



Measurement of RF Emissions from a
Bluetooth Portable Lock Box and Bluetooth
Wall Mount Lock Box
Model Nos. 5440 and 5441

For Master Lock Company
PO Box 927
Oak Creek, WI 53154

P.O. Number Y262176
Date Tested December 1 – 19, 2016
Test Personnel Richard E. King
Test Specification FCC "Code of Federal Regulations" Title 47, Part 15,
Subpart C, Section 15.247 for
Digital Modulation Intentional Radiators Operating
within 2400-2483.5MHz

Industry Canada RSS-GEN
Industry Canada RSS-247

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REVISION HISTORY

Revision	Date	Description
—	16 Jan 2017	Initial release
A	2 FEB 2017	- Added Rev A to the report number on the cover and in the header of each page. - Changed the model from Keysafe to 5440 Bluetooth Portable Lock Box. - Added model 5441 Bluetooth Wall Mount Lock Box throughout the test report with the exception of the radiated emissions plots.

Measurement of RF Emissions from a Bluetooth Portable Lock Box and Bluetooth Wall Mount Lock Box, Model No. 5440 and 5441 Transmitters

1. INTRODUCTION

1.1. Scope of Tests

This report represents the results of the series of radio interference measurements performed on a Master Lock Company Bluetooth Portable Lock Box and Bluetooth Wall Mount Lock Box, Model Nos. 5440 and 5441, no serial numbers assigned, transmitter (hereinafter referred to as the EUT). The EUT is a digital modulation spread spectrum transmitter. The transmitter was designed to transmit in the 2400-2483.5 MHz band using an integral antenna. The EUT was manufactured and submitted for testing by Master Lock Company located in Oak Creek, WI.

1.2. Purpose

The test series was performed to determine if the EUT meets the conducted and radiated RF emission requirements of the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart C, Sections 15.207 and 15.247 for Intentional Radiators. The test series was also performed to determine if the EUT meets the conducted RF emission requirements of the Industry Canada Radio Standards Specification, RSS-Gen, Section 7.2.4 and the radiated RF emission requirements of the Industry Canada Radio Standards Specification, RSS-247, Annex 8 for transmitters. Testing was performed in accordance with ANSI C63.4-2014.

1.3. Deviations, Additions and Exclusions

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

1.4. EMC Laboratory Identification

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

1.5. Laboratory Conditions

The temperature at the time of the test was 23°C and the relative humidity was 15%.

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, Subparts B and C, dated 1 October 2016.
- ANSI C63.4-2014, "American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz".
- Federal Communications Commission Office of Engineering Technology Laboratory Division Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating under § 15.247, June 9, 2015.
- Industry Canada RSS-247, Issue 1, May 2015, "Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and License-Exempt Local Area Network (LE-LAN) Devices".

- Industry Canada RSS-GEN, Issue 4, November 2014, "Spectrum Management and Telecommunications Radio Standards Specification, General Requirements and Information for the Certification of radio communication equipment".
- ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices".

3. EUT SETUP AND OPERATION

3.1. General Description

The EUT is a Master Lock Company, Bluetooth Portable Lock Box and Bluetooth Wall Mount Lock Box, Model Nos. 5440 and 5441. A block diagram of the EUT setup is shown as Figure 1.

3.1.1.Power Input

The EUT was powered by 3VDC from internal batteries.

3.1.2.Peripheral Equipment

No peripheral equipment was submitted with the EUT.

3.1.3.Signal Input/Output Leads

No interconnect cables were submitted with the EUT.

3.1.4.Grounding

The EUT was ungrounded during the tests.

3.2. Operational Mode

For all tests the EUT and all peripheral equipment were placed on an 80cm high non-conductive stand below a 1000MHz and a 150cm high non-conductive stand above 1000MHz. The EUT was energized.

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

- Transmit at 2402MHz
- Transmit at 2440MHz
- Transmit at 2480MHz

3.3. EUT Modifications

No modifications were required for compliance to the specifications 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 C63.4-2014 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 with a calibration interval not greater than two

years. All calibrations are traceable to the National Institute of Standards and Technology (NIST).

4.4. Measurement Uncertainty

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

The measurement uncertainty for these tests is presented below:

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

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

5. TEST PROCEDURES

5.1. Powerline Conducted Emissions

5.1.1. Requirements

Since the EUT was powered by internal batteries and has not connections for AC power, no conducted emissions tests are required.

5.2. DTS (6dB) Bandwidth

5.2.1. Requirement

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

5.2.2. Procedures

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

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

5.2.3. Results

The plots on pages 20 through 22 show that the minimum DTS (6 dB) bandwidth was 726.45kHz which is greater than minimum allowable 6dB bandwidth requirement of 500kHz for systems using digital modulation techniques. The 99% bandwidth was measured to be 742.8kHz.

5.3. Peak Output Power

5.3.1. Requirements

Per section 15.247(b)(3), for systems using digital modulation the maximum peak output conducted power shall not be greater than 1.0W (30dBm). Per section 15.247(b)(4), this limit is based on the use of antennas

with directional gains that do not exceed 6dBi. Since the limit allows for a 6dBi antenna gain, the maximum EIRP can be increased by 6dB to 4 Watt (36dBm).

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

5.3.2.Procedures

The EUT was placed on the non-conductive stand and set to transmit. A dipole antenna (double ridged waveguide antenna for all measurements above 1GHz) was placed at a test distance of 3 meters from the EUT. The resolution bandwidth (RBW) of the spectrum analyzer was set to greater than the 6dB bandwidth. The EUT was maximized for worst case emissions (or maximum output power) at the measuring antenna. The maximum meter reading was recorded. The peak power output was measured for the low, middle and high channels.

The equivalent power was determined from the field intensity levels measured at 3 meters using the substitution method. To determine the emission power, a second dipole antenna (double ridged waveguide antenna for all measurements above 1GHz) was then set in place of the EUT and connected to a calibrated signal generator. The output of the signal generator was adjusted to match the received level at the spectrum analyzer. The signal level was recorded. The reading was then corrected to compensate for cable loss (and antenna gain for all measurements above 1GHz), as required. The peak power output was calculated for low, middle, and high hopping frequencies.

5.3.3.Results

The results are presented on pages 23 through 25. The maximum EIRP measured from the transmitter was -22.2 dBm or .006 mW which is below the 4 Watt limit.

5.4. Radiated Spurious Emissions Measurements

5.4.1.Requirements

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

Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must comply with the radiated emission limits specified in §15.209(a).

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

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

5.4.2.Procedures

All tests were performed in a 32ft. x 20ft. x 18ft. hybrid ferrite-tile/anechoic absorber lined test chamber. The walls and ceiling of the shielded chamber are lined with ferrite tiles. Anechoic absorber material is installed over the ferrite tile. The floor of the chamber is used as the ground plane. The chamber complies with ANSI C63.4-2014 for site attenuation.

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

Preliminary radiated emissions tests were performed to determine the emission characteristics of the EUT. For the preliminary test, a broadband measuring antenna was positioned at a 3 meter distance from the EUT. The entire frequency range from 30MHz to 25GHz used for 2400-2483.5Mhz range was investigated using a peak detector function.

The final open field emission tests were then manually performed over the frequency range of 30MHz to 25GHz used for 2400-2483.5Mhz range.

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

- iv) In instances where it was necessary to use a shortened cable between the measuring antenna and the spectrum analyzer, the measuring antenna was not raised or lowered to ensure maximized readings. Instead the EUT was rotated through all axes to ensure the maximum readings were recorded for the EUT.
- d) For all radiated emissions measurements below 1 GHz, if the peak reading is below the limits listed in 15.209(a), no further measurements are required. If however, the peak readings exceed the limits listed in 15.209(a), then the emissions are remeasured using a quasi-peak detector.
- e) For all radiated emissions measurements above 1 GHz, the peak readings must comply with the 15.35(b) limits. 15.35(b) states that when average radiated emissions measurements are specified, there also is a limit on the peak level of the radiated emissions. The limit on the peak radio frequency emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test. Therefore, all peak readings above 1 GHz must be no greater than 20 dB above the limits specified in 15.209(a).
- f) Next, for all radiated emissions measurements above 1GHz, the resolution bandwidth was set to 1MHz. The analyzer was set to linear mode with a 10Hz video bandwidth in order to simulate an average detector. An average reading was taken.

5.4.3.Results

Preliminary radiated emissions plots with the EUT transmitting at Low Frequency, Middle Frequency, and High Frequency are shown on pages 26 through 49. Final radiated emissions data are presented on data pages 50 through 58.

Photographs of the test configuration which yielded the highest, or worst case, radiated emission levels are shown in Figures 2 through 4.

5.5. Band Edge Compliance

5.5.1.Requirement

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

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).

5.5.2.Procedures

Low Band Edge

- 1) The EUT was setup inside the test chamber on a non-conductive stand.
- 2) A broadband measuring antenna was placed at a test distance of 3 meters from the EUT.
- 3) The EUT was set to transmit continuously at the channel closest to the low band-edge.
- 4) The EUT was maximized for worst case emissions at the measuring antenna. The maximum meter reading was recorded.
- 5) To determine the bandedge compliance, the following spectrum analyzer settings were used:
 - a. Center frequency = low band-edge frequency.
 - b. Span = Wide enough to capture the peak level of the emission operating on the channel closest to the band-edge, as well as any modulation products which fall outside of the authorized band of operation.
 - c. Resolution bandwidth (RBW) $\geq$ 1% of the span.
 - d. The 'Max-Hold' function was engaged. The analyzer was allowed to scan until the envelope of the transmitter bandwidth was defined.
 - e. The marker was set on the peak of the in-band emissions. A display line was placed

20dB down from the peak of the in-band emissions. All emissions which fall outside of the authorized band of operation must be below the 20dB down display line. (All emissions to the left of the center frequency (band-edge) must be below the display line.)

- f. The analyzer's display was plotted using a 'screen dump' utility.

5.4.2.1 High Band Edge

- 1) The EUT was set to transmit continuously at the channel closest to the high band-edge.
- 2) A double ridged waveguide was placed 3 meters away from the EUT. The antenna was connected to the input of a spectrum analyzer.
- 3) The center frequency of the analyzer was set to the high band edge (2483.5MHz)
- 4) The resolution bandwidth was set to 1MHz.
- 5) To ensure that the maximum or worst case emission level was measured, the following steps were taken:
 - a. The EUT was rotated so that all of its sides were exposed to the receiving antenna.
 - b. Since the measuring antenna is linearly polarized, both horizontal and vertical field components were measured.
 - c. The measuring antenna was raised and lowered from 1 to 4 meters for each antenna polarization to maximize the readings.
- 6) The highest measured peak reading was recorded.
- 7) The highest measured average reading was recorded.

5.4.2.2 High Band Edge

- 1) The output of the EUT was connected to the spectrum analyzer through 40dB of attenuation.
- 2) The EUT was set to transmit continuously at the channel closest to the high band-edge
- 3) To determine the band edge compliance, the following spectrum analyzer settings were used:
 - a. Center frequency = high band-edge frequency.
 - b. Span = Wide enough to capture the peak level of the emission operating on the channel closest to the band-edge, as well as any modulation products which fall outside of the authorized band of operation.
 - c. Resolution bandwidth (RBW) $\geq 1\%$ of the span.
 - d. The 'Max-Hold' function was engaged. The analyzer was allowed to scan until the envelope of the transmitter bandwidth was defined.
 - e. The marker was set on the peak of the in-band emissions. A display line was placed 20dB down from the peak of the in-band emissions. All emissions which fall outside of the authorized band of operation must be below the 20dB down display line. (All emissions to the right of the center frequency (band-edge) must be below the display line.)
- 4) The analyzer's display was plotted using a 'screen dump' utility.

5.5.3.Results

Pages 59 through 61 show the radiated band-edge compliance results. As can be seen from these plots, the radiated emissions at the low end band edge are within the 20 dB down limits. The radiated emissions at the high end band edge are within the general limits.

5.6. Power Spectral Density

5.6.1.Requirements

Per section 15.247(d), the peak power spectral density from the intentional radiator shall not be greater than 8

dBm in any 3 kHz band during any time interval of continuous transmission.

5.6.2.Procedures

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

5.6.3.Results

Pages 62 and 64 show the power spectral density results. As can be seen from the plots, the peak power density is less than 8dBm in a 3kHz band during any time interval of continuous transmission.

6. OTHER TEST CONDITIONS

6.1. Test Personnel and Witnesses

All tests were performed by qualified personnel from Elite Electronic Engineering Incorporated. The test series was witnessed by Master Lock Company personnel.

6.2. Disposition of the EUT

The EUT and all associated equipment were returned to Master Lock Company upon completion of the tests.

7. CONCLUSIONS

It was determined that the Master Lock Company Bluetooth Portable Lock Box and Bluetooth Wall Mount Lock Box, Model Nos. 5440 and 5441, digital modulation transmitters, no serial numbers, did fully meet the conducted and radiated emission requirements of the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart C, Sections 15.207 and 15.247 for Intentional Radiators Operating within the 2400-2483.5 MHz band, when tested per ANSI C63.4-2014.

It was also determined that the Master Lock Company Bluetooth Portable Lock Box and Bluetooth Wall Mount Lock Box, Model Nos. 5440 and 5441, digital modulation transmitters, no serial numbers, did fully meet the conducted and radiated RF emission requirements of the Industry Canada Radio Standards Specification, RSS-Gen Section 7.2.4 and RSS-247 Annex 8, for transmitters, when tested per ANSI C63.4-2014.



8. CERTIFICATION

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

The data presented in this test report pertains to the EUT at the test date as operated by Master Lock Company 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 certification, approval, or endorsement by NVLAP, NIST or any agency of the Federal Government.



9. EQUIPMENT LIST

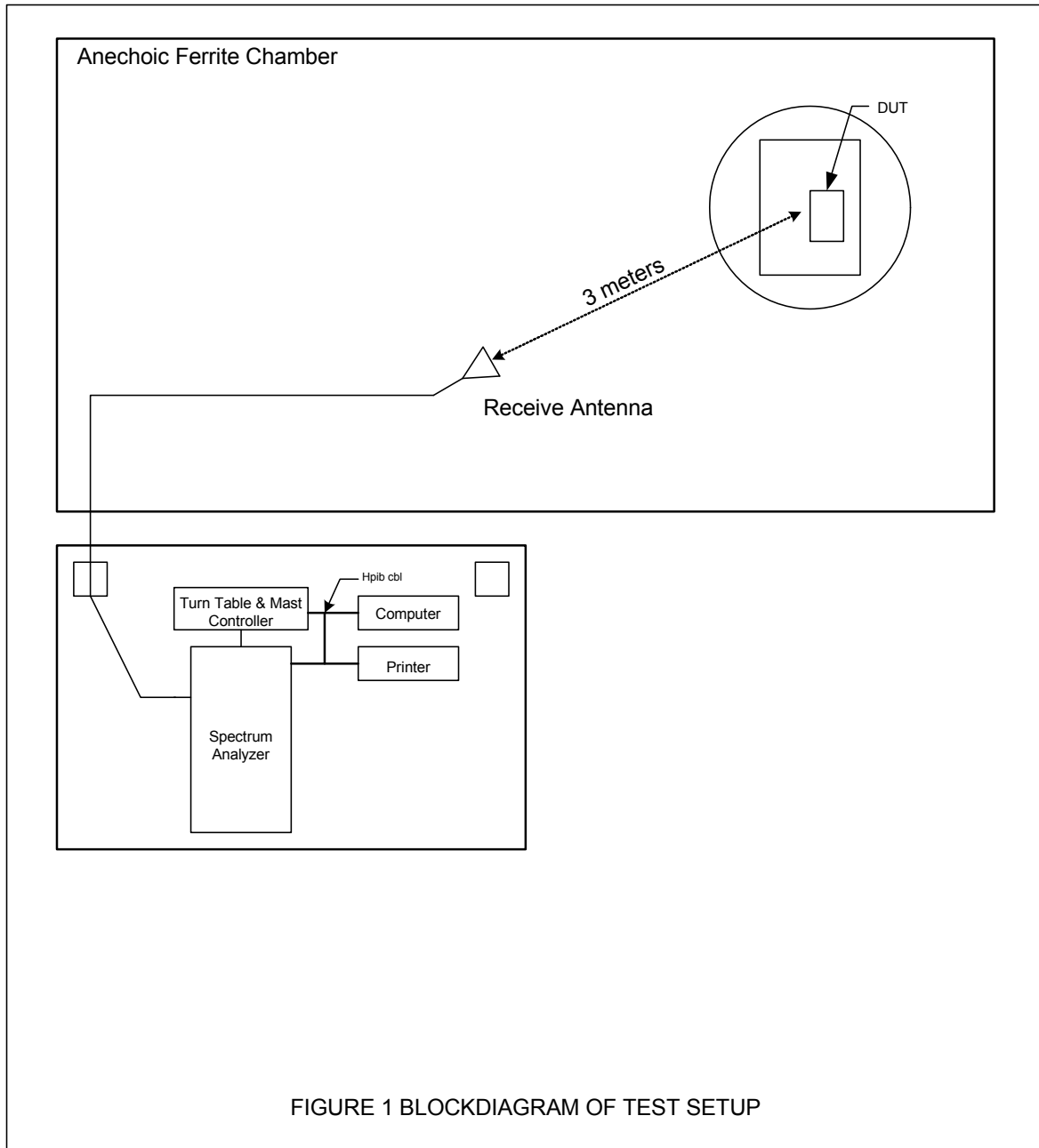
Table 9-1 Equipment List

Eq ID	Equipment Description	Manufacturer	Model No.	Serial No.	Frequency Range	Cal Date	Due Date
APW11	PREAMPLIFIER	PMI	PE2-35-120-5R0-10-12-SFF	PL11685/1241	1GHZ-20GHZ	4/18/2016	4/18/2017
APW4	PREAMPLIFIER	PLANAR	PE2-36-2D540G-5R0-10	PL3043/0651	26.5GHZ-40GHZ	3/2/2016	3/2/2017
GSFB	OSP120 BASE UNIT	ROHDE & SCHWARZ	OSP120	101246	---	9/9/2016	9/9/2017
MPC1	DUAL POWER METER	HEWLETT PACKARD	EPM-442A	US37480258	0.1MHZ-50GHZ	2/5/2016	2/5/2017
MPI4	POWER SENSOR	KEYSIGHT	E9304A	MY56120003	9KHZ-6GHZ	4/26/2016	4/26/2017
NHG1	STANDARD GAIN HORN ANTENNA	NARDA	638	---	18-26.5GHZ	NOTE 1	
NSA7	LOG PERIODIC ANTENNA	AMPLIFIER RESEARCH	AT1080	14239	80-1000MHZ	NOTE 1	
NWQ0	DOUBLE RIDGED WAVEGUIDE ANTENNA	ETS LINDGREN	3117	66657	1GHZ-18GHZ	5/18/2016	5/18/2018
NWQ1	DOUBLE RIDGED WAVEGUIDE ANTENNA	ETS-LINDGREN	3117	66655	1GHZ-18GHZ	4/4/2016	4/4/2018
RBE1	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESU26	100096	20Hz-26GHz	10/18/2016	10/18/2017
XLZ3	50 OHM TERMINATION	PASTERNAK	PE6009	004	DC-18GHZ	7/7/2016	7/7/2017
XOB1	ADAPTER	HEWLETT PACKARD	K281C	10422	18-26.5GHZ	NOTE 1	

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.



