



Measurement of RF Emissions from a  
Garage Door Opener  
Model No. 8010WLA Transmitter

For Chamberlain Group, Inc.  
300 Windsor Dr.  
Oak Brook, IL 60523

P.O. Number 4900051403  
Date Tested March 1-6, 2018  
Test Personnel Tylar Jozefczyk  
Test Specification FCC "Code of Federal Regulations" Title 47, Part 15,  
Subpart C, Section 15.247 for Frequency Hopping  
Spread Spectrum Intentional Radiators Operating  
within the bands 902-928MHz, 2400-2483.5MHz,  
and 5725-5850MHz  
Industry Canada RSS-GEN  
Industry Canada RSS-247

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**REVISION HISTORY**

Revision	Date	Description
—	09 April 2018	Initial release
A	11 April 2018 by TMJ	<ul style="list-style-type: none"><li>- Test report number changed from 1800598-01 to 1800598-01 Rev. A.</li><li>- Model number changed from 8010LA to 8010WLA.</li><li>- Note added to section 3.1.</li><li>- Note added about correct model number in section 5.8.3.</li></ul>

## Measurement of RF Emissions from a Garage Door Opener Transmitter, Model No. 8010WLA

### 1. INTRODUCTION

#### 1.1. Scope of Tests

This report presents the results of the series of radio interference measurements performed on a Chamberlain Group, Inc. Garage Door Opener, Model No. 8010WLA, Serial No. OF00 0CA C51, transmitter (hereinafter referred to as the EUT). The EUT is a frequency hopping spread spectrum transmitter. The transmitter was designed to transmit in the 902-928 MHz band using an internal antenna. The EUT was manufactured and submitted for testing by Chamberlain Group, Inc. located in Oak Brook, 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 C, Sections 15.207 and 15.247 for Intentional Radiators. The test series was also performed to determine if the EUT meets the conducted RF emission requirements of the Industry Canada Radio Standards Specification, RSS-Gen, Section 7.2.4 and the radiated RF emission requirements of the Industry Canada Radio Standards Specification, RSS-247, Section 5 for transmitters. Testing was performed in accordance with ANSI C63.4-2014.

#### 1.3. Deviations, Additions and Exclusions

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

#### 1.4. EMC Laboratory Identification

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

#### 1.5. Laboratory Conditions

The temperature at the time of the test was 22.6°C and the relative humidity was 18%.

### 2. APPLICABLE DOCUMENTS

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

- Federal Communications Commission "Code of Federal Regulations", Title 47, Part 15, Subpart C, dated 1 October 2017
- ANSI C63.4-2014, "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"
- ANSI C63.10-2013, "American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices"
- Industry Canada Radio Standards Specification, RSS-Gen, "General Requirements for Compliance of Radio Apparatus", Issue 4, March 2018
- Industry Canada Radio Standards Specification, RSS-247, "Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and License-Exempt Local Area Network (LE-LAN) Devices", Issue 2, February 2017

### 3. EUT SETUP AND OPERATION

#### 3.1. General Description

The EUT is a Chamberlain Group, Inc. Garage Door Opener, Model No. 8010WLA, Serial No. OF00 0CA C51. A block diagram of the EUT setup is shown as Figure 1.

NOTE: Model No. 8010WLA also references models 001D9086, 001D9086-1, 048DCTWF and 048DCTWFLA.

##### 3.1.1. Power Input

The EUT obtained 115V 60Hz power via a 3-wire, 3 meter unshielded power cord.

##### 3.1.2. Grounding

The EUT was grounded only through the third wire of its input power cord.

#### 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:

- Transmit at 902.25MHz (CW, 1.25ms network packet)
- Transmit at 914.75MHz (CW, 1.25ms network packet)
- Transmit at 926.75MHz (CW, 1.25ms network packet)
- Frequency Hopping Enabled

FHSS – The EUT is set to transmit a FHSS signal at one of the above frequencies.

#### 3.3. EUT Modifications

No modifications were required for compliance to FCC Part 15, Subpart C, Sections 15.207 and 15.247.

### 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 C63.4-2014 for site attenuation.

#### 4.2. Test Instrumentation

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

Conducted and radiated emission measurements were performed with a spectrum analyzer. This receiver allows measurements with the bandwidths and detector functions specified in the requirements. The receiver bandwidth was 120kHz for the 30MHz to 1000MHz radiated emissions data and 1MHz for the 1000MHz to 5000MHz radiated emissions data.

#### 4.3. Calibration Traceability

Test equipment is maintained and calibrated on a regular basis with a calibration interval not greater than two years. 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.

Values of Expanded Measurement Uncertainty (95% Confidence) are presented below:

Measurement Type	Expanded Measurement Uncertainty
Conducted disturbance (mains port) (150 kHz – 30 MHz)	2.7
Radiated disturbance (electric field strength on an open area test site or alternative test site) (30 MHz – 1000 MHz)	4.3
Radiated disturbance (electric field strength on an open area test site or alternative test site) (1 GHz – 6 GHz)	3.1
Radiated disturbance (electric field strength on an open area test site or alternative test site) (6 GHz – 18 GHz)	3.2

## 5. TEST PROCEDURES

### 5.1. Powerline Conducted Emissions

#### 5.1.1. 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 (dBµV)	
	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.

#### 5.1.2. 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.

- 1) The EUT was operated in the Tx mode.
- 2) Measurements were first made on the 120VAC high line.
- 3) The frequency range from 150 kHz to 30 MHz was broken up into smaller frequency sub-bands.
- 4) Conducted emissions measurements were taken on the first frequency sub-band using a peak detector.
- 5) 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.)

- 6) Steps (4) and (5) were repeated for the remainder of the frequency sub-bands until the entire frequency range from 150kHz 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.
- 7) Steps (3) through (6) were repeated on the 120VAC return line.

#### 5.1.3.Results

The plots of the peak, quasi-peak, and average conducted voltage levels, as well as the tabular quasi-peak and average results acquired from each input power line with the EUT operated in the Tx mode are shown on pages 22 through 25. All power line conducted emissions measured from the EUT were within the specification limits. The emissions level closest to the limit (worst case) occurred at 150kHz. The emissions level at this frequency was 27.6dB within the limit. Photographs of the test configuration which yielded the highest or worst case, conducted emission levels are shown in Figure 2.

### 5.2. 20dB Bandwidth

#### 5.2.1.Requirement

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 250kHz, the system shall use at least 50 hopping channels. If the 20dB bandwidth of the hopping channel is 250kHz or greater (but not greater than 500kHz), the system shall use at least 25 hopping channels.

#### 5.2.2.Procedures

The output of the EUT was connected to the spectrum analyzer through 40dB of attenuation.

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 > 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.

#### 5.2.3.Results

The plots on pages 26 through 31 show that the maximum 20 dB bandwidth was measured to be 224.8kHz. The 99% bandwidth was measured to be 194.8kHz.

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

### 5.3. Carrier Frequency Separation

#### 5.3.1.Requirements

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

#### 5.3.2.Procedures

The output of the EUT was connected to the spectrum analyzer through 40dB of attenuation. 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

#### 5.3.3.Results

Page 32 shows the carrier frequency separation. As can be seen from this plot, the carrier frequency separation is 498.5kHz, which is greater than the 20dB bandwidth of the hopping channel.

### 5.4. Number of Hopping Frequencies

#### 5.4.1.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 250kHz, the system shall use at least 50 hopping channels. If the 20dB bandwidth of the hopping channel is 250kHz or greater (but not greater than 500kHz), the system shall use at least 25 hopping channels.

#### 5.4.2.Procedures

The output of the EUT was connected to the spectrum analyzer through 40dB of attenuation. 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.

#### 5.4.3.Results

Page 33 shows the number of hopping frequencies. As can be seen from this plot, the number of hopping frequencies is 50, which is equal to 50, which is the minimum number of required hopping frequencies for systems with a 20dB bandwidth less than 250kHz.

### 5.5. Time of Occupancy

#### 5.5.1.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.

#### 5.5.2.Procedures

The output of the EUT was connected to the spectrum analyzer through 40dB of attenuation. With the hopping function enabled, the EUT was allowed to transmit continuously.

The resolution bandwidth (RBW) was set to 1MHz. 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.

### 5.5.3.Results

Pages 34 and 35 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 the dwell time (1.298ms) multiplied by the number of hops (91). This calculated value is equal to 0.118 seconds, which is less than the 0.4 seconds maximum allowed.

## 5.6. Peak Output Power

### 5.6.1.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 6dBi 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 6dBi.

### 5.6.2.Procedures

For the antenna conducted emissions method, the output of the EUT was connected to the spectrum analyzer through 40dB of attenuation. 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 greater than the 20dB bandwidth. The span was set to approximately 5 times the 20dB bandwidth. The 'Max-Hold' function was engaged. The maximum meter reading was recorded. The peak power output was calculated for the low, middle and high hopping frequencies.

For the radiated emissions method, 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 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, as required. The peak power output was calculated for low, middle, and high hopping frequencies.

### 5.6.3.Results

For antenna conducted emissions method, the results are presented on pages 36 through 38. The maximum peak conducted output power from the transmitter was 0.0085W (13.36dBm), which is below the 1 Watt limit.

For radiated emissions method, the results are presented on page 39. The maximum EIRP measured from the transmitter was 0.0085W (9.3dBm), which is below the 1 Watt limit.

## 5.7. Duty Cycle Factor Measurements

### 5.7.1.Requirements

Unless otherwise specified, when the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in

cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value. The exact method of calculating the average field strength shall be submitted with any application for certification or shall be retained in the measurement data file for equipment subject to notification or verification.

5.7.2.Procedures

- 1) The EUT was placed on the non-conductive stand and set to transmit continuously.
- 2) A double ridged waveguide antenna was positioned at a 3 meter distance from the EUT. The output of the antenna was connected to the input of a spectrum analyzer.
- 3) The center frequency of the spectrum analyzer was set to the transmit frequency of the EUT.
- 4) The frequency span of the spectrum analyzer was set to 0Hz so that the time domain trace of the transmitted pulse of the EUT was displayed on the spectrum analyzer.
- 5) The sweep time of the spectrum analyzer was adjusted so that the beginning and end of a single pulse could be seen on the display of the spectrum analyzer.
- 6) The single sweep function of the spectrum analyzer was used multiple times to determine the maximum pulse width of the EUT.
- 7) The maximum pulse width display of the spectrum analyzer was recorded and then plotted using a 'screen dump' utility.
- 8) The sweep time of the spectrum analyzer was then adjusted to 100msec.
- 9) The single sweep function of the spectrum analyzer was used multiple times to determine the maximum number of transmitted pulses that occurred in a 100msec time period.
- 10) The maximum number of pulses transmitted in a 100msec time period was recorded and then plotted using a 'screen dump' utility.
- 11) The duty cycle correction was calculated using the following equation:  

$$\text{Duty Cycle Correction Factor (dB)} = \text{D.C. (dB)}$$

$$\text{D.C. (dB)} = 20 \times \log [((\text{pulse width (msec)}) \times (\#\text{pulses in a 100msecperiod})) / 100\text{msec}]$$

5.7.3.Results

Duty cycle plots are shown on pages 40 and 41. The EUT transmits a 1.286ms 30 times in a 100msec period. This results in a duty cycle correction factor of -8.273dB.

5.8. Radiated Spurious Emissions Measurements

5.8.1.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).

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

Frequency MHz	Field Strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	3
30.0-88.0	100	3
88.0-216.0	150	3
216.0-960.0	200	3
Above 960	500	3

### 5.8.2.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 C63.4-2014 for site attenuation.

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

Preliminary radiated emissions tests were performed to determine the emission characteristics of the EUT. For the preliminary test, a broadband measuring antenna was positioned at a 3 meter distance from the EUT. The entire frequency range from 30MHz to 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 axes 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 axes 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  $20 \cdot \log(\text{dwell time}/100\text{msec})$ . These readings must be no greater than the limits specified in 15.209(a).

### 5.8.3.Results

Preliminary radiated emissions plots with the EUT transmitting at 902.25MHz, 914.75MHz, and 926.75MHz are shown on pages 42 through 89. Final radiated emissions data are presented on data pages 90 through 98. As can be seen from the data, all emissions measured from the EUT were within the specification limits. The emissions level closest to the limit (worst case) occurred at 2744.22MHz. The emissions level at this frequency was 0.2dB within the limit. Photographs of the test configuration which yielded the highest or worst case, radiated emission levels are shown in Figures 3 and 4.

Note: The model numbers on the scans are incorrect, and all of them are of Model No. 8010WLA.

## 5.9. Band Edge Compliance

### 5.9.1.Requirement

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

### 5.9.2.Procedures

#### 5.4.2.1 Low Band Edge

- 1) The EUT was setup inside the test chamber on a non-conductive stand.
- 2) A broadband measuring antenna was placed at a test distance of 3 meters from the EUT.
- 3) The EUT was set to transmit continuously at the channel closest to the low band-edge (hopping function disabled).
- 4) The EUT was maximized for worst case emissions at the measuring antenna. The maximum meter reading was recorded.
- 5) To determine the band edge compliance, the following spectrum analyzer settings were used:
  - a. Center frequency = low band-edge frequency.
  - b. Span = Wide enough to capture the peak level of the emission operating on the channel closest to the band-edge, as well as any modulation products which fall outside of the authorized band of operation.
  - c. Resolution bandwidth (RBW)  $\geq 1\%$  of the span.
  - d. The 'Max-Hold' function was engaged. The analyzer was allowed to scan until the envelope of the transmitter bandwidth was defined.
  - e. The marker was set on the peak of the in-band emissions. A display line was placed 20dB down from the peak of the in-band emissions. All emissions which fall outside of the authorized band of operation must be below the 20dB down display line. (All emissions to the left of the center frequency (band-edge) must be below the display

- line.)
- f. The analyzer's display was plotted using a 'screen dump' utility.
- 6) Step (5) was repeated with the frequency hopping function enabled.

#### 5.4.2.2 High Band Edge

- 1) The EUT was setup inside the test chamber on a non-conductive stand.
- 2) A broadband measuring antenna was placed at a test distance of 3 meters from the EUT.
- 3) The EUT was set to transmit continuously at the channel closest to the high band-edge (hopping function disabled).
- 4) The EUT was maximized for worst case emissions at the measuring antenna.
- 5) To determine the band edge compliance, the following spectrum analyzer settings were used:
  - a. Center frequency = high band-edge frequency.
  - b. Span = Wide enough to capture the peak level of the emission operating on the channel closest to the band-edge, as well as any modulation products which fall outside of the authorized band of operation.
  - c. Resolution bandwidth (RBW)  $\geq$  1% of the span.
  - d. The 'Max-Hold' function was engaged. The analyzer was allowed to scan until the envelope of the transmitter bandwidth was defined.
  - e. The marker was set on the peak of the in-band emissions. A display line was placed 20dB down from the peak of the in-band emissions. All emissions which fall outside of the authorized band of operation must be below the 20dB down display line. (All emissions to the 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.
- 6) Step (5) was repeated with the frequency hopping function enabled.

In accordance with paragraph 15.231(c), all emissions within 20dB of the peak amplitude level of the center frequency are required to be within a band less than 0.5% of the center frequency wide.

#### 5.9.3.Results

Pages 99 through 104 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. OTHER TEST CONDITIONS

### 6.1. Test Personnel and Witnesses

All tests were performed by qualified personnel from Elite Electronic Engineering Incorporated.

### 6.2. Disposition of the EUT

The EUT and all associated equipment were returned to Chamberlain Group, Inc. upon completion of the tests.

## 7. CONCLUSIONS

It was determined that the Chamberlain Group, Inc. Garage Door Opener, Model No. 8010WLA, frequency hopping spread spectrum transmitter, Serial No. OF00 0CA C51, did fully meet the conducted and radiated emission requirements of the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart C, Sections 15.207 and 15.247 for Intentional Radiators Operating within the 902-928 MHz band, when tested per ANSI C63.4-2014.

It was also determined that the Chamberlain Group, Inc. Garage Door Opener, Model No. 8010WLA, frequency hopping spread spectrum transmitter, Serial No. OF00 0CA C51 did fully meet the conducted and radiated RF emission requirements of the Industry Canada Radio Standards Specification, RSS-Gen Section 7.2.4 and RSS-210 Annex 8, for transmitters, when tested per ANSI C63.4-2014.



## 8. CERTIFICATION

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

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

This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the Federal Government.



9. EQUIPMENT LIST

Table 9-1 Equipment List

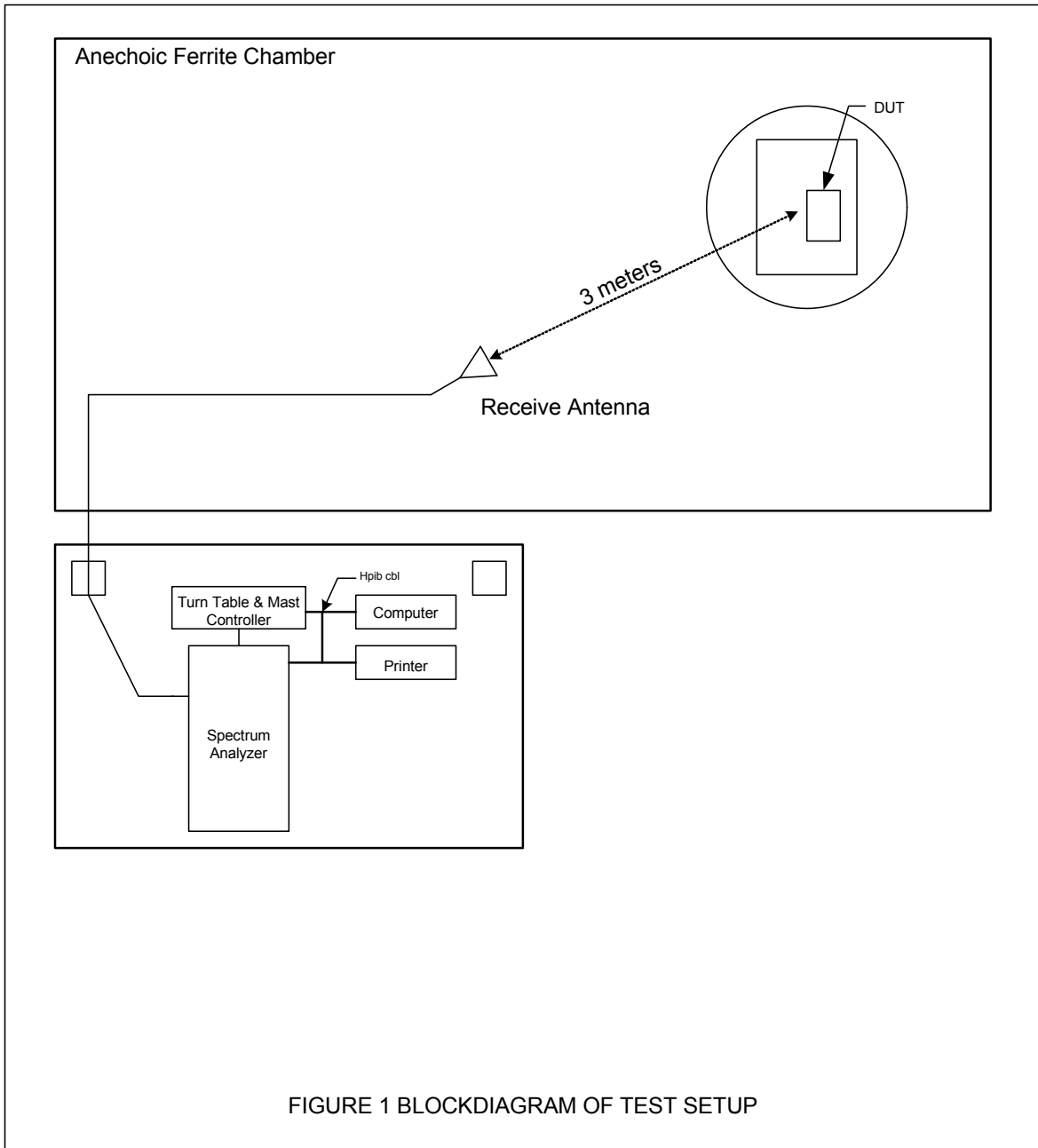
Eq ID	Equipment Description	Manufacturer	Model No.	Serial No.	Frequency Range	Cal Date	Due Date
APW11	PREAMPLIFIER	PMI	PE2-35-120-5R0-10-12-SFF	PL11685/1241	1GHZ-20GHZ	3/22/2017	3/22/2018
CDW8	DESKTOP COMPUTER	ELITE ELECTRONIC ENG	PENTIUM 4	009	3.8GHZ	N/A	
CDY0	WORKSTATION	ELITE	WORKSTATION		WINDOWS 7	N/A	
GRB0	1MHZ, LISN SIGNAL CHECKER	ELITE	LISNCHKR1M	1	1MHZ	1/12/2018	1/12/2019
MEA3	MICRO-OHM METER	KEITHLEY	580	772667	10UOHM-200KOHM	6/6/2017	6/6/2018
NTA4	BILOG ANTENNA	TESEQ	6112D	46660	20-2000GHZ	8/18/2017	8/18/2018
NWQ1	DOUBLE RIDGED WAVEGUIDE ANTENNA	ETS-LINDGREN	3117	66655	1GHZ-18GHZ	4/4/2016	4/4/2018
PLF1	CISPR16 50UH LISN	ELITE	CISPR16/70A	001	.15-30MHz	5/8/2017	5/8/2018
PLF3	CISPR16 50UH LISN	ELITE	CISPR16/70A	003	.15-30MHz	5/8/2017	5/8/2018
RAKI	RF SECTION	HEWLETT PACKARD	85462A	3411A00181	0.009-6500MHZ	3/1/2018	3/1/2019
RAKJ	RF FILTER SECTION	HEWLETT PACKARD	85460A	3330A00154	---	2/23/2018	2/23/2019
RBG3	EMI ANALYZER	ROHDE & SCHWARZ	ESW44	101592	2HZ-44GHZ	2/20/2018	2/20/2019
RBJ0	EMI RECEIVER	ROHDE & SCHWARZ	ESW8	100986	2HZ-8GHZ	12/29/2017	12/29/2018
SES0	24VDC POWER SUPPLY	P-TRANS	FS-32024-1M	001	18-27VDC	NOTE 1	
T1EE	10DB 25W ATTENUATOR	WEINSCHTEL	46-10-34	BN2321	DC-18GHZ	7/7/2016	7/7/2018
T2D1	20DB, 25W ATTENUATOR	WEINSCHTEL	46-20-43	AV5814	DC-18GHZ	7/7/2016	7/7/2018
T2S8	20DB 25W ATTENUATOR	WEINSCHTEL	46-20-34	BV3541	DC-18GHZ	7/7/2016	7/7/2018
VBR8	CISPR EN FCC CE VOLTAGE.exe						
WKA1	SOFTWARE, UNIVERSAL RCV EMI	ELITE	UNIV_RCV_EMI	1	---	I/O	
WQB0	RE_8546A	ELITE	RE_8546A	----	----	CNR	
WQC0	HF_8546A	ELITE	HF_8546A	---	---	CNR	
XLTA	5W, 50 OHM TERMINATION	JFW INDUSTRIES	50T-052	---	DC-2GHZ	1/9/2018	1/9/2020
XPQ3	HIGH PASS FILTER	K&L MICROWAVE	4IH30-1804/T10000-0	4	1.8GHZ-10GHZ	9/12/2017	9/12/2019
XPQ4	HIGH PASS FILTER	K&L MICROWAVE	11SH10-4800/X20000-O/O	1	4.8-20GHZ	9/12/2017	9/12/2019

I/O: Initial Only

N/A: Not Applicable

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





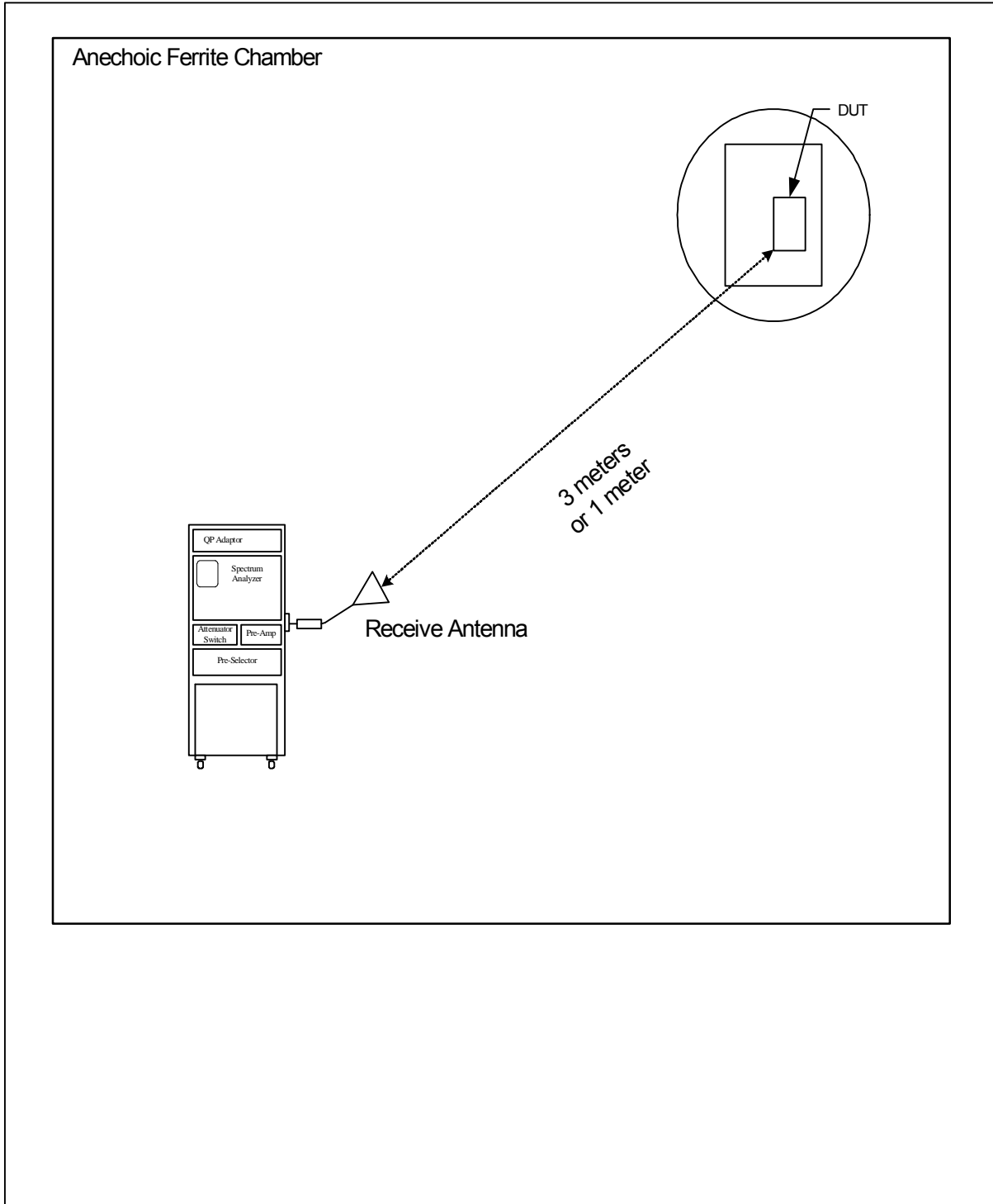
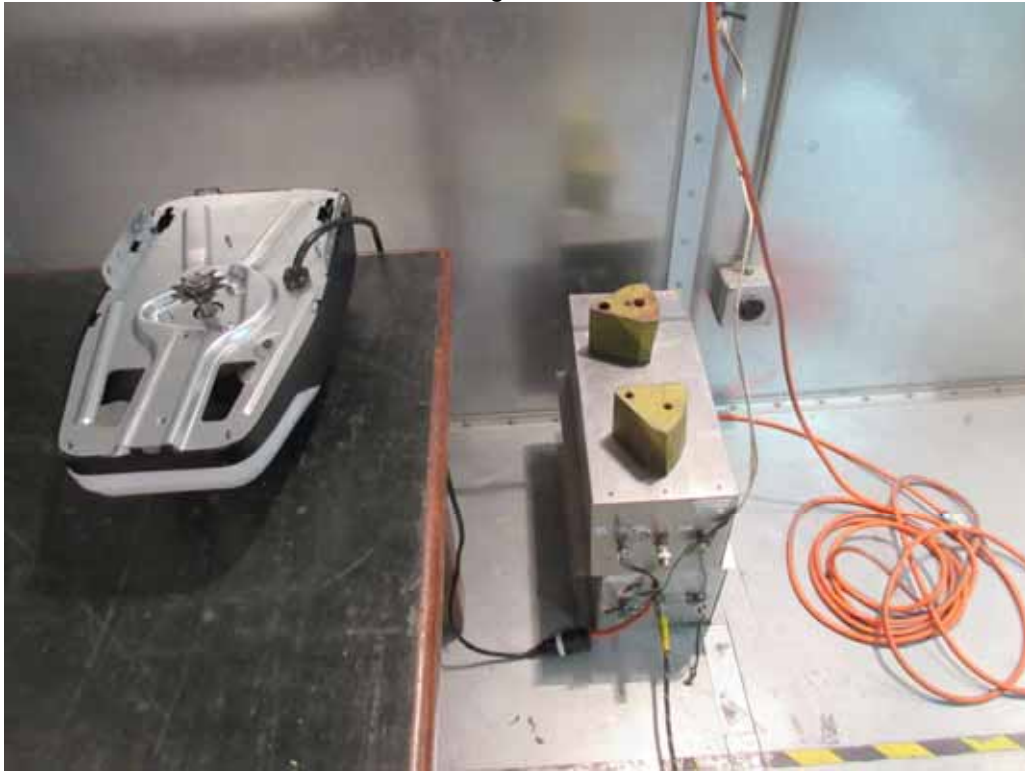


Figure 2



Test Setup for 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, 1 to 5GHz – Horizontal Polarization



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



## FCC Part 15 Subpart B Conducted Emissions Test Significant Emissions Data

VBR8 04/23/2015

Manufacturer : CHABMERLAIN  
Model : 8010LA  
DUT Revision : 1.0  
Serial Number :  
DUT Mode : NORMAL OPERATION  
Line Tested : 120VAC 60HZ HIGH LINE  
Scan Step Time [ms] : 30  
Meas. Threshold [dB] : -10  
Notes :  
Test Engineer : T. Jozefczyk  
Limit : Class B  
Test Date : Mar 06, 2018 10:03:53 AM  
Data Filter : Up to 80 maximum levels detected with 6 dB level excursion threshold over 10 dB margin below limit

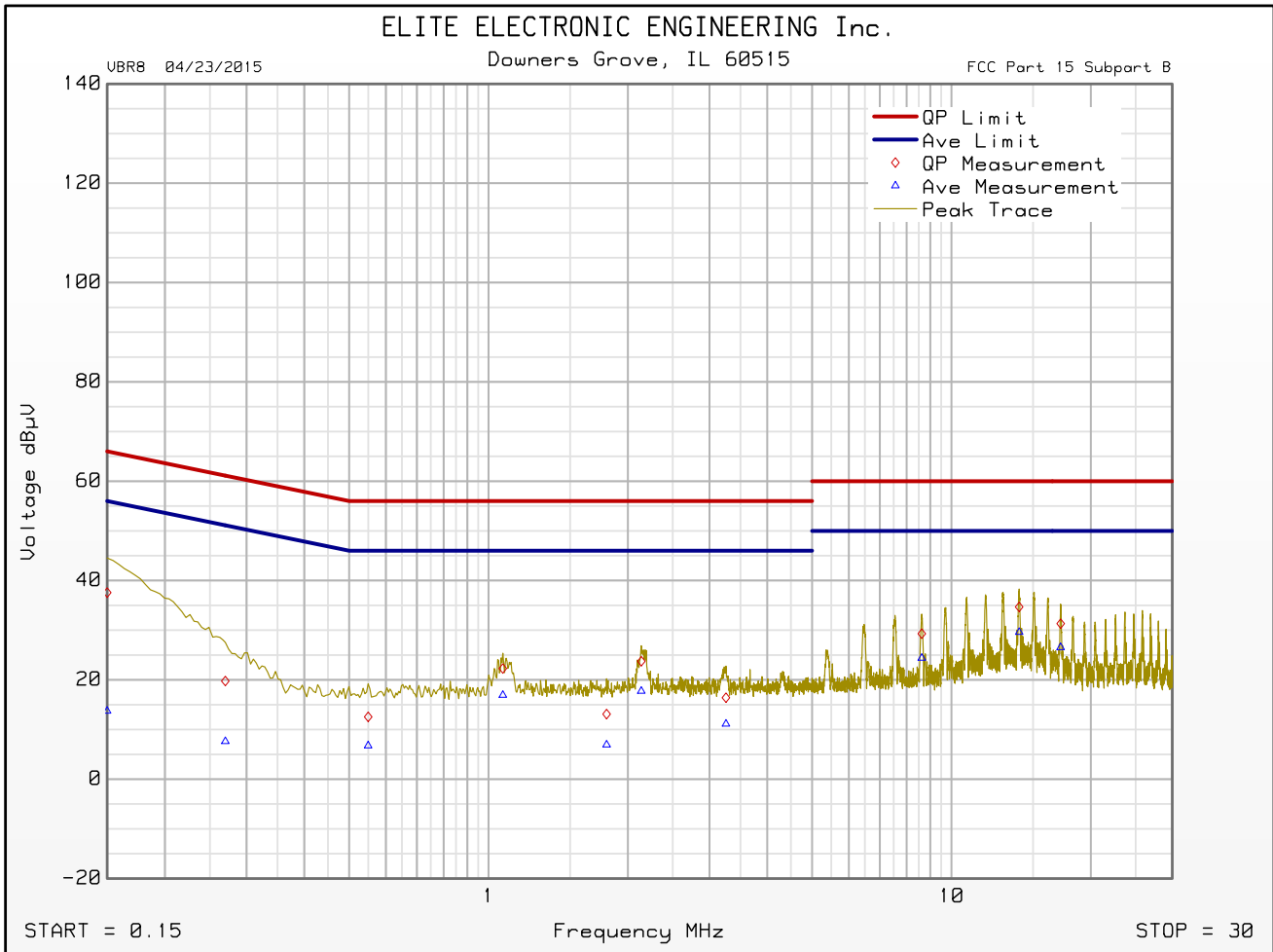
Freq MHz	Quasi-peak Level dBµV	Quasi-peak Limit dBµV	Excessive Quasi-peak Emissions	Average Level dBµV	Average Limit dBµV	Excessive Average Emissions
0.150	37.6	66.0		13.7	56.0	
0.270	19.8	61.1		7.6	51.1	
0.550	12.6	56.0		6.8	46.0	
1.074	22.3	56.0		16.9	46.0	
1.799	13.1	56.0		6.9	46.0	
2.138	23.8	56.0		17.8	46.0	
3.257	16.4	56.0		11.1	46.0	
8.627	29.3	60.0		24.4	50.0	
14.004	34.7	60.0		29.6	50.0	
17.213	31.3	60.0		26.5	50.0	



# FCC Part 15 Subpart B Conducted Emissions Test Cumulative Data

VBR8 04/23/2015

Manufacturer : CHABMERLAIN  
Model : 8010LA  
DUT Revision : 1.0  
Serial Number :  
DUT Mode : NORMAL OPERATION  
Line Tested : 120VAC 60HZ HIGH LINE  
Scan Step Time [ms] : 30  
Meas. Threshold [dB] : -10  
Notes :  
Test Engineer : T. Jozefczyk  
Limit : Class B  
Test Date : Mar 06, 2018 10:03:53 AM



Emissions Meet QP Limit  
Emissions Meet Ave Limit



## FCC Part 15 Subpart B Conducted Emissions Test Significant Emissions Data

VBR8 04/23/2015

Manufacturer : CHABMERLAIN  
Model : 8010LA  
DUT Revision : 1.0  
Serial Number :  
DUT Mode : NORMAL OPERATION  
Line Tested : 120VAC 60HZ NEUTRAL LINE  
Scan Step Time [ms] : 30  
Meas. Threshold [dB] : -10  
Notes :  
Test Engineer : T. Jozefczyk  
Limit : Class B  
Test Date : Mar 06, 2018 09:58:30 AM  
Data Filter : Up to 80 maximum levels detected with 6 dB level excursion threshold over 10 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
0.150	38.4	66.0		15.1	56.0	
0.455	16.6	56.8		7.6	46.8	
0.505	15.9	56.0		6.8	46.0	
0.849	13.6	56.0		7.4	46.0	
1.957	14.5	56.0		8.1	46.0	
2.003	14.4	56.0		8.0	46.0	
3.617	13.3	56.0		7.2	46.0	
8.623	18.7	60.0		13.1	50.0	
13.995	29.0	60.0		24.1	50.0	
17.222	26.5	60.0		21.4	50.0	

