



# MEASUREMENT REPORT

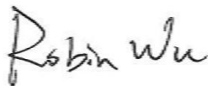
## FCC PART15.245 / RSS-210 Issue 9

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**FCC ID:** SIB-IOTSH01  
**IC:** 6719D-IOTSH01  
**APPLICANT:** Foxconn International Inc.

**Application Type:** Certification  
**Product:** IOT Sensor Hub  
**Model No.:** IOTSH01  
**Brand Name:** SHARP  
**FCC Classification:** Part 15 Field Disturbance Sensor (FDS)  
**FCC Rule Part(s):** FCC PART15.245  
**IC Rule(s):** RSS-210 Issue 9, RSS-Gen Issue 5  
**Test Procedure(s):** ANSI C63.10-2013  
**Test Date:** January 15 ~ February 02, 2019

**Reviewed By:**   
(Kevin Guo)

**Approved By:**   
( Robin Wu )



The test results relate only to the samples tested.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10-2013. Test results reported herein relate only to the item(s) tested.

The test report shall not be reproduced except in full without the written approval of MRT Technology (Suzhou) Co., Ltd.

### Revision History

| Report No.    | Version | Description    | Issue Date | Note  |
|---------------|---------|----------------|------------|-------|
| 1901RSU004-U2 | Rev. 01 | Initial Report | 08-29-2019 | Valid |
|               |         |                |            |       |

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## §2.1033 General Information

|                                |                                                                                                                                 |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| <b>Applicant:</b>              | Foxconn International Inc.                                                                                                      |
| <b>Applicant Address:</b>      | No. 2, Ziyou St., Tucheng Dist., New Taipei City 236 ,Taiwan.                                                                   |
| <b>Manufacturer:</b>           | Foxconn International Inc.                                                                                                      |
| <b>Manufacturer Address:</b>   | No. 2, Ziyou St., Tucheng Dist., New Taipei City 236 ,Taiwan.                                                                   |
| <b>Test Site:</b>              | MRT Technology (Suzhou) Co., Ltd                                                                                                |
| <b>Test Site Address:</b>      | D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China                                              |
| <b>Test Device Serial No.:</b> | N/A <input type="checkbox"/> Production <input checked="" type="checkbox"/> Pre-Production <input type="checkbox"/> Engineering |

### Test Facility / Accreditations

Measurements were performed at MRT Laboratory located in Tian'edang Rd., Suzhou, China.

- MRT facility is a FCC registered (MRT Reg. No. 893164) test facility with the site description report on file and has met all the requirements specified in ANSI C63.4-2014.
- MRT facility is an IC registered (MRT Reg. No. 11384A-1) test laboratory with the site description on file at Industry Canada.
- MRT facility is a VCCI registered (R-20025, G-20034, C-20020, T-20020) test laboratory with the site description on file at VCCI Council.
- MRT Lab is accredited to ISO 17025 by the American Association for Laboratory Accreditation (A2LA) under the American Association for Laboratory Accreditation Program (A2LA Cert. No. 3628.01) in EMC, Telecommunications, Radio and SAR testing.



## 1. INTRODUCTION

### 1.1. Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Industry Canada Certification and Engineering Bureau.

### 1.2. MRT Test Location

The map below shows the location of the MRT LABORATORY, its proximity to the Taihu Lake. These measurement tests were conducted at the MRT Technology (Suzhou) Co., Ltd. Facility located at D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China. The measurement facility compliant with the test site requirements specified in ANSI C63.4-2014.



## 2. PRODUCT INFORMATION

### 2.1. Equipment Description

|                        |                             |
|------------------------|-----------------------------|
| Product Name           | IOT Sensor Hub              |
| Model No.              | IOTSH01                     |
| Transmitting Frequency | 24.15 ~ 24.25GHz            |
| Operation Voltage      | DC 5V                       |
| Modulation Type        | Unmodulated Continuous Wave |

### 2.2. Test Configuration

The device was tested per the guidance of FCC Part 15.245 and ANSI 63.10-2013 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing.

### 2.3. EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and/or no modifications were made during testing.

### 2.4. Labeling Requirements

Per 2.1074 & 15.19; Docket 95-19

The label shall be permanently affixed at a conspicuous location on the device; instruction manual or pamphlet supplied to the user and be readily visible to the purchaser at the time of purchase.

However, when the device is so small wherein placement of the label with specified statement is not practical, only the FCC ID must be displayed on the device per Section 15.19(a)(5). Please see attachment for FCC ID label and label location.

RSP-100 Issue 11 Section 3

The manufacturer, importer or distributor shall meet the labelling requirements set out in this section for every unit:

- (i) prior to marketing in Canada, for products manufactured in Canada
- (ii) prior to importation into Canada, for imported products

For information regarding the e-labelling option, see Notice 2014–DRS1003. The label for the certified product represents the manufacturer's or importer's compliance with Innovation, Science and Economic Development Canada's (ISED) regulatory requirements.

Please see attachment for IC label and label location.

### 3. DESCRIPTION of TEST

#### 3.1. Evaluation Procedure

The measurement procedures described in the American National Standard for Testing Unlicensed Wireless Devices (ANSI C63.10-2013), and the requirement provided in FCC Part 15.245 were used in the measurement of the EUT.

**Deviation from measurement procedure.....None**

#### 3.2. AC Line Conducted Emissions

The line-conducted facility is located inside an 8'x4'x4' shielded enclosure. A 1m x 2m wooden table 80cm high is placed 40cm away from the vertical wall and 80cm away from the sidewall of the shielded room. Two 10kHz-30MHz, 50Ω/50uH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room floor. Power to the LISNs is filtered by external high-current high-insertion loss power line filters. These filters attenuate ambient signal noise from entering the measurement lines. These filters are also bonded to the shielded enclosure.

The EUT is powered from one LISN and the support equipment is powered from the second LISN. All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40cm above the horizontal reference ground-plane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the receiver and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The receiver was scanned from 150kHz to 30MHz. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 9kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Each emission was also maximized by varying: power lines, the mode of operation or data exchange speed, or support equipment whichever determined the worst-case emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions are used for final measurements on the same test site. The analyzer is set to CISPR quasi-peak and average detectors with a 9kHz resolution bandwidth for final measurements.

An extension cord was used to connect to a single LISN which powered by EUT. The extension cord was calibrated with LISN, the impedance and insertion loss are compliance with the requirements as stated in ANSI C63.10-2013.

### 3.3. Radiated Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. For measurements above 1GHz absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1GHz, the absorbers are removed. A MF Model 210SS turntable is used for radiated measurement. It is a continuously rotatable, remote controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. An 80cm high PVC support structure is placed on top of the turntable.

For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30MHz up to the upper frequency shown in 15.33(b)(1) depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1GHz, linearly polarized double ridge horn antennas were used. For frequencies below 30MHz, a calibrated loop antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up for frequencies below 1GHz was placed on top of the 0.8 meter high, 1 x 1.5 meter table; and test set-up for frequencies 1-40GHz was placed on top of the 1.5 meter high, 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, if applicable, turntable azimuth, and receive antenna height was noted for each frequency found.

Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and horn antennas. The test setup was configured to the setup that produced the worst case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by changing the orientation of the EUT through three orthogonal planes and changing the polarity of the receive antenna, whichever produced the worst-case emissions. According to 3dB Beam-Width of horn antenna, the horn antenna should be always directed to the EUT when rising height.

## 4. ANTENNA REQUIREMENTS

### **Excerpt from §15.203 of the FCC Rules/Regulations:**

“An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can 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 antenna of the **IOT Sensor Hub** is **permanently attached**.
- There are no provisions for connection to an external antenna.

### **Conclusion:**

The unit complies with the requirement of §15.203.

## 5. TEST EQUIPMENT CALIBRATION DATE

### Radiated Emission - AC2

| Instrument                       | Manufacturer            | Type No.                                | Asset No.   | Cali. Interval | Cali. Due Date |
|----------------------------------|-------------------------|-----------------------------------------|-------------|----------------|----------------|
| EMI Test Receiver                | R&S                     | ESR7                                    | MRTSUE06001 | 1 year         | 2019/08/14     |
| Signal Analyzer                  | R&S                     | FSV40                                   | MRTSUE06218 | 1 year         | 2020/04/15     |
| EXA Signal Analyzer              | Agilent                 | N9020A                                  | MRTSUE06106 | 1 year         | 2020/04/15     |
| EXA Signal Analyzer              | Keysight                | N9010B                                  | MRTSUE06452 | 1 year         | 2019/07/20     |
| Loop Antenna                     | Schwarzbeck             | FMZB 1519                               | MRTSUE06025 | 1 year         | 2019/11/09     |
| Bilog Period Antenna             | Schwarzbeck             | VULB 9162                               | MRTSUE06022 | 1 year         | 2019/10/20     |
| Broad Band Horn Antenna          | Schwarzbeck             | BBHA 9120D                              | MRTSUE06171 | 1 year         | 2019/11/09     |
| Broad Band Horn Antenna          | Schwarzbeck             | BBHA 9170                               | MRTSUE06024 | 1 year         | 2019/12/17     |
| Micro-Wave Antenna               | MI-WWAVE                | 261U-25                                 | MRTSUE06273 | 5 year         | 2021/12/26     |
| Micro-Wave Antenna               | MI-WWAVE                | 261E-25                                 | MRTSUE06276 | 5 year         | 2021/12/26     |
| Micro-Wave Antenna               | MI-WWAVE                | 261F-25                                 | MRTSUE06275 | 5 year         | 2021/12/26     |
| Waveguide Harmonic Mixer         | Keysight                | M1970V                                  | MRTSUE06271 | 5 year         | 2022/01/17     |
| Waveguide Harmonic Mixer         | Keysight                | M1970W                                  | MRTSUE06272 | 5 year         | 2021/12/07     |
| Microwave System Amplifier       | Agilent                 | 83017A                                  | MRTSUE06076 | 1 year         | 2019/11/16     |
| Amplifier                        | Schwarzbeck             | BBV 9721                                | MRTSUE06121 | 1 year         | 2019/06/13     |
| DC Power Supply                  | GWINSTEK                | DPS-99306D                              | MRTSUE06063 | N/A            | N/A            |
| Digital Thermometer & Hygrometer | Minggao                 | ETH529                                  | MRTSUE06170 | 1 year         | 2019/12/13     |
| Anechoic Chamber                 | RIKEN                   | Chamber-AC2                             | MRTSUE06213 | 1 year         | 2020/04/30     |
| Coaxial transmission line        | Times Microwave Systems | SLU18-SMSM-01 .00M (Serial #94197(TMC)) | N/A         | 5 year         | 2022/01/17     |
| Coaxial transmission line        | Times Microwave Systems | SLU18-SMSM-01 .00M (Serial #94198(TMC)) | N/A         | 5 year         | 2021/12/07     |
| Coaxial transmission line        | UCWAVE                  | SPT67-1.85M1.8 5M-1.0M                  | N/A         | 5 year         | 2021/12/26     |