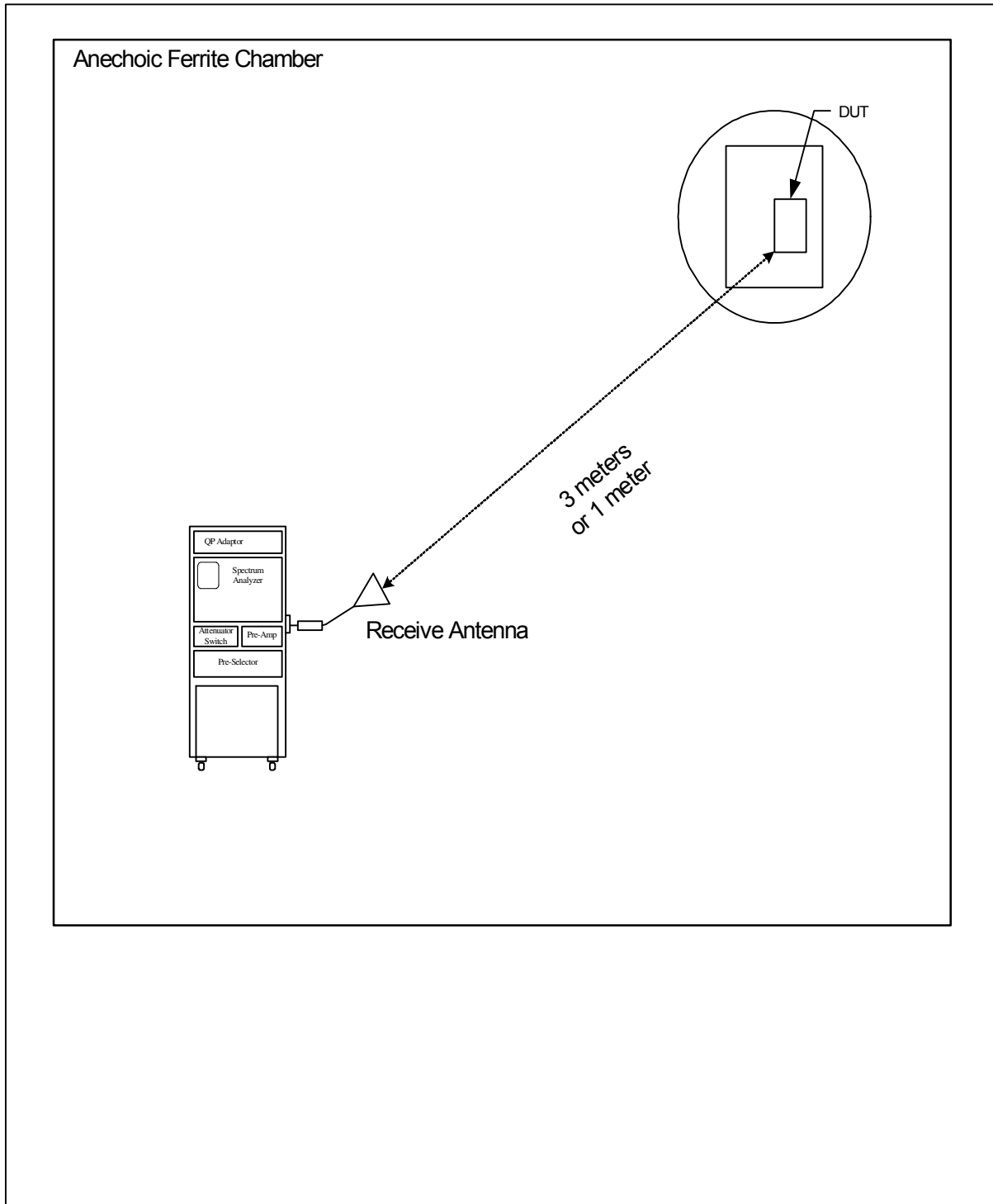
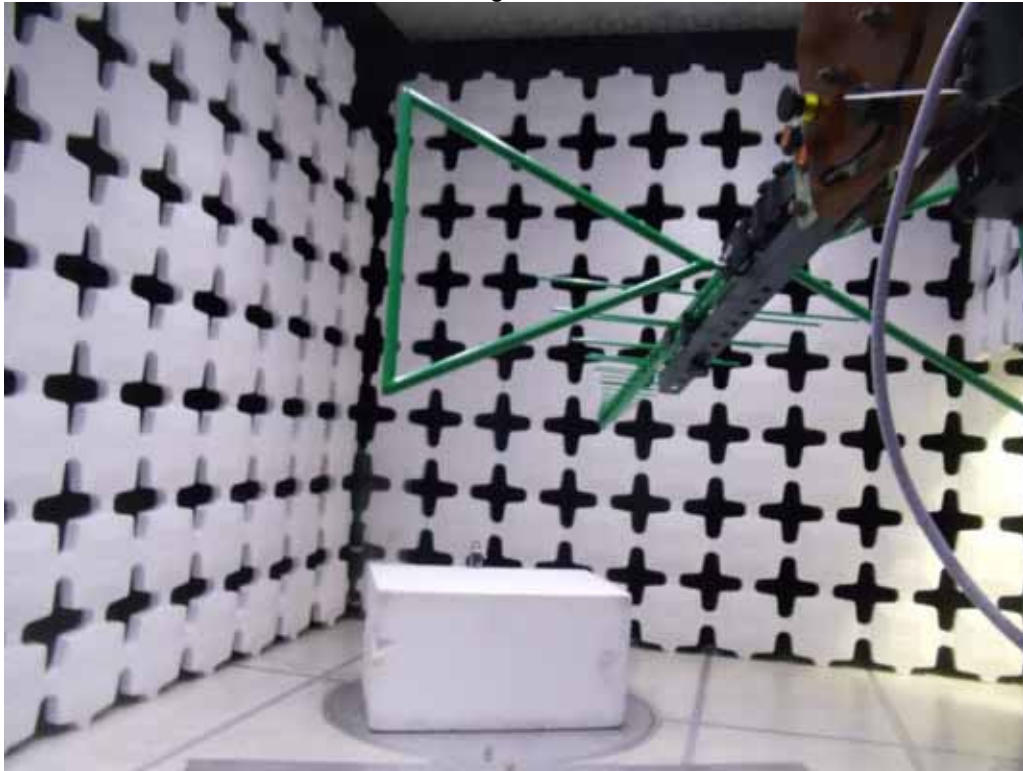


Figure 2



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



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

Figure 3

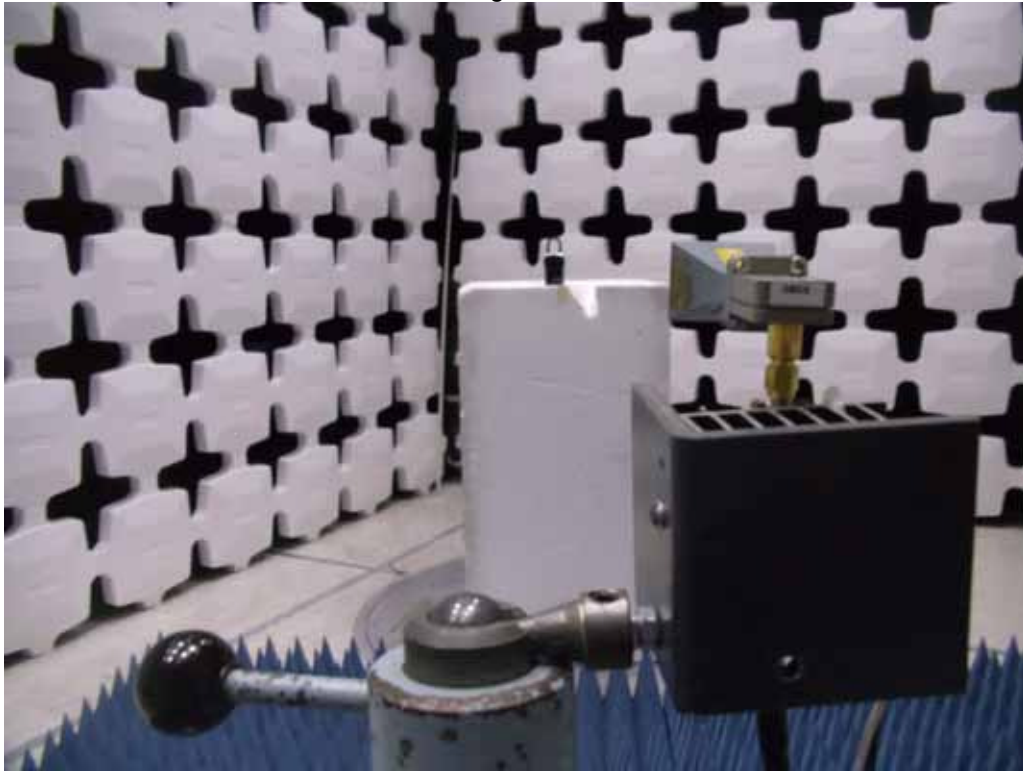


Test Setup for Radiated Emissions, 1GHz to 18GHz – Horizontal Polarization

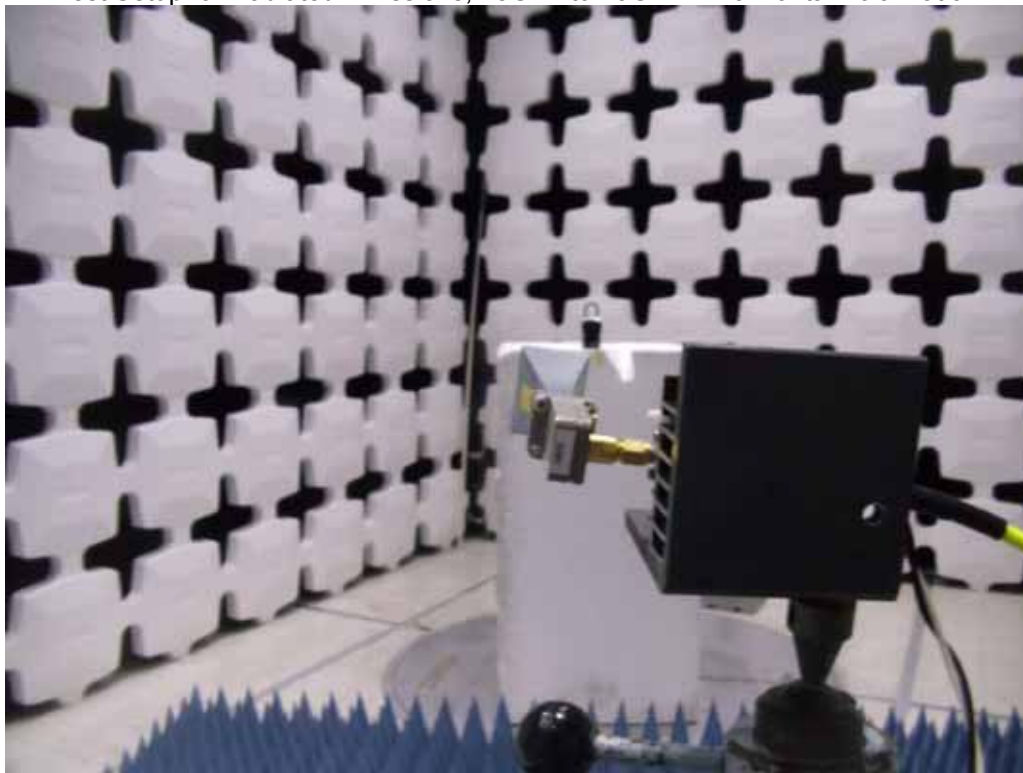


Test Setup for Radiated Emissions, 1GHz to 18GHz – Vertical Polarization

Figure 4



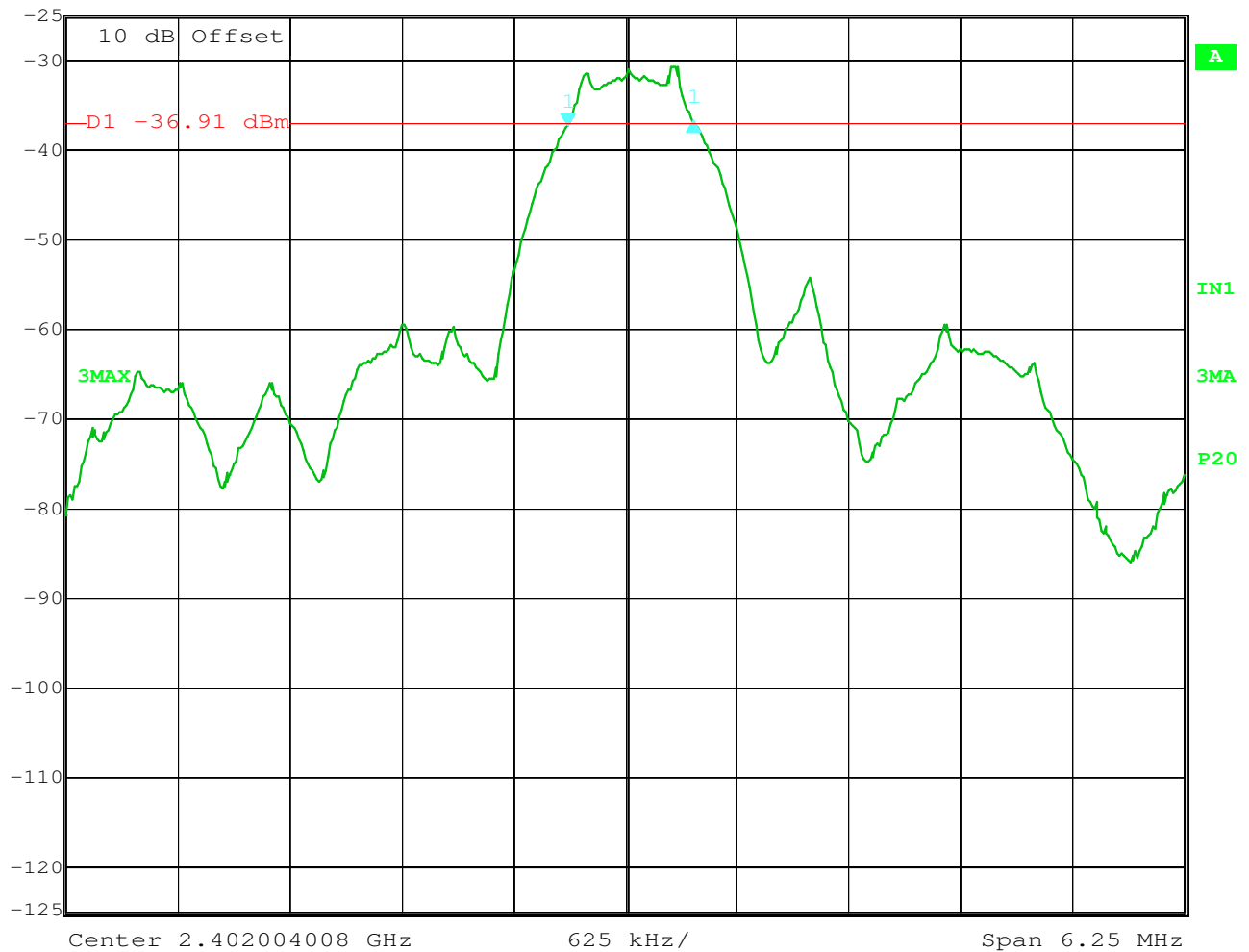
Test Setup for Radiated Emissions, 18GHz to 25GHz – Horizontal Polarization



Test Setup for Radiated Emissions, 18GHz to 25GHz – Vertical Polarization



Delta 1 [T3] RBW 100 kHz RF Att 0 dB
Ref Lvl 0.26 dB VBW 1 MHz
-25 dBm 701.40280561 kHz SWT 5 ms Unit dBm



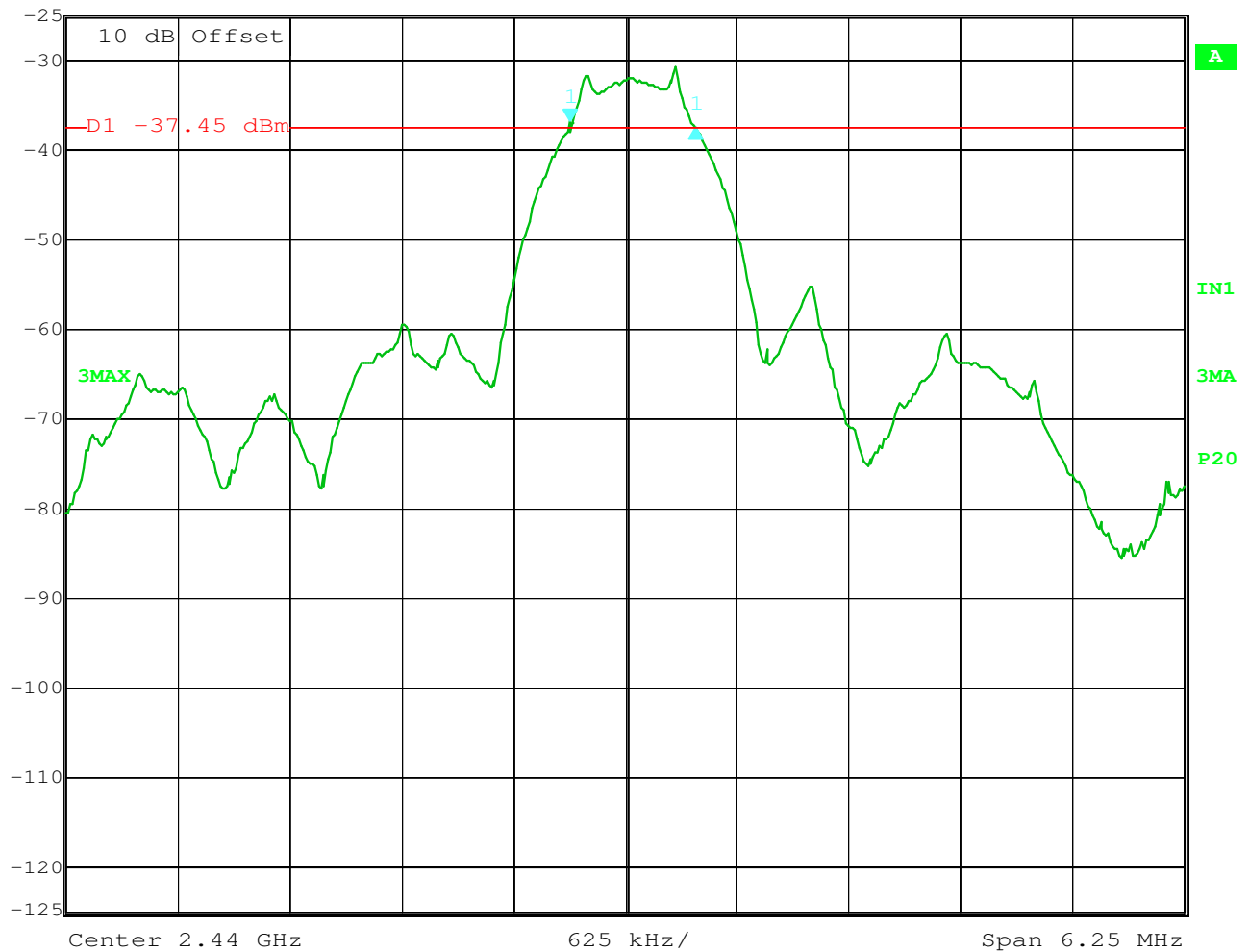
Date: 6.DEC.2016 12:53:51

FCC 15.247 DTS (6 dB) Bandwidth

Manufacturer : Master Lock
Model Number : 5440 and 5441
Mode : Tx @ 2402MHz
Parameters : 6 dB BW = 701.42kHz
Date : 12/6/2016 12:53:51 PM
Notes :



Delta 1 [T3] RBW 100 kHz RF Att 0 dB
Ref Lvl -0.74 dB VBW 1 MHz
-25 dBm 701.40280561 kHz SWT 5 ms Unit dBm



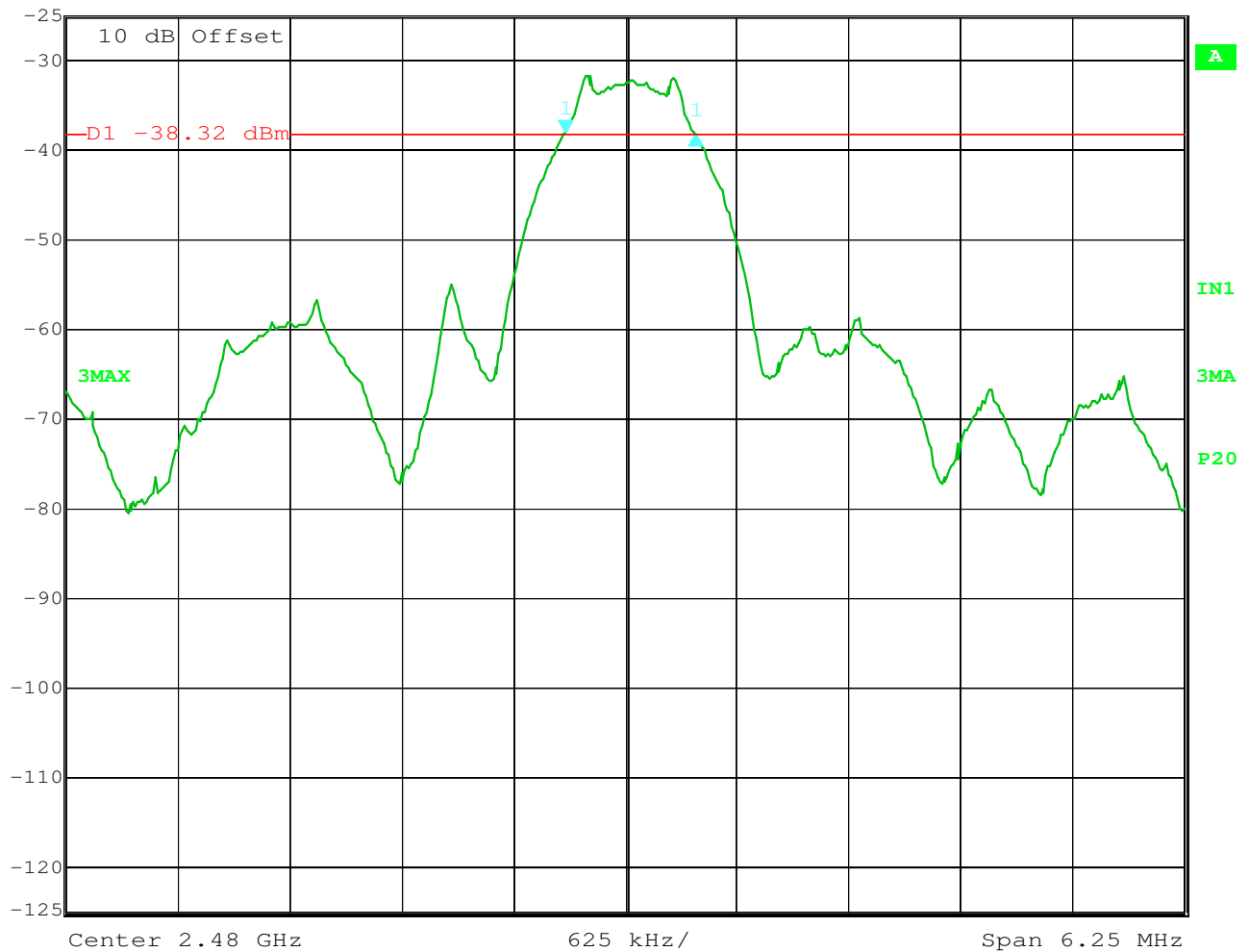
Date: 6.DEC.2016 12:59:37

FCC 15.247 DTS (6 dB) Bandwidth

Manufacturer : Master Lock
Model Number : 5440 and 5441
Mode : Tx 2440 MHz
Parameters : 6 dB BW = 701.4kHz
Date : 12/6/2016 12:59:37 PM
Notes :



