Measurement of RF Interference from an MPT01 Multi-Point Transmitter

For	:	Predictive Sensor Technology
	:	316 N. Main Street
	:	Lynchburg, OH
P.O. No.	:	2
Date Received	:	March 25, 2010
Date Tested	:	March 25, 2010 through March 29, 2010
Test Personnel	:	Mark E. Longinotti
Specification	:	FCC "Code of Federal Regulations" Title 47, Part 15, Subpart C, Section 15.247 for Digital Modulation Intentional Radiators Operating within The bands 902-928MHz FCC "Code of Federatl Regulations" Title 49, Part 15, Subpart B, for Receivers
	:	Industry Canada RSS-210
:		Industry Canada RSS-GEN

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REVISION HISTORY

Revision	Date	Description
—	April 1, 2010	Initial release

Measurement of RF Emissions from a Multi-Point Transmitter, Model No. MPT01

1 INTRODUCTION

1.1 Scope of Tests

This document represents the results of the series of radio interference measurements performed on a Predictive Sensor Technology Multi-Point Transmitter, Model No. MPT01, (hereinafter referred to as the test item). The test item is a digital modulation transceiver. The test item was designed to transmit and receive in the 902-928 MHz band using a ducky antenna that was soldered to the RF board of the test item. Serial No. 00000014 was programmed separately to continuously transmit or receive at 904MHz. Serial No. 00000015 was programmed separately to continuously transmit or receive at 915MHz. Serial No. 00000016 was programmed separately to continuously transmit and receive at 925MHz. Serial No. 00000013 was programmed to transmit at 915MHz in a normal transmit mode. The test item was manufactured and submitted for testing by Predictive Sensor Technology located in Lynchburg, OH.

1.2 Purpose

The test series was performed to determine if the test item meets the following requirements:

- 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.
- Conducted RF emission requirements of the Industry Canada Radio Standards Specification, RSS-Gen, Section 7.2.2 and the radiated RF emission requirements of the Industry Canada Radio Standards Specification, RSS-210, Annex 8 for transmitters
- Conducted and radiated RF emission requirements of the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart B, Sections 15.107 and 15.109 for receivers
- Conducted and radiated RF emission requirements of the Industry Canada Radio Standards Specification, RSS-Gen, Section 7.2.2 and Section 7.2.3 for receivers

Testing was performed in accordance with ANSI C63.4-2003.

1.3 Deviations, Additions and Exclusions

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

1.4 EMC Laboratory Identification

This series of tests was performed by Elite Electronic Engineering Incorporated of Downers Grove, Illinois. The laboratory is accredited by the National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP). NVLAP Lab Code: 100278-0.

1.5 Laboratory Conditions

The temperature at the time of the test was 21C and the relative humidity was 22%.

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 2009
- ANSI C63.4-2003, "American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz"
- Measurement of Digital Transmission Systems Operating under Section 15.247 March 23, 2005
- Industry Canada RSS-210, Issue 7, June 2007, “Spectrum Management and Telecommunications Radio Standards Specification, Low-power License-exempt radio communication devices (All Frequency Bands): Category I Equipment”
- Industry Canada RSS-GEN, Issue 2, June 2007, “Spectrum Management and Telecommunications Radio Standards Specification, General Requirements and Information for the Certification of radio communication equipment”

3 TEST ITEM SET-UP AND OPERATION

3.1 General Description

The test item is a Multi-Point Transmitter, Part No. MPT01. The test item is designed to transmit in the frequency range of 902MHz to 925MHz. A block diagram of the test item setup is shown as Figure 1.

3.1.1 Power Input

The test item was powdered by 3VDC from 2 each “AA” batteries.

3.1.2 Peripheral Equipment

The test item was submitted for testing with no peripheral equipment.

3.1.3 Interconnect Cables

The following interconnect cables were submitted with the test item:

Item	Description
Port 1	4 wire, 10-foot long unterminated cable
Port 2	4 wire, 10-foot long unterminated cable
Port 3	4 wire, 10-foot long unterminated cable

3.1.4 Grounding

The test item was not grounded during test.

3.2 Operational Mode

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

- Continuous Transmit at 904 MHz
- Continuous Transmit at 915 MHz
- Continuous Transmit at 925 MHz
- Continuous Receive at 904 MHz
- Continuous Receive at 915 MHz
- Continuous Receive at 925 MHz

- Transmit at 915MHz (used for power spectral density tests)

3.3 Test Item Modifications

No modifications were required for compliance.

4 TEST FACILITY AND TEST INSTRUMENTATION

4.1 Shielded Enclosure

All tests were performed in a 32ft. x 20ft. x 18ft. hybrid ferrite-tile/anechoic absorber lined test chamber. With the exception of the floor, the reflective surfaces of the shielded chamber are lined with ferrite tiles on the walls and ceiling. Anechoic absorber material is installed over the ferrite tile. The floor of the chamber is used as the ground plane. The chamber complies with ANSI C63.4-2003 for site attenuation.

4.2 Test Instrumentation

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

4.3 Calibration Traceability

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

4.4 Measurement Uncertainty

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

The measurement uncertainty for these tests is presented below:

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

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

5 TEST PROCEDURES

5.1 TRANSMITTER TESTS

5.1.1 Powerline Conducted Emissions

5.1.1.1 Requirements

Since the test item was powered by internal batteries, no conducted emissions tests are required.

5.1.2 6dB Bandwidth

5.1.2.1 Requirements

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

techniques.

5.1.2.2 Procedures

The test item was setup inside the chamber. The test item 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.

5.1.2.3 Results

The plots on pages 18 through 20 show that the minimum 6 dB bandwidth was 549.1kHz which is greater than minimum allowable 6dB bandwidth requirement of 500kHz for systems using digital modulation techniques. The 99% bandwidth was measured to be 697.4kHz.

5.1.3 Peak Output Power

5.1.3.1 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).

5.1.3.2 Procedures

The test item was placed on the non-conductive stand and set to transmit. A bilog antenna was placed at a test distance of 3 meters from the test item. The resolution bandwidth (RBW) of the spectrum analyzer was set to greater than the 6dB bandwidth. The test item 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 dipole antenna was then set in place of the test item 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, as required. The peak power output was calculated for low, middle, and high hopping frequencies.

5.1.3.3 Results

The results are presented on page 21. The maximum EIRP measured from the transmitter was 6.9 dBm or 4.89 mW which is below the 4 Watt limit.

5.1.4 Duty Cycle Factor Measurements

5.1.4.1 Procedures

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

With the transmitter set up to transmit for maximum pulse density, the time domain trace is displayed on the spectrum analyzer. This trace is obtained by tuning center frequency to the transmitter frequency and then setting a zero span width with 5 msec/div. The amplitude settings are adjusted so that the on/off transitions clear the 4th division from the bottom of the display. The markers are set at the beginning and end of the “on-time”. The trace is recorded.

Next the spectrum analyzer center frequency is set to the transmitter frequency with a zero span width and

10msec/div. This shows if the word is longer than 100msec or shorter than 100msec. If the word period is less than 100msec, the display is set to show at least one word. The on-time and off-time are then measured. The on-time is total time signal level exceeds the 4th division. Off-time is time under for the word period. The duty cycle is then computed as the (On-time/ word period) where the word period = (On-time + Off-time).
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5.1.4.2 Results

The plots of the duty cycle are shown on data pages 22 and 23. The duty cycle correction factor was calculated to be -7.89dB.

5.1.5 Spurious Emissions

5.1.5.1 Radiated Spurious Emissions

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

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

Frequency MHz	Field Strenght (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

5.1.5.2 Procedures

Radiated measurements were performed in a 32ft. x 20ft. x 14ft. high shielded enclosure. The shielded enclosure prevents emissions from other sources, such as radio and TV stations from interfering with the measurements. All powerlines and signal lines entering the enclosure pass through filters on the enclosure wall. The powerline filters prevent extraneous signals from entering the enclosure on these leads.

Preliminary radiated emissions tests were performed to determine the emission characteristics of the test item. For the preliminary test, a broadband measuring antenna was positioned at a 3 meter distance from the test item. The entire frequency range from 30MHz to 10.0GHz was investigated using a peak detector function.

The final open field emission tests were then manually performed over the frequency range of 30MHz to 10.0GHz.

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 bilog antenna. The bilog antenna was positioned at a 3 meter distance from the test item. 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 test

item. 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 test item 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 were 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 test item was rotated through all axis to ensure the maximum readings were recorded for the test item.

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 bilog antenna. The bilog antenna was positioned at a 3 meter distance from the test item. 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 test item. 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 test item 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 were 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 test item was rotated through all axis to ensure the maximum readings were recorded for the test item.

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. If there is a duty cycle correction factor, then the reading

obtained with the 10 Hz video bandwidth may be further 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).

5.1.5.3 Results

Preliminary radiated emissions plots with the test item transmitting at 904MHz, 915MHz, and 925MHz are shown on pages 24 through 35. Final radiated emissions data are presented on data pages 36 through 41. As can be seen from the data, all emissions measured from the test item were within the specification limits. The emissions level closet to the limit (worst case) occurred at 9040.3MHz. The emissions level at this frequency was 2.6dB within the limit. See data pages 36 through 41 for details. Photographs of the test configuration which yielded the highest, or worst case, radiated emission levels are shown on Figure 2 and Figure 3.

5.1.6 Band Edge Compliance

5.1.6.1 Requirements

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

5.1.6.2 Procedures

5.1.6.2.1 Low Band Edge

1) The test item 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 test item.
3) The test item was set to transmit continuously at the channel closest to the low band-edge.
4) The test item was maximized for worst case emissions at the measuring antenna. The maximum meter reading was recorded.
5) To determine the band edge compliance, the following spectrum analyzer settings were used:
    a. Center frequency = low band-edge frequency.
    b. Span = Wide enough to capture the peak level of the emission operating on the channel closest to the band-edge, as well as any modulation products which fall outside of the authorized band of operation.
    c. Resolution bandwidth (RBW) ≥ 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.

5.1.6.2.2 High Band Edge

1) The test item 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 test item.
3) The test item was set to transmit continuously at the channel closest to the high band-edge.
4) The test item was maximized for worst case emissions at the measuring antenna.
5) 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) ≥ 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.)
f. The analyzer's display was plotted using a 'screen dump' utility.

5.1.6.3 Results

Pages 42 and 43 show the radiated band-edge compliance results. As can be seen from these plots, the emissions at the low end band edge and the high end band edge are within the 20 dB down limits.

5.1.7 Power Spectral Density

5.1.7.1 Requirement

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.

5.1.7.2 Procedures

1) The test item was placed on the non-conductive stand and set to transmit at a mid channel.
2) A broadband measuring antenna was placed near the test item.
3) To determine the power spectral density, the following spectrum analyzer settings were used for Channel 1:
    a. Center frequency = transmit frequency
    b. Span = 1MHz
    c. Resolution bandwidth (RBW) greater than the 6dB bandwidth.
    d. Sweep time = auto
    e. The peak detector and 'Max-Hold' function was engaged. The analyzer was allowed to scan until the envelope of the transmitter bandwidth was defined.
    f. Channel 1 of the spectrum analyzer was placed in ‘View’ mode.
4) This reading corresponds to the peak output power measured for the mid channel.
5) Turn on the display line 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 test item was then placed in the normal operation mode.
7) To determine the power spectral density, the following spectrum analyzer settings were used for Channel 2:
    a. Center frequency = transmit frequency
    b. Span = 1MHz
    c. Resolution bandwidth (RBW) = 3kHz
    d. Sweep time = span divided by RBW = (for example :1MHz/3kHz = 333 seconds)
    e. The peak detector and 'Max-Hold' function was engaged.
    f. The display line represents the 8 dBm limit
    g. The analyzer's display was plotted using a 'screen dump' utility.

5.1.7.3 Results

Page 44 shows the power spectral density results. As can be seen from this plot, the peak power density is less than 8dBm in a 3kHz band during any time interval of continuous transmission.

5.2 Receiver Tests

5.2.1 Powerline Conducted Emissions

5.2.1.1 Requirements

Since the test item was powered by internal batteries, no conducted emissions tests are required.

5.2.2 Radiated Measurements

5.2.2.1 Requirements

Per the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart B, Section 15.109 and Industry Canada RSS-Gen, Section 7.2.3, all radio frequency emissions from a receiver shall be below the limits shown on the following table:

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

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

Per Industry Canada RSS-Gen, section 4.10, spurious emissions shall be measured from 30MHz to 3 times the highest tuneable or local oscillator frequency.

Per the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart A, Section 15.33, spurious emissions shall be measured from 30MHz to 5GHz for devices in which the highest frequency generated or used is between 500MHz and 1GHz.

5.2.2.2 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 2003 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. Since quasi-peak and average measurements require long integration times, it is not practical to automatically sweep through the quasi-peak or average levels. Therefore, radiated emissions from the test item were first scanned using a peak detector and automatically plotted. The frequencies where significant emission levels were noted were then remeasured using the quasi-peak or average detector.

For preliminary radiated emissions sweeps from 30MHz to 5GHz, the broadband measuring antenna was positioned at a 3 meter distance from the test item. The frequency range from 30MHz to 5GHz was investigated using a peak detector function with the bilog antenna below 1GHz and the double-ridged waveguide antenna above 1GHz. The maximum levels were plotted.

Final radiated emissions were performed on all significant broadband and narrowband emissions found in the preliminary sweeps using the following methods:

1) Measurements below 1GHz were made using a quasi-peak detector and a bilog antenna. Measurements above 1GHz were made using an average detector and a double ridged waveguide antenna.
2) To ensure that maximum or worst case, emission levels were measured, the following steps were taken:

   a. The test item 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

5.2.2.3 Results

The preliminary plots, with the test item receiving at 904MHz, 915MHz, and 925MHz are presented on data pages 45 through 56. The plots are presented for a reference only, and are not used to determine compliance.

The final radiated levels, with the test item receiving at 904MHz, 915MHz, and 925MHz are presented on data pages 57 through 59. As can be seen from the data, all emissions measured from the test item were within the specification limits for receivers. The emissions level closet to the limit (worst case) occurred at 925.02MHz. The emissions level at this frequency was 14.1dB within the limit. Photographs of the test configuration are shown on Figure 3.

6 CONCLUSIONS

It was determined that the Predictive Sensor Technology Multi-Point Transmitter, Part No. MPT01 digital modulation transceiver, 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 902-928 MHz band, and Industry Canada's RSS-210 for Low-power License-exempt radio communication devices when tested per ANSI C63.4-2003.

It was determined that the Predictive Sensor Technology Multi-Point Transmitter, Part No. MPT01 digital modulation transceiver, did fully meet the conducted and radiated emission requirements of the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart B, Sections 15.107 and 15.109 for receivers, and did fully meet the conducted emission requirements of Section 7.2.2 and the radiated emissions requirements of Section 7.2.3 of the Industry Canada Radio Standards Specification, RSS-Gen, for receivers when tested per ANSI C63.4-2003.

7 CERTIFICATION

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

The data presented in this test report pertains to the test item at the test date. Any electrical or mechanical modification made to the test item subsequent to the specified test date will serve to invalidate the data and void this certification.

8 ENDORSEMENT DISCLAIMER

This report must not be used to claim product endorsement by NVLAP or any agency of the US Government.

9 EQUIMENT LIST

Table 9-1 Equipment List

Eq ID	Equipment Description	Manufacturer	Model No.	Serial No.	Frequency Range	Cal Date	Due Date
APW2	PREAMPLIFIER	PLANAR ELECTRONICS	PE2-35-120-5R0-10	PL2925	1GHZ-20GHZ	7/28/2009	7/28/2010
GRE0	SIGNAL GENERATOR	AGILENT TECHNOLOGIES	E4438C	MY42083127	250KHZ-6GHZ	2/16/2010	2/16/2011
NDQ1	TUNED DIPOLE ANTENNA	EMCO	3121C-DB4	313	400-1000MHZ	3/24/2009	3/24/2010
NTA1	BILOG ANTENNA	CHASE EMC LTD.	BILOG CBL6112	2054	0.03-2GHZ	9/10/2009	9/10/2010
NWH0	RIDGED WAVE GUIDE	TENSOR	4105	2081	1-12.4GHZ	8/11/2009	8/11/2010
RBB0	EMI TEST RECEIVER 20HZ TO 40 GHZ.	ROHDE & SCHWARZ	ESIB40	100250	20 HZ TO 40GHZ	3/16/2010	3/16/2011
SES1	24VDC POWER SUPPLY	P TRANS	FS-32024-1M	002	18-27VDC	NOTE 1	
XPQ2	HIGH PASS FILTER	K&L MICROWAVE	4IH30-1804/T10000-0	3	1.8-10GHZ	11/9/2009	11/9/2010

N/A: Not Applicable

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

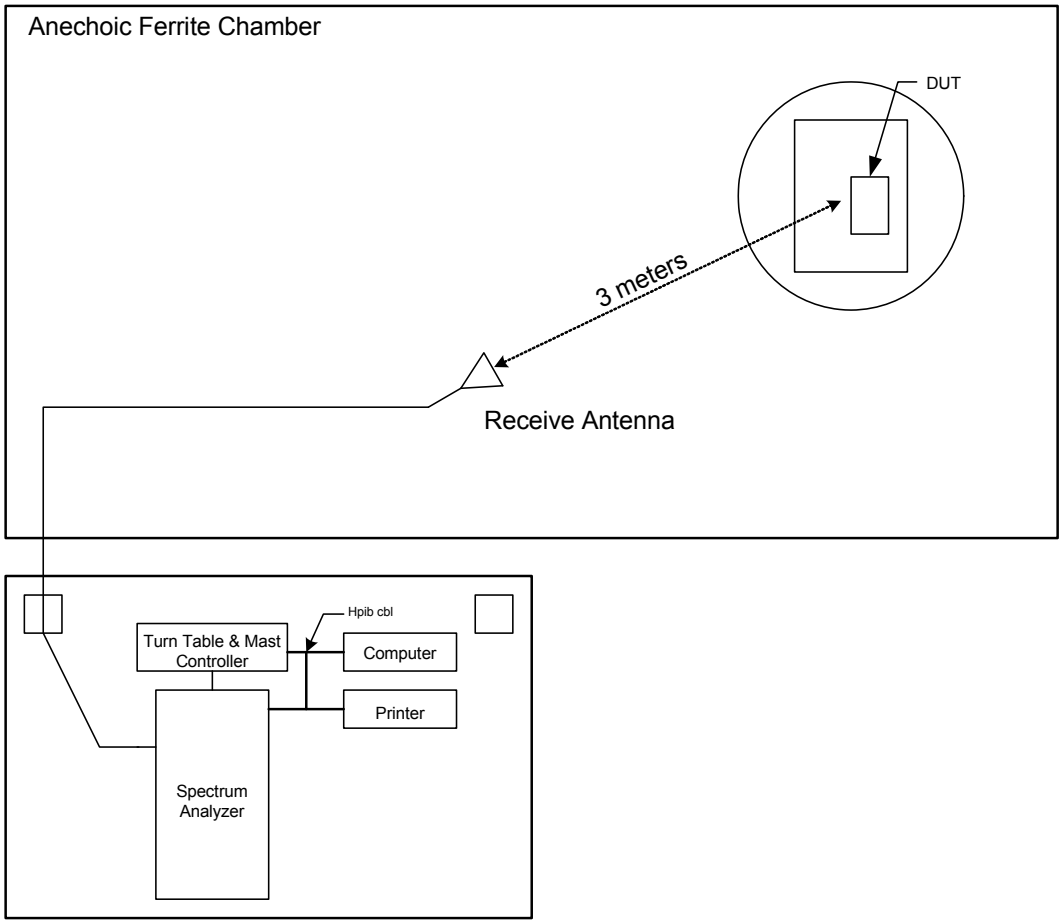
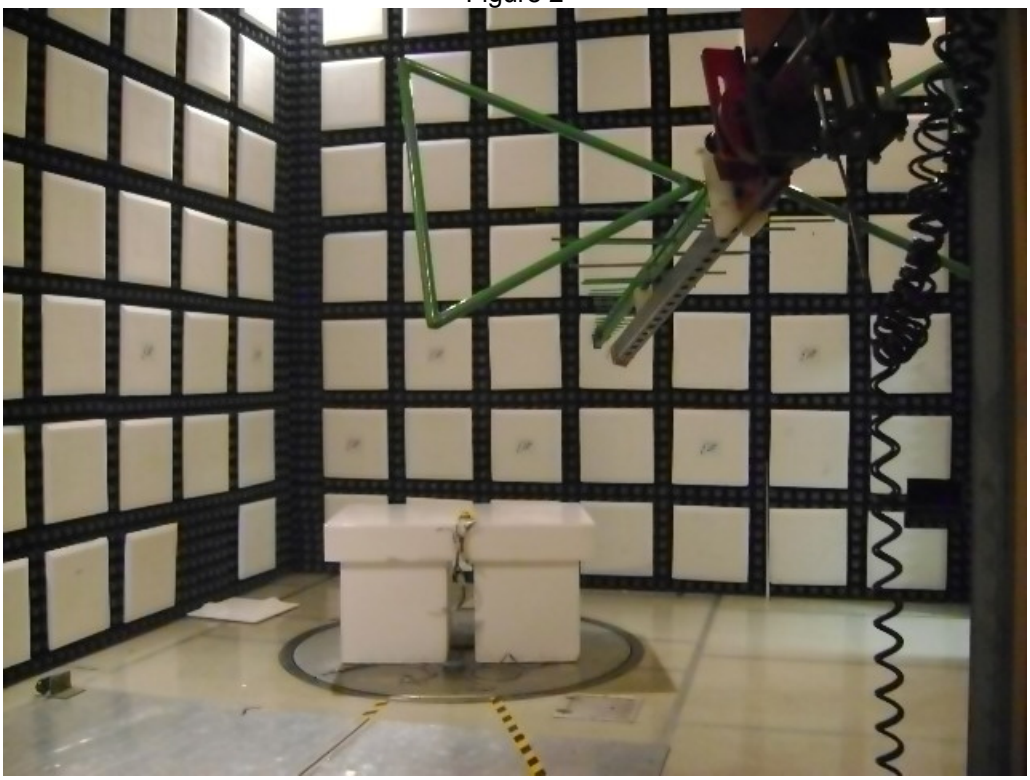
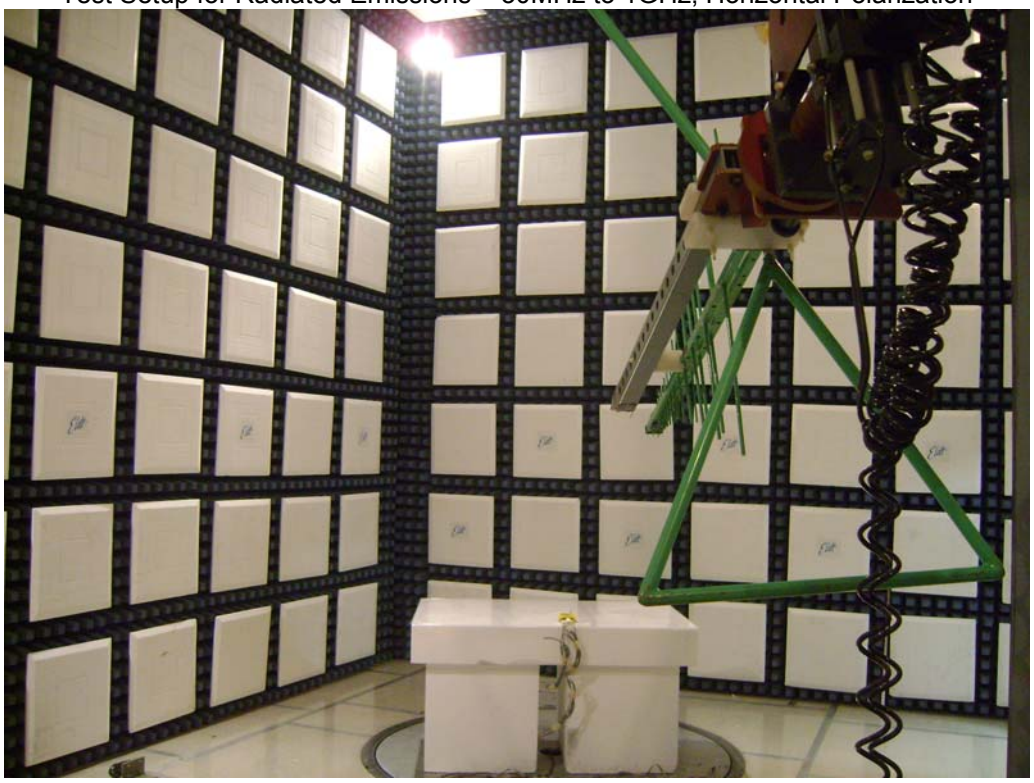


