

**ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT  
INTENTIONAL RADIATOR CERTIFICATION TO  
FCC PART 15 SUBPART C REQUIREMENT**

*OF*

**FL X-3 Destroyer**

**Model No.: AD12512**

**Trade Mark: N/A**

**FCC ID: 2AMON-HIK-AD12512**

**Report No.: ED170713014E**

**Issue Date: July 10, 2017**

*Prepared for*

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EMTEK(DONGGUAN) CO., LTD.**

## VERIFICATION OF COMPLIANCE

|                      |                                                                                                                  |
|----------------------|------------------------------------------------------------------------------------------------------------------|
| Applicant:           | Hikari Design Co.,Ltd.<br>156-1 Takashina-cho, Wakaba-ku, Chiba, 264-0024 Japan                                  |
| Manufacturer:        | AERO CONCEPT LIMITED.<br>UNIT A, 12/F., SHING KING INDUSTRIAL BUILDING, 45KUT SHING STREET, CHAI WAN, HONG KONG. |
| Product Description: | FL X-3 Destroyer                                                                                                 |
| Trade Mark:          | N/A                                                                                                              |
| Model Number:        | AD12512                                                                                                          |

### We hereby certify that:

The above equipment was tested by EMTEK(DONGGUAN) CO., LTD. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10-2013 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.249(2016).

Date of Test :

July 01, 2017 to July 10, 2017

*Abby Li*

Prepared by :

Abby Li/Editor

*Tomas Yang*

Reviewer :

Tomas Yang/Supervisor

*Sam Lv*

Approved & Authorized Signer :

Sam Lv/Manager

## Modified Information

| Version | Summary         | Revision Date | Report No.   |
|---------|-----------------|---------------|--------------|
| Ver.1.0 | Original Report | /             | ED170713014E |
|         |                 |               |              |
|         |                 |               |              |
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Appendix I (Photos of EUT) (3 pages)

## 1. General Information

### 1.1 Product Description

| Characteristics          | Description               |
|--------------------------|---------------------------|
| Product Name             | FL X-3 Destroyer          |
| Model number             | AD12512                   |
| Power Supply             | DC 9V Battery             |
| Modulation               | GFSK                      |
| Operating Frequency      | 2402MHz, 2434MHz, 2472MHz |
| Number of Channels       | 3                         |
| Antenna Type             | Internal antenna          |
| Antenna Gain             | 1 dBi                     |
| Product Hardware version | AD12512-HV01              |
| Product Software version | AD12512-SV01              |
| Radio Hardware version   | AD12512-LT-H01            |
| Radio Software version   | AD12512-LT-S01            |

## 1.2 Test Facility

### Site Description

EMC Lab. : Registered on FCC, July 06, 2016  
The Certificate Number is 247565.

Registered on Industry Canada, January 13, 2017  
The Certificate Number is 9444A.

Name of Firm : EMTEK(DONGGUAN) CO., LTD.

Site Location : No.281, Guantai Road, Nancheng District,  
Dongguan, Guangdong, China

## 2. Test Configuration

|     |
|-----|
| EUT |
|-----|

Table 2-1 Equipment Used in Tested System

| Item | Equipment        | Trade Mark | Model No. | FCC ID            | Note       |
|------|------------------|------------|-----------|-------------------|------------|
| 1.   | FL X-3 Destroyer | N/A        | AD12512   | 2AMON-HIK-AD12512 | <i>EUT</i> |

**Note:**

- (1) Unless otherwise denoted as EUT in 『Remark』 column , device(s) used in tested system is a support equipment.

### 3. Summary of Test Results

| FCC Rules      | Description Of Test                     | Result   |
|----------------|-----------------------------------------|----------|
| §15.207        | AC Power Conducted Emission             | N/A      |
| 2.1049         | 20dB Bandwidth                          | Complies |
| §15.249/15.205 | Band Edge                               | Complies |
| §15.249(a)     | Field Strength of Fundamental Emissions | Complies |
| §15.249(a)(d)  | Radiated Spurious Emissions             | Complies |
| §15.203        | Antenna Requirements                    | Complies |

Note: Due to this EUT is powered by batteries only, AC Power Conducted Emission is not applicable.

#### 4. Description of test modes

The EUT is used as a receiver together with dongles, but it still has the function of transmitting. More detailed feature description, please refer to the operation description or Users Manual.

For Radiated: The EUT's antenna was pre-tested under the following modes:

| Test Mode     | Description     |
|---------------|-----------------|
| Mode A        | X-Y axis        |
| <b>Mode B</b> | <b>Y-Z axis</b> |
| Mode C        | X-Z axis        |

From the above modes, the worst case was found in Mode B. Therefore only the test data of the mode was recorded in this report.

Channel List:

| Channel    | Frequency |
|------------|-----------|
| <b>CH0</b> | 2402      |
| CH1        | 2434      |
| CH2        | 2472      |

## 5. TEST SYSTEM UNCERTAINTY

The following measurement uncertainty levels have been estimated for tests performed on the apparatus:

| Parameter                      | Uncertainty               |
|--------------------------------|---------------------------|
| Radio Frequency                | $\pm 1 \times 10^{-5}$    |
| Maximum Peak Output Power Test | $\pm 1.0\text{dB}$        |
| Conducted Emissions Test       | $\pm 2.0\text{dB}$        |
| Radiated Emission Test         | $\pm 2.0\text{dB}$        |
| Power Density                  | $\pm 2.0\text{dB}$        |
| Occupied Bandwidth Test        | $\pm 1.0\text{dB}$        |
| Band Edge Test                 | $\pm 3\text{dB}$          |
| All emission, radiated         | $\pm 3\text{dB}$          |
| Antenna Port Emission          | $\pm 3\text{dB}$          |
| Temperature                    | $\pm 0.5^{\circ}\text{C}$ |
| Humidity                       | $\pm 3\%$                 |

Remark: The coverage Factor ( $k=2$ ), and measurement Uncertainty for a level of Confidence of 95%.

## 6. 20dB Bandwidth test

### 6.1 Measurement Procedure

The EUT was operating in hopping mode or could be controlled its channel. Printed out the test result from the spectrum by hard copy function.

### 6.2 Test SET-UP (Block Diagram of Configuration)



### 6.3 Measurement Equipment Used:

| EQUIPMENT TYPE    | MFR             | MODEL NUMBER | SERIAL NUMBER | Characteristics | LAST CAL.  | CAL DUE.   |
|-------------------|-----------------|--------------|---------------|-----------------|------------|------------|
| Spectrum Analyzer | Rohde & Schwarz | FSV30        | 1321.3008K    | 10Hz-30GHz      | 05/16/2017 | 05/15/2018 |
| Coaxial Cable     | CDS             | 79254        | 46107086      | 10Hz-30GHz      | 05/16/2017 | 05/15/2018 |
| Antenna Connector | ARTHUR-YANG     | 2244-N1TG1   | N/A           | 10Hz-30GHz      | 05/16/2017 | 05/15/2018 |

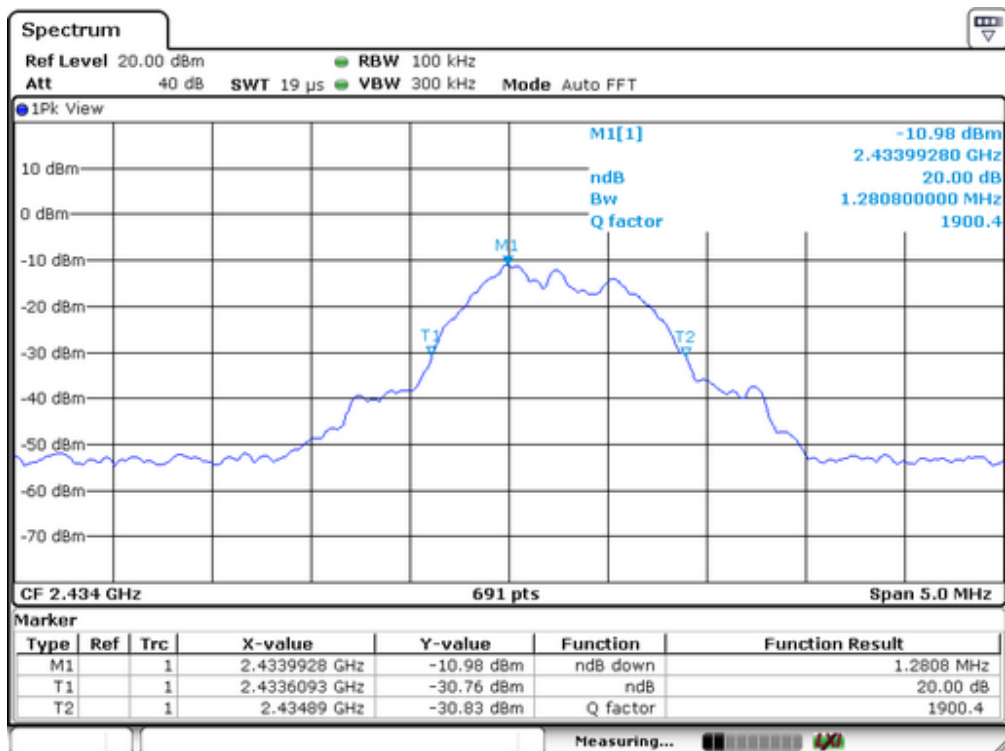
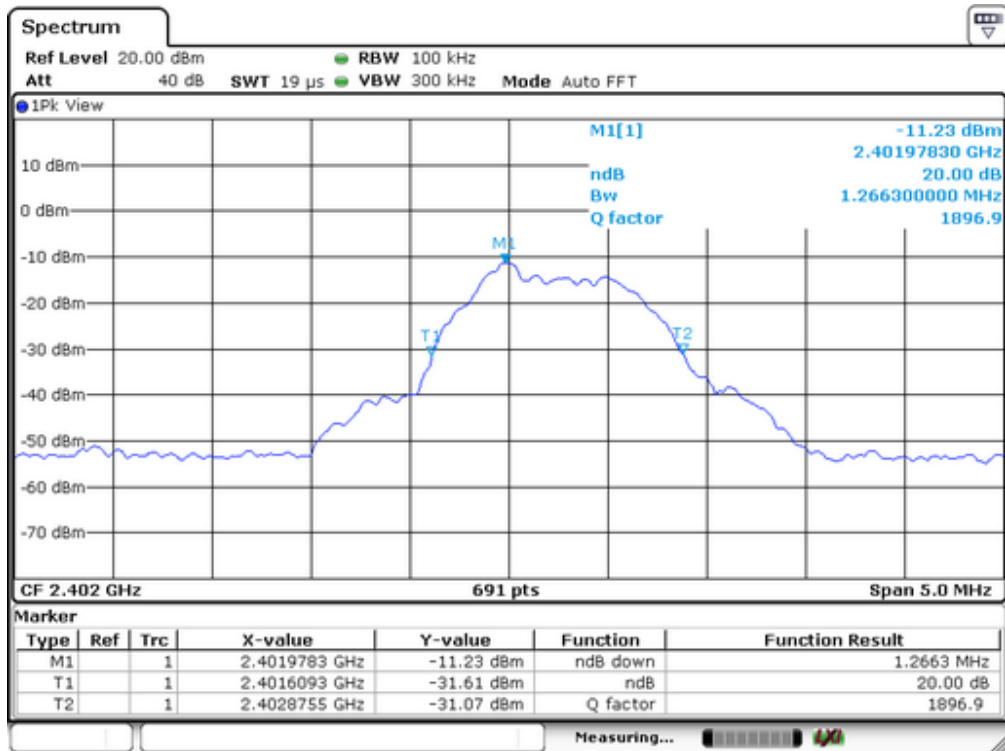
Remark: The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.  
The cable loss is 0.4dBm, and impedance is 50  $\Omega$  for the antenna connector.

