Measurement of RF Emissions from a Zigbee Battery Powered Fuel Level Sensor with Radio Module Transmitter

For	Invensys, Inc. 191 E. North Avenue Carol Stream, IL 60188
P.O. Number	140065401
Date Tested	March 17, 2014 through March 24, 2014
Test Personnel	Mark Longinotti
Test Specification	FCC "Code of Federal Regulations" Title 47, Part 15, Subpart C, Section 15.247 for Frequency Hopping Spread Spectrum Intentional Radiators or Digital Modulation Intentional Radiators Operating within the 2400-2483.5MHz band Industry Canada RSS-210 Industry Canada RSS-GEN

Test Report By: MARK E. LONGINOTTI

Mark Longinotti
EMC Engineer

Requested By: Randy Schmurr
Invensys, Inc.

Approved By: Raymond J Klouda

Raymond J. Klouda
Registered Professional
Engineer of Illinois - 44894

Elite Electronic Engineering, Inc.
1516 Centre Circle
Downers Grove, IL 60515
Tel : (630) 495-9770
Fax: (630) 495-9785
www.elitetest.com

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REVISION HISTORY

Revision	Date	Description
—	April 18, 2014	Initial release

Measurement of RF Emissions from a Zigbee Battery Powered Fuel Level Sensor With Radio Module Transmitter

1. INTRODUCTION

1.1. Scope of Tests

This report represents the results of the series of radio interference measurements performed on an Invensys, Inc. Zigbee Battery Powered Fuel Level Sensor with Radio Module, Serial No. None Assigned, transmitter (hereinafter referred to as the EUT). The EUT was designed to transmit in the 2400-2483.5 MHz band using an internal antenna. The EUT was manufactured and submitted for testing by Invensys, Inc. located in Carol Stream, IL.

1.2. Purpose

The test series was performed to determine if the EUT meets the conducted and radiated RF emission requirements of the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart C, Sections 15.207 and 15.247 for Intentional Radiators. The test series was also performed to determine if the EUT meets the conducted RF emission requirements of the Industry Canada Radio Standards Specification, RSS-Gen, Section 7.2.4 and the radiated RF emission requirements of the Industry Canada Radio Standards Specification, RSS-210, Annex 8 for transmitters. Testing was performed in accordance with ANSI C63.4-2009.

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 22^{o}C and the relative humidity was 18%.

2. APPLICABLE DOCUMENTS

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

- Federal Communications Commission "Code of Federal Regulations", Title 47, Part 15, Subpart C, dated 1 October 2013

- 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"

- Federal Communications Commission Office of Engineering and Technology Laboratory Division Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under Section 15.247, April 9, 2013

- Industry Canada Radio Standards Specification, RSS-Gen, “General Requirements and Information for the Certification of Radiocommunication Equipment”, Issue 3, January 2012

- Industry Canada Radio Standards Specification, RSS-210, "Low-power License-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment", Issue 8, June 2010

3. EUT SETUP AND OPERATION

3.1. General Description

The EUT is an Invensys, Inc., Zigbee Battery Powered Fuel Level Sensor with Radio Module. A block diagram of the EUT setup is shown as Figure 1.

3.1.1. Power Input

The EUT was powered by 3.6VDC from an internal battery.

3.1.2. Peripheral Equipment

The EUT was submitted for testing with no peripheral equipment.

3.1.3. Signal Input/Output Leads

The EUT was submitted for testing with no signal leads.

3.1.4. Grounding

The EUT was ungrounded during the tests.

3.2. Operational Mode

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

Transmit at 2424.92MHz (CH.15), Input power to the PA = 1.7dBm
Transmit at 2449.92MHz (CH.20), Input power to the PA = 1.7dBm
Transmit at 2474.92MHz (CH.25), Input power to the PA = 1.7dBm

3.3. EUT Modifications

No modifications were required for compliance to the FCC 15.247, RSS-Gen, and RSS-210 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 C63.4-2009 for site attenuation.

4.2. Test Instrumentation

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

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

4.3. Calibration Traceability

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

4.4. Measurement Uncertainty

All measurements are an estimate of their true value. The measurement uncertainty characterizes, with a

specified confidence level, the spread of values which may be possible for a given measurement system.

The measurement uncertainty for these tests is presented below:

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

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

5. TEST PROCEDURES

5.1. Powerline Conducted Emissions

5.1.1. Requirements

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

5.2. 6dB Bandwidth

5.2.1. Requirement

The minimum 6dB bandwidth shall be at least 500kHz for all systems using digital modulation techniques.

5.2.2. Procedures

The EUT was setup inside the chamber.

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

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

5.2.3. Results

The plots on pages 20 through 22 show that the minimum 6 dB bandwidth was 1.47MHz which is greater than minimum 6dB bandwidth requirement of 500kHz for systems using digital modulation techniques. The 99% bandwidth was measured to be 2.42MHz.

5.3. Peak Output Power

5.3.1. Requirements

For systems using digital modulation the maximum peak output conducted power shall not be greater than 1.0W (30dBm). This limit is based on the use of antennas with directional gains that do not exceed 6dBi. Since the limit allows for a 6dBi antenna gain, the maximum EIRP can be increased by 6dB to 4 Watt (36dBm).

5.3.2.Procedures

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

The equivalent power was determined from the field intensity levels measured at 3 meters using the substitution method. To determine the emission power, a 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. The peak power output was calculated for low, middle, and high channels.

5.3.3.Results

The results are presented on page 23. The maximum EIRP measured from the transmitter was 12.3 dBm or 17mW which is below the 4 Watt defacto limit.

5.4. Duty Cycle Factor Measurements

5.4.1.Requirements

Unless otherwise specified, when the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. The exact method of calculating the average field strength shall be submitted with any application for certification or shall be retained in the measurement data file for equipment subject to notification or verification.

5.4.2.Procedures

a. The EUT was placed on the non-conductive stand and set to transmit continuously.
b. A double ridged waveguide antenna was positioned at a 3 meter distance from the EUT. The output of the antenna was connected to the input of a spectrum analyzer.
c. The center frequency of the spectrum analyzer was set to the transmit frequency of the EUT.
d. The frequency span of the spectrum analyzer was set to 0Hz so that the time domain trace of the transmitted pulse of the EUT was displayed on the spectrum analyzer.
e. The sweep time of the spectrum analyzer was adjusted so that the beginning and end of a single pulse could be seen on the display of the spectrum analyzer.
f. The single sweep function of the spectrum analyzer was used multiple times to determine the maximum pulse width of the EUT.
g. The maximum pulse width display of the spectrum analyzer was recorded and then plotted using a 'screen dump' utility.
h. The sweep time of the spectrum analyzer was then adjusted to 100msec.
i. The single sweep function of the spectrum analyzer was used multiple times to determine the maximum number of transmitted pulses that occurred in a 100msec time period.
j. The maximum number of pulses transmitted in a 100msec time period was recorded and then plotted using a ‘screen dump’ utility.
k. The duty cycle correction was calculated using the following equation:

Duty Cycle Correction Factor (dB) = D.C. (dB)
D.C. (dB) = 20 x log [((pulse width (msec)) x (#pulses in a 100msecperiod)) / 100msec]

5.4.3.Results

Duty cycle plots are shown on pages 24 and 25. The EUT transmits a 1.83msec pulse 1 time in a 100msec period. This results in a duty cycle correction factor of -34.75dB.

5.5. Radiated Spurious Emissions Measurements

5.5.1. Requirements

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 is not required. In addition, radiated emissions which fall in the restricted bands must comply with the general limits.

General 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

5.5.2. 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 C63.4-2009 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 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.

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 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 General limit, no further measurements are required. If however, the peak readings exceed this limit, then the emissions are remeasured using a quasi-peak detector.

e) For all radiated emissions measurements above 1 GHz, the peak readings shall be limited to 20 dB above the maximum permitted average emission limit applicable to the equipment under test.

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.

If the emission is pulsed, the reading can be adjusted by a “duty cycle correction factor” derived from 20*log(on time/100msec). These readings must be no greater than the limits specified in 15.209(a).

5.5.3.Results

Preliminary radiated emissions plots with the EUT transmitting at 2425MHz, 2450MHz, and 2475MHz are shown on pages 26 through 49. Final radiated emissions data are presented on data pages 50 through 58. As can be seen from the data, all emissions measured from the EUT were within the specification limits. The emissions level closet to the limit (worst case) occurred at 1225MHz. The emissions level at this frequency was 0.6dB within the limit. Photographs of the test configuration which yielded the highest, or worst case, radiated emission levels are shown on Figures 2 through 4.

5.6. Band Edge Compliance

5.6.1.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).

5.6.2.Procedures

5.4.2.1 Low Band Edge

1) The EUT was setup inside the test chamber on a non-conductive stand.
2) A broadband measuring antenna was placed at a test distance of 3 meters from the EUT.
3) The EUT was set to transmit continuously at the channel closest to the low band-edge.
4) The EUT was maximized for worst case emissions at the measuring antenna. The maximum meter reading was recorded.
5) To determine the 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) ≥ 1% of the span.
    d. The 'Max-Hold' function was engaged. The analyzer was allowed to scan until the envelope of the transmitter bandwidth was defined.
    e. The marker was set on the peak of the in-band emissions. A display line was placed 20dB down from the peak of the in-band emissions. All emissions which fall outside of the authorized band of operation must be below the 20dB down display line. (All emissions to the left of the center frequency (band-edge) must be below the display line.)
    f. The analyzer's display was plotted using a 'screen dump' utility.

5.4.2.2 High Band Edge

1) The EUT was 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.

5.6.3.Results

Pages 61 through 66 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.

5.7. Power Spectral Density

5.7.1. 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.

5.7.2. Procedures

1) The EUT was placed on the non-conductive stand and set to transmit.
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 =1.5times the channel bandwidth
    c. Resolution bandwidth (RBW) ≥3kHz
    d. Video bandwidth (VBW) ≥ 3 x RBW
    e. Sweep time = auto couple
    f. The analyzer's display was plotted using a 'screen dump' utility.
    g. If the measured value exceeds the +8dBm limit, reduce the RBW (no less than 3kHz) and repeat step 7.

5.7.3. Results

Pages 61 through 66 show the power spectral density results. As can be seen from the plots, the peak power density is less than 8dBm in a 3kHz band during any time interval of continuous transmission.

6. OTHER TEST CONDITIONS

6.1. Test Personnel and Witnesses

All tests were performed by qualified personnel from Elite Electronic Engineering Incorporated. The test series was partially witnessed by Invensys, Inc. personnel.

6.2. Disposition of the EUT

The EUT and all associated equipment were returned to Invensys, Inc. upon completion of the tests.

7. CONCLUSIONS

It was determined that the Invensys, Inc. Zigbee Battery Powered Fuel Level Sensor with Radio Module, Serial No. None Assigned, did fully meet the conducted and radiated emission requirements of the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart C, Sections 15.207 and 15.247 for Intentional Radiators Operating within the 2400-2483.5 MHz band, when tested per ANSI C63.4-2009.

It was also determined that the Invensys, Inc. Zigbee Battery Powered Fuel Level Sensor with Radio Module, Serial No. None Assigned, did fully meet the conducted and radiated RF emission requirements of the Industry Canada Radio Standards Specification, RSS-Gen Section 7.2.4 and RSS-210 Annex 8, for transmitters, when tested per ANSI C63.4-2009.

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 Invensys, Inc. 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
APW0	PREAMPLIFIER	PLANAR ELECTRONICS	PE2-30-20G20R6G	PL2926/0646	20GHZ-26.5GHZ	3/11/2014	3/11/2015
APW3	PREAMPLIFIER	PLANAR ELECTRONICS	PE2-35-120-5R0-10-12	PL2924	1GHZ-20GHZ	10/8/2013	10/8/2014
CDX8	COMPUTER	ELITE	WORKSTATION			N/A	
HRG6	LASERJET 2100	HEWLETT PACKARD	C1470A	USGG109744	---	N/A	
NHG1	STANDARD GAIN HORN ANTENNA	NARDA	638	---	18-26.5GHZ	NOTE 1	
NWH0	RIDGED WAVE GUIDE	TENSOR	4105	2081	1-12.4GHZ	11/6/2013	11/6/2014
NWQ1	DOUBLE RIDGED WAVEGUIDE ANTENNA		3117	66655	1GHZ-18GHZ	3/11/2014	3/11/2015
RBE1	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESU26	100096	20Hz-26GHz	2/28/2014	2/28/2015
SES0	24VDC POWER SUPPLY	P-TRANS	FS-32024-1M	001	18-27VDC	NOTE 1	
XOB1	ADAPTER	HEWLETT PACKARD	K281C	10422	18-26.5GHZ	NOTE 1	
XPR0	HIGH PASS FILTER	K&L MICROWAVE	11SH10-4800/X20000	001	4.8-20GHZ	9/12/2013	9/12/2014

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

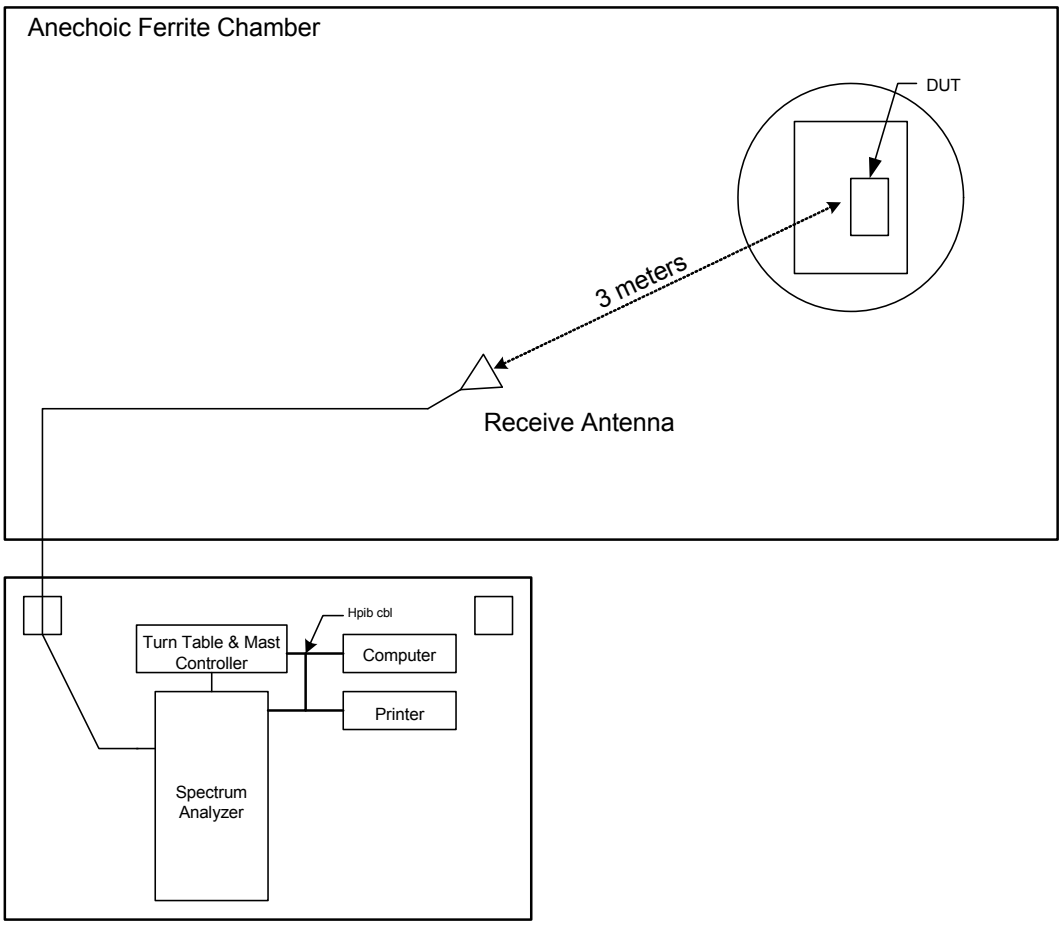


FIGURE 1 BLOCKDIAGRAM OF TEST SETUP

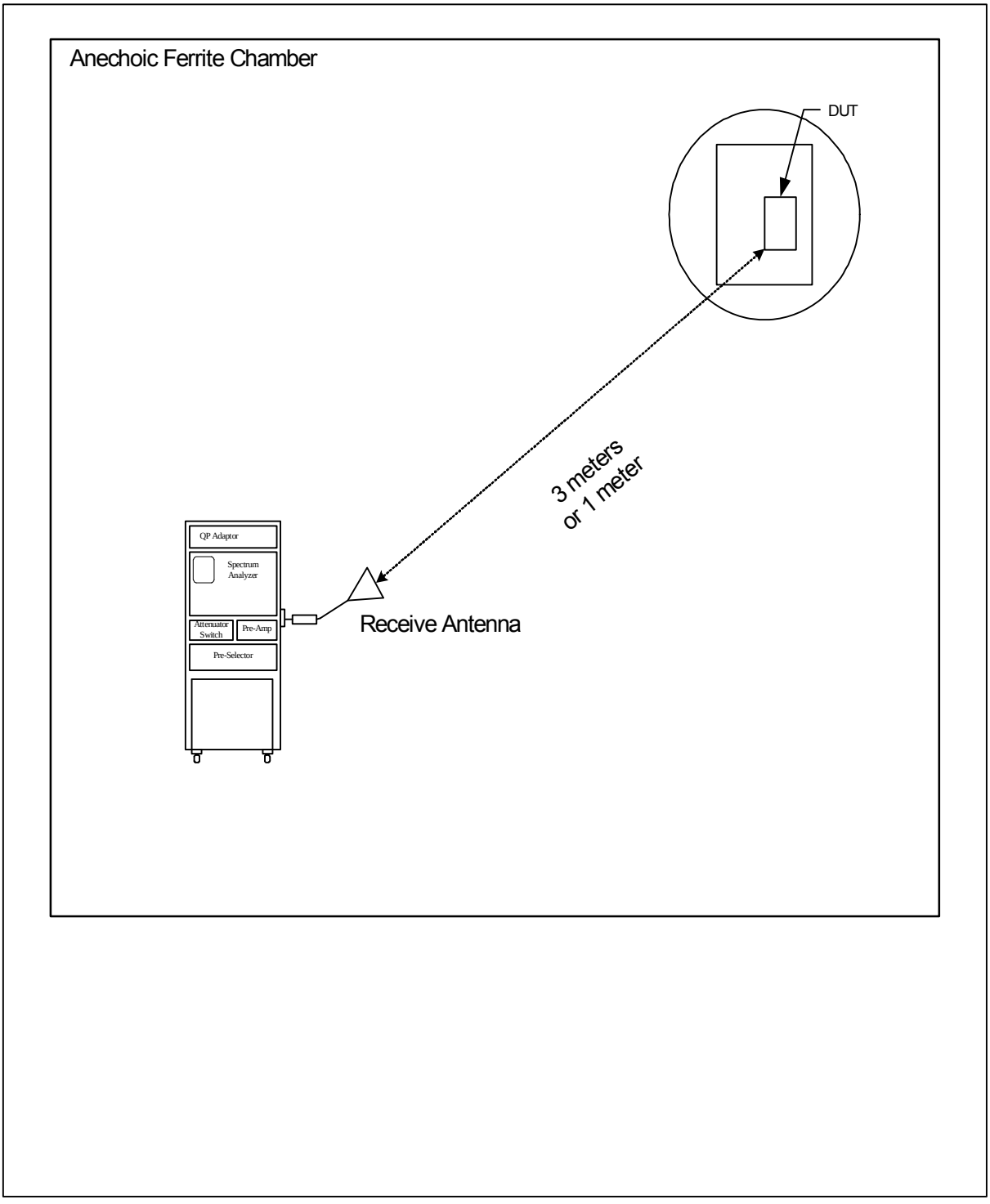
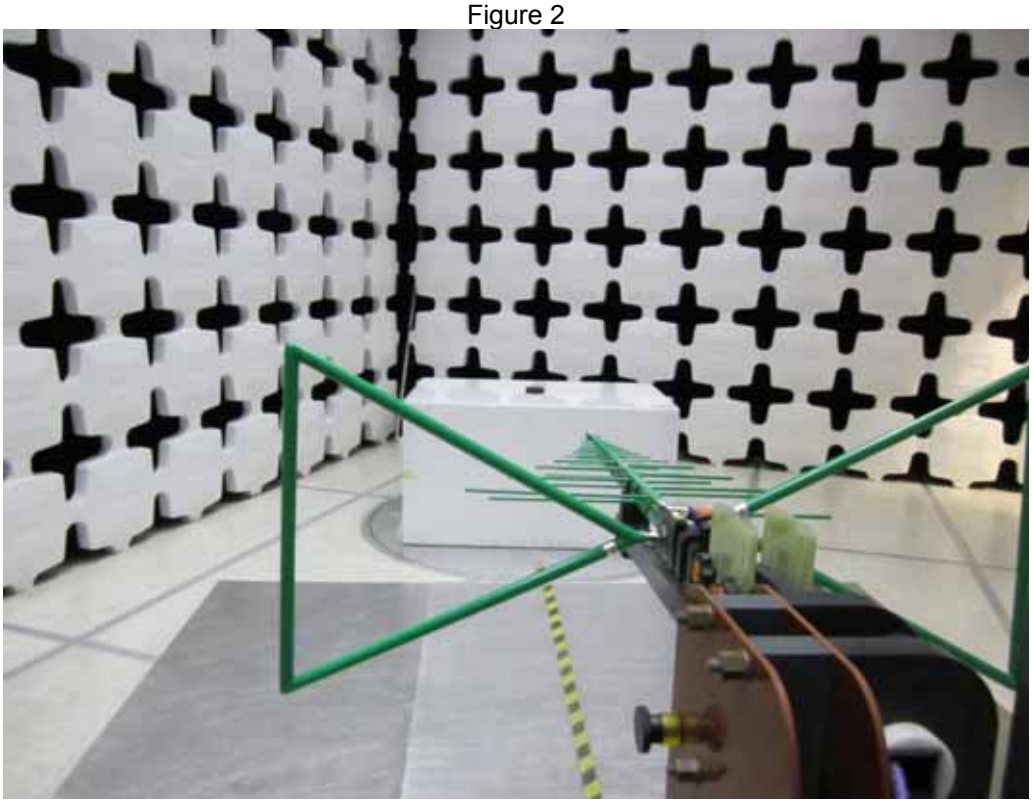

Anechoic Ferrite Chamber
DUT
3 meters
or 1 meter
QP Adaptor
Spectrum
Analyzer
Attenuator
Switch
Pre-Amp
Pre-Selector
Receive Antenna

