



## Measurement of RF Emissions from a CD305 Smart Tag Transmitter

---

For	Physical Graph Corporation 11654 Plaza America Drive Reston, VA 20190
P.O. Number	Credit Card
Date Tested	November 13 -14, 2012
Test Personnel	Richard King
Test Specification	FCC "Code of Federal Regulations" Title 47, Part 15, Subpart C, Section 15.247 for Frequency Hopping Spread Spectrum Intentional Radiators or Digital Modulation Intentional Radiators Operating within The 2400-2483.5MHz band

Test Report By:

*Richard E. King*

Richard King  
EMC Engineer

Requested By:

Andrew Sterian  
Physical Graph Corporation

Approved By:

*Raymond J. Klouda*

Raymond J. Klouda  
Registered Professional  
Engineer of Illinois - 44894

**TABLE OF CONTENTS**

PARAGRAPH	DESCRIPTION OF CONTENTS	PAGE NO.
1. Introduction.....		5
1.1. Scope of Tests.....		5
1.2. Purpose .....		5
1.3. Deviations, Additions and Exclusions.....		5
1.4. EMC Laboratory Identification .....		5
1.5. Laboratory Conditions.....		5
2. Applicable Documents.....		5
3. EUT Setup and Operation.....		5
3.1. General Description .....		5
3.1.1. Power Input.....		5
3.1.2. Peripheral Equipment .....		6
3.1.3. Signal Input/Output Leads .....		6
3.1.4. Grounding .....		6
3.2. Operational Mode .....		6
3.3. EUT Modifications.....		6
4. Test Facility and Test Instrumentation .....		6
4.1. Shielded Enclosure.....		6
4.2. Test Instrumentation.....		6
4.3. Calibration Traceability .....		6
4.4. Measurement Uncertainty .....		6
5. Test Procedures .....		7
5.1. 6dB Bandwidth.....		7
5.1.1. Requirement.....		7
5.1.2. Procedures.....		7
5.1.3. Results .....		7
5.2. Output Power.....		7
5.2.1. Requirements.....		7
5.2.2. Procedures.....		7
5.2.3. Results .....		7
5.3. Radiated Spurious Emissions Measurements.....		8
5.3.1. Requirements.....		8
5.3.2. Procedures.....		8
5.3.3. Results .....		9
5.4. Band Edge Compliance .....		10
5.4.1. Requirement.....		10
5.4.2. Procedures.....		10
5.4.2.1 Low Band Edge .....		10
5.4.2.2 High Band Edge.....		10
5.4.3. Results .....		10
5.5. Power Spectral Density .....		11
5.5.1.1 Requirement .....		11
5.5.1.2 Procedures .....		11
5.5.1.3 Results .....		11

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

**TABLE OF CONTENTS**

PARAGRAPH	DESCRIPTION OF CONTENTS	PAGE NO.
6.	Other Test Conditions .....	11
6.1.	Test Personnel and Witnesses.....	11
6.2.	Disposition of the EUT.....	11
7.	Conclusions.....	11
8.	Certification.....	11
9.	Equipment List.....	12

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



**REVISION HISTORY**

Revision	Date	Description
—	5 December 2012	Initial release

## Measurement of RF Emissions from a Smart Tag, Model No. CD305 Transmitter

### 1. INTRODUCTION

#### 1.1. Scope of Tests

This report represents the results of the series of radio interference measurements performed on a Physical Graph Corporation Smart Tag, Model No. CD305, Serial No. rev. C, transmitter (hereinafter referred to as the EUT). The EUT is a digital transmission system (DTS) transmitter. The transmitter was designed to transmit in the 2400-2483.5 MHz band using an internal antenna. The EUT was manufactured and submitted for testing by Physical Graph Corporation located in Reston, VA.

#### 1.2. Purpose

The test series was performed to determine if the EUT meets the conducted and radiated RF emission requirements of the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart C, Section 15.247 for Intentional Radiators. Testing was performed in accordance with ANSI C63.4-2009.

#### 1.3. Deviations, Additions and Exclusions

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

#### 1.4. EMC Laboratory Identification

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

#### 1.5. Laboratory Conditions

The temperature at the time of the test was 23°C and the relative humidity was 43%.

### 2. APPLICABLE DOCUMENTS

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

- Federal Communications Commission "Code of Federal Regulations", Title 47, Part 15, Subpart C, dated 1 October 2012
- ANSI C63.4-2009, "American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz"
- Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247, KDB 558074, October 4, 2012

### 3. EUT SETUP AND OPERATION

#### 3.1. General Description

The EUT is a Physical Graph Corporation, Smart Tag, Model No. CD305. A block diagram of the EUT setup is shown as Figure 1.

##### 3.1.1. Power Input

The EUT was powered with 3 VDC from an internal rechargeable lithium battery.

### 3.1.2. Peripheral Equipment

The following peripheral equipment was submitted with the EUT:

Item	Description
MacBook Pro	Model a1226 used to program the EUT

### 3.1.3. Signal Input/Output Leads

The following interconnect cables were submitted with the EUT

Item	Description
Interconnect Cable	1 meter USB unshielded cable to provide power and programming connection to the EUT

### 3.1.4. Grounding

The EUT was not grounded during the tests.

## 3.2. Operational Mode

The unit was programmed to operate in one of the following modes:

- Transmit at 2415MHz, CH. 13
- Transmit at 2440MHz, CH. 18
- Transmit at 2470MHz, CH. 24

## 3.3. EUT Modifications

No modifications were required for compliance to the 15.247 requirements.

## 4. TEST FACILITY AND TEST INSTRUMENTATION

### 4.1. Shielded Enclosure

All tests were performed in a 32ft. x 20ft. x 18ft. hybrid ferrite-tile/anechoic absorber lined test chamber. With the exception of the floor, the reflective surfaces of the shielded chamber are lined with ferrite tiles on the walls and ceiling. Anechoic absorber material is installed over the ferrite tile. The floor of the chamber is used as the ground plane. The chamber complies with ANSI C63.4-2009 for site attenuation.

### 4.2. Test Instrumentation

The test instrumentation and auxiliary equipment used during the tests are listed in Table 9-1. Conducted and radiated emission measurements were performed with a spectrum analyzer. This receiver allows measurements with the bandwidths and detector functions specified by the FCC.

### 4.3. Calibration Traceability

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

### 4.4. Measurement Uncertainty

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

Conducted Emissions Measurements		
Combined Standard Uncertainty	1.07	-1.07

Expanded Uncertainty (95% confidence)	2.1	-2.1
---------------------------------------	-----	------

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

## 5. TEST PROCEDURES

### 5.1. 6dB Bandwidth

#### 5.1.1. Requirement

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

#### 5.1.2. Procedures

The EUT was allowed to transmit continuously. The transmit channel was set separately to low, middle, and high channels. The resolution bandwidth (RBW) was set to 30kHz 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.

#### 5.1.3. Results

The plots on pages 16 through 18 show that the minimum 6 dB bandwidth was 1.8 MHz which is greater than minimum allowable 6dB bandwidth requirement of 500kHz for systems using digital modulation techniques.

### 5.2. Output Power

#### 5.2.1. Requirements

Per section 15.247(b)(3), for systems using digital modulation, the peak output conducted power shall not be greater than 1.0W (30dBm). The limit is based on the use of antennas with directional gains that do not exceed 6dBi. Since the requirements allow for a 6dBi antenna gain, the de facto maximum EIRP is the 30dBm limit increased by 6dB or 4 Watt (36dBm).

#### 5.2.2. Procedures

For the radiated measurements, the EUT 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 EUT. The resolution bandwidth (RBW) of the spectrum analyzer was set to the maximum bandwidth. The EUT was maximized for worst case emissions (or maximum output power) at the measuring antenna. The maximum meter reading was recorded. The 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 tuned dipole antenna was then set in place of the EUT and connected to a calibrated signal generator. The output of the signal generator was adjusted to match the received level at the spectrum analyzer. The signal level was recorded. The reading was then corrected to compensate for cable loss and antenna gain, as required. The peak power output was calculated for low, middle, and high channels.

#### 5.2.3. Results

The results for EIRP measurements are presented on page 19. The EIRP measured from the transmitter was 12.4 dBm or 17.3 mW which is below the 4 Watt limit

### 5.3. Radiated Spurious Emissions Measurements

#### 5.3.1. Requirements

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

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

#### 5.3.2. Procedures

All tests were performed in a 32ft. x 20ft. x 18ft. hybrid ferrite-tile/anechoic absorber lined test chamber. The walls and ceiling of the shielded chamber are lined with ferrite tiles. Anechoic absorber material is installed over the ferrite tile. The floor of the chamber is used as the ground plane. The chamber complies with ANSI C63.4-2009 for site attenuation.

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

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

The final open field emission tests were then manually performed over the frequency range of 30MHz to 25GHz.

1) For all harmonics not in the restricted bands, the following procedure was used:

- a) The field strength of the fundamental was measured using a double ridged waveguide antenna. The waveguide antenna was positioned at a 3 meter distance from the 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 where it was necessary to use a shortened cable between the measuring antenna and the spectrum analyzer, the measuring antenna was not raised or lowered to ensure maximized readings. Instead the test item was rotated through all axes 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 bi-log antenna. The bi-log antenna was positioned at a 3 meter distance from the EUT. A peak detector with a resolution bandwidth of 100 kHz was used on the spectrum analyzer.
- b) The field strengths of all emissions above 1 GHz were measured using a double-ridged waveguide antenna. The waveguide antenna was positioned at a 3 meter distance from the EUT. A peak detector with a resolution bandwidth of 1 MHz was used on the spectrum analyzer.
- c) To ensure that maximum or worst case emission levels were measured, the following steps were taken when taking all measurements:
  - i) The EUT was rotated so that all of its sides were exposed to the receiving antenna.
  - ii) Since the measuring antenna is linearly polarized, both horizontal and vertical field components were measured.
  - iii) The measuring antenna was raised and lowered for each antenna polarization to maximize the readings.
  - iv) In instances where it was necessary to use a shortened cable between the measuring antenna and the spectrum analyzer, the measuring antenna was not raised or lowered to ensure maximized readings. Instead the EUT was rotated through all axis to ensure the maximum readings were recorded for the EUT.

d) For all radiated emissions measurements below 1 GHz, if the peak reading is below the limits listed in 15.209(a), no further measurements are required. If however, the peak readings exceed the limits listed in 15.209(a), then the emissions are remeasured using a quasi-peak detector.

e) For all radiated emissions measurements above 1 GHz, the peak readings must comply with the 15.35(b) limits. 15.35(b) states that when average radiated emissions measurements are specified, there also is a limit on the peak level of the radiated emissions. The limit on the peak radio frequency emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test. Therefore, all peak readings above 1 GHz must be no greater than 20 dB above the limits specified in 15.209(a).

f) Next, for all radiated emissions measurements above 1GHz, the resolution bandwidth was set to 1MHz. The analyzer was set to linear mode with a 10Hz video bandwidth in order to simulate an average detector. The average reading was recorded.

### 5.3.3. Results

Preliminary radiated emissions plots for both antennas with the EUT transmitting at 2415 MHz, 2440 MHz, and 2470 MHz are shown on pages 20 through 45. Final radiated emissions data are presented on data pages 46 through 52. As can be seen from the data, all radiated emissions measured from the EUT were within the specification limits.

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

## 5.4. Band Edge Compliance

### 5.4.1. Requirement

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

### 5.4.2. Procedures

#### 5.4.2.1 Low Band Edge

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

#### 5.4.2.2 High Band Edge

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

### 5.4.3. Results

Pages 53 through 55 show the radiated band-edge compliance results. As can be seen from these plots, the radiated emissions at the low end band edge are within the 20 dB down limits. The radiated emissions at the high end band edge are within the general limits.

## 5.5. Power Spectral Density

### 5.5.1.1 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.

### 5.5.1.2 Procedures

- 1) The EUT was placed in the test enclosure and set to transmit at the low channel.
- 2) The measurement procedure PKPSD of the DTS Meas Guidance KDB 558074
- 3) The EUT was then placed in the normal operation mode (for DTS devices)
- 4) To determine the power spectral density, the following spectrum analyzer settings were used:
  - a. Center frequency = transmit frequency
  - b. Set the span to 1.5 times DTS bandwidth
  - c. Resolution bandwidth (RBW) = 3 kHz
  - d. Sweep time = auto couple
  - e. Detector = peak
  - f. Trace = max hold
  - g. Allow trace to stabilize
  - h. The peak marker function was used to determine the maximum amplitude level.
  - i. The analyzer's display was plotted using a 'screen dump' utility.
  - j. The test was repeated for all frequencies and modulations.

### 5.5.1.3 Results

Pages 56 through 58 show 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. OTHER TEST CONDITIONS

### 6.1. Test Personnel and Witnesses

All tests were performed by qualified personnel from Elite Electronic Engineering Incorporated. The test series was witnessed by Physical Graph Corporation personnel.

### 6.2. Disposition of the EUT

The EUT and all associated equipment were returned to Physical Graph Corporation upon completion of the tests.

## 7. CONCLUSIONS

It was determined that the Physical Graph Corporation Smart Tag, Model No. CD305, Serial No. rev. C and Serial No. 7 did fully meet the requirements of the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart C, for Intentional Radiators.

## 8. CERTIFICATION

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

The data presented in this test report pertains to the EUT at the test date as operated by Physical Graph Corporation personnel. Any electrical or mechanical modification made to the EUT subsequent to the specified test date will serve to invalidate the data and void this certification.

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



## 9. EQUIPMENT LIST

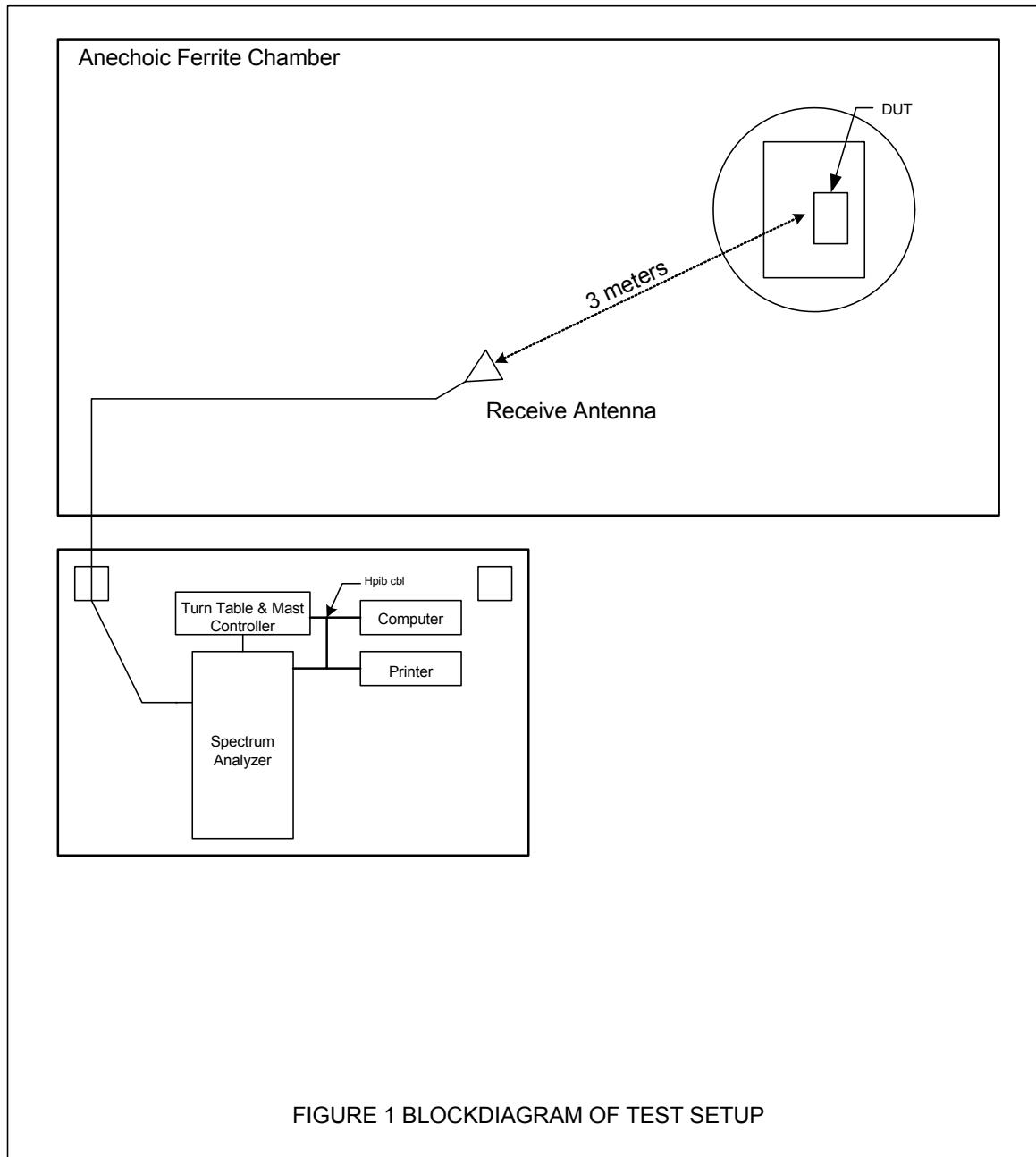
**Table 9-1 Equipment List**

Eq ID	Equipment Description	Manufacturer	Model No.	Serial No.	Frequency Range	Cal Date	Due Date
APW0	PREAMPLIFIER	PLANAR ELECTRONICS	PE2-30-20G20R6G	PL2926/0646	20GHZ-26.5GHZ	8/9/2012	8/9/2013
APW3	PREAMPLIFIER	PLANAR ELECTRONICS	PE2-35-120-5R0-10-12	PL2924	1GHZ-20GHZ	8/22/2012	8/22/2013
CDX2	COMPUTER	ELITE	WORKSTATION	---	---	N/A	
CDX8	COMPUTER	ELITE	WORKSTATION			N/A	
CLT3	LAPTOP COMPUTER	SONY	PCG-GRT390ZP	3001143	---	NOTE 1	
GBR6	SIGNAL GENERATOR	HEWLETT PACKARD	8648C	3642U02047	9KHZ-3000MHZ	2/22/2012	2/22/2013
NHG1	STANDARD GAIN HORN ANTENNA	NARDA	638	---	18-26.5GHZ	NOTE 1	
NTA3	BILOG ANTENNA	TESEQ	6112D	28040	25-1000MHz	2/16/2012	2/16/2013
NWHD0	RIDGED WAVE GUIDE	TENSOR	4105	2081	1-12.4GHZ	11/3/2011	12/3/2012
NWI1	RIDGED WAVE GUIDE	AEL	H1498	154	2-18GHZ	1/28/2012	1/28/2013
NWP1	DOUBLE RIDGED WAVEGUIDE ANTENNA	EATON	3115	2100	1GHZ-12.4GHZ	3/6/2012	3/6/2013
RAKI	RF SECTION	HEWLETT PACKARD	85462A	3411A00181	0.009-6500MHZ	3/15/2012	3/15/2013
RAKJ	RF FILTER SECTION	HEWLETT PACKARD	85460A	3330A00154	---	3/15/2012	3/15/2013
RBA0	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESIB26	100145	20HZ-26.5GHZ	3/8/2012	3/8/2013
RBB0	EMI TEST RECEIVER 20HZ TO 40 GHZ	ROHDE & SCHWARZ	ESIB40	100250	20 HZ TO 40GHZ	3/5/2012	3/5/2013
T1N1	10DB 20W ATTENUATOR	NARDA	766-10	---	DC-4GHZ	8/6/2012	8/6/2013
T2D7	20DB, 25W ATTENUATOR	WEINSCHEL	46-20-43	AY9246	DC-18GHZ	8/6/2012	8/6/2013
T2DL	20DB, 25W ATTENUATOR	WEINSCHEL	46-20-34	BS0910	DC-18GHZ	8/6/2012	8/6/2013
T2S3	20DB 25W ATTENUATOR	WEINSCHEL	46-20-34	BV3544	DC-18GHZ	1/3/2012	1/3/2013
XLJ1	5W, 50 OHM TERMINATION	JFW INDUSTRIES	50T-052	2	DC-2GHZ	8/6/2012	8/6/2013
XLQS	5W, 50 OHM TERMINATION	JFW INDUSTRIES	50T-052	59	DC-2GHZ	8/6/2012	8/6/2013
XPR0	HIGH PASS FILTER	K&L MICROWAVE	11SH10-4800/X20000	001	4.8-20GHZ	8/22/2012	8/22/2013

