Measurement of RF Emissions from a C054045A001A Access Point Digital Transmission Transmitter

For	Cambium Networks LTD. 3800 Golf Road Schaumburg, IL 60196
P.O. Number	NP5501987
Date Tested	April 30th through May 3rd, 2013
Test Personnel	Richard E. King
Test Specification	FCC "Code of Federal Regulations" Title 47, Part 15, Subpart C, Section 15.247 for Digital Modulation Intentional Radiators Operating within the 5725-5850MHz band Industry Canada RSS-GEN Industry Canada RSS-210

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REVISION HISTORY

Revision	Date	Description
—	10 June 2013	Initial release

Measurement of RF Emissions from an Access Point Digital Transmission, Model No. C054045A001A Transmitter

1. INTRODUCTION

1.1. Scope of Tests

This report represents the results of the series of radio interference measurements performed on a Cambium Networks LTD. Access Point Digital Transmission transmitter, Model No. C054045A001A, Serial No. S/N 1, (hereinafter referred to as the EUT). The EUT is a digital modulation spread spectrum transmitter. The transmitter was designed to operate as a fixed point to multi-point transmitter in the 5725-5850 MHz band. The EUT was manufactured and submitted for testing by Cambium Networks LTD. located in Schaumburg, IL.

1.2. Purpose

The test series was performed to determine if the EUT continues to meet 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 with the addition of a 5MHz bandwidth.

The test series was also performed to determine if the EUT continues to meet the conducted RF emission requirements of the Industry Canada Radio Standards Specification, RSS-Gen, Section 7.2.4 and the radiated RF emission requirements of the Industry Canada Radio Standards Specification, RSS-210, Annex 8 for transmitters with the addition of a 5MHz bandwidth.

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 21^{o}C and the relative humidity was 31%.

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"

- Federal Communications Commission Office of Engineering and Technology Laboratory Division Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under Section 15.247, 558074 D01 DTS Measurement Guidance April 9, 2013.

- Industry Canada Radio Standards Specification, RSS-Gen, “General Requirements and

Information for the Certification of Radiocommunication Equipment", Issue 3, December 2010

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

3. EUT SETUP AND OPERATION

3.1. General Description

The EUT is a Cambium Networks LTD., Access Point Digital Transmission, Model No. C054045A001A. A block diagram of the EUT setup is shown as Figure 1.

3.1.1. Power Input

The EUT was powered with 29.5VDC from a Motorola part number ACPSSW-13B transformer via the 30 feet of CAT 5 ethernet cable.

3.1.2. Peripheral Equipment

The EUT was submitted with a Sony Viao laptop that was used to power and communicate with the EUT via one 30 foot long CAT 5 ethernet cable.

3.1.3. Signal Input/Output Leads

The EUT was connected to the laptop via a 30 foot long CAT 5 ethernet cable.

3.1.4. Grounding

The EUT was ungrounded during testing.

3.2. Software

The EUT requires software identified as Software Version 12.1.0 to control the device during testing and to supply the device with its proper load characteristics.

3.3. Operational Mode

All testing was performed seperately in the following modes:

5 MHz Bandwidth:

Tx at 5727.5 MHz
- Channel A
- Channel B

Tx at 5775 MHz
- Channel A
- Channel B

Tx at 5827.5 MHz
- Channel A
- Channel B

3.4. EUT Modifications

No modifications were required for compliance to the FCC 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 specifications.

4.3. Calibration Traceability

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

4.4. Measurement Uncertainty

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

The measurement uncertainty for these tests is presented below:

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

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

5. TEST PROCEDURES

5.1. Powerline Conducted Emissions

5.1.1.Requirements

No conducted emissions tests were performed per Cambium personal. The conducted emissions data was taken during a previous testing.

5.2. DTS Bandwidth

5.2.1.Requirement

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

5.2.2.Procedures

The output of the EUT was connected to the spectrum analyzer through 30.5 dB of attenuation.

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

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

5.2.3.Results

The plots on pages 19 through 24 show that the minimum 6 dB bandwidth was 4.5MHz which is greater than minimum allowable 6dB bandwidth requirement of 500kHz for systems using digital modulation techniques. The 99% bandwidth was measured to be 4.4MHz.

5.3. Average Output Power

5.3.1.Requirements

Per section 15.247(b)(3): For systems using digital modulation in the 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

Since the EUT uses a 17dBi gain antenna, the gain of the antenna exceeds the 6dBi gain antenna by 11dB. Therefore, the output power limit must be reduced by 11dB (11dB = (17dBi-6dBi). The maximum conducted output power must not exceed (30dBm -11dB) or 19dBm (0.079W).

5.3.2.Procedures

a) The output of the EUT was connected to a wide band RF average power meter through 30.5dB of attenuation.

b) The EUT was configured to transmit as close to continously as possible at the low, middle, and high channels.

c) Since the EUT could not transmit ≥98% the duty cycle factor was measured according to section 6.0 of the 558074 D01 DTS measurement guidance.

d) The average power of the transmitter was measured in dBm and adjusted by adding the duty cyle as computed by the following formula 10log (1/x).

e) Since the EUT uses cross polarized antenna the MIMO Matrix was calculated to be 10log(N) dB where N is the number of outputs of the EUT. For this EUT the MIMO was calculated to be 10log(2) = 3dB and the average power was adjusted by 3 dB.

5.3.3.Results

The results are presented on pages 25 and 26. The maximum average conducted output power from the transmitter was 0.037W (15.7 dBm) which is below the 0.079W (19dBm) limit.

The maximum EIRP calculated for the transmitter taking into account the duty cycle, the maximum antenna gain and MIMO was 35.99 dBm or 3.97 W which is below the 4 Watt limit.

A plot Duty cycle is shown on page 27. The EUT can not transmit any greater than 94%. The duty cycle factor was calculated to be 0.29 dB.

5.4. Antenna Conducted Spurious Emissions

5.4.1.Requirements

Per section 15.247(c), the spurious emissions in any 100 kHz BW outside the frequency band must be at least

30dB below the highest 100 kHz BW level measured within the band.

5.4.2.Procedures

The output of the EUT was connected to the spectrum analyzer through 40dB of attenuation. The resolution bandwidth (RBW) was set to 100kHz. The peak detector and 'Max-Hold' function were engaged. The emissions in the frequency range from 30MHz to 40GHz were observed and plotted separately with the EUT transmitting at low, middle and high channels on both channel A and channel B.

5.4.3.Results

The antenna conducted emissions levels were measured and plotted. These plots are presented on pages 28 through 45. The plots show that the conducted spurious emissions were at least 30 dB below the level of the fundamental.

5.5. Radiated Spurious Emissions Measurements

5.5.1.Requirements

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

5.5.2.Procedures

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

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

Preliminary radiated emissions tests were performed to determine the emission characteristics of the EUT. For the preliminary test, a broadband measuring antenna was positioned at a 3 meter distance from the EUT. The entire frequency range from 30MHz to 40GHz was investigated using a peak detector function.

The final open field emission tests were then manually performed over the frequency range of 30MHz to 40GHz .

1) 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. An average reading was taken.

5.5.3.Results

Preliminary radiated emissions plots with the EUT transmitting at Low Frequency, Middle Frequency, and High Frequency are shown on pages 46 through 69. Final radiated emissions data are presented on data pages 70 through 72. As can be seen from the data, the 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 on Figures 3 through 6.

5.6. Band Edge Compliance

5.6.1.Requirement

Per section 15.247(d), the emissions at the band-edges must be at least 30dB below the highest level measured within the band but attenuation below the general limits listed in 15.209(a) is not required.

5.6.2.Procedures

5.4.2.1 Low Band Edge

1) The output of the EUT was connected to the spectrum analyzer through 30.5dB of attenuation.
2) The EUT was set to transmit continuously at the channel closest to the low band-edge and the channel A output.
3) To determine the band edge compliance, the following spectrum analyzer settings were used:

   a. Center frequency = low band-edge frequency.
   b. Span = Wide enough to capture the peak level of the emission operating on the channel closest to the band-edge, as well as any modulation products which fall outside of the authorized band of operation.
   c. Resolution bandwidth (RBW) ≥ 1% of the span.
   d. The 'Max-Hold' function was engaged. The analyzer was allowed to scan until the envelope of the transmitter bandwidth was defined.

e. The marker was set on the peak of the in-band emissions. A display line was placed 30dB down from the peak of the in-band emissions. All emissions which fall outside of the authorized band of operation must be below the 30dB down display line. (All emissions to the left of the center frequency (band-edge) must be below the display line.)

4) The analyzer's display was plotted using a 'screen dump' utility.
5) Steps 2 through 4 were repeated on the channel B output.

5.4.2.2 High Band Edge

1) The output of the EUT was connected to the spectrum analyzer through 30.5dB of attenuation.
2) The EUT was set to transmit continuously at the channel closest to the high band-edge and the channel A output.
3) To determine the band edge compliance, the following spectrum analyzer settings were used:

a. Center frequency = high band-edge frequency.
b. Span = Wide enough to capture the peak level of the emission operating on the channel closest to the band-edge, as well as any modulation products which fall outside of the authorized band of operation.
c. Resolution bandwidth (RBW) ≥ 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 30dB down from the peak of the in-band emissions. All emissions which fall outside of the authorized band of operation must be below the 30dB down display line. (All emissions to the right of the center frequency (band-edge) must be below the display line.)

4) The analyzer's display was plotted using a 'screen dump' utility.
5) Steps 2 through 4 were repeated on the channel B output.

5.6.3.Results

Pages 73 through 76 show the conducted band-edge emission plots. As can be seen from these plots, the emissions at the low end band edge and the high end band edge are below the minimum 30 dB down requirement.

5.7. Power Spectral Density

5.7.1.Requirements

Per section 15.247(d), the peak power spectral density from the intentional radiator shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

5.7.2.Procedures

1) The output of the EUT was connected to the spectrum analyzer through 30.5dB of attenuation.
2) The EUT was set to transmit at the low channel channel A input.
3) The EUT was then placed in the normal operation mode.
4) To determine the power spectral density, the following spectrum analyzer settings were used:

a. Center frequency = transmit frequency
b. Span =1.5times the channel bandwidth
c. Resolution bandwidth (RBW) ≥3kHz
d. Video bandwidth (VBW) ≥ 3 x RBW
e. Sweep time = auto couple

f. The analyzer was allowed to scan until the envelope of the transmitter bandwidth was defined. The peak detector and 'Max-Hold' function was engaged.

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

h. If the measured value exceeds the +8dBm limit, reduce the RBW (no less than 3kHz) and repeat step 4

5) Steps 3 and 4 were repeated on channel B of the EUT.

6) Steps 3 through 5 repeated with the EUT set to the mid channel.

7) Steps 3 through 5 repeated with the EUT set to the high channel.

5.7.3.Results

The power spectral density data is presented on Pages 77 and 82. As can be seen from the plots, the peak power density is less than 8dBm in any 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 Cambium Networks LTD. personnel.

6.2. Disposition of the EUT

The EUT and all associated equipment were returned to Cambium Networks LTD. upon completion of the tests.

7. CONCLUSIONS

It was determined that the Cambium Networks LTD. Access Point Digital Transmission transmitter, Model No. C054045A001A, , did fully comply with 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 5725-5850 MHz band, when tested per ANSI C63.4-2009.

It was also determined that the Cambium Networks LTD. Access Point Digital Transmission transmitter, Part No. C054045A001A, did fully comply with the conducted and radiated RF emission requirements of the Industry Canada Radio Standards Specification, RSS-Gen Section 7.2.4 and RSS-210 Annex 8, for transmitters.

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 Cambium Networks LTD. 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	3/8/2013	3/8/2014
APW11	PREAMPLIFIER	PMI	PE2-35-120-5R0-10-12-SFF	PL11685/1241	1GHZ-20GHZ	1/26/2013	1/26/2014
APW5	PREAMPLIFIER	PLANAR	PE2-36-26D540G-5R0-1	PL3044/0651	26.5GHZ-40GHZ	3/8/2013	3/8/2014
MPC2	DUAL POWER METER	HEWLETT PACKARD	EPM-442A	US37480150	0.1MHZ-50GHZ	3/18/2013	3/18/2014
MPI1	POWER SENSOR	AGILIENT	E9304A	MY41496041	9KHZ-6GHZ	5/11/2012	5/11/2013
NHG1	STANDARD GAIN HORN ANTENNA	NARDA	638	---	18-26.5GHZ	NOTE 1	
NHH0	STANDARD GAIN HORN ANTENNA	NARDA	V637	---	26.5-40GHZ	NOTE 1	
NTA2	BILOG ANTENNA	TESEQ	6112D	28040	25-1000MHz	7/30/2012	7/30/2013
NWG0	RIDGED WAVE GUIDE (DCC-MATC)	AEL	H1479	104	1-12.4GHZ	1/26/2013	1/26/2014
RBB0	EMI TEST RECEIVER 20HZ TO 40 GHZ	ROHDE & SCHWARZ	ESIB40	100250	20 HZ TO 40GHZ	3/7/2013	3/7/2014
T1E1	10DB 25W ATTENUATOR	WEINSCHEL	46-10-43	AU1883	DC-18GHZ	8/6/2012	8/6/2013
T1P0	10dB ATTENUATOR (40GHz)	WEINSCHEL	89-10-12	254	DC-40GHz	3/7/2013	3/7/2014
T2DS	20DB, 25W ATTENUATOR	WEINSCHEL	46-20-34	BS0916	DC-18GHZ	8/6/2012	8/6/2013
T2Q0	20DB, 20W ATTENUATOR	AEROFLEX/WEINSCHEL	89-20-21	337	DC-40GHZ	3/8/2013	3/8/2014
T2Q2	20DB/20W ATTENUATOR	AEROFLEX/WEINSCHEL	89-20-21	336	DC-40GHZ	9/20/2012	9/20/2013
T2S6	20DB 25W ATTENUATOR	WEINSCHEL	46-20-34	BV3539	DC-18GHZ	1/7/2013	1/7/2014
XOA1	WAVE-TO-COAX ADAPTER	HEWLETT PACKARD	R281A	02119	26.5-65GHZ	NOTE 1	
XOB1	ADAPTER	HEWLETT PACKARD	K281C	10422	18-26.5GHZ	NOTE 1	

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

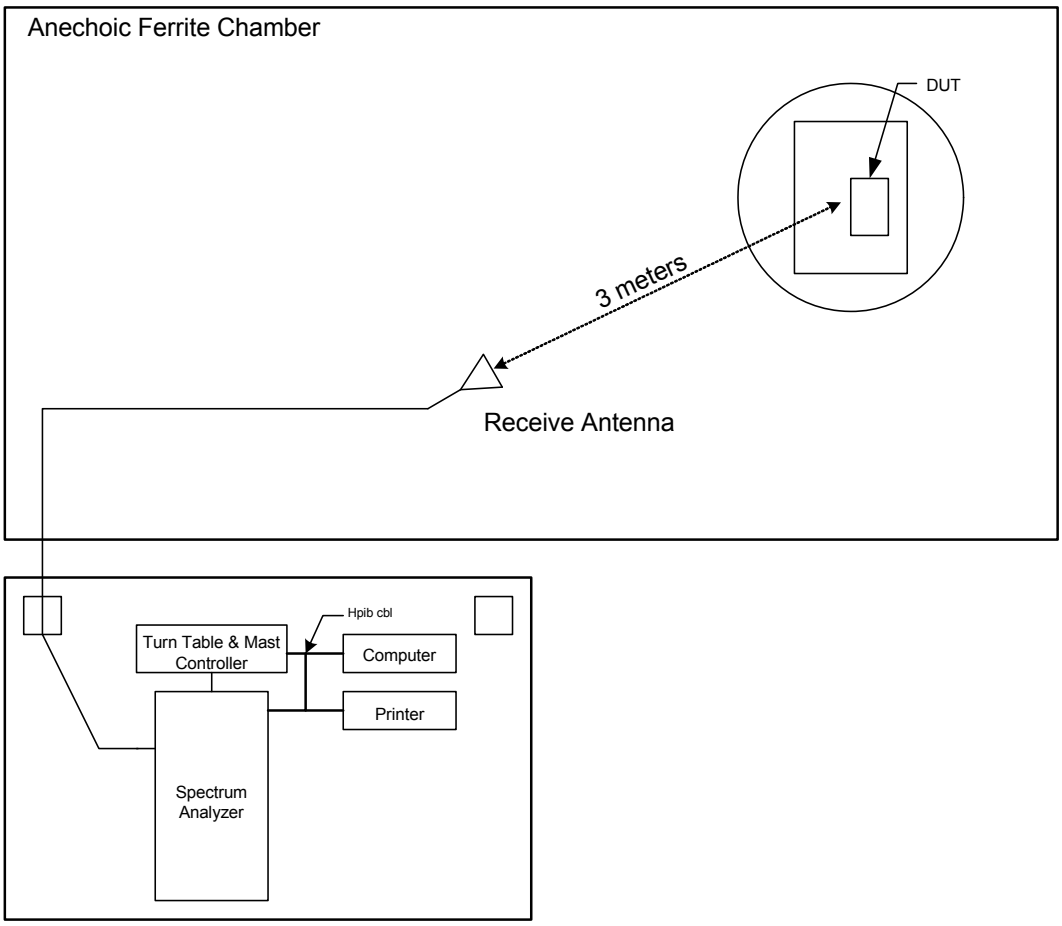


FIGURE 1 BLOCKDIAGRAM OF TEST SETUP

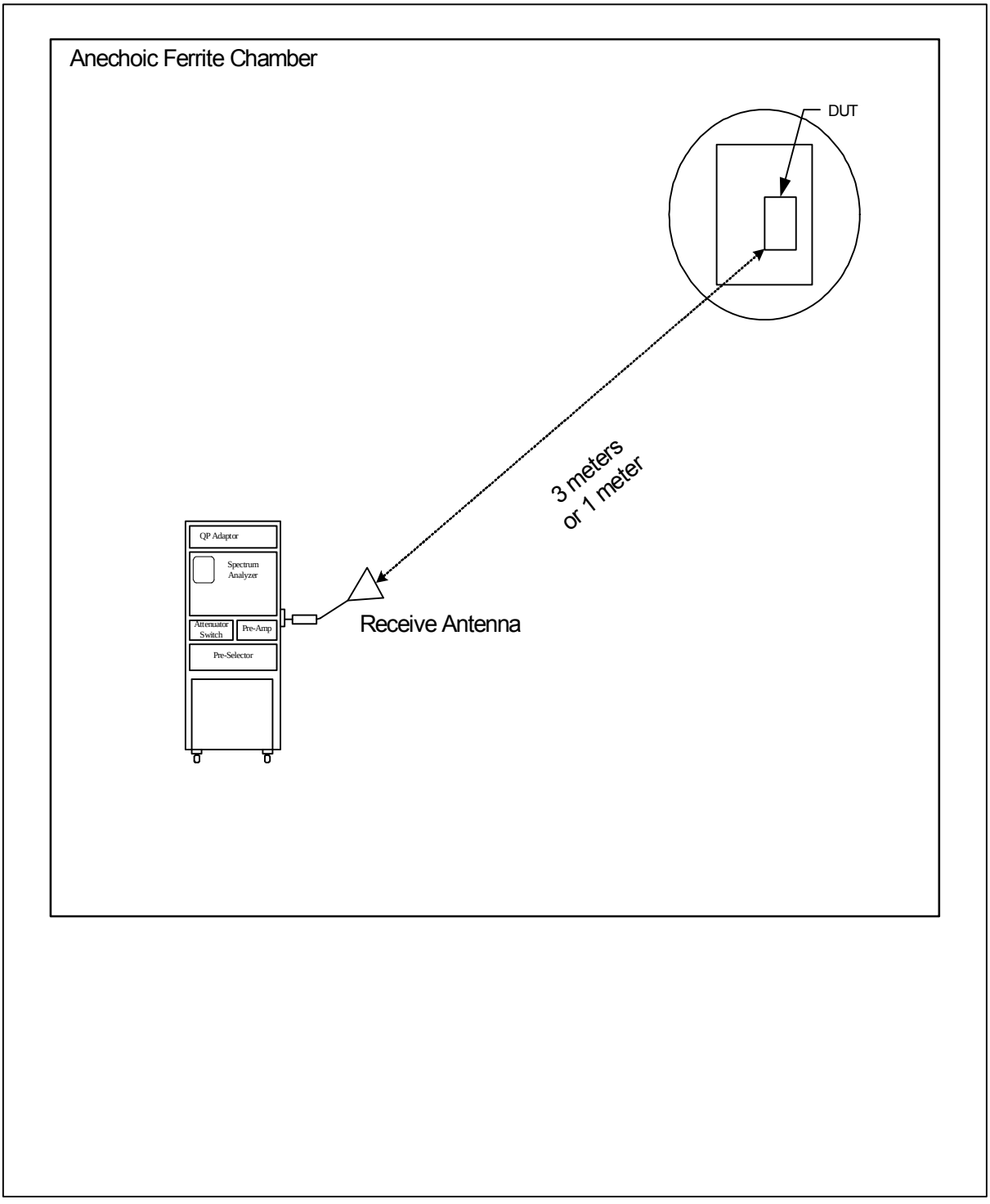
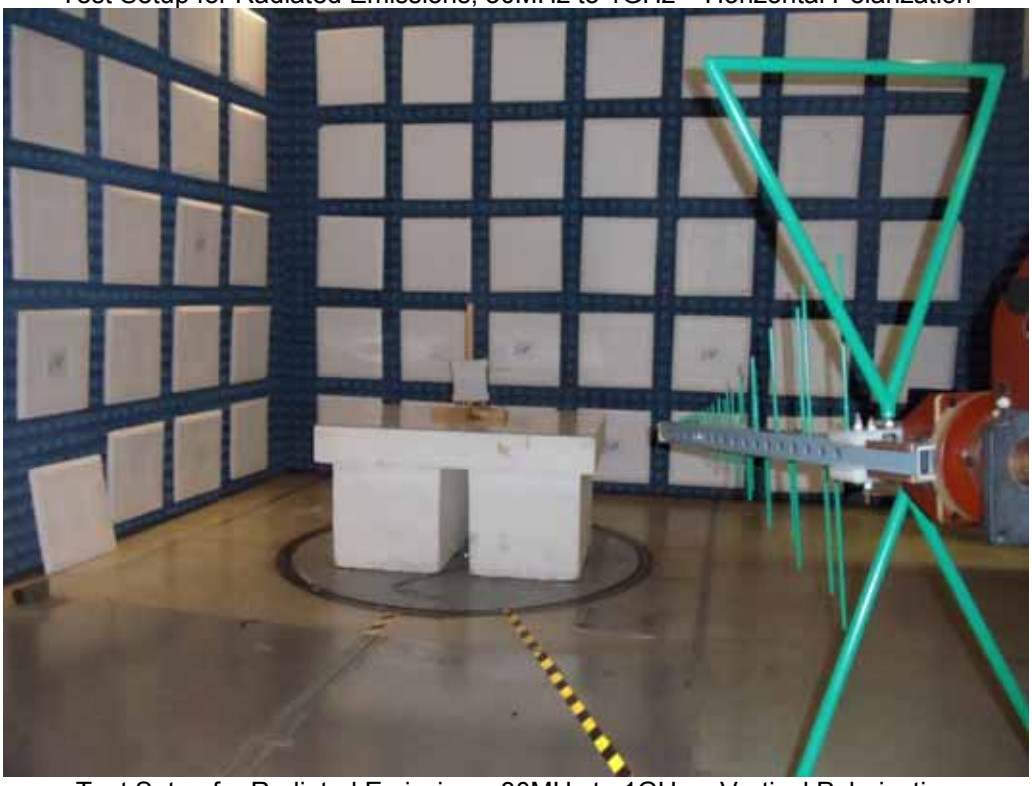

Anechoic Ferrite Chamber
DUT
3 meters
or 1 meter
QP Adaptor
Spectrum
Analyzer
Attenuator
Switch
Pre-Amp
Pre-Selector
Receive Antenna

Figure 2

Test Setup for Antenna Conducted Emissions

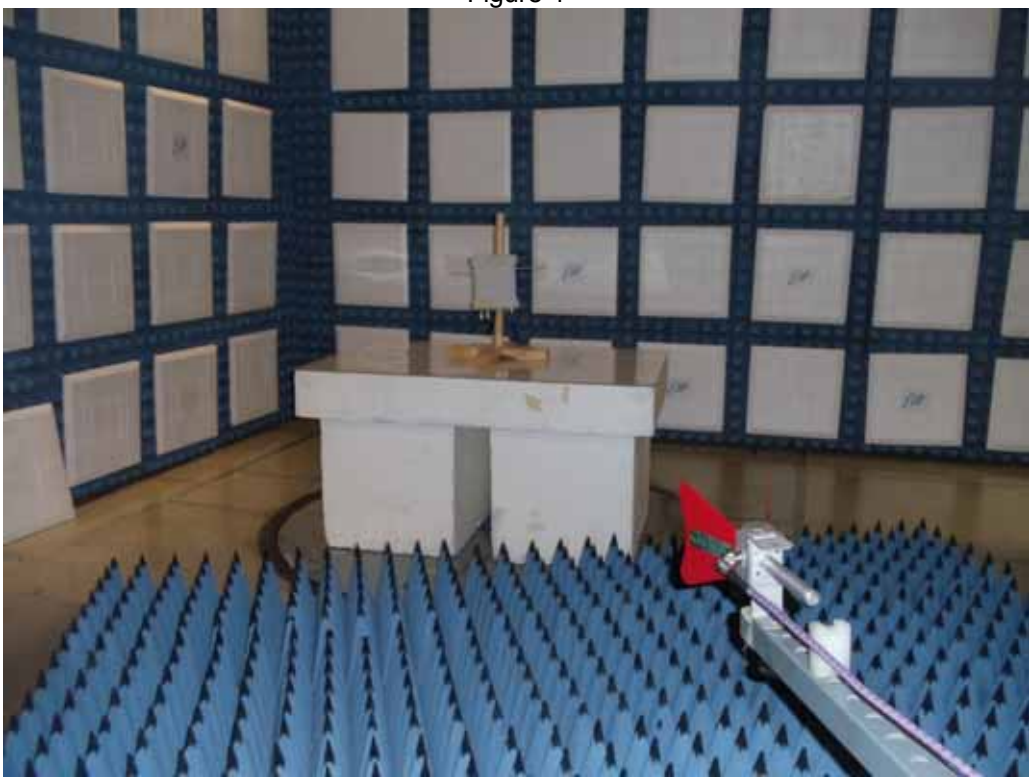
Figure 3

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



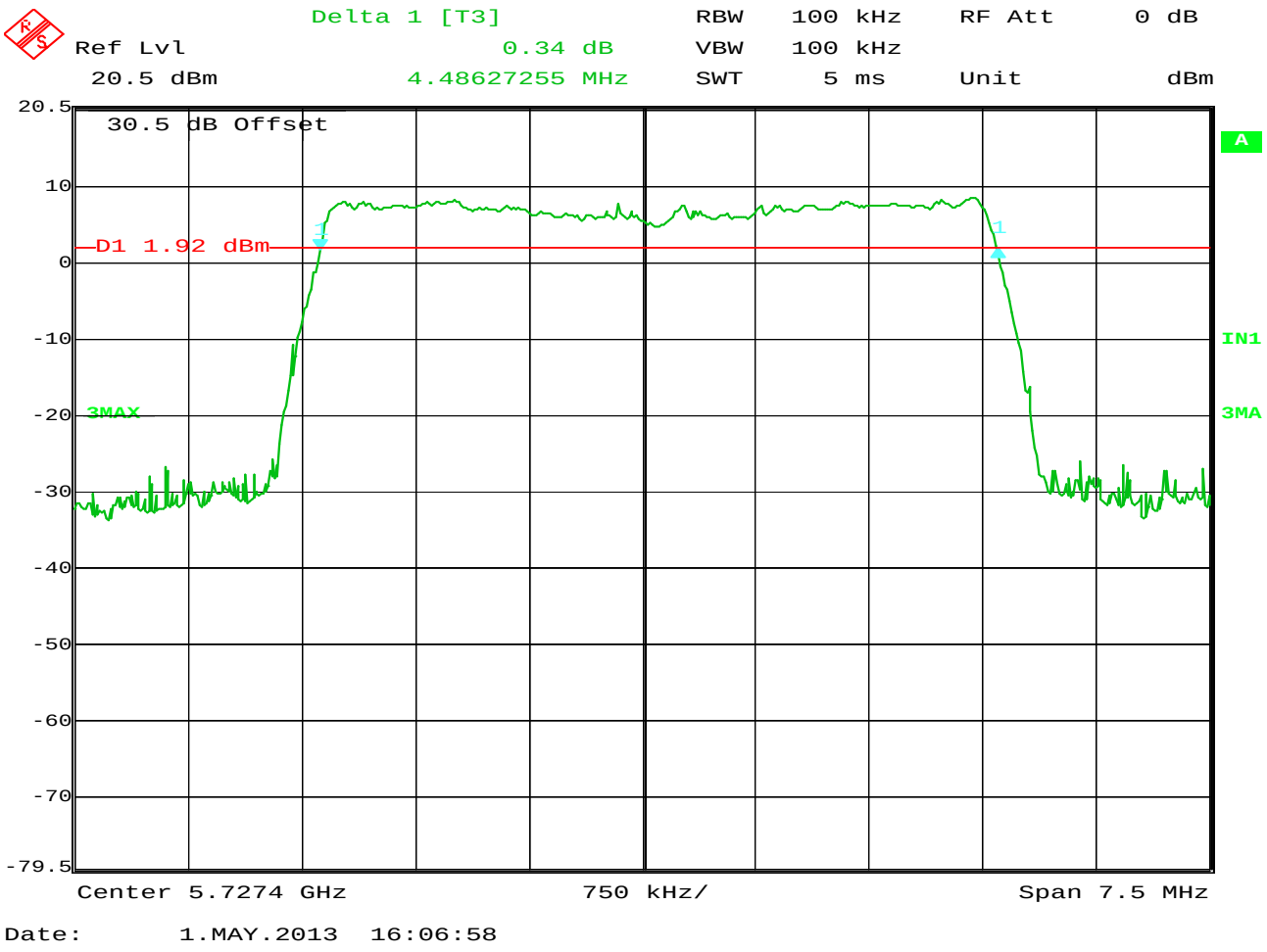
Test Setup for Radiated Emissions, 30MHz to 1GHz – Vertical Polarization

Figure 4



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

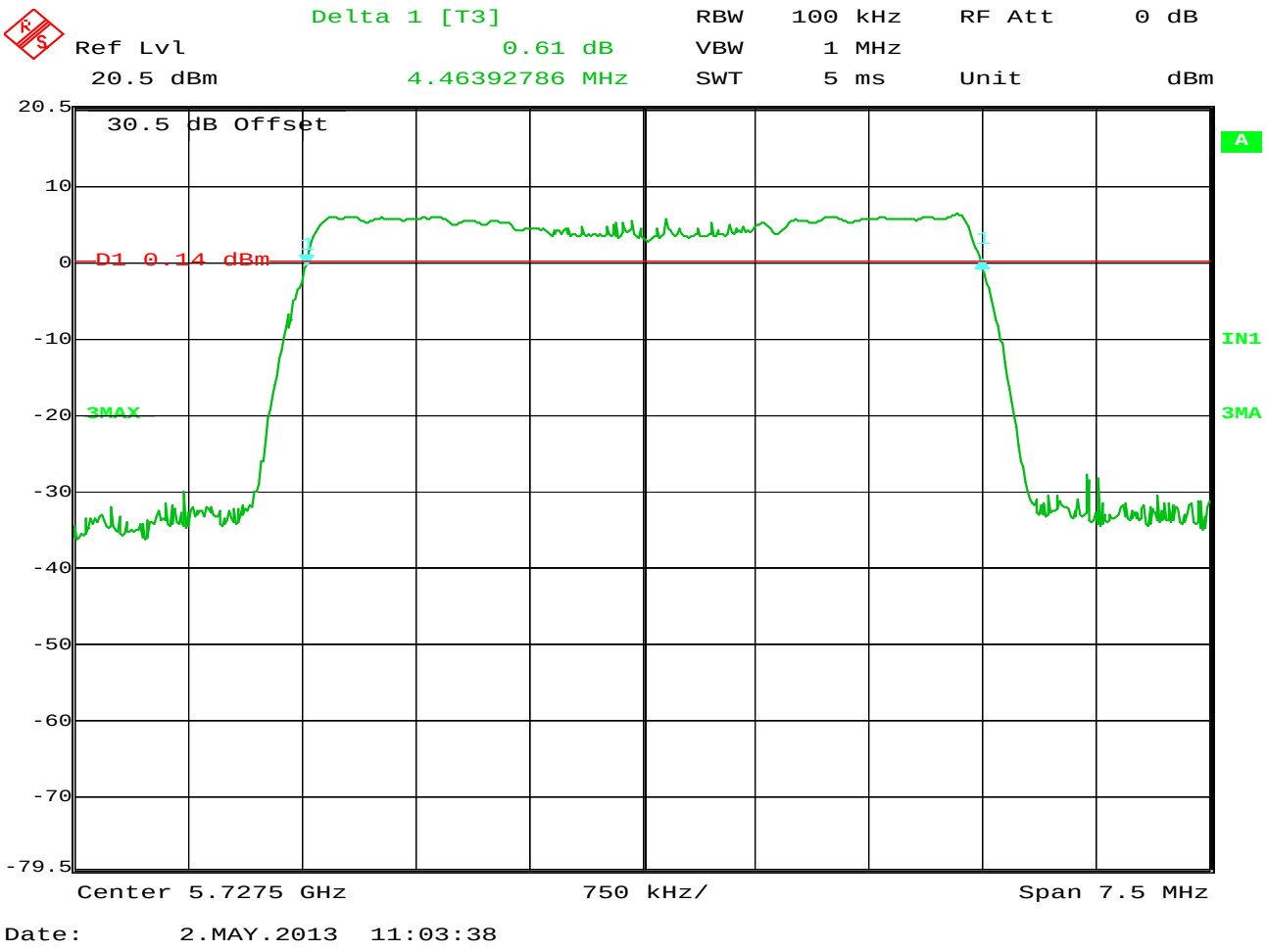
Test Setup for Radiated Emissions, Above 1GHz – Vertical Polarization



FCC 15.247 DTS 6dB Bandwidth

MANUFACTURER	:	Cambium Networks Ltd
MODEL NUMBER	:	C054045A001A
TEST MODE	:	Tx @ 5727.5MHz
	:	Tx at max power
	:	Channel A
	:	Display line L1 represents DTS bandwidth = 4.5MHz

