

# FCC TEST REPORT

**Test report  
On Behalf of  
SPORTident GmbH  
For  
SI-SRR Dongle  
Model No.: SRR-Dongle  
FCC ID: 2AIOJ-SRR**

**Prepared for :** SPORTident GmbH  
Markt14, D-99310 Arnstadt, Thuringia, Germany

**Prepared By :** WST Certification & Testing (HK) Limited  
12/F., San Toi Building, 137-139 Connaught Road Central, Hong Kong

**Date of Test:** May 21, 2016 ~ May 29, 2016

**Date of Report:** May 30, 2016

**Report Number:** WST160524110-E

## TEST RESULT CERTIFICATION

**Applicant's name** ..... : SPORTident GmbH

Address ..... : Markt14, D-99310 Arnstadt, Thuringia, Germany

**Manufacture's Name** ..... : Smart Ease Industrial Limited

Address ..... : Room A03, 2/F, Block A, Pak Fook Industrial Building, 615-617 Tai  
Nan West Street, Lai Chi Kok, Kowloon, Hong Kong.

### Product description

Trade Mark: SPORTident

Product name ..... : SI-SRR Dongle

Model and/or type reference : SRR-Dongle

**Standards** ..... : FCC Rules and Regulations Part 15 Subpart C Section 15.249  
ANSI C63.10: 2013

This publication may be reproduced in whole or in part for non-commercial purposes as long as the WST Certification & Testing (HK) Limited is acknowledged as copyright owner and source of the material. WST Certification & Testing (HK) Limited takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.

**Date of Test** ..... :

Date (s) of performance of tests ..... : **May 21, 2016 ~ May 29, 2016**

Date of Issue ..... : **May 30, 2016**

Test Result ..... : Pass

Testing Engineer :



(Eric Xie)

Technical Manager :



(Dora Qin)

Authorized Signatory :



(Kait Chen)

| <b>Table of Contents</b>                | <b>Page</b> |
|---|-------------|
| 1 . TEST SUMMARY                        | 4           |
| 2 . GENERAL INFORMATION                 | 4           |
| 2.1 General Description of EUT          | 5           |
| Operation of EUT during testing         | 6           |
| 2.2 Description of Test Setup           | 6           |
| 2.3 MEASUREMENT INSTRUMENTS LIST        | 7           |
| 3 . CONDUCTED EMISSIONS TEST            | 9           |
| 3.1 Conducted Power Line Emission Limit | 9           |
| 3.2 Test Setup                          | 9           |
| 3.3 Test Procedure                      | 9           |
| 3.4 Test Result                         | 9           |
| 4 RADIATED EMISSION TEST                | 10          |
| 4.1 Radiation Limit                     | 10          |
| 4.2 Test Setup                          | 10          |
| 4.3 Test Procedure                      | 11          |
| 4.4 Test Result                         | 11          |
| 5 BAND EDGE                             | 15          |
| 5.1 Limits                              | 15          |
| 5.2 Test Procedure                      | 15          |
| 5.3 Test Result                         | 15          |
| 6 OCCUPIED BANDWIDTH MEASUREMENT        | 18          |
| 6.1 Test Setup                          | 18          |
| 6.2 Test Procedure                      | 18          |
| 6.3 Measurement Equipment Used          | 18          |
| 6.4 Test Result                         | 18          |
| 7 ANTENNA REQUIREMENT                   | 20          |
| 8 PHOTOGRAPH OF TEST                    | 21          |

## 1. TEST SUMMARY

### 1.1 Test Procedures And Results

| DESCRIPTION OF TEST            | RESULT    |
|--------------------------------|-----------|
| CONDUCTED EMISSIONS TEST       | COMPLIANT |
| RADIATED EMISSION TEST         | COMPLIANT |
| BAND EDGE                      | COMPLIANT |
| OCCUPIED BANDWIDTH MEASUREMENT | COMPLIANT |
| ANTENNA REQUIREMENT            | COMPLIANT |

### 1.2 Test Facility

Test Firm : Shenzhen WST Testing Technology Co., Ltd.  
Certificated by FCC, Registration No.: 939433  
Address : 1F, No.9 Building, TKG Science & Technology Park, Yangtian Rd.,  
NO.72 Bao'an Dist., Shenzhen, Guangdong, China. 518101

### 1.3 Measurement Uncertainty

|   |               |
|---|---------------|
| Measurement Uncertainty                               |               |
| Conducted Emission Expanded Uncertainty               | = 2.23dB, k=2 |
| Radiated emission expanded uncertainty(9kHz-30MHz)    | = 3.08dB, k=2 |
| Radiated emission expanded uncertainty(30MHz-1000MHz) | = 4.42dB, k=2 |
| Radiated emission expanded uncertainty(Above 1GHz)    | = 4.06dB, k=2 |

## 2. GENERAL INFORMATION

## 2.1 General Description of EUT

|                     |               |
|---------------------|---------------|
| Equipment           | SI-SRR Dongle |
| Model Name          | SRR-Dongle    |
| FCC ID              | 2AIOJ-SRR     |
| Model Difference    | /             |
| Antenna Type        | PCB Antenna   |
| Antenna Gain        | 1.0dBi        |
| Operation frequency | 2402-2480MHz  |
| Number of Channels  | 79 CH         |
| Modulation Type     | GFSK          |
| Power Source        | DC Voltage    |
| Power Rating        | DC 5V from PC |
| Adapter Model       | /             |

### 2.1.1 Carrier Frequency of Channels

| Operation Frequency each of channel |           |         |           |         |           |         |           |
|-------------------------------------|-----------|---------|-----------|---------|-----------|---------|-----------|
| Channel                             | Frequency | Channel | Frequency | Channel | Frequency | Channel | Frequency |
| 1                                   | 2402      | 21      | 2422      | 41      | 2442      | 61      | 2462      |
| 2                                   | 2403      | 22      | 2423      | 42      | 2443      | 62      | 2463      |
| 3                                   | 2404      | 23      | 2424      | 43      | 2444      | 63      | 2464      |
| 4                                   | 2405      | 24      | 2425      | 44      | 2445      | 64      | 2465      |
| 5                                   | 2406      | 25      | 2426      | 45      | 2446      | 65      | 2466      |
| 6                                   | 2407      | 26      | 2427      | 46      | 2447      | 66      | 2467      |
| 7                                   | 2408      | 27      | 2428      | 47      | 2448      | 67      | 2468      |
| 8                                   | 2409      | 28      | 2429      | 48      | 2449      | 68      | 2469      |
| 9                                   | 2410      | 29      | 2430      | 49      | 2450      | 69      | 2470      |
| 10                                  | 2411      | 30      | 2431      | 50      | 2451      | 70      | 2471      |
| 11                                  | 2412      | 31      | 2432      | 51      | 2452      | 71      | 2472      |
| 12                                  | 2413      | 32      | 2433      | 52      | 2453      | 72      | 2473      |
| 13                                  | 2414      | 33      | 2434      | 53      | 2454      | 73      | 2474      |
| 14                                  | 2415      | 34      | 2435      | 54      | 2455      | 74      | 2475      |
| 15                                  | 2416      | 35      | 2436      | 55      | 2456      | 75      | 2476      |
| 16                                  | 2417      | 36      | 2437      | 56      | 2457      | 76      | 2477      |
| 17                                  | 2418      | 37      | 2438      | 57      | 2458      | 77      | 2478      |
| 18                                  | 2419      | 38      | 2439      | 58      | 2459      | 78      | 2479      |
| 19                                  | 2420      | 39      | 2440      | 59      | 2460      | 79      | 2480      |
| 20                                  | 2421      | 40      | 2441      | 60      | 2461      |         |           |