## 6. MEASUREMENT UNCERTAINTY

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k = 2$ .

| Conducted Emission - SR2                                                                                                                      |
|-----------------------------------------------------------------------------------------------------------------------------------------------|
| <p>The maximum measurement uncertainty is evaluated as:</p> <p>9kHz~150kHz: 3.84dB</p> <p>150kHz~30MHz: 3.46dB</p>                            |
| Radiated Emission Measurement - AC2                                                                                                           |
| <p>Measuring Uncertainty for a Level of Confidence of 95% (<math>U=2Uc(y)</math>):</p> <p>9kHz ~ 1GHz: 4.18dB</p> <p>1GHz ~ 18GHz: 4.76dB</p> |

## 7. TEST RESULT

### 7.1. Summary

| FCC Part<br>Section(s) | Test Description                                                                   | Test Limit                                                           | Test Condition    | Test Result | Reference         |
|------------------------|------------------------------------------------------------------------------------|----------------------------------------------------------------------|-------------------|-------------|-------------------|
| 15.215(c)              | Emission Bandwidth                                                                 | 20 dB bandwidth of the emission is contained within 24.075~24.175GHz | Radiated          | Pass        | Section 7.2       |
| 15.209<br>15.245       | Fundamental Field Strength<br>Harmonic Field Strength<br>Restricted Bands Emission | FCC Part 15.245(b),<br>FCC Part 15.209                               |                   | Pass        | Section 7.3 & 7.4 |
| 15.207                 | AC Conducted Emissions<br>150kHz - 30MHz                                           | < FCC 15.207 limits                                                  | Line<br>Conducted | Pass        | Section 7.5       |

| RSS<br>Section(s)                              | Test Description                                                                   | Test Limit                                                                          | Test Condition    | Test Result | Reference         |
|------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------|-------------|-------------------|
| RSS-Gen<br>Clause 6.7                          | Occupied Bandwidth                                                                 | N/A                                                                                 | Radiated          | Pass        | Section 7.2       |
| RSS-Gen<br>Clause 8.9,<br>RSS-210<br>Annex F.1 | Fundamental Field Strength<br>Harmonic Field Strength<br>Restricted Bands Emission | Emissions in restricted bands must meet the radiated limits detailed in clause 8.10 |                   | Pass        | Section 7.3 & 7.4 |
| RSS-Gen<br>Clause 8.11                         | Frequency Stability                                                                | Fall within at least the central 80% of its permitted operating frequency band      |                   | Pass        | Section 7.6       |
| RSS-Gen<br>Clause 8.8                          | AC Conducted Emissions<br>150kHz - 30MHz                                           | < RSS-Gen Clause 8.8 limits                                                         | Line<br>Conducted | Pass        | Section 7.5       |

#### Notes:

The analyzer plots shown in this section were all taken with a correction factor loaded into the analyzer. The correction factor was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.

## 7.2. Emission Bandwidth Measurement

### 7.2.1. Test Limit

For FCC (20dB Emission Bandwidth)

20 dB bandwidth of the emission shall be contained within the frequency band 24.075 ~ 24.175 GHz.

For IC (99% Occupied Bandwidth)

N/A

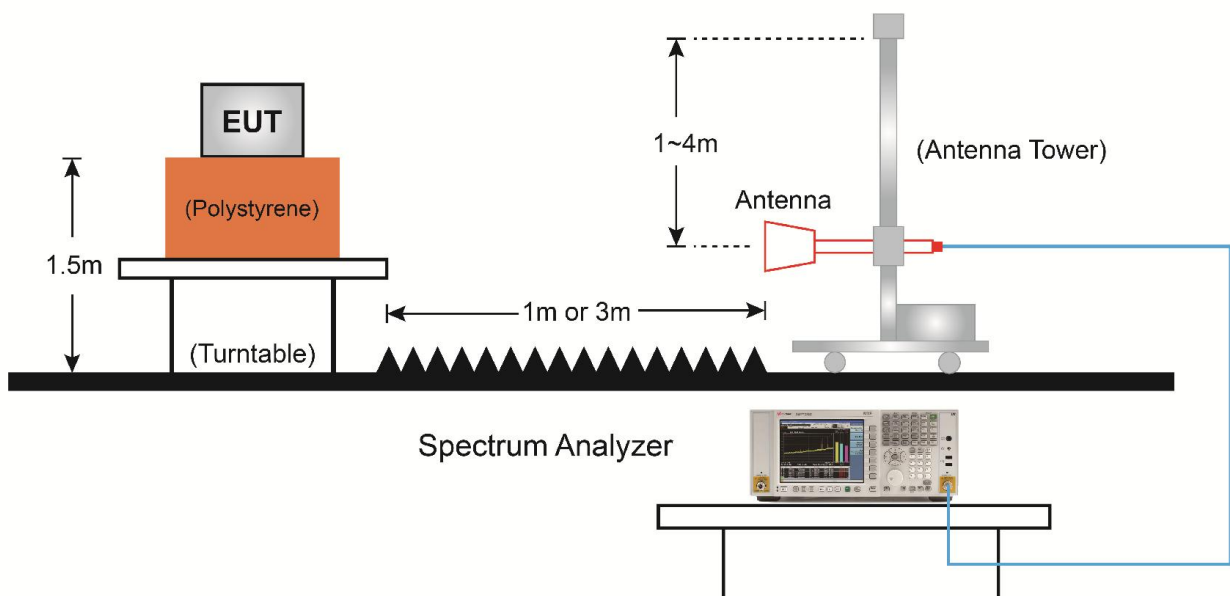
### 7.2.2. Test Procedure used

ANSI C63.10 Section 6.9.2 and Section 6.9.3

### 7.2.3. Test Setting

1. The analyzers' automatic bandwidth measurement capability was used to perform the 99% or 20dB bandwidth measurement. The bandwidth measurement was not influenced by any intermediated power nulls in the fundamental emission.
2. RBW = approximately 1% to 5% of the OBW.
3. VBW  $\geq 3 \times$  RBW.
4. Detector = Peak.
5. Trace mode = max hold.

### 7.2.4. Test Setup



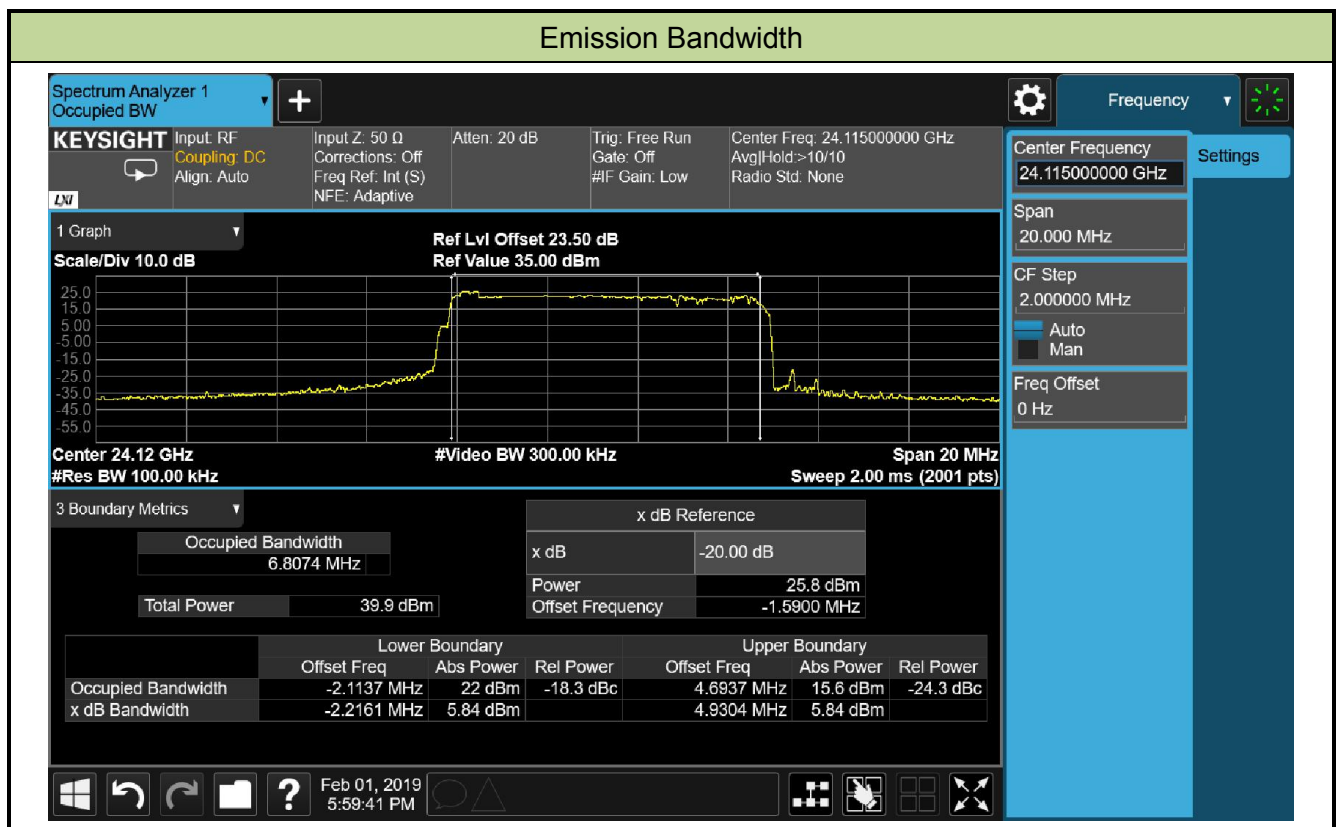
### 7.2.5. Test Result

|               |                |                   |            |
|---------------|----------------|-------------------|------------|
| Product       | IOT Sensor Hub | Temperature       | 25°C       |
| Test Engineer | Milo Li        | Relative Humidity | 56%        |
| Test Site     | AC2            | Test Date         | 2019/02/01 |

| 20dB Bandwidth Range (MHz) | Range Limit (MHz) | Result |
|----------------------------|-------------------|--------|
| $F_L = 24117.784$          | 24075             | Pass   |
| $F_H = 24124.930$          | 24175             | Pass   |
| 99% Occupied Bandwidth     |                   | Result |
| 6.807                      |                   | N/A    |