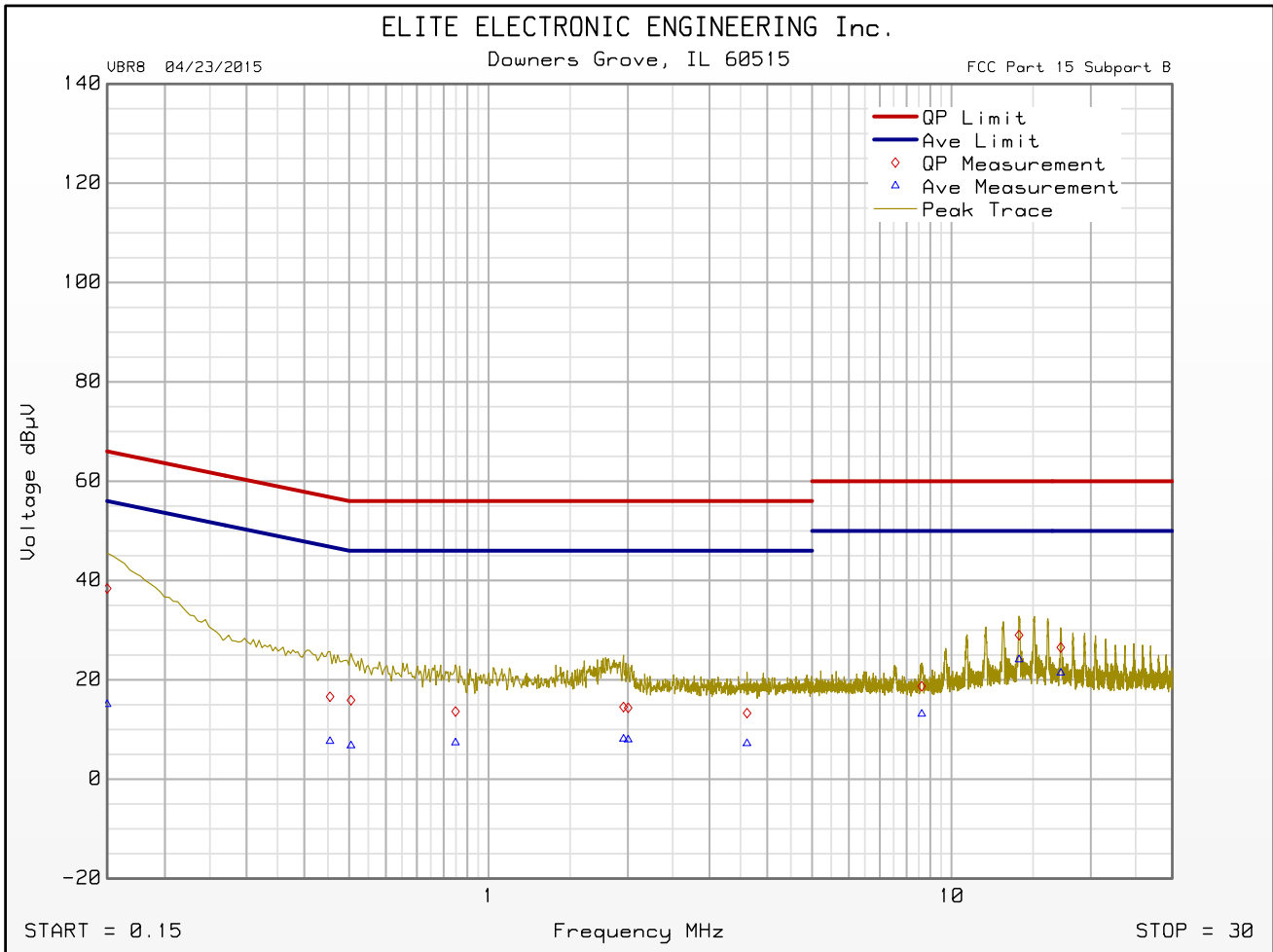




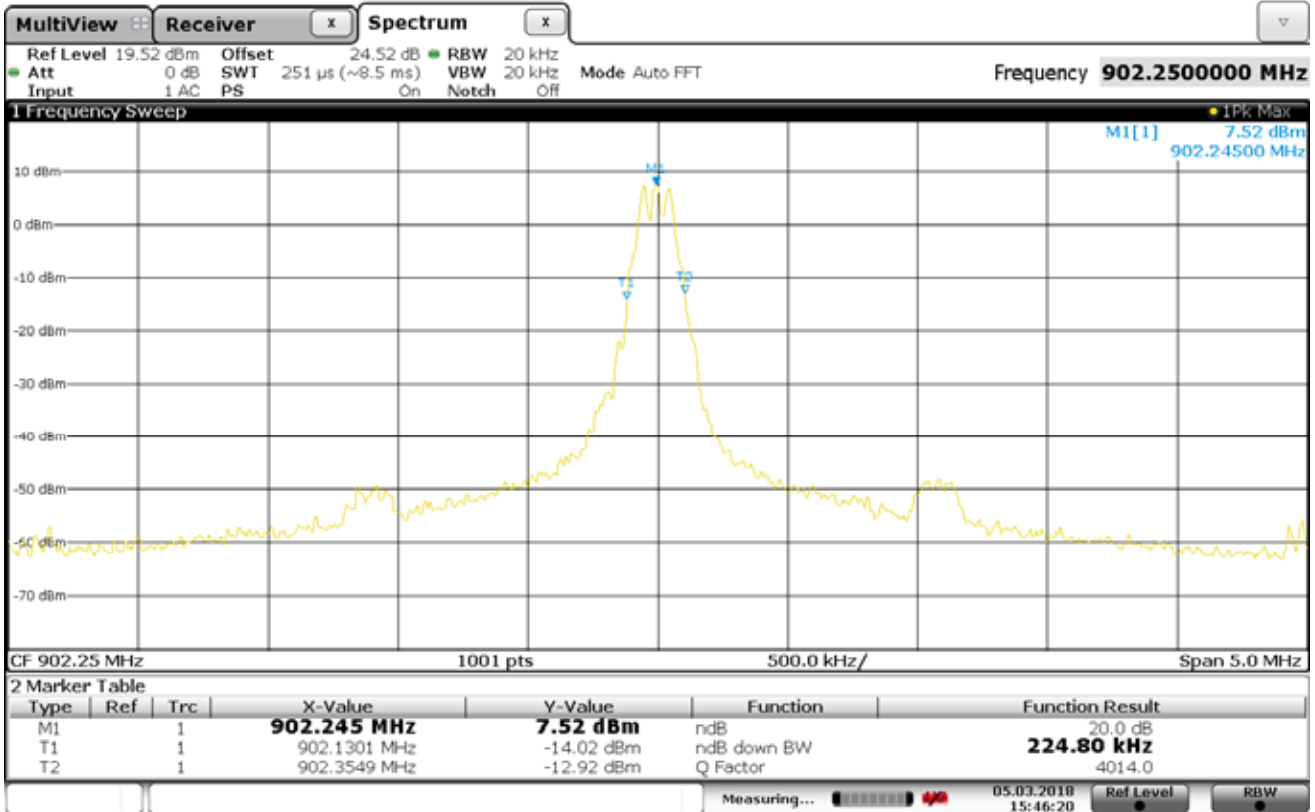
# FCC Part 15 Subpart B Conducted Emissions Test Cumulative Data

VBR8 04/23/2015

Manufacturer : CHABMERLAIN  
Model : 8010LA  
DUT Revision : 1.0  
Serial Number :  
DUT Mode : NORMAL OPERATION  
Line Tested : 120VAC 60HZ NEUTRAL LINE  
Scan Step Time [ms] : 30  
Meas. Threshold [dB] : -10  
Notes :  
Test Engineer : T. Jozefczyk  
Limit : Class B  
Test Date : Mar 06, 2018 09:58:30 AM



Emissions Meet QP Limit  
Emissions Meet Ave Limit

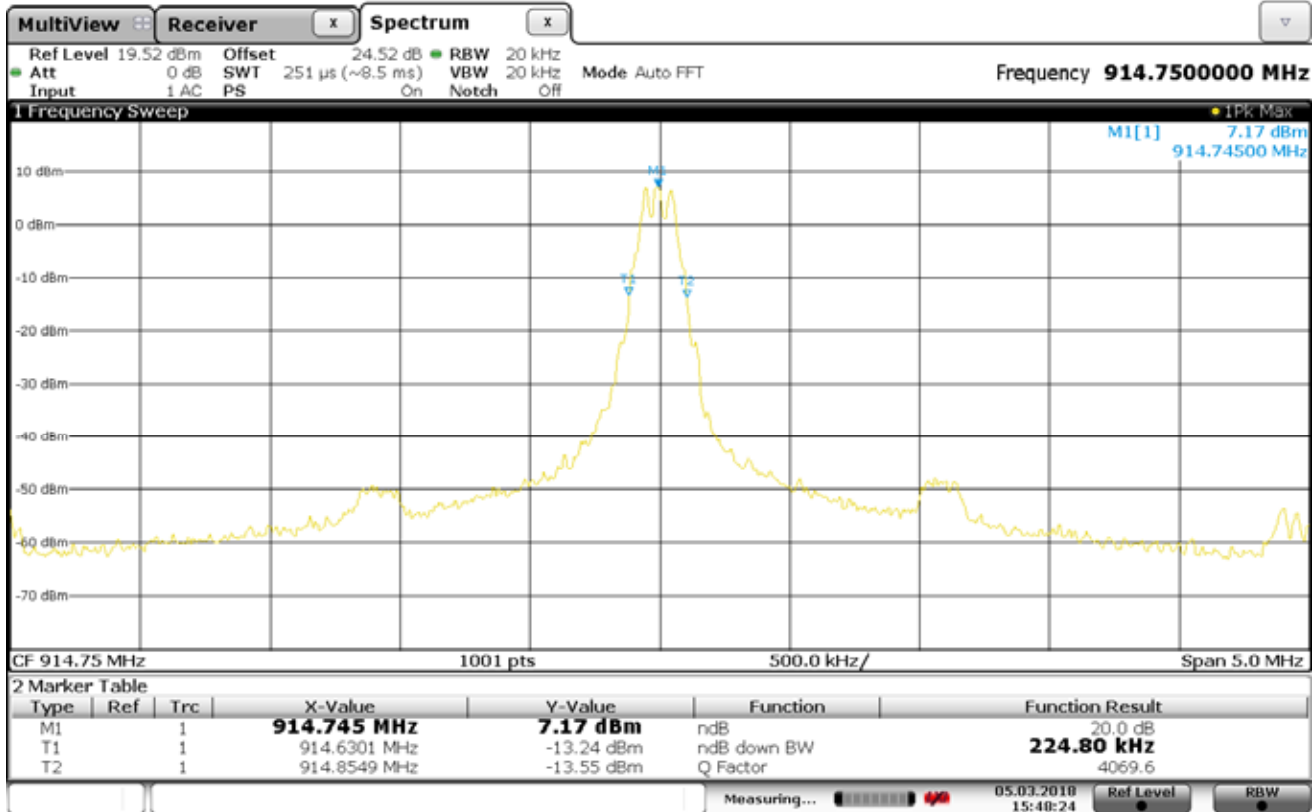


Date: 5.MAR.2018 15:46:20

### 20dB BANDWIDTH

MANUFACTURER : Chamberlain Group, Inc.  
 TEST ITEM : Garage Door Opener  
 MODEL NUMBER : 8010WLA  
 TEST MODE : FHSS – 902.25MHz  
 : 20dB BW = 224.8kHz

### NOTES

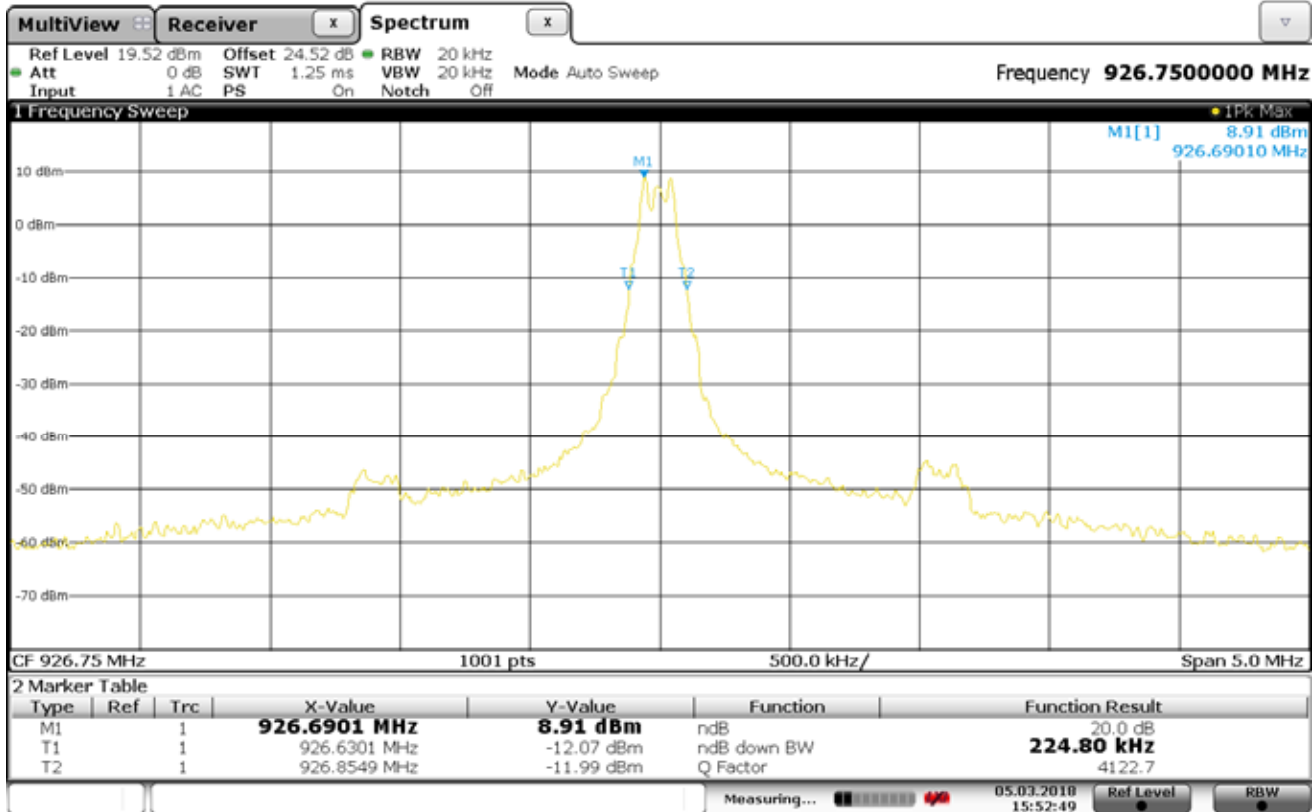


Date: 5.MAR.2018 15:48:23

### 20dB BANDWIDTH

MANUFACTURER : Chamberlain Group, Inc.  
 TEST ITEM : Garage Door Opener  
 MODEL NUMBER : 8010WLA  
 TEST MODE : FHSS – 914.75MHz  
 : 20dB BW = 224.8kHz

### NOTES

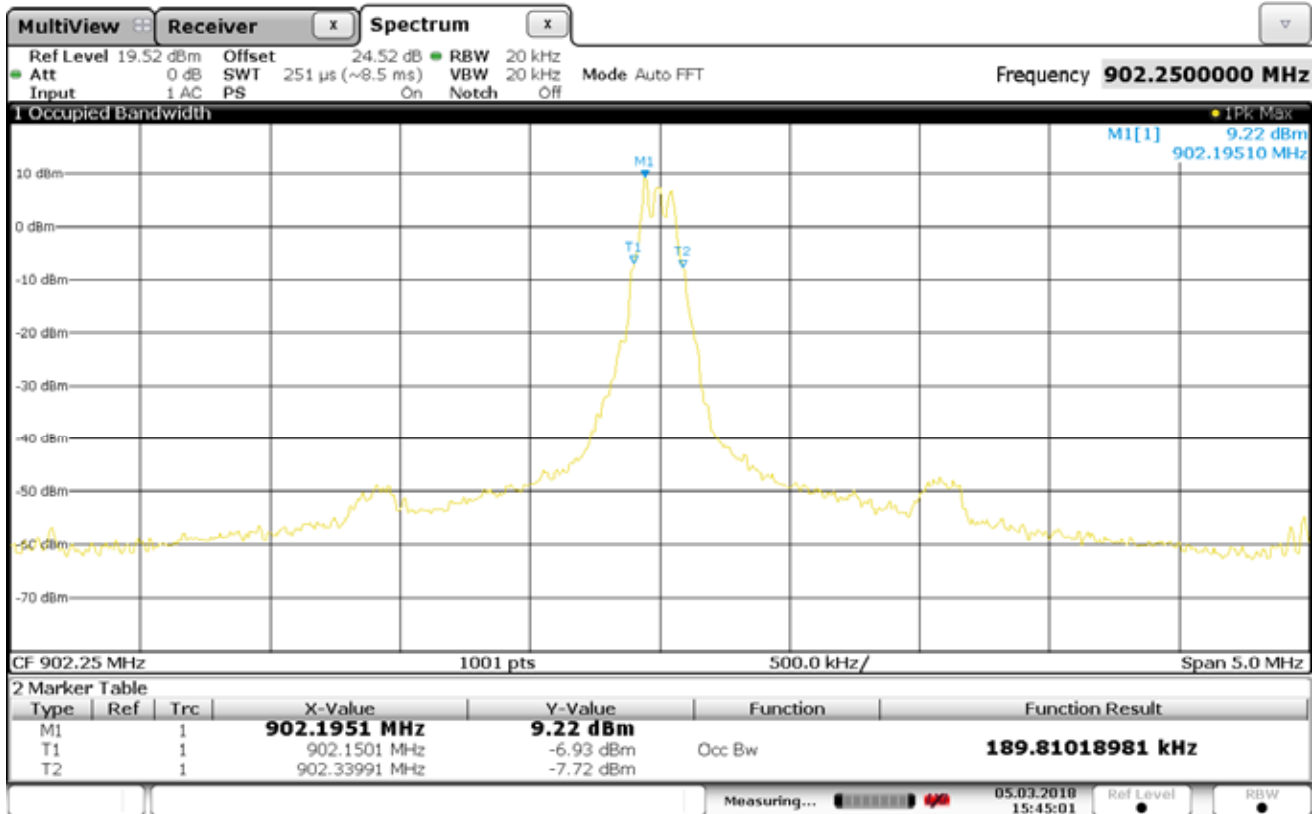


Date: 5.MAR.2018 15:52:50

### 20dB BANDWIDTH

MANUFACTURER : Chamberlain Group, Inc.  
 TEST ITEM : Garage Door Opener  
 MODEL NUMBER : 8010WLA  
 TEST MODE : FHSS – 926.75MHz  
 : 20dB BW = 224.8kHz

### NOTES

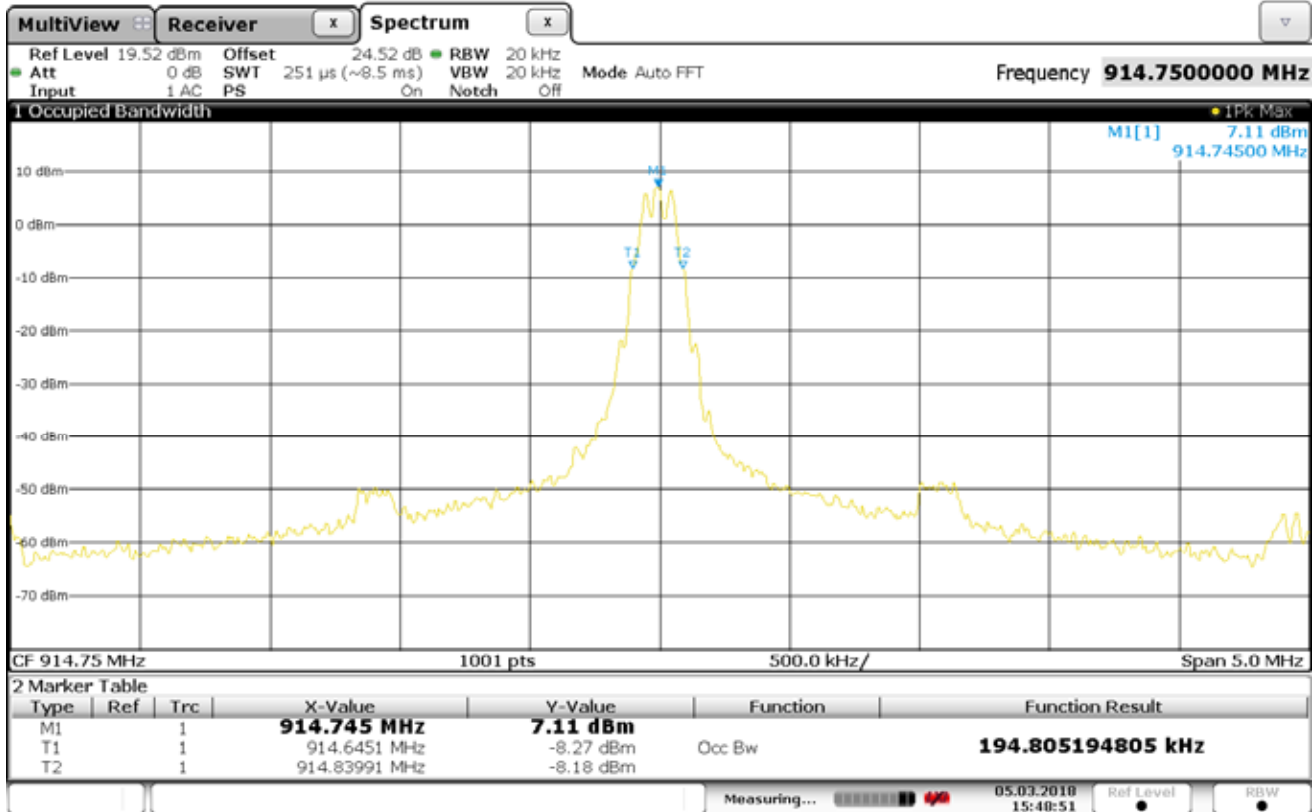


Date: 5.MAR.2018 15:45:00

## 99% BANDWIDTH

MANUFACTURER : Chamberlain Group, Inc.  
 TEST ITEM : Garage Door Opener  
 MODEL NUMBER : 8010WLA  
 TEST MODE : FHSS – 902.25MHz  
 : 99% BW = 189.81kHz

## NOTES

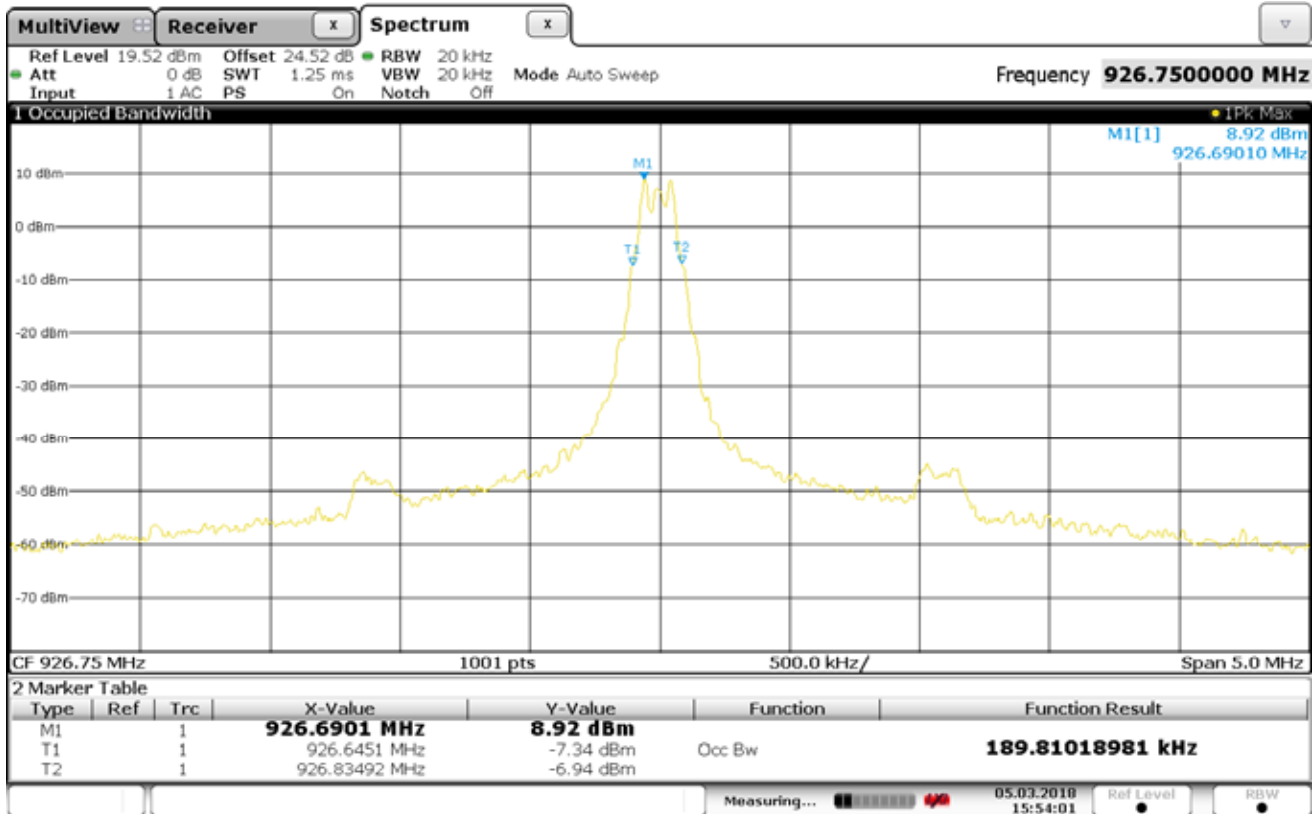


Date: 5.MAR.2018 15:48:50

### 99% BANDWIDTH

MANUFACTURER : Chamberlain Group, Inc.  
 TEST ITEM : Garage Door Opener  
 MODEL NUMBER : 8010WLA  
 TEST MODE : FHSS – 914.75MHz  
 : 99% BW = 194.8kHz

### NOTES

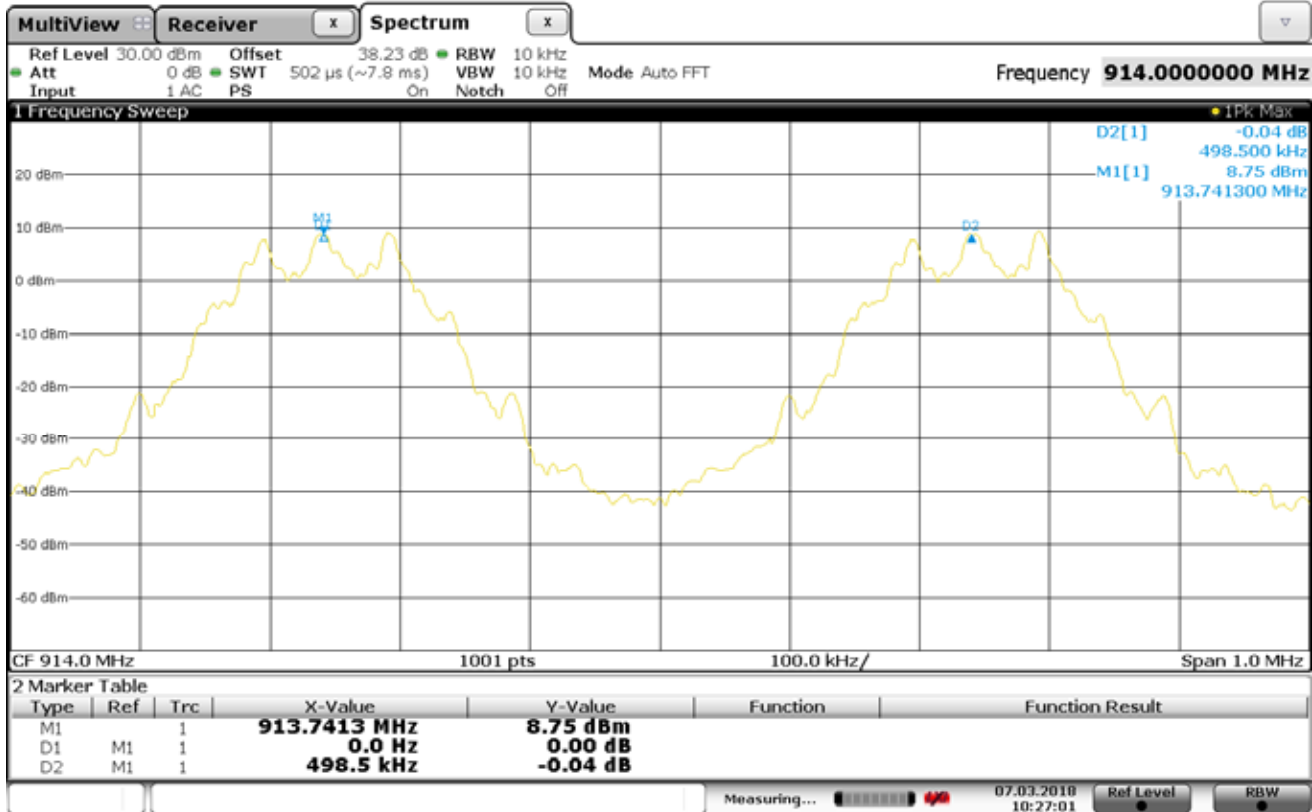


Date: 5.MAR.2018 15:54:01

### 99% BANDWIDTH

MANUFACTURER : Chamberlain Group, Inc.  
 TEST ITEM : Garage Door Opener  
 MODEL NUMBER : 8010WLA  
 TEST MODE : FHSS – 926.75MHz  
 : 99% BW = 189.81kHz

### NOTES



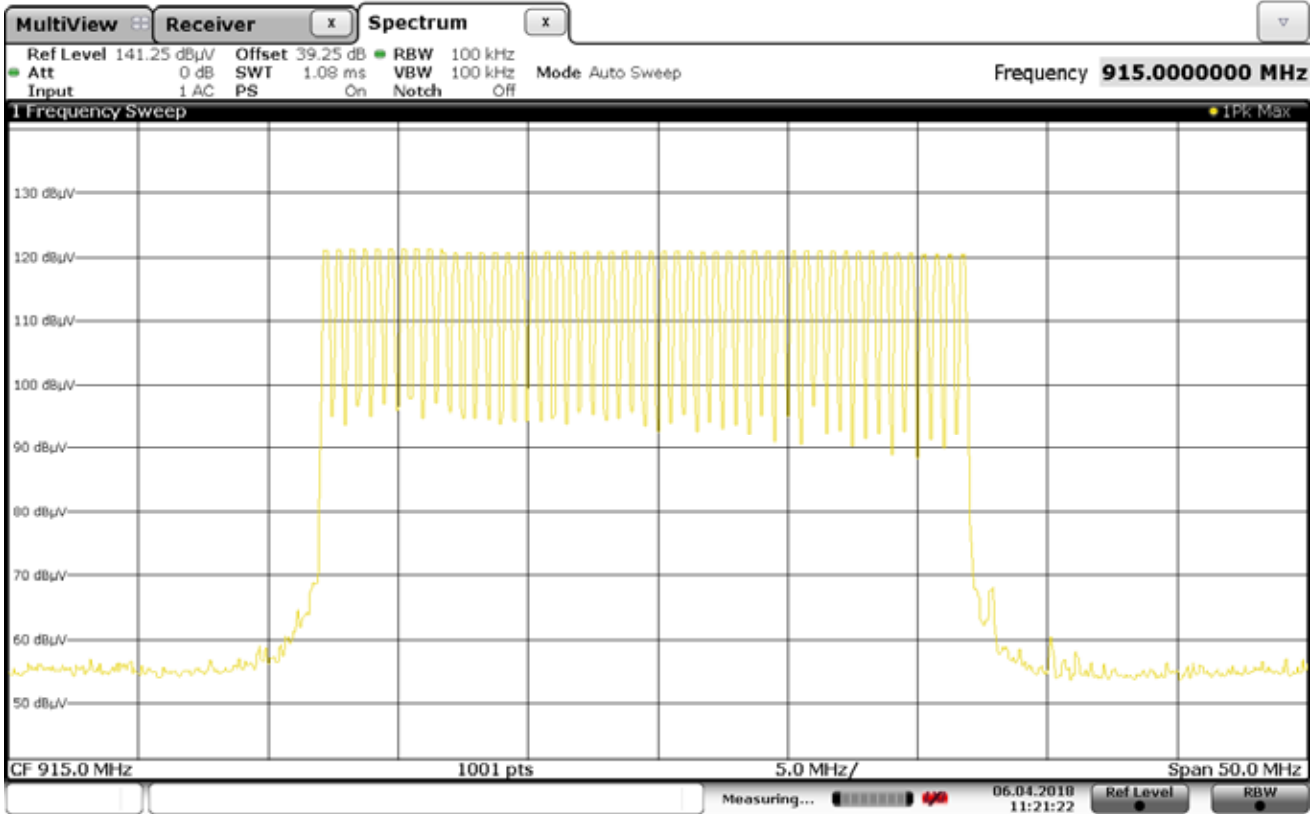
Date: 7.MAR.2018 10:27:02

## CARRIER FREQUENCY SEPARATION

MANUFACTURER : Chamberlain Group, Inc.  
 TEST ITEM : Garage Door Opener  
 MODEL NUMBER : 8010WLA  
 TEST MODE : FHSS  
 : CFS = 498.5kHz

## NOTES



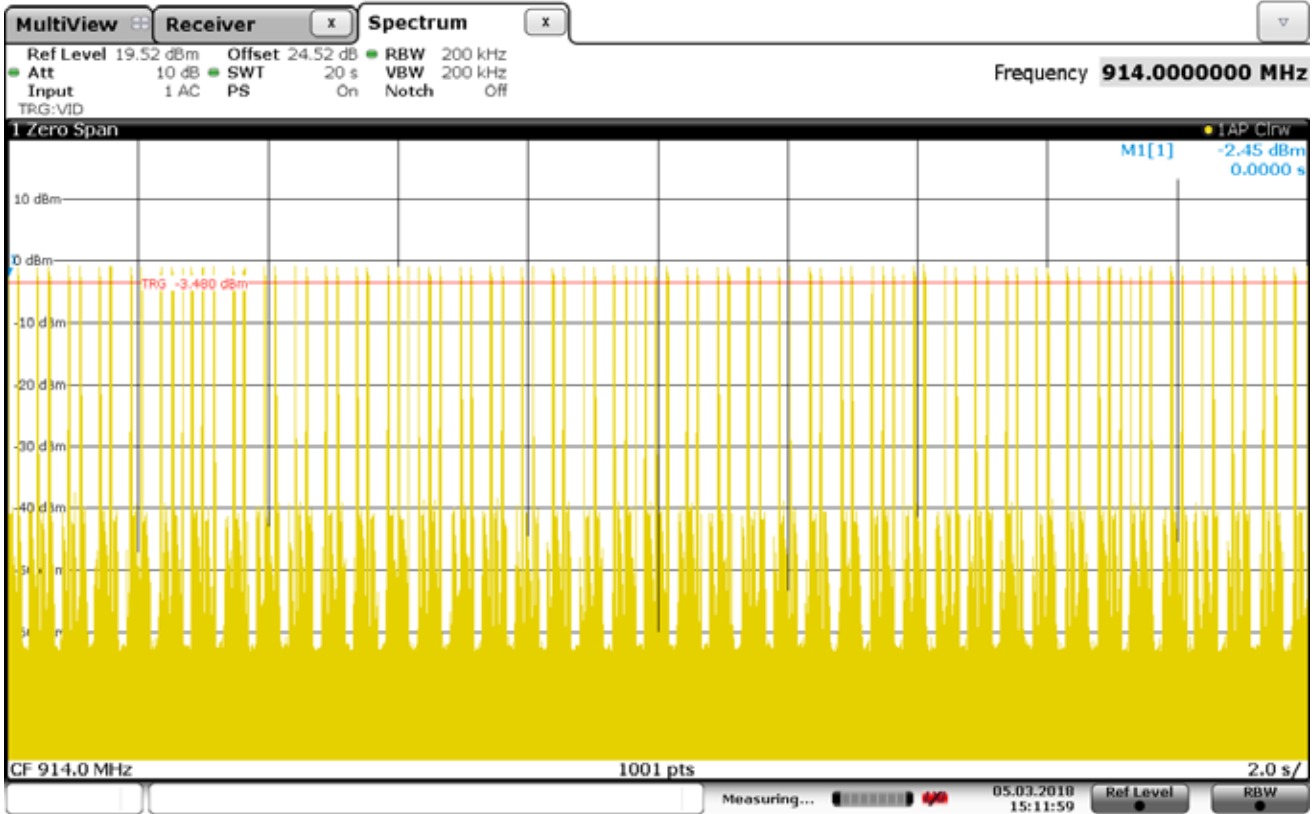


Date: 6.APR.2018 11:21:22

## NUMBER OF HOPPING FREQUENCIES

MANUFACTURER : Chamberlain Group, Inc.  
 TEST ITEM : Garage Door Opener  
 MODEL NUMBER : 8010WLA  
 TEST MODE : FHSS  
 : Number of hopping frequencies = 50

## NOTES

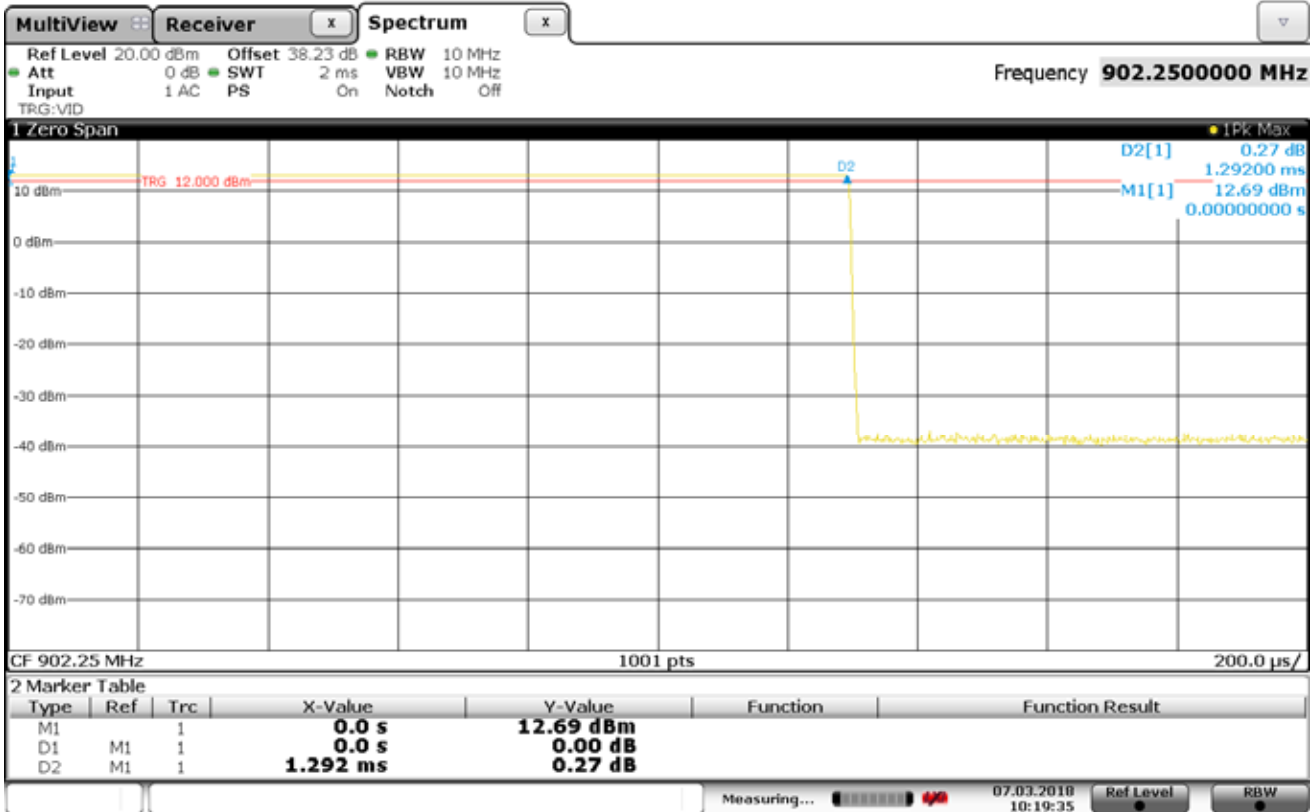


Date: 5.MAR.2018 15:11:59

### TIME OF OCCUPANCY

MANUFACTURER : Chamberlain Group, Inc.  
 TEST ITEM : Garage Door Opener  
 MODEL NUMBER : 8010WLA  
 TEST MODE : FHSS

