Measurement of RF Interference from a 355 Bluetooth Radio Transmitter, Part Number 28215842

For	:	Delphi Electronics and Safety 601 Joaquin Cavaros Road Los Indios, TX 78567
P.O. No.	:	450850691
Date Tested	:	April 14, 2009 through April 16, 2009
Test Personnel	:	Mark E. Longinotti
Specification	:	FCC "Code of Federal Regulations" Title 47 Part 15, Subpart C, Section 15.247 for Frequency Hopping and Digitally Modulated Intentional Radiators Operating within the 2400-2483.5MHz
	:	RSS-210, Annex 8, for Frequency Hopping and Digital Modulation Systems Operating in the Band 2400 – 2483.5MHz
	:	RSS-Gen

Test Report By : MARK E. LONGINOTTI

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Approved By : Raymond J Klouda

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REVISION HISTORY

Revision	Date	Description
—	April 20, 2009	Initial release

Measurement of RF Emissions from a 355 Bluetooth Radio Transmitter, Part No. 28215842

1 INTRODUCTION

1.1 Scope of Tests

This document represents the results of the series of radio interference measurements performed on a Delphi Electronics and Safety 355 Bluetooth Radio transmitter, Part No. 28215842, Serial No.0037, (hereinafter referred to as the test item). The test item is a Bluetooth hybrid frequency hopping spread spectrum transmitter. The transmitter was designed to transmit in 2400-2483.5 MHz, band using an internal antenna. The test item was manufactured and submitted for testing by Delphi Electronics and Safety located in Los Indios, TX.

1.2 Purpose

The test series was performed to determine if the test item 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 test item meets the 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. 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 22°C and the relative humidity was 21%.

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 2008
- FCC Public Notice, DA 00-705, "Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems", Released March 30, 2000
- ANSI C63.4-2003, "American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz"
- Industry Canada Radio Standards Specification, RSS-Gen, “General Requirements and Information for the Certification of Radiocommunication Equipment”, Issue 2, June 2007
- Industry Canada Radio Standards Specification, RSS-210, “Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment”, Issue 7, June 2007

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3 TEST ITEM SETUP AND OPERATION

3.1 General Description

The test item is a Delphi Electronics and Safety 355 Bluetooth Radio hybrid frequency hopping spread spectrum transmitter, Part No. 28215842 . A block diagram of the test item setup is shown as Figure 1 and Figure 2.

3.1.1 Power Input

The test item obtained 13.5VDC from an external power supply simulating the typical power input from an automotive battery.

3.1.2 Grounding

The test item was grounded through the return lead of the power supply simulating typical input power in an automobile.

3.1.3 Peripheral Equipment

No peripheral equipment was required to operate the test item.

3.1.4 Interconnect Cables

The following interconnect cables were submitted with the test item:

Item	Description
Cable harness	2.0 meter long wiring harness from the test item to the power source and equivalent loads.

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 test item could be programmed to operate in each of the following modes: transmit at 2402.0 MHz, transmit at 2441.0 MHz, transmit at 2480.0 MHz, frequency hopping enabled, and inquiry.

3.3 Test Item Modifications

No modifications were required for compliance.

4 TEST EQUIPMENT

4.1 Test Equipment List

A list of the test equipment used can be found on Table 4-1**.**

4.2 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).

5 REQUIREMENTS, PROCEDURES AND RESULTS

5.1 Powerline Conducted Emissions

5.1.1 Requirements

Since the test item is typically powered with 13.5VDC from an automotive battery, no conducted emissions tests are required.

5.2 20dB Bandwidth

5.2.1 Requirement

Per section 15.247 (a)(1), frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate within an output power no greater than 125 mW.

5.2.2 Procedures

The test item was setup inside the chamber. With the hopping function disabled, the test item was allowed to transmit continuously. The frequency hopping channel was set separately to low, middle, and high hopping channels. The resolution bandwidth (RBW) was set to $\geq$ to 1% of the 20 dB BW.

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 19 through 21 show that the maximum 20 dB bandwidth was 890kHz. The 99% bandwidth was measured to be 886kHz.

5.3 Carrier Frequency Separation:

5.3.1 Requirements

Per section 15.247 (a)(1), frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate within an output power no greater than 125 mW.

5.3.2 Procedures

The test item was setup inside the chamber. With the hopping function enabled, the test item was allowed to transmit continuously.

The resolution bandwidth (RBW) was set to $\geq$ to 1% of the span. The peak detector and 'Max-Hold' function was engaged. The span was set wide enough to capture the peaks of at least two adjacent channels. When, the trace had stabilized after multiple scans, the marker-delta function was used to determine the separation between the peaks of the adjacent channels. The analyzer's display was plotted using a 'screen dump' utility.

5.3.3 Results

Page 22 shows the carrier frequency separation. As can be seen from this plot, the separation is 1.0MHz which is greater than the 20dB bandwidth of the hopping channel (890kHz).

5.4 Number of Hopping Frequencies

5.4.1 Requirements

Per section 15.247(a)(1)(iii), for frequency hopping systems operating in the 2400-2483.5MHz band. The frequency hopping systems shall use at least 15 non-overlapping channels.

5.4.2 Procedures

The test item was setup inside the chamber. With the hopping function enabled, the test item was allowed to transmit continuously.

The resolution bandwidth (RBW) was set to $\geq$ to 1% of the span. The peak detector and 'Max-Hold' function was engaged. The span was set wide enough to capture the entire frequency band of operation.

The test item's signal was allowed to stabilize after multiple scans. The number of hopping frequencies was counted. The analyzer's display was plotted using a 'screen dump' utility.

5.4.3 Results

Pages 23 through 25 show the number of hopping frequencies. As can be seen from this plot, the number of frequencies is 78 which is greater than the minimum number of required hopping frequencies for systems operating in the 2400-2483.5 MHz band.

5.5 Time of Occupancy

5.5.1 Requirement

Per section 15.247(a)(1)(iii), for frequency hopping systems operating in the 2400-2483.5MHz band, the average time of occupancy shall not be greater than 0.4 seconds within a 0.4 second period multiplied by the number of hopping channels employed.

5.5.2 Procedures

The test item was setup inside the chamber. With the hopping function enabled, the test item was allowed to transmit continuously.

The resolution bandwidth (RBW) was set to 1 MHz. The peak detector and 'Max-Hold' function was engaged. With the span set to 0Hz, the sweep time was adjusted to capture a single event in order to measure the dwell time per hop. Then, the sweep time was expanded to greater then 0.4 seconds multiplied by the number of hopping channels employed (0.4 seconds *79 hops = 31.6 seconds).

5.5.3 Results

Pages 26 through 28 show the plots for the time of occupancy (dwell time). As can be seen from the plots, the time of occupancy can be determined by a 388.8 usec burst which occurs 330 times in a 31.2 second period. This calculated value is equal to 0.1283msec which is less than the 0.4 seconds allowed.

5.6 Peak Output Power

5.6.1 Requirement

Per section 15.247(b)(1), for frequency hopping systems operating in the 2400-2483.5 MHz band and employing at least 75 non-overlapping hopping channels, the maximum peak output conducted power shall

not be greater than 1 W (30 dBm). 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 6 dBi antenna gain, the maximum EIRP can be increased by 6 dB to 4 Watt (36 dBm).

5.6.2 Procedures

The test item was placed on the non-conductive stand and set to transmit. A broadband measuring antenna was placed at a test distance of 3 meters from the test item. The test item was maximized for worst case emissions (or maximum output power) at the measuring antenna. The maximum meter reading was recorded.

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 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 and antenna gain, as required. The peak power output was calculated for 2402.0 MHz, 2441.0 MHz and 2480.0 MHz hopping frequencies.

5.6.3 Results

The results are presented on page 29. The maximum EIRP measured from the transmitter was -20.3 dBm (9.3uW) which meets the De Facto 36 dBm (4 watt) limit.

5.7 Band Edge Compliance

5.7.1 Requirement

Per section 15.247(c), the emissions at the band-edges must be at least 20dB below the highest level measured within the band. In addition, the radiated emissions which fall in the restricted band beginning at 2483.5 MHz, must meet the general limits of 15.209

5.7.2 Procedures

5.7.2.1 Low Band Edge

1) The test item was placed in the test chamber.
2) The test item was set to transmit continuously at the channel closest to the low band-edge (hopping function disabled).
3) The meter reading was recorded.
4) 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) = 100 kHz (at least 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 20 dB down from the peak of the in-band emissions. All emissions which fall outside of the authorized band of operation must be below the 20 dB 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) Step 4) was repeated with the frequency hopping function enabled.

5.7.2.2 High Band Edge

1) The test item was set to transmit continuously at the channel closest to the high band-edge (hopping function disabled).
2) A double ridged waveguide was placed 3 meters away from the test item. 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 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.
6) The highest measured peak reading was recorded.
7) The highest measured average reading was recorded.
8) Steps 1 through 7 were repeated with the hopping enabled.

5.7.3 Results

Pages 30 through 33 show the radiated band-edge compliance results. As can be seen from these plots, the emissions at the low end band edge are within the 20 dB down limits. The emissions at the high end band edge are within the general limits.

5.8 Spurious Emissions

5.8.1 Radiated Spurious Emissions

5.8.1.1 Requirement

In any 100 kHz 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 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated emissions measurement. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must comply with the radiated emission limits specified in §15.209(a).

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

Frequency MHz	Field Strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30

1.705-30.0	30	3
30.0-88.0	100	3
88.0-216.0	150	3
216.0-960.0	200	3
Above 960	500	3

5.8.1.2 Procedures

Radiated measurements were performed in a 32ft. x 20ft. x 14ft. high semi anechoic chamber. The radiated emissions were investigated over the frequency range of 30 MHz to 25.0 GHz.

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 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 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 level measured at the fundamental. However, attenuation below the general limits specified in §15.209(a) is not required.
2) For all emissions in the restricted bands, the following procedure was used:
   a) The field strengths of all emissions below 1 GHz were measured using a bi-log antenna. The bi-log antenna was positioned at a 3 meter distance from the 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).

5.8.1.3 Results

The preliminary radiated emissions plots with the test item set to transmit at 2402MHz are presented on pages 34 through 37. Factors for the antennas and cables were added to the data before it was plotted. This data is only presented for a reference, and is not used as official data. Final radiated emissions data are presented on data pages 38 through 40. As can be seen from the data, all emissions measured from the test item were within the specification limits. Photographs of the test configuration for radiated emission are shown as Figure 3 and Figure 4.

The preliminary radiated emissions plots with the test item set to transmit at 2441MHz are presented on pages 41 through 44. Factors for the antennas and cables were added to the data before it was plotted. This data is only presented for a reference, and is not used as official data. Final radiated emissions data are presented on data pages 45 and 46. As can be seen from the data, all emissions measured from the test item were within the specification limits. Photographs of the test configuration for radiated emission are shown as Figure 3 and Figure 4.

The preliminary radiated emissions plots with the test item set to transmit at 2480MHz are presented on pages 47 through 50. Factors for the antennas and cables were added to the data before it was plotted. This data is only presented for a reference, and is not used as official data. Final radiated emissions data are presented on data pages 51 and 52. As can be seen from the data, all emissions measured from the test item were within the specification limits. Photographs of the test configuration for radiated emission are shown as Figure 3 and Figure 4.

A block diagram of the test item orientation position is shown in Figure 1 and Figure 2.

5.9 Spectral Density

5.9.1 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.

5.9.2 Procedures

The test item was placed on the non-conductive stand and set to transmit. A broadband measuring antenna was placed near the test item. The test item was put into inquiry mode. The resolution bandwidth (RBW) was initially set to 1MHz to set the reference level. Knowing the peak level, the result of this plot was used to determine the 8dBm limit. The resolution bandwidth (RBW) was set to 3kHz, the sweep time was set to the span divided by 3kHz (1 MHz/3kHz = 333 seconds). The peak detector and 'Max-Hold' function was engaged. The analyzer's display was plotted using a 'screen dump' utility.

5.9.3 Results

Page 53 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.

6 CONCLUSIONS

It was determined that the Delphi Electronics and Safety 355 Bluetooth Radio, Part No. 28215842 hybrid frequency hopping spread spectrum transmitter, 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, and Industry Canada's RSS-210 for Low-power License-exempt radio communication devices 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.

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

8 EQUIPMENT LIST

Table 8-1 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	12/16/2008	12/16/2009
APW2	PREAMPLIFIER	PLANAR ELECTRONICS	PE2-35-120-5R0-10	PL2925	1GHZ-20GHZ	12/16/2008	12/16/2009
CMA1	Controllers	EMCO	2090	9701-1213	---	N/A	
NHG0	STANDARD GAIN HORN ANTENNA	NARDA	638	---	18-26.5GHZ	NOTE 1	
NTA1	BILOG ANTENNA	CHASE EMC LTD.	BILOG CBL6112	2054	0.03-2GHZ	9/2/2008	9/2/2009
NWI1	RIDGED WAVE GUIDE	AEL	H1498	154	2-18GHZ	10/25/2008	10/25/2009
RBB0	EMI TEST RECEIVER 20HZ TO 40 GHZ.	ROHDE & SCHWARZ	ESIB40	100250	20 HZ TO 40GHZ	3/11/2009	3/11/2010
SBA1	DC POWER SUPPLY	APLAB	ZS3205	99071032	0-32VDC;0-5A	NOTE 1	
XPR0	HIGH PASS FILTER	K&L MICROWAVE	11SH10-4800/X20000	001	4.8-20GHZ	7/30/2008	7/30/2009