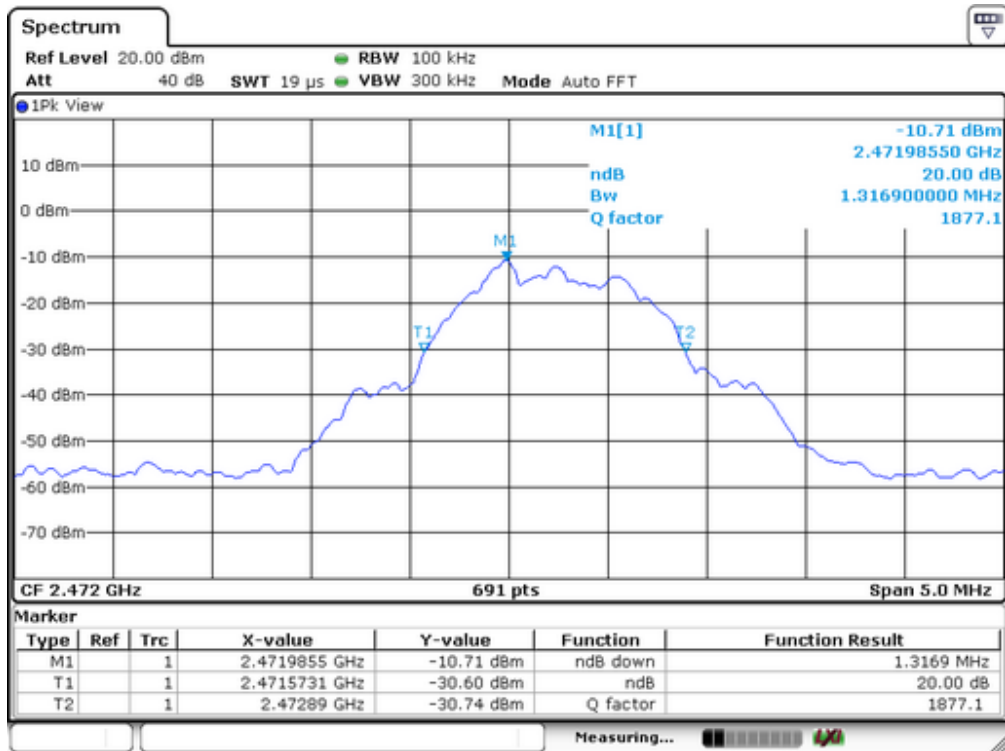
### 6.4 Measurement Results:

Refer to attached data chart.

|                    |      |               |               |
|--------------------|------|---------------|---------------|
| Spectrum Detector: | PK   | Test Date :   | July 10, 2017 |
| Test By:           | Andy | Temperature : | 24°C          |
| Test Result:       | PASS | Humidity :    | 53 %          |
| Modulation:        | GFSK |               |               |

| Channel frequency (MHz) | 20dB Down BW(kHz) |
|-------------------------|-------------------|
| 2402                    | 1266              |
| 2434                    | 1281              |
| 2472                    | 1317              |





## 7. Band EDGE test

### 7.1 Measurement Procedure

The EUT was placed on a styrofoam table which is 1.5m above ground plane.

The measurement procedure at the band edges was simplified by performing the measurement in just one plot. Both, the in-band-emission and the unwanted emission were encompassed by the span. After trace stabilization, the maximum peak was determined by a peak detector and the value was marked by an appropriate limit line. The second limit line, which is 20dB below the first, marks the limit for the emissions in the unrestricted band. A maximum-peak-detector marks the highest emission in the unrestricted band next to the band edge.

The measurements were performed at the lower end of the 2.4GHz band. Use the following spectrum analyzer settings:

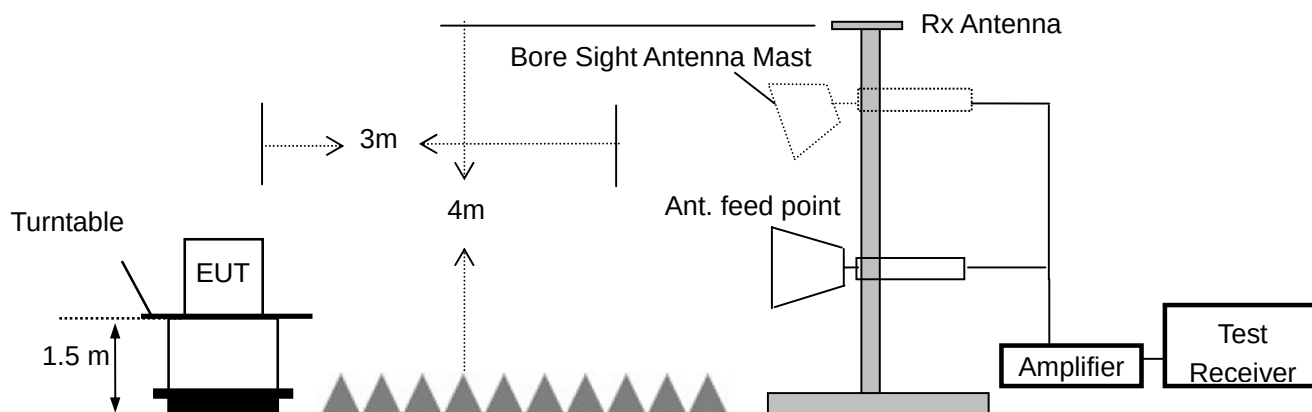
When spectrum scanned above 1GHz setting resolution bandwidth 1MHz, video bandwidth 3MHz:

| EMI Test Receiver | Setting  |
|-------------------|----------|
| Attenuation       | Auto     |
| RB                | 1MHz     |
| VB                | 3MHz     |
| Detector          | Peak     |
| Trace             | Max hold |

When spectrum scanned above 1GHz setting resolution bandwidth 1MHz, video bandwidth 10Hz:

| EMI Test Receiver | Setting  |
|-------------------|----------|
| Attenuation       | Auto     |
| RB                | 1MHz     |
| VB                | 10Hz     |
| Detector          | Peak     |
| Trace             | Max hold |