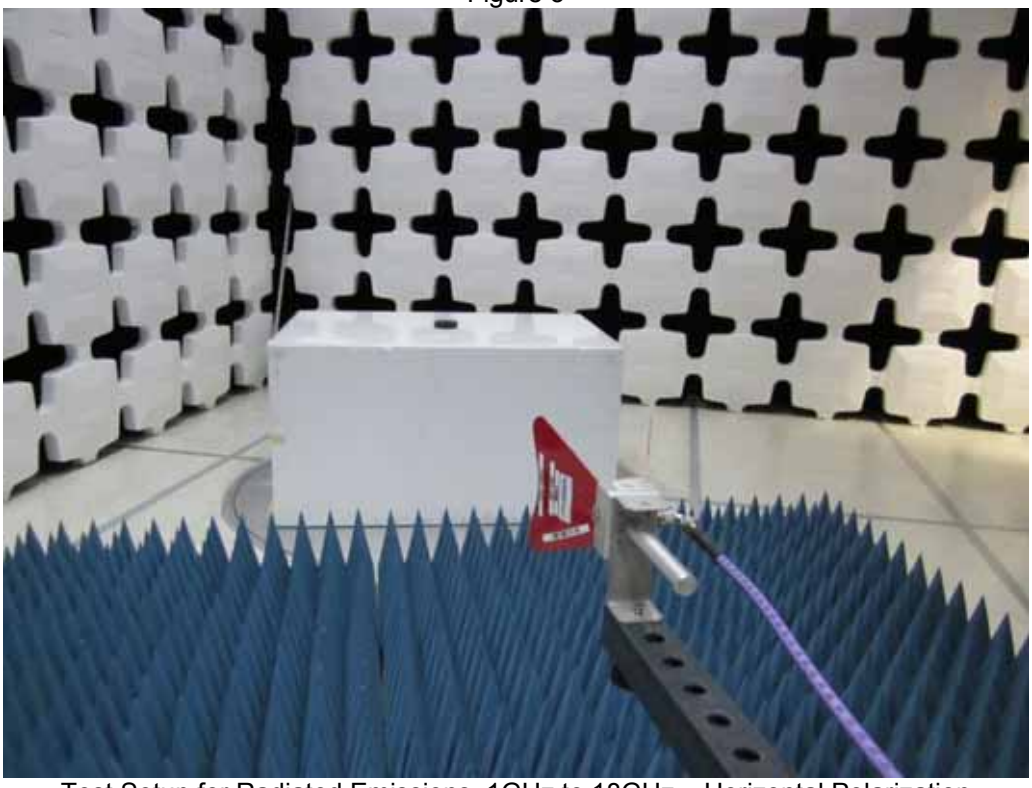
Figure 2



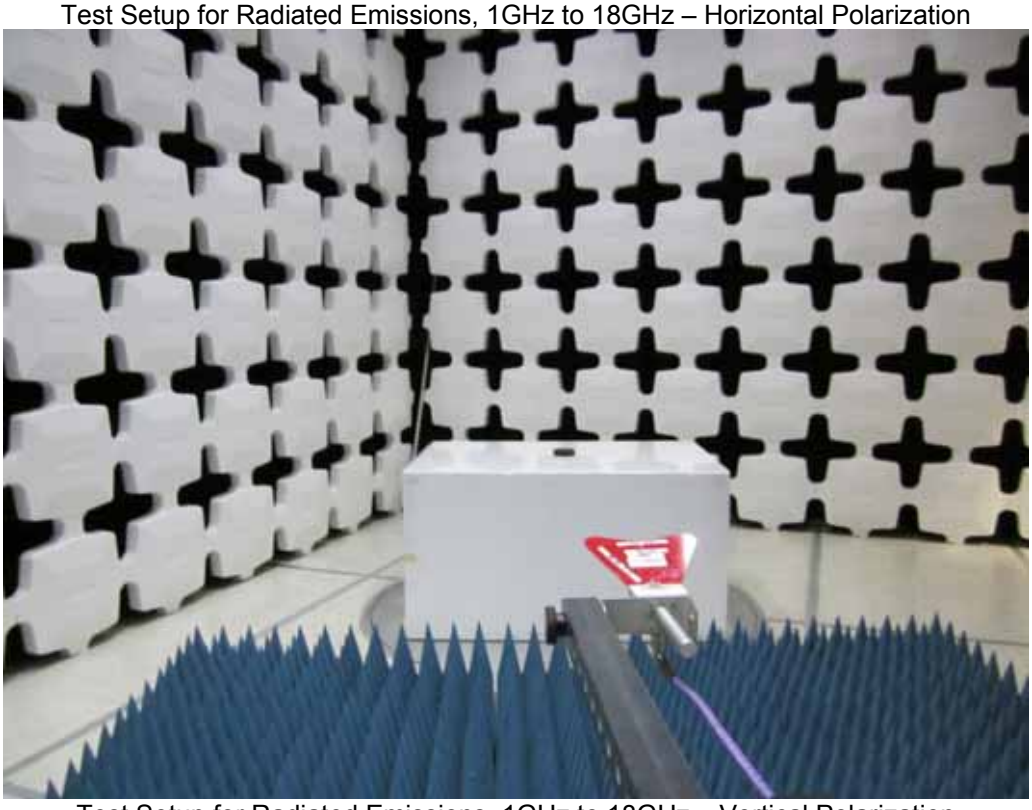
Test Setup for Radiated Emissions, 30MHz to 1GHz – Horizontal Polarization

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

Figure 3

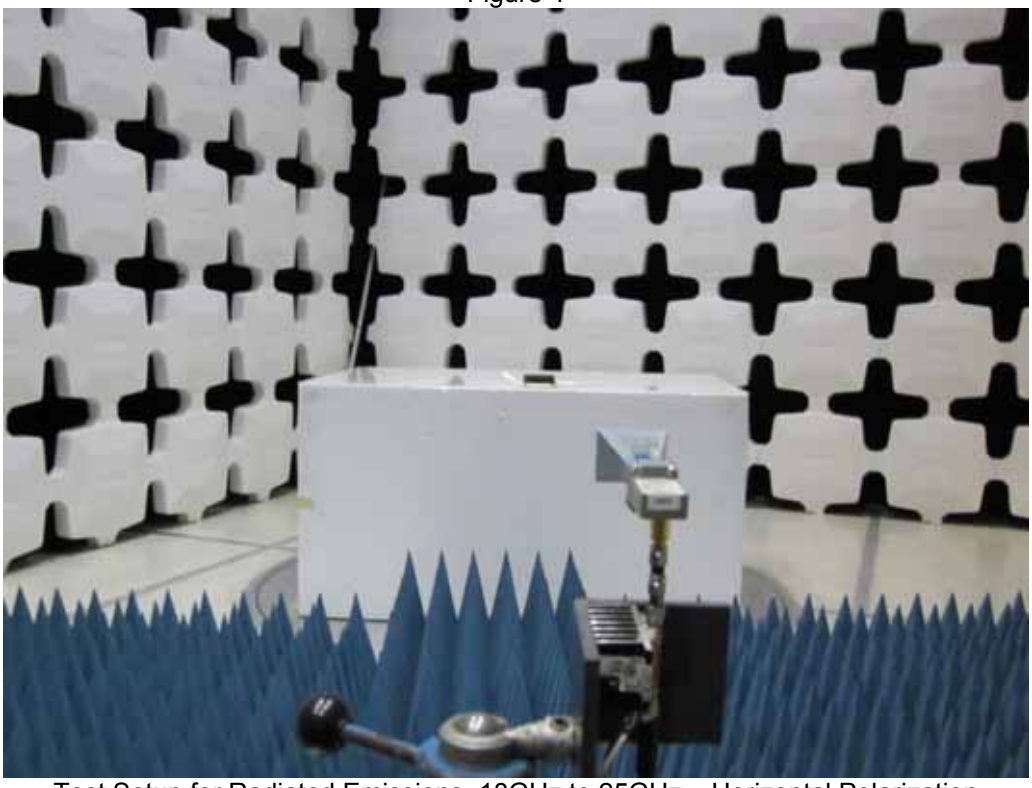


Test Setup for Radiated Emissions, 1GHz to 18GHz – Horizontal Polarization

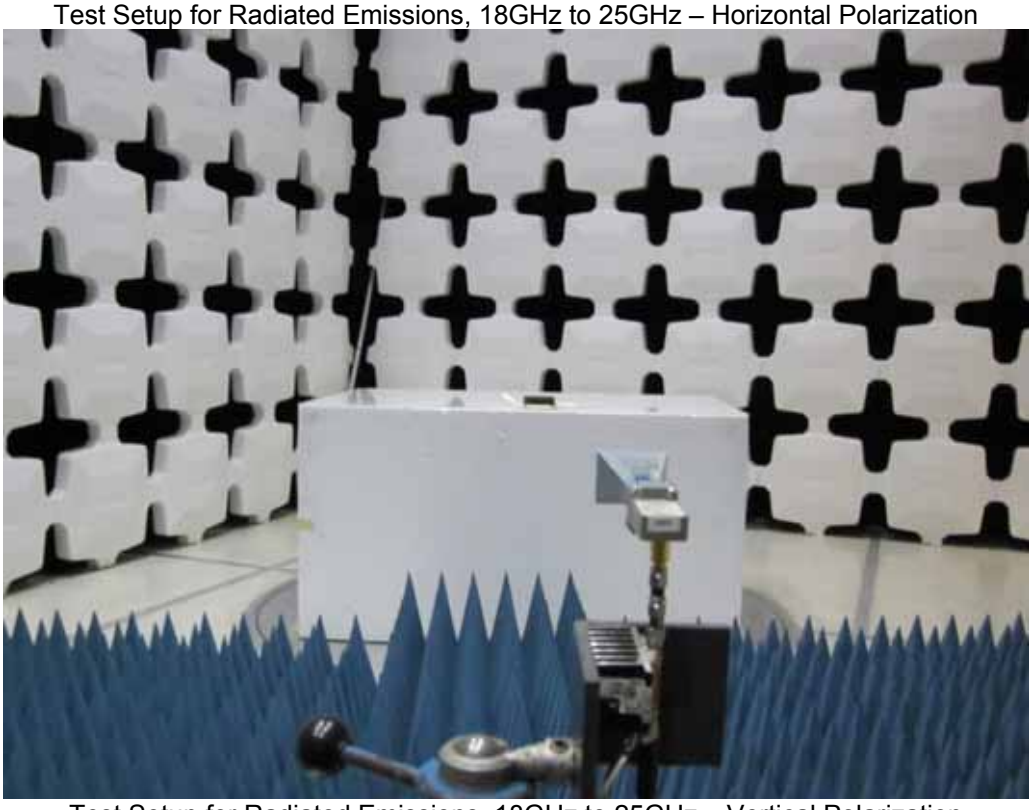


Test Setup for Radiated Emissions, 1GHz to 18GHz – Vertical Polarization

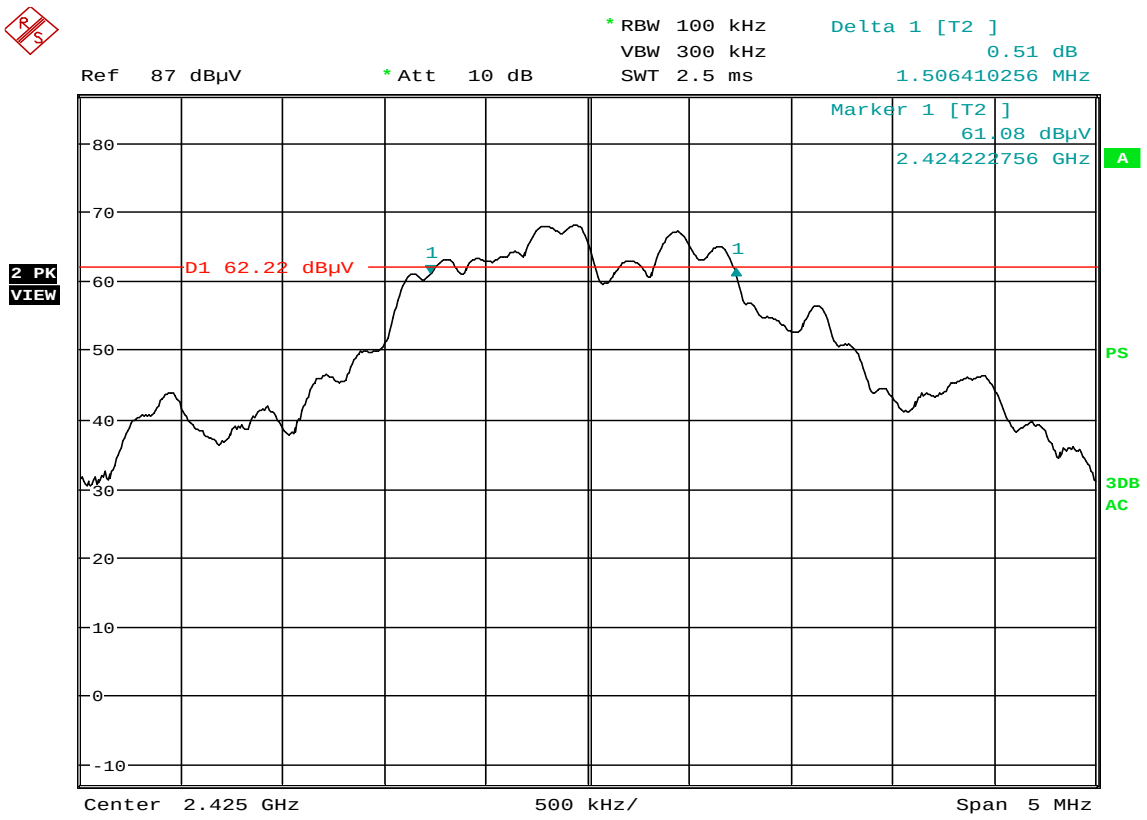
Figure 4



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



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

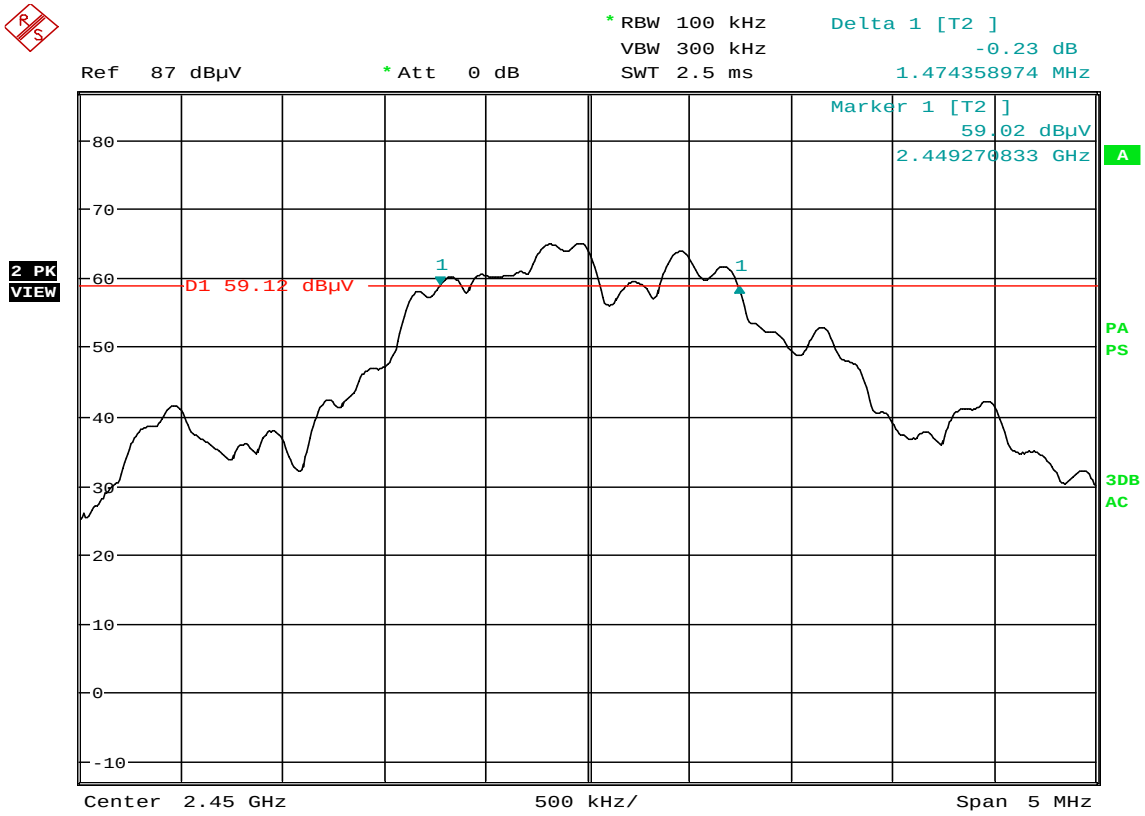


Date: 18.MAR.2014 15:43:52

6dB Bandwidth

MANUFACTURER	:	Invensys Controls
MODEL NUMBER	:	Zigbee Wireless Fuel Sensor
SERIAL NUMBER	:	None Assigned
TEST MODE	:	Tx @ 2425MHz (Ch. 15 - Low)
TEST PARAMETERS	:	6dB bandwidth = 1.51MHz
NOTES	:	Battery Operated, Constant transmit
EQUIPMENT USED	:	RBE1, NWQ1

NOTES

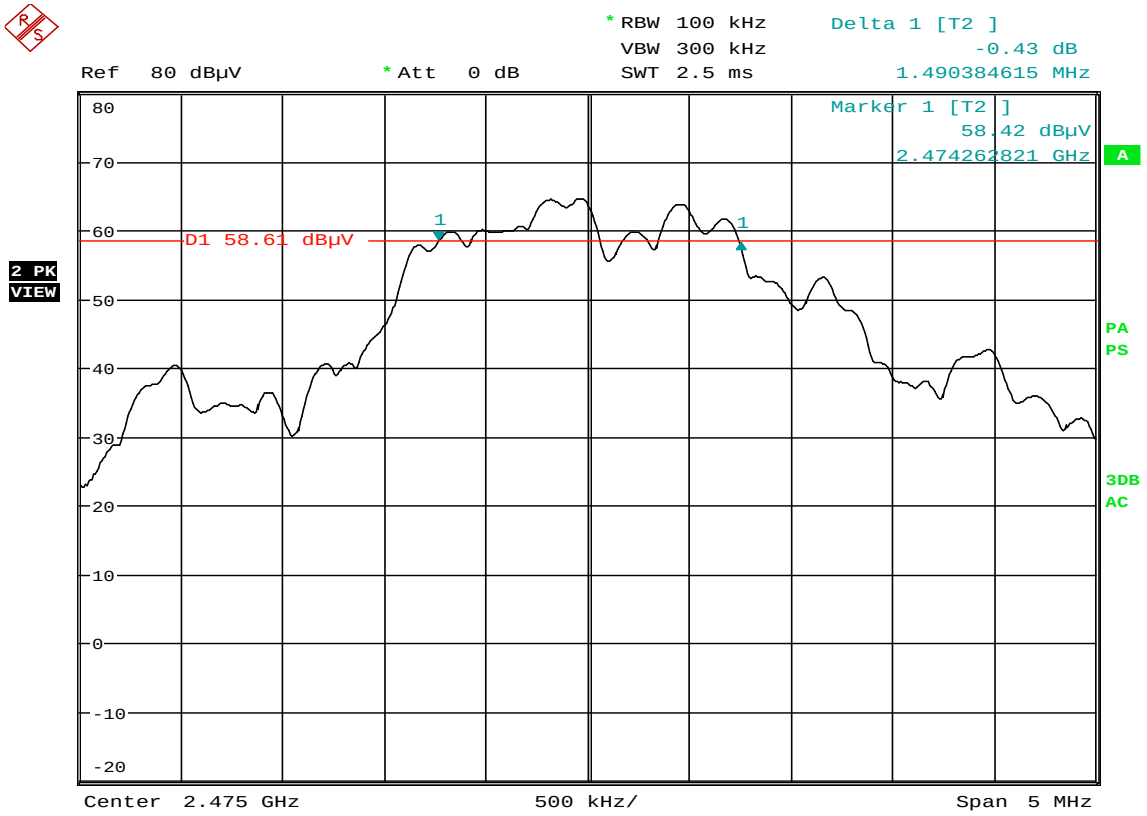


Date: 18.MAR.2014 15:58:40

6dB Bandwidth

MANUFACTURER	:	Invensys Controls
MODEL NUMBER	:	Zigbee Wireless Fuel Sensor
SERIAL NUMBER	:	None Assigned
TEST MODE	:	Tx @ 2450MHz (Ch. 20 - Mid)
TEST PARAMETERS	:	6dB bandwidth = 1.47MHz
NOTES	:	Battery Operated, Constant transmit
EQUIPMENT USED	:	RBE1, NWQ1

NOTES



Date: 19.MAR.2014 08:24:58

6dB Bandwidth

MANUFACTURER	:	Invensys Controls
MODEL NUMBER	:	Zigbee Wireless Fuel Sensor
SERIAL NUMBER	:	None Assigned
TEST MODE	:	Tx @ 2475MHz (Ch. 25 - High)
TEST PARAMETERS	:	6dB bandwidth = 1.49MHz
NOTES	:	Battery Operated, Constant transmit
EQUIPMENT USED	:	RBE1, NWQ1

NOTES

DATA SHEET

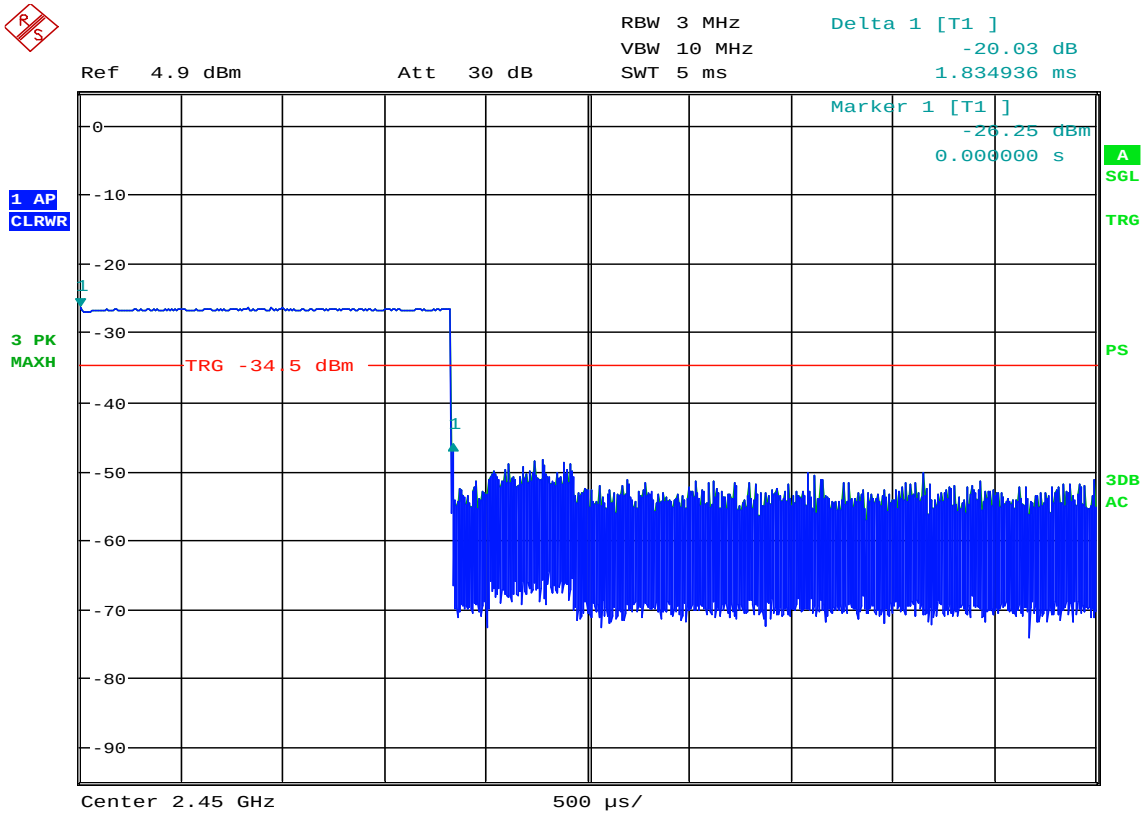
MANUFACTURER	Invensys, Inc.
EUT	Battery Powered Fuel Level Sensor with Radio Module
MODEL NO.	Zigbee
SERIAL NO.	None Assigned
SPECIFICATION	FCC Part 15, Subpart C, Section 15.247 and RSS-210
TEST	Peak Output Power
MODE	Constant transmit
DATE TESTED	March 18, 2014
NOTES	Battery Operated

EIRP = Sig. Gen. Reading + Antenna Gain – Cable Loss

Freq. (MHz)	Ant. Pol.	Wide BW Meter Reading (dBuV)	Matched Sig. Gen. Reading (dB)	Equivalent Antenna Gain (dB)	Cable Loss (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
2425.00	H	72.2	7.4	9.1	4.1	12.3	36.0	-23.7
2425.00	V	64.7	-0.8	9.1	4.1	4.1	36.0	-31.9

Freq. (MHz)	Ant. Pol.	Wide BW Meter Reading (dBuV)	Matched Sig. Gen. Reading (dB)	Equivalent Antenna Gain (dB)	Cable Loss (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
2450.00	H	71.0	6.2	9.0	3.5	11.8	36.0	-24.2
2450.00	V	64.4	-0.6	9.0	3.5	5.0	36.0	-31.0

Freq. (MHz)	Ant. Pol.	Wide BW Meter Reading (dBuV)	Matched Sig. Gen. Reading (dB)	Equivalent Antenna Gain (dB)	Cable Loss (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
2475.00	H	70.3	6.1	9.0	4.2	10.9	36.0	-25.1
2475.00	V	65.2	0.7	9.0	4.2	5.5	36.0	-30.5

