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# *EMC Test Report*

## *Application for Grant of Equipment Authorization*

## *FCC Part 15 Subpart B*

## *Model: FareGate*

| | |
|---|---|
| FCC ID: | 2AXRQWFAG |
| APPLICANT: | STraffic America, LLC<br>1593 Springhill Road, Suite 125<br>Vienna, VA 22182, USA |
| TEST SITE(S): | National Technical Systems<br>41039 Boyce Road<br>Fremont, CA. 94538-2435 |
| PROJECT NUMBER: | PR124988-00 |
| REPORT DATE: | January 7, 2021 |
| FINAL TEST DATES: | October 15 and November 16, 2020 |
| TOTAL NUMBER OF PAGES: | 45 |

ACCREDITED
Testing Cert #0214.26

## *VALIDATING SIGNATORIES*

PROGRAM MGR

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TECHNICAL REVIEWER:

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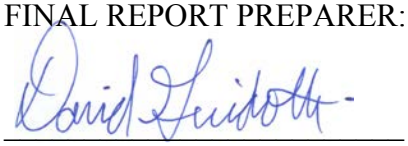

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## *REVISION HISTORY*

| Rev# | Date | Comments | Modified By |
|---|---|---|---|
| - | January 7, 2021 | Initial release | |

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## SCOPE

Governments and standards organizations around the world have published requirements regarding the electromagnetic compatibility (EMC) of electronic equipment. Testing has been performed on the STraffic America, LLC model FareGate, pursuant to the following standards.

| Standard | Title | Standard Date |
|---|---|---|
| FCC Part 15, Subpart B | Radio Frequency Devices | October 2019 as Amended |

All measurements and evaluations have been in accordance with these specifications, test procedures, and measurement guidelines as outlined in National Technical Systems test procedures, and in accordance with the standards referenced therein (refer to Appendix E). National Technical Systems is accredited by the A2LA, certificate number 0214.26, to perform the test(s) listed in this report, except where noted otherwise.

Final system data was gathered in a mode that tended to maximize emissions by varying orientation of EUT, orientation of power and I/O cabling, antenna search height, and antenna polarization.

Every practical effort was made to perform an impartial test using appropriate test equipment of known calibration. All pertinent factors have been applied to reach the determination of compliance.

## OBJECTIVE

The objective of STraffic America, LLC is to verify compliance with FCC requirements for digital devices. A Certification authorization is sought by STraffic America, LLC.

Certification is a procedure where the manufacturer submits test data and technical information to a certification body and receives a certificate or grant of equipment authorization upon successful completion of the certification body's review of the submitted documents. Once the equipment authorization has been obtained, the label indicating compliance must be attached to all identical units, which are subsequently manufactured.

## STATEMENT OF COMPLIANCE

The tested sample(s) of STraffic America, LLC model FareGate complied with the requirements of:

| Standard/Regulation | Equipment Type/Class | Standard Date |
|---|---|---|
| Subpart B of Part 15 of the FCC Rules (CFR title 47) | Class A | 2019 as amended |

As specified in Section 15.101 of FCC Part 15, unintentional radiators shall be authorized prior to the initiation of marketing. Based on the description of the EUT, the following criteria per Section 15.101 of FCC Part 15 were applied to the EUT:

| **Type of device** | **Equipment authorization required** |
|---|---|
| Class A digital devices, peripherals & external switching power supplies | SDoC or Certification |

The test results recorded herein are based on a single type test of the STraffic America, LLC model FareGate and therefore apply only to the tested sample(s). The sample was selected and prepared by David Pedersen of Kiosk Information Systems, Inc.

Testing was performed only on models SA-20WBa0 and SA-20WE0d. These models were considered representative of the entire series. The models in the series are SA-20WBa0, SA-20WBb0, SA-20WRbd, SA-20WRac, SA-20HRb4, SA-20HRa3, SA-20HR2d, SA-20HR1c, SA-20WE0c, SA-20WE0d, SA-20SB10, SA-20SB20, SA-20SR24, SA-20SR13, SA-20SE03 and SA-20SE04

Maintenance of compliance is the responsibility of the company. Any modification of the product that could result in increased emissions or susceptibility should be checked to ensure compliance has been maintained (i.e., printed circuit board layout changes, different enclosure, different line filter or power supply, harnessing and/or interface cable changes, etc.).

## DEVIATIONS FROM THE STANDARDS

No deviations were made from the published requirements listed in the scope of this report.

## INFORMATION TECHNOLOGY EQUIPMENT EMISSIONS TEST RESULTS

The following emissions tests were performed on the STraffic America, LLC model FareGate. The measurements were extracted from the data recorded during testing and represent the highest-amplitude emissions relative to the specification limits. The complete test data is provided in the appendices of this report.

### CONDUCTED EMISSIONS (MAINS PORT)

| Frequency Range Operating Voltage | Standard/Section | Requirement | Measurement Margin | Status |
|---|---|---|---|---|
| 0.15-30 MHz, 120 V, 60 Hz | FCC § 15.107(a) (Class B) | 0.15-0.5 MHz: 66-56 dBµV QP 56-46 dBµV Av 0.5-5.0 MHz: 56 dBµV QP 46 dBµV Av 5.0-30.0 MHz: 60 dBµV QP 50 dBµV Av | 44.3 dBµV @ 0.49 MHz -1.8 dB | Complied |

### RADIATED EMISSIONS

| Frequency Range | Standard/Section | Requirement | Measurement Margin | Status |
|---|---|---|---|---|
| 30-1000 MHz | FCC §15.109(b) Class A | 30-88 MHz 39 dBµV/m 88-216 MHz 43.5 dBµV/m 216-960 MHz 46.4 dBµV/m 960-1000 Mhz 49.5 dBµV/m (10 m limit) | 36.2dBµV/m @ 30.02MHz -2.9 dB | Complied |
| 1-10 GHz | FCC §15.109(b) Class A | 49.5 dBµV/m Av 69.5 dBµV/m Pk (10 m limit) | 44.1 dBµV/m @ 3198.1 MHz -15.9 dB (Note 1) | Complied |
| Note 1 For testing Class A devices to FCC Part 15 Subpart B using the test methods of ANSI C63.4-2014, readings are compared to a 3-meter limit derived from the 10-meter limit using the 20*log(D1/D2) formula, i.e. adding 10.5 dB to the stated 10-meter limits of 49.5 dBµV/m (Average) and 69.5 dBµV/m (Peak). | | | | |

### MEASUREMENT UNCERTAINTIES

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below were calculated using the approach described in CISPR 16-4-2:2003 using a coverage factor of k=2, which gives a level of confidence of approximately 95%. The levels were found to be below levels of CISPR and therefore no adjustment of the data for measurement uncertainty is required.

| Measurement Type | Measurement Unit | Frequency Range | Expanded Uncertainty |
|---|---|---|---|
| Conducted Emissions | dBuV or dBuA | 150 kHz – 30 MHz | ± 2.2 dB |
| Radiated Electric Field | dBuV/m | 30-1000 MHz | ± 3.6 dB |
| | | 1000-40,000 MHz | ± 6.0 dB |

## EQUIPMENT UNDER TEST (EUT) DETAILS

### GENERAL

The STraffic America, LLC model FareGate is a retractable barrier system which is designed to allow access after fare payment. Since the EUT would normally be mounted on the floor during operation, the EUT was treated as floor-standing equipment during testing to simulate the end-user environment. An installation requires two faregates; therefore one "master" and one "slave" unit were used for the evaluation. The electrical rating of the EUT is 120 Volts, 60 Hz, 8 A.

The samples were received on October 12, 2020 and tested on October 15 and November 16, 2020. The EUT consisted of the following component(s):

| Company | Product Name | Description | Serial Number | FCC ID |
|---|---|---|---|---|
| STraffic America, LLC | SA-20WBa0 | Turnstile | 20GA-206-0003 | 2AXRQWFAG |
| STraffic America, LLC | SA-20WE0d | Turnstile | 20GI-206-0004 | 2AXRQWFAG |

At the time this report has been issued, the status of the EUT is pre-production.

### ADDITIONAL EUT DETAILS

The faregates utilize three Certified RFID radio modules (PPT); FCC ID: LVCTR4.

### HIGHEST EUT INTERNAL FREQUENCY SOURCE

The highest internal frequency source ($F_x$) of an EUT is defined as the highest frequency generated or used within the EUT or on which the EUT operates or tunes. The highest internal frequency source determines the frequency range of test for radiated emissions.

The highest internal frequency source of the EUT was declared to be 2000 MHz.

Based on the declared highest internal frequency source, the upper frequency range of measurement for the current project were:

**FCC Part 15, Subpart B**

| Highest Internal Frequency Source (MHz) | Upper Frequency Range of Measurement (MHz) | Applicability |
|---|---|---|
| Below 1.705 | 30 | |
| 1.705 – 108 | 1000 | |
| 108 – 500 | 2000 | |
| 500 – 1000 | 5000 | |
| Above 1000 | 5th harmonic of the highest internal source or 40 GHz, whichever is lower | X |

***ENCLOSURE***

The EUT enclosure measures approximately 28 cm wide by 180 cm deep by 100 cm high. It is primarily constructed of sheet metal.

***MODIFICATIONS***

No modifications were made to the EUT during the time the product was at National Technical Systems.

***SUPPORT EQUIPMENT***

No support equipment was used during testing.

***EUT INTERFACE PORTS***

The I/O cabling configuration during testing was as follows:

| Port | Connected To | Cable(s) | | |
|---|---|---|---|---|
| | | Description | Shielded or Unshielded | Length(m) |
| Master Unit low volatge power cable | Slave Unit CN1 board port | Multiwire | Unshielded | 3.0 |
| Master Unit low volatge power cable | Slave Unit X1 and X2 board ports | Multiwire | Unshielded | 3.0 |
| Master Unit DVI input | Slave Unit DVI output | Multiwire | Shielded | 2.0 |
| Master Unit Ethernet (x3) Cisco hub | Slave Unit Ethernet (x3) | RJ-45 | Shielded | 3.0 |
| Slave Unit Heater AC power input | Master Unit AC #1 Output | 3Wire | Unshielded | 3.0 |
| Power Supply #1 | AC Mains | 3WIre | Unshielded | 1.5 |
| Power Supply #2 | AC Mains | 3WIre | Unshielded | 1.5 |

***EUT OPERATION***

During testing, the EUT was configured to transmit a 13.56 MHz modulated signal continuously. The EUT gates were configured to open and close continuously during and after the test.

## EMISSIONS TESTING

### RADIATED AND CONDUCTED EMISSIONS

Final test measurements were taken at the National Technical Systems Anechoic Chambers listed below. The test sites contain separate areas for radiated and conducted emissions testing. The sites conform to the requirements of 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* and CISPR 16-1-4:2017 - *Specification for radio disturbance and immunity measuring apparatus and methods Part 1-4: Radio disturbance and immunity measuring apparatus Ancillary equipment Radiated disturbances*. They are registered with the VCCI and are on file with the FCC and Industry Canada.

| Site | Registration Numbers | | | Location |
|---|---|---|---|---|
| | VCCI | FCC | Canada | |
| Chamber 7 | Member 1211 Facility Registration A-0169 | US1031 | US0027 | 41039 Boyce Road Fremont, CA 94538-2435 |

ANSI C63.4 recommends that ambient noise at the test site be at least 6 dB below the allowable limits. Ambient levels are below this requirement. The test site(s) contain separate areas for radiated and conducted emissions testing. Results from testing performed in this chamber have been correlated with results from an open area test site above 30 MHz and with an open field site below 30 MHz. Considerable engineering effort has been expended to ensure that the facilities conform to all pertinent requirements of ANSI C63.4.

### RADIATED EMISSIONS CONSIDERATIONS

Radiated emissions measurements were made with the EUT powered from a supply voltage within the expected tolerances of each nominal operating voltage/frequency for each geographical regions covered by the scope of the standards referenced in this report.

### CONDUCTED EMISSIONS CONSIDERATIONS

Conducted emissions tests are performed in conformance with ANSI C63.4 and Subpart B of Part 15 of FCC Rules for Digital Devices.

Mains port measurements are made with the EUT connected to the public power network through nominal, standardized RF impedance, which is provided by a line impedance stabilization network, known as a LISN. A LISN is inserted in series with each current-carrying conductor in the EUT power cord.

## EMISSIONS MEASUREMENT INSTRUMENTATION

### RECEIVER SYSTEM

An EMI receiver as specified in CISPR 16-1-1:2015 is used for emissions measurements. The receivers used can measure over the frequency range of 9 kHz up to 7 GHz. These receivers allow both ease of measurement and high accuracy to be achieved. The receivers have Peak, Average, and CISPR (Quasi-peak) detectors built into their design so no external adapters are necessary. The receiver automatically sets the required bandwidth for the CISPR detector used during measurements.

For measurements above the frequency range of the receivers, a spectrum analyzer is utilized because it provides visibility of the entire spectrum along with the precision and versatility required to support engineering analysis. Average measurements above 1000 MHz are performed on the spectrum analyzer using the linear-average method with a resolution bandwidth of 1 MHz and a video bandwidth of 10 Hz.