I/O: Initial Only

N/A: Not Applicable

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



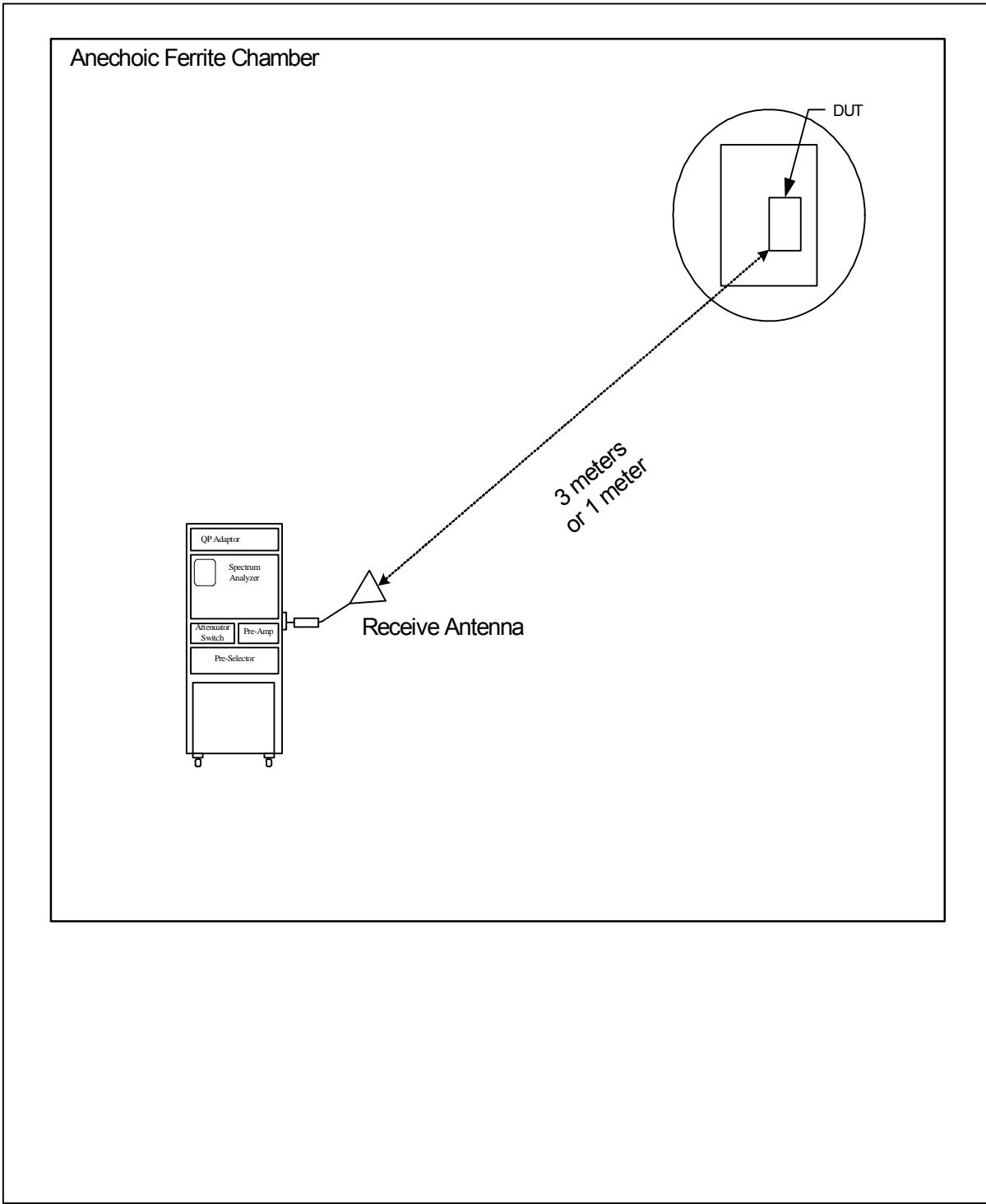


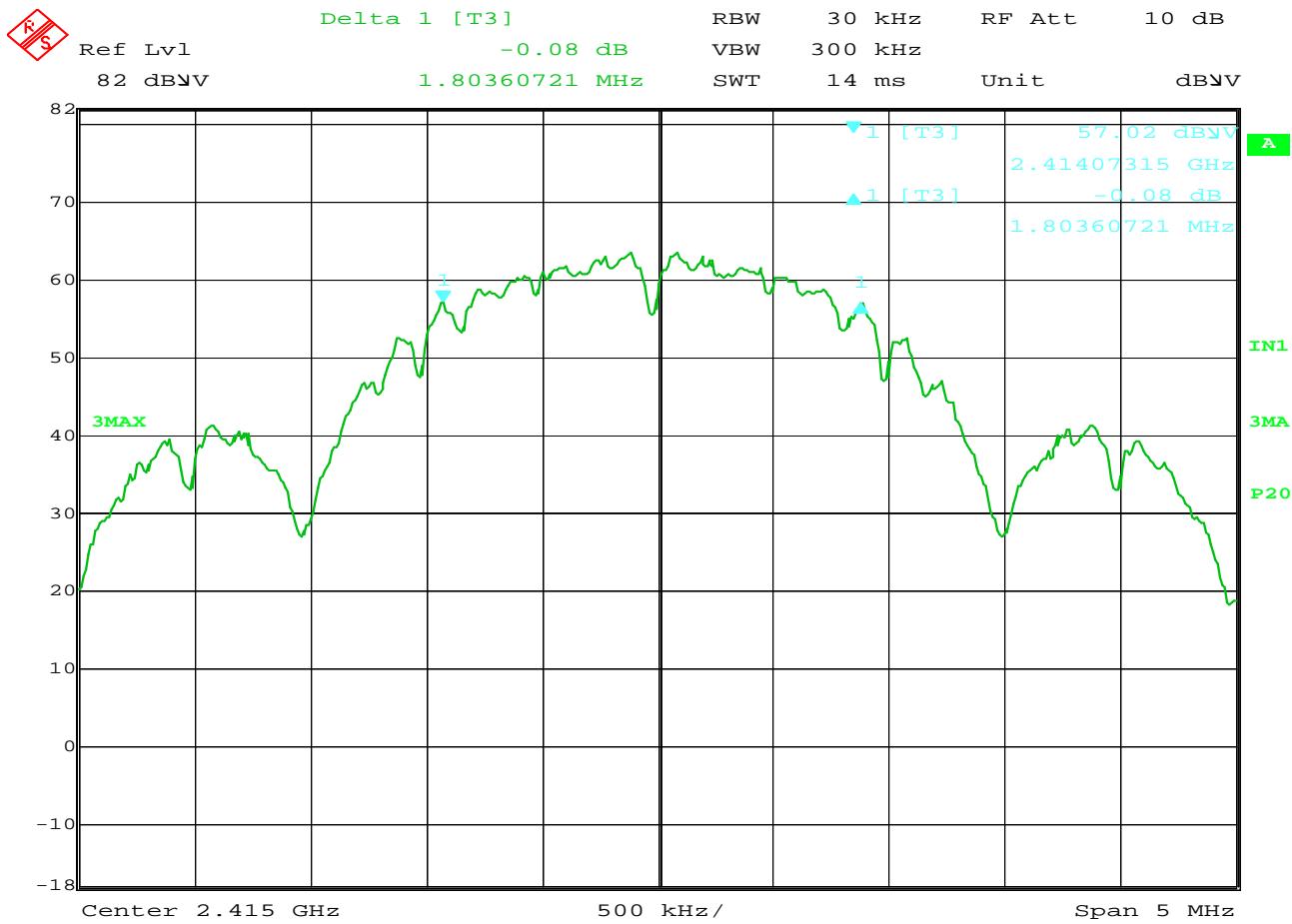
Figure 2



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



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



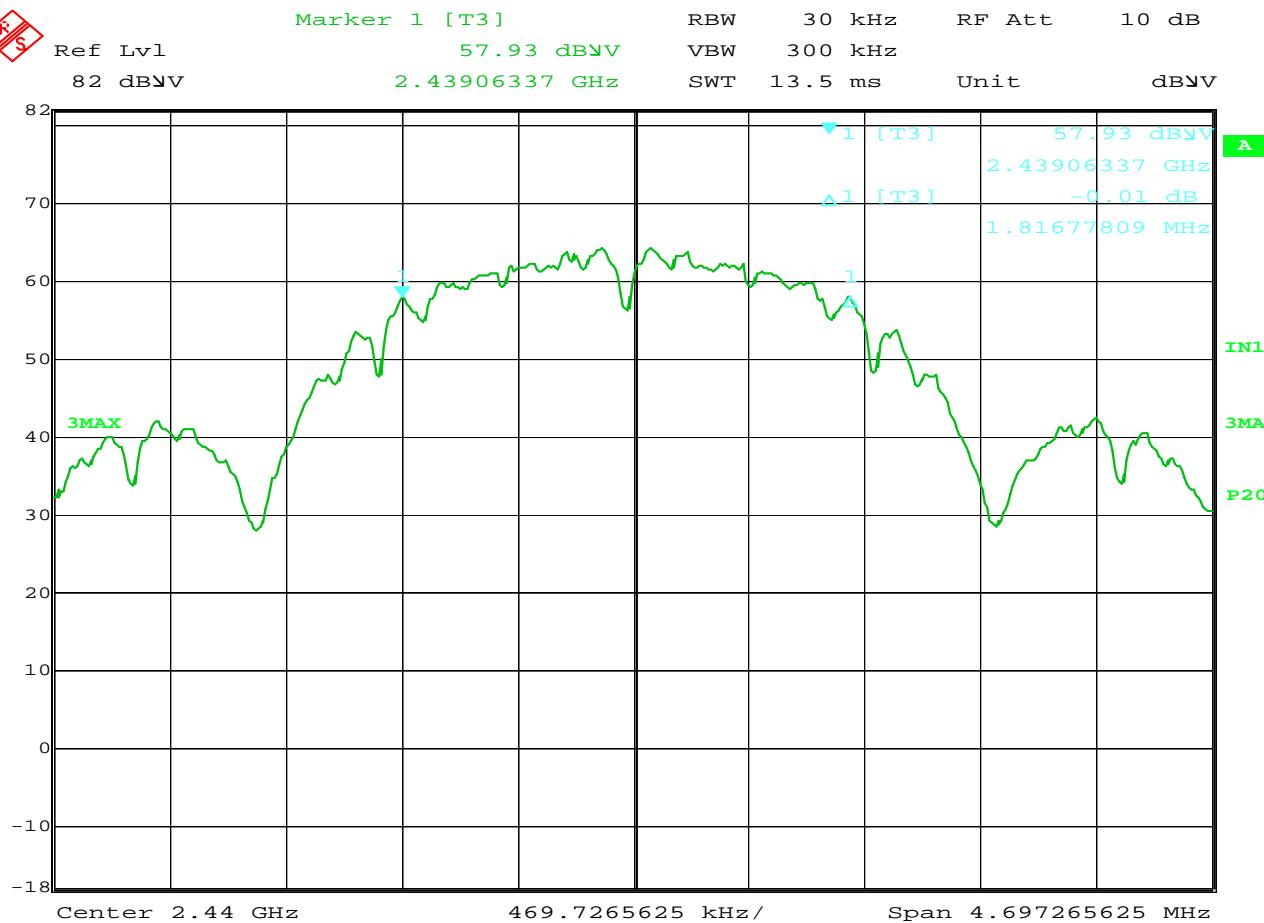
Date: 13.NOV.2012 11:20:16

### 15.247 6dB Bandwidth

**MANUFACTURER** : Physical Graph Corporation  
**MODEL NUMBER** : CD305  
**TEST MODE** : Tx @ Low Channel  
**TEST PARAMETERS** :

---

NOTES



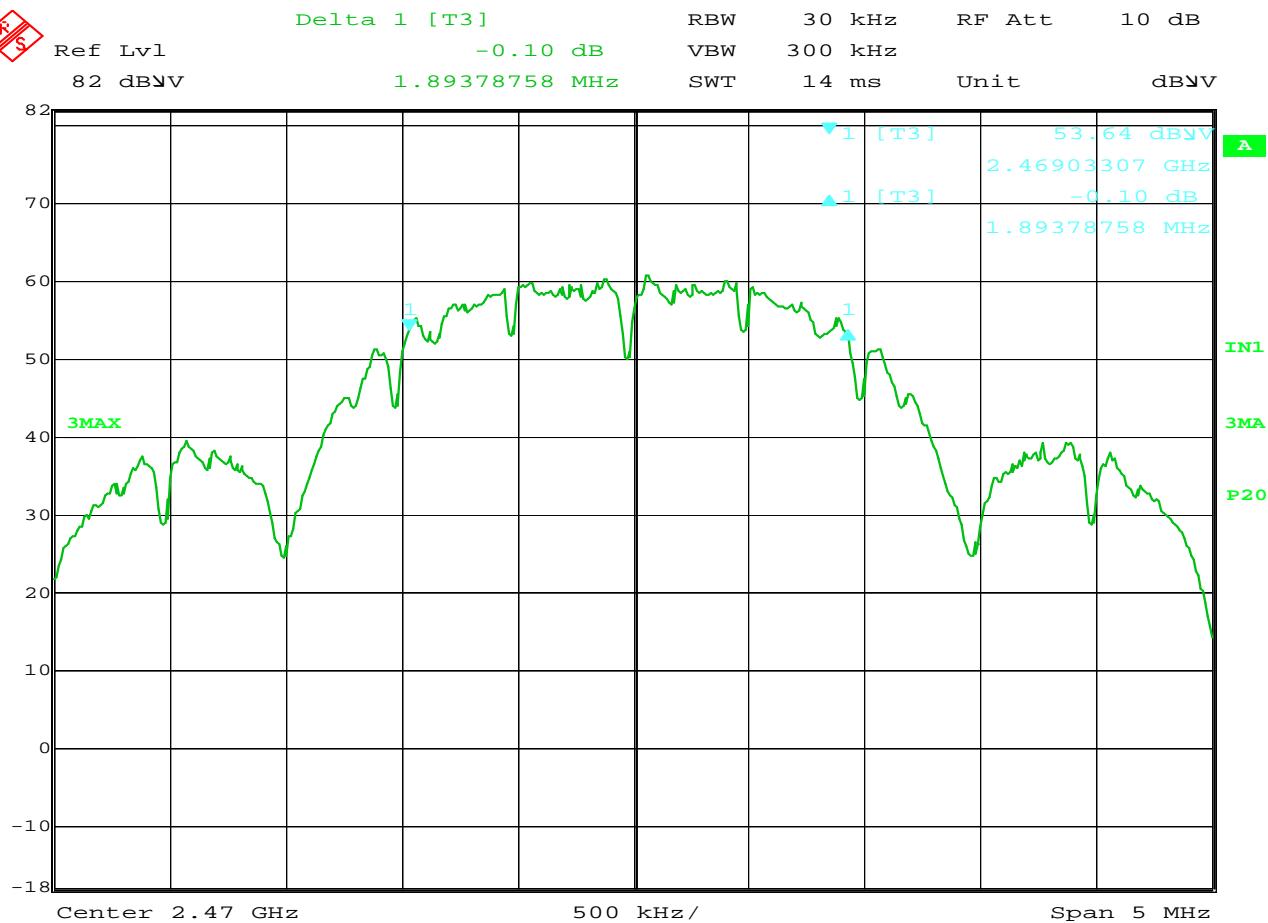
Date: 13.NOV.2012 09:53:40

### 15.247 6dB Bandwidth

**MANUFACTURER** : Physical Graph Corporation  
**MODEL NUMBER** : CD305  
**TEST MODE** : Tx @ Mid Channel  
**TEST PARAMETERS** :

---

NOTES



Date: 13.NOV.2012 11:41:26

### 15.247 6dB Bandwidth

**MANUFACTURER** : Physical Graph Corporation  
**MODEL NUMBER** : CD305  
**TEST MODE** : Tx @ High Channel  
**TEST PARAMETERS** :

---

NOTES

Manufacturer : Physical Graph Corporation  
Test Item : Smart Tag  
Model No. : CD305  
Test Specification : FCC Part 15, Subpart C, Section 15.247, EIRP  
Date : November 13, 2012  
Notes :

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

Freq. (MHz)	Ant Pol	Wide BW Meter Reading (dBuV)	Matched Sig. Gen. Reading (dB)	Equivalent Antenna Gain (dB)	Cable Loss (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
2415.00	H	66.3	2.3	6.4	3.4	5.2	36.0	-30.8
2415.00	V	68.5	4.5	6.4	3.4	7.5	36.0	-28.5
2440.00	H	67.2	3.4	6.5	3.5	6.4	36.0	-29.6
2440.00	V	70.2	5.8	6.5	3.5	8.8	36.0	-27.2
2470.00	H	68.5	4.6	7.9	3.5	8.9	36.0	-27.1
2470.00	V	71.8	8.1	7.9	3.5	12.4	36.0	-23.6

Checked BY *RICHARD E. KING* :

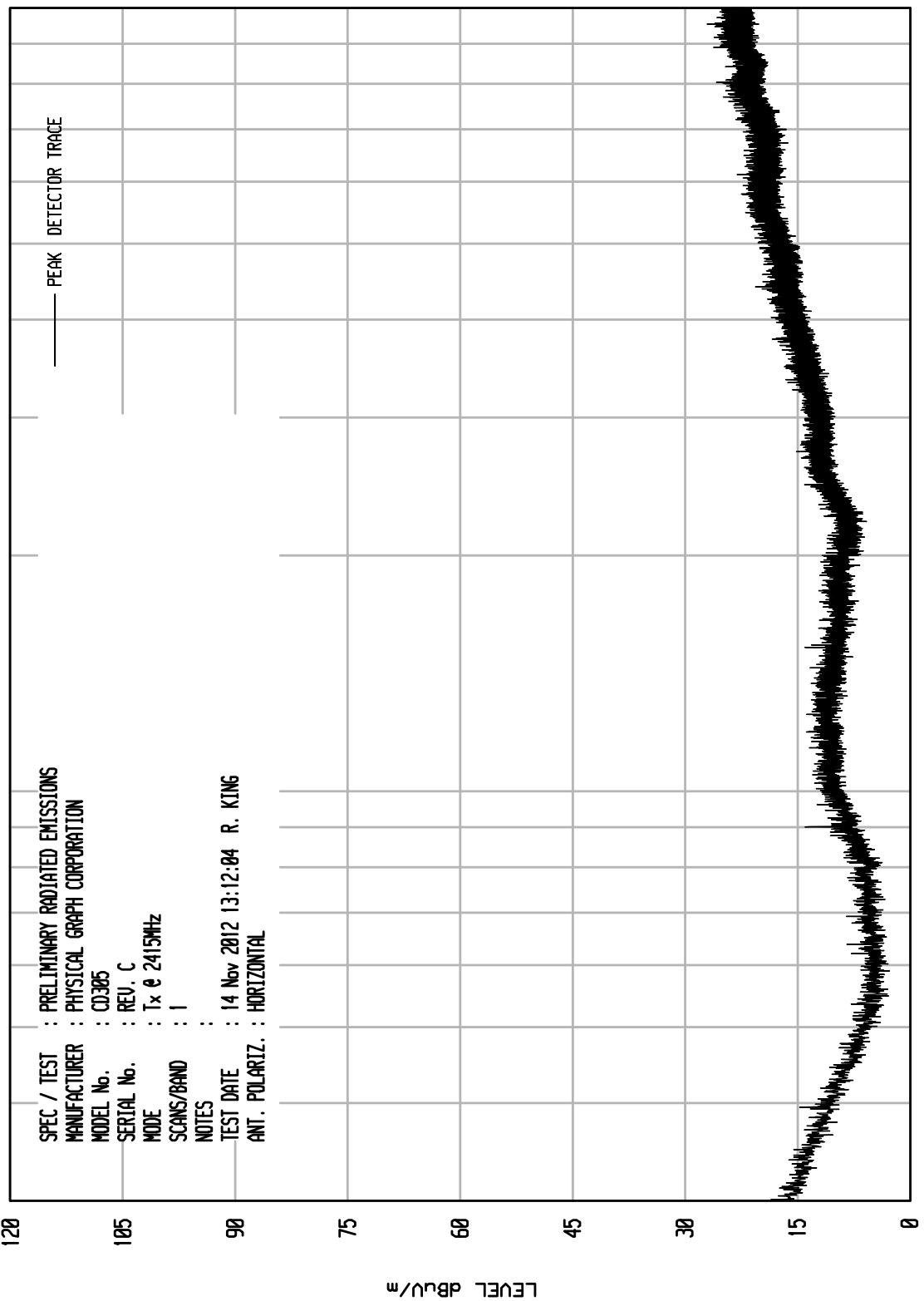
Richard E. King

ELITE ELECTRONIC ENGINEERING Inc.  
Downers Grove, Ill. 60515

MAI 04/26/11

UNIV RCU EMI RUN 17

SPEC / TEST : PRELIMINARY RADIATED EMISSIONS  
MANUFACTURER : PHYSICAL GRAPH CORPORATION  
MODEL No. : CD305  
SERIAL No. : REV. C  
MODE : Tx @ 2415MHz  
SCANS/BAND : 1  
NOTES :  
TEST DATE : 14 Nov 2012 13:12:04 R. KING  
ANT. POLARIZ. : HORIZONTAL

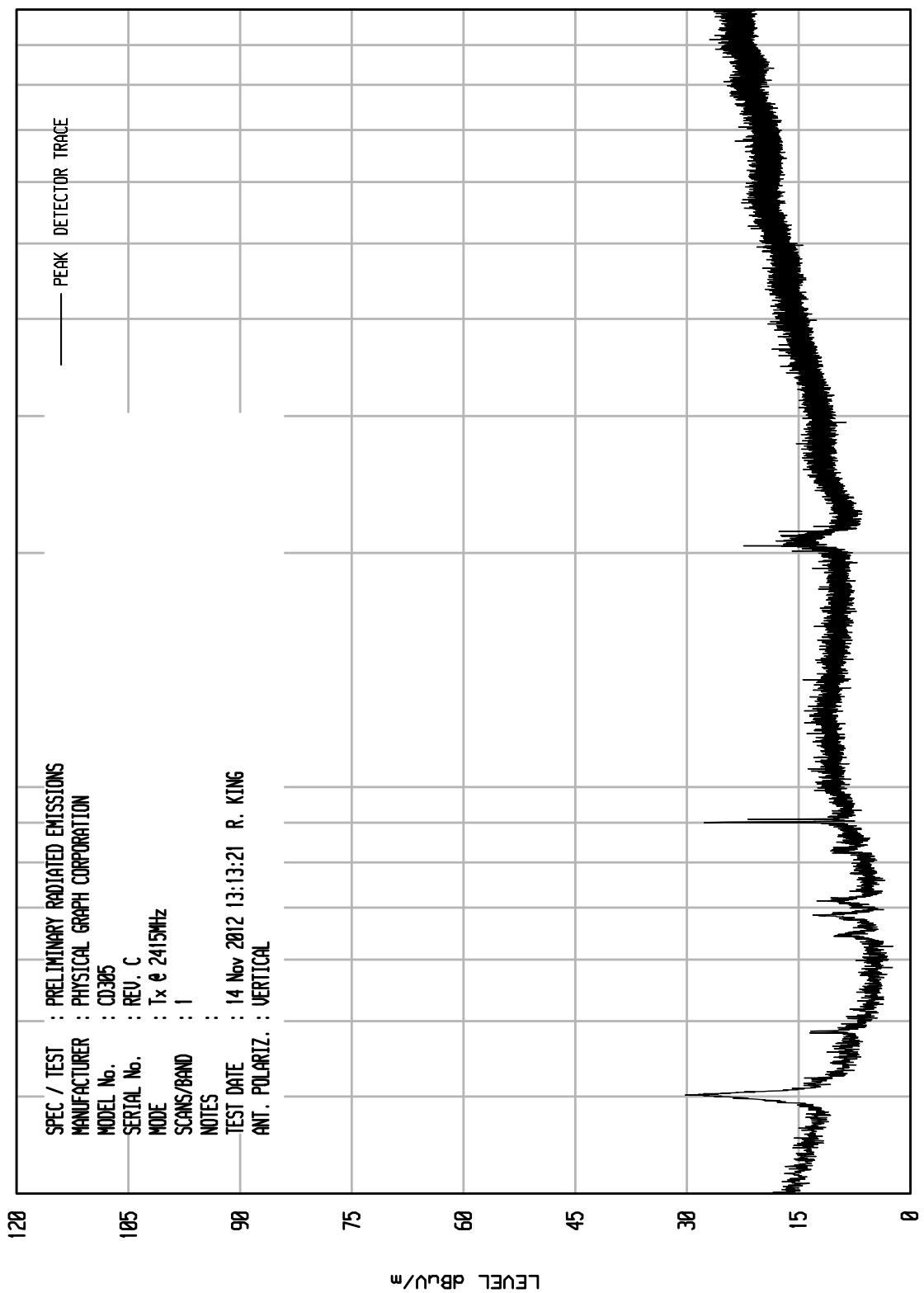


ELITE ELECTRONIC ENGINEERING Inc.  
Downers Grove, Ill. 60515

UNI 04/26/11

UNIV RCU EMI RUN 18

SPEC / TEST : PRELIMINARY RADIATED EMISSIONS  
MANUFACTURER : PHYSICAL GRAPH CORPORATION  
MODEL No. : CD305  
SERIAL No. : REV. C  
MODE : Tx & 2415MHz  
SCANS/BAND : 1  
NOTES :  
TEST DATE : 14 Nov 2012 13:13:21 R. KING  
ANT. POLARIZ. : VERTICAL