Note:  $F_L = 24120 \text{ MHz} - 2.2161 \text{ MHz} = 24117.784 \text{ MHz}$ ;

$F_H = 24120 \text{ MHz} + 4.9304 \text{ MHz} = 24124.930 \text{ MHz}$ ;



### 7.3. Radiated Emission Measurement

#### 7.3.1. Test Limit

| FCC Part 15 Subpart C Paragraph 15.245 & RSS 210 |                                                     |                                                   |
|--------------------------------------------------|-----------------------------------------------------|---------------------------------------------------|
| Fundamental frequency (MHz)                      | Field strength of fundamental<br>(millivolts/meter) | Field strength of harmonics<br>(millivolts/meter) |
| 902 ~ 928                                        | 500                                                 | 1.6                                               |
| 2435 ~ 2465                                      | 500                                                 | 1.6                                               |
| 5785 ~ 5815                                      | 500                                                 | 1.6                                               |
| 10500 ~ 10550                                    | 2500                                                | 25.0                                              |
| 24075 ~ 24175                                    | 2500                                                | 25.0                                              |

Note 1: Regardless of the limits shown in the above table, harmonic emissions in the restricted bands below 17.7 GHz, as specified in §15.205, shall not exceed the field strength limits shown in § 15.209. Harmonic emissions in the restricted bands at and above 17.7GHz shall not exceed the following field strength limits:

(i) For the second and third harmonics of field disturbance sensors operating in the 24075-24175 MHz band and for other field disturbance sensors designed for use only within a building or to open building doors, 25.0 mV/m.

(ii) For all other field disturbance sensors, 7.5 mV/m.

(iii) Field disturbance sensors designed to be used in motor vehicles or aircraft must include features to prevent continuous operation unless their emissions in the restricted bands, other than the second and third harmonics from devices operating in the 24075-24175 MHz band, fully comply with the limits given in § 15.209. Continuous operation of field disturbance sensors designed to be used in farm equipment, vehicles such as fork lifts that are intended primarily for use indoors or for very specialized operations, or railroad locomotives, railroad cars and other equipment which travels on fixed tracks is permitted. A field disturbance sensor will be considered not to be operating in a continuous mode if its operation is limited to specific activities of limited duration (e.g., putting a vehicle into reverse gear, activating a turn signal, etc.).

Note 2: Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

Note 3: Field strength limits are specified at a distance of 3 meters.

Note 4: The emission limits shown above are based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply.

| FCC Part 15 Subpart C Paragraph 15.209 & RSS-Gen |                       |                          |
|--------------------------------------------------|-----------------------|--------------------------|
| Frequency (MHz)                                  | Field Strength (uV/m) | Measurement Distance (m) |
| 0.009 ~ 0.490                                    | 2400/F(kHz)           | 300                      |
| 0.490 ~ 1.705                                    | 24000/F(kHz)          | 30                       |
| 1.705 ~ 30.0                                     | 30                    | 30                       |
| 30 ~ 80                                          | 100**                 | 3                        |
| 80 ~ 216                                         | 150**                 | 3                        |
| 216 ~ 960                                        | 200**                 | 3                        |
| Above 960                                        | 500                   | 3                        |

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

Note 2: Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

Note 3: E field strength (dBuV/m) = 20 log E field strength (uV/m).

### 7.3.2. Test Procedure used

ANSI C63.10 Section 6.3 & Section 6.4 & Section 6.5 & Section 6.6

### 7.3.3. Test Procedure

#### Quasi-Peak Measurements below 1GHz

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. Span was set greater than 1MHz
3. RBW = as specified in Table 1
4. Detector = CISPR quasi-peak or average
5. Sweep time = auto couple
6. Trace was allowed to stabilize

**Table 1 - RBW as a function of frequency**

| Frequency     | RBW           |
|---------------|---------------|
| 9 ~ 150 kHz   | 200 ~ 300 Hz  |
| 0.15 ~ 30 MHz | 9 ~ 10 kHz    |
| 30 ~ 1000 MHz | 100 ~ 120 kHz |
| > 1000 MHz    | 1 MHz         |

**Peak Measurements above 1GHz**

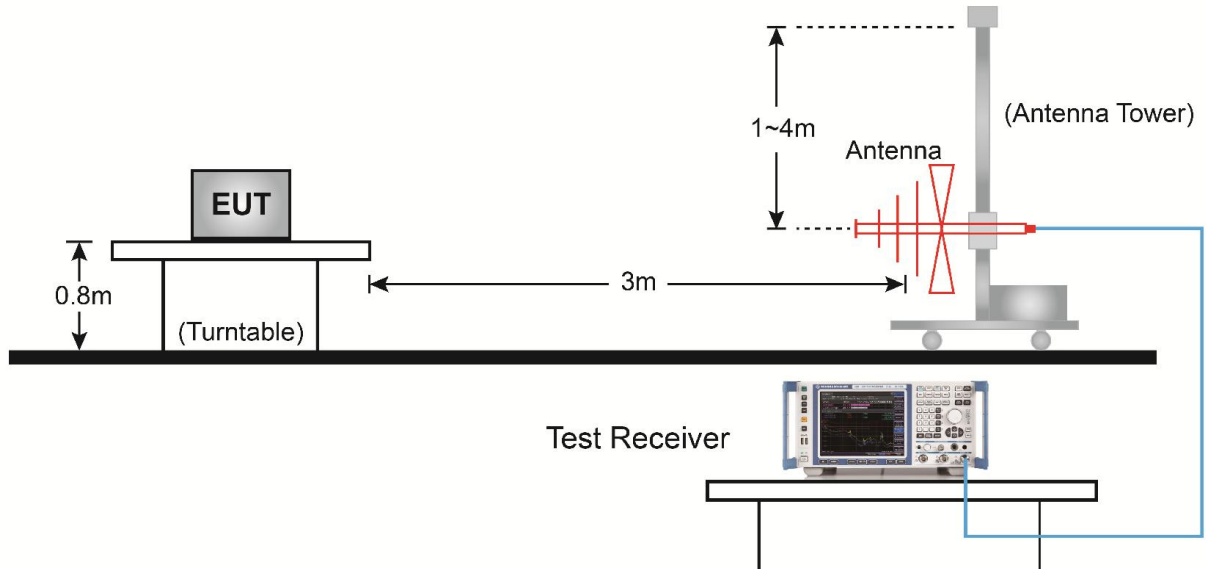
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

**Average Measurements above 1GHz**

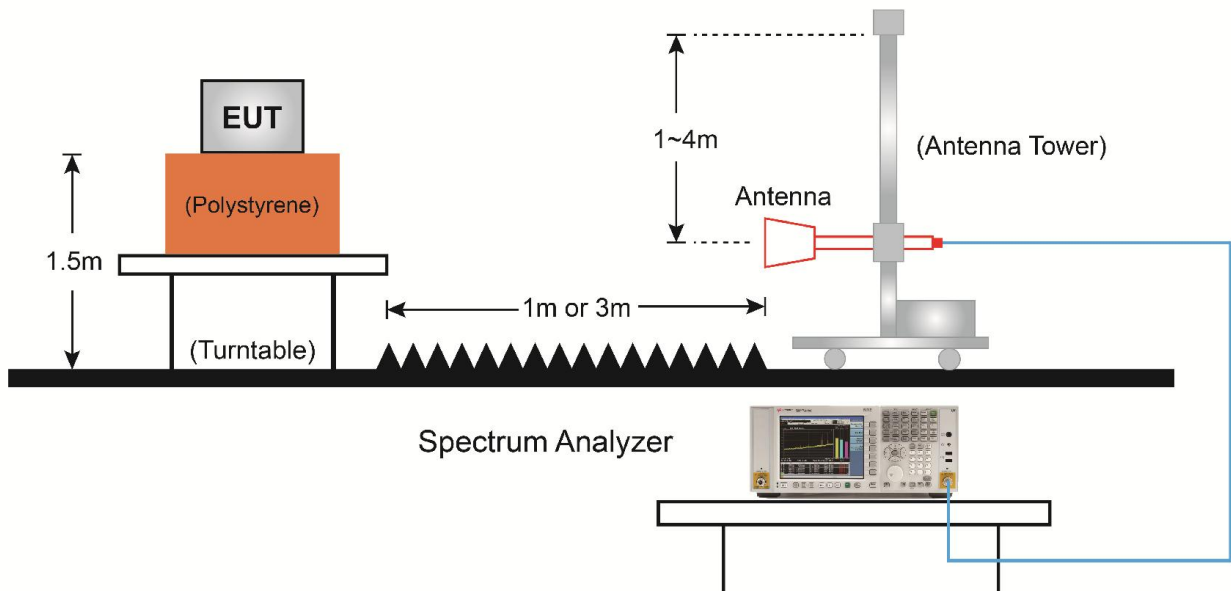
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3.  $VBW \geq [1 / (\text{Minimum transmitter on time})]$  and no less than 1 Hz.
4. The instrument may be set to linear detector mode. Ensure that video filtering is applied in linear voltage domain (rather than in a log or dB domain). Some instruments require linear display mode in order to accomplish this. Others have a setting for Average-VBW Type, which can be set to "Voltage" regardless of the display mode
5. Detector = Peak
6. Sweep time = auto
7. Trace mode = max hold