### Operation of EUT during testing

#### Operating Mode

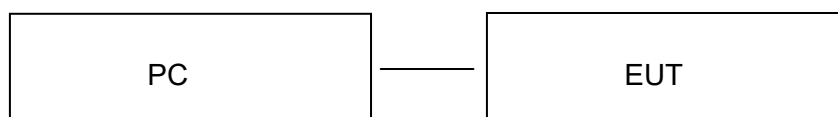
The mode is used: **Transmitting mode**

Low Channel: 2402MHz

Middle Channel: 2441MHz

High Channel: 2480MHz

### 2.2 Description of Test Setup



### 2.3 MEASUREMENT INSTRUMENTS LIST

| Item | Equipment                                   | Manufacturer         | Model No.  | Serial No.    | Last Cal.      | Cal. Interval |
|------|---|----------------------|------------|---------------|----------------|---------------|
| 1.   | EMI Receiver                                | Rohde & Schwarz      | ESCI       | 100627        | May 19, 2016   | 1 Year        |
| 2.   | LISN  | SchwarzBeck          | NSLK 8126  | 8126377       | May 19, 2016   | 1 Year        |
| 3.   | RF Switching Unit                           | Compliance Direction | RSU-M2     | 38303         | May 19, 2016   | 1 Year        |
| 4.   | EMI Test Software ES-K1                     | Rohde & Schwarz      | N/A        | N/A           | N/A            | N/A           |
| 5.   | EMI Test Receiver                           | Rohde & Schwarz      | ESCI       | 100627        | April 19, 2016 | 1 Year        |
| 6.   | Trilog Broadband Antenna                    | Schwarzbeck          | VULB9163   | VULB 9163-289 | April 17, 2016 | 1 Year        |
| 7.   | Pre-amplifier                               | Compliance Direction | PAP-0203   | 22008         | April 19, 2016 | 1 Year        |
| 8.   | EMI Test Software EZ-EMC                    | SHURPLE              | N/A        | N/A           | N/A            | N/A           |
| 9.   | EMI Receiver                                | Rohde & Schwarz      | ESCI       | 100627        | April 19, 2016 | 1 Year        |
| 10.  | LISN  | SchwarzBeck          | NSLK 8126  | 8126377       | April 19, 2016 | 1 Year        |
| 11.  | RF Switching Unit                           | Compliance Direction | RSU-M2     | 38303         | April 19, 2016 | 1 Year        |
| 12.  | EMI Test Software ES-K1                     | Rohde & Schwarz      | N/A        | N/A           | N/A            | N/A           |
| 13.  | EMI Receiver                                | Rohde & Schwarz      | ESCI       | 100627        | April 19, 2016 | 1 Year        |
| 14.  | EMI Receiver                                | Rohde & Schwarz      | ESCI       | 100627        | April 19, 2016 | 1 Year        |
| 15.  | LISN  | SchwarzBeck          | NSLK 8126  | 8126377       | April 19, 2016 | 1 Year        |
| 16.  | RF Switching Unit                           | Compliance Direction | RSU-M2     | 38303         | April 19, 2016 | 1 Year        |
| 17.  | EMI Test Software ES-K1                     | Rohde & Schwarz      | N/A        | N/A           | N/A            | N/A           |
| 18.  | Programmable AC Power source                | SOPH POWER           | PAG-1050   | 630250        | April 26, 2016 | 1 Year        |
| 19.  | Harmonic and Flicker Analyzer               | LAPLACE              | AC2000A    | 272629        | April 26, 2016 | 1 Year        |
| 20.  | Harmonic and Flicker Test Software AC 2000A | LAPLACE              | N/A        | N/A           | N/A            | N/A           |
| 21.  | ESD Simulators                              | KIKUSUI              | KES4021    | LJ003477      | April 26, 2016 | 1 Year        |
| 22.  | EFT Generator                               | EMPEK                | EFT-4040B  | 0430928N      | April 26, 2016 | 1 Year        |
| 23.  | Shielding Room                              | ChangZhou ZhongYu    | JB88       | SEL0166       | April 26, 2016 | 1 Year        |
| 24.  | Signal Generator 9KHz~2.2GHz                | R&S                  | SML02      | SEL0143       | April 26, 2016 | 1 Year        |
| 25.  | Signal Generator 9KHz~1.1GHz                | R&S                  | SML01      | SEL0135       | April 26, 2016 | 1 Year        |
| 26.  | Power Meter                                 | R&S                  | NRVS       | SEL0144       | April 26, 2016 | 1 Year        |
| 27.  | RF Level Meter                              |                      | URV35      | SEL0137       | April 26, 2016 | 1 Year        |
| 28.  | Audio Analyzer                              | R&S                  | UPL        | SEL0136       | April 26, 2016 | 1 Year        |
| 29.  | RF-Amplifier 150KHz~150MHz                  | BONN Elektronik      | BSA1515-25 | SEL0157       | April 26, 2016 | 1 Year        |
| 30.  | Stripline Test Cell                         | Erika Fiedler        | VDE0872    | SEL0167       | April 26, 2016 | N/A           |