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

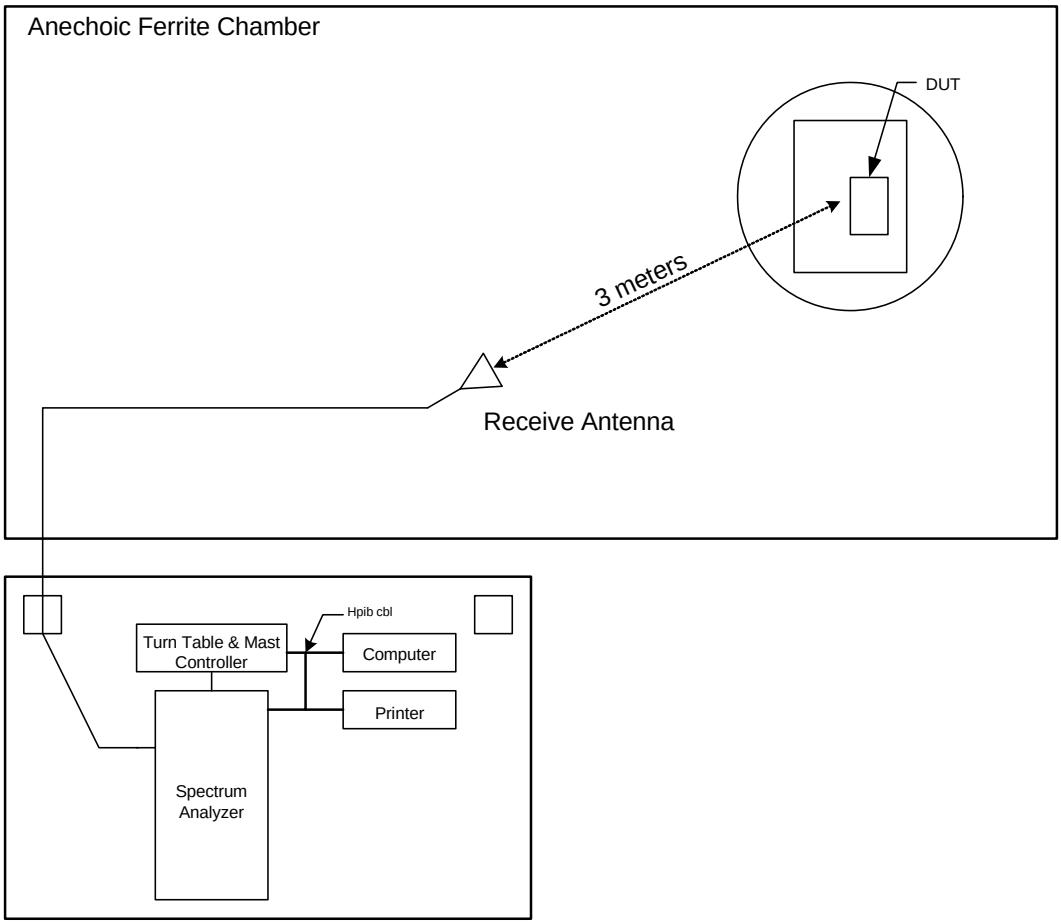


FIGURE 1 BLOCKDIAGRAM OF TEST SETUP

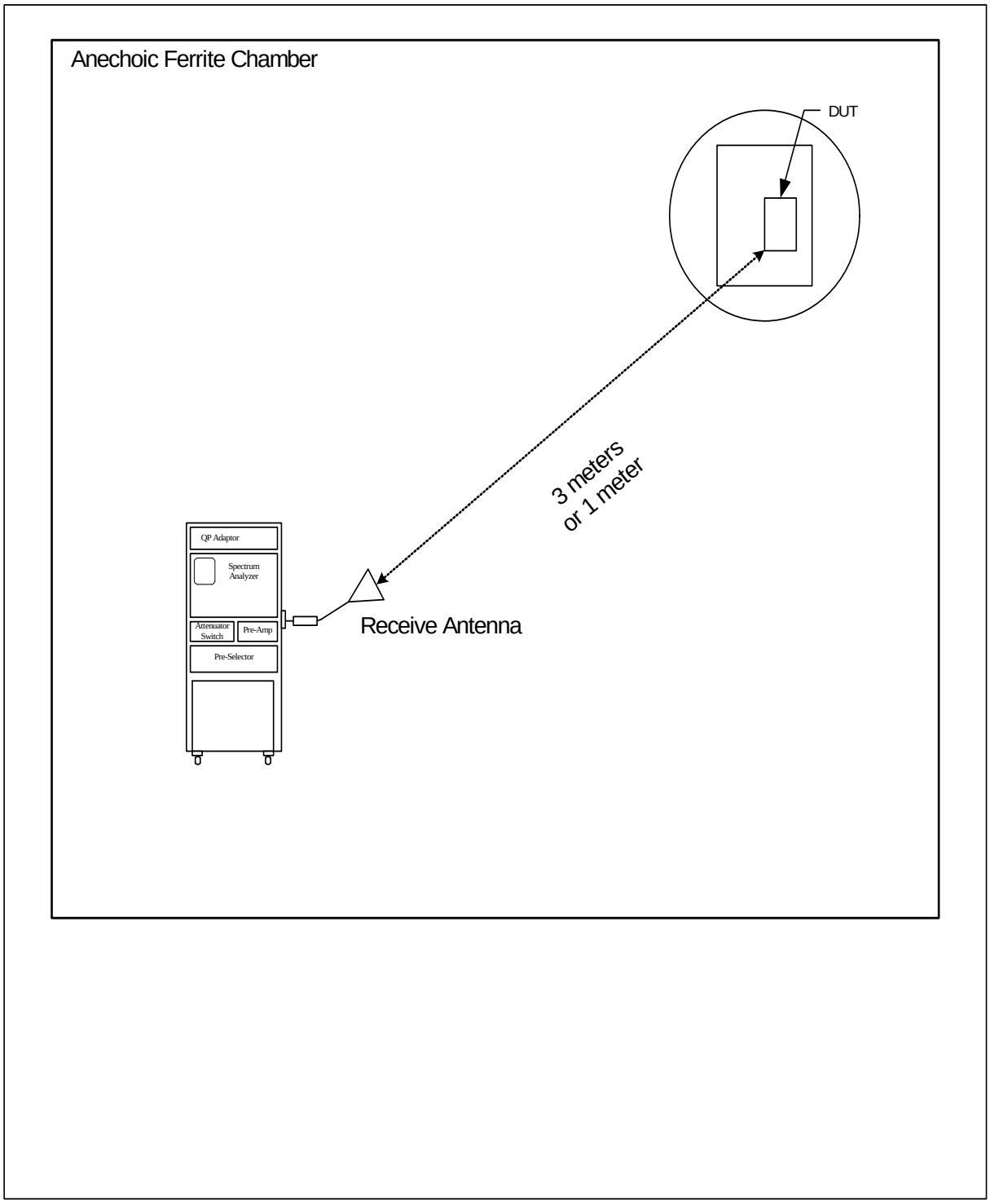
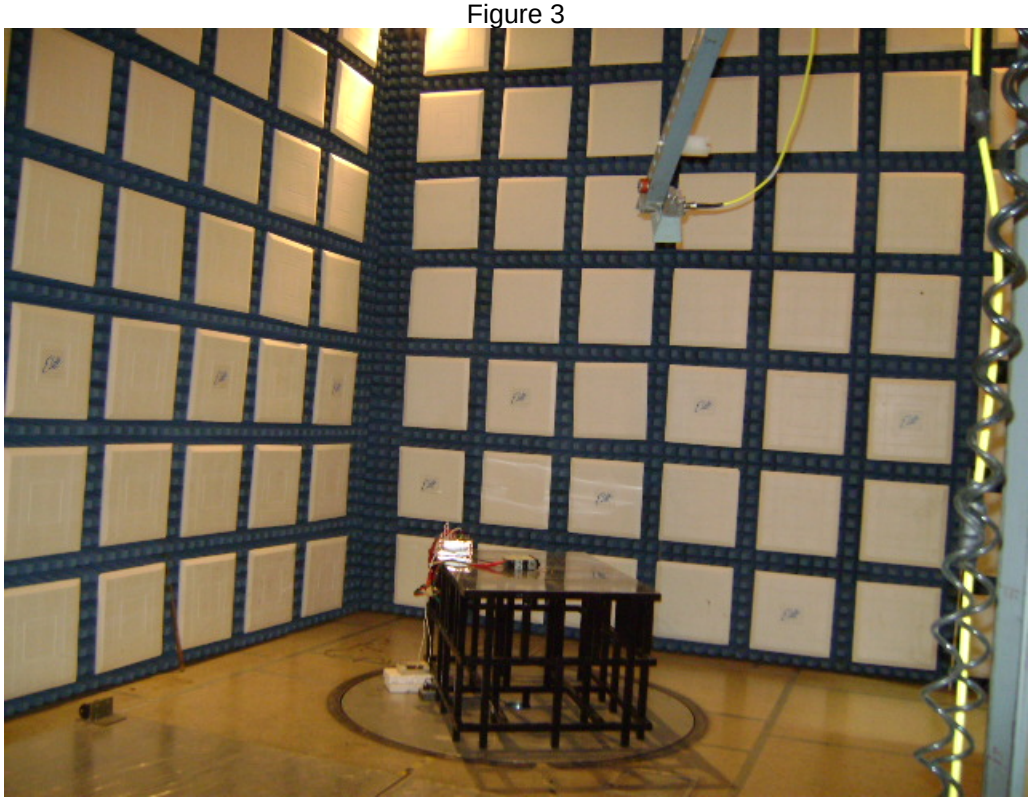
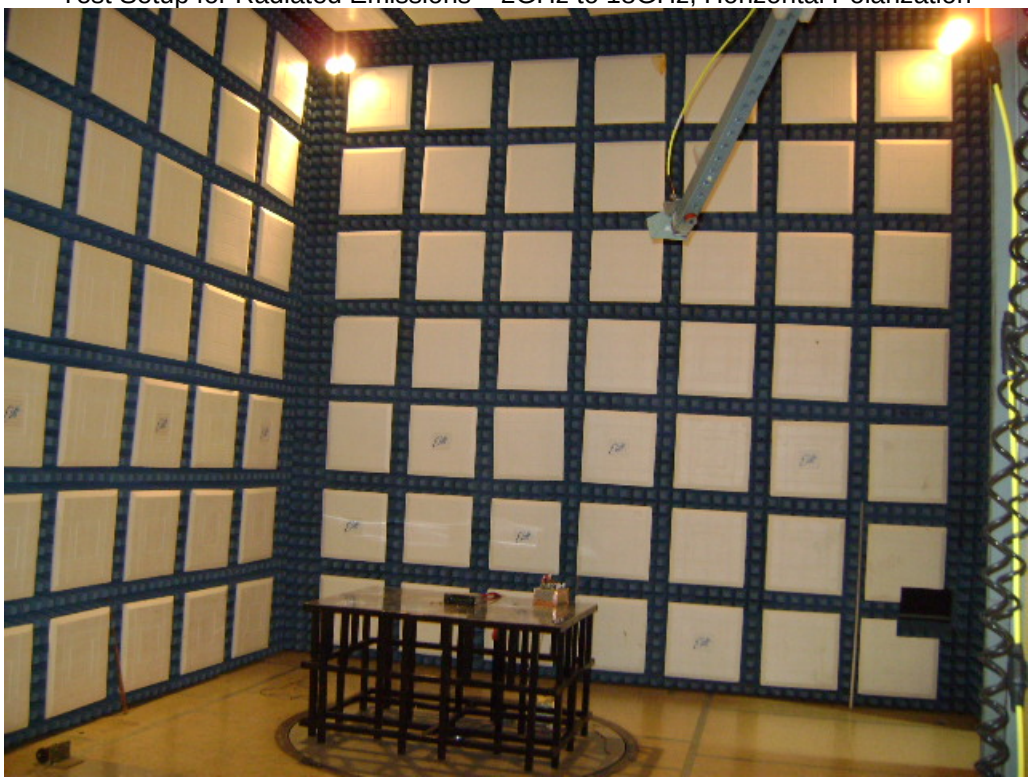


Figure 2: BLOCK DIAGRAM OF TEST SETUP FOR RADIATED EMISSIONS ABOVE 14GHZ

Figure 3

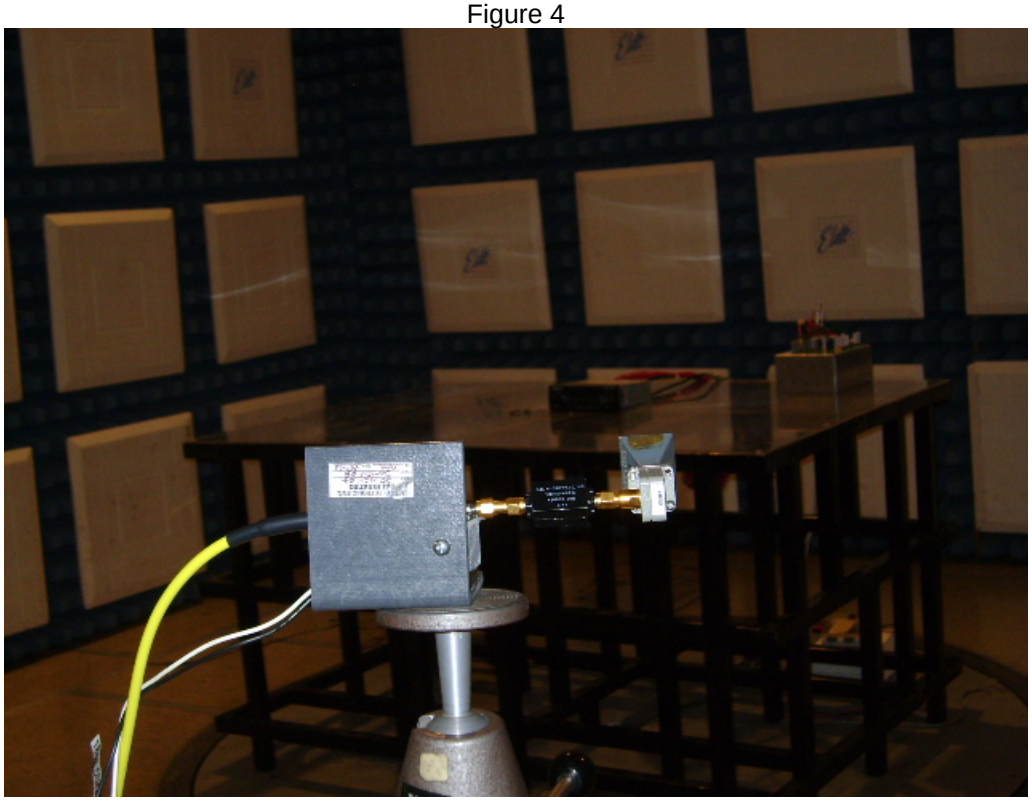


Test Setup for Radiated Emissions – 2GHz to 18GHz, Horizontal Polarization



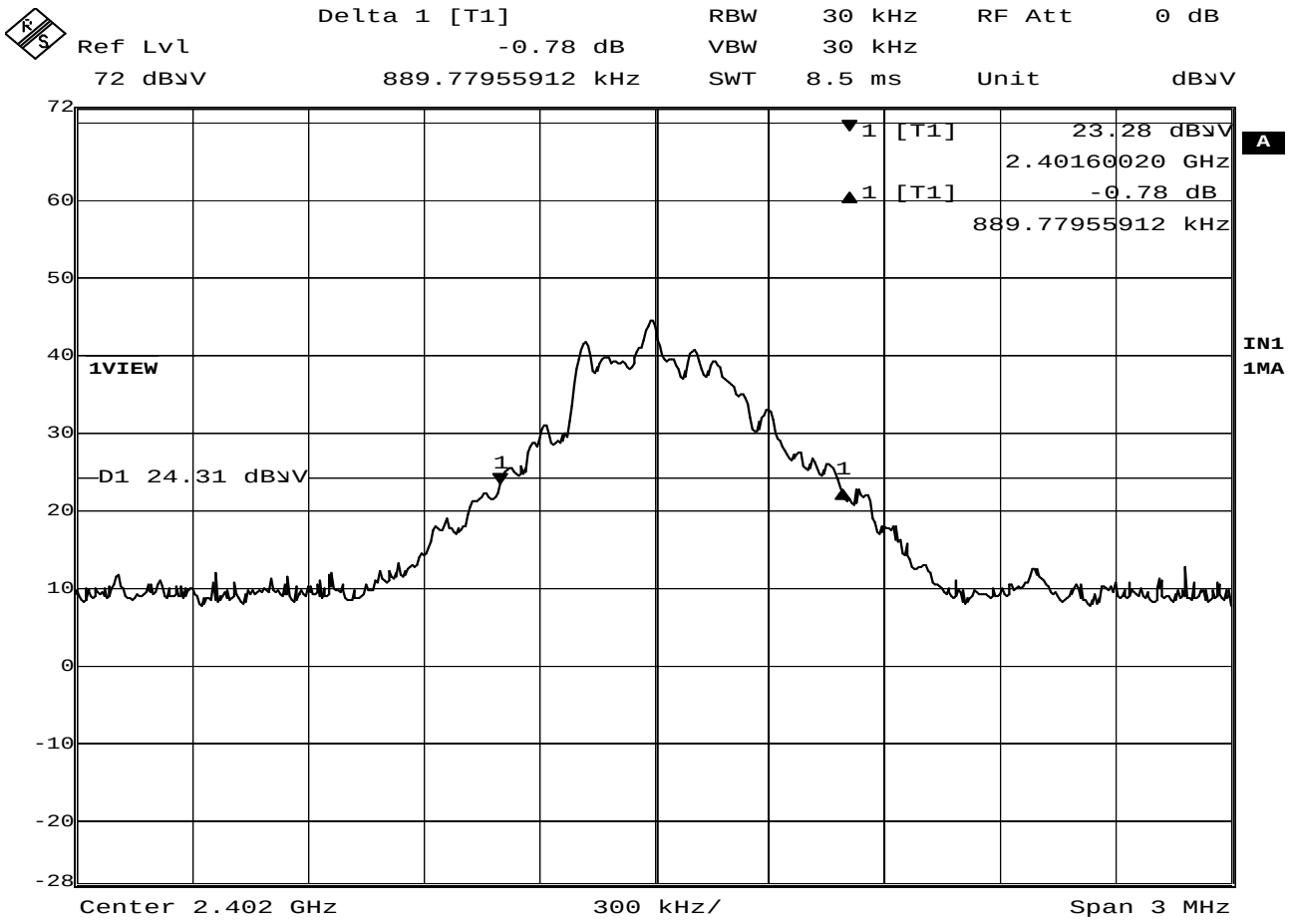
Test Setup for Radiated Emissions – 2GHz to 18GHz, Vertical Polarization

Figure 4



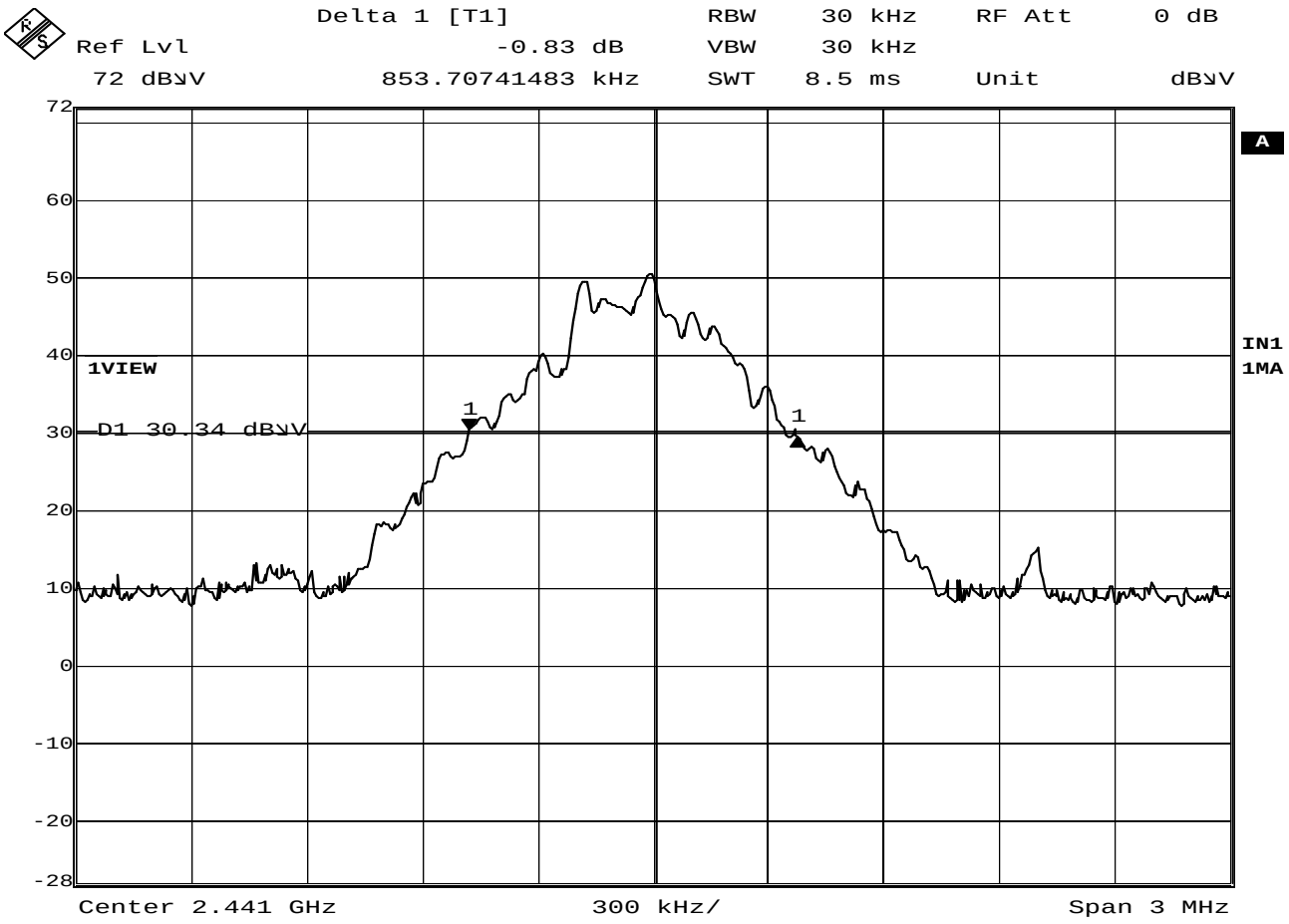
Test Setup for Radiated Emissions, 18GHz to 25GHz, Horizontal Polarization

