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Project 17712-15

**Triax Technologies  
SIM-P**

**Wireless Certification Report**

Prepared for:

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Triax Technologies  
66 Fort Point Street  
Norwalk, CT 06855

By

Professional Testing (EMI), Inc.  
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4 May 2016

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Reviewed by

A handwritten signature in black ink, appearing to read "Larry Finn".

Larry Finn  
Chief Technical Officer

Written by

A handwritten signature in black ink, appearing to read "Eric Lifsey".

Eric Lifsey  
EMC Engineer

**Revision History**

| <b>Revision Number</b> | <b>Description</b>                    | <b>Date</b> |
|------------------------|---------------------------------------|-------------|
| 00                     | Draft for client and internal review. | 1 Mar 2016  |
| 01                     | Final; revised with IC CN.            | 4 May 2016  |
|                        |                                       |             |
|                        |                                       |             |

Corrections:

None.

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# Compliance Certificate

| Applicant                                                                                                           | Device & Test Identification                                                                                |
|---------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| Triax Technologies (Justin Morgenthau)<br>66 Fort Point Street<br>Norwalk, CT 06855<br>Certificate Date: 1 May 2016 | FCC ID: 2AGHISIM-P<br>Industry Canada ID: 21358-SIM-P<br>Model(s): SIM-P<br>Laboratory Project ID: 17712-15 |

The device named above was tested utilizing the following documents and found to be in compliance with the required criteria:

| Requirement          | Reference                                  | Detail                                                                                                                       |
|----------------------|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| FCC 47 CFR Part 15 C | 15.247                                     | Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.                                                  |
| FCC 47 CFR Part 15 C | 15.209                                     | Radiated emission limits; general requirements.                                                                              |
| FCC 47 CFR Part 15 C | 15.107, 15.207                             | Conducted emission limits.                                                                                                   |
| FCC 47 CFR Part 15 C | 15.205                                     | Restricted Bands of Operation                                                                                                |
| KDB 558074 D01       | DR01                                       | DTS Measurement Guidance v03r02                                                                                              |
| KDB 412172           | D01                                        | Guidelines for Determining the ERP and EIRP of an RF Transmitting System                                                     |
| OET Bulletin 65*     | Edition 97-01, and Supplement C, Ed. 01-01 | Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields                        |
| RSS-247              | Issue 1                                    | Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices |
| RSS-Gen              | Issue 4                                    | General Requirements and Information for the Certification of Radio Apparatus                                                |
| RSS-102              | Issue 4                                    | Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)                               |

\*MPE is reported separately from this document. \*\*Corresponding RSS references are listed in the body of the report.

I, Eric Lifsey, for Professional Testing (EMI), Inc., being familiar with the above requirements and test procedures have reviewed the test setup, measured data, and this report. I believe them to be true and accurate.

Eric Lifsey  
EMC Engineer

This report has been reviewed and accepted by the Applicant. The undersigned is responsible for ensuring that this device will continue to comply with the requirements listed above.

\_\_\_\_\_  
Representative of Applicant

## 1.0 Introduction

### 1.1 Scope

This report describes the extent to which the equipment under test (EUT) conformed to the intentional radiator requirements of the United States and Canada.

Professional Testing (EMI), Inc., (PTI) follows the guidelines of National Institute of Standards and Technology (NIST) for all uncertainty calculations, estimates, and expressions thereof for electromagnetic compatibility testing.

### 1.2 EUT Description

| Table 1.2.1: Equipment Under Test |          |                                                                               |
|-----------------------------------|----------|-------------------------------------------------------------------------------|
| Manufacturer / Model              | Serial # | Description                                                                   |
| Triax Technologies<br>SIM-P       | 221*     | 2400-2483.5 MHz FHSS transceiver; using Bluetooth Low Energy radio protocols. |

\*This was the normal firmware sample. Additional non-serial numbered samples were programmed to operate on fixed frequencies as needed for various tests.

| Table 1.2.2: Support Equipment |          |             |
|--------------------------------|----------|-------------|
| Manufacturer / Model           | Serial # | Description |
| none                           |          | none        |

The EUT designed as a remote sensor of impact forces experienced by participants in contact sports.

The EUT measures approximately 33 mm x 13 mm x 9 mm. It includes a permanently embedded rechargeable battery. It plugs into a small adapter that connects the flush charging pins to a typical USB power source to charge. It uses about 25 mA of current when in operation.

### 1.3 EUT Operation

The EUT was exercised in a manner consistent with normal operations.

The EUT was tested as a DTS device as its bandwidth satisfies the DTS minimum bandwidth requirements. In the final application it will be also hopping per the Bluetooth protocol.

### 1.4 Modifications to Equipment

No modifications were made to the EUT during the performance of the test program.

### 1.5 Test Site

Measurements were made at the PTI semi-anechoic facility designated Site 45 (FCC 459644, IC 3036B-1) in Austin, Texas. The site is registered with the FCC under Section 2.948 and Industry Canada per RSS-GEN, and is subsequently confirmed by laboratory accreditation (NVLAP). The test site is located at 11400 Burnet Road, Austin, Texas 78758, while the main office is located at 1601 North A.W. Grimes Boulevard, Suite B, Round Rock, Texas, 78665.

## 1.6 Radiated Measurements

Radiated levels are determined as follows:

$$\text{Raw Measured Level} + \text{Antenna Factor} + \text{Cable Losses} - \text{Amplifier Gain} = \text{Corrected Level}$$

Conducted RF levels, if applicable, are determined as follows:

$$\text{Raw Measured Level} + \text{Attenuator Factor} + \text{Cable Losses} = \text{Corrected Level}$$

Conducted mains levels are determined as follows:

$$\text{Raw Measured Level} + \text{LISN Factor} + \text{Cable/Filter/Limiter Losses} = \text{Corrected Level}$$

Additionally, measurement distance extrapolation factors are applied and documented where used.

## 1.7 Applicable Documents and Clauses

| Table 1.7.1: Applicable Documents |                                                                                                                                     |
|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| Document                          | Title                                                                                                                               |
| 47 CFR                            | Part 15 – Radio Frequency Devices<br>Subpart C -Intentional Radiators                                                               |
| RSS-247 Issue 1                   | Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices        |
| RSS-Gen Issue 4                   | General Requirements and Information for the Certification of Radio Apparatus                                                       |
| ANSI C63.4 2009                   | American National Standard for Methods of Measurement of Radio-Noise Emissions from Low Voltage Electrical and Electronic Equipment |

| Table 1.7.2: Applicable Clauses |                                      |                                  |
|---------------------------------|--------------------------------------|----------------------------------|
| Parameter                       | FCC Part 15 Rule Paragraphs          | IC RSS References                |
| Transmitter Characteristics     | 15.247                               | RSS-247 5.2 (DTS) & 5.4, RSS-Gen |
| Bandwidth                       | 15.247(a)(1), 2.1049, KDB 558074 D01 | RSS-Gen 4.6                      |
| Spurious Emission               | 15.247, 15.209, 15.205               | RSS-247 5.5, RSS-GEN 4.9, 4.10   |
| Band Edge                       | 15.247, 15.205                       | RSS-247 5.5, RSS-Gen 4.9         |
| Antenna Requirement             | 15.203                               | RSS-Gen 8.3                      |
| Conducted Emissions, Mains      | 15.207                               | RSS-Gen 8.8                      |

## 2.0 Fundamental Power

### 2.1 Test Procedure

Peak power is measured using radiated means with modulation. The transmitter hopping sequence is disabled to operate on a single channel for the measurement.

### 2.2 Test Criteria

| 47 CFR (USA) // IC (Canada) |                                                                                                    |            |
|-----------------------------|----------------------------------------------------------------------------------------------------|------------|
| Section Reference           | Parameter                                                                                          | Date       |
| 15.247(a)(3) // RSS-247 5.2 | Fundamental Power<br>Conducted Limits<br>1 W<br>Limit Restated as Field: 125.23 dB $\mu$ V/m @ 3 m | 3 Feb 2016 |

### 2.3 Test Results, Peak Power

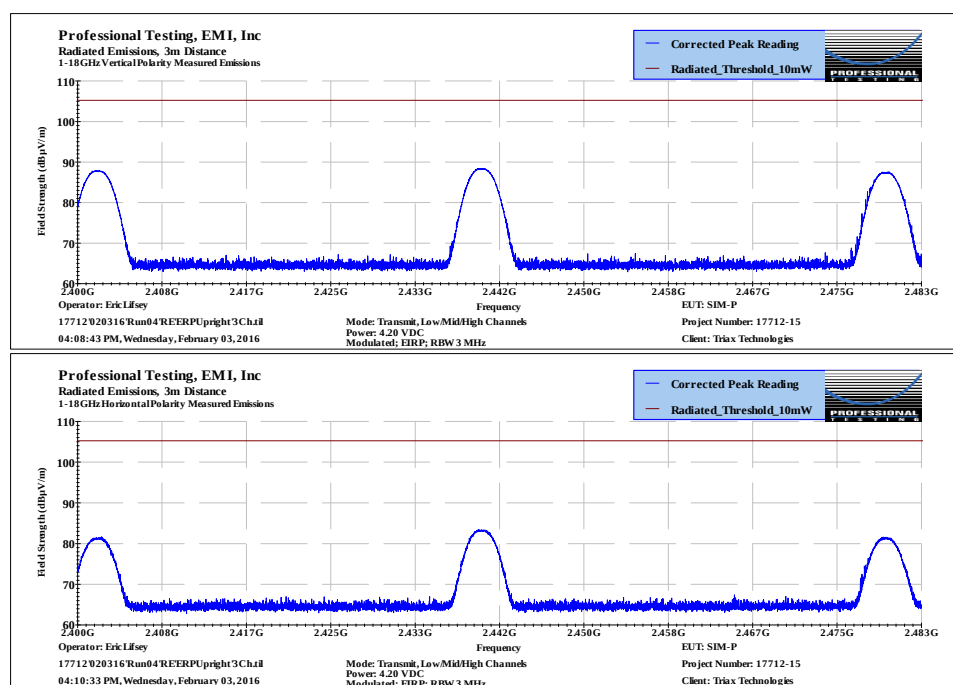
The EUT was measured for radiated power in three orthogonal orientations; the maximum orientation is reported below.

**Table 2.3.1 Power, Peak, Radiated; Orientation: Upright**

| Frequency MHz | Measured Peak Power dB $\mu$ V/m @ 3 m Vertical Polarity | Maximum Measured Peak Power Restated as EIRP in dBm | Maximum Measured Peak Power Restated as EIRP in mW |
|---------------|----------------------------------------------------------|-----------------------------------------------------|----------------------------------------------------|
| 2402          | 87.8                                                     | -7.43                                               | 0.181                                              |
| 2440          | 88.4                                                     | -6.83                                               | 0.208                                              |
| 2480          | 87.6                                                     | -7.63                                               | 0.173                                              |

Measured in 3 MHz RBW, 3 MHz VBW.

The EUT was satisfied the requirements. Plotted measurements appear below.



## 2.4 Test Results, Duty Cycle

Measurement is based on intervals not to exceed 100 msec. Maximum transmitter on time is divided by the lesser of 100 msec or the actual measured minimum transmitter interval time. The result is converted to dB and applied as needed to peak measurements of transmitter artifacts to determine average power. This is not a pass/fail measurement.

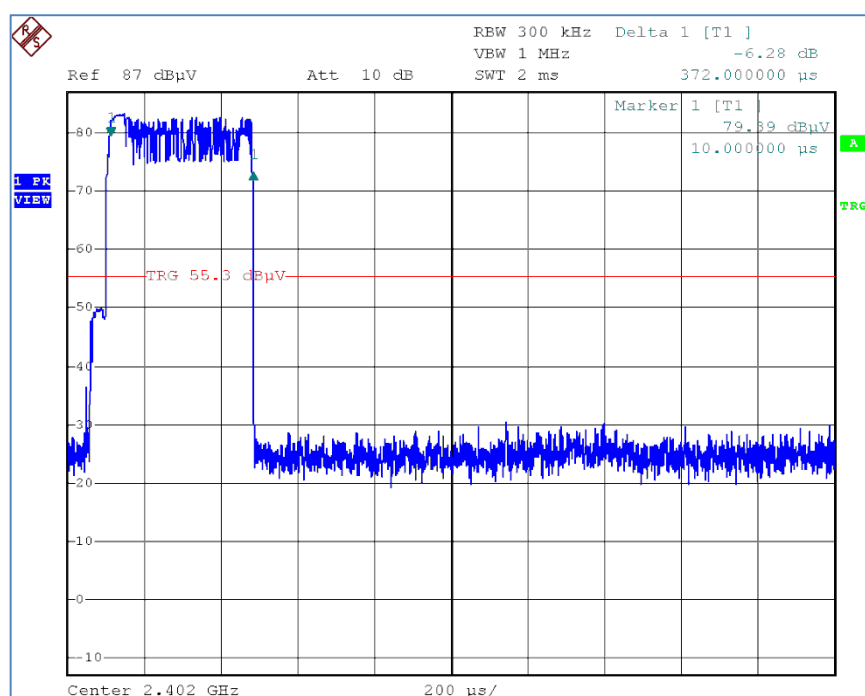
The EUT was placed ~3 cm from the sense antenna and provoked to transmit by tapping it on the surface beneath it to simulate impacts. The EUT communicated with a personal device (iPod) that was located about 1 meter away. The signal was verified as being from the EUT and measurements were taken.