### INSTRUMENT CONTROL COMPUTER

Measurements for radiated and conducted emissions are converted to the field strength at an antenna or voltage developed at the LISN (or ISN) measurement port, which is then compared directly with the appropriate specification limit under software control of the test receivers and spectrum analyzers. This provides added accuracy since all site correction factors, such as cable loss and antenna factors are added automatically. The software used for measurements is NTS EMI Test Software (rev 2.10).

### LINE IMPEDANCE STABILIZATION NETWORK (LISN)

Line conducted emission measurements utilize a 50 µH Line Impedance Stabilization Network (LISN) as the measurement point. The LISN used may also contain an additional 250 µH inductor. This network provides for calibrated radio-frequency noise measurements by the design of the internal low-pass and high-pass filters on the EUT and measurement ports, respectively.

### IMPEDANCE STABILIZATION NETWORK (ISN)

Telecommunication port conducted emission measurements utilize an Impedance Stabilization Network with a 150-ohm termination impedance and specific longitudinal conversion loss as the voltage monitoring point. This network provides for calibrated radio-frequency noise measurements by the design of the internal circuitry on the EUT and measurement ports, respectively. For current measurements, a current probe with a uniform frequency response and less than 1-ohm insertion impedance is used.

### FILTERS/ATTENUATORS

External filters and precision attenuators are often connected between the receiving antenna or LISN and the receiver. This eliminates saturation effects and non-linear operation due to high-amplitude transient events.

### ANTENNAS

A bilog antenna or combination of biconical and log periodic antennas are used to cover the range from 30 MHz to 1000 MHz. Narrowband tuned dipole antennas may be used over the entire 30 to 1000 MHz frequency range for precision measurements of field strength. Above 1000 MHz, horn antennas are used. The antenna calibration factors are included in site factors that are programmed into the test receivers or data collection software.

### ANTENNA MAST AND EQUIPMENT TURNTABLE

The antennas used to measure the radiated electric field strength are mounted on a non-conductive antenna mast equipped with a motor drive to vary the antenna height.

ANSI C63.4 and CISPR 32 specify that the test height above ground for table-mounted devices shall be 80 centimeters. Floor-mounted equipment shall be placed on the ground plane if the device is normally used on a conductive floor or separated from the ground plane by insulating material up to 12-mm thick if the device is normally used on a non-conductive floor. During radiated measurements, the EUT is positioned on a motorized turntable in conformance with this requirement.

### INSTRUMENT CALIBRATION

All test equipment is regularly checked to ensure that performance is maintained in accordance with the company's specifications. An appendix of this report contains the list of test equipment used and calibration information.

## EMISSIONS TEST PROCEDURES

### EUT AND CABLE PLACEMENT

The standards require that interconnecting cables be connected to the available ports of the unit and that the placement of the unit and the attached cables simulate the worst-case orientation that can be expected from a typical installation, so far as practicable. To this end, the position of the unit and associated cabling is varied within the guidelines of ANSI C63.4 and the worst-case orientation is used for final measurements.

### CONDUCTED EMISSIONS (MAINS)

Conducted emissions are measured at the plug end of the power cord supplied with the EUT. Excess power cord length is wrapped in a bundle between 30 and 40 centimeters in length near the center of the cord. Preliminary measurements are made to determine the highest-amplitude emission relative to the specification limit for all the modes of operation. Placement of system components and varying of cable positions are performed in each mode. A final peak-mode scan is then performed in the position and mode for which the highest emission was noted on all current carrying conductors of the power cord. Emissions that have peak values close to the specification limit are also measured in the quasi-peak and average detection modes to determine compliance except when the amplitude of the emission when measured with the quasi-peak detector is more than 10 dB below the specification limit for average measurements. In this case only quasi-peak measurements are performed.

### CONDUCTED EMISSIONS (TELECOMMUNICATION PORTS)

Conducted emissions voltages are measured at a point 80 cm from the EUT. If conducted emission currents are measured, the current probe is located 70 cm from the EUT. Preliminary measurements are made to determine the highest-amplitude emission relative to the specification limit for all the modes of operation. Placement of system components and varying of cable positions are performed in each mode. A final peak-mode scan is then performed in the position and mode for which the highest emission was noted. Emissions that have peak values close to the specification limit are also measured in the quasi-peak and average detection modes to determine compliance except when the amplitude of the emission when measured with the quasi-peak detector is more than 10 dB below the specification limit for average measurements. In this case only quasi-peak measurements are performed.

### RADIATED EMISSIONS

#### General

FCC Part 15 references the test methods of 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) for emissions measurements. Radiated emissions measurements are performed in two phases, preliminary scan and final maximization.

***Preliminary Scan***

A preliminary scan of emissions is conducted in which all significant EUT frequencies are identified with the system in a nominal configuration. At least two scans are performed, one or more of these with the antenna polarized vertically and one or more of these are performed with the antenna polarized horizontally. During the preliminary scans, the EUT is rotated through 360°, the antenna height is varied and cable positions are varied as necessary to determine the highest emission relative to the limit.

***Final Maximization***

During final maximization, the highest-amplitude emissions identified in the spectral search are viewed while the EUT azimuth angle is varied from 0 to 360 degrees relative to the receiving antenna. The azimuth that results in the highest emission is then maintained while varying the antenna height from one to four meters. The result is the identification of the highest amplitude for each of the highest peaks. Each recorded level is corrected in the receiver using appropriate factors for cables, connectors, antennas, and preamplifier gain. Emissions that have values close to the specification limit may also be measured with a tuned dipole antenna to determine compliance.

Final measurements in the frequency range of 30-1000 MHz are made using a quasi-peak detector and compared to the quasi-peak limit. Final measurements above 1 GHz are made using average and peak detectors and compared to the average and peak limits respectively.

The diameter of the test volume demonstrated during the test site validation of Chamber 7 was 2.5 m, while the maximum width of the boundary of the EUT, local AE, and associated cabling within the test volume was 2.5 m.

When testing above 1 GHz, the receive antenna is restricted to a maximum height of 2.5 m. Maximum emissions are found within this restricted range because emission levels decrease over distance and as the antenna is raised above 2.5 m, the distance from the EUT increases. As a result of the increased measurement distance, at antenna heights above 2.5 m, lower emission levels are measured as compared to emissions levels measured at antenna heights at 2.5 m and below. Final measurements are captured at 3 meters test distance except in cases where a closer test distance is required due to noise-floor considerations of the test-and-measurement equipment.

For measurements above 1 GHz every effort is made to ensure the EUT remains within the cone of radiation of the measurement antenna (i.e. 3 dB beam-width of the antenna). This may include rotating the product and/or angling the measurement antenna. A horn antenna having the beam width *W* at the measurement distance 3 m shown in the table below was used for the measurement. Since the height of the EUT from the turntable was 1.5 m, the antenna height was fixed to 1 m.

| Frequency (GHz) | E Plane | H Plane | $\Theta_{3dB}$ | 3dB beam width *W* (m) at 3m |
|---|---|---|---|---|
| 1.0 | 110 | 90 | 90 | 6.0 |
| 2.0 | 50 | 59 | 50 | 2.8 |
| 3.0 | 40 | 62 | 40 | 2.2 |
| 4.0 | 42 | 63 | 42 | 2.3 |
| 5.0 | 54 | 42 | 42 | 2.3 |
| 6.0 | 48 | 39 | 39 | 2.1 |

## SAMPLE CALCULATIONS

### SAMPLE CALCULATIONS - CONDUCTED EMISSIONS

Receiver readings are compared directly to the conducted emissions specification limit (decibel form). The calculation is as follows:

$$R_r - S = M$$

where:

$R_r$ = Receiver Reading in dBuV
S = Specification Limit in dBuV
M = Margin to Specification in +/- dB

### SAMPLE CALCULATIONS - RADIATED EMISSIONS

Receiver readings are compared directly to the specification limit (decibel form). The receiver internally corrects for cable loss, preamplifier gain, and antenna factor. The calculations are in the reverse direction of the actual signal flow, thus cable loss is added and the amplifier gain is subtracted. The Antenna Factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements. A distance factor, when used for electric field measurements, is calculated by using the following formula:

$$F_d = 20*LOG_{10} (D_m/D_s)$$

where:

$F_d$ = Distance Factor in dB
$D_m$ = Measurement Distance in meters
$D_s$ = Specification Distance in meters

Measurement Distance is the distance at which the measurements were taken and Specification Distance is the distance at which the specification limits are based. The Antenna Factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements.

The margin of a given emission peak relative to the limit is calculated as follows:

$$R_c = R_r + F_d$$

and

$$M = R_c - L_s$$

where:

$R_r$ = Receiver Reading in dBuV/m
$F_d$ = Distance Factor in dB
$R_c$ = Corrected Reading in dBuV/m
$L_s$ = Specification Limit in dBuV/m
M = Margin in dB Relative to Spec

# Appendix A Test Equipment Calibration Data

**Radiated Emissions, .03 - 1,000 MHz, 15-Oct-20**

| Manufacturer | Description | Model | Asset # | Calibrated | Cal Due |
|---|---|---|---|---|---|
| National Technical Systems | NTS EMI Software (rev 2.10) | N/A | WC022452 | N/A | |
| Rhode & Schwarz | Loop Antenna | HFH2-Z2 | WC062457 | 1/23/2020 | 1/23/2022 |
| Rohde & Schwarz | EMI Test Receiver, 20 Hz-7 GHz | ESIB 7 | WC064492 | 7/1/2020 | 7/1/2021 |
| Sunol Sciences | Biconilog, 30-3000 MHz | JB3 | WC064573 | 12/3/2019 | 12/3/2021 |
| Com-Power | Preamplifier, 1-1000 MHz | PAM-103 | WC064733 | 7/31/2020 | 7/31/2021 |

**Conducted Emissions - AC Power Ports, 16-Oct-20**

| Manufacturer | Description | Model | Asset # | Calibrated | Cal Due |
|---|---|---|---|---|---|
| National Technical Systems | NTS EMI Software (rev 2.10) | N/A | WC022452 | N/A | |
| EMCO | LISN, 10 kHz-100 MHz | 3825/2 | WC064399 | 8/2/2020 | 8/2/2021 |
| EMCO | LISN, 10 kHz-100 MHz | 3825/2 | WC064407 | 7/4/2020 | 7/4/2021 |
| Rohde & Schwarz | EMI Test Receiver, 20 Hz-7 GHz | ESIB 7 | WC064492 | 7/1/2020 | 7/1/2021 |
| Rohde & Schwarz | Pulse Limiter | ESH3-Z2 | WC072358 | 7/6/2020 | 7/5/2021 |

**Radiated Emissions, 1000 - 10,000 MHz, 16-Oct-20**

| Manufacturer | Description | Model | Asset # | Calibrated | Cal Due |
|---|---|---|---|---|---|
| National Technical Systems | NTS EMI Software (rev 2.10) | N/A | WC022452 | N/A | |
| Hewlett Packard | Spectrum Analyzer (Purple) | 8564E | WC055660 | 8/25/2020 | 8/25/2021 |
| EMCO | Horn Antenna | 3115 | WC062584 | 6/5/2019 | 6/5/2021 |
| Hewlett Packard | Microwave Preamplifier, 1-26.5GHz | 8449B | WC064416 | 8/26/2020 | 8/26/2021 |

**Conducted Emissions - AC Power Ports, 16-Nov-20**

| Manufacturer | Description | Model | Asset # | Calibrated | Cal Due |
|---|---|---|---|---|---|
| National Technical Systems | NTS EMI Software (rev 2.10) | N/A | WC022452 | N/A | |
| EMCO | LISN, 10 kHz-100 MHz | 3825/2 | WC064399 | 8/2/2020 | 8/2/2021 |
| EMCO | LISN, 10 kHz-100 MHz | 3825/2 | WC064407 | 7/4/2020 | 7/4/2021 |
| Rohde & Schwarz | Pulse Limiter | ESH3 Z2 | WC064445 | 7/6/2020 | 7/6/2021 |
| Rohde & Schwarz | EMI Test Receiver, 20 Hz-7 GHz | ESIB7 | WC064455 | 2/11/2020 | 2/11/2021 |

# *Appendix B Test Data*

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| | | | |
|---|---|---|---|
| Client: | STraffic America,LLC | PR Number: | PR124988-00 |
| Product | Faregate | T-Log Number: | TL124988-00-RA |
| System Configuration: | 2 units | Project Manager: | Christine Krebill |
| Contact: | Dave Pedersen | Project Engineer: | David Bare |
| Emissions Standard(s): | FCC Part 15 | Class: | - |
| Immunity Standard(s): | - | Environment: | Stations |

# EMC Test Data

For The

# STraffic America,LLC

Product

Faregate

Date of Last Test: 12/8/2020

| | | | |
|---|---|---|---|
| Client: | STraffic America,LLC | PR Number: | PR124988-00 |
| Model: | Faregate | T-Log Number: | TL124988-00-RA |
| | | Project Manager: | Christine Krebill |
| Contact: | Dave Pedersen | Project Engineer: | David Bare |
| Standard: | FCC Part 15 | Class: | - |

# Conducted Emissions

*(NTS Silicon Valley, Fremont Facility, Semi-Anechoic Chamber)*

## Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 10/16/2020
Test Engineer: Rafael Varelas
Test Location: Fremont Chamber #7
Config. Used: 1
Config Change: None
EUT Voltage: 120V/60Hz

## General Test Configuration

For floor-standing equipment, the EUT was located above a ground plane inside the semi-anechoic chamber, 80 cm from the LISN. A second LISN was used for any local support equipment. Remote support equipment was located outside of the semi-anechoic chamber. Any cables running to remote support equipment where routed through metal conduit and when possible passed through a ferrite clamp upon exiting the chamber.