## 7.2 Test SET-UP (Block Diagram of Configuration)



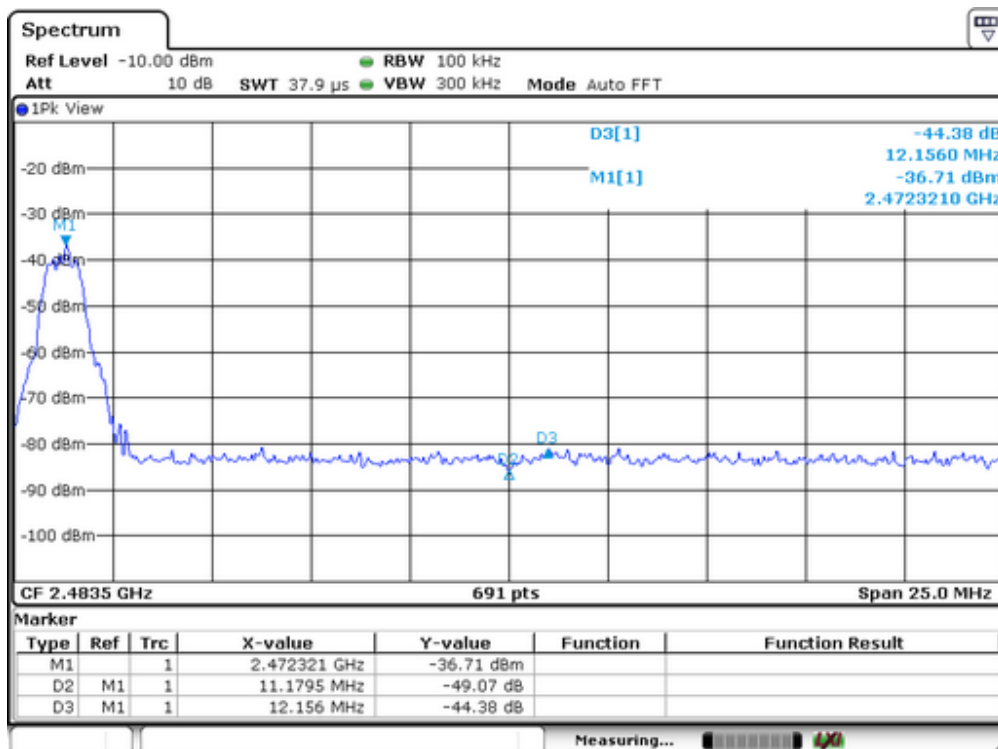
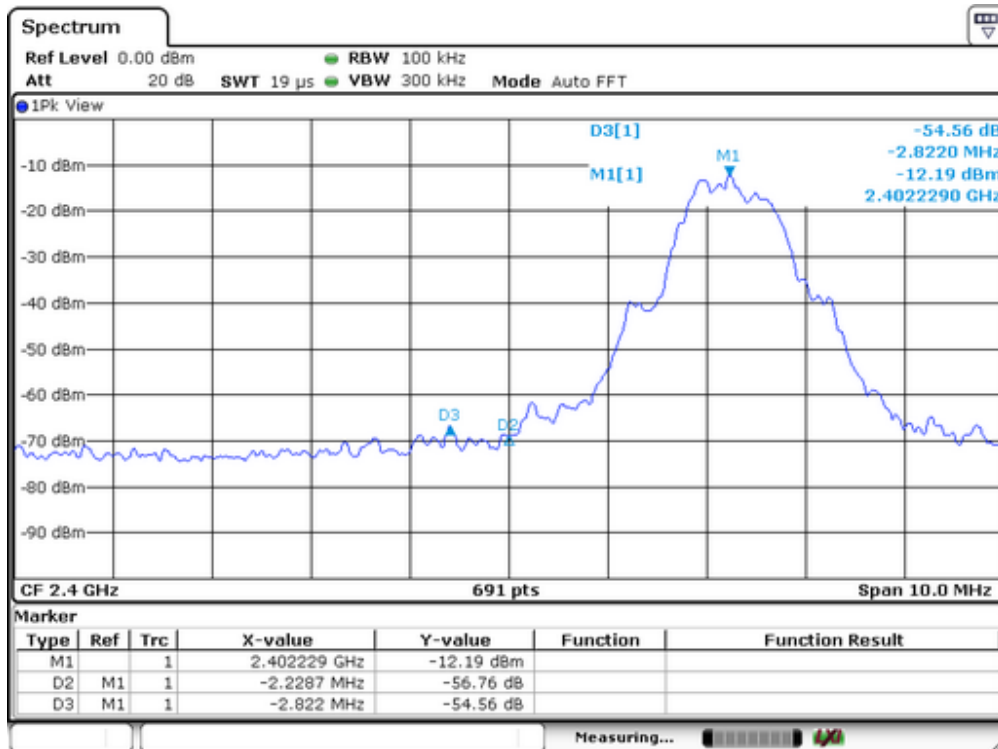
## 7.3 Measurement Equipment Used:

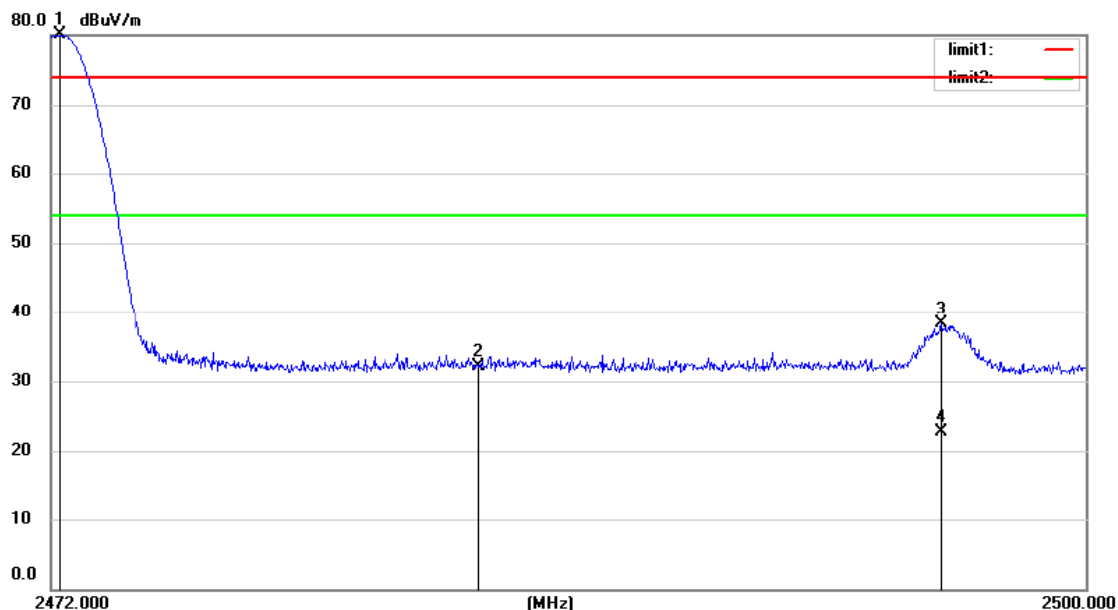
| Item | Equipment       | Manufacturer    | Model No.  | Serial No.   | Characteristics | Last Cal.  | Cal. Interval |
|------|-----------------|-----------------|------------|--------------|-----------------|------------|---------------|
| 1    | Signal Analyzer | Rohde & Schwarz | FSV30      | 103040       | 9KHz-40GHz      | 05/16/2017 | 1 Year        |
| 2    | Horn Antenna    | Schwarzbeck     | BBHA9120D  | 9120D-1272   | 1GHz-18GHz      | 05/16/2017 | 1 Year        |
| 3    | Power Amplifier | LUNAR EM        | LNA1G18-40 | J10100000081 | 1GHz-26.5GHz    | 05/16/2017 | 1 Year        |
| 4    | Cable           | H+S             | CBL-26     | N/A          | 1GHz-26.5GHz    | 05/16/2017 | 1 Year        |
| 5    | Cable           | H+S             | CBL-26     | N/A          | 1GHz-26.5GHz    | 05/16/2017 | 1 Year        |
| 6    | Cable           | H+S             | CBL-26     | N/A          | 1GHz-26.5GHz    | 05/16/2017 | 1 Year        |

## 7.4 Measurement Results:

Spectrum Detector: PK      Test Date : July 10, 2017  
 Test By: Andy      Temperature : 25 °C  
 Test Result: PASS      Humidity : 50 %

| Frequency (MHz) | Modulation | Peak Power Output(dBm) | Result of Band edge(dBc) | Band edge Limit(dBc) |
|-----------------|------------|------------------------|--------------------------|----------------------|
| 2399.41         | GFSK       | -12.19                 | 54.56                    | >20dBc               |
| 2484.48         | GFSK       | -36.71                 | 44.38                    | >20dBc               |





Site Chamber #1

Polarization: **Horizontal**

Temperature: 26

Limit: (RE)FCC Part 15 C

Power: Battery 9V

Humidity: 55 %

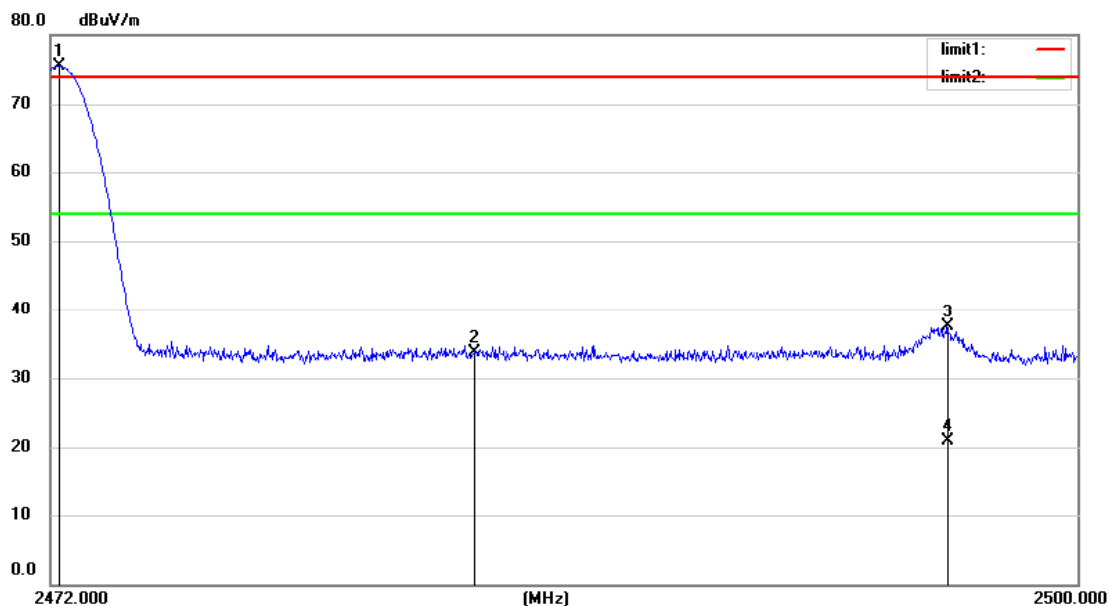
Mode: TX 2472

Note:

| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV/m | Limit<br>dBuV/m | Over<br>dB | Antenna<br>Height<br>cm | Table<br>Degree | Comment |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|------------|-------------------------|-----------------|---------|
| 1   | *   | 2472.224     | 100.81                   | -20.73                  | 80.08                      | 74.00           | 6.08       | peak                    |                 |         |
| 2   |     | 2483.500     | 52.78                    | -20.72                  | 32.06                      | 74.00           | -41.94     | peak                    |                 |         |
| 3   |     | 2496.080     | 59.00                    | -20.68                  | 38.32                      | 74.00           | -35.68     | peak                    |                 |         |
| 4   |     | 2496.080     | 43.33                    | -20.68                  | 22.65                      | 54.00           | -31.35     | AVG                     |                 |         |

