# FCC PART 15, SUBPART C
# ISEDC RSS-247, ISSUE 2, FEBRUARY 2017

# TEST AND MEASUREMENT REPORT

For

## Pratt & Whitney Engine Services, Inc.

249 Vanderbilt Avenue, Norwood, MA 02062, USA

**Model: FAST-A-010-3_E**

| **Report Type:** | **Product Type:** |
|---|---|
| Original Report | FAST (Flight-data Acquisition, Storage & Transmission) |

| | |
|---|---|
| **Prepared By:** | Rudy Sun<br>Test Engineer |
| **Report Number:** | R1705231-247 |
| **Report Date:** | 2017-06-20 |
| **Reviewed By:** | Jin Yang<br>RF Engineer |

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# DOCUMENT REVISION HISTORY

| Revision Number | Report Number | Description of Revision | Date of Revision |
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| 0 | R1705231-247 DTS | Original Report | - |

# 1 General Description

## 1.1 Product Description for Equipment Under Test (EUT)

This test and measurement report was prepared on behalf of *Pratt & Whitney Engine Services, Inc.* and their product model: FAST-A-010-3_E, The device used TiWi's Module TiWi- R1, FCC ID: TFB-TIWI1-01; IC: 5969A-TIWI10, which support Wi-Fi radio (2400-2483.5MHz). The EUT is a FAST (Flight-data Acquisition, Storage & Transmission) and contains a cellular radio (GSM 850/1900 and UMTS 850/1900) and a Wi-Fi radio (2400-2483.5MHz).

## 1.2 Mechanical Description of EUT

The EUT measures approximately 152.4 mm (L) x 68.6 mm (W) x 94.0 mm (H).

*The test data gathered are from typical production sample, serial number: R1705231assigned by Pratt & Whitney Engine Services, Inc.*

## 1.3 Objective

This report is prepared on behalf of *Pratt & Whitney Engine Services, Inc.,* in accordance with Part 2, Subpart J, and Part 15, Subparts A and C of the Federal Communication Commission's rules and ISEDC RSS-247 Issue 2, FEBRUARY 2017.

The objective is to determine compliance with FCC Part 15.247 and ISEDC RSS-247 rules for Output Power, Antenna Requirements, 6 dB Bandwidth, Power Spectral Density, 100 kHz Bandwidth of Band Edges Measurement, Conducted and Radiated Spurious Emissions.

## 1.4 Related Submittal(s)/Grant(s)

R1705231-22, RS132/24,RS133

## 1.5 Test Methodology

All measurements contained in this report were conducted in accordance with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices and FCC KDB 558074 D01 DTS Meas Guidance v04: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247.

## 1.6 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in the field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

| Parameter | Measurement uncertainty |
|---|---|
| Occupied Channel Bandwidth | ±5 % |
| RF output power, conducted | ±0.57 dB |
| Power Spectral Density, conducted | ±1.48dB |
| Unwanted Emissions, conducted | ±1.57dB |
| All emissions, radiated | ±4.0 dB |
| AC power line Conducted Emission | ±2.0 dB |
| Temperature | ±2 $^{o}$ C |
| Humidity | ±5 % |
| DC and low frequency voltages | ±1.0 % |
| Time | ±2 % |
| Duty Cycle | ±3 % |

## 1.7 Test Facility Registrations

BACLs test facilities that are used to perform Radiated and Conducted Emissions tests are currently recognized by the Federal Communications Commission as Accredited with NIST Designation Number US1129.

BACL's test facilities that are used to perform Radiated and Conducted Emissions tests are currently registered with Industry Canada under Registration Numbers: 3062A-1, 3062A-2, and 3062A-3.

BACL is a Chinese Taipei Bureau of Standards Metrology and Inspection (BSMI) validated Conformity Assessment Body (CAB), under Appendix B, Phase I Procedures of the APEC Mutual Recognition Arrangement (MRA). BACL's BSMI Lab Code Number is: SL2-IN-E-1002R

BACL's test facilities that are used to perform AC Line Conducted Emissions, Telecommunications Line Conducted Emissions, Radiated Emissions from 30 MHz to 1 GHz, and Radiated Emissions from 1 GHz to 6 GHz are currently recognized as Accredited in accordance with the Voluntary Control Council for Interference [VCCI] Article 15 procedures under Registration Number A-0027.

## 1.8 Test Facility Accreditations

Bay Area Compliance Laboratories Corp. (BACL) is:

**A-** ***An independent, 3rd-Party, Commercial Test Laboratory accredited to ISO/IEC 17025:2005 by A2LA (Test Laboratory Accreditation Certificate Number 3297.02),*** in the fields of: Electromagnetic Compatibility and Telecommunications. Unless noted by an Asterisk (*) in the Compliance Matrix (See Section 3 of this Test Report), BACL's ISO/IEC 17025:2005 Scope of Accreditation includes all of the Test Method Standards and/or the Product Family Standards detailed in this Test Report..

BACL's ISO/IEC 17025:2005 Scope of Accreditation includes a comprehensive suite of EMC Emissions, EMC Immunity, Radio, RF Exposure, Safety and wireline Telecommunications test methods applicable to a wide range of product categories. These product categories include Central Office Telecommunications Equipment [including NEBS - Network Equipment Building Systems], Unlicensed and Licensed Wireless and RF devices, Information Technology Equipment (ITE); Telecommunications Terminal Equipment (TTE); Medical Electrical Equipment; Industrial, Scientific and Medical Test Equipment; Professional Audio and Video Equipment; Industrial and Scientific Instruments and Laboratory Apparatus; Cable Distribution Systems, and Energy Efficient Lighting.

B- ***A Product Certification Body accredited to ISO/IEC 17065:2012 by A2LA (Product Certification Body Accreditation Certificate Number 3297.03)*** to certify

- For the USA (Federal Communications Commission):
  - 1- All Unlicensed radio frequency devices within FCC Scopes A1, A2, A3, and A4;
  - 2- All Licensed radio frequency devices within FCC Scopes B1, B2, B3, and B4;
  - 3- All Telephone Terminal Equipment within FCC Scope C.
- For the Canada (Industry Canada):
  - 1 All Scope 1-Licence-Exempt Radio Frequency Devices;
  - 2 All Scope 2-Licensed Personal Mobile Radio Services;
  - 3 All Scope 3-Licensed General Mobile & Fixed Radio Services;
  - 4 All Scope 4-Licensed Maritime & Aviation Radio Services;
  - 5 All Scope 5-Licensed Fixed Microwave Radio Services
  - 6 All Broadcasting Technical Standards (BETS) in the Category I Equipment Standards List.
- For Singapore (Info-Communications Development Authority (IDA)):
  - 1 All Line Terminal Equipment: All Technical Specifications for Line Terminal Equipment – Table 1 of IDA MRA Recognition Scheme: 2011, Annex 2
  - 2. All Radio-Communication Equipment: All Technical Specifications for Radio-Communication Equipment – Table 2 of IDA MRA Recognition Scheme: 2011, Annex 2
- For the Hong Kong Special Administrative Region:
  - 1 All Radio Equipment, per KHCA 10XX-series Specifications;
  - 2 All GMDSS Marine Radio Equipment, per HKCA 12XX-series Specifications;
  - 3 All Fixed Network Equipment, per HKCA 20XX-series Specifications.
- For Japan:
  - 1 MIC Telecommunication Business Law (Terminal Equipment):
    - All Scope A1 - Terminal Equipment for the Purpose of Calls;
    - All Scope A2 - Other Terminal Equipment
  - 2 Radio Law (Radio Equipment):
    - All Scope B1 - Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 1 of the Radio Law
    - All Scope B2 - Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 2 of the Radio Law
    - All Scope B3 - Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 3 of the Radio Law