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



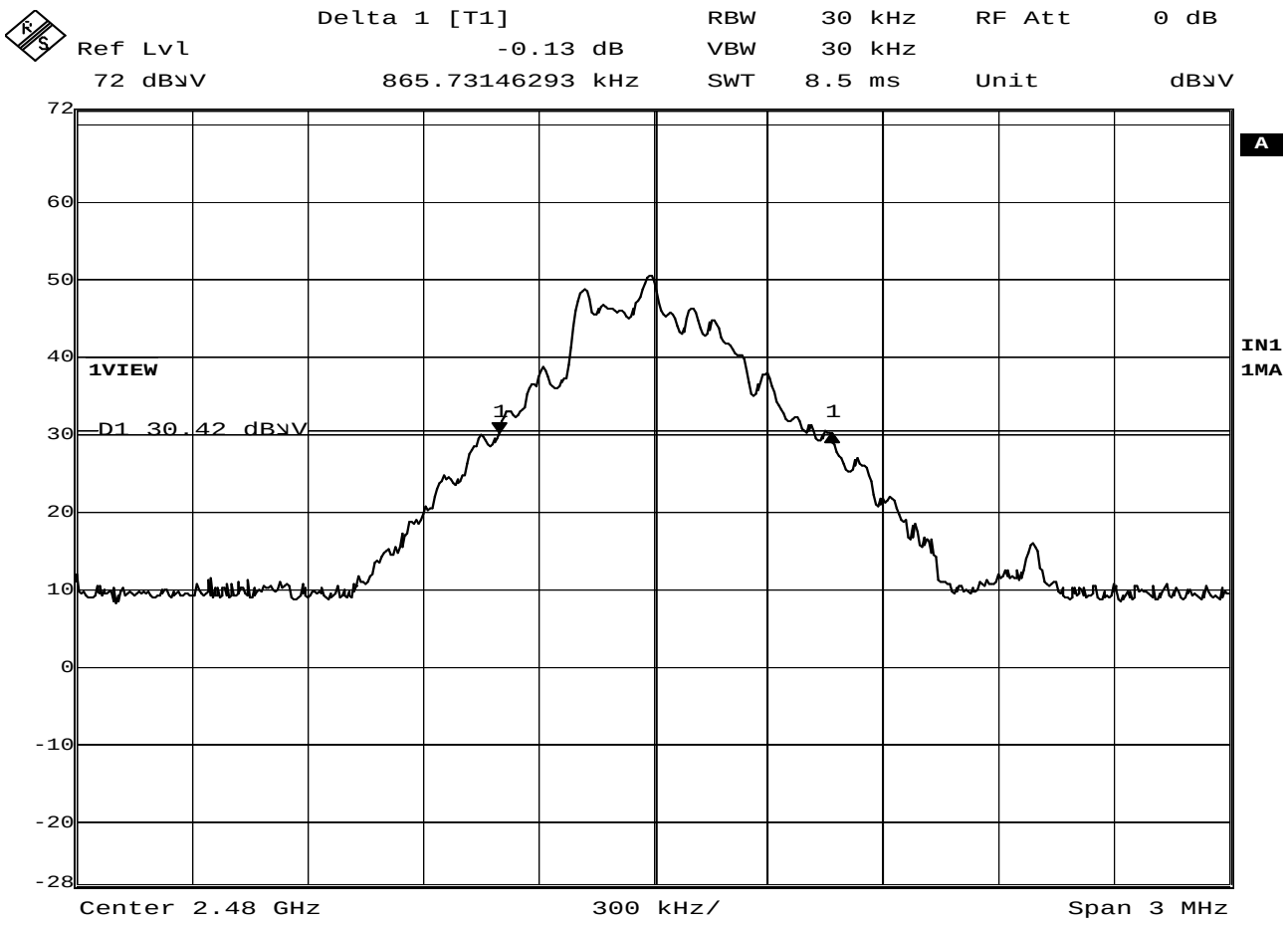
FCC 15.247 20dB Bandwidth

MANUFACTURER	: Delphi Electronics and Safety
PART NUMBER	: 28215842
SERIAL NUMBER	: 0037
TEST MODE	: Tx @ 2402MHz
TEST PARAMETER	: 20dB bandwidth
NOTES	: 20dB bandwidth = 889.8kHz
EQUIPMENT USED	: RBA1,NWH0



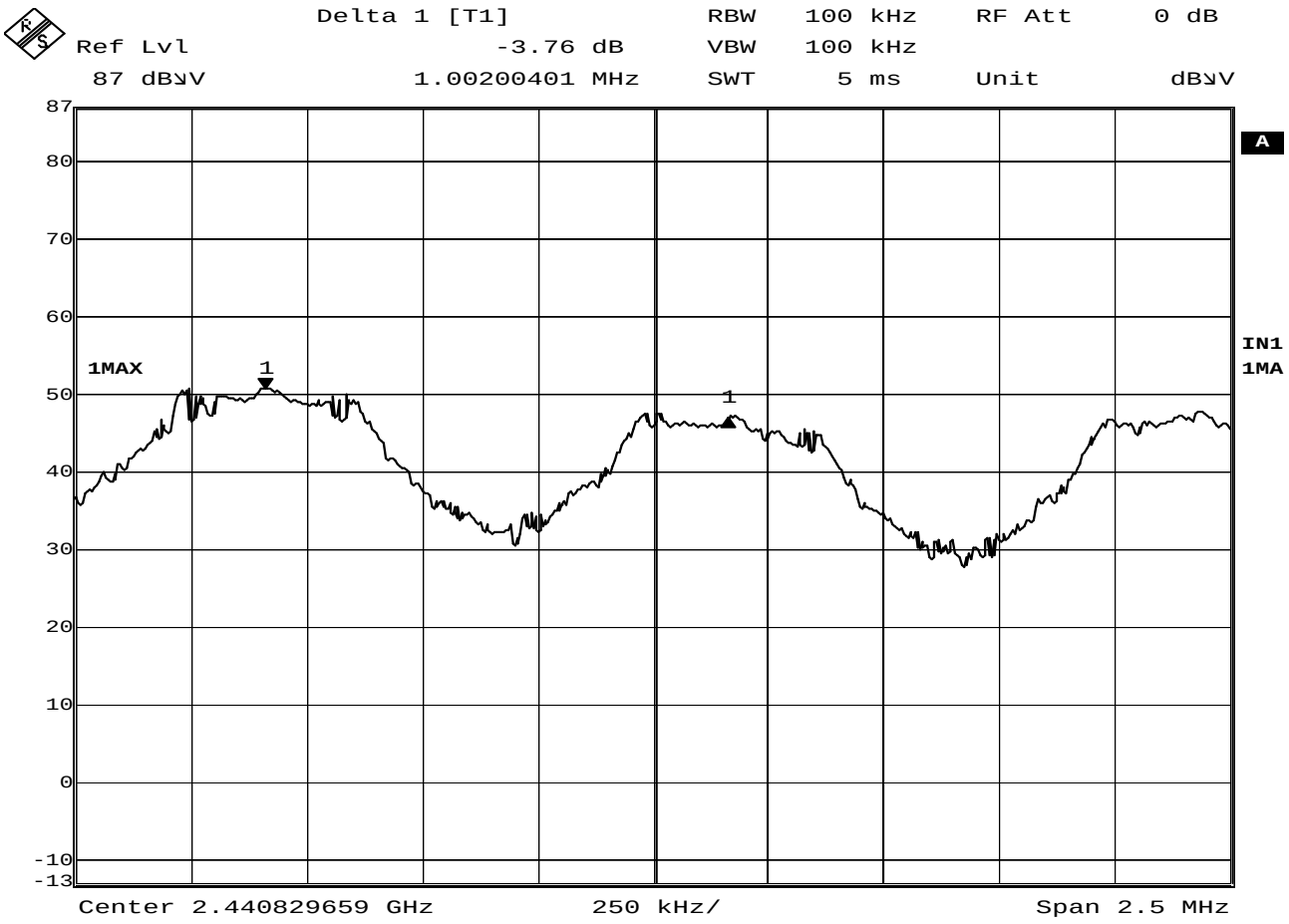
FCC 15.247 20dB Bandwidth

MANUFACTURER	: Delphi Electronics and Safety
PART NUMBER	: 28215842
SERIAL NUMBER	: 0037
TEST MODE	: Tx @ 2441MHz
TEST PARAMETER	: 20dB bandwidth
NOTES	: 20dB bandwidth = 853.7kHz
EQUIPMENT USED	: RBA1,NWH0



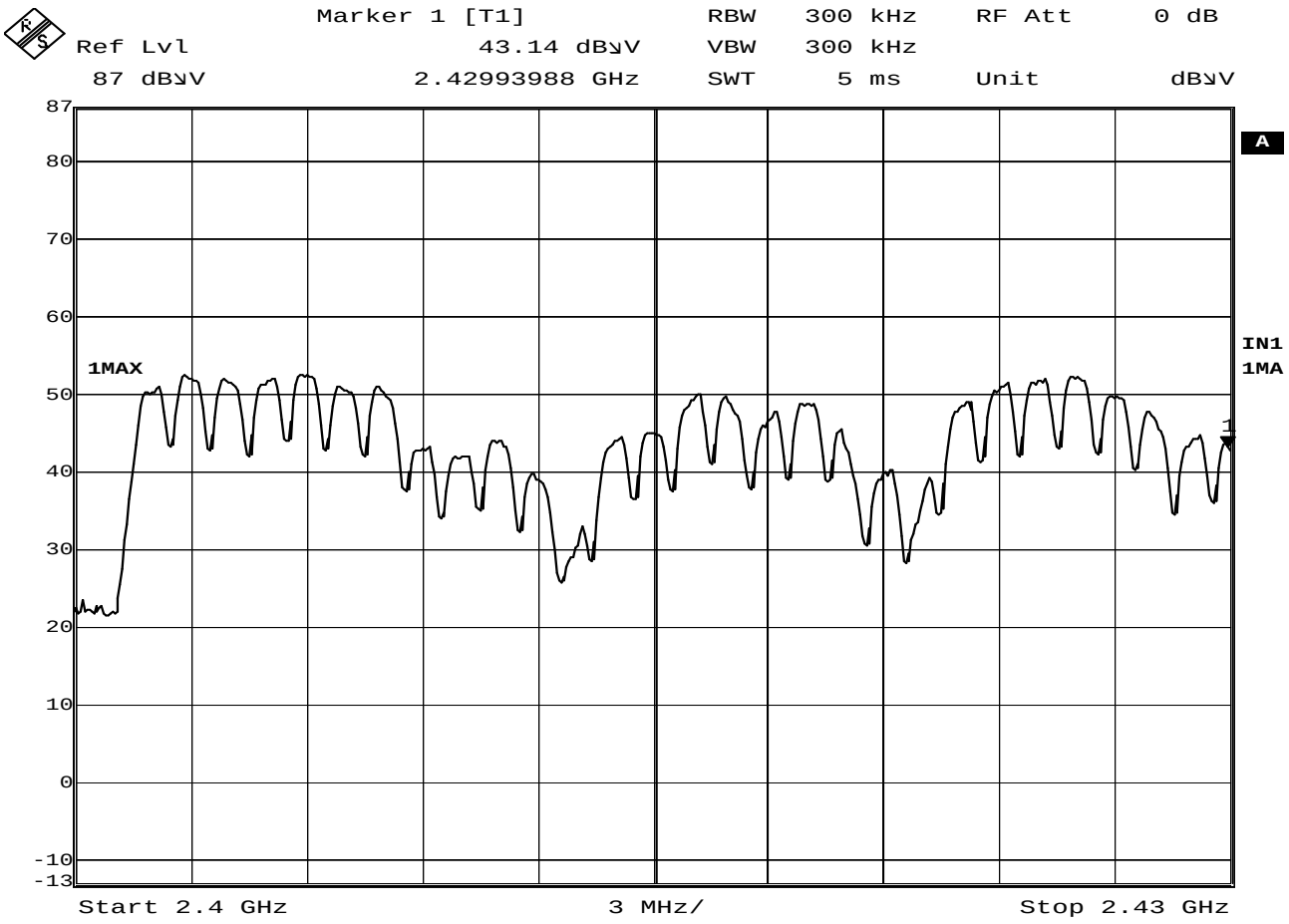
FCC 15.247 20dB Bandwidth

MANUFACTURER	: Delphi Electronics and Safety
PART NUMBER	: 28215842
SERIAL NUMBER	: 0037
TEST MODE	: Tx @ 2480MHz
TEST PARAMETER	: 20dB bandwidth
NOTES	: 20dB bandwidth = 865.7kHz
EQUIPMENT USED	: RBA1,NWH0



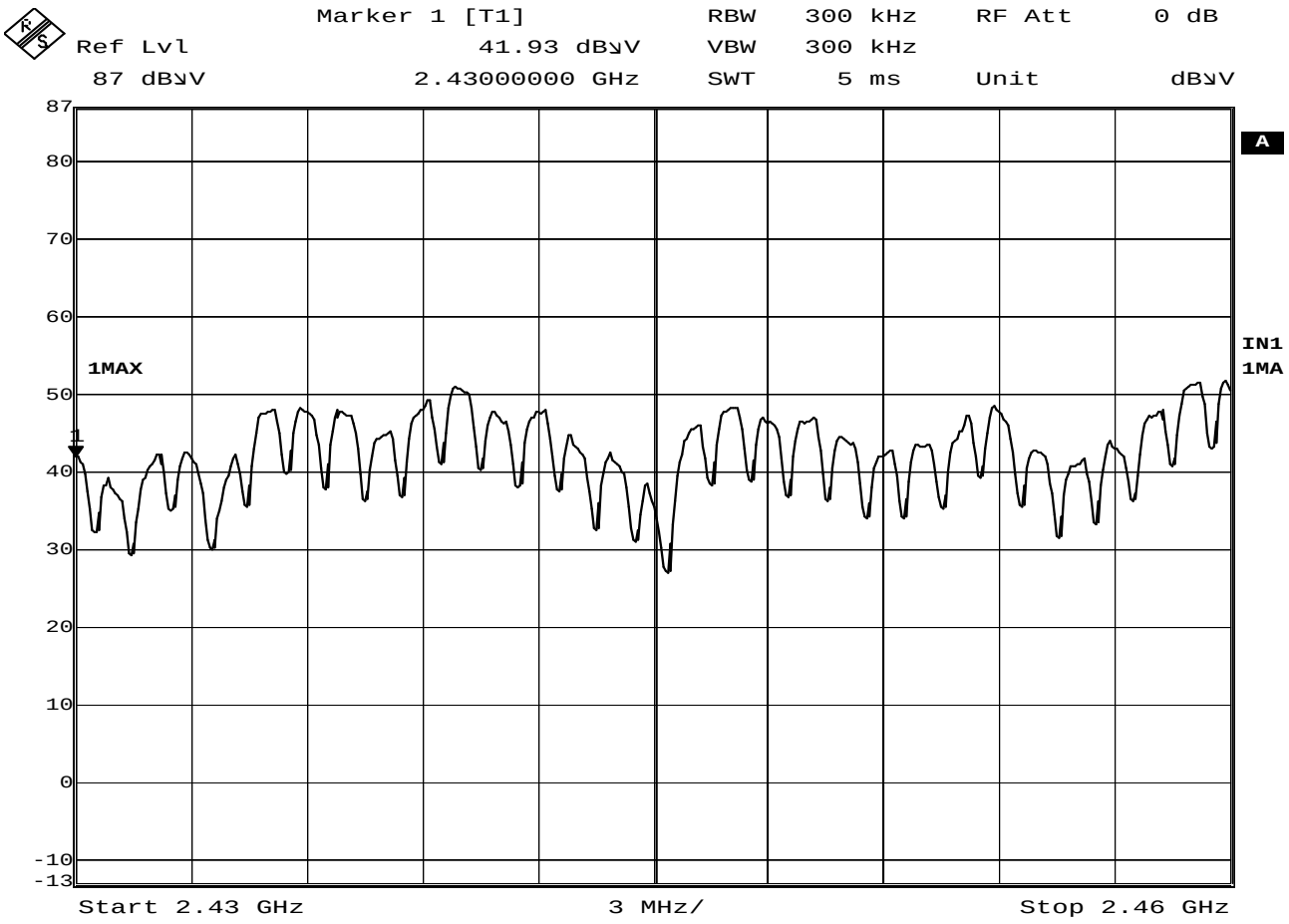
FCC 15.247 Carrier Frequency Separation

MANUFACTURER	: Delphi Electronics and Safety
PART NUMBER	: 28215842
SERIAL NUMBER	: 0037
TEST MODE	: Hopping Enabled
TEST PARAMETER	: Carrier Frequency Separation
NOTES	: Carrier Frequency Separation = 1MHz
EQUIPMENT USED	: RBA1,NWH0



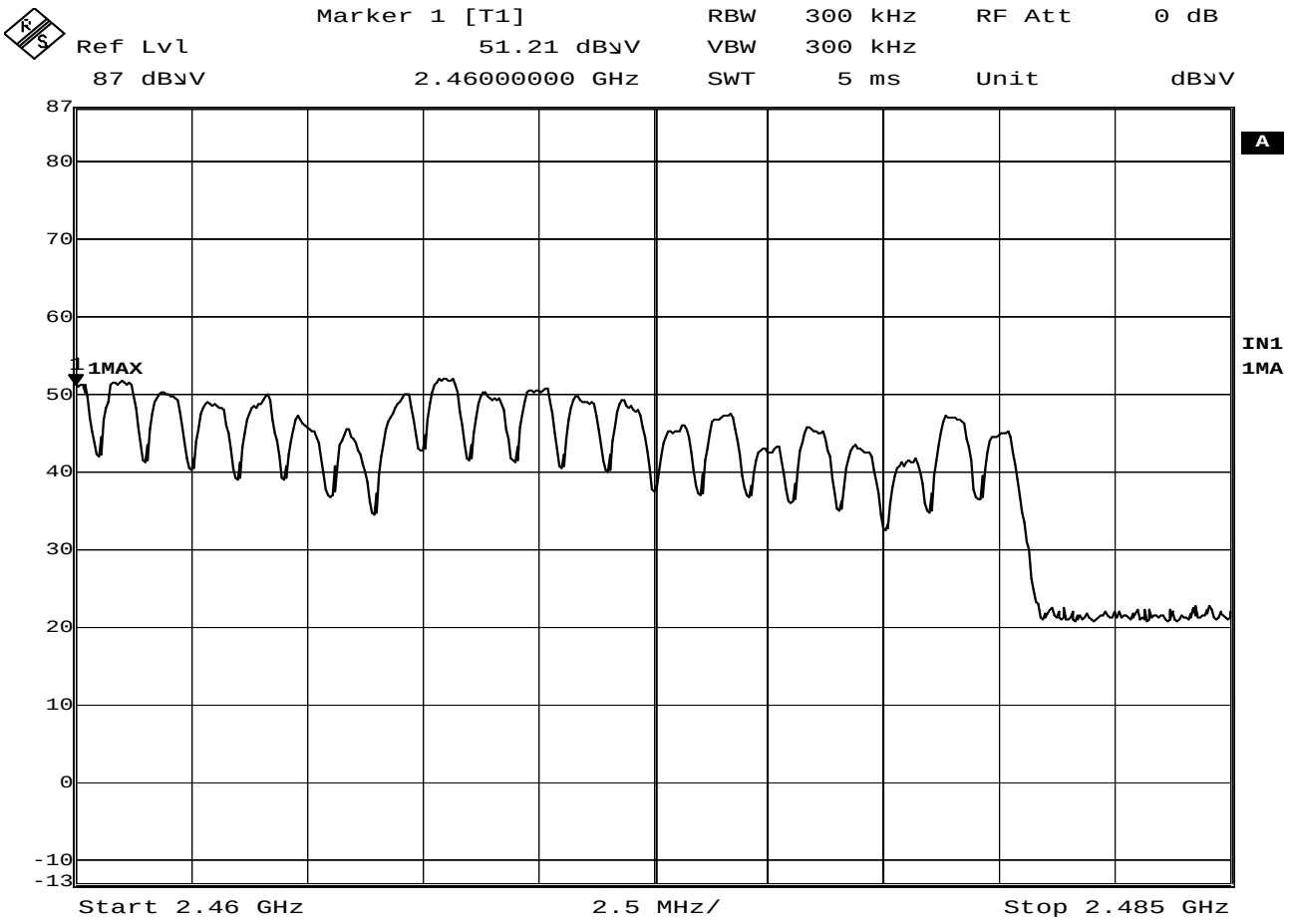
FCC 15.247 Number of Hopping Frequencies