FIGURE 1 BLOCKDIAGRAM OF TEST SETUP

Figure 2



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

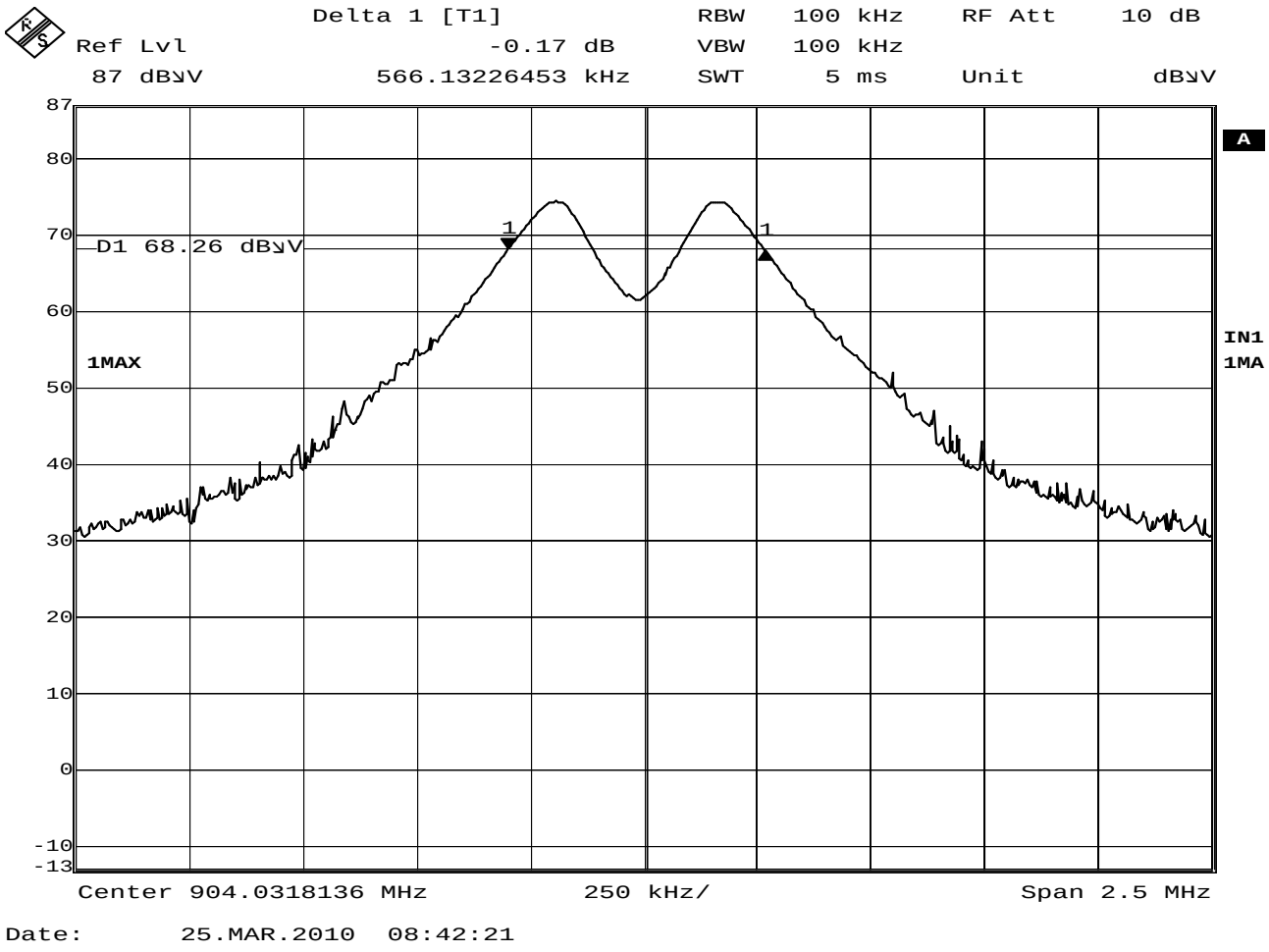


Test Setup for Radiated Emissions – 30MHz to 1GHz, Vertical Polarization

Figure 3

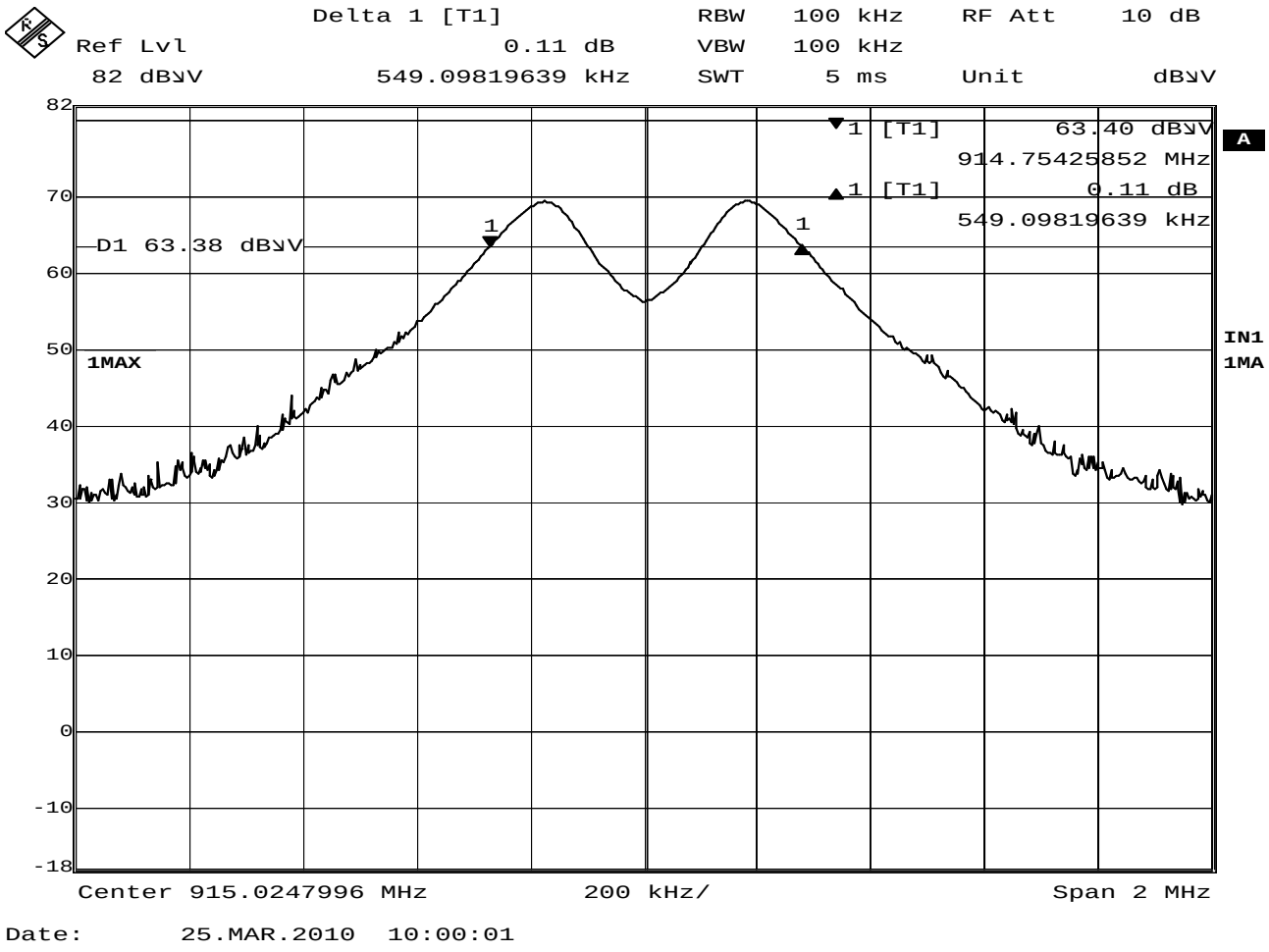
Test Setup for Radiated Emissions – Above 1GHz, Horizontal Polarization

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



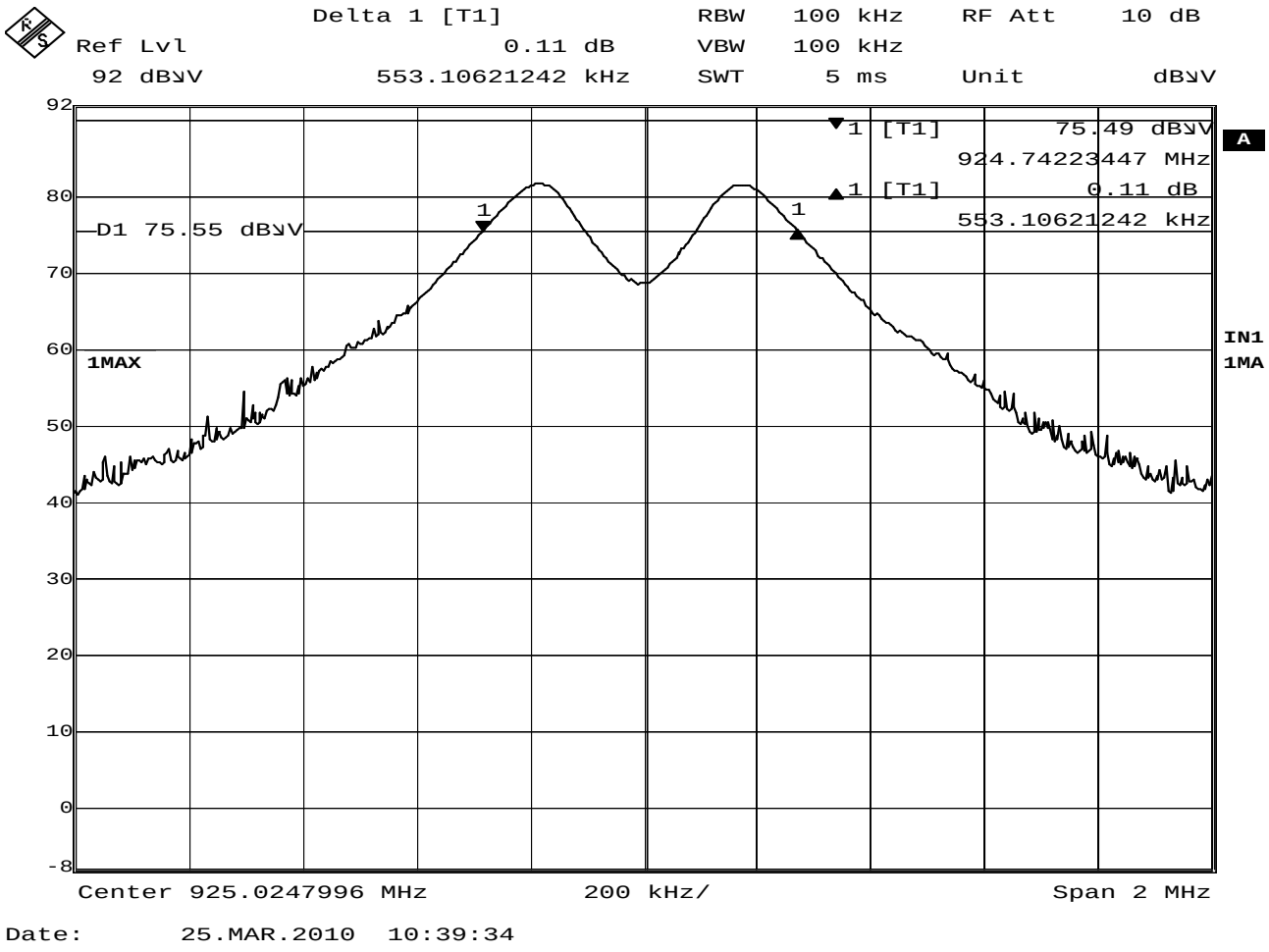
FCC 15.247(a)(2) 6dB Bandwidth

MANUFACTURER	:	Predictive Sensor Technology
MODEL NUMBER	:	MPT01
SERIAL NUMBER	:	00000014
TEST MODE	:	Tx @ 904MHz
TEST DATE	:	March 25, 2010
TEST PARAMETERS	:	6dB bandwidth
NOTES	:	6dB bandwidth = 566.13kHz
EQUIPMENT USED	:	RBB0, NDQ1



FCC 15.247(a)(2) 6dB Bandwidth

MANUFACTURER	:	Predictive Sensor Technology
MODEL NUMBER	:	MPT01
SERIAL NUMBER	:	00000015
TEST MODE	:	Tx @ 915MHz
TEST DATE	:	March 25, 2010
TEST PARAMETERS	:	6dB bandwidth
NOTES	:	6dB bandwidth = 549.1kHz
EQUIPMENT USED	:	RBB0, NDQ1



FCC 15.247(a)(2) 6dB Bandwidth

MANUFACTURER	:	Predictive Sensor Technology
MODEL NUMBER	:	MPT01
SERIAL NUMBER	:	00000016
TEST MODE	:	Tx @ 925MHz
TEST DATE	:	March 25, 2010
TEST PARAMETERS	:	6dB bandwidth
NOTES	:	6dB bandwidth = 553.1kHz
EQUIPMENT USED	:	RBB0, NDQ1

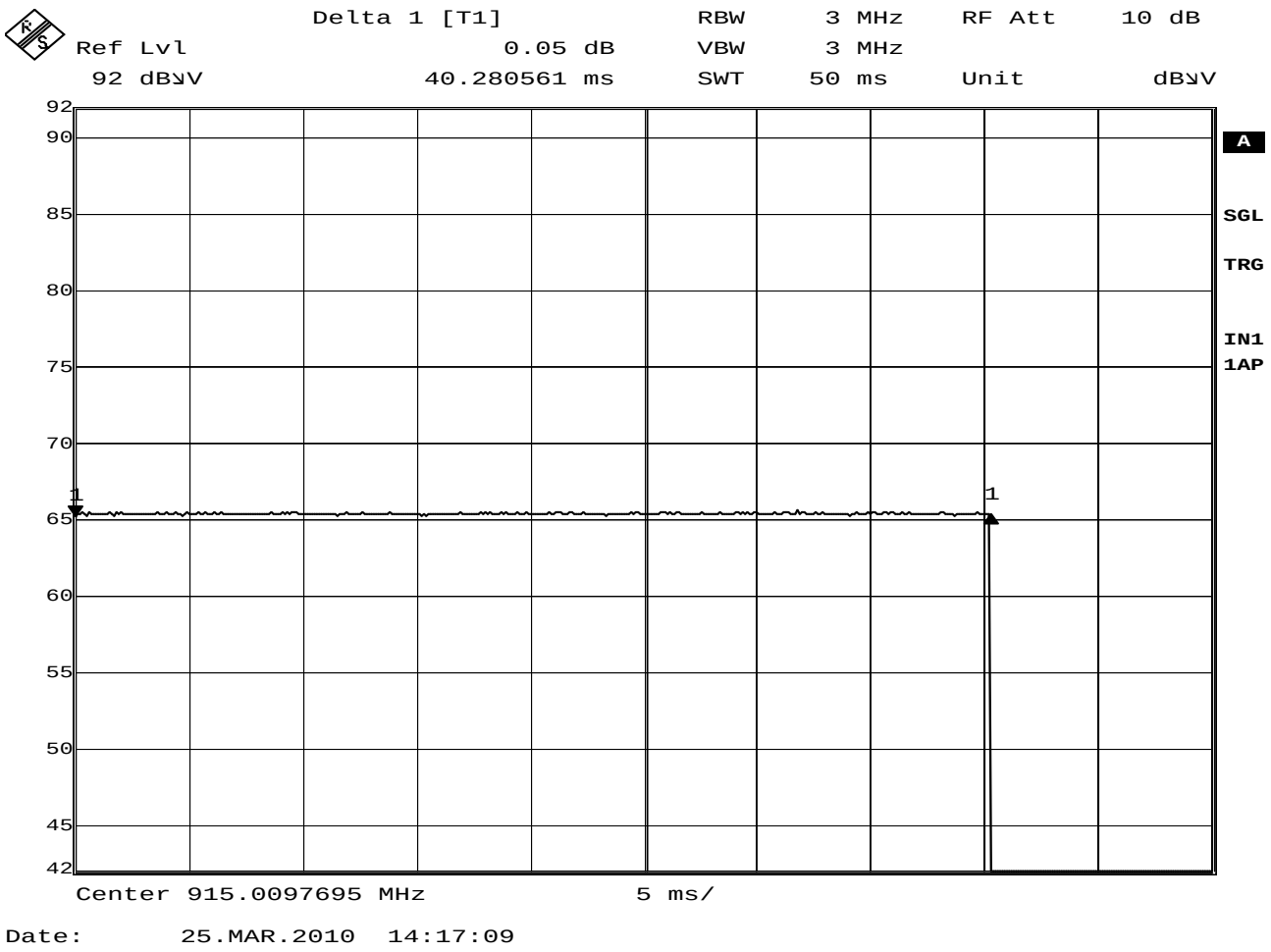
MANUFACTURER	:	Predictive Sensor Technology
MODEL NUMBER	:	MPT01
SERIAL NUMBER	:	See Below
TEST MODE	:	See Below
TEST DATE	:	March 25, 2010
TEST PARAMETERS	:	FCC Part 15, Subpart C, 15.247, Peak Output Power
NOTES	:	EIRP Measurements
EQUIPMENT USED	:	RBB0, NTA1, NDQ1, GRE0

Frequency MHz	Antenna Polarization	Meter Reading dBuV	Matched Signal Generator Reading dBm	Antenna Gain dB	Cable Loss dB	EIRP dBm	Limit dBm
Transmit at 904.03 MHz, Serial No. 00000014							
904.03	Horizontal	82.4	6.1	0.0	1.9	4.2	36.0
904.03	Vertical	75.1	0.2	0.0	1.9	-1.7	36.0
Transmit at 915.02 MHz, Serial No. 00000015							
915.02	Horizontal	84.6	8.8	0.0	1.9	6.9	36.0
915.02	Vertical	79.1	4.2	0.0	1.9	2.3	36.0
Transmit at 925.02 MHz, Serial No. 00000016							
925.02	Horizontal	80.5	5.4	0.0	1.9	3.5	36.0
925.02	Vertical	80.2	6.1	0.0	1.9	4.2	36.0

EIRP (dBm) = Sig. Gen. (dBm) + Antenna Gain (dBm) – Cable Loss (dB)