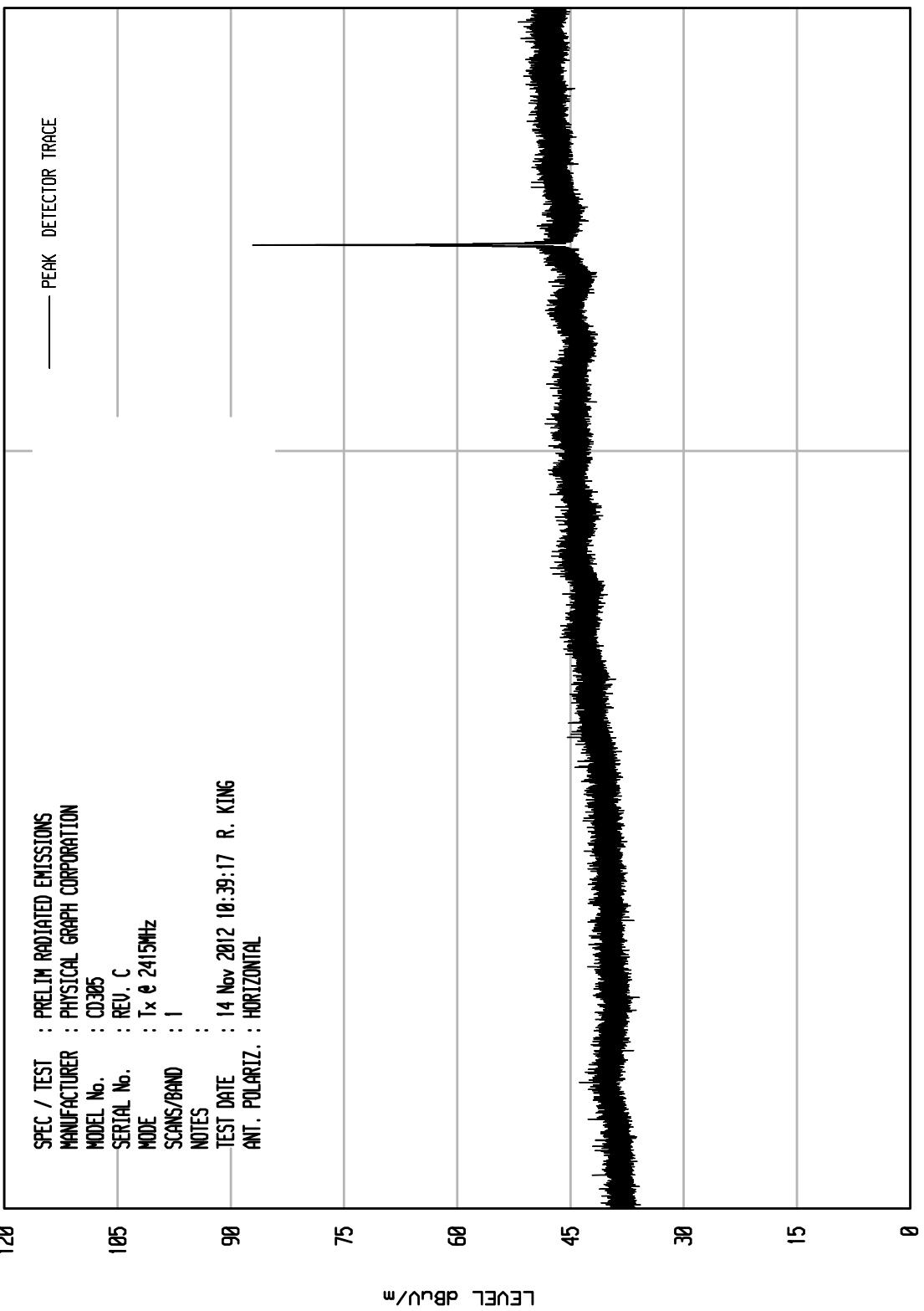


ELITE ELECTRONIC ENGINEERING Inc.  
Downers Grove, Ill. 60515

120 04/26/11

UNIV RCU EMI RUN 11

SPEC / TEST : PRELIM RADIATED EMISSIONS  
MANUFACTURER : PHYSICAL GRAPH CORPORATION  
MODEL No. : CD305  
SERIAL No. : REV. C  
MODE : Tx & 2415MHz  
SCANS/BAND : 1  
NOTES :  
TEST DATE : 14 Nov 2012 10:39:17 R. KING  
ANT. POLARIZ. : HORIZONTAL



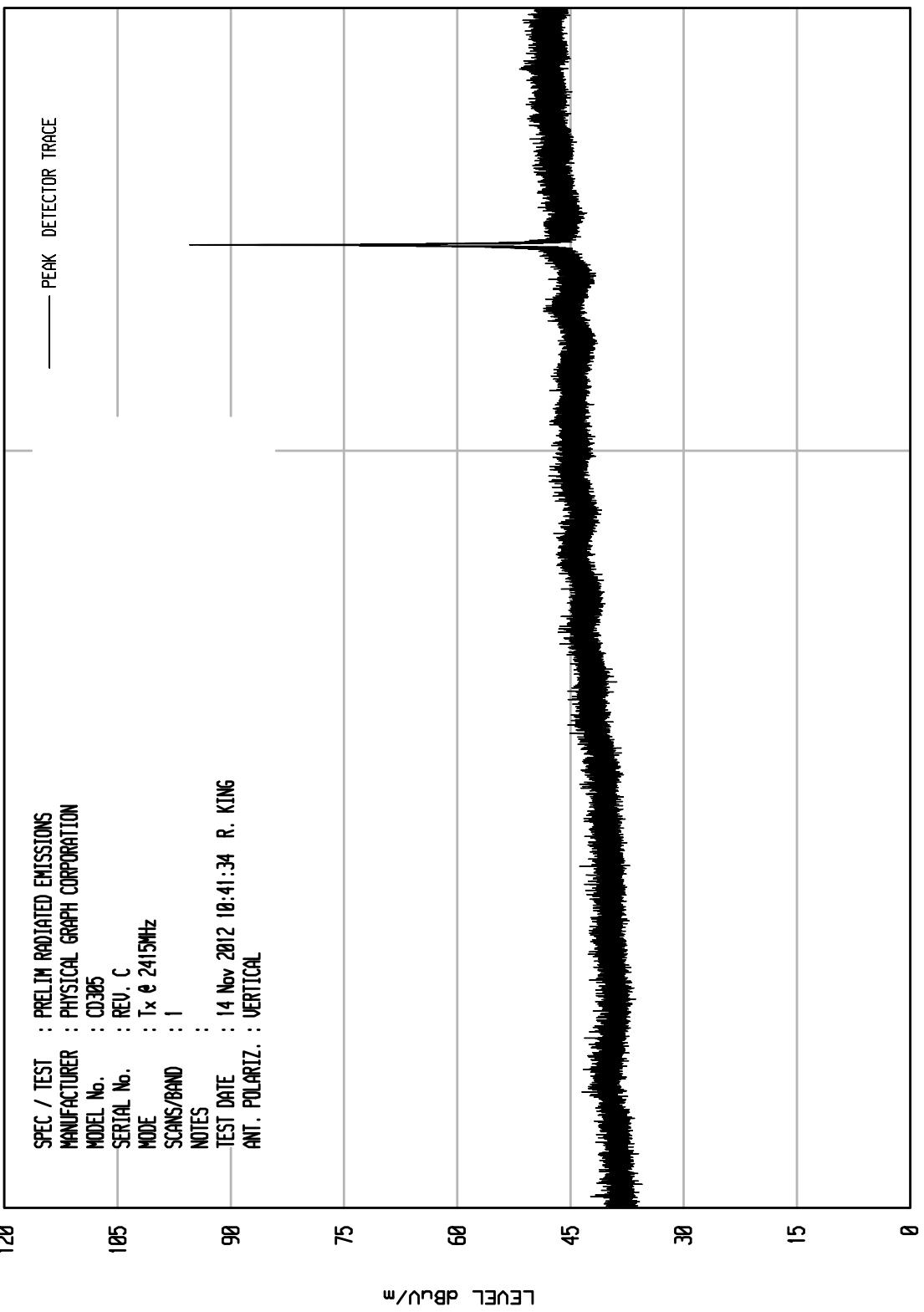
ELITE ELECTRONIC ENGINEERING Inc.  
Downers Grove, Ill. 60515

MAI 04/26/11

120

UNIV RCU EMI RUN 12

SPEC / TEST : PRELIM RADIATED EMISSIONS  
MANUFACTURER : PHYSICAL GRAPH CORPORATION  
MODEL No. : CD305  
SERIAL No. : REV. C  
MODE : Tx @ 2415MHz  
SCANS/BAND : 1  
NOTES :  
TEST DATE : 14 Nov 2012 10:41:34 R. KING  
ANT. POLARIZ. : VERTICAL

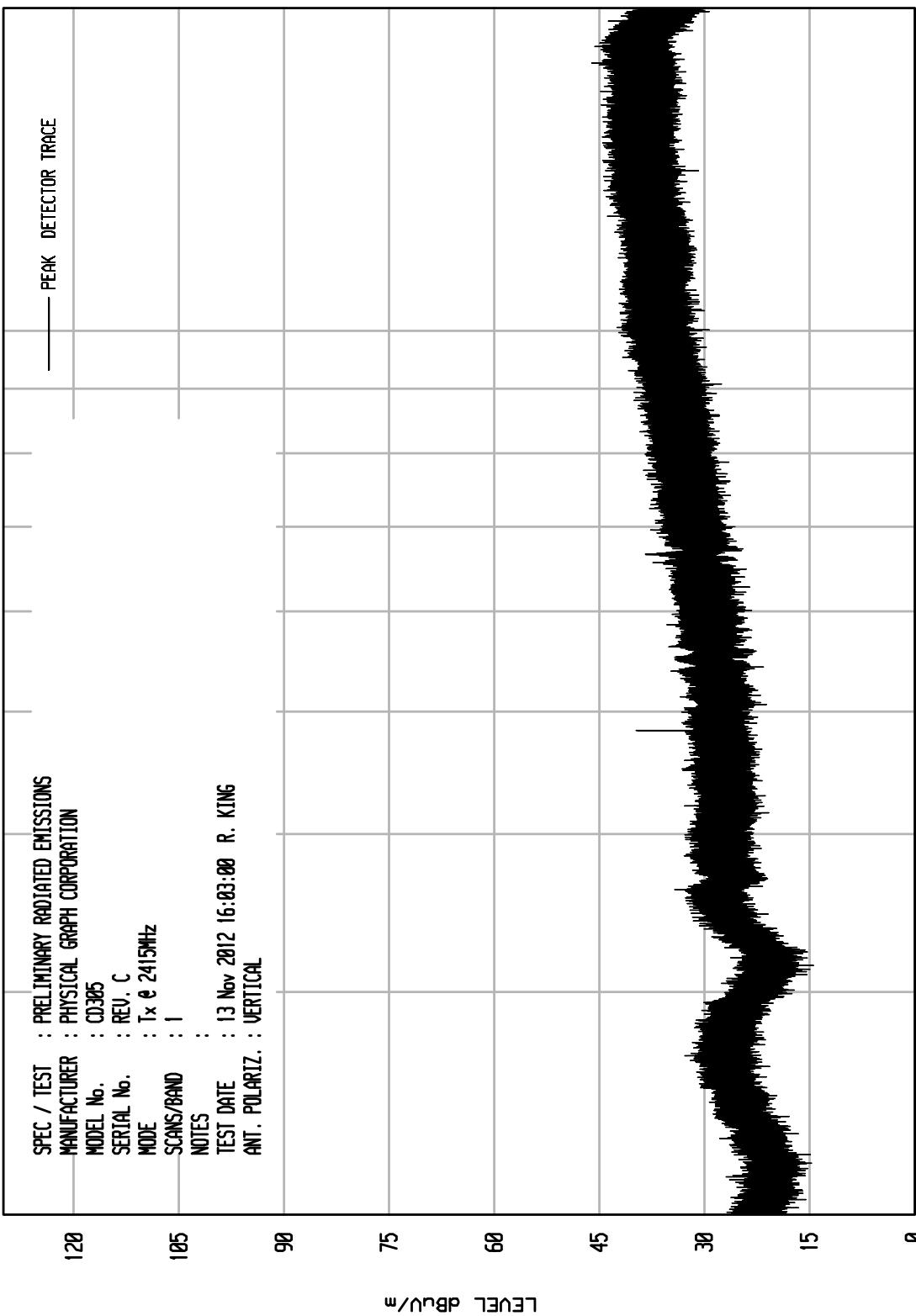


ELITE ELECTRONIC ENGINEERING Inc.  
Downers Grove, Ill. 60515

MAI 04/26/11

UNIV RCU EMI RUN 6

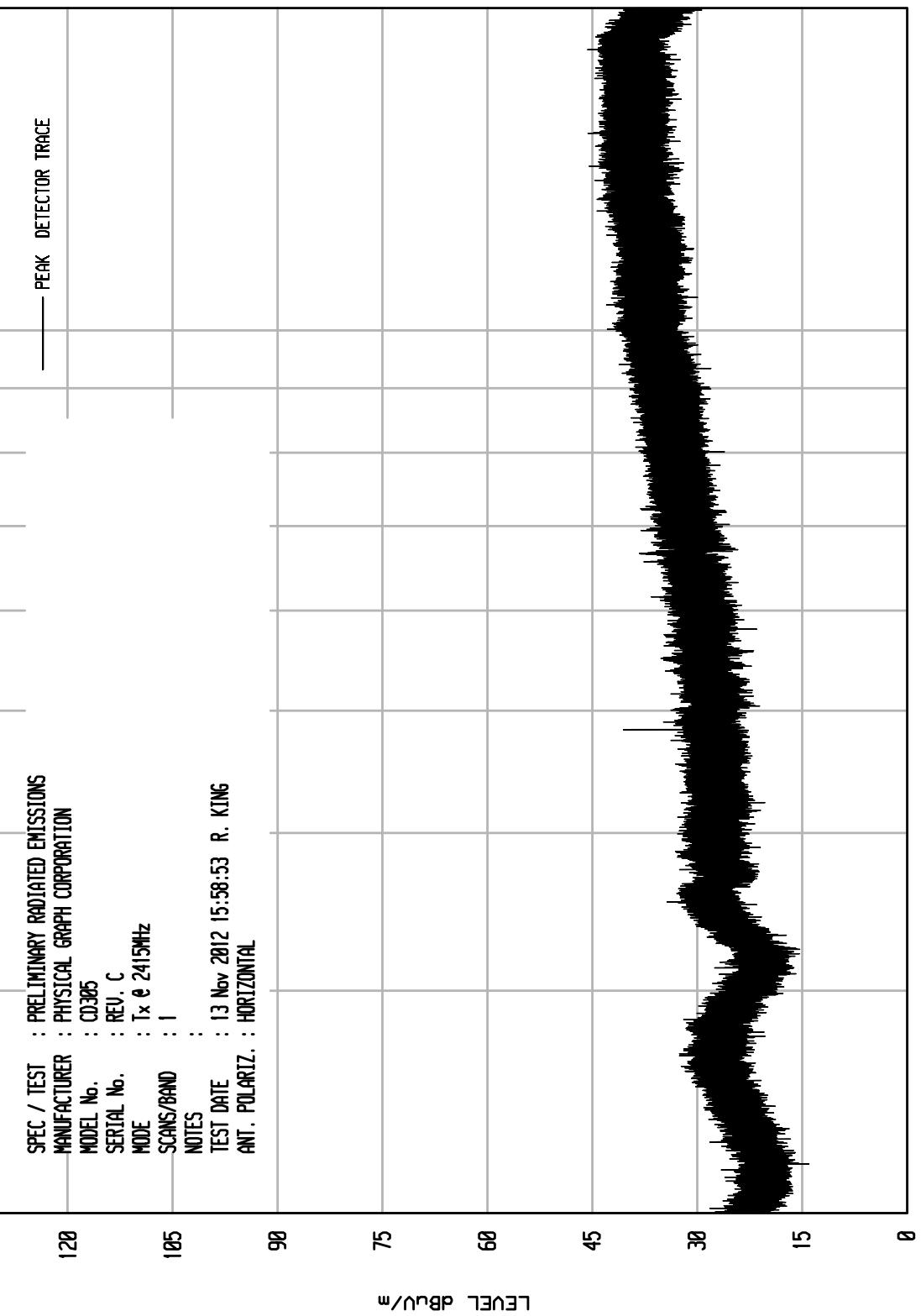
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS  
MANUFACTURER : PHYSICAL GRAPH CORPORATION  
MODEL No. : CD305  
SERIAL No. : REV. C  
MODE : Tx & 2415MHz  
SCANS/BAND : 1  
NOTES :  
TEST DATE : 13 Nov 2012 16:03:00 R. KING  
ANT. POLARIZ. : VERTICAL



