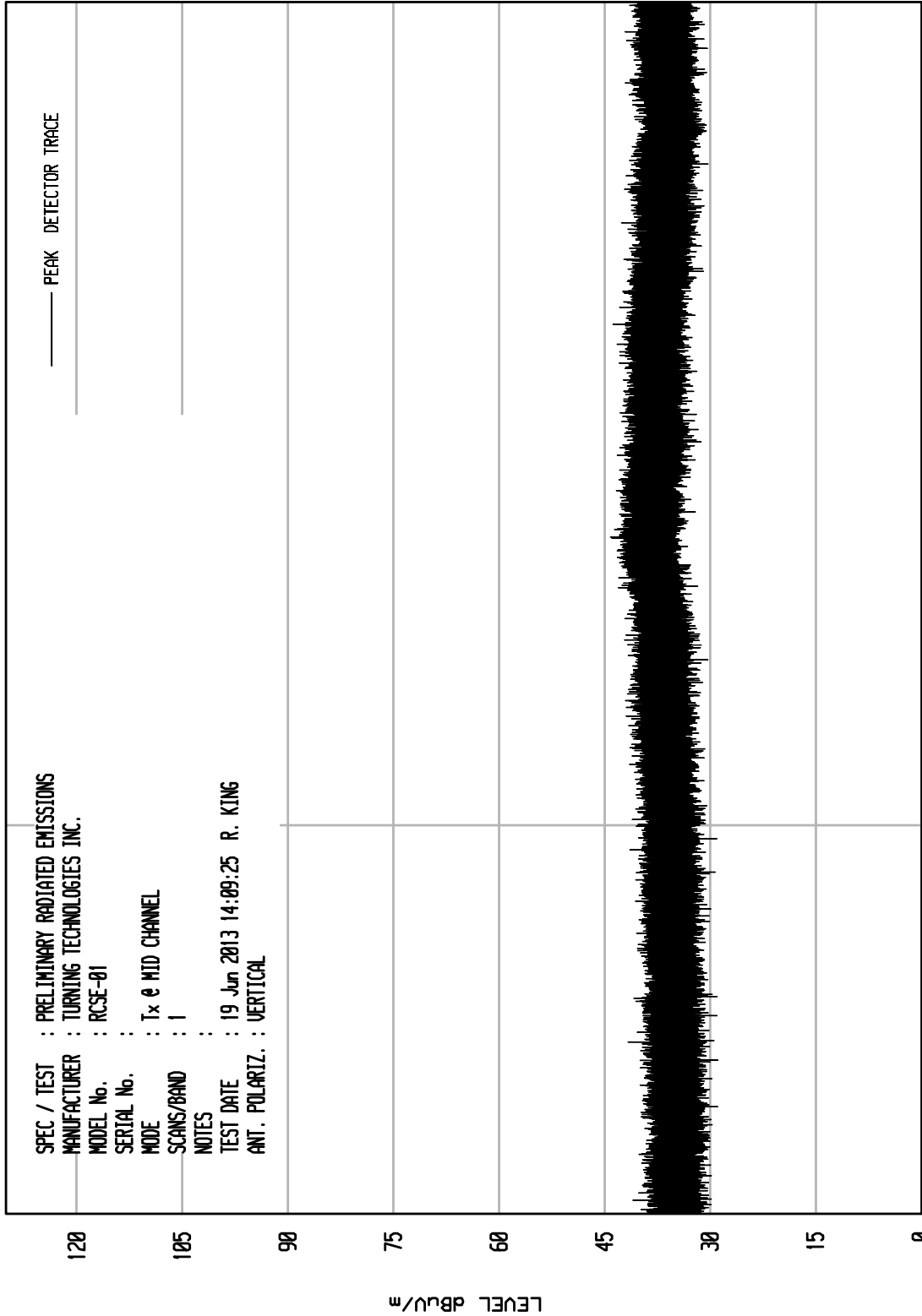
FREQUENCY MHz

START = 18000

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515

UNIT: RCU ENI RUN 4

UKA1 04/26/11



STOP = 25000

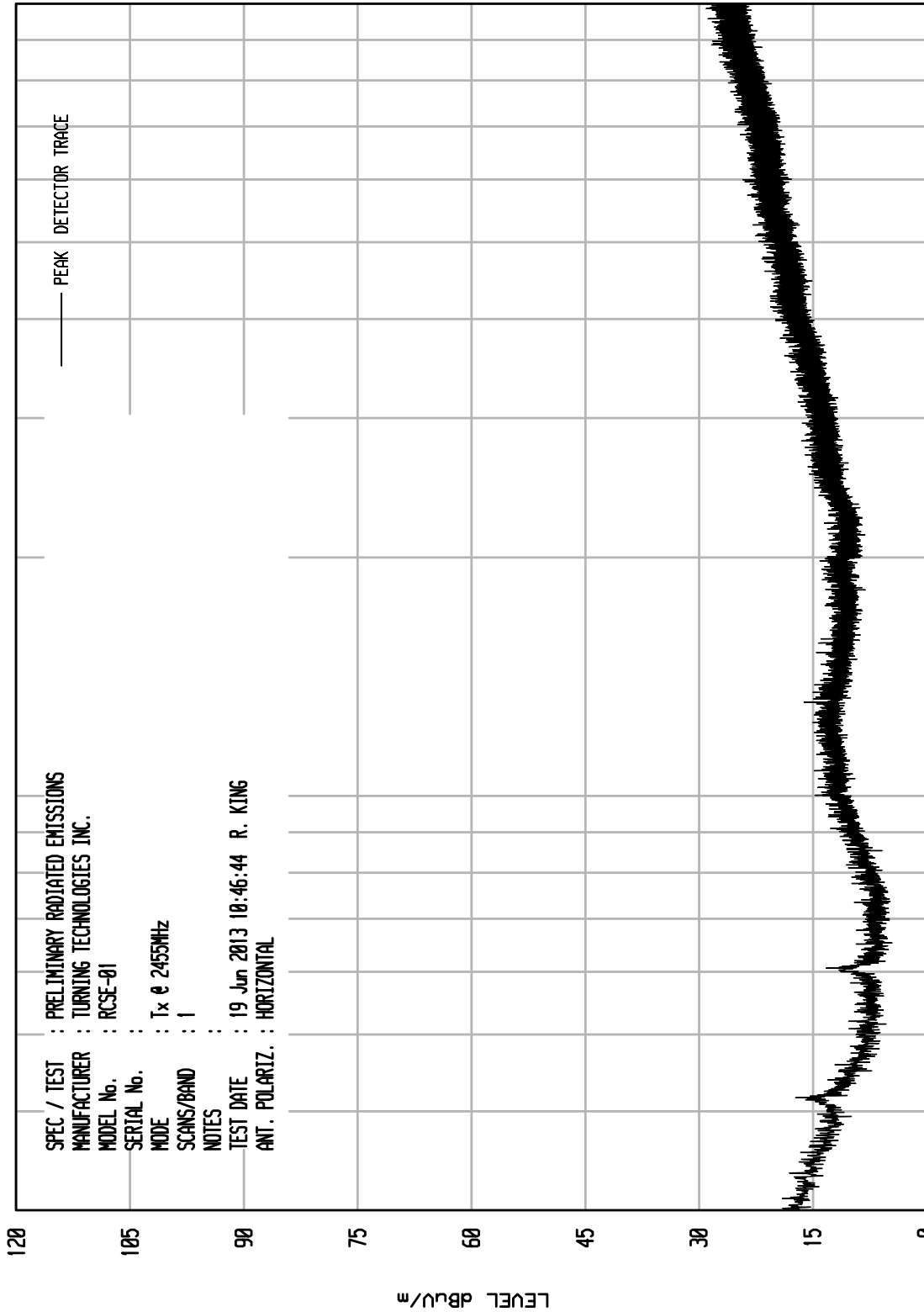
FREQUENCY MHz

START = 18000

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515

