



Measurement of RF Interference from a Jackshaft

For	Genie Company One Door Drive Mount Hope, OH 44660
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REVISION HISTORY

Revision	Date	Description
—	02 Aug 2019	Initial release

Measurement of RF Emissions from a Jackshaft

1. INTRODUCTION

1.1 Scope of Tests

This document represents the results of the series of radio interference measurements performed on a Genie Company Jackshaft, Serial No. None Assigned, (hereinafter referred to as the EUT).

Per Genie Company personnel, the EUT can be sold under the following part numbers which are electrically identical:

Manufacturer	Model No.	Door Type
Genie	6170H	Residential
Genie	6170H-B	Residential
Genie	OPGLDJ0011S	Commercial
Overhead Door	9120H	Residential
Overhead Door	9120H-B	Residential
Overhead Door	OPRLDJ0011S	Commercial

The EUT contains the following:

- Garage door motor with 30 pound load (digital device)
- Superheterodyne receiver designed to receive at 315MHz and 390MHz with a non-removable antenna
- Pre-certified WiFi module (FCC ID: YCJGTIMW300WFL) with a non-removable antenna
- BLE with a non-removable antenna

The EUT was manufactured and submitted for testing by Genie Company located in Mount Hope, OH.

1.2 Purpose

The test series was performed to determine if the EUT meets the conducted RF emission requirements, radiated RF emissions requirements, and additional provisions of the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart B, Sections 15.107 and 15.109, for Class B digital devices and receivers and Subpart C, Sections 15.207 and 15.247 for Intentional Radiators Operating within the 2400-2483.5MHz band.

The test series was also performed to determine if the EUT meets the conducted RF emission requirements, radiated RF emissions requirements, and additional provisions of the Innovation, Science, and Economic Development Canada Radio Standards Specification RSS-Gen Section 8.8 and Section 7.1.2 for receivers, Innovation, Science, and Economic Development Canada Radio Standards Specification RSS-Gen Section 8.8 and Innovation, Science, and Economic Development Canada Radio Standards Specification RSS-247 for Transmitters, and Innovation, Science, and Economic Development Canada ICES-003 section 6.1 and 6.2 for Class B information technology equipment.

Testing was performed in accordance with ANSI C63.4-2014 and ANSI C63.10-2013.

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 Lab Code: 1786-01.

1.5 Laboratory Conditions

The temperature at the time of the test was 22°C and the relative humidity was 38%.

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
- 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"
- Federal Communications Commission Office of Engineering and Technology Laboratory Division, Guidance For Compliance Measurements On Digital Transmissions Systems, Frequency Hopping Spread Spectrum Systems, and Hybrid System Devices Operating Under Section 15.247 of the FCC Rules, April 2, 2019
- Innovation, Science, and Economic Development Canada RSS-247, Issue 2, February 2017, "Spectrum Management and Telecommunications Radio Standards Specification, Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs), and License-Exempt Local Area Network (LE-LAN) Devices"
- Innovation, Science, and Economic Development Canada RSS-GEN, Issue 5, March 2019, "Spectrum Management and Telecommunications Radio Standards Specification, General Requirements for Compliance of Radio Apparatus"
- Innovation, Science, and Economic Development Canada ICES-003, Issue 6, January 2019, Information Technology Equipment (Including Digital Apparatus) – Limits and Methods of Measurement

3. EUT SET-UP AND OPERATION

3.1 General Description

The EUT is a Jackshaft. A block diagram of the EUT setup is shown as Figure 1 and Figure 2.

3.1.1 Power Input

In direct power mode, the EUT obtained 115V 60Hz power via a 3 wire, unshielded power cord. In remote power mode, the EUT was connected to a Class 2 AC transformer via a 20 foot long 3 wire power cable. The Class 2 AC transformer received 115V, 60Hz power via a 3 wire, unshielded power cord. For powerline conducted emissions tests, the high and low leads were connected through a line impedance stabilization network (LISN) which was located on the ground plane. The network complies with the requirements of Paragraph 4.3 of ANSI C63.4-2014.

3.1.2 Peripheral Equipment

The following peripheral equipment was submitted with the EUT:

Item	Description
Lock	Per Genie Company personnel, the following lock model numbers are identical: - PDL-P - OPDL-P - GPDL-P
STBs	Safety Beams
BWC	Basic Wall Console
Jackshaft BBU	Battery Back-up Unit

3.1.3 Interconnect Cables

The following interconnect cables were submitted with the EUT:

Item	Description
STBs cable	2 wires connecting the STBs to the EUT
BWC cable	2 wires connected the BWC to the EUT
BBU cable	2 power leads used to connect the BBU to the EUT

3.1.4 Grounding

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

3.2 Software

For all tests, the Jackshaft PIC had software version JST-V0.000.01F_FCC loaded onto the device to provide correct load characteristics.

3.3 Operational Mode

The EUT and all peripheral equipment were energized. When tests were performed with the motor operating, the motor was set up so that it would alternate between spinning clockwise (CW) and spinning counter-clockwise (CCW) with a 30lb. load.

The EUT was operated in the following modes:

Powerline conducted emissions (direct):

- Motor running CW and CCW with 30lb. load, receive at 315MHz, receive at 390MHz, BLE on, WiFi on

Powerline conducted emissions (with remote Class 2 AC transformer)

- Motor running CW and CCW with 30lb. load, receive at 315MHz, receive at 390MHz, BLE on, WiFi on

Radiated emissions tests (direct power):

- Motor running CW and CCW with 30lb. load, receive at 315MHz, receive at 390MHz, BLE on, WiFi on

Radiated emissions tests (with remote Class 2 AC transformer):

- Motor running CW and CCW with 30lb. load, receive at 315MHz, receive at 390MHz, BLE on, WiFi on

Radiated emissions tests (Battery Backup – no AC power to the EUT):

- Motor running CW and CCW with 30lb. load, receive at 315MHz, receive at 390MHz, BLE on, WiFi on

All tests on the BLE transmitter were performed with the EUT set to the following modes:

- BLE transmit at 2402MHz
- BLE transmit at 2440MHz
- BLE transmit at 2480MHz

3.4 EUT Modifications

No modifications were required for compliance.

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.

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 Transmitter, Receiver, and Digital Device

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), all radio frequency voltages on the power lines of a receiver and digital device shall be below the values shown in Table A when using a quasi-peak or average detector:

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

Per the ISSED RSS-Gen section 7.2 and section 8.8, all radio frequency voltages on the power lines of a receiver and transmitter shall be below the values shown in Table A when using a quasi-peak or average detector:

Per the ISSED ICES-003 section 6.1, all radio frequency voltages on the power lines of a digital device shall be below the values shown in Table A when using a quasi-peak or average detector:

TABLE A

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.

- The EUT was operated in the direct power mode, motor running CW and CCW with 30lb. load, receive at 315MHz, receive at 390MHz, BLE on, WiFi on.
- Measurements were first made on the 115V, 60Hz high line.
- The frequency range from 150 kHz to 30 MHz was broken up into smaller frequency sub-bands.
- Conducted emissions measurements were taken on the first frequency sub-band using a peak detector.
- 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.)
- Steps (d) and (e) 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. The resultant voltage level (VL) is a summation in decibels (dB) of the receiver meter reading (MTR) and the cable loss factor (CF).

$$\text{Formula 1: VL (dBuV) = MTR (dBuV) + CF (dB)}$$

- g) Steps (c) through (f) were repeated on the 115V, 60Hz return line.
- h) Steps (b) through (g) were repeated with the EUT operated in the powered with remote Class 2 AC transformer mode, motor running CW and CCW with 30lb. load, receive at 315MHz, receive at 390MHz, BLE on, WiFi on.

5.1.1.3 Results

Direct power mode, motor running CW and CCW with 30lb. load, receive at 315MHz, receive at 390MHz, BLE on, WiFi on:

The plots of the peak, quasi-peak, and average conducted voltage levels acquired from each input power line are shown on pages 32 and 34. The tabular quasi-peak and average results from each input power are shown on pages 31 and 33. All power line conducted emissions measured from the EUT were within the specification limits.

Powered with remote Class 2 AC transformer mode, motor running CW and CCW with 30lb. load, receive at 315MHz, receive at 390MHz, BLE on, WiFi on:

The plots of the peak, quasi-peak, and average conducted voltage levels acquired from each input power line are shown on pages 36 and 38. The tabular quasi-peak and average results from each input power are shown on pages 35 and 37. All power line conducted emissions measured from the EUT were within the specification limits.

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

5.2 Receiver, and Digital Device

5.2.1 Radiated Measurements

5.2.1.1 Requirements

Per the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart B, 15.109(a), all radio frequency emissions from a receiver or a digital device shall be below the values shown in Table B below.

Per the ISSED RSS-Gen section 7.3, all radio frequency emissions from a receiver shall be below the values shown in Table B below.

Per the ISSED ICES-003 section 6.2.1 and section 6.2.2, all radio frequency emissions from a digital device shall be below the values shown in Table B below.

TABLE B

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

Note 2: Measurements taken with a 120kHz bandwidth.

Frequency MHz	Distance between EUT And Antenna in Meters	Field Strength Limit Peak uV/m	Field Strength Limit Peak dBuV/m	Field Strength Limit Average uV/m	Field Strength Limit Average dBuV/m
>1000	3	5000	74	500	54

Note 1: Measurements taken with a 1MHz Bandwidth.

5.2.1.2 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.

Since a quasi-peak detector and an average detector require a 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 re-measured 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 25GHz 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. The resultant field strength (FS) is a summation in decibels (dB) of the receiver meter reading (MTR), the antenna correction factor (AF), and the cable loss factor (CF). If an external preamplifier is used, the total is reduced by its gain (-PA). If a distance correction (DC) is required, it is added to the total.

Formula 1: $FS \text{ (dBuV/m)} = MTR \text{ (dBuV)} + AF \text{ (dB/m)} + CF \text{ (dB)} + (-PA \text{ (dB)}) + DC \text{ (dB)}$

To convert the Field Strength dBuV/m term to uV/m, the dBuV/m is first divided by 20. The Base 10 AntiLog is taken of this quotient. The result is the Field Strength value in uV/m terms.

Formula 2: $FS \text{ (uV/m)} = \text{AntiLog} [(FS \text{ (dBuV/m)})/20]$

Final radiated emissions were performed on all significant broadband and narrowband emissions found in the exploratory 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.

5.2.1.3 Results

Direct power mode, motor running CW and CCW with 30lb. load, receive at 315MHz, receive at 390MHz, BLE on, WiFi on:

The plots of the peak and quasi-peak radiated emissions levels from 30MHz to 1GHz are presented on pages 39 and 40. The plots of the peak and average radiated emissions levels above 1GHz are presented on pages 41 and 42. The tabular peak and quasi-peak data from 30MHz to 1GHz are presented on page 43. The tabular peak and average data above 1GHz are presented on page 44. Testing was performed up to 5GHz per RSS-Gen section 7.3 which states that spurious emissions tests on a receiver shall be performed up to at least 5 times the highest tunable frequency.

All emissions measured from the EUT met the quasi-peak limit below 1GHz and met both the peak limit and average limit above 1GHz.

Powered with remote Class 2 AC transformer mode, motor running CW and CCW with 30lb. load, receive at 315MHz, receive at 390MHz, BLE on, WiFi on:

The plots of the peak and quasi-peak radiated emissions levels from 30MHz to 1GHz are presented on pages 45 and 46. The plots of the peak and average radiated emissions levels above 1GHz are presented on pages 47 and 48. The tabular peak and quasi-peak data from 30MHz to 1GHz are presented on page 49. The tabular peak and average data above 1GHz are presented on page 50. Testing was performed up to 5GHz per RSS-Gen section 7.3 which states that spurious emissions tests on a receiver shall be performed up to at least 5 times the highest tunable frequency.

All emissions measured from the EUT met the quasi-peak limit below 1GHz and met both the peak limit and average limit above 1GHz.

Battery backup power mode, motor running CW and CCW with 30lb. load, receive at 315MHz, receive at 390MHz, BLE on, WiFi on:

The plots of the peak and quasi-peak radiated emissions levels from 30MHz to 1GHz are presented on pages 51 and 52. The plots of the peak and average radiated emissions levels above 1GHz are presented on pages 53 through 56. The tabular peak and quasi-peak data from 30MHz to 1GHz are presented on page 57. The tabular peak and average data above 1GHz are presented on page 58. Testing was performed up to 25GHz per FCC 15.33 which states that spurious emissions tests on a transmitter shall be performed up to at least the 10th harmonic of the highest fundamental frequency.

All emissions measured from the EUT met the quasi-peak limit below 1GHz and met both the peak limit and average limit above 1GHz.

Photographs of the test configuration which yielded the highest or worst case, conducted emission levels are shown in Figure 4 through Figure 6.

5.3 Transmitter

5.3.1 Powerline Conducted Emissions

5.3.1.1 Requirements

See section 5.1 of this report.

5.3.2 6dB Bandwidth

Per FCC 15.247(a)(2) and ISSED RSS-247 section 5.2.(a), the minimum 6dB bandwidth shall be at least 500kHz for all systems using digital modulation techniques.

5.3.2.1 Procedures

- a) The antenna port of the EUT was connected to the DUT 1 port of the Rohde & Schwarz OSP 120/OSP-B157 system via a coaxial cable and RF attenuator.
- b) The Rohde & Schwarz OSP 120 RF switches were used to connect the inputs of the DUT ports (DUT 1, DUT 2, etc.) to the inputs of the ESW 44 EMI test receiver via a coaxial cable.
- c) The EUT was powered up and set to transmit in the first mode listed in section 3.3.
- d) The following settings were employed on the EMI test receiver:
 1. Center Frequency = Transmit Frequency of the DUT
 2. Frequency Span = 2 x Occupied Channel Bandwidth
 3. RBW = 100kHz
 4. VBW = 3 x RBW
 5. Detector Mode = Max Peak
 6. Trace Mode = Max Hold
- e) Allow the trace to stabilize.
- f) Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).
- g) Determine the 6dB down amplitude.
- h) Place two markers, one at the lowest frequency and the other at the highest frequency of the envelope trace, such that each marker is at or slightly below the 6dB down amplitude determined in step g). If a marker is below this 6dB down amplitude value, then it shall be as close as possible to this value. The occupied bandwidth is the frequency difference between the two markers.
- i) Steps c) through h) were repeated for each of the modes listed in section 3.3.

5.3.2.2 Results

The plots on pages 59 through 61 show that the minimum 6 dB bandwidth was 0.990099MHz which is greater than minimum allowable 6dB bandwidth requirement of 500kHz for systems using digital modulation techniques. The 99% bandwidth plots are shown on pages 62 through 64. The maximum 99% bandwidth was measured to be 1.8MHz.

5.3.3 Peak Output Power

5.3.3.1 Requirements

Per FCC 15.247(b)(3) and ISSED RSS-247 5.4(d) for systems using digital modulation, the maximum peak output conducted power shall not be greater than 1.0W (30dBm).

5.3.3.2 Procedures

- a) The antenna port of the EUT was connected to the DUT 1 port of the Rohde & Schwarz OSP 120/OSP-B157 system via a coaxial cable and RF attenuator.
- b) The Rohde & Schwarz OSP 120 RF switches were used to connect the inputs of the DUT ports (DUT 1, DUT 2, etc.) to the inputs of the ESW 44 EMI test receiver via a coaxial cable.
- c) The EUT was powered up and set to transmit in the first mode listed in section 3.3.
- d) The following settings were employed on the EMI test receiver:
 1. Center Frequency = Transmit Frequency of the DUT
 2. Frequency Span = 3MHz

- | | |
|------------------|-------------|
| 3. RBW | = 1MHz |
| 4. VBW | = 3MHz |
| 5. Detector Mode | = Max Peak |
| 6. Trace Mode | = Max Hold |
| 7. Sweep Points | = 101 |
| 8. Sweep Time | = 4.210usec |

e) Record the highest value.

f) Steps c) through e) were repeated for each of the modes listed in section 3.3.

5.3.3.3 Results

The results are presented on page 65. The maximum peak conducted output power from the transmitter was 1.5mW (2.0 dBm) which is below the 1 Watt limit.

5.3.4 EIRP

5.3.4.1 Requirements

Per FCC 15.247(b)(3) and ISSED RSS-247 5.4(d) for systems using digital modulation, the maximum peak output conducted power shall not be greater than 1.0W (30dBm). Per FCC section 15.247(b)(4) and ISSED RSS-247 5.4(d), 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).

5.3.4.2 Procedures

The EUT was placed on the non-conductive stand and set to transmit. A double ridged waveguide 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 6dB 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 channels.

The equivalent power was determined from the field intensity levels measured at 3 meters using the substitution method. To determine the emission power, a double ridged waveguide antenna was then set in place of the EUT and connected to a calibrated signal generator. The output of the signal generator was adjusted to match the received level at the spectrum analyzer. The signal level was recorded. The reading was then corrected to compensate for cable loss and antenna gain for all measurements above 1GHz, as required. The peak power output was calculated for low, middle, and high channels.

5.3.4.3 Results

The results are presented on pages 66 through 68. The maximum EIRP measured from the transmitter was 0.275 mW (-5.6dBm) which is below the 4 Watt limit.

5.3.5 Duty Cycle Factor Measurements

5.3.5.1 Requirements

Per ANSI C63.10 section 11.6, when continuous transmission cannot be achieved and sweep triggering/signal gating cannot be implemented, alternative procedures are provided that can be used to measure the average power; however, they will require an additional measurement of the transmitter duty cycle (D). The duty cycle refers to the fraction of time over which the transmitter is ON and is transmitting.

5.3.5.2 Procedures

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 500usec/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. The ON time of the pulse is measured. Next the markers are set at the beginning and end of each word period. The total word period is measured. The duty cycle (DC) is then computed as the (On-time/ word period) where the word period = (On-time + Off-time). The duty cycle correction factor formula is:

$$\text{Duty Cycle Correction Factor} = 20 \times \log (1/\text{DC})$$

5.3.5.3 Results

The plots of the duty cycle are shown on data pages 69 through 70. As can be seen from the data, the duty cycle correction factor was calculated to be 1.01dB.

5.3.6 Radiated Spurious Emissions Measurements

5.3.6.1 Requirements

Per section 15.247(d) (and RSS-247 section 5.5), 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 a radiated emissions measurement. Attenuation below the general limits specified in §15.209(a) (and RSS-Gen Table 5) is not required.

Radiated emissions which fall in the restricted bands, as defined in §15.205(a) (and RSS-Gen, Table 7) must comply with the radiated emission limits specified in §15.209(a) (and RSS-Gen, Table 5).

Paragraph 15.209(a) (and RSS-Gen, Table 5 and Table 6) has the following radiated emission limits:

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

5.3.6.2 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 powerlines and signal lines entering the enclosure pass through filters on the enclosure wall. The powerline filters prevent extraneous signals from entering the enclosure on these leads.

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

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

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

- a) The field strength of the fundamental was measured using a double ridged waveguide antenna. The waveguide antenna was positioned at a 3 meter distance from the EUT. The EUT was placed on a 1.5 meter high non-conductive stand. 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. The EUT was placed on a 1.5 meter high non-conductive stand. 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) (and RSS-Gen, Table 5) 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. The EUT was placed on an 80cm high non-conductive stand. 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. The EUT was placed on a 1.5 meter high non-conductive stand. 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) (and RSS-Gen, Table 5), no further measurements are required. If however, the peak readings exceed the limits listed in 15.209(a) (and RSS-Gen, Table 5), 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.

When continuous transmission cannot be achieved, the duty cycle correction factor is added to the reading to compute the emission level that would have been measured had the test been performed at 100% duty cycle.

5.3.6.3 Results

Transmit at 2402MHz:

Preliminary radiated emissions plots and final radiated emissions data are presented on pages 71 through 81. As can be seen from the data, all emissions measured from the EUT were within the specification limits.

Transmit at 2440MHz:

Preliminary radiated emissions plots and final radiated emissions data are presented on pages 82 through 92. As can be seen from the data, all emissions measured from the EUT were within the specification limits.

Transmit at 2480MHz:

Preliminary radiated emissions plots and final radiated emissions data are presented on pages 93 through 103. 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 in Figure 4, Figure 7, and Figure 8.

5.3.7 Band Edge Compliance

5.3.7.1 Requirements

Per FCC 15.247(d) and ISSED RSS-247 section 5.5, 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) and RSS-Gen is not required.

In addition, the radiated emissions which fall in the restricted band beginning at 2483.5 MHz must meet the general limits of 15.209(a) (and RSS-Gen, Table 5).

5.3.7.2 Procedures

5.3.7.2.1 Low Band Edge

- The antenna port of the EUT was connected to the DUT 1 port of the Rohde & Schwarz OSP 120/OSP-B157 system via a coaxial cable and RF attenuator.
- The Rohde & Schwarz OSP 120 RF switches were used to connect the inputs of the DUT ports (DUT 1, DUT 2, etc.) to the inputs of the ESW 44 EMI test receiver via a coaxial cable.
- The EUT was powered up and set to transmit in the first mode listed in section 3.3.
- The following settings were employed on the EMI test receiver:

Sweep 1:

- | | |
|--------------------|-------------|
| 1. Start Frequency | = 2400MHz |
| 2. Stop Frequency | = 2483.5MHz |
| 3. RBW | = 100kHz |
| 4. VBW | = 300kHz |
| 5. Detector Mode | = Max Peak |
| 6. Trace Mode | = Max Hold |

- 7. Sweep Points = 1670
- 8. Sweep Time = 1.67 msec
- 9. Sweep Count = 100

- e) The highest value in Sweep 1 was recorded.
- f) The limit line for Sweep 2 was set at 20dB down from the highest value recorded in Sweep 1.

Sweep 2:

- 1. Start Frequency = 2310MHz
- 2. Stop Frequency = 2400MHz
- 3. RBW = 100kHz
- 4. VBW = 300kHz
- 5. Detector Mode = Max Peak
- 6. Trace Mode = Max Hold
- 7. Sweep Points = 1800
- 8. Sweep Time = 1.8 msec
- 9. Sweep Count = 100

- g) The highest values in Sweep 2 were recorded and compared to the 20dB down limit which was determined from Sweep 1.
- h) The two sweeps were combined and plotted.

5.3.7.2.2 High Band Edge

- a) The EUT was set to transmit continuously, with modulation on, at the channel closest to the high band edge.
- b) A double ridged waveguide was placed 3 meters away from the EUT. The antenna was connected to the input of a spectrum analyzer.
- c) The start frequency of the analyzer was set to the high band edge (2483.5MHz). The frequency span was set to 10MHz.
- d) The resolution band width was set to 1MHz.
- e) To ensure that the maximum or worst case emission level was measured, the following steps were taken:
 - a. The EUT was rotated so that all of its sides were exposed to the receiving antenna.
 - b. Since the measuring antenna is linearly polarized, both horizontal and vertical field components were measured.
 - c. The measuring antenna was raised and lowered from 1 to 4 meters for each antenna polarization to maximize the readings.
- f) The highest measured peak reading was recorded.
- g) The highest measured average reading was recorded.

5.3.7.3 Results

Pages 104 through 106 show the band edge compliance results. As can be seen from these plots, the conducted emissions at the low end band edge are within the 20 dB down limits. The radiated emissions at the high end band edge are within the general limits.

5.3.8 Power Spectral Density

5.3.8.1 Requirement

Per FCC 15.247(f) and ISSED RSS-247 section 5.2.(b), the peak power spectral density from the intentional radiator shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

5.3.8.2 Procedures

- a) The antenna port of the EUT was connected to the DUT 1 port of the Rohde & Schwarz OSP 120/OSP-B157 system via a coaxial cable and RF attenuator.
- b) The Rohde & Schwarz OSP 120 RF switches were used to connect the inputs of the DUT ports (DUT 1, DUT 2, etc.) to the inputs of the ESW 44 EMI Test Receiver via a coaxial cable.
- c) The EUT was powered up and set to transmit in the first mode listed in section 3.3.
- d) The following settings were employed on the EMI Test Receiver:
 - a. Center frequency = transmit frequency
 - b. Span = 3MHz
 - c. Resolution bandwidth (RBW): $3\text{kHz} \leq \text{RBW} \leq 100\text{kHz}$
 - d. VBW = 3 x RBW
 - e. Sweep Points = 600
 - f. Sweep time = 3 msec
 - g. Sweep Count = 100
 - h. The peak detector and 'Max-Hold' function was engaged.
 - i. The display line represents the 8 dBm limit
- e) If the measured value exceeds the 8dBm limit, the RBW was reduced (no less than 3kHz) and step d) was repeated.

Results

Pages 107 through 109 show the power spectral density results. As can be seen from the data, the peak power density is less than 8dBm in a 3kHz band during any time interval of continuous transmission.

5.3.9 Intermodulation Case Spurious Radiated Emissions

5.3.9.1 Requirements

Per FCC KDB 996369 section VII and footnote 9, a transmitter module capable of transmitting simultaneously with another transmitter must be tested by following the simultaneous test procedures described in 15.31(k).

15.31(k) states that composite systems (i.e., systems that incorporate different devices contained in a single enclosure or in separate enclosures connected by wire or cable) shall be measured for compliance with the technical standards in accordance with the procedures in §2.947(f).

2.947(f) states that if the individual devices in a composite system are subject to different technical standards, each such device must comply with its specific standards. In no event may the measured emissions of the composite system exceed the highest level permitted for an individual component. Testing for compliance with the different standards shall be performed with all of the devices in the system functioning.

FCC 15.247 (WiFi, BLE):

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 band width 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

5.3.9.2 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.

1. Preliminary radiated measurements were performed to determine the frequencies where the significant emissions might be found. With the EUT at one set position and the measurement antenna at a set height (i.e. without maximizing), the radiated emissions were measured using a peak detector and automatically plotted. The broadband measuring antenna was positioned at a 3 meter distance from the EUT. This data was then automatically plotted from 10MHz through 25GHz. All preliminary tests were performed separately with the EUT operating in the intermodulation mode listed in Paragraph 3.3.
2. All significant broadband and narrowband signals found in the preliminary sweeps were then measured using a peak detector at a test distance of 3 meters. The measurements were made with an active loop antenna below 30MHz, a bilog antenna from 30MHz to 1GHz, and a double ridged waveguide antenna over the frequency range of 1GHz to 25GHz.
3. To ensure that maximum 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 antennas are 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.

5.3.9.3 Results

WiFi: Transmit on Ch. 1, BLE: Transmit at 2402MHz:

The plots of the peak preliminary spurious radiated emissions are presented on pages 110 through 115. The final radiated emissions data are shown on page 116. As can be seen from the data, the intermodulation product of simultaneous transmissions from the EUT did meet the case spurious radiated emissions requirements.

WiFi: Transmit on Ch. 1, BLE: Transmit at 2440MHz:

The plots of the peak preliminary spurious radiated emissions are presented on pages 117 through 122. The final radiated emissions data are shown on pages 123 and 124. As can be seen from the data, the intermodulation product of simultaneous transmissions from the EUT did meet the case spurious radiated emissions requirements.

WiFi: Transmit on Ch. 1, BLE: Transmit at 2440MHz:

The plots of the peak preliminary spurious radiated emissions are presented on pages 125 through 130. The final radiated emissions data are shown on pages 131 through 133. As can be seen from the data, the intermodulation product of simultaneous transmissions from the EUT did meet the case spurious radiated emissions requirements.

Photographs of the test setup are shown in Figure 4 and Figure 7.

6. CONCLUSIONS

It was determined that the Genie Company Jackshaft, Serial No. None Assigned did fully meet the conducted RF emission requirements, radiated RF emissions requirements, and additional provisions of the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart B, Sections 15.107 and 15.109, for Class B digital devices and receivers and Subpart C, Sections 15.207 and 15.247 for Intentional Radiators Operating within the 2400-2483.5MHz band, when tested per ANSI C63.4-2014 and ANSI C63.10-2013.

It was also determined that the Genie Company Jackshaft, Serial No. None Assigned did fully meet the conducted RF emission requirements, radiated RF emissions requirements, and additional provisions of the Innovation, Science, and Economic Development Canada Radio Standards Specification RSS-Gen Section 8.8 and Section 7.1.2 for receivers, Innovation, Science, and Economic Development Canada Radio Standards Specification RSS-Gen Section 8.8 and Innovation, Science, and Economic Development Canada Radio Standards Specification RSS-247 for Transmitters, and Innovation, Science, and Economic Development Canada ICES-003 section 6.1 and 6.2 for Class B information technology equipment when tested per ANSI C63.4-2014 and ANSI C63-10-2013.

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 certification, approval, or endorsement by A2LA, NIST or any agency of the Federal Government.

9. EQUIPMENT LIST

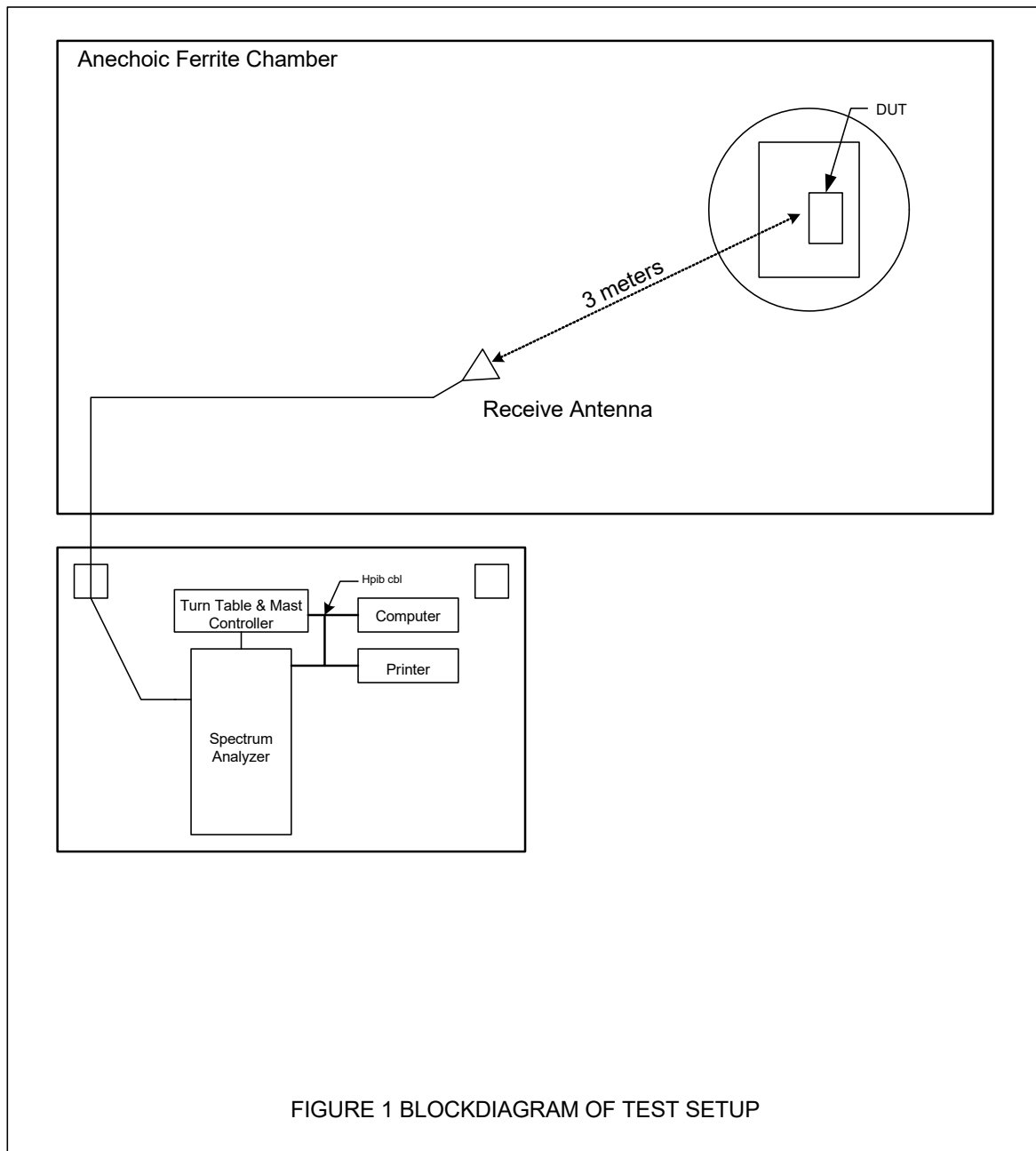
Table 9-1 Equipment List

Eq ID	Equipment Description	Manufacturer	Model No.	Serial No.	Frequency Range	Cal Date	Due Date
APW0	PREAMPLIFIER	PLANAR ELECTRONICS	PE2-30-20G20R6G	PL2926/0646	20GHZ-26.5GHZ	4/8/2019	4/8/2020
APW10	PREAMPLIFIER	PMI	PE2-35-120-5R0-10-12-SFF	PL9609/1139	1GHZ-20GHZ	4/8/2019	4/8/2020
GRE2	SIGNAL GENERATOR	AGILENT	E4438C	MY42081749	250KHZ-6GHZ	2/28/2019	2/28/2020
NHG0	STANDARD GAIN HORN ANTENNA	NARDA	638	---	18-26.5GHZ	NOTE 1	
NTA4	BILOG ANTENNA	TESEQ	6112D	46660	20-2000GHZ	9/5/2018	9/5/2019
NWQ2	DOUBLE RIDGED WAVEGUIDE ANTENNA	ETS LINDGREN	3117	66659	1GHZ-18GHZ	3/22/2018	3/22/2020
PLF1	CISPR16 50UH LISN	ELITE	CISPR16/70A	001	.15-30MHz	4/24/2019	4/24/2020
PLF3	CISPR16 50UH LISN	ELITE	CISPR16/70A	003	.15-30MHz	4/24/2019	4/24/2020
RBG0	EMI ANALYZER	ROHDE & SCHWARZ	ESW44	101533	10HZ-44GHZ	12/5/2018	12/5/2019
RBG2	EMI ANALYZER	ROHDE & SCHWARZ	ESW44	101591	2HZ-44GHZ	2/21/2019	2/21/2020
SES0	24VDC POWER SUPPLY	P-TRANS	FS-32024-1M	001	18-27VDC	NOTE 1	
VBR8	CISPR EN FCC CE VOLTAGE.exe						
VBV2	CISPR EN FCC ICES RE.EXE	ELITE	CISPR EN FCC ICES RE.EXE	---	---	N/A	
WKA1	SOFTWARE, UNIVERSAL RCV EMI	ELITE	UNIV_RCV_EMI	1	---	I/O	
XOB2	ADAPTER	HEWLETT PACKARD	K281C,012	09407	18-26.5GHZ	NOTE 1	
XPR0	HIGH PASS FILTER	K&L MICROWAVE	11SH10-4800/X20000	001	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.



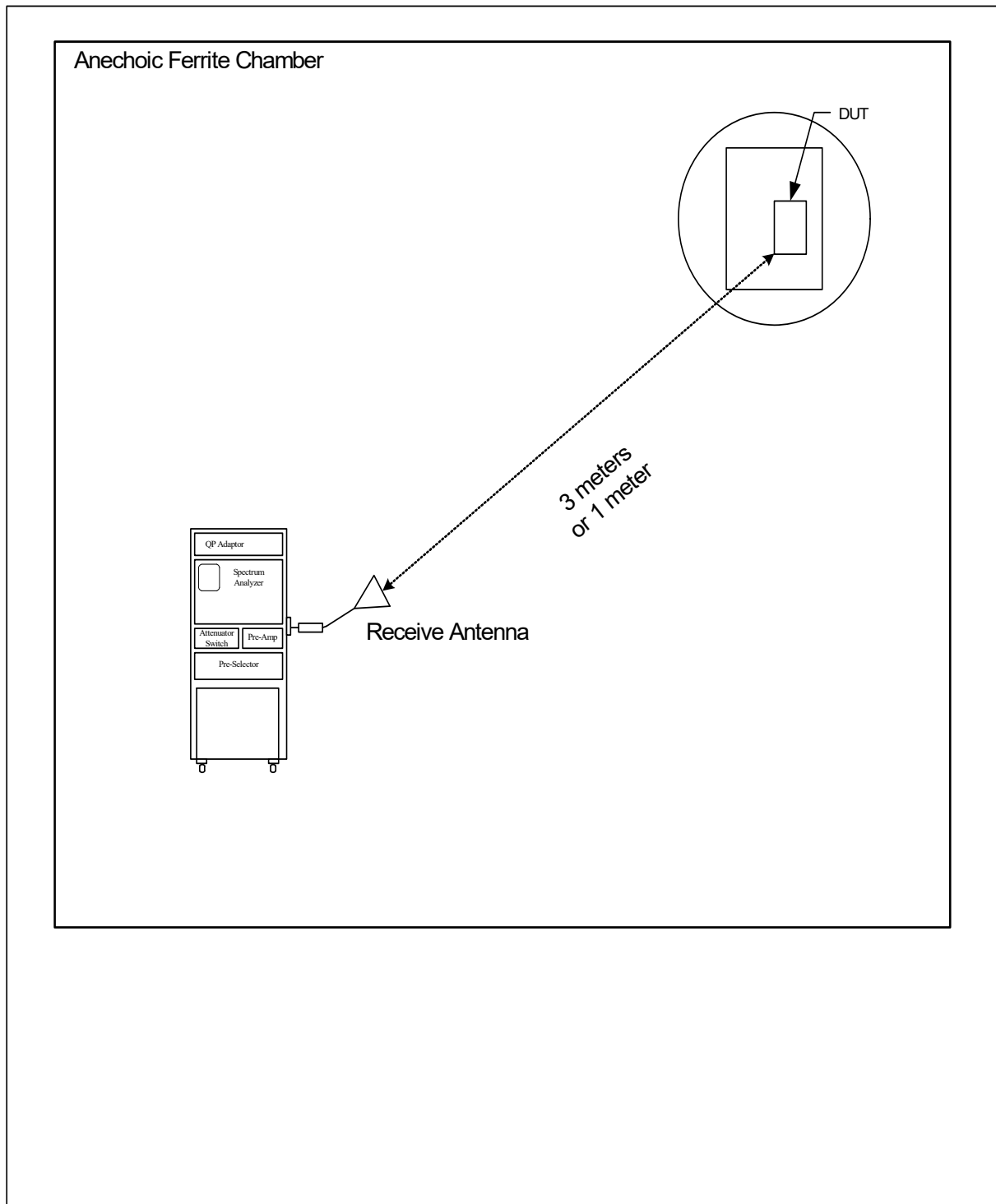
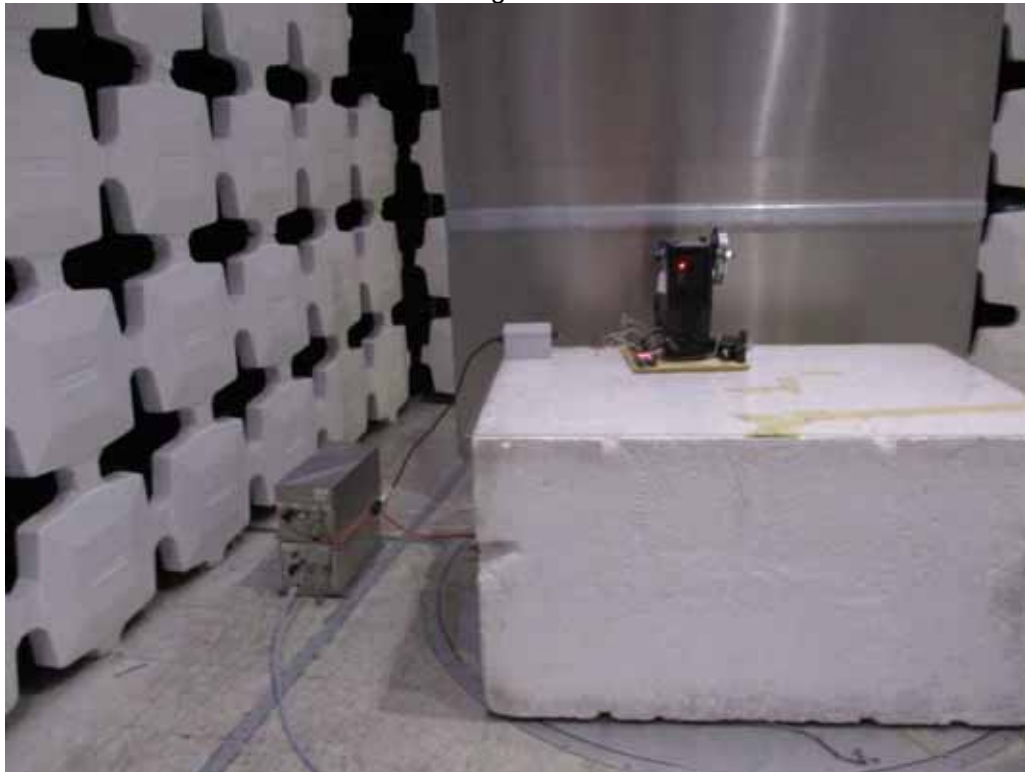


Figure 2: BLOCK DIAGRAM OF TEST SETUP FOR RADIATED EMISSIONS ABOVE 18GHZ

Figure 3



Test Setup for Conducted Emissions

Figure 4

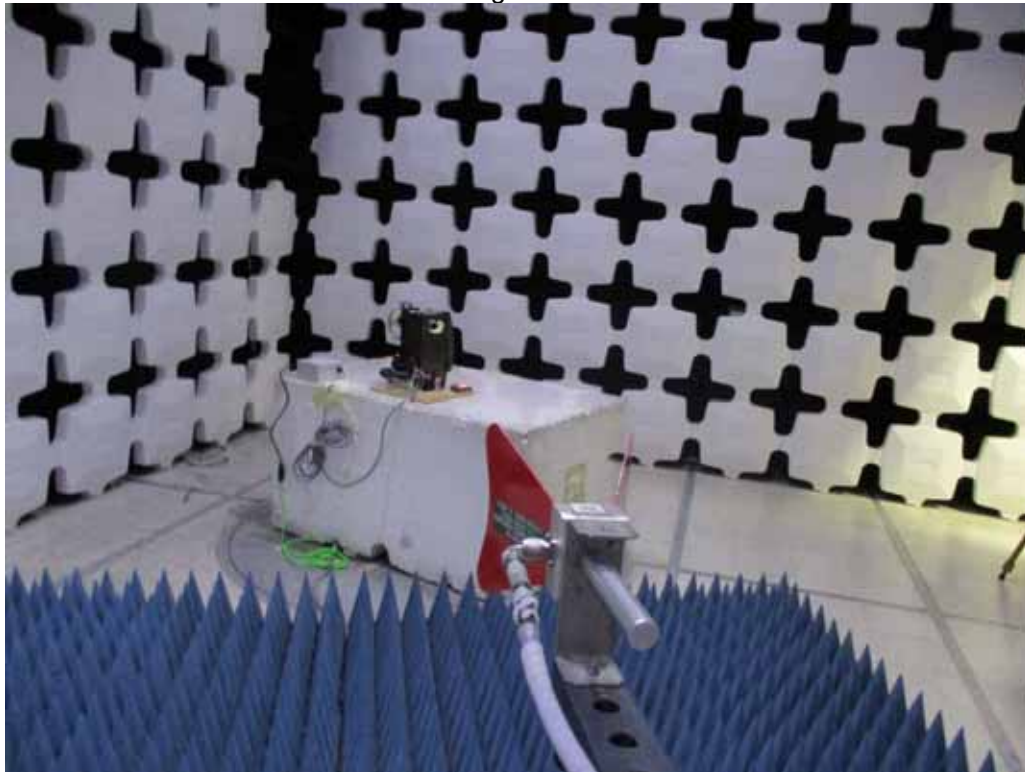


Test Setup for Radiated Emissions – 30MHz to 1GHz, Horizontal Polarization

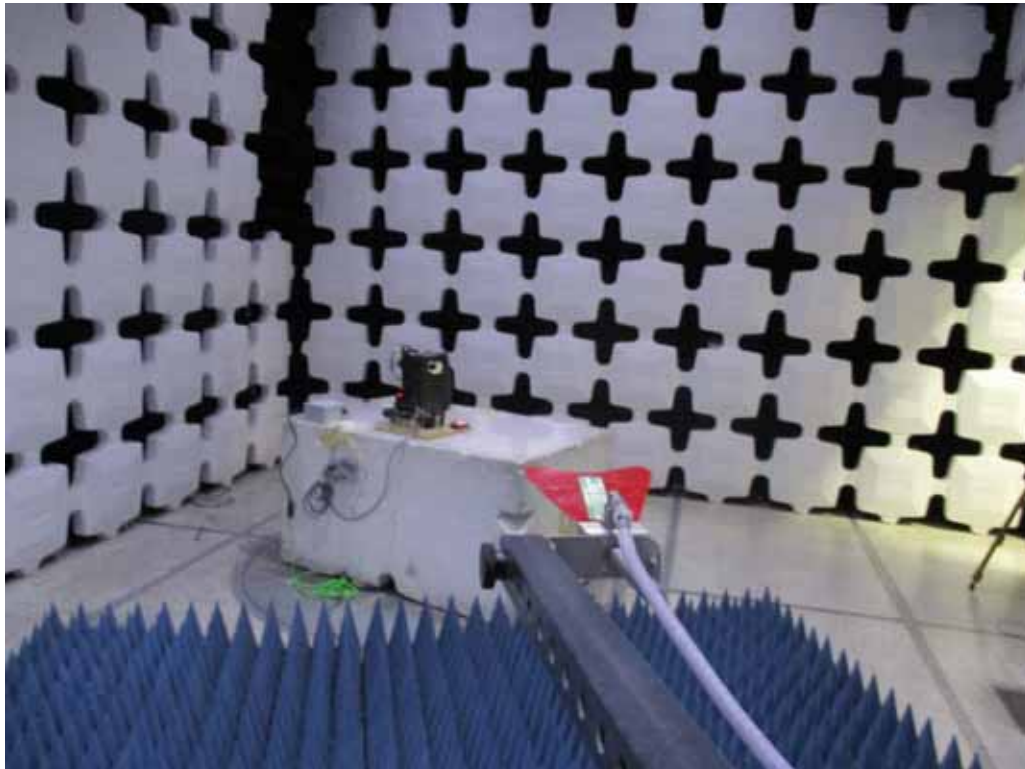


Test Setup for Radiated Emissions – 30MHz to 1GHz, Vertical Polarization

Figure 5

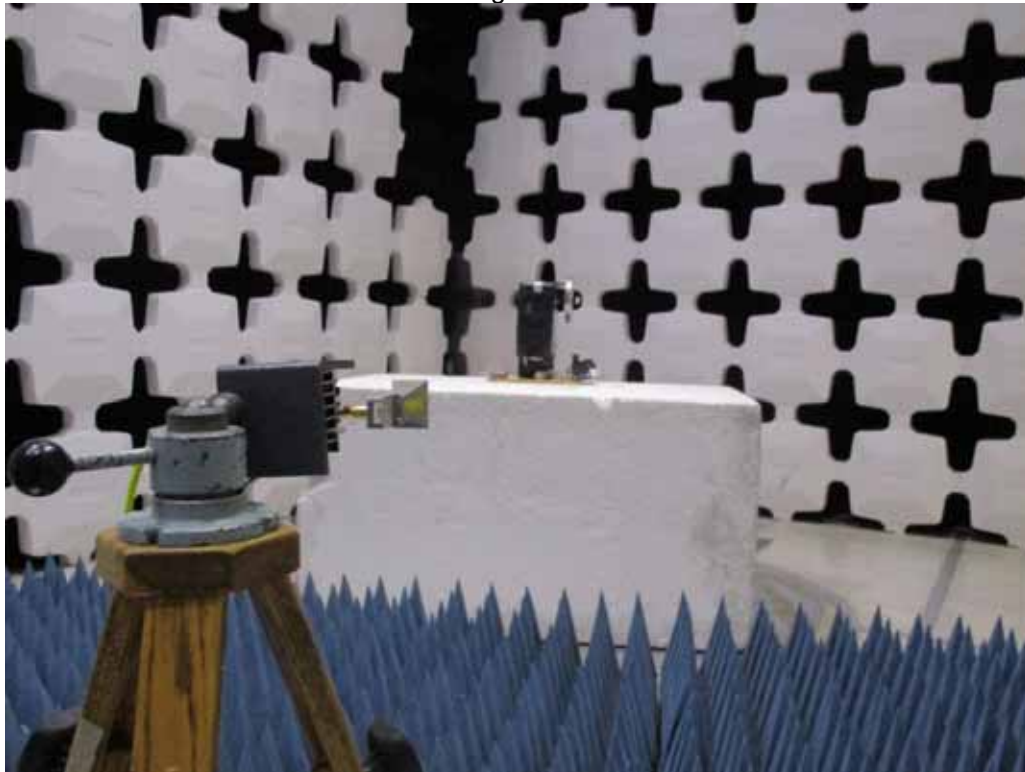


Test Setup for Radiated Emissions, Receivers and Digital Device– 1GHz to 18GHz,
Horizontal Polarization