ELITE ELECTRONIC ENGINEERING Inc.  
Downers Grove, Ill. 60515

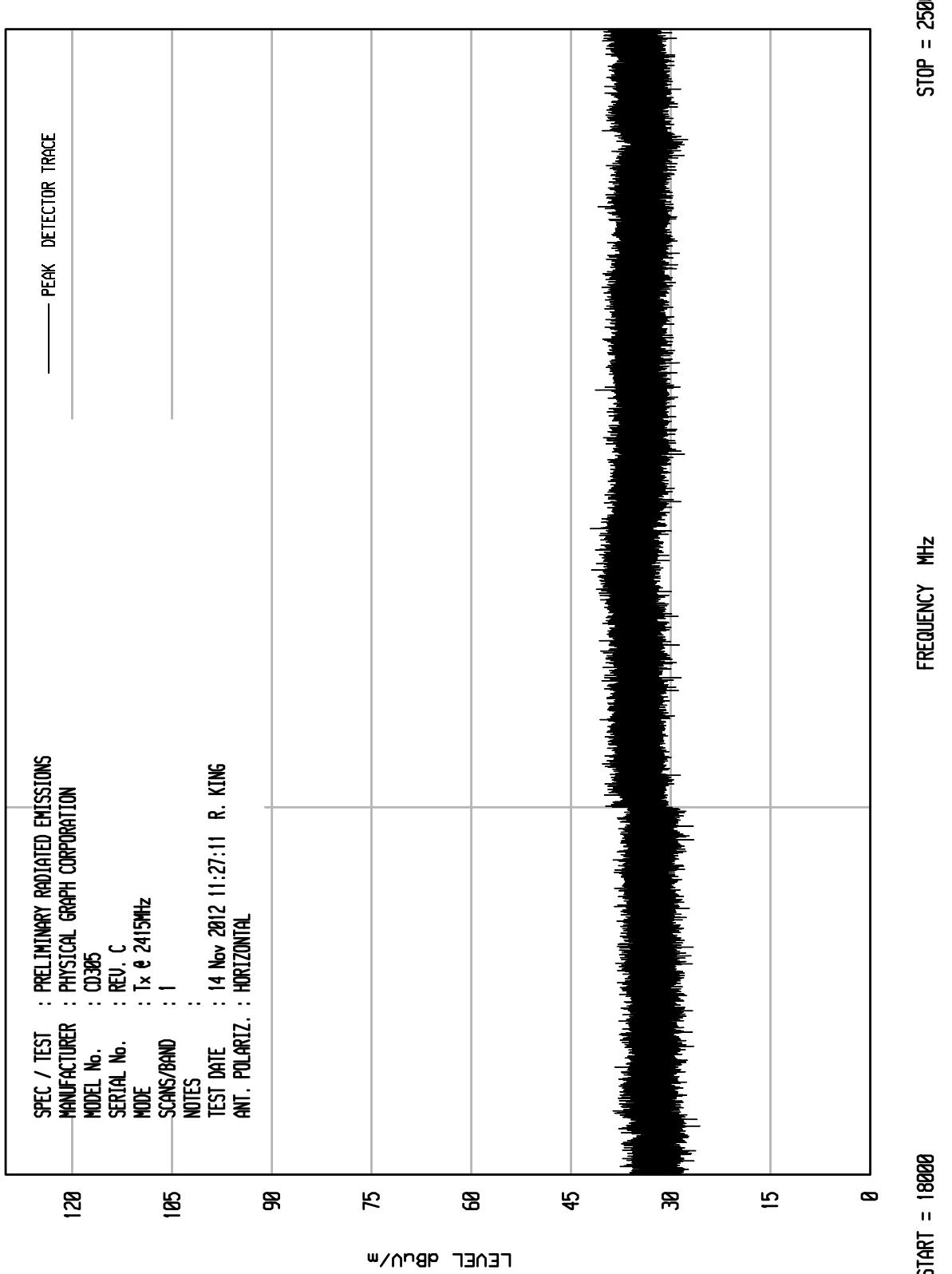
MAI 04/26/11

UNIV RCU EMI RUN 5



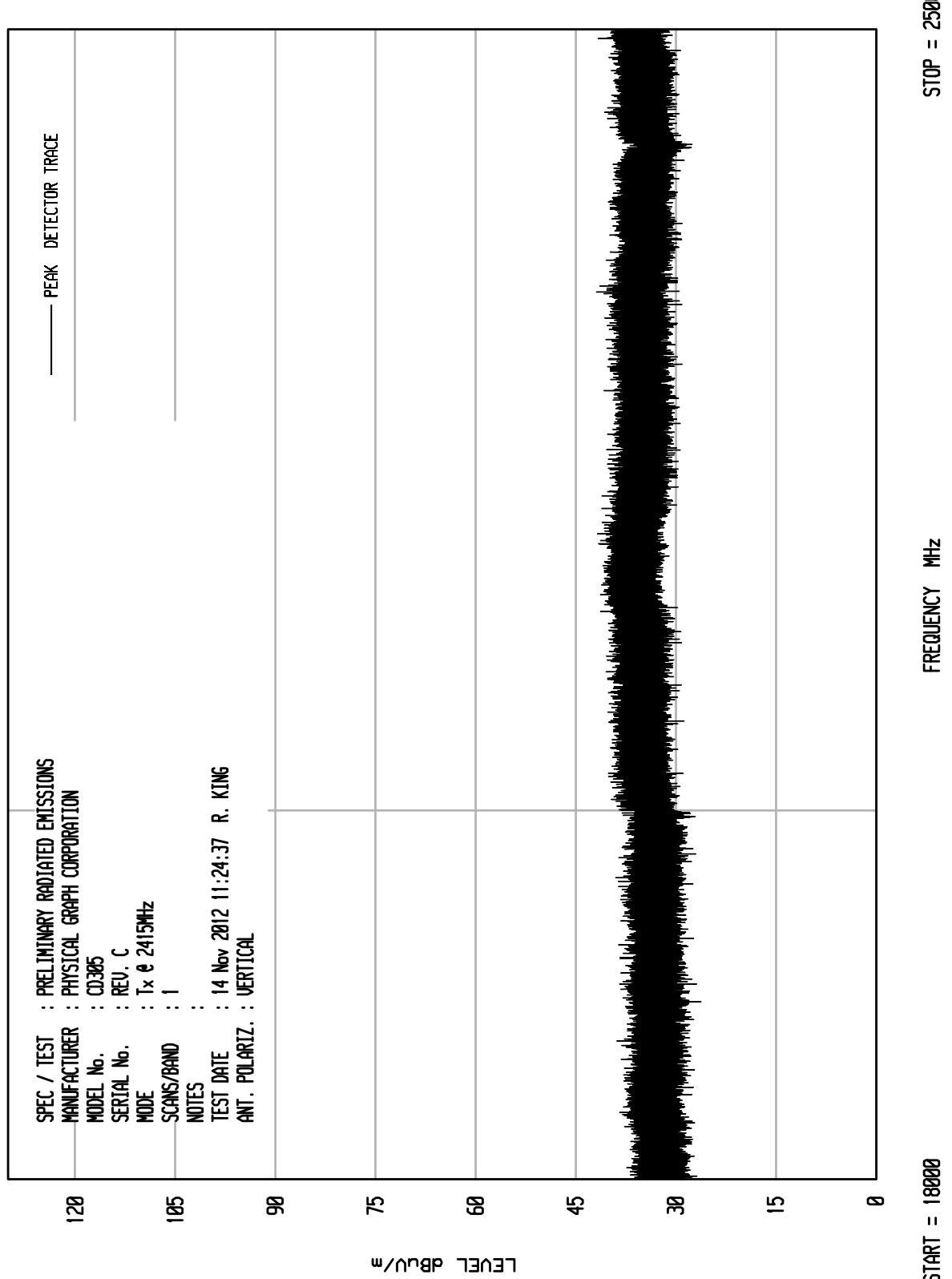
ELITE ELECTRONIC ENGINEERING Inc.  
Downers Grove, Ill. 60515

WKA1 04/26/11



ELITE ELECTRONIC ENGINEERING Inc.  
Downers Grove, Ill. 60515

WKA1 04/26/11

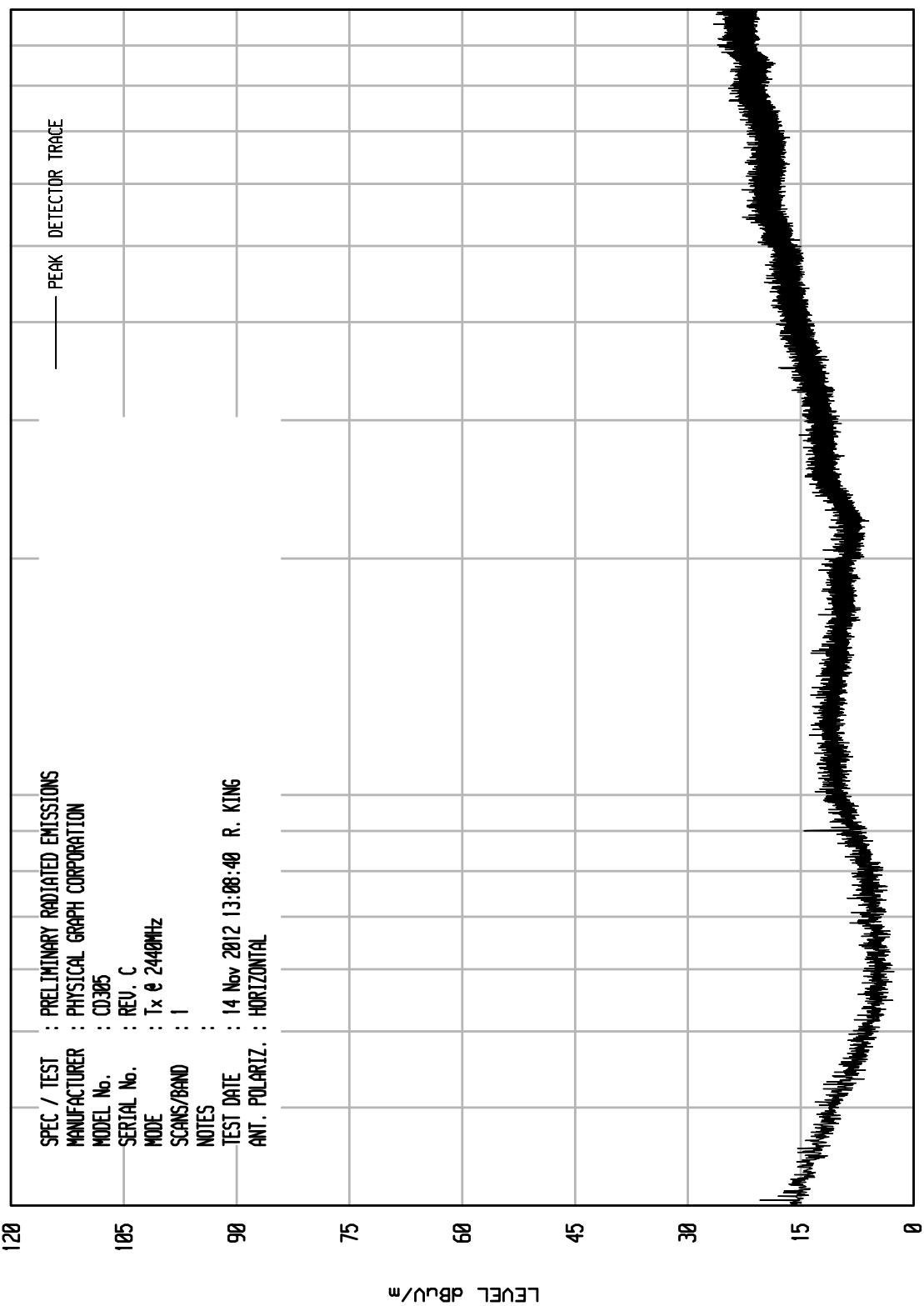


ELITE ELECTRONIC ENGINEERING Inc.  
Downers Grove, Ill. 60515

DATE 04/26/11

UNIV RCU EMI RUN 16

SPEC / TEST : PRELIMINARY RADIATED EMISSIONS  
MANUFACTURER : PHYSICAL GRAPH CORPORATION  
MODEL No. : CD305  
SERIAL No. : REV. C  
MODE : Tx & 2440MHz  
SCANS/BAND : 1  
NOTES :  
TEST DATE : 14 Nov 2012 13:08:40 R. KING  
ANT. POLARIZ. : HORIZONTAL

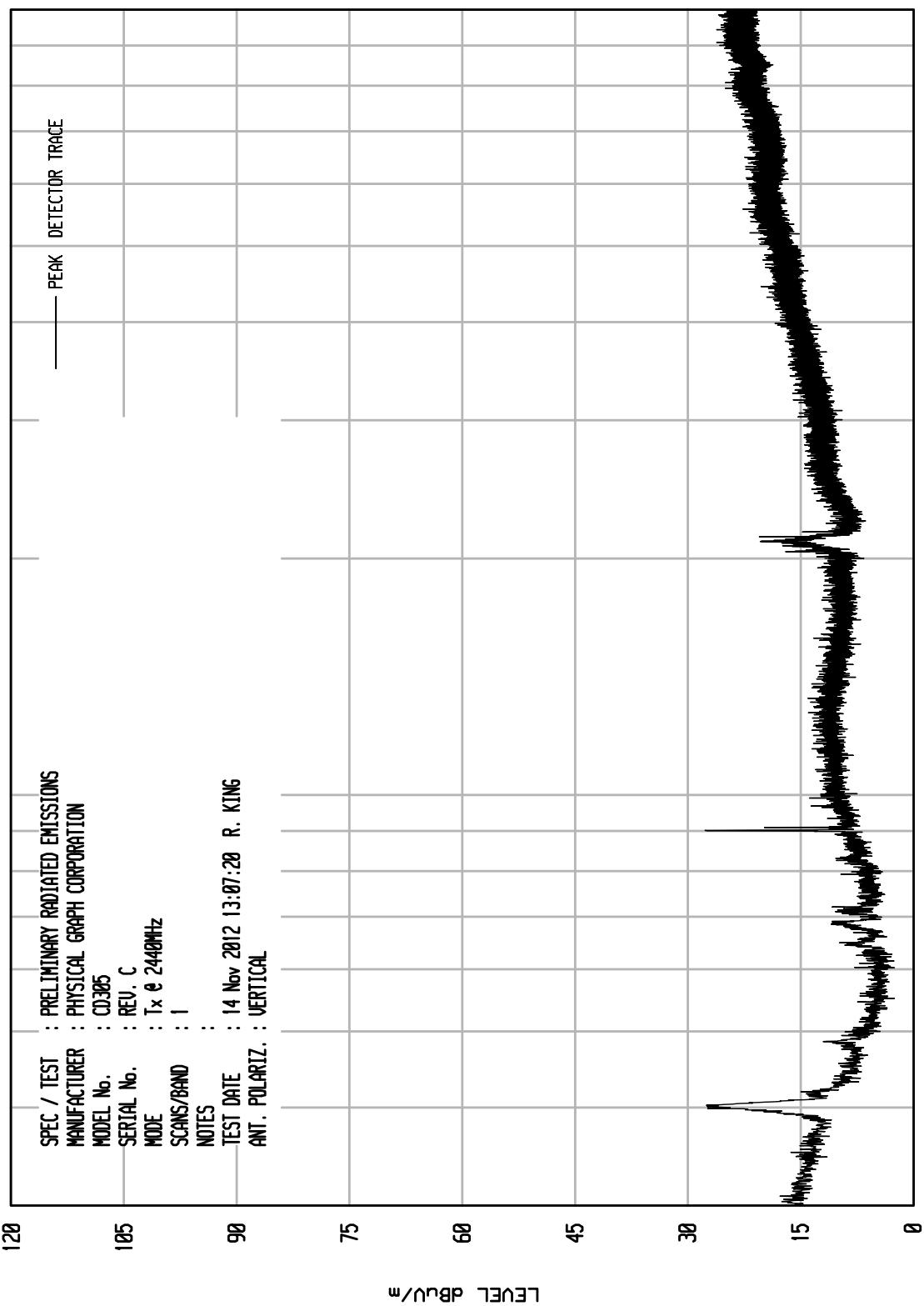


ELITE ELECTRONIC ENGINEERING Inc.  
Downers Grove, Ill. 60515

DATE 04/26/11

UNIV RCU EMI RUN 15

SPEC / TEST : PRELIMINARY RADIATED EMISSIONS  
MANUFACTURER : PHYSICAL GRAPH CORPORATION  
MODEL No. : CD305  
SERIAL No. : REV. C  
MODE : Tx @ 2440MHz  
SCANS/BAND : 1  
NOTES :  
TEST DATE : 14 Nov 2012 13:07:20 R. KING  
ANT. POLARIZ. : VERTICAL



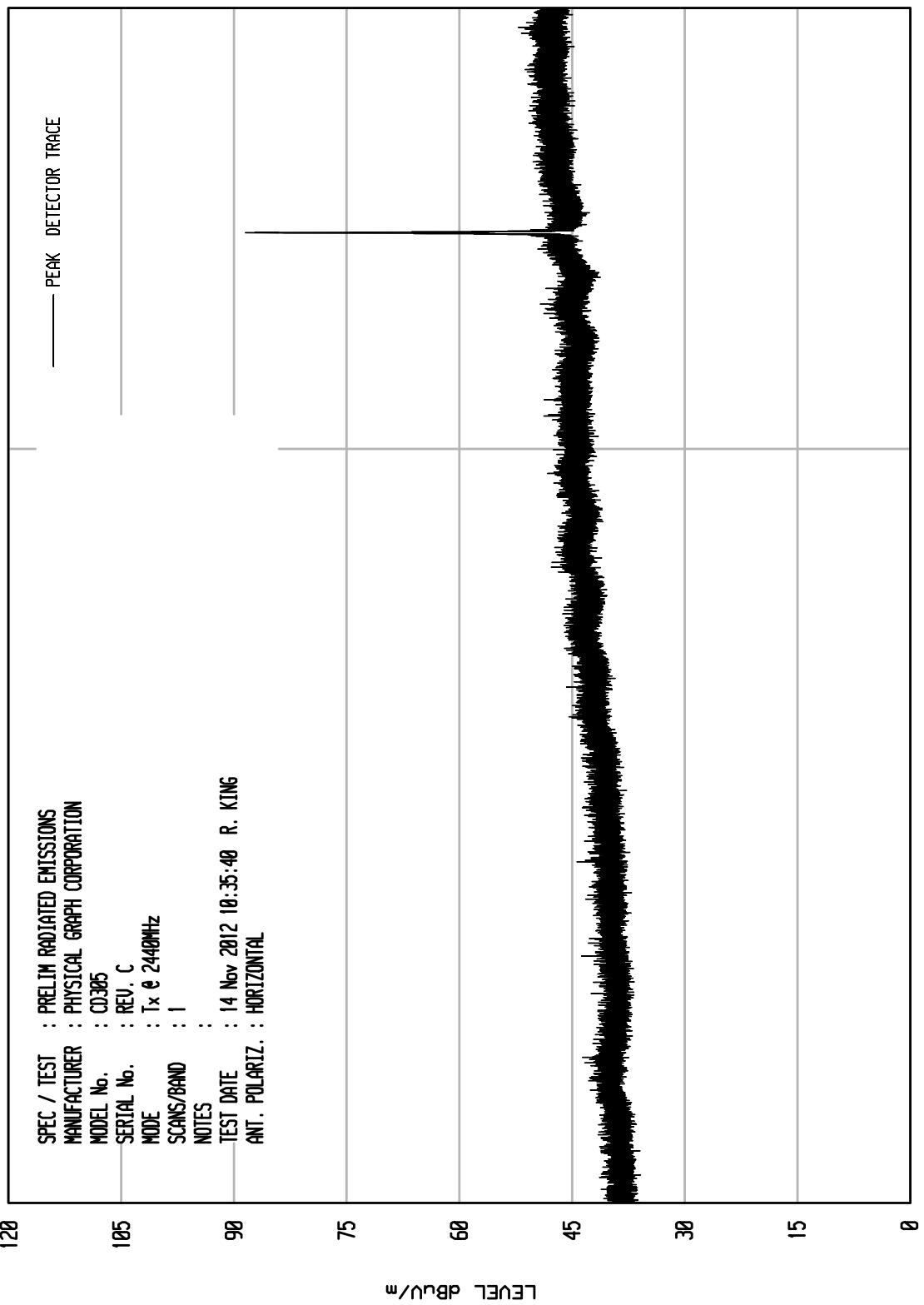
ELITE ELECTRONIC ENGINEERING Inc.  
Downers Grove, Ill. 60515

MAI 04/26/11

120

SPEC / TEST : PRELIM RADIATED EMISSIONS  
MANUFACTURER : PHYSICAL GRAPH CORPORATION  
MODEL No. : CD305  
SERIAL No. : REV. C  
MODE : Tx @ 2440MHz  
SCANS/BAND : 1  
NOTES :  
TEST DATE : 14 Nov 2012 10:35:40 R. KING  
ANT. POLARIZ. : HORIZONTAL

UNIV RCU EMI RUN 10



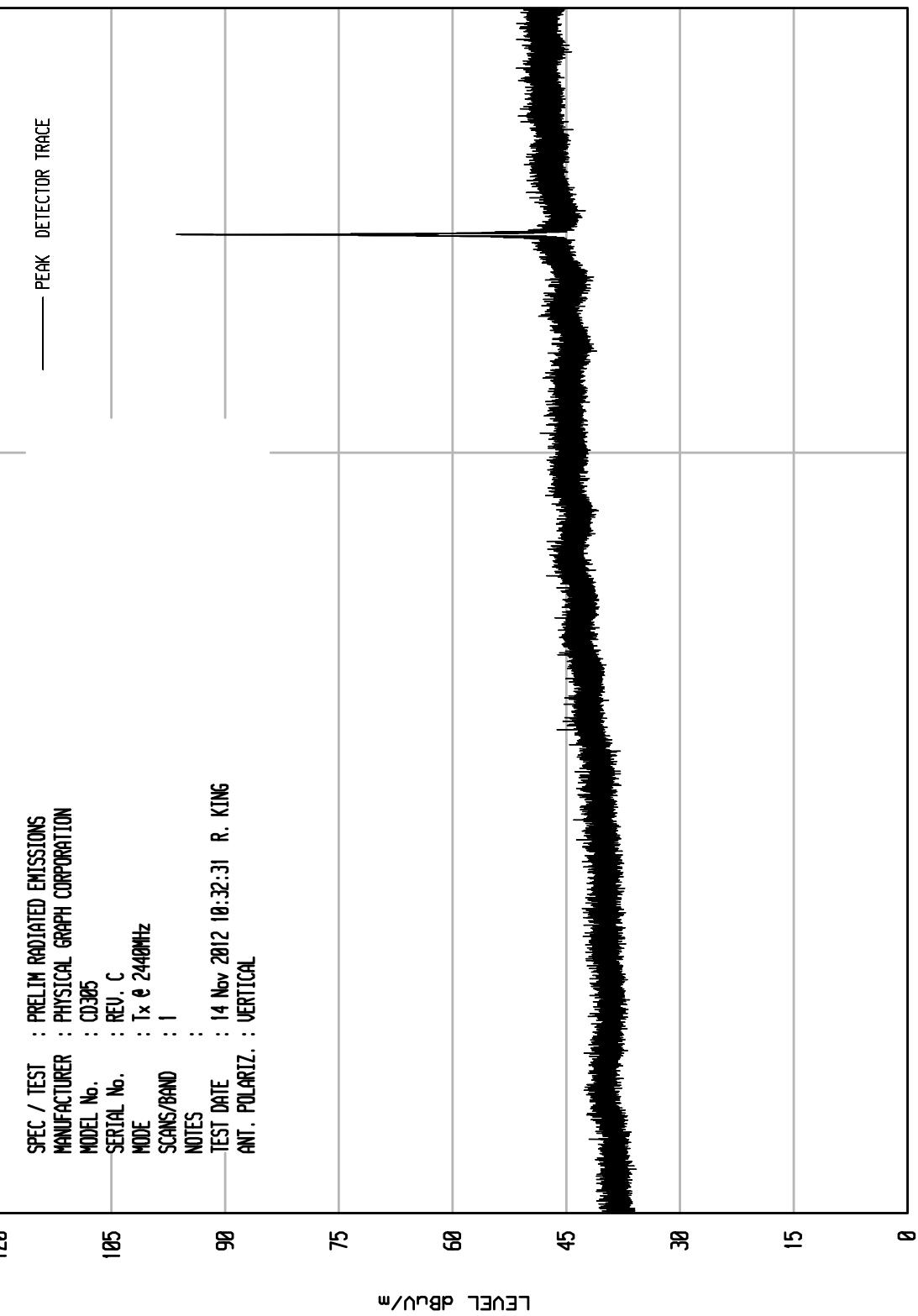
ELITE ELECTRONIC ENGINEERING Inc.  
Downers Grove, Ill. 60515

UNI 04/26/11

120

UNIV RCU EMI RUN 9

SPEC / TEST : PRELIM RADIATED EMISSIONS  
MANUFACTURER : PHYSICAL GRAPH CORPORATION  
MODEL No. : CD305  
SERIAL No. : REV. C  
MODE : Tx @ 2440MHz  
SCANS/BAND : 1  
NOTES :  
TEST DATE : 14 Nov 2012 10:32:31 R. KING  
ANT. POLARIZ. : VERTICAL