UKA1 04/24/13

UNIT: RCU ENI RUN 20

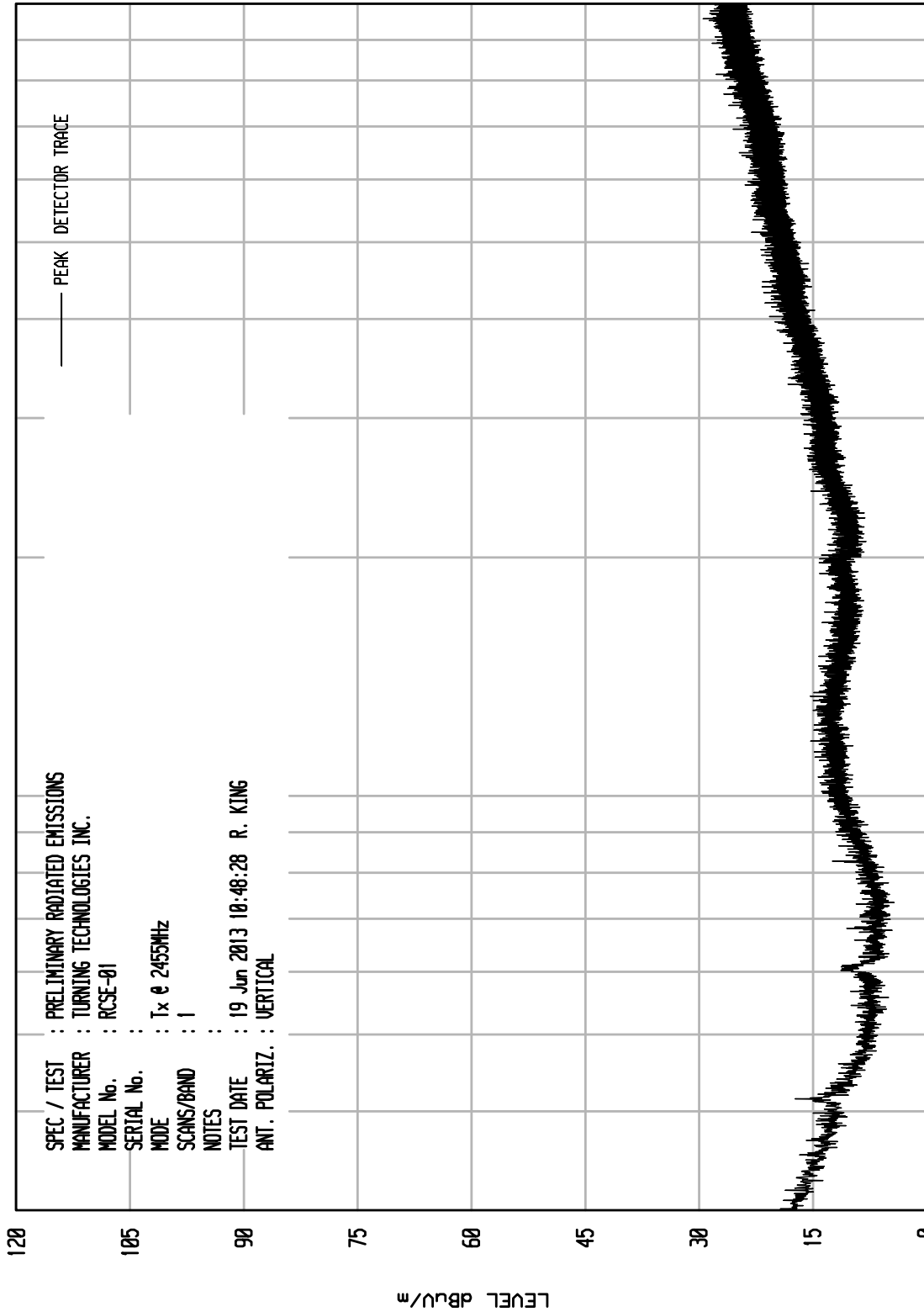


SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : TURNING TECHNOLOGIES INC.
MODEL No. : RCSE-01
SERIAL No. :
MODE : Tx @ 2455MHz
SCANS/BAND : 1
NOTES :
TEST DATE : 19 Jun 2013 10:46:44 R. KING
ANT. POLARIZ. : HORIZONTAL

