# Measurement of RF Interference from the Falcon Weber Connect Controller Transceiver: BLE Report

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|---|---|
| For | Weber-Stephen Products LLC<br>1415 S Roselle Rd<br>Palatine, IL 60067 |
| P.O. Number | 135046 |
| Date Received | May 21, 2020 |
| Date Tested | May 21-28, 2020 |
| Test Personnel | Javier Cardenas |
| Specification | FCC "Code of Federal Regulations" Title 47, Part 15, Subpart C, Sections 15.207 and 15.247 for Digital Modulation Intentional Radiators Operating within the band 2400-2483.5MHz<br>Industry Canada RSS-247<br>Industry Canada RSS-GEN |

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REVISION HISTORY

| Revision | Date | Description |
|---|---|---|
| — | 29 May 2020 | Initial release |
| | | |

# Measurement of RF Emissions from the Weber Connect Controller, Part No. Falcon Transceiver: BLE Report

## 1. INTRODUCTION

### 1.1 Scope of Tests

This document represents the results of the series of radio interference measurements performed on the Bluetooth Low Energy (BLE) radio of a Weber-Stephen Products LLC Weber Connect Controller, Part No. Falcon, transceiver (hereinafter referred to as the EUT). The digital modulation transceiver was designed to transmit and receive in the 2400-2483.5 MHz band using an internal antenna. The EUT was manufactured and submitted for testing by Weber-Stephen Products LLC located in Palatine, IL.

### 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 C, Sections 15.207 and 15.247 for Intentional Radiators Operating within the 2400-2483.5 MHz 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 Industry Canada Radio Standards Specification RSS-Gen Section 8.8 and Industry Canada Radio Standards Specification RSS-247 for Transmitters.

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

### 1.3 Deviations, Additions and Exclusions

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

### 1.4 EMC Laboratory Identification

This series of tests was performed by Elite Electronic Engineering Incorporated of Downers Grove, Illinois. The laboratory is accredited by the American Association for Laboratory Accreditation (A2LA), A2LA Lab Code: 1786-01.

### 1.5 Laboratory Conditions

The temperature at the time of the test was 21C and the relative humidity was 30%.

## 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 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”
- Industry Canada RSS-247, Issue 2, February 2017, “Spectrum Management and Telecommunications Radio Standards Specification, Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs), and Licence-Exempt Local Area Network (LE-LAN) Devices”
- Industry Canada RSS-GEN, Issue 5, March 2019, “Spectrum Management and Telecommunications Radio Standards Specification, General Requirements for Compliance of Radio

Apparatus”

# 3. EUT SET-UP AND OPERATION

## 3.1 General Description

The EUT is a Weber Connect Controller, Part No. Falcon. A block diagram of the EUT setup is shown as Figure 1 and Figure 2.

### 3.1.1 Power Input

The EUT is powered with 5VDC obtained through a host device that gets 115V 60Hz power from the AC mains.

### 3.1.1 Peripheral Equipment

The following peripheral equipment was submitted with the EUT:

| Item | Description |
|---|---|
| EX6 | 36” Grill Host |

### 3.1.2 Grounding

Since only two wires were used to provide the input power, the EUT was ungrounded during the tests.

## 3.2 Operational Mode

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

- Bluetooth: Transmit at 2402MHz
- Bluetooth: Transmit at 2426MHHz
- Bluetooth: Transmit at 2480MHHz

## 3.3 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.

Conducted and radiated emission tests were performed with an EMI receiver utilizes the bandwidths and detectors specified in the requirements.

## 4.3 Calibration Traceability

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

## 4.4 Measurement Uncertainty

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

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

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

# 5. TEST PROCEDURES

## 5.1 Powerline Conducted Emissions

### 5.1.1 Requirements

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

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

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

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

### 5.1.2 Procedures

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

a) The EUT was operated in the Transmit mode.

b) Measurements were first made on the 120VAC, 60Hz line.

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

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

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

limit, quasi-peak and average readings were taken on the highest emissions levels measured during the peak detector scan.)

f) Steps (d) and (e) were repeated for the remainder of the frequency sub-bands until the entire frequency range from 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.

g) Steps (c) through (f) were repeated on the return line.

#### 5.1.3 Results

The plots and tabular results of the peak, quasi-peak, and average conducted voltage levels acquired from each input power line with the EUT operated in the Transmit mode are shown on pages 21 through 24. 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 on Figure 3.

### 5.2 6dB Bandwidth

#### 5.2.1 Requirements

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

#### 5.2.2 Procedures

The EUT was setup inside the chamber. The EUT was allowed to transmit continuously. The transmit channel was set separately to low, middle, and high channels. The resolution bandwidth (RBW) was set to 100kHz, the video bandwidth (VBW) was set to the same as or 3 times greater than the RBW, and the span was set to 3 times the RBW.

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

#### 5.2.3 Results

The plots on pages 25 through 30 show that the minimum 6 dB bandwidth was 714.3kHz which is greater than minimum allowable 6dB bandwidth requirement of 500kHz for systems using digital modulation techniques. The 99% bandwidth was measured to be 1.059MHz.

### 5.3 Peak Output Power

#### 5.3.1 Requirements

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

#### 5.3.2 Procedures

The antenna port of the EUT was connected to the spectrum analyzer through 30dB of attenuation. The EUT was set to transmit separately at the low, middle, and high channels. The resolution bandwidth (RBW) was set to greater than the 6dB bandwidth. The 'Max-Hold' function was engaged. The maximum meter reading was recorded. The peak power output was calculated for the low, middle and high channels.

Additionally 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, as required. The peak power output was calculated for low, middle, and high hopping frequencies.

#### 5.3.3 Results

The results are presented on pages 31 through 33. The maximum peak conducted output power from the transmitter was 0.002W (2.9 dBm) which is below the 1 Watt limit.

The results are presented on pages 34 through 36. The maximum EIRP measured from the transmitter was 6.3 dBm or 0.0043W which is below the 4 Watt limit.

### 5.4 Duty Cycle Factor Measurements

#### 5.4.1 Procedures

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

With the transmitter set up to transmit for maximum pulse density, the time domain trace is displayed on the spectrum analyzer. This trace is obtained by tuning center frequency to the transmitter frequency and then setting a zero span width with 1msec/div. The amplitude settings are adjusted so that the on/off transitions clear the 4th division from the bottom of the display. The markers are set at the beginning and end of the “on-time”. The trace is recorded.

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

#### 5.4.2 Results

The plots of the duty cycle are shown on data pages 37 through 38.

### 5.5 Radiated Spurious Emissions Measurements

#### 5.5.1 Requirements

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

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

| Frequency MHz | Field Strenght (microvolts/meter) | Measurement distance (meters) |
|---|---|---|
| 0.009-0.490 | 2400/F(kHz) | 300 |

| | | |
|---|---|---|
| 0.490-1.705 | 24000/F(kHz) | 30 |
| 1.705-30.0 | 30 | 3 |
| 30.0-88.0 | 100 | 3 |
| 88.0-216.0 | 150 | 3 |
| 216.0-960.0 | 200 | 3 |
| Above 960 | 500 | 3 |

### 5.5.2 Procedures

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 open field emission tests were then manually performed over the frequency range of 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) 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), no further measurements are required. If however, the peak readings exceed the limits listed in 15.209(a), then the emissions are remeasured using a quasi-peak detector.

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

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

#### 5.5.3 Results

Final radiated emissions data are presented on data pages 39 through 47. As can be seen from the data, all emissions measured from the EUT were within the specification limits. Photographs of the test configuration which yielded the highest, or worst case, radiated emission levels are shown on Figures 4 through 6.

### 5.6 Band Edge Compliance

#### 5.6.1 Requirements

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

#### 5.6.2 Procedures

##### 5.6.2.1 Low Band Edge

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

envelope of the transmitter bandwidth was defined.

e. The marker was set on the peak of the in-band emissions. A display line was placed 20dB down from the peak of the in-band emissions. All emissions which fall outside of the authorized band of operation must be below the 20dB down display line. (All emissions to the left of the center frequency (band-edge) must be below the display line.)
f. The analyzer's display was plotted using a 'screen dump' utility.

5.6.2.2 High Band Edge

1) The EUT was set to transmit continuously at the channel closest to the high band-edge.
2) A double ridged waveguide was placed 3 meters away from the EUT. The antenna was connected to the input of a spectrum analyzer.
3) The center frequency of the analyzer was set to the high band edge (2483.5MHz)
4) The resolution bandwidth was set to 1MHz.
5) To ensure that the maximum or worst case emission level was measured, the following steps were taken:

a. The EUT was rotated so that all of its sides were exposed to the receiving antenna.
b. Since the measuring antenna is linearly polarized, both horizontal and vertical field components were measured.
c. The measuring antenna was raised and lowered from 1 to 4 meters for each antenna polarization to maximize the readings.

6) The highest measured peak reading was recorded.
7) The highest measured average reading was recorded.

5.6.3 Results

Pages 48 through 49 show the radiated band-edge compliance results. As can be seen from these plots, the radiated emissions at the low end band edge are within the 20 dB down limits. The radiated emissions at the high end band edge are within the general limits.

## 5.7 Power Spectral Density

5.7.1 Requirement

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

5.7.2 Procedures

1) The antenna port of the EUT was connected to the spectrum analyzer through a 30dB pad.
2) The EUT was then set to transmit at a low, middle and high channel.
3) To determine the power spectral density, the following spectrum analyzer settings were used:
   a. Center frequency = transmit frequency
   b. Span = 1.5 times the DTS (6 dB) bandwidth
   c. Resolution bandwidth (RBW): 3kHz ≤ RBW ≤ 100kHz
   d. Sweep time = auto
   e. The peak detector and 'Max-Hold' function was engaged.
   f. The display line represents the 8 dBm limit
   g. The analyzer's display was plotted using a 'screen dump' utility.

4) If measured value exceeds limit, reduce RBW (no less than 3kHz) and repeat.

5.7.3 Results

Pages 50 through 52 shows the power spectral density results. As can be seen from this plot, the peak power density is less than 8dBm in a 3kHz band during any time interval of continuous transmission.

## 6. CONCLUSIONS

It was determined that the Bluetooth Low Energy (BLE) radio of the Weber-Stephen Products LLC Weber Connect Controller, Part No. Falcon digital modulation transceiver, did fully meet the conducted and radiated emission requirements of the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart C, Sections 15.207 and 15.247 for Intentional Radiators Operating within the 2400-2483.5 MHz band, when tested per ANSI C63.4-2014.

It was also determined that the Bluetooth Low Energy (BLE) radio of the Weber-Stephen Products LLC Weber Connect Controller, Part No. Falcon digital modulation transceiver, did fully meet the Industry Canada Radio Standards Specification RSS-Gen Section 8.8 and Radio Standards Specification RSS-247 for transmitters, when tested per ANSI C63.4-2014.

## 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 | Oper | Equipment Description | Manufacturer | Model No. | Serial No. | Frequency Range | Cal Date | Due Date |
|---|---|---|---|---|---|---|---|---|
| APW1 | | PREAMPLIFIER | PLANAR ELECTRONICS | PE2-30-20G20R6G-3R0-10-12-SFF | PL162015/1446 | 20GHZ-26.5GHZ | 10/2/2019 | 10/2/2020 |
| APW11 | | PREAMPLIFIER | PMI | PE2-35-120-5R0-10-12-SFF | PL11685/1241 | 1GHZ-20GHZ | 4/2/2020 | 4/2/2021 |
| CDX8 | | COMPUTER | ELITE | WORKSTATION | | | N/A | |
| GRE2 | | SIGNAL GENERATOR | AGILENT | E4438C | MY42081749 | 250KHZ-6GHZ | 3/20/2020 | 3/20/2021 |
| MEA0 | | MICRO-OHM METER | KEITHLEY | 580 | 674866 | 10UOHM-200KOHM | 7/13/2019 | 7/13/2020 |
| NHG1 | | STANDARD GAIN HORN ANTENNA | NARDA | 638 | --- | 18-26.5GHZ | NOTE 1 | |
| NSDS1 | | UNIVERSAL SPHERICAL DIPOLE SOURCE | AET | USDS-H | AET-1116 | | NOTE 1 | |
| NTA4 | | BILOG ANTENNA | TESEQ | 6112D | 46660 | 20-2000GHZ | 9/23/2019 | 9/23/2020 |
| NWQ0 | | DOUBLE RIDGED WAVEGUIDE ANTENNA | ETS LINDGREN | 3117 | 66657 | 1GHZ-18GHZ | 5/13/2020 | 5/13/2022 |
| NWQ1 | | DOUBLE RIDGED WAVEGUIDE ANTENNA | ETS-LINDGREN | 3117 | 66655 | 1GHZ-18GHZ | 4/28/2020 | 4/28/2022 |
| PLF1 | | CISPR16 50UH LISN | ELITE | CISPR16/70A | 001 | .15-30MHz | 4/24/2020 | 4/24/2021 |
| PLF3 | | CISPR16 50UH LISN | ELITE | CISPER16/70A | 003 | .15-30MHz | 4/24/2020 | 4/24/2021 |
| RBG2 | | EMI ANALYZER | ROHDE & SCHWARZ | ESW44 | 101591 | 2HZ-44GHZ | 3/23/2020 | 3/23/2021 |
| T1E0 | | 10DB 25W ATTENUATOR | WEINSCHEL | 46-10-43 | AU1882 | DC-18GHZ | 3/19/2020 | 3/19/2022 |
| T2DI | | 20DB, 25W ATTENUATOR | WEINSCHEL | 46-20-34 | BN1041 | DC-18GHZ | 9/20/2018 | 9/20/2020 |
| T2DN | | 20DB, 25W ATTENUATOR | WEINSCHEL | 46-20-34 | BS2147 | DC-18GHZ | 1/10/2020 | 1/10/2022 |
| VBR8 | | CISPR EN FCC CE VOLTAGE.exe | | | | | N/A | |
| 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 | |
| XPR0 | | HIGH PASS FILTER | K&L MICROWAVE | 11SH10-4800/X20000 | 001 | 4.8-20GHZ | 9/6/2019 | 9/6/2021 |