MANUFACTURER	: Delphi Electronics and Safety
PART NUMBER	: 28215842
SERIAL NUMBER	: 0037
TEST MODE	: Hopping Enabled
TEST PARAMETER	: Number of Hopping Frequencies
NOTES	: Number of Hopping Frequencies from 2400MHz to 2430MHz = 28
EQUIPMENT USED	: RBA1,NWH0



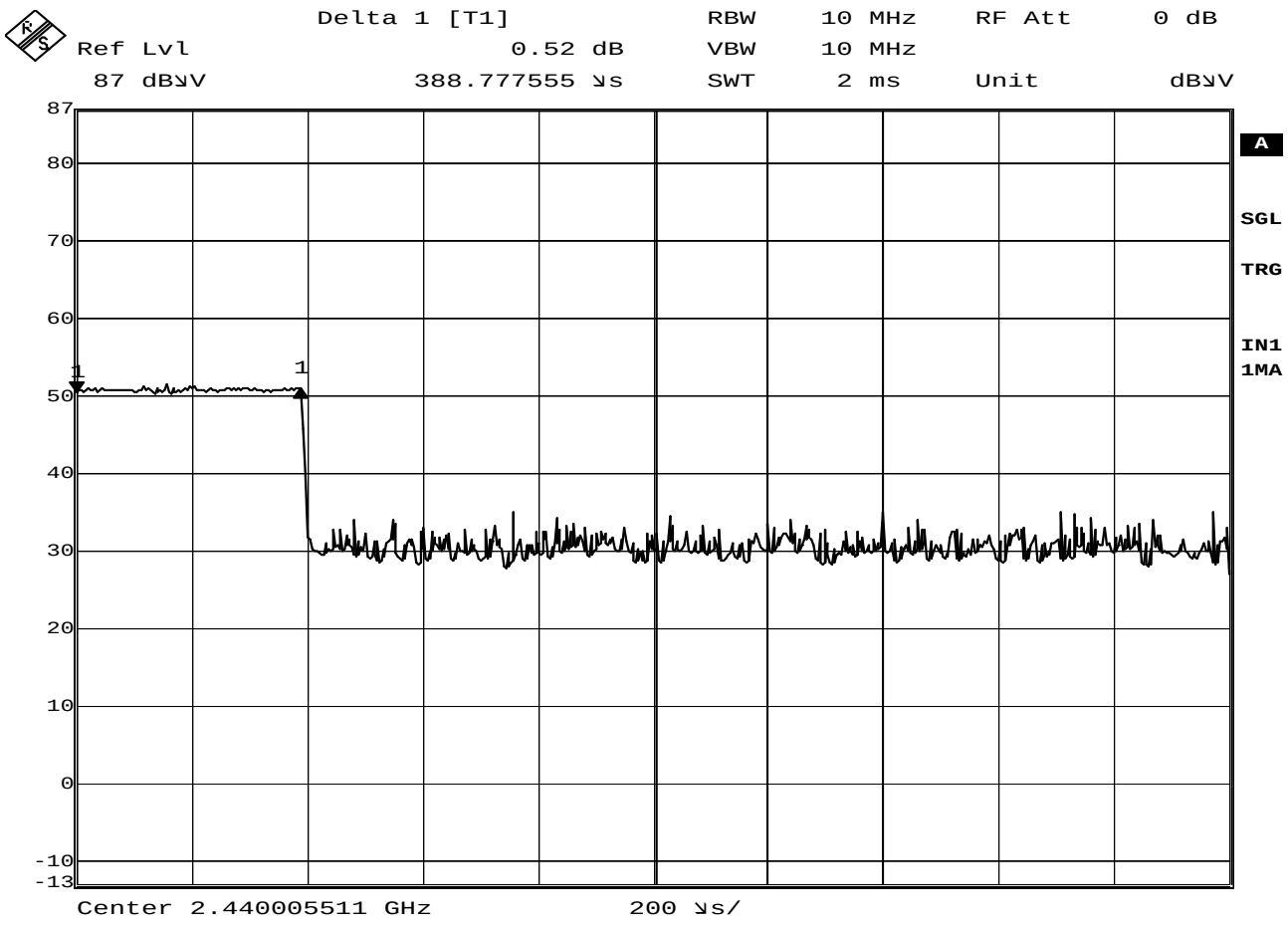
FCC 15.247 Number of Hopping Frequencies

MANUFACTURER	: Delphi Electronics and Safety
PART NUMBER	: 28215842
SERIAL NUMBER	: 0037
TEST MODE	: Hopping Enabled
TEST PARAMETER	: Number of Hopping Frequencies
NOTES	: Number of Hopping Frequencies from 2430MHz to 2460MHz = 30
EQUIPMENT USED	: RBA1,NWH0



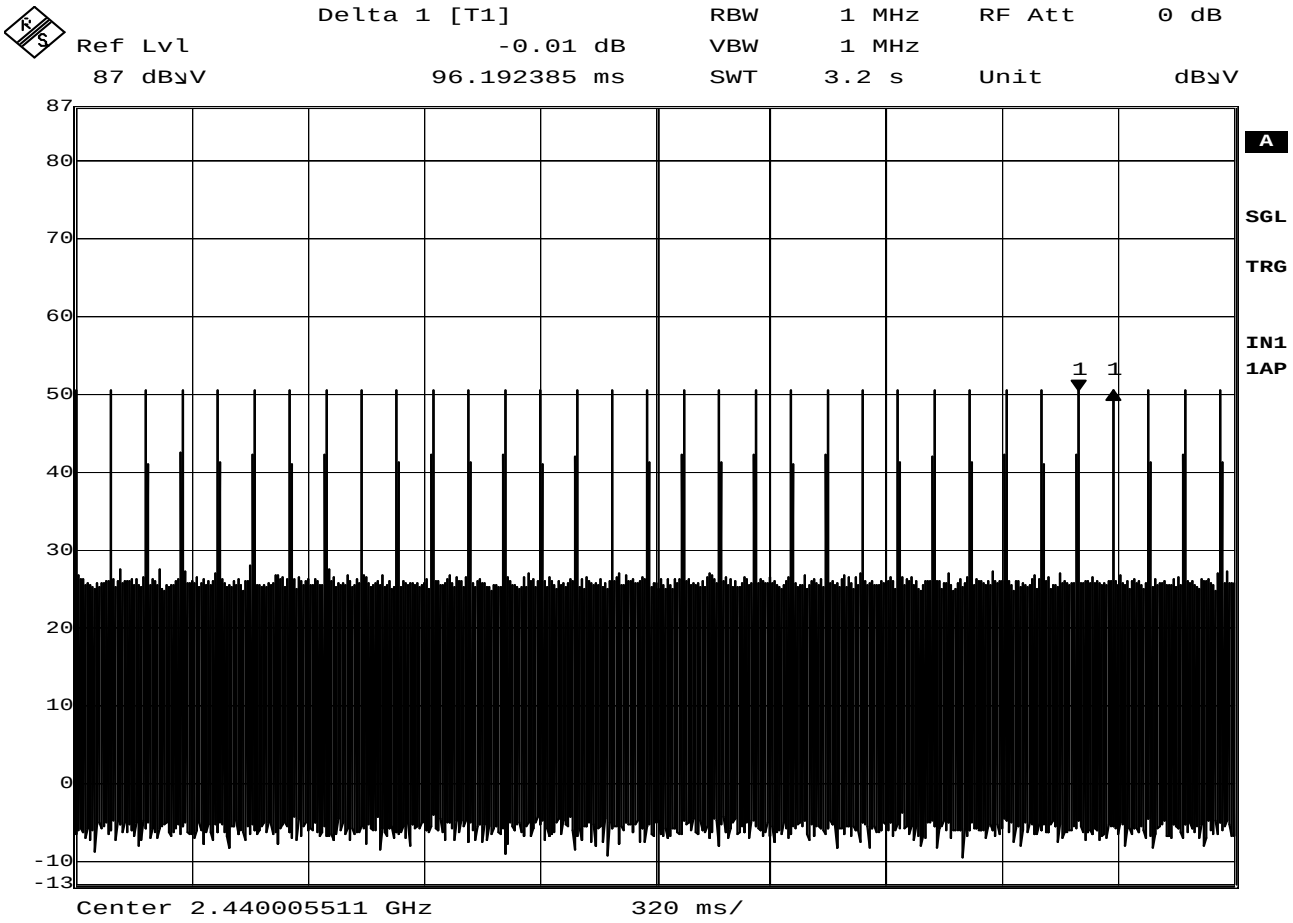
FCC 15.247 Number of Hopping Frequencies

MANUFACTURER	: Delphi Electronics and Safety
PART NUMBER	: 28215842
SERIAL NUMBER	: 0037
TEST MODE	: Hopping Enabled
TEST PARAMETER	: Number of Hopping Frequencies
NOTES	: Number of Hopping Frequencies from 2460MHz to 2483.5MHz = 20
	: Total Number of Hopping Frequencies = 28+30+20 =78
EQUIPMENT USED	: RBA1,NWH0



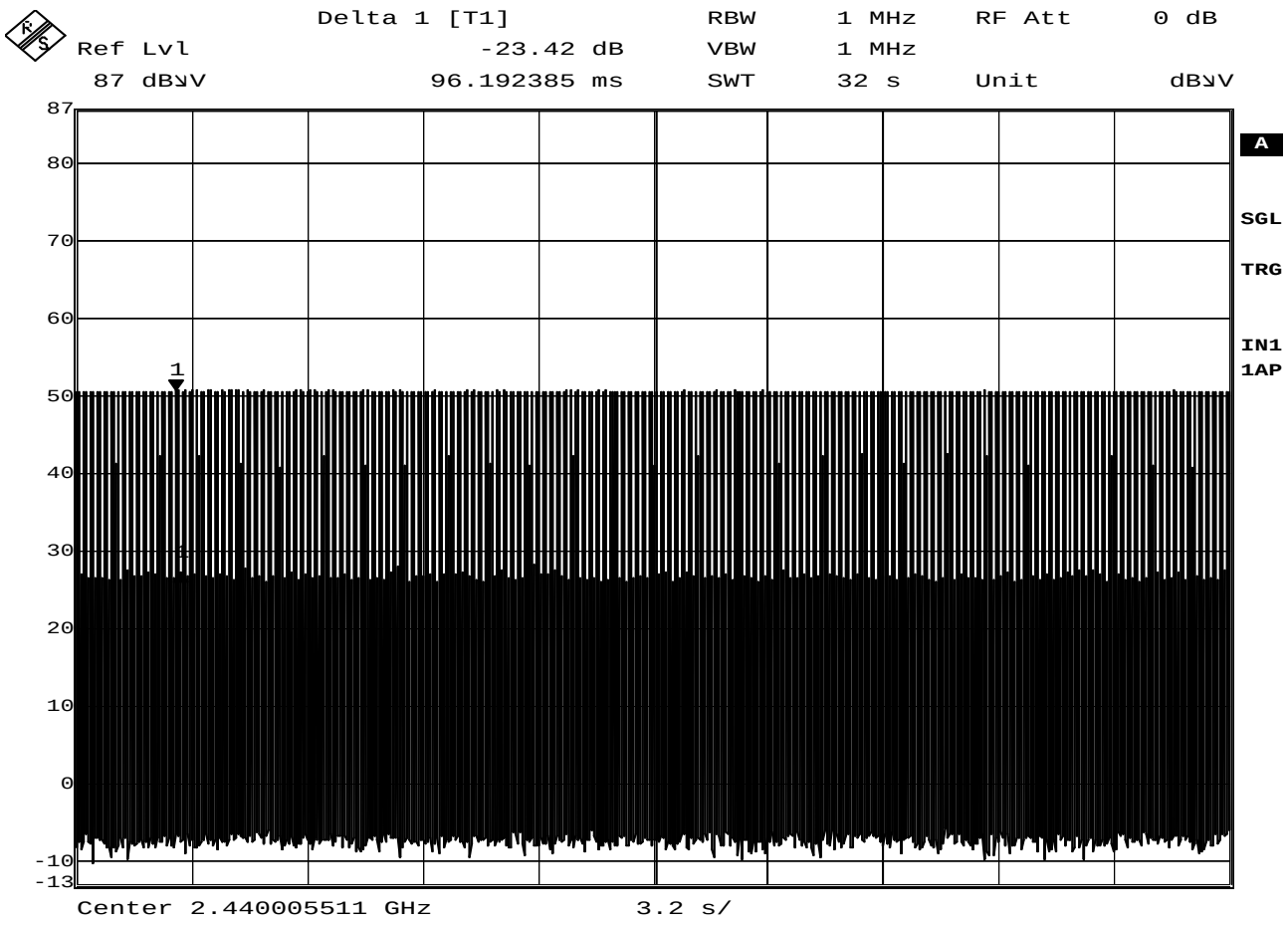
FCC 15.247 Dwell Time

MANUFACTURER	: Delphi Electronics and Safety
PART NUMBER	: 28215842
SERIAL NUMBER	: 0037
TEST MODE	: Hopping Enabled
TEST PARAMETER	: Dwell Time
NOTES	: On Time = 388.8usec
EQUIPMENT USED	: RBA1,NWH0



FCC 15.247 Dwell Time

MANUFACTURER	: Delphi Electronics and Safety
PART NUMBER	: 28215842
SERIAL NUMBER	: 0037
TEST MODE	: Hopping Enabled
TEST PARAMETER	: Number of pulses in 3.12 sec
NOTES	: Number of pulses in 3.12 sec = 33
EQUIPMENT USED	: RBA1,NWH0



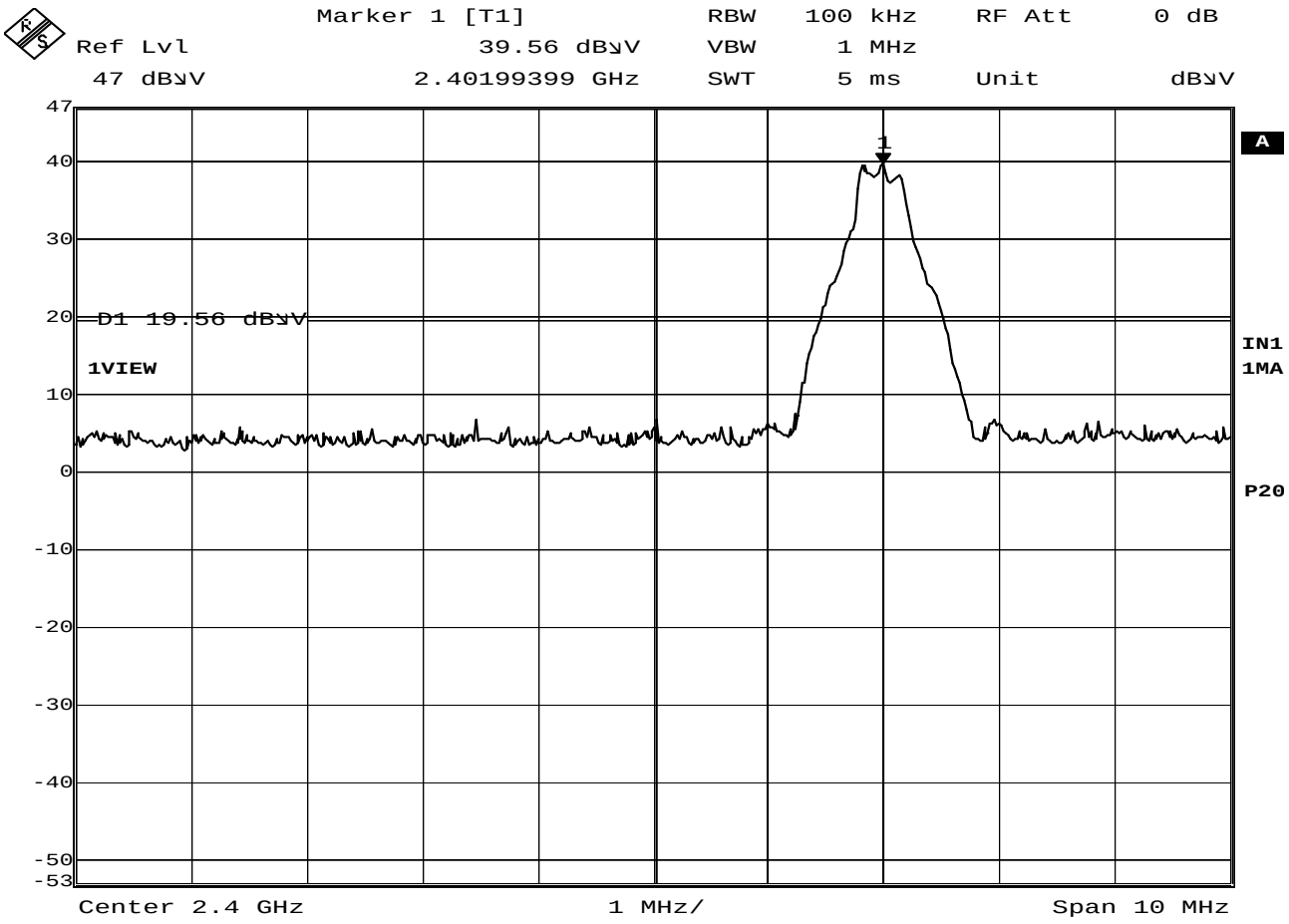
FCC 15.247 Dwell Time

MANUFACTURER	: Delphi Electronics and Safety
PART NUMBER	: 28215842
SERIAL NUMBER	: 0037
TEST MODE	: Hopping Enabled
TEST PARAMETER	: Number of pulses in 31.2 sec period
NOTES	: Number of pulses in a 31.2 sec period =
	:(0.4sec x 78 channels = 0.4 x 78) = 10 x number
	: of pulses in 3.12 sec = 33 x 10 = 330 pulses in
	: a 31.2 sec period
NOTES	: Dwell time = number of pulses x pulse width =
	: 330 x 388.8usec = 128.3msec
EQUIPMENT USED	: RBA1,NWH0

Manufacturer : Delphi Electronics and Safety
Model No. : 28215842
Serial No. : 0037
Test Specification : FCC Part 15, Subpart C, 15.247, Peak Output Power
: Radiated Measurement
Date : April 16, 2009
Notes : Test Distance is 3 meters