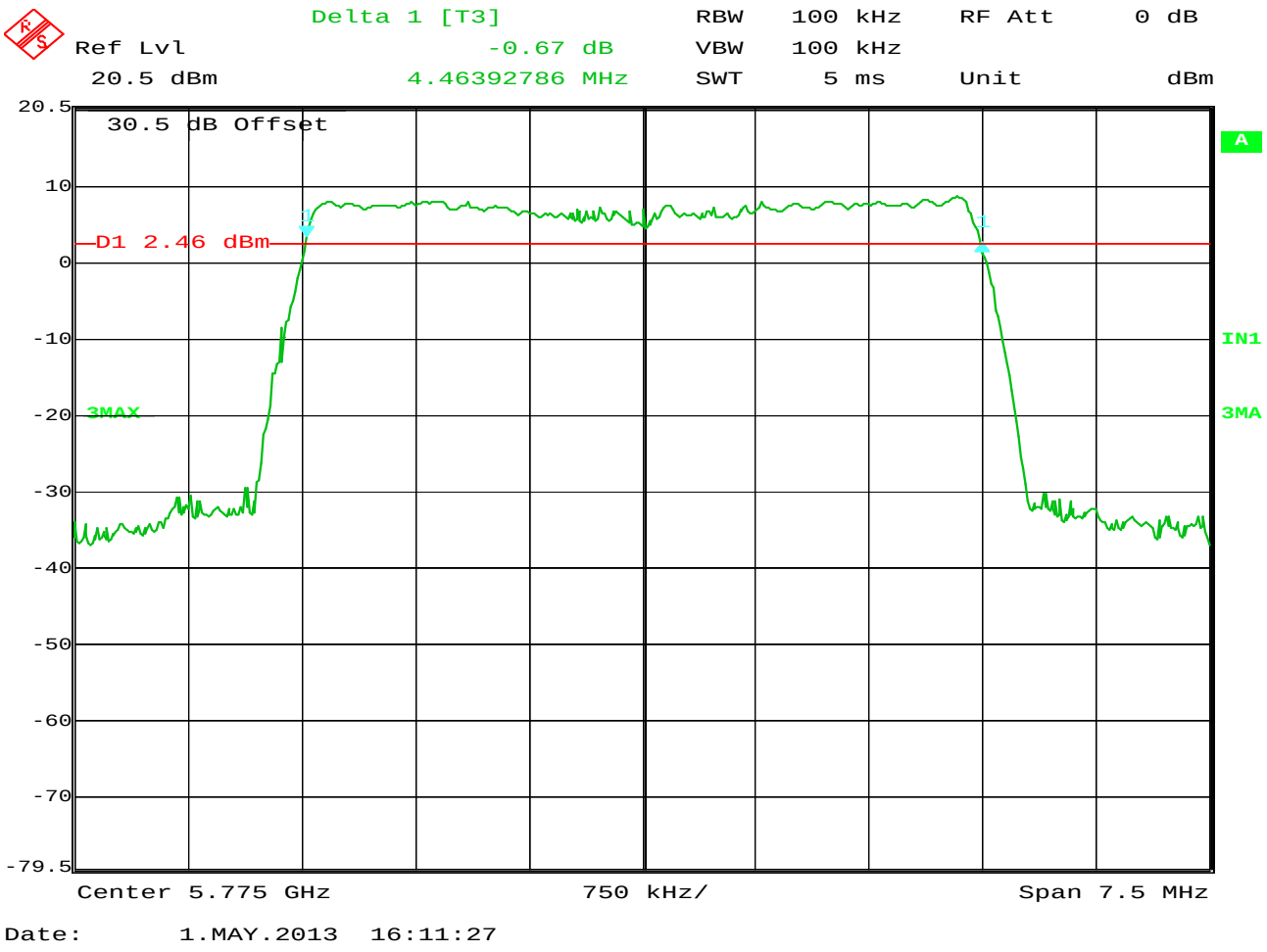
NOTES



FCC 15.247 DTS 6dB Bandwidth

MANUFACTURER	:	Cambium Networks Ltd
MODEL NUMBER	:	C054045A001A
TEST MODE	:	Tx @ 5727.5MHz
	:	Tx at max power
	:	Channel B
	:	Display line L1 represents DTS bandwidth = 4.5MHz

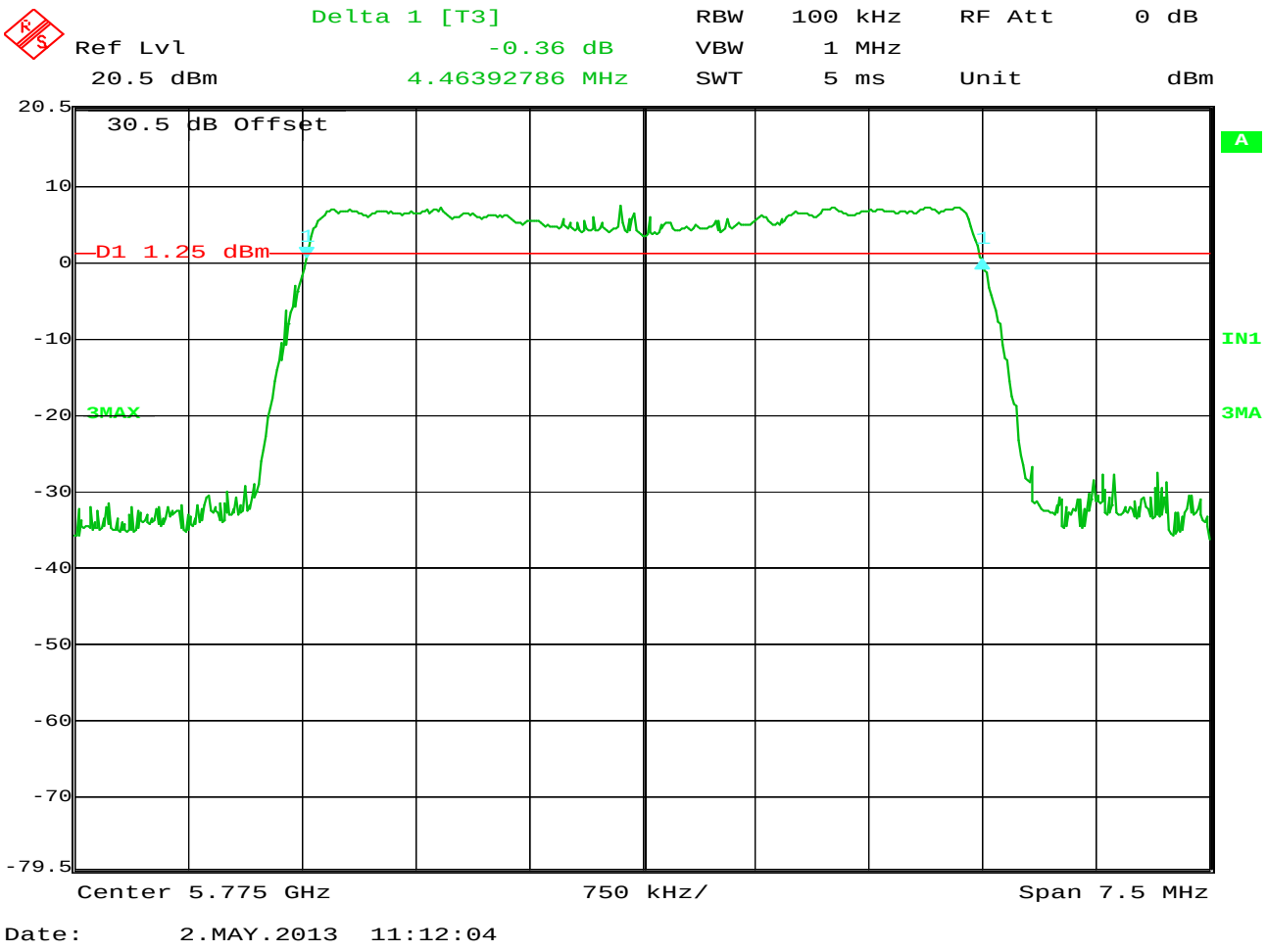
NOTES



FCC 15.247 DTS 6dB Bandwidth

MANUFACTURER	:	Cambium Networks Ltd
MODEL NUMBER	:	C054045A001A
TEST MODE	:	Tx @ 5775MHz
	:	Tx at max power
	:	Channel A
	:	Display line L1 represents DTS bandwidth = 4.5MHz

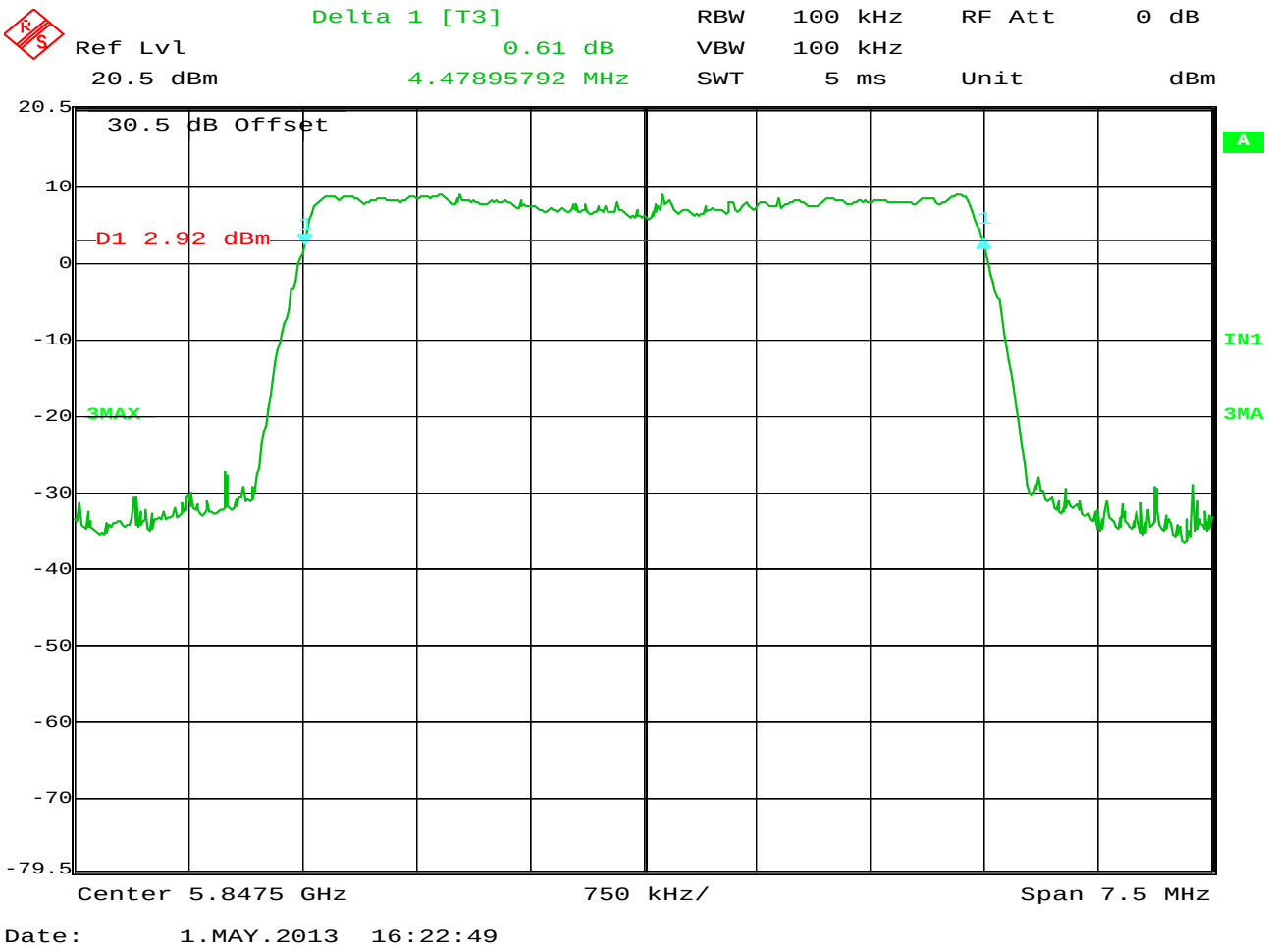
NOTES



FCC 15.247 DTS 6dB Bandwidth

MANUFACTURER	:	Cambium Networks Ltd
MODEL NUMBER	:	C054045A001A
TEST MODE	:	Tx @ 5775MHz
	:	Tx at max power
	:	Channel B
	:	Display line L1 represents DTS bandwidth = 4.5MHz

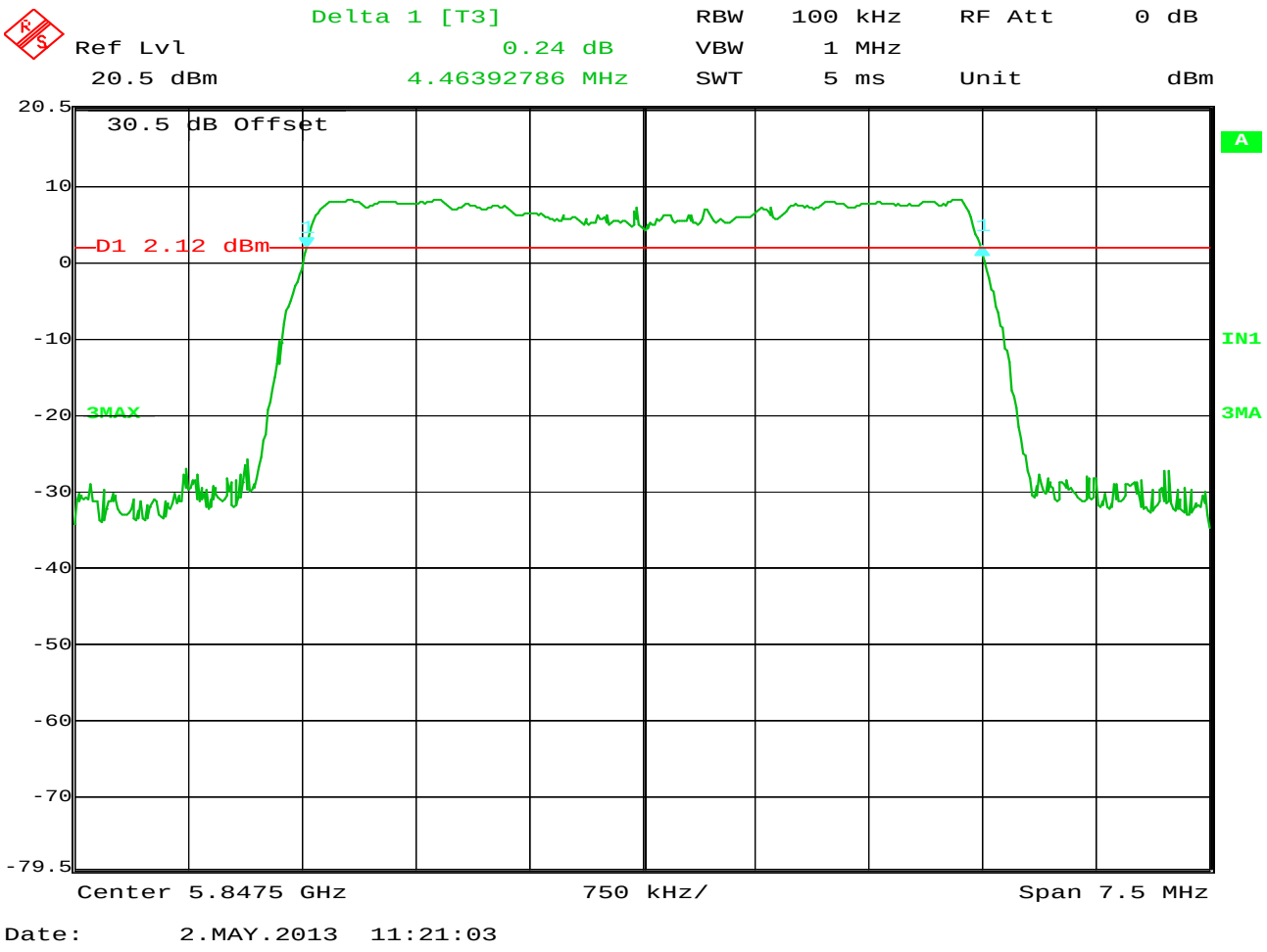
NOTES



FCC 15.247 DTS 6dB Bandwidth

MANUFACTURER	:	Cambium Networks Ltd
MODEL NUMBER	:	C054045A001A
TEST MODE	:	Tx @ 5827.5MHz
	:	Tx at max power
	:	Channel A
	:	Display line L1 represents DTS bandwidth = 4.5MHz

NOTES



FCC 15.247 DTS 6dB Bandwidth

MANUFACTURER	:	Cambium Networks Ltd
MODEL NUMBER	:	C054045A001A
TEST MODE	:	Tx @ 5847.5MHz
	:	Tx at max power
	:	Channel B
	:	Display line L1 represents DTS bandwidth = 4.5MHz

NOTES

DATA SHEET

Manufacturer : Cambium Networks LTD.
Test Item : Access Point Digital Transmission
Model No. : C054045A001A
Test Specification : FCC Part 15, Subpart C, Section 15.247 Output Power
Date : May 5, 2013
Notes : AVERAGE POWER

Freq. (MHz)	Channel A/B	Power Meter Reading (dBm)	Attenuation (dB)	Total (dBm)	Limit (dBm)
5727.5	A	-14.94	30.5	15.56	19
5727.5	B	-15.34	30.5	15.16	19
5775.0	A	-14.96	30.5	15.54	19
5775.0	B	-14.90	30.5	15.60	19
5847.5	A	-14.80	30.5	15.70	19
5847.5	B	-14.80	30.5	15.70	19

Checked BY Richard E. King :

Richard E. King

DATA SHEET

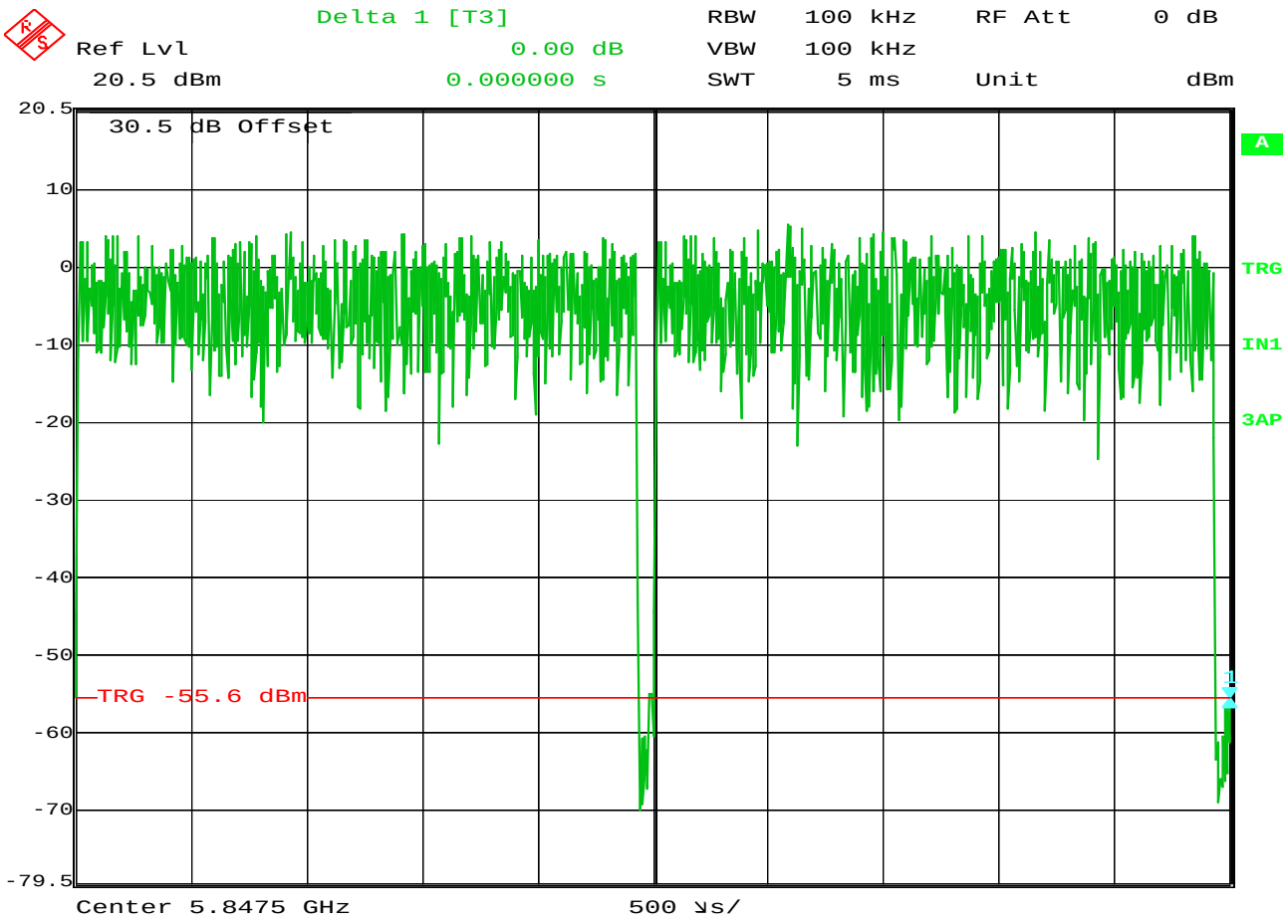
Manufacturer : Cambium Networks LTD.
Test Item : Access Point Digital Transmission
Model No. : C054045A001A
Test Specification : FCC Part 15, Subpart C, Section 15.247 Output Power
Date : May 5, 2013
Notes : Calculated EIRP

Freq. (MHz)	Channel A/B	Power Meter Reading (dBm)	Attenuation (dB)	Highest Antenna Gain (dB)	Duty Cycle (dB)	MIMO (dBm)	Total EIRP (dBm)	EIRP Limit (dBm)
5727.5	A	-14.94	30.5	17.0	.29	3.0	35.85	36.0
5727.5	B	-15.34	30.5	17.0	.29	3.0	35.45	36.0
5775.0	A	-14.96	30.5	17.0	.29	3.0	35.83	36.0
5775.0	B	-14.90	30.5	17.0	.29	3.0	35.89	36.0
5847.5	A	-14.80	30.5	17.0	.29	3.0	35.99	36.0
5847.5	B	-14.80	30.5	17.0	.29	3.0	35.99	36.0

Total = Power meter reading + attenuation + highest gain of the antenna used + duty cycle + MIMO

Checked BY Richard E. King :

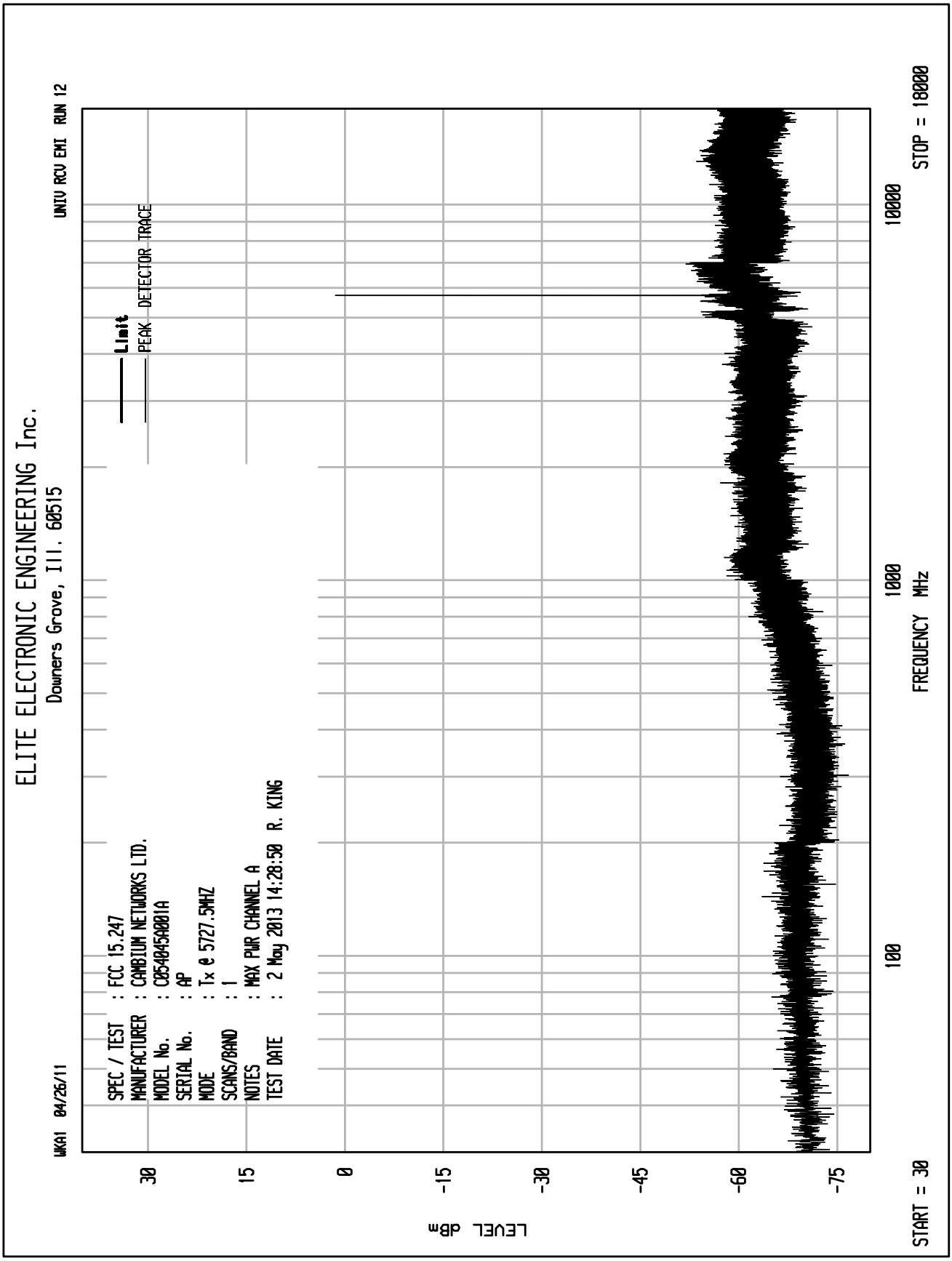
Richard E. King

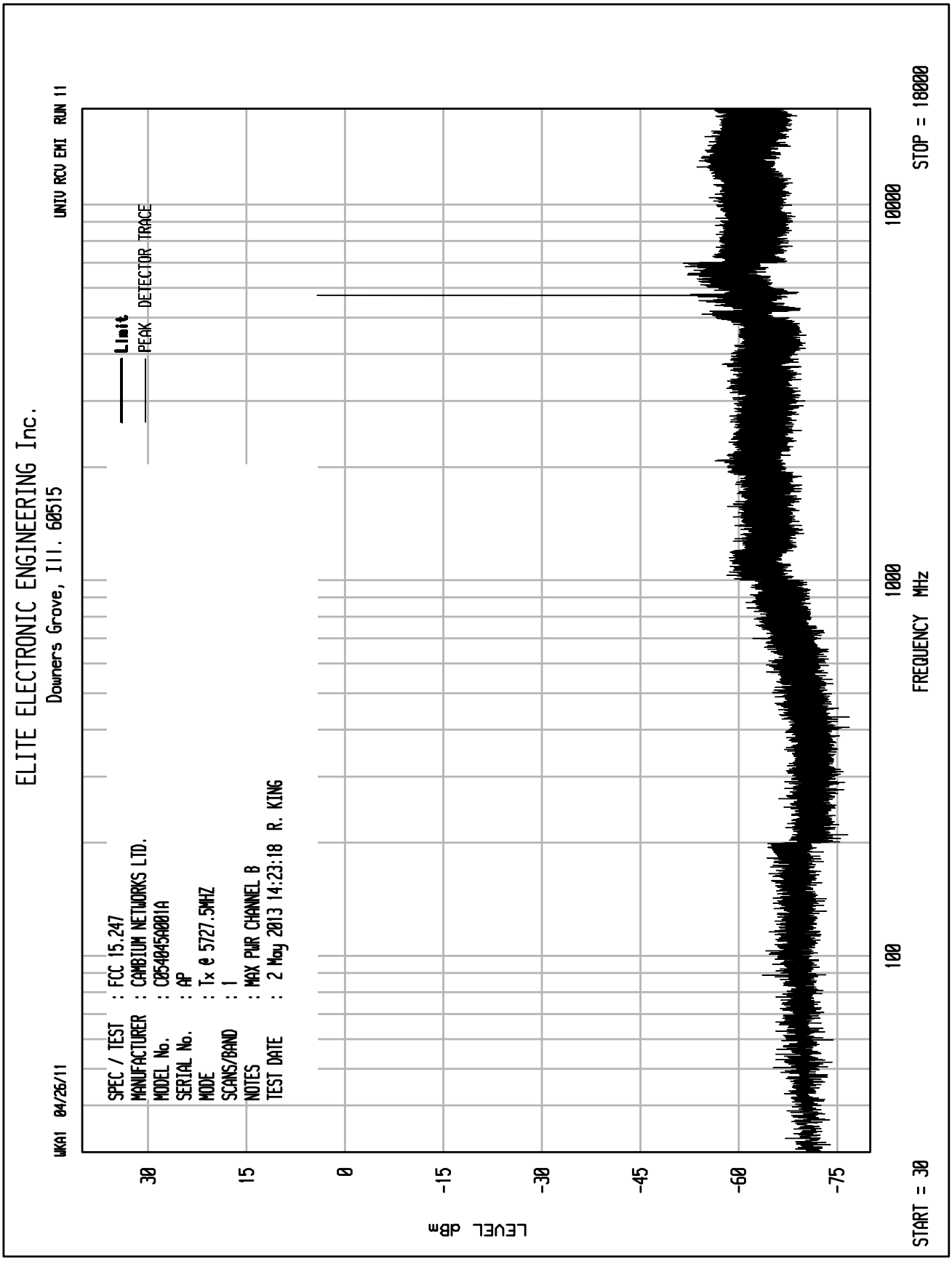


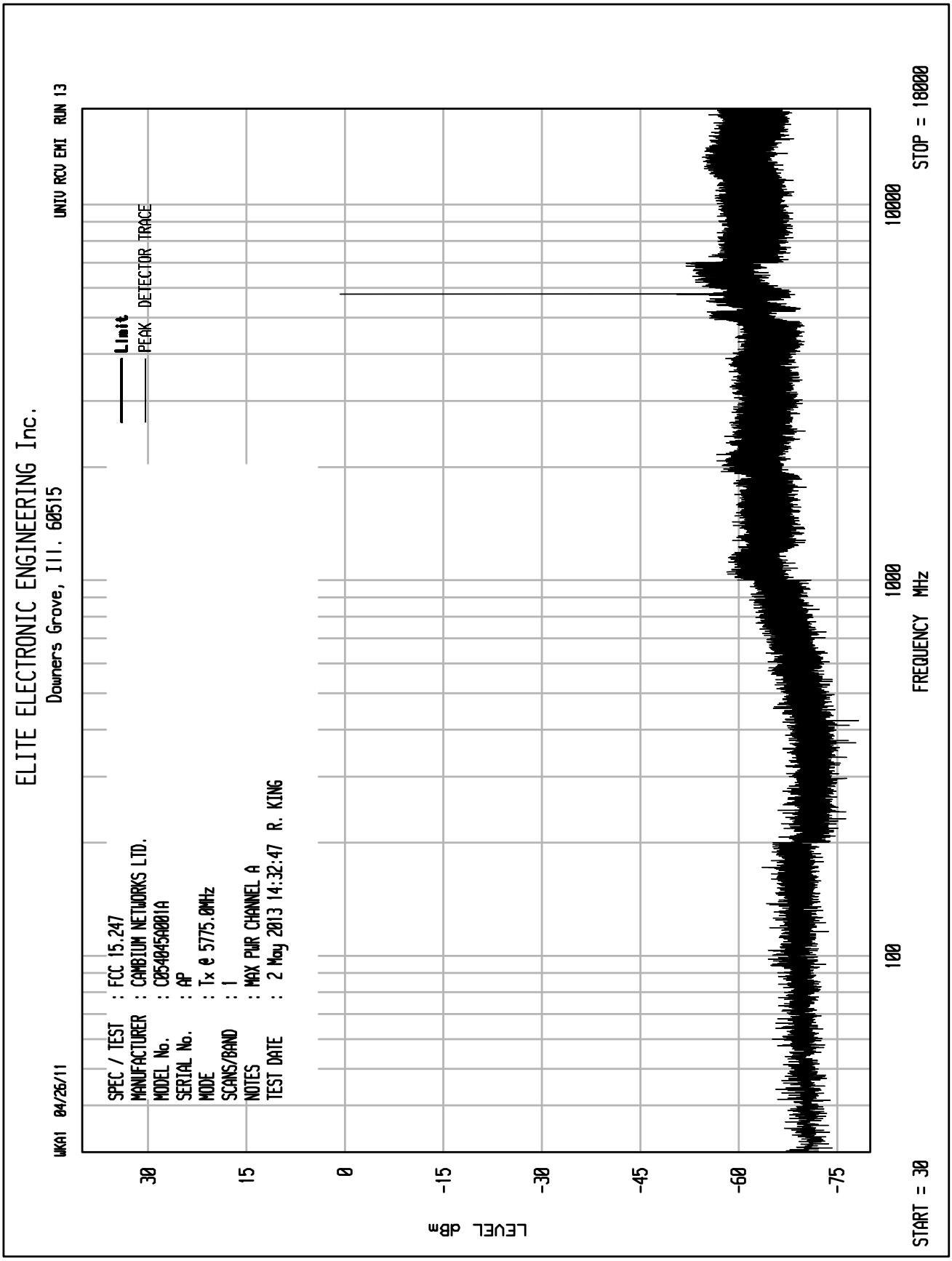
Duty Cycle

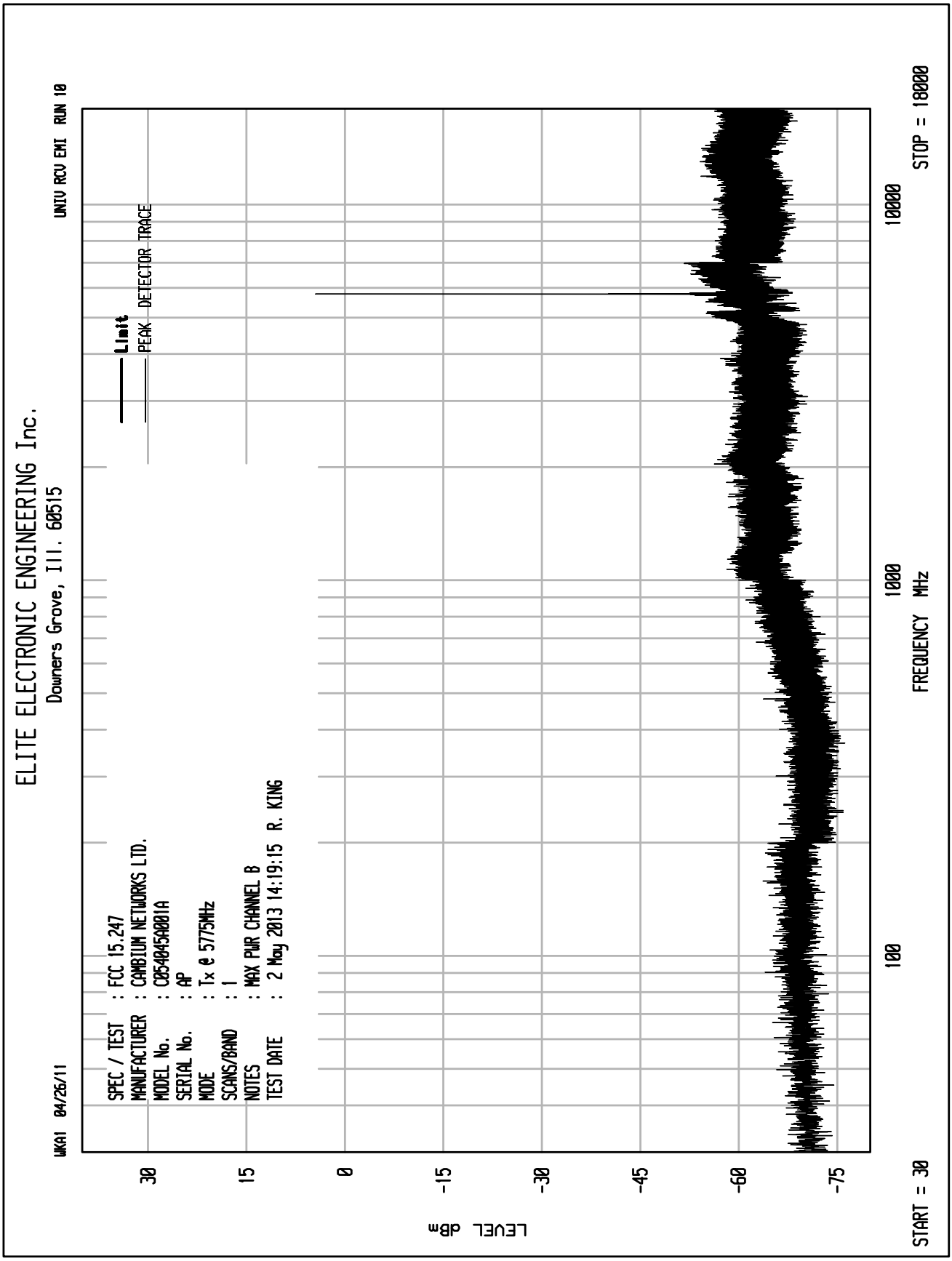
MANUFACTURER	:	Cambium Networks Ltd
MODEL NUMBER	:	C054045A001A
TEST MODE	:	Tx @ 5827.5MHz
	:	Tx at max power
	:	Channel A
	:	Duty Cycle Factor = 10*log(1/x)
	:	x = 94% (4.7/5)
	:	10*log(1/(4.7/5))=.27 dB