Delta 1 [T3] RBW 100 kHz RF Att 0 dB
Ref Lvl -0.34 dB VBW 1 MHz
-25 dBm 726.45290581 kHz SWT 5 ms Unit dBm



Date: 6.DEC.2016 13:02:01

FCC 15.247 DTS (6 dB) Bandwidth

Manufacturer : Master Lock
Model Number : 5440 and 5441
Mode : Tx 2480 MHz
Parameters : 6 dB BW = 726.45kHz
Date : 12/6/2016 13:02:01 PM
Notes :



MANUFACTURER : Master Lock
MODEL NUMBER : 5440 and 5441
TEST PERFORMED : EIRP
TEST DATE : December 1, 2016
TEST MODE : Transmit at 2402MHz
NOTES :
TEST DISTANCE : 3 meters

Freq. (MHz)	Ant Pol	Wide BW Meter Reading (dBuV)	Matched Sig. Gen. Reading (dBm)	Equivalent Antenna Gain (dB)	Cable Loss (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
2402.00	H	42.4	-22.9	4.8	4.1	-22.2	36.0	-58.2
2402.00	V	39.0	-25.4	4.8	4.1	-24.8	36.0	-60.8

$EIRP(dBm) = Sig. Gen. Reading (dBm) + Equivalent Antenna Gain (dB) - Cable Loss (dB)$

Checked BY RICHARD E. KING :

Richard E. King



MANUFACTURER : Master Lock
MODEL NUMBER : 5440 and 5441
TEST PERFORMED : EIRP
TEST DATE : December 1, 2016
TEST MODE : Transmit at 2440MHz
NOTES :
TEST DISTANCE : 3 meters

Freq. (MHz)	Ant Pol	Wide BW Meter Reading (dBuV)	Matched Sig. Gen. Reading (dBm)	Equivalent Antenna Gain (dB)	Cable Loss (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
2440.00	H	42.0	-23.2	4.8	4.2	-22.6	36.0	-58.6
2440.00	V	34.6	-29.8	4.8	4.2	-29.1	36.0	-65.1

$EIRP(dBm) = \text{Sig. Gen. Reading (dBm)} + \text{Equivalent Antenna Gain (dB)} - \text{Cable Loss (dB)}$

Checked BY RICHARD E. KING :

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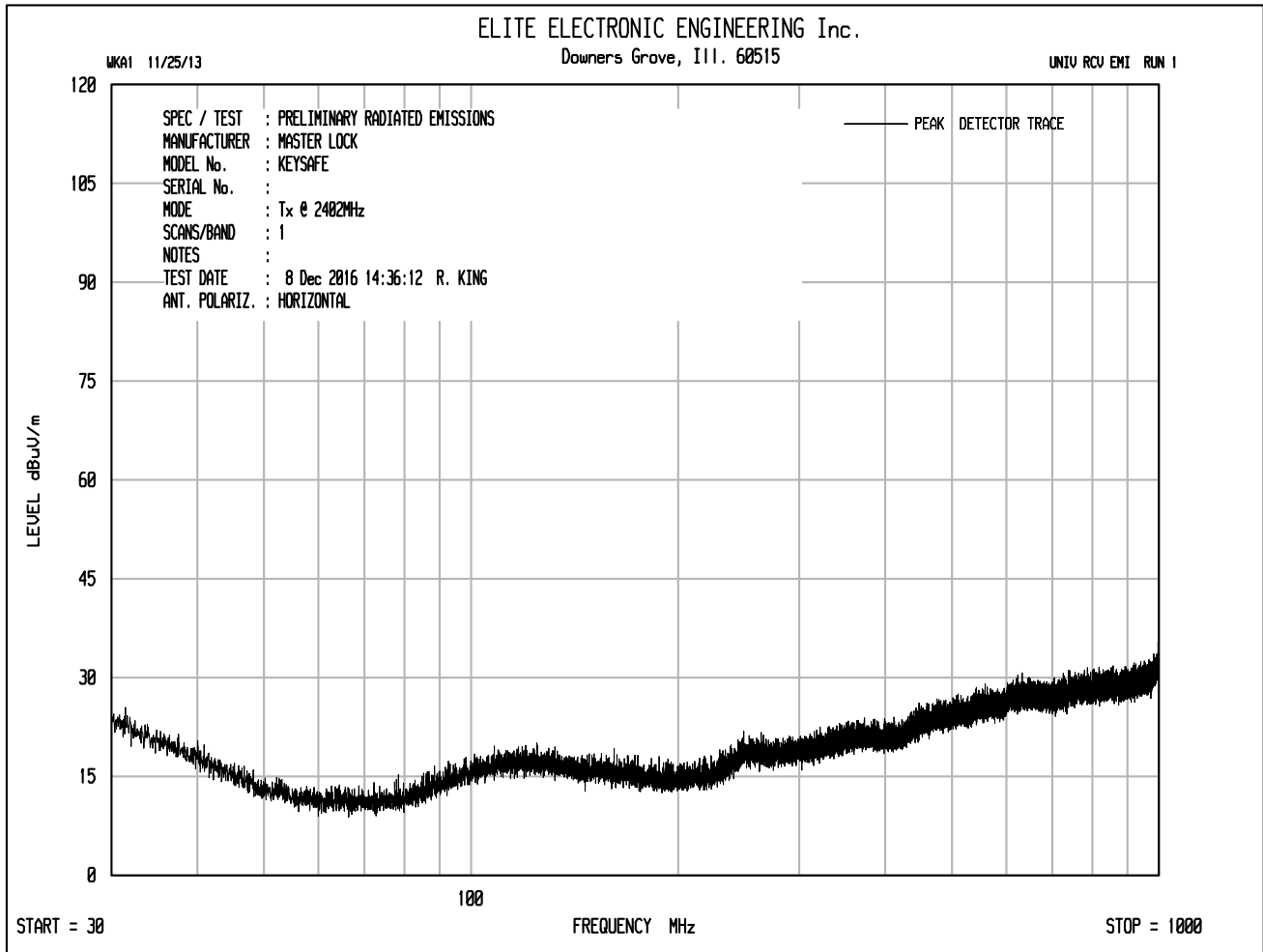
MANUFACTURER : Master Lock
MODEL NUMBER : 5440 and 5441
TEST PERFORMED : EIRP
TEST DATE : December 1, 2016
TEST MODE : Transmit at 2480MHz
NOTES :
TEST DISTANCE : 3 meters

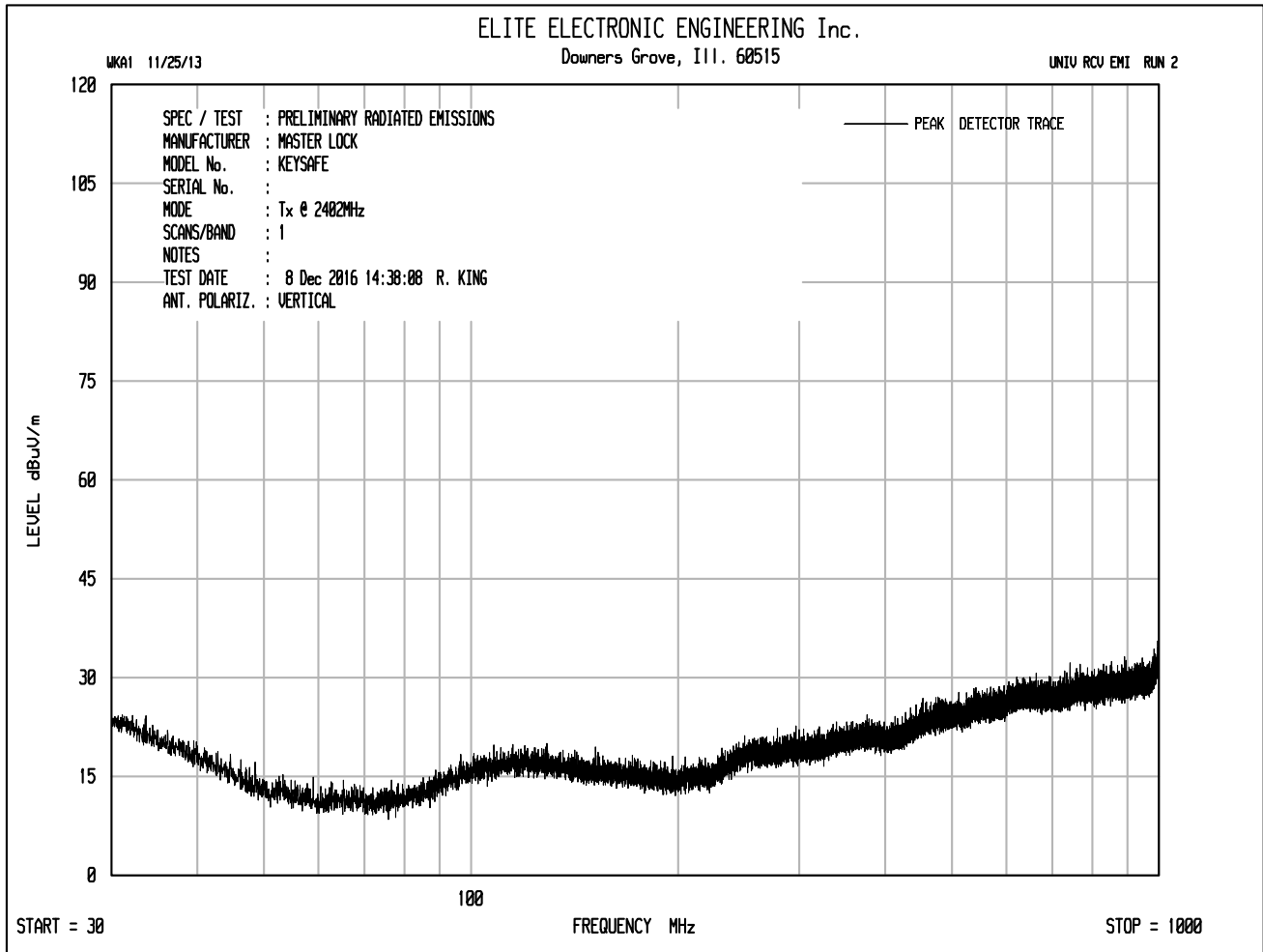
Freq. (MHz)	Ant Pol	Wide BW Meter Reading (dBuV)	Matched Sig. Gen. Reading (dBm)	Equivalent Antenna Gain (dB)	Cable Loss (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
2480.00	H	40.3	-25.6	4.9	4.2	-24.9	36.0	-60.9
2480.00	V	30.9	-33.4	4.9	4.2	-32.7	36.0	-68.7

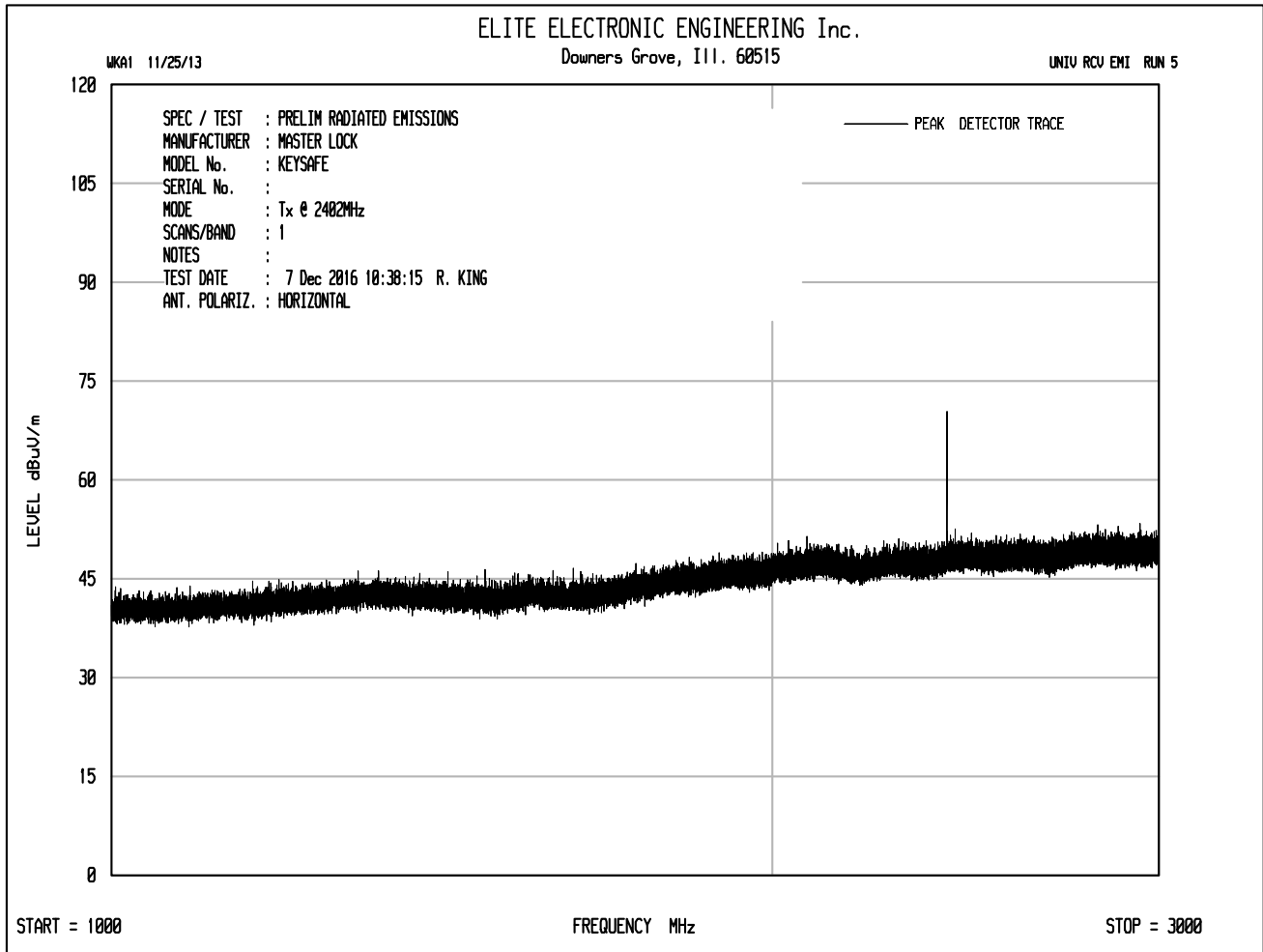
$EIRP(dBm) = Sig. Gen. Reading (dBm) + Equivalent Antenna Gain (dB) - Cable Loss (dB)$

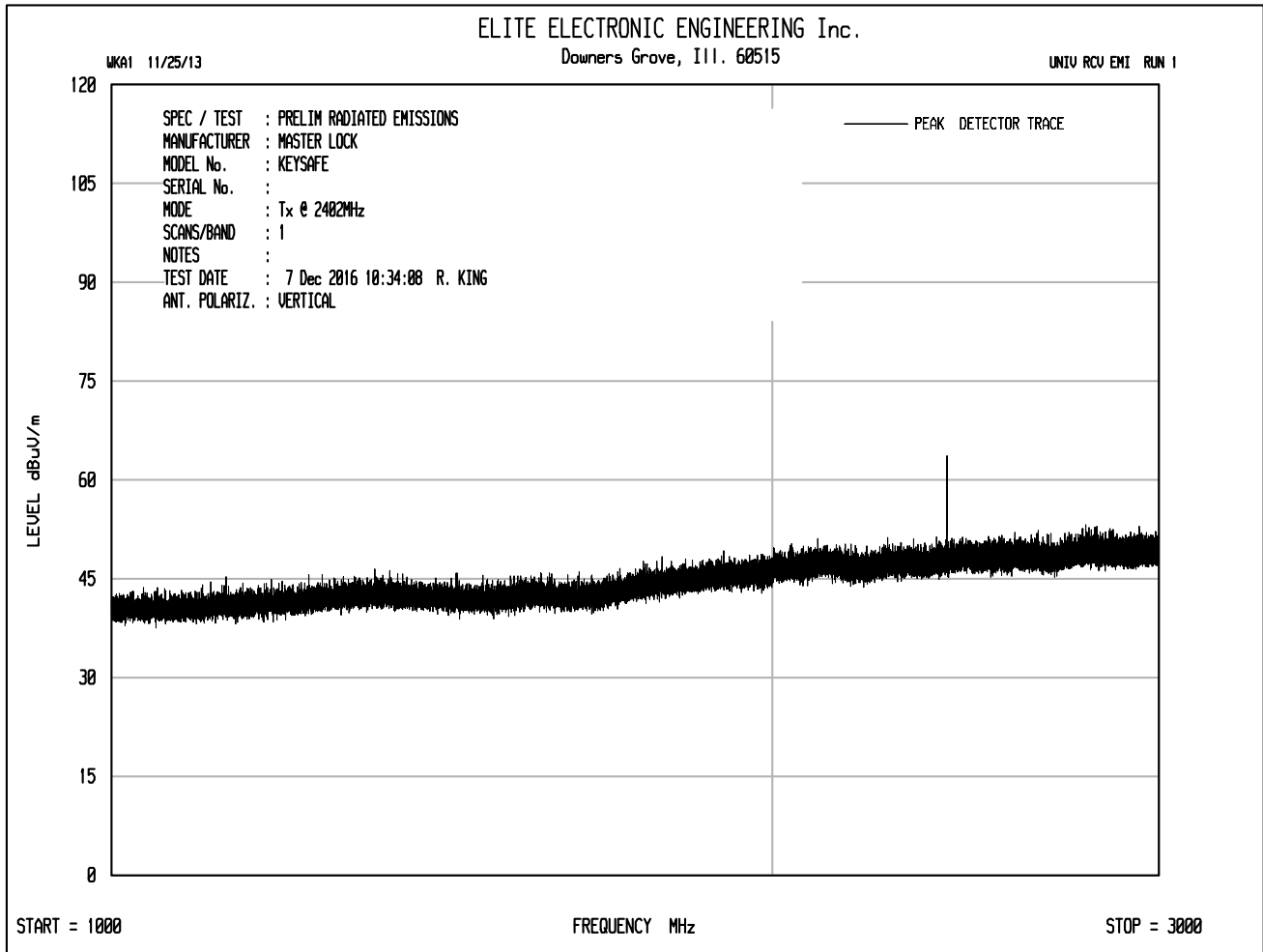
Checked BY RICHARD E. King :