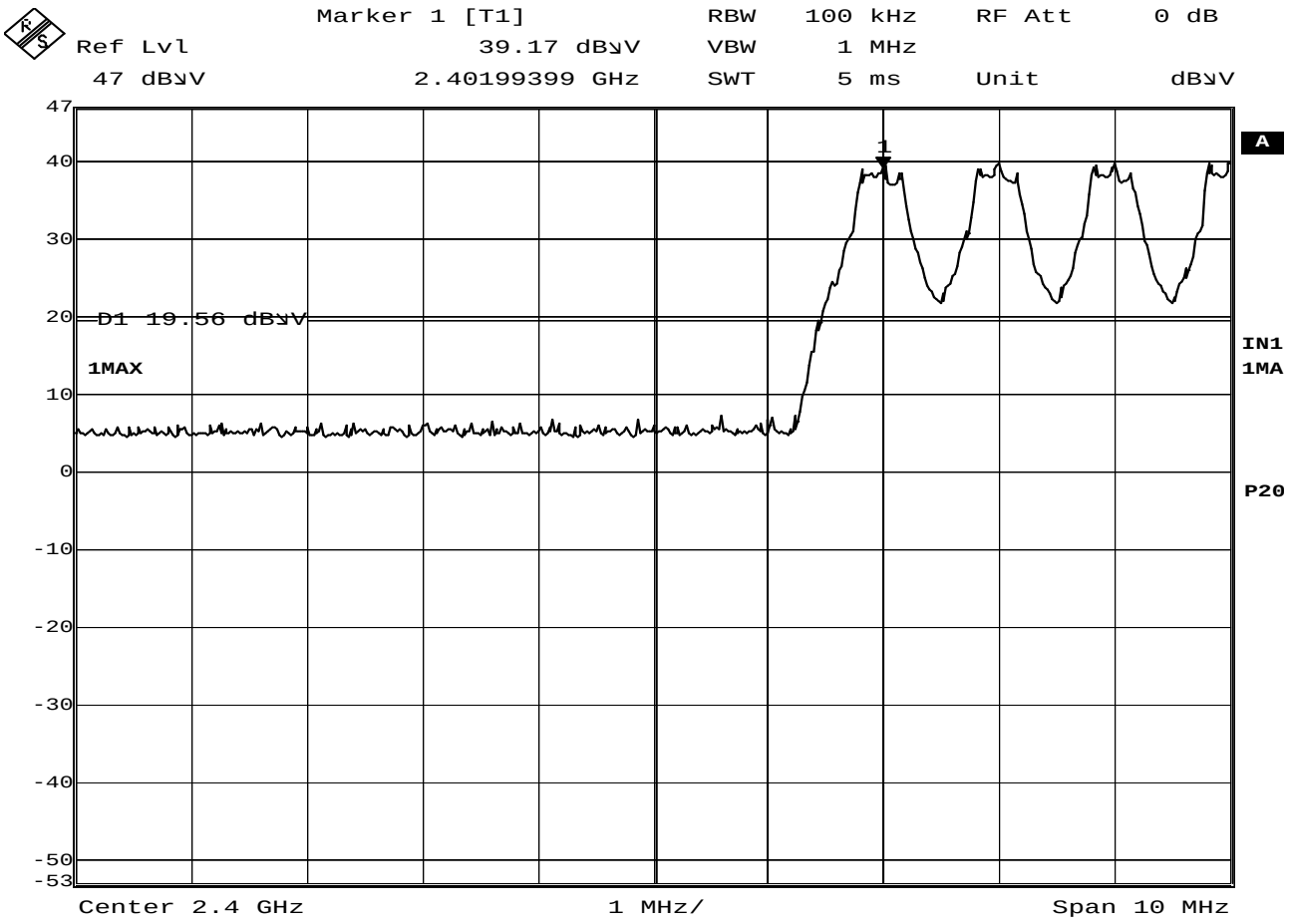
Frequency MHz	Antenna Polarity	Meter Reading dBuV	Matched Signal Generator Reading dBm	Antenna Gain dB	Cable Loss dB	EIRP dBm	Limit dBm
2402.0	H	41.3	-27.3	6.5	3.0	-23.8	36
2402.0	V	37.4	-31.4	6.5	3.0	-27.9	36
2441.0	H	41.7	-26.6	6.6	3.1	-23.0	36
2441.0	V	39.9	-28.0	6.6	3.1	-24.4	36
2480.0	H	43.7	-23.9	6.7	3.1	-20.3	36
2480.0	V	41.4	-26.6	6.7	3.1	-23.0	36

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



FCC 15.247 Band edge compliance

MANUFACTURER	: Delphi Electronics and Safety
PART NUMBER	: 28215842
SERIAL NUMBER	: 0037
TEST MODE	: Tx @ 2402MHz
TEST PARAMETER	: Band edge compliance
NOTES	: At the band edge (2400MHz) the emissions must
	: be 20dBc
EQUIPMENT USED	: RBB0,NWI1



FCC 15.247 Band edge compliance

MANUFACTURER	: Delphi Electronics and Safety
PART NUMBER	: 28215842
SERIAL NUMBER	: 0037
TEST MODE	: Hopping enabled
TEST PARAMETER	: Band edge compliance
NOTES	: At the band edge (2400MHz) the emissions must
	: be 20dBc
EQUIPMENT USED	: RBB0,NWI1

Manufacturer : Delphi Electronics and Safety
Model No. : 28215842
Serial No. : 0037
Test Specification : FCC Part 15, Subpart C, Section 15.247, Band Edge Compliance
Date : April 16, 2009
Mode : See Below
Test Distance : 3 meters
Notes : Peak Readings

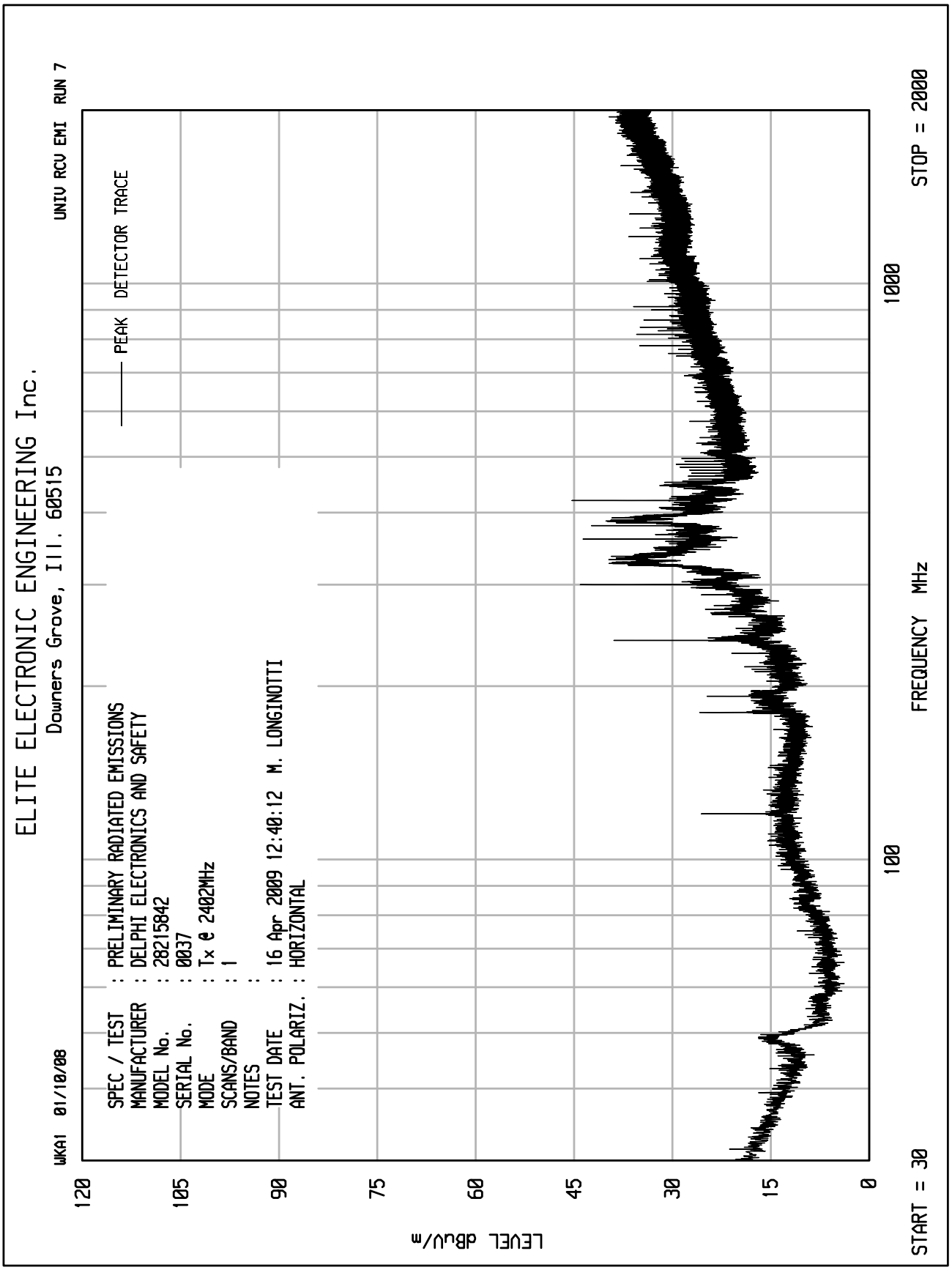
Frequency MHz	Antenna Polarity	Peak Meter Reading dBuV	Ambient	Cable Loss dB	Antenna Factor dB	Pre Amp Gain dB	Total dBuV/m	Total uV/m	Limit uV/m
Tx @ 2480MHz, Modulation On									
2483.5	H	24.3	Ambient	3.8	31.4	0.0	59.5	944.0	5000
2483.5	V	24.3	Ambient	3.8	31.4	0.0	59.5	944.0	5000
Hopping Enabled									
2483.5	H	23.8	Ambient	3.8	31.4	0.0	59.0	891.3	5000
2483.5	V	23.8	Ambient	3.8	31.4	0.0	59.0	891.3	5000

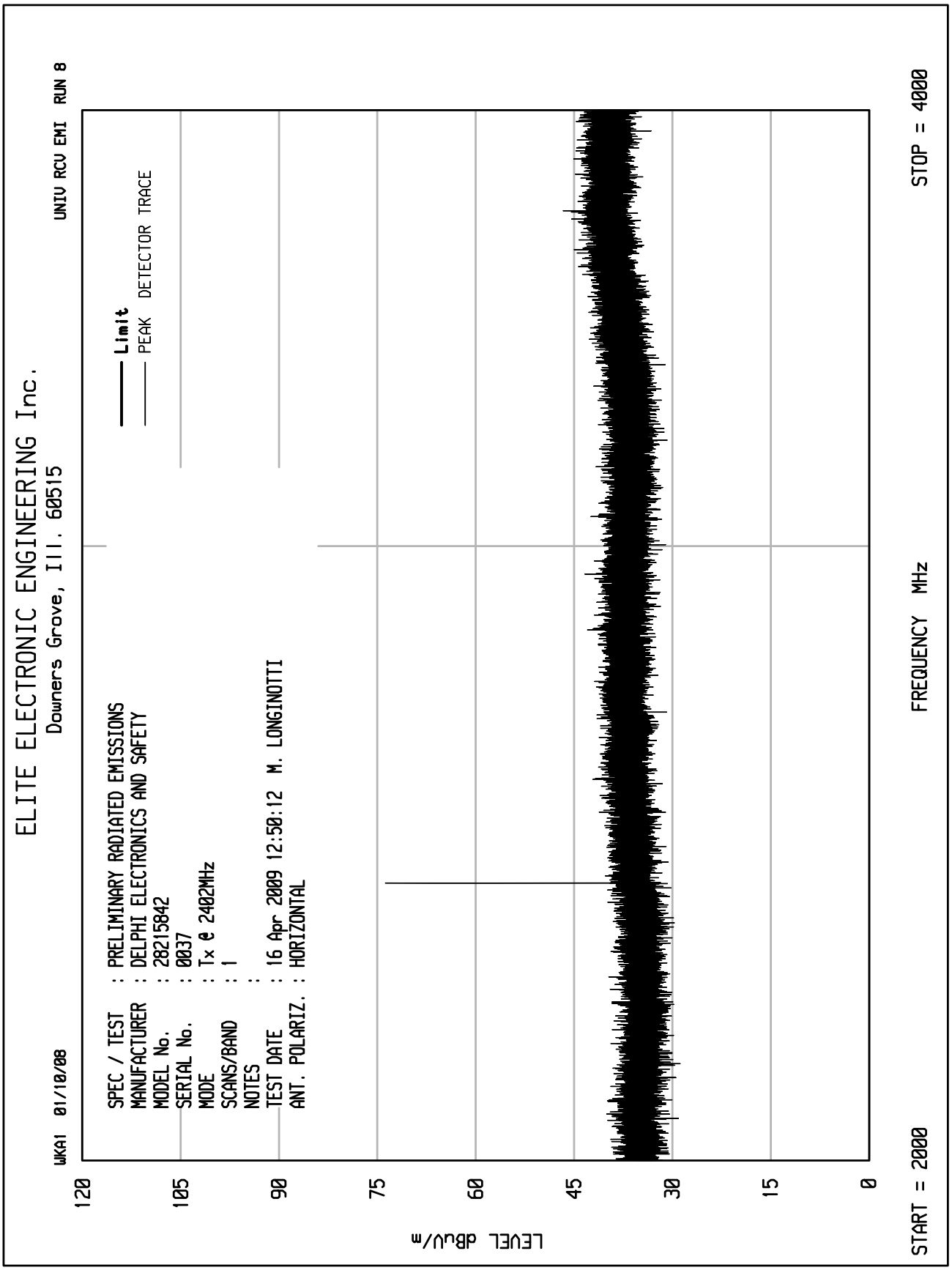
Total = Meter Reading + Cable Loss + Antenna Factor + Preamp Gain

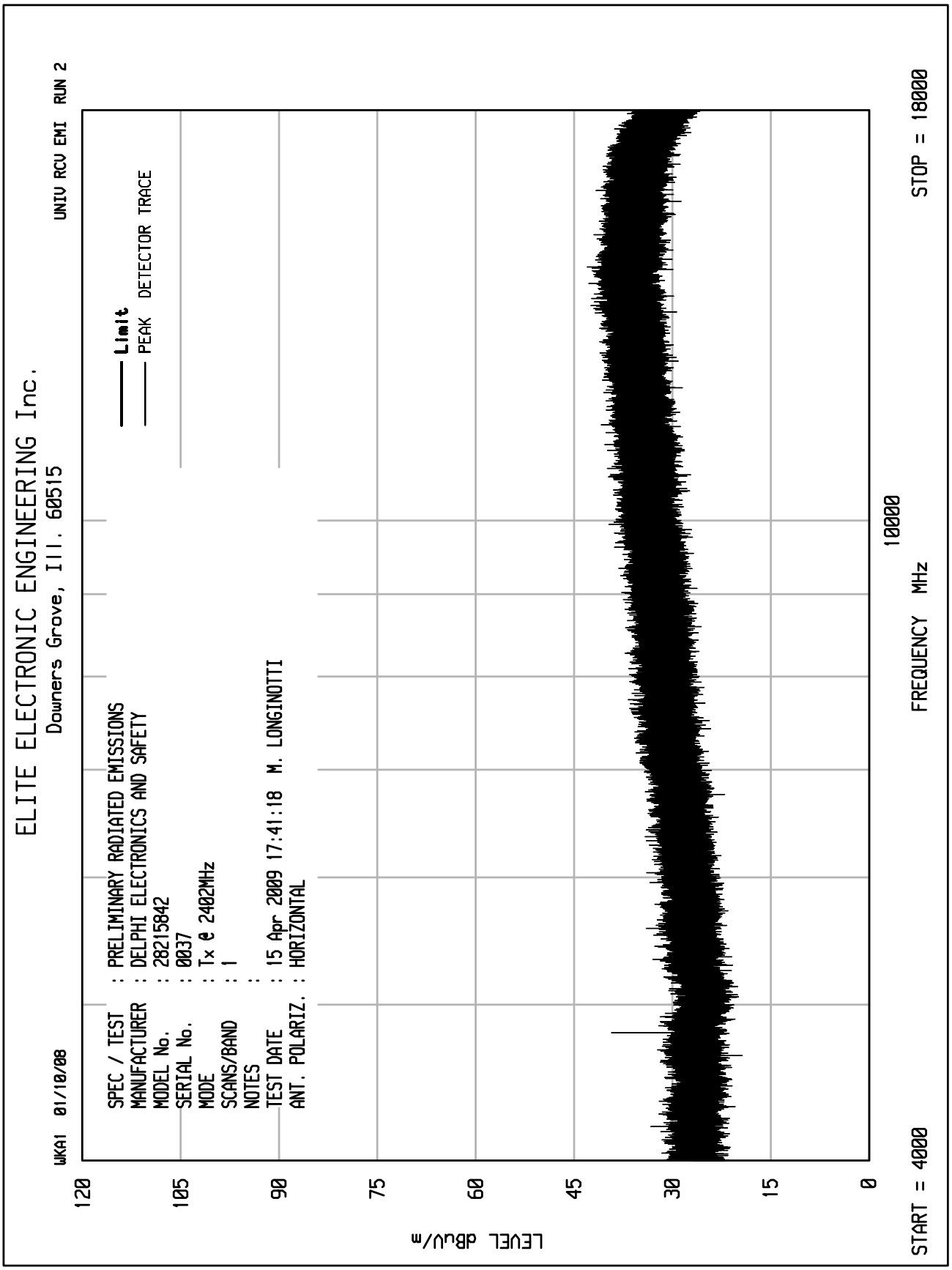
Manufacturer : Delphi Electronics and Safety
Model No. : 28215842
Serial No. : 0037
Test Specification : FCC Part 15, Subpart C, Section 15.247, Band Edge Compliance
Date : April 16, 2009
Mode : See Below
Test Distance : 3 meters
Notes : Average Readings