### 7.3.4. Test Setup

#### Below 1GHz Test Setup:



#### Above 1GHz Test Setup:



### 7.3.5. Test Results

|               |                                      |                   |            |
|---------------|--------------------------------------|-------------------|------------|
| Product       | IOT Sensor Hub                       | Temperature       | 25°C       |
| Test Engineer | Milo Li                              | Relative Humidity | 56%        |
| Test Site     | AC2                                  | Test Date         | 2019/02/01 |
| Remark:       | <b>Fundamental</b> Radiated Emission |                   |            |

| Frequency (GHz) | Reading Level (dBμV) | Factor (dB) | Measure Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Detector | Polarization |
|-----------------|----------------------|-------------|------------------------|----------------|-------------|----------|--------------|
| 24.103          | 103.2                | 10.6        | 113.8                  | 157.5          | -43.7       | Peak     | Horizontal   |
|                 | 102.3                | 10.6        | 112.9                  | 137.5          | -24.6       | Average  | Horizontal   |
|                 | 89.6                 | 10.6        | 100.2                  | 157.5          | -57.3       | Peak     | Vertical     |
|                 | 88.1                 | 10.6        | 98.7                   | 137.5          | -38.8       | Average  | Vertical     |

Note 1: Peak Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)

Note 2: Limit@1m = 20\*Log(2500mV/m) + 60 + 20\*Log(3m/1m) = 137.5dBμV/m (Average detector), and 157.5dBμV/m (Peak detector).

|               |                                    |                   |            |
|---------------|------------------------------------|-------------------|------------|
| Product       | IOT Sensor Hub                     | Temperature       | 25°C       |
| Test Engineer | Milo Li                            | Relative Humidity | 56%        |
| Test Site     | AC2                                | Test Date         | 2019/01/19 |
| Remark:       | <b>Harmonics</b> Radiated Emission |                   |            |

| Mark                                         | Frequency (MHz) | Reading Level (dBμV) | Factor (dB) | Measure Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Detector | Polarization |
|----------------------------------------------|-----------------|----------------------|-------------|------------------------|----------------|-------------|----------|--------------|
| Measurement Distance = 3m (30 MHz ~ 18 GHz)  |                 |                      |             |                        |                |             |          |              |
|                                              | 70.5            | 18.8                 | 10.9        | 29.7                   | 40.0           | -10.3       | QP       | Horizontal   |
|                                              | 480.0           | 19.4                 | 18.3        | 37.7                   | 46.0           | -8.3        | QP       | Horizontal   |
|                                              | 70.5            | 18.9                 | 10.9        | 29.8                   | 40.0           | -10.2       | QP       | Vertical     |
|                                              | 658.1           | 14.9                 | 21.2        | 36.1                   | 46.0           | -9.9        | QP       | Vertical     |
|                                              | 2283.5          | 46.0                 | -1.7        | 44.3                   | 74.0           | -29.7       | Peak     | Horizontal   |
|                                              | 2283.5          | 27.4                 | -1.7        | 25.7                   | 54.0           | -28.3       | Average  | Horizontal   |
|                                              | 7511.0          | 32.7                 | 11.6        | 44.3                   | 74.0           | -29.7       | Peak     | Horizontal   |
|                                              | 7511.0          | 22.2                 | 11.6        | 33.8                   | 54.0           | -20.2       | Average  | Horizontal   |
|                                              | 2666.0          | 48.5                 | -2.2        | 46.3                   | 74.0           | -27.7       | Peak     | Vertical     |
|                                              | 2666.0          | 26.6                 | -2.2        | 24.4                   | 54.0           | -29.6       | Average  | Vertical     |
|                                              | 7655.0          | 23.7                 | 11.3        | 35.0                   | 54.0           | -19.0       | Peak     | Vertical     |
|                                              | 7655.5          | 32.9                 | 11.3        | 44.2                   | 74.0           | -29.8       | Average  | Vertical     |
| Measurement Distance = 1m (18 GHz ~ 121 GHz) |                 |                      |             |                        |                |             |          |              |
|                                              | 26304           | 37.1                 | 11.2        | 48.3                   | 83.5(Note 2)   | -35.2       | Peak     | Horizontal   |
|                                              | 39760           | 35.4                 | 25          | 60.4                   | 83.5(Note 2)   | -23.1       | Peak     | Horizontal   |
|                                              | 39760           | 16.3                 | 25          | 41.3                   | 63.5(Note 2)   | -22.2       | Average  | Horizontal   |
|                                              | 31408           | 41.3                 | 13.7        | 55                     | 83.5(Note 2)   | -28.5       | Peak     | Vertical     |
|                                              | 39584           | 41.9                 | 23.6        | 65.5                   | 83.5(Note 2)   | -18         | Peak     | Vertical     |
|                                              | 39584           | 20.2                 | 23.6        | 43.8                   | 63.5(Note 2)   | -19.7       | Average  | Vertical     |
| *                                            | 48205.0         | 32.4                 | 46.0        | 78.4                   | 117.5(Note 3)  | -39.1       | Peak     | Horizontal   |
| *                                            | 72309.0         | 38.9                 | 58.5        | 97.4                   | 117.5(Note 3)  | -20.1       | Peak     | Horizontal   |
| *                                            | 95370.0         | 36.7                 | 63.3        | 100.0                  | 117.5(Note 3)  | -17.5       | Peak     | Horizontal   |
| *                                            | 48205.0         | 39.5                 | 46.0        | 85.5                   | 117.5(Note 3)  | -32.0       | Peak     | Vertical     |
| *                                            | 72306.0         | 38.3                 | 58.5        | 96.8                   | 117.5(Note 3)  | -20.7       | Peak     | Vertical     |
| *                                            | 96595.0         | 37.3                 | 63.6        | 100.9                  | 117.5(Note 3)  | -16.6       | Peak     | Vertical     |

Note 1: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)

Note 2: Limit@1m =  $20 \cdot \log(500 \mu\text{V/m}) + 20 \cdot \log(3\text{m}/1\text{m}) = 63.5 \text{ dB}\mu\text{V/m}$  (Average detector), and  $83.5 \text{ dB}\mu\text{V/m}$  (Peak detector).

Note 3: “\*” it represents Harmonic emissions in the restricted bands, and its limit is 25 mV/m.

Limit@1m =  $\{[20 \cdot \log[(25/1000)] + 120] + 20 \log(3\text{m}/1\text{m})\} \text{ dBuV/m} = 97.5 \text{ dBuV/m}$  (Average detector), and  $117.5 \text{ dBuV/m}$  (Peak detector).

Note 4: Average measurement was not performed when the peak level lower than average limit.

Note 5: The test trace is same as the ambient noise (the test frequency range: 9 kHz ~ 30 MHz, therefore no data appear in the report).

## 7.4. Radiated Restricted Band Edge Measurement

### 7.4.1. Test Limit

#### For 15.205 requirement:

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a) of FCC part 15, must also comply with the radiated emission limits specified in Section 15.209(a).

| Frequency<br>(MHz)         | Frequency<br>(MHz)  | Frequency<br>(MHz) | Frequency<br>(GHz) |
|----------------------------|---------------------|--------------------|--------------------|
| 0.090 - 0.110              | 16.42 - 16.423      | 399.9 - 410        | 4.5 - 5.15         |
| <sup>1</sup> 0.495 - 0.505 | 16.69475 - 16.69525 | 608 - 614          | 5.35 - 5.46        |
| 2.1735 - 2.1905            | 16.80425 - 16.80475 | 960 - 1240         | 7.25 - 7.75        |
| 4.125 - 4.128              | 25.5 - 25.67        | 1300 - 1427        | 8.025 - 8.5        |
| 4.17725 - 4.17775          | 37.5 - 38.25        | 1435 - 1626.5      | 9.0 - 9.2          |
| 4.20725 - 4.20775          | 73 - 74.6           | 1645.5 - 1646.5    | 9.3 - 9.5          |
| 6.215 - 6.218              | 74.8 - 75.2         | 1660 - 1710        | 10.6 - 12.7        |
| 6.26775 - 6.26825          | 108 - 121.94        | 1718.8 - 1722.2    | 13.25 - 13.4       |
| 6.31175 - 6.31225          | 123 - 138           | 2200 - 2300        | 14.47 - 14.5       |
| 8.291 - 8.294              | 149.9 - 150.05      | 2310 - 2390        | 15.35 - 16.2       |
| 8.362 - 8.366              | 156.52475 - 156.525 | 2483.5 - 2500      | 17.7 - 21.4        |
| 8.37625 - 8.38675          | 156.7 - 156.9       | 2690 - 2900        | 22.01 - 23.12      |
| 8.41425 - 8.41475          | 162.0125 - 167.17   | 3260 - 3267        | 23.6 - 24.0        |
| 12.29 - 12.293             | 167.72 - 173.2      | 3332 - 3339        | 31.2 - 31.8        |
| 12.51975 - 12.52025        | 240 - 285           | 3345.8 - 3358      | 36.43 - 36.5       |
| 12.57675 - 12.57725        | 322 - 335.4         | 3600 - 4400        | ( <sup>2</sup> )   |
| 13.36 - 13.41              | --                  | --                 | --                 |

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Table per Section 15.209.

| FCC Part 15 Subpart C Paragraph 15.209 |                       |                            |
|----------------------------------------|-----------------------|----------------------------|
| Frequency [MHz]                        | Field Strength [uV/m] | Measured Distance [Meters] |
| 0.009 ~ 0.490                          | 2400/F (kHz)          | 300                        |
| 0.490 ~ 1.705                          | 24000/F (kHz)         | 30                         |
| 1.705 ~ 30                             | 30                    | 30                         |
| 30 ~ 88                                | 100                   | 3                          |
| 88 ~ 216                               | 150                   | 3                          |
| 216 ~ 960                              | 200                   | 3                          |
| Above 960                              | 500                   | 3                          |