### NOTES

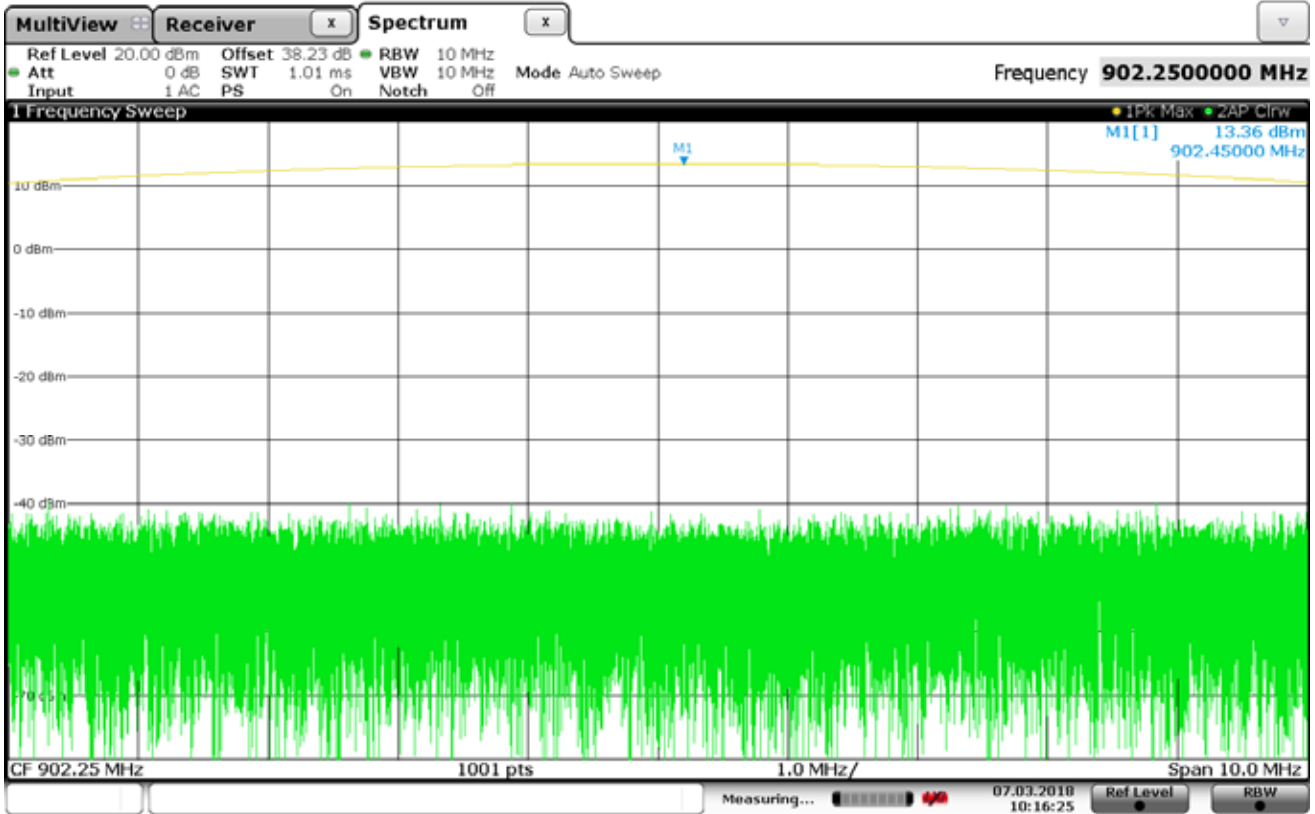


Date: 7.MAR.2018 10:19:35

### TIME OF OCCUPANCY - PULSE

MANUFACTURER : Chamberlain Group, Inc.  
 TEST ITEM : Garage Door Opener  
 MODEL NUMBER : 8010WLA  
 TEST MODE : FHSS

### NOTES

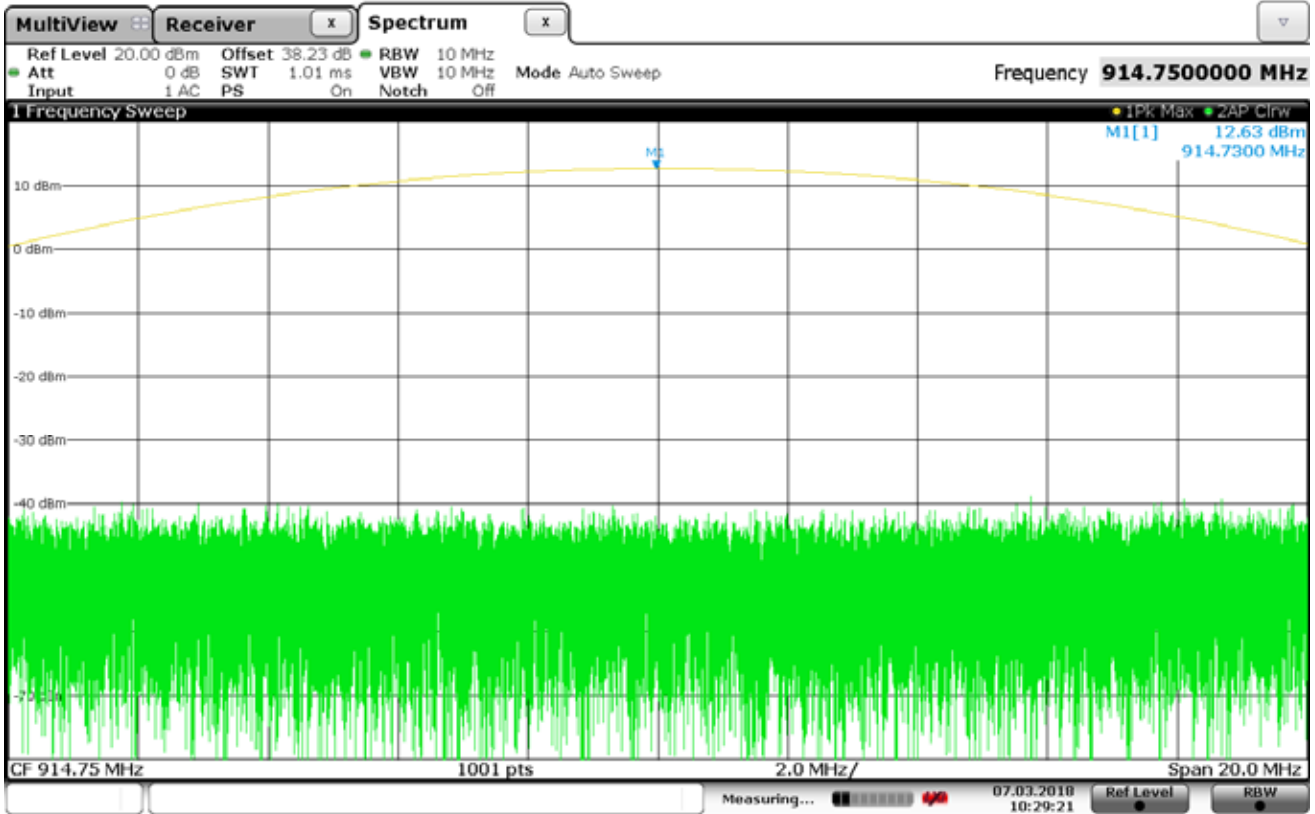


Date: 7.MAR.2018 10:16:25

## PEAK OUTPUT POWER

MANUFACTURER : Chamberlain Group, Inc.  
 TEST ITEM : Garage Door Opener  
 MODEL NUMBER : 8010WLA  
 TEST MODE : FHSS – 902.25MHz  
 : Power output = 13.36dBm

## NOTES

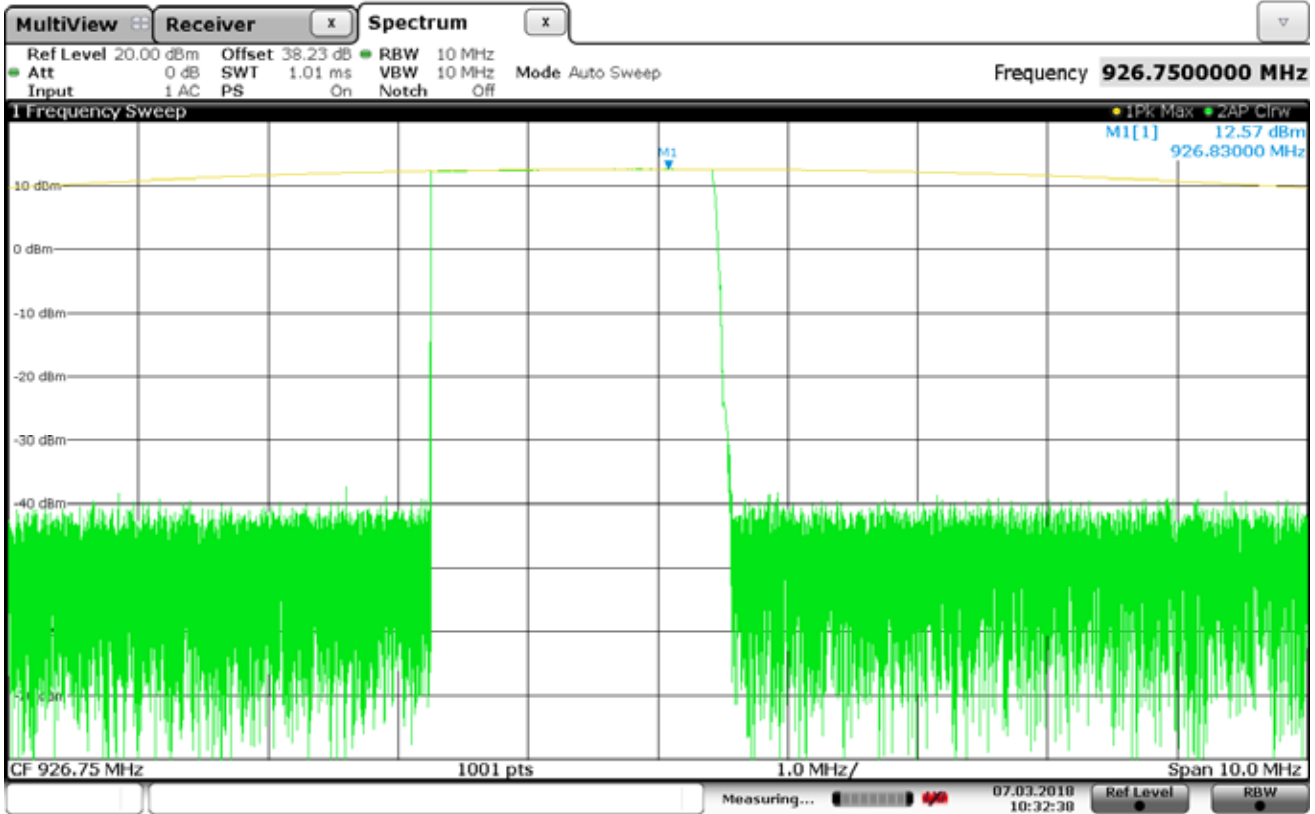


Date: 7.MAR.2018 10:29:21

## PEAK OUTPUT POWER

MANUFACTURER : Chamberlain Group, Inc.  
 TEST ITEM : Garage Door Opener  
 MODEL NUMBER : 8010WLA  
 TEST MODE : FHSS – 914.75MHz  
 : Power output = 12.63dBm

## NOTES



Date: 7.MAR.2018 10:32:38

### PEAK OUTPUT POWER

MANUFACTURER : Chamberlain Group, Inc.  
 TEST ITEM : Garage Door Opener  
 MODEL NUMBER : 8010WLA  
 TEST MODE : FHSS – 926.75MHz  
 : Power output = 12.57dBm

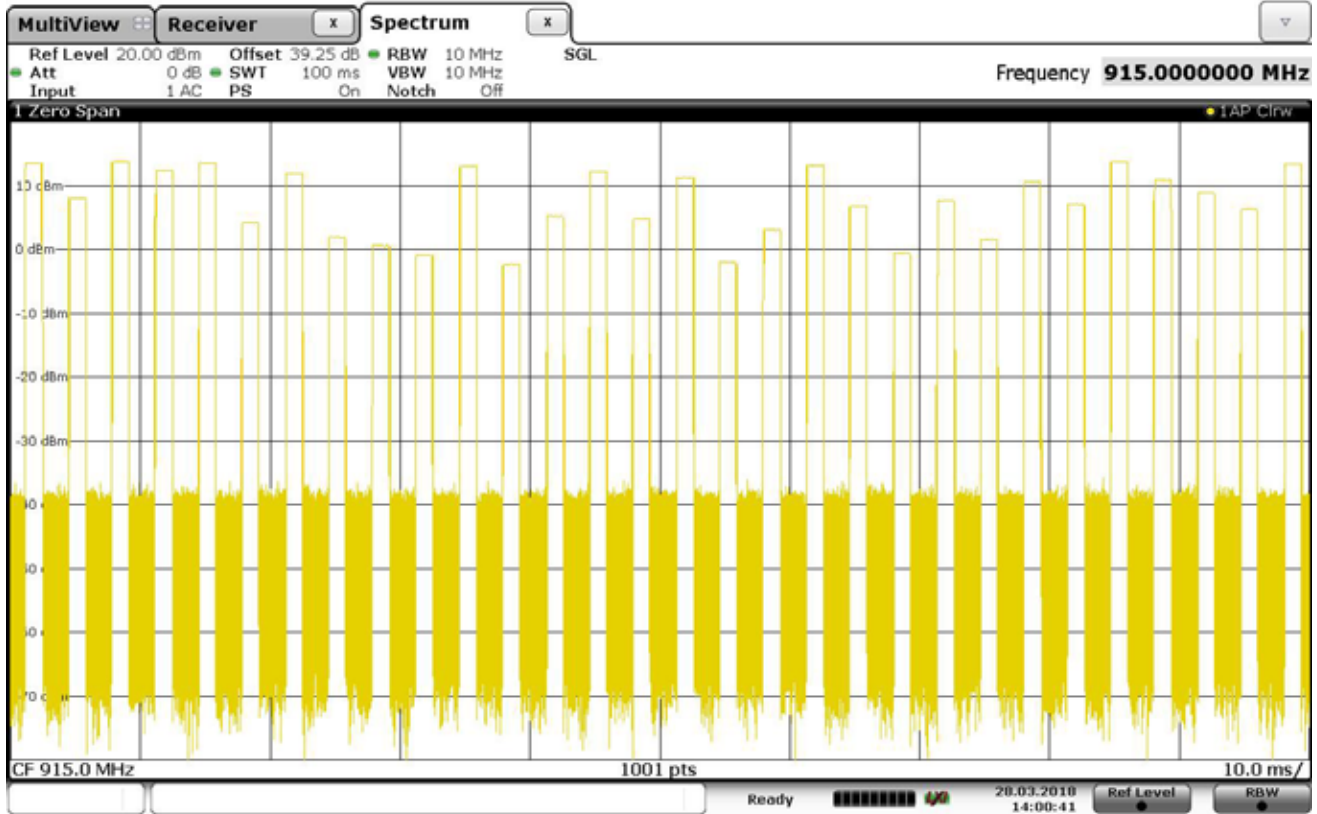
### NOTES



**DATA PAGE**

Manufacturer : Chamberlain Group, Inc.  
Test Item : Garage Door Opener  
Model No. : 8010WLA  
Mode : FHSS  
Test Specification : FCC-15.247, RSS-247 Peak Output Power  
Date : March 2, 2018

Freq. (MHz)	Ant Pol	Matched Sig. Gen. Reading (dBm)	Equivalent Antenna Gain (dB)	Cable Loss (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
902.25	H	8.6	2.2	1.6	9.1	30.0	-20.9
902.25	V	6.0	2.2	1.6	6.6	30.0	-23.4
914.75	H	8.7	2.2	1.6	9.2	30.0	-20.8
914.75	V	6.5	2.2	1.6	7.0	30.0	-23.0
926.75	H	5.6	2.2	1.7	6.1	30.0	-23.9
926.75	V	8.8	2.2	1.7	9.3	30.0	-20.7



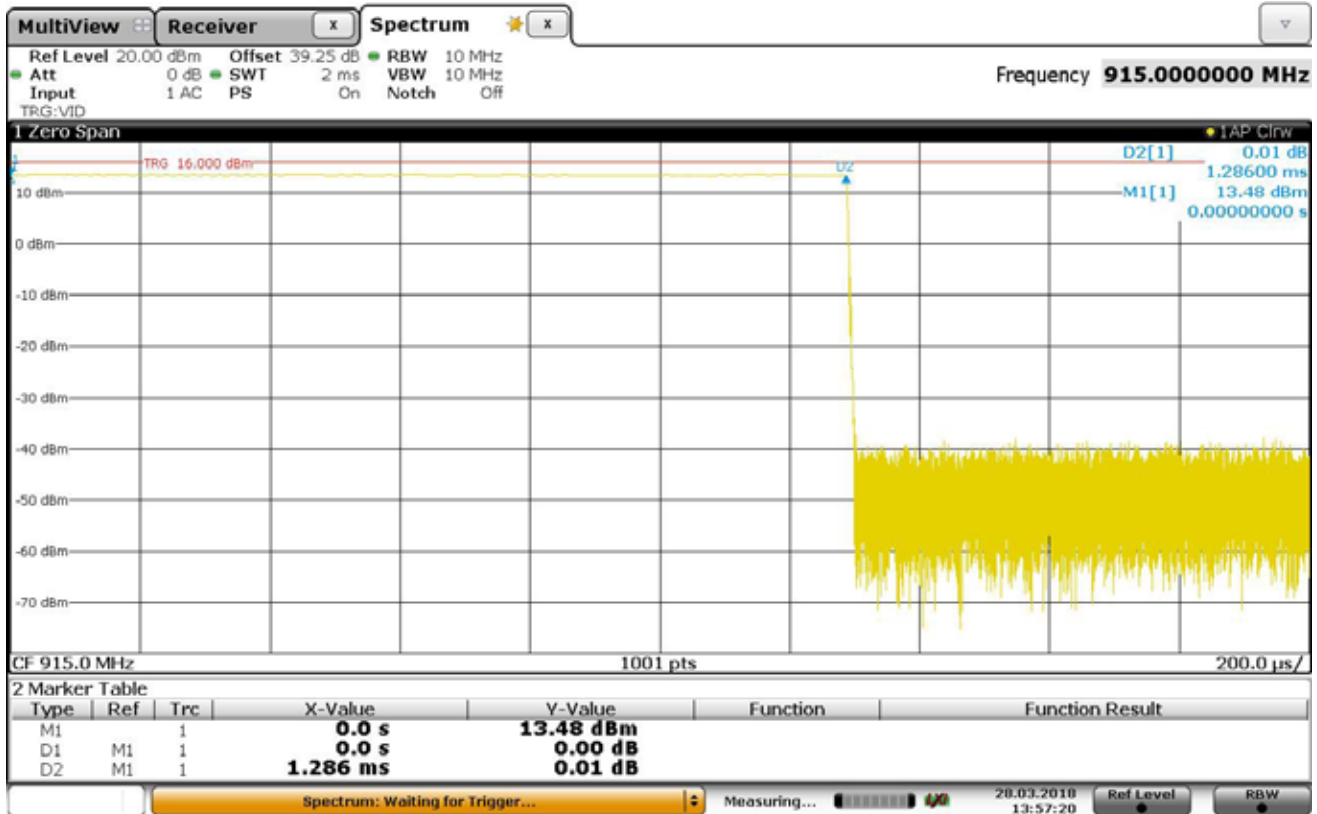
Date: 28.MAR.2018 14:00:41

## DUTY CYCLE

MANUFACTURER : Chamberlain Group, Inc.  
 TEST ITEM : Garage Door Opener  
 MODEL NUMBER : 8010WLA  
 TEST MODE : FHSS  
 : # of pulses in 100ms = 30

## NOTES



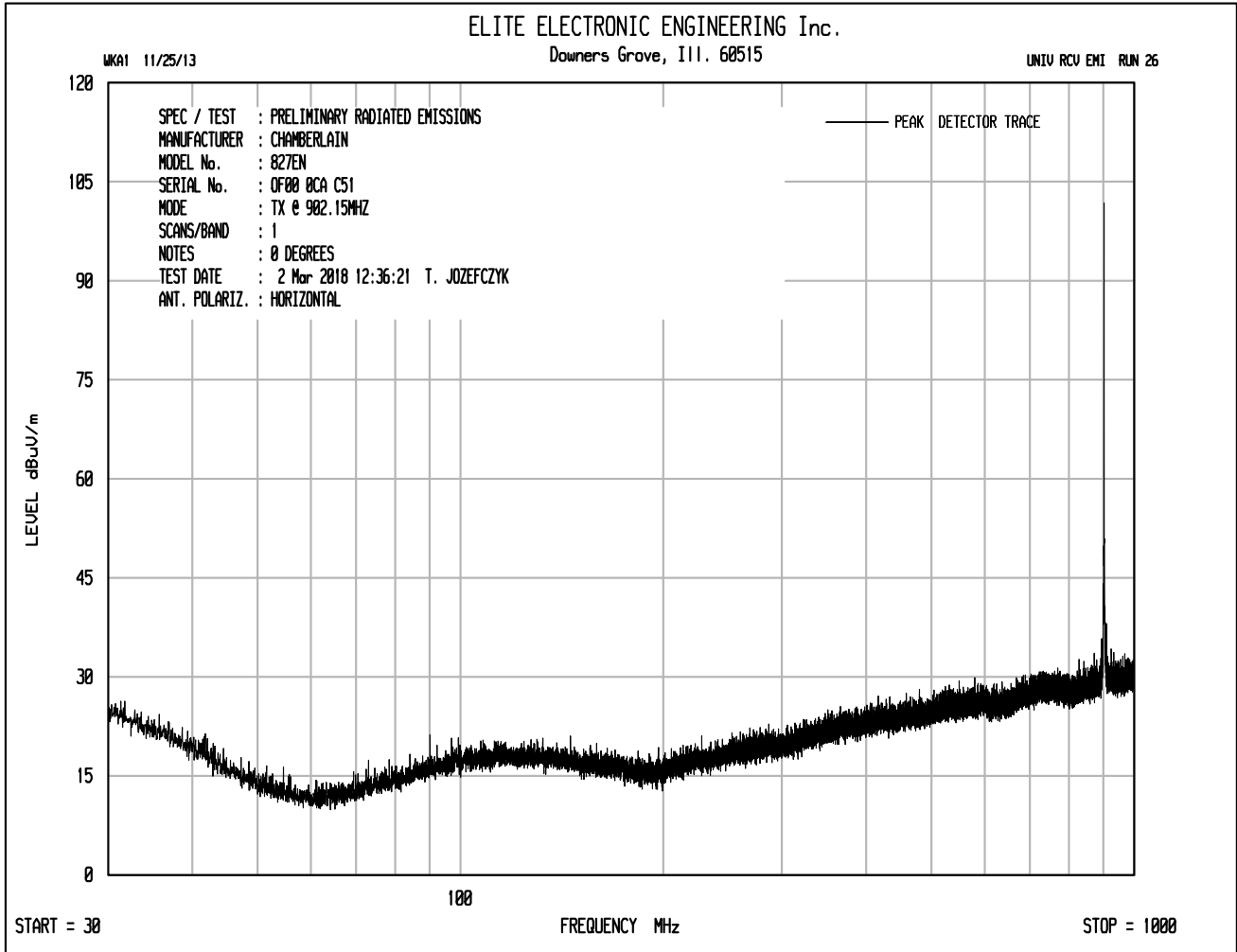


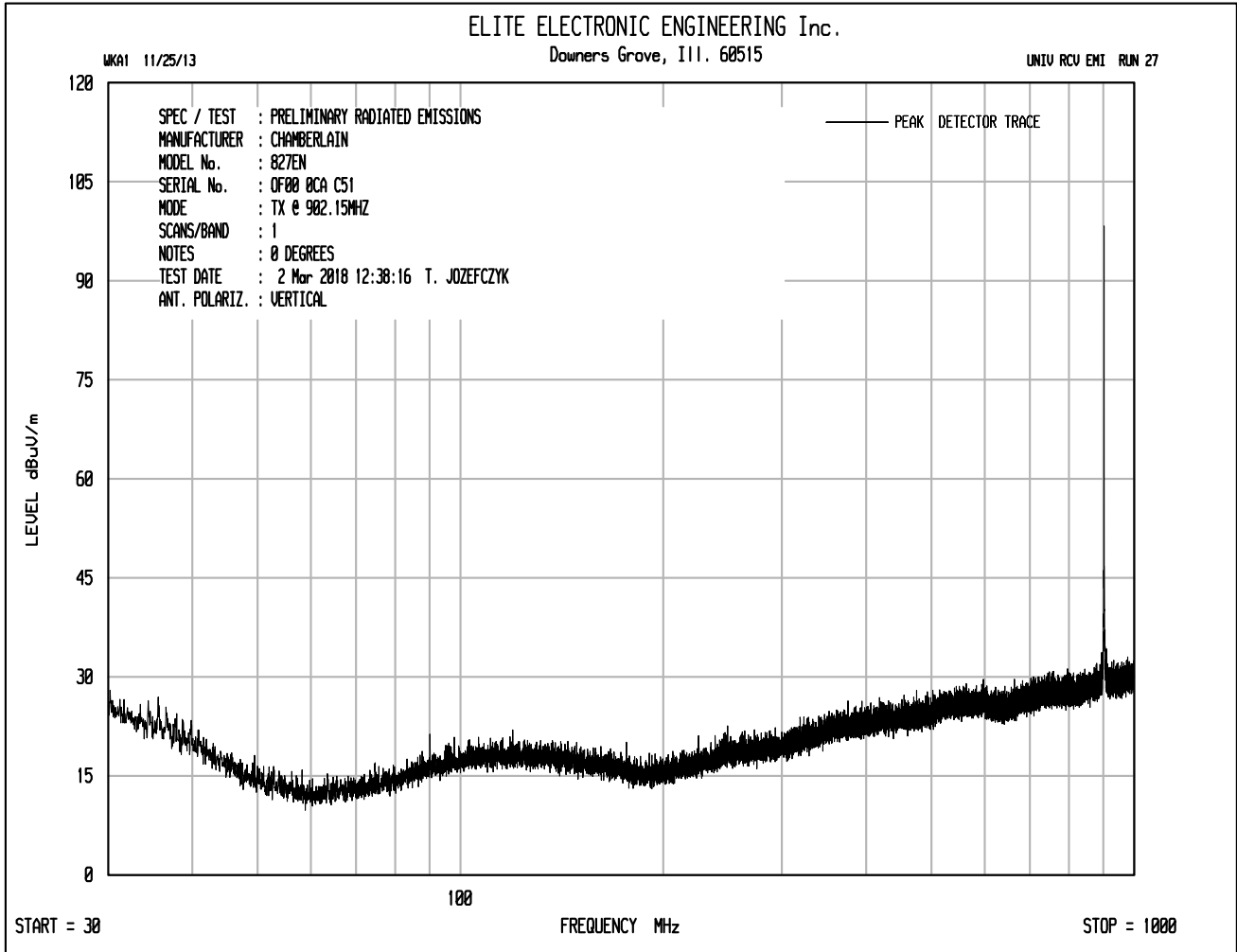
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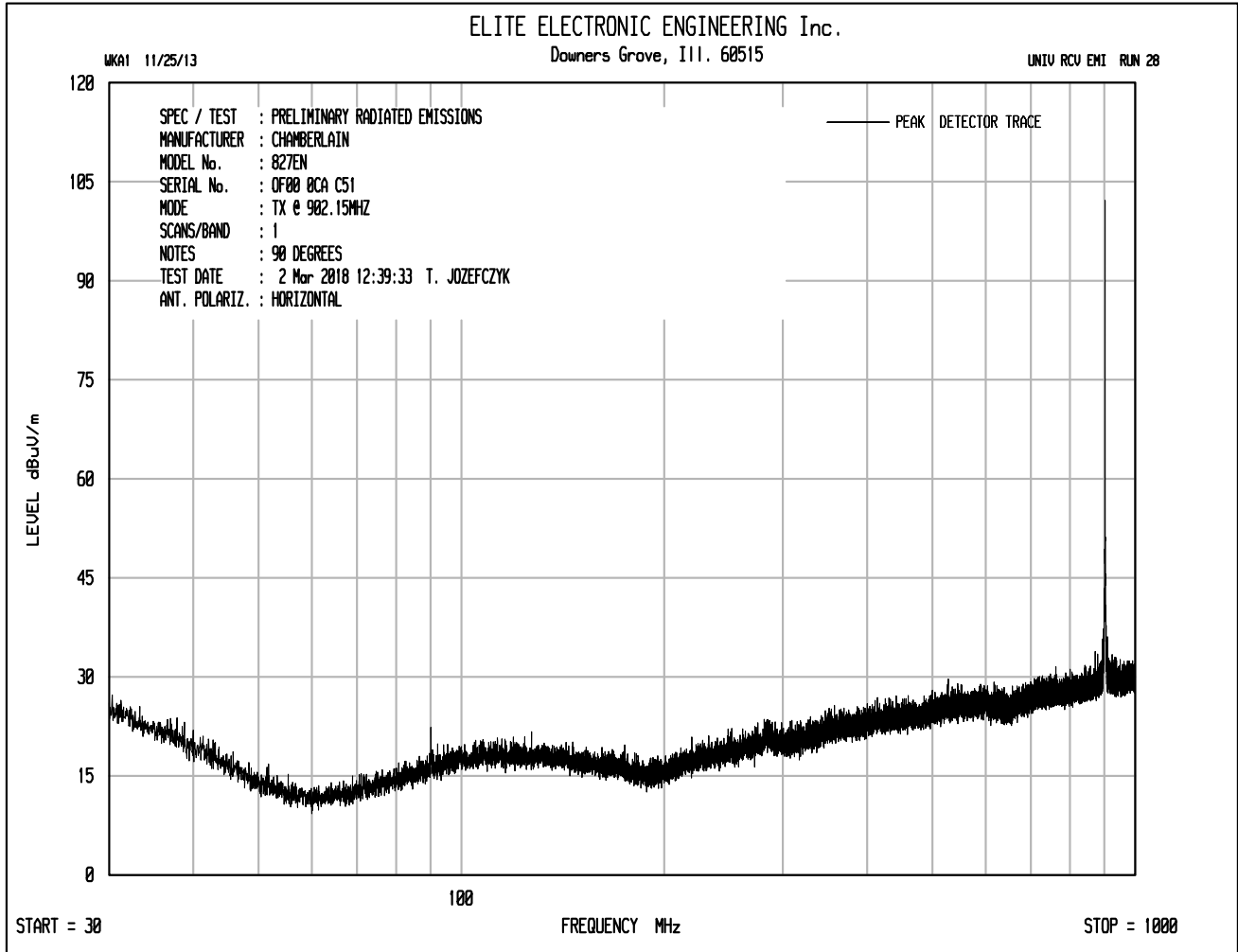
### DUTY CYCLY - PULSE

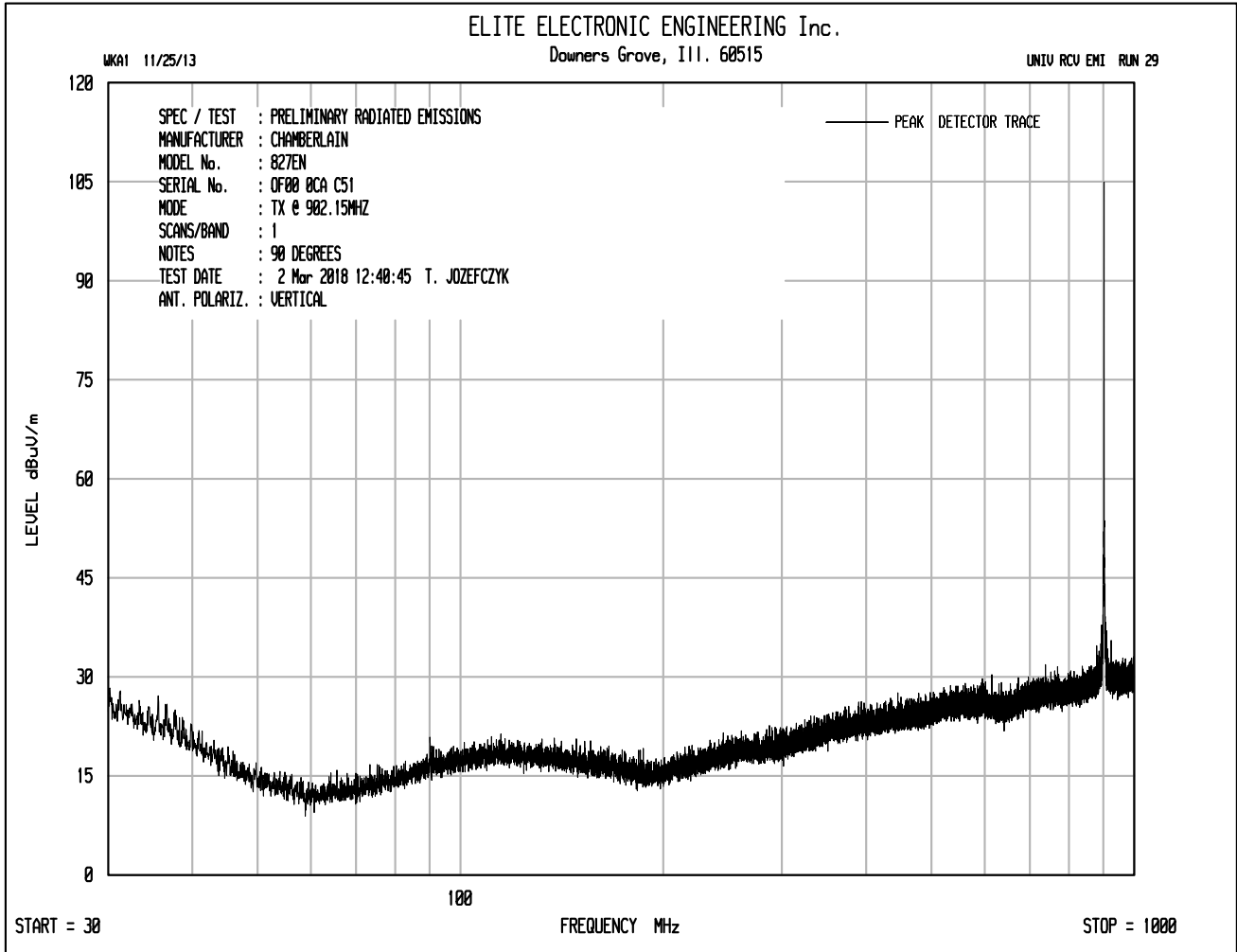
MANUFACTURER : Chamberlain Group, Inc.  
 TEST ITEM : Garage Door Opener  
 MODEL NUMBER : 8010WLA  
 TEST MODE : FHSS  
 : Pulse time = 1.286ms