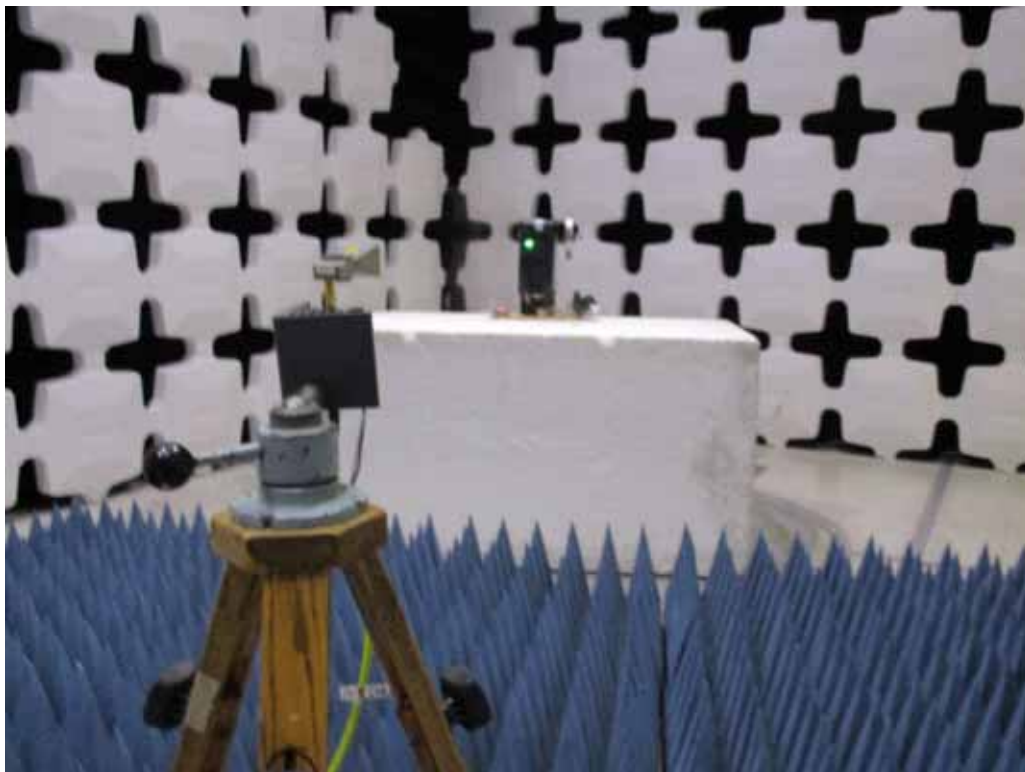


Test Setup for Radiated Emissions, Receivers and Digital Device– 1GHz to 18GHz,
Vertical Polarization

Figure 6

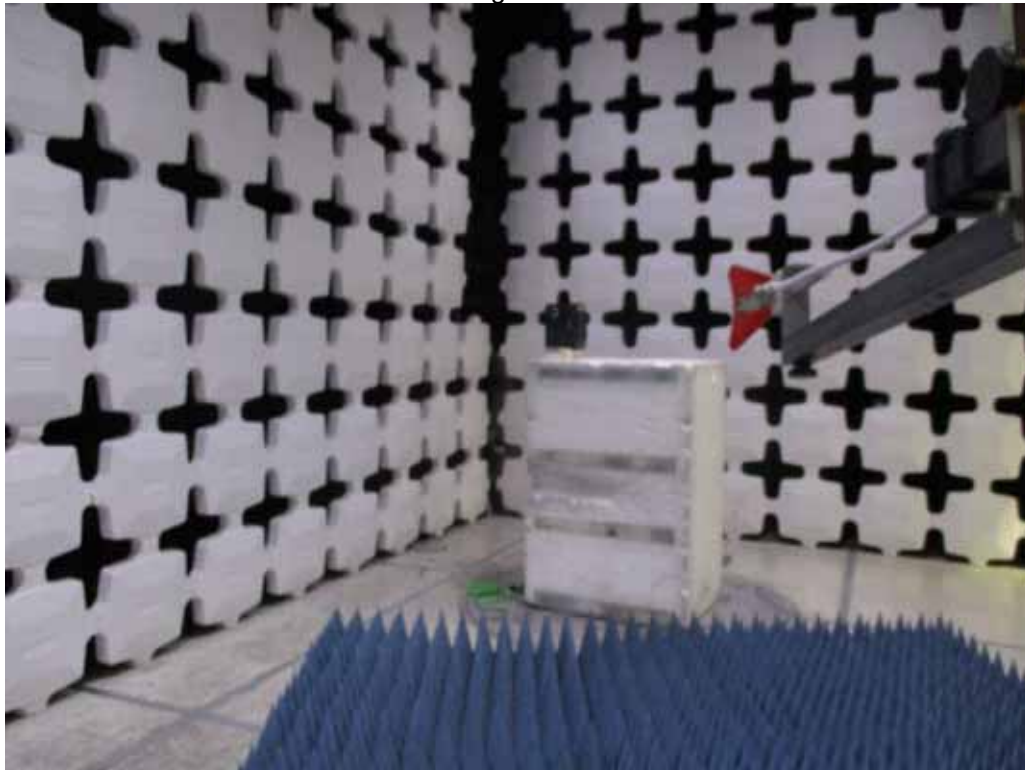


Test Setup for Radiated Emissions, Receivers and Digital Device– Above 18GHz,
Horizontal Polarization

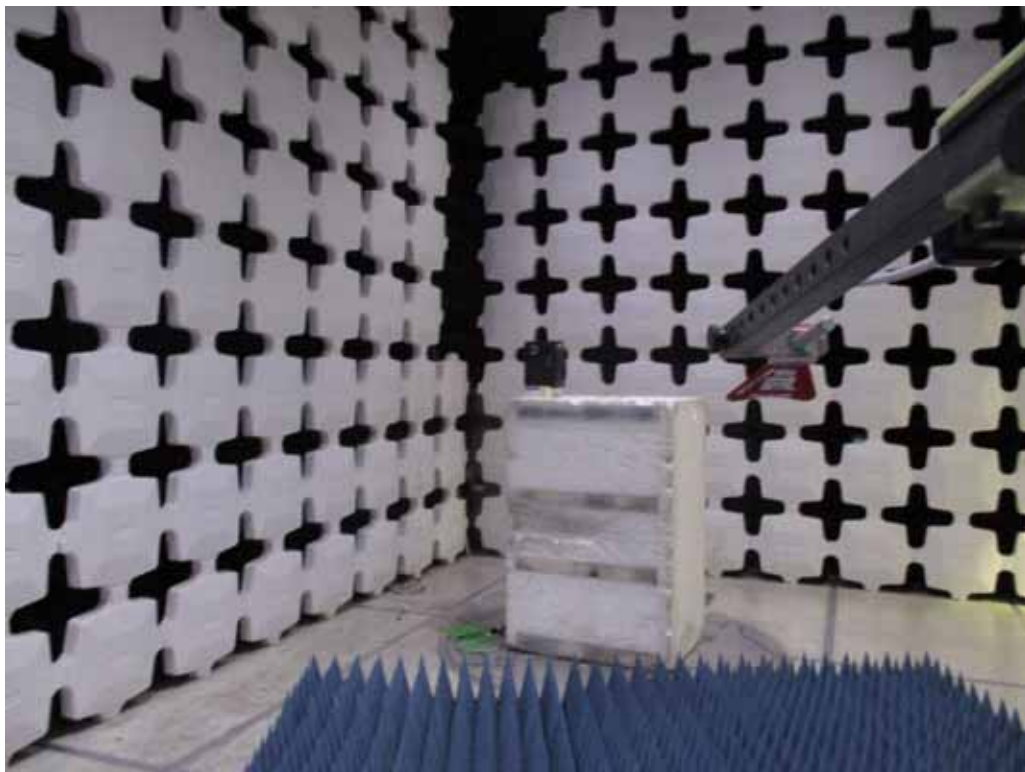


Test Setup for Radiated Emissions, Receivers and Digital Device– Above 18GHz,
Vertical Polarization

Figure 7



Test Setup for Radiated Emissions, Transmitters– 1GHz to 18GHz, Horizontal Polarization



Test Setup for Radiated Emissions, Transmitters– 1GHz to 18GHz, Vertical Polarization

Figure 8



Test Setup for Radiated Emissions, Transmitters– Above 18GHz, Horizontal Polarization



Test Setup for Radiated Emissions, Transmitters– Above 18GHz, Vertical Polarization

FCC Part 15 Subpart B Conducted Emissions Test

Significant Emissions Data

VBR8 04/23/2015

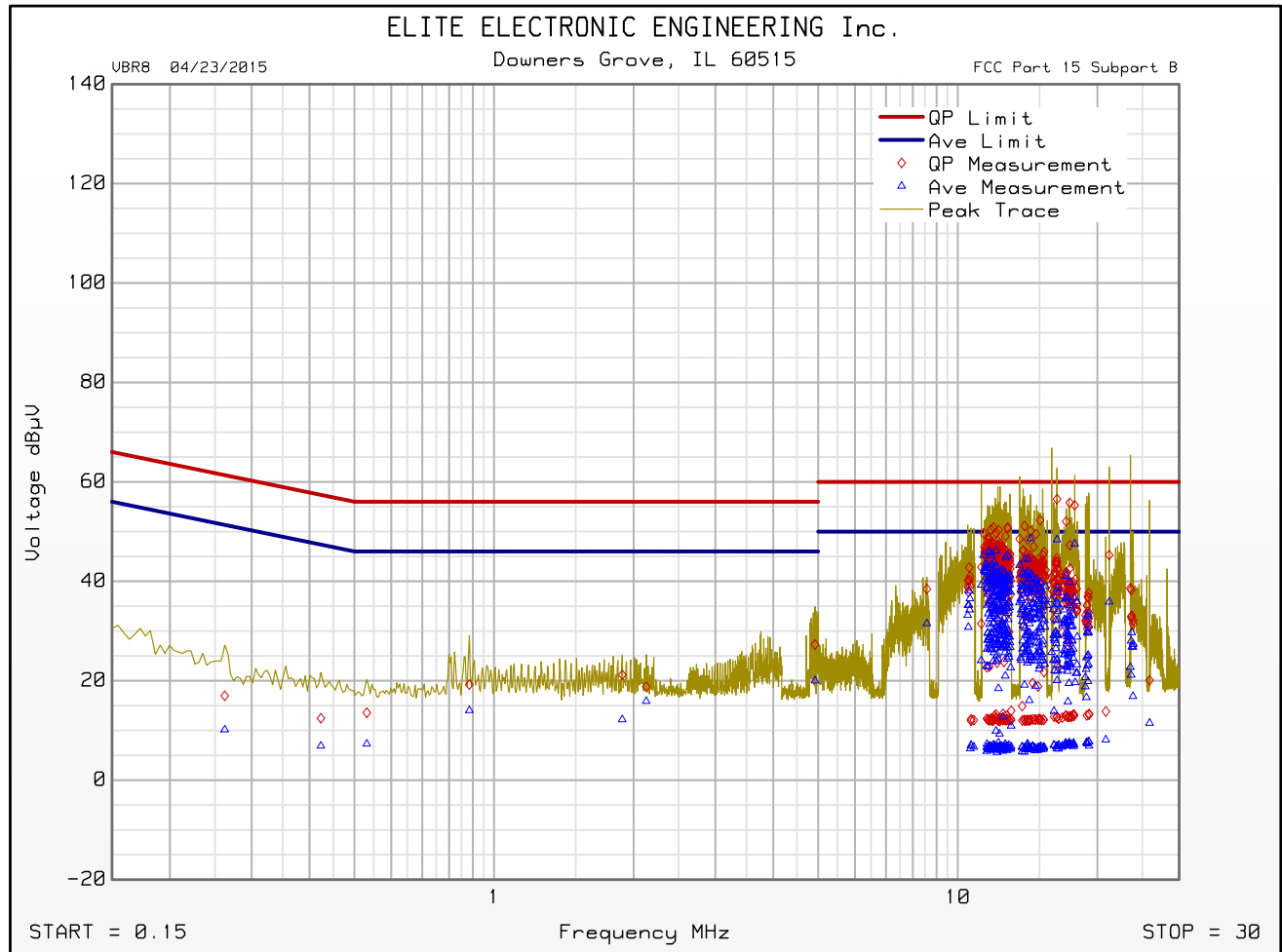
Manufacturer : GENIE
 Model : JACKSHAFT
 DUT Revision :
 Serial Number :
 DUT Mode : MOTOR RUNNING CW AND CCW, RECEIVE AT 315MHz, RECEIVE AT 390MHz, BLE AND WiFi ON
 Line Tested : 115V, 60Hz HIGH
 Scan Step Time [ms] : 30
 Meas. Threshold [dB] : -2
 Notes : 30 LB. LOAD
 Test Engineer : M. Longinotti
 Limit : Class B
 Test Date : Jul 18, 2019 11:03:28 AM
 Data Filter : Up to 80 maximum levels detected with 6 dB level excursion threshold over 2 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
0.263	17.0	61.4		10.2	51.4	
0.423	12.5	57.4		6.9	47.4	
0.532	13.6	56.0		7.3	46.0	
0.885	19.2	56.0		14.0	46.0	
1.889	21.2	56.0		12.2	46.0	
2.129	18.8	56.0		15.9	46.0	
4.922	27.3	56.0		20.0	46.0	
8.578	38.5	60.0		31.5	50.0	
14.360	50.1	60.0		48.6	50.0	
16.367	56.5	60.0		48.4	50.0	
17.434	55.8	60.0		39.8	50.0	

FCC Part 15 Subpart B Conducted Emissions Test Cumulative Data

VBR8 04/23/2015

Manufacturer : GENIE
 Model : JACKSHAFT
 DUT Revision :
 Serial Number :
 DUT Mode : MOTOR RUNNING CW AND CCW, RECEIVE AT 315MHz, RECEIVE AT 390MHz, BLE AND WiFi ON
 Line Tested : 115V, 60Hz HIGH
 Scan Step Time [ms] : 30
 Meas. Threshold [dB] : -2
 Notes : 30 LB. LOAD
 Test Engineer : M. Longinotti
 Limit : Class B
 Test Date : Jul 18, 2019 11:03:28 AM



Emissions Meet QP Limit
 Emissions Meet Ave Limit

FCC Part 15 Subpart B Conducted Emissions Test

Significant Emissions Data

VBR8 04/23/2015

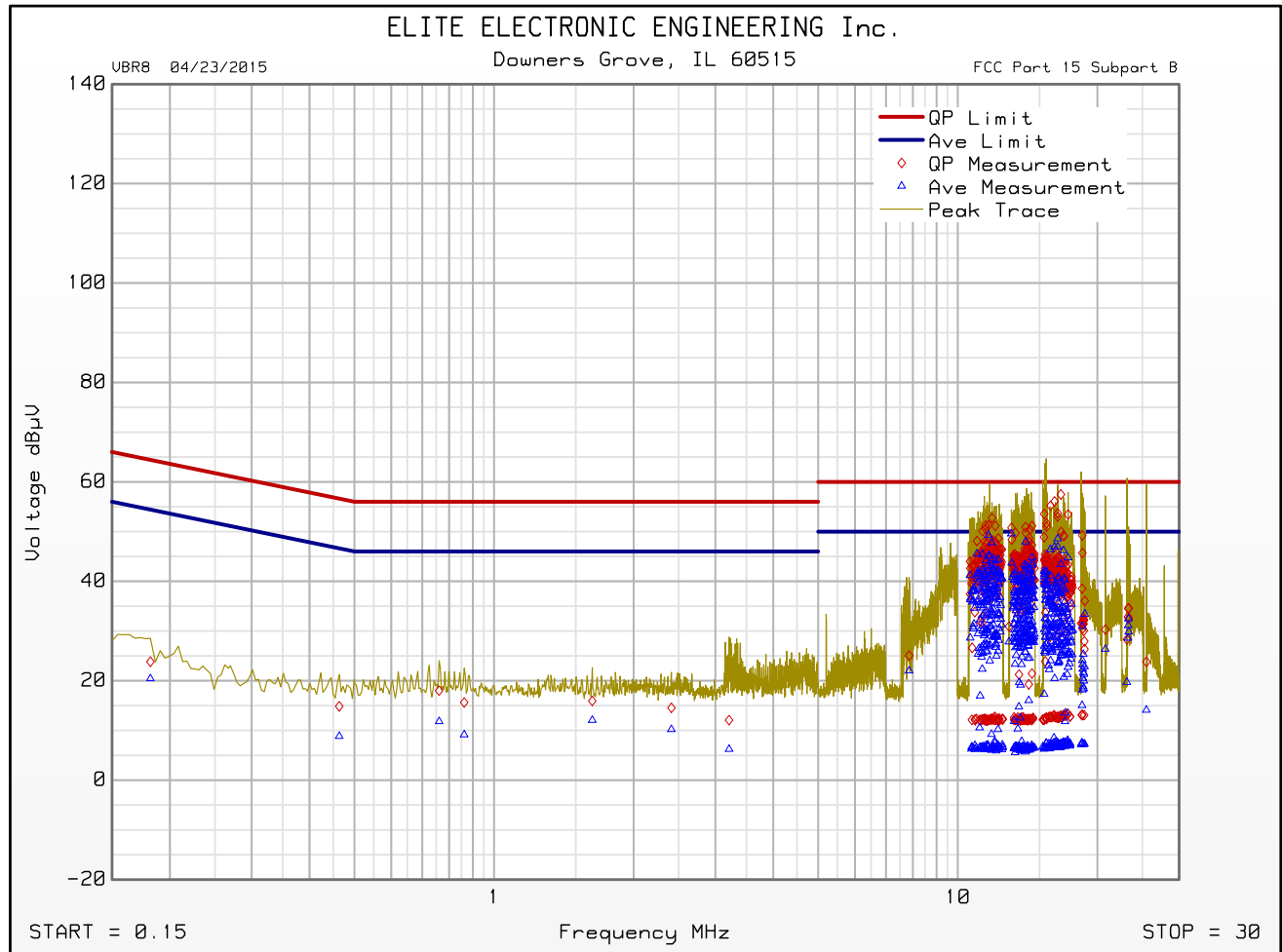
Manufacturer : GENIE
 Model : JACKSHAFT
 DUT Revision :
 Serial Number :
 DUT Mode : MOTOR RUNNING CW AND CCW, RECEIVE AT 315MHz, RECEIVE AT 390MHz, BLE AND WiFi ON
 Line Tested : 115V, 60Hz RETURN
 Scan Step Time [ms] : 30
 Meas. Threshold [dB] : -2
 Notes : 30 LB. LOAD
 Test Engineer : M. Longinotti
 Limit : Class B
 Test Date : Jul 18, 2019 11:38:47 AM
 Data Filter : Up to 80 maximum levels detected with 6 dB level excursion threshold over 2 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
0.182	23.8	64.4		20.4	54.4	
0.464	14.9	56.6		8.8	46.6	
0.761	18.0	56.0		11.8	46.0	
0.862	15.6	56.0		9.1	46.0	
1.628	15.9	56.0		12.1	46.0	
2.412	14.6	56.0		10.2	46.0	
3.212	12.1	56.0		6.2	46.0	
7.853	25.1	60.0		22.0	50.0	
11.646	51.3	60.0		49.3	50.0	
13.055	50.8	60.0		49.6	50.0	
16.425	53.0	60.0		48.6	50.0	
16.687	57.5	60.0		43.4	50.0	

FCC Part 15 Subpart B Conducted Emissions Test Cumulative Data

VBR8 04/23/2015

Manufacturer : GENIE
 Model : JACKSHAFT
 DUT Revision :
 Serial Number :
 DUT Mode : MOTOR RUNNING CW AND CCW, RECEIVE AT 315MHz, RECEIVE AT 390MHz, BLE AND WiFi ON
 Line Tested : 115V, 60Hz RETURN
 Scan Step Time [ms] : 30
 Meas. Threshold [dB] : -2
 Notes : 30 LB. LOAD
 Test Engineer : M. Longinotti
 Limit : Class B
 Test Date : Jul 18, 2019 11:38:47 AM



Emissions Meet QP Limit
 Emissions Meet Ave Limit

FCC Part 15 Subpart B Conducted Emissions Test

Significant Emissions Data

VBR8 04/23/2015

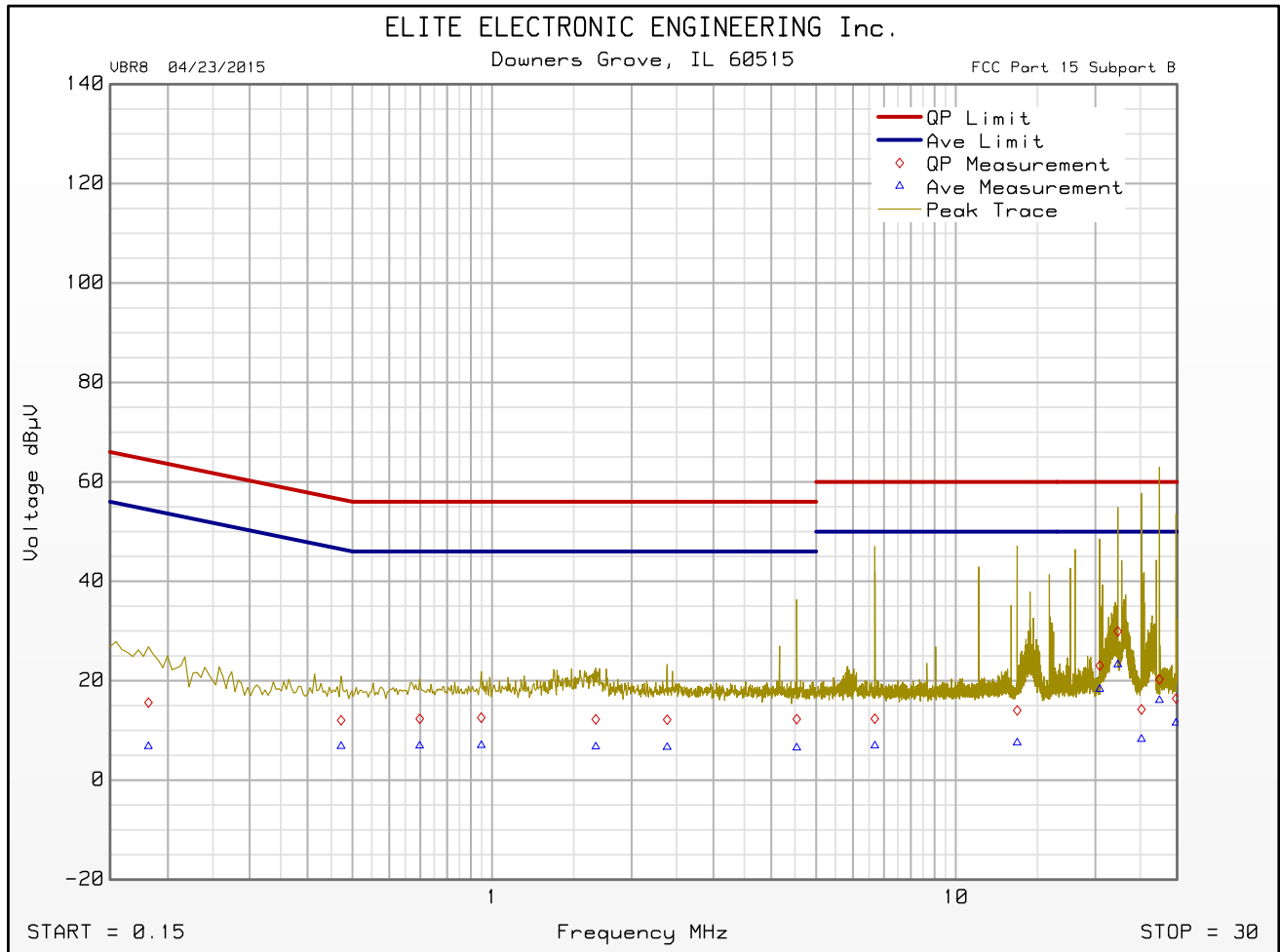
Manufacturer : GENIE
 Model : JACKSHAFT WITH REMOTE TRANSFORMER
 DUT Revision :
 Serial Number :
 DUT Mode : MOTOR RUNNING CW AND CCW, RECEIVE AT 315MHz, RECEIVE AT 390MHz, BLE AND WiFi ON
 Line Tested : 115V, 60Hz HIGH
 Scan Step Time [ms] : 30
 Meas. Threshold [dB] : -2
 Notes : 30 LB. LOAD
 Test Engineer : M. Longinotti
 Limit : Class B
 Test Date : Jul 18, 2019 12:55:26 PM
 Data Filter : Up to 80 maximum levels detected with 6 dB level excursion threshold over 2 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
0.182	15.6	64.4		6.8	54.4	
0.473	12.0	56.5		6.8	46.5	
0.698	12.3	56.0		6.9	46.0	
0.948	12.6	56.0		7.0	46.0	
1.673	12.2	56.0		6.7	46.0	
2.385	12.2	56.0		6.6	46.0	
4.540	12.3	56.0		6.5	46.0	
6.688	12.4	60.0		6.9	50.0	
13.563	14.0	60.0		7.6	50.0	
22.357	29.9	60.0		23.3	50.0	

FCC Part 15 Subpart B Conducted Emissions Test Cumulative Data

VBR8 04/23/2015

Manufacturer : GENIE
 Model : JACKSHAFT WITH REMOTE TRANSFORMER
 DUT Revision :
 Serial Number :
 DUT Mode : MOTOR RUNNING CW AND CCW, RECEIVE AT 315MHz, RECEIVE AT 390MHz, BLE AND WiFi ON
 Line Tested : 115V, 60Hz HIGH
 Scan Step Time [ms] : 30
 Meas. Threshold [dB] : -2
 Notes : 30 LB. LOAD
 Test Engineer : M. Longinotti
 Limit : Class B
 Test Date : Jul 18, 2019 12:55:26 PM



Emissions Meet QP Limit
 Emissions Meet Ave Limit

FCC Part 15 Subpart B Conducted Emissions Test

Significant Emissions Data

VBR8 04/23/2015

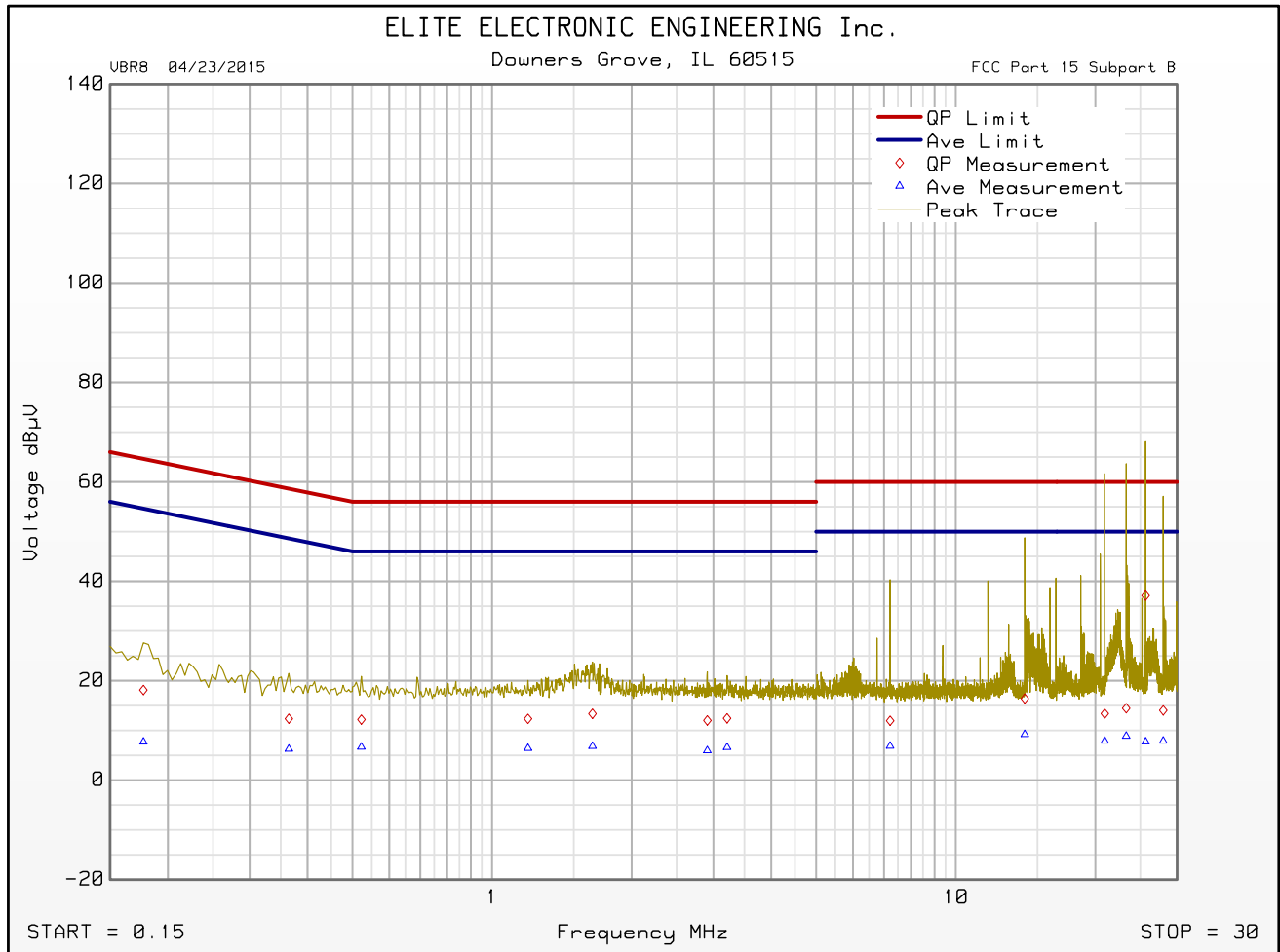
Manufacturer : GENIE
 Model : JACKSHAFT WITH REMOTE TRANSFORMER
 DUT Revision :
 Serial Number :
 DUT Mode : MOTOR RUNNING CW AND CCW, RECEIVE AT 315MHz, RECEIVE AT 390MHz, BLE AND WiFi ON
 Line Tested : 115V, 60Hz RETURN
 Scan Step Time [ms] : 30
 Meas. Threshold [dB] : -2
 Notes : 30 LB. LOAD
 Test Engineer : M. Longinotti
 Limit : Class B
 Test Date : Jul 18, 2019 01:01:03 PM
 Data Filter : Up to 80 maximum levels detected with 6 dB level excursion threshold over 2 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
0.177	18.1	64.6		7.7	54.6	
0.365	12.4	58.6		6.3	48.6	
0.523	12.2	56.0		6.7	46.0	
1.195	12.3	56.0		6.4	46.0	
1.646	13.4	56.0		6.8	46.0	
2.912	12.0	56.0		6.0	46.0	
3.212	12.4	56.0		6.6	46.0	
7.219	12.0	60.0		6.9	50.0	
14.085	16.4	60.0		9.2	50.0	
25.664	37.1	60.0		7.7	50.0	

FCC Part 15 Subpart B Conducted Emissions Test Cumulative Data

VBR8 04/23/2015

Manufacturer : GENIE
 Model : JACKSHAFT WITH REMOTE TRANSFORMER
 DUT Revision :
 Serial Number :
 DUT Mode : MOTOR RUNNING CW AND CCW, RECEIVE AT 315MHz, RECEIVE AT 390MHz, BLE AND WiFi ON
 Line Tested : 115V, 60Hz RETURN
 Scan Step Time [ms] : 30
 Meas. Threshold [dB] : -2
 Notes : 30 LB. LOAD
 Test Engineer : M. Longinotti
 Limit : Class B
 Test Date : Jul 18, 2019 01:01:03 PM

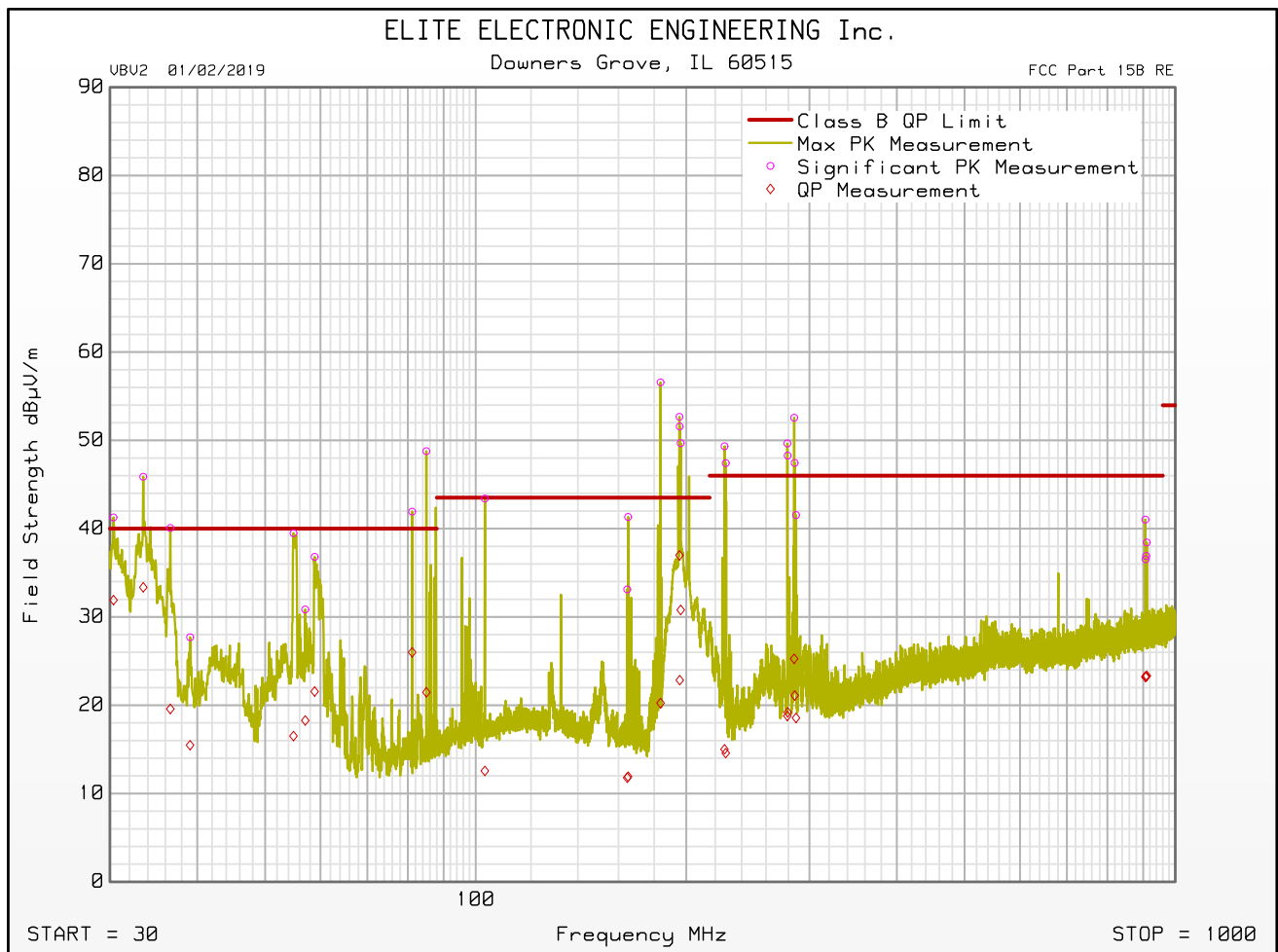


Emissions Meet QP Limit
 Emissions Meet Ave Limit

FCC Part 15B Class B Radiated RF Emissions Test

SW ID/Rev: VBV2 01/02/2019

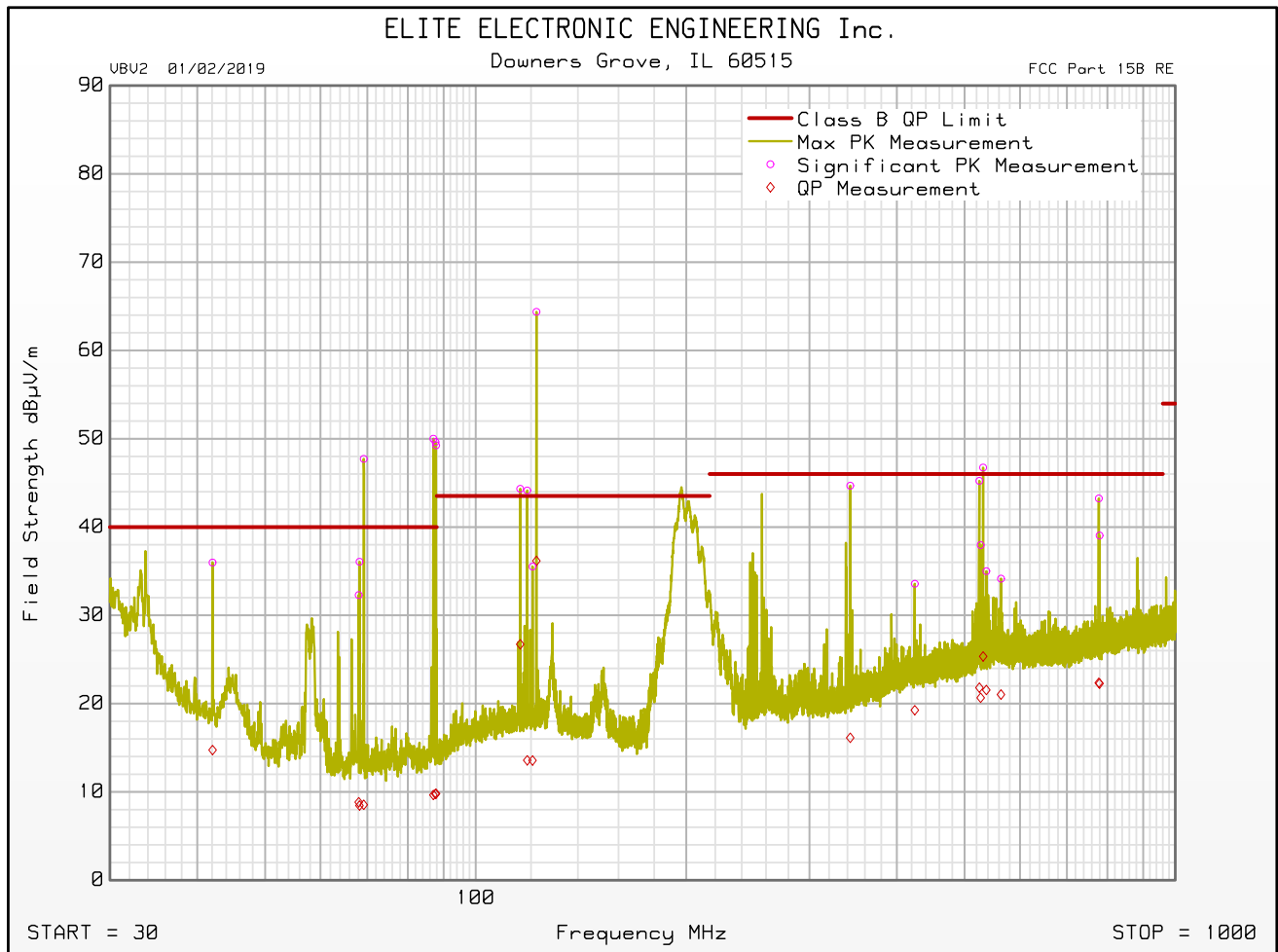
Manufacturer : GENIE
 Model : JACKSHAFT
 Serial Number :
 DUT Mode : MOTOR RUNNING CW AND CCW, RECEIVE AT 315MHz, RECEIVE AT 390MHz, BLE AND WiFi ON
 Ant. Polarization(s) : VERTICAL
 Scan Type : Stepped Scan
 Test RBW : 120 kHz
 Prelim Dwell Time (s) : 0.0001
 Notes : 30 LB. LOAD
 Test Engineer : M. Longinotti
 Test Date : Jul 19, 2019 09:04:53 AM



FCC Part 15B Class B Radiated RF Emissions Test

SW ID/Rev: VBV2 01/02/2019

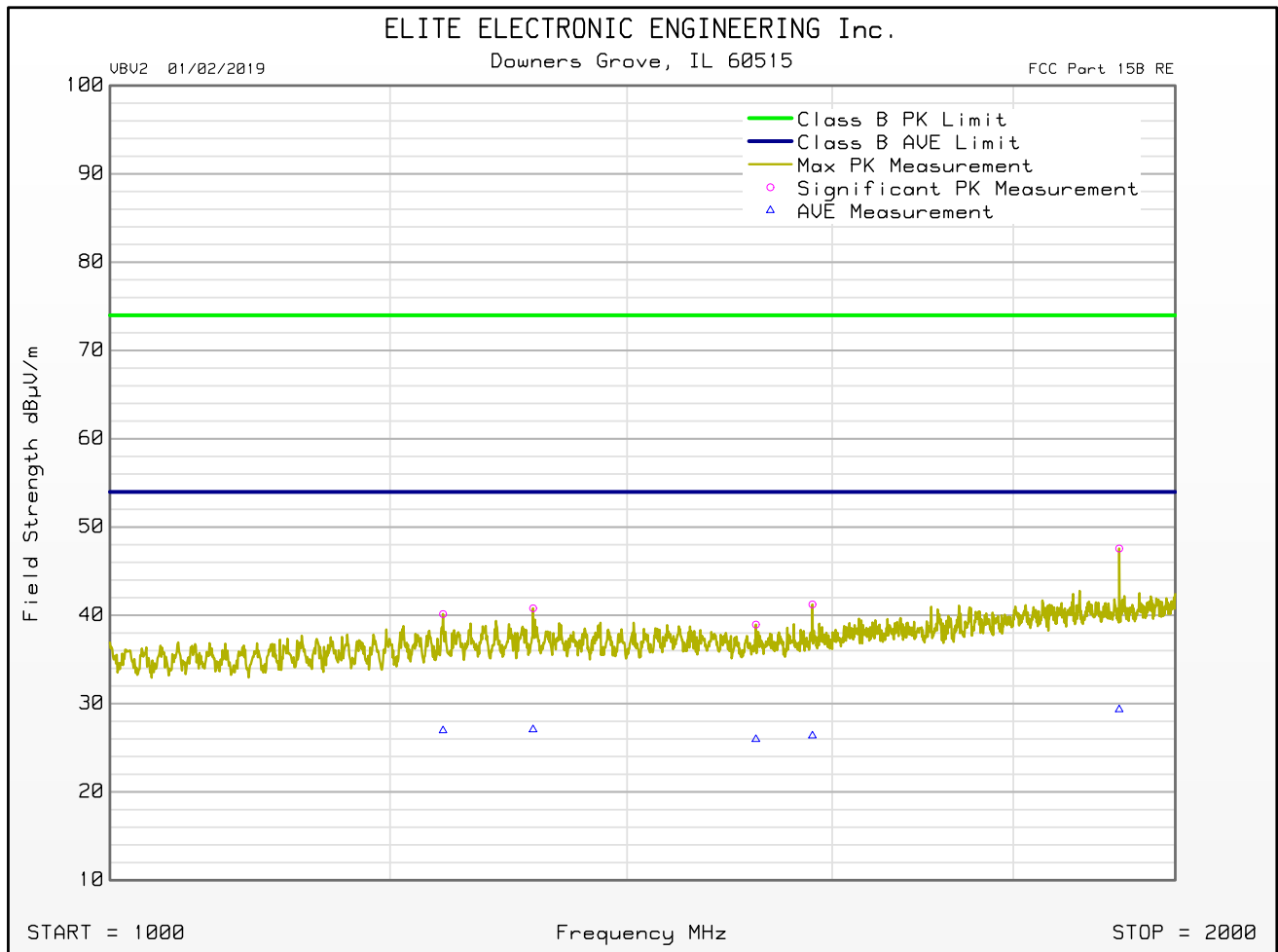
Manufacturer : GENIE
Model : JACKSHAFT
Serial Number :
DUT Mode : MOTOR RUNNING CW AND CCW, RECEIVE AT 315MHz, RECEIVE AT 390MHz, BLE AND WiFi ON
Ant. Polarization(s) : HORIZONTAL
Scan Type : Stepped Scan
Test RBW : 120 kHz
Prelim Dwell Time (s) : 0.0001
Notes : 30 LB. LOAD
Test Engineer : M. Longinotti
Test Date : Jul 19, 2019 09:04:53 AM



FCC Part 15B Class B Radiated RF Emissions Test

SW ID/Rev: VBV2 01/02/2019

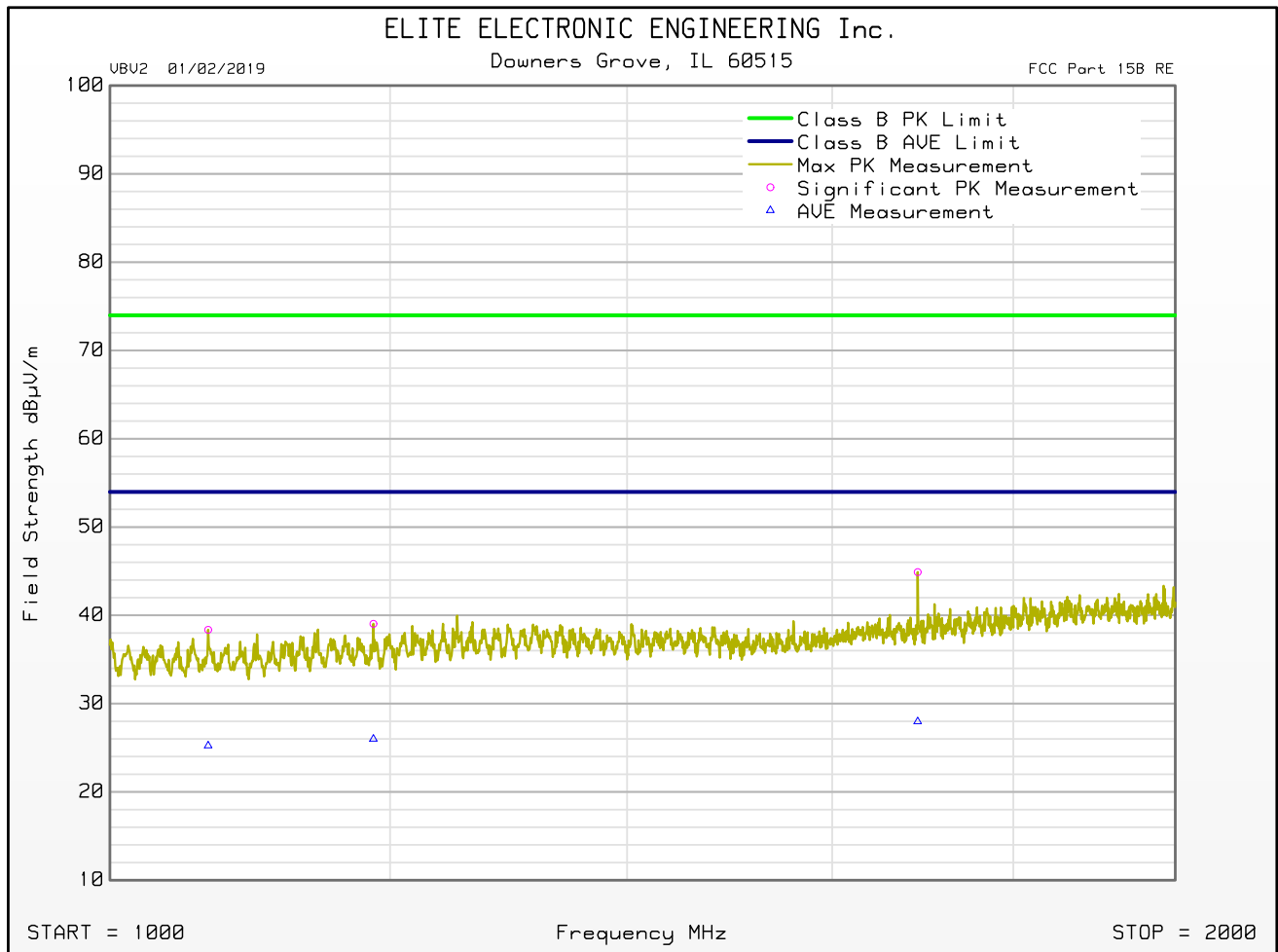
Manufacturer : GENIE
Model : JACKSHAFT
Serial Number :
DUT Mode : MOTOR RUNNING CW AND CCW, RECEIVE AT 315MHz, RECEIVE AT 390MHz, BLE AND WiFi ON
Ant. Polarization(s) : VERTICAL
Scan Type : Stepped Scan
Test RBW : 1 MHz
Prelim Dwell Time (s) : 0.0001
Notes : 30 LB. LOAD
Test Engineer : M. Longinotti
Test Date : Jul 19, 2019 11:54:02 AM