## Ambient Conditions:

Temperature: 24.6 °C
Rel. Humidity: 47 %

## Summary of Results

| Run # | Test Performed | Limit | Result | Margin |
|---|---|---|---|---|
| 1 - PS1 | CE, AC Power,120V/60Hz | FCC 15.107 | Pass | 32.6 dBµV @ 1.68 MHz (-13.4 dB) |
| 2 - PS2 | CE, AC Power,120V/60Hz | FCC 15.107 | Pass | 44.3 dBµV @ 0.49 MHz (-1.8 dB) |

## Modifications Made During Testing

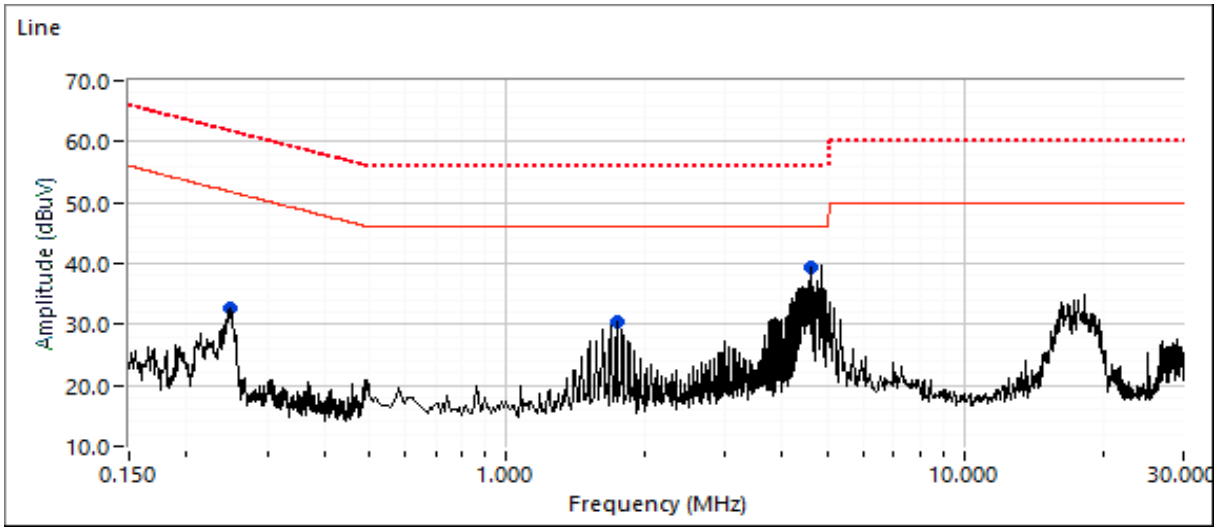
No modifications were made to the EUT during testing

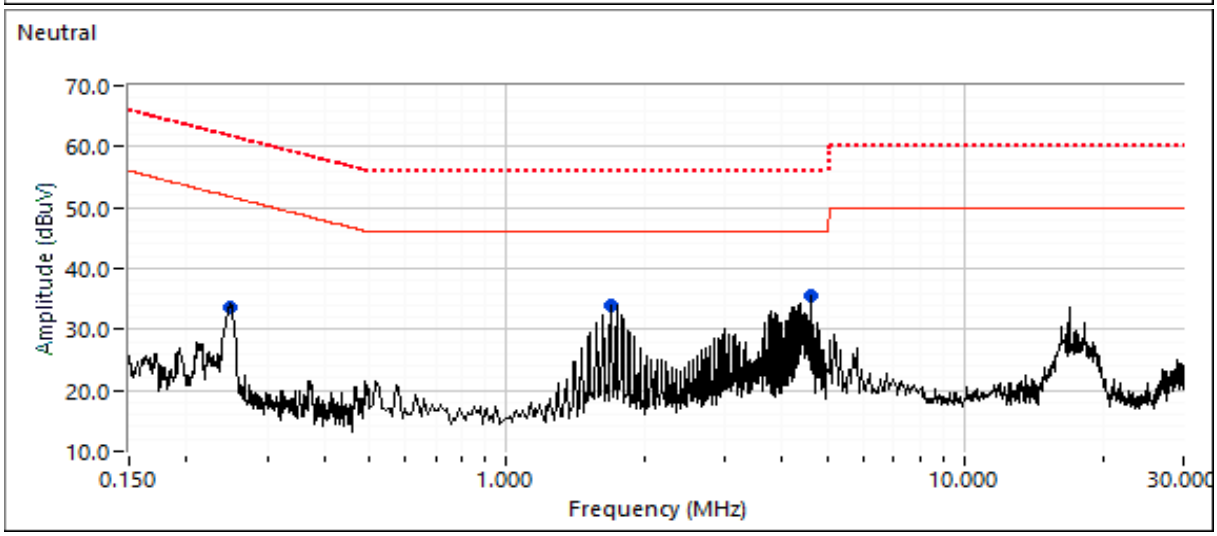
## Deviations From The Standard

No deviations were made from the requirements of the standard.

| | | | |
|---|---|---|---|
| Client: | STraffic America,LLC | PR Number: | PR124988-00 |
| Model: | Faregate | T-Log Number: | TL124988-00-RA |
| | | Project Manager: | Christine Krebill |
| Contact: | Dave Pedersen | Project Engineer: | David Bare |
| Standard: | FCC Part 15 | Class: | - |

Run #1: AC Power Port Conducted Emissions, 0.15 - 30MHz, 120V/60Hz, PS1



| | | | |
|---|---|---|---|
| Client: | STraffic America,LLC | PR Number: | PR124988-00 |
| Model: | Faregate | T-Log Number: | TL124988-00-RA |
| | | Project Manager: | Christine Krebill |
| Contact: | Dave Pedersen | Project Engineer: | David Bare |
| Standard: | FCC Part 15 | Class: | - |

Preliminary peak readings captured during pre-scan (peak readings vs. average limit)

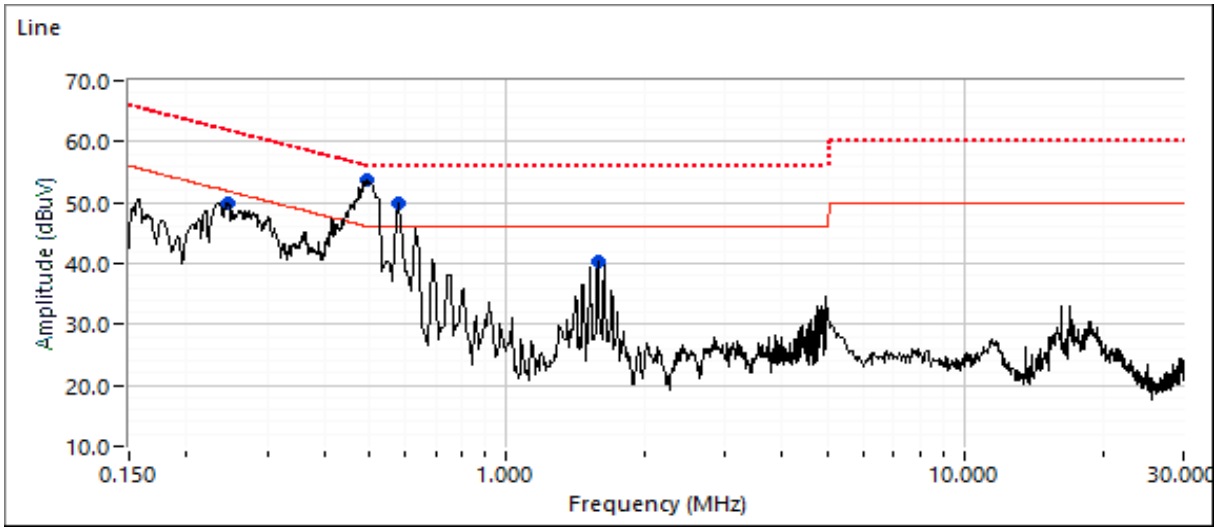
| Frequency | Level | AC | FCC 15.207 | | Detector | Comments |
|---|---|---|---|---|---|---|
| MHz | dBµV | Line | Limit | Margin | QP/Ave | |
| 0.248 | 33.5 | Neutral | 51.7 | -18.2 | Peak | |
| 1.681 | 33.9 | Neutral | 46.0 | -12.1 | Peak | |
| 4.627 | 35.5 | Neutral | 46.0 | -10.5 | Peak | |
| 0.249 | 32.6 | Line | 51.7 | -19.1 | Peak | |
| 1.736 | 30.3 | Line | 46.0 | -15.7 | Peak | |
| 4.628 | 39.3 | Line | 46.0 | -6.7 | Peak | |

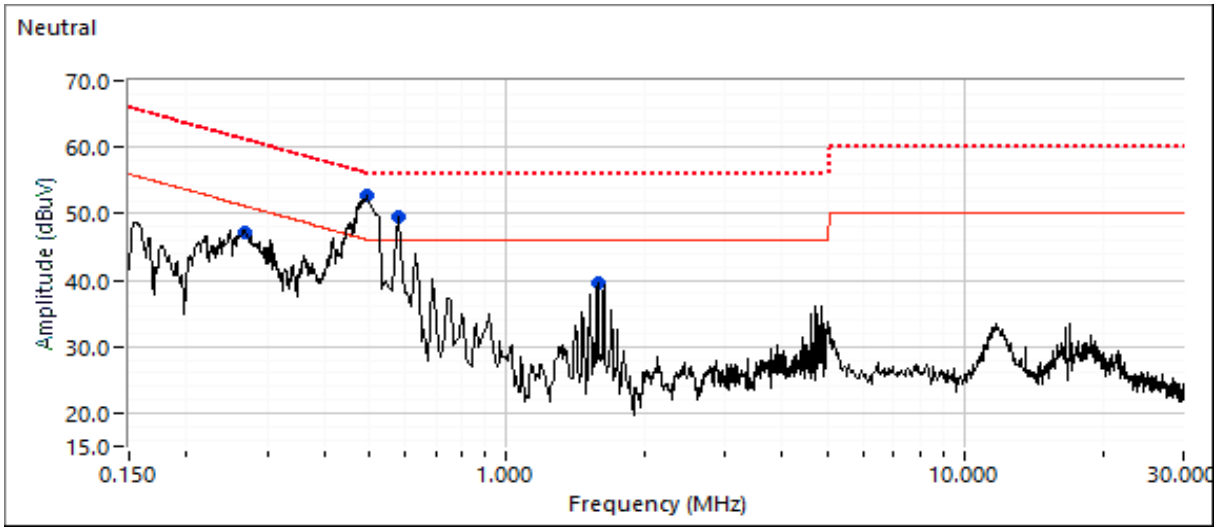
Final quasi-peak and average readings

| Frequency | Level | AC | FCC 15.207 | | Detector | Comments |
|---|---|---|---|---|---|---|
| MHz | dBµV | Line | Limit | Margin | QP/Ave | |
| 1.681 | 32.6 | Neutral | 46.0 | -13.4 | AVG | AVG (0.10s) |
| 4.628 | 29.5 | Line | 46.0 | -16.5 | AVG | AVG (0.10s) |
| 1.736 | 28.8 | Line | 46.0 | -17.2 | AVG | AVG (0.10s) |
| 4.628 | 35.6 | Line | 56.0 | -20.4 | QP | QP (1.00s) |
| 4.627 | 24.2 | Neutral | 46.0 | -21.8 | AVG | AVG (0.10s) |
| 1.681 | 32.9 | Neutral | 56.0 | -23.1 | QP | QP (1.00s) |
| 0.248 | 27.0 | Neutral | 51.8 | -24.8 | AVG | AVG (0.10s) |
| 4.627 | 31.0 | Neutral | 56.0 | -25.0 | QP | QP (1.00s) |
| 0.249 | 25.2 | Line | 51.8 | -26.6 | AVG | AVG (0.10s) |
| 1.736 | 29.2 | Line | 56.0 | -26.8 | QP | QP (1.00s) |
| 0.248 | 32.1 | Neutral | 61.8 | -29.7 | QP | QP (1.00s) |
| 0.249 | 29.9 | Line | 61.8 | -31.9 | QP | QP (1.00s) |

| | | | |
|---|---|---|---|
| Client: | STraffic America,LLC | PR Number: | PR124988-00 |
| Model: | Faregate | T-Log Number: | TL124988-00-RA |
| | | Project Manager: | Christine Krebill |
| Contact: | Dave Pedersen | Project Engineer: | David Bare |
| Standard: | FCC Part 15 | Class: | - |

