Measurement of RF Interference from a Firecracker Transceiver

For	The Chamberlain Group 845 Larch Avenue Elmhurst, IL 60126
P.O. Number	4900002670
Date Tested	July 25, 2012 through August 2, 2012
Test Personnel	Mark Longinotti
Specification	FCC "Code of Federal Regulations" Title 47, Part 15, Subpart C, Sections 15.207 and 15.247 for Frequency Hopping Spread Spectrum Intentional Radiators within the band 902-928 MHz FCC "Code of Federal Regulations" Title 47, Part15, Subpart 15B, Section 15.107 and 15.109 for Receivers Industry Canada RSS-210 Industry Canada RSS-GEN

Test Report By: MARK E. LONGINOTTI

Mark E. Longinotti
EMC Engineer

Approved By: Raymond J Klouda

Raymond J. Klouda
Registered Professional
Engineer of Illinois - 44894

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

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REVISION HISTORY

Revision	Date	Description
—	August 6, 2012	Initial release

Measurement of RF Emissions from a Firecracker Transceiver

1 INTRODUCTION

1.1 Scope of Tests

This document presents the results of the series of radio interference measurements performed on The Chamberlain Group Firecracker, Assembly No. 001D7881, Board No. 014D1232, Serial No. None Assigned, transceiver (hereinafter referred to as the EUT). The EUT is a frequency hopping spread spectrum transceiver. The transceiver was designed to transmit and receive in the 902-928 MHz band using an internal antenna. The EUT contained a super-heterodyne type receiver which utilizes an intermediate frequency (IF) of 937.5 kHz.

The EUT also contained a super-heterodyne type receiver designed to receive at 310MHz, 315MHz, 390MHz, 433.3MHz, 433.92MHz, and 434.54MHz using an internal antenna. The super-heterodyne type receiver utilizes an intermediate frequency (IF) of 937.5 kHz. The EUT was manufactured and submitted for testing by The Chamberlain Group located in Elmhurst, IL.

1.2 Purpose

The test series was performed to determine if the EUT meets the conducted and radiated RF emission requirements of the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart B, Sections 15.107 and 15.109, for receivers and Subpart C, Sections 15.207 and 15.249 for Intentional Radiators Operating within the 902-928 MHz band.

The test series was also performed to determine if the EUT meets the conducted and radiated RF emission requirements of the Industry Canada Radio Standards Specification, RSS-Gen, Section 7.2.4 and Section 6.1 for receivers and the Industry Canada Radio Standards Specification RSS-Gen Section 7.2.4 and RSS-210 Annex 8, for Transmitters.

Testing was performed in accordance with ANSI C63.4-2009.

1.3 Deviations, Additions and Exclusions

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

1.4 EMC Laboratory Identification

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

1.5 Laboratory Conditions

The temperature at the time of the test was 23°C and the relative humidity was 50%.

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, Subparts B and C, dated 1 October 2011
- 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"
- FCC Public Notice, DA 00-705, "Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems", Released March 30, 2000
- Industry Canada RSS-210, Issue 8, December 2010, “Spectrum Management and Telecommunications Radio Standards Specification, Low-power License-exempt radio communication devices (All Frequency Bands): Category I Equipment”

- Industry Canada RSS-GEN, Issue 3, December 2010, “Spectrum Management and Telecommunications Radio Standards Specification, General Requirements and Information for the Certification of radio communication equipment”.

3 EUT SETUP AND OPERATION

3.1 General Description

The EUT is a Firecracker, Assembly No. 001D7881, Board No. 014D1232. A block diagram of the EUT setup is shown as Figure 1.

3.1.1 Power Input

In a normal configuration, the EUT would receive 5VDC from a garage door opener head unit. However, not all of the special test modes required for radiated emissions testing worked properly when powered with 5VDC from a garage door opener head unit. Therefore, for radiated emissions testing purposes, the EUT received 5VDC directly from an external power supply. For conducted emissions tests, the EUT received 5VDC from a Chamberlain Whisper Drive Garage Door Opener Head Unit. The Garage Door Opener Head Unit received 115V, 60Hz power via a 1.1 meter-long, 3-wire power cord.

3.1.2 Peripheral Equipment

For radiated emissions tests, no peripheral equipment was required for the EUT to operate properly. For conducted emissions tests, the EUT received 5VDC power from a Chamberlain Whisper Drive Garage Door Opener Head Unit.

3.1.3 Interconnect Cables

The EUT does not require interconnect cables to operate properly.

3.1.4 Grounding

The EUT was not grounded during testing.

3.2 Operational Mode

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

1) Transmit at 902.25MHz
2) Transmit at 914.75MHz
3) Transmit at 926.75MHz
4) Receive at 310MHz
5) Receive at 315MHz
6) Receive at 390MHz
7) Receive at 433.3MHz
8) Receive at 433.92MHz
9) Receive at 434.54MHz
10) Receive at 902.25MHz
11) Receive at 914.75MHz
12) Receive at 926.75MHz
13) Frequency Hopping Enabled

3.3 EUT Modifications

For radiated emissions testing purposes, the EUT received 5VDC directly from an external power supply instead of from a garage door opener head unit.

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.

Emissions measurements were performed with a spectrum analyzer. This receiver allows measurements with the bandwidths and with the quasi-peak and average detector functions as specified.

4.3 Calibration Traceability

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

4.4 Measurement Uncertainty

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

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

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

5 TEST PROCEDURES

5.1 Receiver

5.1.1 Powerline Conducted Emissions

5.1.1.1 Requirements

Per the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart B, 15.107(a) and Industry Canada RSS-Gen section 7.2.4, all radio frequency voltages on the power lines of a receiver shall be below the values shown below when using a quasi-peak or average detector:

CONDUCTED LIMITS FOR A RECEIVER

Frequency MHz	RFI Voltage dBuV(QP)	RFI Voltage dBuV(Average)
0.15-0.5	66 decreasing with logarithm of frequency to 56	56 decreasing with logarithm of frequency to 46
0.5-5	56	46
5-30	60	50

Note 1: The lower limit shall apply at the transition frequencies.

Note 2: If the levels measured using the QP detector meet both the QP and the Average limits, the EUT is considered to have met both requirements and measurements do not need to be performed using the Average detector.

5.1.1.2 Procedures

The interference on each power lead of the EUT was measured by connecting the measuring equipment to the appropriate meter terminal of the Line Impedance Stabilization Network (LISN). The meter terminal of the LISN not under test was terminated with 50 ohms.

a) The EUT was operated in the Receive at 914.75MHz mode.

b) Measurements were first made on the 115V, 60Hz, high line of the Chamberlain Whisper Drive garage door opener head unit which was used to provide 5VDC power to the EUT.

c) The frequency range from 150 kHz to 30 MHz was broken up into smaller frequency sub-bands.

d) Conducted emissions measurements were taken on the first frequency sub-band using a peak detector.

e) The data thus obtained was then searched by the computer for the highest levels. Any emissions levels that were within 10dB of the average limit were then measured again using both a quasi-peak detector and an average detector. (If no peak readings were within 10dB of the average limit, quasi-peak and average readings were taken on the highest emissions levels measured during the peak detector scan.)

f) Steps (d) and (e) were repeated for the remainder of the frequency sub-bands until the entire frequency range from 150 kHz to 30MHz was investigated. The peak trace was automatically plotted. The plot also shows quasi-peak and average readings that were taken on discrete frequencies. A table showing the quasi-peak and average readings was also generated. This tabular data compares the quasi-peak and average conducted emissions to the applicable conducted emissions limits.

g) Steps (c) through (f) were repeated on the 115V, 60Hz, return line of the Chamberlain Whisper Drive garage door opener head unit which was used to provide 5VDC power to the EUT.

5.1.1.3 Results

The plots of the peak, quasi-peak, and average conducted voltage levels acquired from each input power line with the EUT operated in the Receive at 914.75MHz mode are shown on pages 24 and 26. The tabular quasi-peak and average results from each input power line with the EUT operated in the down mode are shown on pages 23 and 25. All power line conducted emissions measured from the EUT were within the specification limits. A photograph of the test configuration which yielded the highest or worst case, conducted emission levels is shown on Figure 2.

5.1.2 Radiated Measurements

5.1.2.1 Requirements

Per the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart B, Section 15.109(a) and Industry Canada RSS-Gen, Section 6.1, all radio frequency emissions from a receiver shall be below the limits shown on the following table:

RADIATION LIMITS FOR A RECEIVER

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

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

5.1.2.2 Procedures

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

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

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

The broadband measuring antenna was positioned at a 3 meter distance from the EUT. The frequency range from 30MHz to 1GHz was investigated using a peak detector function with the bilog antenna at several heights, horizontal and vertical polarization, and with several different orientations of the EUT with respect to the antenna. The frequency range from 1GHz to 5GHz was investigated using a peak detector function with the double ridged waveguide antenna at several heights, horizontal and vertical polarization, and with several different orientations of the EUT with respect to the antenna. The maximum levels for each antenna polarization were plotted.

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

1) Measurements from 30MHz to 1GHz were made using a quasi-peak detector and a broadband bilog antenna. Measurements above 1GHz were made using an average detector and a broadband double ridged waveguide antenna.

2) To ensure that maximum or worst case, emission levels were 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.

    d) For hand-held or body-worn devices, the EUT was rotated through three orthogonal axes to determine which orientation produces the highest emission relative to the limit.

5.1.2.3 Results

The preliminary plots and final radiated levels for each of the receive modes listed in section 3.2 are presented on pages 27 through 80. The plots are presented for a reference only, and are not used to determine compliance. As can be seen from the data, all 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 Figure 3 and Figure 4.

5.2 Transmitter

5.2.1 Powerline Conducted Emissions

5.2.1.1 Requirements

Per the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart C, Per 15.207(a) and Industry Canada RSS-Gen section 7.2.4, all radio frequency voltages on the power lines of a transmitter shall be below the values shown below when using a quasi-peak or average detector:

Frequency MHz	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 – 0.5	66 decreasing with logarithm of frequency to 56	56 decreasing with logarithm of frequency to 46
0.5 - 5	56	46
5 - 30	60	50

Note 1: The lower limit shall apply at the transition frequencies.
Note 2: If the levels measured using the QP detector meet both the QP and the Average limits, the EUT is considered to have met both requirements and measurements do not need to be performed using the Average detector.

5.2.1.2 Procedures

The interference on each power lead of the EUT was measured by connecting the measuring equipment to the appropriate meter terminal of the Line Impedance Stabilization Network (LISN). The meter terminal of the LISN not under test was terminated with 50 ohms.

a) The EUT was operated in the Transmit at 914.75MHz mode.

b) Measurements were first made on the 115V, 60Hz, high line of the Chamberlain Whisper Drive garage door opener head unit which was used to provide 5VDC power to the EUT.

c) The frequency range from 150 kHz to 30 MHz was broken up into smaller frequency sub-bands.

d) Conducted emissions measurements were taken on the first frequency sub-band using a peak detector.

e) The data thus obtained was then searched by the computer for the highest levels. Any emissions levels that were within 10dB of the average limit were then measured again using both a quasi-peak detector and an average detector. (If no peak readings were within 10dB of the average limit, quasi-peak and average readings were taken on the highest emissions levels measured during the peak detector scan.)

f) Steps (d) and (e) were repeated for the remainder of the frequency sub-bands until the entire frequency range from 150 kHz to 30MHz was investigated. The peak trace was automatically plotted. The plot also shows quasi-peak and average readings that were taken on discrete frequencies. A table showing the quasi-peak and average readings was also generated. This tabular data compares the quasi-peak and average conducted emissions to the applicable conducted emissions limits.

g) Steps (c) through (f) were repeated on 115V, 60Hz, return line of the Chamberlain Whisper Drive garage door opener head unit which was used to provide 5VDC power to the EUT.

5.2.1.3 Results

The plots of the peak, quasi-peak, and average conducted voltage levels acquired from each input power line with the EUT operated in the Transmit at 914.75MHz mode are shown on pages 82 and 84. The tabular quasi-peak and average results from each input power line with the EUT operated in the Transmit at 914.75MHz mode are shown on pages81 and 83. All power line conducted emissions measured from the EUT were within the specification limits. A photograph of the test configuration which yielded the highest or worst case, conducted emission levels is shown on Figure 2.

5.2.2 20dB Bandwidth

5.2.2.1 Requirements

Per 15.247(a)(1), Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Per section 15.247(a)(1)(i), for frequency hopping systems operating in the 902-928MHz band, the 20dB bandwidth shall be measured for determination of the carrier frequency separation limits and must not exceed 500 kHz. If the 20dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping channels. If the 20dB bandwidth of the hopping channel is 250 kHz or greater (but not greater than 500 kHz), the system shall use at least 25 hopping channels.

5.2.2.2 Procedures

The EUT was setup inside the test chamber. With the hopping function disabled, the EUT was allowed to transmit continuously. The frequency hopping channel was set separately to low, middle, and high hopping channels. The resolution bandwidth (RBW) was set to ≥ 1% of the 20 dB BW. The span was set to approximately 2 to 3 times the 20 dB bandwidth.

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.

5.2.2.3 Results

The plots on pages 85 through 87 show that the maximum 20 dB bandwidth was 207.4 kHz. The 99% bandwidth was measured to be 201.4 kHz.

Therefore, since the 20dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping channels.

5.2.3 Carrier Frequency Separation

5.2.3.1 Requirements

Per section 15.247 (a)(1), frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater.

5.2.3.2 Procedures

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

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

5.2.3.3 Results

Page 88 shows the carrier frequency separation. As can be seen from this plot, the carrier frequency separation is 499 kHz, which is greater than the 20dB bandwidth (201.42 kHz).

5.2.4 Number of Hopping Frequencies

5.2.4.1 Requirements

Per section 15.247(a)(1)(i), for frequency hopping systems operating in the 902-928MHz band, the 20dB bandwidth shall be measured for determination of the carrier frequency separation limits and must not exceed 500 kHz. If the 20dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping channels. If the 20dB bandwidth of the hopping channel is 250 kHz or greater (but not greater than 500 kHz), the

system shall use at least 25 hopping channels.

5.2.4.2 Procedures

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

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

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

5.2.4.3 Results

Page 89 shows the number of hopping frequencies. As can be seen from this plot, the number of hopping frequencies is 50 which is equal to (or greater than) 50 which is the minimum number of required hopping frequencies for systems with a 20dB bandwidth less than 250 kHz.

5.2.5 Time of Occupancy

5.2.5.1 Requirements

Per section 15.247(a)(1)(i), for frequency hopping systems operating in the 902-928MHz band, if the 20dB bandwidth of the hopping channel is less than 250kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period.

5.2.5.2 Procedures

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

The resolution bandwidth (RBW) was set to 100 kHz. The peak detector and 'Max-Hold' function were engaged. With the span set to 0Hz, the sweep time was adjusted to capture a single event in order to measure the dwell time per hop. The analyzer's display was plotted using a 'screen dump' utility. Then, the sweep time was expanded to 20 seconds to capture the number of hops in the appropriate sweep time. A single sweep was made. The analyzer's display was plotted using a 'screen dump' utility.

The dwell time in the specified time period was then calculated from dwell time per hop multiplied by the number of hops in the specified time period.

5.2.5.3 Results

Pages 90 and 91 show the plots for the time of occupancy (dwell time). As can be seen from the plots, the time of occupancy can be determined by (1.3mS) multiplied by (80). This calculated value is equal to 0.104 seconds which is less than the 0.4 seconds maximum allowed.

5.2.6 Peak Output Power

5.2.6.1 Requirements

Per section 15.247(b)(2), for frequency hopping systems operating in the 902-928MHz band and employing at least 50 hopping channels, the maximum peak output conducted power shall not be greater than 1W (30dBm). Per section 15.247(b)(4), this limit is based on the use of antennas with directional gains that do not exceed 6dBi. Since the limit allows for a 6dBi antenna gain, the maximum EIRP can be increased by 6dB to 4 Watt (36dBm). If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below 30dBm by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

5.2.6.2 Procedures

The EUT was placed on the non-conductive stand and set to transmit. A dipole antenna was placed at a test distance of 3 meters from the EUT. The resolution bandwidth (RBW) of the spectrum analyzer was set to greater than the 20dB bandwidth. The span was set to approximately 5 times the 20 dB bandwidth. The EUT was maximized for worst case emissions (or maximum output power) at the measuring antenna. The maximum meter reading was recorded. The peak power output was measured for the low, middle and high hopping frequencies.

The equivalent power was determined from the field intensity levels measured at 3 meters using the substitution method. To determine the emission power, a second dipole antenna (double ridged waveguide antenna for all measurements above 1GHz) 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 for all measurements above 1GHz), as required. The peak power output was calculated for low, middle, and high hopping frequencies.

5.2.6.3 Results

The results are presented on page 92. The maximum EIRP measured from the transmitter was 13.4 dBm or 0.022 W which is below the 4 Watt limit.

5.2.7 Duty Cycle Factor Measurements

5.2.7.1 Procedures

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

With the transmitter set up to transmit for maximum pulse density, the time domain trace is displayed on the spectrum analyzer. This trace is obtained by tuning center frequency to the transmitter frequency and then setting a zero span width with 200usec/div. The amplitude settings are adjusted so that the on/off transitions clear the 4th division from the bottom of the display. The markers are set at the beginning and end of the “on-time”. The trace is recorded.

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

5.2.7.2 Results

The plots of the duty cycle are shown on data pages 93 and 94.

The EUT transmits a 1.3 msec pulse. Since a word is greater than 100 msec long, the duty cycle factor was computed over a 100msec interval. The duty cycle correction factor was calculated to be -37.7dB (-37.7dB = 20*log(1.3msec/100msec).

5.2.8 Radiated Spurious Emissions Measurements

5.2.8.1 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).

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

5.2.8.2 Procedures

Radiated measurements were performed in a 32ft. x 20ft. x 14ft. high shielded enclosure. The shielded enclosure prevents emissions from other sources, such as radio and TV stations from interfering with the measurements. All power lines and signal lines entering the enclosure pass through filters on the enclosure wall. The power line 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 10.0GHz was investigated using a peak detector function.

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

1) For all harmonics not in the restricted bands, the following procedure was used:
   a) The field strength of the fundamental was measured using a dipole antenna. The dipole antenna was positioned at a 3 meter distance from the EUT. A peak detector with a resolution bandwidth of 100 kHz was used on the spectrum analyzer.
   b) The field strengths of all of the harmonics not in the restricted band were then measured using a double-ridged waveguide antenna. The waveguide antenna was positioned at a 3 meter distance from the EUT. A peak detector with a resolution bandwidth of 100 kHz was used on the spectrum analyzer.
   c) To ensure that maximum or worst case emission levels at the fundamental and harmonics were measured, the following steps were taken when measuring the fundamental emissions and the spurious emissions:
      i) The EUT was rotated so that all of its sides were exposed to the receiving antenna.
      ii) Since the measuring antenna is linearly polarized, both horizontal and vertical field components were measured.
      iii) The measuring antenna was raised and lowered for each antenna polarization to maximize the readings.
      iv) In instances where it was necessary to use a shortened cable between the measuring antenna and the spectrum analyzer. The measuring antenna was not raised or lowered to ensure maximized readings, instead the EUT was rotated through all axis to ensure the maximum readings were recorded for the EUT.
   d) All harmonics not in the restricted bands must be at least 20 dB below levels measured at the fundamental. However, attenuation below the general limits 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. An average reading was taken. If the dwell time per channel of the hopping signal is less than 100msec, then the reading obtained with the 10 Hz video bandwidth may be further adjusted by a “duty cycle correction factor”, derived from 20*log(dwell time/100msec). These readings must be no greater than the limits specified in 15.209(a).

If the dwell time per channel of the hopping signal is less than 100msec, then the reading obtained with the 10 Hz video bandwidth may be further adjusted by a “duty cycle correction factor”, derived from 20*log(dwell time/100msec). These readings must be no greater than the limits specified in 15.209(a).

5.2.8.3 Results

Preliminary radiated emissions plots with the EUT transmitting at 902.25MHz, 914.75MHz, and 926.75MHz are shown on pages 95 through 106. Final radiated emissions data are presented on data pages 107 through 112. As can be seen from the data, all 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 and 4.

5.2.9 Band Edge Compliance

5.2.9.1 Requirements

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

5.2.9.2 Procedures

5.2.9.2.1 Low Band Edge

1) The EUT was setup inside the test chamber.
2) The EUT was set to transmit continuously at the channel closest to the low band-edge (hopping function disabled).
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 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.

4) Step 3) was repeated with the frequency hopping function enabled.

5.2.9.2.2 High Band Edge

1) The EUT was setup inside the test chamber
2) The EUT was set to transmit continuously at the channel closest to the high band-edge (hopping function disabled).
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 20dB down from the peak of the in-band emissions. All emissions which fall outside of the authorized band of operation must be below the 20dB down display line. (All emissions to the right of the center frequency (band-edge) must be below the display line.)
    f. The analyzer's display was plotted using a 'screen dump' utility.

4) Step 3) was repeated with the frequency hopping function enabled.

5.2.9.3 Results

Pages 113 through 116 show the radiated band-edge compliance results. As can be seen from these plots, the emissions at the low end band edge and the high end band edge are within the 20 dB down limits.

6 CONCLUSIONS

It was determined that The Chamberlain Group Firecracker, Assembly No. 001D7881, Board No. 014D1232, Serial No. None Assigned, frequency hopping spread spectrum transceiver did fully meet the conducted and radiated emission requirements of the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart B, Sections 15.107 and 15.109 for receivers and Subpart C, Sections 15.207 and 15.247 for Intentional Radiators Operating within the 902-928 MHz band, when tested per ANSI C63.4-2009.

It was also determined that The Chamberlain Group Firecracker, Assembly No. 001D7881, Board No. 014D1232, Serial No. None Assigned, frequency hopping spread spectrum transceiver, did fully meet the conducted and radiated RF emission requirements of the Industry Canada Radio Standards Specification, RSS-Gen, Section 7.2.4 and Section 6.1 for receivers and the Industry Canada Radio Standards Specification RSS-Gen Section 7.2.4 and RSS-210 Annex 8 for transmitters, when tested per ANSI C63.4-2009.

7 CERTIFICATION

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

The data presented in this test report pertains to the EUT at the test date. 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.

8 ENDORSEMENT DISCLAIMER

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
APW3	PREAMPLIFIER	PLANAR ELECTRONICS	PE2-35-120-5R0-10-12	PL2924	1GHZ-20GHZ	6/3/2011	8/3/2012
CDY0	WORKSTATION	ELITE	WORKSTATION			N/A	
CMA1	Controllers	EMCO	2090	9701-1213	---	N/A	
GRD0	SIGNAL GENERATOR	HEWLETT PACKARD	E4432B	US38080222	250KHZ-3.0GHZ	8/22/2011	8/22/2012
NDQ1	TUNED DIPOLE ANTENNA	EMCO	3121C-DB4	313	400-1000MHZ	5/24/2012	5/24/2013
NTA0	BILOG ANTENNA	CHASE EMC LTD.	BILOG CBL6112	2057	0.03-2GHZ	7/19/2012	7/19/2013
NWH0	RIDGED WAVE GUIDE	TENSOR	4105	2081	1-12.4GHZ	11/3/2011	11/3/2012
PLF1	CISPR16 50UH LISN	ELITE	CISPR16/70A	001	.15-30MHz	6/20/2012	6/20/2013
PLF3	CISPR16 50UH LISN	ELITE	CISPER16/70A	003	.15-30MHz	6/20/2012	6/20/2013
RAKG	RF SECTION	HEWLETT PACKARD	85462A	3549A00284	0.009-6500MHZ	3/12/2012	3/12/2013
RAKH	RF FILTER SECTION	HEWLETT PACKARD	85460A	3448A00324	---	3/12/2012	3/12/2013
RBB0	EMI TEST RECEIVER 20HZ TO 40GHZ	ROHDE & SCHWARZ	ESIB40	100250	20 HZ TO 40GHZ	3/5/2012	3/5/2013
T1N2	10DB 20W ATTENUATOR	NARDA	766-10	---	DC-4GHZ	8/4/2011	8/4/2012
XPQ3	HIGH PASS FILTER	K&L MICROWAVE	4IH30-1804/T10000-0	4	1.8GHZ-10GHZ	11/15/2011	11/15/2012

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

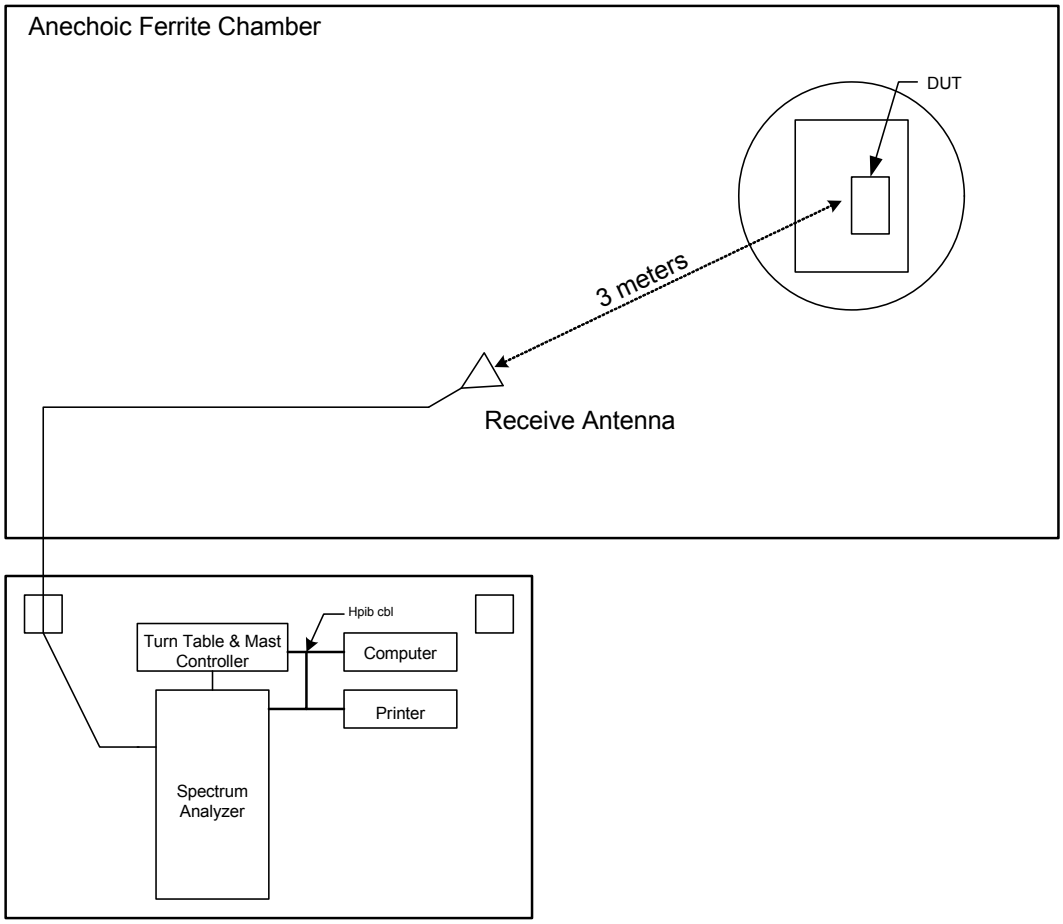
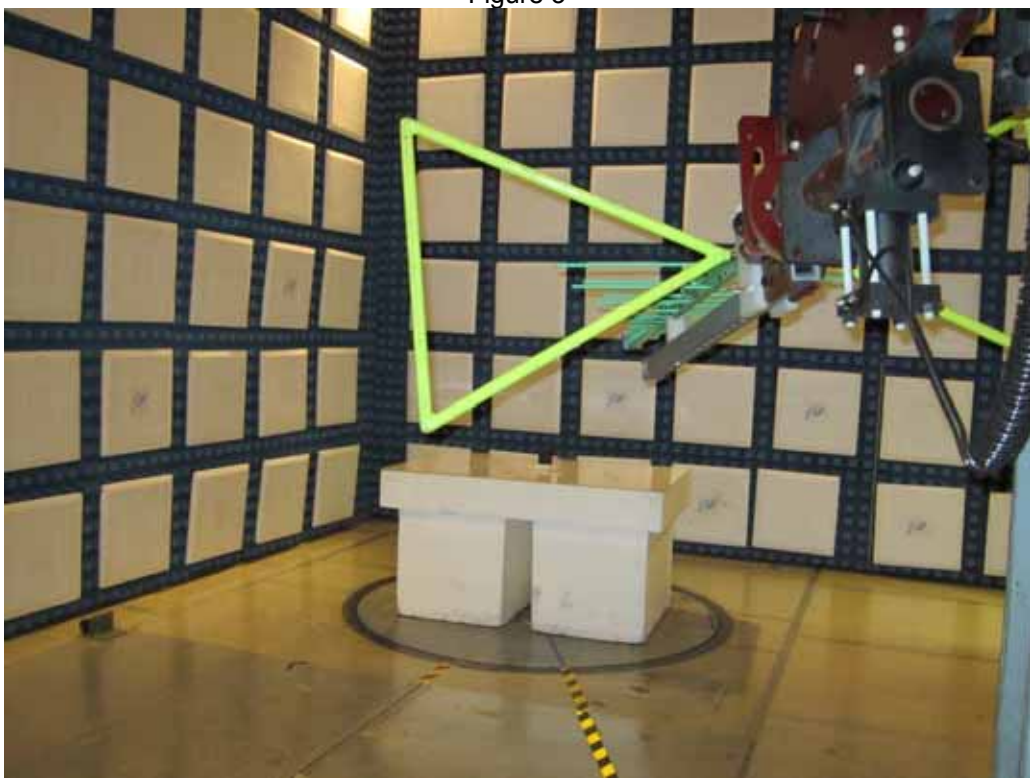


FIGURE 1 BLOCKDIAGRAM OF TEST SETUP

Figure 2

Test Setup for 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 – 1GHz to 5GHz, Horizontal Polarization

Test Setup for Radiated Emissions – 1GHz to 5GHz, Vertical Polarization

FCC Part 15 Subpart B Conducted Emissions Test

Significant Emissions Data

VB** 02/09/2011

Manufacturer	:	CHAMBERLAIN
Model	:	FIRECRACKER
DUT Revision	:	
Serial Number	:	NONE ASSIGNED
DUT Mode	:	Rx @ 914.75MHz
Line Tested	:	115V, 60Hz HIGH
Scan Step Time [ms]	:	30
Meas. Threshold [dB]	:	-6
Notes	:	TESTED W/ GDO HEAD UNIT HD600DM
Test Engineer	:	M. Longinotti
Limit	:	Class B
Test Date	:	Aug 02, 2012 08:54:43 AM
Data Filter	:	Up to 80 maximum levels detected with 6 dB level excursion threshold over 6 dB margin below limit

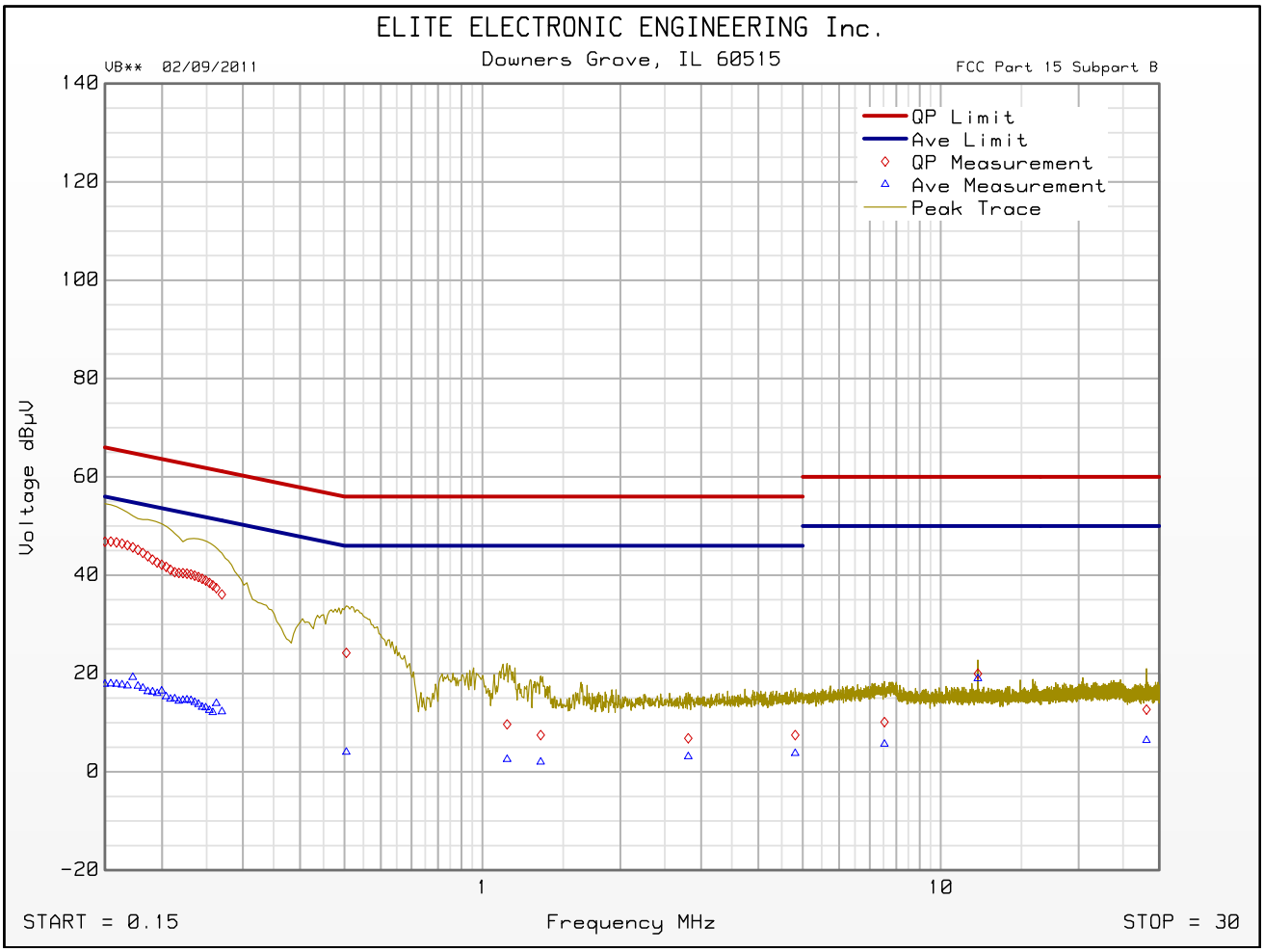
Freq MHz	Quasi-peak Level dBµV	Quasi-peak Limit dBµV	Excessive Quasi-peak Emissions	Average Level dBµV	Average Limit dBµV	Excessive Average Emissions
0.159	46.7	65.5		17.8	55.5	
0.270	36.1	61.1		12.3	51.1	
0.505	24.2	56.0		4.0	46.0	
1.132	9.7	56.0		2.5	46.0	
1.340	7.5	56.0		2.0	46.0	
2.813	6.8	56.0		3.1	46.0	
4.814	7.5	56.0		3.8	46.0	
7.538	10.1	60.0		5.6	50.0	
12.056	20.0	60.0		19.0	50.0	
28.130	12.7	60.0		6.4	50.0	

FCC Part 15 Subpart B Conducted Emissions Test

Cumulative Data

VB** 02/09/2011

Manufacturer	:	CHAMBERLAIN
Model	:	FIRECRACKER
DUT Revision	:	
Serial Number	:	NONE ASSIGNED
DUT Mode	:	Rx @ 914.75MHz
Line Tested	:	115V, 60Hz HIGH
Scan Step Time [ms]	:	30
Meas. Threshold [dB]	:	-6
Notes	:	TESTED W/ GDO HEAD UNIT HD600DM
Test Engineer	:	M. Longinotti
Limit	:	Class B
Test Date	:	Aug 02, 2012 08:54:43 AM



Emissions Meet QP Limit
Emissions Meet Ave Limit

FCC Part 15 Subpart B Conducted Emissions Test

Significant Emissions Data

VB** 02/09/2011

Manufacturer	:	CHAMBERLAIN
Model	:	FIRECRACKER
DUT Revision	:	
Serial Number	:	NONE ASSIGNED
DUT Mode	:	Rx @ 914.75MHz
Line Tested	:	115V, 60Hz RETURN
Scan Step Time [ms]	:	30
Meas. Threshold [dB]	:	-6
Notes	:	TESTED W/ GDO HEAD UNIT HD600DM
Test Engineer	:	M. Longinotti
Limit	:	Class B
Test Date	:	Aug 02, 2012 08:48:25 AM
Data Filter	:	Up to 80 maximum levels detected with 6 dB level excursion threshold over 6 dB margin below limit

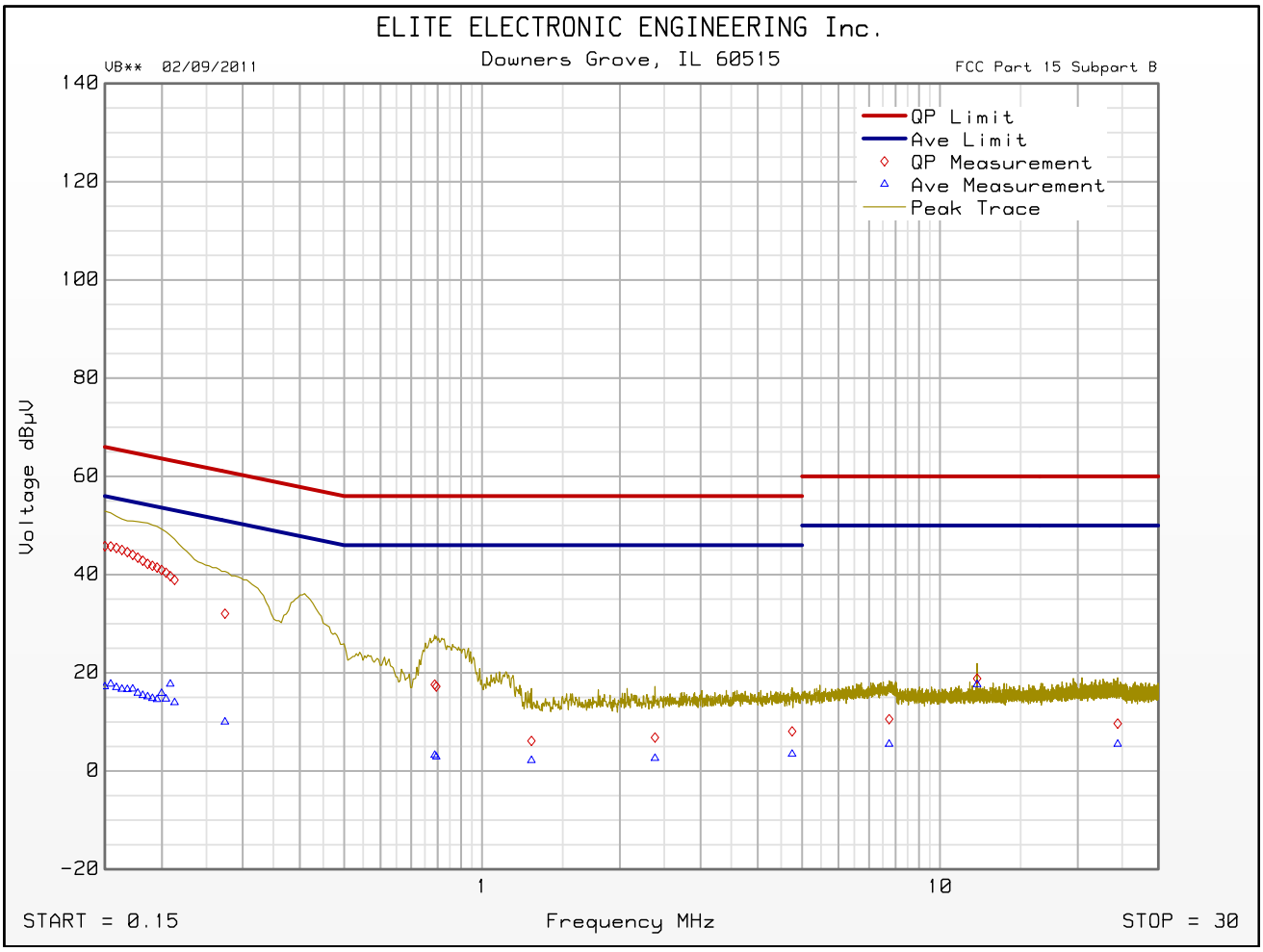
Freq MHz	Quasi-peak Level dBµV	Quasi-peak Limit dBµV	Excessive Quasi-peak Emissions	Average Level dBµV	Average Limit dBµV	Excessive Average Emissions
0.155	45.8	65.8		17.7	55.8	
0.275	32.0	61.0		10.0	51.0	
0.788	17.6	56.0		3.2	46.0	
0.795	17.2	56.0		2.9	46.0	
1.282	6.1	56.0		2.2	46.0	
2.385	6.8	56.0		2.6	46.0	
4.756	8.1	56.0		3.4	46.0	
7.745	10.6	60.0		5.5	50.0	
12.056	18.8	60.0		17.6	50.0	
24.445	9.7	60.0		5.5	50.0	