|     |                                    |                     |                      |         |                |        |
|-----|------------------------------------|---------------------|----------------------|---------|----------------|--------|
| 31. | TV Test Transmitter                | R&S                 | SFM                  | SEL0159 | April 26, 2016 | 1 Year |
| 32. | TV Generator PAL                   | R&S                 | SGPF                 | SEL0138 | April 26, 2016 | 1 Year |
| 33. | TV Generator Ntsc                  | R&S                 | SGMF                 | SEL0140 | April 26, 2016 | 1 Year |
| 34. | TV Generator Secam                 | R&S                 | SGSF                 | SEL0139 | April 26, 2016 | 1 Year |
| 35. | TV Test Transmitter 0.3MHz~3300MHz | R&S                 | SFQ                  | SEL0142 | April 26, 2016 | 1 Year |
| 36. | MPEG2 Measurement Generator        | R&S                 | DVG                  | SEL0141 | April 26, 2016 | 1 Year |
| 37. | Spectrum Analyzer                  | R&S                 | FSP                  | SEL0177 | April 26, 2016 | 1 Year |
| 38. | Matching                           | R&S                 | RAM                  | SEL0146 | N/A            | N/A    |
| 39. | Matching                           | R&S                 | RAM                  | SEL0148 | N/A            | N/A    |
| 40. | Absorbing Clamp                    | R&S                 | MDS21                | SEL0158 | April 26, 2016 | 1 Year |
| 41. | Coupling Set                       | Erika Fiedler       | Rco, Rci, MC, AC, LC | SEL0149 | April 26, 2016 | N/A    |
| 42. | Filters                            | Erika Fiedler       | Sr, LBS              | SEL0150 | N/A            | N/A    |
| 43. | Matching Network                   | Erika Fiedler       | MN, T1               | SEL0151 | N/A            | N/A    |
| 44. | Fully Anechoic Room                | ChangZhou ZhongYu   | 854                  | SEL0169 | April 26, 2016 | 1 Year |
| 45. | Signal Generator                   | R&S                 | SML03                | SEL0068 | April 26, 2016 | 1 Year |
| 46. | RF-Amplifier 30M~1GHz              | Amplifier Reasearch | 250W1000A            | SEL0066 | Oct. 24, 2015  | 1 Year |
| 47. | RF-Amplifier 0.8~3.0GHz            | Amplifier Reasearch | 60S1G3               | SEL0065 | Oct. 24, 2015  | 1 Year |
| 48. | Power Meter                        | R&S                 | NRVD                 | SEL0069 | April 26, 2016 | 1 Year |
| 49. | Power Sensor                       | R&S                 | URV5-Z2              | SEL0071 | April 26, 2016 | 1 Year |
| 50. | Power Sensor                       | R&S                 | URV5-Z2              | SEL0072 | April 26, 2016 | 1 Year |
| 51. | Software EMC32                     | R&S                 | EMC32-S              | SEL0082 | N/A            | N/A    |
| 52. | Log-periodic Antenna               | Amplifier Reasearch | AT1080               | SEL0073 | N/A            | N/A    |
| 53. | Antenna Tripod                     | Amplifier Reasearch | TP1000A              | SEL0074 | N/A            | N/A    |
| 54. | High Gain Horn Antenna(0.8-5G Hz)  | Amplifier Reasearch | AT4002A              | SEL0075 | N/A            | N/A    |

### 3. CONDUCTED EMISSIONS TEST

#### 3.1 Conducted Power Line Emission Limit

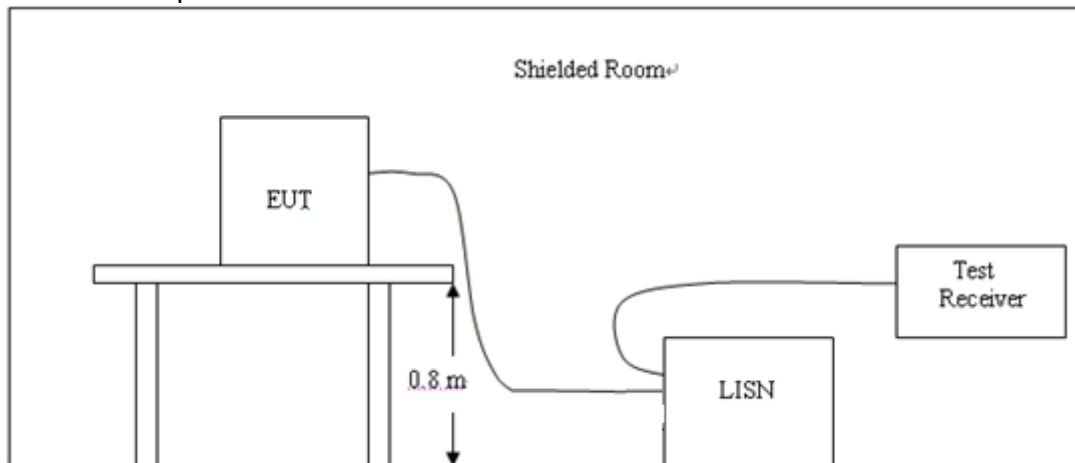
For unintentional device, according to § 15.107(a) Line Conducted Emission Limits is as following

| Frequency (MHz) | Maximum RF Line Voltage (dBμV) |      |         |        |
|-----------------|--------------------------------|------|---------|--------|
|                 | CLASS A                        |      | CLASS B |        |
|                 | Q.P.                           | Ave. | Q.P.    | Ave.   |
| 0.15 - 0.50     | 79                             | 66   | 66-56*  | 56-46* |
| 0.50 - 5.00     | 73                             | 60   | 56      | 46     |
| 5.00 - 30.0     | 73                             | 60   | 60      | 50     |

\* Decreasing linearly with the logarithm of the frequency

For intentional device, according to §15.207(a) Line Conducted Emission Limit is same as above table.

#### 3.2 Test Setup



#### 3.3 Test Procedure

- 1, The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10.
- 2, Support equipment, if needed, was placed as per ANSI C63.10.
- 3, All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
- 4, If a EUT received DC power from the USB Port of Notebook PC, the PC's adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
- 5, All support equipments received AC power from a second LISN, if any.
- 6, The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- 7, Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.

#### 3.4 Test Result

N/A (Because the sample have not AC power source ,so the test item result is NA)

## 4 RADIATED EMISSION TEST

### 4.1 Radiation Limit

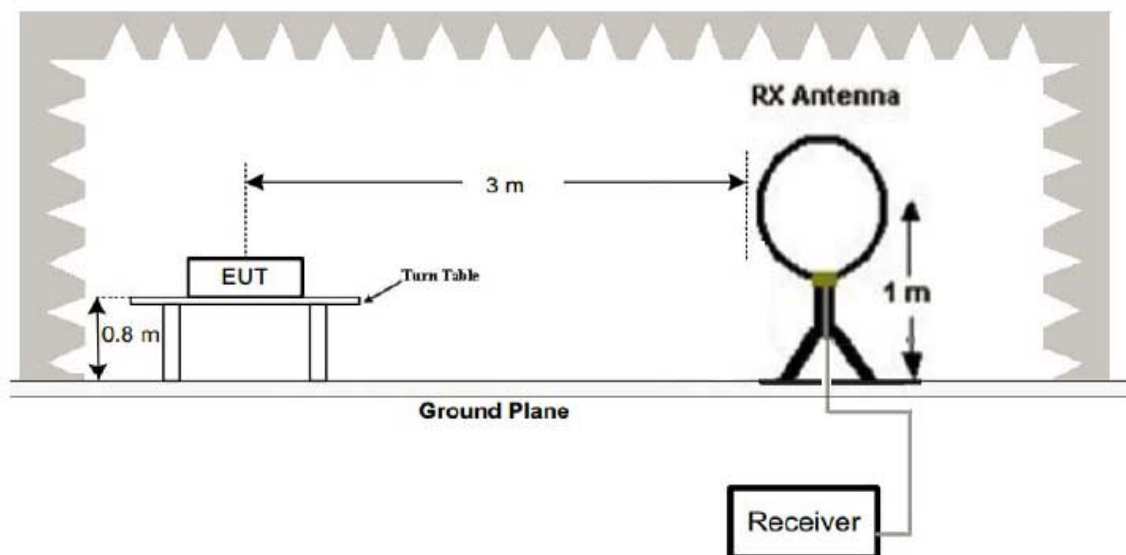
For unintentional device, according to § 15.109(a), except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

| Frequency (MHz) | Distance (Meters) | Radiated (dB $\mu$ V/m) | Radiated ( $\mu$ V/m) |
|-----------------|-------------------|-------------------------|-----------------------|
| 30-88           | 3                 | 40                      | 100                   |
| 88-216          | 3                 | 43.5                    | 150                   |
| 216-960         | 3                 | 46                      | 200                   |
| Above 960       | 3                 | 54                      | 500                   |