START = 1000

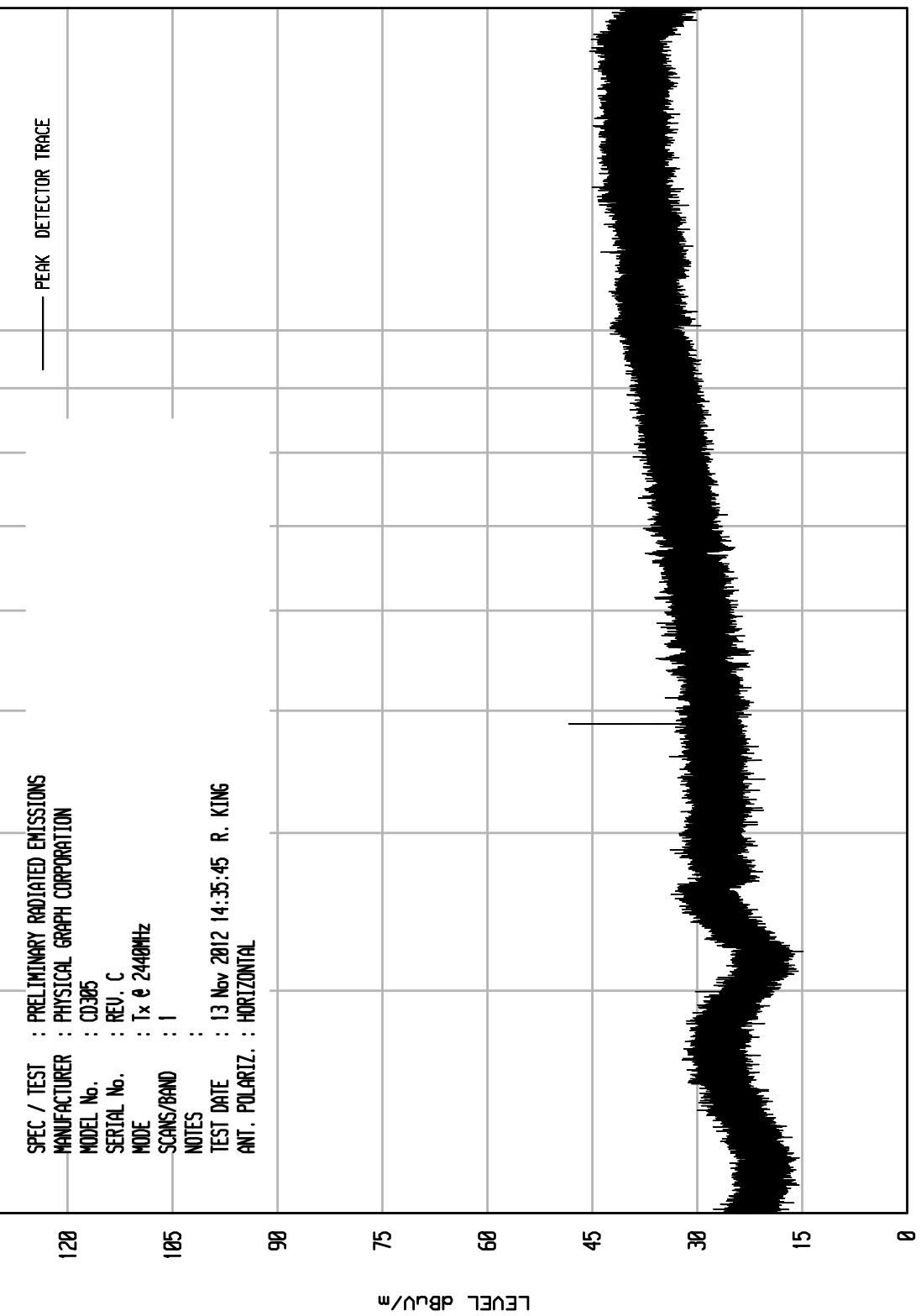
FREQUENCY MHz

STOP = 3000

ELITE ELECTRONIC ENGINEERING Inc.  
Downers Grove, Ill. 60515

MAI 04/26/11

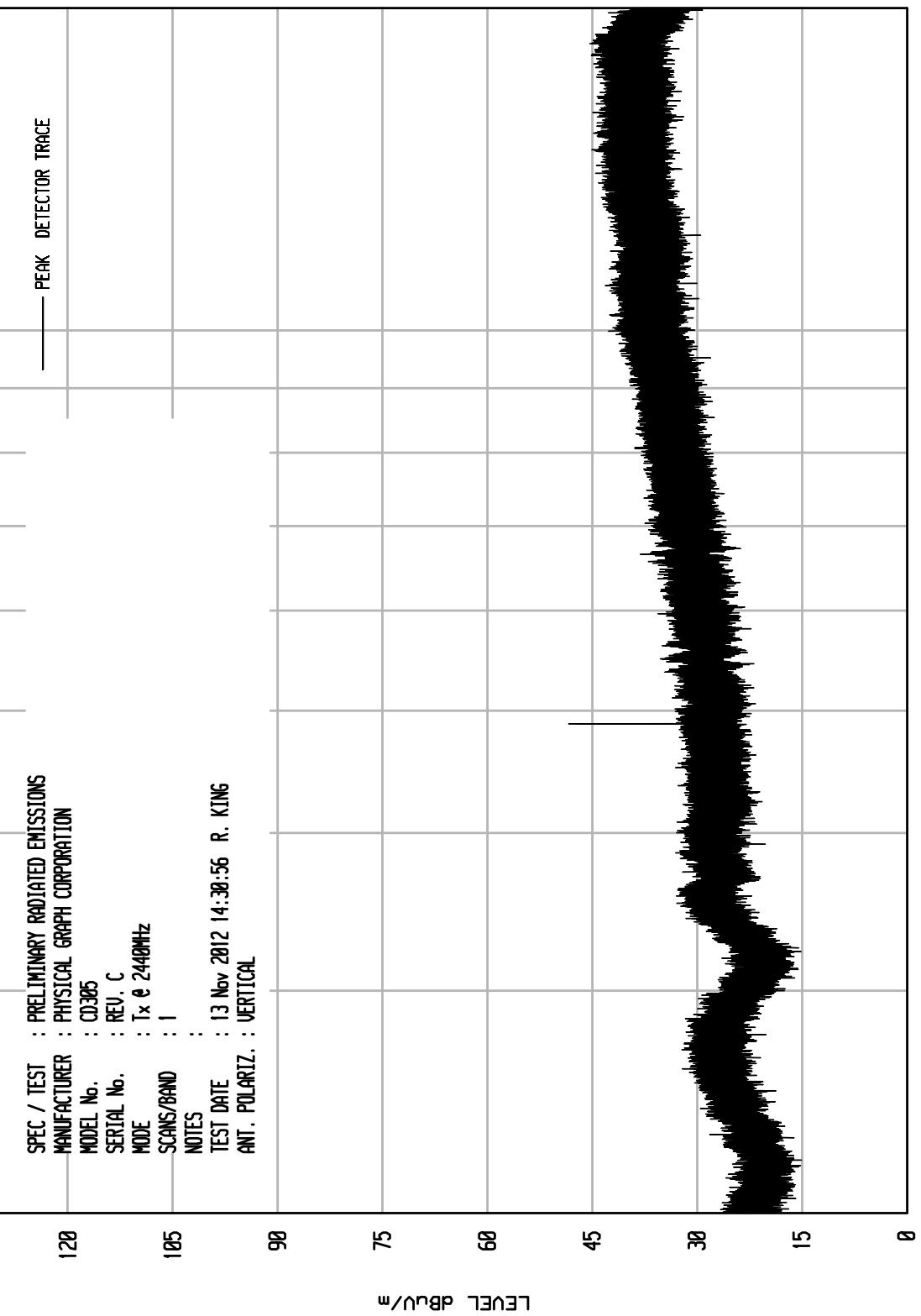
UNIV RCU EMI RUN 4



ELITE ELECTRONIC ENGINEERING Inc.  
Downers Grove, Ill. 60515

MAI 04/26/11

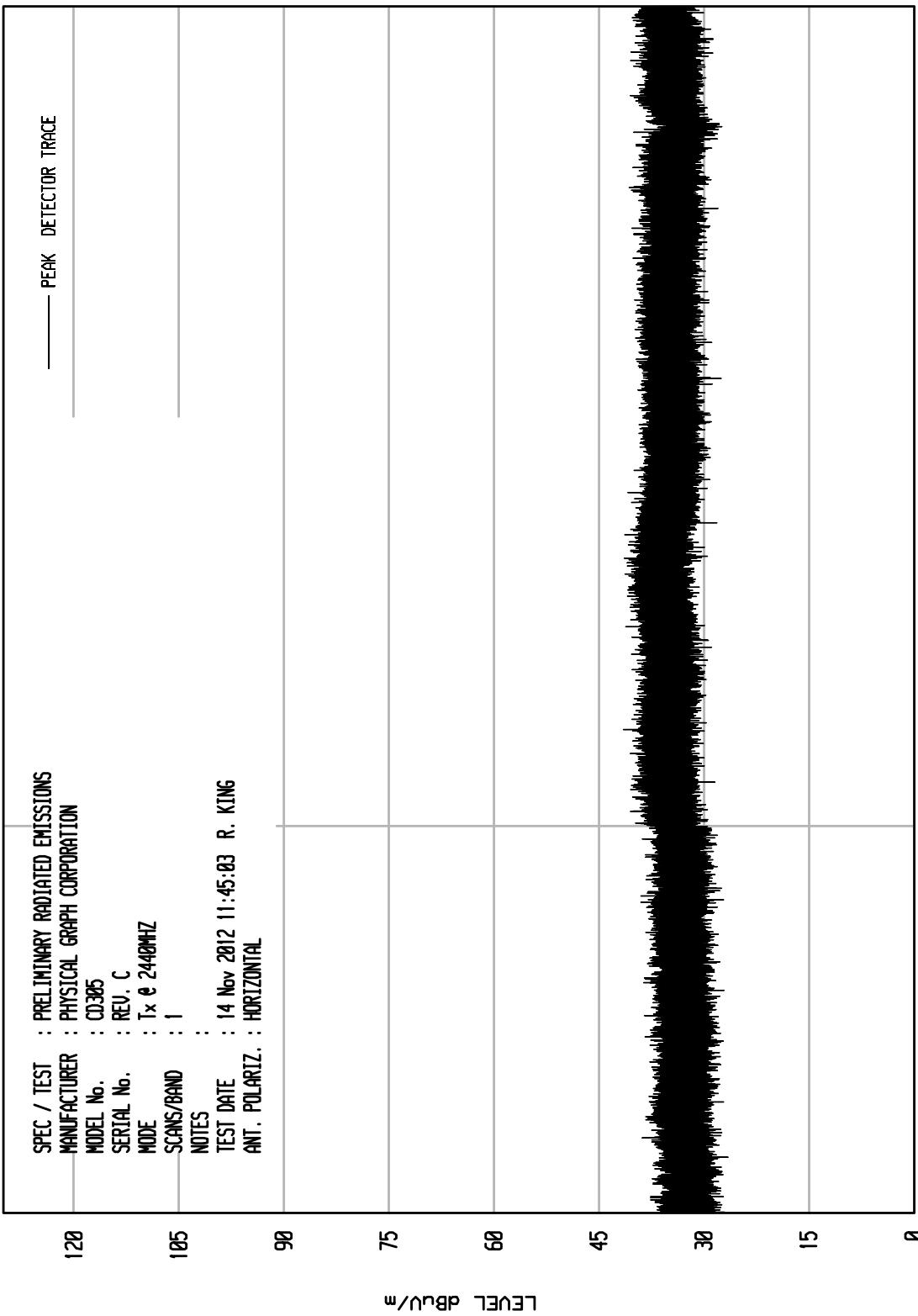
UNIV RCU EMI RUN 3



ELITE ELECTRONIC ENGINEERING Inc.  
Downers Grove, Ill. 60515

MAI 04/26/11

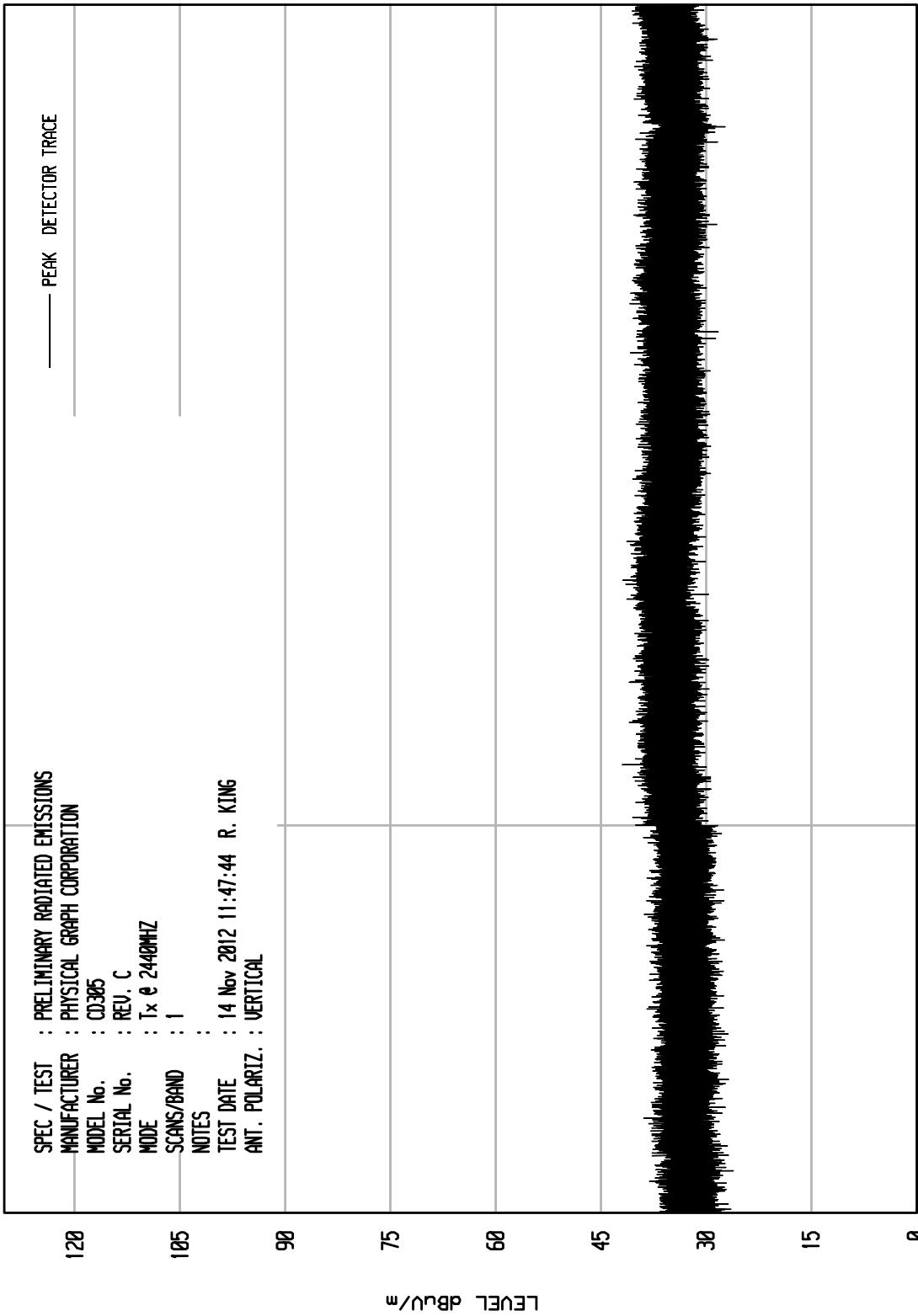
UNIV RCU ENI RUN 4



ELITE ELECTRONIC ENGINEERING Inc.  
Downers Grove, Ill. 60515

MAI 04/26/11

UNIV RCU ENI RUN 5

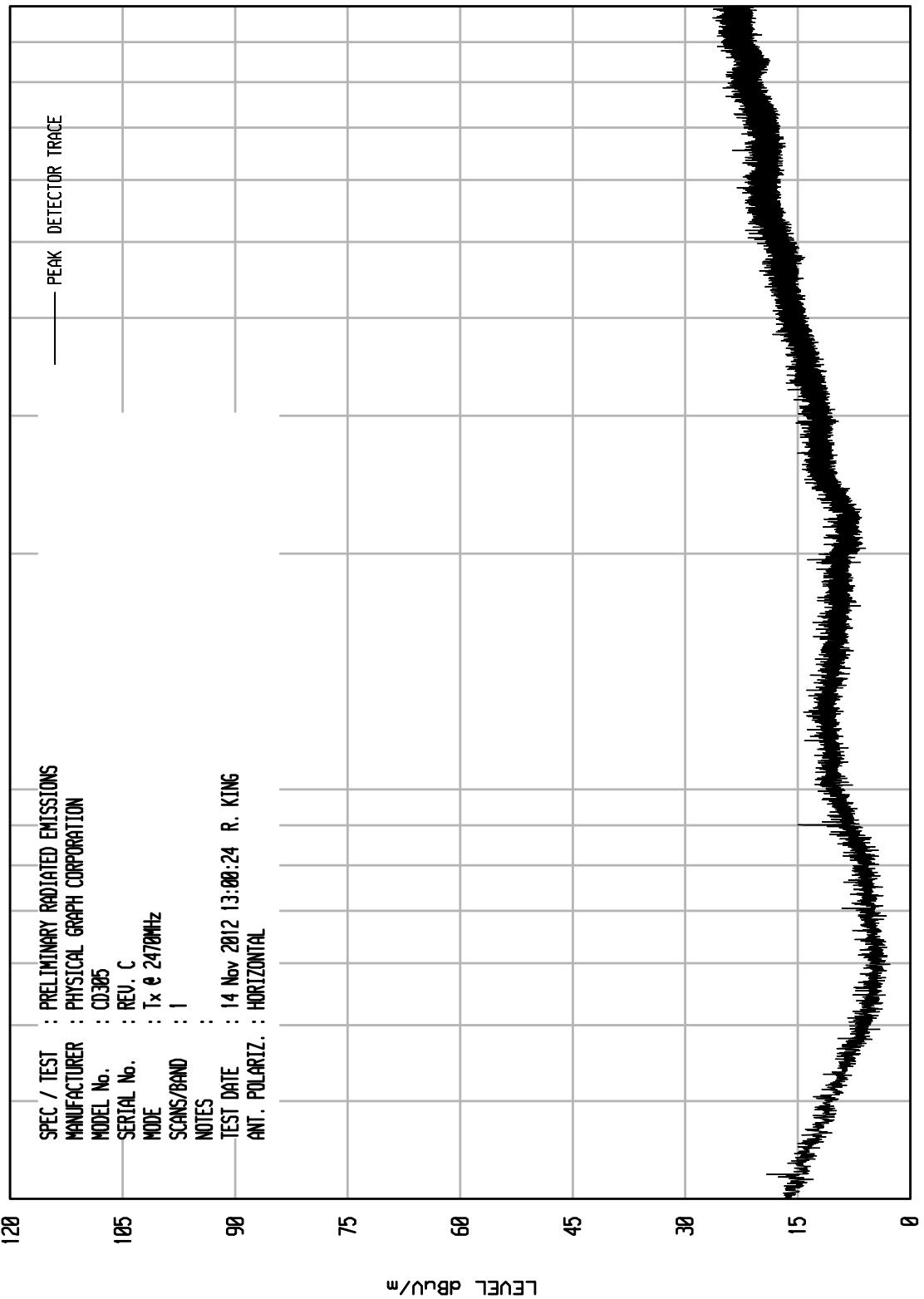


ELITE ELECTRONIC ENGINEERING Inc.  
Downers Grove, Ill. 60515

MAI 04/26/11

UNIV RCU EMI RUN 13

SPEC / TEST : PRELIMINARY RADIATED EMISSIONS  
MANUFACTURER : PHYSICAL GRAPH CORPORATION  
MODEL No. : CD305  
SERIAL No. : REV. C  
MODE : Tx & 2400MHz  
SCANS/BAND : 1  
NOTES :  
TEST DATE : 14 Nov 2012 13:00:24 R. KING  
ANT. POLARIZ. : HORIZONTAL

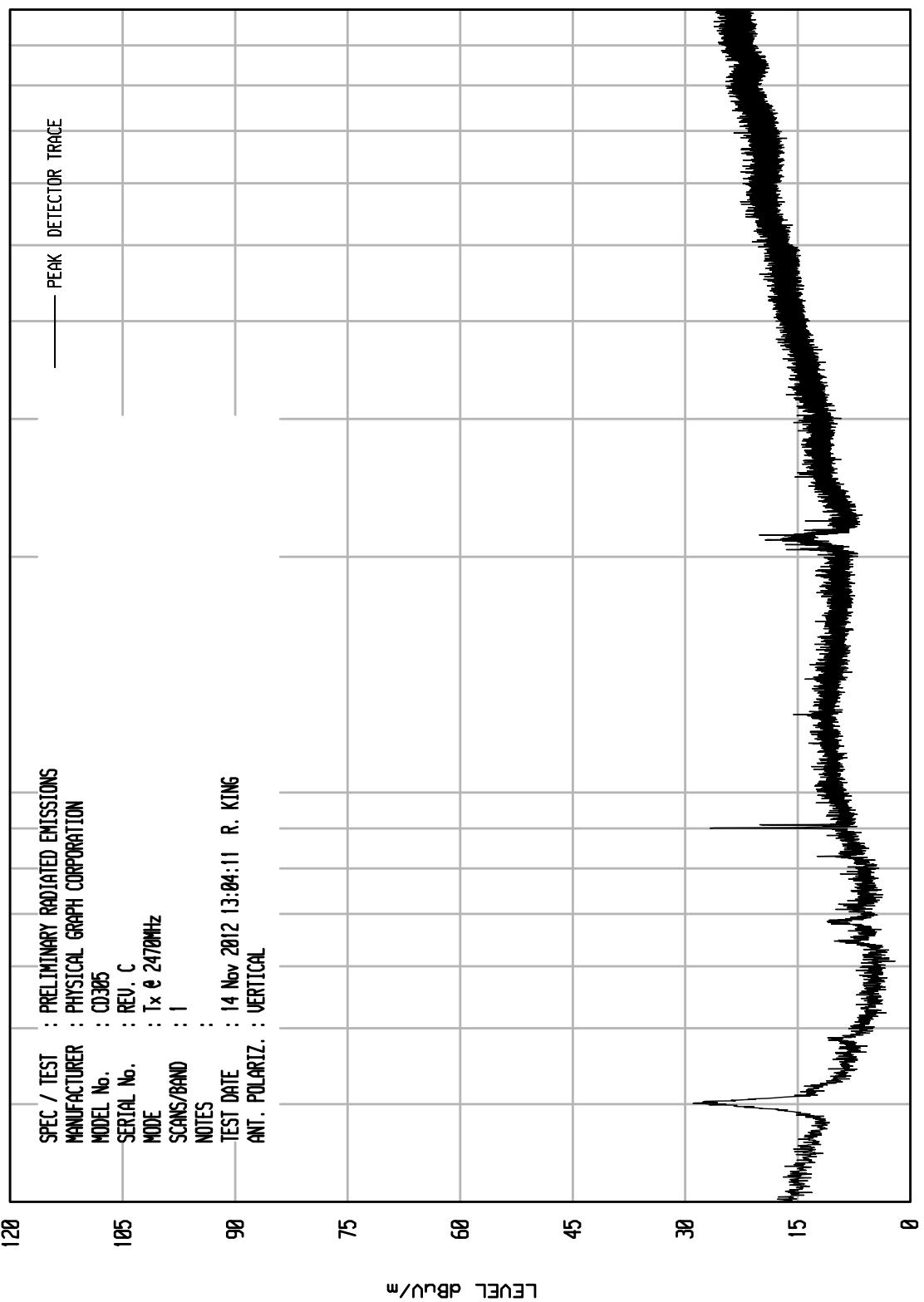


ELITE ELECTRONIC ENGINEERING Inc.  
Downers Grove, Ill. 60515

MAI 04/26/11

UNIV RCU EMI RUN 14

SPEC / TEST : PRELIMINARY RADIATED EMISSIONS  
MANUFACTURER : PHYSICAL GRAPH CORPORATION  
MODEL No. : CD305  
SERIAL No. : REV. C  
MODE : Tx & 2400MHz  
SCANS/BAND : 1  
NOTES :  
TEST DATE : 14 Nov 2012 13:04:11 R. KING  
ANT. POLARIZ. : VERTICAL



ELITE ELECTRONIC ENGINEERING Inc.