N/A: Not Applicable I/O: Initial Only CNR: Calibration Not Required

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

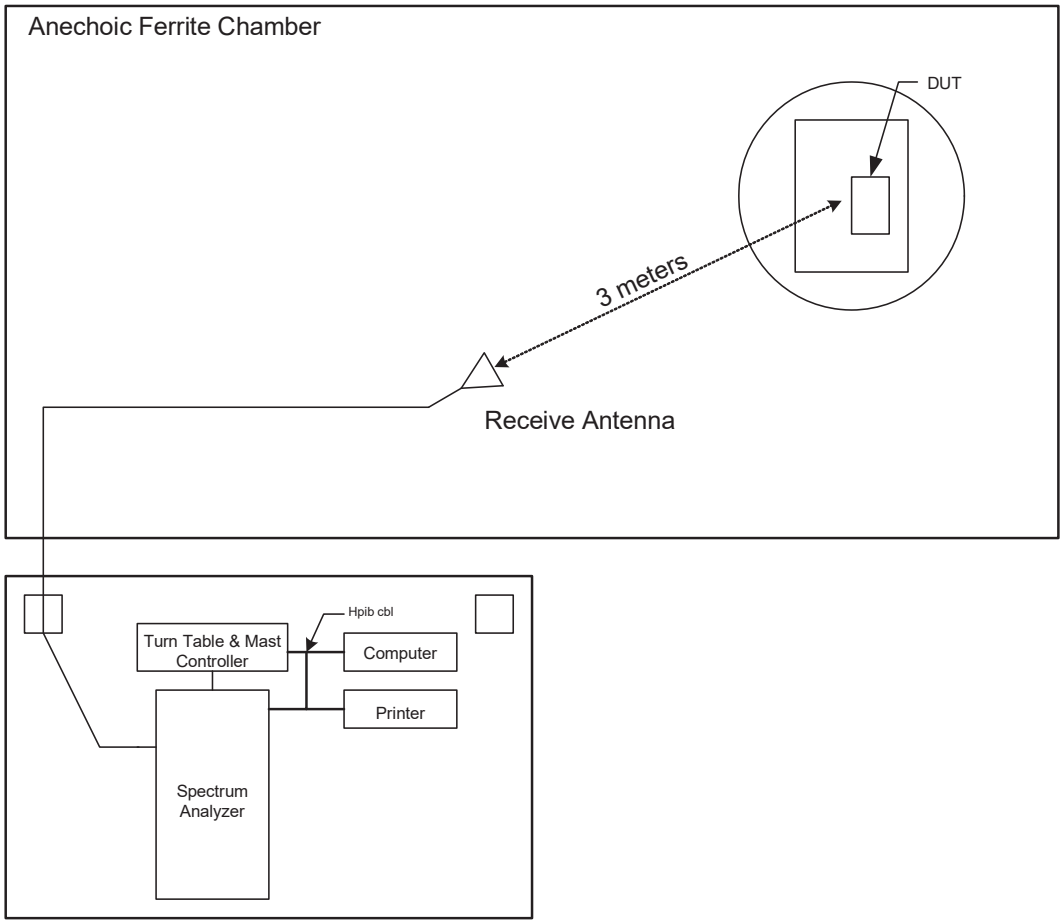



FIGURE 1 BLOCKDIAGRAM OF TEST SETUP

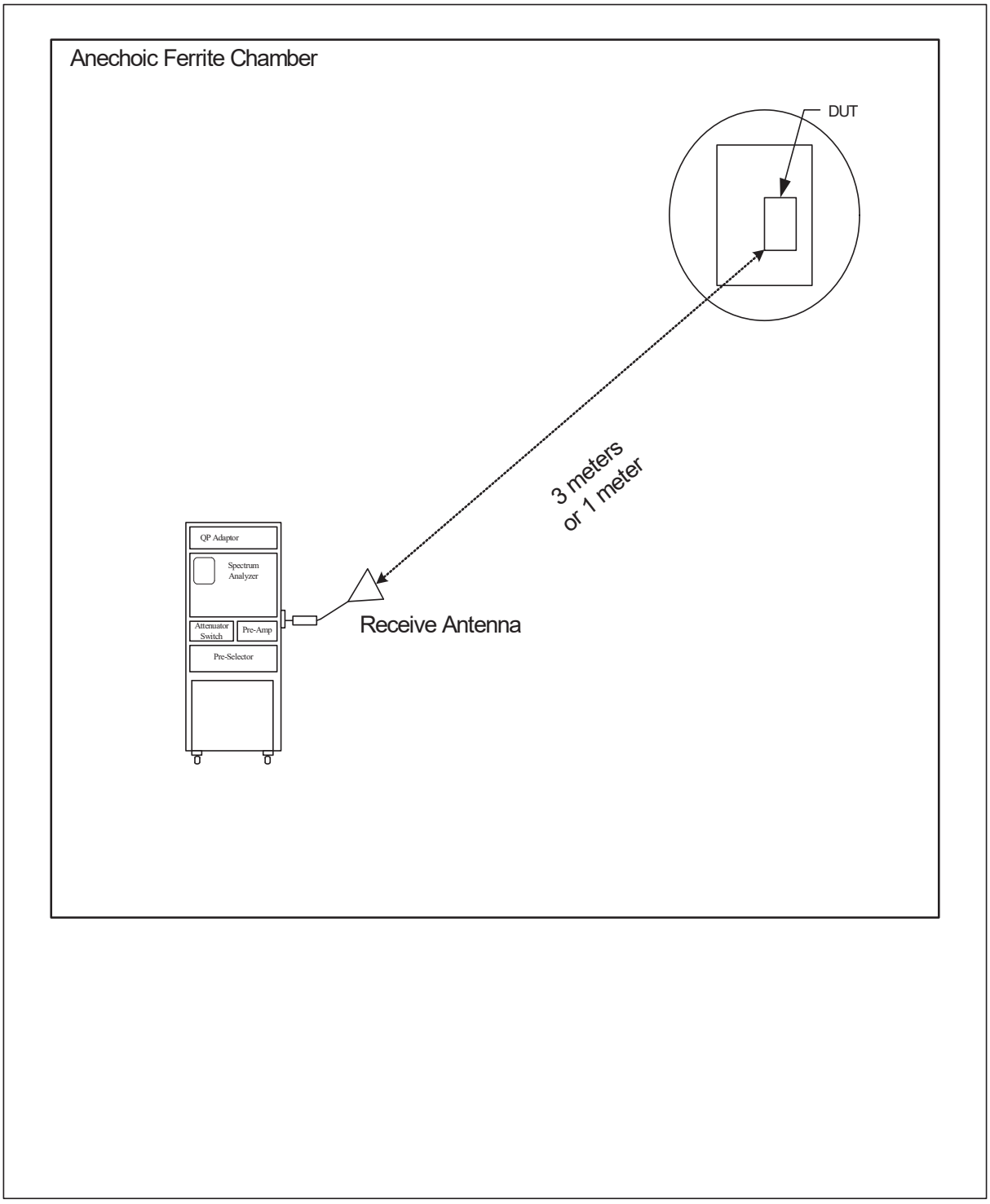



Figure 2: BLOCK DIAGRAM OF TEST SETUP FOR RADIATED EMISSIONS ABOVE 18GHZ

Figure 3

Test Setup for Conducted Emissions

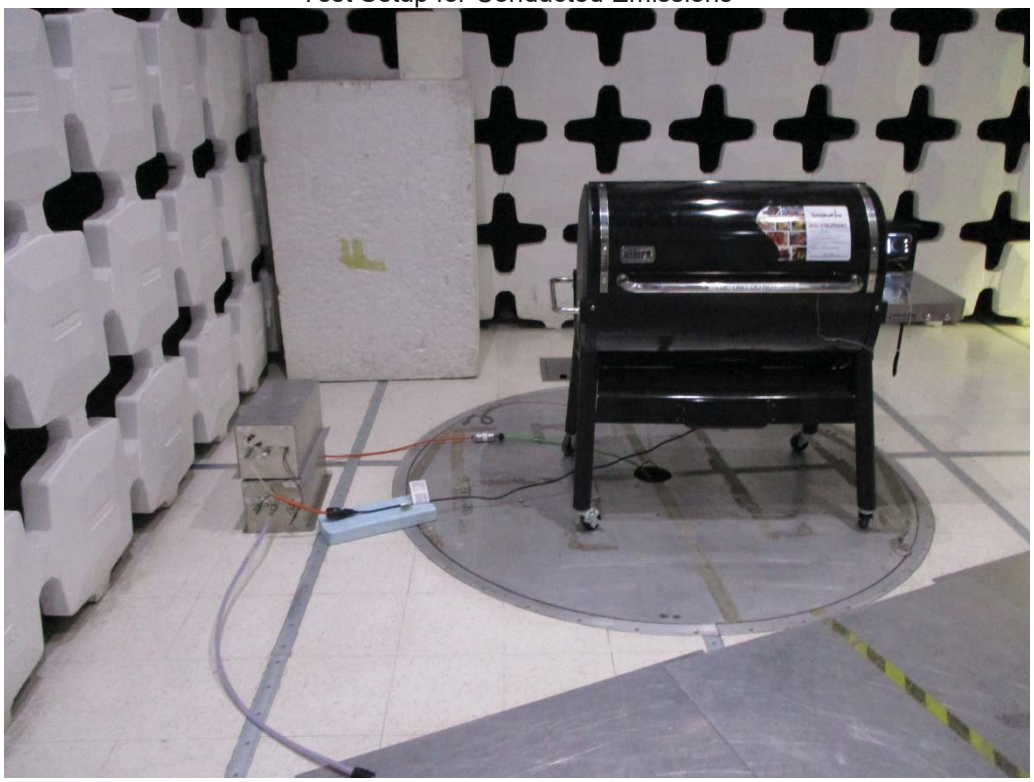
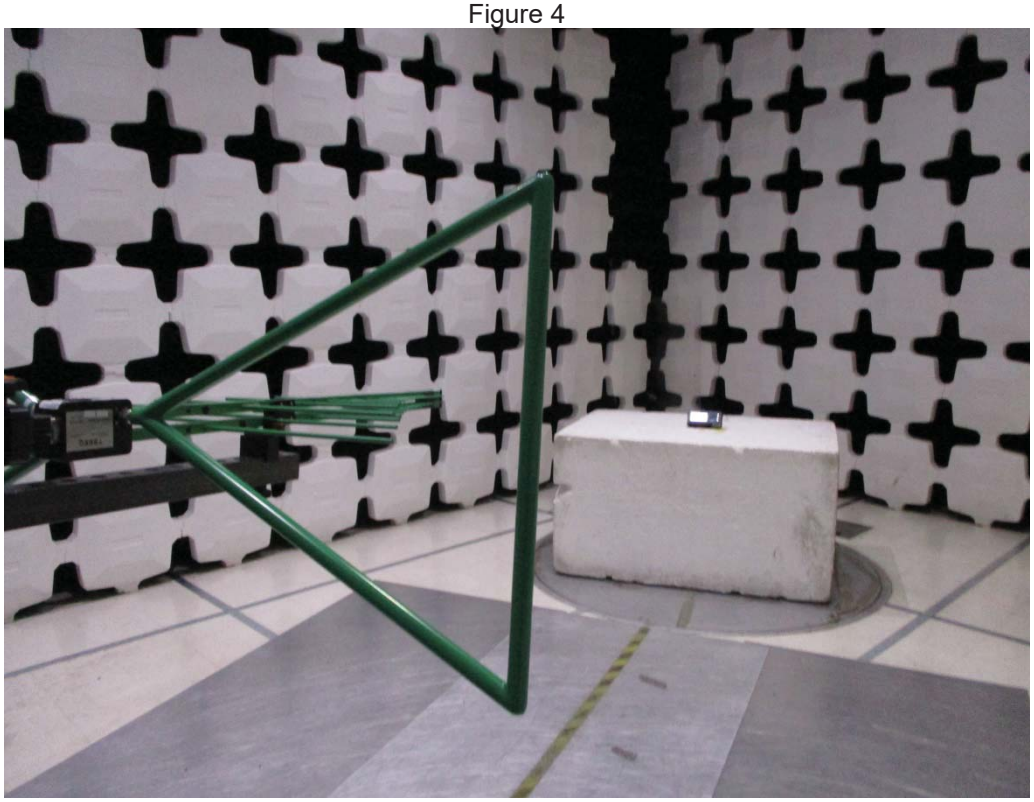
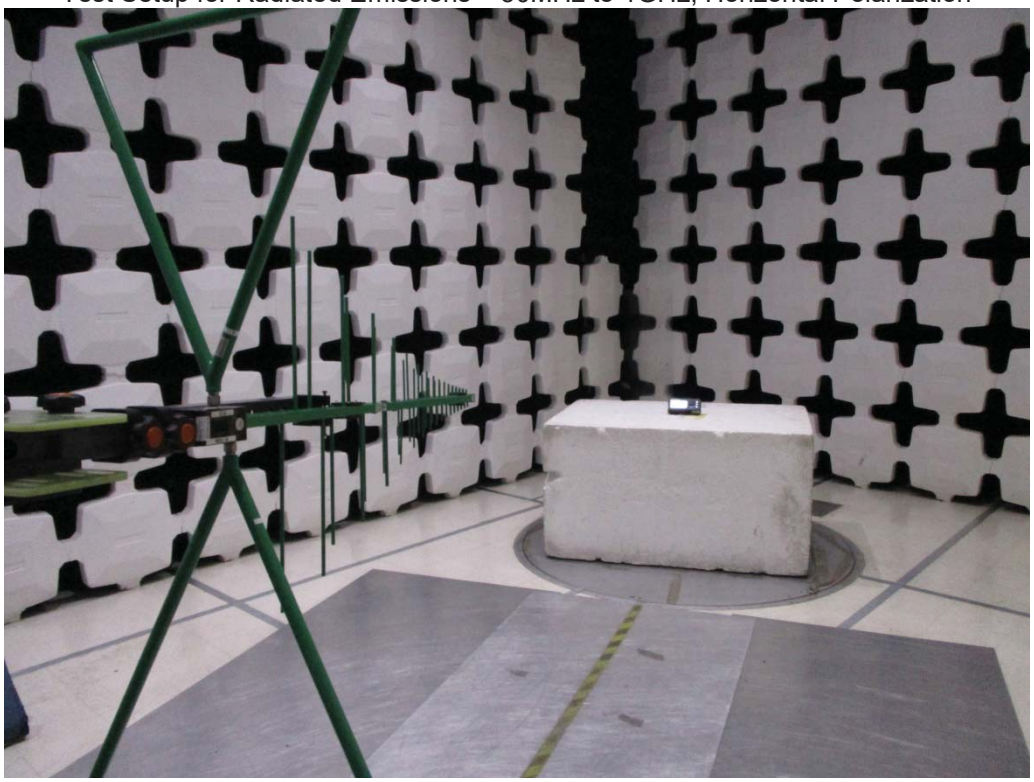