FCC Part 15 Subpart B Conducted Emissions Test

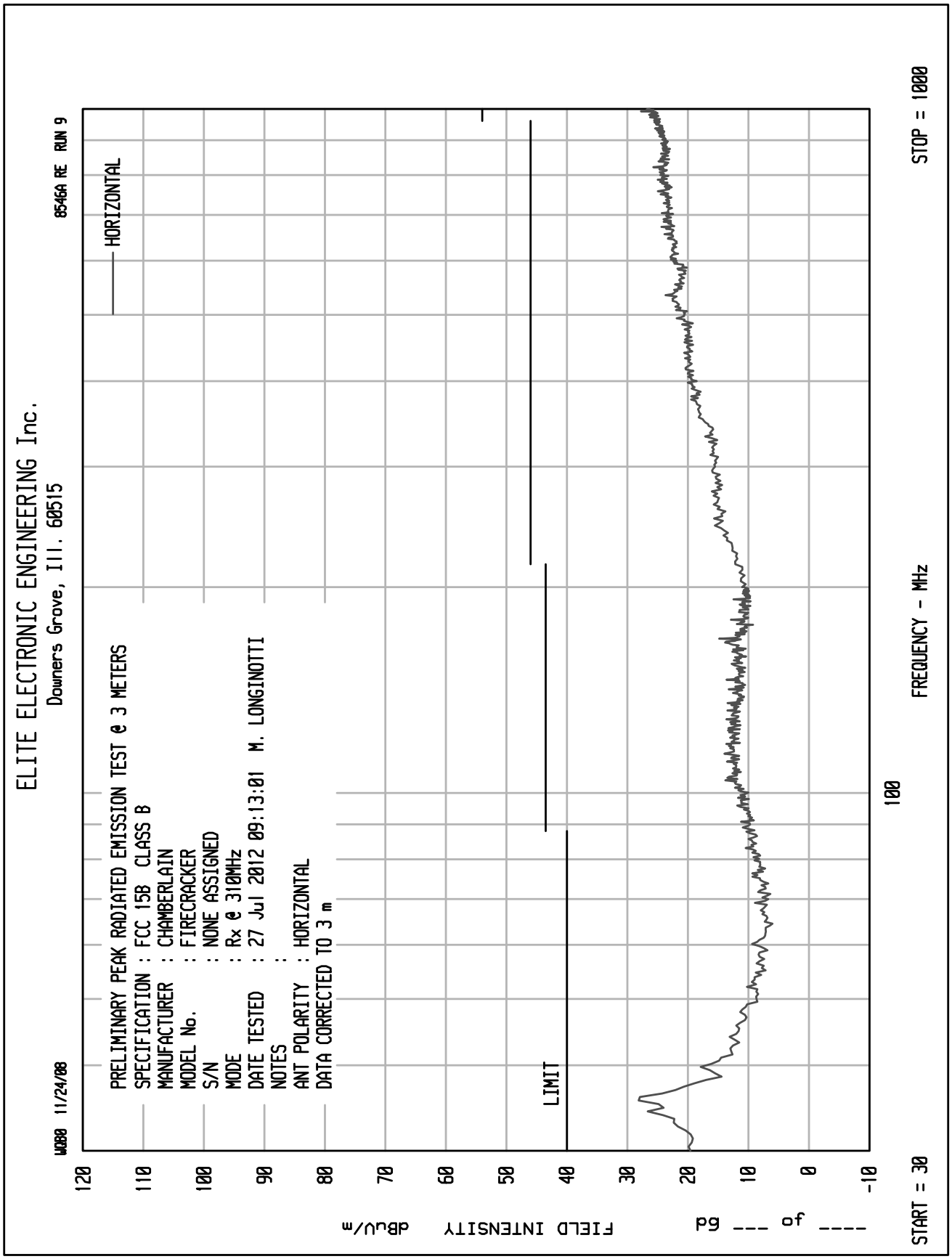
Cumulative Data

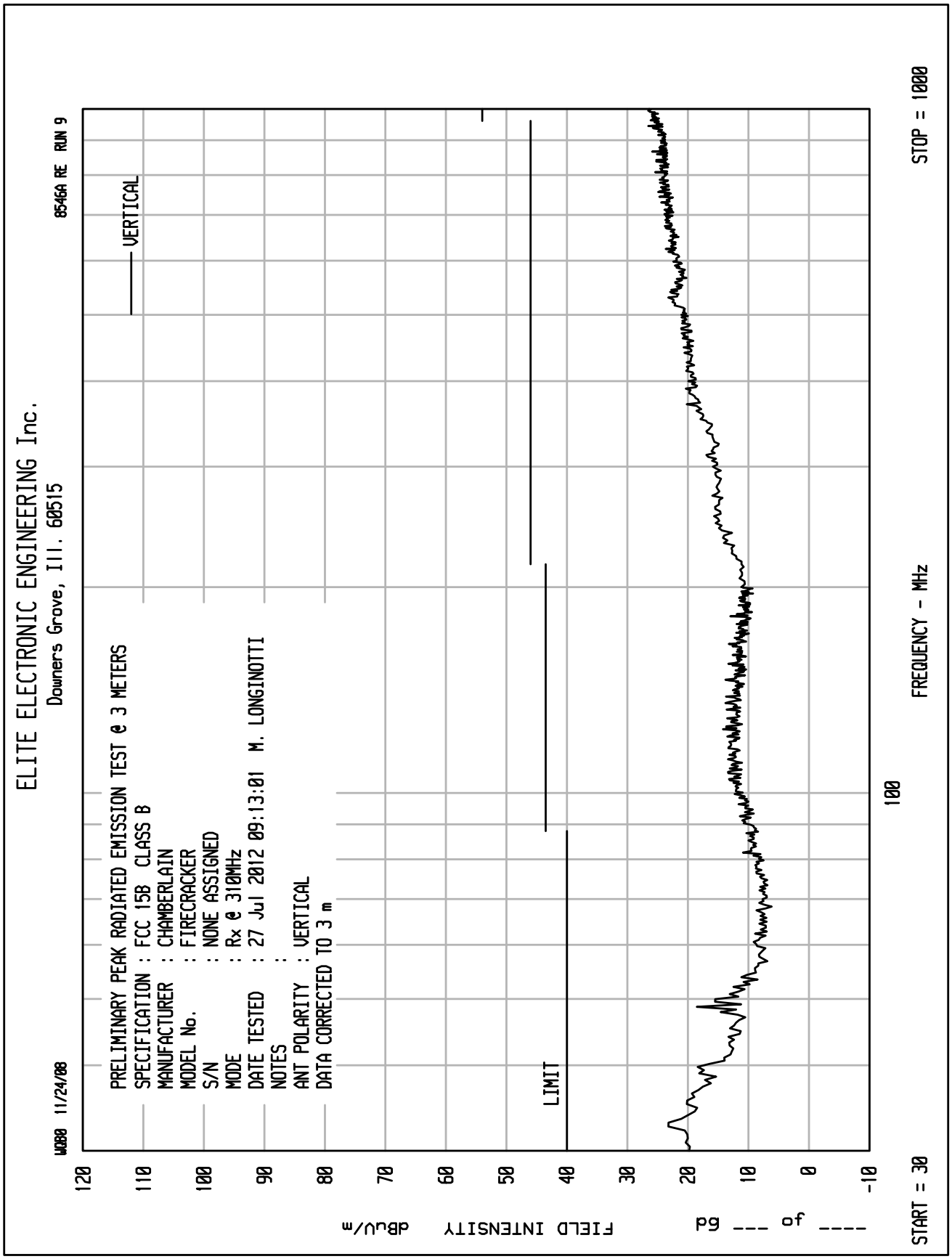
VB** 02/09/2011

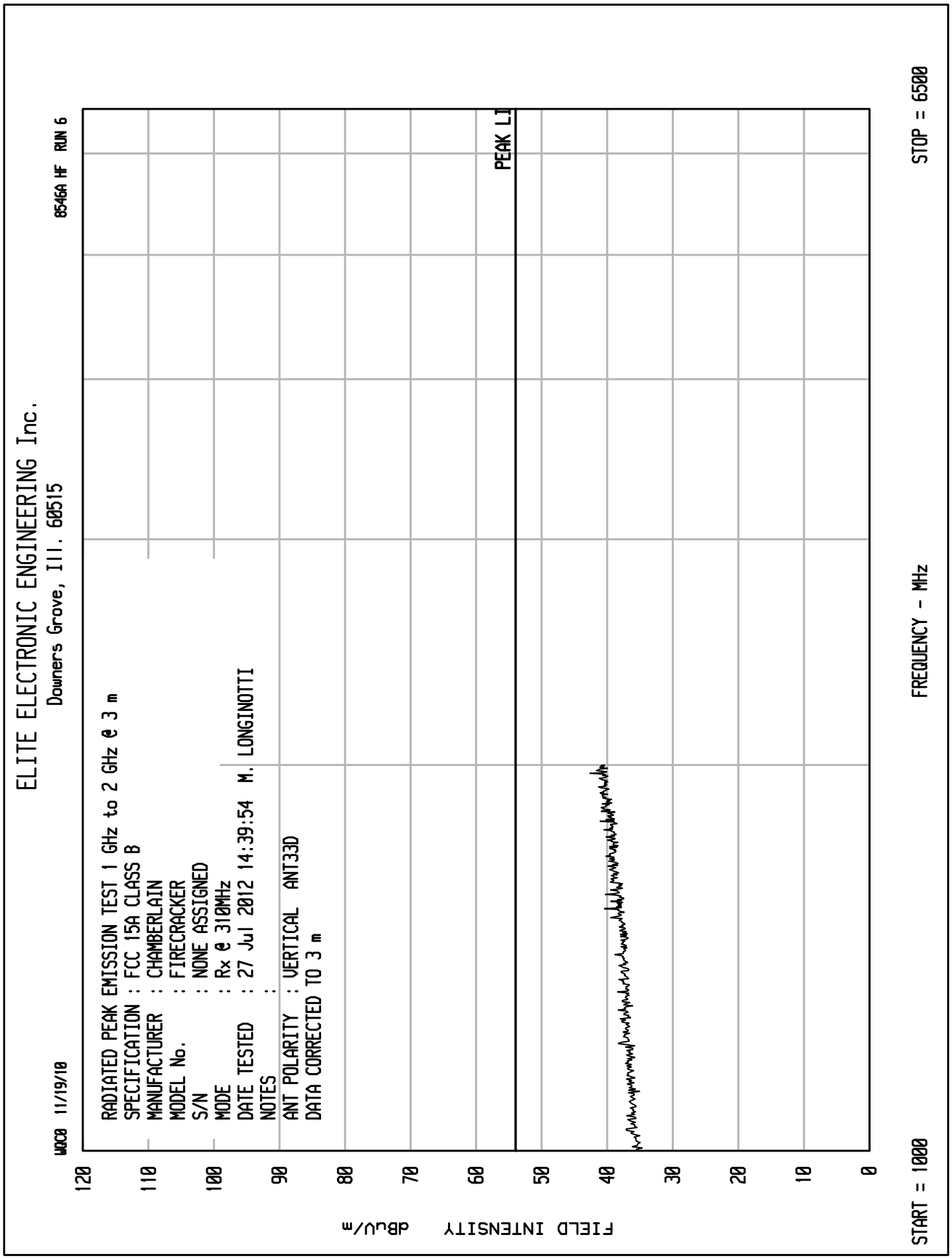
Manufacturer	:	CHAMBERLAIN
Model	:	FIRECRACKER
DUT Revision	:	
Serial Number	:	NONE ASSIGNED
DUT Mode	:	Rx @ 914.75MHz
Line Tested	:	115V, 60Hz RETURN
Scan Step Time [ms]	:	30
Meas. Threshold [dB]	:	-6
Notes	:	TESTED W/ GDO HEAD UNIT HD600DM
Test Engineer	:	M. Longinotti
Limit	:	Class B
Test Date	:	Aug 02, 2012 08:48:25 AM

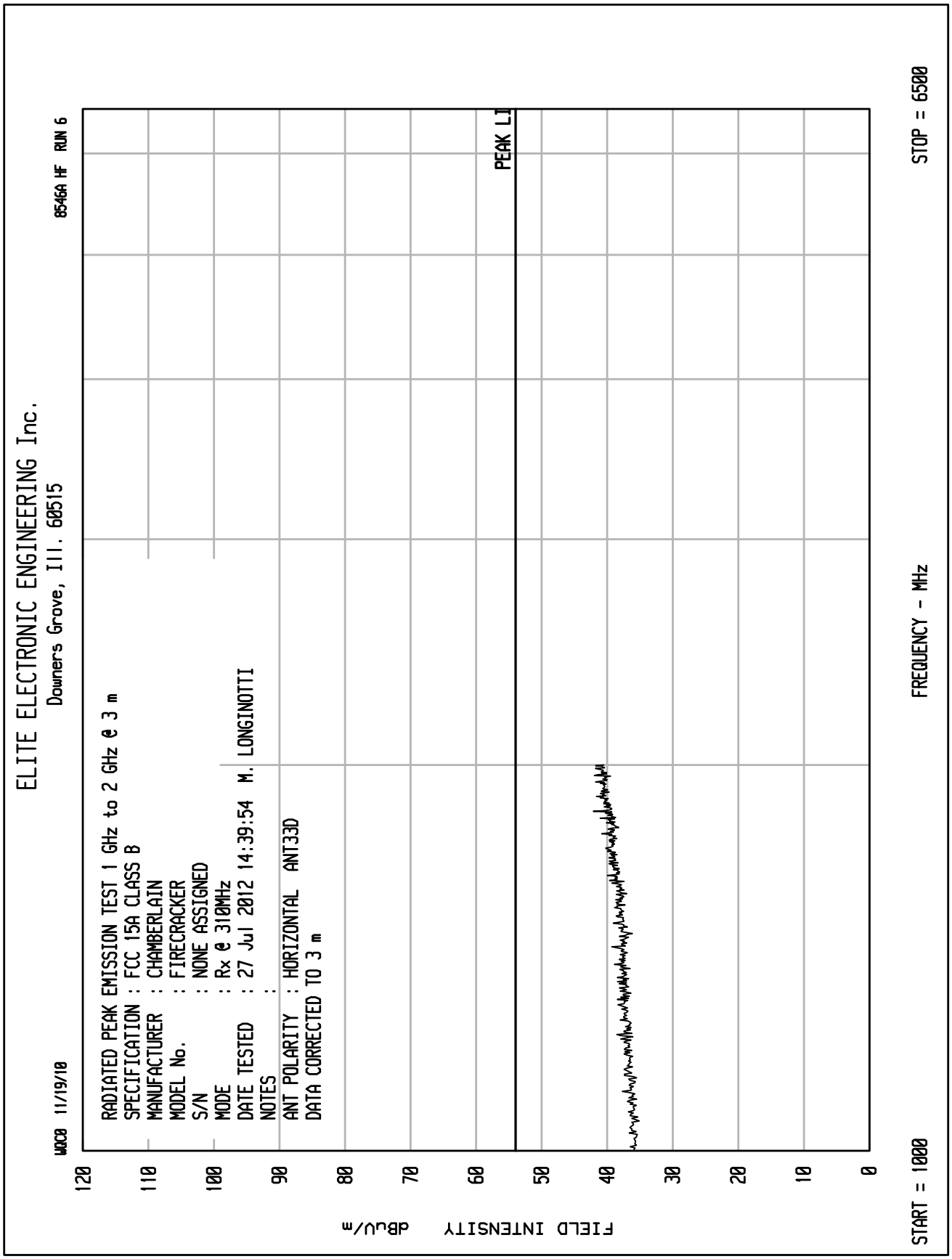


Emissions Meet QP Limit
Emissions Meet Ave Limit


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
8546A RE RUN 9
11/24/08
PRELIMINARY PEAK RADIATED EMISSION TEST @ 3 METERS
SPECIFICATION : FCC 15B CLASS B
MANUFACTURER : CHAMBERLAIN
MODEL No. : FIRECRACKER
S/N : NONE ASSIGNED
MODE : Rx @ 310MHz
DATE TESTED : 27 Jul 2012 09:13:01 M. LONGINOTTI
NOTES :
ANT POLARITY : HORIZONTAL
DATA CORRECTED TO 3 m
HORIZONTAL
LIMIT
FIELD INTENSITY dBuV/m
FREQUENCY - MHz
START = 30
100
STOP = 1000
120
110
100
90
80
70
60
50
40
30
20
10
0
-10


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
8546A RE RUN 9
VERTICAL
PRELIMINARY PEAK RADIATED EMISSION TEST @ 3 METERS
SPECIFICATION : FCC 15B CLASS B
MANUFACTURER : CHAMBERLAIN
MODEL No. : FIRECRACKER
S/N : NONE ASSIGNED
MODE : Rx @ 310MHz
DATE TESTED : 27 Jul 2012 09:13:01 M. LONGINOTTI
NOTES :
ANT POLARITY : VERTICAL
DATA CORRECTED TO 3 m
LIMIT
FIELD INTENSITY dBuV/m
FREQUENCY - MHz
START = 30
100
STOP = 1000
120
110
100
90
80
70
60
50
40
30
20
10
0
-10


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
8546A HF RUN 6
WQC3 11/19/10
RADIATED PEAK EMISSION TEST 1 GHz to 2 GHz @ 3 m
SPECIFICATION : FCC 15A CLASS B
MANUFACTURER : CHAMBERLAIN
MODEL No. : FIRECRACKER
S/N : NONE ASSIGNED
MODE : Rx @ 310MHz
DATE TESTED : 27 Jul 2012 14:39:54 M. LONGINOTTI
NOTES : :
ANT POLARITY : VERTICAL ANT33D
DATA CORRECTED TO 3 m
PEAK LI
FIELD INTENSITY dBuV/m
120
110
100
90
80
70
60
50
40
30
20
10
0
START = 1000
FREQUENCY - MHz
STOP = 6500


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
WQC9 11/19/10
8546A HF RUN 6
RADIATED PEAK EMISSION TEST 1 GHz to 2 GHz @ 3 m
SPECIFICATION : FCC 15A CLASS B
MANUFACTURER : CHAMBERLAIN
MODEL No. : FIRECRACKER
S/N : NONE ASSIGNED
MODE : Rx @ 310MHz
DATE TESTED : 27 Jul 2012 14:39:54 M. LONGINOTTI
NOTES : :
ANT POLARITY : HORIZONTAL ANT33D
DATA CORRECTED TO 3 m
PEAK LI
FIELD INTENSITY dBuV/m
120
110
100
90
80
70
60
50
40
30
20
10
0
START = 1000
FREQUENCY - MHz
STOP = 6500

ETR No. 8546A
DATA SHEET TEST NO. 9

RADIATED QP EMISSION MEASUREMENTS in a 3 m SEMI-ANECHOIC ROOM
SPECIFICATION : FCC 15B CLASS B
MANUFACTURER : CHAMBERLAIN
MODEL NO. : FIRECRACKER
SERIAL NO. : NONE ASSIGNED
TEST MODE : Rx @ 310MHz
NOTES :
TEST DATE : 27 Jul 2012 09:13:01
TEST DISTANCE : 3 m (DATA EXTRAPOLATED TO 3 m)

FREQUENCY MHz	QP READING dBuV	ANT FAC dB	CBL FAC dB	EXT ATTN dB	DIST FAC dB	TOTAL dBuV/m	QP LIMIT dBuV/m	AZ deg	ANT HT cm	POLAR
35.76	5.0	15.7	.5	0.0	0.0	21.1	40.0	315	340	H
54.83	-2.0	6.7	.5	0.0	0.0	5.2	40.0	270	120	V
82.63	-2.0	8.0	.5	0.0	0.0	6.5	40.0	180	120	V
114.64	-2.0	12.0	.6	0.0	0.0	10.6	43.5	180	340	H
125.32	-2.0	11.6	.7	0.0	0.0	10.3	43.5	135	340	V
163.99	2.0	10.0	.9	0.0	0.0	12.9	43.5	90	200	H
168.26	-1.7	9.8	.9	0.0	0.0	9.0	43.5	225	200	H
247.39	-1.3	12.4	1.0	0.0	0.0	12.1	46.0	-0	120	V
359.87	-.8	14.8	1.3	0.0	0.0	15.4	46.0	135	120	V
471.46	-1.3	17.0	1.5	0.0	0.0	17.2	46.0	45	340	V
532.33	-1.5	19.8	1.5	0.0	0.0	19.7	46.0	270	340	H
673.87	-.8	19.7	1.7	0.0	0.0	20.5	46.0	270	340	H
794.94	-.7	20.6	2.0	0.0	0.0	21.9	46.0	0	340	H
866.59	-.8	20.5	2.0	0.0	0.0	21.7	46.0	315	120	V
940.90	-.5	21.2	2.0	0.0	0.0	22.7	46.0	315	120	V

tested by: MARK E. LONGINOTTI
M. LONGINOTTI

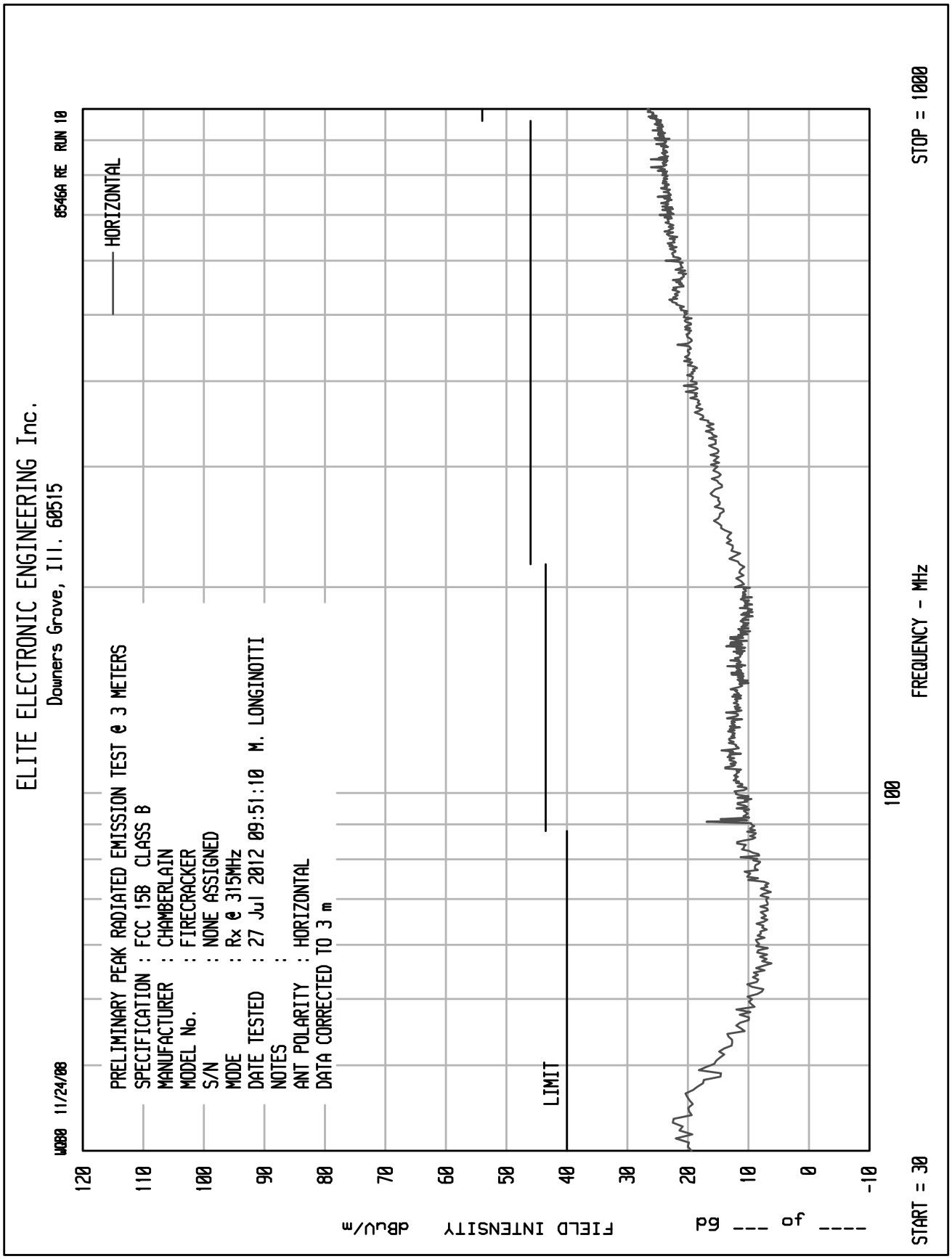
DATA SHEET HF TEST NO. 6

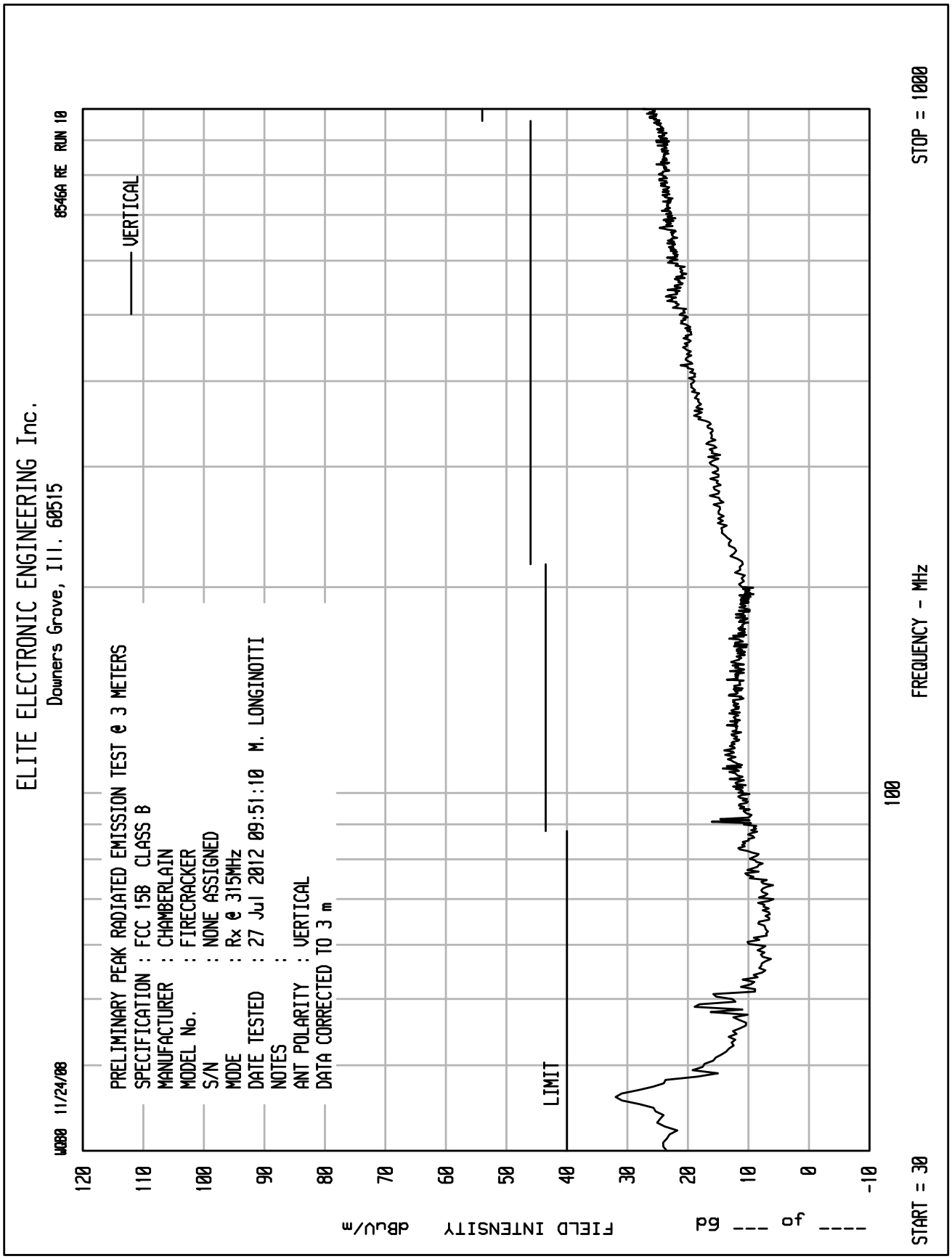
RADIATED AVG EMISSION MEASUREMENTS >=1000 MHz in a 3 m ANECHOIC ROOM

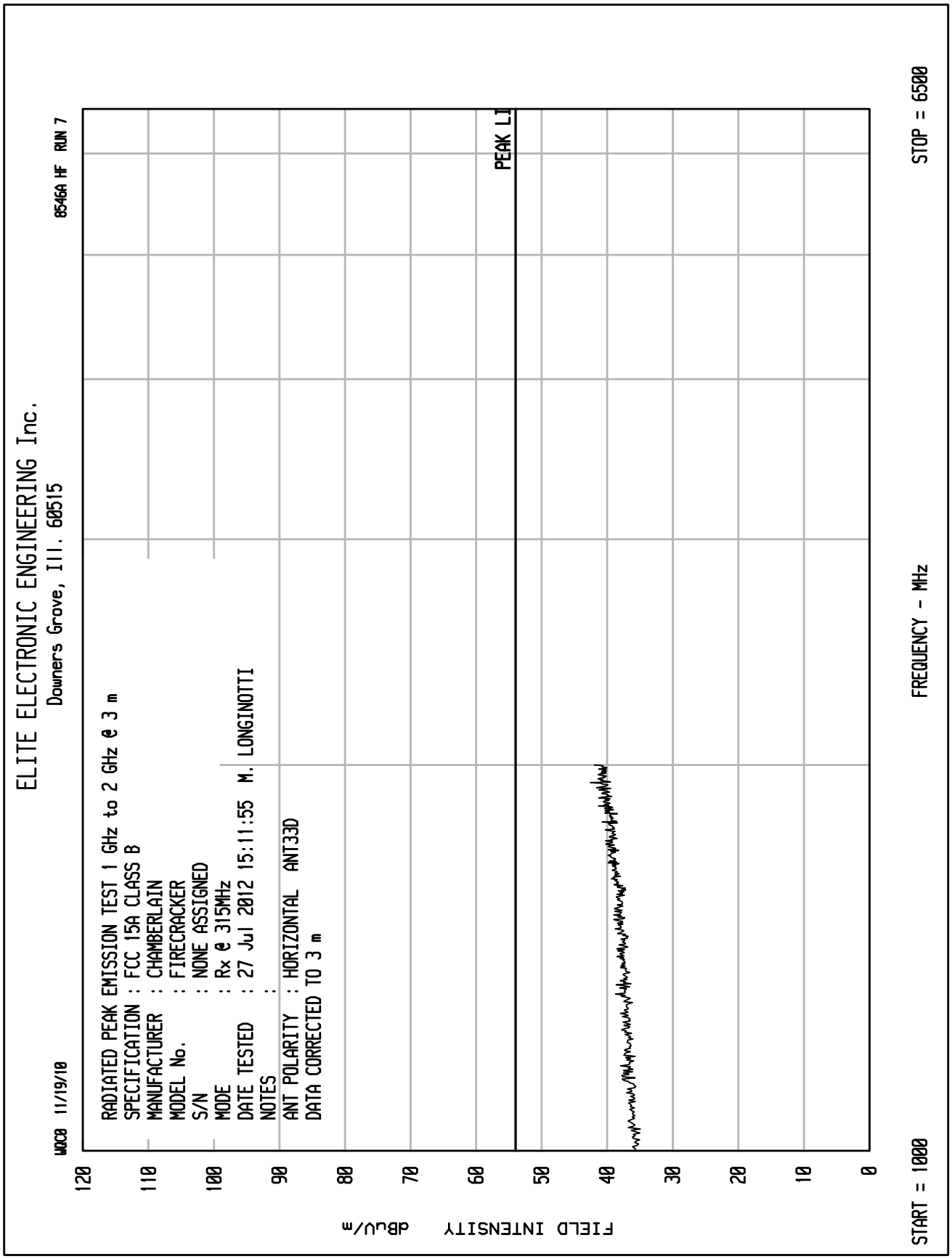
SPECIFICATION : FCC 15A CLASS B
MANUFACTURER : CHAMBERLAIN
MODEL NO. : FIRECRACKER
SERIAL NO. : NONE ASSIGNED
TEST MODE : Rx @ 310MHz
NOTES :
TEST DATE : 27 Jul 2012 14:39:54
TEST DISTANCE : 3 m
ANTENNA : ANT33D

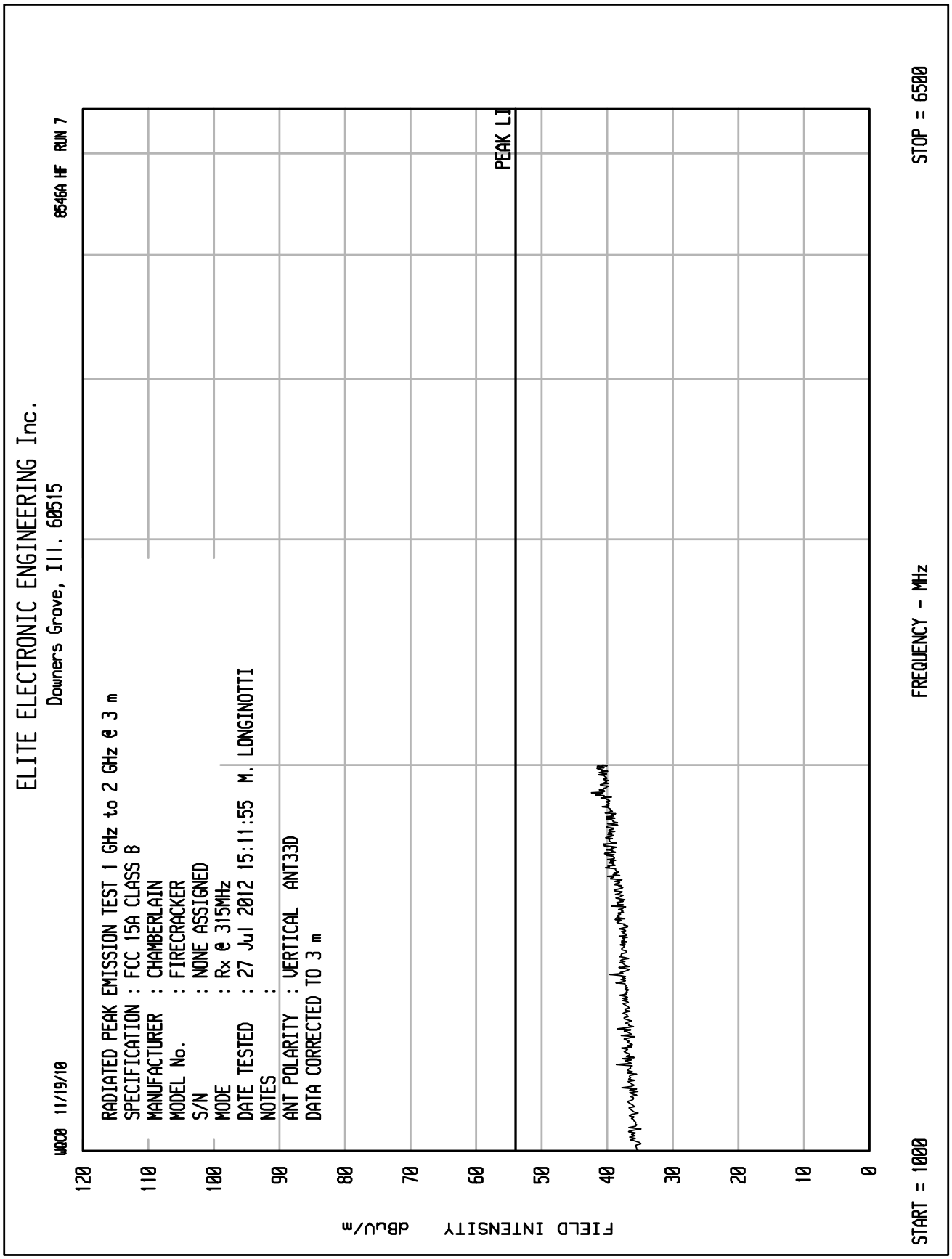
FREQUENCY MHz	AVG READING dBuV	ANT FAC dB	CBL FAC dB	DIST FAC dB	TOTAL dBuV/m	AVG LIMIT dBuV/m	PASS/ FAIL	AZ deg	ANT HT cm	POLAR
1143.06	-3.4	24.6	2.2	0.0	23.4	54.0		315	120	H
1211.89	-3.6	24.7	2.3	0.0	23.4	54.0		269	200	H
1411.24	-2.9	25.0	2.5	0.0	24.6	54.0		225	340	H
1506.80	-3.3	25.1	2.6	0.0	24.4	54.0		225	200	V
1544.97	-2.8	25.2	2.6	0.0	25.1	54.0		315	340	V
1787.56	-3.0	26.4	2.8	0.0	26.3	54.0		45	340	H
1825.76	-2.9	26.7	2.9	0.0	26.7	54.0		135	340	H
1943.65	-3.3	27.6	3.0	0.0	27.2	54.0		315	200	V

tested by: MARK E. LONGINOTTI
M. LONGINOTTI


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
8546A RE RUN 10
HORIZONTAL
PRELIMINARY PEAK RADIATED EMISSION TEST @ 3 METERS
SPECIFICATION : FCC 15B CLASS B
MANUFACTURER : CHAMBERLAIN
MODEL No. : FIRECRACKER
S/N : NONE ASSIGNED
MODE : Rx @ 315MHz
DATE TESTED : 27 Jul 2012 09:51:10 M. LONGINOTTI
NOTES :
ANT POLARITY : HORIZONTAL
DATA CORRECTED TO 3 m
LIMIT
FIELD INTENSITY dBuV/m
FREQUENCY - MHz
START = 30
100
STOP = 1000
120
110
100
90
80
70
60
50
40
30
20
10
0
-10


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
8546A RE RUN 10
VERTICAL
PRELIMINARY PEAK RADIATED EMISSION TEST @ 3 METERS
SPECIFICATION : FCC 15B CLASS B
MANUFACTURER : CHAMBERLAIN
MODEL No. : FIRECRACKER
S/N : NONE ASSIGNED
MODE : Rx @ 315MHz
DATE TESTED : 27 Jul 2012 09:51:10 M. LONGINOTTI
NOTES :
ANT POLARITY : VERTICAL
DATA CORRECTED TO 3 m
LIMIT
FIELD INTENSITY dBuV/m
---- of --- dB
FREQUENCY - MHz
START = 30
100
STOP = 1000
120
110
100
90
80
70
60
50
40
30
20
10
0
-10


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
WQC9 11/19/10
8546A HF RUN 7
RADIATED PEAK EMISSION TEST 1 GHz to 2 GHz @ 3 m
SPECIFICATION : FCC 15A CLASS B
MANUFACTURER : CHAMBERLAIN
MODEL No. : FIRECRACKER
S/N : NONE ASSIGNED
MODE : Rx @ 315MHz
DATE TESTED : 27 Jul 2012 15:11:55 M. LONGINOTTI
NOTES : :
ANT POLARITY : HORIZONTAL ANT33D
DATA CORRECTED TO 3 m
PEAK LI
FIELD INTENSITY dBuV/m
120
110
100
90
80
70
60
50
40
30
20
10
0
START = 1000
FREQUENCY - MHz
STOP = 6500


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
8546A HF RUN 7
WQC3 11/19/10
RADIATED PEAK EMISSION TEST 1 GHz to 2 GHz @ 3 m
SPECIFICATION : FCC 15A CLASS B
MANUFACTURER : CHAMBERLAIN
MODEL No. : FIRECRACKER
S/N : NONE ASSIGNED
MODE : Rx @ 315MHz
DATE TESTED : 27 Jul 2012 15:11:55 M. LONGINOTTI
NOTES : :
ANT POLARITY : VERTICAL ANT33D
DATA CORRECTED TO 3 m
PEAK LI
FIELD INTENSITY dBuV/m
120
110
100
90
80
70
60
50
40
30
20
10
0
START = 1000
FREQUENCY - MHz
STOP = 6500

ETR No. 8546A
DATA SHEET TEST NO. 10

RADIATED QP EMISSION MEASUREMENTS in a 3 m SEMI-ANECHOIC ROOM
SPECIFICATION : FCC 15B CLASS B
MANUFACTURER : CHAMBERLAIN
MODEL NO. : FIRECRACKER
SERIAL NO. : NONE ASSIGNED
TEST MODE : Rx @ 315MHz
NOTES :
TEST DATE : 27 Jul 2012 09:51:10
TEST DISTANCE : 3 m (DATA EXTRAPOLATED TO 3 m)

FREQUENCY MHz	QP READING dBuV	ANT FAC dB	CBL FAC dB	EXT ATTN dB	DIST FAC dB	TOTAL dBuV/m	QP LIMIT dBuV/m	AZ deg	ANT HT cm	POLAR
36.65	-.2	15.2	.5	0.0	0.0	15.5	40.0	45	340	V
51.24	-2.0	8.0	.5	0.0	0.0	6.6	40.0	270	200	V
90.09	4.4	9.1	.5	0.0	0.0	13.9	43.5	270	200	H
115.02	-2.0	12.0	.6	0.0	0.0	10.6	43.5	45	120	H
131.67	-1.9	11.3	.7	0.0	0.0	10.1	43.5	270	340	H
161.99	-.9	10.1	.8	0.0	0.0	10.0	43.5	270	340	H
168.98	-.9	9.8	.9	0.0	0.0	9.8	43.5	180	200	V
249.99	-.8	12.6	1.0	0.0	0.0	12.7	46.0	45	340	H
355.30	-.8	14.7	1.3	0.0	0.0	15.2	46.0	90	340	V
452.10	-1.2	17.0	1.5	0.0	0.0	17.3	46.0	135	120	H
532.33	-1.5	19.8	1.5	0.0	0.0	19.8	46.0	135	340	V
671.10	-1.0	19.7	1.7	0.0	0.0	20.3	46.0	1	120	V
742.51	-.5	20.0	1.9	0.0	0.0	21.4	46.0	315	200	H
846.00	-.8	20.4	2.0	0.0	0.0	21.6	46.0	315	200	H
936.13	-.5	21.2	2.0	0.0	0.0	22.7	46.0	90	200	H

tested by: MARK E. LONGINOTTI
M. LONGINOTTI

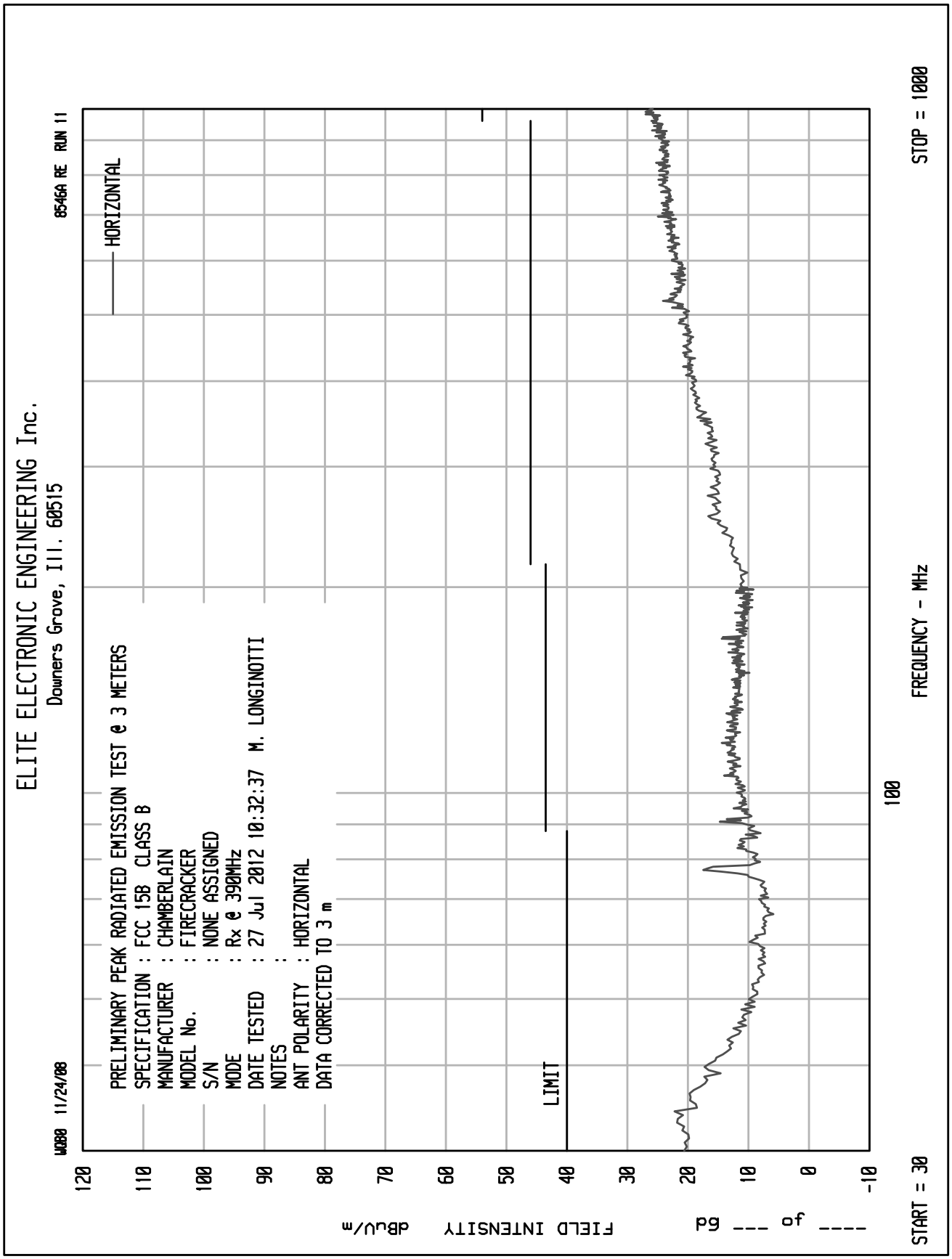
DATA SHEET HF TEST NO. 7

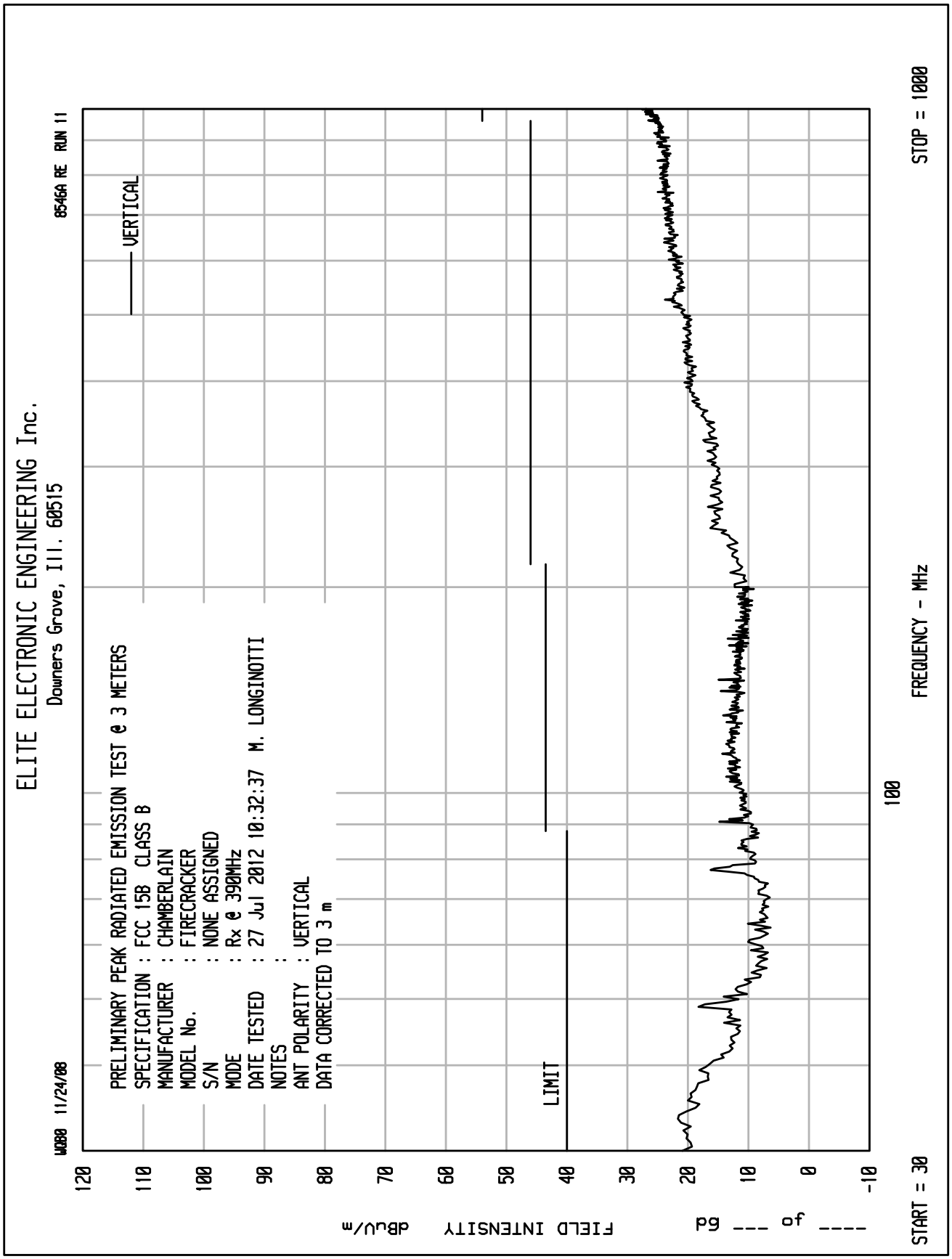
RADIATED AVG EMISSION MEASUREMENTS >=1000 MHz in a 3 m ANECHOIC ROOM