**Table 2.5.1 Duty Cycle Results and Average Duty Cycle Factor Result**

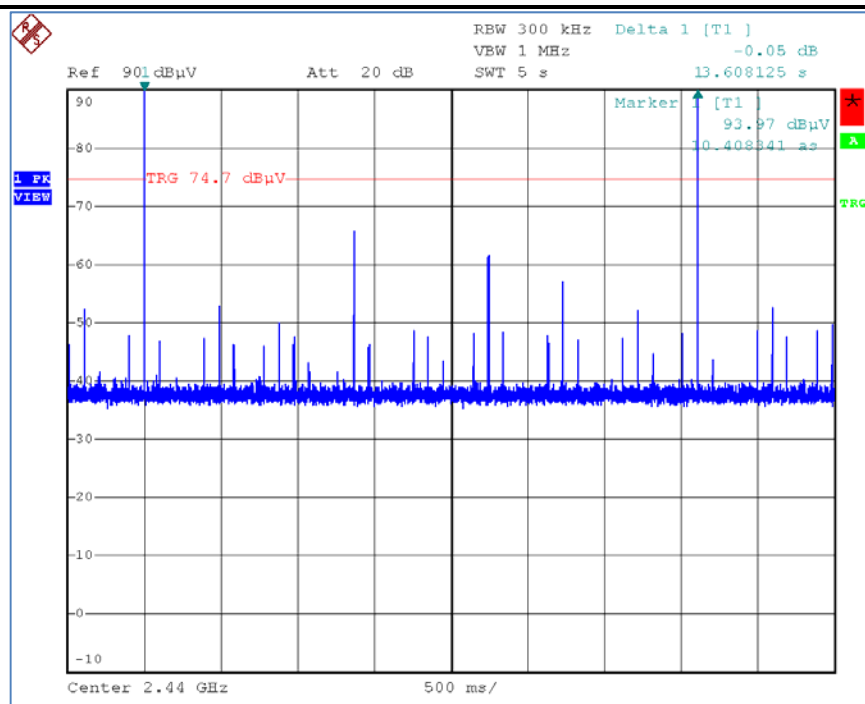
| Measured On Time (msec) | Measured Time Interval (msec) | Duty Cycle Factor Calculation                              | Result (dB) | Duty Cycle Factor Allowed (dB) |
|-------------------------|-------------------------------|------------------------------------------------------------|-------------|--------------------------------|
| 0.372                   | 13,600                        | $= 20 * \log_{10} (0.372 \text{ msec} / 100 \text{ msec})$ | -48.6       | -20.0                          |

The allowed duty cycle factor is applied to peak measured harmonic signals to find average levels.

Plotted results appear below.



**Transmit On Time**



### Transmit Period

### 3.0 Power Spectral Density

#### 3.1 Test Procedure

A spectrum analyzer is either connected directly to the EUT or used by radiated means to measure the fundamental emission. It is adjusted to measure the power spectral density in the specified resolution bandwidth.

#### 3.2 Test Criteria

| 47 CFR (USA) // IC (Canada) |                                                                                                                              |      |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------|------|
| Section Reference           | Parameter                                                                                                                    | Date |
| 15.247(e) // RSS-247, 5.2   | Power Spectral Density, Conducted<br>Limit: 8 dBm / 3 kHz<br>Restated as field strength limit:<br>103.23 dB $\mu$ V/m at 3 m | NA   |

#### 3.3 Test Results

The fundamental peak power measured below the limit for this test and at a greater resolution bandwidth; the EUT satisfies the criteria without additional measurement.

## 4.0 Occupied Bandwidth

### 4.1 Test Procedure

Bandwidth is measured by radiated means. A recording of the results is included.

### 4.2 Test Criteria

| 47 CFR (USA) // IC (Canada)                         |                        |            |
|-----------------------------------------------------|------------------------|------------|
| Section Reference                                   | Parameter              | Date(s)    |
| 14.247(a)(2), 2.1049, KDB 558074 D01 // RSS-Gen 4.6 | Bandwidth, 6 dB, 20 dB | 3 Feb 2016 |

### 4.3 Test Results

The bandwidth measurement is used to verify DTS characteristics and/or for general reporting for agency application.

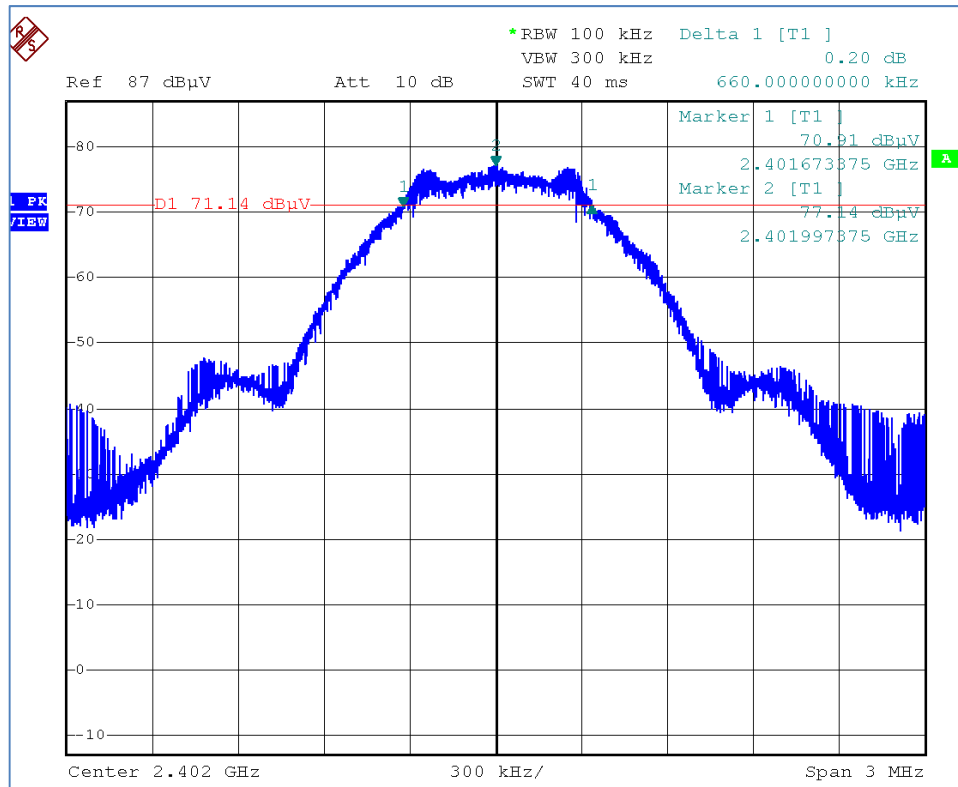
The EUT was found to be in compliance with applicable requirements.

| Table 5.3.1 Bandwidth 6 dB, Minimum 500 kHz in 100 kHz RBW |                               |                                |                           |
|------------------------------------------------------------|-------------------------------|--------------------------------|---------------------------|
| Low Channel Measured BW (kHz)                              | Mid Channel Measured BW (kHz) | High Channel Measured BW (kHz) | Reported Minimum BW (kHz) |
| 660                                                        | 666                           | 666                            | 660                       |

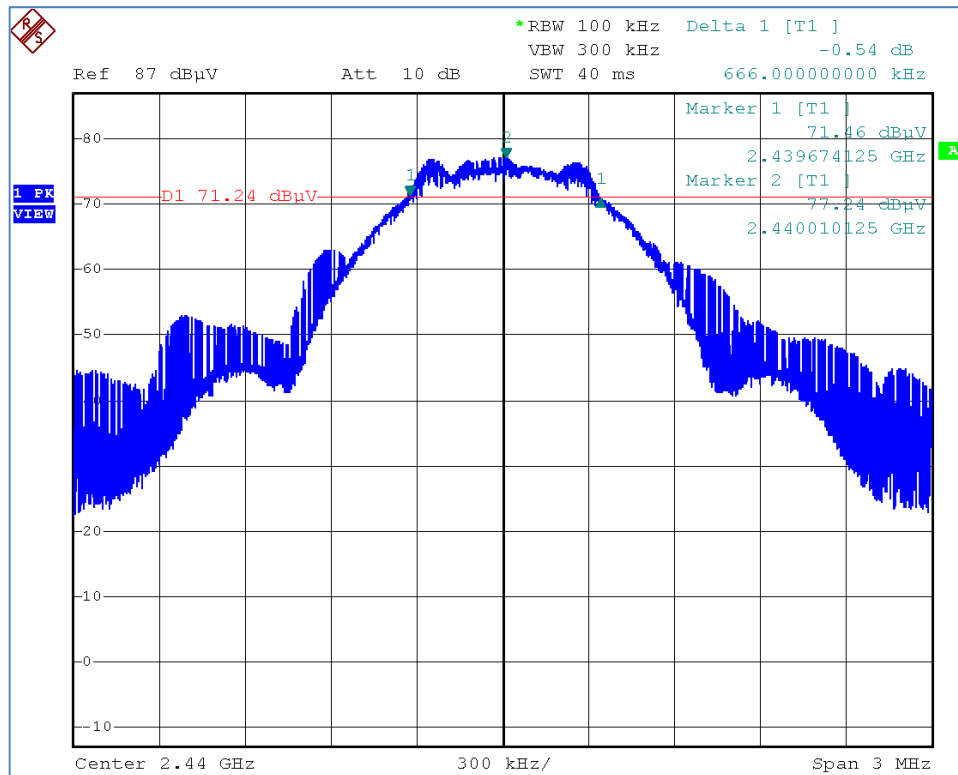
| Table 5.3.2 Bandwidth 20 dB, Measure and Report |                               |                                |                           |
|-------------------------------------------------|-------------------------------|--------------------------------|---------------------------|
| Low Channel Measured BW (kHz)                   | Mid Channel Measured BW (kHz) | High Channel Measured BW (kHz) | Reported Maximum BW (kHz) |
| 1098                                            | 1218                          | 1254                           | 1254                      |

Plotted measurements appear on the following pages.