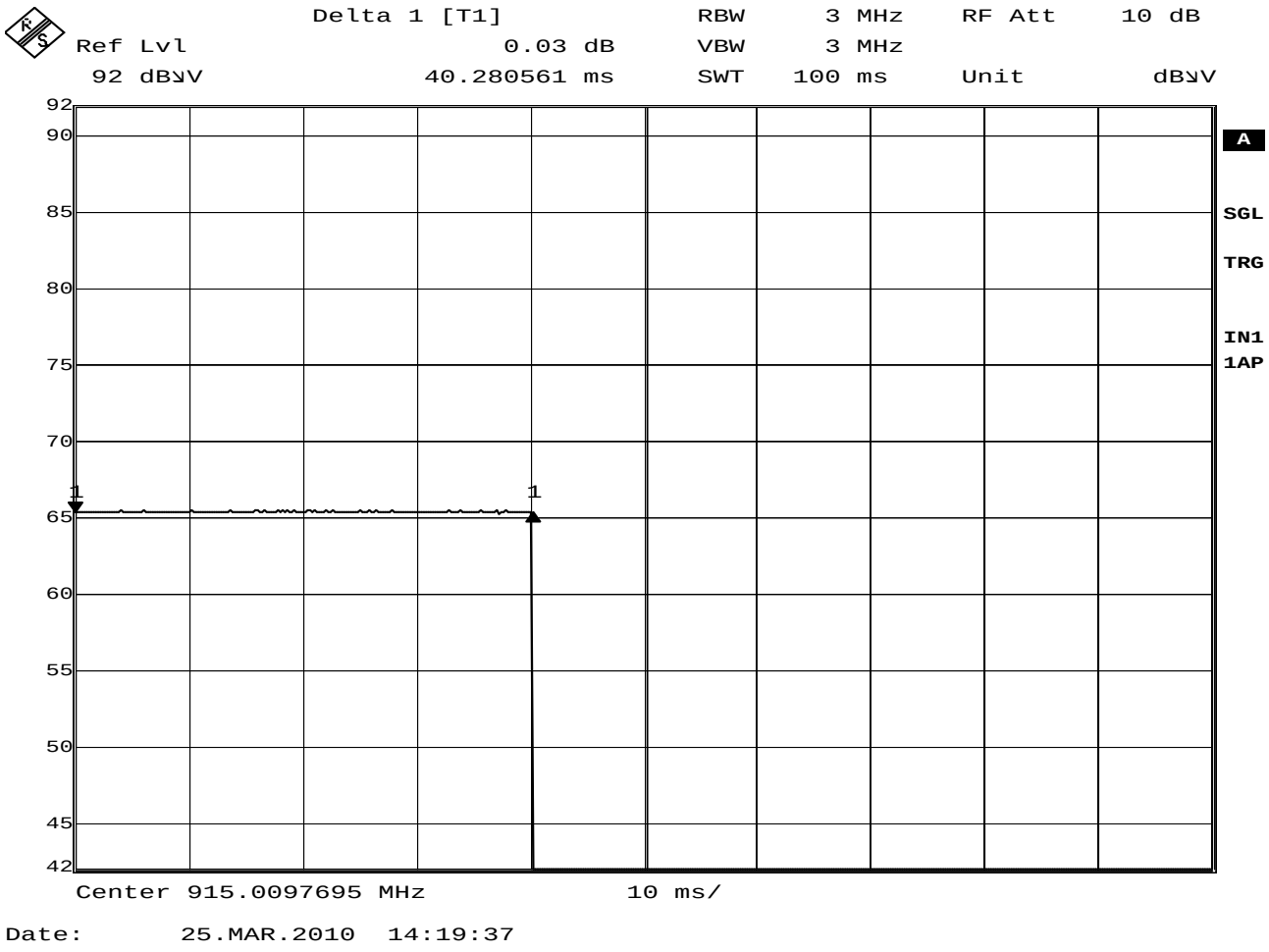
Checked By: MARK E. LONGINOTTI

Mark E. Longinotti



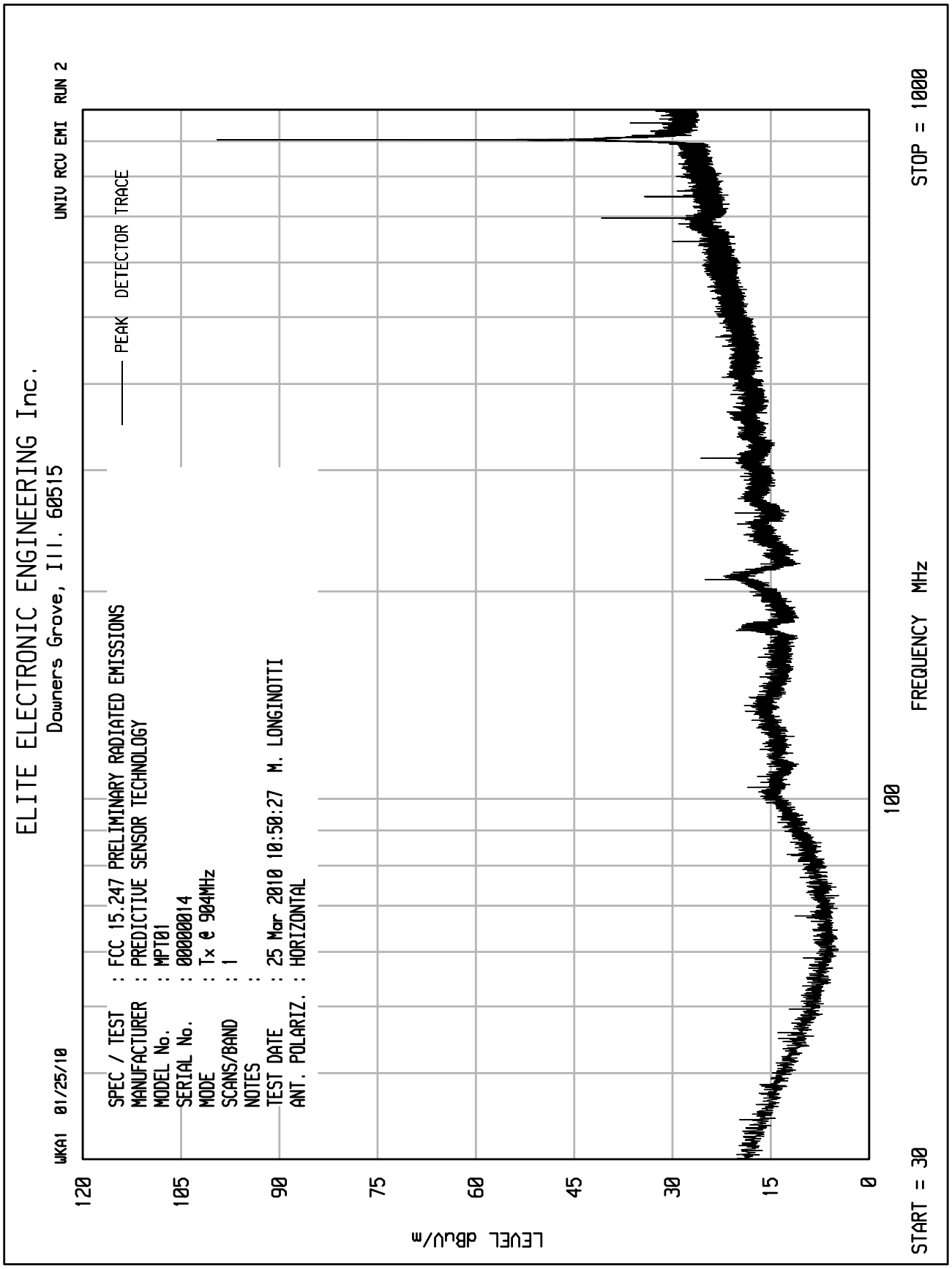
FCC 15.35 Duty Cycle Correction Factor

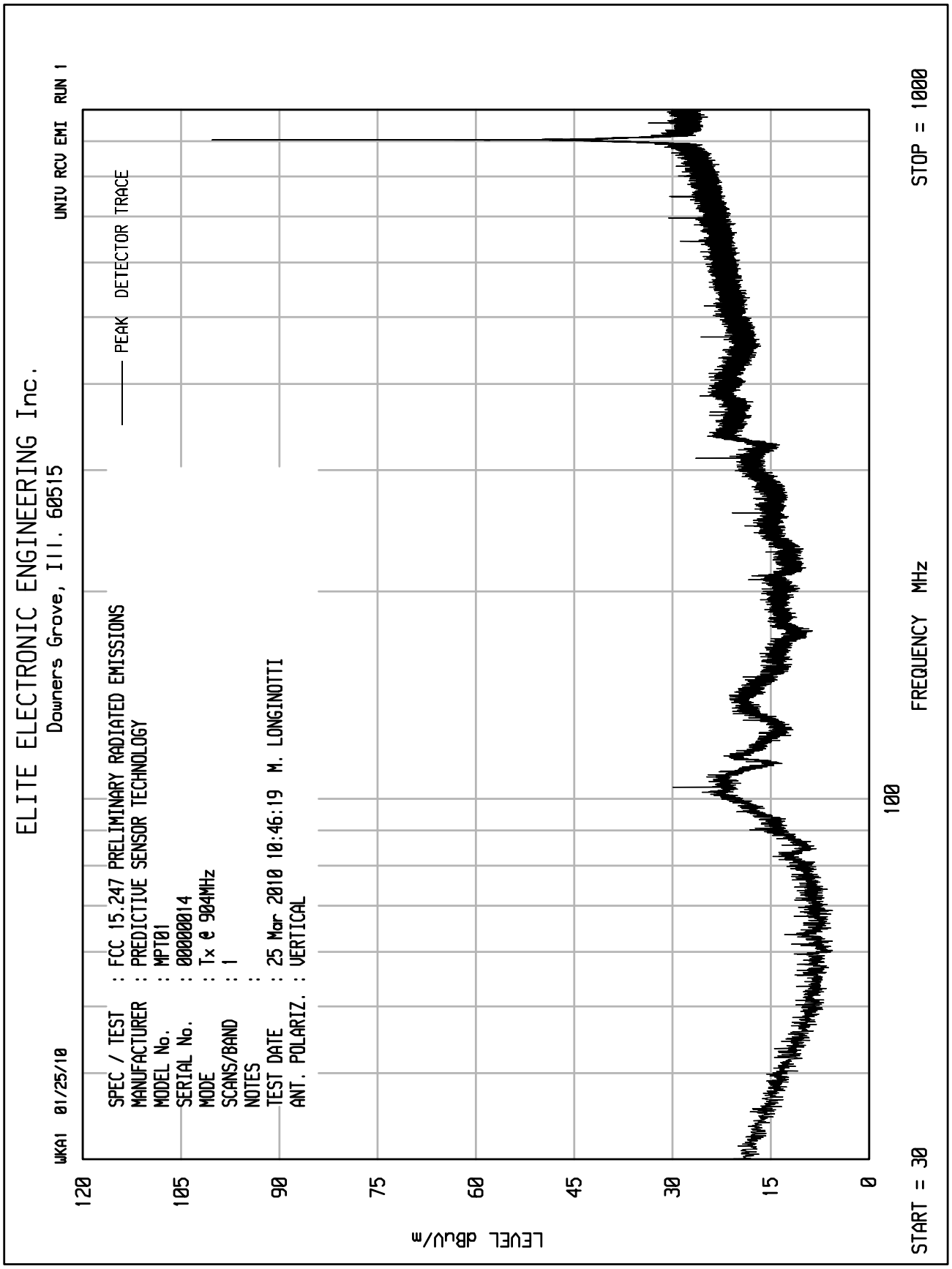
MANUFACTURER	:	Predictive Sensor Technology
MODEL NUMBER	:	MPT01
SERIAL NUMBER	:	00000013
TEST MODE	:	Tx @ 915MHz
TEST DATE	:	March 25, 2010
TEST PARAMETERS	:	Duty Cycle Correction Factor
NOTES	:	On time = 40.28msec
EQUIPMENT USED	:	RBB0, NTA1

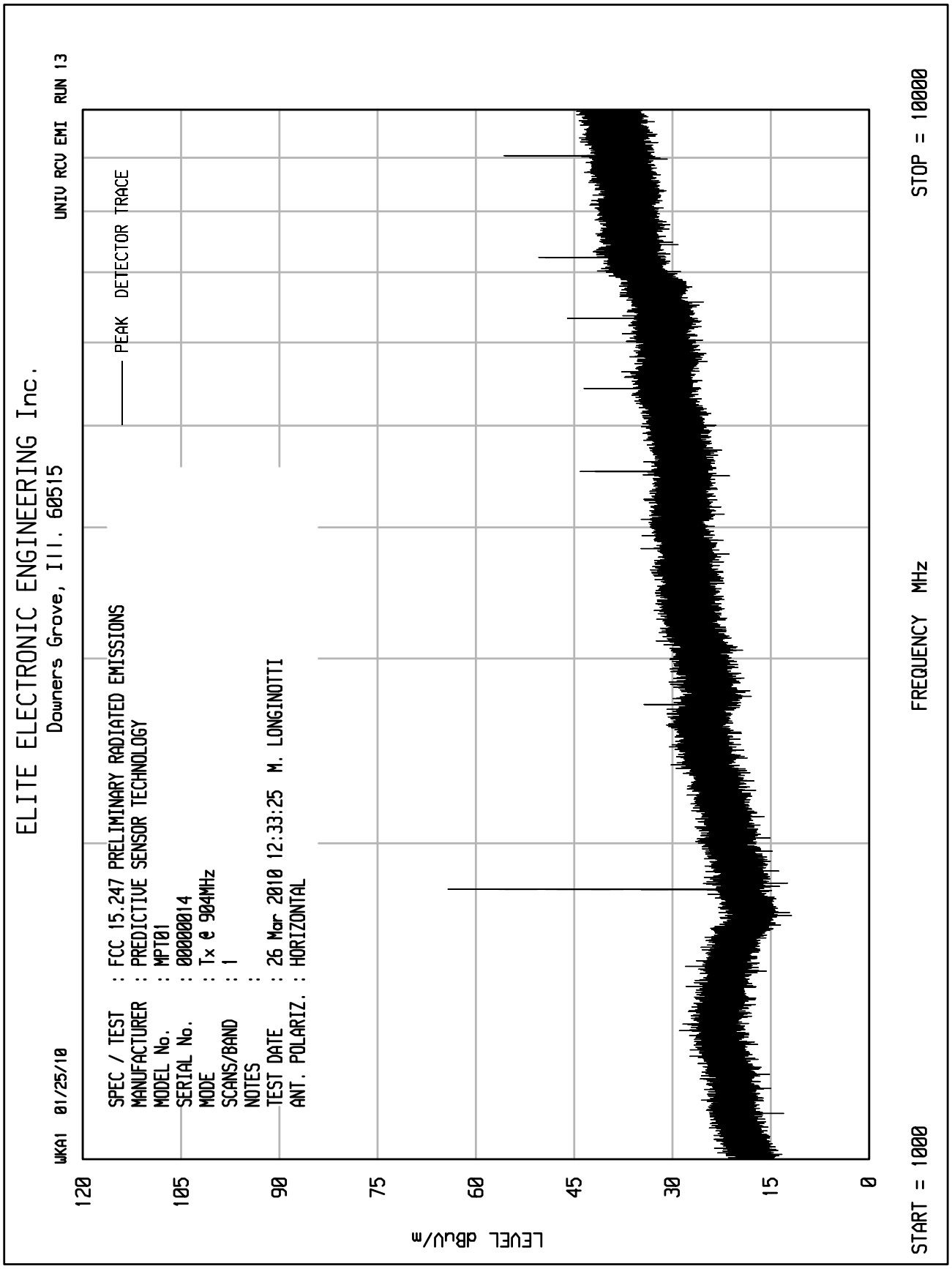


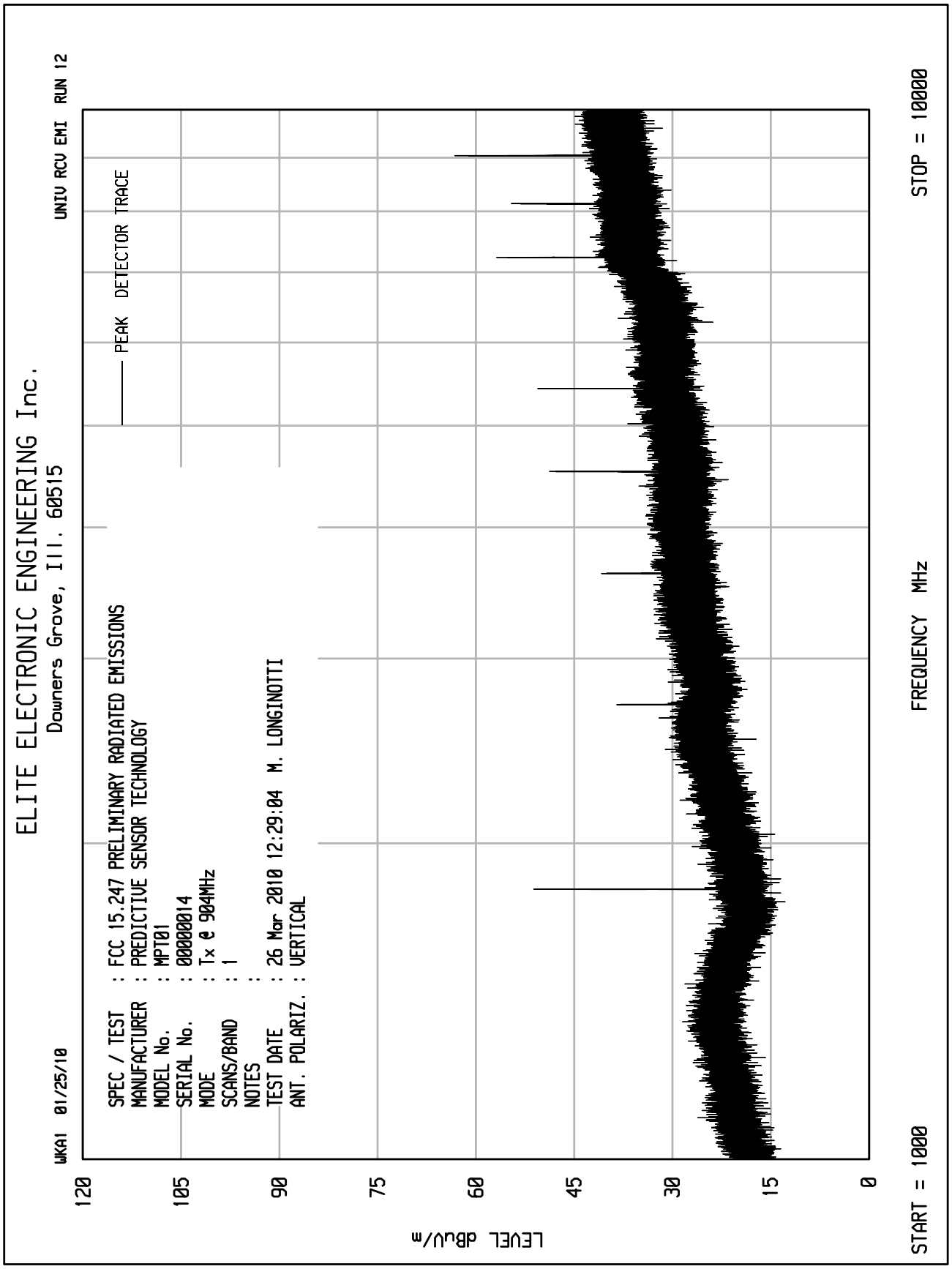
FCC 15.35 Duty Cycle Correction Factor

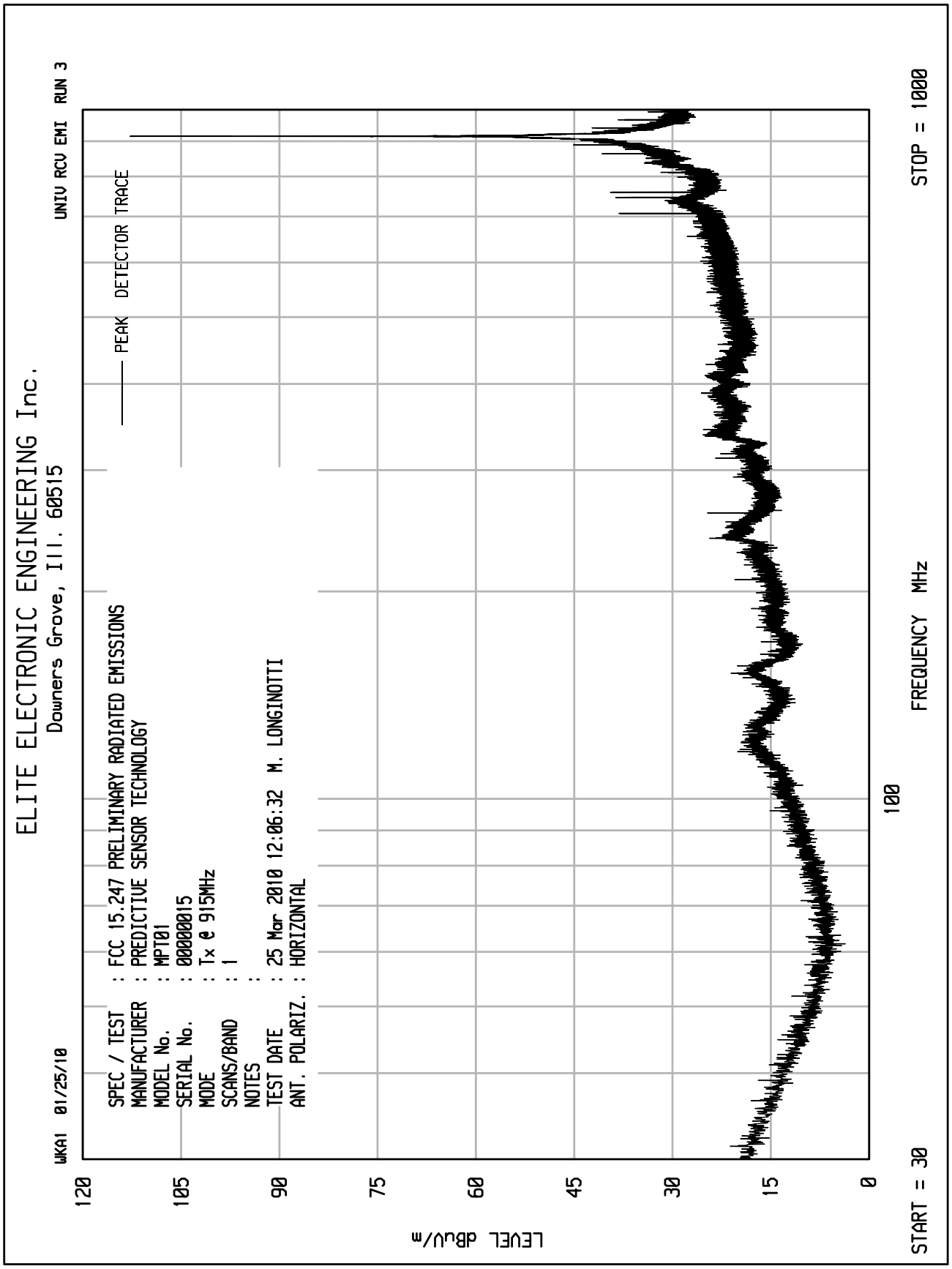
MANUFACTURER	:	Predictive Sensor Technology
MODEL NUMBER	:	MPT01
SERIAL NUMBER	:	00000013
TEST MODE	:	Tx @ 915MHz
TEST DATE	:	March 25, 2010
TEST PARAMETERS	:	Duty Cycle Correction Factor
NOTES	:	On time = 40.28msec in a 100msec periond
	:	Duty Cycle = 20*log(on time/100msec) = 20* log (40.28msec/100msec)
	:	Duty Cycle = -7.89dB
EQUIPMENT USED	:	RBB0, NTA1