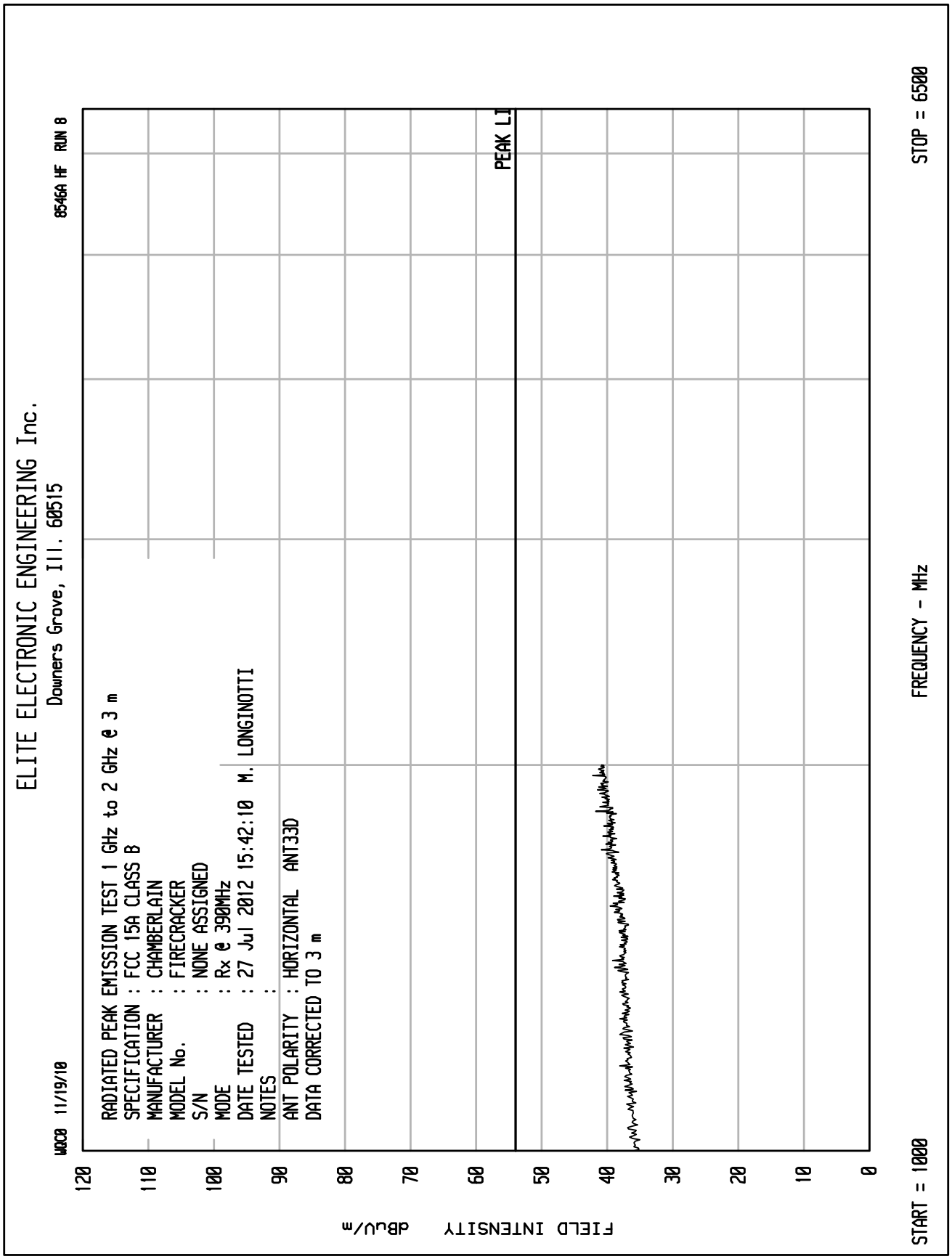
SPECIFICATION : FCC 15A CLASS B
MANUFACTURER : CHAMBERLAIN
MODEL NO. : FIRECRACKER
SERIAL NO. : NONE ASSIGNED
TEST MODE : Rx @ 315MHz
NOTES :
TEST DATE : 27 Jul 2012 15:11:55
TEST DISTANCE : 3 m
ANTENNA : ANT33D

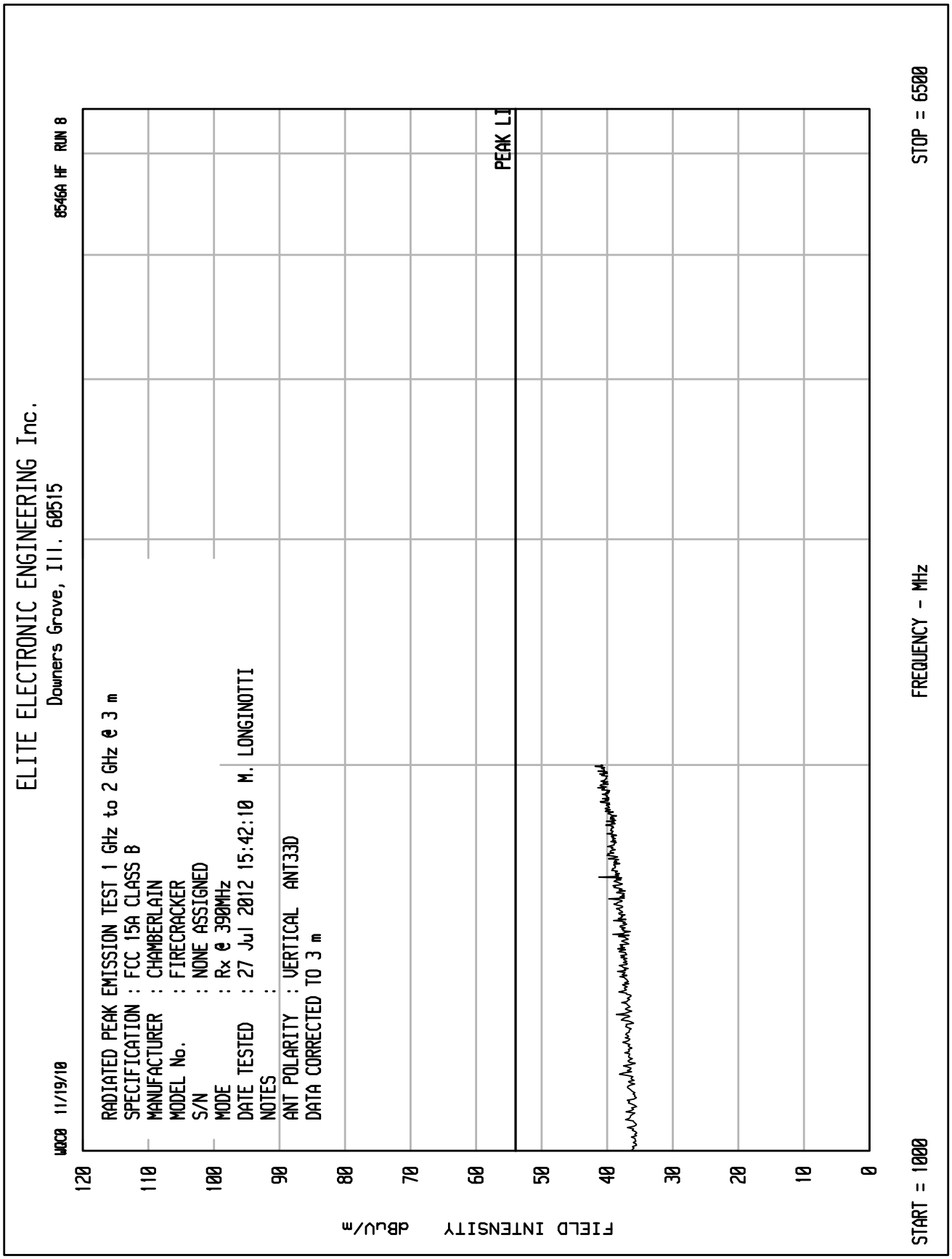
FREQUENCY MHz	AVG READING dBuV	ANT FAC dB	CBL FAC dB	DIST FAC dB	TOTAL dBuV/m	AVG LIMIT dBuV/m	PASS/ FAIL	AZ deg	ANT HT cm	POLAR
1103.03	-3.4	24.5	2.1	0.0	23.2	54.0		180	120	V
1161.39	-3.2	24.6	2.2	0.0	23.6	54.0		-0	200	V
1358.74	-3.0	25.0	2.4	0.0	24.4	54.0		45	200	V
1541.39	-2.7	25.2	2.6	0.0	25.2	54.0		225	340	H
1629.67	-3.2	25.7	2.7	0.0	25.2	54.0		45	200	V
1807.40	-3.2	26.5	2.9	0.0	26.2	54.0		225	120	H
1939.07	-2.9	27.6	3.0	0.0	27.6	54.0		0	340	H
2001.49	-3.2	27.6	3.0	0.0	27.4	54.0		0	120	H

tested by: MARK E. LONGINOTTI
M. LONGINOTTI


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
8546A RE RUN 11
11/24/08
PRELIMINARY PEAK RADIATED EMISSION TEST @ 3 METERS
SPECIFICATION : FCC 15B CLASS B
MANUFACTURER : CHAMBERLAIN
MODEL No. : FIRECRACKER
S/N : NONE ASSIGNED
MODE : Rx @ 390MHz
DATE TESTED : 27 Jul 2012 10:32:37 M. LONGINOTTI
NOTES :
ANT POLARITY : HORIZONTAL
DATA CORRECTED TO 3 m
HORIZONTAL
LIMIT
FIELD INTENSITY dBuV/m
FREQUENCY - MHz
START = 30
100
STOP = 1000
120
110
100
90
80
70
60
50
40
30
20
10
0
-10


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
8546A RE RUN 11
VERTICAL
PRELIMINARY PEAK RADIATED EMISSION TEST @ 3 METERS
SPECIFICATION : FCC 15B CLASS B
MANUFACTURER : CHAMBERLAIN
MODEL No. : FIRECRACKER
S/N : NONE ASSIGNED
MODE : Rx @ 390MHz
DATE TESTED : 27 Jul 2012 10:32:37 M. LONGINOTTI
NOTES :
ANT POLARITY : VERTICAL
DATA CORRECTED TO 3 m
LIMIT
FIELD INTENSITY dBuV/m
FREQUENCY - MHz
START = 30
100
STOP = 1000
120
110
100
90
80
70
60
50
40
30
20
10
0
-10


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
WQC9 11/19/10
8546A HF RUN 8
RADIATED PEAK EMISSION TEST 1 GHz to 2 GHz @ 3 m
SPECIFICATION : FCC 15A CLASS B
MANUFACTURER : CHAMBERLAIN
MODEL No. : FIRECRACKER
S/N : NONE ASSIGNED
MODE : Rx @ 390MHz
DATE TESTED : 27 Jul 2012 15:42:10 M. LONGINOTTI
NOTES : :
ANT POLARITY : HORIZONTAL ANT33D
DATA CORRECTED TO 3 m
PEAK LI
FIELD INTENSITY dBuV/m
120
110
100
90
80
70
60
50
40
30
20
10
0
START = 1000
FREQUENCY - MHz
STOP = 6500


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
WQC9 11/19/10
8546A HF RUN 8
RADIATED PEAK EMISSION TEST 1 GHz to 2 GHz @ 3 m
SPECIFICATION : FCC 15A CLASS B
MANUFACTURER : CHAMBERLAIN
MODEL No. : FIRECRACKER
S/N : NONE ASSIGNED
MODE : Rx @ 390MHz
DATE TESTED : 27 Jul 2012 15:42:10 M. LONGINOTTI
NOTES : :
ANT POLARITY : VERTICAL ANT33D
DATA CORRECTED TO 3 m
PEAK LI
FIELD INTENSITY dBuV/m
120
110
100
90
80
70
60
50
40
30
20
10
0
START = 1000
FREQUENCY - MHz
STOP = 6500

ETR No. 8546A
DATA SHEET TEST NO. 11

RADIATED QP EMISSION MEASUREMENTS in a 3 m SEMI-ANECHOIC ROOM
SPECIFICATION : FCC 15B CLASS B
MANUFACTURER : CHAMBERLAIN
MODEL NO. : FIRECRACKER
SERIAL NO. : NONE ASSIGNED
TEST MODE : Rx @ 390MHz
NOTES :
TEST DATE : 27 Jul 2012 10:32:37
TEST DISTANCE : 3 m (DATA EXTRAPOLATED TO 3 m)

FREQUENCY MHz	QP READING dBuV	ANT FAC dB	CBL FAC dB	EXT ATTN dB	DIST FAC dB	TOTAL dBuV/m	QP LIMIT dBuV/m	AZ deg	ANT HT cm	POLAR
33.98	-.8	16.5	.5	0.0	0.0	16.3	40.0	270	120	H
52.16	-1.6	7.6	.5	0.0	0.0	6.5	40.0	-0	200	V
76.83	2.1	7.3	.5	0.0	0.0	9.8	40.0	45	200	H
115.69	-1.8	12.0	.6	0.0	0.0	10.8	43.5	0	120	H
142.44	-1.9	10.9	.8	0.0	0.0	9.7	43.5	90	200	V
146.33	-1.8	10.7	.8	0.0	0.0	9.7	43.5	180	120	V
166.69	-1.6	9.9	.9	0.0	0.0	9.2	43.5	270	120	H
260.38	-1.3	12.8	1.0	0.0	0.0	12.5	46.0	180	200	H
359.21	-.7	14.8	1.3	0.0	0.0	15.5	46.0	180	340	H
457.75	-1.2	17.0	1.5	0.0	0.0	17.3	46.0	180	200	V
520.45	-1.5	20.0	1.5	0.0	0.0	20.0	46.0	135	340	H
635.82	-1.4	19.9	1.6	0.0	0.0	20.1	46.0	270	200	V
757.89	-.6	20.2	1.9	0.0	0.0	21.5	46.0	135	200	V
830.07	-.7	20.5	2.0	0.0	0.0	21.7	46.0	45	120	H
963.62	-.5	21.6	2.0	0.0	0.0	23.1	54.0	269	200	V

tested by: MARK E. LONGINOTTI
M. LONGINOTTI

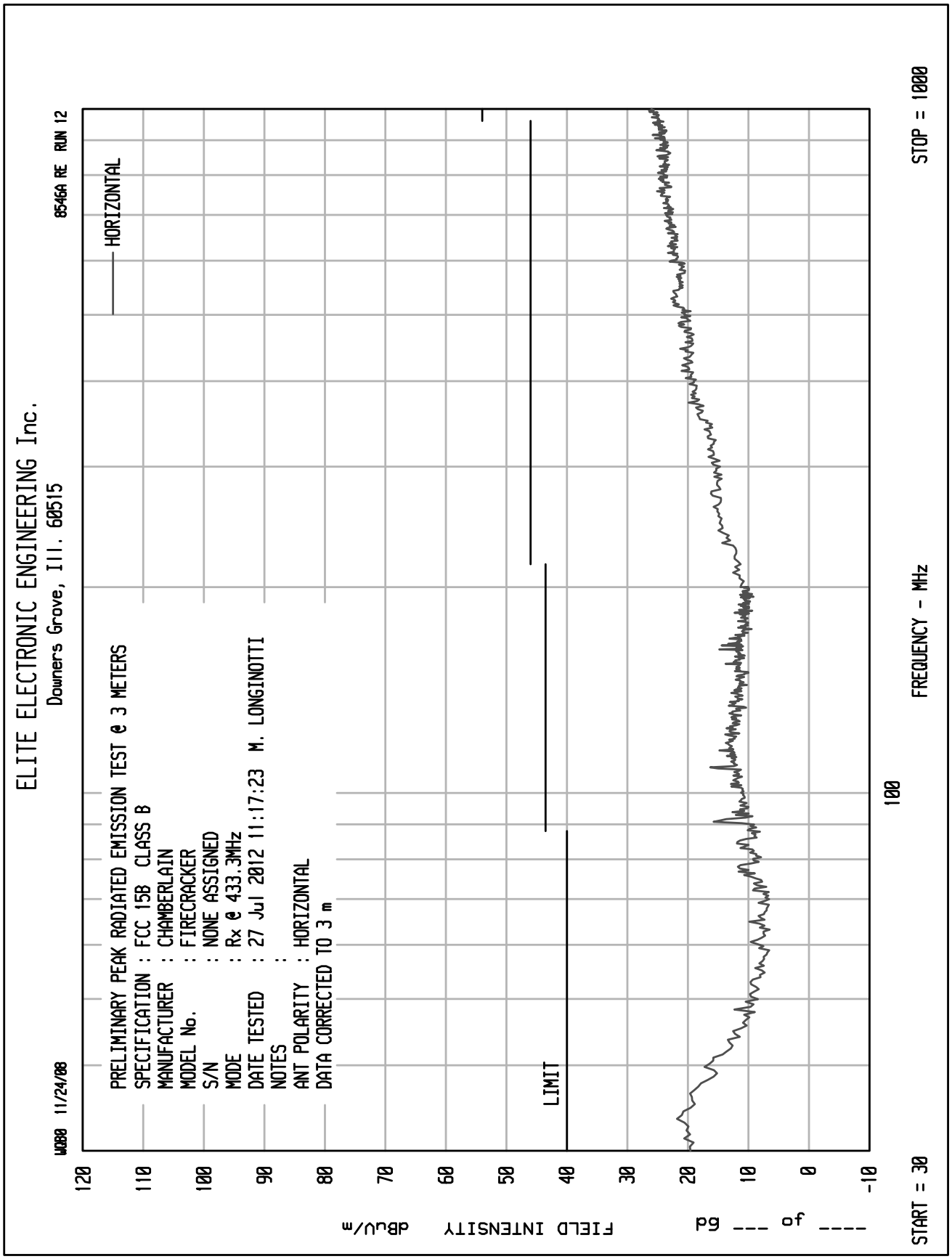
DATA SHEET HF TEST NO. 8

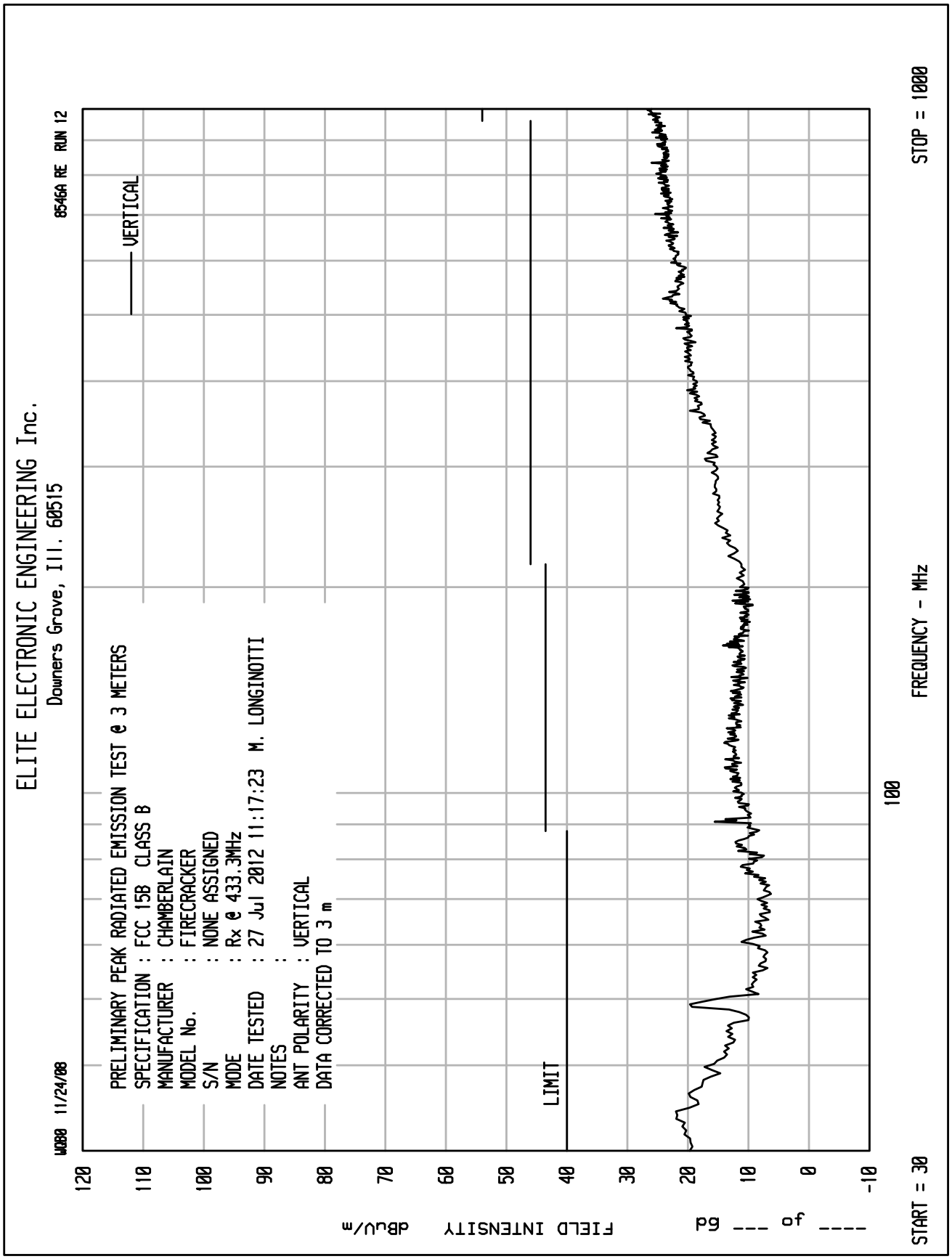
RADIATED AVG EMISSION MEASUREMENTS >=1000 MHz in a 3 m ANECHOIC ROOM

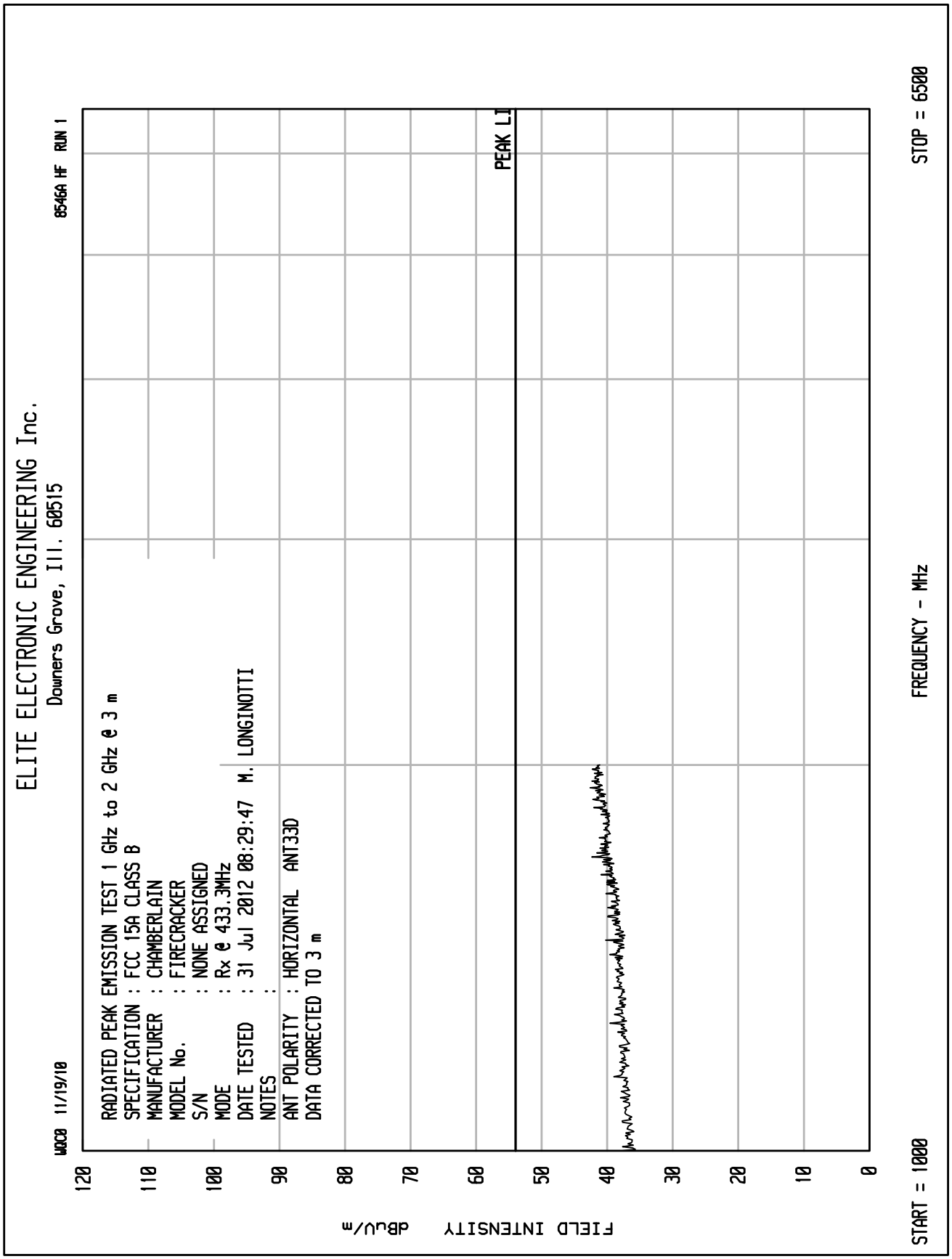
SPECIFICATION : FCC 15A CLASS B
MANUFACTURER : CHAMBERLAIN
MODEL NO. : FIRECRACKER
SERIAL NO. : NONE ASSIGNED
TEST MODE : Rx @ 390MHz
NOTES :
TEST DATE : 27 Jul 2012 15:42:10
TEST DISTANCE : 3 m
ANTENNA : ANT33D

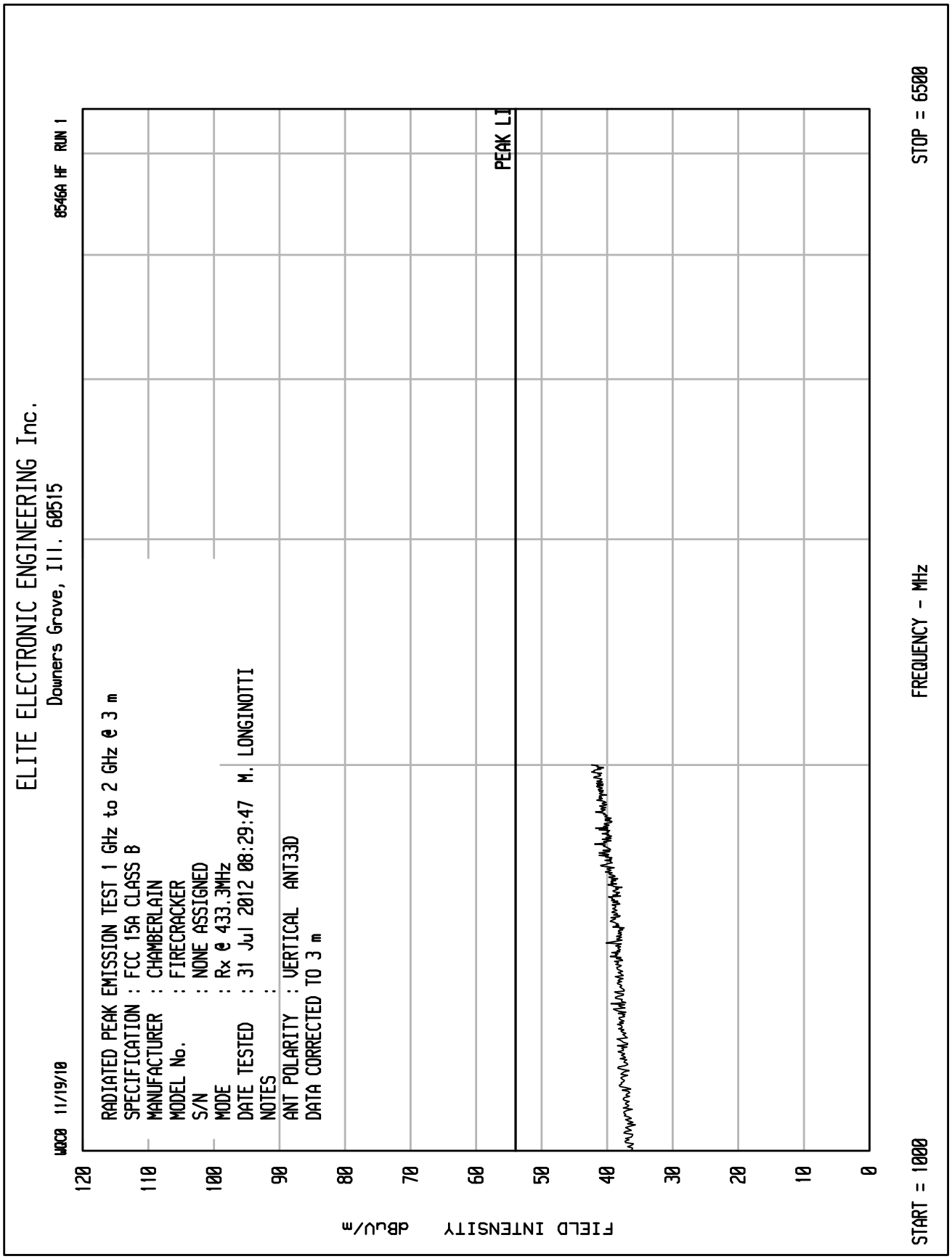
FREQUENCY MHz	AVG READING dBuV	ANT FAC dB	CBL FAC dB	DIST FAC dB	TOTAL dBuV/m	AVG LIMIT dBuV/m	PASS/ FAIL	AZ deg	ANT HT cm	POLAR
1097.61	-3.4	24.4	2.1	0.0	23.2	54.0		135	200	H
1158.38	-3.2	24.6	2.2	0.0	23.7	54.0		270	200	V
1405.58	-3.0	25.0	2.5	0.0	24.5	54.0		270	120	H
1408.57	-3.1	25.0	2.5	0.0	24.4	54.0		315	200	H
1633.54	-3.3	25.8	2.7	0.0	25.2	54.0		135	120	V
1728.09	-2.7	26.4	2.8	0.0	26.5	54.0		135	120	H
1817.22	-3.0	26.6	2.9	0.0	26.5	54.0		1	200	H
1954.60	-2.8	27.6	3.0	0.0	27.7	54.0		180	200	H

tested by: MARK E. LONGINOTTI
M. LONGINOTTI


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
8546A RE RUN 12
HORIZONTAL
PRELIMINARY PEAK RADIATED EMISSION TEST @ 3 METERS
SPECIFICATION : FCC 15B CLASS B
MANUFACTURER : CHAMBERLAIN
MODEL No. : FIRECRACKER
S/N : NONE ASSIGNED
MODE : Rx @ 433.3MHz
DATE TESTED : 27 Jul 2012 11:17:23 M. LONGINOTTI
NOTES :
ANT POLARITY : HORIZONTAL
DATA CORRECTED TO 3 m
LIMIT
FIELD INTENSITY dBuV/m
FREQUENCY - MHz
START = 30
100
STOP = 1000
120
110
100
90
80
70
60
50
40
30
20
10
0
-10


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
8546A RE RUN 12
PRELIMINARY PEAK RADIATED EMISSION TEST @ 3 METERS
SPECIFICATION : FCC 15B CLASS B
MANUFACTURER : CHAMBERLAIN
MODEL No. : FIRECRACKER
S/N : NONE ASSIGNED
MODE : Rx @ 433.3MHz
DATE TESTED : 27 Jul 2012 11:17:23 M. LONGINOTTI
NOTES :
ANT POLARITY : VERTICAL
DATA CORRECTED TO 3 m
VERTICAL
LIMIT
FIELD INTENSITY dBuV/m
FREQUENCY - MHz
START = 30
100
STOP = 1000
120
110
100
90
80
70
60
50
40
30
20
10
0
-10


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
WQC9 11/19/10
8546A HF RUN 1
RADIATED PEAK EMISSION TEST 1 GHz to 2 GHz @ 3 m
SPECIFICATION : FCC 15A CLASS B
MANUFACTURER : CHAMBERLAIN
MODEL No. : FIRECRACKER
S/N : NONE ASSIGNED
MODE : Rx @ 433.3MHz
DATE TESTED : 31 Jul 2012 08:29:47 M. LONGINOTTI
NOTES : :
ANT POLARITY : HORIZONTAL ANT33D
DATA CORRECTED TO 3 m
PEAK LI
FIELD INTENSITY dBuV/m
120
110
100
90
80
70
60
50
40
30
20
10
0
START = 1000
FREQUENCY - MHz
STOP = 6500


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
WQC9 11/19/10
8546A HF RUN 1
RADIATED PEAK EMISSION TEST 1 GHz to 2 GHz @ 3 m
SPECIFICATION : FCC 15A CLASS B
MANUFACTURER : CHAMBERLAIN
MODEL No. : FIRECRACKER
S/N : NONE ASSIGNED
MODE : Rx @ 433.3MHz
DATE TESTED : 31 Jul 2012 08:29:47 M. LONGINOTTI
NOTES : :
ANT POLARITY : VERTICAL ANT33D
DATA CORRECTED TO 3 m
PEAK LI
FIELD INTENSITY dBuV/m
120
110
100
90
80
70
60
50
40
30
20
10
0
START = 1000
FREQUENCY - MHz
STOP = 6500

ETR No. 8546A
DATA SHEET TEST NO. 12

RADIATED QP EMISSION MEASUREMENTS in a 3 m SEMI-ANECHOIC ROOM
SPECIFICATION : FCC 15B CLASS B
MANUFACTURER : CHAMBERLAIN
MODEL NO. : FIRECRACKER
SERIAL NO. : NONE ASSIGNED
TEST MODE : Rx @ 433.3MHz
NOTES :
TEST DATE : 27 Jul 2012 11:17:23
TEST DISTANCE : 3 m (DATA EXTRAPOLATED TO 3 m)

FREQUENCY MHz	QP READING dBuV	ANT FAC dB	CBL FAC dB	EXT ATTN dB	DIST FAC dB	TOTAL dBuV/m	QP LIMIT dBuV/m	AZ deg	ANT HT cm	POLAR
36.14	.2	15.4	.5	0.0	0.0	16.1	40.0	225	200	V
62.25	-2.0	6.0	.5	0.0	0.0	4.5	40.0	0	120	V
91.72	-2.3	9.4	.5	0.0	0.0	7.6	43.5	0	200	H
109.73	-2.0	11.7	.6	0.0	0.0	10.3	43.5	45	200	H
120.57	-1.9	11.8	.6	0.0	0.0	10.5	43.5	315	200	H
162.99	1.6	10.1	.9	0.0	0.0	12.5	43.5	270	200	H
166.99	1.7	9.9	.9	0.0	0.0	12.5	43.5	270	200	H
247.49	-1.2	12.4	1.0	0.0	0.0	12.2	46.0	180	340	V
363.93	-.7	15.0	1.3	0.0	0.0	15.7	46.0	225	200	V
447.70	-1.2	17.0	1.5	0.0	0.0	17.3	46.0	315	120	H
534.30	-1.4	19.7	1.5	0.0	0.0	19.7	46.0	0	340	V
678.73	-.7	19.6	1.7	0.0	0.0	20.6	46.0	0	120	V
701.75	-.6	19.6	1.8	0.0	0.0	20.8	46.0	45	340	V
829.58	-.8	20.5	2.0	0.0	0.0	21.7	46.0	315	120	V
926.02	-.6	21.0	2.0	0.0	0.0	22.5	46.0	270	200	V

tested by: MARK E. LONGINOTTI
M. LONGINOTTI

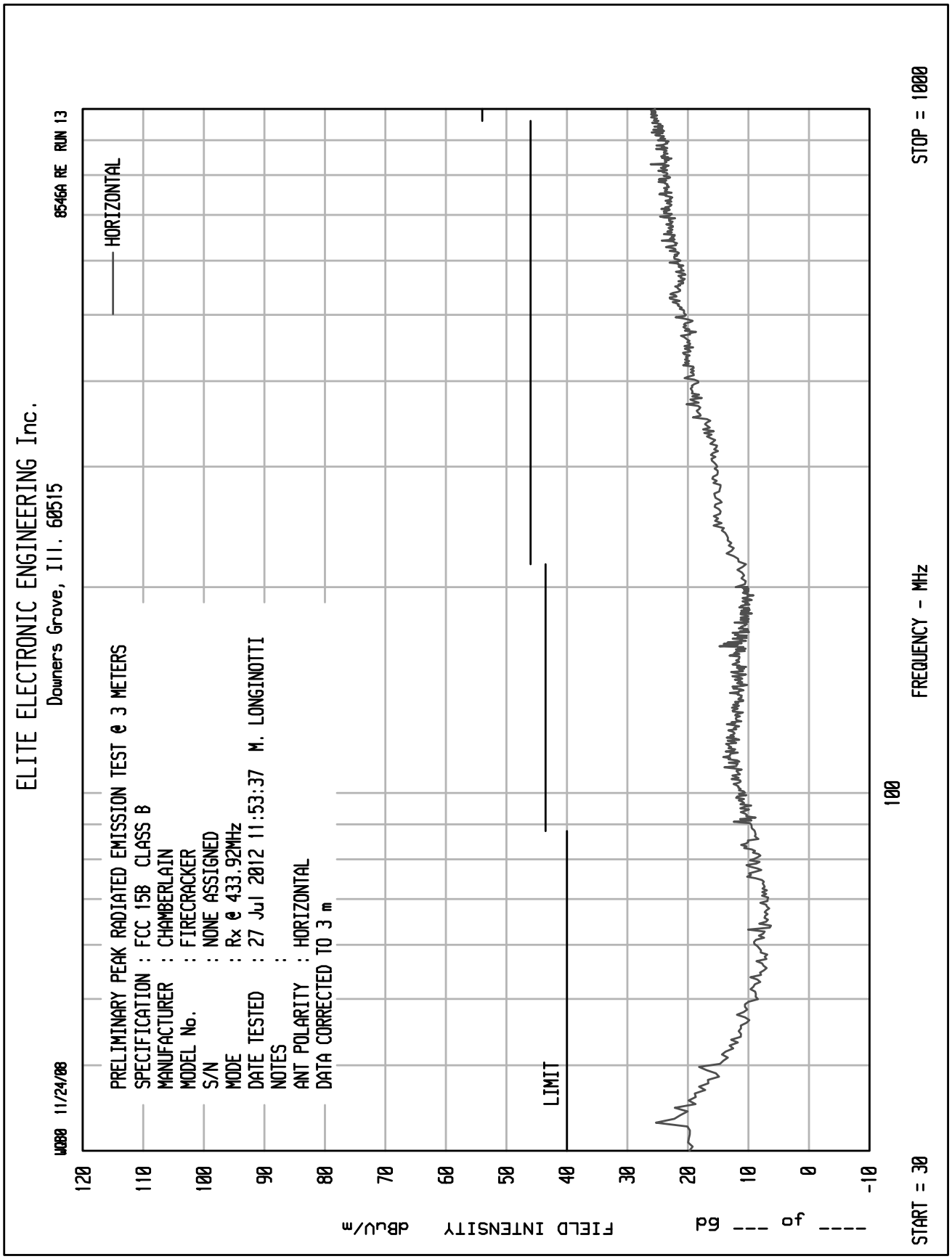
DATA SHEET HF TEST NO. 1

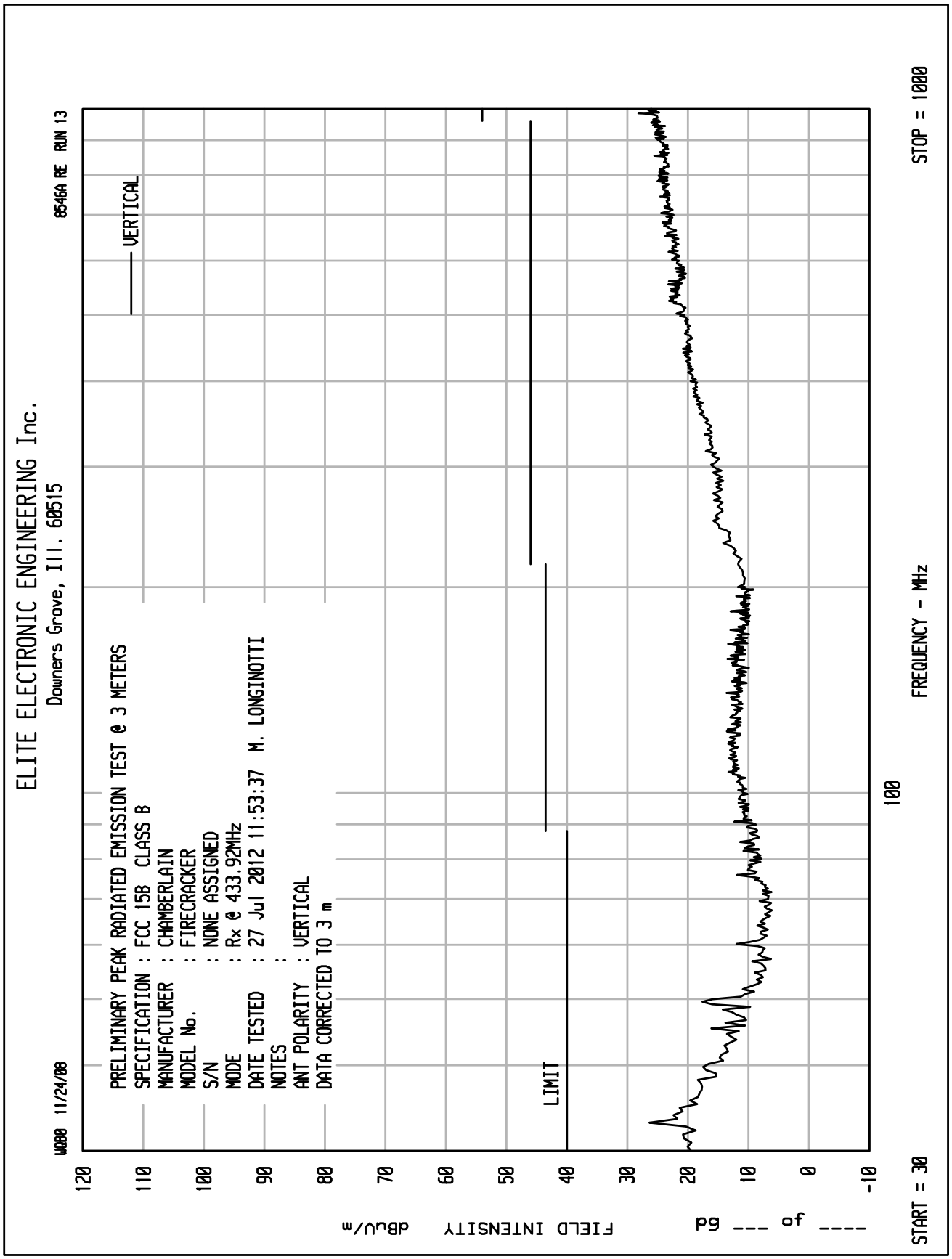
RADIATED AVG EMISSION MEASUREMENTS >=1000 MHz in a 3 m ANECHOIC ROOM

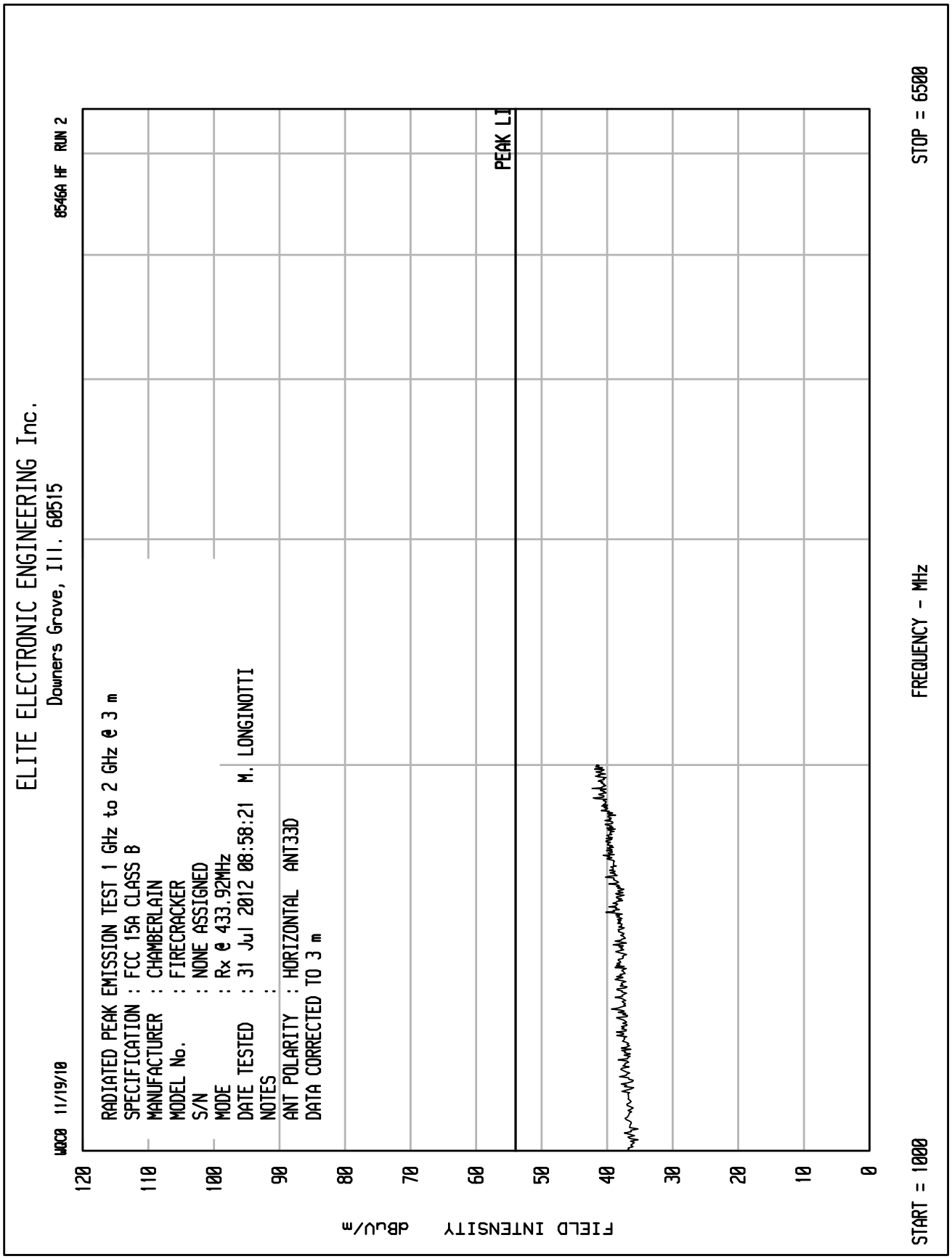
SPECIFICATION : FCC 15A CLASS B
MANUFACTURER : CHAMBERLAIN
MODEL NO. : FIRECRACKER
SERIAL NO. : NONE ASSIGNED
TEST MODE : Rx @ 433.3MHz
NOTES :
TEST DATE : 31 Jul 2012 08:29:47
TEST DISTANCE : 3 m
ANTENNA : ANT33D