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515

UKA1 04/24/13

UNTU RCU ENI RUN 21

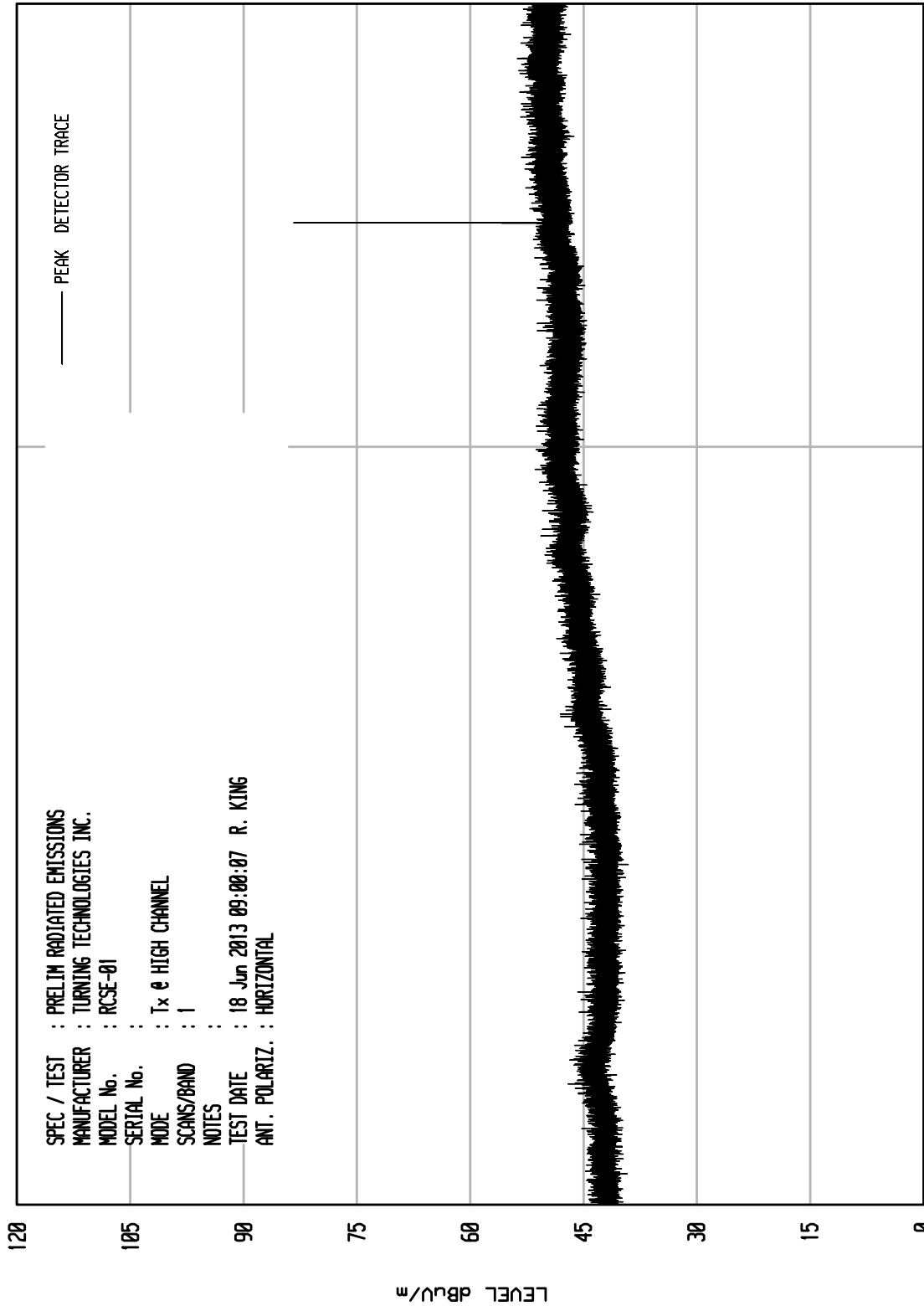


SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : TURNING TECHNOLOGIES INC.
MODEL No. : RCSE-01
SERIAL No. :
MODE : Tx @ 2455MHz
SCANS/BAND : 1
NOTES :
TEST DATE : 19 Jun 2013 10:48:28 R. KING
ANT. POLARIZ. : VERTICAL

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515

UKA1 04/24/13

UNITU RCU ENI RUN 1



START = 1000

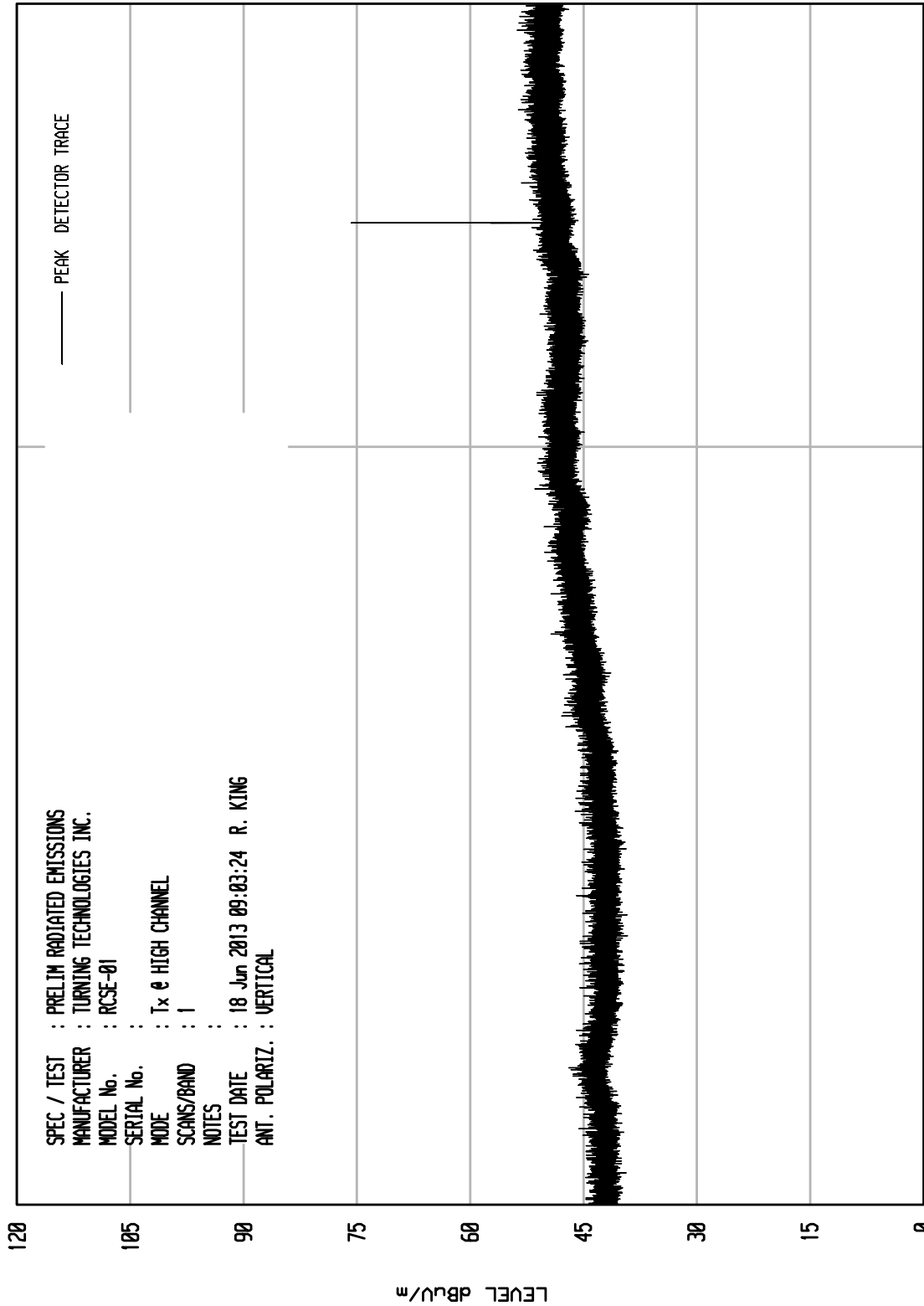
FREQUENCY MHz

STOP = 3000

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515

UNIT: RCU ENI RUN 2

UKA1 04/24/13



SPEC / TEST : PRELIM RADIATED EMISSIONS
MANUFACTURER : TURNING TECHNOLOGIES INC.
MODEL No. : RCSE-01
SERIAL No. :
MODE : Tx @ HIGH CHANNEL
SCANS/BAND : 1
NOTES :
TEST DATE : 18 Jun 2013 09:03:24 R. KING
ANT. POLARIZ. : VERTICAL