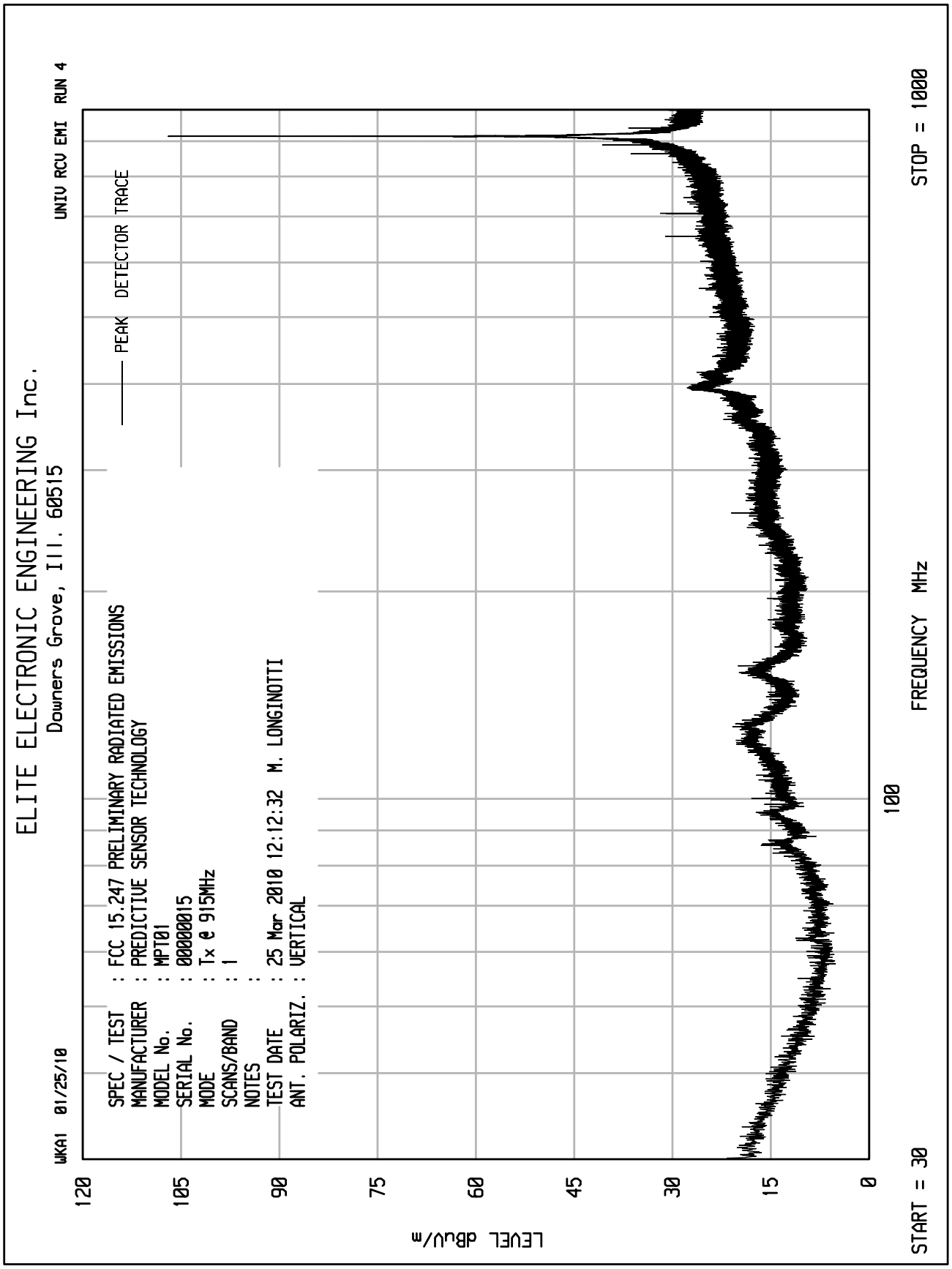

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 2
WKA1 01/25/10
SPEC / TEST : FCC 15.247 PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : PREDICTIVE SENSOR TECHNOLOGY
MODEL No. : MPT01
SERIAL No. : 00000014
MODE : Tx @ 904MHz
SCANS/BAND : 1
NOTES : :
TEST DATE : 25 Mar 2010 10:50:27 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

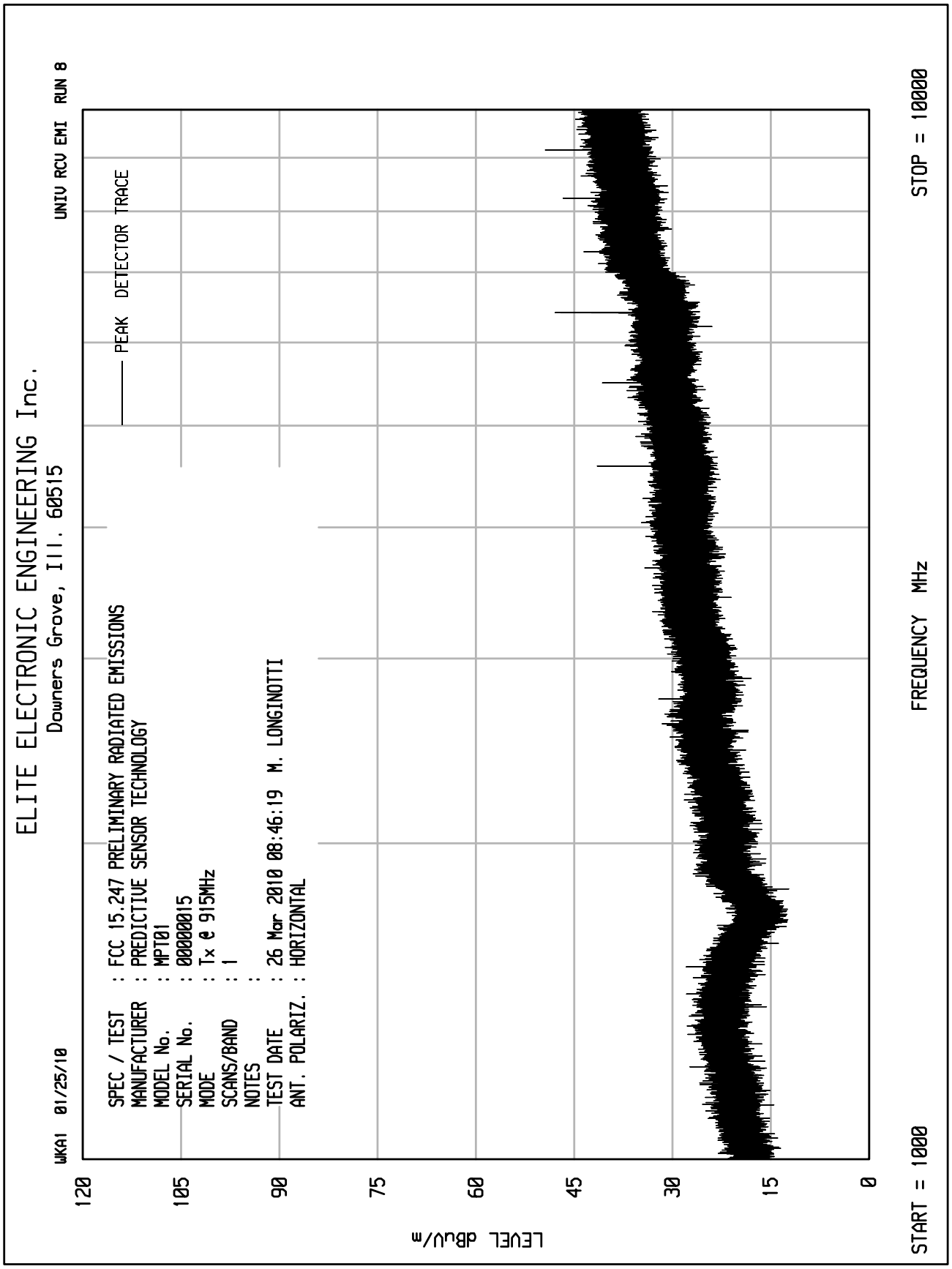

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 1
WKA1 01/25/10
SPEC / TEST : FCC 15.247 PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : PREDICTIVE SENSOR TECHNOLOGY
MODEL No. : MPT01
SERIAL No. : 00000014
MODE : Tx @ 904MHz
SCANS/BAND : 1
NOTES : :
TEST DATE : 25 Mar 2010 10:46:19 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

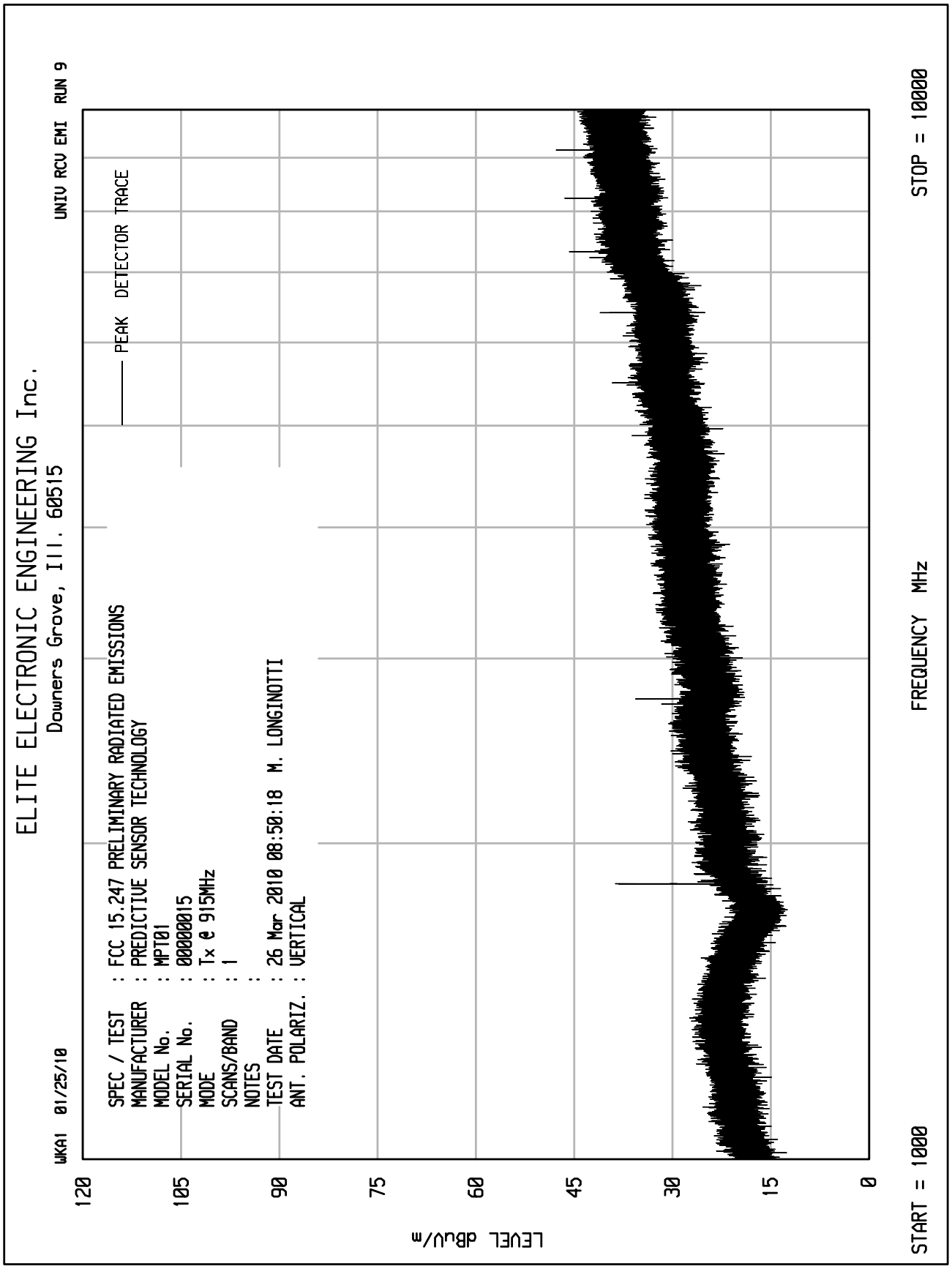

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 13
WKA1 01/25/10
SPEC / TEST : FCC 15.247 PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : PREDICTIVE SENSOR TECHNOLOGY
MODEL No. : MPT01
SERIAL No. : 00000014
MODE : Tx @ 904MHz
SCANS/BAND : 1
NOTES :
TEST DATE : 26 Mar 2010 12:33:25 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 = 10000

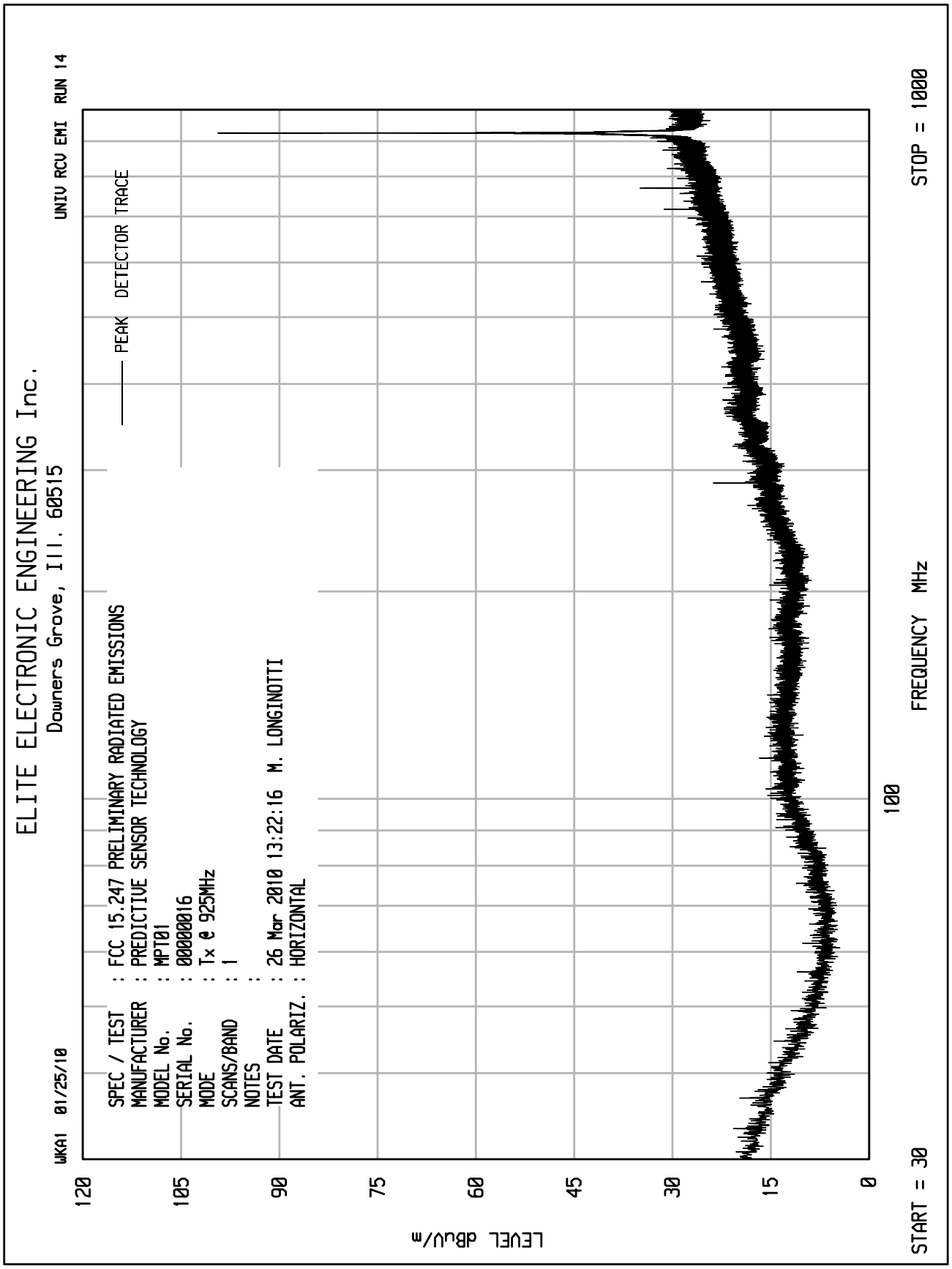

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 12
WKA1 01/25/10
SPEC / TEST : FCC 15.247 PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : PREDICTIVE SENSOR TECHNOLOGY
MODEL No. : MPT01
SERIAL No. : 00000014
MODE : Tx @ 904MHz
SCANS/BAND : 1
NOTES :
TEST DATE : 26 Mar 2010 12:29:04 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 = 10000

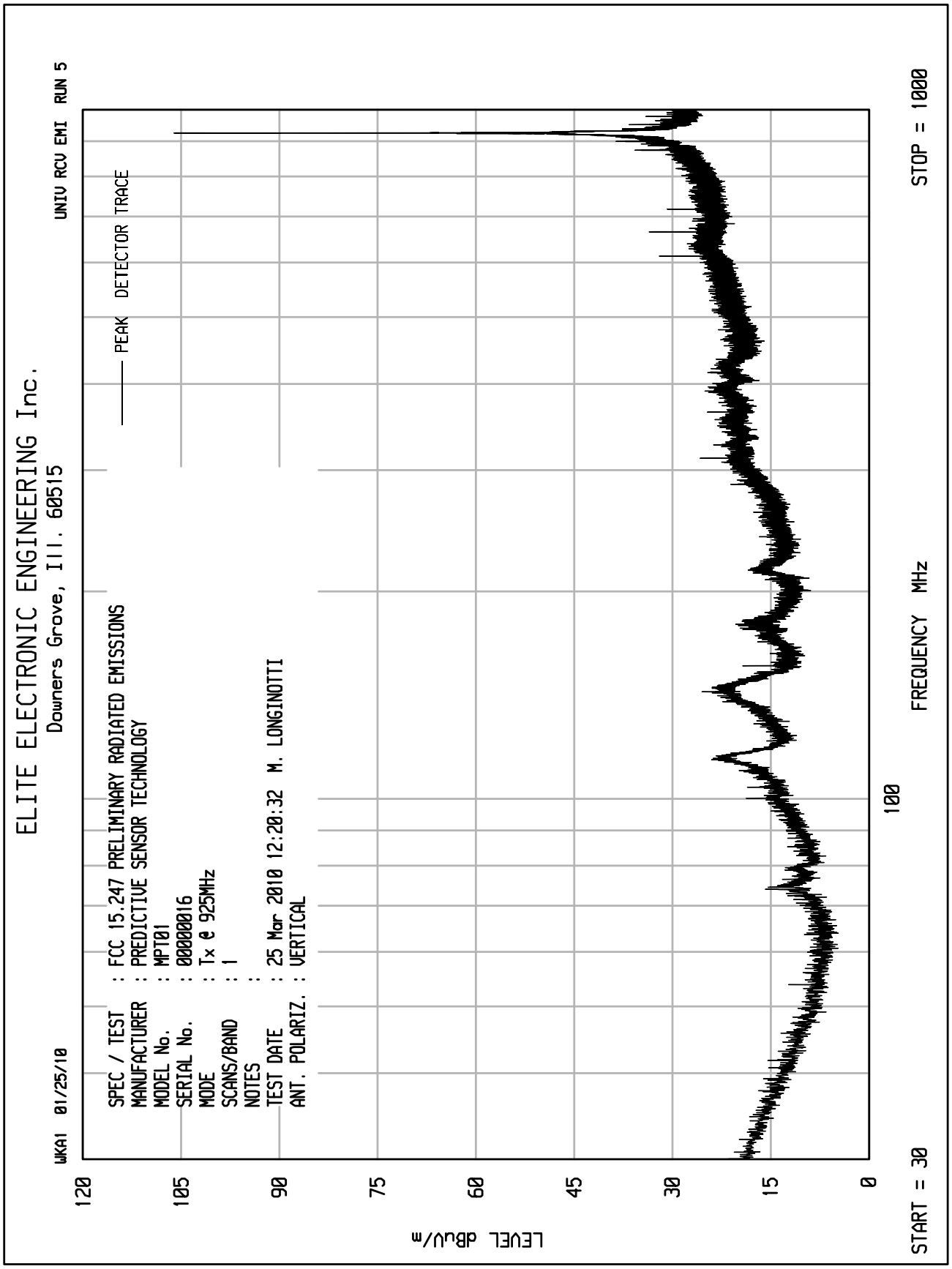

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 3
WKA1 01/25/10
SPEC / TEST : FCC 15.247 PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : PREDICTIVE SENSOR TECHNOLOGY
MODEL No. : MPT01
SERIAL No. : 00000015
MODE : Tx @ 915MHz
SCANS/BAND : 1
NOTES :
TEST DATE : 25 Mar 2010 12:06:32 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

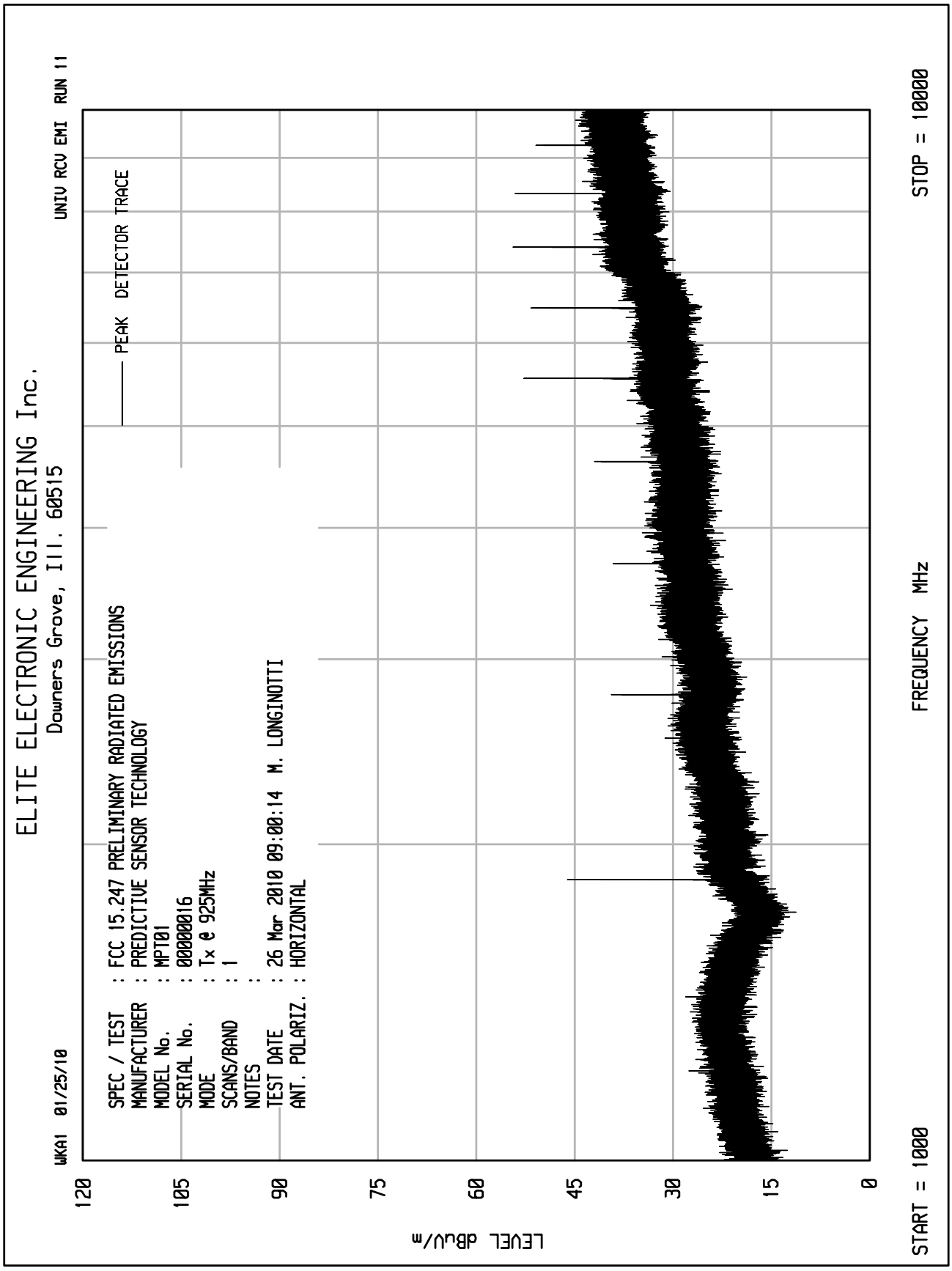

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 4
WKA1 01/25/10
SPEC / TEST : FCC 15.247 PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : PREDICTIVE SENSOR TECHNOLOGY
MODEL No. : MPT01
SERIAL No. : 00000015
MODE : Tx @ 915MHz
SCANS/BAND : 1
NOTES :
TEST DATE : 25 Mar 2010 12:12:32 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