### **For RSS-Gen Section 8.10 Requirement:**

Radiated emissions which fall in the restricted bands, as defined in Section 8.10 of RSS-Gen, must also comply with the radiated emission limits specified in Section 8.9.

| Frequency<br>(MHz)  | Frequency<br>(MHz)    | Frequency<br>(MHz) | Frequency<br>(GHz) |
|---------------------|-----------------------|--------------------|--------------------|
| 0.090 - 0.110       | 16.42 - 16.423        | 1645.5 - 1646.5    | 9.0 - 9.2          |
| 0.495 - 0.505       | 16.69475 - 16.69525   | 1660 - 1710        | 9.3 - 9.5          |
| 2.1735 - 2.1905     | 16.80425 - 16.80475   | 1718.8-1722.2      | 10.6 - 12.7        |
| 3.020 - 3.026       | 25.5 - 25.67          | 2200 - 2300        | 13.25 - 13.4       |
| 4.125 - 4.128       | 37.5 - 38.25          | 2310-2390          | 14.47 - 14.5       |
| 4.17725 - 4.17775   | 73 - 74.6             | 2483.5 - 2500      | 15.35 - 16.2       |
| 4.20725 - 4.20775   | 74.8 - 75.2           | 2655 - 2900        | 17.7 - 21.4        |
| 5.677 - 5.683       | 108 - 138             | 3260 - 3267        | 22.01 - 23.12      |
| 6.215 - 6.218       | 149.9 - 150.05        | 3332 - 3339        | 23.6 - 24.0        |
| 6.26775 - 6.26825   | 156.52475 - 156.52525 | 3345.8 - 3358      | 31.2 - 31.8        |
| 6.31175 - 6.31225   | 156.7 - 156.9         | 3500 - 4400        | 36.43 - 36.5       |
| 8.291 - 8.294       | 162.0125 - 167.17     | 4500 - 5150        | Above 38.6         |
| 8.362 - 8.366       | 167.72 - 173.2        | 5350 - 5460        | --                 |
| 8.37625 - 8.38675   | 240 - 285             | 7250 - 7750        | --                 |
| 8.41425 - 8.41475   | 322 - 335.4           | 8025 - 8500        | --                 |
| 12.29 - 12.293      | 399.9 - 410           | --                 | --                 |
| 12.51975 - 12.52025 | 608 - 614             | --                 | --                 |
| 12.57675 - 12.57725 | 960 - 1427            | --                 | --                 |
| 13.36 -13.41        | 1435 - 1626.5         | --                 | --                 |

### **7.4.2.Test Procedure used**

ANSI C63.10 Section 6.10

### **7.4.3.Test Procedure**

#### **Peak Measurements**

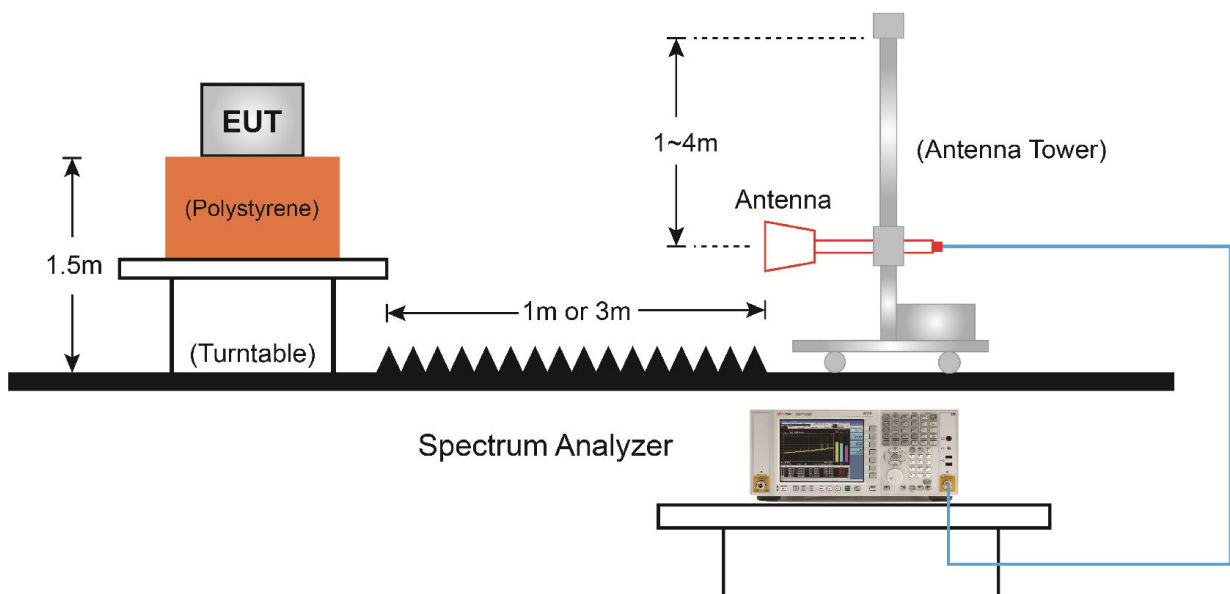
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple

6. Trace mode = max hold
7. Trace was allowed to stabilize

#### **Average Measurements**

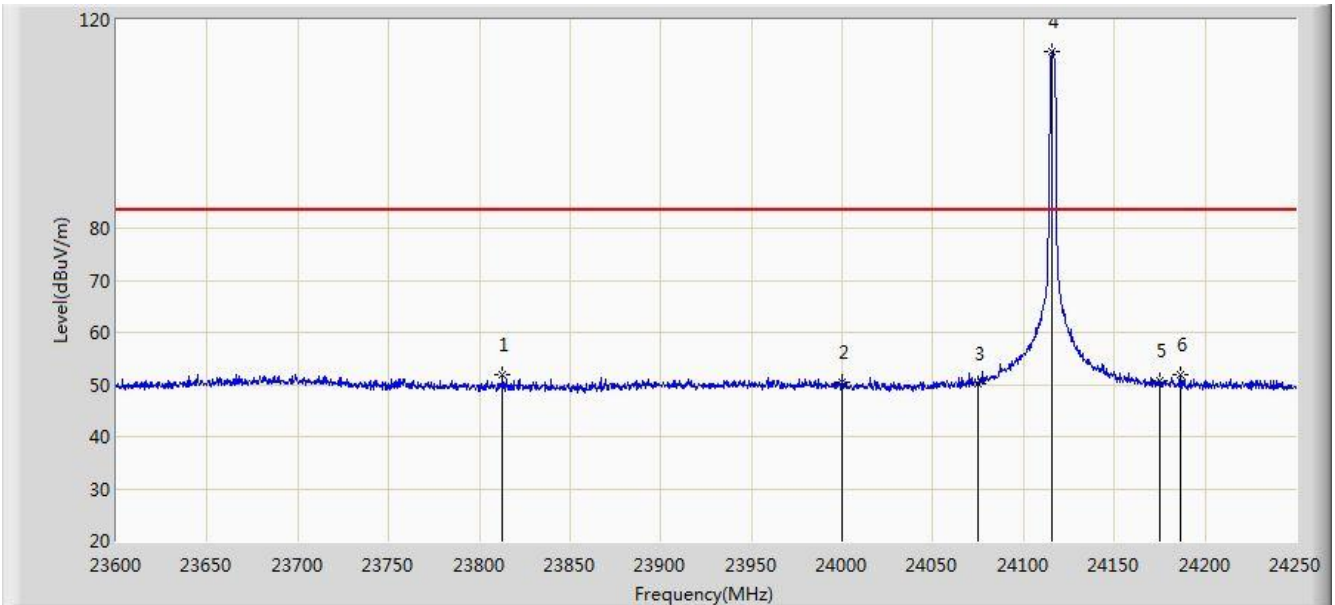
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW  $\geq [1 / (\text{Minimum transmitter on time})]$  and no less than 1 Hz
4. The instrument may be set to linear detector mode. Ensure that video filtering is applied in linear voltage domain (rather than in a log or dB domain). Some instruments require linear display mode in order to accomplish this. Others have a setting for Average-VBW Type, which can be set to "Voltage" regardless of the display mode
5. Detector = Peak
6. Sweep time = auto
7. Trace mode = max hold

#### **7.4.4. Test Setup**



### 7.4.5. Test Result

|                                |                          |
|--------------------------------|--------------------------|
| Site: AC2                      | Time: 2019/02/01 - 15:52 |
| Limit: FCC 109 CLASS B (1M)    | Engineer: Milo Li        |
| Probe: BBHA9170_18-40GHz       | Polarity: Horizontal     |
| EUT: IOT Sensor Hub            | Power: AC 120V/60Hz      |
| Test Mode: Transmit at 24.1GHz |                          |