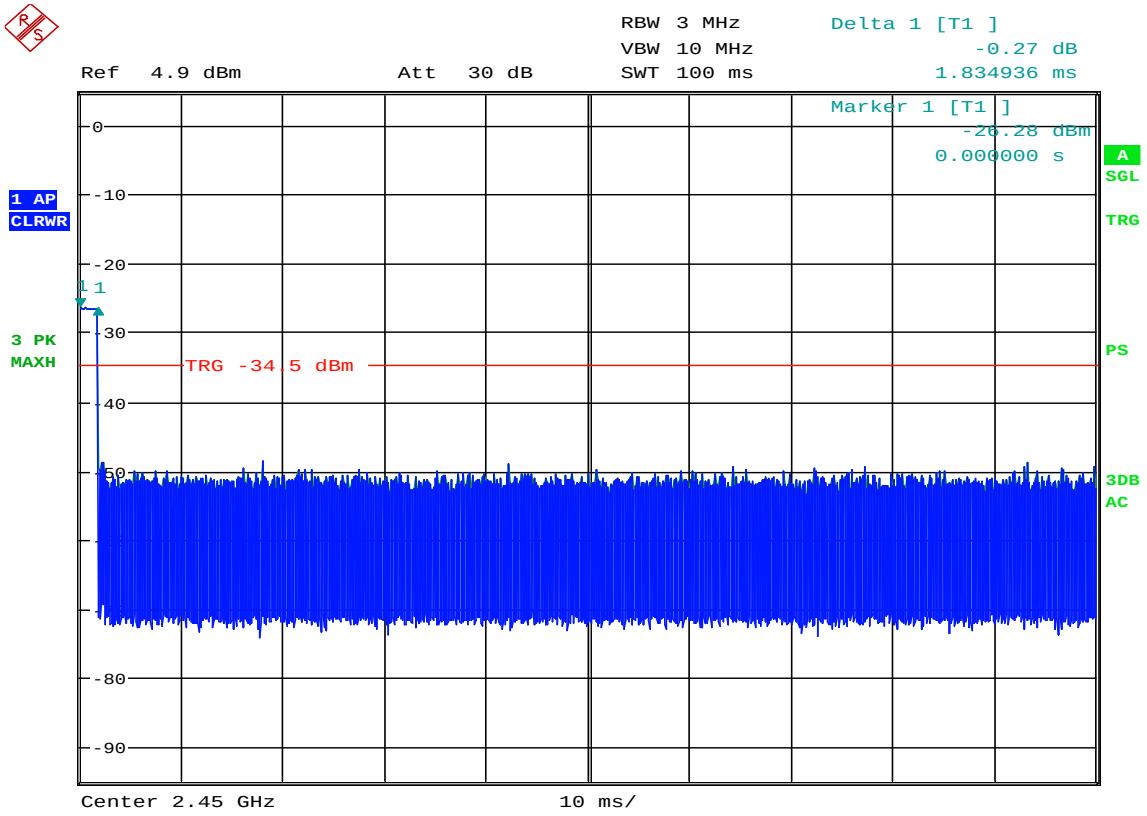


Date: 24.MAR.2014 15:36:50

Duty Cycle Factor

MANUFACTURER	:	Invensys Controls
MODEL NUMBER	:	Zigbee Wireless Fuel Sensor
SERIAL NUMBER	:	None Assigned
TEST MODE	:	Tx @ 2450MHz (Ch. 20 - Mid) – Normal Operation
TEST PARAMETERS	:	Duty Cycle Factor
NOTES	:	Pulse is 1.83msec long
EQUIPMENT USED	:	RBE1, NWQ1

NOTES

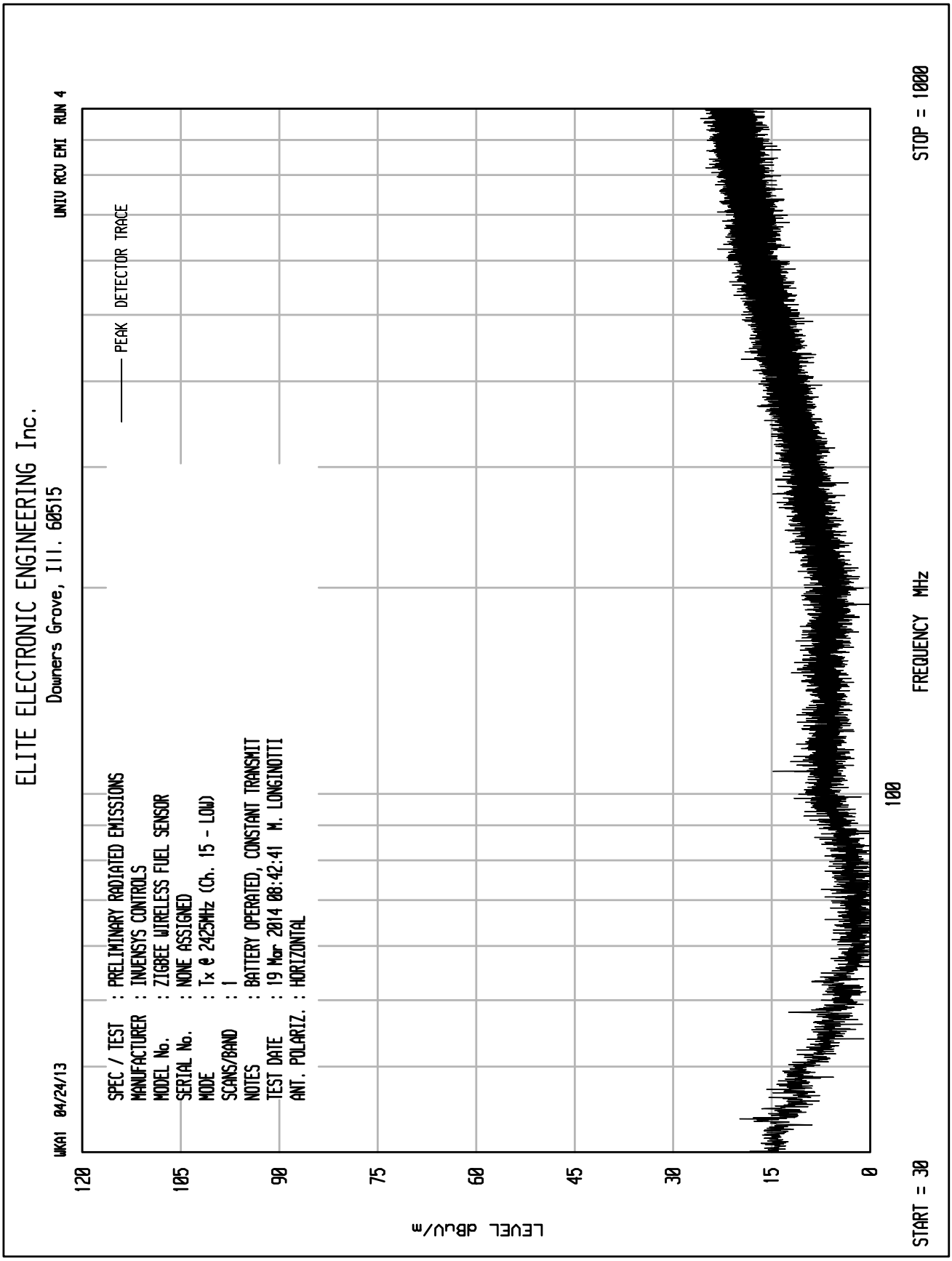


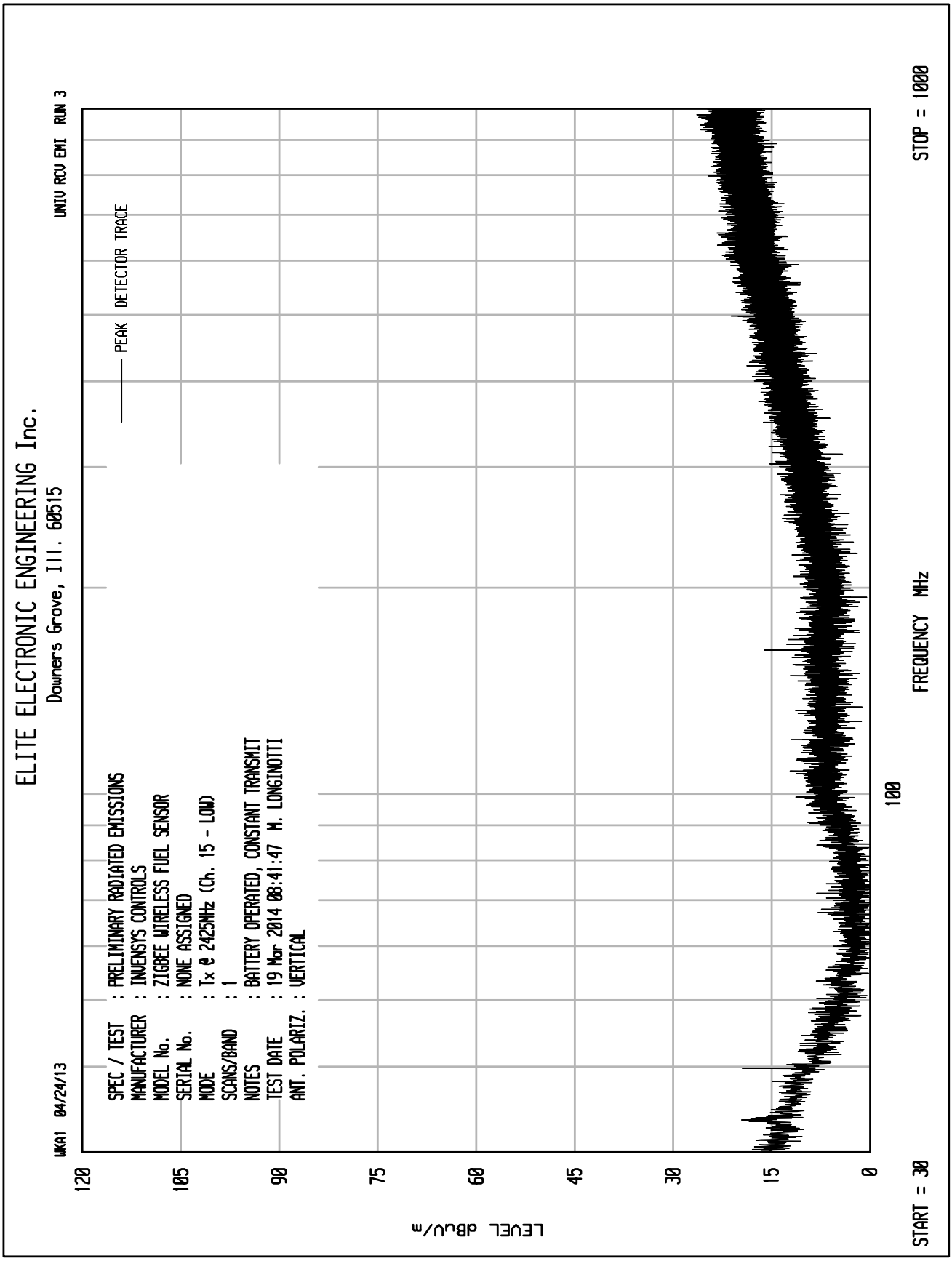
Date: 24.MAR.2014 15:40:02

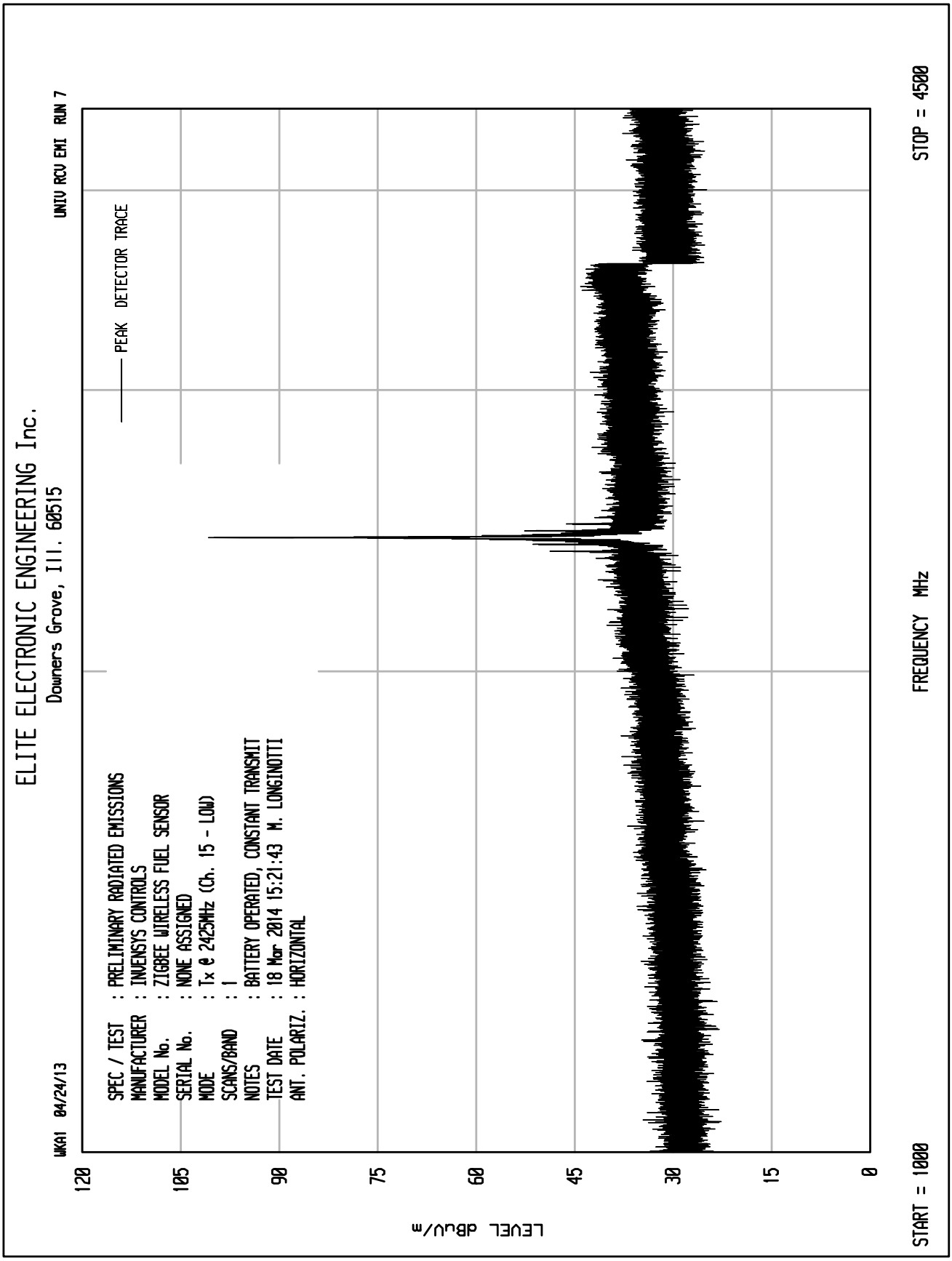
Duty Cycle Factor

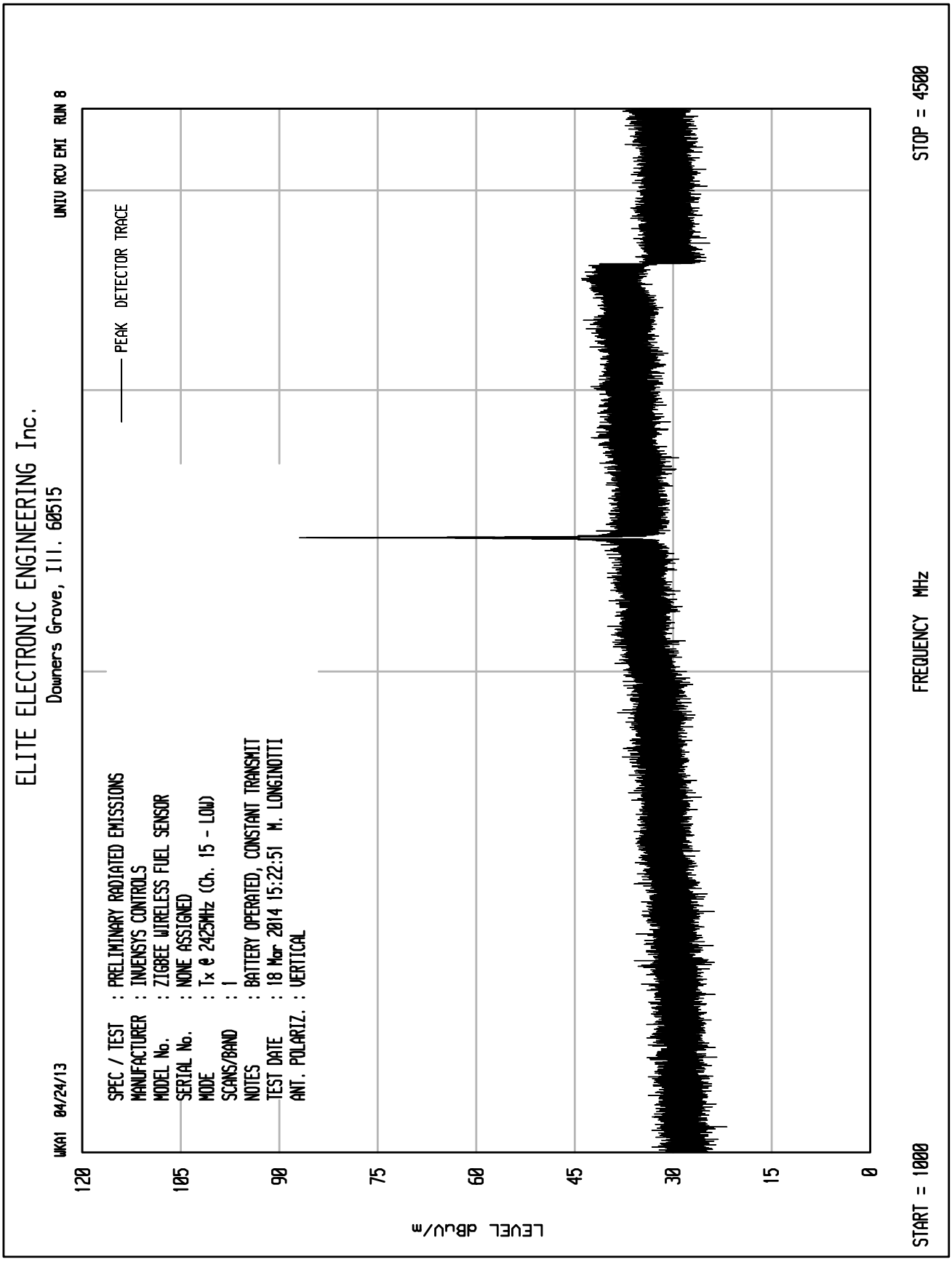
MANUFACTURER	:	Invensys Controls
MODEL NUMBER	:	Zigbee Wireless Fuel Sensor
SERIAL NUMBER	:	None Assigned
TEST MODE	:	Tx @ 2450MHz (Ch. 20 - Mid) – Normal Operation
TEST PARAMETERS	:	Duty Cycle Factor
NOTES	:	Duty Cycle Factor = 20 x log ((on time)/100msec)
	:	Duty Cycle Factor = 20 x log (1.83msec/100msec)
	:	Duty Cycle Factor = -34.75dB
EQUIPMENT USED	:	RBE1, NWQ1

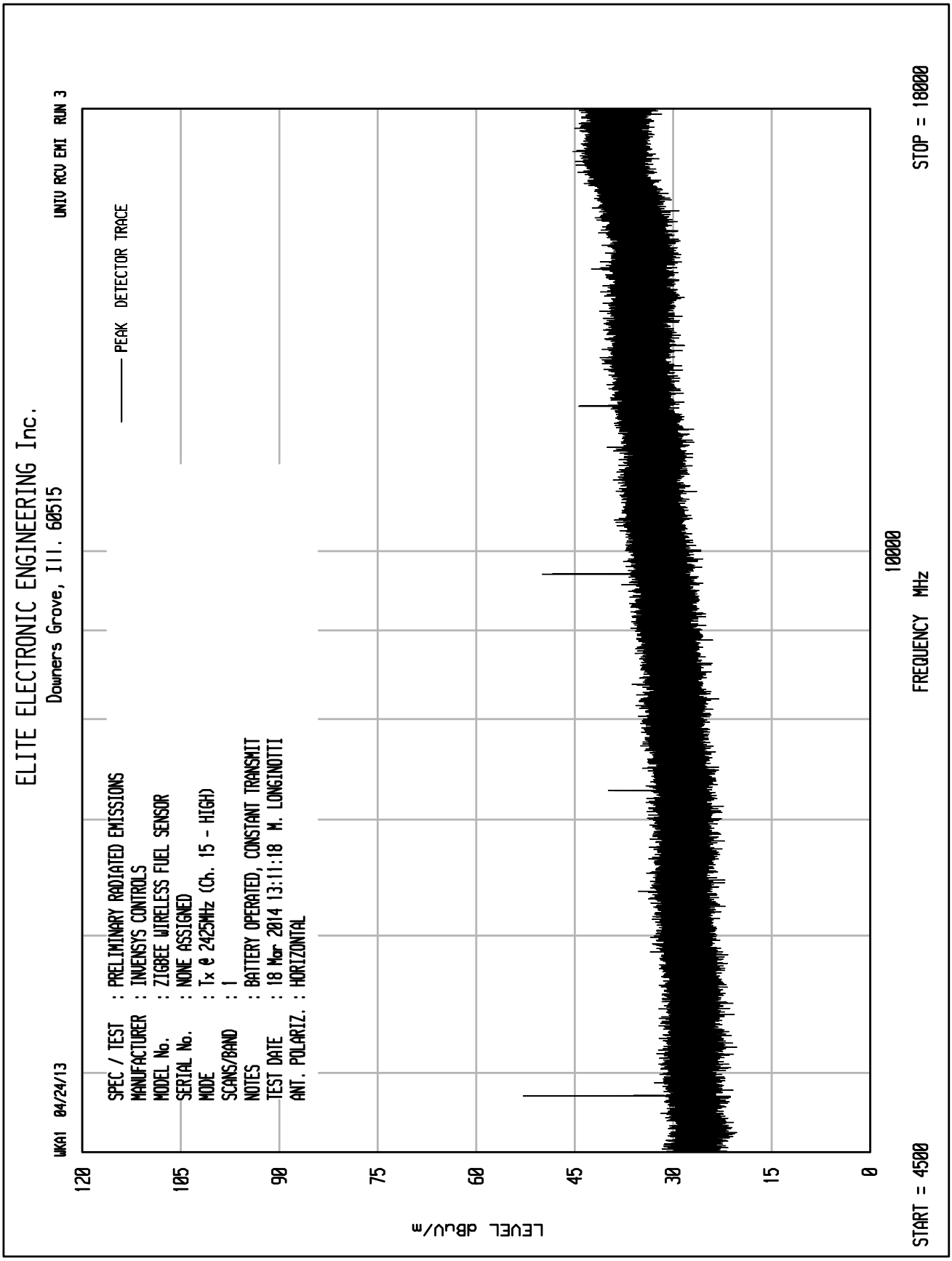
NOTES

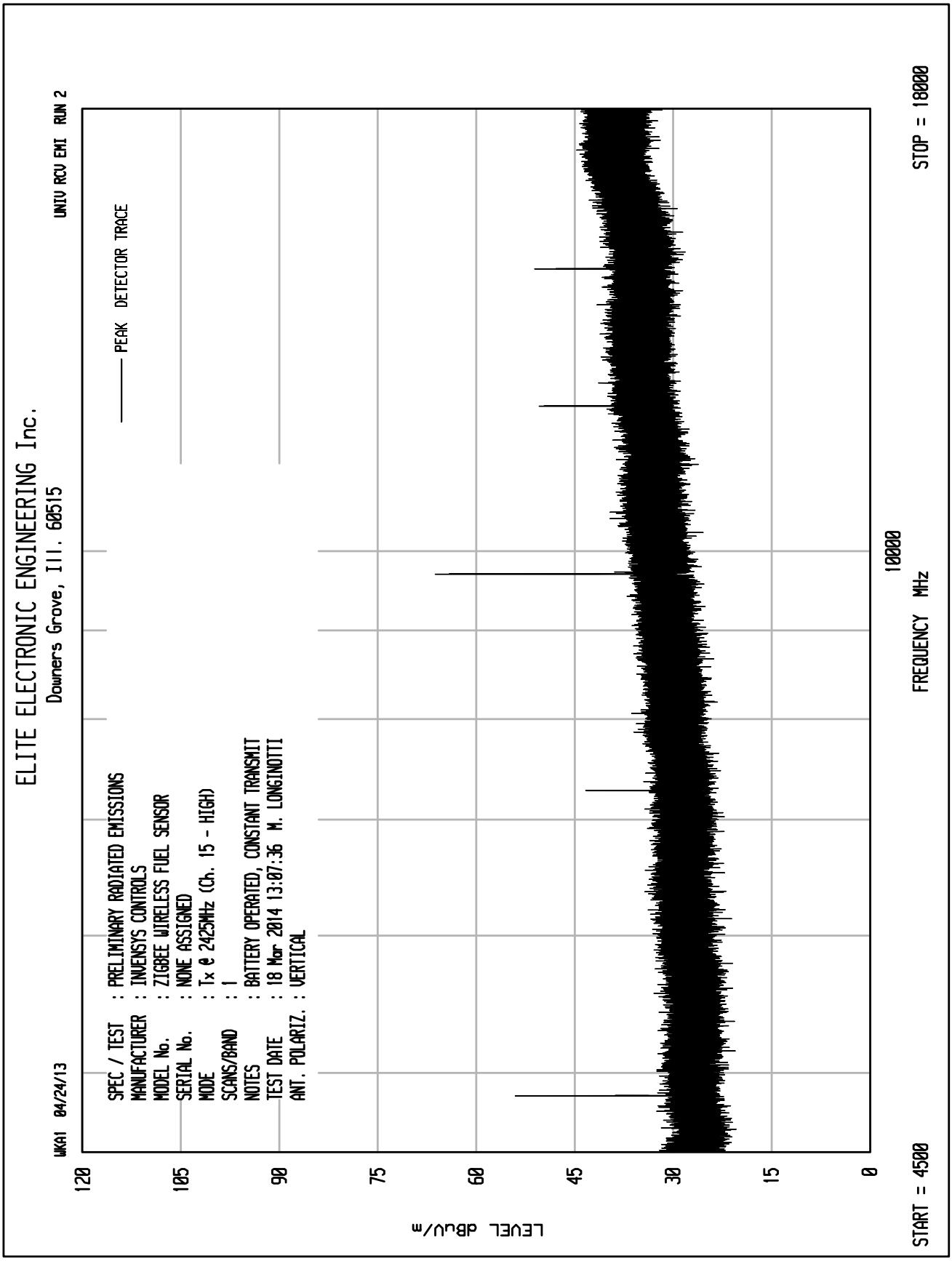

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 4
WKA1 04/24/13
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : INVENSYS CONTROLS
MODEL No. : ZIGBEE WIRELESS FUEL SENSOR
SERIAL No. : NONE ASSIGNED
MODE : Tx @ 2425MHz (Ch. 15 - LOW)
SCANS/BAND : 1
NOTES : BATTERY OPERATED, CONSTANT TRANSMIT
TEST DATE : 19 Mar 2014 08:42:41 M. LONGINOTTI
ANT. POLARIZ. : HORIZONTAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 30
100
FREQUENCY MHz
STOP = 1000