FCC Part 15B Class B Radiated RF Emissions Test

SW ID/Rev: VBV2 01/02/2019

Manufacturer : GENIE
 Model : JACKSHAFT
 Serial Number :
 DUT Mode : MOTOR RUNNING CW AND CCW, RECEIVE AT 315MHz, RECEIVE AT 390MHz, BLE AND WiFi ON
 Ant. Polarization(s) : HORIZONTAL
 Scan Type : Stepped Scan
 Test RBW : 1 MHz
 Prelim Dwell Time (s) : 0.0001
 Notes : 30 LB. LOAD
 Test Engineer : M. Longinotti
 Test Date : Jul 19, 2019 11:54:02 AM



FCC Part 15B Class B Radiated RF Emissions Test

SW ID/Rev: VBV2 01/02/2019

Manufacturer : GENIE
 Model : JACKSHAFT
 Serial Number :
 DUT Mode : MOTOR RUNNING CW AND CCW, RECEIVE AT 315MHz, RECEIVE AT 390MHz, BLE AND WiFi ON
 Scan Type : Stepped Scan
 Test RBW : 120 kHz
 Prelim Dwell Time (s) : 0.0001
 Notes : 30 LB. LOAD
 Test Engineer : M. Longinotti
 Test Date : Jul 19, 2019 09:04:53 AM

Freq MHz	Peak Mtr Rdg dBuV	QP Mtr Rdg dBuV	Ant Fac dB	Amp Fac dB	Cbl Fac dB	Dist Corr dB	Peak Total dBuV/m	QP Total dBuV/m	QP Limit dBuV/m	QP Lim Mrg dB	Ant Pol	Mast Ht cm	Azim °
30.360	16.6	7.3	24.3	0.0	0.4	0.0	41.3	31.9	40.0	-8.1	V	120	270
33.480	22.9	10.4	22.6	0.0	0.4	0.0	45.9	33.4	40.0	-6.6	V	120	90
36.600	19.0	-1.5	20.7	0.0	0.4	0.0	40.1	19.6	40.0	-20.4	V	120	270
39.060	7.9	-4.3	19.4	0.0	0.4	0.0	27.7	15.5	40.0	-24.5	V	120	270
42.060	17.8	-3.5	17.8	0.0	0.4	0.0	36.0	14.7	40.0	-25.3	H	120	225
54.900	26.1	3.2	13.0	0.0	0.4	0.0	39.5	16.5	40.0	-23.5	V	120	270
57.060	17.8	5.2	12.7	0.0	0.4	0.0	30.9	18.3	40.0	-21.7	V	120	270
58.860	23.9	8.7	12.5	0.0	0.4	0.0	36.8	21.6	40.0	-18.4	V	200	135
68.040	19.5	-4.0	12.4	0.0	0.4	0.0	32.3	8.8	40.0	-31.2	H	200	270
68.220	23.3	-4.3	12.4	0.0	0.4	0.0	36.1	8.5	40.0	-31.5	H	200	270
69.180	34.9	-4.3	12.4	0.0	0.4	0.0	47.7	8.5	40.0	-31.5	H	200	270
81.120	28.3	12.3	13.3	0.0	0.4	0.0	41.9	26.0	40.0	-14.0	V	120	0
85.020	34.5	7.2	13.9	0.0	0.4	0.0	48.8	21.5	40.0	-18.5	V	340	0
87.000	35.4	-5.0	14.3	0.0	0.4	0.0	50.0	9.7	40.0	-30.3	H	120	180
87.600	34.9	-5.0	14.4	0.0	0.4	0.0	49.6	9.8	40.0	-30.2	H	120	180
87.780	34.4	-5.0	14.4	0.0	0.4	0.0	49.3	9.8	40.0	-30.2	H	120	180
103.060	25.8	-5.1	17.2	0.0	0.4	0.0	43.4	12.6	43.5	-31.0	V	120	135
115.780	25.6	8.0	18.3	0.0	0.5	0.0	44.3	26.7	43.5	-16.8	H	340	225
118.480	25.5	-5.1	18.2	0.0	0.5	0.0	44.1	13.6	43.5	-29.9	H	340	225
120.580	16.9	-5.0	18.1	0.0	0.5	0.0	35.5	13.6	43.5	-30.0	H	340	225
122.140	45.8	17.6	18.1	0.0	0.5	0.0	64.4	36.2	43.5	-7.3	H	340	225
164.680	16.5	-4.8	16.0	0.0	0.7	0.0	33.1	11.8	43.5	-31.7	V	340	315
165.160	24.7	-4.7	15.9	0.0	0.7	0.0	41.3	11.9	43.5	-31.6	V	340	315
183.760	40.8	4.4	15.1	0.0	0.7	0.0	56.6	20.2	43.5	-23.3	V	340	180
195.580	36.7	21.0	15.2	0.0	0.7	0.0	52.7	37.0	43.5	-6.5	V	200	0
195.760	35.6	6.8	15.3	0.0	0.7	0.0	51.6	22.8	43.5	-20.7	V	200	0
196.360	33.7	14.8	15.3	0.0	0.7	0.0	49.7	30.8	43.5	-12.7	V	200	0
226.860	32.6	-1.7	16.0	0.0	0.8	0.0	49.3	15.0	46.0	-31.0	V	340	180
227.760	30.6	-2.2	16.1	0.0	0.8	0.0	47.4	14.6	46.0	-31.4	V	340	180
278.940	30.1	-0.8	18.8	0.0	0.8	0.0	49.7	18.8	46.0	-27.2	V	120	180
279.300	28.7	-0.4	18.8	0.0	0.8	0.0	48.3	19.2	46.0	-26.8	V	120	180
285.300	32.9	5.6	18.9	0.0	0.8	0.0	52.6	25.3	46.0	-20.7	V	200	180
285.780	27.8	1.4	18.9	0.0	0.8	0.0	47.4	21.1	46.0	-24.9	V	200	180
287.040	21.8	-1.2	19.0	0.0	0.8	0.0	41.5	18.6	46.0	-27.4	V	200	180
343.080	23.8	-4.7	19.9	0.0	0.9	0.0	44.7	16.1	46.0	-29.9	H	340	270
424.380	10.2	-4.2	22.3	0.0	1.1	0.0	33.6	19.3	46.0	-26.7	H	200	0
524.880	20.4	-3.0	23.6	0.0	1.1	0.0	45.2	21.8	46.0	-24.2	H	340	270
527.100	13.2	-4.1	23.6	0.0	1.1	0.0	38.0	20.7	46.0	-25.3	H	340	270
531.420	22.0	0.6	23.6	0.0	1.1	0.0	46.7	25.3	46.0	-20.7	H	200	270
537.000	9.9	-3.5	23.9	0.0	1.1	0.0	35.0	21.5	46.0	-24.5	H	120	270
563.580	8.2	-5.0	24.9	0.0	1.1	0.0	34.2	21.0	46.0	-25.0	H	340	90
777.660	16.1	-4.8	25.7	0.0	1.5	0.0	43.2	22.4	46.0	-23.6	H	340	135
779.520	11.9	-4.9	25.7	0.0	1.5	0.0	39.0	22.3	46.0	-23.7	H	340	135
906.480	13.1	-4.7	26.4	0.0	1.5	0.0	41.0	23.2	46.0	-22.8	V	120	315
907.260	8.6	-4.6	26.4	0.0	1.5	0.0	36.5	23.3	46.0	-22.7	V	120	315
908.760	9.0	-4.6	26.4	0.0	1.5	0.0	36.9	23.3	46.0	-22.7	V	120	315
910.740	10.5	-4.6	26.4	0.0	1.5	0.0	38.4	23.3	46.0	-22.7	V	120	315

FCC Part 15B Class B Radiated RF Emissions Test

SW ID/Rev: VBV2 01/02/2019

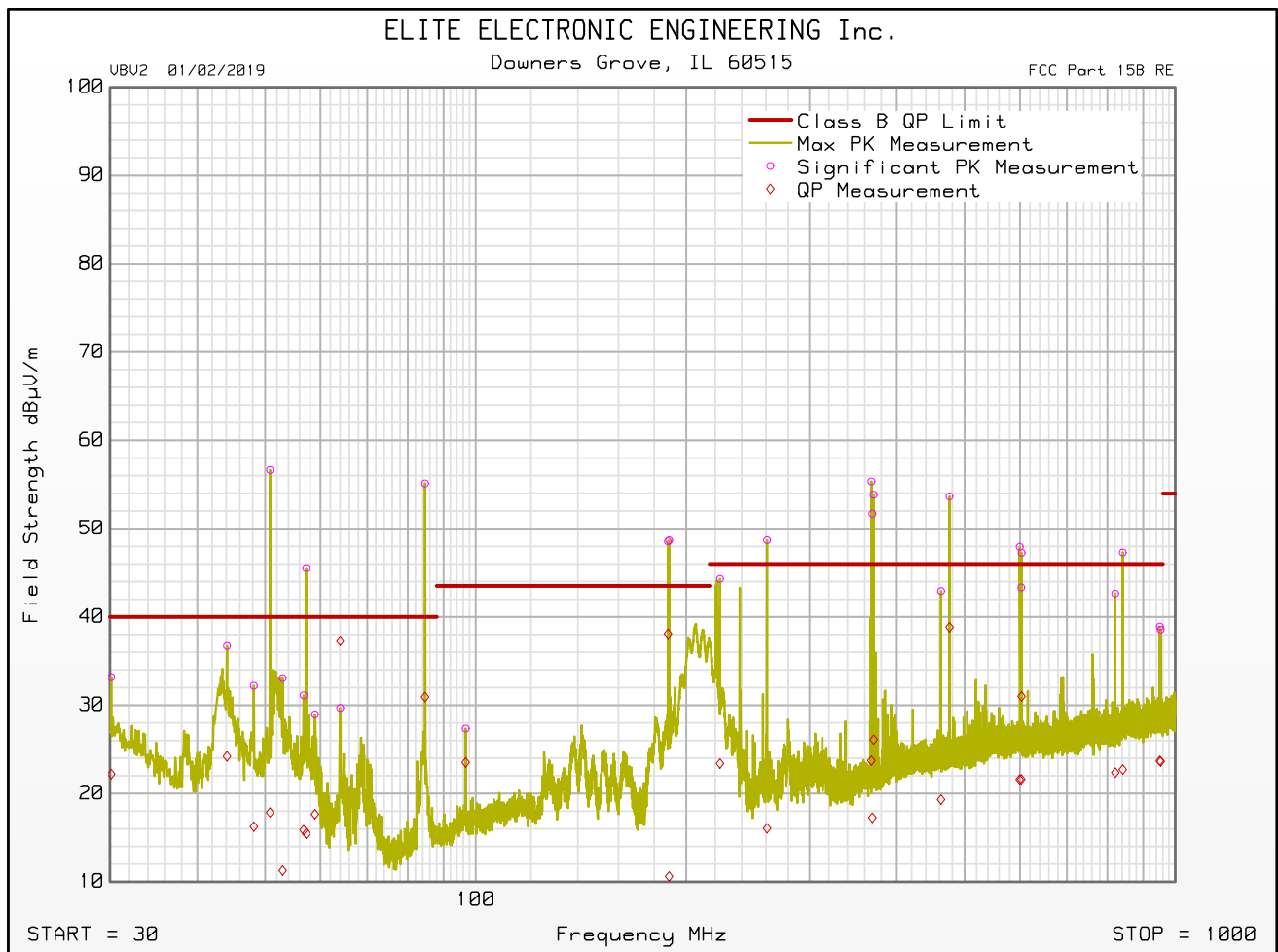
Manufacturer : GENIE
 Model : JACKSHAFT
 Serial Number :
 DUT Mode : MOTOR RUNNING CW AND CCW, RECEIVE AT 315MHZ, RECEIVE AT 390MHZ, BLE AND WiFi ON
 Scan Type : Stepped Scan
 Test RBW : 1 MHz
 Prelim Dwell Time (s) : 0.0001
 Notes : 30 LB. LOAD
 Test Engineer : M. Longinotti
 Test Date : Jul 19, 2019 11:54:02 AM

Freq MHz	Peak Mtr Rdg dBuV	Average Mtr Rdg dBuV	Ant Fac dB	Amp Fac dB	Cbl Fac dB	Dist Corr dB	Peak Total dBuV/m	Peak Limit dBuV/m	Peak Lim Mrg dB	Average Total dBuV/m	Average Limit dBuV/m	Average Lim Mrg dB	Ant Pol	Mast Ht cm	Azim °
1066.000	50.1	37.0	27.7	-41.0	1.6	0.0	38.4	74.0	-35.6	25.2	54.0	-28.7	H	340	135
1187.000	49.6	36.6	28.5	-40.8	1.7	0.0	39.0	74.0	-34.9	26.0	54.0	-28.0	H	120	270
1242.000	50.0	36.8	29.1	-40.7	1.8	0.0	40.1	74.0	-33.8	27.0	54.0	-27.0	V	340	45
1317.000	50.6	36.8	29.0	-40.6	1.8	0.0	40.8	74.0	-33.2	27.1	54.0	-26.9	V	200	90
1522.500	49.2	36.2	28.1	-40.3	2.0	0.0	39.0	74.0	-35.0	26.0	54.0	-28.0	V	340	270
1579.500	51.0	36.2	28.4	-40.2	2.0	0.0	41.2	74.0	-32.7	26.4	54.0	-27.6	V	200	315
1691.500	53.3	36.4	29.6	-40.1	2.1	0.0	44.9	74.0	-29.1	28.0	54.0	-26.0	H	340	270
1928.500	53.7	35.5	31.5	-39.9	2.2	0.0	47.6	74.0	-26.4	29.3	54.0	-24.6	V	200	45

FCC Part 15B Class B Radiated RF Emissions Test

SW ID/Rev: VBV2 01/02/2019

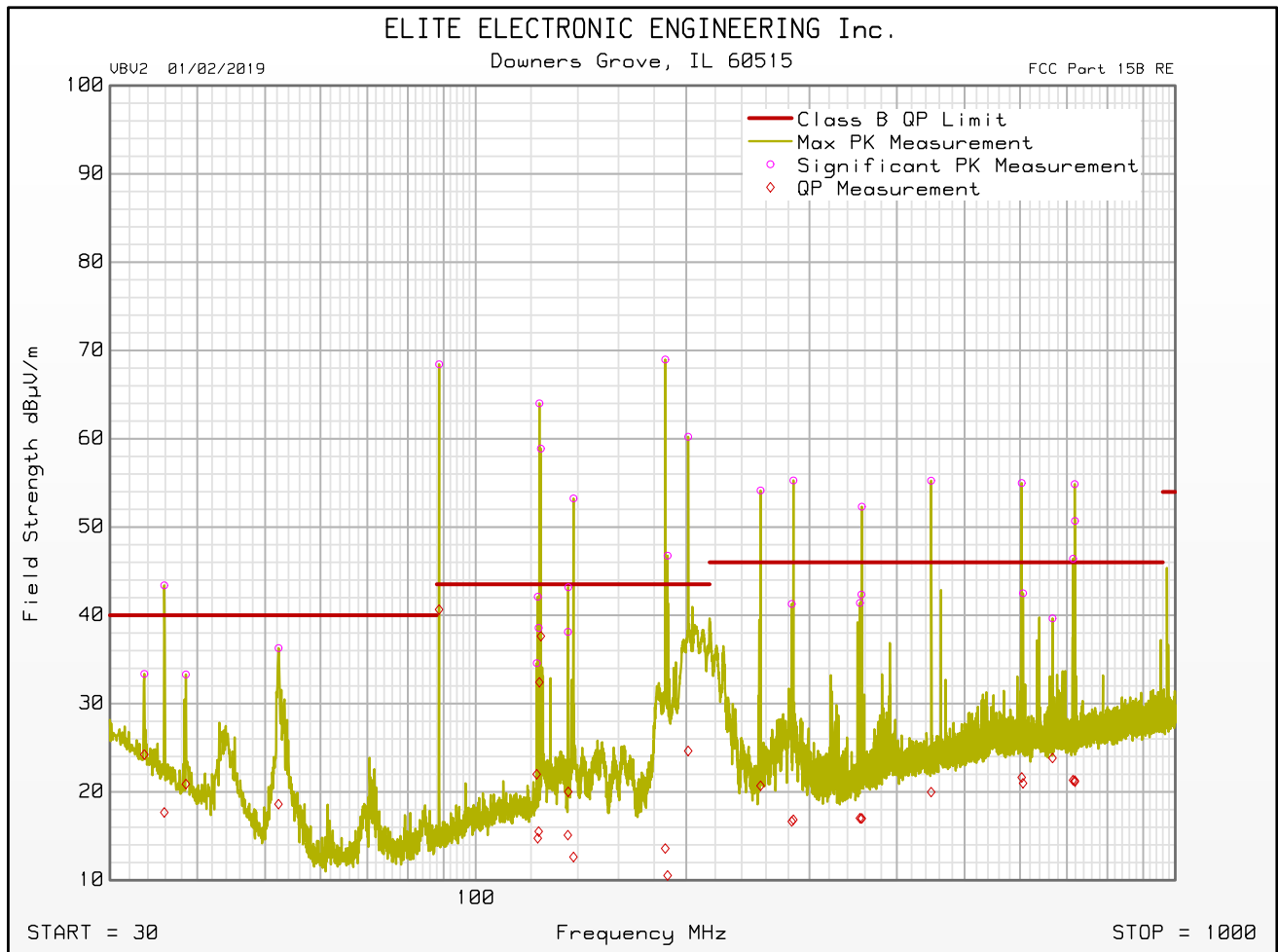
Manufacturer : GENIE
 Model : JACKSHAFT WITH REMOTE TRANSFORMER
 Serial Number :
 DUT Mode : MOTOR RUNNING CW AND CCW, RECEIVE AT 315MHz, RECEIVE AT 390MHz, BLE AND WiFi ON
 Ant. Polarization(s) : VERTICAL
 Scan Type : Stepped Scan
 Test RBW : 120 kHz
 Prelim Dwell Time (s) : 0.0001
 Notes : 30 LB. LOAD
 Test Engineer : M. Longinotti
 Test Date : Jul 18, 2019 02:07:54 PM



FCC Part 15B Class B Radiated RF Emissions Test

SW ID/Rev: VBV2 01/02/2019

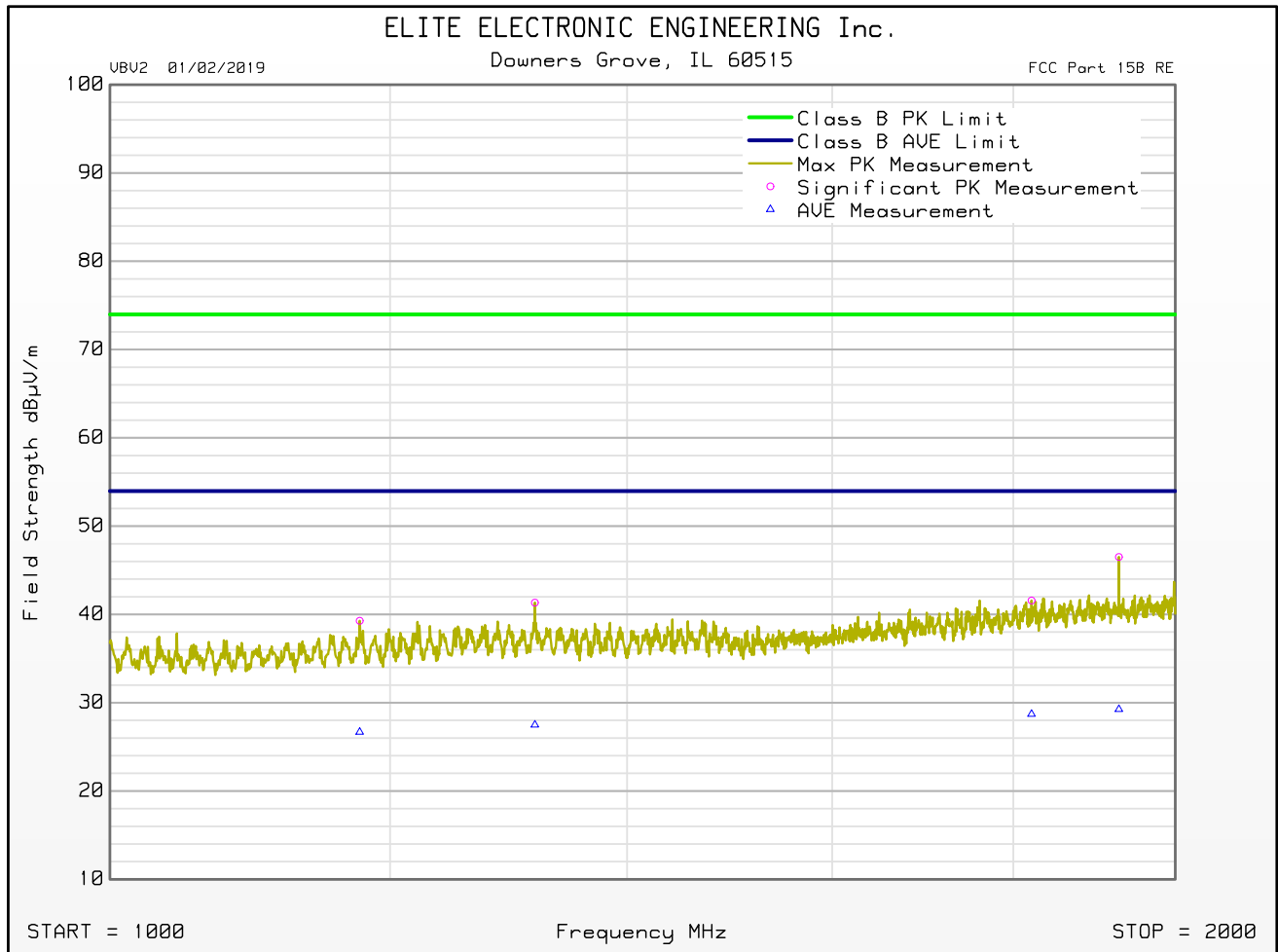
Manufacturer : GENIE
Model : JACKSHAFT WITH REMOTE TRANSFORMER
Serial Number :
DUT Mode : MOTOR RUNNING CW AND CCW, RECEIVE AT 315MHz, RECEIVE AT 390MHz, BLE AND WiFi ON
Ant. Polarization(s) : HORIZONTAL
Scan Type : Stepped Scan
Test RBW : 120 kHz
Prelim Dwell Time (s) : 0.0001
Notes : 30 LB. LOAD
Test Engineer : M. Longinotti
Test Date : Jul 18, 2019 02:07:54 PM



FCC Part 15B Class B Radiated RF Emissions Test

SW ID/Rev: VBV2 01/02/2019

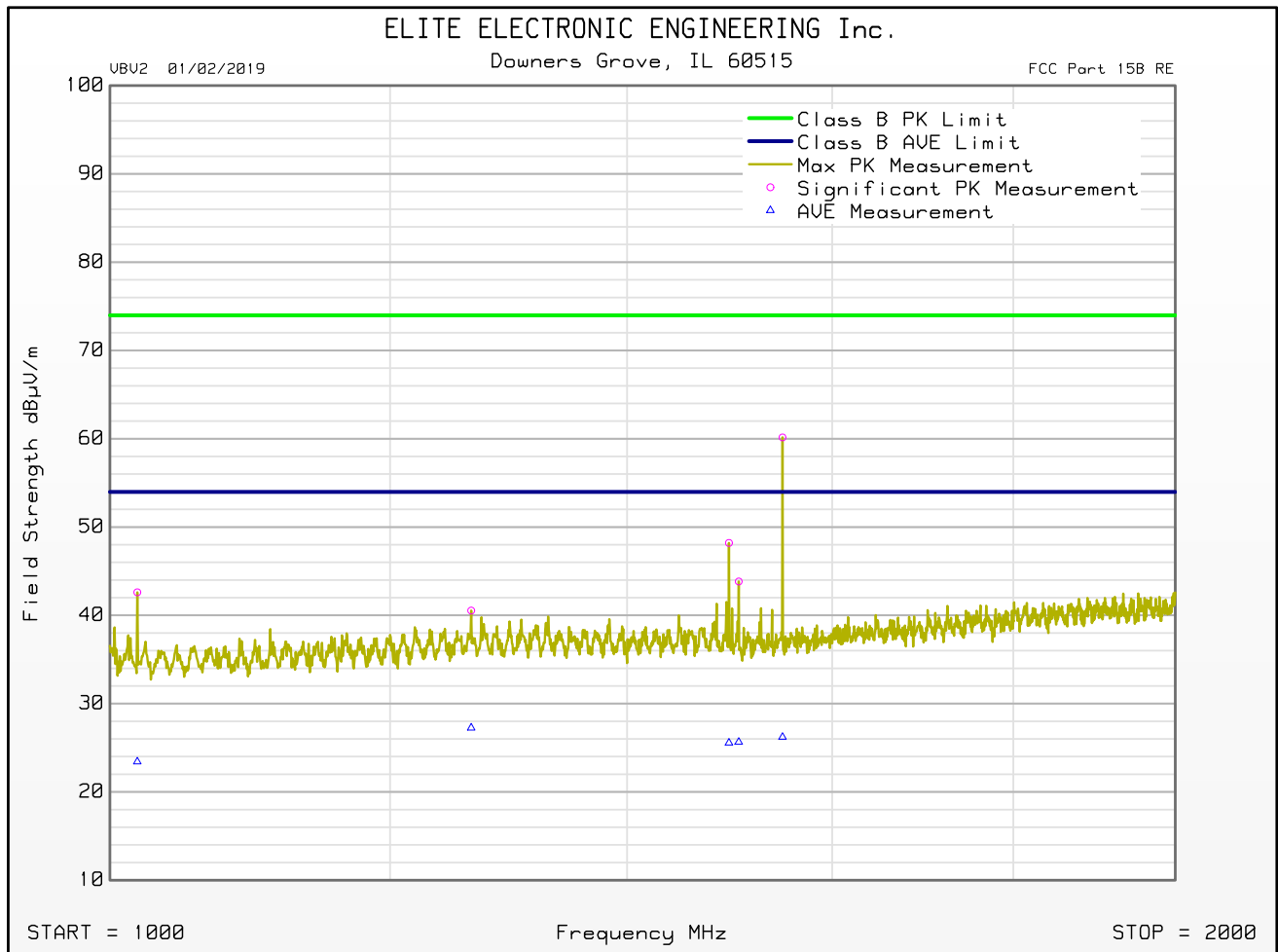
Manufacturer : GENIE
 Model : JACKSHAFT WITH REMOTE TRANSFORMER
 Serial Number :
 DUT Mode : MOTOR RUNNING CW AND CCW, RECEIVE AT 315MHz, RECEIVE AT 390MHz, BLE AND WiFi ON
 Ant. Polarization(s) : VERTICAL
 Scan Type : Stepped Scan
 Test RBW : 1 MHz
 Prelim Dwell Time (s) : 0.0001
 Notes : 30 LB. LOAD
 Test Engineer : M. Longinotti
 Test Date : Jul 19, 2019 12:20:39 PM



FCC Part 15B Class B Radiated RF Emissions Test

SW ID/Rev: VBV2 01/02/2019

Manufacturer : GENIE
 Model : JACKSHAFT WITH REMOTE TRANSFORMER
 Serial Number :
 DUT Mode : MOTOR RUNNING CW AND CCW, RECEIVE AT 315MHz, RECEIVE AT 390MHz, BLE AND WiFi ON
 Ant. Polarization(s) : HORIZONTAL
 Scan Type : Stepped Scan
 Test RBW : 1 MHz
 Prelim Dwell Time (s) : 0.0001
 Notes : 30 LB. LOAD
 Test Engineer : M. Longinotti
 Test Date : Jul 19, 2019 12:20:39 PM





FCC Part 15B Class B Radiated RF Emissions Test

SW ID/Rev: VBV2 01/02/2019

Manufacturer : GENIE
Model : JACKSHAFT WITH REMOTE TRANSFORMER
Serial Number :
DUT Mode : MOTOR RUNNING CW AND CCW, RECEIVE AT 315MHz, RECEIVE AT 390MHz,
BLE AND WiFi ON
Scan Type : Stepped Scan
Test RBW : 120 kHz
Prelim Dwell Time (s) : 0.0001
Notes : 30 LB. LOAD
Test Engineer : M. Longinotti
Test Date : Jul 18, 2019 02:07:54 PM

Freq MHz	Peak Mtr Rdg dBuV	QP Mtr Rdg dBuV	Ant Fac dB	Amp Fac dB	Cbl Fac dB	Dist Corr dB	Peak Total dBuV/m	QP Total dBuV/m	QP Limit dBuV/m	QP Lim Mrg dB	Ant Pol	Mast Ht cm	Azim °
30.120	8.5	-2.5	24.3	0.0	0.4	0.0	33.2	22.2	40.0	-17.8	V	340	45
33.600	10.5	1.3	22.5	0.0	0.4	0.0	33.4	24.2	40.0	-15.8	H	120	225
35.880	21.9	-3.9	21.2	0.0	0.4	0.0	43.4	17.7	40.0	-22.3	H	200	135
38.520	13.3	0.8	19.7	0.0	0.4	0.0	33.3	20.9	40.0	-19.1	H	200	135
44.100	19.5	7.0	16.8	0.0	0.4	0.0	36.7	24.2	40.0	-15.8	V	120	135
48.180	16.9	0.9	15.0	0.0	0.4	0.0	32.2	16.3	40.0	-23.7	V	120	0
50.820	42.3	3.5	14.0	0.0	0.4	0.0	56.6	17.9	40.0	-22.1	V	120	0
52.260	22.4	4.7	13.5	0.0	0.4	0.0	36.3	18.6	40.0	-21.4	H	340	270
52.980	19.3	-2.5	13.4	0.0	0.4	0.0	33.1	11.3	40.0	-28.7	V	120	0
56.760	18.1	2.8	12.7	0.0	0.4	0.0	31.1	15.9	40.0	-24.1	V	340	315
57.240	32.5	2.4	12.6	0.0	0.4	0.0	45.5	15.5	40.0	-24.5	V	340	315
58.920	16.1	4.8	12.5	0.0	0.4	0.0	29.0	17.7	40.0	-22.3	V	120	270
64.020	17.0	24.6	12.3	0.0	0.4	0.0	29.7	37.3	40.0	-2.7	V	120	45
84.660	40.9	16.7	13.8	0.0	0.4	0.0	55.1	30.9	40.0	-9.1	V	200	315
88.660	53.4	25.7	14.6	0.0	0.4	0.0	68.4	40.7	43.5	-2.9	H	340	225
96.760	10.7	6.8	16.3	0.0	0.4	0.0	27.4	23.5	43.5	-20.0	V	120	225
122.260	16.0	3.4	18.1	0.0	0.5	0.0	34.6	22.0	43.5	-21.5	H	120	270
122.680	23.6	-3.8	18.1	0.0	0.5	0.0	42.1	14.7	43.5	-28.8	H	120	270
123.040	20.0	-3.0	18.0	0.0	0.5	0.0	38.6	15.5	43.5	-28.0	H	120	270
123.340	45.5	13.9	18.0	0.0	0.5	0.0	64.0	32.4	43.5	-11.1	H	120	270
123.940	40.4	19.1	18.0	0.0	0.5	0.0	58.9	37.6	43.5	-5.9	H	120	270
135.460	20.0	-3.0	17.6	0.0	0.5	0.0	38.1	15.1	43.5	-28.4	H	340	0
135.640	25.0	1.9	17.6	0.0	0.5	0.0	43.2	20.0	43.5	-23.5	H	340	0
137.980	35.3	-5.3	17.4	0.0	0.6	0.0	53.2	12.6	43.5	-30.9	H	340	0
186.640	53.2	-2.2	15.1	0.0	0.7	0.0	69.0	13.6	43.5	-29.9	H	340	225
188.080	31.0	-5.2	15.1	0.0	0.7	0.0	46.8	10.5	43.5	-33.0	H	340	225
188.320	32.8	22.3	15.1	0.0	0.7	0.0	48.6	38.1	43.5	-5.4	V	340	180
189.040	32.9	-5.2	15.0	0.0	0.7	0.0	48.7	10.6	43.5	-32.9	V	340	180
201.280	44.0	8.4	15.5	0.0	0.8	0.0	60.2	24.6	43.5	-18.9	H	200	315
223.500	28.0	7.1	15.6	0.0	0.8	0.0	44.3	23.4	46.0	-22.6	V	200	45
255.420	34.3	0.8	19.1	0.0	0.8	0.0	54.1	20.7	46.0	-25.3	H	120	0
261.000	28.1	-4.6	19.9	0.0	0.8	0.0	48.7	16.1	46.0	-29.9	V	340	225
283.020	21.6	-3.0	18.9	0.0	0.8	0.0	41.3	16.7	46.0	-29.3	H	200	180
284.580	35.6	-2.8	18.9	0.0	0.8	0.0	55.3	16.9	46.0	-29.1	H	200	180
354.180	20.0	-4.4	20.5	0.0	1.0	0.0	41.4	17.0	46.0	-29.0	H	200	225
355.920	20.8	-4.5	20.5	0.0	1.0	0.0	42.4	17.0	46.0	-29.0	H	200	225
356.400	30.8	-4.6	20.6	0.0	1.0	0.0	52.3	17.0	46.0	-29.0	H	200	225
367.920	33.5	1.9	20.8	0.0	1.0	0.0	55.4	23.7	46.0	-22.3	V	200	180
369.060	29.9	-4.6	20.8	0.0	1.0	0.0	51.7	17.3	46.0	-28.7	V	340	180
370.620	32.0	4.3	20.8	0.0	1.0	0.0	53.8	26.1	46.0	-19.9	V	340	180
447.780	31.4	-3.8	22.7	0.0	1.1	0.0	55.3	20.0	46.0	-26.0	H	200	45
462.660	18.6	-5.0	23.2	0.0	1.1	0.0	42.9	19.3	46.0	-26.7	V	200	0
475.680	29.1	14.3	23.4	0.0	1.1	0.0	53.6	38.8	46.0	-7.2	V	200	225
599.340	22.1	-4.3	24.7	0.0	1.1	0.0	47.9	21.6	46.0	-24.4	V	200	90
602.520	17.5	-4.3	24.7	0.0	1.1	0.0	43.3	21.6	46.0	-24.4	V	200	90
603.060	21.4	5.2	24.7	0.0	1.1	0.0	47.3	31.0	46.0	-15.0	V	200	90
603.300	29.1	-4.2	24.7	0.0	1.1	0.0	55.0	21.6	46.0	-24.4	H	340	180
606.000	16.7	-4.9	24.7	0.0	1.2	0.0	42.5	21.0	46.0	-25.0	H	120	315
667.740	13.5	-2.4	24.9	0.0	1.3	0.0	39.7	23.8	46.0	-22.2	H	120	45
714.420	20.1	-5.0	24.9	0.0	1.4	0.0	46.4	21.3	46.0	-24.7	H	200	225
718.320	28.6	-5.0	24.9	0.0	1.4	0.0	54.9	21.3	46.0	-24.7	H	200	225
718.920	24.4	-5.1	24.9	0.0	1.4	0.0	50.7	21.2	46.0	-24.8	H	120	180
820.740	15.3	-5.0	25.8	0.0	1.5	0.0	42.6	22.4	46.0	-23.6	V	120	180
841.440	19.7	-4.9	26.1	0.0	1.5	0.0	47.3	22.7	46.0	-23.3	V	120	135
950.400	10.5	-4.7	26.9	0.0	1.5	0.0	38.9	23.7	46.0	-22.3	V	200	90
953.220	10.2	-4.8	26.9	0.0	1.5	0.0	38.6	23.6	46.0	-22.4	V	200	90

FCC Part 15B Class B Radiated RF Emissions Test

SW ID/Rev: VBV2 01/02/2019

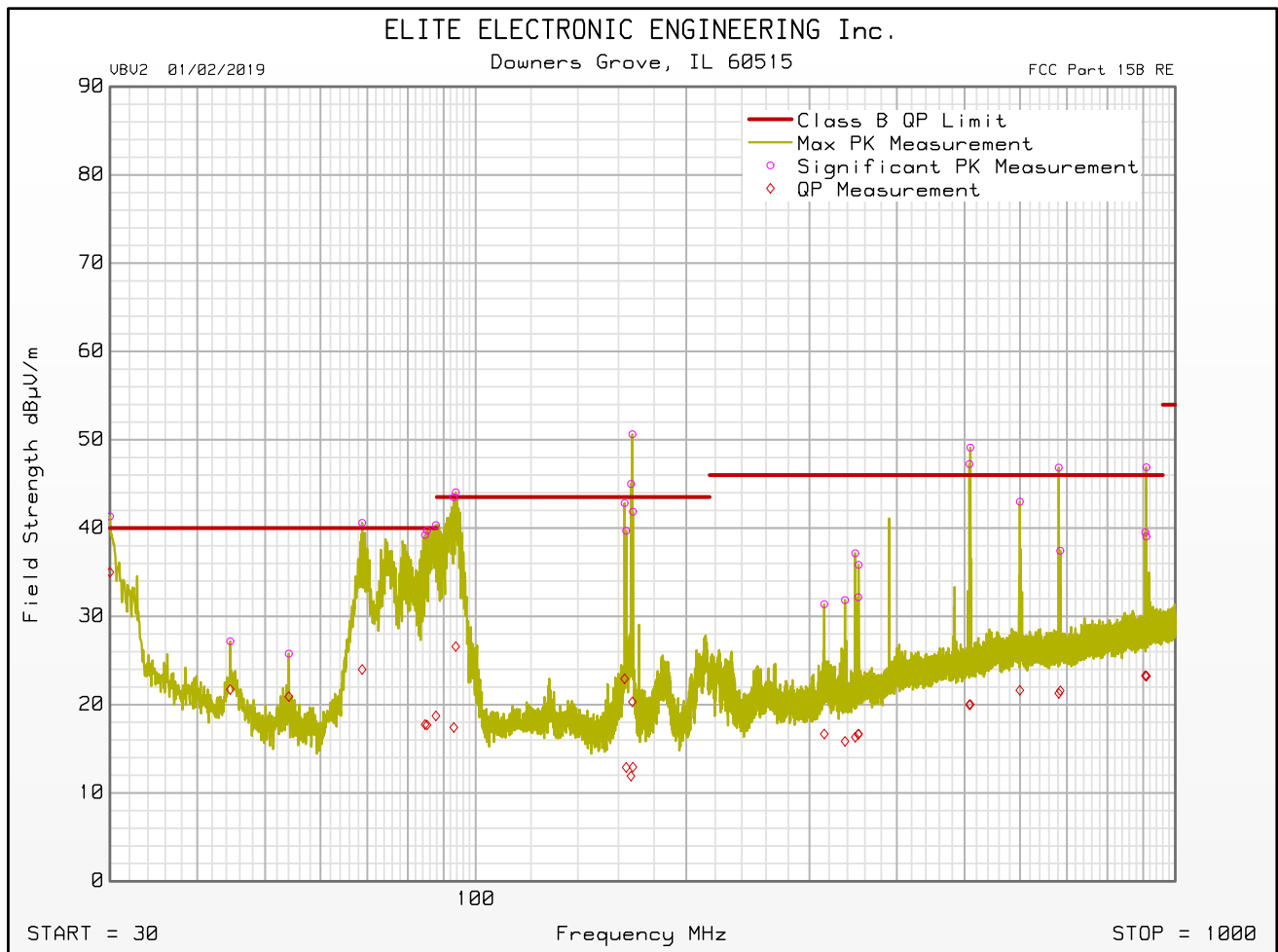
Manufacturer : GENIE
Model : JACKSHAFT WITH REMOTE TRANSFORMER
Serial Number :
DUT Mode : MOTOR RUNNING CW AND CCW, RECEIVE AT 315MHz, RECEIVE AT 390MHz, BLE AND WiFi ON
Scan Type : Stepped Scan
Test RBW : 1 MHz
Prelim Dwell Time (s) : 0.0001
Notes : 30 LB. LOAD
Test Engineer : M. Longinotti
Test Date : Jul 19, 2019 12:20:39 PM

Freq MHz	Peak Mtr Rdg dBuV	Average Mtr Rdg dBuV	Ant Fac dB	Amp Fac dB	Cbl Fac dB	Dist Corr dB	Peak Total dBuV/m	Peak Limit dBuV/m	Peak Lim Mrg dB	Average Total dBuV/m	Average Limit dBuV/m	Average Lim Mrg dB	Ant Pol	Mast Ht cm	Azim °
1018.000	54.3	35.1	27.9	-41.1	1.5	0.0	42.6	74.0	-31.4	23.4	54.0	-30.6	H	340	90
1176.500	50.0	37.4	28.4	-40.8	1.7	0.0	39.3	74.0	-34.7	26.7	54.0	-27.3	V	340	315
1265.000	50.3	37.0	29.1	-40.7	1.8	0.0	40.5	74.0	-33.4	27.3	54.0	-26.7	H	340	180
1318.500	51.1	37.3	29.0	-40.6	1.8	0.0	41.3	74.0	-32.6	27.5	54.0	-26.5	V	120	90
1496.000	58.6	36.0	28.0	-40.3	2.0	0.0	48.2	74.0	-25.8	25.6	54.0	-28.4	H	200	45
1505.500	54.2	36.0	28.0	-40.3	2.0	0.0	43.8	74.0	-30.1	25.7	54.0	-28.3	H	120	90
1549.000	70.2	36.2	28.2	-40.3	2.0	0.0	60.1	74.0	-13.8	26.2	54.0	-27.8	H	120	135
1821.500	48.6	35.7	30.8	-40.0	2.2	0.0	41.6	74.0	-32.4	28.7	54.0	-25.3	V	120	45
1928.000	52.7	35.4	31.5	-39.9	2.2	0.0	46.5	74.0	-27.5	29.3	54.0	-24.7	V	200	315

FCC Part 15B Class B Radiated RF Emissions Test

SW ID/Rev: VBV2 01/02/2019

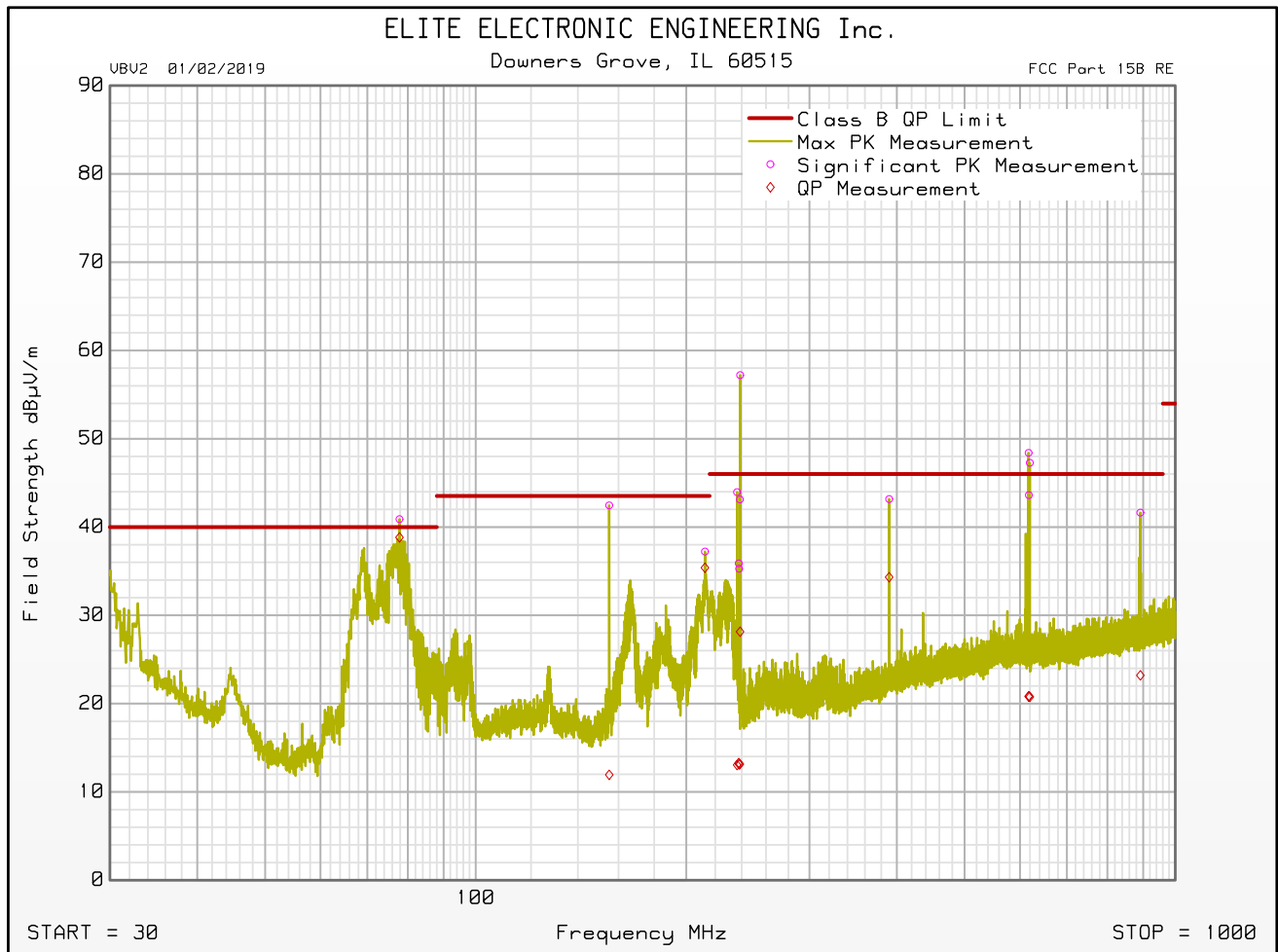
Manufacturer : GENIE
 Model : JACKSHAFT WITH REMOTE TRANSFORMER
 Serial Number :
 DUT Mode : BATTERY BACKUP, MOTOR RUNNING CW AND CCW, RECEIVE AT 315MHz,
 RECEIVE AT 390MHz, BLE AND WiFi ON
 Ant. Polarization(s) : VERTICAL
 Scan Type : Stepped Scan
 Test RBW : 120 kHz
 Prelim Dwell Time (s) : 0.0001
 Notes : 30 LB. LOAD
 Test Engineer : M. Longinotti
 Test Date : Jul 18, 2019 05:45:57 PM