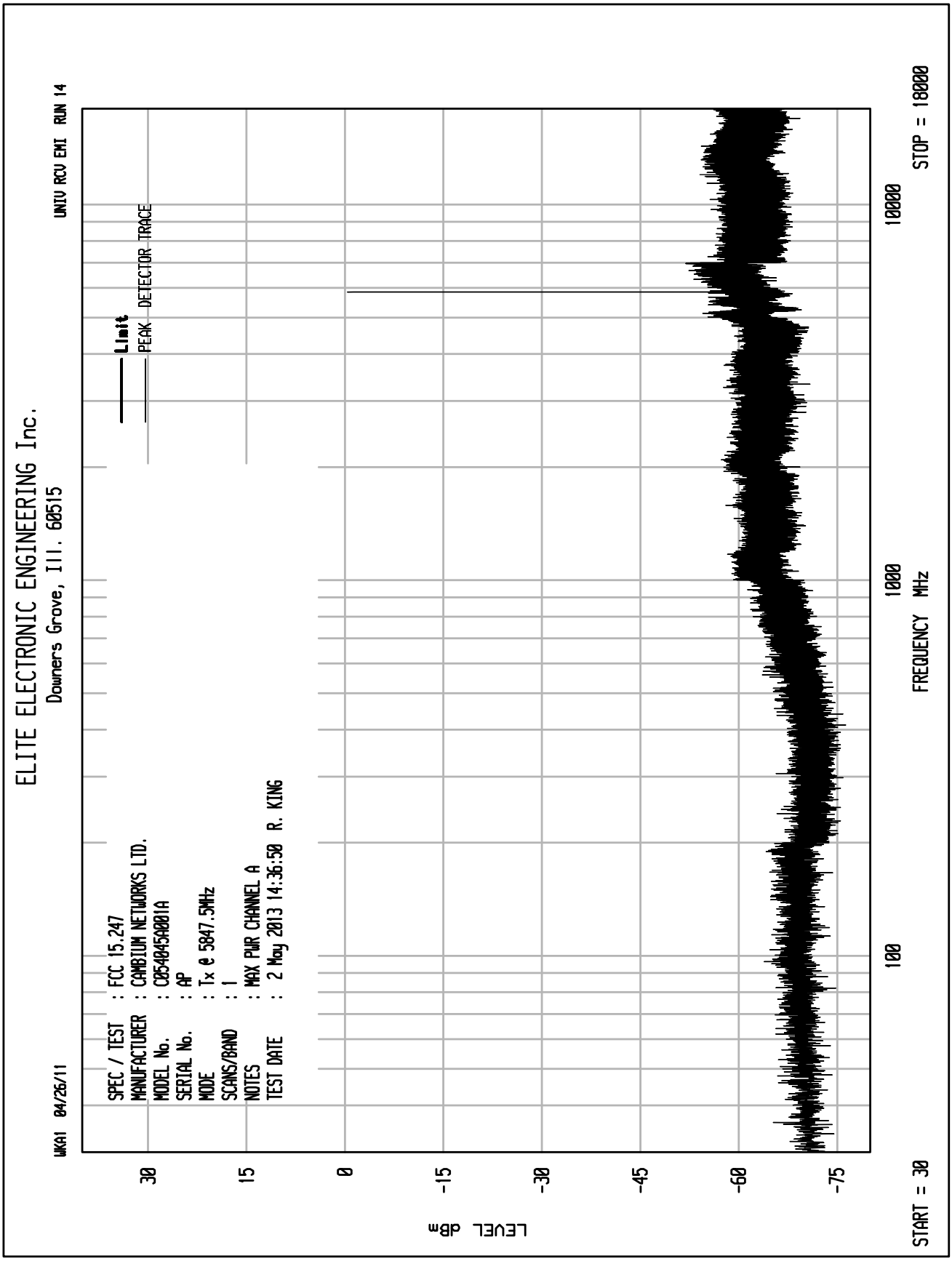
NOTES

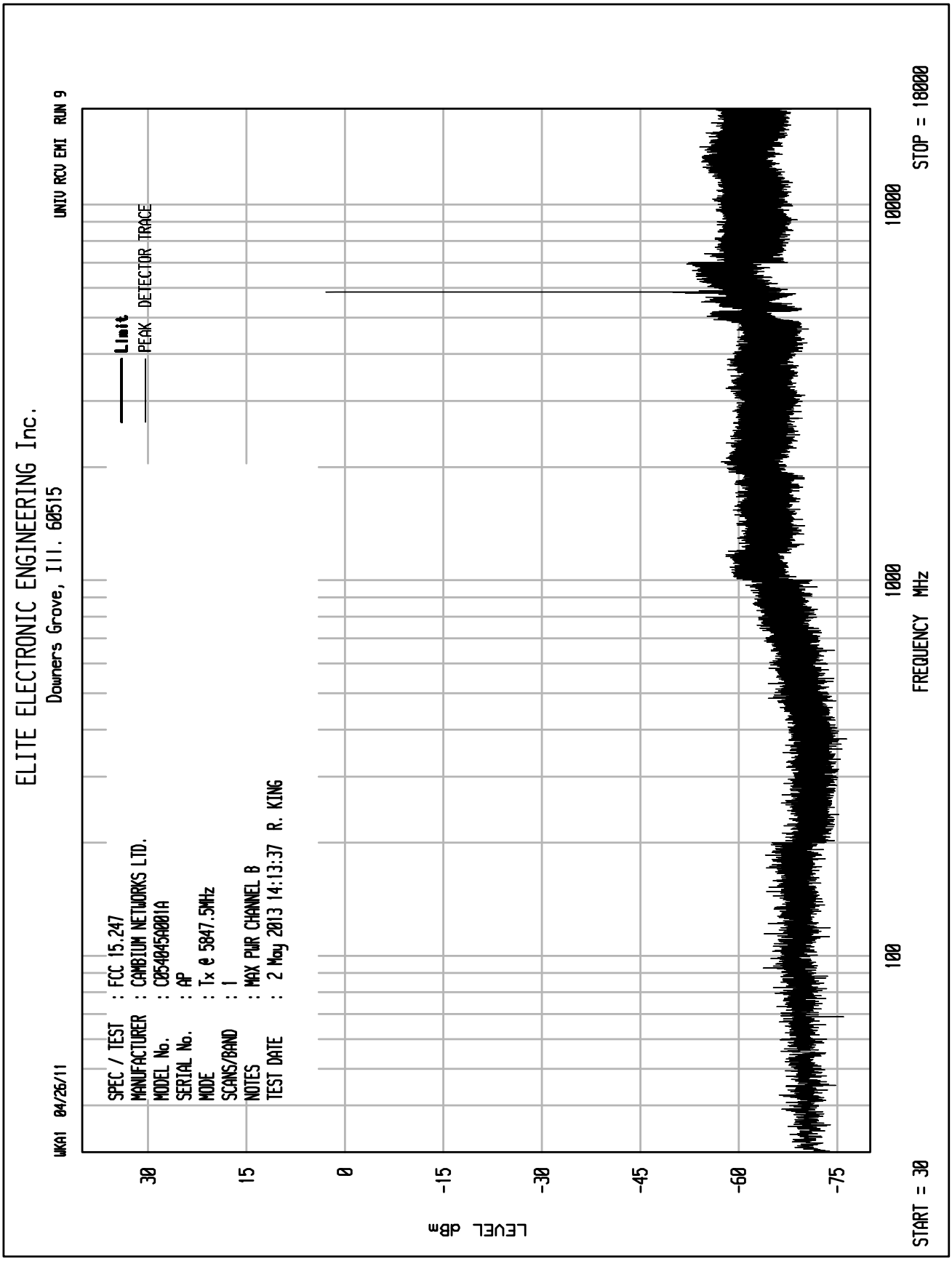

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 12
WKA1 04/26/11
SPEC / TEST : FCC 15.247
MANUFACTURER : CAMBIUM NETWORKS LTD.
MODEL No. : C050045A001A
SERIAL No. : AP
MODE : Tx @ 5727.5MHZ
SCANS/BAND : 1
NOTES : MAX PWR CHANNEL A
TEST DATE : 2 May 2013 14:28:50 R. KING
Limit
PEAK DETECTOR TRACE
LEVEL dBm
30
15
0
-15
-30
-45
-60
-75
START = 30
100
1000
10000
STOP = 18000
FREQUENCY MHz

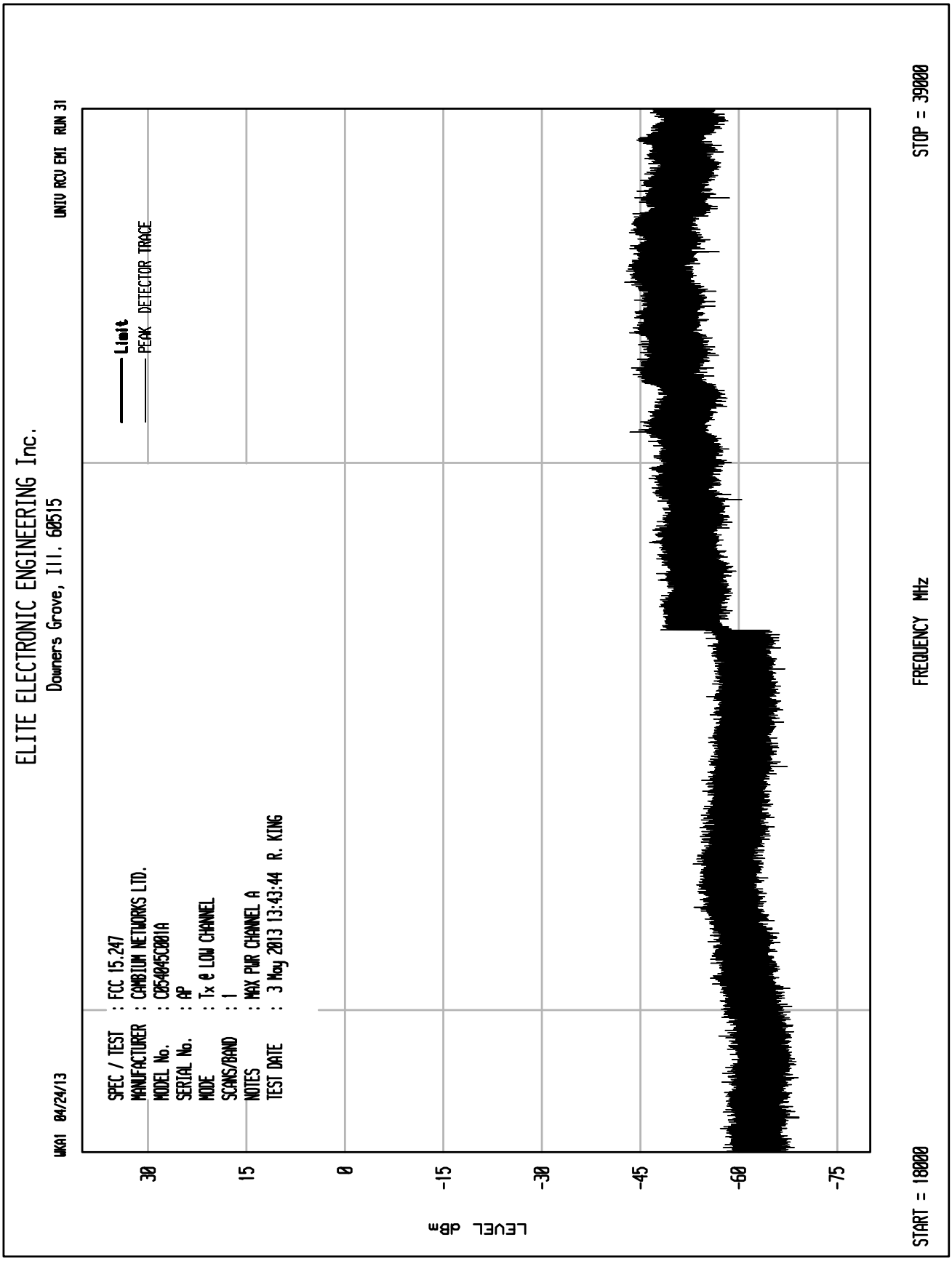

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 11
WKA1 04/26/11
SPEC / TEST : FCC 15.247
MANUFACTURER : CAMBIUM NETWORKS LTD.
MODEL No. : C054045A001A
SERIAL No. : AP
MODE : Tx @ 5727.5MHZ
SCANS/BAND : 1
NOTES : MAX PWR CHANNEL B
TEST DATE : 2 May 2013 14:23:18 R. KING
Limit
PEAK DETECTOR TRACE
LEVEL dBm
30
15
0
-15
-30
-45
-60
-75
START = 30
100
1000
10000
STOP = 18000
FREQUENCY MHz

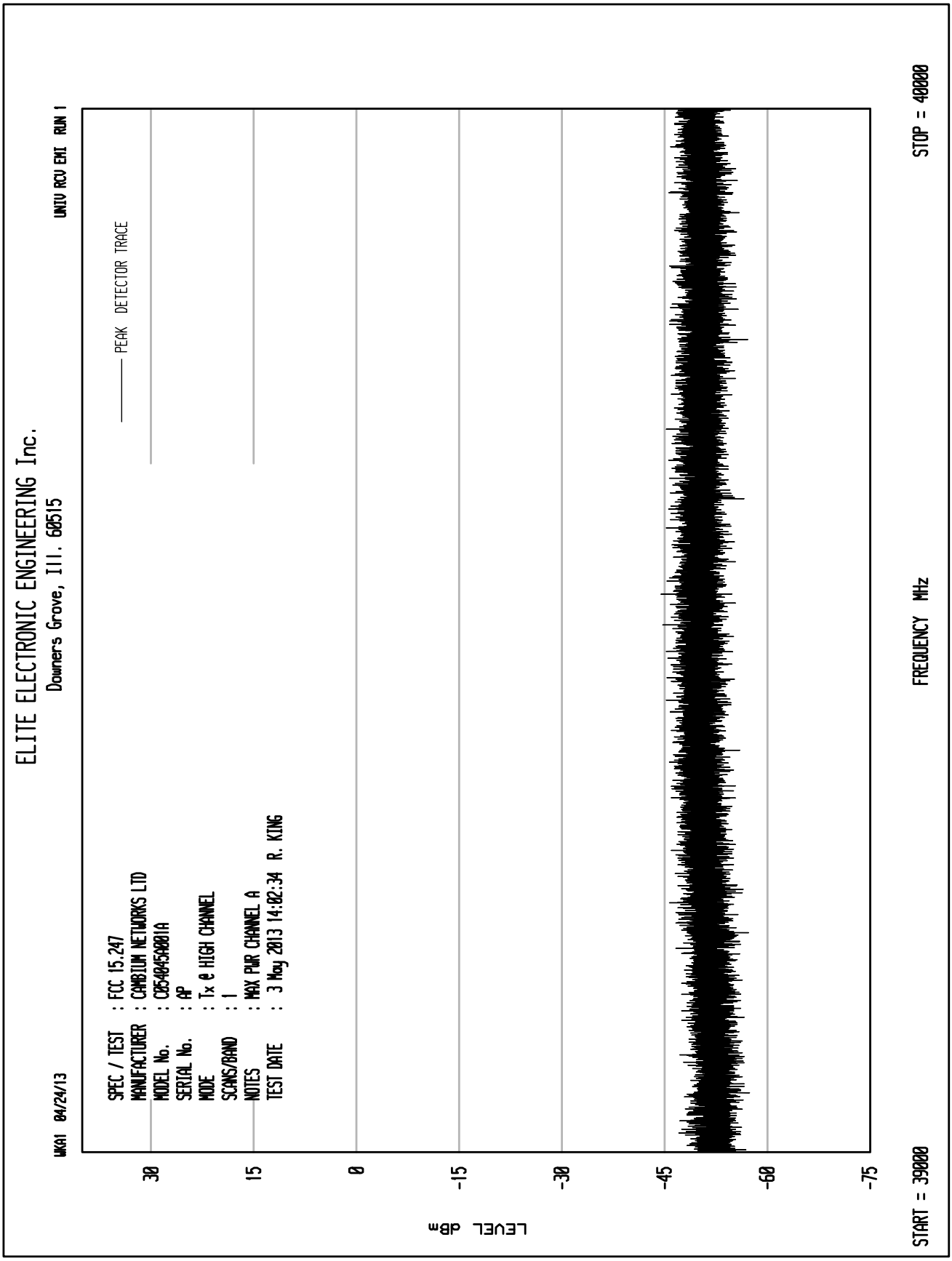

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 13
WKA1 04/26/11
SPEC / TEST : FCC 15.247
MANUFACTURER : CAMBIUM NETWORKS LTD.
MODEL No. : C050045A001A
SERIAL No. : AP
MODE : Tx @ 5775.0MHz
SCANS/BAND : 1
NOTES : MAX PWR CHANNEL A
TEST DATE : 2 May 2013 14:32:47 R. KING
Limit
PEAK DETECTOR TRACE
LEVEL dBm
30
15
0
-15
-30
-45
-60
-75
START = 30
100
1000
10000
STOP = 18000
FREQUENCY MHz

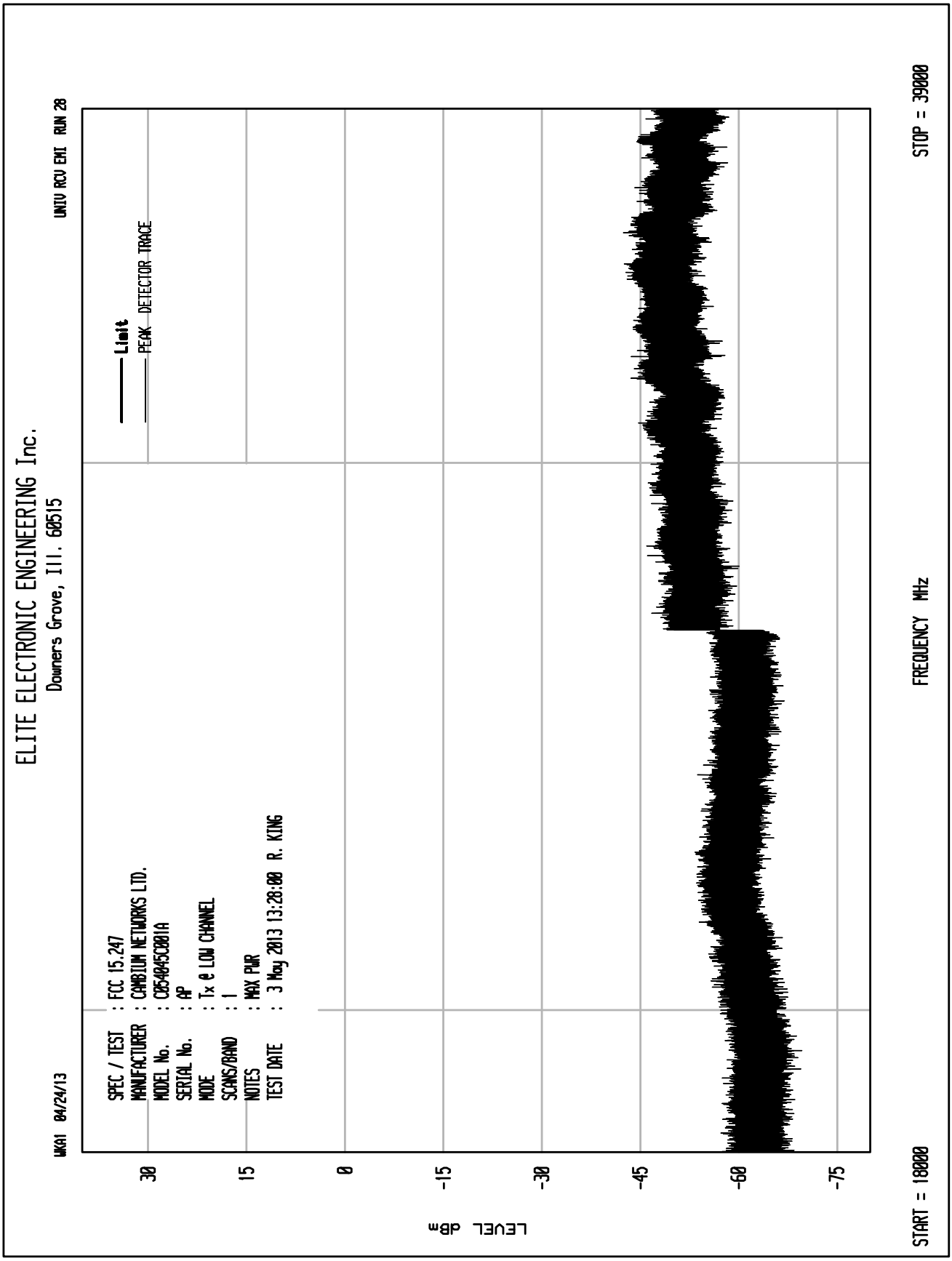

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 10
WKA1 04/26/11
SPEC / TEST : FCC 15.247
MANUFACTURER : CAMBIUM NETWORKS LTD.
MODEL No. : C050045A001A
SERIAL No. : AP
MODE : Tx @ 5775MHz
SCANS/BAND : 1
NOTES : MAX PWR CHANNEL B
TEST DATE : 2 May 2013 14:19:15 R. KING
Limit
PEAK DETECTOR TRACE
LEVEL dBm
30
15
0
-15
-30
-45
-60
-75
START = 30
100
1000
10000
STOP = 18000
FREQUENCY MHz

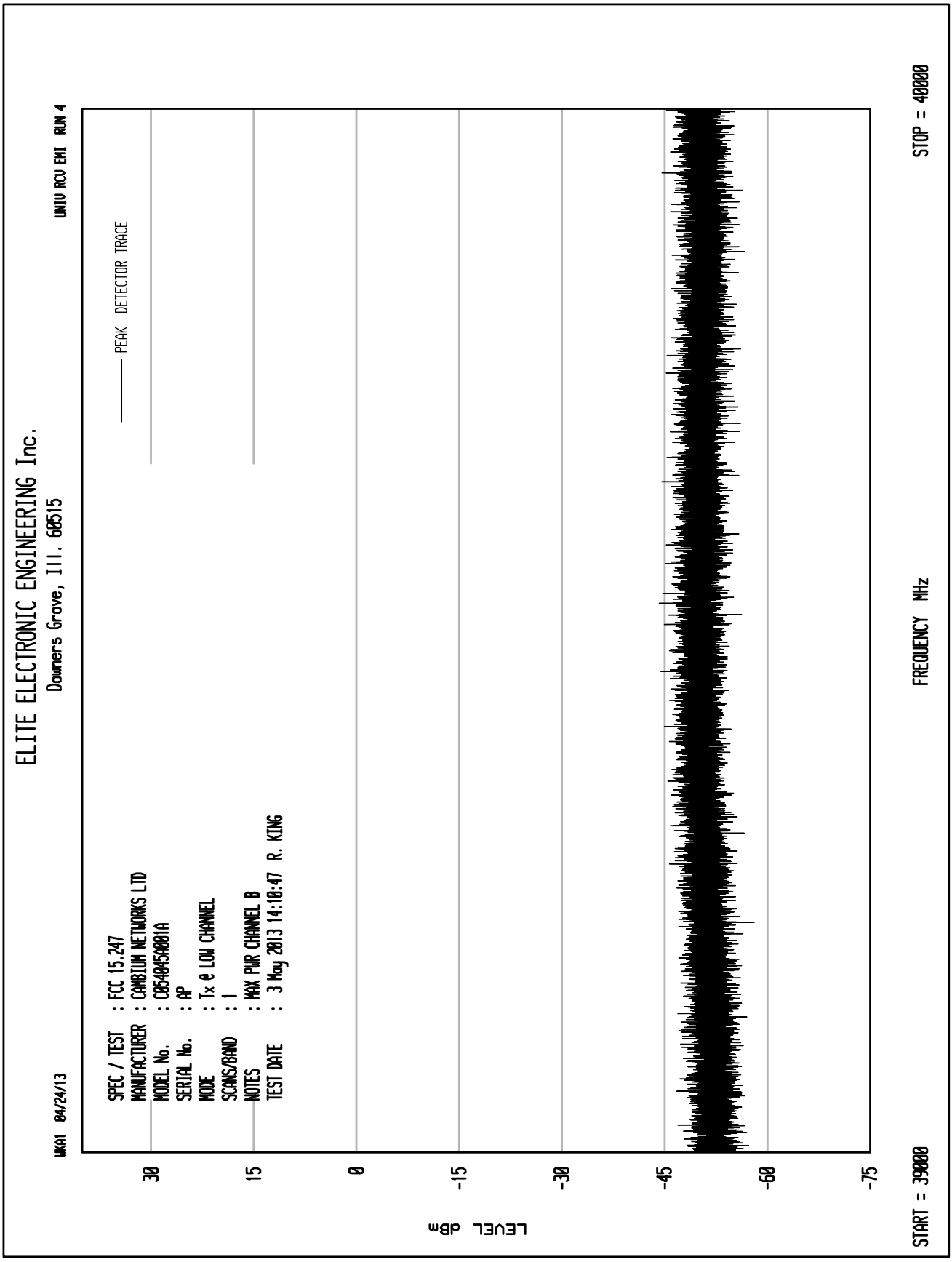

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 14
WKA1 04/26/11
SPEC / TEST : FCC 15.247
MANUFACTURER : CAMBIUM NETWORKS LTD.
MODEL No. : C054045A001A
SERIAL No. : AP
MODE : Tx @ 5847.5MHz
SCANS/BAND : 1
NOTES : MAX PWR CHANNEL A
TEST DATE : 2 May 2013 14:36:50 R. KING
Limit
PEAK DETECTOR TRACE
LEVEL dBm
30
15
0
-15
-30
-45
-60
-75
START = 30
100
1000
10000
STOP = 18000
FREQUENCY MHz

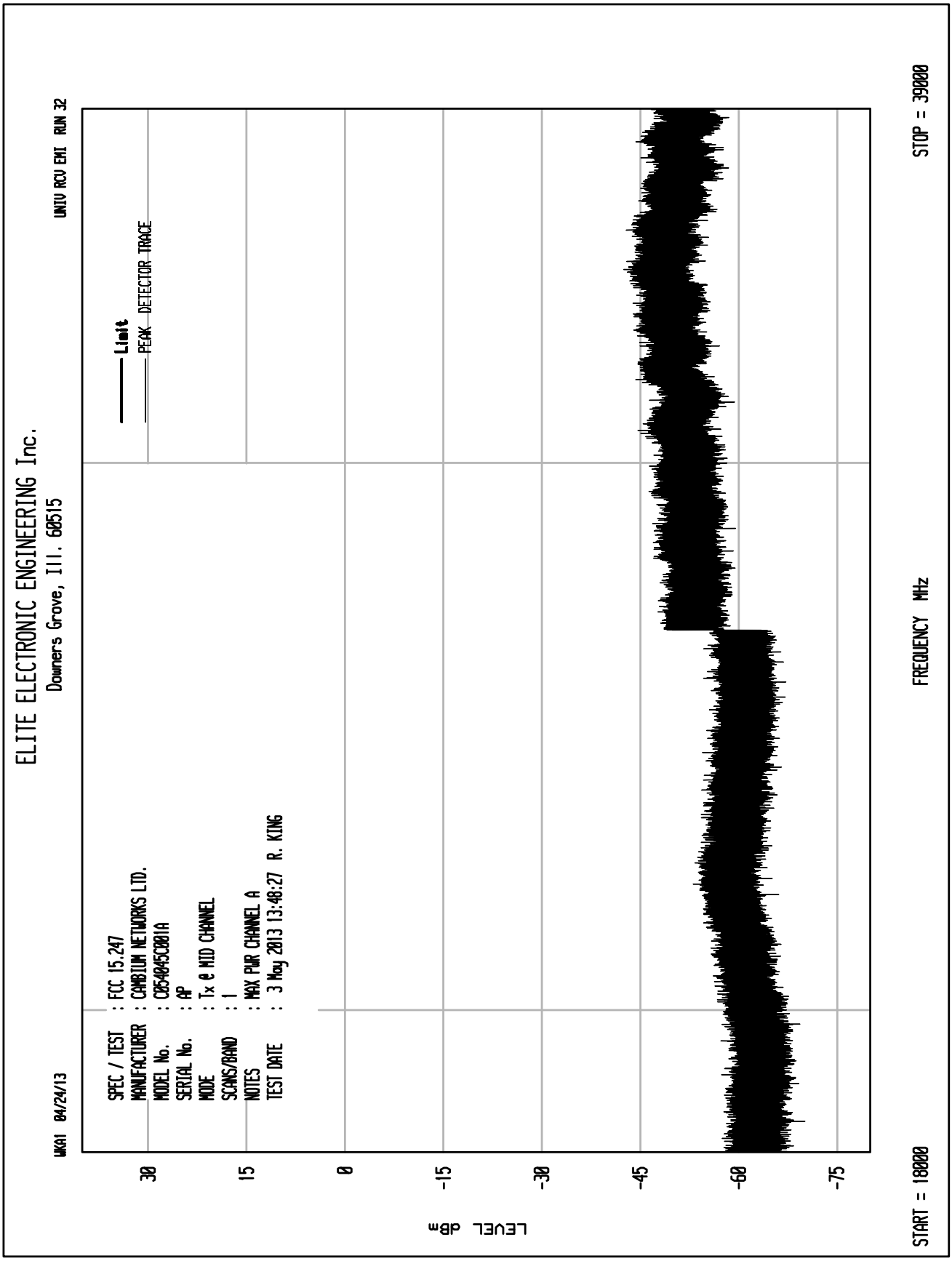

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 9
WKA1 04/26/11
SPEC / TEST : FCC 15.247
MANUFACTURER : CAMBIUM NETWORKS LTD.
MODEL No. : C054045A001A
SERIAL No. : AP
MODE : Tx @ 5847.5MHz
SCANS/BAND : 1
NOTES : MAX PWR CHANNEL B
TEST DATE : 2 May 2013 14:13:37 R. KING
Limit
PEAK DETECTOR TRACE
LEVEL dBm
30
15
0
-15
-30
-45
-60
-75
START = 30
100
1000
10000
STOP = 18000
FREQUENCY MHz

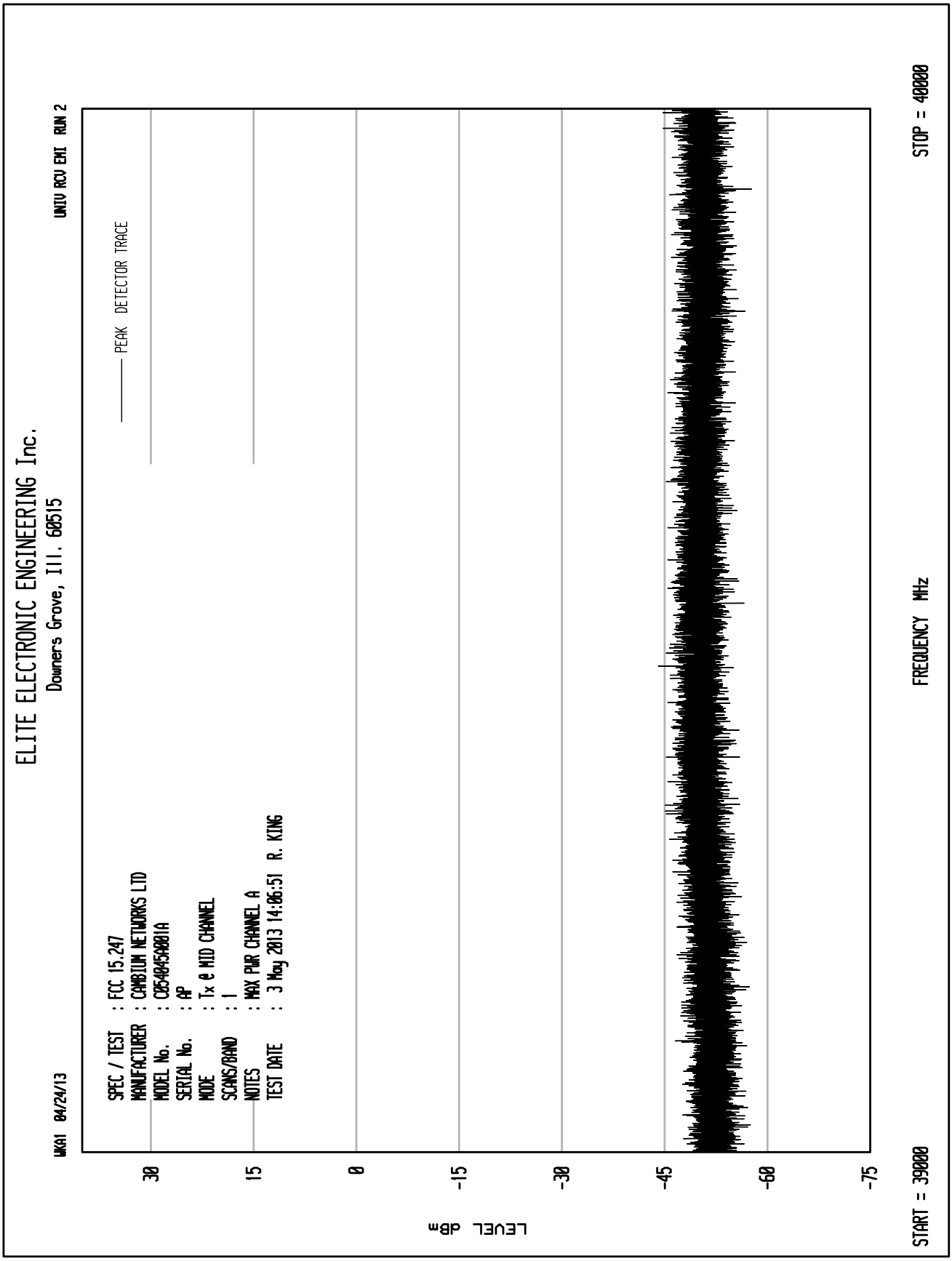

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 31
WKA1 04/24/13
SPEC / TEST : FCC 15.247
MANUFACTURER : CAMBIUM NETWORKS LTD.
MODEL No. : C054045C001A
SERIAL No. : AP
MODE : Tx @ LOW CHANNEL
SCANS/BAND : 1
NOTES : MAX PWR CHANNEL A
TEST DATE : 3 May 2013 13:43:44 R. KING
Limit
PEAK DETECTOR TRACE
LEVEL dBm
30
15
0
-15
-30
-45
-60
-75
START = 18000
FREQUENCY MHz
STOP = 39000