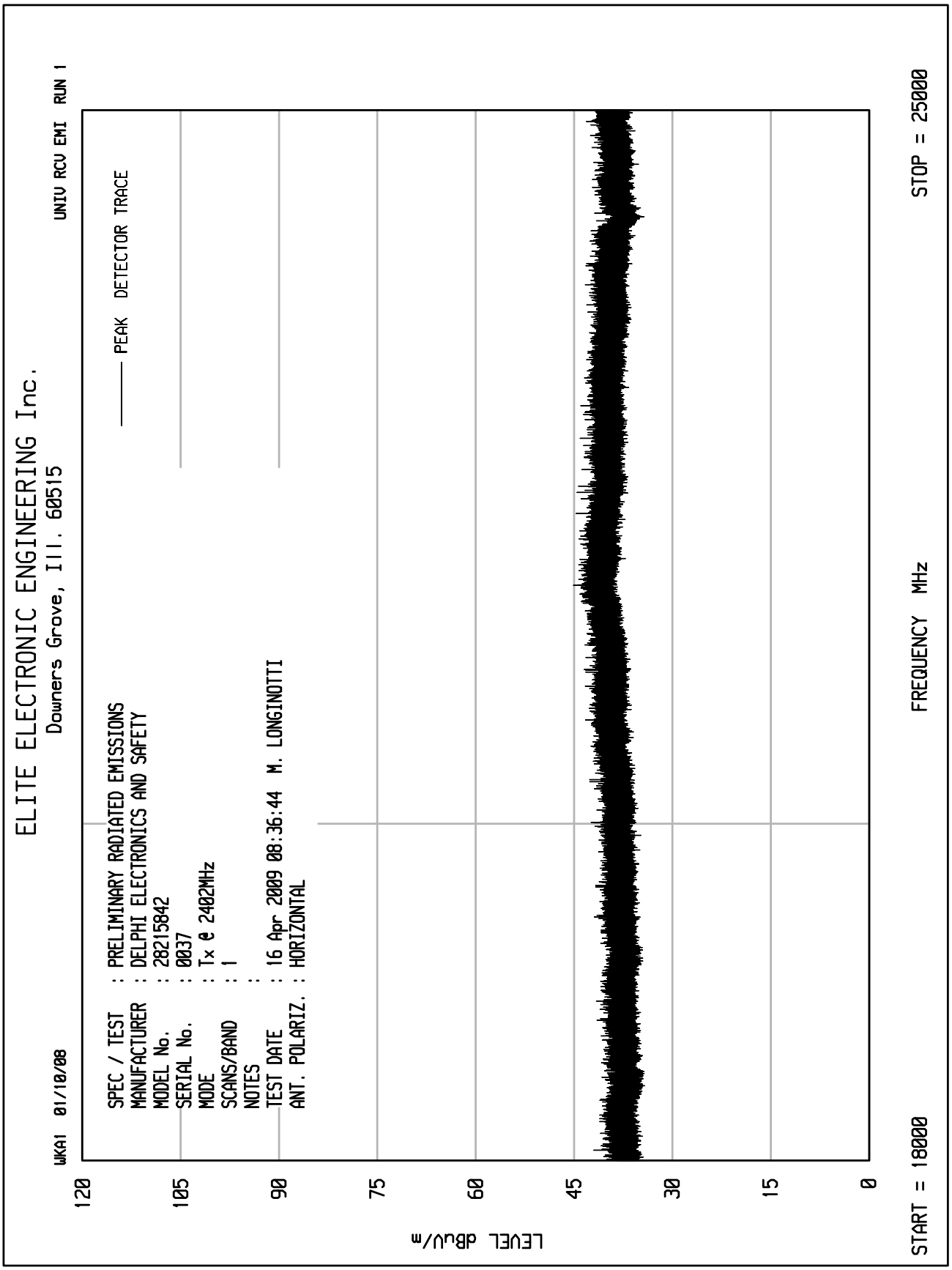
Frequency MHz	Antenna Polarity	Average Meter Reading dBuV	Ambient	Cable Loss dB	Antenna Factor dB	Pre Amp Gain dB	Total dBuV/m	Total uV/m	Limit uV/m
Tx @ 2480MHz, Modulation On									
2483.5	H	11.3	Ambient	3.8	31.4	0.0	46.5	211.3	500
2483.5	V	11.3	Ambient	3.8	31.4	0.0	46.5	211.3	500
Hopping Enabled									
2483.5	H	11.3	Ambient	3.8	31.4	0.0	46.5	211.3	500
2483.5	V	11.3	Ambient	3.8	31.4	0.0	46.5	211.3	500

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


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 7
WKA1 01/10/08
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : DELPHI ELECTRONICS AND SAFETY
MODEL No. : 28215842
SERIAL No. : 0037
MODE : Tx @ 2402MHz
SCANS/BAND : 1
NOTES :
TEST DATE : 16 Apr 2009 12:40:12 M. LONGINOTTI
ANT. POLARIZ. : HORIZONTAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 30
100
1000
STOP = 2000
FREQUENCY MHz


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 8
WKA1 01/10/00
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : DELPHI ELECTRONICS AND SAFETY
MODEL No. : 28215842
SERIAL No. : 0037
MODE : Tx @ 2402MHz
SCANS/BAND : 1
NOTES :
TEST DATE : 16 Apr 2009 12:50:12 M. LONGINOTTI
ANT. POLARIZ. : HORIZONTAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 2000
FREQUENCY MHz
STOP = 4000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 2
WKA1 01/10/08
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : DELPHI ELECTRONICS AND SAFETY
MODEL No. : 28215842
SERIAL No. : 0037
MODE : Tx @ 2402MHz
SCANS/BAND : 1
NOTES :
TEST DATE : 15 Apr 2009 17:41:18 M. LONGINOTTI
ANT. POLARIZ. : HORIZONTAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 4000
10000
FREQUENCY MHz
STOP = 18000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 1
WKA1 01/10/08
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : DELPHI ELECTRONICS AND SAFETY
MODEL No. : 28215842
SERIAL No. : 0037
MODE : Tx @ 2402MHz
SCANS/BAND : 1
NOTES :
TEST DATE : 16 Apr 2009 08:36:44 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

Manufacturer : Delphi Electronics and Safety
Model No. : 28215842
Serial No. : 0037
Test Specification : FCC Part 15, Subpart C, Section 15.247, Radiated Emissions
Date : April 14 through 16, 2009
Mode : Transmit @ 2402.0MHz
Test Distance : 3 meters
Notes : Gray rows indicate restricted bands which must meet the general limits
: Peak measurements

Frequency MHz	Antenna Polarity	Meter Reading dBuV	Ambient	Cable Loss dB	Antenna Factor dB	Pre Amp Gain dB	Total dBuV/m	Total uV/m	Limit uV/m
2402.00	H	40.8		3.8	31.4	0.0	76.0	6280.2	
2402.00	V	36.8		3.8	31.4	0.0	72.0	3962.5	
4804.00	H	45.8	Ambient	5.7	34.5	-35.9	50.1	319.9	5000.0
4804.00	V	47.3		5.7	34.5	-35.9	51.6	380.2	5000.0
7206.00	H	32.8	Ambient	7.6	38.0	-35.5	42.9	140.4	628.0
7206.00	V	33.5	Ambient	7.6	38.0	-35.5	43.6	152.2	628.0
9608.00	H	33.7	Ambient	8.6	39.7	-35.1	47.0	223.3	628.0
9608.00	V	32.9	Ambient	8.6	39.7	-35.1	46.2	203.6	628.0
12010.00	H	42.9	Ambient	9.8	41.4	-34.4	59.7	964.0	5000.0
12010.00	V	43.3	Ambient	9.8	41.4	-34.4	60.1	1009.5	5000.0
14412.00	H	31.6	Ambient	1.4	43.7	-33.9	42.8	138.8	628.0
14412.00	V	30.7	Ambient	1.4	43.7	-33.9	41.9	125.1	628.0
16814.00	H	30.7	Ambient	1.8	44.6	-33.9	43.3	146.0	628.0
16814.00	V	31.2	Ambient	1.8	44.6	-33.9	43.8	154.6	628.0
19216.00	H	36.0	Ambient	2.2	40.4	-27.5	51.1	359.5	50000.0
19216.00	V	35.6	Ambient	2.2	40.4	-27.5	50.7	343.3	50000.0
21618.00	H	28.0	Ambient	2.2	40.6	-26.2	44.7	171.1	628.0
21618.00	V	29.0	Ambient	2.2	40.6	-26.2	45.7	191.9	628.0
24020.00	H	26.7	Ambient	2.2	40.6	-27.4	42.2	128.2	628.0
24020.00	V	27.1	Ambient	2.2	40.6	-27.4	42.6	134.2	628.0

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

Manufacturer : Delphi Electronics and Safety
Model No. : 28215842
Serial No. : 0037
Test Specification : FCC Part 15, Subpart C, Section 15.247, Radiated Emissions
Date : April 14 through 16, 2009
Mode : Transmit @ 2402.0MHz
Test Distance : 3 meters
Notes : Average measurements in Restricted Bands

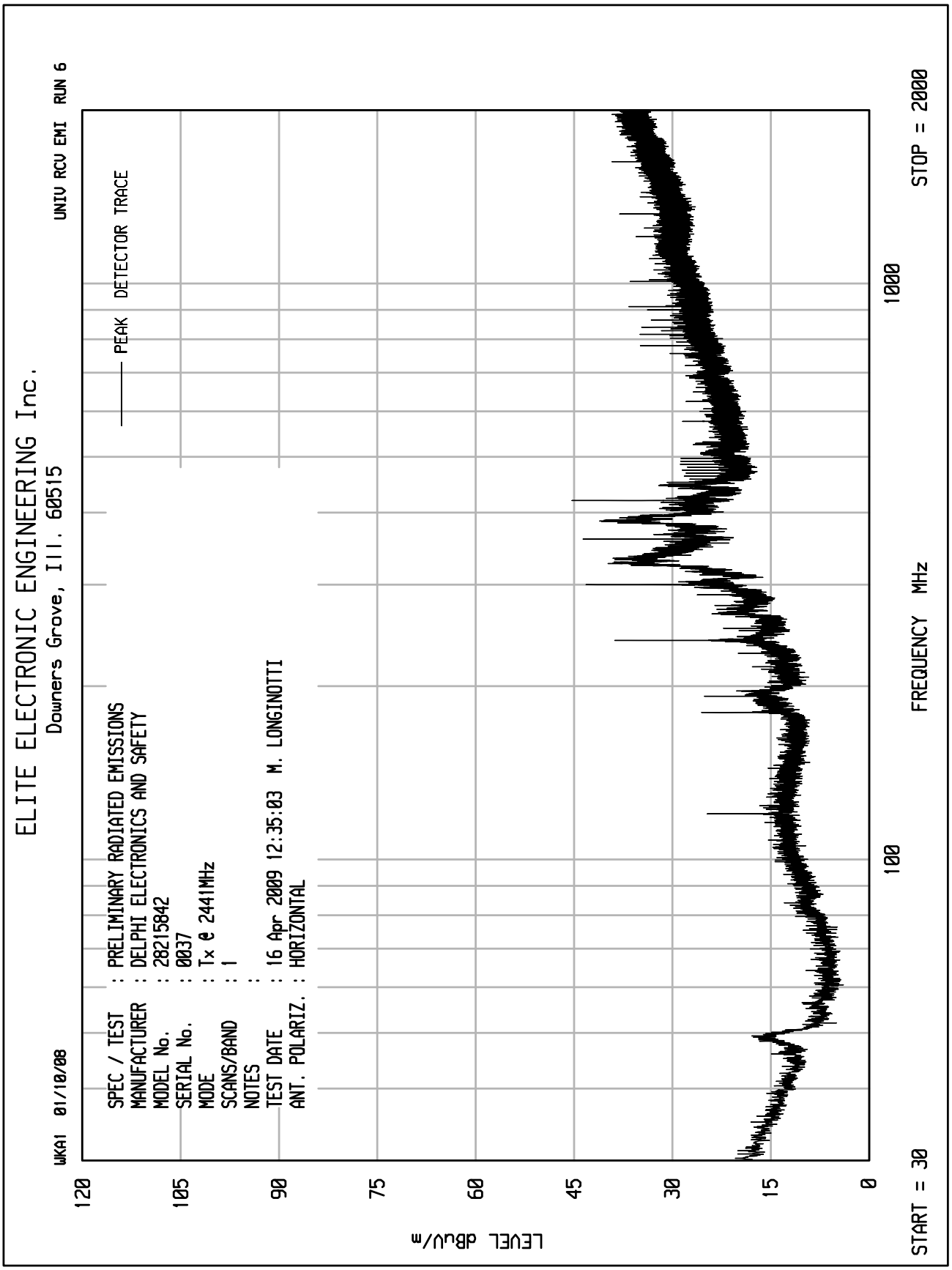
Frequency MHz	Antenna Polarity	Meter Reading dBuV	Ambient	Cable Loss dB	Antenna Factor dB	Pre Amp Gain dB	Total dBuV/m	Total uV/m	Limit uV/m
4804.0	H	37.7		5.7	34.5	-35.9	42.0	125.9	500.0
4804.0	V	41.2		5.7	34.5	-35.9	45.5	188.4	500.0
12010.0	H	29.9	Ambient	9.8	41.4	-34.4	46.7	215.8	500.0
12010.0	V	29.9	Ambient	9.8	41.4	-34.4	46.7	215.8	500.0
12010.0	H	29.9	Ambient	9.8	41.4	-34.4	46.7	215.8	500.0
12010.0	V	29.9	Ambient	9.8	41.4	-34.4	46.7	215.8	500.0

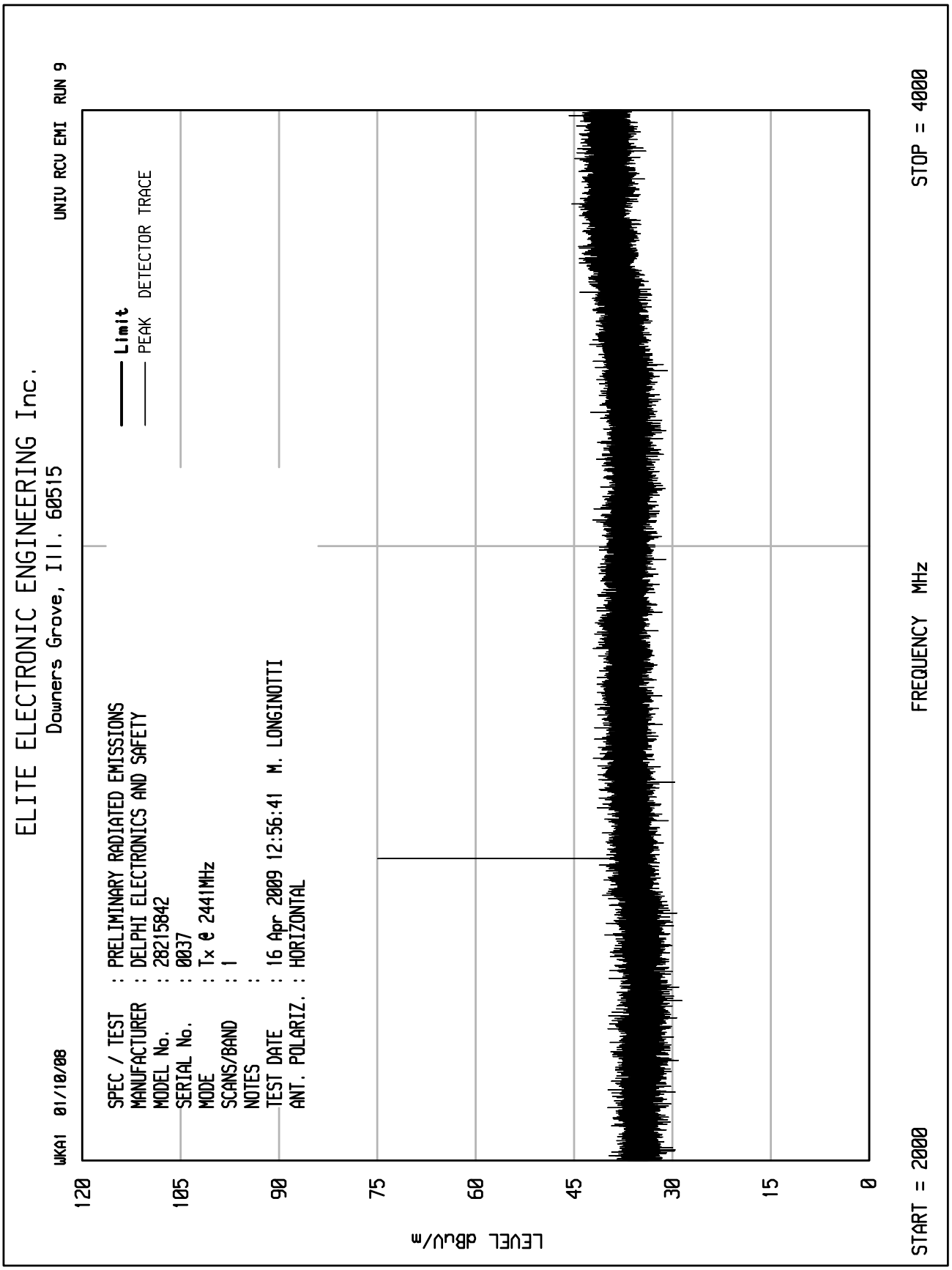
Total = Meter Reading + Cable Loss + Antenna Factor + Preamp Gain

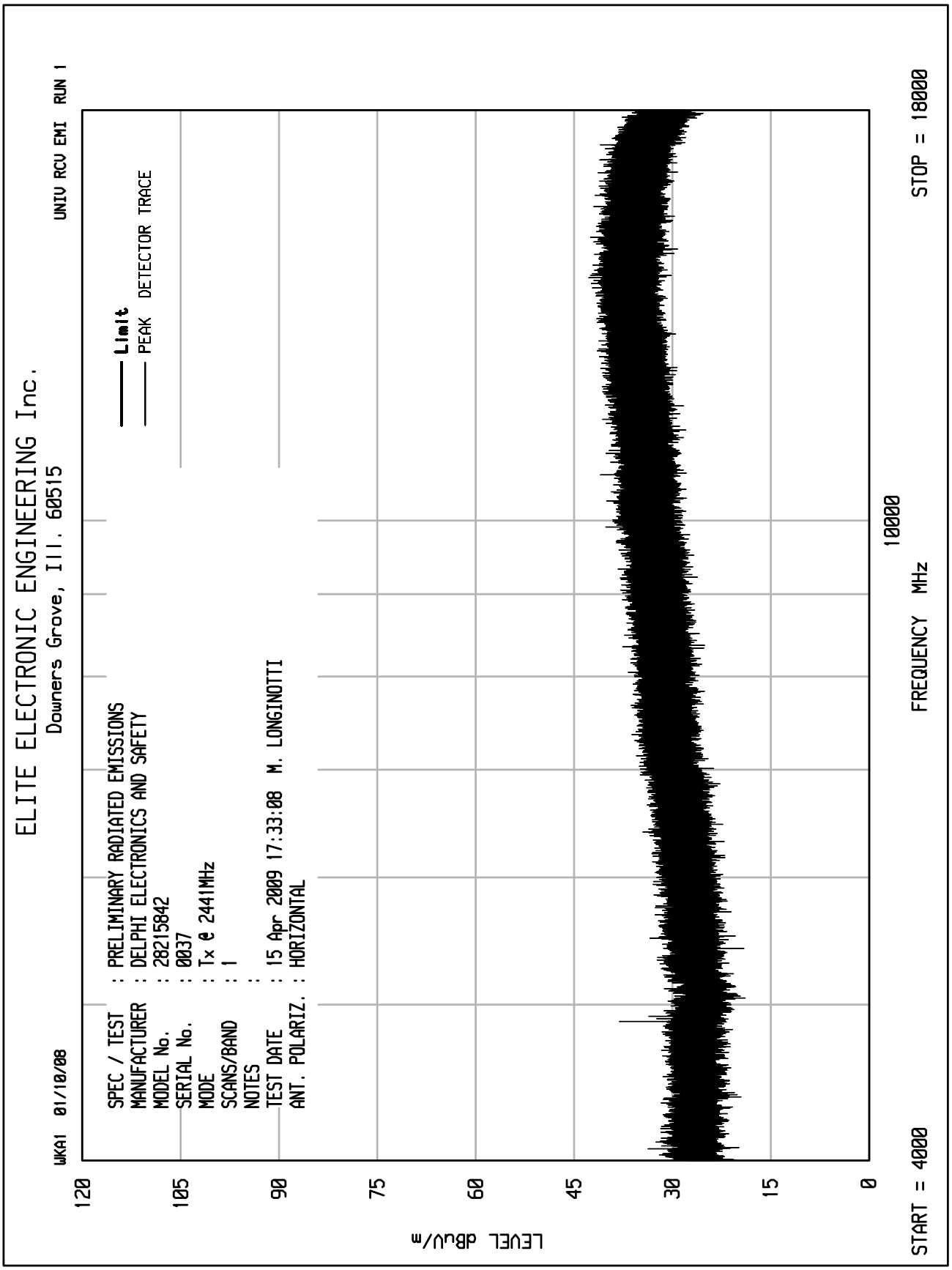
Manufacturer : Delphi Electronics and Safety
Model No. : 28215842
Serial No. : 0037
Test Specification : FCC Part 15, Subpart C, Section 15.247, Radiated Emissions
Date : April 14 through 16, 2009
Mode : Transmit @ 2402.0MHz
Test Distance : 3 meters
Notes : Quasi-peak measurements in Restricted Bands