FCC Part 15B Class B Radiated RF Emissions Test

SW ID/Rev: VBV2 01/02/2019

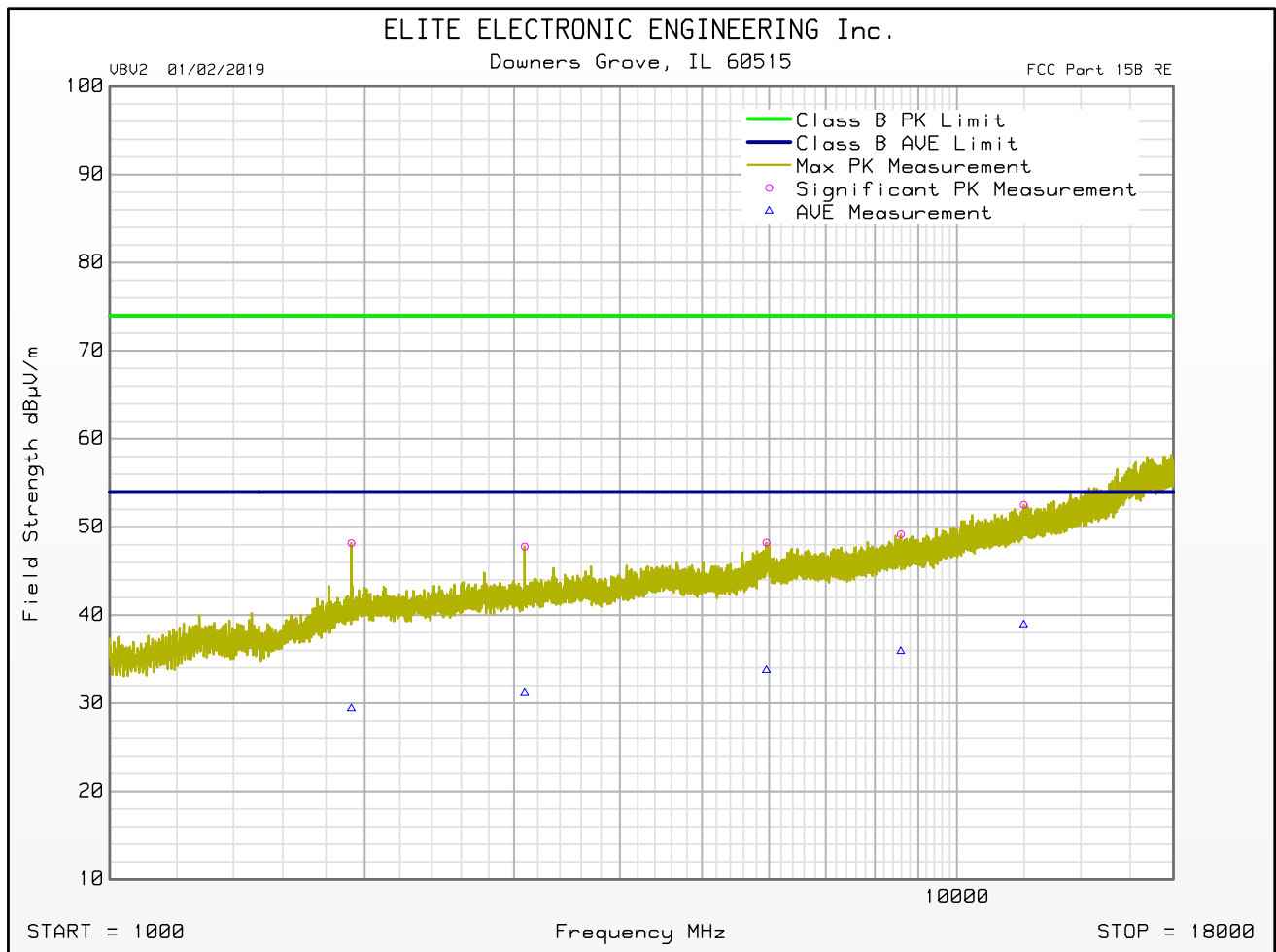
Manufacturer : GENIE
 Model : JACKSHAFT WITH REMOTE TRANSFORMER
 Serial Number :
 DUT Mode : BATTERY BACKUP, MOTOR RUNNING CW AND CCW, RECEIVE AT 315MHz,
 RECEIVE AT 390MHz, BLE AND WiFi ON
 Ant. Polarization(s) : HORIZONTAL
 Scan Type : Stepped Scan
 Test RBW : 120 kHz
 Prelim Dwell Time (s) : 0.0001
 Notes : 30 LB. LOAD
 Test Engineer : M. Longinotti
 Test Date : Jul 18, 2019 05:45:57 PM



FCC Part 15B Class B Radiated RF Emissions Test

SW ID/Rev: VBV2 01/02/2019

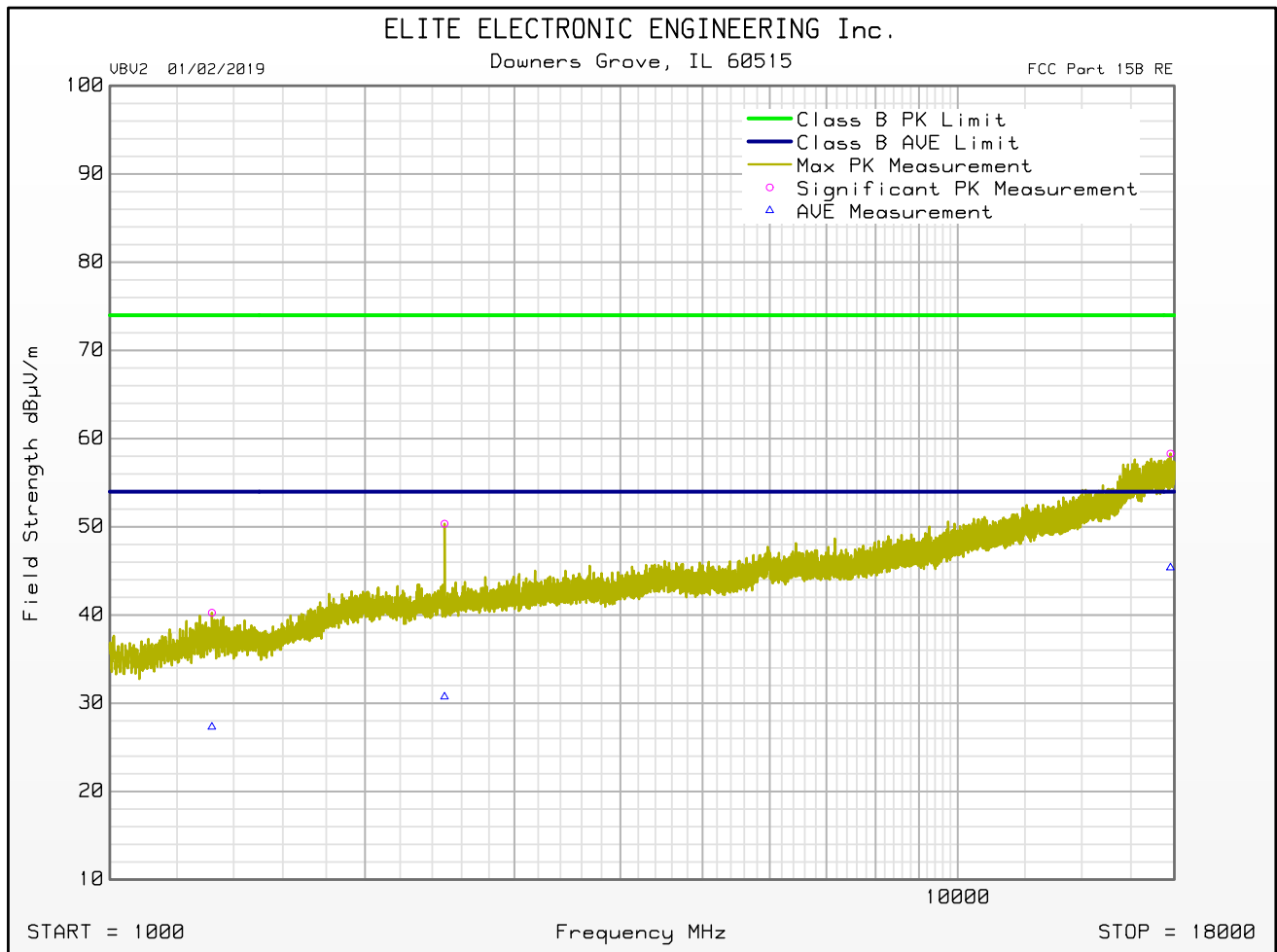
Manufacturer : GENIE
 Model : JACKSHAFT
 Serial Number :
 DUT Mode : BATTERY BACKUP, MOTOR RUNNING CW AND CCW, RECEIVE AT 315MHz,
 RECEIVE AT 390MHz, BLE AND WiFi ON
 Ant. Polarization(s) : VERTICAL
 Scan Type : Stepped Scan
 Test RBW : 1 MHz
 Prelim Dwell Time (s) : 0.0001
 Notes : 30 LB. LOAD
 Test Engineer : M. Longinotti
 Test Date : Jul 19, 2019 01:52:23 PM

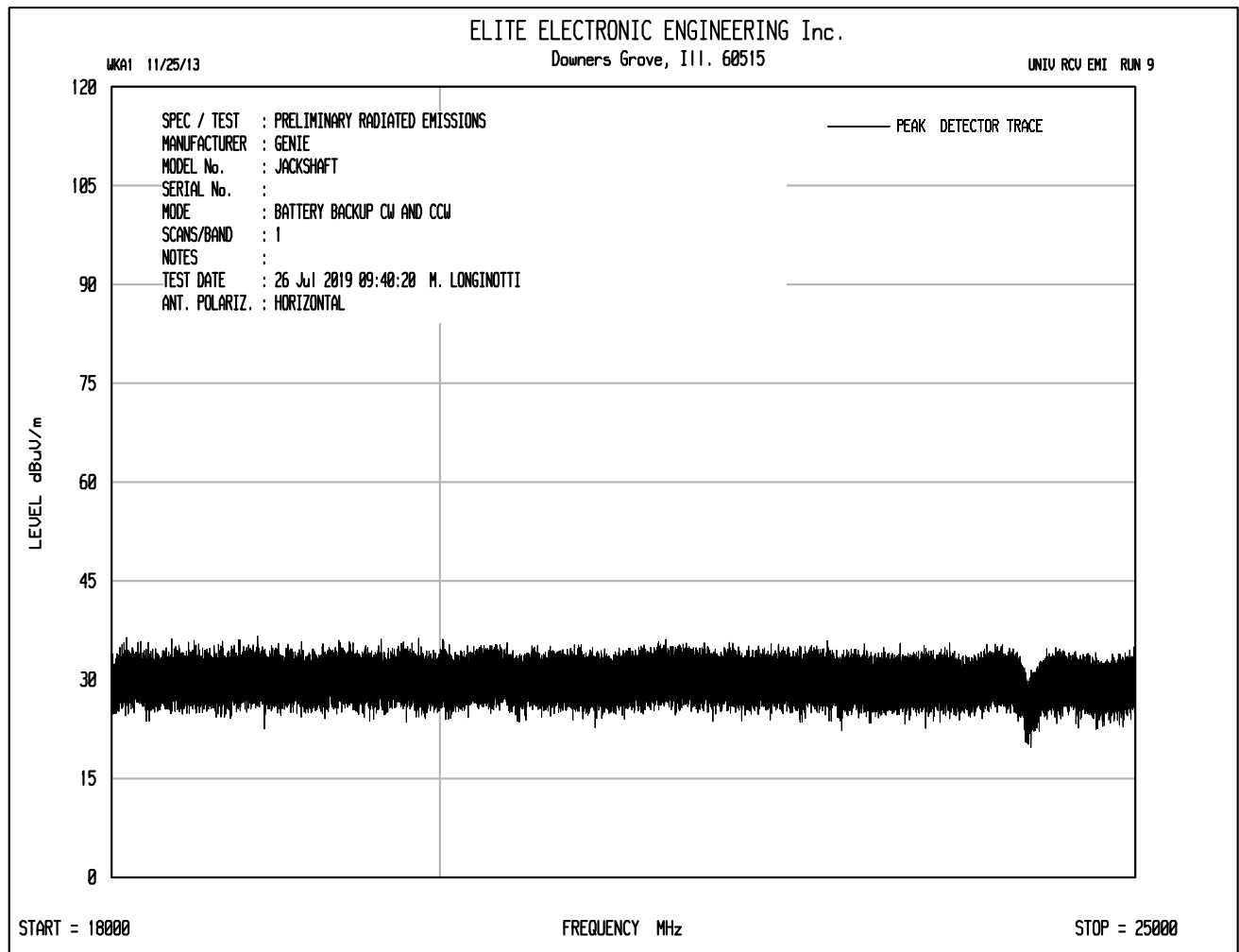


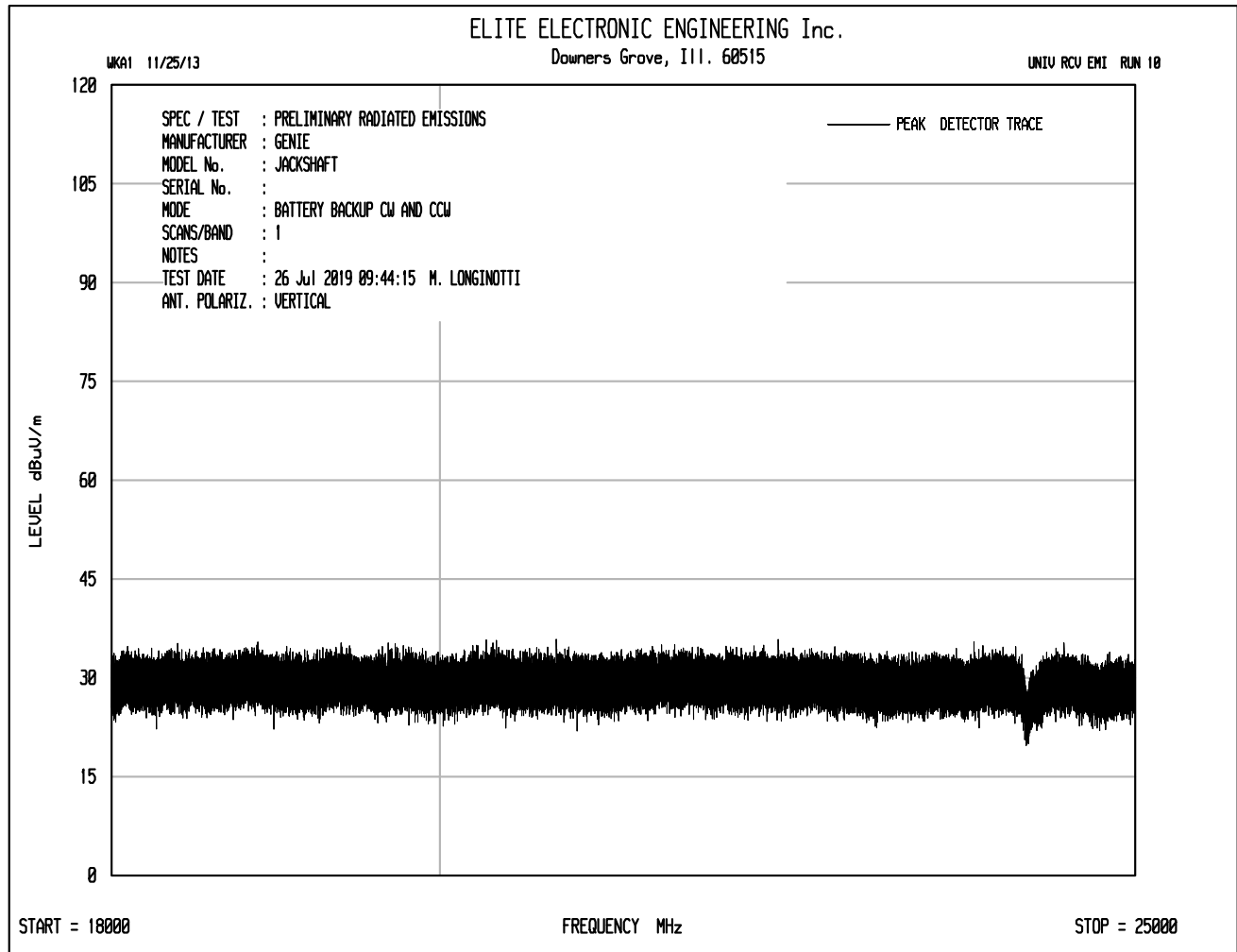
FCC Part 15B Class B Radiated RF Emissions Test

SW ID/Rev: VBV2 01/02/2019

Manufacturer : GENIE
 Model : JACKSHAFT
 Serial Number :
 DUT Mode : BATTERY BACKUP, MOTOR RUNNING CW AND CCW, RECEIVE AT 315MHz,
 RECEIVE AT 390MHz, BLE AND WiFi ON
 Turntable Step Angle (°): 45
 Mast Positions (cm) : 120, 200, 340
 Ant. Polarization(s) : HORIZONTAL
 Scan Type : Stepped Scan
 Test RBW : 1 MHz
 Prelim Dwell Time (s) : 0.0001
 Notes : 30 LB. LOAD
 Test Engineer : M. Longinotti
 Test Date : Jul 19, 2019 01:52:23 PM







FCC Part 15B Class B Radiated RF Emissions Test

SW ID/Rev: VBV2 01/02/2019

Manufacturer : GENIE
 Model : JACKSHAFT WITH REMOTE TRANSFORMER
 Serial Number :
 DUT Mode : BATTERY BACKUP, MOTOR RUNNING CW AND CCW, RECEIVE AT 315MHz,
 RECEIVE AT 390MHz, BLE AND WiFi ON
 Scan Type : Stepped Scan
 Test RBW : 120 kHz
 Prelim Dwell Time (s) : 0.0001
 Notes : 30 LB. LOAD
 Test Engineer : M. Longinotti
 Test Date : Jul 18, 2019 05:45:57 PM

Freq MHz	Peak Mtr Rdg dBuV	QP Mtr Rdg dBuV	Ant Fac dB	Amp Fac dB	Cbl Fac dB	Dist Corr dB	Peak Total dBuV/m	QP Total dBuV/m	QP Limit dBuV/m	QP Lim Mrg dB	Ant Pol	Mast Ht cm	Azim °
30.000	16.6	10.3	24.3	0.0	0.4	0.0	41.3	35.0	40.0	-5.0	V	120	270
44.580	10.2	4.7	16.6	0.0	0.4	0.0	27.2	21.7	40.0	-18.3	V	120	270
54.060	12.2	7.4	13.1	0.0	0.4	0.0	25.8	20.9	40.0	-19.1	V	200	135
68.820	27.8	11.2	12.4	0.0	0.4	0.0	40.6	24.0	40.0	-16.0	V	340	225
77.820	27.6	25.6	12.9	0.0	0.4	0.0	40.9	38.8	40.0	-1.2	H	340	0
84.660	25.0	3.5	13.8	0.0	0.4	0.0	39.2	17.7	40.0	-22.3	V	120	315
85.200	25.4	3.4	13.9	0.0	0.4	0.0	39.7	17.7	40.0	-22.3	V	120	225
87.720	25.5	3.9	14.4	0.0	0.4	0.0	40.3	18.7	40.0	-21.3	V	120	225
93.040	27.5	1.5	15.6	0.0	0.4	0.0	43.5	17.4	43.5	-26.1	V	120	135
93.640	28.0	10.5	15.7	0.0	0.4	0.0	44.1	26.6	43.5	-16.9	V	120	0
155.200	25.5	-5.0	16.3	0.0	0.6	0.0	42.5	11.9	43.5	-31.6	H	120	315
163.240	26.1	6.2	16.1	0.0	0.6	0.0	42.8	22.9	43.5	-20.6	V	200	315
164.080	23.0	-3.8	16.0	0.0	0.7	0.0	39.7	12.9	43.5	-30.6	V	200	315
166.720	28.5	-4.6	15.9	0.0	0.7	0.0	45.0	11.9	43.5	-31.6	V	200	315
167.500	34.1	3.8	15.8	0.0	0.7	0.0	50.6	20.3	43.5	-23.2	V	200	315
167.800	25.4	-3.5	15.8	0.0	0.7	0.0	41.9	12.9	43.5	-30.6	V	200	315
212.680	21.3	19.5	15.2	0.0	0.8	0.0	37.2	35.4	43.5	-8.1	H	200	90
236.400	26.1	-4.8	17.0	0.0	0.8	0.0	44.0	13.1	46.0	-32.9	H	340	45
237.720	17.9	-4.7	17.2	0.0	0.8	0.0	35.9	13.3	46.0	-32.7	H	340	45
238.020	17.3	-4.9	17.2	0.0	0.8	0.0	35.3	13.1	46.0	-32.9	H	340	45
238.620	25.1	-4.9	17.3	0.0	0.8	0.0	43.1	13.1	46.0	-32.9	H	340	45
238.800	39.1	10.1	17.3	0.0	0.8	0.0	57.2	28.1	46.0	-17.9	H	340	45
315.000	11.1	-3.5	19.4	0.0	0.8	0.0	31.4	16.7	46.0	-29.3	V	200	45
337.260	11.2	-4.8	19.7	0.0	0.9	0.0	31.8	15.8	46.0	-30.2	V	200	315
348.780	16.0	-4.8	20.2	0.0	1.0	0.0	37.1	16.3	46.0	-29.7	V	340	270
352.260	10.8	-4.7	20.4	0.0	1.0	0.0	32.2	16.7	46.0	-29.3	V	340	270
352.680	14.5	-4.7	20.4	0.0	1.0	0.0	35.8	16.7	46.0	-29.3	V	340	270
390.000	20.4	11.6	21.7	0.0	1.1	0.0	43.2	34.3	46.0	-11.7	H	200	180
507.900	22.6	-4.7	23.5	0.0	1.1	0.0	47.3	20.0	46.0	-26.0	V	120	180
509.400	24.4	-4.6	23.5	0.0	1.1	0.0	49.1	20.0	46.0	-26.0	V	120	180
599.580	17.1	-4.3	24.7	0.0	1.1	0.0	43.0	21.6	46.0	-24.4	V	340	270
617.280	22.6	-4.9	24.6	0.0	1.2	0.0	48.4	20.8	46.0	-25.2	H	200	0
617.700	17.9	-4.9	24.6	0.0	1.2	0.0	43.6	20.8	46.0	-25.2	H	200	0
619.680	21.5	-5.0	24.6	0.0	1.2	0.0	47.3	20.8	46.0	-25.2	H	200	0
681.540	20.5	-5.0	25.0	0.0	1.3	0.0	46.8	21.3	46.0	-24.7	V	120	45
685.020	11.1	-4.8	25.0	0.0	1.3	0.0	37.4	21.6	46.0	-24.4	V	120	45
891.540	13.7	-4.7	26.4	0.0	1.5	0.0	41.6	23.2	46.0	-22.8	H	200	0
906.060	11.6	-4.6	26.4	0.0	1.5	0.0	39.5	23.3	46.0	-22.7	V	120	180
909.240	11.2	-4.6	26.4	0.0	1.5	0.0	39.0	23.3	46.0	-22.7	V	120	180
909.480	19.0	-4.7	26.4	0.0	1.5	0.0	46.9	23.2	46.0	-22.8	V	120	180



FCC Part 15B Class B Radiated RF Emissions Test

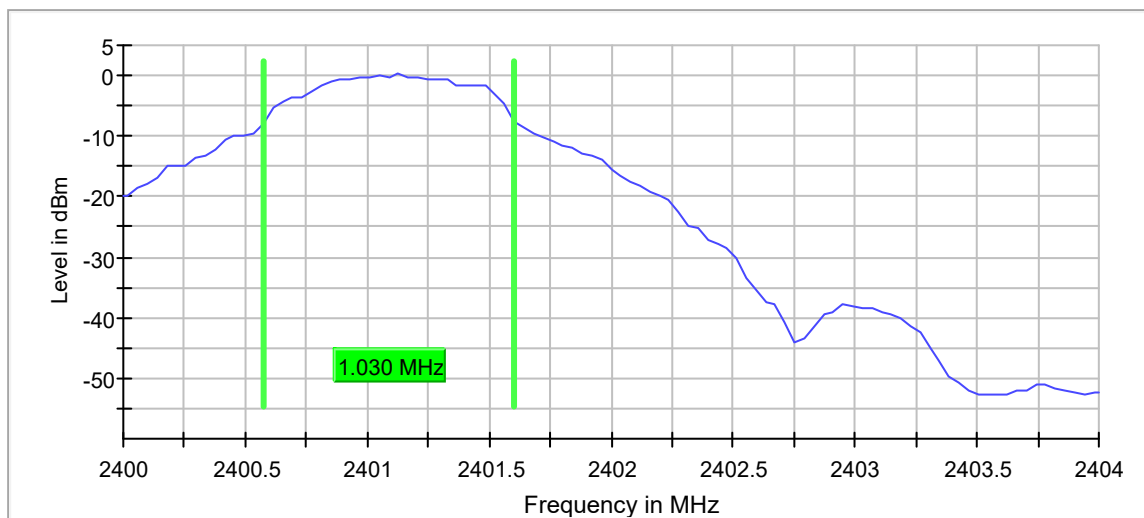
SW ID/Rev: VBV2 01/02/2019

Manufacturer : GENIE
Model : JACKSHAFT
Serial Number :
DUT Mode : BATTERY BACKUP, MOTOR RUNNING CW AND CCW, RECEIVE AT 315MHZ,
RECEIVE AT 390MHZ, BLE AND WiFi ON
Scan Type : Stepped Scan
Test RBW : 1 MHz
Prelim Dwell Time (s) : 0.0001
Notes : 30 LB. LOAD
Test Engineer : M. Longinotti
Test Date : Jul 19, 2019 01:52:23 PM

Freq MHz	Peak Mtr Rdg dBuV	Average Mtr Rdg dBuV	Ant Fac dB	Amp Fac dB	Cbl Fac dB	Dist Corr dB	Peak Total dBuV/m	Peak Limit dBuV/m	Peak Lim Mrg dB	Average Total dBuV/m	Average Limit dBuV/m	Average Lim Mrg dB	Ant Pol	Mast Ht cm	Azim °
1319.500	50.0	37.1	29.0	-40.6	1.8	0.0	40.3	74.0	-33.7	27.3	54.0	-26.7	H	120	90
1928.500	54.3	35.6	31.5	-39.9	2.2	0.0	48.2	74.0	-25.8	29.4	54.0	-24.6	V	120	180
2481.500	55.3	35.6	32.3	-39.9	2.6	0.0	50.4	74.0	-23.6	30.7	54.0	-23.2	H	120	135
3088.000	51.4	34.9	32.9	-39.5	3.0	0.0	47.8	74.0	-26.2	31.2	54.0	-22.8	V	200	270
5957.000	48.3	33.8	35.2	-39.4	4.2	0.0	48.2	74.0	-25.8	33.7	54.0	-20.3	V	120	0
8584.000	47.3	34.0	36.3	-39.4	4.9	0.0	49.2	74.0	-24.8	35.9	54.0	-18.1	V	340	45
11984.500	46.9	33.4	38.7	-39.2	6.1	0.0	52.5	74.0	-21.5	38.9	54.0	-15.1	V	340	135
17815.000	46.9	34.0	41.9	-38.0	7.5	0.0	58.3	74.0	-15.7	45.4	54.0	-8.6	H	120	135

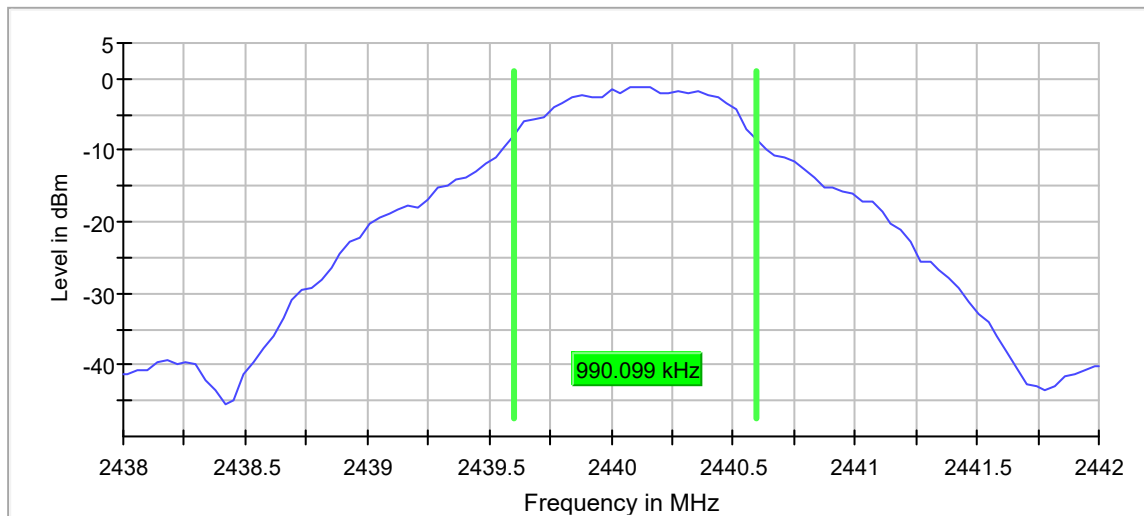
Manufacturer : Genie Company
 Test Item : Jackshaft
 Serial No. : None Assigned
 Mode : Transmit at 2402MHz
 Test Specification : FCC-15.247, RSS-247 6 dB Bandwidth
 Date : July 25, 2019
 Notes :

DUT Frequency MHz	Bandwidth MHz	Limit Min (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Result
2402.000000	1.029703	0.500000	2400.574257	2401.603960	Pass



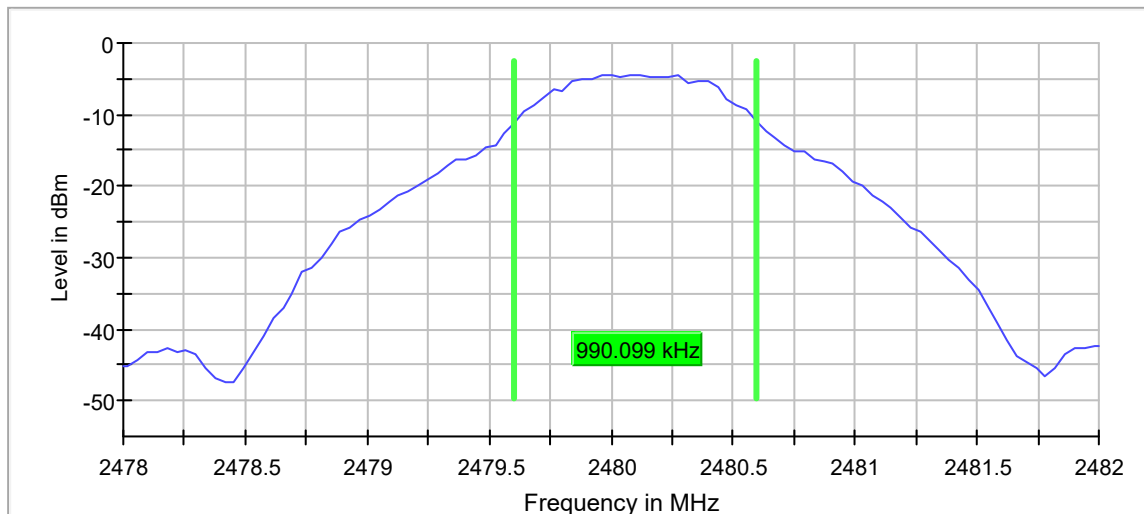
Manufacturer : Genie Company
 Test Item : Jackshaft
 Serial No. : None Assigned
 Mode : Transmit at 2402MHz
 Test Specification : FCC-15.247, RSS-247 6 dB Bandwidth
 Date : July 25, 2019
 Notes :

DUT Frequency MHz	Bandwidth MHz	Limit Min (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Result
2440.000000	0.990099	0.500000	2439.60396	2440.594059	Pass



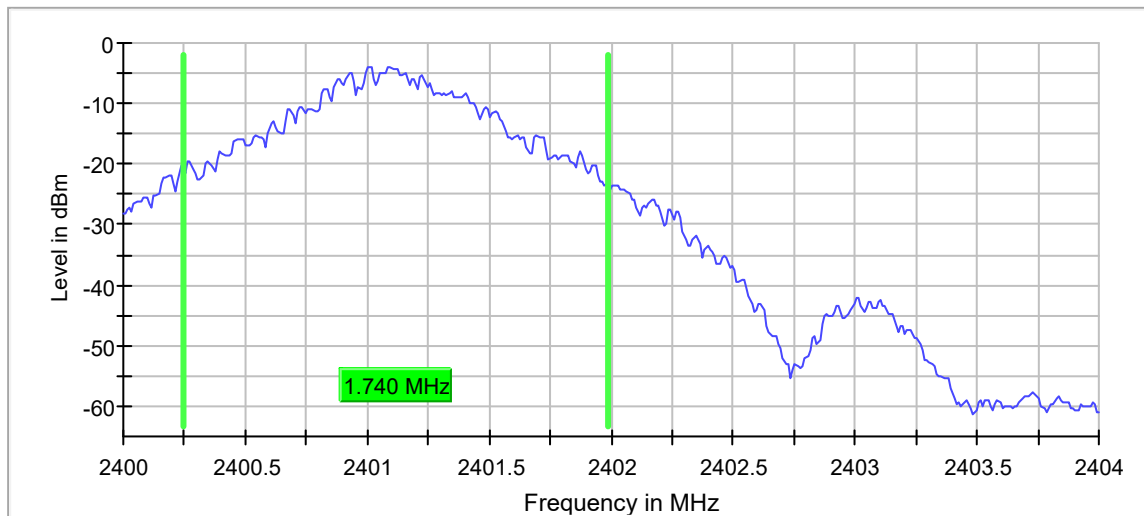
Manufacturer : Genie Company
 Test Item : Jackshaft
 Serial No. : None Assigned
 Mode : Transmit at 2480MHz
 Test Specification : FCC-15.247, RSS-247 6 dB Bandwidth
 Date : July 25, 2019
 Notes :

DUT Frequency MHz	Bandwidth MHz	Limit Min (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Result
2480.000000	0.990099	0.500000	2479.603960	2480.594059	Pass



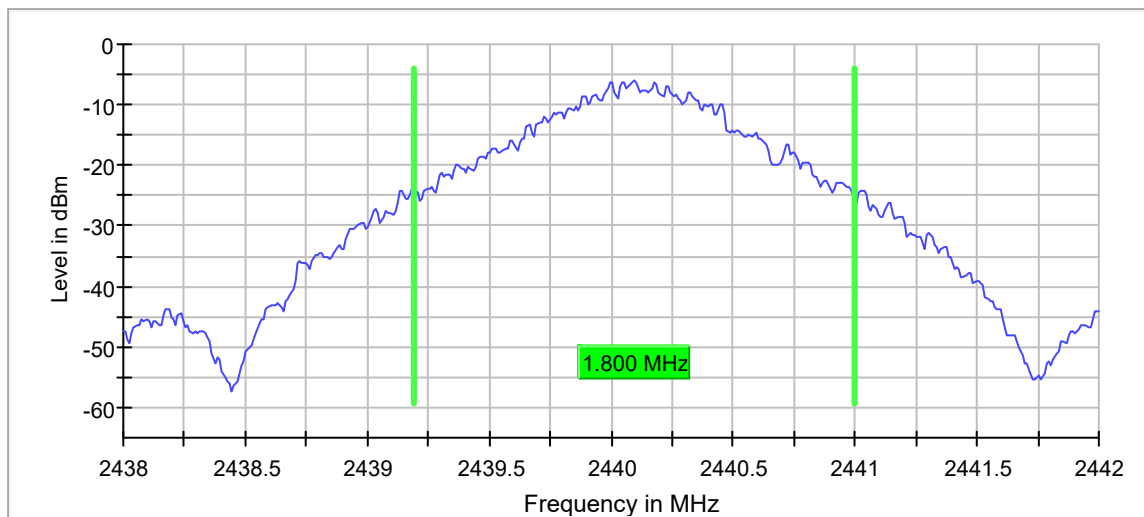
Manufacturer : Genie Company
 Test Item : Jackshaft
 Serial No. : None Assigned
 Mode : Transmit at 2402MHz
 Test Specification : RSS-247 99% Bandwidth
 Date : July 25, 2019
 Notes :

DUT Frequency MHz	Bandwidth MHz	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Result
2402.000000	1.740000	---	---	2400.245000	2401.985000	Pass



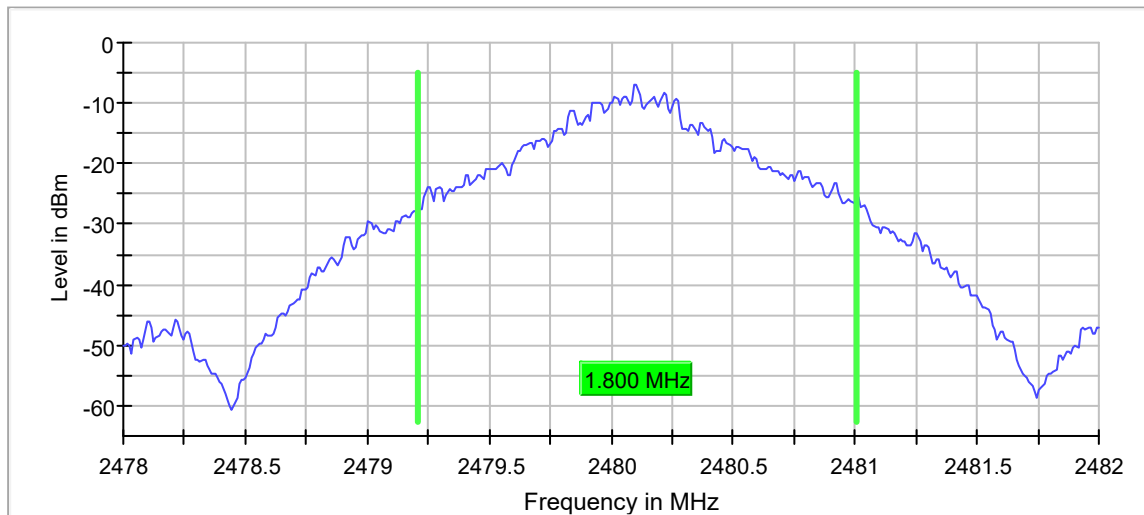
Manufacturer : Genie Company
 Test Item : Jackshaft
 Serial No. : None Assigned
 Mode : Transmit at 2440MHz
 Test Specification : RSS-247 99% Bandwidth
 Date : July 25, 2019
 Notes :

DUT Frequency MHz	Bandwidth MHz	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Result
2440.000000	1.800000	---	---	2439.195000	2440.995000	Pass



Manufacturer : Genie Company
 Test Item : Jackshaft
 Serial No. : None Assigned
 Mode : Transmit at 2480MHz
 Test Specification : RSS-247 99% Bandwidth
 Date : July 25, 2019
 Notes :

DUT Frequency MHz	Bandwidth MHz	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Result
2480.000000	1.800000	---	---	2479.205000	2481.005000	Pass





Manufacturer : Genie Company
Test Item : Jackshaft
Serial No. : None Assigned
Mode : See Below
Test Specification : FCC-15.247, RSS-247 Peak Output Power (Antenna Conducted)
Date : July 25, 2019
Notes :

Frequency MHz	Measured Peak Power dBm	Power Limit dBm	Result
2402	2.0	30.0	Pass
2440	0.5	30.0	Pass
2480	-2.3	30.0	Pass



Manufacturer : Genie Company
Test Item : Jackshaft
Serial No. : None Assigned
Mode : Transmit at 2402MHz
Test Specification : FCC-15.247, RSS-247 EIRP (Peak)
Date : July 19, 2019
Notes :

Freq. (MHz)	Ant Pol	Wide BW Meter Reading (dBuV)	Matched Sig. Gen. Reading (dBm)	Equivalent Antenna Gain (dB)	Cable Loss (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
2402.00	H	53.1	-7.6	4.2	3.4	-6.8	36.0	-42.8
2402.00	V	52.5	-7.8	4.2	3.4	-7.0	36.0	-43.0

EIRP (dBm) = Matched Sig. Gen. Reading (dBm) + Antenna Gain (dB) – Cable Loss (dB)



Manufacturer : Genie Company
Test Item : Jackshaft
Serial No. : None Assigned
Mode : Transmit at 2440MHz
Test Specification : FCC-15.247, RSS-247 EIRP (Peak)
Date : July 19, 2019
Notes :

Freq. (MHz)	Ant Pol	Wide BW Meter Reading (dBuV)	Matched Sig. Gen. Reading (dBm)	Equivalent Antenna Gain (dB)	Cable Loss (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
2440.00	H	51.8	-8.5	5.5	3.5	-6.4	36.0	-42.4
2440.00	V	51.1	-9.0	5.5	3.5	-6.9	36.0	-42.9

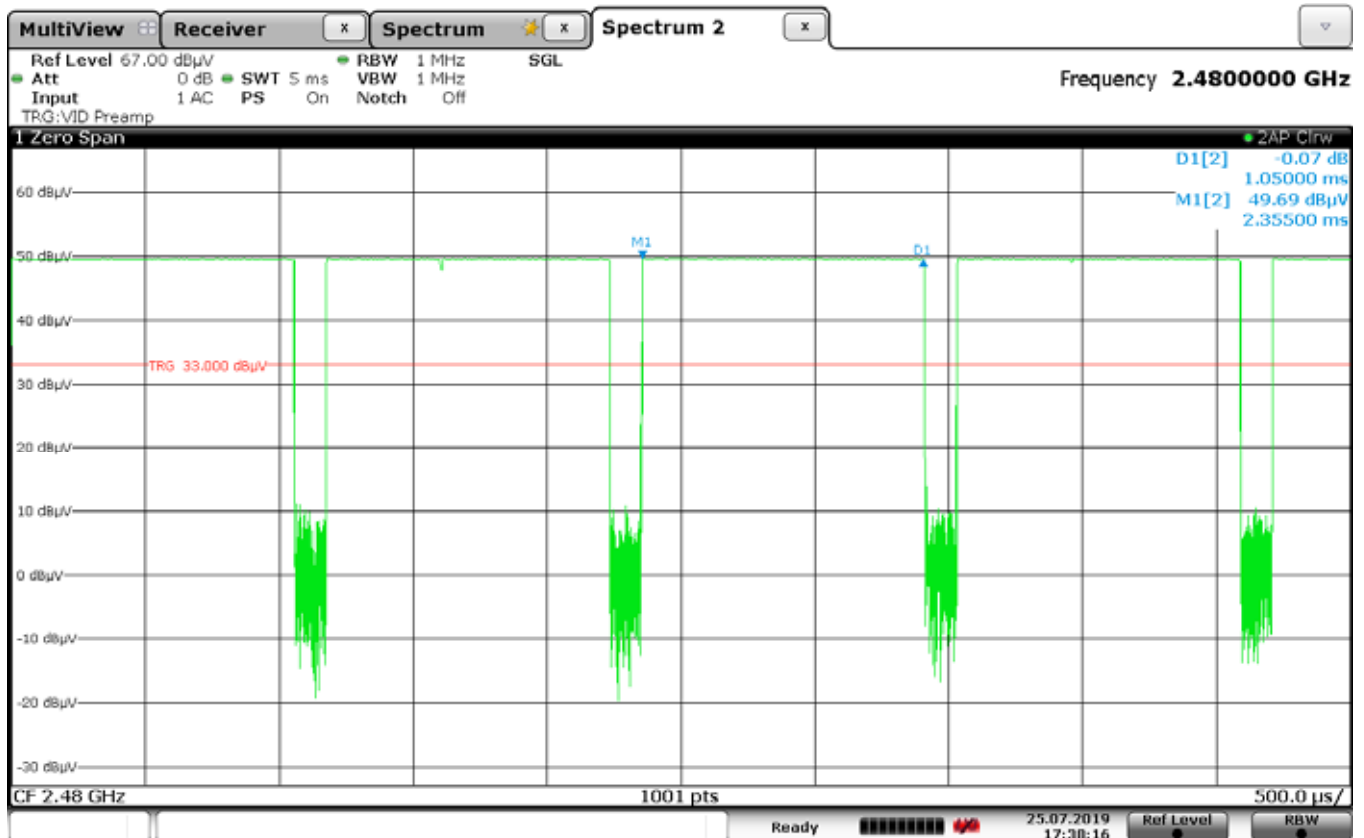
EIRP (dBm) = Matched Sig. Gen. Reading (dBm) + Antenna Gain (dB) – Cable Loss (dB)

Manufacturer : Genie Company
 Test Item : Jackshaft
 Serial No. : None Assigned
 Mode : Transmit at 2480MHz
 Test Specification : FCC-15.247, RSS-247 EIRP (Peak)
 Date : July 19, 2019
 Notes :

Freq. (MHz)	Ant Pol	Wide BW Meter Reading (dBuV)	Matched Sig. Gen. Reading (dBm)	Equivalent Antenna Gain (dB)	Cable Loss (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
2480.00	H	50.4	-9.5	5.6	3.5	-7.4	36.0	-43.4
2480.00	V	52.4	-7.7	5.6	3.5	-5.6	36.0	-41.6

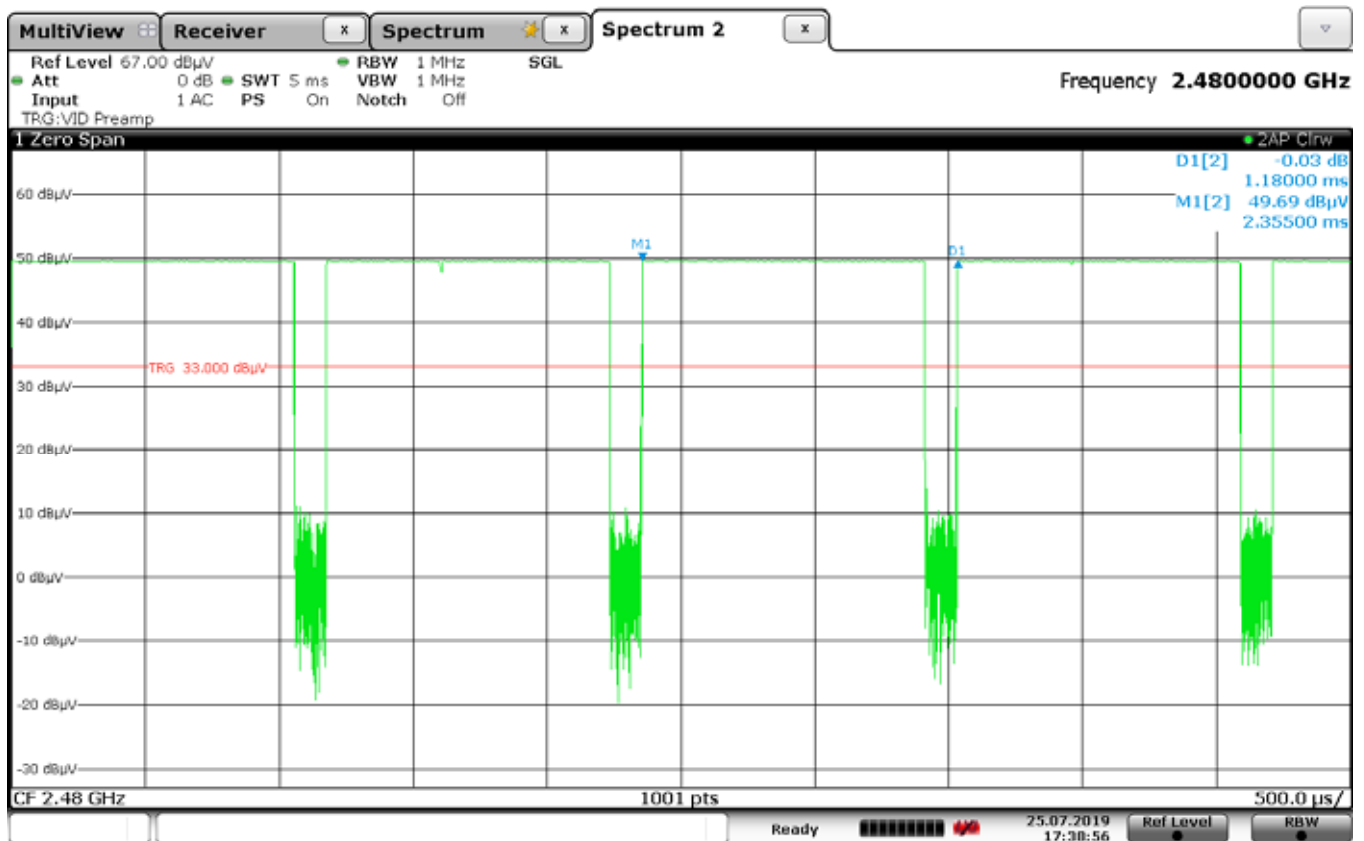
$$\text{EIRP (dBm)} = \text{Matched Sig. Gen. Reading (dBm)} + \text{Antenna Gain (dB)} - \text{Cable Loss (dB)}$$