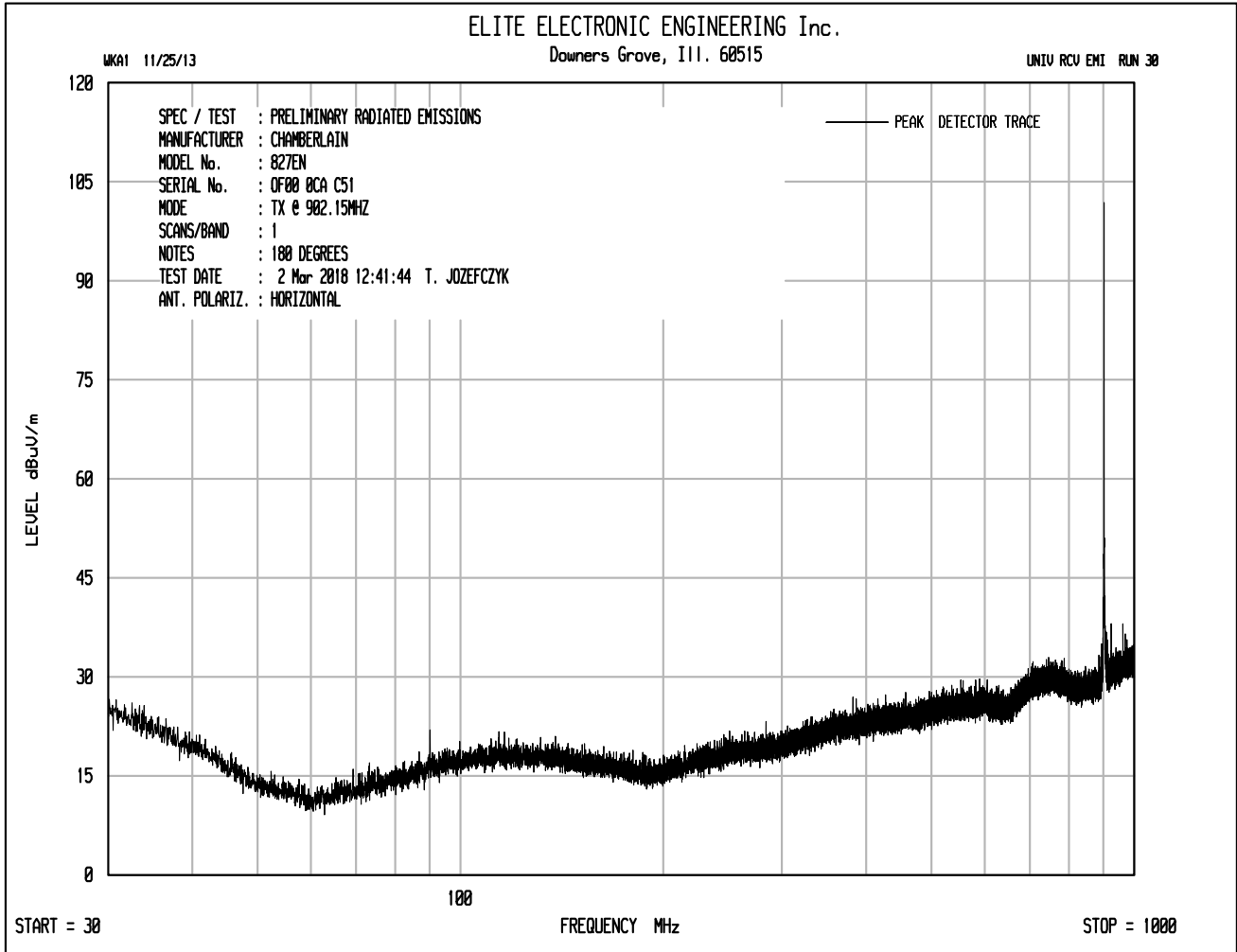
### NOTES

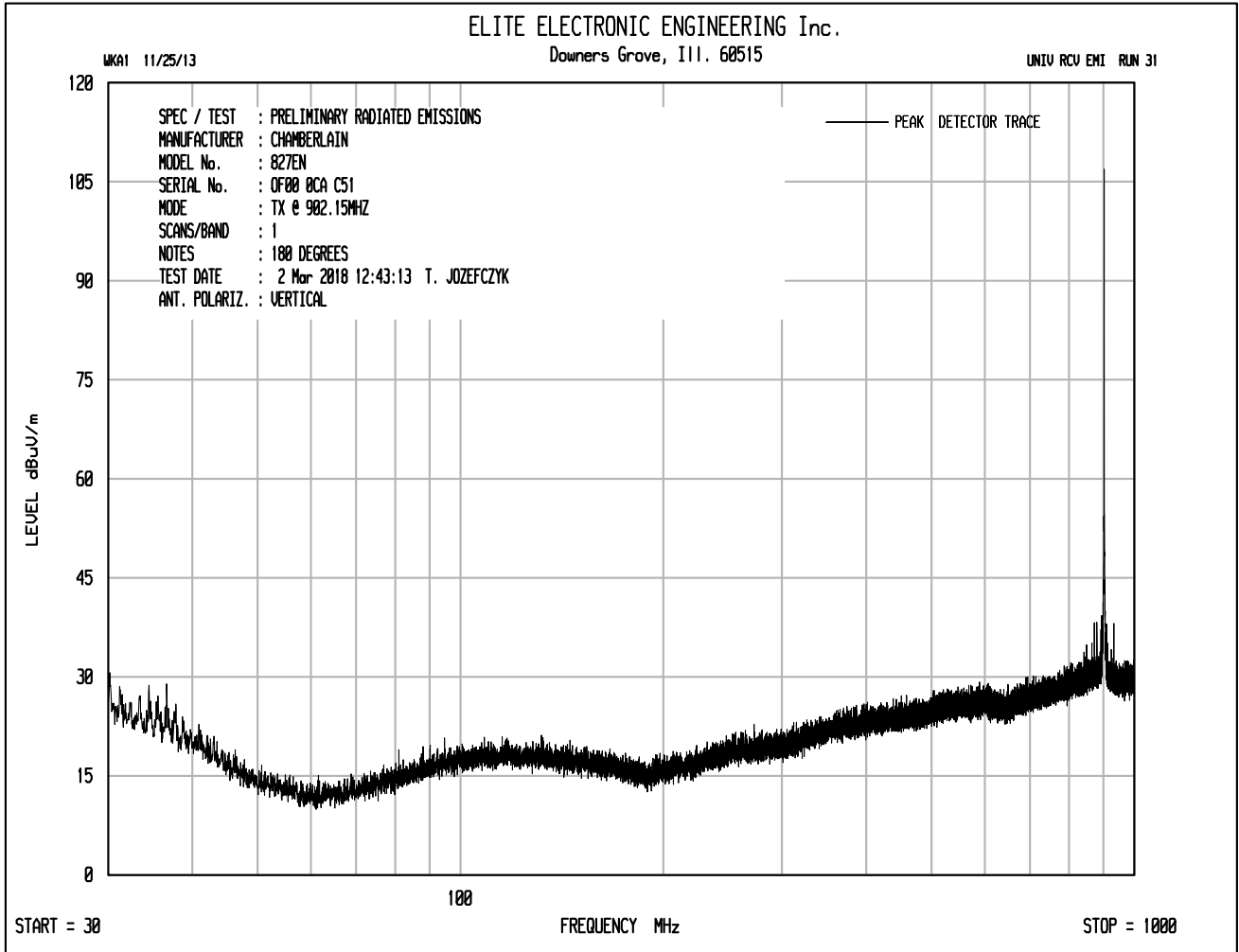


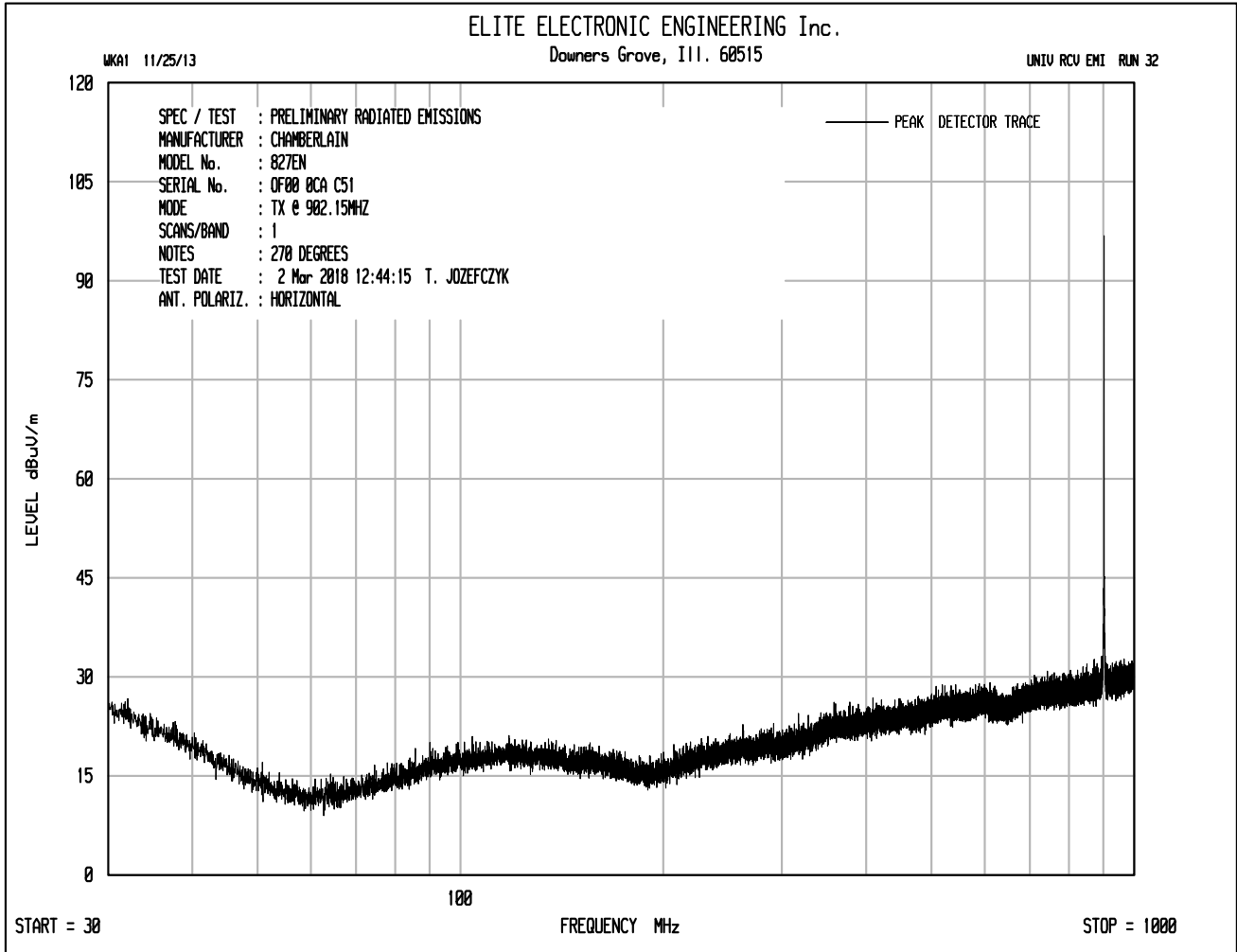




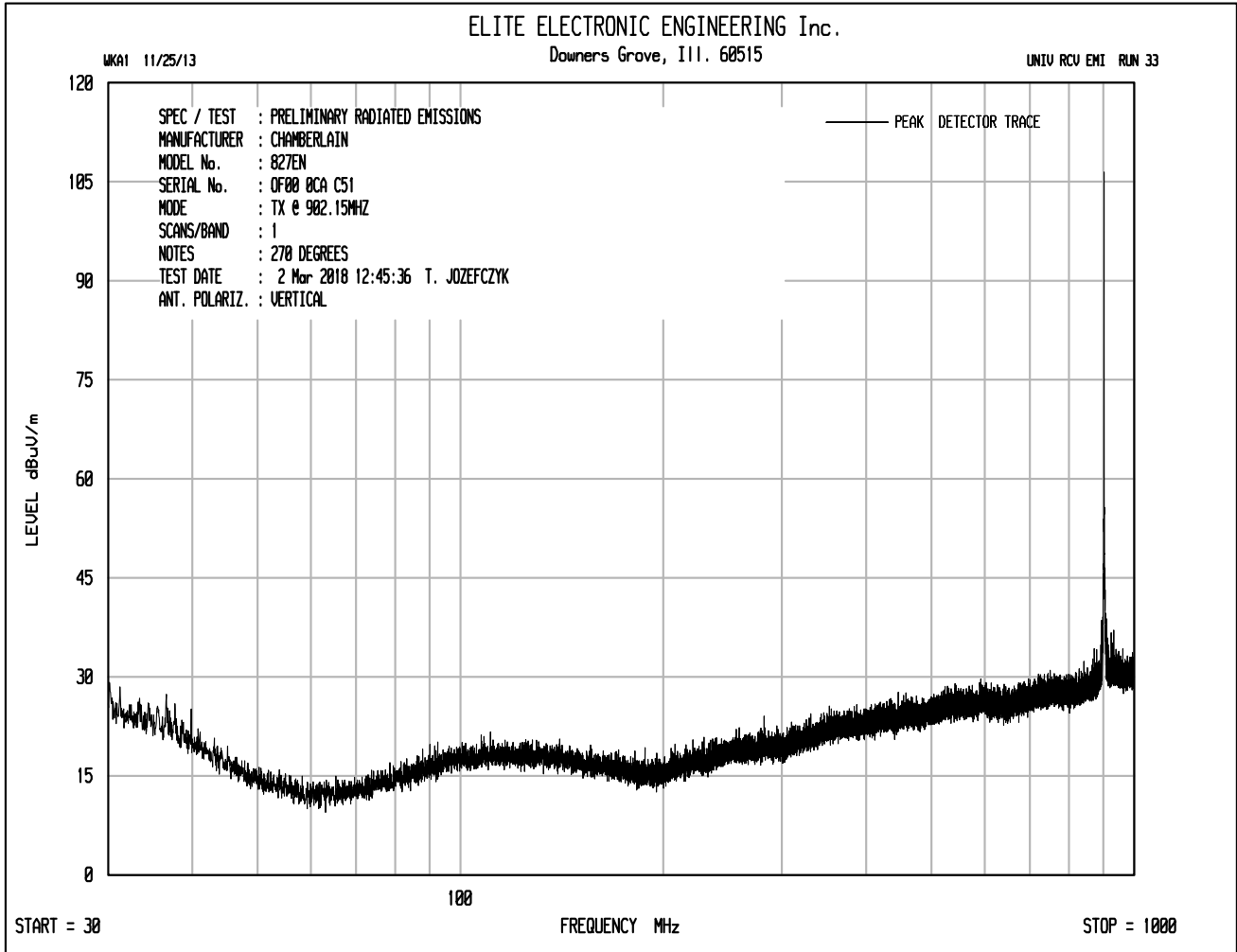


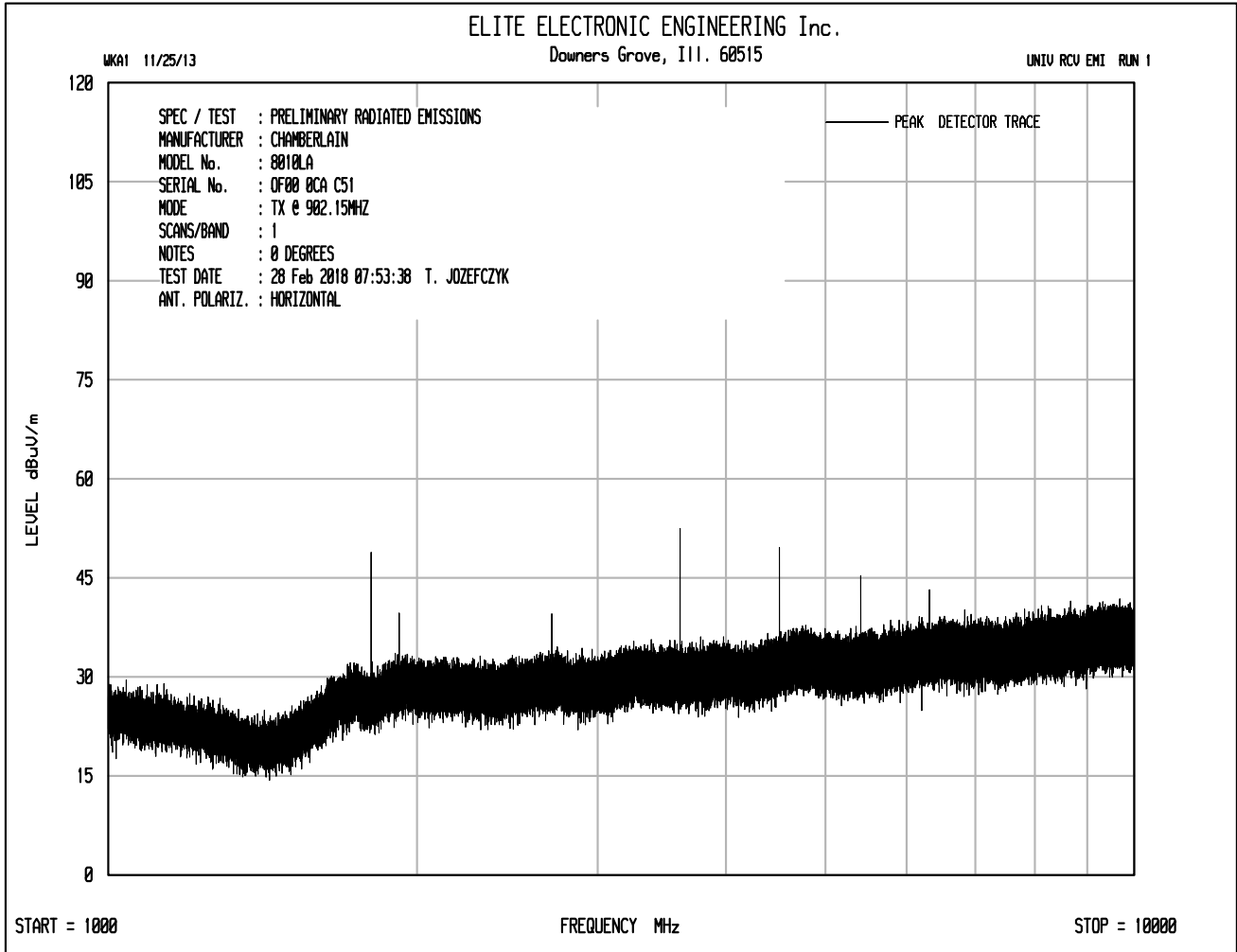


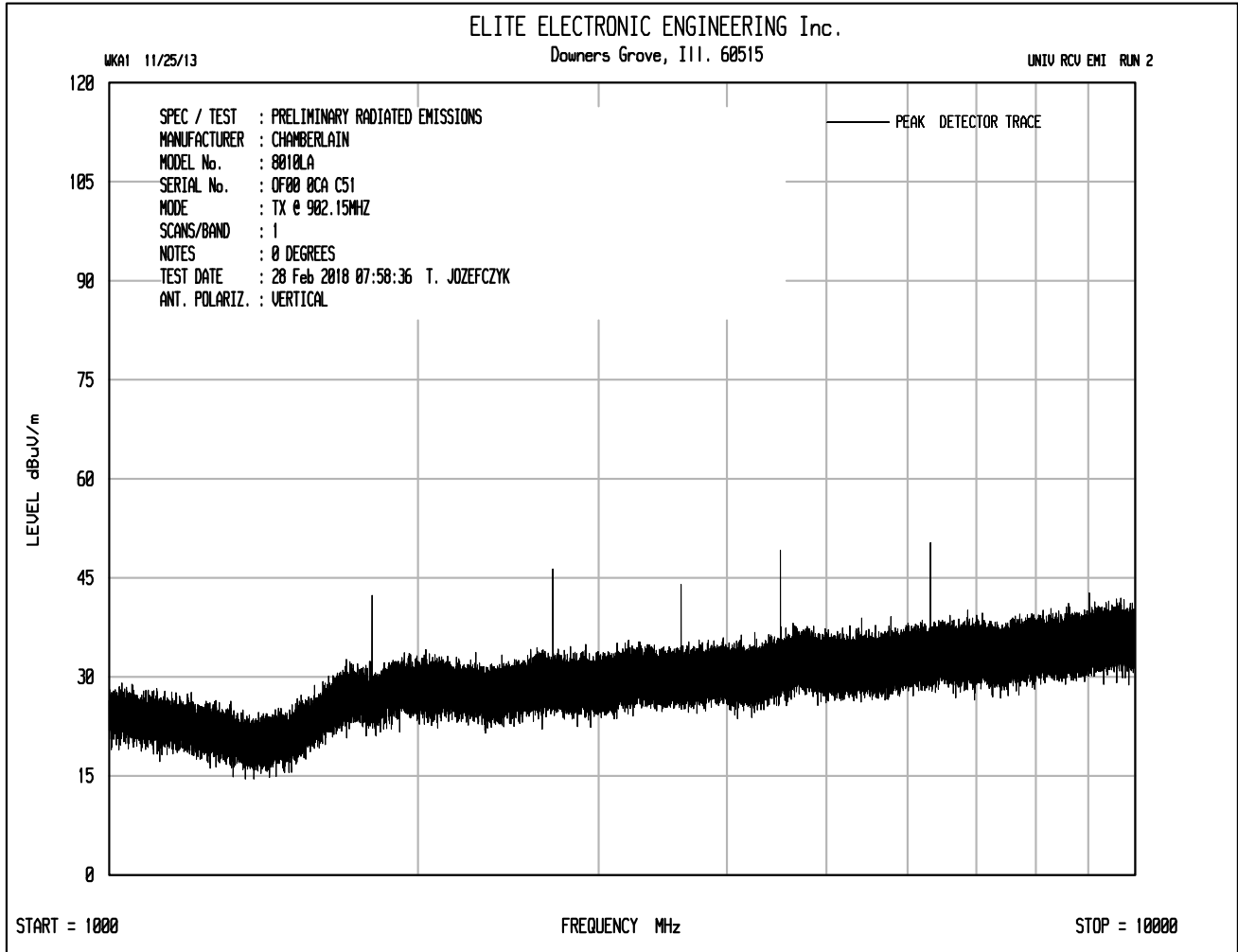


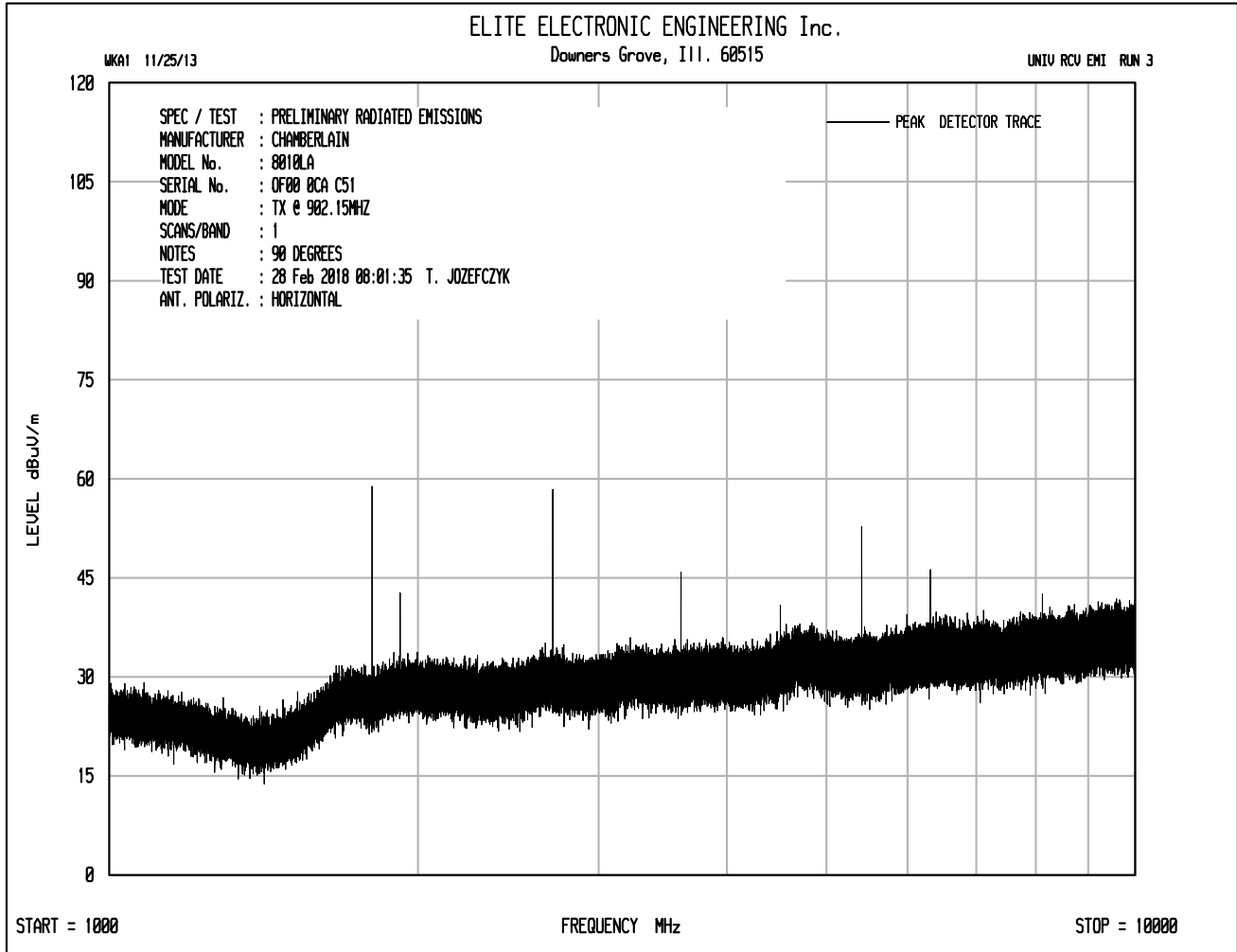


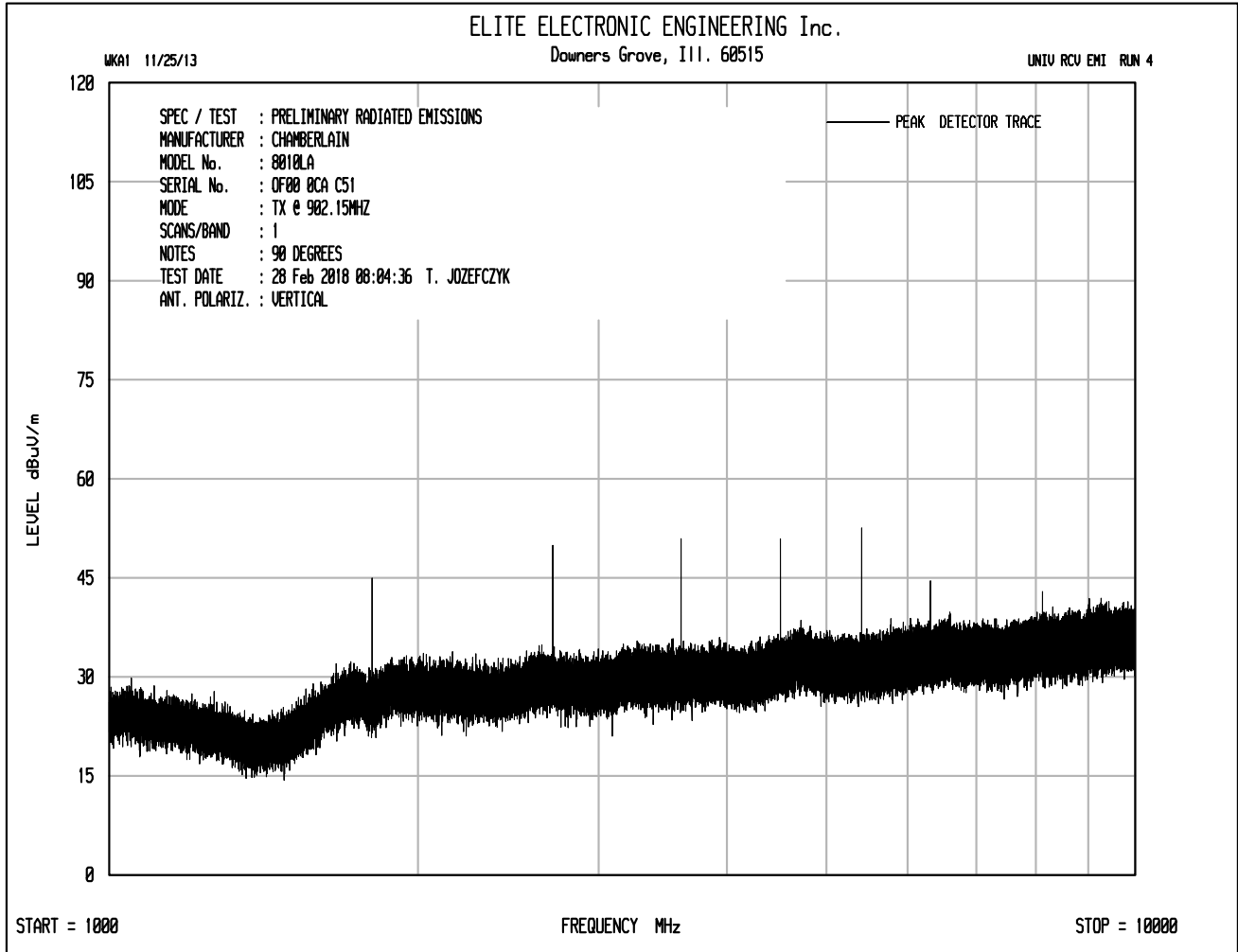


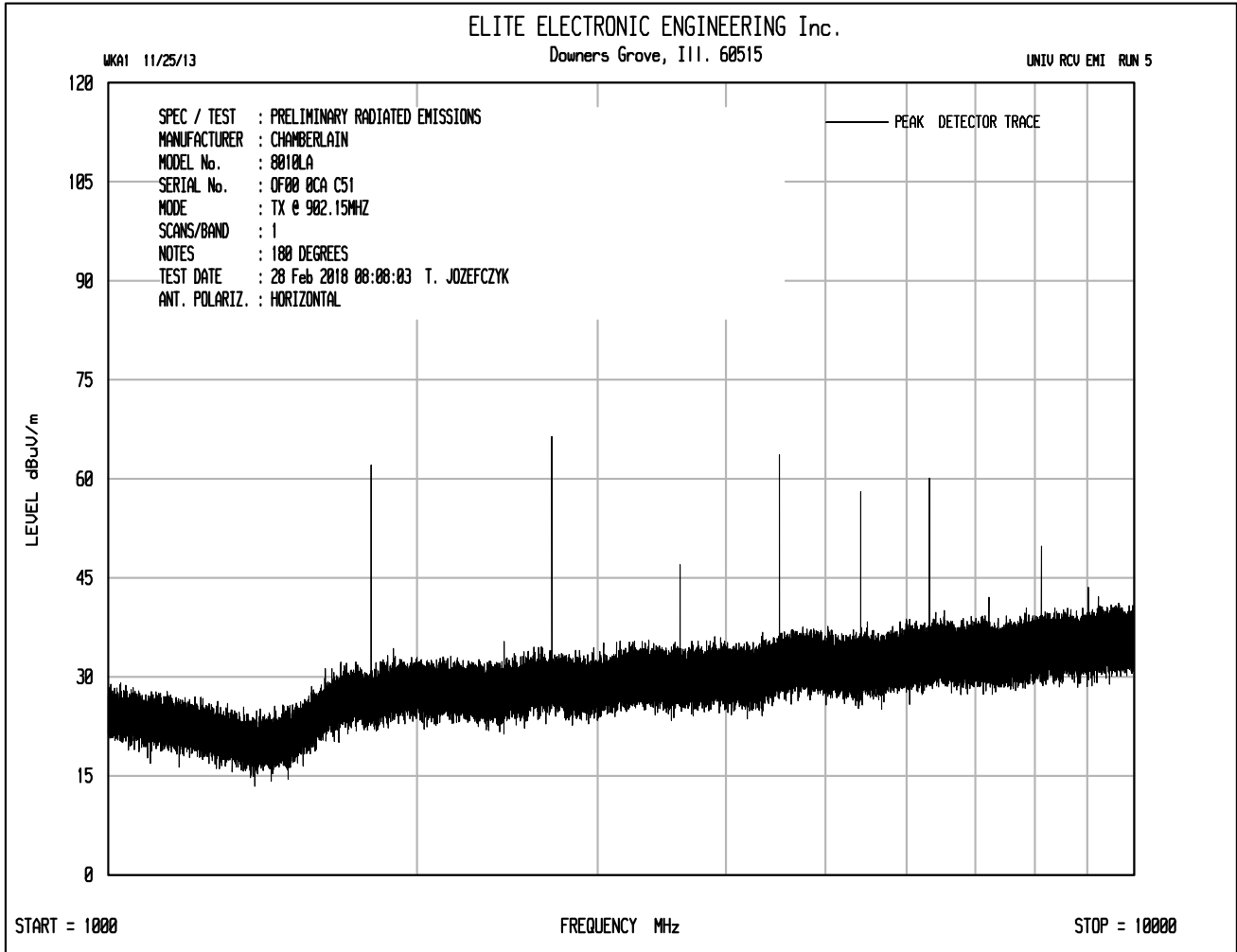


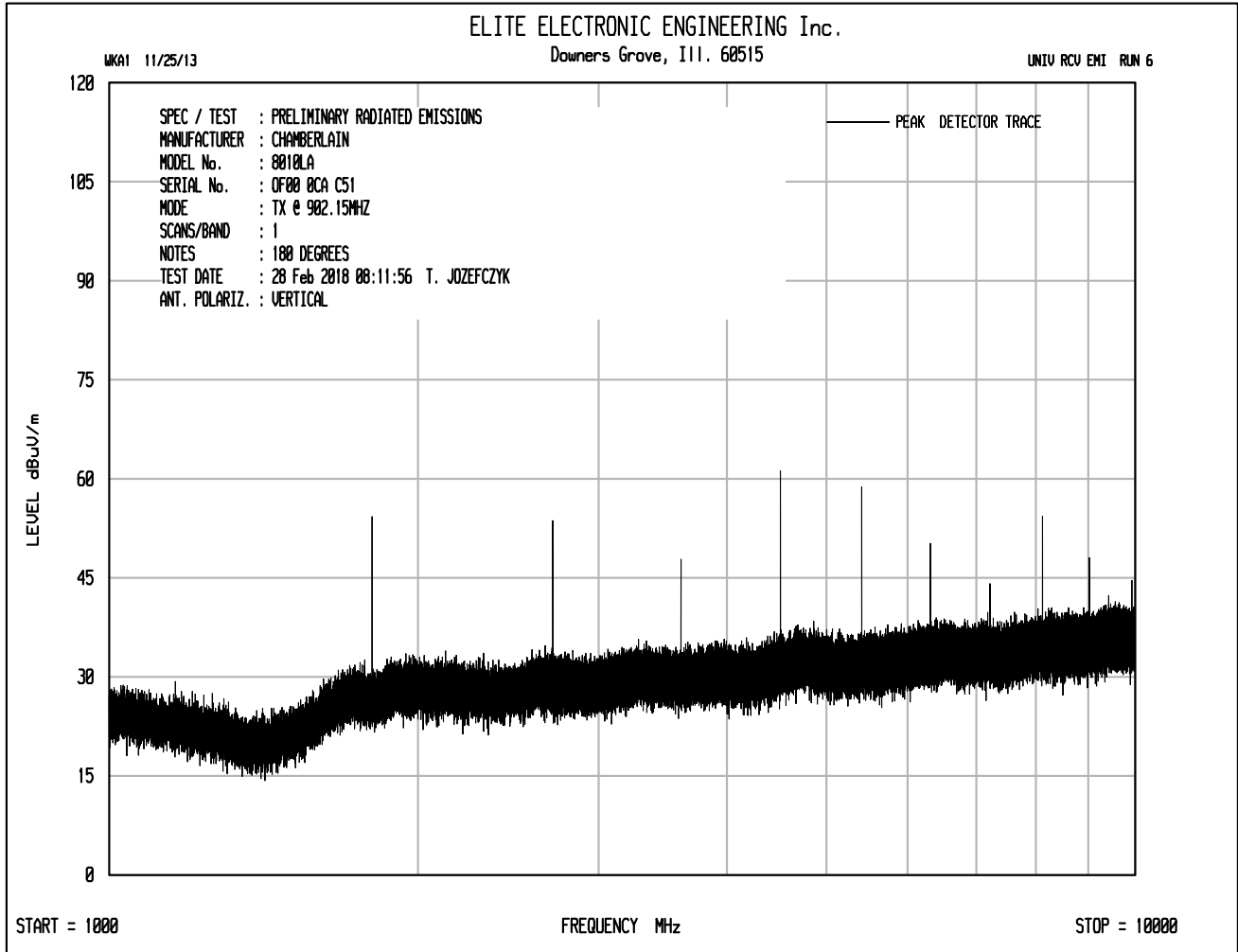


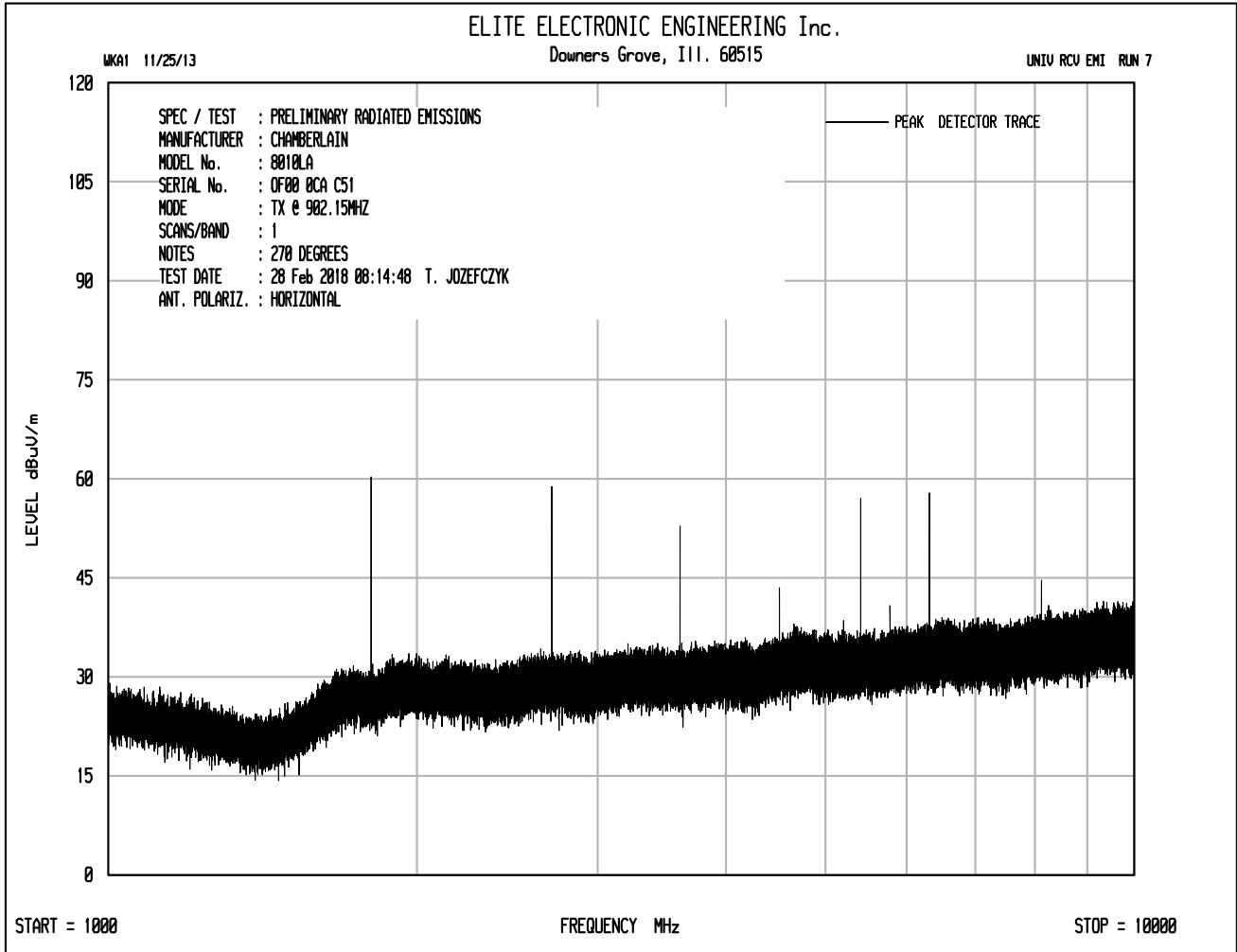




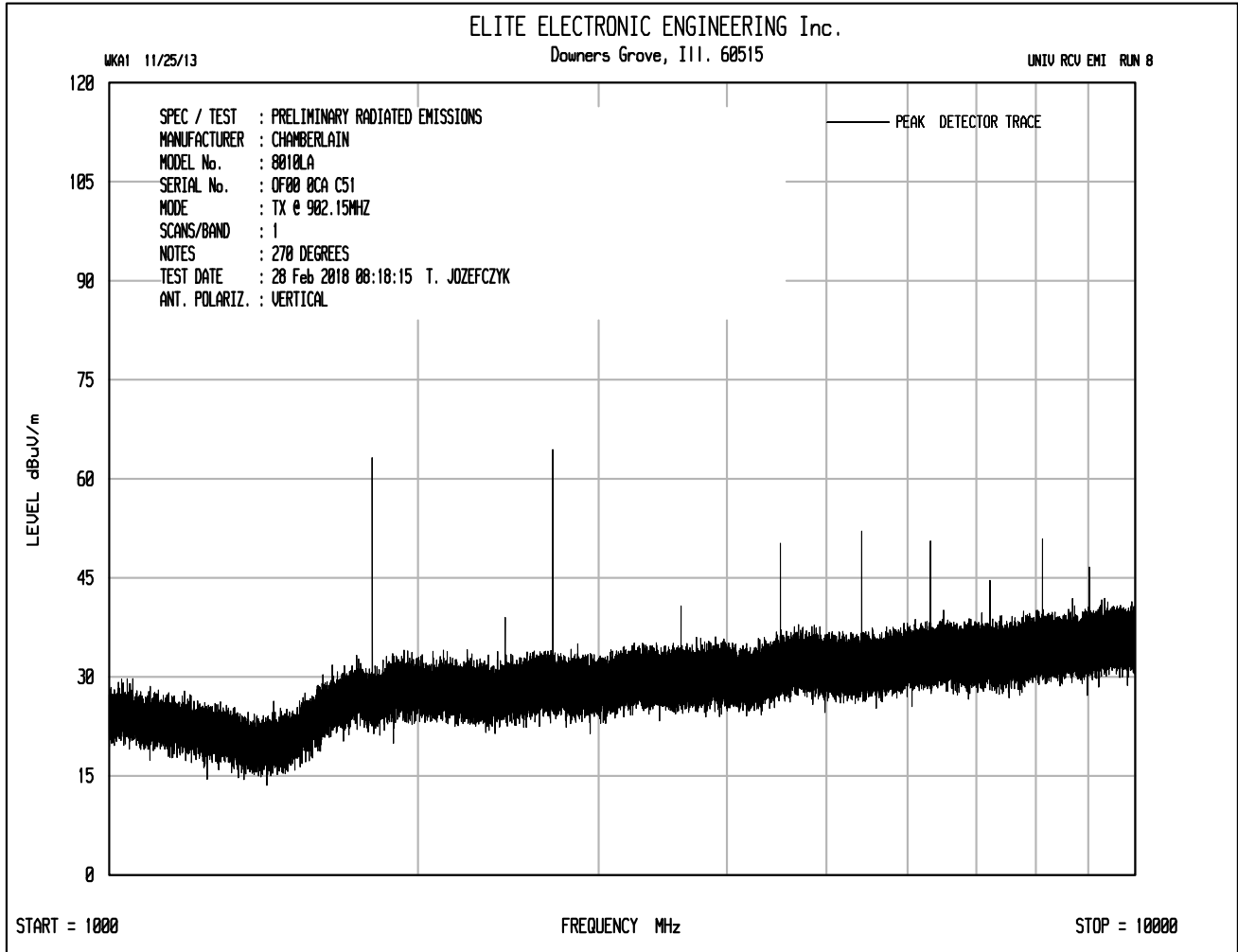