Run #2: AC Power Port Conducted Emissions, 0.15 - 30MHz, 120V/60Hz, PS2



| | | | |
|---|---|---|---|
| Client: | STraffic America,LLC | PR Number: | PR124988-00 |
| Model: | Faregate | T-Log Number: | TL124988-00-RA |
| | | Project Manager: | Christine Krebill |
| Contact: | Dave Pedersen | Project Engineer: | David Bare |
| Standard: | FCC Part 15 | Class: | - |

Preliminary peak readings captured during pre-scan (peak readings vs. average limit)

| Frequency | Level | AC | FCC 15.207 | | Detector | Comments |
|---|---|---|---|---|---|---|
| MHz | dBµV | Line | Limit | Margin | QP/Ave | |
| 0.246 | 49.9 | Line | 51.9 | -2.0 | Peak | |
| 0.493 | 53.7 | Line | 46.1 | 7.6 | Peak | |
| 0.582 | 49.8 | Line | 46.0 | 3.8 | Peak | |
| 1.580 | 40.3 | Line | 46.0 | -5.7 | Peak | |
| 0.268 | 47.2 | Neutral | 51.2 | -4.0 | Peak | |
| 0.499 | 52.6 | Neutral | 46.1 | 6.5 | Peak | |
| 0.582 | 49.6 | Neutral | 46.0 | 3.6 | Peak | |
| 1.578 | 39.6 | Neutral | 46.0 | -6.4 | Peak | |

Final quasi-peak and average readings

| Frequency | Level | AC | FCC 15.207 | | Detector | Comments |
|---|---|---|---|---|---|---|
| MHz | dBµV | Line | Limit | Margin | QP/Ave | |
| 0.493 | 44.3 | Line | 46.1 | -1.8 | AVG | AVG (0.10s) |
| 0.581 | 43.8 | Line | 46.0 | -2.2 | AVG | AVG (0.10s) |
| 0.499 | 43.8 | Neutral | 46.0 | -2.2 | AVG | AVG (0.10s) |
| 0.581 | 42.9 | Neutral | 46.0 | -3.1 | AVG | AVG (0.10s) |
| 0.493 | 52.7 | Line | 56.1 | -3.4 | QP | QP (1.00s) |
| 0.499 | 52.0 | Neutral | 56.0 | -4.0 | QP | QP (1.00s) |
| 1.580 | 38.6 | Line | 46.0 | -7.4 | AVG | AVG (0.10s) |
| 1.578 | 37.6 | Neutral | 46.0 | -8.4 | AVG | AVG (0.10s) |
| 0.581 | 45.7 | Line | 56.0 | -10.3 | QP | QP (1.00s) |
| 0.581 | 45.1 | Neutral | 56.0 | -10.9 | QP | QP (1.00s) |
| 0.246 | 39.0 | Line | 51.9 | -12.9 | AVG | AVG (0.10s) |
| 0.268 | 37.7 | Neutral | 51.2 | -13.5 | AVG | AVG (0.10s) |
| 0.246 | 47.7 | Line | 61.9 | -14.2 | QP | QP (1.00s) |
| 0.268 | 46.6 | Neutral | 61.2 | -14.6 | QP | QP (1.00s) |
| 1.580 | 39.8 | Line | 56.0 | -16.2 | QP | QP (1.00s) |
| 1.578 | 38.8 | Neutral | 56.0 | -17.2 | QP | QP (1.00s) |

| | | | |
|---|---|---|---|
| Client: | STraffic America,LLC | PR Number: | PR124988-00 |
| Model: | Faregate | T-Log Number: | TL124988-00-RA |
| | | Project Manager: | Christine Krebill |
| Contact: | Dave Pedersen | Project Engineer: | David Bare |
| Standard: | FCC Part 15 | Class: | - |

# Radiated Emissions

*(NTS Silicon Valley, Fremont Facility, Semi-Anechoic Chamber)*

## Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 10/15/2020
Test Engineer: Rafael Varelas
Test Location: Fremont Chamber #7
Config. Used: 1
Config Change: None
EUT Voltage: 120V/60Hz

## General Test Configuration

The EUT and any local support equipment were located on the turntable for radiated emissions testing. Any remote support equipment was located outside the semi-anechoic chamber. Any cables running to remote support equipment were routed through metal conduit and when possible passed through a ferrite clamp upon exiting the chamber.

Radiated emissions tests above 1 GHz to FCC Part 15 were performed with floor absorbers in place in accordance with the test methods of ANSI C63.4 and CISPR 16-1-4.

The test distance and extrapolation factor (if applicable) are detailed under each run description.

Note, preliminary testing indicates that the emissions were maximized by orientation of the EUT and elevation of the measurement antenna. Maximized testing indicated that the emissions were maximized by orientation of the EUT, elevation of the measurement antenna, and manipulation of the EUT's interface cables.

## Ambient Conditions:

Temperature: 24.5 °C
Rel. Humidity: 46 %

## Summary of Results

| Run # | Test Performed | Limit | Result | Margin |
|---|---|---|---|---|
| 1 | Radiated Emissions<br>30 - 1000 MHz, Preliminary | FCC Class A | Eval | Refer to individual runs |
| 2 | Radiated Emissions<br>30 - 1000 MHz, Maximized | FCC Class A | Pass | 36.2 dBµV/m @ 30.02 MHz<br>(-2.9 dB) |
| 3 | Radiated Emissions<br>1 GHz - 10 GHz Maximized | FCC Class A | Pass | 44.1 dBµV/m @ 3198.1 MHz<br>(-15.9 dB) |

## Modifications Made During Testing

No modifications were made to the EUT during testing

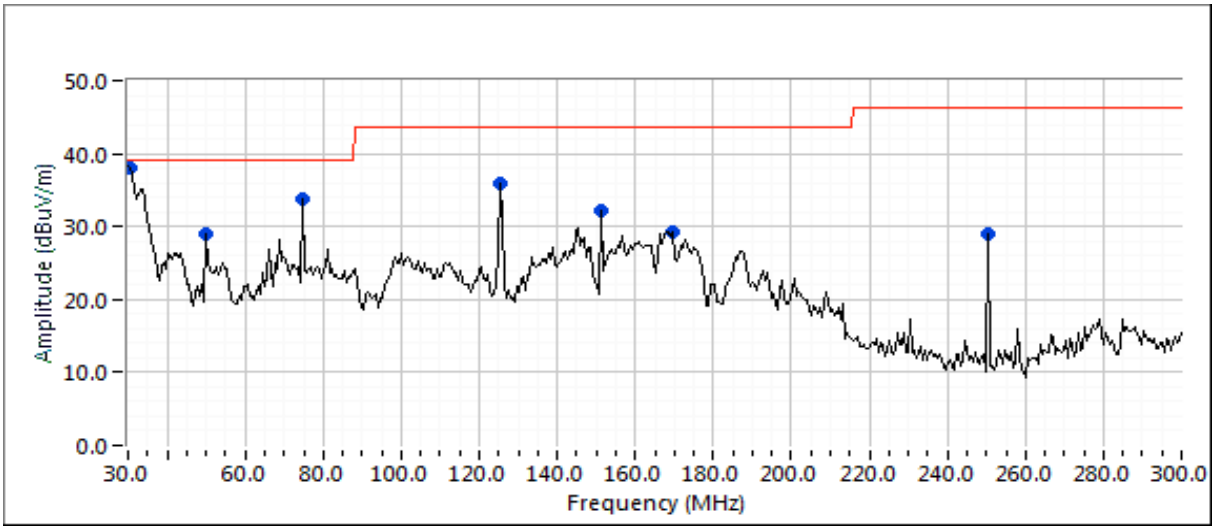
## Deviations From The Standard

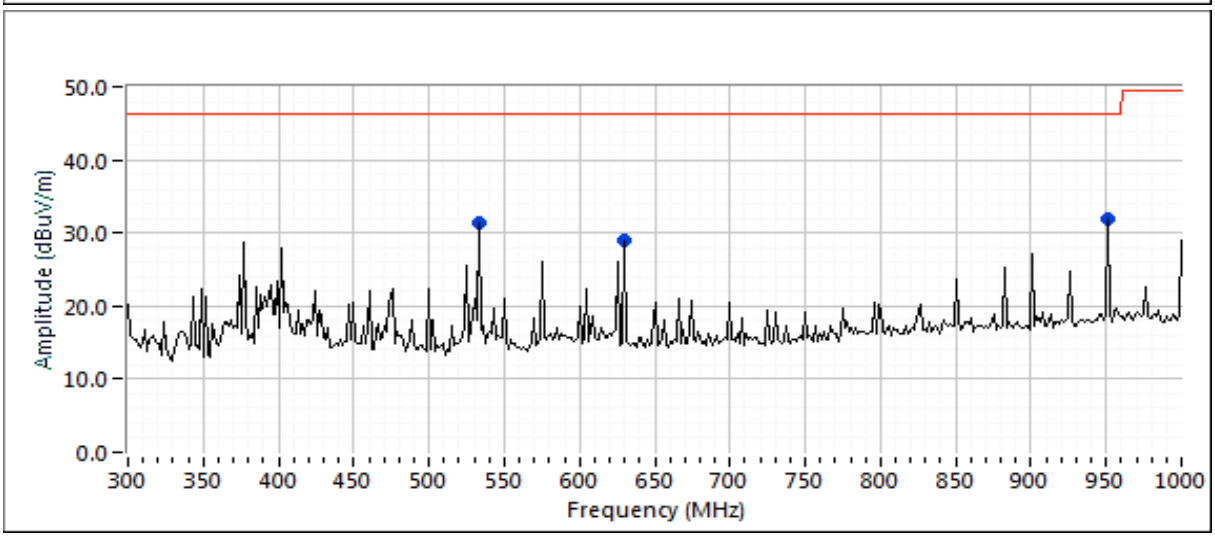
No deviations were made from the requirements of the standard.

| | | | |
|---|---|---|---|
| Client: | STraffic America,LLC | PR Number: | PR124988-00 |
| Model: | Faregate | T-Log Number: | TL124988-00-RA |
| | | Project Manager: | Christine Krebill |
| Contact: | Dave Pedersen | Project Engineer: | David Bare |
| Standard: | FCC Part 15 | Class: | - |

Run #1: Preliminary Radiated Emissions, 30 - 1000 MHz

| Test Parameters for Preliminary Scan(s) | | | |
|---|---|---|---|
| Frequency Range (MHz) | Prescan Distance (meters) | Limit Distance (meters) | Extrapolation Factor (dB, applied to data) |
| 30 - 1000 | 5 | 10 | -6.0 |



| | | | |
|---|---|---|---|
| Client: | STraffic America,LLC | PR Number: | PR124988-00 |
| Model: | Faregate | T-Log Number: | TL124988-00-RA |
| | | Project Manager: | Christine Krebill |
| Contact: | Dave Pedersen | Project Engineer: | David Bare |
| Standard: | FCC Part 15 | Class: | - |

Preliminary peak readings captured during pre-scan

| Frequency | Level | Pol | FCC Class A | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 30.022 | 38.1 | V | 39.1 | -1.0 | Peak | 324 | 1.0 | |
| 50.371 | 29.0 | V | 39.1 | -10.1 | Peak | 203 | 1.0 | |
| 75.010 | 33.8 | V | 39.1 | -5.3 | Peak | 142 | 1.0 | |
| 125.009 | 35.9 | V | 43.5 | -7.6 | Peak | 178 | 1.5 | |
| 151.094 | 32.3 | V | 43.5 | -11.2 | Peak | 166 | 1.0 | |
| 168.937 | 29.2 | V | 43.5 | -14.3 | Peak | 360 | 1.5 | |
| 250.008 | 29.1 | V | 46.4 | -17.3 | Peak | 323 | 2.5 | |
| 532.990 | 31.3 | H | 46.4 | -15.1 | Peak | 343 | 1.0 | |
| 629.513 | 29.0 | V | 46.4 | -17.4 | Peak | 350 | 2.5 | |
| 949.993 | 32.0 | H | 46.4 | -14.4 | Peak | 230 | 2.5 | |

Preliminary quasi-peak readings (no manipulation of EUT interface cables)

| Frequency | Level | Pol | FCC Class A | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 75.010 | 32.9 | V | 39.1 | -6.2 | QP | 146 | 1.0 | QP (1.00s) |
| 151.094 | 32.0 | V | 43.5 | -11.5 | QP | 168 | 1.0 | QP (1.00s) |
| 125.009 | 34.6 | V | 43.5 | -8.9 | QP | 186 | 1.0 | QP (1.00s) |
| 50.371 | 26.7 | V | 39.1 | -12.4 | QP | 193 | 1.0 | QP (1.00s) |
| 30.022 | 36.2 | V | 39.1 | -2.9 | QP | 260 | 1.0 | QP (1.00s) |
| 168.937 | 26.3 | V | 43.5 | -17.2 | QP | 360 | 1.0 | QP (1.00s) |

| | | | |
|---|---|---|---|
| Client: | STraffic America,LLC | PR Number: | PR124988-00 |
| Model: | Faregate | T-Log Number: | TL124988-00-RA |
| | | Project Manager: | Christine Krebill |
| Contact: | Dave Pedersen | Project Engineer: | David Bare |
| Standard: | FCC Part 15 | Class: | - |