STOP = 3000

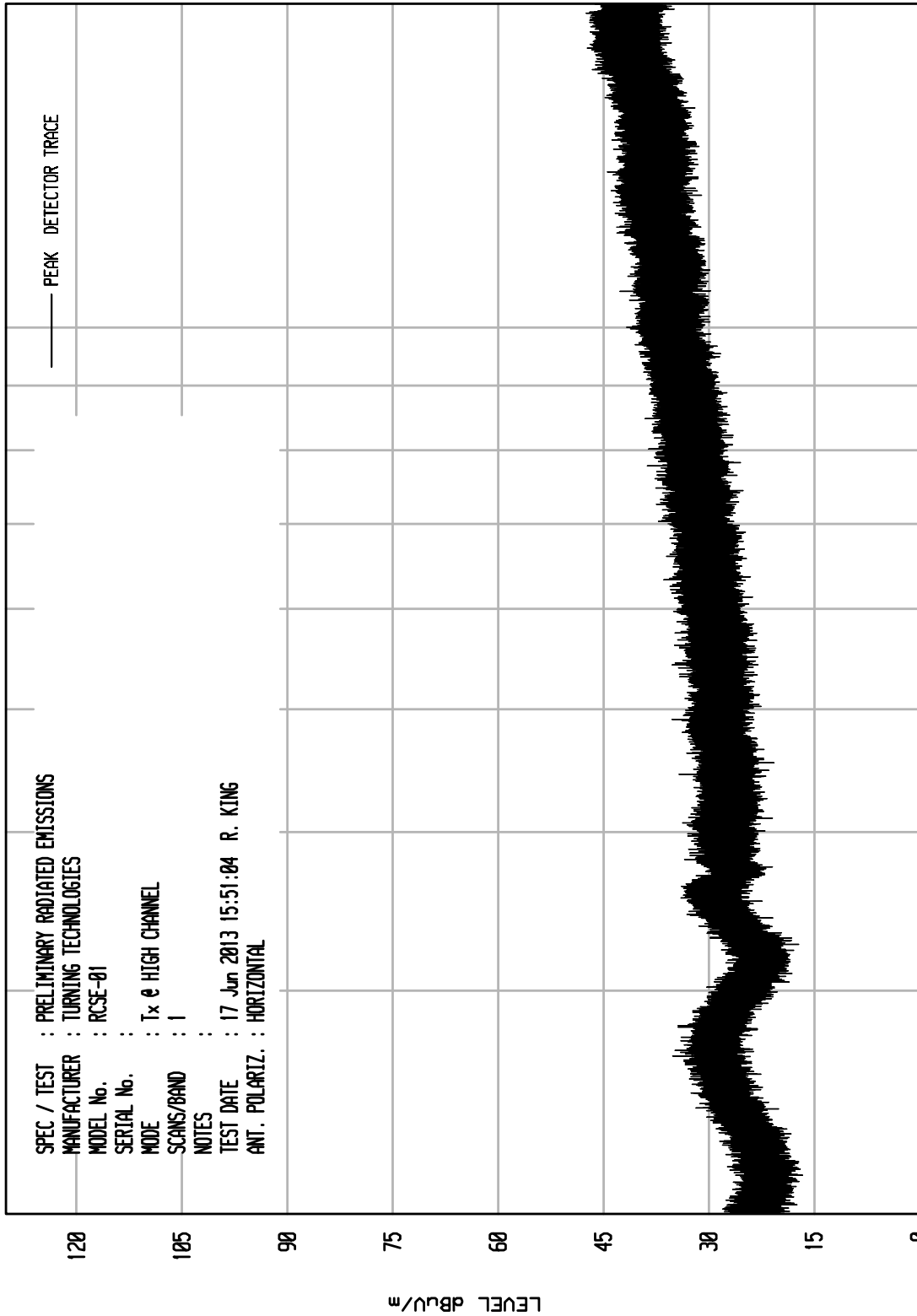
FREQUENCY MHz

START = 1000

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515

UKA1 04/24/13

UNIT: RCU ENI RUN 9



START = 2000

10000

FREQUENCY MHz

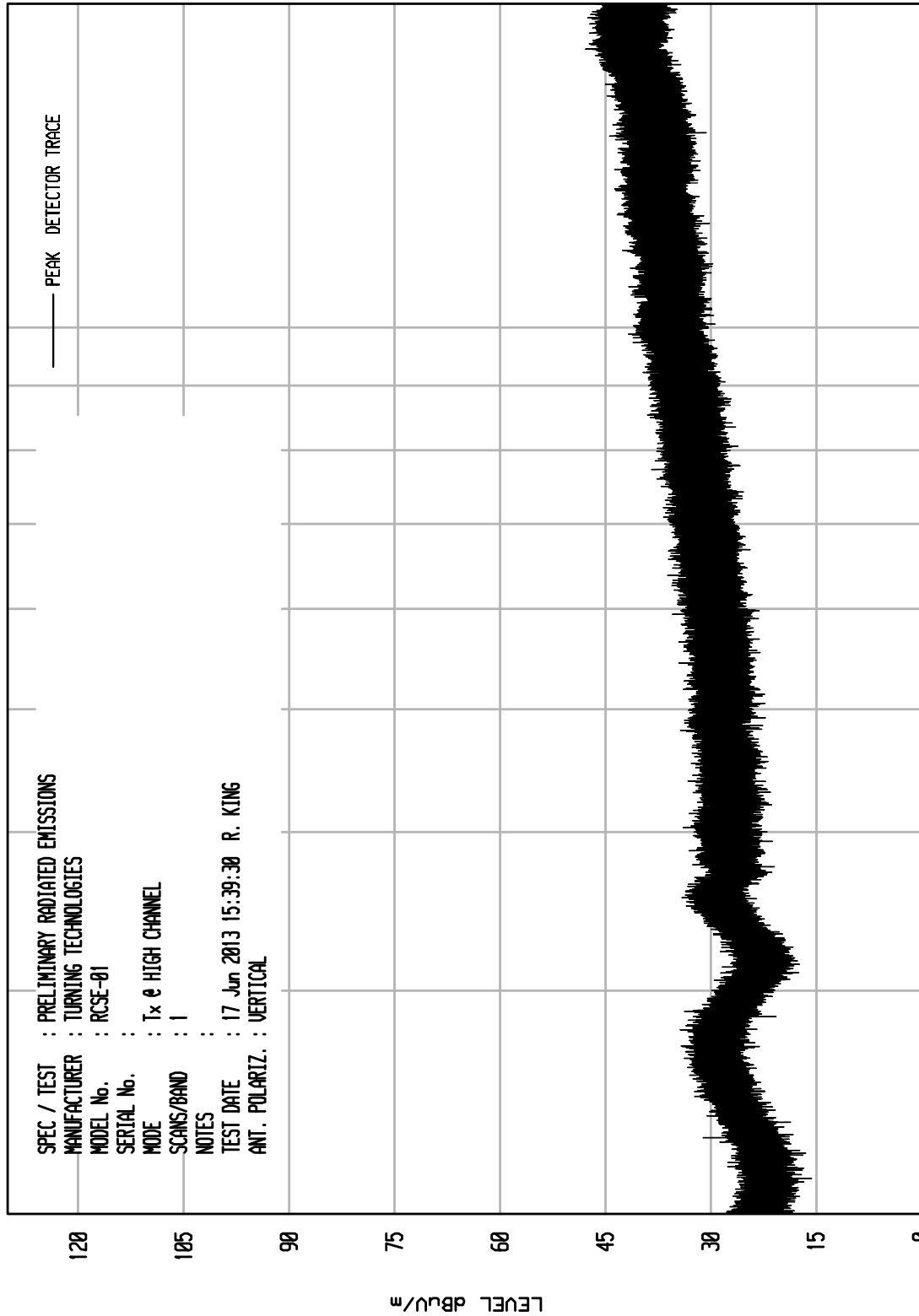
STOP = 18000

ELITE ELECTRONIC ENGINEERING Inc.