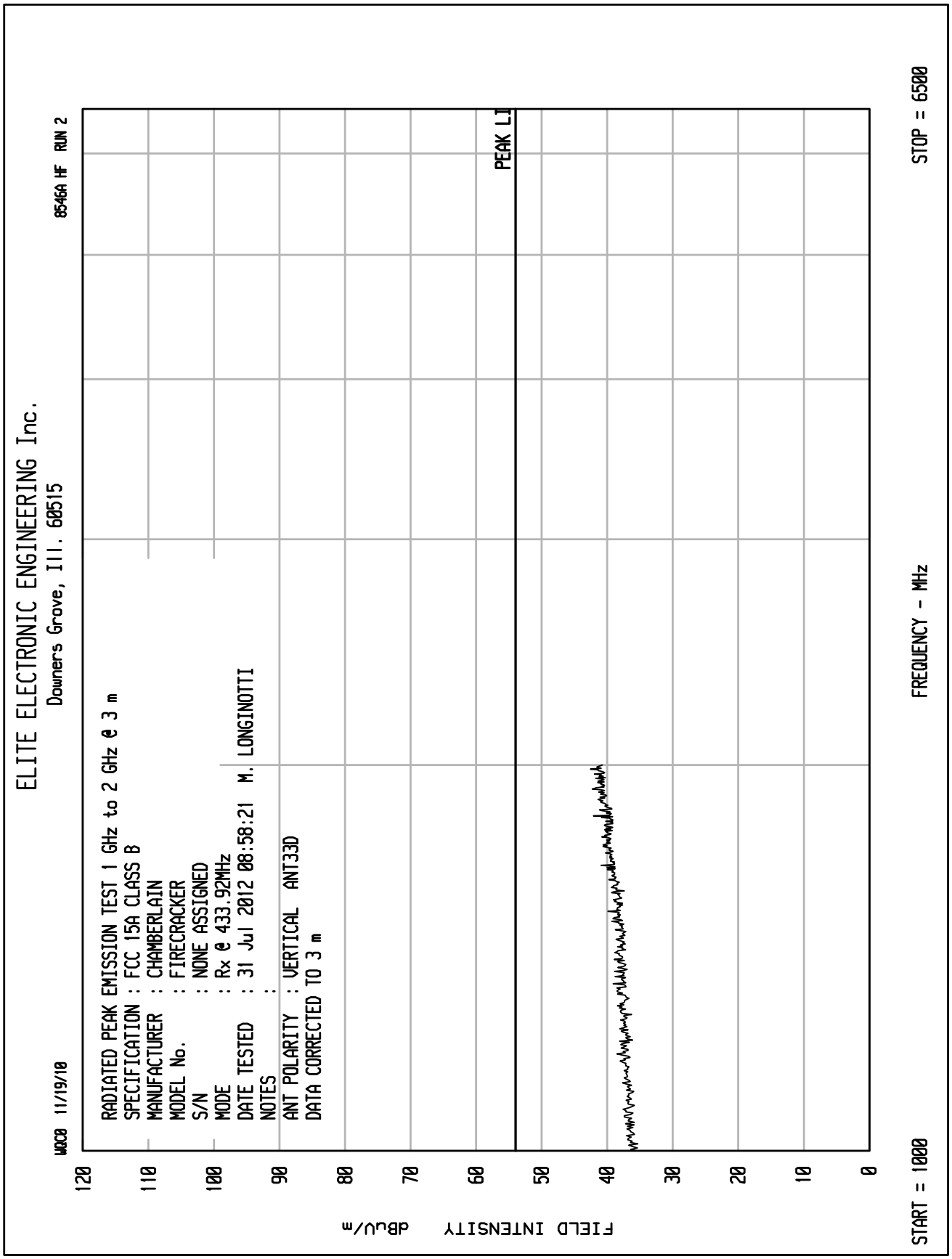
FREQUENCY MHz	AVG READING dBuV	ANT FAC dB	CBL FAC dB	DIST FAC dB	TOTAL dBuV/m	AVG LIMIT dBuV/m	PASS/ FAIL	AZ deg	ANT HT cm	POLAR
1156.97	-2.4	24.6	2.2	0.0	24.4	54.0		270	201	V
1262.37	-2.7	24.8	2.3	0.0	24.5	54.0		-0	340	H
1276.41	-2.5	24.8	2.4	0.0	24.7	54.0		45	200	V
1457.30	-2.5	25.0	2.5	0.0	25.1	54.0		270	340	H
1682.05	-2.4	26.3	2.8	0.0	26.6	54.0		-0	120	V
1694.87	-2.7	26.4	2.8	0.0	26.5	54.0		-0	200	H
1925.13	-2.5	27.5	2.9	0.0	27.9	54.0		225	340	H
1990.49	-2.6	27.6	3.0	0.0	28.0	54.0		-0	120	V

tested by: MARK E. LONGINOTTI
M. LONGINOTTI


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
8546A RE RUN 13
HORIZONTAL
PRELIMINARY PEAK RADIATED EMISSION TEST @ 3 METERS
SPECIFICATION : FCC 15B CLASS B
MANUFACTURER : CHAMBERLAIN
MODEL No. : FIRECRACKER
S/N : NONE ASSIGNED
MODE : Rx @ 433.92MHz
DATE TESTED : 27 Jul 2012 11:53:37 M. LONGINOTTI
NOTES :
ANT POLARITY : HORIZONTAL
DATA CORRECTED TO 3 m
LIMIT
FIELD INTENSITY dBuV/m
FREQUENCY - MHz
START = 30
STOP = 1000
100
120
110
100
90
80
70
60
50
40
30
20
10
0
-10


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
8546A RE RUN 13
VERTICAL
PRELIMINARY PEAK RADIATED EMISSION TEST @ 3 METERS
SPECIFICATION : FCC 15B CLASS B
MANUFACTURER : CHAMBERLAIN
MODEL No. : FIRECRACKER
S/N : NONE ASSIGNED
MODE : Rx @ 433.92MHz
DATE TESTED : 27 Jul 2012 11:53:37 M. LONGINOTTI
NOTES :
ANT POLARITY : VERTICAL
DATA CORRECTED TO 3 m
LIMIT
FIELD INTENSITY dBuV/m
FREQUENCY - MHz
START = 30
100
STOP = 1000
120
110
100
90
80
70
60
50
40
30
20
10
0
-10


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
WQC9 11/19/10
8546A HF RUN 2
RADIATED PEAK EMISSION TEST 1 GHz to 2 GHz @ 3 m
SPECIFICATION : FCC 15A CLASS B
MANUFACTURER : CHAMBERLAIN
MODEL No. : FIRECRACKER
S/N : NONE ASSIGNED
MODE : Rx @ 433.92MHz
DATE TESTED : 31 Jul 2012 08:58:21 M. LONGINOTTI
NOTES : :
ANT POLARITY : HORIZONTAL ANT33D
DATA CORRECTED TO 3 m
PEAK LI
FIELD INTENSITY dBuV/m
120
110
100
90
80
70
60
50
40
30
20
10
0
START = 1000
FREQUENCY - MHz
STOP = 6500


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
WQC9 11/19/10
8546A HF RUN 2
RADIATED PEAK EMISSION TEST 1 GHz to 2 GHz @ 3 m
SPECIFICATION : FCC 15A CLASS B
MANUFACTURER : CHAMBERLAIN
MODEL No. : FIRECRACKER
S/N : NONE ASSIGNED
MODE : Rx @ 433.92MHz
DATE TESTED : 31 Jul 2012 08:58:21 M. LONGINOTTI
NOTES : :
ANT POLARITY : VERTICAL ANT33D
DATA CORRECTED TO 3 m
PEAK LI
FIELD INTENSITY dBuV/m
120
110
100
90
80
70
60
50
40
30
20
10
0
START = 1000
FREQUENCY - MHz
STOP = 6500

ETR No. 8546A
DATA SHEET TEST NO. 13

RADIATED QP EMISSION MEASUREMENTS in a 3 m SEMI-ANECHOIC ROOM
SPECIFICATION : FCC 15B CLASS B
MANUFACTURER : CHAMBERLAIN
MODEL NO. : FIRECRACKER
SERIAL NO. : NONE ASSIGNED
TEST MODE : Rx @ 433.92MHz
NOTES :
TEST DATE : 27 Jul 2012 11:53:37
TEST DISTANCE : 3 m (DATA EXTRAPOLATED TO 3 m)

FREQUENCY MHz	QP READING dBuV	ANT FAC dB	CBL FAC dB	EXT ATTN dB	DIST FAC dB	TOTAL dBuV/m	QP LIMIT dBuV/m	AZ deg	ANT HT cm	POLAR
33.54	.7	16.7	.5	0.0	0.0	17.9	40.0	315	200	V
60.19	-.8	6.0	.5	0.0	0.0	5.8	40.0	45	120	V
73.85	-2.1	6.8	.5	0.0	0.0	5.2	40.0	90	200	V
141.99	-1.8	10.9	.8	0.0	0.0	9.8	43.5	270	120	V
162.98	1.2	10.1	.9	0.0	0.0	12.1	43.5	45	340	H
170.00	-1.5	9.8	.9	0.0	0.0	9.2	43.5	315	120	V
249.18	-1.2	12.6	1.0	0.0	0.0	12.4	46.0	270	120	V
350.21	-.7	14.5	1.3	0.0	0.0	15.1	46.0	-0	200	H
463.77	-1.1	17.0	1.5	0.0	0.0	17.4	46.0	45	200	H
551.82	-1.4	18.9	1.5	0.0	0.0	19.0	46.0	-0	200	V
643.39	-1.3	19.8	1.6	0.0	0.0	20.1	46.0	180	120	H
790.94	-.6	20.5	2.0	0.0	0.0	22.0	46.0	135	200	V
831.44	-.7	20.5	2.0	0.0	0.0	21.8	46.0	135	340	H

tested by: MARK E. LONGINOTTI
M. LONGINOTTI

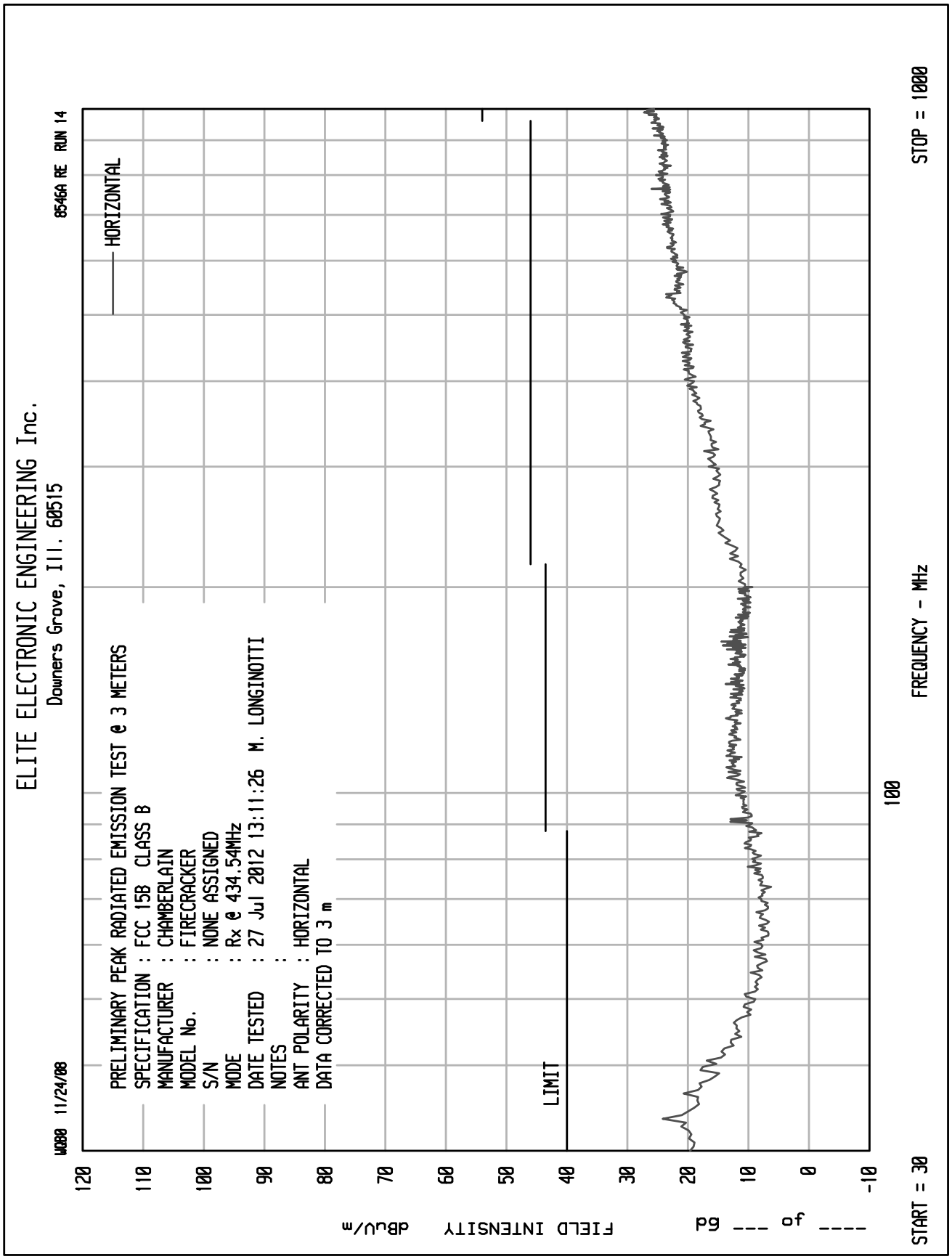
DATA SHEET HF TEST NO. 2

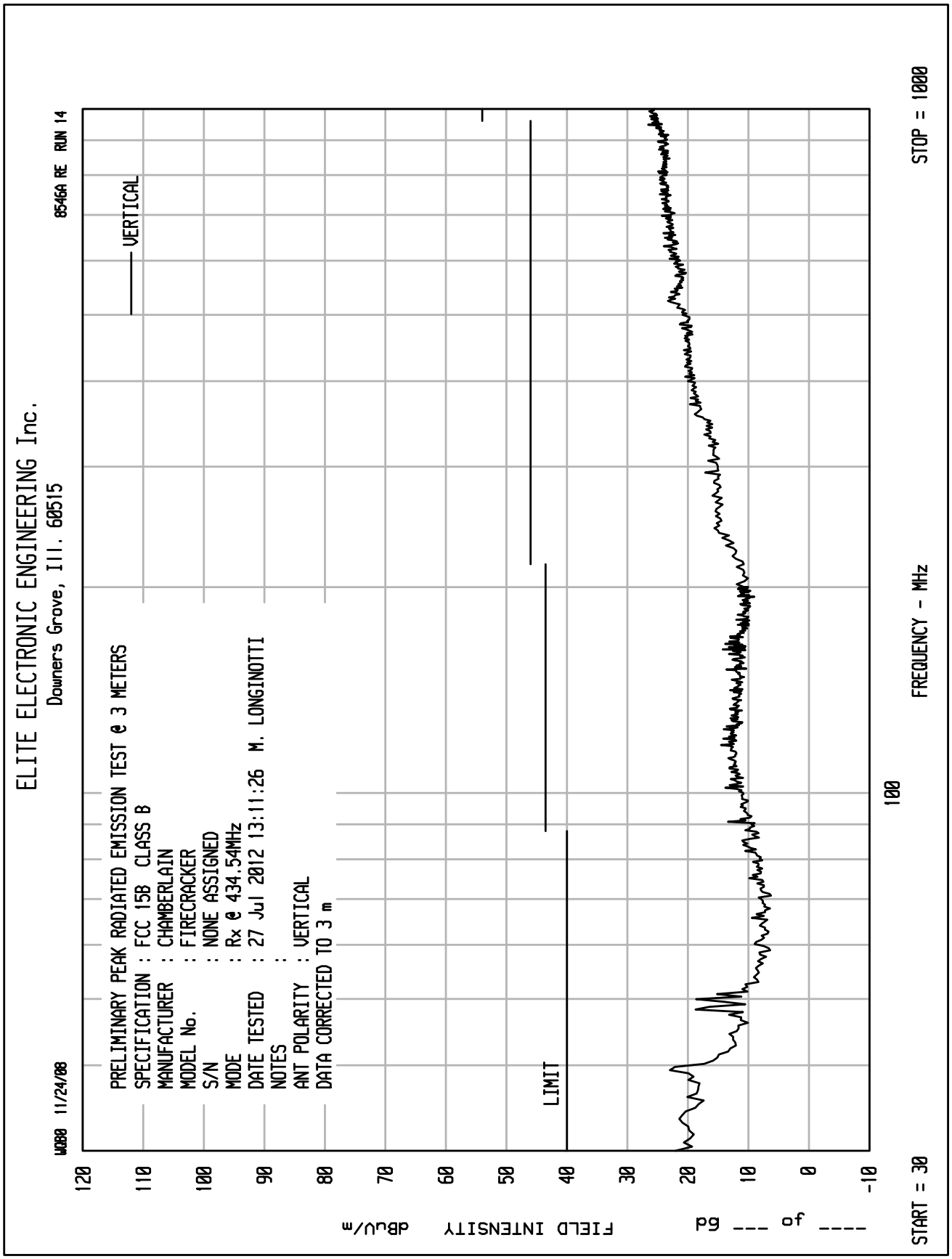
RADIATED AVG EMISSION MEASUREMENTS >=1000 MHz in a 3 m ANECHOIC ROOM

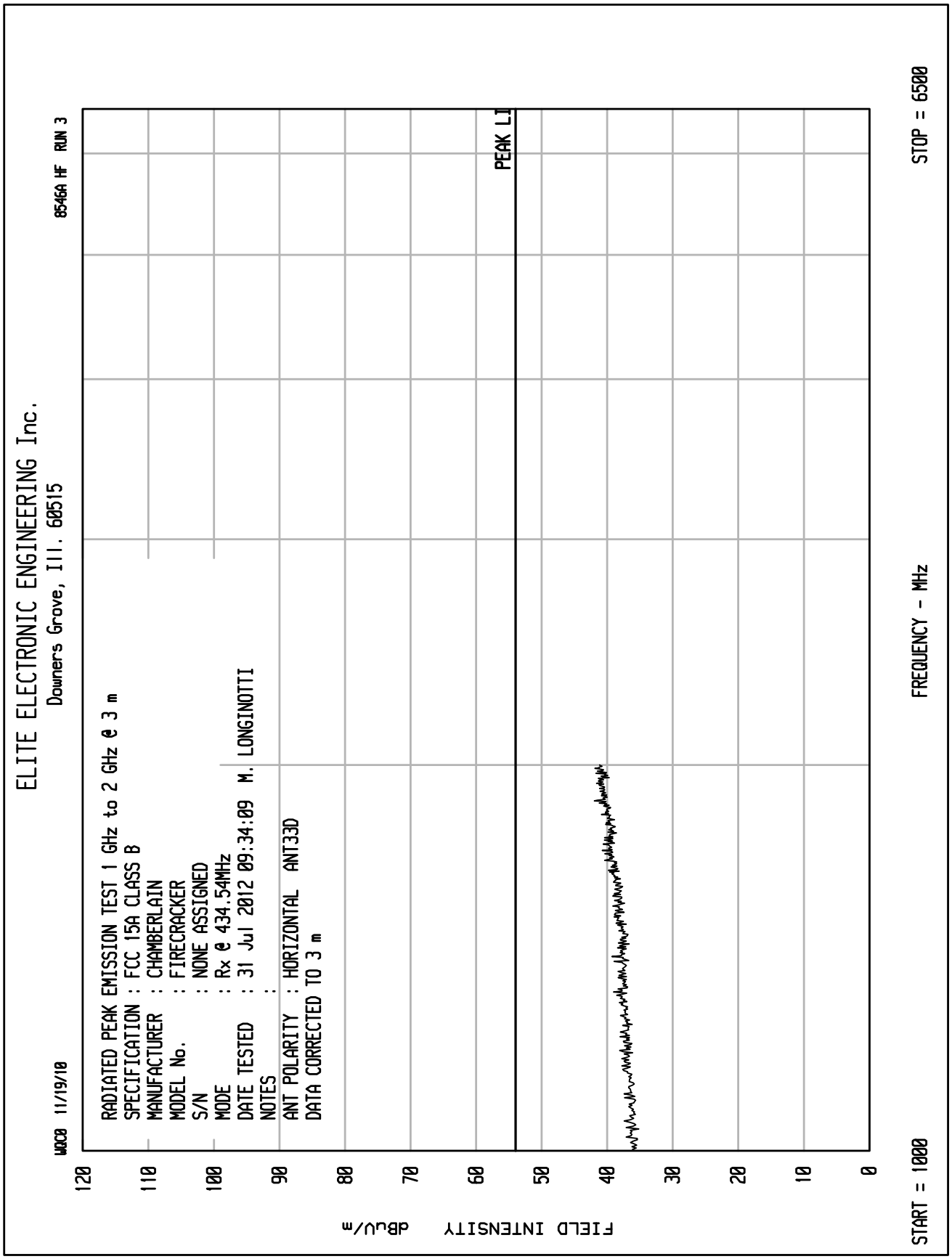
SPECIFICATION : FCC 15A CLASS B
MANUFACTURER : CHAMBERLAIN
MODEL NO. : FIRECRACKER
SERIAL NO. : NONE ASSIGNED
TEST MODE : Rx @ 433.92MHz
NOTES :
TEST DATE : 31 Jul 2012 08:58:21
TEST DISTANCE : 3 m
ANTENNA : ANT33D

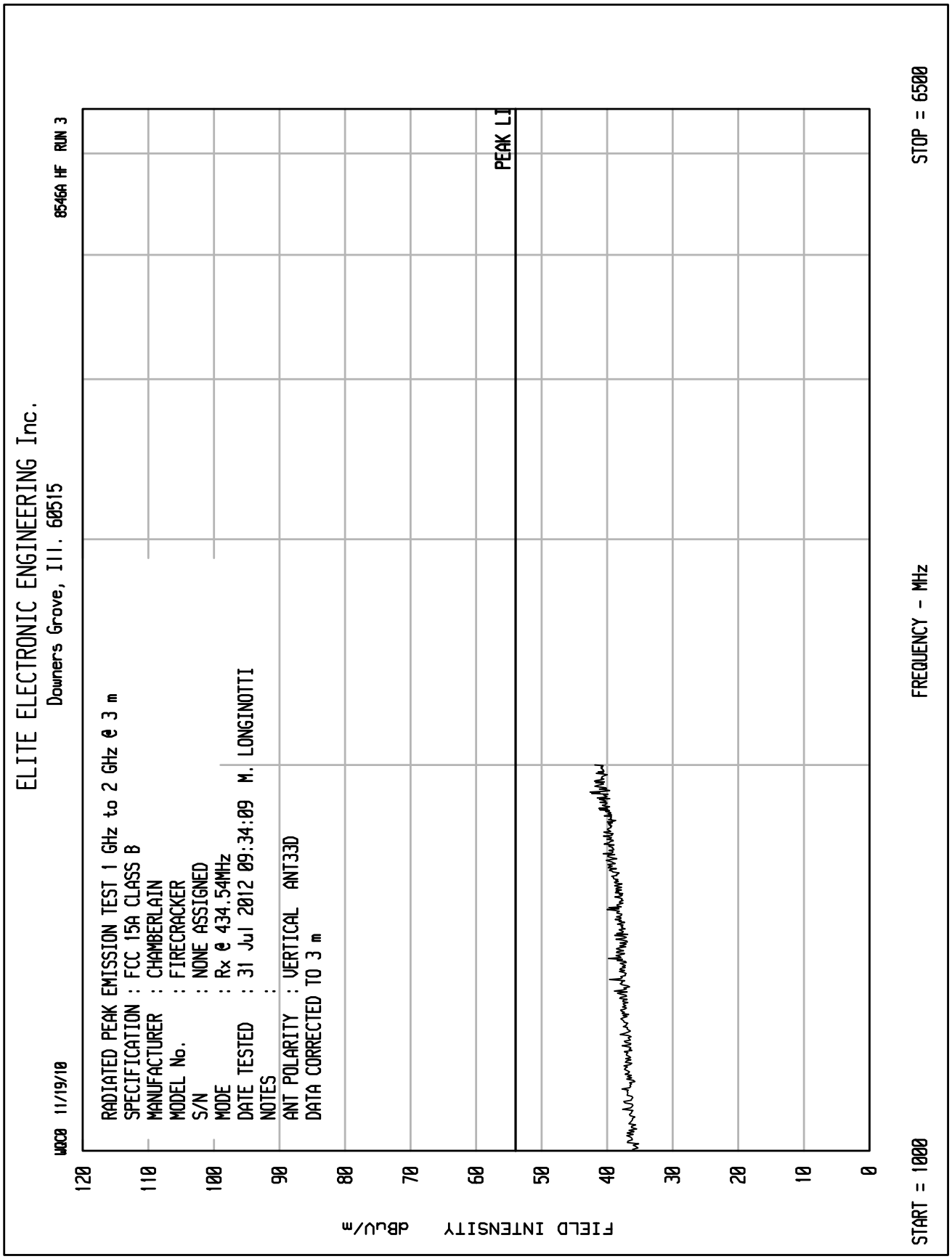
FREQUENCY MHz	AVG READING dBuV	ANT FAC dB	CBL FAC dB	DIST FAC dB	TOTAL dBuV/m	AVG LIMIT dBuV/m	PASS/ FAIL	AZ deg	ANT HT cm	POLAR
1125.71	-3.0	24.5	2.2	0.0	23.7	54.0		225	120	H
1260.85	-2.9	24.8	2.3	0.0	24.2	54.0		225	200	H
1291.38	-2.9	24.9	2.4	0.0	24.4	54.0		180	120	H
1517.28	-2.8	25.1	2.6	0.0	24.9	54.0		225	340	H
1647.56	-2.8	25.9	2.7	0.0	25.9	54.0		225	120	V
1749.66	-2.5	26.4	2.8	0.0	26.7	54.0		0	200	V
1930.76	-2.8	27.5	3.0	0.0	27.7	54.0		0	340	H
2006.40	-2.5	0.0	0.0	0.0	-2.5	54.0		180	200	V

tested by: MARK E. LONGINOTTI
M. LONGINOTTI


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
8546A RE RUN 14
HORIZONTAL
PRELIMINARY PEAK RADIATED EMISSION TEST @ 3 METERS
SPECIFICATION : FCC 15B CLASS B
MANUFACTURER : CHAMBERLAIN
MODEL No. : FIRECRACKER
S/N : NONE ASSIGNED
MODE : Rx @ 434.54MHz
DATE TESTED : 27 Jul 2012 13:11:26 M. LONGINOTTI
NOTES :
ANT POLARITY : HORIZONTAL
DATA CORRECTED TO 3 m
LIMIT
FIELD INTENSITY dBuV/m
FREQUENCY - MHz
START = 30
100
STOP = 1000
120
110
100
90
80
70
60
50
40
30
20
10
0
-10


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
8546A RE RUN 14
PRELIMINARY PEAK RADIATED EMISSION TEST @ 3 METERS
SPECIFICATION : FCC 15B CLASS B
MANUFACTURER : CHAMBERLAIN
MODEL No. : FIRECRACKER
S/N : NONE ASSIGNED
MODE : Rx @ 434.54MHz
DATE TESTED : 27 Jul 2012 13:11:26 M. LONGINOTTI
NOTES :
ANT POLARITY : VERTICAL
DATA CORRECTED TO 3 m
VERTICAL
LIMIT
FIELD INTENSITY dBuV/m
FREQUENCY - MHz
START = 30
100
STOP = 1000
120
110
100
90
80
70
60
50
40
30
20
10
0
-10


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
WQC9 11/19/10
8546A HF RUN 3
RADIATED PEAK EMISSION TEST 1 GHz to 2 GHz @ 3 m
SPECIFICATION : FCC 15A CLASS B
MANUFACTURER : CHAMBERLAIN
MODEL No. : FIRECRACKER
S/N : NONE ASSIGNED
MODE : Rx @ 434.54MHz
DATE TESTED : 31 Jul 2012 09:34:09 M. LONGINOTTI
NOTES : :
ANT POLARITY : HORIZONTAL ANT33D
DATA CORRECTED TO 3 m
PEAK LI
FIELD INTENSITY dBuV/m
120
110
100
90
80
70
60
50
40
30
20
10
0
START = 1000
FREQUENCY - MHz
STOP = 6500


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
WQC9 11/19/10
8546A HF RUN 3
RADIATED PEAK EMISSION TEST 1 GHz to 2 GHz @ 3 m
SPECIFICATION : FCC 15A CLASS B
MANUFACTURER : CHAMBERLAIN
MODEL No. : FIRECRACKER
S/N : NONE ASSIGNED
MODE : Rx @ 434.54MHz
DATE TESTED : 31 Jul 2012 09:34:09 M. LONGINOTTI
NOTES : :
ANT POLARITY : VERTICAL ANT33D
DATA CORRECTED TO 3 m
PEAK LI
FIELD INTENSITY dBuV/m
120
110
100
90
80
70
60
50
40
30
20
10
0
START = 1000
FREQUENCY - MHz
STOP = 6500

ETR No. 8546A

DATA SHEET TEST NO. 14

RADIATED QP EMISSION MEASUREMENTS in a 3 m SEMI-ANECHOIC ROOM
SPECIFICATION : FCC 15B CLASS B
MANUFACTURER : CHAMBERLAIN
MODEL NO. : FIRECRACKER
SERIAL NO. : NONE ASSIGNED
TEST MODE : Rx @ 434.54MHz
NOTES :
TEST DATE : 27 Jul 2012 13:11:26
TEST DISTANCE : 3 m (DATA EXTRAPOLATED TO 3 m)

FREQUENCY MHz	QP READING dBuV	ANT FAC dB	CBL FAC dB	EXT ATTN dB	DIST FAC dB	TOTAL dBuV/m	QP LIMIT dBuV/m	AZ deg	ANT HT cm	POLAR
33.78	-.6	16.7	.5	0.0	0.0	16.7	40.0	45	120	H
53.82	-1.6	7.0	.5	0.0	0.0	5.8	40.0	180	120	V
87.56	-2.2	8.7	.5	0.0	0.0	6.9	40.0	45	120	V
115.09	-1.9	12.0	.6	0.0	0.0	10.7	43.5	45	340	V
122.27	-1.8	11.7	.6	0.0	0.0	10.6	43.5	225	200	V
166.98	.9	9.9	.9	0.0	0.0	11.7	43.5	90	200	H
168.51	-1.6	9.8	.9	0.0	0.0	9.2	43.5	225	340	H
249.76	-1.2	12.6	1.0	0.0	0.0	12.4	46.0	-0	120	V
352.43	-.7	14.6	1.3	0.0	0.0	15.2	46.0	270	340	V
441.17	-1.0	16.9	1.5	0.0	0.0	17.4	46.0	315	120	H
540.75	-1.3	19.3	1.5	0.0	0.0	19.5	46.0	180	120	H
681.89	-.7	19.6	1.7	0.0	0.0	20.7	46.0	315	200	H
761.68	-.5	20.2	1.9	0.0	0.0	21.6	46.0	45	120	H
798.63	-.6	20.6	2.0	0.0	0.0	22.0	46.0	135	120	H
950.70	-.4	21.3	2.0	0.0	0.0	23.0	46.0	225	120	V

tested by: MARK E. LONGINOTTI
M. LONGINOTTI

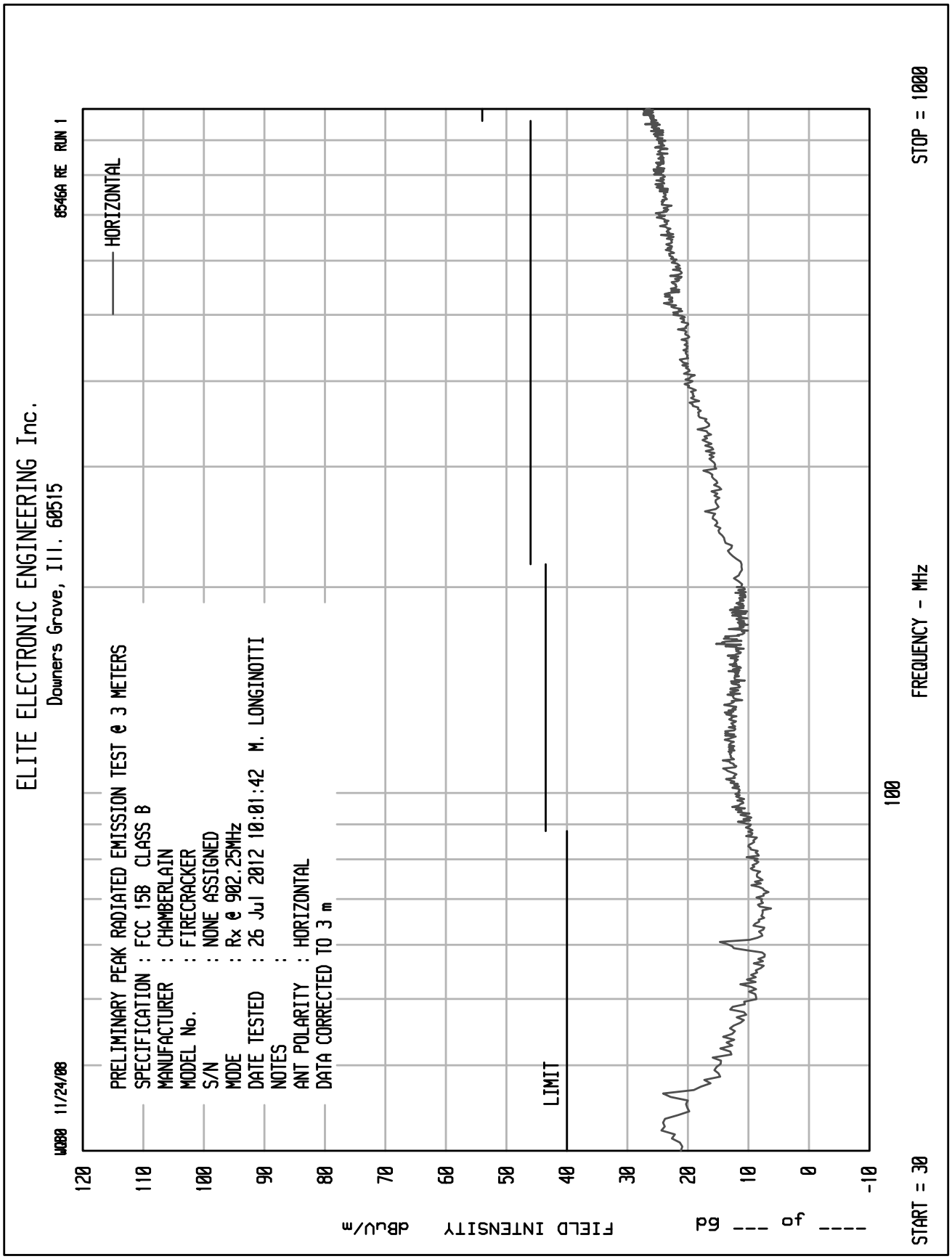
DATA SHEET HF TEST NO. 3

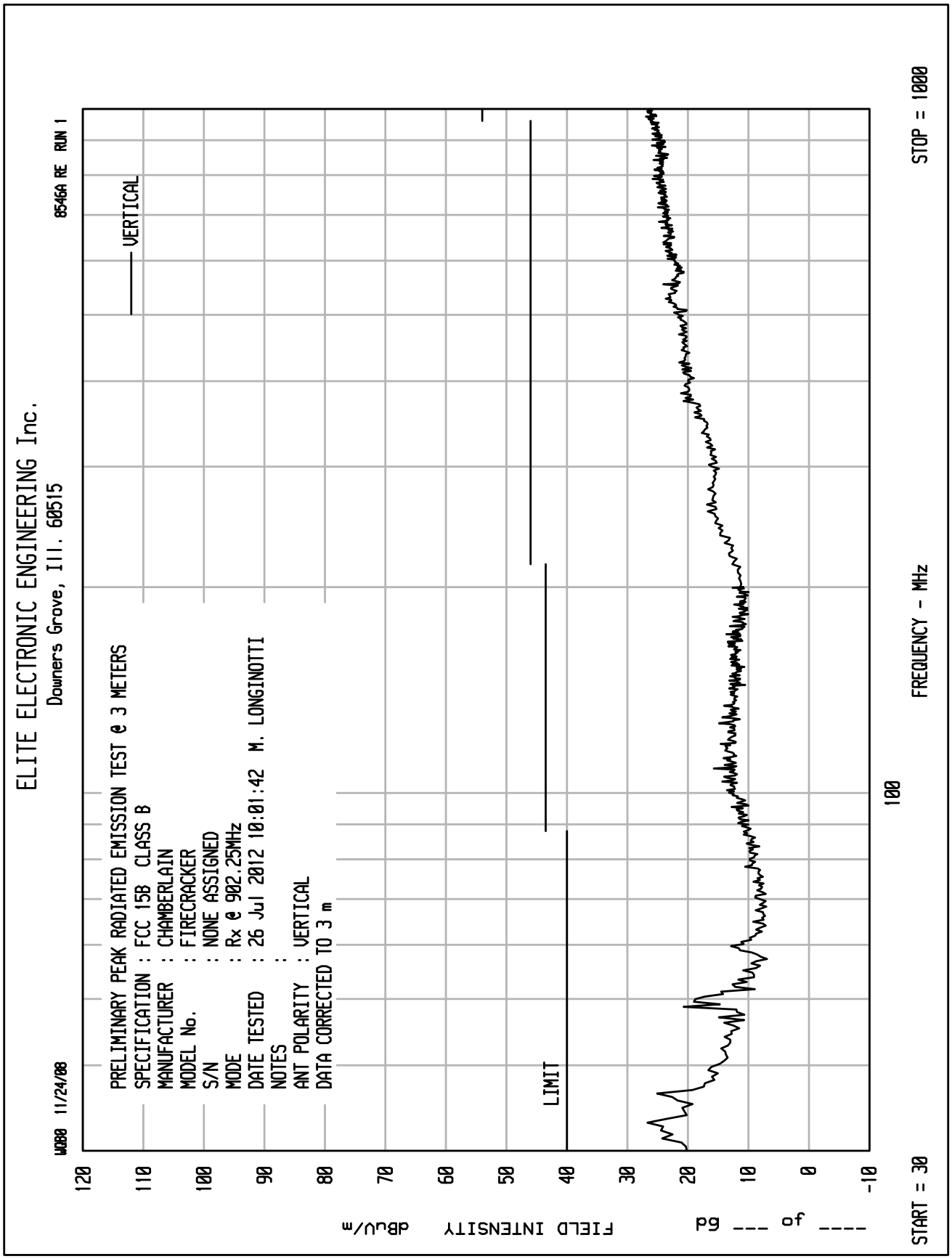
RADIATED AVG EMISSION MEASUREMENTS >=1000 MHz in a 3 m ANECHOIC ROOM

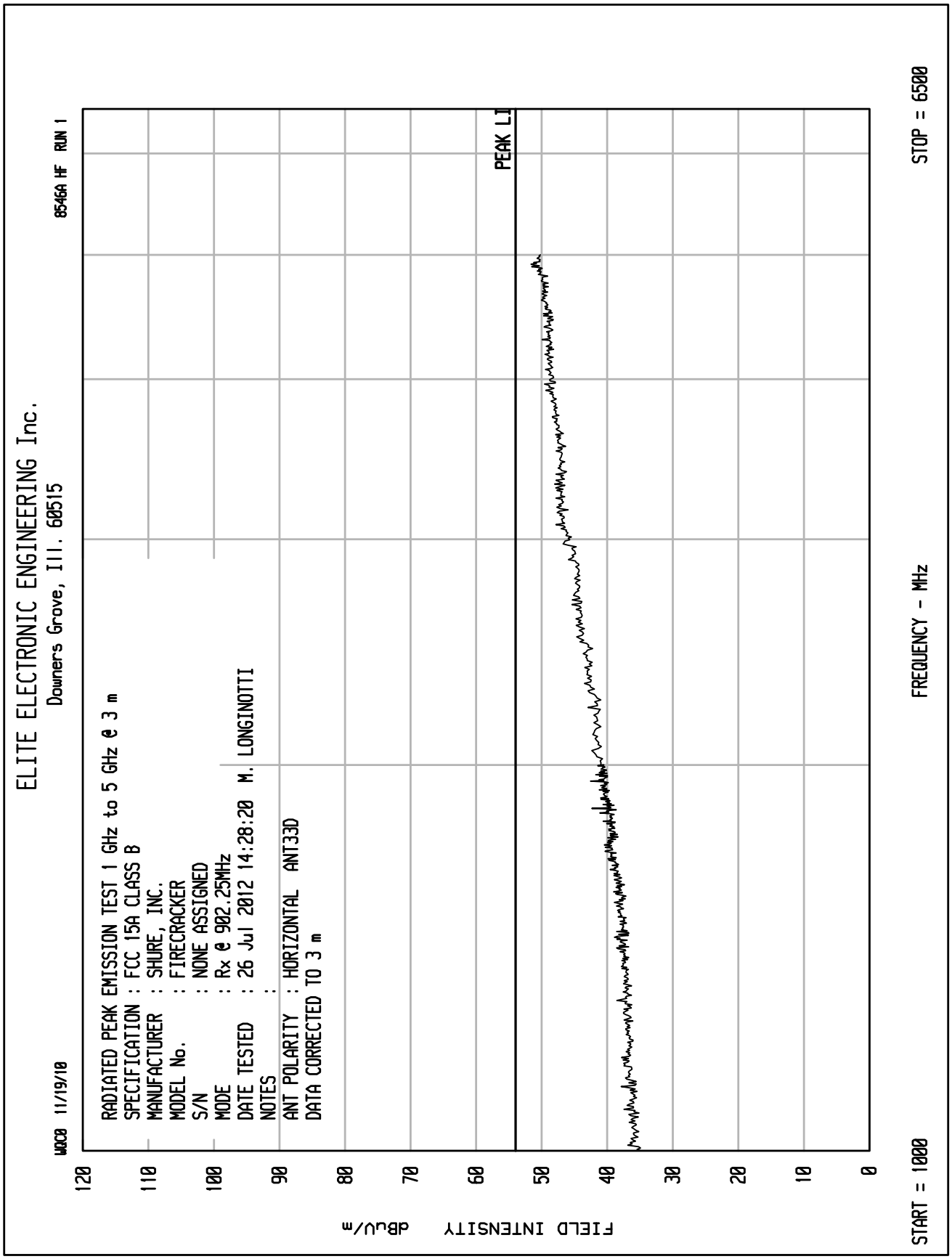
SPECIFICATION : FCC 15A CLASS B
MANUFACTURER : CHAMBERLAIN
MODEL NO. : FIRECRACKER
SERIAL NO. : NONE ASSIGNED
TEST MODE : Rx @ 434.54MHz
NOTES :
TEST DATE : 31 Jul 2012 09:34:09
TEST DISTANCE : 3 m
ANTENNA : ANT33D

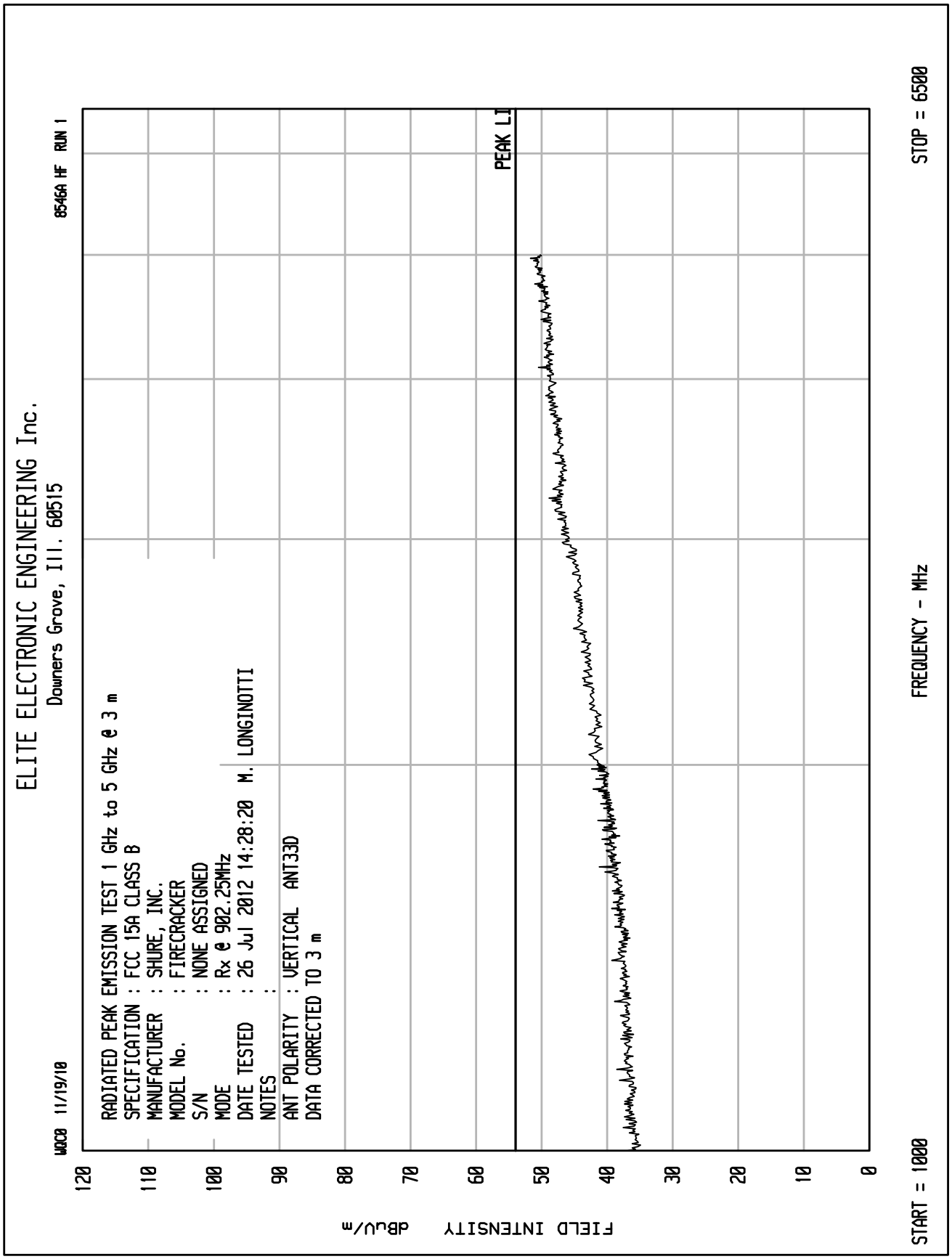
FREQUENCY MHz	AVG READING dBuV	ANT FAC dB	CBL FAC dB	DIST FAC dB	TOTAL dBuV/m	AVG LIMIT dBuV/m	PASS/ FAIL	AZ deg	ANT HT cm	POLAR
1096.44	-3.2	24.4	2.1	0.0	23.4	54.0		-0	200	V
1205.86	-3.4	24.7	2.3	0.0	23.6	54.0		225	120	H
1368.46	-3.0	25.0	2.5	0.0	24.4	54.0		315	340	V
1419.29	-2.7	25.0	2.5	0.0	24.8	54.0		45	340	V
1532.42	-2.7	25.2	2.6	0.0	25.1	54.0		0	120	V
1735.07	-3.0	26.4	2.8	0.0	26.2	54.0		270	340	H
1936.85	-3.0	27.5	3.0	0.0	27.5	54.0		0	340	V
1954.96	-2.8	27.6	3.0	0.0	27.7	54.0		90	200	V

tested by: MARK E. LONGINOTTI
M. LONGINOTTI


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
8546A RE RUN 1
11/24/08
PRELIMINARY PEAK RADIATED EMISSION TEST @ 3 METERS
SPECIFICATION : FCC 15B CLASS B
MANUFACTURER : CHAMBERLAIN
MODEL No. : FIRECRACKER
S/N : NONE ASSIGNED
MODE : Rx @ 902.25MHz
DATE TESTED : 26 Jul 2012 10:01:42 M. LONGINOTTI
NOTES :
ANT POLARITY : HORIZONTAL
DATA CORRECTED TO 3 m
HORIZONTAL
LIMIT
FIELD INTENSITY dBuV/m
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
START = 30
100
STOP = 1000
FREQUENCY - MHz