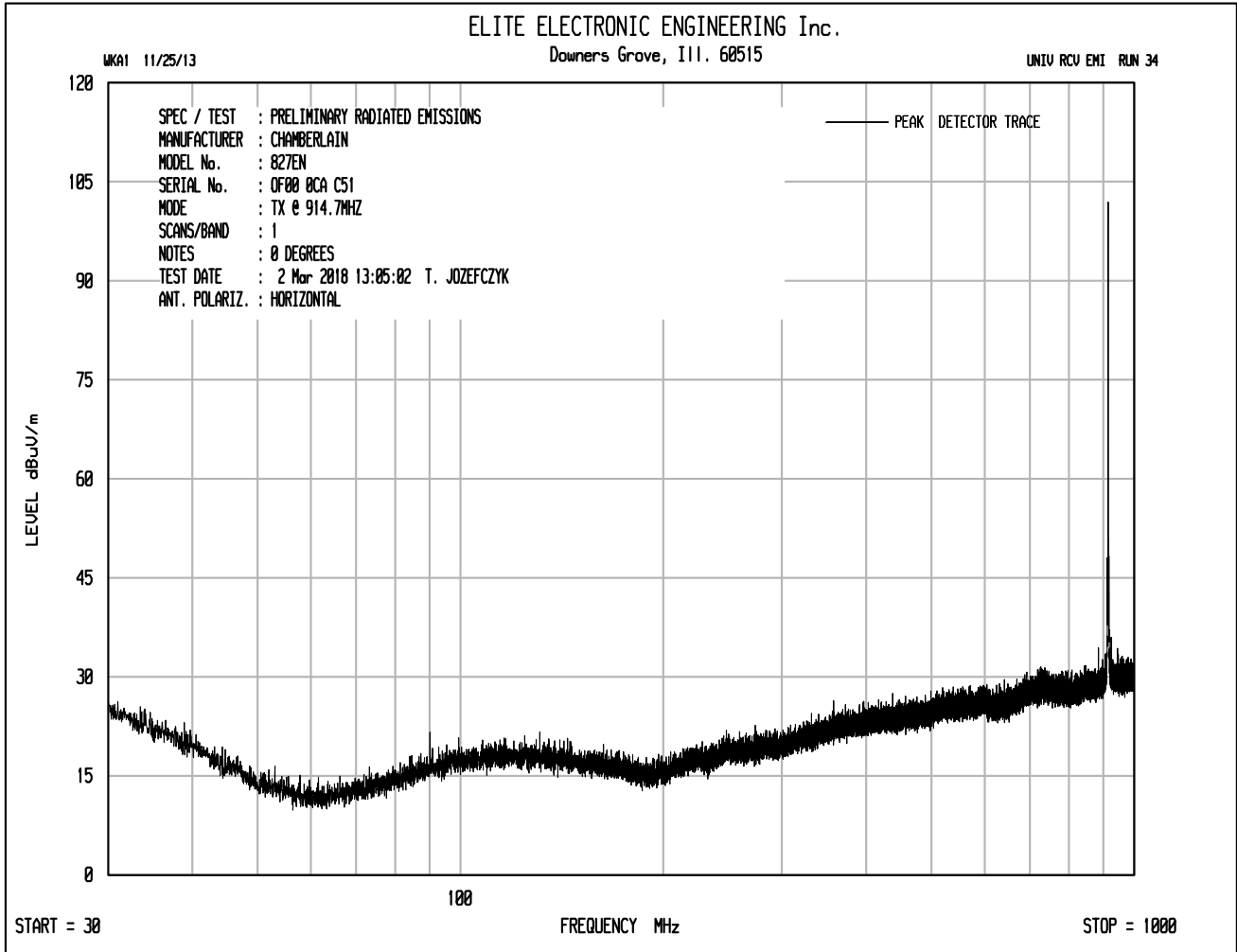


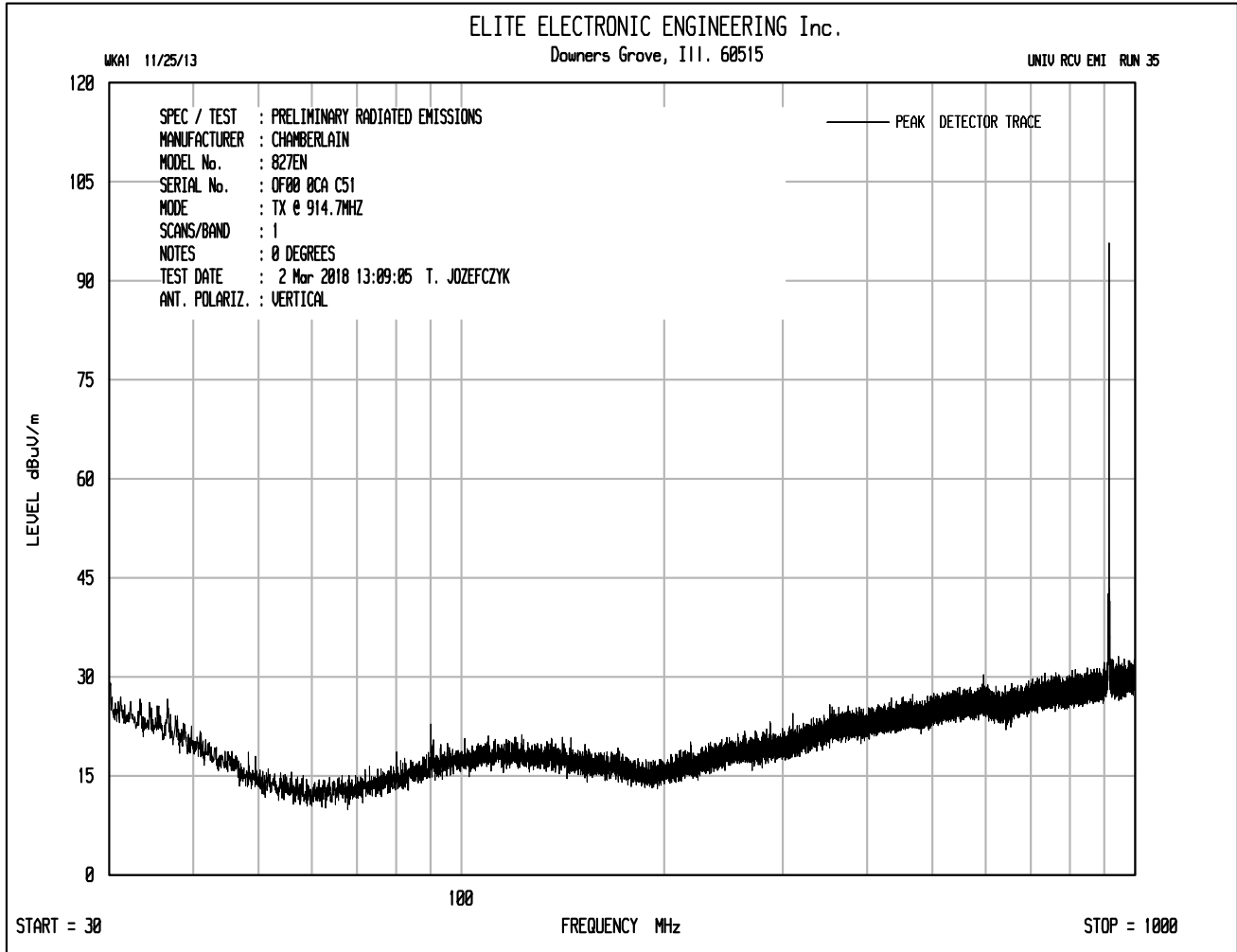


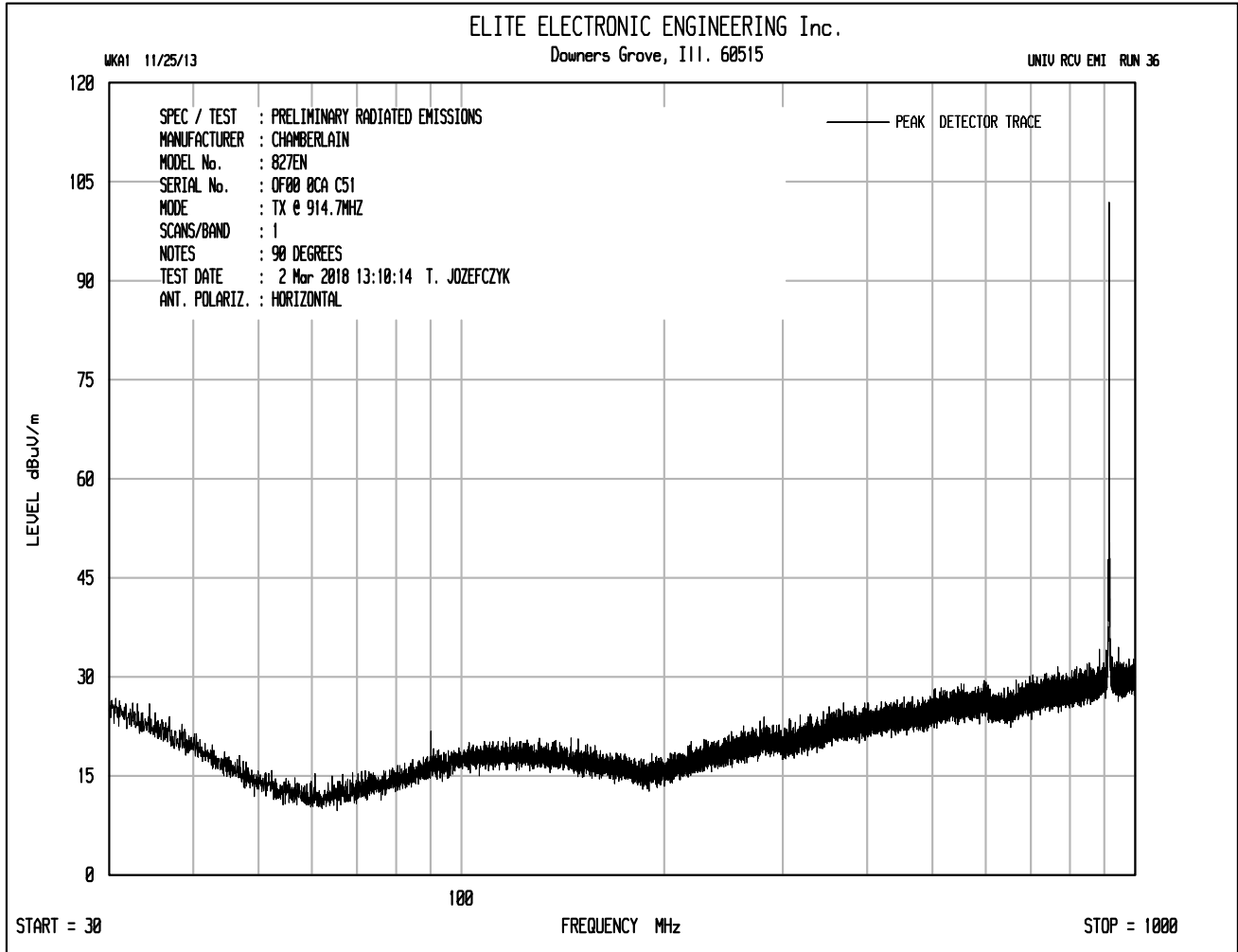


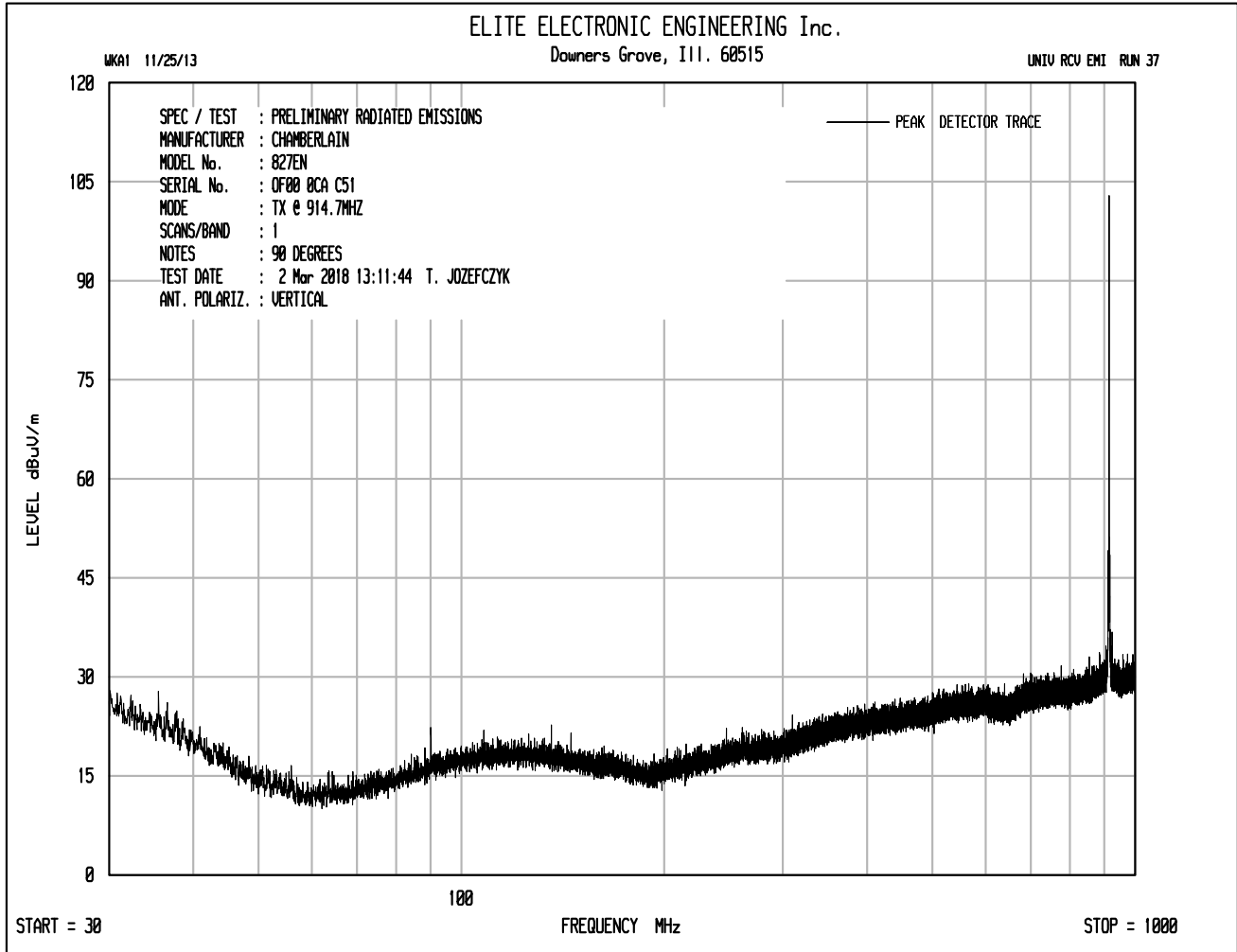




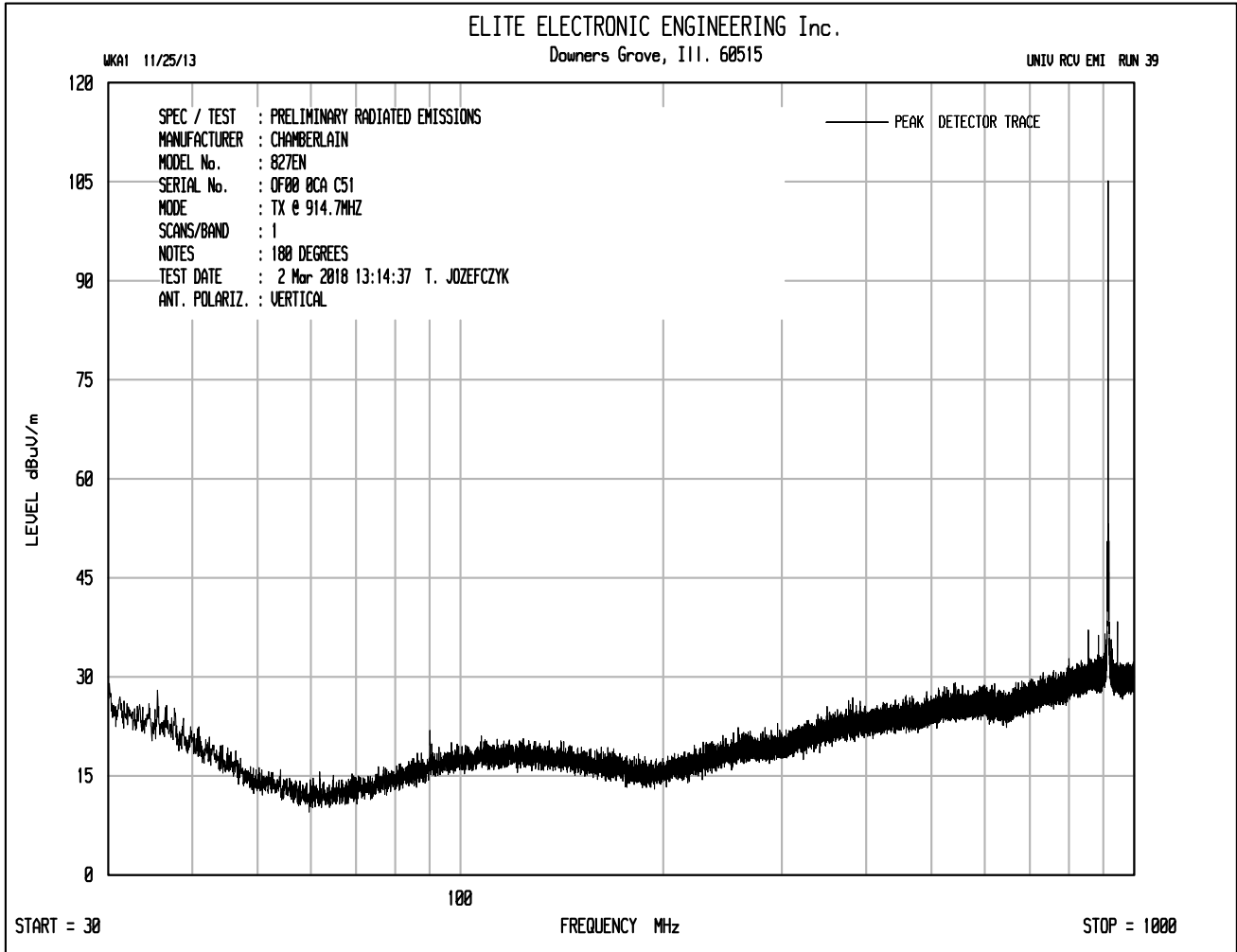


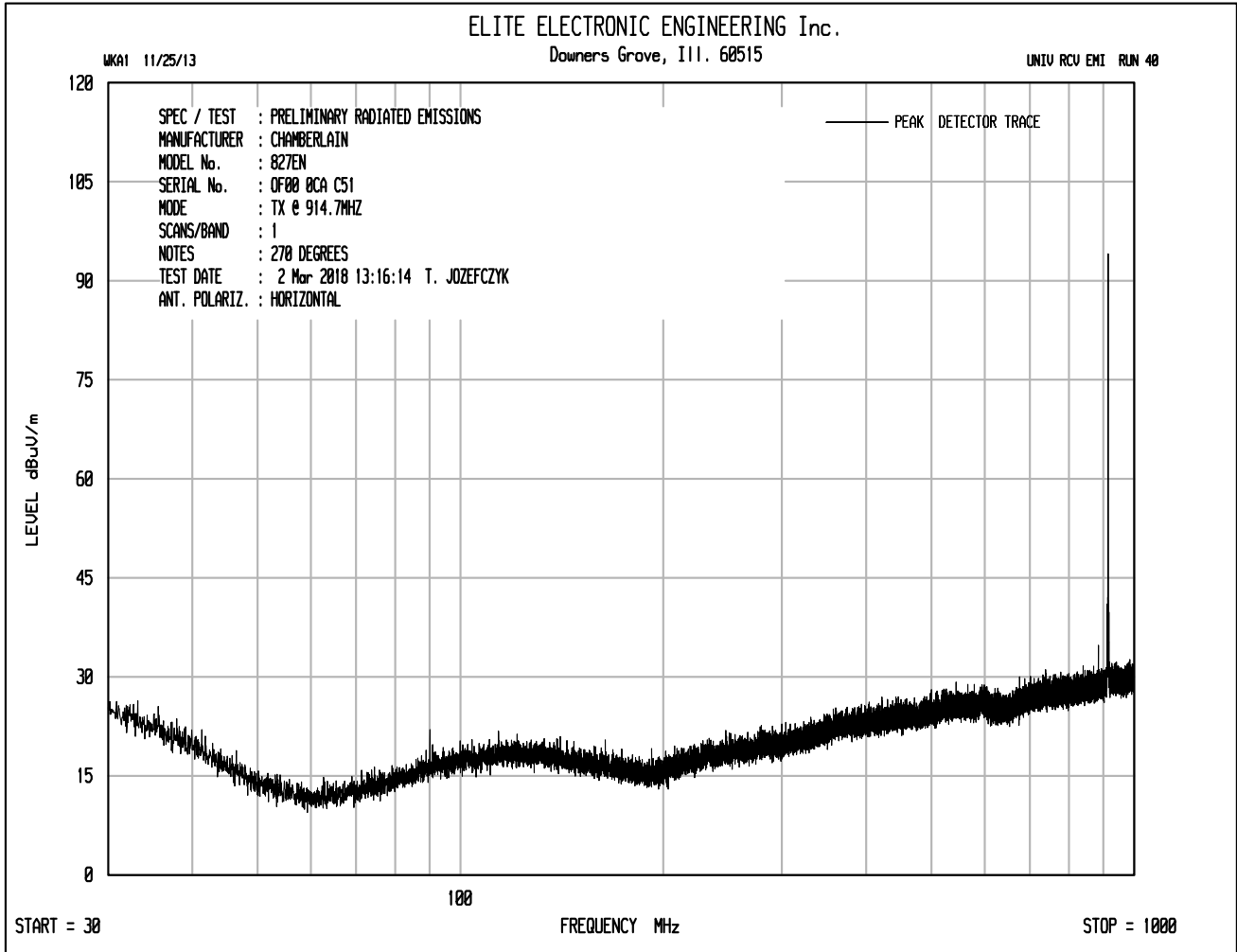




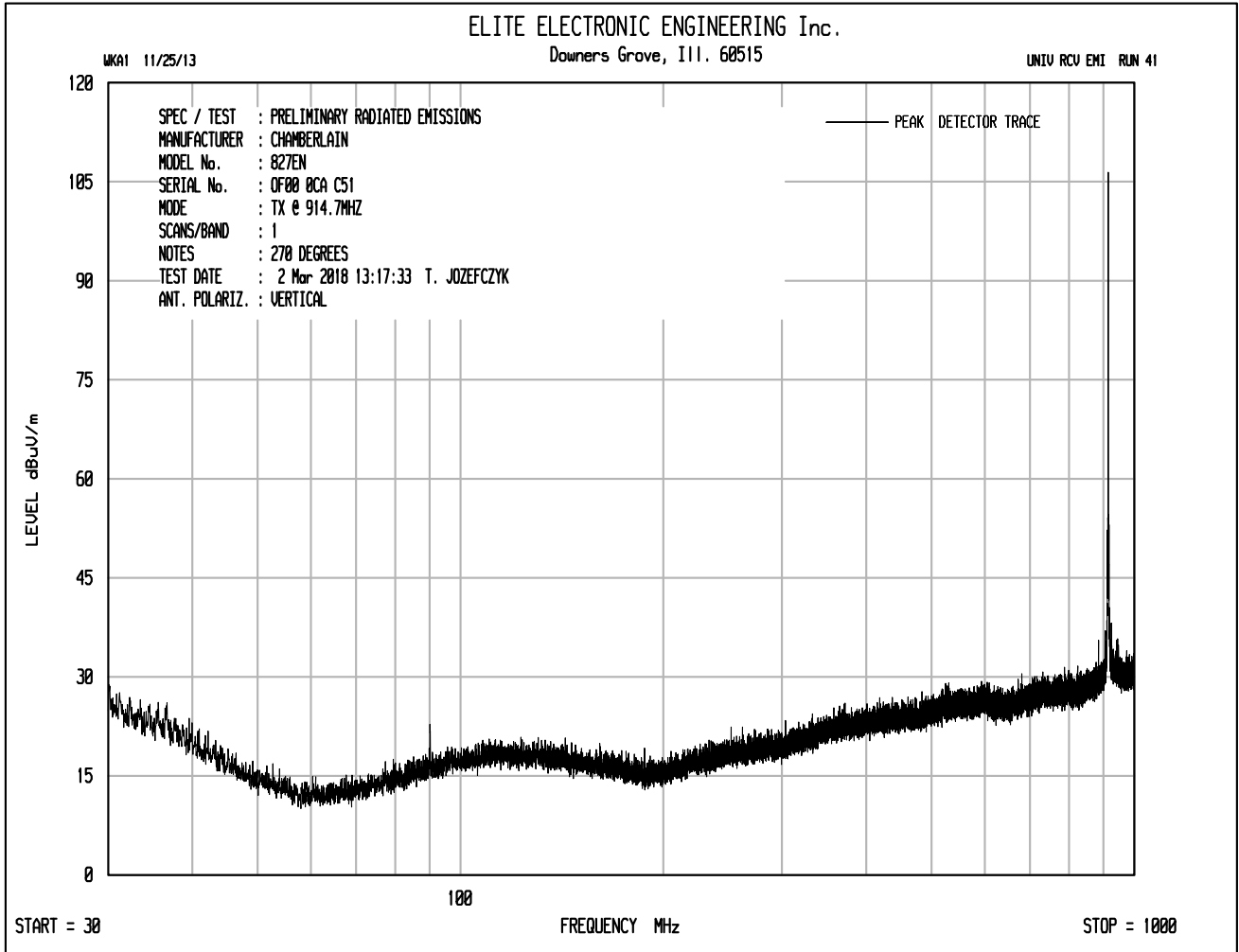


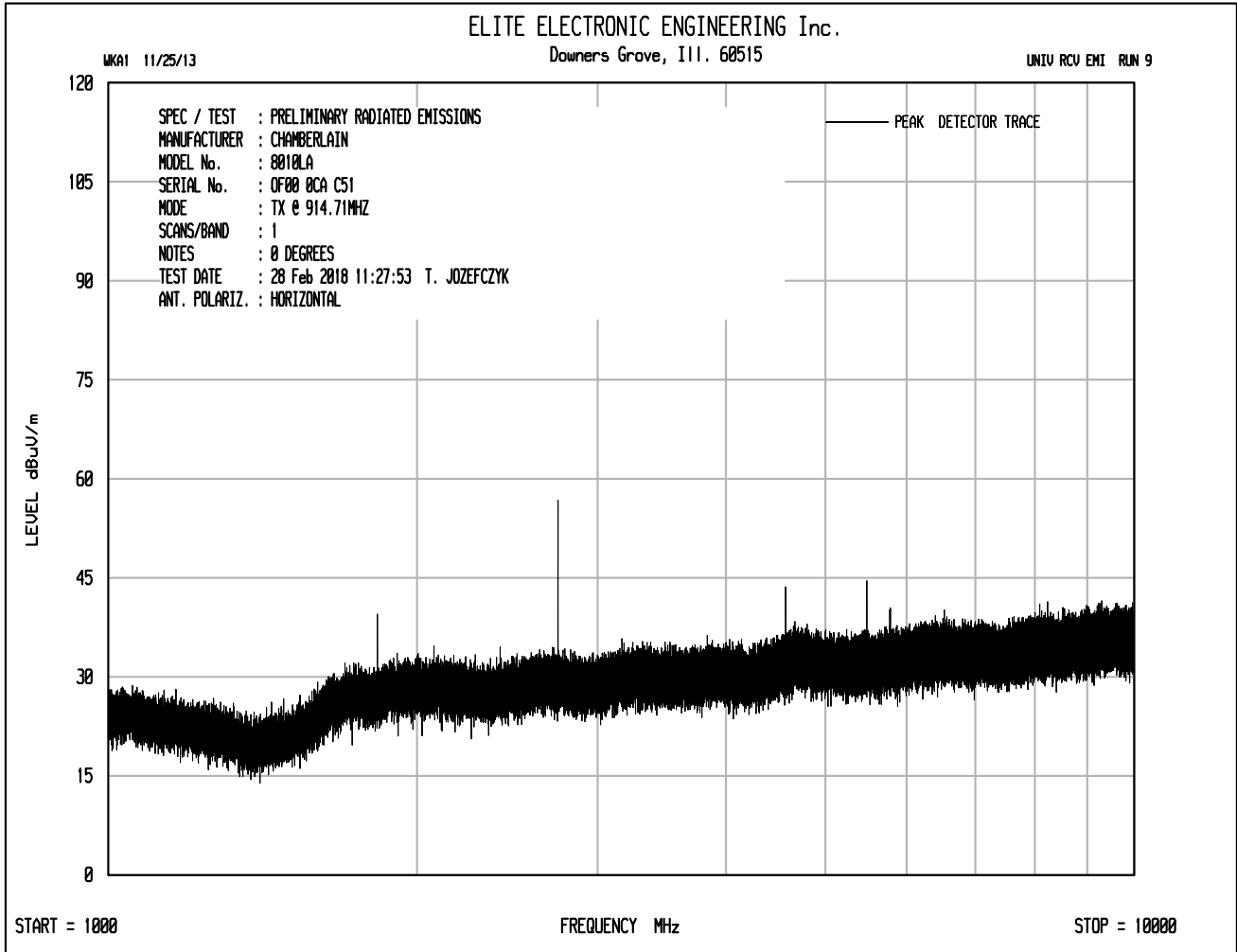


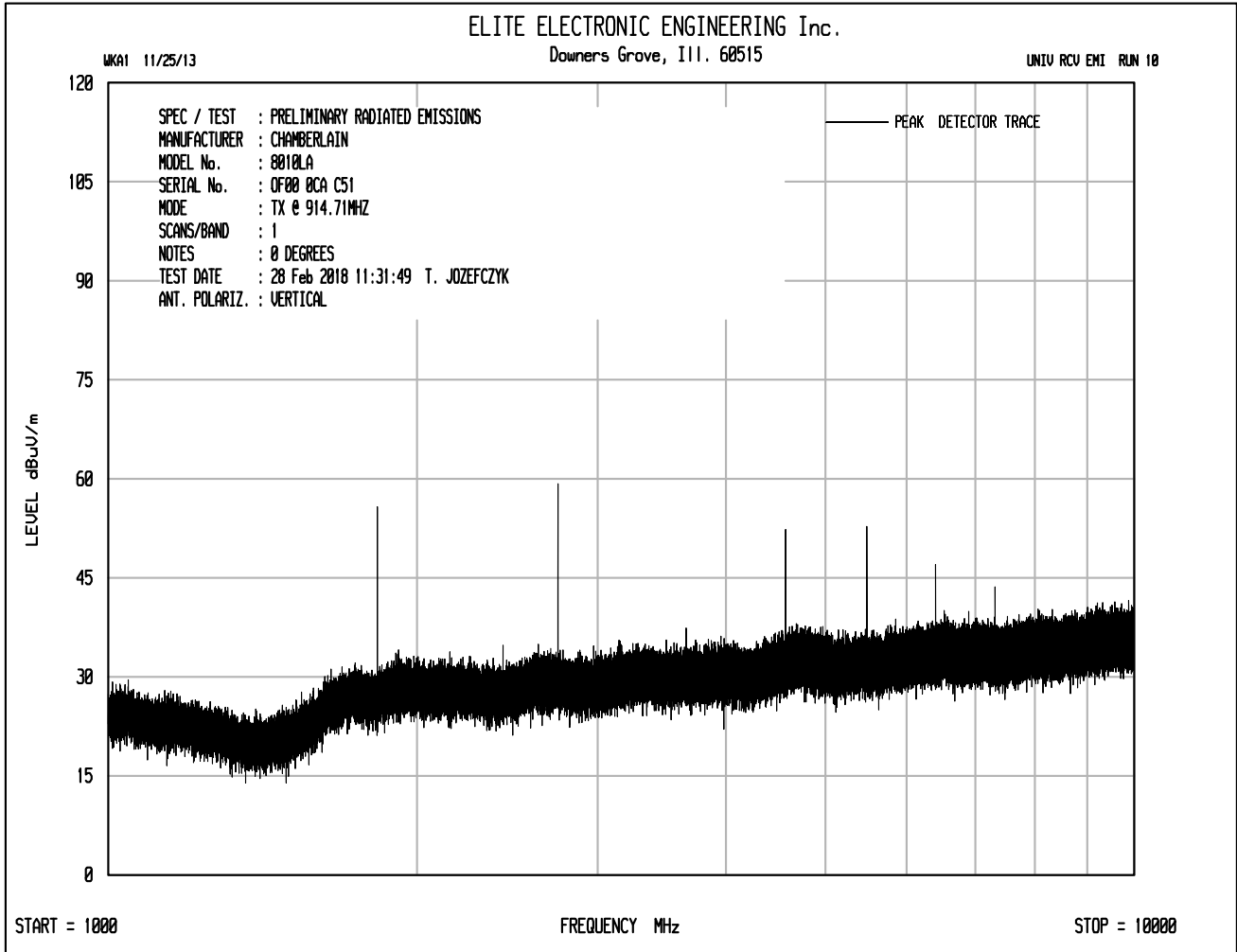


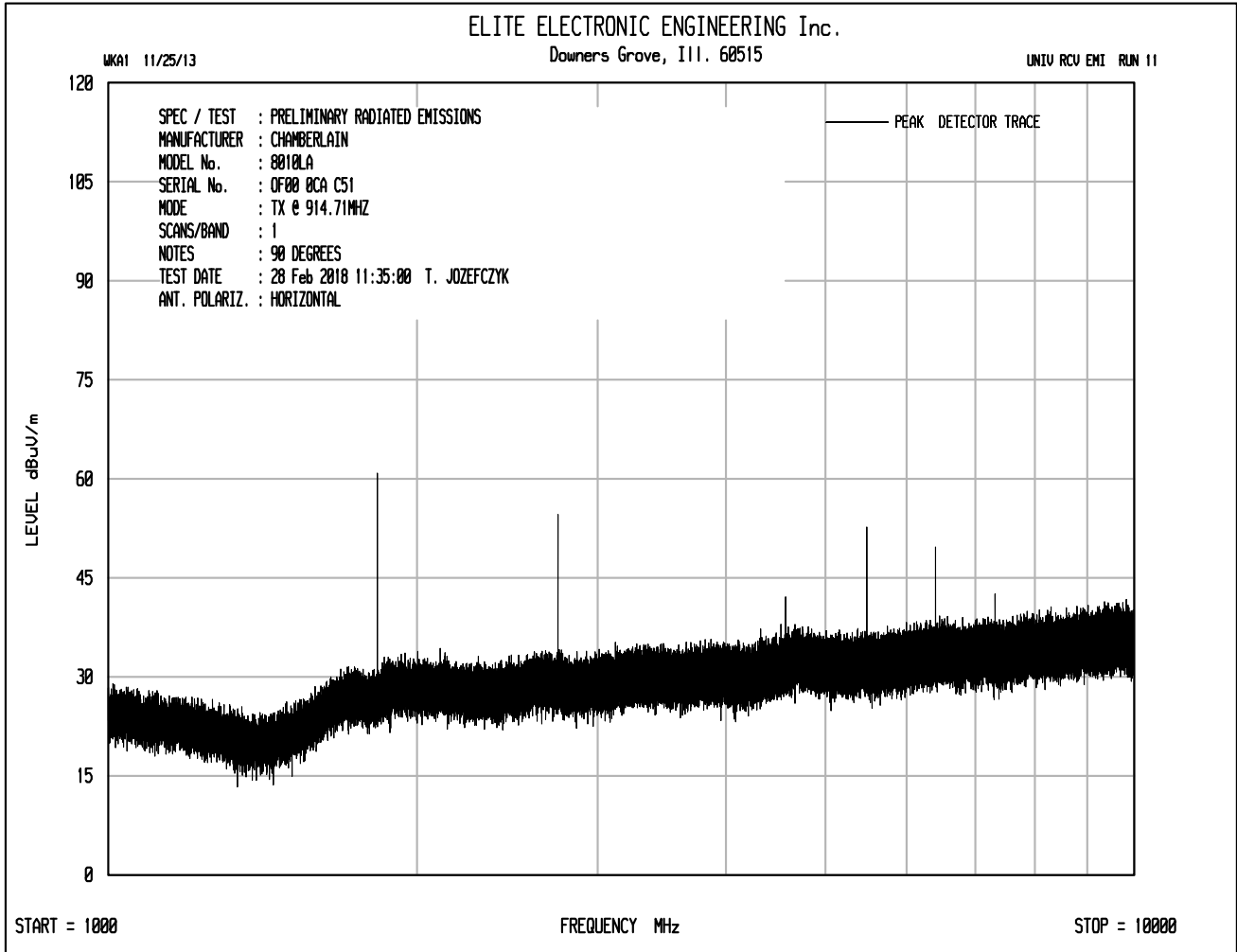


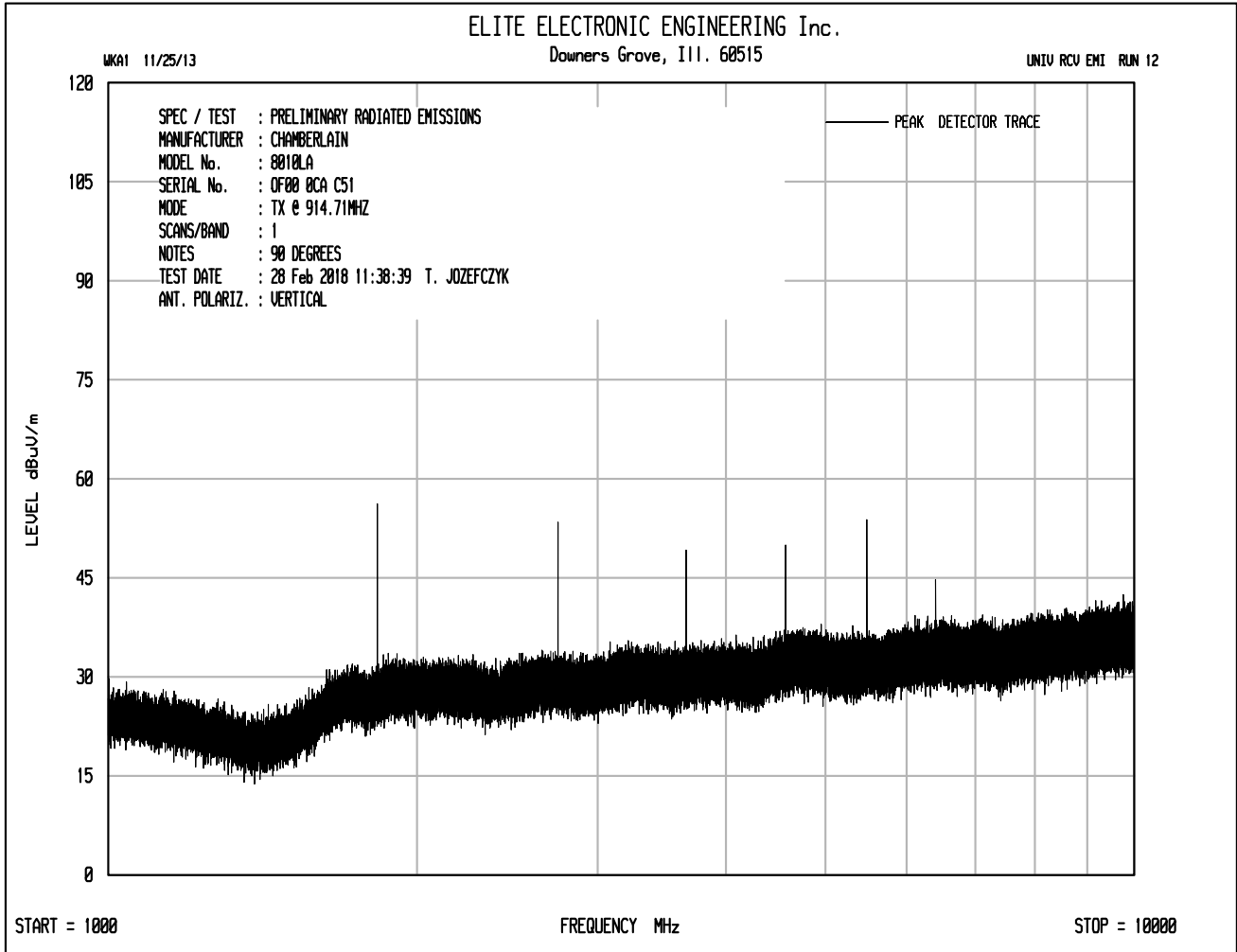


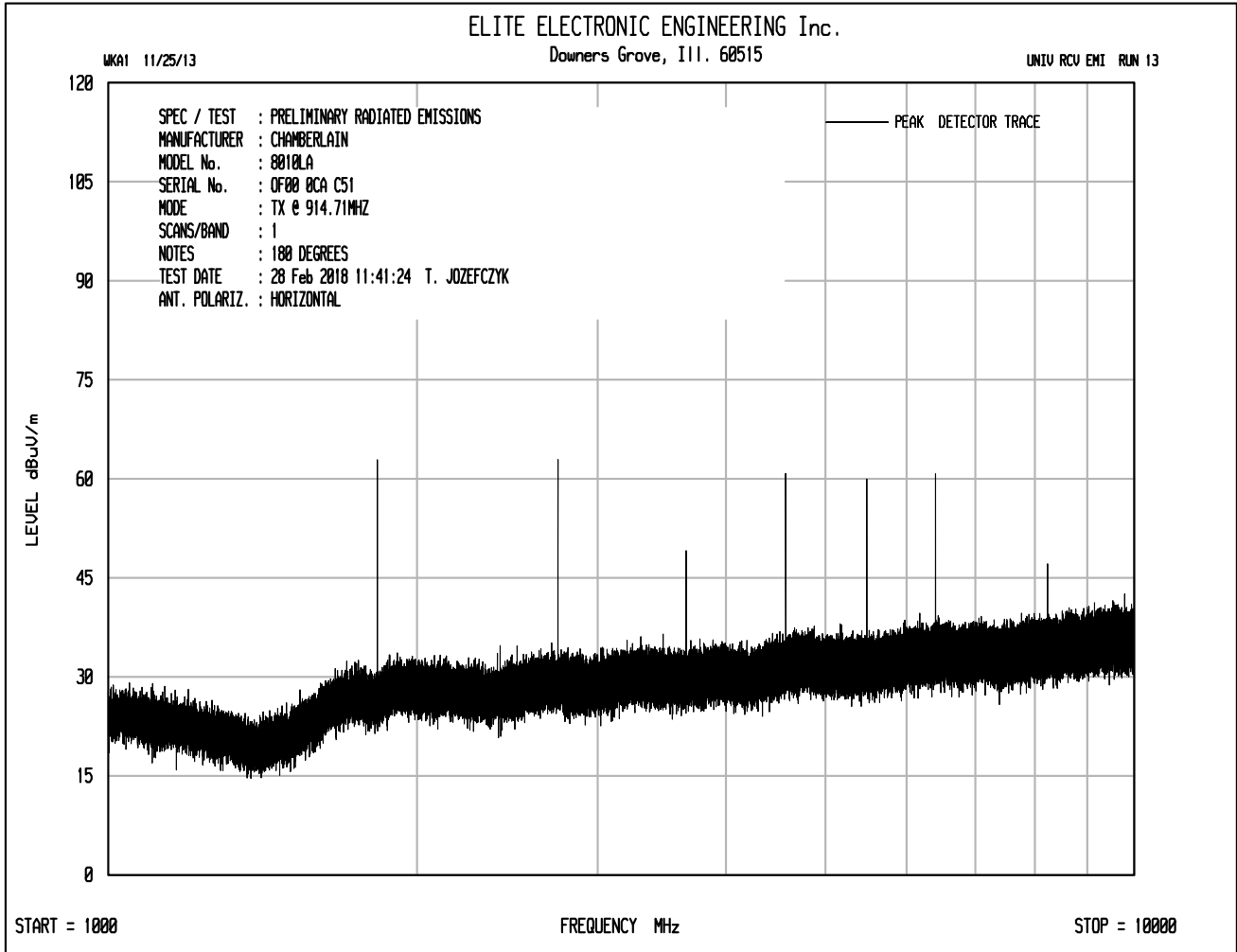


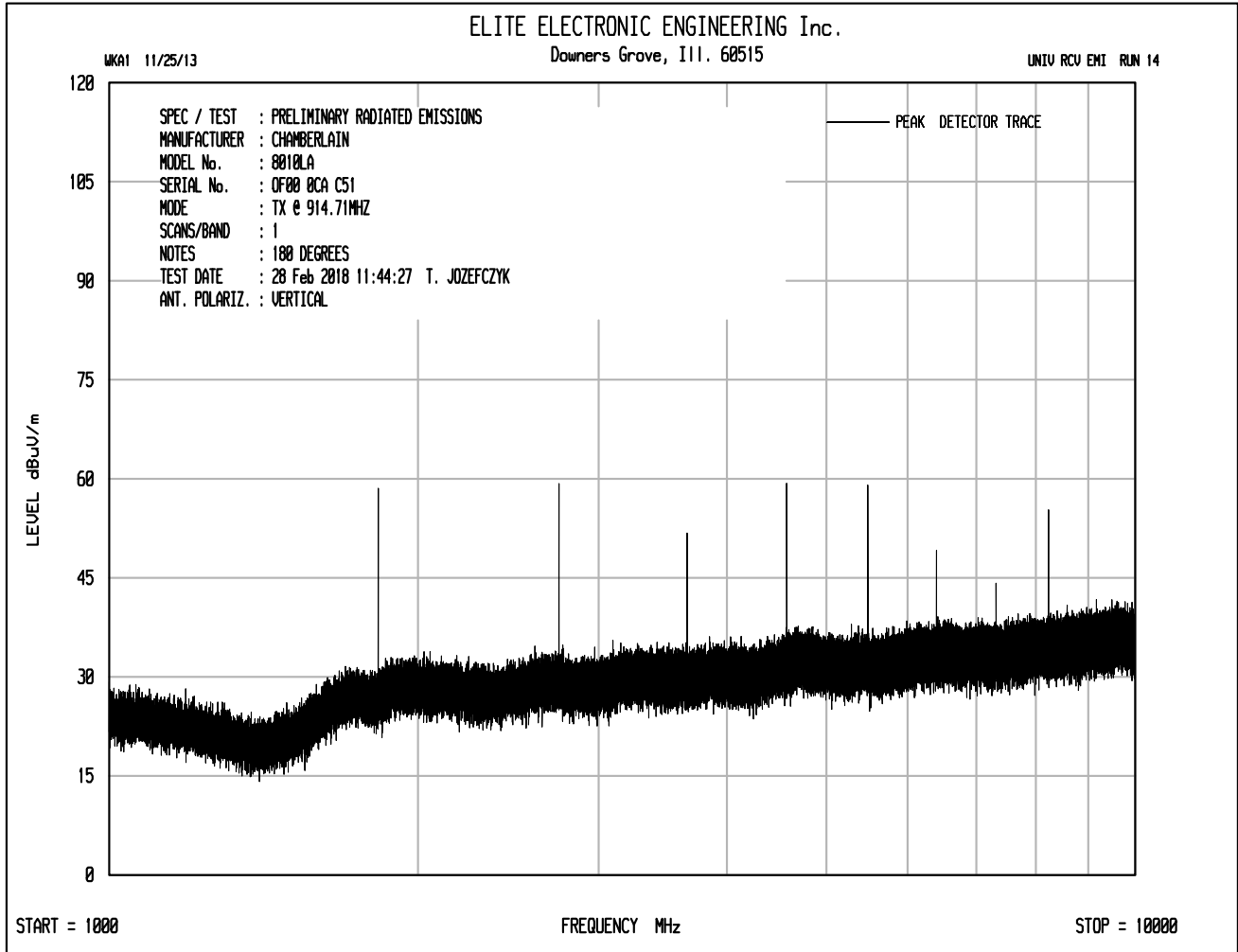