Run #2: Maximized Readings From Run #1

| Test Parameters for Maximized Reading(s) | | | |
|---|---|---|---|
| Frequency Range (MHz) | Test Distance (meters) | Limit Distance (meters) | Extrapolation Factor (dB, applied to data) |
| 30 - 1000 | 5 | 10 | -6.0 |

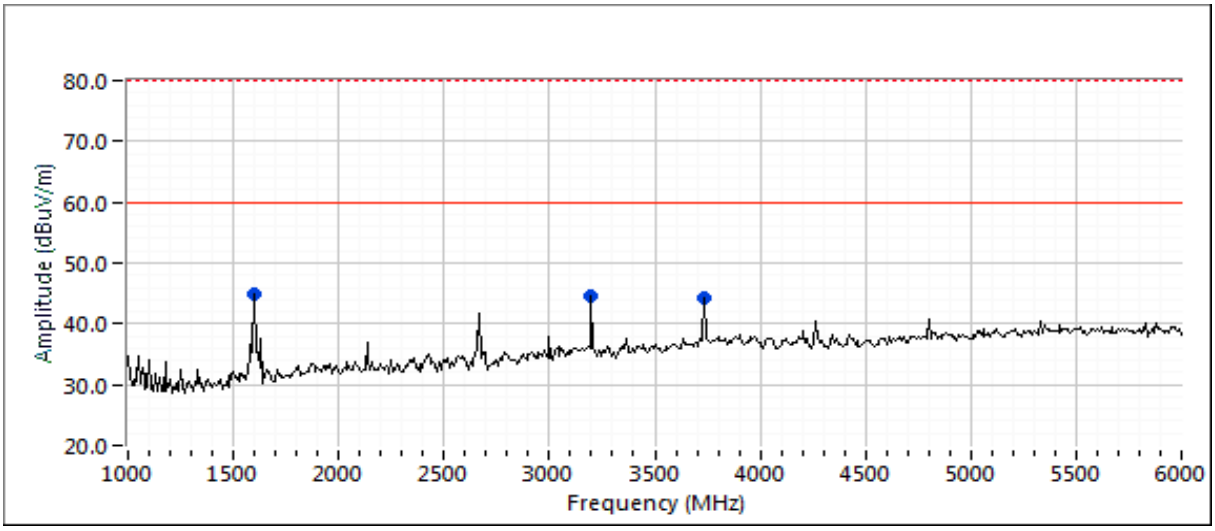
Maximized quasi-peak readings (includes manipulation of EUT interface cables)

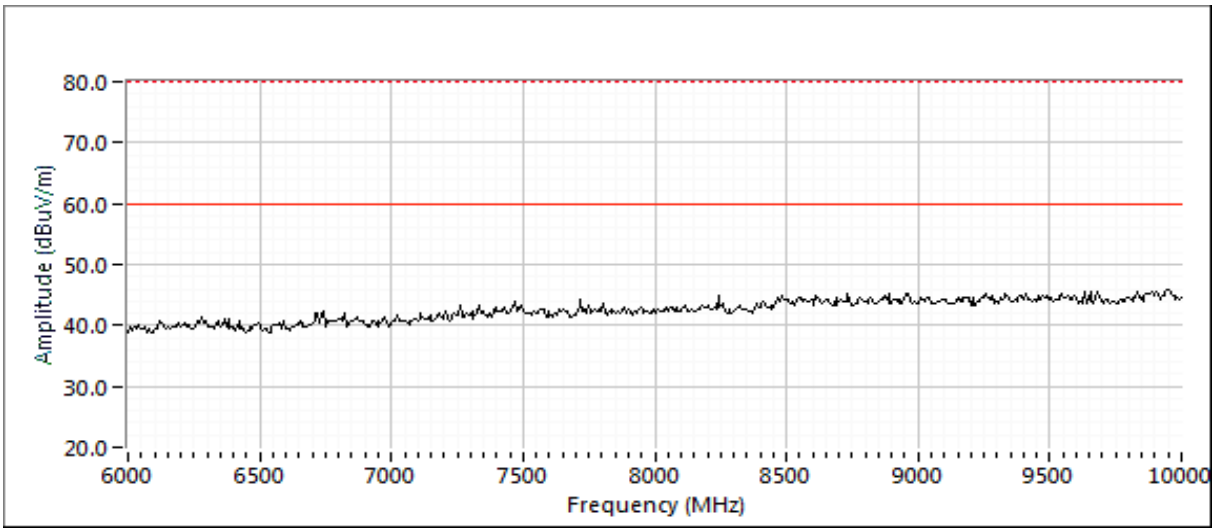
| Frequency | Level | Pol | FCC Class A | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 30.022 | 36.2 | V | 39.1 | -2.9 | QP | 260 | 1.0 | QP (1.00s) |
| 75.010 | 32.9 | V | 39.1 | -6.2 | QP | 146 | 1.0 | QP (1.00s) |
| 125.009 | 34.6 | V | 43.5 | -8.9 | QP | 186 | 1.0 | QP (1.00s) |
| 151.094 | 32.0 | V | 43.5 | -11.5 | QP | 168 | 1.0 | QP (1.00s) |
| 50.371 | 26.7 | V | 39.1 | -12.4 | QP | 193 | 1.0 | QP (1.00s) |
| 168.937 | 26.3 | V | 43.5 | -17.2 | QP | 360 | 1.0 | QP (1.00s) |

| | | | |
|---|---|---|---|
| Client: | STraffic America,LLC | PR Number: | PR124988-00 |
| Model: | Faregate | T-Log Number: | TL124988-00-RA |
| | | Project Manager: | Christine Krebill |
| Contact: | Dave Pedersen | Project Engineer: | David Bare |
| Standard: | FCC Part 15 | Class: | - |

Run #3: Maximized Readings, 1000 - 10000 MHz

| Test Parameters for Preliminary Scan(s) | | | |
|---|---|---|---|
| Frequency Range (MHz) | Prescan Distance (meters) | Limit Distance (meters) | Extrapolation Factor (dB, applied to data) |
| 1000 - 10000 | 3 | 3 | 0.0 |



| | | | |
|---|---|---|---|
| Client: | STraffic America,LLC | PR Number: | PR124988-00 |
| Model: | Faregate | T-Log Number: | TL124988-00-RA |
| | | Project Manager: | Christine Krebill |
| Contact: | Dave Pedersen | Project Engineer: | David Bare |
| Standard: | FCC Part 15 | Class: | - |

Preliminary peak readings captured during pre-scan (peak readings vs. average limit)

**FCC Class A limit (when applicable) converted to 3m limit (by adding 10.5 dB to 10m limit)*

| Frequency | Level | Pol | FCC Class A | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 1599.110 | 45.0 | H | 60.0 | -15.0 | Peak | 164 | 1.9 | |
| 3198.170 | 44.6 | H | 60.0 | -15.4 | Peak | 11 | 1.0 | |
| 3731.170 | 44.2 | V | 60.0 | -15.8 | Peak | 200 | 1.3 | |

Final peak and average readings (vs. FCC limits)

*All final readings collected at 3 meters test distance, unless otherwise noted*

**FCC Class A limit (when applicable) converted to 3m limit (by adding 10.5 dB to 10m limit)*

| Frequency | Level | Pol | FCC Class A | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 3198.080 | 44.1 | H | 60.0 | -15.9 | AVG | 10 | 1.0 | RB 1 MHz;VB 10 Hz;Peak |
| 1598.980 | 43.6 | H | 60.0 | -16.4 | AVG | 159 | 1.3 | RB 1 MHz;VB 10 Hz;Peak |
| 3731.080 | 43.6 | V | 60.0 | -16.4 | AVG | 200 | 1.3 | RB 1 MHz;VB 10 Hz;Peak |
| 1599.200 | 50.4 | H | 80.0 | -29.6 | PK | 159 | 1.3 | RB 1 MHz;VB 3 MHz;Peak |
| 3731.100 | 49.7 | V | 80.0 | -30.3 | PK | 200 | 1.3 | RB 1 MHz;VB 3 MHz;Peak |
| 3198.060 | 49.1 | H | 80.0 | -30.9 | PK | 10 | 1.0 | RB 1 MHz;VB 3 MHz;Peak |

| | |
|---|---|
| Note 1: | For FCC testing above 1 GHz, the limit is based on an average measurement. In addition, the peak reading of any emission above 1 GHz can not exceed the average limit by more than 20 dB. |

| | | | |
|---|---|---|---|
| Client: | STraffic America,LLC | PR Number: | PR124988-00 |
| Model: | Faregate | T-Log Number: | TL124988-00-RA |
| | | Project Manager: | Christine Krebill |
| Contact: | Dave Pedersen | Project Engineer: | David Bare |
| Standard: | FCC Part 15 | Class: | - |

# Radiated Emissions

## Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 10/15/2020
Test Engineer: Rafael Varelas
Test Location: Fremont Chamber #7
Config. Used: 1
Config Change: None
EUT Voltage: 120V/60Hz

## General Test Configuration

The EUT and any local support equipment were located on the turntable for radiated emissions testing.

The test distance and extrapolation factor (if used) are detailed under each run description.
Note, preliminary testing indicates that the emissions were maximized by orientation of the EUT and elevation of the measurement antenna. Maximized testing indicated that the emissions were maximized by orientation of the EUT, elevation of the measurement antenna, and manipulation of the EUT's interface cables.

## Ambient Conditions:

Temperature: 24.5 °C
Rel. Humidity: 46 %

## Summary of Results

| Run # | Test Performed | Limit | Result | Margin |
|---|---|---|---|---|
| 1 | 30 kHz - 30 MHz | FCC 15.209 | Pass | 19.9 dBµV/m @ 30.00 MHz (-9.6 dB) |

## Modifications Made During Testing

No modifications were made to the EUT during testing

## Deviations From The Standard

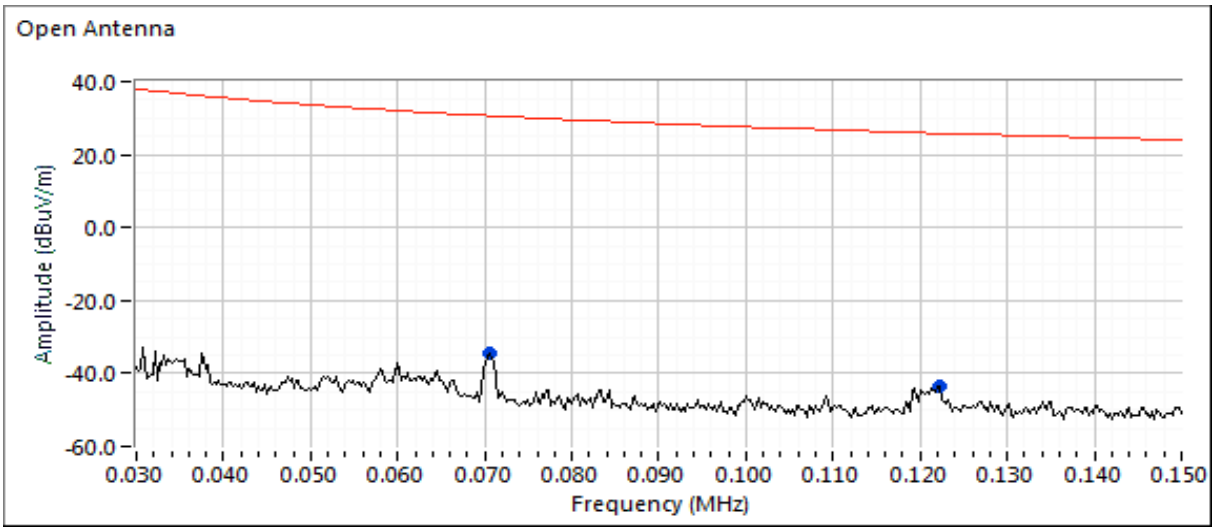
No deviations were made from the requirements of the standard.