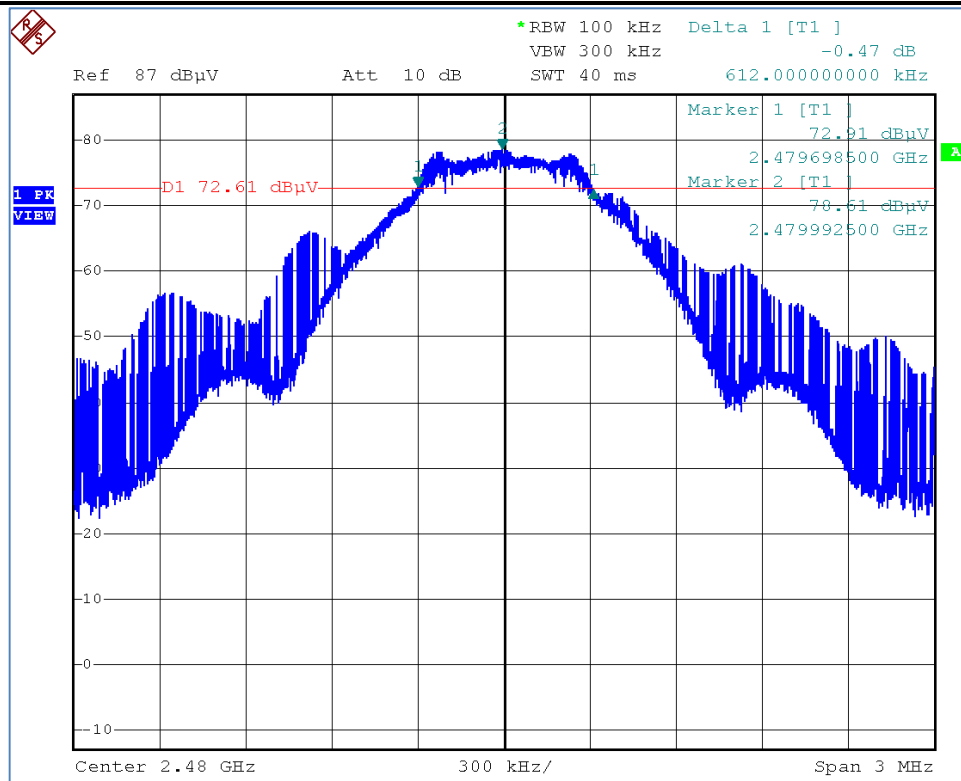
### 4.3.1 Bandwidth Plots, 6 dB



6 dB, Low Channel

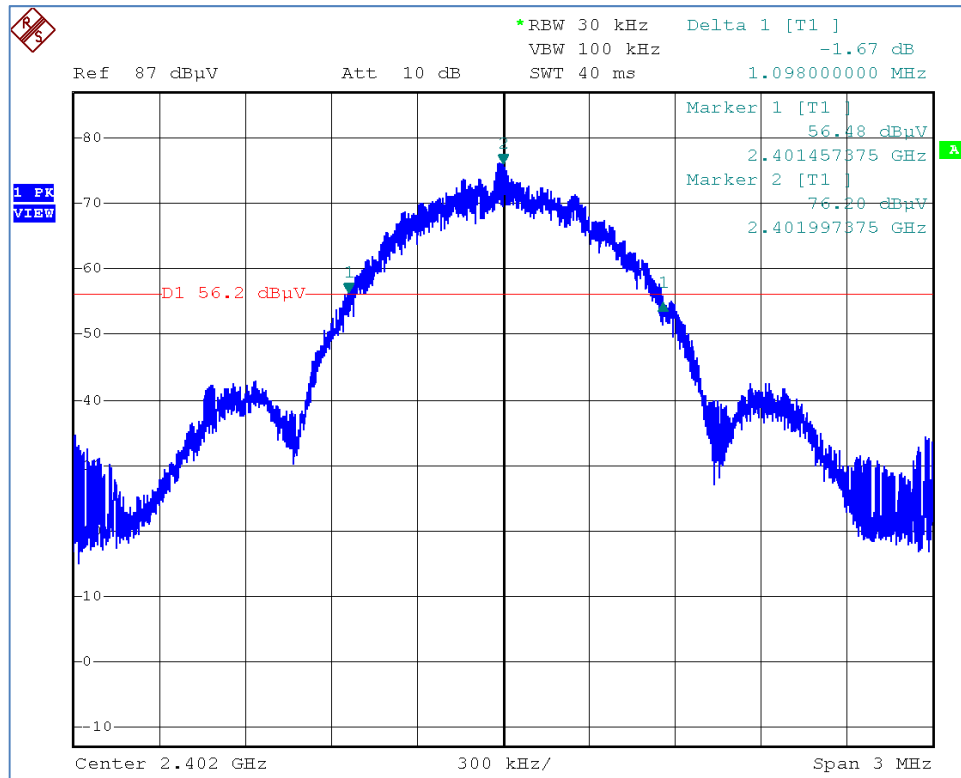


6 dB, Middle Channel

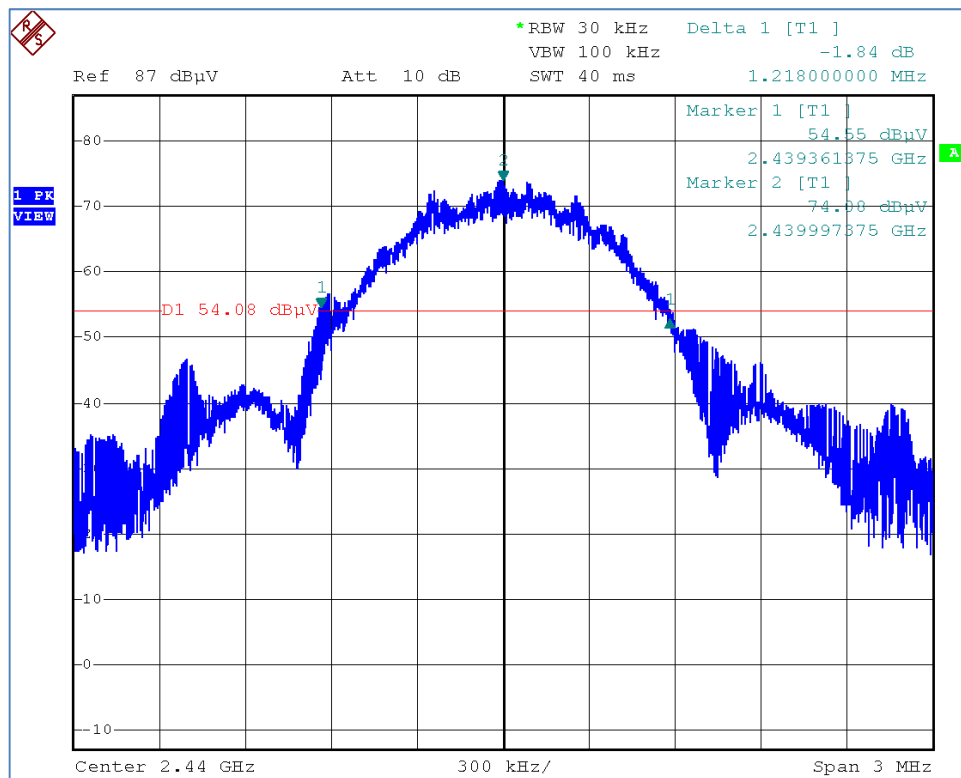


6 dB, High Channel

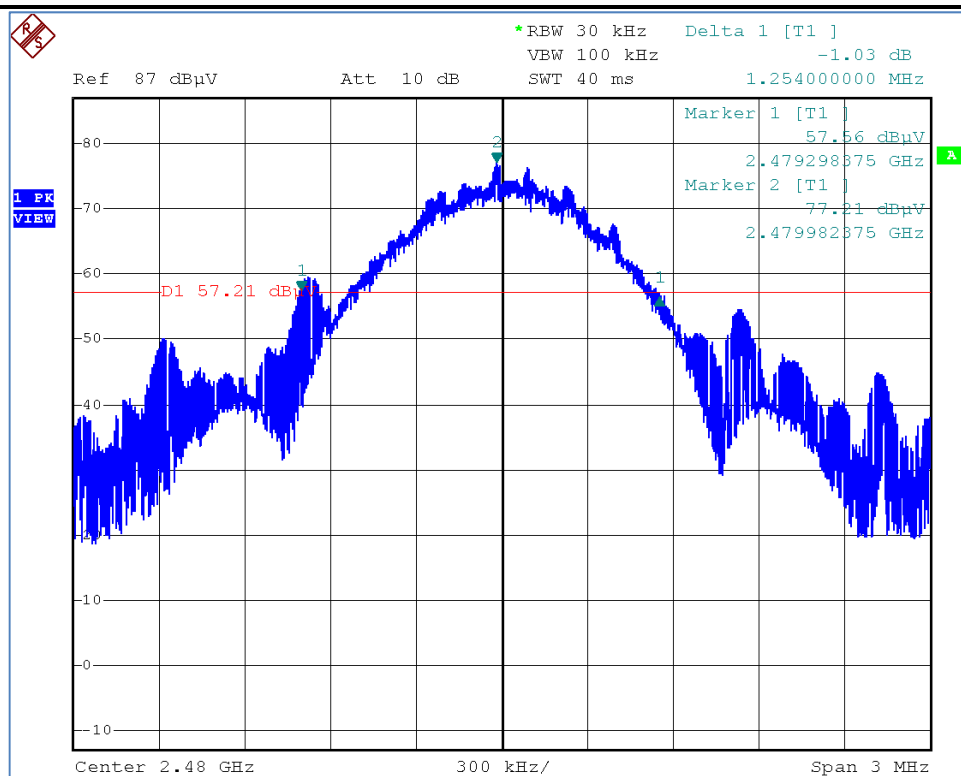
### 4.3.2 Bandwidth Plots, 20 dB



20 dB, Low Channel



20 dB, Middle Channel



20 dB, High Channel

## 5.0 Band Edge

### 5.1 Test Procedure

EUT is placed into normal transmit operation on the nearest band edge channel. The spectrum analyzer is approximately centered on the band edge frequency with span sufficient to include the peak of the adjacent fundamental signal. Measurement includes at least two standard bandwidths from the respective band edge. If required, the band-edge marker-delta method of C63.4 is utilized.

### 5.2 Test Criteria

| 47 CFR (USA) // IC (Canada)                |                                                          |            |
|--------------------------------------------|----------------------------------------------------------|------------|
| Section Reference                          | Parameter                                                | Date(s)    |
| 15.247, 15.205 // RSS-247 5.5, RSS-Gen 4.9 | Unwanted Emissions Adjacent to Authorized Band, Radiated | 4 Feb 2016 |

### 5.3 Test Results

Measurements included more than 2 standard bandwidths (standard bandwidth 1 MHz) from the band edges to provide a clear view of the fundamental and the declining emission levels. Peak detection with max-hold was employed.

Peak detection of emissions at both band edges were below the general emission limits for average limit levels. Also, the duty cycle averaging factor applies -20.0 dB to the peaks recorded.

The EUT satisfied the criteria. Plotted results appears on the following pages.

## 5.3.1 Low Channel Band Edge

| Professional Testing, EMI, Inc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                     |                              |               |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|------------------------------|---------------|
| <b>Test Method:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | ANSI C63.10-2013 American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices     |                              |               |
| <b>In accordance with:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | FCC Part 15.209 - Code of Federal Regulations Part 47, Subpart C - Intentional Radiators, Radiated Emissions Limits |                              |               |
| <b>Section:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 15.209                                                                                                              |                              |               |
| <b>Test Date(s):</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 2/4/2016                                                                                                            | <b>EUT Serial #:</b>         | none          |
| <b>Customer:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Triax Technologies                                                                                                  | <b>EUT Part #:</b>           | none          |
| <b>Project Number:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 17712-15                                                                                                            | <b>Test Technician:</b>      | Eric Lifsey   |
| <b>Purchase Order #:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | NA                                                                                                                  | <b>Supervisor:</b>           | Lisa Arndt    |
| <b>Equip. Under Test:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | SIM-P                                                                                                               | <b>Witness' Name:</b>        | None          |
| <b>Radiated Emissions Test Results Data Sheet</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                     | <b>Page:</b>                 | <b>1 of 1</b> |
| <b>EUT Line Voltage:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 4.2 VDC                                                                                                             | <b>EUT Power Frequency:</b>  | 0 N/A         |
| <b>Antenna Orientation:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Vertical                                                                                                            | <b>Frequency Range:</b>      | Above 1GHz    |
| <b>Band Edge; Low; EUT Mode of Operation:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                     | <b>Transmit; Low Channel</b> |               |
| <div style="display: flex; justify-content: space-between;"> <div style="width: 60%;"> <p>Professional Testing, EMI, Inc<br/>Radiated Emissions, 3m Distance<br/>1-18GHz Vertical Polarity Measured Emissions</p> <p>Operator: Eric Lifsey<br/>17712\020416\Run02\RE\TxBandEdgeLower.tif<br/>01:50:48 PM, Thursday, February 04, 2016</p> </div> <div style="width: 35%;"> <p style="text-align: center;">Frequency</p> <p style="text-align: right;">EUT: SIM-P<br/>Project Number: 17712-15<br/>Client: Triax Technologies</p> </div> </div> |                                                                                                                     |                              |               |
| > 1GHz Vertical Antenna Polarity Measured Emissions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                     |                              |               |

## 5.3.2 High Channel Band Edge

## Professional Testing, EMI, Inc.

|                     |                                                                                                                     |                  |             |
|---------------------|---------------------------------------------------------------------------------------------------------------------|------------------|-------------|
| Test Method:        | ANSI C63.10-2013 American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices     |                  |             |
| In accordance with: | FCC Part 15.209 - Code of Federal Regulations Part 47, Subpart C - Intentional Radiators, Radiated Emissions Limits |                  |             |
| Section:            | 15.209                                                                                                              |                  |             |
| Test Date(s):       | 2/4/2016                                                                                                            | EUT Serial #:    | none        |
| Customer:           | Triax Technologies                                                                                                  | EUT Part #:      | none        |
| Project Number:     | 17712-15                                                                                                            | Test Technician: | Eric Lifsey |
| Purchase Order #:   | NA                                                                                                                  | Supervisor:      | Lisa Arndt  |
| Equip. Under Test:  | SIM-P                                                                                                               | Witness' Name:   | None        |