C- ***A Product Certification Body accredited to ISO/IEC 17065:2012 by A2LA (Product Certification Body Accreditation Certificate Number 3297.01)*** to certify Products to USA's Environmental Protection Agency (EPA) ENERGY STAR Product Specifications for:

1 Electronics and Office Equipment:
- for Telephony (ver. 3.0)
- for Audio/Video (ver. 3.0)
- for Battery Charging Systems (ver. 1.1)
- for Set-top Boxes & Cable Boxes (ver. 4.1)
- for Televisions (ver. 6.1)
- for Computers (ver. 6.0)
- for Displays (ver. 6.0)
- for Imaging Equipment (ver. 2.0)
- for Computer Servers (ver. 2.0)

2 Commercial Food Service Equipment
- for Commercial Dishwashers (ver. 2.0)
- for Commercial Ice Machines (ver. 2.0)
- for Commercial Ovens (ver. 2.1)
- for Commercial Refrigerators and Freezers

3 Lighting Products
- For Decorative Light Strings (ver. 1.5)
- For Luminaires (including sub-components) and Lamps (ver. 1.2)
- For Compact Fluorescent Lamps (CFLs) (ver. 4.3)
- For Integral LED Lamps (ver. 1.4)

4 Heating, Ventilation, and AC Products
- for Residential Ceiling Fans (ver. 3.0)
- for Residential Ventilating Fans (ver. 3.2)

5 Other
- For Water Coolers (ver. 3.0)

***D. A NIST Designated Phase-I and Phase-II Conformity Assessment Body (CAB) for the following economies and regulatory authorities under the terms of the stated MRAs/Treaties:***

- Australia: ACMA (Australian Communication and Media Authority) – APEC Tel MRA -Phase I;
- Canada: (Industry Canada - IC) Foreign Certification Body – FCB – APEC Tel MRA -Phase I & Phase II;
- Chinese Taipei (Republic of China – Taiwan):
  - BSMI (Bureau of Standards, Metrology and Inspection) APEC Tel MRA -Phase I;
  - NCC (National Communications Commission) APEC Tel MRA -Phase I;
- European Union:
  - Radio & Teleterminal Equipment (R&TTE) Directive 1995/5/EC
    US -EU EMC & Telecom MRA CAB
- Hong Kong Special Administrative Region: (Office of the Telecommunications Authority – OFTA)
  APEC Tel MRA -Phase I & Phase II
- Israel – US-Israel MRA Phase I
- Republic of Korea (Ministry of Communications - Radio Research Laboratory) APEC Tel MRA -Phase I
- Singapore: (Infocomm Development Authority - IDA) APEC Tel MRA -Phase I & Phase II;
- Japan: VCCI - Voluntary Control Council for Interference US-Japan Telecom Treaty VCCI Side Letter-
- USA:
  - ENERGY STAR Recognized Test Laboratory – US EPA
  - Telecommunications Certification Body (TCB) – US FCC;
- Vietnam: APEC Tel MRA -Phase I;

# 2 System Test Configuration

## 2.1 Justification

The EUT was configured for testing according to ANSI C63.10-2013 and FCC KDB 558074 D01 DTS Meas Guidance v04.

The EUT was tested in a testing mode to represent worst-case results during the final qualification test.

The worst-case data rates are determined to be as follows for each mode based upon investigation by measuring the average power, peak power and PSD across all data rates bandwidths, and modulations.

## 2.2 EUT Exercise Software

N/A

## 2.3 Channel Plan

| Channel #s | Frequency (MHz) | Channel #s | Frequency (MHz) | Channel #s | Frequency (MHz) | Channel #s | Frequency (MHz) |
|---|---|---|---|---|---|---|---|
| 1 | 2412 | 4 | 2427 | 7 | 2442 | 10 | 2457 |
| 2 | 2417 | 5 | 2432 | 8 | 2447 | 11 | 2462 |
| 3 | 2422 | 6 | 2437 | 9 | 2452 | | |

## 2.4 Equipment Modifications

N/A

## 2.5 Local Support Equipment

| Manufacturer/Product Type | Description | Model No. | Serial No. |
|---|---|---|---|
| Dell | Windows Laptop | E6410 | - |

## 2.6 Support Equipment

There was no support equipment included, or intended for use with EUT during these tests.

## 2.7 Interface Ports and Cabling

| Cable Description | Length (m) | To | From |
|---|---|---|---|
| RF Cable | < 1 m | PSA | EUT |

# 3 Summary of Test Results

Results reported relate only to the product tested.

| FCC/ ISEDC Rules | Description of Test | Results |
|---|---|---|
| FCC §15.203<br>ISEDC RSS-Gen §8.3 | Antenna Requirement | Compliant |
| FCC §2.1091, §15.247(i)<br>ISEDC RSS-102 | RF Exposure | Compliant |
| FCC §2.1053, §15.205, §15.209, §15.247 (d)<br>ISEDC RSS-247 §5.5<br>ISEDC RSS-Gen §8.9 & §8.10 | Radiated Spurious Emissions | Compliant |

# 4 FCC §15.203 & ISEDC RSS-Gen §8.3 - Antenna Requirements

## 4.1 Applicable Standards

According to FCC §15.203:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

And according to FCC §15.247 (b) (4), if transmitting antennas of directional gain greater than 6 dBi are used the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

According to ISEDC RSS-Gen §8.3: Transmitter Antenna

The applicant for equipment certification, as per RSP-100, must provide a list of all antenna types that may be used with the license-exempt transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna.

License-exempt transmitters that have received equipment certification may operate with different types of antennas. However, it is not permissible to exceed the maximum equivalent isotropically radiated power (e.i.r.p.) limits specified in the applicable standard (RSS) for the license-exempt apparatus.

Testing shall be performed using the highest gain antenna of each combination of license-exempt transmitter and antenna type, with the transmitter output power set at the maximum level. [9] When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna manufacturer.

User manuals for transmitters equipped with detachable antennas shall also contain the following notice in a conspicuous location:

This radio transmitter (identify the device by certification number) has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Immediately following the above notice, the manufacturer shall provide a list of all antenna types approved for use with the transmitter, indicating the maximum permissible antenna gain (in dBi).