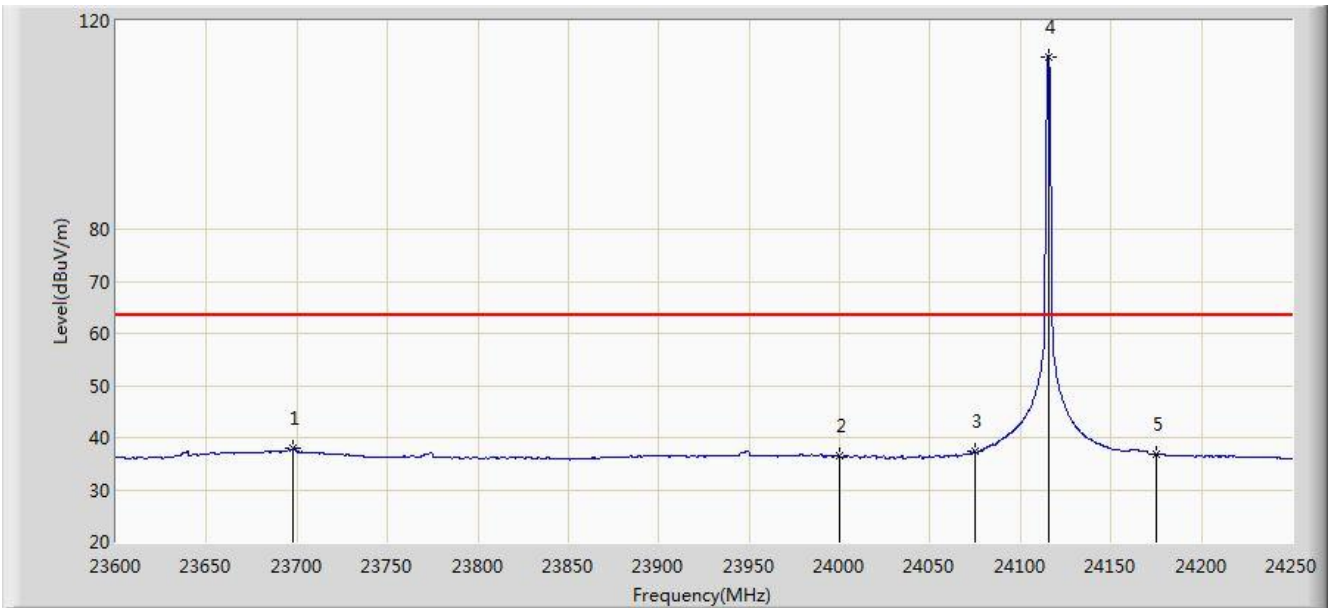
| No | Flag | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|----|------|------|-----------------|------------------------|----------------------|-----------------|----------------|-------------|------|
| 1  |      |      | 23812.875       | 51.951                 | 41.685               | -31.589         | 83.540         | 10.266      | PK   |
| 2  |      |      | 24000.000       | 50.562                 | 40.259               | -32.978         | 83.540         | 10.302      | PK   |
| 3  |      |      | 24075.000       | 50.277                 | 40.239               | -33.263         | 83.540         | 10.038      | PK   |
| 4  |      | *    | 24115.449       | 113.776                | 103.156              | N/A             | N/A            | 10.620      | PK   |
| 5  |      |      | 24175.000       | 50.605                 | 40.191               | -32.935         | 83.540         | 10.413      | PK   |
| 6  |      |      | 24186.301       | 51.988                 | 41.624               | -31.552         | 83.540         | 10.364      | PK   |

Note 1: Peak Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)

Note 2: Limit@1m =  $20 \cdot \log(500 \mu\text{V/m}) + 20 \cdot \log(3\text{m}/1\text{m}) = 63.540 \text{ dB}\mu\text{V/m}$  (Average detector), and  $83.540 \text{ dB}\mu\text{V/m}$  (Peak detector).

|                                |                          |
|--------------------------------|--------------------------|
| Site: AC2                      | Time: 2019/02/01 - 15:59 |
| Limit: FCC 109 CLASS B (1M)    | Engineer: Milo Li        |
| Probe: BBHA9170_18-40GHz       | Polarity: Horizontal     |
| EUT: IOT Sensor Hub            | Power: AC 120V/60Hz      |
| Test Mode: Transmit at 24.1GHz |                          |



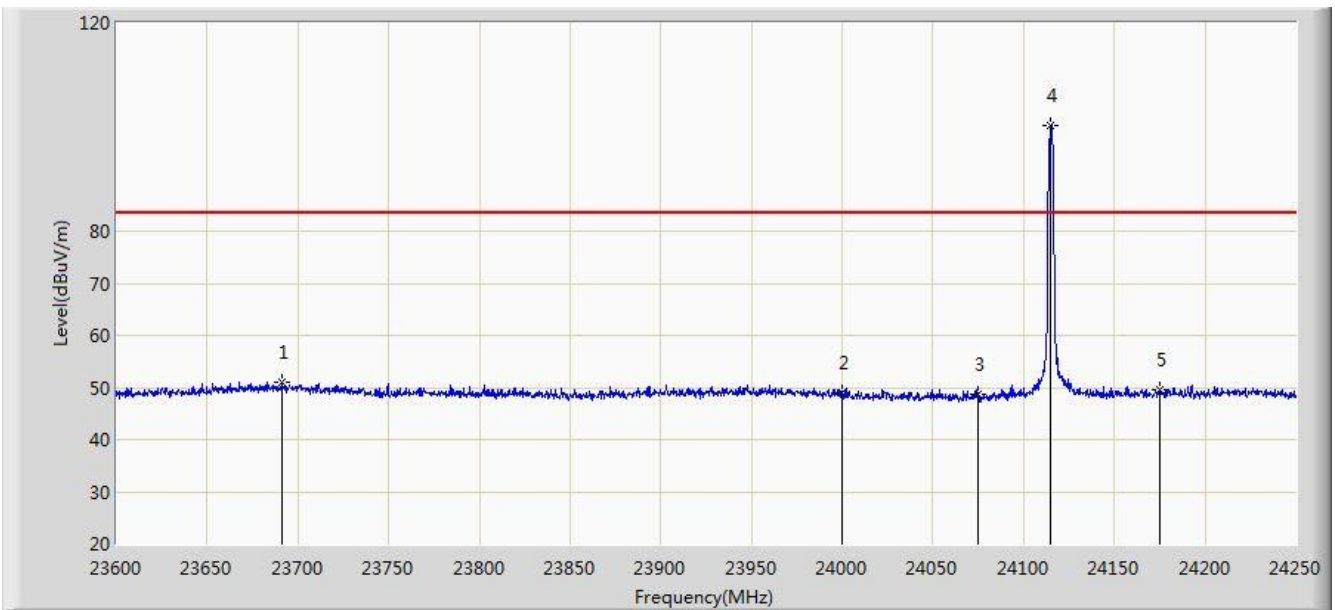
| No | Flag | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|----|------|------|-----------------|------------------------|----------------------|-----------------|----------------|-------------|------|
| 1  |      |      | 23697.824       | 37.869                 | 27.133               | -25.671         | 63.540         | 10.736      | AV   |
| 2  |      |      | 24000.000       | 36.437                 | 26.134               | -27.103         | 63.540         | 10.302      | AV   |
| 3  |      |      | 24075.000       | 37.254                 | 27.216               | -26.286         | 63.540         | 10.038      | AV   |
| 4  |      | *    | 24115.449       | 112.926                | 102.306              | N/A             | N/A            | 10.620      | AV   |
| 5  |      |      | 24175.000       | 36.821                 | 26.407               | -26.719         | 63.540         | 10.413      | AV   |

Note 1: Peak Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)

Note 2: Limit@1m = 20\*Log(500uV/m) + 20\*Log(3m/1m) = 63.540dBuV/m (Average detector), and 83.540dBuV/m (Peak detector).

|                                |                          |
|--------------------------------|--------------------------|
| Site: AC2                      | Time: 2019/02/01 - 16:02 |
| Limit: FCC 109 CLASS B (1M)    | Engineer: Milo Li        |
| Probe: BBHA9170_18-40GHz       | Polarity: Vertical       |
| EUT: IOT Sensor Hub            | Power: AC 120V/60Hz      |
| Test Mode: Transmit at 24.1GHz |                          |



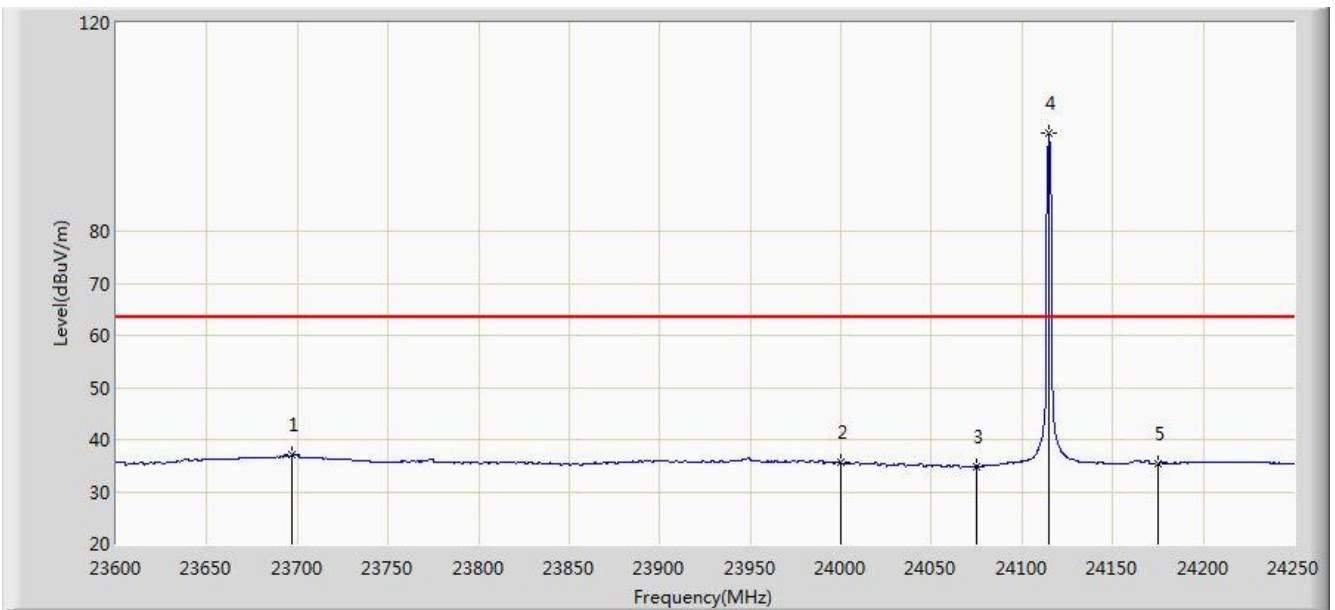
| No | Flag | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|----|------|------|-----------------|------------------------|----------------------|-----------------|----------------|-------------|------|
| 1  |      |      | 23691.324       | 51.072                 | 40.335               | -32.468         | 83.540         | 10.736      | PK   |
| 2  |      |      | 24000.000       | 48.939                 | 38.636               | -34.601         | 83.540         | 10.302      | PK   |
| 3  |      |      | 24075.000       | 48.650                 | 38.612               | -34.890         | 83.540         | 10.038      | PK   |
| 4  |      | *    | 24114.801       | 100.207                | 89.585               | N/A             | N/A            | 10.622      | PK   |
| 5  |      |      | 24175.000       | 49.585                 | 39.171               | -33.955         | 83.540         | 10.413      | PK   |