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
8546A RE RUN 1
PRELIMINARY PEAK RADIATED EMISSION TEST @ 3 METERS
SPECIFICATION : FCC 15B CLASS B
MANUFACTURER : CHAMBERLAIN
MODEL No. : FIRECRACKER
S/N : NONE ASSIGNED
MODE : Rx @ 902.25MHz
DATE TESTED : 26 Jul 2012 10:01:42 M. LONGINOTTI
NOTES :
ANT POLARITY : VERTICAL
DATA CORRECTED TO 3 m
VERTICAL
LIMIT
FIELD INTENSITY dBuV/m
FREQUENCY - MHz
START = 30
100
STOP = 1000
120
110
100
90
80
70
60
50
40
30
20
10
0
-10


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
WQC9 11/19/10
8546A HF RUN 1
RADIATED PEAK EMISSION TEST 1 GHz to 5 GHz @ 3 m
SPECIFICATION : FCC 15A CLASS B
MANUFACTURER : SHURE, INC.
MODEL No. : FIRECRACKER
S/N : NONE ASSIGNED
MODE : Rx @ 902.25MHz
DATE TESTED : 26 Jul 2012 14:28:20 M. LONGINOTTI
NOTES : :
ANT POLARITY : HORIZONTAL ANT33D
DATA CORRECTED TO 3 m
PEAK LI
FIELD INTENSITY dBuV/m
120
110
100
90
80
70
60
50
40
30
20
10
0
START = 1000
FREQUENCY - MHz
STOP = 6500


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
WQC9 11/19/10
8546A HF RUN 1
RADIATED PEAK EMISSION TEST 1 GHz to 5 GHz @ 3 m
SPECIFICATION : FCC 15A CLASS B
MANUFACTURER : SHURE, INC.
MODEL No. : FIRECRACKER
S/N : NONE ASSIGNED
MODE : Rx @ 902.25MHz
DATE TESTED : 26 Jul 2012 14:28:20 M. LONGINOTTI
NOTES : :
ANT POLARITY : VERTICAL ANT33D
DATA CORRECTED TO 3 m
PEAK LI
FIELD INTENSITY dBuV/m
120
110
100
90
80
70
60
50
40
30
20
10
0
START = 1000
FREQUENCY - MHz
STOP = 6500

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 : CHAMBERLAIN
MODEL NO. : FIRECRACKER
SERIAL NO. : NONE ASSIGNED
TEST MODE : Rx @ 902.25MHz
NOTES :
TEST DATE : 26 Jul 2012 10:01:42
TEST DISTANCE : 3 m (DATA EXTRAPOLATED TO 3 m)

FREQUENCY MHz	QP READING dBuV	ANT FAC dB	CBL FAC dB	EXT ATTN dB	DIST FAC dB	TOTAL dBuV/m	QP LIMIT dBuV/m	AZ deg	ANT HT cm	POLAR
30.70	-1.9	18.2	.5	0.0	0.0	16.8	40.0	225	340	V
59.46	-.4	6.0	.5	0.0	0.0	6.2	40.0	0	120	H
88.93	-2.2	8.9	.5	0.0	0.0	7.2	43.5	45	340	V
107.87	1.0	11.6	.6	0.0	0.0	13.1	43.5	315	120	V
126.30	-1.9	11.5	.7	0.0	0.0	10.3	43.5	45	340	V
164.99	1.1	10.0	.9	0.0	0.0	11.9	43.5	225	120	H
166.98	1.6	9.9	.9	0.0	0.0	12.4	43.5	225	200	H
258.90	-1.4	12.8	1.0	0.0	0.0	12.4	46.0	135	120	H
353.52	-.7	14.6	1.3	0.0	0.0	15.1	46.0	315	200	V
466.19	-1.3	17.0	1.5	0.0	0.0	17.2	46.0	181	120	V
553.03	-1.5	18.8	1.5	0.0	0.0	18.9	46.0	270	340	V
682.24	-.8	19.6	1.7	0.0	0.0	20.6	46.0	225	200	V
783.67	-.7	20.4	2.0	0.0	0.0	21.7	46.0	225	120	V
883.85	-.8	20.6	2.0	0.0	0.0	21.8	46.0	135	120	V
953.97	-.6	21.4	2.0	0.0	0.0	22.8	46.0	225	120	H

tested by: MARK E. LONGINOTTI
M. LONGINOTTI

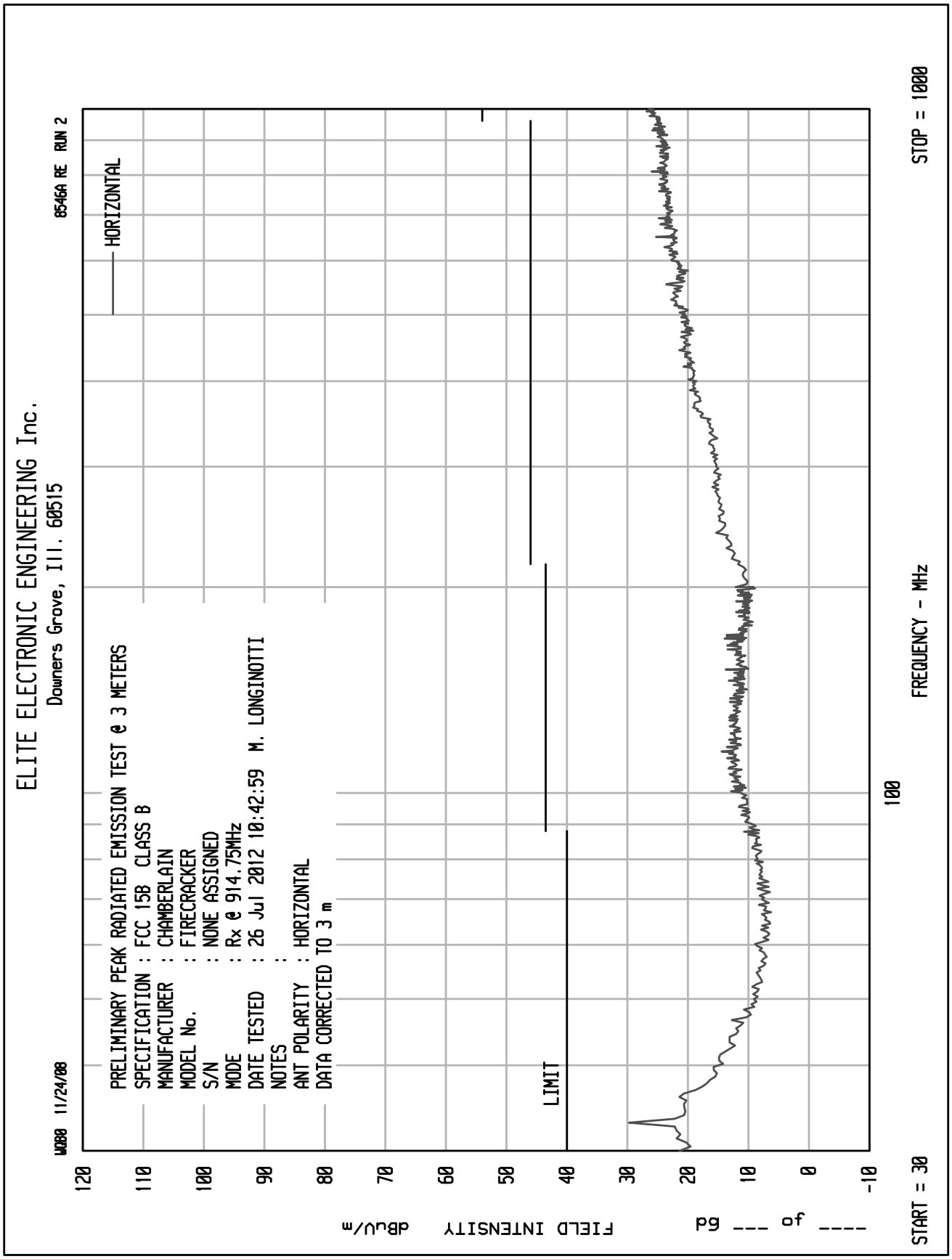
DATA SHEET HF TEST NO. 1

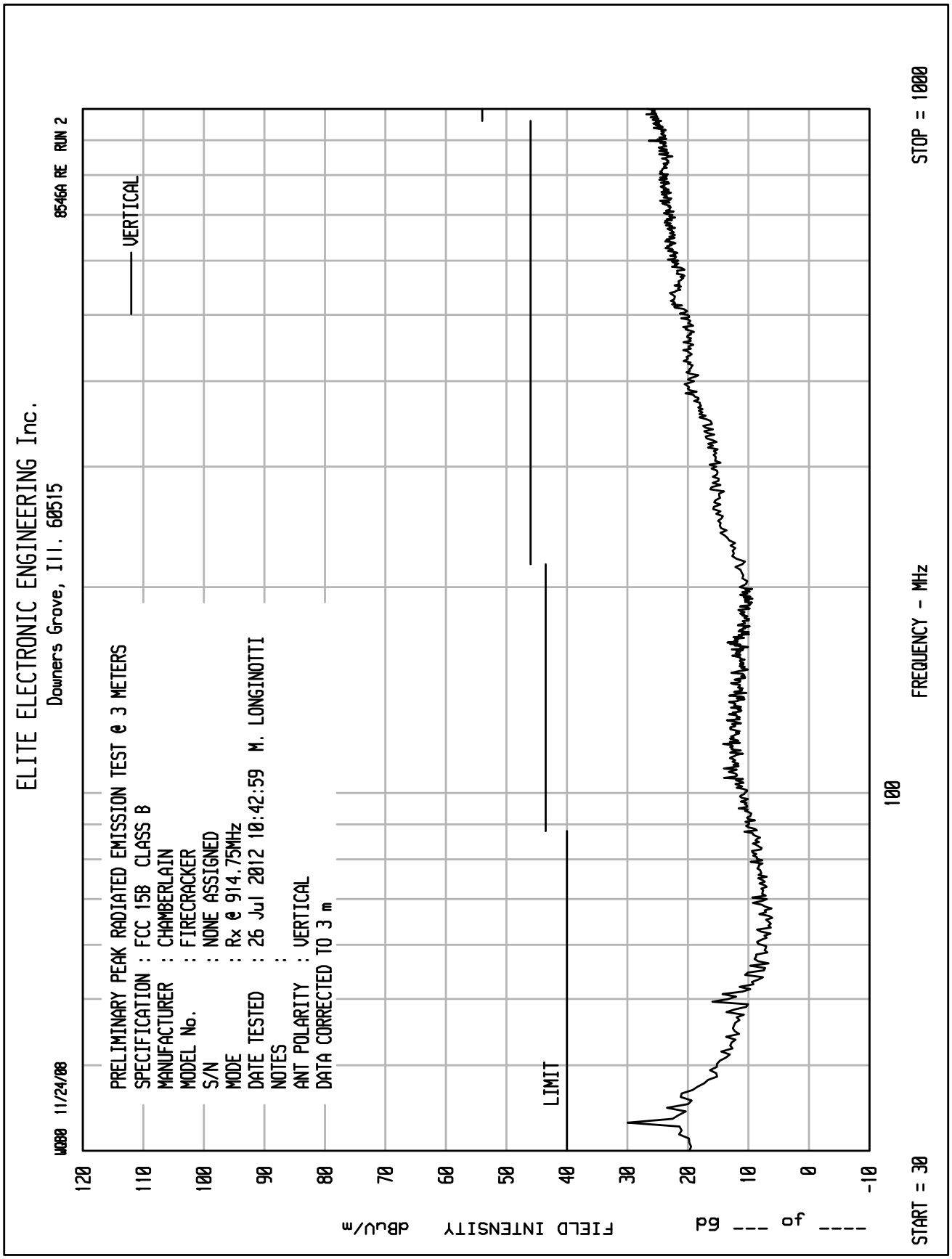
RADIATED AVG EMISSION MEASUREMENTS >=1000 MHz in a 3 m ANECHOIC ROOM

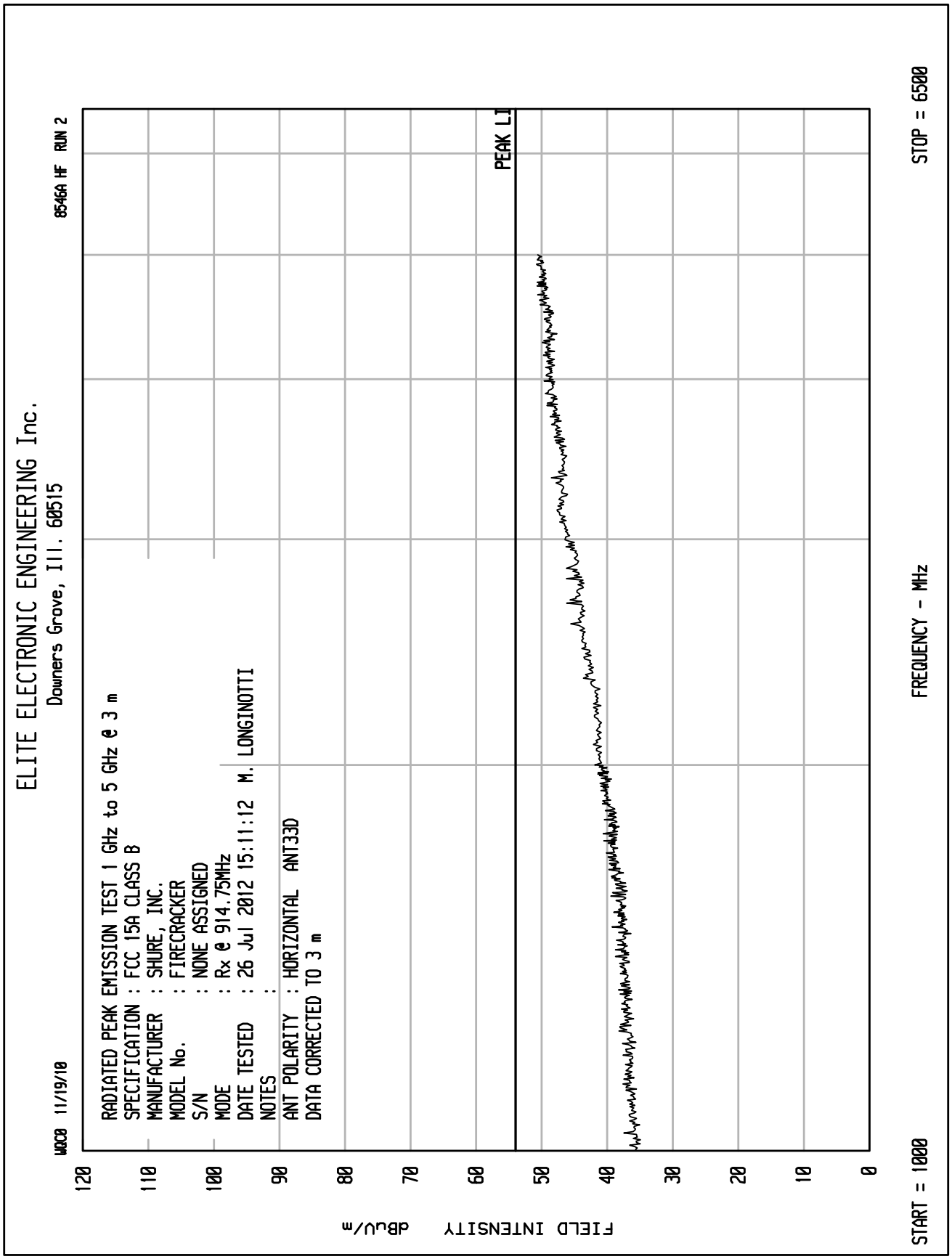
SPECIFICATION : FCC 15A CLASS B
MANUFACTURER : SHURE, INC.
MODEL NO. : FIRECRACKER
SERIAL NO. : NONE ASSIGNED
TEST MODE : Rx @ 902.25MHz
NOTES :
TEST DATE : 26 Jul 2012 14:28:20
TEST DISTANCE : 3 m
ANTENNA : ANT33D

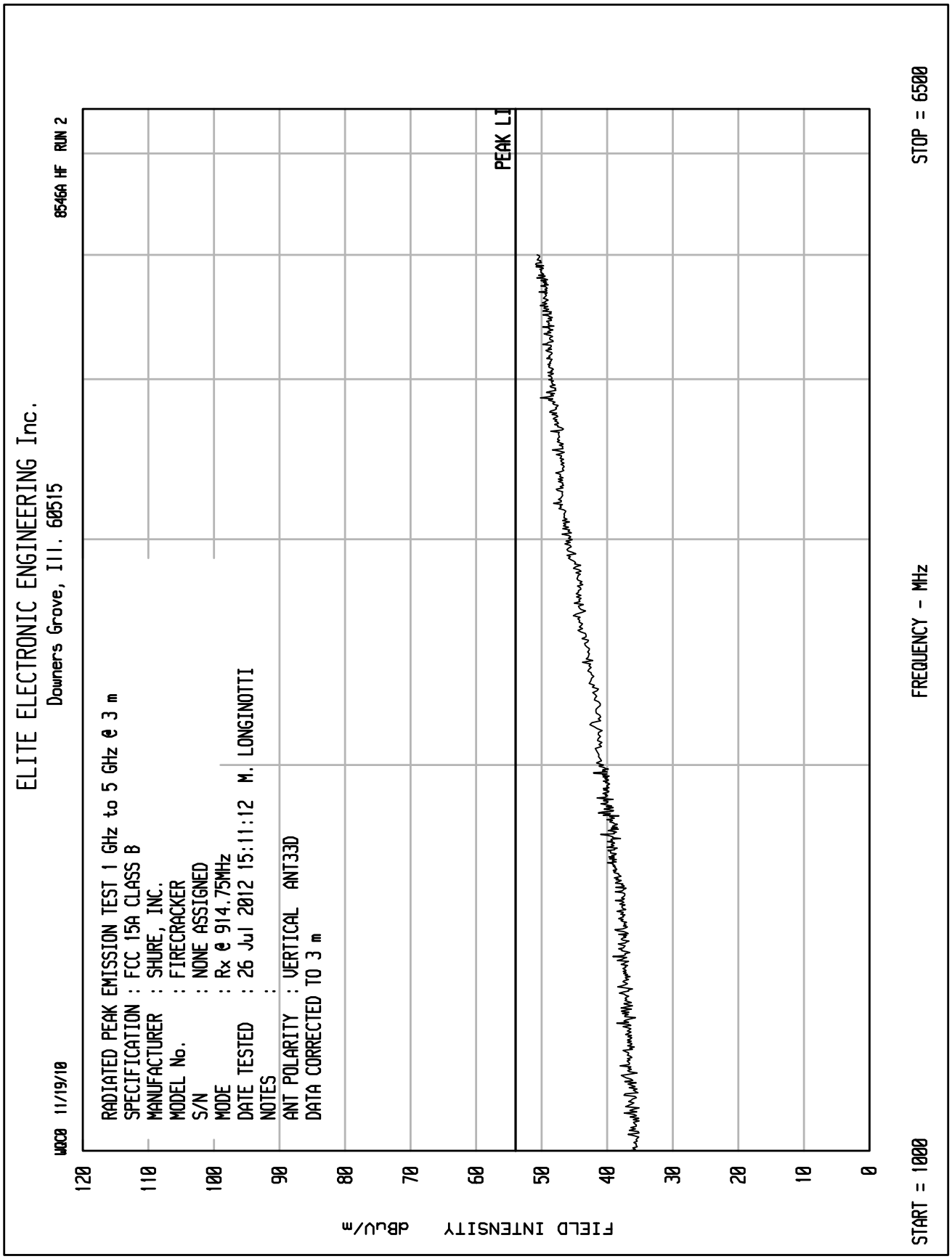
FREQUENCY MHz	AVG READING dBuV	ANT FAC dB	CBL FAC dB	DIST FAC dB	TOTAL dBuV/m	AVG LIMIT dBuV/m	PASS/ FAIL	AZ deg	ANT HT cm	POLAR
1131.95	-3.5	24.5	2.2	0.0	23.2	54.0		90	200	H
1177.85	-3.1	24.7	2.2	0.0	23.7	54.0		270	120	V
1289.30	-3.4	24.9	2.4	0.0	23.9	54.0		44	120	V
1417.30	-3.1	25.0	2.5	0.0	24.4	54.0		90	200	V
1667.74	-2.9	26.1	2.7	0.0	26.0	54.0		180	120	V
1724.16	-3.3	26.4	2.8	0.0	26.0	54.0		225	200	V
1878.14	-3.0	27.3	2.9	0.0	27.2	54.0		1	340	H
2207.57	-2.9	27.6	3.2	0.0	28.0	54.0		135	120	H
2559.27	-2.5	29.5	3.5	0.0	30.5	54.0		225	340	V
3012.80	-2.5	30.7	3.9	0.0	32.2	54.0		45	120	V
3232.57	-2.5	31.8	4.1	0.0	33.3	54.0		180	120	V
3847.11	-2.7	32.9	4.4	0.0	34.6	54.0		135	120	V
4089.93	-2.4	33.0	4.6	0.0	35.2	54.0		44	200	V
4619.01	-2.2	33.3	4.8	0.0	35.9	54.0		270	200	V
4963.64	-2.2	34.3	5.0	0.0	37.0	54.0		270	200	V

tested by: MARK E. LONGINOTTI
M. LONGINOTTI


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
8546A RE RUN 2
HORIZONTAL
PRELIMINARY PEAK RADIATED EMISSION TEST @ 3 METERS
SPECIFICATION : FCC 15B CLASS B
MANUFACTURER : CHAMBERLAIN
MODEL No. : FIRECRACKER
S/N : NONE ASSIGNED
MODE : Rx @ 914.75MHz
DATE TESTED : 26 Jul 2012 10:42:59 M. LONGINOTTI
NOTES :
ANT POLARITY : HORIZONTAL
DATA CORRECTED TO 3 m
LIMIT
FIELD INTENSITY dBuV/m
FREQUENCY - MHz
START = 30
100
STOP = 1000
120
110
100
90
80
70
60
50
40
30
20
10
0
-10


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
8546A RE RUN 2
VERTICAL
PRELIMINARY PEAK RADIATED EMISSION TEST @ 3 METERS
SPECIFICATION : FCC 15B CLASS B
MANUFACTURER : CHAMBERLAIN
MODEL No. : FIRECRACKER
S/N : NONE ASSIGNED
MODE : Rx @ 914.75MHz
DATE TESTED : 26 Jul 2012 10:42:59 M. LONGINOTTI
NOTES :
ANT POLARITY : VERTICAL
DATA CORRECTED TO 3 m
LIMIT
FIELD INTENSITY dBuV/m
FREQUENCY - MHz
START = 30
100
STOP = 1000
120
110
100
90
80
70
60
50
40
30
20
10
0
-10


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
WQC3 11/19/10
8546A HF RUN 2
RADIATED PEAK EMISSION TEST 1 GHz to 5 GHz @ 3 m
SPECIFICATION : FCC 15A CLASS B
MANUFACTURER : SHURE, INC.
MODEL No. : FIRECRACKER
S/N : NONE ASSIGNED
MODE : Rx @ 914.75MHz
DATE TESTED : 26 Jul 2012 15:11:12 M. LONGINOTTI
NOTES : :
ANT POLARITY : HORIZONTAL ANT33D
DATA CORRECTED TO 3 m
PEAK LI
FIELD INTENSITY dBuV/m
120
110
100
90
80
70
60
50
40
30
20
10
0
START = 1000
FREQUENCY - MHz
STOP = 6500


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
WQC9 11/19/10
8546A HF RUN 2
RADIATED PEAK EMISSION TEST 1 GHz to 5 GHz @ 3 m
SPECIFICATION : FCC 15A CLASS B
MANUFACTURER : SHURE, INC.
MODEL No. : FIRECRACKER
S/N : NONE ASSIGNED
MODE : Rx @ 914.75MHz
DATE TESTED : 26 Jul 2012 15:11:12 M. LONGINOTTI
NOTES : :
ANT POLARITY : VERTICAL ANT33D
DATA CORRECTED TO 3 m
PEAK LI
FIELD INTENSITY dBuV/m
120
110
100
90
80
70
60
50
40
30
20
10
0
START = 1000
FREQUENCY - MHz
STOP = 6500

ETR No. 8546A
DATA SHEET TEST NO. 2

RADIATED QP EMISSION MEASUREMENTS in a 3 m SEMI-ANECHOIC ROOM
SPECIFICATION : FCC 15B CLASS B
MANUFACTURER : CHAMBERLAIN
MODEL NO. : FIRECRACKER
SERIAL NO. : NONE ASSIGNED
TEST MODE : Rx @ 914.75MHz
NOTES :
TEST DATE : 26 Jul 2012 10:42:59
TEST DISTANCE : 3 m (DATA EXTRAPOLATED TO 3 m)

FREQUENCY MHz	QP READING dBuV	ANT FAC dB	CBL FAC dB	EXT ATTN dB	DIST FAC dB	TOTAL dBuV/m	QP LIMIT dBuV/m	AZ deg	ANT HT cm	POLAR
34.04	-.3	16.5	.5	0.0	0.0	16.7	40.0	225	200	V
53.51	-2.1	7.1	.5	0.0	0.0	5.5	40.0	90	120	V
87.47	-2.5	8.7	.5	0.0	0.0	6.7	40.0	180	120	H
114.17	-2.2	12.0	.6	0.0	0.0	10.4	43.5	0	340	H
128.79	-2.0	11.4	.7	0.0	0.0	10.1	43.5	135	120	V
150.75	-2.0	10.6	.8	0.0	0.0	9.3	43.5	45	200	H
169.71	-1.8	9.8	.9	0.0	0.0	8.9	43.5	45	200	H
248.33	-1.4	12.6	1.0	0.0	0.0	12.2	46.0	-0	200	H
370.43	-.9	15.4	1.4	0.0	0.0	15.9	46.0	270	120	H
449.56	-1.4	17.0	1.5	0.0	0.0	17.1	46.0	90	120	H
553.65	-1.5	18.8	1.5	0.0	0.0	18.8	46.0	90	340	H
656.08	-1.4	19.7	1.7	0.0	0.0	19.9	46.0	135	340	H
682.05	-.9	19.6	1.7	0.0	0.0	20.5	46.0	-0	200	H
896.97	-.8	20.7	2.0	0.0	0.0	21.8	46.0	270	340	V
933.16	-.7	21.1	2.0	0.0	0.0	22.4	46.0	135	200	H

tested by: MARK E. LONGINOTTI
M. LONGINOTTI

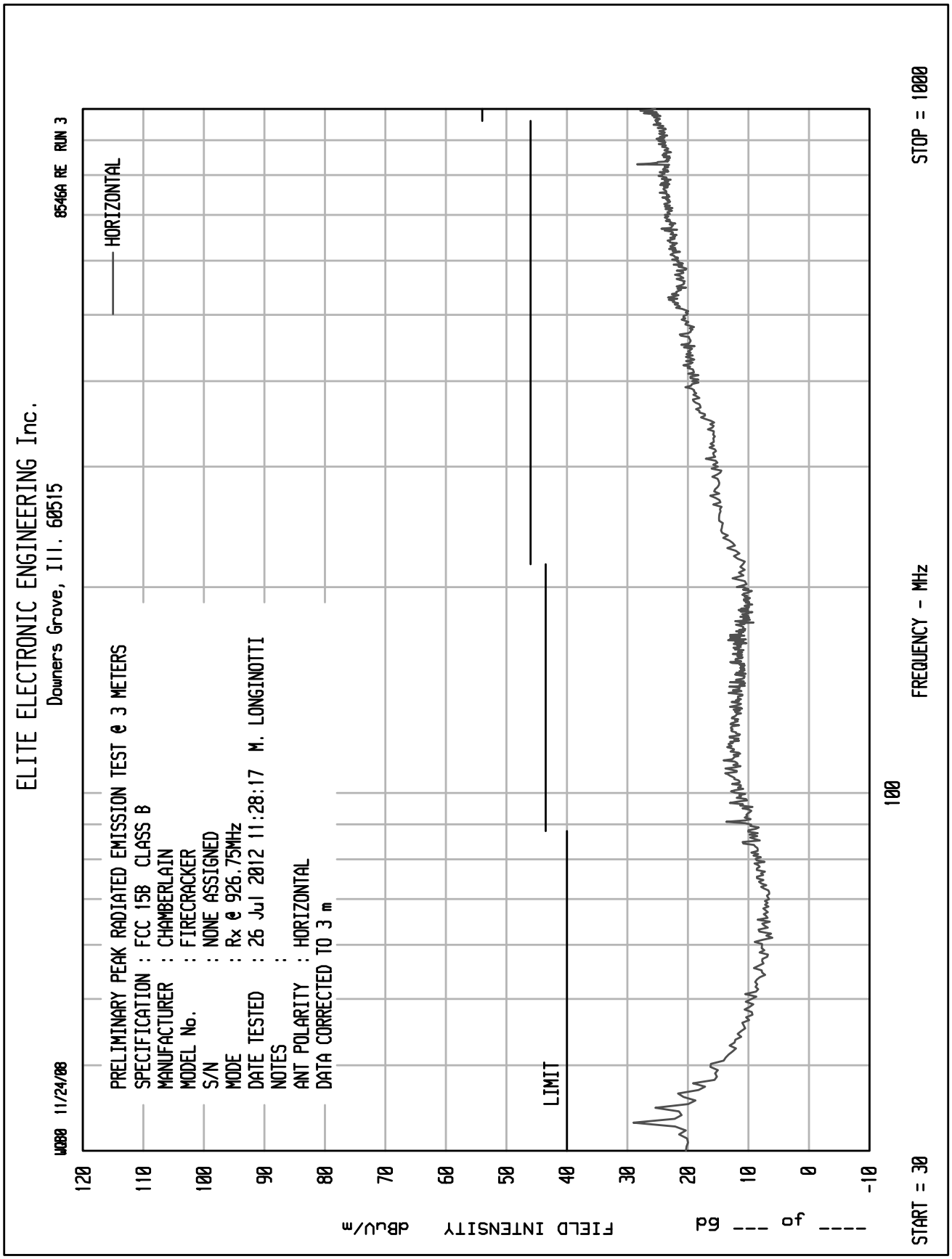
DATA SHEET HF TEST NO. 2

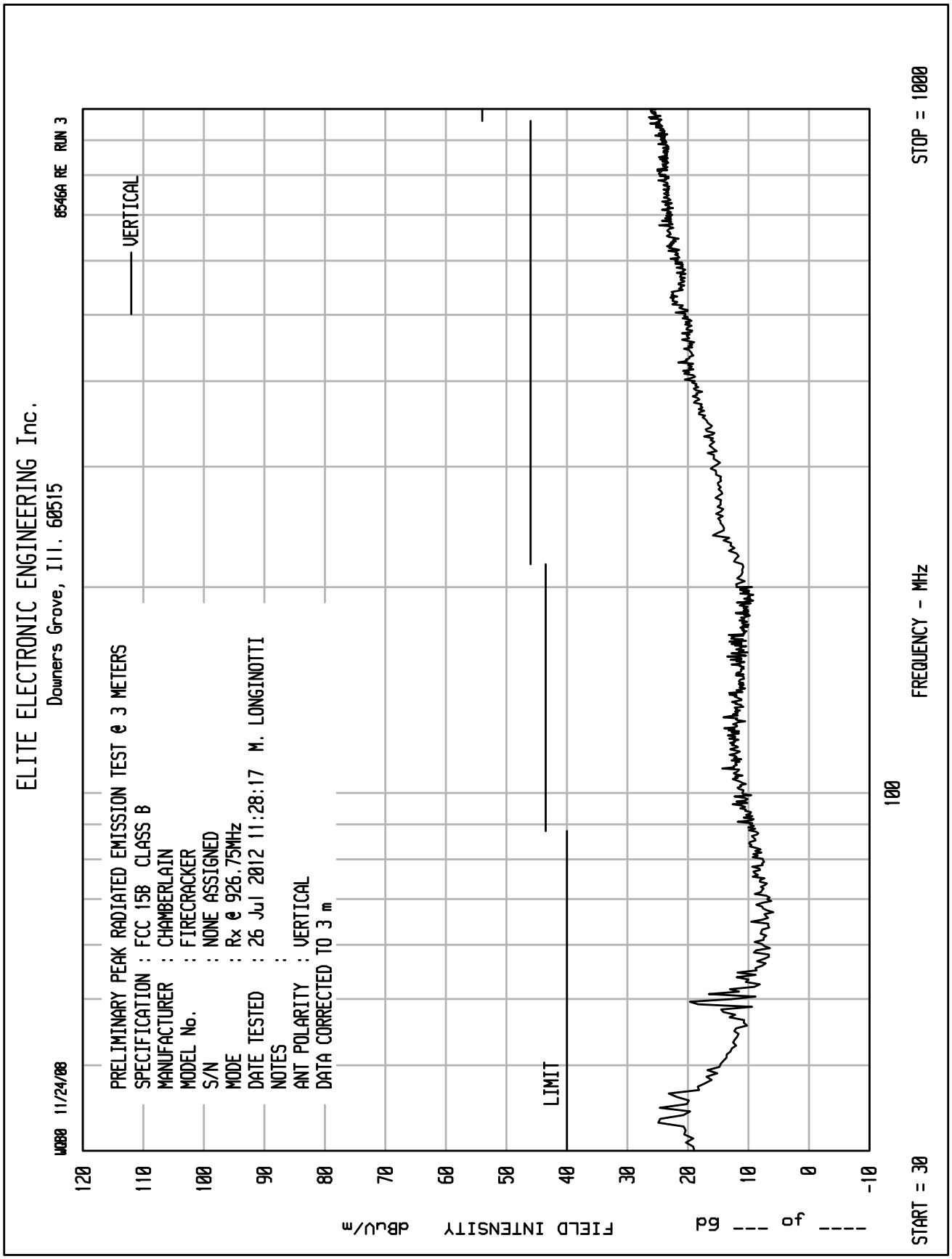
RADIATED AVG EMISSION MEASUREMENTS >=1000 MHz in a 3 m ANECHOIC ROOM

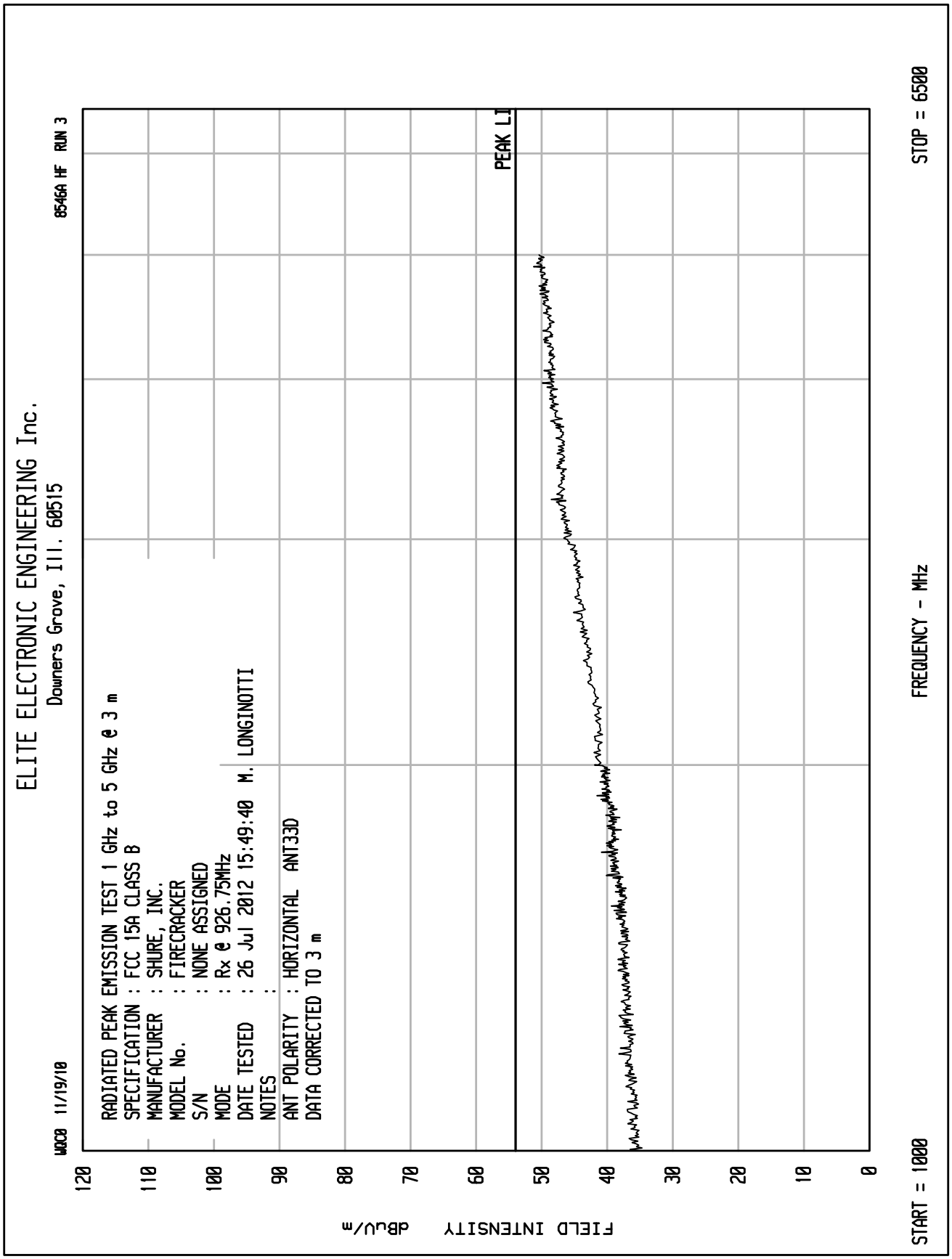
SPECIFICATION : FCC 15A CLASS B
MANUFACTURER : SHURE, INC.
MODEL NO. : FIRECRACKER
SERIAL NO. : NONE ASSIGNED
TEST MODE : Rx @ 914.75MHz
NOTES :
TEST DATE : 26 Jul 2012 15:11:12
TEST DISTANCE : 3 m
ANTENNA : ANT33D

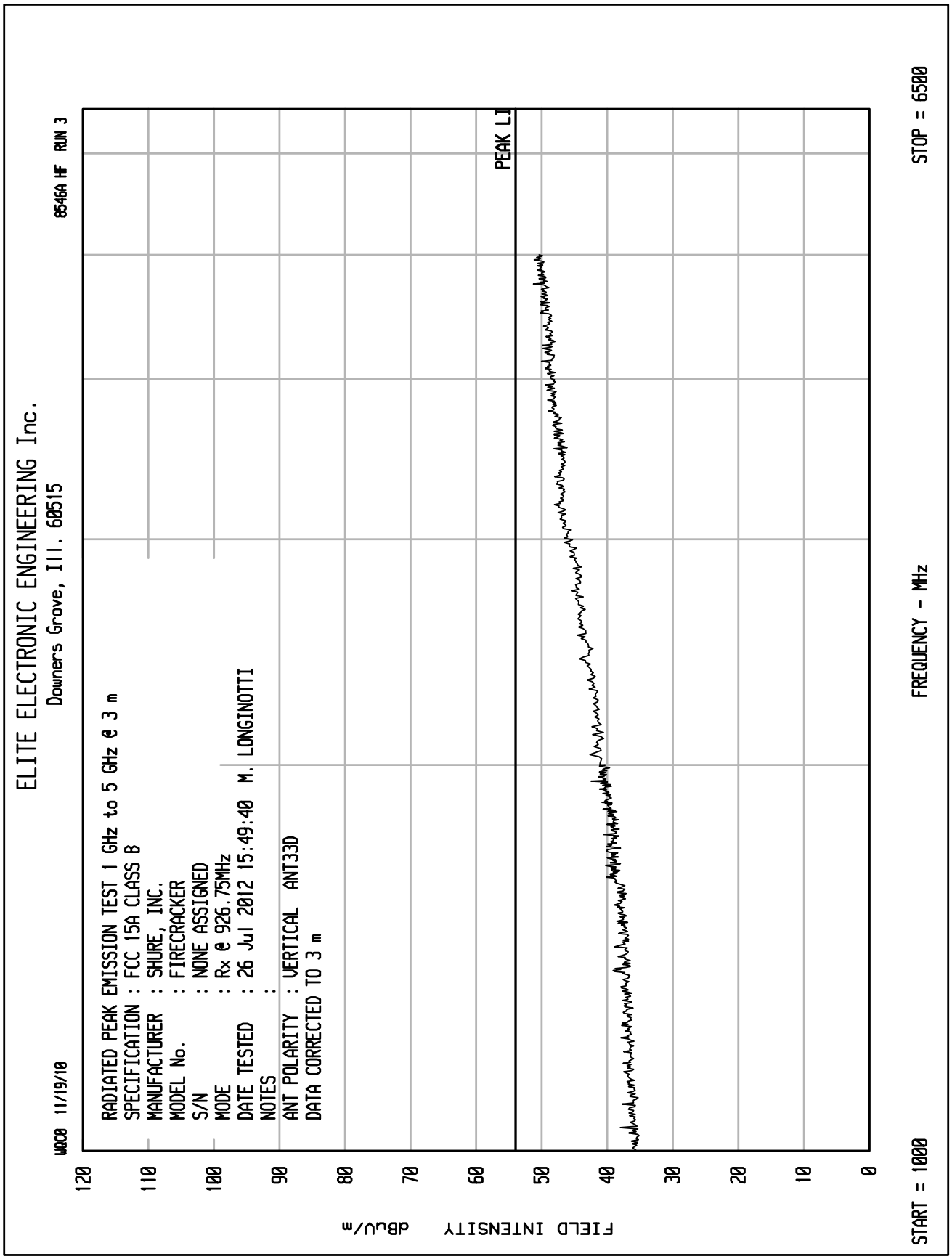
FREQUENCY MHz	AVG READING dBuV	ANT FAC dB	CBL FAC dB	DIST FAC dB	TOTAL dBuV/m	AVG LIMIT dBuV/m	PASS/ FAIL	AZ deg	ANT HT cm	POLAR
1150.78	-3.3	24.6	2.2	0.0	23.5	54.0		315	340	H
1236.28	-3.7	24.8	2.3	0.0	23.4	54.0		180	340	V
1352.12	-3.2	25.0	2.4	0.0	24.2	54.0		225	200	V
1518.66	-3.1	25.1	2.6	0.0	24.7	54.0		180	340	H
1673.78	-3.2	26.2	2.7	0.0	25.8	54.0		135	200	H
1787.69	-3.1	26.4	2.8	0.0	26.2	54.0		315	340	V
1892.02	-3.3	27.4	2.9	0.0	27.1	54.0		270	120	V
2139.57	-3.2	27.7	3.2	0.0	27.6	54.0		180	120	V
2585.93	-2.5	29.6	3.6	0.0	30.7	54.0		45	200	H
2996.55	-2.3	30.6	3.9	0.0	32.2	54.0		225	120	V
3329.28	-3.0	31.9	4.1	0.0	33.0	54.0		270	200	H
3801.60	-2.8	32.7	4.4	0.0	34.4	54.0		180	120	H
3844.88	-2.9	32.9	4.4	0.0	34.4	54.0		270	200	V
4594.70	-1.9	33.2	4.8	0.0	36.1	54.0		135	200	H
4922.80	-2.3	34.1	5.0	0.0	36.9	54.0		270	200	V

tested by: MARK E. LONGINOTTI
M. LONGINOTTI


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
8546A RE RUN 3
HORIZONTAL
PRELIMINARY PEAK RADIATED EMISSION TEST @ 3 METERS
SPECIFICATION : FCC 15B CLASS B
MANUFACTURER : CHAMBERLAIN
MODEL No. : FIRECRACKER
S/N : NONE ASSIGNED
MODE : Rx @ 926.75MHz
DATE TESTED : 26 Jul 2012 11:28:17 M. LONGINOTTI
NOTES :
ANT POLARITY : HORIZONTAL
DATA CORRECTED TO 3 m
LIMIT
FIELD INTENSITY dBuV/m
FREQUENCY - MHz
START = 30
100
STOP = 1000
120
110
100
90
80
70
60
50
40
30
20
10
0
-10