Manufacturer : Genie Company
 Test Item : Jackshaft
 Serial No. : None Assigned
 Mode : Transmit at 2480MHz
 Test Specification : FCC-15.247, RSS-247 Duty Cycle Factor
 Date : July 19, 2019
 Notes : On Time = 1.05msec

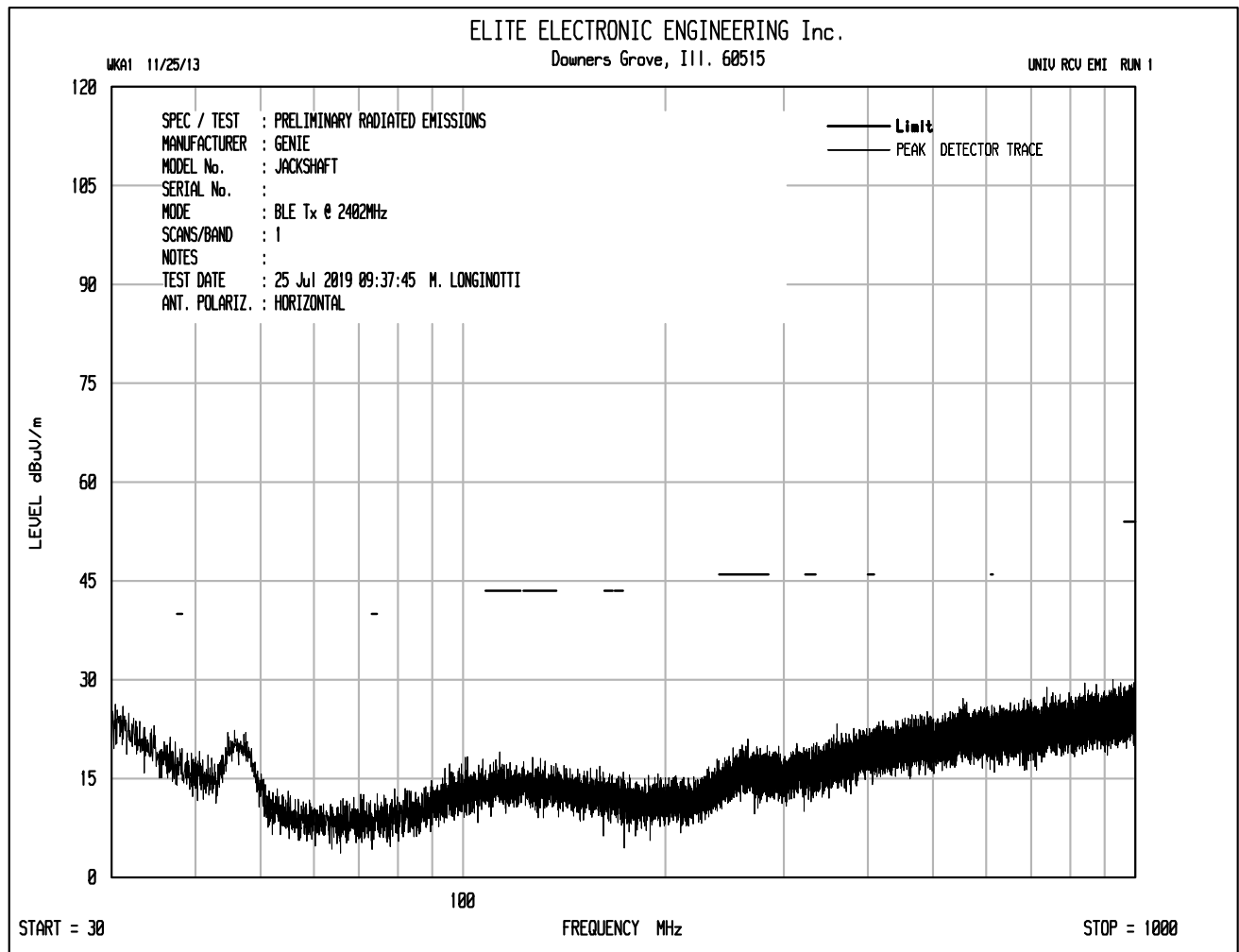


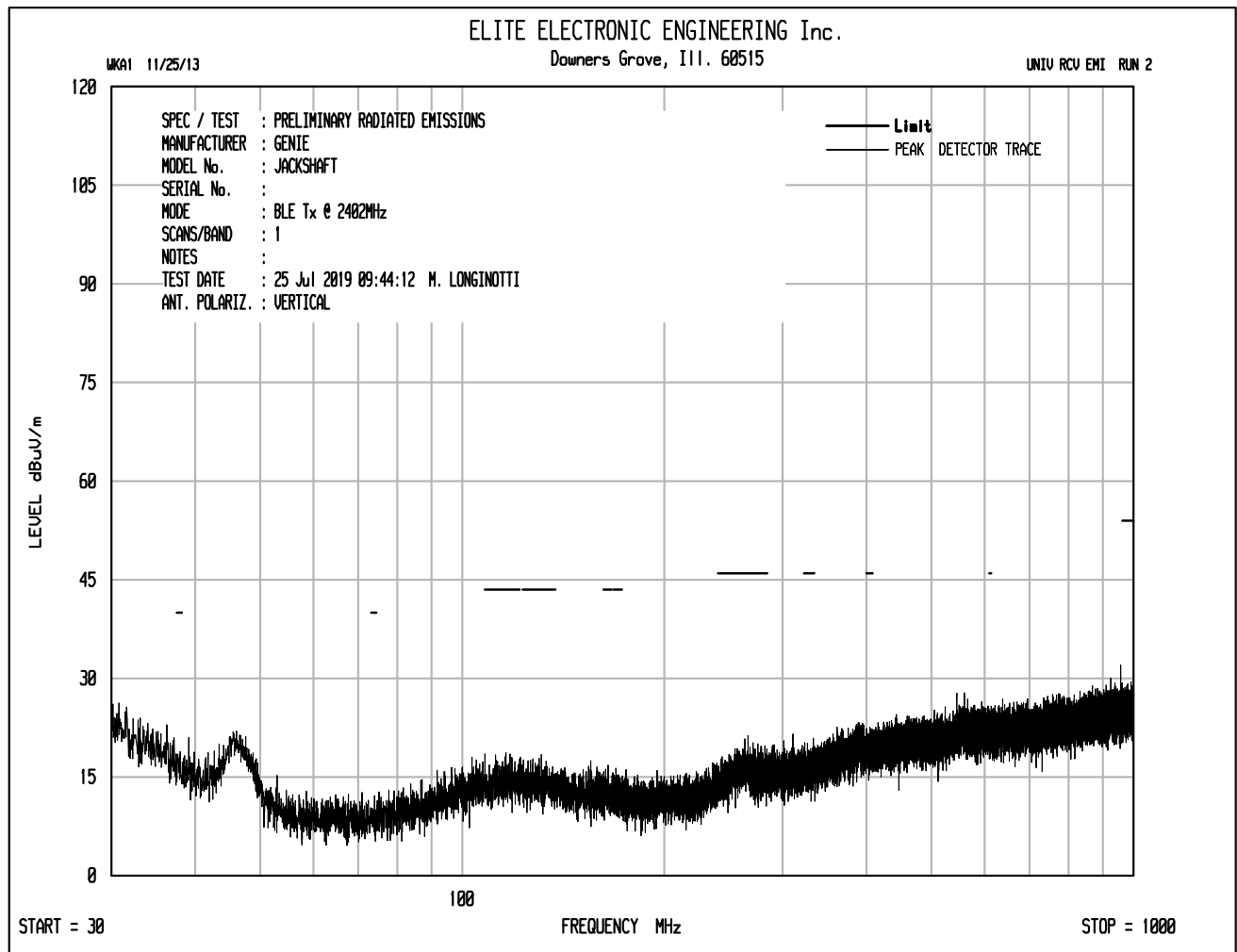
Date: 25 JUL 2019 17:38:16

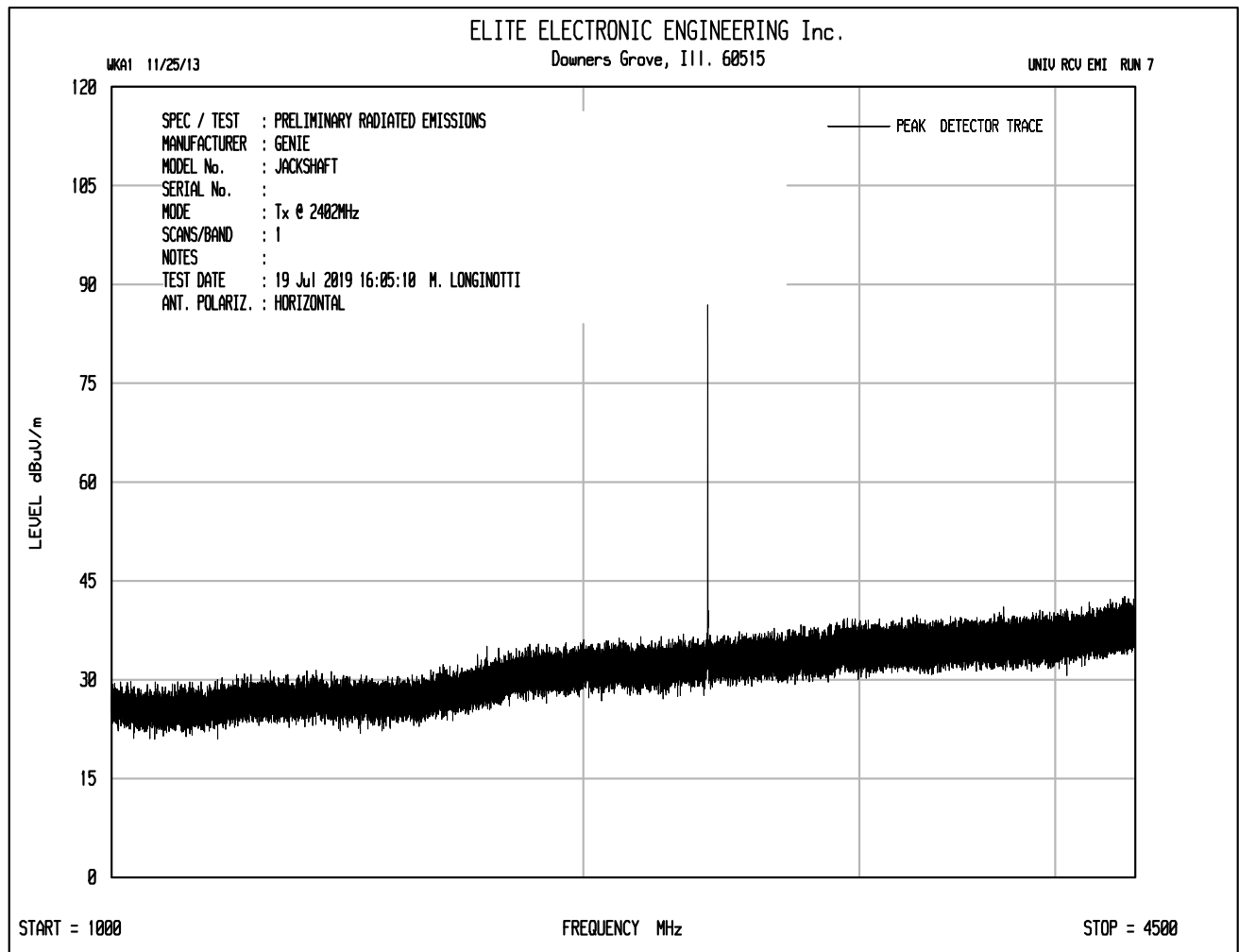
Manufacturer : Genie Company
 Test Item : Jackshaft
 Serial No. : None Assigned
 Mode : Transmit at 2480MHz
 Test Specification : FCC-15.247, RSS-247 Duty Cycle Factor
 Date : July 19, 2019
 Notes : Total Time = 1.18msec, Duty Cycle = (On Time)/(Total Time) = 1.05msec/1.18msec
 : Duty Cycle = .89
 : Duty Cycle Correction Factor = $20 \times \log(1/DC) = 20 \times \log(1/0.89) = 1.01\text{dB}$

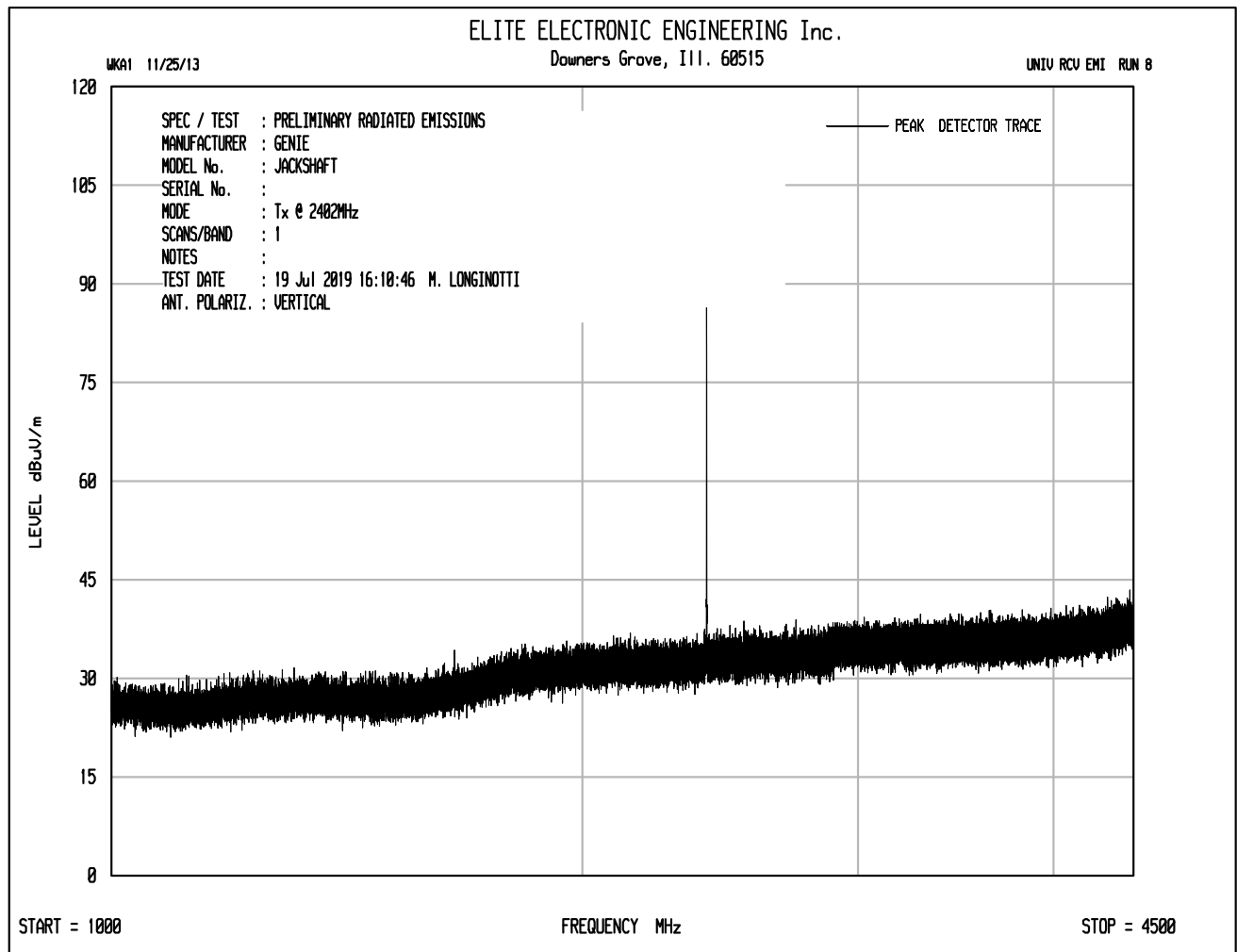


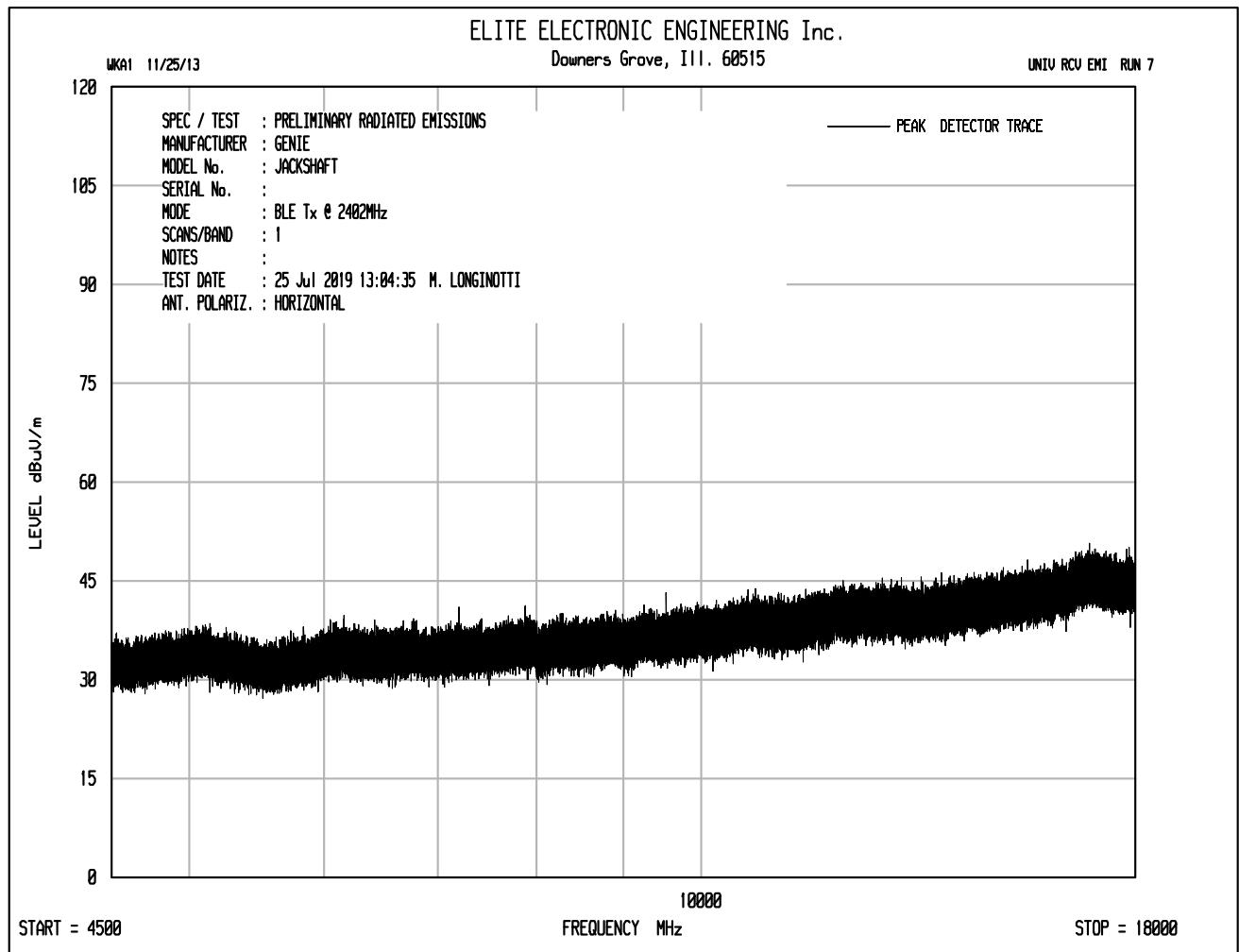
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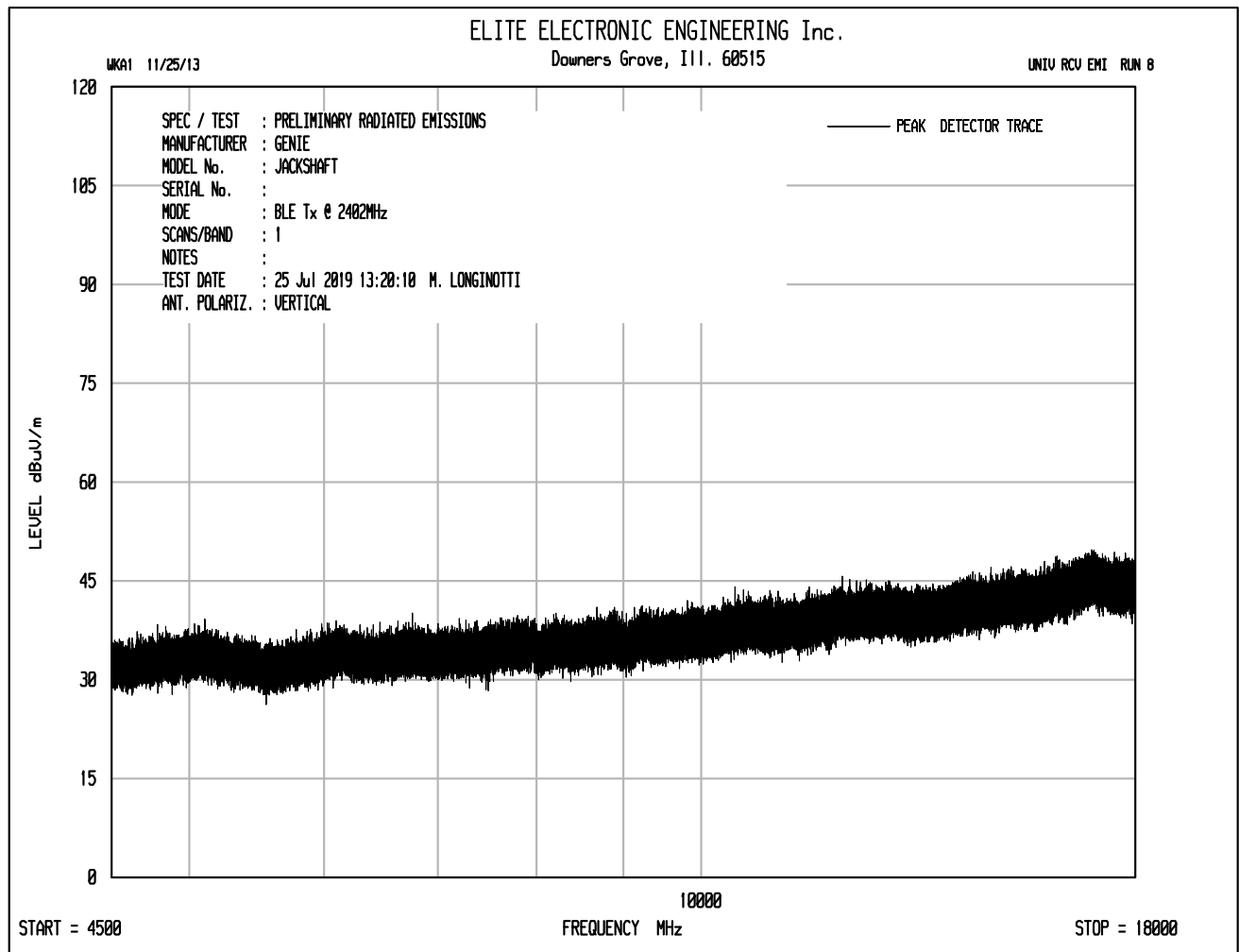


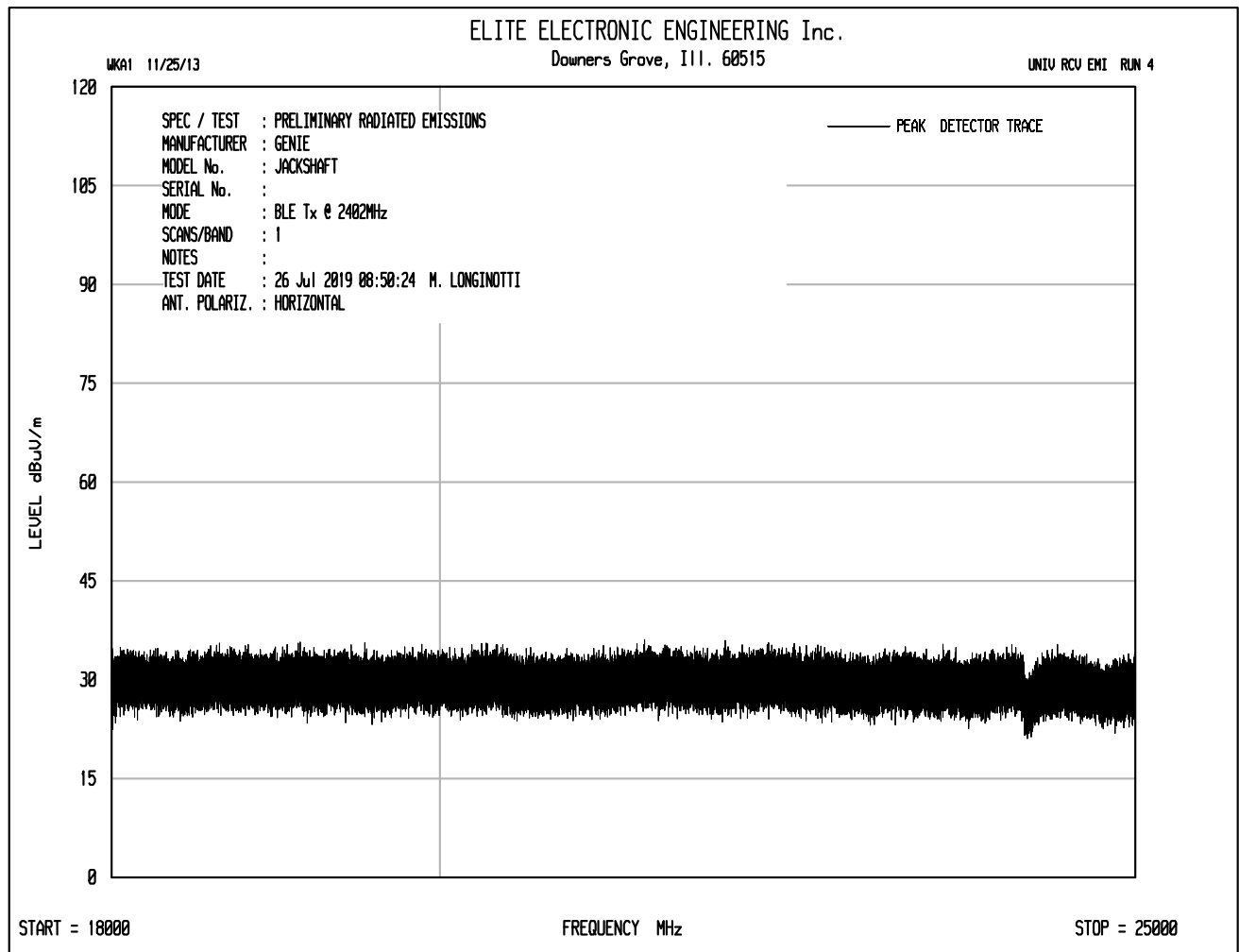


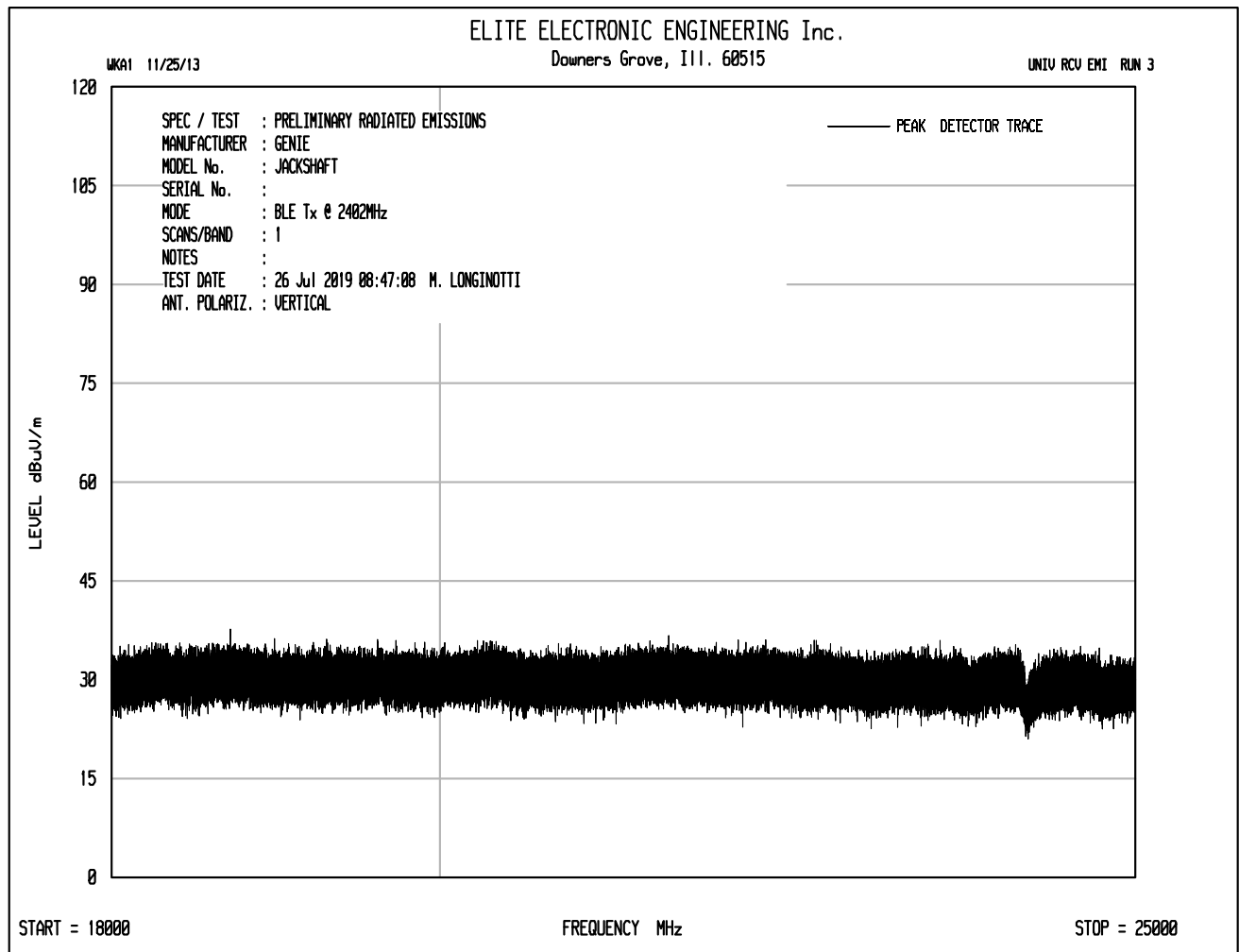














Manufacturer : Genie Company
Test Item : Jackshaft
Serial No. : None Assigned
Mode : Transmit at 2402MHz
Test Specification : FCC-15.247, RSS-247 Peak Radiated Emissions in Restricted Bands
Date : July 19, 2019 through July 26, 2019
Test Distance : 3 meters
Notes : Peak Detector with 1MHz Resolution Bandwidth

Freq. MHz	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	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)
4804.00	H	49.0	Ambient	3.7	34.2	-40.2	46.6	214.3	5000.0	-27.4
4804.00	V	49.3	Ambient	3.7	34.2	-40.2	46.9	221.8	5000.0	-27.1
12010.00	H	49.4	Ambient	6.1	38.7	-39.9	54.3	517.0	5000.0	-19.7
12010.00	V	49.2	Ambient	6.1	38.7	-39.9	54.1	505.2	5000.0	-19.9
19216.00	H	35.0	Ambient	2.2	40.4	-28.2	49.4	293.9	5000.0	-24.6
19216.00	V	35.2	Ambient	2.2	40.4	-28.2	49.6	300.7	5000.0	-24.4

Total (dBuV/m) = Meter Reading + CBL FAC + Ant Fac + Pre Amp



Manufacturer : Genie Company
Test Item : Jackshaft
Serial No. : None Assigned
Mode : Transmit at 2402MHz
Test Specification : FCC-15.247, RSS-247 Average Radiated Emissions in Restricted Bands
Date : July 19, 2019 through July 26, 2019
Test Distance : 3 meters
Notes : Average Detector with 1MHz Resolution Bandwidth

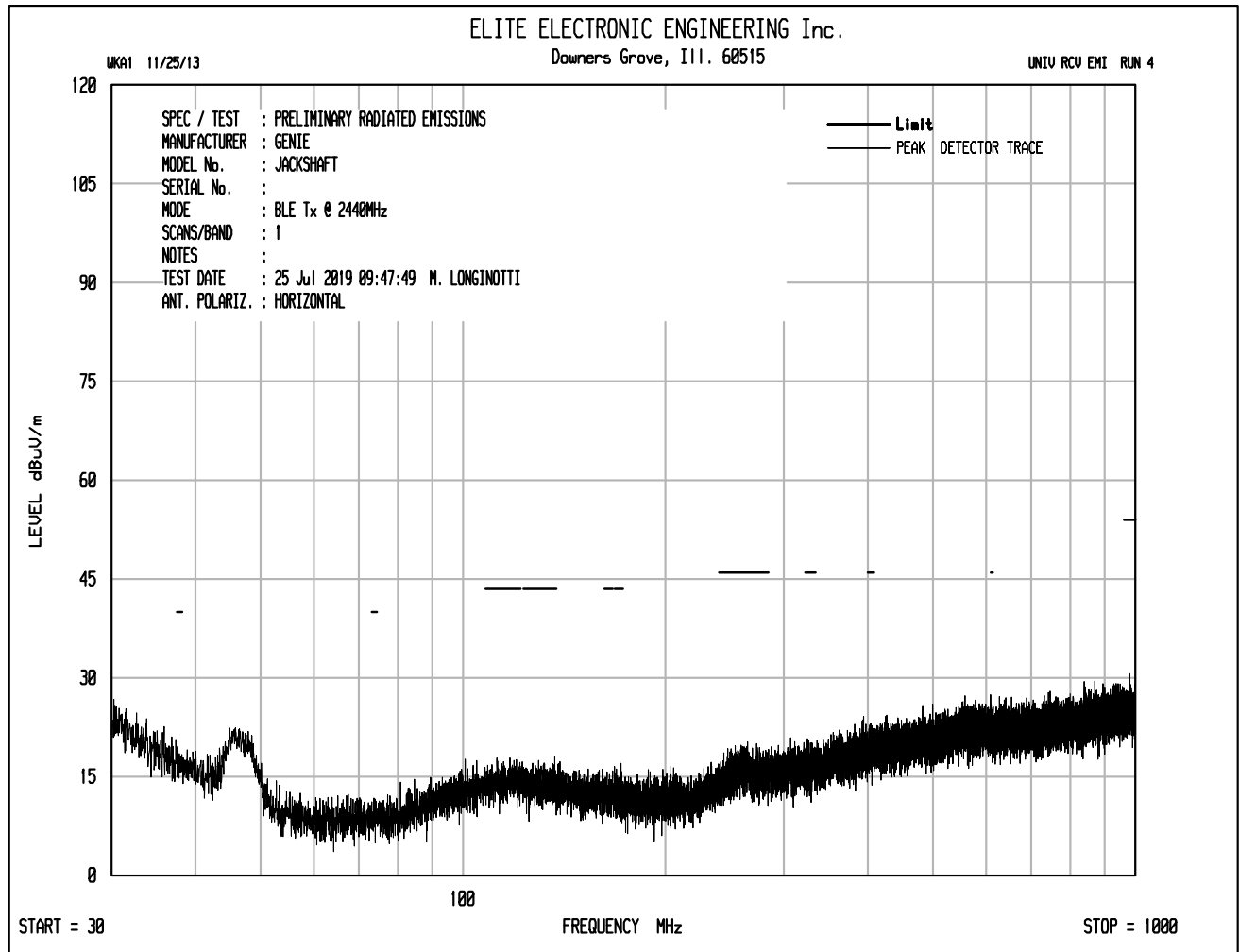
Freq. MHz	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	Pre Amp (dB)	Duty Cycle (dB)	Average Total dBuV/m at 3m	Average Total uV/m at 3 m	Average Limit uV/m at 3 m	Margin (dB)
4804.00	H	34.9	Ambient	3.7	34.2	-40.2	0.0	32.5	42.3	500.0	-21.5
4804.00	V	34.8	Ambient	3.7	34.2	-40.2	0.0	32.4	41.8	500.0	-21.6
12010.00	H	34.8	Ambient	6.1	38.7	-39.9	0.0	39.7	96.3	500.0	-14.3
12010.00	V	34.8	Ambient	6.1	38.7	-39.9	0.0	39.7	96.3	500.0	-14.3
19216.00	H	20.2	Ambient	2.2	40.4	-28.2	0.0	34.6	53.5	500.0	-19.4
19216.00	V	20.4	Ambient	2.2	40.4	-28.2	0.0	34.8	54.7	500.0	-19.2

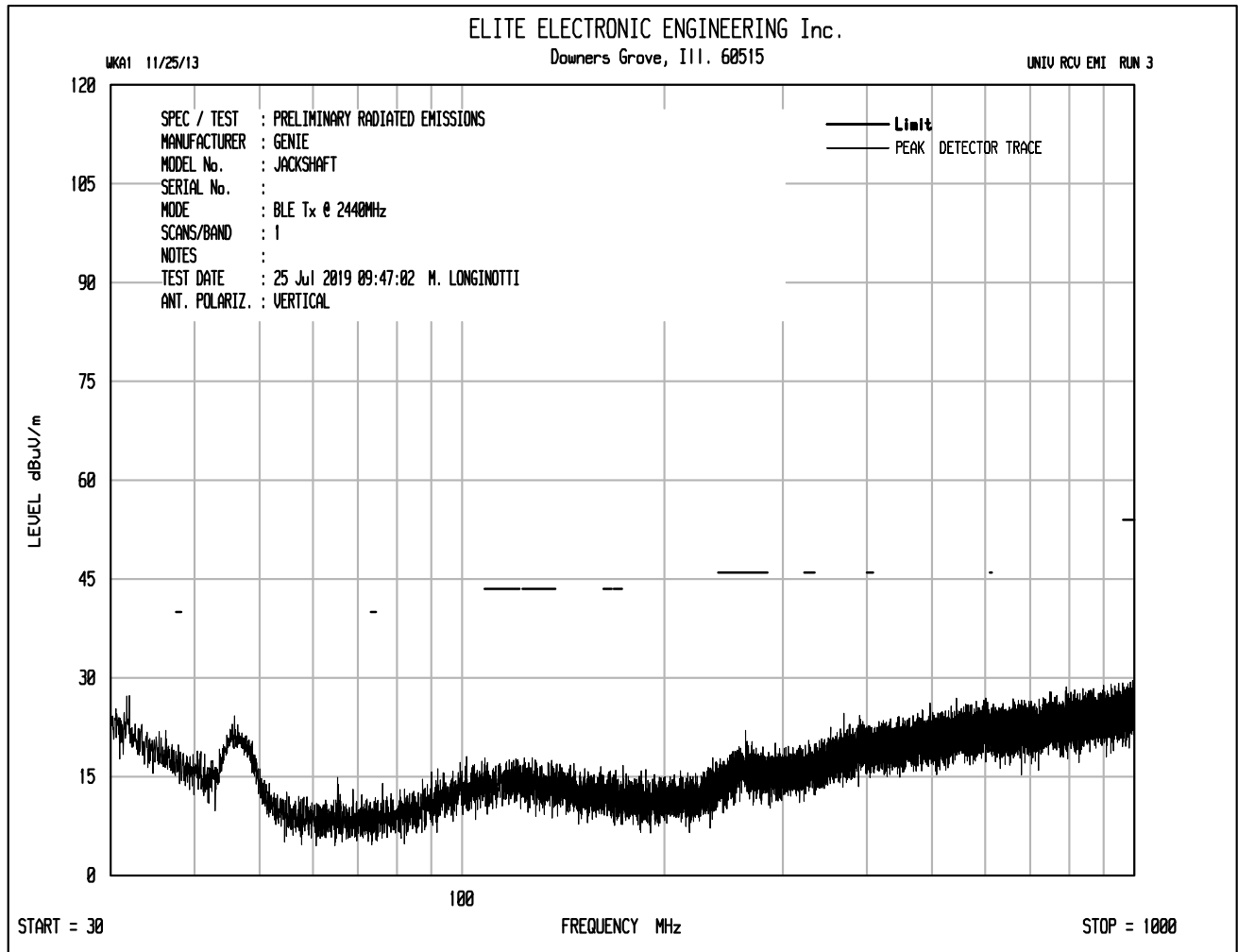
Total (dBuV/m) = Meter Reading + CBL FAC + Ant Fac + Pre Amp + Duty Cycle

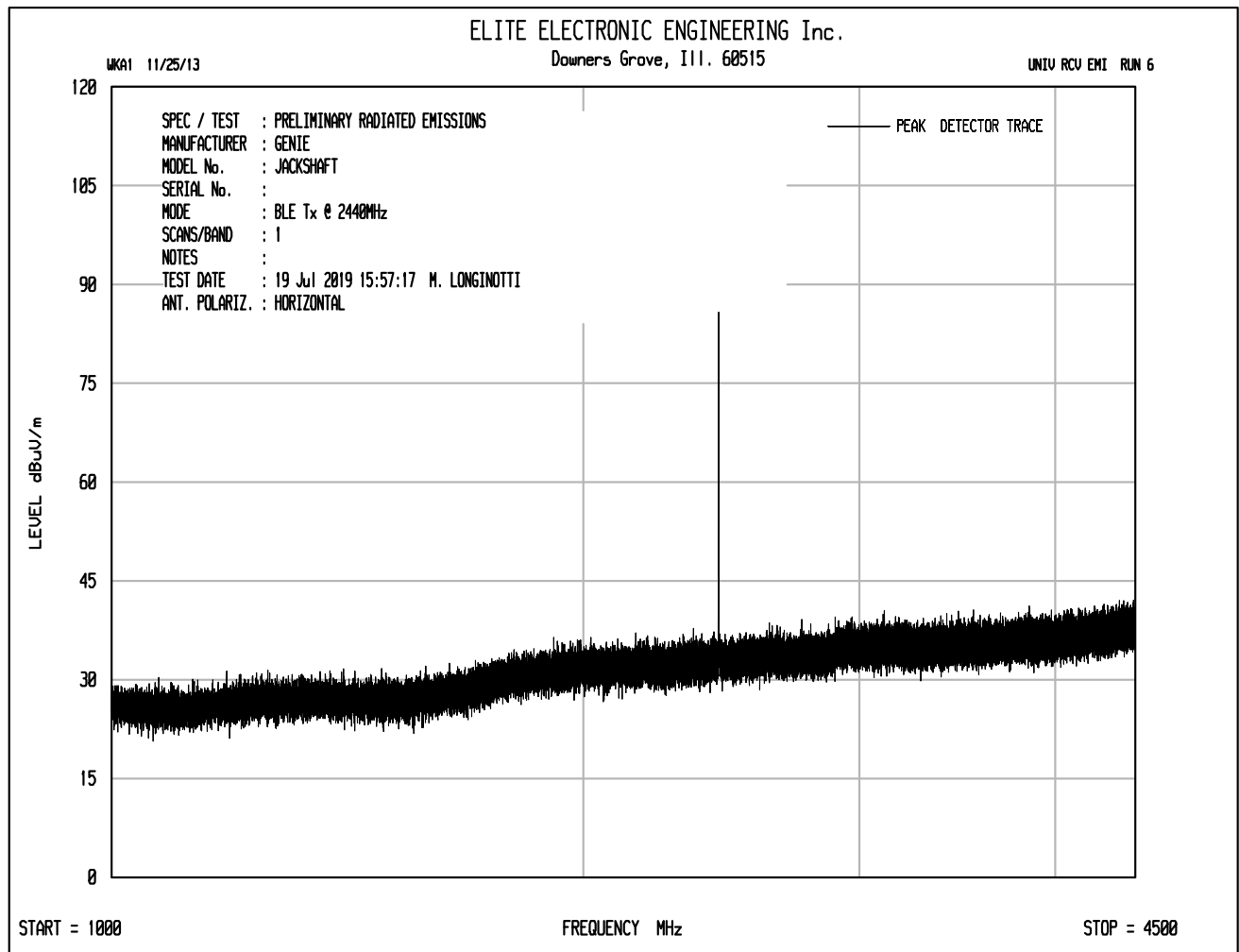
Manufacturer : Genie Company
 Test Item : Jackshaft
 Model No. : Part Number
 Serial No. : None Assigned
 Mode : Transmit at 2402MHz
 Test Specification : FCC-15.247, RSS-247 Peak Radiated Emissions not in Restricted Bands
 Date : July 19, 2019 through July 26, 2019
 Test Distance : 3 meters
 Notes : Peak Detector with 100kHz Resolution Bandwidth