## Radiated Emissions Test Results Data Sheet

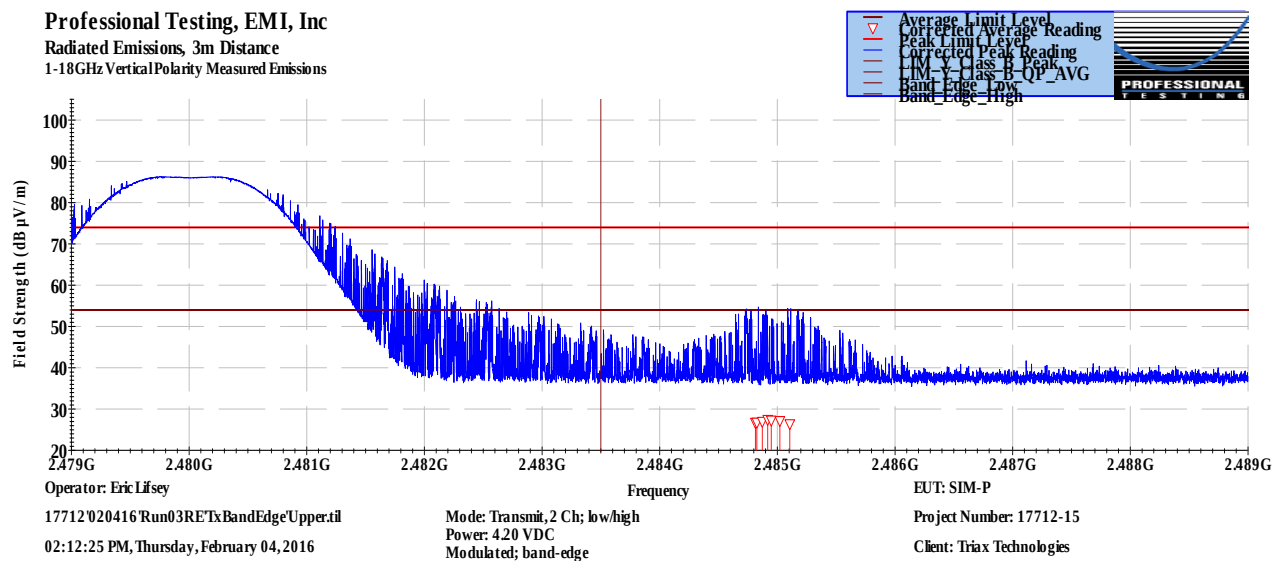
Page: 1 of 1

| EUT Line Voltage:                       |                        |                         | 4.2                     | VDC               | EUT Power Frequency:      |                          |                      | 0           | N/A          |  |
|-----------------------------------------|------------------------|-------------------------|-------------------------|-------------------|---------------------------|--------------------------|----------------------|-------------|--------------|--|
| Antenna Orientation:                    |                        |                         | Vertical                |                   | Frequency Range:          |                          |                      | Above 1GHz  |              |  |
| Band Edge; High; EUT Mode of Operation: |                        |                         |                         |                   | Transmit; Top Channel     |                          |                      |             |              |  |
| Frequency Measured (MHz)                | Test Distance (Meters) | EUT Direction (Degrees) | Antenna Height (Meters) | Detector Function | Recorded Amplitude (dBμV) | Corrected Level (dBμV/m) | Limit Level (dBμV/m) | Margin (dB) | Test Results |  |
| 2484.81                                 | 3                      | 188                     | 1                       | Average           | 35.1                      | 26.719                   | 54.0                 | -27.2       | Pass         |  |
| 2484.83                                 | 3                      | 181                     | 1                       | Average           | 35.1                      | 26.743                   | 54.0                 | -27.2       | Pass         |  |
| 2484.87                                 | 3                      | 54                      | 1                       | Average           | 35.3                      | 26.973                   | 54.0                 | -27.0       | Pass         |  |
| 2484.92                                 | 3                      | 137                     | 1                       | Average           | 35.8                      | 27.444                   | 54.0                 | -26.5       | Pass         |  |
| 2484.95                                 | 3                      | 334                     | 1                       | Average           | 35.6                      | 27.27                    | 54.0                 | -26.7       | Pass         |  |
| 2485.02                                 | 3                      | 220                     | 1                       | Average           | 35.6                      | 27.185                   | 54.0                 | -26.8       | Pass         |  |
| 2485.11                                 | 3                      | 29                      | 1                       | Average           | 34.8                      | 26.4                     | 54.0                 | -27.6       | Pass         |  |
| 2484.92                                 | 3                      | 137                     | 1                       | Peak              | 44.2                      | 35.817                   | 74.0                 | -38.1       | Pass         |  |
| 2484.95                                 | 3                      | 334                     | 1                       | Peak              | 43.6                      | 35.238                   | 74.0                 | -38.7       | Pass         |  |
| 2485.02                                 | 3                      | 220                     | 1                       | Peak              | 44.2                      | 35.801                   | 74.0                 | -38.2       | Pass         |  |

## Professional Testing, EMI, Inc.

Radiated Emissions, 3m Distance

1-18GHz Vertical Polarity Measured Emissions



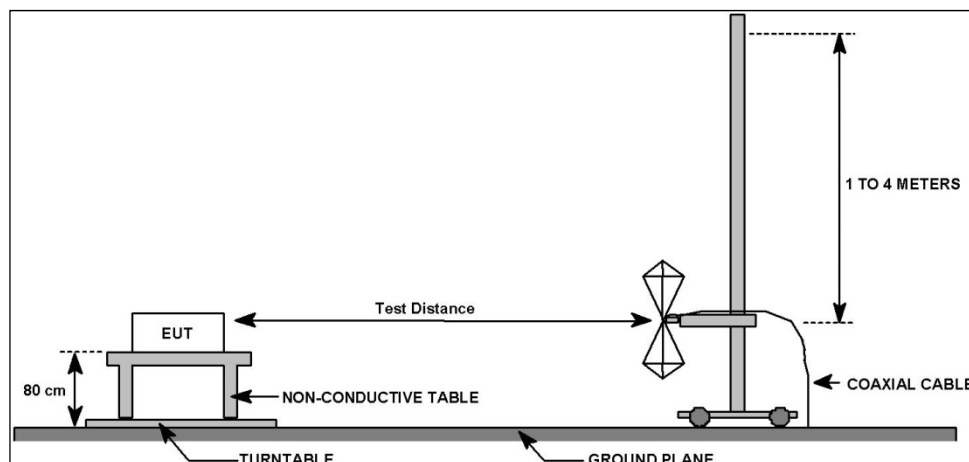
&gt; 1GHz Vertical Antenna Polarity Measured Emissions

## 6.0 Radiated Spurious Emissions, Receive Mode

### 6.1 Test Procedure

The EUT was placed on a non-conductive table 0.8 meters above the ground plane. The EUT was centered on a rotating turntable. Measurements below 1 GHz were taken at a test distance of 10 meters from the measurement antenna. Above 1 GHz the measurement distance was 3 meters.

Spurious emissions below 1 GHz were measured with quasi-peak detection with a resolution bandwidth of 120 kHz. Above 1 GHz peak measurements were taken and average measured where appropriate and 1 MHz resolution bandwidth. A diagram showing the test setup appears below.



### 6.2 Test Criteria

| 47 CFR (USA) // IC (Canada)                          |                                                                           |            |
|------------------------------------------------------|---------------------------------------------------------------------------|------------|
| Section Reference                                    | Parameter                                                                 | Date(s)    |
| 15.247, 15.209 //<br>RSS-247 5.5, RSS-Gen 4.9 & 4.10 | Field Strength of Radiated<br>Spurious/Harmonic Emissions<br>Receive Mode | 4 Feb 2016 |

### 6.3 Test Results

The EUT was tuned to the middle channel and placed in receive mode.

The EUT satisfied the criteria. Recorded data is presented below.

**Table 6.3.1: Radiated Spurious Emissions, Receive Mode, Below 1 GHz, Vertical Polarity**

| Professional Testing, EMI, Inc.            |                        |                                                                                                                     |                         |                      |                            |                          |                      |             |              |
|--------------------------------------------|------------------------|---------------------------------------------------------------------------------------------------------------------|-------------------------|----------------------|----------------------------|--------------------------|----------------------|-------------|--------------|
| Test Method:                               |                        | ANSI C63.10-2013 American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices     |                         |                      |                            |                          |                      |             |              |
| In accordance with:                        |                        | FCC Part 15.209 - Code of Federal Regulations Part 47, Subpart C - Intentional Radiators, Radiated Emissions Limits |                         |                      |                            |                          |                      |             |              |
| Section:                                   |                        | 15.209                                                                                                              |                         |                      |                            |                          |                      |             |              |
| Test Date(s):                              |                        | 2/4/2016                                                                                                            |                         |                      | EUT Serial #:              |                          | none                 |             |              |
| Customer:                                  |                        | Triax Technologies                                                                                                  |                         |                      | EUT Part #:                |                          | none                 |             |              |
| Project Number:                            |                        | 17712-15                                                                                                            |                         |                      | Test Technician:           |                          | Eric Lifsey          |             |              |
| Purchase Order #:                          |                        | NA                                                                                                                  |                         |                      | Supervisor:                |                          | Lisa Arndt           |             |              |
| Equip. Under Test:                         |                        | SIM-P                                                                                                               |                         |                      | Witness' Name:             |                          | None                 |             |              |
| Radiated Emissions Test Results Data Sheet |                        |                                                                                                                     |                         |                      |                            |                          | Page: 1 of 1         |             |              |
| EUT Line Voltage:                          |                        | 4.2 VDC                                                                                                             |                         | EUT Power Frequency: |                            | 0 N/A                    |                      |             |              |
| Antenna Orientation:                       |                        | Vertical                                                                                                            |                         |                      | Frequency Range:           |                          | 30MHz to 1GHz        |             |              |
| EUT Mode of Operation:                     |                        |                                                                                                                     |                         |                      | Receive Mode (Advertising) |                          |                      |             |              |
| Frequency Measured (MHz)                   | Test Distance (Meters) | EUT Direction (Degrees)                                                                                             | Antenna Height (Meters) | Detector Function    | Recorded Amplitude (dBμV)  | Corrected Level (dBμV/m) | Limit Level (dBμV/m) | Margin (dB) | Test Results |
| 31.3805                                    | 10                     | 129                                                                                                                 | 2.8                     | Quasi-peak           | 24.2                       | 12.743                   | 29.5                 | -16.8       | Pass         |
| 94.7165                                    | 10                     | 2                                                                                                                   | 1.4                     | Quasi-peak           | 29.5                       | 10.666                   | 33.1                 | -22.4       | Pass         |
| 548.33                                     | 10                     | 93                                                                                                                  | 2.38                    | Quasi-peak           | 22                         | 18.616                   | 35.6                 | -17.0       | Pass         |
| 882.389                                    | 10                     | 294                                                                                                                 | 3.98                    | Quasi-peak           | 21.3                       | 25.68                    | 35.6                 | -9.9        | Pass         |
| 904.85                                     | 10                     | 213                                                                                                                 | 1.54                    | Quasi-peak           | 21.3                       | 26.474                   | 35.6                 | -9.1        | Pass         |
| 934.04                                     | 10                     | 174                                                                                                                 | 2.26                    | Quasi-peak           | 21.2                       | 26.184                   | 35.6                 | -9.4        | Pass         |

Professional Testing, EMI, Inc

Radiated Emissions, 10m Distance

30MHz - 1GHz Vertical Polarity Measured Emissions

Quasi-peak Limit Level

Corrected Quasi-peak Reading

Peak Limit Level

Corrected Peak Value

Verified Low-PRF OP Reading

LPRE Verification Limit

Operator: Eric Lifsey

17712020416Run04SpurRxModel.ttl

03:57:28 PM, Thursday, February 04, 2016

Mode: Recv(advertising)

Sample: Normal operating unit

Power: 4.20 VDC Battery

EUT: SIM-P

Project Number: 17712-15

Client: Triax Technologies

≤ 1GHz Vertical Antenna Polarity Measured Emissions

≤ 1GHz Vertical Antenna Polarity Measured Emissions

**Table 6.3.2: Radiated Spurious Emissions, Receive Mode, Below 1 GHz, Horizontal Polarity**

| Professional Testing, EMI, Inc.            |                        |                                                                                                                     |                         |                      |                            |                          |                      |              |              |
|--------------------------------------------|------------------------|---------------------------------------------------------------------------------------------------------------------|-------------------------|----------------------|----------------------------|--------------------------|----------------------|--------------|--------------|
| Test Method:                               |                        | ANSI C63.10-2013 American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices     |                         |                      |                            |                          |                      |              |              |
| In accordance with:                        |                        | FCC Part 15.209 - Code of Federal Regulations Part 47, Subpart C - Intentional Radiators, Radiated Emissions Limits |                         |                      |                            |                          |                      |              |              |
| Section:                                   |                        | 15.209                                                                                                              |                         |                      |                            |                          |                      |              |              |
| Test Date(s):                              |                        | 2/4/2016                                                                                                            |                         |                      | EUT Serial #:              |                          | none                 |              |              |
| Customer:                                  |                        | Triax Technologies                                                                                                  |                         |                      | EUT Part #:                |                          | none                 |              |              |
| Project Number:                            |                        | 17712-15                                                                                                            |                         |                      | Test Technician:           |                          | Eric Lifsey          |              |              |
| Purchase Order #:                          |                        | NA                                                                                                                  |                         |                      | Supervisor:                |                          | Lisa Arndt           |              |              |
| Equip. Under Test:                         |                        | SIM-P                                                                                                               |                         |                      | Witness' Name:             |                          | None                 |              |              |
| Radiated Emissions Test Results Data Sheet |                        |                                                                                                                     |                         |                      |                            |                          |                      | Page: 1 of 1 |              |
| EUT Line Voltage:                          |                        | 4.2 VDC                                                                                                             |                         | EUT Power Frequency: |                            | 0 N/A                    |                      |              |              |
| Antenna Orientation:                       |                        | Horizontal                                                                                                          |                         |                      | Frequency Range:           |                          | 30MHz to 1GHz        |              |              |
| EUT Mode of Operation:                     |                        |                                                                                                                     |                         |                      | Receive Mode (Advertising) |                          |                      |              |              |
| Frequency Measured (MHz)                   | Test Distance (Meters) | EUT Direction (Degrees)                                                                                             | Antenna Height (Meters) | Detector Function    | Recorded Amplitude (dBμV)  | Corrected Level (dBμV/m) | Limit Level (dBμV/m) | Margin (dB)  | Test Results |
| 32.6168                                    | 10                     | 110                                                                                                                 | 2.24                    | Quasi-peak           | 23.7                       | 12.241                   | 29.5                 | -17.3        | Pass         |
| 546.914                                    | 10                     | 328                                                                                                                 | 1.09                    | Quasi-peak           | 22.1                       | 18.586                   | 35.6                 | -17.0        | Pass         |
| 642.127                                    | 10                     | 239                                                                                                                 | 3.18                    | Quasi-peak           | 21.9                       | 20.498                   | 35.6                 | -15.1        | Pass         |
| 870.025                                    | 10                     | 233                                                                                                                 | 2.24                    | Quasi-peak           | 21.4                       | 25.003                   | 35.6                 | -10.6        | Pass         |
| 916.844                                    | 10                     | 312                                                                                                                 | 1.05                    | Quasi-peak           | 21.2                       | 26.233                   | 35.6                 | -9.4         | Pass         |
| 932.765                                    | 10                     | 19                                                                                                                  | 2.1                     | Quasi-peak           | 21                         | 26.063                   | 35.6                 | -9.5         | Pass         |

Professional Testing, EMI, Inc

Radiated Emissions, 10m Distance

30MHz - 1GHz Horizontal Polarity Measured Emissions

Quasi-peak Limit Level

Corrected Quasi-peak Reading

Peak Limit Level

Corrected Peak Value

Verified Low-PRE QP Reading

LPRE Verification Limit

Operator: Eric Lifsey

17712020416Run04SpurRxModel1

03:57:28 PM, Thursday, February 04, 2016

Mode: Recv(advertising)