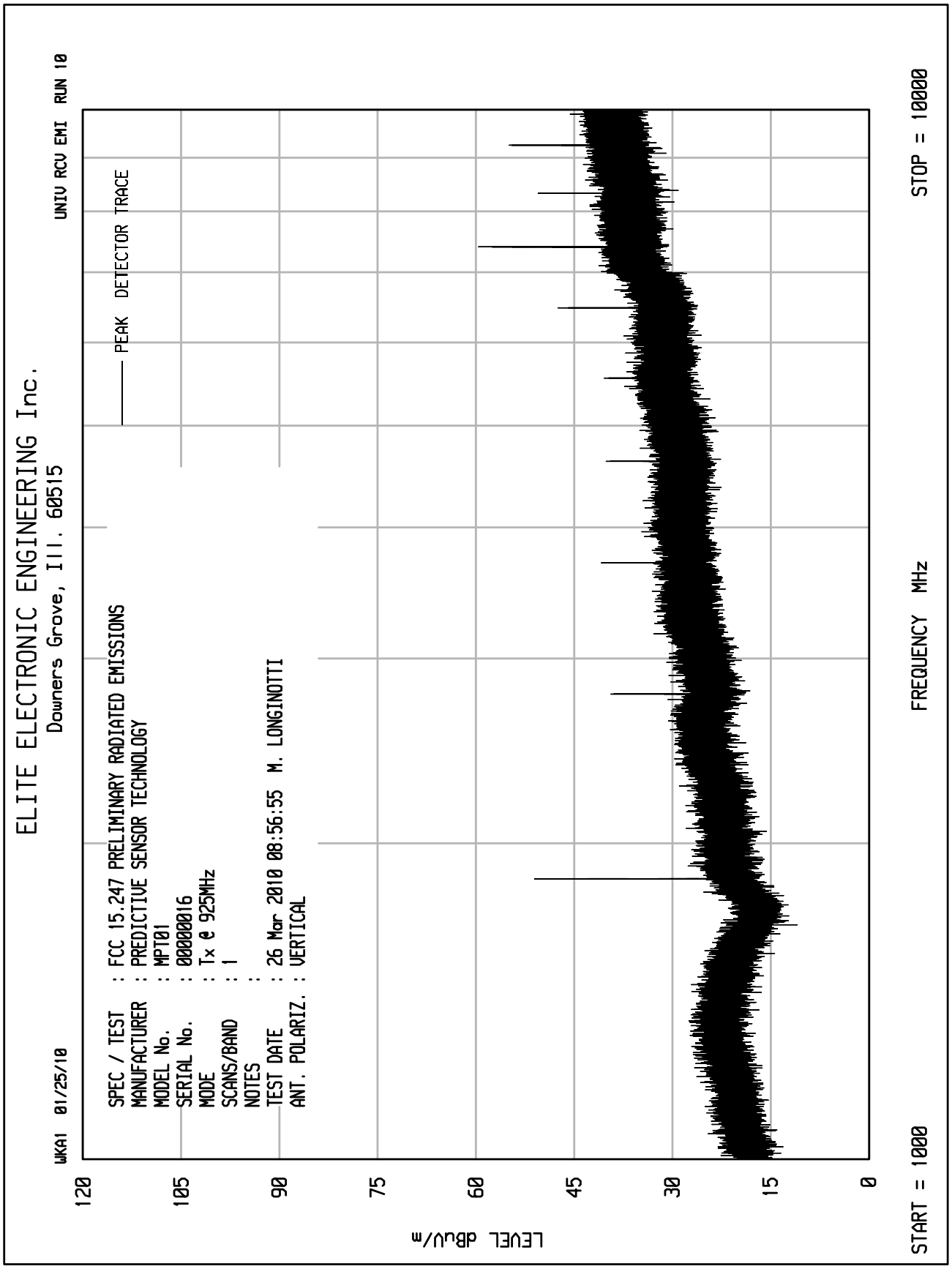

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 8
WKA1 01/25/10
SPEC / TEST : FCC 15.247 PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : PREDICTIVE SENSOR TECHNOLOGY
MODEL No. : MPT01
SERIAL No. : 00000015
MODE : Tx @ 915MHz
SCANS/BAND : 1
NOTES :
TEST DATE : 26 Mar 2010 08:46:19 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 = 10000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 9
WKA1 01/25/10
SPEC / TEST : FCC 15.247 PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : PREDICTIVE SENSOR TECHNOLOGY
MODEL No. : MPT01
SERIAL No. : 00000015
MODE : Tx @ 915MHz
SCANS/BAND : 1
NOTES :
TEST DATE : 26 Mar 2010 08:50:18 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 = 10000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 14
WKA1 01/25/10
SPEC / TEST : FCC 15.247 PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : PREDICTIVE SENSOR TECHNOLOGY
MODEL No. : MPT01
SERIAL No. : 00000016
MODE : Tx @ 925MHz
SCANS/BAND : 1
NOTES :
TEST DATE : 26 Mar 2010 13:22:16 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 5
WKA1 01/25/10
SPEC / TEST : FCC 15.247 PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : PREDICTIVE SENSOR TECHNOLOGY
MODEL No. : MPT01
SERIAL No. : 00000016
MODE : Tx @ 925MHz
SCANS/BAND : 1
NOTES :
TEST DATE : 25 Mar 2010 12:20:32 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 11
WKA1 01/25/10
SPEC / TEST : FCC 15.247 PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : PREDICTIVE SENSOR TECHNOLOGY
MODEL No. : MPT01
SERIAL No. : 00000016
MODE : Tx @ 925MHz
SCANS/BAND : 1
NOTES :
TEST DATE : 26 Mar 2010 09:00:14 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 = 10000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 10
WKA1 01/25/10
SPEC / TEST : FCC 15.247 PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : PREDICTIVE SENSOR TECHNOLOGY
MODEL No. : MPT01
SERIAL No. : 00000016
MODE : Tx @ 925MHz
SCANS/BAND : 1
NOTES :
TEST DATE : 26 Mar 2010 08:56:55 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 = 10000

Manufacturer : Predictive Sensor Technology
Model No. : MPT01
Serial No. : 00000014
Test Specification : FCC Part 15, Subpart C, Section 15.247, Radiated Emissions
Date : March 25 and 26, 2010
Mode : Transmit @ 904 MHz
Test Distance : 3 meters
Notes : Gray rows indicate restricted bands which must meet the general limits
: Peak measurements

Frequency MHz	Antenna Polar.	Meter Reading dBuV	Ambient	Cable Loss dB	Antenna Factor dB	Pre Amp Gain dB	Total dBuV/m	Total uV/m	Limit uV/m	Margin dB
904.03	H	82.3		2.4	22.9	0.0	107.6	238609.3		
904.03	V	75.1		2.4	22.9	0.0	100.4	104156.7		
1808.06	H	74.0		3.4	26.5	-37.3	66.7	2157.1	23860.9	-20.9
1808.06	V	67.2		3.4	26.5	-37.3	59.9	986.0	23860.9	-27.7
2712.09	H	50.3		3.9	29.6	-36.9	46.9	220.6	5000.0	-27.1
2712.09	V	51.2		3.9	29.6	-36.9	47.8	244.7	5000.0	-26.2
3616.12	H	48.3		4.7	32.1	-36.5	48.6	267.8	5000.0	-25.4
3616.12	V	49.8		4.7	32.1	-36.5	50.1	318.2	5000.0	-23.9
4520.15	H	54.4		5.5	32.9	-35.9	56.9	701.2	5000.0	-17.1
4520.15	V	51.0		5.5	32.9	-35.9	53.5	474.1	5000.0	-20.5
5424.18	H	51.0		6.2	35.2	-35.8	56.6	673.7	5000.0	-17.4
5424.18	V	50.2		6.2	35.2	-35.8	55.8	614.4	5000.0	-18.2
6328.21	H	45.6		7.0	35.3	-35.6	52.3	410.8	23860.9	-35.3
6328.21	V	45.9		7.0	35.3	-35.6	52.6	425.2	23860.9	-35.0
7232.24	H	52.2		7.7	37.5	-35.5	61.8	1235.2	23860.9	-25.7
7232.24	V	52.6		7.7	37.5	-35.5	62.2	1293.4	23860.9	-25.3
8136.27	H	48.1		8.0	37.8	-35.3	58.5	842.0	5000.0	-15.5
8136.27	V	48.0		8.0	37.8	-35.3	58.4	832.3	5000.0	-15.6
9040.30	H	49.1		8.8	37.8	-35.2	60.5	1054.8	5000.0	-13.5
9040.30	V	53.6		8.8	37.8	-35.2	65.0	1770.9	5000.0	-9.0

Total (dBuV/m) = Meter Reading (dBuV) + Cable Loss (dB) + Antenna Factor (dB) + Pre Amp Gain (dB)

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

Checked By: MARK E. LONGINOTTI

Mark E. Longinotti

Manufacturer : Predictive Sensor Technology
Model No. : MPT01
Serial No. : 00000014
Test Specification : FCC Part 15, Subpart C, Section 15.247, Radiated Emissions
Date : March 25 and 26, 2010
Mode : Transmit @ 904 MHz
Test Distance : 3 meters
Notes : Average measurements in restricted bands
: Peak measurements

Frequency MHz	Antenna Polar.	Meter Reading dBuV	Ambient	Cable Factor dB	Antenna Factor dB	Pre Amp Gain dB	Duty Cycle dB	Total dBuV/m at 3 meters	Total uV/m at 3 meters	Limit uV/m	Margin dB
2712.09	H	42.9		3.9	29.6	-36.9	-7.9	31.6	37.9	500.0	-22.4
2712.09	V	44.5		3.9	29.6	-36.9	-7.9	33.2	45.6	500.0	-20.8
3616.12	H	39.0		4.7	32.1	-36.5	-7.9	31.4	37.0	500.0	-22.6
3616.12	V	41.9		4.7	32.1	-36.5	-7.9	34.3	51.6	500.0	-19.7
4520.15	H	48.8		5.5	32.9	-35.9	-7.9	43.4	148.2	500.0	-10.6
4520.15	V	45.0		5.5	32.9	-35.9	-7.9	39.6	95.7	500.0	-14.4
5424.18	H	44.1		6.2	35.2	-35.8	-7.9	41.8	122.6	500.0	-12.2
5424.18	V	40.5		6.2	35.2	-35.8	-7.9	38.2	81.0	500.0	-15.8
8136.27	H	39.3		8.0	37.8	-35.3	-7.9	41.8	123.1	500.0	-12.2
8136.27	V	40.4		8.0	37.8	-35.3	-7.9	42.9	139.7	500.0	-11.1
9040.30	H	42.0		8.8	37.8	-35.2	-7.9	45.5	187.6	500.0	-8.5
9040.30	V	47.9		8.8	37.8	-35.2	-7.9	51.4	370.0	500.0	-2.6

Total (dBuV/m) = Meter Reading (dBuV) + Cable Loss (dB) + Antenna Factor (dB) + Pre Amp Gain (dB)

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

Checked By: MARK E. LONGINOTTI
Mark E. Longinotti

Manufacturer : Predictive Sensor Technology
Model No. : MPT01
Serial No. : 00000015
Test Specification : FCC Part 15, Subpart C, Section 15.247, Radiated Emissions
Date : March 25 and 26, 2010
Mode : Transmit @ 915 MHz
Test Distance : 3 meters
Notes : Gray rows indicate restricted bands which must meet the general limits
: Peak measurements

Frequency MHz	Antenna Polar.	Meter Reading dBuV	Ambient	Cable Loss dB	Antenna Factor dB	Pre Amp Gain dB	Total dBuV/m	Total uV/m	Limit uV/m	Margin dB
915.02	H	84.6		2.4	23.1	0.0	110.1	319341.6		
915.02	V	79.1		2.4	23.1	0.0	104.6	169533.5		
1830.04	H	59.8		3.5	26.8	-37.3	52.7	433.2	31934.2	-37.4
1830.04	V	55.1		3.5	26.8	-37.3	48.0	252.2	31934.2	-42.1
2745.06	H	49.6		3.9	29.6	-36.9	46.2	203.7	5000.0	-27.8
2745.06	V	50.1		3.9	29.6	-36.9	46.7	215.8	5000.0	-27.3
3660.08	H	45.2	Ambient	4.7	32.2	-36.5	45.7	192.4	5000.0	-28.3
3660.08	V	45.8	Ambient	4.7	32.2	-36.5	46.3	206.1	5000.0	-27.7
4575.10	H	47.6		5.5	33.1	-35.9	50.3	328.8	5000.0	-23.6
4575.10	V	45.6	Ambient	5.5	33.1	-35.9	48.3	261.2	5000.0	-25.6
5490.12	H	45.7		6.2	35.2	-35.8	51.4	371.3	31934.2	-38.7
5490.12	V	44.7		6.2	35.2	-35.8	50.4	330.9	31934.2	-39.7
6405.14	H	46.5		7.0	34.9	-35.6	52.8	435.5	31934.2	-37.3
6405.14	V	46.3		7.0	34.9	-35.6	52.6	425.6	31934.2	-37.5
7320.16	H	46.3	Ambient	7.7	37.8	-35.5	56.3	651.8	5000.0	-17.7
7320.16	V	45.3	Ambient	7.7	37.8	-35.5	55.3	580.9	5000.0	-18.7
8235.18	H	48.8		8.1	37.4	-35.3	59.0	890.2	5000.0	-15.0
8235.18	V	49.5		8.1	37.4	-35.3	59.7	965.0	5000.0	-14.3
9150.20	H	44.8	Ambient	8.7	37.8	-35.2	56.2	645.0	5000.0	-17.8
9150.20	V	47.0		8.7	37.8	-35.2	58.4	830.9	5000.0	-15.6

Total (dBuV/m) = Meter Reading (dBuV) + Cable Loss (dB) + Antenna Factor (dB) + Pre Amp Gain (dB)

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

Checked By: MARK E. LONGINOTTI

Mark E. Longinotti

Manufacturer : Predictive Sensor Technology
Model No. : MPT01
Serial No. : 00000015
Test Specification : FCC Part 15, Subpart C, Section 15.247, Radiated Emissions
Date : March 25 and 26, 2010
Mode : Transmit @ 915 MHz
Test Distance : 3 meters
Notes : Average measurements in restricted bands
: Peak measurements

Frequency MHz	Antenna Polar.	Meter Reading dBuV	Ambient	Cable Factor dB	Antenna Factor dB	Pre Amp Gain dB	Duty Cycle dB	Total dBuV/m at 3 meters	Total uV/m at 3 meters	Limit uV/m	Margin dB
2745.06	H	42.3		3.9	29.6	-36.9	-7.9	31.0	35.4	500.0	-23.0
2745.06	V	42.9		3.9	29.6	-36.9	-7.9	31.6	38.0	500.0	-22.4
3660.08	H	32.2	Ambient	4.7	32.2	-36.5	-7.9	24.8	17.4	500.0	-29.2
3660.08	V	32.2	Ambient	4.7	32.2	-36.5	-7.9	24.8	17.4	500.0	-29.2
4575.10	H	37.9		5.5	33.1	-35.9	-7.9	32.7	43.4	500.0	-21.2
4575.10	V	36.4		5.5	33.1	-35.9	-7.9	31.2	36.5	500.0	-22.7
7320.16	H	37.6		7.7	37.8	-35.5	-7.9	39.7	96.5	500.0	-14.3
7320.16	V	35.9		7.7	37.8	-35.5	-7.9	38.0	79.4	500.0	-16.0
8235.18	H	41.1		8.1	37.4	-35.3	-7.9	43.4	147.9	500.0	-10.6
8235.18	V	42.6		8.1	37.4	-35.3	-7.9	44.9	175.8	500.0	-9.1
9150.20	H	35.6	Ambient	8.7	37.8	-35.2	-7.9	39.1	90.2	500.0	-14.9
9150.20	V	38.9		8.7	37.8	-35.2	-7.9	42.4	131.8	500.0	-11.6

Total (dBuV/m) = Meter Reading (dBuV) + Cable Loss (dB) + Antenna Factor (dB) + Pre Amp Gain (dB)

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

Checked By: MARK E. LONGINOTTI
Mark E. Longinotti

Manufacturer : Predictive Sensor Technology
Model No. : MPT01
Serial No. : 00000016
Test Specification : FCC Part 15, Subpart C, Section 15.247, Radiated Emissions
Date : March 25 and 26, 2010
Mode : Transmit @ 925 MHz
Test Distance : 3 meters
Notes : Gray rows indicate restricted bands which must meet the general limits
: Peak measurements

Frequency MHz	Antenna Polar.	Meter Reading dBuV	Ambient	Cable Loss dB	Antenna Factor dB	Pre Amp Gain dB	Total dBuV/m	Total uV/m	Limit uV/m	Margin dB
925.02	H	80.5		2.4	23.4	0.0	106.3	206441.7		
925.02	V	80.2		2.4	23.4	0.0	106.0	199433.2		
1850.04	H	69.7		3.5	27.0	-37.3	62.9	1390.8	20644.2	-23.4
1850.04	V	61.3		3.5	27.0	-37.3	54.5	528.8	20644.2	-31.8
2775.06	H	54.2		4.0	29.6	-36.9	50.8	346.3	5000.0	-23.2
2775.06	V	52.9		4.0	29.6	-36.9	49.5	298.2	5000.0	-24.5
3700.08	H	54.0		4.8	32.4	-36.5	54.7	542.5	5000.0	-19.3
3700.08	V	49.2		4.8	32.4	-36.5	49.9	312.2	5000.0	-24.1
4625.10	H	50.5		5.6	33.3	-35.9	53.4	469.8	5000.0	-20.5
4625.10	V	47.4		5.6	33.3	-35.9	50.3	328.8	5000.0	-23.6
5550.12	H	49.4		6.3	35.2	-35.8	55.1	565.9	20644.2	-31.2
5550.12	V	51.8		6.3	35.2	-35.8	57.5	746.0	20644.2	-28.8
6475.14	H	43.3		7.1	34.8	-35.6	49.6	302.6	20644.2	-36.7
6475.14	V	43.7		7.1	34.8	-35.6	50.0	316.9	20644.2	-36.3
7400.16	H	49.6		7.7	37.8	-35.5	59.6	954.7	5000.0	-14.4
7400.16	V	50.6		7.7	37.8	-35.5	60.6	1071.2	5000.0	-13.4
8325.18	H	49.5		8.2	37.3	-35.3	59.6	953.0	5000.0	-14.4
8325.18	V	52.6		8.2	37.3	-35.3	62.7	1361.8	5000.0	-11.3
9250.20	H	41.5		8.7	38.0	-35.2	53.1	449.6	20644.2	-33.2
9250.20	V	44.6		8.7	38.0	-35.2	56.2	642.4	20644.2	-30.1

Total (dBuV/m) = Meter Reading (dBuV) + Cable Loss (dB) + Antenna Factor (dB) + Pre Amp Gain (dB)

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

Checked By: MARK E. LONGINOTTI

Mark E. Longinotti

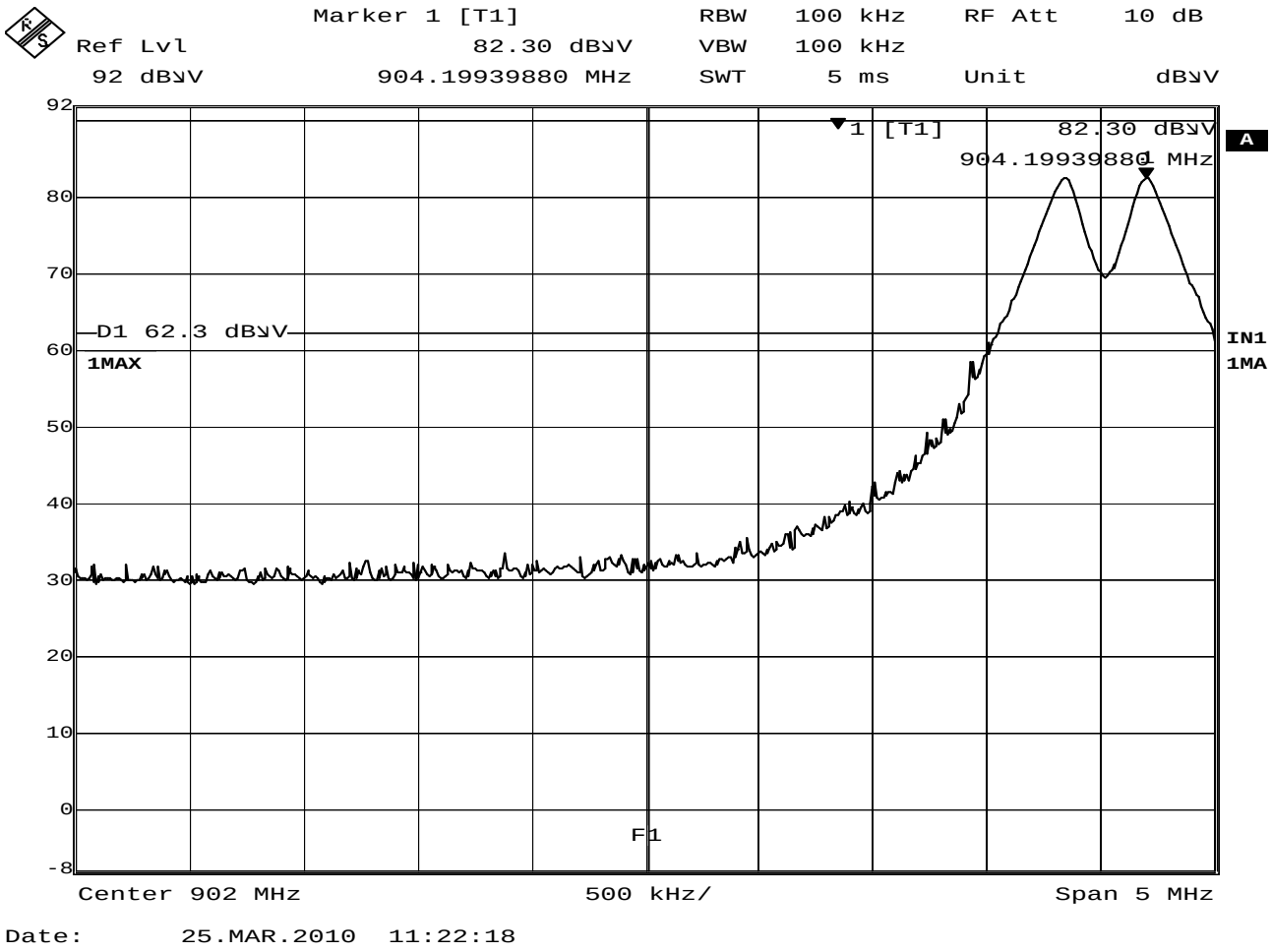
Manufacturer : Predictive Sensor Technology
Model No. : MPT01
Serial No. : 00000015
Test Specification : FCC Part 15, Subpart C, Section 15.247, Radiated Emissions
Date : March 25 and 26, 2010
Mode : Transmit @ 925 MHz
Test Distance : 3 meters
Notes : Average measurements in restricted bands
: Peak measurements