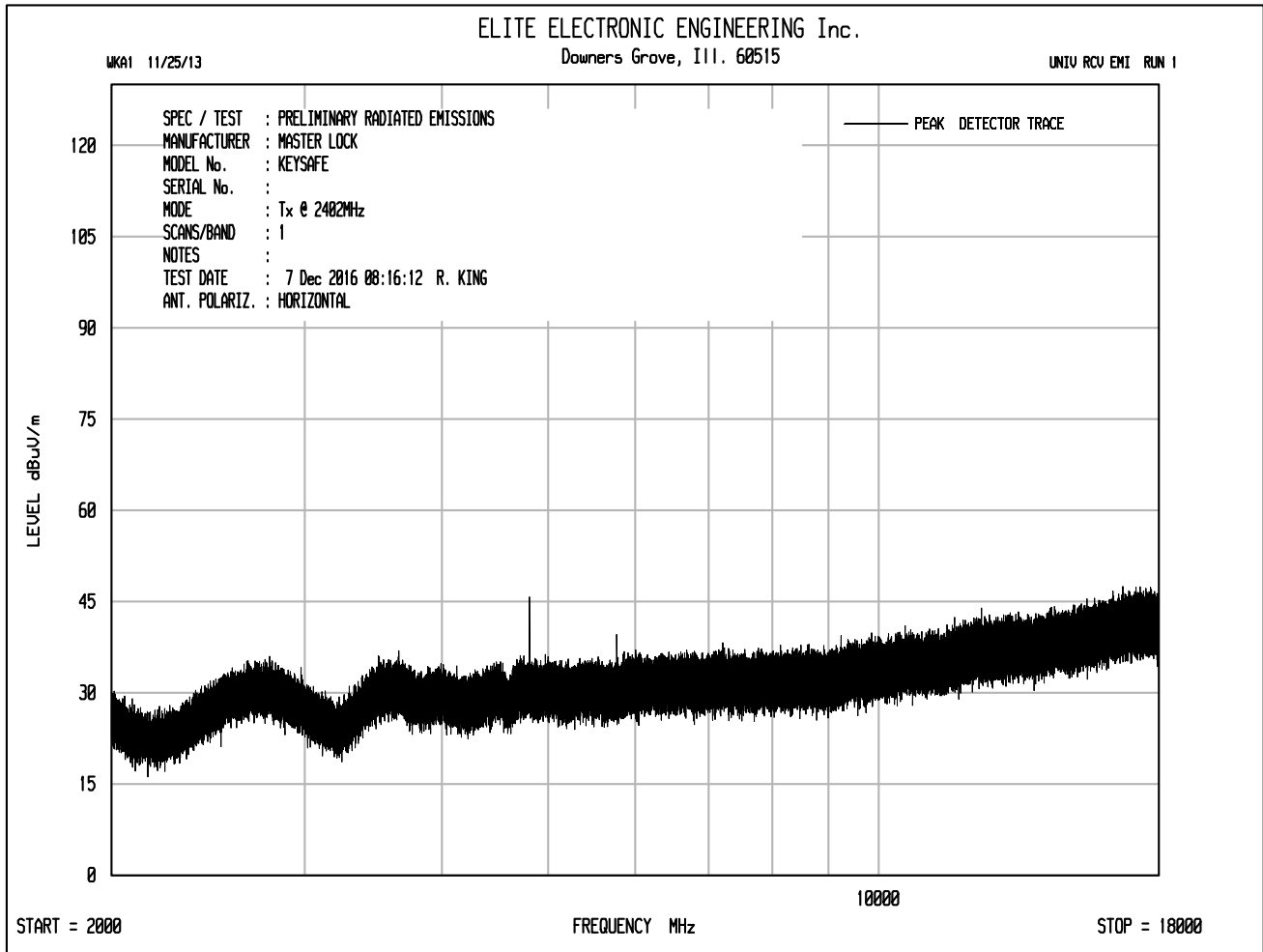
Richard E. King

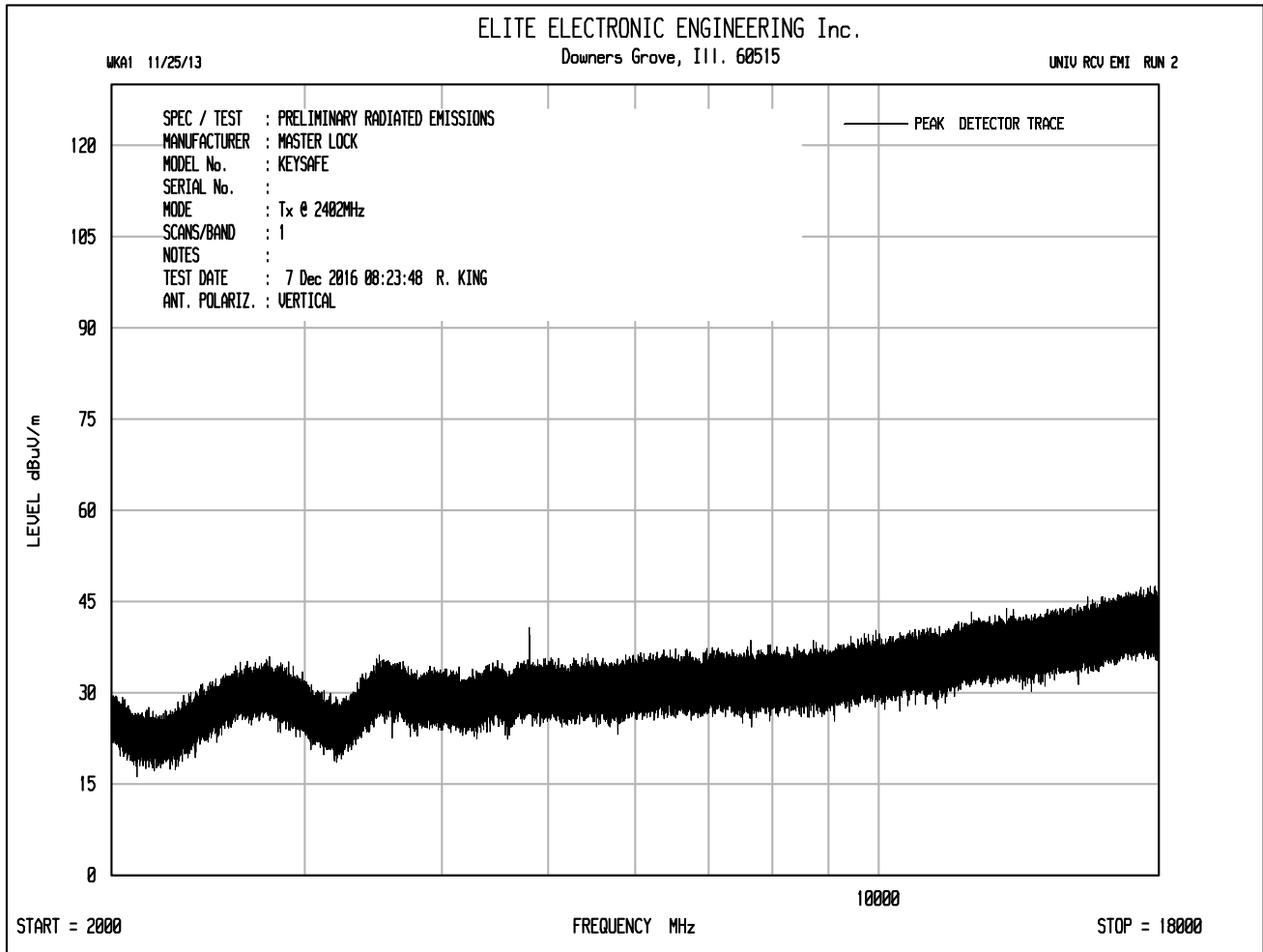


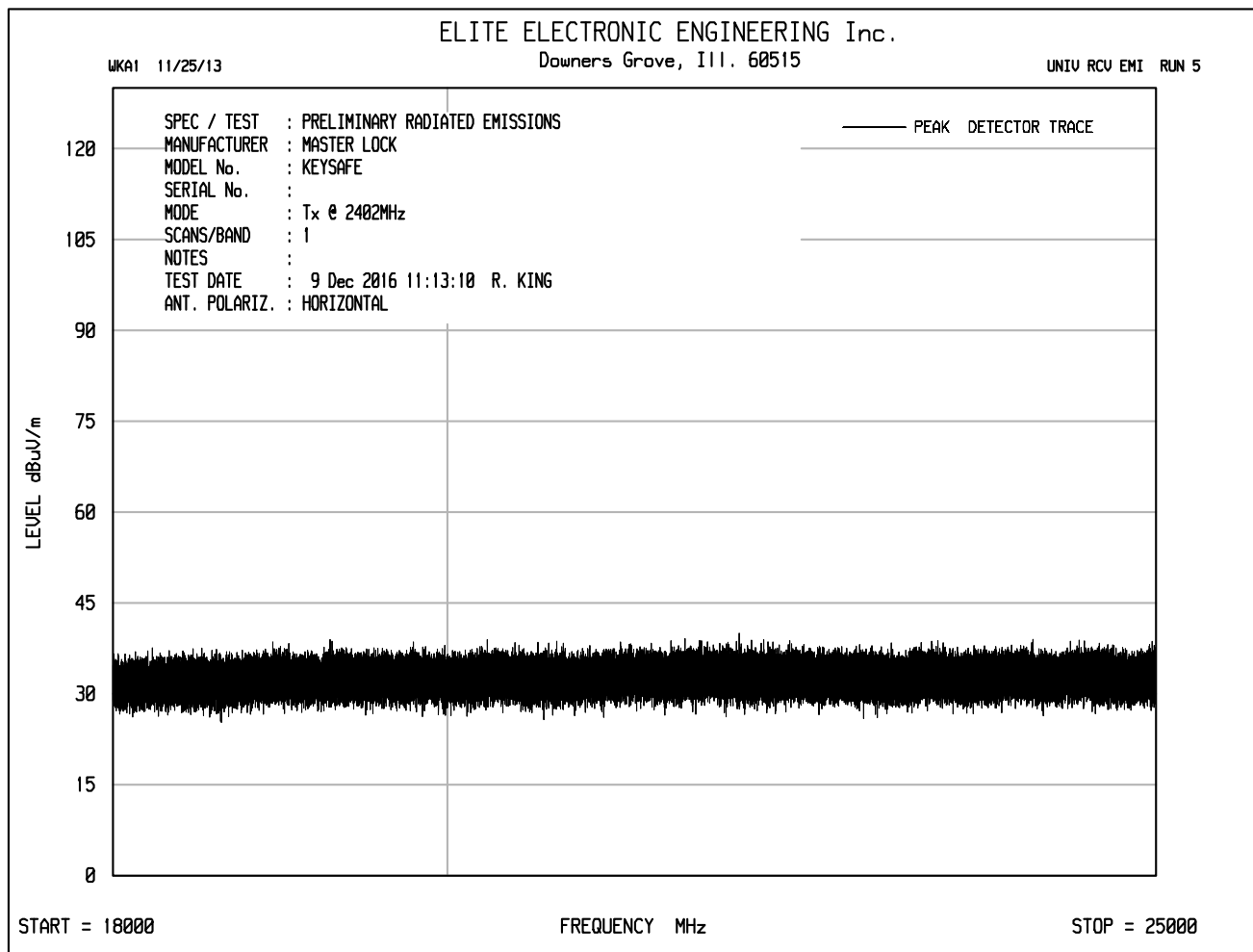


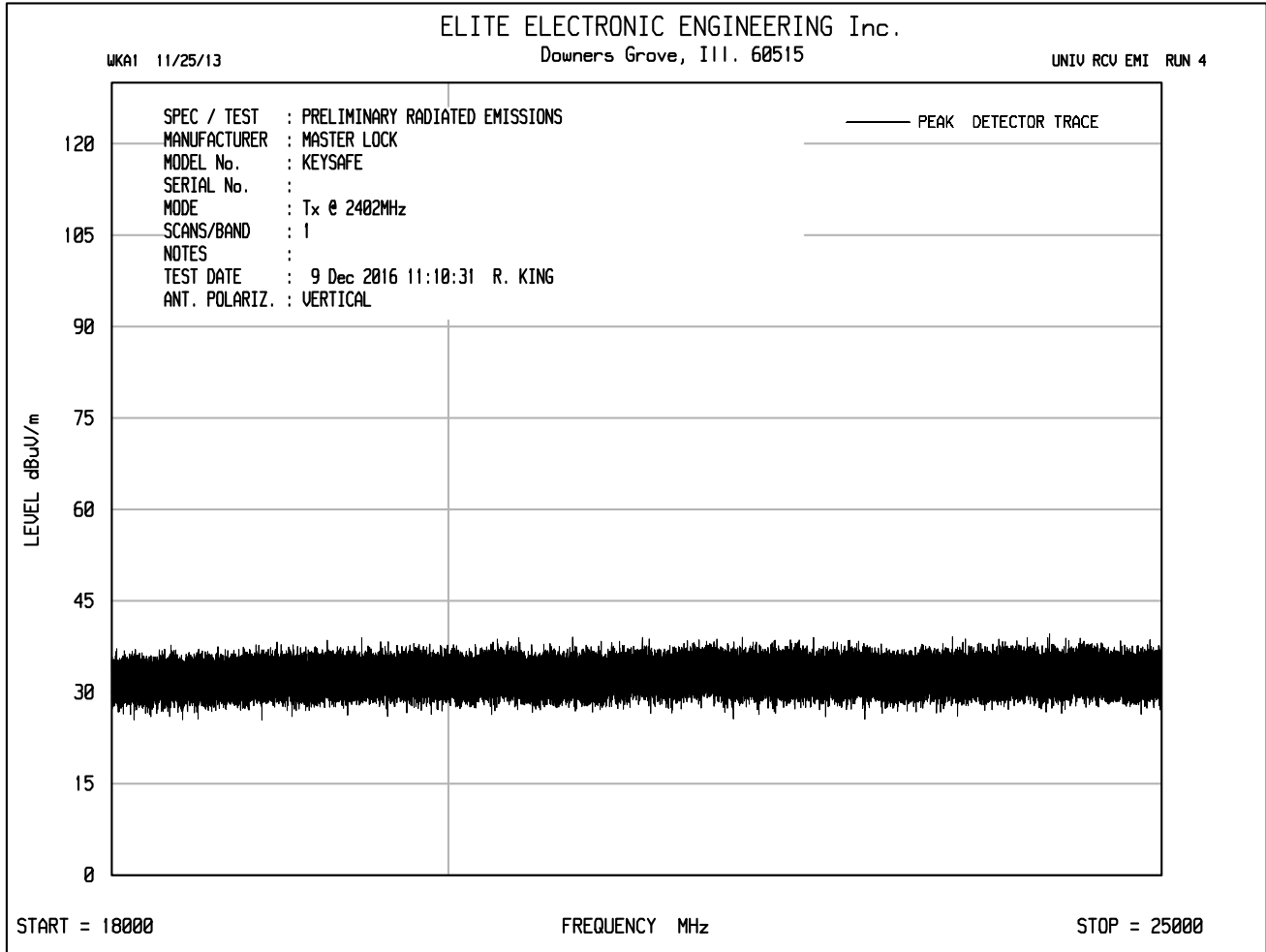


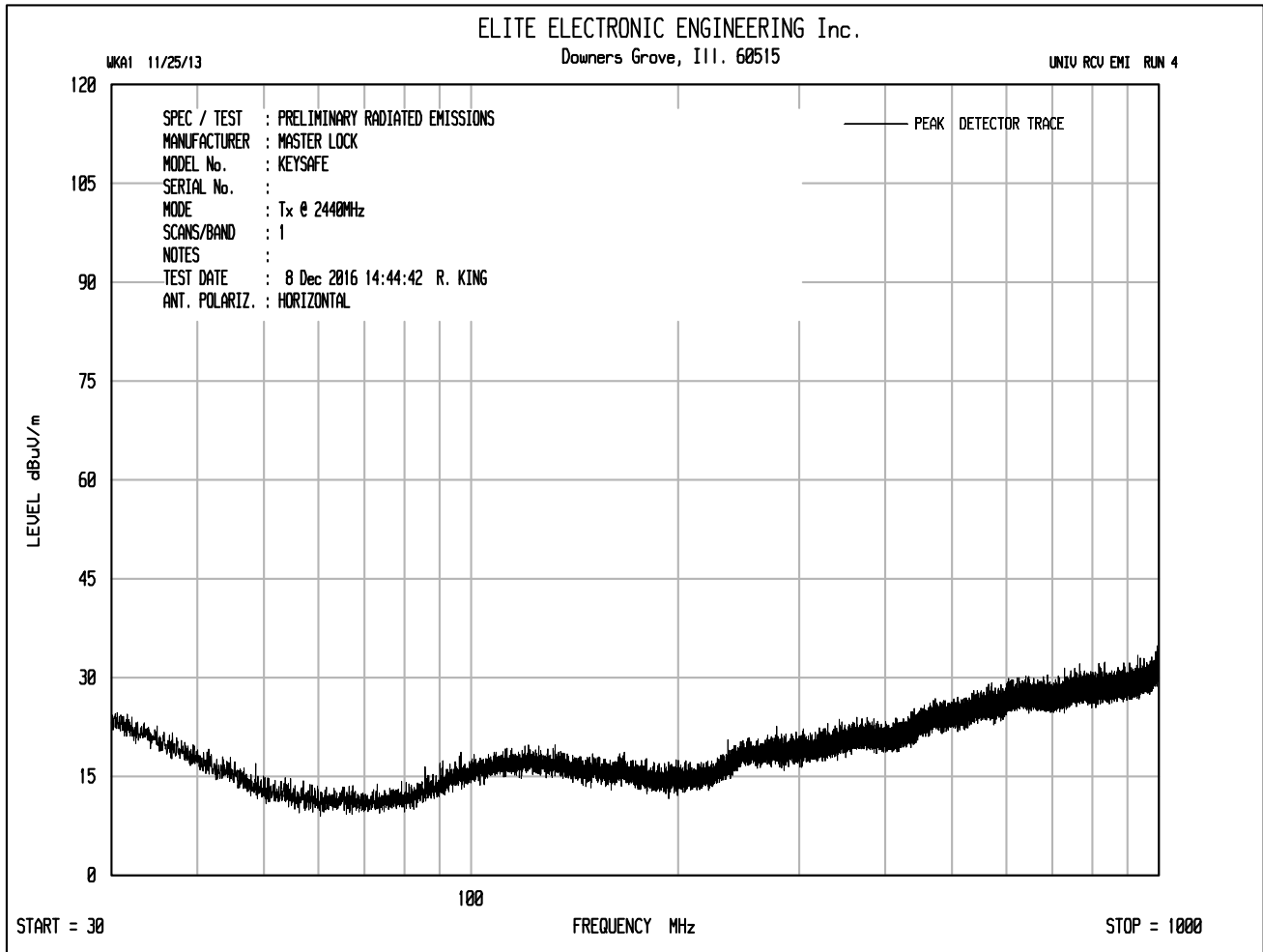


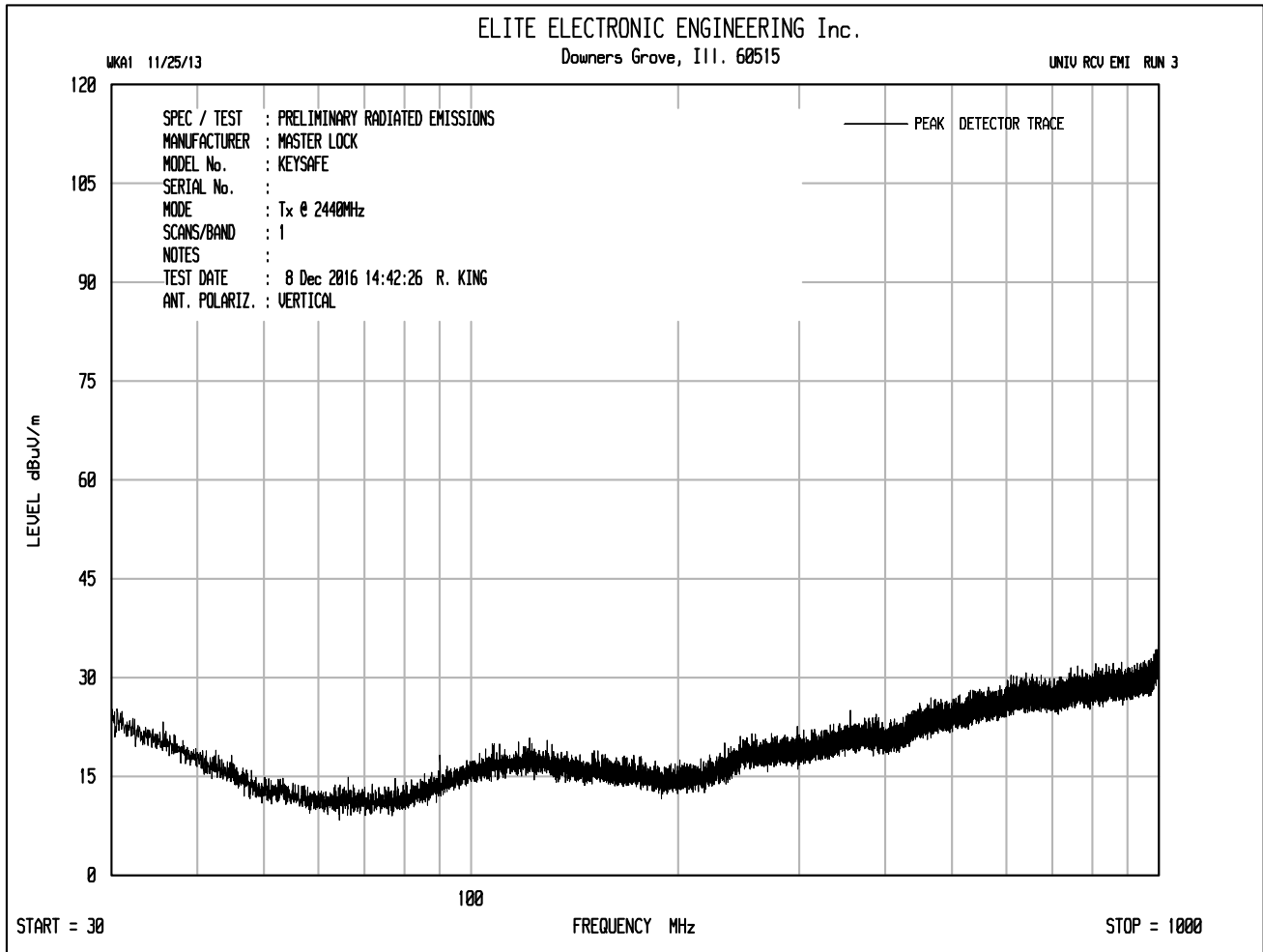


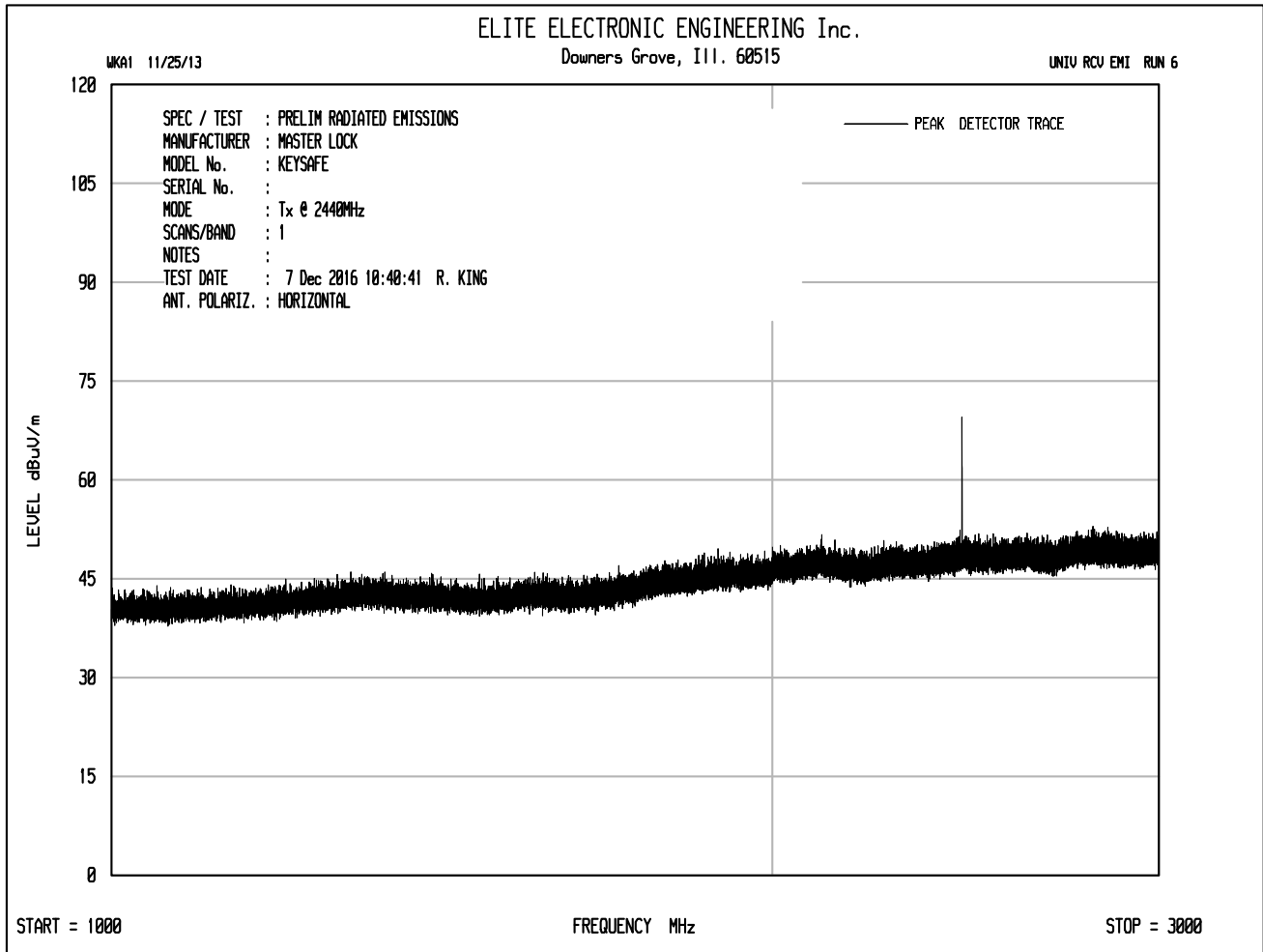


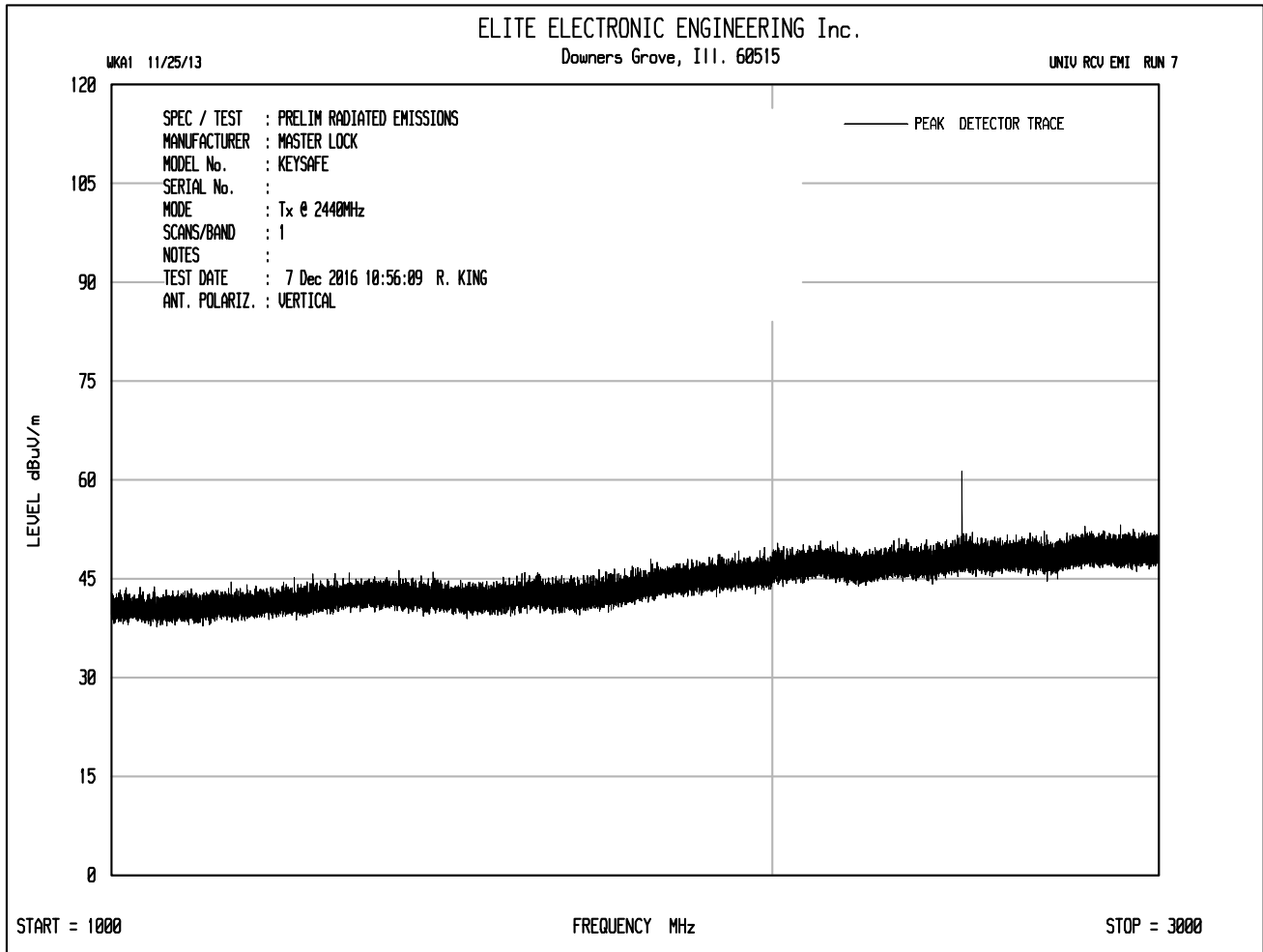


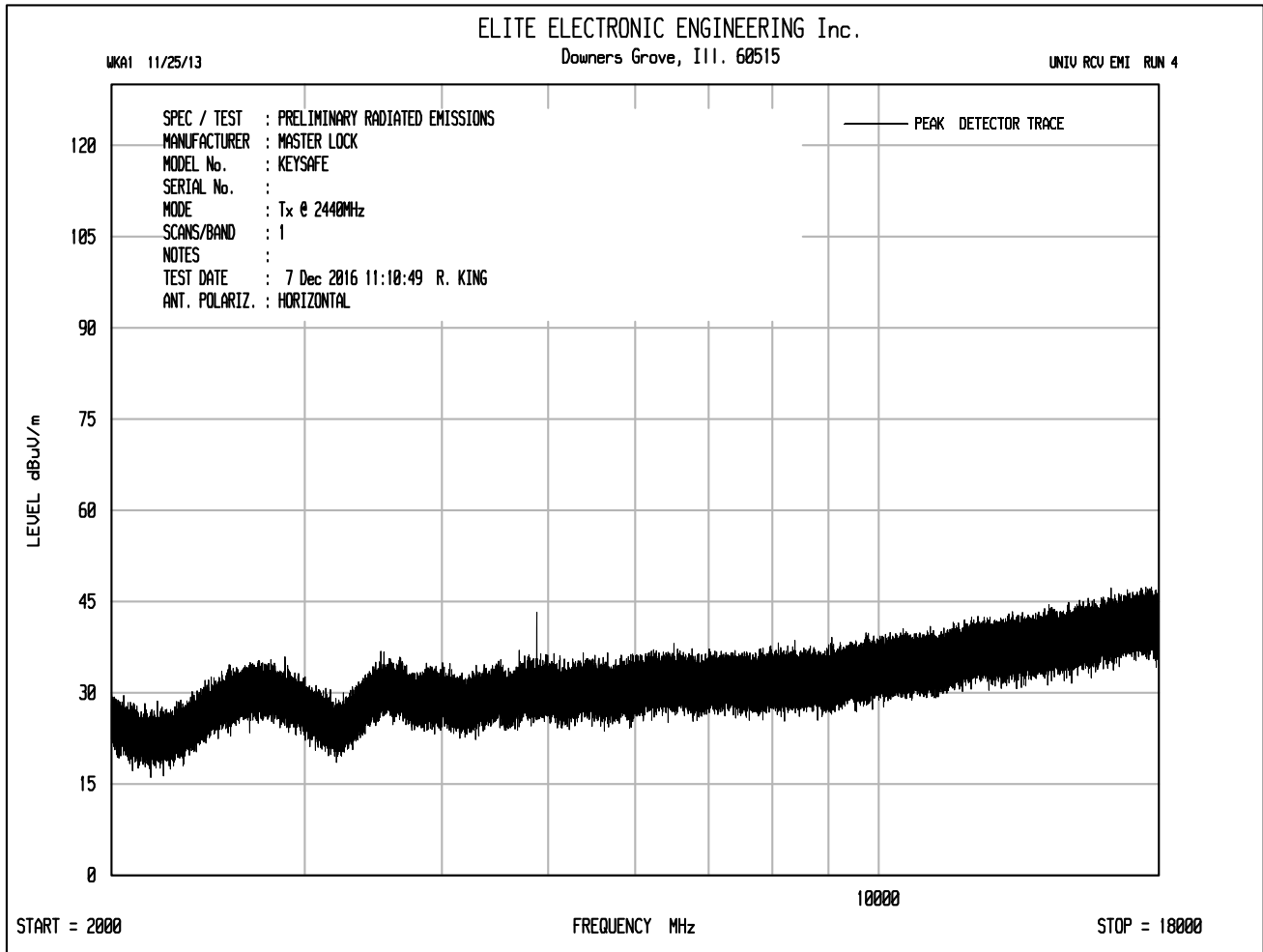


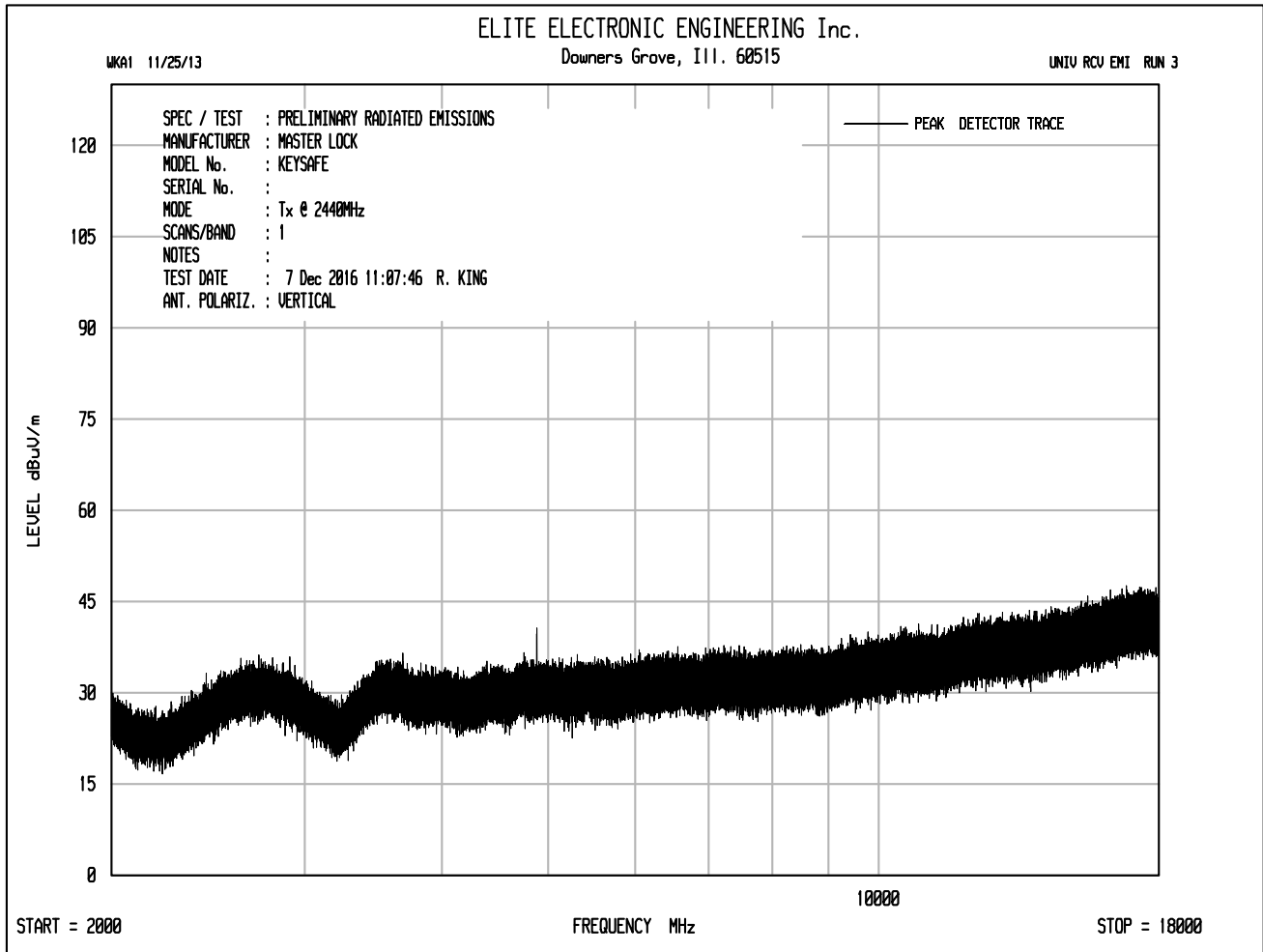


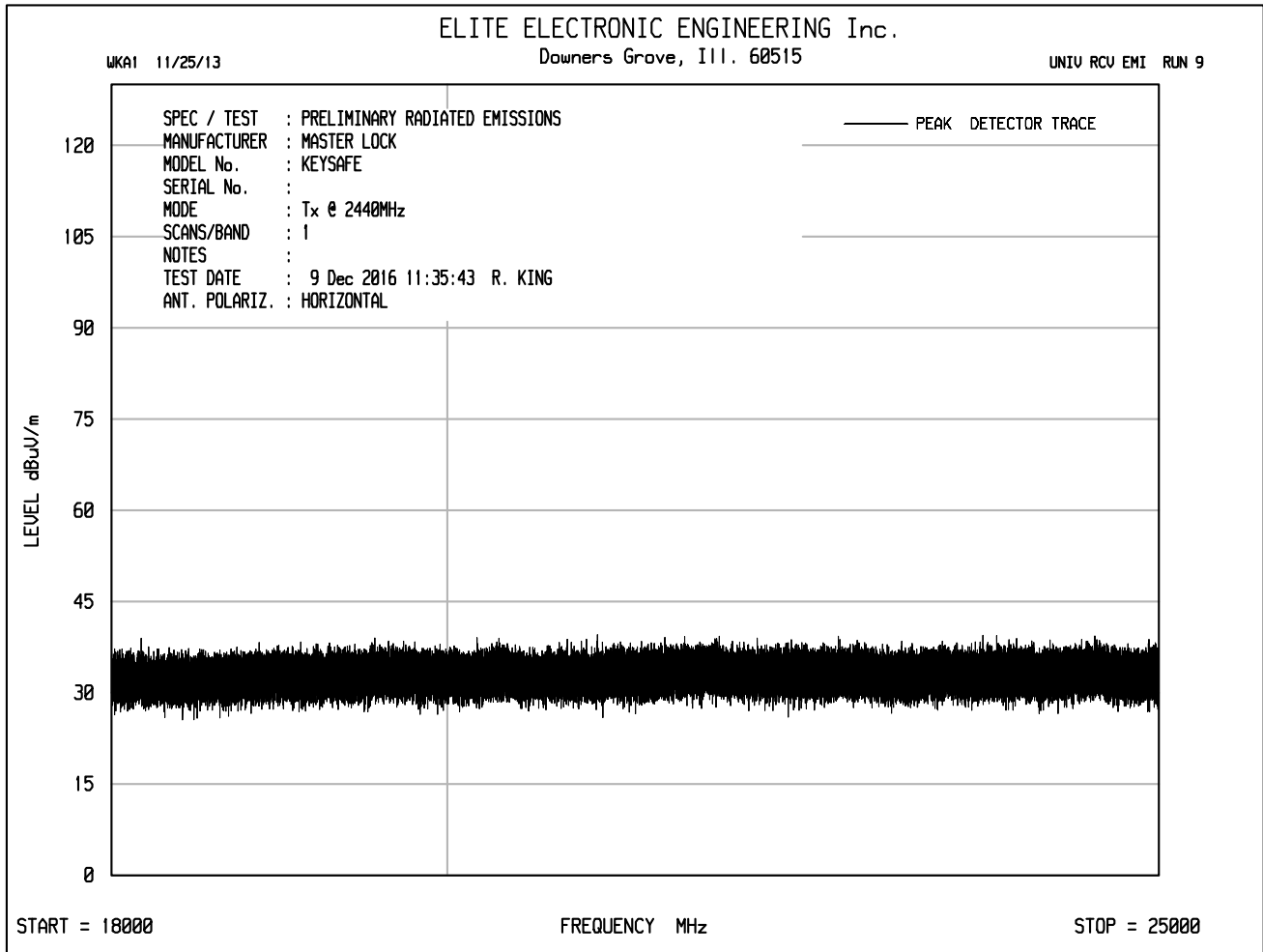


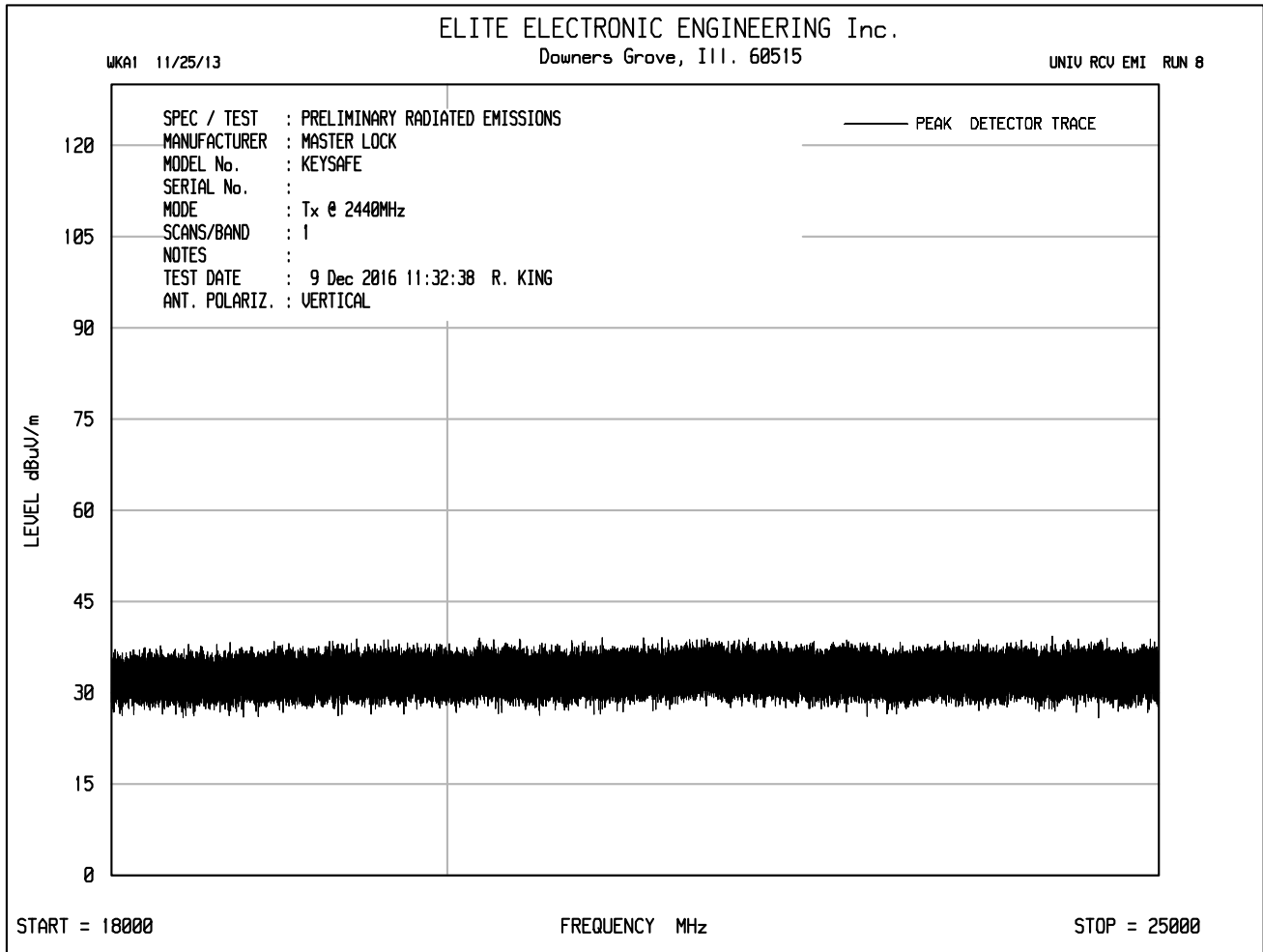


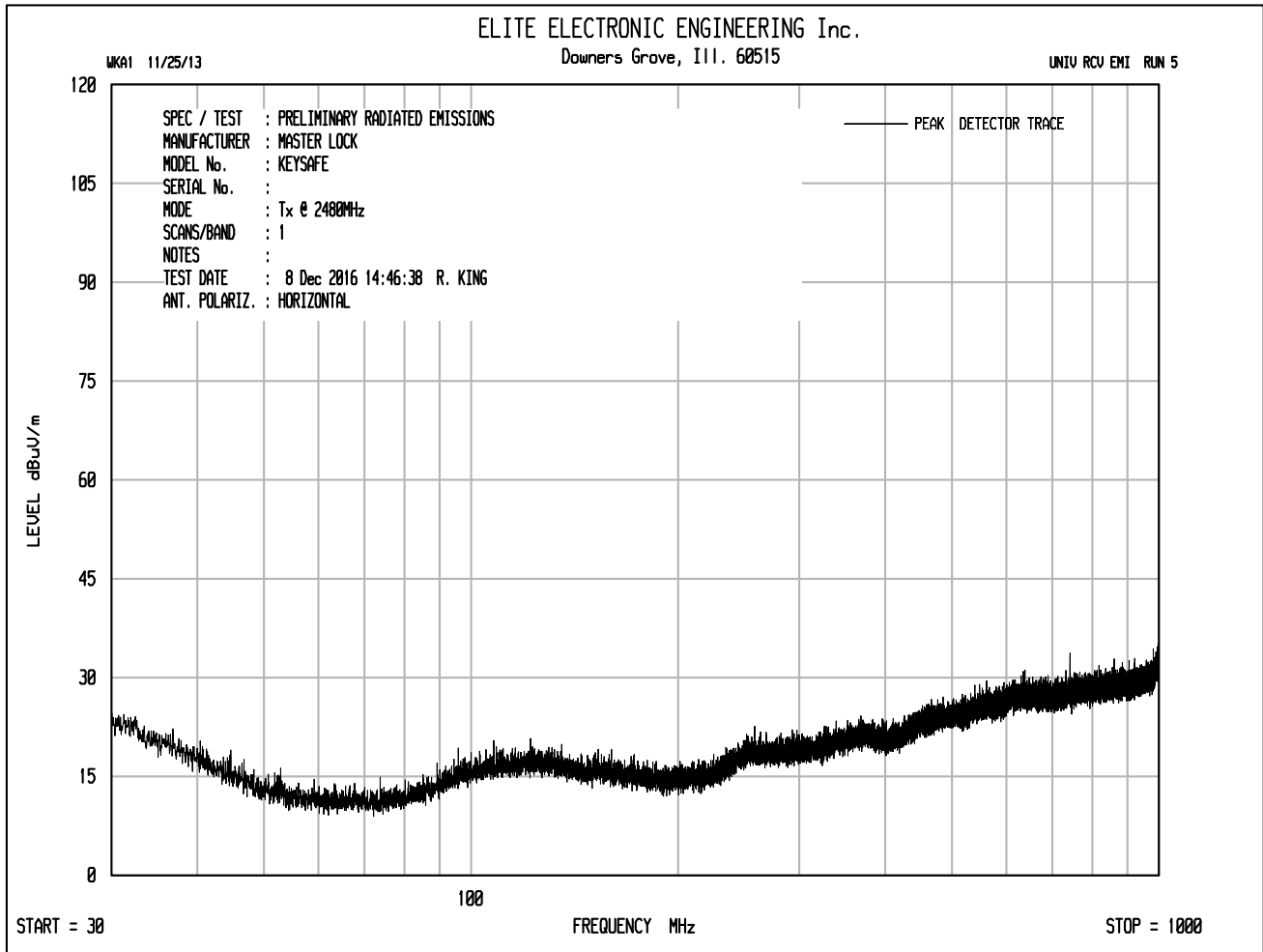


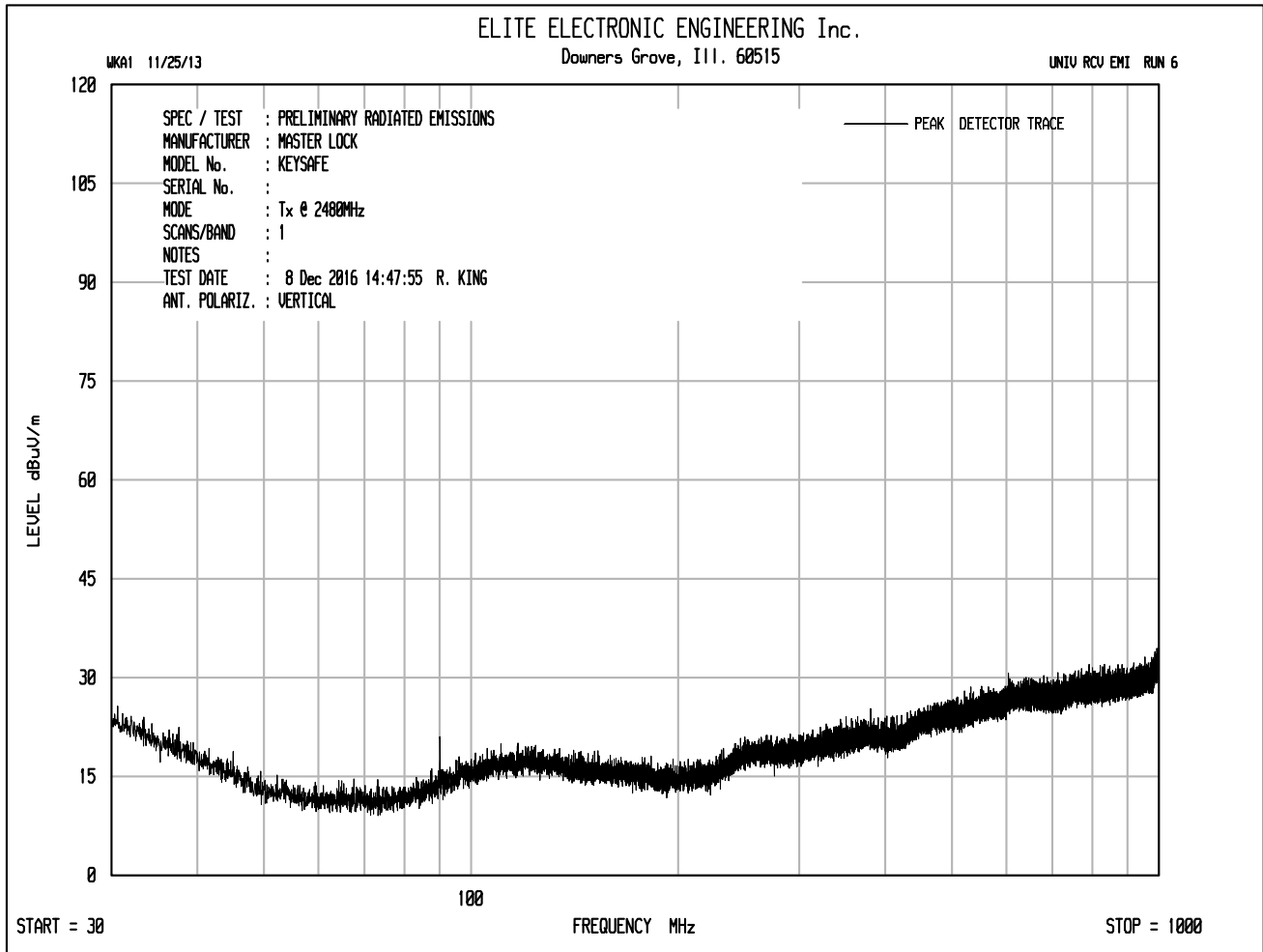


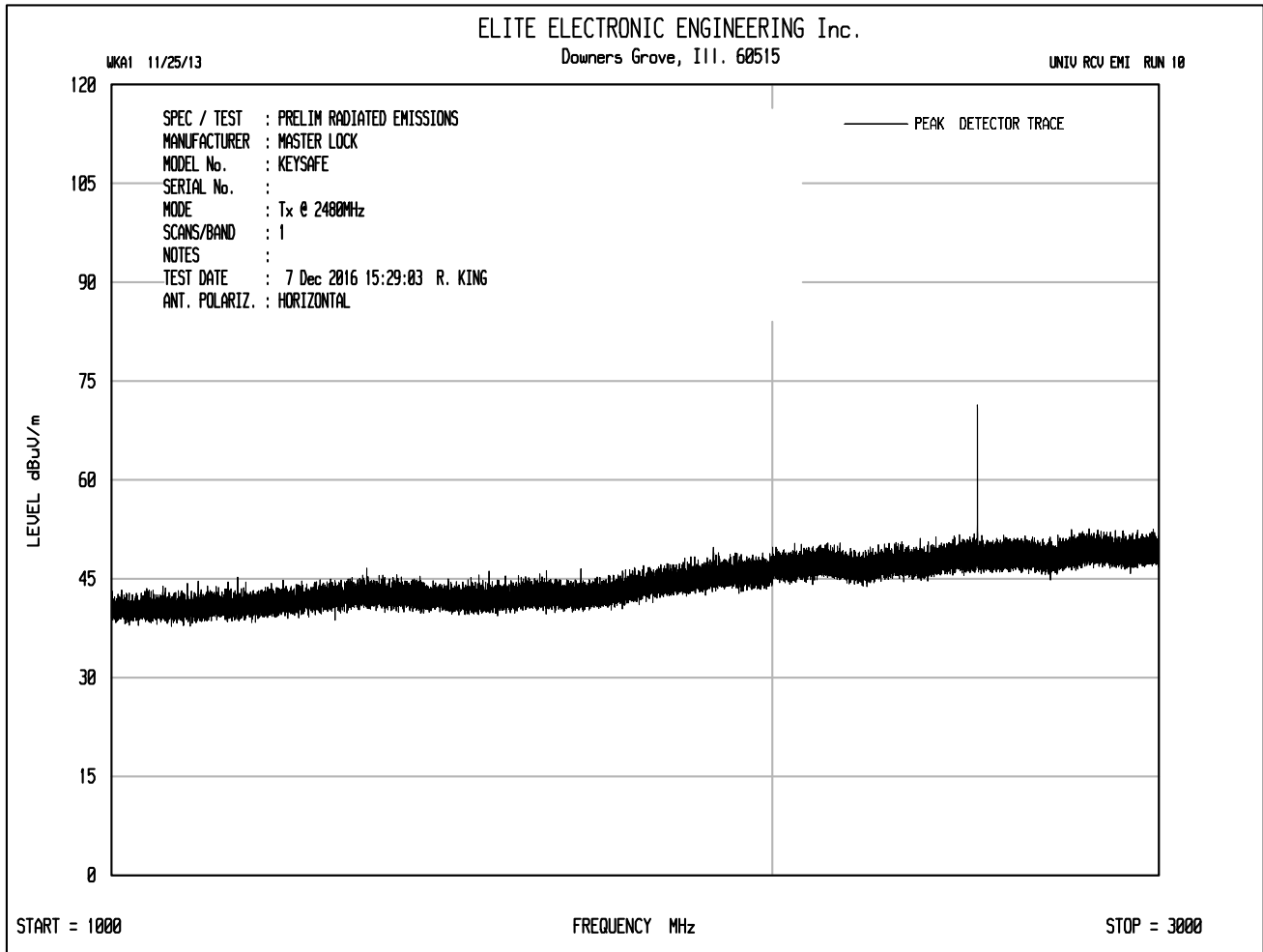


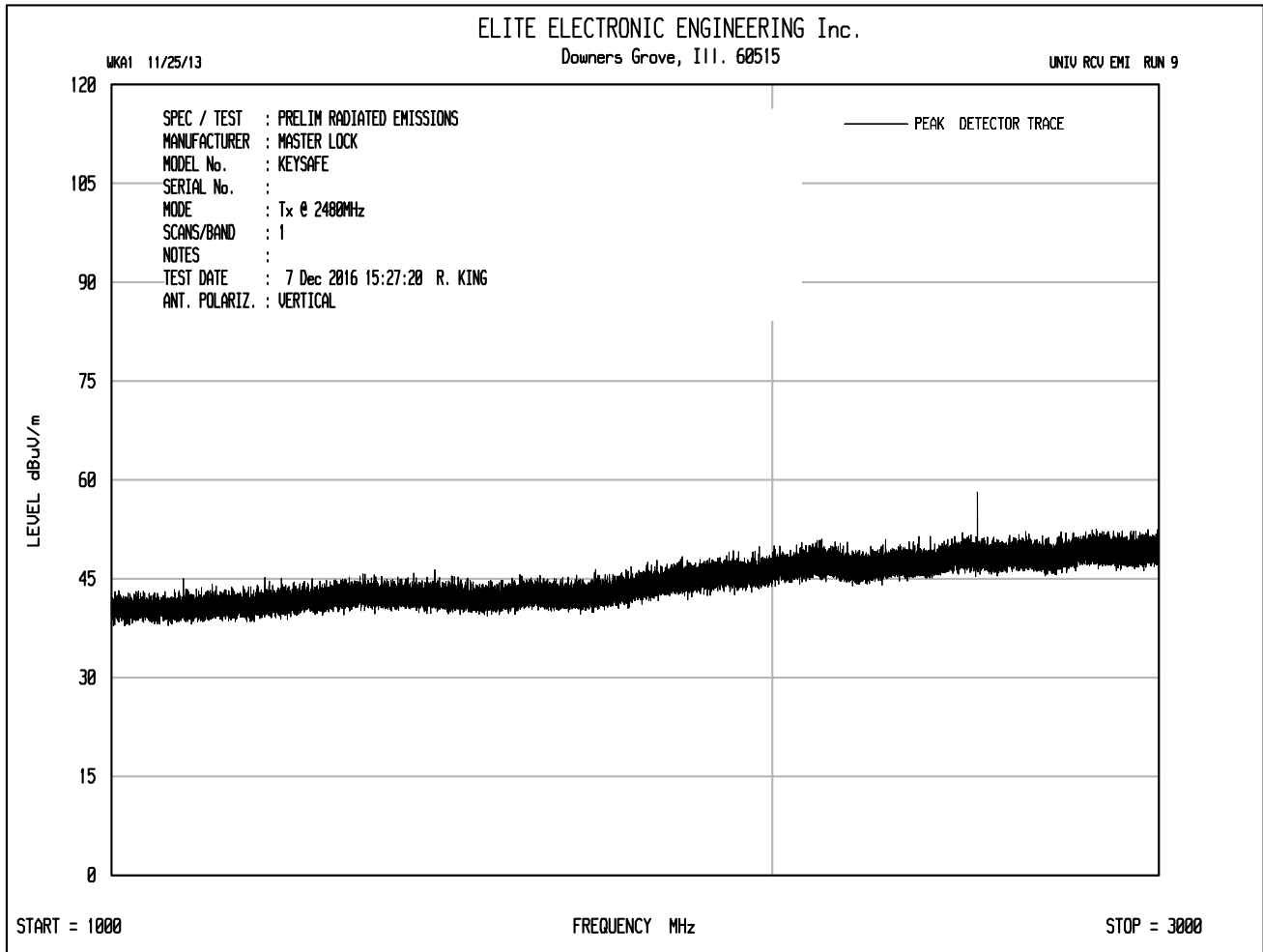


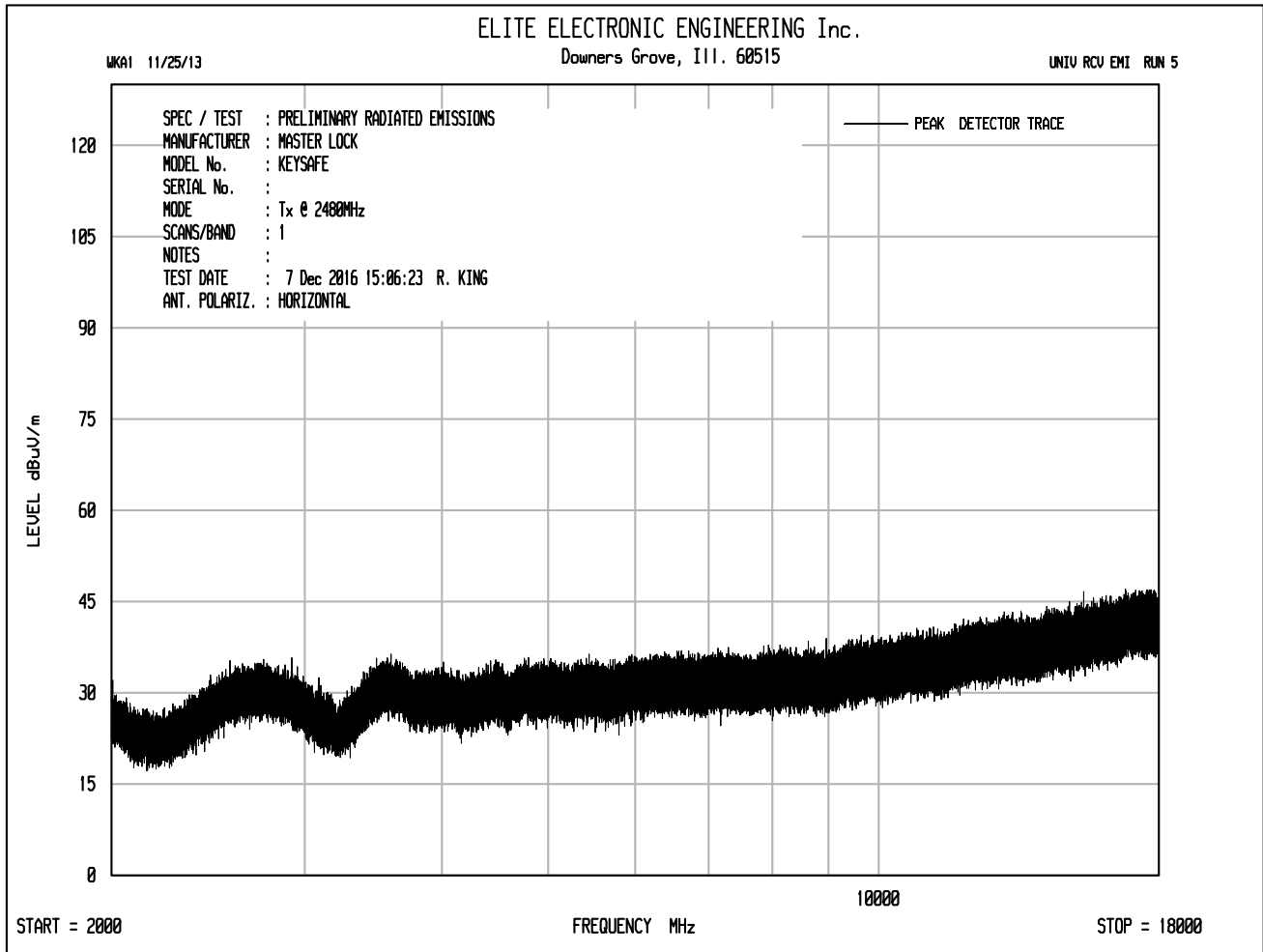


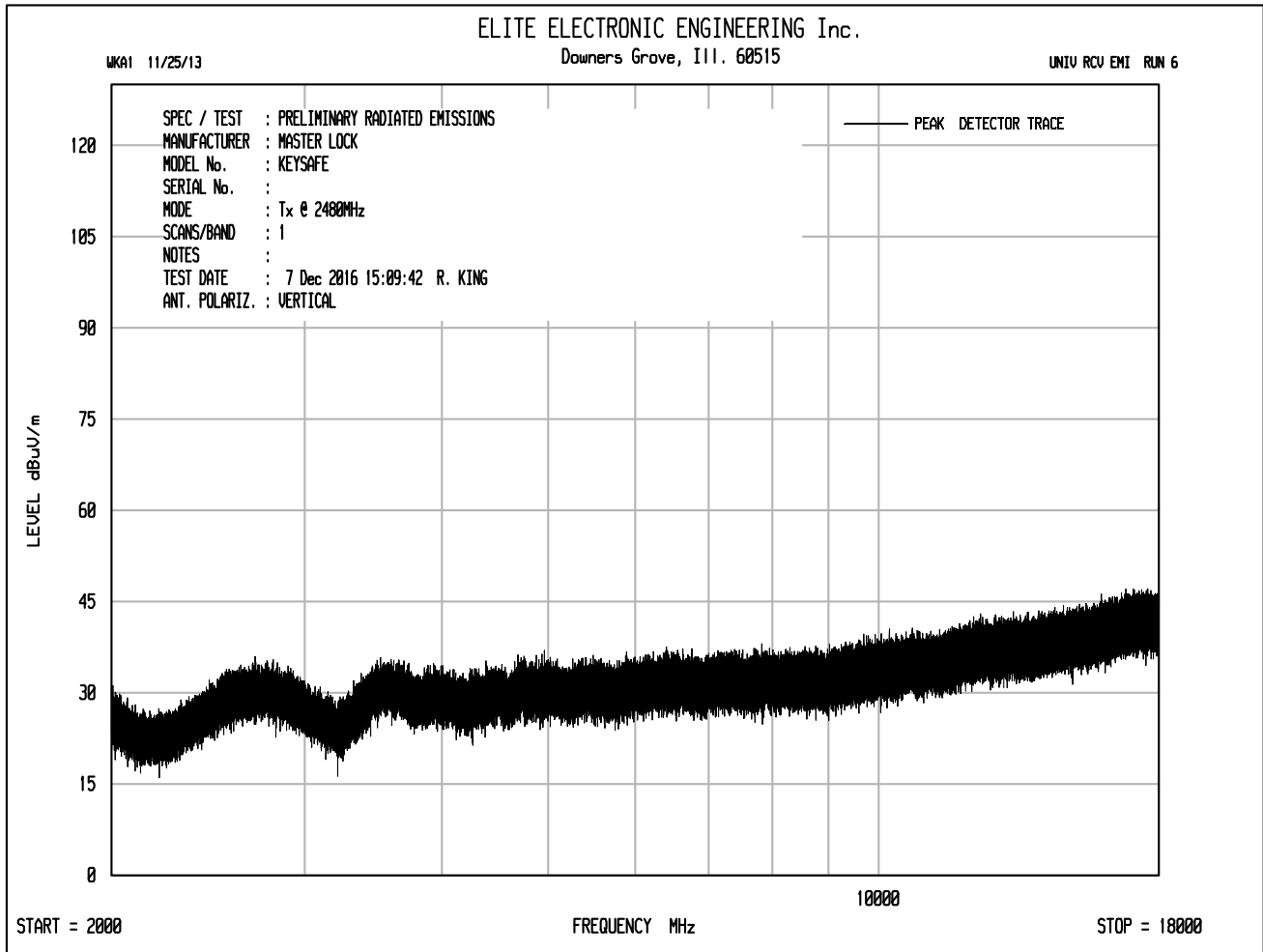


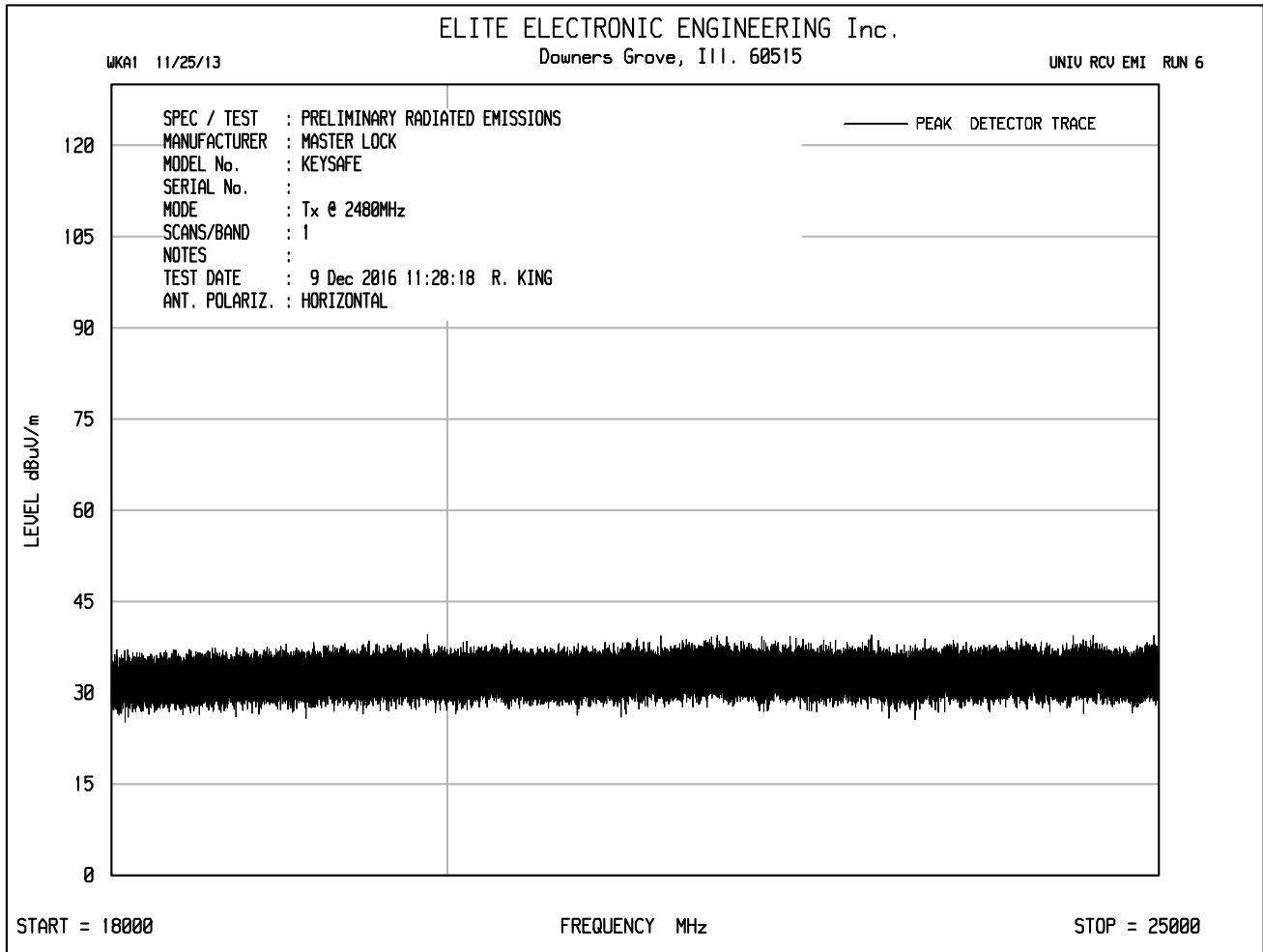


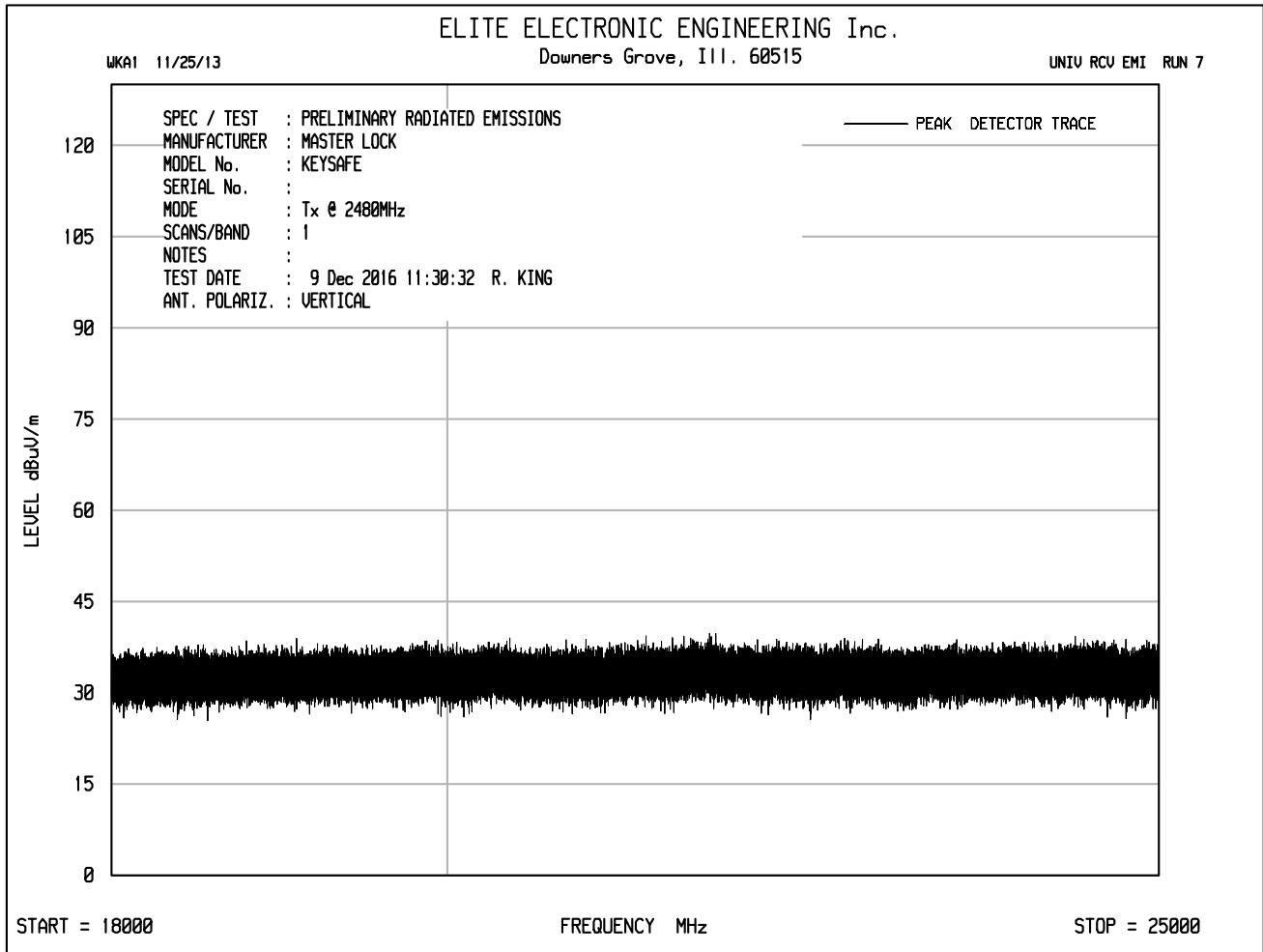














MANUFACTURER : Master Lock
MODEL NUMBER : 5440 and 5441
TEST PERFORMED : Peak Radiated Emissions NOT in a restricted band
TEST DATE : December 5, 2016
TEST MODE : Transmit at 2402MHz
TEST DISTANCE : 3 meters
NOTES : Peak Readings with a 100kHz RBW

Freq. MHz	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Peak Total dBuV/m at 3m	Peak Total uV/m at 3 m	Peak Limit uV/m at 3 m	Margin (dB)
2402.00	H	42.0		2.6	32.0	0.0	76.6	6748.0		
2402.00	V	38.5		2.6	32.0	0.0	73.0	4484.1		
7206.00	H	38.7	*	4.6	35.7	-39.4	39.6	95.0	674.8	-17.0
7206.00	V	38.7	*	4.6	35.7	-39.4	39.6	95.0	674.8	-17.0
9608.00	H	38.7	*	5.2	36.6	-39.3	41.2	114.7	674.8	-15.4
9608.00	V	39.4	*	5.2	36.6	-39.3	41.9	124.4	674.8	-14.7
14412.00	H	39.0	*	6.6	39.6	-38.3	47.0	222.6	674.8	-9.6
14412.00	V	39.1	*	6.6	39.6	-38.3	47.1	225.2	674.8	-9.5
16814.00	H	38.3	*	7.2	41.7	-37.5	49.7	305.5	674.8	-6.9
16814.00	V	38.3	*	7.2	41.7	-37.5	49.7	305.5	674.8	-6.9
21618.00	H	24.7	*	2.2	40.6	-28.7	38.8	87.6	674.8	-17.7
21618.00	V	24.7	*	2.2	40.6	-28.7	38.8	87.6	674.8	-17.7
24020.00	H	24.8	*	2.2	40.6	-30.0	37.6	76.3	674.8	-18.9
24020.00	V	24.8	*	2.2	40.6	-30.0	37.6	76.3	674.8	-18.9

FS (dBuV/m) = MTR (dBuV) + CF + AF (dB/m) + (- PA (dB))