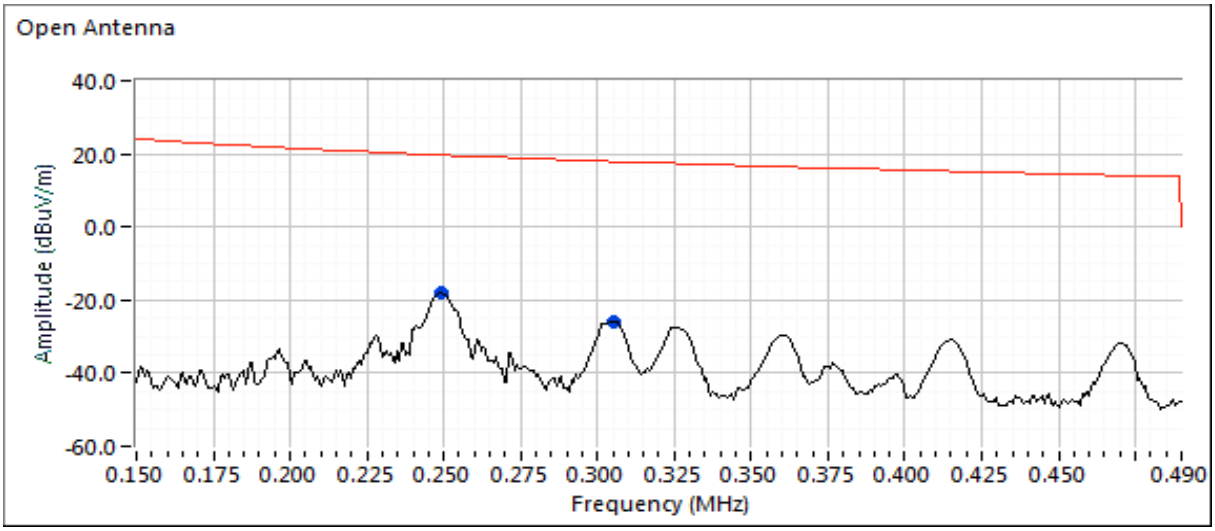
| | | | |
|---|---|---|---|
| Client: | STraffic America,LLC | PR Number: | PR124988-00 |
| Model: | Faregate | T-Log Number: | TL124988-00-RA |
| | | Project Manager: | Christine Krebill |
| Contact: | Dave Pedersen | Project Engineer: | David Bare |
| Standard: | FCC Part 15 | Class: | - |

Run #1: Radiated Emissions, 30 kHz - 30 MHz, FCC 15.209

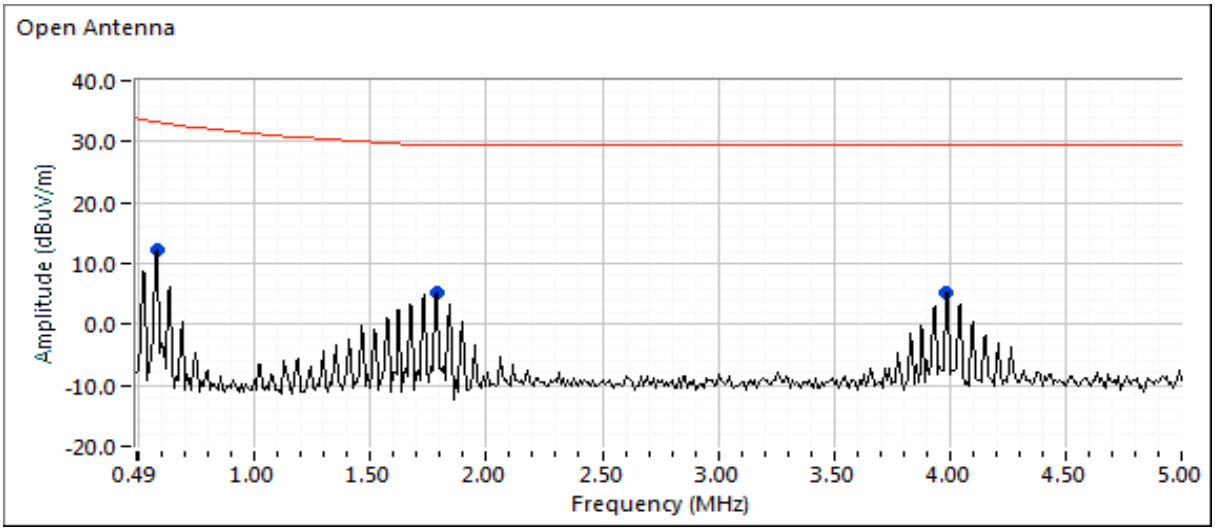
| Frequency Range | Test Distance | Limit Distance | Extrapolation Factor |
|---|---|---|---|
| 0.009 - 0.490 MHz | 3 | 300 | -80.0 |
| 0.490 - 1.705 MHz | 3 | 30 | -40.0 |
| 1.705 - 30.0 MHz | 3 | 30 | -40.0 |

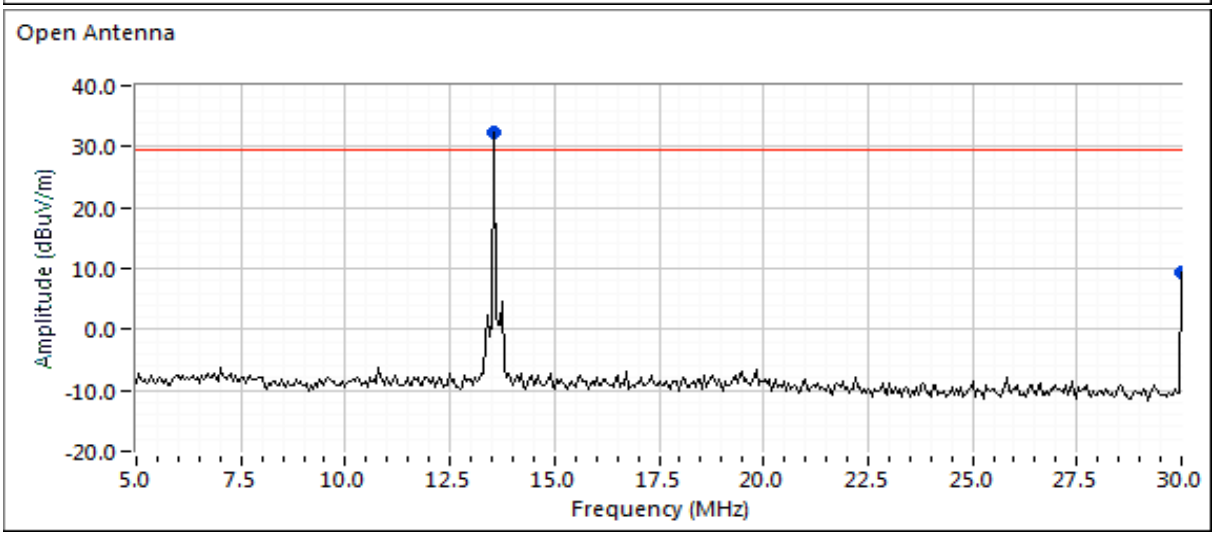
Note - the extrapolation factor is based on 40log(test distance/limit distance) as permitted by FCC 15.31



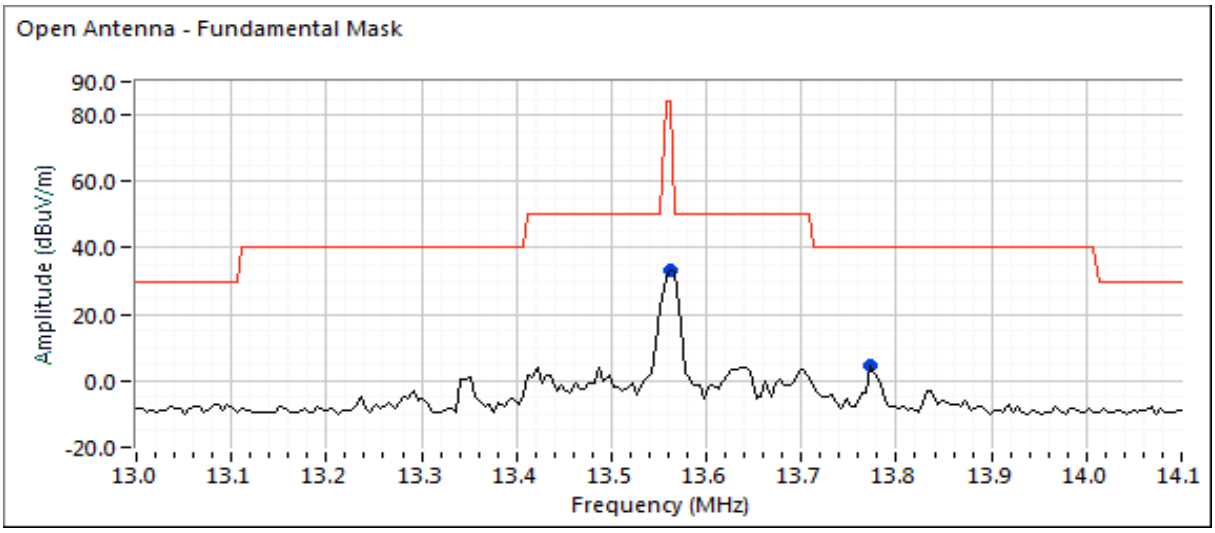



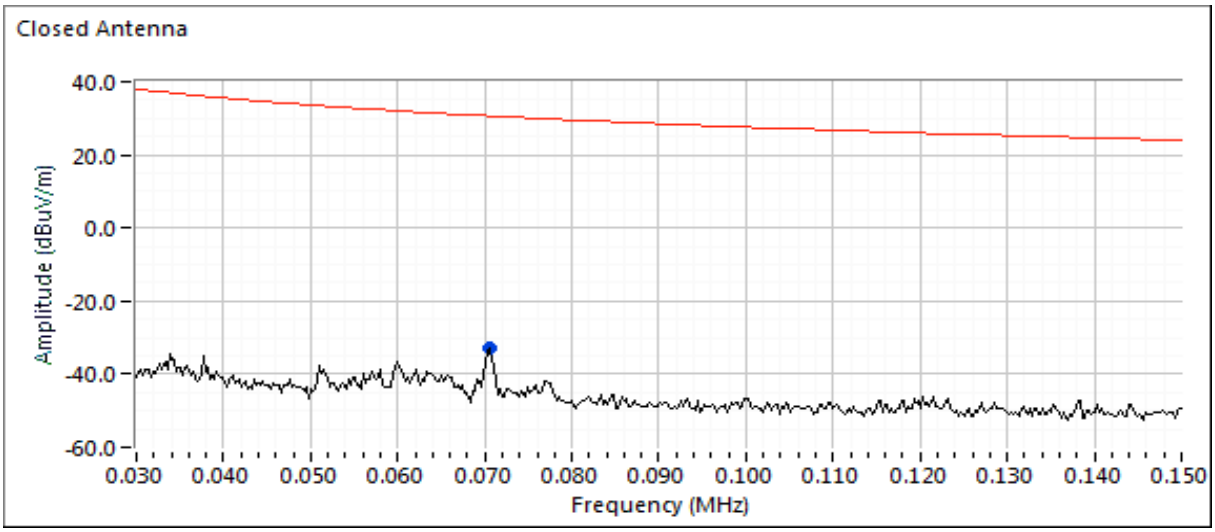
| | | | |
|---|---|---|---|
| Client: | STraffic America,LLC | PR Number: | PR124988-00 |
| Model: | Faregate | T-Log Number: | TL124988-00-RA |
| | | Project Manager: | Christine Krebill |
| Contact: | Dave Pedersen | Project Engineer: | David Bare |
| Standard: | FCC Part 15 | Class: | - |