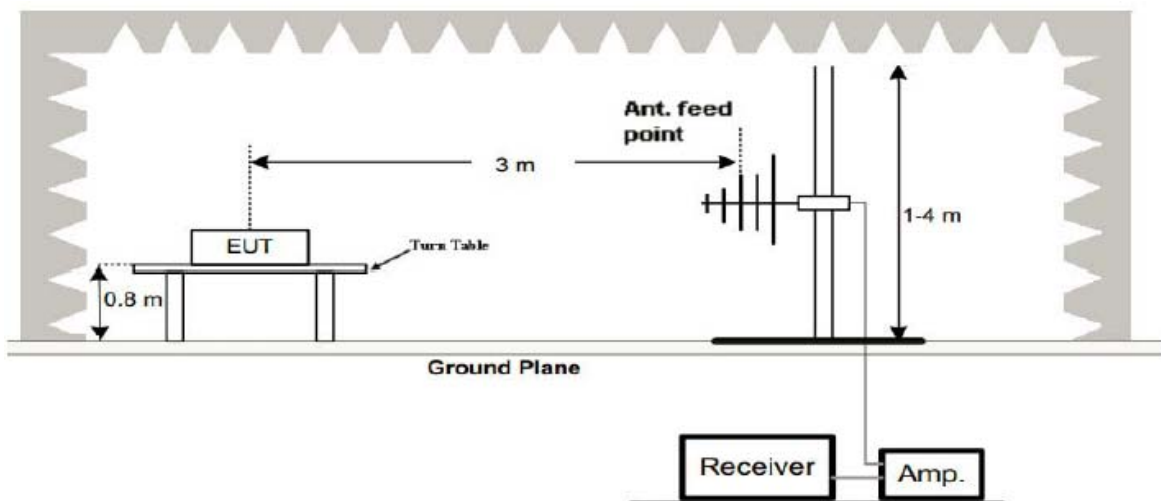
For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the above table.

### 4.2 Test Setup

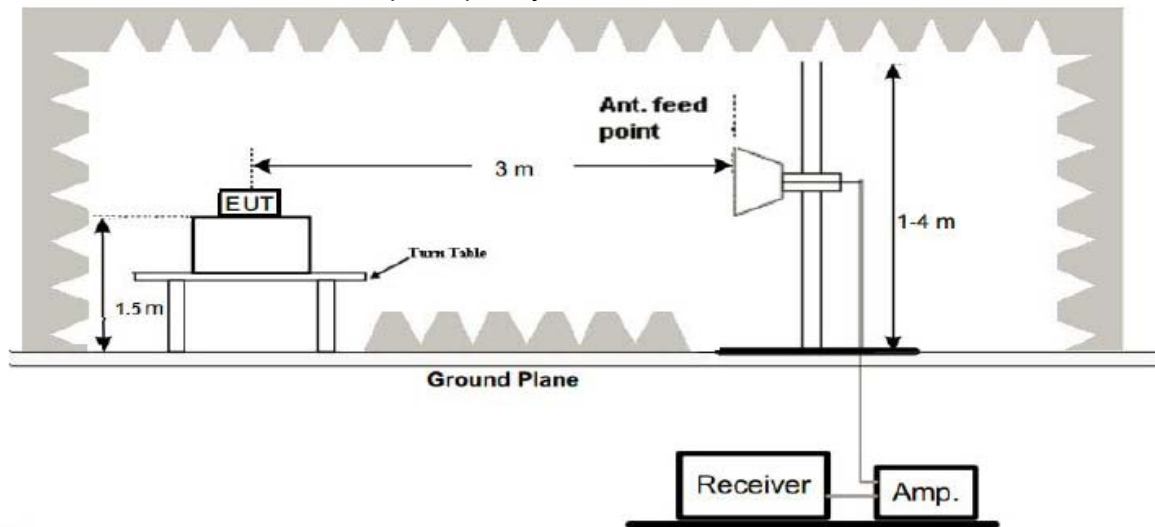
#### (1) Radiated Emission Test-Up Frequency Below 30MHz



#### (2) Radiated Emission Test-Up Frequency 30MHz~1GHz



### (3) Radiated Emission Test-Up Frequency Above 1GHz



#### 4.3 Test Procedure

1. Below 1GHz measurement the EUT is placed on turntable which is 0.8m above ground plane. And above 1GHz measurement EUT was placed on low permittivity and low tangent turn table which is 1.5m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The test frequency range from 9KHz to 25GHz per FCC PART 15.33(a).

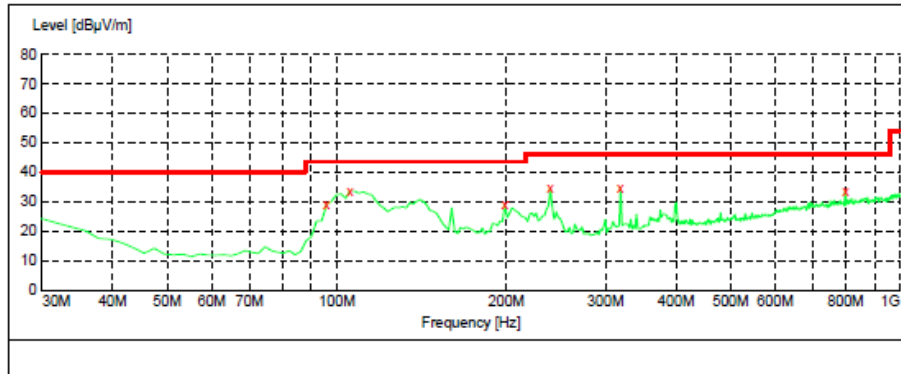
#### 4.4 Test Result

**PASS**

All the test modes completed for test. The worst case of Radiated Emission is CH 2402MHz; the test data of this mode was reported.