FS (uV/m) = AntiLog [(FS (dBuV/m))/20]

Checked BY RICHARD E. King :

Richard E. King



MANUFACTURER : Master Lock
MODEL NUMBER : 5440 and 5441
TEST PERFORMED : Peak Radiated Emissions in a restricted band
TEST DATE : December 5, 2016
TEST MODE : Transmit at 2402MHz
TEST DISTANCE : 3 meters
NOTES : Peak Readings with a 1MHz RBW

Freq. MHz	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Peak Total dBuV/m at 3m	Peak Total uV/m at 3 m	Peak Limit uV/m at 3 m	Margin (dB)
4804.00	H	53.4		3.7	34.6	-39.3	52.4	415.4	5000.0	-21.6
4804.00	V	54.7		3.7	34.6	-39.3	53.7	483.6	5000.0	-20.3
12010.00	H	50.6	*	6.1	38.7	-39.2	56.2	645.5	5000.0	-17.8
12010.00	V	49.7	*	6.1	38.7	-39.2	55.3	580.6	5000.0	-18.7
19216.00	H	35.0	*	2.2	40.4	-28.6	49.0	282.6	5000.0	-25.0
19216.00	V	35.0	*	2.2	40.4	-28.6	49.0	283.0	5000.0	-24.9

$FS \text{ (dBuV/m)} = MTR \text{ (dBuV)} + CF + AF \text{ (dB/m)} + (-PA \text{ (dB)})$

$FS \text{ (uV/m)} = \text{AntiLog} [(FS \text{ (dBuV/m)})/20]$

Checked BY RICHARD E. King :

Richard E. King



MANUFACTURER : Master Lock
MODEL NUMBER : 5440 and 5441
TEST PERFORMED : Average Radiated Emissions in a restricted band
TEST DATE : December 5, 2016
TEST MODE : Transmit at 2402MHz
TEST DISTANCE : 3 meters
NOTES : Avg Readings with a 1MHz RBW

Freq. MHz	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Duty Cycle (dB)	Average Total dBuV/m at 3m	Average Total uV/m at 3 m	Average Limit uV/m at 3 m	Margin (dB)
4804.00	H	46.2		3.7	34.6	-39.3	0.0	45.1	180.3	500.0	-8.9
4804.00	V	40.9		3.7	34.6	-39.3	0.0	39.8	98.1	500.0	-14.1
12010.00	H	36.2	*	6.1	38.7	-39.2	0.0	41.8	123.6	500.0	-12.1
12010.00	V	36.2	*	6.1	38.7	-39.2	0.0	41.9	123.8	500.0	-12.1
19216.00	H	20.9	*	2.2	40.4	-28.6	0.0	35.0	55.9	500.0	-19.0
19216.00	V	20.9	*	2.2	40.4	-28.6	0.0	35.0	55.9	500.0	-19.0

FS (dBuV/m) = MTR (dBuV) + CF + AF (dB/m) + (- PA (dB)) + D.C. (dB)

FS (uV/m) = AntiLog [(FS (dBuV/m))/20]

Checked BY RICHARD E. King :

Richard E. King



MANUFACTURER : Master Lock
MODEL NUMBER : 5440 and 5441
TEST PERFORMED : Peak Radiated Emissions NOT in a restricted band