## 4.2 Antenna Description

The antennas used by the EUT are not permanent attached antennas.

| Antenna usage | Frequency Range (MHz) | Maximum Antenna Gain (dBi) |
|---|---|---|
| RF | 2400-2483.5 | 4.3 |

# 5 FCC § 2.1091, §15.247(i) & ISEDC RSS-102 – RF Exposure

## 5.1 Applicable Standards

According to FCC §15.247(i) and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Limits for General Population/Uncontrolled Exposure

| Frequency Range (MHz) | Electric Field Strength (V/m) | Magnetic Field Strength (A/m) | Power Density ($mW/cm^2$) | Averaging Time (minutes) |
|---|---|---|---|---|
| Limits for General Population/Uncontrolled Exposure | | | | |
| 0.3-1.34 | 614 | 1.63 | * (100) | 30 |
| 1.34-30 | 824/f | 2.19/f | * ($180/f^2$) | 30 |
| 30-300 | 27.5 | 0.073 | 0.2 | 30 |
| 300-1500 | / | / | f/1500 | 30 |
| 1500-100,000 | / | / | 1.0 | 30 |

f = frequency in MHz
* = Plane-wave equivalent power density

According to RSS-102 § 4:

RF Field Strength Limits for Uncontrolled Use Devices (Uncontrolled Environment)

**Table 4: RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)**

| Frequency Range (MHz) | Electric Field (V/m rms) | Magnetic Field (A/m rms) | Power Density ($W/m^2$) | Reference Period (minutes) |
|---|---|---|---|---|
| 0.003-10[21] | 83 | 90 | - | Instantaneous* |
| 0.1-10 | - | $0.73/f$ | - | 6** |
| 1.1-10 | $87/f^{0.5}$ | - | - | 6** |
| 10-20 | 27.46 | 0.0728 | 2 | 6 |
| 20-48 | $58.07/f^{0.25}$ | $0.1540/f^{0.25}$ | $8.944/f^{0.5}$ | 6 |
| 48-300 | 22.06 | 0.05852 | 1.291 | 6 |
| 300-6000 | $3.142f^{0.3417}$ | $0.008335f^{0.3417}$ | $0.02619f^{0.6834}$ | 6 |
| 6000-15000 | 61.4 | 0.163 | 10 | 6 |
| 15000-150000 | 61.4 | 0.163 | 10 | $616000/f^{1.2}$ |
| 150000-300000 | $0.158f^{0.5}$ | $4.21 \times 10^{-4} f^{0.5}$ | $6.67 \times 10^{-5} f$ | $616000/f^{1.2}$ |

**Note:** $f$ is frequency in MHz.
*Based on nerve stimulation (NS).
** Based on specific absorption rate (SAR).

## 5.2 MPE Prediction

Predication of MPE limit at a given distance, Equation from OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2$$

Where: S = power density
P = power input to antenna
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna

## 5.3 MPE Results For FCC

| | |
|---|---|
| Maximum peak output power at antenna input terminal (dBm): | 19.67 |
| Maximum peak output power at antenna input terminal (mW): | 92.683 |
| Prediction distance (cm): | 30 |
| Prediction frequency (MHz): | 2412 |
| Maximum Antenna Gain, typical (dBi): | 4.3 |
| Maximum Antenna Gain (numeric): | 2.692 |
| Power density of prediction frequency at 30.0 cm ($mW/cm^2$): | 0.011 |
| FCC MPE limit for uncontrolled exposure at prediction frequency ($mW/cm^2$): | 1.0 |

The device is compliant with the requirement MPE limit for uncontrolled exposure. The maximum power density at the distance of 30 cm is 0.011 $mW/cm^2$. Limit is 1.0 $mW/cm^2$, so the percentage is 0.011/1= 1.10%. The total percentage is 77.0% (WWAN) + 1.10% (WLAN) = 78.10%.

## 5.4 RF exposure evaluation exemption for IC

| | |
|---|---|
| Maximum peak output power at antenna input terminal (dBm): | 19.67 |
| Maximum peak output power at antenna input terminal (W): | 0.927 |
| Prediction distance (m): | 0.4 |
| Prediction frequency (MHz): | 2412 |
| Antenna Gain, typical (dBi): | 4.3 |
| Maximum Antenna Gain (numeric): | 2.692 |
| Power density at predication frequency at 0.4m ($W/m^2$): | 0.124 |
| MPE limit for uncontrolled exposure at predication frequency ($W/m^2$): | 5.366 |

The device is compliant with the requirement MPE limit for uncontrolled exposure. The maximum power density at the distance of 40 cm is 0.124 $mW/cm^{2.}$ Limit is 5.366 $mW/cm^2$. The percentage is 0.124/5.366= 2.31%. The total percentage is 92.4% (WWAN) + 2.31% (WLAN) = 94.71%.

# 6 FCC §15.205, §15.209, §15.247(d), ISEDC RSS-247 §5.5, & ISEDC RSS-GEN §8.9 & §8.10 - Spurious Radiated Emissions

## 6.1 Applicable Standards

As per FCC §15.35(d): Unless otherwise specified, on any frequency or frequencies above 1000 MHz, the radiated emission limits are based on the use of measurement instrumentation employing an average detector function. Unless otherwise specified, measurements above 1000 MHz shall be performed using a minimum resolution bandwidth of 1 MHz.

As Per FCC §15.205(a) except as show in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

| MHz | MHz | MHz | GHz |
|---|---|---|---|
| 0.090 – 0.110 | 16.42 – 16.423 | | 4. 5 – 5. 15 |
| 0.495 – 0.505 | 16.69475 – 16.69525 | 960 – 1240 | 5. 35 – 5. 46 |
| 2.1735 – 2.1905 | 25.5 – 25.67 | 1300 – 1427 | 7.25 – 7.75 |
| 4.125 – 4.128 | 37.5 – 38.25 | 1435 – 1626.5 | 8.025 – 8.5 |
| 4.17725 – 4.17775 | 73 – 74.6 | 1645.5 – 1646.5 | 9.0 – 9.2 |
| 4.20725 – 4.20775 | 74.8 – 75.2 | 1660 – 1710 | 9.3 – 9.5 |
| 6.215 – 6.218 | 108 – 121.94 | 1718.8 – 1722.2 | 10.6 – 12.7 |
| 6.26775 – 6.26825 | 123 – 138 | 2200 – 2300 | 13.25 – 13.4 |
| 6.31175 – 6.31225 | 149.9 – 150.05 | 2310 – 2390 | 14.47 – 14.5 |
| 8.291 – 8.294 | 156.52475 – 156.52525 | 2483.5 – 2500 | 15.35 – 16.2 |
| 8.362 – 8.366 | 156.7 – 156.9 | 2690 – 2900 | 17.7 – 21.4 |
| 8.37625 – 8.38675 | 162.0125 –167.17 | 3260 – 3267 | 22.01 – 23.12 |
| 8.41425 – 8.41475 | 167.72 – 173.2 | 3.332 – 3.339 | 23.6 – 24.0 |
| 12.29 – 12.293 | 240 – 285 | 3 3458 – 3 358 | 31.2 – 31.8 |
| 12.51975 – 12.52025 | 322 – 335.4 | 3.600 – 4.400 | 36.43 – 36.5 |
| 12.57675 – 12.57725 | 399.9 – 410 | | Above 38.6 |
| 13.36 – 13.41 | 608 – 614 | | |

As per FCC §15.209(a): Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table

| Frequency (MHz) | Field Strength (micro volts/meter) | Measurement Distance (meters) |
|---|---|---|
| 0.009 - 0.490 | 2400/F(kHz) | 300 |
| 0.490 - 1.705 | 24000/F(kHz) | 30 |
| 1.705 - 30.0 | 30 | 30 |
| 30 - 88 | 100** | 3 |
| 88 - 216 | 150** | 3 |
| 216 - 960 | 200** | 3 |
| Above 960 | 500 | 3 |

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz.