### Below 1GHz Test Results:

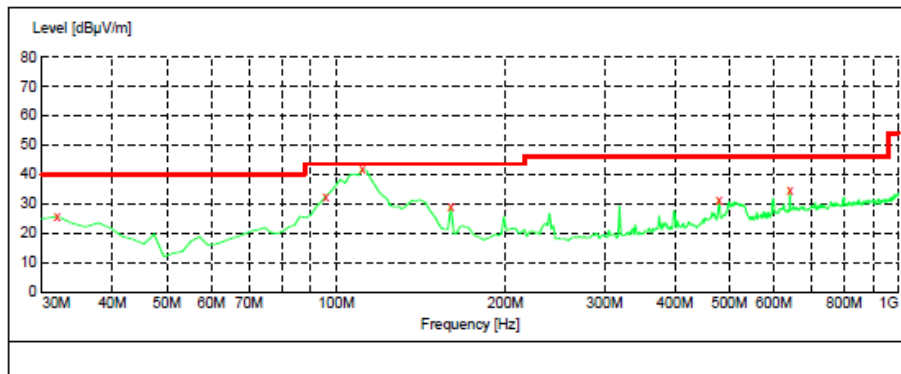
H:



#### MEASUREMENT RESULT:

| Frequency<br>MHz | Level<br>dBμV/m | Transd<br>dB | Limit<br>dBμV/m | Margin<br>dB | Det. | Height<br>cm | Azimuth<br>deg | Polarization |
|------------------|-----------------|--------------|-----------------|--------------|------|--------------|----------------|--------------|
| 95.960000        | 28.80           | 10.2         | 43.5            | 14.7         | ---  | 0.0          | 0.00           | HORIZONTAL   |
| 105.660000       | 33.60           | 12.5         | 43.5            | 9.9          | ---  | 0.0          | 0.00           | HORIZONTAL   |
| 198.780000       | 28.80           | 13.9         | 43.5            | 14.7         | ---  | 0.0          | 0.00           | HORIZONTAL   |
| 239.520000       | 34.60           | 13.7         | 46.0            | 11.4         | ---  | 0.0          | 0.00           | HORIZONTAL   |
| 319.060000       | 34.90           | 15.7         | 46.0            | 11.1         | ---  | 0.0          | 0.00           | HORIZONTAL   |
| 800.180000       | 33.30           | 24.7         | 46.0            | 12.7         | ---  | 0.0          | 0.00           | HORIZONTAL   |

V:



#### MEASUREMENT RESULT:

| Frequency<br>MHz | Level<br>dBμV/m | Transd<br>dB | Limit<br>dBμV/m | Margin<br>dB | Det. | Height<br>cm | Azimuth<br>deg | Polarization |
|------------------|-----------------|--------------|-----------------|--------------|------|--------------|----------------|--------------|
| 31.940000        | 25.70           | 19.2         | 40.0            | 14.3         | ---  | 0.0          | 0.00           | VERTICAL     |
| 95.960000        | 32.60           | 10.2         | 43.5            | 10.9         | ---  | 0.0          | 0.00           | VERTICAL     |
| 111.480000       | 41.70           | 13.7         | 43.5            | 1.8          | ---  | 0.0          | 0.00           | VERTICAL     |
| 159.980000       | 29.30           | 13.6         | 43.5            | 14.2         | ---  | 0.0          | 0.00           | VERTICAL     |
| 480.080000       | 31.50           | 20.0         | 46.0            | 14.5         | ---  | 0.0          | 0.00           | VERTICAL     |
| 641.100000       | 34.90           | 22.6         | 46.0            | 11.1         | ---  | 0.0          | 0.00           | VERTICAL     |

#### Remark:

- (1) Measuring frequencies from 9 KHz to the 1 GHz, Radiated emission test from 9KHz to 30MHz was verified, and no any emission was found except system noise floor.
- (2) \* denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.
- (3) The IF bandwidth of EMI Test Receiver between 30MHz to 1GHz was 120KHz, 1 MHz for measuring above 1 GHz, below 30MHz was 10KHz.

### Above 1 GHz Test Results:

CH Low (2402MHz)

Antenna polarity: H

|   | Freq    | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | A/Pos | T/Pos | Remark |
|---|---------|--------|------------|------------|-------------------|----------------|------------|---------------|-------|-------|--------|
|   | MHz     | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            | cm    | deg   |        |
| 1 | 2402.16 | 88.89  | -25.11     | 114.00     | 89.69             | 27.23          | 6.01       | 34.04         | 182   | 299   | Peak   |
| 2 | 4806.00 | 39.26  | -34.74     | 74.00      | 32.86             | 31.30          | 8.65       | 33.55         | 100   | 0     | Peak   |
| 3 | 7206.00 | 45.54  | -28.46     | 74.00      | 33.58             | 36.06          | 10.29      | 34.39         | 100   | 0     | Peak   |
| 4 | 9612.00 | 44.82  | -29.18     | 74.00      | 27.47             | 39.12          | 12.56      | 34.33         | 100   | 0     | Peak   |

Antenna polarity: V

|   | Freq    | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | A/Pos | T/Pos | Remark |
|---|---------|--------|------------|------------|-------------------|----------------|------------|---------------|-------|-------|--------|
|   | MHz     | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            | cm    | deg   |        |
| 1 | 2401.88 | 84.79  | -29.21     | 114.00     | 85.59             | 27.23          | 6.01       | 34.04         | 122   | 96    | Peak   |
| 2 | 4806.00 | 38.92  | -35.08     | 74.00      | 32.52             | 31.30          | 8.65       | 33.55         | 100   | 0     | Peak   |
| 3 | 7206.00 | 45.62  | -28.38     | 74.00      | 33.66             | 36.06          | 10.29      | 34.39         | 100   | 0     | Peak   |
| 4 | 9612.00 | 45.12  | -28.88     | 74.00      | 27.77             | 39.12          | 12.56      | 34.33         | 100   | 0     | Peak   |

CH Middle (2441MHz)

Antenna polarity: H

|   | Freq    | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | A/Pos | T/Pos | Remark |
|---|---------|--------|------------|------------|-------------------|----------------|------------|---------------|-------|-------|--------|
|   | MHz     | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            | cm    | deg   |        |
| 1 | 2441.08 | 88.63  | -25.37     | 114.00     | 89.24             | 27.37          | 6.04       | 34.02         | 159   | 93    | Peak   |
| 2 | 4884.00 | 39.63  | -34.37     | 74.00      | 33.02             | 31.41          | 8.74       | 33.54         | 100   | 0     | Peak   |
| 3 | 7320.00 | 45.30  | -28.70     | 74.00      | 33.05             | 36.32          | 10.39      | 34.46         | 100   | 0     | Peak   |
| 4 | 9765.00 | 45.40  | -28.60     | 74.00      | 27.63             | 39.28          | 12.74      | 34.25         | 100   | 0     | Peak   |

Antenna polarity: V

|   | Freq    | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | A/Pos | T/Pos | Remark |
|---|---------|--------|------------|------------|-------------------|----------------|------------|---------------|-------|-------|--------|
|   | MHz     | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            | cm    | deg   |        |
| 1 | 2440.99 | 84.71  | -29.29     | 114.00     | 85.32             | 27.37          | 6.04       | 34.02         | 120   | 329   | Peak   |
| 2 | 4884.00 | 40.21  | -33.79     | 74.00      | 33.60             | 31.41          | 8.74       | 33.54         | 100   | 0     | Peak   |
| 3 | 7320.00 | 45.60  | -28.40     | 74.00      | 33.35             | 36.32          | 10.39      | 34.46         | 100   | 0     | Peak   |
| 4 | 9765.00 | 45.26  | -28.74     | 74.00      | 27.49             | 39.28          | 12.74      | 34.25         | 100   | 0     | Peak   |

CH High (2480MHz)