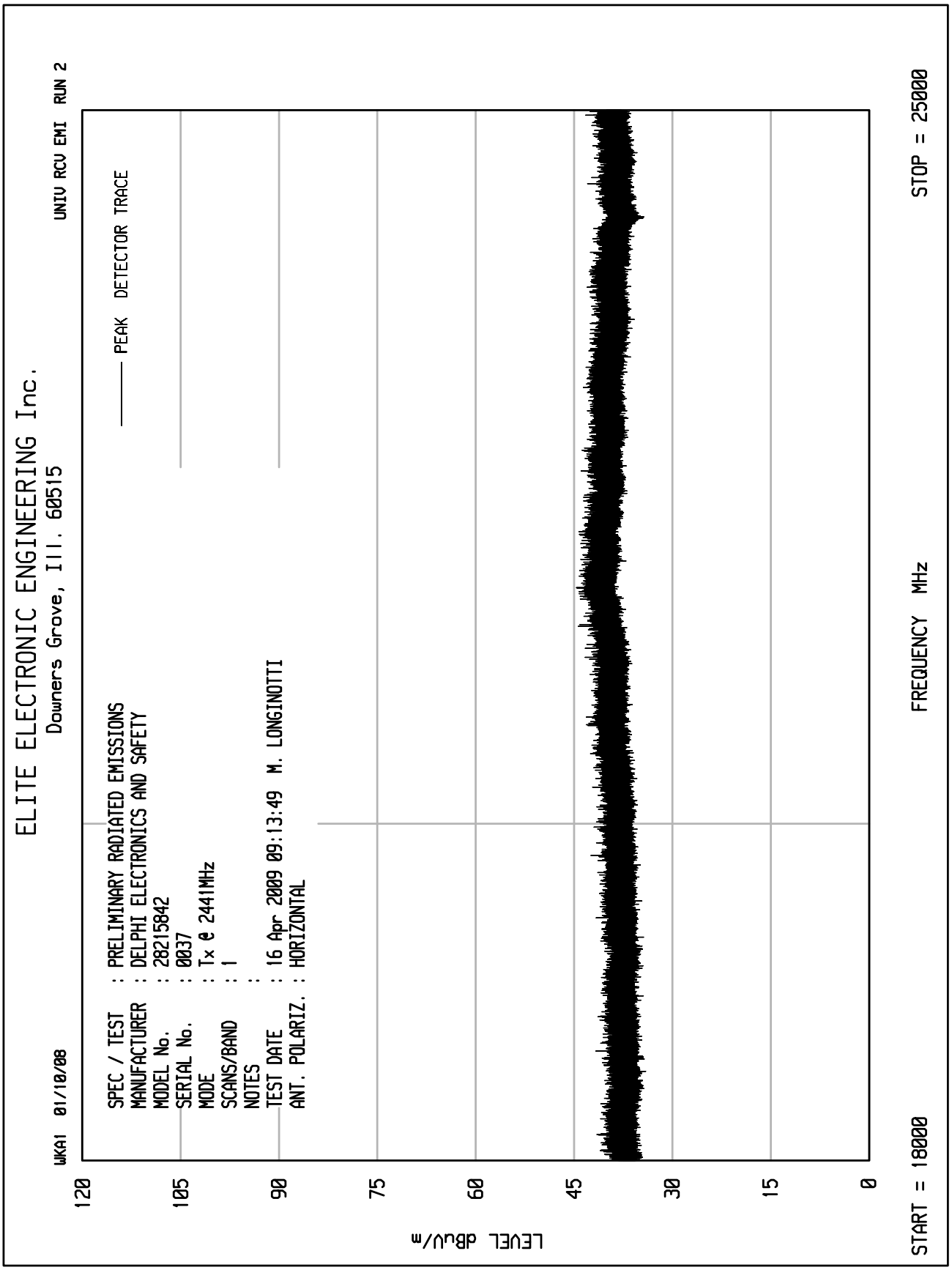
Frequency MHz	Antenna Polarity	Meter Reading dBuV	Ambient	Cable Loss dB	Antenna Factor dB	Pre Amp Gain dB	Total dBuV/m	Total uV/m	Limit uV/m
240.0	H	27.5		1.2	12.5	0.0	41.2	114.2	200.0
240.0	V	16.5		1.2	12.5	0.0	30.2	32.2	200.0
324.0	H	17.0		1.4	14.8	0.0	33.2	45.7	200.0
324.0	V	9.1		1.4	14.8	0.0	25.3	18.4	200.0

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


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 6
WKA1 01/10/08
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : DELPHI ELECTRONICS AND SAFETY
MODEL No. : 28215842
SERIAL No. : 0037
MODE : Tx @ 2441MHz
SCANS/BAND : 1
NOTES :
TEST DATE : 16 Apr 2009 12:35:03 M. LONGINOTTI
ANT. POLARIZ. : HORIZONTAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 30
100
1000
STOP = 2000
FREQUENCY MHz


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 9
WKA1 01/10/00
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : DELPHI ELECTRONICS AND SAFETY
MODEL No. : 28215842
SERIAL No. : 0037
MODE : Tx @ 2441MHz
SCANS/BAND : 1
NOTES :
TEST DATE : 16 Apr 2009 12:56:41 M. LONGINOTTI
ANT. POLARIZ. : HORIZONTAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 2000
FREQUENCY MHz
STOP = 4000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 1
WKA1 01/10/08
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : DELPHI ELECTRONICS AND SAFETY
MODEL No. : 28215842
SERIAL No. : 0037
MODE : Tx @ 2441MHz
SCANS/BAND : 1
NOTES :
TEST DATE : 15 Apr 2009 17:33:08 M. LONGINOTTI
ANT. POLARIZ. : HORIZONTAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 4000
10000
FREQUENCY MHz
STOP = 18000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 2
WKA1 01/10/08
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : DELPHI ELECTRONICS AND SAFETY
MODEL No. : 28215842
SERIAL No. : 0037
MODE : Tx @ 2441MHz
SCANS/BAND : 1
NOTES :
TEST DATE : 16 Apr 2009 09:13:49 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

Manufacturer : Delphi Electronics and Safety
Model No. : 28215842
Serial No. : 0037
Test Specification : FCC Part 15, Subpart C, Section 15.247, Radiated Emissions
Date : April 14 through 16, 2009
Mode : Transmit @ 2441.0 MHz
Test Distance : 3 meters
Notes : Gray rows indicate restricted bands which must meet the general limits
: Peak measurements

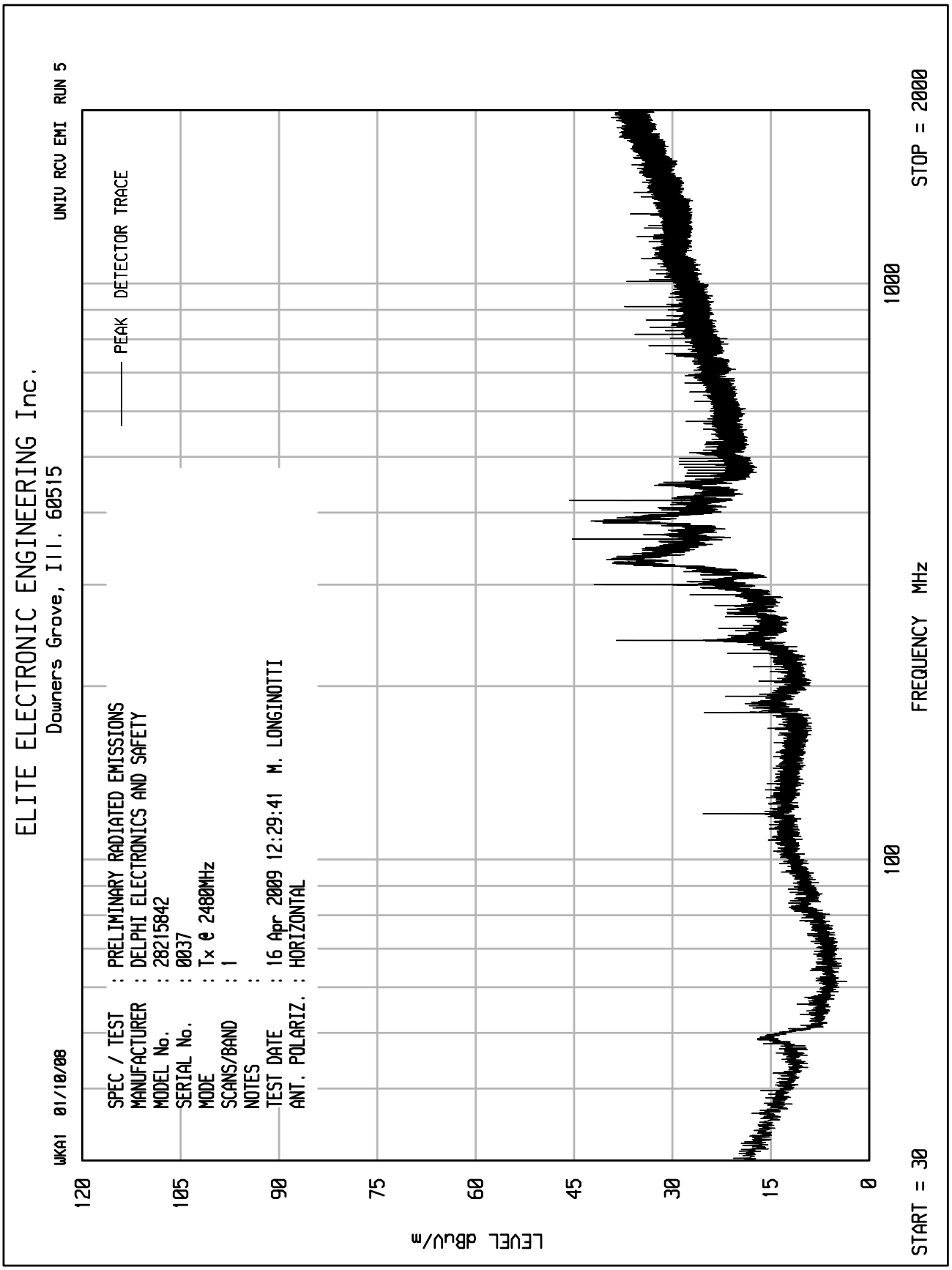
Frequency MHz	Antenna Polarity	Meter Reading dBuV	Ambient	Cable Loss dB	Antenna Factor dB	Pre Amp Gain dB	Total dBuV/m	Total uV/m	Limit uV/m
2441.0	H	41.4		3.8	31.4	0.0	76.6	6759.3	
2441.0	V	39.2		3.8	31.4	0.0	74.4	5246.9	
4882.0	H	44.8	Ambient	5.8	34.5	-35.9	49.2	287.2	5000.0
4882.0	V	46.3		5.8	34.5	-35.9	50.7	341.3	5000.0
7323.0	H	43.8	Ambient	7.7	38.1	-35.5	54.0	503.7	5000.0
7323.0	V	42.7	Ambient	7.7	38.1	-35.5	52.9	443.8	5000.0
9764.0	H	34.5	Ambient	8.6	39.9	-35.0	47.9	248.7	675.9
9764.0	V	33.4	Ambient	8.6	39.9	-35.0	46.8	219.1	675.9
12205.0	H	42.8	Ambient	9.9	41.4	-34.4	59.6	959.4	5000.0
12205.0	V	43.2	Ambient	9.9	41.4	-34.4	60.0	1004.6	5000.0
14646.0	H	33.0	Ambient	1.5	44.1	-33.9	44.6	170.5	675.9
14646.0	V	31.4	Ambient	1.5	44.1	-33.9	43.0	141.9	675.9
17087.0	H	31.9	Ambient	1.9	44.5	-34.0	44.3	164.1	675.9
17087.0	V	32.0	Ambient	1.9	44.5	-34.0	44.4	166.0	675.9
19528.0	H	35.2	Ambient	2.2	40.4	-27.2	50.6	340.3	50000.0
19528.0	V	35.3	Ambient	2.2	40.4	-27.2	50.7	344.2	50000.0
21969.0	H	27.6	Ambient	2.2	40.6	-26.9	43.5	148.8	675.9
21969.0	V	27.8	Ambient	2.2	40.6	-26.9	43.7	152.2	675.9
24410.0	H	26.4	Ambient	2.2	40.6	-27.5	41.8	122.5	675.9
24410.0	V	25.7	Ambient	2.2	40.6	-27.5	41.1	113.0	675.9

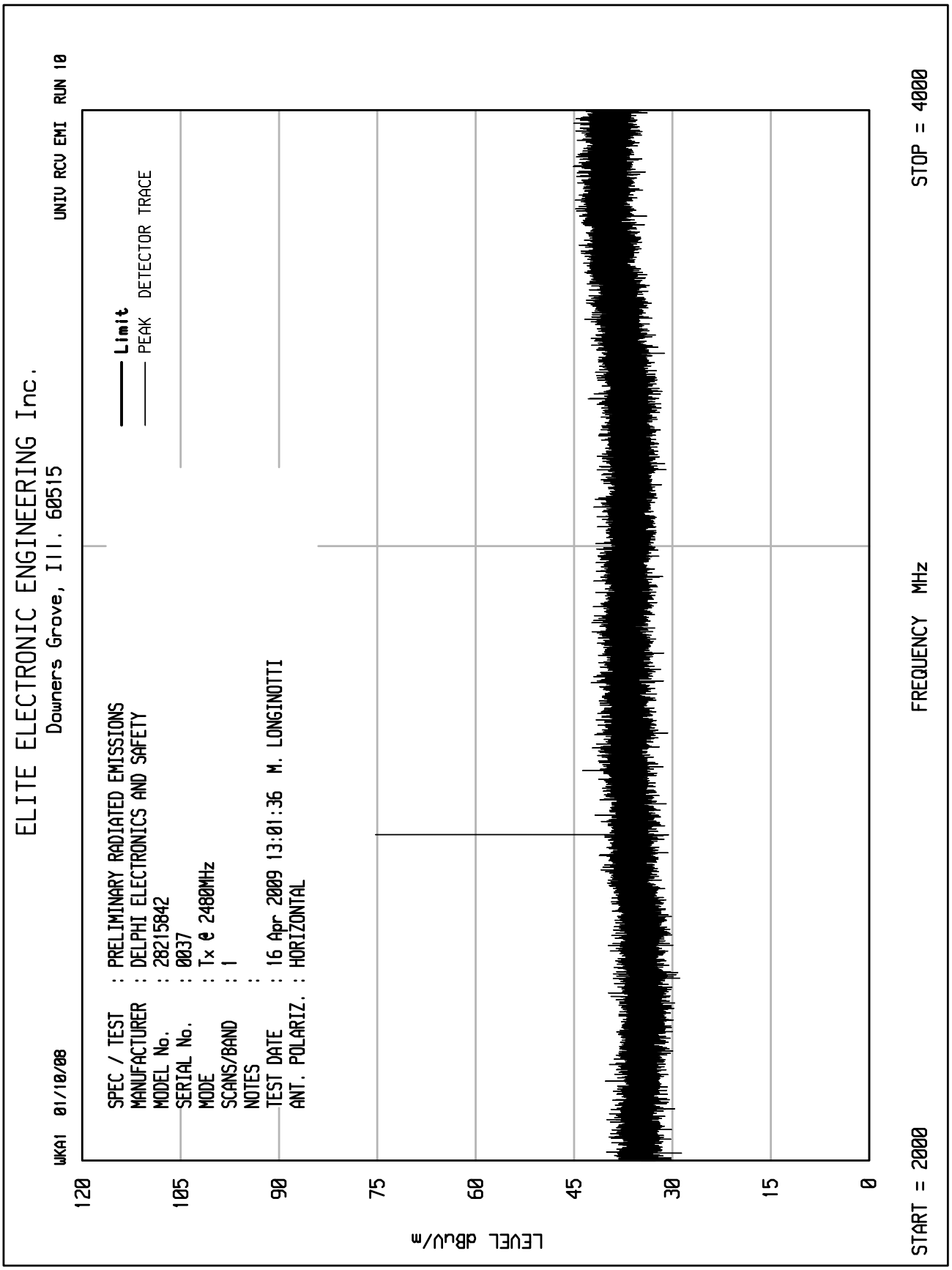
Total = Meter Reading + Cable Loss + Antenna Factor + Preamp Gain