TEST DATE : December 5, 2016
TEST MODE : Transmit at 2440MHz
TEST DISTANCE : 3 meters
NOTES : Peak Readings with a 100kHz RBW

Freq. MHz	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Peak Total dBuV/m at 3m	Peak Total uV/m at 3 m	Peak Limit uV/m at 3 m	Margin (dB)
2440.00	H	39.4		2.6	32.1	0.0	74.1	5056.5		
2440.00	V	33.0		2.6	32.1	0.0	67.7	2428.6		
9760.00	H	39.4	*	5.2	36.9	-39.3	42.3	129.9	505.7	-11.8
9760.00	V	38.3	*	5.2	36.9	-39.3	41.2	114.8	505.7	-12.9
14640.00	H	38.8	*	6.7	39.6	-38.2	46.9	220.8	505.7	-7.2
14640.00	V	38.1	*	6.7	39.6	-38.2	46.2	204.4	505.7	-7.9
17080.00	H	39.8	*	7.3	41.6	-37.6	51.1	360.1	505.7	-2.9
17080.00	V	38.9	*	7.3	41.6	-37.6	50.2	324.3	505.7	-3.9
21960.00	H	24.7	*	2.2	40.6	-29.2	38.3	82.4	505.7	-15.8
21960.00	V	24.7	*	2.2	40.6	-29.2	38.3	82.4	505.7	-15.8
24400.00	H	24.8	*	2.2	40.6	-30.2	37.4	74.2	505.7	-16.7
24400.00	V	24.8	*	2.2	40.6	-30.2	37.4	74.2	505.7	-16.7

FS (dBuV/m) = MTR (dBuV) + CF + AF (dB/m) + (- PA (dB))

FS (uV/m) = AntiLog [(FS (dBuV/m))/20]

Checked BY RICHARD E. KING :

Richard E. King



MANUFACTURER : Master Lock
MODEL NUMBER : 5440 and 5441
TEST PERFORMED : Peak Radiated Emissions in a restricted band
TEST DATE : December 5, 2016
TEST MODE : Transmit at 2440MHz
TEST DISTANCE : 3 meters
NOTES : Peak Readings with a 1MHz RBW

Freq. MHz	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Peak Total dBuV/m at 3m	Peak Total uV/m at 3 m	Peak Limit uV/m at 3 m	Margin (dB)
4880.00	H	53.3		3.7	34.5	-39.3	52.2	409.4	5000.0	-21.7
4880.00	V	52.6		3.7	34.5	-39.3	51.5	374.6	5000.0	-22.5
7320.00	H	50.2	*	4.7	35.7	-39.4	51.1	359.1	5000.0	-22.9
7320.00	V	50.2	*	4.7	35.7	-39.4	51.1	360.3	5000.0	-22.8
12200.00	H	50.2	*	6.1	38.8	-39.1	56.0	631.3	5000.0	-18.0
12200.00	V	50.1	*	6.1	38.8	-39.1	55.9	624.8	5000.0	-18.1
19520.00	H	35.0	*	2.2	40.4	-28.5	49.1	284.8	5000.0	-24.9
19520.00	V	35.0	*	2.2	40.4	-28.5	49.1	285.2	5000.0	-24.9

FS (dBuV/m) = MTR (dBuV) + CF + AF (dB/m) + (- PA (dB))

FS (uV/m) = AntiLog [(FS (dBuV/m))/20]

Checked BY RICHARD E. King :

Richard E. King



MANUFACTURER : Master Lock