\*:Maximum data    x:Over limit    !:over margin

Operator: washington



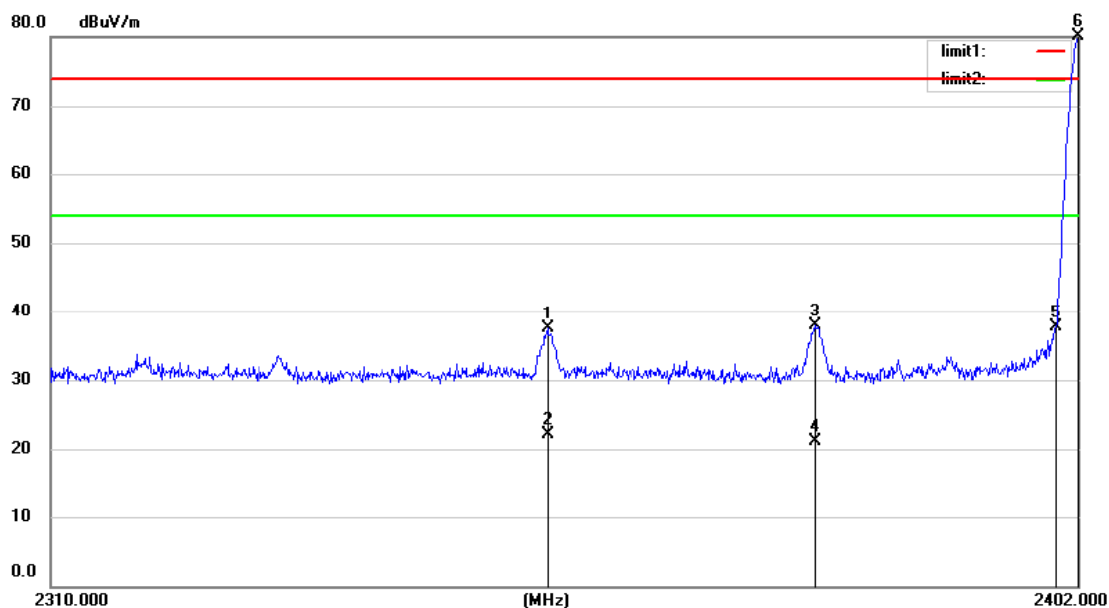
Site Chamber #1  
 Limit: (RE)FCC Part 15 C  
 Mode: TX 2472  
 Note:

Polarization: **Vertical**  
 Power: Battery 9V  
 Temperature: 26  
 Humidity: 55 %

| No. | Mk. | Freq.    | Reading Level | Correct Factor | Measure-ment | Limit  | Over   | Antenna Height | Table Degree |         |
|-----|-----|----------|---------------|----------------|--------------|--------|--------|----------------|--------------|---------|
|     |     | MHz      | dBuV          | dB             | dBuV/m       | dBuV/m | dB     | cm             | degree       | Comment |
| 1   | *   | 2472.224 | 94.75         | -19.33         | 75.42        | 74.00  | 1.42   | peak           |              |         |
| 2   |     | 2483.500 | 52.91         | -19.27         | 33.64        | 74.00  | -40.36 | peak           |              |         |
| 3   |     | 2496.444 | 56.69         | -19.19         | 37.50        | 74.00  | -36.50 | peak           |              |         |
| 4   |     | 2496.444 | 40.00         | -19.19         | 20.81        | 54.00  | -33.19 | AVG            |              |         |

\*:Maximum data    x:Over limit    !:over margin

Operator: washington



Site Chamber #1

Polarization: **Horizontal**

Temperature: 26

Limit: (RE)FCC Part 15 C

Power: Battery 9V

Humidity: 55 %

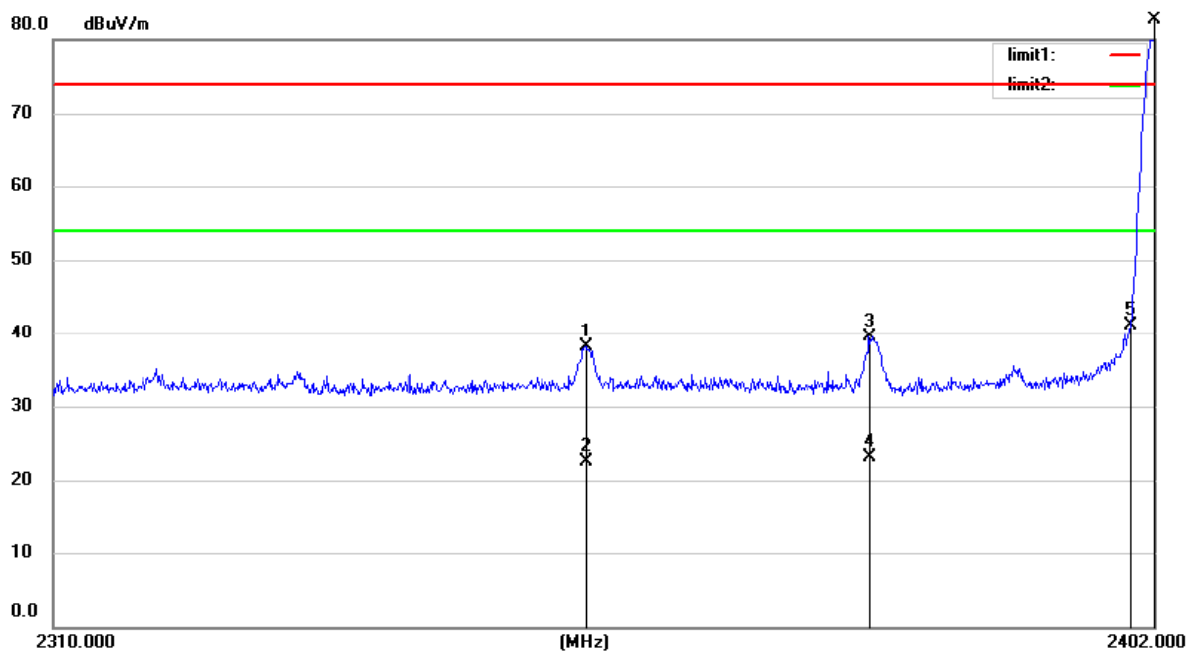
Mode: TX 2402

Note:

| No. | Mk. | Freq.    | Reading Level | Correct Factor | Measurement | Limit  | Over   | Antenna Height | Table Degree |         |
|-----|-----|----------|---------------|----------------|-------------|--------|--------|----------------|--------------|---------|
|     |     | MHz      | dBuV          | dB             | dBuV/m      | dBuV/m | dB     | cm             | degree       | Comment |
| 1   |     | 2354.160 | 58.62         | -21.05         | 37.57       | 74.00  | -36.43 | peak           |              |         |
| 2   |     | 2354.160 | 43.20         | -21.05         | 22.15       | 54.00  | -31.85 | AVG            |              |         |
| 3   |     | 2378.172 | 58.83         | -20.98         | 37.85       | 74.00  | -36.15 | peak           |              |         |
| 4   |     | 2378.172 | 42.10         | -20.98         | 21.12       | 54.00  | -32.88 | AVG            |              |         |
| 5   |     | 2400.000 | 58.54         | -20.93         | 37.61       | 74.00  | -36.39 | peak           |              |         |
| 6   | *   | 2402.000 | 101.05        | -20.93         | 80.12       | 74.00  | 6.12   | peak           |              |         |

\*:Maximum data    x:Over limit    !:over margin

Operator: washington



Site Chamber #1

Polarization: **Vertical**

Temperature: 26

Limit: (RE)FCC Part 15 C

Power: Battery 9V

Humidity: 55 %

Mode: TX 2402

Note:

| No. | Mk. | Freq.    | Reading Level | Correct Factor | Measurement | Limit  | Over   | Antenna Height | Table Degree |         |
|-----|-----|----------|---------------|----------------|-------------|--------|--------|----------------|--------------|---------|
|     |     | MHz      | dBuV          | dB             | dBuV/m      | dBuV/m | dB     | cm             | degree       | Comment |
| 1   |     | 2354.068 | 58.14         | -20.05         | 38.09       | 74.00  | -35.91 | peak           |              |         |
| 2   |     | 2354.068 | 42.56         | -20.05         | 22.51       | 54.00  | -31.49 | AVG            |              |         |
| 3   |     | 2377.896 | 59.44         | -19.90         | 39.54       | 74.00  | -34.46 | peak           |              |         |
| 4   |     | 2377.896 | 43.00         | -19.90         | 23.10       | 54.00  | -30.90 | AVG            |              |         |
| 5   |     | 2400.000 | 60.80         | -19.77         | 41.03       | 74.00  | -32.97 | peak           |              |         |
| 6   | *   | 2402.000 | 102.60        | -19.76         | 82.84       | 74.00  | 8.84   | peak           |              |         |

\*:Maximum data    x:Over limit    !:over margin

Operator: washington

## **8. Radiated Emission Test**

### **8.1 Measurement Procedure**

1. Below 1000MHz, The EUT was placed on a turn table which is 0.8m above ground plane. And above 1000MHz, The EUT was placed on a styrofoam table which is 1.5m above ground plane.
2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
3. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (From 1m to 4m) and turntable (from 0 degree to 360 degree) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
4. Set to the maximum power setting and enable the EUT transmit continuously.
5. Final measurement (Above 1GHz): The frequency range will be divided into different sub ranges depending of the frequency range of the used horn antenna. The EMI Receiver set to peak and average mode and a resolution bandwidth of 1MHz. The measurement will be performed in horizontal and vertical polarization of the measuring antenna and while rotating the EUT in its vertical axis in the range of 0 degree to 360 degree in order to have the antenna inside the cone of radiation.
6. Test Procedure of measurement (For Above 1GHz):
  - 1) Monitor the frequency range at horizontal polarization and move the antenna over all sides of the EUT(if necessary move the EUT to another orthogonal axis).
  - 2) Change the antenna polarization and repeat 1) with vertical polarization.
  - 3) Make a hardcopy of the spectrum.
  - 4) Measure the frequency of the detected emissions with a lower span and resolution bandwidth to increase the accuracy and note the frequency value.
  - 5) Change the analyser mode to Clear/ Write and found the cone of emission.
  - 6) Rotate and move the EUT, so that the measuring distance can be enlarged to 3m and the antenna will be still inside the cone of emission.
  - 7) Measure the level of the detected frequency with the correct resolution bandwidth, with the antenna polarization and azimuth and the peak and average detector, which causes the maximum emission.
  - 8) Repeat steps 1) to 7) for the next antenna spot if the EUT is larger than the antenna beamwidth.