Frequency MHz	Antenna Polar.	Meter Reading dBuV	Ambient	Cable Factor dB	Antenna Factor dB	Pre Amp Gain dB	Duty Cycle dB	Total dBuV/m at 3 meters	Total uV/m at 3 meters	Limit uV/m	Margin dB
2775.1	H	49.3		4.0	29.6	-36.9	-7.9	38.0	79.3	500.0	-16.0
2775.1	V	46.2		4.0	29.6	-36.9	-7.9	34.9	55.5	500.0	-19.1
3700.1	H	47.7		4.8	32.4	-36.5	-7.9	40.5	105.8	500.0	-13.5
3700.1	V	40.7		4.8	32.4	-36.5	-7.9	33.5	47.2	500.0	-20.5
4625.1	H	44.4		5.6	33.3	-35.9	-7.9	39.4	93.7	500.0	-14.5
4625.1	V	40.1		5.6	33.3	-35.9	-7.9	35.1	57.1	500.0	-18.8
7400.2	H	43.0		7.7	37.8	-35.5	-7.9	45.1	179.8	500.0	-8.9
7400.2	V	43.9		7.7	37.8	-35.5	-7.9	46.0	199.5	500.0	-8.0
8325.2	H	43.1		8.2	37.3	-35.3	-7.9	45.3	183.7	500.0	-8.7
8325.2	V	46.6		8.2	37.3	-35.3	-7.9	48.8	274.9	500.0	-5.2

Total (dBuV/m) = Meter Reading (dBuV) + Cable Loss (dB) + Antenna Factor (dB) + Pre Amp Gain (dB)

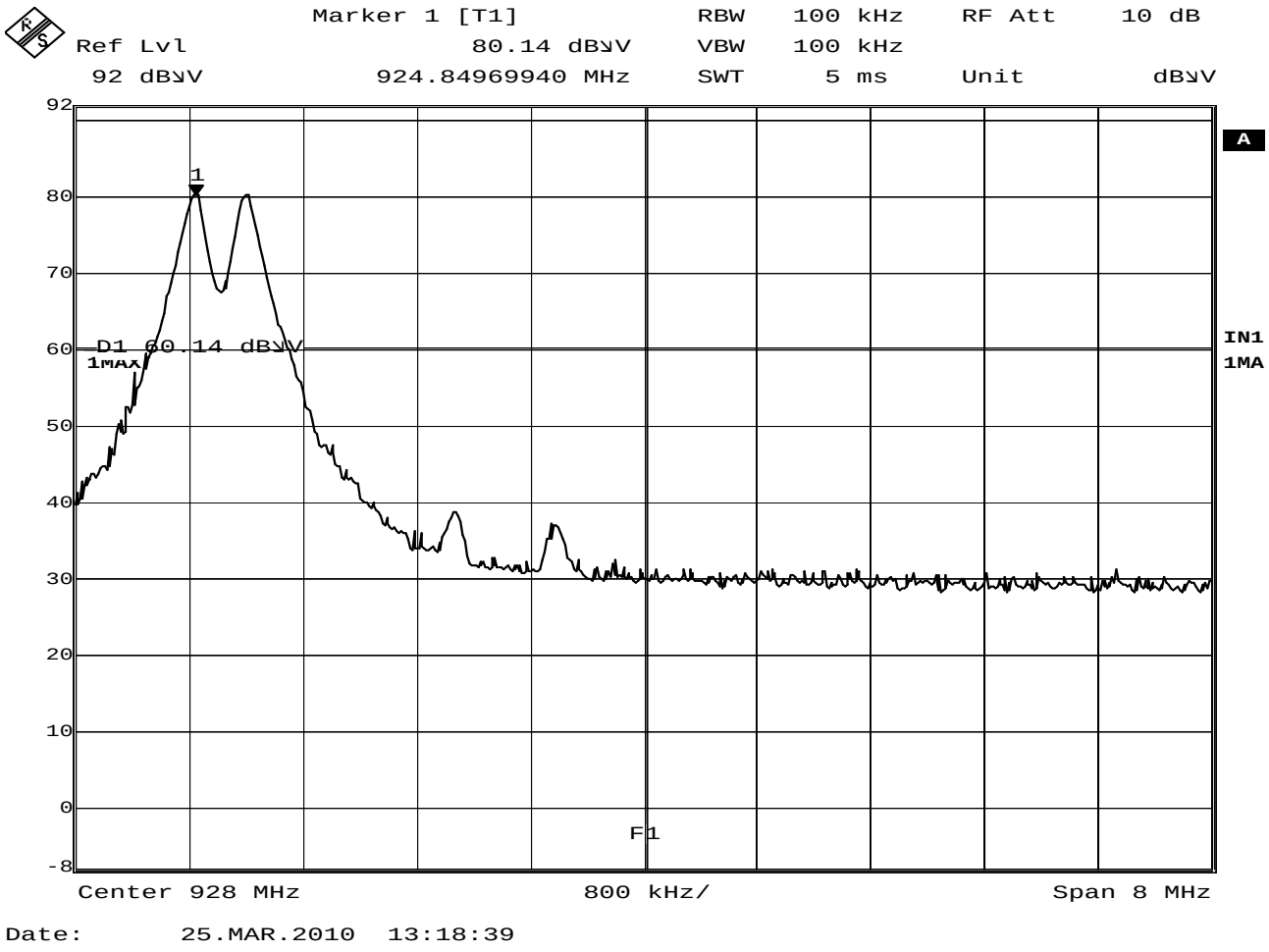
FS (uV/m) = AntiLog [(FS (dBuV/m))/20]

Checked By: MARK E. LONGINOTTI
Mark E. Longinotti



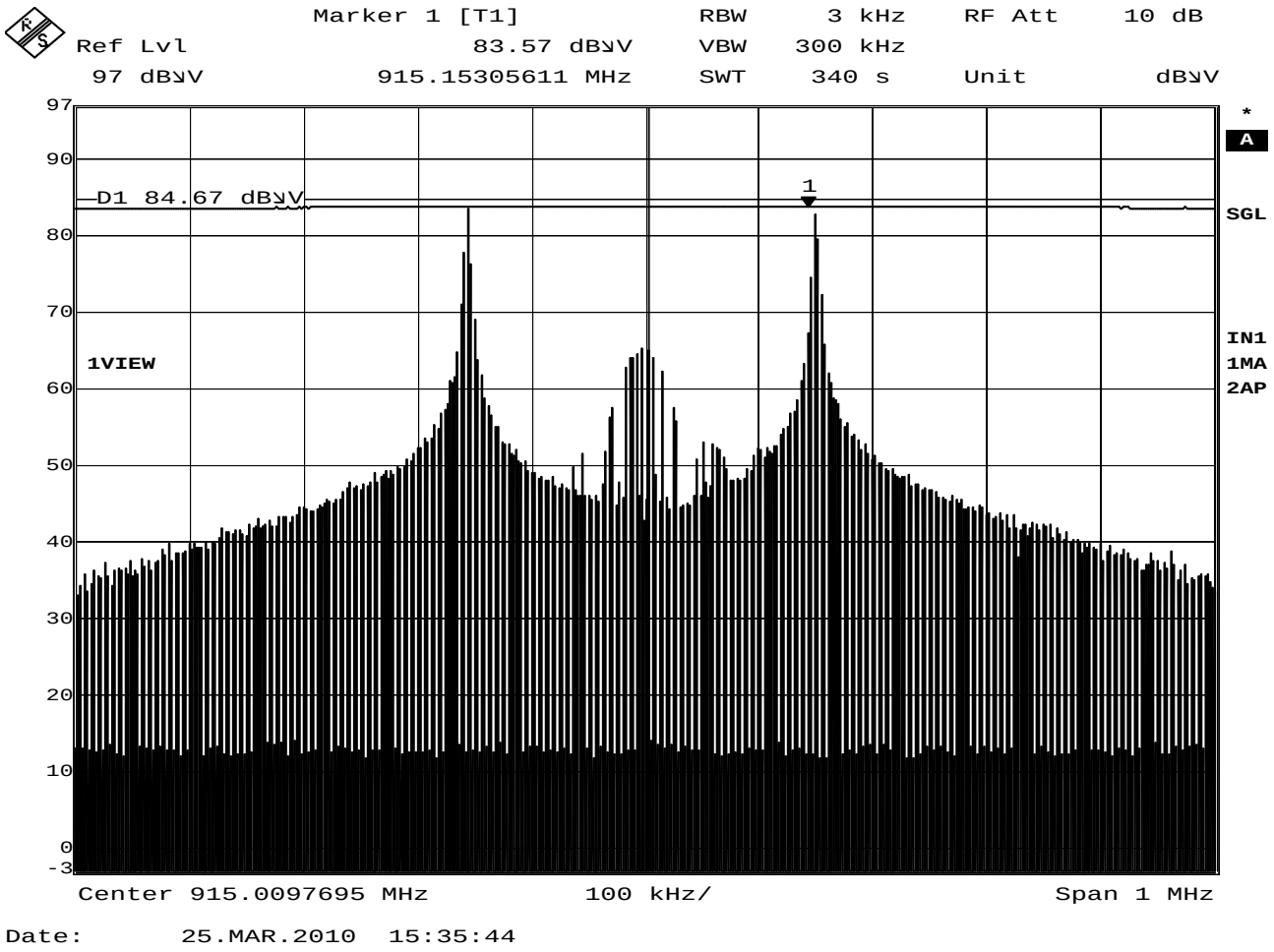
FCC 15.247(d) Band Edge

MANUFACTURER	:	Predictive Sensor Technology
MODEL NUMBER	:	MPT01
SERIAL NUMBER	:	00000014
TEST MODE	:	Tx @ 904MHz
TEST DATE	:	March 25, 2010
TEST PARAMETERS	:	Band Edge
NOTES	:	Display line D1 represents the 20dB down level. Display Line F1 represents the
	:	band edge (902MHz)
EQUIPMENT USED	:	RBB0, NTA1



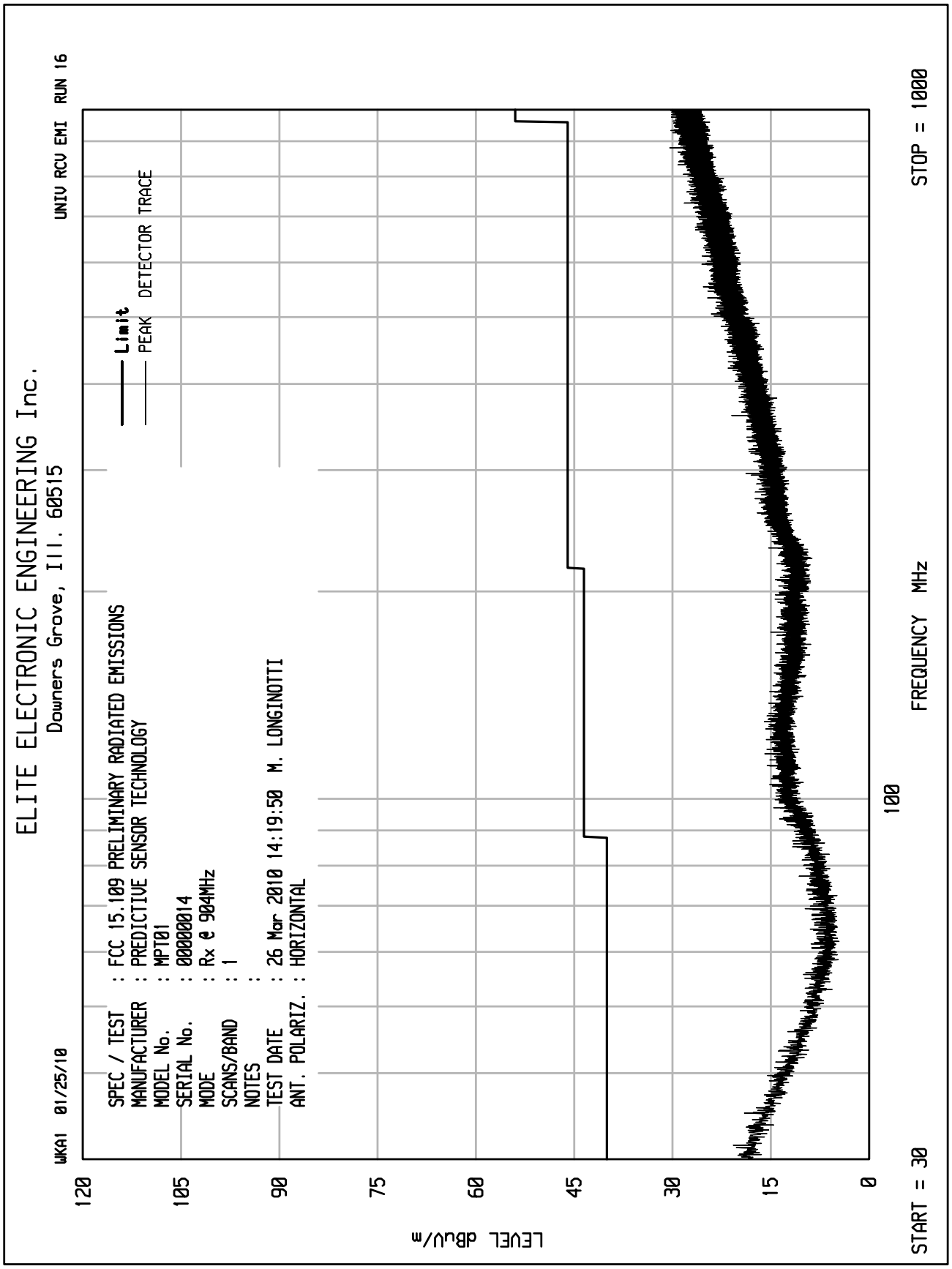
FCC 15.247(d) Band Edge

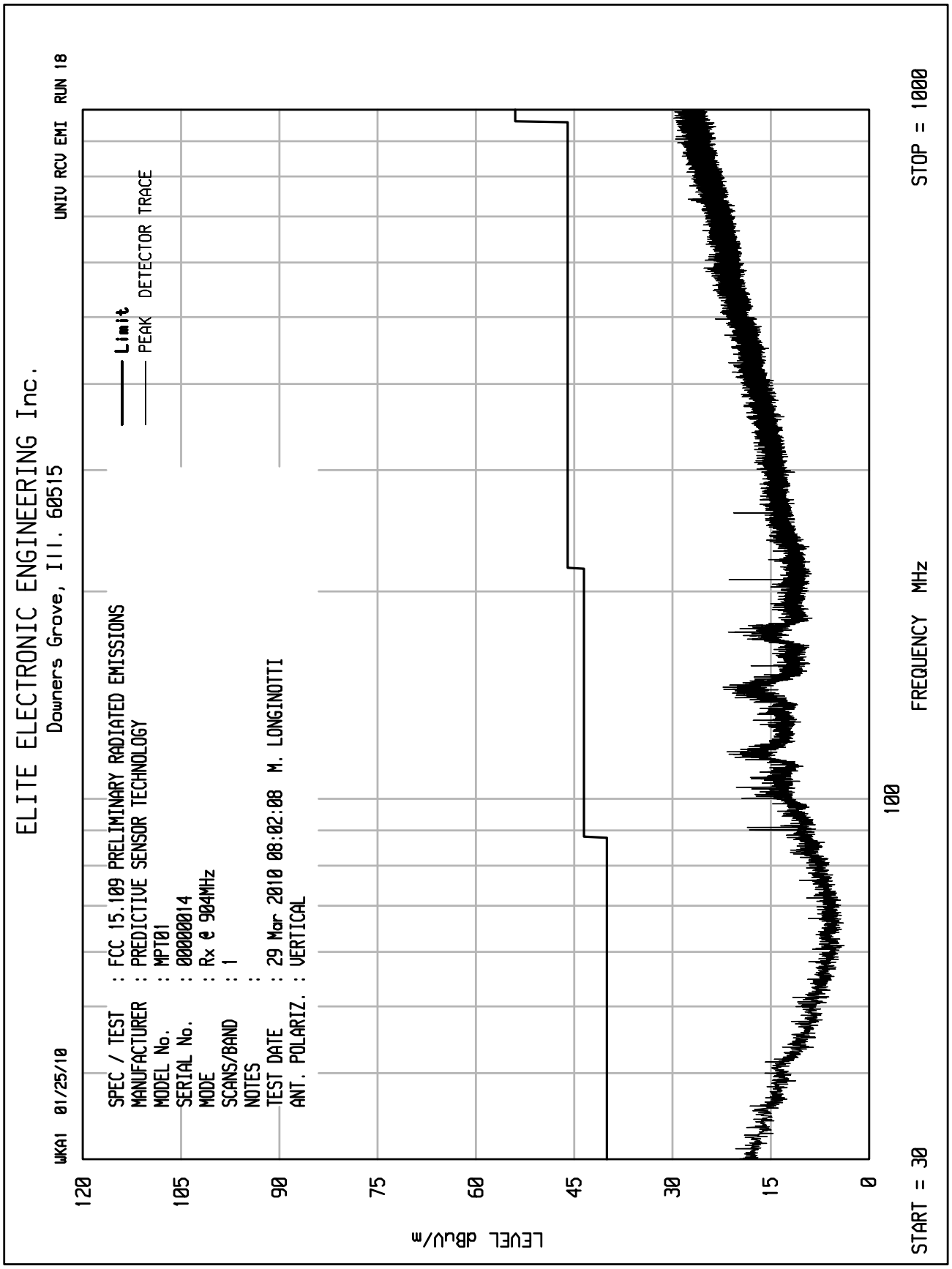
MANUFACTURER	:	Predictive Sensor Technology
MODEL NUMBER	:	MPT01
SERIAL NUMBER	:	00000016
TEST MODE	:	Tx @ 925MHz
TEST DATE	:	March 25, 2010
TEST PARAMETERS	:	Band Edge
NOTES	:	Display line D1 represents the 20dB down level. Display Line F1 represents the
	:	band edge (928MHz)
EQUIPMENT USED	:	RBB0, NTA1