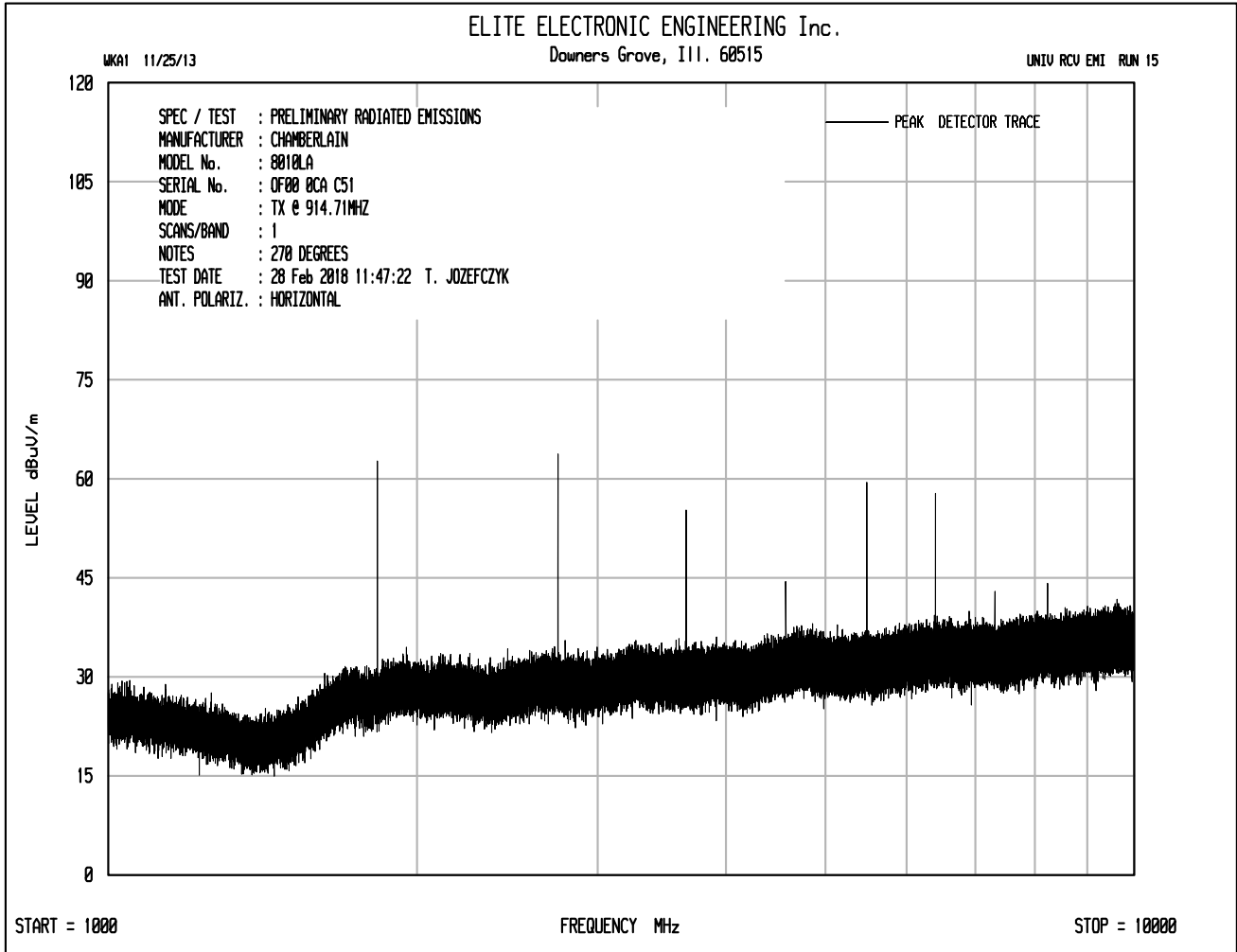




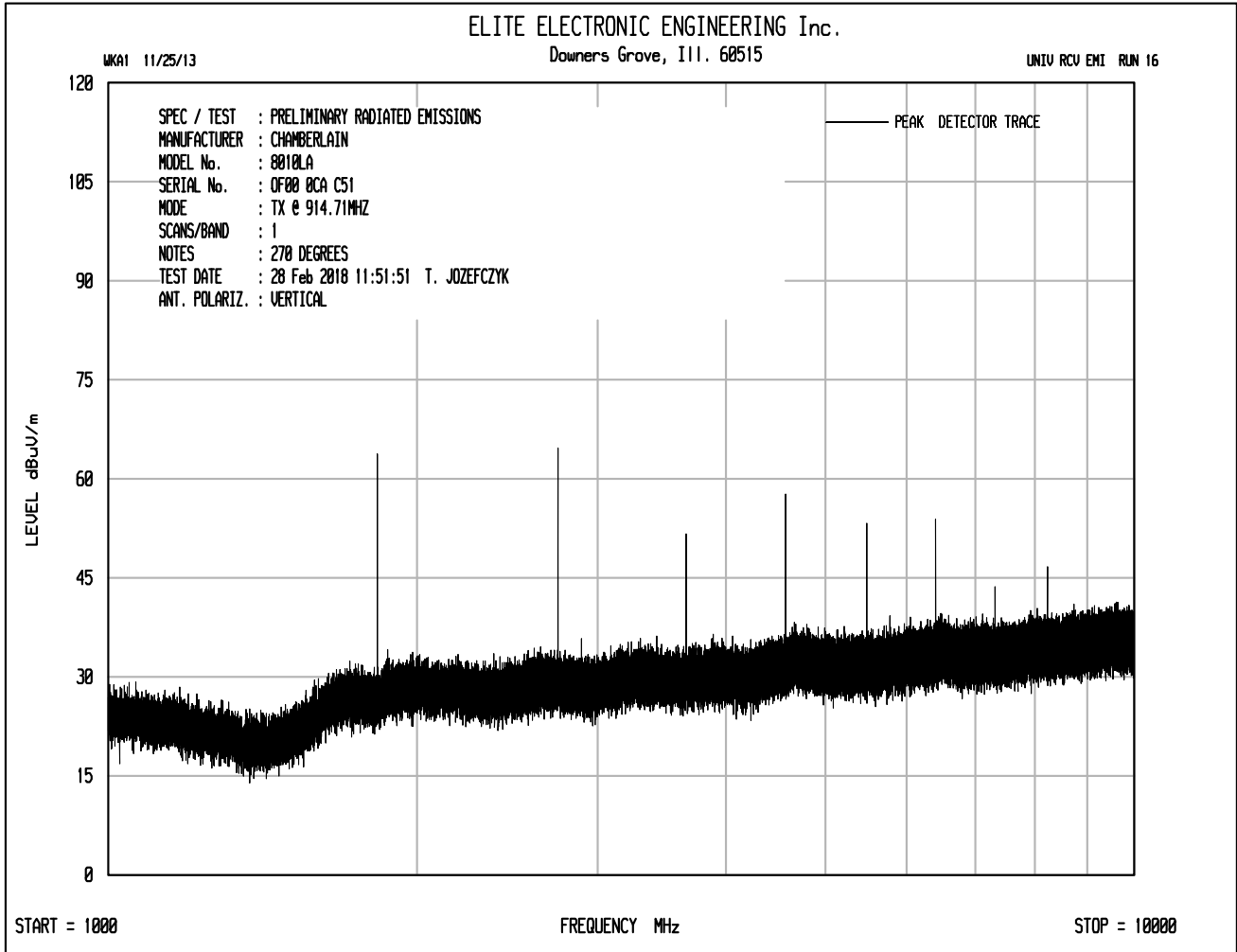


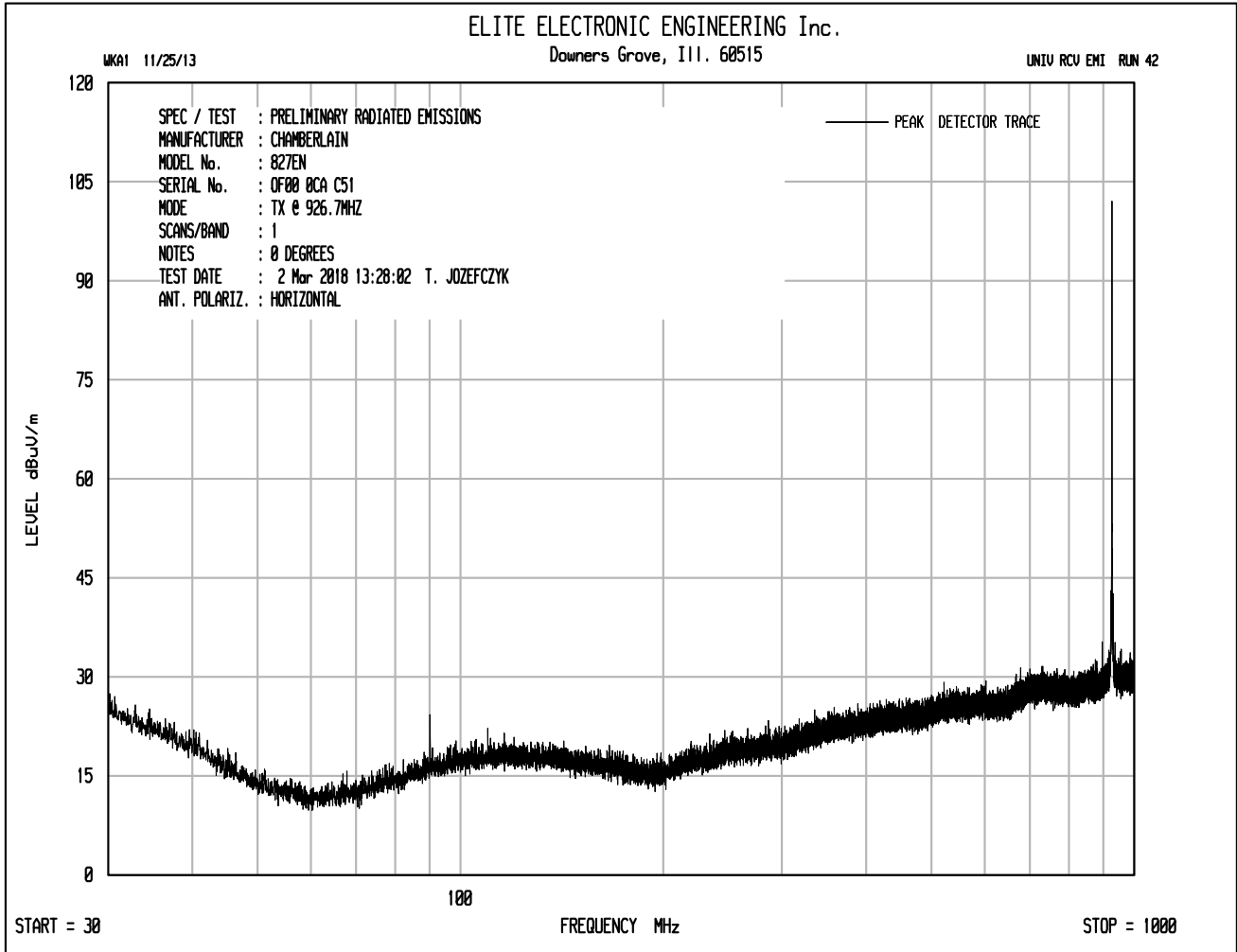


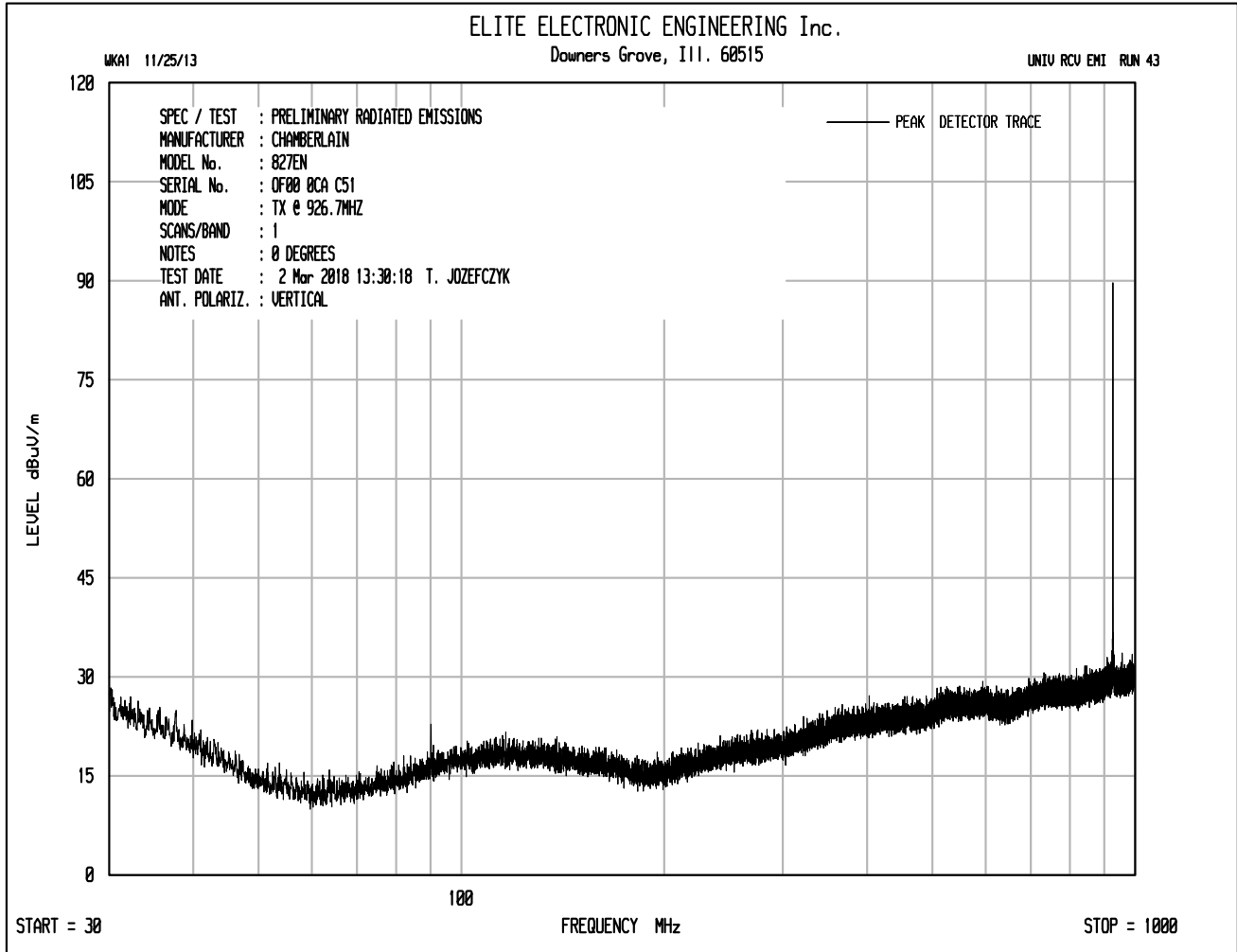


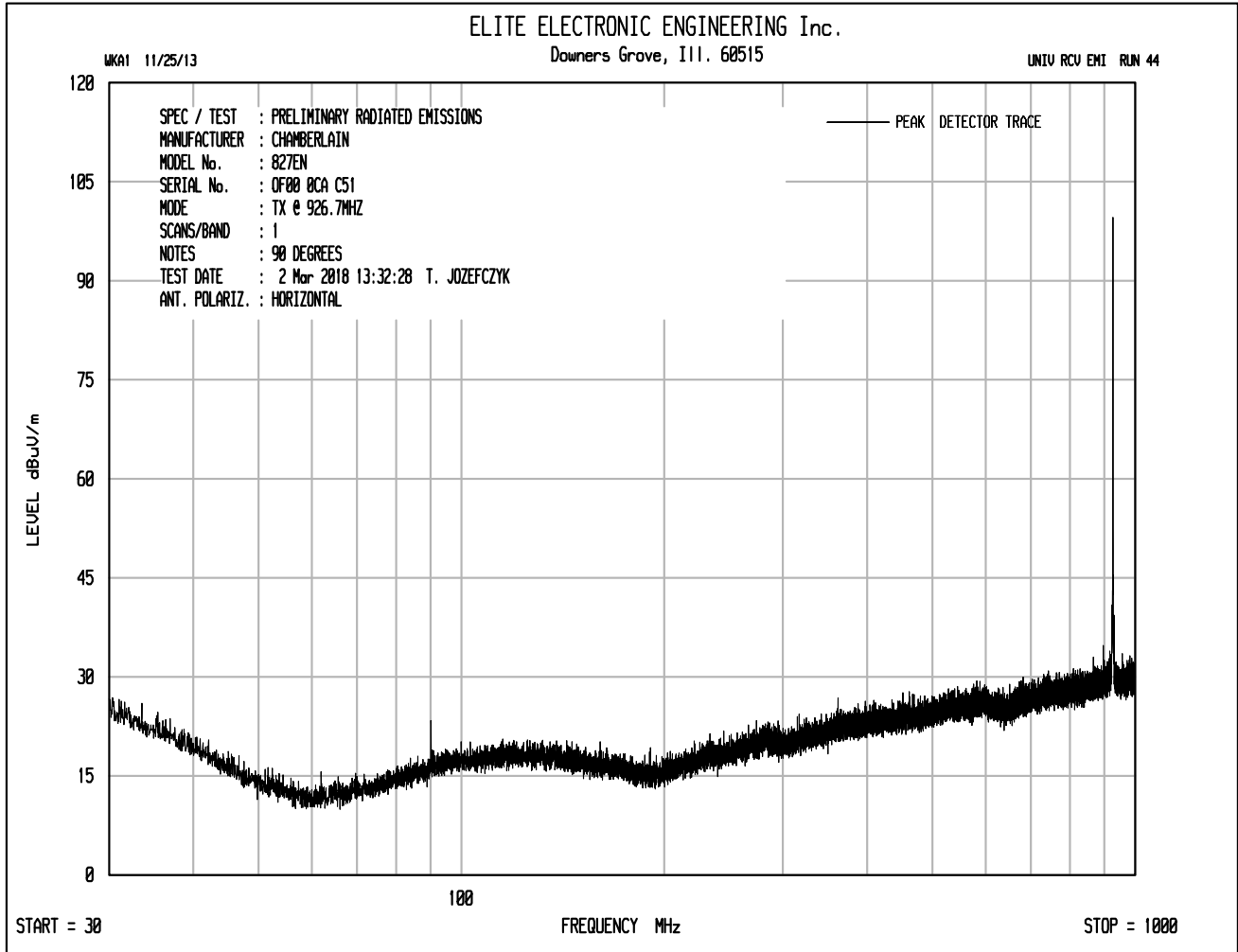


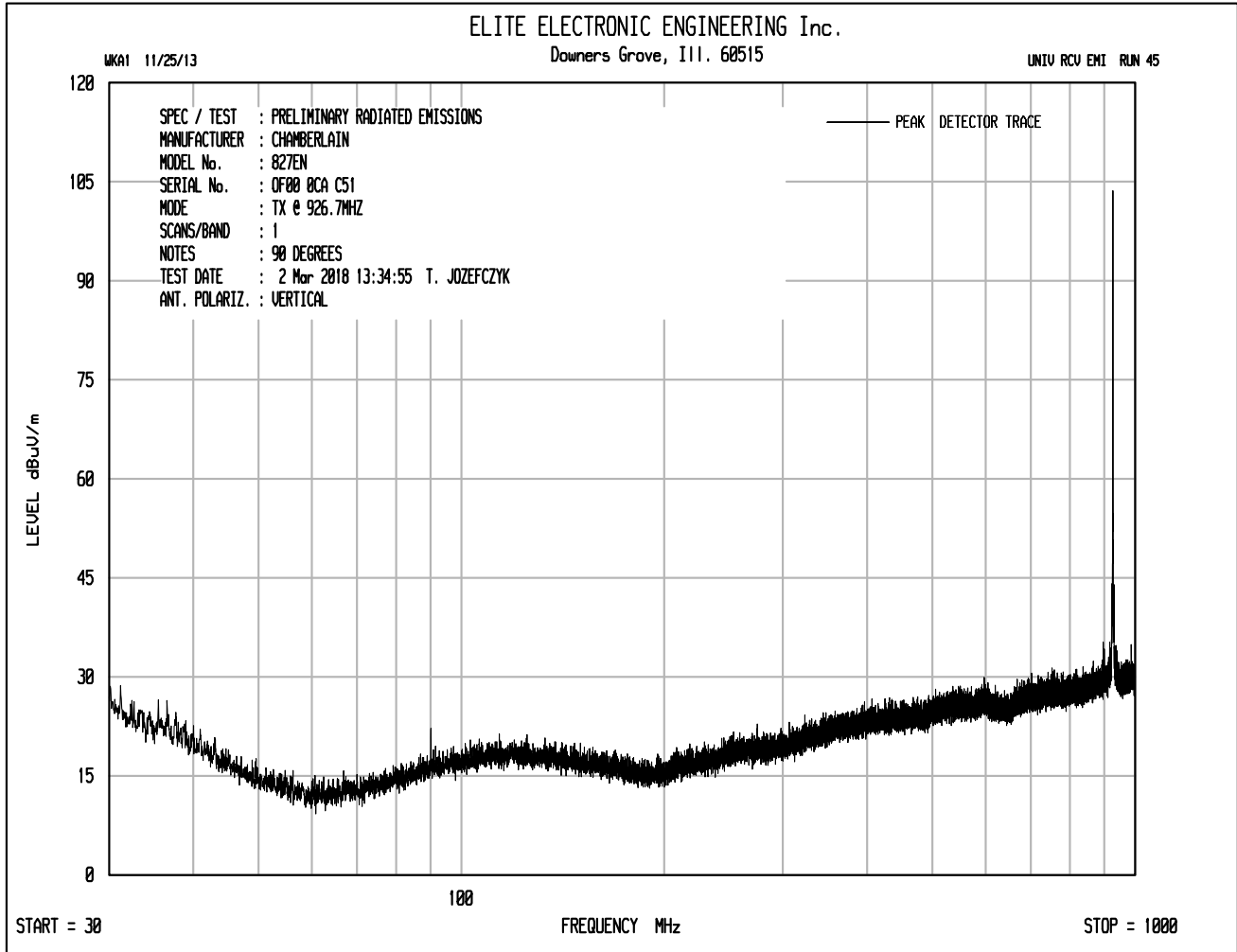


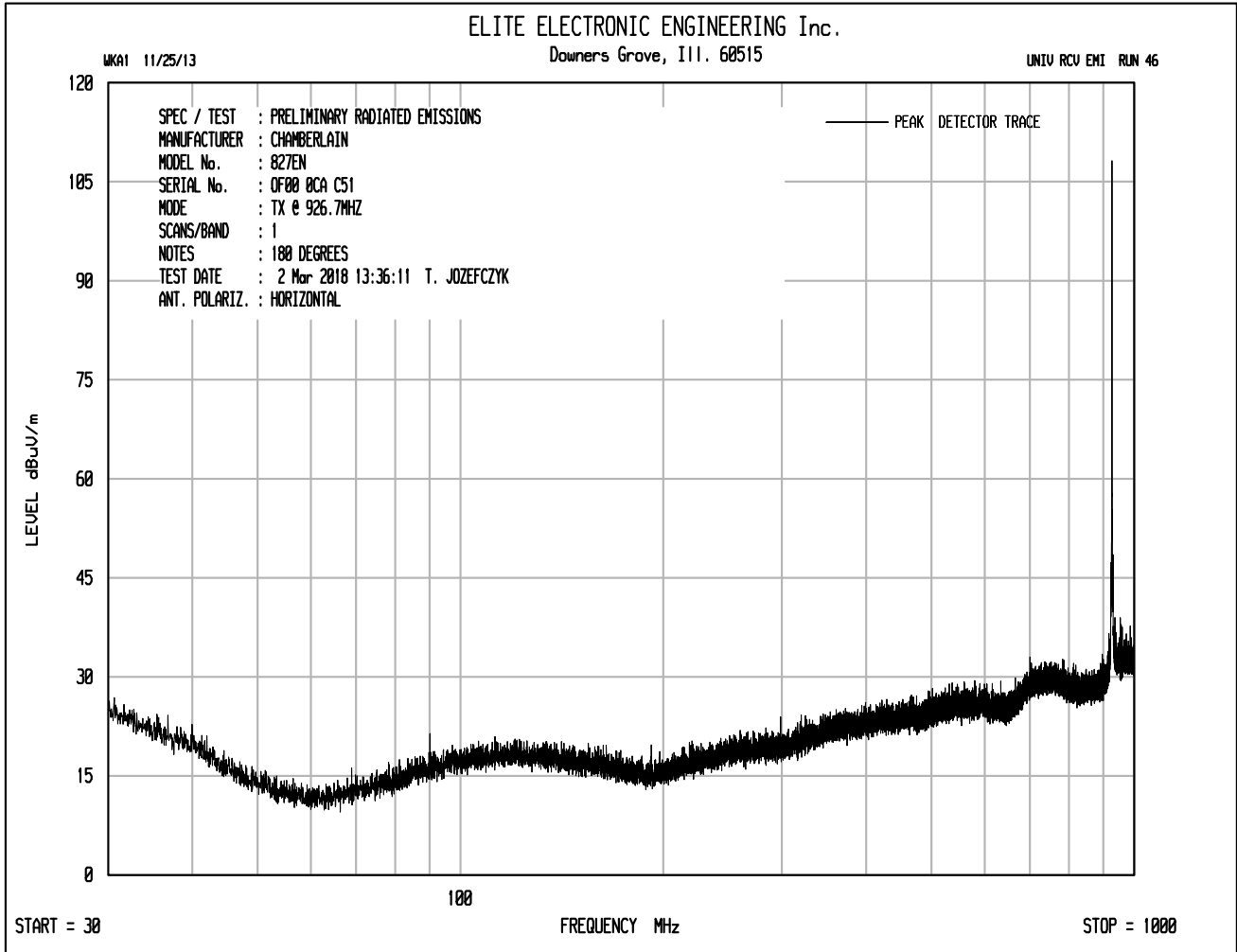


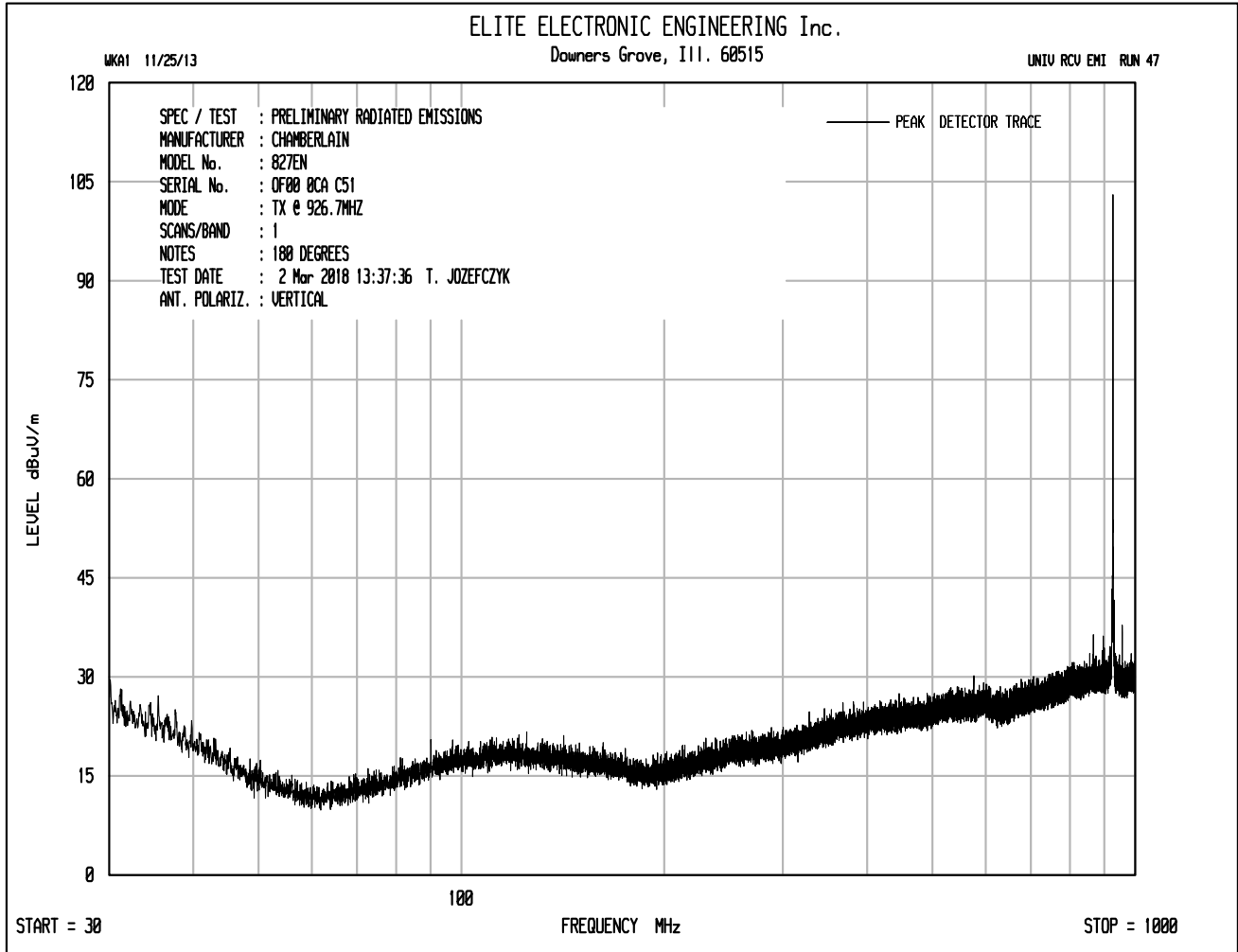


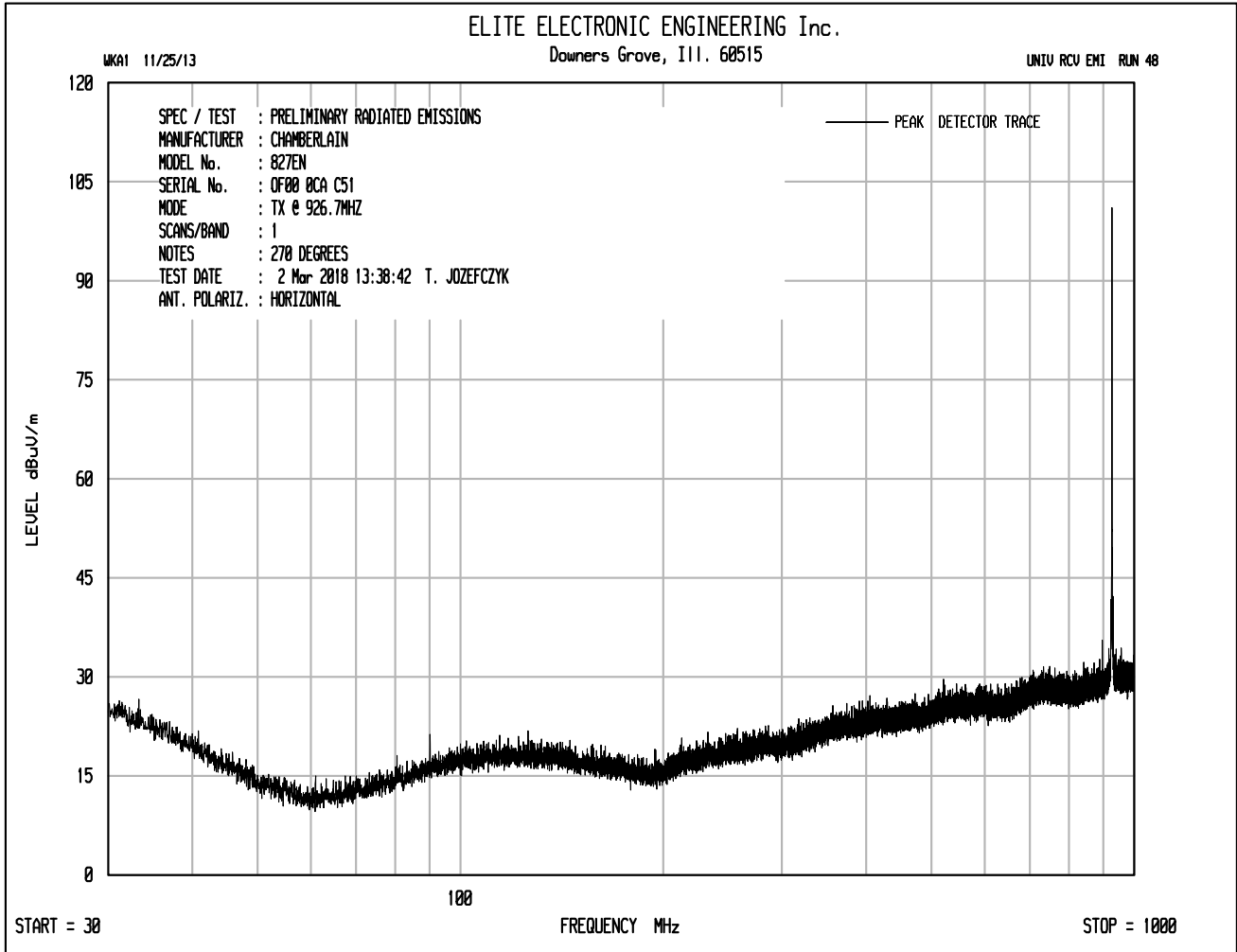




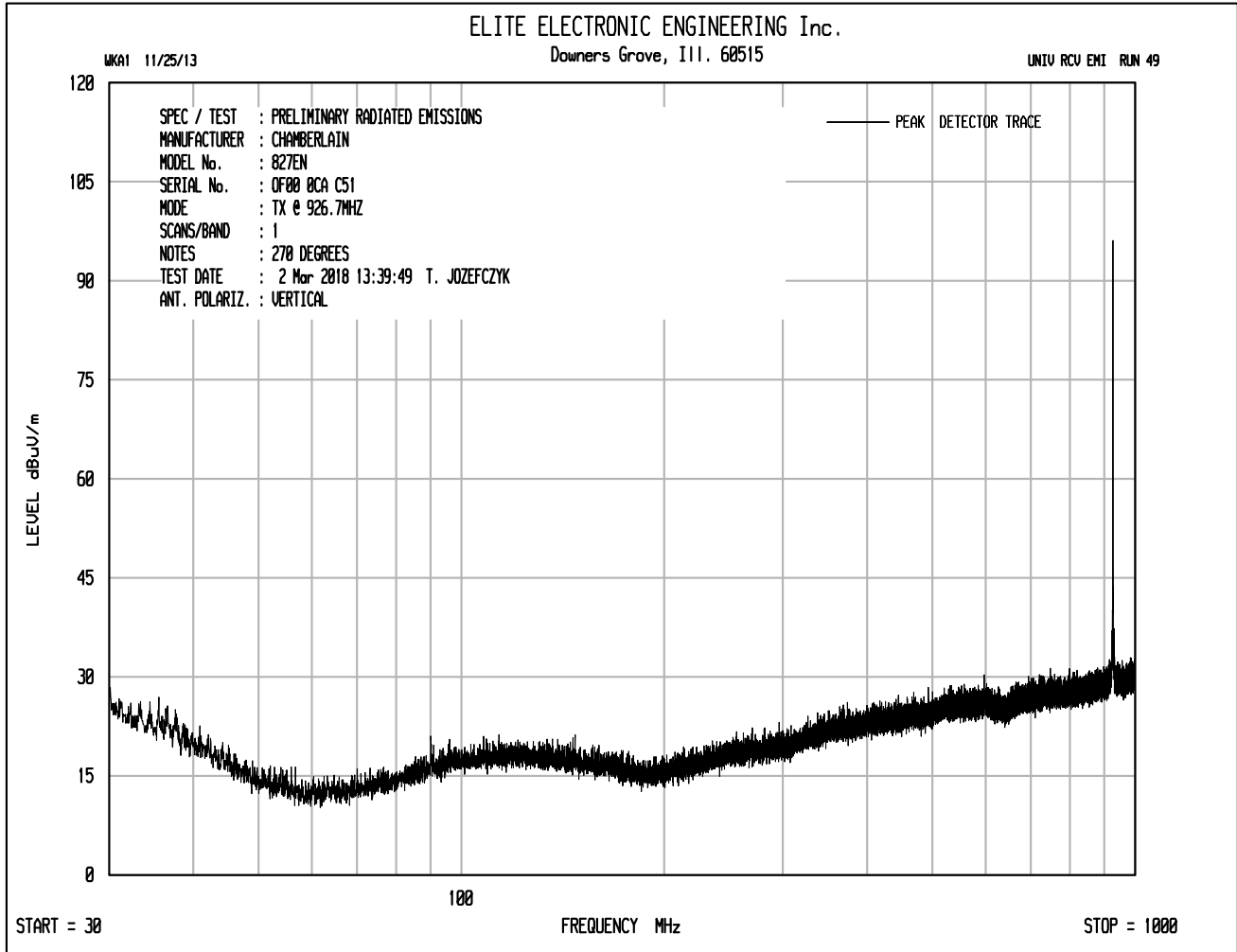


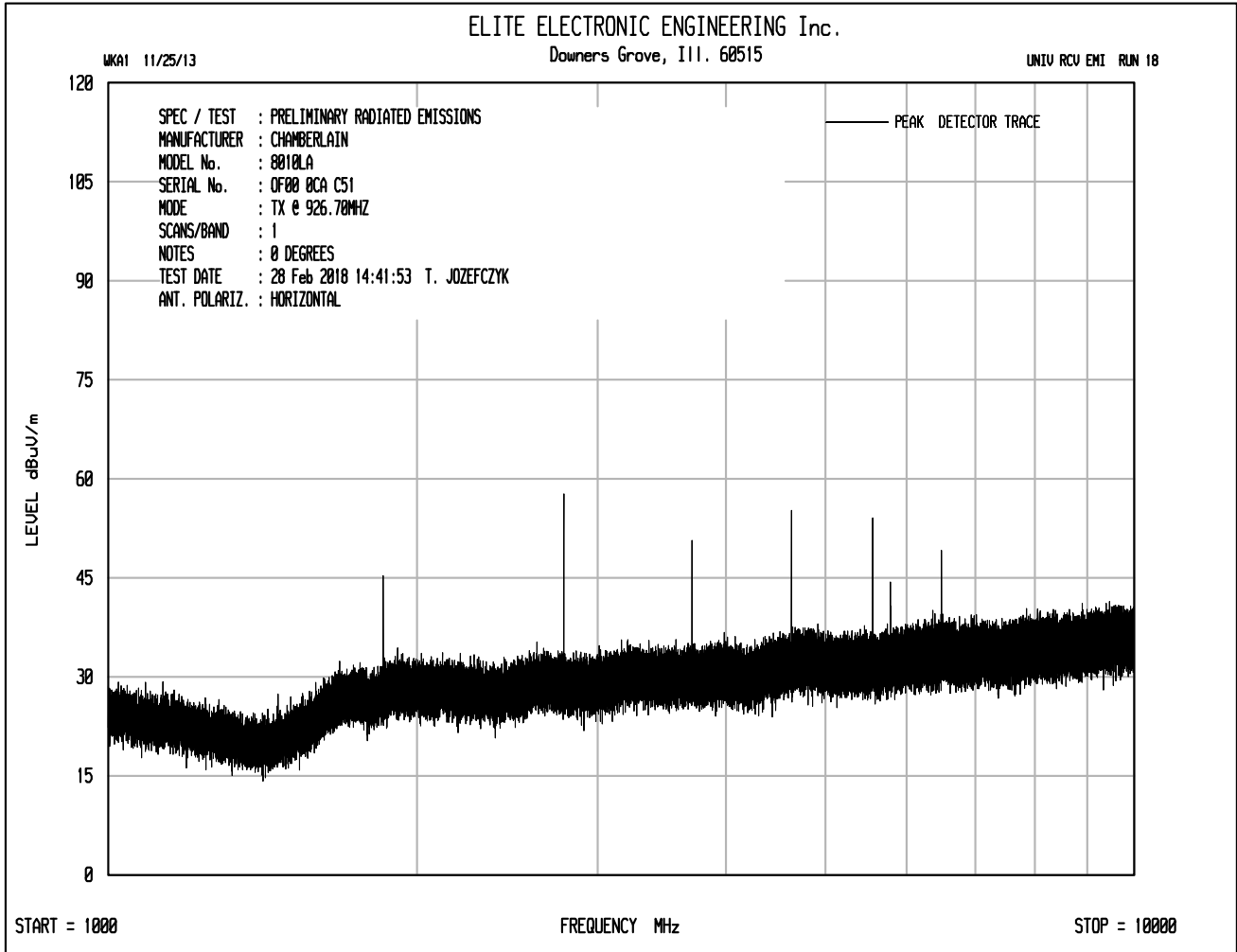


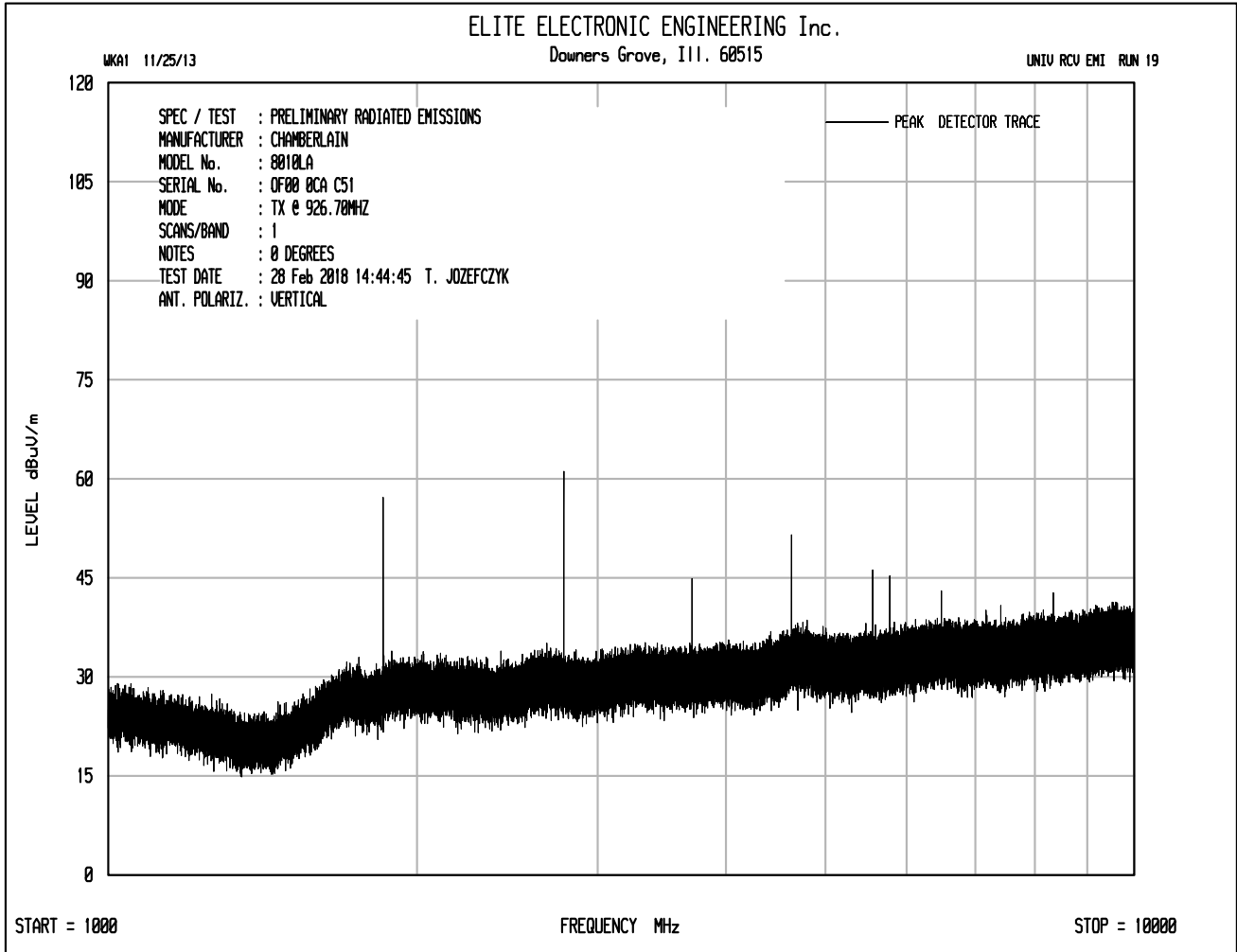