Note 1: Peak Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)

Note 2: Limit@1m = 20\*Log(500uV/m) + 20\*Log(3m/1m) = 63.540dBuV/m (Average detector), and 83.540dBuV/m (Peak detector).

|                                |                          |
|--------------------------------|--------------------------|
| Site: AC2                      | Time: 2019/02/01 - 16:05 |
| Limit: FCC 109 CLASS B (1M)    | Engineer: Milo Li        |
| Probe: BBHA9170_18-40GHz       | Polarity: Vertical       |
| EUT: IOT Sensor Hub            | Power: AC 120V/60Hz      |
| Test Mode: Transmit at 24.1GHz |                          |



| No | Flag | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|----|------|------|-----------------|------------------------|----------------------|-----------------|----------------|-------------|------|
| 1  |      |      | 23696.850       | 36.999                 | 26.263               | -26.541         | 63.540         | 10.736      | AV   |
| 2  |      |      | 24000.000       | 35.596                 | 25.293               | -27.944         | 63.540         | 10.302      | AV   |
| 3  |      |      | 24075.000       | 34.890                 | 24.852               | -28.650         | 63.540         | 10.038      | AV   |
| 4  |      | *    | 24114.801       | 98.768                 | 88.146               | N/A             | N/A            | 10.622      | AV   |
| 5  |      |      | 24175.000       | 35.493                 | 25.079               | -28.047         | 63.540         | 10.413      | AV   |

Note 1: Peak Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)

Note 2: Limit@1m =  $20 \times \log(500 \mu\text{V/m}) + 20 \times \log(3\text{m}/1\text{m}) = 63.540 \text{ dBuV/m}$  (Average detector), and  $83.540 \text{ dBuV/m}$  (Peak detector).

## 7.5. AC Conducted Emissions Measurement

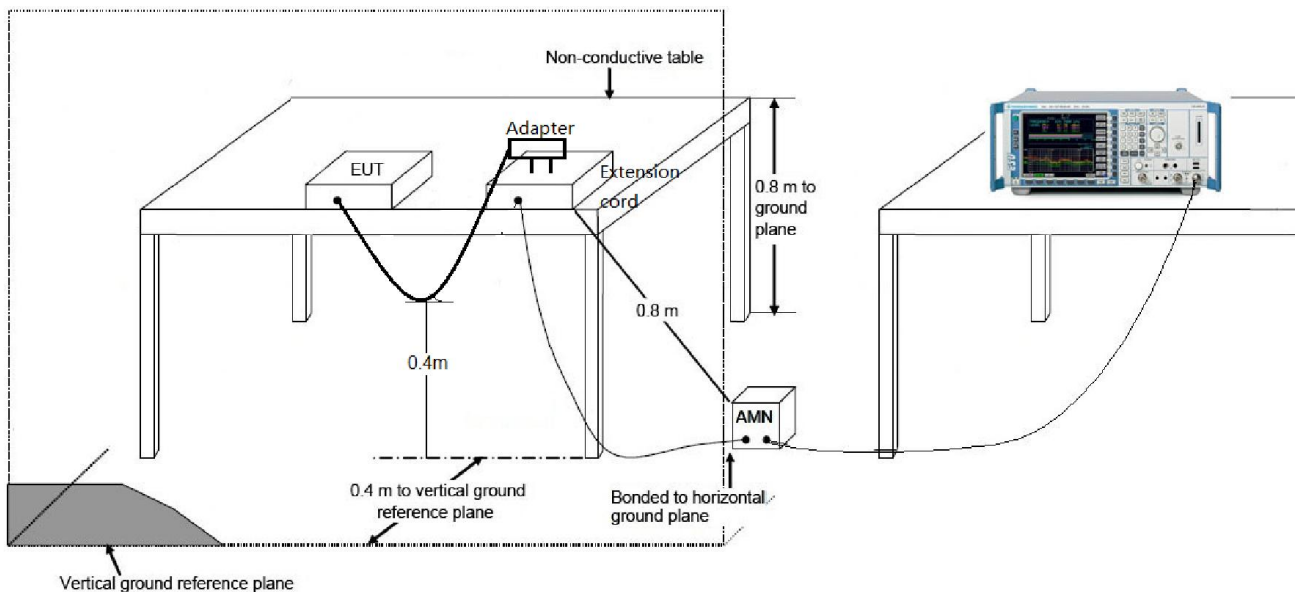
### 7.5.1. Test Limit

| FCC 15.207 & RSS-Gen Limits |           |           |
|-----------------------------|-----------|-----------|
| Frequency (MHz)             | QP (dBuV) | AV (dBuV) |
| 0.15 ~ 0.50                 | 66 ~ 56   | 56 ~ 46   |
| 0.50 ~ 5.0                  | 56        | 46        |
| 5.0 ~ 30                    | 60        | 50        |

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

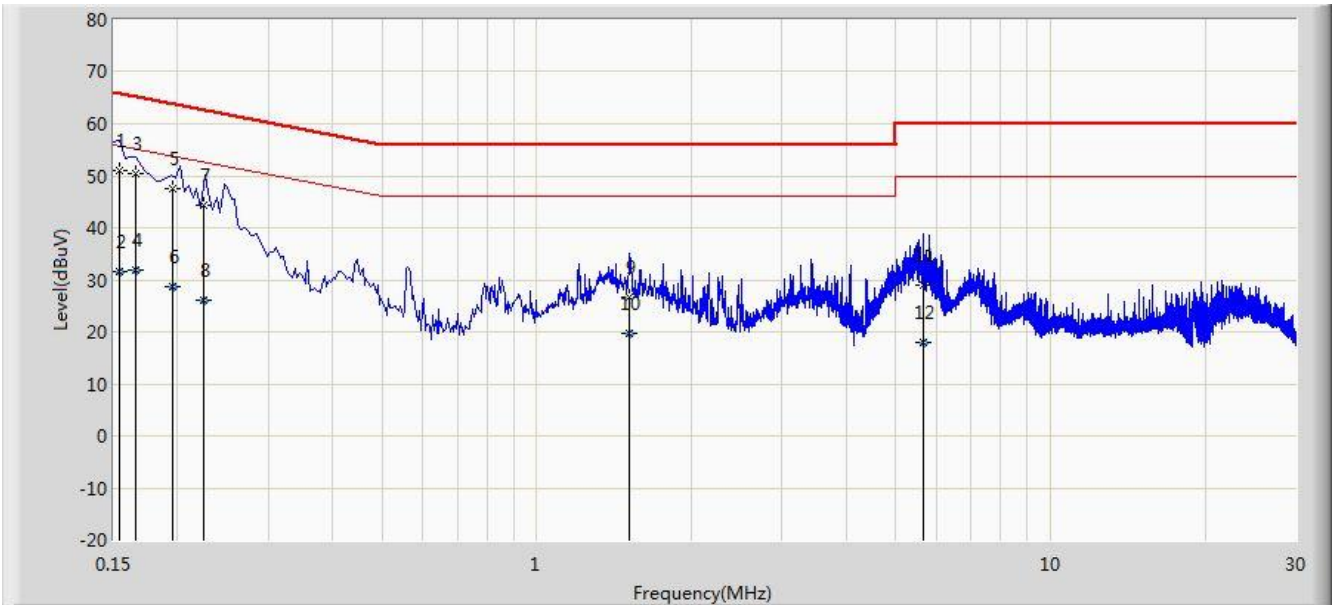
Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.

### 7.5.2. Test Setup



### 7.5.3.Test Result

|                                   |                          |
|-----------------------------------|--------------------------|
| Site: SR2                         | Time: 2019/01/14 - 11:28 |
| Limit: FCC_Part15.207_CE_AC Power | Engineer: Liz Yuan       |
| Probe: ENV216_101683_Filter On    | Polarity: Line           |
| EUT: IOT Sensor Hub               | Power: AC 120V/60Hz      |
| Test Mode 1                       |                          |