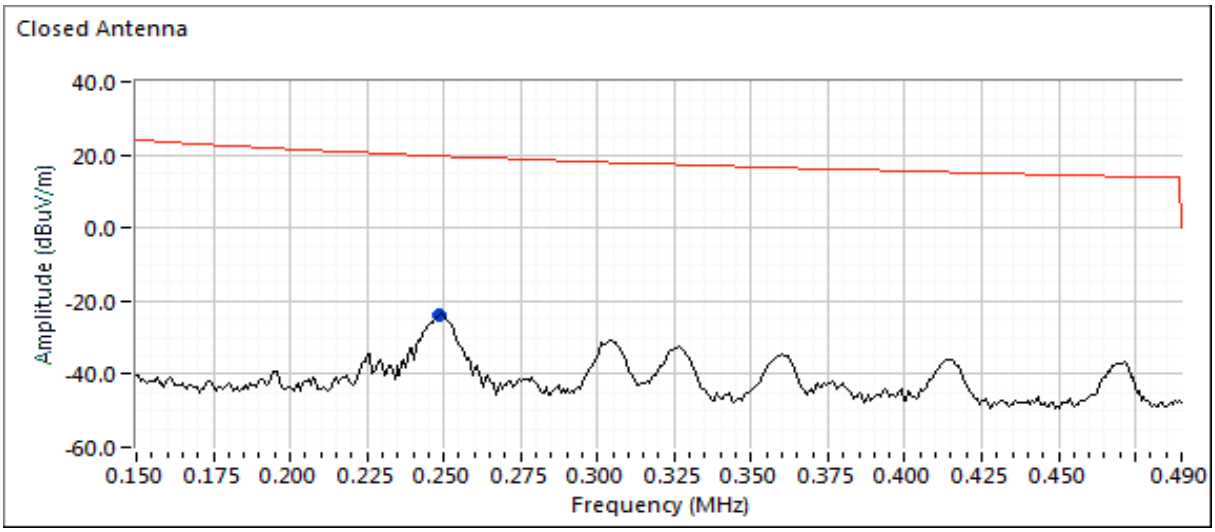



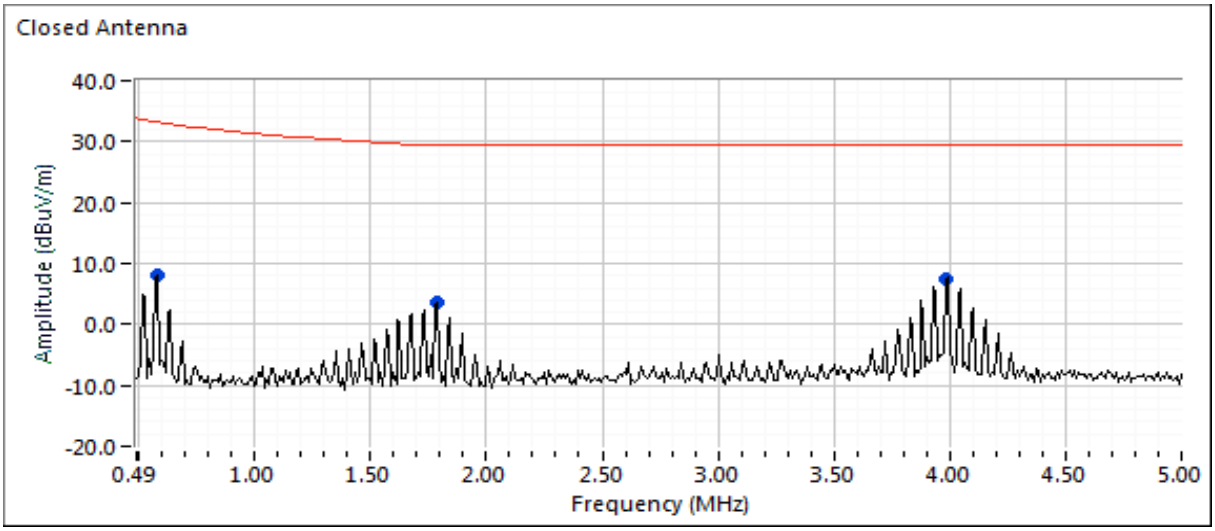
| | | | |
|---|---|---|---|
| Client: | STraffic America,LLC | PR Number: | PR124988-00 |
| Model: | Faregate | T-Log Number: | TL124988-00-RA |
| | | Project Manager: | Christine Krebill |
| Contact: | Dave Pedersen | Project Engineer: | David Bare |
| Standard: | FCC Part 15 | Class: | - |



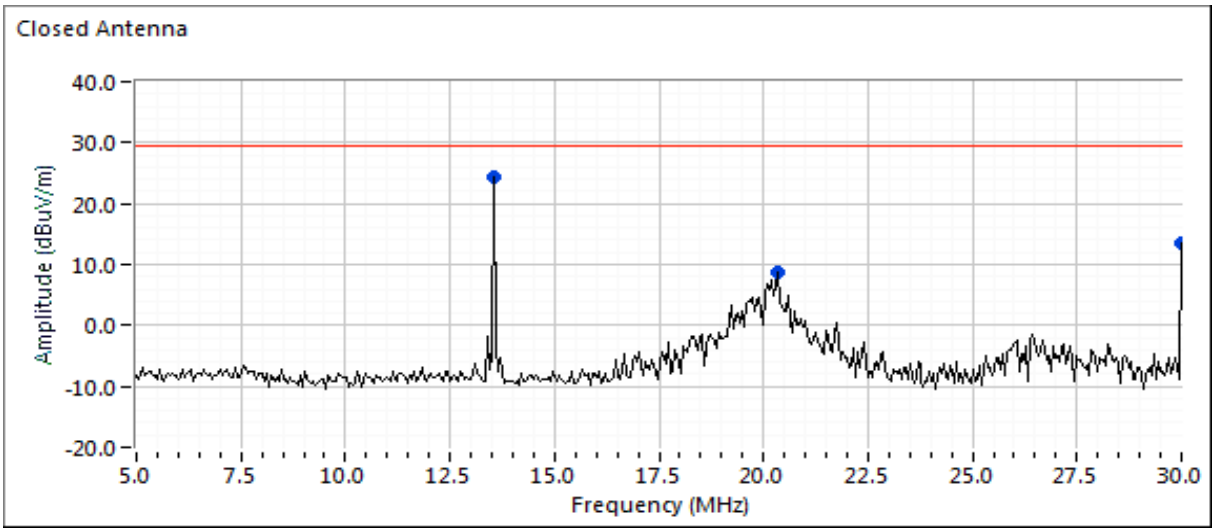



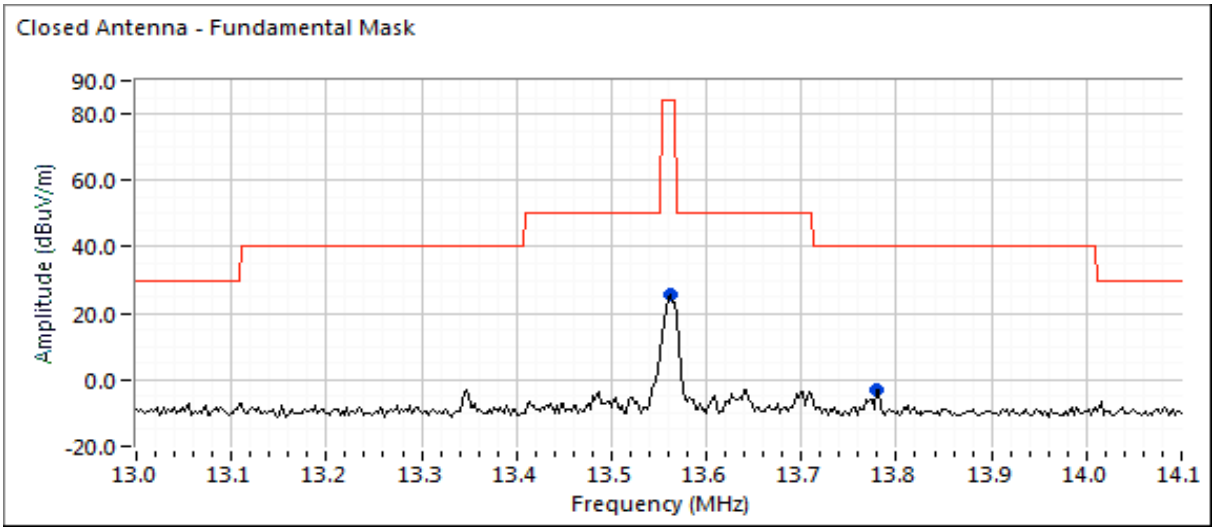
| | | | |
|---|---|---|---|
| Client: | STraffic America,LLC | PR Number: | PR124988-00 |
| Model: | Faregate | T-Log Number: | TL124988-00-RA |
| | | Project Manager: | Christine Krebill |
| Contact: | Dave Pedersen | Project Engineer: | David Bare |
| Standard: | FCC Part 15 | Class: | - |



| | | | |
|---|---|---|---|
| Client: | STraffic America,LLC | PR Number: | PR124988-00 |
| Model: | Faregate | T-Log Number: | TL124988-00-RA |
| | | Project Manager: | Christine Krebill |
| Contact: | Dave Pedersen | Project Engineer: | David Bare |
| Standard: | FCC Part 15 | Class: | - |



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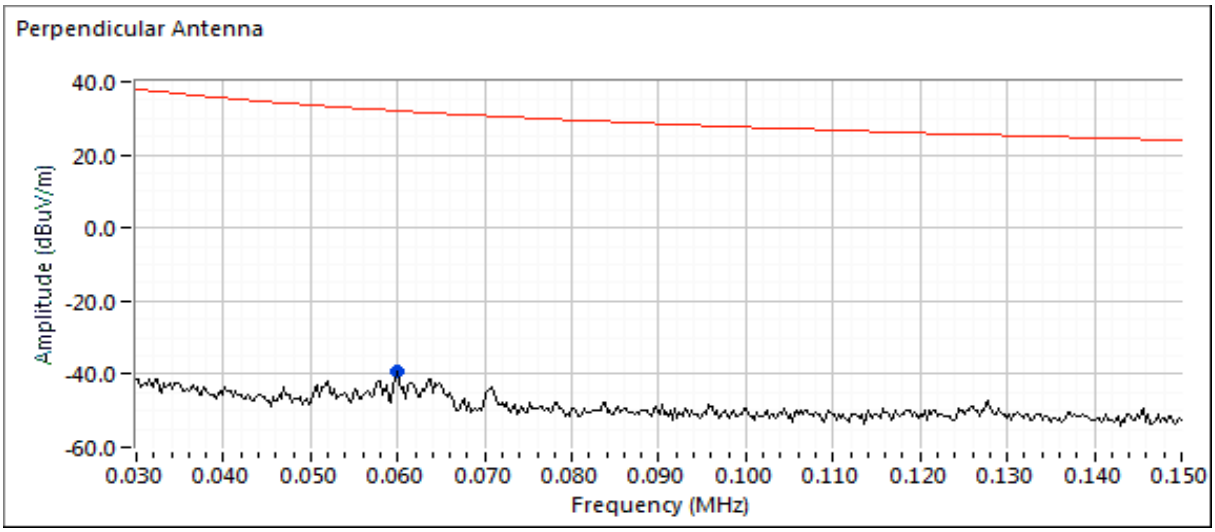
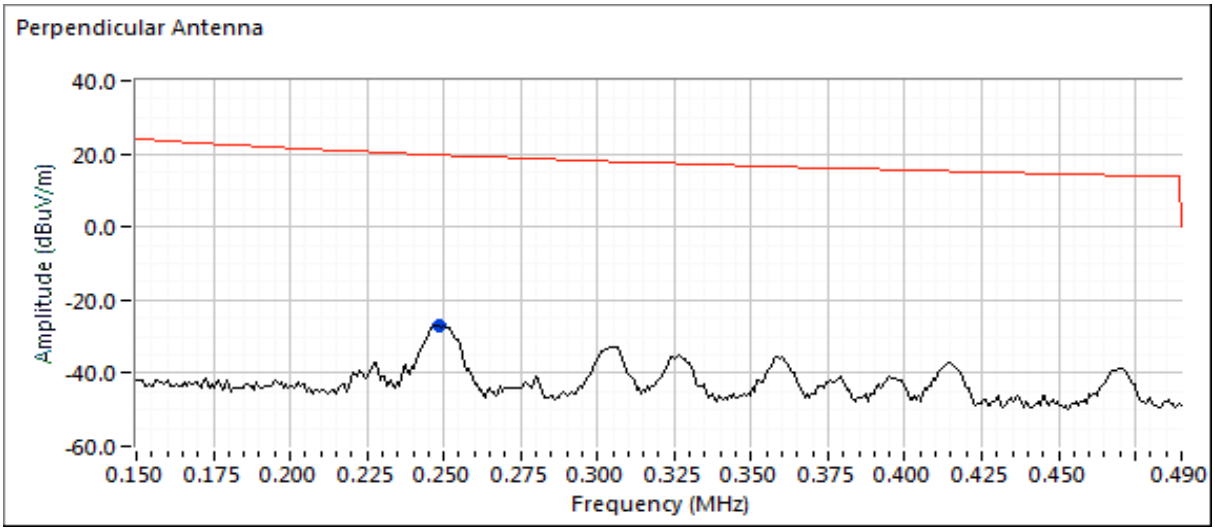
|---|---|---|---|
| Client: | STraffic America,LLC | PR Number: | PR124988-00 |
| Model: | Faregate | T-Log Number: | TL124988-00-RA |
| | | Project Manager: | Christine Krebill |
| Contact: | Dave Pedersen | Project Engineer: | David Bare |
| Standard: | FCC Part 15 | Class: | - |