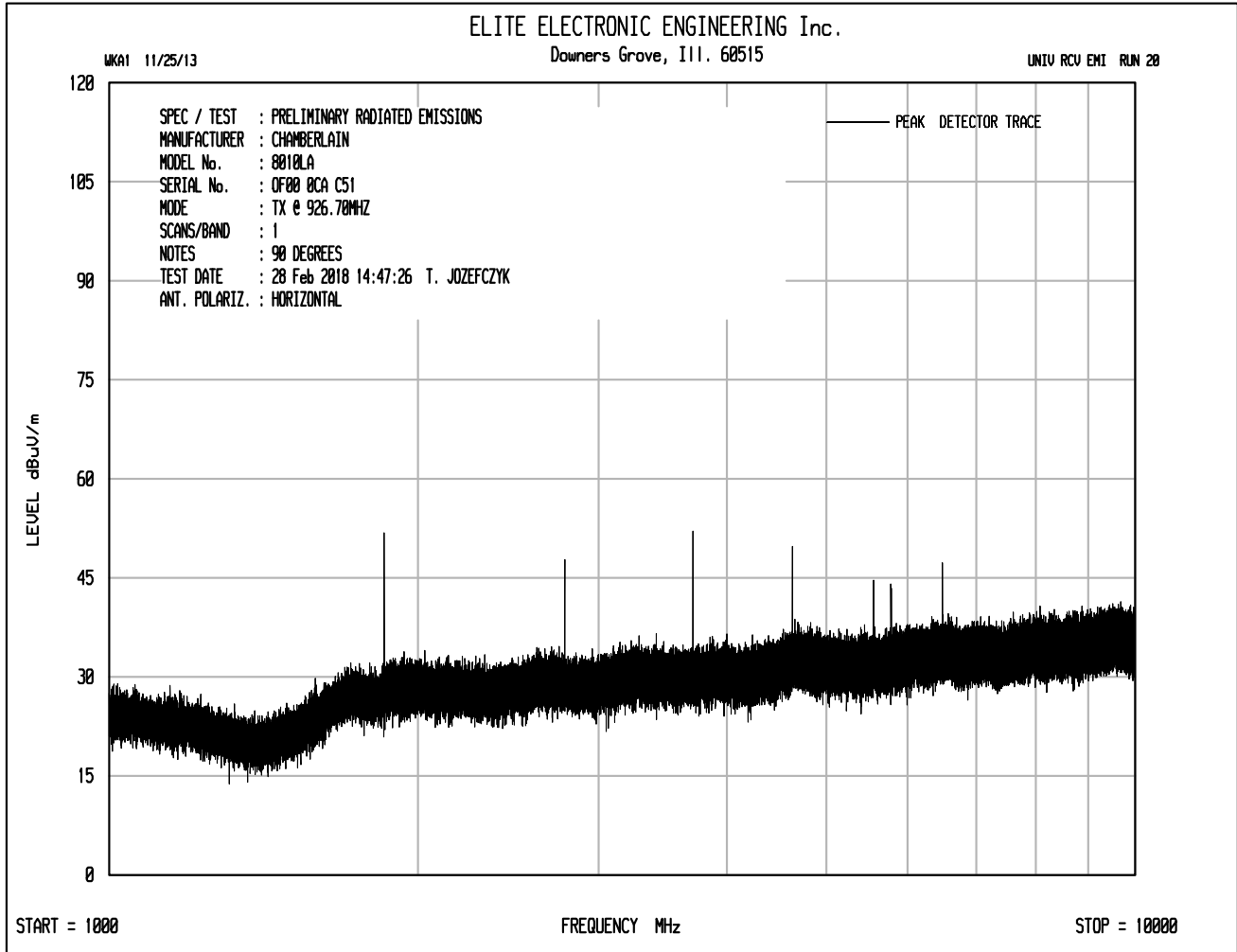


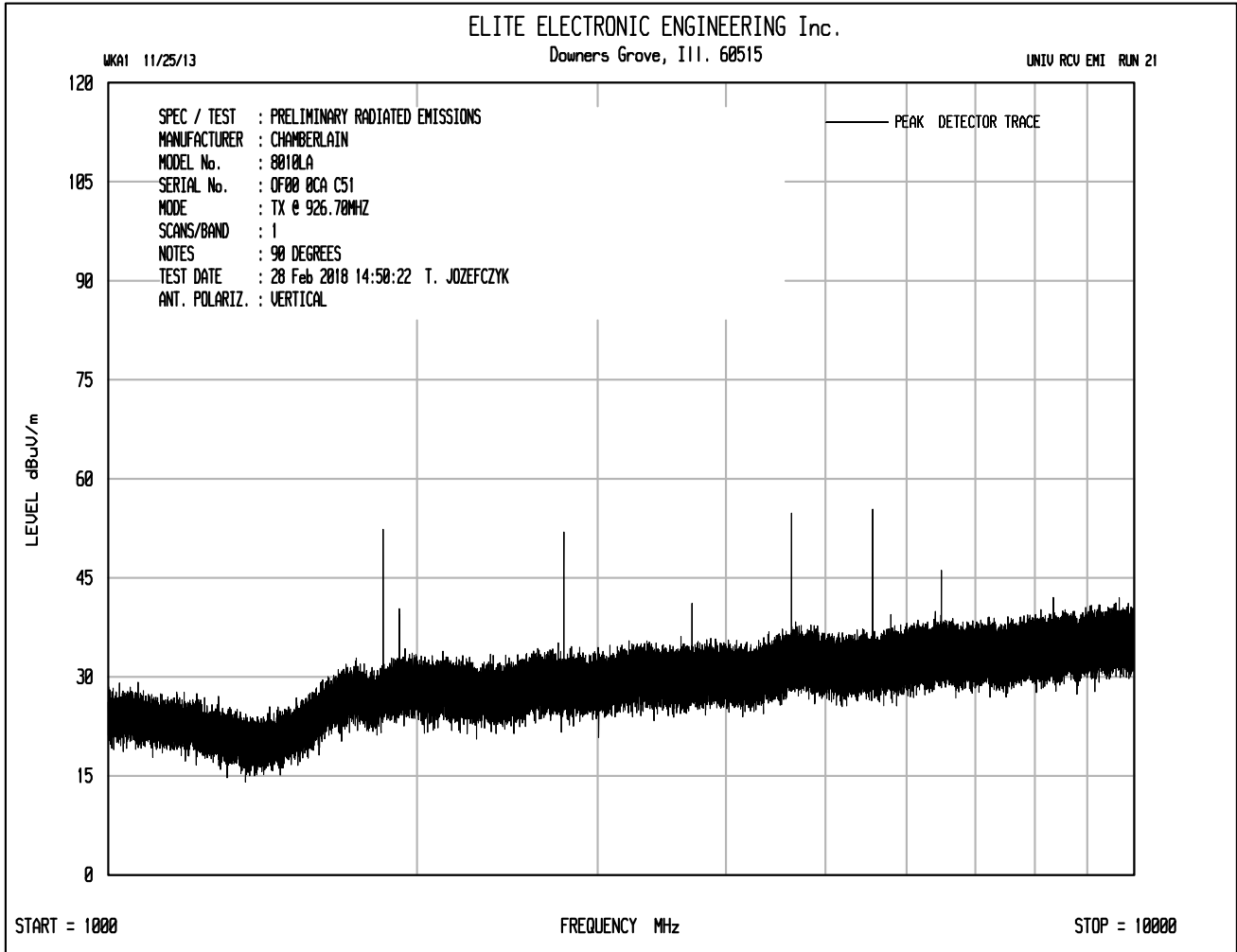


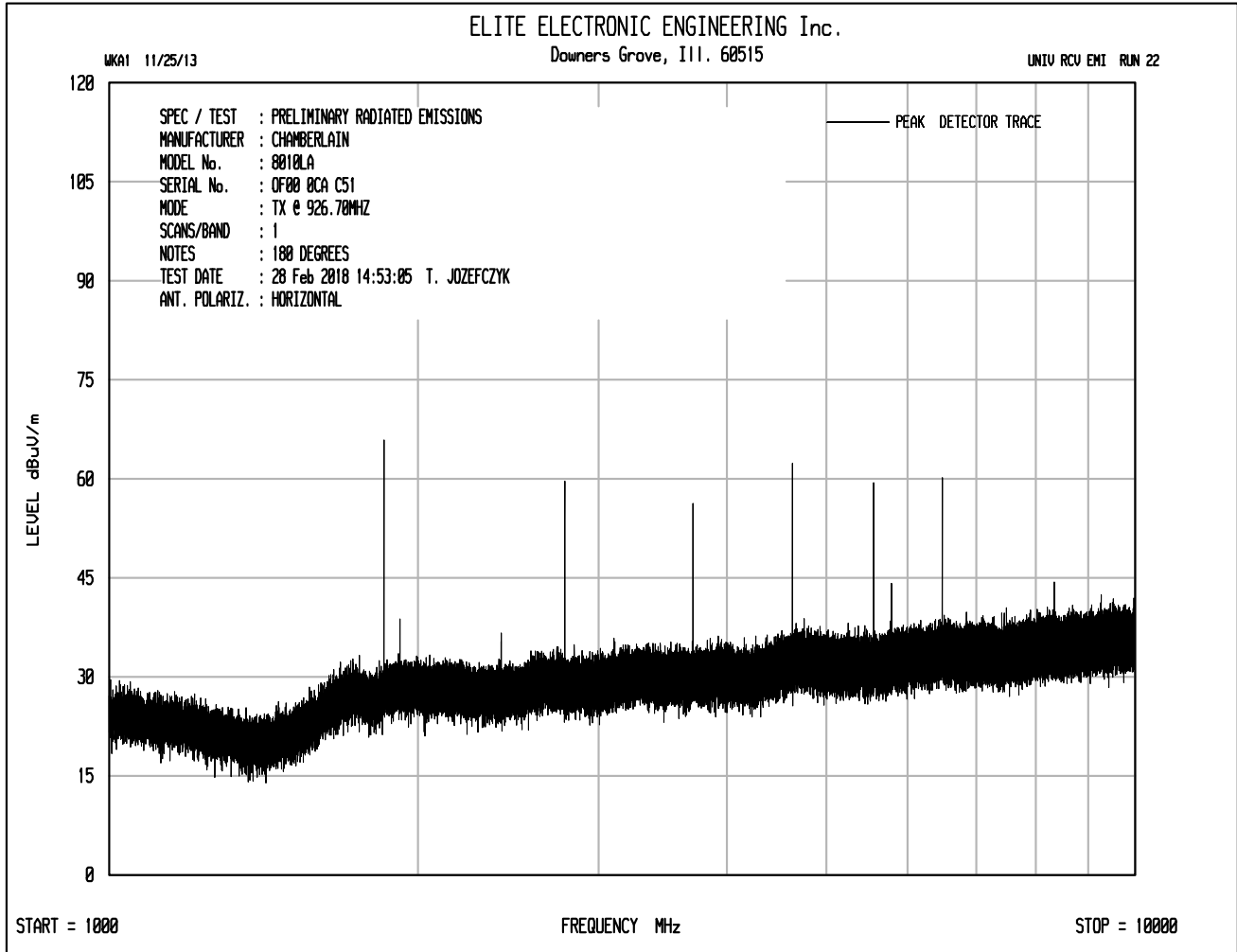


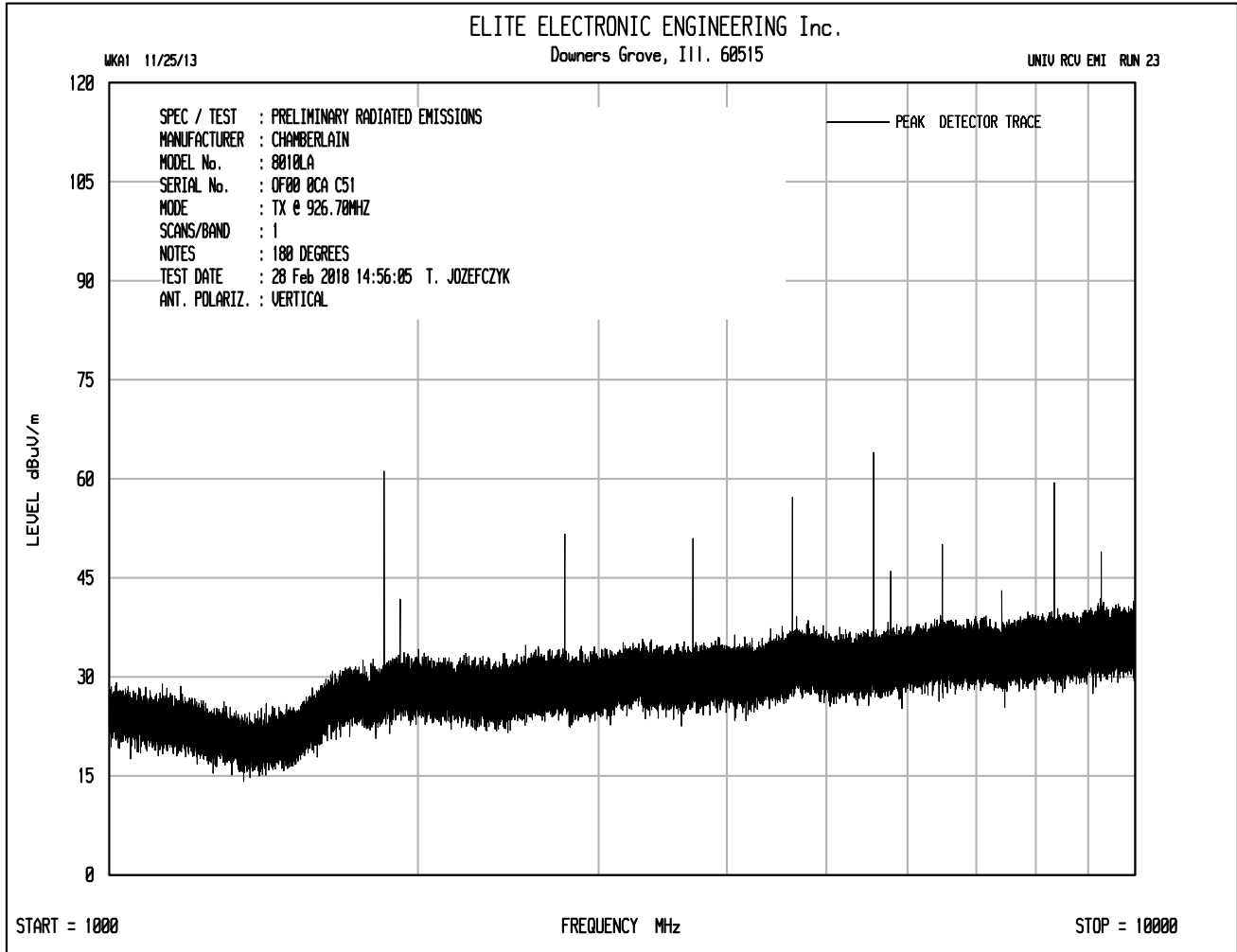


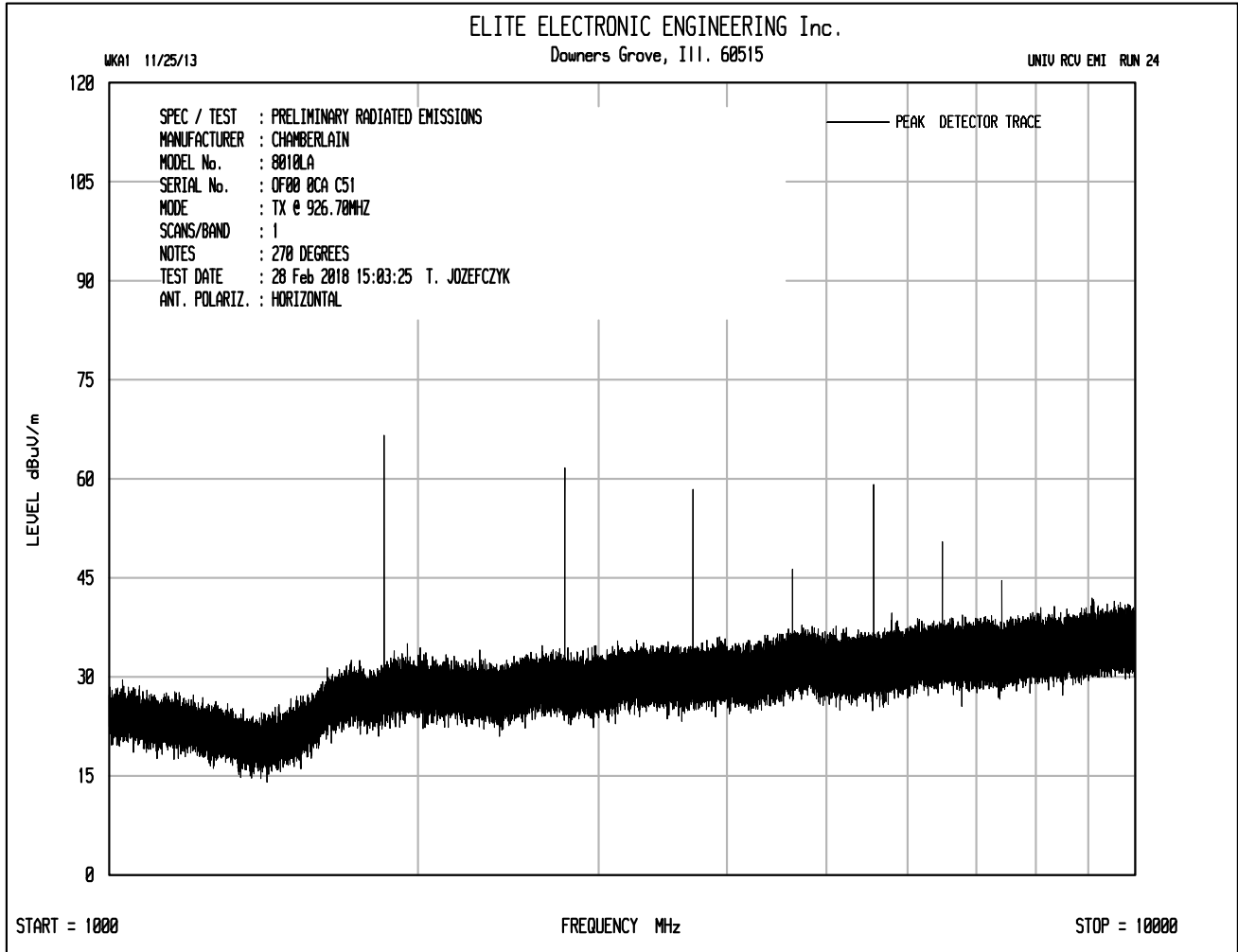




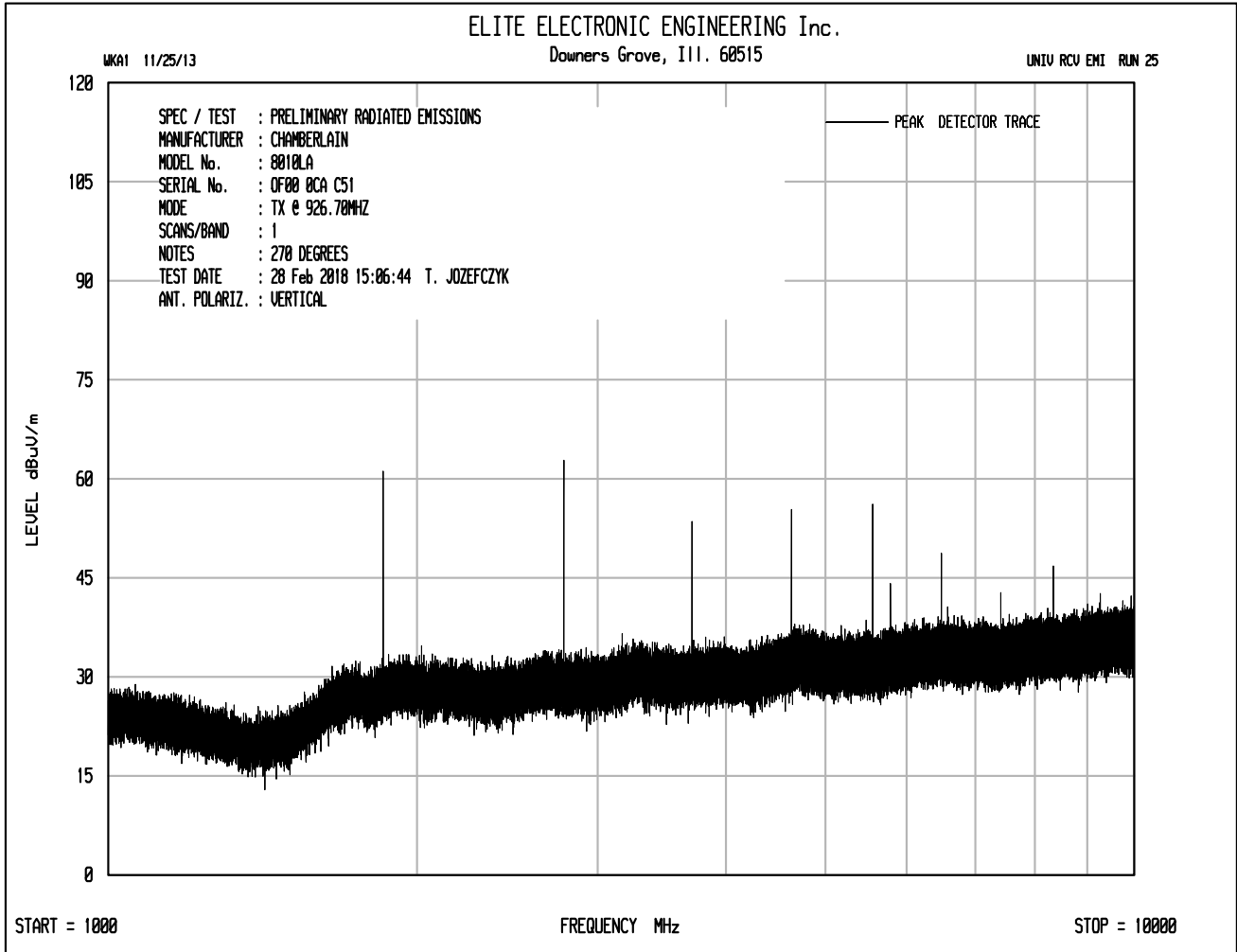














DATA PAGE

Manufacturer : Chamberlain Group, Inc.  
Test Item : Garage Door Opener  
Model No. : 8010WLA  
Mode : Transmit at 902.25MHz  
Test Specification : FCC-15.247, RSS-247 Radiated Spurious Emissions - Harmonics in Non-Restricted Bands  
Date : March 2, 2018