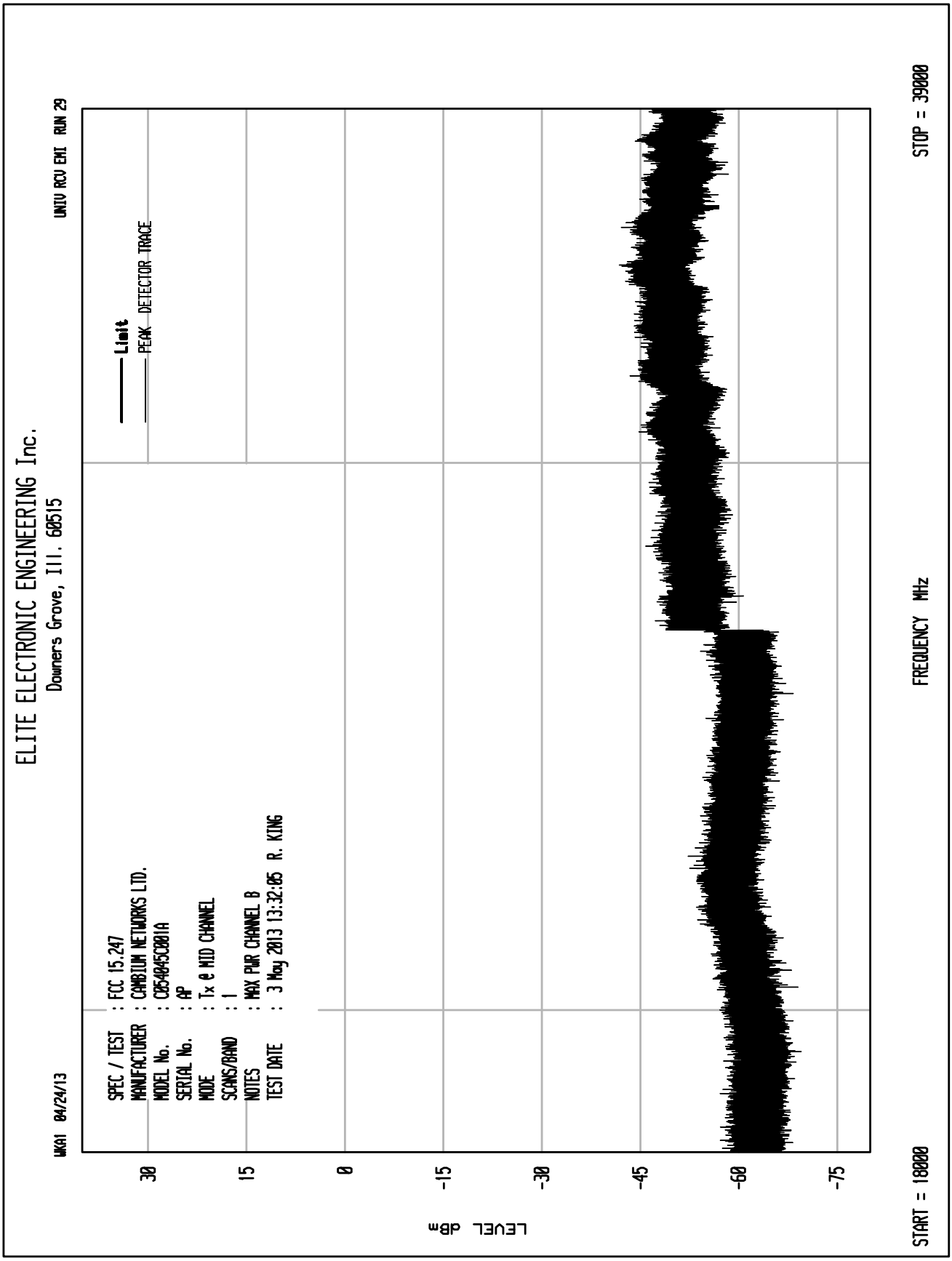

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNII RCV EMI RUN 1
MKR1 04/24/13
SPEC / TEST : FCC 15.247
MANUFACTURER : CAMBIUM NETWORKS LTD
MODEL No. : C054045A001A
SERIAL No. : AP
MODE : Tx @ HIGH CHANNEL
SCANS/BAND : 1
NOTES : MAX PWR CHANNEL A
TEST DATE : 3 May 2013 14:02:34 R. KING
PEAK DETECTOR TRACE
LEVEL dBm
30
15
0
-15
-30
-45
-60
-75
START = 30000
FREQUENCY MHz
STOP = 40000

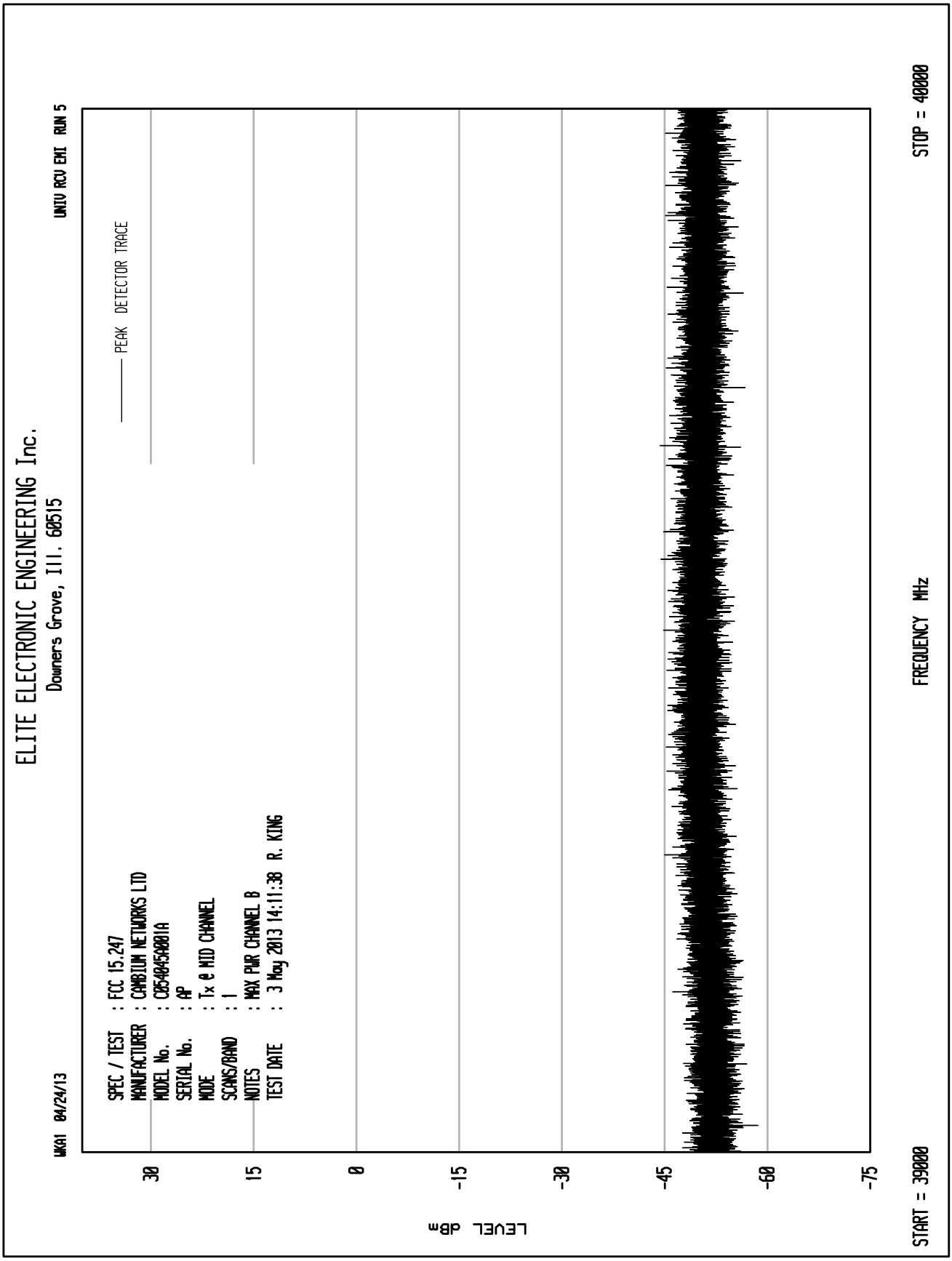

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 28
WKA1 04/24/13
SPEC / TEST : FCC 15.247
MANUFACTURER : CAMBIUM NETWORKS LTD.
MODEL No. : C054045C001A
SERIAL No. : AP
MODE : Tx @ LOW CHANNEL
SCANS/BAND : 1
NOTES : MAX PWR
TEST DATE : 3 May 2013 13:28:00 R. KING
Limit
PEAK DETECTOR TRACE
LEVEL dBm
30
15
0
-15
-30
-45
-60
-75
START = 18000
FREQUENCY MHz
STOP = 39000

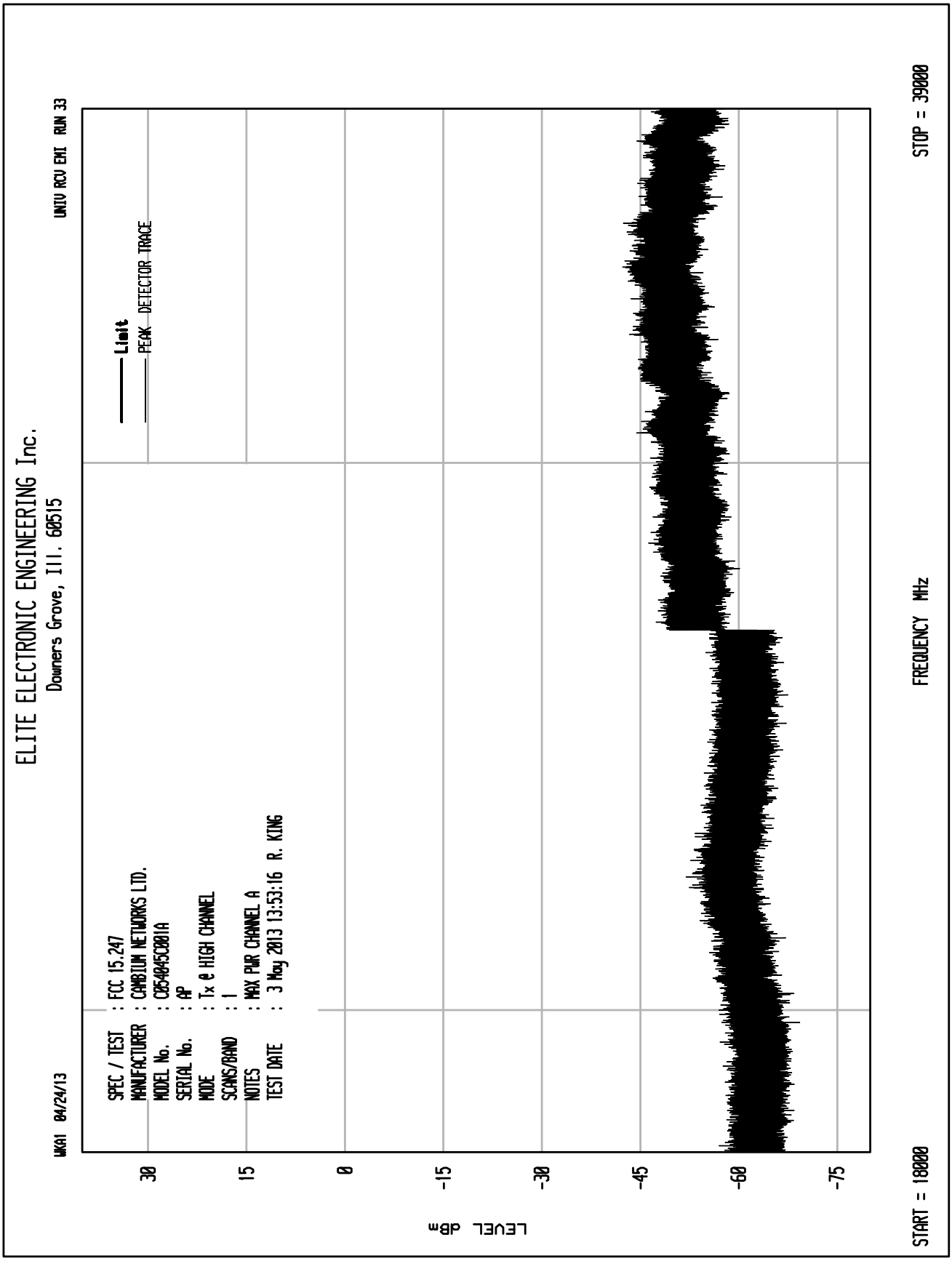

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 4
WKA1 04/24/13
SPEC / TEST : FCC 15.247
MANUFACTURER : CAMBIUM NETWORKS LTD
MODEL No. : C054045A001A
SERIAL No. : AP
MODE : Tx @ LOW CHANNEL
SCANS/BAND : 1
NOTES : MAX PWR CHANNEL B
TEST DATE : 3 May 2013 14:10:47 R. KING
PEAK DETECTOR TRACE
LEVEL dBm
30
15
0
-15
-30
-45
-60
-75
START = 30000
FREQUENCY MHz
STOP = 40000

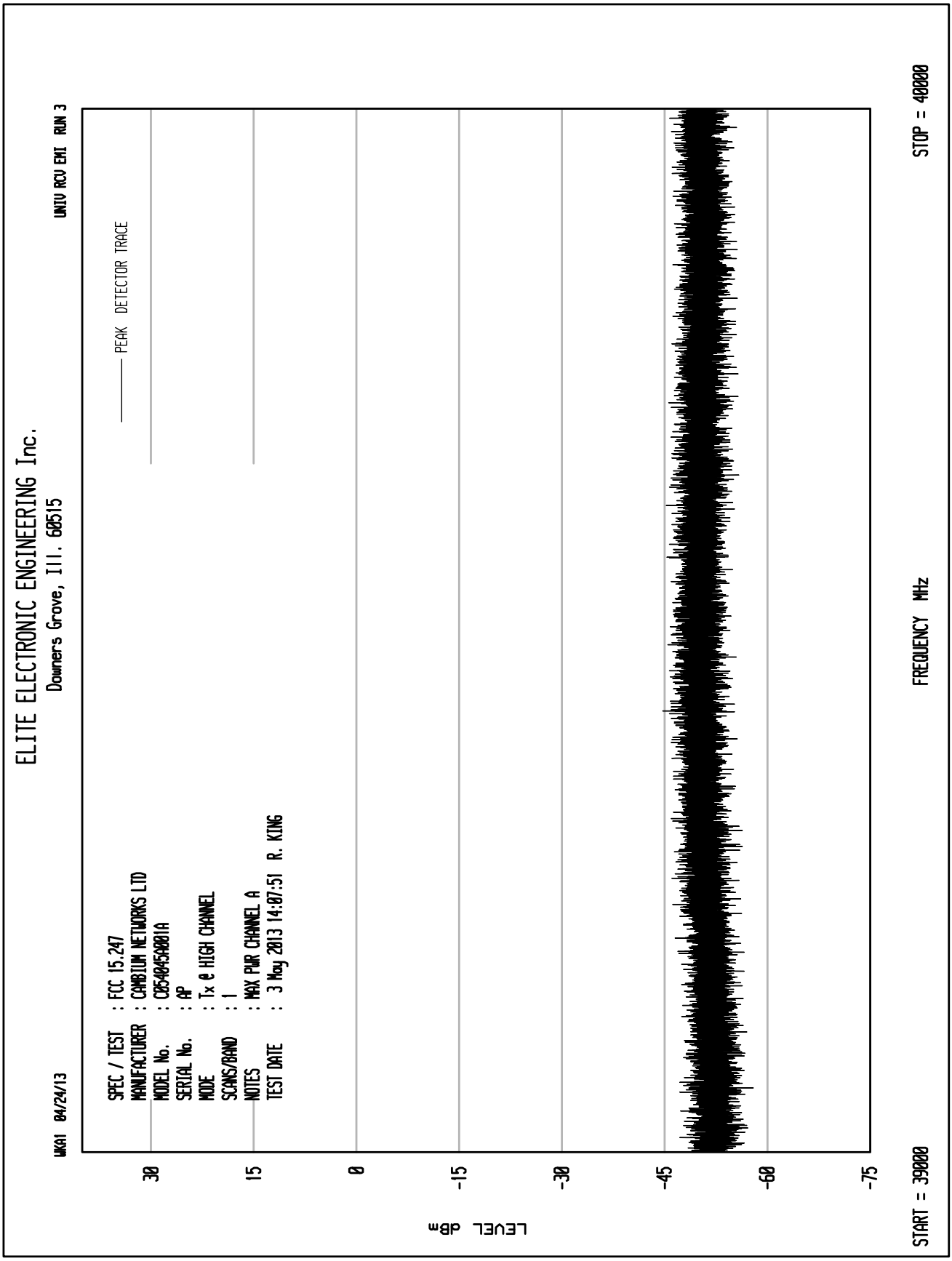

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 32
WKA1 04/24/13
SPEC / TEST : FCC 15.247
MANUFACTURER : CAMBIUM NETWORKS LTD.
MODEL No. : C054045C001A
SERIAL No. : AP
MODE : Tx @ MID CHANNEL
SCANS/BAND : 1
NOTES : MAX PWR CHANNEL A
TEST DATE : 3 May 2013 13:48:27 R. KING
Limit
PEAK DETECTOR TRACE
LEVEL dBm
30
15
0
-15
-30
-45
-60
-75
START = 18000
FREQUENCY MHz
STOP = 39000

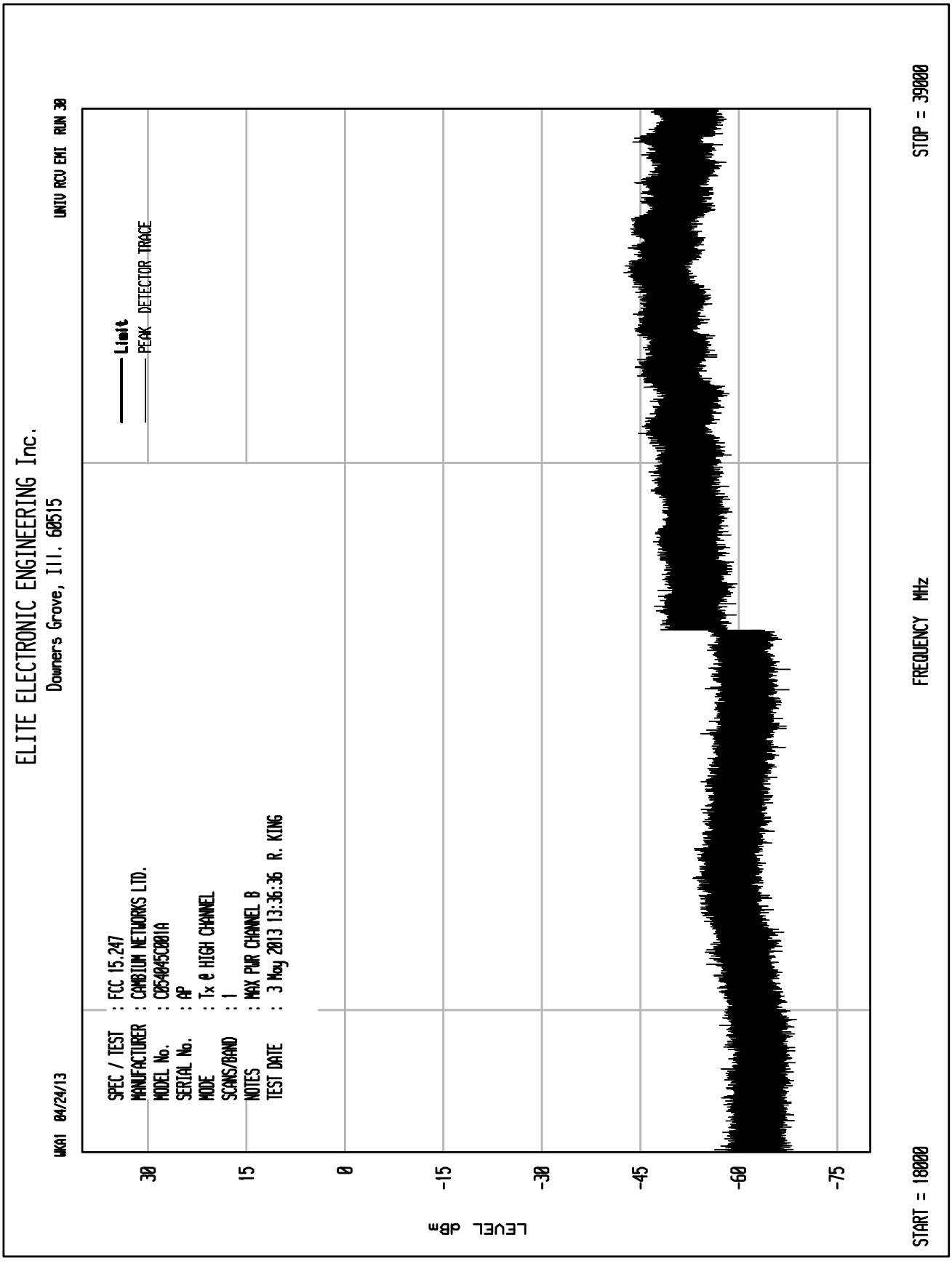

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNII RCV EMI RUN 2
WKA1 04/24/13
SPEC / TEST : FCC 15.247
MANUFACTURER : CAMBIUM NETWORKS LTD
MODEL No. : C054045A001A
SERIAL No. : AP
MODE : Tx @ MID CHANNEL
SCANS/BAND : 1
NOTES : MAX PWR CHANNEL A
TEST DATE : 3 May 2013 14:06:51 R. KING
PEAK DETECTOR TRACE
LEVEL dBm
30
15
0
-15
-30
-45
-60
-75
START = 39000
FREQUENCY MHz
STOP = 40000

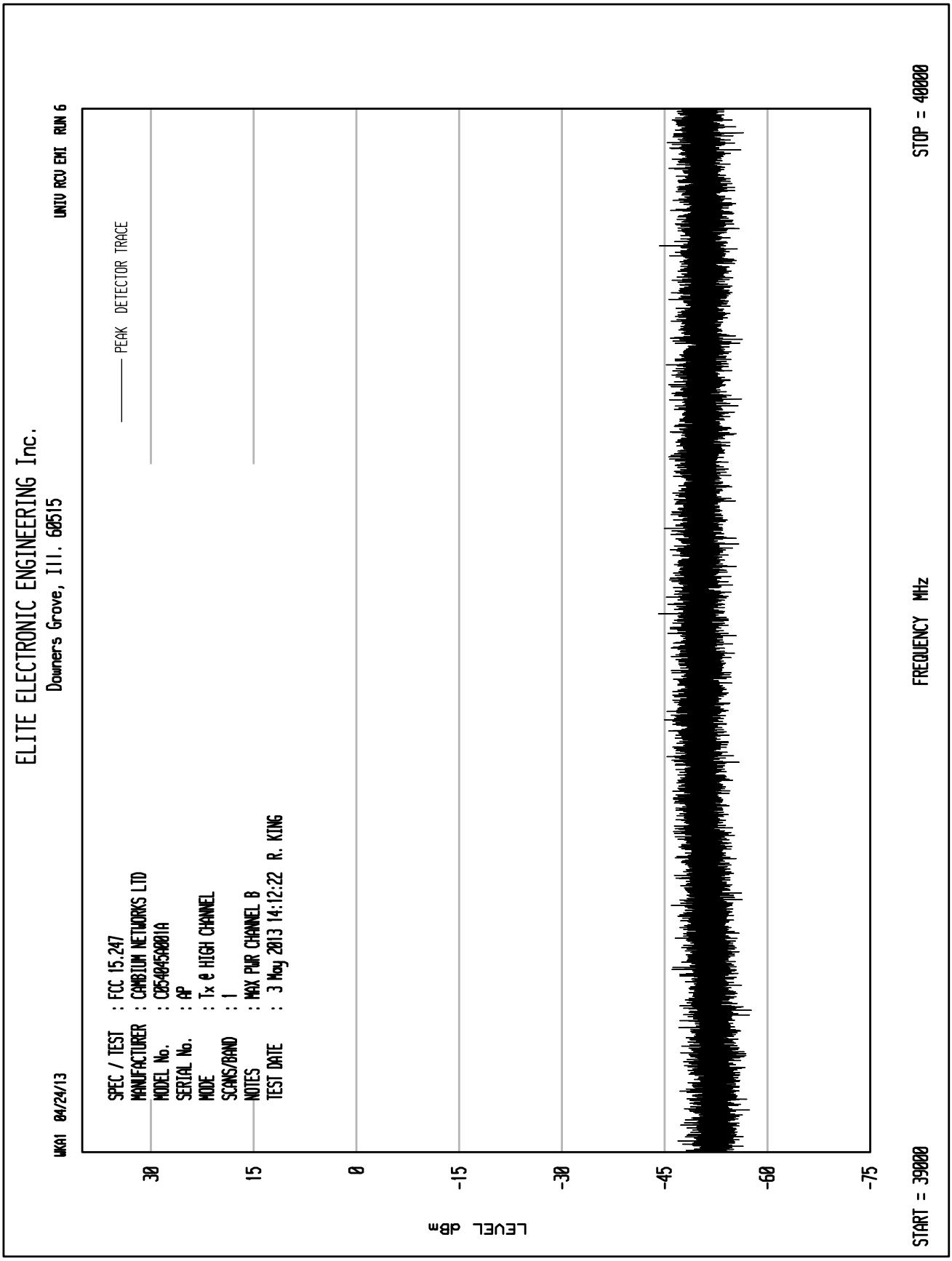

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 29
WKA1 04/24/13
SPEC / TEST : FCC 15.247
MANUFACTURER : CAMBIUM NETWORKS LTD.
MODEL No. : C054045C001A
SERIAL No. : AP
MODE : Tx @ MID CHANNEL
SCANS/BAND : 1
NOTES : MAX PWR CHANNEL B
TEST DATE : 3 May 2013 13:32:05 R. KING
Limit
PEAK DETECTOR TRACE
LEVEL dBm
30
15
0
-15
-30
-45
-60
-75
START = 18000
FREQUENCY MHz
STOP = 39000

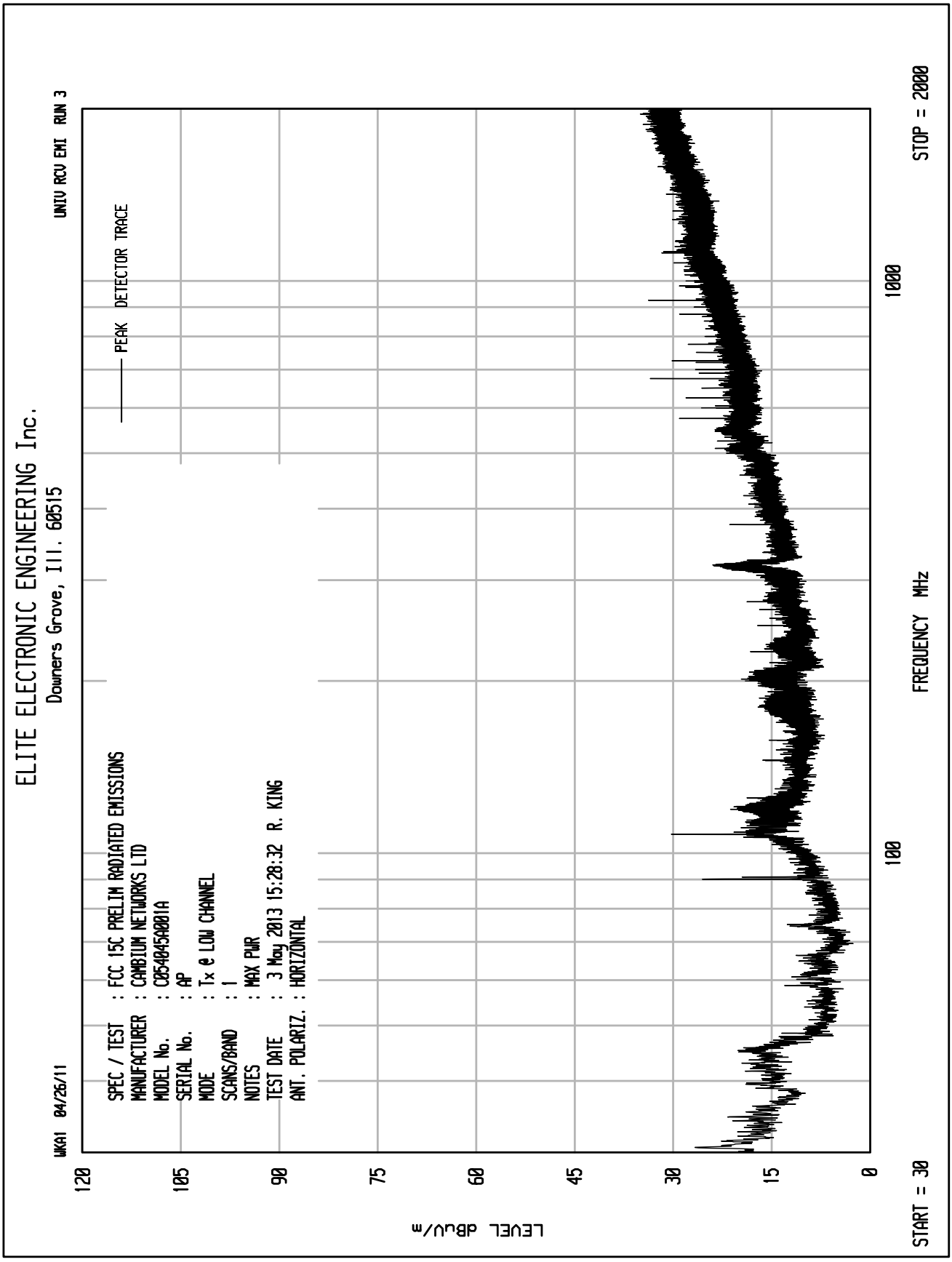

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 5
WKA1 04/24/13
SPEC / TEST : FCC 15.247
MANUFACTURER : CAMBIUM NETWORKS LTD
MODEL No. : C054045A001A
SERIAL No. : AP
MODE : Tx @ MID CHANNEL
SCANS/BAND : 1
NOTES : MAX PWR CHANNEL B
TEST DATE : 3 May 2013 14:11:38 R. KING
PEAK DETECTOR TRACE
LEVEL dBm
30
15
0
-15
-30
-45
-60
-75
START = 30000
FREQUENCY MHz
STOP = 40000

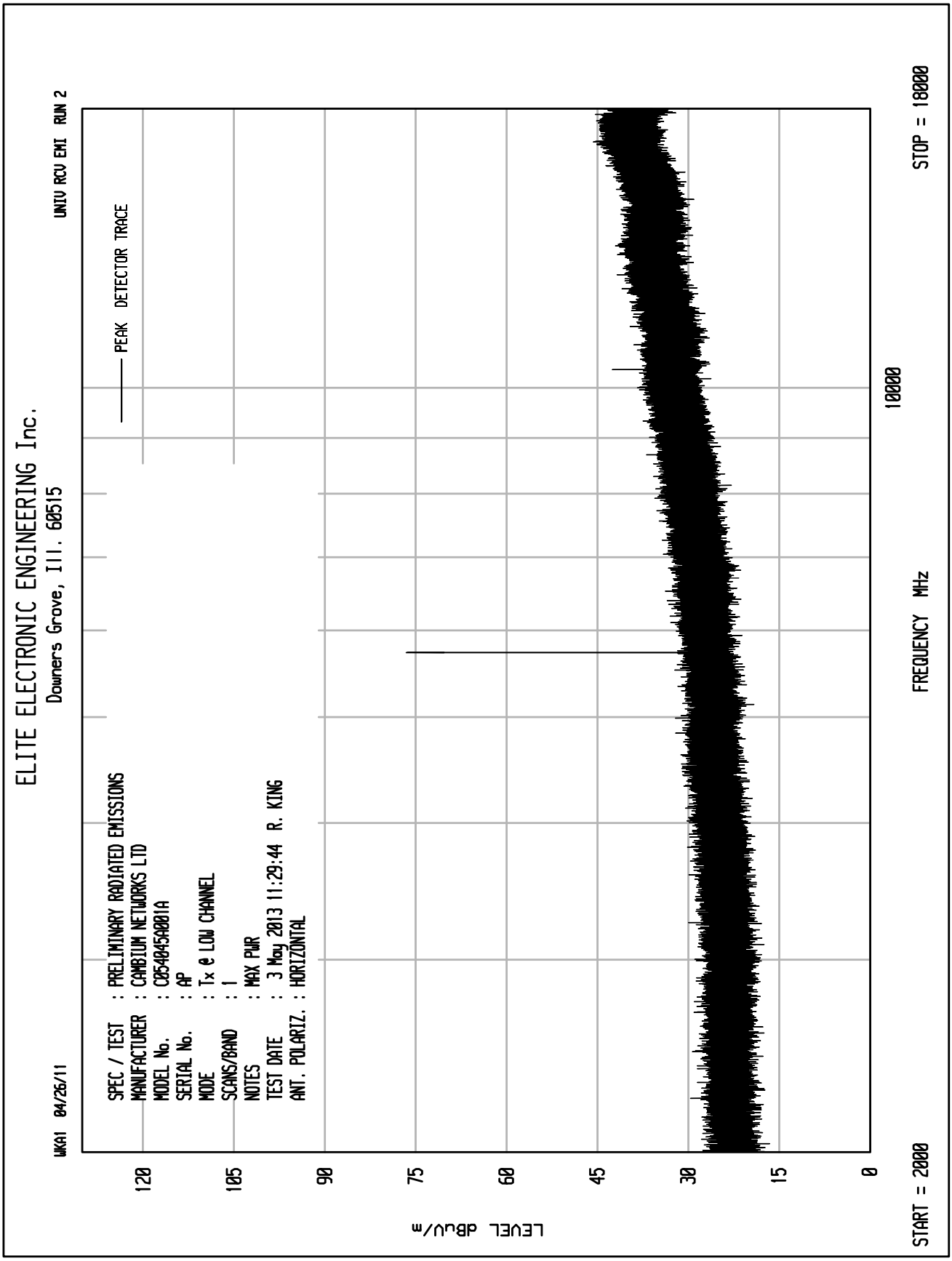

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 33
WKA1 04/24/13
SPEC / TEST : FCC 15.247
MANUFACTURER : CAMBIUM NETWORKS LTD.
MODEL No. : C054045C001A
SERIAL No. : AP
MODE : Tx @ HIGH CHANNEL
SCANS/BAND : 1
NOTES : MAX PWR CHANNEL A
TEST DATE : 3 May 2013 13:53:16 R. KING
Limit
PEAK DETECTOR TRACE
LEVEL dBm
30
15
0
-15
-30
-45
-60
-75
START = 18000
FREQUENCY MHz
STOP = 39000