Antenna polarity: H

|   | Freq    | Level  | Over<br>Limit | Limit<br>Line | ReadAntenna<br>Level Factor | Cable<br>Loss | Preamp<br>Factor | A/Pos | T/Pos | Remark   |
|---|---------|--------|---------------|---------------|-----------------------------|---------------|------------------|-------|-------|----------|
|   | MHz     | dBuV/m | dB            | dBuV/m        | dBuV                        | dB/m          | dB               | dB    | cm    | deg      |
| 1 | 2479.86 | 91.00  | -23.00        | 114.00        | 91.48                       | 27.46         | 6.07             | 34.01 | 204   | 154 Peak |
| 2 | 4962.00 | 41.23  | -32.77        | 74.00         | 34.40                       | 31.54         | 8.83             | 33.54 | 100   | 0 Peak   |
| 3 | 7440.00 | 46.07  | -27.93        | 74.00         | 33.48                       | 36.59         | 10.52            | 34.52 | 100   | 0 Peak   |
| 4 | 9918.00 | 46.05  | -27.95        | 74.00         | 27.91                       | 39.43         | 12.88            | 34.17 | 100   | 0 Peak   |

Antenna polarity: V

|   | Freq    | Level  | Over<br>Limit | Limit<br>Line | ReadAntenna<br>Level Factor | Cable<br>Loss | Preamp<br>Factor | A/Pos | T/Pos | Remark   |
|---|---------|--------|---------------|---------------|-----------------------------|---------------|------------------|-------|-------|----------|
|   | MHz     | dBuV/m | dB            | dBuV/m        | dBuV                        | dB/m          | dB               | dB    | cm    | deg      |
| 1 | 2479.92 | 80.29  | -33.71        | 114.00        | 80.77                       | 27.46         | 6.07             | 34.01 | 100   | 205 Peak |
| 2 | 4962.00 | 41.34  | -32.66        | 74.00         | 34.51                       | 31.54         | 8.83             | 33.54 | 100   | 0 Peak   |
| 3 | 7440.00 | 47.77  | -26.23        | 74.00         | 35.18                       | 36.59         | 10.52            | 34.52 | 100   | 0 Peak   |
| 4 | 9918.00 | 45.53  | -28.47        | 74.00         | 27.39                       | 39.43         | 12.88            | 34.17 | 100   | 0 Peak   |

Remark:

- (1) Measuring frequencies from 1 GHz to the 25 GHz.
- (2) "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency.
- (3) \* denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.
- (4) Data of measurement within this frequency range shown "----" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) The IF bandwidth of EMI Test Receiver between 30MHz to 1GHz was 120KHz, 1 MHz for measuring above 1 GHz, below 30MHz was 10KHz.
- (6) When the test results of Peak Detected below the limits of Average Detected, the Average Detected is not need completed. For example: Top Channel at Fundamental 73.16dBuV/m(PK Value) <93.98(AV Limit), at harmonic 53.20 dBuV/m(PK Value) <54 dBuV/m(AV Limit), the Average Detected not need to completed.

## 5 BAND EDGE

### 5.1 Limits

FCC PART 15.249(d) 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.

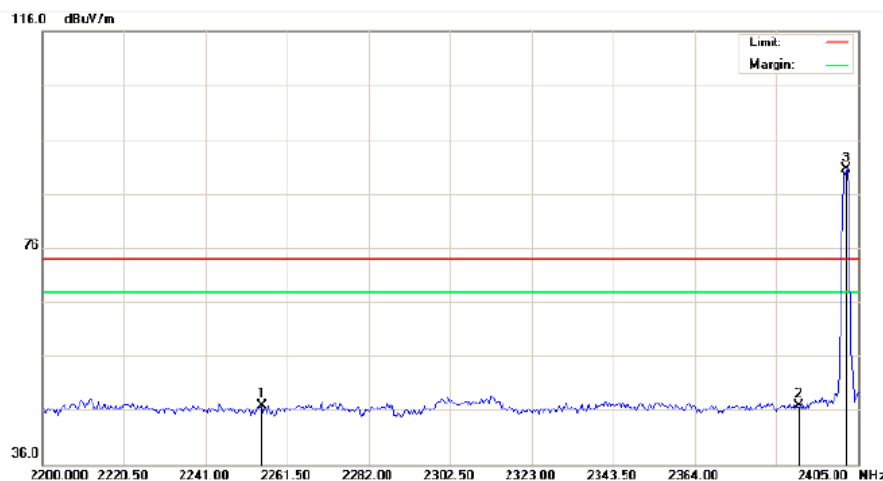
### 5.2 Test Procedure

The band edge compliance of RF radiated emission should be measured by following the guidance in ANSI C63.10 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization etc. Set RBW to 100KHz and VBM to 300KHz to measure the peak field strength and set RBW to 1MHz and VBW to 10Hz to measure the average radiated field strength. The conducted RF band edge was measured by using a spectrum analyzer. Set span wide enough to capture the highest in-band emission and the emission at the band edge. Set RBW to 100 KHz and VBM to 300 KHz, to measure the conducted peak band edge.