However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

As per FCC §15.247 (d), in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c).

As per ISEDC RSS-Gen 8.9,

> Except when the requirements applicable to a given device state otherwise, emissions from licence-exempt transmitters shall comply with the field strength limits shown in Table 4 or Table 5 below. Additionally, the level of any transmitter emission shall not exceed the level of the transmitter's fundamental emission.

**Table 4 – General Field Strength Limits for Licence-Exempt Transmitters at Frequencies Above 30 MHz**

| Frequency (MHz) | Field Strength (µv/m at 3 metres) |
|---|---|
| 30-88 | 100 |
| 88-216 | 150 |
| 216-960 | 200 |
| Above 960* | 500 |

linear average detector function having a minimum resolution bandwidth of 1 MHz. If an average limit is specified for the EUT, then the peak emission shall also be measured with instrumentation properly adjusted for such factors as pulse desensitization to ensure the peak emission is less than 20 dB above the average limit.

Note: Transmitting devices are not permitted in restricted frequency bands unless stated otherwise in the specifISEDC RSS.

As per ISEDC RSS-247 §5.5, in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

## 6.2 Test Setup

The radiated emissions tests were performed in the 5-meter Chamber, using the setup in accordance with ANSI C63.10-2013. The specification used was the FCC 15 Subpart limits.

The spacing between the peripherals was 10 centimeters.

External I/O cables were draped along the edge of the test table and bundle when necessary.

## 6.3 Test Procedure

For the radiated emissions test, the EUT host, and all support equipment power cords were connected to the AC floor outlet.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

The EUT was set 3 meter away from the testing antenna, which was varied from 1-4 meter, and the EUT was placed on a turntable, which was 0.8 meter and 1.5 meter above the ground plane for below and above 1000 MHz measurements, the table shall be rotated for 360 degrees to find out the highest emission. The receiving antenna's polarity should be changed between horizontal and vertical.

The spectrum analyzer or receiver was set as:

Below 1000 MHz:

RBW = 100 kHz / VBW = 300 kHz / Sweep = Auto

Above 1000 MHz:

(1) Peak: RBW = 1MHz / VBW = 1MHz / Sweep = Auto
(2) Average: RBW = 1MHz / VBW = 10Hz / Sweep = Auto

## 6.4 Corrected Amplitude & Margin Calculation

The Corrected Amplitude (CA) is calculated by adding the Antenna Factor (AF), the Cable Loss (CL), the Attenuator Factor (Atten) and subtracting the Amplifier Gain (Ga) to indicated Amplitude (Ai) reading. The basic equation is as follows:

CA = Ai + AF + CL + Atten – Ga

For example, a corrected amplitude of 40.3 dBuV/m = Indicated Reading (32.5 dBuV) + Antenna Factor (+23.5dB) + Cable Loss (3.7 dB) + Attenuator (10 dB) - Amplifier Gain (29.4 dB)

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of -7 dB means the emission is 7 dB below the maximum limit. The equation for margin calculation is as follows:

Margin = Corrected Amplitude – Limit

## 6.5 Test Equipment List and Details

| Manufacturer | Description | Model No. | Serial No. | Calibration Date | Calibration Interval |
|---|---|---|---|---|---|
| Rohde & Schwarz | Receiver, EMI Test | ESCI 1166.5950K03 | 100338 | 2016-02-04 | 2 year |
| Agilent | Analyzer, Spectrum | E4440A | US 42221851 | 2016-06-10 | 1 year |
| Sunol Science Corp | System Controller | SC99V | 011003-1 | N/R | N/R |
| Sunol Sciences | Antenna, Biconi-Log | JB3 | A020106-2 | 2015-07-11 | 2 Years |
| EMCO | Antenna, Horn | 3115 | 9511-4627 | 2016-01-28 | 2 years |
| HP | Amplifier, Pre | 8447D | 2944A06639 | 2016-06-28 | 1 year |
| IW | Yellow High Frequency Cable | DC 1531 | SPS-2303-3840-SPS | 2016-08-05 | 1 Year |
| Suirong | 30 ft conductive emission cable | LMR400 | C0013 | 2017-03-21 | 1 Year |
| Suirong | 30 ft conductive emission cable | LMR400 | C0014 | 2017-03-21 | 1 Year |
| Wainwright Instruments | Band Reject Filter | WRCGV900/930-880/950-40/8SS | - | Each time1 | 1 year |
| - | SMA cable | - | C0002 | Each time1 | N/A |
| HP | Pre-Amplifier | 8449B OPT HO2 | 3008A0113 | 2016-05-23 | 1 year |
| Vasona | Test software | V6.0 build 11 | 10400213 | N/R | N/R |

Note[1]: cable and attenuator included in the test set-up will be checked each time before testing.

***Statement of Traceability: BACL*** *attests that all calibrations have been performed per the A2LA requirements, traceable to NIST.*

## 6.6 Test Environmental Conditions

| | |
|---|---|
| **Temperature:** | 20-22 ºC |
| **Relative Humidity:** | 37-40 % |
| **ATM Pressure:** | 101 kPa |

*The testing was performed by Rudy Sun from 2017-05-25 in 5m chamber 3.*

## 6.7 Summary of Test Results

According to the data hereinafter, the EUT complied with FCC Title 47, Part 15C, ISEDC RSS-GEN, and ISEDC RSS-247 standards' radiated emissions limits, and had the worst margin of:

**2400 – 2483.5MHz Wi-Fi**

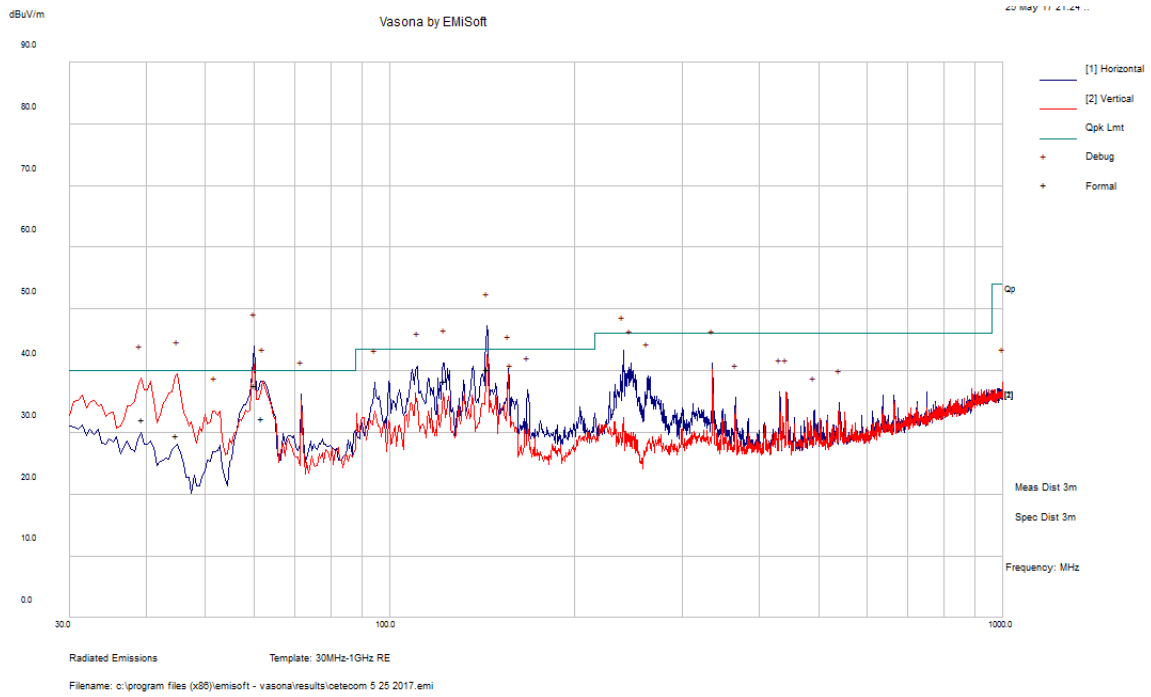
| **Mode: Transmitting** | | | |
|---|---|---|---|
| **Margin (dB)** | **Frequency (MHz)** | **Polarization (Horizontal/Vertical)** | **Mode, channel** |
| -2.26 | 60.01925 | Horizontal | n20, 2437MHz |