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|---|---|---|---|
| Client: | STraffic America,LLC | PR Number: | PR124988-00 |
| Model: | Faregate | T-Log Number: | TL124988-00-RA |
| | | Project Manager: | Christine Krebill |
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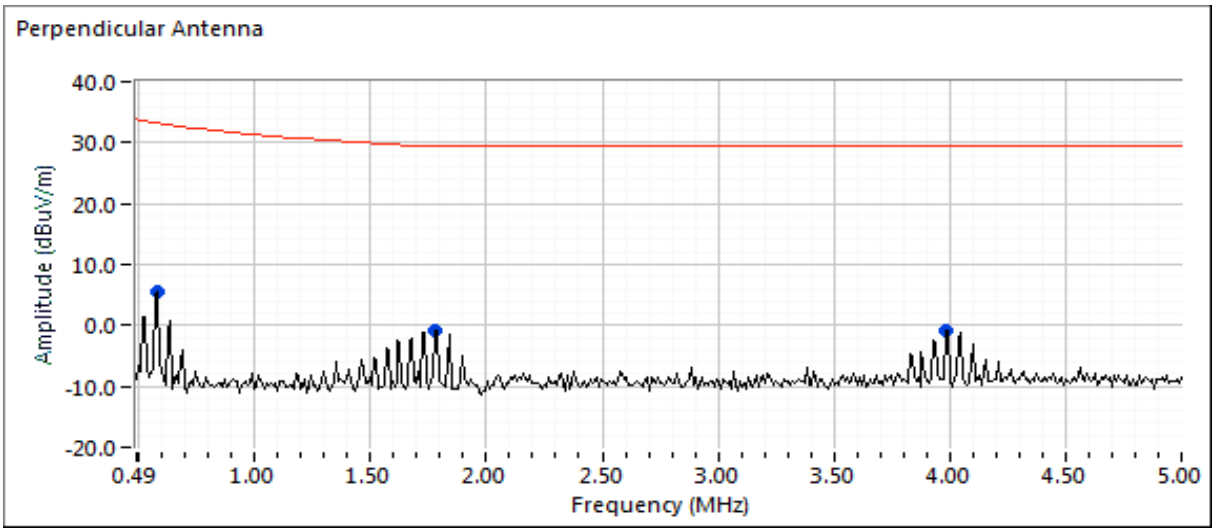
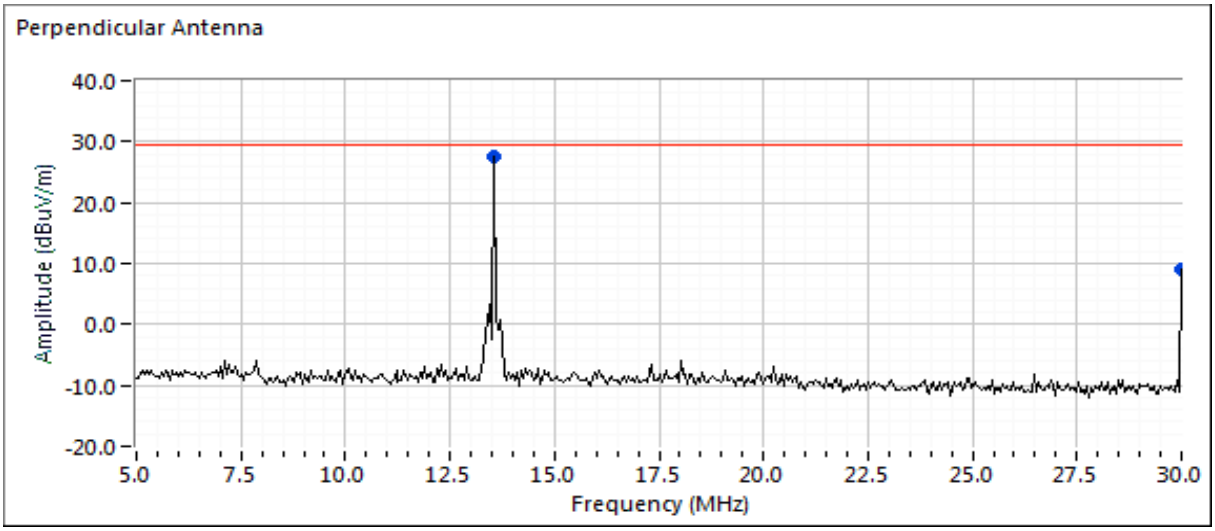
| Standard: | FCC Part 15 | Class: | - |



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|---|---|---|---|
| Client: | STraffic America,LLC | PR Number: | PR124988-00 |
| Model: | Faregate | T-Log Number: | TL124988-00-RA |
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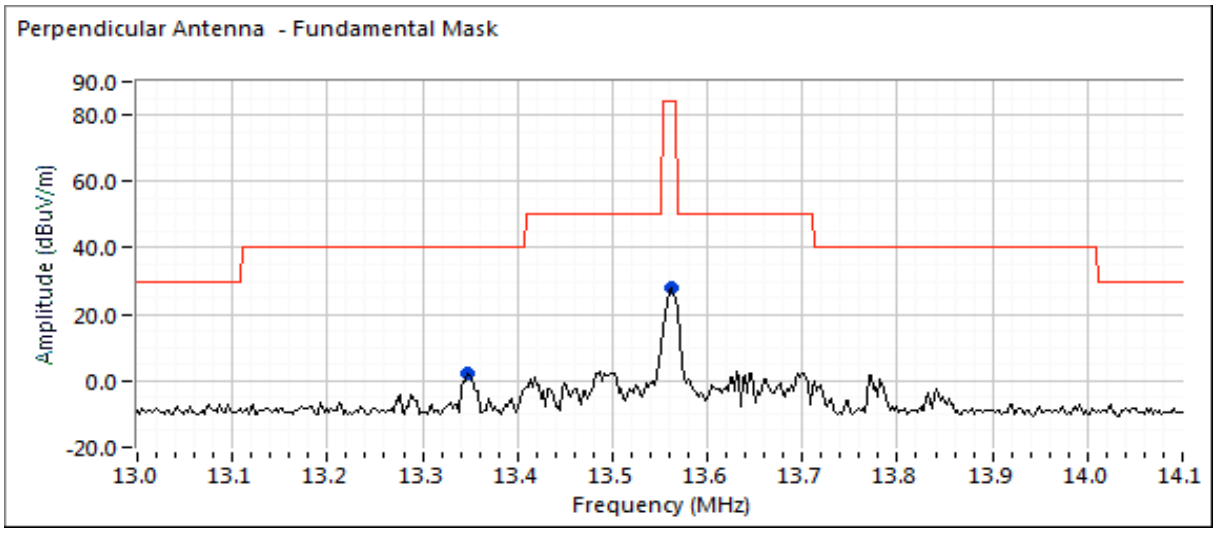
| Standard: | FCC Part 15 | Class: | - |



| | | | |
|---|---|---|---|
| Client: | STraffic America,LLC | PR Number: | PR124988-00 |
| Model: | Faregate | T-Log Number: | TL124988-00-RA |
| | | Project Manager: | Christine Krebill |
| Contact: | Dave Pedersen | Project Engineer: | David Bare |
| Standard: | FCC Part 15 | Class: | - |

Preliminary readings

| Frequency | Level | Pol | FCC 15.209 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 0.071 | -34.6 | O | 30.6 | -65.2 | Peak | 287 | 1.3 | |
| 0.122 | -43.6 | O | 25.8 | -69.4 | Peak | 236 | 1.3 | |
| 0.248 | -18.2 | O | 19.7 | -37.9 | Peak | 290 | 1.3 | |
| 0.305 | -25.7 | O | 17.9 | -43.6 | Peak | 289 | 1.3 | |
| 0.578 | 12.2 | O | 33.2 | -21.0 | Peak | 298 | 1.3 | |
| 1.789 | 5.3 | O | 29.5 | -24.2 | Peak | 284 | 1.3 | |
| 3.989 | 5.1 | O | 29.5 | -24.4 | Peak | 275 | 1.3 | |
| 13.560 | 32.4 | O | 84.0 | -51.6 | Peak | 256 | 1.3 | Fundamental |
| 30.000 | 9.4 | O | 29.5 | -20.1 | Peak | 256 | 1.3 | |
| 13.562 | 33.2 | O | 84.0 | -50.8 | Peak | 80 | 1.3 | Fundamental Mask |
| 13.773 | 4.8 | O | 40.5 | -35.7 | Peak | 270 | 1.3 | Fundamental Mask |
| | | | | | | | | |
| *0.071* | *-32.9* | *C* | *30.6* | *-63.5* | *Peak* | *0* | *1.3* | |
| *0.249* | *-23.6* | *C* | *19.7* | *-43.3* | *Peak* | *232* | *1.3* | |
| *0.580* | *8.0* | *C* | *33.2* | *-25.2* | *Peak* | *349* | *1.3* | |
| *1.791* | *3.5* | *C* | *29.5* | *-26.0* | *Peak* | *340* | *1.3* | |
| 3.989 | 7.6 | C | 29.5 | -21.9 | Peak | 210 | 1.3 | |
| 13.561 | 24.4 | C | 84.0 | -59.6 | Peak | 188 | 1.3 | Fundamental |
| 20.305 | 8.6 | C | 29.5 | -20.9 | Peak | 227 | 1.3 | |
| 30.000 | 13.5 | C | 29.5 | -16.0 | Peak | 324 | 1.3 | |
| 13.562 | 25.9 | C | 84.0 | -58.1 | Peak | 44 | 1.3 | Fundamental Mask |
| 13.778 | -2.9 | C | 40.5 | -43.4 | Peak | 222 | 1.3 | Fundamental Mask |
| | | | | | | | | |
| 0.060 | -39.3 | P | 32.0 | -71.3 | Peak | 62 | 1.3 | |
| 0.249 | -26.8 | P | 19.7 | -46.5 | Peak | 271 | 1.3 | |
| 0.580 | 5.6 | P | 33.2 | -27.6 | Peak | 298 | 1.3 | |
| 1.782 | -0.7 | P | 29.5 | -30.2 | Peak | 289 | 1.3 | |
| 3.988 | -0.7 | P | 29.5 | -30.2 | Peak | 289 | 1.3 | |
| 13.567 | 27.6 | P | 84.0 | -56.4 | Peak | 65 | 1.3 | Fundamental |
| 30.000 | 9.0 | P | 29.5 | -20.5 | Peak | 230 | 1.3 | |
| 13.562 | 28.1 | P | 84.0 | -55.9 | Peak | 232 | 1.3 | Fundamental Mask |
| 13.348 | 2.3 | P | 40.5 | -38.2 | Peak | 220 | 1.3 | Fundamental Mask |

| | |
|---|---|
| Note 1: | The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, with a peak limit 20dB above the average limit. |
| Note 2: | O = Open Antenna, C = Closed Antenna, P = Perpendicular Antenna Orientation |

| | | | |
|---|---|---|---|
| Client: | STraffic America,LLC | PR Number: | PR124988-00 |
| Model: | Faregate | T-Log Number: | TL124988-00-RA |
| | | Project Manager: | Christine Krebill |
| Contact: | Dave Pedersen | Project Engineer: | David Bare |
| Standard: | FCC Part 15 | Class: | - |

Maximized readings (includes manipulation of EUT interface cables)

| Frequency | Level | Pol | FCC 15.209 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 30.000 | 19.9 | C | 29.5 | -9.6 | QP | 324 | 1.3 | QP (1.00s) |
| 30.000 | 17.3 | O | 29.5 | -12.2 | QP | 256 | 1.3 | QP (1.00s) |
| 0.578 | 13.1 | O | 33.2 | -20.1 | QP | 298 | 1.3 | QP (1.00s) |
| 3.989 | 7.6 | C | 29.5 | -21.9 | QP | 210 | 1.3 | QP (1.00s) |
| 0.248 | -21.7 | O | 19.7 | -41.4 | AVG | 290 | 1.3 | AVG (0.10s) |

| | |
|---|---|
| Note 1: | The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, with a peak limit 20dB above the average limit. |
| Note 2: | O = Open Antenna, C = Closed Antenna, P = Perpendicular Antenna Orientation |

# Appendix C Product Labeling Requirements

The following information has been provided to clarify notification, equipment labeling requirements and information that must be included in the operator's manual. These requirements may be found in the standards/regulations listed in the scope of this report.

### Label Location

The required label(s) must be in a *conspicuous location* on the product, which is defined as any location readily visible to the user of the device without the use of tools.

### Label Attachment

The label(s) must be *permanently attached* to the product, which is defined as attached such that it can normally be expected to remain fastened to the equipment during the equipment's expected useful life. A paper gum label will generally not meet this condition.

### United States Class A Label

> This device complies with Part 15 of FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

If the device is too small or for such use that it is not practicable to place the US label statement on it, the statement shall be placed in a prominent location in the instruction manual or pamphlet supplied in paper form with the product. If not it shall be placed on the container in which the device is marketed or on a paper insert or removable tag on the product.

For FCC, a unique identifier shall appear on the product label. The importer or manufacturer shall maintain adequate identification records to facilitate positive identification of each product sold.

For a product incorporating a Certified module, the label shall also include the text “Contains FCC ID:“ followed by the FCC ID of the module(s).

# Appendix D User Manual Regulatory Statements

Where special accessories, such as shielded cables, are required in order to meet the emission limits, appropriate instructions regarding the need to use such accessories must be contained on the first page of text concerned with the installation of the device in the operator's manual.

A requirement by FCC regulations, and recommended for all regulatory markets, is a cautionary statement to the end user that changes or modifications to the device not expressly approved by you, the manufacturer, could void their right to operate the equipment.

### *United States Class A Manual Statement*

> **NOTE:** This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Note: Additional information about corrective measures may also be provided to the user at the company's option.

The FCC has indicated that the radio interference statement be bound in the same manner as the operator's manual. Thus, a loose-leaf insert page in a bound or center-spine and stapled manual would not meet this condition.

# Appendix E Basic and Reference Standards

***Subpart B of Part 15 of FCC Rules for digital devices.***

FCC Part 15 Subpart B references the use of ANSI C63.4–2014: "*Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz*" for the purposes of evaluating the radiated and conducted emissions from digital devices.

***End of Report***

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