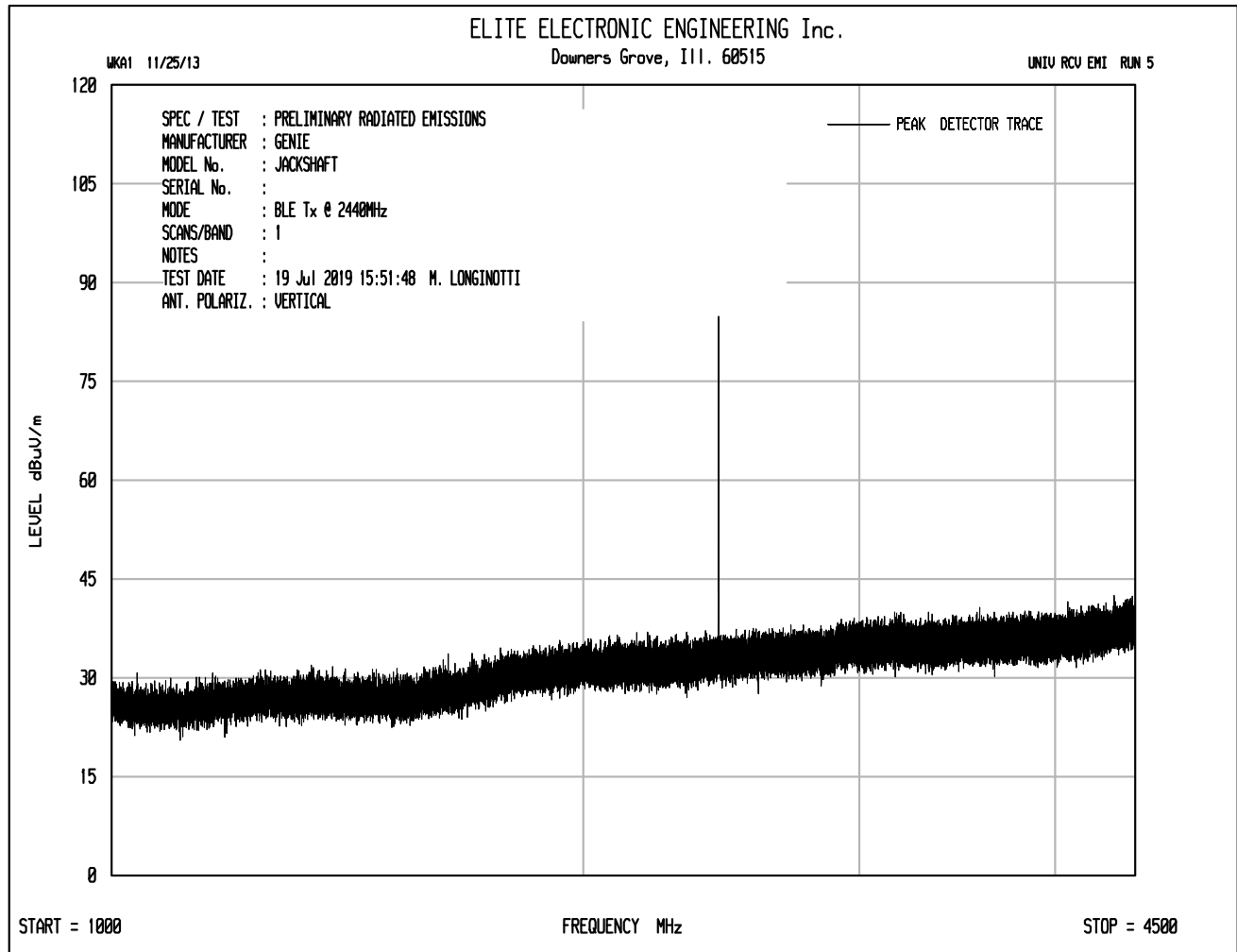
Freq. MHz	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	Pre Amp (dB)	Peak Total dBuV/m at 3m	Peak Total uV/m at 3 m	Peak Limit uV/m at 3 m	Margin (dB)
2402.00	H	52.9		2.6	32.2	0.0	87.7	24250.3		
2402.00	V	52.3		2.6	32.2	0.0	87.1	22631.7		
7206.00	H	41.0		4.6	35.9	-40.3	41.3	115.5	2425.0	-26.4
7206.00	V	42.4		4.6	35.9	-40.3	42.7	135.7	2425.0	-25.0
9608.00	H	38.6	Ambient	5.2	36.8	-40.3	40.3	104.0	5000.0	-33.6
9608.00	V	39.3	Ambient	5.2	36.8	-40.3	41.0	112.7	5000.0	-32.9
14412.00	H	38.0	Ambient	6.6	39.6	-39.6	44.6	170.3	5000.0	-29.4
14412.00	V	38.1	Ambient	6.6	39.6	-39.6	44.7	172.2	5000.0	-29.3
16814.00	H	38.2	Ambient	7.2	42.0	-39.2	48.1	255.5	5000.0	-25.8
16814.00	V	37.6	Ambient	7.2	42.0	-39.2	47.5	238.5	5000.0	-26.4
21618.00	H	23.7	Ambient	2.2	40.6	-28.6	37.9	78.6	5000.0	-29.8
21618.00	V	24.2	Ambient	2.2	40.6	-28.6	38.4	83.3	5000.0	-29.3
24020.00	H	25.3	Ambient	2.2	40.6	-28.8	39.4	92.9	5000.0	-28.3
24020.00	V	24.8	Ambient	2.2	40.6	-28.8	38.9	87.7	5000.0	-28.8

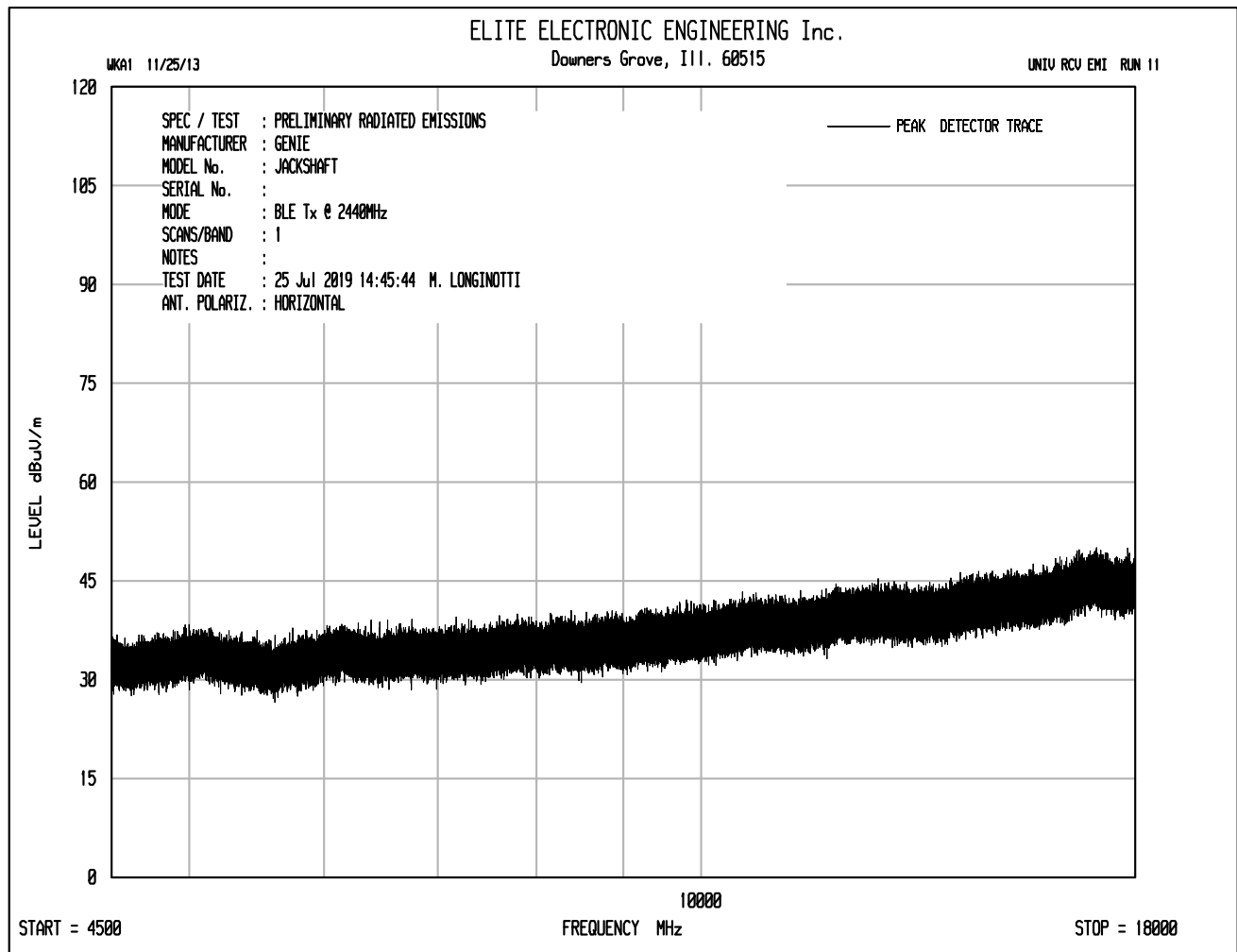
Total (dBuV/m) = Meter Reading + CBL FAC + Ant Fac + Pre Amp + Duty Cycle

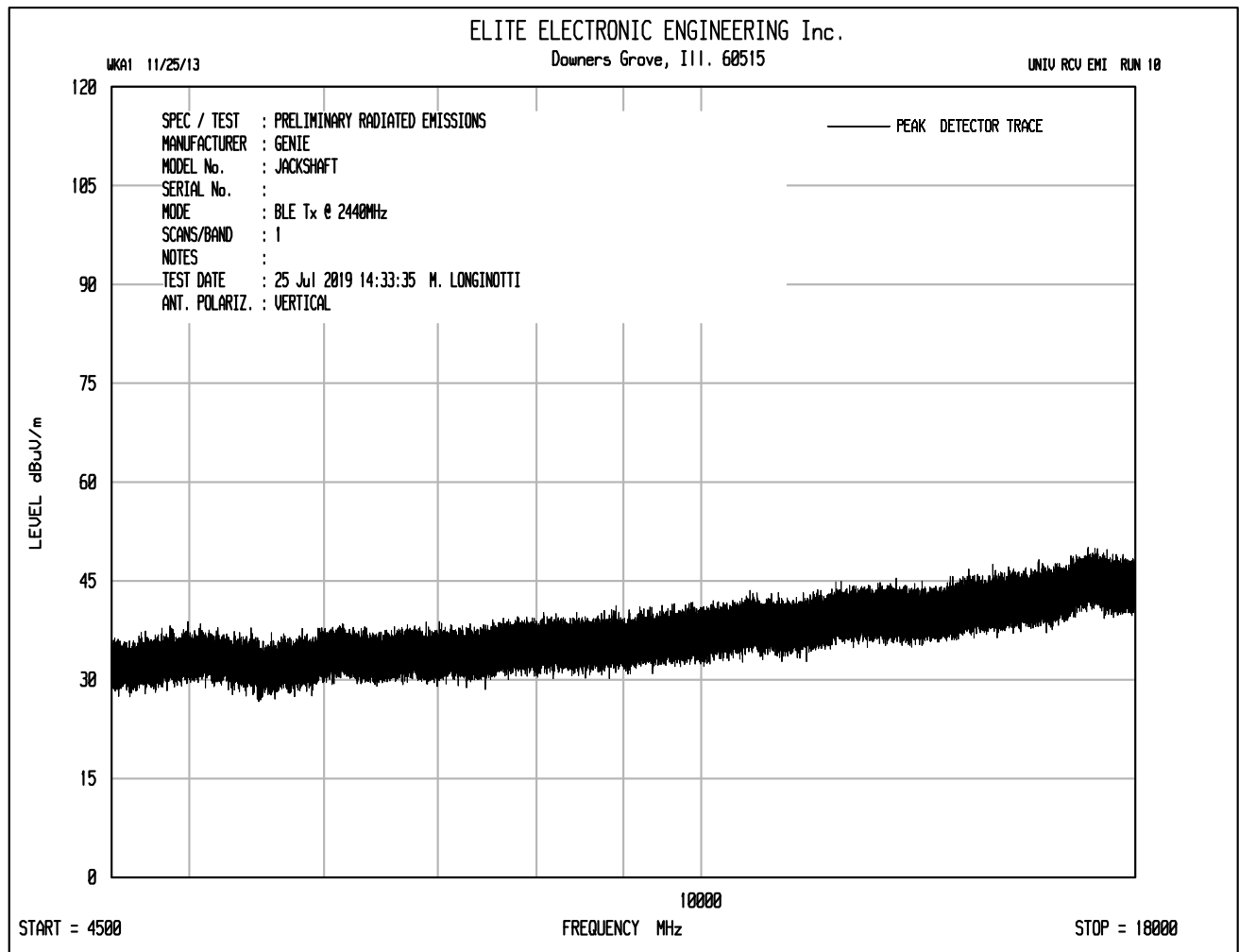


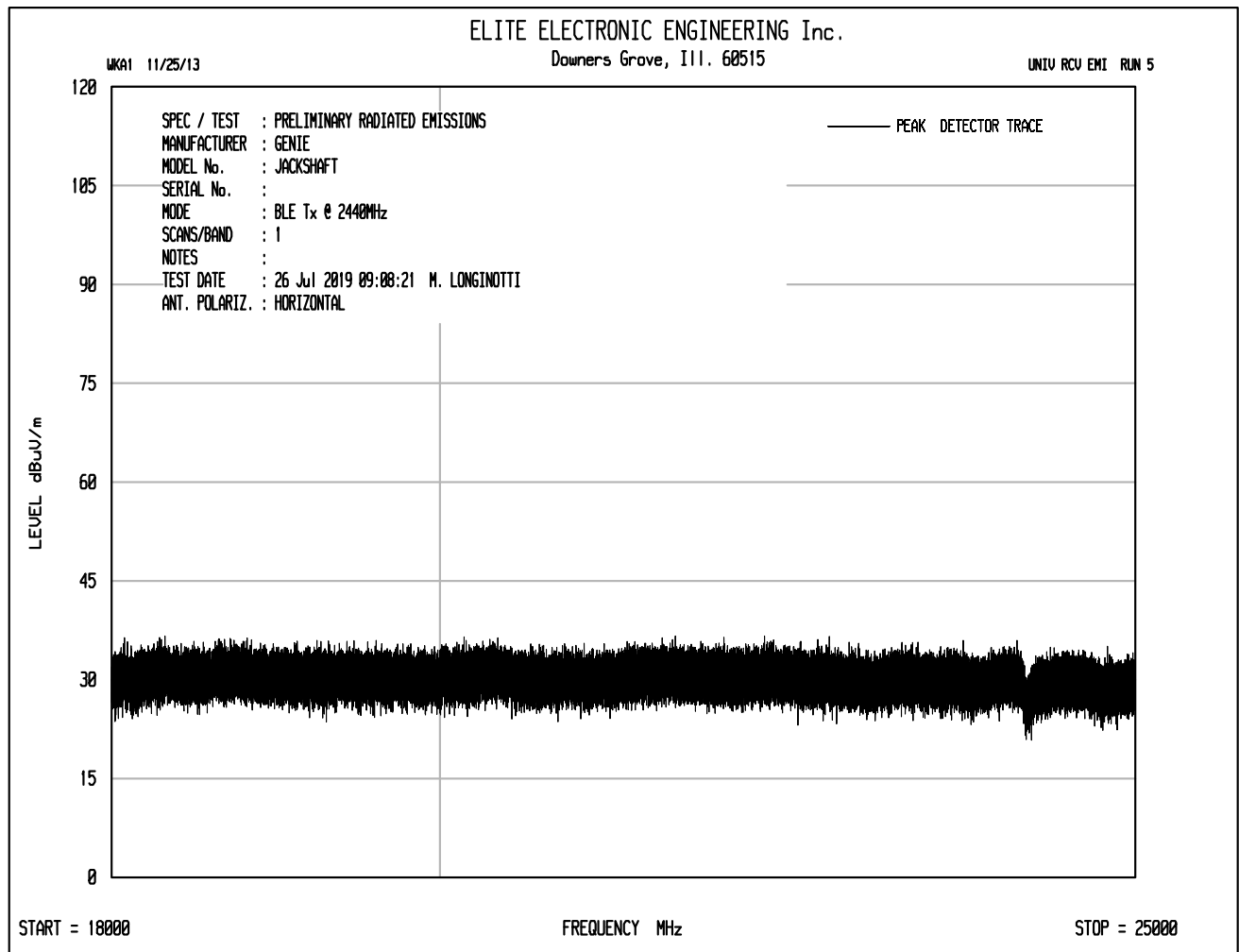


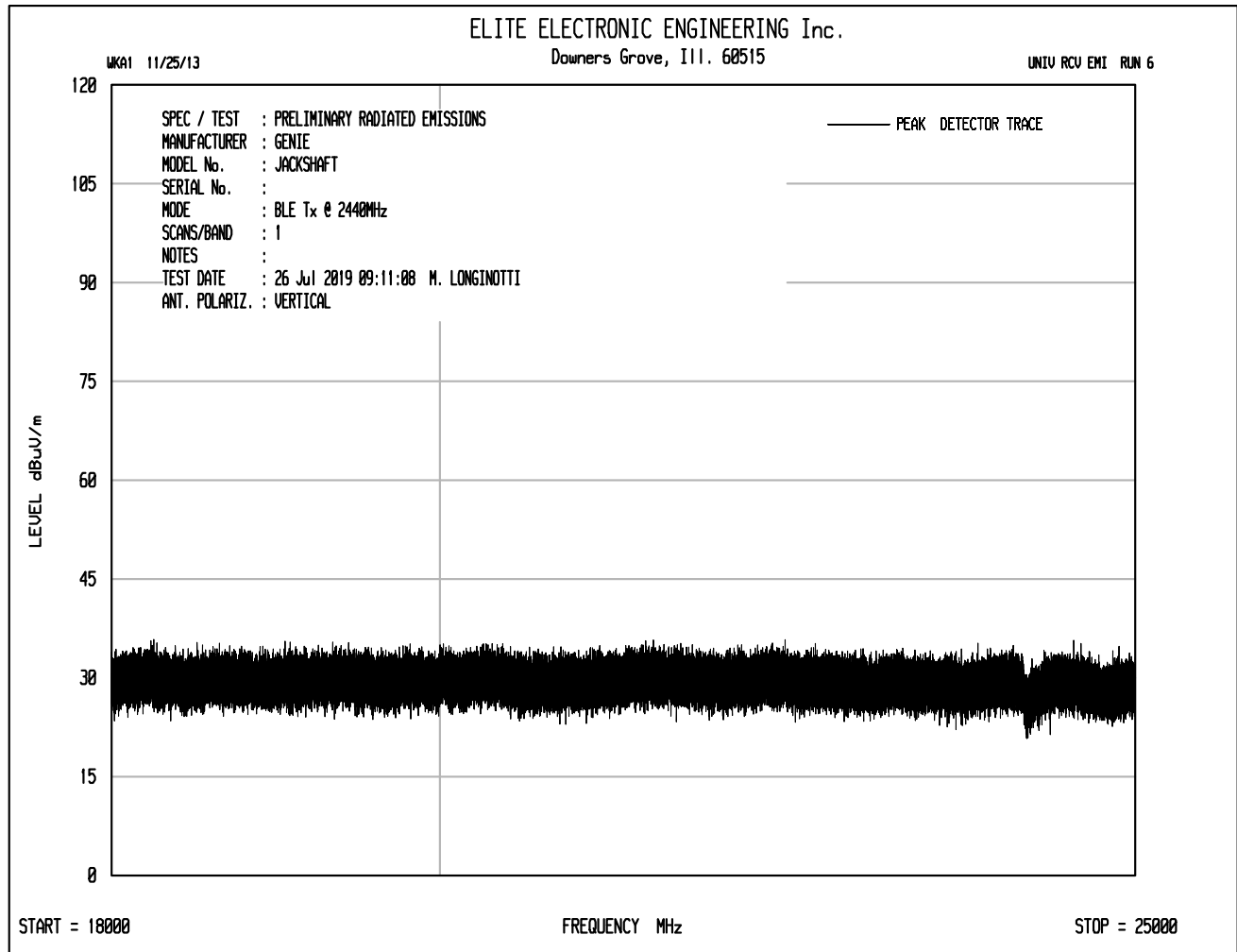














Manufacturer : Genie Company
Test Item : Jackshaft
Serial No. : None Assigned
Mode : Transmit at 2440MHz
Test Specification : FCC-15.247, RSS-247 Peak Radiated Emissions in Restricted Bands
Date : July 19, 2019 through July 26, 2019
Test Distance : 3 meters
Notes : Peak Detector with 1MHz Resolution Bandwidth

Freq. MHz	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	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)
4880.00	H	49.5	Ambient	3.7	34.1	-40.1	47.2	229.3	5000.0	-26.8
4880.00	V	49.4	Ambient	3.7	34.1	-40.1	47.1	226.6	5000.0	-26.9
7320.00	H	48.5	Ambient	4.7	35.9	-40.3	48.8	274.1	5000.0	-25.2
7320.00	V	48.3	Ambient	4.7	35.9	-40.3	48.6	267.8	5000.0	-25.4
12200.00	H	49.1	Ambient	6.1	38.7	-39.9	53.9	497.5	5000.0	-20.0
12200.00	V	49.3	Ambient	6.1	38.7	-39.9	54.1	509.0	5000.0	-19.8
19520.00	H	34.1	Ambient	2.2	40.4	-28.2	48.5	267.4	5000.0	-25.4
19520.00	V	34.2	Ambient	2.2	40.4	-28.2	48.6	270.5	5000.0	-25.3

Total (dBuV/m) = Meter Reading + CBL FAC + Ant Fac + Pre Amp



Manufacturer : Genie Company
Test Item : Jackshaft
Serial No. : None Assigned
Mode : Transmit at 2440MHz
Test Specification : FCC-15.247, RSS-247 Average Radiated Emissions in Restricted Bands
Date : July 19, 2019 through July 26, 2019
Test Distance : 3 meters
Notes : Average Detector with 1MHz Resolution Bandwidth

Freq. MHz	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	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)
4880.00	H	35.0	Ambient	3.7	34.1	-40.1	0.0	32.7	43.2	500.0	-21.3
4880.00	V	34.7	Ambient	3.7	34.1	-40.1	0.0	32.4	41.7	500.0	-21.6
7320.00	H	34.60	Ambient	4.7	35.9	-40.3	0.0	34.9	55.3	500.0	-19.1
7320.00	V	34.4	Ambient	4.7	35.9	-40.3	0.0	34.7	54.1	500.0	-19.3
12200.00	H	33.7		6.1	38.7	-39.9	0.0	38.5	84.5	500.0	-15.4
12200.00	V	33.7	Ambient	6.1	38.7	-39.9	0.0	38.5	84.5	500.0	-15.4
19520.00	H	19.7	Ambient	2.2	40.4	-28.2	0.0	34.1	50.9	500.0	-19.8
19520.00	V	20.3	Ambient	2.2	40.4	-28.2	0.0	34.7	54.6	500.0	-19.2

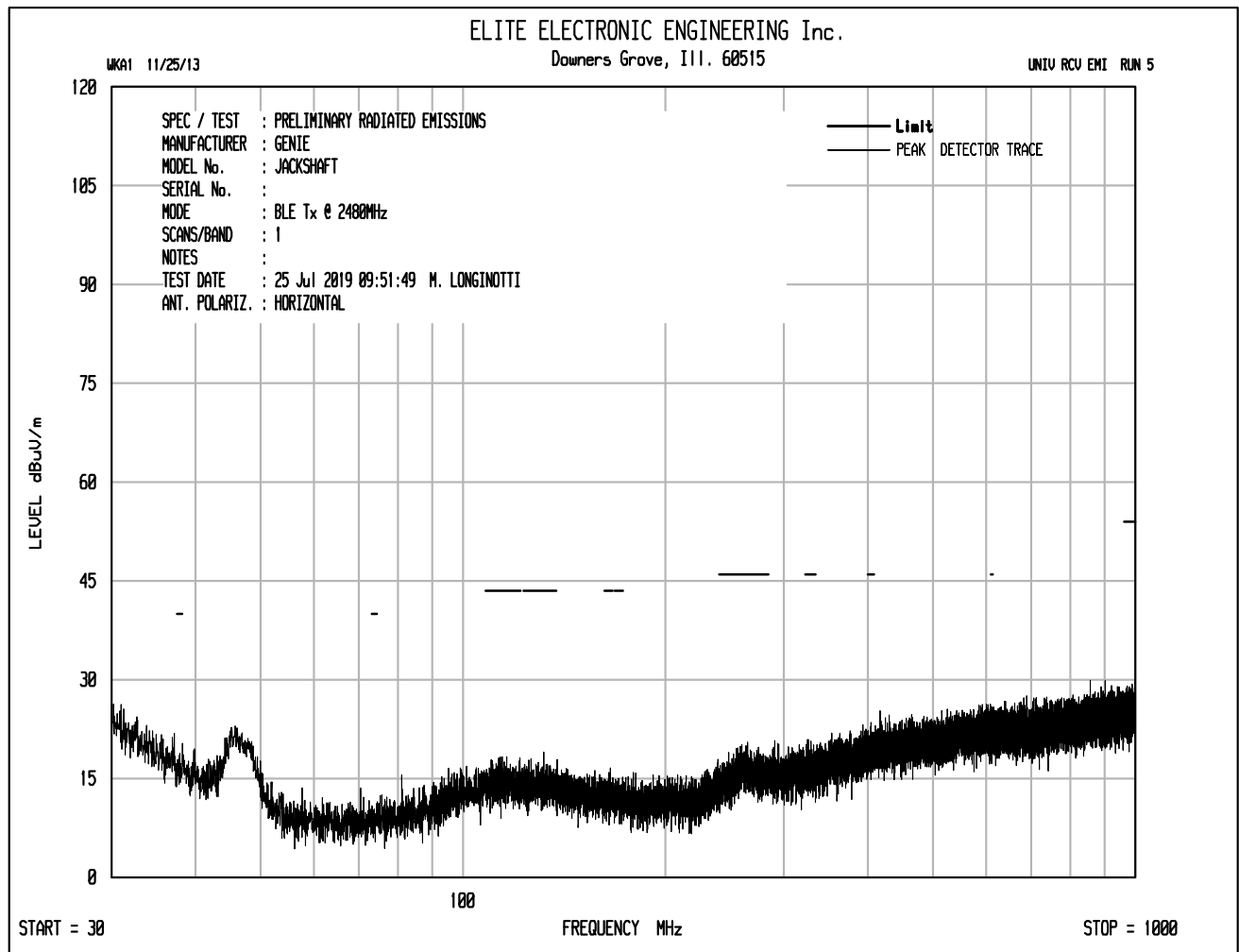
Total (dBuV/m) = Meter Reading + CBL FAC + Ant Fac + Pre Amp + Duty Cycle

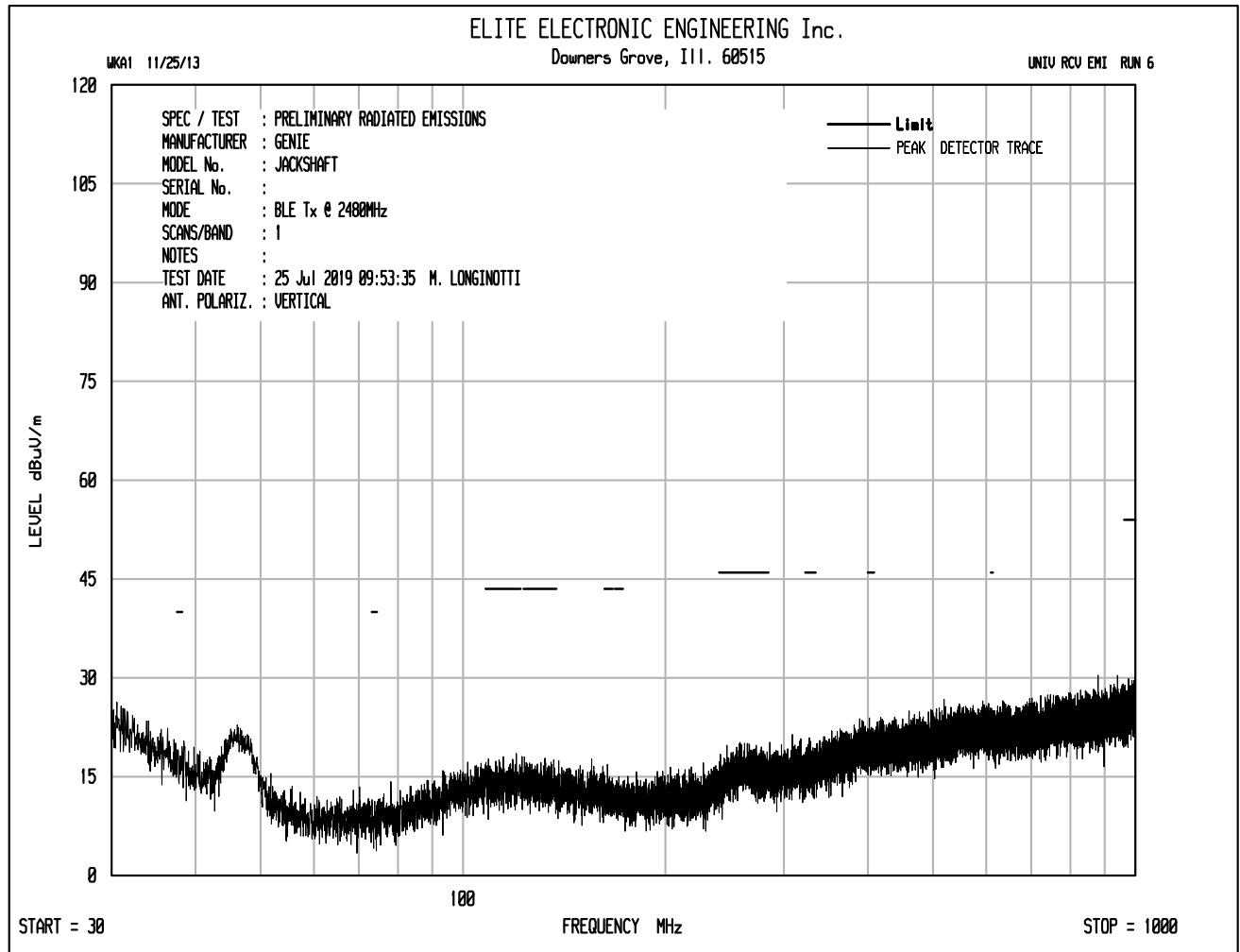


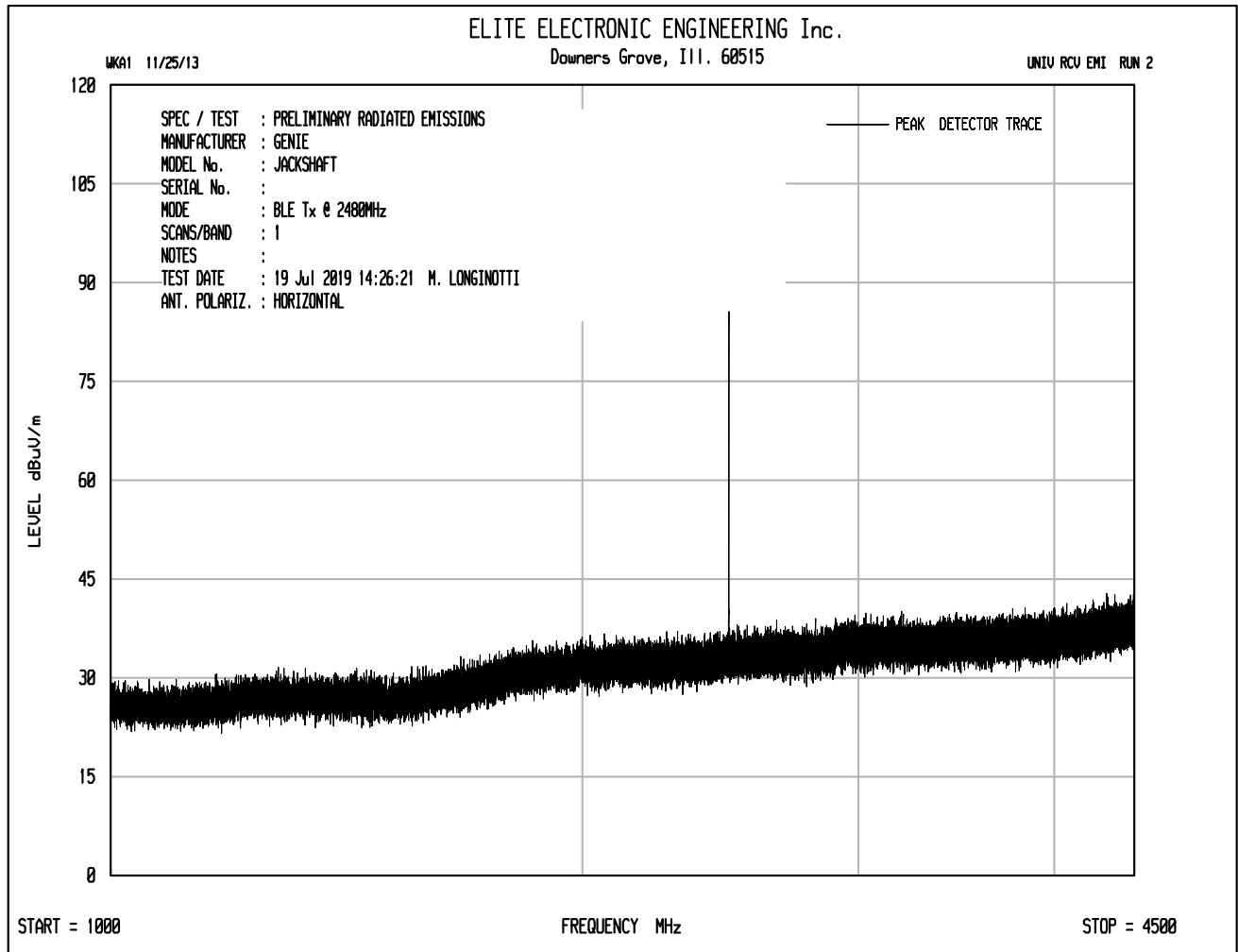
Manufacturer : Genie Company
Test Item : Jackshaft
Model No. : Part Number
Serial No. : None Assigned
Mode : Transmit at 2440MHz
Test Specification : FCC-15.247, RSS-247 Peak Radiated Emissions not in Restricted Bands
Date : July 19, 2019 through July 26, 2019
Test Distance : 3 meters
Notes : Peak Detector with 100kHz Resolution Bandwidth

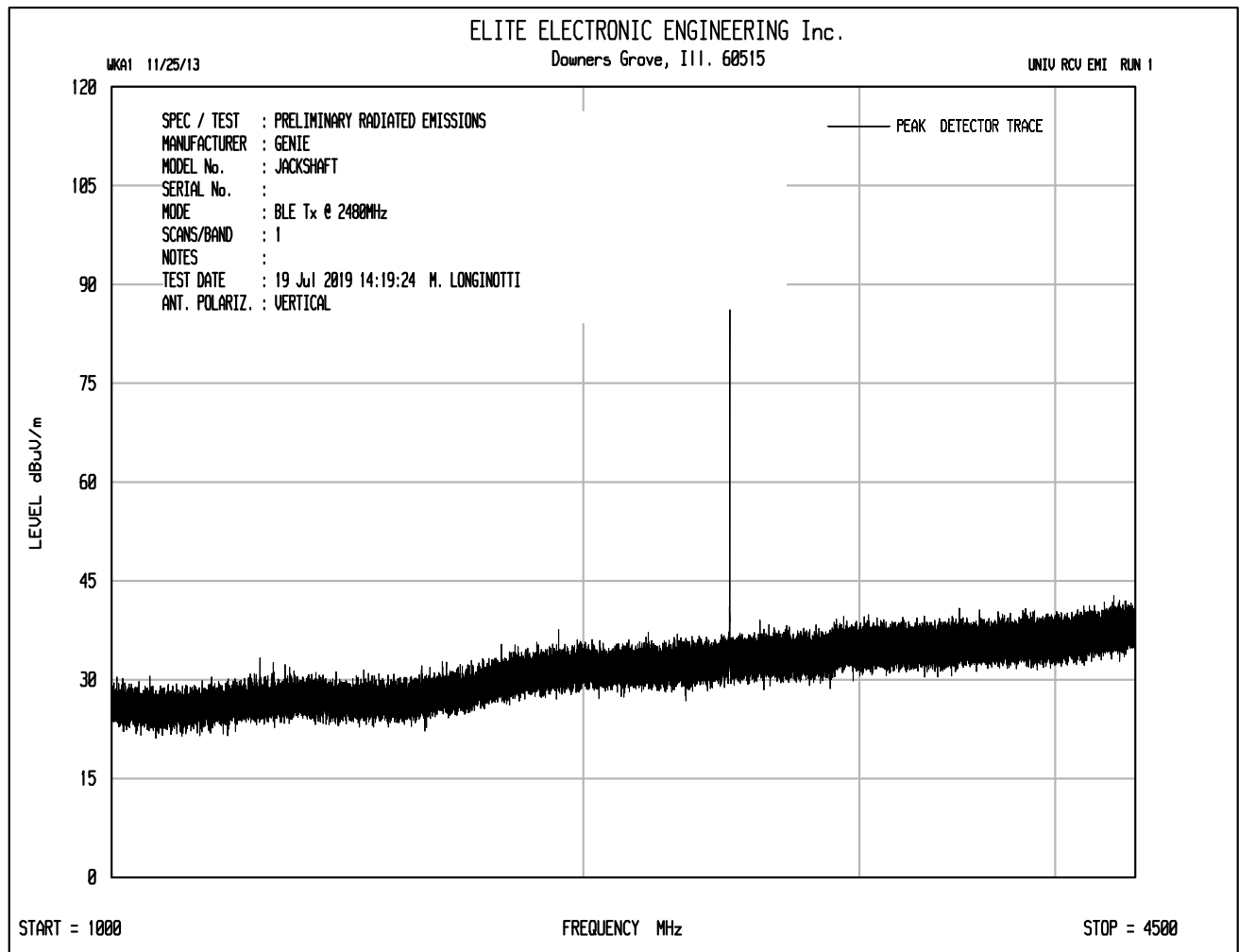
Freq. MHz	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	Pre Amp (dB)	Peak Total dBuV/m at 3m	Peak Total uV/m at 3 m	Peak Limit uV/m at 3 m	Margin (dB)
2440.00	H	51.8		2.6	32.3	0.0	86.7	21609.5		
2440.00	V	50.9		2.6	32.3	0.0	85.8	19482.5		
9760.00	H	38.9	Ambient	5.2	37.0	-40.3	40.9	110.5	5000.0	-33.1
9760.00	V	38.9	Ambient	5.2	37.0	-40.3	40.9	110.5	5000.0	-33.1
14640.00	H	38.1	Ambient	6.7	39.7	-39.6	44.9	176.5	5000.0	-29.0
14640.00	V	38.7	Ambient	6.7	39.7	-39.6	45.5	189.1	5000.0	-28.4
17080.00	H	38.3	Ambient	7.3	41.8	-39.3	48.1	253.7	5000.0	-25.9
17080.00	V	38.2	Ambient	7.3	41.8	-39.3	48.0	250.8	5000.0	-26.0
21960.00	H	24.7	Ambient	2.2	40.6	-28.9	38.6	85.3	5000.0	-35.4
21960.00	V	23.9	Ambient	2.2	40.6	-28.9	37.8	77.8	5000.0	-36.2
24400.00	H	25.1	Ambient	2.2	40.6	-29.1	38.8	87.4	5000.0	-35.2
24400.00	V	23.9	Ambient	2.2	40.6	-29.1	37.6	76.1	5000.0	-36.4

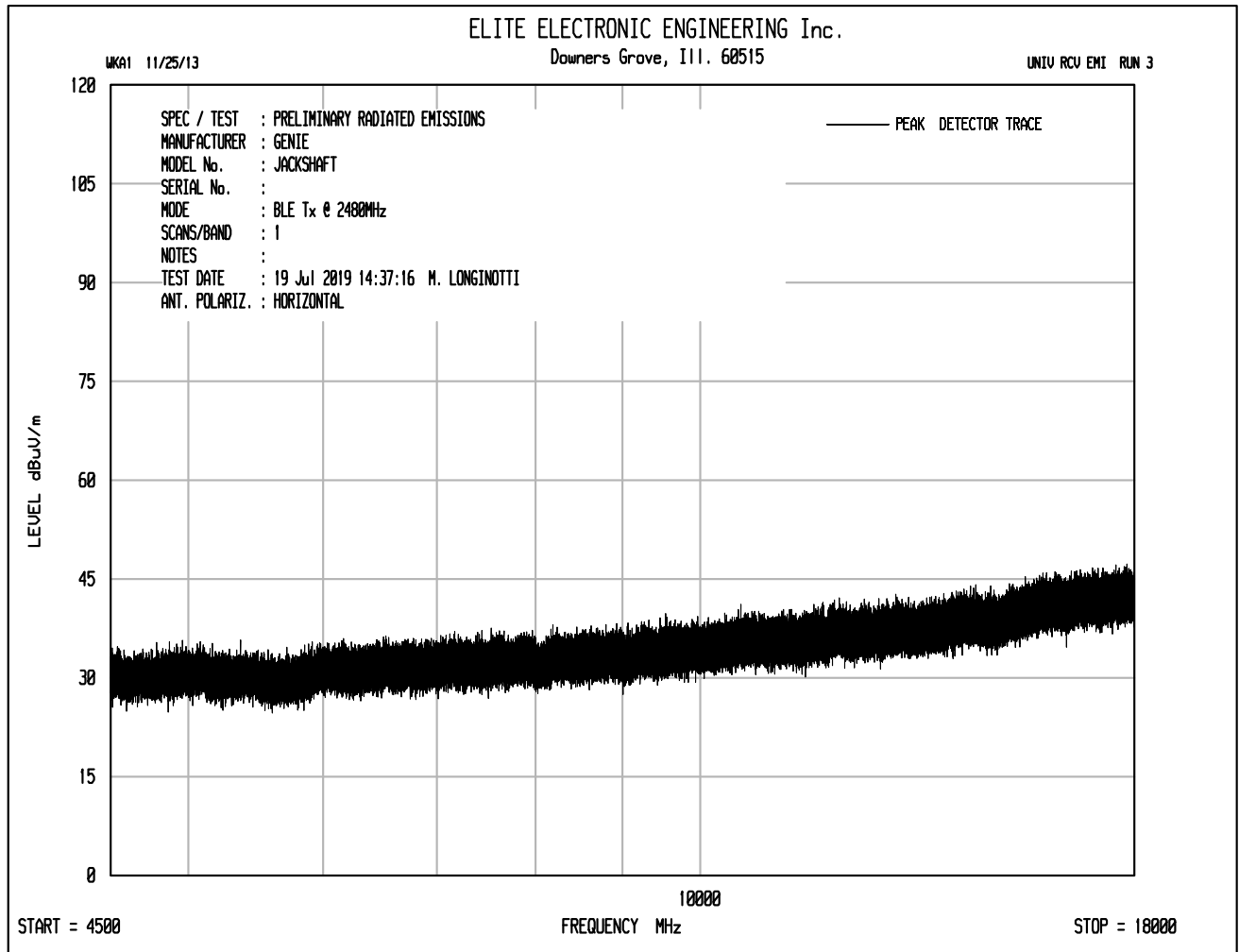
Total (dBuV/m) = Meter Reading + CBL FAC + Ant Fac + Pre Amp + Duty Cycle