Please refer to the following table and plots for specific test result details

## 6.8 Radiated Emissions Test Results

### 1) 30 MHz – 1 GHz Worst Case, Measured at 3 meters

**2400 – 2483.5 MHz**




| Frequency (MHz) | Corrected Amplitude (dBµV/m) | Antenna Height (cm) | Antenna Polarity (H/V) | Turntable Azimuth (degrees) | Limit (dBµV/m) | Margin (dB) | Comment |
|---|---|---|---|---|---|---|---|
| 60.01925 | 37.74 | 289 | H | 94 | 40 | -2.26 | QP |
| 144.0288 | 40.2 | 175 | H | 202 | 43.5 | -3.3 | QP |
| 44.95075 | 29.57 | 191 | V | 290 | 40 | -10.43 | QP |
| 39.42075 | 32.17 | 144 | V | 46 | 40 | -7.83 | QP |
| 61.782 | 32.33 | 245 | V | 115 | 40 | -7.67 | QP |
| 122.8763 | 38.43 | 161 | H | 99 | 43.5 | -5.07 | QP |

**2) 1–10 GHz Measured at 3 meters**

**b mode**

| Frequency (MHz) | S.A. Reading (dBµV) | Turntable Azimuth (degrees) | Test Antenna | | | Cable Loss (dB) | Pre-Amp. (dB) | Cord. Reading (dBµV/m) | FCC | | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Height (cm) | Polarity (H/V) | Factor (dB/m) | | | | Limit (dBµV/m) | Margin (dB) | |
| Low Channel 2412 MHz | | | | | | | | | | | |
| 2412 | 61.84 | 360 | 218 | H | 29.042 | 6.259 | 0 | 97.141 | - | - | Peak |
| 2412 | 65.44 | 233 | 265 | V | 29.042 | 6.259 | 0 | 100.741 | - | - | Peak |
| 2412 | 31.03 | 360 | 218 | H | 29.042 | 6.259 | 0 | 66.331 | - | - | Ave |
| 2412 | 32.61 | 233 | 265 | V | 29.042 | 6.259 | 0 | 67.911 | - | - | Ave |
| 2390 | 26.05 | 360 | 218 | H | 29.042 | 6.237 | 0 | 61.329 | 74 | -12.671 | Peak |
| 2390 | 25.51 | 233 | 265 | V | 29.042 | 6.237 | 0 | 60.789 | 74 | -13.211 | Peak |
| 2390 | 12.39 | 360 | 218 | H | 29.042 | 6.237 | 0 | 47.669 | 54 | -6.331 | Ave |
| 2390 | 12.37 | 233 | 265 | V | 29.042 | 6.237 | 0 | 47.649 | 54 | -6.351 | Ave |
| 4824 | 45.80 | 360 | 218 | H | 32.472 | 8.416 | 38.54 | 48.148 | 74 | -25.852 | Peak |
| 4824 | 46.03 | 233 | 265 | V | 32.472 | 8.416 | 38.54 | 48.378 | 74 | -25.622 | Peak |
| 4824 | 33.03 | 360 | 218 | H | 32.472 | 8.416 | 38.54 | 35.378 | 54 | -18.622 | Ave |
| 4824 | 33.04 | 233 | 265 | V | 32.472 | 8.416 | 38.54 | 35.388 | 54 | -18.612 | Ave |
| 7236 | 44.63 | 360 | 218 | H | 36.692 | 10.348 | 37.9 | 53.77 | 74 | -20.23 | Peak |
| 7236 | 43.51 | 233 | 265 | V | 36.692 | 10.348 | 37.9 | 52.65 | 74 | -21.35 | Peak |
| 7236 | 32.04 | 360 | 218 | H | 36.692 | 10.348 | 37.9 | 41.18 | 54 | -12.82 | Ave |
| 7236 | 32.02 | 233 | 265 | V | 36.692 | 10.348 | 37.9 | 41.16 | 54 | -12.84 | Ave |
| | | | | | | | | | | | |

| Frequency (MHz) | S.A. Reading (dBµV) | Turntable Azimuth (degrees) | Test Antenna | | | Cable Loss (dB) | Pre-Amp. (dB) | Cord. Reading (dBµV/m) | FCC | | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Height (cm) | Polarity (H/V) | Factor (dB/m) | | | | Limit (dBµV/m) | Margin (dB) | |
| Middle Channel 2437 MHz | | | | | | | | | | | |
| 2437 | 64.83 | 264 | 248 | V | 29.413 | 6.241 | 0 | 100.484 | - | - | Peak |
| 2437 | 60.72 | 360 | 177 | H | 29.413 | 6.241 | 0 | 96.374 | - | - | Peak |
| 2437 | 31.55 | 264 | 248 | V | 29.413 | 6.241 | 0 | 67.204 | - | - | Ave |
| 2437 | 30.67 | 360 | 177 | H | 29.413 | 6.241 | 0 | 66.324 | - | - | Ave |
| 4874 | 44.88 | 264 | 248 | V | 32.638 | 8.386 | 38.54 | 47.364 | 74 | -26.636 | Peak |
| 4874 | 45.10 | 360 | 177 | H | 32.638 | 8.386 | 38.54 | 47.584 | 74 | -26.416 | Peak |
| 4874 | 32.47 | 264 | 248 | V | 32.638 | 8.386 | 38.54 | 34.954 | 54 | -19.046 | Ave |
| 4874 | 32.50 | 360 | 177 | H | 32.638 | 8.386 | 38.54 | 34.984 | 54 | -19.016 | Ave |