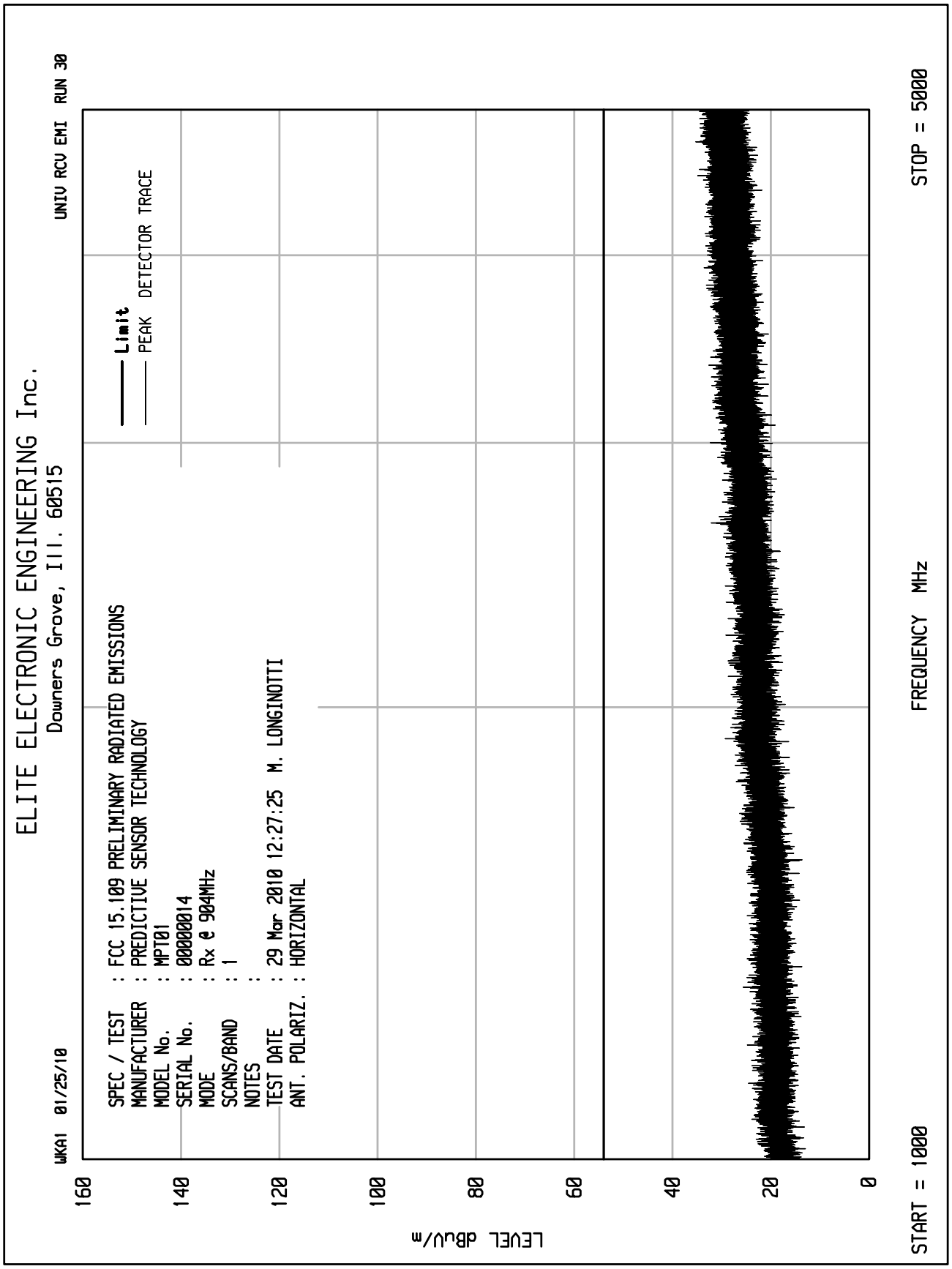


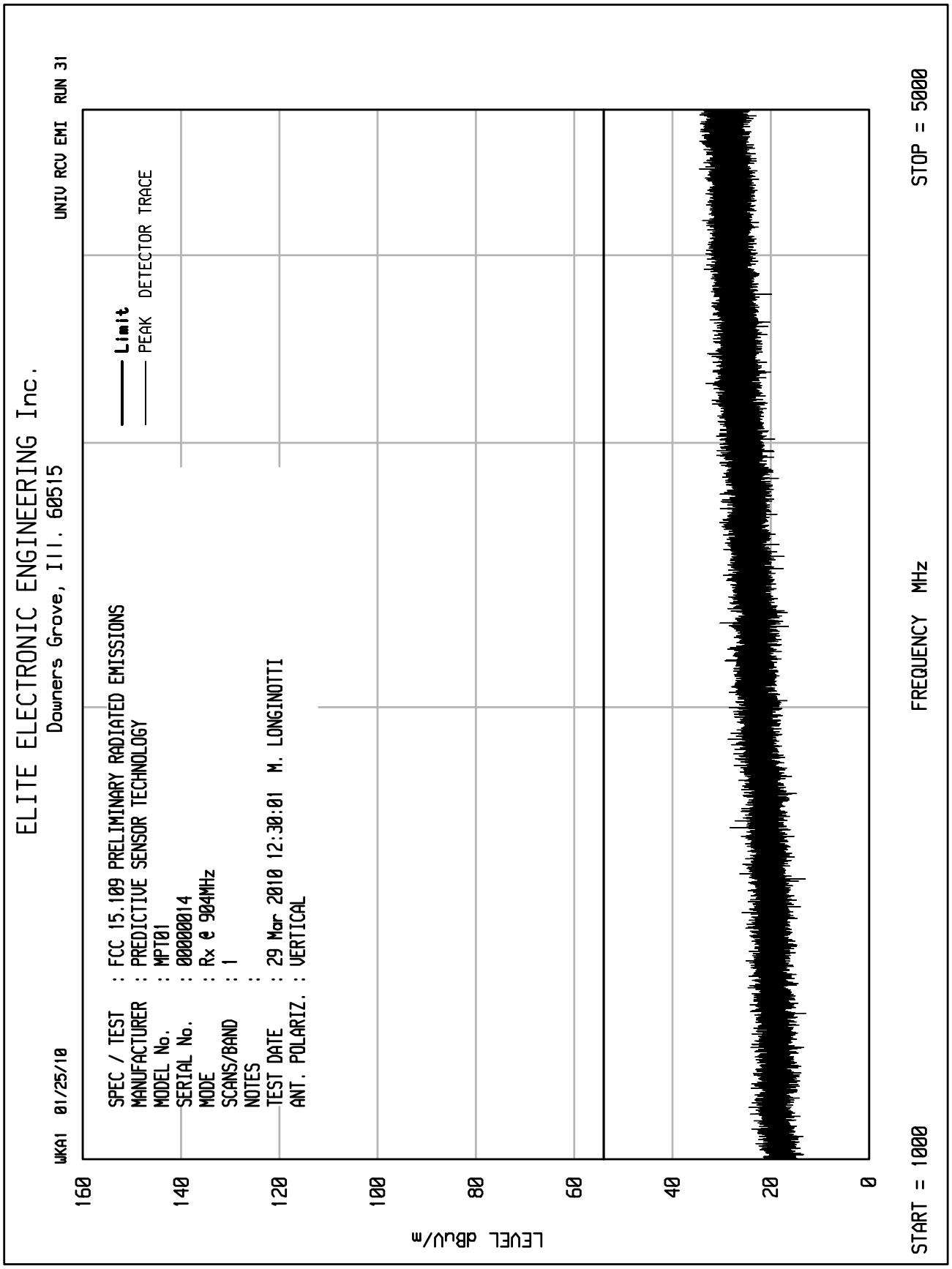
FCC 15.247(d) Power Spectral Density

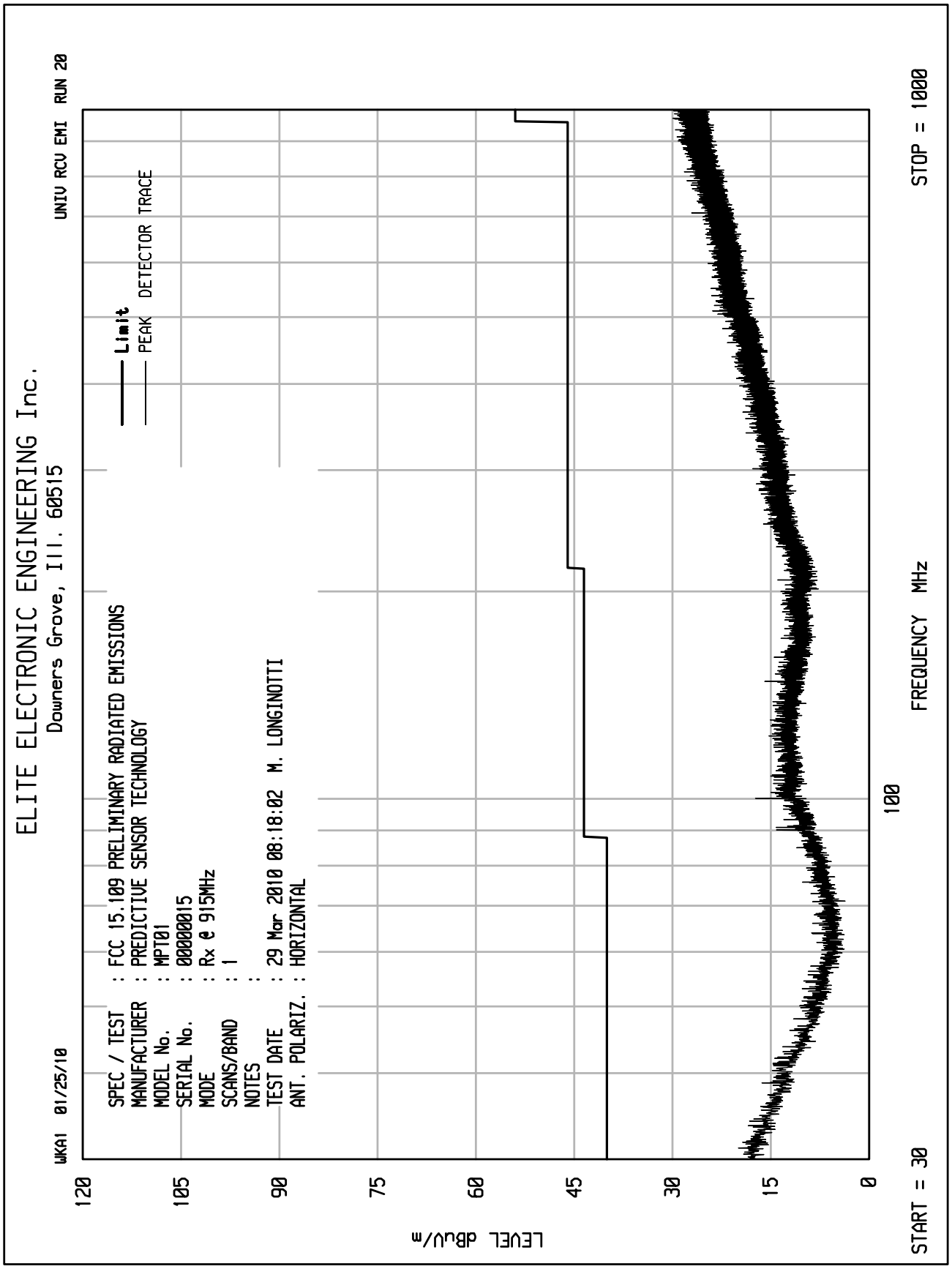
MANUFACTURER	:	Predictive Sensor Technology
MODEL NUMBER	:	MPT01
SERIAL NUMBER	:	00000013
TEST MODE	:	Tx @ 915MHz
TEST DATE	:	March 25, 2010
TEST PARAMETERS	:	Power Spectral Density
NOTES	:	83.57dBuV/m = 6.9 dBm matched in 1MHz RBW.
		: Top Trace = 83.57 dBuV is the peak equivalent to
		: 6.9dBm. Display line (D1) is equal to + 8dBm;
		: (8 – (6.9) = 1.2 dB difference;
		: 83.57 dBuV + 1.2 dB = 84.7dBuV.
		: Bottom trace = power spectral density in 3kHz
		: RBW with 340 second sweep time.
EQUIPMENT USED	:	RBB0, NTA1

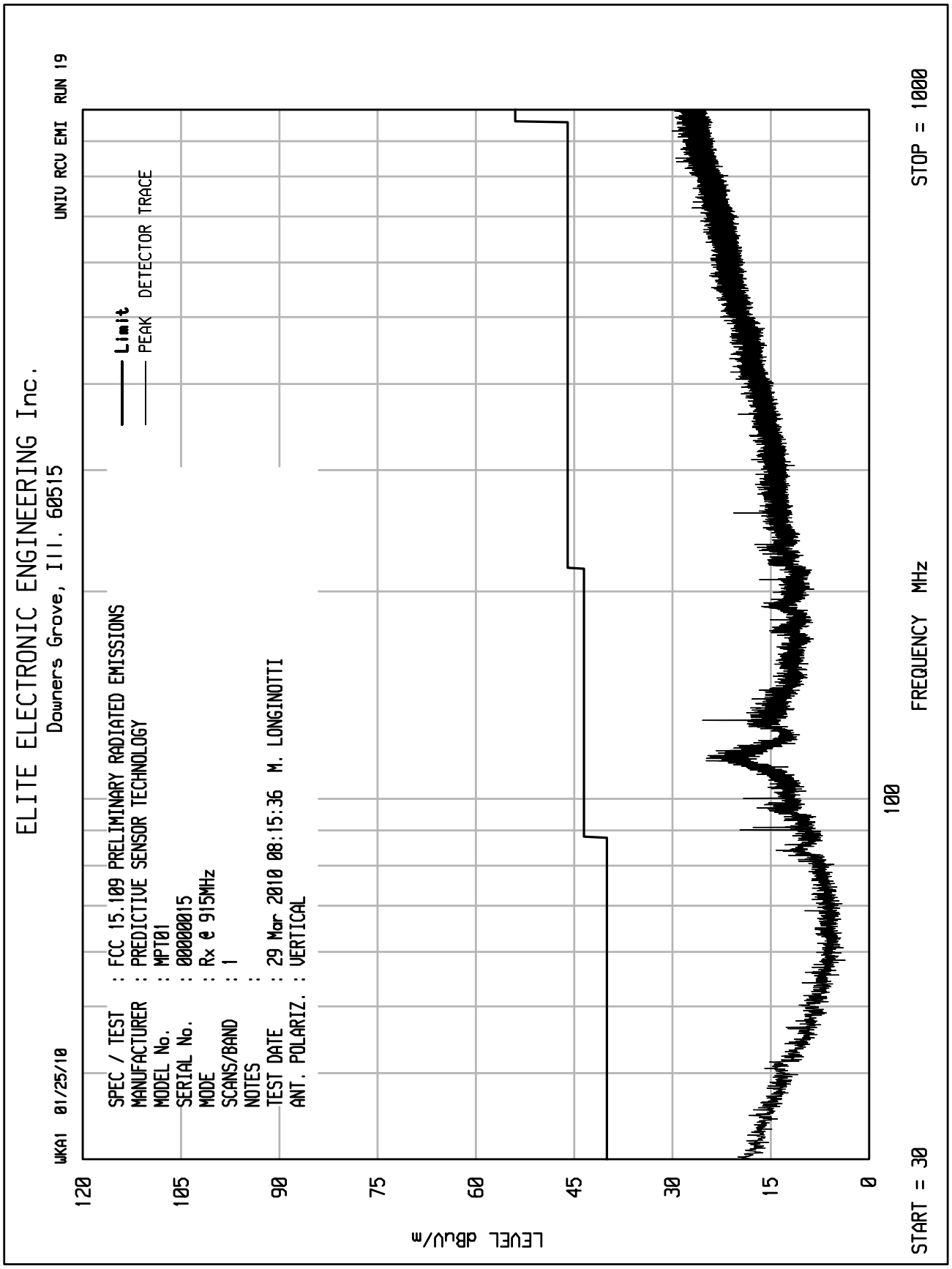

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 16
WKA1 01/25/10
SPEC / TEST : FCC 15.109 PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : PREDICTIVE SENSOR TECHNOLOGY
MODEL No. : MPT01
SERIAL No. : 00000014
MODE : Rx @ 904MHz
SCANS/BAND : 1
NOTES :
TEST DATE : 26 Mar 2010 14:19:50 M. LONGINOTTI
ANT. POLARIZ. : HORIZONTAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 30
100
FREQUENCY MHz
STOP = 1000

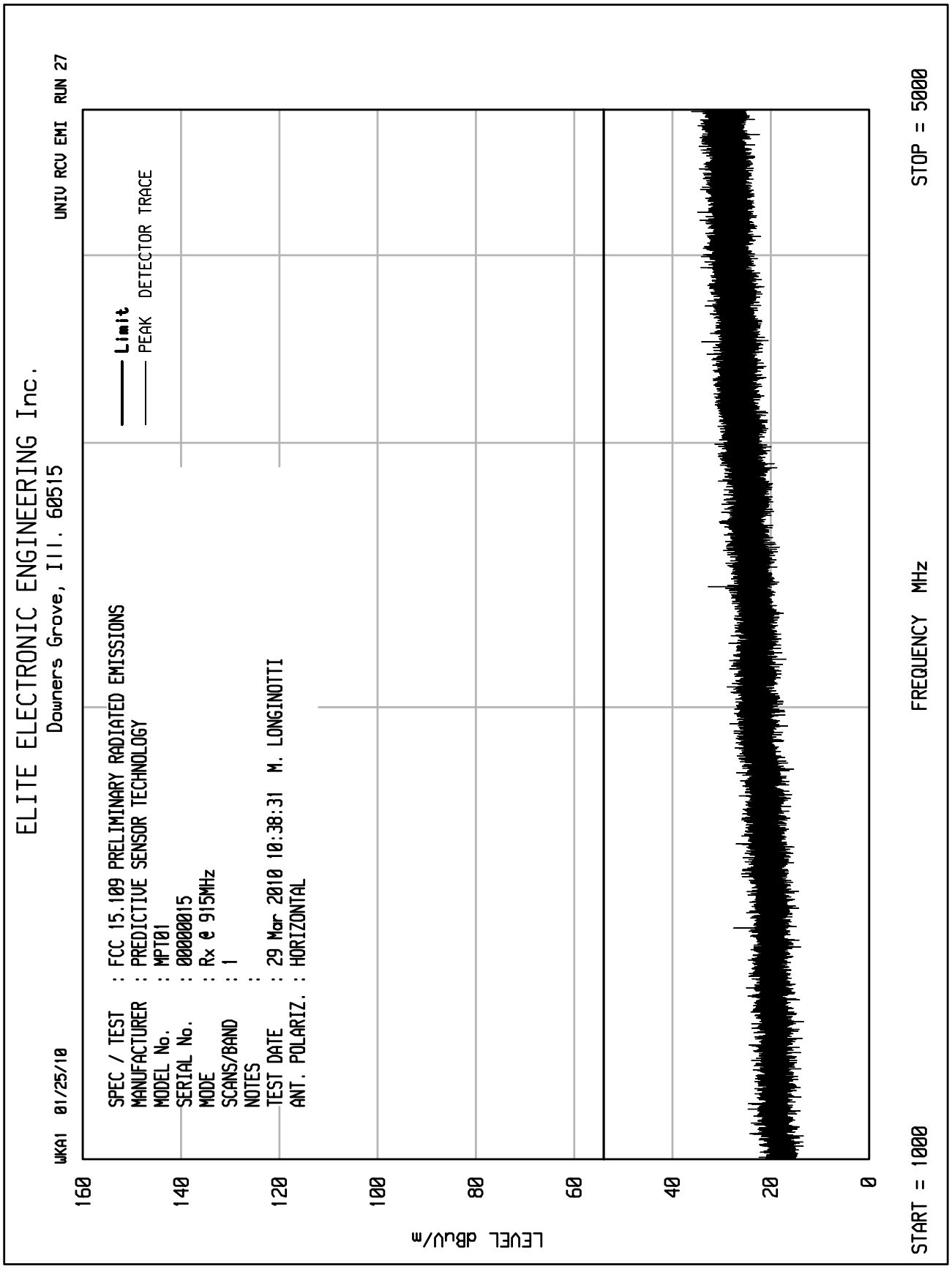

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 10
WKA1 01/25/10
SPEC / TEST : FCC 15.109 PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : PREDICTIVE SENSOR TECHNOLOGY
MODEL No. : MPT01
SERIAL No. : 00000014
MODE : Rx @ 904MHz
SCANS/BAND : 1
NOTES : :
TEST DATE : 29 Mar 2010 08:02:08 M. LONGINOTTI
ANT. POLARIZ. : VERTICAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 30
100
FREQUENCY MHz
STOP = 1000

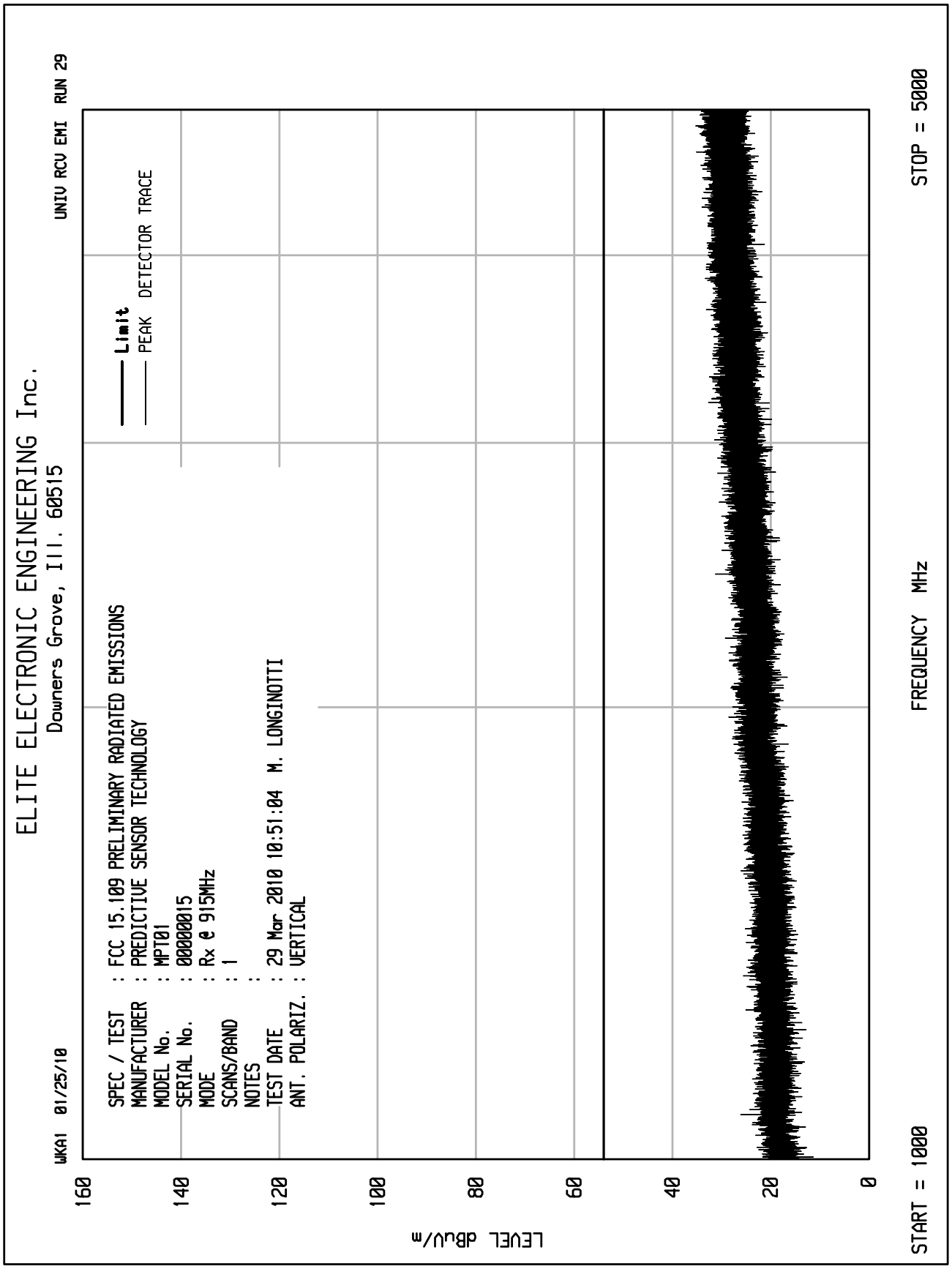

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 30
WKA1 01/25/10
SPEC / TEST : FCC 15.109 PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : PREDICTIVE SENSOR TECHNOLOGY
MODEL No. : MPT01
SERIAL No. : 00000014
MODE : Rx @ 904MHz
SCANS/BAND : 1
NOTES :
TEST DATE : 29 Mar 2010 12:27:25 M. LONGINOTTI
ANT. POLARIZ. : HORIZONTAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
160
140
120
100
80
60
40
20
0
START = 1000
FREQUENCY MHz
STOP = 5000

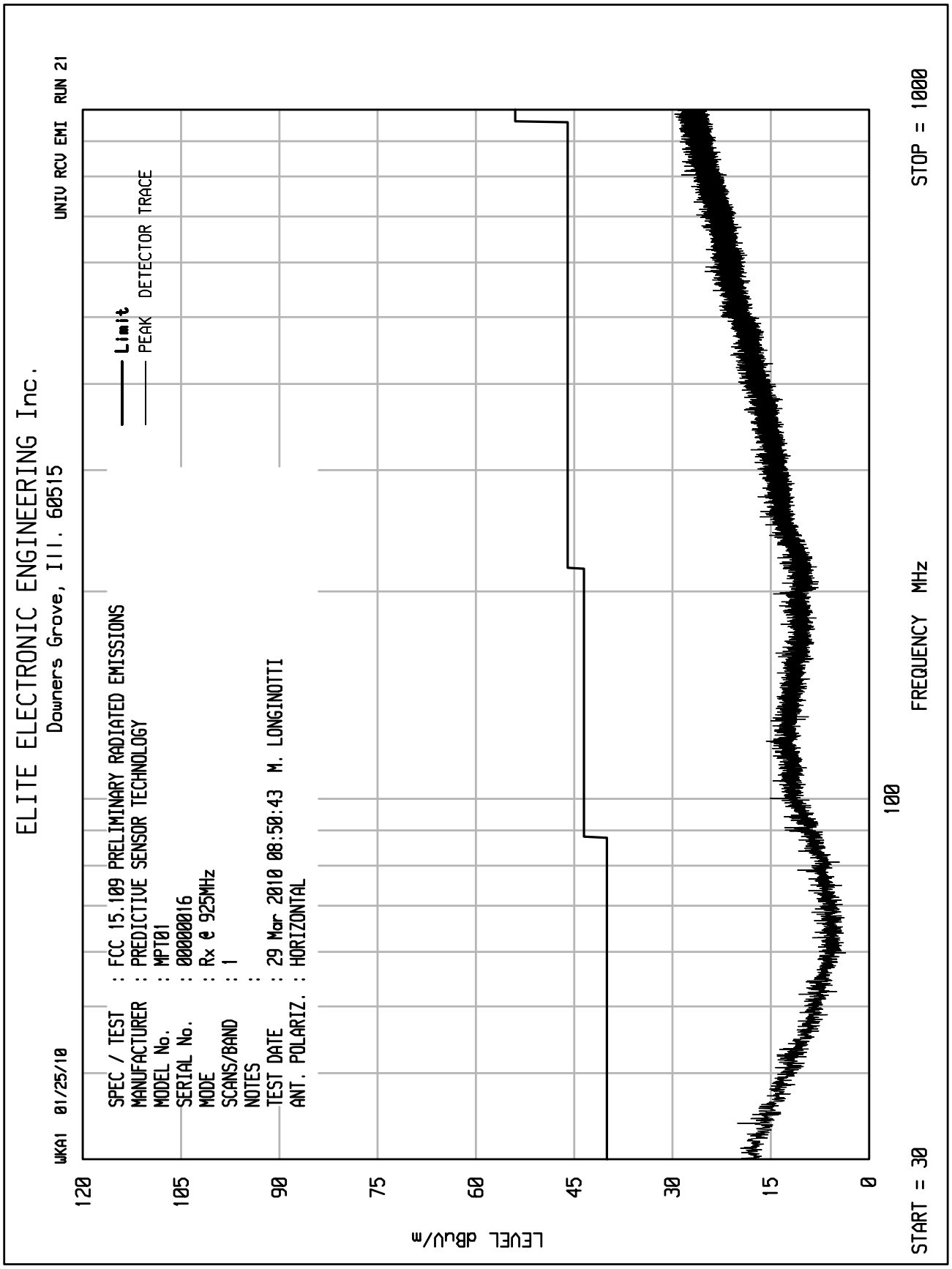

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 31
WKA1 01/25/10
SPEC / TEST : FCC 15.109 PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : PREDICTIVE SENSOR TECHNOLOGY
MODEL No. : MPT01
SERIAL No. : 00000014
MODE : Rx @ 904MHz
SCANS/BAND : 1
NOTES :
TEST DATE : 29 Mar 2010 12:30:01 M. LONGINOTTI
ANT. POLARIZ. : VERTICAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
160
140
120
100
80
60
40
20
0
START = 1000
FREQUENCY MHz
STOP = 5000