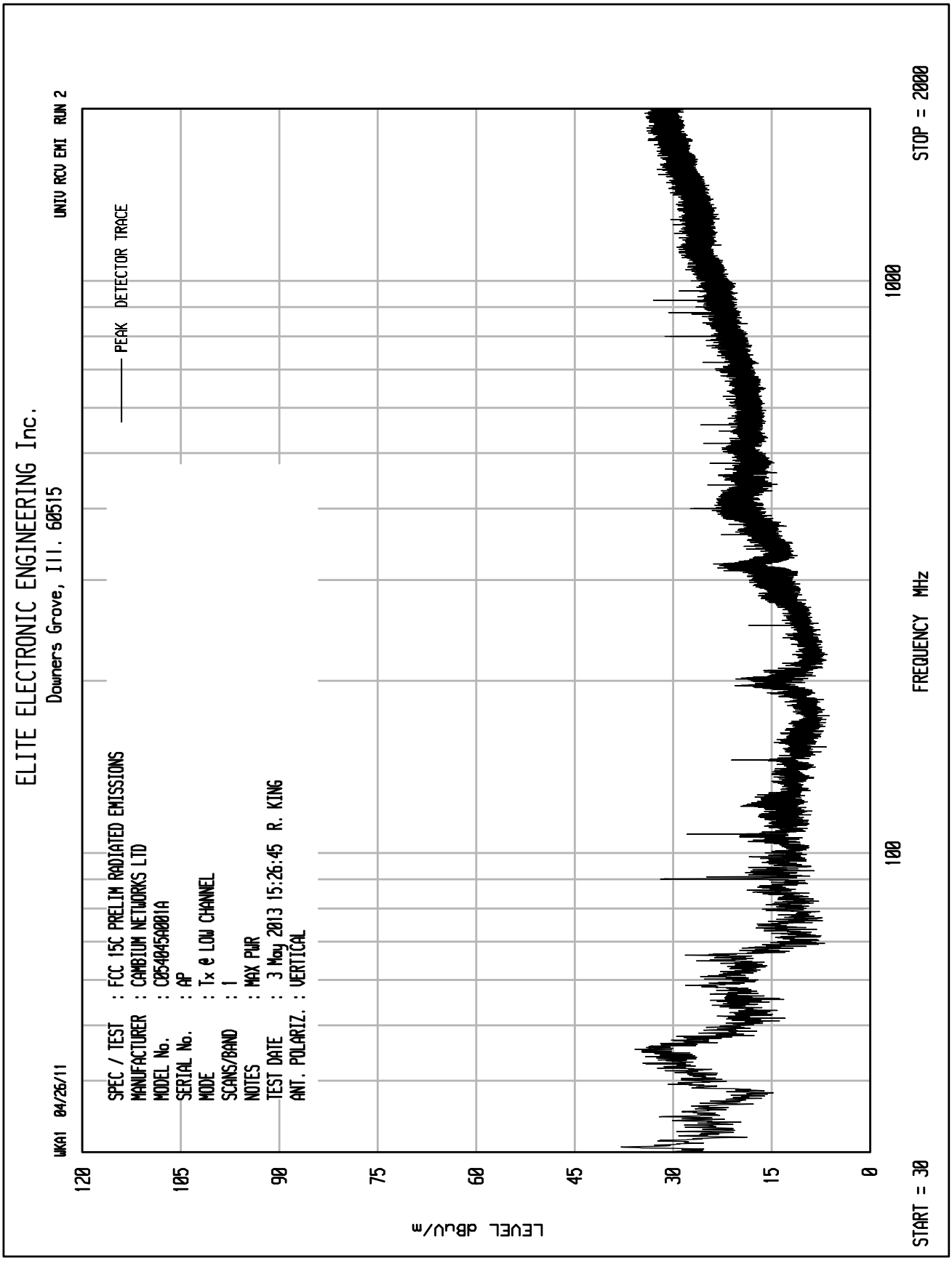

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 3
WKA1 04/24/13
SPEC / TEST : FCC 15.247
MANUFACTURER : CAMBIUM NETWORKS LTD
MODEL No. : C054045A001A
SERIAL No. : AP
MODE : Tx @ HIGH CHANNEL
SCANS/BAND : 1
NOTES : MAX PWR CHANNEL A
TEST DATE : 3 May 2013 14:07:51 R. KING
PEAK DETECTOR TRACE
LEVEL dBm
30
15
0
-15
-30
-45
-60
-75
START = 30000
FREQUENCY MHz
STOP = 40000

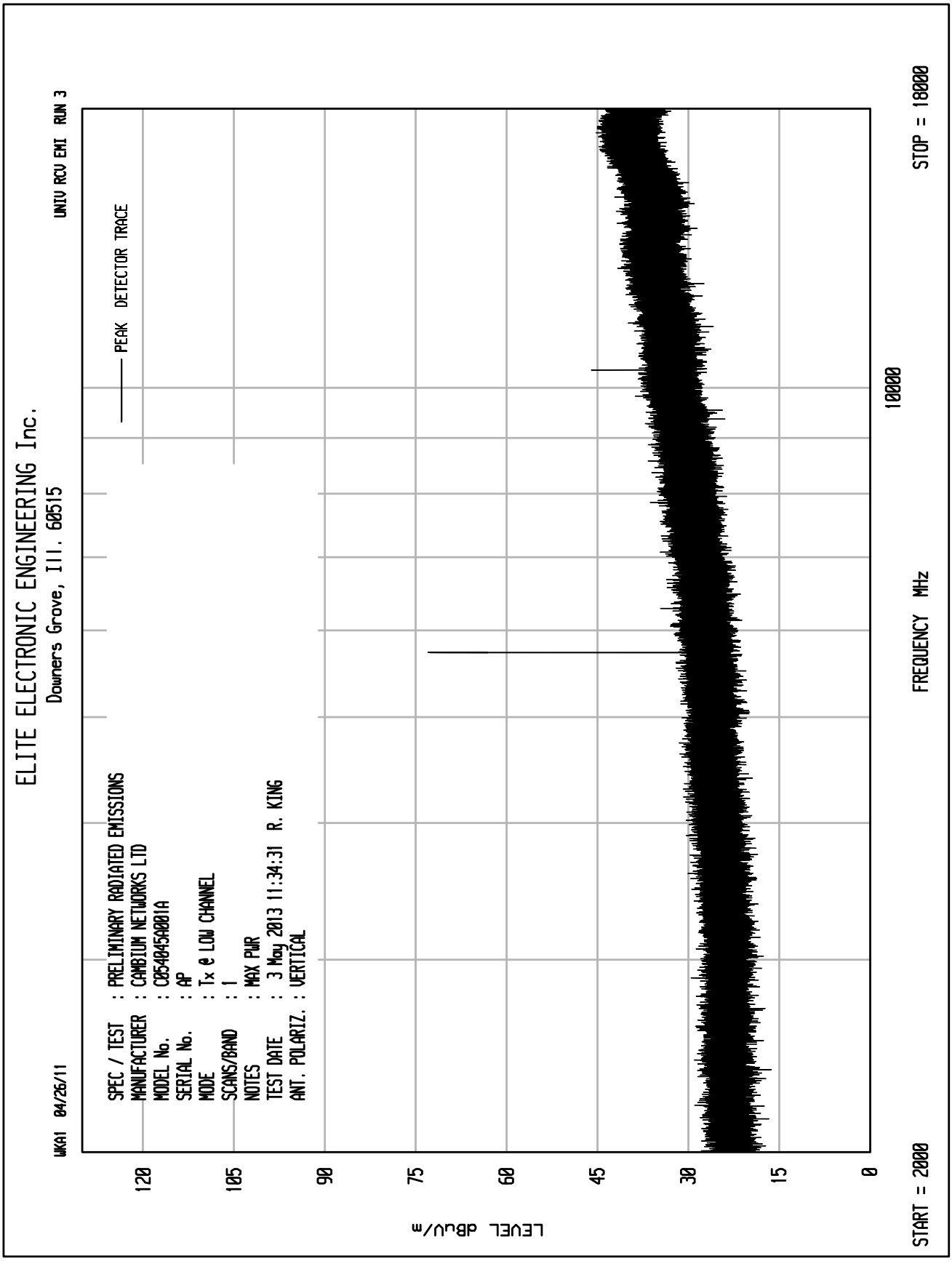

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 30
WKA1 04/24/13
SPEC / TEST : FCC 15.247
MANUFACTURER : CAMBIUM NETWORKS LTD.
MODEL No. : C054045C001A
SERIAL No. : AP
MODE : Tx @ HIGH CHANNEL
SCANS/BAND : 1
NOTES : MAX PWR CHANNEL B
TEST DATE : 3 May 2013 13:36:36 R. KING
Limit
PEAK DETECTOR TRACE
LEVEL dBm
30
15
0
-15
-30
-45
-60
-75
START = 18000
FREQUENCY MHz
STOP = 39000

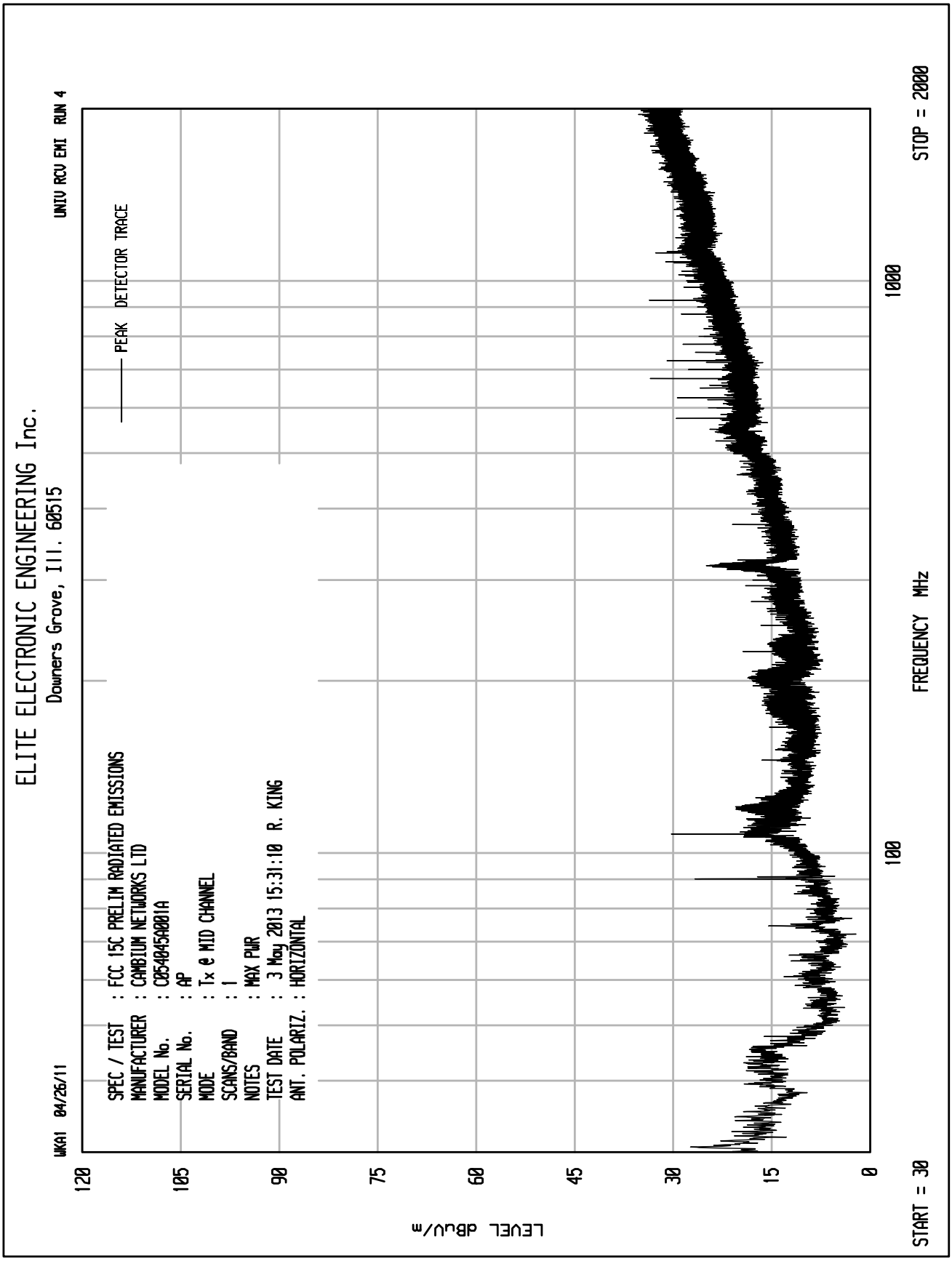

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNII RCV EMI RUN 6
WKA1 04/24/13
SPEC / TEST : FCC 15.247
MANUFACTURER : CAMBIUM NETWORKS LTD
MODEL No. : C054045A001A
SERIAL No. : AP
MODE : Tx @ HIGH CHANNEL
SCANS/BAND : 1
NOTES : MAX PWR CHANNEL B
TEST DATE : 3 May 2013 14:12:22 R. KING
PEAK DETECTOR TRACE
LEVEL dBm
30
15
0
-15
-30
-45
-60
-75
START = 39000
FREQUENCY MHz
STOP = 40000

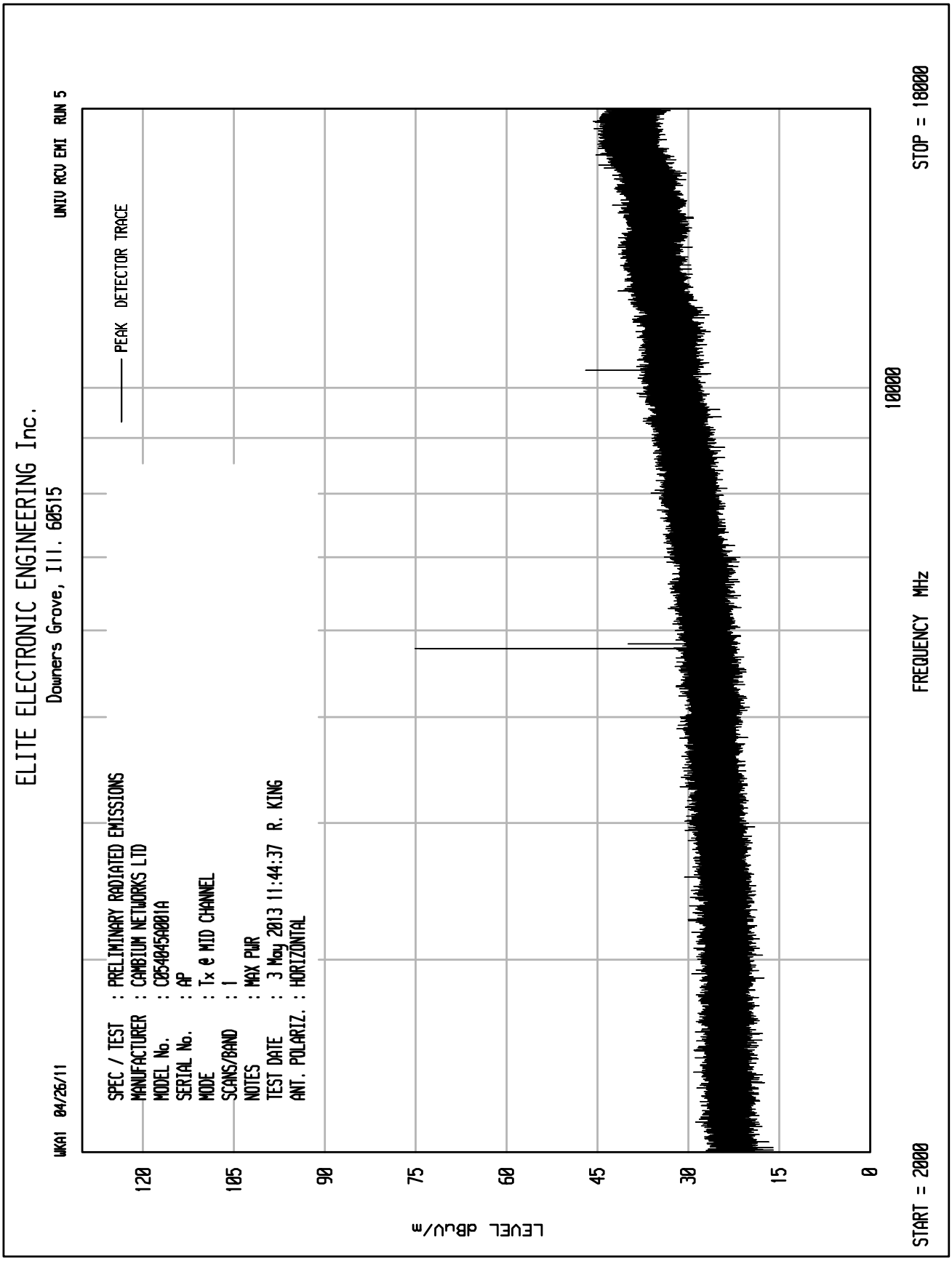

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 3
WKA1 04/26/11
SPEC / TEST : FCC 15C PRELIM RADIATED EMISSIONS
MANUFACTURER : CAMBIUM NETWORKS LTD
MODEL No. : C054045A001A
SERIAL No. : AP
MODE : Tx @ LOW CHANNEL
SCANS/BAND : 1
NOTES : MAX PWR
TEST DATE : 3 May 2013 15:28:32 R. KING
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

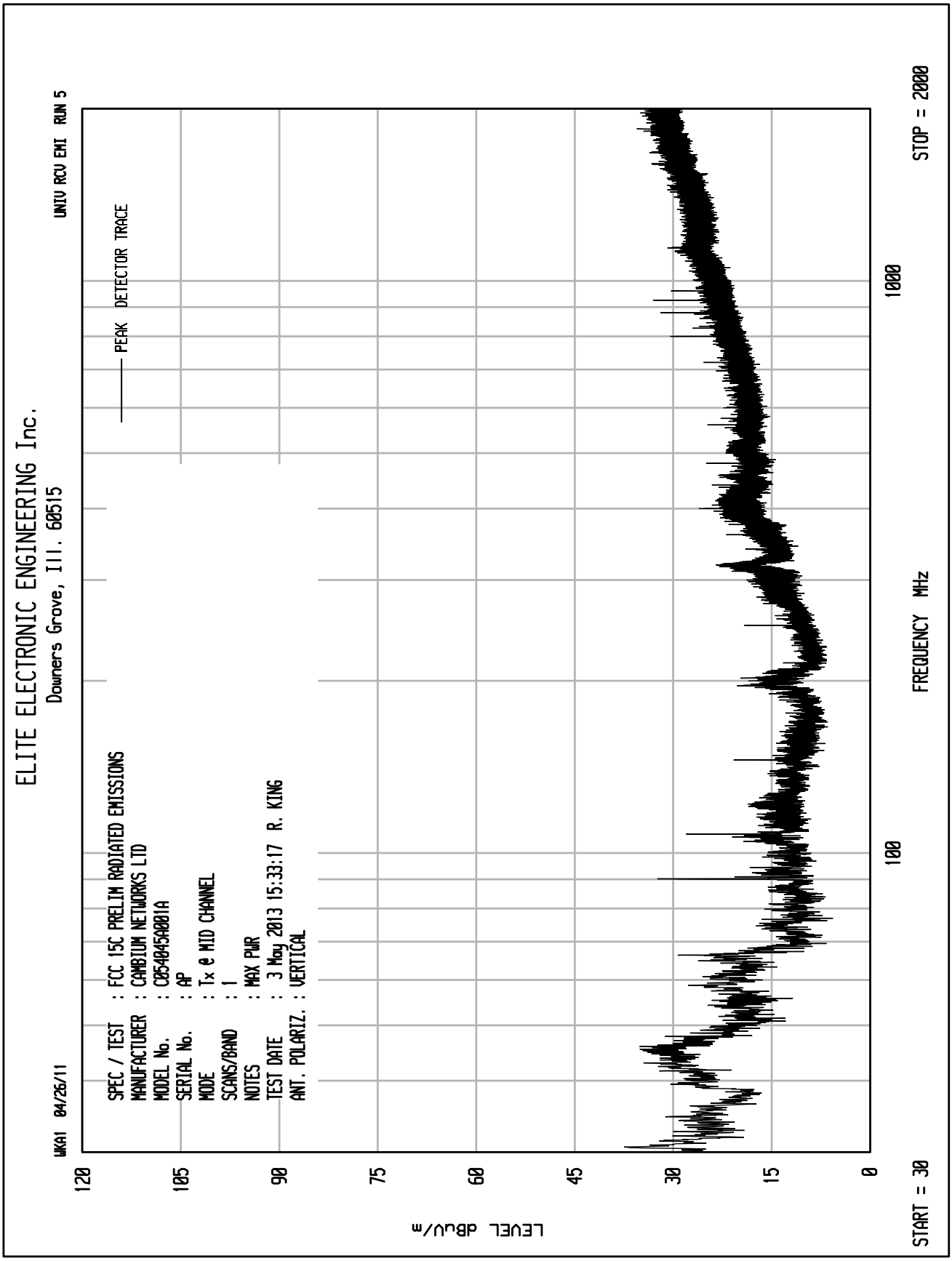

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 2
WKA1 04/26/11
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : CAMBIUM NETWORKS LTD
MODEL No. : C054045A001A
SERIAL No. : AP
MODE : Tx @ LOW CHANNEL
SCANS/BAND : 1
NOTES : MAX PWR
TEST DATE : 3 May 2013 11:29:44 R. KING
ANT. POLARIZ. : HORIZONTAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 2000
10000
FREQUENCY MHz
STOP = 18000

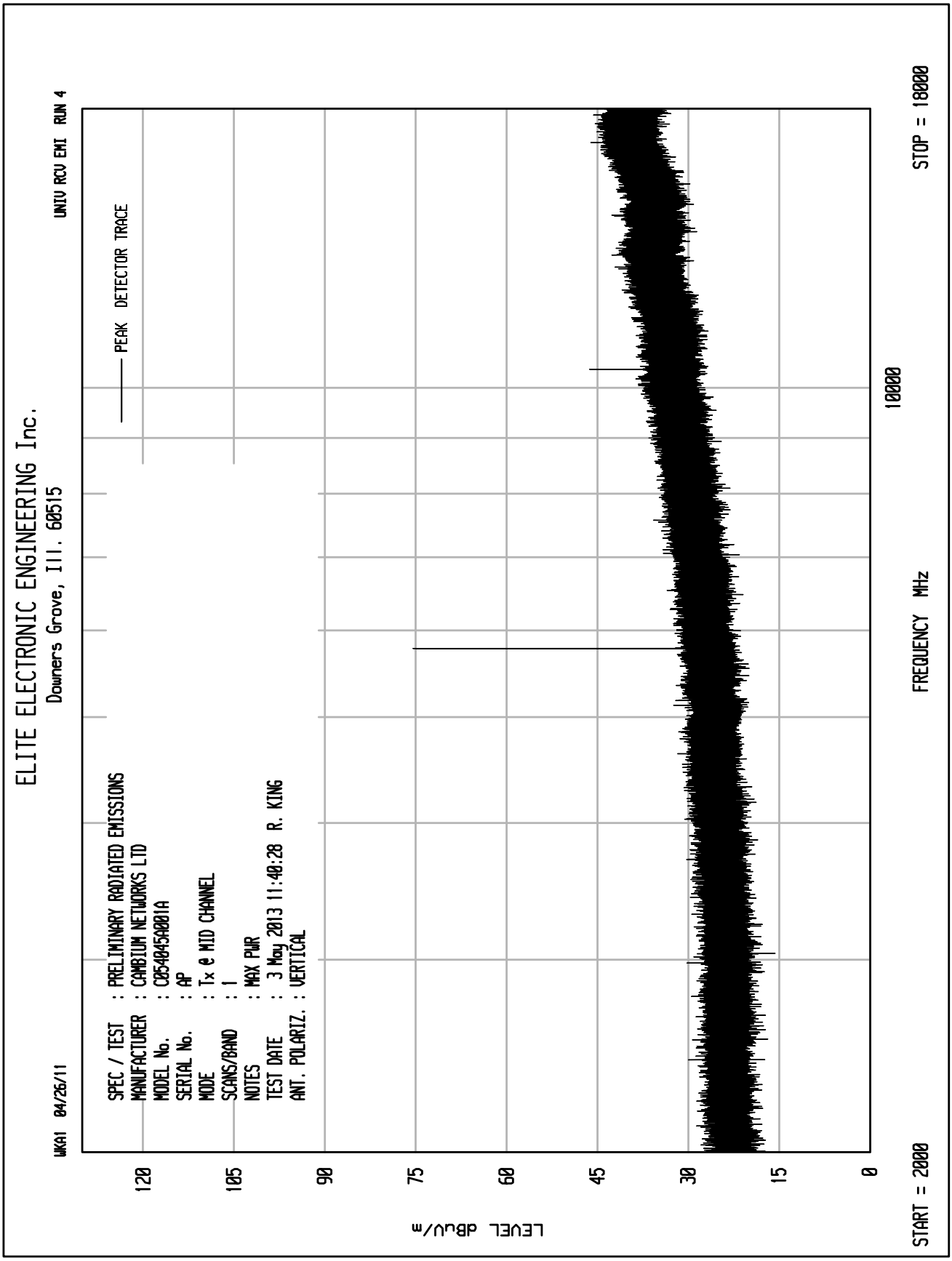

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 2
WKA1 04/26/11
SPEC / TEST : FCC 15C PRELIM RADIATED EMISSIONS
MANUFACTURER : CAMBIUM NETWORKS LTD
MODEL No. : C054045A001A
SERIAL No. : AP
MODE : Tx @ LOW CHANNEL
SCANS/BAND : 1
NOTES : MAX PWR
TEST DATE : 3 May 2013 15:26:45 R. KING
ANT. POLARIZ. : VERTICAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 30
100
1000
STOP = 2000
FREQUENCY MHz

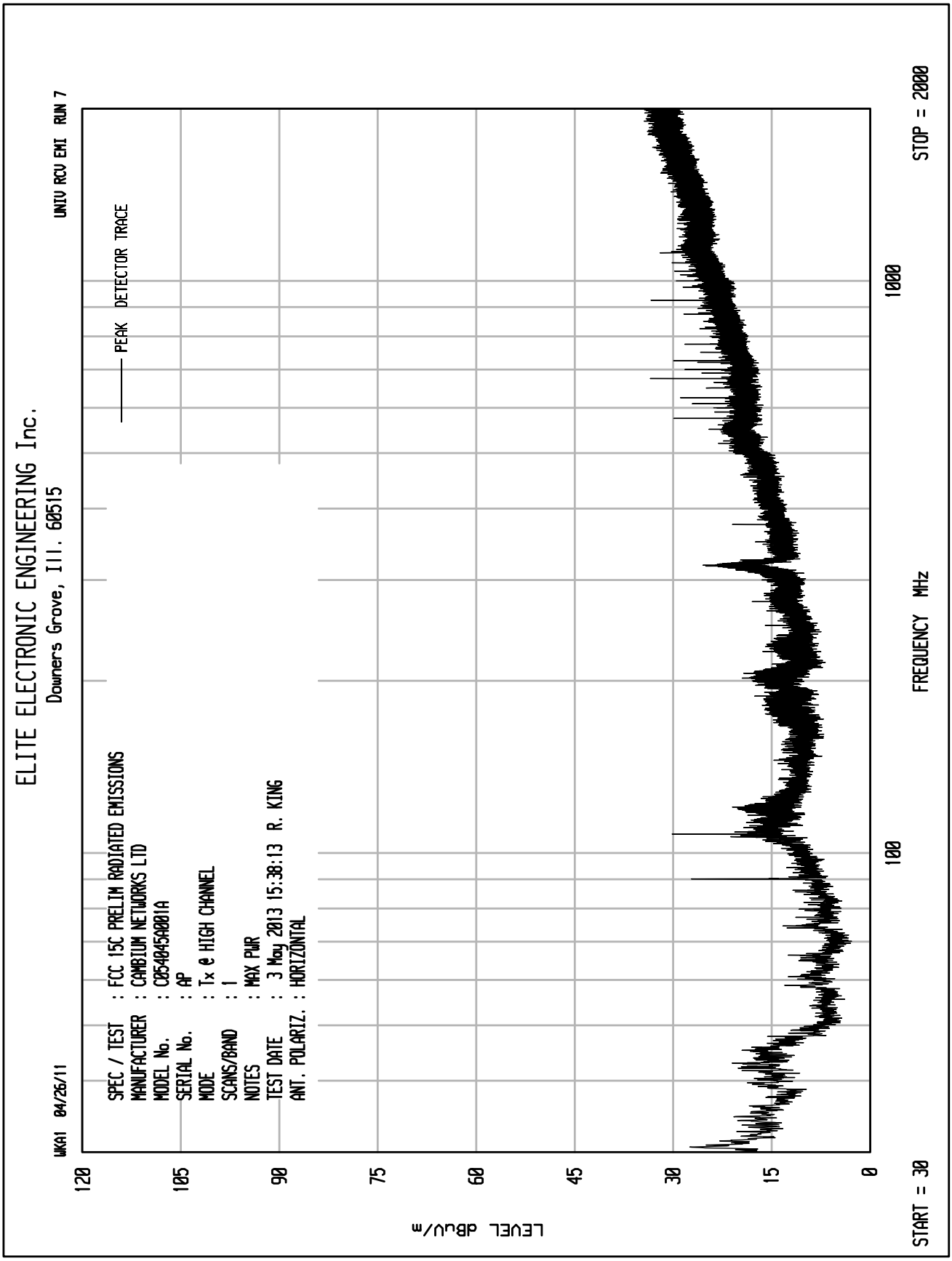

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 3
WKA1 04/26/11
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : CAMBIUM NETWORKS LTD
MODEL No. : C054045A001A
SERIAL No. : AP
MODE : Tx @ LOW CHANNEL
SCANS/BAND : 1
NOTES : MAX PWR
TEST DATE : 3 May 2013 11:34:31 R. KING
ANT. POLARIZ. : VERTICAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 2000
10000
STOP = 18000
FREQUENCY MHz

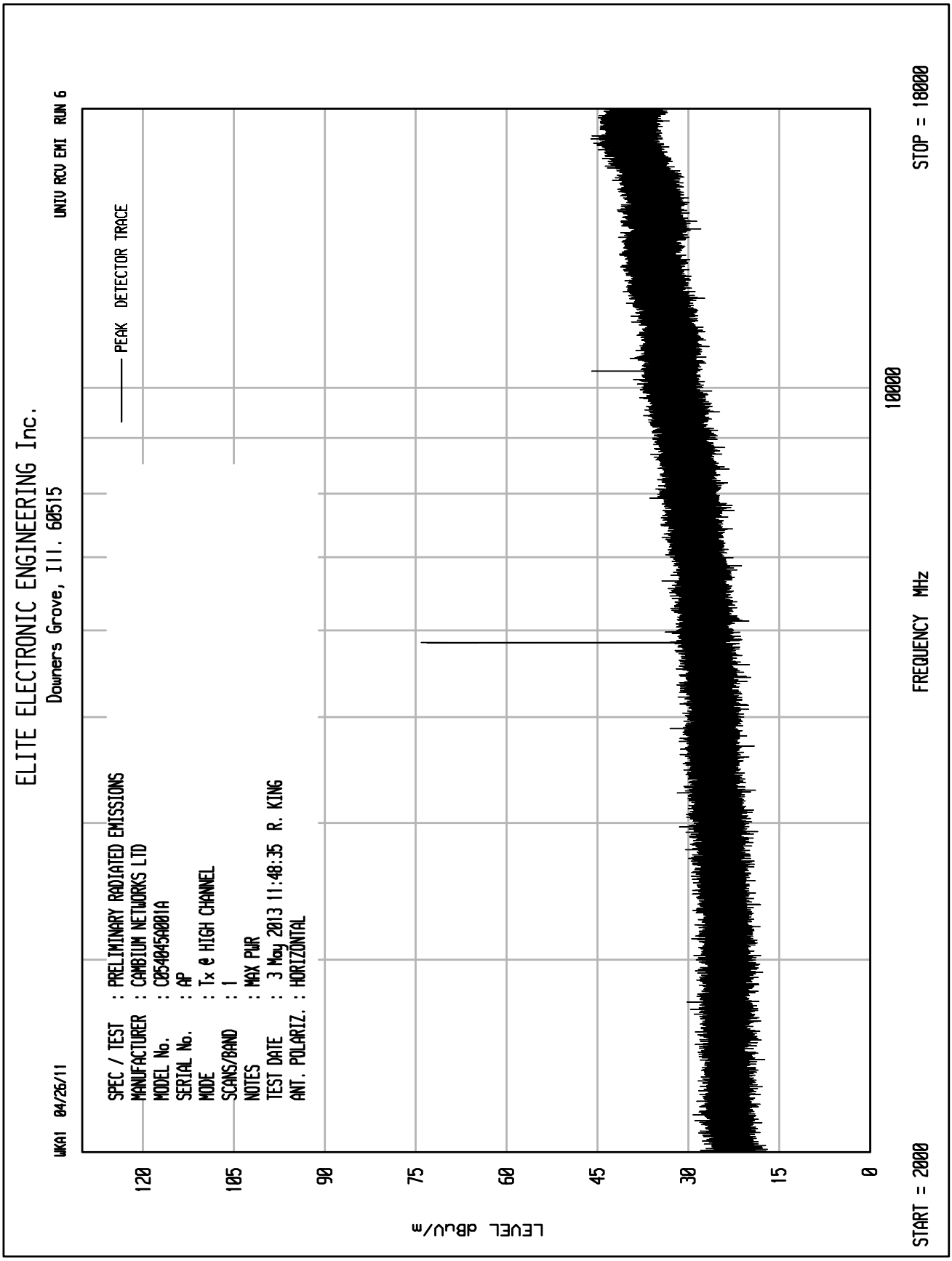

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 4
WKA1 04/26/11
SPEC / TEST : FCC 15C PRELIM RADIATED EMISSIONS
MANUFACTURER : CAMBIUM NETWORKS LTD
MODEL No. : C054045A001A
SERIAL No. : AP
MODE : Tx @ MID CHANNEL
SCANS/BAND : 1
NOTES : MAX PWR
TEST DATE : 3 May 2013 15:31:10 R. KING
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