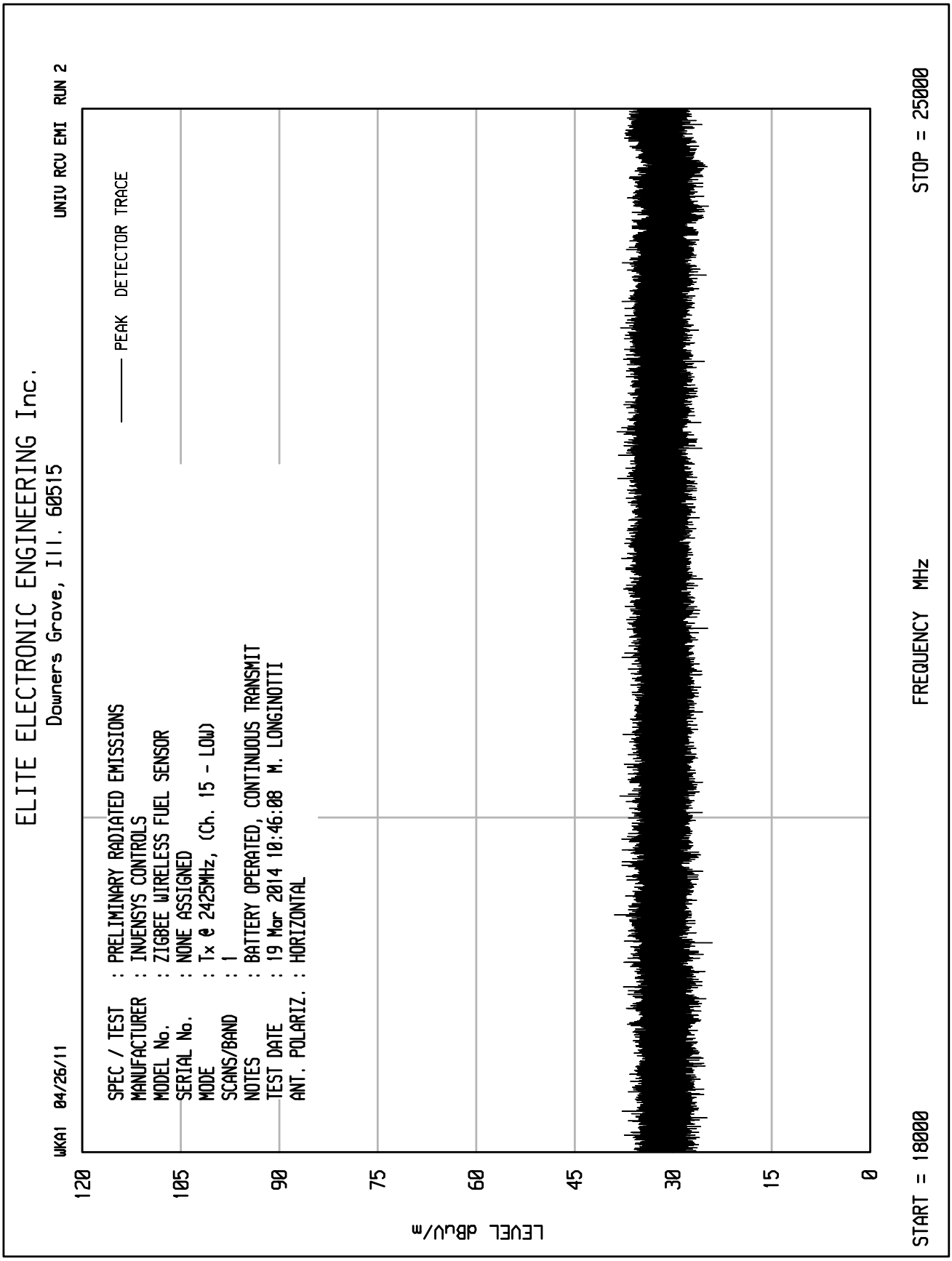

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 3
WKA1 04/24/13
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : INVENSYS CONTROLS
MODEL No. : ZIGBEE WIRELESS FUEL SENSOR
SERIAL No. : NONE ASSIGNED
MODE : Tx @ 2425MHz (Ch. 15 - LOW)
SCANS/BAND : 1
NOTES : BATTERY OPERATED, CONSTANT TRANSMIT
TEST DATE : 19 Mar 2014 08:41:47 M. LONGINOTTI
ANT. POLARIZ. : VERTICAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 30
100
FREQUENCY MHz
STOP = 1000

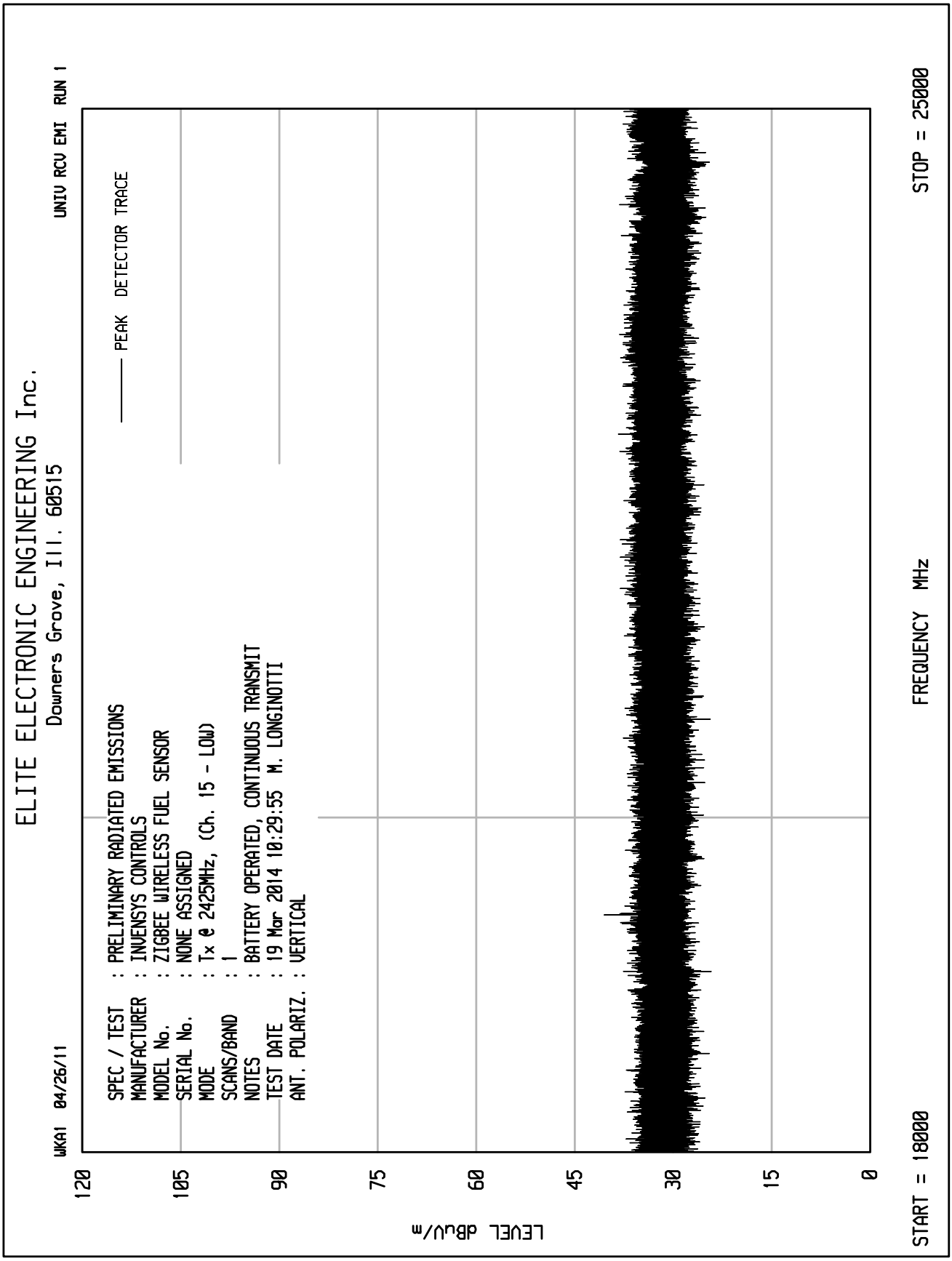

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 7
WKA1 04/24/13
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : INVENSYS CONTROLS
MODEL No. : ZIGBEE WIRELESS FUEL SENSOR
SERIAL No. : NONE ASSIGNED
MODE : Tx @ 2425MHz (Ch. 15 - LOW)
SCANS/BAND : 1
NOTES : BATTERY OPERATED, CONSTANT TRANSMIT
TEST DATE : 18 Mar 2014 15:21:43 M. LONGINOTTI
ANT. POLARIZ. : HORIZONTAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 1000
FREQUENCY MHz
STOP = 4500

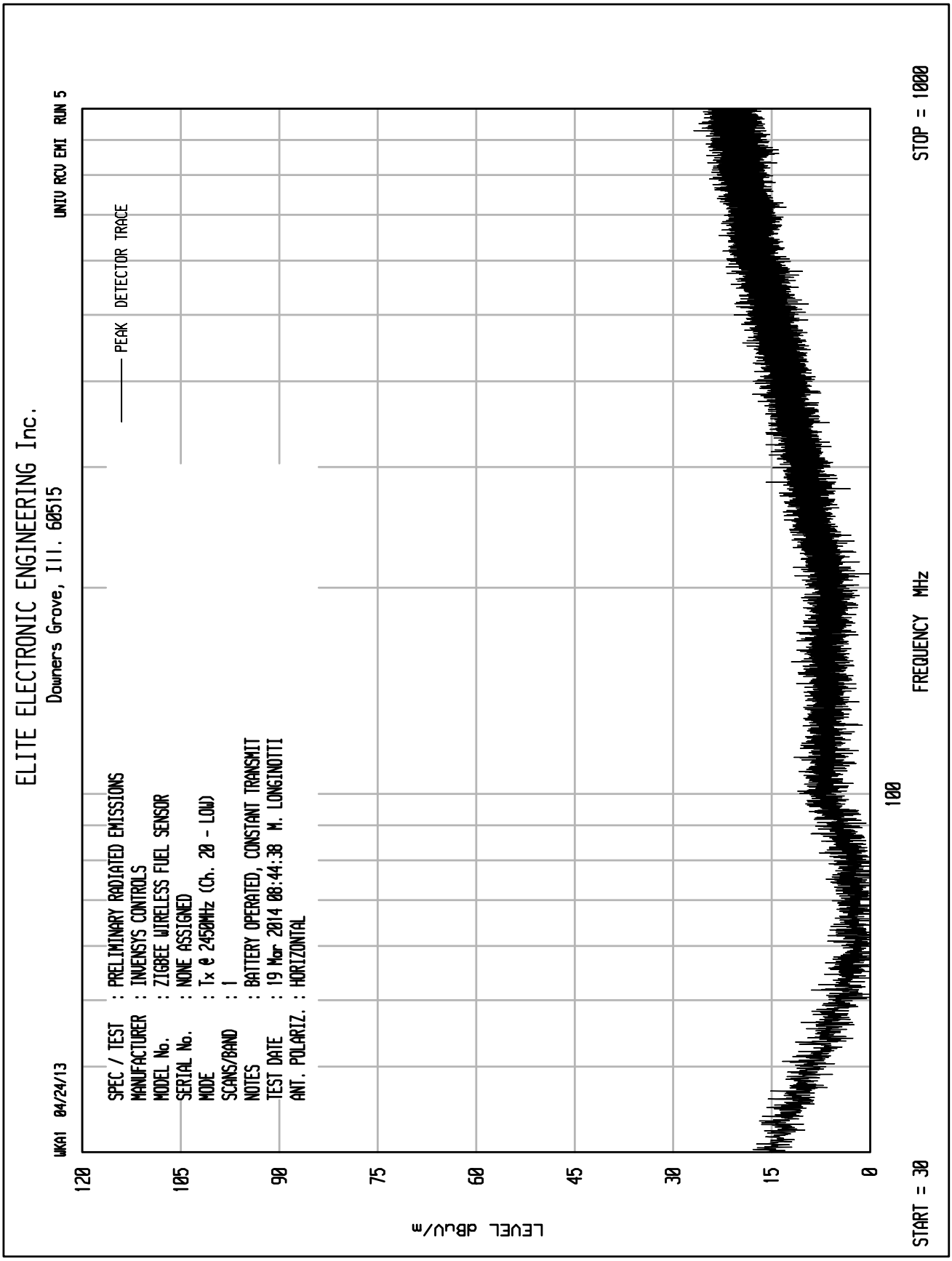

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 8
WKA1 04/24/13
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : INVENSYS CONTROLS
MODEL No. : ZIGBEE WIRELESS FUEL SENSOR
SERIAL No. : NONE ASSIGNED
MODE : Tx @ 2425MHz (Ch. 15 - LOW)
SCANS/BAND : 1
NOTES : BATTERY OPERATED, CONSTANT TRANSMIT
TEST DATE : 18 Mar 2014 15:22:51 M. LONGINOTTI
ANT. POLARIZ. : VERTICAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 1000
FREQUENCY MHz
STOP = 4500

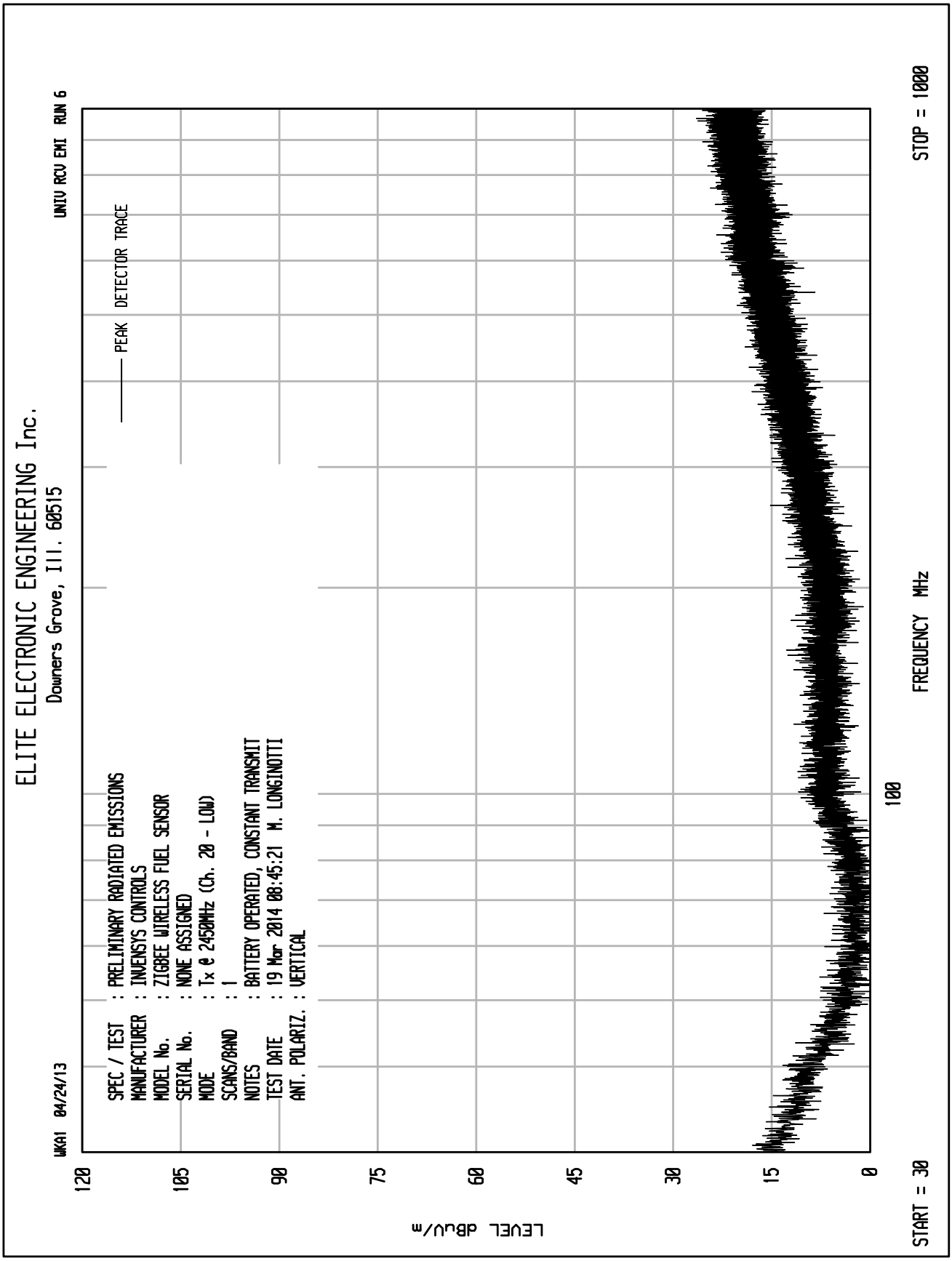

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 3
WKAI 04/24/13
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : INVENSYS CONTROLS
MODEL No. : ZIGBEE WIRELESS FUEL SENSOR
SERIAL No. : NONE ASSIGNED
MODE : Tx @ 2425MHz (Ch. 15 - HIGH)
SCANS/BAND : 1
NOTES : BATTERY OPERATED, CONSTANT TRANSMIT
TEST DATE : 18 Mar 2014 13:11:18 M. LONGINOTTI
ANT. POLARIZ. : HORIZONTAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 4500
10000
FREQUENCY MHz
STOP = 18000

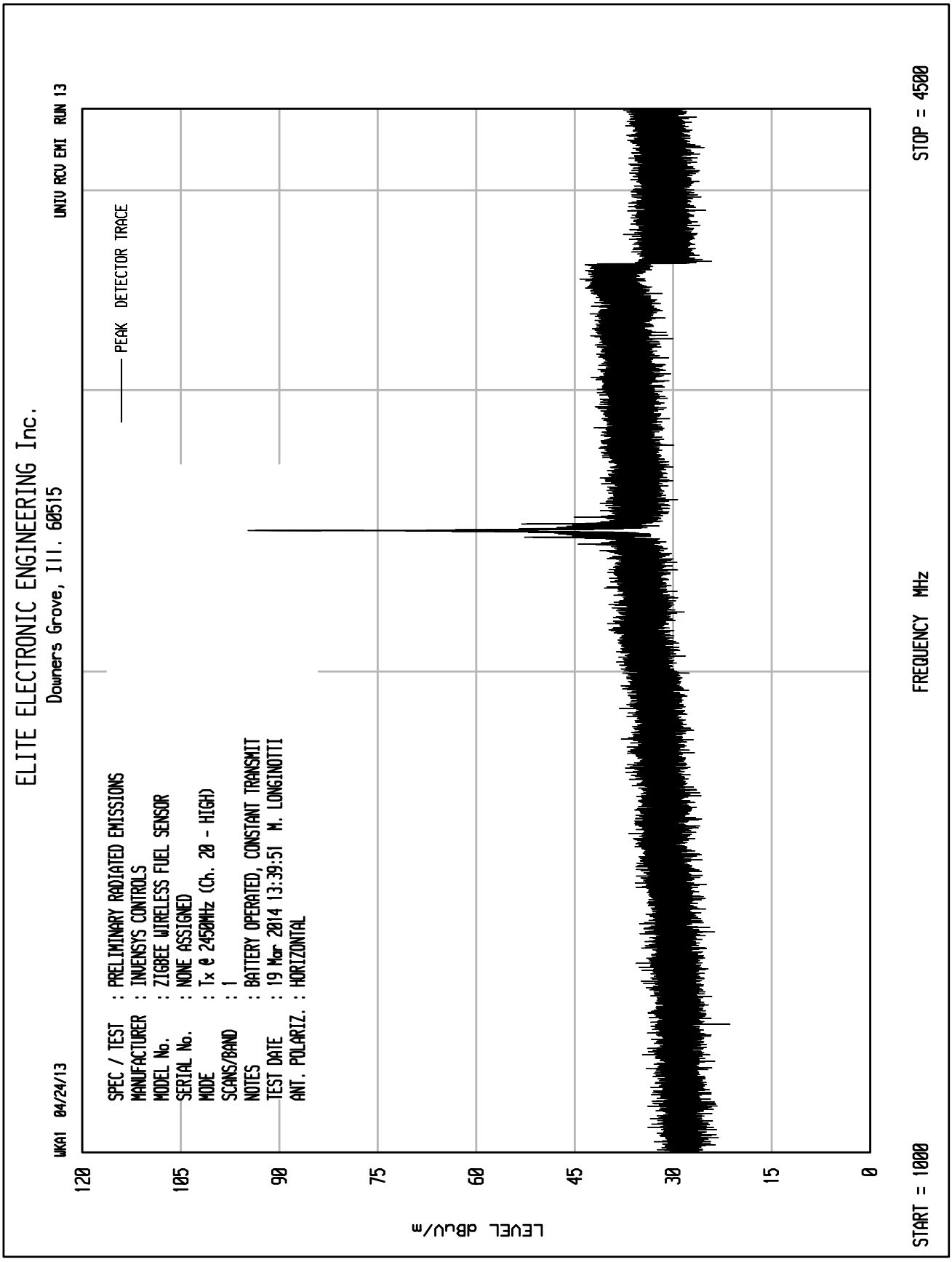

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 2
WKA1 04/24/13
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : INVENSYS CONTROLS
MODEL No. : ZIGBEE WIRELESS FUEL SENSOR
SERIAL No. : NONE ASSIGNED
MODE : Tx @ 2425MHz (Ch. 15 - HIGH)
SCANS/BAND : 1
NOTES : BATTERY OPERATED, CONSTANT TRANSMIT
TEST DATE : 18 Mar 2014 13:07:36 M. LONGINOTTI
ANT. POLARIZ. : VERTICAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 4500
10000
FREQUENCY MHz
STOP = 18000