Downers Grove, Ill. 60515

UKA1 04/24/13

UNIT: RCU ENI RUN 7



START = 2000

10000

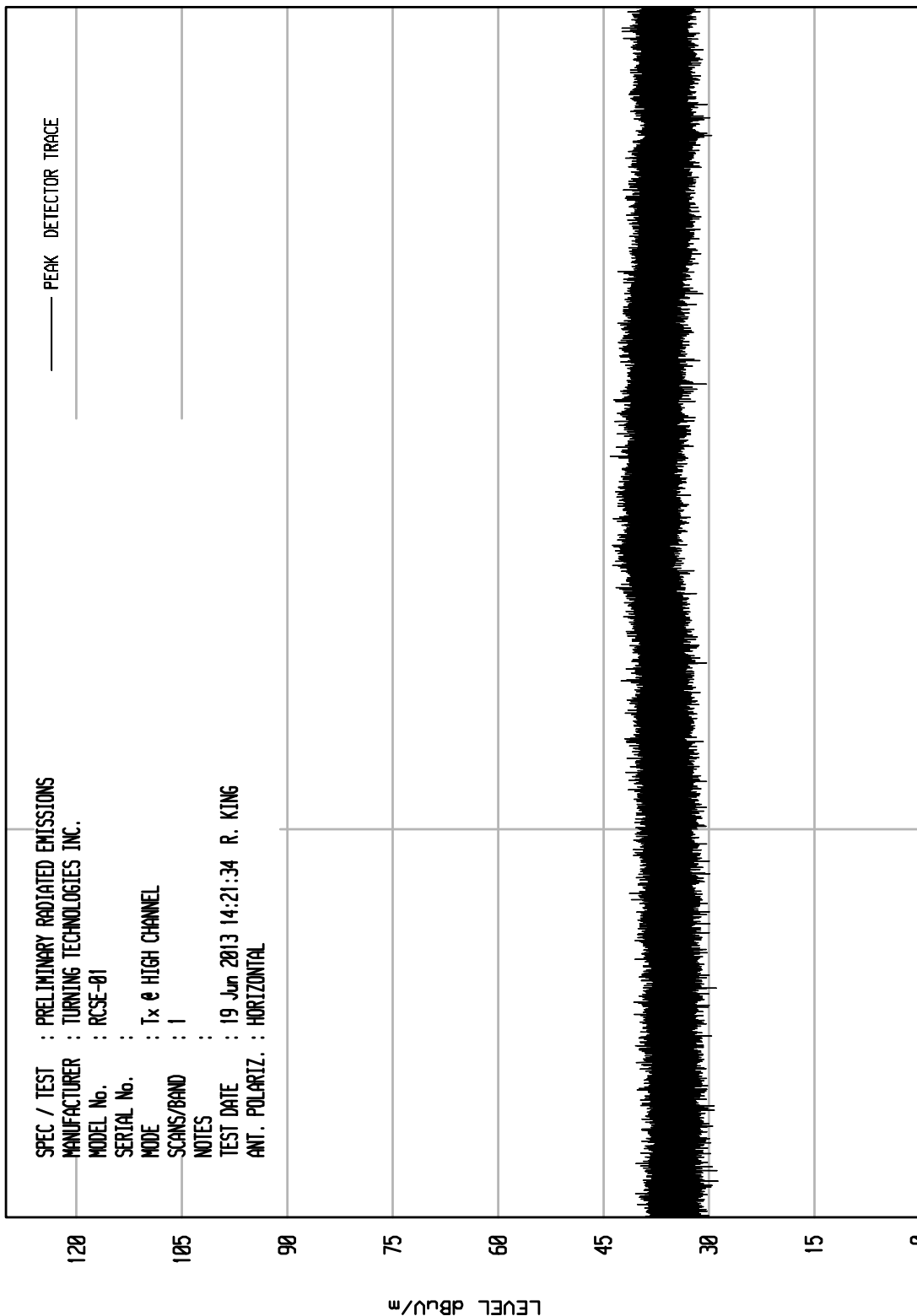
FREQUENCY MHz

STOP = 18000

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515

UNIT: RCU ENI RUN 6

UKA1 04/26/11



START = 18000

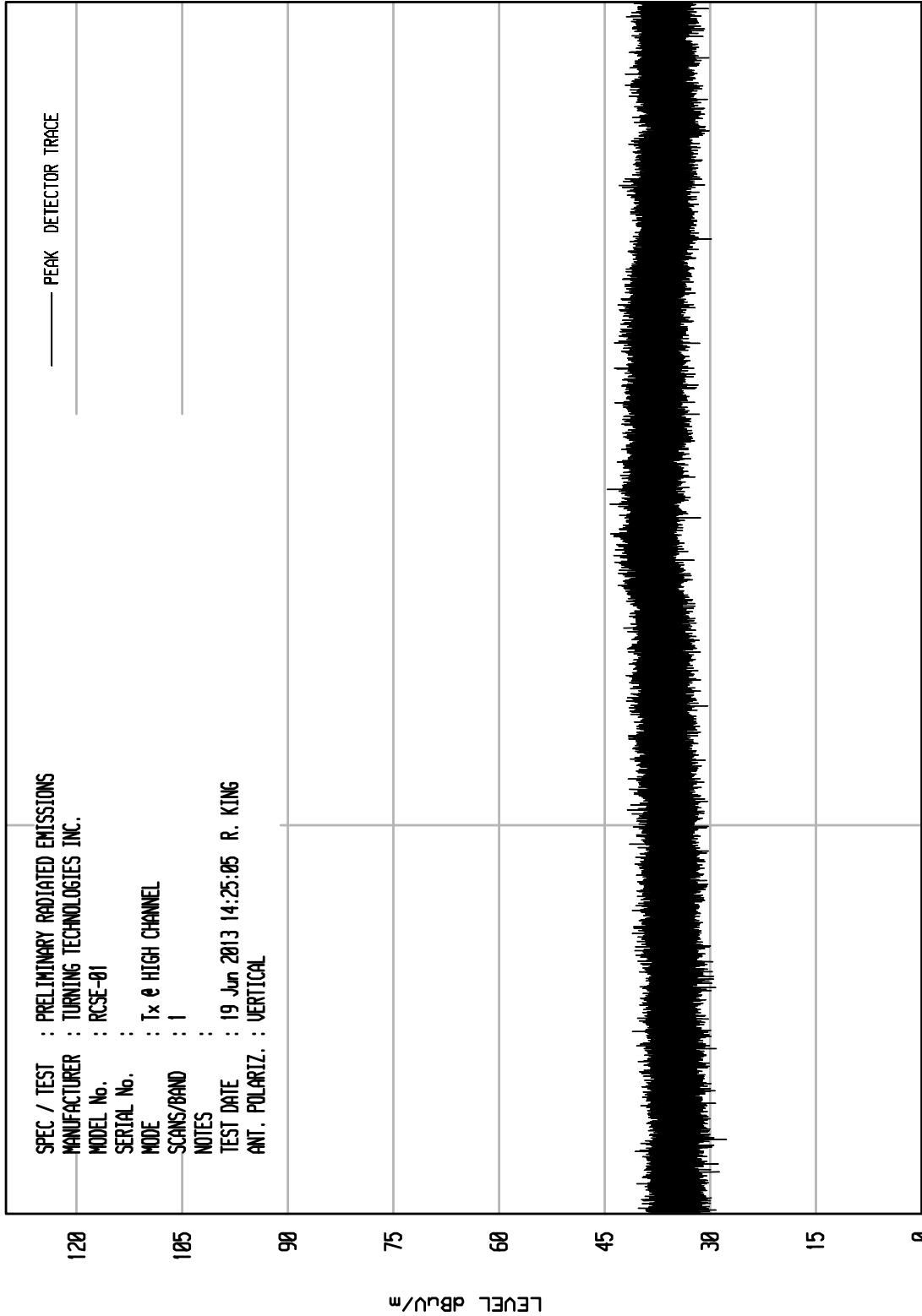
FREQUENCY MHz

STOP = 25000

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515

UKA1 04/26/11

UNIT0 RCU ENI RUN 7



START = 18000

FREQUENCY MHz

STOP = 25000



Manufacturer : Turning Technologies, LLC.
Test Item : Keypad transceiver
Model No. : RCSE-01
Serial No. : E10024
Mode : Transmit at 2411MHz
Test Specification : FCC 15.249 and Industry Canada RSS-210 Annex 2, section A2.9
Date : June 17, 2013
Test Distance : 3 meters
Note : Peak readings

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)
2411.000	H	64.9	3.4	32.2	0.0	100.6	106566.8	500000.0	-13.4
2411.000	V	57.9	3.4	32.2	0.0	93.5	47382.9	500000.0	-20.5
4822.000	H	51.0	4.8	34.4	-40.1	50.2	322.1	5000.0	-23.8
4822.000	V	49.1	4.8	34.4	-40.1	48.2	257.9	5000.0	-25.7
7233.000	H	46.3	6.1	35.4	-39.8	48.1	253.7	5000.0	-25.9
7233.000	V	45.7	6.1	35.4	-39.8	47.5	236.7	5000.0	-26.5
9644.000	H	45.9	6.8	36.8	-38.8	50.8	345.4	5000.0	-23.2
9644.000	V	45.4	6.8	36.8	-38.8	50.2	324.6	5000.0	-23.8
12055.000	H	46.0	8.0	39.0	-39.6	53.4	465.9	5000.0	-20.6
12055.000	V	45.9	8.0	39.0	-39.6	53.3	462.1	5000.0	-20.7
14466.000	H	45.9	8.7	39.5	-39.9	54.2	515.4	5000.0	-19.7
14466.000	V	45.7	8.7	39.5	-39.9	54.0	501.9	5000.0	-20.0
16877.000	H	45.7	9.4	40.9	-38.7	57.3	731.6	5000.0	-16.7
16877.000	V	45.7	9.4	40.9	-38.7	57.3	731.6	5000.0	-16.7
19288.000	H	34.7	2.2	40.4	-27.4	49.9	311.6	5000.0	-24.1
19288.000	V	35.5	2.2	40.4	-27.4	50.6	340.5	5000.0	-23.3
21699.000	H	35.7	2.2	40.6	-26.3	52.1	404.9	5000.0	-21.8
21699.000	V	35.3	2.2	40.6	-26.3	51.8	388.5	5000.0	-22.2