### 5.3 Test Result

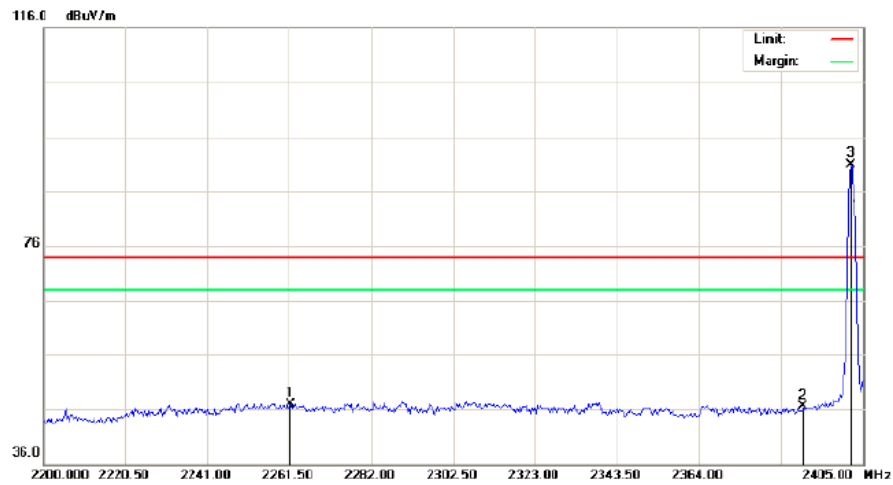
**PASS**

Antenna polarity: H



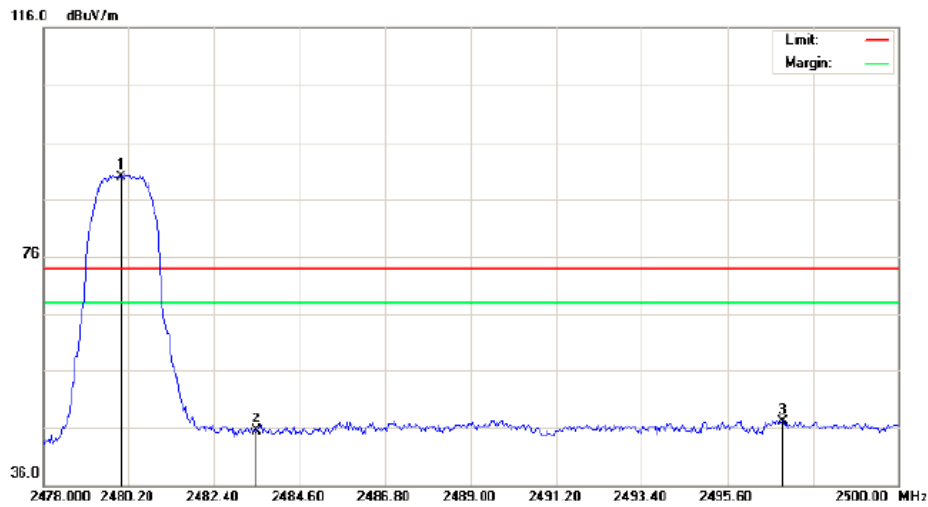
| No. | Mk | Freq.<br>MHz | Reading<br>dBuV | Factor<br>dBm | Measurement<br>dBuV/m | Limit<br>dBuV/m | Over<br>dB | Detector | Antenna<br>Height<br>cm | Table<br>Degree<br>degree | Comment |
|-----|----|--------------|-----------------|---------------|-----------------------|-----------------|------------|----------|-------------------------|---------------------------|---------|
| 1   |    | 2255.008     | 36.79           | 10.16         | 46.95                 | 74.00           | -27.05     | peak     |                         |                           |         |
| 2   |    | 2390.000     | 36.50           | 10.31         | 46.81                 | 74.00           | -27.19     | peak     |                         |                           |         |
| 3   | *  | 2402.000     | 80.22           | 10.32         | 90.54                 | 74.00           | 16.54      | peak     |                         |                           |         |

Antenna polarity: V



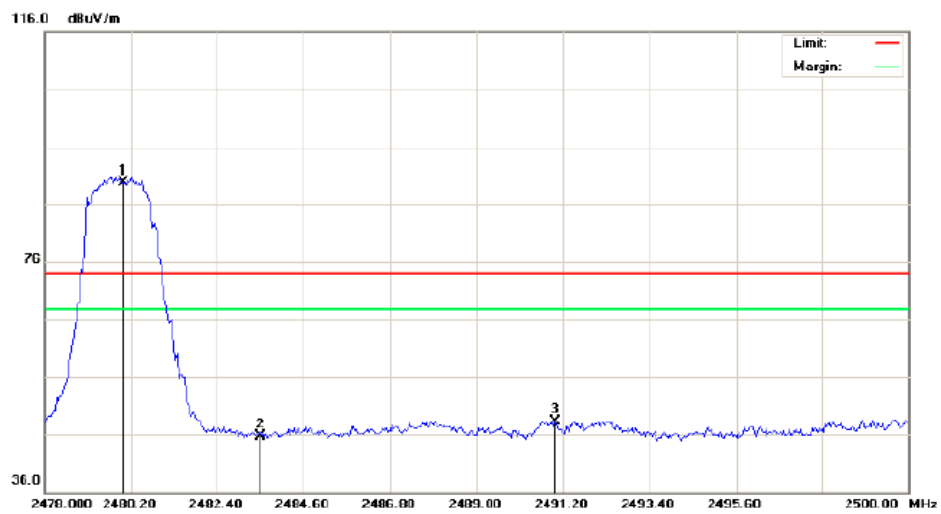
| No. | Mk | Freq.    | Reading | Factor | Measurement | Limit  | Over   | Detector | Antenna Height | Table Degree | Comment |
|-----|----|----------|---------|--------|-------------|--------|--------|----------|----------------|--------------|---------|
|     |    | MHz      | dBuV    | dB/m   | dBuV/m      | dBuV/m | dB     |          | cm             | degree       |         |
| 1   |    | 2261.842 | 36.80   | 10.17  | 46.97       | 74.00  | -27.03 | peak     |                |              |         |
| 2   |    | 2390.000 | 36.21   | 10.31  | 46.52       | 74.00  | -27.48 | peak     |                |              |         |
| 3   | *  | 2402.000 | 80.59   | 10.32  | 90.91       | 74.00  | 16.91  | peak     |                |              |         |

Antenna polarity: H



| No. | Mk | Freq.    | Reading | Factor | Measurement | Limit  | Over   | Detector | Antenna Height | Table Degree | Comment |
|-----|----|----------|---------|--------|-------------|--------|--------|----------|----------------|--------------|---------|
|     |    | MHz      | dBuV    | dB/m   | dBuV/m      | dBuV/m | dB     |          | cm             | degree       |         |
| 1   | *  | 2480.000 | 79.55   | 10.41  | 89.96       | 74.00  | 15.96  | peak     |                |              |         |
| 2   |    | 2483.500 | 35.19   | 10.41  | 45.60       | 74.00  | -28.40 | peak     |                |              |         |
| 3   |    | 2497.030 | 36.67   | 10.43  | 47.10       | 74.00  | -26.90 | peak     |                |              |         |

Antenna polarity: V



| No. | Mk | Freq.    | Reading | Factor | Measurement | Limit  | Over   | Detector | Antenna Height | Table Degree | Comment |
|-----|----|----------|---------|--------|-------------|--------|--------|----------|----------------|--------------|---------|
|     |    | MHz      | dBuV    | dB/m   | dBuV/m      | dBuV/m | dB     |          | cm             | degree       |         |
| 1   | *  | 2480.000 | 79.32   | 10.41  | 89.73       | 74.00  | 15.73  | peak     |                |              |         |
| 2   |    | 2483.500 | 35.26   | 10.41  | 45.67       | 74.00  | -28.33 | peak     |                |              |         |
| 3   |    | 2491.017 | 37.95   | 10.42  | 48.37       | 74.00  | -25.63 | peak     |                |              |         |

## 6 OCCUPIED BANDWIDTH MEASUREMENT

### 6.1 Test Setup

Same as Radiated Emission Measurement

### 6.2 Test Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set EUT as operation in fixed frequency emission.
3. Based on FCC Part15 C Section 15.239(a): RBW= 30KHz. VBW= 100 KHz, Span=1MHz.
4. The useful radiated emission from the EUT was detected by the spectrum analyser with peak detector.