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
8546A RE RUN 3
VERTICAL
PRELIMINARY PEAK RADIATED EMISSION TEST @ 3 METERS
SPECIFICATION : FCC 15B CLASS B
MANUFACTURER : CHAMBERLAIN
MODEL No. : FIRECRACKER
S/N : NONE ASSIGNED
MODE : Rx @ 926.75MHz
DATE TESTED : 26 Jul 2012 11:28:17 M. LONGINOTTI
NOTES :
ANT POLARITY : VERTICAL
DATA CORRECTED TO 3 m
LIMIT
FIELD INTENSITY dBuV/m
FREQUENCY - MHz
START = 30
100
STOP = 1000
120
110
100
90
80
70
60
50
40
30
20
10
0
-10


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
WQC9 11/19/10
8546A HF RUN 3
RADIATED PEAK EMISSION TEST 1 GHz to 5 GHz @ 3 m
SPECIFICATION : FCC 15A CLASS B
MANUFACTURER : SHURE, INC.
MODEL No. : FIRECRACKER
S/N : NONE ASSIGNED
MODE : Rx @ 926.75MHz
DATE TESTED : 26 Jul 2012 15:49:40 M. LONGINOTTI
NOTES : :
ANT POLARITY : HORIZONTAL ANT33D
DATA CORRECTED TO 3 m
PEAK LI
FIELD INTENSITY dBuV/m
120
110
100
90
80
70
60
50
40
30
20
10
0
START = 1000
FREQUENCY - MHz
STOP = 6500


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
WQC9 11/19/10
8546A HF RUN 3
RADIATED PEAK EMISSION TEST 1 GHz to 5 GHz @ 3 m
SPECIFICATION : FCC 15A CLASS B
MANUFACTURER : SHURE, INC.
MODEL No. : FIRECRACKER
S/N : NONE ASSIGNED
MODE : Rx @ 926.75MHz
DATE TESTED : 26 Jul 2012 15:49:40 M. LONGINOTTI
NOTES : :
ANT POLARITY : VERTICAL ANT33D
DATA CORRECTED TO 3 m
PEAK LI
FIELD INTENSITY dBuV/m
120
110
100
90
80
70
60
50
40
30
20
10
0
START = 1000
FREQUENCY - MHz
STOP = 6500

ETR No. 8546A
DATA SHEET TEST NO. 3

RADIATED QP EMISSION MEASUREMENTS in a 3 m SEMI-ANECHOIC ROOM
SPECIFICATION : FCC 15B CLASS B
MANUFACTURER : CHAMBERLAIN
MODEL NO. : FIRECRACKER
SERIAL NO. : NONE ASSIGNED
TEST MODE : Rx @ 926.75MHz
NOTES :
TEST DATE : 26 Jul 2012 11:28:17
TEST DISTANCE : 3 m (DATA EXTRAPOLATED TO 3 m)

FREQUENCY MHz	QP READING dBuV	ANT FAC dB	CBL FAC dB	EXT ATTN dB	DIST FAC dB	TOTAL dBuV/m	QP LIMIT dBuV/m	AZ deg	ANT HT cm	POLAR
32.97	6.8	17.1	.5	0.0	0.0	24.4	40.0	90	340	H
54.69	-2.0	6.7	.5	0.0	0.0	5.2	40.0	0	120	V
82.86	-2.2	8.0	.5	0.0	0.0	6.3	40.0	225	200	H
109.47	-2.1	11.7	.6	0.0	0.0	10.1	43.5	180	200	V
129.06	-2.0	11.4	.7	0.0	0.0	10.1	43.5	270	120	V
160.38	-1.7	10.2	.8	0.0	0.0	9.3	43.5	225	340	V
166.43	-1.7	9.9	.9	0.0	0.0	9.1	43.5	225	200	H
231.25	-1.4	10.6	1.0	0.0	0.0	10.3	46.0	315	200	V
364.69	-.8	15.1	1.3	0.0	0.0	15.7	46.0	225	200	H
420.15	-1.0	16.7	1.5	0.0	0.0	17.2	46.0	135	200	V
528.10	-1.6	20.0	1.5	0.0	0.0	19.9	46.0	135	340	H
673.07	-.9	19.7	1.7	0.0	0.0	20.4	46.0	45	120	V
777.08	-.7	20.4	2.0	0.0	0.0	21.6	46.0	90	340	V
839.15	-.8	20.4	2.0	0.0	0.0	21.6	46.0	135	200	H
945.59	-.6	21.3	2.0	0.0	0.0	22.7	46.0	270	340	V

tested by: MARK E. LONGINOTTI
M. LONGINOTTI

DATA SHEET HF TEST NO. 3

RADIATED AVG EMISSION MEASUREMENTS >=1000 MHz in a 3 m ANECHOIC ROOM

SPECIFICATION : FCC 15A CLASS B
MANUFACTURER : SHURE, INC.
MODEL NO. : FIRECRACKER
SERIAL NO. : NONE ASSIGNED
TEST MODE : Rx @ 926.75MHz
NOTES :
TEST DATE : 26 Jul 2012 15:49:40
TEST DISTANCE : 3 m
ANTENNA : ANT33D

FREQUENCY MHz	AVG READING dBuV	ANT FAC dB	CBL FAC dB	DIST FAC dB	TOTAL dBuV/m	AVG LIMIT dBuV/m	PASS/ FAIL	AZ deg	ANT HT cm	POLAR
1045.07	-3.0	23.9	2.1	0.0	23.0	54.0		135	200	V
1177.07	-3.3	24.6	2.2	0.0	23.5	54.0		90	200	H
1388.39	-3.2	25.0	2.5	0.0	24.2	54.0		270	340	V
1446.90	-3.2	25.0	2.5	0.0	24.4	54.0		45	340	V
1645.54	-3.2	25.9	2.7	0.0	25.4	54.0		270	200	V
1726.48	-3.1	26.4	2.8	0.0	26.1	54.0		90	120	H
1908.47	-3.0	27.5	2.9	0.0	27.5	54.0		0	120	H
2036.15	-2.8	27.6	3.0	0.0	27.9	54.0		0	120	V
2573.24	-2.4	29.6	3.6	0.0	30.7	54.0		0	340	H
3017.72	-2.4	30.7	3.9	0.0	32.2	54.0		0	200	H
3213.79	-2.4	31.7	4.0	0.0	33.4	54.0		270	200	H
3769.82	-2.9	32.6	4.4	0.0	34.1	54.0		270	200	V
4138.65	-2.6	33.0	4.6	0.0	35.0	54.0		135	340	V
4589.81	-2.1	33.2	4.8	0.0	35.9	54.0		180	120	V
4728.54	-2.6	33.6	4.9	0.0	35.9	54.0		101	120	V

tested by: MARK E. LONGINOTTI
M. LONGINOTTI

FCC Part 15 Subpart B Conducted Emissions Test

Significant Emissions Data

VB** 02/09/2011

Manufacturer	:	CHAMBERLAIN
Model	:	FIRECRACKER
DUT Revision	:	
Serial Number	:	NONE ASSIGNED
DUT Mode	:	Tx @ 914.75MHz
Line Tested	:	115V, 60Hz HIGH
Scan Step Time [ms]	:	30
Meas. Threshold [dB]	:	-6
Notes	:	TESTED W/ GDO HEAD UNIT HD600DM
Test Engineer	:	M. Longinotti
Limit	:	Class B
Test Date	:	Aug 02, 2012 08:31:02 AM
Data Filter	:	Up to 80 maximum levels detected with 6 dB level excursion threshold over 6 dB margin below limit

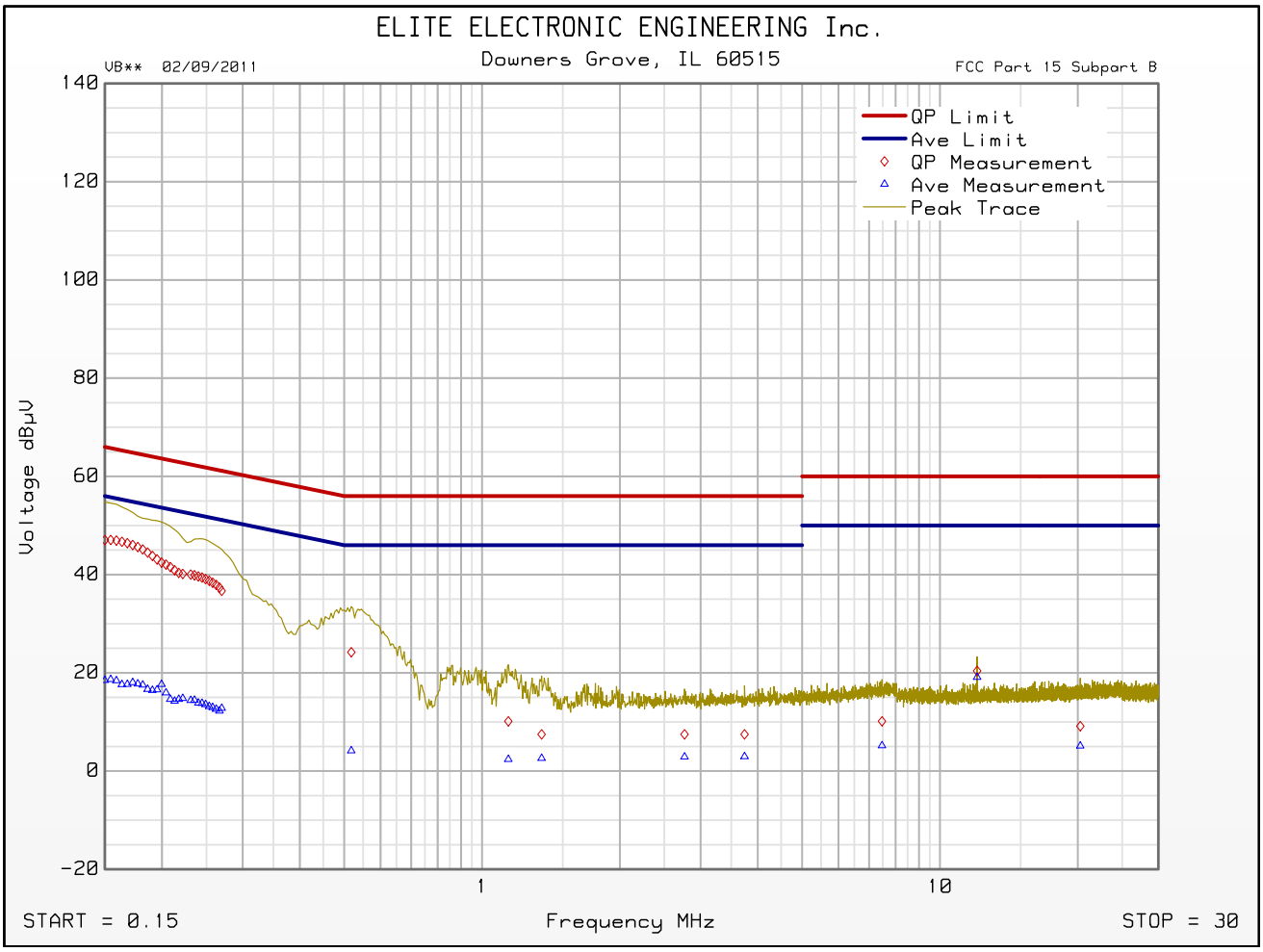
Freq MHz	Quasi-peak Level dBµV	Quasi-peak Limit dBµV	Excessive Quasi-peak Emissions	Average Level dBµV	Average Limit dBµV	Excessive Average Emissions
0.159	46.9	65.5		18.4	55.5	
0.270	36.7	61.1		12.8	51.1	
0.518	24.2	56.0		4.1	46.0	
1.141	10.1	56.0		2.4	46.0	
1.349	7.5	56.0		2.6	46.0	
2.768	7.5	56.0		2.9	46.0	
3.743	7.5	56.0		3.0	46.0	
7.471	10.1	60.0		5.2	50.0	
12.056	20.4	60.0		19.1	50.0	
20.255	9.1	60.0		5.1	50.0	

FCC Part 15 Subpart B Conducted Emissions Test

Cumulative Data

VB** 02/09/2011

Manufacturer	:	CHAMBERLAIN
Model	:	FIRECRACKER
DUT Revision	:	
Serial Number	:	NONE ASSIGNED
DUT Mode	:	Tx @ 914.75MHz
Line Tested	:	115V, 60Hz HIGH
Scan Step Time [ms]	:	30
Meas. Threshold [dB]	:	-6
Notes	:	TESTED W/ GDO HEAD UNIT HD600DM
Test Engineer	:	M. Longinotti
Limit	:	Class B
Test Date	:	Aug 02, 2012 08:31:02 AM



Emissions Meet QP Limit
Emissions Meet Ave Limit

FCC Part 15 Subpart B Conducted Emissions Test

Significant Emissions Data

VB** 02/09/2011

Manufacturer	:	CHAMBERLAIN
Model	:	FIRECRACKER
DUT Revision	:	
Serial Number	:	NONE ASSIGNED
DUT Mode	:	Tx @ 914.75MHz
Line Tested	:	115V, 60Hz RETURN
Scan Step Time [ms]	:	30
Meas. Threshold [dB]	:	-6
Notes	:	TESTED W/ GDO HEAD UNIT HD600DM
Test Engineer	:	M. Longinotti
Limit	:	Class B
Test Date	:	Aug 02, 2012 08:37:14 AM
Data Filter	:	Up to 80 maximum levels detected with 6 dB level excursion threshold over 6 dB margin below limit

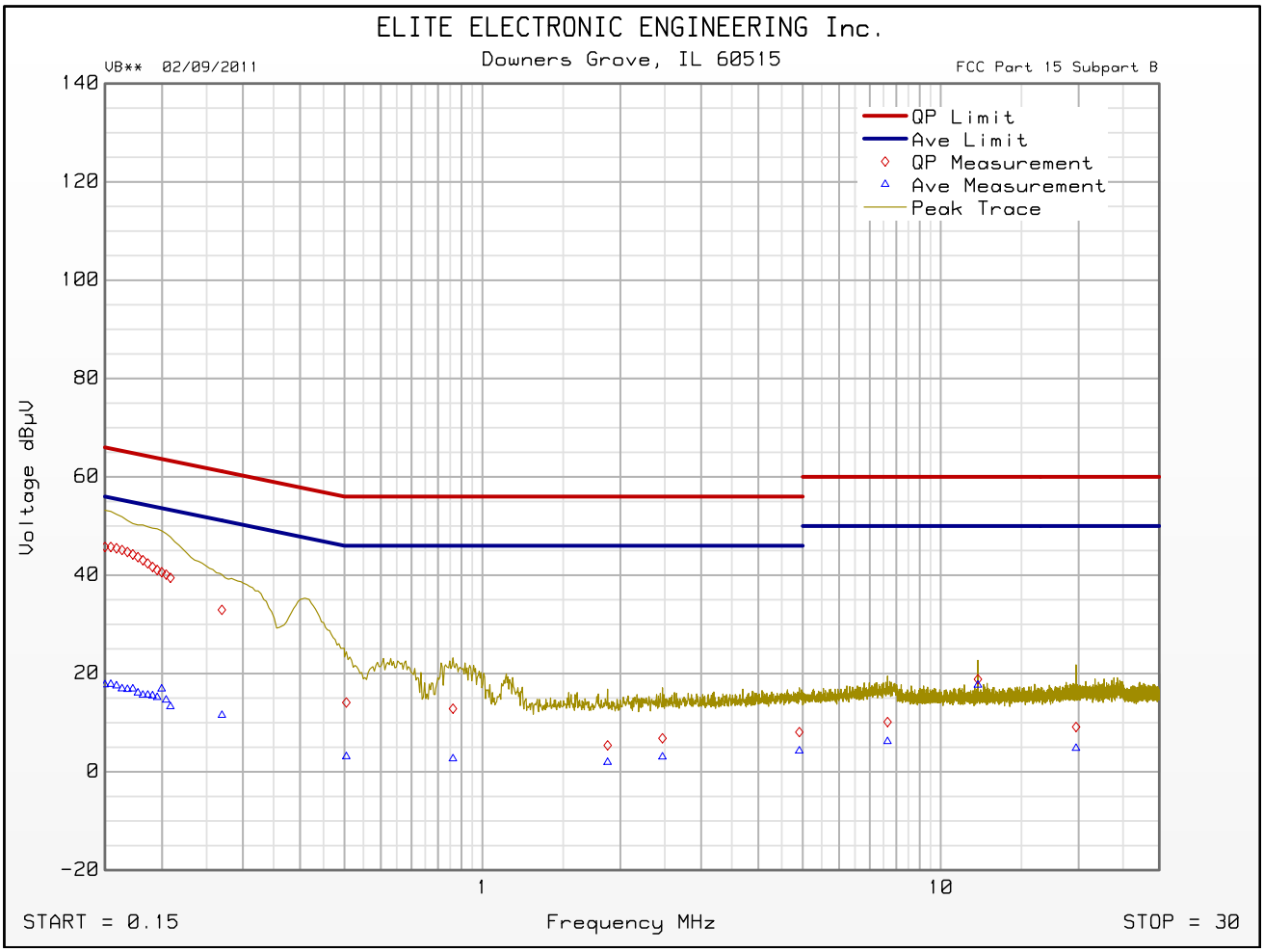
Freq MHz	Quasi-peak Level dBµV	Quasi-peak Limit dBµV	Excessive Quasi-peak Emissions	Average Level dBµV	Average Limit dBµV	Excessive Average Emissions
0.155	45.8	65.8		17.8	55.8	
0.270	33.0	61.1		11.5	51.1	
0.505	14.1	56.0		3.1	46.0	
0.862	12.9	56.0		2.7	46.0	
1.876	5.4	56.0		1.9	46.0	
2.471	6.8	56.0		3.0	46.0	
4.913	8.1	56.0		4.3	46.0	
7.655	10.1	60.0		6.2	50.0	
12.056	18.8	60.0		17.7	50.0	
19.742	9.1	60.0		4.8	50.0	

FCC Part 15 Subpart B Conducted Emissions Test

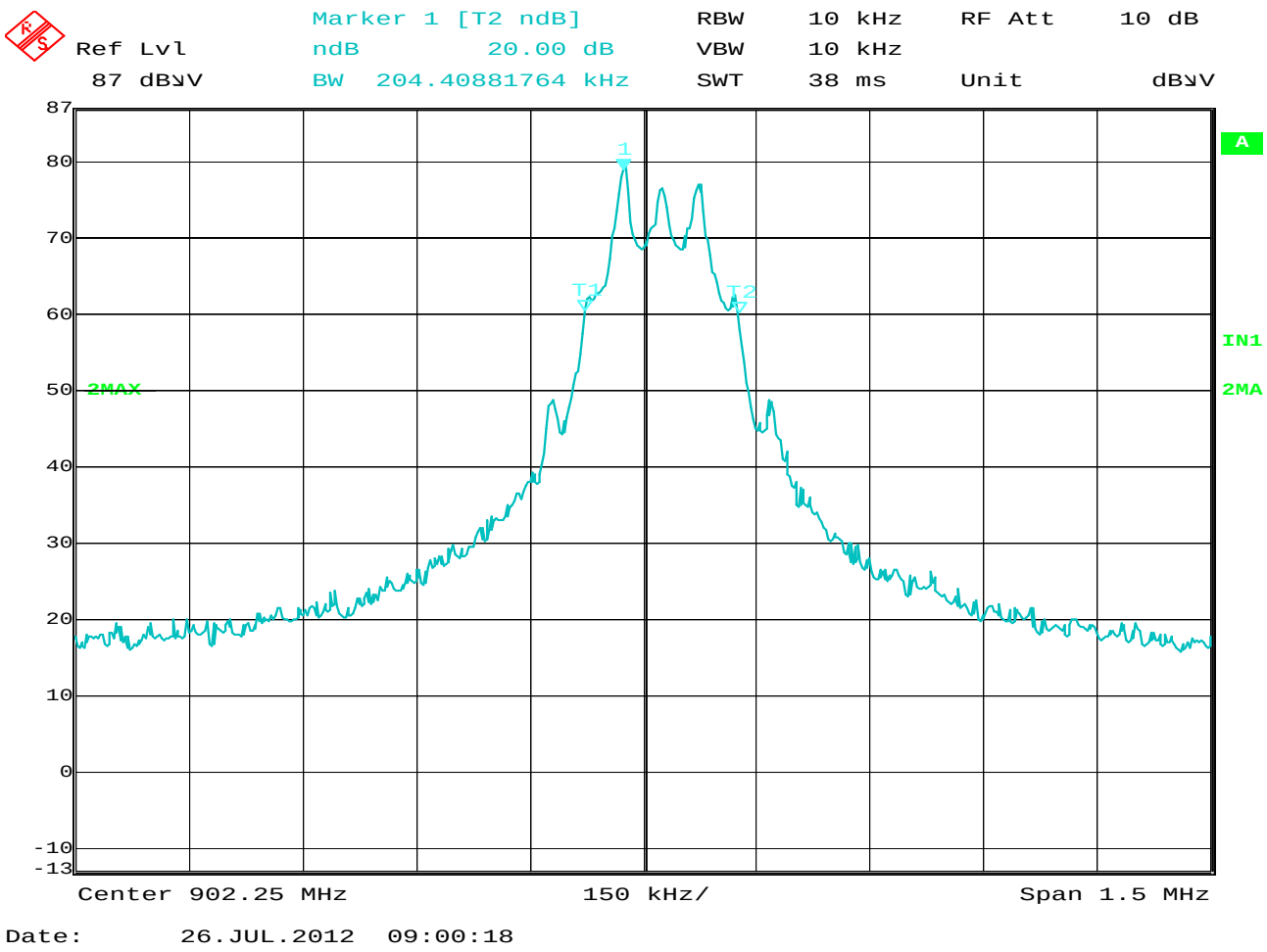
Cumulative Data

VB** 02/09/2011

Manufacturer	:	CHAMBERLAIN
Model	:	FIRECRACKER
DUT Revision	:	
Serial Number	:	NONE ASSIGNED
DUT Mode	:	Tx @ 914.75MHz
Line Tested	:	115V, 60Hz RETURN
Scan Step Time [ms]	:	30
Meas. Threshold [dB]	:	-6
Notes	:	TESTED W/ GDO HEAD UNIT HD600DM
Test Engineer	:	M. Longinotti
Limit	:	Class B
Test Date	:	Aug 02, 2012 08:37:14 AM

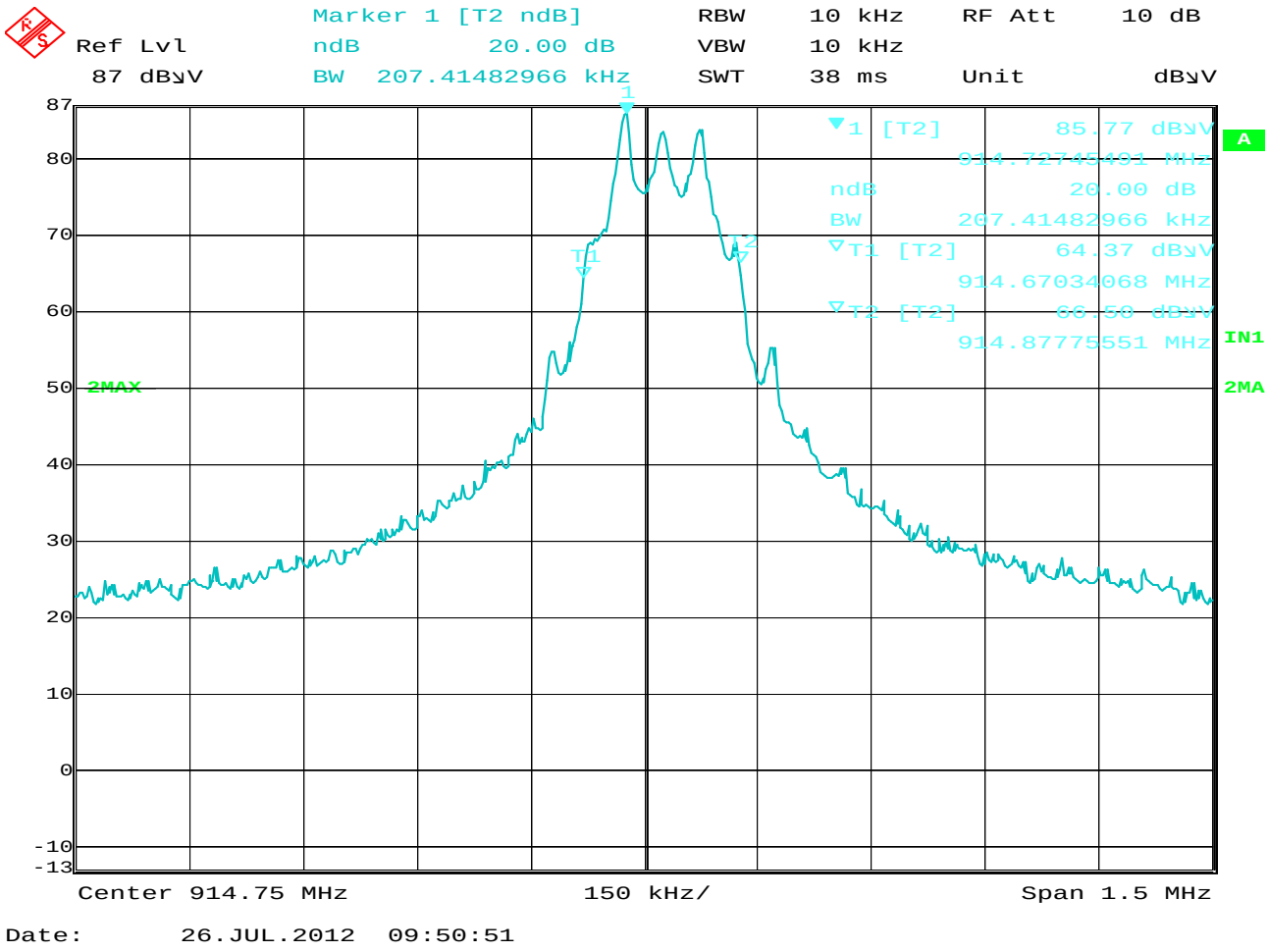


Emissions Meet QP Limit
Emissions Meet Ave Limit



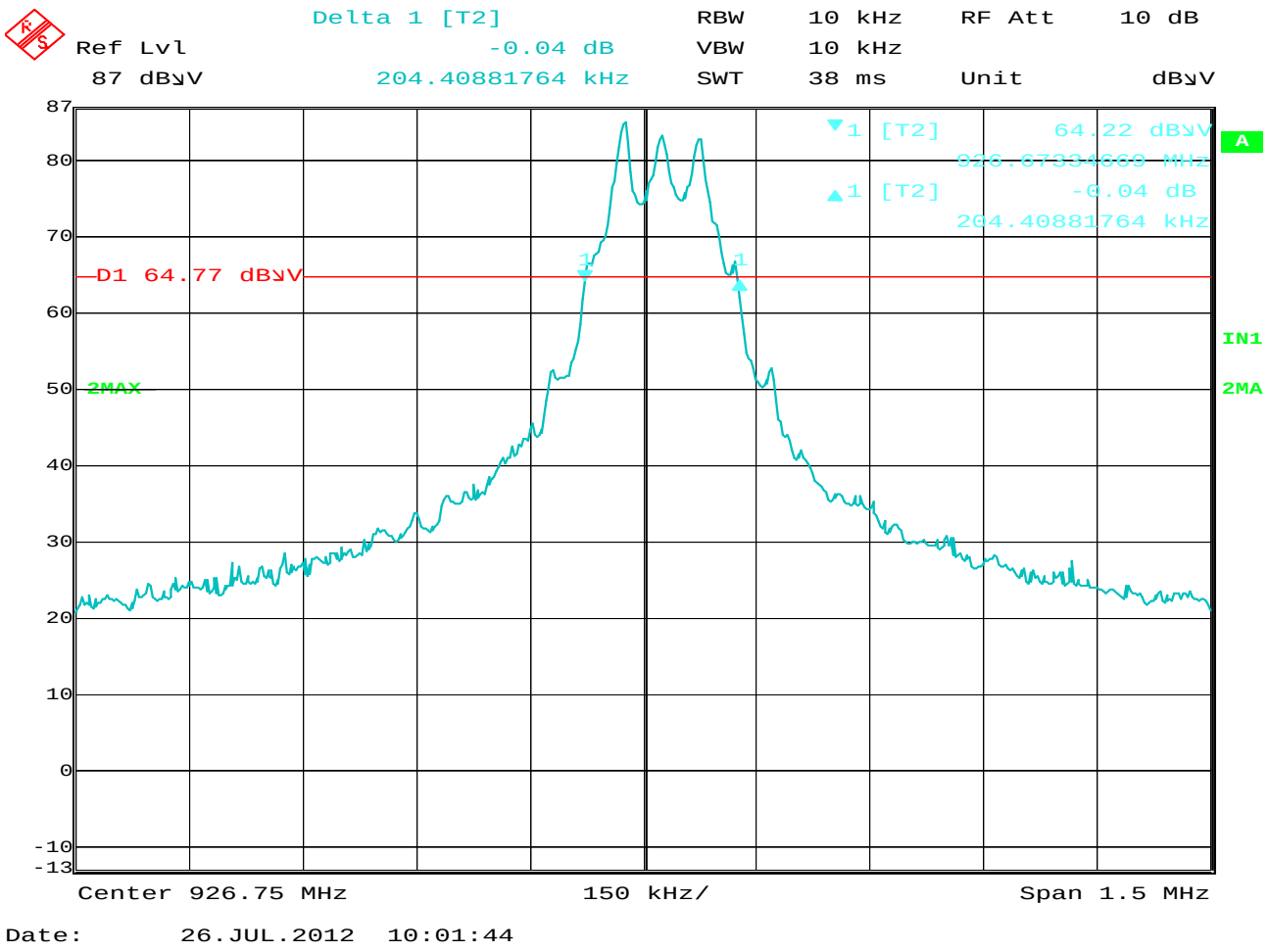
15.247(a) 20dB Bandwidth

MANUFACTURER	:	The Chamberlain Group, Inc.
MODEL NUMBER	:	Firecracker
SERIAL NUMBER	:	None Assigned
TEST MODE	:	Tx @ 902.25MHz
TEST DATE	:	July 26, 2012
TEST PARAMETERS	:	20dB bandwidth
NOTES	:	20dB bandwidth = 204.4kHz, 99% bandwidth = 201.4kHz
EQUIPMENT USED	:	RBB0, NTA0



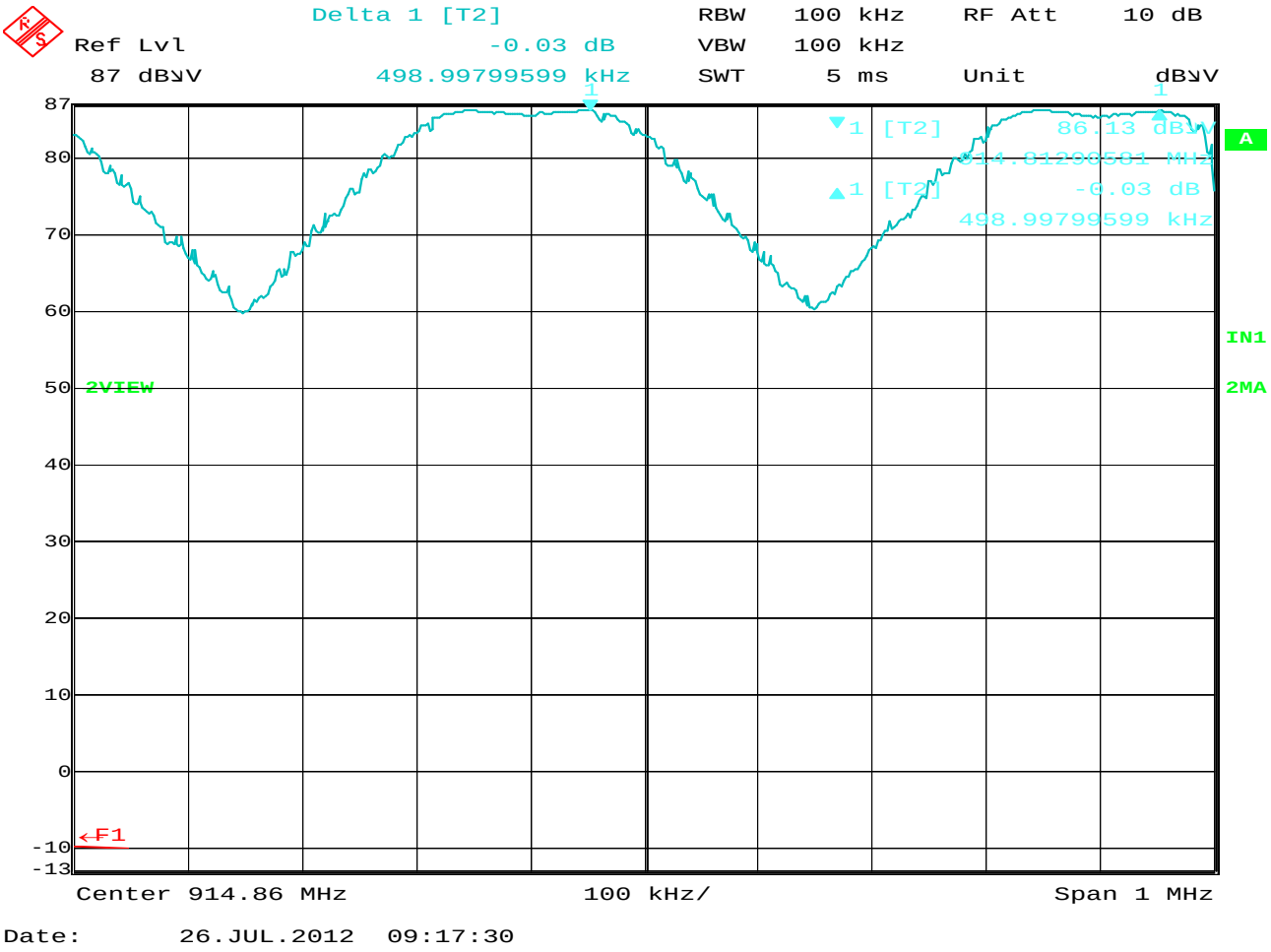
15.247(a) 20dB Bandwidth

MANUFACTURER	:	The Chamberlain Group, Inc.
MODEL NUMBER	:	Firecracker
SERIAL NUMBER	:	None Assigned
TEST MODE	:	Tx @ 914.75MHz
TEST DATE	:	July 26, 2012
TEST PARAMETERS	:	20dB bandwidth
NOTES	:	20dB bandwidth = 207.4kHz, 99% bandwidth = 195.4kHz
EQUIPMENT USED	:	RBB0, NTA0



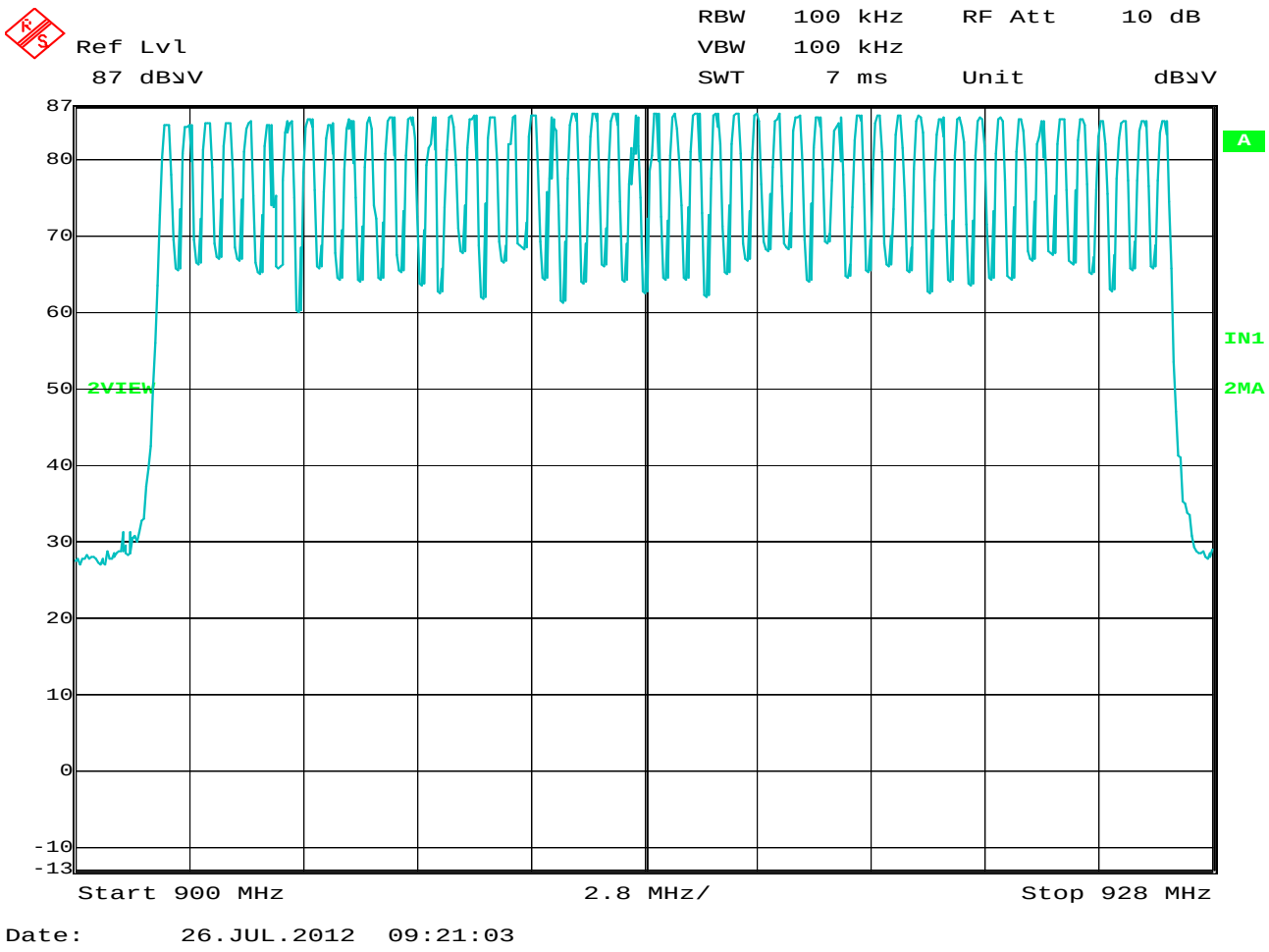
15.247(a) 20dB Bandwidth

MANUFACTURER	:	The Chamberlain Group, Inc.
MODEL NUMBER	:	Firecracker
SERIAL NUMBER	:	None Assigned
TEST MODE	:	Tx @ 926.75MHz
TEST DATE	:	July 26, 2012
TEST PARAMETERS	:	20dB bandwidth
NOTES	:	20dB bandwidth = 204.4kHz, 99% bandwidth = 189.4kHz
EQUIPMENT USED	:	RBB0, NTA0



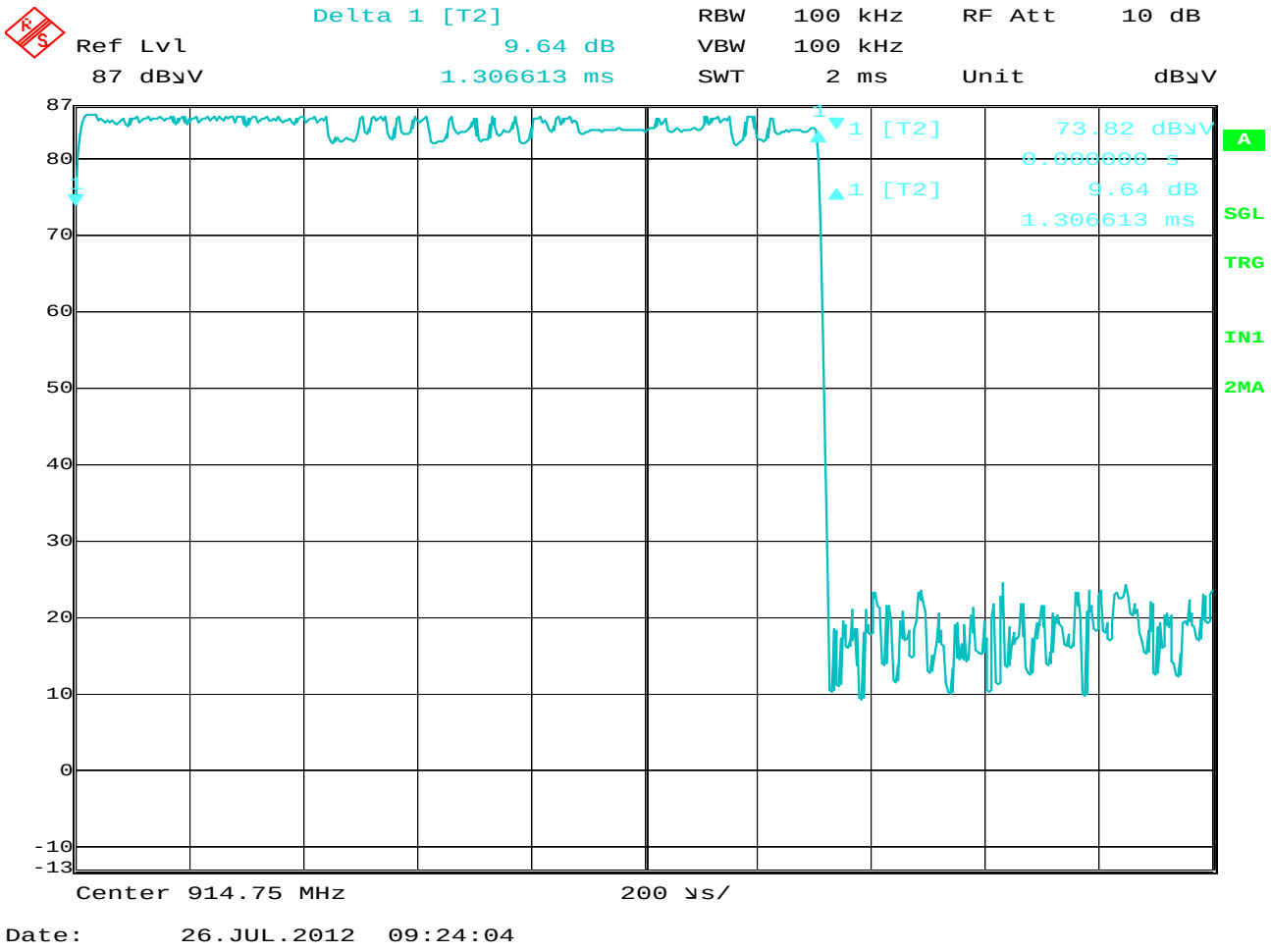
15.247(a) Carrier Frequency Separation

MANUFACTURER	:	The Chamberlain Group, Inc.
MODEL NUMBER	:	Firecracker
SERIAL NUMBER	:	None Assigned
TEST MODE	:	Hopping Enabled
TEST DATE	:	July 26, 2012
TEST PARAMETERS	:	Carrier Frequency Separation
NOTES	:	Carrier Frequency Separation = 499kHz
EQUIPMENT USED	:	RBB0, NTA0



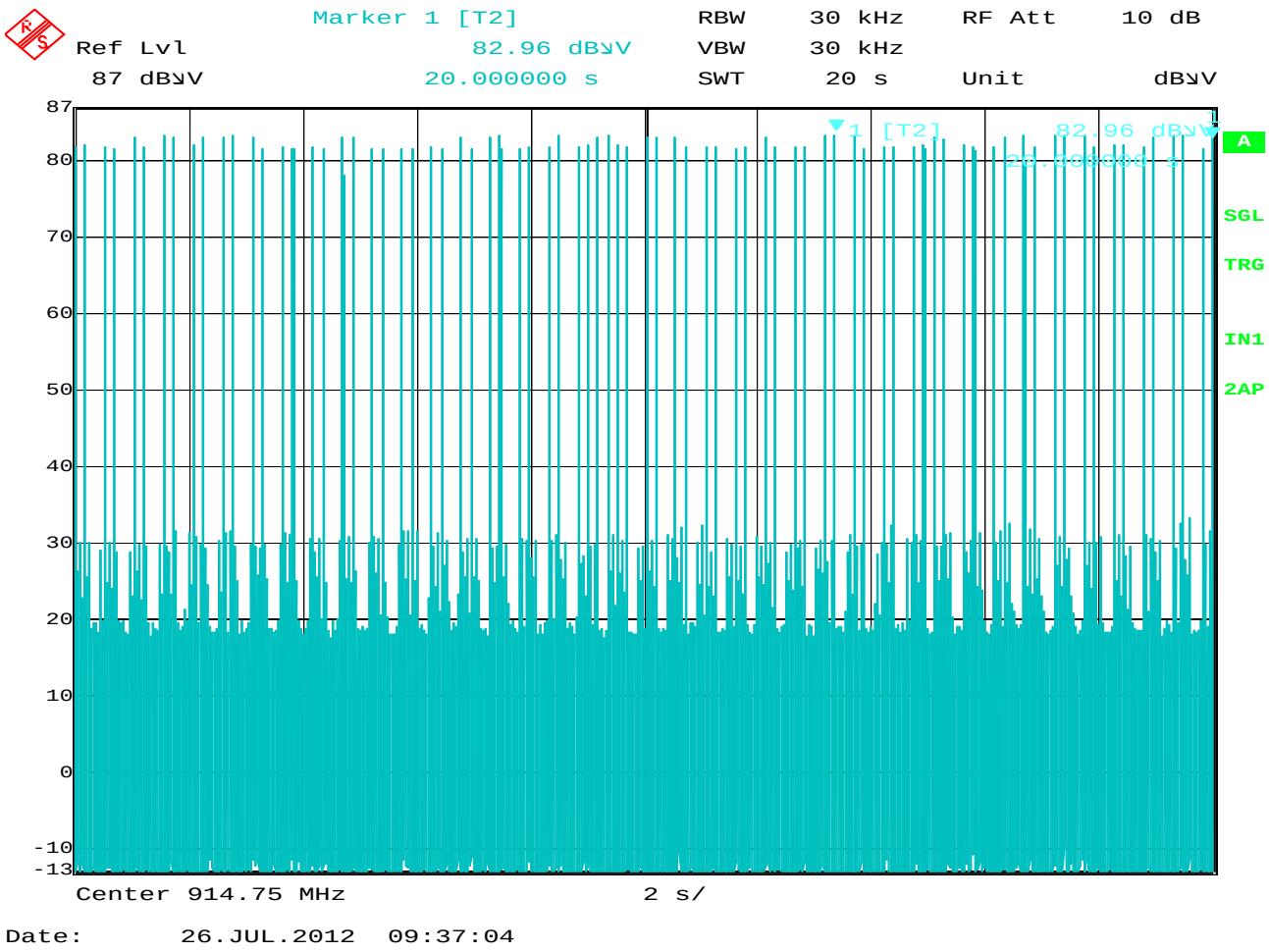
15.247(a) Number of Hopping Frequencies

MANUFACTURER	:	The Chamberlain Group, Inc.
MODEL NUMBER	:	Firecracker
SERIAL NUMBER	:	None Assigned
TEST MODE	:	Hopping Enabled
TEST DATE	:	July 26, 2012
TEST PARAMETERS	:	Number of Hopping Frequencies
NOTES	:	Number of Hopping Frequencies = 50
EQUIPMENT USED	:	RBB0, NTA0