Figure 4

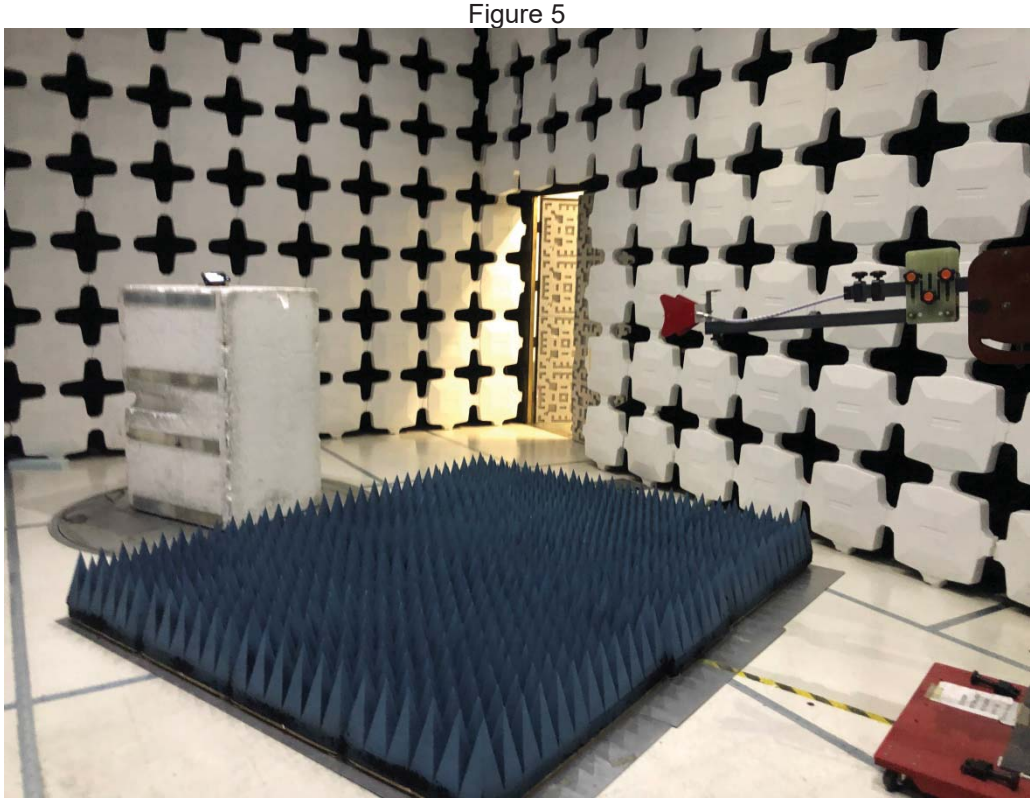


Test Setup for Radiated Emissions – 30MHz to 1GHz, Horizontal Polarization

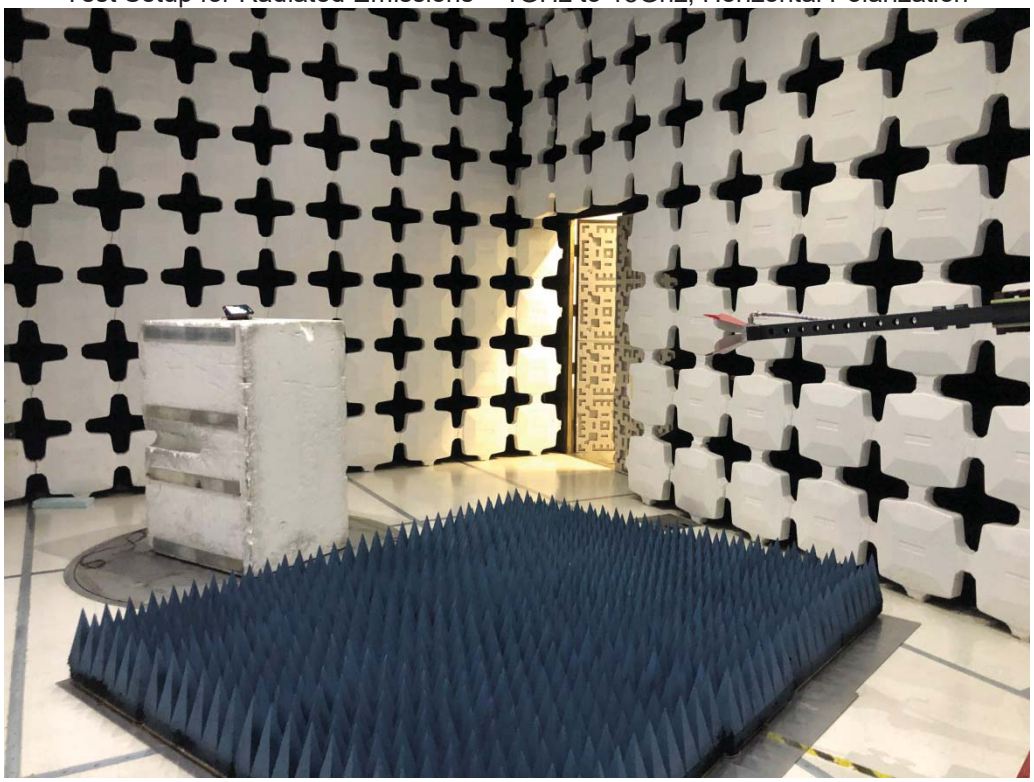


Test Setup for Radiated Emissions – 230MHz to 1GHz, Vertical Polarization

Figure 5

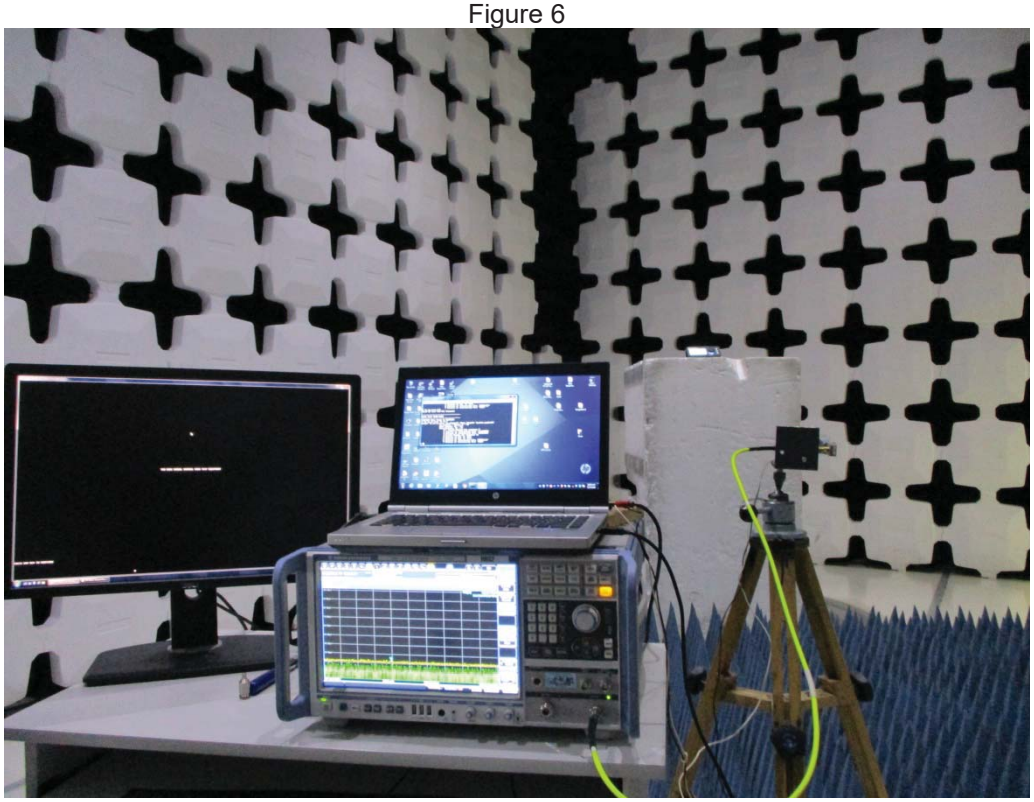


Test Setup for Radiated Emissions – 1GHz to 18Ghz, Horizontal Polarization

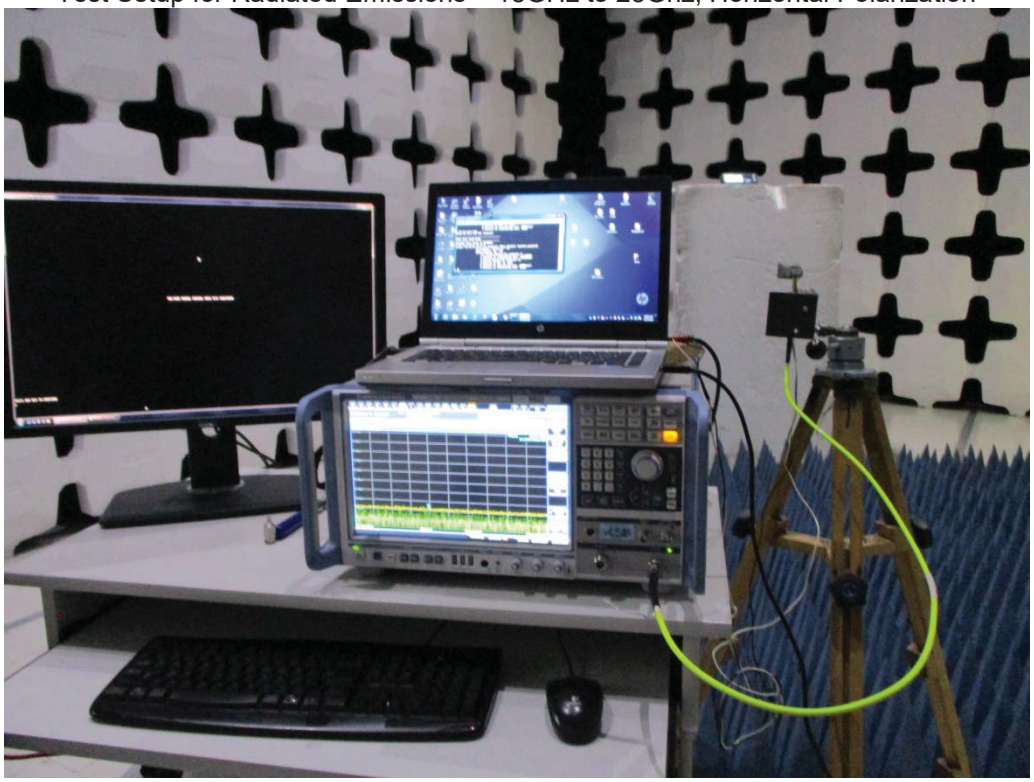


Test Setup for Radiated Emissions – 1GHz to 18Ghz, Vertical Polarization

Figure 6



Test Setup for Radiated Emissions – 18GHz to 25Ghz, Horizontal Polarization



Test Setup for Radiated Emissions – 18GHz to 25Ghz, Vertical Polarization

# FCC Part 15 Subpart B Conducted Emissions Test

## Significant Emissions Data

VBR8 05/14/2020

| | | |
|---|---|---|
| Manufacturer | : | Weber-Stephen Products LLC |
| Model | : | Falcon |
| DUT Revision | : | --- |
| Serial Number | : | NA |
| DUT Mode | : | Transmit: BLE 2402MHz |
| Line Tested | : | 120VAC, 60Hz |
| Scan Step Time [ms] | : | 30 |
| Meas. Threshold [dB] | : | -10 |
| Notes | : | Inside an EX6 |
| Test Engineer | : | J. Cardenas |
| Limit | : | FCC15.207 |
| Test Date | : | May 28, 2020 12:08:58 PM |
| Data Filter | : | Up to 80 maximum levels detected with 6 dB level excursion threshold over 10 dB margin below limit |

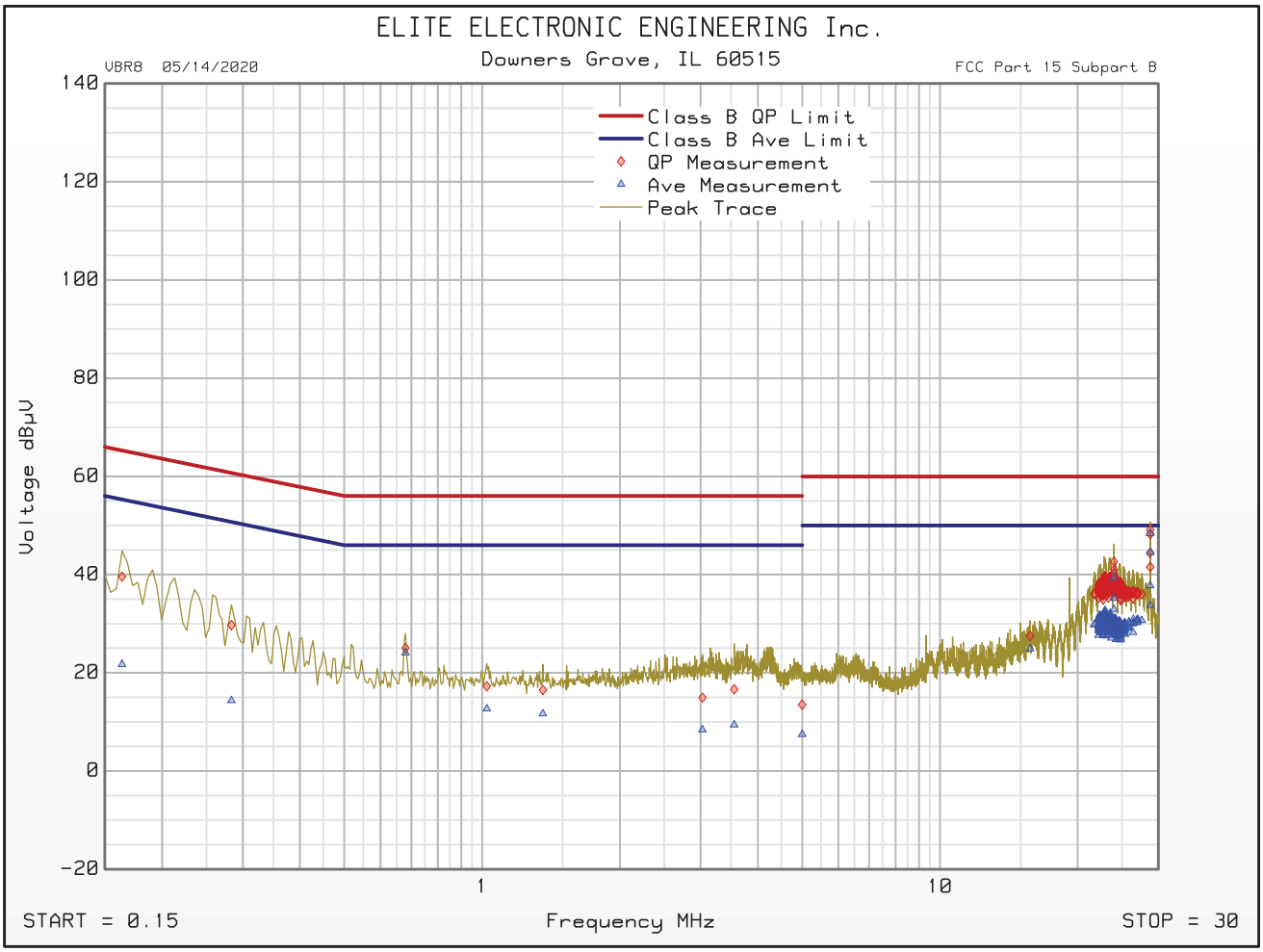
| Freq MHz | Quasi-peak Level dBµV | Quasi-peak Limit dBµV | Excessive Quasi-peak Emissions | Average Level dBµV | Average Limit dBµV | Excessive Average Emissions |
|---|---|---|---|---|---|---|
| 0.164 | 39.6 | 65.3 | | 21.7 | 55.3 | |
| 0.284 | 29.7 | 60.7 | | 14.4 | 50.7 | |
| 0.680 | 25.0 | 56.0 | | 24.1 | 46.0 | |
| 1.024 | 17.2 | 56.0 | | 12.7 | 46.0 | |
| 1.358 | 16.5 | 56.0 | | 11.7 | 46.0 | |
| 3.029 | 14.9 | 56.0 | | 8.4 | 46.0 | |
| 3.554 | 16.7 | 56.0 | | 9.4 | 46.0 | |
| 5.000 | 13.5 | 56.0 | | 7.5 | 46.0 | |
| 15.741 | 27.5 | 60.0 | | 24.9 | 50.0 | |
| 28.796 | 49.1 | 60.0 | | 48.4 | 50.0 | |

# FCC Part 15 Subpart B Conducted Emissions Test

## Cumulative Data

VBR8 05/14/2020

| | | |
|---|---|---|
| Manufacturer | : | Weber-Stephen Products LLC |
| Model | : | Falcon |
| DUT Revision | : | --- |
| Serial Number | : | NA |
| DUT Mode | : | Transmit: BLE 2402MHz |
| Line Tested | : | 120VAC, 60Hz |
| Scan Step Time [ms] | : | 30 |
| Meas. Threshold [dB] | : | -10 |
| Notes | : | Inside an EX6 |
| Test Engineer | : | J. Cardenas |
| Limit | : | Class B |
| Test Date | : | May 28, 2020 12:08:58 PM |




Emissions Meet QP Limit
Emissions Meet Ave Limit

# FCC Part 15 Subpart B Conducted Emissions Test

## Significant Emissions Data

VBR8 05/14/2020

| | | |
|---|---|---|
| Manufacturer | : | Weber-Stephen Products LLC |
| Model | : | Falcon |
| DUT Revision | : | --- |
| Serial Number | : | NA |
| DUT Mode | : | Transmit: BLE 2402MHz |
| Line Tested | : | Neutral |
| Scan Step Time [ms] | : | 30 |
| Meas. Threshold [dB] | : | -10 |
| Notes | : | Inside an EX6 |
| Test Engineer | : | J. Cardenas |
| Limit | : | Class B |
| Test Date | : | May 28, 2020 12:24:28 PM |
| Data Filter | : | Up to 80 maximum levels detected with 6 dB level excursion threshold over 10 dB margin below limit |

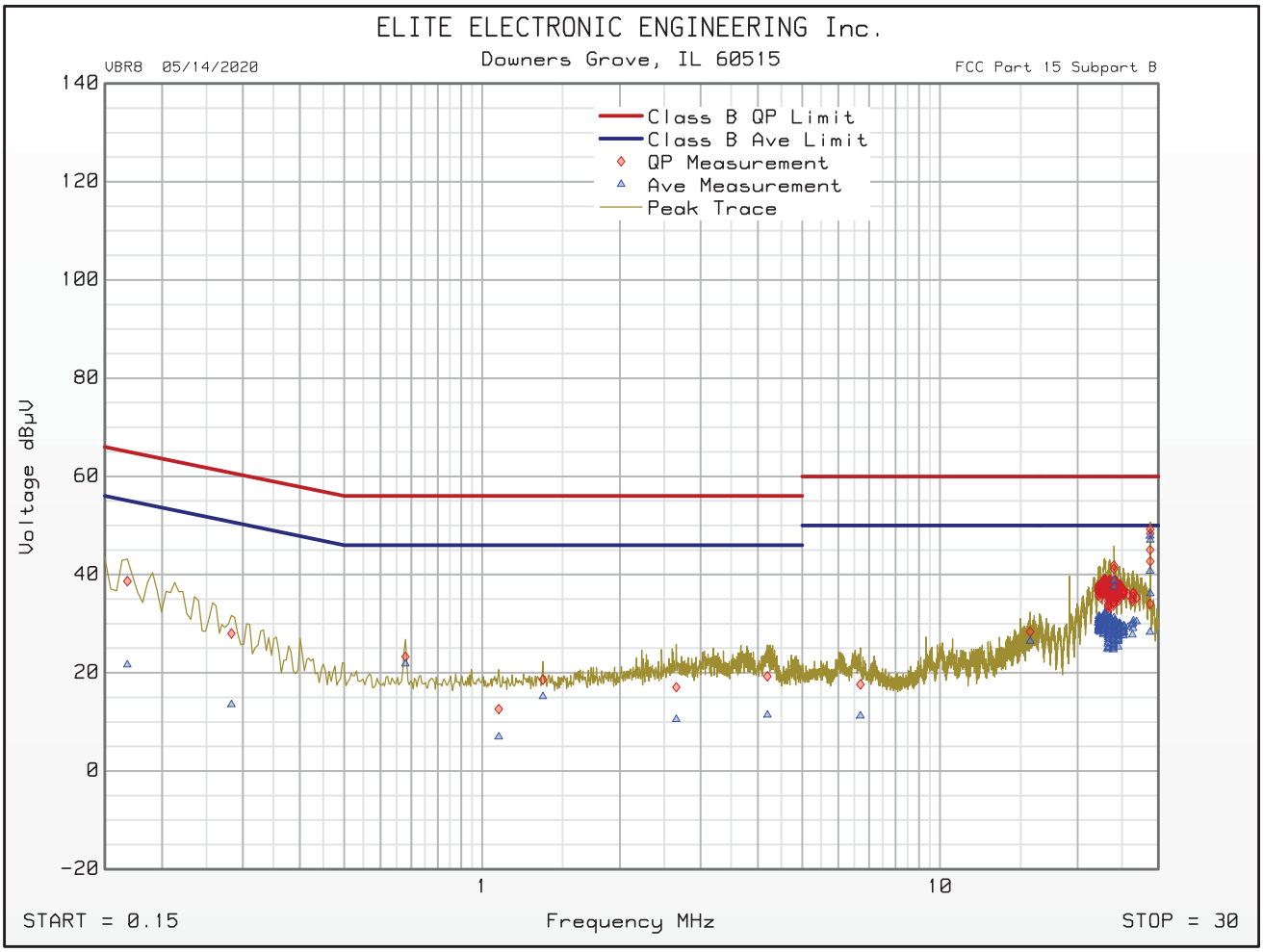
| Freq MHz | Quasi-peak Level dBµV | Quasi-peak Limit dBµV | Excessive Quasi-peak Emissions | Average Level dBµV | Average Limit dBµV | Excessive Average Emissions |
|---|---|---|---|---|---|---|
| 0.168 | 38.7 | 65.1 | | 21.6 | 55.1 | |
| 0.284 | 28.0 | 60.7 | | 13.5 | 50.7 | |
| 0.680 | 23.3 | 56.0 | | 21.8 | 46.0 | |
| 1.087 | 12.6 | 56.0 | | 7.0 | 46.0 | |
| 1.358 | 18.6 | 56.0 | | 15.2 | 46.0 | |
| 2.655 | 17.1 | 56.0 | | 10.5 | 46.0 | |
| 4.198 | 19.3 | 56.0 | | 11.4 | 46.0 | |
| 6.701 | 17.6 | 60.0 | | 11.2 | 50.0 | |
| 15.741 | 28.3 | 60.0 | | 26.5 | 50.0 | |
| 28.796 | 49.2 | 60.0 | | 47.8 | 50.0 | |