Sample: Normal operating unit

Power: 4.20 VDC Battery

EUT: SIM-P

Project Number: 17712-15

Client: Triax Technologies

≤ 1GHz Horizontal Antenna Polarity Measured Emissions

≤ 1GHz Horizontal Antenna Polarity Measured Emissions

**Table 6.3.3: Radiated Spurious Emissions, Receive Mode, Above 1 GHz, Vertical Polarity**

| <b>Professional Testing, EMI, Inc.</b>            |                        |                                                                                                                     |                         |                   |                                   |                             |                      |              |              |
|---------------------------------------------------|------------------------|---------------------------------------------------------------------------------------------------------------------|-------------------------|-------------------|-----------------------------------|-----------------------------|----------------------|--------------|--------------|
| <b>Test Method:</b>                               |                        | ANSI C63.10-2013 American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices     |                         |                   |                                   |                             |                      |              |              |
| <b>In accordance with:</b>                        |                        | FCC Part 15.209 - Code of Federal Regulations Part 47, Subpart C - Intentional Radiators, Radiated Emissions Limits |                         |                   |                                   |                             |                      |              |              |
| <b>Section:</b>                                   |                        | 15.209                                                                                                              |                         |                   |                                   |                             |                      |              |              |
| <b>Test Date(s):</b>                              |                        | 2/4/2016                                                                                                            |                         |                   | <b>EUT Serial #:</b>              |                             | none                 |              |              |
| <b>Customer:</b>                                  |                        | Triax Technologies                                                                                                  |                         |                   | <b>EUT Part #:</b>                |                             | none                 |              |              |
| <b>Project Number:</b>                            |                        | 17712-15                                                                                                            |                         |                   | <b>Test Technician:</b>           |                             | Eric Lifsey          |              |              |
| <b>Purchase Order #:</b>                          |                        | NA                                                                                                                  |                         |                   | <b>Supervisor:</b>                |                             | Lisa Arndt           |              |              |
| <b>Equip. Under Test:</b>                         |                        | SIM-P                                                                                                               |                         |                   | <b>Witness' Name:</b>             |                             | None                 |              |              |
| <b>Radiated Emissions Test Results Data Sheet</b> |                        |                                                                                                                     |                         |                   |                                   |                             |                      | Page: 1 of 1 |              |
| <b>EUT Line Voltage:</b>                          |                        | 4.2                                                                                                                 |                         | VDC               |                                   | <b>EUT Power Frequency:</b> |                      | 0 N/A        |              |
| <b>Antenna Orientation:</b>                       |                        | Vertical                                                                                                            |                         |                   | <b>Frequency Range:</b>           |                             | Above 1GHz           |              |              |
| <b>EUT Mode of Operation:</b>                     |                        |                                                                                                                     |                         |                   | <b>Receive Mode (Advertising)</b> |                             |                      |              |              |
| Frequency Measured (MHz)                          | Test Distance (Meters) | EUT Direction (Degrees)                                                                                             | Antenna Height (Meters) | Detector Function | Recorded Amplitude (dBμV)         | Corrected Level (dBμV/m)    | Limit Level (dBμV/m) | Margin (dB)  | Test Results |
| 2434.77                                           | 3                      | 331                                                                                                                 | 1                       | Peak              | 44.5                              | 35.971                      | 74.0                 | -38.0        | Pass         |
| 4878.53                                           | 3                      | 255                                                                                                                 | 1                       | Peak              | 43.3                              | 39.48                       | 74.0                 | -34.5        | Pass         |
| 7327.91                                           | 3                      | 346                                                                                                                 | 1                       | Peak              | 37.4                              | 40.855                      | 74.0                 | -33.1        | Pass         |
| 9752.84                                           | 3                      | 32                                                                                                                  | 1                       | Peak              | 35.4                              | 42.313                      | 74.0                 | -31.6        | Pass         |
| 12150                                             | 3                      | 23                                                                                                                  | 1                       | Peak              | 36.1                              | 46.426                      | 74.0                 | -27.5        | Pass         |
| 2434.77                                           | 3                      | 331                                                                                                                 | 1                       | Average           | 34.5                              | 26.011                      | 54.0                 | -27.9        | Pass         |
| 4878.53                                           | 3                      | 255                                                                                                                 | 1                       | Average           | 33.3                              | 29.51                       | 54.0                 | -24.4        | Pass         |
| 7327.91                                           | 3                      | 346                                                                                                                 | 1                       | Average           | 28.9                              | 32.405                      | 54.0                 | -21.6        | Pass         |
| 9752.84                                           | 3                      | 32                                                                                                                  | 1                       | Average           | 26.5                              | 33.337                      | 54.0                 | -20.6        | Pass         |
| 12150                                             | 3                      | 23                                                                                                                  | 1                       | Average           | 27.9                              | 38.206                      | 54.0                 | -15.8        | Pass         |

**Professional Testing, EMI, Inc**  
Radiated Emissions, 3m Distance  
1-18GHz Vertical Polarity Measured Emissions

The graph displays the measured radiated emissions for the EUT SIM-P in receive mode. The y-axis represents Field Strength in dBμV/m, ranging from 20 to 90. The x-axis represents Frequency in GHz, ranging from 1G to 13G. A red horizontal line at 74.0 dBμV/m indicates the Average Limit Level. A blue line with markers shows the corrected average readings, which remain below the limit level across the entire frequency range. A legend in the top right corner identifies the lines: Average Limit Level (red), Corrected Average Reading (blue), Peak Limit Level (red), and Corrected Peak Reading (blue). The Professional Testing, EMI, Inc logo is also present.

Operator: Eric Lifsey  
17712020416Run04SpurRxModel1  
03:22:40 PM, Thursday, February 04, 2016

Mode: Recv(advertising)  
Sample: Normal operating unit  
Power: 4.20 VDC Battery

EUT: SIM-P  
Project Number: 17712-15  
Client: Triax Technologies

**> 1GHz Vertical Antenna Polarity Measured Emissions**

**Table 6.3.4: Radiated Spurious Emissions, Receive Mode, Above 1 GHz, Horizontal Polarity**

| <b>Professional Testing, EMI, Inc.</b>            |                        |                                                                                                                     |                         |                             |                                   |                          |                      |              |              |
|---------------------------------------------------|------------------------|---------------------------------------------------------------------------------------------------------------------|-------------------------|-----------------------------|-----------------------------------|--------------------------|----------------------|--------------|--------------|
| <b>Test Method:</b>                               |                        | ANSI C63.10-2013 American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices     |                         |                             |                                   |                          |                      |              |              |
| <b>In accordance with:</b>                        |                        | FCC Part 15.209 - Code of Federal Regulations Part 47, Subpart C - Intentional Radiators, Radiated Emissions Limits |                         |                             |                                   |                          |                      |              |              |
| <b>Section:</b>                                   |                        | 15.209                                                                                                              |                         |                             |                                   |                          |                      |              |              |
| <b>Test Date(s):</b>                              |                        | 2/4/2016                                                                                                            |                         |                             | <b>EUT Serial #:</b>              |                          | none                 |              |              |
| <b>Customer:</b>                                  |                        | Triax Technologies                                                                                                  |                         |                             | <b>EUT Part #:</b>                |                          | none                 |              |              |
| <b>Project Number:</b>                            |                        | 17712-15                                                                                                            |                         |                             | <b>Test Technician:</b>           |                          | Eric Lifsey          |              |              |
| <b>Purchase Order #:</b>                          |                        | NA                                                                                                                  |                         |                             | <b>Supervisor:</b>                |                          | Lisa Arndt           |              |              |
| <b>Equip. Under Test:</b>                         |                        | SIM-P                                                                                                               |                         |                             | <b>Witness' Name:</b>             |                          | None                 |              |              |
| <b>Radiated Emissions Test Results Data Sheet</b> |                        |                                                                                                                     |                         |                             |                                   |                          |                      | Page: 1 of 1 |              |
| <b>EUT Line Voltage:</b>                          |                        | 4.2 VDC                                                                                                             |                         | <b>EUT Power Frequency:</b> |                                   | 0 N/A                    |                      |              |              |
| <b>Antenna Orientation:</b>                       |                        | Horizontal                                                                                                          |                         |                             | <b>Frequency Range:</b>           |                          | Above 1GHz           |              |              |
| <b>EUT Mode of Operation:</b>                     |                        |                                                                                                                     |                         |                             | <b>Receive Mode (Advertising)</b> |                          |                      |              |              |
| Frequency Measured (MHz)                          | Test Distance (Meters) | EUT Direction (Degrees)                                                                                             | Antenna Height (Meters) | Detector Function           | Recorded Amplitude (dBμV)         | Corrected Level (dBμV/m) | Limit Level (dBμV/m) | Margin (dB)  | Test Results |
| 2444.36                                           | 3                      | 320                                                                                                                 | 1                       | Peak                        | 44.3                              | 35.784                   | 74.0                 | -38.2        | Pass         |
| 4877.72                                           | 3                      | 254                                                                                                                 | 1                       | Peak                        | 41.4                              | 37.637                   | 74.0                 | -36.3        | Pass         |
| 7315.97                                           | 3                      | 221                                                                                                                 | 1                       | Peak                        | 38.4                              | 41.804                   | 74.0                 | -32.2        | Pass         |
| 9747.08                                           | 3                      | 201                                                                                                                 | 1                       | Peak                        | 35.3                              | 42.159                   | 74.0                 | -31.8        | Pass         |
| 11290                                             | 3                      | 307                                                                                                                 | 1                       | Peak                        | 37.2                              | 47.127                   | 74.0                 | -26.8        | Pass         |
| 2444.36                                           | 3                      | 320                                                                                                                 | 1                       | Average                     | 34.5                              | 26.015                   | 54.0                 | -27.9        | Pass         |
| 4877.72                                           | 3                      | 254                                                                                                                 | 1                       | Average                     | 33.3                              | 29.475                   | 54.0                 | -24.5        | Pass         |
| 7315.97                                           | 3                      | 221                                                                                                                 | 1                       | Average                     | 28.9                              | 32.337                   | 54.0                 | -21.6        | Pass         |
| 9747.08                                           | 3                      | 201                                                                                                                 | 1                       | Average                     | 26.5                              | 33.372                   | 54.0                 | -20.6        | Pass         |
| 11290                                             | 3                      | 307                                                                                                                 | 1                       | Average                     | 27.3                              | 37.265                   | 54.0                 | -16.7        | Pass         |

**Professional Testing, EMI, Inc**  
Radiated Emissions, 3m Distance  
1-18GHz Horizontal Polarity Measured Emissions

Field Strength (dBμV/m)

Frequency

Operator: Eric Lifsey  
17712\020416\Run04\SpurRxModel.ttl  
03:22:40 PM, Thursday, February 04, 2016

Mode: Recive (advertising)  
Sample: Normal operating unit  
Power: 4.20 VDC Battery

EUT: SIM-P  
Project Number: 17712-15  
Client: Triax Technologies

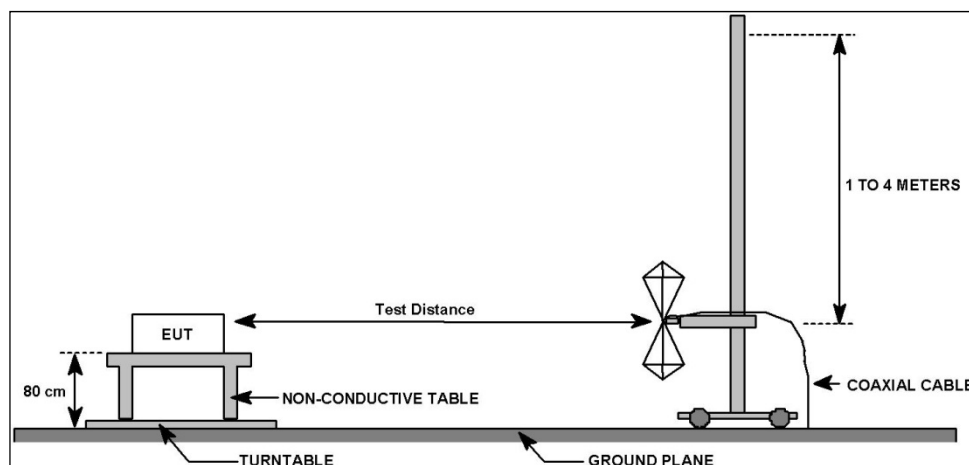
**> 1GHz Horizontal Antenna Polarity Measured Emissions**

## 7.0 Radiated Spurious Emissions, Transmit Mode

### 7.1 Test Procedure

The EUT was placed on a non-conductive table 0.8 meters above the ground plane. The EUT was centered on a rotating turntable. Measurements below 1 GHz were taken at a test distance of 10 meters from the measurement antenna. Above 1 GHz the measurement distance was 3 meters.

Spurious emissions below 1 GHz were measured with quasi-peak detection with a resolution bandwidth of 120 kHz. Above 1 GHz peak measurements were taken and average measured where appropriate using 1 MHz resolution bandwidth. A diagram showing the test setup appears below.



### 7.2 Test Criteria

| 47 CFR (USA) // IC (Canada)                          |                                                                            |            |
|------------------------------------------------------|----------------------------------------------------------------------------|------------|
| Section Reference                                    | Parameter                                                                  | Date(s)    |
| 15.247, 15.209 //<br>RSS-247 5.5, RSS-Gen 4.9 & 4.10 | Field Strength of Radiated<br>Spurious/Harmonic Emissions<br>Transmit Mode | 4 Feb 2016 |

### 7.3 Test Results

Three EUTs were employed to cover the three test channels of bottom, middle, and top channel.