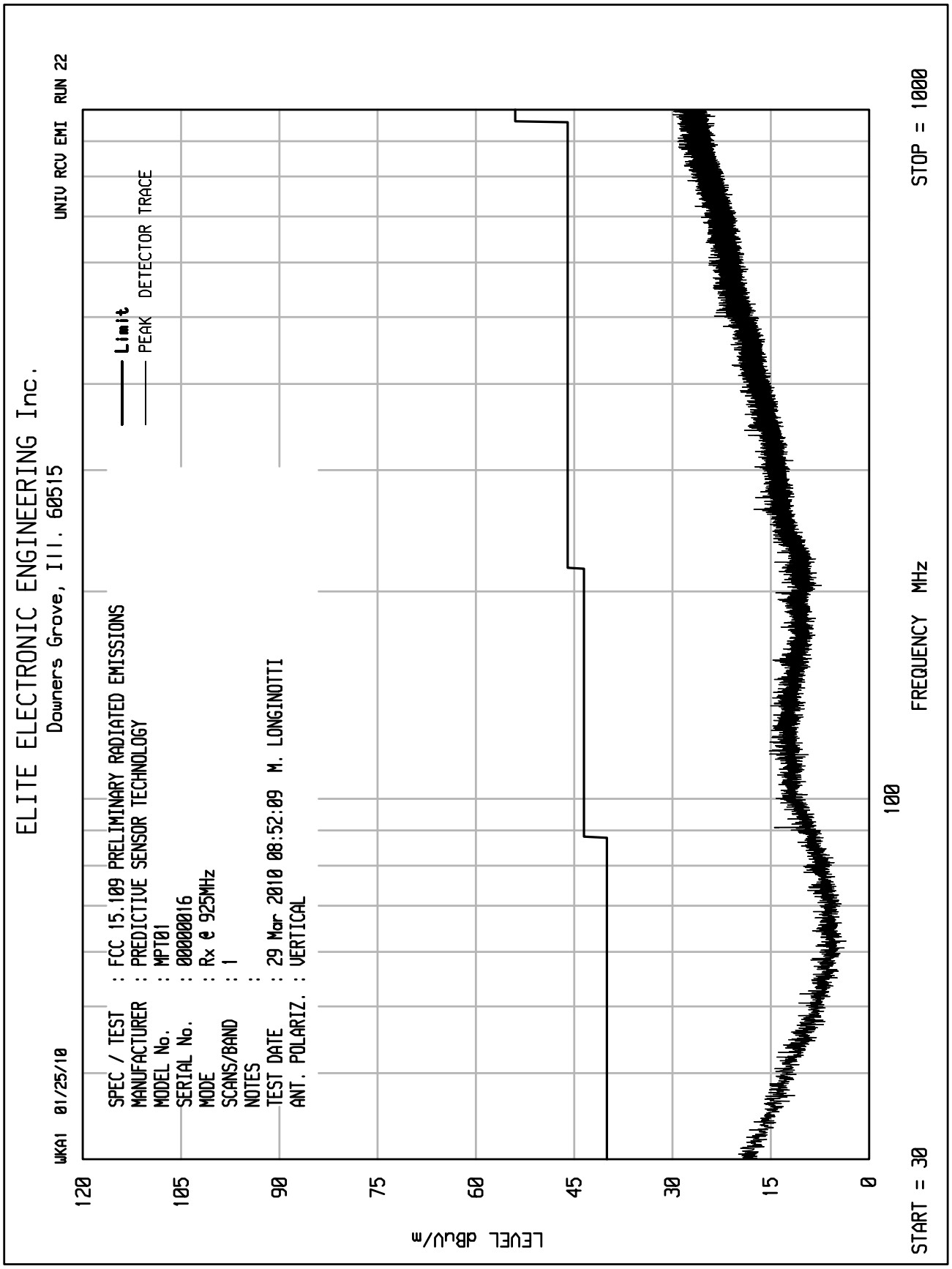

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 20
WKA1 01/25/10
SPEC / TEST : FCC 15.109 PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : PREDICTIVE SENSOR TECHNOLOGY
MODEL No. : MPT01
SERIAL No. : 00000015
MODE : Rx @ 915MHz
SCANS/BAND : 1
NOTES :
TEST DATE : 29 Mar 2010 08:18:02 M. LONGINOTTI
ANT. POLARIZ. : HORIZONTAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 30
100
FREQUENCY MHz
STOP = 1000

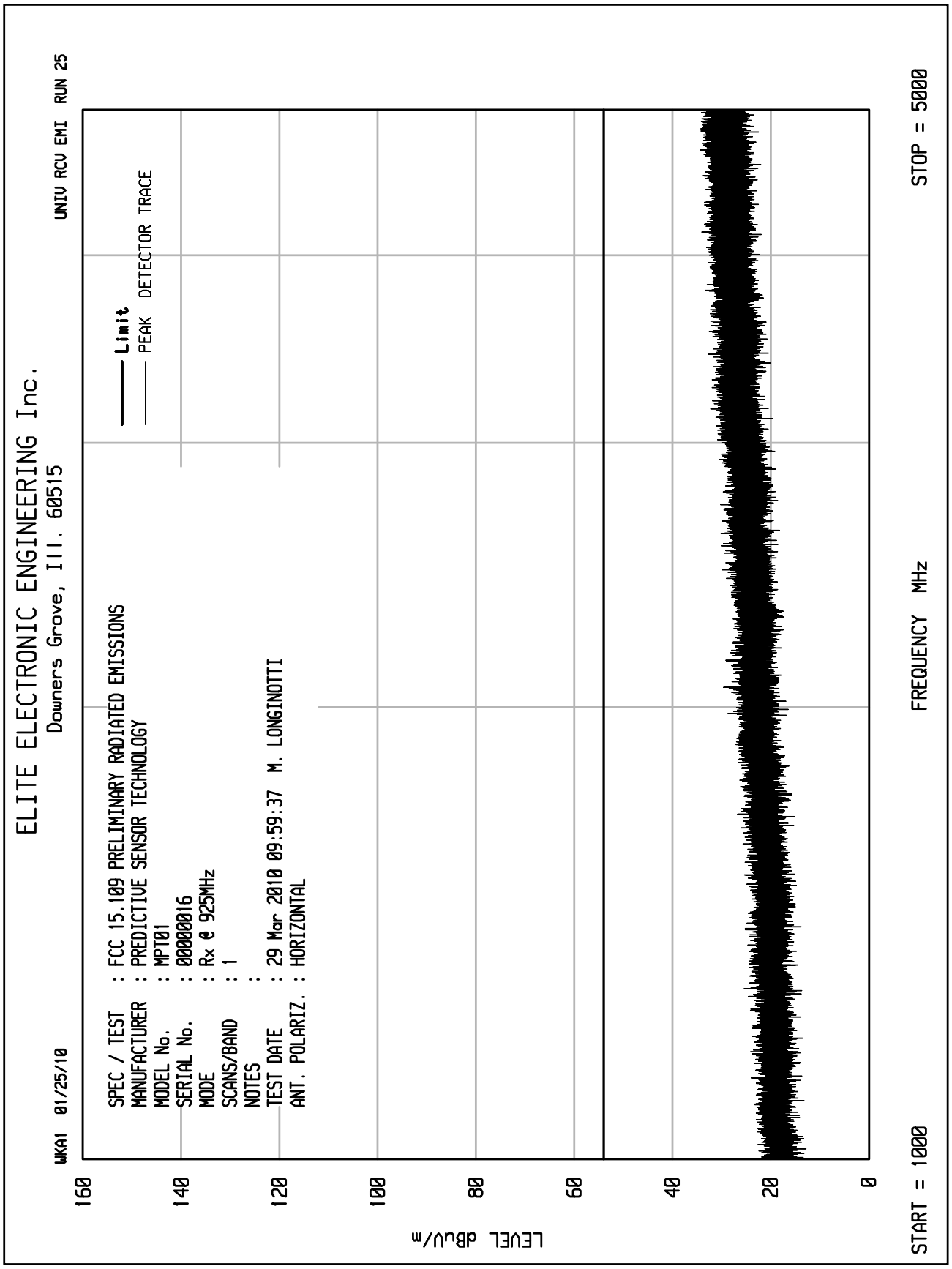

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 19
WKA1 01/25/10
SPEC / TEST : FCC 15.109 PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : PREDICTIVE SENSOR TECHNOLOGY
MODEL No. : MPT01
SERIAL No. : 00000015
MODE : Rx @ 915MHz
SCANS/BAND : 1
NOTES : :
TEST DATE : 29 Mar 2010 08:15:36 M. LONGINOTTI
ANT. POLARIZ. : VERTICAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 30
100
FREQUENCY MHz
STOP = 1000

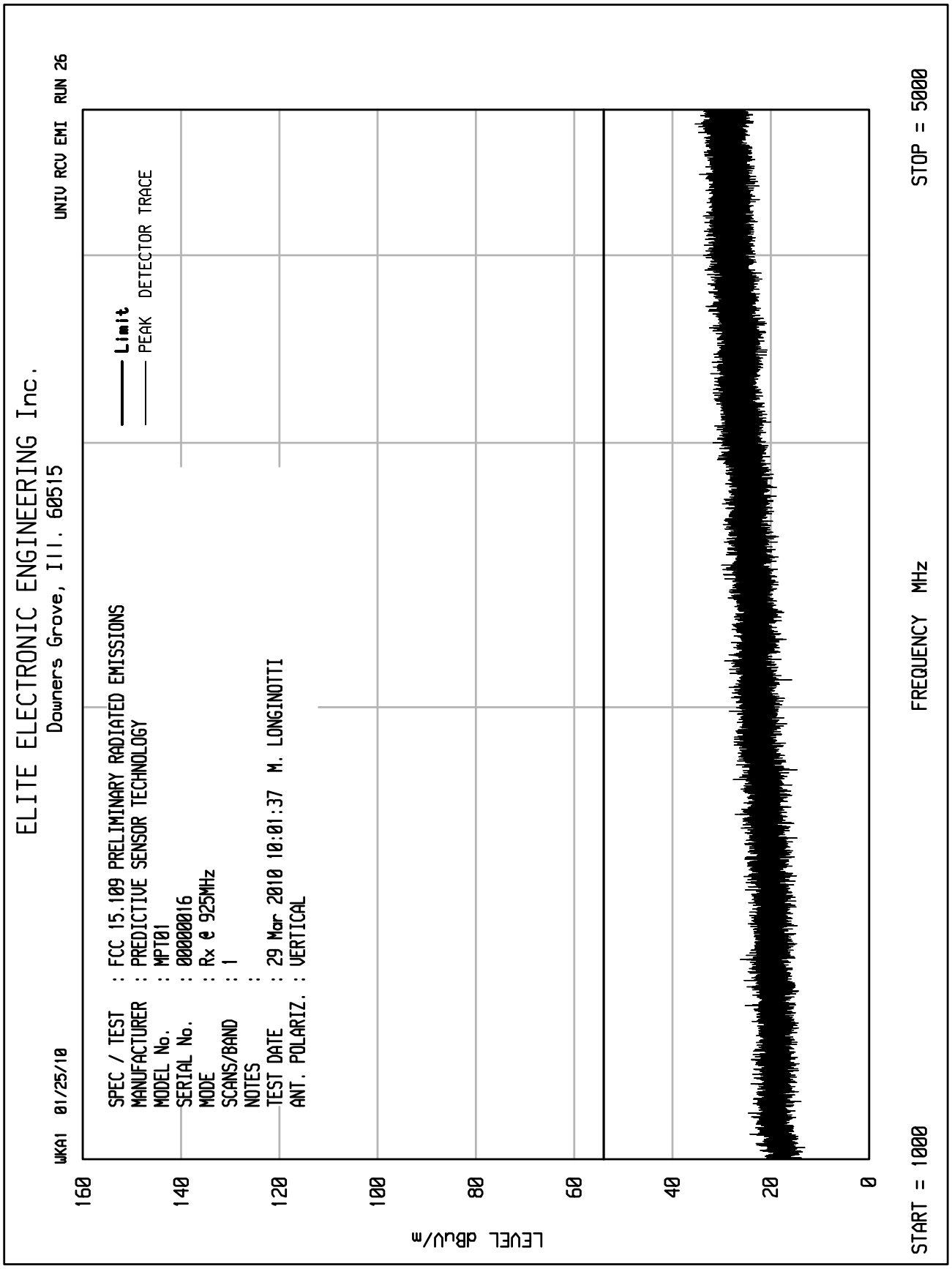

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 27
WKA1 01/25/10
SPEC / TEST : FCC 15.109 PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : PREDICTIVE SENSOR TECHNOLOGY
MODEL No. : MPT01
SERIAL No. : 00000015
MODE : Rx @ 915MHz
SCANS/BAND : 1
NOTES :
TEST DATE : 29 Mar 2010 10:38:31 M. LONGINOTTI
ANT. POLARIZ. : HORIZONTAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
160
140
120
100
80
60
40
20
0
START = 1000
FREQUENCY MHz
STOP = 5000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 29
WKA1 01/25/10
SPEC / TEST : FCC 15.109 PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : PREDICTIVE SENSOR TECHNOLOGY
MODEL No. : MPT01
SERIAL No. : 00000015
MODE : Rx @ 915MHz
SCANS/BAND : 1
NOTES :
TEST DATE : 29 Mar 2010 10:51:04 M. LONGINOTTI
ANT. POLARIZ. : VERTICAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
160
140
120
100
80
60
40
20
0
START = 1000
FREQUENCY MHz
STOP = 5000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 21
WKA1 01/25/10
SPEC / TEST : FCC 15.109 PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : PREDICTIVE SENSOR TECHNOLOGY
MODEL No. : MPT01
SERIAL No. : 00000016
MODE : Rx @ 925MHz
SCANS/BAND : 1
NOTES :
TEST DATE : 29 Mar 2010 08:50:43 M. LONGINOTTI
ANT. POLARIZ. : HORIZONTAL
Limit
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 22
WKA1 01/25/10
SPEC / TEST : FCC 15.109 PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : PREDICTIVE SENSOR TECHNOLOGY
MODEL No. : MPT01
SERIAL No. : 00000016
MODE : Rx @ 925MHz
SCANS/BAND : 1
NOTES :
TEST DATE : 29 Mar 2010 08:52:09 M. LONGINOTTI
ANT. POLARIZ. : VERTICAL
Limit
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 25
WKA1 01/25/10
SPEC / TEST : FCC 15.109 PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : PREDICTIVE SENSOR TECHNOLOGY
MODEL No. : MPT01
SERIAL No. : 00000016
MODE : Rx @ 925MHz
SCANS/BAND : 1
NOTES :
TEST DATE : 29 Mar 2010 09:59:37 M. LONGINOTTI
ANT. POLARIZ. : HORIZONTAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
160
140
120
100
80
60
40
20
0
START = 1000
FREQUENCY MHz
STOP = 5000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 26
WKA1 01/25/10
SPEC / TEST : FCC 15.109 PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : PREDICTIVE SENSOR TECHNOLOGY
MODEL No. : MPT01
SERIAL No. : 00000016
MODE : Rx @ 925MHz
SCANS/BAND : 1
NOTES :
TEST DATE : 29 Mar 2010 10:01:37 M. LONGINOTTI
ANT. POLARIZ. : VERTICAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
160
140
120
100
80
60
40
20
0
START = 1000
FREQUENCY MHz
STOP = 5000

Manufacturer : Predictive Sensor Technology
Model No. : MPT01
Serial No. : 00000014
Test Specification : FCC Part 15, Subpart B, Section 15.109, Radiated Emissions
Date : March 25 and 26, 2010
Mode : Receive @ 904 MHz
Test Distance : 3 meters
Notes :

Frequency MHz	Antenna Polar.	Meter Reading dBuV	Ambient	Cable Loss dB	Antenna Factor dB	Pre Amp Gain dB	Total dBuV/m	Total uV/m	Limit uV/m	Margin dB
904.03	H	5.3	Ambient	2.4	22.9	0.0	30.6	33.7	200.0	-15.5
904.03	V	5.1	Ambient	2.4	22.9	0.0	30.4	32.9	200.0	-15.7
1808.06	H	33.8	Ambient	3.4	26.5	-37.3	26.5	21.1	500.0	-27.5
1808.06	V	33.8	Ambient	3.4	26.5	-37.3	26.5	21.1	500.0	-27.5
2712.09	H	34.3	Ambient	3.9	29.6	-36.9	30.9	35.0	500.0	-23.1
2712.09	V	34.3	Ambient	3.9	29.6	-36.9	30.9	35.0	500.0	-23.1
3616.12	H	31.7	Ambient	4.7	32.1	-36.5	32.0	39.6	500.0	-22.0
3616.12	V	31.7	Ambient	4.7	32.1	-36.5	32.0	39.6	500.0	-22.0
4520.15	H	31.0	Ambient	5.5	32.9	-35.9	33.5	47.4	500.0	-20.5
4520.15	V	31.0	Ambient	5.5	32.9	-35.9	33.5	47.4	500.0	-20.5

Total (dBuV/m) = Meter Reading (dBuV) + Cable Loss (dB) + Antenna Factor (dB) + Pre Amp Gain (dB)

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

Checked By: MARK E. LONGINOTTI

Mark E. Longinotti

Manufacturer : Predictive Sensor Technology
Model No. : MPT01
Serial No. : 00000015
Test Specification : FCC Part 15, Subpart B, Section 15.109, Radiated Emissions
Date : March 25 and 26, 2010
Mode : Receive @ 915 MHz
Test Distance : 3 meters
Notes :

Frequency MHz	Antenna Polar.	Meter Reading dBuV	Ambient	Cable Loss dB	Antenna Factor dB	Pre Amp Gain dB	Total dBuV/m	Total uV/m	Limit uV/m	Margin dB
915.02	H	5.2	Ambient	2.4	23.1	0.0	30.7	34.2	200.0	-15.3
915.02	V	5.5	Ambient	2.4	23.1	0.0	31.0	35.4	200.0	-15.0
1830.04	H	35.2	Ambient	3.5	26.8	-37.3	28.1	25.5	500.0	-25.8
1830.04	V	35.1	Ambient	3.5	26.8	-37.3	28.0	25.2	500.0	-25.9
2745.06	H	32.0	Ambient	3.9	29.6	-36.9	28.6	26.9	500.0	-25.4
2745.06	V	31.9	Ambient	3.9	29.6	-36.9	28.5	26.5	500.0	-25.5
3660.08	H	31.6	Ambient	4.7	32.2	-36.5	32.1	40.2	500.0	-21.9
3660.08	V	31.5	Ambient	4.7	32.2	-36.5	32.0	39.7	500.0	-22.0
4575.10	H	31.0	Ambient	5.5	33.1	-35.9	33.7	48.6	500.0	-20.2
4575.10	V	31.0	Ambient	5.5	33.1	-35.9	33.7	48.6	500.0	-20.2

Total (dBuV/m) = Meter Reading (dBuV) + Cable Loss (dB) + Antenna Factor (dB) + Pre Amp Gain (dB)

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

Checked By: MARK E. LONGINOTTI
Mark E. Longinotti

Manufacturer : Predictive Sensor Technology
Model No. : MPT01
Serial No. : 00000016
Test Specification : FCC Part 15, Subpart B, Section 15.109, Radiated Emissions
Date : March 25 and 26, 2010
Mode : Receive @ 915 MHz
Test Distance : 3 meters
Notes :

Frequency MHz	Antenna Polar.	Meter Reading dBuV	Ambient	Cable Loss dB	Antenna Factor dB	Pre Amp Gain dB	Total dBuV/m	Total uV/m	Limit uV/m	Margin dB
925.02	H	5.1	Ambient	2.4	23.4	0.0	30.9	35.1	200.0	-15.1
925.02	V	6.1	Ambient	2.4	23.4	0.0	31.9	39.3	200.0	-14.1
1850.04	H	35.3	Ambient	3.5	27.0	-37.3	28.5	26.5	500.0	-25.5
1850.04	V	35.3	Ambient	3.5	27.0	-37.3	28.5	26.5	500.0	-25.5
2775.06	H	32.7	Ambient	4.0	29.6	-36.9	29.3	29.1	500.0	-24.7
2775.06	V	32.6	Ambient	4.0	29.6	-36.9	29.2	28.8	500.0	-24.8
3700.08	H	32.8	Ambient	4.8	32.4	-36.5	33.5	47.2	500.0	-20.5
3700.08	V	32.7	Ambient	4.8	32.4	-36.5	33.4	46.7	500.0	-20.6
4625.10	H	31.3	Ambient	5.6	33.3	-35.9	34.2	51.5	500.0	-19.7
4625.10	V	31.3	Ambient	5.6	33.3	-35.9	34.2	51.5	500.0	-19.7

Total (dBuV/m) = Meter Reading (dBuV) + Cable Loss (dB) + Antenna Factor (dB) + Pre Amp Gain (dB)

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

Checked By: MARK E. LONGINOTTI
Mark E. Longinotti