| Frequency (MHz) | S.A. Reading (dBµV) | Turntable Azimuth (degrees) | Test Antenna | | | Cable Loss (dB) | Pre-Amp. (dB) | Cord. Reading (dBµV/m) | FCC | | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Height (cm) | Polarity (H/V) | Factor (dB/m) | | | | Limit (dBµV/m) | Margin (dB) | |
| High Channel 2462 MHz | | | | | | | | | | | |
| 2462 | 65.12 | 232 | 275 | V | 29.3 | 6.229 | 0 | 100.649 | - | - | Peak |
| 2462 | 61.48 | 331 | 177 | H | 29.3 | 6.229 | 0 | 97.009 | - | - | Peak |
| 2462 | 32.62 | 232 | 275 | V | 29.3 | 6.229 | 0 | 68.149 | - | - | Ave |
| 2462 | 31.17 | 331 | 177 | H | 29.3 | 6.229 | 0 | 66.699 | - | - | Ave |
| 2483.5 | 25.39 | 232 | 275 | V | 29.34 | 6.223 | 0 | 60.953 | 74 | -13.047 | Peak |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2483.5 | 25.73 | 331 | 177 | H | 29.34 | 6.223 | 0 | 61.293 | 74 | -12.707 | Peak |
| 2483.5 | 12.66 | 232 | 275 | V | 29.34 | 6.223 | 0 | 48.223 | 54 | -5.777 | Ave |
| 2483.5 | 12.62 | 331 | 177 | H | 29.34 | 6.223 | 0 | 48.183 | 54 | -5.817 | Ave |
| 4924 | 45.63 | 232 | 275 | V | 32.638 | 8.386 | 38.54 | 48.114 | 74 | -25.886 | Peak |
| 4924 | 46.01 | 331 | 177 | H | 32.638 | 8.386 | 38.54 | 48.494 | 74 | -25.506 | Peak |
| 4924 | 33.36 | 232 | 275 | V | 32.638 | 8.386 | 38.54 | 35.844 | 54 | -18.156 | Ave |
| 4924 | 33.38 | 331 | 177 | H | 32.638 | 8.386 | 38.54 | 35.864 | 54 | -18.136 | Ave |

**g mode**

| Frequency (MHz) | S.A. Reading (dBµV) | Turntable Azimuth (degrees) | Test Antenna | | | Cable Loss (dB) | Pre-Amp. (dB) | Cord. Reading (dBµV/m) | FCC | | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Height (cm) | Polarity (H/V) | Factor (dB/m) | | | | Limit (dBµV/m) | Margin (dB) | |
| Low Channel 2412 MHz | | | | | | | | | | | |
| 2412 | 65.52 | 333 | 177 | H | 29.042 | 6.259 | 0 | 100.821 | - | - | Peak |
| 2412 | 69.02 | 229 | 265 | V | 29.042 | 6.259 | 0 | 104.321 | - | - | Peak |
| 2412 | 52.48 | 333 | 177 | H | 29.042 | 6.259 | 0 | 87.781 | - | - | Ave |
| 2412 | 55.88 | 229 | 265 | V | 29.042 | 6.259 | 0 | 91.181 | - | - | Ave |
| 2390 | 25.29 | 333 | 177 | H | 29.042 | 6.237 | 0 | 60.569 | 74 | -13.431 | Peak |
| 2390 | 24.7 | 229 | 265 | V | 29.042 | 6.237 | 0 | 59.979 | 74 | -14.021 | Peak |
| 2390 | 14.77 | 333 | 177 | H | 29.042 | 6.237 | 0 | 50.049 | 54 | -3.951 | Ave |
| 2390 | 14.85 | 229 | 265 | V | 29.042 | 6.237 | 0 | 50.129 | 54 | -3.871 | Ave |
| 4824 | 45.66 | 333 | 177 | H | 32.472 | 8.416 | 38.54 | 48.008 | 74 | -25.992 | Peak |
| 4824 | 45.45 | 229 | 265 | V | 32.472 | 8.416 | 38.54 | 47.798 | 74 | -26.202 | Peak |
| 4824 | 35.69 | 333 | 177 | H | 32.472 | 8.416 | 38.54 | 38.038 | 54 | -15.962 | Ave |
| 4824 | 35.64 | 229 | 265 | V | 32.472 | 8.416 | 38.54 | 37.988 | 54 | -16.012 | Ave |
| 7236 | 44.41 | 333 | 177 | H | 36.692 | 10.348 | 38 | 53.45 | 74 | -20.55 | Peak |
| 7236 | 44.81 | 229 | 265 | V | 36.692 | 10.348 | 38 | 53.85 | 74 | -20.15 | Peak |
| 7236 | 34.94 | 333 | 177 | H | 36.692 | 10.348 | 38 | 43.98 | 54 | -10.02 | Ave |
| 7236 | 34.70 | 229 | 265 | V | 36.692 | 10.348 | 38 | 43.74 | 54 | -10.26 | Ave |
| | | | | | | | | | | | |
| **Frequency (MHz)** | **S.A. Reading (dBµV)** | **Turntable Azimuth (degrees)** | **Test Antenna** | | | **Cable Loss (dB)** | **Pre-Amp. (dB)** | **Cord. Reading (dBµV/m)** | **FCC** | | **Comments** |
| | | | **Height (cm)** | **Polarity (H/V)** | **Factor (dB/m)** | | | | **Limit (dBµV/m)** | **Margin (dB)** | |
| Middle Channel 2437 MHz | | | | | | | | | | | |
| 2437 | 68.81 | 219 | 251 | V | 29.413 | 6.241 | 0 | 104.464 | - | - | Peak |
| 2437 | 66.33 | 360 | 180 | H | 29.413 | 6.241 | 0 | 101.984 | - | - | Peak |
| 2437 | 54.76 | 219 | 251 | V | 29.413 | 6.241 | 0 | 90.414 | - | - | Ave |
| 2437 | 51.3 | 360 | 180 | H | 29.413 | 6.241 | 0 | 86.954 | - | - | Ave |
| 4874 | 45.68 | 219 | 251 | V | 32.638 | 8.386 | 38.54 | 48.164 | 74 | -25.836 | Peak |
| 4874 | 45.09 | 360 | 180 | H | 32.638 | 8.386 | 38.54 | 47.574 | 74 | -26.426 | Peak |
| 4874 | 35.58 | 219 | 251 | V | 32.638 | 8.386 | 38.54 | 38.064 | 54 | -15.936 | Ave |
| 4874 | 35.57 | 360 | 180 | H | 32.638 | 8.386 | 38.54 | 38.054 | 54 | -15.946 | Ave |

| Frequency (MHz) | S.A. Reading (dBµV) | Turntable Azimuth (degrees) | Test Antenna | | | Cable Loss (dB) | Pre-Amp. (dB) | Cord. Reading (dBµV/m) | FCC | | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Height (cm) | Polarity (H/V) | Factor (dB/m) | | | | Limit (dBµV/m) | Margin (dB) | |
| High Channel 2462 MHz | | | | | | | | | | | |
| 2462 | 68.65 | 311 | 272 | V | 29.413 | 6.229 | 0 | 104.292 | - | - | Peak |
| 2462 | 63.06 | 360 | 209 | H | 29.413 | 6.229 | 0 | 98.702 | - | - | Peak |
| 2462 | 54.01 | 311 | 272 | V | 29.413 | 6.229 | 0 | 89.652 | - | - | Ave |
| 2462 | 50.26 | 360 | 209 | H | 29.413 | 6.229 | 0 | 85.902 | - | - | Ave |
| 2483.5 | 25.26 | 311 | 272 | V | 29.413 | 6.223 | 0 | 60.896 | 74 | -13.104 | Peak |
| 2483.5 | 25.77 | 360 | 209 | H | 29.413 | 6.223 | 0 | 61.406 | 74 | -12.594 | Peak |
| 2483.5 | 15.15 | 311 | 272 | V | 29.413 | 6.223 | 0 | 50.786 | 54 | -3.214 | Ave |
| 2483.5 | 15.1 | 360 | 209 | H | 29.413 | 6.223 | 0 | 50.736 | 54 | -3.264 | Ave |
| 4924 | 45.55 | 311 | 272 | V | 32.638 | 8.386 | 38.54 | 48.034 | 74 | -25.966 | Peak |
| 4924 | 44.61 | 360 | 209 | H | 32.638 | 8.386 | 38.54 | 47.094 | 74 | -26.906 | Peak |
| 4924 | 35.87 | 311 | 272 | V | 32.638 | 8.386 | 38.54 | 38.354 | 54 | -15.646 | Ave |
| 4924 | 35.88 | 360 | 209 | H | 32.638 | 8.386 | 38.54 | 38.364 | 54 | -15.636 | Ave |