The following table is the setting of spectrum analyzer:

When spectrum scanned from 30MHz to 1GHz setting resolution bandwidth 120KHz and video bandwidth 300KHz:

| EMI Test Receiver | Setting  |
|-------------------|----------|
| Attenuation       | Auto     |
| RB                | 120KHz   |
| VB                | 300KHz   |
| Detector          | QP       |
| Trace             | Max hold |

When spectrum scanned above 1GHz setting resolution bandwidth 1MHz, video bandwidth 3MHz:

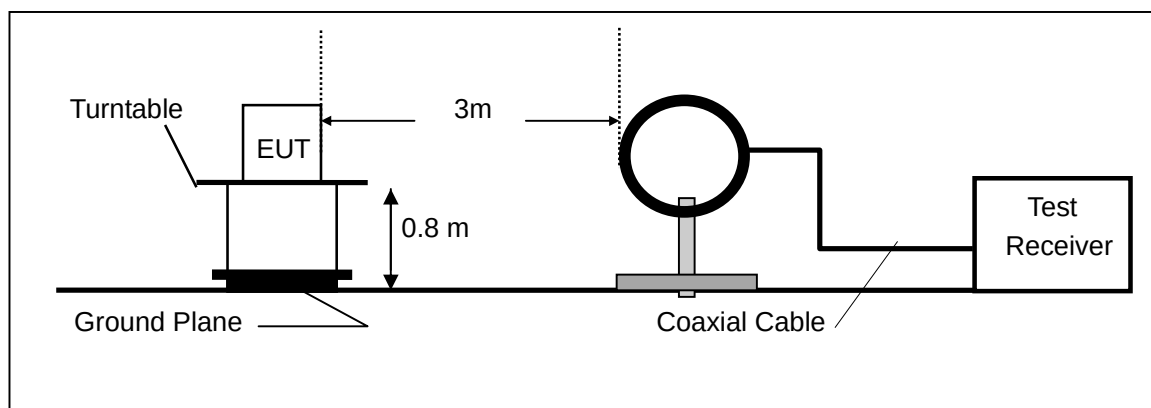
| EMI Test Receiver | Setting  |
|-------------------|----------|
| Attenuation       | Auto     |
| RB                | 1MHz     |
| VB                | 3MHz     |
| Detector          | Peak     |
| Trace             | Max hold |

When spectrum scanned above 1GHz setting resolution bandwidth 1MHz, video bandwidth 10Hz:

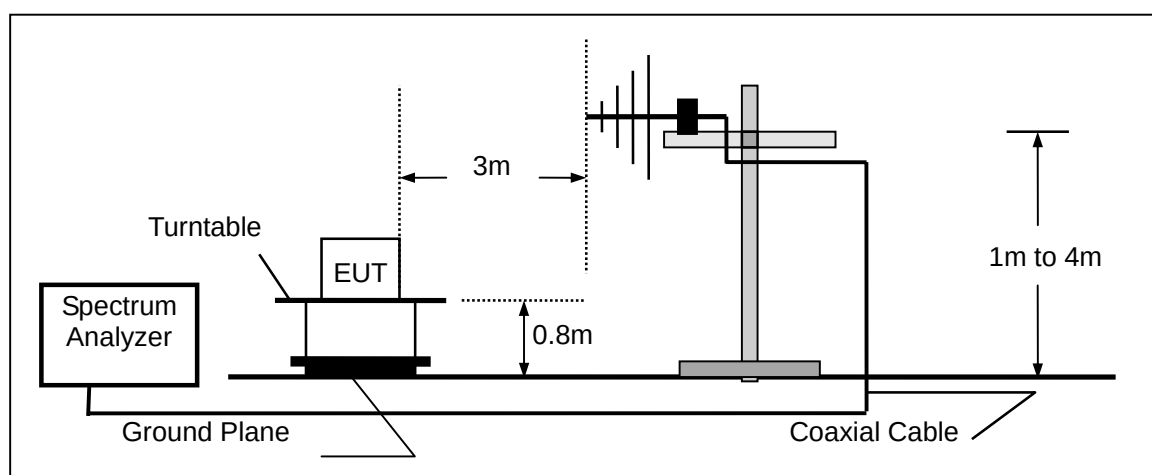
| EMI Test Receiver | Setting  |
|-------------------|----------|
| Attenuation       | Auto     |
| RB                | 1MHz     |
| VB                | 10Hz     |
| Detector          | Peak     |
| Trace             | Max hold |

## 8.2 Test SET-UP (Block Diagram of Configuration)

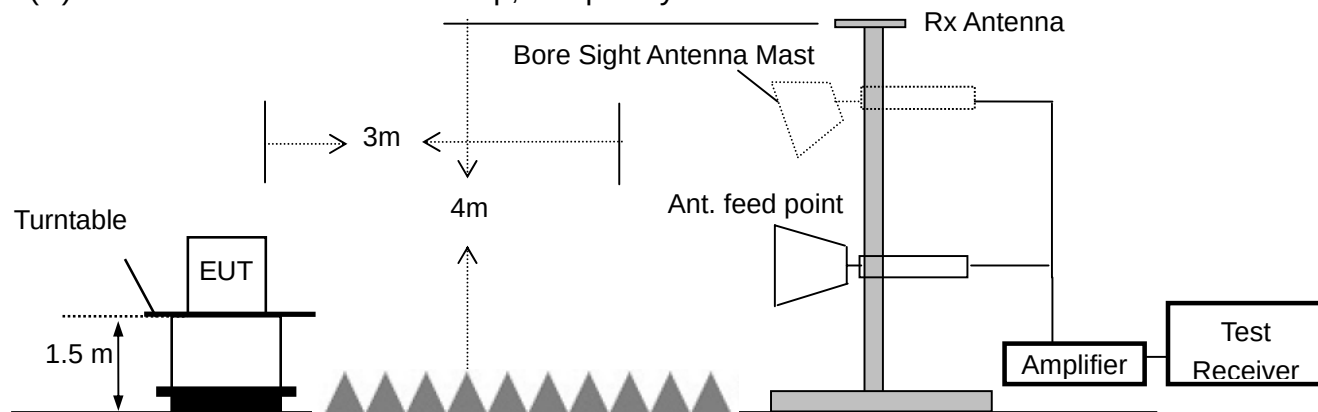
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(B) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(C) Radiated Emission Test Set-Up, Frequency above 1000MHz



### 8.3 Measurement Equipment Used:

| Item | Equipment                      | Manufacturer    | Model No.    | Serial No.   | Characteristics | Last Cal.  | Cal. Interval |
|------|--------------------------------|-----------------|--------------|--------------|-----------------|------------|---------------|
| 1.   | Test Receiver                  | Rohde & Schwarz | ESCI         | 1166.5950.03 | 9KHz-3GHz       | 05/16/2017 | 1 Year        |
| 2.   | Loop Antenna                   | Schwarzbeck     | FMZB 1519    | 012          | 9 KHz -30MHz    | 05/16/2017 | 1 Year        |
| 3.   | Bilog Antenna                  | Schwarzbeck     | VULB9163     | 000141       | 25MHz-2GHz      | 05/16/2017 | 1 Year        |
| 4.   | Power Amplifier                | CDS             | RSU-M352     | 818          | 1MHz-1GHz       | 05/16/2017 | 1 Year        |
| 5.   | Power Amplifier                | HP              | 8447F        | OPT H64      | 1GHz-26.5GHz    | 05/16/2017 | 1 Year        |
| 6.   | Color Monitor                  | SUNSPO          | SP-140A      | N/A          | --              | 05/16/2017 | 1 Year        |
| 7.   | Single Line Filter             | JIANLI          | XL-3         | N/A          | --              | 05/16/2017 | 1 Year        |
| 8.   | Single Phase Power Line Filter | JIANLI          | DL-2X100B    | N/A          | --              | 05/16/2017 | 1 Year        |
| 9.   | 3 Phase Power Line Filter      | JIANLI          | DL-4X100B    | N/A          | --              | 05/16/2017 | 1 Year        |
| 10.  | DC Power Filter                | JIANLI          | DL-2X50B     | N/A          | --              | 05/16/2017 | 1 Year        |
| 11.  | Cable                          | Schwarzbeck     | PLF-100      | 549489       | 9KHz-3GHz       | 05/16/2017 | 1 Year        |
| 12.  | Cable                          | Rosenberger     | CIL02        | A0783566     | 9KHz-3GHz       | 05/16/2017 | 1 Year        |
| 13.  | Cable                          | Rosenberger     | RG 233/U     | 525178       | 9KHz-3GHz       | 05/16/2017 | 1 Year        |
| 14.  | Signal Analyzer                | Rohde & Schwarz | FSV30        | 103040       | 9KHz-40GHz      | 05/16/2017 | 1 Year        |
| 15.  | Horn Antenna                   | Schwarzbeck     | BBHA9120D    | 9120D-1272   | 1GHz-18GHz      | 05/16/2017 | 1 Year        |
| 16.  | Horn Antenna                   | Schwarzbeck     | BBHA 9170    | BBHA9170399  | 14GHz -26.5GHz  | 05/16/2017 | 1 Year        |
| 17.  | Boresight Antenna Tower        | EMEC            | AM-BS-4500-D | N/A          | N/A             | 05/16/2017 | 1 Year        |
| 18.  | Power Amplifier                | LUNAR EM        | LNA1G18-40   | J10100000081 | 1GHz-26.5GHz    | 05/16/2017 | 1 Year        |
| 19.  | Cable                          | H+S             | CBL-26       | N/A          | 1GHz-26.5GHz    | 05/16/2017 | 1 Year        |
| 20.  | Cable                          | H+S             | CBL-26       | N/A          | 1GHz-26.5GHz    | 05/16/2017 | 1 Year        |
| 21.  | Cable                          | H+S             | CBL-26       | N/A          | 1GHz-26.5GHz    | 05/16/2017 | 1 Year        |

#### 8.4 Limit:

The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table 15.209(a):

| Frequencies<br>(MHz) | Field Strength<br>(micorvolts/meter) | Measurement Distance<br>(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                                |