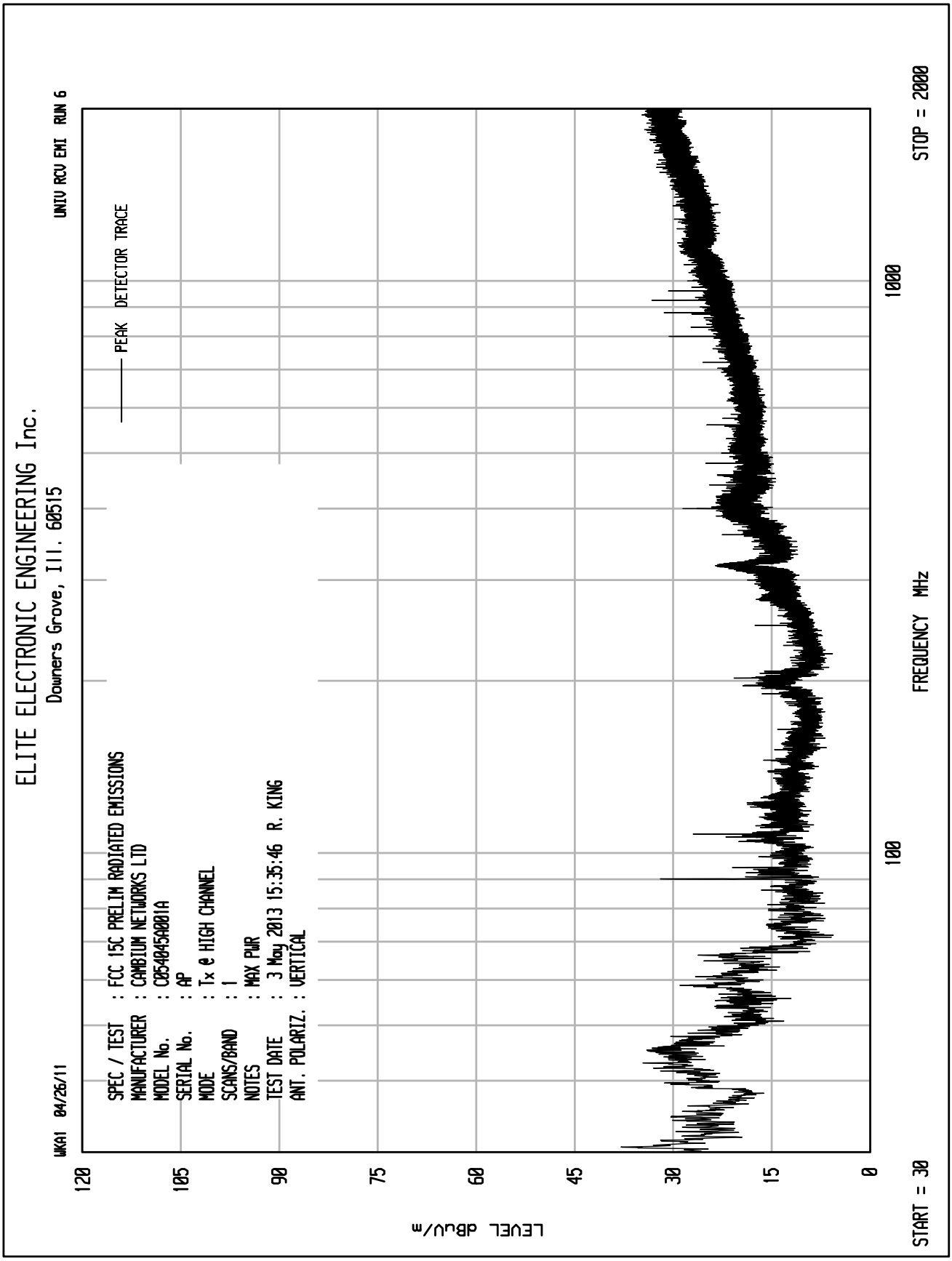

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 5
WKA1 04/26/11
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : CAMBIUM NETWORKS LTD
MODEL No. : C054045A001A
SERIAL No. : AP
MODE : Tx @ MID CHANNEL
SCANS/BAND : 1
NOTES : MAX PWR
TEST DATE : 3 May 2013 11:44:37 R. KING
ANT. POLARIZ. : HORIZONTAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 2000
10000
STOP = 18000
FREQUENCY MHz

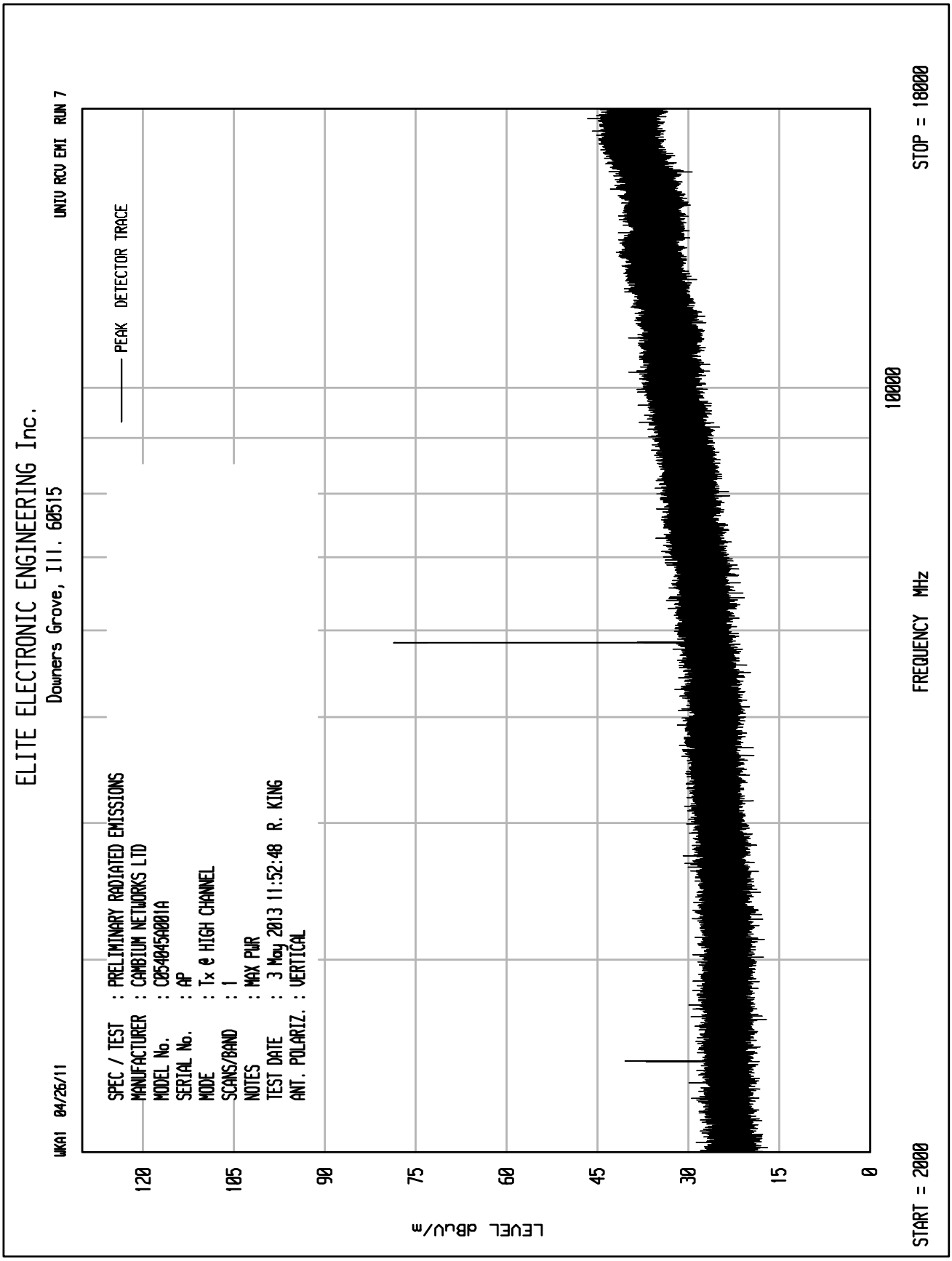

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 5
WKA1 04/26/11
SPEC / TEST : FCC 15C PRELIM RADIATED EMISSIONS
MANUFACTURER : CAMBIUM NETWORKS LTD
MODEL No. : C054045A001A
SERIAL No. : AP
MODE : Tx @ MID CHANNEL
SCANS/BAND : 1
NOTES : MAX PWR
TEST DATE : 3 May 2013 15:33:17 R. KING
ANT. POLARIZ. : VERTICAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 30
100
1000
STOP = 2000
FREQUENCY MHz

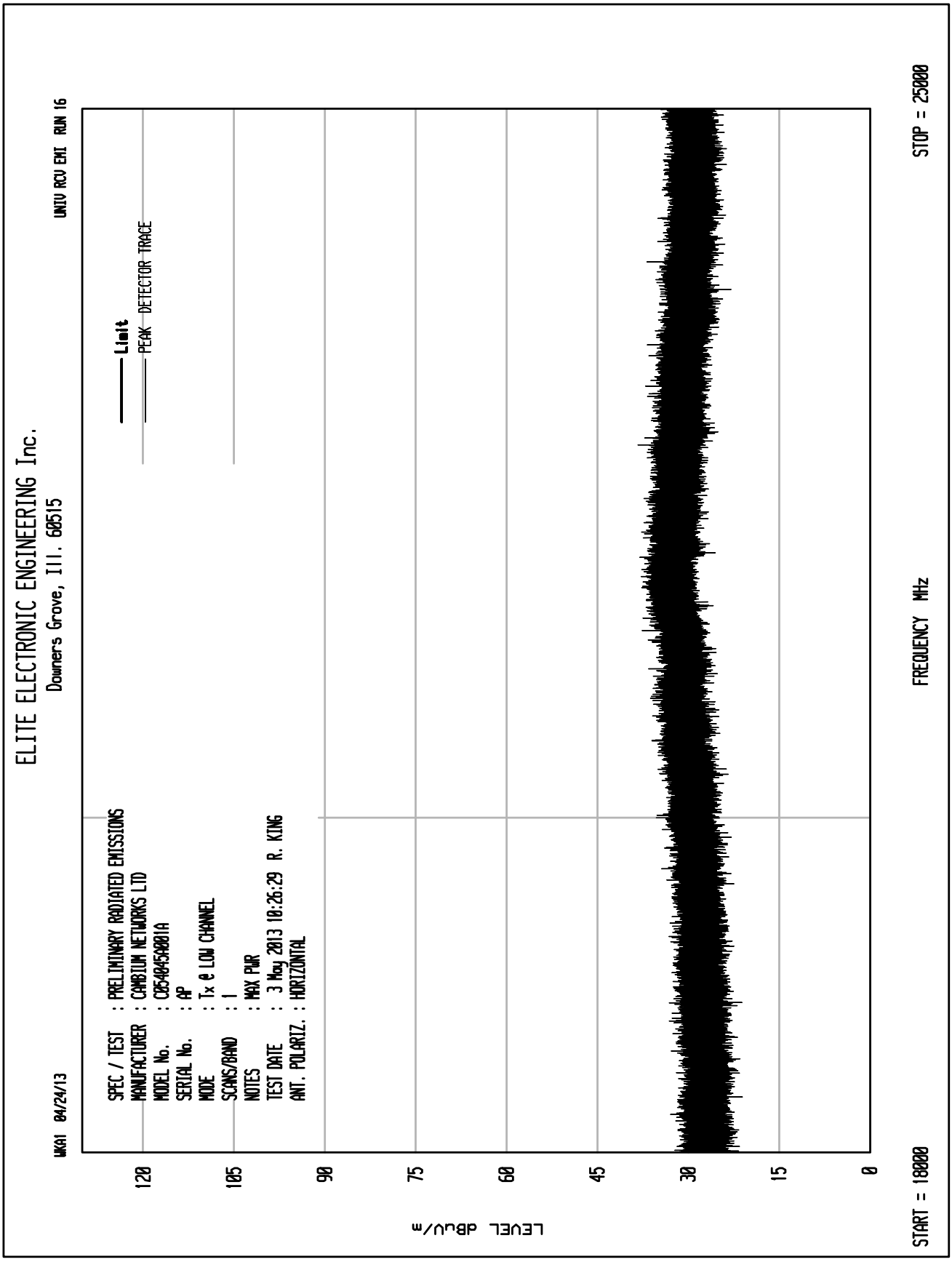

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 4
WKA1 04/26/11
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : CAMBIUM NETWORKS LTD
MODEL No. : C054045A001A
SERIAL No. : AP
MODE : Tx @ MID CHANNEL
SCANS/BAND : 1
NOTES : MAX PWR
TEST DATE : 3 May 2013 11:40:28 R. KING
ANT. POLARIZ. : VERTICAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 2000
10000
FREQUENCY MHz
STOP = 18000

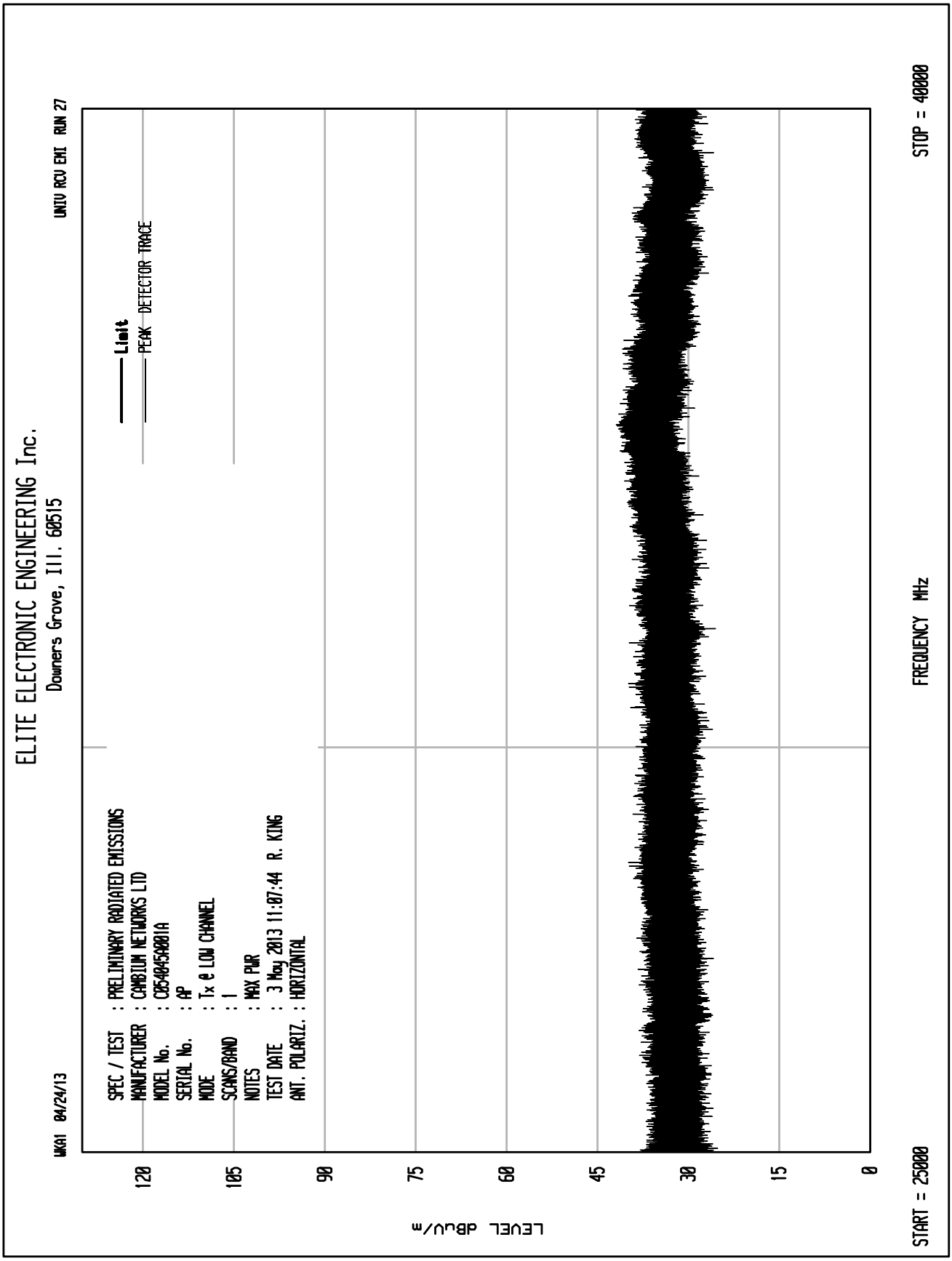

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 7
WKA1 04/26/11
SPEC / TEST : FCC 15C PRELIM RADIATED EMISSIONS
MANUFACTURER : CAMBIUM NETWORKS LTD
MODEL No. : C054045A001A
SERIAL No. : AP
MODE : Tx @ HIGH CHANNEL
SCANS/BAND : 1
NOTES : MAX PWR
TEST DATE : 3 May 2013 15:38:13 R. KING
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

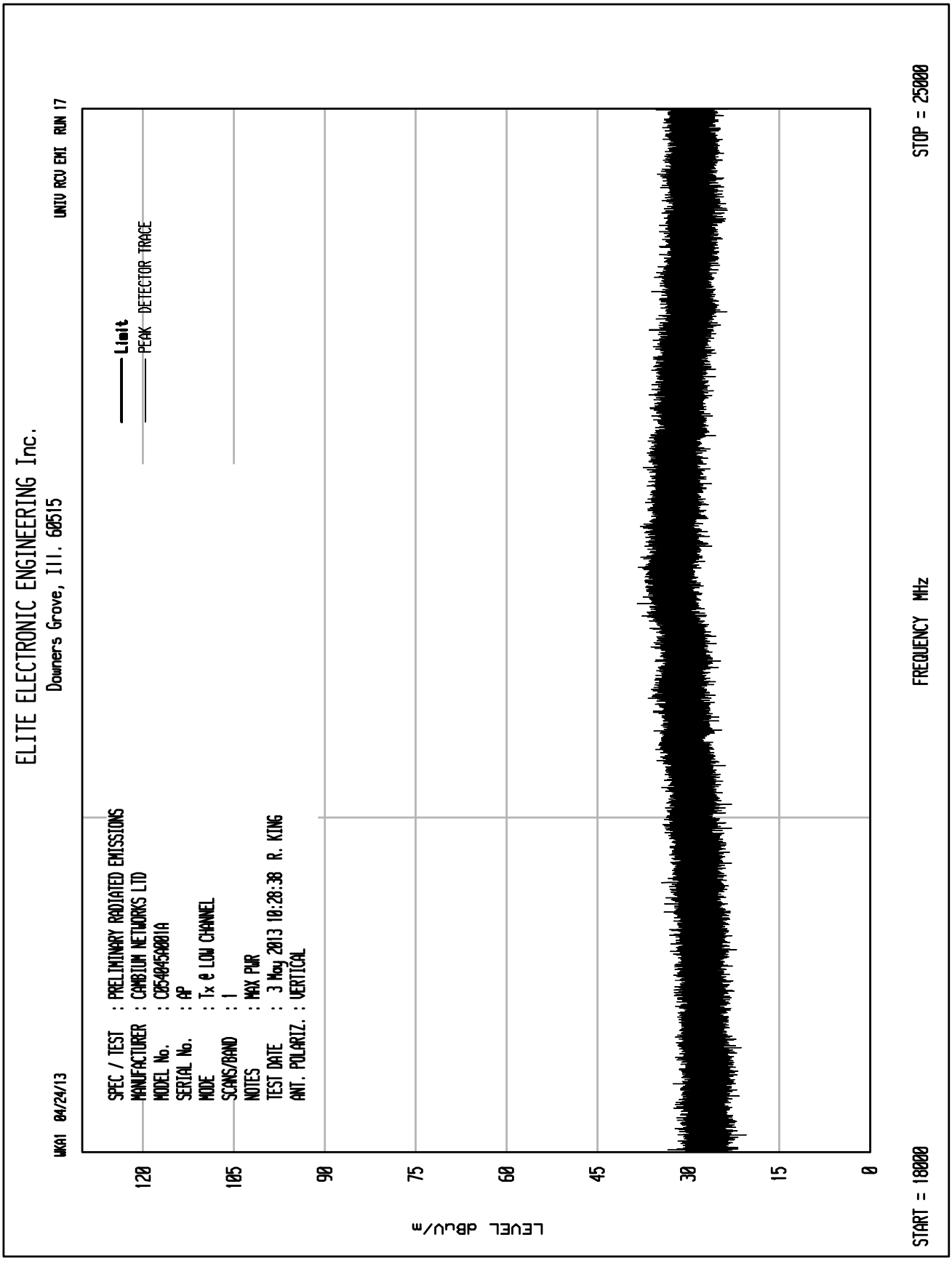

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 6
WKA1 04/26/11
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : CAMBIUM NETWORKS LTD
MODEL No. : C054045A001A
SERIAL No. : AP
MODE : Tx @ HIGH CHANNEL
SCANS/BAND : 1
NOTES : MAX PWR
TEST DATE : 3 May 2013 11:48:35 R. KING
ANT. POLARIZ. : HORIZONTAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 2000
10000
FREQUENCY MHz
STOP = 18000

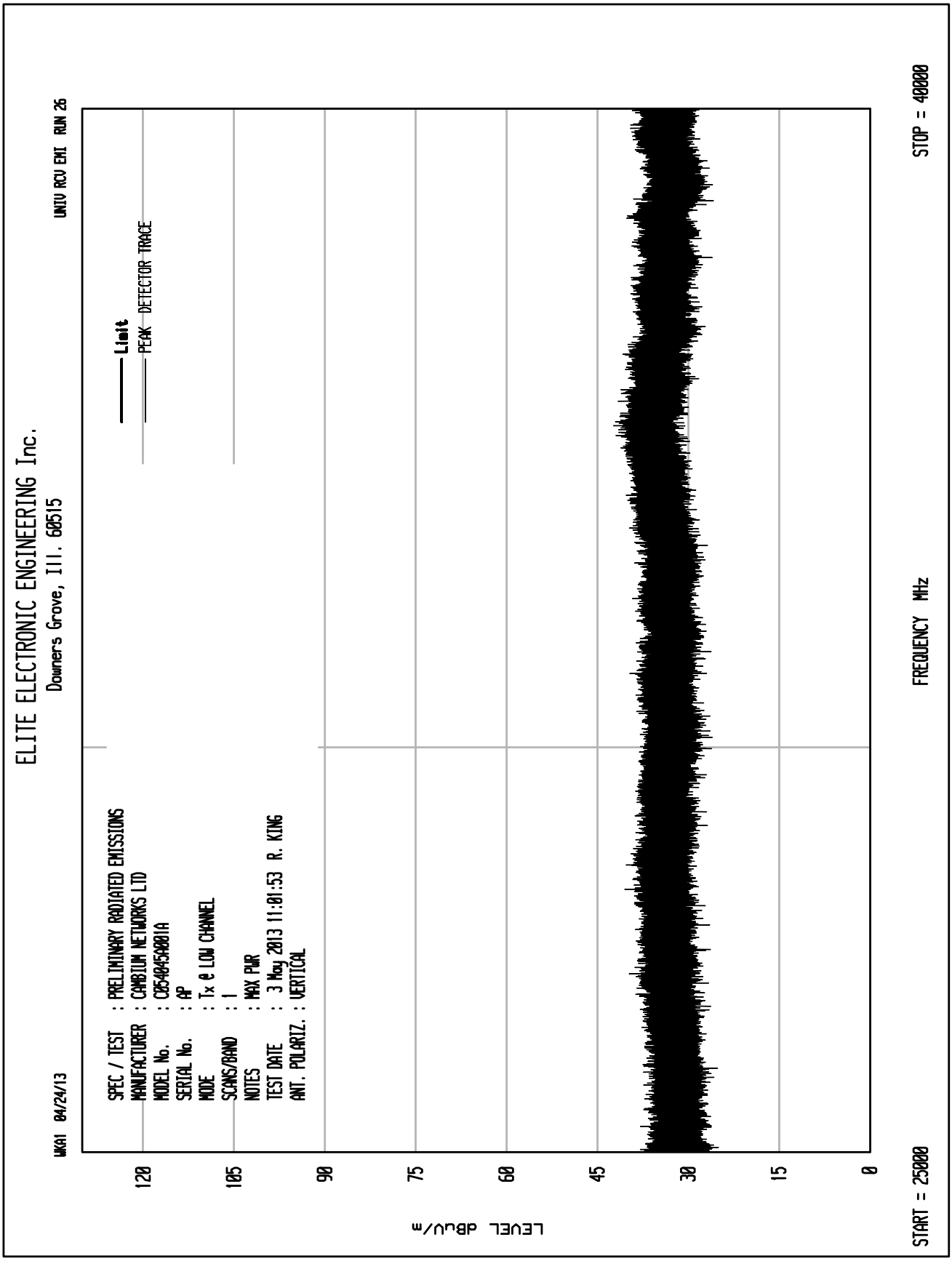

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 6
WKA1 04/26/11
SPEC / TEST : FCC 15C PRELIM RADIATED EMISSIONS
MANUFACTURER : CAMBIUM NETWORKS LTD
MODEL No. : C054045A001A
SERIAL No. : AP
MODE : Tx @ HIGH CHANNEL
SCANS/BAND : 1
NOTES : MAX PWR
TEST DATE : 3 May 2013 15:35:46 R. KING
ANT. POLARIZ. : VERTICAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 30
100
1000
STOP = 2000
FREQUENCY MHz

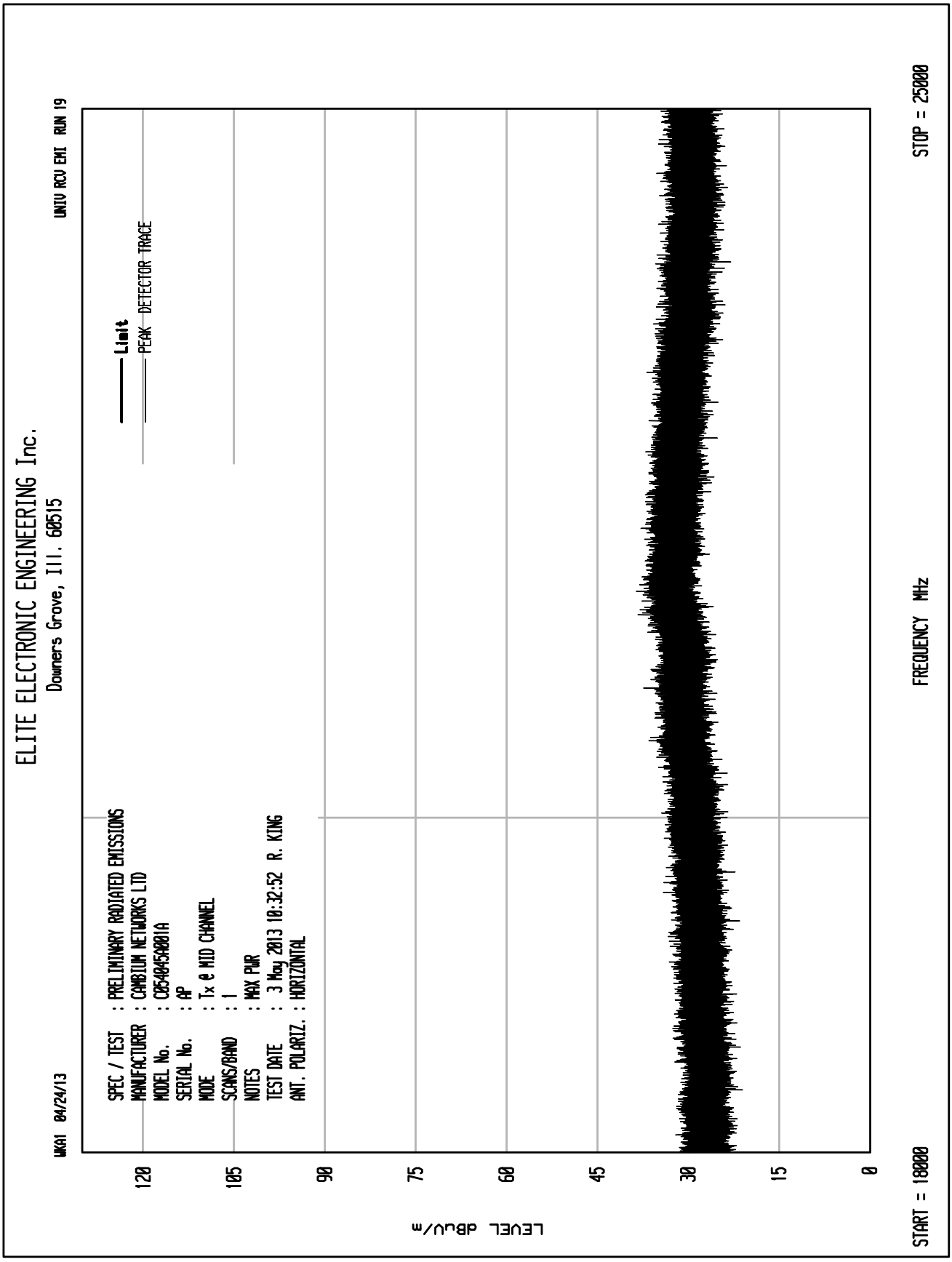

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 7
WKA1 04/26/11
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : CAMBIUM NETWORKS LTD
MODEL No. : C054045A001A
SERIAL No. : AP
MODE : Tx @ HIGH CHANNEL
SCANS/BAND : 1
NOTES : MAX PWR
TEST DATE : 3 May 2013 11:52:48 R. KING
ANT. POLARIZ. : VERTICAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 2000
10000
FREQUENCY MHz
STOP = 18000

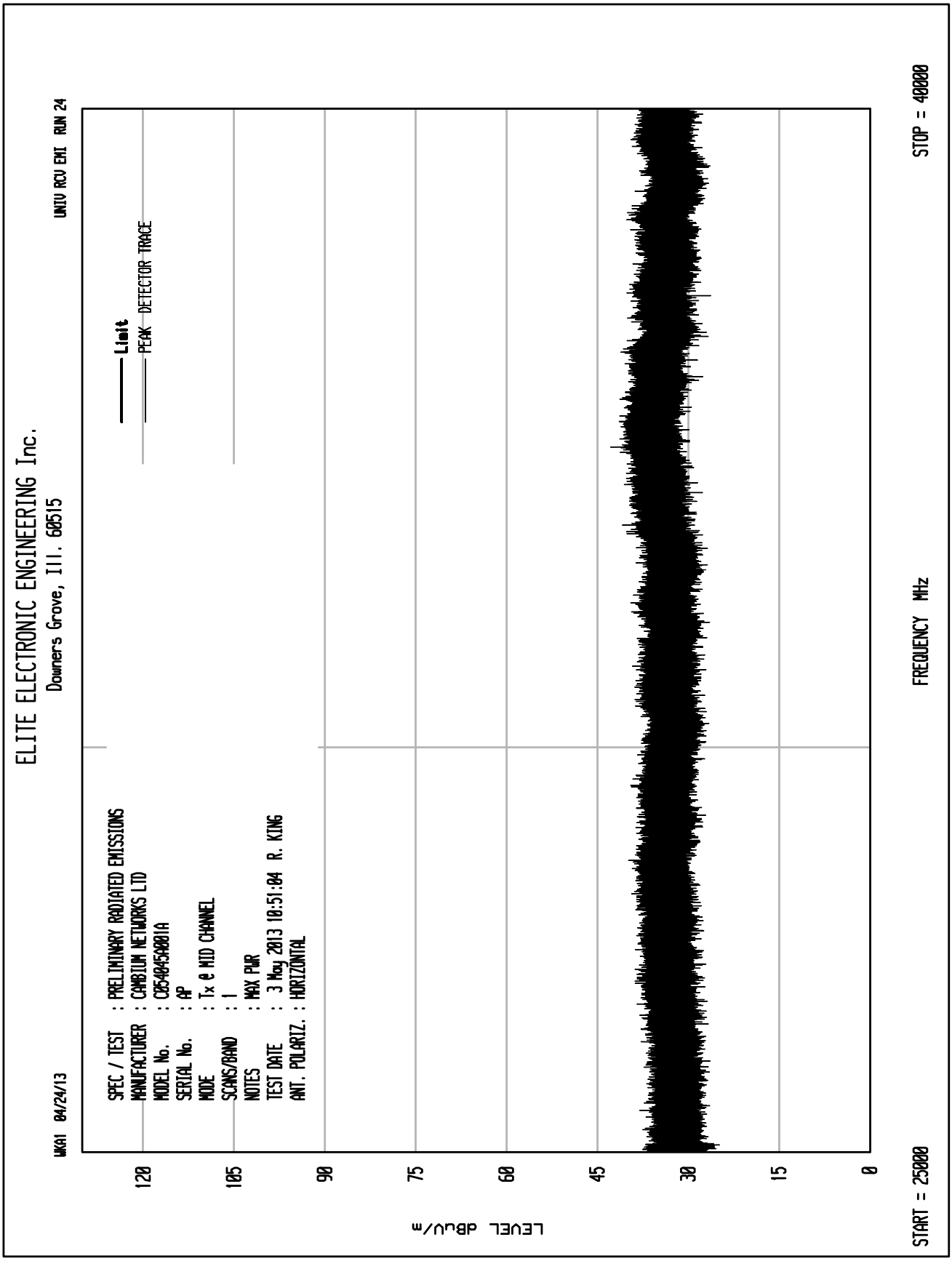

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 16
WKA1 04/24/13
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : CAMBIUM NETWORKS LTD
MODEL No. : C054045A001A
SERIAL No. : AP
MODE : Tx @ LOW CHANNEL
SCANS/BAND : 1
NOTES : MAX PWR
TEST DATE : 3 May 2013 10:26:29 R. KING
ANT. POLARIZ. : HORIZONTAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 18000
FREQUENCY MHz
STOP = 25000