MODEL NUMBER : 5440 and 5441
TEST PERFORMED : Average Radiated Emissions in a restricted band
TEST DATE : December 5, 2016
TEST MODE : Transmit at 2440MHz
TEST DISTANCE : 3 meters
NOTES : Avg Readings with a 1MHz RBW

Freq. MHz	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Duty Cycle (dB)	Average Total dBuV/m at 3m	Average Total uV/m at 3 m	Average Limit uV/m at 3 m	Margin (dB)
4880.00	H	45.5		3.7	34.5	-39.3	0.0	44.4	165.6	500.0	-9.6
4880.00	V	41.9		3.7	34.5	-39.3	0.0	40.8	109.5	500.0	-13.2
7320.00	H	35.94	*	4.7	35.7	-39.4	0.0	36.9	69.8	500.0	-17.1
7320.00	V	35.9	*	4.7	35.7	-39.4	0.0	36.9	69.8	500.0	-17.1
12200.00	H	36.1	*	6.1	38.8	-39.1	0.0	41.8	123.5	500.0	-12.1
12200.00	V	36.1	*	6.1	38.8	-39.1	0.0	41.9	124.1	500.0	-12.1
19520.00	H	20.9	*	2.2	40.4	-28.5	0.0	35.0	56.4	500.0	-19.0
19520.00	V	20.9	*	2.2	40.4	-28.5	0.0	35.0	56.4	500.0	-19.0

FS (dBuV/m) = MTR (dBuV) + CF + AF (dB/m) + (- PA (dB)) + D.C. (dB)

FS (uV/m) = AntiLog [(FS (dBuV/m))/20]

Checked BY RICHARD E. KING :

Richard E. King



MANUFACTURER : Master Lock
MODEL NUMBER : 5440 and 5441
TEST PERFORMED : Peak Radiated Emissions NOT in a restricted band
TEST DATE : December 5, 2016
TEST MODE : Transmit at 2480MHz
TEST DISTANCE : 3 meters
NOTES : Peak Readings with a 100kHz RBW

Freq. MHz	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Peak Total dBuV/m at 3m	Peak Total uV/m at 3 m	Peak Limit uV/m at 3 m	Margin (dB)
2480.00	H	37.4		2.7	32.2	0.0	72.2	4057.2		
2480.00	V	29.6		2.7	32.2	0.0	64.4	1662.4		
9920.00	H	37.8	*	5.3	37.0	-39.2	40.8	109.3	500.0	-13.2
9920.00	V	38.6	*	5.3	37.0	-39.2	41.6	120.4	500.0	-12.4
14880.00	H	39.0	*	6.8	39.7	-38.2	47.3	232.3	500.0	-6.7
14880.00	V	37.9	*	6.8	39.7	-38.2	46.2	204.7	500.0	-7.8
17360.00	H	38.8	*	7.4	41.4	-37.7	49.8	308.5	500.0	-4.2
17360.00	V	37.8	*	7.4	41.4	-37.7	48.8	276.5	500.0	-5.1
24800.00	H	24.8	*	2.2	40.6	-30.9	36.7	68.2	500.0	-17.3
24800.00	V	24.8	*	2.2	40.6	-30.9	36.7	68.2	500.0	-17.3

FS (dBuV/m) = MTR (dBuV) + CF + AF (dB/m) + (- PA (dB))

FS (uV/m) = AntiLog [(FS (dBuV/m))/20]

Checked BY RICHARD E. KING :