# FCC Part 15 Subpart B Conducted Emissions Test

## Cumulative Data

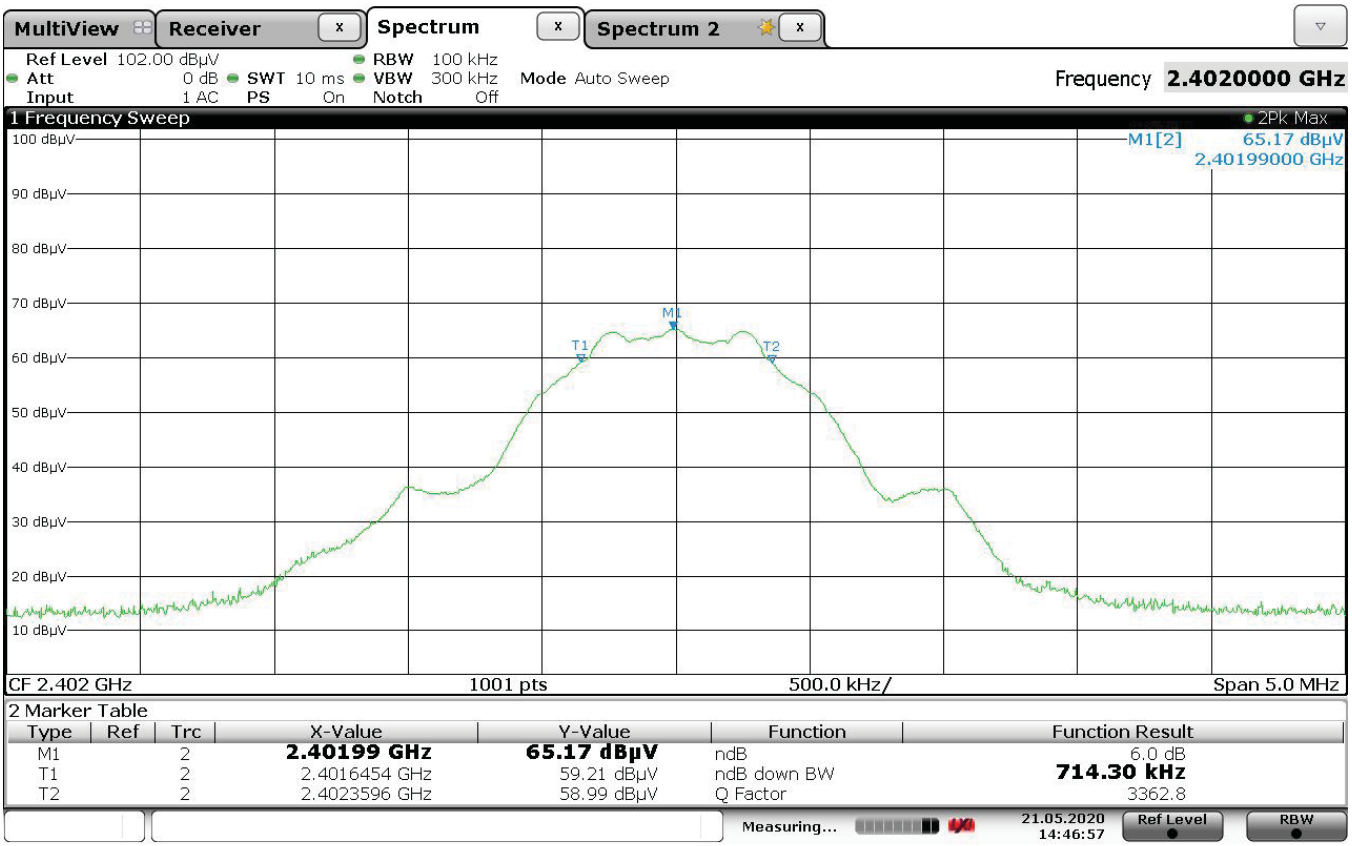
VBR8 05/14/2020

| | | |
|---|---|---|
| Manufacturer | : | Weber-Stephen Products LLC |
| Model | : | Falcon |
| DUT Revision | : | --- |
| Serial Number | : | NA |
| DUT Mode | : | Transmit: BLE 2402MHz |
| Line Tested | : | Neutral |
| Scan Step Time [ms] | : | 30 |
| Meas. Threshold [dB] | : | -10 |
| Notes | : | Inside an EX6 |
| Test Engineer | : | J. Cardenas |
| Limit | : | Class B |
| Test Date | : | May 28, 2020 12:24:28 PM |



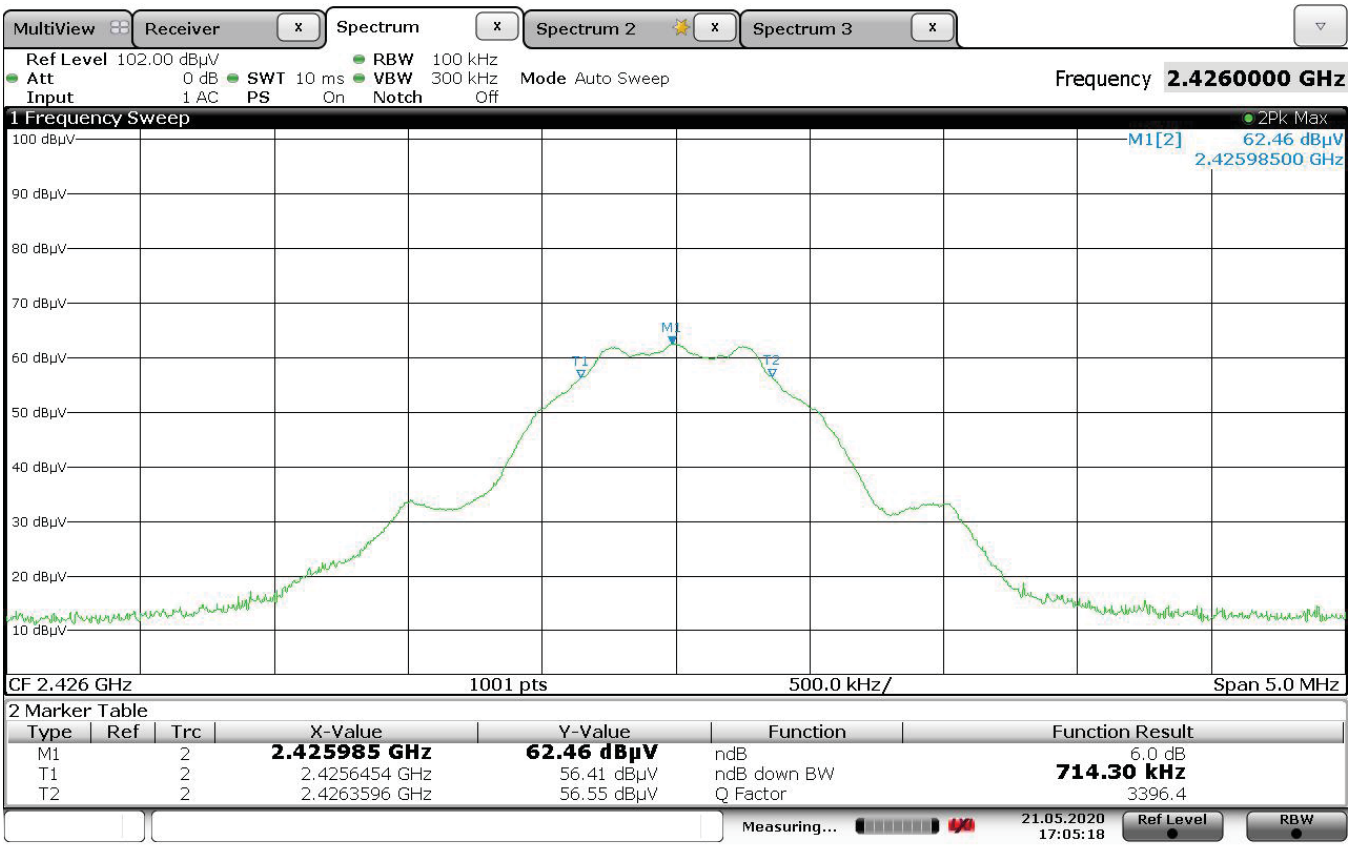

Emissions Meet QP Limit
Emissions Meet Ave Limit

| Test Details | |
|---|---|
| Manufacturer | Weber-Stephen Products LLC |
| Model | Falcon |
| S/N | NA |
| Mode | Transmit |
| Carrier Frequency | 2402MHz |
| Parameters | 6dB Bandwidth = 714.3kHz |
| Notes | |



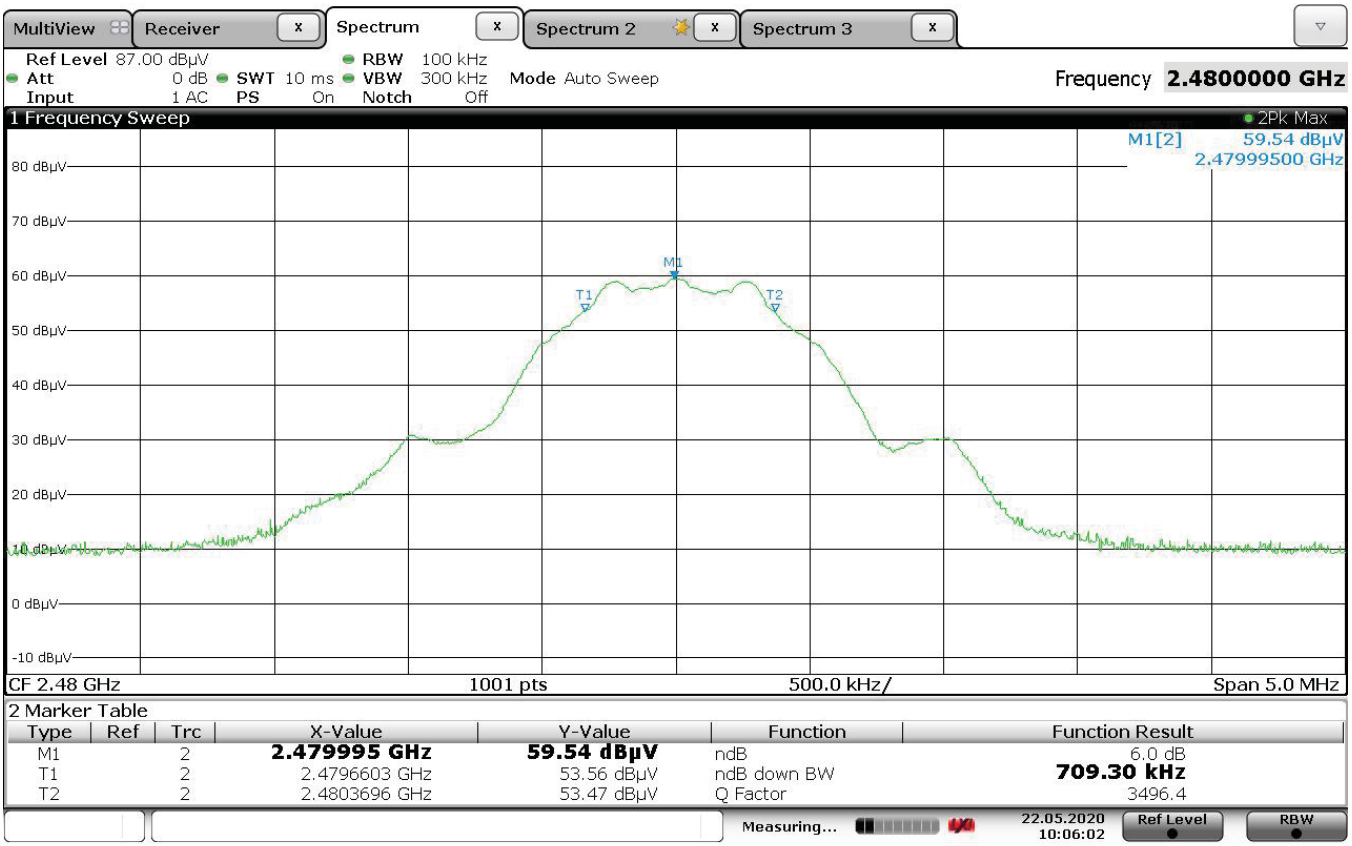

Date: 21.MAY.2020 14:46:57

| Test Details | |
|---|---|
| Manufacturer | Weber-Stephen Products LLC |
| Model | Falcon |
| S/N | NA |
| Mode | Transmit |
| Carrier Frequency | 2426MHz |
| Parameters | 6dB Bandwidth = 714.3kHz |
| Notes | |



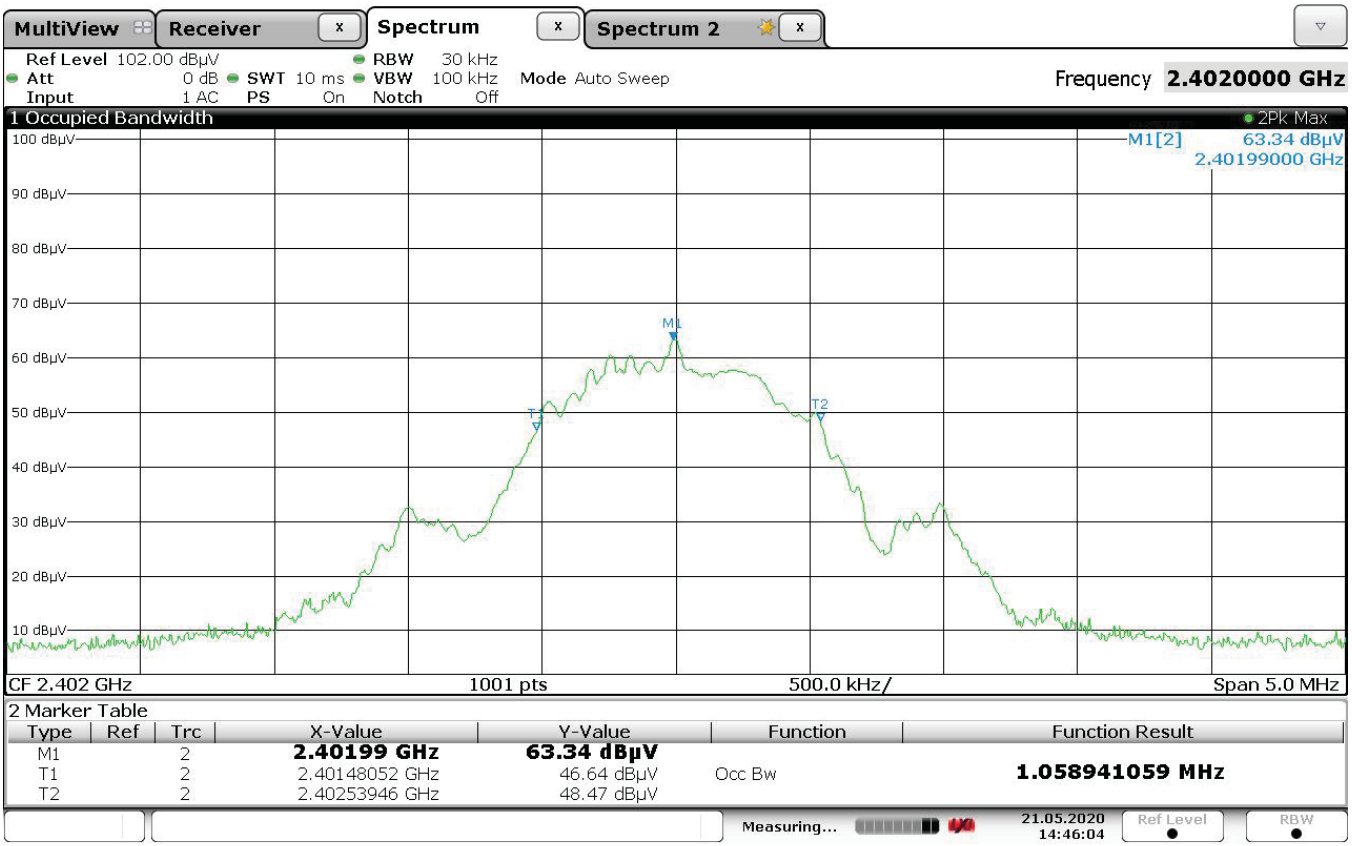

Date: 21.MAY.2020 17:05:18

| Test Details | |
|---|---|
| Manufacturer | Weber-Stephen Products LLC |
| Model | Falcon |
| S/N | NA |
| Mode | Transmit |
| Carrier Frequency | 2480MHz |
| Parameters | 6dB Bandwidth = 709.3kHz |
| Notes | |



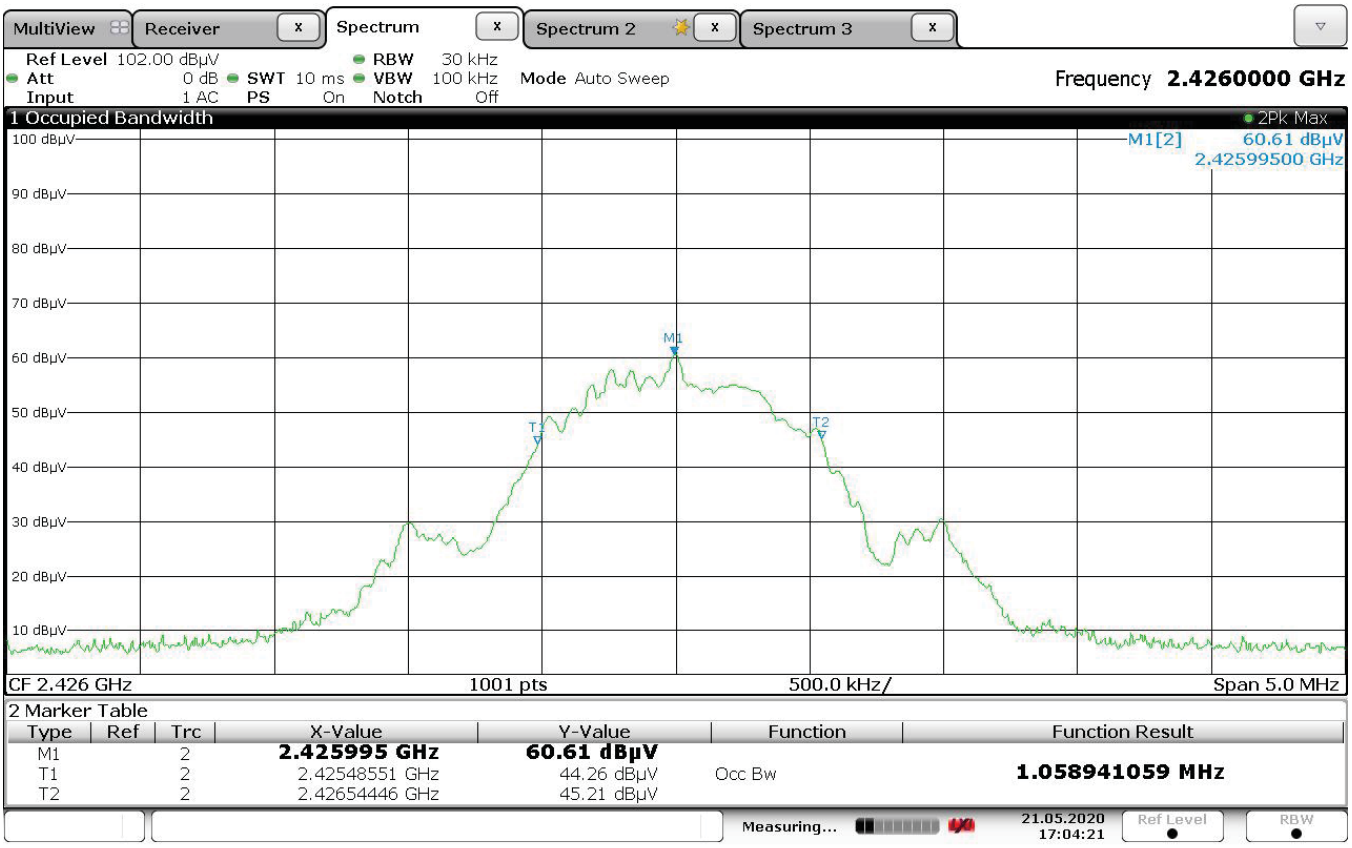

Date: 22.MAY.2020 10:06:02

| Test Details | |
|---|---|
| Manufacturer | Weber-Stephen Products LLC |
| Model | Falcon |
| S/N | NA |
| Mode | Transmit |
| Carrier Frequency | 2402MHz |
| Parameters | 99% Bandwidth = 1.059MHz |
| Notes | |