15.247(a) Time of Occupancy

MANUFACTURER	:	The Chamberlain Group, Inc.
MODEL NUMBER	:	Firecracker
SERIAL NUMBER	:	None Assigned
TEST MODE	:	Hopping Enabled
TEST DATE	:	July 26, 2012
TEST PARAMETERS	:	Time of Occupancy
NOTES	:	Pulse width = 1.3msec
EQUIPMENT USED	:	RBB0, NTA0



15.247(a) Time of Occupancy

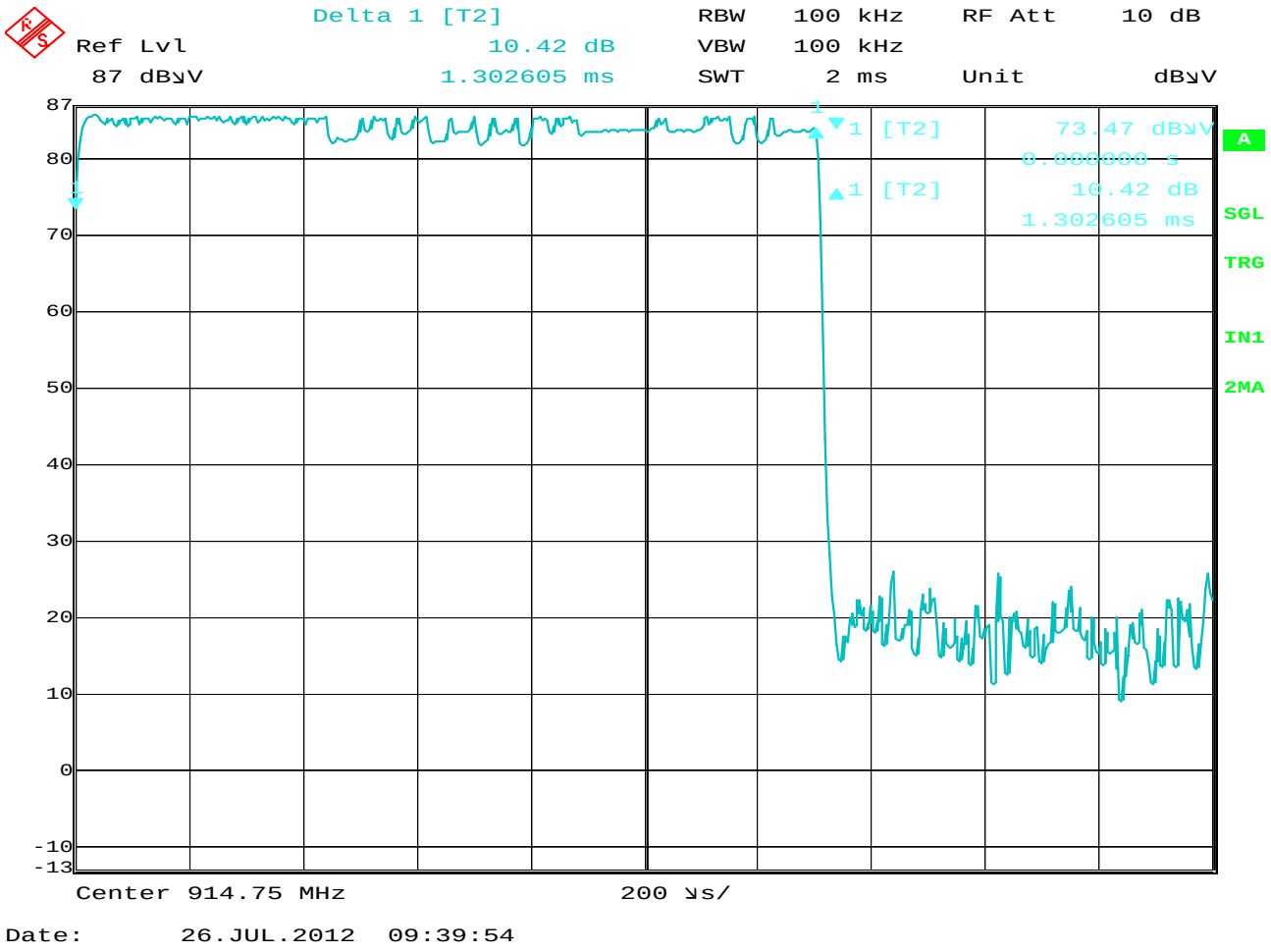
MANUFACTURER	:	The Chamberlain Group, Inc.
MODEL NUMBER	:	Firecracker
SERIAL NUMBER	:	None Assigned
TEST MODE	:	Hopping Enabled
TEST DATE	:	July 26, 2012
TEST PARAMETERS	:	Time of Occupancy
NOTES	:	Time of Occupancy in a 20 second period = (# pulses) x (pulse duration)
	:	Time of Occupancy in a 20 second period = 80 x 1.3msec = 104msec
EQUIPMENT USED	:	RBB0, NTA0

MANUFACTURER : The Chamberlain Group
MODEL : Firecracker
SERIAL NO. : None Assigned
SPECIFICATION : FCC 15.247 and RSS-210 Peak RF Power Output – EIRP
DATE : July 25, 2012 and July 27, 2012
MODE : See Below
EQUIPMENT USED : RBB0, NTA0, NDQ1, GRD0, CMA1

Freq. MHz	Meter Reading dBuV	Matched Sig. Gen. Reading dBm	Antenna Gain dB	Cable Loss dB	EIRP dBm	Limit dBm
902.25	85.0	12.2	2.2	2.0	12.4	36.0
914.75	86.2	13.2	2.2	2.0	13.4	36.0
926.75	85.7	12.8	2.2	2.0	13.0	36.0

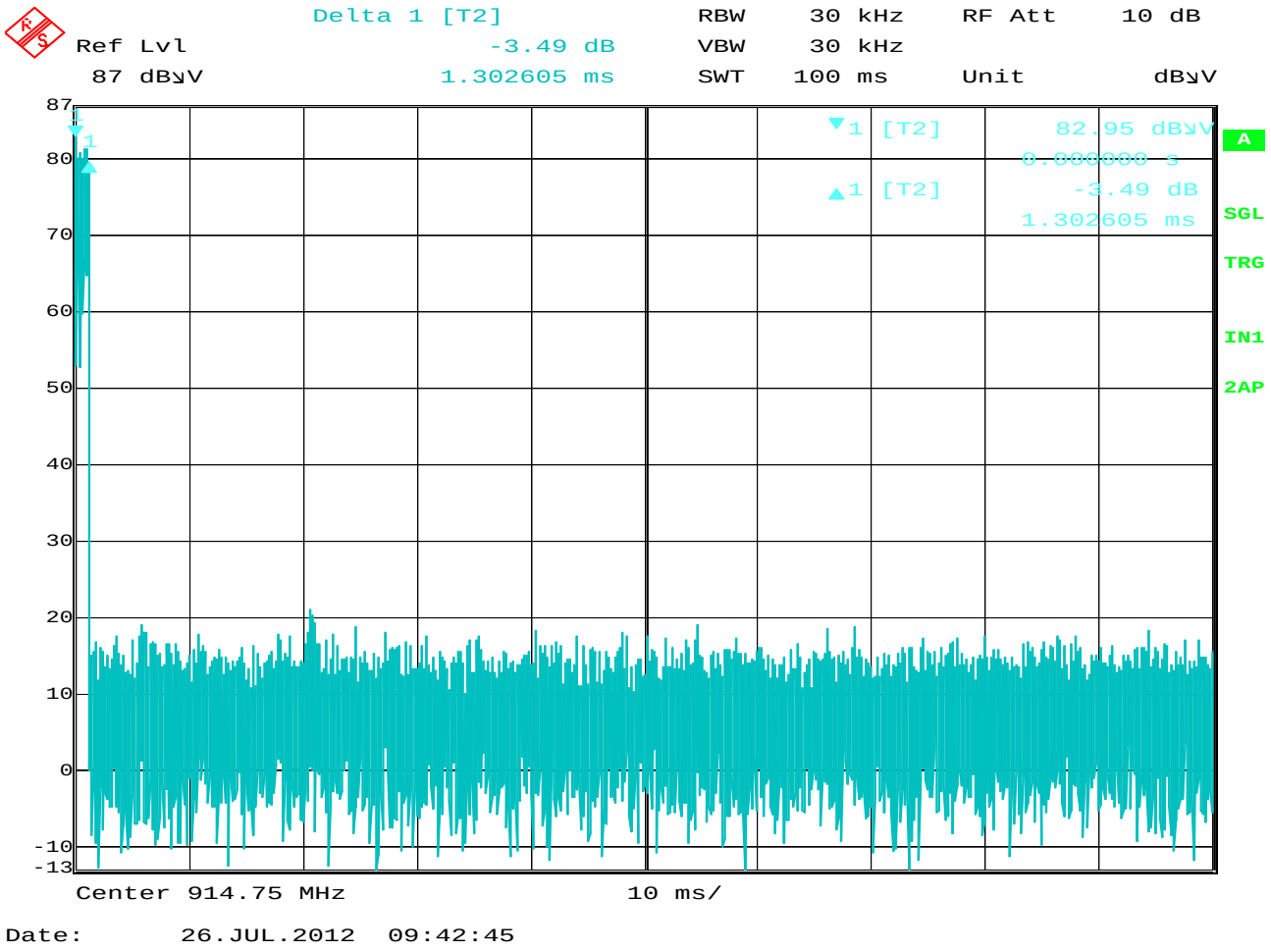
Checked By: MARK E. LONGINOTTI

Mark Longinotti



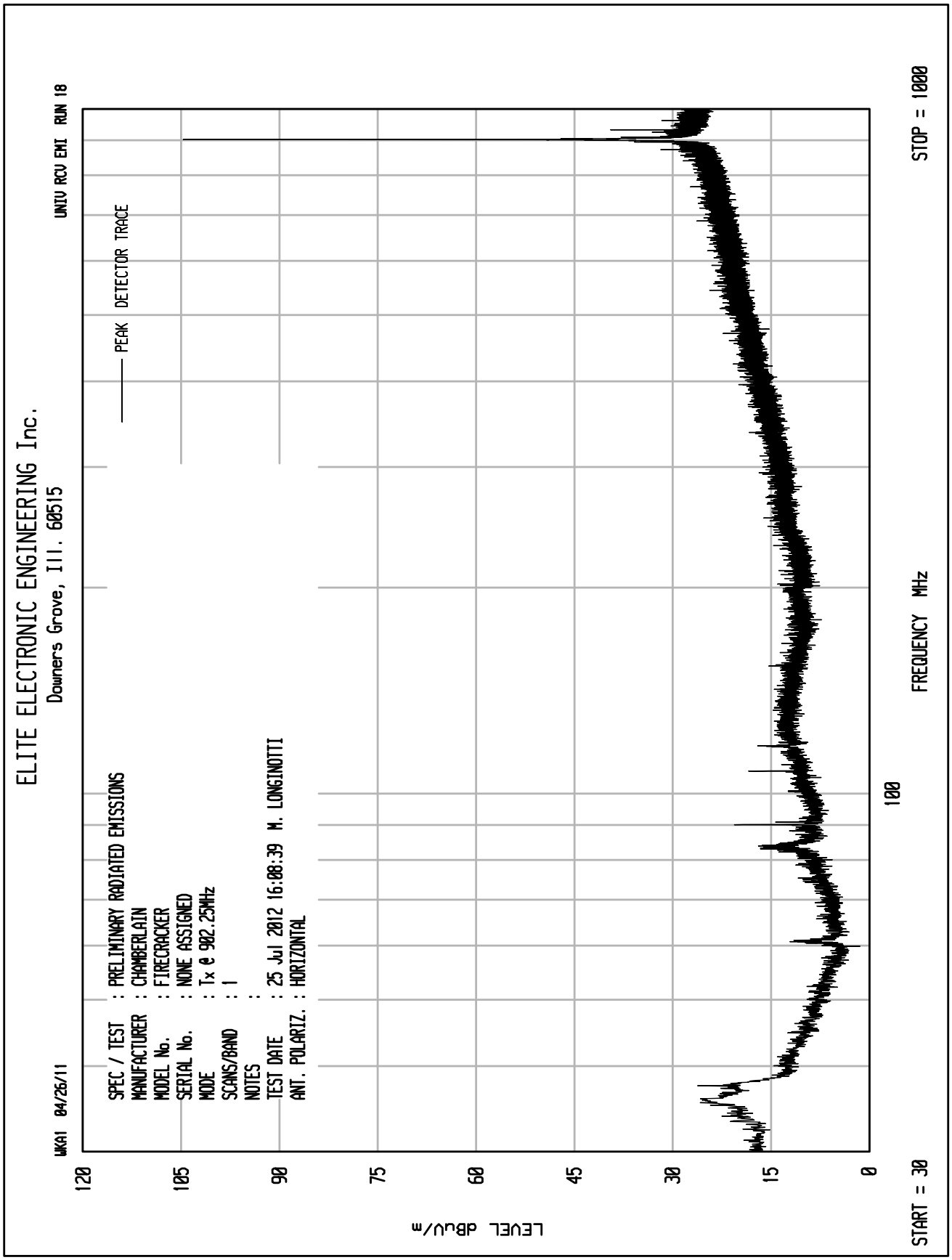
15.35(c) Duty Cycle Correction Factor

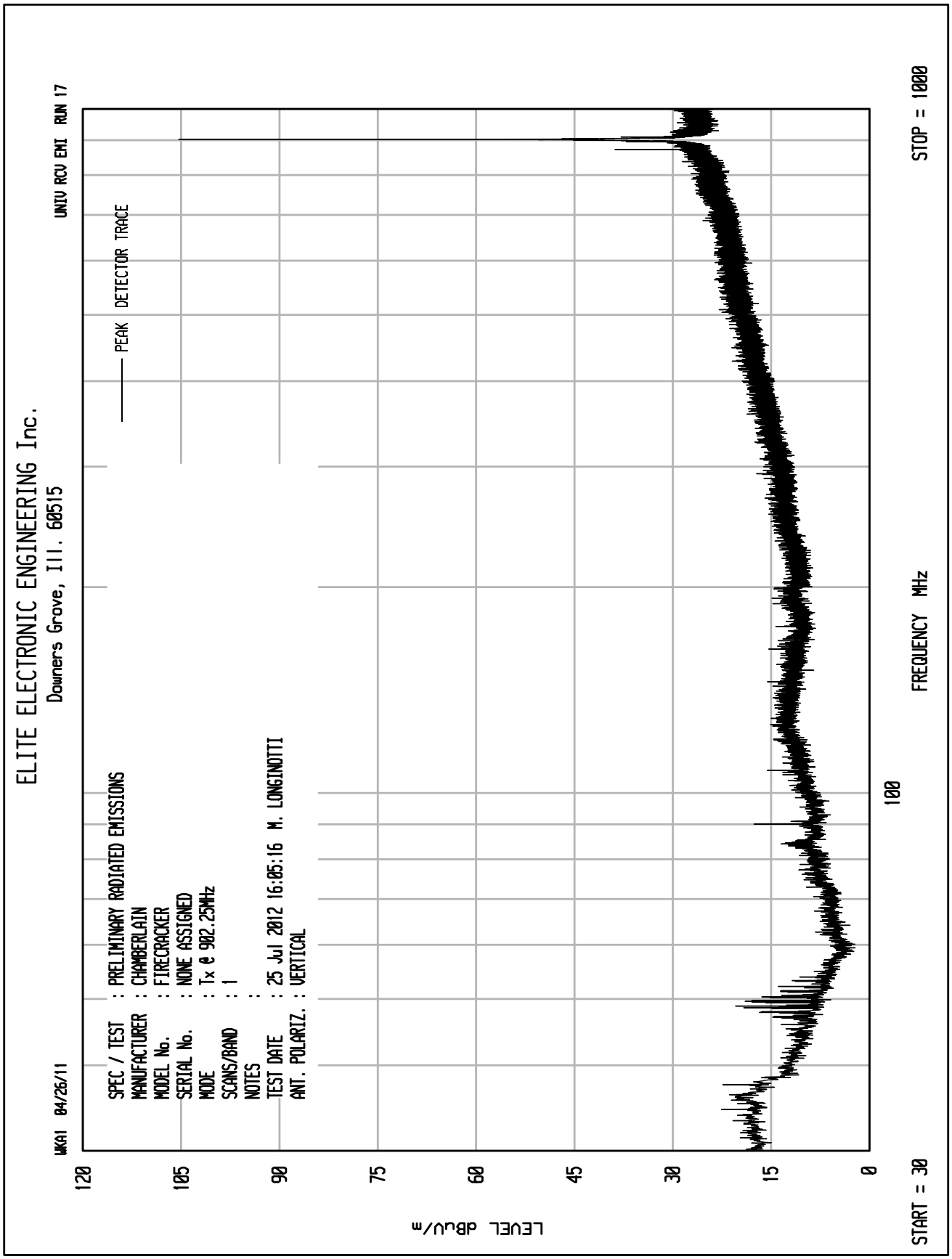
MANUFACTURER	:	The Chamberlain Group, Inc.
MODEL NUMBER	:	Firecracker
SERIAL NUMBER	:	None Assigned
TEST MODE	:	Hopping Enabled
TEST DATE	:	July 26, 2012
TEST PARAMETERS	:	Duty Cycle Factor
NOTES	:	Pulse Duration = 1.3msec
EQUIPMENT USED	:	RBB0, NTA0

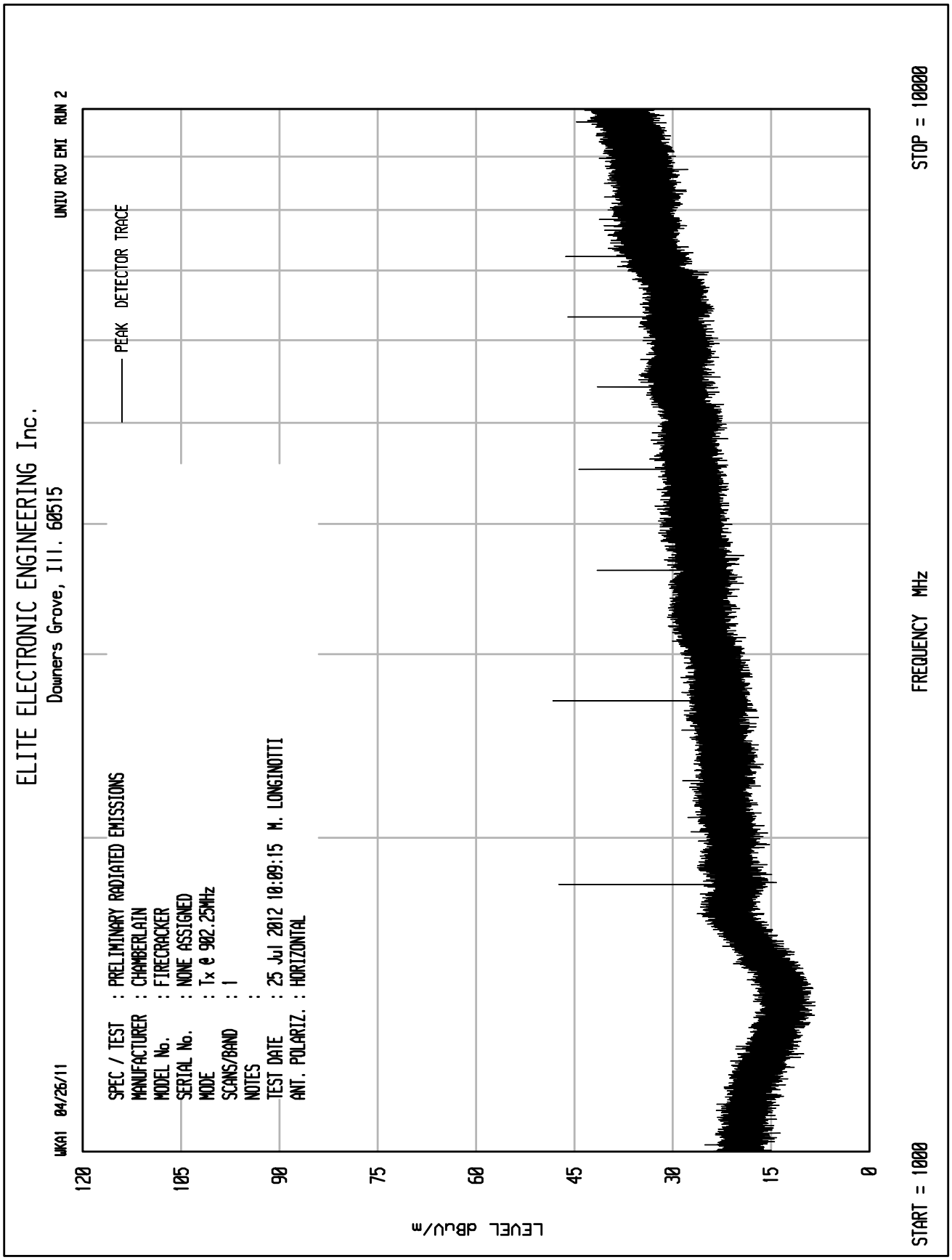


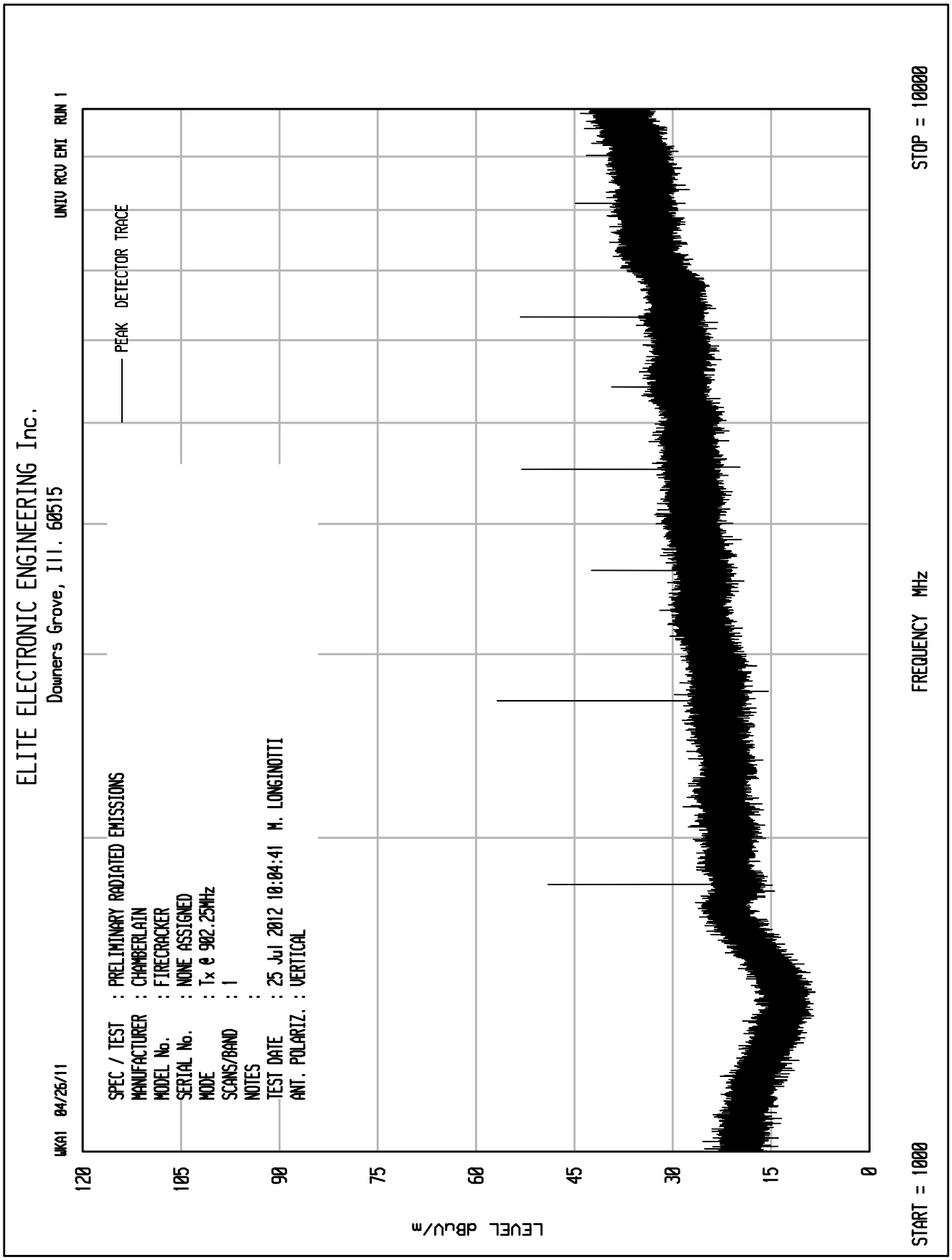
15.35(c) Duty Cycle Correction Factor

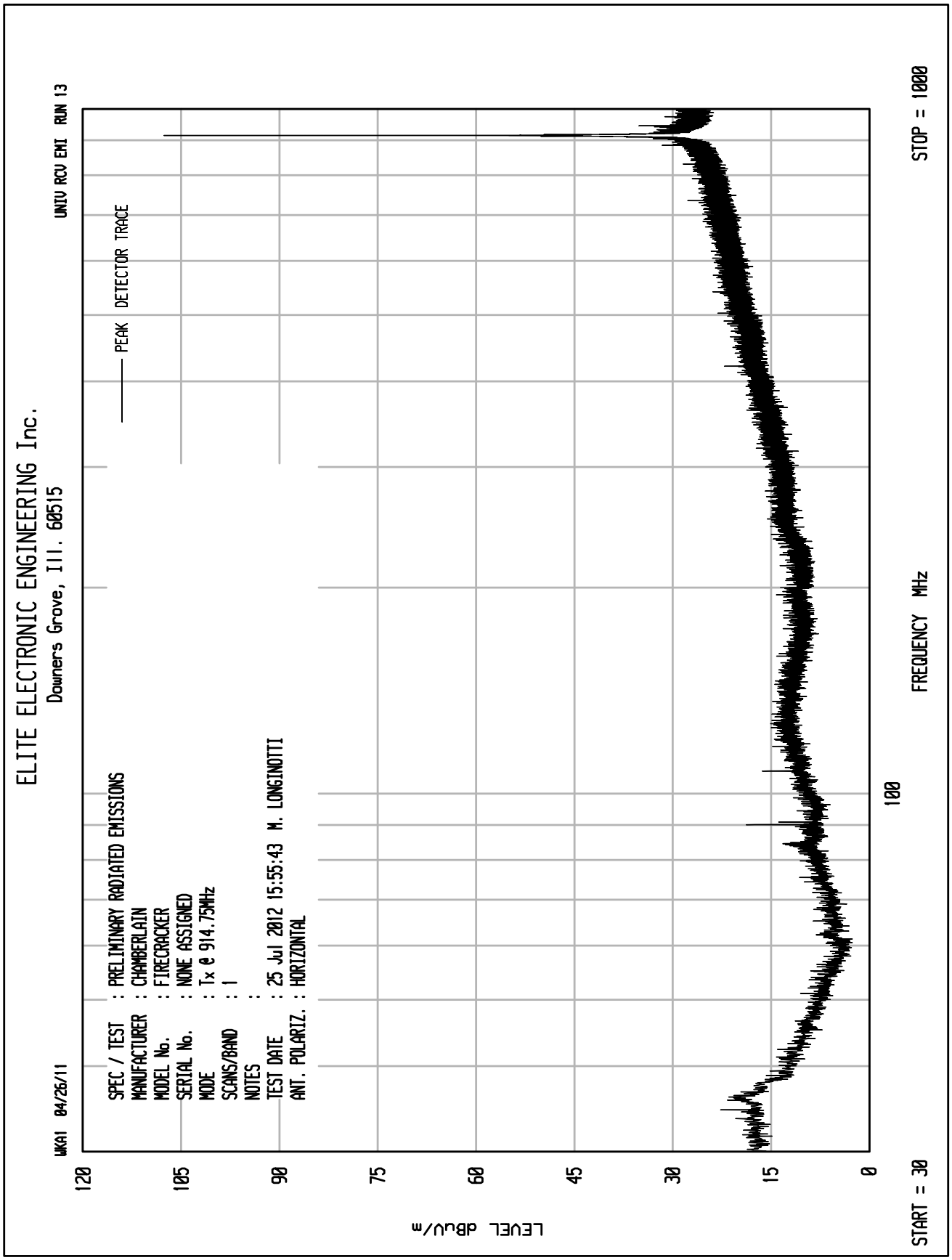
MANUFACTURER	:	The Chamberlain Group, Inc.
MODEL NUMBER	:	Firecracker
SERIAL NUMBER	:	None Assigned
TEST MODE	:	Hopping Enabled
TEST DATE	:	July 26, 2012
TEST PARAMETERS	:	Duty Cycle Factor
NOTES	:	Number of pulses in a 100msec period = 1, pulse duration = 1.3msec
	:	Duty Cycle Correction Factor = 20*log((pulse duration)x(number of pulses in 100msec)/(100msec))
	:	Duty Cycle Correction Factor = 20*log((1.3msec)x(1 pulse)/(100msec))
	:	Duty Cycle Correction Factor = -37.7dB
EQUIPMENT USED	:	RBB0, NTA0

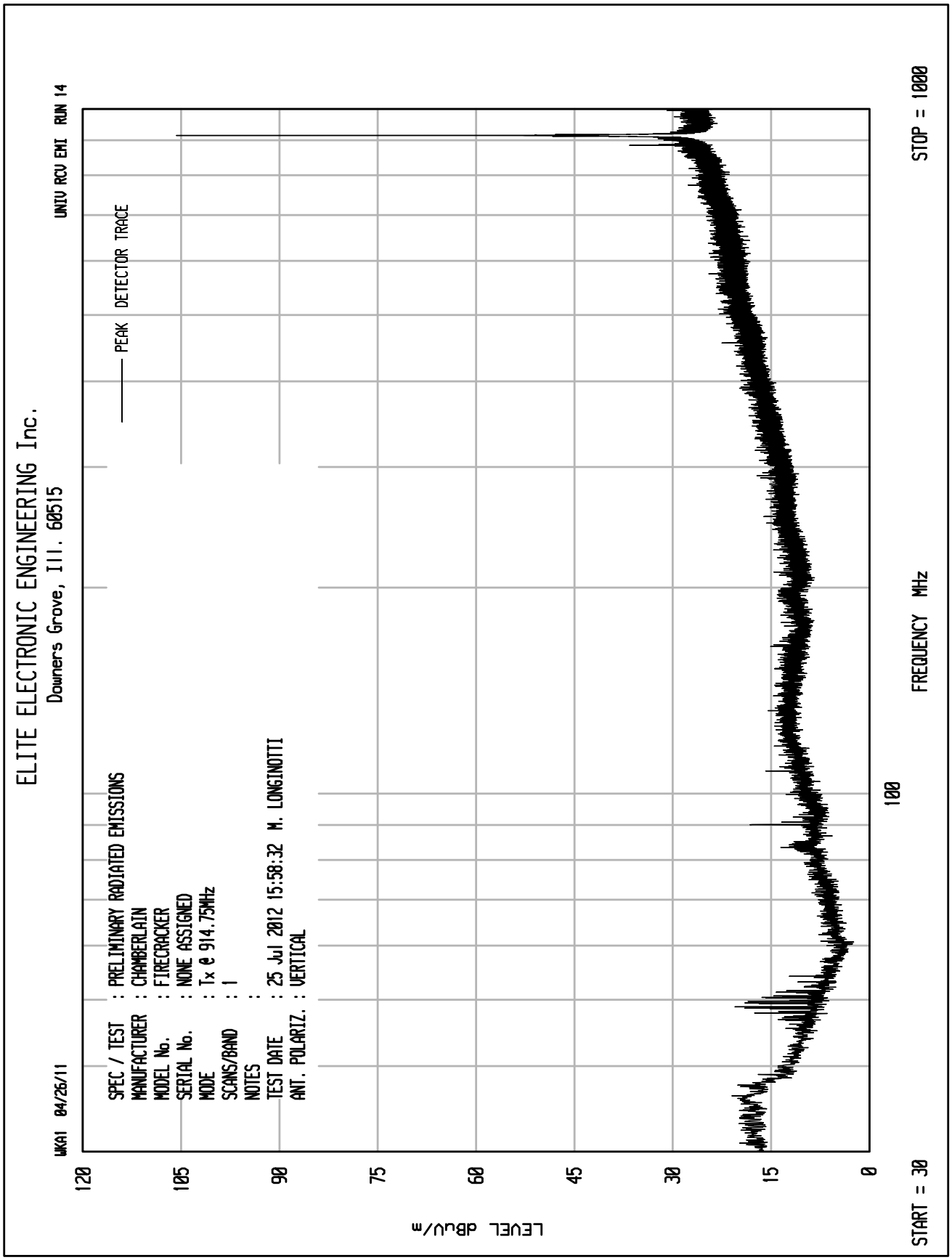

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 18
WKAI 04/26/11
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : CHAMBERLAIN
MODEL No. : FIRECRACKER
SERIAL No. : NONE ASSIGNED
MODE : Tx @ 902.25MHz
SCANS/BAND : 1
NOTES :
TEST DATE : 25 Jul 2012 16:08:39 M. LONGINOTTI
ANT. POLARIZ. : HORIZONTAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 30
100
FREQUENCY MHz
STOP = 1000

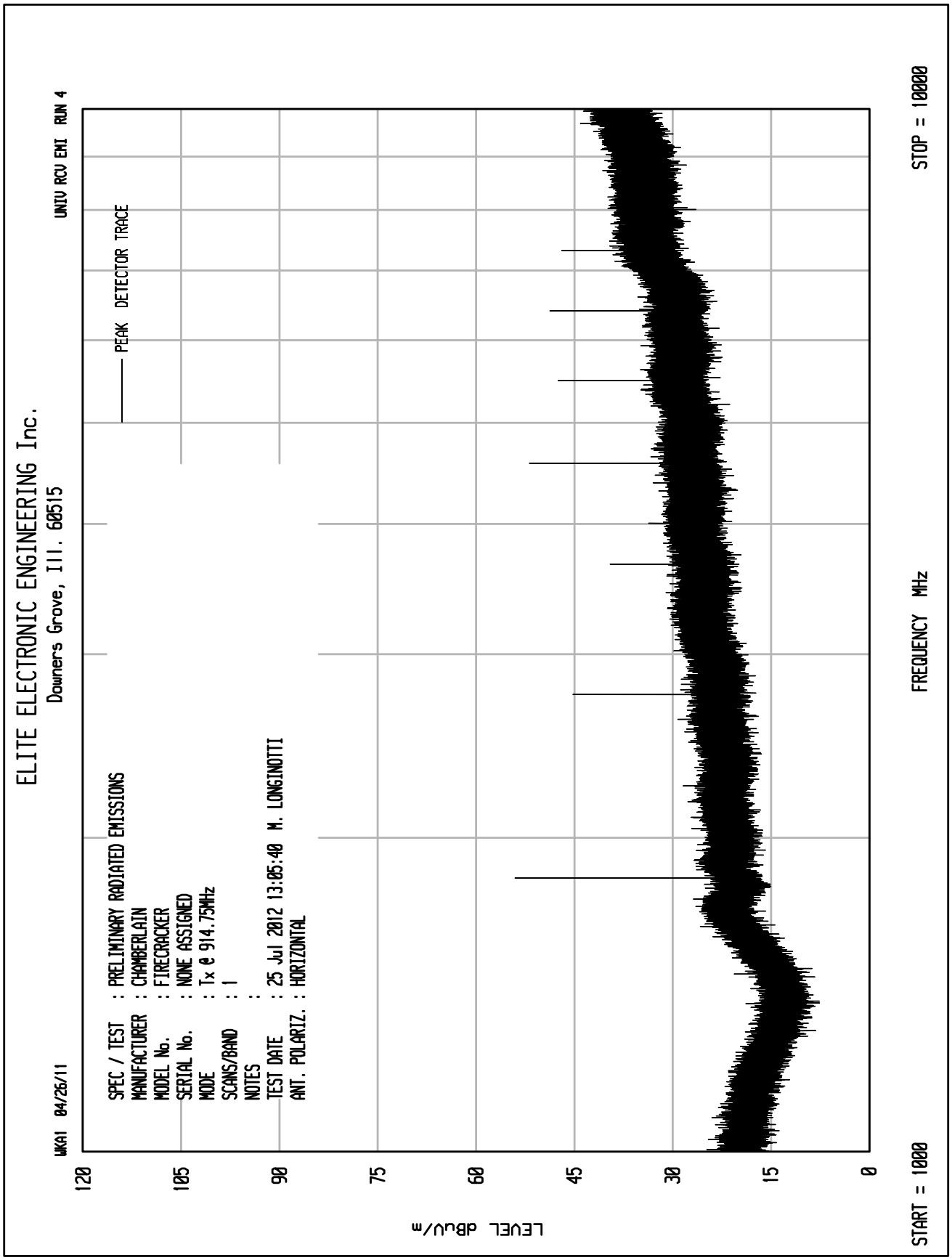

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 17
WKAI 04/26/11
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : CHAMBERLAIN
MODEL No. : FIRECRACKER
SERIAL No. : NONE ASSIGNED
MODE : Tx @ 902.25MHz
SCANS/BAND : 1
NOTES :
TEST DATE : 25 Jul 2012 16:05:16 M. LONGINOTTI
ANT. POLARIZ. : VERTICAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 30
100
FREQUENCY MHz
STOP = 1000

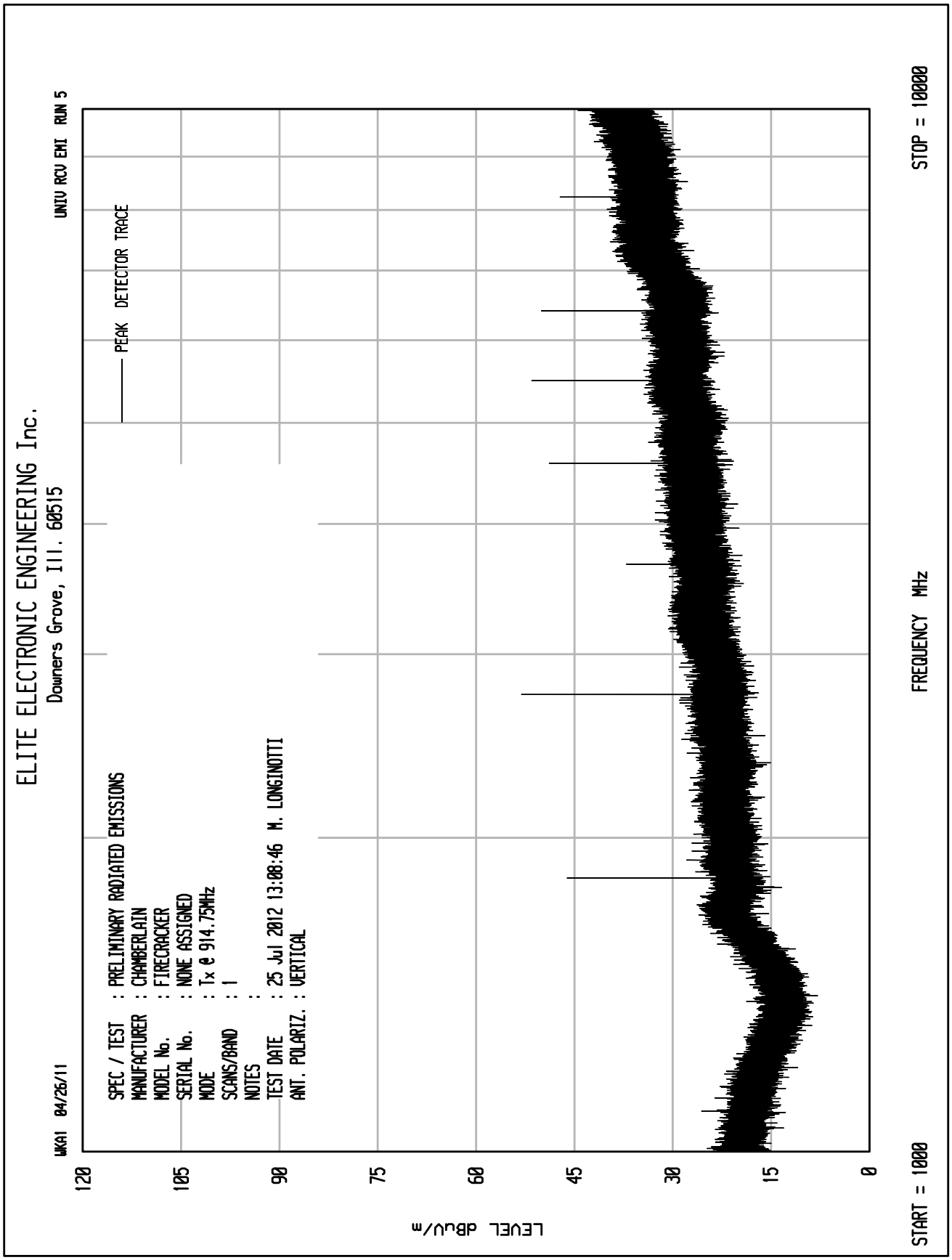

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 2
WKAI 04/26/11
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : CHAMBERLAIN
MODEL No. : FIRECRACKER
SERIAL No. : NONE ASSIGNED
MODE : Tx @ 902.25MHz
SCANS/BAND : 1
NOTES :
TEST DATE : 25 Jul 2012 10:09:15 M. LONGINOTTI
ANT. POLARIZ. : HORIZONTAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 1000
FREQUENCY MHz
STOP = 10000

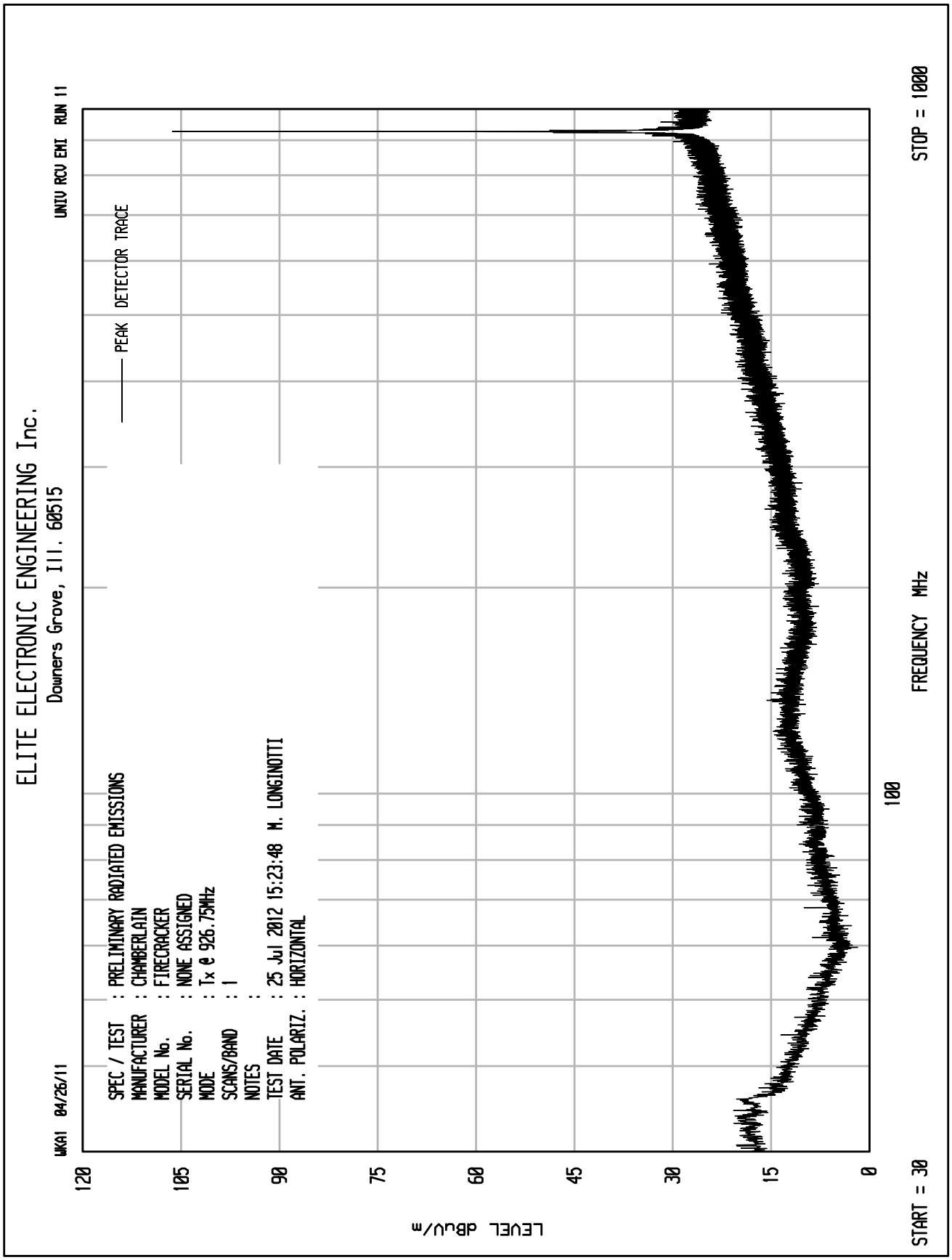

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 1
WKAI 04/26/11
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : CHAMBERLAIN
MODEL No. : FIRECRACKER
SERIAL No. : NONE ASSIGNED
MODE : Tx @ 902.25MHz
SCANS/BAND : 1
NOTES :
TEST DATE : 25 Jul 2012 10:04:41 M. LONGINOTTI
ANT. POLARIZ. : VERTICAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 1000
FREQUENCY MHz
STOP = 10000