**n20 mode**

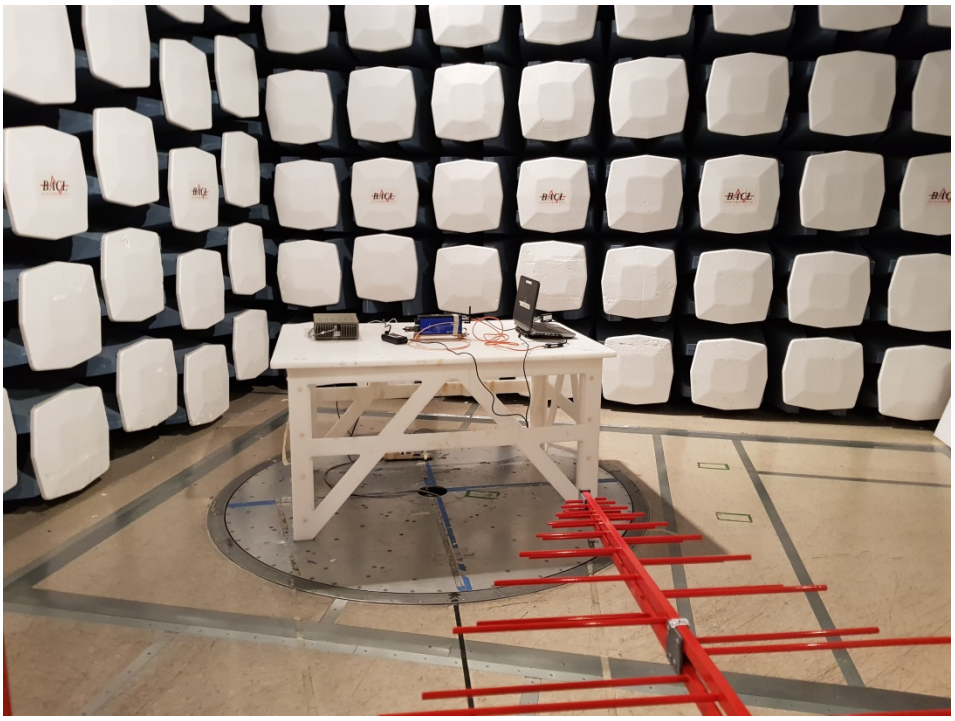
| Frequency (MHz) | S.A. Reading (dBµV) | Turntable Azimuth (degrees) | Test Antenna | | | Cable Loss (dB) | Pre-Amp. (dB) | Cord. Reading (dBµV/m) | FCC | | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Height (cm) | Polarity (H/V) | Factor (dB/m) | | | | Limit (dBµV/m) | Margin (dB) | |
| Low Channel 2412 MHz | | | | | | | | | | | |
| 2412 | 65.08 | 360 | 237 | V | 29.042 | 6.259 | 0 | 100.38 | - | - | Peak |
| 2412 | 65.99 | 360 | 226 | H | 29.042 | 6.259 | 0 | 101.29 | - | - | Peak |
| 2412 | 45.25 | 360 | 237 | V | 29.042 | 6.259 | 0 | 80.55 | - | - | Ave |
| 2412 | 46.04 | 360 | 226 | H | 29.042 | 6.259 | 0 | 81.34 | - | - | Ave |
| 2390 | 25.05 | 360 | 237 | V | 29.042 | 6.237 | 0 | 60.33 | 74 | -13.67 | Peak |
| 2390 | 26.41 | 360 | 226 | H | 29.042 | 6.237 | 0 | 61.69 | 74 | -12.31 | Peak |
| 2390 | 14.65 | 360 | 237 | V | 29.042 | 6.237 | 0 | 49.93 | 54 | -4.07 | Ave |
| 2390 | 14.79 | 360 | 226 | H | 29.042 | 6.237 | 0 | 50.07 | 54 | -3.93 | Ave |
| 4824 | 45.25 | 360 | 237 | V | 32.472 | 8.416 | 38.54 | 47.60 | 74 | -26.40 | Peak |
| 4824 | 45.27 | 360 | 226 | H | 32.472 | 8.416 | 38.54 | 47.62 | 74 | -26.38 | Peak |
| 4824 | 35.64 | 360 | 237 | V | 32.472 | 8.416 | 38.54 | 37.99 | 54 | -16.01 | Ave |
| 4824 | 35.63 | 360 | 226 | H | 32.472 | 8.416 | 38.54 | 37.98 | 54 | -16.02 | Ave |
| 7236 | 44.95 | 360 | 226 | H | 36.692 | 10.211 | 37.9 | 53.953 | 74 | -20.047 | Peak |
| 7236 | 44.66 | 360 | 237 | V | 36.692 | 10.211 | 37.9 | 53.663 | 74 | -20.337 | Peak |
| 7236 | 34.64 | 360 | 226 | H | 36.692 | 10.211 | 37.9 | 43.643 | 54 | -10.357 | Ave |
| 7236 | 34.62 | 360 | 237 | V | 36.692 | 10.211 | 37.9 | 43.623 | 54 | -10.377 | Ave |
| | | | | | | | | | | | |
| Frequency (MHz) | S.A. Reading (dBµV) | Turntable Azimuth (degrees) | Test Antenna | | | Cable Loss (dB) | Pre-Amp. (dB) | Cord. Reading (dBµV/m) | FCC | | Comments |
| | | | Height (cm) | Polarity (H/V) | Factor (dB/m) | | | | Limit (dBµV/m) | Margin (dB) | |
| Middle Channel 2437 MHz | | | | | | | | | | | |
| 2437 | 69.23 | 319 | 280 | V | 29.413 | 6.241 | 0 | 104.88 | - | - | Peak |
| 2437 | 64.78 | 360 | 224 | H | 29.413 | 6.241 | 0 | 100.43 | - | - | Peak |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2437 | 50.38 | 319 | 280 | V | 29.413 | 6.241 | 0 | 86.03 | - | - | Ave |
| 2437 | 45.09 | 360 | 224 | H | 29.413 | 6.241 | 0 | 80.74 | - | - | Ave |
| 4874 | 45.16 | 319 | 280 | V | 32.638 | 8.386 | 38.54 | 47.64 | 74 | -26.36 | Peak |
| 4874 | 45.70 | 360 | 224 | H | 32.638 | 8.386 | 38.54 | 48.18 | 74 | -25.82 | Peak |
| 4874 | 35.84 | 319 | 280 | V | 32.638 | 8.386 | 38.54 | 38.32 | 54 | -15.68 | Ave |
| 4874 | 35.85 | 360 | 224 | H | 32.638 | 8.386 | 38.54 | 38.33 | 54 | -15.67 | Ave |