24110.000	H	34.7	2.2	40.6	-27.4	50.1	320.9	5000.0	-23.9
24110.000	V	34.4	2.2	40.6	-27.4	49.9	311.8	5000.0	-24.1

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

Checked BY RICHARD E. King :

Richard E. King



Manufacturer : Turning Technologies, LLC.
Test Item : Keypad transceiver
Model No. : RCSE-01
Serial No. : E10024
Mode : Transmit at 2411MHz
Test Specification : FCC 15.249 and Industry Canada RSS-210 Annex 2, section A2.9
Date : June 17, 2013
Test Distance : 3 meters
Note : Average readings

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)
2411.00	H	64.9	3.4	32.2	0.0	-32.5	68.1	2527.1	50000.0	-25.9
2411.00	V	57.86	3.4	32.2	0.0	-32.5	61.0	1123.6	50000.0	-33.0
4822.00	H	51.04	4.8	34.4	-40.1	-32.5	17.7	7.6	500.0	-36.3
4822.00	V	49.11	4.8	34.4	-40.1	-32.5	15.7	6.1	500.0	-38.2
7233.00	H	46.28	6.1	35.4	-39.8	-32.5	15.6	6.0	500.0	-38.4
7233.00	V	45.68	6.1	35.4	-39.8	-32.5	15.0	5.6	500.0	-39.0
9644.00	H	45.91	6.8	36.8	-38.8	-32.5	18.3	8.2	500.0	-35.7
9644.00	V	45.37	6.8	36.8	-38.8	-32.5	17.7	7.7	500.0	-36.3
12055.00	H	45.98	8.0	39.0	-39.6	-32.5	20.9	11.0	500.0	-33.1
12055.00	V	45.91	8.0	39.0	-39.6	-32.5	20.8	11.0	500.0	-33.2
14466.00	H	45.91	8.7	39.5	-39.9	-32.5	21.7	12.2	500.0	-32.2
14466.00	V	45.68	8.7	39.5	-39.9	-32.5	21.5	11.9	500.0	-32.5
16877.00	H	45.68	9.4	40.9	-38.7	-32.5	24.8	17.3	500.0	-29.2
16877.00	V	45.68	9.4	40.9	-38.7	-32.5	24.8	17.3	500.0	-29.2
19288.00	H	34.69	2.2	40.4	-27.4	-32.5	17.4	7.4	500.0	-36.6
19288.00	V	35.46	2.2	40.4	-27.4	-32.5	18.1	8.1	500.0	-35.8
21699.00	H	35.69	2.2	40.6	-26.3	-32.5	19.6	9.6	500.0	-34.3
21699.00	V	35.33	2.2	40.6	-26.3	-32.5	19.3	9.2	500.0	-34.7
24110.00	H	34.69	2.2	40.6	-27.4	-32.5	17.6	7.6	500.0	-36.4
24110.00	V	34.44	2.2	40.6	-27.4	-32.5	17.4	7.4	500.0	-36.6

Amb = Ambient

Total (dBUV/m) = Meter Reading + CBL FAC + Ant Fac + Pre Amp + Duty Cycle

Checked BY RICHARD E. King :