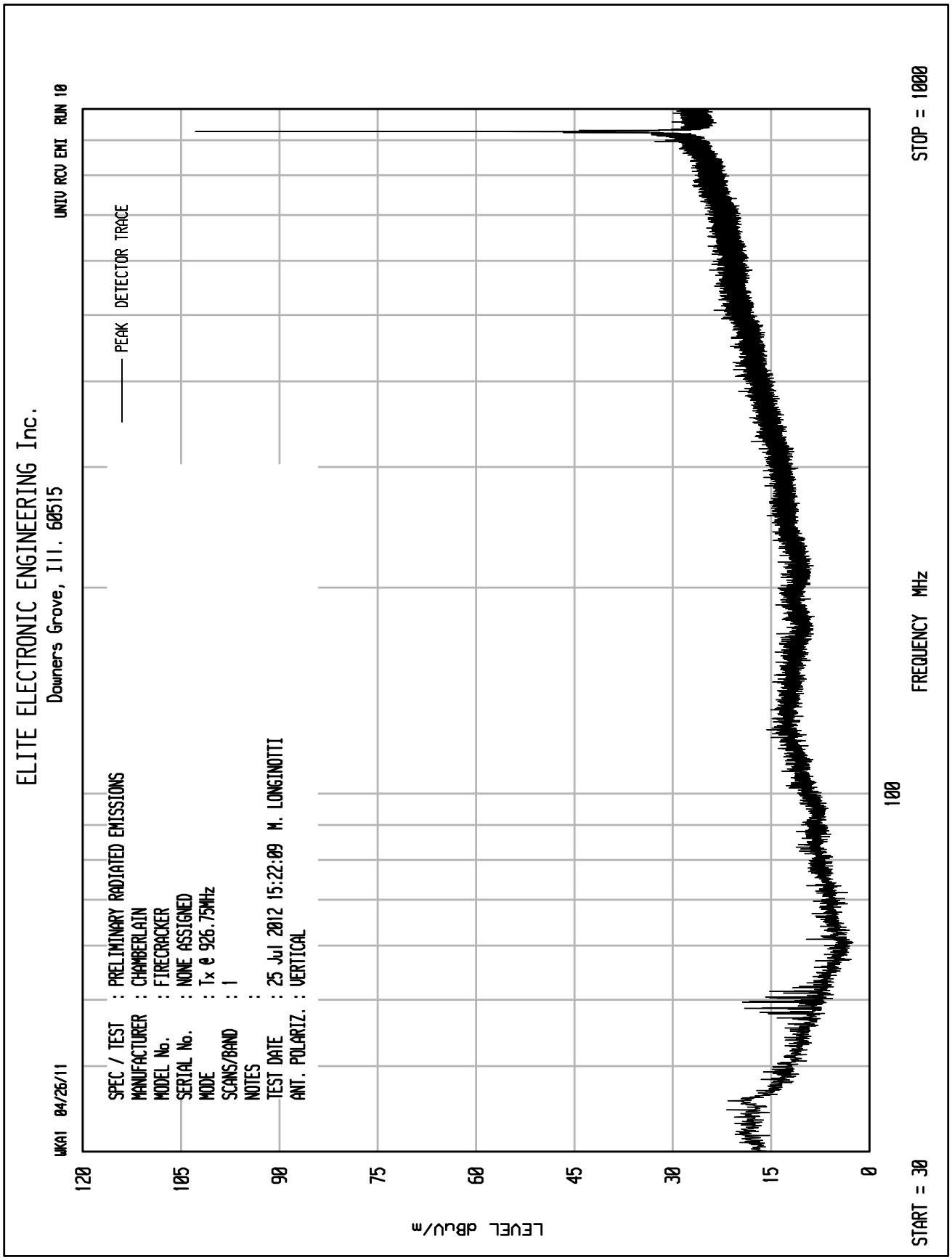

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 13
WKAI 04/26/11
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : CHAMBERLAIN
MODEL No. : FIRECRACKER
SERIAL No. : NONE ASSIGNED
MODE : Tx @ 914.75MHz
SCANS/BAND : 1
NOTES :
TEST DATE : 25 Jul 2012 15:55:43 M. LONGINOTTI
ANT. POLARIZ. : HORIZONTAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 30
100
FREQUENCY MHz
STOP = 1000

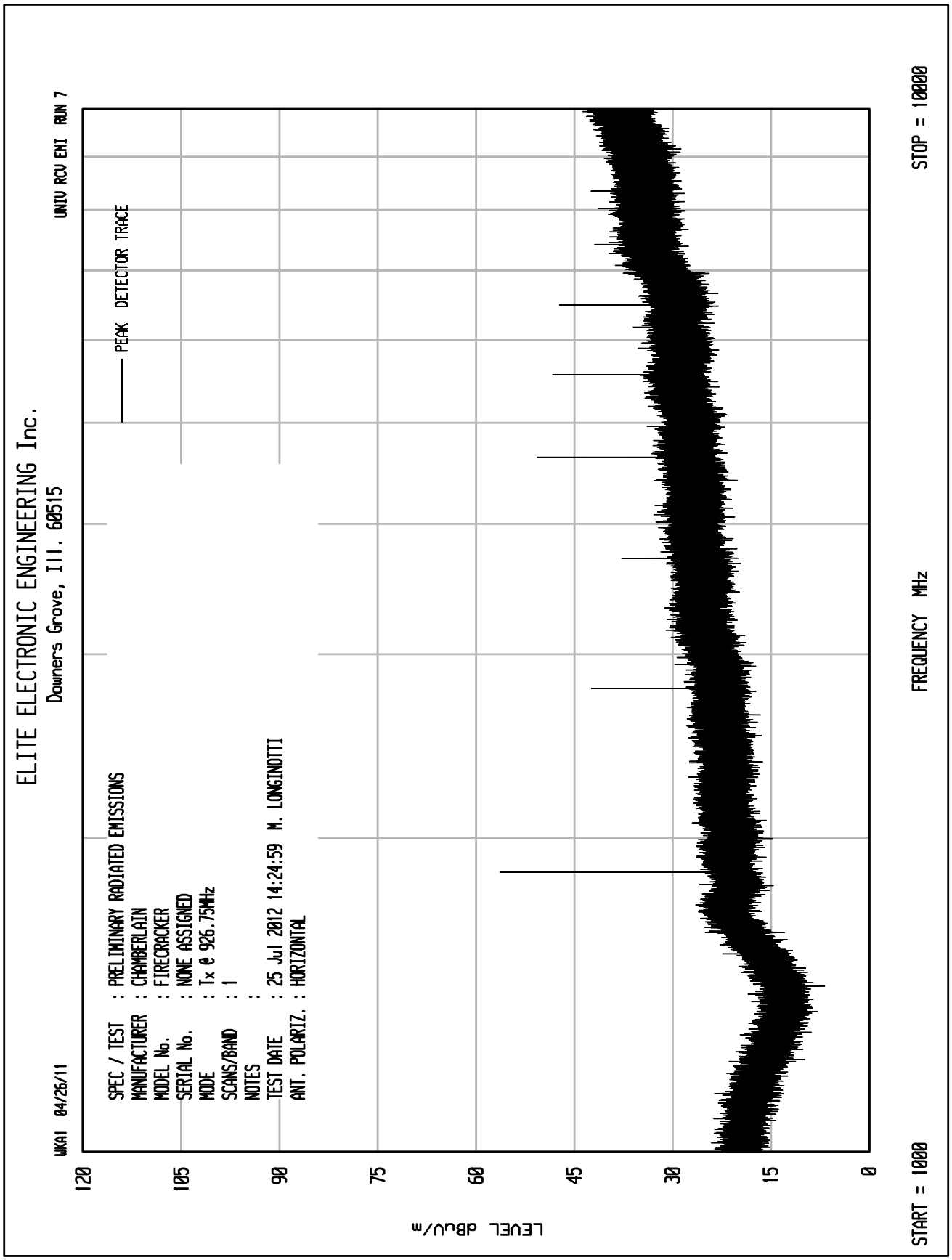

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 14
WKAI 04/26/11
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : CHAMBERLAIN
MODEL No. : FIRECRACKER
SERIAL No. : NONE ASSIGNED
MODE : Tx @ 914.75MHz
SCANS/BAND : 1
NOTES :
TEST DATE : 25 Jul 2012 15:58:32 M. LONGINOTTI
ANT. POLARIZ. : VERTICAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 30
100
FREQUENCY MHz
STOP = 1000

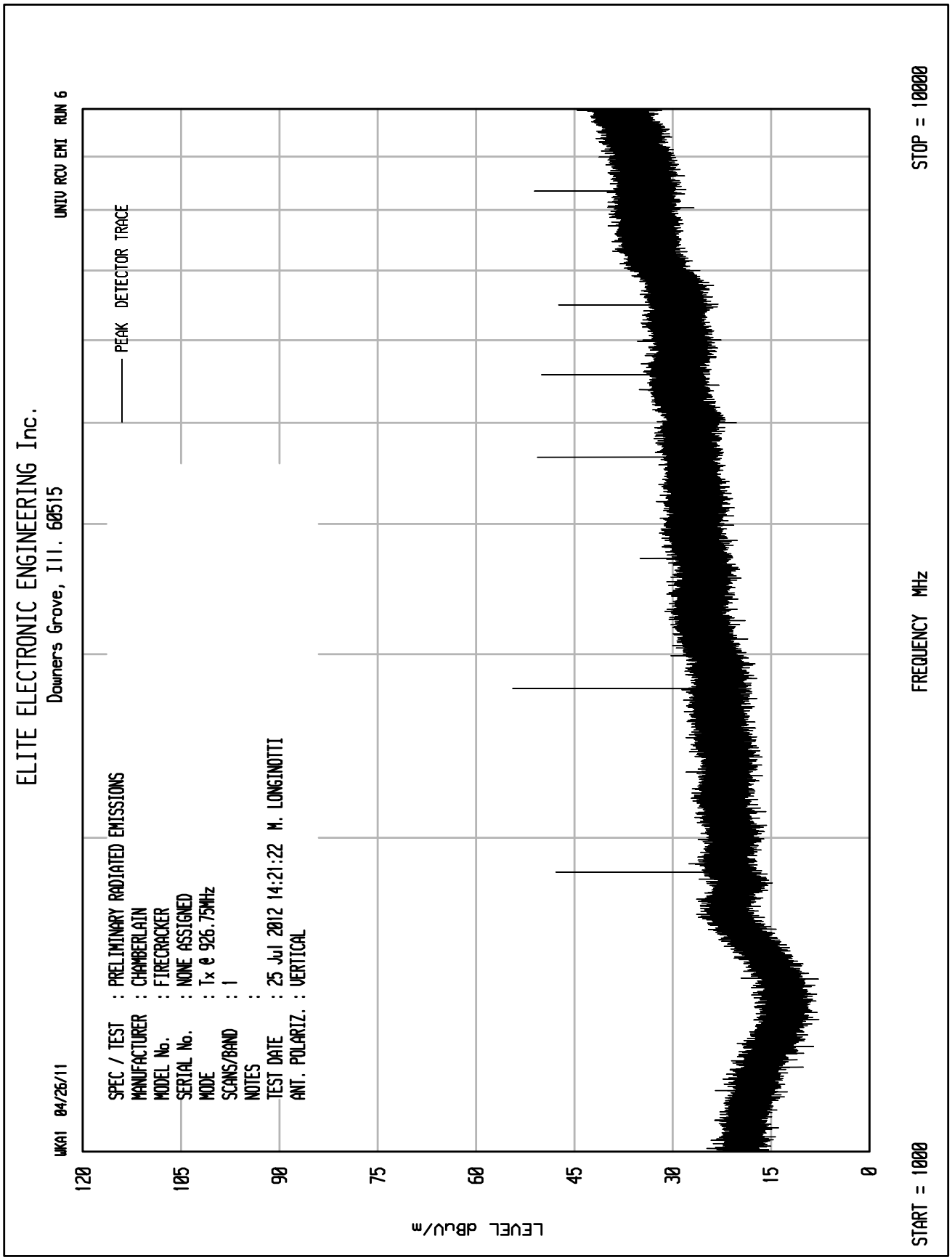

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 4
WKAI 04/26/11
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : CHAMBERLAIN
MODEL No. : FIRECRACKER
SERIAL No. : NONE ASSIGNED
MODE : Tx @ 914.75MHz
SCANS/BAND : 1
NOTES :
TEST DATE : 25 Jul 2012 13:05:40 M. LONGINOTTI
ANT. POLARIZ. : HORIZONTAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 1000
FREQUENCY MHz
STOP = 10000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 5
WKAI 04/26/11
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : CHAMBERLAIN
MODEL No. : FIRECRACKER
SERIAL No. : NONE ASSIGNED
MODE : Tx @ 914.75MHz
SCANS/BAND : 1
NOTES :
TEST DATE : 25 Jul 2012 13:08:46 M. LONGINOTTI
ANT. POLARIZ. : VERTICAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 1000
FREQUENCY MHz
STOP = 10000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 11
WKA1 04/26/11
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : CHAMBERLAIN
MODEL No. : FIRECRACKER
SERIAL No. : NONE ASSIGNED
MODE : Tx @ 926.75MHz
SCANS/BAND : 1
NOTES :
TEST DATE : 25 Jul 2012 15:23:48 M. LONGINOTTI
ANT. POLARIZ. : HORIZONTAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 30
100
FREQUENCY MHz
STOP = 1000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 10
WKA1 04/26/11
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : CHAMBERLAIN
MODEL No. : FIRECRACKER
SERIAL No. : NONE ASSIGNED
MODE : Tx @ 926.75MHz
SCANS/BAND : 1
NOTES :
TEST DATE : 25 Jul 2012 15:22:09 M. LONGINOTTI
ANT. POLARIZ. : VERTICAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 30
100
FREQUENCY MHz
STOP = 1000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 7
WKAI 04/26/11
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : CHAMBERLAIN
MODEL No. : FIRECRACKER
SERIAL No. : NONE ASSIGNED
MODE : Tx @ 926.75MHz
SCANS/BAND : 1
NOTES :
TEST DATE : 25 Jul 2012 14:24:59 M. LONGINOTTI
ANT. POLARIZ. : HORIZONTAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 1000
FREQUENCY MHz
STOP = 10000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 6
WKAI 04/26/11
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : CHAMBERLAIN
MODEL No. : FIRECRACKER
SERIAL No. : NONE ASSIGNED
MODE : Tx @ 926.75MHz
SCANS/BAND : 1
NOTES :
TEST DATE : 25 Jul 2012 14:21:22 M. LONGINOTTI
ANT. POLARIZ. : VERTICAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 1000
FREQUENCY MHz
STOP = 10000

MANUFACTURER : The Chamberlain Group
MODEL : Firecracker
SERIAL NO. : None Assigned
SPECIFICATION : FCC 15.247 and RSS-210 Peak Radiated Emissions
DATE : July 25, 2012
MODE : Tx at 902.25 MHz
TEST EQUIPMENT : RBB0,CMA1,NTA0,NWH0,XPQ3,APW3

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)
902.25	H	84.8		2.0	21.2	0.0	108.1	253343.1		
902.25	V	85.0		2.0	21.2	0.0	108.3	259244.2		
1804.50	H	64.8		2.9	27.0	-40.6	54.1	508.8	25924.4	-34.1
1804.50	V	68.6		2.9	27.0	-40.6	57.9	788.0	25924.4	-30.3
2706.75	H	64.3		3.7	30.0	-40.3	57.6	760.1	5000.0	-16.4
2706.75	V	65.2		3.7	30.0	-40.3	58.5	843.1	5000.0	-15.5
3609.00	H	49.4		4.3	32.4	-40.1	45.9	197.3	5000.0	-28.1
3609.00	V	51.4		4.3	32.4	-40.1	47.9	248.3	5000.0	-26.1
4511.25	H	60.4		4.7	33.2	-40.0	58.4	829.0	5000.0	-15.6
4511.25	V	60.7		4.7	33.2	-40.0	58.7	858.2	5000.0	-15.3
5413.50	H	54.0		5.1	35.3	-40.1	54.4	524.6	5000.0	-19.6
5413.50	V	53.2		5.1	35.3	-40.1	53.6	478.4	5000.0	-20.4
6315.75	H	58.1		5.6	35.3	-39.9	59.1	904.1	25924.4	-29.2
6315.75	V	57.2		5.6	35.3	-39.9	58.2	815.1	25924.4	-30.1
7218.00	H	43.3		6.1	37.4	-39.8	47.1	226.3	25924.4	-41.2
7218.00	V	40.4		6.1	37.4	-39.8	44.2	162.0	25924.4	-44.1
8120.25	H	51.6		6.5	37.8	-39.6	56.4	657.8	5000.0	-17.6
8120.25	V	50.0		6.5	37.8	-39.6	54.8	547.1	5000.0	-19.2
9022.50	H	46.1	Ambient	6.5	37.7	-39.1	51.2	362.9	5000.0	-22.8
9022.50	V	45.9	Ambient	6.5	37.7	-39.1	51.0	354.7	5000.0	-23.0

Checked By: MARK E. LONGINOTTI

Mark Longinotti

MANUFACTURER : The Chamberlain Group
MODEL : Firecracker
SERIAL NO. : None Assigned
SPECIFICATION : FCC 15.247 and RSS-210 Average Radiated Emissions
DATE : July 25, 2012
MODE : Tx at 902.25 MHz
TEST EQUIPMENT : RBB0,CMA1,NTA0,NWH0,XPQ3,APW3

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)
2706.75	H	64.30		3.7	30.0	-40.3	-37.7	19.9	9.9	500.0	-34.1
2706.75	V	65.2		3.7	30.0	-40.3	-37.7	20.8	11.0	500.0	-33.2
3609.00	H	49.4		4.3	32.4	-40.1	-37.7	8.2	2.6	500.0	-45.8
3609.00	V	51.4		4.3	32.4	-40.1	-37.7	10.2	3.2	500.0	-43.8
4511.25	H	60.4		4.7	33.2	-40.0	-37.7	20.7	10.8	500.0	-33.3
4511.25	V	60.7		4.7	33.2	-40.0	-37.7	21.0	11.2	500.0	-33.0
5413.50	H	54.0		5.1	35.3	-40.1	-37.7	16.7	6.8	500.0	-37.3
5413.50	V	53.2		5.1	35.3	-40.1	-37.7	15.9	6.2	500.0	-38.1
8120.25	H	51.6		6.5	37.8	-39.6	-37.7	18.7	8.6	500.0	-35.3
8120.25	V	50.0		6.5	37.8	-39.6	-37.7	17.1	7.1	500.0	-36.9
9022.50	H	46.1	Ambient	6.5	37.7	-39.1	-37.7	13.5	4.7	500.0	-40.5
9022.50	V	45.9	Ambient	6.5	37.7	-39.1	-37.7	13.3	4.6	500.0	-40.7

Checked By: MARK E. LONGINOTTI

Mark Longinotti

MANUFACTURER : The Chamberlain Group
MODEL : Firecracker
SERIAL NO. : None Assigned
SPECIFICATION : FCC 15.247 and RSS-210 Peak Radiated Emissions
DATE : July 25, 2012
MODE : Tx at 914.75 MHz
TEST EQUIPMENT : RBB0,CMA1,NTA0,NWH0,XPQ3,APW3

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)
914.75	H	86.6		2.1	21.5	0.0	110.2	322038.1		
914.75	V	86.2		2.1	21.5	0.0	109.8	307544.0		
1829.50	H	67.6		2.9	27.2	-40.6	57.1	720.1	32203.8	-33.0
1829.50	V	69.0		2.9	27.2	-40.6	58.5	846.0	32203.8	-31.6
2744.25	H	67.4		3.7	29.9	-40.3	60.7	1083.9	5000.0	-13.3
2744.25	V	67.2		3.7	29.9	-40.3	60.5	1059.2	5000.0	-13.5
3659.00	H	53.1		4.3	32.5	-40.1	49.8	310.0	5000.0	-24.2
3659.00	V	52.4		4.3	32.5	-40.1	49.1	286.0	5000.0	-24.9
4573.75	H	64.4		4.7	33.3	-40.0	62.5	1329.7	5000.0	-11.5
4573.75	V	59.9		4.7	33.3	-40.0	58.0	792.1	5000.0	-16.0
5488.50	H	53.1		5.2	35.4	-40.1	53.6	476.9	32203.8	-36.6
5488.50	V	51.5		5.2	35.4	-40.1	52.0	396.6	32203.8	-38.2
6403.25	H	57.6		5.7	35.1	-39.9	58.5	839.8	32203.8	-31.7
6403.25	V	55.1		5.7	35.1	-39.9	56.0	629.7	32203.8	-34.2
7318.00	H	49.9		6.2	37.9	-39.8	54.2	513.0	5000.0	-19.8
7318.00	V	49.1		6.2	37.9	-39.8	53.4	467.8	5000.0	-20.6
8232.75	H	51.5		6.5	37.7	-39.5	56.1	641.3	5000.0	-17.8
8232.75	V	50.6		6.5	37.7	-39.5	55.2	578.2	5000.0	-18.7
9147.50	H	46.7	Ambient	6.6	37.7	-39.0	51.9	395.5	5000.0	-22.0
9147.50	V	47.1	Ambient	6.6	37.7	-39.0	52.3	414.1	5000.0	-21.6

Checked By: MARK E. LONGINOTTI

Mark Longinotti

MANUFACTURER : The Chamberlain Group
MODEL : Firecracker
SERIAL NO. : None Assigned
SPECIFICATION : FCC 15.247 and RSS-210 Average Radiated Emissions
DATE : July 25, 2012
MODE : Tx at 914.75 MHz
TEST EQUIPMENT : RBB0,CMA1,NTA0,NWH0,XPQ3,APW3

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)
2744.25	H	67.40		3.7	29.9	-40.3	-37.7	23.0	14.1	500.0	-31.0
2744.25	V	67.2		3.7	29.9	-40.3	-37.7	22.8	13.8	500.0	-31.2
3659.00	H	53.1		4.3	32.5	-40.1	-37.7	12.1	4.0	500.0	-41.9
3659.00	V	52.4		4.3	32.5	-40.1	-37.7	11.4	3.7	500.0	-42.6
4573.75	H	64.4		4.7	33.3	-40.0	-37.7	24.8	17.3	500.0	-29.2
4573.75	V	59.9		4.7	33.3	-40.0	-37.7	20.3	10.3	500.0	-33.7
7318.00	H	49.9		6.2	37.9	-39.8	-37.7	16.5	6.7	500.0	-37.5
7318.00	V	49.1		6.2	37.9	-39.8	-37.7	15.7	6.1	500.0	-38.3
8232.75	H	51.5		6.5	37.7	-39.5	-37.7	18.4	8.4	500.0	-35.5
8232.75	V	50.6		6.5	37.7	-39.5	-37.7	17.5	7.5	500.0	-36.4
9147.50	H	46.7	Ambient	6.6	37.7	-39.0	-37.7	14.2	5.2	500.0	-39.7
9147.50	V	47.1	Ambient	6.6	37.7	-39.0	-37.7	14.6	5.4	500.0	-39.3

Checked By: MARK E. LONGINOTTI

Mark Longinotti

MANUFACTURER : The Chamberlain Group
MODEL : Firecracker
SERIAL NO. : None Assigned
SPECIFICATION : FCC 15.247 and RSS-210 Peak Radiated Emissions
DATE : July 25, 2012
MODE : Tx at 926.75 MHz
TEST EQUIPMENT : RBB0,CMA1,NTA0,NWH0,XPQ3,APW3

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)
926.75	H	86.8		2.1	21.6	0.0	110.5	333679.5		
926.75	V	85.7		2.1	21.6	0.0	109.4	293988.0		
1853.50	H	67.9		3.0	27.3	-40.5	57.7	763.3	33368.0	-32.8
1853.50	V	65.6		3.0	27.3	-40.5	55.4	585.7	33368.0	-35.1
2780.25	H	67.0		3.7	29.9	-40.4	60.3	1033.1	5000.0	-13.7
2780.25	V	66.7		3.7	29.9	-40.4	60.0	998.0	5000.0	-14.0
3707.00	H	50.6		4.3	32.7	-40.1	47.6	238.5	5000.0	-26.4
3707.00	V	49.9		4.3	32.7	-40.1	46.9	220.0	5000.0	-27.1
4633.75	H	62.7		4.8	33.5	-40.0	60.9	1115.1	5000.0	-13.0
4633.75	V	59.4		4.8	33.5	-40.0	57.6	762.7	5000.0	-16.3
5560.50	H	52.7		5.2	35.2	-40.1	53.1	450.4	33368.0	-37.4
5560.50	V	50.5		5.2	35.2	-40.1	50.9	349.6	33368.0	-39.6
6487.25	H	54.6		5.7	35.0	-39.9	55.5	593.4	33368.0	-35.0
6487.25	V	56.6		5.7	35.0	-39.9	57.5	747.1	33368.0	-33.0
7414.00	H	47.7	Ambient	6.2	37.9	-39.7	52.1	403.2	5000.0	-21.9
7414.00	V	46.7	Ambient	6.2	37.9	-39.7	51.1	359.3	5000.0	-22.9
8340.75	H	52.1		6.5	37.5	-39.5	56.7	680.6	5000.0	-17.3
8340.75	V	52.1		6.5	37.5	-39.5	56.7	680.6	5000.0	-17.3
9267.50	H	37.0	Ambient	6.6	37.9	-39.0	42.6	135.2	33368.0	-47.8
9267.50	V	37.4	Ambient	6.6	37.9	-39.0	43.0	141.6	33368.0	-47.4

Checked By: MARK E. LONGINOTTI

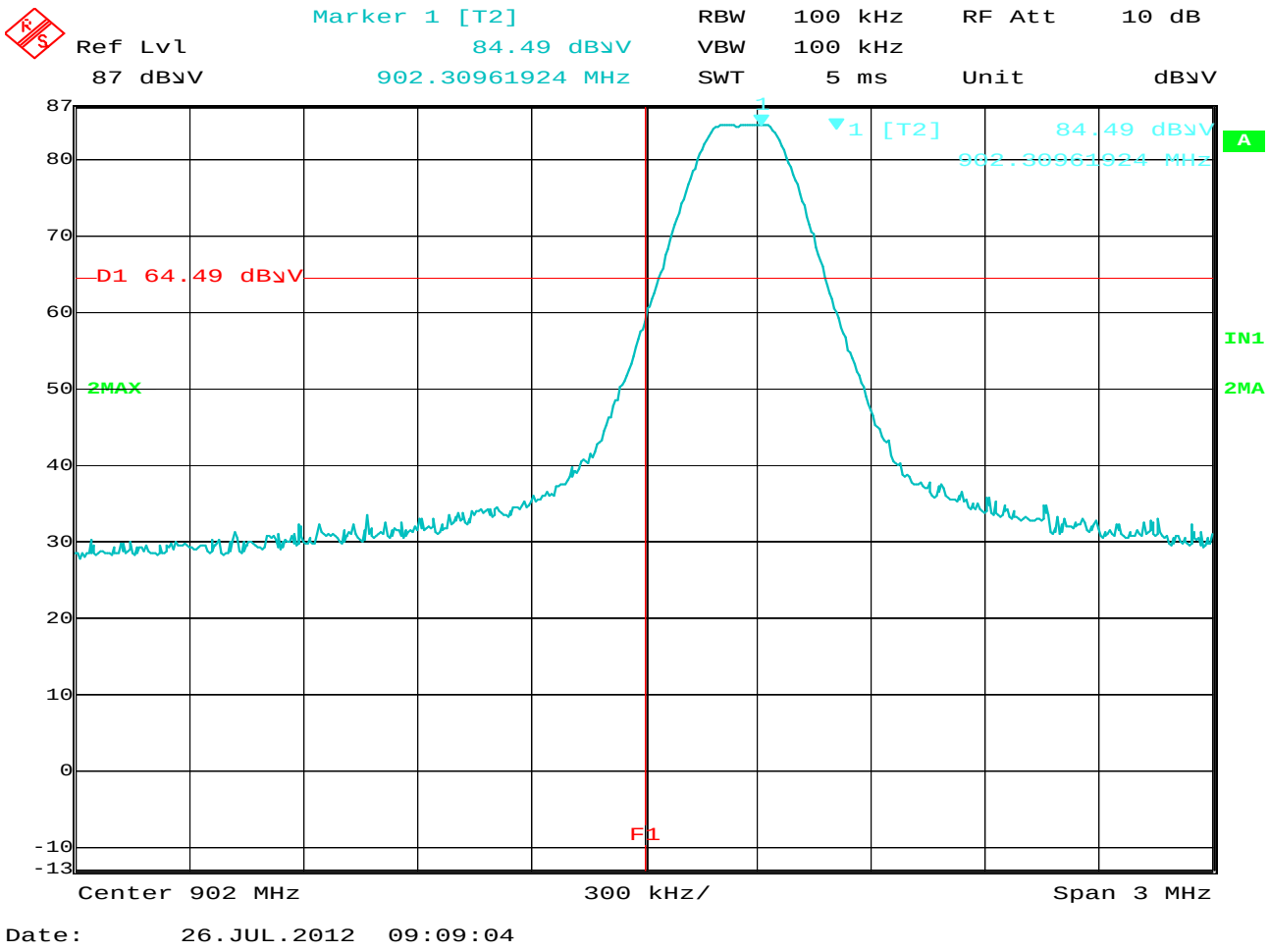
Mark Longinotti

MANUFACTURER : The Chamberlain Group
MODEL : Firecracker
SERIAL NO. : None Assigned
SPECIFICATION : FCC 15.247 and RSS-210 Peak Radiated Emissions
DATE : July 25, 2012
MODE : Tx at 926.75 MHz
TEST EQUIPMENT : RBB0,CMA1,NTA0,NWH0,XPQ3,APW3

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)
2780.25	H	67.00		3.7	29.9	-40.4	-37.7	22.6	13.5	500.0	-31.4
2780.25	V	66.7		3.7	29.9	-40.4	-37.7	22.3	13.0	500.0	-31.7
3707.00	H	50.6		4.3	32.7	-40.1	-37.7	9.9	3.1	500.0	-44.1
3707.00	V	49.9		4.3	32.7	-40.1	-37.7	9.2	2.9	500.0	-44.8
4633.75	H	62.7		4.8	33.5	-40.0	-37.7	23.2	14.5	500.0	-30.7
4633.75	V	59.4		4.8	33.5	-40.0	-37.7	19.9	9.9	500.0	-34.0
7414.00	H	47.7	Ambient	6.2	37.9	-39.7	-37.7	14.4	5.3	500.0	-39.6
7414.00	V	46.7	Ambient	6.2	37.9	-39.7	-37.7	13.4	4.7	500.0	-40.6
8340.75	H	52.1		6.5	37.5	-39.5	-37.7	19.0	8.9	500.0	-35.0
8340.75	V	51.1		6.5	37.5	-39.5	-37.7	18.0	7.9	500.0	-36.0

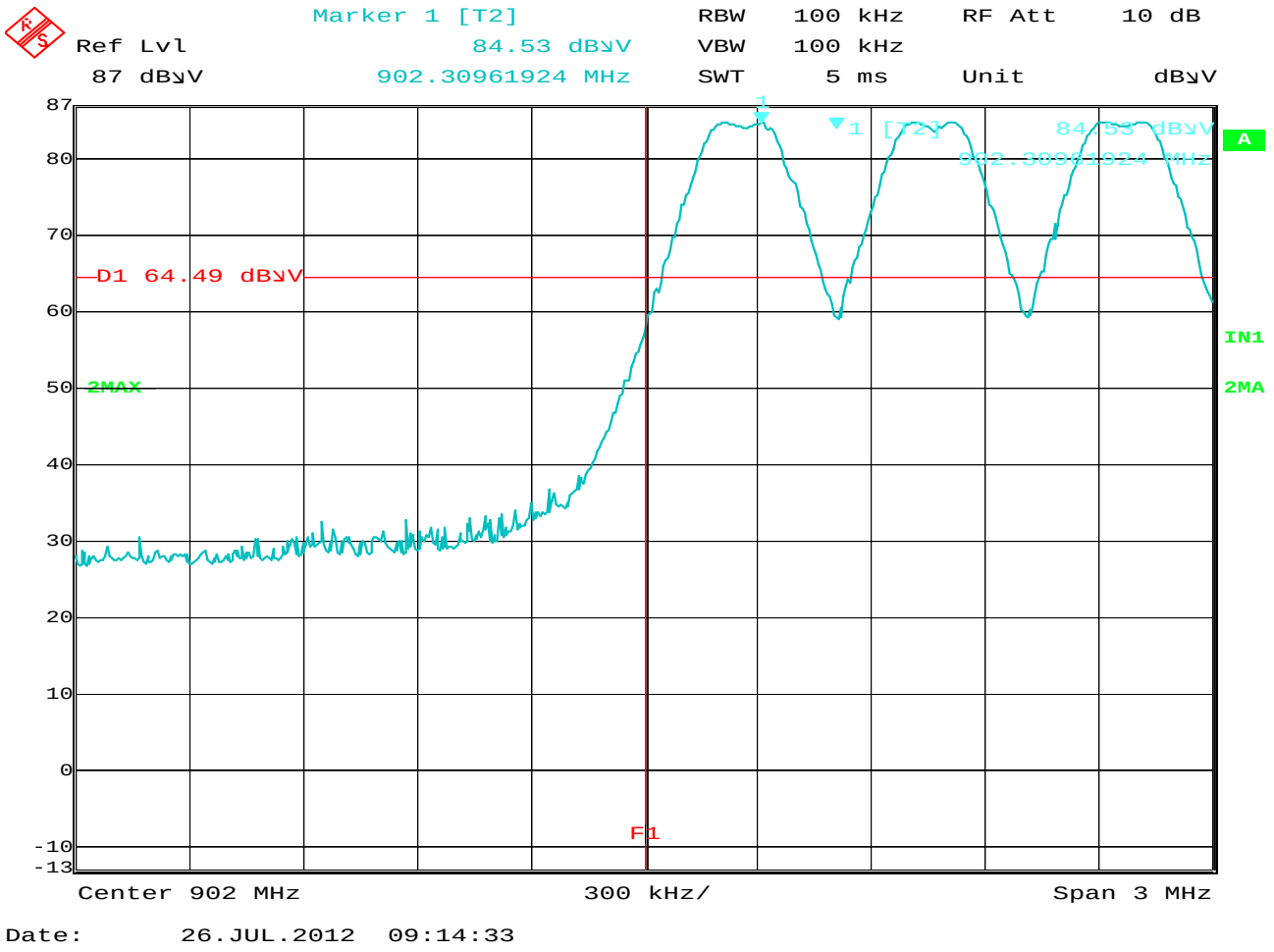
Checked By: MARK E. LONGINOTTI

Mark Longinotti



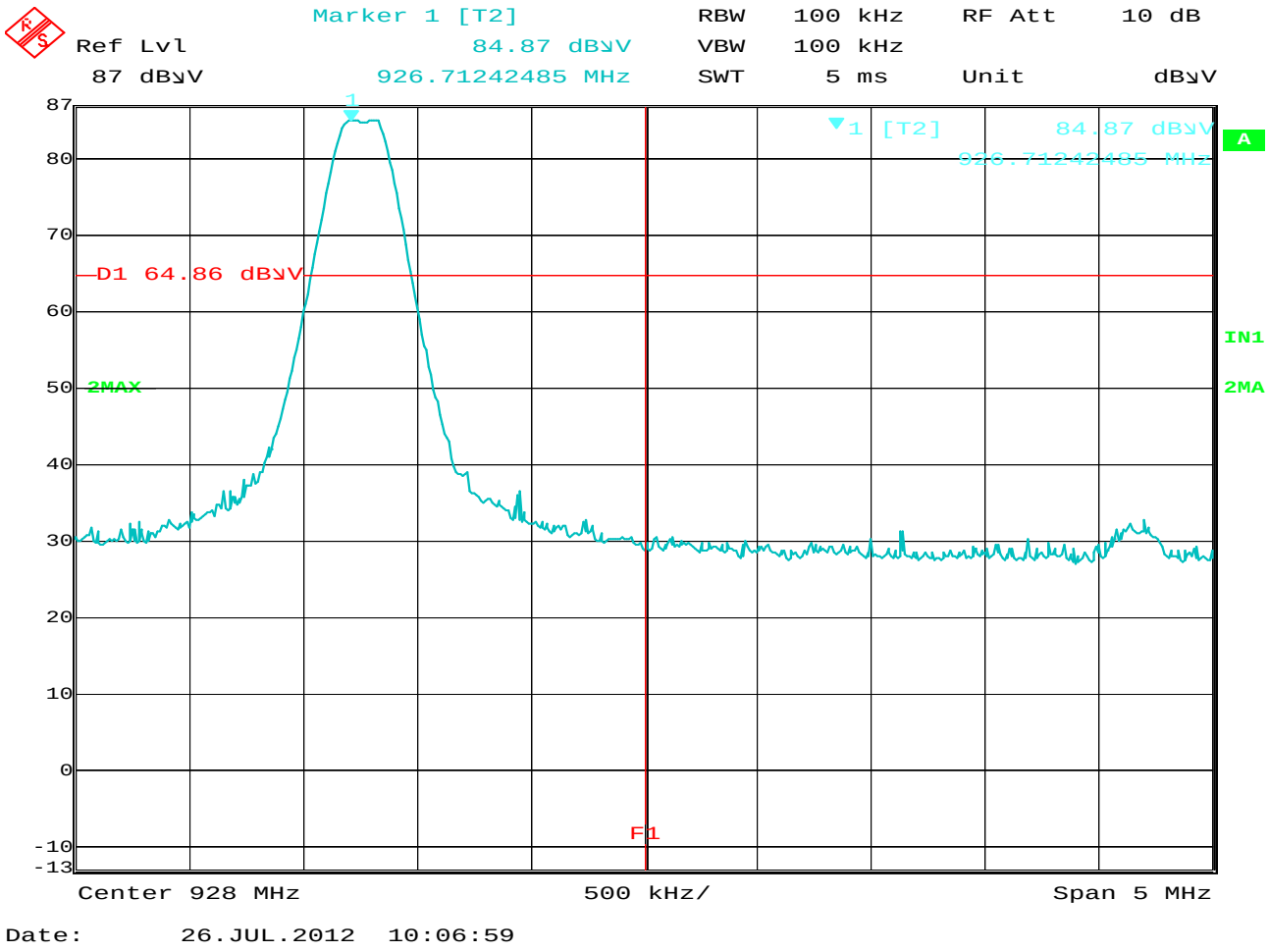
15.247(d) Band Edge Compliance

MANUFACTURER	:	The Chamberlain Group, Inc.
MODEL NUMBER	:	Firecracker
SERIAL NUMBER	:	None Assigned
TEST MODE	:	Tx @ 902.25MHz
TEST DATE	:	July 26, 2012
TEST PARAMETERS	:	Band Edge Compliance
NOTES	:	Display Line D1 represents the 20dB down point from the peak output power in a 100kHz bandwidth. Display line F1 represents the band edge (902MHz)
EQUIPMENT USED	:	RBB0, NTA0



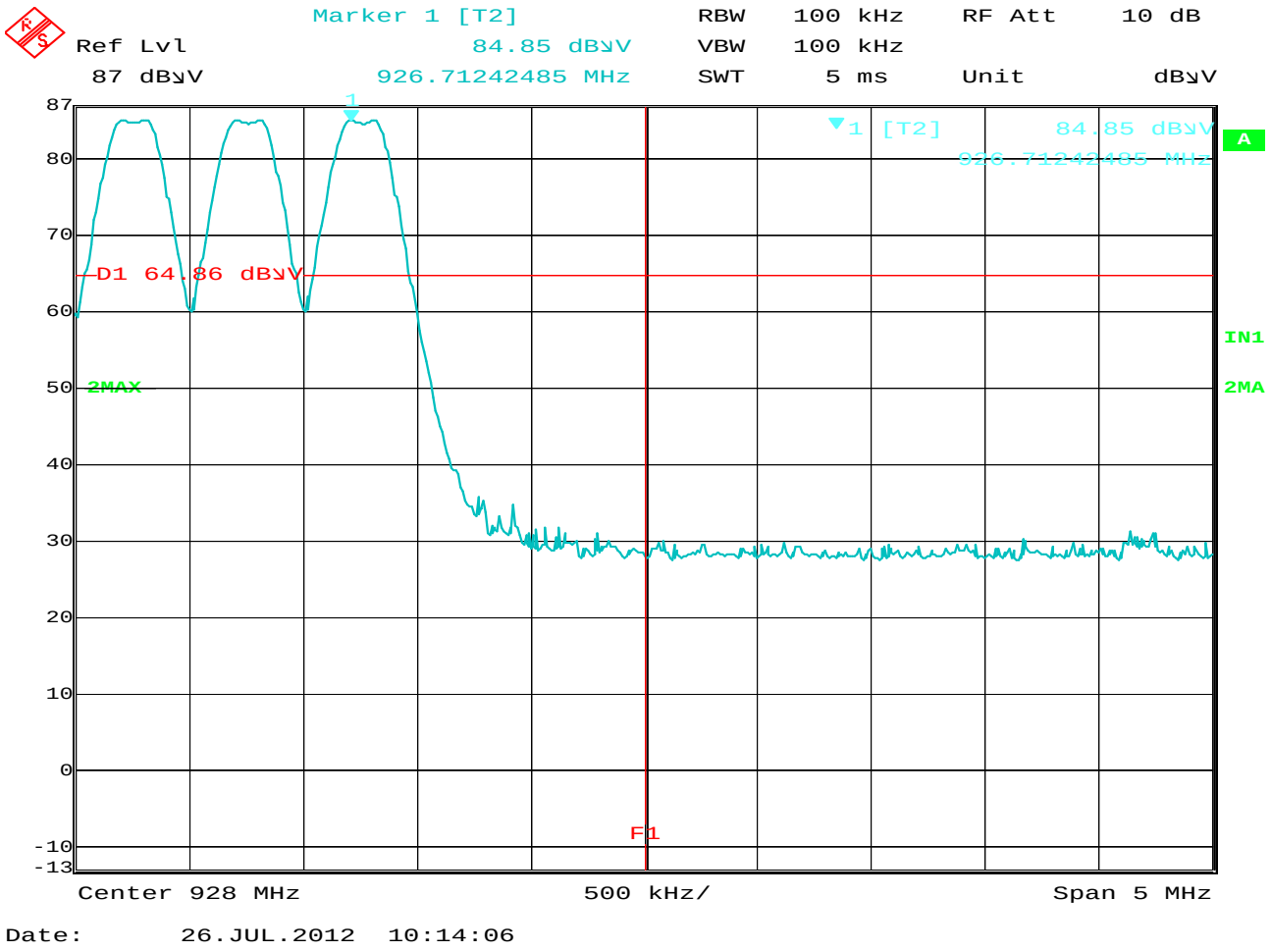
15.247(d) Band Edge Compliance

MANUFACTURER	:	The Chamberlain Group, Inc.
MODEL NUMBER	:	Firecracker
SERIAL NUMBER	:	None Assigned
TEST MODE	:	Hopping Enabled
TEST DATE	:	July 26, 2012
TEST PARAMETERS	:	Band Edge Compliance
NOTES	:	Display Line D1 represents the 20dB down point from the peak output power in a 100kHz bandwidth. Display line F1 represents the band edge (902MHz)
EQUIPMENT USED	:	RBB0, NTA0



15.247(d) Band Edge Compliance

MANUFACTURER	:	The Chamberlain Group, Inc.
MODEL NUMBER	:	Firecracker
SERIAL NUMBER	:	None Assigned
TEST MODE	:	Tx @ 926.75MHz
TEST DATE	:	July 26, 2012
TEST PARAMETERS	:	Band Edge Compliance
NOTES	:	Display Line D1 represents the 20dB down point from the peak output power in a 100kHz bandwidth. Display line F1 represents the band edge (928MHz)
EQUIPMENT USED	:	RBB0, NTA0



15.247(d) Band Edge Compliance

MANUFACTURER	:	The Chamberlain Group, Inc.
MODEL NUMBER	:	Firecracker
SERIAL NUMBER	:	None Assigned
TEST MODE	:	Hopping Enabled
TEST DATE	:	July 26, 2012
TEST PARAMETERS	:	Band Edge Compliance
NOTES	:	Display Line D1 represents the 20dB down point from the peak output power in a 100kHz bandwidth. Display line F1 represents the band edge (928MHz)
EQUIPMENT USED	:	RBB0, NTA0