Remark: 1. Emission level in dBuV/m=20 log (uV/m)

2. Measurement was performed at an antenna to the closed point of EUT distance of meters.

The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

| Frequency(MHz) | Filed Strength of Fundamental(at 3m) |         | Filed Strength of Harmonics(at 3m) |         |
|----------------|--------------------------------------|---------|------------------------------------|---------|
|                | PEAK                                 | AVERAGE | PEAK                               | AVERAGE |
| 902-928        | 114                                  | 94      | 74.0                               | 54.0    |
| 2400-2483.5    | 114                                  | 94      | 74.0                               | 54.0    |
| 5725-5875      | 114                                  | 94      | 74.0                               | 54.0    |
| 24000-24250    | 128                                  | 108     | 88.0                               | 68.0    |

## 8.5 Measurement Result

### Below 30MHz:

|                    |            |               |               |
|--------------------|------------|---------------|---------------|
| Operation Mode:    | TX         | Test Date :   | July 10, 2017 |
| Frequency Range:   | 9KHz~30MHz | Temperature : | 28℃           |
| Test Result:       | PASS       | Humidity :    | 65 %          |
| Measured Distance: | 3m         | Test By:      | Andy          |

| Freq.<br>(MHz) | Ant.Pol.<br>H/V | Emission<br>Level<br>(dBuV/m) | Limit 3m<br>(dBuV/m) | Over<br>(dB) |
|----------------|-----------------|-------------------------------|----------------------|--------------|
| --             | --              | --                            | --                   | --           |

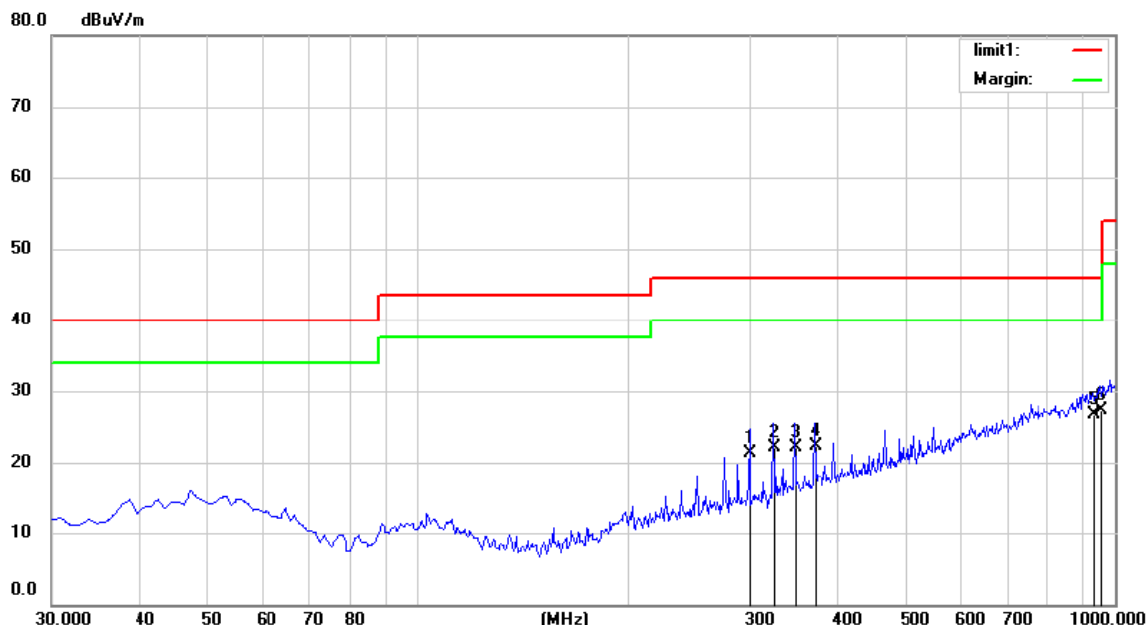
Note: the amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.

### Below 1000MHz:

Pass.

All the modulation modes were tested the data of the mode are recorded in the following pages and the others modulation methods do not exceed the limits.

Please refer to the following data.



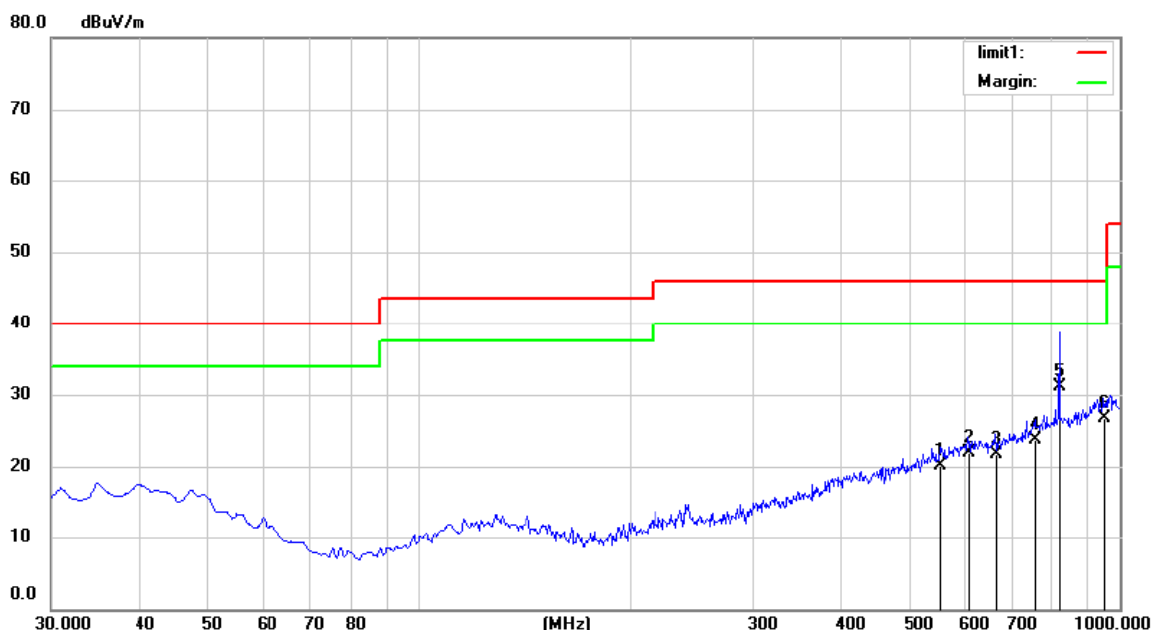
Site: Chamber #1  
 Limit: (RE)FCC PART 15 C 3m  
 Mode: TX2402  
 Note:

Polarization: **Horizontal**  
 Power: Battery 9V  
 Temperature: 26  
 Humidity: 55 %

| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV/m | Limit<br>dBuV/m | Over<br>dB | Antenna<br>Height<br>cm | Table<br>Degree | Comment |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|------------|-------------------------|-----------------|---------|
| 1   |     | 299.6600     | 35.22                    | -13.93                  | 21.29                      | 46.00           | -24.71     | QP                      |                 |         |
| 2   |     | 323.9100     | 35.23                    | -13.19                  | 22.04                      | 46.00           | -23.96     | QP                      |                 |         |
| 3   |     | 348.1600     | 34.25                    | -12.23                  | 22.02                      | 46.00           | -23.98     | QP                      |                 |         |
| 4   |     | 372.4100     | 34.05                    | -11.65                  | 22.40                      | 46.00           | -23.60     | QP                      |                 |         |
| 5   |     | 932.1000     | 26.55                    | 0.23                    | 26.78                      | 46.00           | -19.22     | QP                      |                 |         |
| 6   | *   | 952.4700     | 26.58                    | 0.81                    | 27.39                      | 46.00           | -18.61     | QP                      |                 |         |

\*:Maximum data    x:Over limit    !:over margin

Operator: washington

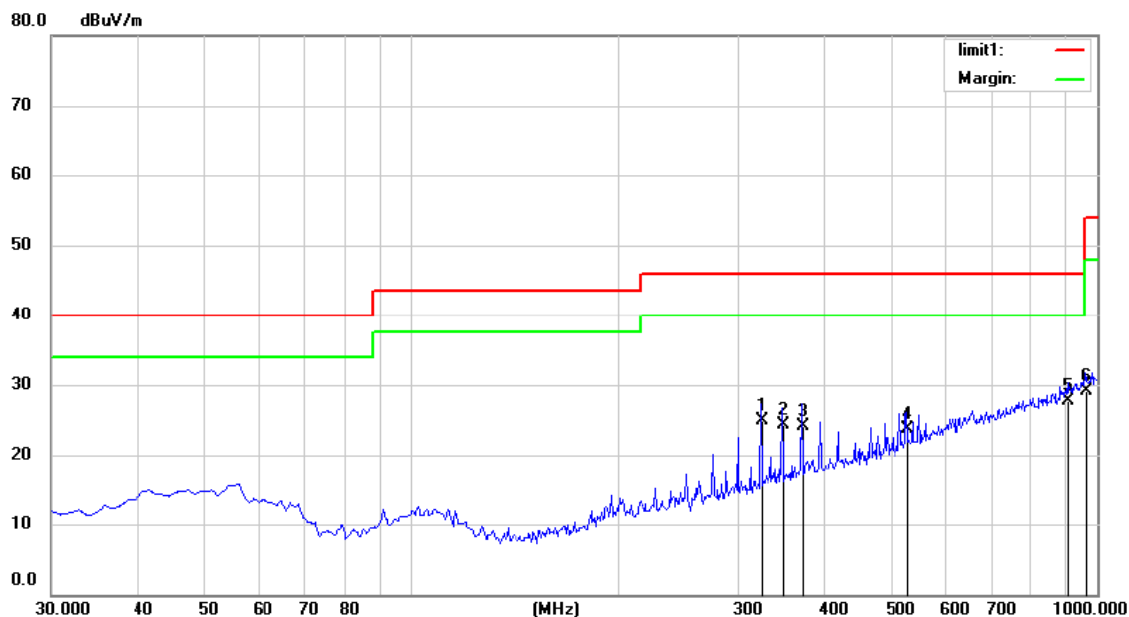


Site Chamber #1 Polarization: **Vertical** Temperature: 26  
 Limit: (RE)FCC PART 15 C 3m Power: Battery 9V Humidity: 55 %  
 Mode: TX2402  
 Note:

| No. | Mk. | Freq.    | Reading Level | Correct Factor | Measure-ment | Limit  | Over   | Antenna Height | Table Degree |         |
|-----|-----|----------|---------------|----------------|--------------|--------|--------|----------------|--------------|---------|
|     |     | MHz      | dBuV          | dB             | dBuV/m       | dBuV/m | dB     | cm             | degree       | Comment |
| 1   |     | 556.7100 | 28.05         | -8.03          | 20.02        | 46.00  | -25.98 | QP             |              |         |
| 2   |     | 609.0900 | 29.12         | -7.28          | 21.84        | 46.00  | -24.16 | QP             |              |         |
| 3   |     | 664.3800 | 28.35         | -6.65          | 21.70        | 46.00  | -24.30 | QP             |              |         |
| 4   |     | 756.5300 | 28.23         | -4.46          | 23.77        | 46.00  | -22.23 | QP             |              |         |
| 5   | *   | 822.4900 | 34.23         | -3.09          | 31.14        | 46.00  | -14.86 | QP             |              |         |
| 6   |     | 951.5000 | 27.35         | -0.65          | 26.70        | 46.00  | -19.30 | QP             |              |         |