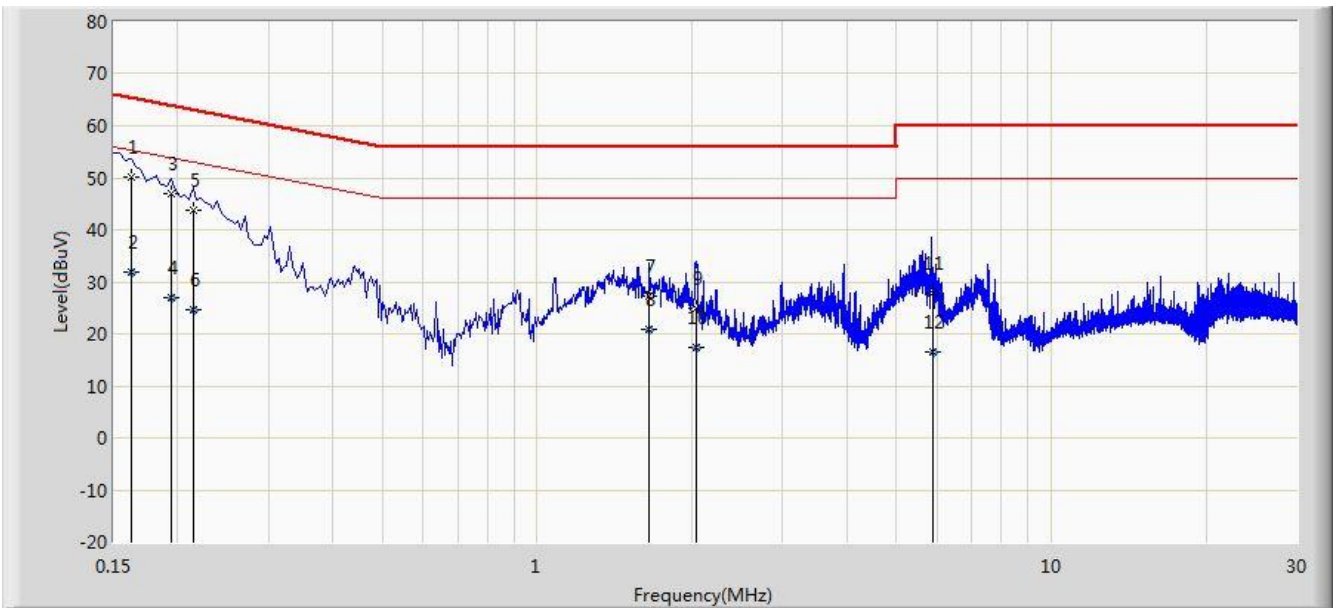


| No | Flag | Mark | Frequency (MHz) | Measure Level (dBuV) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV) | Factor (dB) | Type |
|----|------|------|-----------------|----------------------|----------------------|-----------------|--------------|-------------|------|
| 1  |      |      | 0.154           | 50.987               | 40.247               | -14.795         | 65.781       | 10.740      | QP   |
| 2  |      |      | 0.154           | 31.497               | 20.758               | -24.284         | 55.781       | 10.740      | AV   |
| 3  |      | *    | 0.166           | 50.404               | 40.317               | -14.754         | 65.158       | 10.087      | QP   |
| 4  |      |      | 0.166           | 31.865               | 21.778               | -23.293         | 55.158       | 10.087      | AV   |
| 5  |      |      | 0.196           | 47.611               | 37.600               | -16.168         | 63.778       | 10.011      | QP   |
| 6  |      |      | 0.196           | 28.611               | 18.600               | -25.168         | 53.778       | 10.011      | AV   |
| 7  |      |      | 0.224           | 44.342               | 34.400               | -18.327         | 62.669       | 9.942       | QP   |
| 8  |      |      | 0.224           | 26.042               | 16.100               | -26.627         | 52.669       | 9.942       | AV   |
| 9  |      |      | 1.518           | 26.586               | 16.698               | -29.414         | 56.000       | 9.888       | QP   |
| 10 |      |      | 1.518           | 19.588               | 9.700                | -26.412         | 46.000       | 9.888       | AV   |
| 11 |      |      | 5.660           | 28.992               | 18.900               | -31.008         | 60.000       | 10.092      | QP   |
| 12 |      |      | 5.660           | 17.892               | 7.800                | -32.108         | 50.000       | 10.092      | AV   |

Note: Measure Level (dBμV) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + LISN Factor (dB).

|                                   |                          |
|-----------------------------------|--------------------------|
| Site: SR2                         | Time: 2019/01/14 - 11:52 |
| Limit: FCC_Part15.207_CE_AC Power | Engineer: Liz Yuan       |
| Probe: ENV216_101683_Filter On    | Polarity: Neutral        |
| EUT: IOT Sensor Hub               | Power: AC 120V/60Hz      |
| Test Mode 1                       |                          |



| No | Flag | Mark | Frequency (MHz) | Measure Level (dBuV) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV) | Factor (dB) | Type |
|----|------|------|-----------------|----------------------|----------------------|-----------------|--------------|-------------|------|
| 1  |      | *    | 0.162           | 50.020               | 39.942               | -15.341         | 65.361       | 10.078      | QP   |
| 2  |      |      | 0.162           | 31.843               | 21.765               | -23.518         | 55.361       | 10.078      | AV   |
| 3  |      |      | 0.194           | 46.996               | 36.975               | -16.868         | 63.864       | 10.021      | QP   |
| 4  |      |      | 0.194           | 26.995               | 16.974               | -26.869         | 53.864       | 10.021      | AV   |
| 5  |      |      | 0.214           | 43.715               | 33.727               | -19.334         | 63.049       | 9.988       | QP   |
| 6  |      |      | 0.214           | 24.754               | 14.766               | -28.295         | 53.049       | 9.988       | AV   |
| 7  |      |      | 1.654           | 27.153               | 17.268               | -28.847         | 56.000       | 9.885       | QP   |
| 8  |      |      | 1.654           | 20.761               | 10.876               | -25.239         | 46.000       | 9.885       | AV   |
| 9  |      |      | 2.044           | 24.972               | 15.100               | -31.028         | 56.000       | 9.872       | QP   |
| 10 |      |      | 2.044           | 17.472               | 7.600                | -28.528         | 46.000       | 9.872       | AV   |
| 11 |      |      | 5.893           | 27.914               | 17.800               | -32.086         | 60.000       | 10.114      | QP   |
| 12 |      |      | 5.893           | 16.514               | 6.400                | -33.486         | 50.000       | 10.114      | AV   |

Note: Measure Level (dBμV) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + LISN Factor (dB).

## 7.1. Frequency Stability Measurement

### 7.1.1. Test Limit

#### RSS-Gen Clause 8.11

If the frequency stability of the licence-exempt radio apparatus is not specified in the applicable RSS, the fundamental emissions of the radio apparatus should be kept within at least the central 80% of its permitted operating frequency band in order to minimize the possibility of out-of-band operation. In addition, its occupied bandwidth shall be entirely outside the restricted bands and the prohibited TV bands of 54-72 MHz, 76-88 MHz, 174-216 MHz, and 470-602 MHz, unless otherwise indicated.

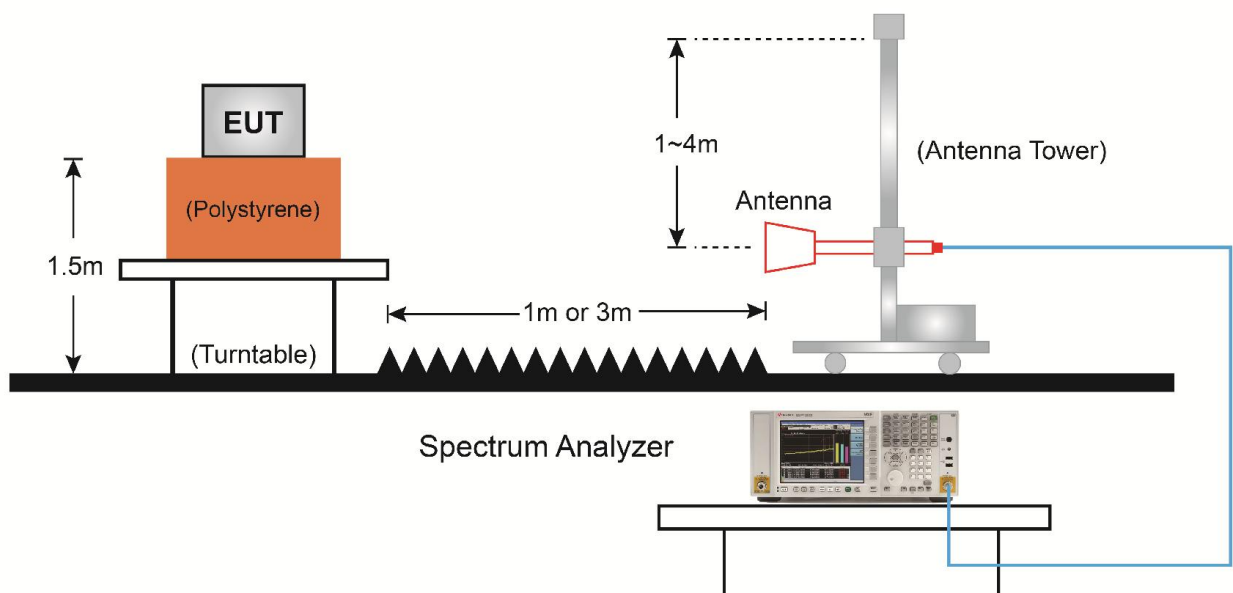
#### Conclusion:

So there is no requirement for frequency stability, but emission bandwidth should satisfy this requirement.

### 7.1.2. Test Procedure used

ANSI C63.10 Section 6.9

### 7.1.3. Test Setup



#### 7.1.4. Test Result

|               |             |                   |            |
|---------------|-------------|-------------------|------------|
| Product       | LCD MONITOR | Temperature       | 25°C       |
| Test Engineer | Milo Li     | Relative Humidity | 56%        |
| Test Site     | AC2         | Test Date         | 2019/02/01 |

| 99% Bandwidth Range (MHz) | Range Limit (MHz)     | Result |
|---------------------------|-----------------------|--------|
| $F_L = 24117.886$         | $< (LIMIT_L = 24085)$ | Pass   |
| $F_H = 24124.694$         | $> (LIMIT_H = 24165)$ | Pass   |

Note 1:  $LIMIT_L = 24075 \text{ MHz} + (24175 \text{ MHz} - 24075 \text{ MHz}) \cdot 0.1 = 24085 \text{ MHz}$ ;

$LIMIT_H = 24175 \text{ MHz} + (24175 \text{ MHz} - 24075 \text{ MHz}) \cdot 0.1 = 24165 \text{ MHz}$ ;

Note 2:  $F_L = 24120 \text{ MHz} - 2.1137 \text{ MHz} = 24117.886 \text{ MHz}$ ;

$F_H = 24120 \text{ MHz} + 4.6937 \text{ MHz} = 24124.694 \text{ MHz}$ ;

Note 3: Its occupied bandwidth is outside the restricted bands and the prohibited TV bands of 54-72 MHz, 76-88 MHz, 174-216 MHz, and 470-602 MHz.

## 8. CONCLUSION

The data collected relate only the item(s) tested and show that the **IOT Sensor Hub** is in compliance with Part 15C of the FCC Rules and ISED Rules.

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The End

## **Appendix A - Test Setup Photograph**

Refer to “1901RSU004-UT” file.

## **Appendix B - EUT Photograph**

Refer to "1901RSU004-UE" file.