Date: 21.MAY.2020 14:46:04

| Test Details | |
|---|---|
| Manufacturer | Weber-Stephen Products LLC |
| Model | Falcon |
| S/N | NA |
| Mode | Transmit |
| Carrier Frequency | 2426MHz |
| Parameters | 99% Bandwidth = 1.059MHz |
| Notes | |

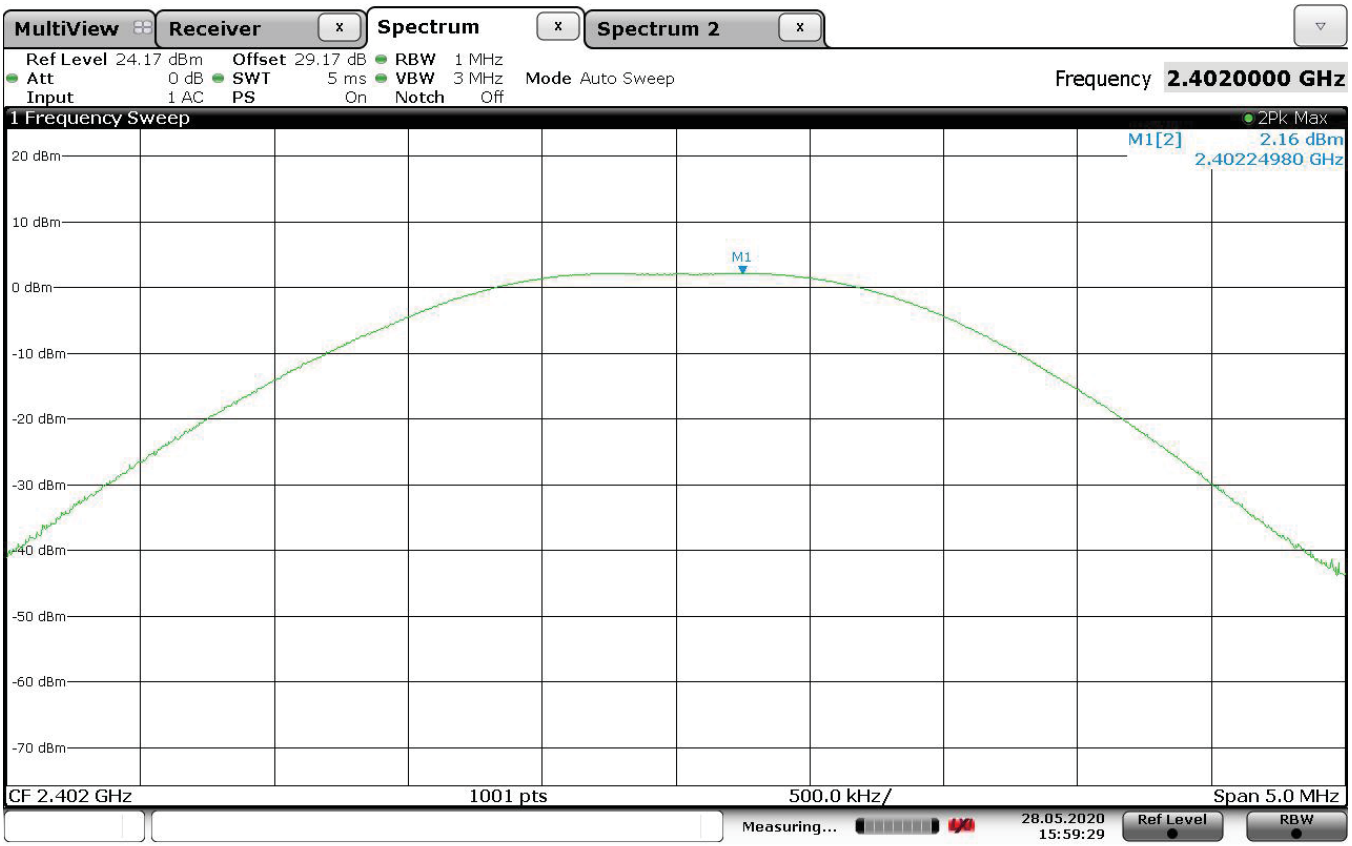



Date: 21.MAY.2020 17:04:21

| Test Details | |
|---|---|
| Manufacturer | Weber-Stephen Products LLC |
| Model | Falcon |
| S/N | NA |
| Mode | Transmit |
| Carrier Frequency | 2480MHz |
| Parameters | 99% Bandwidth = 1.059MHz |
| Notes | |

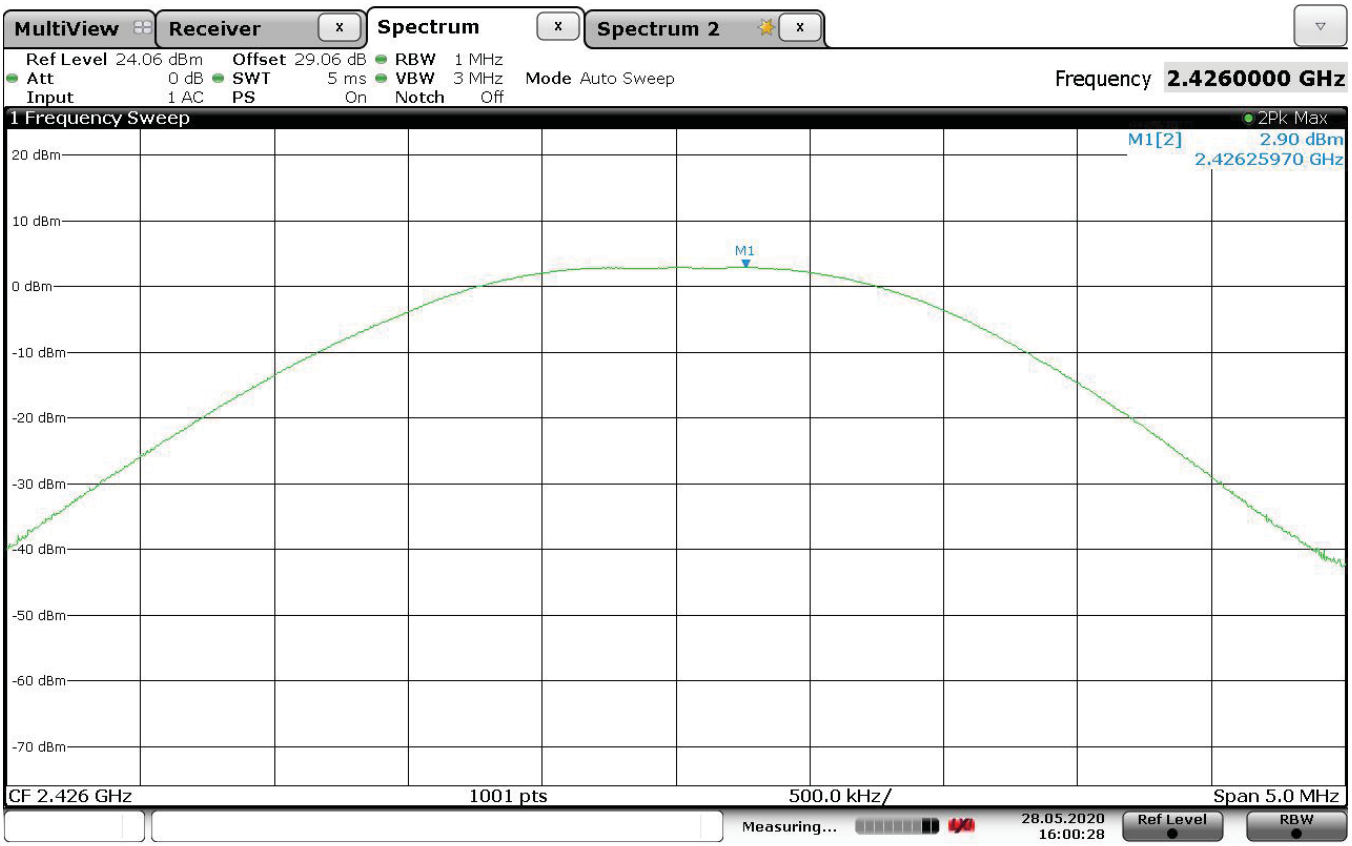

Date: 22.MAY.2020 10:05:16

| Test Details | |
|---|---|
| Manufacturer | Weber-Stephen Products LLC |
| Model | Falcon |
| S/N | NA |
| Mode | Transmit |
| Carrier Frequency | 2402MHz |
| Parameters | Peak Conducted Output Power = 2.16dBm |
| Notes | |



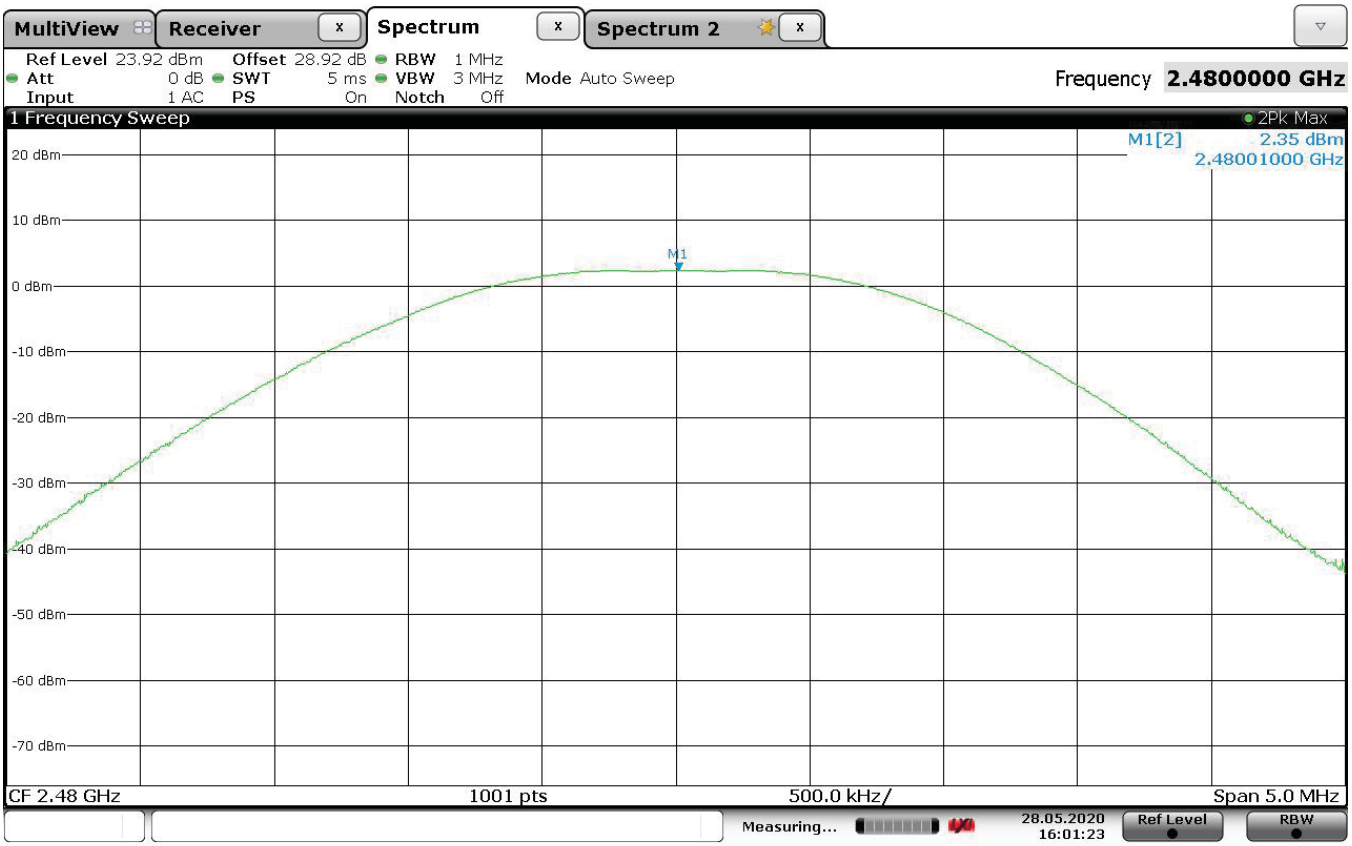

Date: 28.MAY.2020 15:59:29

| Test Details | |
|---|---|
| Manufacturer | Weber-Stephen Products LLC |
| Model | Falcon |
| S/N | NA |
| Mode | Transmit |
| Carrier Frequency | 2402MHz |
| Parameters | Peak Conducted Output Power = 2.9dBm |
| Notes | |




Date: 28.MAY.2020 16:00:27

| Test Details | |
|---|---|
| Manufacturer | Weber-Stephen Products LLC |
| Model | Falcon |
| S/N | NA |
| Mode | Transmit |
| Carrier Frequency | 2402MHz |
| Parameters | Peak Conducted Output Power = 2.35dBm |
| Notes | |




Date: 28.MAY.2020 16:01:23

| Test Details | |
|---|---|
| Manufacturer | Weber-Stephen Products LLC |
| Model | Falcon |
| S/N | NA |
| Mode | Transmit |
| Carrier Frequency | 2402MHz |
| Parameters | EIRP = 6.3dBm |
| 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 | 66.0 | 4.0 | 5.7 | 3.4 | 6.3 | 36.0 | -29.7 |
| 2402.00 | V | 63.1 | 0.8 | 5.7 | 3.4 | 3.0 | 36.0 | -33.0 |

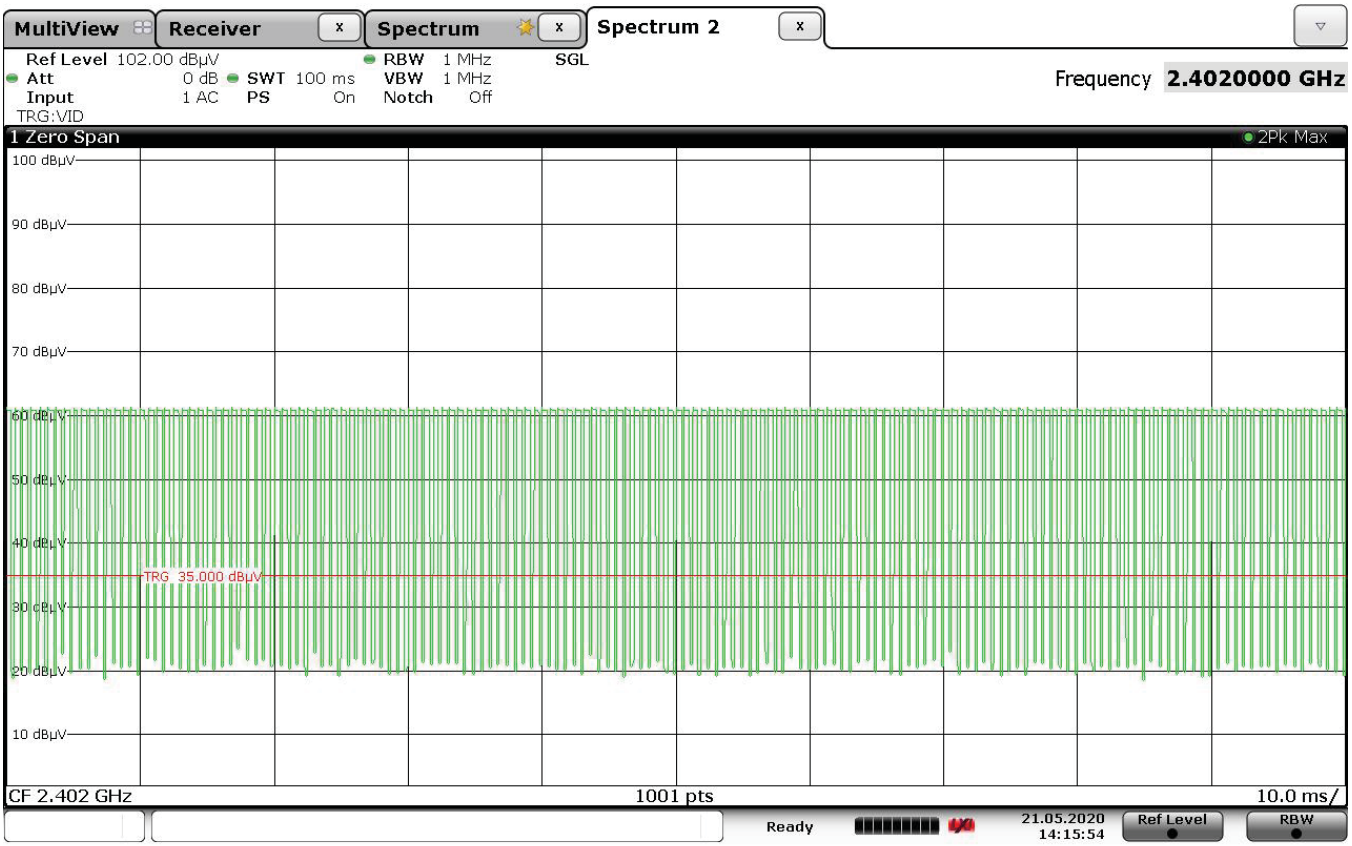
| Test Details | |
|---|---|
| Manufacturer | Weber-Stephen Products LLC |
| Model | Falcon |
| S/N | NA |
| Mode | Transmit |
| Carrier Frequency | 2426MHz |
| Parameters | EIRP = 3.2 |
| Notes | |

| 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) |
|---|---|---|---|---|---|---|---|---|
| 2426.00 | H | 63.4 | 1.0 | 5.6 | 3.5 | 3.2 | 36.0 | -32.8 |
| 2426.00 | V | 62.8 | 0.9 | 5.6 | 3.5 | 3.1 | 36.0 | -32.9 |

| Test Details | |
|---|---|
| Manufacturer | Weber-Stephen Products LLC |
| Model | Falcon |
| S/N | NA |
| Mode | Transmit |
| Carrier Frequency | 2480MHz |
| Parameters | EIRP = -0.3 |
| 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 | 60.5 | -2.4 | 5.6 | 3.5 | -0.3 | 36.0 | -36.3 |
| 2480.00 | V | 58.7 | -3.5 | 5.6 | 3.5 | -1.4 | 36.0 | -37.4 |

| Test Details | |
|---|---|
| Manufacturer | Weber-Stephen Products LLC |
| Model | Falcon |
| S/N | NA |
| Mode | Transmit |
| Carrier Frequency | 2402MHz |
| Parameters | Duty Cycle Factor = -4.1 |
| Notes | 100ms |