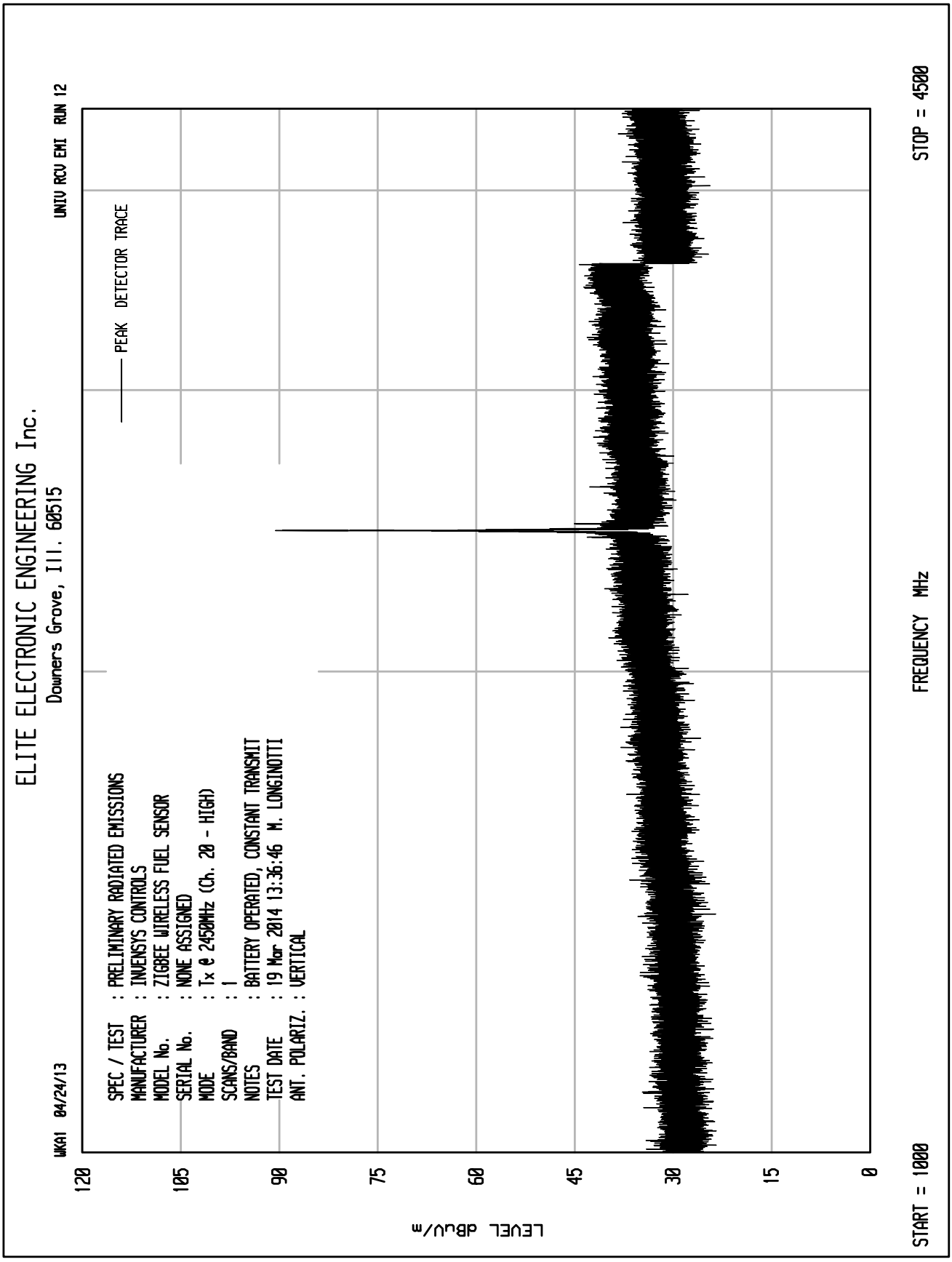

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 2
WKA1 04/26/11
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : INVENSYS CONTROLS
MODEL No. : ZIGBEE WIRELESS FUEL SENSOR
SERIAL No. : NONE ASSIGNED
MODE : Tx @ 2425MHz, (Ch. 15 - LOW)
SCANS/BAND : 1
NOTES : BATTERY OPERATED, CONTINUOUS TRANSMIT
TEST DATE : 19 Mar 2014 10:46:08 M. LONGINOTTI
ANT. POLARIZ. : HORIZONTAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 18000
FREQUENCY MHz
STOP = 25000

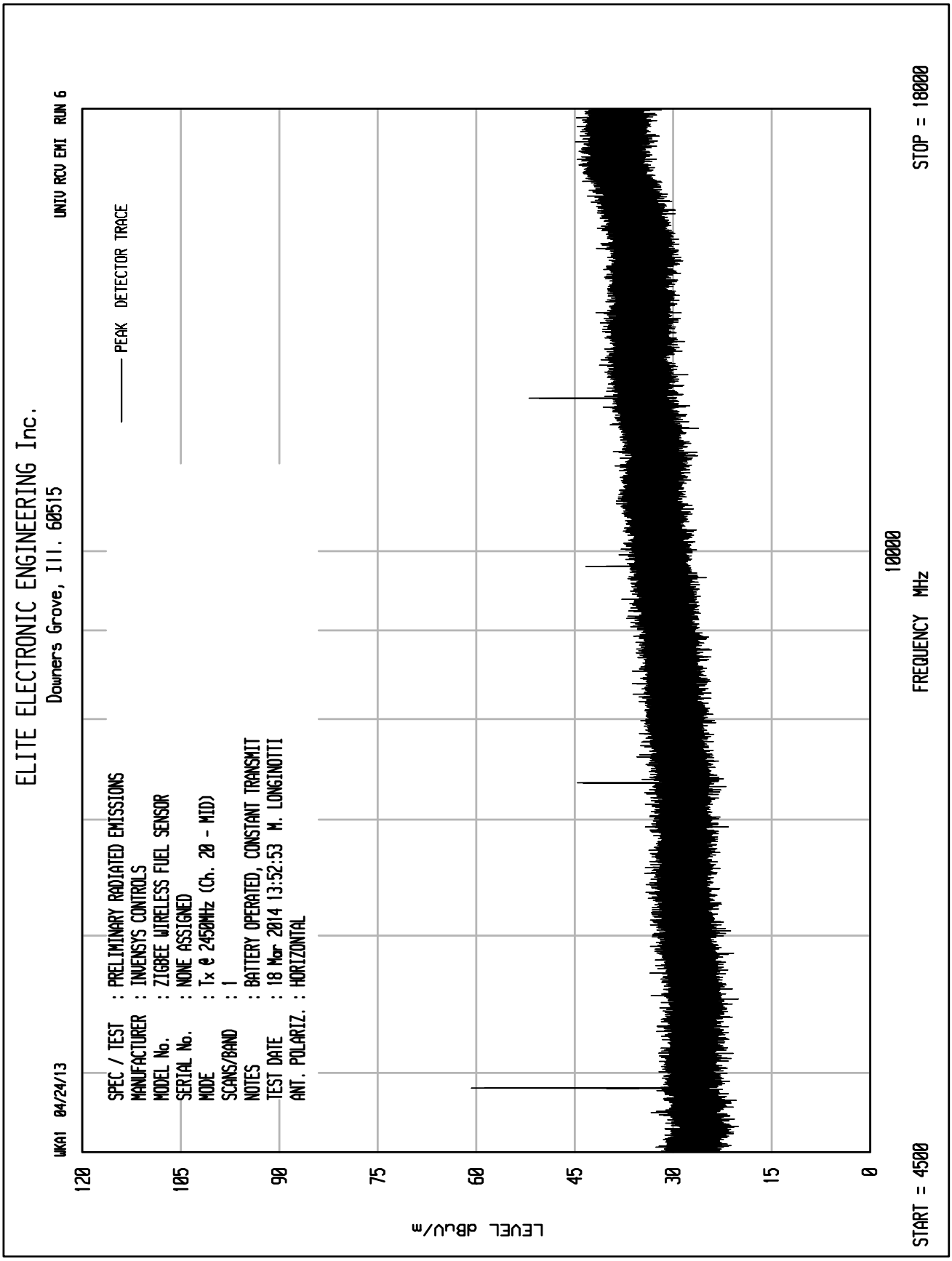

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 1
WKA1 04/26/11
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : INVENSYS CONTROLS
MODEL No. : ZIGBEE WIRELESS FUEL SENSOR
SERIAL No. : NONE ASSIGNED
MODE : Tx @ 2425MHz, (Ch. 15 - LOW)
SCANS/BAND : 1
NOTES : BATTERY OPERATED, CONTINUOUS TRANSMIT
TEST DATE : 19 Mar 2014 10:29:55 M. LONGINOTTI
ANT. POLARIZ. : VERTICAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 18000
FREQUENCY MHz
STOP = 25000

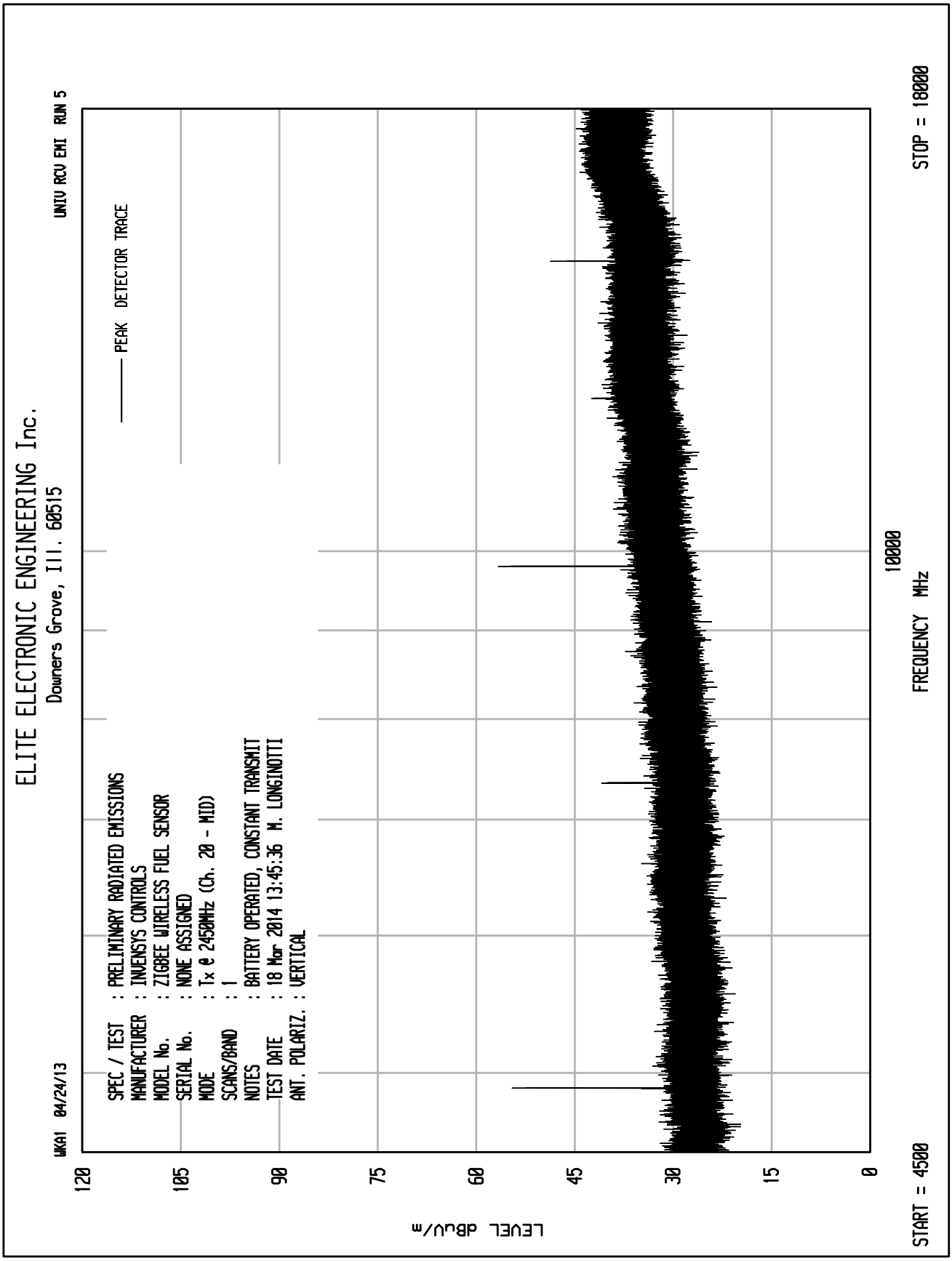

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 5
WKA1 04/24/13
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : INVENSYS CONTROLS
MODEL No. : ZIGBEE WIRELESS FUEL SENSOR
SERIAL No. : NONE ASSIGNED
MODE : Tx @ 2450MHz (Ch. 20 - LOW)
SCANS/BAND : 1
NOTES : BATTERY OPERATED, CONSTANT TRANSMIT
TEST DATE : 19 Mar 2014 08:44:38 M. LONGINOTTI
ANT. POLARIZ. : HORIZONTAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 30
100
FREQUENCY MHz
STOP = 1000

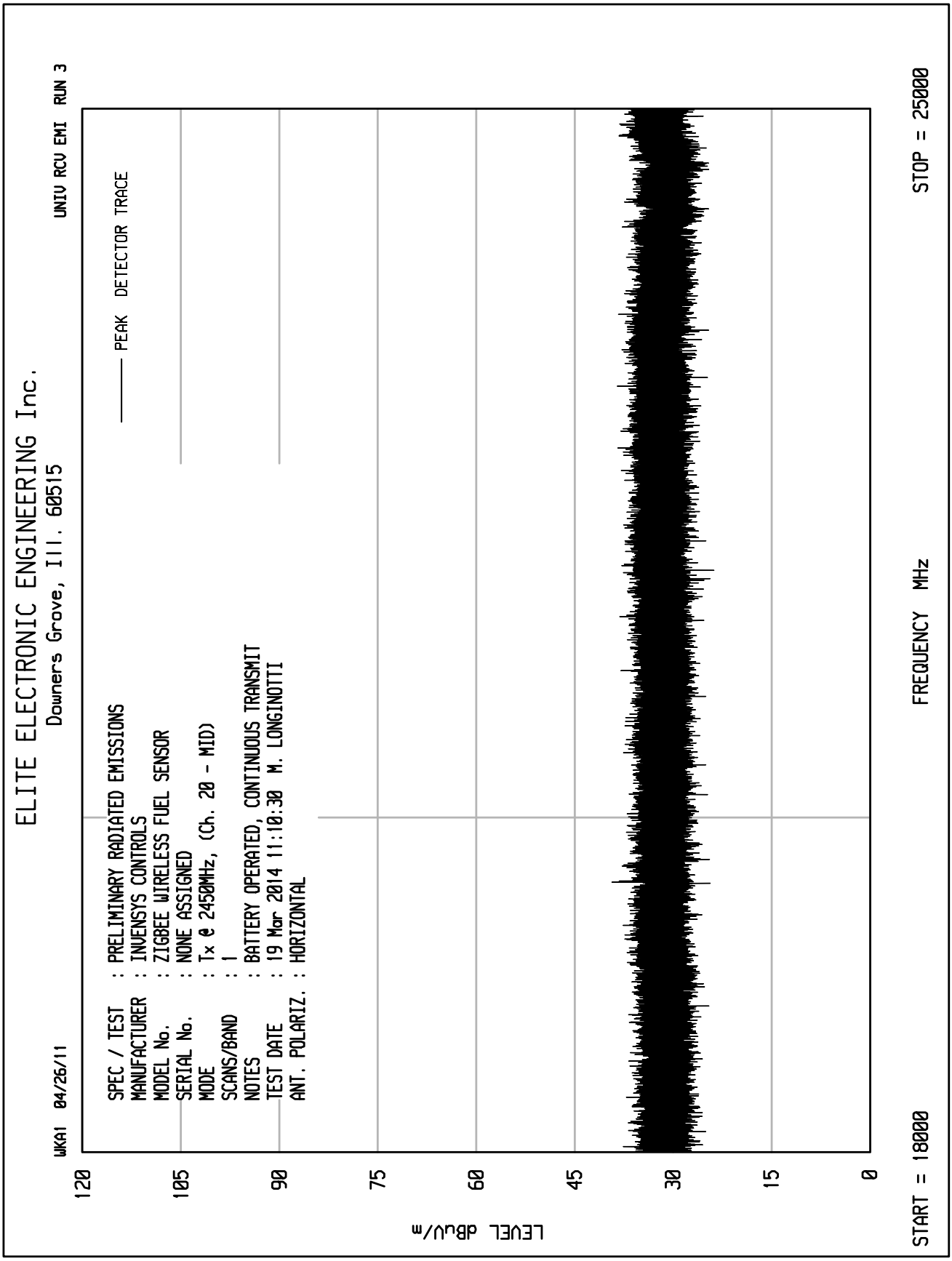

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 6
WKA1 04/24/13
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : INVENSYS CONTROLS
MODEL No. : ZIGBEE WIRELESS FUEL SENSOR
SERIAL No. : NONE ASSIGNED
MODE : Tx @ 2450MHz (Ch. 20 - LOW)
SCANS/BAND : 1
NOTES : BATTERY OPERATED, CONSTANT TRANSMIT
TEST DATE : 19 Mar 2014 08:45:21 M. LONGINOTTI
ANT. POLARIZ. : VERTICAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 30
100
FREQUENCY MHz
STOP = 1000

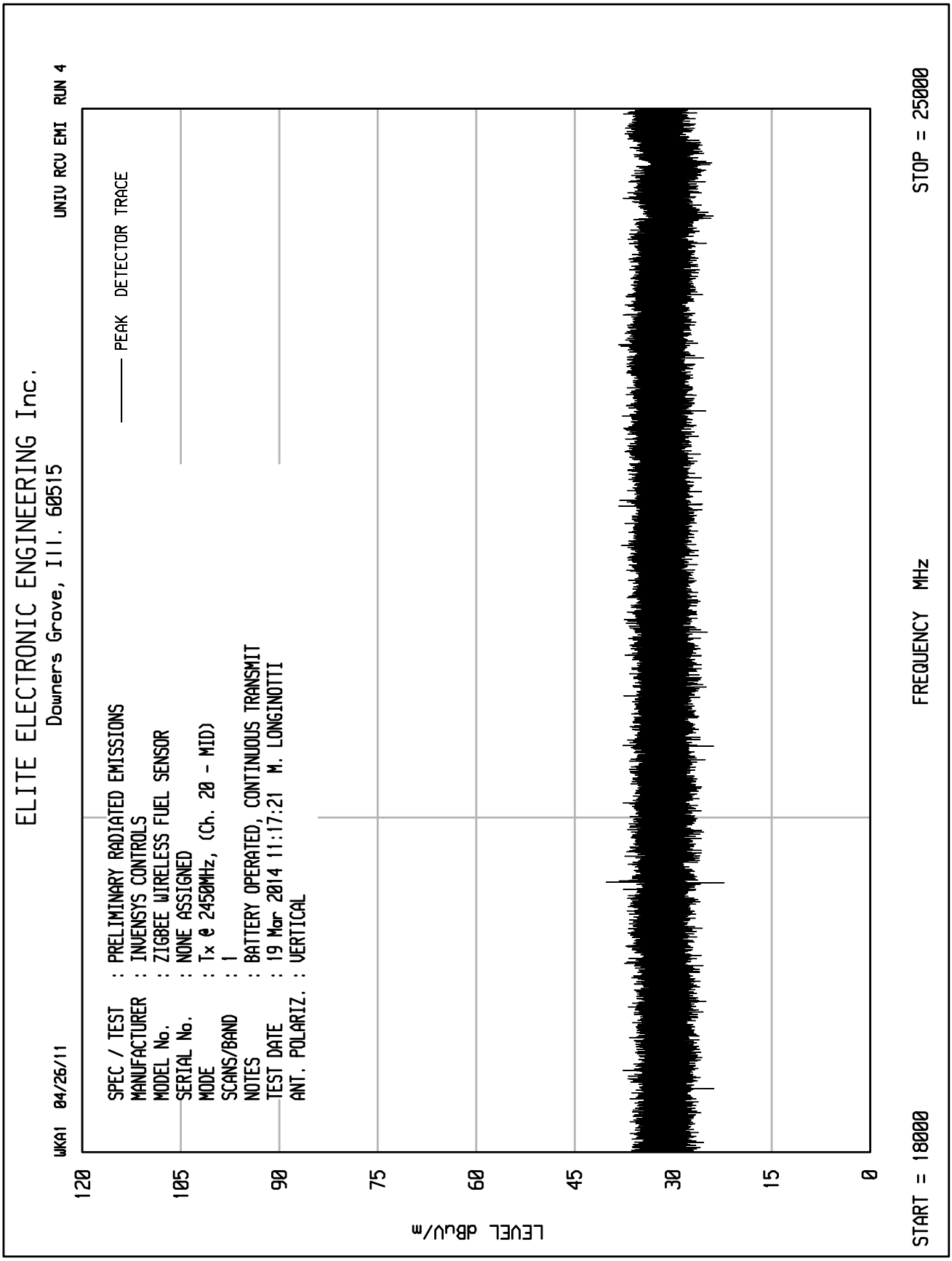

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 13
WKA1 04/24/13
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : INVENSYS CONTROLS
MODEL No. : ZIGBEE WIRELESS FUEL SENSOR
SERIAL No. : NONE ASSIGNED
MODE : Tx @ 2450MHz (Ch. 20 - HIGH)
SCANS/BAND : 1
NOTES : BATTERY OPERATED, CONSTANT TRANSMIT
TEST DATE : 19 Mar 2014 13:39:51 M. LONGINOTTI
ANT. POLARIZ. : HORIZONTAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 1000
FREQUENCY MHz
STOP = 4500

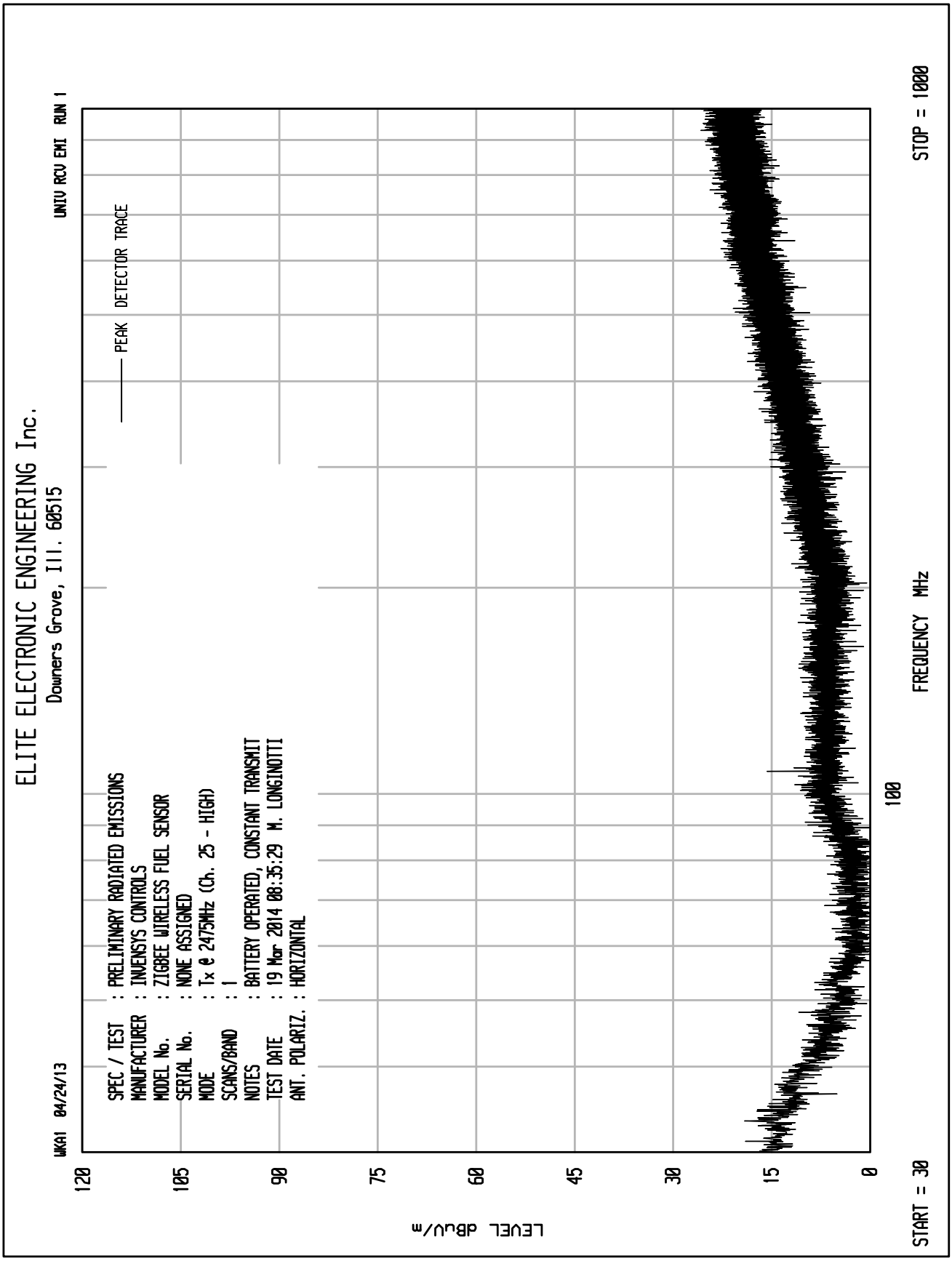

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 12
WKA1 04/24/13
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : INVENSYS CONTROLS
MODEL No. : ZIGBEE WIRELESS FUEL SENSOR
SERIAL No. : NONE ASSIGNED
MODE : Tx @ 2450MHz (Ch. 20 - HIGH)
SCANS/BAND : 1
NOTES : BATTERY OPERATED, CONSTANT TRANSMIT
TEST DATE : 19 Mar 2014 13:36:46 M. LONGINOTTI
ANT. POLARIZ. : VERTICAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 1000
FREQUENCY MHz
STOP = 4500