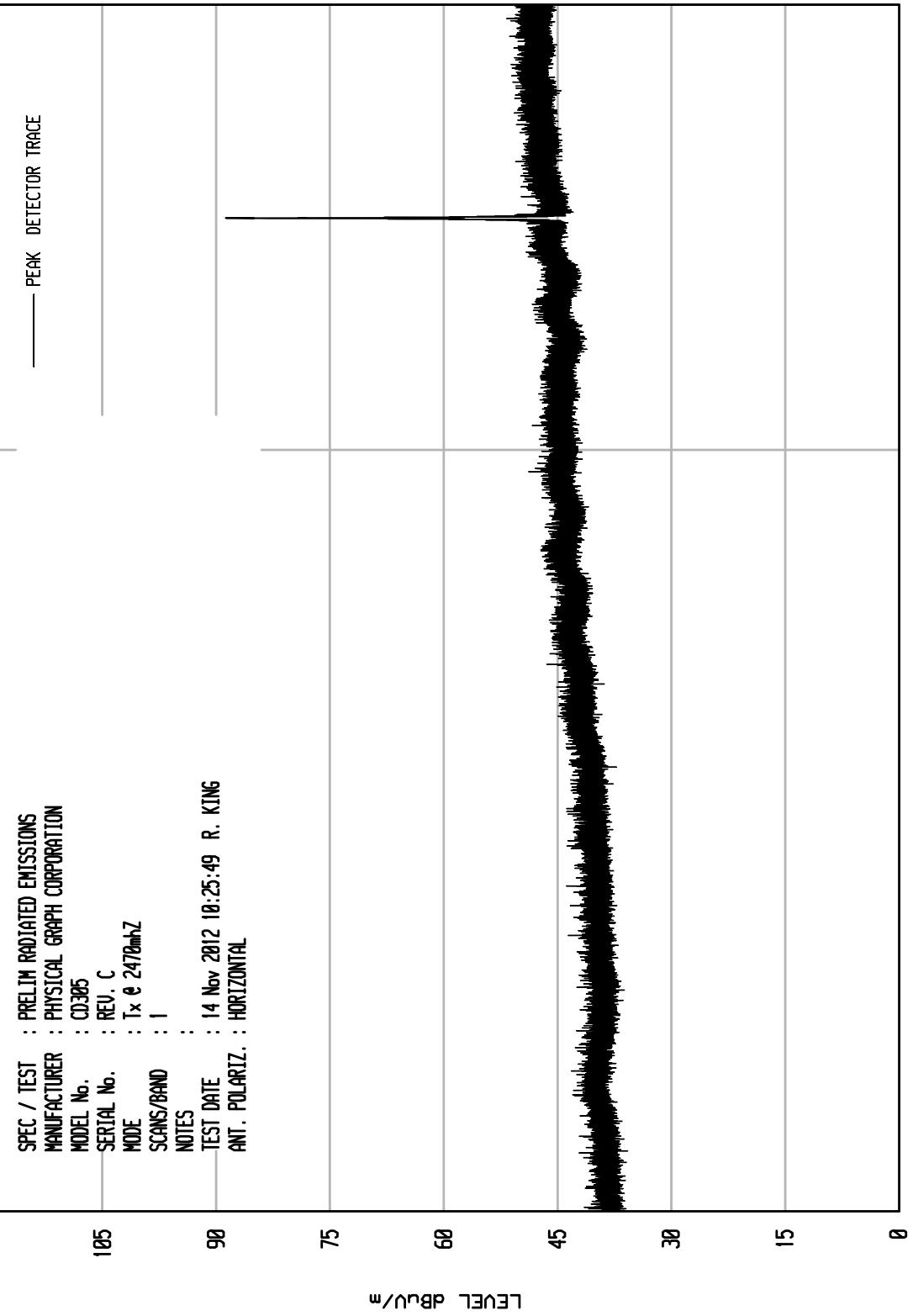
Downers Grove, Ill. 60515

DATE 04/26/11

120

SPEC / TEST	:	PRELIM RADIATED EMISSIONS
MANUFACTURER	:	PHYSICAL GRAPH CORPORATION
MODEL No.	:	CD305
SERIAL No.	:	REV. C
MODE	:	Tx & 2470MHz
SCANS/BAND	:	1
NOTES	:	
TEST DATE	:	14 Nov 2012 10:25:49
ANT. POLARIZ.	:	HORIZONTAL

UNIV RCU RUN 7

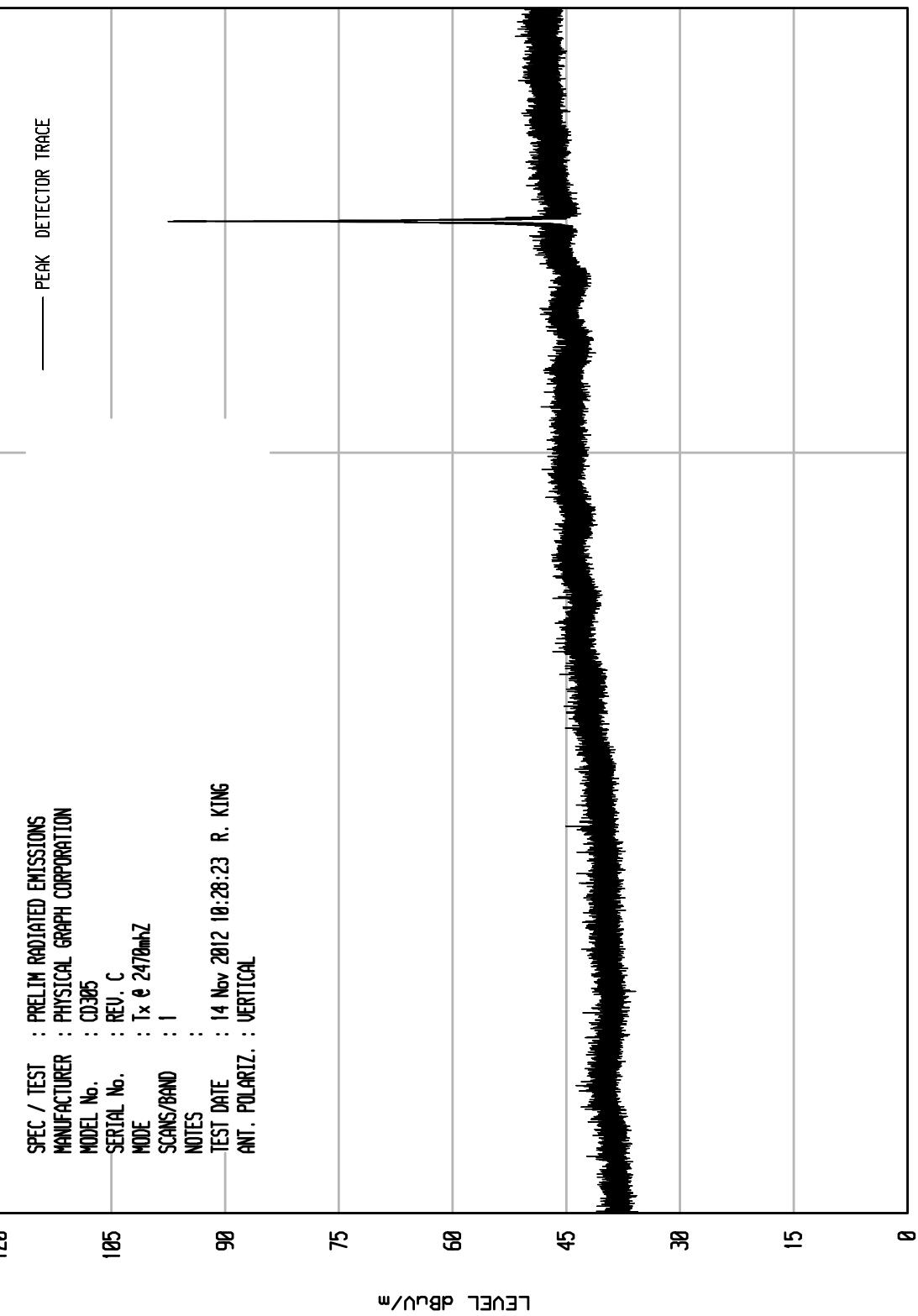


ELITE ELECTRONIC ENGINEERING Inc.  
Downers Grove, Ill. 60515

120  
105  
90  
100  
80

SPEC / TEST : PRELIM RADIATED EMISSIONS  
MANUFACTURER : PHYSICAL GRAPH CORPORATION  
MODEL No. : CD305  
SERIAL No. : REV. C  
MODE : Tx & 2470MHz  
SCANS/BAND : 1  
NOTES :  
TEST DATE : 14 Nov 2012 10:28:23 R. KING  
ANT. POLARIZ. : VERTICAL

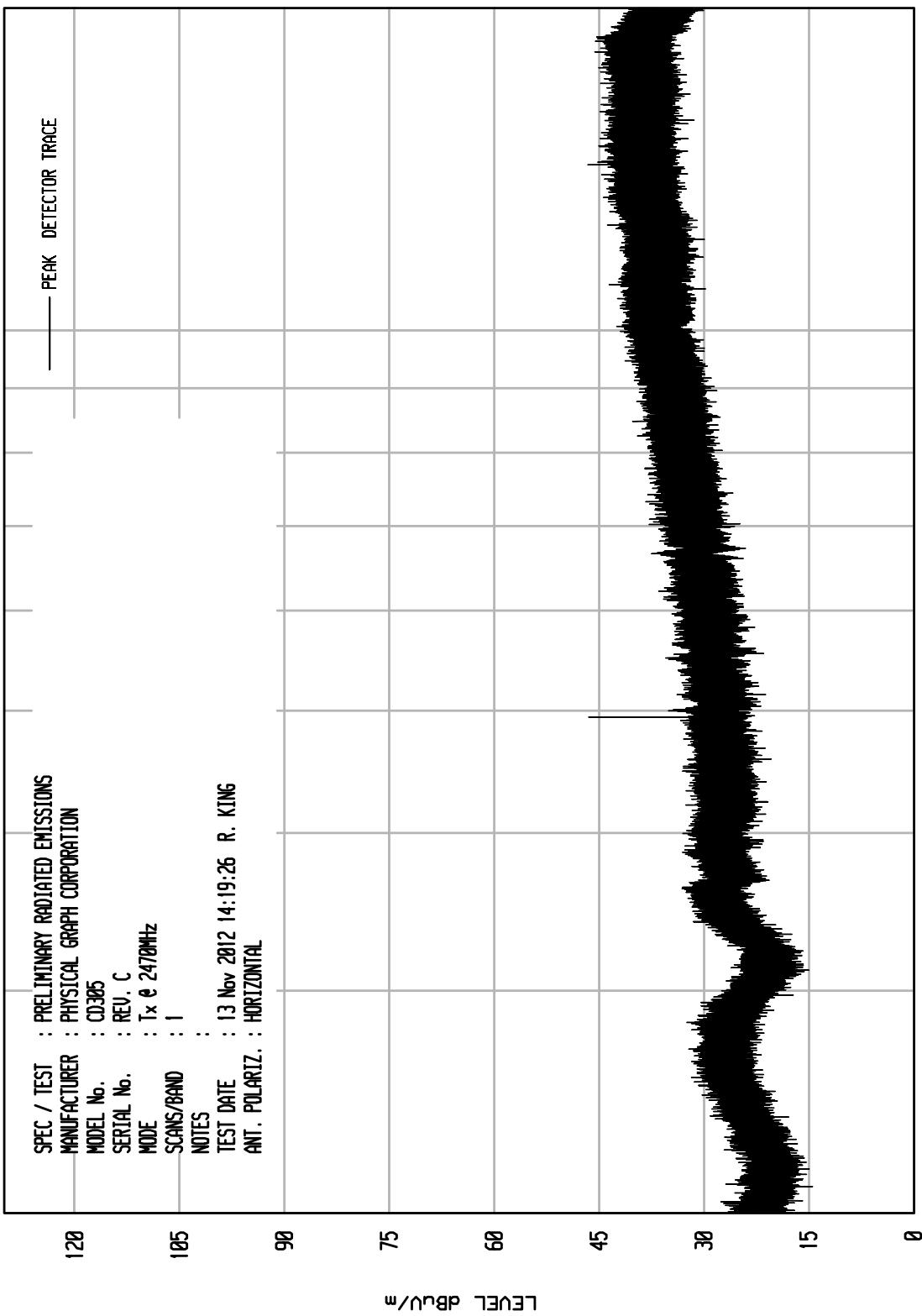
UNIV RCU EMI RUN 8



ELITE ELECTRONIC ENGINEERING Inc.  
Downers Grove, Ill. 60515

MAI 04/26/11

UNIV RCU EMI RUN 1



START = 2000

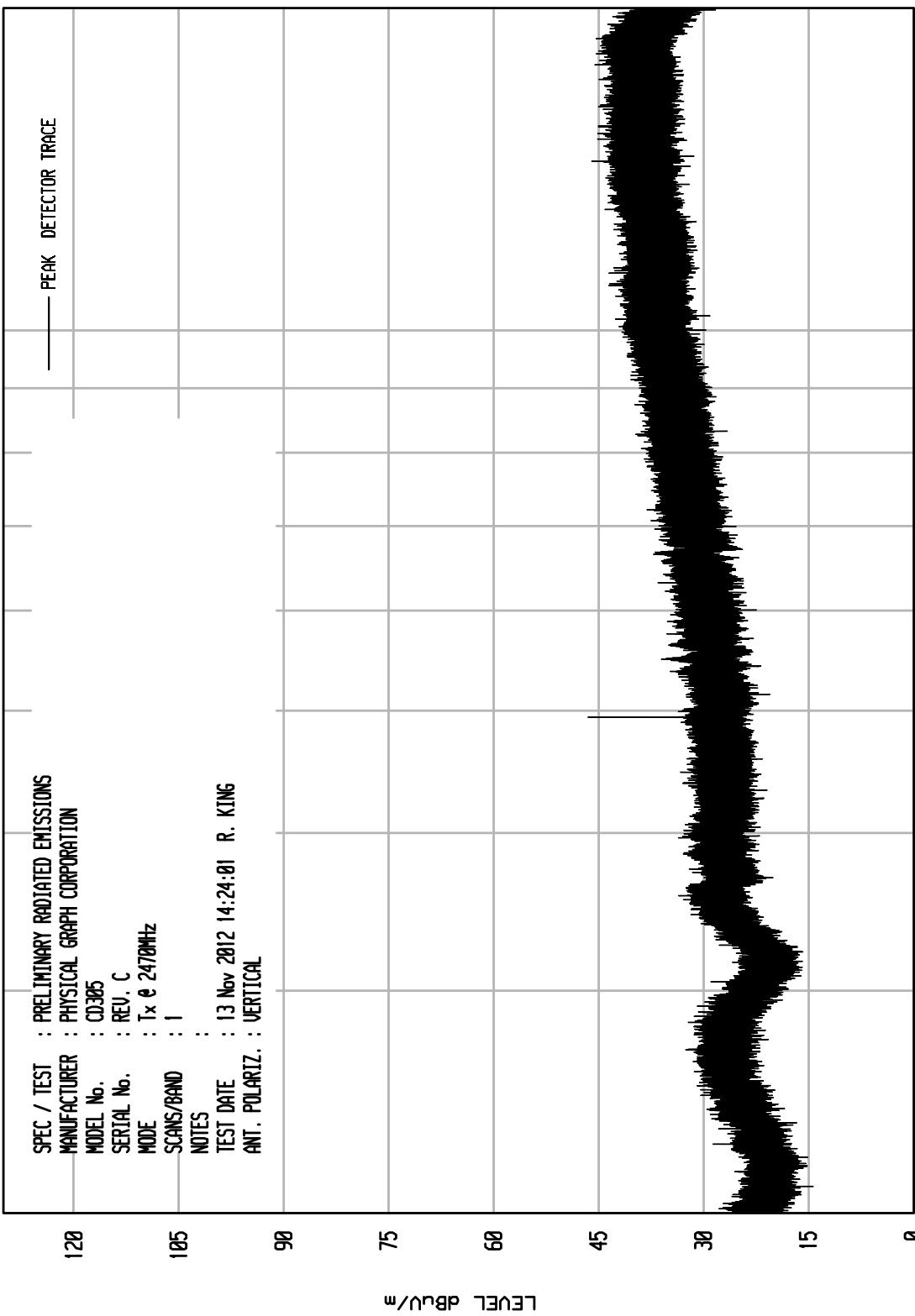
STOP = 18000

ELITE ELECTRONIC ENGINEERING Inc.  
Downers Grove, Ill. 60515

MAI 04/26/11

UNIV RCU EMI RUN 2

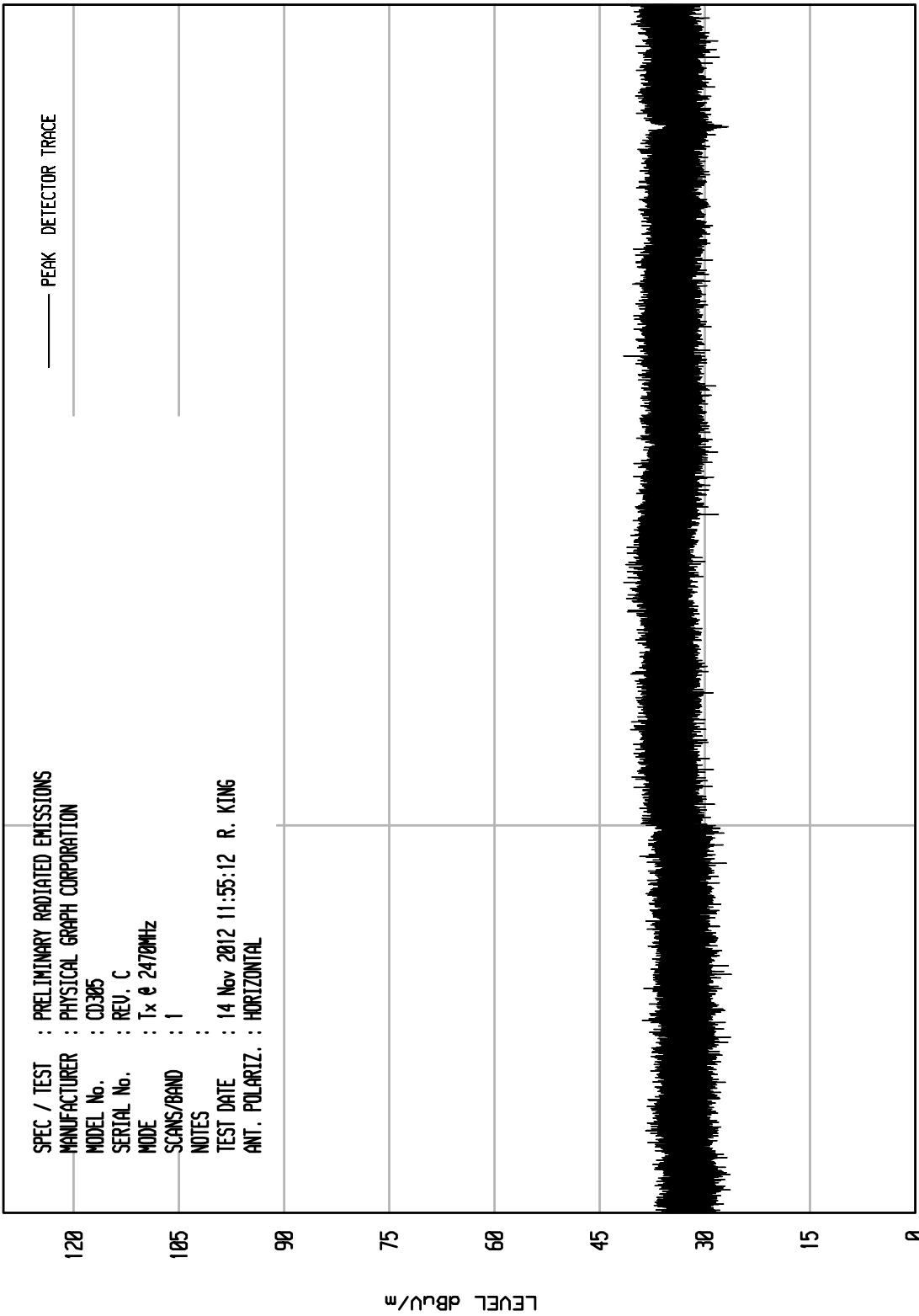
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS  
MANUFACTURER : PHYSICAL GRAPH CORPORATION  
MODEL No. : CD305  
SERIAL No. : REV. C  
MODE : Tx & 2400MHz  
SCANS/BAND : 1  
NOTES :  
TEST DATE : 13 Nov 2012 14:24:01 R. KING  
ANT. POLARIZ. : VERTICAL