Date: 21.MAY.2020 14:15:54

| Test Details | |
|---|---|
| Manufacturer | Weber-Stephen Products LLC |
| Model | Falcon |
| S/N | NA |
| Mode | Transmit |
| Carrier Frequency | 2402MHz |
| Parameters | Duty Cycle Factor = -4.1 |
| Notes | 10ms |


Date: 21.MAY.2020 14:17:07

$$Duty\ Cycle\ Factor = 20 \times \log\left(\frac{160 \times 0.390ms}{100ms}\right) = -4.1$$

| Test Details | |
|---|---|
| Manufacturer | Weber-Stephen Products LLC |
| Model | Falcon |
| S/N | NA |
| Mode | Transmit |
| Carrier Frequency | 2402MHz |
| Parameters | Peak Radiated Emissions – In the Restricted Bands |
| Notes | |

| 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 | 51.9 | | 3.7 | 36.9 | -39.3 | 53.1 | 451.7 | 5000.0 | -20.9 |
| 4804.00 | V | 51.6 | | 3.7 | 36.9 | -39.3 | 52.8 | 437.4 | 5000.0 | -21.2 |
| 12010.00 | H | 50.1 | * | 6.1 | 41.7 | -39.2 | 58.8 | 869.3 | 5000.0 | -15.2 |
| 12010.00 | V | 49.8 | * | 6.1 | 41.7 | -39.2 | 58.4 | 831.1 | 5000.0 | -15.6 |
| 19216.00 | H | 42.3 | * | 2.2 | 40.4 | -28.9 | 56.0 | 632.1 | 5000.0 | -18.0 |
| 19216.00 | V | 42.5 | * | 2.2 | 40.4 | -28.9 | 56.2 | 644.6 | 5000.0 | -17.8 |

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

| Test Details | |
|---|---|
| Manufacturer | Weber-Stephen Products LLC |
| Model | Falcon |
| S/N | NA |
| Mode | Transmit |
| Carrier Frequency | 2402MHz |
| Parameters | Average Radiated Emissions – In the Restricted Bands |
| Notes | |

| 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 | 39.1 | | 3.7 | 36.9 | -39.3 | 4.1 | 44.4 | 166.1 | 500.0 | -9.6 |
| 4804.00 | V | 38.7 | | 3.7 | 36.9 | -39.3 | 4.1 | 44.0 | 159.0 | 500.0 | -10.0 |
| 12010.00 | H | 34.1 | * | 6.1 | 41.7 | -39.2 | 4.1 | 46.9 | 220.6 | 500.0 | -7.1 |
| 12010.00 | V | 34.1 | * | 6.1 | 41.7 | -39.2 | 4.1 | 46.8 | 219.9 | 500.0 | -7.1 |
| 19216.00 | H | 25.5 | * | 2.2 | 40.4 | -28.9 | 4.1 | 43.3 | 145.8 | 500.0 | -10.7 |
| 19216.00 | V | 25.4 | * | 2.2 | 40.4 | -28.9 | 4.1 | 43.2 | 144.0 | 500.0 | -10.8 |

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

| Test Details | |
|---|---|
| Manufacturer | Weber-Stephen Products LLC |
| Model | Falcon |
| S/N | NA |
| Mode | Transmit |
| Carrier Frequency | 2402MHz |
| Parameters | Peak Radiated Emissions – Not in the Restricted Bands |
| Notes | |

| 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 | 65.2 | | 2.6 | 33.6 | 0.0 | 101.4 | 118009.3 | | |
| 2402.00 | V | 62.1 | | 2.6 | 33.6 | 0.0 | 98.3 | 82683.0 | | |
| 7206.00 | H | 39.3 | | 4.6 | 38.1 | -39.4 | 42.6 | 135.1 | 11800.9 | -38.8 |
| 7206.00 | V | 39.0 | | 4.6 | 38.1 | -39.4 | 42.3 | 130.3 | 11800.9 | -39.1 |
| 9608.00 | H | 39.4 | * | 5.2 | 39.2 | -39.3 | 44.5 | 168.0 | 11800.9 | -36.9 |
| 9608.00 | V | 38.9 | * | 5.2 | 39.2 | -39.3 | 44.0 | 158.4 | 11800.9 | -37.4 |
| 14412.00 | H | 38.1 | * | 6.6 | 42.0 | -38.3 | 48.5 | 265.1 | 11800.9 | -33.0 |
| 14412.00 | V | 38.3 | * | 6.6 | 42.0 | -38.3 | 48.6 | 269.4 | 11800.9 | -32.8 |
| 16814.00 | H | 37.7 | * | 7.2 | 45.0 | -37.5 | 52.4 | 415.7 | 11800.9 | -29.1 |
| 16814.00 | V | 37.4 | * | 7.2 | 45.0 | -37.5 | 52.1 | 400.6 | 11800.9 | -29.4 |
| 21618.00 | H | 31.5 | * | 2.2 | 40.6 | -28.1 | 46.2 | 204.9 | 11800.9 | -35.2 |
| 21618.00 | V | 30.7 | * | 2.2 | 40.6 | -28.1 | 45.4 | 186.9 | 11800.9 | -36.0 |
| 24020.00 | H | 31.8 | * | 2.2 | 40.6 | -27.6 | 47.1 | 226.4 | 11800.9 | -34.3 |
| 24020.00 | V | 31.1 | * | 2.2 | 40.6 | -27.6 | 46.4 | 208.4 | 11800.9 | -35.1 |

| Test Details | |
|---|---|
| Manufacturer | Weber-Stephen Products LLC |
| Model | Falcon |
| S/N | NA |
| Mode | Transmit |
| Carrier Frequency | 2426MHz |
| Parameters | Peak Radiated Emissions – In the Restricted Bands |
| Notes | |

| 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) |
|---|---|---|---|---|---|---|---|---|---|---|
| 4852.00 | H | 53.2 | | 3.7 | 36.6 | -39.3 | 54.2 | 515.2 | 5000.0 | -19.7 |
| 4852.00 | V | 52.2 | | 3.7 | 36.6 | -39.3 | 53.2 | 458.7 | 5000.0 | -20.7 |
| 7278.00 | H | 49.5 | * | 4.7 | 38.1 | -39.4 | 52.8 | 437.1 | 5000.0 | -21.2 |
| 7278.00 | V | 48.9 | * | 4.7 | 38.1 | -39.4 | 52.3 | 411.2 | 5000.0 | -21.7 |
| 12130.00 | H | 49.2 | * | 6.1 | 41.8 | -39.1 | 58.0 | 792.8 | 5000.0 | -16.0 |
| 12130.00 | V | 49.0 | * | 6.1 | 41.8 | -39.1 | 57.8 | 775.6 | 5000.0 | -16.2 |
| 19408.00 | H | 42.0 | * | 2.2 | 40.4 | -29.1 | 55.6 | 601.7 | 5000.0 | -18.4 |
| 19408.00 | V | 41.9 | * | 2.2 | 40.4 | -29.1 | 55.4 | 592.0 | 5000.0 | -18.5 |

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

| Test Details | |
|---|---|
| Manufacturer | Weber-Stephen Products LLC |
| Model | Falcon |
| S/N | NA |
| Mode | Transmit |
| Carrier Frequency | 2426MHz |
| Parameters | Average Radiated Emissions – In the Restricted Bands |
| Notes | |

| 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) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 4852.00 | H | 39.3 | | 3.7 | 36.6 | -39.3 | 4.1 | 44.4 | 166.5 | 500.0 | -9.5 |
| 4852.00 | V | 38.9 | | 3.7 | 36.6 | -39.3 | 4.1 | 44.0 | 159.2 | 500.0 | -9.9 |
| 7278.00 | H | 33.91 | * | 4.7 | 38.1 | -39.4 | 4.1 | 41.4 | 117.0 | 500.0 | -12.6 |
| 7278.00 | V | 33.8 | * | 4.7 | 38.1 | -39.4 | 4.1 | 41.2 | 115.4 | 500.0 | -12.7 |
| 12130.00 | H | 33.9 | * | 6.1 | 41.8 | -39.1 | 4.1 | 46.7 | 217.3 | 500.0 | -7.2 |
| 12130.00 | V | 33.8 | * | 6.1 | 41.8 | -39.1 | 4.1 | 46.7 | 216.8 | 500.0 | -7.3 |
| 19408.00 | H | 25.1 | * | 2.2 | 40.4 | -29.1 | 4.1 | 42.7 | 137.2 | 500.0 | -11.2 |
| 19408.00 | V | 25.1 | * | 2.2 | 40.4 | -29.1 | 4.1 | 42.7 | 137.2 | 500.0 | -11.2 |

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

| Test Details | |
|---|---|
| Manufacturer | Weber-Stephen Products LLC |
| Model | Falcon |
| S/N | NA |
| Mode | Transmit |
| Carrier Frequency | 2426MHz |
| Parameters | Peak Radiated Emissions – Not in the Restricted Bands |
| Notes | |

| 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) |
|---|---|---|---|---|---|---|---|---|---|---|
| 2426.00 | H | 62.5 | | 2.6 | 33.6 | 0.0 | 98.7 | 86226.9 | | |
| 2426.00 | V | 62.0 | | 2.6 | 33.6 | 0.0 | 98.2 | 81122.8 | | |
| 9704.00 | H | 37.8 | * | 5.2 | 39.2 | -39.3 | 43.0 | 140.5 | 8622.7 | -35.8 |
| 9704.00 | V | 38.6 | * | 5.2 | 39.2 | -39.3 | 43.8 | 154.6 | 8622.7 | -34.9 |
| 14556.00 | H | 37.2 | * | 6.7 | 42.3 | -38.3 | 47.9 | 248.4 | 8622.7 | -30.8 |
| 14556.00 | V | 37.1 | * | 6.7 | 42.3 | -38.3 | 47.8 | 245.9 | 8622.7 | -30.9 |
| 16982.00 | H | 38.2 | * | 7.2 | 45.1 | -37.5 | 53.1 | 450.9 | 8622.7 | -25.6 |
| 16982.00 | V | 37.7 | * | 7.2 | 45.1 | -37.5 | 52.5 | 423.3 | 8622.7 | -26.2 |
| 21834.00 | H | 31.6 | * | 2.2 | 40.6 | -28.5 | 45.9 | 197.0 | 8622.7 | -32.8 |
| 21834.00 | V | 31.4 | * | 2.2 | 40.6 | -28.5 | 45.7 | 192.5 | 8622.7 | -33.0 |
| 24260.00 | H | 31.8 | * | 2.2 | 40.6 | -27.4 | 47.3 | 232.1 | 8622.7 | -31.4 |
| 24260.00 | V | 31.7 | * | 2.2 | 40.6 | -27.4 | 47.2 | 228.9 | 8622.7 | -31.5 |

| Test Details | |
|---|---|
| Manufacturer | Weber-Stephen Products LLC |
| Model | Falcon |
| S/N | NA |
| Mode | Transmit |
| Carrier Frequency | 2480MHz |
| Parameters | Peak Radiated Emissions – In the Restricted Bands |
| Notes | |

| 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 | 55.4 | | 4.9 | 37.0 | -39.3 | 58.0 | 789.8 | 5000.0 | -16.0 |
| 4960.00 | V | 54.8 | | 4.9 | 37.0 | -39.3 | 57.4 | 738.0 | 5000.0 | -16.6 |
| 7440.00 | H | 49.5 | * | 6.2 | 38.2 | -39.4 | 54.5 | 529.3 | 5000.0 | -19.5 |
| 7440.00 | V | 49.2 | * | 6.2 | 38.2 | -39.4 | 54.1 | 509.6 | 5000.0 | -19.8 |
| 12400.00 | H | 49.1 | * | 8.0 | 41.7 | -39.0 | 59.8 | 974.2 | 5000.0 | -14.2 |
| 12400.00 | V | 50.1 | * | 8.0 | 41.7 | -39.0 | 60.8 | 1102.0 | 5000.0 | -13.1 |
| 19840.00 | H | 43.0 | * | 2.2 | 40.4 | -28.4 | 57.2 | 725.9 | 5000.0 | -16.8 |
| 19840.00 | V | 42.5 | * | 2.2 | 40.4 | -28.4 | 56.8 | 690.8 | 5000.0 | -17.2 |
| 22320.00 | H | 42.4 | * | 2.2 | 40.6 | -28.6 | 56.6 | 673.2 | 5000.0 | -17.4 |
| 22320.00 | V | 42.3 | * | 2.2 | 40.6 | -28.6 | 56.5 | 666.2 | 5000.0 | -17.5 |

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

| Test Details | |
|---|---|
| Manufacturer | Weber-Stephen Products LLC |
| Model | Falcon |
| S/N | NA |
| Mode | Transmit |
| Carrier Frequency | 2480MHz |
| Parameters | Average Radiated Emissions – In the Restricted Bands |
| Notes | |

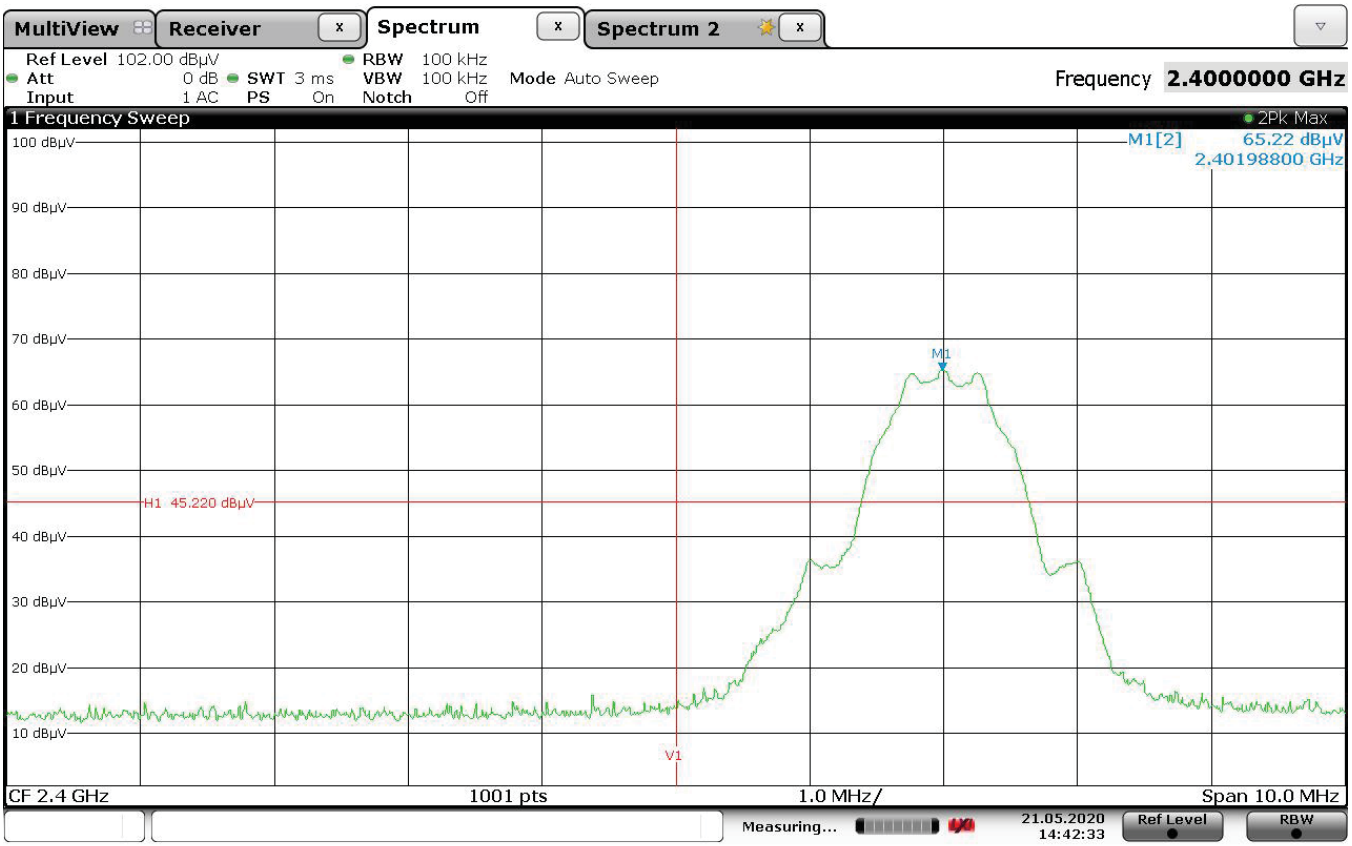
| Freq. MHz | Ant Pol | Meter Reading (dBuV) | Ambient | CBL Fac (dB) | Ant Fac (dB/m) | Pre Amp (dB) | Duty Cycle (dB) | Average Total dBuV/m at 3m | Average Total uV/m at 3 m | Average Limit uV/m at 3 m | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 4960.00 | H | 43.9 | | 3.7 | 37.0 | -39.3 | 4.1 | 49.4 | 293.9 | 500.0 | -4.6 |
| 4960.00 | V | 42.4 | | 3.7 | 37.0 | -39.3 | 4.1 | 47.9 | 247.0 | 500.0 | -6.1 |
| 7440.00 | H | 33.85 | * | 4.7 | 38.2 | -39.4 | 4.1 | 41.4 | 117.8 | 500.0 | -12.6 |
| 7440.00 | V | 33.9 | * | 4.7 | 38.2 | -39.4 | 4.1 | 41.4 | 118.2 | 500.0 | -12.5 |
| 12400.00 | H | 33.4 | * | 6.1 | 41.7 | -39.0 | 4.1 | 46.3 | 206.6 | 500.0 | -7.7 |
| 12400.00 | V | 33.7 | * | 6.1 | 41.7 | -39.0 | 4.1 | 46.6 | 212.9 | 500.0 | -7.4 |
| 19840.00 | H | 25.5 | * | 2.2 | 40.4 | -28.4 | 4.1 | 43.8 | 155.0 | 500.0 | -10.2 |
| 19840.00 | V | 25.4 | * | 2.2 | 40.4 | -28.4 | 4.1 | 43.8 | 154.7 | 500.0 | -10.2 |
| 22320.00 | H | 25.7 | * | 2.2 | 40.6 | -28.6 | 4.1 | 44.0 | 158.5 | 500.0 | -10.0 |
| 22320.00 | V | 25.8 | * | 2.2 | 40.6 | -28.6 | 4.1 | 44.1 | 159.4 | 500.0 | -9.9 |