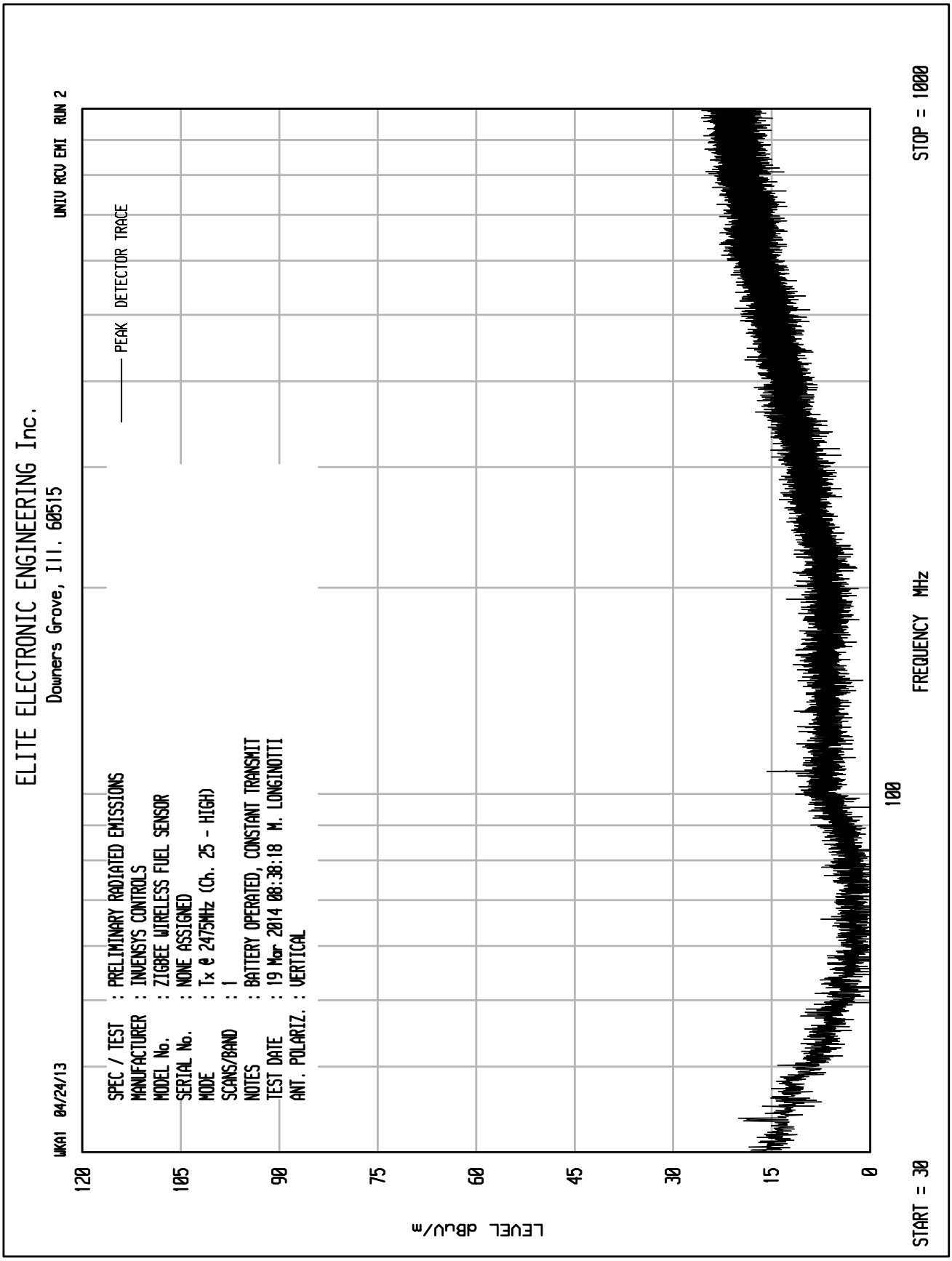

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 6
WKA1 04/24/13
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : INVENSYS CONTROLS
MODEL No. : ZIGBEE WIRELESS FUEL SENSOR
SERIAL No. : NONE ASSIGNED
MODE : Tx @ 2450MHz (Ch. 20 - MID)
SCANS/BAND : 1
NOTES : BATTERY OPERATED, CONSTANT TRANSMIT
TEST DATE : 18 Mar 2014 13:52:53 M. LONGINOTTI
ANT. POLARIZ. : HORIZONTAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 4500
10000
STOP = 18000
FREQUENCY MHz

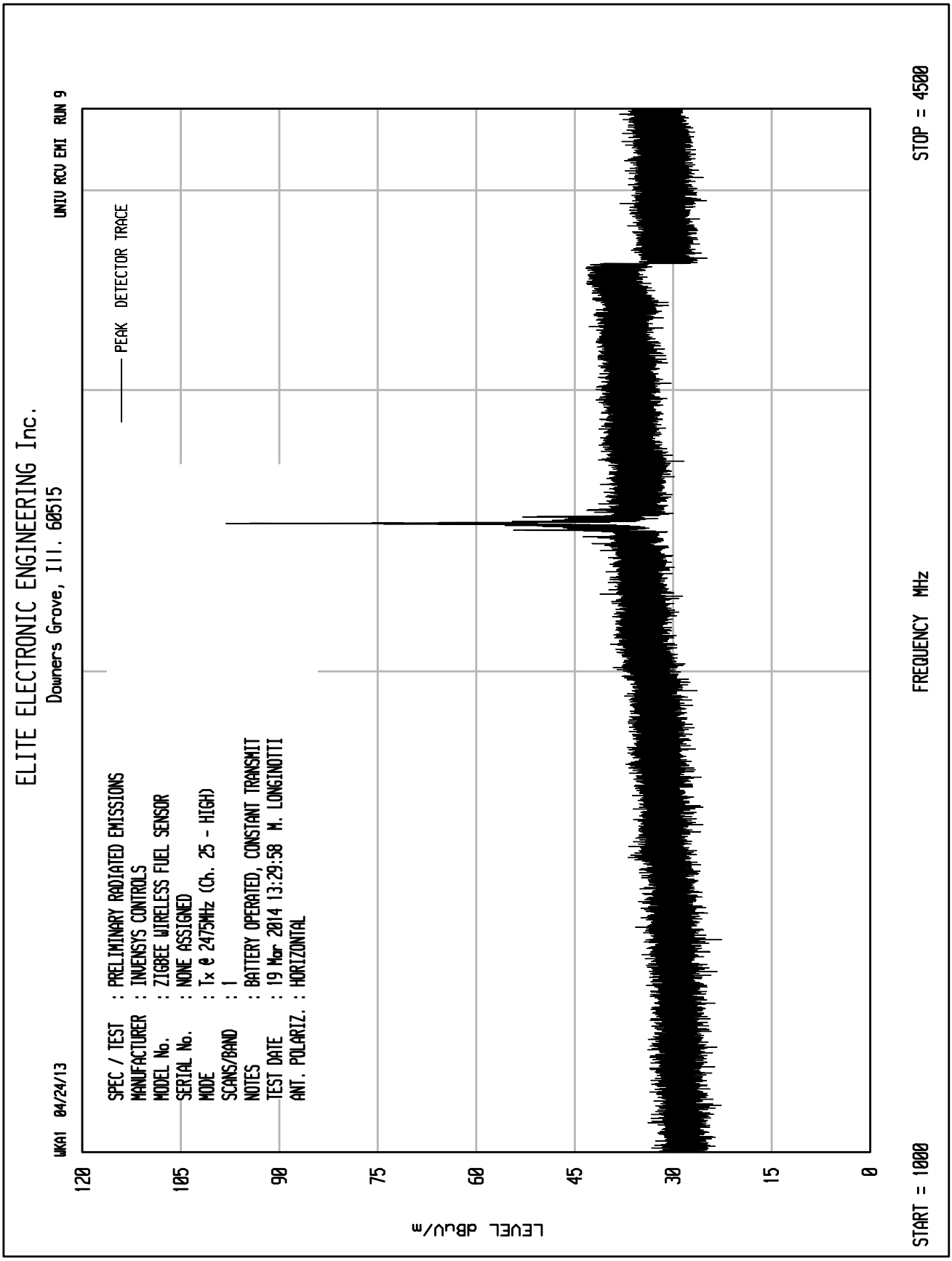

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 5
WKA1 04/24/13
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : INVENSYS CONTROLS
MODEL No. : ZIGBEE WIRELESS FUEL SENSOR
SERIAL No. : NONE ASSIGNED
MODE : Tx @ 2450MHz (Ch. 20 - MID)
SCANS/BAND : 1
NOTES : BATTERY OPERATED, CONSTANT TRANSMIT
TEST DATE : 18 Mar 2014 13:45:36 M. LONGINOTTI
ANT. POLARIZ. : VERTICAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 4500
10000
FREQUENCY MHz
STOP = 18000

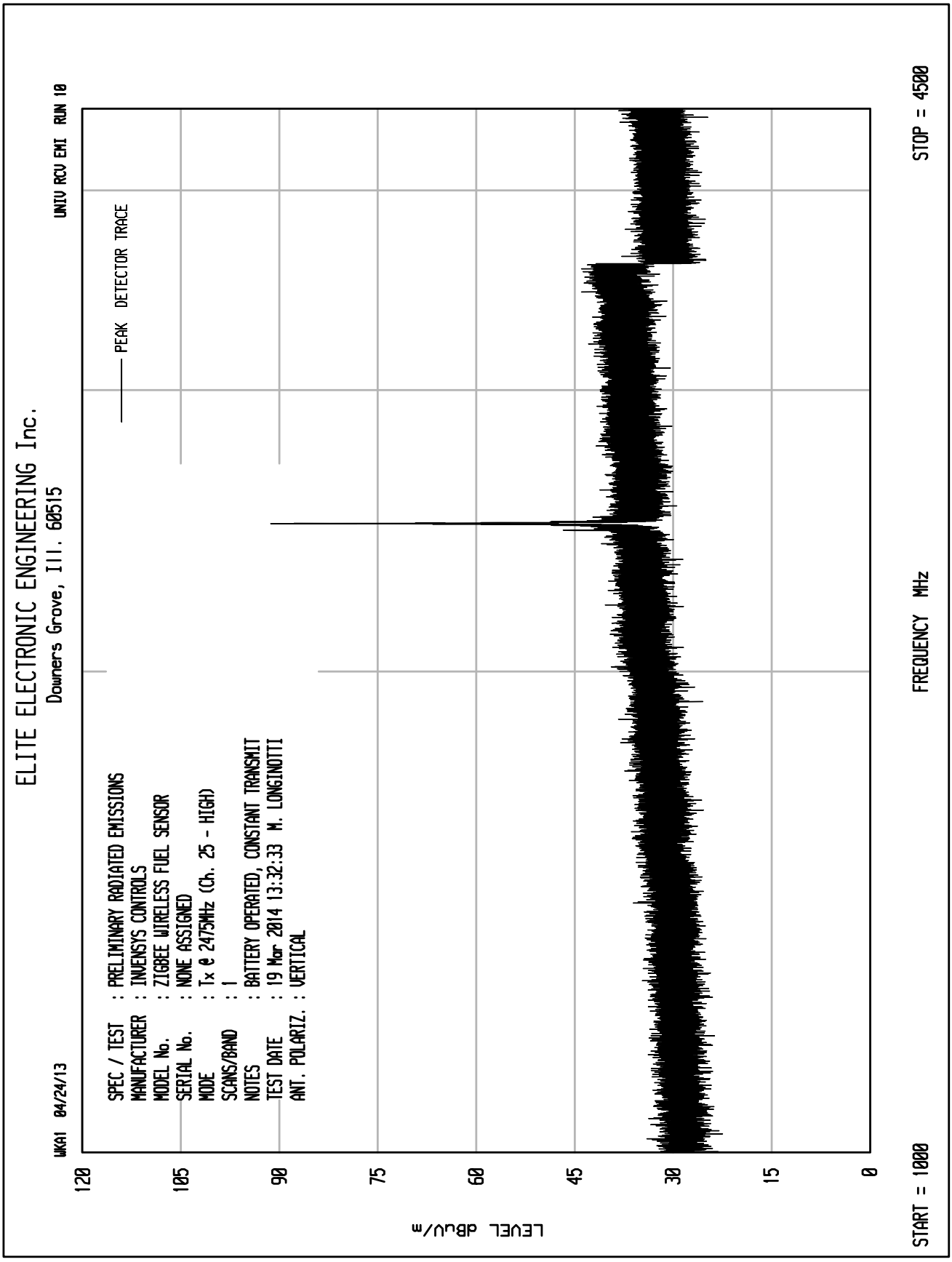

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 3
WKA1 04/26/11
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : INVENSYS CONTROLS
MODEL No. : ZIGBEE WIRELESS FUEL SENSOR
SERIAL No. : NONE ASSIGNED
MODE : Tx @ 2450MHz, (Ch. 20 - MID)
SCANS/BAND : 1
NOTES : BATTERY OPERATED, CONTINUOUS TRANSMIT
TEST DATE : 19 Mar 2014 11:10:30 M. LONGINOTTI
ANT. POLARIZ. : HORIZONTAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 18000
FREQUENCY MHz
STOP = 25000

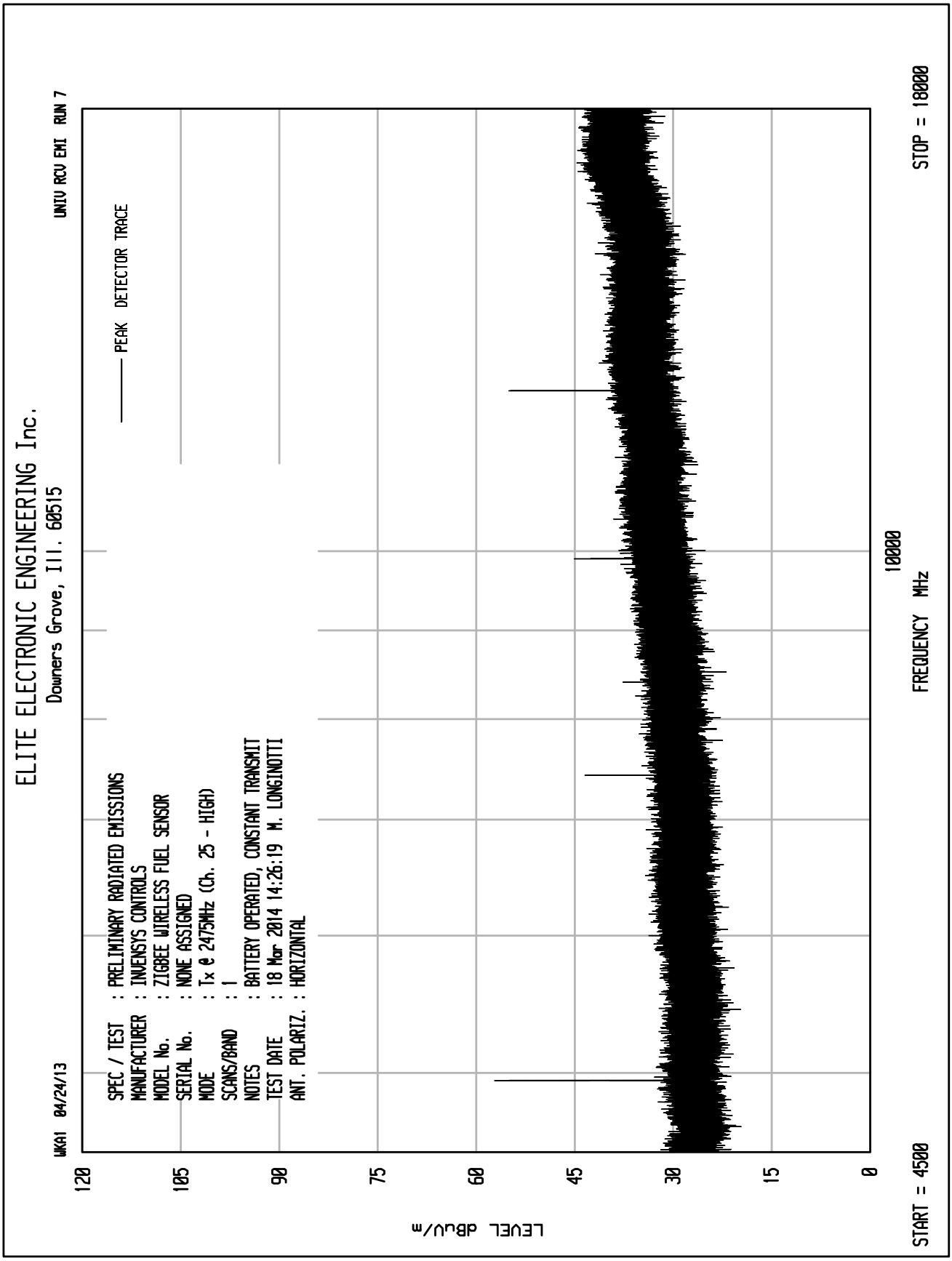

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 4
WKA1 04/26/11
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : INVENSYS CONTROLS
MODEL No. : ZIGBEE WIRELESS FUEL SENSOR
SERIAL No. : NONE ASSIGNED
MODE : Tx @ 2450MHz, (Ch. 20 - MID)
SCANS/BAND : 1
NOTES : BATTERY OPERATED, CONTINUOUS TRANSMIT
TEST DATE : 19 Mar 2014 11:17:21 M. LONGINOTTI
ANT. POLARIZ. : VERTICAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 18000
FREQUENCY MHz
STOP = 25000

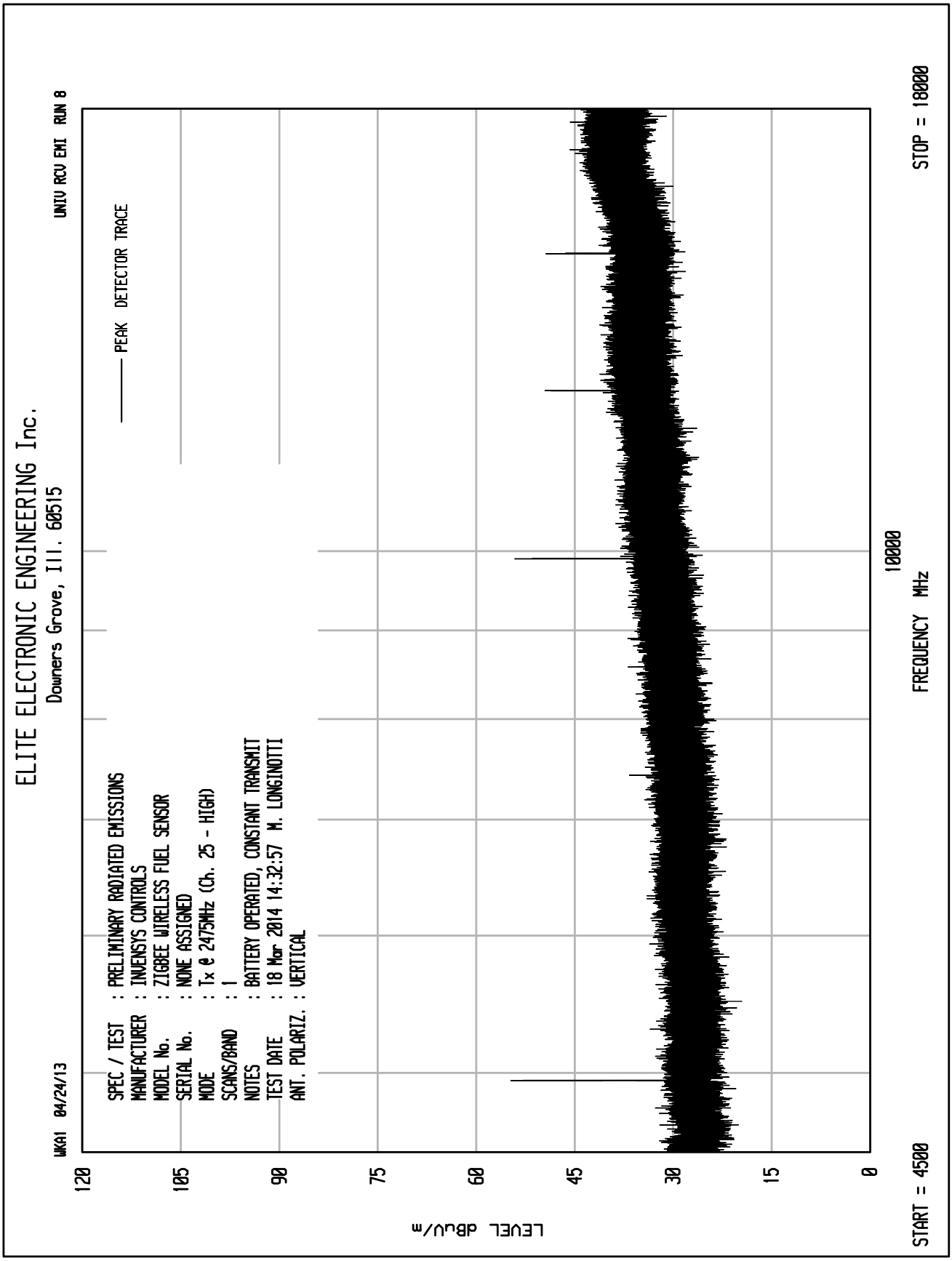

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 1
WKA1 04/24/13
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : INVENSYS CONTROLS
MODEL No. : ZIGBEE WIRELESS FUEL SENSOR
SERIAL No. : NONE ASSIGNED
MODE : Tx @ 2475MHz (Ch. 25 - HIGH)
SCANS/BAND : 1
NOTES : BATTERY OPERATED, CONSTANT TRANSMIT
TEST DATE : 19 Mar 2014 08:35:29 M. LONGINOTTI
ANT. POLARIZ. : HORIZONTAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 30
100
FREQUENCY MHz
STOP = 1000

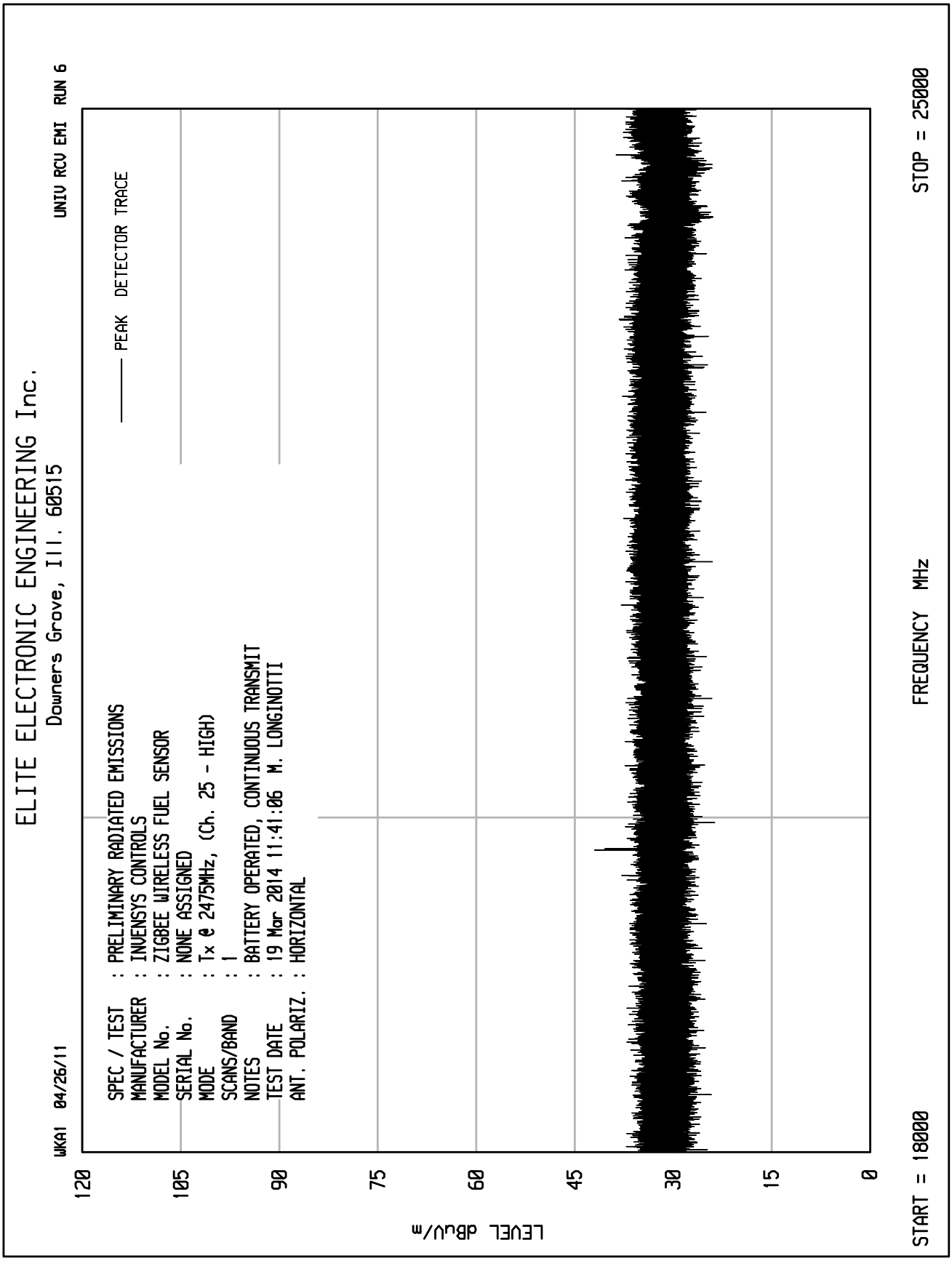

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 2
WKA1 04/24/13
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : INVENSYS CONTROLS
MODEL No. : ZIGBEE WIRELESS FUEL SENSOR
SERIAL No. : NONE ASSIGNED
MODE : Tx @ 2475MHz (Ch. 25 - HIGH)
SCANS/BAND : 1
NOTES : BATTERY OPERATED, CONSTANT TRANSMIT
TEST DATE : 19 Mar 2014 08:38:18 M. LONGINOTTI
ANT. POLARIZ. : VERTICAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 30
100
FREQUENCY MHz
STOP = 1000