ELITE ELECTRONIC ENGINEERING Inc.  
Downers Grove, Ill. 60515

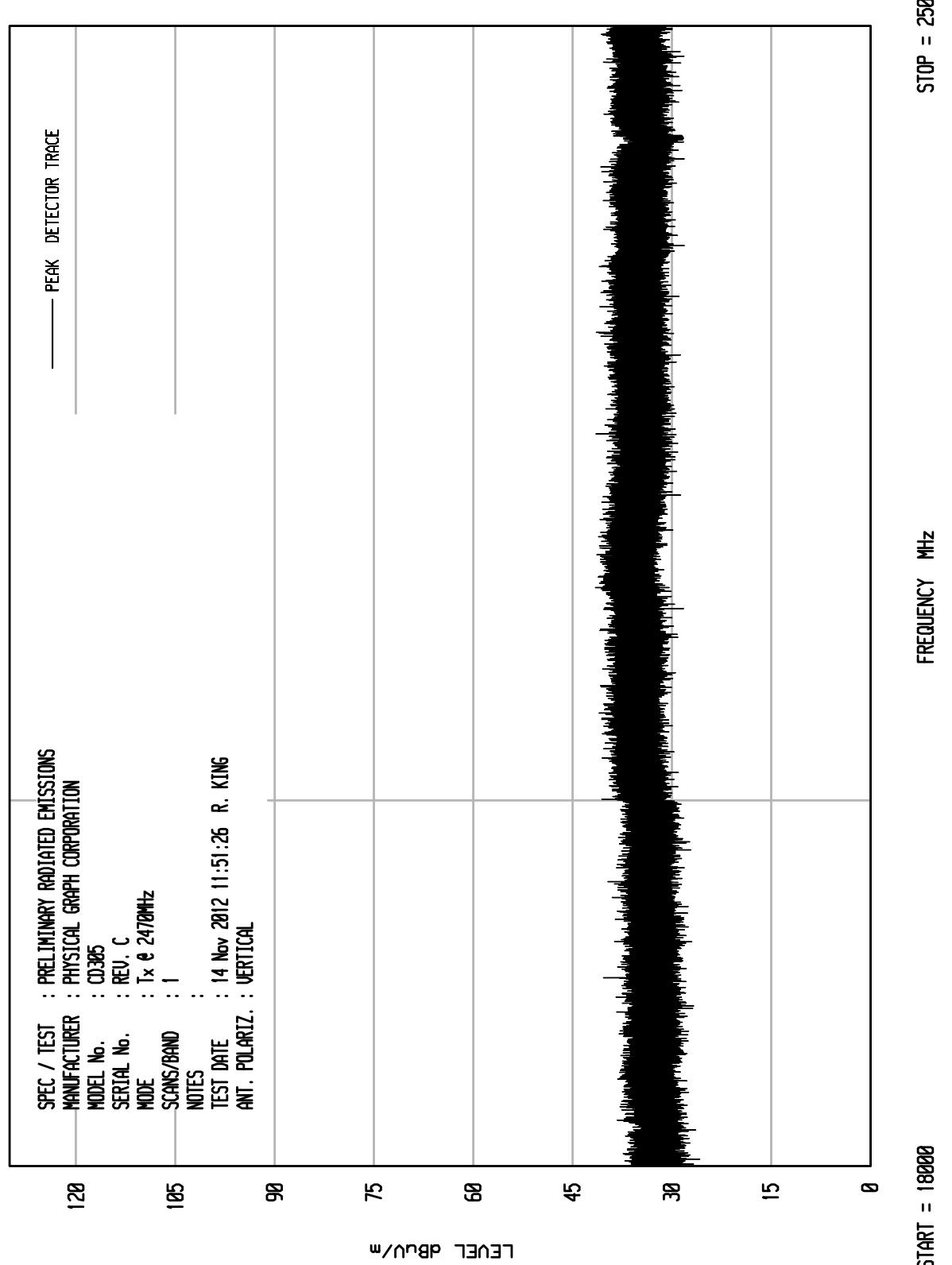
JKAI 04/26/11

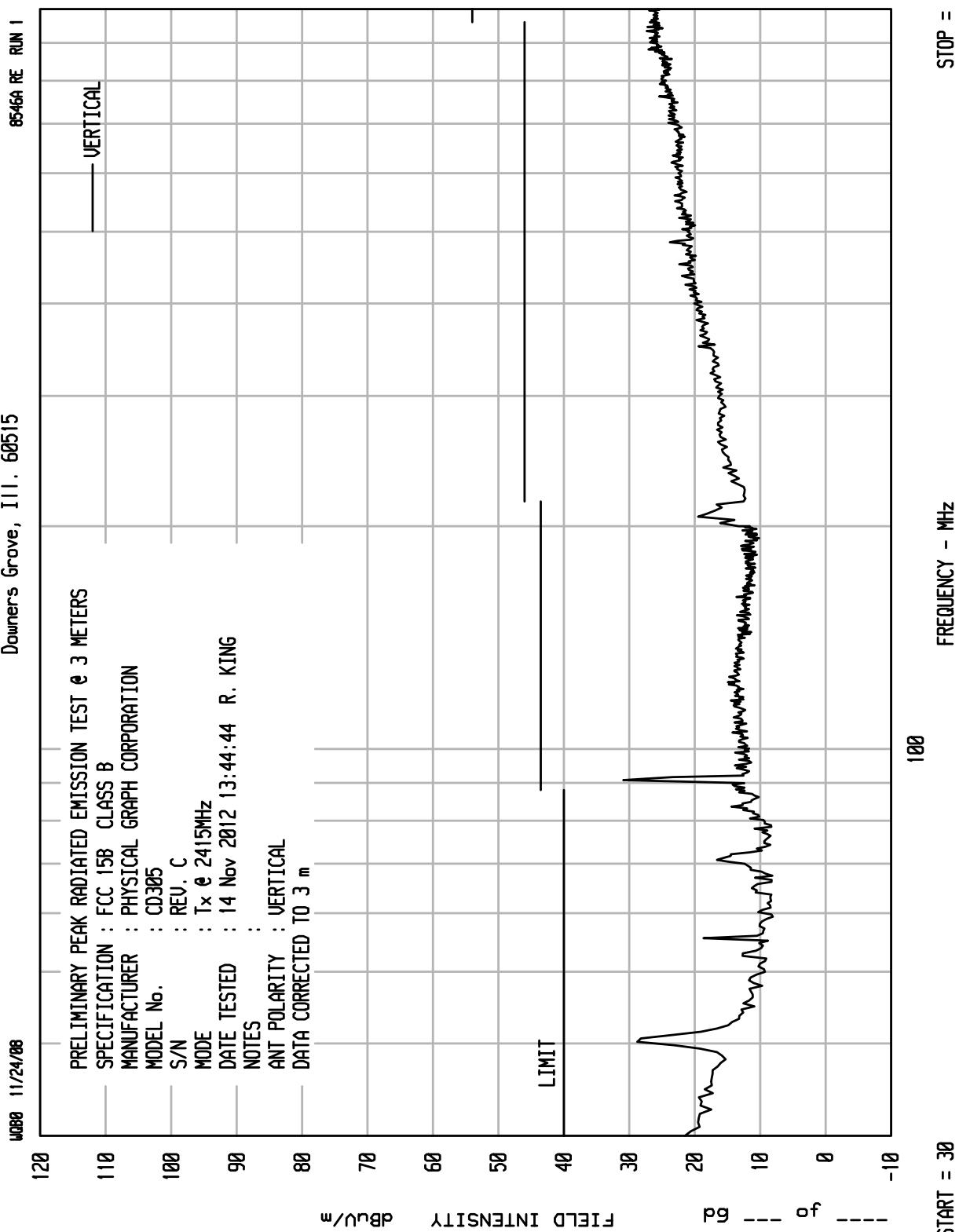
UNIV RCU ENI RUN 7



ELITE ELECTRONIC ENGINEERING Inc.  
Downers Grove, Ill. 60515

WKA1 04/26/11



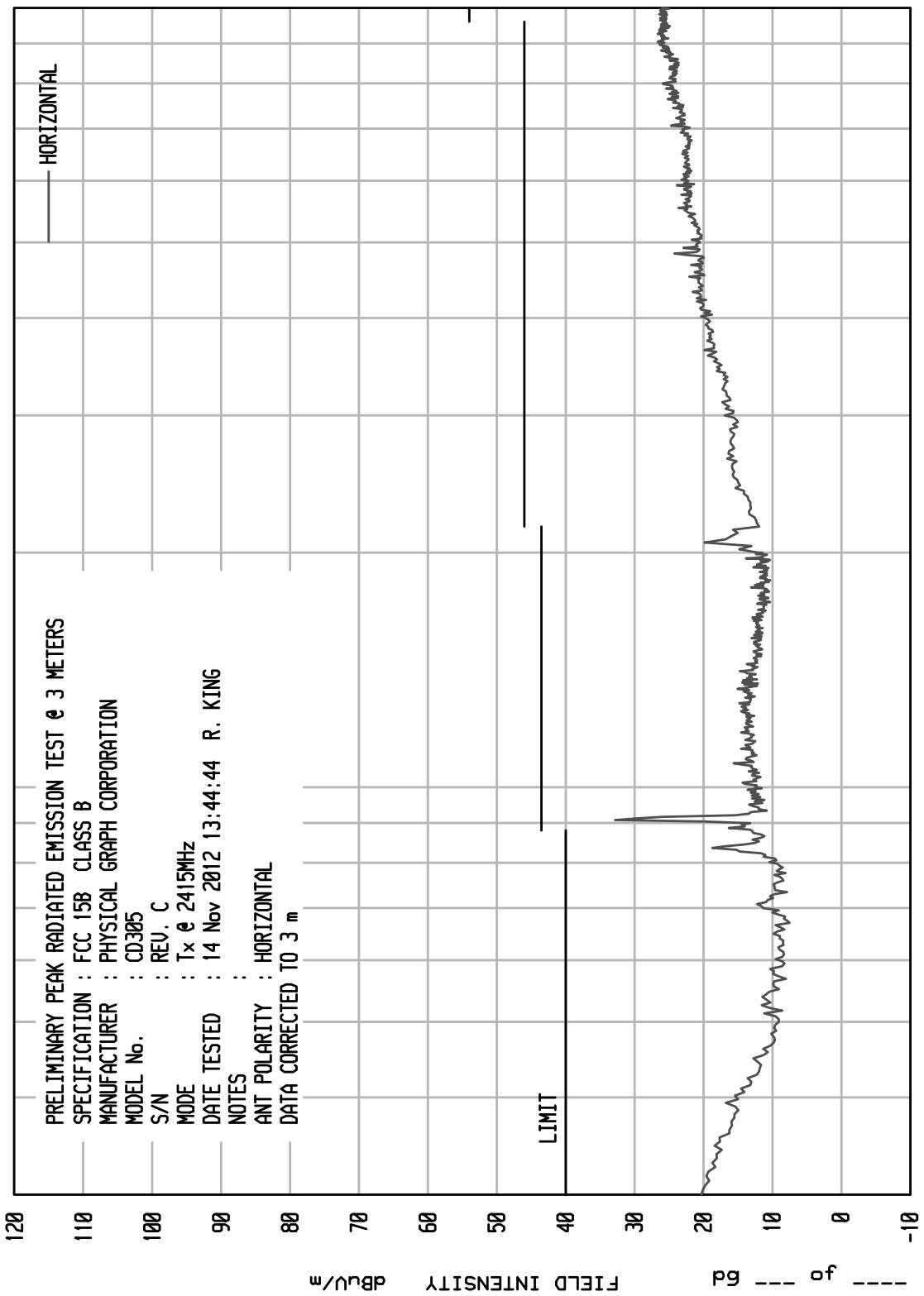


ELITE ELECTRONIC ENGINEERING Inc.  
Downers Grove, Ill. 60515

WB#0 11/24/06

8546A RE RUN 1

PRELIMINARY PEAK RADIATED EMISSION TEST @ 3 METERS  
SPECIFICATION : FCC 15B CLASS B  
MANUFACTURER : PHYSICAL GRAPH CORPORATION  
MODEL No. : CD305  
S/N : REV. C  
MODE : Tx @ 2415MHz  
DATE TESTED : 14 Nov 2012 13:44:44 R. KING  
NOTES : ANT POLARITY : HORIZONTAL  
DATA CORRECTED TO 3 m



START = 30

100 FREQUENCY - MHz

STOP = 1000



ETR No.

8546A

DATA SHEET

TEST NO. 1

RADIATED QP EMISSION MEASUREMENTS in a 3 m SEMI-ANECHOIC ROOM

SPECIFICATION : FCC 15B CLASS B

MANUFACTURER : PHYSICAL GRAPH CORPORATION

MODEL NO. : CD305

SERIAL NO. : REV. C

TEST MODE : Tx @ 2415MHz

NOTES :

TEST DATE : 14 Nov 2012 13:44:44

TEST DISTANCE : 3 m (DATA EXTRAPOLATED TO 3 m)

FREQUENCY MHz	QP READING dBuV	ANT	CBL	EXT	DIST	TOTAL	QP LIMIT dBuV/m	AZ deg	ANT HT cm	POLAR
		FAC dB	FAC dB	ATTN dB	FAC dB	dBuV/m				
40.13	11.0	12.8	.4	0.0	0.0	24.2	40.0	0	120	V
56.86	-6.1	6.3	.4	0.0	0.0	.6	40.0	0	340	V
90.06	24.0	9.1	.4	0.0	0.0	33.4	43.5	90	200	H
108.00	-4.4	11.3	.4	0.0	0.0	7.3	43.5	0	340	H
132.28	-7.4	11.5	.5	0.0	0.0	4.7	43.5	225	340	H
159.12	-3.6	10.1	.6	0.0	0.0	7.0	43.5	135	120	V
182.33	-7.8	9.5	.7	0.0	0.0	2.4	43.5	135	340	H
213.16	3.7	9.4	.8	0.0	0.0	13.9	43.5	270	340	H
364.62	-6.5	14.9	1.0	0.0	0.0	9.3	46.0	225	340	H
448.01	-.6	16.8	1.1	0.0	0.0	17.4	46.0	135	200	V
480.00	1.7	16.9	1.1	0.0	0.0	19.7	46.0	180	340	H
587.95	-6.6	18.6	1.1	0.0	0.0	13.1	46.0	45	200	H
799.24	-6.5	20.4	1.5	0.0	0.0	15.4	46.0	225	340	H
881.04	-5.7	20.4	1.5	0.0	0.0	16.2	46.0	90	120	V
925.75	-5.9	20.9	1.5	0.0	0.0	16.5	46.0	270	340	V

Checked BY *Richard E. King* :

---

Richard E. King

## DATA PAGE

Manufacturer : Physical Graph Corporation  
 Model No. : CD305  
 Test Specification : FCC Part 15, Subpart C, Section 15.247, Radiated Emissions  
 Date : November 13, 2012  
 Mode : Transmit @ 2415 MHz  
 Test Distance : 3 meters  
 Notes : Peak Detector  
           : Total = Meter Reading + Cable Loss + Antenna Factor + Preamp Gain

Freq. MHz	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Peak Total dBuV/m at 3m	Peak Total uV/m at 3 m	Peak Limit uV/m at 3 m	Margin (dB)
2415.00	H	62.0		2.6	31.5	0.0	96.1	63497.7		
2415.00	V	63.9		2.6	31.5	0.0	98.0	79388.6		
4830.00	H	54.5		3.7	34.7	-40.1	52.8	436.9	5000.0	-21.2
4830.00	V	54.9		3.7	34.7	-40.1	53.2	457.5	5000.0	-20.8
7245.00	H	35.5	*	4.7	37.8	-39.8	38.2	81.6	7938.9	-39.8
7245.00	V	35.1	*	4.7	37.8	-39.8	37.8	78.1	7938.9	-40.1
9660.00	H	41.3		5.2	39.7	-38.8	47.5	236.6	7938.9	-30.5
9660.00	V	41.2		5.2	39.7	-38.8	47.4	233.3	7938.9	-30.6
12075.00	H	45.8	*	6.1	41.3	-39.6	53.6	476.7	5000.0	-20.4
12075.00	V	46.5	*	6.1	41.3	-39.6	54.2	515.5	5000.0	-19.7
14490.00	H	46.1	*	6.6	42.3	-39.9	55.1	566.0	5000.0	-18.9
14490.00	V	45.8	*	6.6	42.3	-39.9	54.8	548.0	5000.0	-19.2
16905.00	H	36.0	*	7.2	41.2	-38.7	45.7	192.8	7938.9	-32.3
16905.00	V	36.6	*	7.2	41.2	-38.7	46.2	205.2	7938.9	-31.8
19320.00	H	33.5	*	2.2	40.4	-27.5	48.6	269.9	5000.0	-25.4
19320.00	V	33.5	*	2.2	40.4	-27.5	48.6	269.9	5000.0	-25.4
21735.00	H	24.7	*	2.2	40.6	-27.3	40.2	102.6	7938.9	-37.8
21735.00	V	24.7	*	2.2	40.6	-27.3	40.2	102.6	7938.9	-37.8
24150.00	H	24.5	*	2.2	40.6	-28.3	39.1	89.7	7938.9	-38.9
24150.00	V	24.5	*	2.2	40.6	-28.3	39.1	89.7	7938.9	-38.9



## DATA PAGE

Manufacturer : Physical Graph Corporation  
Model No. : CD305  
Test Specification : FCC Part 15, Subpart C, Section 15.247, Radiated Emissions  
Date : November 13, 2012  
Mode : Transmit @ 2415 MHz  
Test Distance : 3 meters  
Notes : Average Readings in Restricted Bands  
: Total = Meter Reading + Cable Loss + Antenna Factor + Preamp Gain

Freq. MHz	Ant Pol	Meter Reading (dBuV)	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Average Total dBuV/m at 3m	Average Total uV/m at 3 m	Average Limit uV/m at 3 m	Margin (dB)
4830.00	H	46.5	3.7	34.7	-40.1	44.8	173.9	500.0	-9.2
4830.00	V	47.3	3.7	34.7	-40.1	45.6	191.0	500.0	-8.4
12075.00	H	32.9	6.1	41.3	-39.6	40.7	108.7	500.0	-13.3
12075.00	V	32.9	6.1	41.3	-39.6	40.7	108.2	500.0	-13.3
14490.00	H	33.0	6.6	42.3	-39.9	42.0	125.8	500.0	-12.0
14490.00	V	33.0	6.6	42.3	-39.9	42.0	125.8	500.0	-12.0
19320.00	H	21.5	2.2	40.4	-27.5	36.6	67.7	500.0	-17.4
19320.00	V	21.5	2.2	40.4	-27.5	36.6	67.7	500.0	-17.4

## DATA PAGE

Manufacturer : Physical Graph Corporation  
 Model No. : CD305  
 Test Specification : FCC Part 15, Subpart C, Section 15.247, Radiated Emissions  
 Date : November 13, 2012  
 Mode : Transmit @ 2440MHz  
 Test Distance : 3 meters  
 Notes : Peak Detector  
           : Total = Meter Reading + Cable Loss + Antenna Factor + Preamp Gain

Freq. MHz	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Peak Total dBuV/m at 3m	Peak Total uV/m at 3 m	Peak Limit uV/m at 3 m	Margin (dB)
2440.00	H	63.8		2.6	31.5	0.0	97.9	78610.9		
2440.00	V	66.5		2.6	31.5	0.0	100.6	107271.2		
4880.00	H	55.4		3.7	34.7	-40.1	53.7	486.5	5000.0	-20.2
4880.00	V	55.3		3.7	34.7	-40.1	53.6	479.8	5000.0	-20.4
7320.00	H	45.2	*	4.7	37.9	-39.8	48.0	252.3	5000.0	-25.9
7320.00	V	45.2	*	4.7	37.9	-39.8	48.0	252.0	5000.0	-26.0
9760.00	H	36.5	*	5.2	39.8	-38.7	42.8	138.0	10727.1	-37.8
9760.00	V	38.0	*	5.2	39.8	-38.7	44.3	164.4	10727.1	-36.3
12200.00	H	44.3	*	6.1	41.4	-39.4	52.3	412.7	5000.0	-21.7
12200.00	V	44.2	*	6.1	41.4	-39.4	52.2	406.5	5000.0	-21.8
14640.00	H	34.5	*	6.7	42.3	-40.1	43.5	148.8	10727.1	-37.2
14640.00	V	33.9	*	6.7	42.3	-40.1	42.8	138.4	10727.1	-37.8
17080.00	H	36.5	*	7.3	40.8	-38.7	45.9	198.0	10727.1	-34.7
17080.00	V	36.0	*	7.3	40.8	-38.7	45.4	185.4	10727.1	-35.2
19520.00	H	35.0	*	2.2	40.4	-27.1	50.5	333.2	5000.0	-23.5
19520.00	V	35.0	*	2.2	40.4	-27.1	50.5	333.2	5000.0	-23.5
21960.00	H	25.3	*	2.2	40.6	-27.5	40.5	106.2	10727.1	-40.1
21960.00	V	25.3	*	2.2	40.6	-27.5	40.5	106.2	10727.1	-40.1
24400.00	H	24.5	*	2.2	40.6	-28.2	39.1	90.0	10727.1	-41.5
24400.00	V	24.5	*	2.2	40.6	-28.2	39.1	90.0	10727.1	-41.5

## DATA PAGE

Manufacturer : Physical Graph Corporation  
Model No. : CD305  
Test Specification : FCC Part 15, Subpart C, Section 15.247, Radiated Emissions  
Date : November 13, 2012  
Mode : Transmit @ 2440MHz  
Test Distance : 3 meters  
Notes : Average Readings in Restricted Bands  
: Total = Meter Reading + Cable Loss + Antenna Factor + Preamp Gain

Freq. MHz	Ant Pol	Meter Reading (dBuV)	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Average Total dBuV/m at 3m	Average Total uV/m at 3 m	Average Limit uV/m at 3 m	Margin (dB)
4880.00	H	47.2	3.7	34.7	-40.1	45.5	188.4	500.0	-8.5
4880.00	V	47.2	3.7	34.7	-40.1	45.5	189.3	500.0	-8.4
7320.00	H	33.4	4.7	37.9	-39.8	36.3	65.0	500.0	-17.7
7320.00	V	33.2	4.7	37.9	-39.8	36.0	63.4	500.0	-17.9
12200.00	H	30.7	6.1	41.4	-39.4	38.7	86.1	500.0	-15.3
12200.00	V	30.7	6.1	41.4	-39.4	38.7	85.8	500.0	-15.3
19520.00	H	21.6	2.2	40.4	-27.1	37.1	71.3	500.0	-16.9
19520.00	V	21.6	2.2	40.4	-27.1	37.1	71.3	500.0	-16.9