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

| Test Details | |
|---|---|
| Manufacturer | Weber-Stephen Products LLC |
| Model | Falcon |
| S/N | NA |
| Mode | Transmit |
| Carrier Frequency | 2426MHz |
| Parameters | Peak Radiated Emissions – Not in the Restricted Bands |
| Notes | |

| 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 | 59.7 | | 2.7 | 33.6 | 0.0 | 96.0 | 63236.8 | | |
| 2480.00 | V | 57.7 | | 2.7 | 33.6 | 0.0 | 94.0 | 50346.6 | | |
| 9920.00 | H | 38.8 | * | 5.3 | 39.6 | -39.2 | 44.4 | 166.4 | 6323.7 | -31.6 |
| 9920.00 | V | 38.8 | * | 5.3 | 39.6 | -39.2 | 44.4 | 166.6 | 6323.7 | -31.6 |
| 14880.00 | H | 38.0 | * | 6.8 | 42.7 | -38.2 | 49.3 | 292.3 | 6323.7 | -26.7 |
| 14880.00 | V | 37.4 | * | 6.8 | 42.7 | -38.2 | 48.7 | 272.8 | 6323.7 | -27.3 |
| 17360.00 | H | 37.5 | * | 7.4 | 44.2 | -37.7 | 51.3 | 367.7 | 6323.7 | -24.7 |
| 17360.00 | V | 37.2 | * | 7.4 | 44.2 | -37.7 | 51.0 | 355.2 | 6323.7 | -25.0 |
| 24800.00 | H | 32.8 | * | 2.2 | 40.6 | -26.9 | 48.8 | 274.1 | 6323.7 | -27.3 |
| 24800.00 | V | 33.2 | * | 2.2 | 40.6 | -26.9 | 49.2 | 289.4 | 6323.7 | -26.8 |

| Test Details | |
|---|---|
| Manufacturer | Weber-Stephen Products LLC |
| Model | Falcon |
| S/N | NA |
| Mode | Transmit |
| Carrier Frequency | 2402MHz |
| Parameters | Band-Edge Compliance – Low Band-Edge |
| Notes | |



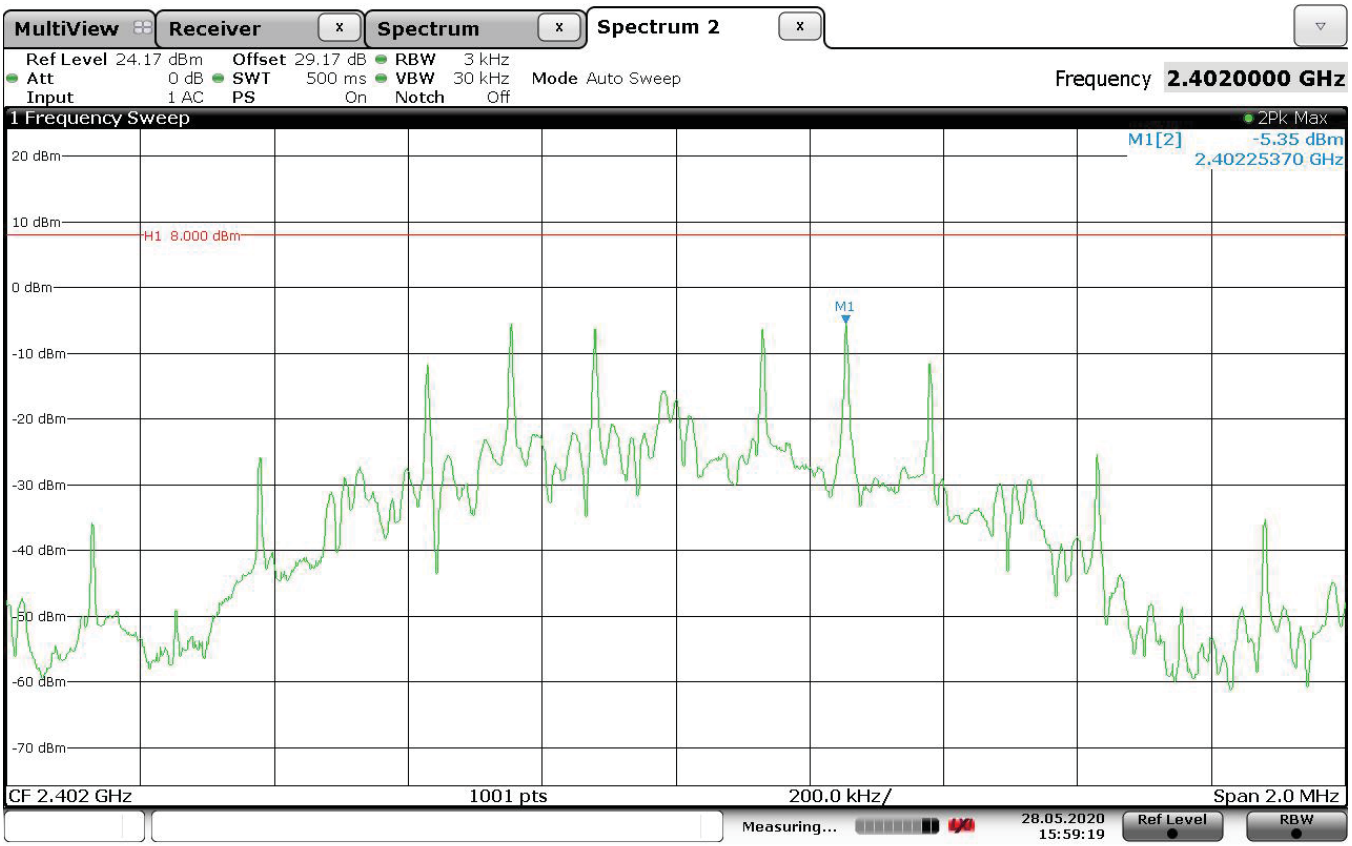

Date: 21.MAY.2020 14:42:33

| Test Details | |
|---|---|
| Manufacturer | Weber-Stephen Products LLC |
| Model | Falcon |
| S/N | NA |
| Mode | Transmit |
| Carrier Frequency | 2402MHz |
| Parameters | Band-Edge Compliance – High Band-Edge |
| Notes | |

| 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 | 26.0 | * | 2.7 | 33.6 | 0.0 | 62.3 | 1300.4 | 5000.0 | -11.7 |
| 2483.50 | V | 24.1 | * | 2.7 | 33.6 | 0.0 | 60.4 | 1044.9 | 5000.0 | -13.6 |

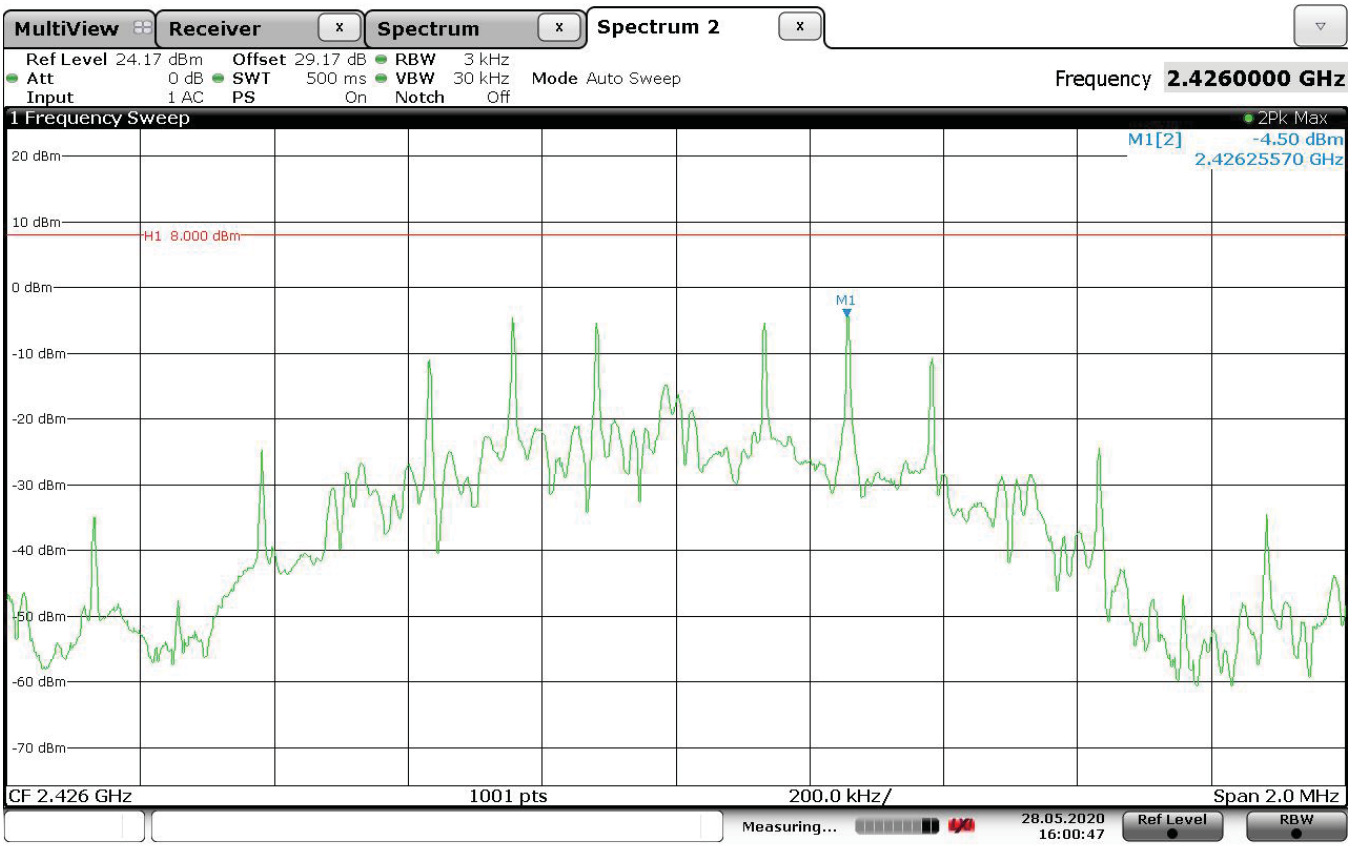
| Freq. MHz | Ant Pol | Meter Reading (dBuV) | Ambient | CBL Fac (dB) | Ant Fac (dB/m) | Pre Amp (dB) | Duty Cycle (dB) | Average Total dBuV/m at 3m | Average Total uV/m at 3 m | Average Limit uV/m at 3 m | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2483.50 | H | 7.2 | * | 2.7 | 33.6 | 0.0 | 4.1 | 47.6 | 239.6 | 500.0 | -6.4 |
| 2483.50 | V | 7.1 | * | 2.7 | 33.6 | 0.0 | 4.1 | 47.5 | 236.1 | 500.0 | -6.5 |

| Test Details | |
|---|---|
| Manufacturer | Weber-Stephen Products LLC |
| Model | Falcon |
| S/N | NA |
| Mode | Transmit |
| Carrier Frequency | 2402MHz |
| Parameters | PSD = -5.35dBm |
| Notes | |



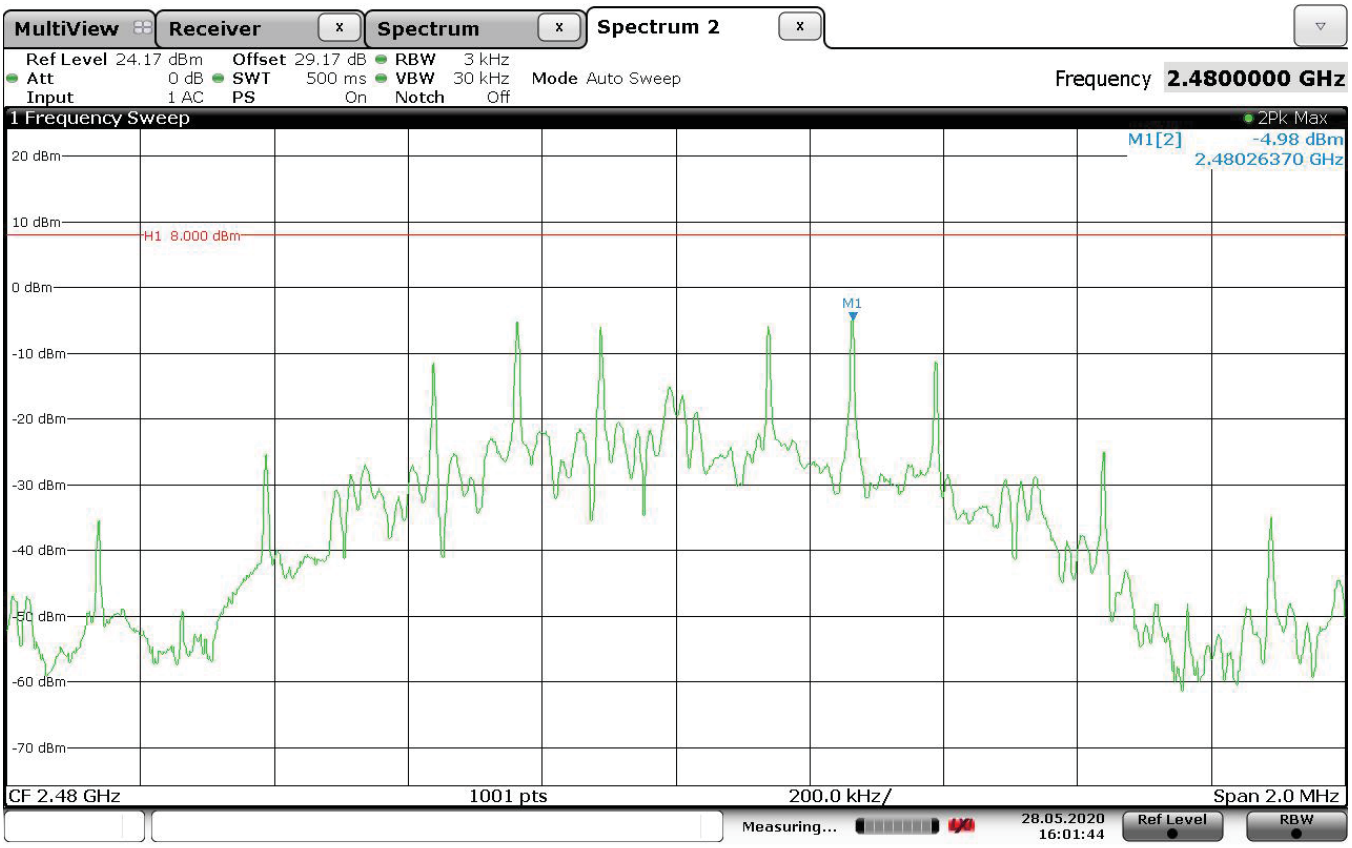

Date: 28.MAY.2020 15:59:18

| Test Details | |
|---|---|
| Manufacturer | Weber-Stephen Products LLC |
| Model | Falcon |
| S/N | NA |
| Mode | Transmit |
| Carrier Frequency | 2426MHz |
| Parameters | PSD = -4.5dBm |
| Notes | |




Date: 28.MAY.2020 16:00:47

| Test Details | |
|---|---|
| Manufacturer | Weber-Stephen Products LLC |
| Model | Falcon |
| S/N | NA |
| Mode | Transmit |
| Carrier Frequency | 2480MHz |
| Parameters | PSD = -4.98dBm |
| Notes | |