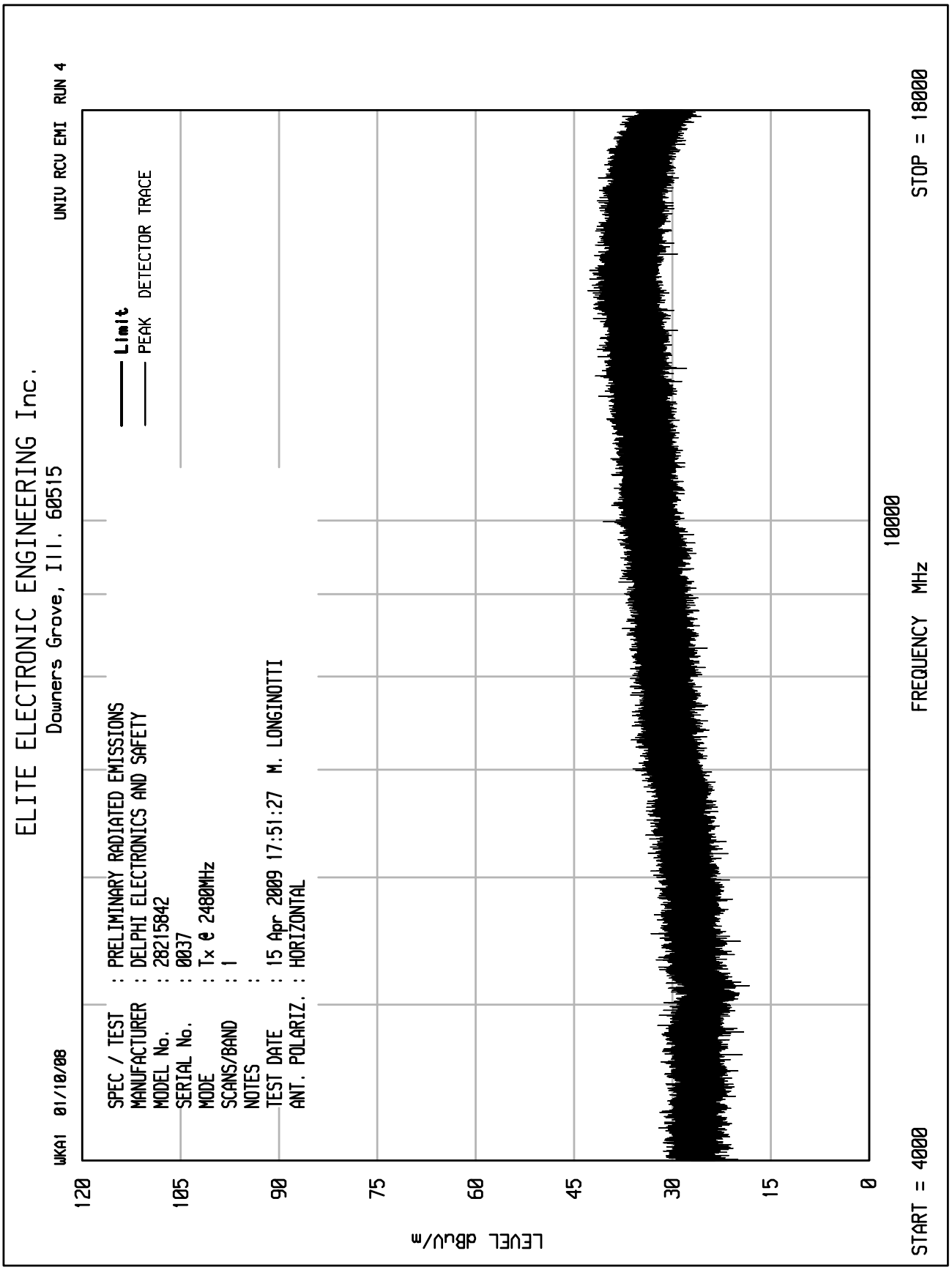
Data Page

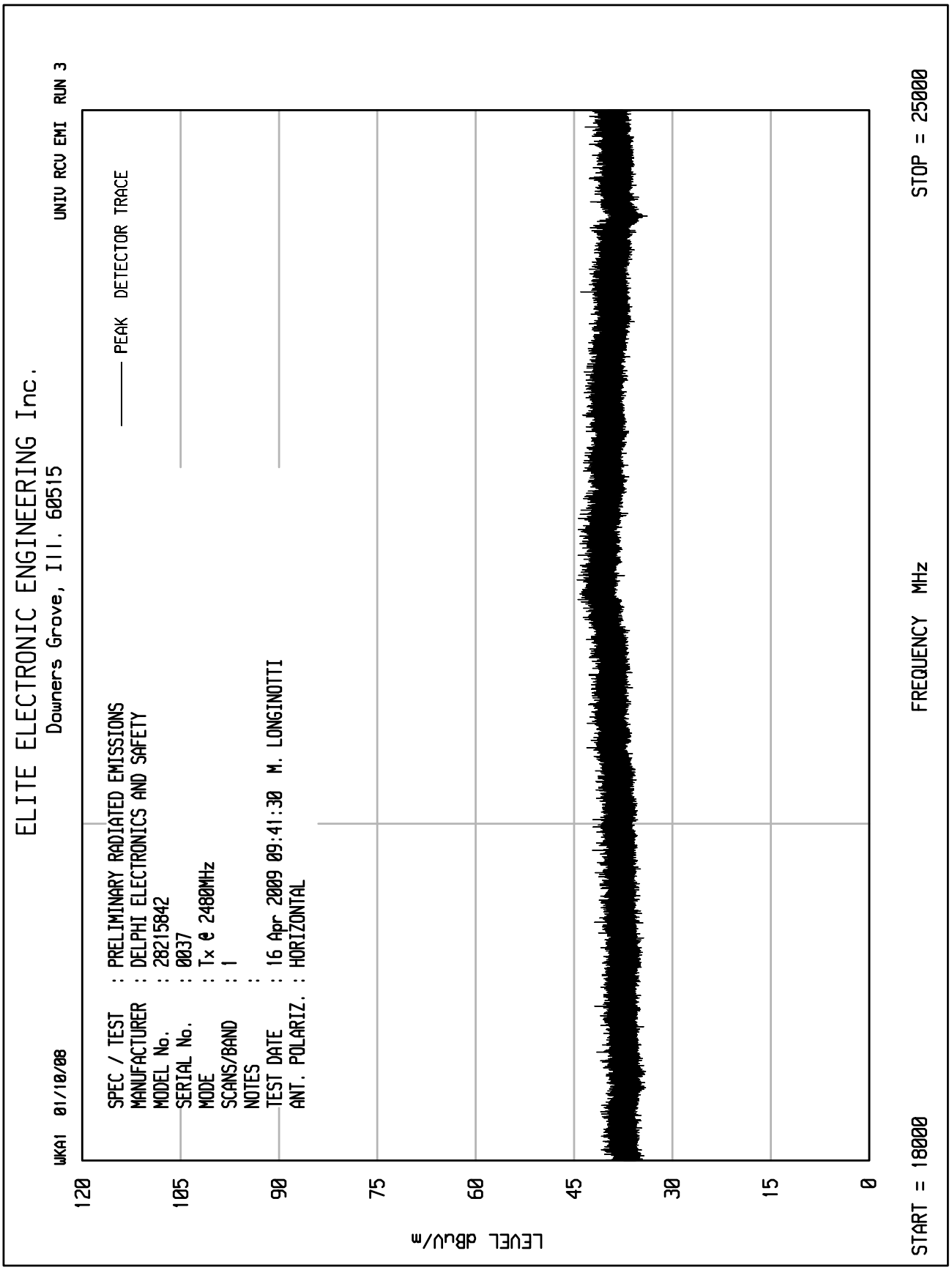
Manufacturer : Delphi Electronics and Safety
Model No. : 28215842
Serial No. : 0037
Test Specification : FCC Part 15, Subpart C, Section 15.247, Radiated Emissions
Date : April 14 through 16, 2009
Mode : Transmit @ 2441.0 MHz
Test Distance : 3 meters
Notes : Average measurements in restricted bands

Frequency MHz	Antenna Polarity	Meter Reading dBuV	Ambient	Cable Loss dB	Antenna Factor dB	Pre Amp Gain dB	Total dBuV/m	Total uV/m	Limit uV/m
4882.0	H	38.1		5.8	34.5	-35.9	42.5	132.8	500.0
4882.0	V	39.7		5.8	34.5	-35.9	44.1	159.7	500.0
7323.0	H	30.3	Ambient	7.7	38.1	-35.5	40.5	106.5	500.0
7323.0	V	30.3	Ambient	7.7	38.1	-35.5	40.5	106.5	500.0
12205.0	H	29.6	Ambient	9.9	41.4	-34.4	46.4	209.9	500.0
12205.0	V	29.7	Ambient	9.9	41.4	-34.4	46.5	212.3	500.0
19528.0	H	23.9	Ambient	2.2	40.4	-27.2	39.3	92.7	500.0
19528.0	V	23.5	Ambient	2.2	40.4	-27.2	38.9	88.5	500.0


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 5
WKA1 01/10/08
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : DELPHI ELECTRONICS AND SAFETY
MODEL No. : 28215842
SERIAL No. : 0037
MODE : Tx @ 2480MHz
SCANS/BAND : 1
NOTES :
TEST DATE : 16 Apr 2009 12:29:41 M. LONGINOTTI
ANT. POLARIZ. : HORIZONTAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 30
100
1000
STOP = 2000
FREQUENCY MHz


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 10
WKA1 01/10/08
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : DELPHI ELECTRONICS AND SAFETY
MODEL No. : 28215842
SERIAL No. : 0037
MODE : Tx @ 2400MHz
SCANS/BAND : 1
NOTES :
TEST DATE : 16 Apr 2009 13:01:36 M. LONGINOTTI
ANT. POLARIZ. : HORIZONTAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 2000
FREQUENCY MHz
STOP = 4000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 4
WKA1 01/10/08
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : DELPHI ELECTRONICS AND SAFETY
MODEL No. : 28215842
SERIAL No. : 0037
MODE : Tx @ 2400MHz
SCANS/BAND : 1
NOTES :
TEST DATE : 15 Apr 2009 17:51:27 M. LONGINOTTI
ANT. POLARIZ. : HORIZONTAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 4000
10000
FREQUENCY MHz
STOP = 18000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 3
WKA1 01/10/08
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : DELPHI ELECTRONICS AND SAFETY
MODEL No. : 28215842
SERIAL No. : 0037
MODE : Tx @ 2480MHz
SCANS/BAND : 1
NOTES :
TEST DATE : 16 Apr 2009 09:41:30 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

Manufacturer : Delphi Electronics and Safety
Model No. : 28215842
Serial No. : 0037
Test Specification : FCC Part 15, Subpart C, Section 15.247, Radiated Emissions
Date : April 14 through 16, 2009
Mode : Transmit @ 2480.0 MHz
Test Distance : 3 meters
Notes : Gray rows indicate restricted bands which must meet the general limits
: Peak measurements

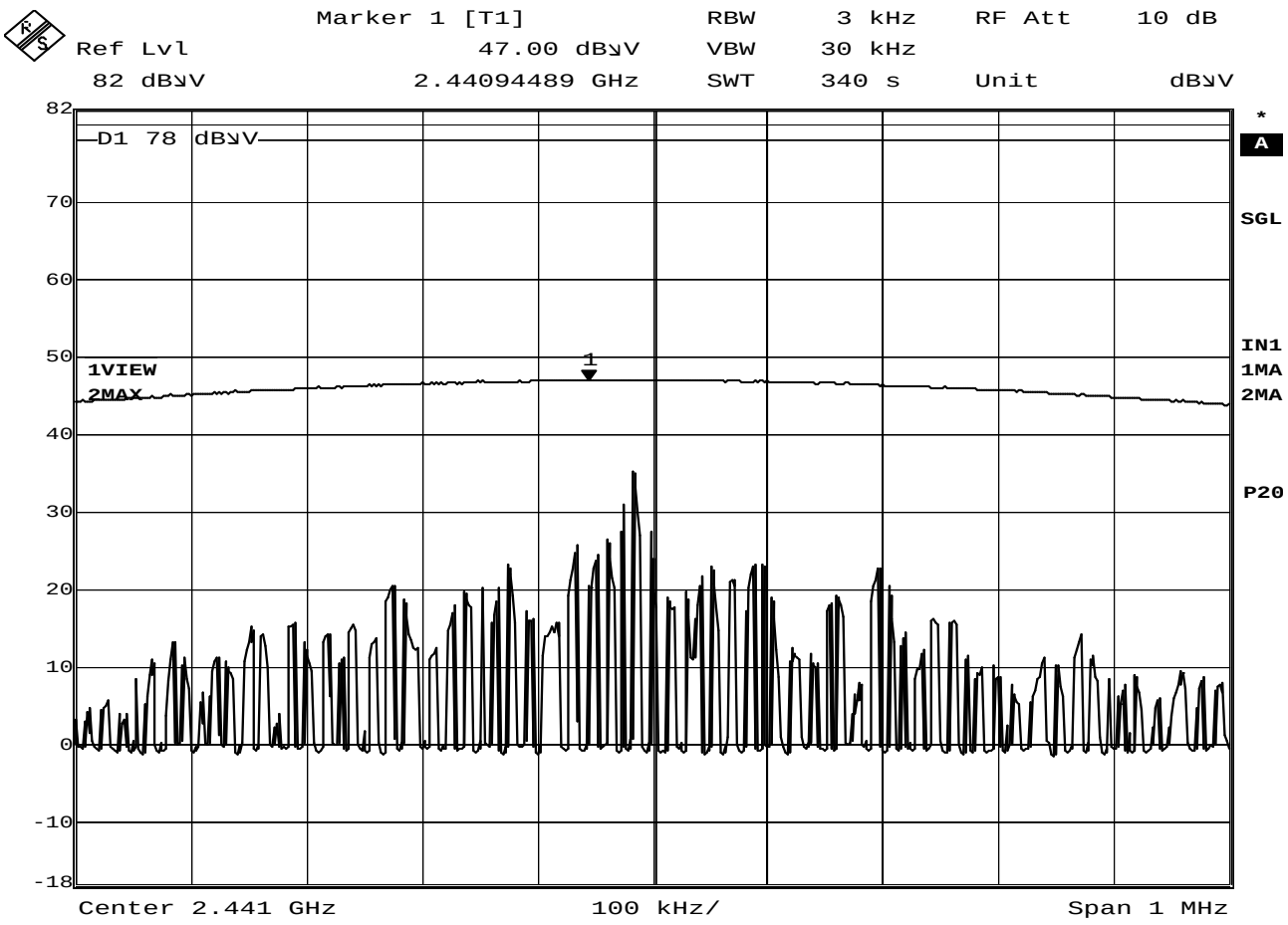
Frequency MHz	Antenna Polarity	Meter Reading dBuV	Ambient	Cable Loss dB	Antenna Factor dB	Pre Amp Gain dB	Total dBuV/m	Total uV/m	Limit uV/m
2480.0	H	43.4		3.8	31.4	0.0	78.6	8546.7	
2480.0	V	41.2		3.8	31.4	0.0	76.4	6634.4	
4960.0	H	46.0	Ambient	5.8	34.5	-35.9	50.4	332.1	5000.0
4960.0	V	44.3	Ambient	5.8	34.5	-35.9	48.7	273.1	5000.0
7440.0	H	43.3	Ambient	7.7	38.1	-35.5	53.6	480.7	5000.0
7440.0	V	43.2	Ambient	7.7	38.1	-35.5	53.5	475.2	5000.0
9920.0	H	33.1	Ambient	8.5	40.0	-35.0	46.6	215.0	854.7
9920.0	V	33.9	Ambient	8.5	40.0	-35.0	47.4	235.7	854.7
12400.0	H	43.3	Ambient	9.9	41.3	-34.4	60.2	1022.8	5000.0
12400.0	V	43.6	Ambient	9.9	41.3	-34.4	60.5	1058.8	5000.0
14880.0	H	31.5	Ambient	1.5	44.5	-34.0	43.5	150.0	854.7
14880.0	V	32.9	Ambient	1.5	44.5	-34.0	44.9	176.2	854.7
17360.0	H	32.1	Ambient	2.0	44.4	-33.9	44.6	168.9	854.7
17360.0	V	32.8	Ambient	2.0	44.4	-33.9	45.3	183.1	854.7
19840.0	H	35.6	Ambient	2.2	40.4	-26.9	51.4	369.9	50000.0
19840.0	V	35.4	Ambient	2.2	40.4	-26.9	51.2	361.5	50000.0
22320.0	H	36.6	Ambient	2.2	40.6	-27.1	52.3	414.1	50000.0
22320.0	V	36.2	Ambient	2.2	40.6	-27.1	51.9	395.4	50000.0
24800.0	H	26.3	Ambient	2.2	40.6	-27.2	41.9	124.9	854.7
24800.0	V	26.0	Ambient	2.2	40.6	-27.2	41.6	120.6	854.7

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

Manufacturer : Delphi Electronics and Safety
Model No. : 28215842
Serial No. : 0037
Test Specification : FCC Part 15, Subpart C, Section 15.247, Radiated Emissions
Date : April 14 through 16, 2009
Mode : Transmit @ 2480.0 MHz
Test Distance : 3 meters
Notes : Average measurements in restricted bands

Frequency MHz	Antenna Polarity	Meter Reading dBuV	Ambient	Cable Loss dB	Antenna Factor dB	Pre Amp Gain dB	Total dBuV/m	Total uV/m	Limit uV/m
4960.0	H	40.1		5.8	34.5	-35.9	44.5	168.4	500.0
4960.0	V	37.6		5.8	34.5	-35.9	42.0	126.3	500.0
7440.0	H	29.7	Ambient	7.7	38.1	-35.5	40.0	100.4	500.0
7440.0	V	29.7	Ambient	7.7	38.1	-35.5	40.0	100.4	500.0
12400.0	H	29.8	Ambient	9.9	41.3	-34.4	46.7	216.2	500.0
12400.0	V	29.8	Ambient	9.9	41.3	-34.4	46.7	216.2	500.0
19840.0	H	23.6	Ambient	2.2	40.4	-26.9	39.4	92.9	500.0
19840.0	V	23.1	Ambient	2.2	40.4	-26.9	38.9	87.7	500.0
22320.0	H	24.9	Ambient	2.2	40.6	-27.1	40.6	107.7	500.0
22320.0	V	24.7	Ambient	2.2	40.6	-27.1	40.4	105.2	500.0

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



FCC 15.247 Power Spectral Density

MANUFACTURER	: Delphi Electronics and Safety
PART NUMBER	: 28215842
SERIAL NUMBER	: 0037
TEST MODE	: Inquiry Mode
TEST PARAMETER	: Power Spectral Density
NOTES	: 76.6dBuV/m = -23.0 dBm matched in 1MHz RBW.
	: Top Trace = 47.0 dBuV is the peak equivalent to
	: -23.0 dBm. Display line (D1) is equal to + 8dBm;
	: (8 – (-23.0) = 31.0 dB difference;
	: 47.0 dBuV + 31.0 dB = 78.0 dBuV.
	: Bottom trace = power spectral density in 3kHz
	: RBW with 340 second sweep time.
EQUIPMENT USED	: RBB0,NWI0