Richard E. King



Manufacturer : Turning Technologies, LLC.
Test Item : Keypad transceiver
Model No. : RCSE-01
Serial No. : E10024
Mode : Transmit at 2433MHz
Test Specification : FCC 15.249 and Industry Canada RSS-210 Annex 2, section A2.9
Date : June 17, 2013
Test Distance : 3 meters
Note : Peak readings

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)
2433.000	H	64.7	3.5	32.3	0.0	100.4	105034.8	500000.0	-13.6
2433.000	V	58.9	3.5	32.3	0.0	94.7	54054.7	500000.0	-19.3
4866.000	H	50.9	4.9	34.4	-40.1	50.0	316.8	5000.0	-24.0
4866.000	V	50.2	4.9	34.4	-40.1	49.4	294.3	5000.0	-24.6
7299.000	H	48.0	6.2	35.4	-39.8	49.8	310.7	5000.0	-24.1
7299.000	V	46.6	6.2	35.4	-39.8	48.4	263.3	5000.0	-25.6
9732.000	H	46.6	6.9	36.9	-38.7	51.7	383.4	5000.0	-22.3
9732.000	V	46.9	6.9	36.9	-38.7	52.0	396.5	5000.0	-22.0
12165.000	H	46.0	8.0	39.0	-39.5	53.5	472.5	5000.0	-20.5
12165.000	V	46.0	8.0	39.0	-39.5	53.5	472.5	5000.0	-20.5
14598.000	H	47.0	8.8	39.6	-40.0	55.4	589.5	5000.0	-18.6
14598.000	V	46.7	8.8	39.6	-40.0	55.1	570.1	5000.0	-18.9
17031.000	H	46.6	9.5	40.9	-38.6	58.4	830.2	5000.0	-15.6
17031.000	V	45.2	9.5	40.9	-38.6	56.9	703.3	5000.0	-17.0
19464.000	H	35.2	2.2	40.4	-27.2	50.6	337.8	5000.0	-23.4
19464.000	V	34.4	2.2	40.4	-27.2	49.8	309.5	5000.0	-24.2
21897.000	H	36.0	2.2	40.6	-26.8	52.0	397.7	5000.0	-22.0
21897.000	V	36.5	2.2	40.6	-26.8	52.5	423.2	5000.0	-21.4
24330.000	H	34.8	2.2	40.6	-27.5	50.2	324.0	5000.0	-23.8
24330.000	V	35.2	2.2	40.6	-27.5	50.6	338.5	5000.0	-23.4

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

Checked BY RICHARD E. King :

Richard E. King



Manufacturer : Turning Technologies, LLC.
Test Item : Keypad transceiver
Model No. : RCSE-01
Serial No. : E10024
Mode : Transmit at 2433MHz
Test Specification : FCC 15.249 and Industry Canada RSS-210 Annex 2, section A2.9
Date : June 17, 2013
Test Distance : 3 meters
Note : Average readings

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)
2433.00	H	64.7	3.5	32.3	0.0	-32.5	67.9	2490.8	50000.0	-26.1
2433.00	V	58.9	3.5	32.3	0.0	-32.5	62.2	1281.8	50000.0	-31.8
4866.00	H	50.9	4.9	34.4	-40.1	-32.5	17.5	7.5	500.0	-36.5
4866.00	V	50.2	4.9	34.4	-40.1	-32.5	16.9	7.0	500.0	-37.1
7299.00	H	48.0	6.2	35.4	-39.8	-32.5	17.3	7.4	500.0	-36.6
7299.00	V	46.6	6.2	35.4	-39.8	-32.5	15.9	6.2	500.0	-38.1
9732.00	H	46.6	6.9	36.9	-38.7	-32.5	19.2	9.1	500.0	-34.8
9732.00	V	46.9	6.9	36.9	-38.7	-32.5	19.5	9.4	500.0	-34.5
12165.00	H	46.0	8.0	39.0	-39.5	-32.5	21.0	11.2	500.0	-33.0
12165.00	V	46.0	8.0	39.0	-39.5	-32.5	21.0	11.2	500.0	-33.0
14598.00	H	47.0	8.8	39.6	-40.0	-32.5	22.9	14.0	500.0	-31.1
14598.00	V	46.7	8.8	39.6	-40.0	-32.5	22.6	13.5	500.0	-31.4
17031.00	H	46.6	9.5	40.9	-38.6	-32.5	25.9	19.7	500.0	-28.1
17031.00	V	45.2	9.5	40.9	-38.6	-32.5	24.4	16.7	500.0	-29.5
19464.00	H	35.2	2.2	40.4	-27.2	-32.5	18.1	8.0	500.0	-35.9
19464.00	V	34.4	2.2	40.4	-27.2	-32.5	17.3	7.3	500.0	-36.7
21897.00	H	36.0	2.2	40.6	-26.8	-32.5	19.5	9.4	500.0	-34.5
21897.00	V	36.5	2.2	40.6	-26.8	-32.5	20.0	10.0	500.0	-33.9
24330.00	H	34.8	2.2	40.6	-27.5	-32.5	17.7	7.7	500.0	-36.3
24330.00	V	35.2	2.2	40.6	-27.5	-32.5	18.1	8.0	500.0	-35.9

Amb = Ambient

Total (dBuV/m) = Meter Reading + CBL FAC + Ant Fac + Pre Amp + Duty Cycle

Checked BY RICHARD E. KING :

Richard E. King



Manufacturer : Turning Technologies, LLC.
Test Item : Keypad transceiver
Model No. : RCSE-01
Serial No. : E10024
Mode : Transmit at 2455MHz
Test Specification : FCC 15.249 and Industry Canada RSS-210 Annex 2, section A2.9
Date : June 17, 2013
Test Distance : 3 meters
Note : Peak readings

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)
2455.000	H	64.7	3.5	32.3	0.0	100.5	105685.6	500000.0	-13.5
2455.000	V	61.0	3.5	32.3	0.0	96.8	69106.0	500000.0	-17.2
4910.000	H	51.0	4.9	34.4	-40.1	50.2	324.3	5000.0	-23.8
4910.000	V	49.5	4.9	34.4	-40.1	48.7	273.2	5000.0	-25.3
7365.000	H	47.0	6.2	35.4	-39.7	48.9	278.7	5000.0	-25.1
7365.000	V	47.8	6.2	35.4	-39.7	49.6	302.8	5000.0	-24.4
9820.000	H	46.9	6.9	37.0	-38.7	52.1	404.8	5000.0	-21.8
9820.000	V	46.8	6.9	37.0	-38.7	52.0	397.4	5000.0	-22.0
12275.000	H	46.0	8.0	38.9	-39.4	53.5	474.4	5000.0	-20.5
12275.000	V	45.8	8.0	38.9	-39.4	53.4	465.2	5000.0	-20.6
14730.000	H	45.1	8.9	39.7	-40.1	53.4	470.0	5000.0	-20.5
14730.000	V	44.5	8.9	39.7	-40.1	52.9	442.7	5000.0	-21.1
17185.000	H	44.9	9.6	41.0	-38.8	56.7	684.8	5000.0	-17.3
17185.000	V	45.5	9.6	41.0	-38.8	57.2	727.0	5000.0	-16.7
19640.000	H	35.1	2.2	40.4	-27.1	50.6	340.1	5000.0	-23.3
19640.000	V	34.7	2.2	40.4	-27.1	50.3	325.6	5000.0	-23.7
22095.000	H	35.3	2.2	40.6	-27.0	51.1	358.9	5000.0	-22.9
22095.000	V	35.5	2.2	40.6	-27.0	51.2	364.4	5000.0	-22.7
24550.000	H	34.7	2.2	40.6	-27.4	50.1	319.7	5000.0	-23.9
24550.000	V	35.3	2.2	40.6	-27.4	50.7	344.1	5000.0	-23.2