### 6.3 Measurement Equipment Used

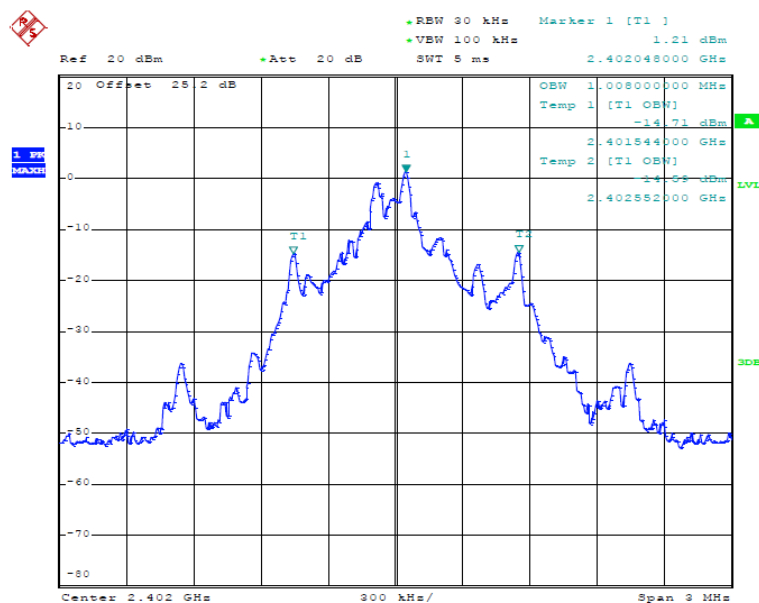
Same as Radiated Emission Measurement

### 6.4 Test Result

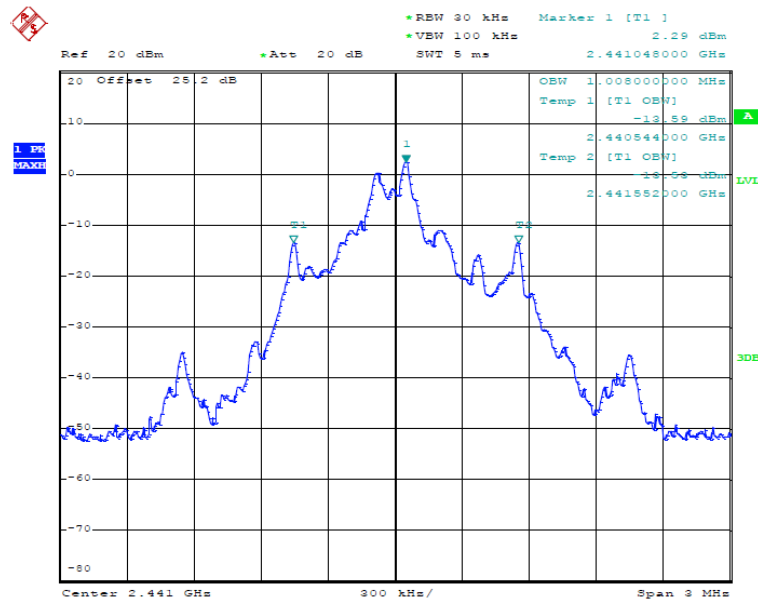
**PASS**

| Channel Frequency (MHz) | 20Db Bandwidth(MHz) | Limit              |
|-------------------------|---------------------|--------------------|
| 2402                    | 1.008               | $\geq 1\text{MHz}$ |
| 2441                    | 1.008               | $\geq 1\text{MHz}$ |
| 2480                    | 1.008               | $\geq 1\text{MHz}$ |

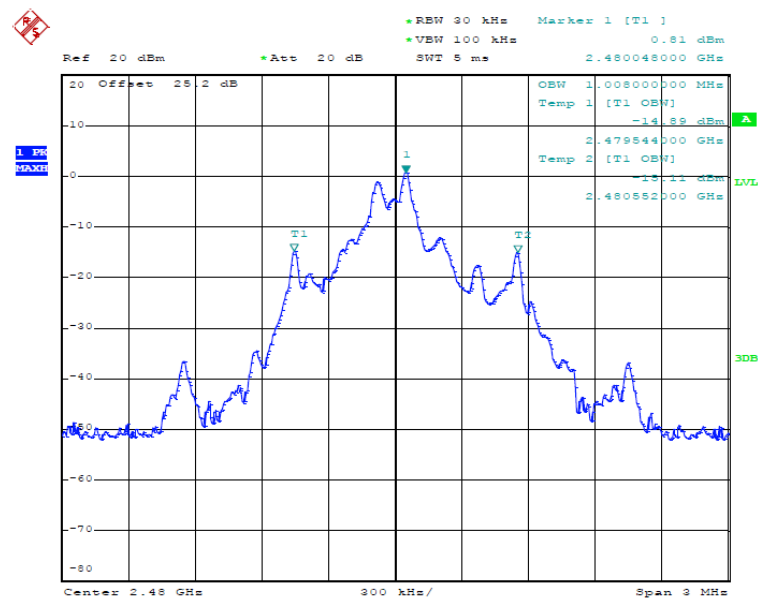
CH: 2402MHz



CH: 2441MHz



CH: 2480MHz



## 7 ANTENNA REQUIREMENT

### Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.249, if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

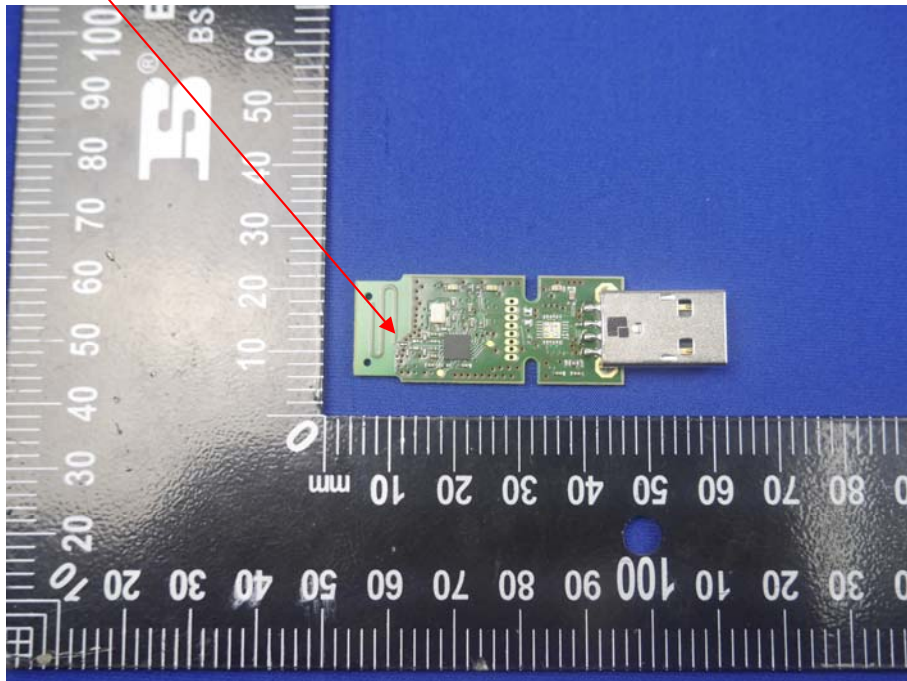
### Refer to statement below for compliance.

The manufacturer 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. Further, this requirement does not apply to intentional radiators that must be professionally installed.

### Antenna Connected Construction

The antenna used in this product is a PCB Antenna, The directional gains of antenna used for transmitting is 1dBi.

### ANTENNA



## 8 PHOTOGRAPH OF TEST

### 8.1 Radiated Emission