## DATA PAGE

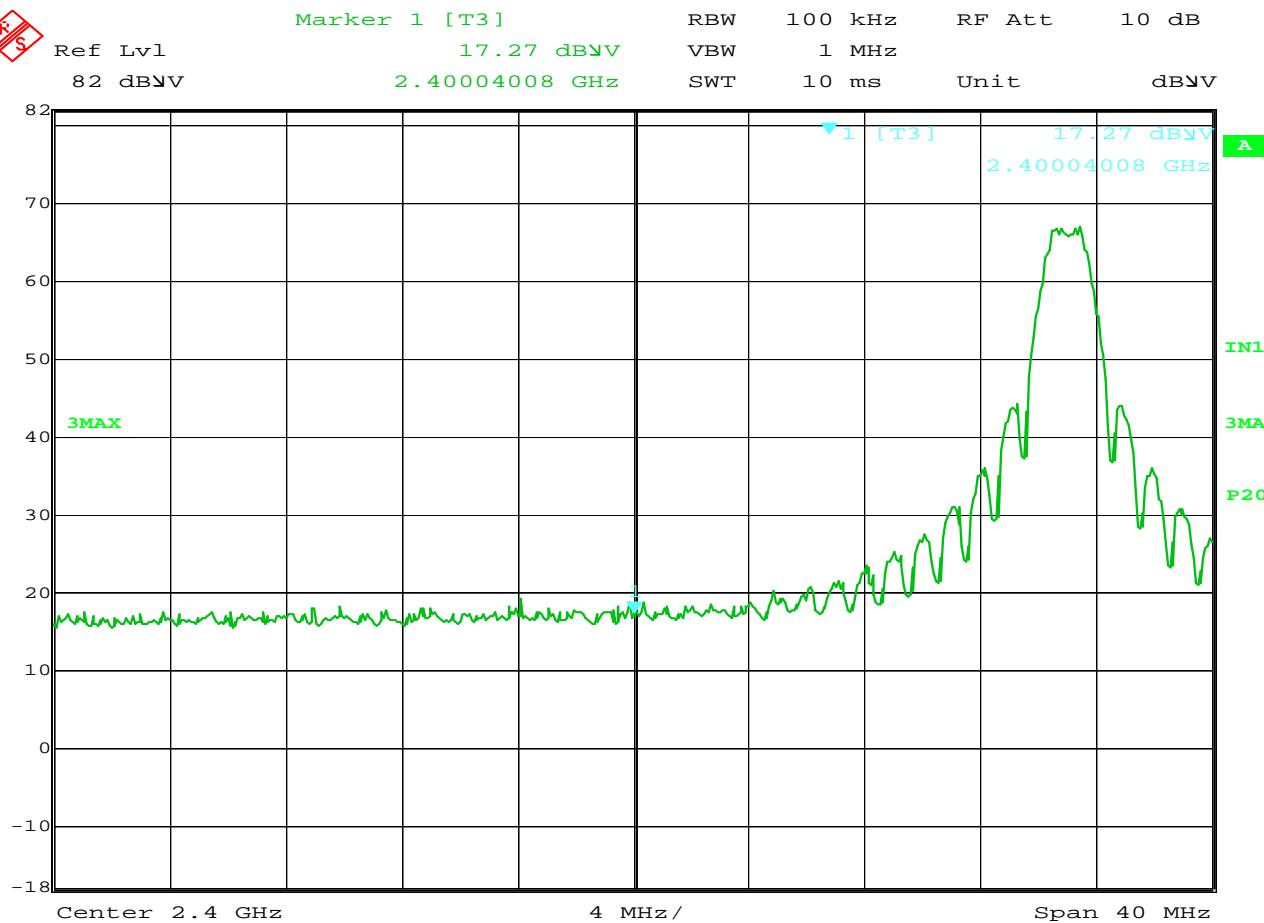
Manufacturer : Physical Graph Corporation  
Model No. : CD305  
Test Specification : FCC Part 15, Subpart C, Section 15.247, Radiated Emissions  
Date : November 13, 2012  
Mode : Transmit @ 2470 MHz  
Test Distance : 3 meters  
Notes : Battery Operated  
Notes : Peak Detector  
Notes : Total = Meter Reading + Cable Loss + Antenna Factor + Preamp Gain

Freq. MHz	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Peak Total dBuV/m at 3m	Peak Total uV/m at 3 m	Peak Limit uV/m at 3 m	Margin (dB)
2470.00	H	64.8		2.7	31.5	0.0	99.0	88804.8		
2470.00	V	67.9		2.7	31.5	0.0	102.0	126455.1		
4940.00	H	54.3		3.7	34.8	-40.2	52.6	427.0	5000.0	-21.4
4940.00	V	54.0		3.7	34.8	-40.2	52.4	414.9	5000.0	-21.6
7410.00	H	46.3	*	4.7	38.0	-39.7	49.3	291.2	5000.0	-24.7
7410.00	V	47.9	*	4.7	38.0	-39.7	50.8	346.9	5000.0	-23.2
9880.00	H	37.2	*	5.3	39.9	-38.6	43.7	153.7	12645.5	-38.3
9880.00	V	38.4		5.3	39.9	-38.6	44.9	175.9	12645.5	-37.1
12350.00	H	47.8	*	6.1	41.4	-39.3	56.0	634.3	5000.0	-17.9
12350.00	V	47.8	*	6.1	41.4	-39.3	56.0	632.8	5000.0	-18.0
14820.00	H	37.8	*	6.8	42.3	-40.2	46.6	214.6	12645.5	-35.4
14820.00	V	37.9	*	6.8	42.3	-40.2	46.8	218.3	12645.5	-35.3
17290.00	H	37.6	*	7.3	40.0	-38.9	46.0	200.3	12645.5	-36.0
17290.00	V	37.6	*	7.3	40.0	-38.9	46.0	199.1	12645.5	-36.1
19760.00	H	33.7	*	2.2	40.4	-26.8	49.5	298.4	5000.0	-24.5
19760.00	V	33.7	*	2.2	40.4	-26.8	49.5	298.4	5000.0	-24.5
22230.00	H	34.0	*	2.2	40.6	-27.7	49.1	285.3	5000.0	-24.9
22230.00	V	34.0	*	2.2	40.6	-27.7	49.1	285.3	5000.0	-24.9
24700.00	H	24.7	*	2.2	40.6	-28.2	39.3	92.7	12645.5	-42.7
24700.00	V	24.7	*	2.2	40.6	-28.2	39.3	92.7	12645.5	-42.7

## DATA PAGE

Manufacturer : Physical Graph Corporation  
Model No. : CD305  
Test Specification : FCC Part 15, Subpart C, Section 15.247, Radiated Emissions  
Date : November 13, 2012  
Mode : Transmit @ 2470 MHz  
Test Distance : 3 meters  
Notes : Battery Operated  
Notes : Average Readings in Restricted Bands  
Notes : Total = Meter Reading + Cable Loss + Antenna Factor + Preamp Gain

Freq. MHz	Ant Pol	Meter Reading (dBuV)	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Average Total dBuV/m at 3m	Average Total uV/m at 3 m	Average Limit uV/m at 3 m	Margin (dB)
4940.00	H	45.9	3.7	34.8	-40.2	44.2	162.7	500.0	-9.8
4940.00	V	45.7	3.7	34.8	-40.2	44.0	158.6	500.0	-10.0
7410.00	H	34.3	4.7	38.0	-39.7	37.3	72.9	500.0	-16.7
7410.00	V	34.2	4.7	38.0	-39.7	37.1	71.8	500.0	-16.9
12350.00	H	34.2	6.1	41.4	-39.3	42.5	132.7	500.0	-11.5
12350.00	V	34.3	6.1	41.4	-39.3	42.5	133.3	500.0	-11.5
19760.00	H	21.4	2.2	40.4	-26.8	37.2	72.7	500.0	-16.7
19760.00	V	21.4	2.2	40.4	-26.8	37.2	72.7	500.0	-16.7
22230.00	H	21.0	2.2	40.6	-27.7	36.1	63.9	500.0	-17.9
22230.00	V	21.0	2.2	40.6	-27.7	36.1	63.9	500.0	-17.9



Date: 13.NOV.2012 11:24:42

Manufacturer	: Physical Graph Corporation
Test Item	: Smart Tag
Model No.	: CD305
Serial No.	: rev. C
Mode	: Transmit at 2415 MHz
Test Specification	: FCC 15.247 and Industry Canada RSS-210 Annex 2, section A2.9
Date	: November 13, 2012
Test Distance	: 3 meters
Note	: Peak readings



Manufacturer : Physical Graph Corporation  
Test Item : Smart Tag  
Model No. : CD305  
Serial No. : rev. C  
Mode : Transmit at 2470 MHz  
Test Specification : FCC 15.247 and Industry Canada RSS-210 Annex 2, section A2.9  
Date : November 13, 2012  
Test Distance : 3 meters  
Note : Peak readings

Freq. MHz	Ant Pol	Meter Reading (dBuV)	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Peak Total dBuV/m at 3m	Peak Total uV/m at 3 m	Peak Limit uV/m at 3 m	Margin (dB)
2483.50	H	24.9	2.7	31.5	0.0	59.1	896.6	5000.0	-14.9
2483.50	V	25.1	2.7	31.5	0.0	59.2	916.4	5000.0	-14.7

Checked BY

*RICHARD E. KING* :

---

Richard E. King



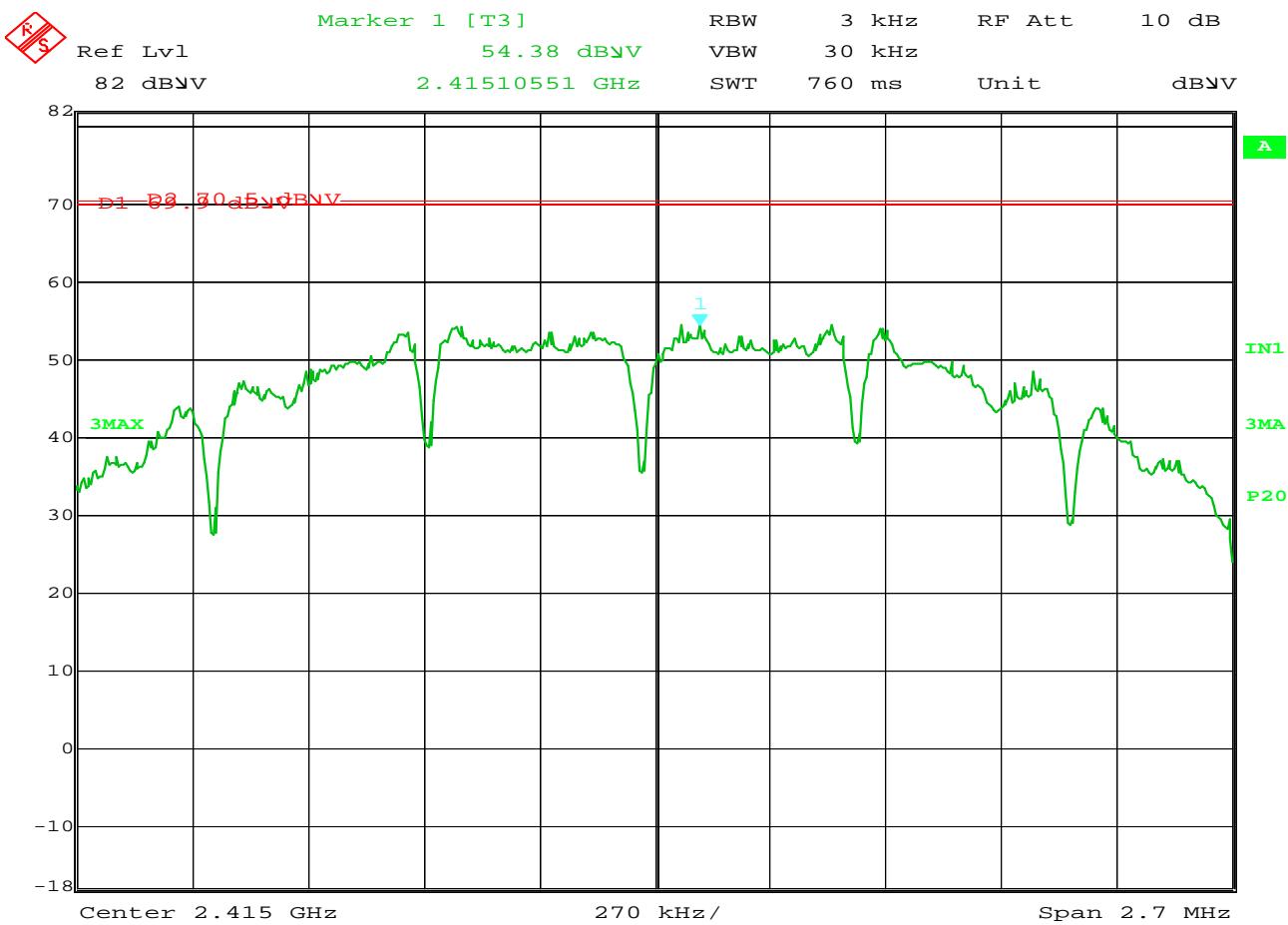
Manufacturer : Physical Graph Corporation  
Test Item : Smart Tag  
Model No. : CD305  
Serial No. : rev. C  
Mode : Transmit at 2470 MHz  
Mode : b, 11 MBps  
Test Specification : FCC 15.247 and Industry Canada RSS-210 Annex 2, section A2.9  
Date : November 13, 2012  
Test Distance : 3 meters  
Note : Average readings

Freq. MHz	Ant Pol	Meter Reading (dBuV)	CBL Fac (dB)	Ant Fac (dB)	Average Total dBuV/m at 3m	Average Total uV/m at 3 m	Average Limit uV/m at 3 m	Margin (dB)
2483.50	H	12.0	2.7	31.5	46.2	203.0	500.0	-7.8
2483.50	V	12.2	2.7	31.5	46.3	207.3	500.0	-7.6

Checked BY

---

Richard E. King



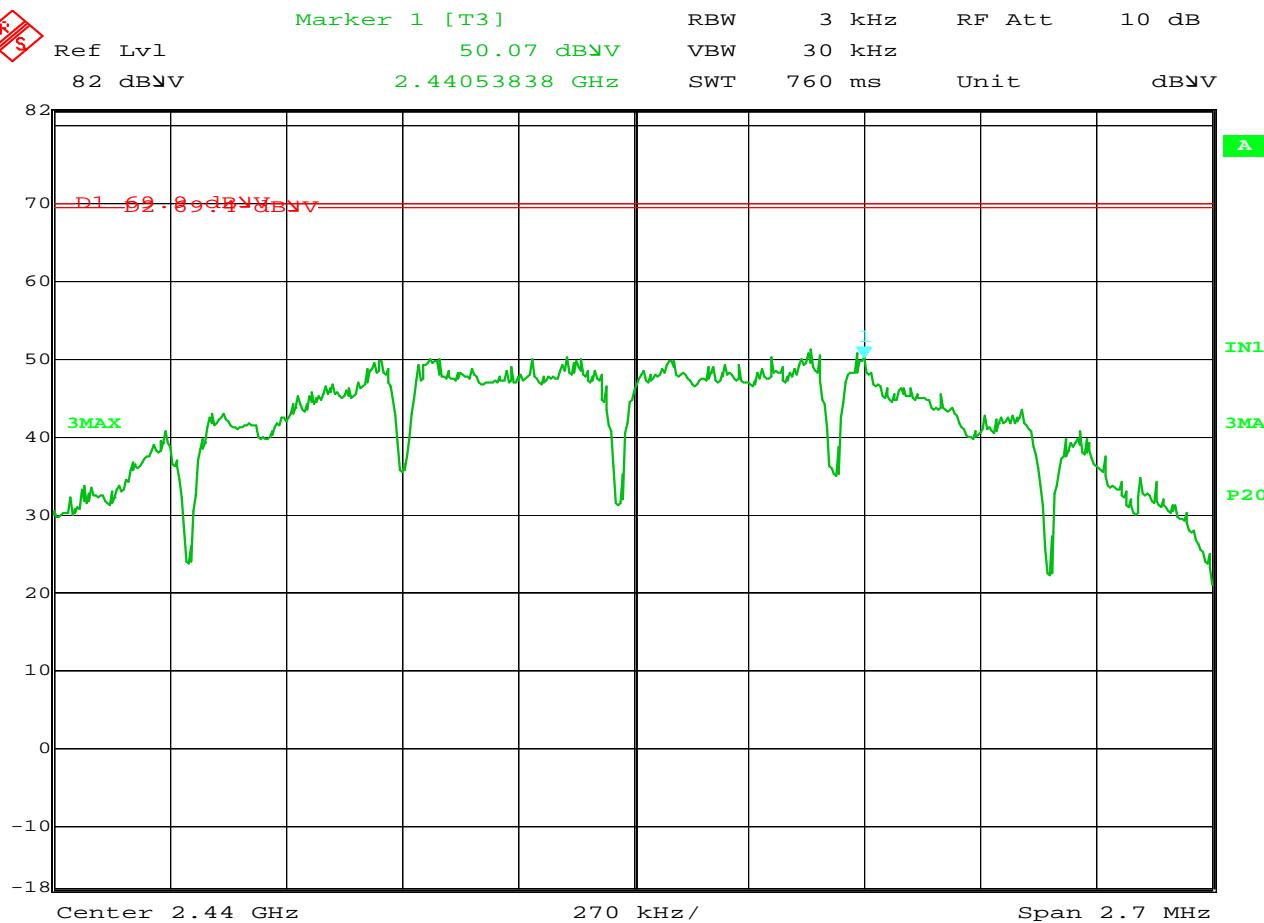
Date: 14.NOV.2012 08:14:09

### 15C Spectral Density Measurement

MANUFACTURER	: Physical Graph Corporation
MODEL NUMBER	: CD305
SERIAL NUMBER	: rev. C
TEST MODE	: Tx @ CH 18 2415MHz
TEST DATE	: November 13, 2012
TEST PARAMETER	: Display Line 1 = EUT EIRP = 7.5 dBm : Display Line 2 = 8 dBm Limit

---

### NOTES



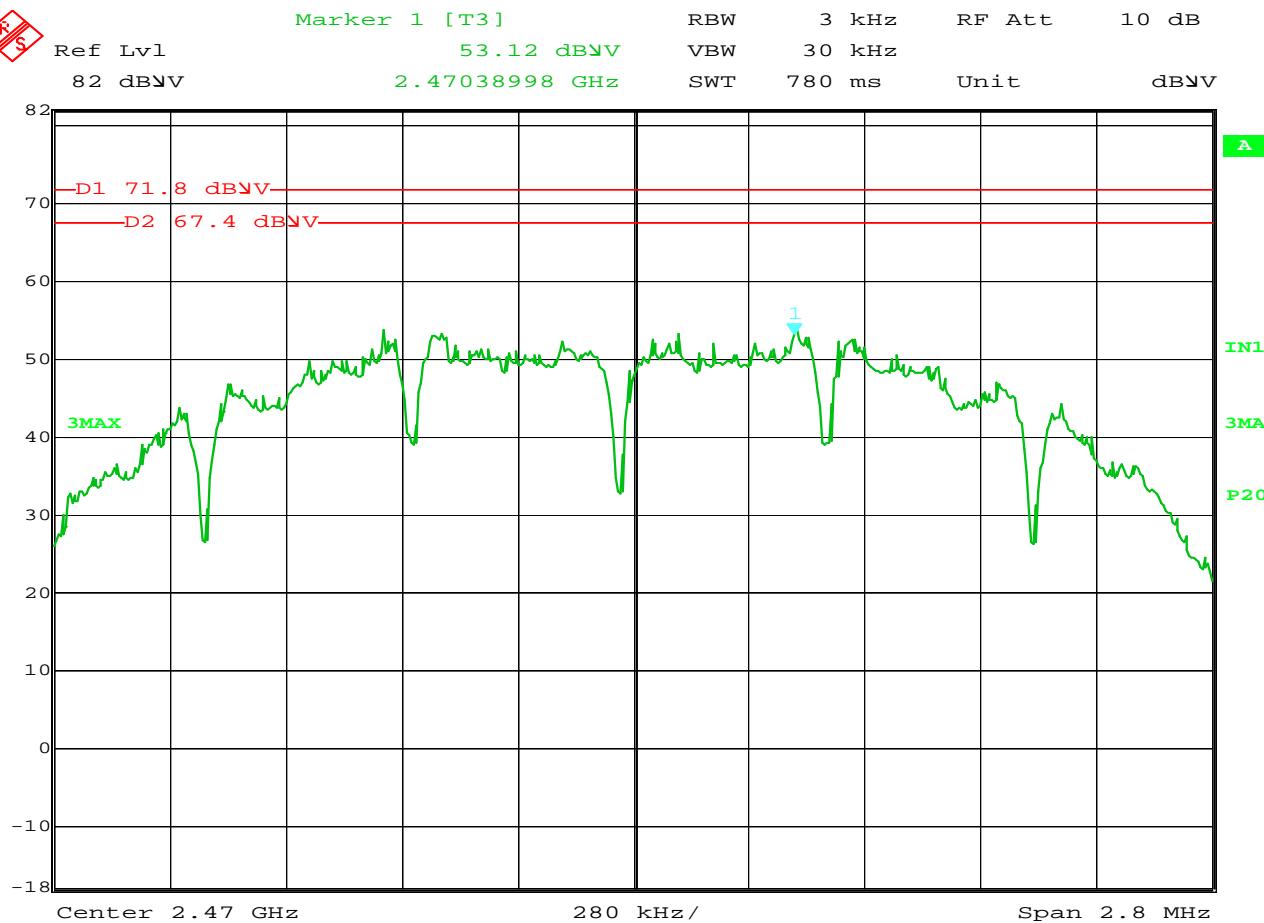
Date: 14.NOV.2012 08:32:31

### 15C Spectral Density Measurement

MANUFACTURER	: Physical Graph Corporation
MODEL NUMBER	: CD305
SERIAL NUMBER	: rev. C
TEST MODE	: Tx @ CH 18 2440MHz
TEST DATE	: November 13, 2012
TEST PARAMETER	: Display Line 1 = EUT EIRP = 8.8 dBm : Display Line 2 = 8 dBm Limit

---

### NOTES



Date: 14.NOV.2012 08:47:38

### 15C Spectral Density Measurement

**MANUFACTURER** : Physical Graph Corporation  
**MODEL NUMBER** : CD305  
**SERIAL NUMBER** : rev. C  
**TEST MODE** : Tx @ CH 18 2470MHz  
**TEST DATE** : November 13, 2012  
**TEST PARAMETER** : Display Line 1 = EUT EIRP = 12.4 dBm  
 : Display Line 2 = 8 dBm Limit

---

### NOTES