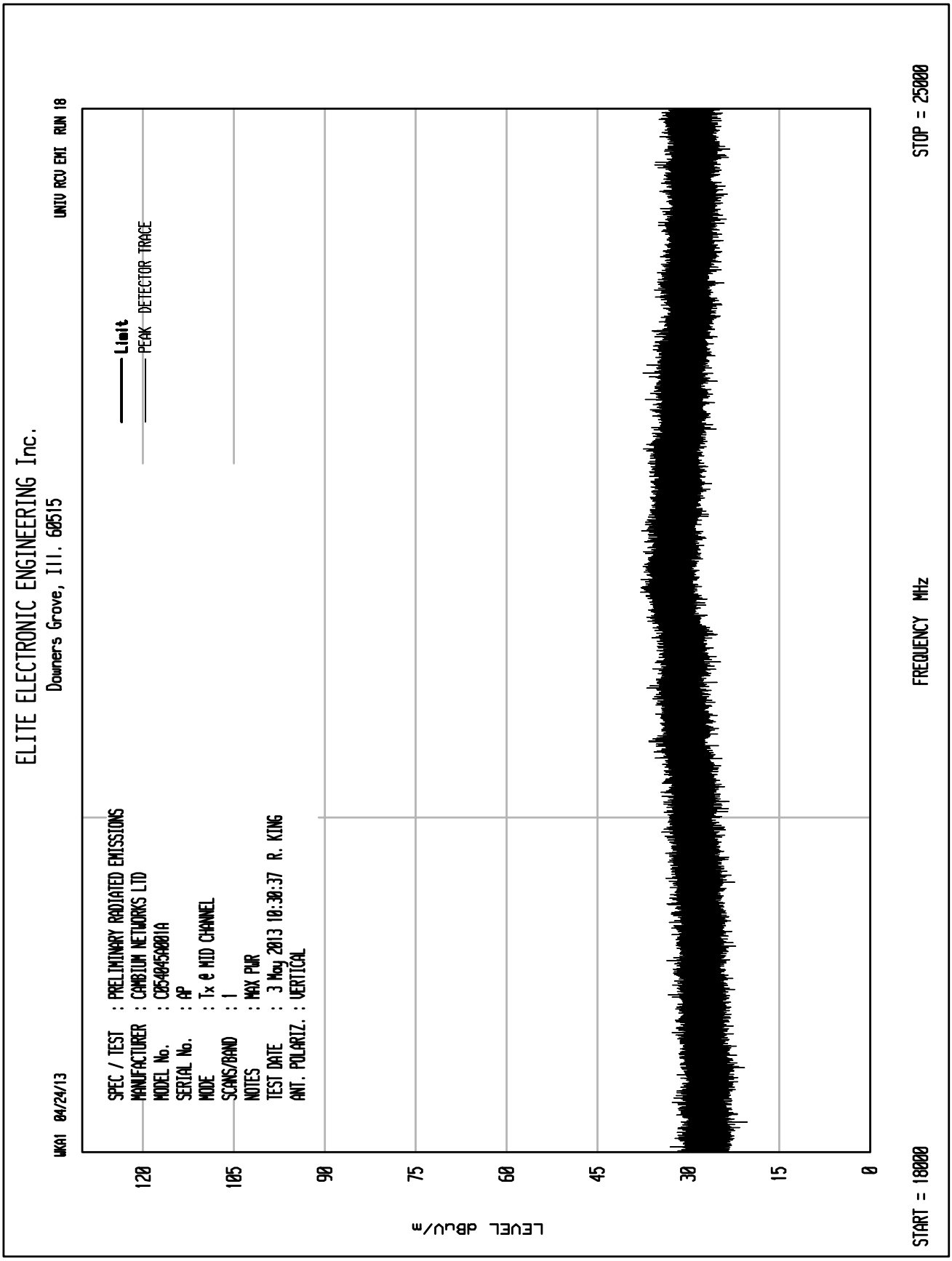

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 27
WKA1 04/24/13
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : CAMBIUM NETWORKS LTD
MODEL No. : C054045A001A
SERIAL No. : AP
MODE : Tx @ LOW CHANNEL
SCANS/BAND : 1
NOTES : MAX PWR
TEST DATE : 3 May 2013 11:07:44 R. KING
ANT. POLARIZ. : HORIZONTAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 25000
FREQUENCY MHz
STOP = 40000

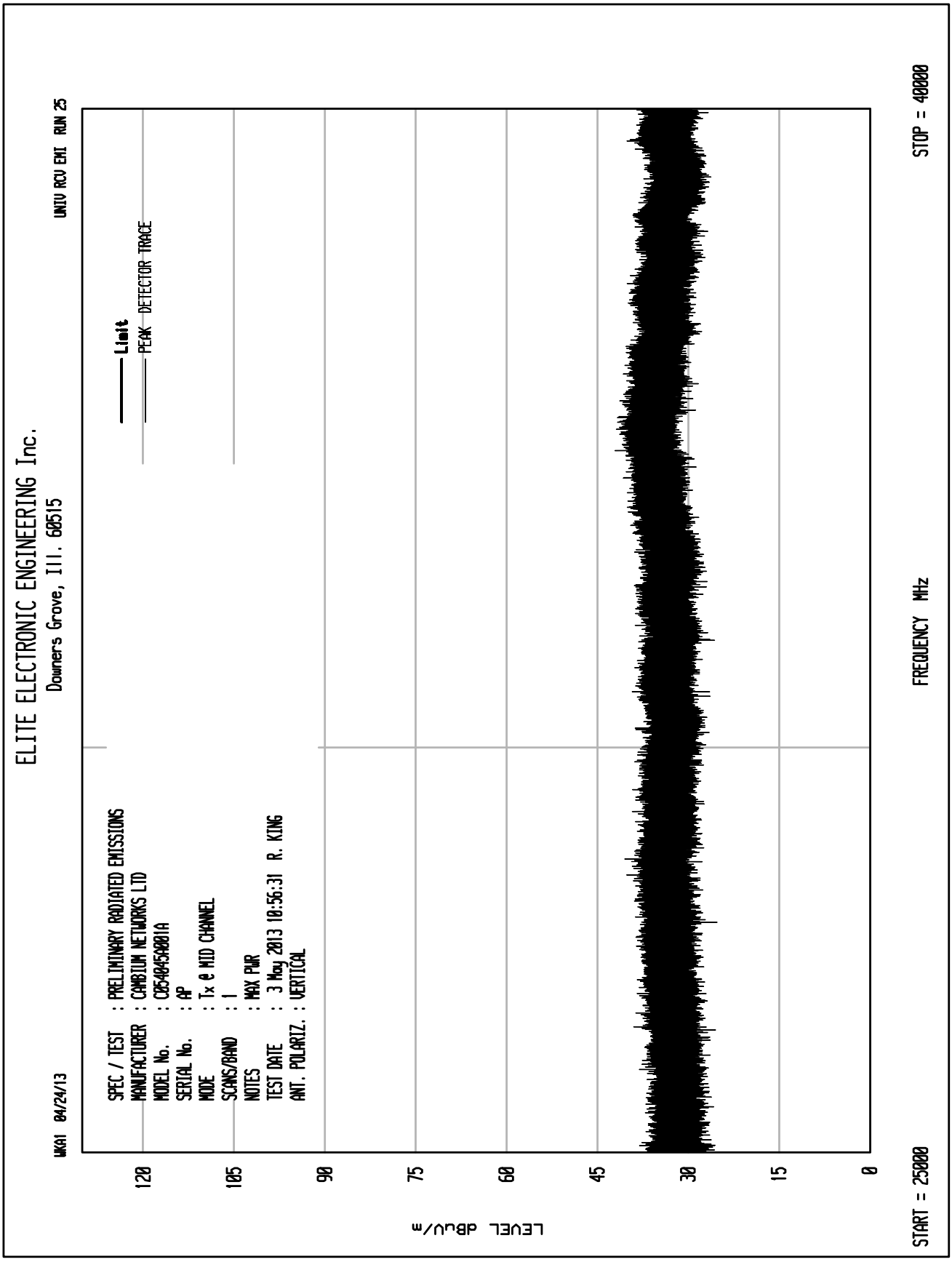

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 17
WKA1 04/24/13
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : CAMBIUM NETWORKS LTD
MODEL No. : C054045A001A
SERIAL No. : AP
MODE : Tx @ LOW CHANNEL
SCANS/BAND : 1
NOTES : MAX PWR
TEST DATE : 3 May 2013 10:28:38 R. KING
ANT. POLARIZ. : VERTICAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 18000
FREQUENCY MHz
STOP = 25000

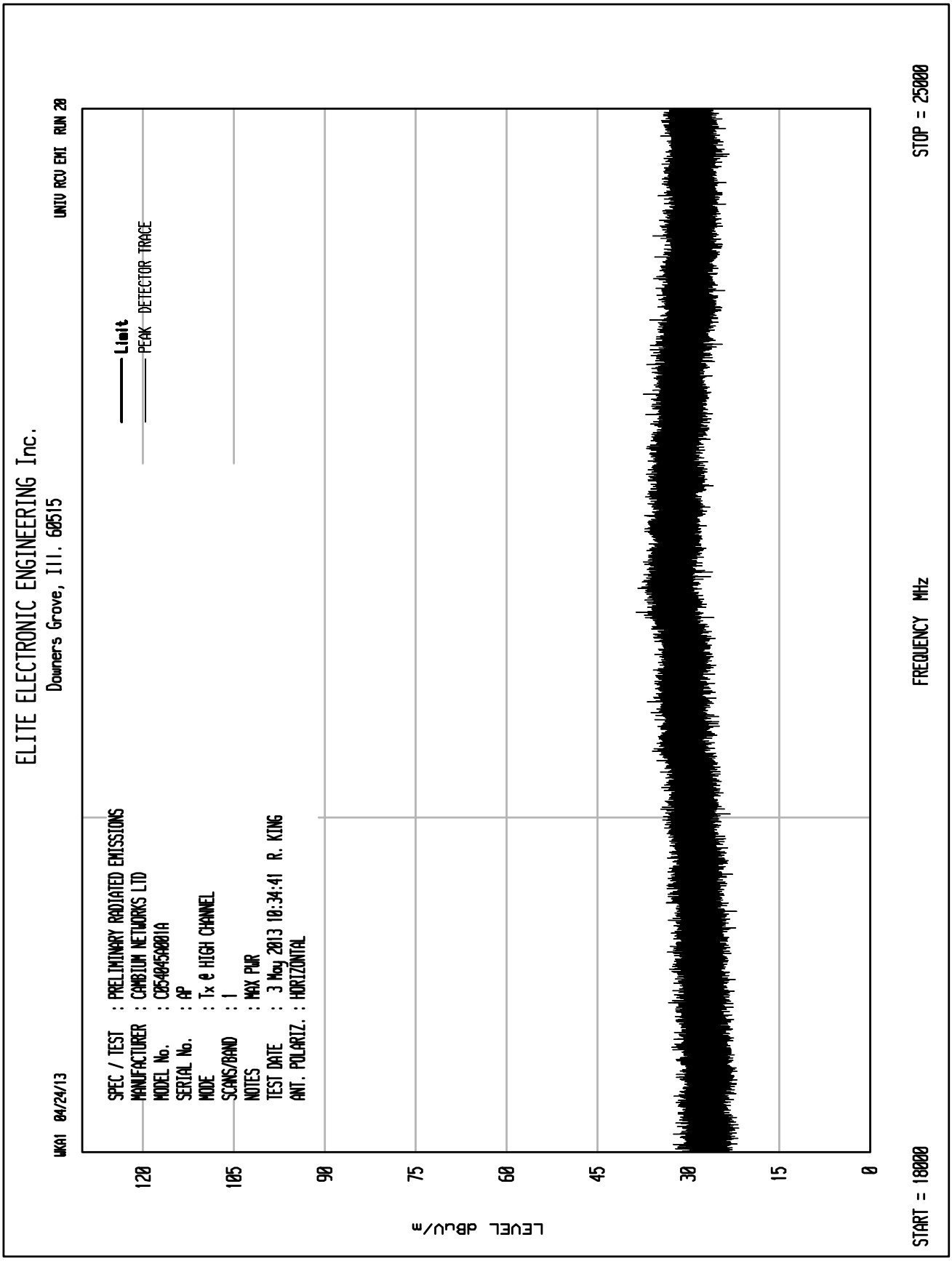

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 26
WKA1 04/24/13
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : CAMBIUM NETWORKS LTD
MODEL No. : C054045A001A
SERIAL No. : AP
MODE : Tx @ LOW CHANNEL
SCANS/BAND : 1
NOTES : MAX PWR
TEST DATE : 3 May 2013 11:01:53 R. KING
ANT. POLARIZ. : VERTICAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 25000
FREQUENCY MHz
STOP = 40000

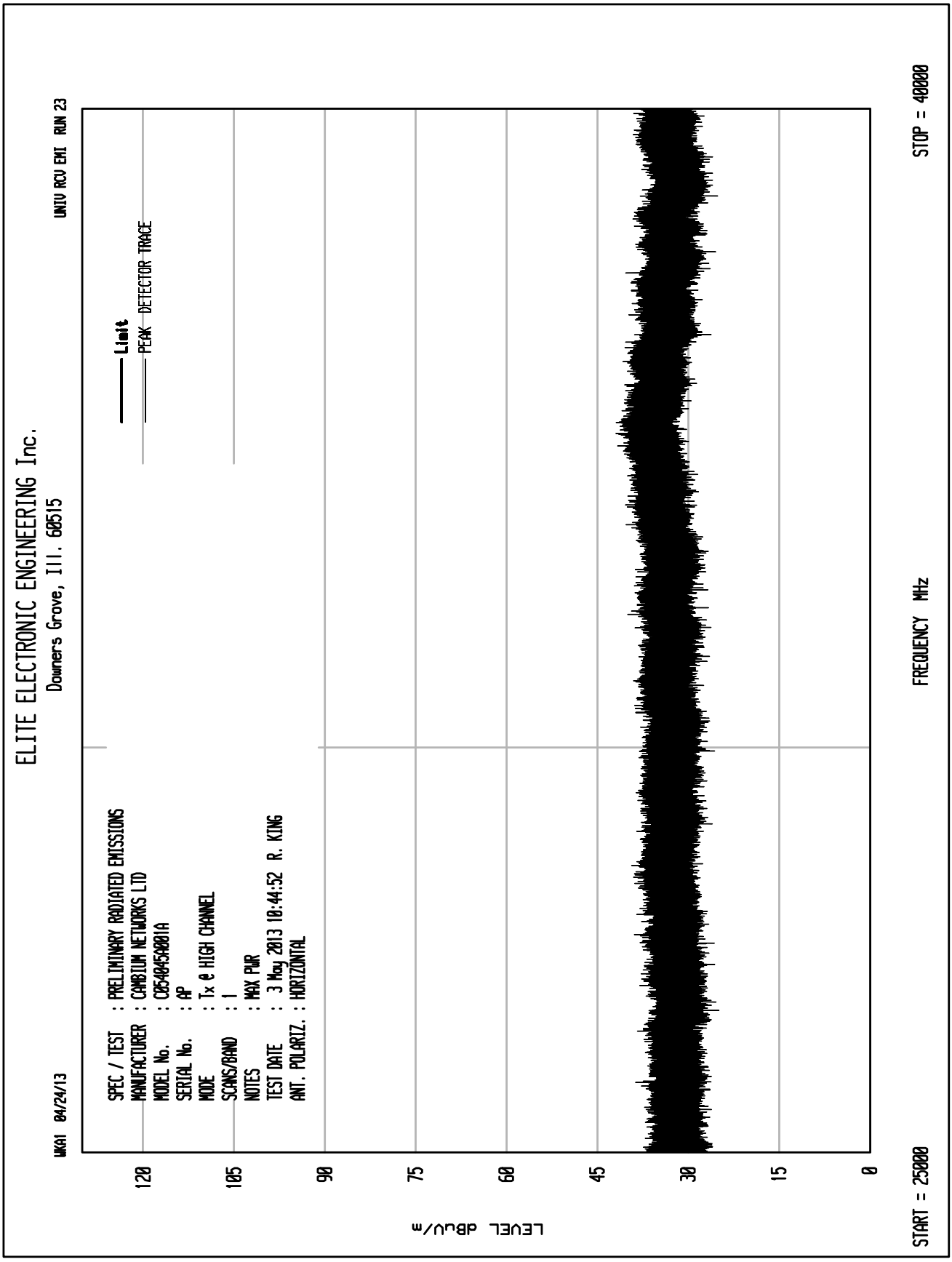

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 19
WKA1 04/24/13
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : CAMBIUM NETWORKS LTD
MODEL No. : C054045A001A
SERIAL No. : AP
MODE : Tx @ MID CHANNEL
SCANS/BAND : 1
NOTES : MAX PWR
TEST DATE : 3 May 2013 10:32:52 R. KING
ANT. POLARIZ. : HORIZONTAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 18000
FREQUENCY MHz
STOP = 25000

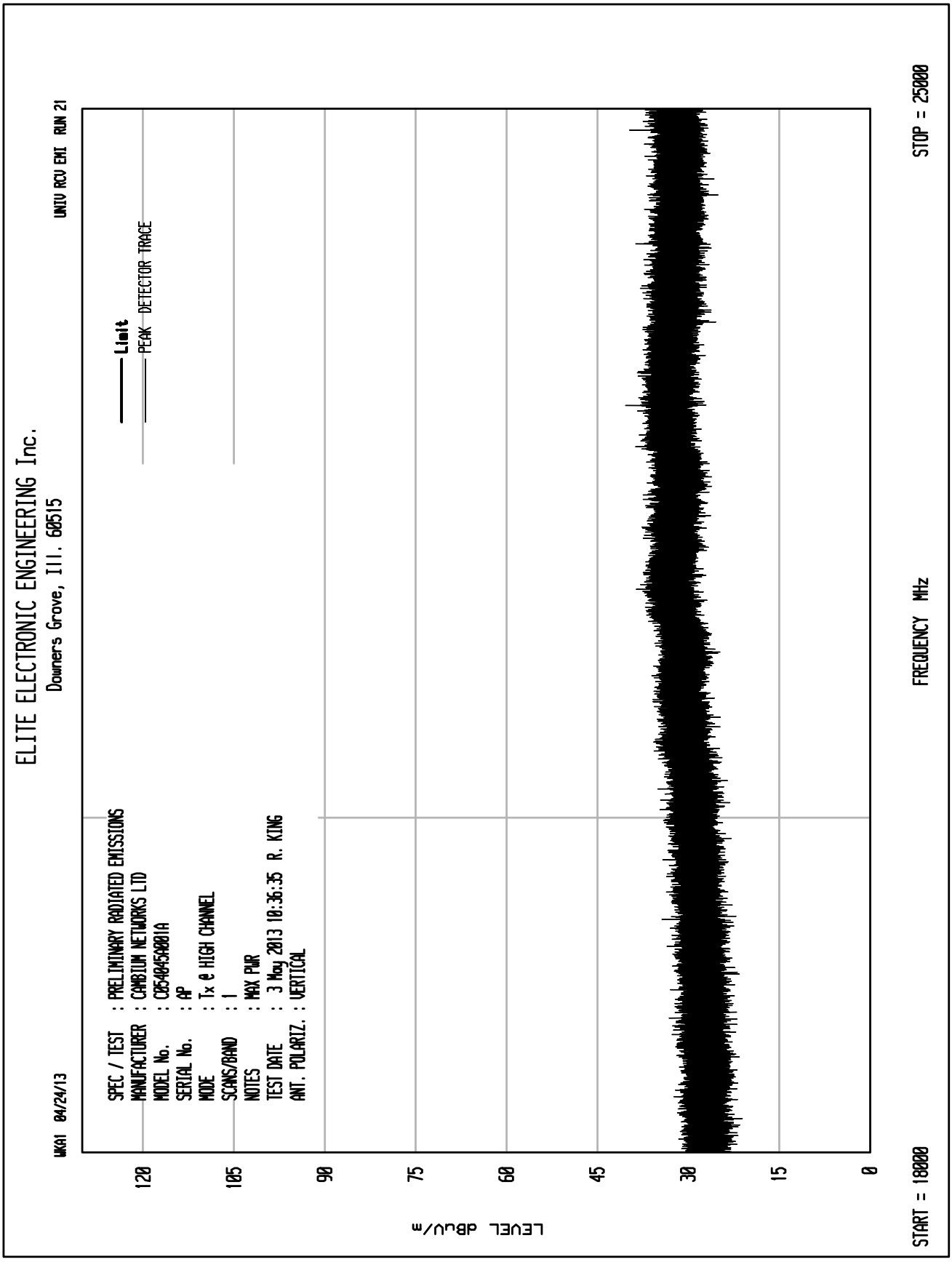

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 24
WKA1 04/24/13
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : CAMBIUM NETWORKS LTD
MODEL No. : C054045A001A
SERIAL No. : AP
MODE : Tx @ MID CHANNEL
SCANS/BAND : 1
NOTES : MAX PWR
TEST DATE : 3 May 2013 10:51:04 R. KING
ANT. POLARIZ. : HORIZONTAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 25000
FREQUENCY MHz
STOP = 40000

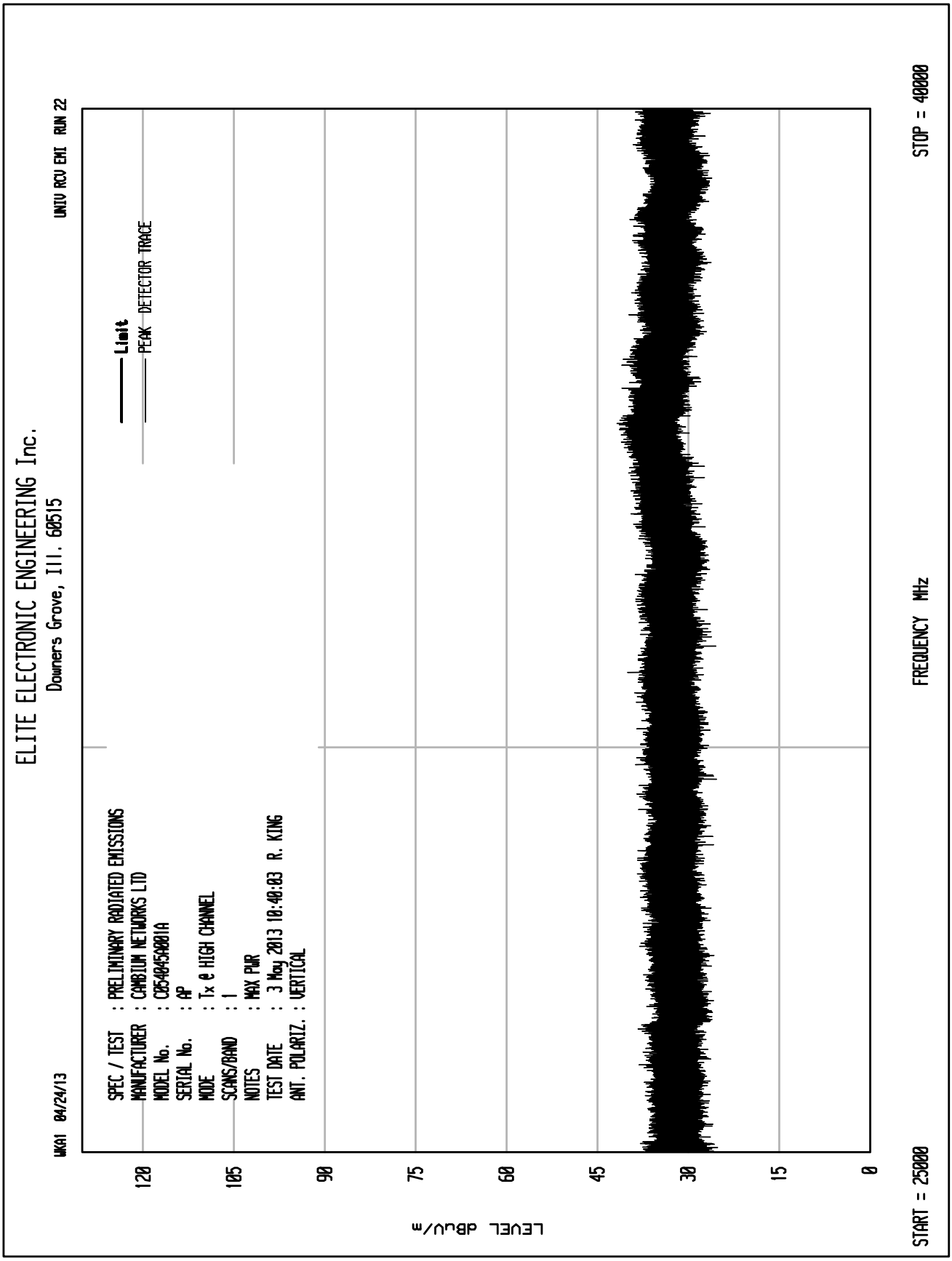

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 18
WKA1 04/24/13
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : CAMBIUM NETWORKS LTD
MODEL No. : C054045A001A
SERIAL No. : AP
MODE : Tx @ MID CHANNEL
SCANS/BAND : 1
NOTES : MAX PWR
TEST DATE : 3 May 2013 10:30:37 R. KING
ANT. POLARIZ. : VERTICAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 18000
FREQUENCY MHz
STOP = 25000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 25
WKA1 04/24/13
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : CAMBIUM NETWORKS LTD
MODEL No. : C054045A001A
SERIAL No. : AP
MODE : Tx @ MID CHANNEL
SCANS/BAND : 1
NOTES : MAX PWR
TEST DATE : 3 May 2013 10:56:31 R. KING
ANT. POLARIZ. : VERTICAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 25000
FREQUENCY MHz
STOP = 40000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 20
WKA1 04/24/13
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : CAMBIUM NETWORKS LTD
MODEL No. : C054045A001A
SERIAL No. : AP
MODE : Tx @ HIGH CHANNEL
SCANS/BAND : 1
NOTES : MAX PWR
TEST DATE : 3 May 2013 10:34:41 R. KING
ANT. POLARIZ. : HORIZONTAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 18000
FREQUENCY MHz
STOP = 25000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 23
WKA1 04/24/13
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : CAMBIUM NETWORKS LTD
MODEL No. : C054045A001A
SERIAL No. : AP
MODE : Tx @ HIGH CHANNEL
SCANS/BAND : 1
NOTES : MAX PWR
TEST DATE : 3 May 2013 10:44:52 R. KING
ANT. POLARIZ. : HORIZONTAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 25000
FREQUENCY MHz
STOP = 40000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 21
WKA1 04/24/13
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : CAMBIUM NETWORKS LTD
MODEL No. : C054045A001A
SERIAL No. : AP
MODE : Tx @ HIGH CHANNEL
SCANS/BAND : 1
NOTES : MAX PWR
TEST DATE : 3 May 2013 10:36:35 R. KING
ANT. POLARIZ. : VERTICAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 18000
FREQUENCY MHz
STOP = 25000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 22
WKA1 04/24/13
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : CAMBIUM NETWORKS LTD
MODEL No. : C054045A001A
SERIAL No. : AP
MODE : Tx @ HIGH CHANNEL
SCANS/BAND : 1
NOTES : MAX PWR
TEST DATE : 3 May 2013 10:40:03 R. KING
ANT. POLARIZ. : VERTICAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 25000
FREQUENCY MHz
STOP = 40000

DATA SHEET

Manufacturer : Cambium Networks LTD.
Test Item : Access Point Digital Transmission
Model No. : C054045A001A
Test Specification : FCC Part 15, Subpart C, Section 15.247
: Case Spurious Emissions in Restricted Bands
Test Mode : Tx at 5727.5 MHz
Date : May 5, 2013
Notes :

Freq. MHz	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Duty Cycle (dB)	Average Total dBuV/m at 3m	Average Total uV/m at 3 m	Average Limit uV/m at 3 m	Margin (dB)
11455.00	H	31.8		7.7	38.8	-30.1	0.3	48.5	265.5	500.0	-5.5
11455.00	V	31.5		7.7	38.8	-30.1	0.3	48.2	256.5	500.0	-5.8
22910.00	H	36.5	*	2.3	40.6	-26.9	0.3	52.8	436.9	500.0	-1.2
22910.00	V	36.5	*	2.3	40.6	-26.9	0.3	52.8	436.9	500.0	-1.2

Checked BY Richard E. King :

Richard E. King

DATA SHEET

Manufacturer : Cambium Networks LTD.
Test Item : Access Point Digital Transmission
Model No. : C054045A001A
Test Specification : FCC Part 15, Subpart C, Section 15.247
: Case Spurious Emissions in Restricted Bands
Test Mode : Tx at 5775 MHz
Date : May 5, 2013
Notes :

Freq. MHz	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Duty Cycle (dB)	Average Total dBuV/m at 3m	Average Total uV/m at 3 m	Average Limit uV/m at 3 m	Margin (dB)
11550.00	H	35.2		7.8	38.9	-30.1	0.3	52.1	401.3	500.0	-1.9
11550.00	V	36.1		7.8	38.9	-30.1	0.3	53.0	445.1	500.0	-1.0
23100.00	H	36.4	*	2.3	40.6	-27.0	0.3	52.6	426.9	500.0	-1.4
23100.00	V	36.4	*	2.3	40.6	-27.0	0.3	52.6	426.9	500.0	-1.4

Checked BY Richard E. King :

Richard E. King

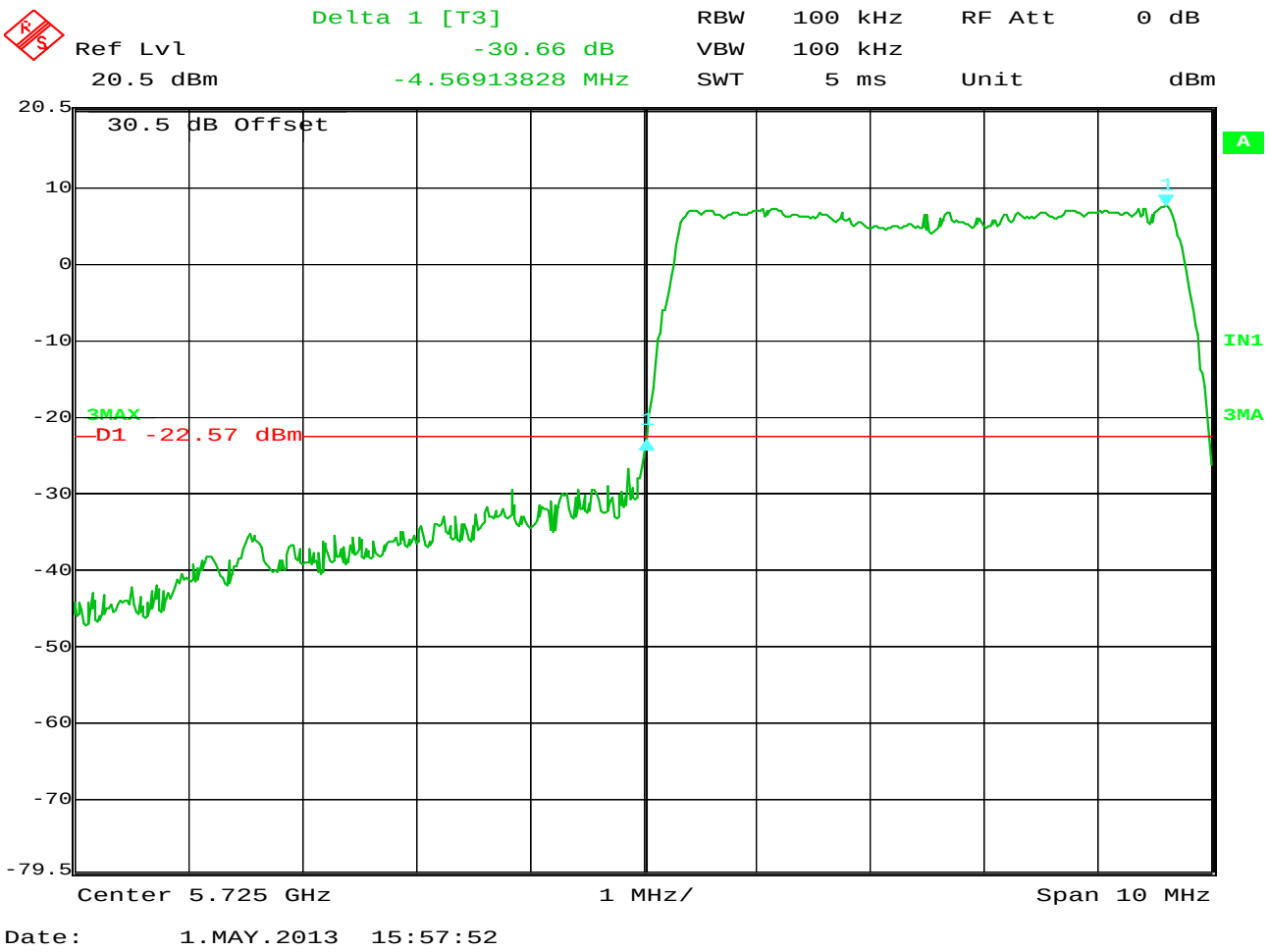
DATA SHEET

Manufacturer : Cambium Networks LTD.
Test Item : Access Point Digital Transmission
Model No. : C054045A001A
Test Specification : FCC Part 15, Subpart C, Section 15.247
: Case Spurious Emissions in Restricted Bands
Test Mode : Tx at 5847.5 MHz
Date : May 5, 2013
Notes :

Freq. MHz	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Duty Cycle (dB)	Average Total dBuV/m at 3m	Average Total uV/m at 3 m	Average Limit uV/m at 3 m	Margin (dB)
11695.00	H	35.9		7.9	39.2	-30.1	0.3	53.2	455.2	500.0	-0.8
11695.00	V	35.2		7.9	39.2	-30.1	0.3	52.5	420.0	500.0	-1.5

Checked BY Richard E. King :

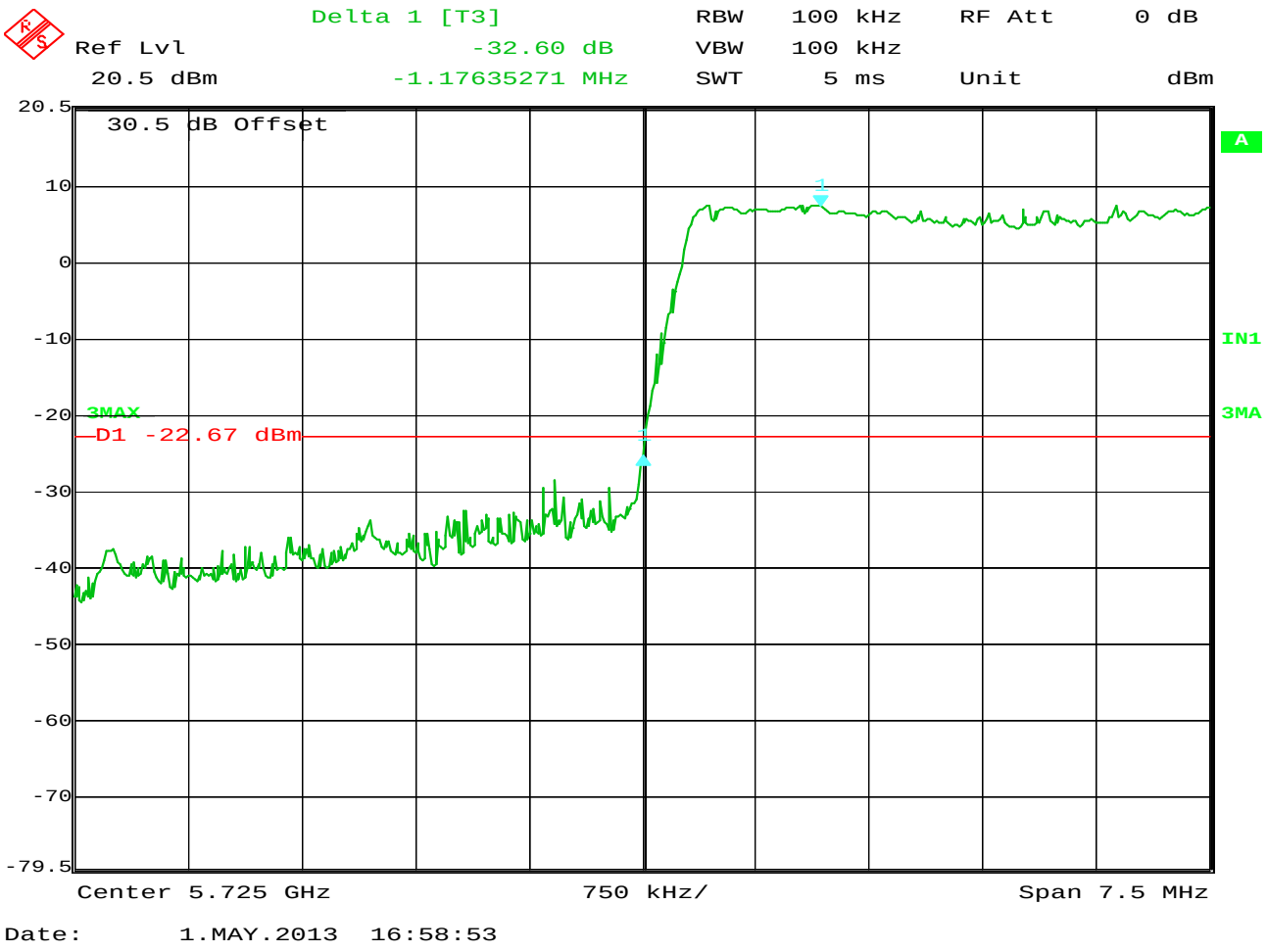
Richard E. King



FCC 15.247 Bandedge Compliance

MANUFACTURER	:	Cambium Networks Ltd
MODEL NUMBER	:	C054045A001A
TEST MODE	:	Tx @ 5727.5MHz
	:	Tx at max power
	:	Channel A
	:	Display Line L1 equals the 8dBm.