Modulation was enabled for this test and the transmitter was placed into continuous transmit mode.

The duty cycle averaging factor applies -20.0 dB to the peaks recorded for the harmonics.

All measurements used peak detection.

**Table 7.3.1: TX Mode, Below 1 GHz, Vertical Polarity**

| Professional Testing, EMI, Inc.            |                        |                                                                                                                     |                         |                                           |                           |                          |                      |              |              |
|--------------------------------------------|------------------------|---------------------------------------------------------------------------------------------------------------------|-------------------------|-------------------------------------------|---------------------------|--------------------------|----------------------|--------------|--------------|
| Test Method:                               |                        | ANSI C63.10-2013 American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices     |                         |                                           |                           |                          |                      |              |              |
| In accordance with:                        |                        | FCC Part 15.209 - Code of Federal Regulations Part 47, Subpart C - Intentional Radiators, Radiated Emissions Limits |                         |                                           |                           |                          |                      |              |              |
| Section:                                   |                        | 15.209                                                                                                              |                         |                                           |                           |                          |                      |              |              |
| Test Date(s):                              |                        | 2/4/2016                                                                                                            |                         |                                           | EUT Serial #:             |                          | none                 |              |              |
| Customer:                                  |                        | Triax Technologies                                                                                                  |                         |                                           | EUT Part #:               |                          | none                 |              |              |
| Project Number:                            |                        | 17712-15                                                                                                            |                         |                                           | Test Technician:          |                          | Eric Lifsey          |              |              |
| Purchase Order #:                          |                        | NA                                                                                                                  |                         |                                           | Supervisor:               |                          | Lisa Arndt           |              |              |
| Equip. Under Test:                         |                        | SIM-P                                                                                                               |                         |                                           | Witness' Name:            |                          | None                 |              |              |
| Radiated Emissions Test Results Data Sheet |                        |                                                                                                                     |                         |                                           |                           |                          |                      | Page: 1 of 1 |              |
| EUT Line Voltage:                          |                        | 4.2 VDC                                                                                                             |                         | EUT Power Frequency:                      |                           | 0 N/A                    |                      |              |              |
| Antenna Orientation:                       |                        | Vertical                                                                                                            |                         |                                           | Frequency Range:          |                          | 30MHz to 1GHz        |              |              |
| EUT Mode of Operation:                     |                        |                                                                                                                     |                         | Transmit Mode, Modulated, 3 Channels/EUTs |                           |                          |                      |              |              |
| Frequency Measured (MHz)                   | Test Distance (Meters) | EUT Direction (Degrees)                                                                                             | Antenna Height (Meters) | Detector Function                         | Recorded Amplitude (dBμV) | Corrected Level (dBμV/m) | Limit Level (dBμV/m) | Margin (dB)  | Test Results |
| 30.8241                                    | 10                     | 35                                                                                                                  | 3.06                    | Quasi-peak                                | 24.2                      | 12.7                     | 29.5                 | -16.8        | Pass         |
| 648.938                                    | 10                     | 162                                                                                                                 | 1.47                    | Quasi-peak                                | 21.8                      | 20.448                   | 35.6                 | -15.2        | Pass         |
| 884.565                                    | 10                     | 37                                                                                                                  | 2.79                    | Quasi-peak                                | 21.3                      | 25.812                   | 35.6                 | -9.8         | Pass         |
| 906.976                                    | 10                     | 81                                                                                                                  | 3.26                    | Quasi-peak                                | 21.3                      | 26.425                   | 35.6                 | -9.2         | Pass         |
| 921.557                                    | 10                     | 145                                                                                                                 | 1.29                    | Quasi-peak                                | 21.1                      | 26.076                   | 35.6                 | -9.5         | Pass         |
| 949.336                                    | 10                     | 25                                                                                                                  | 2.12                    | Quasi-peak                                | 21                        | 26.177                   | 35.6                 | -9.4         | Pass         |

Professional Testing, EMI, Inc

Radiated Emissions, 10m Distance

30MHz - 1GHz Vertical Polarity Measured Emissions

Quasi-peak Limit Level

Corrected Quasi-peak Reading

Peak Limit Level

Corrected Peak Value

Verified Low-PRF QP Reading

LPRE Verification Limit

Operator: Eric Lifsey

17712\020416\Run01\Spur3Ch.tif

10:10:39 AM, Thursday, February 04, 2016

Mode: Transmit, 3 channels/samples

Samples: EC37/2402, FC17/2440, GC39/2480

Power: 420 VDC

EUT: SIM-P

Project Number: 17712-15

Client: Triax Technologies

≤ 1GHz Vertical Antenna Polarity Measured Emissions

**≤ 1GHz Vertical Antenna Polarity Measured Emissions**

**Table 7.3.2: TX Mode, Below 1 GHz, Horizontal Polarity**

| Professional Testing, EMI, Inc.            |                        |                                                                                                                     |                         |                      |                                           |                          |                      |              |              |
|--------------------------------------------|------------------------|---------------------------------------------------------------------------------------------------------------------|-------------------------|----------------------|-------------------------------------------|--------------------------|----------------------|--------------|--------------|
| Test Method:                               |                        | ANSI C63.10-2013 American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices     |                         |                      |                                           |                          |                      |              |              |
| In accordance with:                        |                        | FCC Part 15.209 - Code of Federal Regulations Part 47, Subpart C - Intentional Radiators, Radiated Emissions Limits |                         |                      |                                           |                          |                      |              |              |
| Section:                                   |                        | 15.209                                                                                                              |                         |                      |                                           |                          |                      |              |              |
| Test Date(s):                              |                        | 2/4/2016                                                                                                            |                         |                      | EUT Serial #:                             |                          | none                 |              |              |
| Customer:                                  |                        | Triax Technologies                                                                                                  |                         |                      | EUT Part #:                               |                          | none                 |              |              |
| Project Number:                            |                        | 17712-15                                                                                                            |                         |                      | Test Technician:                          |                          | Eric Lifsey          |              |              |
| Purchase Order #:                          |                        | NA                                                                                                                  |                         |                      | Supervisor:                               |                          | Lisa Arndt           |              |              |
| Equip. Under Test:                         |                        | SIM-P                                                                                                               |                         |                      | Witness' Name:                            |                          | None                 |              |              |
| Radiated Emissions Test Results Data Sheet |                        |                                                                                                                     |                         |                      |                                           |                          |                      | Page: 1 of 1 |              |
| EUT Line Voltage:                          |                        | 4.2 VDC                                                                                                             |                         | EUT Power Frequency: |                                           | 0 N/A                    |                      |              |              |
| Antenna Orientation:                       |                        | Horizontal                                                                                                          |                         |                      | Frequency Range:                          |                          | 30MHz to 1GHz        |              |              |
| EUT Mode of Operation:                     |                        |                                                                                                                     |                         |                      | Transmit Mode, Modulated, 3 Channels/EUTs |                          |                      |              |              |
| Frequency Measured (MHz)                   | Test Distance (Meters) | EUT Direction (Degrees)                                                                                             | Antenna Height (Meters) | Detector Function    | Recorded Amplitude (dBμV)                 | Corrected Level (dBμV/m) | Limit Level (dBμV/m) | Margin (dB)  | Test Results |
| 30.9033                                    | 10                     | 207                                                                                                                 | 3.7                     | Quasi-peak           | 24.2                                      | 12.787                   | 29.5                 | -16.7        | Pass         |
| 543.007                                    | 10                     | 252                                                                                                                 | 1.32                    | Quasi-peak           | 22.1                                      | 18.493                   | 35.6                 | -17.1        | Pass         |
| 633.169                                    | 10                     | 299                                                                                                                 | 1.3                     | Quasi-peak           | 22                                        | 20.368                   | 35.6                 | -15.2        | Pass         |
| 765.838                                    | 10                     | 299                                                                                                                 | 3.49                    | Quasi-peak           | 21.5                                      | 22.502                   | 35.6                 | -13.1        | Pass         |
| 896.133                                    | 10                     | 80                                                                                                                  | 1.3                     | Quasi-peak           | 21.4                                      | 26.46                    | 35.6                 | -9.1         | Pass         |
| 916.981                                    | 10                     | 264                                                                                                                 | 3.94                    | Quasi-peak           | 21.2                                      | 26.25                    | 35.6                 | -9.4         | Pass         |

Professional Testing, EMI, Inc

Radiated Emissions, 10m Distance

30MHz - 1GHz Horizontal Polarity Measured Emissions

Quasi-peak Limit Level

Corrected Quasi-peak Reading

Peak Limit Level

Corrected Peak Value

Verified Low-PRF QP Reading

LPRE Verification Limit

Operator: Eric Lifsey

17712020416Run01Spur3Ch.tif

10:10:39 AM, Thursday, February 04, 2016

Mode: Transmit, 3 channels/samples

Samples: EC37/2402, FC17/2440, GC39/2480

Power: 4.20 VDC

EUT: SIM-P

Project Number: 17712-15

Client: Triax Technologies

≤ 1GHz Horizontal Antenna Polarity Measured Emissions

≤ 1GHz Horizontal Antenna Polarity Measured Emissions

---

**Table 7.3.3: TX Mode, Above 1 GHz, Vertical Polarity**

## Professional Testing, EMI, Inc.

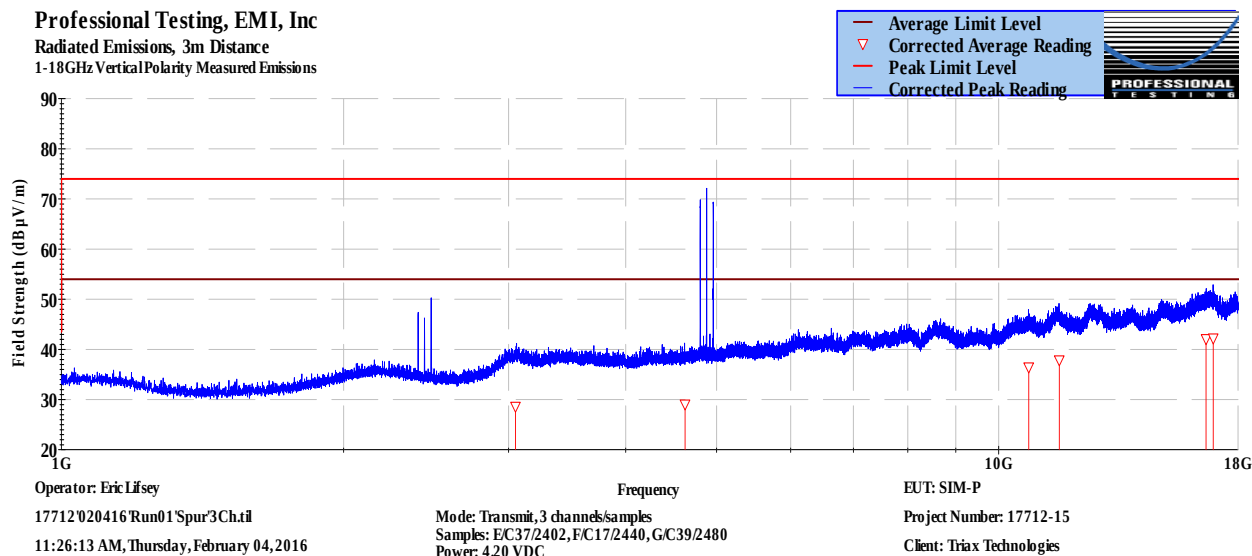
|                            |                                                                                                                     |                         |             |
|----------------------------|---------------------------------------------------------------------------------------------------------------------|-------------------------|-------------|
| <b>Test Method:</b>        | ANSI C63.10-2013 American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices     |                         |             |
| <b>In accordance with:</b> | FCC Part 15.209 - Code of Federal Regulations Part 47, Subpart C - Intentional Radiators, Radiated Emissions Limits |                         |             |
| <b>Section:</b>            | 15.209                                                                                                              |                         |             |
| <b>Test Date(s):</b>       | 2/4/2016                                                                                                            | <b>EUT Serial #:</b>    | none        |
| <b>Customer:</b>           | Triax Technologies                                                                                                  | <b>EUT Part #:</b>      | none        |
| <b>Project Number:</b>     | 17712-15                                                                                                            | <b>Test Technician:</b> | Eric Lifsey |
| <b>Purchase Order #:</b>   | NA                                                                                                                  | <b>Supervisor:</b>      | Lisa Arndt  |
| <b>Equip. Under Test:</b>  | SIM-P                                                                                                               | <b>Witness' Name:</b>   | None        |