Date: 28.MAY.2020 16:01:43

Scope of Accreditation

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

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ELECTRICAL

Valid to: June 30, 2021 Certificate Number: 1786.01

In recognition of the successful completion of the A2LA Accreditation Program evaluation process, accreditation is granted to this laboratory to perform the following automotive electromagnetic compatibility and other electrical tests:

| Test Technology: | Test Method(s)[1]: |
|---|---|
| ***Transient Immunity*** | ISO 7637-2 (including emissions); ISO 7637-3;<br>ISO 16750-2:2012, Sections 4.6.3 and 4.6.4;<br>CS-11979, Section 6.4; CS.00054, Section 5.9;<br>EMC-CS-2009.1 (CI220); FMC1278 (CI220, CI221, CI222);<br>GMW 3097, Section 3.5;<br>SAE J1113-11; SAE J1113-12 |
| ***Electrostatic Discharge (ESD)*** | ISO 10605 (2001, 2008);<br>CS-11979 Section 7.0; CS.00054, Section 5.10;<br>EMC-CS-2009.1 (CI 280); FMC1278 (CI280); SAE J1113-13;<br>GMW 3097 Section 3.6 |
| ***Conducted Emissions*** | CISPR 25 (2002, 2008), Sections 6.2 and 6.3;<br>CISPR 25 (2016), Sections 6.3 and 6.4;<br>CS-11979, Section 5.1; CS.00054, Sections 5.6.1 and 5.6.2;<br>GMW 3097, Section 3.3.2;<br>EMC-CS-2009.1 (CE 420); FMC1278 (CE420, CE421) |
| ***Radiated Emissions Anechoic*** | CISPR 25 (2002, 2008), Section 6.4;<br>CISPR 25 (2016), Section 6.5;<br>CS-11979, Section 5.3; CS.00054, Section 5.6.3;<br>GMW 3097, Section 3.3.1;<br>EMC-CS-2009.1 (RE 310); FMC1278 (RE310) |
| ***Vehicle Radiated Emissions*** | CISPR 12; ICES-002 |

| Test Technology: | Test Method(s) [1]: |
|---|---|
| ***Bulk Current Injection (BCI)*** | ISO 11452-4;<br>CS-11979, Section 6.1; CS.00054, Section 5.8.1;<br>GMW 3097, Section 3.4.1;<br>SAE J1113-4;<br>EMC-CS-2009.1 (RI112); FMC1278 (RI112) |
| ***Bulk Current Injections (BCI)***<br>*(Closed Loop Method)* | ISO 11452-4; SAE J1113-4 |
| ***Radiated Immunity Anechoic***<br>*(Including Radar Pulse)* | ISO 11452-2; ISO 11452-5;<br>CS-11979, Section 6.2; CS.00054, Section 5.8.2;<br>GMW 3097, Section 3.4.2;<br>EMC-CS-2009.1 (RI114); FMC1278 (RI114); SAE J1113-21 |
| ***Radiated Immunity Magnetic Field*** | ISO 11452-8 |
| ***Radiated Immunity Reverb*** | ISO/IEC 61000-4-21;<br>GMW 3097, Section 3.4.3;<br>EMC-CS-2009.1 (RI114); FMC1278 (RI114);<br>ISO 11452-11 |
| ***Radiated Immunity***<br>*(Portable Transmitters)* | ISO 11452-9;<br>EMC-CS-2009.1 (RI115); FMC1278 (RI115) |
| ***Vehicle Radiated Immunity (ALSE)*** | ISO 11451-2 |
| ***Electrical Loads*** | ISO 16750-2, Sections 4.2, 4.3, 4.4, 4.5, 4.6, 4.7,<br>4.8, 4.9, 4.11, and 4.12 |
| ***Dielectric Withstand Voltage*** | MIL-STD-202, Method 301;<br>EIA-364-20D |
| ***Insulation Resistance*** | MIL-STD-202, Method 302;<br>SAE/USCAR-2, Revision 6, Section 5.5.1;<br>EIA-364-21D |
| ***Contact Resistance*** | MIL-STD-202, Method 307;<br>SAE/USCAR-2, Revision 6, Section 5.3.1;<br>EIA/ECA-364-23C;<br>USCAR21-3 Section 4.5.3 |
| ***DC Resistance*** | MIL-STD-202, Method 303 |
| ***Contact Chatter*** | MIL-STD-202, Method 310;<br>SAE/USCAR-2, Revision 6, Section 5.1.9 |
| ***Voltage Drop*** | SAE/USCAR-2, Revision 6, Section 5.3.2;<br>USCAR21-3 Section 4.5.6 |

| Test Technology: | Test Method(s)[1]: |
|---|---|
| **Emissions** | |
| Radiated and Conducted (3m Semi-anechoic chamber, up to 40 GHz) | 47 CFR, FCC Part 15 B (using ANSI C63.4:2014); 47 CFR, FCC Part 18 (using FCC MP-5:1986); ICES-001; ICES-003; ICES-005; IEC/CISPR 11, Ed. 4.1 (2004-06); AS/NZS CISPR 11 (2004); IEC/CISPR 11 Ed 5 (2009-05) + A1 (2010); KN 11 (2008-5) with RRL Notice No. 2008-3 (May 20, 2008); CISPR 11; EN 55011; KN 11; CNS 13803 (1997, 2003); CISPR 14-1; EN 55014-1; AS/NZS CISPR 14.1; KN 14-1; IEC/CISPR 22 (1997); EN 55022 (1998) + A1(2000); EN 55022 (1998) + A1(2000) + A2(2003); EN 55022 (2006); IEC/CISPR 22 (2008-09); AS/NZS CISPR 22 (2004); AS/NZS CISPR 22, 3rd Edition (2006); KN 22 (up to 6 GHz); CNS 13438 (up to 6 GHz); VCCI V-3 (up to 6 GHz); CISPR 32; EN 55032; KN 32 |
| Current Harmonics | IEC 61000-3-2; EN 61000-3-2; KN 61000-3-2 |
| Flicker and Fluctuations | IEC 61000-3-3; EN 61000-3-3; KN 61000-3-3 |
| **Immunity** | |
| Electrostatic Discharge | IEC 61000-4-2, Ed. 1.2 (2001); IEC 61000-4-2 (1995) + A1(1998) + A2(2000); EN 61000-4-2 (1995); EN 61000-4-2 (2009-05); KN 61000-4-2 (2008-5); RRL Notice No. 2008-4 (May 20, 2008); IEC 61000-4-2; EN 61000-4-2; KN 61000-4-2; IEEE C37.90.3 2001 |
| Radiated Immunity | IEC 61000-4-3 (1995) + A1(1998) + A2(2000); IEC 61000-4-3, Ed. 3.0 (2006-02); IEC 61000-4-3, Ed. 3.2 (2010); KN 61000-4-3 (2008-5); RRL Notice No. 2008-4 (May 20, 2008); IEC 61000-4-3; EN 61000-4-3; KN 61000-4-3; IEEE C37.90.2 2004 |
| Electrical Fast Transient/Burst | IEC 61000-4-4, Ed. 2.0 (2004-07); IEC 61000-4-4, Ed. 2.1 (2011); IEC 61000-4-4 (1995) + A1(2000) + A2(2001); KN 61000-4-4 (2008-5); RRL Notice No. 2008-5 (May 20, 2008); IEC 61000-4-4; EN 61000-4-4; KN 61000-4-4 |
| Surge | IEC 61000-4-5 (1995) + A1(2000); IEC 61000-4-5, Ed 1.1 (2005-11); EN 61000-4-5 (1995) + A1(2001); KN 61000-4-5 (2008-5); RRL Notice No. 2008-4 (May 20, 2008); IEC 61000-4-5; EN 61000-4-5; KN 61000-4-5; IEEE C37.90.1 2012 |

| Test Technology: | Test Method(s)[1]: |
|---|---|
| **Immunity (cont'd)** | |
| Conducted Immunity | IEC 61000-4-6 (1996) + A1(2000);<br>IEC 61000-4-6, Ed 2.0 (2006-05);<br>IEC 61000-4-6 Ed. 3.0 (2008);<br>KN 61000-4-6 (2008-5); RRL Notice No. 2008-4 (May 20, 2008);<br>EN 61000-4-6 (1996) + A1(2001); IEC 61000-4-6; EN 61000-4-6;<br>KN 61000-4-6 |
| Power Frequency Magnetic Field Immunity | IEC 61000-4-8 (1993) + A1(2000); IEC 61000-4-8 (2009);<br>EN 61000-4-8 (1994) + A1(2000);<br>KN 61000-4-8 (2008-5); RRL Notice No. 2008-4 (May 20, 2008);<br>IEC 61000-4-8; EN 61000-4-8; KN 61000-4-8 |
| Voltage Dips, Short Interrupts, and Line Voltage Variations | IEC 61000-4-11, Ed. 2 (2004-03);<br>KN 61000-4-11 (2008-5);<br>RRL Notice No. 2008-4 (May 20, 2008);<br>IEC 61000-4-11; EN 61000-4-11; KN 61000-4-11 |
| Ring Wave | IEC 61000-4-12, Ed. 2 (2006-09);<br>EN 61000-4-12:2006;<br>IEC 61000-4-12; EN 61000-4-12; KN 61000-4-12 |
| Generic and Product Specific EMC Standards | IEC/EN 61000-6-1; AS/NZS 61000-6-1; KN 61000-6-1;<br>IEC/EN 61000-6-2; AS/NZS 61000-6-2; KN 61000-6-2;<br>IEC/EN 61000-6-3; AS/NZS 61000-6-3; KN 61000-6-3;<br>IEC/EN 61000-6-4; AS/NZS 61000-6-4; KN 61000-6-4;<br>EN 50130-4; IEC 61326-1;<br>IEC/CISPR 14-2; EN 55014-2; AS/NZS CISPR 14.2; KN 14-2;<br>IEC/CISPR 24; AS/NZS CISPR 24; EN 55024; KN 24;<br>IEC 60601-1-2; JIS T0601-1-2 |
| ***TxRx EMC Requirements*** | EN 301 489-1; EN 301 489-3; EN 301 489-9; EN 301 489-17;<br>EN 301 489-19; EN 301 489-52; |
| ***European Radio Test Standards*** | ETSI EN 300 086-1; ETSI EN 300 086-2;<br>ETSI EN 300 113-1; ETSI EN 300 113-2;<br>ETSI EN 300 220-1; ETSI EN 300 220-2;<br>ETSI EN 300 330-1; ETSI EN 300 330-2;<br>ETSI EN 300 440-1; ETSI EN 300 440-2;<br>ETSI EN 300 422-1; ETSI EN 300 422-2;<br>ETSI EN 300 328; ETSI EN 301 893;<br>ETSI EN 301 511; ETSI EN 301 908-1;<br>ETSI EN 908-2; ETSI EN 908-13;<br>ETSI EN 301 413;<br>ETSI EN 302 502 |

| Test Technology: | Test Method(s)[1]: |
|---|---|
| ***Canadian Radio Tests*** | RSS-102 (RF Exposure Evaluation only); RSS-111; RSS-112; RSS-117; RSS-119; RSS-123; RSS-125; RSS-127; RSS-130; RSS-131; RSS-132; RSS-133; RSS-134; RSS-135; RSS-137; RSS-139; RSS-140; RSS-141; RSS-142; RSS-170; RSS-181; RSS-182; RSS-191; RSS-192; RSS-194; RSS-195; RSS-196; RSS-197; RSS-199; RSS-210; RSS-211; RSS-213; RSS-215; RSS-216; RSS-220; RSS-222; RSS-236; RSS-238; RSS-243; RSS-244; RSS-246; RSS-247; RSS-251; RSS-252; RSS-287; RSS-288; RSS-310; RSS-GEN |
| ***Mexico Radio Tests*** | IFT-008; NOM-208-SCFI |
| ***Japan Radio Tests*** | Radio Law No. 131, Ordinance of MPT No. 37, 1981, MIC Notification No. 88:2004, Table No. 22-11; ARIB STD-T66, Regulation 18 |
| ***Taiwan Radio Tests*** | LP-0002 |
| ***Australia/New Zealand Radio Tests*** | AS/NZS 4268; Radiocommunications (Short Range Devices) Standard (2014) |
| ***Hong Kong Radio Tests*** | HKCA 1039 Issue 6; HKCA 1042; HKCA 1033 Issue 7; HKCA 1061; HKCA 1008; HKCA 1043; HKCA 1057; HKCA 1073 |
| ***Korean Radio Test Standards*** | KN 301 489-1; KN 301 489-3; KN 301 489-9; KN 301 489-17; KN 301 489-52 |
| ***Unlicensed Radio Frequency Devices*** *(3 Meter Semi-Anechoic Room)* | 47 CFR FCC Part 15C, 15D, 15E, 15F, 15G, 15H (using ANSI C63.10:2013, ANSI C63.17:2013 and FCC KDB 905462 D02 (v02)) |
| ***Licensed Radio Service Equipment*** | 47 CFR FCC Parts 20, 22, 24, 25, 27, 30, 73, 74, 80, 87, 90, 95, 96, 97, 101; ANSI/TIA-603-E; TIA-102.CAAA-E; ANSI C63.26:2015; |
| ***OTA (Over the Air) Performance*** GSM, GPRS, EGPRS UMTS (W-CDMA) LTE including CAT M1 A-GPS for UMTS/GSM LTS A-GPS, A-GLONASS, SIB8/SIB16 Large Device/Laptop/Tablet Testing Integrated Device Testing WiFi 802.11 a/b/g/n/ac | CTIA Test Plan for Wireless Device Over-the-Air Performance (Method for Measurement for Radiated Power and Receiver Performance) V3.8.2; CTIA Test Plan for RF Performance Evaluation of WiFi Mobile Converged Devices V2.1.0 |

| Test Technology: | Test Method(s)[1]: |
|---|---|
| ***Electrical Measurements and Simulation*** | |
| AC Voltage / Current | FAA AC 150/5345-10H |
| (1mV to 5kV) 60 Hz | FAA AC 150/5345-43J |
| (0.1V to 250V) up to 500 MHz | FAA AC 150/5345-44K |
| (1µA to 150A) 60 Hz | FAA AC 150/5345-46E |
| DC Voltage / Current | FAA AC 150/5345-47C |
| (1mV to 15 kV) / (1µA to 10A) | FAA EB 67D |
| Power Factor / Efficiency / Crest Factor | |
| (Power to 30kW) | |
| Resistance | |
| (1mΩ to 4000MΩ) | |
| Surge | |
| (Up to 10 kV / 5 kA) (Combination Wave and Ring Wave) | |

On the following products and materials:
Telecommunications Terminal Equipment (TTE), Radio Equipment, Network Equipment, Information Technology Equipment (ITE), Automotive Electronic Equipment, Automotive Hybrid Electronic Devices, Maritime Navigation and Radio Communication Equipment and Systems, Vehicles, Boats and Internal Combustion Engine Driven Devices, Automotive, Aviation, and General Lighting Products, Medical Electrical Equipment, Motors, Industrial, Scientific and Medical (ISM) Radio-Frequency Equipment, Household Appliances, Electric Tools, Low-voltage Switchgear and Control gear, Programmable Controllers, Electrical Equipment for Measurement, Control and Laboratory Use, Base Materials, Power and Data Transmission Cables and Connectors

[1] When the date, revision or edition of a test method standard is not identified on the scope of accreditation, the laboratory is expected to be using the current version within one year of the date of publication, per part C., Section 1 of A2LA *R101 - General Requirements - Accreditation of ISO-IEC 17025 Laboratories*.

Testing Activities Performed in Support of FCC Declaration of Conformity and Certification in Accordance with 47 Code of Federal Regulations and FCC KDB 974614, Appendix A, Table A.1[2]

| Rule Subpart/Technology | Test Method | Maximum Frequency (MHz) |
|---|---|---|
| Unintentional Radiators | | |
| Part 15B | ANSI C63.4:2014 | 40000 |
| Industrial, Scientific, and Medical Equipment | | |
| Part 18 | FCC MP-5 (February 1986) | 40000 |
| Intentional Radiators | | |
| Part 15C | ANSI C63.10:2013 | 40000 |
| Unlicensed Personal Communication Systems Devices | | |
| Part 15D | ANSI C63.17:2013 | 40000 |

Testing Activities Performed in Support of FCC Declaration of Conformity and Certification in Accordance with 47 Code of Federal Regulations and FCC KDB 974614, Appendix A, Table A.1[2]

| Rule Subpart/Technology | Test Method | Maximum Frequency (MHz) |
|---|---|---|
| U-NII without DFS Intentional Radiators<br>Part 15E | ANSI C63.10:2013 | 40000 |
| U-NII with DFS Intentional Radiators<br>Part 15E | FCC KDB 905462 D02 (v02) | 40000 |
| UWB Intentional Radiators<br>Part 15F | ANSI C63.10:2013 | 40000 |
| BPL Intentional Radiators<br>Part 15G | ANSI C63.10:2013 | 40000 |
| White Space Device Intentional Radiators<br>Part 15H | ANSI C63.10:2013 | 40000 |
| Commercial Mobile Services (FCC Licensed Radio Service Equipment)<br>Parts 22 (cellular), 24, 25 (below 3 GHz), and 27 | ANSI/TIA-603-E; TIA-102.CAAA-E; ANSI C63.26:2015 | 40000 |
| General Mobile Radio Services (FCC Licensed Radio Service Equipment)<br>Parts 22 (non-cellular), 90 (below 3 GHz), 95, 97, and 101 (below 3 GHz) | ANSI/TIA-603-E; TIA-102.CAAA-E; ANSI C63.26:2015 | 40000 |
| Citizens Broadband Radio Services (FCC Licensed Radio Service Equipment)<br>Part 96 | ANSI/TIA-603-E; TIA-102.CAAA-E; ANSI C63.26:2015 | 40000 |
| Maritime and Aviation Radio Services<br>Parts 80 and 87 | ANSI/TIA-603-E; ANSI C63.26:2015 | 40000 |
| Microwave and Millimeter Bands Radio Services<br>Parts 25, 30, 74, 90 (above 3 GHz), 97 (above 3 GHz), and 101 | ANSI/TIA-603-E; TIA-102.CAAA-E; ANSI C63.26:2015 | 40000 |
| Broadcast Radio Services<br>Parts 73 and 74 (below 3 GHz) | ANSI/TIA-603-E; TIA-102.CAAA-E; ANSI C63.26:2015 | 40000 |

Testing Activities Performed in Support of FCC Declaration of Conformity and Certification in Accordance with 47 Code of Federal Regulations and FCC KDB 974614, Appendix A, Table A.1[2]

| Rule Subpart/Technology | Test Method | Maximum Frequency (MHz) |
|---|---|---|
| Signal Boosters<br>Part 20 (Wideband Consumer Signal Boosters, Provider-specific signal boosters, and Industrial Signal Boosters)<br>Section 90.219 | ANSI C63.26:2015 | 40000 |

[2]Accreditation does not imply acceptance to the FCC equipment authorization program. Please see the FCC website (https://apps.fcc.gov/oetcf/eas/) for a listing of FCC approved laboratories.

# Accredited Laboratory

A2LA has accredited

## ELITE ELECTRONIC ENGINEERING INC.

*Downers Grove, IL*

for technical competence in the field of

## Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated April 2017*).

Presented this 8th day of August 2019.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 1786.01
Valid to June 30, 2021

*For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.*