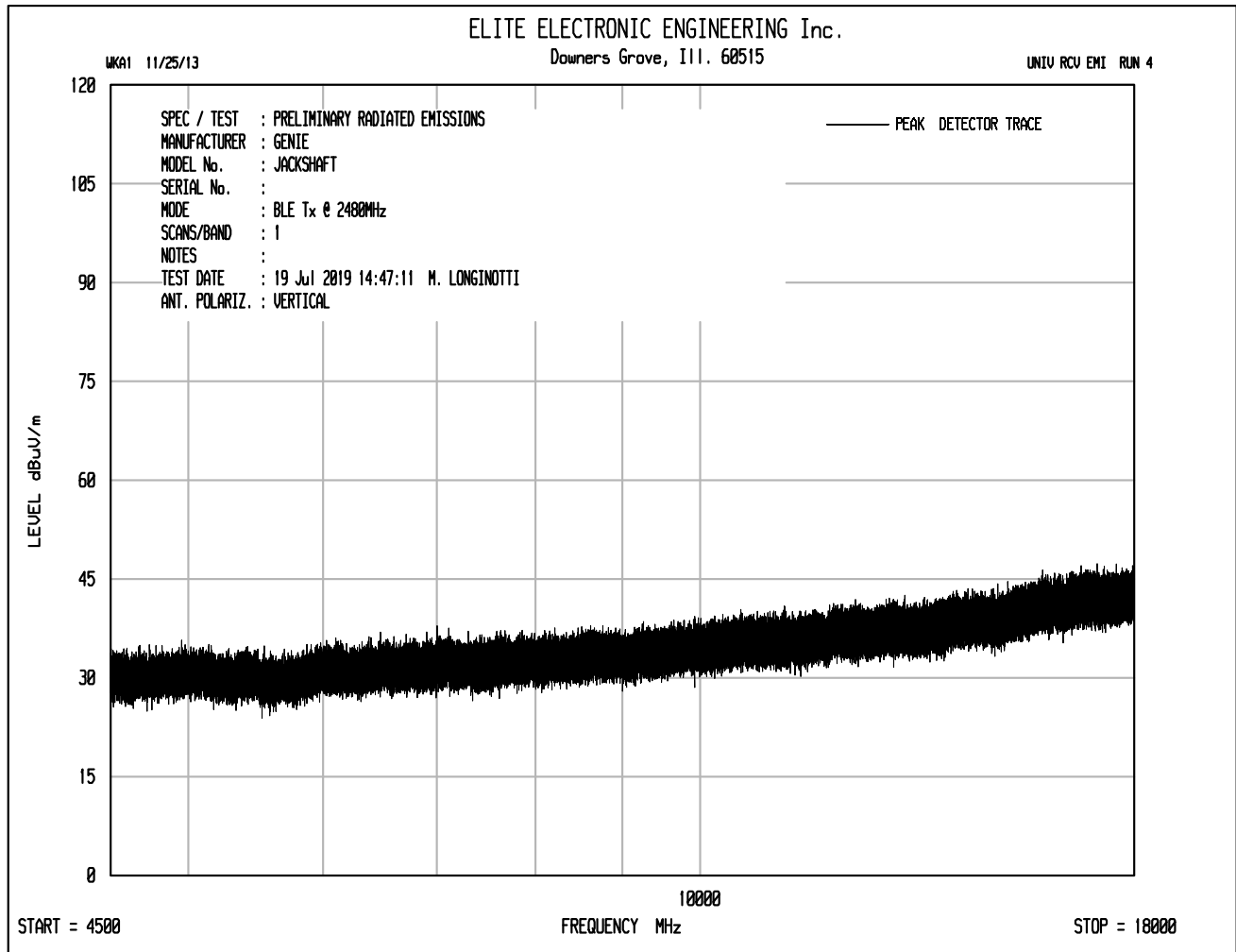


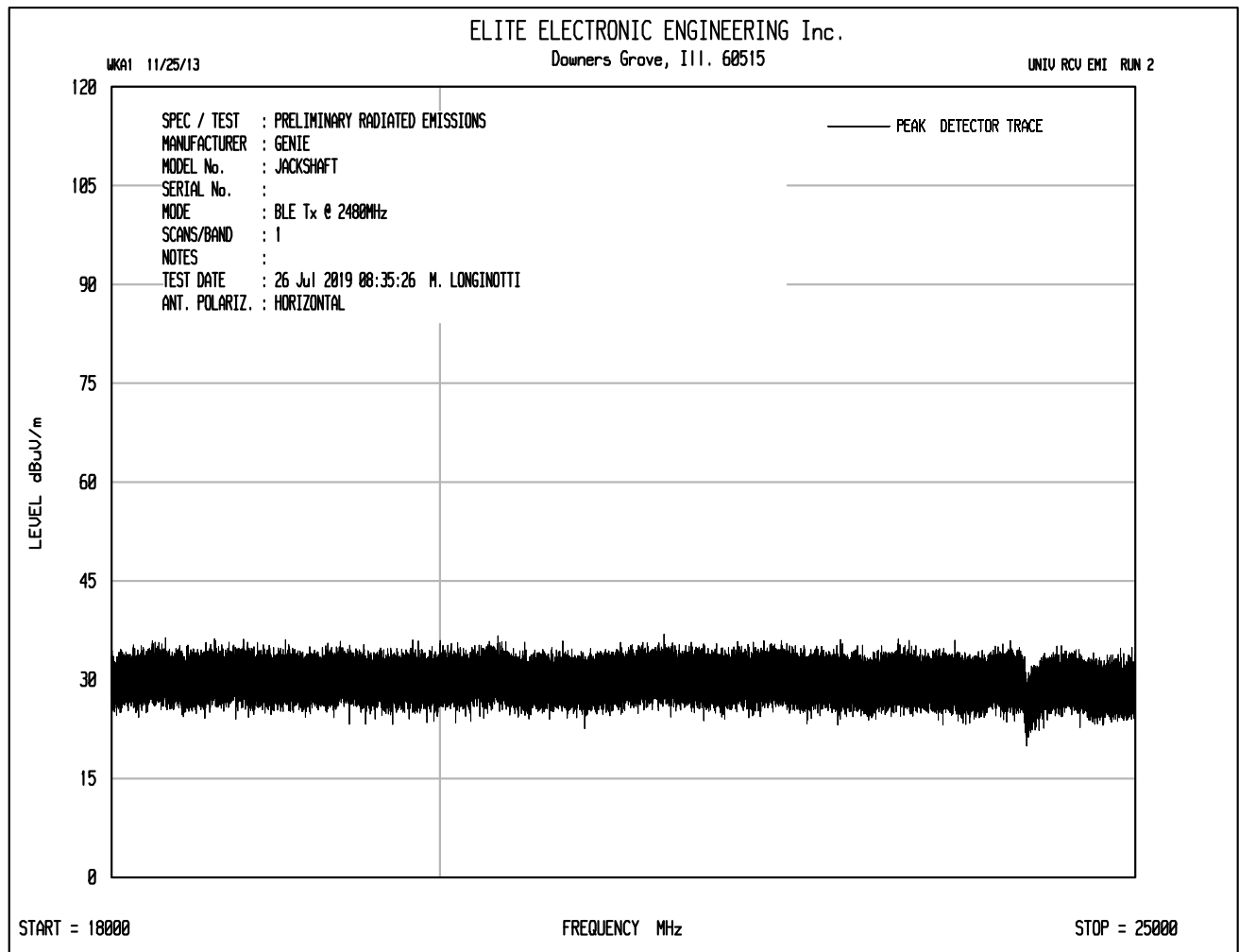


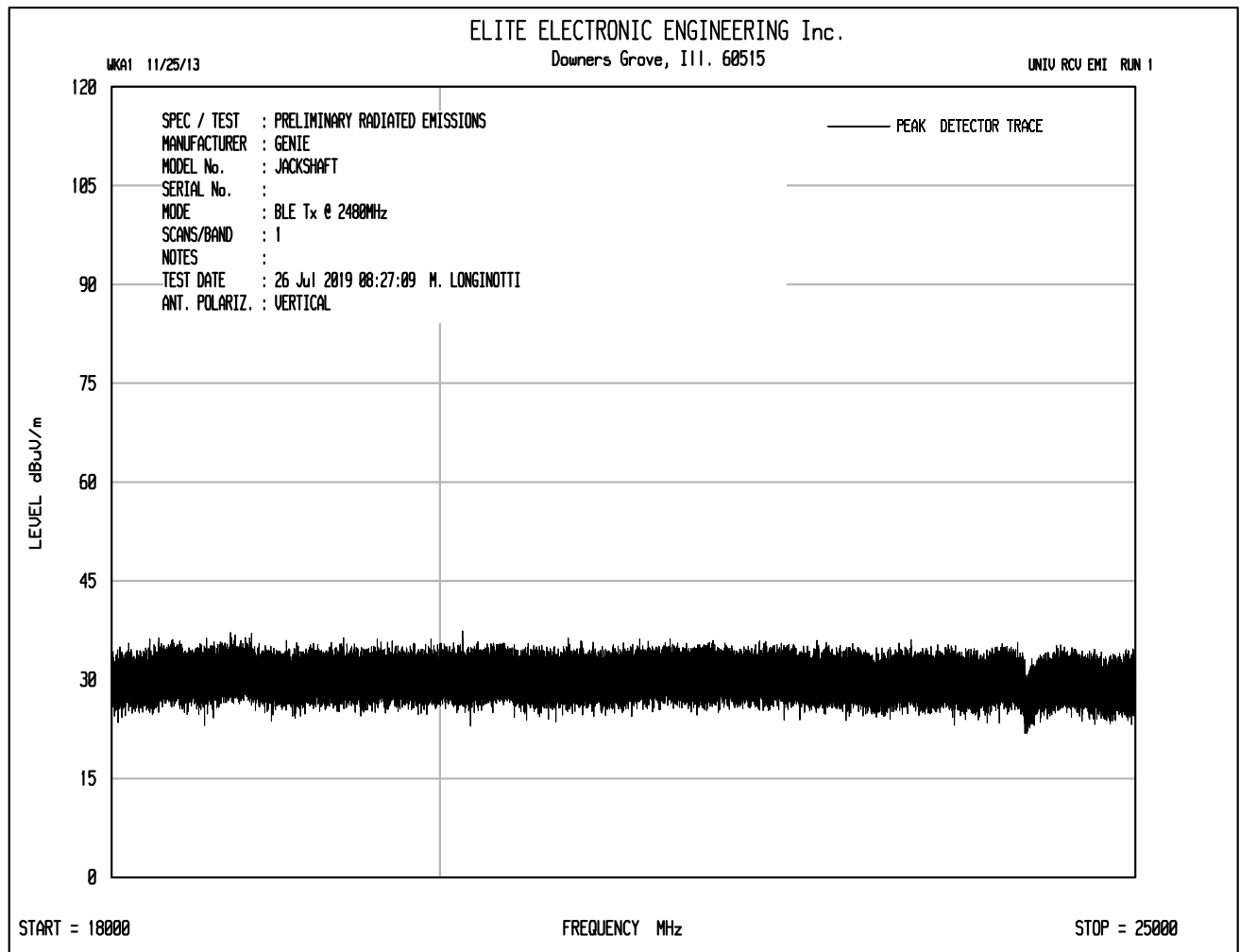












Manufacturer : Genie Company
 Test Item : Jackshaft
 Serial No. : None Assigned
 Mode : Transmit at 2480MHz
 Test Specification : FCC-15.247, RSS-247 Peak Radiated Emissions in Restricted Bands
 Date : July 19, 2019 through July 26, 2019
 Test Distance : 3 meters
 Notes : Peak Detector with 1MHz Resolution Bandwidth

Freq. MHz	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	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)
4960.00	H	50.2	Ambient	3.7	34.1	-40.0	48.0	252.3	5000.0	-25.9
4960.00	V	50.7	Ambient	3.7	34.1	-40.0	48.5	267.3	5000.0	-25.4
7440.00	H	49.2	Ambient	4.7	35.8	-40.3	49.4	295.0	5000.0	-24.6
7440.00	V	48.9	Ambient	4.7	35.8	-40.3	49.1	285.0	5000.0	-24.9
12400.00	H	48.5	Ambient	6.1	38.6	-40.0	53.2	458.6	5000.0	-20.8
12400.00	V	49.2	Ambient	6.1	38.6	-40.0	53.9	497.1	5000.0	-20.1
19840.00	H	34.0	Ambient	2.2	40.4	-28.4	48.2	258.5	5000.0	-25.7
19840.00	V	34.1	Ambient	2.2	40.4	-28.4	48.3	261.5	5000.0	-25.6
22320.00	H	35.4	Ambient	2.2	40.6	-29.0	49.2	288.8	5000.0	-24.8
22320.00	V	35.5	Ambient	2.2	40.6	-29.0	49.3	292.2	5000.0	-24.7

Total (dBuV/m) = Meter Reading + CBL FAC + Ant Fac + Pre Amp

Manufacturer : Genie Company
 Test Item : Jackshaft
 Serial No. : None Assigned
 Mode : Transmit at 2480MHz
 Test Specification : FCC-15.247, RSS-247 Average Radiated Emissions in Restricted Bands
 Date : July 19, 2019 through July 26, 2019
 Test Distance : 3 meters
 Notes : Average Detector with 1MHz Resolution Bandwidth

Freq. MHz	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	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)
4960.00	H	36.4	Ambient	3.7	34.1	-40.0	0.0	34.2	51.5	500.0	-19.7
4960.00	V	34.9	Ambient	3.7	34.1	-40.0	0.0	32.7	43.4	500.0	-21.2
7440.00	H	37.20	Ambient	4.7	35.8	-40.3	0.0	37.4	74.1	500.0	-16.6
7440.00	V	36.2	Ambient	4.7	35.8	-40.3	0.0	36.4	66.0	500.0	-17.6
12400.00	H	33.5	Ambient	6.1	38.6	-40.0	0.0	38.2	81.5	500.0	-15.8
12400.00	V	33.5	Ambient	6.1	38.6	-40.0	0.0	38.2	81.5	500.0	-15.8
19840.00	H	19.3	Ambient	2.2	40.4	-28.4	0.0	33.5	47.6	500.0	-20.4
19840.00	V	19.5	Ambient	2.2	40.4	-28.4	0.0	33.7	48.7	500.0	-20.2
22320.00	H	20.4	Ambient	2.2	40.6	-29.0	0.0	34.2	51.4	500.0	-19.8
22320.00	V	20.6	Ambient	2.2	40.6	-29.0	0.0	34.4	52.6	500.0	-19.6

Total (dBuV/m) = Meter Reading + CBL FAC + Ant Fac + Pre Amp + Duty Cycle

Manufacturer : Genie Company
 Test Item : Jackshaft
 Serial No. : None Assigned
 Mode : Transmit at 2480MHz
 Test Specification : FCC-15.247, RSS-247 Peak Radiated Emissions not in Restricted Bands
 Date : July 19, 2019 through July 26, 2019
 Test Distance : 3 meters
 Notes : Peak Detector with 100kHz Resolution Bandwidth

Freq. MHz	Ant Pol	Meter Reading (dBUV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	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)
2480.00	H	50.3		2.7	32.3	0.0	85.3	18377.4		
2480.00	V	52.3		2.7	32.3	0.0	87.3	23135.8		
9920.00	H	38.6	Ambient	5.3	37.1	-40.3	40.8	109.3	5000.0	-33.2
9920.00	V	39.1	Ambient	5.3	37.1	-40.3	41.3	115.8	5000.0	-32.7
14880.00	H	38.0	Ambient	6.8	39.8	-39.6	45.0	177.1	5000.0	-29.0
14880.00	V	38.0	Ambient	6.8	39.8	-39.6	45.0	177.1	5000.0	-29.0
17360.00	H	38.2	Ambient	7.4	41.7	-39.4	47.8	246.3	5000.0	-26.1
17360.00	V	37.9	Ambient	7.4	41.7	-39.4	47.5	238.0	5000.0	-26.4
24800.00	H	24.0	Ambient	2.2	40.6	-29.2	37.7	76.4	2313.6	-29.6
24800.00	V	25.0	Ambient	2.2	40.6	-29.2	38.7	85.7	2313.6	-28.6

Total (dBUV/m) = Meter Reading + CBL FAC + Ant Fac + Pre Amp + Duty Cycle

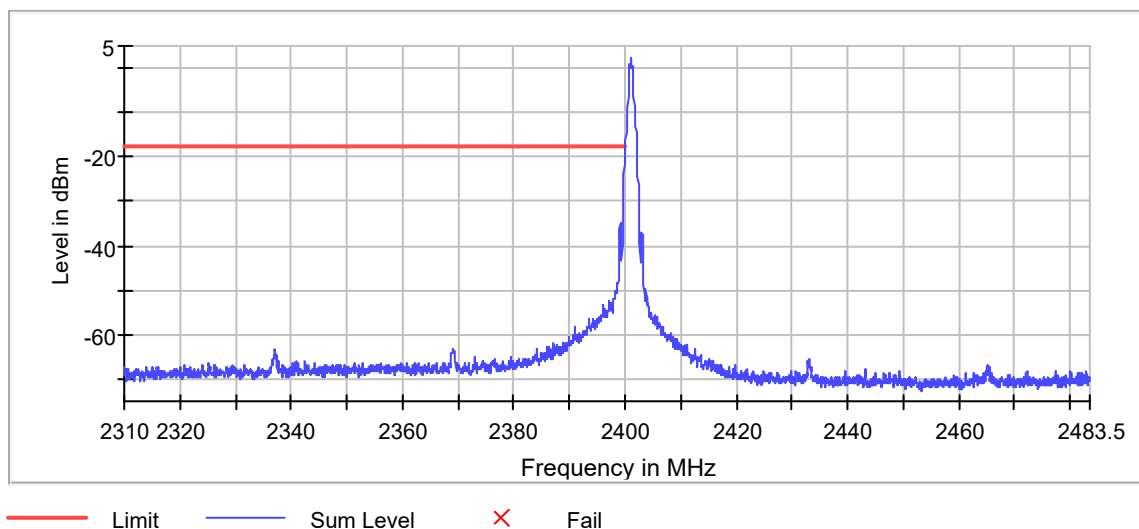
Manufacturer : Genie Company
 Test Item : Jackshaft
 Serial No. : None Assigned
 Mode : Transmit at 2402MHz
 Test Specification : FCC-15.247, RSS-247 Low Band Edge
 Date : July 25, 2019
 Notes :

In band Peak

Frequency (MHz)	Level (dBm)
2401.075000	2.3

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2399.975000	-18.2	0.4	-17.7	PASS
2399.925000	-19.3	1.6	-17.7	PASS
2399.875000	-20.0	2.3	-17.7	PASS
2399.825000	-21.5	3.7	-17.7	PASS
2399.775000	-23.8	6.1	-17.7	PASS
2399.725000	-25.8	8.1	-17.7	PASS
2399.675000	-28.2	10.5	-17.7	PASS
2399.625000	-30.9	13.2	-17.7	PASS
2399.575000	-33.5	15.8	-17.7	PASS
2399.125000	-34.8	17.1	-17.7	PASS
2399.175000	-35.1	17.3	-17.7	PASS
2399.525000	-35.4	17.7	-17.7	PASS
2399.075000	-36.0	18.2	-17.7	PASS
2399.275000	-36.0	18.3	-17.7	PASS
2399.225000	-36.1	18.4	-17.7	PASS





Manufacturer : Genie Company
Test Item : Jackshaft
Serial No. : None Assigned
Mode : Transmit at 2480MHz
Test Specification : FCC-15.247, RSS-247 Peak Radiated Emissions at the high band edge
Date : July 25, 2019
Test Distance : 3 meters
Notes : Peak Detector with a 1MHz Resolution Bandwidth

Freq. MHz	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	Pre Amp (dB)	Peak Total dBuV/m at 3m	Peak Total uV/m at 3 m	Peak Limit uV/m at 3 m	Margin (dB)
2483.50	H	21.6		2.7	32.3	0.0	56.6	675.6	5000.0	-17.4
2483.50	V	23.5		2.7	32.3	0.0	58.5	840.8	5000.0	-15.5

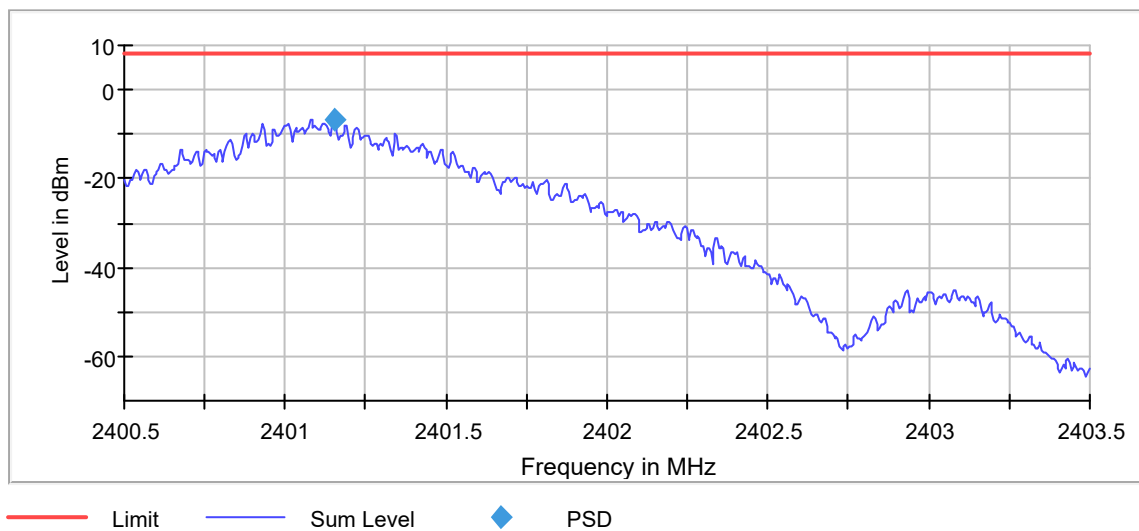


Manufacturer : Genie Company
Test Item : Jackshaft
Serial No. : None Assigned
Mode : Transmit at 2480MHz
Test Specification : FCC-15.247, RSS-247 Average Radiated Emissions at the high band edge
Date : July 25, 2019
Test Distance : 3 meters
Notes : Average Detector with a 1MHz Resolution Bandwidth

Freq. MHz	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	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)
2483.50	H	5.2		2.7	32.3	0.0	1.0	41.2	114.9	500.0	-12.8
2483.50	V	6.5		2.7	32.3	0.0	1.0	42.5	133.4	500.0	-11.5

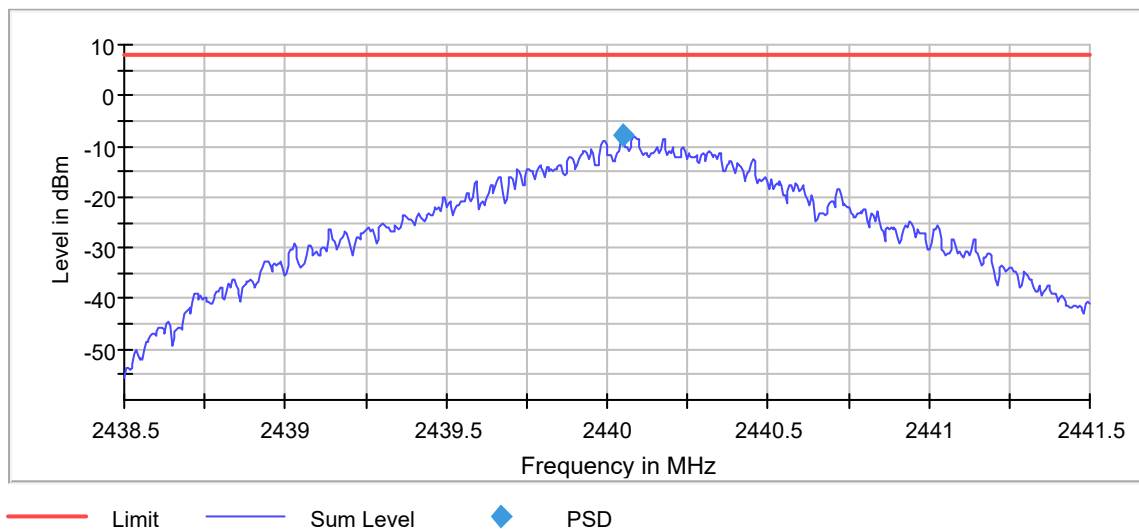
Manufacturer : Genie Company
 Test Item : Jackshaft
 Serial No. : None Assigned
 Mode : Transmit at 2402MHz
 Test Specification : FCC-15.247, RSS-247 Peak Power Spectral Density
 Date : July 25, 2019
 Notes :

DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	RBW (kHz)	Limit Max (dBm)	Result
2402.000000	2401.152500	-6.720	10.0	8.0	PASS



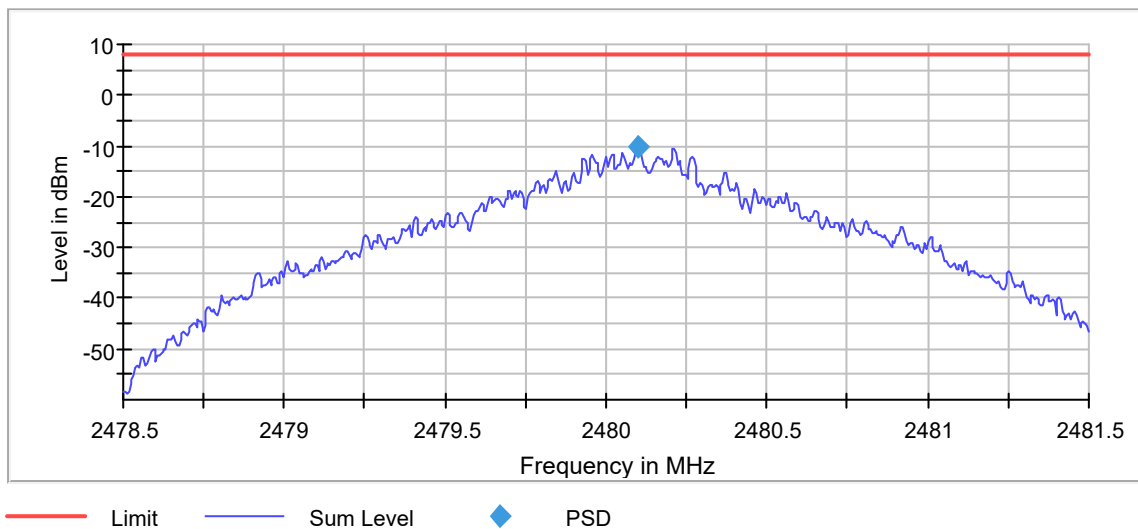
Manufacturer : Genie Company
 Test Item : Jackshaft
 Serial No. : None Assigned
 Mode : Transmit at 2440MHz
 Test Specification : FCC-15.247, RSS-247 Peak Power Spectral Density
 Date : July 25, 2019
 Notes :

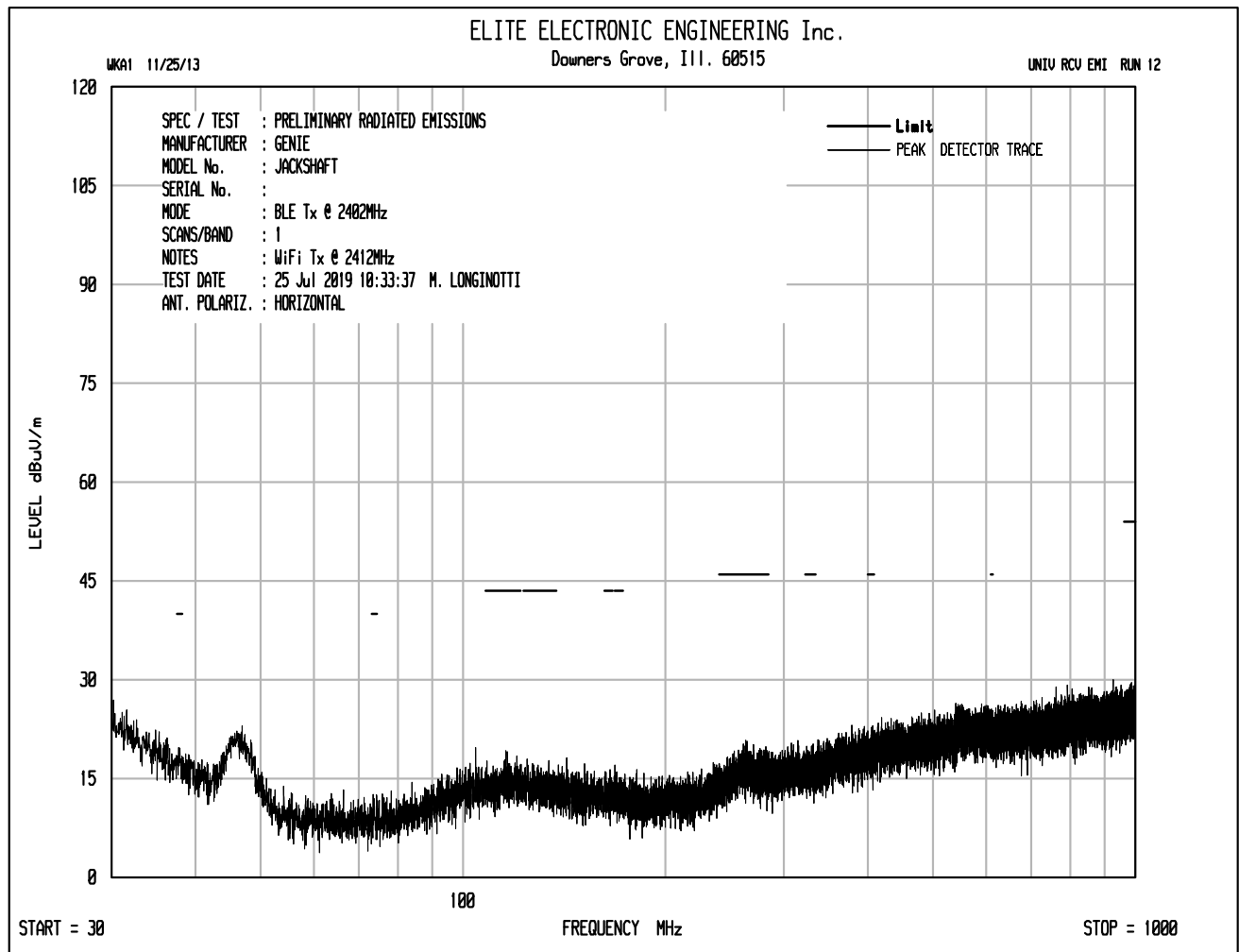
DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	RBW (kHz)	Limit Max (dBm)	Result
2440.000000	2440.047500	-7.801	10.0	8.0	PASS

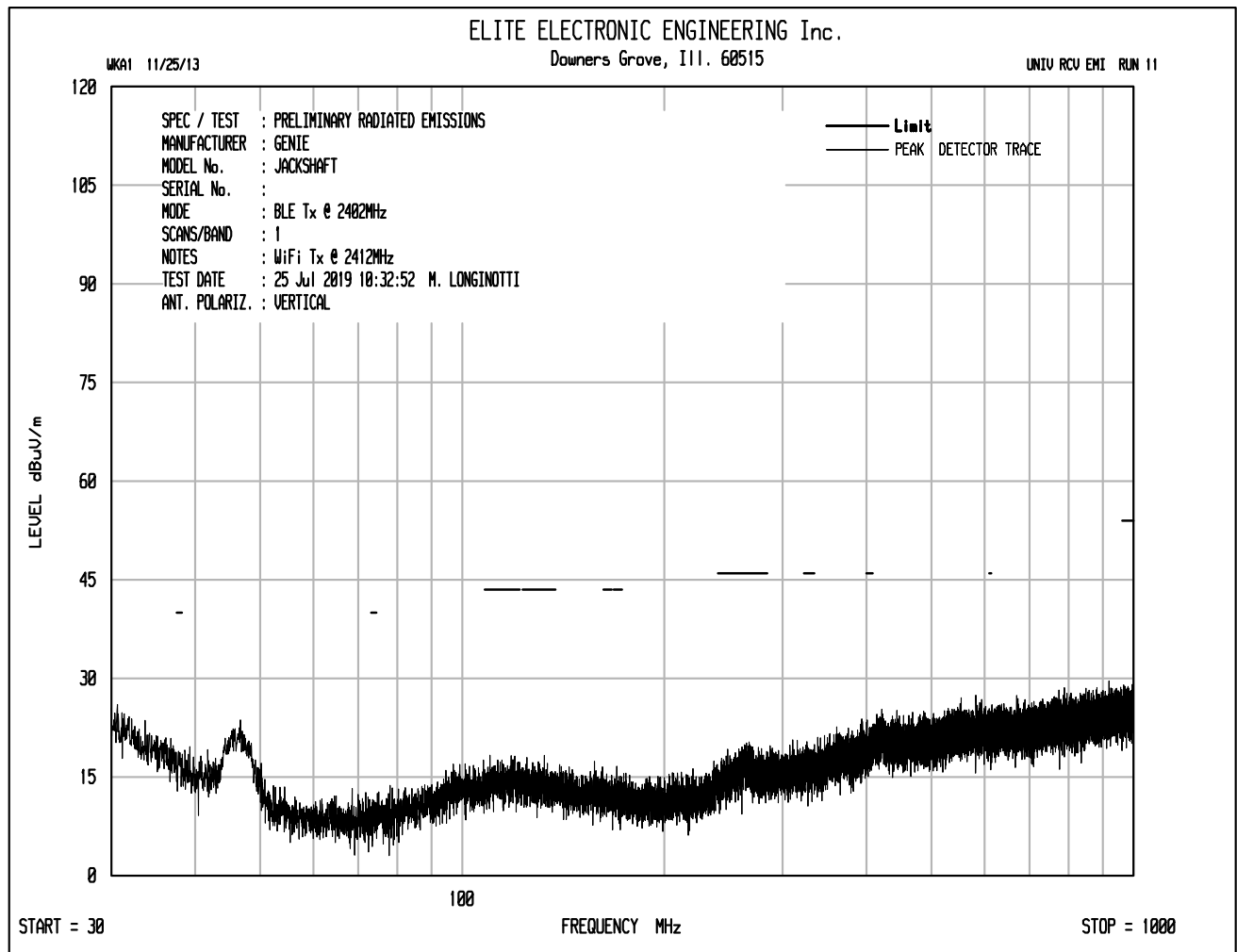


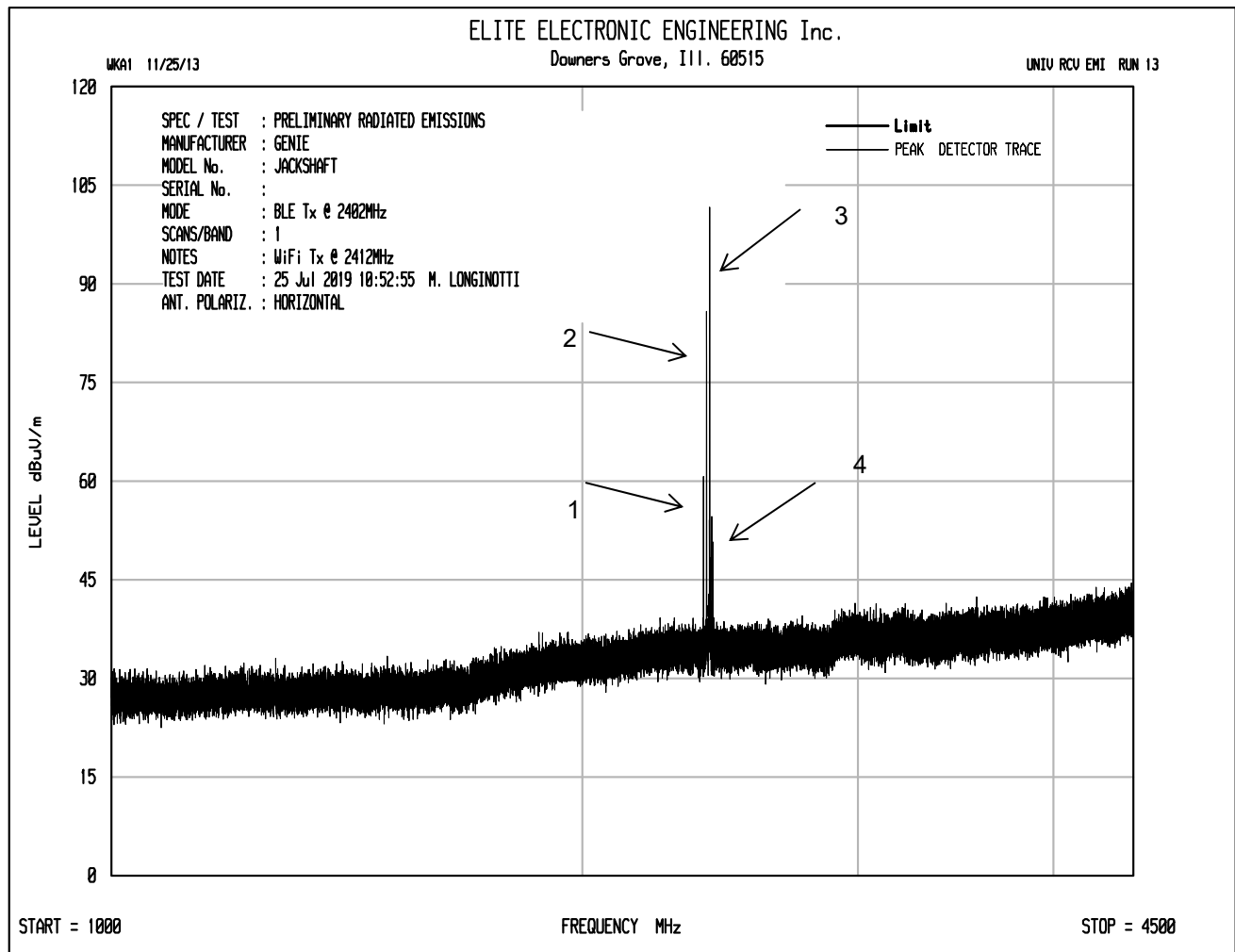
Manufacturer : Genie Company
 Test Item : Jackshaft
 Serial No. : None Assigned
 Mode : Transmit at 2480MHz
 Test Specification : FCC-15.247, RSS-247 Peak Power Spectral Density
 Date : July 25, 2019
 Notes :

DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	RB W (kHz)	Limit Max (dBm)	Result
2480.000000	2480.102500	-10.351	10.0	8.0	PASS

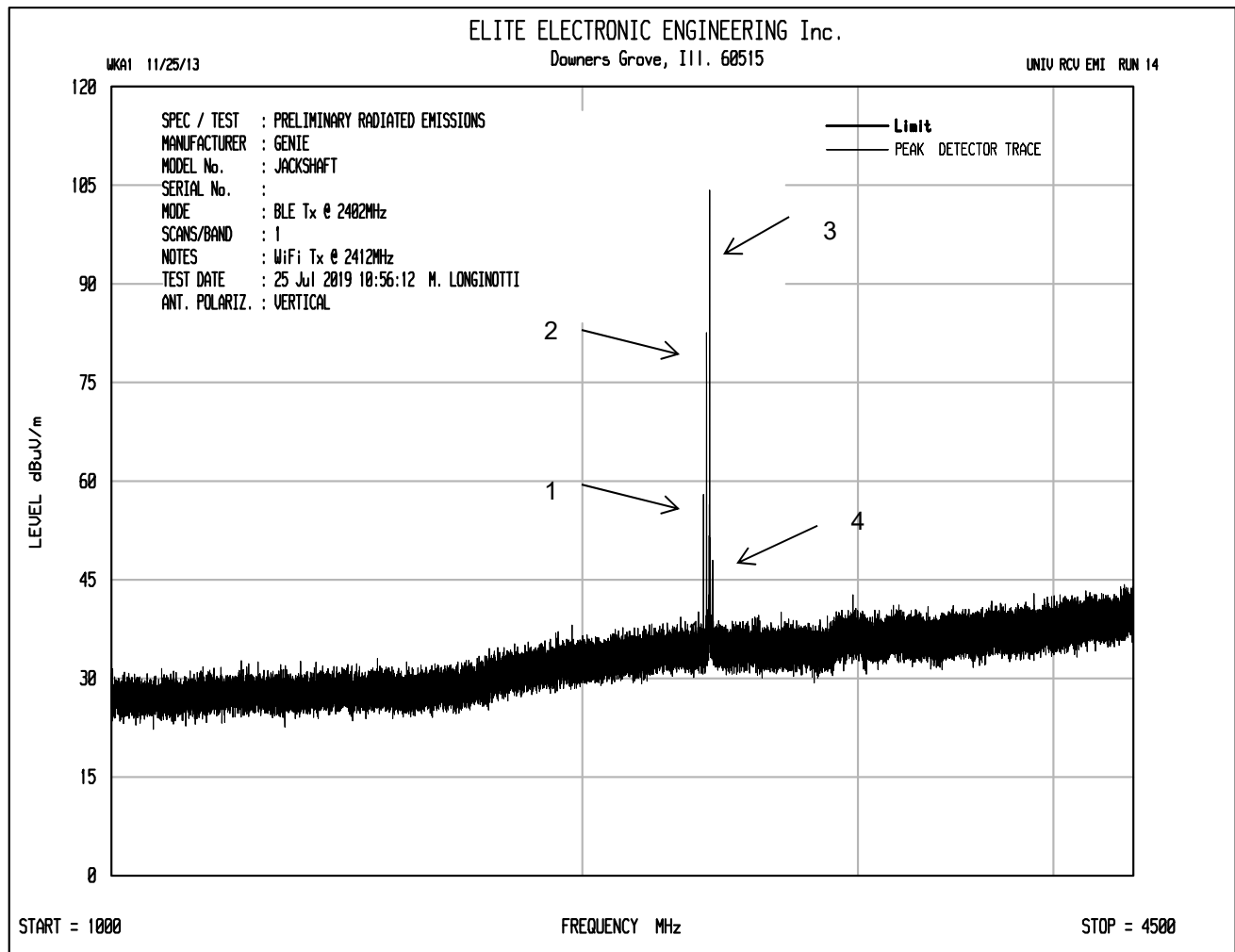




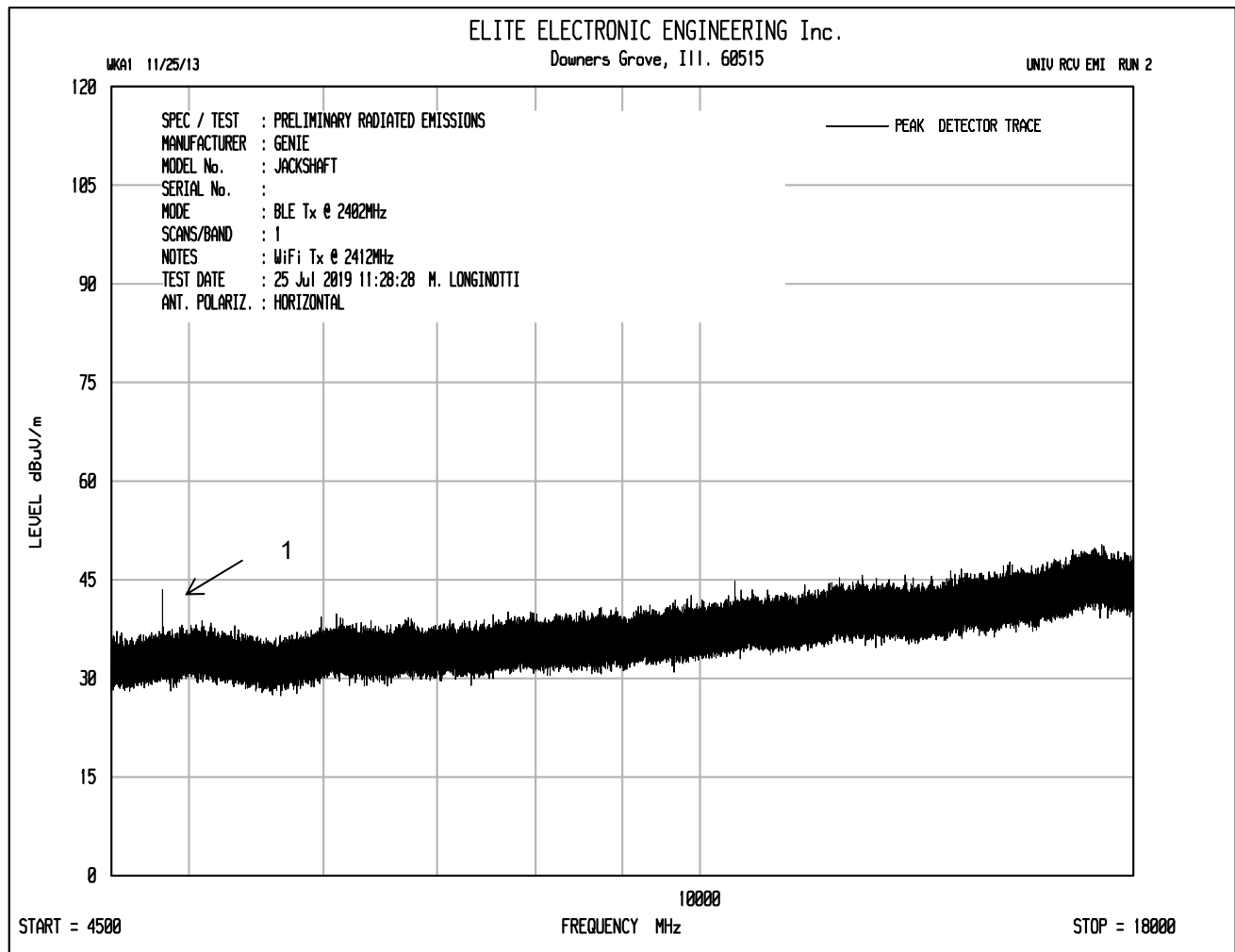




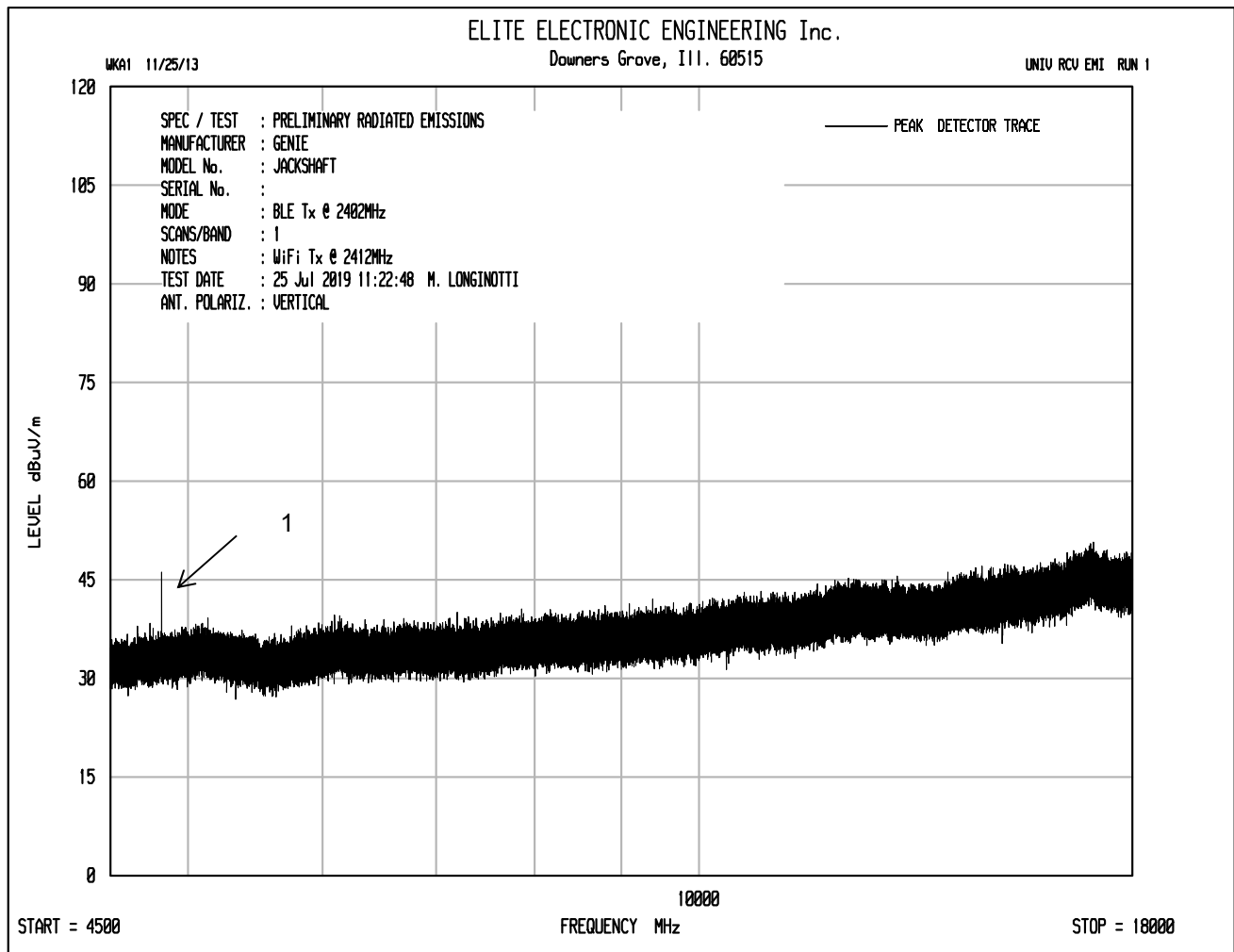
- 1- 2392MHz (2 x 2402MHz – 2412MHz)
- 2- BLE Tx @ 2402MHz
- 3- WiFi Tx @ 2412MHz
- 4- 2422MHz (2 x2412MHz – 2402MHz) (in the 2400MHz to 2483.5MHz band)



- 1- 2392MHz (2 x 2402MHz – 2412MHz)
- 2- BLE Tx @ 2402MHz
- 3- WiFi Tx @ 2412MHz
- 4- 2422MHz (2 x 2412MHz – 2402MHz) (in the 2400MHz to 2483.5MHz band)



1 – 4824MHz (2nd harmonic of WiFi 2412MHz)



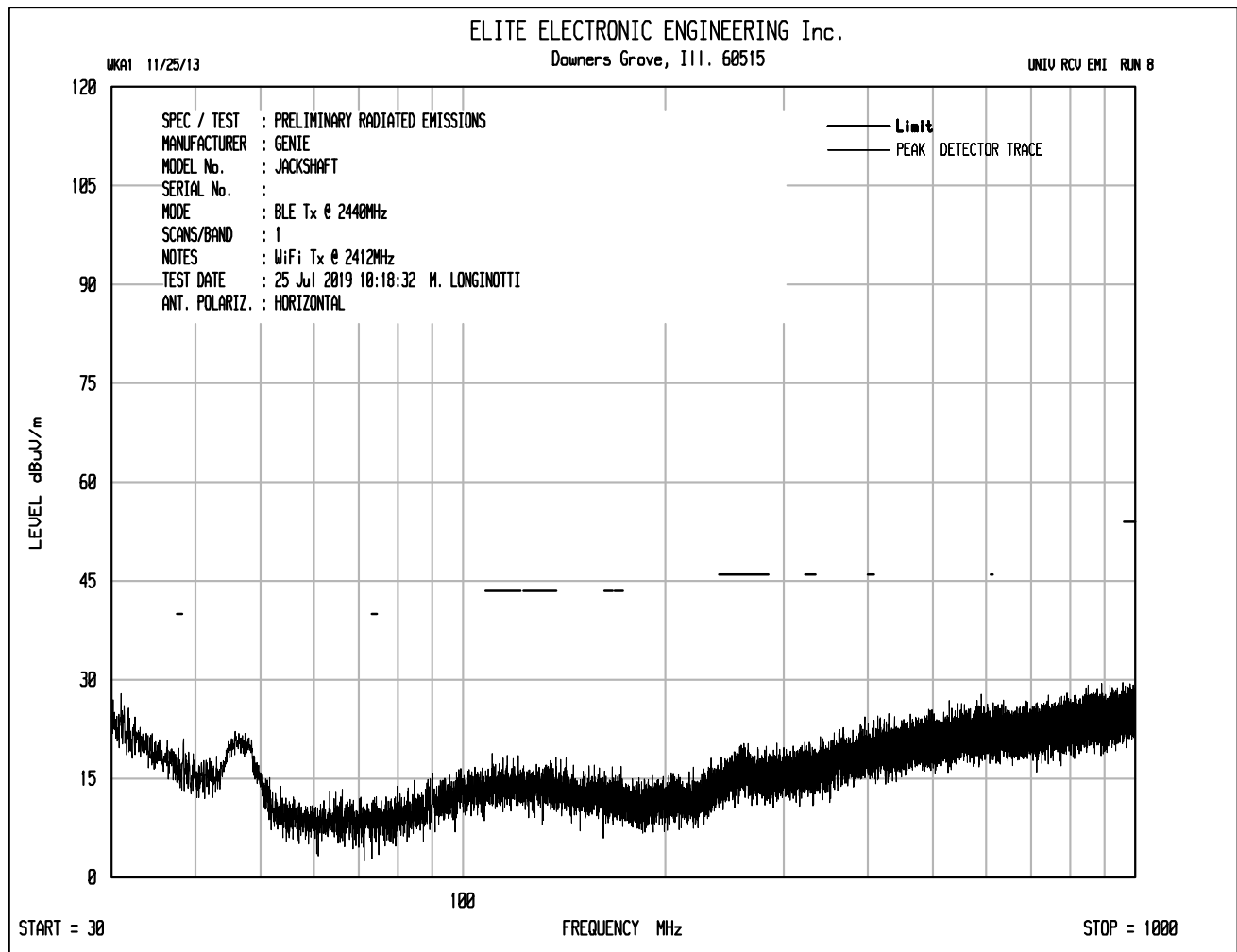
1 – 4824MHz (2nd harmonic of WiFi 2412MHz)