Richard E. King



MANUFACTURER : Master Lock
MODEL NUMBER : 5440 and 5441
TEST PERFORMED : Peak Radiated Emissions in a restricted band
TEST DATE : December 5, 2016
TEST MODE : Transmit at 2480MHz
TEST DISTANCE : 3 meters
NOTES : Peak Readings with a 1MHz RBW

Freq. MHz	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Peak Total dBuV/m at 3m	Peak Total uV/m at 3 m	Peak Limit uV/m at 3 m	Margin (dB)
4960.00	H	52.6		3.7	34.5	-39.3	51.5	376.0	5000.0	-22.5
4960.00	V	51.2		3.7	34.5	-39.3	50.1	319.6	5000.0	-23.9
7440.00	H	50.1	*	4.7	35.6	-39.4	51.0	354.4	5000.0	-23.0
7440.00	V	49.9	*	4.7	35.6	-39.4	50.9	349.5	5000.0	-23.1
12400.00	H	50.5	*	6.1	38.8	-39.0	56.4	657.5	5000.0	-17.6
12400.00	V	49.3	*	6.1	38.8	-39.0	55.2	572.7	5000.0	-18.8
19840.00	H	35.0	*	2.2	40.4	-28.2	49.5	297.3	5000.0	-24.5
19840.00	V	35.0	*	2.2	40.4	-28.2	49.5	297.6	5000.0	-24.5
22320.00	H	36.2	*	2.2	40.6	-29.1	49.9	314.0	5000.0	-24.0
22320.00	V	36.2	*	2.2	40.6	-29.1	49.9	314.0	5000.0	-24.0

FS (dBuV/m) = MTR (dBuV) + CF + AF (dB/m) + (- PA (dB))

FS (uV/m) = AntiLog [(FS (dBuV/m))/20]

Checked BY RICHARD E. KING :

Richard E. King



MANUFACTURER : Master Lock
MODEL NUMBER : 5440 and 5441
TEST PERFORMED : Average Radiated Emissions in a restricted band
TEST DATE : December 5, 2016
TEST MODE : Transmit at 2480MHz
TEST DISTANCE : 3 meters
NOTES : Avg Readings with a 1MHz RBW

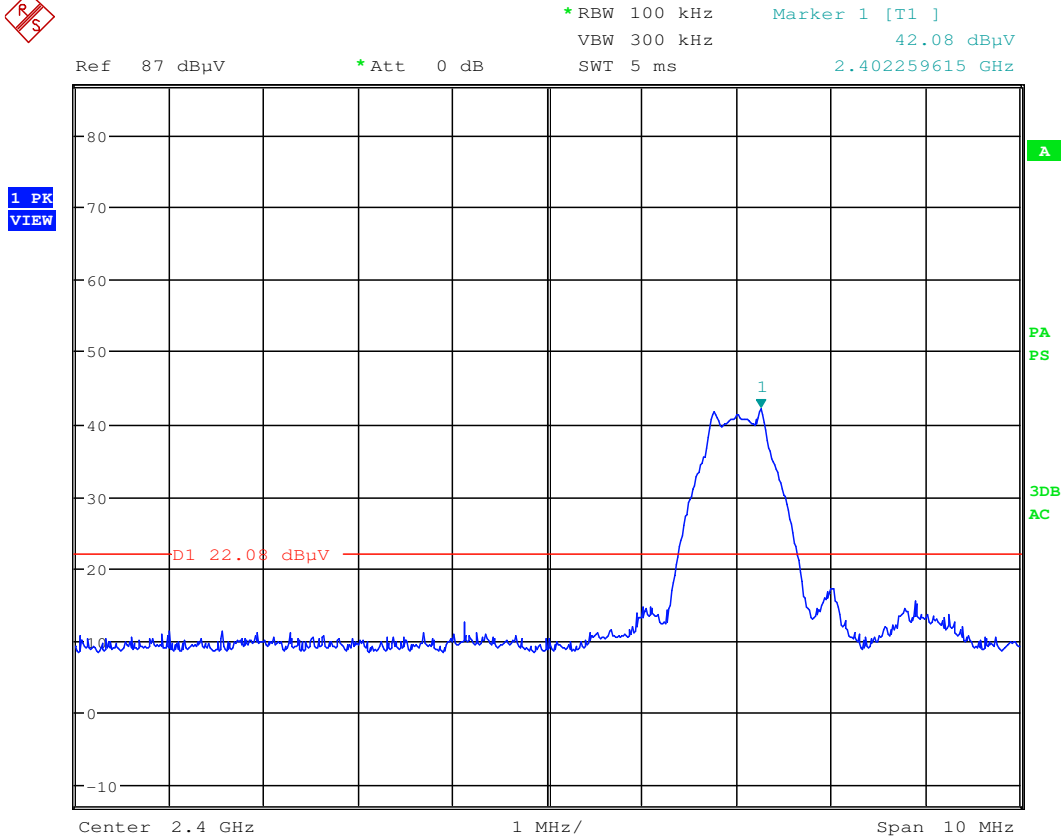
Freq. MHz	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Duty Cycle (dB)	Average Total dBuV/m at 3m	Average Total uV/m at 3 m	Average Limit uV/m at 3 m	Margin (dB)
4960.00	H	42.9		3.7	34.5	-39.3	0.0	41.8	122.7	500.0	-12.2
4960.00	V	37.9		3.7	34.5	-39.3	0.0	36.8	69.1	500.0	-17.2
7440.00	H	35.93	*	4.7	35.6	-39.4	0.0	36.9	69.7	500.0	-17.1
7440.00	V	35.8	*	4.7	35.6	-39.4	0.0	36.7	68.4	500.0	-17.3
12400.00	H	35.9	*	6.1	38.8	-39.0	0.0	41.8	122.9	500.0	-12.2
12400.00	V	35.8	*	6.1	38.8	-39.0	0.0	41.7	121.5	500.0	-12.3
19840.00	H	20.9	*	2.2	40.4	-28.2	0.0	35.4	58.8	500.0	-18.6
19840.00	V	20.9	*	2.2	40.4	-28.2	0.0	35.4	58.8	500.0	-18.6
22320.00	H	22.2	*	2.2	40.6	-29.1	0.0	35.9	62.4	500.0	-18.1
22320.00	V	22.2	*	2.2	40.6	-29.1	0.0	35.9	62.4	500.0	-18.1

FS (dBuV/m) = MTR (dBuV) + CF + AF (dB/m) + (- PA (dB)) + D.C. (dB)

FS (uV/m) = AntiLog [(FS (dBuV/m))/20]

Checked BY RICHARD E. King :

Richard E. King



Date: 29.JAN.2003 02:04:54

FCC 15.247 Bandedge Compliance

Manufacturer : Master Lock
Model Number : 5440 and 5441
Mode : Tx 2402MHz
Parameters : -20dBc in a 100kHz RBW
Date : 12/9/2016 1:29:48 PM (correct date)
Notes :



Manufacturer : Master Lock Company
Test Item : Bluetooth Portable Lock Box and Bluetooth Wall Mount Lock Box
Model Nos. : 5440 and 5441
Mode : Tx @ 2480MHz High Channel
Date : 12/9/2016
Notes : Peak Detector with 1MHz Resolution Bandwidth

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

Freq. MHz	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Peak Total dBuV/m at 3m	Peak Total uV/m at 3 m	Peak Limit uV/m at 3 m	Margin (dB)
2483.00	H	19.8		2.7	32.2	0.0	54.6	537.2	5000.0	-19.4
2483.00	V	18.2		2.7	32.2	0.0	53.0	447.4	5000.0	-21.0

Checked BY RICHARD E. KING :

Richard E. King



Manufacturer : Master Lock Company
Test Item : Bluetooth Portable Lock Box and Bluetooth Wall Mount Lock Box
Model Nos. : 5440 and 5441
Mode : Tx @ 2480MHz High Channel
Date : 12/9/2016
Notes : Average Measurement with 1MHz Resolution Bandwidth

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

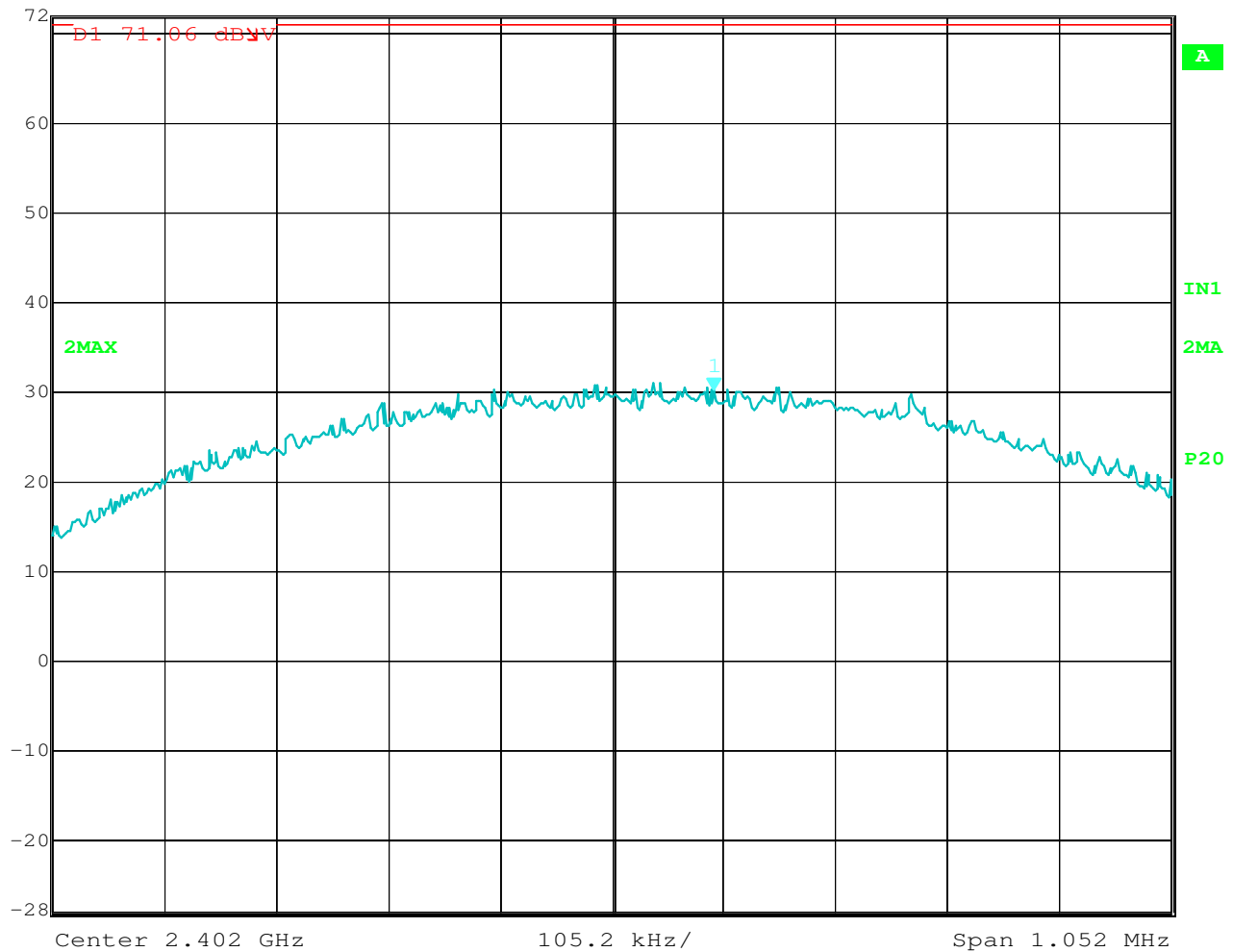
Freq. MHz	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Average Total dBuV/m at 3m	Average Total uV/m at 3 m	Average Limit uV/m at 3 m	Margin (dB)
2483.00	H	6.9		2.7	32.2	0.0	41.7	121.8	500.0	-12.3
2483.00	V	6.1		2.7	32.2	0.0	41.0	111.7	500.0	-13.0

Checked BY RICHARD E. KING :

Richard E. King



Marker 1 [T2] RBW 10 kHz RF Att 0 dB
Ref Lvl 30.25 dBμV VBW 100 kHz
72 dBμV 2.40209592 GHz SWT 27 ms Unit dBμV



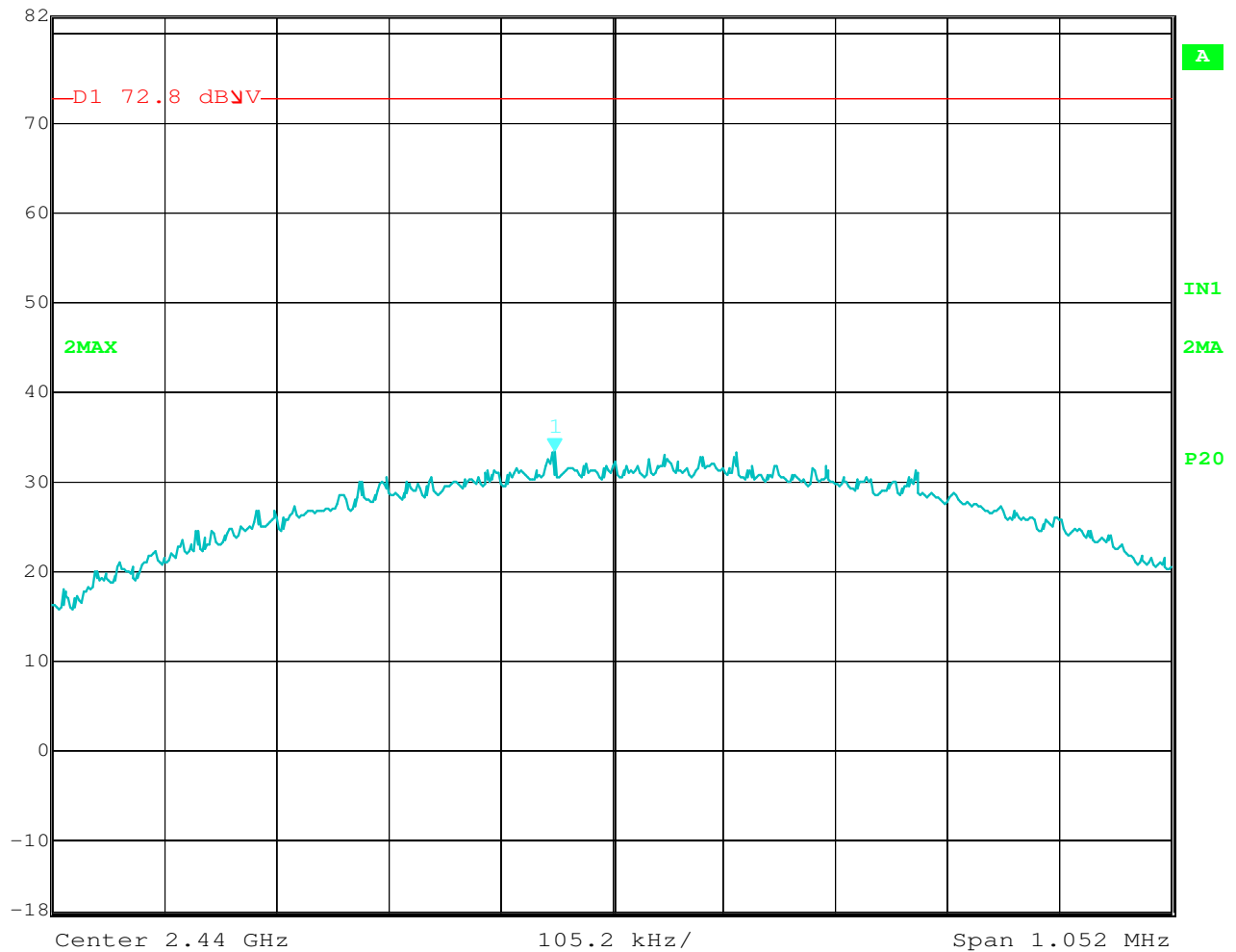
Date: 20.DEC.2016 08:35:27

FCC 15.247 Power Spectral Density

Manufacturer : Master Lock
Model Number : 5440 and 5441
Mode : Tx 2402MHz
Parameters : D1 = 8dBm limit
Date : 12/20/2016
Notes : EIRP = 40.86 dBuV/m when matched equals -22.2 dBm.
Notes : 8dBm Delta = 8dBm - (-22.2)dBm = 30.2dB
Notes : 8dBm limit = 40.86 dBuV/m + delta = 71.06dBuV/m



Marker 1 [T2] RBW 10 kHz RF Att 10 dB
Ref Lvl 33.30 dBμV VBW 100 kHz
82 dBμV 2.43994624 GHz SWT 27 ms Unit dBμV



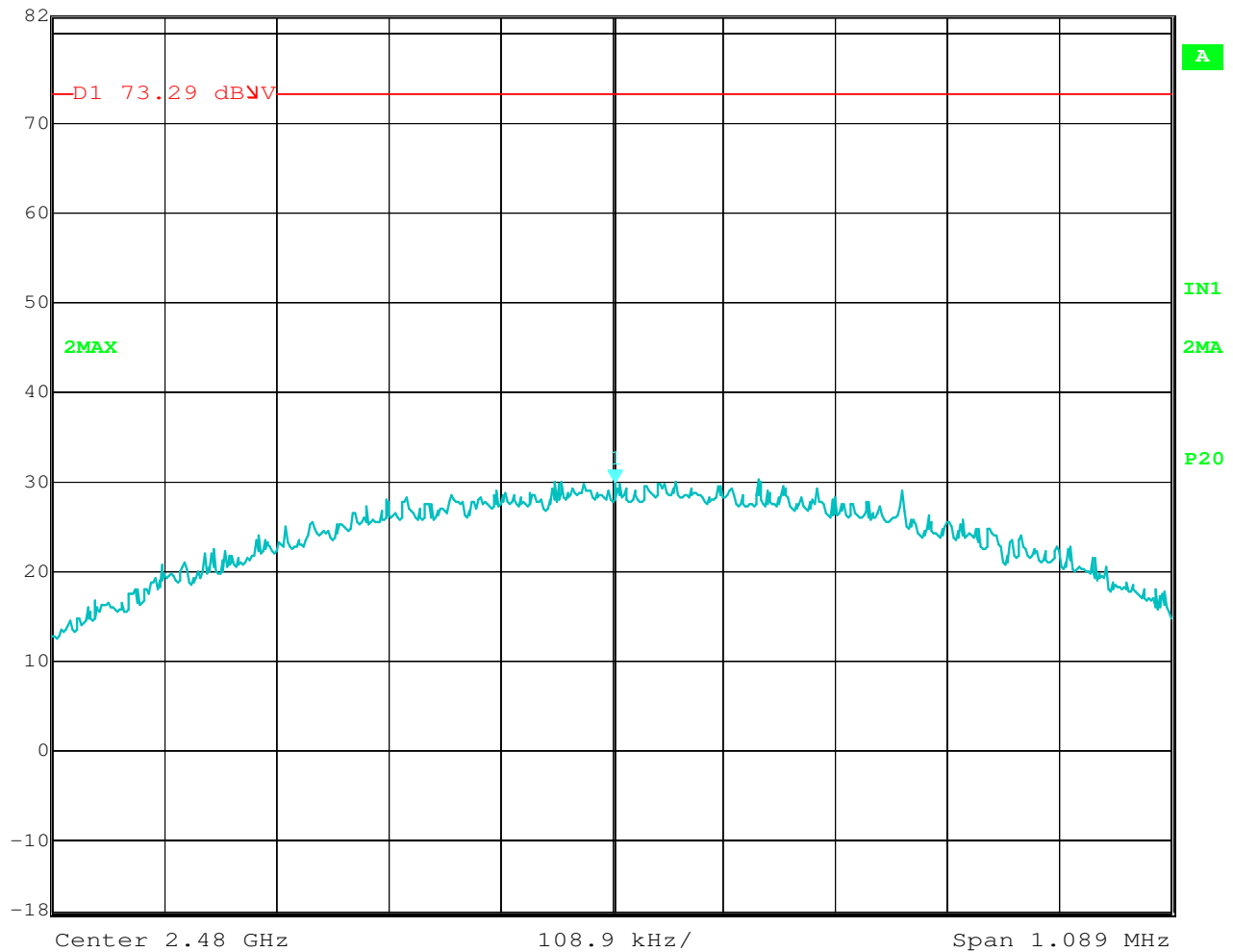
Date: 20.DEC.2016 08:44:12

FCC 15.247 Power Spectral Density

Manufacturer : Master Lock
Model Number : 5440 and 5441
Mode : Tx 2440MHz
Parameters : D1 = 8dBm
Date : 12/20/2016
Notes : EIRP = 42.2dBuV/m when matched equals -22.6 dBm.
Notes : 8dBm Delta = 8dBm -(-22.6)dBm = 30.6dB
Notes : 8dBm limit = 42.2dBuV/m + delta = 72.8dBuV/m



Marker 1 [T2] RBW 10 kHz RF Att 10 dB
Ref Lvl 29.84 dBV VBW 100 kHz
82 dBV 2.48000327 GHz SWT 28 ms Unit dBV



Date: 20.DEC.2016 09:05:49

FCC 15.247 Power Spectral Density

Manufacturer : Master Lock
Model Number : 5440 and 5441
Mode : Tx 2480MHz
Parameters : D1 = 8dBm
Date : 12/20/2016
Notes : EIRP = 40.3dBuV/m when matched equals -24.9 dBm.
Notes : 8dBm Delta = 8dBm - (-24.9)dBm = 32.9dB
Notes : 8dBm limit = 40.3dBuV/m + delta = 73.29dBuV/m