Freq. MHz	Ant Pol	Meter Reading (dBμV)	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Peak Total dBμV/m at 3m	Peak Total μV/m at 3 m	Peak Limit μV/m at 3 m	Margin (dB)
902.25	H	77.9	2.9	26.3	0.0	107.1	227026.5		
902.25	V	75.3	2.9	26.3	0.0	104.5	167716.8		
1804.50	H	72.6	3.8	30.2	-40.0	66.6	2137.1	22702.6	-20.5
1804.50	V	67.5	3.8	30.2	-40.0	61.5	1189.4	22702.6	-25.6
6315.75	H	63.2	6.3	35.5	-39.4	65.7	1918.3	22702.6	-21.5
6315.75	V	54.9	6.3	35.5	-39.4	57.3	734.4	22702.6	-29.8
7218.00	H	48.3	6.9	35.7	-39.4	51.4	370.6	22702.6	-35.7
7218.00	V	45.7	6.9	35.7	-39.4	48.8	276.0	22702.6	-38.3



DATA PAGE

Manufacturer : Chamberlain Group, Inc.  
Test Item : Garage Door Opener  
Model No. : 8010WLA  
Mode : Transmit at 902.25MHz  
Test Specification : FCC-15.247, RSS-247 Radiated Spurious Emissions – Harmonics in Restricted Band  
Date : March 2, 2018

Freq. MHz	Ant Pol	Meter Reading (dBµV)	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Peak Total dBµV/m at 3m	Peak Total µV/m at 3 m	Peak Limit µV/m at 3 m	Margin (dB)
2706.75	H	76.4	4.6	32.5	-39.8	73.6	4800.9	5000.0	-0.4
2706.75	V	70.1	4.6	32.5	-39.8	67.3	2321.8	5000.0	-6.7
3609.00	H	57.4	5.4	33.0	-39.2	56.6	676.4	5000.0	-17.4
3609.00	V	56.2	5.4	33.0	-39.2	55.4	589.1	5000.0	-18.6
4511.25	H	67.3	5.6	34.0	-39.2	67.8	2447.2	5000.0	-6.2
4511.25	V	62.5	5.6	34.0	-39.2	63.0	1408.2	5000.0	-11.0
5413.50	H	63.2	5.9	34.9	-39.4	64.7	1708.7	5000.0	-9.3
5413.50	V	61.9	5.9	34.9	-39.4	63.3	1469.4	5000.0	-10.6
8120.25	H	56.2	7.1	35.7	-39.4	59.7	962.0	5000.0	-14.3
8120.25	V	59.0	7.1	35.7	-39.4	62.4	1315.8	5000.0	-11.6
9022.50	H	52.3	7.9	36.1	-39.3	57.0	708.8	5000.0	-17.0
9022.50	V	52.4	7.9	36.1	-39.3	57.1	718.6	5000.0	-16.8



DATA PAGE

Manufacturer : Chamberlain Group, Inc.  
Test Item : Garage Door Opener  
Model No. : 8010WLA  
Mode : Transmit at 902.25MHz  
Test Specification : FCC-15.247, RSS-247 Radiated Spurious Emissions – Restricted Band Averages  
Date : March 2, 2018

Freq. MHz	Ant Pol	Meter Reading (dBμV)	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Duty Cycle (dB)	Average Total dBμV/m at 3m	Average Total μV/m at 3 m	Average Limit μV/m at 3 m	Margin (dB)
2706.75	H	52.29	4.6	32.5	-39.8	0.0	49.5	300.1	500.0	-4.4
2706.75	V	49.8	4.6	32.5	-39.8	0.0	47.1	225.9	500.0	-6.9
3609.00	H	41.9	5.4	33.0	-39.2	0.0	41.1	113.2	500.0	-12.9
3609.00	V	40.9	5.4	33.0	-39.2	0.0	40.1	100.7	500.0	-13.9
4511.25	H	47.5	5.6	34.0	-39.2	0.0	48.0	249.8	500.0	-6.0
4511.25	V	44.8	5.6	34.0	-39.2	0.0	45.2	182.3	500.0	-8.8
5413.50	H	45.8	5.9	34.9	-39.4	0.0	47.3	230.5	500.0	-6.7
5413.50	V	44.0	5.9	34.9	-39.4	0.0	45.5	187.6	500.0	-8.5
8120.25	H	40.5	7.1	35.7	-39.4	0.0	44.0	157.6	500.0	-10.0
8120.25	V	42.6	7.1	35.7	-39.4	0.0	46.0	200.5	500.0	-7.9
9022.50	H	35.5	7.9	36.1	-39.3	0.0	40.1	101.6	500.0	-13.8
9022.50	V	38.4	7.9	36.1	-39.3	0.0	43.1	142.7	500.0	-10.9



DATA PAGE

Manufacturer : Chamberlain Group, Inc.  
Test Item : Garage Door Opener  
Model No. : 8010WLA  
Mode : Transmit at 914.75MHz  
Test Specification : FCC-15.247, RSS-247 Radiated Spurious Emissions - Harmonics in Non-Restricted Bands  
Date : March 2, 2018

Freq. MHz	Ant Pol	Meter Reading (dBμV)	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Peak Total dBμV/m at 3m	Peak Total μV/m at 3 m	Peak Limit μV/m at 3 m	Margin (dB)
914.74	H	77.8	2.9	26.4	0.0	107.1	226231.7		
914.74	V	72.4	2.9	26.4	0.0	101.7	121353.8		
1829.48	H	70.9	3.9	30.4	-40.0	65.2	1818.8	22623.2	-21.9
1829.48	V	66.2	3.9	30.4	-40.0	60.4	1050.2	22623.2	-26.7
5488.44	H	63.8	5.9	34.8	-39.4	65.1	1805.4	22623.2	-22.0
5488.44	V	56.9	5.9	34.8	-39.4	58.2	816.7	22623.2	-28.8
6403.18	H	59.2	6.3	35.5	-39.4	61.7	1209.9	22623.2	-25.4
6403.18	V	51.1	6.3	35.5	-39.4	53.6	476.1	22623.2	-33.5



DATA PAGE

Manufacturer : Chamberlain Group, Inc.  
Test Item : Garage Door Opener  
Model No. : 8010WLA  
Mode : Transmit at 914.75MHz  
Test Specification : FCC-15.247, RSS-247 Radiated Spurious Emissions – Harmonics in Restricted Band  
Date : March 2, 2018

Freq. MHz	Ant Pol	Meter Reading (dBµV)	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Peak Total dBµV/m at 3m	Peak Total µV/m at 3 m	Peak Limit µV/m at 3 m	Margin (dB)
2744.22	H	76.4	4.6	32.5	-39.7	73.8	4878.9	5000.0	-0.2
2744.22	V	68.5	4.6	32.5	-39.7	65.8	1953.5	5000.0	-8.2
3658.96	H	60.7	5.4	33.0	-39.2	60.0	998.0	5000.0	-14.0
3658.96	V	60.0	5.4	33.0	-39.2	59.2	913.3	5000.0	-14.8
4573.70	H	68.4	5.6	34.2	-39.2	69.0	2805.5	5000.0	-5.0
4573.70	V	63.6	5.6	34.2	-39.2	64.2	1625.6	5000.0	-9.8
7317.92	H	52.3	6.9	35.7	-39.4	55.4	589.9	5000.0	-18.6
7317.92	V	53.6	6.9	35.7	-39.4	56.7	682.0	5000.0	-17.3
8232.66	H	56.1	7.2	35.8	-39.4	59.6	956.0	5000.0	-14.4
8232.66	V	57.2	7.2	35.8	-39.4	60.7	1090.1	5000.0	-13.2
9147.40	H	50.8	8.1	36.2	-39.3	55.7	609.0	5000.0	-18.3
9147.40	V	53.4	8.1	36.2	-39.3	58.3	826.3	5000.0	-15.6



DATA PAGE

Manufacturer : Chamberlain Group, Inc.  
Test Item : Garage Door Opener  
Model No. : 8010WLA  
Mode : Transmit at 914.75MHz  
Test Specification : FCC-15.247, RSS-247 Radiated Spurious Emissions – Restricted Band Averages  
Date : March 2, 2018

Freq. MHz	Ant Pol	Meter Reading (dBμV)	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Duty Cycle (dB)	Average Total dBμV/m at 3m	Average Total μV/m at 3 m	Average Limit μV/m at 3 m	Margin (dB)
2744.22	H	52.12	4.6	32.5	-39.7	0.0	49.5	298.1	500.0	-4.5
2744.22	V	48.8	4.6	32.5	-39.7	0.0	46.1	202.7	500.0	-7.8
3658.96	H	44.3	5.4	33.0	-39.2	0.0	43.5	150.2	500.0	-10.4
3658.96	V	43.8	5.4	33.0	-39.2	0.0	43.0	141.6	500.0	-11.0
4573.70	H	48.1	5.6	34.2	-39.2	0.0	48.7	270.7	500.0	-5.3
4573.70	V	46.1	5.6	34.2	-39.2	0.0	46.6	214.8	500.0	-7.3
7317.92	H	38.4	6.9	35.7	-39.4	0.0	41.5	119.1	500.0	-12.5
7317.92	V	37.3	6.9	35.7	-39.4	0.0	40.4	104.7	500.0	-13.6
8232.66	H	37.3	7.2	35.8	-39.4	0.0	40.8	110.3	500.0	-13.1
8232.66	V	41.1	7.2	35.8	-39.4	0.0	44.7	171.2	500.0	-9.3
9147.40	H	35.6	8.1	36.2	-39.3	0.0	40.6	106.8	500.0	-13.4
9147.40	V	37.4	8.1	36.2	-39.3	0.0	42.4	131.4	500.0	-11.6



DATA PAGE

Manufacturer : Chamberlain Group, Inc.  
Test Item : Garage Door Opener  
Model No. : 8010WLA  
Mode : Transmit at 926.75MHz  
Test Specification : FCC-15.247, RSS-247 Radiated Spurious Emissions - Harmonics in Non-Restricted Bands  
Date : March 2, 2018

Freq. MHz	Ant Pol	Meter Reading (dB $\mu$ V)	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Peak Total dB $\mu$ V/m at 3m	Peak Total $\mu$ V/m at 3 m	Peak Limit $\mu$ V/m at 3 m	Margin (dB)
926.75	H	74.8	2.9	26.7	0.0	104.4	165228.3		
926.75	V	77.8	2.9	26.7	0.0	107.4	234468.4		
5560.50	H	64.6	6.0	34.8	-39.4	66.1	2010.1	23446.8	-21.3
5560.50	V	59.4	6.0	34.8	-39.4	60.8	1099.5	23446.8	-26.6
6487.25	H	58.4	6.4	35.5	-39.4	60.8	1096.5	23446.8	-26.6
6487.25	V	51.2	6.4	35.5	-39.4	53.7	481.4	23446.8	-33.8
9267.50	H	42.3	8.1	36.2	-39.3	47.3	232.2	23446.8	-40.1
9267.50	V	42.4	8.1	36.2	-39.3	47.3	232.7	23446.8	-40.1





DATA PAGE

Manufacturer : Chamberlain Group, Inc.  
Test Item : Garage Door Opener  
Model No. : 8010WLA  
Mode : Transmit at 926.75MHz  
Test Specification : FCC-15.247, RSS-247 Radiated Spurious Emissions – Harmonics in Restricted Band  
Date : March 2, 2018

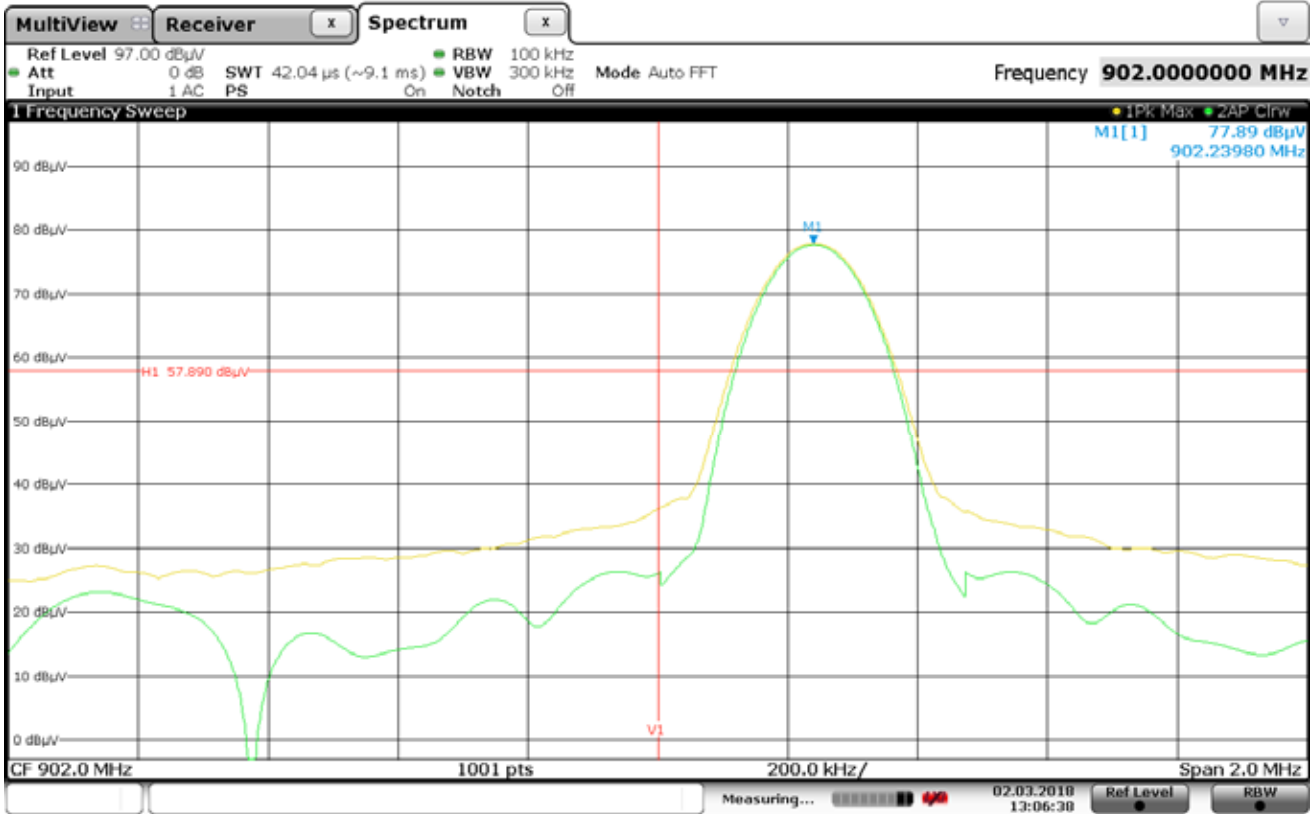
Freq. MHz	Ant Pol	Meter Reading (dBμV)	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Peak Total dBμV/m at 3m	Peak Total μV/m at 3 m	Peak Limit μV/m at 3 m	Margin (dB)
2780.25	H	75.8	4.7	32.5	-39.7	73.3	4619.3	5000.0	-0.7
2780.25	V	70.8	4.7	32.5	-39.7	68.2	2576.8	5000.0	-5.8
3707.00	H	60.8	5.4	33.1	-39.2	60.1	1008.0	5000.0	-13.9
3707.00	V	58.7	5.4	33.1	-39.2	58.0	792.4	5000.0	-16.0
4633.75	H	69.0	5.7	34.3	-39.3	69.7	3061.8	5000.0	-4.3
4633.75	V	62.4	5.7	34.3	-39.3	63.1	1428.8	5000.0	-10.9
7414.00	H	52.8	6.9	35.6	-39.4	55.9	626.5	5000.0	-18.0
7414.00	V	50.8	6.9	35.6	-39.4	53.9	493.7	5000.0	-20.1
8340.75	H	53.4	7.2	35.8	-39.4	57.0	709.5	5000.0	-17.0
8340.75	V	58.7	7.2	35.8	-39.4	62.2	1294.1	5000.0	-11.7



DATA PAGE

Manufacturer : Chamberlain Group, Inc.  
Test Item : Garage Door Opener  
Model No. : 8010WLA  
Mode : Transmit at 926.75MHz  
Test Specification : FCC-15.247, RSS-247 Radiated Spurious Emissions – Restricted Band Averages  
Date : March 2, 2018

Freq. MHz	Ant Pol	Meter Reading (dBµV)	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Duty Cycle (dB)	Average Total dBµV/m at 3m	Average Total µV/m at 3 m	Average Limit µV/m at 3 m	Margin (dB)
2780.25	H	51.65	4.7	32.5	-39.7	0.0	49.1	285.5	500.0	-4.9
2780.25	V	49.2	4.7	32.5	-39.7	0.0	46.7	216.3	500.0	-7.3
3707.00	H	44.5	5.4	33.1	-39.2	0.0	43.8	155.0	500.0	-10.2
3707.00	V	43.7	5.4	33.1	-39.2	0.0	43.0	140.9	500.0	-11.0
4633.75	H	48.4	5.7	34.3	-39.3	0.0	49.1	286.7	500.0	-4.8
4633.75	V	44.5	5.7	34.3	-39.3	0.0	45.2	182.2	500.0	-8.8
7414.00	H	36.2	6.9	35.6	-39.4	0.0	39.3	92.0	500.0	-14.7
7414.00	V	34.5	6.9	35.6	-39.4	0.0	37.6	75.5	500.0	-16.4
8340.75	H	37.9	7.2	35.8	-39.4	0.0	41.5	119.0	500.0	-12.5
8340.75	V	41.8	7.2	35.8	-39.4	0.0	45.4	186.4	500.0	-8.6

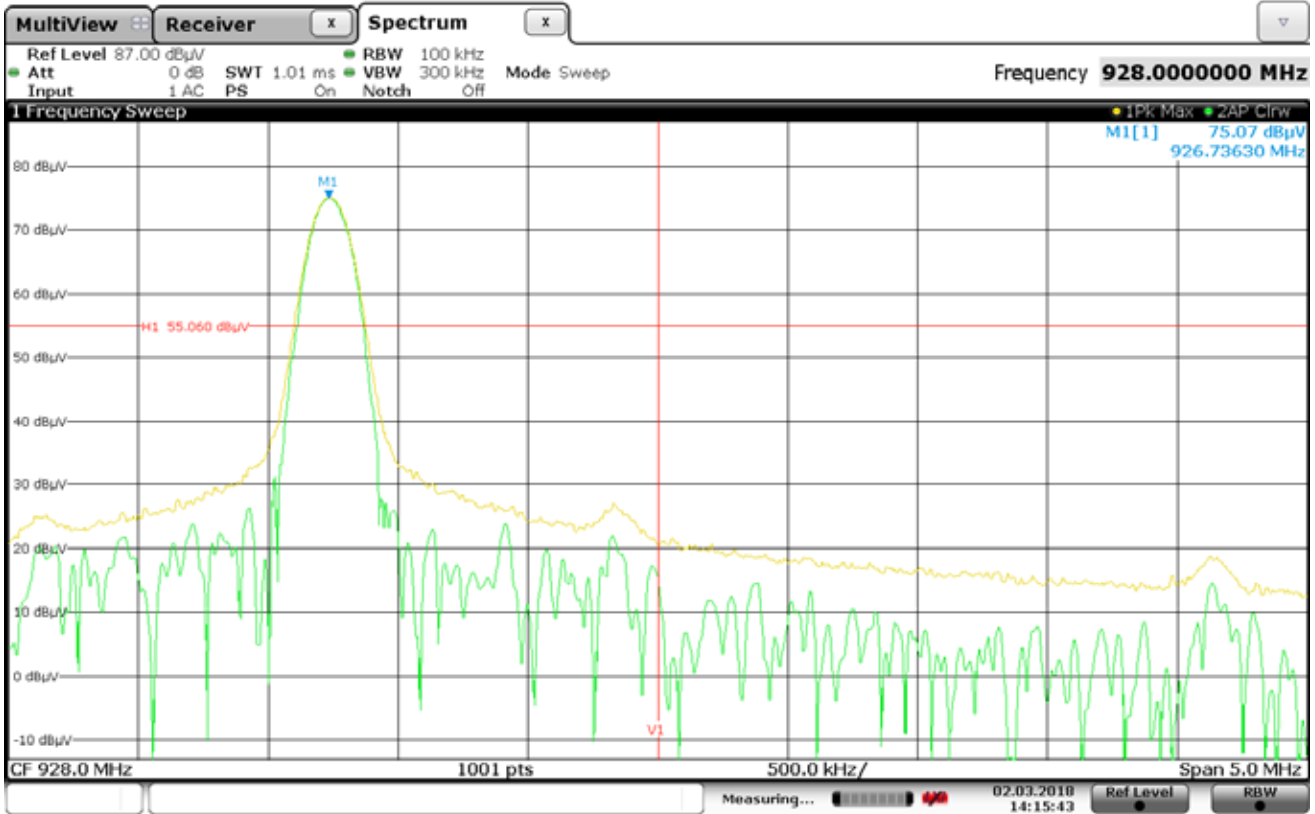


Date: 2.MAR.2018 13:06:39

### BAND EDGE – RADIATED

MANUFACTURER : Chamberlain Group, Inc.  
 TEST ITEM : Garage Door Opener  
 MODEL NUMBER : 8010WLA  
 TEST MODE : Tx – 902MHz

### NOTES

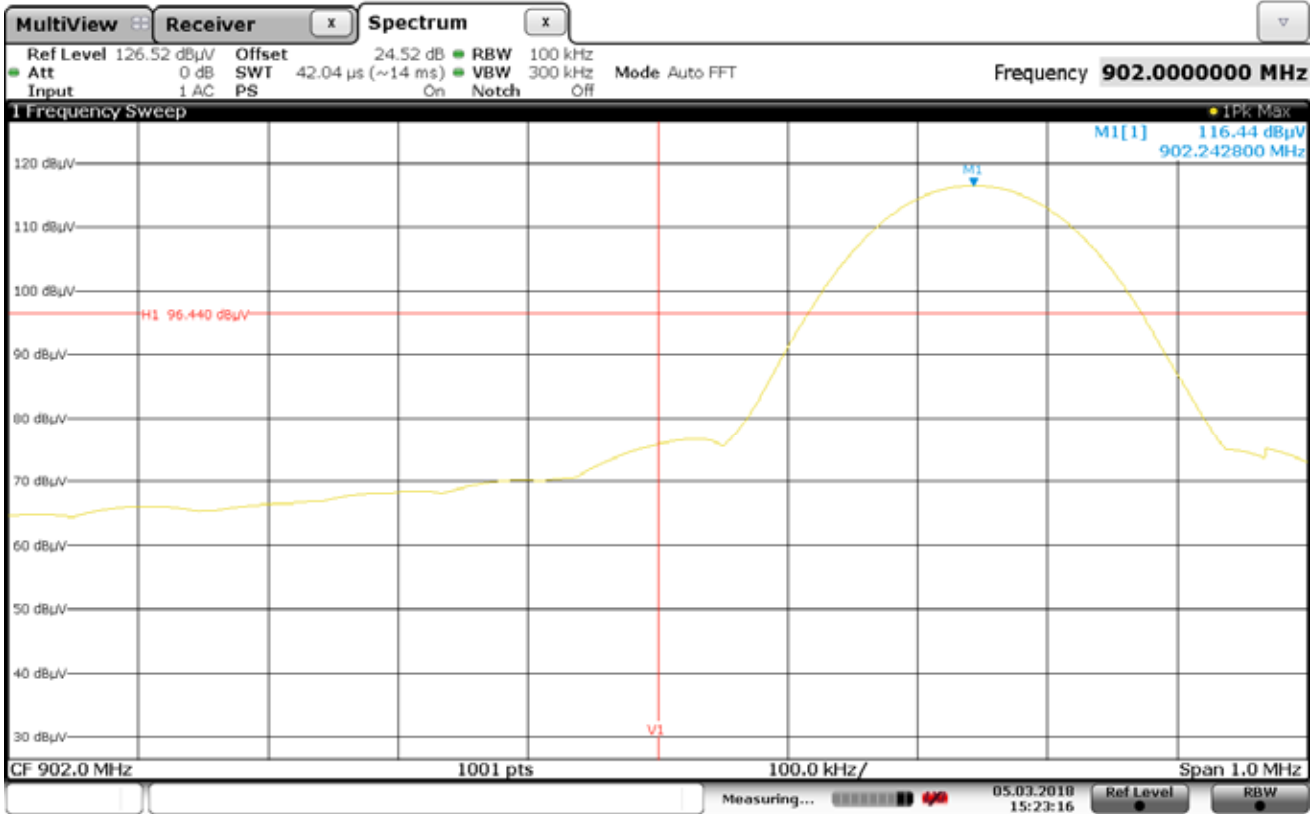


Date: 2.MAR.2018 14:15:42

## BAND EDGE – RADIATED

MANUFACTURER : Chamberlain Group, Inc.  
 TEST ITEM : Garage Door Opener  
 MODEL NUMBER : 8010WLA  
 TEST MODE : Tx – 928MHz

## NOTES

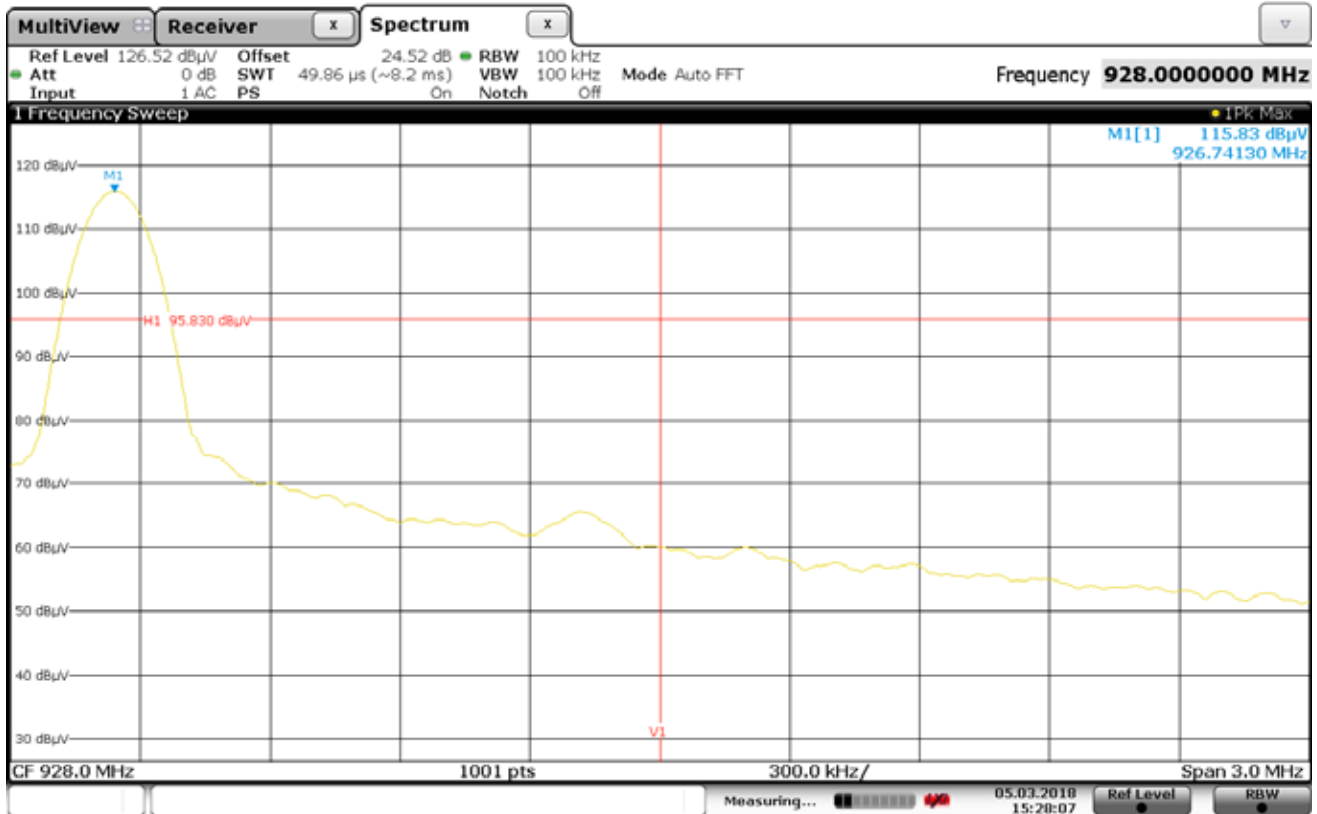


Date: 5.MAR.2018 15:23:15

## BAND EDGE – CONDUCTED

MANUFACTURER : Chamberlain Group, Inc.  
 TEST ITEM : Garage Door Opener  
 MODEL NUMBER : 8010WLA  
 TEST MODE : Tx – 902MHz

## NOTES

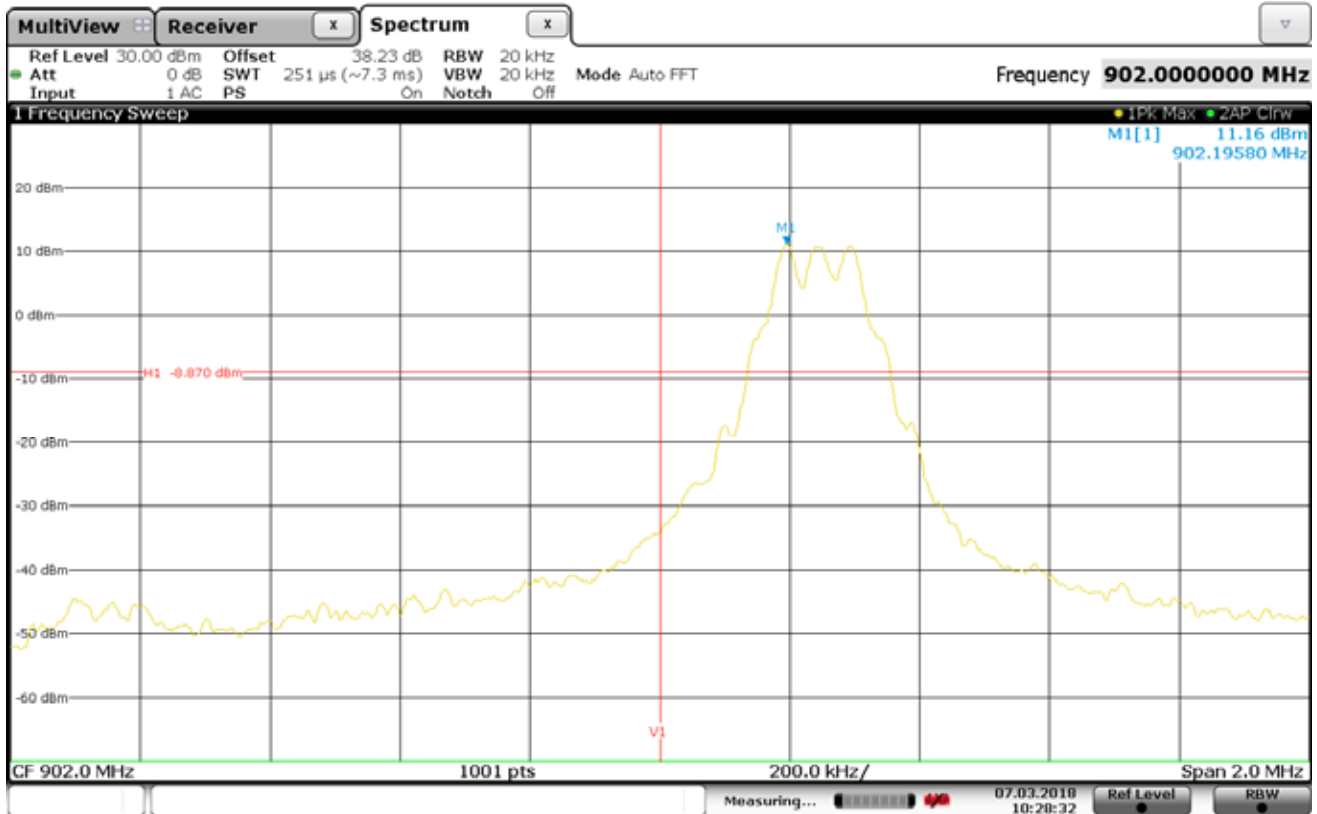


Date: 5.MAR.2018 15:28:07

### BAND EDGE – CONDUCTED

MANUFACTURER : Chamberlain Group, Inc.  
TEST ITEM : Garage Door Opener  
MODEL NUMBER : 8010WLA  
TEST MODE : Tx – 928MHz

### NOTES

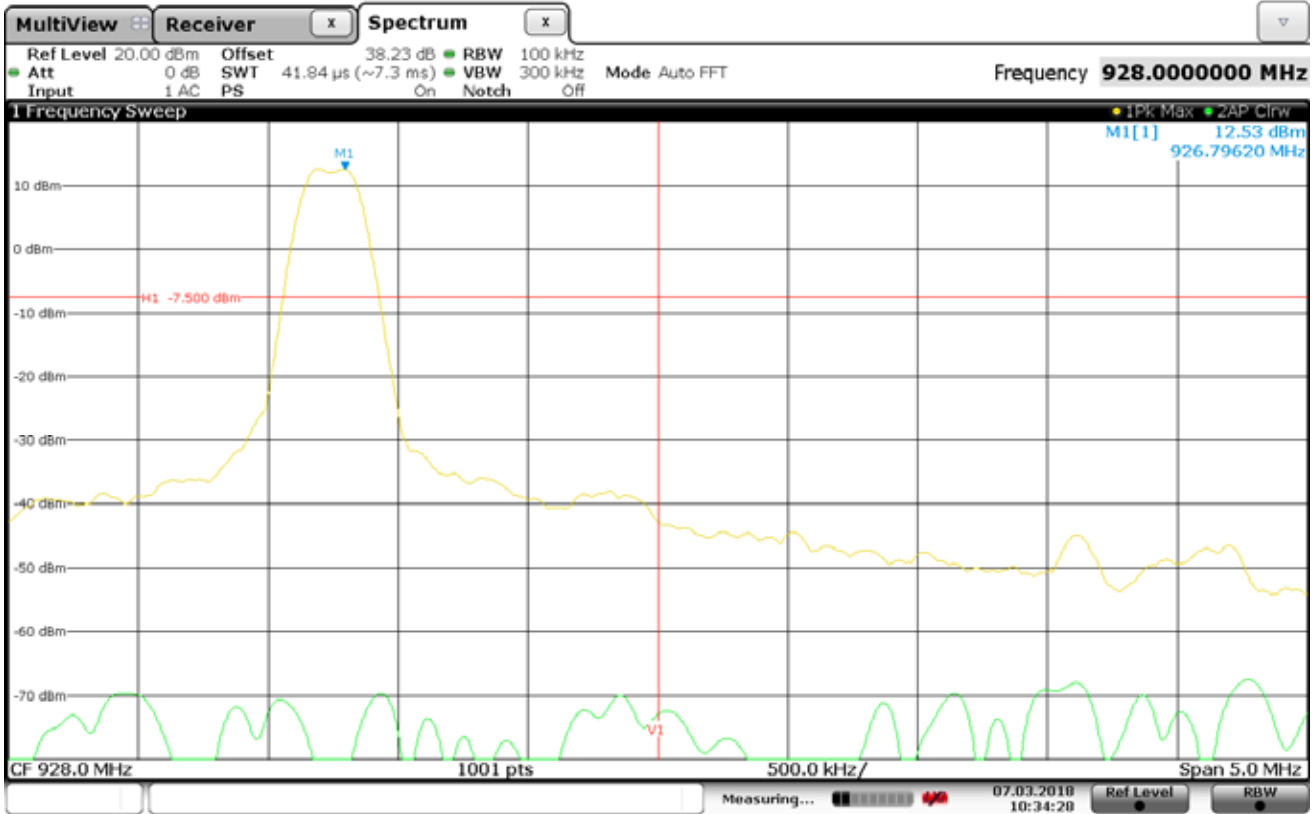


Date: 7.MAR.2018 10:28:31

## BAND EDGE - FHSS

MANUFACTURER : Chamberlain Group, Inc.  
TEST ITEM : Garage Door Opener  
MODEL NUMBER : 8010WLA  
TEST MODE : FHSS

## NOTES



Date: 7.MAR.2018 10:34:28

## BAND EDGE - FHSS

MANUFACTURER : Chamberlain Group, Inc.  
 TEST ITEM : Garage Door Opener  
 MODEL NUMBER : 8010WLA  
 TEST MODE : FHSS

## NOTES