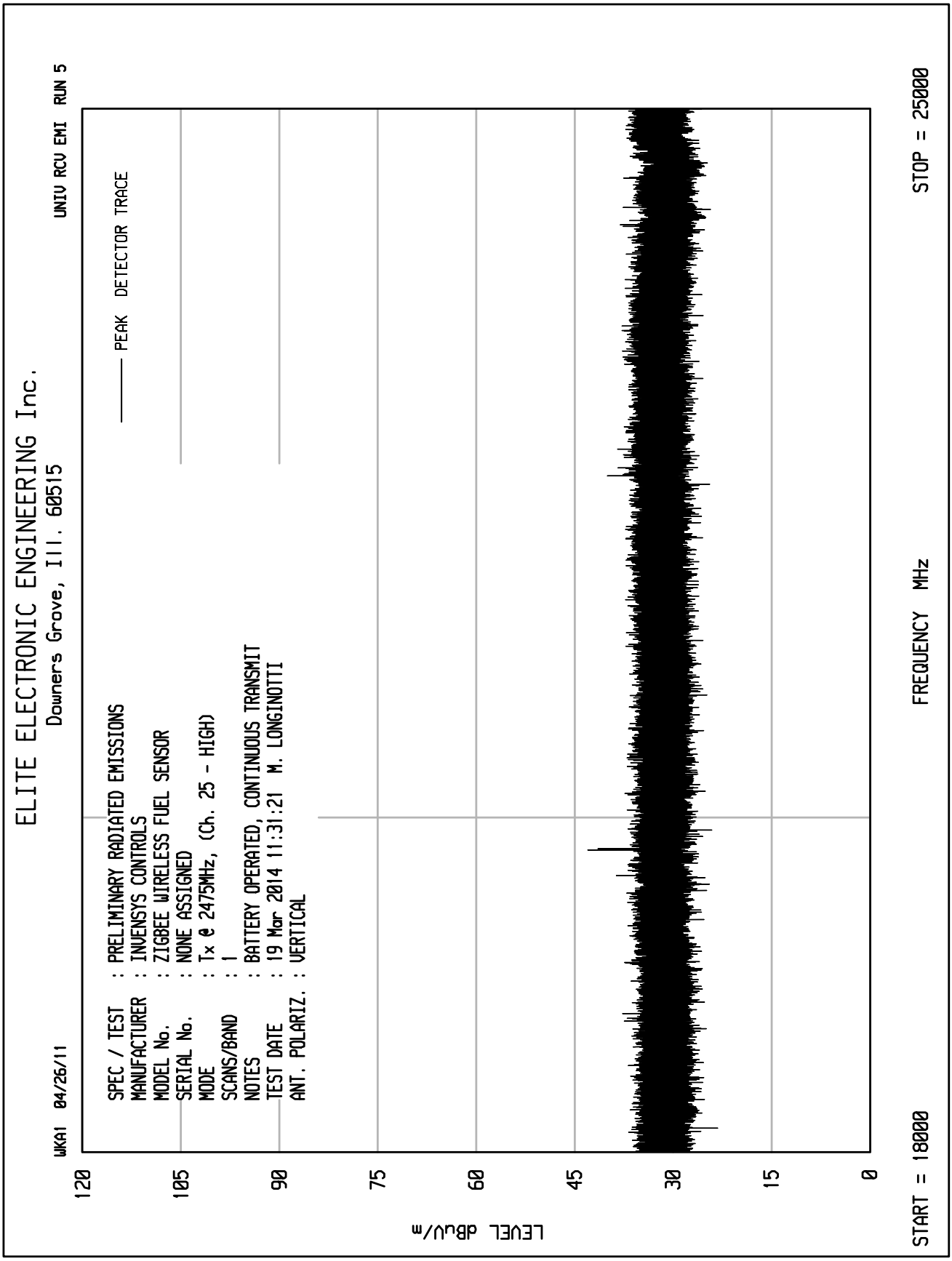

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 9
WKA1 04/24/13
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : INVENSYS CONTROLS
MODEL No. : ZIGBEE WIRELESS FUEL SENSOR
SERIAL No. : NONE ASSIGNED
MODE : Tx @ 2475MHz (Ch. 25 - HIGH)
SCANS/BAND : 1
NOTES : BATTERY OPERATED, CONSTANT TRANSMIT
TEST DATE : 19 Mar 2014 13:29:58 M. LONGINOTTI
ANT. POLARIZ. : HORIZONTAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 1000
FREQUENCY MHz
STOP = 4500


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 10
WKA1 04/24/13
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : INVENSYS CONTROLS
MODEL No. : ZIGBEE WIRELESS FUEL SENSOR
SERIAL No. : NONE ASSIGNED
MODE : Tx @ 2475MHz (Ch. 25 - HIGH)
SCANS/BAND : 1
NOTES : BATTERY OPERATED, CONSTANT TRANSMIT
TEST DATE : 19 Mar 2014 13:32:33 M. LONGINOTTI
ANT. POLARIZ. : VERTICAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 1000
FREQUENCY MHz
STOP = 4500


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 7
WKA1 04/24/13
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : INVENSYS CONTROLS
MODEL No. : ZIGBEE WIRELESS FUEL SENSOR
SERIAL No. : NONE ASSIGNED
MODE : Tx @ 2475MHz (Ch. 25 - HIGH)
SCANS/BAND : 1
NOTES : BATTERY OPERATED, CONSTANT TRANSMIT
TEST DATE : 18 Mar 2014 14:26:19 M. LONGINOTTI
ANT. POLARIZ. : HORIZONTAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 4500
10000
FREQUENCY MHz
STOP = 18000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 8
WKA1 04/24/13
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : INVENSYS CONTROLS
MODEL No. : ZIGBEE WIRELESS FUEL SENSOR
SERIAL No. : NONE ASSIGNED
MODE : Tx @ 2475MHz (Ch. 25 - HIGH)
SCANS/BAND : 1
NOTES : BATTERY OPERATED, CONSTANT TRANSMIT
TEST DATE : 18 Mar 2014 14:32:57 M. LONGINOTTI
ANT. POLARIZ. : VERTICAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 4500
10000
FREQUENCY MHz
STOP = 18000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 6
WKA1 04/26/11
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : INVENSYS CONTROLS
MODEL No. : ZIGBEE WIRELESS FUEL SENSOR
SERIAL No. : NONE ASSIGNED
MODE : Tx @ 2475MHz, (Ch. 25 - HIGH)
SCANS/BAND : 1
NOTES : BATTERY OPERATED, CONTINUOUS TRANSMIT
TEST DATE : 19 Mar 2014 11:41:06 M. LONGINOTTI
ANT. POLARIZ. : HORIZONTAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 18000
FREQUENCY MHz
STOP = 25000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 5
WKA1 04/26/11
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : INVENSYS CONTROLS
MODEL No. : ZIGBEE WIRELESS FUEL SENSOR
SERIAL No. : NONE ASSIGNED
MODE : Tx @ 2475MHz, (Ch. 25 - HIGH)
SCANS/BAND : 1
NOTES : BATTERY OPERATED, CONTINUOUS TRANSMIT
TEST DATE : 19 Mar 2014 11:31:21 M. LONGINOTTI
ANT. POLARIZ. : VERTICAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 18000
FREQUENCY MHz
STOP = 25000

DATA SHEET

MANUFACTURER	Invensys, Inc.
EUT	Battery Powered Fuel Level Sensor with Radio Module
MODEL NO.	Zigbee
SERIAL NO.	None Assigned
SPECIFICATION	FCC Part 15, Subpart C, Section 15.247 and RSS-210
TEST	Spurious Radiated Emissions Not in the Restricted Bands
MODE	Constant transmit @ 2425MHz, CH.15 (Low)
DATE TESTED	March 17, 2014 through March 19, 2014
NOTES	Battery Operated
NOTES	Peak readings in a 100kHz bandwidth

Peak
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)	Peak Total dBuV/m at 3m	Peak Total uV/m at 3 m	Peak Limit uV/m at 3 m	Margin (dB)
2425.00	H	67.2		2.6	32.3	0.0	102.1	127177.1		
2425.00	V	59.4		2.6	32.3	0.0	94.3	51809.4		
9700.00	H	59.1		5.2	36.9	-38.8	62.5	1334.3	12717.7	-19.6
9700.00	V	64.3		5.2	36.9	-38.8	67.7	2428.0	12717.7	-14.4
14550.00	H	50.0		6.7	39.9	-40.0	56.6	674.7	12717.7	-25.5
14550.00	V	53.1		6.7	39.9	-40.0	59.7	964.0	12717.7	-22.4
16975.00	H	37.8	Ambient	7.2	41.8	-38.6	48.2	257.0	12717.7	-33.9
16975.00	V	38.1	Ambient	7.2	41.8	-38.6	48.5	266.0	12717.7	-33.6
21825.00	H	26.7		2.2	40.6	-28.3	41.2	114.9	12717.7	-40.9
21825.00	V	29.6		2.2	40.6	-28.3	44.1	160.4	12717.7	-38.0
24250.00	H	25.3	Ambient	2.2	40.6	-29.1	39.0	89.4	12717.7	-43.1
24250.00	V	24.8	Ambient	2.2	40.6	-29.1	38.5	84.4	12717.7	-43.6

Checked by: MARK E. LONGINOTTI
Mark Longinotti

DATA SHEET

MANUFACTURER	Invensys, Inc.
EUT	Battery Powered Fuel Level Sensor with Radio Module
MODEL NO.	Zigbee
SERIAL NO.	None Assigned
SPECIFICATION	FCC Part 15, Subpart C, Section 15.247 and RSS-210
TEST	Spurious Radiated Emissions in the Restricted Bands
MODE	Constant transmit @ 2425MHz, CH.15 (Low)
DATE TESTED	March 17, 2014 through March 19, 2014
NOTES	Battery Operated
NOTES	Peak readings in a 1MHz bandwidth

Peak
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)	Peak Total dBuV/m at 3m	Peak Total uV/m at 3 m	Peak Limit uV/m at 3 m	Margin (dB)
4850.00	H	62.2		3.7	34.9	-40.1	60.6	1074.3	5000.0	-13.4
4850.00	V	61.9		3.7	34.9	-40.1	60.3	1037.8	5000.0	-13.7
7275.00	H	55.3		4.7	35.6	-39.8	55.8	616.3	5000.0	-18.2
7275.00	V	59.2		4.7	35.6	-39.8	59.7	965.6	5000.0	-14.3
12125.00	H	65.6		6.1	39.2	-39.6	71.3	3661.4	5000.0	-2.7
12125.00	V	67.6		6.1	39.2	-39.6	73.3	4609.5	5000.0	-0.7
19400.00	H	37.4		2.2	40.4	-27.9	52.1	403.3	5000.0	-21.9
19400.00	V	38.6		2.2	40.4	-27.9	53.3	463.1	5000.0	-20.7

Checked by: MARK E. LONGINOTTI
Mark Longinotti

DATA SHEET

MANUFACTURER	Invensys, Inc.
EUT	Battery Powered Fuel Level Sensor with Radio Module
MODEL NO.	Zigbee
SERIAL NO.	None Assigned
SPECIFICATION	FCC Part 15, Subpart C, Section 15.247 and RSS-210
TEST	Spurious Radiated Emissions in the Restricted Bands
MODE	Constant transmit @ 2425MHz, CH.15 (Low)
DATE TESTED	March 17, 2014 through March 19, 2014
NOTES	Battery Operated
NOTES	Average readings in a 1MHz bandwidth

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

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)
4850.00	H	62.2		3.7	34.9	-40.1	-34.8	25.9	19.7	500.0	-28.1
4850.00	V	61.9		3.7	34.9	-40.1	-34.8	25.6	19.0	500.0	-28.4
7275.00	H	55.3		4.7	35.6	-39.8	-34.8	21.0	11.3	500.0	-32.9
7275.00	V	59.2		4.7	35.6	-39.8	-34.8	24.9	17.7	500.0	-29.0
12125.00	H	65.6		6.1	39.2	-39.6	-34.8	36.5	67.0	500.0	-17.5
12125.00	V	67.6		6.1	39.2	-39.6	-34.8	38.5	84.4	500.0	-15.5
19400.00	H	37.4		2.2	40.4	-27.9	-34.8	17.4	7.4	500.0	-36.6
19400.00	V	38.6		2.2	40.4	-27.9	-34.8	18.6	8.5	500.0	-35.4

Checked by: MARK E. LONGINOTTI
Mark Longinotti

DATA SHEET

MANUFACTURER	Invensys, Inc.
EUT	Battery Powered Fuel Level Sensor with Radio Module
MODEL NO.	Zigbee
SERIAL NO.	None Assigned
SPECIFICATION	FCC Part 15, Subpart C, Section 15.247 and RSS-210
TEST	Spurious Radiated Emissions Not in the Restricted Bands
MODE	Constant transmit @ 2450MHz, CH.20 (Mid)
DATE TESTED	March 17, 2014 through March 19, 2014
NOTES	Battery Operated
NOTES	Peak readings in a 100kHz bandwidth

Peak
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)	Peak Total dBuV/m at 3m	Peak Total uV/m at 3 m	Peak Limit uV/m at 3 m	Margin (dB)
2450.00	H	66.0		2.6	32.3	0.0	100.9	111440.9		
2450.00	V	59.2		2.6	32.3	0.0	94.1	50938.3		
9800.00	H	60.4		5.2	37.0	-38.7	63.9	1568.1	11144.1	-17.0
9800.00	V	63.9		5.2	37.0	-38.7	67.4	2346.3	11144.1	-13.5
14700.00	H	49.1		6.7	39.9	-40.1	55.6	603.4	11144.1	-25.3
14700.00	V	51.4		6.7	39.9	-40.1	57.9	786.3	11144.1	-23.0
17150.00	H	37.9	Ambient	7.3	41.7	-38.8	48.1	254.4	11144.1	-32.8
17150.00	V	37.6	Ambient	7.3	41.7	-38.8	47.8	245.7	11144.1	-33.1
24500.00	H	25.1		2.2	40.6	-29.3	38.7	86.1	11144.1	-42.2
24500.00	V	24.7		2.2	40.6	-29.3	38.3	82.2	11144.1	-42.6

Checked by: MARK E. LONGINOTTI
Mark Longinotti

DATA SHEET

MANUFACTURER	Invensys, Inc.
EUT	Battery Powered Fuel Level Sensor with Radio Module
MODEL NO.	Zigbee
SERIAL NO.	None Assigned
SPECIFICATION	FCC Part 15, Subpart C, Section 15.247 and RSS-210
TEST	Spurious Radiated Emissions in the Restricted Bands
MODE	Constant transmit @ 2450MHz, CH.20 (Mid)
DATE TESTED	March 17, 2014 through March 19, 2014
NOTES	Battery Operated
NOTES	Peak readings in a 1MHz bandwidth

Peak
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)	Peak Total dBuV/m at 3m	Peak Total uV/m at 3 m	Peak Limit uV/m at 3 m	Margin (dB)
4900.00	H	63.8		3.7	34.9	-40.2	62.3	1297.8	5000.0	-11.7
4900.00	V	61.6		3.7	34.9	-40.2	60.1	1007.4	5000.0	-13.9
7350.00	H	56.7		4.7	35.6	-39.8	57.3	729.1	5000.0	-16.7
7350.00	V	59.0		4.7	35.6	-39.8	59.6	950.1	5000.0	-14.4
12250.00	H	65.1		6.1	39.2	-39.4	71.0	3529.2	5000.0	-3.0
12250.00	V	67.5		6.1	39.2	-39.4	73.4	4652.4	5000.0	-0.6
19600.00	H	37.1		2.2	40.4	-27.8	51.9	392.4	5000.0	-22.1
19600.00	V	36.4		2.2	40.4	-27.8	51.2	362.1	5000.0	-22.8
22050.00	H	36.4		2.2	40.6	-28.4	50.8	346.2	5000.0	-23.2
22050.00	V	35.3		2.2	40.6	-28.4	49.7	305.0	5000.0	-24.3

Checked by: MARK E. LONGINOTTI
Mark Longinotti

DATA SHEET

MANUFACTURER	Invensys, Inc.
EUT	Battery Powered Fuel Level Sensor with Radio Module
MODEL NO.	Zigbee
SERIAL NO.	None Assigned
SPECIFICATION	FCC Part 15, Subpart C, Section 15.247 and RSS-210
TEST	Spurious Radiated Emissions in the Restricted Bands
MODE	Constant transmit @ 2450MHz, CH. 20 (Mid)
DATE TESTED	March 17, 2014 through March 19, 2014
NOTES	Battery Operated
NOTES	Average readings in a 1MHz bandwidth

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

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)
4900.00	H	63.8		3.7	34.9	-40.2	-34.8	27.5	23.8	500.0	-26.5
4900.00	V	61.6		3.7	34.9	-40.2	-34.8	25.3	18.4	500.0	-28.7
7350.00	H	56.7		4.7	35.6	-39.8	-34.8	22.5	13.3	500.0	-31.5
7350.00	V	59.0		4.7	35.6	-39.8	-34.8	24.8	17.4	500.0	-29.2
12250.00	H	65.1		6.1	39.2	-39.4	-34.8	36.2	64.6	500.0	-17.8
12250.00	V	67.5		6.1	39.2	-39.4	-34.8	38.6	85.1	500.0	-15.4
19600.00	H	37.1		2.2	40.4	-27.8	-34.8	17.1	7.2	500.0	-36.9
19600.00	V	36.4		2.2	40.4	-27.8	-34.8	16.4	6.6	500.0	-37.6
22050.00	H	36.4		2.2	40.6	-28.4	-34.8	16.0	6.3	500.0	-37.9
22050.00	V	35.3		2.2	40.6	-28.4	-34.8	14.9	5.6	500.0	-39.0

Checked by: MARK E. LONGINOTTI
Mark Longinotti

DATA SHEET

MANUFACTURER	Invensys, Inc.
EUT	Battery Powered Fuel Level Sensor with Radio Module
MODEL NO.	Zigbee
SERIAL NO.	None Assigned
SPECIFICATION	FCC Part 15, Subpart C, Section 15.247 and RSS-210
TEST	Spurious Radiated Emissions Not in the Restricted Bands
MODE	Constant transmit @ 2475MHz, CH.25 (High)
DATE TESTED	March 17, 2014 through March 19, 2014
NOTES	Battery Operated
NOTES	Peak readings in a 100kHz bandwidth

Peak
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)	Peak Total dBuV/m at 3m	Peak Total uV/m at 3 m	Peak Limit uV/m at 3 m	Margin (dB)
2475.00	H	65.1		2.7	32.3	0.0	100.1	101077.3		
2475.00	V	59.8		2.7	32.3	0.0	94.8	54910.3		
9900.00	H	57.9		5.3	36.9	-38.6	61.5	1183.2	10107.7	-18.6
9900.00	V	62.5		5.3	36.9	-38.6	66.1	2009.4	10107.7	-14.0
14850.00	H	47.8		6.8	39.9	-40.3	54.2	511.5	10107.7	-25.9
14850.00	V	49.9		6.8	39.9	-40.3	56.3	651.3	10107.7	-23.8
17325.00	H	38.0		7.3	41.9	-39.0	48.3	259.2	10107.7	-31.8
17325.00	V	37.5	Ambient	7.3	41.9	-39.0	47.8	244.7	10107.7	-32.3
24750.00	H	24.5	Ambient	2.2	40.6	-29.5	37.9	78.2	10107.7	-42.2
24750.00	V	24.8	Ambient	2.2	40.6	-29.5	38.2	81.0	10107.7	-41.9

Checked by: MARK E. LONGINOTTI
Mark Longinotti

DATA SHEET

MANUFACTURER	Invensys, Inc.
EUT	Battery Powered Fuel Level Sensor with Radio Module
MODEL NO.	Zigbee
SERIAL NO.	None Assigned
SPECIFICATION	FCC Part 15, Subpart C, Section 15.247 and RSS-210
TEST	Spurious Radiated Emissions in the Restricted Bands
MODE	Constant transmit @ 2475MHz, CH.25 (High)
DATE TESTED	March 17, 2014 through March 19, 2014
NOTES	Battery Operated
NOTES	Peak readings in a 1MHz bandwidth

Peak
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)	Peak Total dBuV/m at 3m	Peak Total uV/m at 3 m	Peak Limit uV/m at 3 m	Margin (dB)
4950.00	H	63.8		3.7	35.0	-40.2	62.3	1306.9	5000.0	-11.7
4950.00	V	61.5		3.7	35.0	-40.2	60.0	1002.8	5000.0	-14.0
7425.00	H	58.2		4.7	35.7	-39.8	58.8	871.5	5000.0	-15.2
7425.00	V	60.4		4.7	35.7	-39.8	61.0	1122.7	5000.0	-13.0
12375.00	H	64.2		6.1	39.2	-39.3	70.2	3226.7	5000.0	-3.8
12375.00	V	66.5		6.1	39.2	-39.3	72.5	4204.9	5000.0	-1.5
19800.00	H	37.1		2.2	40.4	-27.8	52.0	397.1	5000.0	-22.0
19800.00	V	37.5		2.2	40.4	-27.8	52.4	415.8	5000.0	-21.6
22275.00	H	37.4		2.2	40.6	-28.5	51.7	384.3	5000.0	-22.3
22275.00	V	36.4		2.2	40.6	-28.5	50.7	342.5	5000.0	-23.3
24750.00	H	24.5	Ambient	2.2	40.6	-29.5	37.9	78.2	10107.7	-42.2
24750.00	V	24.8	Ambient	2.2	40.6	-29.5	38.2	81.0	10107.7	-41.9

Checked by: MARK E. LONGINOTTI
Mark Longinotti

DATA SHEET

MANUFACTURER	Invensys, Inc.
EUT	Battery Powered Fuel Level Sensor with Radio Module
MODEL NO.	Zigbee
SERIAL NO.	None Assigned
SPECIFICATION	FCC Part 15, Subpart C, Section 15.247 and RSS-210
TEST	Spurious Radiated Emissions in the Restricted Bands
MODE	Constant transmit @ 2450MHz, CH. 25 (High)
DATE TESTED	March 17, 2014 through March 19, 2014
NOTES	Battery Operated
NOTES	Average readings in a 1MHz bandwidth

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

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)
4950.00	H	63.8		3.7	35.0	-40.2	-34.8	27.6	23.9	500.0	-26.4
4950.00	V	61.5		3.7	35.0	-40.2	-34.8	25.3	18.4	500.0	-28.7
7425.00	H	58.2		4.7	35.7	-39.8	-34.8	24.1	15.9	500.0	-29.9
7425.00	V	60.4		4.7	35.7	-39.8	-34.8	26.3	20.5	500.0	-27.7
12375.00	H	64.2		6.1	39.2	-39.3	-34.8	35.4	59.1	500.0	-18.6
12375.00	V	66.5		6.1	39.2	-39.3	-34.8	37.7	77.0	500.0	-16.3
19800.00	H	37.1		2.2	40.4	-27.8	-34.8	17.2	7.3	500.0	-36.8
19800.00	V	37.5		2.2	40.4	-27.8	-34.8	17.6	7.6	500.0	-36.4
22275.00	H	37.4		2.2	40.6	-28.5	-34.8	16.9	7.0	500.0	-37.0
22275.00	V	36.4		2.2	40.6	-28.5	-34.8	15.9	6.3	500.0	-38.0