### Radiated Emissions Test Results Data Sheet

Page: 1 of 1

| EUT Line Voltage:        |                        | 4.2                     | VDC                     |                   | EUT Power Frequency:                      |                          | 0                    | N/A         |              |
|--------------------------|------------------------|-------------------------|-------------------------|-------------------|-------------------------------------------|--------------------------|----------------------|-------------|--------------|
| Antenna Orientation:     |                        | Vertical                |                         |                   | Frequency Range:                          |                          | Above 1GHz           |             |              |
| EUT Mode of Operation:   |                        |                         |                         |                   | Transmit Mode, Modulated, 3 Channels/EUTs |                          |                      |             |              |
| Frequency Measured (MHz) | Test Distance (Meters) | EUT Direction (Degrees) | Antenna Height (Meters) | Detector Function | Recorded Amplitude (dBμV)                 | Corrected Level (dBμV/m) | Limit Level (dBμV/m) | Margin (dB) | Test Results |
| 3051.68                  | 3                      | 311                     | 1                       | Peak              | 44.5                                      | 37.956                   | 74.0                 | -36.0       | Pass         |
| 4627.82                  | 3                      | 211                     | 1                       | Peak              | 43.5                                      | 39.362                   | 74.0                 | -34.6       | Pass         |
| 10766.8                  | 3                      | 23                      | 1                       | Peak              | 36.5                                      | 45.793                   | 74.0                 | -28.2       | Pass         |
| 11604.1                  | 3                      | 145                     | 1                       | Peak              | 36.5                                      | 46.974                   | 74.0                 | -27.0       | Pass         |
| 16648.1                  | 3                      | 206                     | 1                       | Peak              | 36.2                                      | 50.856                   | 74.0                 | -23.1       | Pass         |
| 16936.9                  | 3                      | 254                     | 1                       | Peak              | 37.8                                      | 52.432                   | 74.0                 | -21.5       | Pass         |
| 3051.68                  | 3                      | 311                     | 1                       | Average           | 35.1                                      | 28.611                   | 54.0                 | -25.3       | Pass         |
| 4627.82                  | 3                      | 211                     | 1                       | Average           | 33.2                                      | 29.056                   | 54.0                 | -24.9       | Pass         |
| 10766.8                  | 3                      | 23                      | 1                       | Average           | 27.2                                      | 36.45                    | 54.0                 | -17.5       | Pass         |
| 11604.1                  | 3                      | 145                     | 1                       | Average           | 27.4                                      | 37.869                   | 54.0                 | -16.1       | Pass         |
| 16648.1                  | 3                      | 206                     | 1                       | Average           | 27.4                                      | 42.093                   | 54.0                 | -11.9       | Pass         |
| 16936.9                  | 3                      | 254                     | 1                       | Average           | 27.6                                      | 42.215                   | 54.0                 | -11.7       | Pass         |

Professional Testing, EMI, Inc.  
Radiated Emissions, 3m Distance  
1-18GHz Vertical Polarity Measured Emissions



### 1 to 18 GHz Vertical Antenna Polarity Measured Emissions

**Table 7.3.4: TX Mode, Above 1 GHz, Horizontal Polarity**

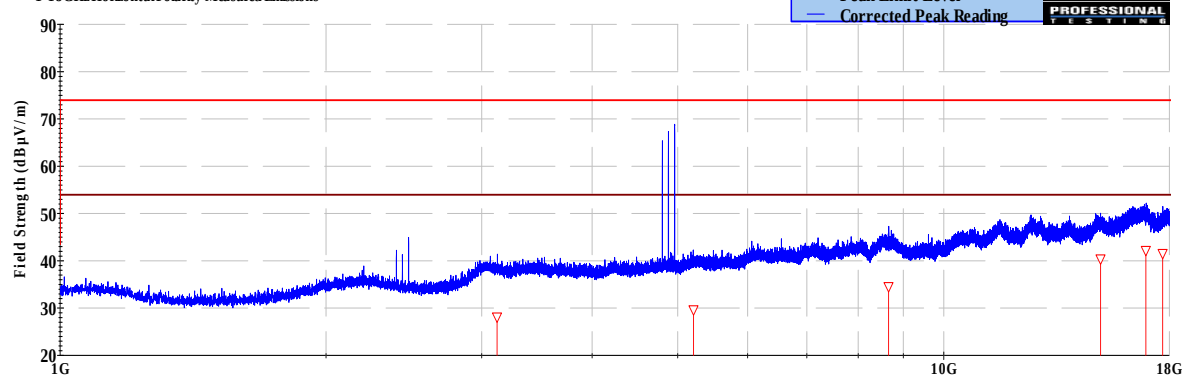
| Professional Testing, EMI, Inc. |                                                                                                                     |                  |             |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------|------------------|-------------|
| Test Method:                    | ANSI C63.10-2013 American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices     |                  |             |
| In accordance with:             | FCC Part 15.209 - Code of Federal Regulations Part 47, Subpart C - Intentional Radiators, Radiated Emissions Limits |                  |             |
| Section:                        | 15.209                                                                                                              |                  |             |
| Test Date(s):                   | 2/4/2016                                                                                                            | EUT Serial #:    | none        |
| Customer:                       | Triax Technologies                                                                                                  | EUT Part #:      | none        |
| Project Number:                 | 17712-15                                                                                                            | Test Technician: | Eric Lifsey |
| Purchase Order #:               | NA                                                                                                                  | Supervisor:      | Lisa Arndt  |
| Equip. Under Test:              | SIM-P                                                                                                               | Witness' Name:   | None        |

## Radiated Emissions Test Results Data Sheet

Page: 1 of 1

|                          |                        |                         |                         |                   |                                           |                          |                      |             |              |
|--------------------------|------------------------|-------------------------|-------------------------|-------------------|-------------------------------------------|--------------------------|----------------------|-------------|--------------|
| EUT Line Voltage:        |                        | 4.2                     | VDC                     |                   | EUT Power Frequency:                      |                          | 0                    | N/A         |              |
| Antenna Orientation:     |                        | Horizontal              |                         |                   | Frequency Range:                          |                          | Above 1GHz           |             |              |
| EUT Mode of Operation:   |                        |                         |                         |                   | Transmit Mode, Modulated, 3 Channels/EUTs |                          |                      |             |              |
| Frequency Measured (MHz) | Test Distance (Meters) | EUT Direction (Degrees) | Antenna Height (Meters) | Detector Function | Recorded Amplitude (dBμV)                 | Corrected Level (dBμV/m) | Limit Level (dBμV/m) | Margin (dB) | Test Results |
| 3122.7                   | 3                      | 255                     | 1                       | Peak              | 44.1                                      | 37.376                   | 74.0                 | -36.6       | Pass         |
| 5208.92                  | 3                      | 250                     | 1                       | Peak              | 41.9                                      | 38.861                   | 74.0                 | -35.1       | Pass         |
| 8659.97                  | 3                      | 172                     | 1                       | Peak              | 35.6                                      | 42.95                    | 74.0                 | -31.0       | Pass         |
| 15046                    | 3                      | 212                     | 1                       | Peak              | 36.8                                      | 48.767                   | 74.0                 | -25.2       | Pass         |
| 16929                    | 3                      | 30                      | 1                       | Peak              | 36.1                                      | 50.766                   | 74.0                 | -23.2       | Pass         |
| 17686.5                  | 3                      | 38                      | 1                       | Peak              | 35.4                                      | 49.88                    | 74.0                 | -24.1       | Pass         |
| 3122.7                   | 3                      | 255                     | 1                       | Average           | 34.8                                      | 28.1                     | 54.0                 | -25.9       | Pass         |
| 5208.92                  | 3                      | 250                     | 1                       | Average           | 32.6                                      | 29.616                   | 54.0                 | -24.3       | Pass         |
| 8659.97                  | 3                      | 172                     | 1                       | Average           | 27.2                                      | 34.541                   | 54.0                 | -19.4       | Pass         |
| 15046                    | 3                      | 212                     | 1                       | Average           | 28.4                                      | 40.37                    | 54.0                 | -13.6       | Pass         |
| 16929                    | 3                      | 30                      | 1                       | Average           | 27.6                                      | 42.206                   | 54.0                 | -11.8       | Pass         |
| 17686.5                  | 3                      | 38                      | 1                       | Average           | 27.1                                      | 41.546                   | 54.0                 | -12.4       | Pass         |

Professional Testing, EMI, Inc  
Radiated Emissions, 3m Distance  
1-18GHz Horizontal Polarity Measured Emissions



Operator: Eric Lifsey

17712\020416\Run01\Spur3Ch.ttl

11:26:13 AM, Thursday, February 04, 2016

Frequency

Mode: Transmit, 3 channels/samples  
Samples: EC37/2402, FC17/2440, G/C39/2480  
Power: 4.20 VDC

EUT: SIM-P

Project Number: 17712-15

Client: Triax Technologies

**1 to 18 GHz Horizontal Antenna Polarity Measured Emissions**

**Table 7.3.5: TX Mode, 18-25 GHz, Vertical Polarity**

| <b>Professional Testing, EMI, Inc.</b>            |                        |                                                                                                                     |                         |                   |                                                  |                             |                      |                            |              |
|---------------------------------------------------|------------------------|---------------------------------------------------------------------------------------------------------------------|-------------------------|-------------------|--------------------------------------------------|-----------------------------|----------------------|----------------------------|--------------|
| <b>Test Method:</b>                               |                        | ANSI C63.10-2013 American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices     |                         |                   |                                                  |                             |                      |                            |              |
| <b>In accordance with:</b>                        |                        | FCC Part 15.209 - Code of Federal Regulations Part 47, Subpart C - Intentional Radiators, Radiated Emissions Limits |                         |                   |                                                  |                             |                      |                            |              |
| <b>Section:</b>                                   |                        | 15.209                                                                                                              |                         |                   |                                                  |                             |                      |                            |              |
| <b>Test Date(s):</b>                              |                        | 2/4/2016                                                                                                            |                         |                   | <b>EUT Serial #:</b>                             |                             | none                 |                            |              |
| <b>Customer:</b>                                  |                        | Triax Technologies                                                                                                  |                         |                   | <b>EUT Part #:</b>                               |                             | none                 |                            |              |
| <b>Project Number:</b>                            |                        | 17712-15                                                                                                            |                         |                   | <b>Test Technician:</b>                          |                             | Eric Lifsey          |                            |              |
| <b>Purchase Order #:</b>                          |                        | NA                                                                                                                  |                         |                   | <b>Supervisor:</b>                               |                             | Lisa Arndt           |                            |              |
| <b>Equip. Under Test:</b>                         |                        | SIM-P                                                                                                               |                         |                   | <b>Witness' Name:</b>                            |                             | None                 |                            |              |
| <b>Radiated Emissions Test Results Data Sheet</b> |                        |                                                                                                                     |                         |                   |                                                  |                             |                      | Page: <b>1</b> of <b>1</b> |              |
| <b>EUT Line Voltage:</b>                          |                        | 4.2                                                                                                                 |                         | VDC               |                                                  | <b>EUT Power Frequency:</b> |                      | 0 N/A                      |              |
| <b>Antenna Orientation:</b>                       |                        | Vertical                                                                                                            |                         |                   |                                                  | <b>Frequency Range:</b>     |                      | Above 1GHz                 |              |
| <b>EUT Mode of Operation:</b>                     |                        |                                                                                                                     |                         |                   | <b>Transmit Mode, Modulated, 3 Channels/EUTs</b> |                             |                      |                            |              |
| Frequency Measured (MHz)                          | Test Distance (Meters) | EUT Direction (Degrees)                                                                                             | Antenna Height (Meters) | Detector Function | Recorded Amplitude (dBμV)                        | Corrected Level (dBμV/m)    | Limit Level (dBμV/m) | Margin (dB)                | Test Results |
| 19673.6                                           | 3                      | 332                                                                                                                 | 1                       | Average           | 32.3                                             | 27.76                       | 54.0                 | -26.2                      | Pass         |
| 23721.6                                           | 3                      | 281                                                                                                                 | 1                       | Average           | 33.4                                             | 31.762                      | 54.0                 | -22.2                      | Pass         |
| 24579.4                                           | 3                      | 158                                                                                                                 | 1                       | Average           | 33.4                                             | 32.8                        | 54.0                 | -21.2                      | Pass         |
| 24791.5                                           | 3                      | 157                                                                                                                 | 1                       | Average           | 33.6                                             | 33.942                      | 54.0                 | -20.0                      | Pass         |

**Professional Testing, EMI, Inc**  
Radiated Emissions, Measured at 1m and Scaled to 3m Distance  
18-26.5 GHz Vertical Polarity Measured Emissions

The graph displays the measured field strength in dBμV/m across a frequency range from 18.0 GHz to 25.0 GHz. The y-axis ranges from 20 to 90 dBμV/m. A solid red line represents the Average Limit Level at approximately 75 dBμV/m. A dashed red line represents the Peak Limit Level at approximately 55 dBμV/m. The measured emissions are shown as a blue line fluctuating between 30 and 50 dBμV/m. Three red triangles indicate specific corrected average readings at approximately 23.7, 24.6, and 24.8 GHz, all of which are well below the limit levels.