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

Checked BY RICHARD E. King :

Richard E. King



Manufacturer : Turning Technologies, LLC.
Test Item : Keypad transceiver
Model No. : RCSE-01
Serial No. : E10024
Mode : Transmit at 2455MHz
Test Specification : FCC 15.249 and Industry Canada RSS-210 Annex 2, section A2.9
Date : June 17, 2013
Test Distance : 3 meters
Note : Average readings

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)
2455.00	H	64.7	3.5	32.3	0.0	-32.5	68.0	2506.2	50000.0	-26.0
2455.00	V	61.01	3.5	32.3	0.0	-32.5	64.3	1638.8	50000.0	-29.7
4910.00	H	51.03	4.9	34.4	-40.1	-32.5	17.7	7.7	500.0	-36.3
4910.00	V	49.54	4.9	34.4	-40.1	-32.5	16.2	6.5	500.0	-37.8
7365.00	H	47.03	6.2	35.4	-39.7	-32.5	16.4	6.6	500.0	-37.6
7365.00	V	47.75	6.2	35.4	-39.7	-32.5	17.1	7.2	500.0	-36.9
9820.00	H	46.93	6.9	37.0	-38.7	-32.5	19.6	9.6	500.0	-34.3
9820.00	V	46.77	6.9	37.0	-38.7	-32.5	19.5	9.4	500.0	-34.5
12275.00	H	45.97	8.0	38.9	-39.4	-32.5	21.0	11.2	500.0	-33.0
12275.00	V	45.8	8.0	38.9	-39.4	-32.5	20.9	11.0	500.0	-33.1
14730.00	H	45.06	8.9	39.7	-40.1	-32.5	20.9	11.1	500.0	-33.0
14730.00	V	44.54	8.9	39.7	-40.1	-32.5	20.4	10.5	500.0	-33.6
17185.00	H	44.93	9.6	41.0	-38.8	-32.5	24.2	16.2	500.0	-29.8
17185.00	V	45.45	9.6	41.0	-38.8	-32.5	24.7	17.2	500.0	-29.2
19640.00	H	35.07	2.2	40.4	-27.1	-32.5	18.1	8.1	500.0	-35.8
19640.00	V	34.69	2.2	40.4	-27.1	-32.5	17.8	7.7	500.0	-36.2
22095.00	H	35.33	2.2	40.6	-27.0	-32.5	18.6	8.5	500.0	-35.4
22095.00	V	35.46	2.2	40.6	-27.0	-32.5	18.7	8.6	500.0	-35.2
24550.00	H	34.69	2.2	40.6	-27.4	-32.5	17.6	7.6	500.0	-36.4
24550.00	V	35.33	2.2	40.6	-27.4	-32.5	18.2	8.2	500.0	-35.7

Amb = Ambient

Total (dBUV/m) = Meter Reading + CBL FAC + Ant Fac + Pre Amp + Duty Cycle

Checked BY RICHARD E. King :

Richard E. King



Manufacturer : Turning Technologies, LLC.
Test Item : Keypad transceiver
Model No. : RCSE-01
Serial No. : E10024
Mode : Transmit at 2411MHz
Test Specification : FCC 15.249 and Industry Canada RSS-210 Annex 2, section A2.9
Date : June 17, 2013
Test Distance : 3 meters
Note : Peak readings

Freq (MHz)	Ant Pol	Meter Reading (dBuV)	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Peak Total dBuV/m at 3 M	Peak Total uV/m at 3M	Peak Limit uV/m at 3M	Margin (dB)
2400.000	H	26.1	3.4	32.2	0.0	61.7	1219.0	5000.0	-12.3
2400.000	V	24.3	3.4	32.2	0.0	59.9	990.8	5000.0	-14.1

Checked BY RICHARD E. King :

Richard E. King



Manufacturer : Turning Technologies, LLC.
Test Item : Keypad transceiver
Model No. : RCSE-01
Serial No. : E10024
Mode : Transmit at 2411MHz
Test Specification : FCC 15.249 and Industry Canada RSS-210 Annex 2, section A2.9
Date : June 17, 2013
Test Distance : 3 meters
Note : Average readings

Freq (MHz)	Ant Pol	Meter Reading (dBuV)	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Duty Cycle Corr. (dB)	Total dBuV/m at 3 M	Total uV/m at 3M	Limit uV/m at 3M	Margin (dB)
2400.00	H	26.1	3.4	32.2	0.0	-32.5	29.2	28.9	500.0	-24.8
2400.00	V	24.3	3.4	32.2	0.0	-32.5	27.4	23.5	500.0	-26.6

Checked BY RICHARD E. King :

Richard E. King



Manufacturer : Turning Technologies, LLC.
Test Item : Keypad transceiver
Model No. : RCSE-01
Serial No. : E10024
Mode : Transmit at 2455MHz
Test Specification : FCC 15.249 and Industry Canada RSS-210 Annex 2, section A2.9
Date : June 17, 2013
Test Distance : 3 meters
Note : Peak readings

Freq (MHz)	Ant Pol	Meter Reading (dBuV)	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Peak Total dBuV/m at 3 M	Peak Total uV/m at 3M	Peak Limit uV/m at 3M	Margin (dB)
2483.500	H	23.6	3.5	32.4	0.0	59.5	939.9	5000.0	-14.5
2483.500	V	20.4	3.5	32.4	0.0	56.3	650.3	5000.0	-17.7

Checked BY RICHARD E. King :

Richard E. King



Manufacturer : Turning Technologies, LLC.
Test Item : Keypad transceiver
Model No. : RCSE-01
Serial No. : E10024
Mode : Transmit at 2455MHz
Test Specification : FCC 15.249 and Industry Canada RSS-210 Annex 2, section A2.9
Date : June 17, 2013
Test Distance : 3 meters
Note : Average readings

Freq (MHz)	Ant Pol	Meter Reading (dBuV)	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Duty Cycle Corr. (dB)	Total dBuV/m at 3 M	Total uV/m at 3M	Limit uV/m at 3M	Margin (dB)
2483.50	H	23.6	3.5	32.4	0.0	-32.5	27.0	22.3	500.0	-27.0
2483.50	V	20.4	3.5	32.4	0.0	-32.5	23.8	15.4	500.0	-30.2

Checked BY RICHARD E. KING :

Richard E. King