Checked by: MARK E. LONGINOTTI
Mark Longinotti

DATA SHEET

MANUFACTURER	Invensys, Inc.
EUT	Battery Powered Fuel Level Sensor with Radio Module
MODEL NO.	Zigbee
SERIAL NO.	None Assigned
SPECIFICATION	FCC Part 15, Subpart C, Section 15.247 and RSS-210
TEST	Band Edge Compliance
MODE	Constant transmit @ 2425MHz, CH.15 (Low)
DATE TESTED	March 17, 2014 through March 19, 2014
NOTES	Battery Operated
NOTES	Peak readings in a 100kHz bandwidth

Peak
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 3m	Total uV/m at 3 m	Limit uV/m at 3 m	Margin (dB)
2425.00	H	67.2		2.6	32.3	0.0	102.1	127177.1		
2425.00	V	59.4		2.6	32.3	0.0	94.3	51809.4		
2400.00	H	19.6		2.6	32.2	0.0	54.4	526.9	12717.7	-27.7
2400.00	V	15.8	Ambient	2.6	32.2	0.0	50.6	340.2	12717.7	-31.5

Checked by: MARK E. LONGINOTTI
Mark Longinotti

DATA SHEET

MANUFACTURER	Invensys, Inc.
EUT	Battery Powered Fuel Level Sensor with Radio Module
MODEL NO.	Zigbee
SERIAL NO.	None Assigned
SPECIFICATION	FCC Part 15, Subpart C, Section 15.247 and RSS-210
TEST	Band Edge Compliance
MODE	Constant transmit @ 2475MHz, CH.25 (High)
DATE TESTED	March 17, 2014 through March 19, 2014
NOTES	Battery Operated
NOTES	Readings in a 1MHz bandwidth

Peak Readings

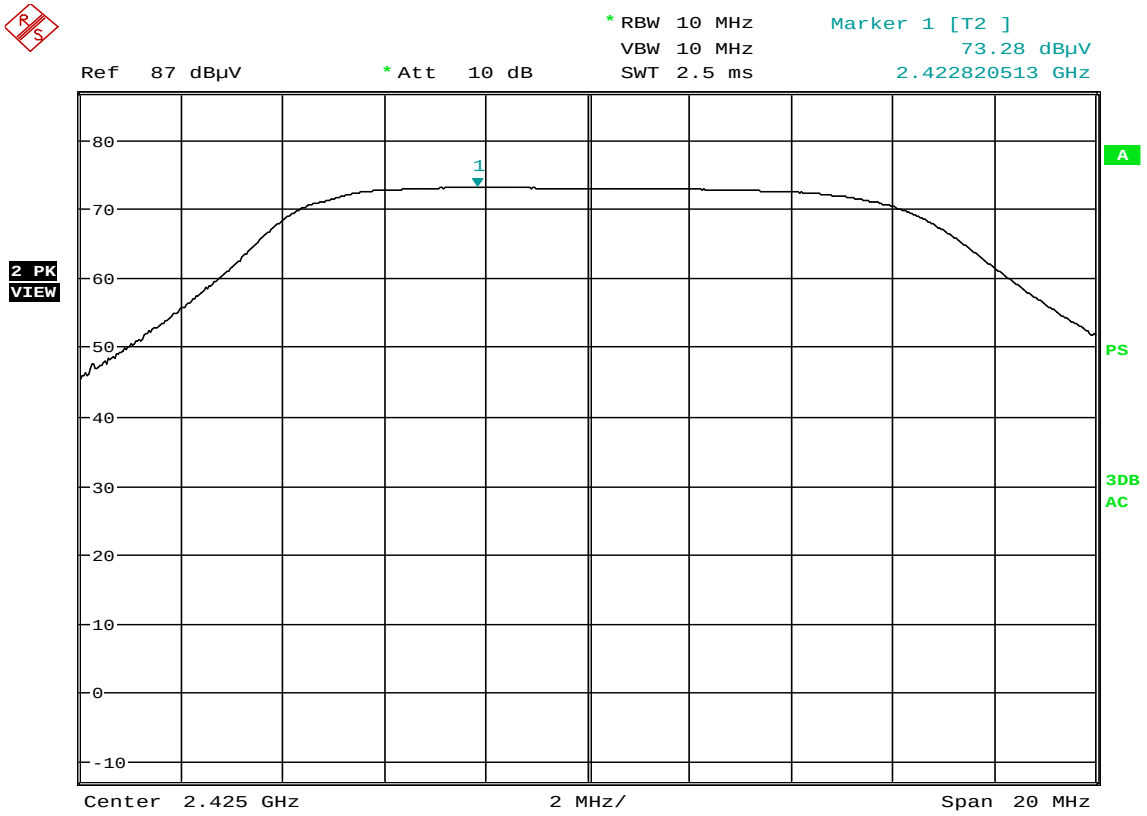
Freq. MHz	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Peak Total dBuV/m at 3m	Peak Total uV/m at 3 m	Peak Limit uV/m at 3 m	Margin (dB)
2483.50	H	29.3		2.7	32.3	0.0	64.3	1642.6	5000.0	-9.7
2483.50	V	22.8		2.7	32.3	0.0	57.8	777.2	5000.0	-16.2

Average Readings

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)
2483.50	H	29.3		2.7	32.3	0.0	-34.8	29.6	30.1	500.0	-24.4
2483.50	V	22.8		2.7	32.3	0.0	-34.8	23.1	14.2	500.0	-30.9

Checked by: MARK E. LONGINOTTI

Mark Longinotti

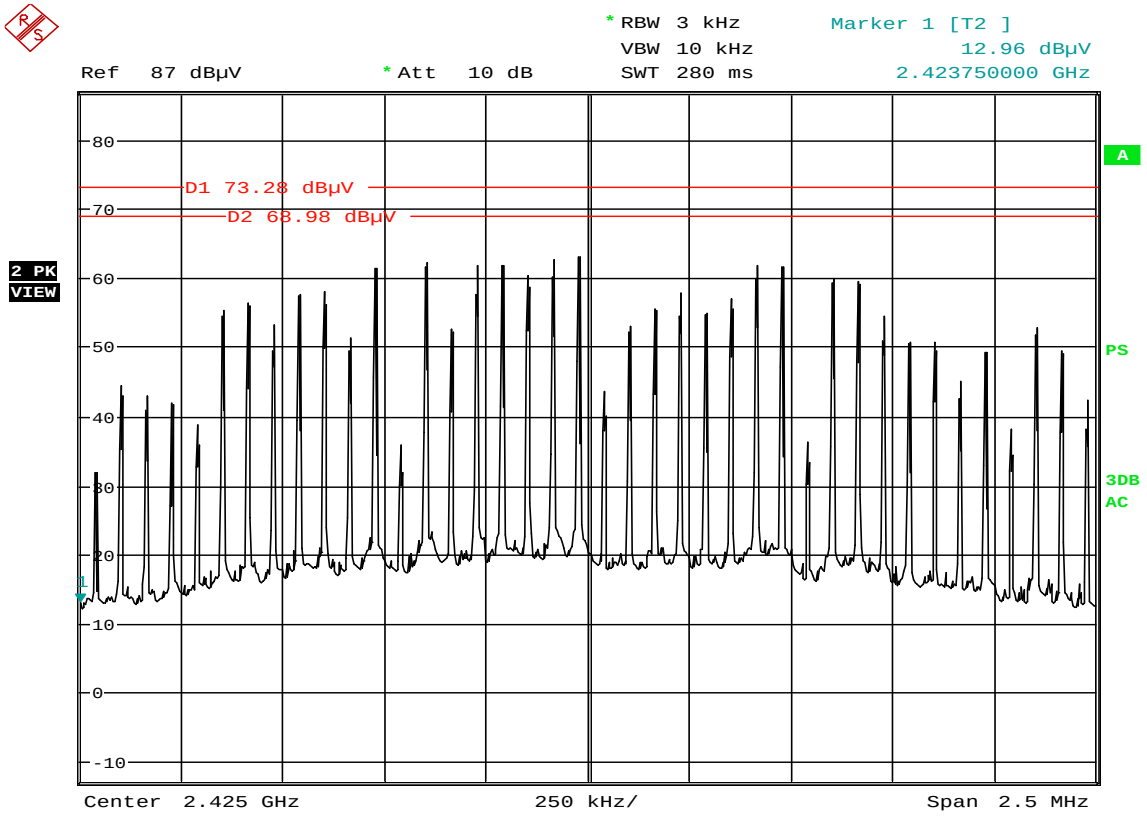


Date: 18.MAR.2014 15:35:53

Power Spectral Density

MANUFACTURER	:	Invensys Controls
MODEL NUMBER	:	Zigbee Wireless Fuel Sensor
SERIAL NUMBER	:	None Assigned
TEST MODE	:	Tx @ 2425MHz (Ch. 15 - Low)
TEST PARAMETERS	:	Power Spectral Density
NOTES	:	Emissions reading of 73.28dBuV corresponds to an EIRP reading of 12.3dBm.
EQUIPMENT USED	:	RBE1, NWQ1

NOTES

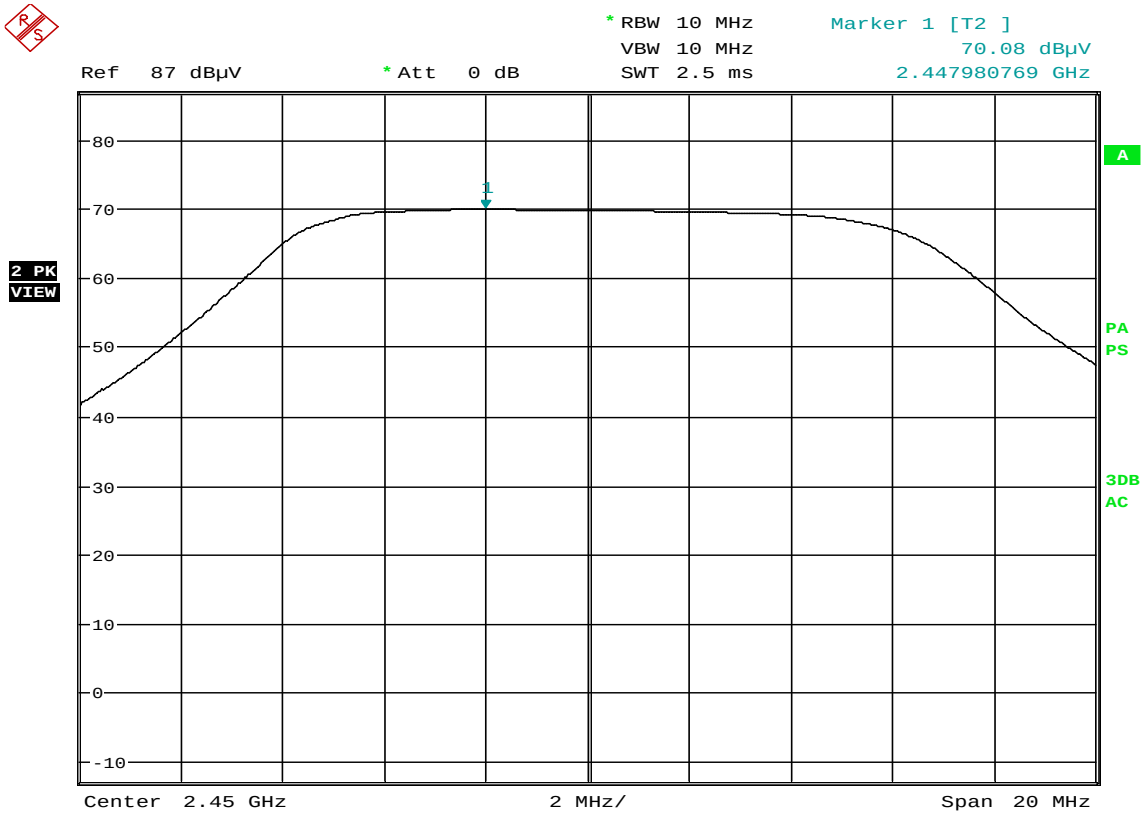


Date: 18.MAR.2014 15:39:04

Power Spectral Density

MANUFACTURER	:	Invensys Controls
MODEL NUMBER	:	Zigbee Wireless Fuel Sensor
SERIAL NUMBER	:	None Assigned
TEST MODE	:	Tx @ 2425MHz (Ch. 15 - Low)
TEST PARAMETERS	:	Power Spectral Density
NOTES	:	Emissions reading of 73.28dBuV corresponds to an EIRP reading of 12.3dBm. Display line D1 represents the EIRP of 12.3dBm. Display line D2 represents the 8dBm limit (8dBm – 12.3dBm = 4.3dBm below the 12.3 dBm EIRP reading). The trace represents the PSD in a 3kHz RBW. .
EQUIPMENT USED	:	RBE1, NWQ1

NOTES

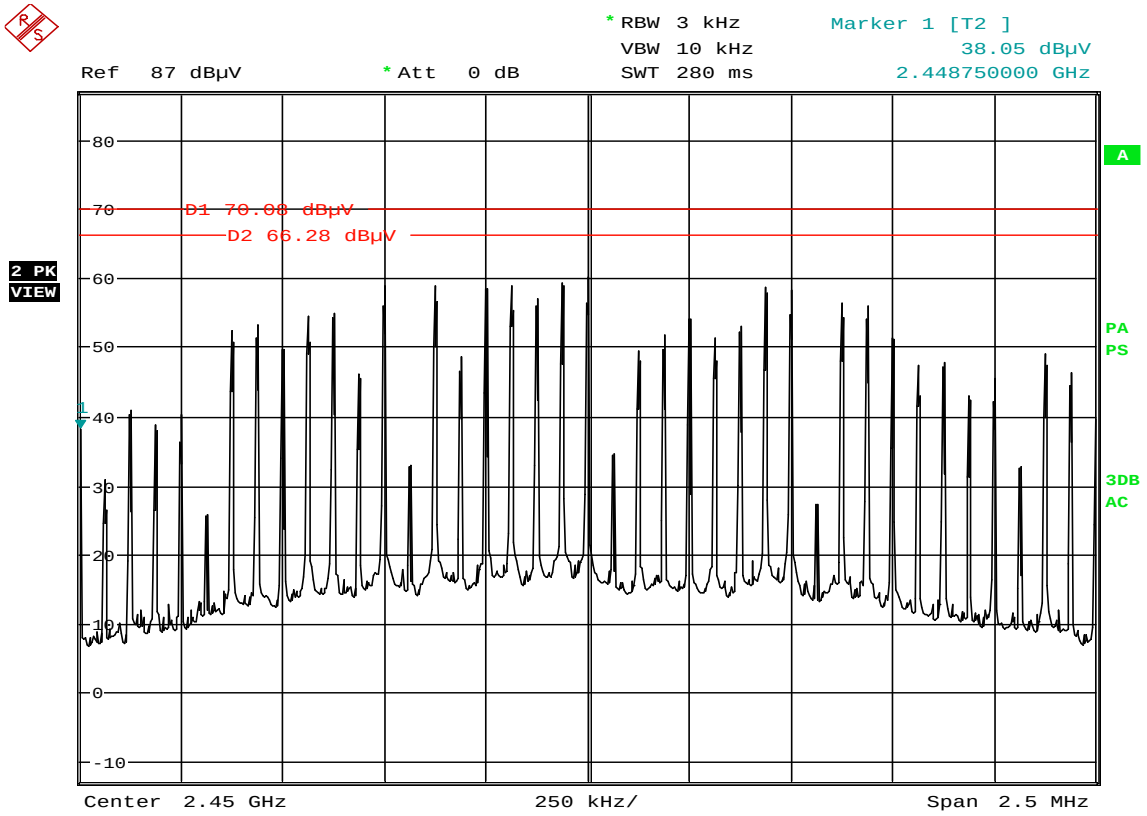


Date: 18.MAR.2014 15:52:32

Power Spectral Density

MANUFACTURER	:	Invensys Controls
MODEL NUMBER	:	Zigbee Wireless Fuel Sensor
SERIAL NUMBER	:	None Assigned
TEST MODE	:	Tx @ 2450MHz (Ch. 20 - Mid)
TEST PARAMETERS	:	Power Spectral Density
NOTES	:	Emissions reading of 70.08dBuV corresponds to an EIRP reading of 11.8dBm.
EQUIPMENT USED	:	RBE1, NWQ1

NOTES

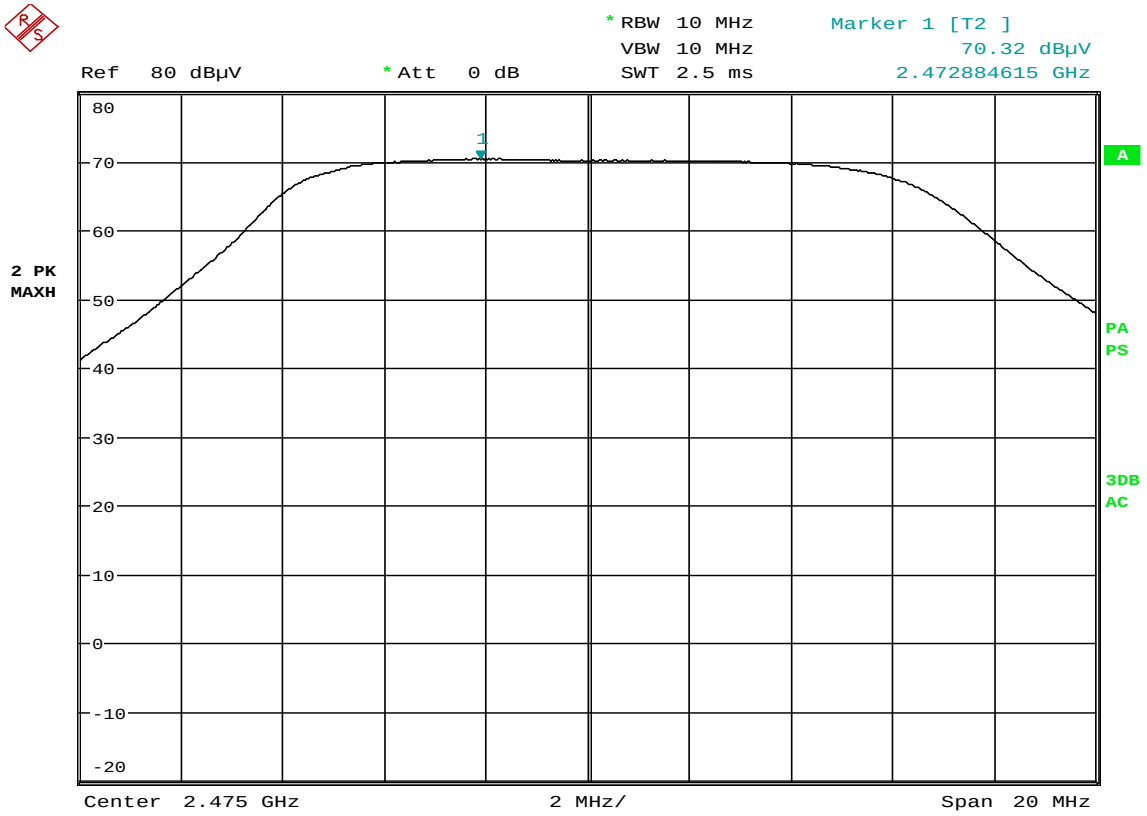


Date: 18.MAR.2014 15:55:09

Power Spectral Density

MANUFACTURER	:	Invensys Controls
MODEL NUMBER	:	Zigbee Wireless Fuel Sensor
SERIAL NUMBER	:	None Assigned
TEST MODE	:	Tx @ 2450MHz (Ch. 20 - Mid)
TEST PARAMETERS	:	Power Spectral Density
NOTES	:	Emissions reading of 70.08dBuV corresponds to an EIRP reading of 11.8dBm. Display line D1 represents the EIRP of 11.8dBm. Display line D2 represents the 8dBm limit (8dBm – 11.8dBm = 3.8dBm below the 11.8 dBm EIRP reading). The trace represents the PSD in a 3kHz RBW.
EQUIPMENT USED	:	RBE1, NWQ1

NOTES

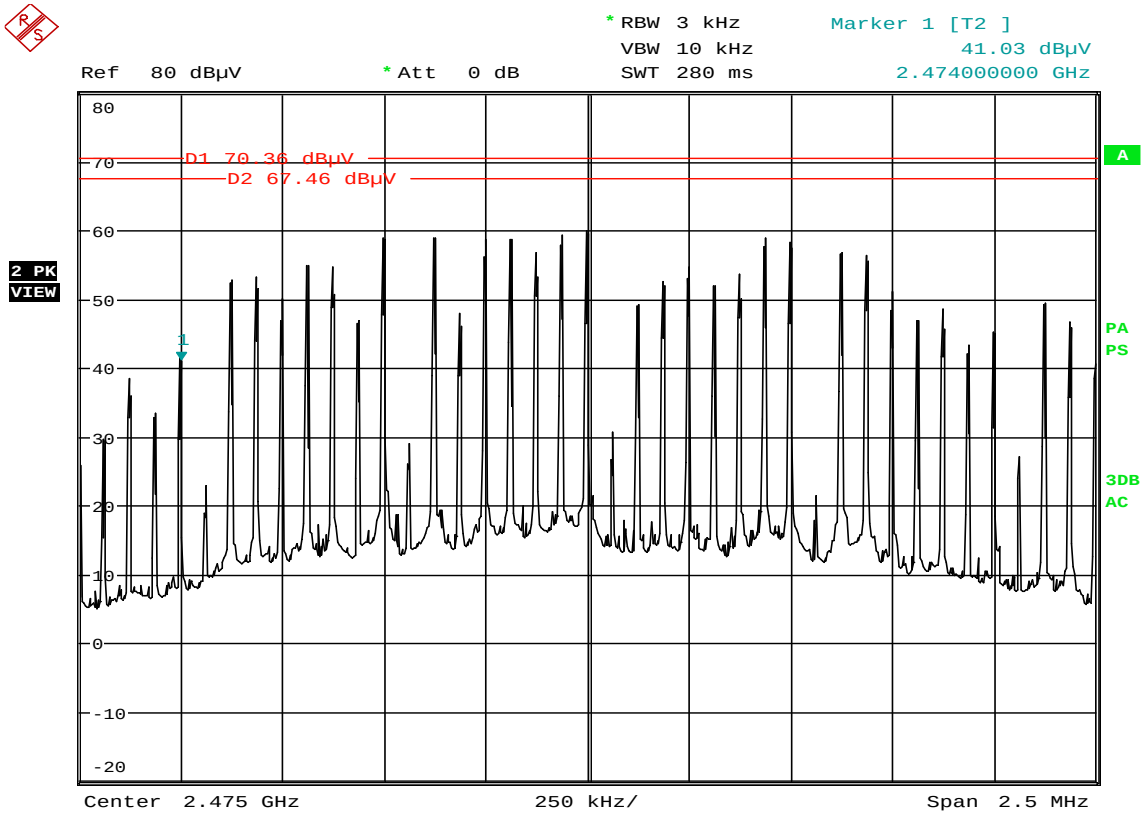


Date: 19.MAR.2014 08:29:30

Power Spectral Density

MANUFACTURER	:	Invensys Controls
MODEL NUMBER	:	Zigbee Wireless Fuel Sensor
SERIAL NUMBER	:	None Assigned
TEST MODE	:	Tx @ 2475MHz (Ch. 25 - High)
TEST PARAMETERS	:	Power Spectral Density
NOTES	:	Emissions reading of 70.36dBuV corresponds to an EIRP reading of 10.9dBm.
EQUIPMENT USED	:	RBE1, NWQ1

NOTES



Date: 19.MAR.2014 08:33:52

Power Spectral Density

MANUFACTURER	:	Invensys Controls
MODEL NUMBER	:	Zigbee Wireless Fuel Sensor
SERIAL NUMBER	:	None Assigned
TEST MODE	:	Tx @ 2475MHz (Ch. 25 - High)
TEST PARAMETERS	:	Power Spectral Density
NOTES	:	Emissions reading of 70.36dBuV corresponds to an EIRP reading of 10.9dBm. Display line D1 represents the EIRP of 10.9dBm. Display line D2 represents the 8dBm limit (8dBm – 10.9dBm = 2.9dBm below the 10.9 dBm EIRP reading). The trace represents the PSD in a 3kHz RBW.
EQUIPMENT USED	:	RBE1, NWQ1

NOTES