\*:Maximum data x:Over limit !:over margin

Operator: washington

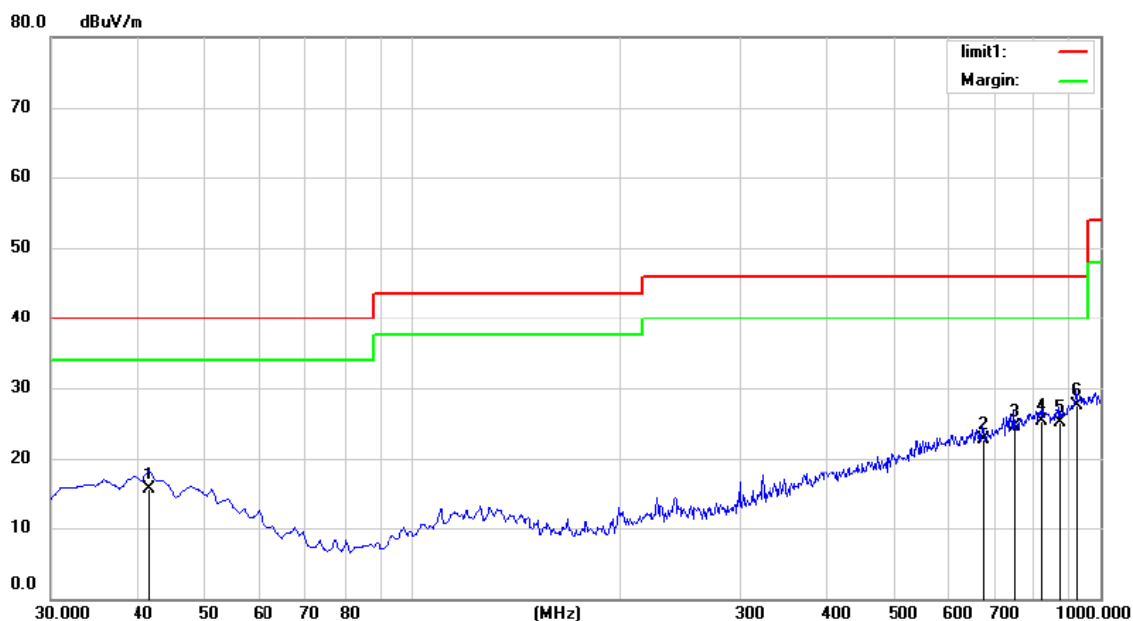


Site Chamber #1 Polarization: **Horizontal** Temperature: 26  
 Limit: (RE)FCC PART 15 C 3m Power: Battery 9V Humidity: 55 %  
 Mode: TX2434  
 Note:

| No. | Mk. | Freq.    | Reading Level | Correct Factor | Measure-ment | Limit  | Over   | Antenna Height | Table Degree |        |
|-----|-----|----------|---------------|----------------|--------------|--------|--------|----------------|--------------|--------|
|     |     | MHz      | dBuV          | dB             | dBuV/m       | dBuV/m | dB     | Detector       | cm           | degree |
| 1   |     | 323.9100 | 38.13         | -13.19         | 24.94        | 46.00  | -21.06 | QP             |              |        |
| 2   |     | 348.1600 | 36.58         | -12.23         | 24.35        | 46.00  | -21.65 | QP             |              |        |
| 3   |     | 372.4100 | 35.85         | -11.65         | 24.20        | 46.00  | -21.80 | QP             |              |        |
| 4   |     | 528.5800 | 32.11         | -8.32          | 23.79        | 46.00  | -22.21 | QP             |              |        |
| 5   | *   | 906.8800 | 28.12         | -0.39          | 27.73        | 46.00  | -18.27 | QP             |              |        |
| 6   |     | 964.1100 | 28.13         | 1.02           | 29.15        | 54.00  | -24.85 | QP             |              |        |

\*:Maximum data x:Over limit !:over margin

Operator: washington



Site Chamber #1

Polarization: **Vertical**

Temperature: 26

Limit: (RE)FCC PART 15 C 3m

Power: Battery 9V

Humidity: 55 %

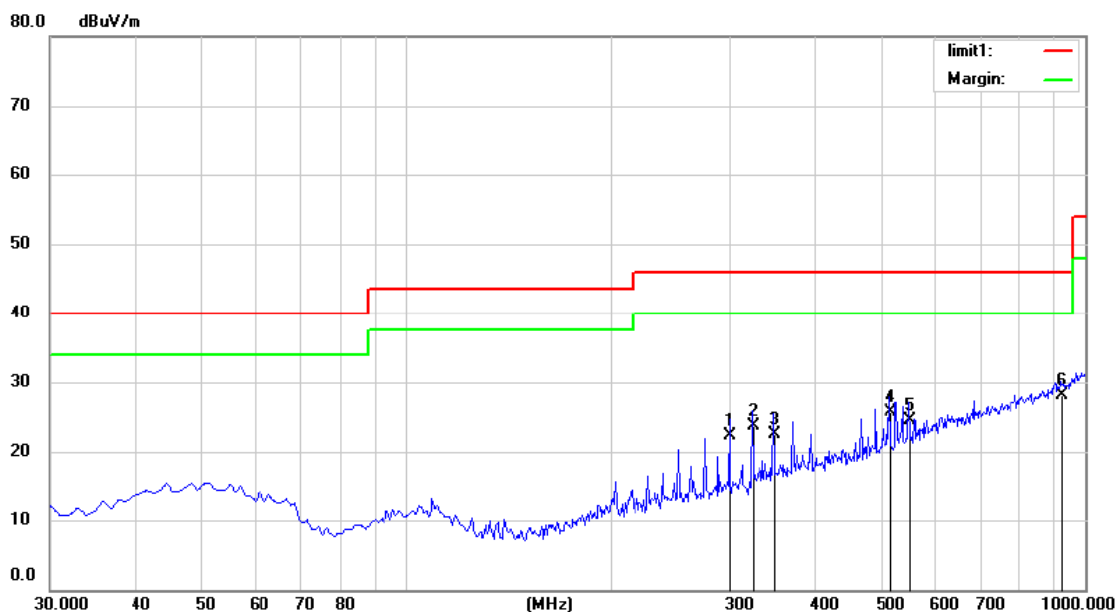
Mode: TX2434

Note:

| No. | Mk. | Freq.    | Reading Level | Correct Factor | Measure-ment | Limit  | Over   | Antenna Height | Table Degree |         |
|-----|-----|----------|---------------|----------------|--------------|--------|--------|----------------|--------------|---------|
|     |     | MHz      | dBuV          | dB             | dBuV/m       | dBuV/m | dB     | cm             | degree       | Comment |
| 1   |     | 41.6400  | 28.90         | -13.49         | 15.41        | 40.00  | -24.59 | QP             |              |         |
| 2   |     | 675.0500 | 29.12         | -6.50          | 22.62        | 46.00  | -23.38 | QP             |              |         |
| 3   |     | 748.7700 | 29.13         | -4.53          | 24.60        | 46.00  | -21.40 | QP             |              |         |
| 4   |     | 824.4300 | 28.35         | -3.11          | 25.24        | 46.00  | -20.76 | QP             |              |         |
| 5   |     | 873.9000 | 28.13         | -2.95          | 25.18        | 46.00  | -20.82 | QP             |              |         |
| 6   | *   | 925.3100 | 28.65         | -1.19          | 27.46        | 46.00  | -18.54 | QP             |              |         |

\*:Maximum data    x:Over limit    !:over margin

Operator: washington



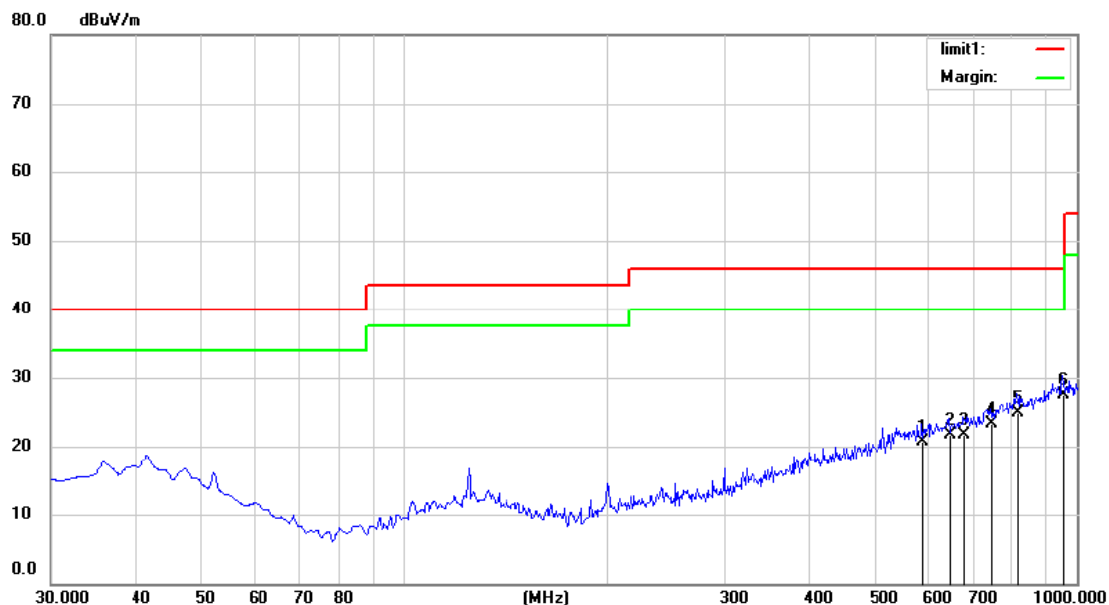
Site: Chamber #1  
 Limit: (RE)FCC PART 15 C 3m  
 Mode: TX2472  
 Note:

Polarization: **Horizontal**  
 Power: Battery 9V  
 Temperature: 26  
 Humidity: 55 %

| No. | Mk. | Freq.    | Reading Level | Correct Factor | Measurement | Limit  | Over   | Antenna Height | Table Degree |         |
|-----|-----|----------|---------------|----------------|-------------|--------|--------|----------------|--------------|---------|
|     |     | MHz      | dBuV          | dB             | dBuV/m      | dBuV/m | dB     | cm             | degree       | Comment |
| 1   |     | 299.6600 | 36.23         | -13.93         | 22.30       | 46.00  | -23.70 | QP             |              |         |
| 2   |     | 323.9100 | 36.88         | -13.19         | 23.69       | 46.00  | -22.31 | QP             |              |         |
| 3   |     | 348.1600 | 34.80         | -12.23         | 22.57       | 46.00  | -23.43 | QP             |              |         |
| 4   |     | 515.9700 | 34.25         | -8.60          | 25.65       | 46.00  | -20.35 | QP             |              |         |
| 5   |     | 551.8600 | 32.22         | -7.68          | 24.54       | 46.00  | -21.46 | QP             |              |         |
| 6   | *   | 923.3700 | 28.05         | -0.01          | 28.04       | 46.00  | -17.96 | QP             |              |         |

\*:Maximum data    x:Over limit    !:over margin

Operator: washington



Site Chamber #1

Polarization: **Vertical**

Temperature: 26

Limit: (RE)FCC PART 15 C 3m

Power: Battery 9V

Humidity: 55 %

Mode: TX2472

Note:

| No. | Mk. | Freq.    | Reading Level | Correct Factor | Measurement | Limit  | Over   | Antenna Height | Table Degree |         |
|-----|-----|----------|---------------|----------------|-------------|--------|--------|----------------|--------------|---------|
|     |     | MHz      | dBuV          | dB             | dBuV/m      | dBuV/m | dB     | cm             | degree       | Comment |
| 1   |     | 589.6900 | 28.23         | -7.52          | 20.71       | 46.00  | -25.29 | QP             |              |         |
| 2   |     | 645.9500 | 28.60         | -6.88          | 21.72       | 46.00  | -24.28 | QP             |              |         |
| 3   |     | 677.9600 | 28.11         | -6.46          | 21.65       | 46.00  | -24.35 | QP             |              |         |
| 4   |     | 742.9500 | 28.05         | -4.71          | 23.34       | 46.00  | -22.66 | QP             |              |         |
| 5   |     | 817.6400 | 28.10         | -3.15          | 24.95       | 46.00  | -21.05 | QP             |              |         |
| 6   | *   | 955.3800 | 28.23         | -0.65          | 27.58       | 46.00  | -18.42 | QP             |              |         |

\*:Maximum data    x:Over limit    !:over margin

Operator: washington

**Above 1000MHz~10<sup>th</sup> Harmonics:**

Operation Mode: GFSK (CH0: 2402MHz) Test Date : July 10, 2017

| Freq.<br>(MHz) | Ant. Pol.<br>H/V | Emission Level(dBuV/m) |       | Limit 3m(dBuV/m) |    | Margin(dB) |        |
|----------------|------------------|------------------------|-------|------------------|----|------------|--------|
|                |                  | PK                     | AV    | PK               | AV | PK         | AV     |
| 2402(F)        | V                | 97.58                  | 77.14 | 114              | 94 | -16.42     | -16.86 |
| 4804           | V                | 65.12                  | 45.23 | 74               | 54 | -8.88      | -8.77  |
| 7206           | V                | 64.26                  | 44.21 | 74               | 54 | -9.74      | -9.79  |
| 9608           | V                | 63.14                  | 43.25 | 74               | 54 | -10.86     | -10.75 |
| 12010          | V                | 62.95                  | 42.12 | 74               | 54 | -11.05     | -11.88 |
| 14412          | V                | 61.41                  | 41.36 | 74               | 54 | -12.59     | -12.64 |
| 16814          | V                | 60.29                  | 40.28 | 74               | 54 | -13.71     | -13.72 |
| 2402(F)        | H                | 98.65                  | 78.65 | 114              | 94 | -15.35     | -15.35 |
| 4804           | H                | 65.24                  | 45.35 | 74               | 54 | -8.76      | -8.65  |
| 7206           | H                | 64.14                  | 44.02 | 74               | 54 | -9.86      | -9.98  |
| 9608           | H                | 63.95                  | 43.14 | 74               | 54 | -10.05     | -10.86 |
| 12010          | H                | 62.22                  | 42.17 | 74               | 54 | -11.78     | -11.83 |
| 14412          | H                | 61.25                  | 41.36 | 74               | 54 | -12.75     | -12.64 |
| 16814          | H                | 60.82                  | 40.84 | 74               | 54 | -13.18     | -13.16 |

Operation Mode: GFSK (CH34: 2440MHz) Test Date : July 10, 2017

| Freq.<br>(MHz) | Ant. Pol.<br>H/V | Emission Level(dBuV/m) |       | Limit 3m(dBuV/m) |    | Margin(dB) |        |
|----------------|------------------|------------------------|-------|------------------|----|------------|--------|
|                |                  | PK                     | AV    | PK               | AV | PK         | AV     |
| 2434(F)        | V                | 98.22                  | 78.41 | 114              | 94 | -15.78     | -15.59 |
| 4868           | V                | 64.12                  | 44.26 | 74               | 54 | -9.88      | -9.74  |
| 7302           | V                | 63.04                  | 43.51 | 74               | 54 | -10.96     | -10.49 |
| 9736           | V                | 62.41                  | 42.19 | 74               | 54 | -11.59     | -11.81 |
| 12170          | V                | 61.36                  | 41.25 | 74               | 54 | -12.64     | -12.75 |
| 14604          | V                | 60.59                  | 40.36 | 74               | 54 | -13.41     | -13.64 |
| 17038          | V                | 59.42                  | 39.25 | 74               | 54 | -14.58     | -14.75 |
| 2434(F)        | H                | 99.41                  | 79.51 | 114              | 94 | -14.59     | -14.49 |
| 4868           | H                | 65.14                  | 45.62 | 74               | 54 | -8.86      | -8.38  |
| 7302           | H                | 64.36                  | 44.36 | 74               | 54 | -9.64      | -9.64  |
| 9736           | H                | 63.25                  | 43.51 | 74               | 54 | -10.75     | -10.49 |
| 12170          | H                | 62.14                  | 42.84 | 74               | 54 | -11.86     | -11.16 |
| 14604          | H                | 61.29                  | 41.58 | 74               | 54 | -12.71     | -12.42 |
| 17038          | H                | 60.59                  | 40.29 | 74               | 54 | -13.41     | -13.71 |

Operation Mode: GFSK (CH69: 2479MHz) Test Date : July 10, 2017

| Freq.<br>(MHz) | Ant. Pol.<br>H/V | Emission Level(dBuV/m) |       | Limit 3m(dBuV/m) |    | Margin(dB) |        |
|----------------|------------------|------------------------|-------|------------------|----|------------|--------|
|                |                  | PK                     | AV    | PK               | AV | PK         | AV     |
| 2472(F)        | V                | 97.05                  | 77.26 | 114              | 94 | -16.95     | -16.74 |
| 4944           | V                | 64.15                  | 44.14 | 74               | 54 | -9.85      | -9.86  |
| 7416           | V                | 63.25                  | 43.95 | 74               | 54 | -10.75     | -10.05 |
| 9888           | V                | 61.26                  | 41.24 | 74               | 54 | -12.74     | -12.76 |
| 12360          | V                | 60.32                  | 40.18 | 74               | 54 | -13.68     | -13.82 |
| 14832          | V                | 59.52                  | 39.61 | 74               | 54 | -14.48     | -14.39 |
| 17304          | V                | 58.63                  | 38.41 | 74               | 54 | -15.37     | -15.59 |
| 2472(F)        | H                | 98.62                  | 78.25 | 114              | 94 | -15.38     | -15.75 |
| 4944           | H                | 65.14                  | 45.25 | 74               | 54 | -8.86      | -8.75  |
| 7416           | H                | 64.26                  | 44.63 | 74               | 54 | -9.74      | -9.37  |
| 9888           | H                | 63.25                  | 43.51 | 74               | 54 | -10.75     | -10.49 |
| 12360          | H                | 62.94                  | 42.14 | 74               | 54 | -11.06     | -11.86 |
| 14832          | H                | 61.11                  | 41.25 | 74               | 54 | -12.89     | -12.75 |
| 17304          | H                | 60.24                  | 40.39 | 74               | 54 | -13.76     | -13.61 |

### 8.5 Radiated Measurement Photos:



## **9. Antenna requirement**

### **9.1 Limit**

Except for special regulations, the Low-power Radio-Frequency Devices must not be equipped with any jacket for installing an antenna with extension cable. 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 manufacture may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited.

### **9.2 Result**

The EUT's antenna, permanent attached antenna, used a Internal antenna, The antenna's gain is 1 dBi and meets the requirement.

# APPENDIX I (Photos of EUT)