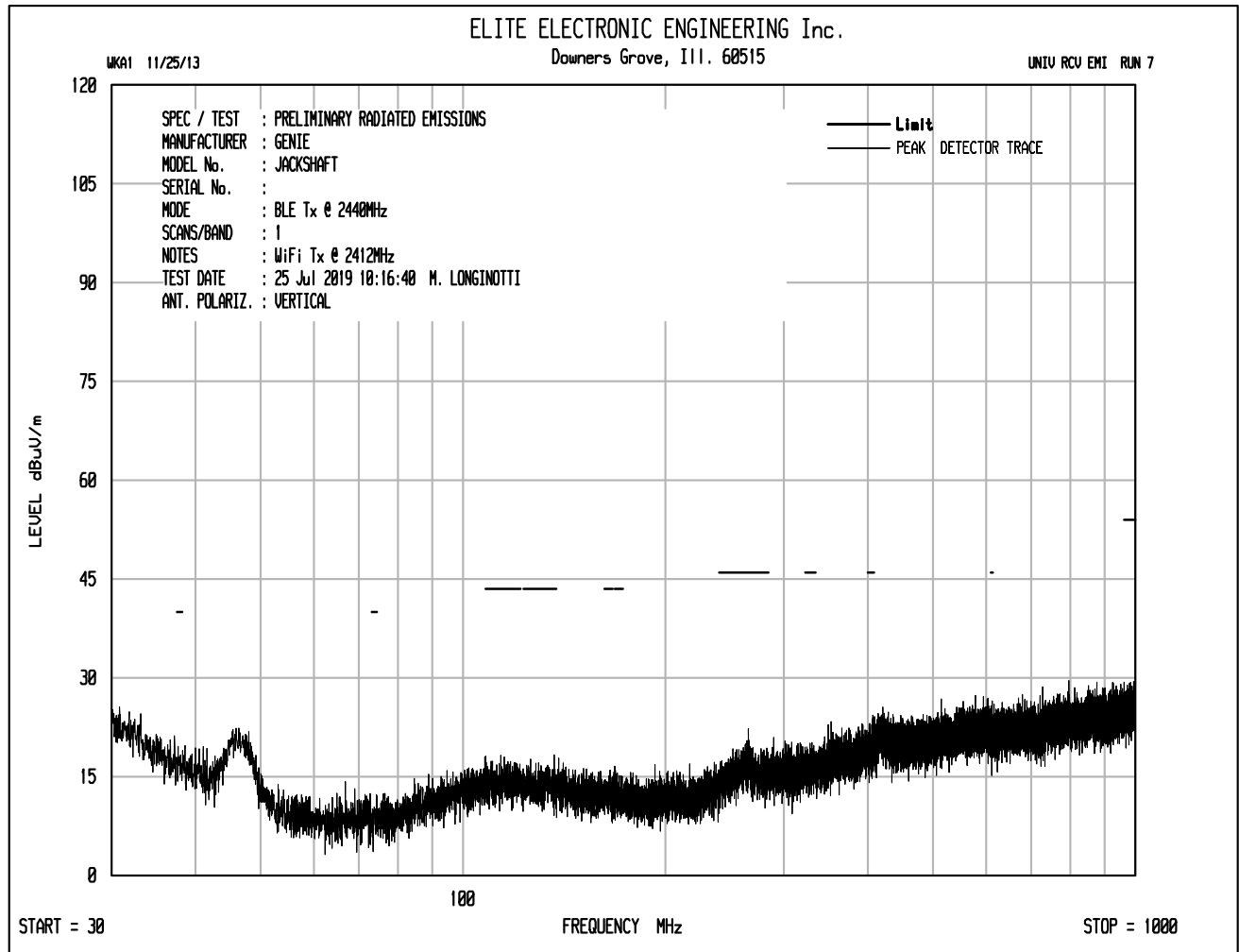


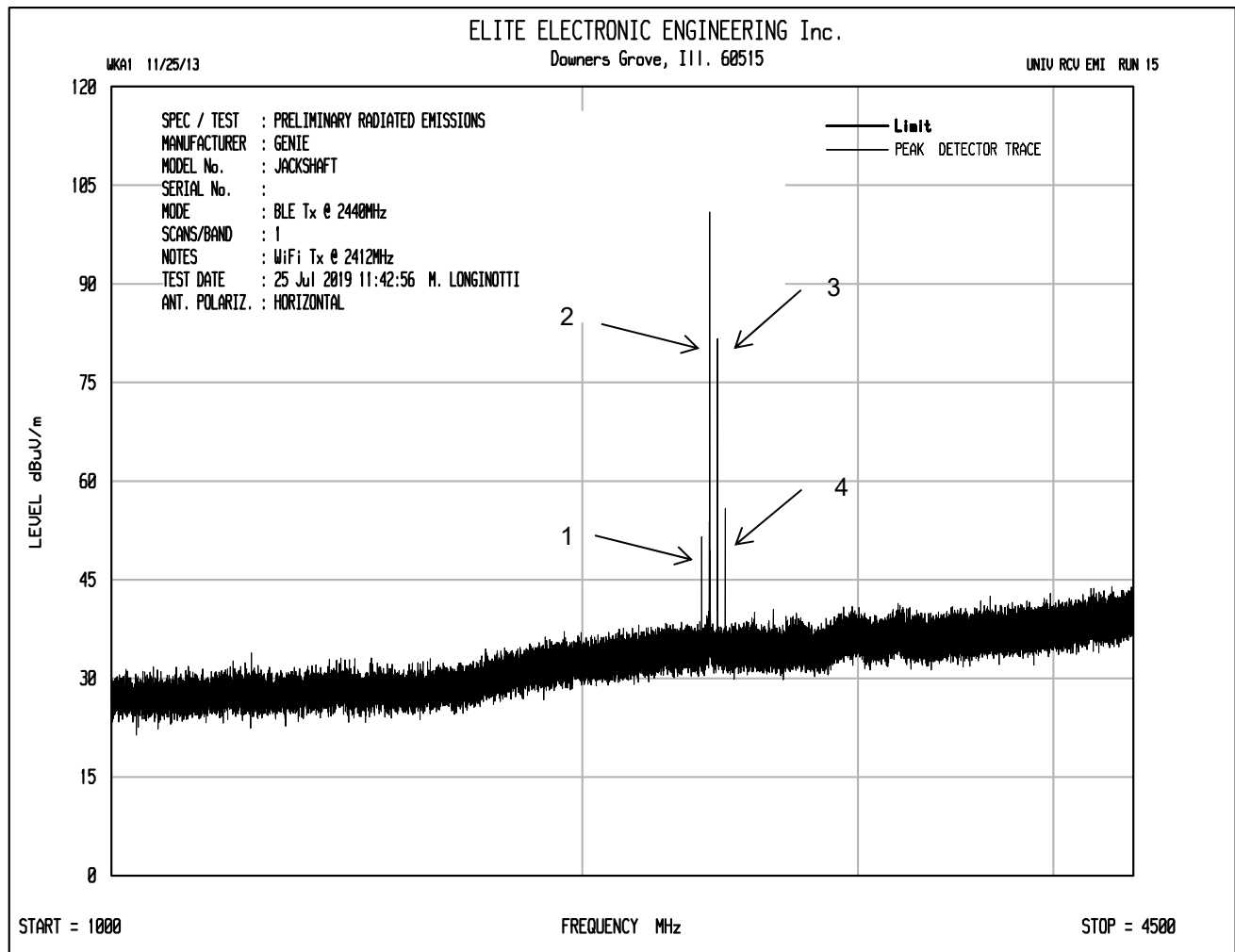
Manufacturer : Genie Company
Test Item : Jackshaft
Serial No. : None Assigned
Mode : WiFi: Transmit at 2412MHz, BLE: Transmit at 2402MHz
Test Specification : FCC-15.247, RSS-247 Intermodulation Peak Radiated Emissions not in Restricted Bands
Date : July 25, 2019
Test Distance : 3 meters
Notes : Peak Detector with 100kHz Resolution Bandwidth

Freq. MHz	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	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)
2412.00	H	69.1		2.6	32.2	0.0	103.9	157043.9		
2412.00	V	75.7		2.6	32.2	0.0	110.5	335753.9		
2392.00	H	27.5		2.6	32.1	0.0	62.2	1295.3	33575.4	-28.3
2392.00	V	30.6		2.6	32.1	0.0	65.3	1850.8	33575.4	-25.2

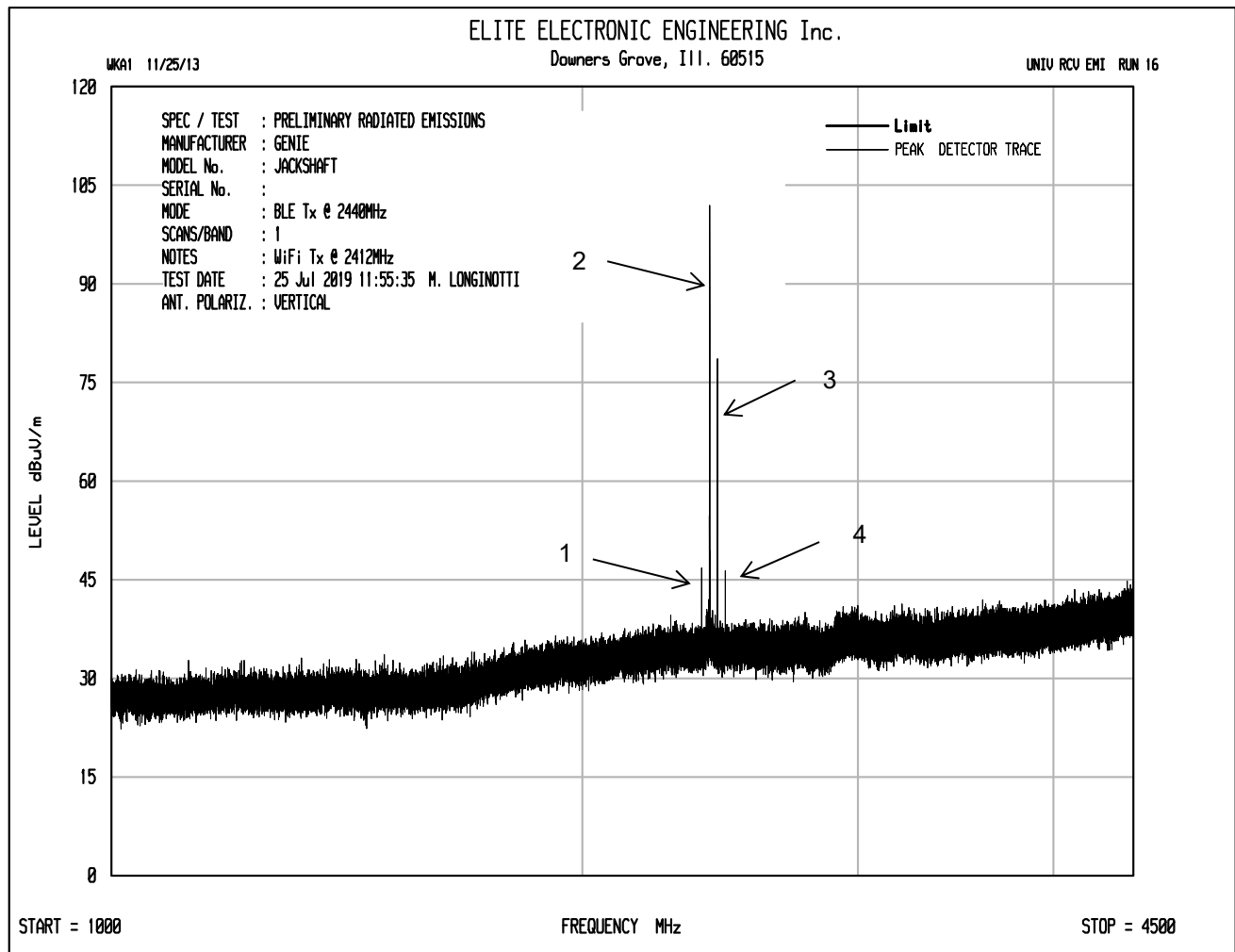
Total (dBuV/m) = Meter Reading + CBL FAC + Ant Fac + Pre Amp + Duty Cycle



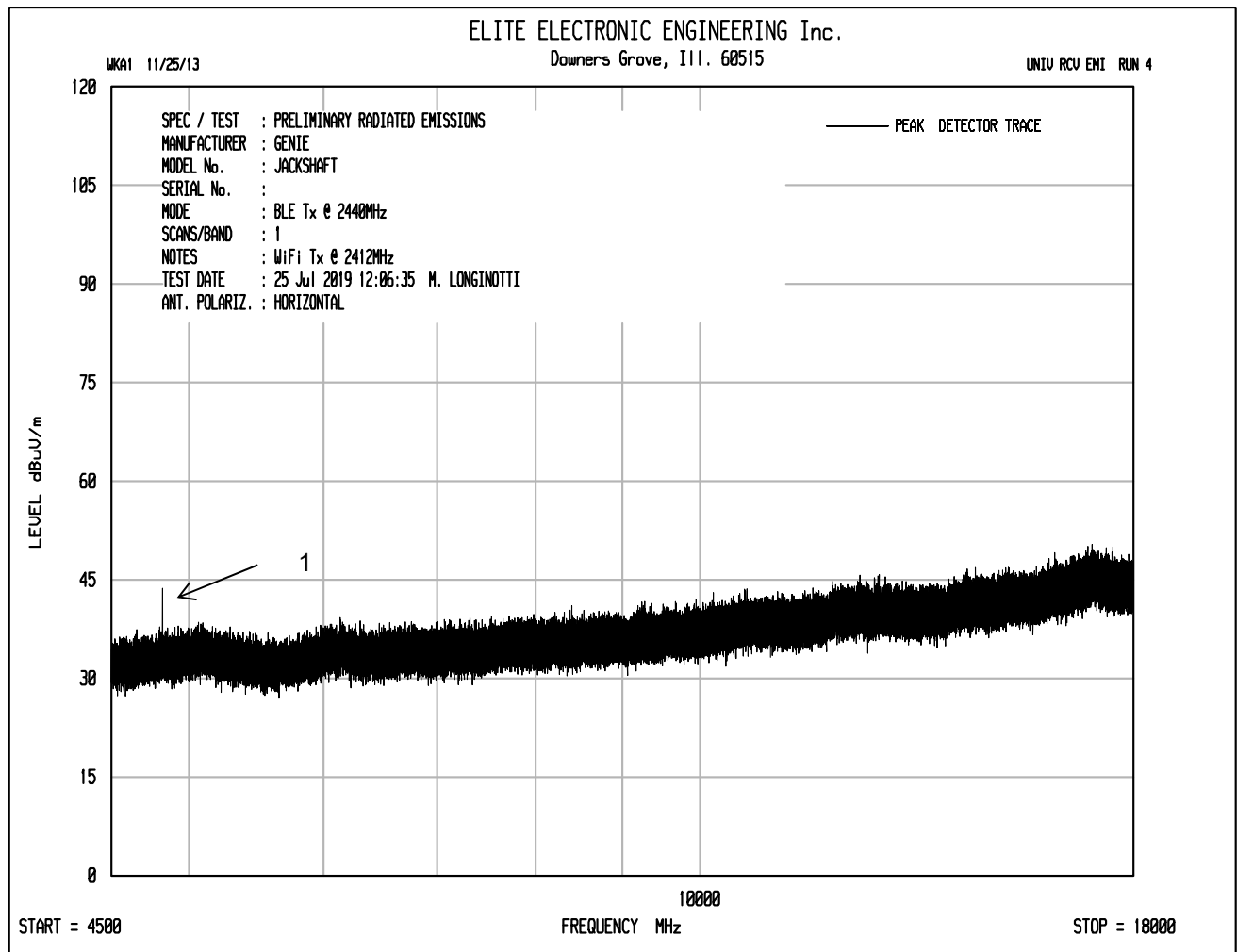




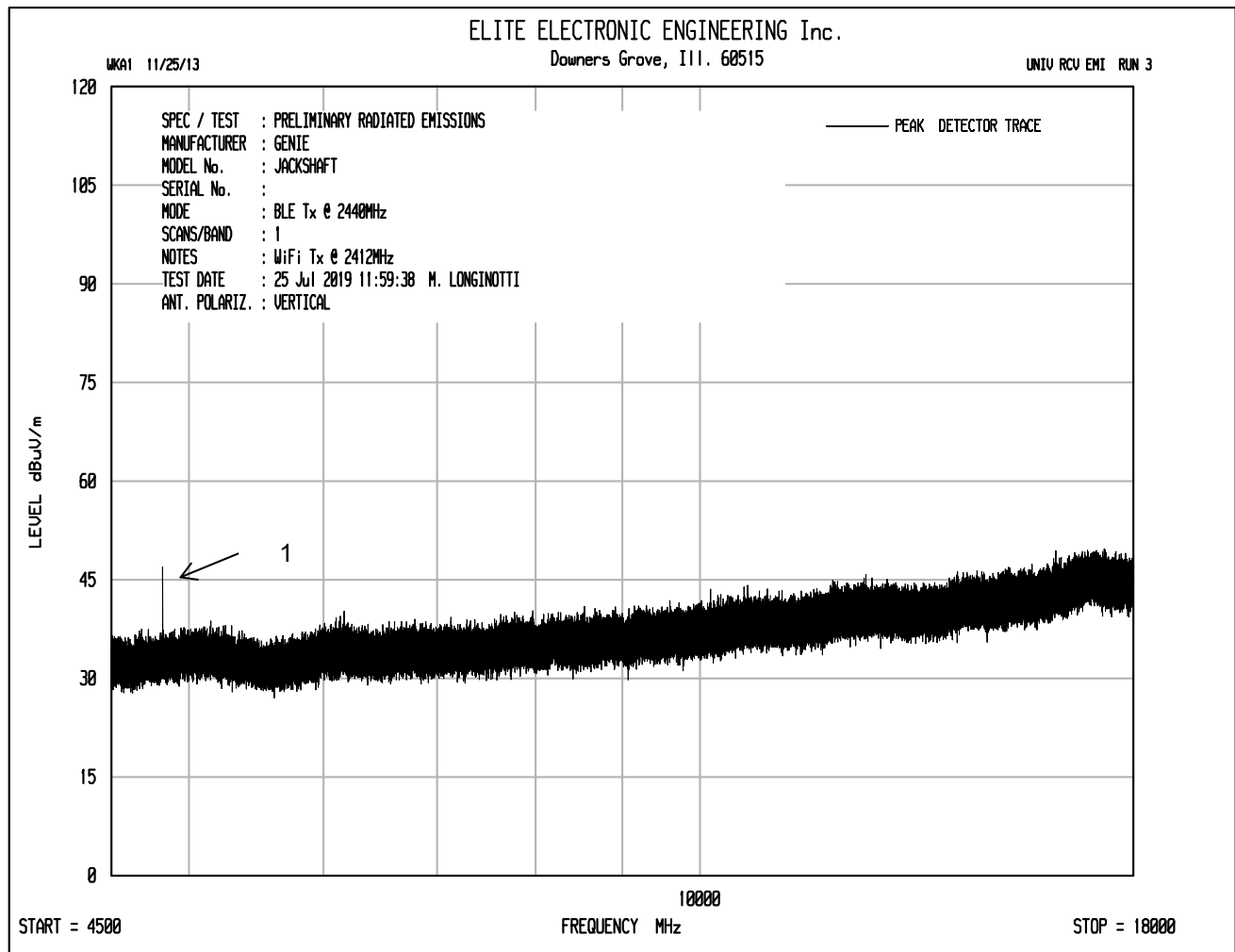
- 1 - 2384MHz (2 x 2412MHz – 2440MHz)
- 2 - WiFi Tx @ 2412MHz
- 3 - BLE Tx @ 2440MHz
- 4 - 2468MHz (2 x 2440MHz – 2412MHz) (in the 2400MHz to 2483.5MHz band)



- 1 - 2384MHz (2 x 2412MHz – 2440MHz)
- 2 - WiFi Tx @ 2412MHz
- 3 - BLE Tx @ 2440MHz
- 4 - 2468MHz (2 x 2440MHz – 2412MHz) (in the 2400MHz to 2483.5MHz band)



1 – 4824MHz (2nd harmonic of WiFi 2412MHz)



1 – 4824MHz (2nd harmonic of WiFi 2412MHz)



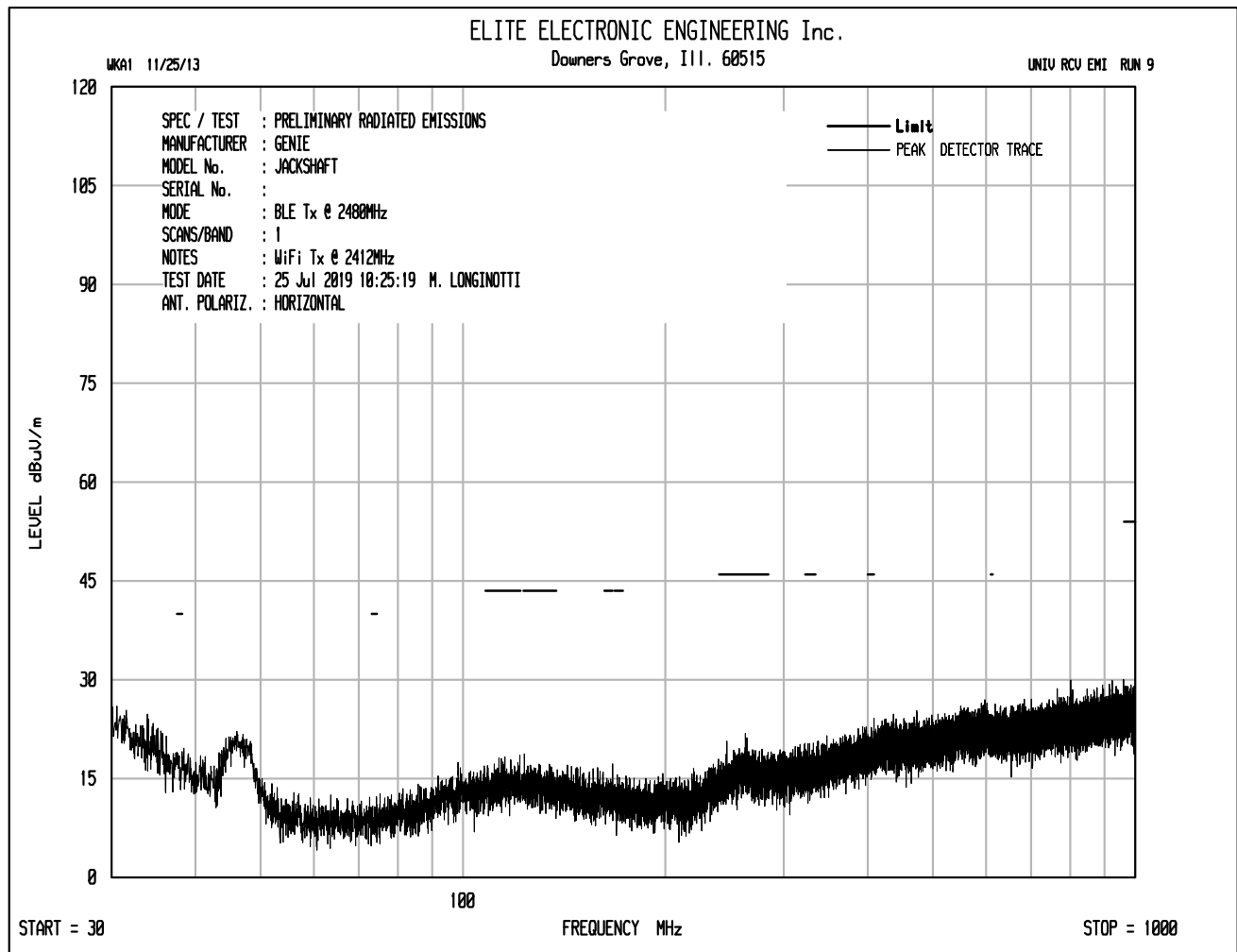
Manufacturer : Genie Company
Test Item : Jackshaft
Serial No. : None Assigned
Mode : WiFi: Transmit at 2412MHz, BLE: Transmit at 2440MHz
Test Specification : FCC-15.247, RSS-247 Intermodulation Peak Radiated Emissions in Restricted Bands
Date : July 25, 2019
Test Distance : 3 meters
Notes : Peak Detector with a 1MHz Resolution Bandwidth

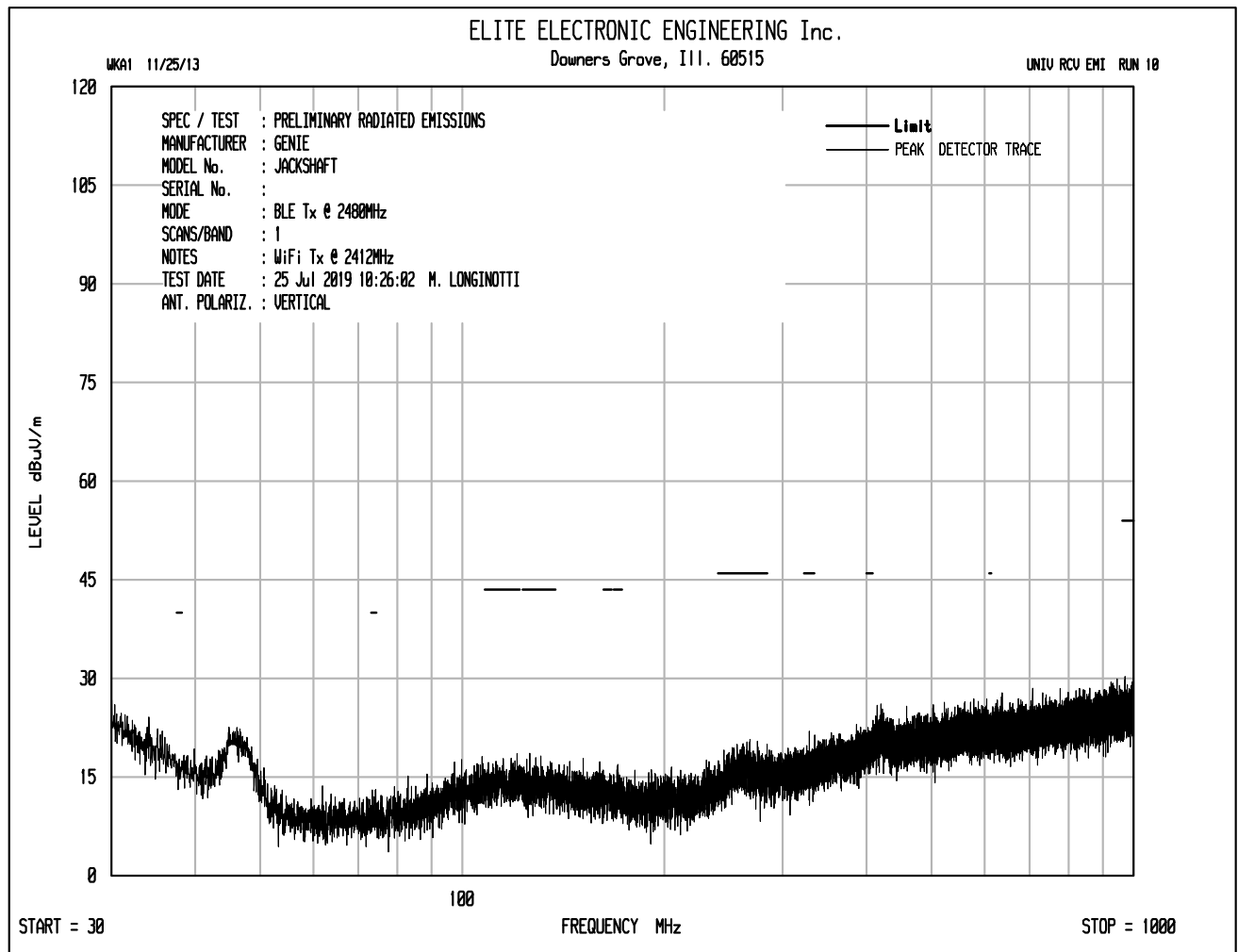
Freq. MHz	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	Pre Amp (dB)	Peak Total dBuV/m at 3m	Peak Total uV/m at 3 m	Peak Limit uV/m at 3 m	Margin (dB)
2384.00	H	20.7		2.6	32.1	0.0	55.4	589.2	5000.0	-18.6
2384.00	V	22.6		2.6	32.1	0.0	57.3	733.3	5000.0	-16.7

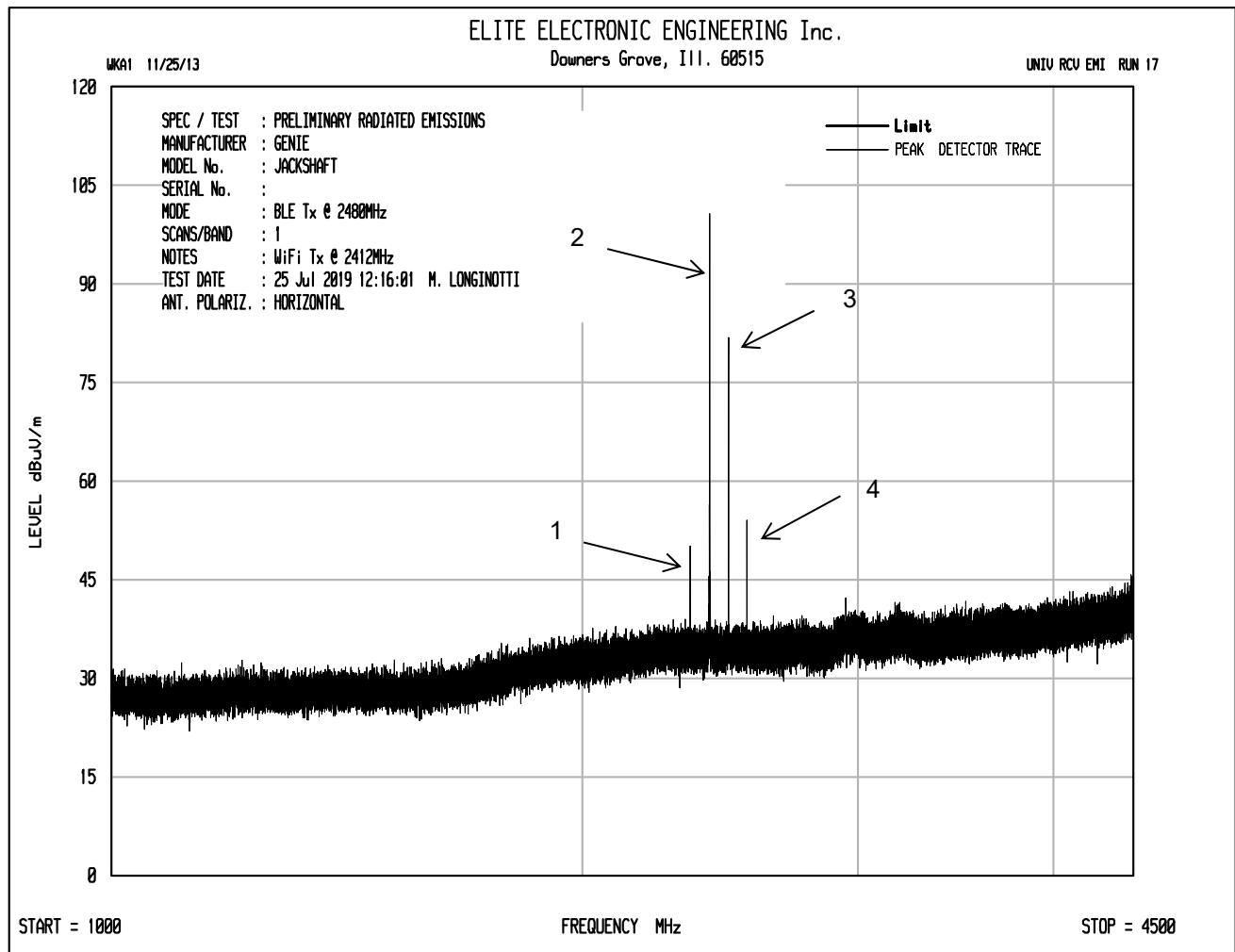


Manufacturer : Genie Company
Test Item : Jackshaft
Serial No. : None Assigned
Mode : WiFi: Transmit at 2412MHz, BLE: Transmit at 2402MHz
Test Specification : FCC-15.247, RSS-247 Intermodulation Average Radiated Emissions in Restricted
: Bands
Date : July 25, 2019
Test Distance : 3 meters
Notes : Average Detector with a 1MHz Resolution Bandwidth

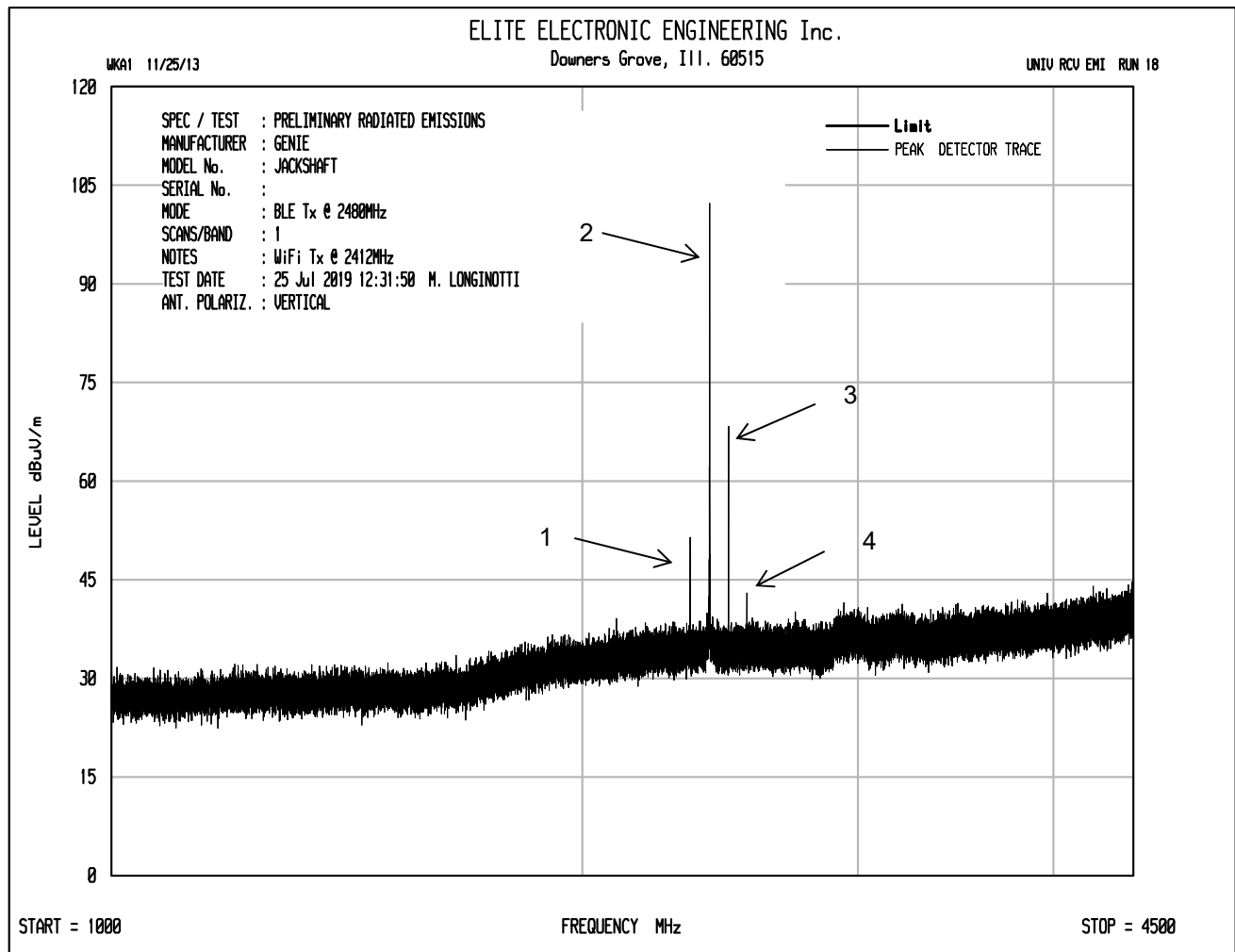
Freq. MHz	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	Pre Amp (dB)	Duty Cycle (dB)	Average Total dBuV/m at 3m	Average Total uV/m at 3 m	Average Limit uV/m at 3 m	Margin (dB)
2384.00	H	14.8		2.6	32.1	0.0	0.0	49.5	298.7	500.0	-4.5
2384.00	V	18.3		2.6	32.1	0.0	0.0	53.0	447.0	500.0	-1.0



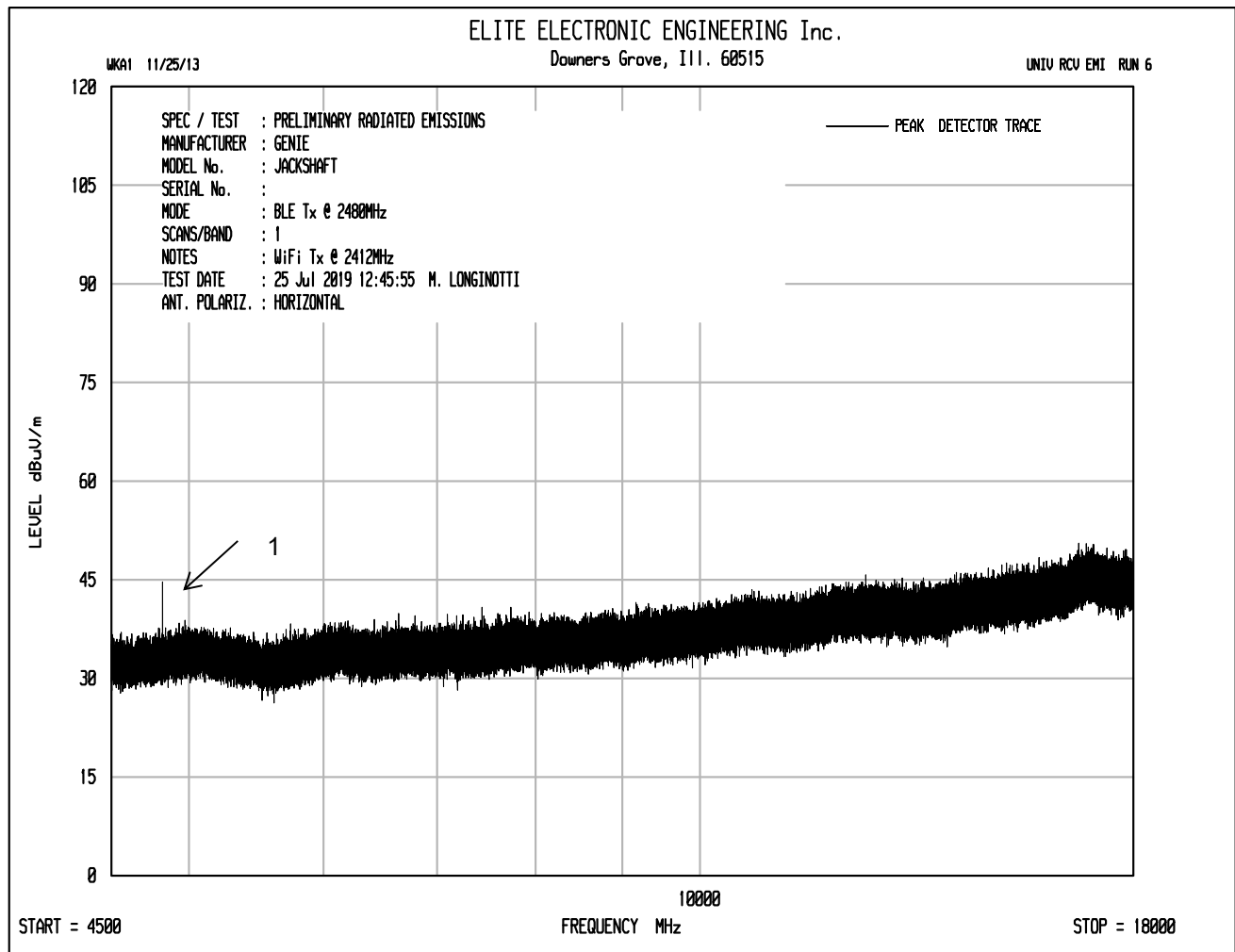




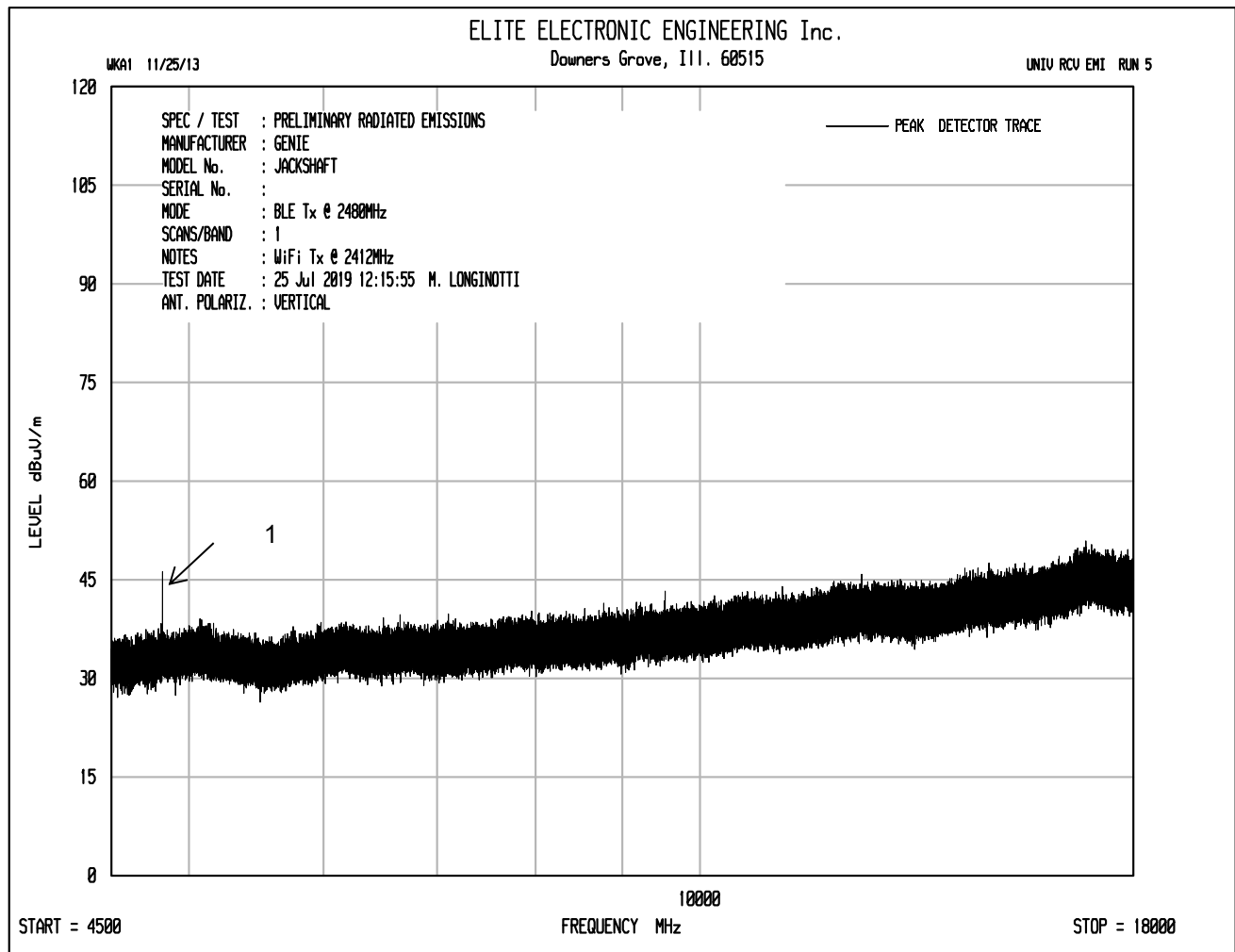
- 1 - 2344MHz (2 x 2412MHz – 2480MHz)
- 2 - WiFi Tx @ 2412MHz
- 3 - BLE Tx @ 2480MHz
- 4 - 2548MHz (2 x 2480MHz – 2412MHz)



- 1 - 2344MHz (2 x 2412MHz – 2480MHz)
- 2 - WiFi Tx @ 2412MHz
- 3 - BLE Tx @ 2480MHz
- 4 - 2548MHz (2 x 2480MHz – 2412MHz)



1 – 4824MHz (2nd harmonic of WiFi 2412MHz)



1 – 4824MHz (2nd harmonic of WiFi 2412MHz)



Manufacturer : Genie Company
Test Item : Jackshaft
Serial No. : None Assigned
Mode : WiFi: Transmit at 2412MHz, BLE: Transmit at 2480MHz
Test Specification : FCC-15.247, RSS-247 Intermodulation Peak Radiated Emissions in Restricted Bands
Date : July 25, 2019
Test Distance : 3 meters
Notes : Peak Detector with a 1MHz Resolution Bandwidth

Freq. MHz	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	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)
2344.00	H	20.7		2.6	32.0	0.0	55.2	577.2	5000.0	-18.8
2344.00	V	22.4		2.6	32.0	0.0	56.9	702.0	5000.0	-17.1

Manufacturer : Genie Company
 Test Item : Jackshaft
 Serial No. : None Assigned
 Mode : WiFi: Transmit at 2412MHz, BLE: Transmit at 2480MHz
 Test Specification : FCC-15.247, RSS-247 Intermodulation Average Radiated Emissions in Restricted
 : Bands
 Date : July 25, 2019
 Test Distance : 3 meters
 Notes : Average Detector with a 1MHz Resolution Bandwidth

Freq. MHz	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	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)
2344.00	H	15.7		2.6	32.0	0.0	0.0	50.2	324.6	500.0	-3.8
2344.00	V	18.8		2.6	32.0	0.0	0.0	53.3	463.8	500.0	-0.7

Manufacturer : Genie Company
 Test Item : Jackshaft
 Serial No. : None Assigned
 Mode : WiFi: Transmit at 2412MHz, BLE: Transmit at 2480MHz
 Test Specification : FCC-15.247, RSS-247 Intermodulation Peak Radiated Emissions not in Restricted Bands
 Date : July 25, 2019
 Test Distance : 3 meters
 Notes : Peak Detector with 100kHz Resolution Bandwidth

Freq. MHz	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	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)
2412.00	H	69.1		2.6	32.2	0.0	103.9	157043.9		
2412.00	V	75.7		2.6	32.2	0.0	110.5	335753.9		
2548.00	H	19.8		2.7	32.5	0.0	55.0	560.1	33575.4	-35.6
2548.00	V	19.5		2.7	32.5	0.0	54.7	541.1	33575.4	-35.9

Total (dBuV/m) = Meter Reading + CBL FAC + Ant Fac + Pre Amp + Duty Cycle