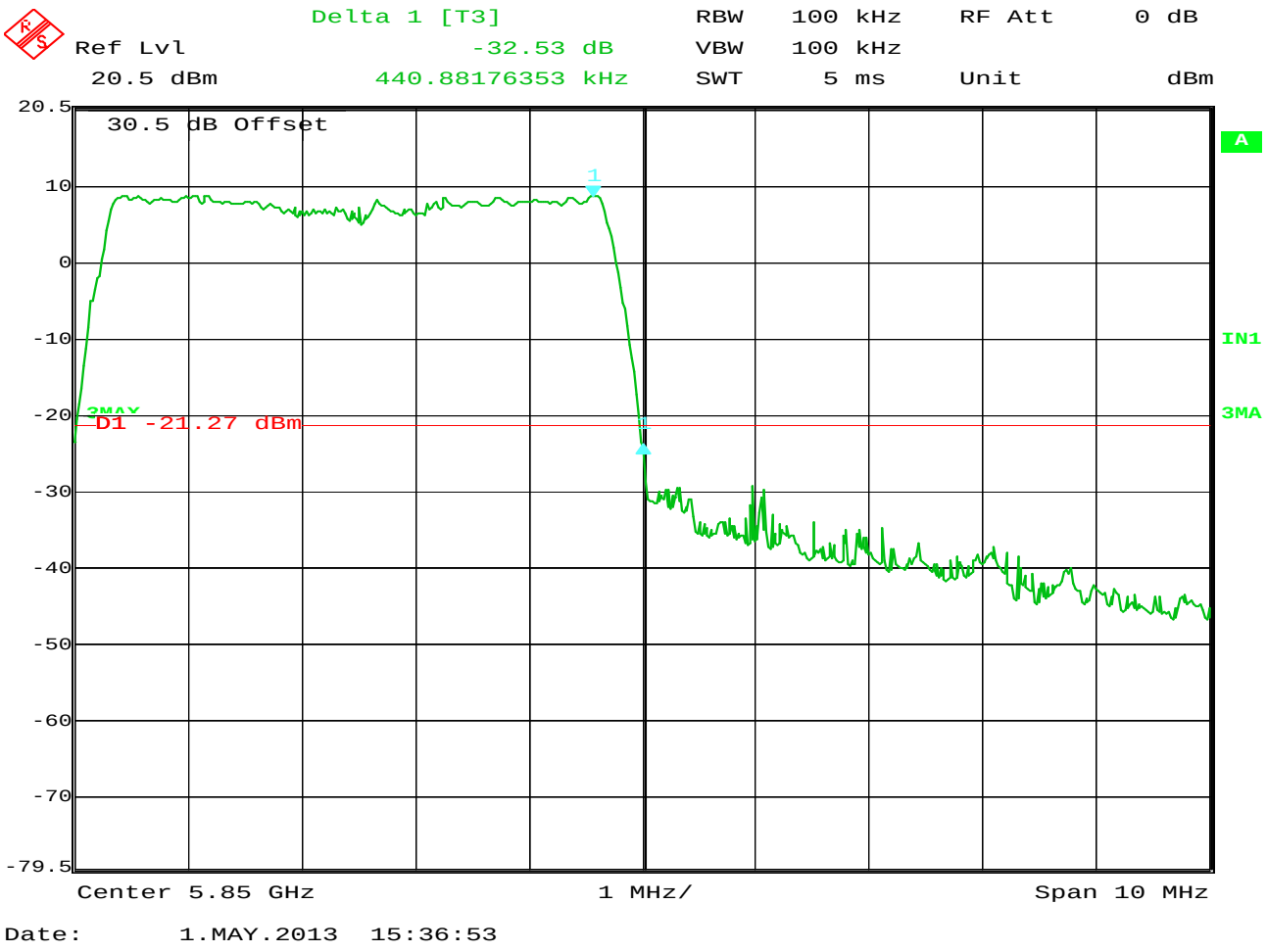
NOTES



FCC 15.247 Bandedge Compliance

MANUFACTURER	:	Cambium Networks Ltd
MODEL NUMBER	:	C054045A001A
TEST MODE	:	Tx @ 5727.5MHz
	:	Tx at max power
	:	Channel B
	:	Display line L1 represents the 8dBm limit

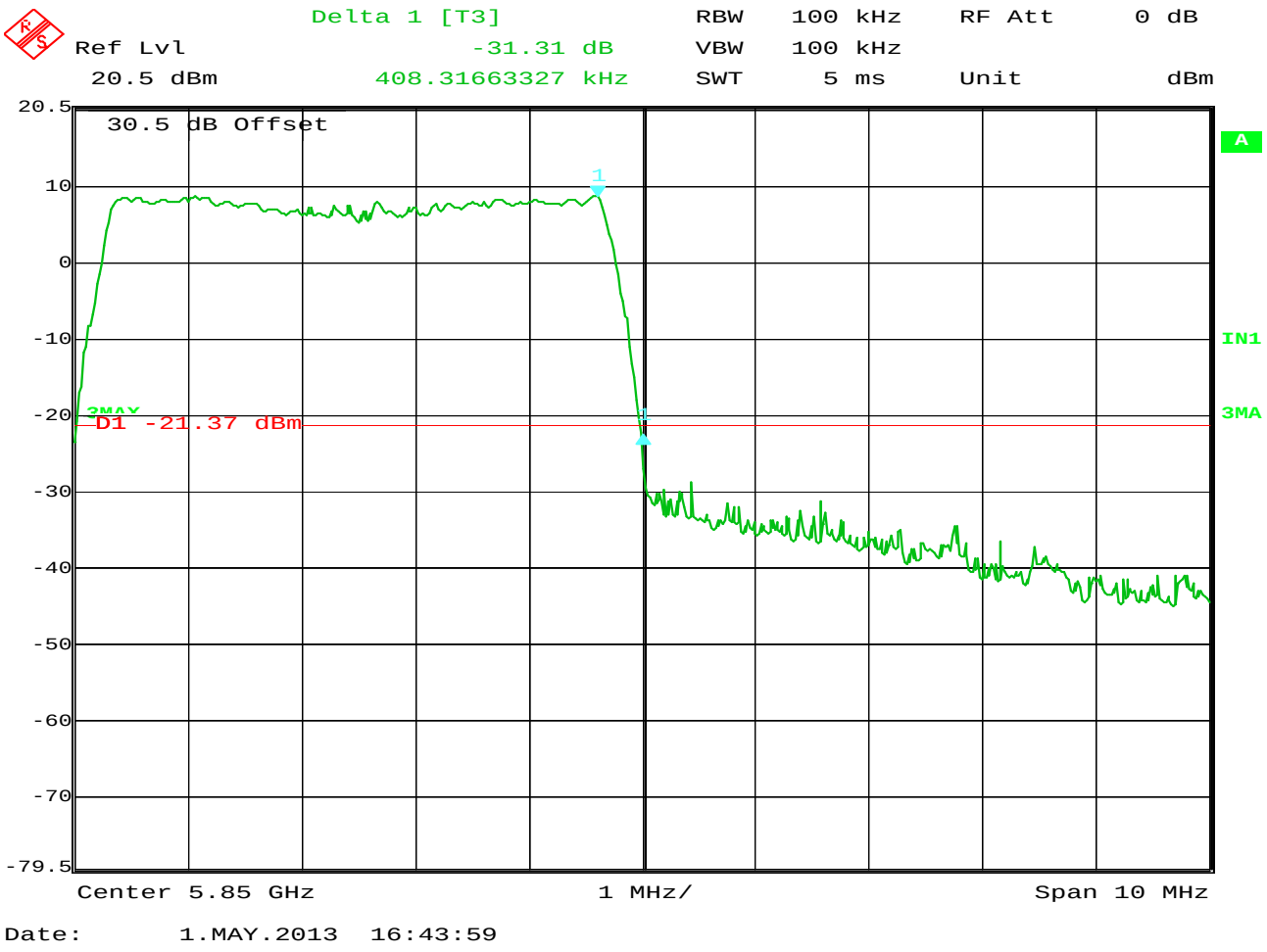
NOTES



FCC 15.247 Bandedge Compliance

MANUFACTURER	:	Cambium Networks Ltd
MODEL NUMBER	:	C054045A001A
TEST MODE	:	Tx @ 5847.5MHz
	:	Tx at max power
	:	Channel A
	:	Display Line L1 equals the -30dBc.

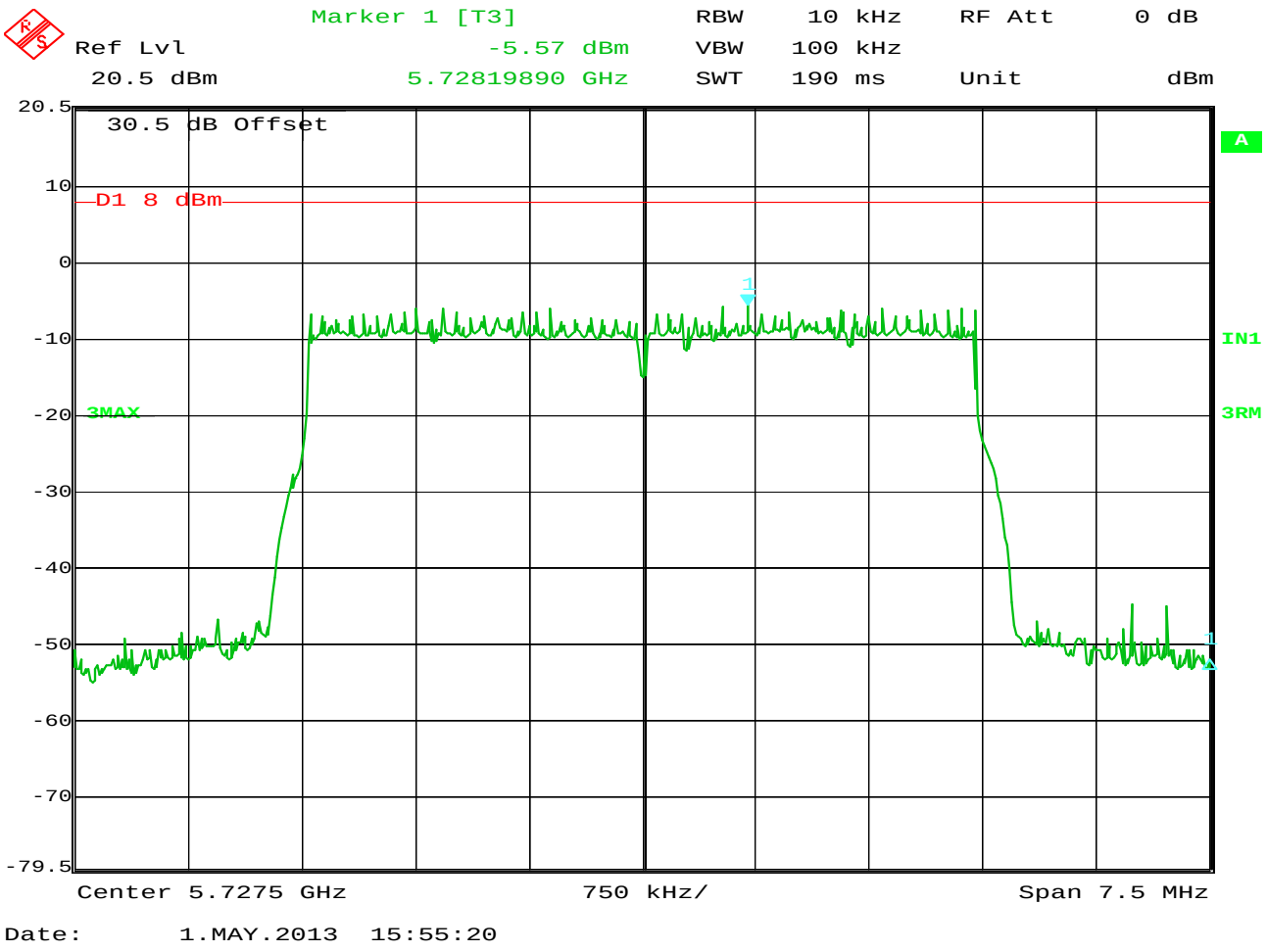
NOTES



FCC 15.247 Bandedge Compliance

MANUFACTURER	:	Cambium Networks Ltd
MODEL NUMBER	:	C054045A001A
TEST MODE	:	Tx @ 5827.5MHz
	:	Tx at max power
	:	Channel B
	:	Display line L1 represents -30dBc

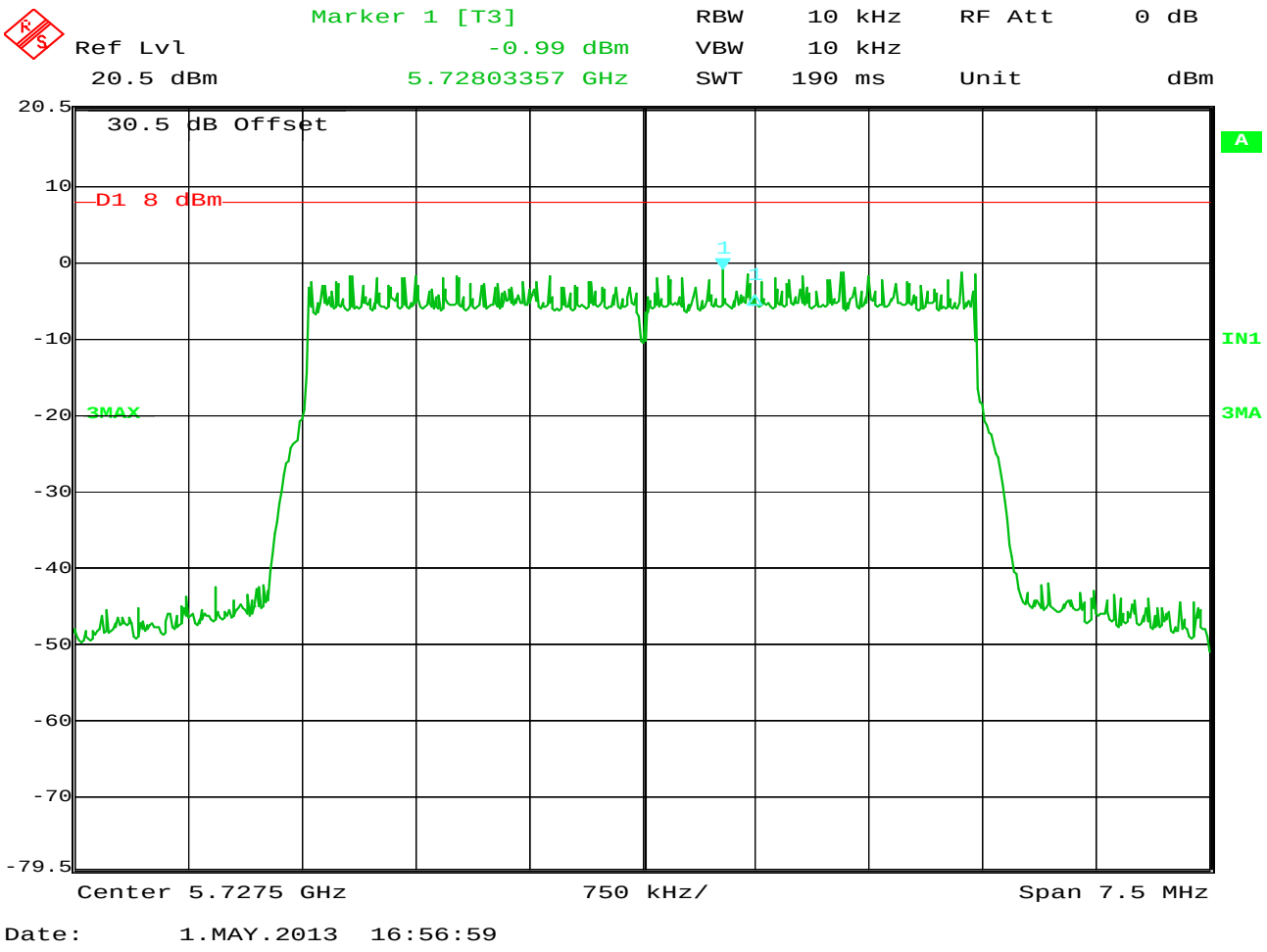
NOTES



FCC 15.247 Power Spectral Density

MANUFACTURER	:	Cambium Networks Ltd
MODEL NUMBER	:	C054045A001A
TEST MODE	:	Tx @ 5727.5MHz
	:	Tx at max power
	:	Channel A
	:	Display line L1 represents the 8dBm limit
	:	The power spectral density reading was adjusted by adding the MIMO
	:	correction factor of 3dB to the reading.
	:	PSD= -5.57dBm + MIMO (3dB) = -2.57 dBm

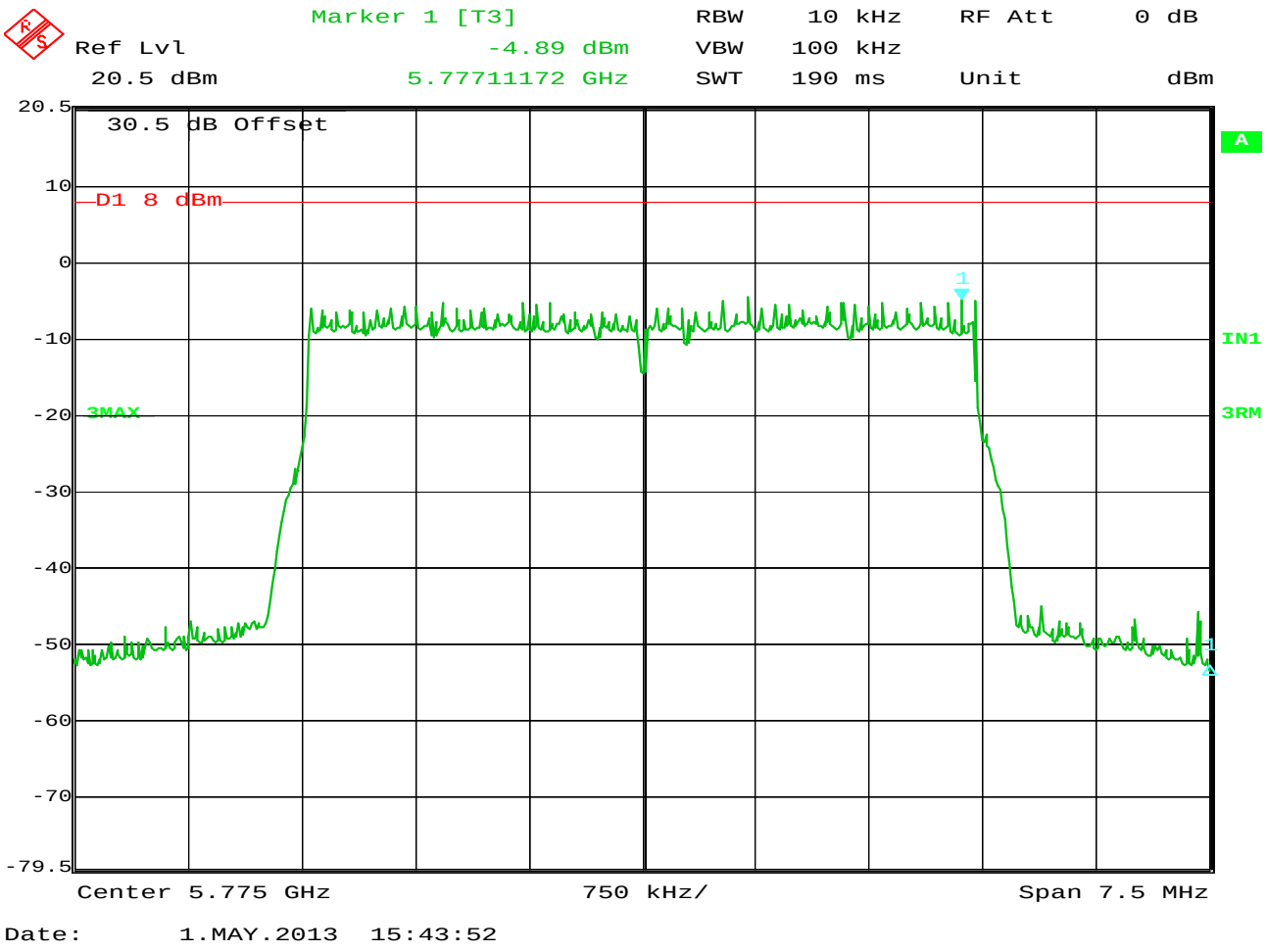
NOTES



FCC 15.247 Power Spectral Density

MANUFACTURER	:	Cambium Networks Ltd
MODEL NUMBER	:	C054045A001A
TEST MODE	:	Tx @ 5727.5MHz
	:	Tx at max power
	:	Channel B
	:	Display line L1 represents the 8dBm limit
	:	The power spectral density reading was adjusted by adding the MIMO
	:	correction factor of 3dB to the reading.
	:	PSD= -0.99dBm + MIMO (3dB) = 2.01 dBm

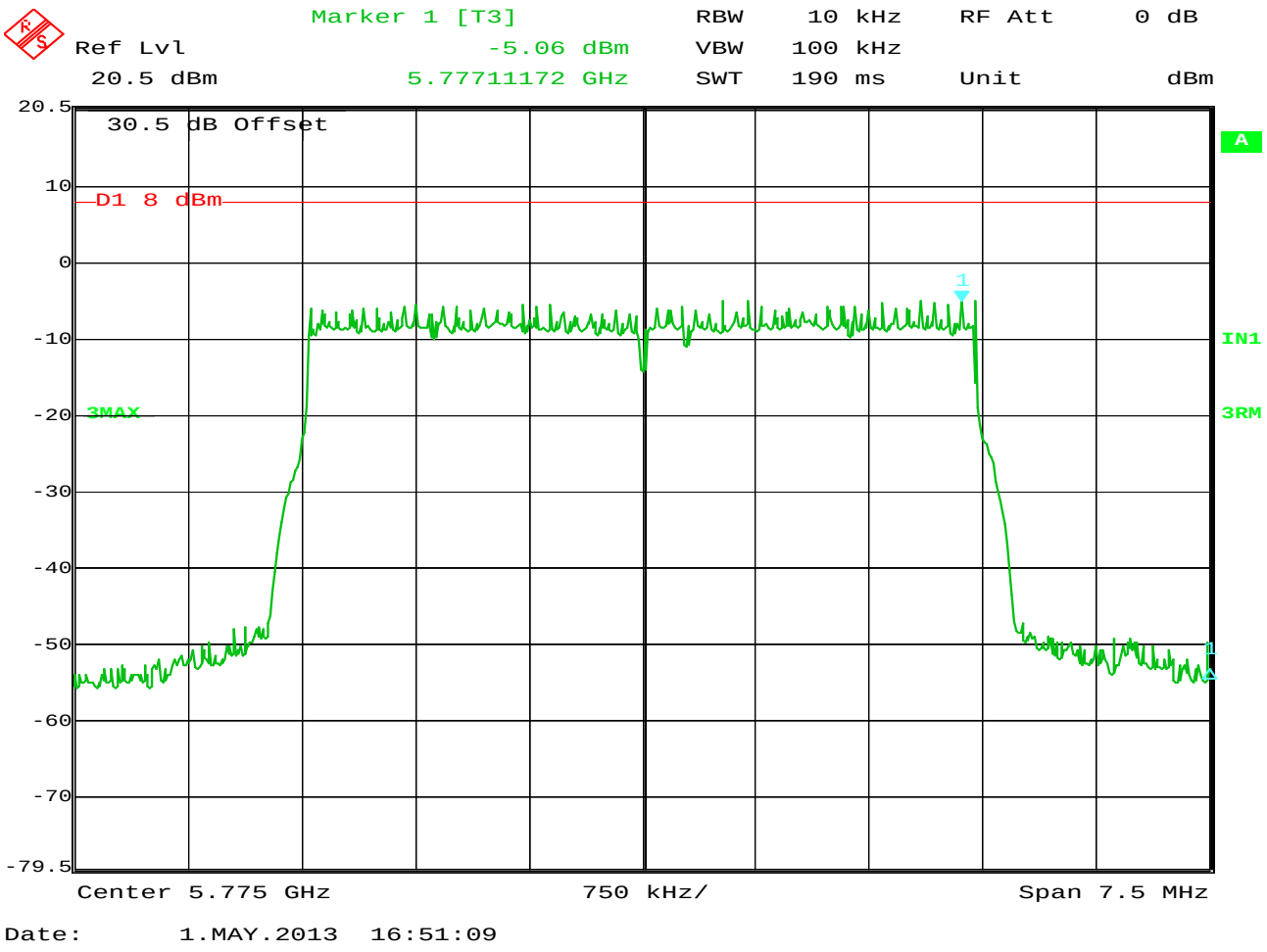
NOTES



FCC 15.247 Power Spectral Density

MANUFACTURER	: Cambium Networks Ltd
MODEL NUMBER	: C054045A001A
TEST MODE	: Tx @ 5775MHz
	: Tx at max power
	: Channel A
	: Display line L1 represents the 8dBm limit
	: The power spectral density reading was adjusted by adding the MIMO
	: correction factor of 3dB to the reading.
	: PSD= -4.89dBm + MIMO (3dB) = -1.89 dBm.

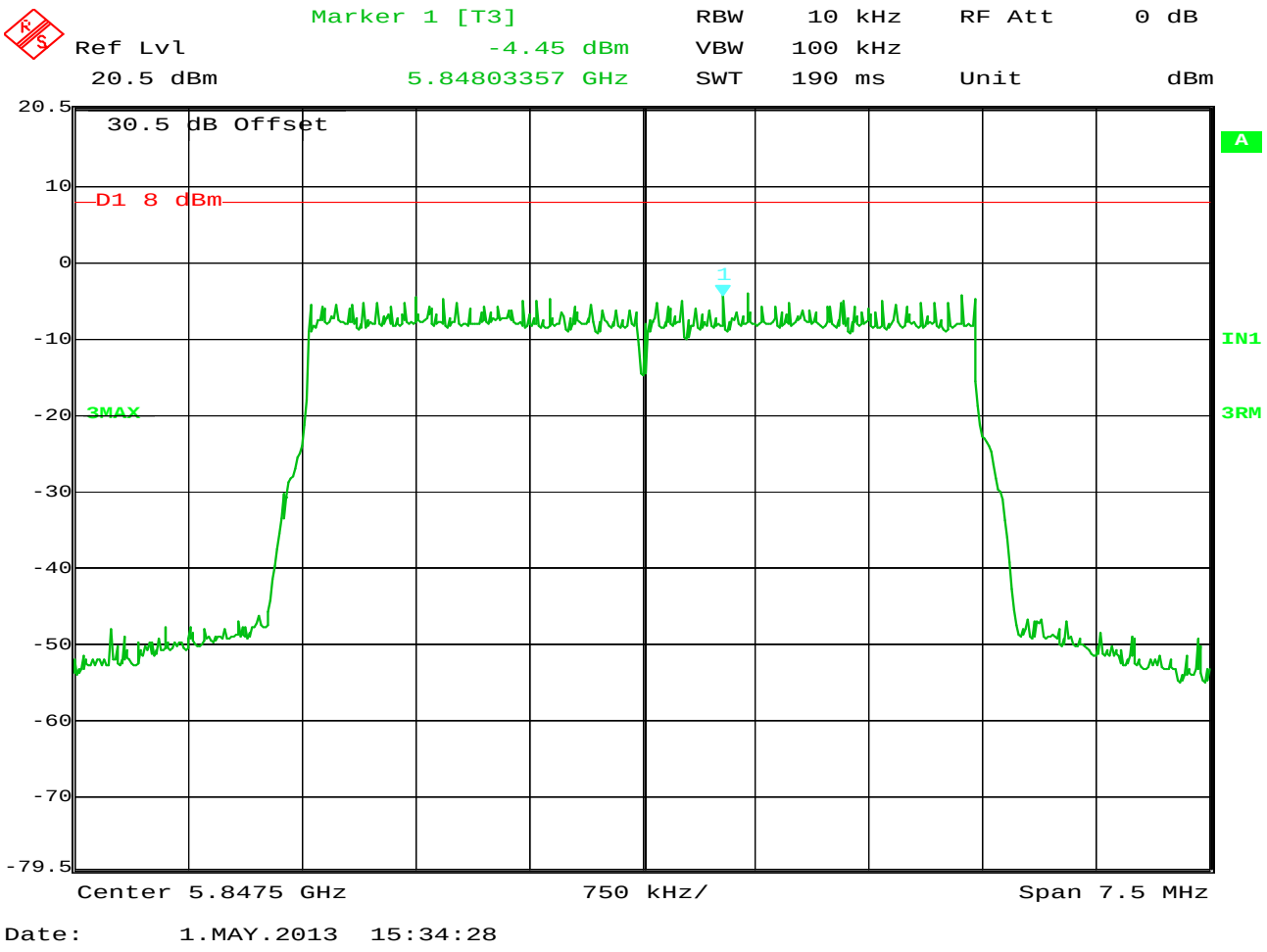
NOTES



FCC 15.247 Power Spectral Density

MANUFACTURER	: Cambium Networks Ltd
MODEL NUMBER	: C054045A001A
TEST MODE	: Tx @ 5775MHz
	: Tx at max power
	: Channel B
	: Display line L1 represents the 8dBm limit
	: The power spectral density reading was adjusted by adding the MIMO
	: correction factor of 3dB to the reading.
	: PSD= -5.06dBm + MIMO (3dB) = -2.06 dBm

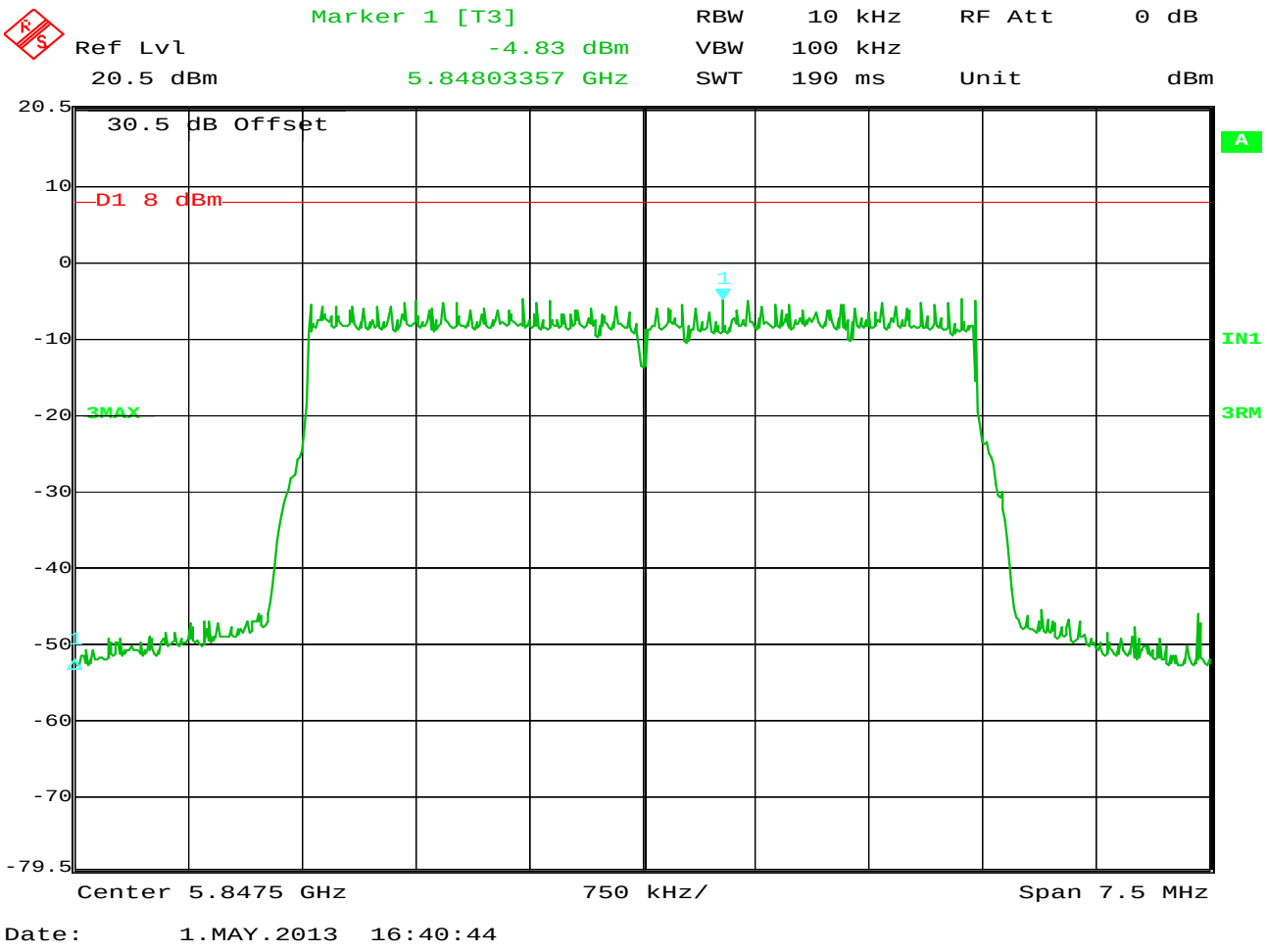
NOTES



FCC 15.247 Power Spectral Density

MANUFACTURER	: Cambium Networks Ltd
MODEL NUMBER	: C054045A001A
TEST MODE	: Tx @ 5847.5MHz
	: Tx at max power
	: Channel A
	: Display line L1 represents the 8dBm limit
	: The power spectral density reading was adjusted by adding the MIMO
	: correction factor of 3dB to the reading.
	: PSD= -4.45dBm + MIMO (3dB) = -1.45 dBm

NOTES



FCC 15.247 Power Spectral Density

MANUFACTURER	:	Cambium Networks Ltd
MODEL NUMBER	:	C054045A001A
TEST MODE	:	Tx @ 5827.5MHz
	:	Tx at max power
	:	Channel B
	:	Display line L1 represents the 8dBm limit
	:	The power spectral density reading was adjusted by adding the MIMO
	:	correction factor of 3dB to the reading.
	:	PSD= -4.83dBm + MIMO (3dB) = -1.83 dBm

NOTES