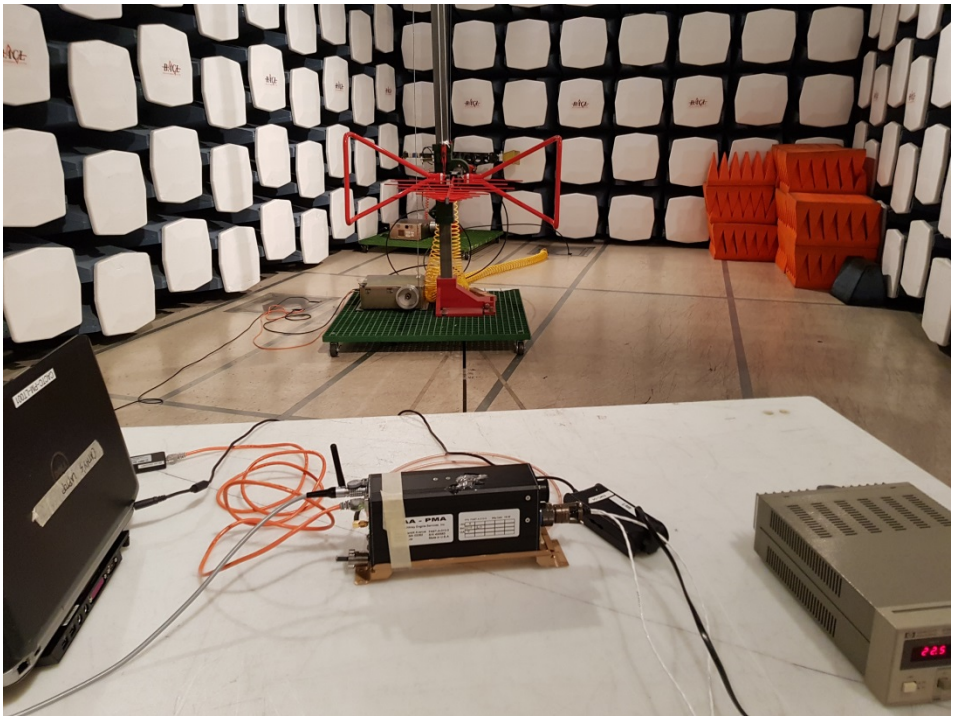
| Frequency (MHz) | S.A. Reading (dBµV) | Turntable Azimuth (degrees) | Test Antenna | | | Cable Loss (dB) | Pre-Amp. (dB) | Cord. Reading (dBµV/m) | FCC | | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Height (cm) | Polarity (H/V) | Factor (dB/m) | | | | Limit (dBµV/m) | Margin (dB) | |
| High Channel 2462 MHz | | | | | | | | | | | |
| 2462 | 67.3 | 318 | 258 | V | 29.413 | 6.229 | 0 | 102.94 | - | - | Peak |
| 2462 | 64.72 | 360 | 208 | H | 29.413 | 6.229 | 0 | 100.36 | - | - | Peak |
| 2462 | 48.78 | 318 | 258 | V | 29.413 | 6.229 | 0 | 84.42 | - | - | Ave |
| 2462 | 44.58 | 360 | 208 | H | 29.413 | 6.229 | 0 | 80.22 | - | - | Ave |
| 2483.5 | 25.76 | 318 | 258 | V | 29.413 | 6.223 | 0 | 61.40 | 74 | -12.60 | Peak |
| 2483.5 | 25.81 | 360 | 208 | H | 29.413 | 6.223 | 0 | 61.45 | 74 | -12.55 | Peak |
| 2483.5 | 15.12 | 318 | 258 | V | 29.413 | 6.223 | 0 | 50.76 | 54 | -3.24 | Ave |
| 2483.5 | 15.1 | 360 | 208 | H | 29.413 | 6.223 | 0 | 50.74 | 54 | -3.26 | Ave |
| 4924 | 47.17 | 318 | 258 | V | 32.638 | 8.386 | 38.54 | 49.65 | 74 | -24.35 | Peak |
| 4924 | 44.50 | 360 | 208 | H | 32.638 | 8.386 | 38.54 | 46.98 | 74 | -27.02 | Peak |
| 4924 | 35.89 | 318 | 258 | V | 32.638 | 8.386 | 38.54 | 38.37 | 54 | -15.63 | Ave |
| 4924 | 35.89 | 360 | 208 | H | 32.638 | 8.386 | 38.54 | 38.37 | 54 | -15.63 | Ave |

# 7 Exhibit B - Test Setup Photographs

## 7.1 Radiated Emission below 1 GHz Front View

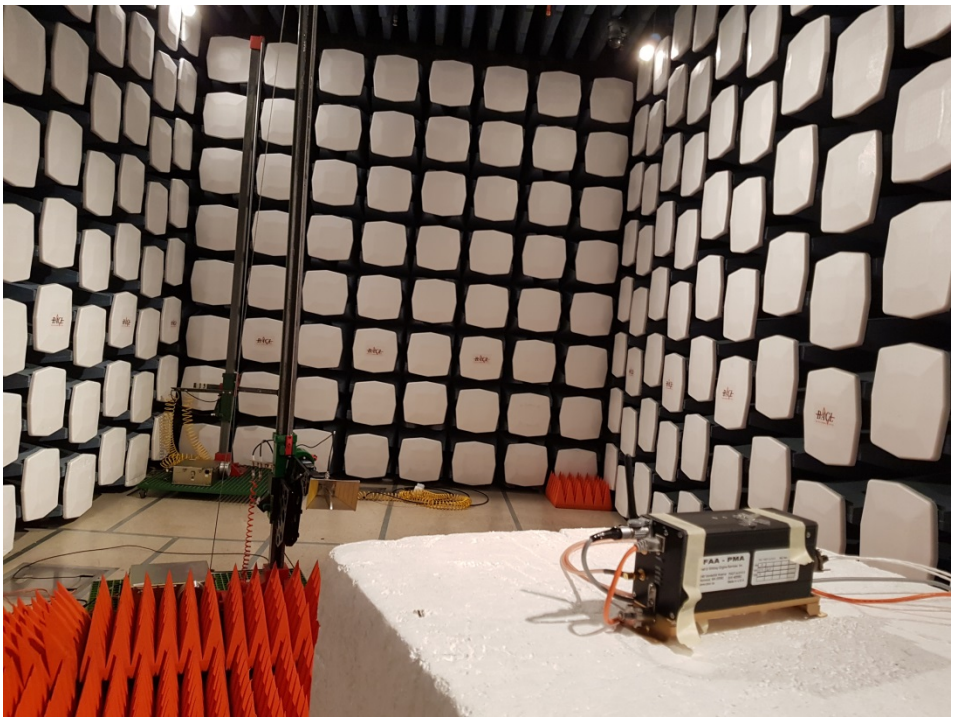


## 7.2 Radiated Emission below 1 GHz Rear View



## 7.3 Radiated Emission above 1 GHz Front View

## 7.4 Radiated Emission above 1 GHz Rear View



**--- END OF REPORT ---**