**Legend:**  
— Average Limit Level  
△ Corrected Average Reading  
— Peak Limit Level  
— Corrected Peak Reading

**Operator:** Eric Lifsey  
**Project Number:** 17712-15  
**Client:** Triax Technologies

**Mode:** Transmit, 3 channels/samples  
**Samples:** EC37/2402, F/C17/2440, G/C39/2480  
**Power:** 4.20 VDC

**> 18 GHz Vertical Antenna Polarity Measured Emissions**

Table 7.3.6: TX Mode, 18-25 GHz, Horizontal Polarity

| Professional Testing, EMI, Inc.                   |                        |                                                                                                                     |                         |                                                  |                           |                          |                      |              |              |
|---------------------------------------------------|------------------------|---------------------------------------------------------------------------------------------------------------------|-------------------------|--------------------------------------------------|---------------------------|--------------------------|----------------------|--------------|--------------|
| <b>Test Method:</b>                               |                        | ANSI C63.10-2013 American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices     |                         |                                                  |                           |                          |                      |              |              |
| <b>In accordance with:</b>                        |                        | FCC Part 15.209 - Code of Federal Regulations Part 47, Subpart C - Intentional Radiators, Radiated Emissions Limits |                         |                                                  |                           |                          |                      |              |              |
| <b>Section:</b>                                   |                        | 15.209                                                                                                              |                         |                                                  |                           |                          |                      |              |              |
| <b>Test Date(s):</b>                              |                        | 2/4/2016                                                                                                            |                         |                                                  | <b>EUT Serial #:</b>      |                          | none                 |              |              |
| <b>Customer:</b>                                  |                        | Triax Technologies                                                                                                  |                         |                                                  | <b>EUT Part #:</b>        |                          | none                 |              |              |
| <b>Project Number:</b>                            |                        | 17712-15                                                                                                            |                         |                                                  | <b>Test Technician:</b>   |                          | Eric Lifsey          |              |              |
| <b>Purchase Order #:</b>                          |                        | NA                                                                                                                  |                         |                                                  | <b>Supervisor:</b>        |                          | Lisa Arndt           |              |              |
| <b>Equip. Under Test:</b>                         |                        | SIM-P                                                                                                               |                         |                                                  | <b>Witness' Name:</b>     |                          | None                 |              |              |
| <b>Radiated Emissions Test Results Data Sheet</b> |                        |                                                                                                                     |                         |                                                  |                           |                          |                      | Page: 1 of 1 |              |
| <b>EUT Line Voltage:</b>                          |                        | 4.2 VDC                                                                                                             |                         | <b>EUT Power Frequency:</b>                      |                           | 0 N/A                    |                      |              |              |
| <b>Antenna Orientation:</b>                       |                        | Horizontal                                                                                                          |                         |                                                  | <b>Frequency Range:</b>   |                          | Above 1GHz           |              |              |
| <b>EUT Mode of Operation:</b>                     |                        |                                                                                                                     |                         | <b>Transmit Mode, Modulated, 3 Channels/EUTs</b> |                           |                          |                      |              |              |
| Frequency Measured (MHz)                          | Test Distance (Meters) | EUT Direction (Degrees)                                                                                             | Antenna Height (Meters) | Detector Function                                | Recorded Amplitude (dBμV) | Corrected Level (dBμV/m) | Limit Level (dBμV/m) | Margin (dB)  | Test Results |
| 20703.3                                           | 3                      | 259                                                                                                                 | 1                       | Average                                          | 33.1                      | 29.251                   | 54.0                 | -24.7        | Pass         |
| 23759.3                                           | 3                      | 29                                                                                                                  | 1                       | Average                                          | 33.5                      | 31.865                   | 54.0                 | -22.1        | Pass         |
| 25089.2                                           | 3                      | 90                                                                                                                  | 1                       | Average                                          | 33.9                      | 34.216                   | 54.0                 | -19.7        | Pass         |
| 25659.9                                           | 3                      | 66                                                                                                                  | 1                       | Average                                          | 34.2                      | 34.663                   | 54.0                 | -19.3        | Pass         |

**Professional Testing, EMI, Inc.**  
Radiated Emissions, Measured at 1m and Scaled to 3m Distance  
18-26.5 GHz Horizontal Polarity Measured Emissions

The graph displays the measured field strength in dBμV/m on the y-axis (ranging from 20 to 90) against frequency in GHz on the x-axis (ranging from 18.0 to 26.5). A solid red line represents the Average Limit Level at approximately 75 dBμV/m. A dashed red line represents the Corrected Average Reading, which fluctuates between 30 and 50 dBμV/m. A solid blue line represents the Peak Limit Level at approximately 55 dBμV/m. A dashed blue line represents the Corrected Peak Reading, which fluctuates between 35 and 45 dBμV/m. The measured emissions are consistently below the limit levels.

Operator: Eric Lifsey  
17712\020416\Run01\Spur3Ch.tif  
01:20:38 PM, Thursday, February 04, 2016

Mode: Transmit, 3 channels/samples  
Samples: EC37/2402, FC17/2440, GC39/2480  
Power: 420 VDC

EUT: SIM-P  
Project Number: 17712-15  
Client: Triax Technologies

**> 18 GHz Horizontal Antenna Polarity Measured Emissions**

## 8.0 Antenna Construction Requirements

The design was investigated for meeting the antenna construction requirements of the applicable rules.

### 8.1 Procedure

A direct examination of the antenna construction is performed and compared to rule criteria that prevent wireless device antennas from being modified by end users in ways that would void their authorization to use the device.

### 8.2 Criteria

| 47 CFR (USA) // IC (Canada) |                      |            |
|-----------------------------|----------------------|------------|
| Section Reference           | Parameter            | Date(s)    |
| 15.203 //<br>RSS-Gen 8.3    | Antenna Construction | 1 Mar 2016 |

### 8.3 Results

| Table 8.3.1 Antenna Construction Details |                |
|------------------------------------------|----------------|
| Antenna Manufacturer and Model           | Specifications |
| Manufacturer:                            |                |
| Part Number:                             |                |
|                                          |                |

- Antenna is chip style component.
- There is no external antenna connector.
- The antenna is not accessible.

The antenna design above satisfies the requirements of the rules.

## 9.0 Equipment

### 9.1 Radiated Emissions 30 MHz to 25 GHz

| Professional Testing, EMI, Inc.        |              |                                                                                                                     |                                               |                |                      |
|----------------------------------------|--------------|---------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|----------------|----------------------|
| <b>Test Method:</b>                    |              | ANSI C63.10-2013 American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices     |                                               |                |                      |
| <b>In accordance with:</b>             |              | FCC Part 15.209 - Code of Federal Regulations Part 47, Subpart C - Intentional Radiators, Radiated Emissions Limits |                                               |                |                      |
| <b>Section:</b>                        |              | 15.209                                                                                                              |                                               |                |                      |
| <b>Test Date(s):</b>                   |              | 2/4/2016                                                                                                            | <b>EUT Serial #:</b>                          |                | none                 |
| <b>Customer:</b>                       |              | Triax Technologies                                                                                                  | <b>EUT Part #:</b>                            |                | none                 |
| <b>Project Number:</b>                 |              | 17712-15                                                                                                            | <b>Test Technician:</b>                       |                | Eric Lifsey          |
| <b>Purchase Order #:</b>               |              | NA                                                                                                                  | <b>Supervisor:</b>                            |                | Lisa Arndt           |
| <b>Equip. Under Test:</b>              |              | SIM-P                                                                                                               | <b>Witness' Name:</b>                         |                | None                 |
| Radiated Emissions Test Equipment List |              |                                                                                                                     |                                               |                |                      |
| <b>Title! Software Version:</b>        |              | 4.2.A, May 23, 2010, 08:38:52 AM                                                                                    |                                               |                |                      |
| <b>Test Profile:</b>                   |              | 2015 Rad Emissions_ClassA - LowPRF_072715.til or<br>2015 Rad Emissions_ClassB - LowPRF_072715.til                   |                                               |                |                      |
| Asset #                                | Manufacturer | Model                                                                                                               | Equipment Nomenclature                        | Serial Number  | Calibration Due Date |
| 1937                                   | Agilent      | E4440A                                                                                                              | Spectrum Analyzer, 3 Hz - 26.5 GHz, Opt. AYZ  | MY44808298     | 12/15/2016           |
| 1926                                   | ETS-Lindgren | 3142D                                                                                                               | Antenna, Biconilog, 26 MHz - 6 GHz            | 135454         | 1/25/2017            |
| C027D                                  | none         | RG214                                                                                                               | Cable Coax, N-N, 25m                          | none           | 10/1/2016            |
| 1327                                   | EMCO         | 1050                                                                                                                | Controller, Antenna Mast                      | none           | N/A                  |
| 0942                                   | EMCO         | 11968D                                                                                                              | Turntable, 4ft.                               | 9510-1835      | N/A                  |
| 1969                                   | HP           | 11713A                                                                                                              | Attenuator/Switch Driver                      | 3748A04113     | N/A                  |
| 1509B                                  | Braden       | N/A                                                                                                                 | TDK 10M Chamber, VSWR > 1 GHz                 | DAC-012915-005 | 3/14/2017            |
| 2004                                   | Miteq        | AFS44-00101800-2S-10P-44                                                                                            | Amplifier, 40dB, .1-18GHz                     | 0              | 1/11/2018            |
| C030                                   | none         | none                                                                                                                | Cable Coax, N-N, 30m                          | none           | 10/1/2016            |
| 1325                                   | EMCO         | 1050                                                                                                                | Controller, Antenna Mast                      | 9003-1461      | N/A                  |
| 1780                                   | ETS-Lindgren | 3117                                                                                                                | Antenna, Double Ridged Guide Horn, 1 - 18 GHz | 110313         | 2/25/2017            |
| 1542                                   | A.H. Systems | SAS-572                                                                                                             | Antenna, Horn 18-26.5GHz, 20dB gain           | 225            | N/A                  |
| 1973                                   | Agilent      | 83017A                                                                                                              | Amplifier, Microwave 0.5-26.5 GHz             | MY39500497     | 2/2/2018             |

---

**9.2 Bandwidth and Duty Cycle**

| <b>Asset #</b> | <b>Manufacturer</b> | <b>Model #</b> | <b>Description</b> | <b>Calibration Due</b> |
|----------------|---------------------|----------------|--------------------|------------------------|
| ALN-077        | Rohde & Schwarz     | FSP-30         | Spectrum Analyzer  | 16 Dec 2016            |

## 10.0 Measurement Bandwidths

| Radiated Emissions Spectrum Analyzer Bandwidth and Measurement Time - Peak Scan                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                           |                      |                       |                            |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|----------------------|-----------------------|----------------------------|
| Frequency Band Start (MHz)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Frequency Band Stop (MHz) | 6 dB Bandwidth (kHz) | Number of Ranges Used | Measurement Time per Range |
| 0.009                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0.15                      | 0.3                  | 2                     | Multiple Sweeps            |
| 0.15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 30                        | 9                    | 6                     | Multiple Sweeps            |
| 30                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1000                      | 120                  | 2                     | Multiple 800 mS Sweeps     |
| 1000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 6000                      | 1000                 | 2                     | Multiple Sweeps            |
| 6000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 18000                     | 1000                 | 2                     | Multiple Sweeps            |
| 18000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 26500                     | 1000                 | 2                     | Multiple Sweeps            |
| *Notes:<br>1. The settings above are specifically calculated for the E4440A series of spectrum analyzers, which have 8,000 data points per range.<br>2. The measurement receiver resolution bandwidth setting was 300 Hz for quasi-peak measurements from 9-150 kHz.<br>3. The measurement receiver resolution bandwidth setting was 9 kHz for quasi-peak measurements from 0.15-30 MHz.<br>4. The measurement receiver resolution bandwidth setting was 120 kHz for quasi-peak measurements from 30-1000 MHz.<br>5. The measurement receiver resolution bandwidth setting was 1 MHz for average measurements from 1-18 GHz. |                           |                      |                       |                            |

## Appendix: Policy, Rationale, and Evaluation of EMC Measurement Uncertainty

All uncertainty calculations, estimates and expressions thereof shall be in accordance with NIST policy. Since PTI operates in accordance with NIST (NVLAP) Handbook 150-11: 2007, all instrumentation having an effect on the accuracy or validity of tests shall be periodically calibrated or verified traceable to national standards by a competent calibration laboratory. The certificates of calibration or verification on this instrumentation shall include estimates of uncertainty as required by NIST Handbook 150-11.

### 1. Rationale and Summary of Expanded Uncertainty.

Each piece of instrumentation at PTI that is used in making measurements for determining conformance to a standard (or limit), shall be assessed to evaluate its contribution to the overall uncertainty of the measurement in which it is used. The assessment of each item will be based on either a type A evaluation or a type B evaluation. Most of the evaluations will be type B, since they will be based on the manufacturer's statements or specifications of the calibration tolerances, or uncertainty will be stated along with a brief rationale for the type of evaluation and the resulting stated uncertainties.

The individual uncertainties included in the combined standard uncertainty for a specific test result will depend on the configuration in which the item of instrumentation is used. The combination will always be based on the law of propagation of uncertainty. Any systematic effects will be accommodated by including their uncertainties, in the calculation of the combined standard uncertainty; except that if the direction and amount of the systematic effect cannot be determined and separated from its uncertainty, the whole effect will be treated as uncertainty and combined along with the other elements of the test setup.

Type A evaluations of standard uncertainty will usually be based on calculating the standard deviation of the mean of a series of independent observations, but may be based on a least-squares curve fit or the analysis of variance for unusual situations. Type B evaluations of standard uncertainty will usually be based on manufacturer's specifications, data provided in calibration reports, and experience. The type of probability distribution used (normal, rectangular, a priori, or u-shaped) will be stated for each Type B evaluation.

In the evaluation of the uncertainty of each type of measurement, the uncertainty caused by the operator will be estimated. One notable operator contribution to measurement uncertainty is the manipulation of cables to maximize the measured values of radiated emissions. The operator contribution to measurement uncertainty is evaluated by having several operators independently repeat the same test. This results in a Type A evaluation of operator-contributed measurement uncertainty.

A summary of the expanded uncertainties of PTI measurements is shown as Table 1. These are the worst-case uncertainties considering all operative influence factors.

**Table 1: Summary of Measurement Uncertainties for Site 45**

| Type of Measurement         | Frequency Range   | Meas. Dist. | Expanded Uncertainty U, dB (k=2) |
|-----------------------------|-------------------|-------------|----------------------------------|
| Mains Conducted Emissions   | 150 kHz to 30 MHz | N/A         | 2.9                              |
| Telecom Conducted Emissions | 150 kHz to 30 MHz | N/A         | 2.8                              |
| Radiated Emissions          | 30 to 1,000 MHz   | 10 m        | 4.8                              |
|                             | 1 to 18 GHz       | 3 m         | 5.7                              |

## **End of Report**

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